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Sustainable Economic Development and Advancing Education Excellence in the Era of Global Pandemic

Editor

Khalid S. Soliman

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Steliana Rodino, INCDSB-National Institute of Research and Development for Biological Sciences, ICEADR-Institute of Research for Agriculture Economy and Rural Development, Romania
Magdalena Zubiel-Kasprowicz, WSB University, Poland
Judyta Kabus, Czestochowa University of Technology, Poland
Ljiljana Jovčić, Belgrade Academy of Professional Studies, Department Medical College of Professional Health, Serbia
Silvius Stanciu, ”Dunărea de Jos” University of Galati, Romania
Amiruddin Ahamat, Universiti Teknikal Malaysia Melaka (UTeM), Malaysia

Octavian Dospinescu, Alexandru Ioan Cuza University, Romania
Andreea Anton, Ștefan cel Mare University of Suceava, Romania
Wojciech Szczepan Staszewski, University of Stettin, Poland
Marcel Kordoš, Alexander Dubček University in Trenčín, Slovakia
Paula Bajdor, CUT, Poland
Markus Günther, Bielefeld University, Germany
Ewa Stańczyk-Hugiet, Wroclaw University of Economics and Business, Poland
Martina Marchevská, University of Presov, Slovakia
Jolanta Kruk, WSB University in Gdańsk, Poland
Olga Rudakova, Central Russian Institute of Management – Branch of The Russian Presidential Academy of National Economy and Public Administration, Russia
Modupe Ake, Landmark University Omuaran Kwara State, Nigeria
Fran Galetic, University of Zagreb, Croatia
Łukasz Kuta, Wroclaw University of Environmental and Life Sciences, Poland
Alberto González Martínez, Universidad de León, Spain
Liudmyla Kliuchko, V.N. Karazin Kharkiv National University, Ukraine
Liudmyla Niemets, V.N. Karazin Kharkiv National University, Ukraine
Katarzyna Gadomska-Lila, University of Szczecin, Poland
Sebastian Kelle, University of Illinois, USA
Laurentiu-Stelian Mihai, University of Craiova, Romania
Mădălin-Dorin Pop, Politehnica University of Timișoara, Romania
Dorota Klimecka-Tatar, Czestochowa University of Technology, Poland
Mejda Dakhlaoui, Imam Abdulrahman Bin Faisal University – Dammam, KSA
Ibtissam Abarar, Université Hassan II, Morocco
Ramona Orăștean, Lucian Blaga University of Sibiu, Romania
Agnieszka Piasecka-Robak, University of Lower Silesia, Wrocław, Poland
Sharmila Rani Moganadas, Multimedia University, Malaysia
Stanciu Vasile Miltiade, Spiru Haret University, Romania
Jolanta Maria Ciak, WSB University in Torun, Poland
Justyna Hachoł, Wroclaw University of Environmental and Life Sciences, Poland
Joanna Zimmer, Wroclaw University of Science and Technology, Poland
Izabela Turek, Czestochowa University of Technology, Poland
Angela Roman, Alexandru Ioan Cuza University of Iasi, Romania
Olawale Yinusa Olonade, Covenant University, Nigeria
Grace Evbuomwan, Augustine University, Nigeria
Gabriela Marchis, Danubius University of Galati, Romania
Michal Paták, University of Pardubice, Czech Republic
Noor Azlinna Azizan, Prince Sultan University, KSA
Silviu Beciu, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
Marta Młokosiewicz, University of Szczecin, Poland
Faisal Zulhumadi, Universiti Utara Malaysia, Malaysia
Constanța Zoie Rădulescu, National Institute for Research and Development in Informatics, Romania
Kazimierz Nagody-Mrozowicz, The General Tadeusz Kościuszko Military University of Land Forces, Poland
Adekunle Emmanuel Adegboyegun, Adekunle Ajasin University, Nigeria
Christophe Kolski, Univ. Polytechnique Hauts-de-France, France
Otilia Manta, Romanian Academy, Romania
T. G. Vasista, Vasista Consulting and Performing Services OPC Pvt. Ltd., India
Ionuț-Claudiu Popa, The Bucharest University of Economic Studies, Romania
Marinela Mircea, The Bucharest University of Economic Studies, Romania
Marek Siemiński, University of Warmia and Mazury in Olsztyn, Poland
Ilze Kacane, Daugavpils University, Latvia
Hafedh Ferchichi, Higher Institute of Technological Studies of Jendouba, Tunisia
Aslina Baharum, Universiti Malaysia Sabah, Malaysia
Małgorzata Kuraś, Czestochowa University of Technology, Poland
Oana Mitruț, POLITEHNICA University of Bucharest, Romania

Menaouer Brahami, National Polytechnic School of Oran - Maurice Audin, Algeria
Abd Rahman Ahmad, Universiti Tun Hussein Onn Malaysia, Malaysia
Livia Sangeorzan, Transilvania University of Brașov, Romania
Olufemi Patrick Adeyeye, Federal University Oye Ekiti (FUOYE), Nigeria
Anna Zarkada, Athens University of Economic and Business, Greece
Diana Panait-Ioncica, ASE, Romania
Gabriela Tigu, Bucharest University of Economic Studies, Romania
Constanta-Nicoleta Bodea, The Bucharest University of Economic Studies, Romania
Kalubi Rawlings Jerry Mazuba, Peter the Great, St. Petersburg Polytechnic University, Russia
Jelena Lukić, Modern Business School, Belgrade, Serbia
Mariem Gzara, University of Monastir, Tunisia
Olha Suptelo, V.N. Karazin Kharkiv National, Ukraine
Adriana Krawczyk, Amsterdam School of International Business, AUAS, Netherlands
Isibor Areghan, Covenant University, Nigeria
Anna Łupicka, Poznań University of Economics and Business, Poland
Irina Georgescu, Bucharest University of Economics, Romania
Iuliana Marin, POLITEHNICA University of Bucharest, Romania
Claudia Carstea, ”Henri Coanda” Air Force Academy, Romania
Anna Hamranová, University of Economics in Bratislava, Slovakia
Małgorzata Smolarek, Humanitas University, Poland
Adrian Nicolae Branga, Lucian Blaga University of Sibiu, Romania
Nikolay V. Gontar, Southern Federal University, Russia
Georgiana Armenita Arghiroiu, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
Irina Zaychenko, Peter the Great Saint-Petersburg Polytechnic University, Russia
Muhammad Najib Razali, UTM, Malaysia
Waldemar Woźniak, University of Zielona Góra, Poland
Mohammad Aizat bin Basir, Universiti Malaysia Terengganu (UMT), Malaysia
Boris Kollár, University of Žilina, FPEDAS, Department of Economics, Slovakia
Alicja Szyszko, Jagiellonian University in Kraków, Poland
Maria Magdalena Roșu, POLITEHNICA University of Bucharest, Romania
Svetlana Borisovna Vereshchak, I. N. Ulyanov Chuvash State University, Russia
Odunayo Paul Salau, Covenant University, Nigeria
Ioana-Alexandra Toader, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
Valentina Șuparschii, "Dunărea de Jos" University of Galați, Romania
Peter Busch, Macquarie University, Australia
Jayamalathi Jayabalan, University Tunku Abdul Rahman, Malaysia
Katarzyna Chruzik, WSB University, Poland
Adriana Reveiu, Bucharest University of Economic Studies, Romania
Katalin Gál, Partium Christian University, Romania
Mahmud Bashiru, University Science Malaysia, Nigeria
Radu D. Stanciu, POLITEHNICA University of Bucharest, Romania
Irina Severin, Politehnica University of Bucharest, Romania
Adrian Kapczyński, Silesian University of Technology, Poland
Dumiter Florin Cornel, Vasile Goldiș” Western University of Arad, Romania
Ching Sock Lee, Universiti Sains Malaysia, Malaysia
Aneta Włodarczyk, Czestochowa University of Technology, Poland
Ana Azevedo, CEOS.PP / ISCAP / P.PORTO, Portugal
Joanna Szymańska, Wroclaw University of Economics and Business, Poland
Mohammed Amine Hafiane, Université Mohammed Premier d’Oujda, Morocco
Mariola Piłatowska, Nicolaus Copernicus University, Poland
Irina Avdeeva, Central Russian Institute of Management, Branch of RANEPA, Russia
Elena Lacatus, Polytechnic University of Bucharest, Romania
Eko Sakapurnama, Universitas Indonesia, Indonesia
Ugochukwu Moses Urim, Covenant University, Nigeria

Tadeusz Dudycz, Wrocław University of Science and Technology, Poland
Petr Doucek, Prague University of Economics and Business, Czech Republic
Olufemi Daniel Durodola, Covenant University, Nigeria
Nuno Adriano Baptista Ribeiro, Instituto Politécnico de Bragança, Portugal
Alen Stojanovic, Faculty of Economics & Business Zagreb, Croatia
Azran Ahmad, MAMPU, Malaysia
Cristian Bucur, Petroleum-Gas University of Ploieşti, Romania
Shaizatulaqma Kamalul Ariffin, Universiti Sains Malaysia, Malaysia
Michał Goliński, Warsaw School of Economics, Poland
Fadeke Esther Owolabi, Covenant University, Nigeria
Khalil Abakar Moussa Kaya, Universiti Tun Hussein Onn Malaysia, Malaysia
Jelena Franjković, J.J. Strossmayer University of Osijek, Croatia
Katarzyna Grondys, Czestochowa University of Technology, Poland
Oleh Lazariev, Uman National University of Horticulture, Ukraine
Gheorghita Vlad, Politehnica University of Bucharest, Romania
Nasina Mat Desa, Universiti Sains Malaysia, Malaysia
Hishamuddin Ismail, Multimedia University, Malaysia
Marius Bulearca, Center for Industry and Services Economics, Romanian Academy, Bucharest, Romania
Dmitry Rodionov, Peter the Great St Petersburg Polytechnic University, Russia
Akunna Ebere Azuh, Covenant University, Ota, Ogun State, Nigeria
Piotr Kuraś, Czestochowa University of Technology, Poland
Agnieszka Stachowiak, Poznan University of Technology, Poland
Manaf Al-Okaily, Jadara University, Jordan
Rachmadi Agus Triono, Universitas Indonesia, Indonesia
Ionel-Bujorel Păvăloiu, University POLITEHNICA of Bucharest, Romania
Daniel Lang, Institut Mines-Télécom Business School, France
Ildikó-Csilla Takács, Bucharest University of Economic Studies, Romania
Ionela-Roxana Glăvan, Bucharest University of Economic Studies, Romania
Natalia A. Navrotskaia, Saint-Petersburg State University, Russia
Grzegorz Maśloch, SGH Warsaw School of Economics, Poland
Allal Mokeddem, University of Algiers 3, Faculty of economics, Commerce and Management Science, Management Department, Algeria
Arkadiusz Banasik, Silesian University of Technology, Poland
Marinela Vrîncianu, Bucharest University of Economic Studies, Romania
Poorna Prabhat Sunkara, JNTU Ananthapur, India
Igor Jovino Aguilar Alonso, Universidad Nacional Tecnólogica de Lima Sur, Peru
Teresa Dieguez, IPCA, Portugal
Siti Munerah Abd Karim, Sunway University, Malaysia
Iván Quintanilla Areyuna, University of Atacama, Chile
Mohd Shamsuri Md Saad, Universiti Teknikal Malaysia Melaka, Malaysia
Vladimir Plotnikov, St. Petersburg State University of Economics, Russia
Ryszard Szynowski, WSB Academy, Poland
Rossazana Ab Rahim, Universiti Malaysia Sarawak, Malaysia
Anca Gabriela Ilie, Bucharest University of Economic Studies, Faculty of International Business and Economics, Romania
Bogdan Tiganoaia, POLITEHNICA University of Bucharest, Romania
Daniel Homocianu, Alexandru Ioan Cuza University of Iasi, Romania
Alin Emanuel Artene, Politehnica University of Timisoara, Romania
Iulia-Cristina Stanica, “Politehnica” University of Bucharest, Romania
Katarzyna Cheba, West Pomeranian University of Technology, Szczecin, Poland
Houssemeddine Derbel, University of Manouba, Tunisia
Jacek Batóg, University of Szczecin, Poland
Svetlana Globa, Siberian Federal University, Russia
Aleksandra Krajnović, University of Zadar, Croatia
Jan Chromy, Institute of Hospitality Management in Prague, Czech Republic

Tamara Iskra Alcántara Concepción, Universidad Nacional Autónoma de México, México
Agata Mesjasz-Lech, Czestochowa University of Technology, Poland
Ștefan Cătălin Popa, The Bucharest University of Economic Studies, Romania
Olga Makarova, Peter the Great St. Petersburg Polytechnic University, Russia
Olesya Valerievna Ivanchenko, Rostov State University of Economics, Russia
Gita Radhakrishna, Multimedia Univesity, Malaysia
Elżbieta Rogalska, University of Warmia and Mazury in Olsztyn, Poland
Ciprian-Octavian Truică, University Politehnica of Bucharest, Romania
Aw Yoke Cheng, Berjaya University College, Malaysia
Jayanty Kuppusamy, Multimedia University, Malaysia
Khairunesa Isa, Universiti Tun Hussein Onn Malaysia, Malaysia
Ramona Dobre, Bucharest University of Economic Studies, Romania
Ecaterina Daniela Zeca, „Dunarea de Jos" University of Galati, Romania
Honorata Howaniec, University of Bielsko-Biala, Poland
Constantin Ilie, OVIDIUS University from Constanta, Romania
Sławomir Jankiewicz, WSB University in Poznan, Poland
Maja Jokiel, Wroclaw University of Economics and Bussines, Poland
Haslinda Binti Husaini, Universiti Teknologi Mara (UiTM), Malaysia
Derweanna Bah Simpong, Universiti Malaysia Kelantan, Malaysia
Zikri Muhammad, Universiti Malaysia Terengganu, Malaysia
Olufunmilayo Tope Afolayan, Covenant University, Ota, Ogun; The Federal Polytechnic, Ilaro, Ogun State, Nigeria
Paul Ciprian Patic, Valahia University of Targoviste, Romania
Erin Olayinka, Covenant University, Nigeria
Maria Bernat, Opole University of Technology, Poland
Florin Stoica, Lucian Blaga University of Sibiu, Romania
Natalia Buchalska-Sugajska, UTP University of Science and Technology, Poland
Chuks Odiegwu-Enwerem, National Open University of Nigeria, Jabi Abuja, Nigeria
Anna Ivanova, Voronezh State University of Forestry and Technologies named after G.F. Morozov, Russia
Tomáš Sadílek, Prague University of Economics & Business, Czechia
Irina Voronova, Riga Technical University, Latvia
Stanislaw Urbanski, University of Science and Technology, Poland
Sorin Burlacu, Bucharest University of Economic Studies, Romania
Elena-Anca Paraschiv, National Institute for Research and Development in Informatics, Romania
Olufemi Adebayo Oladipo, Landmark University, Nigeria
Mariusz Urbański, Czestochowa UT, Poland
Hana Štverková, VŠB-Technical University of Ostrava, Czech Republic
Edyta Kulej-Dudek, Czestochowa University of Technology, Poland
Ionuț Jianu, Bucharest University of Economic Studies, Romania
Nik Hazimah Nik Mat, Universiti Malaysia Terengganu, Malaysia
Daisy Kee Mui Hung, Universiti Sains Malaysia, Malaysia
Eva Lukášková, College of Business and Hotel Management, Czech Republic
Tatiana Borisovna Turishcheva, Plekhanov Russian University of Economics, Russia
Nicoleta Daniela Ignat, POLITEHNICA University of Bucharest, Romania
Gabriela Prostean, Politehnica University of Timisoara, Romania
Ivonne Maria Gil Osorio, Universidad Libre Seccional Barranquilla, Colombia
Olga M. Kochkina, MGIMO, Russia
Adrian Moise, Petroleum-Gas University of Ploiesti, Romania
Ludmila M. Osinevich, Kursk State University, Russia
Barbara Wasilewska, Opole University of Technology, Poland
Joanna Muszyńska, Nicolaus Copernicus University in Toruń, Poland
Petrică Sorin Angheluță, The Bucharest University of Economic Studies, Romania
Claudiu Cicea, Bucharest University of Economic Studies, Romania
Erik Ružić, Juraj Dobrila University of Pula, Croatia
Malgorzata Rataj, University of Information Technology and Management in Rzeszow, Poland

Blanka Bazsova, VSB-Technical University of Ostrava, Czech Republic
Inese Lūsēna-Ezera, Liepaja University, Latvia
Tomas Broum, University of West Bohemia, Czech Republic
Dajana Barbić, Faculty of Economics & Business Zagreb, Croatia
Martina Hedvicakova, University of Hradec Králové, Czech Republic
Luis Nobre Pereira, University of Algarve, Portugal
Siti Noorsuriani Maon, Universiti Teknologi MARA (UiTM), Malaysia
Robert Ulewicz, Czestochowa University of Technology, Poland
Karima Haoudi, Université Ibn Tofail, Morocco
Aleks Krasnov, Peter the Great St.Petersburg Polytechnic University, Russia
Ratna Anggraini, Jakarta State University, Indonesia
Marcin Butlewski, Poznan University of Technology, Poland
Fabrizio Amarilli, Politecnico di Milano, Italy
Alina Romanovska, Daugavpils University, Latvia
Petr Rehacek, VSB-Technical University of Ostrava, Czech Republic
Elena-Simona Apostol, University Politehnica of Bucharest, Romania
Tatiana Olegovna Dyukina, Saint-Petersburg State University, Russia
Ovidiu Blajina, POLITEHNICA University of Bucharest, Romania
Hanane Haddad, Abdelmalik Essaâdi University, Morocco
Izabela Czabak-Górska, Opole University of Technology, Poland
Vlatka Skokic, University of Split, Croatia
Adriana Alexandru, National Institute for Resear, ICI Bucharestch and Development in Informatics, Romania
Cristiana Doina Tudor, University of Economic Studies in Bucharest, Romania
Natalia Lytneva, Oryol State University of Economics and Trade, Russia
Violetta Kuzmina, SWSU South West State University, Russia
Anna Rybak, Czestochowa University of Technology, Poland
Katarzyna Marek-Kolodziej, Opole University of Technology, Poland
Andreea Zamfir, Bucharest University of Economic Studies, Romania
Katarina Haviernikova, Alexander Dubcek University of Trencin, Slovakia
Nor Fauziana Bt Ibrahim, Multimedia University (MMU), Malaysia
Sanja Broz Tominac, University of Zgareb, Faculty of Economics and Business, Croatia
Sanja Franc, Faculty of Economics and Business, University of Zagreb, Croatia
Lawrence Uchenna Okoye, Covenant University, Ota, Nigeria
Prokopjeva Evgenia Leonidovna, Khakass Technical Institute – Branch of the Siberian Federal University, Russia
Agnieszka Knap-Stefaniuk, Jesuit University Ignatianum in Krakow, Poland
Dariusz Masłowski, Opole University of Technology, Poland
Nica Ionuț, Bucharest University of Economic Studies, Romania
Elżbieta Sobczak, Wroclaw University of Economics and Business, Poland
Kamila Tomczak-Horyń, Opole University of Technology, Poland
Tuan Tran Hoang, University of Labour and Social Affrairs (HCMC Campus), Viet Nam
Kalaiselvee Rethinam, AIMST University, Malaysia
Dorota Kwiatkowska-Ciotucha, Wroclaw University of Economics and Business, Poland
Rohoza Mykola, University Poltava University of Economics and Trade, Ukraine
Vera Samarina, Staryy Oskol Technological Institute, Branch of National Research Technological University "MISIS", Russia
Jolly Sahni, Prince Sultan University, KSA
Constantin-Marius Apostoaie, Alexandru Ioan Cuza University of Iaşi, Romania
Wojciech Bożek, University of Stettin, Poland
Mariusz Tomczyk, War Studies University, Poland
Patricio Ramirez-Correa, Uniersidad Catolica del Norte, Chile
Okorie Uchechukwu Emena, Covenant University, Nigeria
Manuela Ingaldi, Czestochowa University of Technology, Poland
Svetlana Morkovina, Voronezh State University of Forestry and Technologies named after G.F. Morozov, Russia

Paweł Buchwald, University WSB in Dąbrowa Górnicza, Poland
Dana Kiselakova, University of Presov in Presov, Faculty of Management, Slovakia
Elena Gasparovich, UrFU, Russia
Justyna Maria Myszak, University of Szczecin, Poland
Krzysztof Błoński, University of Szczecin, Poland
Petronela Cristina Simion, University “Politehnica” of Bucharest, Romania
Girjanauth Boodraj, University of Technology, Jamaica
Jakub Fučík, University of Defence, Czech Republic
Oleksandr Yukhymovych Yermakov, National University of Life and Environmental Sciences of Ukraine, Ukraine
Alexei Dolzhenko, Rostov State University of Economics, Russia
Sylwia Konecka, Poznań University of Economics and Business, Poland
Lanre Amodu, Covenant University, Nigeria
Liliana Nicoleta Simionescu, The Bucharest University of Economics Studies, Romania
Oksana V. Haidai, Uman National University of Horticulture, Ukraine
Angie O. Igbinoba, Covenant University, Nigeria
Georgiana-Raluca Lădaru, The Bucharest University of Economic Studies, Romania
Ruxandra Dinulescu, Bucharest University of Economic Studies, Romania
Piotr Kułyk, University of Zielona Góra, Poland
Eugenia Czernyszewicz, University of Life Sciences in Lublin, Poland
Raisa Kozhukhivska, Uman National University of Horticulture, Ukraine
E. A. Borkova, Saint Petersburg State University of Economics, Russia
Katarzyna Kuziak, Wroclaw University of Economics and Business, Poland
Ovidiu-Iulian Bunea, The Bucharest University of Economic Studies, Romania
Karolina Rybicka, University of Technology, Poland
Ritesh Chugh, CQUniversity, Australia
Marius Schönberger, RISEBA University of Applied Sciences, Latvia
Hezlina Mohd Hashim, Universiti Teknologi PETRONAS, Malaysia
Pedro Neves Rito, Polytechnic Institute of Viseu, Portugal
Natalia Vladimirovna Lazareva, Saint Petersburg State University of Economics, Russia
Krzysztof Krukowski, University of Warmia and Mazury in Olsztyn, Poland
Maja Pervan, Faculty of Economics, Business and Tourism, Croatia
Josef Botlík, Silesian University in Opava, Czechia
Beata Sofrankova, University of Presov, Faculty of Management, Slovakia
Liva Grinevica, Latvia University of Life Sciences and Technologies, Latvia
Mihai Caramihai, POLITEHNICA University of Bucharest, Romania
Ivan Strugar, University of Zagreb, Croatia
Stefania Cristina Mirica, "Dunărea de Jos" University of Galați, Romania
Paweł Hanczar, Wroclaw University of Economics, Poland
Yong Jing Yi, INTI International College Penang, Malaysia
Edyta Zajbert, University of Economics and Business, Poland
Alena Fedorova, Ural Federal University named after the first President of Russia B.N.Yeltsin, Russia
Hind El Ouazzani, Sultan My Slimane University, Morocco
Shirley Consuelo Honajzrová Banús, Institute of Hospitality Management in Prague, Czech Republic
Alicja Malgorzata Graczyk, Wroclaw University of Economics and Business, Poland
Felix Sadyrbaev, Daugavpils University, Latvia
Larisa Desfonteines, St. Petersburg Peter the Great Polytechnic University, Russia
António Eduardo Martins, Universidade Aberta, Portugal
Janusz Marek Lichtarski, Wroclaw University of Economics and Business, Poland
Elżbieta D. Nawrocka, Wroclaw University of Economics and Business, Poland
Olfa Mrabet, Université Centrale - Honoris United University, Tunisia
Vladimír Bolek, University of Economics in Bratislava, Slovakia
Magdalena Swacha-Lech, Wroclaw University of Economics and Business, Poland
Emese Tokarčíková, University of Zilina, Slovakia
Ivica Linderová, College of Polytechnics Jihlava, Czech Republic

Eva Malichova, University of Zilina, Slovakia
Noreha Hashim, Universiti Malaysia Terengganu, Malaysia
Robert Poskart, Opole University, Poland
Tatiana Shpilina, Russian State Social University, Russia
Małgorzata Rutkowska, Wroclaw University of Science and Technology, Poland
Estera Piwoni-Krzeszowska, Wroclaw University of Economics and Business, Poland
Elizaveta Gromova, Peter the Great St.Petersburg Polytechnic University, Russia
Alicja Brodzka, Wrocław University of Economics and Business, Poland
Ayodeji Olonode, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria
Adrianna Guzowska, UTP University of Science and Technology in Bydgoszcz, Poland
Ekaterina Uskova, UrFU, Russia
Khatijah Omar, Universiti Malaysia Terengganu, Malaysia
Ricardo Correia, Instituto Politécnico de Bragança, Portugal
Witold Kowal, Wroclaw University of Economics and Business, Poland
Marta Daroń, Czestochowa University of Technology, Poland
Cezar Toader, Technical Univ. of Cluj-Napoca, Romania
Katarzyna Skrzypek, University of Zielona Góra, Poland
Alfred Paszek, Opole University of Technology, Poland
Lamyaa El Bassiti, Mohammed V University in Rabat, Morocco
Razana Juhaida Johari, Universiti Teknologi MARA Shah Alam, Malaysia
Justyna Śpiewak, UTP University of Science and Technology in Bydgoszcz, Poland
Agnieszka Stanimir, Wroclaw University of Economics and Business, Poland
Cristina Mohora, Politechnica University of Bucharest, Romania
Liviu-Adrian Cotfas, Bucharest University of Economic Studies, Romania
Ivani Ferreira, Instituto Federal do Paraná – IFPR, Brasil
Ivana Nekvapilova, University of Defense, Czech Republic
Funke Omole, Covenant University, Nigeria
Oleksandr Shpykuliak, National Scientific Center «Institute of Agrarian Economics», Ukraine
Mirosław Matusek, Silesian University of Technology, Poland
Iveta Linina, Turiba University, Latvia
Gabriela Bucur, Petroleum Gas University of Ploiesti, Romania
Corina Marinescu, The Bucharest University of Economic Studies, Romania
Magdalena Kąkol, Maria Curie-Sklodowska University in Lublin, Poland
Josef Dvorak, University of West Bohemia, Czech Republic
Andrey Baybarin, Southwest State University, Russia
Lina Artemenko, National Technical University of Ukraine “Igor Sikorsky Kyiv Politechnic Institute”, Ukraine
Anna Lemańska-Majdzik, Czestochowa University of Technology, Poland
Lorena Batagan, Bucharest University of Economics, Romania
Chiraz El Hog, Sousse University, Tunisia
Adam Sulich, Wroclaw University of Economics and Business, Poland
Olga Loyko, Tomsk Polytechnic University, Russia
Diana Fayvishenko, Kyiv National University of Trade and Economics, Ukraine
Ekhlaque Ahmed, Institute of Business Management, Pakistan
Jumadil Saputra, Universiti Malaysia Terengganu, Malaysia
Aurelia Ioana Chereji, University of Oradea, Romania
Katarzyna Grzesik, Wroclaw University of Economics and Business, Poland
Vladimirs Šatrevičs, Riga Technical University, Latvia
Valerii Pavliuk, Co-founder of the NGO "Association of Social Innovations and Scientific Communications", Ukraine
Tatiana Arkadyevna Karandaeva, Mari State University, Russia
Maja Pušnik, University of Maribor, Slovenia
Andreyeva Darya Andreyevna, St. Petersburg State University of Economics, Russia
Aurelia Vasilica Balan, University of Agricultural Sciences and Veterinary Medicine in Bucharest, Romania
Mateusz Gontarz, Wroclaw University of Economics and Business, Poland
Noorul Azwin Md Nasir, Uni. Malaysia Kelantan, Malaysia

Irina V. Sharf, National Research Tomsk Polytechnic University, Russia
Mária Farkasné Fekete, Institute of Economics and Methodology, Szent Istvan University, Hungary
Svetlana Kostina, Ural Federal University, Russia
Ebe Igbinoba, Covenant University, Nigeria
Ojebola Oluwatunmise, Covenant University, Nigeria
Malgorzata Kutera, Jagiellonian University, Poland
Agung Nugroho, Universitas Indonesia, Indonesia
Zygmunt Kruczek, Academy of Physical Education, Faculty of Tourism and Recreation, Krakow, Poland
Tatiana Nicolaevna Larina, Orenburg State Agrarian University, Russia
Anna Shevyakova, PI Academy "Bolashaq", Kazakhstan
Liudmyla Chvertko, Pavlo Tychyna Uman State Pedagogical University, Ukraine
Adam Ryszko, Silesian University of Technology, Poland
Katarzyna Świerszcz, Military University of Technology in Warsaw, Poland
Anna Kobiałka, University of Life Sciences in Lublin, Poland
James Braman, Community College of Baltimore County, USA
Dragan Benazic, Juraj Dobrila University of Pula, Croatia
Sergei Smirnov, St-Petersburg State University, Russia
Zuliani Dalimunthe, Universitas Indonesia, Indonesia
Dorota Domalewska, War Studies University, Poland
Viktorija Šipilova, Daugavpils University, Latvia
Arshad Ahmad, King Saud University, KSA
Imen Chaouachi Allani, University of Carthage, Tunisia
Mukhamediyev B.M., Al-Farabi Kazakh National University, Kazakhstan
Agnieszka Szczudlińska-Kanoś, Jagiellonian University, Poland
Arkadiusz Piwowar, Wroclaw University of Economics and Business, Poland
Zied Akrout, University of Sfax, Tunisia
Cecilia Cristina Socorro Gonzalez, Universidad del Zulia, Venezuela
Damir Kalpić, University of Zagreb, Croatia
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Analysis of The Municipal-Private Partnership Model as a Growth Driver for Single-Industry Towns (Monotowns)

Natalia V. GORODNOVA
Ural Federal University, Ekaterinburg, Russia, n.v.gorodnova@urfu.ru

Elena G. SHABLOVA
Ural Federal University, Ekaterinburg, Russia, e.g.shablova@urfu.ru

Dmitry L. SKIPIN
Tyumen Territorial Institute of Professional Accountants, Russia, d.l.skipin@utmn.ru

Anastasiya A. PESHKOVA
Ural Federal University, Ekaterinburg, Russia, np91@list.ru

Ivan S. ROZHENTSOV
Ural Federal University, Ekaterinburg, Russia, rozivan@yandex.ru

Abstract

Such factors as a significant size of the territory, low population density, and regional inequality, set before the Russian state one of the urgent tasks to develop single-industry towns (monotowns) under the conditions of a coordinated and progressive update of the infrastructure. Currently, a number of priority projects and programs in the field of construction and reconstruction of infrastructure facilities in single-industry towns are provided for at the federal level. Their implementation requires a significant amount of capital investment and is being carried out mainly at the expense of public funds. Given the limited budget funding, there is a need for private investment that can be raised under municipal-private partnerships (MPPs). In the authors' opinion, in the scientific and specialized literature to date, the question of the MPP model implementation in resource single-industry towns has not been sufficiently studied. In this regard, the purpose of this article is to study the conditions and prerequisites for the implementation of the MPP mechanism as a growth factor for single-industry towns in Russia. In the study, the tendencies for improving the legal and regulatory framework of the development of Russian single-industry towns are identified; a model for the interaction of MPP participants and a methodology for assessing the effectiveness of implementing MPP projects are developed based on the analysis of the existing methods; and the social and economic effects of implementing the MPP mechanism in single-industry towns of the Sverdlovsk Region are assessed.It is concluded that the formation of the Russian legal and regulatory framework for the establishment and functioning of MPP allows for the suggestion that this institution may become one of the promising tools for the development of the urban economy. The results obtained can be useful for scholars, government bodies, and analytical organizations that carry out research in the field of the development of MPP models at the regional level.

Keywords: public-private partnership, municipal-private partnership, development of single-industry towns (monotowns), infrastructure projects, construction, effectiveness

Introduction

Urgency. Russia currently faces one of the strategic tasks, which is to diversify the economy of single-industry towns and to search for ways to increase their economic stability and development that will allow raising investment, creating conditions and prerequisites for the development of private initiative and business, as well as creating new workplaces. Russian President V.V. Putin

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notes the special traditional complexity of solving this problem, which is associated primarily with the specifics of the economic condition of municipal and urban entities (hereinafter referred to as m.e./u.e.), in particular, with the almost complete lack of land plots for constructing socially significant objects that would be prepared to attract investors or prepared in terms of infrastructure. In this regard, the topic of the study devoted to the incorporation of municipal-private partnership models as one of the main growth drivers for single-industry towns in the conditions of economic instability, external challenges and threats, is becoming even more urgent**.**

Ensuring sustainable social and economic development of single-industry municipal entities (single-industry towns) is one of the priority tasks of the Russian state policy; the quality of life of the people in these settlements depends on its implementation.

The current versions of the regulations contain no definition of a single-industry town as such. In its efforts to highlight the qualifying features of a single-industry town, the Government of the Russian Federation in its resolution of July 29, 2014, approved a list of criteria for classifying municipal entities as "single-industry":

a) the status of an urban district or a municipal settlement;

b) the resident population is not less than 3 thousand people;

c) employment in one of the organizations operating within the territory of the municipality is at least 20 % of the total employed population;

d) the organization is engaged in mineral extraction (except oil and gas) and/or the production (processing) of industrial products;

e) the municipal entity is included in the list of single-industry towns determined by the Government of the Russian Federation.

The compliance with these criteria is essential for towns since obtaining the status of "single-industry" allows receiving significant government support, including financing the construction and reconstruction of infrastructure facilities.

The purpose of the study. The formation by the Russian state of the legal and regulatory framework for the establishment and functioning of MPP allows for the suggestion that this institution may become one of the promising tools for the development of the urban economy. However, to what extent is it possible to use this tool in resource single-industry towns? In the authors' opinion, this issue has not been studied sufficiently in the scientific literature to date. In this regard**, the purpose of this article** is to study the conditions and prerequisites for the implementation of the MPP mechanism as a growth factor for single-industry towns in the Russian Federation.

Methods and methodology. The methodological framework of the study includes general scientific methods of cognition, in particular, synthesis, comparative analytical and logical analysis, a systemic method, and simulation modelling. A system of factors of interaction between the state and the municipality, as well as the results of the analysis of existing methods for assessing the factors of interaction between subjects of public-private (municipal-private) partnerships, are adopted as the basis of the author's municipal-private partnership model.

Testing the author's model of municipal-private partnerships in single-industry towns has allowed obtaining the following main results:

1) the PPP mechanism is mainly used for infrastructure development in such areas as transport, water supply, energy, and solid waste disposal and recycling (Su, Ang, 2012);

2) the development of the legal regulation of PPP activities is confirmed by the adoption of new legislation in a number of countries with emerging markets, including the Russian Federation;

3) the quality of the legal and regulatory framework and the institutional environment is an important (but not a key) factor affecting the implementation of PPP (MPP) projects;

4) key factors of the PPP (MPP) development are the level of state support, many years of technical experience and potential, as well as the availability of investment;

5) the deficit of financial resources (including private resources) significantly restrains the development of the PPP market.

The conducted study allows developing the following recommendations to improve the effectiveness of PPPs (MPPs) in emerging markets:

a) ensuring cooperation and coordination regarding the PPP issues among various ministries, departments, and specialized structures;

b) ensuring transparency at all stages of the PPP project implementation, including holding open tenders, publishing contract terms, assessing the effectiveness and social significance of projects, and creating accessible public registers;

c) taking into account the concept of “sustainable economic development” in the selection and implementation of PPP projects.

In the authors' opinion, the above recommendations are relevant for the Russian emerging market of PPP (MPP).

Main Part of the Study

The stated objective, tasks, and expected results of testing have determined the logic and structure of the study. The general logic of the study is presented in the fig. 1 below.

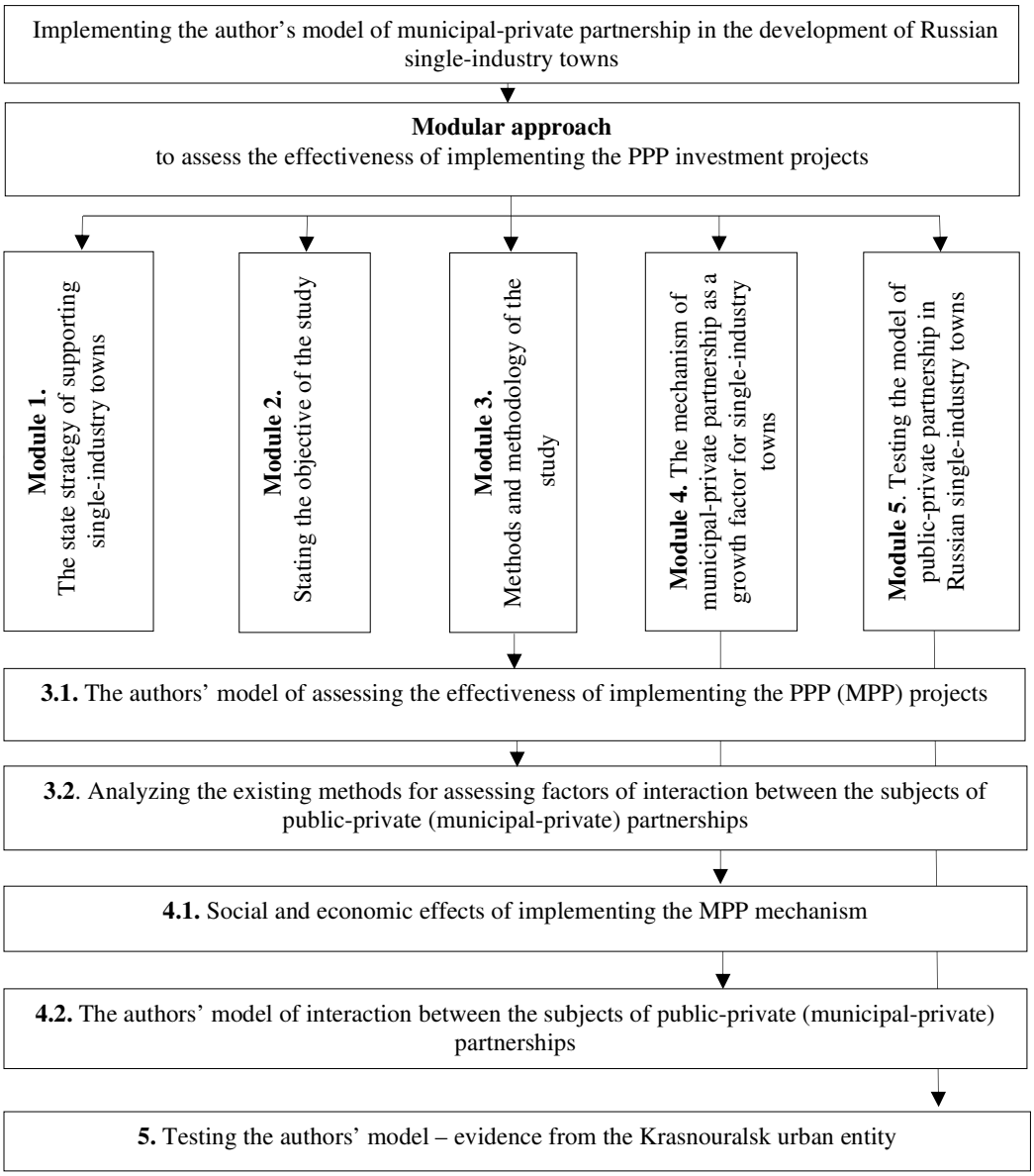

Fig. 1: Modules of the Study

The topic of the study - the problem of the development of Russian single-industry towns in modern economic conditions - is recognized by the expert community as relevant and rather urgent.

Module 1. The state strategy of supporting single-industry town

As of July 2019, the government distinguishes three categories with 319 single-industry towns, depending on the risk of their social and economic situation worsening. Since July 2016, the "Integrated Development of Single-Industry Towns" program that defines a set of measures for the period up to 2025 has been underway. The main objectives of this program are as follows:

- to create new opportunities and niches for business in single-industry towns;
- to ensure coordination of support measures, including for projects in the field of healthcare, education, road quality, housing and communal services and the urban environment, small and medium-sized enterprises, and industrial development;
- to create managerial competencies in single-industry towns.

A special aspect of the above program is its comprehensive nature, as it integrates activities from various priority projects and programs and includes support measures for federal and regional government bodies, development institutions, and other organizations. In particular, among the main measures the following should be highlighted:

1) The activity of the non-profit organization "Single-Industry Towns Development Foundation" to establish the necessary conditions for creating new jobs, attracting investments in single-industry towns, as well as developing the urban environment. This goal can be achieved by co-financing the expenses of constituent entities of the Russian Federation and municipalities on constructing and reconstructing infrastructure facilities required to launch new investment projects, as well by forming teams to manage single-industry town development projects, including the organization of their training.

In order to fulfil the tasks assigned to the Foundation, the budget allocations from federal funds in the amount of RUB 6.5 billion were made in 2017, RUB 4.7 billion - in 2018, and RUB 4.7 billion - in 2019.

As of year-end 2017, the Foundation achieved the following results in the construction and (or) reconstruction of infrastructure facilities:

- financial obligations under 12 agreements on co-financing of expenses of constituent entities of the Russian Federation for the construction of infrastructure facilities in the amount of RUB 4.96 billion were fulfilled;
- 30 infrastructure facilities worth RUB 6.3 billion were commissioned in 13 single-industry towns;
- 17 agreements on infrastructure in the amount of RUB 7.34 billion are financed.

2) Establishing Priority Social and Economic Development Areas (PSEDA) in order to diversify the economy of single-industry towns and reduce dependence on dominant local employers (town-supporting enterprises). PSEDA residents in single-industry towns receive a wide range of preferences: income tax, corporate property tax and land tax benefits, as well as benefits on insurance contributions to state extra-budgetary funds.

As of year-end 2017, PSEDA were established in 36 single-industry towns, where 93 residents are registered, which should contribute to the creation of more than 5,100 jobs and attract RUB 1.5 billion by 2026.

3) Implementing the "Safe and High-Quality Roads" project, through which the program for the comprehensive development of transport infrastructure in 38 urban agglomerations, including 42 single-industry towns, is also being implemented. As of year-end 2017, the share of the road network that meets the regulatory state in these single-industry towns increased on average from 45 % (in 2016) to 52 % (in 2017).

4) Implementing the "Five Steps of Improvement" concept aimed at creating comfortable public spaces in single-industry towns of Russia. The concept includes the following steps:

- improving vibrant public space;
- creating modern spaces for the young;
- revitalizing the city attractions;
- updating or creating an object of social infrastructure;
- activating abandoned or inefficiently used buildings and territories. According to the data (InfraONE, 2018) as of year-end 2017, 1,149 projects were implemented in single-industry towns.

5) Implementing the "Forming a Comfortable Urban Environment" project where monotowns received financing in the amount of RUB 5.8 billion, including RUB 3.9 billion from the federal budget and RUB 1.9 billion from regional budgets.

Thus, the above data indicate the interest of the state in developing the infrastructure of single-industry towns, which, in turn, requires a significant amount of capital investment. On average, public investment accounts for about 65-70 %, while private investment accounts for 30-35 %. The state has no opportunity to finance a larger share of funds due to the state budget deficit and high debt burden to Western countries (Reynaers, Grimmelikhuijsen, 2015).

Today, in Russia as a whole, the minimum yearly need for investments in infrastructure projects is RUB 2.3 trillion. Additional RUB 3.3 trillion (InfraONE, 2018) is required to ensure the development of infrastructure According to experts, the average underfunding of infrastructure is 20-40 %. In this regard, there is *a tendency to strengthen the role of private investment in infrastructure projects, various instruments of interaction between the state and private sector entities are being developed and implemented*, including municipal-private partnerships (MPPs).

Module 2. The objective of the study

In the authors' opinion, the issue of taking into account the specifics of the development of Russian single-industry towns in the context of implementing municipal-private partnership projects in the construction of capital construction and land development projects has not been studied sufficiently. In this regard, **the purpose of this article** is to study the conditions and prerequisites for the implementation of the MPP mechanism as a growth factor for single-industry towns in the Russian Federation.

Module 3. Methods and methodology of the study

The authors' model of assessing the effectiveness of implementing the PPP (MPP) projects

The methodological basis of the study included general scientific methods of cognition, in particular, synthesis, comparative analytical and logical analysis, and the system method. The method of simulation modelling is used as the basis of the author's model for implementing municipal-private partnerships (MPPs) in Russian single-industry towns and the mechanism of interaction between subjects of MPPs.

In this regard, the authors of the study analysed the experience of implementing MPP projects in the Urals region assessed by an integral indicator of the effectiveness of implementing partnership projects, which includes an assessment of six qualitative characteristics of each specific PPP (MPP) project, in particular:

1) belonging to two or more related industries;

2) compliance with the features of PPP (MPP) defined by the Russian legal and regulatory framework;

3) the duration of implementing the MPP project in Russian single-industry towns;

4) the complexity and specificity of the MPP project implemented in single-industry towns;

5) the stage of the project;

6) the amount of private investment.

The integral indicator of the effectiveness of implementing the MPP projects is calculated according to the following formula:

$R_i = k_1 L_i + k_2 N_i + k_3 E_i$, where (1)

R_i – the integral indicator for the *i*-region;

k_1, k_2, k_3 – coefficients that define the significance (weight) of sub-indicators,

where $k_1 = 0.03$, $k_2 = 0.03$, $k_3 = 0.04$;

L_i – the level of a sub-indicator evaluating the development of the region's institutional environment;

N_i – the level of a sub-indicator evaluating the region's legal and regulatory framework in the field of PPP (MPP);

E_i – the level of a sub-indicator evaluating the experience of implementing PPP (MPP) projects in the region.

The key factor in making the region one of the leaders is the experience in implementing projects, the presence of which determines the attraction of the desired infrastructure investor. The authors calculated the integral indicator for the *i*-region R_i and compiled a rating of the regions in terms of the effectiveness of PPP projects (table 1).

Table 1: Ranking of Russian regions by the level of PPP mechanism development

Ranking	Economic entity	Value of the complex indicator (R_i)
1	City of Moscow	90.0
2	City of Saint Petersburg	90.0
3	The Moscow region	90.0
4	The Republic of Tatarstan	84.5
5	The Republic of Bashkortostan	83.2
6	The Perm Krai	80.6
7	The Sverdlovsk region	76.9

According to the results of the study, it can be concluded that the Sverdlovsk region is in the top 10 regions with the most developed mechanism of public-private partnership.

Analyzing the existing methods for assessing factors of interaction between the subjects of public-private (municipal-private) partnerships

Among the foreign instruments that allow assessing the prevailing conditions on a national scale, the *methodology of The Economist Intelligence Unit analytical company* should be singled out (The Economist Intelligence Unit, 2017). The Integral Index (the Infrascope index) includes 23 indicators grouped into five groups and consisting of 78 qualitative and quantitative sub-indicators.

Based on the results of testing the methodology using the example of 13 countries with an emerging PPP market (Albania, Belarus, Bulgaria, Egypt, Georgia, Jordan, Kazakhstan, Morocco, Romania, Serbia, Slovakia, Turkey, Ukraine), the analysts of The Economist Intelligence Unit obtained the following results:

1) the PPP mechanism is mainly used for infrastructure development in such areas as transport, water supply, energy, and solid waste disposal and recycling;

2) the development of the legal regulation of PPP operation is confirmed by the adoption of new legislation in a number of countries, including Belarus (2016), Jordan (2014), Kazakhstan (2015), Morocco (2014), and Romania (2016);

3) The quality of the legal and regulatory framework and the institutional environment is an important (but not a key) factor affecting the implementation of PPP projects. Thus, Turkey and Morocco, distinguished by their extensive experience in implementing projects, are at the stage of formation of the legal regulation of the relevant activities. On the other hand, in Belarus and Kazakhstan, where the legal and regulatory framework is well-developed, there are practically no examples of completed projects (at the time of the study);

4) key factors of the PPP development are the level of state support, many years of technical experience and potential, as well as the availability of investment;

5) the deficit of financial resources (including private resources) significantly restrains the development of the PPP market. The latter is due to the long payback period of investments and the large volume of capital investments. Active attraction of funds of institutional investors was noted only in Jordan and Turkey, despite the fact that this source is one of the main ones in Western countries. Two countries, Morocco and Turkey, used the so-called “green bonds” (Choi, 2015), an innovative financing tool that is not used to a sufficient degree in the emerging markets around the world.

Analyzing the data of The Economist Intelligence Unit allows developing the following recommendations to improve the efficiency of PPPs in emerging markets:

a) ensuring cooperation and coordination regarding the PPP issues among various ministries, departments, and specialized structures. This is confirmed by the fact that most countries with the highest level of integral index were highly rated by the sub-index in the corresponding area (Kazakhstan, Slovakia, and Jordan). The country's legal and regulatory framework should clearly define roles and responsibilities, while the public-private partnership development program should be consistent with the national infrastructure development plan;

b) ensuring transparency at all stages of the PPP project implementation, including holding open tenders, publishing contract terms, assessing the effectiveness and social significance of projects, and creating accessible public registers. The following statistical data regarding this are available as part of a study by The Economist Intelligence Unit:

- in all these countries, one of the mandatory requirements is the publication of tender documentation;
- two countries (Albania and Slovakia) stipulate the need for full publication of contracts;
- three countries (Bulgaria, Egypt, and Serbia) have a publicly accessible online PPP registry. The lack of a registry significantly limits the knowledge available on the scale and area of PPP application;
- two countries (Georgia and Morocco) publish the results of public consultations on the PPP implementation;
- none of the countries reviewed publishes the results of evaluating the effectiveness of PPP projects, which, according to the company analysts, is a serious omission in terms of accountability;

c) taking into account the concept of “sustainable economic development” in the selection and implementation of PPP projects. Most of the reviewed countries require environmental impact assessments as part of the feasibility study for projects. However, none of them provides a system for managing natural disaster risks, changing climatic conditions or adapting to them. Natural disaster risk is partially accounted for in three countries (Bulgaria, Turkey, and Kazakhstan) using the project insurance requirement.

In the authors' opinion, the above recommendations are relevant for the Russian emerging PPP market as well.

In the Russian scientific literature, the interaction factors are analysed at the regional level *according to the methodology of the National Center for PPP*. Each year, a ranking of the Russian regions is formed according to the level of public-private partnership development. The regions are ranked using the integral index, which includes 22 assessment indicators combined in three groups (Association “The PPP Development Center”, 2016):

1) *The development of the region’s institutional environment* in the field of public-private partnerships (10 indicators used to assess the availability and quality of specialized PPP bodies, information resources, PPP specialists, taking into account PPP mechanisms in strategic and program documents of the region, the effectiveness of various measures to support private partners);

2) *The region's legal and regulatory framework in the field of PPPs* (5 indicators used to assess the availability and quality of the procedure for inter-agency cooperation at all stages of the PPP project implementation cycle, as well as compliance with federal law);

Upon the analysis of methods for assessing the effectiveness of PPP (MPP) projects, the following conclusions can be made:

1) the existing index systems differ in calculation methodology, structure, as well as a set of indicators and are focused on assessing the environmental factors, including the regulatory support of the PPP (MPP) sphere, the development of the institutional environment, experience in project implementation, and the availability of financing;

2) most of the indicators used do not allow for the analysis of factors affecting the effectiveness of implementing digital projects;

3) the indicators that allow assessing the level of project support by the population, as well as the degree of willingness of private partners to participate in implementing large investment and construction projects based on the use of digital technologies are not taken into account.

In the authors' opinion, the last factors are the main ones due to the high social significance of large investment and construction projects. *Awareness of the population about projects, the possibility to express their opinions on issues of adopting or implementing decisions are some of the key conditions for the development of the PPP (MPP) mechanism*. In addition, the effectiveness of project implementation depends on the quality of the internal institutional environment, the level of development of the economic, technical, digital, and other potentials of private partners. Therefore, these indicators should also be taken into account when assessing the factors of interaction between PPP entities.

In this regard, in addition to the existing analytical tools, the authors have developed a methodology for assessing the interaction among the subjects of public-private partnerships, taking into account the above groups of indicators, as well as the specifics of digital projects.

Module 4. The mechanism of municipal-private partnership as a growth factor for single-industry towns

The creation and progressive improvement of the legal and regulatory framework for the formation and functioning of public-private (municipal-private) partnership in Russia confirms the relevance of the use of this mechanism in the field of urban development.

Initially, this mechanism could be applied to the following objects and facilities: roads, bridges, road service facilities; public transport; railway and pipeline transport facilities; sea and river ports, ships; airports; facilities for the production, transmission, and distribution of electrical energy; hydraulic engineering structures, platforms, artificial islands; health care, education, culture, sports, recreation and tourism facilities, etc.

Later, creating information technologies and technologically related property was included in the list of objects. Considering that the changes have come into effect relatively recently (since 2018), currently this mechanism is not widely tested on the example of implementing projects for the single-industry town development.

It should be noted that, upon the adoption of Federal Law “On Public-Private Partnership (PPP), Municipal Private Partnership in the Russian Federation and Amending Certain Legislative Acts of the Russian Federation” of July 13, 2015, the number of PPP projects in Russia increased sharply from 873 in 2015 to 2,183 in 2016. According to Dealogic Projectware, from 2000 to 2015, the total

number of partnerships in the European Union amounted to 1,184; the total cost of PPP projects is EUR 270 billion.

When Russia adopted the agenda of improving social and economic conditions of society, infrastructure development and the implementation of socially significant innovative projects, it has led to the development of the legal and regulatory framework for establishing structures integrated with the state and their functioning. In particular, on January 1, 2016, special Federal Law No. 224-FZ "On Public-Private Partnerships" entered into force. This gave a new impetus to the development of such institution as PPP in the construction industry, in healthcare, and in the provision of educational services. Legal conflicts and the lack of experience in implementing social and infrastructure projects for the development of single-industry towns in PPP conditions dictate the need for research in this area.

The concept of PPP is often used as "cooperation between a public (state) entity and a private (commercial) entity to achieve a specific goal or set of goals" (Busch, Givens, 2013). PPP is a special type of management network that can be defined as "*more or less stable models of social relations between interdependent entities that are formed as part of a state program and/or cluster, are supported and transformed through a series of business contracts*" (Koppenjan, de Jong, 2018, Schaeffer, Loveridge, 2002). The management network covers all relevant stakeholders regarding the development and/or implementation of a government project or program (Steijn, Klijn, Edelenbos, 2011). An analysis of international experience shows that *the pace of development of individual industries largely depends on the directions of national economic policy*, which is the basis for the effective functioning of the national economy. The following impact methods can be used to control economic processes (Kovaleva, Chernov, 2017).

1. Direct impact: introducing new rules of behaviour by establishing them as legal norms, for example, establishing algorithms for financial support of individual business entities. State control in the economy should correspond to market opportunities and be applied within the appropriate legal and regulatory framework, the degree of elaboration of which is one of the problems discussed in modern science.

2. Indirect impact: the impact that the actions of the government carried out within the framework of the established rules of conduct have on the economic behaviour of entities. For example, a government agency may provide financial support to individual business entities that supply essential goods to the public procurement system.

The methods of direct and indirect impact are mutually complementary and are based on the principle of economic efficiency. In addition, the application of any method should maintain equilibrium in the economic system. Strengthening a number of administrative methods of direct impact (for example, legislative restrictions) can reduce the initiatives of economic entities, while the abuse of indirect methods (for example, unjustified financial support of some entities) weakens market mechanisms (Istiak, Serletis, 2018).

In addition to the above-listed methods of state control, another special form is state enterprise, where the state acts as a direct participant in social and economic processes (Ingham, Doig, Hargrove, 1988, Kingdon, 2011). The aim of the state entrepreneurship is to solve social and economic problems, but not to make a profit: achieving economic growth, increasing employment, protecting the environment and supporting vital knowledge and capital-intensive industries (Millward, 2011). PPP differs from traditional and innovative forms (design and construction contracts) of a public-private contract in that private players must make a financial contribution to the PPP mission. PPP productivity depends on the social context, institutional environment, and political struggle, which determines their form and functioning (Sørensen, Torfing, 2009).

The advantages of market competition and the practice of contract execution are recognized, however, the scientific literature analyses the experience of legal conflicts and failures in the

development and signing of contracts. In scientific works, the practice of legal regulation of PPPs, the strengths and limitations of applying the contract system, the classification of contracts, and the analysis of the development of the contract system were studied. The study (Marx, Jadir, 2016) developed a model for the participation of a private partner in the implementation of PPP (MPP) projects (BOOT or BOT contracts). In addition, they pay special attention to the process of managing and sharing risks among project participants in the framework of PPPs, including identifying and grouping the main risks of private contracts, as well as monitoring the implementation of contracts. The authors emphasize the priority of contracted PPPs alongside institutional PPPs.

The authors of another study (Kivleniece, Quelin, 2012) emphasize the importance of the governance structure and improving efficiency through the development of the theoretical basis of two conceptual public-private structural alternatives: autonomous mode and an integrative PPP management model, each of which is associated with different capabilities of creating values, considerations and conclusions

This study (Mahoney, Mcgahan, Pitelis, 2009) focuses on private or public institutions without constantly considering their interdependencies. Attention to private or public interests increased with a deepening of professional knowledge: for example, academic managers tend to consider a corporation as a unit of analysis (Gorodnova, Khaykin, 2009), while scientists in the field of public policy analyze the government and multilateral, public and non-profit organizations. The authors advocate a partial combination of these research programs because private and public interests cannot be fully taken into account if they are conceived independently.

In studies of foreign authors, limitations of the national budget are noted (Barlow, Roehrich, Wright, 2013): European and American governments are more likely to cooperate with the private sector in order to obtain guarantees that the costs of the construction and operation of socially significant capital construction projects will be borne by the private partner, the state -private partnerships help the government avoid initial investments, while private sector partners receive a return on investment (Marx, 2017).

As a rule, state-owned enterprises operate in areas related to the function of the state, including the creation and maintenance of socially significant infrastructure facilities, and significant and capital investments from the state are necessary for their prompt and proper maintenance (Wang, Zhao, 2014).

In Russia, the smallest amount required for investments intended for the development of transport, energy, social, and public utility infrastructure is about 3.5 % of GDP. In order to achieve this level, over the next 5-7 years investment in Russia should increase by 6-10 % per year. This is practically consistent with world estimates (an average of 3.8 % of global GDP per year (The Economist Intelligence Unit, 2019)). The current volume of research is focused on assessing the cash flows of future PPP projects, and there are significant opportunities for studying the factors that form the operating environment for PPPs (Yang, Shieh et al., 2018).

According to (Kivleniece, Quelin, 2012), the existing body of a research body has three main limitations. Public-private cooperation requires further theoretical conceptualization. Greater efforts may be required to understand the exact mechanism for creating value in public-private relations, again about alternative forms of economic organization and border elections between sectors. Existing studies of the mechanisms for distributing cash and creating value in relations between the public and private sectors, as a rule, are aimed at obtaining significant economic benefits that private actors derive from relations with the public sector, bypassing the wider organizational and managerial dilemmas inherent in such cooperation, and any potential adverse effects on the private sector.

Cruz and Marques emphasize that PPP mechanisms are particularly vulnerable to the uncertainties and risks posed by several factors (Cruz, Marques, 2013). A variety of risks contributed to the possibility of revision (Engel, Fischer, Galetovic, 2006). Barlow and Roehrich reveal that the

innovative ability of PPP projects in social sectors was not encouraged under the Private Financial Initiatives Program (Barlow, Roehrich, Wright, 2013). When Russia adopted new national projects for the development of the digital economy, and given the urgent need to develop breakthrough technologies in all areas of society and to implement the concept of information and intellectual technologies, the emphasis is on studying the effectiveness of innovative projects. within the framework of PPP mechanisms it becomes even more relevant (Choi, 2015).

In essence, the mechanism of public-private partnership allows a public partner (local governments) to involve private law entities in performing functions related to the sphere of activity of the state, in particular the creation and reconstruction of socially significant objects.

Social and economic effects of implementing the MPP mechanism

The studies often emphasize that MPP is one of the promising tools for the development of urban economy (Roumboutsos, 2016).

In 2017, in the wings of the round table "Development of Public-Private And Municipal-Private Partnerships", it was noted that public-private partnerships are becoming an increasingly visible form of cooperation between the state and private business in Russia and one of the promising tools for developing public infrastructure in the long term . Also, based on the example of the housing and public utility services sector, the heterogeneity of the development of partnerships in large and small cities was noted; the reason of this is that the private sector is not particularly interested in participating in such projects due to increased depreciation of fixed assets, low incomes of the population, long payback on investments, and insufficient profitability.

According to the analysis of scientific literature (Mostafavi, Abraham, Sinfield, 2014), the authors concluded that the social and economic effects of implementing the mechanism of municipal-private partnership is the following positive results for the state, society, and private investors:

- increasing the investment attractiveness of municipalities as a result of improving the infrastructure network;

- improving the living conditions of the population of municipalities through the development of transport and social infrastructure;

- improving the availability and quality of services provided by the public sector, in connection with the full (or partial) transfer to the private partner of the risks associated with the cost and quality of construction work and maintenance that determine the level of economic benefits received by the private partner during the operation phase of the facility;

- reducing the budget load with regard to the obligation of a private partner to finance the creation of an infrastructure facility;

- increasing the financial stability and economic efficiency of the construction industry and business entities, taking into account private partners receiving guarantees, subsidies, benefits that are secured in legislation, for example, guarantees for the completion of construction within a reasonable time due to government participation, guarantees for the lowest prices on the market due to cost optimization for payment of taxes, acquisition of land, construction of facilities;

- introducing state-owned land plots into the economy as a result of the expansion of large cities and the construction of a local road and infrastructure network.

Despite the significant number of the above listed positive effects, there are also a number of difficulties in implementing MPP projects.

The authors' model of interaction between the subjects of public-private (municipal-private) partnerships

The legal basis for forming and implementing an agreement on public-private (municipal-private) partnership (hereinafter "PPP" and "MPP") was fixed at the federal level in 2016. Initially, this mechanism could be applied to the following objects and facilities: roads, bridges, road service facilities; public transport; railway and pipeline transport facilities; sea and river ports, ships; airports; facilities for the production, transmission, and distribution of electrical energy; hydraulic engineering structures, platforms, artificial islands; health care, education, culture, sports, recreation and tourism facilities, etc.

Later, creating information technologies and technologically related property was included in the list of objects. Considering that the changes have come into effect relatively recently (since 2018), currently this mechanism is not widely tested on the example of implementing projects for creating "smart cities". Lack of project implementation practices is one of the obstacles to attracting private investors, as this leads to difficulties in assessing potential risks and uncertainties. For this reason, standard models for implementing digital projects must be developed, which, in the authors' opinion, allows identifying the main relationships and principles of interaction between the subjects of the partnership and simplifies understanding and analysis of the mechanism for participants in the process.

The results of analysing the Russian literature show that the existing model presentation options outlined by the National Center for PPP are based on the concession agreement mechanism and do not take into account the specifics of the alternative form of implementing digital projects - municipal-private partnership agreements. Taking into account the latest changes in the legislation, the authors developed a structure for implementing investment projects for the construction of capital construction projects as part of an agreement on public-private partnership.

In order to build "smart city" facilities, the municipality provides to a private partner a land plot for rent without bidding, which reduces administrative barriers and reduces costs due to lower transaction costs.

Creating an object (a facility) under an MPP agreement is financed through investments from a private partner. Under the agreement, the project may be co-financed by the municipality, whose share must not exceed 50 %. As a rule, due to the budget deficit of municipalities, funds are allocated from the regional budget in the form of intergovernmental subsidies.

In the process of project implementation, a private partner may raise credit resources, so a facility under construction may be pledged to a credit institution (Shelepov, Andronova, 2018). In the case of foreclosure on the subject of pledge, the municipality has the pre-emptive right to purchase the pledged property.

As a general rule, a private partner is obliged to fulfil obligations under an MPP agreement at its own expense. If necessary, it may engage third parties (subcontractors), if permitted by the terms of the agreement. In this case, the private partner is responsible for the actions of the subcontractors as for its own.

If, when creating an object (a facility), the results of intellectual activity or technical means that belong to third parties (copyright holders) are applied, then the public partner must provide the private partner with the opportunity to use these rights. For this, the public partner and the copyright holders enter into a license agreement. Then, based on the written consent of the copyright holder,

public and private partners enter into a sublicensing agreement. If the corresponding rights are not granted by the public partner, the private partner may acquire such rights from third parties (copyright holders) at its own expense.

As a result of the project, a private partner acquires ownership of the object of the agreement. If the amount of project financing by a municipality in total exceeds the amount invested by a private partner, then the object of the agreement and exclusive rights to the results of intellectual activity are transferred to the municipality no later than on the day the agreement is terminated.

The agreement may provide for a fee paid by a private partner to the municipality during the operation of the object of the agreement. The size of the fee, the form, the procedure, and the timing of the payment shall be established by the MPP agreement. Private partners may pay the fees as follows:

- payments (in a fixed amount) made periodically or one-time to the budget of the municipal entity;
- the established share of products or the share of income received by a private partner as a result of implementing activities provided for by the agreement;
- transfer of the ownership of property owned by a private partner to a municipal entity.

In order to increase the effectiveness of interaction between subjects of public-private (municipal-private) partnerships, analytical tools that allow assessing the conditions that affect the effectiveness of activities, as well as identifying functional areas that require further development and should be taken into account when planning interaction must be developed. The application of methods for assessing factors is a kind of indicator of the level of methodological readiness of modern managers and specialists to develop partnership activities.

Module 5. Testing the model of public-private partnership in Russian single-industry towns

In order to study the conditions and prerequisites for implementing the mechanism of municipal-private partnership in Russian single-industry towns, the authors conducted a study using the example of the metallurgical urban district of Krasnouralsk.

Currently, the creation and reconstruction of construction projects in the urban entity Krasnouralsk is funded mainly at the expense of budgetary funds.

In the authors' opinion, the private sector is not particularly interested in participating in MPP projects mainly due to the following factors:

1) a long payback period of capital investments (10-15 years) with a non-obvious guarantee of demand for an object, taking into account negative demographic trends;
2) the lack of standard infrastructure projects with a streamlined implementation mechanism (Schaeffer, Loveridge, 2002);
3) the complexity of contractual relations for MPP projects in comparison with the state order or other types of legal relations between the public and private parties. This leads to a higher cost of preparatory and pre-project works and takes much more time at the stage of coordination between the municipality and private sector entities.

In the authors' opinion, the existing norms of federal legislation do not take into account the specifics of municipal entities; a too long procedure for entering into MPP agreements is in place. Therefore, in case of a private initiative, the period from submitting a proposal for the implementation of a PPP project to the moment a public partner makes a decision on the implementation of the project may take up to 330 days, which is equivalent to the period for PPP projects implemented at the federal or regional level. It is necessary to consider the possibility of establishing a more simplified and accelerated procedure for reviewing, negotiating, and entering into agreements for MPP projects. In this case, the dynamics of the number of agreements on municipal-private partnerships could increase.

Conclusion and Discussion

Thus, according to the results of the study, the authors came to the conclusion that currently in Russia there is a tendency to develop mechanisms and models of public-private partnerships (PPPs), which are becoming the preferred form of cooperation between the state and private business and one of the promising tools for developing public infrastructure in long term. At the same time, the role of private investment in infrastructure projects and in the development of territories of single-industry towns is also growing.

Creating and implementing various mechanisms to develop the town and increase its investment attractiveness, including through creating new and reconstructing existing construction projects, is an issue of survival for Russian single-industry towns in the face of a negative demographic trend (population decline and population aging). Lack of investment and financial resources for the development of the economy and urban improvement aggravates the need to attract private investment for implementing infrastructure projects using the mechanism of municipal-private partnership. According to representatives of the scientific community and a number of large domestic companies, MPP is *a promising mechanism for the development of urban economy*.

Ensuring sustainable social and economic development of single-industry municipal entities (monotowns) is one of the priority tasks of Russian state policy. However, the effective application of this mechanism in Russian single-industry towns is impeded by a number of conditions and factors that prevent increasing the participation rate of private investors.

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Aspects of Corporate Social Responsibility Included in The Integrated Reports: OMV Petrom Case Study

Carmen Florentina PĂUNESCU (PETRE)
Ph.D. Student, Doctoral School of Economics, University of Craiova, Craiova, Romania
E-mail: carmenpetre1980@yahoo.com

Mariana MAN
Professor Ph.D., Faculty of Sciences, Department of Economic Sciences, University of Petroșani, Petrosani, Romania
E-mail: man_mariana2006@yahoo.com

Abstract

In a competitive environment and in the context of accelerating the globalisation process, organisations are forced to develop new strategies to stay competitive on short term, but especially on long term. The organisations are aware and encouraged to integrate and involve themselves in social responsibility issues. Climate change, environmental degradation, social troubles, etc. are addressed in reporting non-financial information. In order to effectively respond these global issues and the requests of the interested parties, the reporting of non-financial information must be harmonised and interconnected with the financial reporting, Ienciu, I.A., et al., (2014). The result of these harmonisations and interconnections is materialised in what we call the integrated reporting of organisations. In this paper one presents a study on how the OMV Petrom Group has identified the aspects of corporate social responsibility, prioritised them and integrated them into the business strategy and integrated reporting. At the same time, the study sets to identify the challenges that the OMV Petrom Group dealt with during the implementation of integrated reporting according to international integrated reporting standards. Once these challenges have been identified, we suggest some best practice recommendations that should be addressed in providing non-financial information through integrated reporting.

Keywords: corporate social responsibility, non-financial information, integrated reporting.

JEL classification: M41, M14, G43

Introduction

By adopting a socially responsible conduct, organisations obtain many advantages, differentiate themselves from competitors and bring their contribution to the sustainable development. Different categories of stakeholders are exerting increasing pressures for the responsible performance of economic activities, James, M.L., (2015). These tendencies are manifesting more and more strongly in Romania, especially after the moment of integration into the European Union. Thus, those organisations that will understand the importance of the new requirements and will act in due time regarding the development of a corporate social responsibility are in advantage (CSR -Corporate Social Responsibility).

Organisations of all types and sizes are called to become socially responsible, ecologically sustainable and economically competitive, Orlitzky M. et al., (2011). Managers could try to maximise the benefits and value of their business, satisfying the expectations of interested parties. However, this maximisation of value cannot be measured only from a financial perspective, but also from a broader approach.

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The objective of the paper is to identify the challenges in disclosing aspects of corporate social responsibility in integrated reporting. Once these aspects are identified, we analyze the extent to which OMV Petrom has complied with the five essential principles of the organization's ability to create long-term value.

Research Methodology

Case Study

The research carried out supposed taking the following steps:

- Step one consisted of a documentation regarding the evolution of the process of integration of the corporate social responsibility aspects into the integrated reporting model within the OMV Petrom Group. In this regard, we studied the integrated reporting for the period 2014 - 2018 provided by Omv Petrom (available at https://www.omvpetrom.com).
- Step two: in this stage, based on the documentation made in step one, one proceeded to the performance of a research that consisted of following the way in which the OMV Petrom Group captured the social responsibility aspects in the integrated reporting. At the same time, one also analysed how the integrated reporting models were adopted by OMV Petrom Group and the extent to which it respected the five essential principles of the capacity to create value, namely: connectivity of non-financial information; materiality, the concise character; reliability and completeness; consistency and comparability. In looking for the way to fulfil the application of the five principles we identified the challenges of OMV Petrom Group in disclosing the social responsibility aspects, its approaches, identifying some recommendations.

The management of corporate social responsibility aspects by the OMV Petrom Group is done by integrating them in the structure of the general governance of the organisation. These aspects are treated with the same importance as the economic aspects of the OMV Petrom Group, establishing an organisation scheme that corresponds to the key indicators of social performance. The employed experts of OMV Petrom Group maintain a continuous communication of the progress made in the field of social and environmental aspects, according to the strategy and the objectives of corporate social responsibility by disclosing them in the integrated reports.

The Social Responsibility Department has been developing and communicating for almost a decade the Social Responsibility Platform of the Group, entitled " Țara lui Andrei (Andrei's Country)", contributing with their efforts and ideas to the fulfilment of the sustainability projects for the development of the community. The specificity of the activity sector of the OMV Petrom Group makes it address special precaution measures to support the protection of its employees, its assets, the environment and also the community where it operates. That is why, a first aspect of corporate social responsibility addressed by OMV Petrom Group in the integrated reports is health, safety, security and environment (HSSE).

The commitment of the organisation to lead a responsible activity led to the implementation of a vision called "No injuries-no loss". This vision was implemented with the help of the HSSE2021+ strategy, in which the OMV Petrom Group tried to reduce the risk of employees' illnesses. The HSSE2021+ strategy involved carrying out several campaigns: "Passport for health", "Earn health: now!", as well as over 36,000 screenings, which involved employees in creating a work environment that is beneficial to physical and mental health. During 2014-2018, the rate of preventive consultations increased, leading to a decrease in the risks of illness of employees (figure no.1).

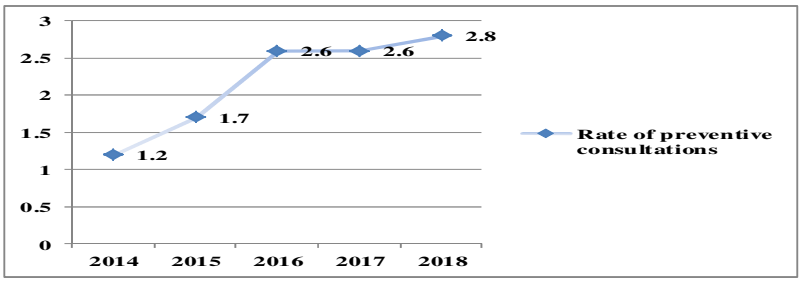

Figure 1: Rate of preventive consultations

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

Another aspect of social responsibility is workplace safety. In 2018, the program "Be smart, Be safe", "Champion in the field of safety", "Take safety home with you" was initiated, through which the organisation identified the risks in the field of safety, and internally certified over 1000 employees at training courses. Workplace safety represents an important goal for the organisation, which is why a series of modernisation and improvement projects have been initiated.

OMV Petrom Group has collaborated with various institutions (European Process Safety Centre, Center for Chemical Process Safety BEACON) for the elaboration of some studies for the application and improvement. OMV Petrom Group complies with the recommendations of the International Association of Oil and Gas Producers regarding the key performance indicators for process safety. These indicators support learning from past events in order to make improvements in the future. In the integrated reporting from 2016-2018 the OMV Petrom Group shows a constant decrease of the TIER1 incidents and the maintenance of the TIER2 type incidents regarding the process safety, figure no.2.

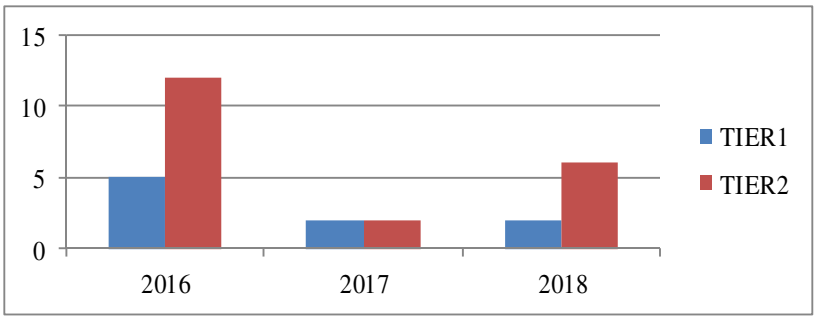

Figure 2: Process safety events

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

Another important corporate social responsibility aspect that is an integral part of the OMV Petrom group objective is environmental management. The organisation aims to minimise the impact of its activity on the environment over the entire life of its products. In order to achieve this objective, the organisation carried out a series of activities: they reviewed the environmental risk assessment registers and implemented measures to reduce it; they elaborated water and waste management reports; they implemented measures to reduce water use; they conducted studies on biodiversity

assessment in the most important locations; they developed the Program "Modelling environmental values through performance" and evaluated its compliance with OMV/ISO14001 Standard.

As for the greenhouse gases (GHG), the OMV Petrom group initiated a project that resulted in the use of solar energy at points that distribute fuel. The results of this project showed a decrease of the impact of greenhouse gas emissions on the environment, resulting in substantial cost reductions, thus increasing social performance: GHG Goal 1 "Direct emissions from operations that are owned or controlled by the organisation" (figure no.3.) and GHG Purpose 2 "Indirect energy emissions resulting from generation of electric energy, heating, cooling or steam purchased" (figure no.4).

OMV Petrom Group shows in the integrated report of the year 2018 a tendency of decrease in the evolution of the impact of the activity on the environment at the level of 2017 compared to 2016 regarding direct GHG emissions. For the year 2018, the organisation explains the reached level of 4.5 million CO2 eq, slightly increased as being caused by the increase of electricity production.

The impact of GHG indirect emissions (emissions related to the production of energy purchased by the organisation for the activity performance) generally had a slight increase tendency generated by the increase of the quantity of electricity purchased, in total consumption by the organisation. The organisation also claims that the purchased energy had higher green CO2 compared to 2017.

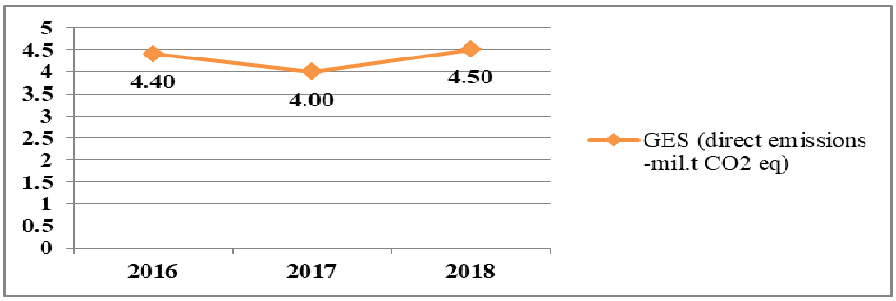

Figure 3: GHG direct emissions

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

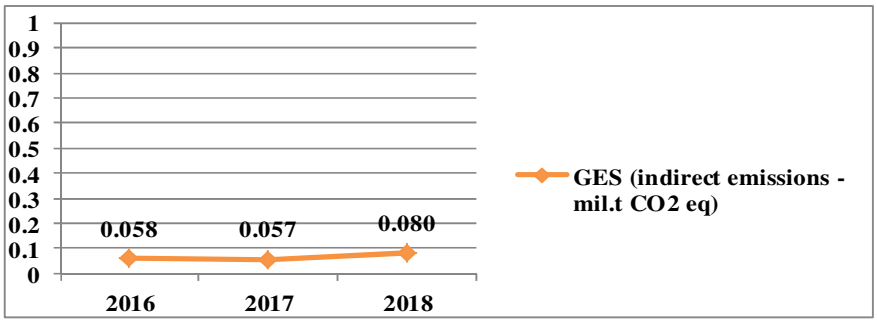

Figure 4: GHG indirect emissions

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

The social responsibility aspects captured in the integrated reporting of the OMV Petrom Group during 2014-2018 are synthetized in five main areas: business principles and social responsibility;

safety, health, security, environment; efficient carbon management, employees and innovation. OMV Petrom Group will continue with these areas of interest for which it proposes commitments and objectives for the 2025 horizon (table no.1).

Table 1: OMV 2025 Areas of interest and objectives of social responsibility

Areas of interest	Commitments	Objectives	Sustained durable development objectives
Health, Safety, Security, Environment (HSSE)	HSSE have the highest priority in all actions carried out by OMV Petrom Group. Proactive risk management is key to achieving the HSSE vision of "No injury - no loss"	One of the most important objectives is *to obtain zero accidents at the place of work*. Other equally important goals are also to maintain as leader for the event rate for process safety and stabilising the injury rate at the workplace.	ODD3- Health and well-being ODD8- Decent work and economic growth ODD6-Clean water
Carbon efficient management	OMV Petrom Group focuses on increasing the efficiency of carbon emissions in its operations, as well as the responsible management of waste produced by OMV Petrom Group	Decreased intensity of carbon dioxide emissions by 19% compared to 2010 at OMV1 and up to 4% at OMV2. Reaching the level of zero routine gas flaring.	ODD13- Climate action ODD7- Clean energy at affordable prices
Innovation	Increasing innovation through investments, research and development. Production optimisation and development of innovative energy solutions.	Increasing the share of sustainable raw materials co-processed in refineries at approx. 200,000 tons per year. Increasing the recovery factor in the ECE region in the selected fields by 5% to 15% adopting innovative solutions of assisted oil recovery. ReOil development on an industrial scale approx. 200,000 tons/year.	ODD13- Climate action ODD12- Responsible consumption and production ODD9- Industry, innovation and infrastructure ODD8- Decent work and economic growth
Employees	Creation and maintenance of competent employees. OMV Petrom Group is dedicated to the vision of diversity and gender equality.	Increasing the percentage of women in the management compartments from 3% to 25%. Maintaining the percentage of 75% of managers who have internal experience	ODD10- Reducing inequality ODD5- Gender equality
Business principles and social responsibility	OMV Petrom Group makes efforts to maintain high quality ethical standards. OMV Petrom Group is a	Promoting awareness of ethical principles and values through access to training courses and training sessions on	ODD16- Peace, justice and efficient institutions ODD4- Education and quality

	signatory to the United Nations Global Compact (UN) and is committed to respecting the UN guiding principles on human rights.	human rights for all OMV Petrom Group employees.	ODD8- Decent work and economic growth

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

In its integrated reporting OMV Petrom Group supports responsible behaviour towards all interested parties as a priority and not just an option in carrying out its activity. The integration of the corporate social responsibility aspects represents a journey of the organisation towards the promotion of the leadership test in sustainability. Integrated reporting represents such a good tool - in an era where organisations gain so much reputation for being transparent - that it is a pity to invest so much money, work and energy in a tool just to inform investors. Therefore, OMV Petrom Group considers larger target groups when identifying integrated reporting content. At the same time, the OMV Petrom Group believes that Web-based technology (a tool with all the features that make it simple and easy to use for information searching) can be used to meet the non-financial information needs of all interested parties.

Following the analysis of the integrated reports for the period 2014-2018, we tried to identify the manner of fulfilment of the application of the five essential principles when disclosing the social responsibility aspects. Thus, we identified what challenges the OMV Petrom Group deals with, what approaches it adopts and we identified some recommendations (table no.2).

Table 2 : Non-financial information connectivity - identified challenges, approaches and recommendations

Non-financial information connectivity		
Challenges identified	**Practical approaches**	**Recommendations**
• OMV Petrom Group initially made separate financial and corporate social responsibility reports, that it now integrates into one. This integration is likely to lead to better reporting, which should meet the needs of stakeholders. For example, financial reporting standards require reporting of employee related costs (for example, pensions and salaries). At the same time, the quality of the employees, their involvement and motivation are some of the strongest aspects of corporate social responsibility and, at the same time, indicators of success for any organisation. The information regarding the costs of the employees would be found in the financial reporting, while information on the report of the employees etc. would be found in the non-financial reporting. Achieving connectivity of the two types of information would be a reached goal. • Another challenge of connectivity would be to improve the link between risks and the strategy adopted by OMV Petrom Group.	• One aspect of the connectivity principle is how OMV Petrom Group helps readers navigate between different parts of the integrated report, including the use of cross-references. • OMV Petrom Group uses for its Annual Integrated Report and Consolidated Financial Statements a help page, entitled *About the report*, which presents the symbols used for cross-references on the Internet, from other sections of the report or other group reports. The page also graphically explains how sections of the integrated annual report refer to content elements within the Integrated Report (IR). Then, in a Note to the	• OMV Petrom Group must continue to use technology to help readers navigate between relevant and connected sections of their reports. For example, certain social responsibility aspects, such as health and safety, should be included in a separate section when we talk about the safety and security of the employees or when the OMV Petrom Group refers to the health and safety of external interested parties (mainly the clients of the organisation). • Approaching the integrated report as a general and concise

Connecting the strategy with the determined risks, with the resources held and the moment when these resources are turned into financial resources, would be a reached objective. • Improving the understanding of how the value of resources translates into financial value (building an innovation team, at one point, translates into financial value). • Other challenges in achieving connectivity would be between the social responsibility indicators and the financial results, because a change of the social responsibility indicator will have an impact on the financial indicator which is not immediate, does not appear in the same year, having a certain gap. • Connecting the notions of past, present and future. In order to achieve this connectivity, the OMV Petrom Group must address this by defining several "impact indicators". For example, instead of focusing on "outcome" indicators such as the number of employees participating in volunteer initiatives, an impact indicator would refer to people in the community who have improved their lives as a result of such initiatives.	Management Report, it is usually explained how they approached the principle of connectivity. As part of this explanation, the OMV Petrom Group also publishes an interactive version of the financial statements integrated on their website as another tool to highlight the connectivity of the information. • OMV Petrom Group aims to use technology to help readers navigate between relevant and connected sections of their reports. For example, the report "*Our Energy for a Sustainable Future*" for 2018 includes cross-references and links to sites.	document, connecting other more detailed regulatory reports and information. • Using clear indicators directing readers to connected information from the integrated report and other parts, including online reports. • Making connections between management information, boardroom discussions and priority topics relevant to investors and other interested parties.

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

In an attempt to align with the guidelines of the European Union Directive 95/2014, the OMV Petrom group has developed a vast consultation process with all the stakeholders of the organisation in order to manage in identifying the material issues in the disclosure of the integrated reports. The result of these consultations was the identification of thirteen material aspects that show the major interest of the stakeholders for the impact that is generated by the activity of the OMV Petrom group (table no.3).

Table 3: Materiality - identified challenges, approaches and recommendations

Materiality		
Identified challenges	**Practical approaches**	**Recommendations**
• Reconciling the needs of different interested parties when determining materiality; • Applying materiality filters that focus on identifying the key factors of the organisation. • Identifying material risks in a way that meets the needs of different investors.	• OMV Petrom Group has developed and supported an entire consultation process with the interested parties, both inside and outside the group in order to determine the material aspects for the Integrated Report. The organisation identified thirteen material issues (energy efficiency; local communities; human rights; health, safety and security; innovation and	• Identifying the main user of the integrated report and determining the materiality (therefore - this will be essential to determine what to be

• OMV Petrom Group tends to present in its corporate reports strategic risks such as the volatility of the oil and gas market, climate change, political risks, regulatory risk, risk related to human capital, risk related to technology and innovation. Among these there are risks that are extremely unlikely to materialize. • According to the Framework, the materiality of a risk depends on the size of its impact, if materialised, and on the probability that it will materialise. The probability of natural disasters is low, but the magnitude of their impact could be huge; on the other hand, focusing on such risks might mean that other, more immediate risks are overlooked. One solution might be to include only the material risks in the main body of the report, but offering a more extensive list of risks in an appendix. This could meet the needs of different types of investors (for example, long-term and short-term investors), who may have different expectations from the reporting of OMV Petrom Group.	technologies; environment; greenhouse gases GHG and other emissions; occupancy degree and employees' skills development; supply chain management; ; risk management, water management; business ethics and anti-corruption; hydrocarbon spills) which it has classified into five areas of interest (Health, safety, security, environment; efficient carbon management; innovation; employees; business principles and social responsibility). • Beside these material aspects, the OMV Petrom Group also refers to other additional topics just as important to the organisation and interested parties (product responsibility, biodiversity and waste management). • OMV Petrom Group discloses in the integrated reports explanations about how risks and opportunities must be considered in terms of value creation. These reports include a comprehensive explanation of the risks that the OMV Petrom Group is facing and the measures it takes. • OMV Petrom Group presents a management system for both gross and net risks (risks that exist after taking countermeasures into account), which shows the financial liability against the probability of occurrence or frequency.	included and what to be excluded from the report). • Clear explanation of the process of materiality assessment, including how OMV Petrom Group evaluated and prioritised material problems. • Including a comprehensive explanation of the risks they face and the measures taken.

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The challenges identified by OMV Petrom Group in revealing the aspects of social responsibility, practical approaches as well as recommendations for best practices for concision are identified in table no.4.

Table 4 : Concise character - identified challenges, approaches and recommendations

Concise character		
Identified challenges	**Practical approaches**	**Recommendations**
• The framework of the report regarding the disclosure of aspects of social responsibility is quite detailed and this can make it difficult for the OMV Petrom Group to produce concise reports that investors can read and understand. • The concise nature is also	• The reporting includes informative diagrams that explain the functioning of the activity of OMV Petrom Group, visually presenting how the product	• Use of cross-references in the OMV Petrom Group report (internal and external to other reports) and the efficient use of several graphical elements, tables, and diagrams. • Identifying problems to be reported by implementing solid materiality determination

a challenge when the OMV Petrom Group wishes to include new aspects of social responsibility addressed, either to meet the regulatory requirements or because the additional content could be useful to the readers. • OMV Petrom Group is also concerned about the risk of losing valuable non-financial information for some stakeholders by focusing too much on the concise character. • Sometimes, the importance of concision can be outweighed so that some primary data accessible on the Internet do not present risks, for instance when non-financial information is used outside the context by the media. • Part of the impulse for greater concision comes from users' feedback. Thus, beside fewer pages, readers may request that financial content be easier to understand for people who are not financial analysts.	supply chain works on the market. • OMV Petrom Group embraced the challenge of concision, applying a mantra of *rethinking, reuse, reduction*. By rethinking the interim reporting approach, the quarterly reports were reduced. sometimes this reduction is impossible to achieve having more specific regulatory requirements and certain detailed notes must be provided.	processes - this would also contribute to improving reliability and completeness. • Applying a robust materiality determination process to filter out the things that must be excluded (i.e. those that are not important for value creation) when assessing their relative importance. • Consider how digital technology could help satisfying the broader information needs of the interested parties. • Online reporting could help to reconcile the need for concision with the desire to provide a detailed social responsibility aspect that some stakeholders may appreciate.

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The probability that the integrated reporting of the OMV Petrom Group will fulfil its intended function, under set conditions of use, for a specified period of time can be determined by its wish to include as much and as exhaustively as possible the aspects of corporate social responsibility (table no.5).

Table 5: Reliability and completeness - identified challenges, approaches and recommendations

Reliability and completeness		
Identified challenges	**Practical approaches**	**Recommendations**
• OMV Petrom Group is aware that the corporate social responsibility information included in an integrated report should be submitted to similar levels of rigor, if investors consider them useful. However, non-financial reporting is not yet mature. There is a lack of coherence between the many existing non-financial reporting frameworks and standards, and the widely recognised mechanisms that provide corporate social responsibility information have not yet appeared in non-financial reporting. • OMV Petrom Group considers that internal systems and processes hold the key.	• Establishing a firm line for reporting the data from year to year to contribute to the assurance of a more balanced reporting of good and bad news. • OMV Petrom Group attempts to disclose consistent corporate social responsibility aspects from year to	• OMV Petrom Group must make sure that the supervision of the reporting content is exercised by the Board of Directors. • Establishing clear internal control processes for non-financial information that will be included in the integrated reports. • Identifying relevant standards and

The process of obtaining data to an insufficient standard may lead to failure of reporting. For instance, as a main indicator or representative of social impact, the OMV Petrom Group uses to measure the number of professionals it has trained, but it was possible for one person to participate in several training sessions. Thus, the price they pay for reporting social responsibility aspects is, at least in some individuals' opinion, that there is less information about sustainability. • Lack of any *guideline or template* that insurance providers could use when providing insurance for social responsibility information. OMV Petrom Group addressed this issue by creating an annex that shows how the main content areas of the framework were covered and sought external assurance in this regard (establishing an audit process for this). • Looking from a broader perspective, a key issue is that in which the reporting of social responsibility issues cannot be done in a common language to assess whether it is a good report or not.	year, even for those years in which they do not do so well. Explanations regarding the measures taken to solve any issues are presented. • Changes in strategy are explained by the OMV Petrom Group, so that readers are confident that the adjustments are not designed to hide poor results.	frameworks used and disclosing them in the report. • Reporting non-financial information used by management in business management. • Clearly explaining why certain key corporate social responsibility indicators are used and the reason for some changes in the reported indicators. • Disclosure of negative aspects of social performance, as well as positive aspects and explanation of what management will do to meet the challenges.

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

A consistent and comparable integrated report is the expected result by all interested parties of OMV Petrom Group (www.omvpetrom.com). In order to obtain such a report, the organisation took a step forward with each disclosed reporting, adapting to the rigour of the requirements of the stakeholders. However, OMV Petrom Group has encountered many challenges in reporting corporate social responsibility aspects (table no.6).

Table 6: Consistency and comparability - identified challenges, approaches and recommendations

Consistency and comparability		
Identified challenges	**Practical approaches**	**Recommendations**
• Providing significant non-financial information over such a long period can be difficult. While acknowledging the importance of consistency, the OMV Petrom Group considers that it is appropriate to change the measures reported if the organisation has good reasons for doing so and clearly explains this. For example, the indicator showing customer satisfaction can be changed with the indicator showing customer experience, which for the OMV Petrom Group is a better measure, because it uses it for internal management processes. OMV Petrom Group will explain the reason for the change and will include a comparative figure for the previous year. OMV Petrom Group is currently more	• OMV Petrom Group presents its economic and corporate social responsibility aspects through figures and tables for a better consistency and comparability from one year to another. • If the OMV Petrom Group will want to start using new key indicators of corporate social responsibility, procedures and a rigorous internal control are established first.	• Including specific social responsibility indicators for comparability for several periods of time when they are available. • The keeping by OMV Petrom Group of the same specific indicators of social responsibility from year to year, if it does not have to change them to

concerned about internal consistency and reporting consistent measures over time than with reporting information comparable to those of other organisations. • There are certain convergences in the sectors. For example, for human capital, staff employment measures become a common practice. Another convergence - the comparison between market participants that is not a short-term target. Market participants need time to adapt and find the right balance. They do not see player comparison as a priority. The priority here is to disclose the way of creating values in an authentic, concrete, and substantial way. • Challenges regarding the production of non-financial information that can be compared between the OMV Petrom Group and other organisations who are concerned that the interested parties will compare pears with apples because of differences in how organisations calculate and present specific indicators of social performance. • We are many light years from comparability on certain topics. This is partly due to different legal regimes around the world, which may require or prohibit the reporting or collection of certain information (for instance, information about the ethnic origin of employees).	• When developing new indicators for the environment or social performance, they undergo a review before being presented in the integrated report. Then, comparable data are presented for two previous years, in order not to produce the opportunity to be taken out of context. • The corporate social responsibility indicators must be consistent data, and therefore OMV Petrom Group does not introduce a new corporate social responsibility indicator until it has three years of data disclosed by the report.	improve the utility and relevance of the comparability of non-financial information for the interested parties. • Explanation by OMV Petrom Group of any modification of the selection or calculation of specific indicators of social responsibility from year to year. • The adoption by the OMV Petrom Group of a robust review process for any new specific social responsibility indicator to ensure the significant character from one year to another.

Source: Adaptation and processing after OMV Petrom, Sustainability Reports https://www.omvpetrom.com/services/downloads/00/omvpetrom.com/1522170967456/OMVPetrom-Raport%20Sustenabilitate%202018

Conclusions and Discussions

Reporting information on sustainable development helps organisations define goals, measure performance, and adopt changes for the performance of more sustainable operations. A sustainability report provides information regarding the positive or negative impact of the actions of the organisation on the environment, society and the strategy of the organisation, Velte, P.; Stawinoga, M. (2017). The integrated reporting of any sustainable organisation must include the following elements: an overview of the performed activity and the external context, the risks, and opportunities of the activity, as well as the strategy and governance, IIRC (2013a.). All these content elements represent the business model that shapes the performance of the sustainable organisation.

Integrated reporting allows organisations to identify more clearly and fully what really drives them forward. This leads to a greater clarity regarding business management, determining the challenges and finding the opportunities. The next steps of integrated reporting are represented by the way technology can be used to help the interested parties to access more effectively the data they need. The organisations are aware that there are a lot of possibilities to display information, so it would be easier for the interested parties, especially the investors, to gather all the data they need and analyse it, Dura, C., Baron, O.D. (2015).

Following the documentation made on the integrated reporting of the OMV Petrom Group, we conducted a research on how the corporate social responsibility aspects were captured in the

integrated reports. Upon this research, it was outlined that the OMV Petrom Group has made sustained efforts to reduce pollution, being also concerned about the involvement in various corporate social responsibility actions. The case study revealed a significant presence of the term sustainability in the integrated reports published in the period 2014-2018. Moreover, the study carried out on the integrated reporting of the OMV Petrom Group highlighted a superior use of the corporate social responsibility aspects.

The annual integrated reports of OMV Petrom Group for 2014-2018 include information on the financial, social, and environmental performances. They also include long-term social and environmental goals. Each integrated report also provides a brief explanation of the performance against the goals related to water and energy consumption, also providing the context necessary to assess the social performance of the organisation. In this manner, the OMV Petrom Group has demonstrated its responsibility regarding its performance.

In its 2014 Annual Report, the OMV Petrom Group included for the first time a statement of the Board of Directors and of the executive management, according to which the report was prepared in compliance with the GRI international standards. One defines in the report the principles and content for filling in sustainability reports and they are submitted to the GRI context indexing standard. The sustainable development goals approved by the General Assembly of the United Nations, which OMV Petrom Group integrates in its strategy, are presented in the annex Areas of interest and the objectives of social responsibility OMV 2025.

OMV Petrom Group states that they have approached a continuous process to improve quality and control over environmental and social data. The audit committee requested that all non-financial data have the same validity as the financial data. The chapters on human capital management and environmental management include indicators whose sphere includes information about group affiliates due to the impact of the problems shown by the report. This applies to biodiversity indicators and labour force indicators. Once this process was finalised, the Audit Committee accepted that all data is of equivalent quality. For the integrated reports of OMV Petrom Group to make specific reference to the compliance with the international integrated reporting framework, a separate process has been conducted. In this way, the report offers a complete and balanced overview of the group's position and performance, while also demonstrating responsibility, concision, materiality, and reliability.

OMV Petrom Group has understood that it must develop its understanding and capacity to integrate corporate social responsibility practices into its business strategies, because such activities can lead to long-term profits, competitive advantage, and consolidation of the product position on the market. The result of all social responsibility activities is the creation of long-term value of the organisation.
We consider the relevance of the research o represents knowledge of how OMV Petrom has approached the best practices of corporate social responsibility in integrated reporting. These approaches could serve as examples for other organizations to change their paradigm and make the CSR strategy part contribute to their business.

A future way of research that we intend to explore is the possibility of developing a theoretical model to establish the thematic representation of the best aspects of corporate social responsibility in integrated reporting that can be followed by other organizations operating in similar branches or in affiliated sectors.

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Vigor at Work, How Employees' Perception of Working Time Influence Their Work Satisfaction

Umar BAIHAQKI

Universitas Negeri Jakarta, Jakarta, Indonesia, umar_baihaqki@unj.ac.id

Meila Riskia FITRI

Universitas Negeri Jakarta, Jakarta, Indonesia, mfitri@unj.ac.id

Wulan A.KHAIRUNISA

wulanazahra49@gmail.com

Abstract

Work intensification has risen the working time for employees and challenges the balance of time allocation in their life. Using dispositional theory, we examine how employees perceived working time and its implication to their work satisfaction. The working time perception variable is elaborate into four dimensions, including discipline, incentive, knowledge, and commitment. Based on a survey of 320 employees, we conclude that working time perception have a linear influence to work satisfaction with a fair intensity. We conclude that employees who are bounded by their work setting would have a fairly work satisfaction when they perceived their working hours positively.

Keyword: Working Time, Work Satisfaction, Individual Trait, Dispositional Theory

Introduction

Work intensification is turning into a mainstream management approach amid the liberal economy. The approach promotes employees high-performance to achieve organization efficiency (Green, 2001). Organization management arrange workloads that takes longer working time and require higher skills to complete (Burchielli, Bartram, & Thanacoody, 2008; Peetz, 2019). Employers can ask for more effort to their employees by giving them a relative degree of discretion to do their job and remunerate their endavour based on performance (Bartling, Fehr, and Schmidt, 2013). In this sense, employees are divided into two groups, one that is able to arrange the work setting and one that only follows (Clark et al, 2014).

Work setting arrangement modify working environment for employees to adapt when they are living their organization's life (Goodarzi, Nurmi, & Rantanen, 2015). One of the objective factors in the work setting arrangement is working time. Working time shapes workers experience and influence their productivity (O'Carroll, 2015; KÜnn-Nelen. De Grip. And Fourarge, 2013; Azwir dan Satriawan, 2018). There are two groups of interest regarding to the working time arrangement in organization. The employer arranges work hours in their favor to generate maximum production output, which makes them prefer longer working hours. On the other hand, the employees prefer shorter working time so that they can have more time to arrange their personal life and wellbeings (Vielers, Münderlein, and Koster 2013; Garnero, Kampelmann, and Rycx, 2014; Leuze and Strauß, 2016). These two opposite

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interest is not symmetrical, whereas the employer has a better bargaining position and the employee is in the position to comply (O'Carroll, 2015; Watson, 2008 : 246).

However, the employer should not unilaterally determine working time. Several studies on working time concludes that working time have a nonlinear correlation on productivity (Beherens, 2013; Bannai and Tamakoshi, 2014). Employees' working time only support productivity rate until a certain turning point where adding more working time would reduce their productivity. Excessive working time are hazardous to employees' health and also become one of the occupational stress factor that cause anxiety. Long working hours could generate health issue whereas employees do not have enough time to rest, which increase the possibility to fall sick and force them to absence from their work (Nätti, Oinas, & Anttila, 2015). This issue could harm organizational productivity due to employees' absence because of health reasons. Prolonged work hours and excessive workload also raised the psychological risk of employees (Boschetto, De Rosa, & Marini, 2016). Long work hours increase the work-family conflict which reduces the ability of the employees to focus on what they are doing in the organization (O'Carroll, 2015; Burchielli, Bartram, & Thanacoody, 2008). Therefor work hour is not a one-dimensional concept, and it is more useful to understand work hours from the employees' perspective (O'Carroll, 2015).

Employees responses to work time arrangements vary according to the context they are experiencing. Part-time employee and the full-time employee has a different way to perceived working time in this sense. For part-time employees, especially those who are paid based on their working time, they tend to work extra hours to get more income (Vielers, Wanrooy and Wilson, 2006; KÜnn-Nelen. De Grip. And Fourarge, 2013; Münderlein, and Koster, 2013; Garnero, Kampelmann, & rycx, 2014; Baihaqki & Jahja, 2019). Meanwhile, full-time employees with a fixed income from their employer prefers shorter working time. They perceived working time as a part of their workload, and would prefer to outsmart their work setting to reduce the workload by taking leave, absence from the office, or even quit their job (Surachman, 2016; Nätti, Oinas, & Anttila, 2015; Ruppanner & Maume, 2016). These two-argument depict the subjectivity of employees' perception on work time arrangement. Therefore it is useful to use the dispositional theory that covers individual perceived work setting, and how that perception influences their work satisfaction (Peng & Mao, 2015; Judge, Bono, & Locke, 2000; Cropanzano, James, & Konovsky, 1993).

Dispositional theory see individual behavior influence worker behavior. This research describe individual as worker who perceive his/her working time. This view leads them to the strategy to finish the job within a certain time. Regarding working over time, employee consider that they will receive rewards, namely incentives and more knowledge. The reward then affects their work satisfaction because it is obtained from the success of managing self-esteem, being confident in their skill and being able to control the situation in the form of pressure from supervisors (Mitchell, Smyser, & Weed, 1975; Ford & Collinson, 2011), team members (Frazier, et al, 2015; Zhai, Lindorff & Cooper, 2013), as well as the working time (Okulicz-Kozaryn & Golden, 2018).

Thus it becomes important to discuss the effect of working time on job satisfaction. Ideally, the ideal working time is 8 hours a day (Bannai and Tamakoshi, 2014), but in fact employee often spend longer than the office. The working arrangement may also encourages employee to complete the work on time by providing incentives. Accordingly the goals or targets of the organization could be achieved effectively and efficiently. Therefor this article continues to elaborate the impact of employees' working time on their satisfaction.

Personal Trait and Work Satisfaction

Social environments nurture personality traits through social relations. Work setting creates a certain environment that is intended to influence employees' behavior (Goodarzi, et al, 2015). The Worker

adaptation to the dynamic of their work setting in the organization are varies according to their personal traits. Dispositional theory explain the importance of personality trait to regulate the mood of an individual toward his/her environment. Several studies have used this theory to explain the relationship between employees personality as a factor of their work satisfaction. The first group of study focus on self determination as an internal drive of individual action that support his or her approach to adapt to organizational change. (Shogren, et al, 2015). Self determination is an outonomous desire to actualize his/her interest that is driven by personal disposition. The next group of study put more attantion to the organization as a dynamic environment that influence workers wellbeing (Frazier, et al, 2015). Workers consciousely evaluate their attachment to the organization, including their trust and confidence of the fulfillment of their personal interest through organization (Frazier, et al, 2015; Samnani & Singh, 2016; Peng & Mao, 2015). The worker use self efficacy to evaluate his/her position in the organization through in response to organizational trietment.Worker who is personally fit to his/her organizational environment has higher job satisfaction than the one who continously struggle to adopt with the work setting (Peng & Mao, 2015). Judge et al (2000) have elaborated self core evaluation of individual employee as a variable that influence employees work satisfaction into four dimensions: self-esteem, self-efficacy, locus of control, and neuroticism (Judge, Bono & Locke, 2000: 237).

Working life build self-esteem to the worker by giving a sense of identity according to their role in society (Grint & Nixon, 2015; Baihaqki & Jahja, 2019). However, the meaning of work for an individual also depends on how they perceived their role in the job they are working on. Employee evaluates their role in an organization, whereas they would be motivated when they are involve in the achievment of organizational goals (Nencini, Romaioli, & Meneghini, 2016), and the social relationship with their colleagues (Zhai, Lindorff & Cooper, 2013).

Self Efficacy also plays an important role to job satisfaction. Employees are actualizing themselves through their work, therefor person job-fit would improve their commitment to the job and cope with other demands from outside of their organization life (Peng & Mao, 2015). The high-performance working system stated that a certain amount of discretion would benefit employees and increase their performance, and thus their satisfaction (Bartling, Fehr, & Schmidt, 2013; Okulicz-Kozaryn & Golden, 2018). Employees perceive that they have an acceptable locus of control which makes them able to control what is important in their working live (Mitchell, Smyser, & Weed, 1975).

Working Time Arrangement

Modern organizational management aims to create a competitive production process. Organization management use flexible work arrangements to coopt with the liberal competition. These flexible arrangements could be classified into functional flexibility and numerical flexibility (Peetz, 2019). Functional flexibility refers to managerial settings that treat employees as an active resource that are able to develop themselves. Employers start to intensify the workload of their employees. They manages human resources so that their employees are ready to adapt to variety of workloads. Numerical flexibility puts the number of workers or the hours they work according to the needs of the organization. Employers arrange the remuneration system for their employees to pursue efficiency. Hourly wages and overtime wages are replaced by periodic full-paid incentives. This system benefits employers because they do not need to pay employees who have to worked overtime to finish their tasks. Since employee also has received benefits, their productivity expectations have also increased. Thus, employees perceive working time as part of the worload because it relates to the incentives they receive.

Working time perception is not a one-dimensional concept, such as the amount of time spent working. This notion is perceived differently by the employer and the employee. For employers, working hours are a variable of productivity, whereas increasing or reducing work hours would influence the production output. Employers may give incentives for their employees to work extra time. The high-performance management system suggests discretion for employees in completing an extensive workload (Bartling, Fehr & Schmidt, 2013). To maintain employees' motivation, management also

provides a relatively huge benefit for employees who can achieve their given target. This work arrangement is aimed to nurture self-motivation from the employee to be responsible for their achievement, as employees may need more time to finish their task. Therefore they voluntarily work overtime so that they would get the full benefit from completing their task.

Employees perciefed working time as part of their workload, thus the amount of work hours also influences their work satisfaction (Boschetto, De Rosa, & Marini 2016; O'Carroll, 2015). They realized that their labor are paid from their productivity, and the number of hours they spend working are one of the basis to value their performance. They perceive that having more working hours could generate more income for them (Vielers, Münderlein, & Koster, 2013; Wanroy & Wilson, 2006). However, allocating their time for work would reduce the time for their other needs, namely for their family life and recreation. Thus spending more time for work is considered as a determinant factor that generate work to family conflict, since work has taken most of the time to maintain employee's family live (Yeh, 2015; Clark, et al, 2014; Voydanoff, 2014; Kelly, et al, 2014). To reduce the risk of work to family conflict, one should compartementualize their organizational life and family life strictly.

Spending more time to work also increase employees' fatigue which increase the risk for employee's health and their psychological distress. Overwork and being unable to refresh their physiq and psychology also known factors for depression and physical illness, that force employees to take absence for health reason (Nätti, Oinas, & Anttila, 2015; Bannai & Tamakoshi, 2014). Another reason work hours become a stressor factor is because it generates work-family conflict for the worker (Yeh, 2015; King, et al, 2014; Voydanoff, 2014). However, it not always be the case that shorter work hours would be guaranteed less work-family conflict as concluded by Ruppanner & Maume which stresses the presence of an individualistic cultural ideology that interfere how worker balance their time for organization and family (Ruppanner & Maume, 2016). Long work hours make workers seek for an adaptive strategy for balancing their organization life and family life (Hill, Märtinson, & Ferris 2004).

Method

The literatur review concludes work hours is a multidimensional concepts that also useful to explain employee's work satisfaction. This article presents a model for the influence of the working time perception to employee's work satisfaction. Respondents are given questions with four responses categories coded in number 1 through 5 which are refers as follow: 1= very low, 2 = low, 3 = fair, 4 = high, 5 = very high. Our hypothesis is working time perception influences work satisfaction. To test this hypothesis, we survey 320 employees from various formal organizations. Form their responses, we built a linear relationship model between the two variables.

The working time perception variable is measured from employees' perception of the work hours at their workplace. Dispositional theory suggests that every individual is driven by their personality trait. Employees who are fit with the workting time arrangement as part of the work setting in their organization perceived the official work hours positively. The worktime perception variable value composed of the four dimensions, which include: Work time discipline (Xd1), Work time incentive (Xd2), Work time knowledge (Xd3), and Work time commitment (Xd4). The work time perception index is obtained with the following equation:

$$X = (\Sigma Xd1i) + (\Sigma Xd2i) + (\Sigma Xd3i) + (\Sigma Xd4i)$$

The respondents were given questions as follows:

The dependent variable in this study is job satisfaction. We follow the work of Timothy Judge in describing employee work satisfaction perception into four dimensions of personal trait, including self-esteem, self-efficacy, locus of control, and neuroticism. The measurement elaborated into four dimension variables, which include: Self Esteem, (Yd1), Self-efficacy (Yd2), Locus of control (Yd3) and neuroticism (Yd4). The job satisfaction index obtained by the following equation:

$$Y = (\Sigma Yd1i) + (\Sigma Yd2i) + (\Sigma Yd3i) + (\Sigma Yd4i)$$

Table 1: Instrument validity test for working time perception variable

1	I understand the terms of working time in my office	1					
2	I work 8 hours every weekday in my office	.314**	1				
3	I start working on time in my office every weekday	.308**	.416**	1			
4	I get off from my office accordance with the offcial working time every weekday	.215**	.433**	.504**	1		
	Working time knowledge	.505**	.782**	.762**	.810**	1	
1	If i came late I would delay to get off to fulfill 8 hours working time	1					
2	There are at least 10 days in a month when I work overtime at the office	.305**	1				
3	There are at least 10 days in a month I continue my work at home	0.073	.287**	1			
4	There are at least once in a month I work overtime at weekend	.188**	.283**	.378**	1		
	Working time commitment	.591**	.707**	.651**	.702**	1	
1	Coming late makes my salary/incentive get cut	1					
2	My chances of getting promoted will be less if I often come late for work	.432**	1				
3	My company will give me incentive if I start off and get off working on time	.306**	.347**	1			
4	The salary, incentive or provision of allowances in my office mention about working time	.432**	.394**	.576**	1		
5	I think the financial compensation and other benefits from my office are worth compared to my working time	0.008	.187**	.217**	.185**	1	
	Working time incentive	.685**	.697**	.742**	.783**	.428**	1
1	My supervisor gave me a warning when I came late for work	1					
2	My colleagues gave me a warning when I came late for work	.621**	1				
3	My working time duration is 40 hours per week	.246**	.224**	1			
4	For the past a week my working time is more than 40 hours	0.043	0.006	0.078	1		
	Working time discipline	.742**	.721**	.614**	.459**	1	

*p < .01; * p < 0.05; ***

Table 2: Instrument validity test for work satisfaction variable

1	I proud of myself when I finish my tasks on time	1						
2	I proud of myself when my boss recognize my job	.427**	1					
3	For me what I do at the office shows who I am	.339**	.427**	1				
4	I am ready with the consequences if I failed to finish my job properly	.246**	.187**	.308*	1			
5	I think I deserve to occupy my current position	.161**	.386**	.373**	.231**	1		
	Self esteem	.596**	.716**	.735**	.616**	.669**	1	
1	I am qualified to carry out my job at the office	1						
2	I can guide other colleagues to complete my routine tasks	.499**	1					
3	I deserve to get a promotion	.538**	.501**	1				
4	I have my own method to work effectively and efficiently	.549**	.373**	.487**	1			
5	My works have received recognition from my boss/supervisor	.431**	.392**	.454**	.426**	1		
6	My works have become a reference in my office	.458**	.403**	.431**	.421**	.593**	1	
	Self efficacy	.762**	.724**	.722**	.701**	.751**	.748**	1
1	I can adjust the rythm of my work	1						
2	I have never submitted my work over the deadline	.423**	1					
3	I can lead other colleagues in a team work	.280**	.242**	1				
4	I can decide my own whenever I start working	.238**	0.046	.186**	1			
5	I have the flexibility to complete my tasks	.352**	.151**	.171**	.515**	1		
	Locus of controll	.674**	.561**	.566**	.681**	.700**	1	
1	I feel anxious when my work have not finished yet	1						
2	I feel nervous with my colleagues judgments on my work	.363**	1					
3	I feel nervous with my supervisor judgments on my work	.366**	.735**	1				
4	I feel bad whenever I come late to work	.280**	.192**	.239**	1			
5	Getting off earlier from office's working hour make myself uneasy	.201**	.166**	.175**	.416**	1		
6	My emotional balance is not affected by my work	0.082	0.09	0.051	.152**	.184**	1	
	Neuroticism	.578**	.683**	.686**	.634**	.622**	.445**	1

*p < .01; * p < 0.05; ***

Product moment correlation is used to test the validity of each question to measure both of test variables. The validity test result show that all items are valid and included in the idex variables equation. A regression test is used to verify the relationship model between the two test variabel, that employees working time perceptions influence their work satisfaction. The regression test includes three satistical assumption, including normality test to ensure the varians of collected data is distributed normally; liniearity test of the two test variables to verivy the best model to depict the relationship between work time perceptions and work satisfaction.

Table 3: Instrument Reliability Test

Variable	Cronbach Alfpha
Work Time Perception	0.8
Work Satisfaction	0.8

p < .01; * p < 0.05; **

Participants

The respondent involved in this survey are those who has work more than 12 months. They are employees who work in government or privat institution with a formal working agreement. Therefore, all the respondent has sallary above the official minimum paymant in the city and considered as a middle income. Respondents were recruited using snowball sampling technique. The were given the questionnaire link via through their social media accounts.

Finding and Discussion

Workers have a low perception of their work time. However, the elaboration in the perception of work time variables shows the variation of values in its four dimensions. Measurement of the perception of work time divided into four dimensions. Workers who have a good work time discipline are punctual in starting work and returning from work. Their knowledge of the detailed regulations regarding their working time is also high. However, they tend to take for granted in responding to work time. They do not question the details of working time regulations in their respective institutions. However, workers are aware of the incentives provided by their offices concerning work time. They also realize that the remuneration system in their office no longer provides an incentive for working extra time. Thus, their commitment to completing work outside office hours is low. This particular finding supports the conclusion from the previous study that suggests workers prefer shorter work hours.

Table 4: Test Variable Dimensions Index Values

Work Time Perception Dimension Variables	**Mean**	**St.dev**	**Meaning**
Work time discipline	3.63	1.03	High
Work time incentive	3.57	1.12	High
Work time knowledge	3.94	1.08	High
Work time commitment	3.05	1.16	Fair
Work Satisfaction Dimension Variables	**Mean**	**St.dev**	
Self-esteem	4.39	0.80	High
Self-efficacy	4.31	0.73	High
Locus of control	4.15	0.765	High
Neuroticism	3.69	0.88	High
N = 320			

Most respondents have a high perception of work satisfaction. Based on the calculation results, the majority of employees have a high work satisfaction on self-esteem dimensions, self-efficacy dimensions, and the locus of control dimensions. The respondent has a lower score in neuroticism dimensions, but the score is quite close to the high margins. These findings confirm that highly educated workers have a relatively high level of anxiety. Since they have relatively long working time, this finding also confirms that longer work hours do put employees at a higher risk of distress. Based on the result of the index scoring from both of the test variables, we conclude that higher work time perception can lead to higher work satisfaction.

Table 5: Test variables index values

Test Variables	**Mean**	**St.dev**
Work Time Perception Variable	3.39	0.92
Work Satisfaction Variable	3.94	0.72
N = 320		

The descriptive analysis from this survey is consistent with the conclussion of most previeous studies on the meaning of worktime for workers. Employees prefere shorter working time. This finding also confirms the worker's perspective on the flexibility of work time. They perceived work time as the time they spent at the office to do activities that are related with their work. Therefor working overtime means the time that are spend to do work after official work hours, no matter where it takes place, eather in the office or other places. Thus, the ability to complete work task in the office, and not bringing work to home also support their work satisfaction.

Table 6: Linearity Test

Test	**F**	**sig**
Linearity	59.1188	0.00**
Deviation from Linearity	10.5	0.027

*p < .01; * p < 0.05; ***

perception variable and work satisfaction. The result shows that the Linearity *p* value is lower than 0.05 but the deviation from linearity *p* value is lower than 0.05 which means that the assumption of linierity model is not fully satisfied. Thus further analysis to test the linier model relationship is needed. We proceed to examine how exactly employees work time perception influence their work satisfaction by deviding work time perception variable to two categories using its mean value as the reference of separation. The model summary of the regression analysis is depicted in table 7.

Table 7: The Regression Model

Predictor	**R^2**	**F**	**B**	**SE B**	**β**
Higher Perception of Working Time	.141	26.416**	0.638	.124	0.375**
Lower Perception of Working Time	.004	.675	.093	.113	.066
Work Time Perception	.133	48.659**	.355	.051	.364**

*p < .01; * p < 0.05; ***

The test on the relationship model between two variables concludes that the work time perception variable only influence work satisfaction when it is perceived positively by the respondent. Based on the regression model, we interpret the appropriate model is that the perception of work time affects job satisfaction linierly. The model indicates the strength of the relationship between two variables is low, with an R-value of 0.364. The R^2 value indicates that the work time perception explains 13 % of their work satisfaction. Although work time perception only explains a limited amount of work satisfaction, the model is significant to represent the relationship between the two variables empirically.

The regression model developed from the survey results indicates a linear relationship between the test variables. It is reasonable to conclude that the higher attention of employees to their working time, the higher their work satisfaction would become. This finding is different from the group theory that stated working time have a nonlinear influence on employees' productivity (Beherens, 2013; Bannai and Tamakoshi, 2014). A linear model is more appropriate to explain the relationship between employees' working time perception and work satisfaction. There are two reasons explain this difference. First, the perception of work time is more complex than merely the amount of hours spent on work. Working time perception is a set of values compose from incentives, knowledge, discipline, and commitment regarding the working time. Each employee perceived the four components based on their personality. These multi-dimensional measurements can accommodate the contributions of the four factors which the employees consider when they allocate their daily time for work-related activities.

Second, this research also demonstrates how the work satisfaction could serve as a predictor of how workers respond to management flexibility. Employees are adapting to flexible work settings that are applied to serve employer's interests more than theirs'. A management culture with low trust has intensive control of employee behavior (Peetz, 2019). Management replaces hourly overtime wages with fixed monthly performance incentives. This makes employees are pursuing to meet all requirement to get a full incentive from their work, including working overtime. This phenomenon is becoming more intriguing because an individual-level each employee enjoys wage increases, but at the aggregate level, the employee's productivity decreases.

Workers' adaptation to working time arrangement reflected in the neuroticism dimensions. Based on the survey finding, the neuroticism dimension has the lowest value among the four dimensions of work satisfaction. These findings indicate a high intensity of management in regulating employees' behavior at work. Thus, workers understand that working hours are directly related to their income, so they are willing to work for a long time. However, long working hours are still limited only when they work in the office. Workers do not take their work home, so the time allocation for work, family, and recreation remains strictly compartmentalized.

Conclusion

A high-performance working system in a modern management system provides flexibility for work settings for employees. The implementation of this type of flexible work setting has created what is called numerical flexibility, which applied by arranging employees' working. Although every worker bounded by formal provisions enacted by their respective organizations, the respondents in this research responded differently to their working time setting arrangement.

Working time is significant because it is part of the daily lives of workers. The working time perception refers to the division of time allocation in one day, namely for work, family, and recreation. Moreover, work satisfaction can provide crucial information about the meaning of work time in the life of a worker.

Based on the research findings, there are several things to note between the effect of work time to work satisfaction:

1. The working time perception is more than mere knowledge about time. In a high-performance working system management, work time has become an integral part of the remuneration system. Thus workers also anticipate the incentive that they could receive form the amount of time they spend to work. It generates a complex perception that involves knowledge of benefit and behavior to achieve their interest.
2. Work time perception has a relationship with moderate intensity on work satisfaction. The nature of the relationship tends to be linear: the higher the working time perception, the higher the work satisfaction of an employee would become.
3. The majority of respondents involved in this survey were workers with a tertiary education background. So it is reasonable to assume that they are part of the blue-collar worker group that has relative freedom to determine their work arrangements. By considering the link between their working time perception, and their work satisfaction, the finding of this study support the theory of high-performance working system, which suggest that discretion for workers would raise their performance.

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Trends of Fast Food among University Students

Khairunesa ISA

Centre for General Studies and Co-curricular, Universiti Tun Hussein Onn Malaysia, Batu Pahat Johor, Malaysia,

Asliaty ATIM

Centre for Language Studies, Universiti Tun Hussein Onn Malaysia, Batu Pahat Johor, Malaysia

Abstract

The trend of students' food selection today has changed in line with the prevailing development. Food is no longer seen as only a necessity in life, but it also reflects the social status of students that sadly manages to overrule health issues and academic achievements. This study was conducted to examine the student literacy level on the effects of fast food consumption and the trend of fast food intake among students of University A. The results from the analysis found that the student literacy level on the effects of fast food intake was high with a mean value of 4.27 and most students only consumed fast food as snacks in the evening at their own residences. This fast food consumption trend shows that students did not consider fast food as their main meals but only as their light meals or snacks.

Keywords: food literacy, food consumption, fast food, academic performance.

Introduction

The current economic development of the world has caused a significant increase in the growth of fast food premises in many countries including Malaysia. This has also contributed to the changing lifestyle of individuals, especially on the food intake patterns and healthy eating habits. Today, food is not only seen as a basic necessity in life but is also associated with individual social status. Individuals who enjoy expensive food in luxury restaurants and fast food restaurants are said to have higher standard of living than those who cook their own meals at home. Not only that, the food trend at fast food premises has also become a culture of socializing, relaxing and meeting mediums to discuss business issues and completing assignments among students (Abdullah and Ali, 2011).

Life in the university has changed students' lifestyles. Students are responsible for determining their own food intake patterns comprising of healthy, balanced diets. This is because the food intake practices among students would affect their health and academic achievement (Abdullah and Ali, 2011). Imbalanced diet would cause psychological effects as well as chronic diseases and non-communicable diseases such as obesity, diabetes, hypertension and cardiovascular diseases (Ha and Caine-Bish, 2009). Unhealthy eating habits would cause the students to become lethargic and unable to focus during their learning session (Azeman, 2017).

Within four years, Malaysia has experienced an increase of 27% in obesity; from 10.5% in 2010 to 13.3% in 2014 (The Star, 2018). In 2015, Malaysia continued to be the nation with the highest rate of obesity in Southeast Asia with an increase of 18% (Bernama, 2019). This status reflected the health of Malaysians where many of them were vulnerable to the dangers of non-communicable diseases (NCDs) such as diabetes, cardiovascular diseases and hypertension. National Health Morbidity Survey statistics (NHMS) in 2015 once again showed that Malaysia has become an obese country, where one in two adults were overweight or obese. While in 2018, 5.5 million Malaysians (30.6%) experienced the problem of obesity (Bernama, 2019).

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What is more alarming is that, if these statistics continue to increase, the population density of Malaysia will include a high number of obese people and the country will face the risk of having the highest record of non-communicable diseases. In addition to that, QSR Brand has planned to open at least 67 new KFC outlets and 60 Pizza Hut restaurants throughout Malaysia by 2021, along with 50 KFC drive- through at PETRONAS stations throughout the country during the same period (Bernama, 2018). In terms of students' food intake patterns, a well-balanced diet will affect their health, as well as their physical and mental developments or responses in the learning process. Therefore, this study was conducted to examine the level of student literacy on the effects of fast food intake and the trend of fast food intake among students of University A.

Literature Review

Food is a basic necessity for living things to survive. Other than enabling people to move and be healthy, food is also needed to help protect the body from being vulnerable to disease threats. The world of nutrition has transformed from cases of health problems that were due to lack of nutritional food to cases of food surplus such as obesity, cholesterol, diabetes, hypertension and heart diseases. The Lancet Journal in 2011 reported that nearly 350 million adults worldwide had diabetes, which had doubled since 1980 (Zhou *et al.*, 2016). Meanwhile, Malaysia is said to be the fattest nation with the highest obesity rate in Southeast Asia, besides ranking sixth in the Asia Pacific region and 17th in the world in terms of the number of people with diabetes (The Star, 2018). It is said that about 54 percent of adults are obese and this shows that seven out of 10 adults in Malaysia are suffering from chronic illnesses (The Star, 2018).

There are many factors that influence the trend of food selection among students such as food environment, habits, traditions, food traits and individual social status (Bailey and Tian, 2002). Students prefer to select and buy food based on a number of things such as the quality of service, price and buying incentives (Verma, Plaschka and Louviere, 2002). Meanwhile , argued that the selection of food can be influenced by psychological aspects, according to the individual psychological influence on food selection stated by (Yeung Ruth and Morris, 2001). Some view by (Abdullah and Ali, 2011) discovered six aspects that influence students' food selection which are the menu, meal time, eating venue, meal expenses and respondents' perceptions about the eating purpose and other food related matters.

There are two factors that affect the selection of food which are the internal factors such as individual physiological needs and health, and external factors which are social demand. According to (Li, 2011), the price of food and the suggestions given by parents are the factors that strongly influenced students in their food selection. However, the attitude of parents who are more likely to buy food than to cook meals at home has caused children to become obese. Therefore, it is not a surprise when the United Nations Children's Fund (UNICEF) study shows that child obesity in Malaysia is second highest in Southeast Asia, after Brunei (Liyana Hasnan, 2019).

Findings by (Maria Erica S.D. Dumlao., 2014) showed three main factors that affect the selection of food among students, namely demographic characteristics, food characteristics and the frequency of the food menus offered. She added that income level in the demographic characteristics is said to influence the selection of food amongst students, besides food characteristics such as food size, food presentation, cooking preparation and value for money (Maria Erica S.D. Dumlao., 2014). (Blešić *et al.*, 2018) also found that other factors such as food quality, food presentation, menu options, hygiene, service and distance influence individuals in selecting their food items.

Research Methodology

This study involved 130 students, who were randomly selected from University A. Questionnaire was used as the instrument to determine the level of student literacy on the effects of fast food consumption and the trend of fast food intake among students. All data was analysed descriptively using SPSS version 20. The 5-mark scale measurement which are 1- strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree were provide in the questionnaire items. It classified into low,

moderate and high with the indicator based on the Mean score as shown in Table 1 which indicate as student literacy level on the effects of fast food intake.

Table 1: Indicator of student stressor

Grade	Score Mean
low	0.00 - 1.66
moderate	1.67 - 3.33
high	3.34 – 5.00

Result and Discussion

A total of 130 students consisting of 61.5% women and 38.5% men were involved in the study. More than half of the respondents (62.3%) aged 21-26 years old while 36.2% were below 20 years old. Majority of the respondents were staying in the residential college. The demographic respondent is tabulated in Table 2.

Table 2: Demographic of respondents

Variables	Attributes	Frequency	Percentage
Gender	Male	50	38.5%
	Female	80	61.5%
	Total	**280**	**100%**
Age	≤20 years	47	36.2%
	21-26 years	83	63.8%
	Total	**280**	**100%**

The results of the analysis show that the student literacy level on the effects of fast food intake was high with a mean value of 4.27 where almost all students stated that fast food had a negative impact on health. Most respondents agreed that fast food such as snacks or junk food could contribute to kidney damage (67.7%) and dementia (36.2%), whilst majority of the respondents (93.6%) agreed that carbonated drinks may contribute to diabetes. In the context of fast food such as burgers, fries and pizzas, almost all of the respondents (94.6%) agreed that frequent intake of fast food could induce obesity. The findings show that although students were aware of the negative effects of fast food intake, more than half of the respondents agreed that the selection of fast food was made due to quick service (62.8%), good taste (58.9%) and cheap (31.4%).

Nevertheless, the analysis shows that the frequency of students' fast food intake was at a moderate level with a mean value of 2.50. This shows that most students consumed fast food in moderate quantities where most of them 'always' had instant noodles (21.5%) followed by fries (15.4%) and soft drinks (13.1%). Most respondents had these selections of fast food for dinner after 7pm at home (62%) compared to only a small number of students (4%) consumed fast food for dinner at fast food premises.In addition to that, the level of intake for other selections of fast food such as burgers (47%), pizzas (68.5%) and nuggets (56.2)was relatively low. This shows that students still had the awareness to choose a healthier meal options, rather than eating unhealthy food that taste good (Ika Suswanti, 2014).

Conclusion

In conclusion, it can be argued that University A students had a high degree of literacy on good nutrition practices and the negative impact of fast food intake. Respondents agreed that fast food

intake have negative impact on the health and body system, as well as the academic achievement of the students. According to 1 excessive fast food intake would affect the students' academic achievement. Even when there is no scientific evidence to confirm the findings, scientifically, the high content of chemicals and seasoning ingredients in the provision of fast food will have adverse effects in the long run. Because of this, only a small number of students consumed fast food such as instant noodles on regular basis as they found that fast food is quick, delicious and cheap 14. Meanwhile, the selections for other fast food such as fries, burgers and pizzas among students may be due to the influence of advertising on mass media and the rapid growth of fast food premises in the surrounding areas, besides their quick service and relatively low prices compared to other traditional food 11.

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Youth' Willingness and Challenges in Volunteerism: Student Perspective

Khairunesa ISA

Center for General Studies and Curricular, Universiti Tun Hussein Onn Malaysia,
86400 Parit Raja, Batu Pahat Johor

Asliaty ATIM

Center for Language Studies, Universiti Tun Hussein Onn Malaysia,
86400 Parit Raja,Batu Pahat Johor

Fadzlunesa ISA

Faculty of Social Science and Humanities, Universiti Teknologi Malaysia,
81300 Skudai Johor

Johanisma JAMIN

Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia,
86400 Parit Raja,Batu Johor

Abstract

Volunteering is not only give benefit to the recipients, this noble pursuit will also present a positive impact on individual self-development especially among youth. As youth, they are encouraged to be actively involved in voluntary activities in order to train themselves with good soft skills. However, youth participation in volunteerism is said to be at an unsatisfactory level. Therefore, this study was conducted to determine the youth' level of willingness to participate in voluntary activities and discuss the challenges faced by them in participating in the activities. The findings show that the students' level of willingness to participate in voluntary activities was positively high and the level of the challenges faced was only moderate. In conclusion, it can be suggested that a clear understanding and recognition of the concept of volunteerism need be emphasized in order to produce more youth who have the spirit of volunteerism.

Keywords: Volunteerism, Self-development, Willingness, Motivation, Challenge, Youth development.

Introduction

Volunteerism is a concept of work or service that provides aid willingly and sincerely without being forced by any party or intending to obtain any material compensation (Bahari, 2004). Voluntary work can produce an individual who are sensitive and accountable to the social and environmental issues of the community because they are motivated to help solve the imbalance in the society. Bezruchka (2000) defined volunteerism as a deed of serving the community with no expectation of either reward, payment or exchange of goods. Based on that concept, Houle and Kaplan (2005) found six core values required for the development of volunteerism, which include paying no attention to remuneration, sincerity or willingness, mental and psychological readiness, high commitment, selflessness and sacrifice.

Youth participation in various areas of volunteerism such as community service, technical, sports, health, publications and cultural arts can enhance their own identities. Youth is the time of life when

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one is young, and often means the time between childhood and adulthood (Macmillan, 2009). As a student, they can confront more obstacles than others throughout the responsibilities that they faced while managing the campus life and adjust to the new challenges (Tinto, 1987). Based on the volunteerism concept, it is assumed that participating in voluntary activities will produce more disciplined and confident students as well as able to manage time more systematically (Haski-Leventhal and Bargal, 2008). Therefore, they are strongly encouraged to be engaged in voluntary activities. According to Mabry (1998) students who are involved in voluntary activities will undergo significant changes in terms of the social values that they have. This is because of the informal learning process acquire while interacting with the communities during their voluntary activities.

The spirit of volunteerism is considered as a core value for modern society especially among the younger generation (Batson *et al.*, 2002). Youth participation and engagement in volunteerism is an increasingly important issue in order to meet the development and challenges of individual and community well-being (Tamam and Hashmi, 2016) as it trains the youth to be selfless and more caring in helping to improve the quality of other human lives (Geiser *et al*, 2014). In addition, voluntary activities are also found to assist in reinforcing skills, socializing and having the passion to be with other people. However, according to Muhamad and Alauddin, (2013), besides committing to volunteerism, wanting to join and participate in any voluntary activities could also be challenging for youth. Because of this, the level of youth willingness to participate in voluntary activities is said to be disappointing (Suzanah *et al*, 2014). Although these activities promise experience, promoting good habits and good reputation of the youth, students are reluctant to play a role and contribute in charitable activities. According to Tamam and Hashmi, (2016), Warren *et al* (2014) and Abdullah *et al.* (2012) also demonstrated that youth involvement in social activities is still at an unsatisfactory level. Meanwhile Lim and Buntat (2006) stated that university students' participation in voluntary programmes is still inadequate and what more disappointing is that, some students consider voluntary programmes as a waste time and unbeneficial (Sarah, 2018). Hence, this study aims to determine the students' level of willingness to participate in voluntary activities and to discuss the challenges faced by students in participating in the activities.

Literature Review

Astin and Sax (1998) stated that students' engagement in voluntary activities will not only enhance their academic and co-curricular performance, but it also cultivates a sense of responsibility to help the needy communities. Similarly, according to Muhamad and Alauddin (2013), with volunteerism, youth can enhance their value in their self-esteem. By performing the volunteering activities, will reflected someone action and their leadership (Gibson, 2006) (Hartenian and Lilly, 2009). Hence, the positive vibes of volunteerism can be reflect not only to the students, but also to the university and community itself (Aizuddin, 2017). Meanwhile, Musick and Wilson (2003) pointed out that participation in voluntary work would have a positive impact on individuals, especially in improving their physical well-being, expanding and maintaining social connections as well as solving the social issues in the community. Besides, Palumbo (2015) and Miller (2014) found a significant relationship between volunteerism and performances in group in their previous studies on pro-social behaviors' literature. As a result, an autonomous motivation, leader self-sacrifice and self-independent will be produce by youth among university student in voluntary activities (Ogueji and Udegbe, 2019). The theory to dedicate more effort to volunteerism can help youth to gain the ability to understand others situation and empathy between the youth and others welfare (Bidee *et al.*, 2013).

According to Mohd Ismail Mustari (2005), the society considers youth as an age group that symbolizes speed, rejuvenation, strength, excitement, joy and all the beauty and perfection. In order to uphold these perceptions, youth are encouraged to be engaged in voluntary activities, which suit their emotional and physical abilities to help other people who are faced with problems. Furthermore, according to Wilson and Atangambuyu (2019) voluntary activities can be considered as a way to express gratitude and the way they can giving back to society to help ease the suffering that others were going through. Also moreover, voluntary activities can help to satisfy the desire of physiological and safety needs as state in Abraham Maslow's hierarchy of needs through communication in volunteerism (Johns and Saks, 2001). As according to Muhamad and Alauddin

(2013) engaging in volunteer activities can help to bring out the nature of altruism which means the desire to do good thing to others and feeling relieved to be able to help others (Clary *et al.*, 1998). As a result, youth development policies and agendas, either planned by the government or voluntary organizations or NGOs, will not be successful without any voluntary participation at various levels (Bang and Ross, 2009). In fact, it is difficult for these organizations to act without voluntary participation by youth. However, Chacon *et al.*, (2010) and Dorsch *et al.* (2002) argued that volunteering in terms of organizing, agenda development, community programme and its importance need to be more acknowledged by youth. This is because certain parties believe that volunteerism is an implicit manifestation that coexist in the work of youth societies instead of operating on its own.

According to Turiman *et al.* (2009), one of the mechanisms for young people to positively interact with the community is through youth organization. This is because the goal of youth organization include mobilizing youth resources; establishing networking among young members; developing the spiritual and physical strength towards morality; encouraging young people to be responsible citizens; developing the caring spirit; involving youth in the planning, implementation and evaluation of development programs; and developing the spirit of solidarity and volunteerism (Azimi *et al.*, 2002). Support that statement, Bahari (1995) state that another channel to train youth soft skill is through volunteerism activities.

Universities are among the best platforms that provide opportunities for students to train themselves in volunteerism. The implementation of university-community engagement (UCE) concept can be the basis for honing and instilling volunteering elements or behaviours amongst students (Isa, 2017) as the programme trains students to interact and deal with real-life environments. Through real- life experience of carrying out programmes with the community, students are trained to be more motivated to participate in voluntary work. According to Hussain and Yasin (2017), motivation is an important element in relation to students' participation and interest in voluntary activities (Chacon *et al.*, 2010; and (Geiser *et al*, 2014).

Participation in voluntary activities is closely linked to religious, cultural, and socio-political values as they are interconnected and influential in the success of volunteerism (Grönlund *et al.*, 2011), which not only involves the targeted groups but also the volunteers. According to Chacon *et al.* (1998), psychosocial factors such as caring, motivated, socially supportive and self- satisfaction in carrying out activities also influence students to be engaged in voluntary activities. On the other hand, Bowman (2009) and Fiorillo (2011) found that monetary rewards do not affect individual motivation in voluntary activities. However, Finkelstein (2008) found a connection between satisfaction and motivation in joining voluntary activities. According to Finkelstein (2008) volunteers who achieve high level of satisfaction in their voluntary work will be more motivated to continue volunteering. Supporting Chacon *et al.*, (1998), Van Vianen *et al.* (2008) also found that there is a relationship between culture and satisfaction in carrying out voluntary work while personality is not a dominant factor that influence individual satisfaction in volunteerism.

McBride *et al.* (2012) argued that voluntary activity is a programme that assists particular groups of people. It is not only beneficial to the assisted groups but also to the volunteers who provide the assistance. Therefore, in order to ensure that voluntary programmes benefit both parties, voluntary activities must meet the expectations of both parties and maximize the benefits to all (McBride *et al.* 2012).In the context of the volunteer, self-preparation should be taken seriously so that the goal of the voluntary activities can be achieved. According to Batson *et al.* (2002) and Dorsch *et al.* (2002), before volunteering youth should acknowledge certain aspects such as personality, society, environment, system, regulation and all relevant parties. Meanwhile Baum and Lockstone (2007) and Pearce (1982) argued that this requires certain strategies and agendas in order for youth to highlight their potential, for example training, exposure and encouragement so that they will eventually be motivated to voluntarily contribute to the society and the nation.

Besides, volunteers are individuals who spend lot of their time to help community members without being materially rewarded; they assume responsibility for voluntary activity, seeking personal satisfaction and acquisition of new experience (Adler and Benbunan-Fich, 2011). According to Cook *et al.* (2013), the need to volunteer is motivated by self-interest. It assumes that self-interest has no genetic basis. The theory hypothesizes that social exchanges comprise actions conditional on the

rewarding actions of others i.e. it can increase the probability that someone will help us in return in the future; it can relieve the personal distress of the bystander; and it can help us gain social approval and increased self-worth

Meanwhile, Gombe *et al.* (2015) found that benefits, needs and reasons to volunteer are important factors which influence an individual's decision to participate in volunteering activities. Even though Eley and Kirk (2003) state that young people volunteer for different motives and benefit than older people because young people always seek the opportunity to gain work-related experienced, skills and extra qualification that can help them in their education and career. With this in the long term, they will know what kind of benefits, needs and reason to focus in order to expend the number of potential volunteers.

Research Methodology

To obtain data from the respondents, the survey that utilised questionnaires was implemented in this study. This quantitative study involved 200 randomly selected students from University A. The development of an item was referred to the previous quantitative and qualitative research. The questionnaire was divided into three sections where section A contain two question that measured the respondents' demographic information and section B contain two question that was administered to determine the students' level of willingness to participate in voluntary work and the challenges in their participation in the activities. That two question were developed by providing with 5-mark scale measurement which are 1- strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree. The grade then is classified to low, moderate and high with the indicator based on the Mean score as shown in Table 1. The grade then is classified to low, moderate and high with the indicator based on the Mean score as shown in Table 1. Low, medium and high are indicated as level of stress of the students. Section C was provide eight random question, designed to comprehend better regarding the student's thoughts in their voluntary work. The answer was only provided with yes and no option to measure the frequency and the percentage. All data was descriptively analysed and interpreted using SPSS version 20.

Table 1: Indicator of student stressor

Grade	Score Mean
Low	0.00 - 1.66
Moderate	1.67 - 3.33
High	3.34 – 5.00

Result

A total of 200 students were involved in this study where 62.5% were females and the remaining 37.5% were males. This analysis manages to successfully support the findings of Murtaugh, *et al.* (1999) which stated that women are more motivated to participate in voluntary activities because women are more concerned about issues related to society and welfare than men. However, Ekerdt (1986) argued when it was found that men were more likely to participate in voluntary activities than women. Almost all respondents in this study were between 19 and 24 years old and only a few were over 25 years old. However, the age range of the respondents still represents the youth. Table 2 shows the number of respondents based on the demographic. The result for section B and section C were indicate in Table 3 and Table 4 respectively.

Table 2: Demographic of respondents

Variables	Atribites	Frequency	Percentage
Gender	Male	75	37.5%
	Female	125	62.5%
	Total	280	100%
Age	19-24 years	169	84.5%
	≥25 years	31	15.5 %
	Total	280	100%

Table 3: Mean score of student willingness and the challenge

Items	Mean
Students' willingness to participate in volunteerism	4.25
Challenges faced by the respondents to participate in voluntary activities	3.07

Table 4: The student's thoughts about their voluntary work

Items	Frequency	Percentage
Agree voluntary work increase their confident	255	91.0%
Agree voluntary work make them more responsible	242	86.4%
Ready to participate in voluntary work if had a chance	199	71.0%
Not expected any reward from doing voluntary work	209	74.6%
Being student not restricted them from joining voluntary work	163	58.2%
Family not obstructed them from joining voluntary work	234	83.6%
Self-confident was one of the challenges in joining voluntary work	209	74.6%
Transport was one of the challenges in joining voluntary work	226	80.7%

Discussion

This study complements the findings of Smith et al. (2010) that stated volunteerism is more beneficial to the youth. The findings showed that more than half of the respondents (62.1%) were staying in the residential college while the remaining respondents were staying in rental houses away from the university area. Thus, location was also one of the factors that influenced students' involvement in voluntary activities.

The analysis shows that students' willingness to participate in volunteerism was high with the min value of 4.25. This finding directly reflects students' clear understanding on the concepts and benefits of joining voluntary work. The result supports previous findings (Ibrahim and Amin, 2015; Hussain and Yasin, 2017; Smith *et al.* 2010; *Grönlund et al.,* 2011 and Chacon *et al*., 1998 which stated that the understanding of the concepts and benefits of participating in volunteerism would influence students' willingness to volunteer and participate in voluntary work. Stronger evidence can be seen when almost all respondents (91%) agreed that voluntary activities could increase their confidence and 86.4% believed that voluntary activities made them to be more responsible. Recognizing the benefits gained by joining voluntary work, majority of the respondents (86.5%) acknowledged that they would encourage their friends to participate in voluntary activities. According to Smith et al. (2010) individual tendency to participate in voluntary activities varies depending on the persuasion and influence of fellow volunteers

regardless whether they are active, semi-active, professional, non-skilled, spontaneous or associate volunteers (Bellamy, 2001).

In line with the concept of volunteerism, which is to provide aid willingly in any circumstances, more than half of the respondents (79.1%) stated that they were always ready to participate in voluntary work. 74.6% of the respondents opposed the idea of expecting rewards and material gains as the key goal to participate in voluntary activities. According to Hustinx *et al.* (2010), student volunteers were influenced by a mix of motivations and benefit. Nevertheless, Allen *et al.* 2008 found that most people who participated in volunteer-related work aimed at gaining intrinsic satisfaction and rewards such as found on Sani (2013) that other factors can motivate youth to participate in volunteerism include wealth, health status, level of socialization and family status. This finding shows that the respondents understood and successfully embraced the concept of voluntary work. In support of the findings, Hussain and Yasin (2017) also found that appreciation in the context of the spirit of volunteerism needs to be based on the understanding, feelings, beliefs, practices, attitudes and positive encouragement on how to alleviate the problems in the society.

In terms of the challenges faced by the respondents to participate in voluntary activities, the findings show that the respondents faced a moderate level of challenges with a mean value of 3.07. Half of the respondents (58.2%) stated that being a student did not restrict them from being involved in volunteerism. This shows that students were able to allocate their time between being a student and participating in social activities especially in helping those in need. Additionally, almost all respondents (83.6%) stated that parents were not an obstruction for them to participate in volunteerism. This finding further supports the findings of Hussain and Yasin (2017) who discovered that family factor had a high mean of 4.38 on the involvement of students in voluntary activities. This suggests that not only did students recognize the benefits gained from the activity, but parents were also found to be supportive of their children's participation in activities that could enhance their potentiality.

Although the students showed a high level of willingness to participate in voluntary activities there was still a little constraint for students to participate in the activities. This is because 74.6% of the respondents mentioned that self-confidence was one of the challenges for them to participate in volunteerism. This is probably because the respondents needed longer periods of engagement in voluntary work in order to enhance their self-esteem before becoming a professional volunteer. In the context of convenience, almost all respondents (80.7%) stated that transportation was also a challenge for them to participate in volunteerism. Staying in residential college and their status as first-year students who are not allowed to bring any vehicles to the campus limited the students' participation in voluntary activities. Sani (2013) added that high level of academic load, commitment with chores, assisting with domestic work and absence of immediate benefit from the community are some factors influenced low participant of youth. On the whole, the findings show that there were no major obstacles that hinder the students' participation in voluntary work.

Conclusion

The level of willingness to participate in voluntary activities among students was positively high. Recognizing the importance and benefits of such activities, especially in terms of self-enrichment, it was found that these students made an effort to manage their time in order to create a balance between academic and volunteerism. Hence, a clear understanding and recognition of the concept of volunteerism can produce a sincere youth in helping the needy. In addition, motivation in volunteering can be promoted once student discover the impact of their participation. The challenges and shortcomings faced by youth in volunteerism will not stop them from pursuing their participation and engagement in voluntary work, but it will be a great platform for them to serve and give their best impact to the community and the nation.

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Transparency in Banking Financial Reporting Evaluation System

Liviu-Adrian STOICA, Ph.D.

Bucharest University of Economic Studies, Bucharest, Romania
liviu.stoica@csie.ase.ro

Abstract

This paper analyses the public annual reports of different banks, published online each year and put to public disposition to be checked, on the data and information exposed about the bank financial indicators, to determine how the transparency is approached by each bank and the level of confidence that it creates. In the same time, the paper tries to define a system of best practices of transparency of data that should be exposed as a minimal requirement trying to propose a mathematical model for reporting evaluation system that show the level of transparency of the bank and same time trying to identify any misuse or trying to hide sensitive data. The scope of the mathematical system is to calculate the transparency level of reports that is a main component of the trust level that a person should or can have in the bank and, in the same time, showing the stability of the future of the bank.

Keywords: Transparency, Analysis, Bank, System, Evaluation model

Introduction

The reports published by the banks for the public transparency are prepared in order to meet the transparency and publication requirements provided by the Regulation of the National Bank of Romania no. 5/2013 on prudential requirements for credit institutions, as subsequently amended and supplemented, as well as Regulation no. 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment companies and amending Regulation (EU) no. 648/2012. The EU regulations 648 scope is the "strengthening of the Financial System calling for internationally consistent efforts that are aimed at strengthening transparency, accountability and regulation by improving the quantity and quality of capital in the banking system once the economic recovery is assured. The introduction of a supplementary non-risk-based measure to contain the build-up of leverage in the banking system, and the development of a framework for stronger liquidity buffers".

A well-informed public on the role and functions of the bank and understanding the economic reasons and data taken into account in establishing the bank decisions is an important factor in achieving its fundamental goal maintaining financial stability. Understanding the importance of transparency and institutional accountability, the bank should permanently provide the public with information, statistical data and detailed explanations on its own activity and the used system, as well as analyzes on domestic and international macroeconomic and financial future developments. The main instrument for assuming institutional responsibility is the presentation to the public, on the end of each year, of the activity report for the previous year, a document accompanied by the financial statements and the audit report.

The rules and regulations that requires bank to present the transparency reports about the decisions it makes, the planning on the future, the risks identified etc., let the bank choose what to expose and until what level they expose this information.

The need of this mathematical approach came from interpreting and analyzing the reports exposed by the banks to try and determine which bank is more transparent in the financial decisions. The model of the system tries to identify the exposed elements that are needed as a minimal necessity for the

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population to have an increased trust in the bank as stability and future and make the evaluation for it. In the analyze are taken under evaluation different banks statements from Romania, from different years.

The mathematical system proposed to quantify the total transparency level of financial indicators presented by the bank determine a main component of the total transparency level of bank, which include the other data presented by the bank to the customers such as detailed contracts, presentation of assets etc. The main decision on transparency based on the financial indicators presented by the bank to the public is because the decision is made before actually work or interact with the bank in any way. The other scoring coming from the easiness of reading and understanding a contract or information's offered in the offices about bank products or how detailed the customers are informed about bank assets come after the interaction with the bank.

Mathematical Approach

Based on the reports published by the banks, correlated with the rules and regulations imposed by the law the paper analyses the exposed financial indicators, how they are presented, the level of details about them and if they respect all the rules and regulations.

The system is composed from subsystems that can be identified as categories and for each category is proposed a formula of evaluation in points of measurement to try quantify everything unitary. The test cases and analyze is based on the documents provided in the bibliography. The minimal subsystems identified are:

1. Organizational structure (OS)

a. Overview that include (OW): type of organization of the bank, registered office address in clean and details, order number from the Trade Register, unique registration, number from Register of Credit Institutions. share capital value and others, all not under GDPR restrictions;

b. shareholding structure (SS) – under GDPR but was respected because on individuals is without name or other details, just as percentage;

c. management body (MB) – under GDPR, presented the organization - name and position but without physical address or other information, most of the persons can be linked between name and email address from the bank site and contact information;

d. subordinate committees (SCO) – under GDPR, but presented only the organization and what each committee attributes and duties have without exposing any name employee.

All the data of the overview presentation help to identify the exact location of the bank, so anyone can find and communicate with and all the data required for identification as a business. As mention is the value of the share capital which can increase or decrease the trust in the capacity of the business or crises coverage. The data of the shareholding present the expose of the investment of bank structure, the management body with the names detailed let the persons be identified, their curriculum vitae analyzed for public to check the experience of the management or any kind of background activity.

The subordinate committees present the decision structure and how the bank works, making a presentation of the future stability on the decisions took in the name of the bank.

The formula proposed is:

$$OS = OW + SS + MB + SCO, \text{ where:}$$

$$OW = \sum_{i=1}^{n} OWe_i \text{ , where:}$$

OWe = element of overview presentation that describe the bank, can have values from 1 to 3 depending of the data exposed as: identification parameters have value of 1, contact parameters have value of 2 and financial parameters have value of 3

i = current element and n = number of elements of overview presentation

SS – if it exists have a value of 5 if describe the overall structure or 10 based on how detailed it is, else 0
MB = NP * PD, where:

NP = Number of positions in management
PD = positions details, where 1 for no other information, 2 for name only, 5 for name and seniority in work and 10 for name, seniority in work and curriculum vitae

$$SCO = \sum_{i=1}^{n} NSCO_i * SCOR_i, where:$$

NSCO = subcommittee identified in report and described
SCOR = number of rights and decisions that a subcommittee can have
i = current element and n = number of subcommittees

2. Internal control framework (ICF) present the description, objectives, and functions (risk management function, compliance function, internal audit function) - not under GDPR restrictions. A very good mention is the 'Whistle Blowing' (as defined by EU rules and FIRST BANK report: "an inviolable basic attribute of the internal alert policy is the protection of the anonymity and the principle of confidentiality of the data of the persons submitting such reports, as well as the assurance that their current position and / or future professional development will not be affected as a result of issuing the report") that increase the trust in the security policies and efficiency of the bank – under GDPR and respecting the anonymity of the report sender.

The evaluation proposed is:

$$ICF = qDE + \sum_{i=1}^{n} Cf * FNC + WB, where:$$

qDE = coefficient of description, with values from 1 to 5 based on the elements included in description like objective, structure, rules, risks, organization, each element having 1 point
Cf = is coefficient for functions calculated based on the product of committees involved and objectives associated (CfCi * CfOa), each committee and objective exposed have a value of 1 point
FNC = function described

i = current function and n = number of functions

WB = recommendation of information classified and anonymous, with a value of 50 (this high value was chosen because it proves the intention of the bank to be serious and transparent without any flaws or bad practices)

3. Recruitment and remuneration practices (RRP) that include the description of selection criteria at hierarchical level, necessary competencies, professional experience and the remuneration model, performance, including penalties.

RRP = RLD + RSC + RRM + RDE, where

RLD = recruitment description level evaluated from 1 to 10 based on the information exposed, where 1 represents just the positions offered and 10 position with the full details of the job description and responsibilities, where each detail has a value of 1 point

RSC = recruitment selection criteria evaluated, as a product from 1 to 5 based on the selection criteria detailed on level in hierarchy and 1 to 5 on the competences and experience needed, where 1 represents just the minimum selection criteria (as example you need bachelor degree or competence in Office products) and for 5 the studies with specialization, years of work etc. or all the requirements needed as abilities, competencies etc. , where each element identified have a value of 1 point

RRM = recruitment remuneration model, evaluated from 1 to 20, where 1 represent just an evaluation of salary as good salary or good remuneration and 20 all descriptions based on the policies applied,

position detailed, salary composition, bonuses and penalties, where each policy described have a value of 2 points

RDE = recruitment detailed elements from 1 to 20, based on values and details exposed, where 1 describes just the organizational structure and 20 full details on the elements such as members of the management body in its supervisory function, members of senior management, investment services, retail services, management assets, corporate functions, independent control functions, other areas of activity, number of employees total employees full time, total net profit, total remuneration, total remuneration varies, where each element described have a value of 2 points

4. Objectives and policies regarding risk management (OPRRM) defined by risk management strategy and processes, types of significant risks and risk strategy parameters, including presentation and quantification of risks based on the identified risk level and establishing the general risk profile.

$$OPRRM = nS + nP + nTR + nPRS + 2 * GR$$

nS = number of strategies presented
nP = number of principles used
nTR = number of types of risks identified
nPRS = number of parameters for risk strategy
GR = general risk, from 10 to 50 where 50 is low, 40 is medium-low, 30 is medium, 20 medium-high and 10 is high or -100 if is not presented because that denote a hiding of risk exposure which affect the overall transparency level in the bank reports

5. Risks (REV), formed from Credit risk and associated risks (credit risk, risk of concentration, counterparty risk, residual risk, macroeconomic risk, the risk coming from the foreign currency lending activity of the debtors exposed to the foreign exchange risk, settlement risk, country risk), Market risk (interest rate risk, exchange rate risk), Liquidity risk, Operational Risk, Reputational Risk, Other risks (interest rate risk outside the trading book, strategic risk, regulatory risk, risk of excessive use of leverage) and each of them should include the actions taken by the bank, evaluation and identification methods, monitoring, reduction and control procedures and reporting procedures.

$$REV = \sum_{i=1}^{n} CR_i + nM + nRCP + nRP + vDR, where:$$

i = current risk and n = number of risks

CR = value of risk calculated as:

$CR_i = nActB_i * nEIM_i$, where:

nActB = value from 1 to 5 based on number of actions taken by the bank, each action has a value of 1 point

nEIM = value from 1 to 5 based on number of methods used for evaluation and identification, each method has a value of 1 point

nM = value from 1 to 10 based on number of monitored aspects, each monitored aspect have a value of 1 point

nRCP = value from 1 to 10 based on number of reduction and control procedures, each procedure has a value of 1 point

nRP = value from 1 to 10 based on number of reporting procedures, each report has a value of 1 point
vDR = value of 0 to 15+ depending if it has examples of detailed reporting, 5 points for each LCR (coverage liquidity requirements), NSFR (stable financing), ALMM (liquidity indicator and immediate liquidity), as example LCR should include stock of high-quality liquid assets, cash outflows, cash

receipts, net cash outflows = MAX ((Outputs - Inputs), 25% Outputs), liquidity requirement coverage indicator (%), or 0 if none, and more than 15 if more.

6. Own funds and capital requirements (OFCR) based on Regulation of the National Bank of Romania no. 5/2013 on prudential requirements for credit institutions and Regulation (EU) 575/2013 on prudential requirements for credit institutions and investment companies with subsequent amendments and completions.

It should include information about equity, adjustments fiscal impact, intangible assets (net value), subordinated loans, unrealized gains resulting from the fair value measurement of financial assets available for sale AFS (20%), prudential filter (20%) and own funds total. The main regulated characteristics of own funds based on level 1 own funds and level 2 own funds and the value of Tier I own funds and Capital requirements for credit risk, market risk and operational risk. The risk weighted assets (RWA) should be calculated in accordance with the provisions of Regulation (EU) no. 575/2013 of the European Parliament and of the Council, using the standardized approach. The value of the risk-weighted exposure is calculated using the fixed risk (RW) weights and depends on the type of debtors (company / retail) and the external rating (if available).

The value of OFCR is based on the number of the information presented, how many indicators are with their value, having 1 point for each indicator identified.

7. Quantitative and qualitative information (QQI) on credit and concentration risks exposing the details on remaining credit (past due), impaired credit, specific credit risk adjustments (SCRA) based on the concept of improbability referred to in Article 178 (3) (b) of Regulation (EU) No 575/2013 and total and average value of net exposures.

The table of details should contain information about exposures, a geographical breakdown of net exposures that should present information about central administrations or central banks, concentration of exposures depending on the activity sector and the types of counterparties, the expiry of exposures and the exposure credit quality depending on the exposure class. Other data tables that should be included in the transparency reporting should be, but not limited to the quality of the exposure credit depending on the activity sector, increasing the age of outstanding exposures, non-performing and restructured exposures, loans and advances depreciated individually. A presentation about the creditworthiness of the bank that include the situation of encumbered and unencumbered assets is as follows exploited loans, capital instruments, debt securities, loans and advances, other than spot loans, other assets structured on the carrying amount of encumbered assets, fair value of encumbered assets, the carrying amount of non-performing assets and fair value of unencumbered assets.

QQI is calculated based as sum of the number of tables presented, where each table have the value equals with the sum of elements inside the table, where each element has a value of 1 point.

8. Other reports and information (ORI) should include main indicators monitored as solvency indicator (total equity ratio), the leverage indicator, short-term liquidity coverage indicator – LCR, levels 1 and 2 of own funds, funds instruments, equity instruments, capital instruments and as many indicators as possible.

ORI is calculated as a sum of total elements exposed, with 1 point of elements identified and 2 points for elements identified that have a value associated.

Analyze on the proposed model for several banks

The total transparency level on reporting (TTLR) is the sum of the components identified, adjusted by the ponder of importance in the equation. For each category it was allocated a coefficient of importance in the final equation based on the data offered and how the data affects the transparency exposed.

$$TTLR = 0.5 * OS + 0.5 * ICF + 2 * RRP + OPRRM + REV + OFCR + QQI + ORI$$

The higher level of the indicator indicates a higher transparency in the reports offered by the bank. Combined with the level of transparency from other sources show the total transparency of a bank.

Using the proposed model, the article presents in the Table 1 an evaluation of measurement of the transparency, based on the reports offered by several banks for the public.

Table 1: Evaluation of transparency

Indicator/Bank	FIRST BANK	CEC	RAIFFEISEN
OW	8	4	0
SS	10	13	0
MB	16	18	35
SCO	15	4	2
1. OS	**49**	**39**	**37**
qDE	5	1	2
$\sum Cf * FNC$	52	64	45
WB	50	0	0
2. ICF	**107**	**65**	**47**
RLD	8	9	6
RSC	20	0	0
RRM	20	22	15
RDE	18	25	12
3. RRP	**66**	**56**	**33**
nS	10	12	7
nP	9	10	8
nTR	12	12	7
nPRS	3	3	2
GR	20	0	0
4. OPRRM	**74**	**37**	**24**
$\sum CR$	20	20	16
nM	8	7	7
nRCP	9	7	6
nRP	7	6	5
vDR	5	0	0
5. REV	**49**	**40**	**34**
6. OFCR	**20**	**15**	**18**
7. QQI	**116**	**129**	**118**
8. ORI	**98**	**131**	**39**
TTLR	**566**	**516**	**341**

Source: Author own research based on input tables and proposed method

It is necessary to verify if the bank respect and publish the statements according to Regulation of the National Bank of Romania no. 5/2013 regarding prudential requirements for credit institutions, Regulation no. 575/2013 of the European Parliament and of the Council on prudential requirements for credit institutions and investment companies and modification of Regulation (EU) no. 648/2012 (called CRR), Guidance on publication requirements under Part Eight of Regulation (EU) no. 575/2013 - EBA / GL / 2016/11 of 04.08.2017, Guidance on the publication of the liquidity coverage indicator (CSF) in supplementing the information on liquidity risk management under art. 435 of Regulation (EU) no.

575/2013 - EBA / GL / 2017/01 of 21.06.2017, Guidance on sound remuneration policies in accordance with Articles 74 (3) and 75 (2) of Directive 2013/36 / EU and information published pursuant to Article 450 of Regulation (EU) no. 575/2013 - EBA / GL / 2015/22 of 27.06.2016, Guidance on the threshold of significance, ownership and confidentiality and on the frequency of reporting under Articles 432 (1), 432 (2) and 433 of Regulation (EU) no. 575/2013 - EBA / GL / 2014/14 of 23.12.2014; BNR instructions from 28.10.2015 on the threshold of significance, ownership and confidentiality and on publication frequency, specified in Articles 432 (1), 432 (2) and 433 of Regulation (EU) no. 575/2013, Guidance on the publication of information on encumbered and unencumbered assets by tasks as well as the Delegated Regulation (EU) No. 2295/2017 on the technical standards of regulation for the publication of encumbered and unencumbered assets with tasks - EBA / GL / 2014/03 from 27.06.2014.

Conclusions

Based on the analyze we can check the results and try to make a ladder of bank transparency which help to quantify the total trustworthiness for the banks analyzed, to see which one is more stable, in which a person should invest the trust and money.

The algorithm and proposed method can be expanded or refined even more, based on the proposed scale of evaluation of each point with a more detailed point system for each equation based on the overall structure exposed by the reports and the regulations.

The evaluation method is proposed for a better understanding on the bank's behavior on transparency, on the self-awareness of the risks on which it is exposed, the strategies that it can take to countermeasure all the vulnerabilities and to offer a proper stability on the financial market. Especially a company need to know in what bank it should keep its money, which is more transparent when doing a business with it and not to risk the investment.

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Analysis of Hotspots and Trends of Life Insurance in China

Fangxiang CHENG

Beijing Jiaotong University, Beijing, China
19120601@bjtu.edu.cn

Xindi WANG

Beijing Jiaotong University, Beijing, China
xdwang@bjtu.edu.cn

Abstract

With the continuous development of economy, China has already become the world's second largest life insurance market. In order to have a deep insight of the research hotspots and trend in the field of life insurance in China, this article analyzes 1,389 related articles of core journals, which were published from 2000 to 2019. This paper firstly analyzes the research status of life insurance in China from the perspectives of quantity evolution, the most cited articles, and the distribution of journal and institution, as well as the hotspot map of articles. Next, this research obtains the hot topics and trend in life insurance research by the frequency of keywords, co-word networks and the method of network modularization. These hot topics are life insurance market and products, life insurance company operation, life insurance finance and life insurance business processing. Finally, the trend analysis shows that life insurance company operation has the hottest trend in recent years.

Keywords: Bibliometrics, Life insurance, Research hotspots, Co-word analysis

Introduction

In recent years, global insurance premium income has continued to increase. Since the Economic Reform and Open Up, China's insurance industry has flourished, and China has now become the world's second largest insurance market. However, China's insurance industry still has problems such as weak service capabilities, outdated development concepts, and insufficient risk management and control capabilities, which are not conducive to sustained and stable development (Xu, 2019).

In response to hot issues and development trend in the insurance industry, many experts and scholars have conducted research from different specific fields and perspectives. For example, Huang et al (2016) used bibliometric methods such as knowledge graphs to study overseas agricultural insurance articles. They analyzed from the perspective of areas, institutions, co-citation networks, topic co-occurrence networks, keyword clustering, etc. Wang et al (2018) analyzed the research hotspots and trend in the field of engineering insurance in China with the method of co-word analysis etc. However, at present, few studies are focusing on the research hotspots of life insurance in China.

In order to understand the research hotspots and trend of life insurance in China, this article analyzes the articles related to life insurance in CNKI for the past 20 years. The analysis is conducted from the perspectives of articles quantity evolution, the most coted articles, and the distribution of journal, region, and institution. And hot topics of life insurance are also extracted with the methods of keyword co-occurrence analysis and modularization.

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Data Collection and Indicator Construction

Data collection

The articles come from the Chinese academic journal database in China National Knowledge Infrastructure (CNKI). In order to ensure the high relevance of the selected articles and life insurance, the selecting method is to include "life insurance" in the title or "life insurance" in the keyword, starting from 2000. In order to ensure the influence and authority of the selected articles, the source category selects SCI (Science Citation Index) source journals, EI (Engineering Index) source journals, core journals, CSSCI (Chinese Social Science Citation Index), CSCD (Chinese Science Citation database). The selecting time was February 7, 2020, and 1,604 articles were selected. Irrelevant articles like advertisements are deleted, and then 1,389 articles are finally obtained.

Indicator Construction

In a network, the centrality of a node is an indicator to measure the importance of a node in the network. The greater the centrality of a node, the stronger the connection between this node and other nodes in the network, the more important the node is. The calculation formula of node centrality is as follows (Daly and Haahr, 2009):

$$BC(p_i) = \sum_{j=1}^{N} \sum_{k=1}^{j-1} \frac{g_{jk}(p_i)}{g_{jk}}$$

g_{jk} represents the number of shortest paths from node j to node k. $g_{jk}(p_j)$ represents the number of nodes p_j in the shortest path from node j to node k.

Through the measurement of the connection density in the network, the network is modularly divided, and the modularized value Q is used to measure the quality of the division. The value range of Q is [0,1]. When Q>3, the network division is reliable (Wang et al, 2019). The calculation formula of Q is (Blondel et al, 2008):

$$Q = \frac{1}{2m} \sum_{i,j} \left[A_{ij} - \frac{k_i k_j}{2m} \right] \delta(c_i, c_j)$$

Where A_{ij} represents the weight of the connection between nodes i and j, k_i is the sum of the weights of all the edges connected to node i, c_i and c_j represent the modules where nodes i and j are located respectively. If $c_i = c_j$. $\delta(c_i, c_j)$ takes 1, if not, it takes 0. m represents the sum of the weights of the edges in the entire network.

Research Status Overview

Trend in the amount of articles

Counting 1,389 articles by year, the annual number of articles is obtained, as shown in Figure 1. From 2000 to 2019, the average annual publication of the articles was 69.45. The number of articles from 2000 to 2003 was relatively high, with more than 110 articles. There was a sudden decrease in 2004 and a slow decline after a new peak in 2008. After a small recovery from 2010 to 2013, the number of articles declined year by year from 2013 to 2019. The number of articles has been declining in recent years, which is related to the standardization of life insurance research and the improvement of research methods. It also indicates that the research on life insurance will develop with high quality instead of high quantity (Wang, 2018).

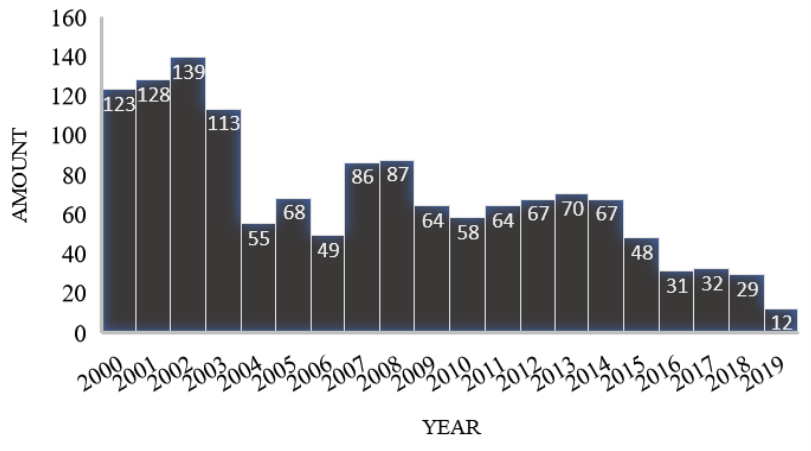

Figure 1: Annual volume of articles

Journal Distribution

These articles we obtained were published by 267 different journals, the top five journals with the highest proportion are shown in Table 1. As can be seen from the table, the articles of *Insurance Studies* in the field of life insurance ranks among the best in terms of quantity and influence. *Insurance Studies* is an authoritative professional journal in the field of domestic insurance research. In addition, except for the comprehensive impact factor of *Shanghai Insurance Monthly*, which is only 0.142, the impact factors of other journals in the top five journals are all above 0.6, all of which have great influence. In addition, 209 journals out of 267 journals published three or less related documents within the statistical range, showing a significant long-tail effect.

Table 1: Journals with highest proportion of articles

Journal Title	Numbers of articles	Proportion	Impact Factor
Insurance Studies	327	23.54%	1.077
Shanghai Insurance Monthly	164	11.81%	0.142
Statistics & Decision	55	3.96%	0.638
China Finance	48	3.46%	0.603
Financial Theory & Practice	33	2.38%	0.606

Regional Distribution

Count the regions from which the articles originated. Among them, the documents of multiple authors are based on the region of the institution where the first author is located, and the articles of unknown regions are ignored. The hotspot map is showed in Figure 2. The darker the area in the hotspot map, the more papers are from there. The articles distribution covers 29 provinces and cities in China. Among them, Beijing, Shanghai and Tianjin have the largest numbers of articles, accounting for 19.9%, 13.6% and 8.2% respectively. In addition, Sichuan, Hubei, Guangdong, Jiangsu and Shandong publish more documents than other provinces or cities. Overall, life insurance research in southern and southeastern coastal areas of China is dense and concentrated in relatively economically developed provinces and cities, while the number of publications in the northeast and northwest is the lowest. This is not only related to the differences in the number of universities, research institutions and enterprises in various regions, but also related to the regional differences in the life insurance market demand (Huang, 2017).

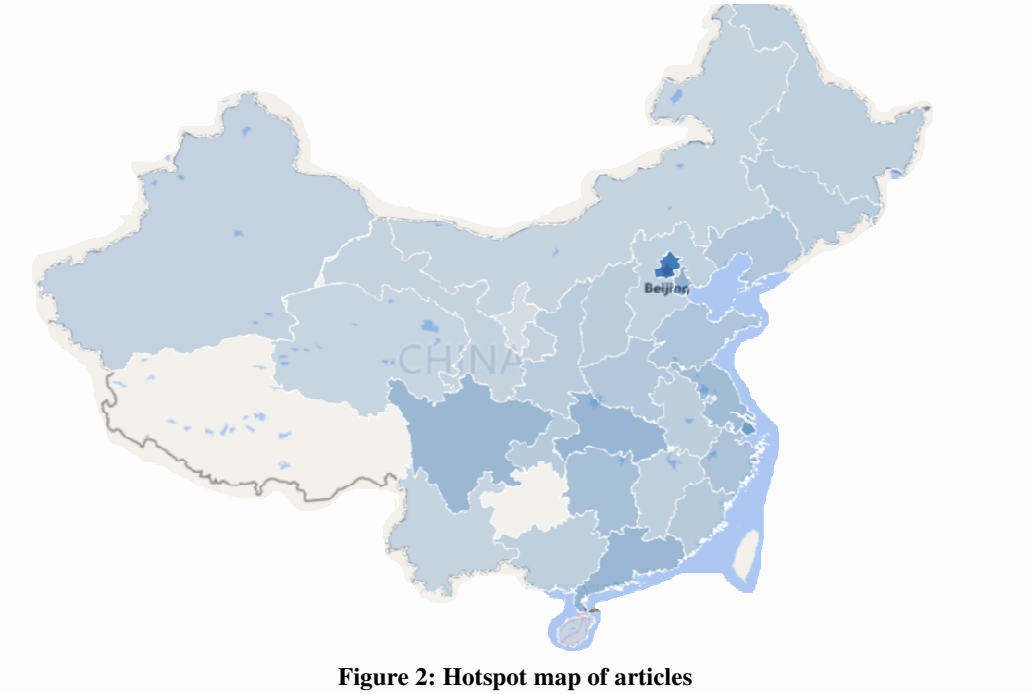

Figure 2: Hotspot map of articles

Institutional Distribution

Count the institutions of articles, 405 institutions are obtained, including universities, enterprises, and public institutions. China Life Insurance Co., Ltd., a large state-owned financial and insurance company, published the highest volume of articles, accounting for more than 14%. Among the public institutions, China Insurance Regulatory Commission published the highest volume of articles. The rest of the top 5 are colleges and universities which are Nankai University, Shanghai University of Finance and Economics and Southwestern University of Finance and Economics, as shown in Table 2.

The Most Cited Articles

The five most cited articles are shown in Table 3. Among them, the most cited document is “Empirical analysis of China's life insurance demand”. This article makes assumptions and empirical analysis of the factors that affect China's life insurance demand, using multiple statistical regression as an empirical analysis tool. The conclusions drawn are that China's growing economic strength and constantly improving social security systems will make China's life insurance industry profitable. But the lower education level and inflation of the population may hinder the life insurance industry's development (Zhuo, 2001). In addition, among the five most cited documents, the most frequent keyword is "life insurance demand".

Table 2: Institution with highest proportion of articles

Institution name	Number of articles	Proportion	Organization type
China Life Insurance Co., Ltd.	201	14.47%	Enterprise
Nankai University	76	5.47%	College or university
Shanghai University of Finance and Economics	55	3.96%	College or university

Southwestern University of Finance and Economics	47	3.38%	College or university
China Insurance Regulatory Commission	43	3.10%	Public institution

Table 3: The most cited articles

Article Title	Journal	Year	Citations
Empirical analysis of China's life insurance demand	*Insurance Studies*	2001	312
On Establishing "Reverse Mortgage Loan" Life Insurance Service	*Insurance Studies*	2002	194
Empirical study on influential factors of life insurance demand in China	*China Soft Science*	2005	123
An Empirical Analysis of China's Life Insurance Demand in the Transition Period	*Insurance Studies*	2002	92
Examination on the Determinants of Life Insurance Demand in China	*Journal of Zhongnan University of Economics and Law*	2006	88

Analysis of Hotspots and Trend

The keywords of the articles show the theme, content, and method of articles research. By extracting, co-occurrence analysis and modularization analysis of the high-frequency keywords of the articles, the development trend of research hotspots in the field can be obtained.

Co-occurrence analysis of keywords

Count the keywords of the articles, and abandon the common keywords such as "life insurance" and "life insurance company", as well as some irrelevant keywords. Combine synonymous keywords. Keywords with the frequency greater than or equal to 15 are selected as high-frequency keywords, then 45 high-frequency keywords are obtained.

The co-occurrence analysis of keywords, which is also called co-word analysis, refers to counting the times that keywords appear in the articles together to measure the closeness of the links between keywords. Because the keywords of the articles generally represent the core research content and methods of the articles, so the evolution of the research topic can be further explored through the co-occurrence analysis of keywords (Feng and Leng, 2006). First, the co-occurrence matrix of high-frequency keywords is derived through the document management tool Note Press, as shown in Table 4.

Table 4: Keywords co-occurrence matrix (partial)

	Insurance premium	Insurance market	Demand	Life insurance products	Solvency	Agent
Insurance premium	93	9	3	4	1	3
Insurance market	9	89	7	8	2	7
Demand	3	7	72	3	0	0
Life insurance products	4	8	3	63	1	3
Solvency	1	2	0	1	62	1
Agent	3	7	0	3	1	58

Gephi is a free and open source network analysis software. By importing the co-word matrix into Gephi software, a visual co-word network can be obtained, as shown in Figure 3. The thickness of the connection between keyword nodes is determined by the number of co-occurrences between keyword pairs. The more the co-occurrences between two keywords, the thicker the connecting line between them, the stronger the relativity between them. The size of the keyword node represents the node centrality. The larger the node centrality, the larger the keyword node, the more important the node is. From the co-occurrence network, we can see that the keywords of "life insurance products", "insurance premiums", "solvency", "insurance policy" and "insurance market" are at the center of the network, and the frequencies of these words are also high. These keywords can represent hot research keywords in China's life insurance in the past two decades.

Figure 3: Keywords co-occurrence network

Extraction of Hot Topics

Gephi's modularization function is based on the algorithm proposed by Blondel et al (2008). This algorithm continuously iterates to maximize the connection density of points in each community, thereby achieving optimal modularization. The modularization function of Gephi was utilized to modularize the high-frequency keyword network and divide the network into 4 sub-communities. The modular value Q=0.314>0.3 indicates that the sub-community network structure is stable and the classification results are credible. The classification result is shown in Table 5. The high-frequency words and the words with high node centrality in each category represent important nodes of the sub-community and can be used for hot topic extraction. The result is also shown in co-occurrence network, as shown in Figure 4, the nodes have same colors are in same category. Summarize the articles topics of each category separately, and four research hot topics are extracted.

The first category refers to the topic of life insurance market and life insurance products. The main contents of these researches include the life insurance market, the factors affecting the demand for life insurance, the interest rate risk, strategy, and structural adjustment of life insurance products, the forecast of insurance premium income, and the life insurance marketing model and system. The methods used in this type of research mainly include empirical research and empirical analysis. For example, Yang et al (2005) used the time series autoregressive distribution lag model to conduct an

empirical analysis of the impact of GDP, maintenance rate, interest rate, expected inflation rate and education level on China's life insurance demand.

Table 5: Classification result of keywords (partial)

Category 1			Category 2		
Keywords	**Frequency**	**Node centrality**	**Keywords**	**Frequency**	**Node centrality**
Insurance market	89	44.10	Solvency	62	45.48
Demand	72	13.72	Risk	51	26.69
Life insurance products	63	61.96	Asset liability management	46	7.69
Agent	58	16.38	Actuarial	36	21.52
Premium income	45	16.99	Management	36	4.38
Category 3			**Category 4**		
Keywords	**Frequency**	**Node centrality**	**Keywords**	**Frequency**	**Node centrality**
Bank	48	28.36	Insurance premium	93	69.71
Funds	44	20.37	Insurance policy	57	35.51
Insurance business	31	23.88	Surrender	38	25.21
DEA method	28	0.28	Insured	35	6.04
Liability reserve	20	7.73	Insurance amount	35	4.07

The second topic category is life insurance company operation. The main contents of such research include the operating efficiency of life insurance companies, the analysis of the factors affecting the solvency, the monitoring and management of solvency, the impact of spread losses and the resolution methods, and the company's value assessment and interest rate risk analysis and prevention. The methods used in these researches mainly include factor analysis, principal component analysis, and actuarial techniques. For example, Jiang et al (2014) used the data envelopment model to measure the effectiveness of life insurance companies' operating performance, and explored the factors that affect the performance of life insurance companies.

The third topic category is life insurance finance. Such researches mainly include the use of funds for life insurance companies, investment, the development of banking insurance, the impact of bank interest rates on life insurance companies, and the financial risks of the life insurance industry. For example, Liu et al (2013) used a comprehensive evaluation model to study the efficiency of the use of funds in China's life insurance companies.

The fourth topic category is life insurance business processing. The main research contents in this category include discount, pledge and securitization of policy, surrender treatment, factors affecting the surrender rate, underwriting and claims, the rights and interests of policy holders and insured persons, insurance contract disputes and other legal issues. The prevention of fraud is also included. For example, Wang (2012) used negative binomial regression to conduct an empirical study on domestic life insurance products. Then it analyzed influencing factors of surrender of general, dividend and investment-linked life insurance.

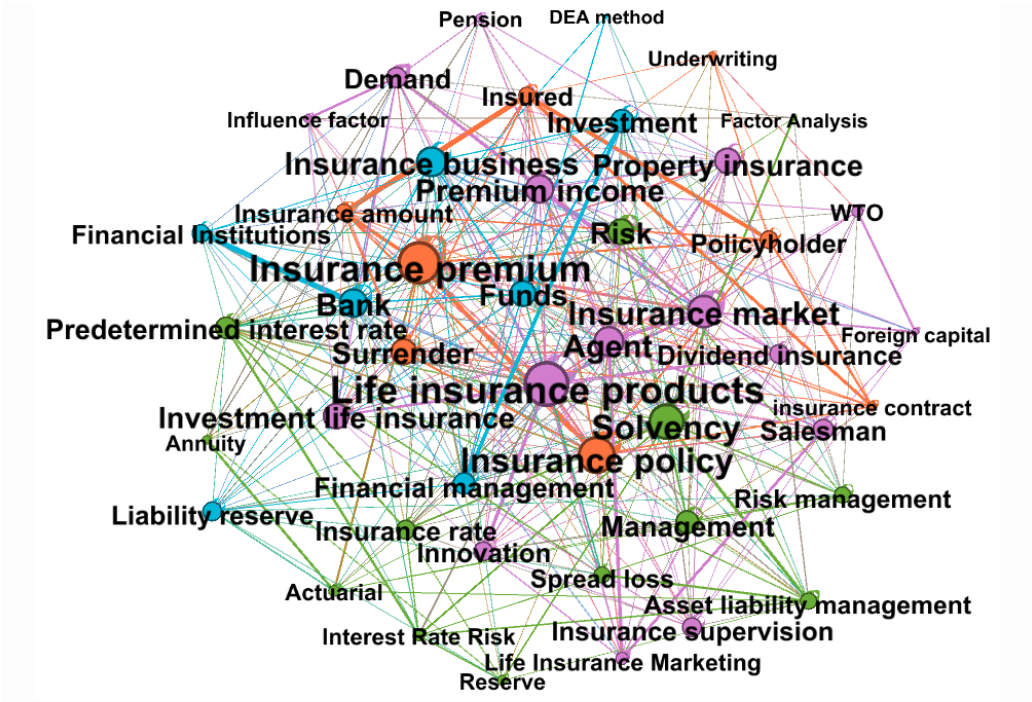

Figure 4: Classification result of keywords co-occurrence network modularization

Analysis of Hot Topics Evolution Trend

The numbers of articles of four categories of research hot topics are shown in Figure 5. The four types of articles are time-sliced to take four years as a time period. The evolution trend of the number of four hot research topics is obtained, which is shown in Figure 6. The proportion of the number of articles in each period is also shown in Figure 7.

It can be seen from the figures that overall, the topics of life insurance market and life insurance products account for the largest proportion in the research of China's life insurance field, but in recent years, research on the operation of life insurance companies has replaced it as a new hot spot in this field. This might be affected by the issuance and full implementation of the "New Articles of the Ten Nations" and "Compensation for the Second Generation" on China's life insurance companies in recent years (Sun, 2018). At the beginning of this century, when China just joined the WTO, the volume of articles related to life insurance business processing had largest proportion, and the proportion of articles later declined slowly, which is in line with the continuous development of China’s life insurance industry and legal systems in recent years. Compared with the other three topics, the research on life insurance finance has the least weight, but its proportion is relatively stable.

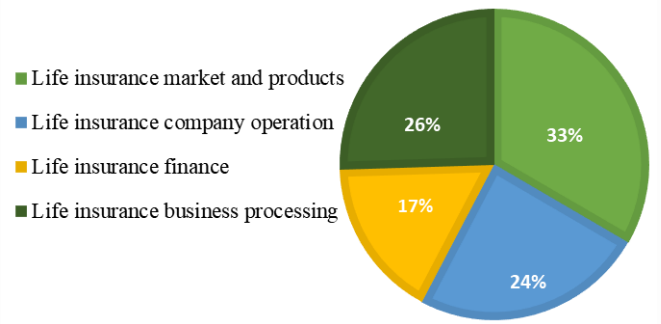

Figure 5: Article proportion of hot topics

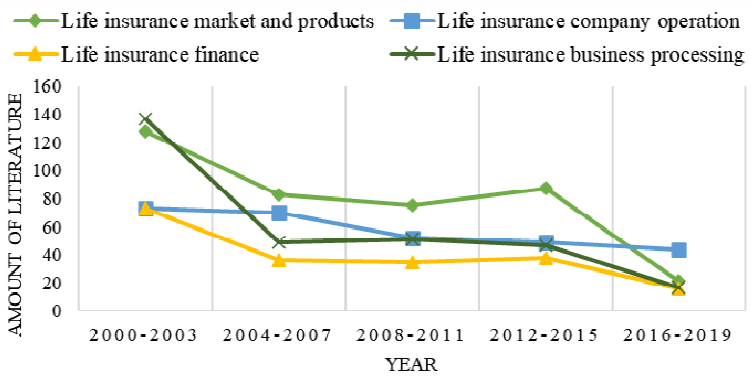

Figure 6: Trend of the article volume of hot topics

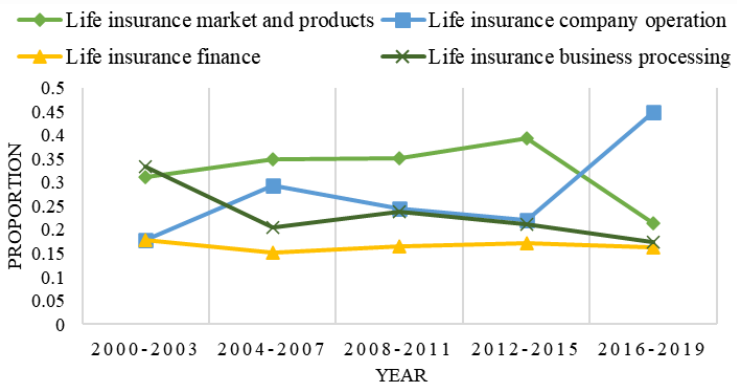

Figure 7: Trend of the article proportion of hot topics

Conclusions

This article analyzes 1,389 articles in CNKI related to life insurance. We obtained the evolution of articles amount, the most cited articles, as well as distribution of journal, region, and institution. By the method of co-word analysis, network modularization etc., this article also obtained hot topics of life insurance research in China which are life insurance market and products, life insurance company operation, life insurance finance and life insurance business processing. Among them, research on life insurance company operations is the hottest in recent years. Through this research, people can have an overall insight of research in life insurance in China. This research can also provide reference for relevant scholars to conduct further studies.

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Analysis of The Influence of Process Performance on Organizational Performance: Evidence from Romania

Andreea BARBU
University POLITEHNICA of Bucharest, Romania, Bucharest, barbu.andreeab@yahoo.com

Gheorghe MILITARU
University POLITEHNICA of Bucharest, Romania, Bucharest, gheorghe.militaru@upb.ro

Valentin-Andrei MĂNESCU
Webecom S.R.L., Romania, Bucharest, valentin@webecom.ro

Ramona Alexandra NEGHINĂ
Webecom S.R.L., Romania, Bucharest, ramona@webecom.ro

Mihaela-Rodica GANCIU
Energomontaj SA, Romania, Bucharest, mihaella.ganciu@gmail.com

Abstract

Performance is a key concept for any organization, and lately, it has begun to become a priority for both business management and researchers. Managers want to provide the best products and services to customers, increasing the company's revenues, but at the same time, they aim to streamline their internal operations, reduce costs and increase the company's productivity. The researchers come to the aid of the companies and carry out activities to understand what influences the performance of the company, what is the level of performance of the company and what could be the most effective methods for a company to improve its performance. The problem is that there are not many papers that analyse how exactly some processes affect business performance and what processes contribute the most to increase business performance. Thus, the main objective of this paper is to determine the most important processes within the service companies that contribute to increase organizational performance. In this regard, the authors used quantitative research to analyse 8 main processes from a service company. The results highlighted the fact that every process can improve the organizational performance by improving its process performance, but there are a few processes that are more important for companies than others. Thus, the management of the service companies should pay more attention to processes like human resources management, marketing and sales, and the financial-accounting process, those being processes that influence the most the organizational performance.

Keywords: service company performance, business process performance, performance, processes performance

Introduction

In the last decades, researchers and managers all over the world have started to study different ways to improve business performance. They have analysed various dimensions of performance,

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like finance, customers, processes, internal business processes, customers' satisfaction or employees' satisfaction.

Different studies highlighted the fact that employees are a valuable resource in a company. By ensuring a good level of employees' satisfaction, the management of the company can achieve good service experience level that will conduct to customers' satisfaction, loyalty, and profitability increases (Lam et al, 2001; Chi & Gursoy, 2009; Boswell & Boudreau, 2000; Barbu & Militaru, 2019). Focusing on processes, the authors noted that the most used key performance indicators are associated with time execution, level of flexibility and quality for the processes, activity costs, employee's productivity, number of recommendations received from customers, income of the company and company profitability (Fitzgerald. et al, 1991; Van Looy & Shafagatova, 2016; Ryu & Won Lee, 2014; Fajrina et al, 2019)

The problem is that there are not many papers that analyse how exactly some processes affect business performance and what processes contribute the most to increase business performance. Thus, the main objective of this paper is to determine the most important processes within the service companies that contribute to increase organizational performance.

Methodology

Through this paper, the authors propose to identify the processes that influence the most the performance of a service company. In this regard, the authors conducted a quantitative research on employees from the professional service companies from Romania, using a questionnaire to measure the perceptions of the people surveyed. The questionnaire can be divided into 10 sections: 8 sections focus on the main processes within a service company, one section analyses organizational performance, and one section is used to analyse demographic data.

The processes that were analysed in this paper are: supply process (P1), human resources management (P2), financial-accounting process (P3), marketing and sales process (P4), service delivery process (P5), customer service process (P6), management process (P7), innovation process (P8). For each process, as it can be seen in Tab. 1, the following variables were analysed: the perceived level of the process performance, the level of process importance within the service company, and the perceived performance level of the process according to Time, Flexibility, Quality, Cost, and Transparency. For the mentioned variables, the items were measured on a 5-point Likert-type scale ranging from 1 (total disagreement) to 5 (total agreement).

Table 1: Variables used in the paper

Items	P1	P2	P3	P4	P5	P6	P7	P8
Process performance	✓	✓	✓	✓	✓	✓	✓	✓
Process importance	✓	✓	✓	✓	✓	✓	✓	✓
Time	✓	✓	✓	✓	✓	✓	✓	✓
Flexibility	✓	✓	✓	✓	✓	✓	✓	✓
Quality	✓	✓	✓	✓	✓	✓	✓	✓
Cost	✓	✓	✓	✓	✓	✓	✓	✓
Transparency		✓					✓	

Source: Authors' own research

The questionnaire developed for this study was applied online, in June 2019, the sample consisting of 150 employees working in the service companies in Bucharest, Romania. For the organizational performance concept, the authors studied different aspects of performance from different sources

like the awards for quality and organizational excellence (EFQM Leading Excellence, 2013, Juran et al,1974; JUSE, 2015), the Kaplan and Norton' s research paper (1996), and other papers that analyse the profit-service chain (Larivière, 2008; Heskett, et al, 1994). Thereby, the variables that were used to describe organizational performance are: Profitability, Income, Market share, Service quality, Customer satisfaction, Employee satisfaction, Processes, and groups of interest.

Results

The sample of the research paper was represented by 150 employees working in service companies in Bucharest, Romania. Out of the total respondents, 61% were female, while the largest share of respondents was having executive positions within the company (81%). Most of the companies surveyed are in the following domains: IT (25), Commerce (21), Financial and Banking (19), Construction (14), Transport (14) and Consulting (11). About half of the firms surveyed are on the market for more than 10 years, while 26% have less than 3 years since their establishment.

To test the internal consistency of the questionnaire items, the Cronbach Alpha coefficients were analysed (Tab.2). In terms of interpreting the value of the coefficient Alpha, Hair at al. (2007) recommended a minimum value of 0.7 for Cronbach Alpha, while there are some researchers (Fornell and Larker, 1981; Garson, 2010) who claim that these values are statistically significant when they exceed the minimum value of 0.6 in the case of exploratory studies. For our study, the Cronbach Alpha coefficients are higher than 0.7, which means that the variables included in the research have a good internal consistency.

Table 2: Cronbach Alpha's Coefficients

Items	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
Supply process (P1)	0.707	0.711	4
Human Resources Management process (P2)	0.776	0.774	5
Financial- Accounting process (P3)	0.774	0.776	4
Marketing and Sales process (P4)	0.807	0.805	4
Service Delivery process (P5)	0.736	0.748	4
Customer service process (P6)	0.813	0.812	4
Management process (P7)	0.869	0.869	5
Innovation process (P8)	0.908	0.908	4
Performance	0.793	0.796	8

Source: Authors' own research

Table 3 presents the summary of the models between the organizational performance (the dependent variable) and the performance of the analysed processes (the independent variables).

Table 3: Summary of the models between organizational performance and the performance of the analysed processes

Model	The relationship between performance and company processes	R	R^2	Adjusted R Square	Standard error of estimation
1	Supply process (P1)	0.457	0.209	0.203	0.512
2	Human Resources Management process (P2)	0.612	0.374	0.37	0.455
3	Financial- Accounting process (P3)	0.558	0.312	0.307	0.477
4	Marketing and Sales process (P4)	0.626	0.392	0.387	0.449

5	Service Delivery process (P5)	0.459	0.211	0.206	0.511
6	Customer service process (P6)	0.453	0.205	0.2	0.513
7	Management process (P7)	0.556	0.309	0.305	0.478
8	Innovation process (P8)	0.513	0.263	0.258	0.494

Source: Authors' own research

In the case of model 1, the value of the R square coefficient is 0.209. This value indicates that the variation of the organizational performance (the dependent variable) is explained in a proportion of 20.9% by the performance of the supply process (the independent variable). In the case of model 2, the variation of the organizational performance is explained in a proportion of 37.4% by the variation of the performance of the human resources management process (R^2=0.374). Similarly, the coefficients from the other 6 processes were analysed. The smallest value was found in model 6, where the variation of the organizational performance is explained in a proportion of only 20% by the variation of providing support services performance.

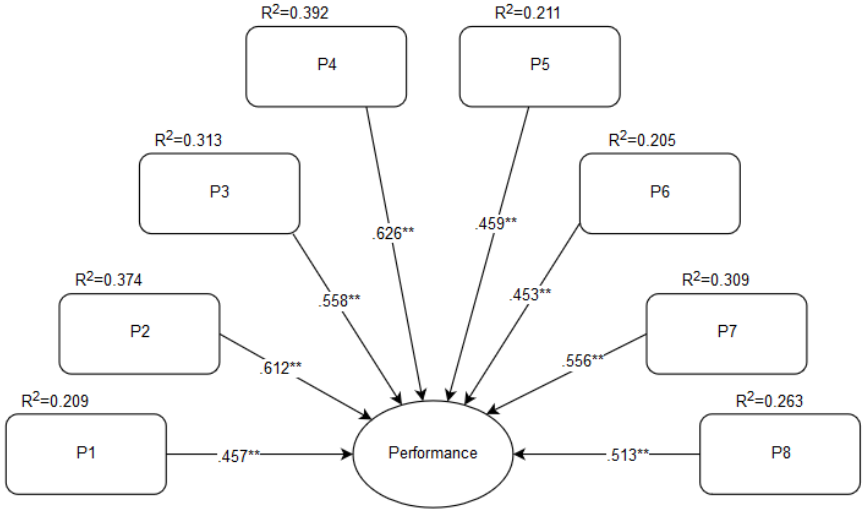

Fig. 1: The relationship between organizational performance and processes performance

Source: Authors' own research

Thus, by analysing the 8 models (Figure1), it can be said that all the 8 processes influence the organizational performance, while the organizational performance is strongly correlated with the performance of the following processes: P2 (R=0.612, p<0.01) and P4 (R=0.626, p<0.01).

Table 4: Summary of tested models and variables entered

Model	Variables Entered	Variables Removed	Method
1	Supply process (P1), Human Resources Management process (P2), Financial-Accounting process (P3), Marketing and Sales process (P4), Service Delivery process (P5), Customer service process (P6), Management process (P7), Innovation process (P8)	.	Enter
2	.	Innovation process (P8)	Backward (criterion: Probability of F-to-remove >=.100)
3	.	Customer service process (P6)	Backward (criterion: Probability of F-to-remove >=.100)

4	.	Management process (P7)	Backward (criterion: Probability of F-to-remove >=.100)
5	.	Supply process (P1)	Backward (criterion: Probability of F-to-remove >=.100)
6	.	Service Delivery process (P5)	Backward (criterion: Probability of F-to-remove >=.100)
a. All the requested variables were entered; b. Dependent variable: Performance			

Source: Authors' own research

In order to see which processes can be considered to develop an equation describing the performance of service organizations, the authors used the SPSS statistical program to provide the statistical model corresponding to multiple linear regression (Table 4). It is found that for most models, the value of R square is about 0.515, which means that the independent variables associated with the tested models explain 51.5% of the organizational performance. The highest value of adjusted R square is 0.503 for model 6, which means that 50.3% of the variance of the dependent variable was explained by the variance of the independent variables.

Table 5 contains the regression equation coefficients for each model tested. Taking into account the value of Sig., it is found that the only statistically relevant model is model 6. Model 6 contains the following independent variables: the performance of the human resources management process (P2), the performance of the financial-accounting process (P3) and the performance of the marketing and sales process (P4).

Table 5: Summary of tested models

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R^2	Adjusted R Square
		B	Std. Error	Beta				
1	(Constant)	1.397	0.273		5.119	0	0.515	0.488
	P1	0.035	0.067	0.04	0.522	0.602		
	P2	0.199	0.072	0.264	2.775	0.006		
	P3	0.153	0.074	0.18	2.067	0.041		
	P4	0.253	0.067	0.335	3.782	0		
	P5	0.038	0.074	0.042	0.512	0.609		
	P6	-0.011	0.073	-0.012	-0.148	0.883		
	P7	0.016	0.072	0.022	0.22	0.826		
	P8	-0.001	0.052	-0.001	-0.015	0.988		
2	(Constant)	1.398	0.269		5.205	0	0.515	0.492
	P1	0.035	0.066	0.04	0.524	0.601		
	P2	0.199	0.071	0.264	2.806	0.006		
	P3	0.153	0.073	0.18	2.082	0.039		
	P4	0.253	0.065	0.335	3.908	0		
	P5	0.038	0.073	0.043	0.521	0.603		
	P6	-0.011	0.072	-0.013	-0.153	0.878		
	P7	0.015	0.068	0.022	0.226	0.821		
3	(Constant)	1.389	0.261		5.32	0	0.515	0.495
	P1	0.034	0.066	0.039	0.518	0.605		
	P2	0.199	0.071	0.264	2.817	0.006		
	P3	0.15	0.07	0.176	2.124	0.035		
	P4	0.251	0.063	0.332	3.973	0		

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R^2	Adjusted R Square
		B	Std. Error	Beta				
	P5	0.035	0.069	0.038	0.5	0.618		
	P7	0.015	0.068	0.022	0.226	0.821		
4	(Constant)	1.387	0.26		5.333	0	0.515	0.498
	P1	0.034	0.066	0.039	0.521	0.603		
	P2	0.207	0.061	0.275	3.396	0.001		
	P3	0.148	0.07	0.175	2.119	0.036		
	P4	0.256	0.057	0.34	4.47	0		
	P5	0.038	0.067	0.042	0.562	0.575		
5	(Constant)	1.425	0.249		5.725	0	0.514	0.501
	P2	0.209	0.061	0.277	3.442	0.001		
	P3	0.159	0.066	0.188	2.409	0.017		
	P4	0.263	0.056	0.349	4.726	0		
	P5	0.042	0.067	0.047	0.633	0.528		
6	(Constant)	1.493	0.224		6.668	0	0.513	0.503
	P2	0.22	0.058	0.291	3.785	0		
	P3	0.172	0.063	0.203	2.731	0.007		
	P4	0.267	0.055	0.354	4.83	0		

a. Dependent variable: Performance

Source: Authors' own research

According to the analysis from Tab. 5, we discovered that organizational performance can be defined with the help of human resource management, financial accounting, marketing and sales performance (Eq.1).

Performance=1.493+0.220*HumanResourcesManagement+0.172*FinancialAccounting+0.267*MarketingSales (1)

This means that for each increase with one unit of the Human Resources Management process performance, the organizational performance will increase by 0.220, for each increase with one unit of the financial-accounting process performance, the organizational performance will increase by 0.172, and for each increase with one unit of the performance of the marketing and sales process, the organizational performance will increase by 0.267 (data extracted from Tab 5., Model 6).

Conclusion

The results of this study indicate that taken individually, each of the 8 analysed processes influences the organizational performance of the service companies. Moreover, 3 important processes need to come to the attention of the management of the service providers, these being: human resources management, marketing and sales, and the financial-accounting process, those being processes that influence the most the organizational performance. In this regard, the management of the companies should pay more attention to human resources to find specialists in the field, people with experience, who have both technical knowledge and soft skills to be able to interact as best as possible in a team. The correlations that were found in this study indicates that by improving the performance of the human resources management process, the management of a company can increase the organizational performance.

Also, companies should invest more in ensuring good financial-accounting processes, finance performance being one of the most important dimensions of the organizational performance. The good results obtained in the financial processes will determine in time good results in terms of the overall performance of the company.

Furthermore, marketing and sales processes are very important for every type of company, this department being that one that helps businesses to create added value, to develop services according to customers' needs, to grow the customer portfolio, to achieve profitability. Thus, the management of the service companies should focus on improving the activities from this department to increase the organizational performance.

Despite the information presented, the results of this study must be interpreted and put into practice, however, with great care, because this study is a pilot one and has some limitations. For example, the respondents of the questionnaire are employees with management and executive positions. Taking into account that this paper analysed the respondents' perceptions, the results might have been different if the respondents were only employees with management positions. Also, in the literature, there are a lot of ways to describe organizational performance, this concept being a complex one. For this paper, the authors used information from several papers and awards for quality and organizational excellence, the variables resulting from this research and chosen by the authors being: Profitability, Income, Market share, Service quality, Customer satisfaction, Employee satisfaction, Processes, and groups of interest. Furthermore, only 8 processes within a company providing services were investigated. Thus, in the future, the authors will focus more on the processes that will be individually analysed from several perspectives to determine how they can more accurately contribute to the improvement of the organizational performance in the field of services.

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Measuring the Value of Creativity in Strategies Formulated by Startups

Aldona Malgorzata DEREN

Wroclaw University of Science and Technology, Faculty of Computer Science and Management, 50-370 Wroclaw, Wybrzeze Wyspianskiego 27, Poland, aldona.deren@pwr.edu.pl

Jan SKONIECZNY

Wroclaw University of Science and Technology, Faculty of Computer Science and Management, 50-370 Wroclaw, Wybrzeze Wyspianskiego 27, Poland, jan.skonieczny@pwr.edu.pl

Abstract

The aim of the article is to present an analytical tool for measuring creativity in strategies formulated in innovative startups. It was assumed that the basis of these strategies are intangible resources, generated as a result of creative activity of technostarters (startup managers). The concept of this tool refers to three dimensions of the strategy: novelty, usefulness and time perspective of its development. A qualitative methodology was chosen, including literature and surveys conducted among 42 startups located at the Wroclaw University of Science and Technology. The developed numerical tool is simple, clear and economically justified. The constructed tool allows to assess the value of creativity in the generated and proposed strategic options even before choosing the right one, i.e. the one that will be effectively implemented. Technostarters, even those with little experience in strategy assessment, will determine the value of creating strategic options formulated in the strategic planning process by means of a list of questions (checklist) developed by the authors.

Keywords: startup, strategy, creativity, measuring.

Introduction

Social, economic and technical undertakings undertaken by human are related to creative activity. This kind of activity has accompanied man since the beginning of time. It enabled the invention of various tools and the transformation of natural resources found in nature. From the beginning, creativity was a process of searching for new values and formulating laws and rules that could be applied to various areas of human social life. In fact, until the end of the 19th century, creativity was understood as the activity of individuals equipped with special intellectual and cognitive abilities. In the twentieth century there was a radical change in the approach to creativity - both in the sense of process and the creative person. Currently, creativity is treated as everyday personal, group and professional activity manifested in every area of human activity, i.e. organizational, cognitive, productive, artistic, educational, caring, service, cleaning and sports. This perspective makes creativity an inalienable part of the functioning and management of a company, especially the formulation and implementation of strategies.

The aim of the article is to present an analytical tool for measuring creativity in strategies formulated in innovative startups. It was assumed that the basis of these strategies are intangible resources, generated as a result of creative activity of technostarters (startup managers). The concept of this tool refers to three dimensions of the strategy: novelty, usefulness and time perspective of its development. A qualitative methodology was chosen, including literature and surveys conducted among 42 startups located at the Wroclaw University of Science and Technology. The developed numerical tool is simple, clear and economically justified. The constructed tool allows to assess the

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value of creativity in the generated and proposed strategic options even before choosing the right one, i.e. the one that will be effectively implemented. Technostarters, even those with little experience in strategy assessment, will determine the value of creating strategic options formulated in the strategic planning process by means of a list of questions (checklist) developed by the authors.

Defining Creativity

Human creativity has been the subject of research in psychology as well as in technical and economic sciences for many years. In the book by Nęcka (2003) indicates that there are four systemic approaches to human creativity in psychology:

- as a transgression (Kozielecki, 1997);
- as an investment (Sternberg and Lubart, 1995a);
- as a chance and a configuration (Simonton, 1997);
- as the system of an person, a field, and a domain (Csikszentmihalyi, 1996).

In technical sciences, intuition and imagination are the basic conditions for human creativity. Intuition is the ability to anticipate, without resorting to reasoning. It enables the anticipation of the course of physical phenomena or technical process under predetermined conditions. The instruments of intuition are: reasoning and experience. On the other hand, imagination means the ability to create certain images in thoughts. As Troskolanski (1978) writes, "Imagination [...] includes space and movement. No technical device may be created without the capacity for spatial vision: tool, instrument, machine, structure".

In the book by Pilawski (1990) claims that creative human activity cannot be strictly defined because it is a concept from the fields of economics, sociology, technology and law, as well as all these sciences simultaneously. In these disciplines, there is a lack of precise or axiomatically accepted elementary concepts - such as in mathematics - which would characterize human creativity in an unambiguous and exhaustive way. Taking such a point of view, it can be said that the work of both man and organization and other concepts used in management organization theory - e.g. strategy, organization, system - are by their very nature subjective concepts. They are the subject of research that uses the inductive method, which limits the "deductive precision of a strict definition based on a priori formulated axioms". Of course, this does not mean resigning from inventing, constructing, or verifying new concepts, in order to get to know the reality.

In economic sciences, on the other hand, creativity is defined as an economic process and compared to a transaction between the resources held and the needs of an individual (or groups of individuals), and the resources, needs and requirements of an environment in which shared resources are transformed in such a way that a new quality emerges to meet shared needs and requirements. In the book by Mirski (2011), this is done by transforming information, matter and energy into a useful, valuable, new and original product, in accordance with the requirements and needs of the environment.

In the book by Maslow (1957) characterizes creativity by searching for specific two levels: primary and secondary. Primary creation is a source of new discoveries, true novelty of ideas, which in their essence differ from the previous ones. On the other hand, secondary creation is characteristic of scientists and is visible in their common quest to discover new scientific phenomena. Secondary creation is achieved through cooperation and gaining experience from other researchers and shaping the basis for a new perspective on a given issue or idea.

Creativity can also be analyzed by distinguishing three levels of organization management:

- individual (cognitive abilities, knowledge, expertise, motivation);
- group (coherence of creative activities, group composition, accessibility to resources);
- the organization (legitimizing conflicts, encouraging high-risk activities, building a creative climate in the organization).

Each of these levels of creativity is described by a different set of factors that foster their development.

The level of individual creativity is a constant attitude of human to the world of things and the world of nature. Continuously and continuously, man generates something that can be new and valuable. Individual creativity is the ability to be constantly surprised, the ability to concentrate on a creative task, experience one's own self and sense of identity, it is also the ability to accept conflicts and tensions and the desire to "be born again" (Bratnicki et al, 2014). Individual creativity also means creating individual social bonds and shaping one's social advancement.

Group work refers to at least two people who interact directly with each other. Individuals - being one group - set common standards for thinking and acting, as well as a common goal. Thanks to this action, they have a sense of their own distinctiveness and equal access to resources and results of work. This kind of creativity is characteristic for startups, which are projects aimed at activities in completely new business areas. Creating a new product or service in such risky conditions requires organizing around creative ideas (Deren and Skonieczny, 2016).

Startup as A Creative Undertaking

The literature lists many characteristics of startups that characterize their essence as:

- a project created to produce new products and services in conditions of extreme uncertainty (Ries, 2011);
- an organization created to look for a repeatable and scalable business model (Blank and Dorf, 2013);
- a company in the first phase of development, which uses modern technological and innovative solutions (Kariv, 2013);
- a new company without an operational history, with a high degree of market and technology uncertainty (Giardino et al, ,2014);
- a new company in the growth and market research phase related to high-tech projects with high growth potential (Calopa et al, 2014).

Startups are based on the identification of a market trend or other problem giving new growth opportunities, for which an innovative solution has been found and a business model created (Chan Kim and Mauborgne, 2004). Startup should be disruptive, i.e. radically changing the market, and hyperscalable, i.e. characterized by a very fast growth of sales or number of customers, leading to a high valuation of the company (Skala, 2018).

Startups are mostly created by young, brave, passionate and committed people who want to use their skills creatively (Gontarek, 2017). Most often these people have an idea to solve the problem or fill the existing market gap, but they need help (financial, business) to do so.

In the case of startups two different approaches have been developed in the formulation of development strategies. The first one, traditional and borrowed from large companies, is based on a strategic plan. Formulating a strategic plan is a long and cumbersome process, which involves not only managers and specialists, but is also often the subject of conflict between different groups within and outside the company. A strategic process consists of several stages:

- strategic analysis;
- forecasting of environmental changes;
- developing a strategic vision of the company,
- to develop a strategy;
- develop a competition strategy;
- draw up an investment plan and develop a strategy.

The strategic plan (goals and objectives) act developed in this process shall be implemented.

An alternative approach to strategic planning is to use business models, e.g. Business Model Canvas (Osterwalder and Pigneur, 2010), Model Lean Startup (Ries, 2011) or Model Customer Development (Blank and Dorf, 2012). The last of these models contains two processes: search, implementation.
The search involves a stage of market research, where the creating vision is transformed into a series of hypotheses about the business model. Then the plan is developed to test customers' reactions to these hypotheses. On this basis facts and decisions are determined.

The next stage is market verification, where the defined business model is checked for repeatability and scalability. The stage of creating a customer base is the beginning of the business model implementation phase. This is where the demand among customers is created and sales develop.

Whereas building is the stage at which the organization changes from a start-up into an innovative enterprise focused on the implementation of a verified business model.

Both traditional, planning and model approaches have their advantages and disadvantages. In the case of strategic planning, the developed and adopted plan may become obsolete already at the time of implementation due to changes in the turbulent environment. The model approach is more flexible as it includes a pivot action. The weakness of this approach, on the other hand, is the quality and multiplicity of hypotheses to be verified.

In the opinion of the authors, a synthesis of these two approaches aimed at creating a creative space that will allow to generate, as for more strategic options (SWOT analysis), from which only those with the greatest value of creativity will be selected for implementation. Adopting such an assumption requires measurement of creativity in the developed strategy (strategic options).

Creativity in the Organization's Strategy

Creative processes trigger the ability of a person or a team to use their mental potential creatively when creating new, original ideas in the form of concepts, products or strategies (Ottemiller, et al 2014). In these processes different ideas are combined in an original way, new assumptions are made, new ideas are formulated which allow seeing old things in a new perspective.

The result of creative processes are new creative creations. According to Sternberg and Lubart (1995b) every new creative production "is original, unpredictable, capable of astonishing the viewer, because it is more than the next logical step".

In order for a given production to meet, literally, the requirement of 'creativity' must meet certain criteria. In the research study Cropley and Cropley (2005) claim that the basic distinguishing features of creative products (products) are: relevance and effectiveness - the product solves the problem it was supposed to solve; novelty - the product is original and "surprising"; elegance - the product is beautiful and pleasant; it goes beyond a simple mechanical solution by obtaining an additional bonus in the form of cost-effectiveness of the product; generality (generalizability) - the product has a wide range of applications; it can be used in other conditions and open up new opportunities to solve other problems (Cropley.

In the book Lipka, et al (2011) believe that the results of creative processes are diverse, which means that they can be both products and personal services for employees (present, future and former), whose properties are not imposed in any way. Such results should be characterized by the following features: novelty, originality, generosity (inspirational potential), value and social acceptance, i.e. recognition of usefulness at a given time. In their opinion, an example of a product with these characteristics is the Strategic Scorecard of Kaplan and Norton (2007). This charter presents a sequence of cause-and-effect activities as it helps to transform intangible assets into tangible ones in different functional areas of an organization. Initially, this charter has the characteristics of an original innovation which, through dissemination, becomes a mimicry innovation. Its subsequent versions, applicable in practice, are a transformation of the original in terms of specific features of the

organization's functioning. Such an action can be described as creative, and the implementation of this card in a given organization as reproducible.

In the book by Fazlagic (2015) proposes to use criteria relating to internal and external characteristics to assess creative products. Among the internal features he mentions: originality, value, novelty, uniqueness, logic, harmony, and the criteria relating to external features are: giving an impulse for changes in the environment, causing redefinition, changing the context or application, giving a new life or reconstructing, causing a change in the way of thinking, causing a synthesis of existing concepts into one new.

In business practice, multi-criteria assessment of creative products is basically avoided because it is a complex and costly process, which limits the choice of the 'most creative' product to be assessed. Most often the authors limit their choice to:

- one criterion, e.g. novelty (innovation) (Schumpeter, 1960);
- two criteria: product (existing; new) and market (existing; new) (Ansoff, 1957) or usefulness and price (Faukner and Bowman, 1995), or competitive target (broad; narrow) and competitive advantage (lower cost; uniqueness) (Porter, 1995), or novelty and usefulness (Puccio, el al, 2011).

In our opinion, three criteria should be used to evaluate creativity, i.e. novelty, usefulness and temporal perspective, in relation to strategy. The rationale for introducing the three criteria is the essence of the strategy, which in classical terms is defined as an action plan defining the long-term direction and scope of the organization's activities, achieving, thanks to its configuration of resources and competences, an advantage in a changing environment in order to meet the expectations of stakeholders (Johnson, et al, 2009). In addition, we believe that the creative process is natural for participants at all levels of management, so strategy is also a creative product. The more creative it contains, the more dynamic and flexible it will be with regard to changes in the startup environment. Any strategy is a creative product regardless of whether it is developed through a strategic planning process or through a business model.

Measuring creativity in strategy in practice

The analysis of the literature allowed the authors to assume that the fundamental role of creativity in strategy can be expressed in the synthesis of the strategic plan, market opportunities, organizational abilities and requirements for market success (Skonieczny, 2019). Based on this assumption, a survey was conducted among 42 small innovative companies and startups located in the Academic Incubator of Entrepreneurship at Wroclaw University of Science and Technology. The incubator was established in 2006 and promotes and supports the economic activity of students, doctoral students, employees and graduates and supports the creation of startups. At the same time, the incubator cooperates with experts who have knowledge of creativity and innovation and strategies to provide techno-starters with knowledge that supports new ideas, technical solutions and technologies that are the basis for the development of their startups in the academic environment. The incubator focuses on research, which are created at laboratories or scientific institutes. The results of their activities, e.g. in the form of new patents, can be used by commercial companies, once they have purchased appropriate licenses.

The prepared research questionnaire contained questions concerning the respondents' perception of the creative issues in the organization's strategy. The respondents, based on their knowledge and experience, had the opportunity to assess the value of creativity in the strategy, which is implemented in their startup. The value of creativity in the strategy was expressed by a simple formula:

$$V(C) = a_1\frac{\sum_{i=1}^{10} V(Ni)}{10} + a_2\frac{\sum_{i=1}^{10} V(Ui)}{10} + a_3\frac{\sum_{i=1}^{10} V(TPi)}{10}$$

Specification:
$a_1; a_2; a_3$ – indicators of novelty, usefulness and temporal perspective in strategy;

V(C) – creativity value in strategy;
$V(N_i)$ – novelty value in strategy;
$V(U_i)$ – usefulness value in strategy;
$V(TP_i)$ – temporal perspective value in strategy.

The value of novelty, usefulness and temporal perspective was calculated using the 7-point R. Likert scale. The study assumed that the share of novelty, usefulness and temporal perspective in the measuring of the value of creativity in the strategy is equal to 1/3 (a1 = a2 = a3). The calculated value of creativity in the strategy takes numbers in the range (1;7), where V(C) = 1 and means the lowest value of creativity in the creative V(C) = 7 is the highest value of creativity in the strategy. The study of novelty, usefulness and temporal perspective was based on the questions in tables 1-3.

Table 1: Measuring of novelty in the strategy

A novelty feature. Does the strategy allow for:
1. Generating new ideas, concepts and business models.
2. Monitoring existing, competitive, breakthrough and innovative solutions.
3. Transform and develop the generated ideas into ready-made market solutions and products.
4. Implementing and implementing the prepared solutions on the market.
5. Openness to new and previously unknown ideas, concepts and methods of operation.
6. Adaptation of new solutions created in other organizations.
7. Undertaking activities and undertakings in new market areas.
8. Patenting and protection of intellectual property resources.
9. Continuous improvement and development of resources of organizations oriented towards new solutions.
10. Eliminating factors constituting a barrier in generating and introducing new, innovative solutions.

Source: Own elaboration

Table 2: Measuring of usefulness in the strategy

A usefulness feature. Does the strategy allow for:
1. Undertaking market activities in the area of economic activity
2. Ability to act in conditions of uncertainty.
3. Moving forces and (economic) resources into areas with higher productivity and higher yield.
4. Recognizing opportunities and threats and making optimal choices.
5. Mobilization of material, intangible and relational resources
6. Searching for and using new resources that are in the organization and in its environment.
7. Searching for changes, responding to them and using them in the organization's activities.
8. Launching new business and organizational ventures.
9. Flexibility and the organization's ability to make sudden turns in business ("pivot").
10. Building a competitive advantage on the market.

Source: Own elaboration

Table 3: Measuring of the temporal perspective in the strategy

A temporal perspective feature: Does the strategy allow for:
1. Strengthening an organization's position in core market areas - local, regional, and global markets.
2. Providing additional benefits to customers.
3. Strengthening the organization's resilience to attacks from potential competitors.
4. Entering a strategic new market area (market development).
5. The organization's gaining a leadership position in a new market area.
6. Securing the achieved market position.
7. Monitoring and strengthening of the market position.
8. Responding to actions and attacks from competitors.
9. Expansion as the organization's strategy for functioning on the market.
10. Multiple options as an adopted strategy of the organization's operation and a condition of its success.

Source: Own elaboration.

The survey conducted among 42 startups showed that the dominant feature of their formulated strategies is the time perspective of (42.86% of responses), successively - novelty (37.715 responses) and usefulness (21.43% of responses). This sequence of features is surprising, especially in the context of innovations that should constitute the basis for the development of startups.

At the same time, half of the surveyed organizations (50% of responses) declare that intellectual resources are not secured in the analyzed strategy, for example by patenting. The verification of the proposed tool for measuring creativity in the strategy made it possible to collect important results regarding the use of strategies by the studied startups.

The most important of them are listed below. In the group of the examined startups:

- 40 startups declared that they have and implement their own strategy (95.24%). However, 2 organizations do not have and do not realize their own strategy;

- 76,1 % of the surveyed organizations (i.e. 32 startups) evaluate their strategy as more creative than the strategy implemented by competing organizations.

- 23.81% of the surveyed organizations (i.e. 10 startups) claim that the strategy of competitive entities is more creative than the strategy implemented by these organizations.

- 78.58% of the respondents identify creativity in strategy as a good method. However, 9 examined organizations (21.42%) do not identify creativity in strategy as a synonym of a good method.

- for 95.24% of the respondents, the key element identifying creativity in the strategy are choices concerning e.g. technology, market, customer, etc. Another important element in the opinion of the respondents is knowledge and understanding of the competitive environment (92.29%). Next, the respondents indicated: objective evaluation of possessed resources and desired resources (85.71%); simple, consistent and long-term goals (83.33%); simplicity, conciseness, comprehensibility and logic (80.95%); external and internal compatibility with the environment and possessed resources (80.95%);

- almost 62% of the surveyed organizations indicated six elements of strategy described in the literature on the subject as important, i.e: key choices concerning e.g. technology, market, customer, etc.; simplicity, conciseness, comprehensibility, logic, rationality; external and internal compatibility with the environment and possessed resources; simple, consistent and long-term goals; knowledge and understanding of the competitive environment; objective evaluation of possessed resources and desired resources as those that identify creativity in the strategy;

- 21.42% of respondents do not see the relation between the so-called good or successful strategy and creativity in the strategy.

The use of the above-described tool for measuring creativity in the strategy (novelty, usefulness and time perspective) in practice allows startups to diagnose market challenges, and then develop strategic options and choose the one that has the greatest chance of success. The developed questions also enable technostarters, resources necessary to achieve the assumed strategic goals.

Conclusions

Today's innovative companies operate in a turbulent environment, in which it is particularly difficult to predict changes. This requires creative action, especially in the formulation of strategies (strategic options). Due to the unstable environment, the generated strategic options must be subject to continuous assessment and creative modification. This assessment requires simple, clear and economically justified tools. The analytical tool for measuring creativity in strategy presented in the

article meets these criteria. The concept of this tool refers to three key dimensions of the strategy: novelty (innovative creation), usefulness (applied creation) and time perspective (long-term creation). The constructed tool was used to evaluate the strategy of startups operating in the Academic Enterprise Incubator located at the Wroclaw University of Science and Technology. These startups face the problem of uncertain demand, limited internal resources and the search for an innovative business model. In this situation, the success of the venture depends not only on the innovative potential and the possibility of its commercialization, but above all on a creative strategy which enables the formulation of many different, alternative strategic options and the selection of those which, if effectively implemented, guarantee the greatest success (the transition of the startup to the next phase of development).

Qualitative research carried out by the authors was based on examples of startups with regard to their development phases. The research used a configuration approach based on the managerial perception method obtained by means of a questionnaire, focusing on the creation and development processes for the startup model. The questions generated in the questionnaire are not only used to determine the level of creativity value in the strategy, but above all they are helpful in the evaluation of each of the proposed strategic options. The list of questions presented in tables 1-3 is not closed and can be supplemented with further ones, which will appear on the basis of knowledge and experience gained during startup operation.

The described tool for measuring creativity in the strategy allows not only to assess the value of creativity in the generated strategic options, but also to select those options that contain the greatest creative value. Creativity is a source of all innovation and entrepreneurship, and thus an important mechanism for the development not only of startups, but of all modern organizations. There are many instruments in the literature to measure creativity in organizations at different levels. Among them one can distinguish: the KEYS instrument, the creativity climate questionnaire (CCQ). KEYS is a tool developed by Amabile et al (1996) and used to measure the perception of the work environment both at the level of an organization and at the level of team and management. These tools focus on the analysis of different components and are based on different concepts that take into account the different dimensions of an organization. The described tool for measuring creativity in a strategy is a simple and universal solution aimed primarily at startups and small innovative companies. The concept of researching creativity in a strategy in configuration presented in the study provides a basis for further research aimed at explaining the role and impact of creativity in the strategy of creating and developing other organizations.

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Financial Sustainability of Educational Institutions in Nigeria: Balanced Scorecard Approach and Implications for Policy Designs

Philip Olawale Odewole[1], Mary Kehinde Salawu[2] and Rafiu Oyesola Salawu[3]

[1,2 &3]Obafemi Awolowo University, Ile-Ife, Nigeria

Correspondence should be addressed to: Philip Olawale Odewole; waleodewole@gmail.com

Abstracts

The study investigated the financial sustainability of the public federal higher educational institutions in Nigeria. The population of the study comprised twenty-five (25) Public higher educational institutions from four (4) geo-political zones and Abuja. Secondary data were sourced from Annual General Warrant from the Office of the Accountant General of the Federation and Audited Financial Statements of the Public Sector Entities. Data obtained were analyzed using Balanced Score Card techniques. The results showed that more than 92% of the sampled public higher educational institutions in Nigeria only attained a basic standard of sustainability test where the ratios of their Internally Generated Revenue to recurrent expenditure is between (40 – 60)% or 0.04 and 0.6 showing the ability of the institutions to generate sufficient revenue independently to cover only the operational expenses in the short-run. Also, the results equally showed that only 8% of the population attained an intermediate standard of sustainability whereby the ratio of Internally Generated Revenue to Recurrent expenditure is between (60 – 90%) or 0.6 and 0.9, indicating that 92% of the institutions heavily depended on central authority funding for their survival. The results further revealed that none of the higher educational institutions attained an advance standard of sustainability, that is, showing zero reliance on external funding. In conclusion, public higher educational institutions in Nigeria are financially dependent on central authority for survival. Therefore, the central authorities should roll out blueprints that will make the public higher educational institutions widen their internally generated revenue capacity and reduce the reliance on central authority funding for sustenance

Keywords*:* Financial Sustainability, IGR, Educational institution, Balanced Scorecard.

Introduction

The need for the prevalence of both the operating and financial sustainability within the financial system of the public higher institutions has been a major concern among stakeholders in Nigeria. Though, these institutions fall under the not-for-profit-making organizations, the delay or sometimes, the denial of financial inflows from the central authorities has weakened the capacity of federal educational institutions capacity to generate enough revenue to cover operational costs and still have sufficient balance for capital investment and plough backs for further developments. One of the biggest puzzles of a public sector entity is the attainment of sustainability. Either operating or financial sustainability is attained by a public higher educational institution where the needs of today are met without compromising future ability to meet different needs in the scheme of things within the organization for tomorrow (Hahn and Figge, 2011). Therefore, the drive towards both operating sustainability and financial sustainability becomes the daily dreams of public federal higher educational institutions in Nigeria. This realization is expected to serve as a panacea against an operational crisis in times of sharp cuts in central authority grants and financial releases from the supervising agencies or Federal Ministry of finance. To maintain, therefore, both the operating and financial sustainability, it becomes necessary for these institutions to increase their internal generating-revenue capacity to accommodate all operational costs, absorb recurrent expenditure,keep sufficient fund balance for physical project developments and also for executing quality academic

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researches that will deepen the wealth of knowledge among the academia.This study was precipitated by the inability of the federal educational institutions to carry out basic statutory functions like payment of staff salaries,provision of basic amenities,maintenance and repairs of non-current assets etc with a delay or denial of government funding despite the IGRs by these entities.Many authors have written on the trends or patterns of internally revenue generated of the federal educational institutions in Nigeria,but there is a caveat.The linkage of the various inflows to the sustainability of the institutions has been left uninvestigated.This missing link is the focus of this study. This paper, therefore, investigated both the operational and financial sustainability of the public federal higher educational institutions in Nigeria. The remainder of this paper is arranged as follows: following the introductory session, session two reviewed the relevant literature while session three discussed the methodology. Session four focused on the interpretation and discussion of findings while session five concluded the paper and outlined the policy recommendations for all the stakeholders.

Literature Review

Sustainability is the ability of a going concern to meet the current obligation within its own resources without compromising meeting the future needs (Hahns & Figgae, 2011). It is the ability to meet the needs of today within the fiscal year which measures budget solvency, paying up current obligations, maintaining existing service levels and settling outstanding obligations of the entity to the sundry creditors (Onwuliri & Alozie, 2017). The steady slide in crude-oil prices in the recent years has resulted to statutory decline in national revenue generation in Nigeria(Okonkwo, 2014). The effect of fall in oil-prices has exerted liquidity pressure on the federal government driving her towards finding alternative ways of funding by public entities. Evaluating the ability of a public educational institution to meet its obligation as it arises within the organization therefore becomes imperative.

Financial solvency in government treasury is often associated to multifactorial factors ranging from environmental factors, financial factors and organization factors. Public educational institutions hardly maintain a balanced budget that will sustain the entity sustainability (Masengo, 2011, Mupunga and Leperox 2015,Rittona 2014, Alogoskoufis 2011, Kouretta 2010). Attaining corporate sustainability therefore entailing public entity's expanding the financial bottom line.It equally requires widening the financial resources base of entities into a triple bottom base to accommodate sustainable growth and development (Albertini, 2013, Rivera,Munoz& Moneva,2017). Therefore, how public entity positions itself to achieve sustainable development and balances financial discipline with human development is a great concern to the top echelons within the organisation (Shank & Shockey, 2016).

Corporate sustainability focuses on the ability to generate enough revenue to meet both capital and recurrent operating expenses within the entity (Nollenberger, 2003, Chaney, 2002, GFOA, 2003, Crawford & Associate, 2008,Yawar & Seuring,2017). It determines whether the entity will continue in operation or not, either in a short-run or in a long-run. The inability of an entity to generate inflows large enough within its internal resource to cover recurrent expenses and operational cost is a proof that the entities are not sustainable(Moldavska,2017). Such inability is also an indication of the entity's reliance on the central authority for external assistance to cover recurrent liabilities so as to keep afloat. Corporate sustainability, therefore, focuses on the expansion of the entity's financial base to include both the environmental and social aspects of organizational performance (Albertini,2013,Shah,Arjoon& Rambocas,2016). As the public federal higher educational institutions compete among themselves to remain relevant within their core values and competencies in the emerging markets, the challenge of sustainability has weakened the realization of these dreams. The reality of insufficient cashflows from the Federal government to cushion the effects of inadequate internally generated revenue has demystified the realization of the organizational goals(Grewatsch &Kleindienst,2017).This has propelled the search for survival and formulate strategies to keep aglow outside the operating environment of the organization for reliance and external funding (Dixon-Fowler, Slater, Johnson, Ellstrand, Romi,2013). The federal higher education institutions which are unable to generate enough fund within their production bases and sphere of influence to cover running expenses are therefore unable to stand alone in times of financial shocks (Crawford,2008, Truant,Corazza &Scagnelli,2017)). Also, such entities are susceptible to failure and in danger of winding up in the event of a continuous delay from the central authority in releasing financial

resources to the entities. Financial literature on sustainability contains different standards or tests established to determine the revenue-generating ability of the public entities. The standards address the entity's ability to meet current operational costs within the internally generated revenue (Ngomonu & Wang, 2015).

An entity, therefore, attains a basic standard of financial sustainability if its ability to raise revenue within its own internally generated resource to meet the operational cost in the organization falls between 40% and 60% (0.4 and 0.6) (GFOA, 2003). The institution is, therefore, able to muster the financial strength, to source for fund internally within its resource without reliance on external assistance for the entity's financial demands. The attainment of basic standard of financial sustainability, therefore, means that the entity satisfies the necessary condition for survival or prove its of ability to continue in operations. At this phase of the sustainability test, only 40% to 60% of the revenue demand for recurrent expenses are met internally.The entity is therefore able to provide basic needs,settle its bills as they arise etc in the short-run. However,where the going concern revenue generation's ability is higher and above the basic standard, the entity operates better and with greater results. At this advanced level, the entity attains an intermediate standard whereby its revenue generation ability ratio is between 60% and 90% (0.6 and 0.9). Institutions in this group have more ability to accommodate financial shocks, extend operations, absorb more running expenses and depend less on federal authority for funding. Lastly, a public entity attains an advanced standard when it's ability to generate revenue within own operations is greater than 90% (> 0.90) (GFOA, 2003). This stage is the target of all federal higher educational institutions in Nigeria. At this standard, all financing decisions and investing decisions are made without any external restraints or influence on the entity. Financial commitments or obligations are taken at this point without prejudice to the central authority's assistance. Therefore, this phase witnesses the ability of a public sector's entity to generate fund within the sphere of its internally generated revenue to meet all its operational costs and still have enough revenue to invest on different capital goods. The attainment at this level signals a major component of the financial sustainability of an enterprise.

Also, the sustainability test of an entity is determined by the level of its operating surplus ratios. A public higher educational institution is financially sustainable if it attains a positive operating surplus ratio with a stable financial plan in the long-run coupled with the ability to sustain this feat. The indication of a positive ratio for an entity is the percentage increase in total own revenue which are needed for the entity to attain break-even operating results at the current operation (Nollenberger, 2003, Cheney et al., 2002, GFOA, 2003, Crawford and Associate, 2008). A public higher educational institution, therefore, attains a basic standard of financial sustainability when its ratio is between 1% and 15% (0.01 and 0.15) during an operational year and advanced standard when its ratio is greater than 15% (> 0.15) (GFOA, 2003).

The fund mobilization capacity and the extent at which the entity is reliant on other government agencies for funding its operation is another component to determine the financial sustainability of a financial entity. An institution with a higher ratio is an indication of its heavy reliance on external resources for survival (Nollenbarger, 2003, Cheney et al., 2002, GFOA, 2003, Crawford and Associate, 2008). The study anchors on the theory of constraints to drive the rest of the work.According to the theory,every entity must identify its weakest link or constraints before it can improve its performance.

Methodology

The paper focused on the sustainability of the federal higher Educational Institutions in Nigeria. The population of the study comprised twenty-five (25) federal higher education institutions from four (4) geo-political zones and Abuja. Secondary data were sourced from Annual General Warrant from the office of the Accountant General of the Federation and Audited Financial Statements of the Public sector entities between 2008 – 2016. The balanced scorecard was adopted in analyzing the data. The evaluation of both the operating and financial sustainability of the public educational institutions was therefore carried out using the balanced scorecard proposed by Kaplan and Norton (1992). The use of balanced scorecard is famous in public sector entities' performance measurement. Previous studies by different authors like Kloof and Martin (2000), Moullin (2007), Askin (2004), Drury (2001), and Striteske (2010) adopted balanced scored card as the techniques of analysis. The balanced scorecard,

therefore, has been used copiously to analyse both the operating and financial sustainability tests of the public sector entities (MAB, 1997).

Measurement of the Operating and Financial Sustainability of Public Higher Educational Institutions

The financial metrics play a dominant role in the measurements and determination of sustainability of public entity and are therefore frequently used as predictors of financial performance in public organizations using relevant variables (Sheh, 2014, GFOA 2003, Craword & Associates, 2008). The financial metrics for public sector performance measurements are as follows:

$$OPF_{it}{}^{1} = IR_{it}/RE_{it}$$
(1)

$$OPF_{it}{}^{2} = TR_{it} - RE_{it}/IR_{it}$$
(2)

$$FMB_{it} - IGF_{it}/TRG_{it}$$
(3)

$$BUP_{it}{}^{1} = BTR_{it} - ATR_{it}/BTR_{it}$$
(4)

$$BUP_{it}{}^{2} - BTE_{it} - ATE_{it}/BTE_{it}$$
(5)

These are financial ratios computed based on the public sector entities' financial statements and fund statements. Financial ratios are valuable tools used in measuring an organization's financial behaviour and performance (Erdogan, 2013). The operationalization of the variables is presented in Table 1.

Table 1: Operationalization of Operating and Financial Sustainability Variables

S/N	Variables	Measurement	Apriori's expectation
1.	Operating Performance (OPF^1)	Internally Generated Revenue (IGR)/Recurrent Expenditure (RE)	1. Basic standard (40-60)% or (0.4 and 0.6). 2. Intermediate standard (60-90)% or (0.6 – 0.9). 3. Advanced standard more than 90% or > 0.9
2.	Operating Performance (OPF^2)	Total Revenue (TR) – Recurrent Expenditure (RE)/ Internally Generated Revenue (IR)	1. Basic standard between (1-15)% or 0.1 – 0.15. 2. Advanced standard > 15%
3.	Fund Mobilization Performance (FMP)	Total Intergovernmental Funds Received (IGF)/ Total Revenue including Grants and Contribution (TGR)	High ratio is an indication of high reliant on external resources for funding.
4.	Budget Performance (BuP^1)	Budgeted Total Revenue (BTR) – Actual Total Revenue (ATR)/ Budgeted Total Revenue (BTR)	High ratio is an indication of high performance and ability to meet revenue budget in internal and external source while low ratio means low performance and inability to meet revenue budget.
5.	Budget Performance	Budgeted Total Expenditure	A low ratio shows the ability of the

	(BuP[2])	(BTE) – Actual Total Expenditure (ATE)/ Budgeted Total Expenditure (BTE)	entity to minimize cost and attain the expenditure budget while high ratios show the inability of the entity to minimize costs.

Measurements of Variables in evaluating the Operating and financial sustainability of public higher educational institutions.

In interpreting ratios in equation (1) and (2), variable $OPF_{it}1$ and $OPF_{it}2$ represent the public sector entities operating performance ratios for entity i at time t. IR_{it} is the total internal revenue collected by the public sector entity from different internal sources. RE_{it} is the total recurrent expenditure of the entity at time t and TR_{it} is the total operating revenue excluding grants and contribution for the development by the public sector entity i at time t. In equation (3), variable $FMB_{it}1$ represents the fund mobilization performance ratio of public sector entity i at time t, IGF_{it} is the total intergovernmental funds received by the entity i at time t, and TRG_{it} is the total revenue including grants and contribution for the development by the public sector entity i at time t.

In equation (4) and (5), $BUP_{it}\ 1$ and $BUP_{it}2$, represent budget performance ratios for ith entity in time t for model 1 to 2. ATR_{it} is the actual total revenue collected for each public sector entity i in time t, BTR_{it} is the budgeted total revenue collected for entity i in time t, ATE_{it} is the actual total expenditure for entity i in time t and BTE is the budgeted total expenditure of public sector entity i in time t.

In equation (1), $OPF_{it}\ 1$ measures the operational sustainability of the public sector entity. It determines whether there is adequate revenue to finance the recurrent operational expenses. It is a measure of public sector financial performance. Inability of the entity to cover operating expenditure within its resources is a symptom of over-reliance on external borrowings and intergovernmental funds. When operating expenses are not met within the internally generated revenue, it is a signal that the entity is not sustainable. These entities are incapacitated to operate in a situation when the central government funds are unavailable or denied or delayed. Different standards have been established to recognize the varying revenue-raising capacities of the public sector entities. GFOA (2003) came up with three basis of measuring revenue-raising capacities of public sector entities as standard basic, intermediate basic and advance basic. A basic standard is achieved within an entity when the revenue-generating capacity ratio is between 40% and 60% (or 0.4 and 0.6). An intermediate standard is achieved when the ratio of internally generated revenue capacity of an entity is rated between 60% and 90% (or 0.6 and 0.9). An advanced standard for a public entity is achieved when the ratio of revenue generated capacity is greater than 90% (or > 0.9) GFOA (2003).

In equation (2), $OPF_{it}\ 2$ measures the ability of the public sector entity to cover its operational cost and have revenue available for capital funding or other purposes within the accounting year or thereafter in the organization. A public entity is sustainable if it can achieve a consistent positive operating surplus with long term sound financial plans and still have the potential to continue in that capacity shortly. A negative ratio indicates the percentage increase in total own-source revenue (principally rates) that would have been required to achieve a break-even operating result (Nollenbarger, 2003; Chaney, 2002; GFOA, 2003, Crawford & Associate, 2008).

The basic standard between 1% and 15% (0.01 and 0.15) is the benchmark while the advanced standard > 15% (> 0.15) is the recommended standard GFOA (2003). In equation (3), $FMB_{it}1$ measures the extent to which a public sector entity is reliant on other government for resources. A high ratio may indicate that a public sector entity is over-reliant on external resources, increasing risk as external providers may alter funding streams (Nollenberyer, 2003; Chaney, 2002; GFOA, 2003; Crawford & Associate, 2008).

Equation (4) and (5) represent BUP_{it} measure the ability of the public sector entity to manage the budgets which they set in the accounting period (Nollenberyer, 2003; Chaney, 2002; GFOA, 2003; Crawford & Associate, 2008). Two ratios are often used to assess the budget performance. The first ratio addresses the ability of the public sector entity to meet the revenue budget in terms of total revenue collected from both the internal and government's sources while the other ratio measures the ability of public sector entities to minimize cost and attain the expenditure budget.

Results and Discussion of Findings

Figure 1 presents the operational sustainability of the public sector entities in the education sector. It illustrates how the public educational institutions within the sector are more likely to sustain, with the ratios of revenue capacity generated ranging between 40% and 60%. The implication of this is that some of the institutions within the sector can muster strength with available internally Generated Revenue (IGR) in times of delay of personnel allocations and overhead costs from the central authority. In other words,the MDAs in this category are not heavily reliant on federal government subventions to cover their operational costs. Many of these educational institutions are able to cope in the short-run at the periods of paucity of fund from the headquarters, by paying its current obligations as and when due. At these levels of operations, the institutions can also maintain existing service levels as well as meeting outstanding obligations in the short-run.Also, the attainment of operational sustainability mean that the revenue base for the educational institutions is therefore relatively wide in scope and large in size to accommodate pressing operating costs without recourse to external funding. This ability to generate revenue independently from internal sources to cover the operational costs make the educational institutions able to weather the storm and insulate against all odds during the financial crisis. The wide sources of revenue generations make the institutions under the education sector less vulnerable to external control and less dependent on intergovernmental financial releases and local borrowings. The sector's operations are hardly stifled by federal government temporary delay in funding and releases for recurrent operational expenses. There are three attainable standards of operating sustainability: the basic standard, the intermediate standard and the advanced standard.

The Basic Standard portrays the educational institution's ability to operate in the short-run; covering both the overhead costs and operational costs. Therefore, the basic standard test for the institution is determined by the ability of the entity to generate sufficient revenue independently to settle organization recurrent expenses within the accrued internally generated revenue in the short-run. The inability of any educational institution to cover operating expenditure arising from the organization's operations in the short-run is an indication of overt dependence on external sources for survival (Nollenberger, 2003). It can be seen from the table that most of the institutions operated between (40%- 60%) which qualified them for the minimum sustainable standard of sustainability test.

However, the basic standard is a minimum level of sustainability test.It is a short-run effect. In the long run, some of the educational institutions could not cope with operating challenges of incurring running expenses. Therefore, in the event of central authority's delay in releasing personnel costs allocations meant for the payment of salaries, overhead costs releases for financing overhead recurrent expenditure, many of the institutions are unable to cope with the tide of stringent financial allocations.

Also, in the consideration of the number of educational institutions that attained the intermediate standard, out of the twenty-five (25) sampled organizations in the education sector, only two of them WAEC and JAMB attained an intermediate standard with the average sustainability test ratios of 70% which falls within the prescribed intermediate standard (60% - 90%) (GFOA, 2003). These two institutions represent just 8% of the sampled population. In other words, only two institutions out of a total of twenty -five institutions can finance their recurrent expenditure without allocation from central authority with little or no financial stress. The operations of these two institutions are clearly different from the remaining 23 educational institutions.West Africa Examination Council (WAEC) is an educational agency for the whole of West African countries.Its primary funtions include organizing the significant O' Level examination for West African students,deciding which

examinations are needed for school students from different countries in West Africa.This autonomous body is equally saddled with the responsibility of issuing of O'level certificates to successful students,ensuring that educational standards are met during various examintions and equally promoting and helping students understand how big their potential goes beyond the exams.Its operating activities are financed mostly through the charges collected from students and does not rely solely on governmental funding for survival.Also,Joint Admission and Matriclation Board (JAMB)is also an autonomous body.It was established in 1978.The core functions of JAMB includes conducting UTME(Unified Tertiary Mtriculation Exams to the secondary school graduates.It ensures that every student who wishes to study at a tertiary institutionmeets all the requirements totake UTME. JAMB is responsible for fixing the dates,duration and test-type of UTME examinations.Its operations are financed by the various charges derivable from students and does not rely solely on external funding for financing.

The other twenty-three (23) entities which represent 92% of the population in the sector only attained a minimum sustainability level between 40% - 60%. The implication is that in the period of adverse and prolonged financial inflows from the central bodies or central authorities, only two entities (8%) out of twenty-five could withstand the hardship of long paucity of funds from the federal government. The other twenty-three (23) entities whose sustainability test ratios fall within (40% - 60%) will experience difficulty in settling recurrent expenses without external funding. This group of institutions with a low fiscal sustainability index ran huge recurrent expenditure that cannot be sustained within the internally generated revenue. Many of the educational institutions run high recurrent bills mainly driven by the high allocations received from the federal government without counterpart funding from their IGR. The implication of low revenue to these institutions, therefore, means that the amount of money available for both human and physical developments would be restricted. Also, in case of any oil price fluctuations in the international markets which are the mainstay of all the entities, many of these institutions face the risk of downsizing of staff or suspension of core services due to inability to pay staff salaries. The third standard is the advanced standard whereby the ratio of revenue generation capacity is greater than 90% (or > 0.9). This is the sufficient condition for an entity to operate in order to attain optimum sustainability level to insulate against both short-term and long-term financial hardships from the central authorities or intergovernmental bodies. Unfortunately, none of the institutions within the sampled population achieved this feat. The implication is that the higher public educational institutions in Nigeria cannot adequately generate enough funds internally on their own to meet internal operating needs for a relatively long period without external funding from the central authorities.

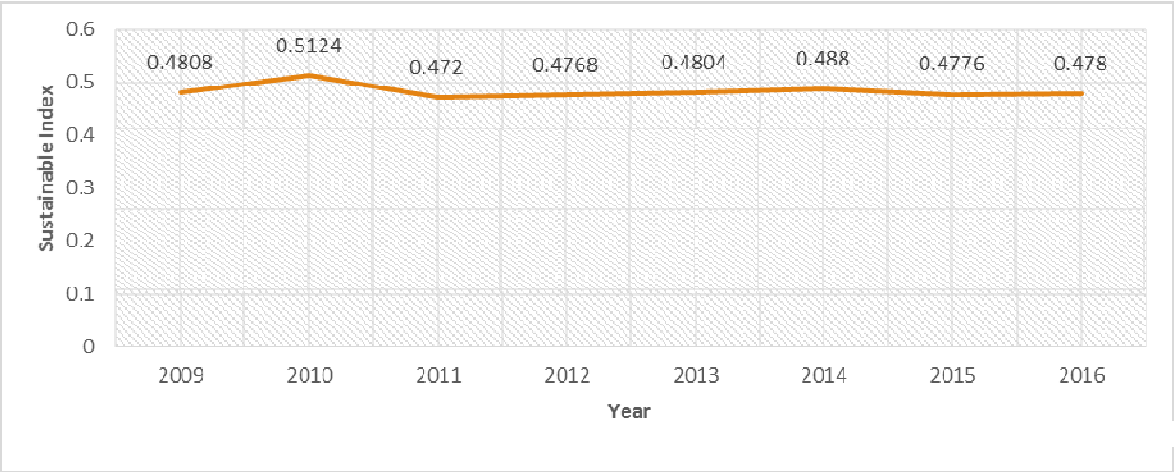

Figure 1: Operational sustainability of public educational institutions in Nigeria

Figure 1 shows the spread of operational sustainability test values of the public higher educational institutions in Nigeria. From the sustainability index above, it shows that most of the institutions attained the basic standard of sustainability with the sustainability index ranging from 40%-60%.

In summary, therefore, the public higher educational institutions in Nigeria are clinically sick with weak financial bases for generating enough internal revenue to finance its legitimate core operations and cover all its operating expenses within its defined revenue base. The ability to generate fund for internal operations is only restricted to a basic standard which is the lowest attainable standard of sustainability. The inability to withstand financial storms occasioned by prolonged delay or absence of external funding is more pronounced among the entities.

Figure 2 presents the financial sustainability of the public educational institutions.The financial sustainability means that the entity has ability not only to cover operational costs but also sustain sufficient revenues thereafter within the organization for capital funding, investment purposes and ploughing back for other developments. According to Crawford and Associates (2008), a public entity is financially sustainable, if the entity consistently achieves a positive operating surplus ratio within the organization.Also,the entity must show evidence of a sound long-term financial plan for the foreseeable future, and a consideration of asset management within the institution. In this context, therefore, an entity that cannot sustain a positive operating surplus in the long-run with a sound long-term financial plan is not financially sustainable.

Differences, therefore, abound between operational sustainability and financial sustainability of an entity. Operational sustainability is a subset of financial sustainability. An entity can attain operational sustainability without achieving financial sustainability. Operational sustainability is a short-run concept whereas financial sustainability is a long-run concept. Therefore, an entity fulfils a necessary condition for attaining operational sustainability when sufficient revenues are generated to pay for recurrent operational expenses within the organization in the short -run. Attaining financial sustainability is a sufficient condition attainable when sufficient revenue generated by the entities covers the operational costs, with sufficient balance being left behind to be ploughed back into the organization for capital funding, project investments and the execution of different chains of capital contracts. Figure 2 therefore, presents the financial sustainability of the public higher under the study. For all the institutions under consideration, their positive operating surplus ratios recorded were above the minimum basic standard of 1% and 15%. All of them attained advanced standard where positive operating surplus is greater than 15% (> 0.15). They are therefore considered financially sustainable. At this level, the institutions can cover operational costs and still have revenues available within the entity for capital funding or capital project investment and ploughing back the surplus for future use (Crawford & Associates, 2008, GFOA, 2003, Wollenberger, 2003). This, therefore, suggests that these educational institutions have relatively large internal generated revenue base wide enough to accommodate physical and human development after covering the operational costs within the entities.

In times of financial crisis and economic meltdown which normally characterized by cuts in government capital project releases, these entities can still keep afloat in capital funding by expanding their capital development (Palley, 2006, Khattry, 2013, Kumar, Lagh & Plekhanvov, 2007, Mwakalobo, 2009, 2010, 2013).

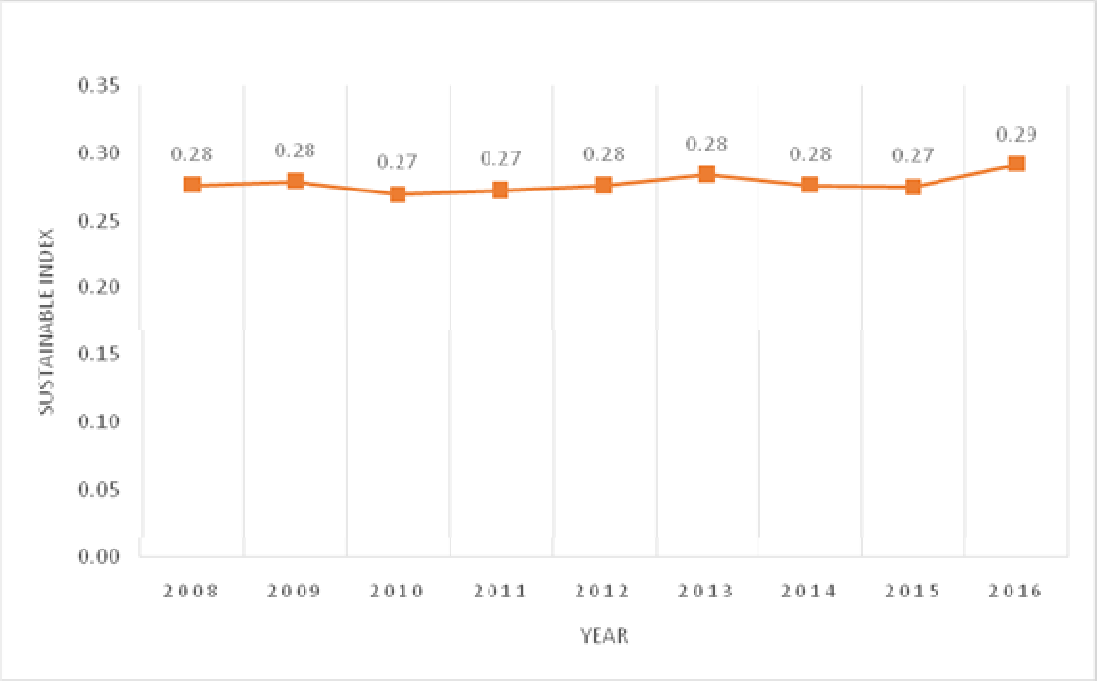

Figure 2: Financial sustainability index of higher public educational Institutions in Nigeria

Figure 2 shows the sustainability index of federal higher institutions in Nigeria. The average operating surplus ratios are positive showing that institutions are financially stable with the ability to generate enough revenue internally to cover operational costs and still have sufficient for capital developments.

Also, in the period of adverse restrictive fiscal policies which impacts negatively on public spending whereby government infrastructure in many institutions suffer from government expenditure comprehension, this group of federal educational institutions can withstand the tide by expanding their capital physical development through the meager internally generated revenue (Kumar, 2007, Basu & Movrissey, 2007, Schade, 2010, Drether, 2012, Gupta, 2012). This is largely because the entities can demonstrate persistent ability to cover their operational costs within the scope of their operations consistently and still have sufficient revenue available for future developments such as road construction, building of more hostels and lecture theatres etc. More also, the attainment of financial sustainability by the public sector entities is a proof of an existence of a sound long-term financial plans within the organization coupled with a good asset management accommodated within the positive operating surplus ratio. The institutions under the education sector are therefore considered financially sustainable within the research periods.

In Figure 3, budget performance among the institutions in the education sector is displayed with the various percentages against the institutions during the research periods. Ninety-two (92%) of the federal institutions recorded low budget performance while eight (8%) recorded high budget performance. This imply that 92% of the population could not manage their budgets which they prepared in their organizations for the accounting period. The implication is that budget deficits and budget summersaults are grave consequences in the organizations. The personnel cost deficits will, therefore, lead to the inability of the institutions to pay the adequate salaries to the employees as at when due, resulting in personnel cost shortfalls. Besides, if the situation continues unchecked, the possibility of downsizing and right-sizing of both line and administrative personnel staff to maintain a sizeable payroll is imminent. The prevalence of high budget deficits in overhead cost budget will equally worsen the inability of the institutions to settle current obligations in the organization. The scenario also presents the lack of budgetary provisions for current obligation or when budgetary

provision is not backed up with the available cash to pay for it, which hinders public budgets translating governments' policies, commitments and goals into sound decision making. The fedaeral educational institution's budget focuses on how much revenue to raise, how it should be raised and modalities to use these funds to meet the organization's competing needs. An organization, therefore, needs a functional budget to develop sustainable financial policies and organizational growth. Federal higher educational institutions with financial problems are sometimes propelled by weak budget systems and faulty budget choices which result in debt overhangs to many institutions.

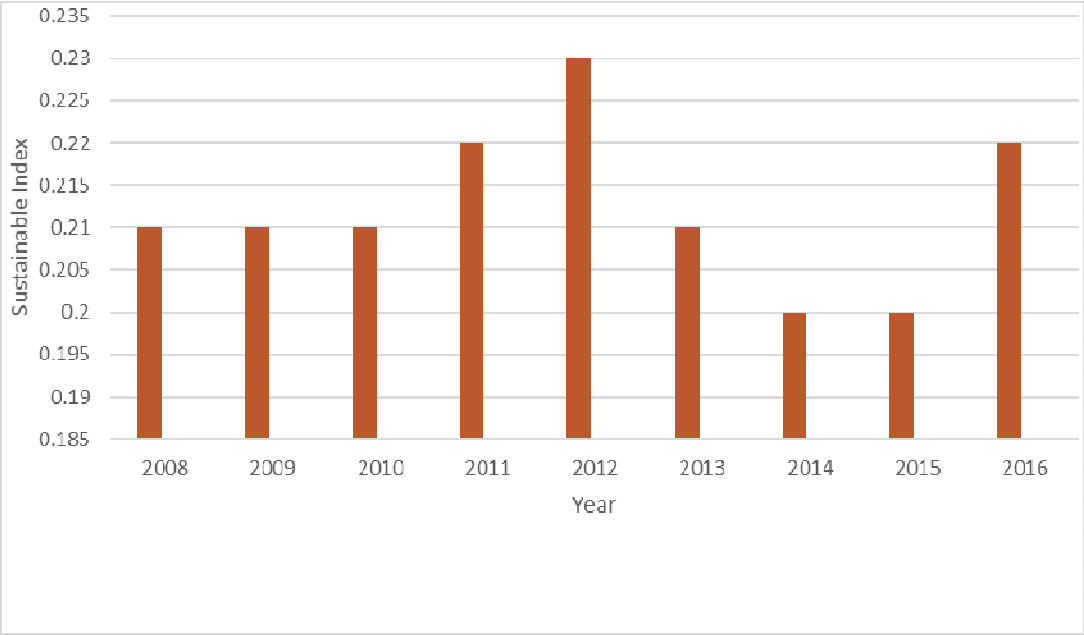

Figure 3: Sustainability Index on Higher Educational Institutions on Budget Performance

Figure 3shows the sustainability index of public educational institutions with budget performance. From the figure, the majority of the institutions (92%) recorded low budget performance while 8% of the population recorded high budget performance.

It can, therefore, be concluded that federal higher educational institutions in Nigeria suffered from weak budgetary system whereby allocated funds to specific programme or projects hardly reach the intended beneficiaries or accomplish the projects for which the fund are earmarked for.

Figure 4 measures the ability of the institutions to minimize cost and attain the expenditure budget within the accounting periods. The figure contains ratios that are used to assess the budget performance of the entities in the current year in addition to the previous year measurement. The cost minimization concept is a financial strategy aimed at achieving the most cost-effective way of delivering goods and services to the required level of quality in an organization.

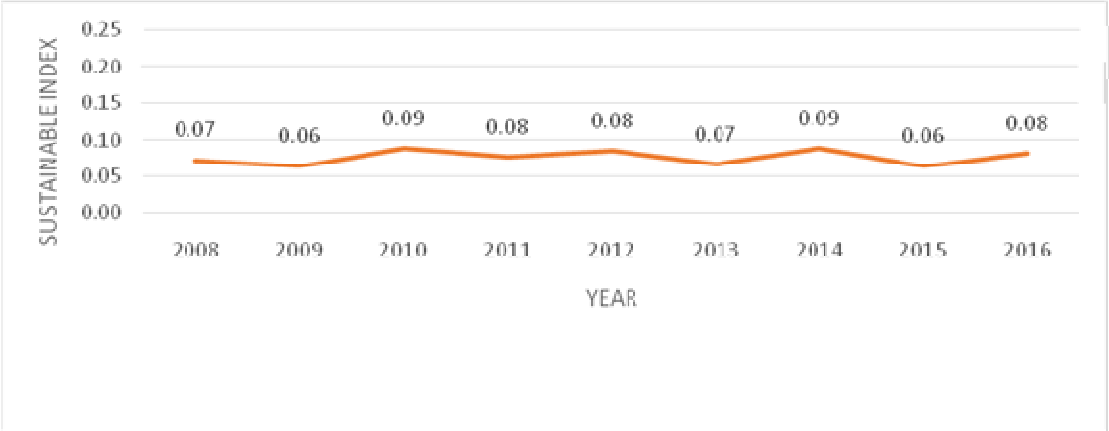

Figure 4: Sustainability Index on Cost Minimization and Expenditure Budget

Figure 4 shows the sustainability index of the higher public educational institutions with their ability to minimize the costs of inputs. The graph shows that the propensity of the institutions to minimize costs is low thereby leading to redundancies and wastages.

The result of a reduction in cost is higher profits and better cash inflows. Public entity's problem sometimes behaves in the same direction with the private firm's problem which maximizes profits by choosing the optimal quantity of inputs to employ and output to produces. From figure 4, the capacity of the entities under the education sector appears lower in minimizing the costs of inputs among the various institutions. The stark reality is that wastages, redundancies, bureaucracies, perennial losses are the multiple effects in a low-cost minimizing organization. Therefore, the low propensity of the federal educational institutions to minimize the cost of both personnel costs and material costs are parts of gateways to perennial redundancies and wastages that characterize our higher institutions of learning in Nigeria.

Figure 5 presents a summary of the federal higher educational institutions' behaviour in fund mobilization and performance ratios within the sampled population. The fund mobilization performance ratios are stated between 24% - 25% at lower and upper limits. This is an indication that the educational institutions did not depend heavily on external fund providers for the execution of various projects. It also emphases the capacity of the entities to attract foreign aids or external fund with minimum efforts in addition to the streams of internally generated revenue available to meet up financial obligations as they arise. Therefore, the evidences of the low fund mobilization performance index for the educational institutions measure the extent to which the entities do not rely on government funding as the main sources of fund. The lower the fund mobilization performance ratios the better for the organization to survive in times of financial hardship. Also, any delay or denial from the central authority for releases, grants or/and financial allocations to the institutions will not strangulate the entity. Nigerian government presently faces three trade-offs in the process of public expenditure management which can affect the public higher educational institutions in Nigeria that heavily rely on the central authority for funding without alternative counterpart funding within the organization (Khattrg, 2013). The first trade-off is between the spending on physical infrastructure and human capital development within the organization which are sometimes mutually exclusive and makes capital rationing the only viable option.

However, because of the substantial costs expected of capital investments which government undertakes, a larger proportion of the costs on capital investment takes place to the inclusion of substantial resources on human capital investment in the organization (Mwakalobo, 2015). The second trade-off is allocating resources between public investment in both physical and human capital infrastructure and interest payments in the nation accumulated debt. A low level of

dependence on the central authority by the public higher institutions is, therefore, a panacea for the governments to focus on the multifaceted paradigm.

Figure 5: Sustainability Index of Fund Mobilization and Performance

The figure above shows the sustainability index for the public educational institutions on fund mobilization and performance. The low fund mobilization performance ratios indicate that the institutions were not dependent solely on external funding for survival.

Conclusion

The paper investigated the financial sustainability of the public higher educational institutions in Nigeria. The findings revealed that all the federal higher educational institutions operated at the basic standard level whereby they could generate enough revenue to cover operational expenditures while some of the institutions also attained intermediate standards whereby they could generate enough revenue for their operational costs and still have enough fund for capital investment and plough back for future usage. This feat, others could not achieve. The study, therefore, concluded that the central authorities should roll out blueprints that will make the federal higher educational institutions in Nigeria widen their internally generated revenue capacity and reduce the reliance on central authority funding for improved sustainability.

Recommendation

In order to improve the level of sustainability of the higher institutions in Nigeria, the following recommendations become imperative :

Central authority should roll out blueprints for all public higher institution to widen their Internally Generated Revenue base. These could be by building more of student hostels at lower commercial rates to students, operation of bakery services, bookshops, printing press, farm produce, maintenance of filling stations etc. The current trend now in the public sector entities funding is the introduction of public-private partnership arrangement whereby essential services that cannot be provided only by government's allocations are assisted through the involvement of private individuals who inject fund

and make the services available as at when due. The higher educational institutions can take advantage of this arrangement.

The cost minimization strategies have been proved to be potent in stemming the wave of wastages and redundancies in many organizations. As a way out of a financial crisis that bedevils many government higher institutions, workable plans to minimize costs should be introduced into the institutions to alleviate the challenges of cash crunch and liquidity problem. The education institutions should embark on rigorous fund mobilization drives in all areas of operations and activities within the organization. Less reliance should be placed on the dependence on financial allocations and releases from the central authorities.

The educational institutions should stop the lopsidedness in staff appointments to minimize wastages in personnel costs utilization. Also, due process should be followed in material procurements for all units in the various institutions to prevent double-dealings and enhance transparency in all financial dealings in the educational systems. There should be tight budgetary systems in all the educational institutions that would be strictly based on available revenue generation during the accounting year. Bounded goods should be discouraged in all the institutions as a matter of policy.

Confirmations of both budgetary provision and fund availability should always precede procurement processes for all items of purchases. Needs assessment strategies should be evolved in all the institutions to demarcate needs from wants. Each institution should identify areas of acute shortage of staff and material needs and focus on such critical areas. Efforts should equally be on deck to eliminate all slacks in both personnel cost allocations and overhead costs expenditure.

The federal government should create incentives for all the educational institutions to expand growth and earning potentials thereby enabling resources needed to improve educational facilities in the countries. The study, therefore, concluded that the central authorities should roll out blueprints that will make the public higher educational institutions in Nigeria widen their internally generated revenue capacity and reduce the reliance on central authority funding for improved sustainability.

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Scrum Solo: Application in Projects with a Strong Integration Component

Joao N. BRITO
Primavera BSS, Braga, Portugal, jnabrito@gmail.com

Carlos REBELO
University of Minho, Braga, Portugal, carlosrebelo-7@hotmail.com

Miguel A. BRITO
Centro Algoritmi - University of Minho, Braga, Portugal, mab@dsi.uminho.pt

Abstract

In Portugal, 90% of software developing companies are micro companies. In 2002, in the Brazilian market, about 60% of the software developing companies would start their activities with just a single developer (Pagotto, Fabrti, Lerario, and Gonçalves, 2016). The Scrum Solo methodology was developed having in mind, that there is a big need for organizing and managing the software development of teams comprised by a single individual. The underlying complexity of big systems and the underlying integration complexity makes the usage of techniques and processes that guarantee the control of the project vital. The methodology described in this document is validated with two application cases in a context of development. The first one is an extensive project, with strong integration component, and the second one the development of an application for process dematerialization. The Scrum Solo methodology performed well in both cases despite their differences. Nevertheless, more cases should be analyzed with the emphasis in using different contexts namely other organizations.

Keywords: Scrum Solo, Scrum, Software Development Process.

Introduction

In Portugal, 90% of software development companies are characterized as micro-enterprises ("Lista de Empresas de Desenvolvimento de Software em Portugal", 2018). In the Brazilian market, in 2012, about 60% of software companies started their activities with only one developer (Pagotto, Fabrti, Lerario, and Gonçalves, 2016).

Agile methodologies are widely used by many teams nowadays. Among these, Scrum is the most widely practiced Agile method/framework (Srivastava et al, 2017). From the respondents to the survey referenced in the 14th Annual State of Agile Report (2020), at least 75% of respondents practice Scrum or a hybrid that includes Scrum. However, as stated before, many of those teams, are a single person team. This was the main motivation to adapt the Scrum methodology to solo teams, thus Scrum Solo.

In this article, Scrum Solo is described, explaining the main activities, the actors involved, and the artifacts resulting from the process. Furthermore, two validation cases were developed and are also described in this paper.

These two projects where developed over a period of roughly six months each, for one of the biggest Portuguese's software development company. The first one's goal was to create a tool that generates code from a REST Web service (REpresentational State Transfer) automatically, based on the existing code of an ERP system (Enterprise Resource Planning), this way, removing the need of having 2 big teams in parallel, developing both the ERP, and the Web API solution. The second one's goal was to develop a mobile application prototype, which integrates with the aforementioned ERP through the

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Web API, contributing to the dematerialization of processes such as a salesperson writing down sales details on paper, and typing it afterwards at the office.

This cross-platform mobile application targets sellers which are away from the company and cannot access the ERP directly, adding mobility and flexibility. With the conclusion of this prototype, they were able to access, create, edit, and delete different entities such as items, documents, suppliers, and customers, saving them the time of, for example, having to write everything in paper and typing it afterwards at the office.

Scrum Solo Methodological Approach

Scrum Solo is an adaptation of Scrum and PSP (Personal Software Process) for solo software development. Based on figure 1, it is possible to see the similarities with Scrum (Pagotto, Fabrti, Lerario, and Gonçalves, 2016).

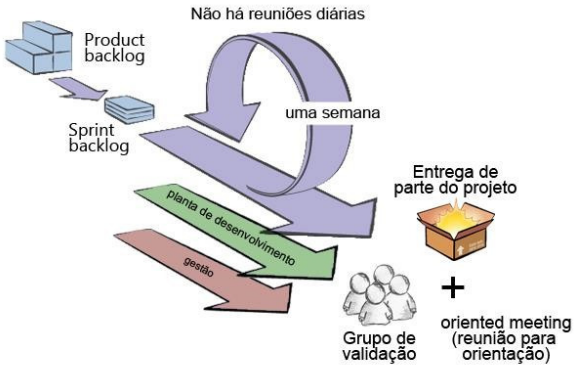

Fig 1. Scrum Solo (Pagotto, Fabrti, Lerario, and Gonçalves, 2016)

Scrum's goal is to provide a convenient process for project development, presenting an empirical approach, which applies ideas based on the theory of industrial process control to software development, introducing additional ideas such as flexibility, adaptability and productivity (Soares, 2007).

Scrum was designed to allow normal developers to organize and form high development teams (Sutherland, Viktorov, Blount, and Puntikov, 2007). Scrum assumes that the systems development process is complicated and unpredictable, which can only be described as a general progression (Schwaber, 1997).

The workflow begins with the creation of a product backlog, which contains all the tasks necessary to implement the features desired by the customer. From this group of tasks, some are selected to be developed during the sprint (within a week). This sprinting process is iterative until the project's completion date arrives, or until all tasks are completed. During sprints, it is necessary to have management activities, which aim to plan and monitor the development of the project. After completing the tasks, the project is delivered, which will be reviewed by an evaluation group and, eventually, an orientation meeting will be held with the people who will use the developed product (figure 1).

This methodological approach has four main activities: definition of requirements, sprint, deployment, and management. The definition of requirements (figure 2) aims to define the scope of the product, the

product backlog and, if possible, a software prototype. These objectives will be achieved with the help of customer input and advisor that will assist the developer to achieve his goal.

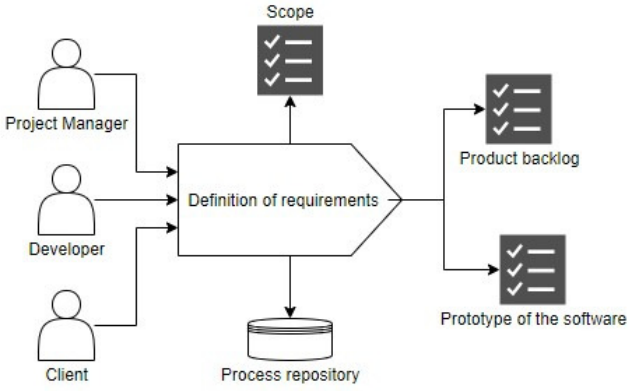

Fig 2. Definition of requirements (Adaptation from Pagotto, Fabri, Lerario, and Gonçalves, 2016)

Sprints, represented in figure 3, are the activity where the development of a set of tasks selected at the beginning of the same, from the product backlog, occurs. These tasks must be completed within one week, resulting in a sprint backlog, part of the product, development plan, and minutes.

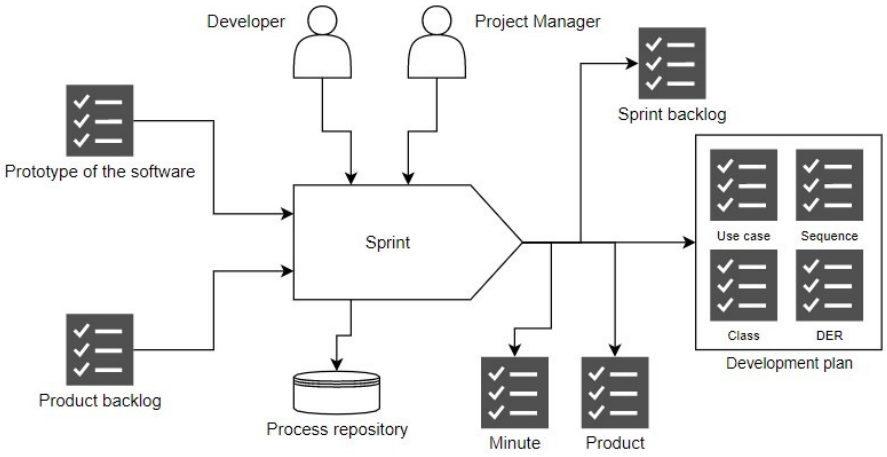

Fig 3. Sprint (Adaptation from Pagotto, Fabrti, Lerario, and Gonçalves, 2016)

During the sprints it is necessary to manage the status of the project. The project management activity has this objective. Using the product backlog, the developer, advisor, and client must discuss the status of the project. From this reflection, the project's analytical structure (WBS), project schedule and cost table will be generated.

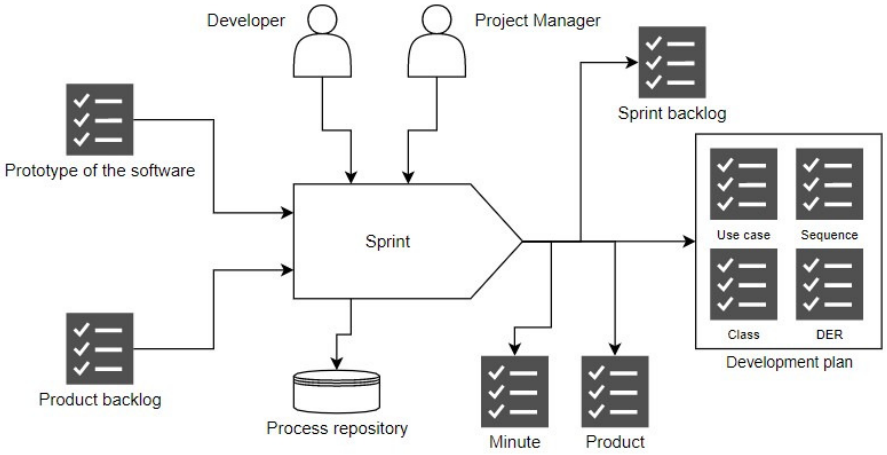

Fig 4. Project management (Adaptation from Pagotto, Fabrti, Lerario, and Gonçalves, 2016)

Finally, as a last task, deployment is the activity in which the product is made available for use by the customer. It is also important, after delivery, to have an orientation meeting so that those involved understand in more detail how the product works.

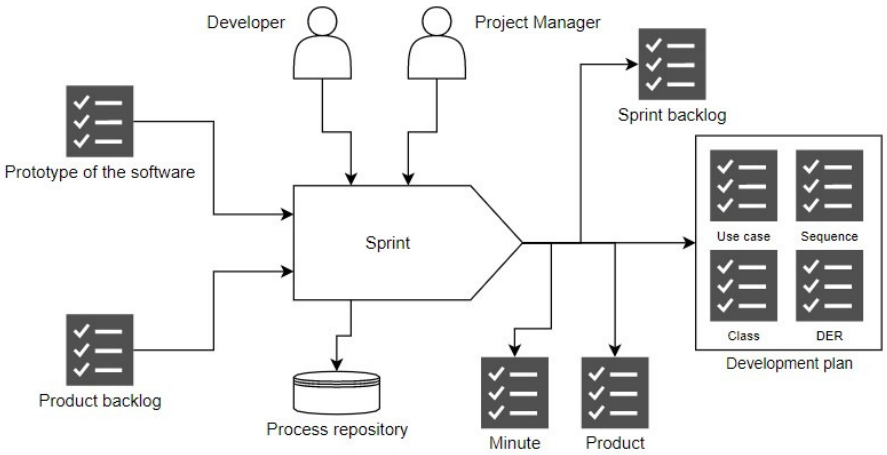

Fig 5. Deployment (Adaptation from Pagotto, Fabrti, Lerario, and Gonçalves, 2016)

There are several actors in this process, namely the developer, who is responsible for developing the product and following the methodology; the client (product owner), who will be the owner of the final product, can be made up of one or more individuals who will interact with the product (example: managers, accountants, others ...); the advisor, who is responsible for helping to guide the developer throughout the process, so that the requirements are well met; and, finally, the validation group, made up of the end users of the product, who aim to evaluate the product and provide feedback.

The various artifacts generated throughout the process are as follows:

Scope: it serves to characterize the scope of the process and the aspects inherent in mapping the problems of the product owner, describing the scope of the product, the customer profile, and the functional requirements.

- Software prototype: consists of images of the user interface with the product. It is advisable to use the ".png" format and point the name of the product backlog item that represents the image.

- Product backlog: is a list of features that must be implemented in the software. Each line in this list must contain a feature code, description, insertion date and selection date for the sprint backlog.

- Process repository: it serves to store all documents related to the entire product development process in the cloud. It is important that the developer organizes the repository folders well and follow a set of rules for that purpose.

- Sprint backlog: it is a list of all the features that must be implemented in a given sprint. The sprint backlog must also store the feature code.

- Product or part in operation: a version of the product that gives the customer the possibility of obtaining a return on the investment previously made at the time he asked for its development.

- Minute: it is used to record the moments when a feature is implemented. Used in the sprint and delivery: in the sprint, the functionality is validated by the advisor; delivery is validated by the customer.

- Development plan: aims to gather the artifacts used in the specification of the functionalities. Scrum Solo suggests the use of diagrams of use cases, sequence, classes, and entity and relationship, always with the possibility of using others, if necessary, for the case.

- Analytical structure of the project: a hierarchical structure that subdivides the work of a project into smaller and more readable components.

- Chronogram: aims to organize work packages sequentially within a certain time frame. The person responsible for the execution of each activity can be appointed. It is suggested to use the schedule in the format of a Gantt diagram.

- Cost table: aims to map the effective cost generated during the execution of the project to be compared with the budget previously made.

A search was also made for "Scrum Solo" through the Google academic platform, however, the state of the art is still underdeveloped. Fonseca (2016) only generically describes what Scrum Solo is as a "methodology for dynamic project management that also allows the development of software in an agile way". Similarly, Sanches Kleim (2016) describes that Scrum Solo was developed with the scope of helping with the organization of software development by individuals, based on the good practices described by PSP and Scrum.

Application of Scrum Solo in an Extensive Project, with Strong Integration Component

The Scrum Solo methodology consists of an iterative and incremental process, which unites the best practices defined by the Personal Software Process (PSP) and Scrum, to promote the smooth functioning of the development of a project. This methodology was applied to the development of a project whose objective was to be able to create a tool that generates code from a REST Web

service (REpresentational State Transfer) automatically, based on the existing code of an ERP system.

This project allows users to access the ERP through a Web service and, eventually, through a dedicated website, which consumes the service. However, the value of this project lies in the fact that the conversion of the ERP code (developed over 25 years, by multiple teams, with about 4.5 million lines of code today) is done automatically, saving an enormous amount of resources in its creation and maintenance, since the ERP is constantly in development, the Web service would have to monitor, adding a level of complexity in the coordination of the ERP and Web service development teams.

In projects of this magnitude, there are added risks associated with work, which do not exist in traditional software development projects. The identified risks involve limiting access to the original ERP code and its complexity; code incompatibility between the ERP and Web service (the use of certain mechanisms for the use of assemblies by the ERP, caused a lot of problems due to the incompatibility of these mechanisms with the Web, resulting in the need to change the original ERP code); there were also problems in working with the version of ERP that was under development, sometimes bugs were found, resulting in time spent looking for the source of the problem; finally, the need to change the machine also proved to be a setback, due to the dimension of the project and the configuration of several components to support development.

The Scrum Solo methodology, although it has a project management task, does not respond well to these cases of high dependence on external factors, in this case, the ERP's underlying services. It is proposed to create a risk mitigation task, equivalent to a low percentage of the time spent per sprint, which can be replaced by a development task if time is available. This mitigation task can, for example, be added at the end of all sprints, costing two to four hours.

Scrum Solo goes through an initial moment of defining requirements, followed by sprints where the program is developed, followed by the deployment of the program to the client. During the development process it is also necessary to have project management activities. Next, the tasks developed for the particular case, previously mentioned, will be exposed.

During the definition of requirements (figure 2), several meetings were held with the client and advisor, to obtain an understanding of the necessary requirements of the application. This process resulted in a document called scope, which contains the definition of the scope of the problem and the customer's profile; and a document called product backlog, with 32 activities that, after completion, resulted in a product that will be delivered to the customer.

The Web API has the peculiarity of not having a traditional user interface. Instead, its interface is done through URL's ("{Domain}/api/{class}/{method}/{parameters}"). In other words, the software prototype is made up of this generic standard for the interface, which will then be used during code generation.

The process repository is divided into two parts. The artifacts generated regarding the use of Scrum Solo were filed in a folder in the cloud, using Google Drive services. The code developed, was saved on the client's local network, and was managed through the TFS tool (Team Foundation Server).

It was defined that the sprints (figure 3) would consist of five working days of development, however, a sprint does not necessarily represent a week, due to the interruption of development for external reasons, such as writing scientific articles, holidays, events, among others. This aspect brings a uniformity that will have an impact on the representation of the sprints, since everyone has the same amount of working time.

It is understood that, according to the work Pagotto et al. (2016), after a sprint, a development plan is supposed to be generated. In this case, the Web API already respects all the business rules imposed by the ERP. This fact comes from the exclusive use of the ERP business layer in the Web API, that is, all business rules will be respected, just like in the ERP, making the elaboration of the artifact unnecessary.

As for the product, new versions were saved on TFS regularly, allowing access to the code by authorized persons, and having access to the records of all changes made.

The sprint backlog aims to identify which product backlog tasks were executed in a given sprint, its start date, and the time spent on its completion. Although it is important for the future to have this artifact well documented and readable by people other than the developer, there is no need for complex tools for its management, a simple sheet of paper or a word document is sufficient (figure 6).

The development of the project was completed in June 2018, with the deployment activity (figure 5) already completed.

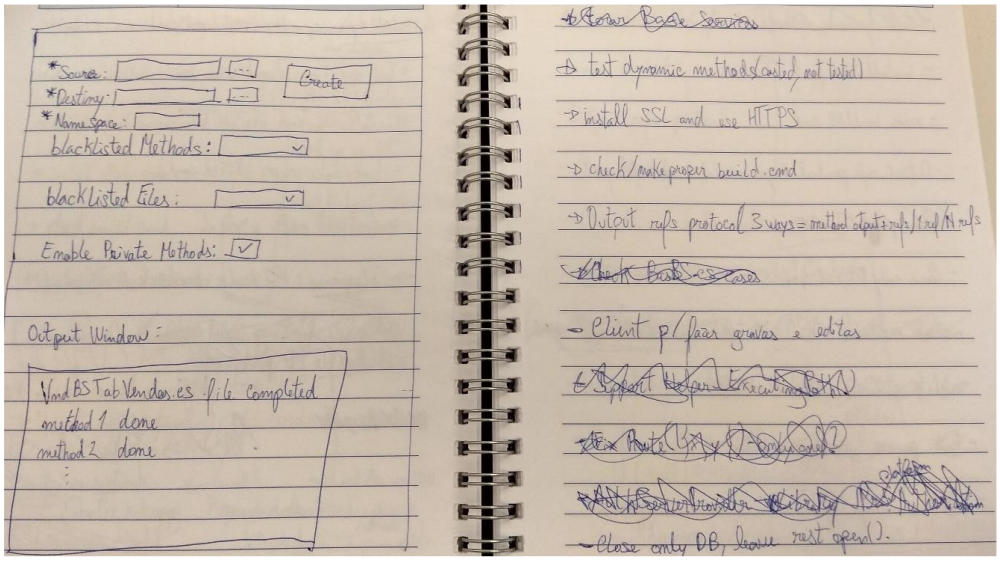

Fig 6. Example of a sprint backlog

Application of Scrum Solo in a Project, with Strong Component of Process Dematerialization

The Scrum Solo methodology was also used in another project, which aimed to achieve a process dematerialization of already existing processes. The solution was to develop a mobile application prototype, which integrates with the ERP mentioned in the previous example.

This cross-platform mobile application targets sellers which are away from the company and cannot access the ERP directly, adding mobility and flexibility. With the conclusion of this prototype, they were able to access, create, edit, and delete different entities such as items, documents, suppliers, and customers, saving them the time of, for example, having to write everything in paper and typing it afterwards at the office.

The major benefits are the highly performant load times and the ability to access all the above-mentioned features even offline (keeping in mind that some information might be outdated because it has not been synchronized).

With any project, comes different difficulties. In this case, the main one with the ERP and its Web API was the incomplete/undetailed documentation, which lead to adversities while trying to integrate different information and setting up a test server for deployment testing. With these issues, the project activities were adapted accordingly, and they were reported to the product team which made many improvements based on the inputs given.

As a side benefit, being one of the first projects using the ERP's Web API, a series of optimizations and quality of life updates were done in parallel with the development of this project. With Scrum Solo, it was easy to adapt to the constant changes to the Web API.

To carry out this project, the risk mitigation task referred to in the previous project was followed, being implemented in order to monitor the progress of the project, serving to carry out a retrospective of the prototype in relation to the scope. This task was divided into two distinct parts. The first part was dedicated to the identification of possible features that could be explored through those already carried out in the previous sprint, enhancing the responsiveness of the prototype in relation to the respective application processes.

One of the main goals of the development, was to use concept of Rich Internet Applications (RIA). RIAs combine the Web's lightweight distribution architecture with desktop applications' interface interactivity and computation power, and the resulting combination improves all the elements of a Web application (data, business logic, communication, and presentation) (Fraternali, Piero, Rossi, and Sánchez-Figueroa, 2010).

In this case, the product backlog was constructed by further detailing an already existing document, provided by the company. The sprints were done weekly, independently of having one or five workdays. Despite this fluctuation in length, the methodology was able to be customized to fit the project management needs.

At the end of each sprint, a functional prototype was presented, containing all the new and previous features developed, maintaining a complete artifact that allows viewing the prototype's state in relation to its final target.

Conclusion

After describing the main activities, their actors and artefacts resulting from the process, and the use of the Scrum Solo methodology, it is conclusive that a good adaptation was really made from the methodologies on which it was based. However, as the name "methodology" indicates, Scrum Solo is not exempt from adaptations to the specific cases of each individual and each project, such as setting the sprints as one week (regardless of having one or five workdays), or setting the sprints as five days, even though they might not be consecutive.

The number of scientific articles on Scrum Solo is still scarce, in addition to the work of Pagotto, Fabrti, Lerario, and Gonçalves (2010), the few references found are about specific applications of the methodology and were described in section 2.

Regarding the application of this methodology to cases described, the success obtained is notable. It was possible to organize and manage two projects carried out separately, lasting half a year each from start to finish without jeopardizing the delivery date or any requirement requested by the organization, despite some unexpected problems from the ERP's underlying services, which were fixed after giving feedback.

Finally, it is proposed to create a risk mitigation task, equivalent to a low percentage of the time spent per sprint, which can be replaced by a development task if time is available. This mitigation task can, for example, be added at the end of all sprints, costing two to four hours.

Acknowledgements

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Customer Service in Logistics - A Theoretical Framework

Iwona WASIELEWSKA-MARSZAŁKOWSKA

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, iwasielewska@umk.pl, ORCID: 0000-0001-6830-7859

Katarzyna SAMEK

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, katarzyna.samek@umk.pl, ORCID: 0000-0002-5519-8558

Abstract

The article is devoted to the analysis of the issue of customer service in logistics. The article indicates theoretical aspects relating to the issues of logistic customer service defined in the literature. Customer service finds close connections with all logistic processes taking place in the enterprise as well as between enterprises operating in modern supply chains. The wide nature and scope of logistic customer service activities determine the necessary coordination, especially monitoring the areas and relations between the company and the customer, in terms of the system it is the coordination of relations between all elements of the system. Having and managing logistics in an enterprise and supply chains will not be complete without the location and proper treatment of customer service (Wasielewska-Marszałkowska, 2014). The article aims to identify the essence of logistic customer service and to characterize its elements. The set goal is accompanied by the following research question: What is the role of logistic customer service in companies' operations? The systematic literature review method was used to review the literature on logistics customer service. The review was carried out following the methodology described in the publication of W. Czakon, Fundamentals of research methodology in management sciences, Wolters Kluwer, Warsaw 2015, pp. 119-139. The authors conducted a literature review in 5 stages, i.e. defining the purpose of the research, selecting basic literature, selecting publications, developing a publication database, and analyzing the content. The resources of popular databases containing scientific publications, including post-conference articles, were analyzed. Full-text foreign databases such as Emerald Insight, SinceDirect, Scopus®, Springer Nature Journals, Web of Science, Wiley, and Polish databases - BazEkon and Ceon were analyzed. The EBSCO Discovery Service tool was used to search for publications.

Keywords: customer service, logistics customer service, businesses,

Introduction

One of the basic tasks of the company that wants to achieve success is marketing and focusing attention on a potential customer. The customer should be seen as a central link, a driving force whose satisfaction is the main goal of the company's operation. It is up to the customer how long the enterprise will remain on the market. This is emphasized by Ph. Kotler, arguing that a company that focuses on the customer can be more successful (Kotler 1994). However, to achieve this goal, the company must not only produce and deliver products of increasingly higher quality but above all, still strive for the favor and recognition of new and existing customers by ensuring the best customer service.

Competition forces companies to constantly search for new solutions and activities to maintain competitive advantage. Competing on the market is not only creating an attractive offer, but also presenting it on the market in such a way that this offer (not the offer of a competitive company) is chosen by the customer. The customer is the decision maker and the addressee of the offer, he chooses the offer between competing companies. The decision made by the customer is stimulated by the receipt of the offer. The source of competitive advantage of the selected offer may be, among others price

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advantage or value advantage. On the one hand, the customer expects a high quality product, and on the other an attractive price for the product offered. Customers deciding about the selection of a specific offer also pay attention to a number of other additional benefits offered by the company under the proposed offer. These are not only material benefits, they are also aspects of commercial and legal service, after-sales service related to warranty and post-warranty service as well as the level of customer service offered by the company.

The wide scope of proper coordination of logistic customer service somewhat determines the functioning and even the existence of an enterprise in a market economy. Making any decision in the structure of the company is associated with customer orientation, without which the company cannot exist, which primarily determines the monitoring of customer service (Wasielewska-Marszałkowska, 2014). Thus, any service provider should recognize the consumer as the focal point of its business. Caring for the customer and concern for his satisfaction contributes to maintaining long-term relationships, and thus becomes an important factor in the success of enterprises (Samek, 2016).

In the last several years, customer service has become an issue of increasing attention among both theoreticians and business practitioners. T.J. Peters and R.H. In their bestseller In Search of Excellence, Waterman emphasized the importance of "approaching the customer" as a recipe for business success (Coyle, Bardi, Langley, 2010). This approach to the customer had several meanings, but without doubt one of the important aspects of this guideline was to have a logistics system that was sensitive enough to customer orders and would take their needs into account. With regard to the basic principles of 6W logistics (the right quantity, right condition / quality, right place, right time, right price / cost, right customer) and considering each of them as a criterion for measuring customer service, one could put forward the thesis that the fulfillment of each of these principles gives the company a position of competitive advantage. In practice, however, compliance with these basic principles does not give full customer satisfaction. In the era of progressing globalization and the ruthless competitive struggle of enterprises cooperating in the supply chain and entire supply chains, one of the most important elements is optimal (rational) logistics management of customer service (Wasielewska-Marszałkowska, 2014).

The essence of logistic customer service (LCS)

The issue of customer service has many dimensions and is interpreted in different ways. It covers not only logistics but also marketing, financial and many other aspects (Ciesielski, 2006). Companies can use logistics customer service as a differentiating element to compete more effectively in the marketplace (Yazdanparast, Manuj and Swartz, 2010; Leuschner, Charvet and Rogers, 2013).

One of the first definitions of logistic customer service was published by La Londe and Zinszer (1976). In defining customer service, the authors point to:

- punctual delivery of goods, in accordance with customer orders (including timely delivery of sales documents),
- certainty and reliability of delivery of materials to the customer in accordance with his expectations,
- comprehensive action involving all business spheres, which aims to supply goods in a way that satisfies the buyer and enables the supplier to achieve his goals,
- necessary actions that are aimed at the receipt, preparation, implementation and financial service of customer orders and clarification of irregularities that may occur at the same time,
- performance of the contract, which includes communication with the customer, shipping, transport, invoicing process and full product control and warranty service.

In conclusion, it can be concluded that the authors focused on defining logistic customer service in the traditional sense, indicating ways of meeting customer needs, which are key in the service provided. The studies of La Londe and Zinszer contributed to the further evolution of research on customer service issues.

Scientific research from the late 1980s to 1990s indicated a strategic shift in the way companies define the appropriate level of customer service from a cost-based approach to a proactive approach by using customer service to "retain the customer" (Langley and Holcomb 1991 [in:] Daugherty et. al, 2018).

According to M.B. Schary (1984), defining the LCS as: "a system of solutions that provide the customer with a satisfactory relationship between the time of placing an order and the time of receiving a product." In his research, the author points to the importance of delivery time and skillful management of the ordering cycle. By contrast, Fawcett, McLeish and Ogden (1992, in .: Melović, Mitrović, et al. All, 2015) present the customer service through several definitions that illustrate very well the breadth of the extent of this term, without opting for any of these particular visions:

- customer service is the quality of performances of the distribution system,
- delivery service represents different dimensions of the implementation of the process of ordering along with the sales promotion,
- customer service means adjusting a part of offers to a specific demand,
- customer service is a direct result of the connection between sales activities and the delivery process, which begins with the order and ends with the delivery, but in some cases it continues with the post-purchase stage of the product usage.

Moreover, J. Petrykowska additionally claims that “from the point of view of logistics service the client to the ability or ability to meet the results and expectations of clients, especially as to the time and place of the clients ordered, using all the terms of logistics employment, i.e. transport, warehousing, inventory management, information and packaging” (Petrykowska, 2009).

The importance attached to logistics customer service is reflected in the prominent role played by this stream of research within the supply chain management field (eg, Georgi, Darkow & Kotzab, 2010, in: R. Leuschner, F. Charvet, DS Rogers, 2013). While most of the literature found on this topic is in logistics (eg, Daugherty, Stank & Ellinger, 1998; Mentzer et al., 1989; Novack, Rinehart & Langley, 1994), researchers in other fields have studied this subject as well (R. Leuschner, F. Charvet, DS Rogers, 2013).

Research by Daugherty et. al. (Daugherty et. al, 2018), indicate that the subject of logistic customer service (LCS) was undertaken by many researchers in the "early 90s and 2000s". They also notice a significant decline in the interest in LCS in academic journals since the end of 2000. In their conclusions, the authors emphasized: "a wide range of topics that can be addressed in customer service research in logistics, in particular concerning changes in customer and consumer service expectations brought about by omnichannel and online commerce (as well as traditional stationery)". The wide range of subject areas, the authors say, “present related opportunities - from inventory management to after-sales support and returns management. Also, the authors point out "the need to pay more attention to important areas of customer logistics services in the omnichannel and e-commerce supply chains".

Based on the literature review, the authors in Table 1 presented selected interpretations of logistic customer service.

Table 1: Selected interpretations of logistic customer service in the literature

Author / Year	Interpretation
Haessler i Talbot (1991)	The authors emphasize the concept of the "delight" of the customer - in this aspect, companies must "go beyond what is expected and provide services that are unexpected in a positive way and provide value to the customer."
Livingstone (1992)	In the author's opinion, “customer service does not materialize merely through the dedicated efforts of front-line staff, although ‘people power’ can work miracles. To provide excellent customer service continuously, the order management cycle must have service built into the total process.”
Christopher (1998)	The researcher describes logistic customer service as "providing the customer with the right product at the right time and in the right place."

Kempny (2001)	The author points out that logistic customer service is: "the ability or the ability to meet customer requirements and expectations, mainly as to the time and place of ordered deliveries, using all available forms of logistics activity, including transport, storage, inventory management, information, and packaging".
Dadzie i in. (2005)	According to the authors: "As the consumer market segment of the Internet economy continues to grow, the role of customer service in the emerging logistics supply chain systems will continue to change."
Ciesielski (2006)	The author emphasizes that:"The essence of logistic customer service is that a customer who buys a specific product simultaneously acquires other related benefits. The value of the product according to the customer is related to the entire offer, ie the sum of the value of the product and the standard of customer service".
(Davis-Sramek et al., 2008).	The researchers point out that "customer loyalty is usually conceptualized as a consequence of customer satisfaction that is driven by long-term commitment, mutual dependence and trust."

Source: Own elaboration based on: Christopher (1998); D. Kempny (2001); Ciesielski (2006); Livingstone (1992), Haessler and Talbot (1991), Dadzie et al. (2005), (Davis-Sramek et al., 2008) [in:] Daugherty et al. al, 2018.

In conclusion, the considerations relating to the essence of logistic customer service, according to Ciesielski, the authors believe that every company striving for success on the market should adopt customer orientation in the management process, thus formulating its mission. As well, companies should also monitor and measure their achievements in this area and define the course of the service process, distinguishing certain tasks, and assigning them to individual employees (Ciesielski, 2006). The role of logistic customer service for the functioning and "existence" of modern enterprises is enormous, it somewhat determines the functioning of the company on the contemporary market.

In our opinion, the level and quality of customer service offered by enterprises is a priority for enterprises in relation to newly acquired clients and a guarantee of retaining existing clients (Wasielewska-Marszałkowska, 2014). Enterprises through better customer service activities gain an advantage in a competitive market, which also allows companies to compete effectively in more demanding and new domestic and foreign markets. In the current market situation, customer relationships are a major focus for businesses. Multi-criteria optimization of logistic processes is not limited only to space, time, cost and physical distance, but also has a fundamental quality parameter in mind: customer service maximally possible in given conditions. It is not only about the external customer appearing at the beginning and end of the integrated process (logistics chain), but also every internal customer appearing on the logistics channels. The modern client is an intelligent client, his requirements and interests become more individualized. The requirements of today's client include offering professional and fast service, openness and friendly attitude, above all, professional advice, solving existing problems related to the purchase / delivery of products / services. The client expects that meeting his requirements will guarantee him a sense of security, certainty and comfort from the cooperation with the company, a modern client expects the company to provide individual and comprehensive service.

Moreover, the authors share the opinion of Daugherty et. al. (Daugherty et. al, 2018) that nowadays, scientific research on the logistics of customer service should be focused on aspects related to logistics services provided for customers under omnichannel and e-commerce supply chains.

Elements of logistic customer service

For contemporary enterprises as part of activities in the field of logistics customer service, its measurement and control focused on increasing efficiency in customer service is important. The four logistic elements of customer service - time, reliability, communication and convenience - are the basic premises for creating a reasonable and effective customer service program. These elements also form the basis for the standards of logistics customer service (J.J. Coyle, E.J. Bardi, C.J. Langley Jr., 2010).

All customer service elements can be divided into three groups: pre-transaction, transactional and post-transactional elements (Fig. 1). It should be noted, however, that there is no complete agreement either

as to the number of elements, nor as to their content, nor how they are classified and interpreted (Ciesielski, 2006). Lalonde and Zinszer (B.J. Zinszer, B.J. LaLonde, 1976) gave an important contribution by identifying and classifying elements of the customer service in three groups - pre-transaction, transaction and post-transaction ones.

Pre-transaction customer service elements do not have much relation to routine logistics activities (order processing, storage, inventory management, transport), but they significantly affect the volume of product sales or the level of services. They also signal the company's policy regarding service. Formulating the assumptions of this policy requires managers to come out with a certain offer "outside" and create a convincing vision of service, taking into account its most important criteria: time, delivery reliability, access to information and convenience.

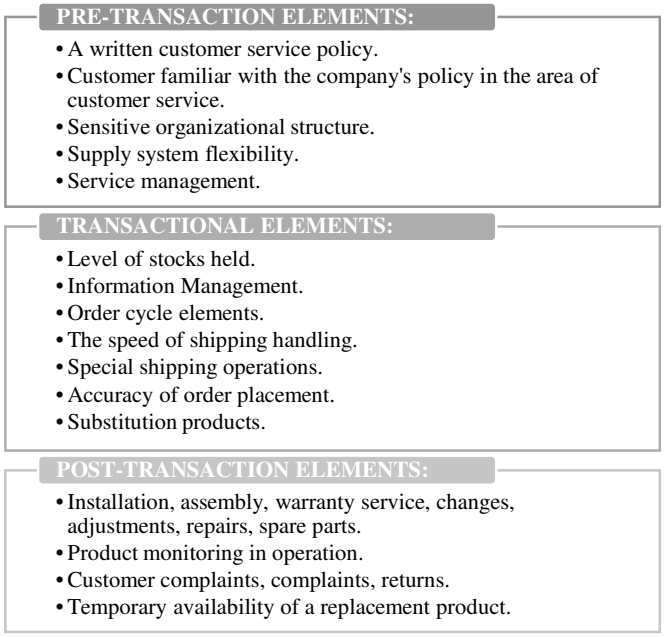

Fig. 1: Elements of logistic customer service
Source: Own study based on D. Kempny, Logistic customer service, PWE, Warsaw 2001, pp. 19-27.

Pre-transaction elements traditionally include (Ciesielski, 2006, Kempny, 2001):

- **service policy formulated in writing** - it should take into account the real needs of customers, on the basis of which service standards are set; it also specifies who to whom reports on the implementation of the service and with what frequency and the method of measuring performance; companies placed under strong competitive pressure and struggling to maintain their position on the market attach great importance to this; it can also be seen that the more competitive the market, the more readable the customer service policy, the more precise the measures of its implementation and the more frequent the control and measurement of the service;
- **clear service declarations submitted** to the client that protect him from unrealistic expectations, actions to raise the level of service make sense when customers are informed about it; written declarations and declarations submitted to clients also contain information on how to contact the company in the event of non-compliance with the assumed level of service;
- **organizational structure of the operating company** (suppliers); there is no organizational structure that is most suitable for a particular service policy, but such

structures should be shaped, as they should facilitate communication and cooperation between the cells responsible for implementing the service policy, which results, among others, from the classic relationship between the structure and the strategy of the company; in addition, the supplier should provide the customer with the name and telephone number (fax, e-mail, internet address) of the departments that will provide him with the necessary information and explanations;

- **system flexibility** - should be taken into account and planned already in the pre-trade phase; it ensures efficient and proper service even in difficult, unforeseen conditions (natural disasters), with shortages and strikes; the need to adapt to the atypical requirements of significant, profitable clients is also currently emphasized;
- **instructions and practical training (seminars)** to help customers improve inventory management, ordering or brokering are also included in the customer service components before products are sold.

Transactional elements defined as the most important from the logistic point of view, i.e. determining the efficient and consistent with the client's expectations of the transaction - from the moment the order is placed until the product is received. This group includes:

- **delivery time** - the time elapsing from the moment the order is placed until he receives the ordered product;
- **delivery flexibility** - understood as the ability to adapt the time, range and delivery method to the needs of customers;
- **product availability from stock** - readiness to immediately release products remaining in stock at the supplier's;
- **completeness of deliveries** - understood as the implementation of a full order - full specification of ordered products;
- **delivery frequency** - this element is particularly important in the case of fast-moving products, e.g. perishable foodstuffs, whose stock should be replenished on a regular basis
- **reliability of deliveries** - the essence of which is customer confidence that the quantity, quality, type of products ordered will be delivered at the agreed time;
- **access to more complete information** - readiness to answer customer questions, put at the disposal of recipients competent personnel representing the company, presentation of equipment and facilitation of contact with the use of media, IT tools for efficient contact with the client;
- **order placement convenience** - means simplicity and adaptation to the client's needs of documents related to ordering, taking into account legal requirements.

Also in this element, technical support and availability of substitution products for the customer are indicated. However, they do not exhaust the list of elements important in customer service. What happens after the transaction is also important.

Post-transactional customer service elements, like pre-transactional ones, are more in the sphere of marketing than of logistics interest. In traditional marketing, after-sales elements were identified with customer service, while they are now being treated. much more widely. Some of the services offered to customers after the sale of products, such as the supply of spare parts, are just as important to logistics professionals as transactional elements. Post-transaction services ensure customers correctly use products, and in many cases - protect their interests and health. Suppliers and manufacturers can tell if a product sold is functioning as intended when the customer begins to use it.

Post-transaction control elements usually include:

- **installation, warranties, replacements, repair and delivery of parts**, which means that the customer in the after-sales phase is guaranteed: availability of tub parts and repairs, documentation explaining the operation of the products (operating instructions) and after-sales guarantees, as well as dismantling and reinstallation of the product after repair or

exchange; these are elements of service that significantly affect purchase decisions, which is why they are planned, just like the other after-sales elements, in the pre-transaction phase; service standards provided or declared for these elements help in gaining customers; their performance is assessed and monitored in the same way as transactional elements;

- **observation of the product in operation, consumption or personal use**; this is an important element for some new pharmaceutical, chemical, cosmetic and food products being placed on the market, as they can sometimes be;
- **threat to the life and health of customers**; in order to avoid legal complications (lawsuits, arbitrations, complaints) and related losses, enterprises offering new products that are not fully tested and widely used should be prepared for immediate removal from the market if they prove to be potentially dangerous;
- **complaints, complaints and allegations that are traditional elements of customer service**; already in the pre-sales phase, standards and rules for handling returns, complaints and complaints should be defined, since the handling of returns that almost every producer deals with is costly, and also burden the manufacturer's logistics system and disrupts its proper operation; Returns service serves the flow of products in one direction - to the customer, and damaged and defective products flow against the tide.

Ordinary manufacturers offer customers standards for the implementation of after-sales service elements, including strictly defined standards for the time of delivery of spare parts, deadlines and time for handling complaints and complaints, warranty and guaranteed service periods, etc. The standards should take into account the technical and economic capabilities of the manufacturer, competition and expectations customers.

Customer service consists of the elements listed in all three phases of the commercial exchange of goods and services. However, in logistics, and especially in supply chain management, the most attention is paid to transactional elements. These can be successfully called logistics. This is where one of the more visible dividing lines of interest for customer service in marketing and logistics runs. Logistics is mainly interested in transactional elements in combination/mix logistics elements, the others are the domain of marketing, although they are also not out of the question for logisticians. However, how we will ultimately understand customer service and what elements will be involved in a particular situation or individual case will be decided by the customer himself (Kempny, 2001).

Three groups of elements should be taken into account in proper customer service. Omission of any group may have serious consequences for the company (Ciesielski, 2006, Kempny 2001). The essence of offering a high level of logistic customer service by companies is to control the quality of customer service. The company should establish appropriate procedures to measure, monitor and control the quality of customer service. Such methods can be used as Statistical Process Control (SPC), analysis of feedback and taking necessary corrective actions. When customer service standards are ineffective, the company should not delay modifying or rejecting them, depending on the situation (J.J. Coyle, E.J. Bardi, C.J. Langley Jr., 2010).

Conclusions implications, limitations and recommendations for future research

Today's reality is characterized by a high rate of change and a constant increase in customer expectations. The effects of market globalization, growing competition, technological and IT progress and others set high demands on enterprises. The described tips and elements of logistic customer service can only indicate which path should be taken by the company in pursuit of market advantage. Because the concepts of even the best specialists and practitioners about the directions in which the world will be heading, as well as skills, knowledge and behavior that will allow to achieve market success may slightly differ from the reality, which is characterized by high variability. What today is a guarantee of success and an indicator of proper customer service may cease to be one after some time. Regardless of the formulation of the service policy, development of standards or continuous control and monitoring of the process, if the company does not introduce changes aimed at eliminating errors arising in customer service, and does not start to treat the customer as a source of benefits for the company, implementing a value system that puts the right customer service will be impossible.

Today's customer is a demanding customer, customers don't want to and won't wait "They don't want to wait -" Consumers are looking for that immediate delivery option "(Beckwith 2017, p. 44). Hence, the task of enterprises is to strive for compliance with customer expectations.

When discussing the issue of logistics customer service, one cannot ignore the role of the customer in creating the quality of logistics services offered by enterprises. The role of the customer in creating the quality of services is undeniable. Based on their own experience, preferences and needs, the recipients choose the enterprise whose services they will use. The quality aspect is currently the most desired by customers. What counts in the competitive struggle is the service provider who not only meets the needs of the client at the highest level, but above all does it better than the competitors. The issue of customer impact on shaping the quality of logistics services is therefore an interesting direction for future scientific research.

In this article, the authors did not raise the issue of IT systems and social media used in logistic customer service. On the other hand, maintaining high quality customer service is possible thanks to dedicated IT systems such as ERP and CRM as well as social media that help manage logistics processes in the company. Investigating the impact of these IT systems on the quality of logistics customer service is therefore an important issue for future research, especially for modern businesses.

Extremely important for logistics service is its evaluation and measurement system, which enables reliable assessment of errors and successes. In this article, the authors of the article intentionally did not address the issues of customer service quality measures (quantitative instruments for measuring the level of logistic customer service, methods of analyzing dependencies in the assessment of customer satisfaction or methods of customer preferences in relation to logistics service). They intend to address this issue in the future.

Summary

Historically, Hesket indicated more than 40 years ago that "Logistics can mean the difference between success and failure in business" (Hesket, 1977). Besides, Flint and Mentzer (2000) in their research will emphasize "understanding how customers'" logistical needs change over time is a key component to predicting what customers may value in the future "(Daugherty, Bolumole, & Grawe, 2018). Today, the importance of logistics customer service in the enterprise is becoming increasingly important. The management is aware that proper customer service is an effective competitive tool. Therefore, they subordinate their activities to numerous standards contained in quality books. The guidelines described there enable companies to efficiently and quickly customer service, which affects their satisfaction.

Enterprises in the era of progressing globalization are forced to take multidirectional actions in order to achieve competitive advantage, of which the quality of the level of customer service is becoming a natural element in the competitive struggle. Competitive activity of the organization boils down to winning the fight in three areas of activity: profitability, efficiency and effectiveness, i.e. winning the fight in the sphere of negotiations on supply markets, in the sphere of competition in terms of costs and quality of production of goods and in the tender sphere on the market of consumption of goods (Chaberek, 2002). The issue of logistics customer service is closely related to the overall enterprise management system, not only the adopted mission and company philosophy, but also through integrated logistics activities, whose coordination and optimal use leads to the desired effect in customer service. The process of customer service in modern enterprises is subordinated and focused on the main goal, which is customer satisfaction.

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Evolution and Modern Solutions in Managing Sales Competitiveness Based on Trade Calculation

Vladimir A. CHERNOV

Nizhny Novgorod, Russia,
E-mail address: Chernovva@rambler.ru

Abstract

The main competitive advantage of the world economy at the present stage is the ability to reduce costs in the competitive struggle of the world market participants. For the most accurate cost management, calculation is necessary, which, according to the hypothesis of the study, is the main means of effective, competitive management of trade processes, sustainable innovative development of the sphere of commodity circulation. In the coming digital economy of the information society, calculation methods are becoming an important intellectual asset as a means of designing information for decision-making by artificial intelligence in cloud services. Calculation is a necessary condition for the introduction of new technologies of "lean production". These methods of controlling allow the most rational, complete and effective management of costs, prices, product range, financial results and competitiveness in the sphere of circulation and serve as an algorithm for neural networks in creating digital economy technologies. The present article dwells on the questions of profit management on the basis of trade calculation. It gives the historical overview of development of calculation methods and their application in the most acute issue of regulation of sales competitiveness. The article shows out that issue of distribution chain is treated in the fullest way in Russian sources.

Keywords: Calculation; competitiveness; action; distribution cost; cost capacity; income capacity; commodity groups accounting.

Introduction

In the conditions of market saturation, toughening of competition toughening observed in many countries and aggravated with the crisis phenomena in the world economy, a part of trading companies is forced to yield a position in the market to more competitive representatives of the sphere of a commodity circulation.

In recent decades, researchers from different countries have proposed many methods and mechanisms to improve the competitiveness and sustainability of production and sales. On the way to increase innovation activity and commercialization of innovations, it is proposed to activate the development of network platforms of cluster structure, digital interaction that form innovative ecosystems; crowdfunding financing, various types of joint spaces for organizing the work of people with different jobs are created – coworking based on interdisciplinarity, openness and collaboration. Lean technologies are being introduced, and methods of cost and profit analysis are being proposed aimed at eliminating typical errors, especially in situations where the probability of making such errors and miscalculations is implicit and not obvious. Several governments have proposed joint development of seven modern official cost-benefit analysis (CBA) guidelines on eight main cost-benefit issues. The implementation of all these initiatives will be most accurate and successful if data on the costs of circulation are most accurately presented for each product group and product name. Such data cannot be obtained without special calculation and distribution methods of trade calculation. The article considers the evolution of these methods from the first developments, reveals the successes of past periods, examines the historical transformation and highlights the developments of recent years in

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solving the problems of reducing cost intensity, increasing sales competitiveness. The latest developments in improving the methodology of trade calculation most take into account the needs of a modern dynamically developing economy on the way to implement innovative development of trading operations.

Problems of The Modern Market and The Role of Trade Calculation in Their Solution in The Historical Perspective

The situation on international and national markets has become more complicated in recent years. Consolidation of views and approaches to measuring efficiency at various levels of social reproduction is possible only on the basis of a dynamic assessment of social wealth, since it is precisely this factor that reproduces the human community that can be measured at all levels of human activity. In a number of leading countries (the United Kingdom (great Britain), Japan, and Italy), there is a decrease in household income (table 1), which leads to a decrease in demand for goods. In other countries, we see a small increase in household income (table 1), but the growth rate of physical volume of retail trade turnover (table 2) exceeds the growth of the population's income (table 1). This trend will lead to a shortage of money supply in the population and a reduction in effective demand. And this is the path to a recession. To these problems should be added the huge business losses due to the COVID-2019 pandemic.

Table 1: Growth rate of real wages of employees (2010=100)

Countries	Years		
	2016	2017	2018
Russia	108	112	121
USA	103	103	-
France	103	104	
United Kingdom (Great Britain)	98	98	
Poland	106	114	
Japan	99	99	98
Italy	98	97	

Table 2: Volume indices of retail turnover (2010=100)

Countries	Years		
	2016	2017	2018
Russia	103,9	105,3	108,2
USA	115	118	120
France	117	121	124
United Kingdom (Great Britain)	115	117	120
Poland	116	123	131
Germany	106	112	114
Japan	99	100,5	101
Italy	95	94	94

In the conditions of market saturation, toughening of competition toughening observed Not to lose their positions in the market trade companies apply more and more refined, sophisticated ways of increasing its sales competitiveness. However when running various marketing campaigns to attract customers, it is not always possible to attain a detailed and exact assessment of costs, losses, the rate of payback and result of the campaigns. To control the costs of the marketing campaigns aiming at increasing the demand and attracting customers, to evaluate financial feasibility and economic

benefits of such actions, trade accounting should be used which, is unfortunately far from being regularly applied in the trade. If a competitive advantage on the market is not expected to be attained by unnatural reconstruction of the market by illegitimate ways, but is due to maximizing of sales effectiveness, accounting is necessary. Only on the basis of calculation it is possible to define in a rather exact way the possibilities to increase a competitiveness of sales in the trade sphere.

Under the calculation of distribution expenses one should mean the evaluation of expenses capacity by groups of products or items. To get information about profitability of the item groups, except for the costs one also needs to know the income capacity per item group. Calculation of expenses capacity and income capacity of the product or item groups is called trading calculation.
In national and foreign book editions and separate articles there is a set of publications on methods of accounting management of industrial enterprises and calculation of prime cost of production. An absolutely another situation is observed in the distribution sphere. The topic of trade accounting is extremely rare in national and foreign publications.

The importance of the solution of this problem has been noted by practitioners of the American business in the article "On What the Shop Makes Money?". The article states: "We bring to your attention one more part of a basic research, carried out by the Marsh supermarkets of the American network. This fragment is devoted to the most intriguing question of modern retail business – profitability. From what the shop makes money? What goods in assortment are profitable and what less? How to define it? How to correct the current approach on the bases of the received results?"

And, according to authors of the article, this research represents and absolutely unique in the world not presented earlier level of penetration into basic concepts of retail process.

Claims of the researches of the American network of the Marsh supermarkets for uniqueness of the approach naturally raise doubts as scientific works with comparable results in this area were carried out much earlier, than they were started by Marsh association.

The first attempts to study product-by-product-group distribution expenses in trade, made in the early XIX century, associated with the name of Professor Sher. According to the Russian scientists. Cher has analysed in 1910 calculations of the Basel society of consumers in Switzerland on 12 groups of goods in 11 years – from 1898 to 1908. Calculation was considered on 8 groups of food goods and 4 groups of nonfood goods. The research was conducted with the following aim:
• definition of an expenses capacity and profitability of trade on separate commodity groups,
• estimation of competitiveness of trade unions,
• search of means of cost reduction in the trade device, improvement of system of prices.

Later in the USA and Germany special investigations were run on this topic, mainly in wholesale trade. In the USA such researches were conducted by the Ministry of Trade under J. Millard's guide, as well as by the ministry of agriculture.

The American research and developments in the sphere of the early thirties were published in Russian scientific publications. Developments of that time didn't give satisfactory methods of calculation. Expense capacity by commodity groups was determined very vaguely. Distribution of joint costs between groups of goods was made in proportion to the volume or cost of commodity stocks, commodity turnover, weight of the sold goods, etc. The method of the accounting of direct costs wasn't applied.

In the consequence the attention of foreign economists to the large wholesale and retail enterprises diminishes. Decrease of interest in this problem according to the prof. M. I. Bakanov is explained by more and more developed specialization on certain goods and appearance of departments and sections, thus the accounting departments of firms have an opportunity to obtain reliable data about distribution costs on each of these divisions and thus on each of the commodity groups.

Later on in foreign economic literature methods of calculation of trade expenses on commodity groups in small and medium-sized retail enterprises started to be discussed with a greater interest. The objective of the study was to develop a practically acceptable methods of calculating the self-cost of commodity circulation, which became an object of research of Marianne Betting in her doctoral dissertation.

The first attempts to investigate product-by-product-group expenses in the USSR have been made in the late twenties, in the early thirties. In 1931-1932 Central Union of Consumer Societies and the central institute of economic research of the people's Commissariat of trade of the USSR developed methodical instructions according to which distribution costs on commodity groups in several regions of the country. The data collected by them, though gave some ideas about the structure of the prices of separate goods, nevertheless were very inexact as expenses were generally distributed by commodity groups by means of a number of roughly estimated coefficients.

In the late 30-s the topic of product-by-product-group distribution expenses were studied by the scientific-research Institute of trade and public catering (NIITOP) of the people's Commissariat of trade of the USSR. A researcher of the Institute N. N. Ryauzov participated in the development of the methodical materials. The institute recommended two completely different methods of studying of distribution costs: the first one was a calculation method for food trade organizations, the second one was called reporting accounting – for the industrial trade companies. The first way smoothed distinctions between shops. Its results had rather low reliability. The second way had an excessive labor input.

Attempts of the scientific-research Institute of trade and public catering to establish a systematic study of distribution expenses by commodity groups were not allowed by the respective competent authorities.

The method of coefficients, method of economic-mathematical modeling, method of the direct accounting have been also developed for definition of an expenses capacity. However comprehensive experimental check has shown that the method of economic-mathematical modeling doesn't provide necessary reliability. When using a method of coefficients in the course of the experiment it has been revealed that the level of expenses was overestimated by 35-80% on one goods, and underestimated by 40-85% on others that proves this method to be unsuitable too.

The idea of a systematic accounting product-by-product-group calculation of costs was first expressed and justified M. I. Bakanov. The first articles in which these questions were treated in details were published in 1938. Its feasibility was experimentally confirmed. Results of the experience were published in the “Accounting” magazine by M. I. Bakanov and N. I. Sakhanovsky – the senior accountant of shop of Mosgastronom where the experiment was run. This article dwells on the methods of the accounting and distribution of separate items of expenditure.

The greatest accent to the problem of a expenses capacity of goods, income capacity, profitability in trade and public catering is made in PHD and doctor's theses of M. I. Bakanov, and also in his numerous journal publications (45 articles). Both theses of M. I. Bakanov are published by independent books.

M. I. Bakanov developed and gave the necessary theoretical justification to scientific-distributional method of item-by-item and item-by-item-group study of distribution expenses.

Later professor Bakanov involved teachers of the department, many graduate and postgraduate students in obtaining unique data on this topic. The cumulated materials are used by governmental institutions for justification of trade discounts (margins) in wholesale and retail trade, public catering that presumably has provided additional gain of 2,6 billion rubles for the trading organizations of system of the Ministry of Trade of RSFSR (The letter of Ministry of Trade of RSFSR of 09.11.76 No. 17/94-590).

The ways of the problem solving "A research of profitability of public catering, the wholesale and retail trade" having important practical application continued to be developed by the department of accounting and the economic analysis of the Correspondence institute of the Soviet trade under the leadership of the Doctor of Economics, professor Bakanov M. I. The research materials on the optimal profitability in different economic regions, commodity groups, as well as projects of new trade and wholesale marketing discounts were presented to the Ministry of Trade of RSFSR and found its practical application for what the head of the research and his researching group were officially thanked in 1978. (The order of Ministry of Trade of RSFSR of 12.01.78 No. 12).

A rather deep study of the problem of the commodity groups accounting and the analysis of an expenses capacity, income capacity and profitability in public catering was highlighted in the researches of D. I. Ilinzer (1973), G. A. Chistyakova (1974) and A. I. Levina (1978).

The most detailed analysis of the methods of calculation of distribution expenses in trade was made by M. I. Bakanov and S. M. Kapelyush's (1987)

The interest in this subject is explained by an increasing relevance of trade accounting in economy not only in our country, but also abroad. One of ways of gaining a competitive advantage is the reduction of prices of goods. To ensure a profitable work of the enterprises of trade when a trade margin is decreasing it is necessary to:
* to know the sum of the expenses for each type of goods to determine the maximal possible reduction of price taking into account expenses per type of goods;
* to exclude from the commercial turnover the goods which aren't in sufficient demand at the current price if further reduction of prices of these goods is impossible due to high expenses on these goods;
* to establish a trade margin differentially by each type of goods not below the costs of their realization (if the demand allows it);

In the conditions of inflation, usually there is no absolute reduction of prices, but to increase in demand, the sales volume and profit their relative decrease can be required. The relative price decrease in the conditions of inflation means that the prices change in such a way as an increase in the prices of concrete goods of a given enterprise is lower than the price increase caused by inflation in the market on the same goods.

But it is possible to reduce the prices only up to the amount which isn't exceeding the sum of the expenses demanded for production and realization of these goods. Otherwise the enterprise will suffer losses. And the choice of the most profitable goods is possible only in case their expenses capacity, to define it a ccalculation is necessary.

The calculation of distribution expenses is required in the distribution sphere for the reason that almost in all trade companies it is impossible to consider directly the expenses of each type of goods, and there are no other ways of exact definition of the expenses related to delivery and sales of concrete types of goods.

Trade calculation allows establishing the prices in the distribution sphere (a trade margin) for goods not only from the point of view of demand, but also from the point of view of payback, and also to choose the goods bringing profit, to reveal and exclude unprofitable types of goods from the turnover.

At the time of the Soviet economy the potential of calculation was not fully used. At planned and distributive system accounting was necessary generally for justification of the margins and discounts regulated by the state to control their compliance to the expenses on each of commodity groups. In the market economy the potential of accounting is more used to resolve the following tasks:

• increase in competitiveness of goods due to economically reasonable reduction of prices (a trade margin) of goods;
• definition and choice of the most profitable goods;

• identification of unprofitable commodity groups for development of recommendations on the increase in their profitability or for their exception from the turnover;
• determination of the optimal price from the point of view of payback, demand and competitiveness on separate goods due to change of a trade margin.

In this regard we will address experience of the American network of the Marsh supermarkets again. The American researchers quite reasonably note complexity of the matter. They note that in the concept of profitability of retail business there is nothing obvious, simple or rectilinear. The goods can be represented in one light when you measure his "dirty" margin (gross profits) and to look absolutely in a different way from the point of view of net profit.

For example, according to the researches "Marsh" perishable goods and goods of nonfood sector play a larger role in formation of gross revenue, than in sales volumes. Turnover of groceries, on the contrary, is high, however their margin is small. Complexity of the concept of profitability also consists in it, according to the researchers of network of the Marsh supermarkets. A lot of things depend on what and how to measure, what expenses to consider and how.

Marsh supermarkets developed special projects for buyers to increase profitability of each separate item and the whole enterprise in general. For example, many companies will never lower the price below 99 cents for a 2-liter Cola drink, but Marsh does it and finally wins on the increased of the consumer stream. In general more than 60 percent of soft drinks in Marsh shops are sold at the price below or equal prime cost.

Obviously, it is possible at skillful balancing of the income and expenses on each commodity group. For the most exact and effective coordination the calculation of an expenses capacity and income capacity for commodity groups is needed. How does the Marsh association perform similar calculations?

Further from article we see, that both for domestic retail business, and for Americans' the formula of profit on a concrete product (DPP – direct product profit) is very simple – the income minus expenses. What remains inexplicable and hardly accountable is a formalization of a shop expenses.

Then the statement follows that the research "Marsh" represents the first attempt to separate DPP and a dirty margin on each category in a shop. The research department of "Marsh" meticulously collected the formation on all components of expenses, including the maintenance of a warehouse and other rooms, labor expenses, expenses on inventory etc. The indirect expenses connected with management weren't considered. These data then was entered into the formula created by Institute of Food Marketing.

Further on, the authors give an example of collection of data on expenses: The entering bill for tenancy in which 735 boxes of a product are stored is about $5.43. Obviously, having the data on the total amount of the rent and quantity of the stored products it is easy to count expenses on rent on a unit of production. Delivery of 11 boxes of this product in shop costs 58 cents that also allows calculating expenses on delivery per piece. As we know, this is far from being new to the Russian economy. The electronic registration of each pack of products in the base takes about 2 seconds, also 2 seconds are spent for reading of a bar code of a product upon his purchase. 60% of all packings of this product pass through baggers hands (the employee packing goods into packages near the cash desk), and 1,7 seconds at the same time are spent for each packing. This time, obviously, is considered at calculation of expenses on packing, sales. The result of such a meticulous work is entered in the table in which the gross revenue (%), profit (%), average retail price for the sold unit ($), average gross revenue for the sold unit ($), average profit for the sold unit ($) are reflected per group of goods.

As we see, data on expenses, expenses capacity, income capacity on commodity groups aren't provided, and the understanding of expenses for each unit of a product is suggested to be made by a

making a difference between the income and profit that in itself doesn't solve a problem of calculation of expenses for groups of goods.

This technique also treats the calculation of the rent per the number of packings of product stored in the room. But if there are various groups of goods in the room, then it will be better to use the calculation technique mentioned earlier developed by Russian authors. For distribution of expenses on packing in Russia calculation a more rational and universal approach is presented too. Besides, in methods of Marsh association additional calculation of delivery of a certain number of separate commodity group in shop is required that is very difficult in practice, but this problem is effectively solved by the methods of trade calculation developed in Russia.

An important drawback of the American technique is also that as it has been told, indirect expenses aren't considered. But in trade there are a lot of such expenses which can't be correlated to any certain goods directly. And if they drop out of an accounting field of vision, calculation will be highly distorted.

Generally, a positive experience of calculation of profit by network of the American supermarkets for commodity groups should be noted. In comparison with management without accounting it is an important business tool. In this sense domestic researchers called the calculation "sailing directions in the ocean of free prices". But to calculate profit on commodity groups and skillfully balance prices on the level of prime cost it is indispensable to have rather exact data not only on direct expenses, but also on indirect expenses, expenses capacity and income capacity per commodity groups. For the sake of objectivity, it is necessary to point out the weakness of this very important part of the problem in the American researches.

The importance of calculation of distribution expenses in trade is also confirmed "… by the most necessary and up-to-the-minute recommendations and practical advice …" and calculations of the German author Manfred Weber. His opinion on calculation, generally, doesn't differ from the opinions given earlier. Trade expenses, he writes, are overhead costs as the reason for their appearance is one or several goods. They can't be correlated to any concrete good and therefore they can't be directly attributed to a certain item as single-element expenses, for example, to transportation costs. However, each item of goods should have a corresponding share of trade expenses. According to Weber's recommendations at calculation of expenses of separate items of goods trade expenses are calculated by means of a trade extra charge on their purchase price. And actually the calculation is presented only in the form of distribution of variable expenses in proportion to the weight of goods, and constant expenses – in proportion to the size of the settlement sums (the general cost of commodity group). As we see his system also doesn't give full and rather exact calculations.

Besides, the technique of the American Marsh supermarkets, as well as the calculations of the German – M. Weber don't represent methods of distribution of costs of storage, development, sorting, packing, etc. while distribution of similar expenses is proportional to the weight or cost by Weber's method won't give real values.

Thus, we have the reasons to claim that in the history of domestic researches there are more powerful results, than those of Marsh association and the calculations of the German author Manfred Weber declare.

The best solution of this problem is carried out by the methods presented in M. I. Bakanov and S. M. Kapelyush's work specified earlier. "Calculation of distribution costs in trade".

The technique of Calculation of distribution expenses in relation to market economy with overcoming one of the main disadvantages – high labor input by means of application of the spreadsheets "Microsoft Excel", was described in 1999 in the "Audit and Financial Analysis" magazine. The management of competitiveness of sales on the basis of accounting in combination with the analysis of elasticity of demand to expenses and the price is revealed.

Studies of problems in the application of cost and profit analysis methods and typical errors observed over many years have revealed ways to eliminate them, especially in situations where the probability of making such errors and miscalculations is implicit and not obvious. But in order to prevent such hidden miscalculations, you need more thorough and detailed information about costs, which can be provided by a trading calculation.

The UK Treasury, European Commission, U.S. Environmental Protection Agency, New Zealand Treasury, Infrastructure Australia, NSW State Treasury, and Victorian State Department of Treasury and Finance have developed seven current official cost-benefit analysis (CBA) guidelines for the eight main cost-benefit issues.

While all the guidelines are quality guidelines for the CBA, the paper concludes that each of these guidelines has room for improving theory and practice in various aspects. An important refinement and detail in the calculation of costs and benefits will be the data of the trade calculation. Modern achievements in the use of accounting for the management of profit, demand and competitiveness of sales are revealed in the monograph (Bakanov M.I., Chernov V.A., 2018).

Features of Applying Trade Calculation Methods in the Digital Economy

The methods of calculation of distribution expenses are simple in their content. They are based on distribution of expenses in proportion to the specific weight of these or those indicators. However on volume they are very bulky and without use of computer facilities they are very labor-consuming. Now, when use of personal computers became the widespread phenomenon in practice of the enterprises, trade accounting becomes one of the elementary and not labor-consuming methods to be used in management accounting and the analysis. For a user of personal computer it is enough to type the program of calculations in system of the spreadsheets "Microsoft Excel" once that, of course, demands certain efforts. For further use of the programs it is enough to replace the start data, and the results will be automatically calculated and shown in the corresponding cells with automatic change of the illustrating graphs. And a set of such program doesn't require an expertise in the field of programming. The user owning system of the tables "Microsoft Excel" is capable to make such program. It is also possible to use other programs made by professional programmers.

The automated program of calculation of expenses can be used not only for calculations, but also as an effective model for forecasting of an expenses capacity and profitability of groups of goods. If, for example, at the enterprise in the forthcoming period a change of any cost item or levels of trade margins on any goods is being planned, then for the forecast of results of changes it is enough to enter the estimated changed data into initial spreadsheets. The table of results will automatically show the calculated predicted values of an expenses capacity of commodity groups and their expected profitability. The expected results of changes will be automatically illustrated by "Excel" graphs and charts.

Thus, we approach formation of the knowledge base in management accounting. Traditionally management accounting operates with the database. At the same time on the one hand there are data. To make correct decisions on the basis of these data, the accountant carries out the corresponding calculations. The knowledge base contains not only data, but also set of methods and means of the organization, accumulation and use of knowledge for the solution of complex administrative challenges. Generally, the knowledge base in the form of expert system contains registration data of a task and offers the result of their processing – the ready decision in the automated mode.

Under the knowledge base we understand a set of knowledge on this domain structured for formalization of the decision-making process. The knowledge base contains an algorithmic basis of information technologies as expert (intellectual) systems. Proposing ready solutions, they act as artificial intelligence that is very applicable in the management of competitiveness of sales on the basis of trade calculation.

So, we see that the problem of expenses capacity, income capacity of commodity groups and profitability acquires the greatest relevance with a growing competition in the market. The calculation of expenses is necessary as it is impossible to consider expenses directly by each type of goods in trade enterprises, and there are no other ways of rather exact definition of expenses related to delivery and realization of concrete types of goods.

Trade accounting allows to establish the prices in the sphere of trade (a trade margin) for goods not only from the point of view of demand, but also from the point of view of payback that is especially important for improvement of the financial result; it helps to choose the goods bringing profit, to reveal and exclude unprofitable types of goods from the turnover.

Operating with a certain idea of development and guided by its level at a particular moment in time, in the financial management system it is possible to achieve the most preferable degree of development of commercial structures through the application of certain tools that form a specific mechanism. This mechanism will be most accurate, rational and efficient if it uses detailed information about the cost of circulation, obtained on the basis of commercial calculation, that proves a practical importance of the solution of this problem for trade enterprises of different countries. Modern information technologies allow solving the specified problems by means of artificial intelligence.

The author's approach (methodology) to the distribution of costs for goods, the formation of retail prices and the calculation of profit, which can serve as the basis for an algorithm for calculating these parameters through artificial intelligence are presented in detail in the source (Bakanov M. I., Chernov V. A., 2018). Previous developments are disclosed in the book (Bakanov M. I., Chernov V. A., 2012). Due to their large size they can not be considered in the framework of the conference. The source of information for controlling sales is accounting data, forms of accounting and statistical reporting. However, the main supplier of cost data for product groups is the trade calculation methods themselves, since they allow you to get information that is not available in any sources, and that can only be obtained by processing accounting data using trade calculation methods. Trading methods are becoming an algorithm for automated calculations of indicators and management decision - making by artificial intelligence.

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Cloud Project Management

Bhushan OZA and Dr. Peter BUSCH

Department of Computing
Macquarie University, 2109
N.S.W. Australia

bhushanoza99@gmail.com peter.busch@mq.edu.au

Abstract

Effective and efficient project management is essential at all times to ensure projects meet goals, within given constraints. This paper seeks to determine how cloud computing can enhance project management with respect to the ten project management bodies of knowledge (PMBOK). Results show there are various cloud project management tools available, having the potential to perform better than traditional project management tools in all areas of the PMBOK. A qualitative analysis performed on relevant literature by discovered the overall concept of cloud project management is generally positive. Observations from this research and analysis resulted in some recommendations which may help ensure successful project management using cloud computing.

Keywords: Cloud Computing, Project Management, Qualitative Analysis.

Introduction

Technology is constantly advancing and providing new ways to make our personal and professional lives more efficient. The "cloud" is one such component of this rapidly evolving technology (Arora & Parashar, 2013). In its simplest form, the cloud can be described as storing your memory and CPU (Central Processing Unit) power elsewhere i.e. in the "cloud", but taking their advantage on your machines. Cloud use can range from personal use, such as Google Docs to make your documents, to professional use such as running virtual machines on your clients. Project management (PM) is a critical component of any organization's success, even when dealing with complex problems such as pandemics (Ruan *et al*., 2019), and it has been found good project management leads to successful projects (Schwalbe, 2018). PM also needs to keep adapting to technological changes in order to provide effective solutions, which are vital to a project's or organization's performance. In this instance, change refers to cloud computing. This paper examines the integration of cloud computing and project management and how the cloud can help in project management, vindicating the arguments by performing qualitative analysis.

Cloud Computing

Cloud computing is believed to be the 'silver bullet' of IT in the 21st century, but it is also a complex subject (Bredenkamp, 2012). On-demand computing resources are available because of cloud computing, including computing power and data storage without having to perform management on a daily basis. Cloud computing has led to "portable" data centres made available to internet users. Broadly, clouds can be divided into four types – the private cloud for a single organization, the public cloud for the general public, the hybrid cloud and the community cloud (Verma & Sharma, 2019). Cloud computing providers usually offer their services in three categories – Infrastructure as a Service (IaaS) (Preimesberger, 2015), Platform as a Service (PaaS) (Hurwitz, 2012) and Software as a Service (SaaS) (Pocatilu *et al*., 2010). Other categories include Mobile Backend as a Service (MBaaS) (Monroe, 2013), Serverless Computing (Miller, 2015), Function as a Service (FaaS) (Avram, 2016), Content as a Service (CaaS) (Doglio, 2012), Data as a Service (DaaS) (Olson, 2010), Desktop as a Service (Rouse *et al*., 2013), Integration Platform as a Service (IPaaS) (Thoo *et al*., 2011), Network as a Service (NaaS) (Frank, 2011), Security as a Service (SECaaS) (Olavsrud, 2017) and Business Process Management as a Service (BPMaaS) (Barnawi *et al*., 2015). Customers can choose their preferred

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service based on what they desire. Dropbox, Google Drive, Salesforce, etc. are some of the famous cloud applications. As a lot of terms were introduced above, below are three figures classifying these terms, making these concepts easier to understand (figures 1, 2 and 3). These types and categories, as well as Dropbox, are discussed after the figures, beginning with the Private Cloud.

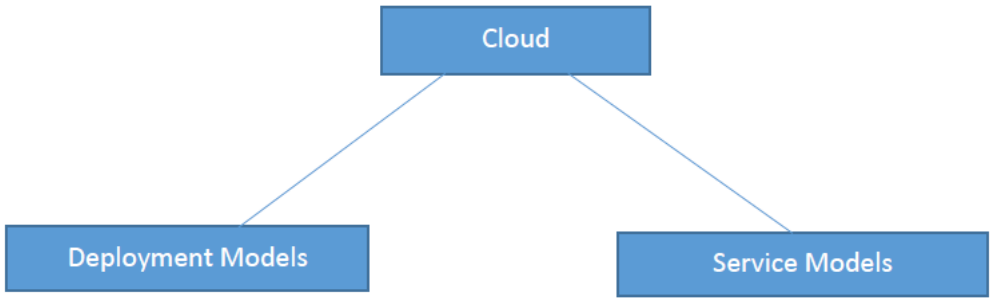

Figure 1: Cloud Classification

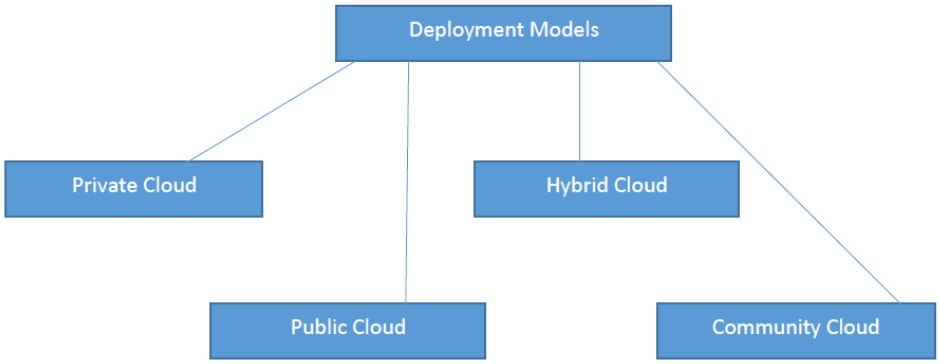

Figure 2: Deployment models

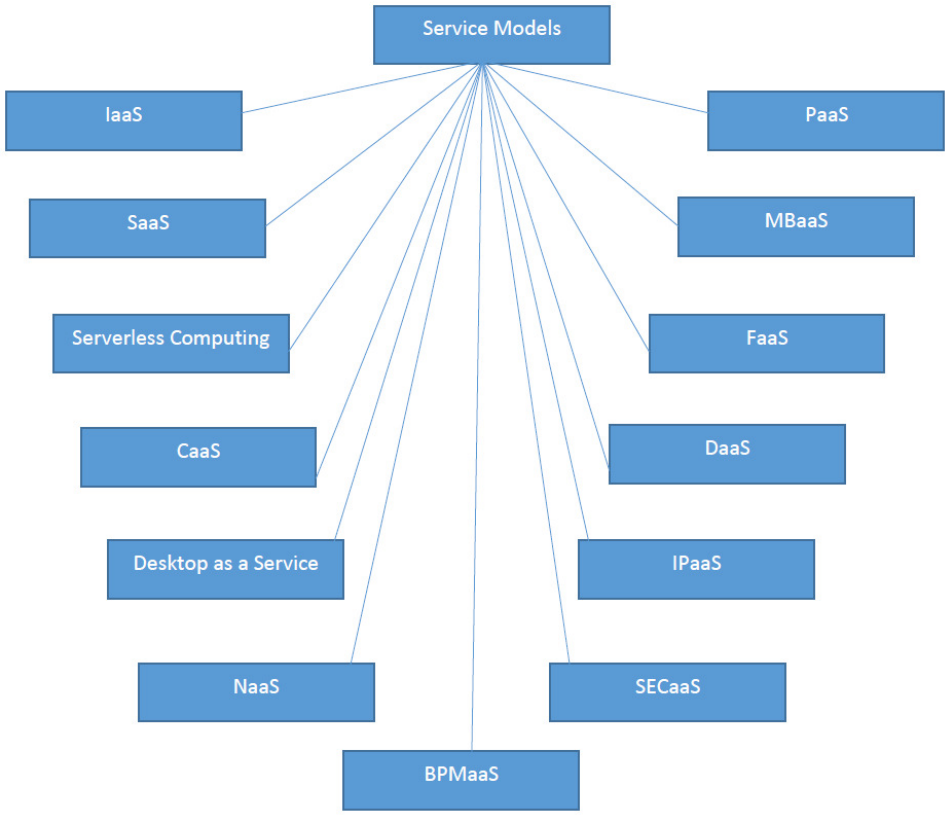

Figure 3: Service Models

Deployment Models

A *private cloud* involves a secure and distinct cloud based environment created exclusively for the specified client. It is explicitly built for providing services within an organization to maintain privacy and security (Verma & Sharma, 2019). Examples of a private cloud include Microsoft's Azure and Amazon's AWS cloud. A private cloud removes the need to have on premise hardware or data centres for the client organization. *Public Cloud* can be defined as cloud services offered by companies over the public internet, thus making it available to any interested user (Verma & Sharma, 2019); this can be free or paid, depending on provider and user requirements. Examples include Google Drive and Microsoft's OneDrive. The paid versions can be set-up in such a way the customer pays only for what they use; this can be based on CPU cycles used, amount of storage required, bandwidth consumed and so forth. Using a combination of private and public cloud is known as the *Hybrid Cloud* (Verma & Sharma, 2019). The driver to use this type of cloud is the combination of privacy and availability for multi-tenancy. Examples of hybrid cloud are the US Microsoft Hybrid Cloud (Cybercon.com), IBM Cloud App Development (Bluemix.net) and so on. *Community cloud* allows sharing and management of information by a number of related organizations (Verma & Sharma, 2019). Community Cloud is operated by a community of organizations which share common concerns such as storage and security. Some examples of community clouds include Salesforce and QTS Data Centres.

Service Models

With regard to service models, *Infrastructure as a Service (IaaS)* refers to online services providing high level Application Program Interfaces (APIs). Typically, a hypervisor - a virtual machine monitor, runs the virtual machines as guests. One of the most common hypervisors is VMware's ESXi; others include Microsoft's Hyper-V, Citrix's Xen, KVM, etc. Some of them are open source such as the Kernel-based Virtual Machine (KVM), whereas most are proprietary such as ESXi or Hyper-V, to name but a few. IaaS is used frequently nowadays, for example a company called GoGrid manages

cloud and dedicated hosting for more than 15,000 customers claiming to deploy more than 600,000 virtual machines for those customers using IaaS (Preimesberger, 2015). *Platform as a Service (PaaS)* provides a platform to users for running, developing, and managing applications without building and maintaining infrastructure which would otherwise be required. PaaS can be delivered as a public cloud with the customer controlling software development with minimal configuration as a private service behind a firewall, or as a software deployed on public IaaS (Hurwitz, 2012). *Software as a Service (SaaS)* is a subscription-based and centrally hosted cloud computing service for software licensing and delivery. For example, SaaS Customer Relationship Management (CRM) is used by many large enterprises across the world instead of on-premise systems, for managing sales opportunities and actions of sales personnel (Chen *et al*., 2018). Salesforce is one of the successful organizations in the field of CRM. They focus on areas of marketing automation, analytics and application development, along with ways to improve customer service. *Mobile Backend as a Service (MBaaS)* - also known as "Backend as a Service" (BaaS) (Monroe, 2013), enables application developers to link their applications to backend cloud storage and APIs exposed by backend applications. MBaaS also provides useful features such as integration with social networking services and user management.

Other models include *Serverless Computing* - a cloud computing category in which the provider runs the server, dynamically allocating machine resources; this is unique as pricing is actually based on resources consumed by the application, rather than pre-purchasing units of capacity (Miller, 2015). Serverless computing has the potential to be cheaper than purchasing or renting servers (Jamieson, 2017). *Function as a Service (FaaS)* provides a platform on which customers can run, develop and manage application functions without the need to build and maintain infrastructure. Thus, it is similar to PaaS, however FaaS does not require any constantly running server process, thus differentiating itself with the former (Avram, 2016). AWS Lambda is one of the earliest FaaS offerings by a major provider (Eyk *et al*., 2017). *Content as a Service (CaaS)* otherwise known as "Managed Content as a Service" (MCaaS), is where the provider is responsible for delivering content to the customer via licensed internet services under a subscription model. This is an on-demand service. The primary benefit of this service is that the client has the ability to centralize content, as well as make it easily manageable (Doglio, 2020). *Data as a Service (DaaS)* accesses the provider's data product and is used by the client on demand (Olson, 2010), that is to say beyond geographical and organizational borders. As this service is focused on data with access being controlled via data services, quality is improved due to a single point of updates by the provider. *Desktop as a Service* refers to the concept of remote desktop virtualization and virtual desktop infrastructures, or VDIs. In essence, desktop virtualization involves a logical operating system or a virtual operating system isolated from the client used to access it (Rouse *et al*., 2013). Desktop as a service tends to be used amongst public cloud providers. *Integration Platform as a Service (IPaaS)* addresses data, processes and application integration (Thoo *et al*., 2011) and can also be described as a suite of cloud services enabling customers to govern, develop, and execute integration flows between different applications. Such an integration is critical to the needs of certain businesses.

Other approaches use *Network as a Service (NaaS)* for network transport connection; this service is often combined with mainstream services such as IaaS, PaaS and SaaS (Frank, 2011). NaaS considers computing resources and networking as a single point for optimizing resource allocations. At times NaaS can involve a virtual network service as well. *Security as a Service (SECaaS)* sees a provider integrate their security services into an infrastructure accomplished on a subscription basis. In fact SECaaS is more cost effective when compared to running one's own security services when taking total ownership cost in to account (Olavsrud, 2017). Additionally, SECaaS negates the need for on-premise hardware (Furfaro *et al*., 2014). *Business Process Management/Monitoring as a Service (BPMaaS)* is a runtime business process compliance monitoring framework incorporating a broad range of high level compliance patterns for abstracting the specification of relevant constraints (Barnawi *et al.,* 2015). End users benefit from the friendly interface provided by BPMaaS to monitor their business. One application of these service models is *Dropbox*, a popular American cloud service company allowing users to host files (Li *et al*., 2013). Dropbox has computer applications for most mainstream operating systems such as Microsoft Windows, Linux computers, Apple macOS, iOS and Android. Dropbox offers cheap storage and thus has the potential to generate high amounts of internet traffic (Drago *et al*., 2012).

On-demand resources, along with portable data centers, are very helpful for today's organizations, making cloud computing critical for the IT industry (Bredenkamp, 2012). The four types of cloud computing discussed earlier were the Private, Public, Hybrid and the Community Cloud. We also divided the cloud into different categories (Pocatilu *et al*., 2010). The three major categories discussed were Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Some seldom used categories were also reviewed, namely Mobile Backend as a Service (MBaaS) (Monroe, 2013), Serverless Computing (Miller, 2015) Function as a Service (FaaS) (Avram, 2016), Content as a Service (CaaS), Data as a Service (DaaS), Desktop as a Service, Integration Platform as a Service (IPaaS), Network as a Service (NaaS), Security as a Service (SECaaS) and Business Process Management as a Service (BPMaaS). A particularly well-known application called Dropbox was also discussed. Let us now turn our attention to the topic of project management with a cloud focus.

Cloud Project Management

Project Management has existed in a formal western sense of the term since the Manhattan project, producing the world's first atomic weapons (Schwalbe, 2018). The goal of project management is to achieve all project goals within given constraints. Traditionally this has been accomplished manually or via on-premise systems (Preimesberger, 2019). However, most projects require the management of numerous documents and related work, which can be made easier by implementing cloud based solutions (Baird, 2015). Cloud is a relatively new concept, and thus its integration with project management is an even newer concept. As a result SaaS is the only area of cloud computing where considerable literature exists for discussion of the integration of cloud and project management; which is what the following section explores. Following this discussion, specific tools related to cloud project management are introduced, such as BaseCamp, Zoho Projects, etc. Finally, coverage with regard to PMBOK is undertaken.

PM with SaaS

SaaS project management can specifically refer to delivering project management software on demand, in an environment where cloud computing is in place. As every business requires the ability to manage projects effectively, SaaS is an appropriate delivery model for project management software. SaaS project management applications consist of comprehensive tools for managing projects throughout their lifecycle, such as bug trackers and tickets, change management tools, online chats, virtual conference rooms, cost and budget trackers, dashboards, contact management tools, reporting tools, templates, collaboration tools, audit tools, scheduling tools, resource management tools and so on. Companies such as Gehry Technologies (Post, 2012), Autodesk (Maher, 2009) and Newforma (Joyce, 2012) have been developing such SaaS tools. Using SaaS project management service adds significant advantages. In fact Arnold (2009) suggests using Google Sites (an example of SaaS) for management after the project is completed. He describes Google Sites as a collaborative tool with a very good trouble ticketing system. Some other tools described are Zoho Projects and BaseCamp. In contrast to on-premise project management tools, SaaS PM tools are a popular alternative, as on premise tools lack the ability to serve remote clients effectively (Chen *et al.,* 2018); such PM Tools also remove all barriers to team collaboration as people can simply connect to the internet and start working, regardless of their location (Arnold, 2009). Another collaboration benefit is the use of a central repository to track and synchronize projects, unlike on-premise systems. Some examples of such centralized repositories are GitHub, BitBucket etc.

SaaS PM Tools also have an advantage over traditional tools regarding costs; this is due to SaaS applications running in the cloud, as this in turn helps SaaS vendors distribute maintenance costs over time, making prices affordable for their clients. Tiered pricing structures also help in lowering costs for clients (Abaffy, 2013). SaaS vendors also handle upgrade works and costs, lessening the workload of clients. Such benefits are more applicable to start-ups as they usually lack funding for on-premise systems. One major advantage is also the high scalability of SaaS tools; this can be as simple as subscribing to more services and power from the respective vendor. Finally, SaaS tools demand little training since they only require people are comfortable using internet as most complex jobs are the vendor's responsibility (Chen *et al.,* 2018). In recent times, Customer Relationship Management (CRM) has become a widely studied concept. CRM is related to SaaS as it traditionally uses SaaS to function (Chen *et al.,* 2018). Large enterprises across the world use SaaS CRMs instead of on-premise

systems to manage their sales departments. The driver for this behaviour are the low costs of SaaS, such as zero investment in machinery and equipment. Companies such as Salesforce rely on their CRM business for generating revenue (Arnold, 2009). Let us next examine some examples.

BaseCamp provides core project management and collaboration features. Third party applications are available to extend their features, such as introducing time tracking, accounting and charts to the core BaseCamp application (Arnold, 2009). Useful components of BaseCamp are the messaging and whiteboard features which help in collecting ideas from large groups of people. One can post and reply to messages via email from BaseCamp. Messaging threads are also available. *Zoho* [www.zoho.com] consists of a full suite of inexpensive and high quality business applications and can be considered a one stop shop for any business (Arnold, 2009). Basic features such as time tracking and progress charts have been incorporated in Zoho, which takes a more traditional approach in project management when compared to BaseCamp (Arnold, 2009). The popular *Google Sites* is originally a tool called JotSpot that Google acquired many years ago (Arnold, 2009). Google Sites is an array of applications such as Docs, Spreadsheets, Presentation, Calendar etc., effectively comprising all routinely used applications. Other useful tools include ticketing systems and file storage (Google Drive). One major advantage of Google Sites is that it makes project documentation easy due to the abovementioned features. Microsoft's Azure is another major cloud product (Sawyer, 2011), although typically used by larger organizations. Having explored cloud options, let us turn our attention to the management of projects in the cloud space.

Cloud vs. Traditional PM and the PMBOK

According to the Project Management Institute [pmi.org], there are 10 bodies of knowledge with respect to project management (Huda & Maliki, 2019): Project Integration, Scope, Time, Cost, Quality, Human Resource, Communication, Risk, Procurement and Stakeholder Management. Dillon & Scanlon (2011) comprehensively described how the cloud can contribute to making PM easier compared to traditional PM. As the cloud allows integration at a centralized place easily and this data can be seamlessly shared, along the lines of GitHub, integration and stakeholder management can benefit from this strategy.

Cloud tools such as BaseCamp can quickly determine if the scope of project is feasible or not by utilizing its third party applications; this can help in the case of scope management. Tracking tools such as Atlassian's Jira can help with time management (McDuling, 2019). In the cloud, live changes of anything including costs, can quickly be circulated among the team members as described earlier, helping with cost management. Using tools such as Zoho projects and BaseCamp, strict quality management can be enforced and improved with tools such as audit manager and document manager. Tools such as Workday also consist of additional features (Preimesberger, 2019) helping with timesheet submissions, vacation requests and performance reviews, clearly decreasing the workload of the human resources (HR) department. Tools such as Google Sites enable rapid communication thus improving communication management. The third party application - BaseCamp (Arnold, 2009) can also have features providing information about operation inefficiencies, thus improving risk management. These tools (Preimesberger, 2019) also allow for total oversight and control of service spending, improving procurement management. The aforementioned arguments indicate the cloud helps improve traditional on-premise project management (Dillon & Scanlon, 2011) in each of the ten areas of the PMBOK. Table 1 summarizes the above.

Cloud project management is a new but useful concept helping businesses thrive. Compared to traditional approaches to project management, cloud project management can be particularly helpful. SaaS is so far the only cloud service which project management has adopted. SaaS project management offers a range of benefits such as low costs, tension free clients, centralized repositories, CRM software and so on. BaseCamp, Zoho Projects, and Google Sites are a few examples of specific tools related to cloud project management. The cloud - particularly SaaS, improves every area of the PMBOK in different ways (Dillon & Scanlon, 2011).

Table 1: Project management bodies of knowledge (PMBOK) vs. cloud offerings

PMBOK	What makes cloud PM better than traditional PM?
Integration	Ability for centralized data (Arnold, 2009) integrating everything into one place.
Scope	Advanced tools like BaseCamp consisting of fully functional scoping tools (Arnold, 2009).
Time	Tracking tools such as Jira, ensure time is managed wisely (McDuling, 2019).
Cost	Live changes to costs provided instantaneously to all stakeholders (Chen *et al*., 2018).
Quality	Zoho delivers audit and document management tools improving quality management (Arnold, 2009).
HR	Workday consisting of timesheet submission and vacation request features, ensuring easier HR management (Preimesberger, 2019).
Communications	Google Sites enable quick communication among participants making communication management easier and quicker (Arnold, 2009).
Risk	BaseCamp provides information about operational inefficiencies thus improving risk management (Arnold, 2009).
Procurement	BaseCamp allows for total oversight and spending control (Preimesberger, 2019).
Stakeholder	Ability for centralized data (Arnold, 2009) means stakeholders access data easily.

With the cloud (especially SaaS) expected to keep expanding, cloud project management can only grow further (Farb, 2011). We wanted to do more than just establish the boundaries of project management and cloud computing, and sought to undertake some qualitative analysis of the literature around this topic to see if we could uncover hidden concepts overlapping the two areas. We turn our attention to this exploration of concepts next.

Qualitative Analysis of themes

Qualitative analysis is the analysis of qualitative data such as text from journal articles. NVivo is an example of qualitative analysis software (Lam & Busch, 2019), able to provide useful insights into any topic, provided you feed it with enough raw data. Forty articles (included in the reference list), from 2009 to 2020, were loaded into a new NVivo hermeneutic unit. The papers were gathered from 40 library databases such as Academic Search Premier, ACM Digital Library, Advanced Technologies & Aerospace Database, AIS Electronic Library, Computer Index Australasia, Elsevier, ENGINE, IEEE, O'Reilly, Scopus, Springer and Wiley. The keywords used to find these papers were "cloud computing" AND "project management". Some papers were also obtained from Google Scholar using the keyword "cloud project management". Auto-coding was performed at the sentence level looking for themes. In auto-coding, NVivo automatically recognizes themes and topics or concepts present in the given files. The output of this operation appears in various forms – tree maps, bar graphs and so on. The following section shows those reports generated by NVivo auto-coding and their discussion. Figure 4 shows a tree

map generated from NVivo auto-coding. Bigger tiles indicate higher dominance of that topic in the literature gathered.

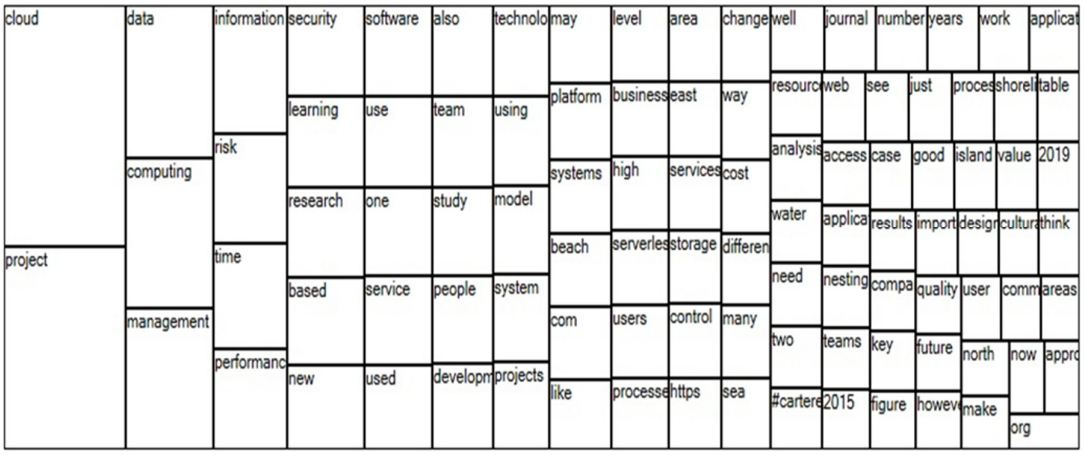

Figure 4: illustrating themes from auto-coding cloud vs. project management.

Nodes and Sentiment Analysis

Sentiment analysis was also conducted in Nvivo where sentiment represents a critical way of undertaking qualitative analysis illustrating the tone of an article or a topic. NVivo can generate themes or nodes from all provided documents by auto-coding keywords. Eighteen themes or nodes were auto-generated and after merging some terms e.g. merging cloud and computing, project and management etc., 14 final themes were determined. A sentiment analysis was then conducted resulting in figures 5, 6 and 7. Each major box in figure 5 corresponds to a particular theme. Inside those are four boxes corresponding to different sentiments about that theme: neutral, mixed, positive and negative. Clearly the neutral majority demonstrates the neutrality of all themes, but also fails to offer more insight. For a deeper analysis, figure 6 illustrating a bar graph is shown; this figure shows bars of each themes, separated into four different colours for very negative, moderately negative, moderately positive and very positive sentiments. It is clear the green - “moderately positive” category dominates. This result is

vindicated by figure 7, which shows the darkest shading in the same category. Both the graph and table also show exact auto-coding counts.

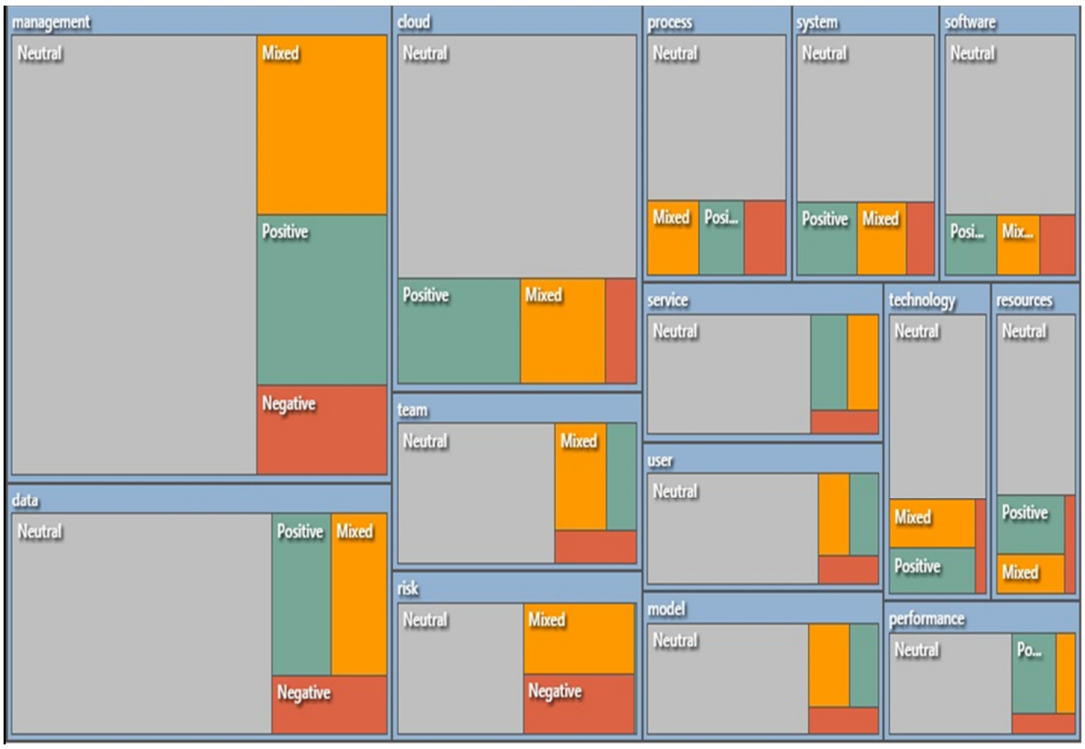

Figure 5: Box Chart illustrating sentiment vs. themes

To determine how the concept of cloud project management changed over the 2009 to 2020 time period, papers were equally divided into two categories: 2009-2014 and 2015-2020. Sixteen papers were from the 2009-2014 period and 24 from the 2015-2020 period as these were the numbers found from searching the library databases. Shown below in tabular form are both the reports starting with the 2009-2014 report (figures 8 and 9). These reports analyse sentiments provided in individual papers, and classify them into four different categories: Very Negative, Moderately Negative, Moderately Positive, and Very Positive. As an example, phrases like "cloud PM is the worst" would indicate a very negative sentiment, "cloud PM is bad" would be a moderately negative sentiment, "cloud PM is good" would be a moderately positive sentiment, and "cloud PM is the best" would be a very positive sentiment. Darker shading indicated a category's higher dominance for that article. Numbers shown in the figures are the count of how many times a sentiment was shown. In figure 7, sentiment was moderately positive as indicated by the darker shading. It is however difficult to determine overall sentiment in figure 8 due to mixed shadings. Hence, it is best to determine total count of each category for accurate analysis. The count was 127 for very negative, 324 for moderately negative, 419 for moderately positive and 166 for very positive. Now, it is clear a similar result of moderately positive was obtained for figure 9 as well. Therefore it can be said the attitude towards cloud project management has remained fairly consistent since 2009. The primary pattern noticed was the neutrality of the topic; even when it swayed towards negative or positive side, there still existed "moderate" sentiment. Whenever the topic was not neutral, the overall sentiment was found to be moderately positive. It must be noted the sample size was 40 documents, although these were gathered from a variety of sources. Also under the comparison reports section, the split of documents was not exactly the same, as there were 16-24 in favour of the 2015-2020 category. It was found that the overall outlook on the topic of project management in the cloud was moderately positive.

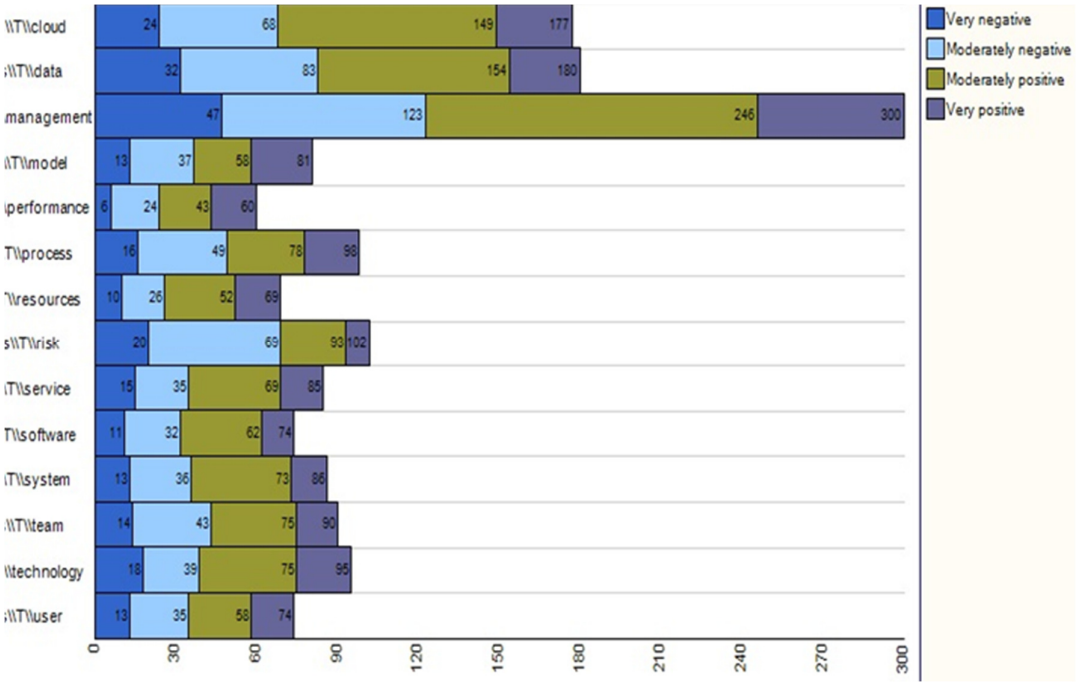

Figure 6: Bar Graph illustrating sentiment vs. themes.

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
cloud	24	44	81	28
data	32	51	71	26
management	47	76	123	54
model	13	24	21	23
performance	6	18	19	17
process	16	33	29	20
resources	10	16	26	17
risk	20	49	24	9
service	15	20	34	16
\\software	11	21	30	12
\\system	13	23	37	13
\\team	14	29	32	15
\\technology	18	21	36	20
\\user	13	22	23	16

Figure 7: Overall sentiment analysis of themes

Discussion

One of the findings was that while many companies adopt SaaS PM, very few adopt PM with other cloud service models. One reason could be that SaaS is easier and quicker to setup then other mainstream services - i.e. IaaS and PaaS (Pocatilu et al., 2010). However, companies in the ICT industry such as VMware, Citrix and Nutanix for example, have certain very successful IaaS products such as hypervisors. Companies could benefit from utilizing other specialized services for specific needs, rather than adhering to SaaS PM only. For example MBaaS is useful when dealing with backend cloud storage, for CaaS helps clients centralize their content whereas DaaS focuses on data quality. Mainstream services may not always be able to perform at the same level when dealing in such specialized circumstances. It can be inferred from the NVivo output that documents mentioning “risks” in relation to Cloud PM had considerable negative sentiment, inferring cyber security may be an area of concern. Recent data breaches of government databases and systems make this issue more severe. For example,

the Australian National University (ANU) suffered data breaches at least two times in recent years, compromising the data of many students (Giggacher, 2019); which in turn resulted in huge reputational loss. Hence cloud providers would certainly benefit from strengthening their cyber security, giving consumers the confidence to use them as a substitute for traditional project management. While there are plenty of tools available making cloud PM better than traditional PM, there is no one tool providing all-encompassing functionality. An all-in-one tool would definitely be more encouraging to people and prompt them to switch to cloud PM. For example while tools such as Zoho projects specialize in providing auditing tools, BaseCamp provides useful scoping tools. However neither of them provide both, potentially detering customers from using them. If there are reservations about moving into a cloud project management environment from a traditional PM setup, one can also perform a gradual transition by moving one of the PMBOK to the cloud. This can act as a trial of cloud PM, and if successful be expanded to all ten PMBOKs.

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
autodesk	1	4	10	6
SaaS PM	11	7	9	6
E learning	8	20	35	4
bentley azure	1	3	11	2
cloud expected to keep rising	0	4	6	1
3D	0	2	4	1
bim in cloud	1	1	5	1
cloud is not a product	5	6	12	8
automatic	1	2	5	2
] badly	3	6	7	0
] change	6	6	13	9
] collaboration	2	0	5	2
] Secure User Data in Cloud Computin...	4	10	8	3
] sharpest edge	4	7	8	6
] classroom	9	18	56	19
] navy	0	1	2	0

Figure 8 : Sentiment analysis articles published 2009-2014

	A : Very negative	B : Moderately negative	C : Moderately positive	D : Very positive
cisco	2	1	8	1
cloud to complete projects	4	5	23	3
IaaS	0	0	0	1
Cloud computing security	14	44	39	13
intelligent business	0	1	4	3
1889-Article Text-4056-1-10-20180517	2	3	23	13
billion	0	1	4	3
journey to cloud	0	3	5	1
microsoft	0	0	3	2
] SaaS CRM project systems	14	30	46	18
] OneDrive	0	4	3	2
] A method for achieving provable data...	7	15	12	5
] asset	0	0	3	2
] atlassian freemium	0	0	0	1
] china	8	12	24	2
] Cloud Computing Security using Bloc...	4	11	14	3
] Cloud Programming Simplified	9	43	53	13
] Issues and Challenges in Cloud Com...	4	3	12	6
] On Producing Reliable and Affordabl...	7	24	16	12
] risk	24	73	42	15
] top pm software vendors	3	6	23	7
] US-China policies on AI, Big Data, a...	7	12	17	12
] Cloud computing in high tech startups	10	16	30	12
] Toward ML-Centric Cloud Platforms	8	17	15	16

Figure 9: Sentiment analysis articles published 2015-2020

For example a company can transition all its communication management strategies to the Google Suite or an equivalent cloud tool; if this enhances communication management, then cloud PM tools such as BaseCamp can be applied to other fields of the PMBOK. As evident from figures 8 and 9, the overall outlook on cloud PM is moderately positive, however there are a few areas, such as risk, having major negative sentiments. If the aforementioned solutions are implemented, then these negative sentiments can further be reduced. As seen in table 1, the cloud is already enhancing PM with respect to the ten areas of the PMBOK because of various cloud tools. Again, implementation of the aforementioned solutions will further improve cloud project management.

Conclusion

Cloud computing is still new and on the upward adoption trajectory. It is very flexible (Schneckenberg, 2014) and can be applied to a variety of areas - project management being one of them. Project management is key to organizational success. Enhancing PM with cloud services has benefits. This paper discussed both, cloud and project management in detail, before considering their integration. Cloud computing may be distinguished by two categories – Deployment Models and Service Models. These categories can be further broken down into specific terms. There are four deployment models – private, public, hybrid and community cloud. There are plenty of service models, 13 of which were covered. The mainstream services, i.e. IaaS, PaaS and SaaS were part of these 13 service models. Project Management is about accomplishing all project goals within given time and cost constraints. The cloud increases the capabilities of project management in every area of the Project Management Bodies of Knowledge (PMBOK), such as scope, integration, time, cost, due to the advanced tools for cloud project management such as BaseCamp and Zoho Projects. We then conducted a qualitative analysis. Results obtained were discussed in depth and patterns in the raw data identified, such as many documents having neutral sentiment. A limitation was the uneven distribution of documents based on time period, but in general cloud project management has been positively received in the articles qualitatively examined. Some recommendations are promoting use of non-mainstream services such as CaaS, MBaaS, etc.,

strengthening cyber security, creating tools with a broad range of functionality, and making a gradual transition to cloud. It may be concluded cloud project management is here to stay and in fact will only become more popular (Bianchini et al., 2020).

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Reducing Exchange Rate Risk on The Example of ERP Software

Marek GAŁĄZKA

Adam Mickiewicz University, Poznań, Poland
galazka@amu.edu.pl

Abstract

Companies that transact in different currencies face financial risk because of unpredictable exchange rate fluctuations. Exchange rate risk constitutes one of the most common forms of risk that firms in the international arena encounter and, in recent years, the management of this risk has become one of the key factors in overall financial management. Measuring and managing exchange rate risk exposure is important for reducing a firm's vulnerabilities from major exchange rate movements, which could adversely affect profit margins and the value of assets.
The purpose of the article is to show how to implement and provide a solution in SAP ERP or S/4HANA systems that significantly reduces exchange rate risk.

Keywords: ERP Systems, Foreign Exchange Risk, Risk Management

Introduction

Today, the economic environment in which most firms operate is highly volatile and uncertain. One of the main factors effecting this process is the increasing market globalization and internationalization, which is reflected in increased exchange, interest, inflation rates fluctuations as well as in high competition, demand levels etc. Big multinational companies are particularly exposed to exchange rate fluctuation; therefore, special attention should be paid to exchange rate management.

Exchange rate risk management is an integral part in every firm's decisions about foreign currency exposure (Alayannis, G., Ihring, J., and Weston J., 2001). They analysed the effectiveness of operational and financial hedging by U.S non-financial multinationals (1996-1998). They found that on an average operational hedging does not reduce exchange rate risk exposure on its own. Financial hedges are effective on their own, and so is a combination of financial and operational hedging. (Debashish, S. S., 2008) focused on foreign exchange risk management practices and derivative product usage by large non-banking Indian based firms apart from techniques of risk hedging, the risk evaluation methods adopted and the risk management policy. (Nagendran, R., 2008) studied the foreign exchange rate movements in India for the major currencies like U.S Dollar, GB Pound Sterling, Euro and Japanese Yen from 1999 to August 2007 and attempted to give solutions to this exchange rate challenge using Technical Analysis. (Goel, M., Gupta, S. L., and Goel, L., 2011) made a comparative analysis of management of foreign exchange exposure by banking and non-banking as well as foreign and Indian MNCs operating in India. (Afza, T., and Alam, A., 2011) showed that firms having higher foreign sales are more likely to use derivative instruments to reduce exchange rate exposure. Moreover, financially distressed large size firms with financial constraints and fewer managerial holdings are more likely to use foreign exchange derivatives. (Hon, T. 2013) studied the ways that the Hong Kong companies in the Hong Seng Index Constituent Stocks manage their financial risk with derivatives. By analyzing the companies‟ annual reports and financial reviews, it was found that 82.6% of these companies used derivatives in 2010. Specifically, 58.7% of them used swaps to hedge interest rate risk, and 54.3% of them used forward contracts to hedge foreign exchange risk. (Mbabazize, P. M., Daniel, T., and Ekise, I. E., 2014) examined the role of foreign exchange risk management on performance management of exporting firms in developing countries taking Uganda as the case study. (Chaitanya, C.H., and Radhika, T., 2015) attempted to study the impact of exchange rate on select Indian IT companies, Market Price Of Share (MPS) and the tools and techniques used by Indian IT majors to net their foreign exposures. An analysis of the data collected from various secondary sources revealed that

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foreign exchange rate had significant impact on market as a whole. (Assad, M. J. 2016) attempted to study the capacity to manage foreign exchange risk among businesses and to identify the attributes which explain the divergence among individuals/firms. It emerged from the study that the perception within the country to manage foreign currency risk was weak and it was not a normal practice for local firms to have a policy for guiding the practice with respect to foreign currency risk management. (Ito, T., et al, 2016) investigated the relationship between the Japanese firms' exposure to the exchange rate risk and risk management, such as choice of invoicing currency, and financial and operational hedge. (Sikarwar, E., and Nidugala, G. K., 2018) examined the relationship between the value of the firm and unanticipated changes in exchange rate. (Dash, M., 2019) studied the impact of currency fluctuations on cash flows of IT service providers and analysed and evaluated the foreign exchange risk management strategies to find out which of the strategies was appropriate in particular situations.

Many companies use the ERP systems. The term ERP abbreviated from "Enterprise Resource Planning", was introduced by the Gartner Group in the early 1990s (Arif, M., Kulonda, D. J., Proctor, M., and Williams, K., 2004) and represent computer and software systems that combine and integrate all related processes of the enterprise, and serve users for the management of all functions within the enterprise (Swartz, D., and Orgill, K., 2001). Researchers referred ERP systems as enterprise system (ES), enterprise resource management (Cobarsí, J., Bernardo, M., and Coenders, G., 2008), and business system respectively (Davenport, T. H., 1998, 2000). (Klaus, H., Rosemann, M., and Gable, G. G., 2000) conceptualized ERP System as comprehensive packaged software solutions of Information System (IS) designed to integrate all business processes and work to present a complete outlook of the business from a singular IT and information architecture (Klaus, H., Rosemann, M., and Gable, G. G., 2000). (Davenport, T. H., 1998) also described ERP an information strategy that merge all information within an organization and create a comprehensive information infrastructure involving all organizational units and functions. (Marnewick, C., and Labuschagne, L., 2005) clarified that ERP system is more than just a product or software and they further conceptualized ERP into four components. The first component is software component (Finance, Human Resources, Supply Chain Management, Supplier Relationship Management, Customer Relationship Management, Business Intelligence), which is the visible part to users and seen as ERP product. The second component is process flow, which deals with the information flow among modules within ERP system. Third is customer mind-set, that define the influence of ERP system on users, team, and organization. And the final component is change management, this component deals with the adoptability of ERP system implementation within the organization, that are user attitude, project changes, business process changes, system changes.

Many international companies that trade around the world and conduct transactions in different currencies use the SAP ERP system. For such companies, it is very important that the exchange rates that are available in the system are updated daily. Incorrect exchange rates in the system significantly increase the exchange rate risk for companies. In this article is described an example implementation of loading daily current exchange rates from the European Central Bank to the SAP system.

Description of the solution in the SAP ERP or S4/HANA system

This section is divided into functional description and technical description

Functional Description

Exchange rates are to be maintain in SAP to allow transactions in other than the company code currency or book value in additional local currencies in the New G/L accounting. SAP has a dedicated table for maintaining exchange rates. The name of the table is TCURR.

MAN...	KURST	FCURR	TCURR	GDATU	UKURS	FFACT	TFACT
100	EURX	USD	EUR	09.05.2020	/1,08430	0	0
100	EURX	USD	EUR	08.05.2020	/1,07830	0	0
100	EURX	USD	EUR	07.05.2020	/1,08070	0	0
100	EURX	USD	EUR	06.05.2020	/1,08430	0	0
100	EURX	USD	EUR	05.05.2020	/1,09420	0	0
100	EURX	USD	EUR	01.05.2020	/1,08760	0	0

Fig. 1: SAP Exchange Rate Table (TCURR)

Exchange rates can be entered and updated manually (Transaction OB08).

Change View "Currency Exchange Rates": Overview

New Entries

ExRt	ValidFrom	Indir.quot		Ratio(from)	From		Dir.quot.		Ratio (to)	To
EURX	09.05.2020	1,08430	X	1	USD	=		X	1	EUR
EURX	08.05.2020	1,07830	X	1	USD	=		X	1	EUR
EURX	07.05.2020	1,08070	X	1	USD	=		X	1	EUR
EURX	06.05.2020	1,08430	X	1	USD	=		X	1	EUR
EURX	05.05.2020	1,09420	X	1	USD	=		X	1	EUR
EURX	01.05.2020	1,08760	X	1	USD	=		X	1	EUR
EURX	30.04.2020	1,08420	X	1	USD	=		X	1	EUR
EURX	29.04.2020	1,08770	X	1	USD	=		X	1	EUR
EURX	28.04.2020	1,08520	X	1	USD	=		X	1	EUR
EURX	25.04.2020	1,08000	X	1	USD	=		X	1	EUR
EURX	24.04.2020	1,07720	X	1	USD	=		X	1	EUR
EURX	23.04.2020	1,08670	X	1	USD	=		X	1	EUR
EURX	22.04.2020	1,08370	X	1	USD	=		X	1	EUR
EURX	21.04.2020	1,08600	X	1	USD	=		X	1	EUR
EURX	18.04.2020	1,08600	X	1	USD	=		X	1	EUR

Fig. 2: Transaction OB08- changes in exchange rates

Manually changing exchange rates is obviously not a very smart solution. This article describes how to automate this process. Central banks provide current exchange rates every day (often in XML or JSON file format). The solution proposed in the article uploads exchange rates from the European Central Bank into TCURR table. This operation takes place every day after 16 CET because exchange rates are usually updated around 16:00 CET on every working day, except on closing days. All exchange rates published by ECB use indirect quotation. Indirect quotation expresses how much foreign currency you get/pay for 1 EUR.

Technical Description

The solution contains ABAP class that show how to load daily currency exchange rates provided by the European Central Bank into the corresponding customizing table of the ABAP system. The class retrieves currency exchange rates from the ECB's own XML API (https://www.ecb.europa.eu/stats/eurofxref/eurofxref-daily.xml). To do this, you need to create the RFC connection to ECB, that is, start the sm59 transaction.

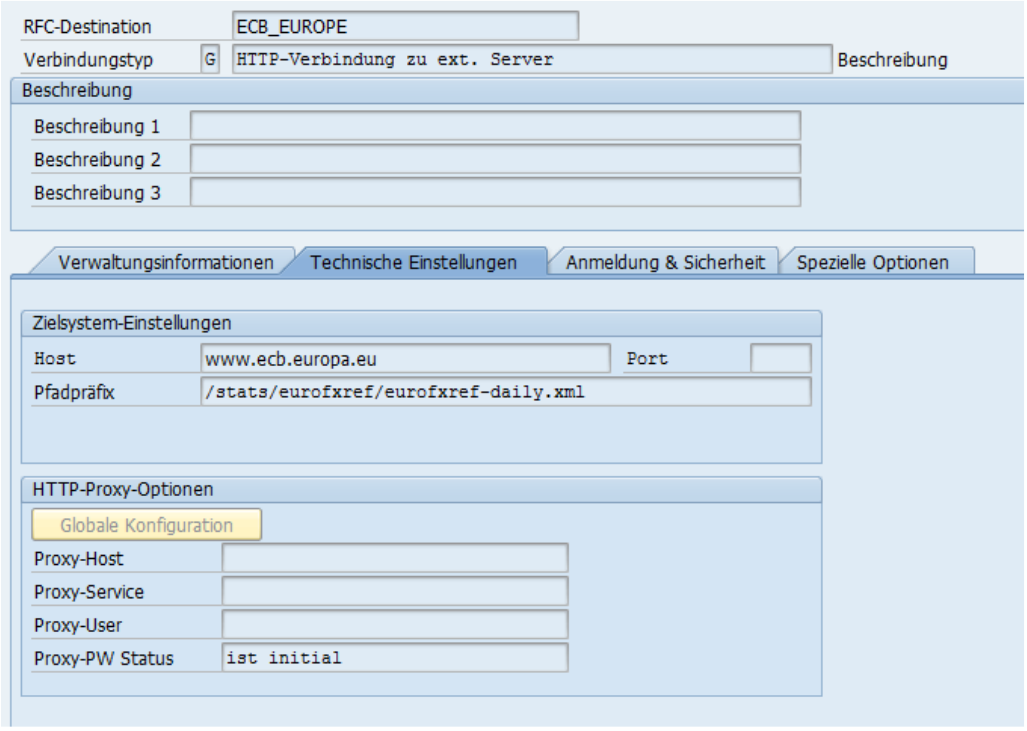

Fig. 3: Transaction SM59

Note that retrieving ECB data is just an example; there are other central banks or services that provide different or enhanced data on exchange rates for which the retrieval needs to be altered appropriately, with respect to service link and format, of course.

The class perform the exchange rate retrieval, convert the retrieved data into the internal storage format and write it to the currency rate customizing table using the respective BAPI 'BAPI_EXCHRATE_CREATEMULTIPLE'. On execution as "console app" the ABAP console provides notice on write. Note that appropriate write authorization must be supplied to actually perform the customizing update (Authorization Objects for V_TCURR).

The application should be run in the SAP system automatically as a job every day after 16 CET.

Implementation of the solution in the SAP ERP or S4/HANA system

In this section is showed the source code of the class that show how to load daily currency exchange rates provided by the European Central Bank into the corresponding customizing table of the ABAP system. These example class provides currency exchange rates to the currency rate type EURX which is the "standard exchange rate type" provided in the regular system deployment of an SAP environment system. The source code is written in ABAP (programming language in SAP system).

```
CLASS zcl_ecb_exchange_rates_xml DEFINITION
  PUBLIC
  FINAL
  CREATE PUBLIC .

  PUBLIC SECTION.
```

```
    METHODS main .
  PROTECTED SECTION.
  PRIVATE SECTION.

    TYPES:
      BEGIN OF ty_entry,
        level  TYPE i,
        parent TYPE string,
        name   TYPE string,
        attr   TYPE string,
        value  TYPE string,
      END OF ty_entry.


    DATA gt_entry TYPE TABLE OF ty_entry.
    DATA gt_exchange_rates TYPE bssp_t_bapi1093_0.
    DATA gv_content_xml TYPE xstring.

    METHODS get_rates
      IMPORTING
        !iv_dest TYPE rfcdes-rfcdest.
    METHODS parse_rates.
    METHODS update_rates.
    METHODS fill_rates.
ENDCLASS.


CLASS ZCL_ECB_EXCHANGE_RATES_XML IMPLEMENTATION.


* <SIGNATURE>-----------------------------------------------------------------------------------------+
* | Instance Private Method ZCL_ECB_EXCHANGE_RATES_XML->FILL_RATES
* +-----------------------------------------------------------------------------------------------------+
* +-----------------------------------------------------------------------------------------</SIGNATURE>
  METHOD fill_rates.

    CONSTANTS: gc_rate_type TYPE kurst_curr VALUE 'P',
               gc_base      TYPE fcurr_curr VALUE 'EUR'.

    DATA: ls_return    TYPE bapiret1,
          ls_exch_rate TYPE bapi1093_0,
          ls_entry     TYPE ty_entry,
          lr_cxroot    TYPE REF TO cx_root.

    LOOP AT gt_entry INTO ls_entry.
* process the actual rates
      ls_exch_rate-rate_type = gc_rate_type.
      ls_exch_rate-from_curr = gc_base.
      CASE ls_entry-attr.
        WHEN 'time'.
          REPLACE ALL OCCURRENCES OF '-' IN ls_entry-value WITH ''.
          ls_exch_rate-valid_from = ls_entry-value.
        WHEN 'currency'.
          ls_exch_rate-to_currncy = ls_entry-value.
        WHEN 'rate'.
* ECB publishes its exchange rates always in ratio 1:1
```

```
        ls_exch_rate-from_factor_v = 1.
        ls_exch_rate-to_factor_v = 1.
* multiply by switched factors
        TRY.
           ls_exch_rate-exch_rate_v = ls_entry-value / ls_exch_rate-from_factor_v  * ls_exch_rate-
to_factor_v.
*          ls_exch_rate-exch_rate_v   = ls_entry-value.
          CATCH cx_sy_conversion_overflow cx_sy_arithmetic_overflow INTO lr_cxroot.
           MESSAGE i532(0u) WITH lr_cxroot->get_text( ).
           CONTINUE.
        ENDTRY.

        APPEND ls_exch_rate TO gt_exchange_rates.
     ENDCASE.
   ENDLOOP.

  ENDMETHOD.

* <SIGNATURE>-----------------------------------------------------------------------------------------+
* | Instance Private Method ZCL_ECB_EXCHANGE_RATES_XML->GET_RATES
* +-----------------------------------------------------------------------------------------------------+
* | [--->] IV_DEST                    TYPE       RFCDES-RFCDEST
* +-----------------------------------------------------------------------------------------</SIGNATURE>
  METHOD get_rates.

   DATA: lv_hfield  TYPE ihttpnvp,
        lt_hfields TYPE tihttpnvp,
        lr_client  TYPE REF TO if_http_client.

* create connection to ECB
   CALL METHOD cl_http_client=>create_by_destination
     EXPORTING
       destination              = iv_dest
     IMPORTING
       client                   = lr_client
     EXCEPTIONS
       argument_not_found       = 1
       destination_not_found    = 2
       destination_no_authority = 3
       plugin_not_active        = 4
       internal_error           = 5.

   IF sy-subrc <> 0.


   MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno WITH sy-msgv1 sy-msgv2 sy-
msgv3 sy-msgv4.
   ENDIF.

* set header fields
   CLEAR lv_hfield.
   lv_hfield-name  = '~request_method'.
   lv_hfield-value = 'GET'.
   APPEND lv_hfield TO lt_hfields.

   CLEAR lv_hfield.
   lv_hfield-name  = '~server_protocol'.
```

```
   lv_hfield-value = 'HTTP/1.1'.
   APPEND lv_hfield TO lt_hfields.

   CLEAR lv_hfield.
   lv_hfield-name  = 'cache-control'.
   lv_hfield-value = 'no-cache'.
   APPEND lv_hfield TO lt_hfields.

   CALL METHOD lr_client->request->set_header_fields
     EXPORTING
       fields = lt_hfields.

* send


   CALL METHOD lr_client->send
     EXPORTING
       timeout                    = 0
     EXCEPTIONS
       http_communication_failure = 1
       http_invalid_state         = 2
       http_processing_failed     = 3
       http_invalid_timeout       = 4.

   IF sy-subrc <> 0.
     MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno WITH sy-msgv1 sy-msgv2 sy-
msgv3 sy-msgv4.
   ENDIF.

* receive
   CALL METHOD lr_client->receive
     EXCEPTIONS
       http_communication_failure = 1
       http_invalid_state         = 2
       http_processing_failed     = 3
       OTHERS                     = 4.

   IF sy-subrc <> 0.
     MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno WITH sy-msgv1 sy-msgv2 sy-
msgv3 sy-msgv4.
   ENDIF.

* get content
   gv_content_xml = lr_client->response->get_data( ).

* close connection
   CALL METHOD lr_client->close
     EXCEPTIONS
       http_invalid_state = 1
       OTHERS             = 2.

   IF sy-subrc <> 0.
     MESSAGE ID sy-msgid TYPE sy-msgty NUMBER sy-msgno WITH sy-msgv1 sy-msgv2 sy-
msgv3 sy-msgv4.
   ENDIF.

 ENDMETHOD.
```

```
* <SIGNATURE>-----------------------------------------------------------------------------------------+
* | Instance Public Method ZCL_ECB_EXCHANGE_RATES_XML->MAIN
* +-----------------------------------------------------------------------------------------------------+
* +-----------------------------------------------------------------------------------------</SIGNATURE>
  METHOD main.

    get_rates( 'ECB_EUROPE' ).
    parse_rates( ).
    update_rates( ).

  ENDMETHOD.


* <SIGNATURE>-----------------------------------------------------------------------------------------+
* | Instance Private Method ZCL_ECB_EXCHANGE_RATES_XML->PARSE_RATES
* +-----------------------------------------------------------------------------------------------------+
* +-----------------------------------------------------------------------------------------</SIGNATURE>
  METHOD parse_rates.

    DATA: ls_entry  TYPE ty_entry,
          ls_parent TYPE ty_entry,
          lt_stack  TYPE TABLE OF ty_entry.

    DATA(lr_reader) = cl_sxml_string_reader=>create( gv_content_xml ).

    DO.
      DATA(lr_node) = lr_reader->read_next_node( ).

      IF lr_node IS INITIAL.
        EXIT.
      ENDIF.

      CASE lr_node->type.
        WHEN if_sxml_node=>co_nt_element_open.
          DATA(lr_open_element) = CAST if_sxml_open_element( lr_node ).
          DATA(lr_attributes)  = lr_open_element->get_attributes( ).
          READ TABLE lt_stack WITH KEY level = ls_entry-level INTO ls_parent.
          IF sy-subrc = 0.
            ls_entry-parent = ls_parent-parent.
          ENDIF.
          ls_entry-level = ls_entry-level + 1.
          ls_entry-name = lr_open_element->qname-name.
          ls_parent-level  = ls_entry-level.
          ls_parent-parent = ls_entry-name.
          READ TABLE lt_stack WITH KEY level = ls_parent-level TRANSPORTING NO FIELDS.
          IF sy-subrc = 0.
            DELETE lt_stack WHERE level = ls_parent-level.
          ENDIF.
          INSERT ls_parent INTO TABLE lt_stack.
          LOOP AT lr_attributes INTO DATA(lr_attribute).
            ls_entry-attr  = lr_attribute->qname-name.
            ls_entry-value = lr_attribute->get_value( ).
            APPEND ls_entry TO gt_entry.
          ENDLOOP.
```

```
        CONTINUE.

      WHEN if_sxml_node=>co_nt_value.
        DATA(lr_value_node) = CAST if_sxml_value_node( lr_node ).
        ls_entry-name = lr_open_element->qname-name.
        ls_entry-value = lr_value_node->get_value( ).
        APPEND ls_entry TO gt_entry.
        CONTINUE.

      WHEN if_sxml_node=>co_nt_element_close.
        ls_entry-level = ls_entry-level - 1.
        CONTINUE.
      WHEN OTHERS.
    ENDCASE.
  ENDDO.

 ENDMETHOD.


* <SIGNATURE>-----------------------------------------------------------------------------------------+
* | Instance Private Method ZCL_ECB_EXCHANGE_RATES_XML->UPDATE_RATES
* +-----------------------------------------------------------------------------------------------------+
* +-------------------------------------------------------------------------------------</SIGNATURE>
 METHOD update_rates.

   DATA: lv_line   TYPE i,
         lv_text   TYPE string,
         ls_return TYPE bapiret2,
         lt_return TYPE TABLE OF bapiret2.

   fill_rates( ).

   CALL FUNCTION 'BAPI_EXCHRATE_CREATEMULTIPLE'
     EXPORTING
       upd_allow     = space
       chg_fixed     = space
       dev_allow     = '000'
     TABLES
       exchrate_list = gt_exchange_rates
       return        = lt_return.

* check errors
   DELETE lt_return WHERE type = 'I' OR
                          type = 'W' OR
                          type = 'S'.

   DESCRIBE TABLE lt_return LINES lv_line.
   IF lv_line > 0.
*   error during update
     ROLLBACK WORK.

     LOOP AT lt_return INTO ls_return.
*     error E! - different errors 'Line xxx'
       IF ( ls_return-id = 'E!' ) AND
          ( ls_return-number >= '008' AND ls_return-number <= '021' ).
         MESSAGE i531(0u) WITH ls_return-message.
```

```
      ENDIF.
    ENDLOOP.

  ELSE.
*  update succesfull
    DESCRIBE TABLE gt_exchange_rates LINES lv_line.
    lv_text = lv_line.
    CONCATENATE 'Number of exchange rates:' lv_text INTO lv_text SEPARATED BY space.
    WRITE lv_text.
    COMMIT WORK AND WAIT.
  ENDIF.

 ENDMETHOD.
ENDCLASS.
```

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Quality Cost Calculation as Data Source for Kaizen Costing System

Jozef GRUSZKA

Faculty of Engineering Management, Poznan University of Technology, Poznan, Poland,
jozef.gruszka@put.poznan.pl

Beata MRUGALSKA

Faculty of Engineering Management, Poznan University of Technology, Poznan, Poland,
beata.mrugalska@put.poznan.pl

Abstract

The automotive industry sets new standards not only for quality management (ISO/TS 16949:2016) but it also inspires to search for effective production methods such as lean production, agile production and tools supporting their management processes in a global car supply chain. One of such tools is the loss reduction system (Kaizen Costing). The purpose of the paper is to present the issues of quality cost accounting which determine the level of quality costs to sales value, preventive costs, control and assessment costs, and cost of losses. On the basis of the loss cost account, the types of internal and external failure costs were determined in reference to the cost components that affect the losses and should be subject to the improvement process within the Kaizen Costing system. In the surveyed enterprises, they implemented the quality management system based on the IATF 16949 standard but they use different management accounting systems as they do not have the same owners. Moreover, their quality management systems are mature enough to be able to consciously assess the existing situation in reference to loss cost and determine the necessary improvement actions for products that are already in the production and delivery phase to the customer. However, their IT systems only include the main internal failure costs in the costs of foundry and mechanical departments, and in the case of external failure costs these are costs of complaints and special transports. The cost of losses of individual products require additional calculations outside the system.

Keywords: Quality Costs Calculation, Loss Cost, Kaizen Costing.

Introduction

Modern production enterprises pursuit to excellence in constant globalization and internationalization of the world economy. It mainly relies on searching for new markets, cheaper labor and new locations in less developed countries where it is possible to adapt already implemented technologies from modern workplaces. A good recent practice is automotive industry. Due to changes in the environment its global representatives adopt a new strategy and business models that are more focused on emerging markets, new consumer needs and concepts of mobility. According to the KPMG's report - Global Automotive Executive Survey (KPMG, 2018) the basic factors of change are globalization and production increase, environmental challenges (development of electric drives, application of environmental friendly technologies), change of consumer behavior (in reference to economic solutions, safety innovations, applied ergonomic solutions, comfort) and urbanization and development of mega cities (i. e. urban car design).

The automotive industry is dominated by supplier market, which produces about 80% of the parts for the assembly of new cars, which has to deal with changes in the global environment, respond to the needs of car concerns and their customers, and create favorable conditions for changes (Grzybowska & Łupicka, 2019). These changes result from the development and technological innovations, shortening life cycle of products, reduction of production costs or shorter delivery times. It is

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supposed be achieved, among others, by the development of ERP information and information systems, Enterprise Resource Planning, which create new opportunities for access to information, e.g. on quality costs and their use in decision-making processes, which are often already at the operational level, as long-term strategies quickly lose their relevance (Lenart, 2016).

The increasing global competition makes the companies to change their manufacturing practices. In order to achieve their goals they start to implement advanced methods and techniques such as just-in-time, lean manufacturing, productivity improvement and total quality management to name a few (Górny, 2020; Mrugalska, Konieczna & Wyrwicka, 2020; Mrugalska, 2020). They pursuit to reduce cost, cycle time and improve quality (Modarress, Ansari & Lockwood, 2005). This paper presents a case study of Kaizen Costing in two automotive companies. The purpose of this study is to show the issues of quality cost accounting which determines the level of quality costs. In both of the enterprises the quality management system is based on the IATF 16949 (2016) standard but they use different management accounting systems. It let us show relevant data supporting production decisions which can be useful for practitioners in reference to Kaizen Costing system.

Kaizen Costing

Kaizen Costing (KC) is a system which facilitates the cost reduction at the manufacturing process of the existing components or product by a pre-specified amount (Drury, 2004). It is an extension to the production of the cost management activities performed using Target Costing which is applied to the development stage of a new product (Iii & Smith, 2000). KC derives from Japanese word "Genkakaizen" and its meaning is a little bit different than English word "improvement". It denotes continuous accumulations of small betterment actions rather than improvements by innovations (Afonso & Leite, 2016; Monden & Hamada, 1991). Therefore, it refers to the changes focused on either the increase of the effectiveness of the production process or reduction of costs of an individual product without altering its functionality (Copper & Slagmulder, 1997). It is implemented outside the standard cost system as a part of the overall budget control system. It denotes the actual cost per product for the most recent period and it must be decreased in the succeeding period to meet the target profit (Monden & Hamada, 1991). It is recognized that Kaizen Costing activities may have an impact on approximately 10% of a product's costs, in contrast to approximately 90% which can be achieved within target costing (Cooper, 1996).

Kaizen Costing can be implemented to manage diverse costs in an organization. It can refer to the cost of the supply chain (i.e. administration, order procurement, inventory and transportation costs) or regulate the cost gained in the production of goods/services (i.e. cost of machinery, tools, equipment, raw material and labour). It can be also applicable to the cost of acquiring a patent, license, registration fees, hiring of chartered accountant and all other legal formalities. In a case of redesigning of a product it encompasses cost on research, analysis, hiring of expert personnel, etc. (Prachi, 2019).

KC allows to find opportunities for cost efficiency by engaging all workers in the enterprise (Afonso et al., 2008). It is a team-based approach integrating staff from various functional organizational units (Baykasoglu & Kaplanoglu, 2007). In order to implement it, it is needed to introduce and sustain supportive organizational culture which enable to build positive relation between people, work and organization (Medinilla, 2014). The motivation of the employees should be oriented to continuous improvement, achievement of goals which are defined in strategic plans, and provision of information support for project leader (Rojek & Sobańska, 2011).

Kaizen Costing consolidates the gains in the existing markets as it is used for steady and determined cost optimization to maintain a competitive advantage. It refers to the existing products which functionality cannot be altered simply (Ahn, Clermont & Schwetschke, 2018). Moreover, it can be treated as a solution to introduce strategic products which standard costs are higher than its target costs (Agndal & Nilsson, 2008). It changes the market perspective of target costing by stressing an internal focus. However, it has to be emphasized that KC helps to achieve a long-term profit for a company as it can be applied to a new launched product, which costs are too high, or a mature

product, which selling price is decreasing (Cooper & Slagmulder, 1999). The summary of key features of Kaizen Costing is depicted in Figure 1.

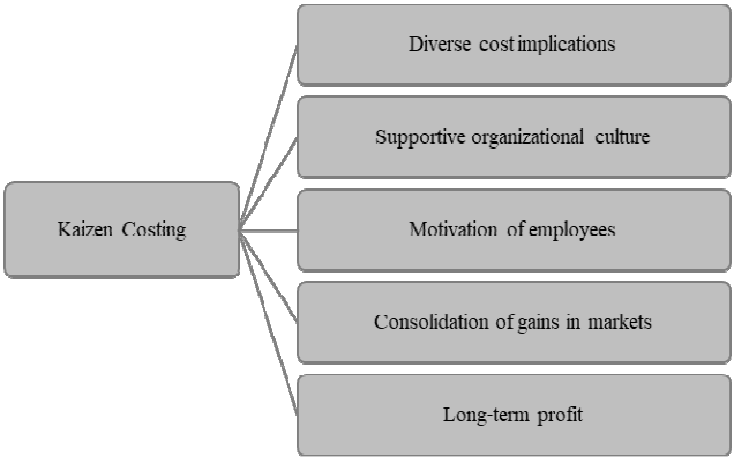

Fig. 1. Key features of Kaizen Costing

As far as the benefits of Kaizen Costing are discussed, it is worth to emphasize the improvement of business efficiency (product, process, project and organization) due to the reduction of various types of cost in all kinds of organizations (service industry or manufacturing industry). It protects against waste of time and resources. Its application allows to solve the identified problems to reach perfection in business operations. Furthermore, it is a customer-oriented technique which concentrates on providing better service to the consumers. On the other hand, the attention is paid to a positive work environment for the employees and the management. In order to fulfill a common aim the advantages of team work are emphasized where employees with different skills and knowledge are engaged.

Despite positive aspects of KC there are also some disadvantages such as difficulty to adopt the change in process or product for the bottom level management. It requires expertise and training to lead it smoothly, and if it is not implemented strategically, it can even lead to negative effects. The implemented change is irreversible, and it requires efforts and cost in withdrawing such decisions (Prachi, 2019).

Research Methodology

Characteristics of Enterprises

The research was done in two companies called (1) and (2) with the international capital from automotive industry. Both of them have aluminum foundry and machinery department. They have implemented quality management systems based on the standard of the quality management system in the automotive industry - IATF 16949: 2016. The enterprise (1) has a separate quality cost account as the part of the IT system which directly lets to obtain data related to individual items of quality costs (internal and external failure costs, cost assessment and preventive costs). It produces highly specialized aluminum castings (Fig. 2a) which are subjected to a machining process. The enterprise (2) does not have a separate quality cost account as part of the IT system used, from which only data related to the internal and external failure costs could be obtained directly. The data regarding cost assessment and preventive costs were adopted from previously conducted research in the field of quality cost accounting (Gruszka & Kurzawski, 2018). Similarly to the company (1), the company (2) deals with the production of highly specialized aluminum castings (Fig. 2b) which are then subjected to a mechanical machining.

a) b)

Fig. 2. a) piston for commercial vehicle engines, b) joke brake caliper

Technological Processes

The surveyed enterprises have technologically similar processes. Both the foundry and machining processes are carried out in the automated foundry lines. The piston parts (Fig. 2a) and corpus (Fig. 2b) are gravity cast into reusable metal molds. The cast products are thermally improved in the process of super saturation and aging, and are the subject to control for the presence of foundry defects. Then the details are transferred to the mechanical department where they are processed in numerical machining centers.

After machining, the details undergo a washing process. The finished products (2a and 2b) are sent to the customers where the remaining components are installed in the internal combustion engine for pistons and for the joke brake in the casting body and then these products are assembled in the passenger cars.

Research and Results of Quality Cost Analysis

As the purpose of this paper was to conduct the research and analysis of quality costs in the field of cost structure, the authors investigated the sources of the largest failures indicating the possibility of them reducing through product quality improvement processes. The research was carried out using selected qualitative methods and tools (Raßfeld at al., 2015; Zymonik, 2003). The results of the investigation of quality costs are illustrated in Figure 3.

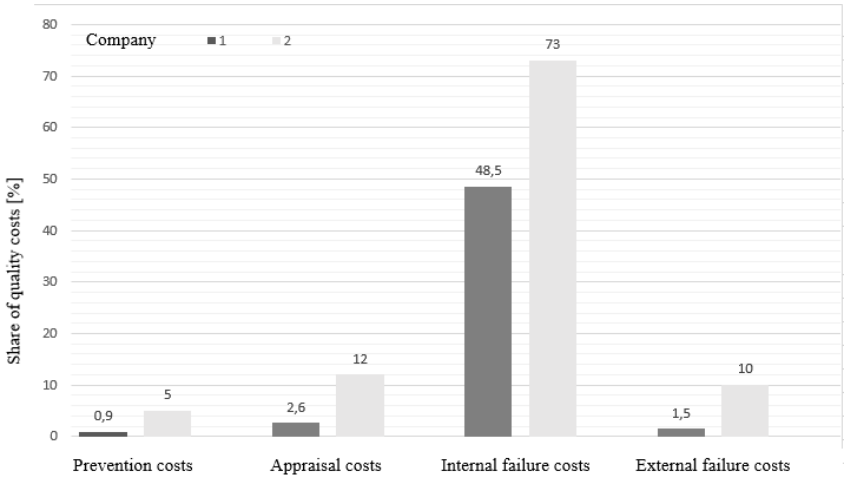

Fig. 3. Structure of quality costs

For the enterprises (1) and (2) the total quality costs are at the level of 5.85% and 10.7% of the sale value, respectively. It is worth to emphasize that the data from the European industry research shows

that they should be in the range of 4-8% (RWTUV, 1993). Furthermore, as it can be noticed on Fig. 3 the data show that the companies have a wide range of opportunities to take improvement actions, particularly, it is the enterprise (2). For both surveyed enterprises the dominant component of the quality costs are total loss costs (for enterprise (1) at 50% share in quality costs and for enterprise 2 at 83%). It differs significantly the enterprise 2 from the European industry data as they achieve the level of 45-55%.

On the other hand, the external failure cost of enterprise (1) is relatively low as it is 1.5%. According to Malik et al. (2018) it is the effect of using control procedures of shipped products. In this case it results from the analyses and related improvement activities (once a week) by quality engineering (QE) in the field of foundries and machining. In order to clarify the problem of significant loss cost in the enterprise (2) further research and analysis of the share of costs in the internal and external failure costs was made what is depicted on Figures 4 and 5.

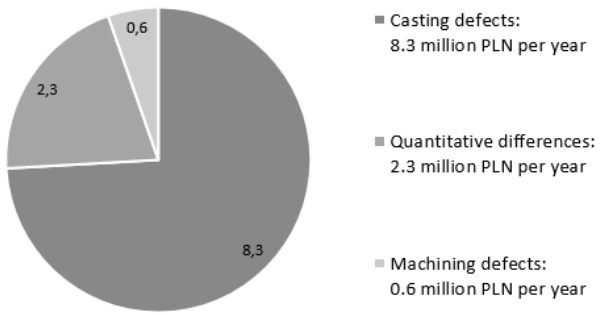

Fig. 4. Structure of internal failure costs (company (2)).

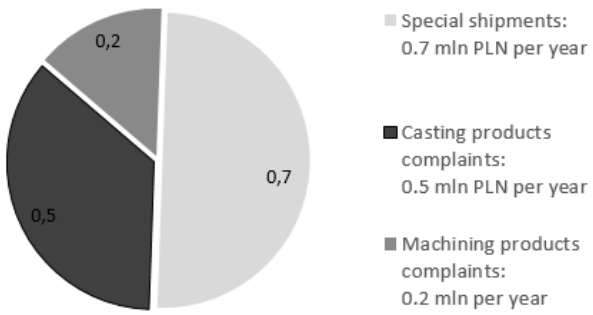

Fig. 5. Structure of external failure costs (company (2)).

In the internal failure costs the dominant role plays loss cost due to defects and quantitative difference, at the level of PLN 8.9 million per year and PLN 2.3 million/year, respectively. The main cost is the foundry department (PLN 10.6 million/year). In the external cost it is possible to differentiate transport cost of parts due to delays in delivery on time in the amount of PLN 0.7 ml/year and complain cost due to delivery of nonconformities. In the foundries loss costs are at the level of PLN 0.5 million/year and in the mechanical department they are at the level of PLN 0.2 million/year.

The result of the further research in the enterprise (2) was cost analysis of losses related to non-compliant products, which have the largest share in the loss cost in the foundry area (Fig. 6) and in the area of the mechanical department (Fig. 7).

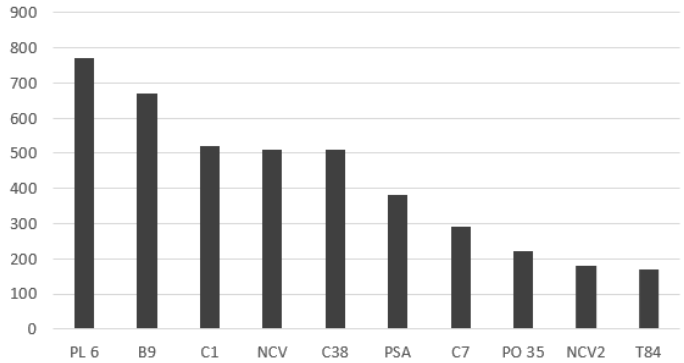

Fig. 6. List of TOP 10 products with the highest share in the loss cost (thousand PLN) in the foundry processing department.

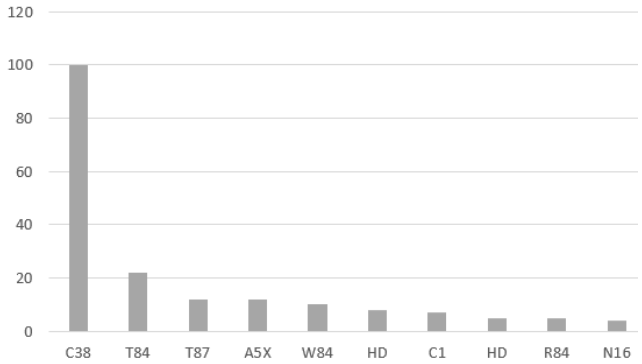

Fig 7. List of TOP 10 products with the highest share in the loss cost (thousand PLN) in the mechanical processing department (2)

A list of TOP 10 products was determined by the Pareto analysis to indicate the possibility of undertaking improvement actions in the scope of reducing the costs of losses. The basis for the program of improvement actions should be the following methods: Process Failure Mode and Effects Analysis (PFMEA), 5 Whys method and the 8D problem solving process for particular products.

Conclusions

As the results of the investigation show the implementation of the quality management system based on the IATF 16949 standard does not have to let the company fully benefit from the opportunities for improvement in reducing loss costs. In particular, the enterprise 2 does not use the full quality cost accounting in its management accounting system. The IT system contains only the main carriers of the internal failure costs in the scope of the costs of deficiencies in the foundry and mechanical department, and in the scope of external failure cost these are the costs of complaints and special transports. The data related to the cost of losses of individual products require additional calculations outside the system, which was used in research, among others. The situation is opposite in the company 1 which has a full set of cost data. The controlling department prepares for QE for weekly meetings of production management in order to establish programs of improvement activities on individual production lines in both the foundry and machining area.

Today, the principle of reducing costs of losses as part of quality management is already a well-known and practiced rule in particular automotive companies. In the case of the examined enterprises, the area of the aluminum foundry department of the enterprise 2 should first be included

in the improvement action program and at the same time it would be necessary to implement a quality cost account under management accounting.

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The Analysis of The Relationship Between the Processes from Different Types of Service Companies and Organizational Performance. Evidence from Romania

Andreea BARBU
University POLITEHNICA of Bucharest, Romania, Bucharest, barbu.andreeab@yahoo.com

Gheorghe MILITARU
University POLITEHNICA of Bucharest, Romania, Bucharest, gheorghe.militaru@upb.ro

Georgiana MOICEANU
University POLITEHNICA of Bucharest, Romania, Bucharest, moiceanugeorgiana@gmail.com

Abstract

Organizational performance is one of the most approached topics in the last period, this concept being attractive to both scientific and economic worlds. Also, this concept is analyzed concerning a lot of dimensions, factors and other concepts, including organizational processes. The goal of this paper is to analyze the relationships between the processes of different types of service companies and organizational performance. For this paper, the authors developed a questionnaire that was applied to a group of employees from the Romanian service companies. Based on their responses and perceptions, there were highlighted the most important processes that can contribute to improving organizational performance and also the most important or unimportant processes for each analyzed type of company. This study is an exploratory one, with evidence from Romania.

Keywords: organizational performance, service company performance, business process performance

Introduction

Organizational performance is a very popular topic in the last years. This concept is presented in both business and scientific environment. All of the researchers and managers are looking for all kinds of solutions to improve business performance. A part of them is looking for answers in the ecosystem, while the rest of them is analyzing the internal part of the business.

The interest in business process performance and organizational performance can be also seen by looking at more of the 3.3 million papers about this subject on Google Scholar. For example, since the beginning of 2020, on Google Scholar you can find more than 44500 papers that are about business process performance and also organizational performance.

Even though there are a lot of papers on this subject, it is quite hard to find information about the processes from different types of service companies and their interaction with business performance. Thus, the goal of this paper is to analyze the relationships between different types of service companies, the business processes and organizational performance.

Literature Review

Organizational performance is a complex concept that is widely debated (Andersen, Boesen, and Pederson 2016; Abdallah & Matsui, 2009; Lee et al., 2019). Over time, different scales of measuring performance were developed that considered a variety of dimensions, sources and types of elements

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(George et al., 2019), but from all the measuring model developed the simplest way used to define performance refers to achieving the organization's goals (Abubakar et al., 2017).

In a recent paper that analyzed how employees' satisfaction can improve business processes within professional service firms (Barbu & Militaru, 2019), the authors used 8 main processes for which they determined the level of importance, the performance according to time, flexibility, quality, cost and transparency. The analyzed processes were: supply process, human resources management process, financial-accounting process, marketing and sales process, service delivery process, customer service process, management process and innovation process. Considering each process as an individual it can be said that:

Supply process - The relationship between the supply process and organizational performance has been researched in the literature for over 3 decades. In this regard, the existence of a positive link between proximity to suppliers and organizational performance has been researched and demonstrated (Powell, 1995; Carr & Pearson, 1999), a close link between supply process and long-term organizational performance was determined (Tan et al., 1998), while Johnson (1999) shows that this link directly contributes to the increase of sales and market share.

Human Resources Management process - Researching the literature and various meta-analyses (Saridakis et al., 2017), it can be seen that between human resource management practices and business performance there is a positive association, that is highlighted through studies transverse or longitudinal.

Financial-accounting process - By analyzing various published papers in the financial field (Kerzner, 2011; Okes, 2013; Militaru, 2015; Horváthová, 2010; Huang, 2010; Chang et al., 2016) it can be seen the deep interest given for financial processes in relationship with organizational performance. The implications of the financial – accounting department on the company are widely studied since their influence determines the course of action for later activities.

Marketing and sales process - Through the study of O'Leary-Kelly and Flores (2002), general support was found for the model proposed by them, which showed that the impact of integrating the manufacturing and marketing/sales decision on organizational performance is moderated by a company's business strategy and the uncertainty of demand. Also, many studies analyze how social media influences marketing and sales strategies, having direct impacts on the financial performance of the organization (Niedermeier et al., 2016; Wang et al., 2016; Rodriguez et al., 2016).

Service delivery process - Regarding the process of providing services, most of the papers in this field refer to the quality of the service provided (Ali & Raza, 2015; Del Alonso-Almeida et al., 2013; Jaca & Psomas, 2015; Thorpe, 2014) and highlight the fact that quality practices significantly affect competitiveness, but also the financial performance of service companies.

Customer service process - Scientific literature presents that the customer service process is also associated with customer relationship management, which is analyzed mainly in terms of interaction with Social Media networks (Wang & Kim, 2017; Rodriguez et al., 2014; Wang et al., 2016). These operations are used to improve the performance of companies, the use of Social Media platforms playing a moderating role by increasing the positive impact of CRM social capabilities on the company's performance (Wang & Kim, 2017).

Management process - In the case of the management process, various studies analyze the strategic involvement of managers in companies, their results indicating that the involvement of managers in the formation of strategy is associated with improved organizational performance (Wooldridge & Floyd, 1990).

Innovation process - The study of innovation in service sectors is a process that has not been explored as much as other processes. For example, Prajogo (2006) analyzed the relationship between innovation and business performance, conducting a comparative study between production and

service companies. The results expressed that there is no significant difference between production and service firms in terms of product or process innovation performance, but indicated a stronger correlation between manufacturing firms and service firms between innovation and business performance, especially in terms of process innovation. Also, through this study, it was found that process innovation shows a relatively stronger relationship with enterprise performance than product innovation in production sectors.

Thus, having this overview of the existing connections between the selected processes and the organizational performance, the authors wanted to test how the type of service companies determine the influence of those processes in the relationship with the organizational performance. The literature review was conducted from a wide range of publications because various processes were involved in the analysis. The publications were chosen based on the close connection to each type of process and based on the similar manner in which the research was done by the authors.

Methodology

The goal of this paper is to analyze the relationship between the type of services, type of processes and organizational performance. For this study, it was developed a questionnaire that was sent to different employees from the professional service companies from Romania, measuring their perceptions about the impact of different processes on the company performance. The analyzed processes are P1-supply process, P2- human resources management, P3- financial-accounting process, P4-marketing and sales process, P5- service delivery process, P6-customer service process, P7- management process, P8- innovation process. The targeted types of services were in the following domains: IT, commerce, financial and banking, construction, transport, support services, consulting, telecommunication, tourism and hospitality industry, medical and pharmaceutical services, hygiene and beauty services, security, energy production, education, entertainment (the most important types of services according to the State Office for Inventions and Trademarks -OSIM, 2020). For this study, the authors received 150 responses from employees of service companies from Bucharest, Romania, this study being a pilot one. Half of the analyzed companies have more than 10 years on the Romanian market, while a quarter of the companies analyzed are on the market for less than 3 years. The authors received answers both from those in executive positions (81%) and from those in management positions (19%). Most of the answers came from those working in the IT field (25), Commerce (21), Financial and Banking (19), Construction (14), Transport (14) and Consulting (11). The respondents' perceptions were measured on a 5-point Likert-type scale ranging from 1 (very unimportant) to 5 (very important).

Results

Figure 1 shows the impact of the processes depending on the nature of the services provided by the sample companies.

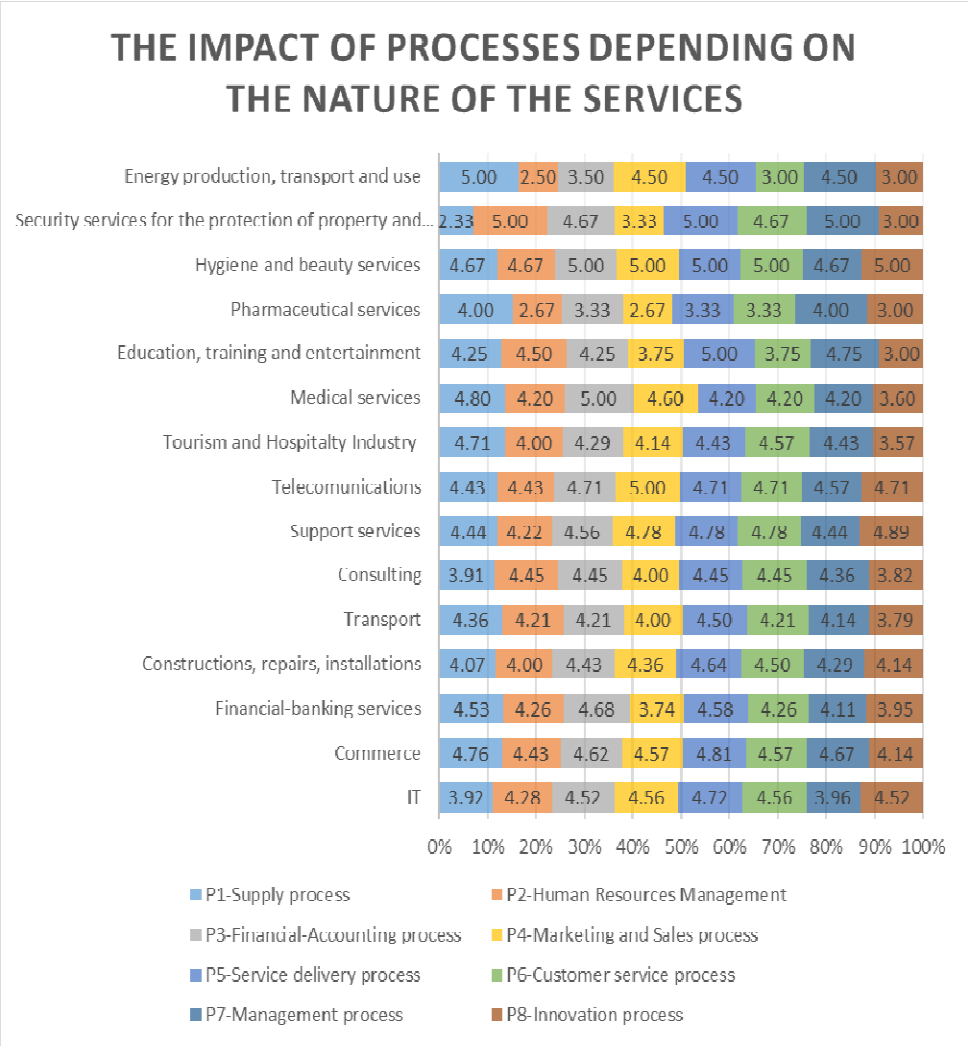

Fig 1. The impact of processes depending on the nature of the services
Source: Authors' own research

In the case of IT companies, the most important is the process of providing services, with an overall score of 4.72, followed by the process of providing support services, the financial accounting process and the innovation process. The order of these processes indicates that this type of service is one that can be included in the category of professional services, where the value of the service increases as the attention of managers and employees goes to the areas mentioned. The lowest score (3.92) is obtained in the case of the supply process, which indicates that in this type of companies, this process is not a very important one, as it does not require a constant supply of materials or raw materials, the most important resources being human resources, mainly the people knowledge and capabilities, the technical equipment and computer programs owned by the companies.

For companies in the commerce area, the highest score is recorded in the case of the service delivery process (4.81), followed by the supply process (4.76). These two processes are the most important, being the ones that bring value to the company, without which the clients could not benefit from the services of the analyzed company. Support services are also important, the score being 4.57. It is noted that all processes have a score above 4, the management process having a very important role

for this type of company, with a score of 4.67, which even indicates a favorable position in front of processes such as human resources management, innovation or the financial-accounting process.

In the case of financial-banking services, the highest score is found in the financial-banking process, which suggests that this is the most important type of process for companies in this field. The lowest score is 3.74 for the marketing and sales process, which means that from the perspective of employees in this field, the process does not play a very important role when it comes to the company's performance, focusing on the financial aspect to maximize revenue. Innovation is also less important, with a score just below 4, while high weights can be found in the case of service delivery processes (4.58), human relations management process (4.26), or supply process (4.53). Because we are talking about companies in the financial field, the score obtained for the supply is a suspiciously high one, this result being based on the answers of the employees in that field, who may have considered the supply process differently from the way it is expressed in the paper, maybe as supplying the banking units with money or papers, tonners and other stationery used daily when concluding financial contracts, which does not represent the analyzed purpose.

The scores obtained for the companies in the area of construction, repairs and installations are located in the range 4.00-4.64, the lowest score being associated with the human resources management process, and the highest with the service delivery process. We also find low scores for the processes of innovation, supply and management, which should represent an issue for the company's management that must pay more attention to employees and the quality of products used in providing services.

In the case of transport companies, the highest score is 4.5 for the service delivery process, which is considered by respondents to be the most important process for this category of services. On the other hand, the lowest score is 3.79 for the innovation process, suggesting that from an employee’s point of view, innovation does not play an important role in this type of service. A fairly high score (4.36) can be observed for the supply process, which indicates that the transport of materials influences how transport can be made, the logistics part being essential in this case. The marketing and sales process has a score of 4, indicating a level of importance below that of human resources management, financial-accounting or support services.

In the case of consulting companies, it is noted that the processes of human resources management, financial-accounting, service provision, but also the provision of support services have the same level of importance (4.45), which is a very high score, indicating the complexity of this type of service. The lowest scores are found in this case for the supply process (3.91) and innovation (3.82).

For companies that provide support services to other companies on the market, the most important processes are marketing and sales and of course the process of providing the support services, which in this case coincides with the actual provision of the service (4.78). However, these scores are exceeded by the innovation score (4.89), which suggests that in the case of this type of service, innovation, research and development play a special role leading to finding the most appropriate solutions for companies that use the services of these companies. The procurement process has the lowest score (3.91), indicating that in this area it is not necessary to purchase various products or materials for the actual provision of the service.

In the case of telecommunications companies, it was found the maximum score of 5 for the marketing and sales process, which shows the special importance of this process for companies in this sector. Also, there are important processes of innovation, financial-accounting, effective delivery of services, but also support services (4.71), all of which directly contribute to the organizational performance in this sector. The lowest scores are 4.43 which are high scores, which indicates that the field of telecommunications is very complex, where each of the analyzed processes is very important, contributing to the smooth running of activities within the analyzed companies.

In the case of companies in the tourism sector and the hospitality industry, the most important process is the supply (4.71), which together with the process of providing services, but also providing support

services adds value to companies. The lowest score is associated with the innovation process (3.57), indicating that in this sector, more attention needs to be paid to other issues, such as management (4.43) or marketing and sales (4.14) than to waste resources in the area of innovation.

Healthcare companies also indicate a low level of importance for innovation (3.60), relying on processes such as financial-banking (5) or the supply of necessary medical supplies (4.8). It is interesting that, unfortunately, the respondents consider the marketing and sales process more important than the actual provision of medical services or the provision of support services, the difference between the scores being 40 percent.

For companies operating in the field of education, training and entertainment, the delivery of the service has the greatest role (5), this being in fact what brings value to the organization. The management process (4.75), but also the human resources management process (4.5) also plays important roles, the human resource being the most valuable resource of the companies in this sector. The supply process has a surprisingly high score (4.25), this having as a possible explanation the fact that employees still focus on the classic elements of stationery in the educational process or training and entertainment, not using the advantages of technology, which is argued and the low innovation grade (3), which indicates the respondents' perception of the importance of discoveries and their application in the analyzed environment.

In the case of pharmaceutical services, there are low scores for the analyzed processes, the human resources management process and the marketing and sales process having scores such as 2.67. Although respondents believe that the marketing and sales process does not play an important role in their companies, there is massive advertising on the market of drugs and pharmaceutical chains, which are intended to be noticed by as many people as possible, pharmacies resorting to customers' loyalty strategies. Thus, the results obtained are somewhat in contradiction with what is observed on the market, this could be due to the quality of data collected from respondents, who are in principle in positions of execution, and at this level, have a different perception of the importance of various processes. The highest grades are 4, found for the supply process, and management. These operations of planning, organization, management and control, together with the timely supply of medicines are in the view of the respondents the most important aspects desired in the case of pharmaceutical companies.

Companies in the hygiene and beauty sector stand out with very high scores, over 4.67, where the maximum score is reached in terms of marketing and sales processing, financing-accounting, provision of services and provision of support services, and also the process of innovation. Services play a very important role since the service delivery work itself and personal care of things must use the best service offerings to cope with the schedule. Those in leadership positions known about the importance of communication with customers especially in this sector of services, but also the fact that for the customers the waiting time to benefit from the desired service is very important and can influence their whole experience. Thus, the score for innovation is maximum, since it is necessary to create new solid solutions or prominent brands in this market, coming up with all kinds of original ideas to attract the attention of customers. The procurement process is also an important role (4.67), within this category of services because of both specific utensils and materials needed for hygiene and beauty processes. The management process and human resource management process have the same importance, the way the management manages the work team being very important.

In the case of companies that provide protection of goods and services, planning, organization, management, control of actions, as well as human resource management have the most important roles, along with the effective provision of the service (score 5), followed by providing support services (4.67). The least important are the supply process (2.33) and the innovation process (3), these not being specific to the analyzed companies in this field. For companies specific to the area of transport and use of energy, the highest scores are in the case of the supply process (5), marketing and sales, management and service delivery (4.5), while the lowest scores are recorded for the management process of human resources (2.5), support services (3) or innovation (3). Unfortunately,

the quality of these results is influenced by the small number of respondents in this area (3 respondents), the data provided representing the perception of employees in this field.

In Figure 2, it can be seen that the highest performance is recorded by companies in the area of hygiene and beauty services (4.46), followed by those in the area of IT, support and telecommunications services (with a score of approximately 4.4). The lowest performances are registered in the case of pharmaceutical services (3.38), education, training and entertainment (3.53), consultancy (3.7) and medical services (3.73).

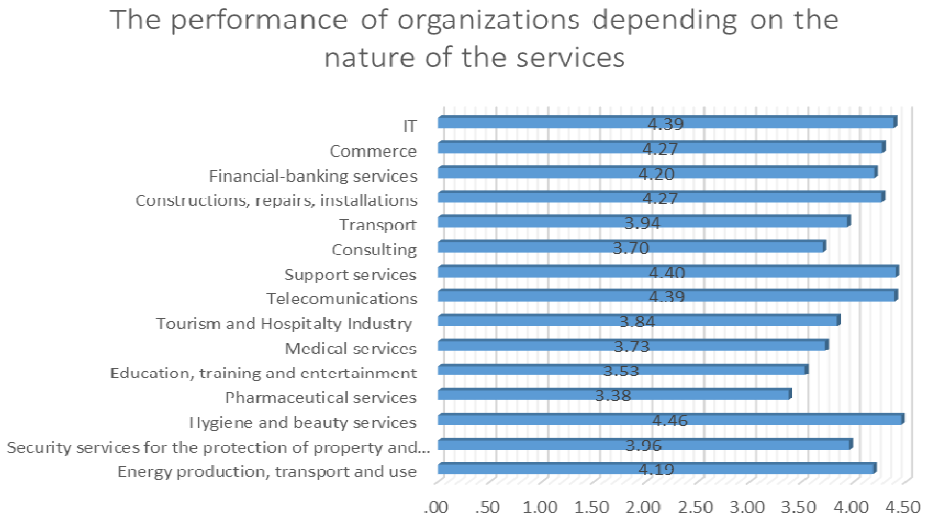

Fig 2. The performance of organizations depending on the nature of the services
Source: Authors' own research

Conclusion

Analyzing the industries where the grades related to the influence of processes on organizational performance exceed the value of 4.5, it is found that the most important processes are the Service delivery process (with 11 grades above 4.5), Financial-Accounting process (9 grades above 4.5), Customer service process (8 marks above 4.5), and Marketing and Sales process (7 marks above 4.5). On the other hand, the processes that respondents consider to have a lesser impact on organizational performance are Human Resources Management (4.12 average score) and Innovation process (3.88). These results presented should be seen by people in management positions as a chance to oversee and give more attention to these situations and take measures in terms of developing an organizational culture based on communication and collaboration between employees, but also innovation. These two processes contribute to bringing added value to any organization.

This study is not without limitation, for which the results must be used with care. For this study, were received only 150 responses from employees of service companies from Bucharest, Romania. The respondents work in 15 distinct categories of services, for several of them registering only a few responses, which is why some of this data may not be so representative for the whole industry, this fact imposing on the study some limitations. The article provides an exploratory study, where we collected answers from both management and executive positions holders. Their responses based on their perceptions could be influenced by their experience and positions, which is why the authors plan on conducting a more extensive study on 2 different groups of people, then analyzing the different perceptions between those in management positions and those in executive positions.

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COVID-19 lockdown and Mental Well Being: A Study of Pakistan and Saudi Arabia

Hina GULL[1], Saqib SAEED[2], Sardar Zafar IQBAL[3], Madeeha SAQIB[4], Albandary Mohammed ALAMER[5], Wiem Abdalmonem Bin KHALEFA[6]

[1,2,3,4,5] Department of Computer Information Systems, College of Computer Science and Information Technology, Imam Abdulrahman Bin Faisal University, P.O. Box No. 1982, Dammam, Saudi Arabia
[6]College of Arts, Imam Abdulrahman Bin Faisal University, P.O. Box No. 1982, Dammam, Saudi Arabia

[1]hgull@iau.edu.sa, [2]sbsaed@iau.edu.sa, [3]saiqbal@iau.edu.sa, [4]mssaeed@iau.edu.sa, [5]amalamer@iau.edu.sa, [6]wabenkhalifa@iau.edu.sa

Abstract

Coronavirus pandemic has affected the normal work routine of individuals across the globe. Majority of governments have responded to this pandemic by imposing curfews and lockdown to flatten the curve of virus spread. This situation has helped to minimize the virus spread but movement restrictions coupled with fear of getting infected may increase mental stress and depression. Therefore, in this paper, we report the results from an empirical study carried out in Pakistan and Saudi Arabia. The findings suggest that in this lockdown has negatively impacted individuals' health. The results also suggest that demographic factors contribute to the psychological impact of lockdown resulting in negatively affecting work and personal life of individuals. The findings will help the governments to establish support systems to improve mental health in Pakistan and Saudi Arabia in case of similar future conditions. In future, we intend to develop user centric prototypes for psychological support of public in pandemic situations.

Keywords: COVID-19, Mental health, Empirical study, Pakistan, Saudi Arabia

Introduction

Coronavirus (COVID-19) started in China in late 2019, and quickly spread across the world. World Health Organization upgraded the COVID-19 to pandemic on 11th March 2019. As of today, there are 19187943, confirmed infected cases, 716075 deaths in 217 countries ("World Health Organization (WHO)", 2020). Due to unavailability of any vaccination and approved medicine against COVID-19, social distancing is considered as optimal approach to reduce the spread of this virus. To enforce social distancing different countries have taken different actions which include curfews, quarantine, closure of business activities and movement restrictions. To control violations of these public safety rules, different countries introduced special legal provisions pertaining to fines and imprisonment.

Social distancing and quarantine results in loneliness and boredom, frustration and depression which negatively affects the mental health of individuals (Venkatesh and Edirappuli, 2020). These implications are equally relevant for public irrespective of their job role. Anxiety and depression are two key factors which negatively affect the mental health. We were particularly interested to understand how COVID-19 pandemic and corresponding government actions have impacted on mental wellbeing of people. To acquire the answers of our questions we particularly focused on responses from two countries Pakistan and Saudi Arabia. The reason for selecting these two countries was based on their strict and lenient adherence to COVID-19 lockdown violations. In Saudi Arabia there were strict legal penalties and in case of Pakistan such strictness was not implemented.

Saudi Arabia started the lockdown from Qatif region on 8th March 2020 and it was extended to a nationwide curfew for 21 days lasting from 7 PM-to 6 AM from March 23rd, 2020. The nationwide

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curfew timing was extended from 3PM to 6 AM on April 8 till further notice. Due to the beginning of holy month of Ramadhan the curfew timings were revised to 5 PM to 9AM from April 26th, 2020. The curfew was extended to 24 hours from 22nd May to 27th May 2020. Recently, from 28th May 2020, governments have announced gradual removal of curfew. To ensure, public adherence to these laws strict laws were introduced e.g. a fine of SR 10,000 for first curfew violation which is doubled for each subsequent violation ("Arab news", 2020). In case of Pakistan, the first Corona case was reported on 26th February and lockdown was imposed by different provincial governments starting from 24th March 2020 and it lasted till 9th May. The government lifted the lockdown mainly to facilitate daily wage workers who were badly affected due to closure of economic activities. In case of Pakistan there were no heavy penalties on violations of lockdown, although violations of these lockdown were arrested but the government responded softly by releasing all violators ("Pandemic in Pakistan", 2020).

In the next section related work is discussed followed by problem statement, hypothesis and methodology in sections 3 and 4. Section 5 confers the findings followed by discussion and conclusion in section 6 and 7 respectively.

Related Work

Although, there is a significant body of knowledge on impact of diseases on human health but the recent COVID-19 pandemic significantly attracting the attention of researchers. There have been numerous studies about coronavirus disease and its impact on society since its first case was diagnosed in late 2019. Galea et al (2020) (Galea et al., 2020) have studied the consequences of COVID-19 and physical distancing on mental health. According to them COVID-19 has subsequently increased anxiety and depression in United Kingdom, that they have to issue psychological guide for their general population. They also discussed several methods for early intervention and prevention of disease. Ornell et al (2020) (Ornell et al., 2020) have discussed the fear of COVID-19 which results in burden on mental health of people. According to them the number of people effected psychologically by the pandemic were greater than people infected with virus. Therefore, they propose number of strategies to deal with psychological effect of this pandemic. Similarly, Wang et al (2020) (Wang et al., 2020) have studied the psychological effect on people in China in the early stage of COVID-19 spread. They have analyzed several factors related to mental health such as stress, anxiety and depression among the general population of China. Online survey was conducted to gather data, which results in half of the population having moderate to severe anxiety, while a substantial number of people were suffering from severe depression. They also identified number of factors that have significant relationship with depression and anxiety. Mazza et al (2020) (Mazza et al., 2020) have conducted an online survey to analyze mental health effect of COVID-19 on people in Italy. According to them quarantine has caused huge psychological stress in general population of Italy. As per study, anxiety, depression and stress seemed to be elevated in people who have their family members effected with virus or the people who are working away from their family. They also identified several risk factors related to mental wellbeing of people in this pandemic. Similarly, Colizzi et al (2020) (Colizzi et al., 2020) have studied some medically unexplained symptoms during COVID-19 pandemic and lockdown. According to them, in addition to infection, there are several psychological risks associated with COVID-19, especially in people who are already suffering from serious mental issues. They report a detailed case of a person who was tested negative with virus but there was immediate need for his admission to psychiatric unit of hospital. Later, he was diagnosed with SSD (Somatic symptom disorder). Jung et al (2020) (Jung, 2020) have conducted an online survey in Germany to analyze the mental health of Germans in pandemic of COVID-19. They specifically analyze mental state of people in Germany in response to the lockdown. Results showed significant higher values associated with depression and anxiety in Germans. In this study the mean score was beyond 50 which indicates higher possibility of depression in people in lockdown. According to study German women showed more depression and anxiety than men. Other symptoms of mental health problems such as sleep disorders and poor appetite were also identified in the study. Ammar et al (2020) (AMMAR et al., 2020) have conducted multi country survey to analyze the effect of home quarantine on mental wellbeing of people. Result of this study has shown negative impact on mental and emotional state of people in quarantine with higher proportion of respondents having several emotional and mental disorders. They identified several rationales associated with this emotional and psychological impact such as unhealthy lifestyle, no physical and social activity and joblessness. Respondents also showed elevated use of technology

to kill boredom and monotony. Authors suggested to implement technology-based solutions to help relief in psychological stress during quarantine period. Naser et al (2020) (Naser et al., 2020) have conducted a cross sectional study in Jordon to investigate the impact of COVID-19 and quarantine on mental condition of university students, healthcare workers and general population of Jordon. Survey results highlight that higher proportion of people of Jordan suffering from anxiety and depression. As per evaluation, females are more vulnerable and especially divorced females having history of chronic disease were more likely to have anxiety and were at higher risk of getting depression. Kang et al (2020) (Kang et al., 2020) explored the mental state of nursing and paramedic staff in Wuhan (epicenter of pandemic). Study revealed that 34.4% of respondents suffering from mild disturbances, 22.4% suffering from moderate disturbances and 6.2% had severe disturbance. Majority of people having severe mental distress were females and most of them approached psychological literature and other resources to cope with stress. Many of them also tried several self-help methods to keep themselves out of anxiety and stress. A substantial number of people also visited psychiatrists to cure their condition of severe depression. Ahmed et al (Ahmed et al., 2020) also studied the mental health of Chinese people in early days of pandemic outbreak and imposed lockdown in China. Due to severe lockdown, only self-reported cases were used to examine the state of people in China. Results showed preeminent percentage of anxiety, depression, hazardous and harmful alcohol use, and lesser mental wellbeing in Chinese people. They also suggested that there is need to implement several health care approaches such as counseling sessions and other mental health related services.

Despite these studies, there is no specific study explaining the mental situation of people from the developing countries. The citizens of developing countries are normally confronted with weak psychological support and health systems. Furthermore, the economic worries pose additional tension for these individuals. So, it will be interesting to understand the mental health situation in such settings.

Problem Statement and Hypothesis

Our main research question was how COVID-19 lockdown has affected the mental wellbeing of people in Pakistan and Saudi Arabia. Our secondary question was whether demographic attributes like gender, marital status and education have any role in increase or decrease of depression and anxiety. Furthermore, we also intended to explore whether environment variables such as presence of infection in an acquaintance, or strict legal control by government of lockdown has any significant role in variation of depression and anxiety. Lastly, we were interested to understand that whether lockdown related anxiety and depression affects work and personal life. To get answers of these questions we have developed following five hypotheses to evaluate the results of our study.

H1: COVID-19 lockdown has significant impact on mental health of public.

H2: Personally, knowing a corona patient (like relative, family member) increases the anxiety and depression?

H3: The strict/lenient adherence of lockdown is insignificant to mental wellbeing.

H4: Gender, Marital status and education have significant psychological impact on people?

H5: COVID-19 lockdown resulted anxiety and depression negatively affected work and personal life.

Methodology

For our study, we intended to conduct a cross sectional quantitative study and we rolled out our questionnaire during 20th May 2020 -27th May 2020. The survey questions were based on previously validated and widely used questions by health practitioners to measure anxiety and depression. Generalized Anxiety Disorder (GAD-7) is a set of seven questions used to determine anxiety and patient health questionnaire (PHQ-9) is a set of nine questions used to measure severity of depression (Löwe et al., 2008)(Levis et al., 2019). We included these questions in our questionnaire and questionnaire was created on Google forms. The survey link was distributed through social media apps (Facebook, Twitter and WhatsApp) and all the participants were volunteer. As snowball sampling method was used (Naderifar et al., 2017), so first referral was started with 15 individual who took part in the study and then were asked to distribute the survey in their contacts. A total of 490 responses were

collected during data collection phase. 394 responses passed our qualification criteria which included completeness and geographical location of either Pakistan of Saudi Arabia. There were 189 responses from Pakistan and 207 responses from Saudi Arabia. Majority of our respondents were female (52.8%), between age group 18-29 (67.7%) and single (68.9%). In terms of academic qualification 36.6 % respondents were Pre-Bachelors, 33.9% having a bachelor's degree whereas 29.2% were either having master's or higher degree.

In order to analyze the data, we used partial least square analysis (Lowry and Gaskin, 2014) using SmartPLS (Ringle et al., 2015) and developed models to understand the pass or failure of our hypothesis. As already mentioned, we used the PHQ-9 and GAD-7 questions, so we established models to understand the casual relationships among different factors. It is worth mentioning that based on PHQ-9 and GAD-7 there were 9 factors which were contributing in the depression while 7 factors were contributing in anxiety, However, during factor analysis it was found that two factors (Feeling bad about yourself or that you are a failure or have let yourself or your family down and Thoughts that you would be better off dead, or of hurting yourself) were not significantly contributing in the results having values less than 0.7. So, these two factors were removed from the model and PLS was applied again to get the significant model. In anxiety all factors were significantly contributing. The mapping of questions in questionnaires and corresponding attribute used in model for factors contributing to depression and anxiety is shown in figure 1.

Findings

Figure 2 shows the structural model for H1. Mental health is based on depression and anxiety and after partial square application R2 value for the latent variable mental health is found to be 0.991 which is substantial value according to Hair et al (2014) (Hair et al., 2014). Therefore, these findings highlight that there is a direct correlation of mental health and anxiety due to COVID-19 lockdown. Furthermore, based on PHQ-9 and GAD-7 grading sales we categorized the levels of depression among respondents. Depression is categorized into Minimal Depression (rating 1-4), Mild Depression (rating 5-9), Moderate Depression (rating 10-14), Moderately Severe Depression (rating 15-19) and Severe Depression (rating 20-27) (Levis et al., 2019). As Figure 2, suggests 20.41% respondents reported minimal depression, 26.53% mild depression, 22.45% moderate depression, 10.61% moderately severe depression and 1.02% severe depression given in figure 3. Similarly, anxiety is also categorized into four categories which are None/Minimal (rating 0-4), Mild (rating 5-9), Moderate (rating 10-14) and Severe (rating 15-21) (Löwe et al., 2008). In our survey,30.61% respondents reported minimal anxiety, 31.63% mild, 22.65% moderate and 15.1%sever anxiety, as shown in figure 4.

Factors Related to Depression		**Factors related to Anxiety**	
Questionnaire Question	**Name used in models**	**Questionnaire Question**	**Name used in models**
Little interest or pleasure in doing things?	Interest	Feeling nervous, anxious or on edge	Nervous Anxious
Feeling down, depressed, or hopeless?	Depressed	Not being able to stop or control worrying	Control Worry
Trouble falling or staying asleep, or sleeping too much?	Sleep Problems	Worrying too much about different things	Worrying over things
Feeling tired or having little energy?	Tired	Trouble relaxing	Trouble relaxing
Poor appetite or overeating?	Poor appetite	Being so restless that it is hard to sit still	Restless
Feeling bad about yourself — or that you are a failure or have let yourself or your family down?	Failure	Feeling afraid as if something awful might happen	Afraid Awful
Trouble concentrating on things, such as reading the newspaper or watching television?	Newspaper/ TV	Becoming easily annoyed or irritable	Annoyed
Moving or speaking so slowly that other people could have noticed? Or so fidgety or restless that you have been moving a lot more than usual?	----------		
Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?	----------		

Fig. 1: Mapping of Factors Related to Depression and Anxiety (Questionnaire-Model)

Furthermore, bootstrapping was conducted for the level of path coefficients analysis with about 5000 subsamples. Results shows that there is a significant impact of COVID-19 lockdown on mental health of public ($p<0.01$ where β (anxiety)=0.577 and β(depression)=0.499). Predictive relevance is used to examine the model's capability to predict each latent variable or factor. Predictive relevance (Q^2) was calculated by applying blindfolding. Blindfolding with omission distance D=7 results gives $Q^2 = 0.849$ which is greater than 0.5, showing that the model has predictive relevance. Q^2 is also obtained by using cross validated communality (obtained by predicting the questionable blocks using latent variable) (Akter et al., 2011). All construct cross validated communality value is greater than zero which is set threshold. Therefore, results given in the table 1 shows the values of cross validated redundancy and cross validated communality indicating that the model has acceptable predictive relevance.

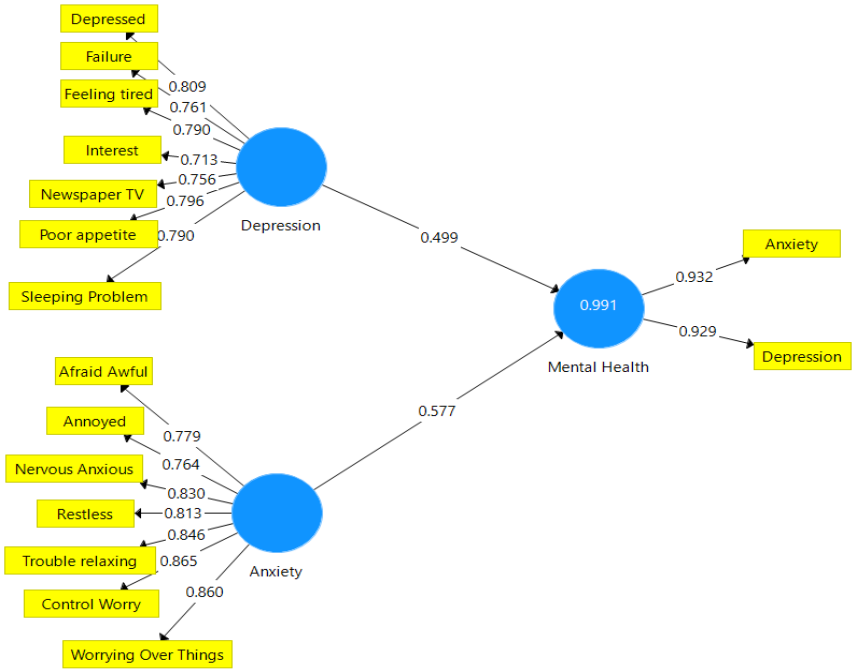

Fig. 2: Structural Model for H1

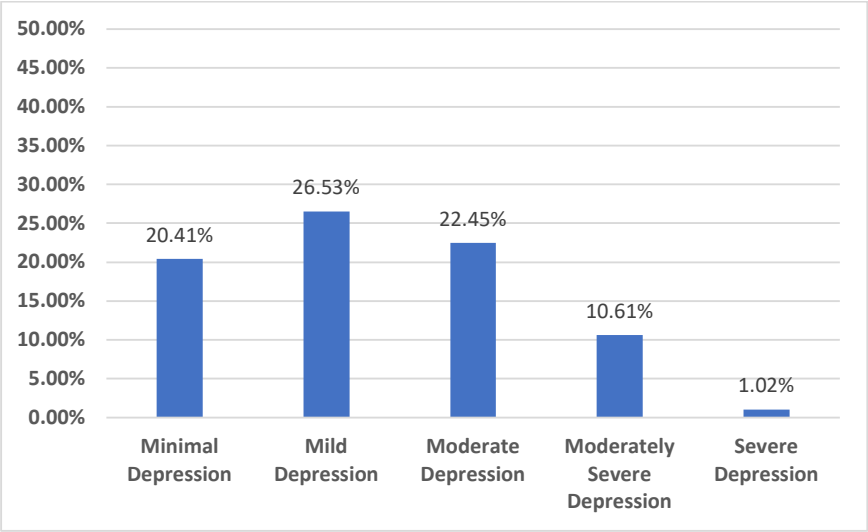

Fig. 3: Percentage of depression levels among respondents

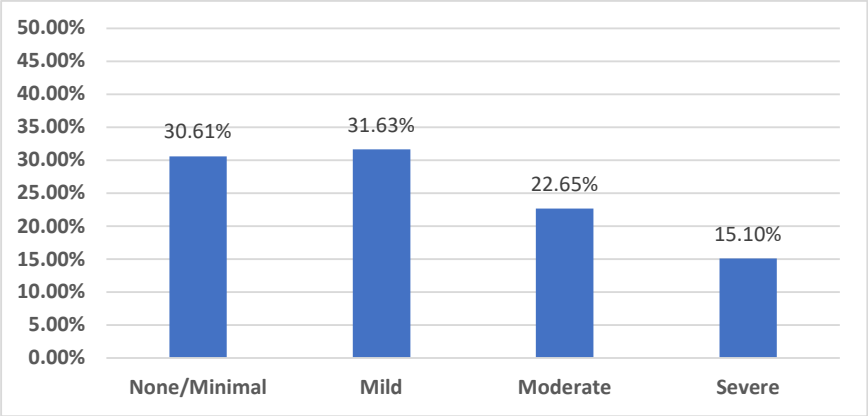

Fig. 4: Percentage of Anxiety Levels among respondents

Table 1: Predictive Relevance -H1

Factors	Construct Cross validated Redundancy			Construct Cross validated Communality		
	SSO	SSE	Q^2(=1-SSE/SSO)	SSO	SSE	Q^2(=1-SSE/SSO)
Anxiety	3409.000	349.000		3409.000	1471.730	0.568
Depression	3409.000	349.000		3409.000	1828.616	0.464
Mental Health	974.000	146.886	0.849	974.000	489.513	0.497

We were also interested to explore whether any known COVID-19 infection in friends and family has any impact on the anxiety and depression. Figure 5 and 6 shows the structural model for H2 (known case in acquaintance Yes and No). After partial square application R2 value for the latent variable mental health (in case of Yes) is found to be 0.989, whereas in case of No 0.991 both of which are substantial values. Initially there were 9 factors which were contributing in the depression while 7 factors were contributing in anxiety. After factor analysis it was found that two factors (Feeling bad about yourself or that you are a failure or have let yourself or your family down and Thoughts that you would be better off dead, or of hurting yourself) were not significantly contributing in the results having values less than 0.7. So, these two factors were removed from the model and PLS was applied again to get the significant model. In anxiety all factors were significantly contributing. Bootstrapping was conducted for the level of path coefficients analysis with about 5000 subsamples. Results shows that there is a significant impact of COVID-19 n mental health of general public whether you know any patient personally ($p<0.01$ where β (anxiety)=0.562 and β(depression)=0.504), or you don't know any ($p<0.01$ where β (anxiety)=0.582 and β(depression)=0.50). Results clearly indicates that there is significant relationship between COVID-19 lockdown and mental wellbeing of people irrespective of personal relationship with corona patient. Bootstrapping also indicates strong value of anxiety than depression. Predictive relevance (Q^2) was calculated by applying blindfolding. Blindfolding with omission distance D=7 results gives $Q^2 = 0.856$ for knowing patient and 0.844 for not knowing patient, both of which are greater than 0.5. Also, cross validated communality values are greater than threshold zero, showing that the model has predictive relevance. Table 2 shows cross validated redundancy and cross validated communality values (Yes case). Table 3-shows cross validated redundancy and cross validated communality values (No case).

Table 2: Predictive Relevance-H2-Yes

Factors	Construct Cross validated Redundancy			Construct Cross validated Communality		
	SSO	SSE	Q^2(=1-SSE/SSO)	SSO	SSE	Q^2(=1-SSE/SSO)
Anxiety	931.000	931.000		931.000	331.230	0.644
Depression	931.000	931.000		31.000	473.895	0.491
Mental Health	266.000	38.188	0.856	266.000	130.182	0.511

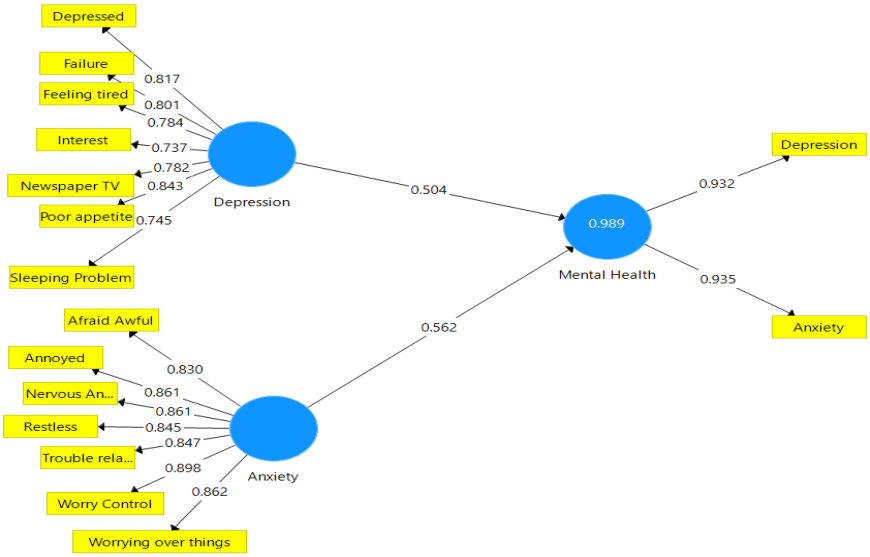

Fig. 5: Structural Model-H2-Yes

For hypothesis 3, we have taken data from Saudi Arabia (strict adherence of lockdown) and Pakistan (lenient adherence of lockdown). Figure 7 and 8 shows structural model for Saudi Arabia and Pakistan respectively. Similar trend can be seen, after partial square application R2 value for the latent variable mental health (KSA and Pakistan) is found to be 0.996 and 0.984 which are both substantial values. In both cases, initially there were 9 factors which were contributing in the depression while 7 factors were contributing in anxiety. After factor analysis it was found that two factors (Feeling bad about yourself or that you are a failure or have let yourself or your family down and Thoughts that you would be better off dead, or of hurting yourself) were not significantly contributing in the results having values less than 0.7. So, these two factors were removed from the model and PLS was applied again to get the significant model. In anxiety all factors were significantly contributing. Bootstrapping was conducted for the level of path coefficients analysis with about 5000 subsamples. Results shows that there is a significant impact of COVID-19 lockdown on mental health of general public in Saudi Arabia ($p<0.01$ where β (anxiety)=0.543 and β(depression)=0.53), while for Pakistan similar trend can be seen ($p<0.01$ where β (anxiety)=0.604 and β(depression)=0.453). Results clearly indicates that there is significant relationship between COVID-19 lockdown and mental wellbeing of people irrespective of adherence for lockdown in both countries. Bootstrapping also indicates that in both Saudi Arabia and Pakistan, People are more anxious than depressed having values (%age) (SA= anxiety= 64.83, depression= 56.06, Pakistan= anxiety= 43.31, depression= 31.31). Predictive relevance (Q^2) was calculated by applying blindfolding. Blindfolding with omission distance D=7 results gives Q^2 = 0.869 for Pakistan

and 0.851 for Saudi Arabia which are greater than 0.5. Table 4 shows the cross validated redundancy for KSA and Pakistan respectively.

Table 3: Predictive Relevance-H2-No

Factors	Construct Cross validated Redundancy			Construct Cross validated Communality		
	SSO	SSE	Q^2(=1-SSE/SSO)	SSO	SSE	Q^2(=1-SSE/SSO)
Anxiety	2478.000	2478.000		2478.000	1160.931	0.532
Depression	2478.000	2478.000		2478.000	1364.025	0.450
Mental Health	708.000	110.658	0.844	708.000	364.230	0.486

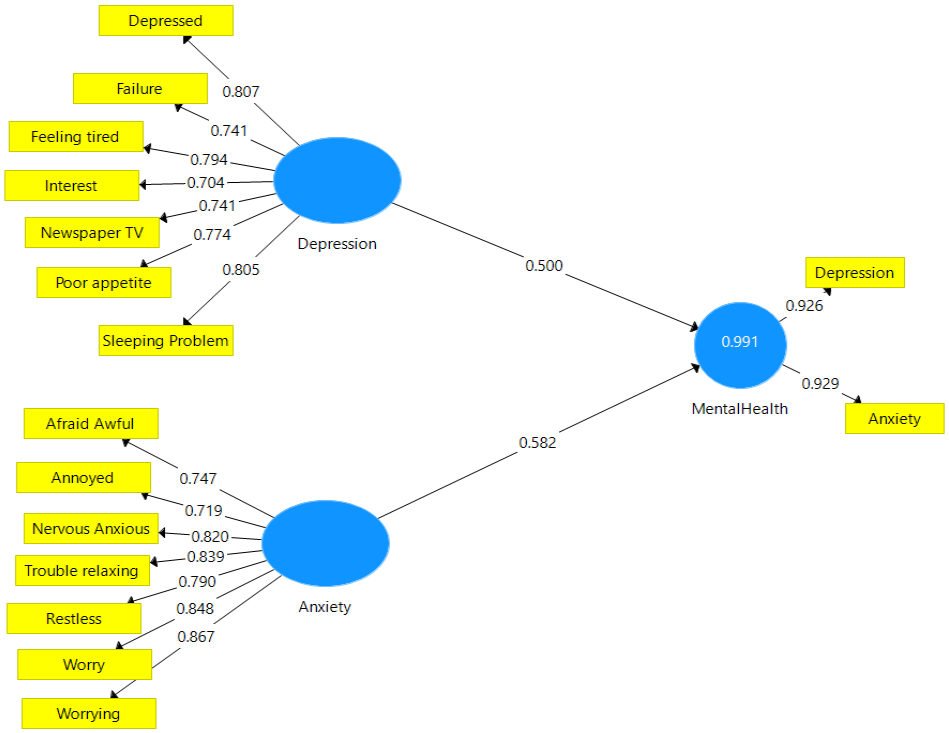

Fig. 6: Structural Model-H2-No

Table 4: Predictive Relevance (Cross Validated Redundancy)-H3

Factors	Construct Cross validated Redundancy KSA			Construct Cross validated Redundancy Pakistan		
	SSO	SSE	Q^2(=1-SSE/SSO)	SSO	SSE	Q^2(=1-SSE/SSO)
Anxiety	1435.000	1435.000		1323.000	1323.000	
Depression	1640.000	1640.000		1134.000	1134.000	
Mental Health	410.000	60.703	0.852	378.000	49.329	0.869

Table 5 shows the cross validated communality for KSA and Pakistan respectively. Therefore, results given in both tables shows the values of cross validated redundancy (>0.5) and cross validated communality (>0) indicating that the model has acceptable predictive relevance. Figure 9 shows structural model for Hypothesis 4. Similar trend can be seen, after partial square application R2 value for the latent variable mental health is found to be 0.986 which is substantial value. Initially there were 9 factors which were contributing in the depression while 7 factors were contributing in anxiety. After factor analysis it was found that two factors (Feeling bad about yourself or that you are a failure or have let yourself or your family down and Thoughts that you would be better off dead, or of hurting yourself) were not significantly contributing in the results having values less than 0.7. So, these two factors were removed from the model and PLS was applied again to get the significant model. In anxiety all factors were significantly contributing. Bootstrapping was conducted for the level of path coefficients analysis with about 5000 subsamples. Results shows that Gender, Marital status and education have significant psychological impact on mental health of general public ($p<0.01$). Bootstrapping also indicate strong values for depression =5.106 (Figure 10). Predictive relevance (Q^2) was calculated by applying blindfolding. Blindfolding with omission distance D=7 results gives Q^2 = 0.846 which are greater than 0.5. Similarly, cross validated redundancy has values greater than threshold 0, therefore indicating that that the model has predictive relevance (Table 6).

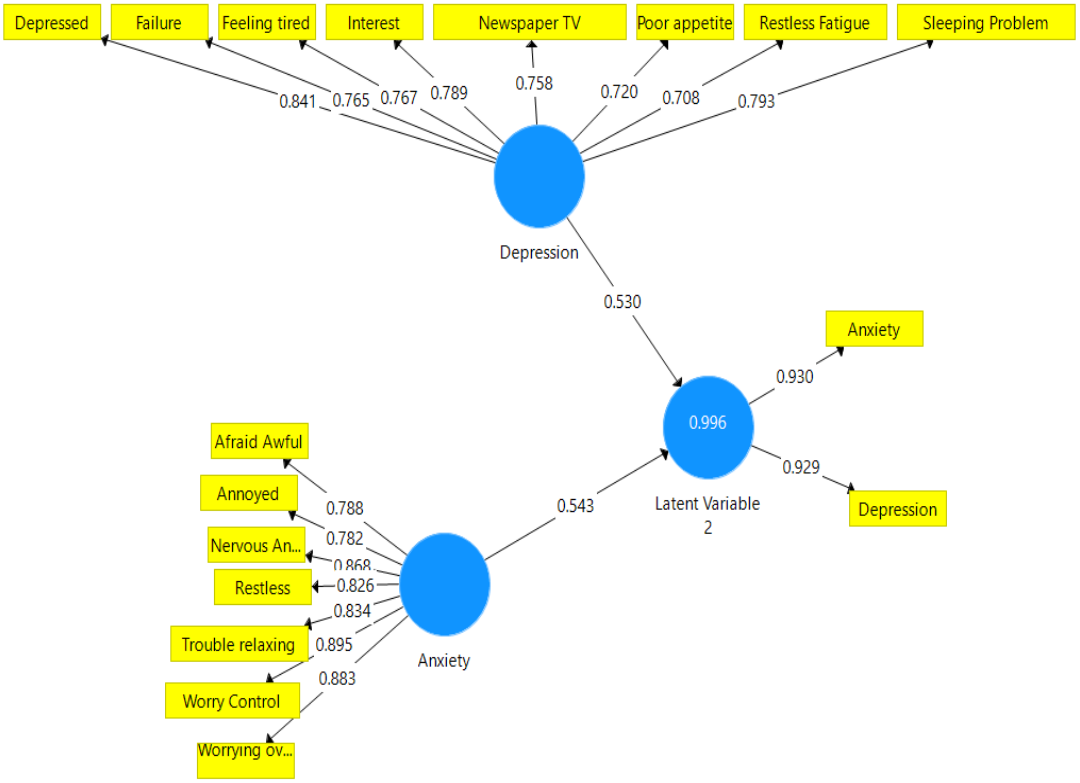

Fig. 7: Structural Model-H3-Saudi Arabia

Table 5: Predictive Relevance (Cross Validated Communality)-H3

Factors	Construct Cross validated Communality KSA			Construct Cross validated Communality Pakistan		
	SSO	SSE	Q^2(=1-SSE/SSO)	SSO	SSE	Q^2(=1-SSE/SSO)
Anxiety	1435.000	565.623	0.606	1323.000	652.839	0.507
Depression	1640.000	873.837	0.467	1134.000	640.419	0.435
Mental Health	410.000	207.478	0.494	378.000	168.763	0.554

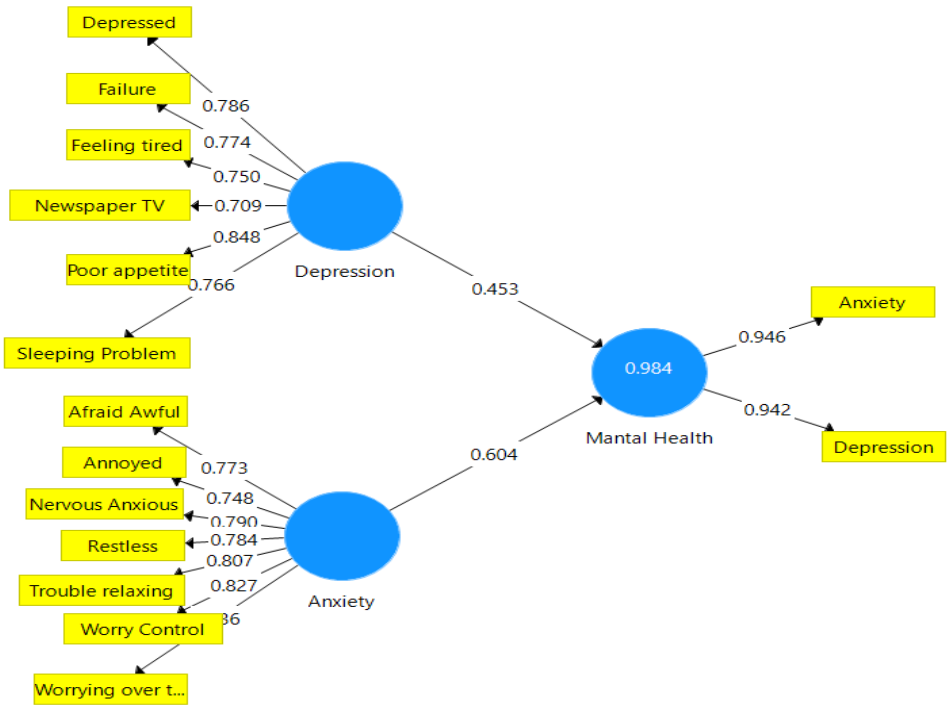

Fig. 8: Structural Model-H3-Pakistan

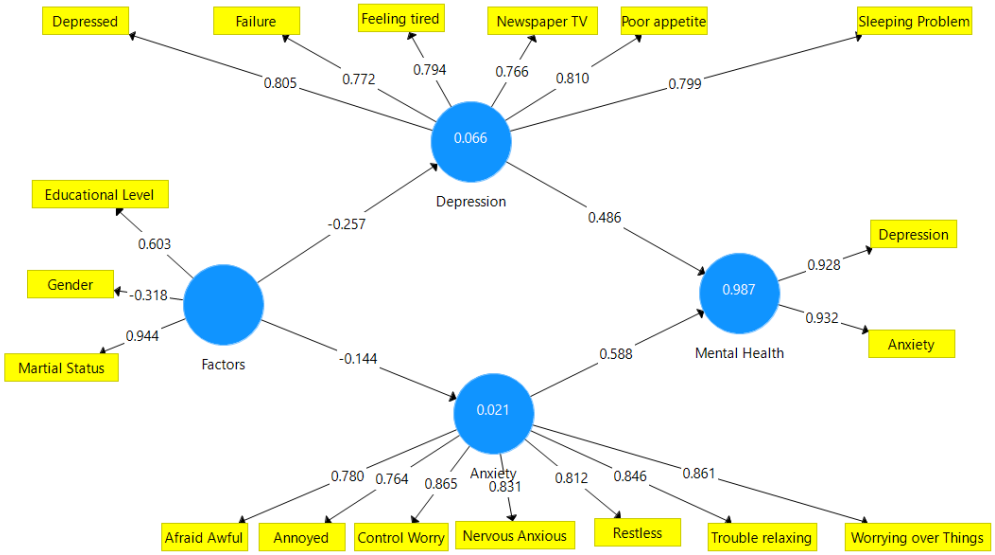

Fig. 9: Structural Model-H4

Table 6: Predictive Relevance-H4

Factors	**Construct Cross validated Redundancy**			**Construct Cross validated Communality**		
	SSO	**SSE**	**Q^2(=1-SSE/SSO)**	**SSO**	**SSE**	**Q^2(=1-SSE/SSO)**
Anxiety	3409.000	3362.168	0.014	3409.000	1471.868	0.568
Depression	2922.000	2804.294	0.040	2922.000	1541.303	0.473
Factors	1461.000	1461.000		1461.000	1360.871	0.069
Mental Health	974.000	150.231	0.846	974.000	489.517	0.497

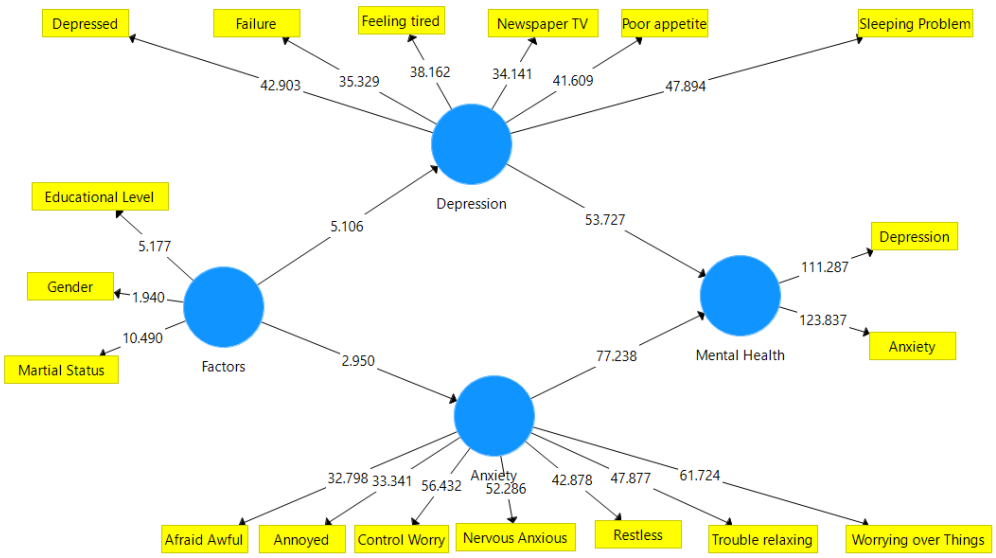

Fig. 10: H4- Bootstrap

Figure 10 shows structural model for Hypothesis 5. Similar trend can be seen, after partial square application R2 value for the latent variable Impact on Personal and professional life is found to be 0.408 which is substantial value. We have taken two factors anxiety and depression to see the impact on personal and professional life which has three factors (Do work, get along with people and do things at home). Bootstrapping was conducted for the level of path coefficients analysis with about 5000 subsamples. Results shows that COVID-19 lockdown resulted anxiety and depression negatively affected work and personal life. ($p<0.01$). Bootstrapping also indicate that work is most negatively affected having value 63.13 as compared to do things at home (34.18) and get along with people (27.97) being least. Predictive relevance (Q^2) was calculated by applying blindfolding. Blindfolding with omission distance D=7 results gives Q2 = 0.846 (Mental Health) which are greater than 0.5, showing that the model has predictive relevance, while Q^2= 0.26(Personal and Professional Impact) which indicated relatively weak relevance. While Q^2 value in case of cross validated communality is greater than 0 in each case. Table 7 shows cross validated redundancy and cross validated communality values for H5.

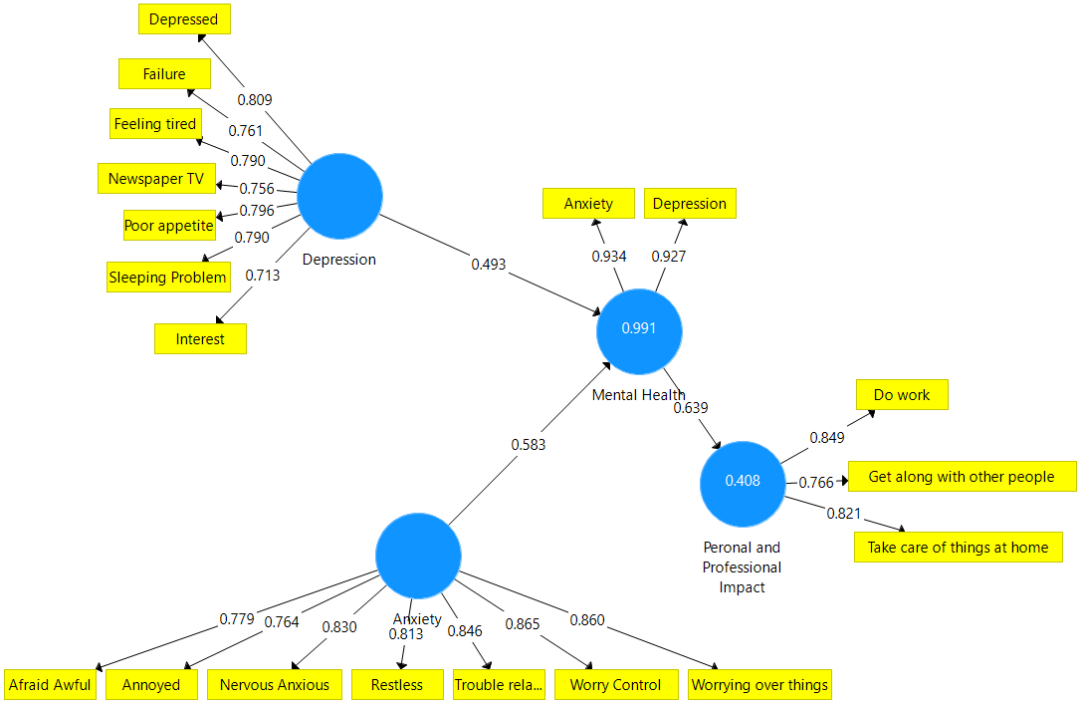

Fig. 11: Structural Model-H5

Table 7: Predictive Relevance-H5

Factors	**Construct Cross validated Redundancy**			**Construct Cross validated Communality**		
	SSO	**SSE**	**Q^2(=1-SSE/SSO)**	**SSO**	**SSE**	**Q^2(=1-SSE/SSO)**
Anxiety	3409.000	3409.000		3409.000	1472.686	0.568
Depression	3409.000	3409.000		3409.000	1827.469	0.464
Personal and Professional Impact	1461.000	1079.050	0.261	974.000	489.539	0.497
Mental Health	974.000	146.641	0.849	1461.000	988.244	0.324

Discussion

Based on the analysis result three of our hypotheses have been supported by data whereas H3 and H4 are not support by data given in table 8.

Table 8: Hypothesis Results

Hypothesis	Result
H1: COVID-19 lockdown has significant impact on mental health of public.	Supported
H2: Personally, knowing a corona patient (like relative, family member) increases the anxiety and depression?	Not Supported
H3: The strict/lenient adherence of lockdown is insignificant to mental wellbeing.	Not Supported
H4: Gender, Marital status and education have significant psychological impact on people?	Supported
H5: COVID-19 lockdown resulted anxiety and depression negatively affected work and personal life.	Supported

Mazza et al., (2020) (Mazza et al., 2020) highlighted that stressed is elevated to people who have some infected patient in their family but in our case, we did not observe this finding. The stress in both groups remained same whether they have someone infected in their acquaintance or not. Colizzi et al., (2020) (Colizzi et al., 2020) and Nasser et al., (2020) (Naser et al., 2020) found that women have more depression and anxiety compared to men, this trend was found in our study as well. In their early work in China, Kang et al. (2020) (Kang et al., 2020) highlighted that majority of the health workers experience mild disturbance and our study supports that similar trend is observed across the public, as majority of respondents in our survey were also in that category. More specific analysis of the data indicates interesting insights. As far as depression is concerned among (1.02% of population) having severe depression, females (62.5%) are more prone to severe depression. To our surprise most of them were between age 18-29 and were university students. Opposite pattern can be seen in people having moderately severe depression. Majority of male (58%) are having moderately severe depression. Most of them are between age of 18-29, single and are university students. No evidence of having severe and moderate severe depression was found in people of age more than 50. In case of anxiety, 15.22% of total participants suffer from severe anxiety. Analysis indicates that majority of them having severe anxiety are female (57%). Again, most of them are single, between age of 18-29 and are university students. Another trait that is common between people having severe anxiety and severe depression is that almost all of them are worried about getting infected with virus or transmit it to family members.

Conclusion

COVID-19 and its adverse effects have brought major changes in national and international behavior patterns and closure of daily functioning. Curfew, lockdown, and self-imposed quarantine have been observed all over the world. COVID-19 has drastic effect on both physical and mental wellbeing of population of almost every country. Our study highlights the empirical results from Pakistan and Saudi Arabia, which are in line with other studies conducted in other geographical regions. There is enormous potential in technological systems to support people in such difficult times and situations (Farooqui et al., 2019)(Elhussein et al., 2018). However, there is a need for in depth user studies to formulate user requirements to appropriately design technological solutions(Saeed et al., 2016)(Saeed et al., 2014). Such systems then need to be rolled out in practice to evaluate their effectiveness. In future, we intend to conduct detailed qualitative studies to deeply understand the requirements for psychological support systems supporting end users and develop guidelines for the governments and practitioners to support the public in such crisis situations in the future. Furthermore, based on these requirements we intend to design prototypes for online psychological support of public in pandemic situations.

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Effect of Employee Well-Being on Turnover Intention of Millennial Employees

Ilham Caesara EKHANANDA

Faculty of Economics and Business, Universitas Indonesia, Jakarta, Indonesia,
ilham.caesara81@ui.ac.id

Fanny MARTDIANTY

Faculty of Economics and Business, Universitas Indonesia, Jakarta, Indonesia,
fanny.martdianty@ui.ac.id

Ayu APRILIANTI

Faculty of Economics and Business, Universitas Indonesia, Jakarta, Indonesia
aprilianti@ui.ac.id

Abstract

The purpose of this paper is to study the effect of the four types of employee well-being based on the circumplex model: work engagement, job satisfaction, burnout, and workaholism, to turnover intention. This study also explored the role of religiosity in turnover intention. The study involved a survey of 300 millennial employees in Jakarta, Indonesia. The data were analyzed using a moderated regression model using AMOS 23.0 software. The results suggested that burnout and workaholism were positively and significantly affect turnover intention. However, there was no significant effect found on work engagement and job satisfaction on turnover intention and the mediating role of religiosity. This study also showed that employee well-being significantly affects the turnover intention of millennial employees. It implied that organizations should concern about their employee well-being and ensure to lessen their burnout and avoid them to become workaholics to minimize the turnover intention.

Keywords: Employee Well-Being, Turnover Intention, Religiosity

Introduction

Turnover is one of the topics of concern to many researchers and practitioners in the field of human resources management as turnover influences the functioning of an organization. The researchers found that turnover can interfere with various productivity-related results and have an impact on overall company financial performance (Park & Shaw, 2013). Voluntary turnover is often surprising and cannot be managed by organizations (Shaw et al., 1998) so voluntary turnover tends to be negatively related to organizational performance. Various other studies later found that turnover intention was the strongest antecedent of voluntary turnover (Hom et.al., 2017). If turnover data is not known, then the turnover intention is considered as the best predictor to represent it.

A meta-analysis study of predictors of turnover intention in social workers found that stress, burnout, and job satisfaction were predictors with high effect sizes, and well-being was the strongest predictor among other demographic predictors (Kim & Kao, 2014). Employee well-being is an important determinant of organizational growth. Various studies have shown that high levels of employee well-being reduce employee turnover rates and increase employee performance (Ilies, Aw, & Pluut, 2015).

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Even though there is quite a lot of research has been done to look at aspects of well-being in workers separately such as job satisfaction and burnout, there is not much research on interdependent constructs well-being. Bakker & Oerlemans (2011) then apply a model of interdependent constructs of well-being from Russell (1980) to the specific context at work. There are four types of employee well-being that can be included in this model, namely work engagement, job satisfaction, burnout, and workaholism.

The effect of interdependent constructs of employee well-being on turnover intention has been investigated before (Wu, Rafiq, & Chin, 2017). The study showed that there are relationships between two interdependent constructs of employee well-being namely work engagement and life satisfaction to turnover intention. The study also found the influence of moderation of religiosity on Muslims as the subject of his research or Muslim religious beliefs. The finding of religiosity showed that religious belief rooted in people's unconscious shared values and norms and affect their daily life, including at work.

This paper selected millennial employees in Jakarta as a study context, as a study showed that millennial employees in Indonesia are identical with high employee turnover (Deloitte Indonesia, 2019). Based on the report, the average industry turnover is currently above 10%. Millennial is a population born between 1980-2000 and by 2020, they will be in the age of 20-40 years. Thus, millennial is at the most productive age to contribute to the world of work and the economy. The high rate of millennial employee turnover could be associated with several millennial characteristics. Studies suggest that millennial are independent, tech-savvy, have a high entrepreneurial spirit, need continuous feedback always wants new responsibilities, has a low tolerance for boredom, requires work-life balance, a comfortable work environment, flexible work and working hours, and does not like working overtime (Martin, 2005; Pinzaru, et.al., 2016; Smith & Nichols, 2015).

The primary theoretical contribution of this study is to propose a model that characterizes the relationships of interdependent constructs of employee well-being based on the circumplex model with turnover intention from a new angle by incorporating religiosity. In addition, as millennials will be the major representation of the workforce in the years to come, it is important for management to understand them and prevent the negative effect of turnover intention.

Literature Review

Employee Turnover and Turnover Intention

Employee turnover refers to employees who leave their organization and are replaced by new employees (Li, Sawhney, & Tortorella, 2019). Employee turnover can be divided into two, voluntary turnover that reflects an employee's decision to leave an organization and involuntary turnover that reflects an employer's decision to terminate employment (Shaw et.al., 1998). Voluntary turnover is the most common form of turnover to be studied (Hom et al., 2017) because voluntary turnover tends to be negatively related to organizational performance. Various studies found that turnover intention was the strongest antecedent of voluntary turnover (Hom et.al., 2017). If turnover data is not known, then the turnover intention is considered as the best predictor to represent it.

Turnover intention can be described as the intention of individual behavior consciously and deliberately to leave the organization that employs it (Bothma & Roodt, 2013). Turnover intention is considered as the last step in the decision-making process before someone actually leaves the workplace. A meta-analysis study of predictors of turnover intention in social workers in the United States found that there were four predictors that had a high effect size, namely stress, burnout, job satisfaction, and organizational commitment (Kim & Kao, 2014). In the same study, well-being was found to be the strongest predictor among other demographic predictors. Previously, there was not much research on interdependent constructs of well-being on turnover intention, although quite a lot of research was done to look at aspects of well-being in the work world separately such as job satisfaction and burnout (Scanlan, Meredith, & Poulsen, 2013).

In the well-being approach, there is a circumplex model of affect that shows that well-being varies on two axes, namely pleasure, and activation or arousal (Russell, 1980). Bakker & Oerlemans (2011) then apply this model to the specific context at work. There are four types of employee well-being that can be included in this model, namely work engagement, job satisfaction, burnout, and workaholism. The four types of employee well-being have characteristics according to their quadrants. Work engagement has a high level of pleasure and activation. Job satisfaction has a high level of pleasure and low activation. Burnout features a low level of pleasure and activation. Meanwhile, workaholism has a low level of pleasure and high activation.

Work Engagement and Turnover Intention

Work engagement is defined as a positive state of mind related to work (Schaufeli & Bakker, 2003). It refers to affective states that are more persistent and settled. In general, high work engagement will be reflected in the positive behavior of employees. This work engagement is characterized by vigor, dedication, and absorption (Schaufeli & Bakker, 2003). Vigor is characterized by a high level of energy and mental endurance at work and willingness to give full effort when working. Dedication refers to deep involvement in work and feeling enthusiastic, inspired, proud, and challenged. Absorption, characterized by being fully concentrated and dissolved in work, where time passes quickly so reluctant to break away from work. Various studies have shown that high work engagement is associated with a decrease in turnover intention (du Plooy & Roodt, 2010; Gupta & Shaheen, 2017).

H1. Work engagement has a negative effect on the turnover intention for millennial employees in Jakarta.

Job Satisfaction and Turnover Intention

Job satisfaction is a positive feeling of employees towards their work (Brayfield & Rothe, 1951). Other definitions mention job satisfaction as the extent to which employees have a positive affective orientation towards the work given by the organization (Price & Mueller, 1986). Over the past twenty years, a lot of research has been done to develop a voluntary turnover prediction model, with job satisfaction being one of the most common antecedents (Tett & Meyer, 2006). Employees who have high job satisfaction, have satisfaction with their work, and do not feel burdened with their work. Several studies found a negative effect of job satisfaction on turnover intention (O'Connor, 2018; Kim & Kao, 2014).

H2. Job satisfaction has a negative effect on the turnover intention for millennial employees in Jakarta

Burnout and Turnover Intention

Burnout is a syndrome of emotional exhaustion and cynicism that often occurs among working individuals (Maslach & Jackson, 1981). Burnout has three main aspects, namely increasing feelings of emotional exhaustion, developing negative and cynical attitudes and feelings towards works, and a tendency to evaluate themselves negatively. Various studies have found that overall burnout as well as its three dimensions namely cynicism, emotional exhaustion, and professional efficacy have an influence on turnover intention (Jung & Kim, 2012). The dimensions of emotional exhaustion and cynicism have a positive effect on turnover intention while the professional efficacy dimension has a negative effect on turnover intention. While in several other studies it was found that only two dimensions of burnout namely cynicism and emotional exhaustion were significant predictors of turnover intention (Lee & Ashforth, 1996; Liu & Lo, 2017)

H3. Burnout has a positive effect on the turnover intention for millennial employees in Jakarta.

Workaholism and Turnover Intention

Workaholism is defined as a strong inner drive to work too hard and become obsessed with work (Schaufeli, Taris, & Rhenen, 2008). There are three general characteristics of workaholics (Scott, Moore, & Miceli, 1997). First, workaholics spend a lot of time on work activities when given the freedom to do so. Second, workaholics are reluctant to break away from work and they constantly think about work when they are not working. Third, they work hard beyond their organizational or economic needs. Some researchers suggest that workaholics are very productive workers, but there are studies that show the opposite (Taris, Schaufeli, & Shimazu, 2010). A study showed that workaholism also has a positive relationship with turnover intention because they do not feel that their work is a pleasant thing (van Beek et.al., 2014).

H4. Workaholism has a positive effect on the turnover intention of millennial employees in Jakarta.

Religiosity and Turnover Intention

Religiosity is considered difficult to measure because there are various definitions and there are no experts who can capture the meaning of the term as a whole (Scutte & Hosch, 1996). Existing definitions of religiosity use a sociological approach, rather than psychological concepts (Huber & Huber, 2012). Huber (2003, in Huber, Huber, & Allemand, 2011) states that religiosity is the construct of the religious system in individuals who are part of the personal construct system. Huber and Huber (2012) propose the division of the dimension of religiosity into five dimensions. The dimensions are the intellectual dimension, the ideological dimension, public practice, private practice, and religious experience.

Religiosity has positive impacts on work-related outcomes such as better job performance (Osman-Gani et al., 2013) and lower turnover intention (Beehner & Blackwell, 2016; Wu, Rafiq, & Chin, 2017). Specifically, Wu, Rafiq & Chin (2017) found that religiosity moderates the negative relationship between two markers of employee well-being namely work engagement and life satisfaction, with employee turnover intention.

H5. Religiosity moderates the negative relationship between work engagement and turnover intention in millennial employees in Jakarta.

Based on the hypotheses above, the research model can be depicted in figure 1.

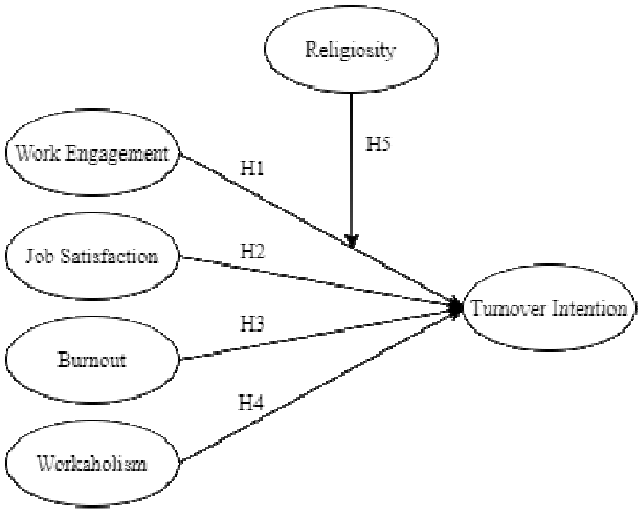

Figure 1: Research Model

Methods

Participants and Procedures

In this study, data collection was carried out using the primary survey method using a questionnaire. Questionnaires were administered through social media and instant messages. Participants were millennial employees ranging in age from 20 to 40 years in 2020, or who were born between 1980 and 2000, with a minimum one year of permanent employee status on a company in Jakarta, Indonesia. For ensuring that all the participants meet the characteristics, we asked screening questions to the participants and also asked them to report their relevant demographic information. The data were collected over a period of two months. Before testing the relationships among constructs, the authors used the Mahalanobis Distance, Cook's Distance, and Leverage Point methods to detect outlier data in SPSS 25. Hypothesis testing was tested using structural equation modeling with AMOS 23.0.

Measures

To measure the constructs, this study used previously validated items. A five-point Likert-type scale was used for all items, with the exception of demographic items. Work engagement was measured with the nine-item scale based on the shortened version of the Utrecht Work Engagement Scale or the UWES-9 (Schaufeli et al., 2006). Job satisfaction was measured with the 20-item scale based on the Minnesota Satisfaction Questionnaire - Short Form (MSQ-SF) developed by Weiss, et.al (1967). Burnout was measured with Maslach's Burnout Inventory - General Survey (MBI-GS), developed by Schaufeli et al., (1996). This research only used two-dimensions from this scale, emotional exhaustion, and cynicism. Workaholism was measured with a ten-item scale based on Dutch Work Addiction Scale or DUWAS (Taris & Schaufeli, 2003). Religiosity was measured with a 15-item scale Centrality of Religiosity Scale (CRS) developed by Huber (2003, in Huber & Huber, 2012). The turnover intention was measured with the six-item scale based on the shortened version of the Turnover Intention Scale or the TIS-6 (Bothma & Roddt, 2013).

Result

In this study, a total of 354 responses were retrieved by the cut-off date for data collection. Sixteen responses were eliminated due to participants did not meet the characteristics needed. Out of the 338 respondents, 214 participants (63.3 percent) are females. The majority of respondents work in private companies, with a percentage of 75.7 percent or a total of 256 respondents. Based on religion, the majority of respondents stated that they embraced Islam with 78.99 percent of respondents. From these 338 respondents, there were 38 responses that counted as outliers and therefore were taken off from data analysis.

Table 1: AVE and CR for each variable

Variables	AVE	CR
Job Satisfaction	0,429	0,84
Work Engagement	0,956	0,977
Burnout	0,777	0,874
Workaholism	0,49	0,657
Religiosity	0,743	0,919
Turnover Intention	0,653	0,79

The measurement model was evaluated through confirmatory factor analysis (CFA) to test the validity and reliability of the constructs. Validity can be seen from the value of the loading factor (standardized loading) and the reliability can be seen from the value of composite reliability (CR) and average variance extracted (AVE) (see table 1). A re-estimation was made on the model after being reduced to produce a valid indicator, that have values of the standardized loading factor for each

indicator are greater than 0.6. Then, the reliability test was performed using AVE and CR. The CR values of all latent variables are more than 0.7, and the AVE values of all variables except job satisfaction and workaholism were greater than 0.5. Fornell & Larcker (1981) argues that if AVE values are below the minimum standard of 0.5 but CR values still meet the minimum threshold, then the construct is considered to have sufficient reliability or convergent validity.

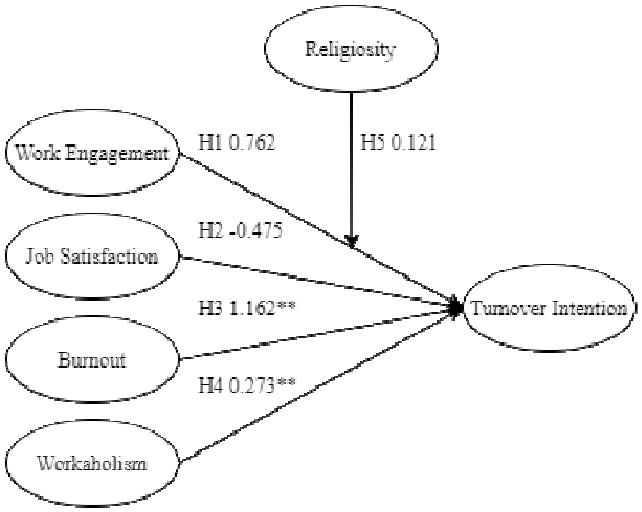

Figure 2: Hypothesis Testing

***significant at 5%*

Figure 2 showed the results of the hypothesis testing. In terms of *H1* and *H2*, we expected that work engagement and job satisfaction would negatively affect turnover intention in a millennial employee in Jakarta. However, this study suggested that there was no significant negative effect of work engagement on turnover intention ($p>0.05$) and job satisfaction to turnover intention ($p>0.05$). Therefore, *H1* and *H2* were not accepted.

This study found that burnout was positively and significantly affect turnover intention ($\beta=1.162$, $p<0.05$). Therefore, *H3* was accepted. In addition, workaholism also positively and significantly affect turnover intention. ($\beta=0.273$, $p<0.05$). Thus, *H4* was accepted.

The moderated regression analysis showed that there was no moderation effect of religiosity to work engagement and turnover intention relationship ($p>0.05$). Therefore, the *H5* was not accepted.

Table 2: Hypothesis Test Result

Hypothesis	Variables	Estimate	S.E.	P-value	Result
H1	Work Engagement → Turnover Intention	0.762	0.632	0.229	Not Significant
H2	Job Satisfaction → Turnover Intention	-0.475	0.286	0.098*	Not Significant
H3	Burnout → Turnover Intention	1.162	0.388	0.003**	Significant
H4	Workaholism → Turnover Intention	0.273	0.122	0.025**	Significant
H5	Work Engagement*Religiosity → Turnover Intention	0.121	0.207	0.559	Not Significant

*Note: **: Significant at 5%, *: Significant at 10%*

Discussion

Based on the results of this study, there are findings that support the theory of employee well-being and turnover intention in millennials, but there are also findings that do not support previous studies. This study suggests that there is a positive direct effect of burnout on the turnover intention of millennial employees in DKI Jakarta. These findings are in line with previous studies which also found a positive effect of burnout on turnover intention (du Ploy & Roodt, 2010; Liu & Lo, 2017). This shows that the higher the millennial employees feel burnout, the higher the employee's intention to do voluntary turnover. This research also shows that sometimes millennial employees feel emotionally exhausted, but rarely think that the work is not important

The results of this study also indicate a positive direct effect of workaholism on the turnover intention of millennial employees in DKI Jakarta. Previous research on workaholism showed inconsistent results. The results of this study support research which states that workaholism has a positive effect on turnover intention (van Beek et al., 2012). This shows that employees who are workaholic and obsessed with their work is prone to have the intention to leave their jobs. In addition, millennial employees often do two or three things at once, such as lunch while writing memos and talking on the phone.

It was found that work engagement had no negative effect on the turnover intention on Y generation employees in DKI Jakarta. The results of this study did not support various studies that found a negative influence of work engagement on turnover intention (du Plooy & Roodt, 2010; Gupta & Shaheen, 2017). Previous studies have shown that employees who have an engagement in their work will have a low intention for turnover. The contrary results of this study may be influenced by the characteristics of millennial employees who constantly want new responsibilities, feel bored easily. and prefers to meet new people and new opportunities (Martin, 2005; Pinzaru, et. al., 2016). These characteristics can indicate that the intention of millennial employees to change jobs can be caused by wanting to find a new atmosphere regardless of the positive state of mind for a job.

The results of this study also showed that job satisfaction did not have a negative effect on the turnover intention for millennial employees in DKI Jakarta. This is not in line with several studies that found the negative influence of job satisfaction on turnover intention (O'Connor, 2018; Kim & Kao, 2014). This result can also be caused by the condition of PSBB in DKI Jakarta due to the Covid-19 pandemic. This condition can affect the condition of employee well-being and the intention of employees to do voluntary turnover. This is shown in the employee's answers regarding turnover intention. Specifically, millennial employees often wish to find other work that better suits their personal needs and consider leaving their job. However, they rarely think that their current work does not provide satisfaction for their personal needs. This shows that although they consider their work has satisfied their personal needs, millennial employees often wish to leave their current jobs.

This study also did not find the moderator role of the religiosity variable on the effect of work engagement on turnover intention. This result does not support the study of Wu, Rafiq, & Chin (2017) who found that religiosity moderates the effect of work engagement on turnover intention. This result can be caused by the diversity of the work field of the companies in this study. Contrary to the study of Wu, Rafiq, & Chin (2017), a study conducted on Bank employees in Pakistan, found the positive influence of religiosity on turnover intention (Zafar et al., 2012). The research found that the higher a person's religiosity, in this case, Islamic religiosity, the more likely the individual is to intend to get out of his place of work, which is a bank. This can be caused by the characteristics of banks that have a riba system which is prohibited in Islam. Thus, the field of work can also influence the direction of the influence of religiosity on turnover intention.

Practical Implications

The implications of this study are related to the important role of employee well-being in managing employee’s turnover intention. Employees who have high emotional exhaustion and feel cynical about the work have a vulnerability to make a turnover. In addition, employees who work too hard

when they are not happy about what they do are also vulnerable to turnover. In this study, many employees often feel tired at the end of the day after work, but they rarely feel that their work is not important. Therefore, managers can make programs to reduce the exhaustion at the end of the day. One program that can be done is to include the value of work-life balance in company culture. The value of work-life balance can be applied through routine programs, company regulations and appeal from managerial.

Limitation and Suggestions

This study has several limitations. First, this study did not explore much about the relation between the four constructs of employee well-being based on the circumplex model, because this study focused on the influence of the four constructs on turnover intention. Therefore, research on interdependent constructs of employee well-being needs to be carried out further and more deeply, such as to look at the relationship between the employee well-being constructs and their relationship with various job outcomes such as job performance, turnover intention, and so on.

Second, the study of religiosity in the workplace is still limited. In this study, researchers only focused on the role of religiosity on the relationship of work engagement and turnover intention in accordance with the results of previous studies. Therefore, more studies about religiosity in the workplace need to be done, as religiosity can affect individual values and attitudes. In addition, future studies of religiosity should focus on a certain field of work. Based on previous research, differences in the company's work field can influence the direction of the influence of religiosity on turnover intention.

This study has a focus on millennial, born in 1980 to 2000, in DKI Jakarta as research respondents. For more elaborate studies about millennials, future studies can conduct comparative research to see the difference between employee well-being and turnover intention in the millennial generation and other generations. Further research can also be carried out with a specific sector of work to have more similar characteristics on participants. The use of secondary data can also be considered in future research.

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Digital Transformation of The Procedure of Admission to Russian Universities

Alexey Ivanovich PYKHTIN, Oleg Victorovich OVCHINKIN, Vladislav Vladimirovich FURSOV and Irina Victorovna SHCHIGOLEVA

Southwest State University, Kursk, Russia

Abstract

The article deals with the problems faced by university applicants and universities in modern conditions in the framework of the admission campaign: the complexity and opacity of the admission procedure, the risks of incorrect submission of consent to enrolment by applicants, the restriction on the number of universities and majors chosen by incoming applicants, the lack of the system of priorities for selected areas of training, the need for decision-making by applicants in the conditions of time pressure and uncertainty. The article proposes three approaches to the digital transformation of the procedure of admission to universities: a conservative one (a version of which is used in the Superservice "Admission to University Online"), an evolutionary one (based on the centralization of competitive selection in all the universities of Russia in the conditions independent of a great deal of target figures of admission), and a revolutionary one (involving conducing nationwide competition for each area of training across the country). A comparative analysis of the advantages and disadvantages of each approach in comparison with the Superservice of the Ministry of science and high education of Russia "Admission to University Online", which is currently being developed, is carried out. It is shown that technical tools and algorithms for implementing any of the approaches have already been created. Financing of the procedure of digital transformation is possible both at the expense of the Ministry of science and high education of Russia and at the expense of the resources saved by universities.

Keywords. Admission procedure, Digital transformation

Introduction

Standardization and strict regulation of the requirements for the university admission process by the regulatory institution (the Ministry of Education and Science of the Russian Federation and Rosobrnadzor) related to the transition to the widespread accounting the results of the Unified State Exam (USE) as entrance examinations in 2009, the stage-by-stage improvement and typification of the legal framework, the development and introduction of a federal information system to ensure the conduct of the state final certification of students and the admission of citizens to educational institutions to get vocational secondary and higher education (FIS GIA (Federal Information System of State Final Examination)) opened the prospects for addressing issues of digital transformation of the process of work with the applicants throughout Russia [1, 2].

In this regard, in 2019, the Ministry of Education and Science of Russia began to implement the ambitious project of Superservice for Admission to University Online [3]. Let us note that similar attempts were carried out by the Ministry of Education of Russia in 2004 [4] and by Rosobrnadzor in 2006 [5], but as a result, both projects did not receive further development. Similar ideas are typical for the states with the systems of national exams similar to the Unified State Exam both in the former Soviet republics and in Asia and Latin America [6, 7, 8].

The resurgence of interest in the topic within the framework of the project of Superservice of the Ministry of Education and Science of Russia is associated with a number of existing problems faced by universities and applicants which could be solved by means of a potential digital transformation of the procedure of admission to Russian universities.

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Materials and Methods

Firstly, the existing admission procedure is complex in its arrangement and opaque to applicants in many situations. Moreover, the existing difficulties arose as a side effect of the increasing role of control over universities by regulatory institutions in an attempt to ensure greater unambiguity and transparency for applicants. In 2009, applicants could apply for admission to an unlimited number of universities for an unlimited number of majors. As a result, the number of applicants increased in universities by at least 2-3 times although totally, approximately the same number of students were enrolled as compared to the pre-reform period. For example, in 2005-2008, approximately 1,700 people applied for 700 full-time state-funded places at the Southwest State University (SWSU), but since 2009 the number of applications increased to 3,000. The Russian Ministry of Education and Science responded to universities' calls concerning a sharp increase in 'idle' work with document processing and limitation of applicant's simultaneous participation in the competition only in 5 universities in 3 areas of training in each. It should be noted that in SWSU, the measures taken did not affect the situation concerning the number of applicants and applications.

From the applicant's viewpoint, this restriction is negative; the same can be said concerning the ban on the use of the priority system by universities, which was replaced with a system of consent to enrolment by the Ministry of Education and Science. The essence of the system of priorities is that an applicant arranges the chosen majors in descending order taking into account his/her interests (the first major in the list is the most preferable, the last one is the least preferable). In this case, university enrolment is also carried out strictly in accordance with the compiled list: if an applicant can be enrolled according to the competition for major 1 then he is enrolled at it, if he does not pass the competition, then he/she is considered in the competition for the 2nd major and so on. The priority system is algorithmized, scaled in the inter-university competitive space, allows universities to abandon the stages ('waves') of enrolment, allows applicants not to perform certain actions in the conditions of limited information and time restriction [9]. The only drawback of the priority system is the possibility that an applicant in his/her application for admission puts his/her preferences incorrectly in the list of majors. According to statistics on admission to SWSU since 2005, on average, about 1 out of 1,000 applicants applied to the admission office with claims that they had not understood how the priority system worked at the time of enrolment.

Secondly, at present, due to the imperfection of the current admission procedure related to the need to submit consent to enrolment by a certain date and time in the conditions of uncertainty, an applicant with a high USE scores may fail to be enrolled to study at the expense of state funds, choosing the university and/or the major incorrectly when submitting the original documents on previous education (only applicants with very high USE scores who are at the top of the ranking lists of applicants can accurately predict the results of their enrolment). In other words, there is a high risk that an applicant, giving his/her consent to enrolment in one of the universities he/she chose for one of the three majors, will not be enrolled to state-funded education at university, despite the fact that with another option of applying for consent to be enrolled (perhaps within the same university), it would be a real option.

Thirdly, since regulatory documents allow applicants to choose no more than 3 majors at no more than 5 universities at one time, applicants have to travel from one university to another many times during the admission campaign; moreover, these universities can be located in different cities of Russia, which cause time and material expenditures. In many cases, an applicant does not have enough time to bring the original documents from one university to another.

Fourth, there are periods during which an applicant is forced to spend time in the admission office or continuously analyze the competitive situation on the university's information services to reduce the risks of losing a potential state-funded place for training. Such key periods include the date and time of the end of the submission of consent to enrolment to the university. The current regulatory framework allows universities to use various options for informing applicants. Many universities seek to ensure maximum transparency and accessibility of information concerning the current competitive situation; at the same time, some educational institutions just fulfill formal requirements and

applicants have to process massive amounts of information from university websites manually to calculate and predict their chances of enrolment.

To overcome the above problems, it is proposed to solve the following tasks: to consider approaches to organizing a centralized competition in Russian universities; propose algorithms for processing applicants' data on a Russian scale; to find sources of financing the implementation of the selected approaches; assess the need for legislative changes; choose a platform to implement the optimal approach.

The first of the existing approaches is a conservative one; it involves modernizing the FIS GIA and admission into a single automated information system for admission to Russian universities, i.e. digitalization, not digital transformation of the current admission regulation. It is this approach that is the basis for the development of the Superservice for Admission to University Online. As part of it, in addition to traditional options for applying for admission to university (personally, by proxy, by courier or by regular mail (Russian Post)), applicants are provided with the service of accepting applications on the Public Services Portal of the Russian Federation (EPGU in Russian) as well as in a network of Multifunctional State (Municipal) Services Centres. Generally, changes in the regulatory framework are not planned, with the exception of certain aspects (replacing the submission of the original document (certificate) on education with electronic consent in the user's personal account in the Superservice, etc.). Competitive selection is carried out separately in each university according to the previously approved admission quotas. The implementation of the approach necessitates digitalization of some related areas of activity: systematization of certificates of disability, sports achievements of Russian citizens, etc. It should be noted that due to the peculiarities of the current regulations concerning admission to universities, the digitalization process in this case can be much more complicated and expensive than digital transformation. One of the 'bottlenecks' is the point in time related to the end of the period when an applicant can give his/her enrolment consent. During these periods, the attendance at the sites of each of the universities in Russia increases several times, so on August 1, 2019, more than 3,000 people visited the SWSU admission office portal, including more than 500 people at 18:00. For comparison, on July 31 and August 2, at the same portal traffic amounted to no more than 1,500 visitors. Thus, implementing a large-scale Russian information system, it is necessary to provide technical capacities that can withstand peak loads. If the regulatory framework is changed, it is possible to implement the system using the existing equipment of the FIS GIA and admission.

The model of the evolutionary approach presupposes that in the period of the application for passing the USE, future applicants indicate a priority list of universities they want to enter and areas of training (majors). The distribution of applicants is carried out according to the previously approved university admission quotas; the competition is held centrally throughout Russia. The approach ensures that an applicant with a sufficient USE score will enter the university he/she is most interested in from the list of his/her priorities.

The revolutionary approach allows applicants to indicate a priority list of areas of training (majors) that they want to be enrolled in during the period of applying for the USE. In this case, the distribution of applicants is carried out in areas of training on a Russian scale without the need to distribute admission quotas among universities; the 'winners' of the competition get the right to study at the expense of budgetary funds.

Research Results and Discussion

Table 1 presents the results of assessment of the advantages and disadvantages of each of the above approaches.

Table 1: Characteristic features of applying different approaches to the admission procedure

Characteristic feature	Superservice	Conservative approach	Evolutionary approach	Revolutionary approach
The need to amend regulations	Insignificant	Insignificant	Significant	Significant
The need to change the mechanism for distributing admission quotas	No	No	No	Yes
Possible technological platform	FIS GIA and admission + Public services	FIS GIA and admission + Public services	FIS GIA and admission + Public services	FIS GIA and admission + Public services
Additional expenditures for the modernization of information systems by universities	Yes	Yes	No	No
Number of actions performed by applicants	Large	Large	Small	Small
Guaranteed admission of the best trained applicants to the state-funded places	No	No	Yes (for universities chosen by applicants)	Yes

It should be noted that algorithms for competition enrolment on a Russian scale already exist and have been tested on a data set equal to the average annual number of applicants (about 1 million people). It was shown [9] that the time spent on calculating the competitive situation on a Russian scale for any of the selected approaches does not exceed several minutes, even if there are no restrictions on the number of universities and majors chosen by applicants. In the case of using Superservice, such information processing must be carried out repeatedly; in case of a conservative approach, it must be carried out before each stage of enrolment; and in other approaches – once a year during the period of organizing the admission.

The systems currently used (primarily, FIS GIA and admission) contain applicants' personal data, their USE results, the number of state-funded / non-state-funded places in universities according to majors, information on winners / prize winners of school olympiads. Modification of the FIS GIA and admission will require taking into account such additional information as the priorities of the universities / majors selected by applicants (the priority system of majors is implemented in the FIS GIA and admission but it is not currently used due to the cancellation of this opportunity in the regulatory framework), data on the availability of privileges for admission to places within the special quota and target quota, data on individual achievements, overall grade point average of the Certificate on secondary education (for admission to secondary vocational education programs). It should be noted that the collection of this information is already provided for in the framework of the Superservice project.

To finance the implementation of this project, resources allocated annually to support the FIS GIA and admission and creation of Superservice can be used. If the FIS GIA and admission replaces the admission campaign block of university information systems, the partial funding can be transferred to universities by saving their funds to support their own or third-party automated information systems and the work of the admission office. In this case, it will be necessary to make changes to the

regulatory framework regarding the implementation of the procedure for admitting citizens to universities. When implementing the revolutionary approach, it will also be necessary to make changes to the procedure for distributing state-funded places among universities.

The possible problems related to the digital transformation of university admission procedures and possible solutions are analyzed in Table 2.

Table 2: Possible problems related to the digital transformation of university admission procedures and their possible solutions

Problem	Solution
Admission within the quota	Quotas are allocated on a Russian scale; a separate competition is held for these quotas
Admission to Master's Degree programs	Introduction of a unified exam for bachelors / entering exam results that do not affect other universities into the general system by universities
Unwillingness of some universities to enrol applicants according to the results of the All-Russian competition / admission to creative training programs (majors)	Conducting additional entrance tests (examinations) in the selected universities (now this procedure is implemented in universities that have the right to conduct additional entrance tests in majors)
Admission of foreign citizens	Admission based on the USE results / entering of exam results that do not affect other universities in the general system by universities
Incorrect major prioritizing by applicants	Active awareness-raising work in schools especially when future applicants choose USE subjects; social advertising campaign
A sharp decline in enrolment in 'low rated' universities	Creation of large scientific and educational centres and university campuses through aggregation / merging / reformation of universities

Now, let us consider the advantages of the proposed approaches to digital transformation of the university admission procedure.

Applicants do not have to visit the university several times in person to apply or submit consent to enrolment, which leads to saving in time and resources for travelling around Russia. An applicant gets a guarantee of enrolment for state-funded education at least in one of the selected universities, if an applicant has enough points according to the results of entrance examinations.

Universities reduce material and labour costs for admission campaigns, that is why they gain the opportunity to strengthen the marketing component.

The Ministry of Education and Science of Russia guarantees the enrolment of the best students to state-funded training programs (majors), gets an opportunity to reduce the load on the FIS GIA and admissions servers on peak days, and acquires a new tool for regulating the number of students, including those who apply for education on a non-state-funded basis, and a new approach to ranking universities and supervising the admission procedure.

Conclusion

Thus, the paper considers the problems faced by applicants and educational organizations in the framework of universities' admission campaigns: the challenges of the admission procedure, the risks of making the wrong decisions by applicants in the conditions of time limits and uncertainty, and the

lack of a priority system in the application for admission. Three approaches to the digital transformation of the university admission procedure are proposed: conservative, evolutionary and revolutionary. From the point of view of cost optimality and the resulting social effects for applicants, the implementation of either evolutionary approach or revolutionary one seems to be the most promising. The FIS GIA and admission system can be used as the core for any of the approaches, but in the case of the conservative approach, it will be necessary to modify the technical capacities of the system to resolve the problems of peak traffic arising in the days when applicants submit consents to enrolment. Possible challenges of digital transformation of the admission procedure and their solutions are presented.

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Leadership in Staff Training in the Armed Forces of the Czech Republic

David ULLRICH
University of Defence, Brno, Czech republic, david.ullrich@unob.cz

Jan ZEZULA
University of Defence, Brno, Czech republic, jan.zezula@unob.cz

Vratislav POKORNÝ
University of Defence, Brno, Czech republic, pokorny.v@seznam.cz

Miroslav POLACH
University of Defence, Brno, Czech republic, miroslav.polach@unob.cz

Abstract

The article describes the method of preparation and education of future military professionals in the field of direct leadership in the conditions of the University of Defence in Brno. The first part describes the process of preparation and education of students of the University of Defence in Brno in subjects related to direct leadership (applied behavioral science, leadership, military leadership and field preparation). The second part describes their interconnection, which is the result of a combination of identified requirements and competencies for military leadership.

Keywords: communication, Czech Armed Forces, leadership, military leader, military professional ethics, military psychology, University of Defence.

Introduction

The current security environment in which a military professional moves is accompanied by dynamic changes. The basic characteristics of this environment include the difficult predictability of threats and risks, instability, the asymmetry of conflicts, the lack of a continuous battlefield, the low predictability of further development. The importance of the linear concept decreases and the importance of holistic conception increases. This environment is characterized (Spilý & Hrnčiar, 2013) by blurred the boundary between war and politics, the military and civilians, were traditional states have lost their monopoly on the conduct of armed conflicts.

Systems, processes, methods and models of selection, education and training of professional soldiers and commanders must constantly reflect these changes, analyse them, evaluate them and adapt them to their character.

Ability to face current and future threats from military required to perceive the specific nature of the security and operating environment, its context, the participants, their goals and motivations. The achievement in current conflicts is determined by the aplication of a different thinking, use a different approach with quite different sort of power (lethal, non-lethal), fully different military capabilities, and therefore a essentially different form of military education and training (Hrnčiar, 2017).

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This environment brings new challenges (Prisecaru, 2017), same as new requirements for the competence of managers and leaders – competence for industry 4.0 (Hecklau, et al., 2017). Teachers face the question how to usefully modify their programs and education forms. (Grabowska, 2018). Therefore how to adapt education for today's environment requirements (Santos & Benneworth, 2019), plus at times when organisations are willing to invest into the development of leadership and education of their employees (Crawford & Kelder, 2019).

Theoretical background

In the system of personnel training, leadership training also has an irreplaceable role. Three levels of leadership can be defined for the needs of education, and training of members of the Czech Armed Forces:

- tactical (direct) leadership;
- organizational leadership;
- strategic leadership.

Tactic (direct) leadership, or "face to face" command, is typical of team commanders, platoons, companies, and senior company sergeants, i.e. sergeant, technical sergeant, senior sergeant, lieutenant, senior lieutenant, and captain. Organizational leadership is typical of commanders and senior ensigns of battalions, regiments, brigades, and divisions, i.e. the rank of ensigns, lieutenants, majors, lieutenant colonels, and colonels. Strategic leadership represents the highest level of leadership and is typical of senior officers and senior warrant officers of the HQ, the general staff and the Ministry of Defence, i.e. the rank of staff ensign, colonel, brigadier general, major general, lieutenant general, army general and top civilian officials of the Ministry of Defence. For all three levels of leadership described above, the common, inseparable basis is the value framework and the commander's character formed by him. There are fundamental differences in the type and level of knowledge, skills, and activities involved.

The training of leadership at the University of Defence

At present, military professionals are preparing for the basic command functions, i.e. platoon commander and deputy company commander, or the basic staff function, i.e. the Chief of Staff as part of the accredited military bachelor and master studies at the University of Defence. They are expected to accurately fulfill their obligations under military orders and regulations and to carry out activities set by their superiors. It is preparation for the implementation of direct leadership. The training of leadership staff is defined at the University of Defence as a process comprising three basic sub-processes.

The content of the first education subprocess is a social science basis. It contains a block of applied behavioral sciences whose purpose is to provide a sum of knowledge of applied psychology, sociology, andragogy, moral philosophy (ethics), and the basics of communication.

„The development of leadership concepts brings a significant finding that it is important to recognize the overall direction of the leader´s behaviour in managing people. To assess his/her role it is useful to know which values he/she appreciates, whether his/her behaviour leads up to the realization of welfare or quite the opposite.“ (Mikulka, et al., 2018). For this reason, the first semester of study is designed to study the military professional ethics, focused on the area of "internal relationship" to the military profession and the role of military leader in connection with combat ethos, values of military profession[1], the need for

[1] It is a responsibility and a sense of duty, justice, dedication, courage, loyalty and honor.

the moral integrity of professional soldiers[2] and interpersonal relations and bonds within the internal culture of the Army of the Czech Republic and society.

The second semester is focused on military psychology with a focus on the degree of self-resilience and stress management techniques in connection with conducting military activities, and on applied sociology in the military environment.

The third semester is focused on mastering the principles and techniques of effective social communication in the management of subordinates, the development, and management of communication and information flow in specific conditions of the Army of the Czech Republic.

The content of the second subprocess is a summary of activities that will allow updating the available knowledge. An important role in this subprocess is to monitor the knowledge, abilities, and skills of students in challenging conditions within the subject Field Preparation. The content is to determine the disposition of individuals for coping with the demands and burdens associated with conducting military activities. Monitoring carried out of:

- dispositions for decision making under the pressure of time;
- the level and selected dimensions of personality, value orientation and self-knowledge in relation to the military profession;
- prerequisites for the development of group cohesion and combat ethos;
- overall ability to act as commander-leader.

Complex interconnection of personality, psychophysical, psychological, social, neurophysiological and physiological methods to identify competencies of the individual for direct leadership will be used in the model Preparation in the Field of the 4th semester. The methods will be carried out in a three-day continuous experiment, as well as in rest conditions a week before and after the experiment. Students will be exposed to model situations that most closely match the real stress conditions of the training.

The content of the third subprocess in the 5th and 6th semesters is the evaluation of the above-mentioned dispositions and the development of competencies to lead people for direct leadership in the mentioned topics below.

1. Leadership as a process
2. The role of the leader in the security environment, concepts of professionalism, leader and the change
3. Leader – perception versus observation, reflection, and action
4. Leader and power
5. Leadership, ethics, and values
6. Features of a leader
7. Personal leader´s credit and influencing the others
8. Leadership in a wider context of a military organization
9. Stress management and problem-solving
10. An individual, groups, teams and the management
11. Methods of identification of the commander-leader competencies
12. Commander´s-leader´s competencies Appraisal in individual students
13. Leader´s self-development and development of others

[2] The moral integrity of a military professional is a binding link between the military role and the value system of the armed forces, enabling moral action and the creation of a combat ethos.

14. Commander-Leader competencies development

Leadership competences, on the tactical level, are primarily developed in 'Preparation in the field' training courses during the 5th and 6th semesters (four weeks). Students in the infantry branch are trained, with regard to tactical professional tasks (i.e. troop leading procedures, defensive and offensive operations, and patrolling), as platoon leaders. Students are evaluated on the basis of tactical knowledge and skills, and their individual predisposition for platoon leader level leadership in the final stage of their training. Additional training in the 7th and 8th semester is offered to mechanised infantry branch leaders, in order to further develop their competences. Part of this additional training relies on virtual reality simulations of the environment in which infantry vehicles operate. Training sessions with actual infantry fighting vehicles are only introduced in the final stages.

Leadership is also the content of the career training of NCOs, Ensigns and junior officers, which is carried out at the Training Command - Military Academy and for senior officers at the Center of Security and Military Strategic Studies of the University of Defence has an irreplaceable role. Materials developed abroad have been used creatively to create the subject of leadership in career courses, in particular by an international group of experts and academic workers from NATO and PfP (Generic Officer Professional Military Education Reference Curriculum, Partnership Action Plan on Defence Institution Building – Reference Curriculum, Non- Commissioned Officer Professional Military Education Reference Curriculum).

The training of Petty Officers and NCOs is divided into three levels that are interrelated to develop the knowledge, habits, and skills necessary to perform lower command and staff functions. Preparation of non-commissioned officers (commander of a squad, station, tank, mortar, team) is performed within the subject of "Leadership and Ethics", which is aimed at providing the theory of leadership, developing attitudes to the values and character of non-commissioned officers so that they are able to lead and develop their subordinates at the lowest tactical level and in mixed groups in the Czech Armed Forces and the international (coalition) environment. In the preparation of the NCO´s, the experience gained at the lowest command positions is developed in the basic course in the subject "Leadership and Ethics". It further develops an understanding of leadership theory, identifying and actively promoting and defending the values and character of NCO´s so that they can lead and develop their subordinates on a tactical level and in mixed units of the armed forces and an international (coalition) environment. In the Higher NCO´s course, the subject of "Leadership and Ethics" uses the experience of the course participants in performance in lower command and senior staff positions. It further develops an understanding of leadership theory, identification with active implementation and advocacy of the values and character of NCO´s so that they can lead, develop and educate their subordinates even in mixed units of the armed forces and in the international (coalition) environment. It also deals with the transfer of experience, mentoring and an important aspect of the distinction of command power of authority and the possibility of influencing decisions.

The training of officers is newly divided into four courses, which build on each other and develop gradually acquired knowledge habits and skills for the performance of basic, middle and senior command and staff functions.

In the basic officer course, the subject of "Leadership and Military Ethics" is focused and military education to military professional ethics, understanding the moral aspect of an officer, personal example of a commander, management theory of organization, and human rights education. It includes training of presentation skills and performing practical tasks in combat play and practical tactical training-exercises.

The course for lower officers is intended to introduce the "Leadership" course to students in the theory and practical application of leadership in the army as an organization and develop the theory of military ethics in practice. In this section, the rules on the use of force (ROE) in the context of the application of the law in armed conflict (LOAC) are practiced.

In the course for senior officers, the subject of "Leadership" ensures the transition from direct to organizational leadership. The preparation is focused on mastering the application of management theory skills in command and control, application of management and leadership styles, control skills, analysis, and action. An essential part is an understanding of the moral, ethical, conceptual, interpersonal and technical components of the skills needed to organize change management. The study also includes knowledge and skills of team building, evaluation of their effectiveness and solution of interpersonal conflicts, gender policy, etc.

The General Staff course in the subject of "Leadership" develops strategic leadership and adds it with the knowledge and skills of the so-called mediated leadership and management of large organizations at the interdepartmental, cross-departmental and international levels. It includes the study of management theory and leadership in an environment of uncertainty, creation of visions, concepts, setting goals and values. Officers will understand the importance of ethics at the strategic level of decision making in studying historical examples.

Methods for identification

In model situations that correspond with real situations of deployment in security environment will be used a complex networking of personality, psychophysical, psychological, social, neurophysiological an physiological methods for identification of competence of an individual for direct leadership. Methods will be realized in 3-day continuous experiment then in calm environment one week before and after the experiment.
Methods for identification:

1. Methods of personality disposition;

2. Methods of psychical and executive functions (mental level) - attention, memory;

3. Methods of social disposition;

4. Methods of moral-value disposition: a) measuring of value orientations by means of Schwartz Value Survey (SVS) and Portrait Values Questionnaire (PVQ); (b) measuring moral decision-making and reasoning using the Moral Competence Test (MCT) and interpreting how to deal with model and situational moral dilemmas in stressful situations; (c) measuring the level of prosocial moral reasoning by the Prosocial Tendencies Measure (PTM and PTM-R); d)determining the level of communication skills and personality prerequisites for communication using the Social Competence Inventory (SCI);

5. Methods of psychophysical dispositions: a) spectral analysis – measuring of spectral analysis of heart rate variability; b) measuring of the autonomic nervous system - Blachghost system;

Conclusion

The analysis of the current security environment has indicated specifics that affect the quality and potential requirements of the capabilities and skills of commanders, professional managers, and leaders, i.e. people who perform functions and activities related to the organization and management of human systems environments. The characteristics, influences and possible trends of the development of the current security environment place specific requirements not only on the preparation of military commanders and leaders to operate in this environment but also professionals who already operate in this environment. Professionalism is not only given by professional skills (hard skills) and social skills (soft skills) but above all by personal quality, on the background of which are cultivated and continuously developed natural potentials of people to personal competencies (subtle skills).

The goal of the Czech Republic, as stated in the Defence Strategy[3] is to have armed forces of motivated, trained, universally prepared and properly equipped personnel, who will be provided with all the prerequisites to perform work. These are, in terms of competencies - education, training and other forms of preparation in the armed forces for the fulfillment of specified tasks of the armed forces. According to the Conception of the Construction of the Army of the Czech Republic 2025,[4] the Czech Army uses departmental, military, off-ministerial and foreign facilities, and institutions to prepare its personnel. The Army will continue to deepen its cooperation with the University of Defence Brno, which is not only a research institution but also an educational facility for the lifelong training of officers and civilian personnel.

Trends in changing the quality requirements of people's skills are profiled mainly in two areas of professional skills that are interrelated. One area is the military-professional and specialized competencies and quality of a professional as an expert in a special activity, function, or field of military activities. The second area is the competence, quality of the professional involved in the command and control of processes and systems. Changes in requirements take place both at the individual level (abilities, qualities, thinking, individual values) and at the system level (relationships, decision making, communication, achieving goals, sharing meaning, values, etc.). That is why leadership is the basic framework and accented topic of training and education for military professionals, commanders and leaders.

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Production Potential and Income of Very Small Farms in the European Union and Poland

Agnieszka STRZELECKA

Koszalin University of Technology, Faculty of Economic Sciences, Department of Finance, Poland
agnieszka.strzelecka@tu.koszalin.pl

Danuta ZAWADZKA

Koszalin University of Technology, Faculty of Economic Sciences, Department of Finance, Poland
danuta.zawadzka@tu.koszalin.pl

Abstract

The primary goal of the paper is to assess the production potential and incomes of very small farms in the European Union, with particular emphasis on Polish entities. The basic source of data were statistics collected as part of the accountancy data collection system from agricultural holdings - European Farm Accountancy Data Network (European FADN). The analysis took into account the years 2012-2017. The spatial scope of the study covered the area of the European Union, with particular emphasis on Poland. Very small farms were distinguished based on the criterion of their economic size. It was assumed that a very small farm is one whose economic size does not exceed EUR 8,000 Standard Output (SO). The obtained results show that the value of assets of very small farms in Poland amounted to an average of around 73 thousand EUR in the analyzed period and was on average 66% higher than the value of assets used in the production process by very small agricultural holdings in the European Union (EU). At the same time, family farm income expressed per family labour unit (EUR / FWU) was almost 25% lower in very small farms in Poland than in the EU. It was also found that fixed assets dominate the assets structure of very small farms, and in the case of Polish entities this share amounted to 92.3% on average, while for EU farms the value of this ratio was slightly lower and amounted to 87.4%. The surveyed entities both in Poland and in the EU use primarily equity capital to finance agricultural activities. Furthermore, it was established that the relation of total production (total output) to total costs (total input) in the case of EU farms was higher than 1 throughout the entire analyzed period. On the other hand, very small farms from Poland from 2014 were characterized by a level of costs exceeding the value of production. This proves the importance of external support (in the form of operating subsidies) for creating agricultural income of very small farms in Poland.

Keywords: very small farm, family farm income, production potential, operating subsidies, FADN, Poland, European Union

Introduction

Research results presented in the literature show that there are many different factors determining the level of income obtained by agricultural holdings. The underlying production factors affecting farm income include land, labour and capital (see, e.g. Carls et al., 2019; Gummi and Mu'azu, 2019; Kurdyś-Kujawska et al., 2019; Murawska, 2019; Kocsis and Major, 2018; Średzińska, 2018; Soliwoda, Kulawik and Góral, 2016; Beckman and Schimmelpfennig, 2015). However, the profitability of the agricultural sector depends to a large extent on direct payments. Studies presented in the literature indicate that the vast majority of farms are unable to cover total costs without receiving payments under Pillar I and Pillar II. The inability to cover total costs means that farmers are unable to remunerate family labour and assets as in the other sectors of the economy. Among the

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factors determining the level of income obtained by agricultural holdings, those that relate to the farm's production potential are of significant importance. However, the impact of some factors, as evidenced in research results, can be differentiated depending on the economic size of a given farm (see, e.g. Średzińska, 2017).

Large farms in the pig & poultry, horticulture and permanent crop sectors are more profitable and less reliant on direct payments (European Commission). The income of very small farms is, in most cases very low, so that small changes in revenue or costs can cause high relative changes in income. Very Small farms are also becoming more diversified into off-farm sources of income, often because they are too small to make a decent living from farming. On the production side, the available evidence still supports an inverse relationship between land productivity and farm size.

Small-scale farms typically achieve their higher land productivity using labour-intensive methods rather than capital-intensive machines. The results of Średzińska's research (2017) prove that in the case of very small and small farms (separated on the basis of the economic size criterion), there is a negative relationship between income and the value of assets. Our previous study (Strzelecka, Zawadzka and Kurdyś-Kujawska, 2019) showed that in the case of very small farms (included in our study), there is a positive relationship between the productivity of plant production and livestock production, as well as the productivity of the labour factor and the level of agricultural income. Moreover, we found that too high value of fixed assets per employee and too high intensity of production (measured by the use of fixed and current assets per hectare) have a negative impact on the level of very small farm income (Strzelecka, Zawadzka and Kurdyś-Kujawska, 2019). This confirms the results of research conducted by Średzińska, which demonstrated that for small-scale units in the agricultural sector there is a negative relationship between the value of assets and the level of agricultural income (Średzińska, 2017). Therefore, we found it important to analyse and assess the production potential and incomes of very small farms in the European Union, with particular emphasis on Polish entities.

The rest of the paper is structured as follows. Next section presents the survey methodology and data sources. Third section presents the results of the study, which consisted of three main stages. The first stage refers to the assessment of the production potential of the very small farms surveyed. Changes were found in the level and structure of assets and financing sources of the examined entities in the years 2012-2017. Subsequently, the profitability of production was assessed. To this end, the relation between the production value and the level of costs incurred was examined. The last stage of the research covered the assessment of the effectiveness of using the production potential of very small farms. For this purpose, changes in the level of income obtained by these entities per family labour unit were assessed. The importance of financial support, in the form of operating subsidies, in creating agricultural income of very small farms was also established. The last section concludes.

Data Sources and Research Methodology

The research covered very small individual commodity farms. The primary source of data were statistics collected as part of the accountancy data collection system from agricultural holdings - European Farm Accountancy Data Network (European FADN). The analysis took into account the years 2012-2017. The spatial scope of the study covered the area of the European Union (EU), with particular emphasis on Poland. Very small farms were distinguished based on the criterion of their economic size. According to the criterion, it was assumed that a very small farm is one whose economic size does not exceed EUR 8,000 Standard Output (SO)[1].

The following categories of data were used in the study (according to FADN definitions): a) *assets* - sum of fixed assets and current assets. Only assets in ownership are taken into account; b) *sources of financing*: sum of net worth and liabilities (value of long-, medium- or short-term loans still to be repaid); c) relation of total output (*total production*[2]) to total input (*total costs*[3]); d) *family farm income* - the remuneration for fixed production factors of the farm (work, land and capital) and remuneration for the entrepreneur's risks (loss/profit) in the accounting year; e) *family farm income*

expressed per family labour unit (EUR/FWU[4]); f) *total subsidies* (excluding investments) - subsidies on current operations linked to production (not investments). All data presented in the study are the average values for the considered groups of farms.

To achieve the aim of the study, the following research methods were used: a) literature analysis, b) empirical data analysis using descriptive and comparative methods, as well as statistical methods (average, structure indicators, dynamics indicators). The results of the analyses are presented in tabular and graphical form.

Results

When assessing the production potential of very small farms, the level and structure of assets involved in the agricultural production process were first determined. Figure 1 presents changes in the value of total assets in very small farms in the EU and Poland during the period under analysis.

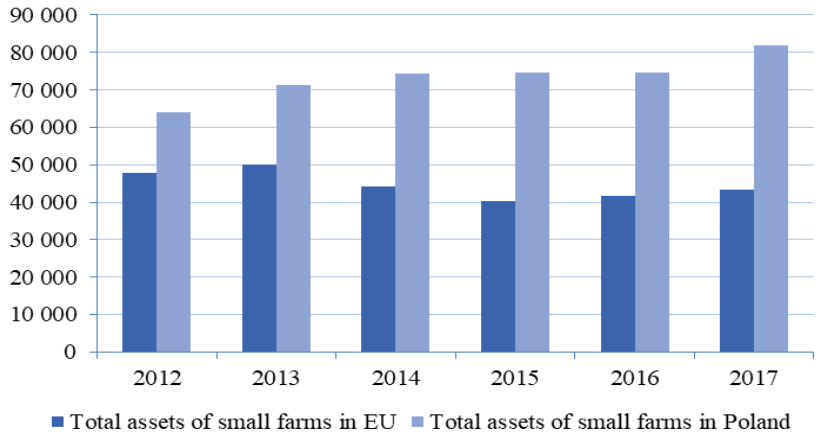

Fig. 1: Total assets of very small farms in the European Union and Poland [EUR]
Source: Authors' own study based on EU FADN data

The obtained results show that in the entire period considered in the analysis, very small farms in Poland used assets of higher value in the production process than the entities from the EU (average 66% higher). The average value of assets involved in the production process in the case of Polish entities averaged 73.5 thousand EUR over the years analyzed. For comparison, an average very small farm in the EU during the same period used assets whose value was on average 66% lower, of an average value of 44.5 thousand EUR. It was also observed that entities conducting agricultural activity in Poland increased the value of assets from year to year, however, the pace of these changes varied (from 0.25% in 2015 to 11.46% in 2013). Next, the structure of assets of very small farms was examined, with particular emphasis on fixed assets, which in the case of entities from the agricultural sector were decisive in the production potential of a given entity.

Table 1: Assets structure of very small farms in the European Union and Poland from 2012 to 2017

Specification	Years					
	2012	2013	2014	2015	2016	2017
Assets structure [%]						
EUROPEAN UNION						
Total assets	100.00	100.00	100.00	100.00	100.00	100.00
Total fixed assets, of which*:	84.96	85.40	86.69	89.37	88.91	89.26
Land, permanent crops & quotas	*58.25*	*59.78*	*56.18*	*54.28*	*53.59*	*52.20*
Buildings	*28.37*	*26.73*	*29.27*	*31.61*	*32.11*	*33.46*
Machinery	*11.30*	*11.44*	*12.25*	*11.63*	*11.84*	*12.07*
Breeding livestock	*2.08*	*2.06*	*2.30*	*2.47*	*2.46*	*2.27*
Total current assets	15.04	14.60	13.31	10.63	11.09	10.74
POLAND						
Total assets	100.00	100.00	100.00	100.00	100.00	100.00
Total fixed assets, of which*:	91.06	91.69	93.01	92.86	92.53	92.62
Land, permanent crops & quotas	*62.77*	*59.47*	*59.66*	*61.64*	*61.40*	*60.93*
Buildings	*27.47*	*29.21*	*29.61*	*28.92*	*27.76*	*28.46*
Machinery	*8.76*	*10.52*	*9.96*	*8.82*	*10.34*	*10.05*
Breeding livestock	*0.99*	*0.80*	*0.76*	*0.62*	*0.50*	*0.57*
Total current assets	8.94	8.31	6.99	7.14	7.47	7.38

** Share ratios for individual fixed assets were calculated in relation to the total value of tangible assets (internal structure of fixed assets).*
Source: Authors' own study based on EU FADN data

During the period under analysis, permanent assets were dominant in the structure of assets in both groups of very small farms under consideration. In the case of Polish entities, this share amounted to 92.3% on average, while for EU farms, the value of this ratio was slightly lower and amounted to 87.4%. The predominance of fixed assets in the structure of assets is a characteristic feature of units from the agricultural sector (see, e.g. Kołoszko-Chomentowska, 2018). Particular importance in this aspect is attributed to land, which will become an essential factor of production used in agricultural activities.

In relation to capital used in agricultural activities, the structure of financing sources for very small farms in the EU and Poland in 2012-2017 was also examined (Table 2).

Table 2: Sources of financing structure of very small farms in the European Union and Poland from 2012 to 2017

Specification	Years					
	2012	2013	2014	2015	2016	2017
Sources of financing structure [%]						
EUROPEAN UNION						
Total sources of financing	100.00	100.00	100.00	100.00	100.00	100.00
Net worth	99.05	99.34	98.54	99.27	99.07	99.24
Total liabilities, of which*:	0.95	0.66	1.46	0.73	0.93	0.76

Long and medium-term loans	*75.77*	*60.24*	*49.77*	*65.08*	*73.01*	*68.88*
Short-term loans	*24.23*	*40.06*	*50.23*	*34.58*	*26.99*	*31.12*
POLAND						
Total sources of financing	100.00	100.00	100.00	100.00	100.00	100.00
Net worth	97.84	99.12	99.17	99.25	99.31	99.27
Total liabilities, of which*:	2.16	0.88	0.83	0.75	0.69	0.73
Long and medium-term loans	*88.95*	*54.56*	*60.65*	*68.86*	*57.36*	*69.41*
Short-term loans	*11.05*	*45.44*	*39.35*	*31.14*	*42.44*	*30.59*

** Share ratios of individual components of liabilities were calculated in relation to the value of total liabilities (internal structure of liabilities).*
Source: Authors' own study based on EU FADN data

It was found that the surveyed entities both in Poland and in the EU use primarily equity capital to finance agricultural activities. As in the case of the dominant role of tangible assets in the structure of assets, financing of operations primarily with equity is a characteristic feature of entities from the agricultural sector (see, e.g. Mądra-Sawicka and Wasilewski 2017; Vučković, Veselinović and Drobnjaković, 2017). The results obtained for very small farms covered by the analysis showed that foreign capital is of marginal importance in financing the agricultural activity of these units. It was also found that both very small farms in the EU as well as in Poland, when using foreign capital, primarily decide on medium or long-term liabilities, which in both groups of entities constituted an average of 2/3 of foreign sources of financing. It was also observed that the importance of short-term financing increased in 2017 compared to the first year included in the analysis, as indicated by the changes noted in the structure.

Income from the agricultural activity depends, on the one hand, on the value of production created, and, on the other hand, on the amount of incurred costs related to agricultural activity. Our previous study (Strzelecka and Zawadzka, 2019) showed that farms, regardless of production type, are characterized by high cost-intensity indicators. The results obtained for very small farms (Fig. 2) confirmed previously observed dependencies.

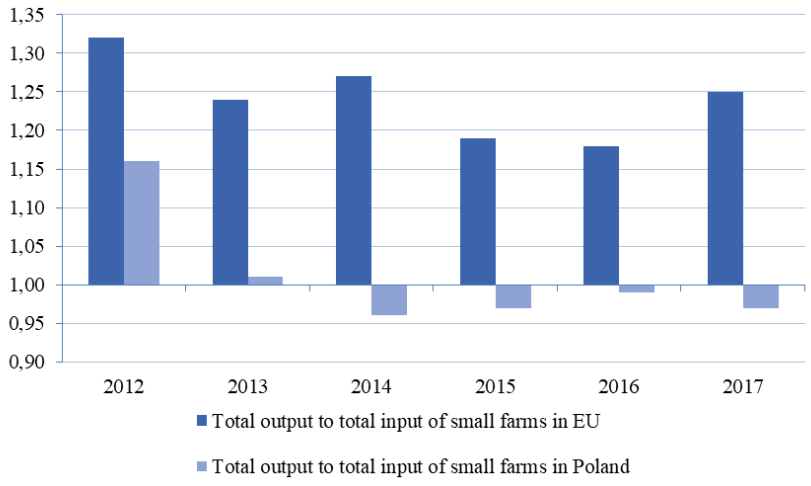

Fig. 2: Ratio of total output to total input of very small farms in the European Union and Poland [ratio]
Source: Authors' own study based on EU FADN data

In the case of EU farms, the relation of total production (total output) to total costs (total input) was higher than 1 throughout the entire analyzed period. Conversely, from 2014, very small Polish farms were characterized by a level of costs exceeding the value of production. Therefore, if these farms did not receive financial support in the form of subsidies on current operations linked to production, then the family farm income would have had a negative value.

Next, the value of family farm income expressed per family labour unit of very small farms in the EU and Poland was assessed (Fig. 3).

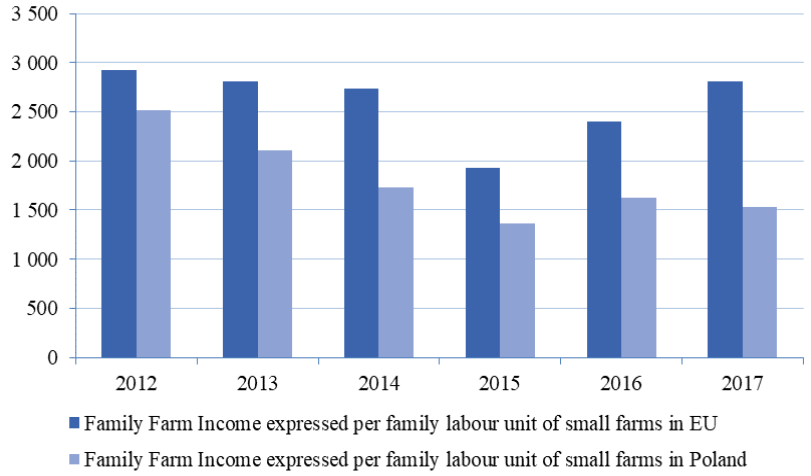

Fig. 3: Value of family farm income expressed per family labour unit of very small farms in the European Union and Poland [EUR / FWU]

Source: Authors' own study based on EU FADN data

Throughout the period under analysis, the average very small farm in the EU was characterized by a higher level of agricultural income per family labour unit, than Polish entities. The level of the discussed income category in EU farms amounted to EUR 2,600.8 / FWU on average (in 2012-2017), and was on average 43.4% higher than the average value recorded for Polish farms. The most significant difference was observed in 2017 when family farm income expressed per family labour unit in the EU amounted to EUR 2807.1 / FWU and was 83.7% higher than the value of the discussed income category in very small Polish farms. The obtained research results show, on the one hand, that very small farms in Poland are characterized by higher asset equipment than EU units (Fig. 1), on the other hand, that Polish farms are characterized by lower financial efficiency and obtain a relatively lower level of agricultural income per family labour unit, compared to very small EU farms (Fig. 3).

The significance of financial support in the form of operating subsidies in creating agricultural income of the analyzed very small farms in the EU and Poland was also examined (Table 3).

Table 3. Ratio of total subsidies (excluding on investment) to family farm income of very small farms in European Union and Poland [%]

Specification	Years					
	2012	2013	2014	2015	2016	2017
European Union	48.94%	53.50%	38.30%	72.23%	69.99%	54.55%
Poland	70.26%	87.76%	98.32%	167.11%	148.73%	142.55%

Source: Authors' own study based on EU FADN data

In the case of very small farms from the EU, subsidies constituted on average from 38.3% (in 2014) to 72.23% (in 2015) of income from a family farm. In comparison, starting from 2015, the income of very small farms from Poland came entirely from financial support in the form of operating subsidies. Moreover, these farms allocated a part of the received financial support to cover the high costs incurred in connection with their agricultural activities. It proves that very small farms in Poland are characterized by a lower ability to generate income from operating activities than entities from the EU.

Conclusions

The aim of the research was to assess the production potential and incomes of very small farms in the European Union, with particular emphasis on Polish entities. The results of our study showed that the value of assets of very small farms in Poland amounted to an average of around 73 thousand EUR in the analyzed period, and was on average 66% higher than the value of assets used in the production process by very small agricultural holdings in the EU. At the same time, family farm income expressed per family labour unit (EUR / FWU) was almost 25% lower in very small farms in Poland than in the EU. It was also found that fixed assets dominate the assets structure of very small farms; in the case of Polish entities this share amounted to 92.3% on average, while for EU farms the value of this ratio was slightly lower and amounted to 87.4%. The surveyed entities both in Poland and the EU primarily use equity capital to finance agricultural activities. Furthermore, it was established that the relation of total production (total output) to total costs (total input) in the case of EU farms was higher than 1 throughout the entire analyzed period. Alternatively, from 2014 very small Polish farms were characterized by a level of costs exceeding the value of production. This proves the importance of external support (in the form of operating subsidies) for creating agricultural income of very small farms in Poland.

Endnotes

[1] Standard Output (SO) is the average monetary value of the agricultural output at farm-gate price of each agricultural product (crop or livestock) in a given region (FADN).

[2] Total production - total of output of crops and crop products, livestock and livestock products and of other output (FADN).

[3] Total costs - Costs linked to the agricultural activity of the holder and related to the output of the accounting year (FADN).

[4] FWU - Family work unit = Family AWU. Total unpaid labour input. Refers generally to family labour and is expressed in FWU (FADN).

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Heart-Brain Communication:
The Way To Build Resilience and Improve Performance

Tereza Trnkova
University of Defence, Czech Republic, Brno
Tereza.trnkova@unob.cz

Abstract

This paper describes several facts about the heart-brain connection and how the heart influences brain function and performance. Research studies show that it is not true that we have limited control over the mind and emotions. If we adopt and train self-regulation skills, the emotional system can be regulated and brought into coherence. Understanding of heart-brain connection and communication means, that we can increase our capacity, performance and become more resilient. We have also information on how to shift and reset our inner systems and default settings and operate more effectively and with greater capacity and within daily interactions. Most organizations nowadays face to constant organizational changes and transformation is part of the daily life of many companies. The pressure to deliver results, work remotely and independently and make important decisions have a huge impact on business performance and health of employees. Numerous scientific studies have now shown that excessive pressure directly impacts the internal physiological processes of individuals. This has an impact on the performance of an individual and consequently on the organisation itself. Heart – brain communication shows what is happening with people internal functions and describes that we can do with our default settings, how to train them and subsequently to improve personal performance, staff turnover, personal health and thereby organizational effectiveness. Aim of this paper is to introduce some research outcomes of the HeartMath Institute and explore the importance of heart-brain communication on individual performance.

Keywords: Heart, Resilience, Performance, Brain, Emotions, Organization Effectiveness, Coherence, Heart Rate Variability, Performance, Baseline.

Introduction

The world has changed. Continuous change and pressure on performance have become the norm in a global economy. The pressure to deliver and operate in the environment of last-minute changes have a major impact on performance and the health of people working in organisations. Several research studies show how we can change our default settings and extend our ability to perform, become more resilient and increase our capacity and amount of energy.

The importance of emotions and heart rate variability is more than significant when speaking about resilience, performance, and capacity. Emotions define what we care about and what motivates us. Emotions and resilience are closely related because emotions are the primary drives of physiological processes involved in energy regulation. This is a reason why the key to sustaining good health, optimal function and resilience is the ability to manage emotions.

We can shift our physiology into a coherent state and increase physiological efficiency and alignment of the mental and emotional systems that accumulate resilience across all four domains (emotional, spiritual, physical, mental) by learning self-regulation techniques and learn and understand heart-brain communication.

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No matter in which organisation people work, all firms want to have employees who can make a good decision when needed, people who can communicate with others, cooperate and contribute to a firms goals and overall efficiency. For the majority of people if not for all people in the world, there is a need to cooperate with others to achieve goals, meaning that teamwork is part of it all and essential element. Teamwork is happening in a group of people working together. When members of the team are not self-regulated, acting in their interest or seeking only their acknowledgement, the whole team is impacted by this behaviour. Stressful conditions in a given group act to increase emotional stress among its members and can lead to social pathologies such as violence, abuse, inefficacy, increased errors. [1] Based on the research, job stress is estimated to cost American companies more than $300 billion a year in health costs, absenteeism and poor performance. [2] Daily interactions with others at work or home has an impact on how we feel, how we act, how we communicate with each other and it has also impact on physiological processes in our body that affect our health.

As per the above, the way we live and interact with others have a direct impact on our performance and our health. Good teamwork and cooperation mean that individuals have to become more capable of self-management and self-aware of their own emotions for the group to work effectively.

This paper brings several research findings and explains how is it possible to improve workplace communication, cooperation, productivity, problem-solving by using practical steps and techniques and also explains heart-brain communication which is what is happening in our internal systems when practising these techniques over the certain time. Research task was to map out what is happening on the heart-brain axis and how these processes influence individual performance which can subsequently influence teamwork, communication and organisational effectiveness.

The Human Heart, Brain And Emotions

The heart is an organ, which pumps blood through the blood vessels of the circulatory system. This organ is still not well known outside the fields of psychophysiology and neurocardiology and still waits to be fully discovered and unfolded. New studies show that the human heart has its brain and the source of emotion, courage and wisdom. [3]

HeartMath Institute Research Centre has been involved in research of physiological mechanisms by which the heart and brain communicate and how the activity of the heart influences our perceptions, emotions, intuition, and hearth, for more than 25 years. It is known that emotions affect the autonomic nervous system, hormonal and immune system. What was explored by HeartMath institute was the fact, that heart rate variability or heart rhythms are the most dynamic and reflective indicators of emotional states, current stress, and cognitive processes.

It was proven that depleting emotions cause disorder in the higher-level brain centres and autonomic nervous system and are projected to heart rhythm patterns and affect the function of all systems in the body. This helped to better understand the communication between heart and brain and was explored that heart acts as having own mind (called heart brain) and even independent nervous system that sends a signal to the brain, specifically to the amygdala which is emotional processing centre and to the thalamus that synchronises our cortical functions and affects our brain centres and are responsible for clarity of thoughts and decision making. Heart and brain are in permanent communication. On top of that, the heart is an electric organ that creates a magnetic field around the body which can be measured by magnetometers even outside the body. These fields contain information about our feelings thanks to emotions we feel. Different magnetic fields can exchange information so people sitting next to each other ar entering the magnetic field of the heart of someone else. The magnetic field that we produce can affect others in our environment. There were also several examples done in this area, one of them showing that mother's brainwaves were synchronised to the baby's heartbeats when the mother was asked to focus her attention on her baby without touching the baby.

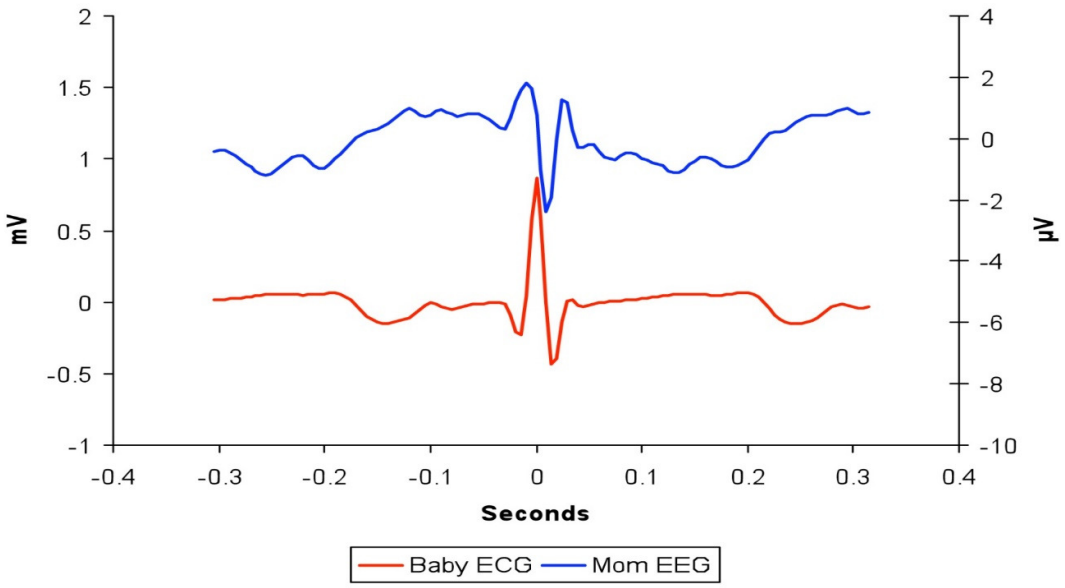

Figure 1: Mother's Brainwaves Sync to Baby's Heartbeats

Source: Resilience Advantage Trainer Notes, HeartMath 2019

https://certified.heartmath.com/resource-center/hmct/hmct-delivery/#ppt

Coherence and Resilience

Coherence has several definitions but it is always connected with correlations, connectedness, consistency, and efficient energy utilization. It is wholeness and global order. The whole is great than the sum of its individual parts. [4]

Researchers have proven that heart coherence is:, „an optimal physiological state associated with increased cognitive function, self-regulatory capacity, emotional stability, and resilience." [5]

Another research showed benefits of coherent field environment showing that when we are in a coherent state, it can help others become more balanced and composed more quickly. It explains that our emotional energetics influence people around us whether we are aware of it or not. The best way we can od to influence team atmosphere at work is to maintain our own personal coherence and focus on ourselves and our emotional reactions. This also explains why we feel the tense atmosphere when we enter a room and we don't know why and vice versa.

For humans apply four main domains of resilience, we speak about physical, mental, emotional and spiritual. Coherence does not mean that all parts are doing the same thing at the same time. We speak about a specific level of harmony and stability in the various rhythmic activities within living systems. [6]

When these domains of resilience are in harmony, the body is functioning optimally and is related to the ease and flow in life processes. Heart coherence can be measured by heart rate variability and heart rhythm pattern can be analysed (whether a pattern is chaotic-looking or smooth). When a person is in a coherent state, there is a change in autonomic balance toward increased parasympathetic activity and increased heart-brain synchronization. Based on the research, in this state body's systems operates effectively, are in harmony and facilitate natural regenerative processes. Research conducted in the USA in HM research institute shows that rhytmic – breathing methods can get the organism to the coherent state for a specific time and when self-generating positive emotions, people can achieve physiological coherence for an extended time.

When going back to four domains of resilience, there is one, responsible or key in building resilience and ability to increase human capacity. Capacity is, in fact, the resilience or in other words, resilience is capacity to prepare for, recover from and adapt in the face of stress, challenge and adversity. This definition was created by HeartMath instituted with cooperation and contribution of US Navy. [7]

Resilience doesn't come from rare and special or extraordinary qualities or processes. Resilience develops from the everyday magic of ordinary resources. It is not a sign of exceptional strength, but a fundamental feature of normal coping skills. [8]

Emotions play an important role when speaking about health, stress, resilience and coherence. It was recognized that the heart, overtaxed by constant emotional influences or excessive physical effort, suffers disorders of function and become vulnerable to disease. [9]

From a psychophysiological perspective, emotions are central to the experience of stress. It is the feelings of anxiety, irritation, frustration, lack of control, and hopelessness that are actually what we describe ourselves as stressed. It can be a minor inconvenience or difficult life situation, situations are experienced as stressful to the extent that they trigger emotions such as annoyance, irritation, anxiety, and overwhelm. [10]

Research in neuroscience shows that emotion and cognition can be thought of as separate but interacting functions and systems that communicate via bidirectional neural connections between the neocortex, the body and emotional centres such as the amygdala and the body. [11]

These connections allow emotions to reshape cortical activity while cognitive input from the cortex reshapes emotional processing. Research shows that the neural connections are stronger and transmit information from the emotional centres to the cognitive centres in the brain. This explains the strong influence of input from the emotional system on functions such as attention, perception.

Impact of heart-brain communication on employee performance and organizational efficiency

Why are these findings important for organizations and business environment? When we are coherent, we can make smarter choices, enhance focus, creativity and ability to problem-solve. Getting into sync and coherence can help us to react appropriately to everyday situations (like difficult conversations at work, meeting with someone with who we disagree, having an important conversation with someone, making important decision etc.), give us greater situational awareness and access to creativity.

This is an important message for the business environment and the way how employees in organizations act, how they decide, how they behave under pressure. Depleting emotions and incoherent heart rhythm inhibits brain function and directly affect physical and mental performance.

By heart-rhythm coherence training, workplace communication, productivity, innovative problem solving can be improved and employees turnover can be lowered which bring not only economic advantages but also social and teamwork benefits. There are already build and developed tools and techniques that can be implemented in employees training programmes and can build organisational coherence and resilience. There is an increasing number of private companies, hospitals, schools and military units which are working towards increasing their team or company coherence. [12]

A team consists of its members and to train team coherence, we have to begin with individuals and train them so individuals can understand its benefits for their own life, health but also for their cooperation within the team and they can achieve their goals more effectively. Recent HeartMath studies conducted with over 11,903 people have shown improvements in mental & emotional well-being in just 6-9 weeks using HeartMath training and technology. Data are based on individuals responding often to always on normed and validated pre and post Personal and Organizational Quality Assessment (POQA-R). [13]

- 24% improvement in the ability to focus
- 30% improvement in sleep

- 38% improvement in calmness
- 46% drop in anxiety
- 48% drop in fatigue
- 56% drop in depression

Change of Familiar Neural Patterns

As known from the emotional intelligence field, simply knowing something does not change people‘s behaviour. And when thinking about the body’s default settings it is more than true.

Our body behaves as set points of default settings. Even if we know that there are emotions that deplete and renew our energy and influence heart-brain communication, it can be difficult to think about the possibility to change our default settings. Based on the research we can reset our default settings and establish a new baseline but it requires discipline and our attention.

Human bodies are systems of physiological and behavioural baselines that keep our system regulated and operating optimally. The heart and brain communicate together in four ways – via the nervous system, hormones, pulse waves, and electromagnetic fields. For all these baselines we use our familiar patterns or baselines that our body strives to maintain. Default settings, in the majority of cases, are not optimal and healthy. Research shows that we can reset and shift our inner baselines and establish a new, healthier baseline by using self-regulation techniques that help us replace depleting emotions with positive attitudes and feelings. This can have a huge impact on the way how people behave from a long term perspective. The good news is that we can change our reactions if we train our internal systems regularly and pay attention to our emotions.

Amygdala is an organ that stores all memories and is connected with the heart via a strong nervous system. It is also a key brain centre that is involved in emotional experience. The input from the heart and body to the amygdala helps create a current feeling of an emotion. Simply, it is a type of memory that forms a baseline reference.

The process of establishing a new baseline takes place at the physiological level, which is imperative for sustained and lasting change to occur. It is possible to shift the baseline when practising becoming more coherent often regularly, but ideally every day.

Outcomes examples after implementation of coherence building techniques

Below is an example from the research that illustrates 2 high school students and their heart-rhythm patterns. The left side shows HRV before they learned and regularly practised the coherence techniques and practised them over four months. On the right, there is visible HRV at the end of the study. At the time of measurement they didn't use any technique, they were sitting still. The graphs show the change in HRV which means that after the study students were more resilient, thein rhythm was more coherent and they were able to shift their baseline.

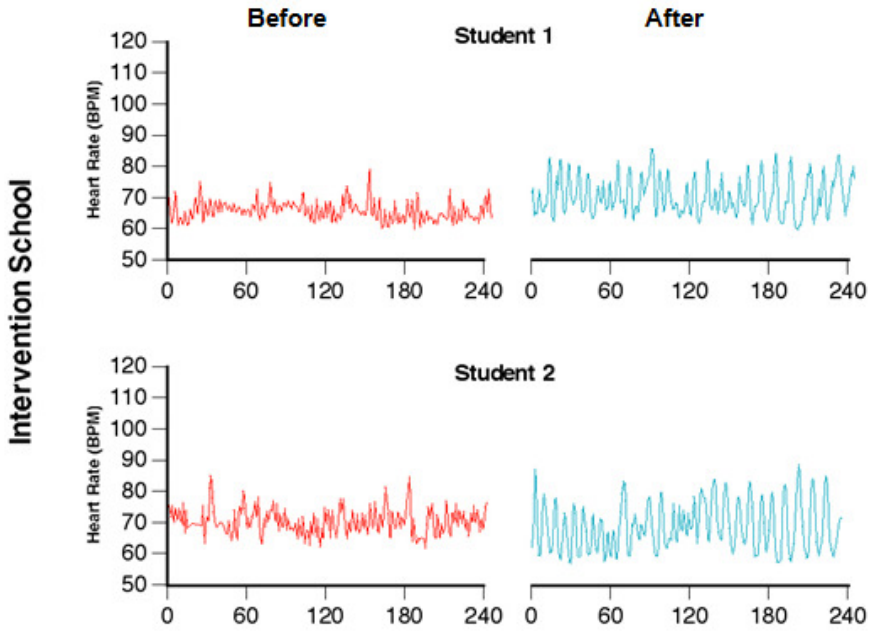

Figure 2: Example of the Research – Intervention School

Source: R. McCraty; S. "Science of the Heart," HearthMath, pp. 31, 2015.

Another example shows measurable and sustainable improvements in personal performance, staff turnover, personal health and organizational effectiveness. Research and data below were gathered with the cooperation and through projects at Shell, BP, Unilever, Cisco, Boeing and others working closely with their medical and organizational development staff. Research shows improvements in several aspects before, six weeks and six months after the intervention.

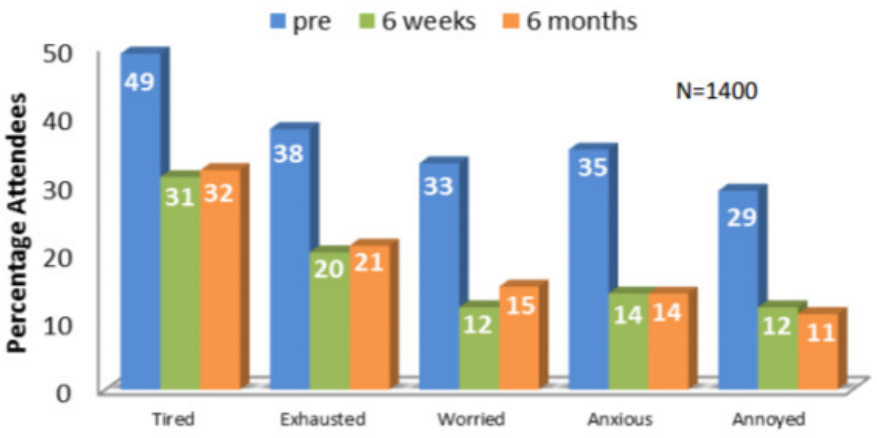

Figure 2: Example of the Research - Business

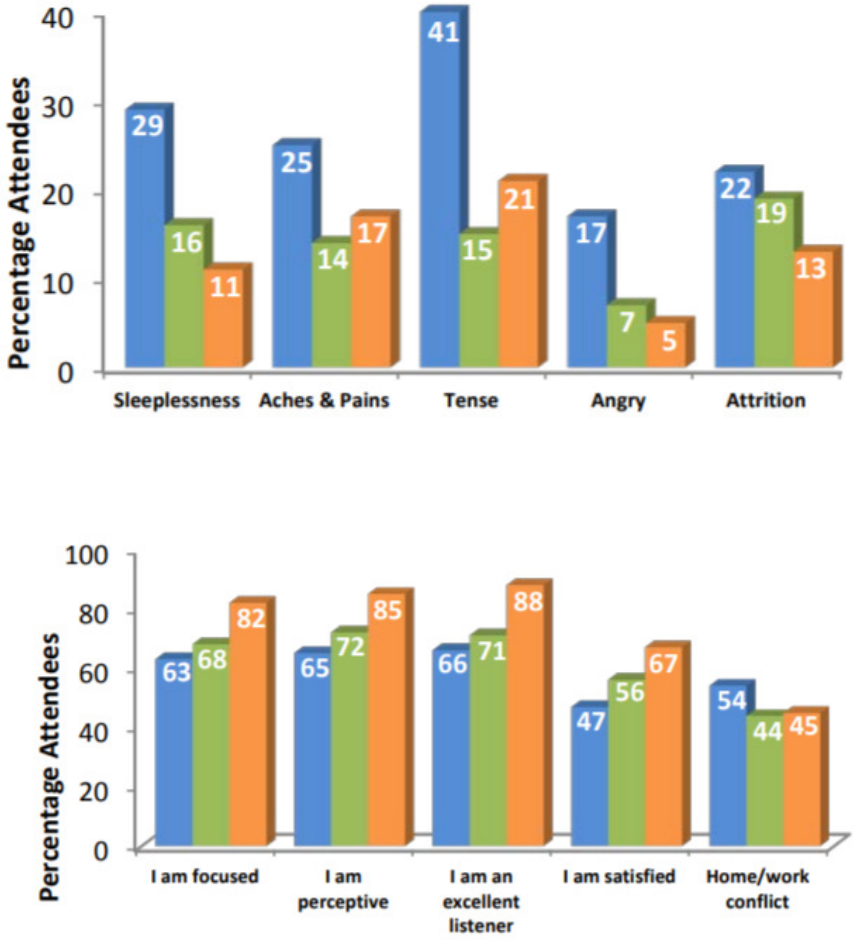

Source: HM Resource Center. "Improving Performance" HeartMath Resource Center. *https://certified.heartmath.com/resource-center/hmct/marketing/#flyers*

Conclusion

The psychophysical fitness of an individual relates to the balance and harmony of the individual's inner environment. If our psychophysical fitness is good, we can manage more easily not only stressful working days, but we are also more resistant to stress. The inner environment can be also explained as inner battery and our own capacity to be prepared for, recover from and adapt in the face of stress. The most important strength that the majority of people need to build is the capacity to self-regulate their emotions, attitudes, and behaviours. [14]

The pivotal aspect of the challenging situations is, as described by Pokorny, Pindesova, Sieger - the human mind. From it, there are aspects such as mental state or mental resilience, as well as mental competence for meaningful decision making and action. [15]

It may take some time for resilience and positive changes to emerge, but there several ways and methods on how to train resilience through resilience-building skills. We should remember that we are unable to influence the events themselves, but we can influence our reactions to them and there are ways how to learn and archive our inner capacity and shift our default settings and establish a new baseline. The novel element of it's all is, that we can change our behaviours and reactions, we have

techniques to do it, but it is only up to us if we decide to learn and practise these techniques to access our connection with our heart and follow the guidance that heart is telling to us. Our heart is our guide through our daily interactions as well as a guide showing our direction on our life‘s journey. It is a process of self-discovery.

Research describes and shows how emotions change our heart rhythm patterns. Positive emotions create coherent heart rhythms. In contrast, negative emotions create chaotic, erratic patterns. Using a heart rhythm monitor, we can see our heart rhythms change in real-time as we shift from stressful emotions like anger or anxiety to positive feelings like care or appreciation. Coherent heart rhythm patterns facilitate higher brain function, whereas negative emotions inhibit a person’s ability to think clearly. Coherent heart rhythms also create a feeling of solidity and security.

These findings can have a major impact on the performance of employees and organisational effectiveness. When we consider the implementation of these programmes and methods to training programmes for companies we can see improvements in several areas of work and life. From long time-period, we can experience increased situational awareness in relationships, meetings and projects, enhanced ability to focus, process information and solve problems or increased ability to handle challenging clients and situations.

And just to mention at the end, except for personal and social coherence there is also a global coherence and global coherence initiative (GCI). We already know that we radiate out into the field environment through the magnetic field around us and we can therefore influence the field of people around us. Global coherence undergoing research believes that the heart’s magnetic fields around the world are connected meaning we are all connected together around the world along with earth’s magnetic fields. This shows that interconnectedness between humanity and the earth’s energetic systems exist and when we create a personal coherent field environment, it can benefit others and help offset the current planetary-wide discord and incoherence. [16]

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Assessment of Complaint Processes at A Distribution Company Using Logistic Regression

Marcin ŚLĘZAK
Motor Transport Institute, Warsaw, Poland, marcin.slezak@its.waw.pl

Daria WITKOWSKA
Military University of Technology, Warsaw, Poland, daria.witkowska01@student.wat.edu.pl

Abstract

Manufacturers compete and constantly expand their offers, but the technological level and market opportunities mean that the quality and technical differences between the offered products are less and less visible. The result is an increase in intangible assets, in particular proper customer service, which has recently become a necessary condition in building customer satisfaction and loyalty. A satisfied customer will come back to make a purchase again, what's more, he can encourage other people. That is why reverse logistics and related to it after-sales service, which has become the subject of the examination of this article, play such an important role in the operations of enterprises. Based on the empirical data regarding complaint decisions, the impact of selected predictors on the binary dependent variable was assessed, i.e. complaint consideration or rejection. The logistic regression model was used for this purpose. The analysis presented allowed to assess the reliability of complaint processes at the examined company.

Keywords: complaints, logistic regression, complaint time, complaint cost.

Introduction

The progressing globalization and growing scale of production of goods with simultaneous environmental degradation make it necessary to introduce the concept of sustainable development in modern enterprises. The objective of such activities is not only to achieve competitive advantage, but also to ensure social, economic and environmental sustainability.

Reverse logistics and related to it after-sales service play a particularly important role in the operations of distribution companies. Customer orientation and awareness that a well-organized system of returns and complaints will ensure maintaining regular customers makes it a constantly evolving field. Complaints submitted by consumers are an expression of their dissatisfaction and an assessment of the quality of services provided, which is why their analysis is a common topic in the literature. The research focuses primarily on the possibility of translating the expressed claims into market success, through continuous improvement of implemented processes and improving their quality [4, 5], or implementation of tools supporting the consideration of complaints [7, 23]. Therefore, learning about certain consumer behaviour patterns, their nature [2, 3] and factors accompanying filing complaints [9, 10] is widely discussed in the literature. Information on the size of the complaint, the number of complainants and the reasons for the complaint are being considered [1, 9]. Key performance indicators of such processes are assessed, e.g. articulation rate/non-articulation rate, registration rate/non-registration rate, proportion of convinced/disappointed complainants, recommendation rate/warning rate and repurchase rate/churn rate [10]. The time and location of the complaint are being investigated [12], as well as its form (channel) [11].

In the research available in the literature, various mathematical methods and tools are used in this respect, e.g. : Supervised Machine Learning [3, 6, 14], analytical Customer Relationship Management (CRM) [12], time series [9], emotional classification model, statistical process control (SPC) model [13], statistical testing [22, 25]. Similarly to this article, logistic regression is also used, allowing to

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study of qualitative variables [4]. As a result, comprehensive complaint management systems are presented [8].

Therefore, the available research concerns mainly dependencies that contribute to the customer satisfaction and the likelihood that he will make a purchase again. Consideration of a complaint should always be a process consistent with consumer law and dependent solely on the subject of the dispute. Meanwhile, this article examines the impact of factors that should not affect the complaint decision, such as the price of the product being complained about, the duration of the complaint, or a calendar month. The obtained results allow to assess the reliability of the complaint process at the examined company.

Methodology - Logistic Regression

Logistic regression is one of the most commonly used tools for analyzing qualitative dependent variables [3, 16, 11]. It has practically unlimited scope of application in various fields of science, especially in medicine [16], biology, sociology, psychology, economics as well as marketing and banking, but also in logistics [5] and transport [4].

In the logistic regression, values of the explained variable usually indicate the occurrence or absence of the analyzed event. Logistic regression then allows to calculate the probability of this event, called an opportunity. This is the ratio of the probability that an event will occur to the probability that this event will not occur. Thus, in classical probability, the ratio of the number of successes to the number of attempts is determined, while in the logistic regression, the chance, is determine, i.e. the ratio of the number of successes to the number of failures [12].

For case A the quoted definition can be expressed by the following formula:

$$(Chance)\ S(A) = \frac{P(A)}{P(not\ A)} = \frac{P(A)}{1-P(A)} \tag{1}$$

The logistic regression model is based on the logistic function described by the formula (2):

$$f(x) = \frac{e^x}{1+e^x} = \frac{1}{1+e^{-x}} \tag{2}$$

The logistic function takes values between 0 (when x tends to minus infinity) and 1 (when x tends to plus infinity). The shape of the logistic function graph resembles the extended letter S (Fig. 1).

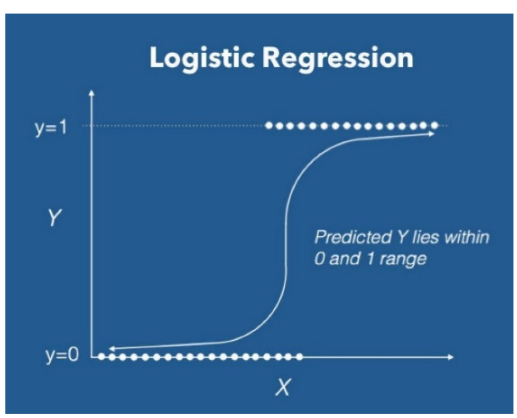

Figure 1: Graph of the logistic function

source: https://www.datacamp.com/community/tutorials/logistic-regression-R

We can distinguish three stages that describe how the value of this function changes:

- at the beginning the function is close to 0 for some time,
- there is a sharp increase from the threshold value,
- finally it strives towards value 1.

Relying on the logistic function, we can define a logistic regression model. Let Y denote the dichotomous variable, taking the values:

1 - for the event that interests us, most often survival, obtaining a loan, passing an exam,
0 - otherwise, for example death, not obtaining a loan or not passing an exam.
Then the logistic regression model is determined by the equation:

$$P(Y = 1|x_1, x_2, \dots, x_k) = \frac{e^{\alpha 0+\sum_{i=1}^{k} \alpha_i x_i}}{1+e^{\alpha 0+\sum_{i=1}^{k} \alpha_i x_i}} \quad (3)$$

where: $\alpha_i, i = 0, \dots, k$: are regression coefficients,
$x_1, x_2, \dots, x_k$ are independent variables (quantitative or qualitative)
The left side of the equation is the conditional probability that the variable Y will take a value of 1 for the values of independent variables $x_1, x_2, \dots, x_k$.

The confusion matrix is used to evaluate the classifier. The rows of this matrix determine the correct decision classes, and the columns predict the model. In this way, the correct classifier decisions are described, i.e. the size of the TP class - *true positive* and the TN class - *true negative*, and the errors made, i.e. the FP class - *false positive* or FN - *false negative*. The classification results for a given decision rule are presented in the Table below. It compares the actual state and indications of the model.

Table 1: Confusion matrix

	The distinguished state has been observed	**The distinguished state has not been observed**
The distinguished state was anticipated	TP	FP
The distinguished state was not anticipated	FN	TN

A good model is therefore the one that minimizes the number of errors, namely FN and FP. Additionally, we distinguish two main measures of the quality of decision rules:

- Sensitivity, which is a truly positive fraction, determining the test's ability to detect the studied feature, it is the ratio of true positive results to the sum of truly positive and falsely negative ones.
- Specificity, which is a truly negative fraction, measures the percentage of real negatives that are correctly identified as such.

Sensitivity - TPR (*True Positive Rate*) is described by the formula:

$$\text{TPR} = \frac{TP}{TP+FN} \quad (4)$$

Specificity – FPR (*False Positive Rate*)

$$\text{FPR} = \frac{FP}{FP+TN} \quad (5)$$

The sensitivity and specificity are the basis in the construction of ROC (*Receiver Operating Characteristic*) curves, which illustrate the relationship between sensitivity and specificity of the model under study. It allows to evaluate and compare classification models with each other. Such analysis is possible due to the calculation of the area under the ROC curve graph, referred to as AUC (*Area Under Curve*), which is defined as the measure of goodness and relevance of a given model. The AUC index ranges from 0 to 1. An AUC value of 0.5 can be described as a random action, while a value of 1 is an

ideal indicator. It follows that the higher the value, the better the model. Comparing two models cannot be limited only to comparing the AUC indicator, because the ROC curve itself, its shape and course speak a lot about a given model. The more convex the graph, the better the classifier.

The Wald's test is used to assess the significance of the parameters of the logistic regression model. The null hypothesis assumes no predictor influence on the result variable H_0:$\alpha_i = 0$). Wald test statistics are calculated according to the formula:

$$W = \left(\frac{\alpha_i}{SEE}\right)^2 \tag{6}$$

where: α_i – coefficient next to the explanatory variable i,
SEE – standard error.

The statistics distribution is approximately consistent with the normal distribution in large samples. However, squared it is consistent with the chi^2 distribution (with one degree of freedom).

Regression models of the studied enterprise

The subject of the study is a branch of a large spare parts distributor. The dependent variable analyzed was information on whether the complaint was rejected (O) or approved (F), while the independent variables used to construct the model of logistic regression are:

- number of items - means how many products were submitted as one complaint (e.g. four same glow plugs were submitted under one complaint number),
- number of days - length of complaint handling (in days),
- price - the purchase price of the product under complaint.

The estimated parameters of the model are presented in Table. 2.

Table 2: Values of model I parameters

Effect	Parameters	Error Standard	Wald Stat.	GU upper 95,0%	GU lower 95,0%	p-value
Number of items	-1,11	0,09	138,07	-1,29	-0,92	$< 2{,}2*10^{-16}$
Number of days	-0,03	0,01	19,71	-0,04	-0,02	$< 2{,}2*10^{-16}$
Price (PLN)	0,003	0,001	251,79	0,002	0,003	$< 2{,}2*10^{-16}$

Whereas the odds ratios are presented in Table 3.

Table 3: Odds ratios - model I

Effect	Odds ratio	GU upper 95,0%	GU lower 95,0%	p-value
Number of items	0,33	0,27	0,39	$< 2{,}2*10^{-16}$
Number of days	0,97	0,95	0,98	$< 2{,}2*10^{-16}$
Price (PLN)	1,003	1,002	1,003	$< 2{,}2*10^{-16}$

Characteristics of parameters is limited only to assessing the direction of its impact. A negative factor for the variable - number of items means that the more items of a product in a given complaint, the smaller the chance of rejection. Similarly, a negative factor for the variable - number of days means that the longer the complaint is processed, the less likely it is that it will be rejected. The higher the price of the product, the chance of rejection increases.

The predictors' strength can be assessed using the calculated odds ratios. According to Table 3, the following conclusions can be drawn:

- if the number of items increases by 1, the chance of rejecting a complaint decreases by 0.3,
- if the number of days on which the complaint is considered increases by 1, the chance of rejecting the complaint decreases by 0.97,
- the unit price increase, increases the chance of rejection by 0.3%.

The classifier was assessed by plotting the ROC curve (Fig. 2). The area under the curve - AUC is 0.82 and means that the classifier is very good.

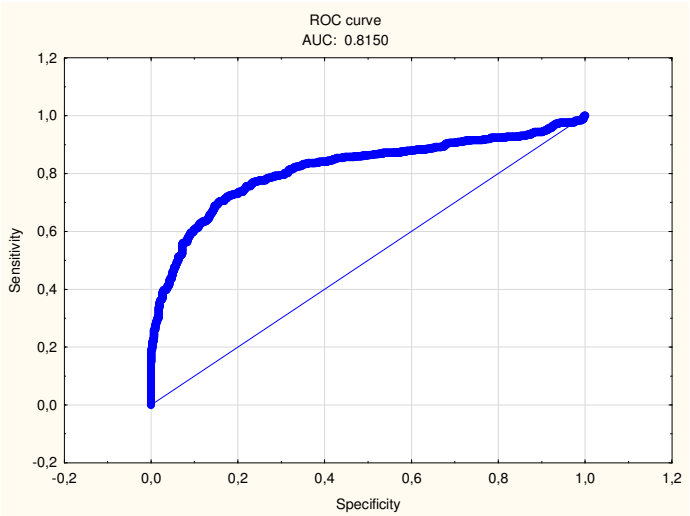

Figure 2: ROC curve Model I

Later in the study, Model II was proposed, which was created by extending Model I with a new (qualitative) variable - a month. This is justified by a frame chart showing the cost of complaints in individual months, which, as shown in Figure 3, varies considerably for individual months.

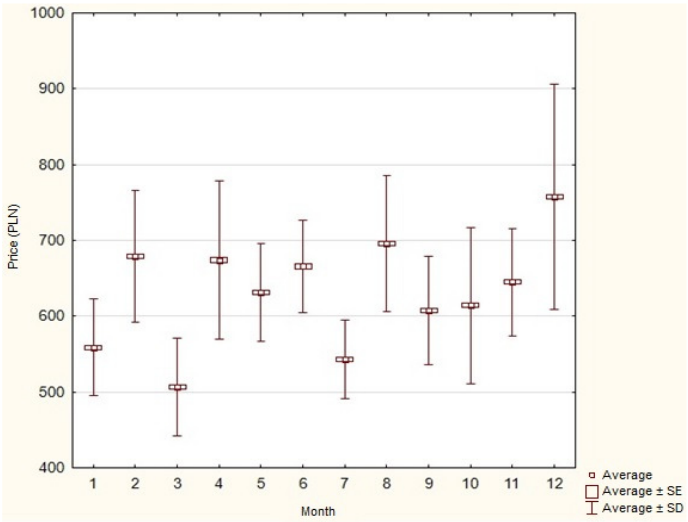

Figure 3: Frame diagram of the price variable grouped by month

After estimating the model parameters, the following results were obtained (Table 4).

Table 4: Calculated parameters of the model II

Effect	Rating	Standard Error	Wald Stat.	GU upper 95,0%	GU lower 95,0%	p-value
Number of days	-0,02	0,01	5,26	-0,03	0,00	0,02
Price (PLN)	0,00	0,00	285,87	0,00	0,00	$< 2{,}2*10^{-16}$
January	-1,54	0,22	47,80	-1,97	-1,10	$< 2{,}2*10^{-16}$
February	-1,67	0,24	49,24	-2,14	-1,20	$< 2{,}2*10^{-16}$
March	-1,65	0,23	50,61	-2,11	-1,20	$< 2{,}2*10^{-16}$
April	-1,63	0,26	39,60	-2,13	-1,12	$< 2{,}2*10^{-16}$
May	-1,63	0,23	50,94	-2,08	-1,18	$< 2{,}2*10^{-16}$
June	-1,66	0,25	43,42	-2,15	-1,16	$< 2{,}2*10^{-16}$
July	-2,27	0,26	78,96	-2,77	-1,77	$< 2{,}2*10^{-16}$
August	-1,74	0,24	51,76	-2,21	-1,27	$< 2{,}2*10^{-16}$
September	-1,94	0,23	70,30	-2,40	-1,49	$< 2{,}2*10^{-16}$
October	-2,01	0,24	69,51	-2,49	-1,54	$< 2{,}2*10^{-16}$
November	-1,71	0,28	36,64	-2,26	-1,16	$< 2{,}2*10^{-16}$

The odds ratios were also calculated for model II (Table 5).

Table 5: Odds ratios - Model II

Effect	Odds ratio	GU upper 95,0%	GU lower 5,0%	p-value
Number of days	0,98	0,97	1,00	0,02
Price (PLN)	1,00	1,00	1,00	$< 2{,}2*10^{-16}$
January	0,21	0,14	0,33	$< 2{,}2*10^{-16}$
February	0,19	0,12	0,30	$< 2{,}2*10^{-16}$
March	0,19	0,12	0,30	$< 2{,}2*10^{-16}$
April	0,20	0,12	0,33	$< 2{,}2*10^{-16}$
May	0,20	0,13	0,31	$< 2{,}2*10^{-16}$
June	0,19	0,12	0,31	$< 2{,}2*10^{-16}$
July	0,10	0,06	0,17	$< 2{,}2*10^{-16}$
August	0,18	0,11	0,28	$< 2{,}2*10^{-16}$
September	0,14	0,09	0,23	$< 2{,}2*10^{-16}$
October	0,13	0,08	0,21	$< 2{,}2*10^{-16}$
November	0,18	0,10	0,31	$< 2{,}2*10^{-16}$

In model II, all variables are also significant. The continuous predictors in model II are: number of days and price. The extension of the model with a qualitative variable caused a slight change in the odds ratios of the predictors. The month of December is the reference level. The assessment of the parameters shows that all the studied months have a negative value, which means that compared to December, all of them reduce the likelihood of rejecting a complaint. The probability of rejecting a complaint:

- in January, compared to December it is 0.21 smaller (21%),
- in February, March and June compared to December it is 0.19 smaller (19%),
- in April and May, compared to December it is 0.20 smaller (20%),

- in July, compared to December it is 0.10 smaller (10%),
- in August and November, compared to December it is 0.18 smaller (18%),
- in September, compared to December it is 0.14 smaller (14%),
- in October, compared to December it is 0.13 smaller (13%).

As results from the classifier evaluation using the ROC curve and AUC meter (Fig. 4), model II is better than model I. The area under the curve is 0.85.

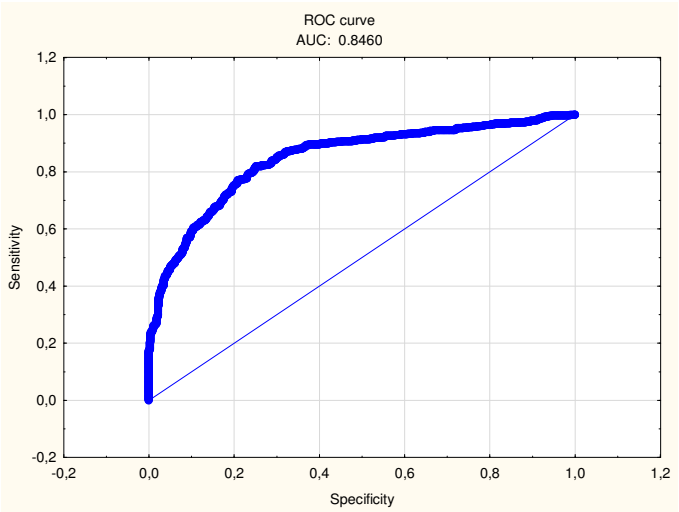

Figure 4: ROC Model II curve

The analysis presented shows that the decision regarding the acceptance or rejection of a complaint in the examined company depends on factors that should not affect it, such as the price of the order to which the complaint relates, the time of considering the complaint or the number of products submitted for
a complaint. The study shows that the high price of the goods gives a greater chance of rejecting the complaint. Different impact, in turn, has the number of complaints and the time of consideration process, whose increase decreases this chance.

Model II showed that the calendar month also has a significant impact on the decision to reject or accept a complaint. It turned out that the biggest chance of rejection was in December. This may result, for example, from the accumulation of tasks associated with the end of the calendar year. Nevertheless, all the predictors selected for the study should not affect the complaint decision, and the presented analysis shows some worrying bias in their consideration. Further research should focus in detail on the reasons for this at the company in question.

Summary

Enterprises wanting to operate on today's market must be open to information from outside (both from competitors and contractors). An efficient complaint handling system ensures the retaining regular and loyal customers, which is necessary to achieve a competitive advantage. Enterprises should strive for the highest possible results in terms of customer satisfaction, guaranteeing the high quality of products and services offered, professional service and developing after-sales service. Currently, with such intense competition, price ceases to be the sole criterion for customer selection. As a modern method of acquiring and retaining clients, is regarded, so-called, post-transaction security. Customers who "come back" to the company to make a return or complaint are a source of very valuable information

about the products distributed. Such knowledge directly translates into increased sales by increasing trust in the company that responds appropriately to the feedback received from customers.

At the examined company, the complaint process is influenced by factors that should not affect the decisions taken. The logistic regression analysis used showed how individual variables shape the likelihood of complaints being rejected. It turned out that the price of the advertised product acts as a stimulant. On the other hand, the destimulants were the number of days on which the complaint was examined and the number of items complained about. The month in which the complaint is considered was also significant. The biggest chance of rejection is in December.

The results obtained suggest the need to verify the complaint handling process at the examined company and consider introducing changes. The presented method can also be used to evaluate this process after making corrections. Additionally, the universality of the method allows its application in any similar enterprise.

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PowerApps and Dynamics 365:

Developing Digital-Student, A Self-Promotion App

Miguel RAIMUNDO
Polytechnic of Viseu, Viseu, Portugal, miguelmraimundo@hotmail.com

David MOTA
Bizdirect - Microsoft Subsidiary, Viseu, Portugal, david.mota@bizdirect.pt

Cristina WANZELLER
CISeD – Research Centre in Digital Services, Polytechnic of Viseu, Viseu, Portugal, cwanzeller@estgv.ipv.pt

Filipe SA
CISeD – Research Centre in Digital Services, Polytechnic of Viseu, Viseu, Portugal, filipe.sa@estgv.ipv.pt

Pedro MARTINS
CISeD – Research Centre in Digital Services, Polytechnic of Viseu, Viseu, Portugal, pedromom@estgv.ipv.pt

Abstract

The always on-going technological changes that we are subject to on a daily basis mean that there is a need for adaptation and evolution on behalf of all public education establishments with regards to the computerization and digitization of various student's day-to-day processes. The motivation for the Digital-Student application arises precisely from this fact, where direct contact between student-institution is required, offering permanent availability to satisfy students' requirements. The active school's participation will always be an effective mean of promotion and development of the institution. In this evaluation work, an application is developed using the Microsoft PowerApps and Dynamics365 platform, aimed at all students at any higher education institution. It is an application that allows users to share with each other relevant information about their academic path. From basic information such as Skills and Soft skills to more elaborate information such as training courses attended or documents such as curricula and certificates. At the end of the work, it is expected that the final solution to be considered as an example of success with regards to the theme of modernization.

Keywords: PowerApps; Dynamics365; mobile; modeling; development.

INTRODUCTION

The aim of this work is to develop a mobile application, Digital-Student, that allows students from any educational institution to organize and share everything they have accomplished over their academic path. This includes basic information such as skills and soft skills and even more detailed information such as attendances in training courses, certificates and/or other documents.

The specific goals for the project are the following:

•The possibility for each student to have a personal area to add their private information and academic (curricular) information (not shared with others) - a section was created for this purpose in the application where users could add, view and edit three sections: "About," "Skills" and "SoftSkills.".

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•The possibility of adding to their profile training courses that the student attended - as indicated in the previous point, each student would have a personal area and, for each student, there would also be the possibility of having an application area where he could add to the training that he attended - this would be done automatically. Such functionality would be performed using the QRCode technology. At the end of each workshop, the user would be able to read a QRCode that would automatically add to the list the training course that he attended. Afterwards, the user can scan the training course certificate and upload it to the application.

•The possibility of adding documents and certificates to the student's profile - in addition to being able to add new training courses that the student attended, it would also be possible for the student to be able to add documents and certificates to his/her profile.

•Possibility of sharing profiles – finally, in addition to all the features described above, there would be an opportunity for each user to search and view information, documents and training courses of other users.

This paper describes how Microsoft PowerApps and Dynamics365 can be used to leverage a fast-mobile application development. Preliminary results show that the development process is much efficient due to the low-code platform inherent to PowerApps and Dynamics365.

The paper is organized as follows. Section 2 resumes the related work and makes a summarized comparison of tools used at the development stage. In this Section it is also compared the main final products competitors. Section 3 introduces the project from a technical point of view, as well as the use cases. Section 4 explains how the prototype and the final app was developed. In section 5 the tests and results are discussed. Finally, in Section 6, the conclusions and future work guidelines are provided.

RELATED WORK

In this section are analyzed some related applications. This analysis enabled to examine the status of applications where it was possible to conclude that many had different intentions, for instance, many were more oriented towards the post-student life.

Aiming to develop mobile applications, three tools were studied. Table 1 compares the three main development tools available to speed applications development. In the first column, Android Studio is the Official Integrated Development Environment (IDE) for developing Android apps and is based on IntelliJ IDEA. In addition to IntelliJ's Code Editor and Advanced Developer Tools, Android Studio offers even more features to increase productivity when building Android apps (Zapata, B. C., 2013). OutSystems is a fast delivery platform for low-code applications that speeds up the delivery of mobile and web applications. Developers use an integrated development environment that covers the entire life cycle of development: development, quality assurance, implementation, monitoring and management (Golovin, D., 2017). Power Apps is the central technology used to do this project. It is a suite of apps, services, connectors and data platform that provides a rapid application development environment to build custom apps for business needs. Using Power Apps, you can quickly create custom business apps that connect to your business data stored either in the underlying data platform or various online and on-premises data sources (Rymer, 2019).

Table 1 : Comparison Table - At Development Level

Comparison Table - At Development Level			
Functionality	Android Studio	OutSystems	Powerapps
Low Code	✗	✓	✓
Easiness Listing Entity Data	✗	✓	✓
Date/Time Pickers easy to use	✗	✓	✓
Easiness Data inserting	✗	✗	✓
Local Data Base	✓	✗	✓
Search For Specific Queries	✗	✓	✓
User Friendly	✗	✗	✓
Development Speed	✗	✓	✓
High Security Level	✗	✓	✓
Automatic real-time Data Verification	✗	✗	✓
Affordable Price	✓	✓	✓

From Table 1, it is possible to conclude that PowerApps is the most suitable tool for fast development of mobile application since it offers all the “must have” requirements from a developer point of view. Android Studio and Outsystems, are both equally outstanding applications. However, they don’t offer such versatility and efficiency.

In Table 2 is presented a comparison of final products that directly compete with the proposed application. LinkedIn is a social business network founded in December 2002. It is comparable to other social networks and is mainly used by professionals in order to present their skills, in a way that other professionals from the same company can approve, giving credibility to the content. This application is relatively important because it has the ability to expose the capabilities of users so that third parties and companies can find more quickly and efficiently any person suitable for the job in question (Skeels, 2009). In more detail, the “Personal Profile” includes a sub-menu devoted to showing basic information about the user. The “Shared Profiles” is related to the social nature of LinkedIn and the “Add Certifications and training Courses” is linked to the idea that LinkedIn allows users to add Certifications and Training Course attendances to their profile.

Sumry uses each user's unique story to create connections. Helps to create job portfolios and online resumes. It is a platform that highlights education, specialization, certifications, user's professional experience and presents recommendations from people who may have worked with them in their previous work. As soon as the user finds a vacancy of interest, it offers an opportunity to be introduced to the company even before the user officially submits an application (Alexander, S., 2016). In this case the “Personal Profile” includes a sub-menu devoted to showing basic information about the user and the “Shared Profiles” is related to the social nature of Sumry. Finally, the “Add Certifications and training Courses” is linked to the idea that users are allowed to add Certifications and Training Course attendances to their profile.

The proposed application, Digital-Student, supports the most essential features present in LinkedIn and Sumry. At the same time, Digital-Student improves the ease of finding out which more students from the same educational institution attended the same Training Course and supports additional adding of those Training Courses automatically via a QRCode.

Table 2: At Final Product Level

Comparison Table - At Final Product Level			
Functionality	**LinkedIn**	**Sumry**	**DigitalStudent**
Personal Profile	✓	✓	✓
See which students attended the same training courses	✗	✗	✓
Shared Profiles	✓	✓	✓
Add Certifications and training Courses	✓	✓	✓

PROJECT ANALYSIS AND USE CASES

This chapter will include an in-depth analysis of the project structure, a brief discussion of the application architecture, an explanation of the use cases and an analysis of the database model.

Figure 1 describes the communication model between the various applications used to develop this project. In (1) is represented the "power automate" that is responsible for helping create automated workflows between applications and services for file synchronization, notifications and data collection. It provides a simple code platform for process and workflow automation. Communication from (1) to (2) and (2) to (1) is done automatically and from (2) to (3) is done by connecting both the application and the Data Base to the same repository (what is called "Solution" in PowerApps).

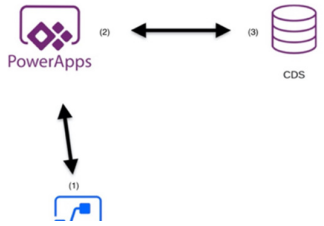

Figure 1 : Communication Scheme

The application is developed on the PowerApps platform and will communicate with the PowerAutomate service, which is part of the PowerPlatform cloud services. In order to prevent the data from being stored locally, the application will also communicate with a database in the CDS (Common Data Service) where it will store and read data that is crucial to its proper functioning.

The use cases, Figure 2, were collected from both customer and developing team. The input from the customer was recorded in the format of a low detail prototype (Figure 3). Other use cases, suggested by the developing team were translated into extra features in the final app, such as, DarkMode and search functions throughout the app.

In order to gather the use cases of the proposed application, throughout the development of the project, several (Scrum) meetings were held with all intervenient (programmers and users).

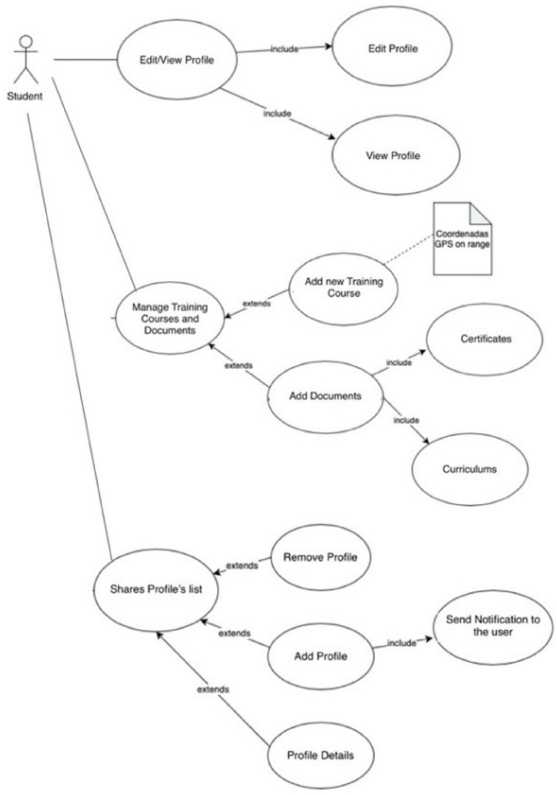

Figure 2 : Use Cases

Throughout the development of the project, several meetings were held with both advisors. In these meetings, various subjects were discussed such as: the student's qualification in the project, main points about the development, difficulties encountered and discussion of steps to overcome such difficulties.

PROTOTYPE AND APPLICATION

After the requirements, prototypes were made in order to idealize the application structure. Following an intensive study of the technologies and tools to be used in the implementation of this project, the specific goals of the project were elaborated on the prototypes illuminating the interface of contact with the user. Paper and pencil were used to make these prototypes.

In the depicted prototype, Figure 3, we can see the sketch version of the user's Profile on the left and the Shared Profiles on the opposite side.

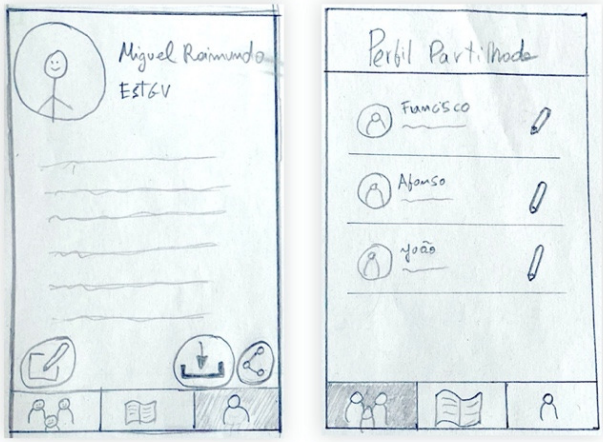

Figure 3 : Example of a Low Fidelity Prototype

After the first prototypes finalized, the final application design was created. It is presented in Figure 4, bellow.

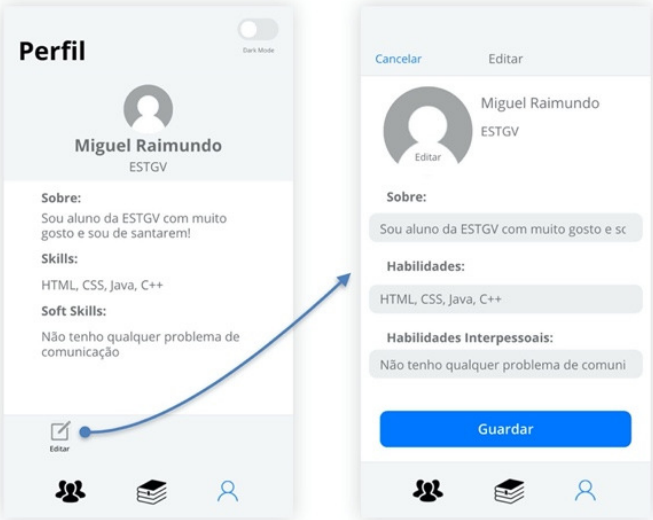

Figure 4 : Example of the final Application Design

Database Model

The application database model is presented in Figure 5. The Relational Data Model represents the tables and the relationship between them, schematically in order to obtain a representation of the existing Database. XMLToolBox tool was used to generate the Data Model. This model represents how all the data that is collected through the app is being stored.

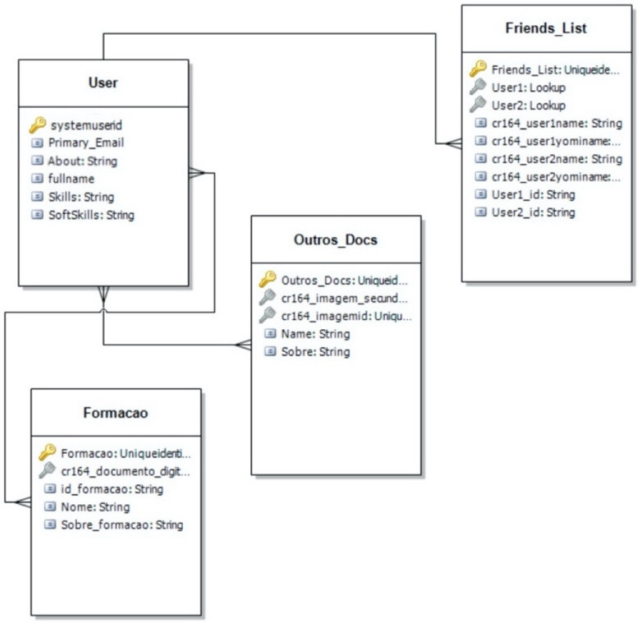

Figure 5 : Database Model

The database table “User” is used to store the data of the users of the application. Its primary key is the “systemuserid” field. It consists of the "About" field that represents the About section of the user profile and the "Skills" and "SoftSkills". It also consists of "Primary Email" and "full name" which represent the unique email of each user and the Full Name.

The database table “Friends List” is used to store the data of the shared profiles. Its primary key is the unique id “Friends_list” field. The fields "User1" and "User2" represent foreign keys resulting from the relationship with the "User" table.

The table “Others_Docs” is used to store the documents and certificates of each student. Its primary key is the “Others_Docs” field, which represents a unique id for each record. The fields “cr164_imagem_secundaria” and “cr164_imagemid” represent foreign keys resulting from the relationship with the “User” table. The fields "Name" and "About" refer to the name and an About section of the document.

Finally, the “Formacao” table is used to store the training courses that each user attended. Its primary key is the “Formacao” field, which represents a unique id for each record. The “cr164_document_digitalizado” field represents a foreign key resulting from the relationship with the “User” table. The “id_formacao” field represents a unique id for each record too. The fields "Name" and "Sobre_formacao" refer to the name and an About section of the training course.

Application

The objective of the current section is to demonstrate the implementation of the features developed for the application in accordance with the requested requirements.

Right after logging in, into the PowerApps application with Office365 credentials provided by the educational institution and opening the DigitalStudent application, the user is presented with the home page (Figure 4), which is the profile. When editing the profile (and after filling in all the required fields), with the intention of saving its changes, the user will have to select the “Save” button. After

selecting this button, in addition to navigating to the “Profile” screen again, it will acquire all the information that was written in the text fields above and will perform an Update in the Users table. This is accomplished using the PowerApps “Patch” command. A notification is also presented to the user that the profile has been saved successfully.

The “training courses and other documents” are available to the user to add the training courses they attended and other documents, such as the certificates or curricula.

When the student intends to be present at a training course, he will need to read a QRCode generated by the person responsible for the training course. GPS coordinates restriction has been implemented in order that someone outside of the educational institution can’t read the QRCode. Note that, because GPS is not accurate inside buildings, other methods based on Bluetooth (BLE) beacons and WIFI are currently being implemented, for indoors precise location detection.

Thus, if the coordinates of the user's device match the coordinates of the educational institution installations, a warning will be shown saying “Training Course added successfully”. Otherwise, the warning shows a message “You’re not at the correct location”. It is also possible to see which more students have taken part in a certain training course. After selecting the training course, the student attended, there is a "More People" button which brings us to a new screen that shows all users who have attended the same training course. The "Certificate" button is also visible, which is used to upload the training course certificate.

The other documents section, as already mentioned, is intended to provide the possibility of adding documents and other certificates to the students’ profile. Here you can add a name to the document, a short description and the document itself (in JPG or PNG format). As in the User Profile, a previously added document can also be edited or deleted.

Finally, shared profiles are the last subdivision of the application. Here, the student has the opportunity to consult information about other users. This possibility is limited depending on the student's presence in the list of students with a profile shared with the student who is logged in. That is, each user will have a list of shared profiles in which all users share the profile with the user logged in to the application. The user who logs in may consult information about the other user, such as Skills, SoftSkills, documents and even training courses. Subsequently, all users on this list also have the opportunity to consult all this information about the user logged in.

To add users to this list, the student will only need to select the "+" icon as shown in Figure 6 and a list will be presented with all students who use the application and who are not yet in their shared profile list. From there, "Add" must be selected by the student. Of course, after adding a new shared profile, the user is always free to delete the "relationship" between them.

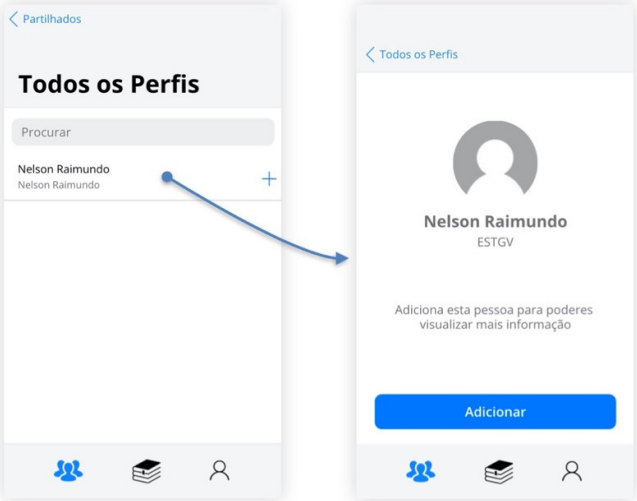

Figure 6 : Adding a Shared Profile

In the process of adding a shared profile, the user that is added receives a notification on his device that informs him of the addition made by another user. This is done by using PowerAutomate which allows the automatic workflow creation that minimize the programming required for certain features. In this case, it was used to automate the notification sending process. Analyzing Figure 7, bellow, the notification is shown on the mobile phone where Francisca Raimundo is logged in.

Figure 7 : Notification

It is worth noting the DarkMode implementation on this application. Bearing in mind that it is an application that takes ideas and certain characteristics from certain social networks and that it will not only be used during school hours, DarkMode has been discussed and implemented. It allows the application to be used (even) more comfortably and saves the battery (when using OLED screens).

The Figure 8, below, shows the DarkMode application screen. It can be switched on and off via a toggle on the main screen.

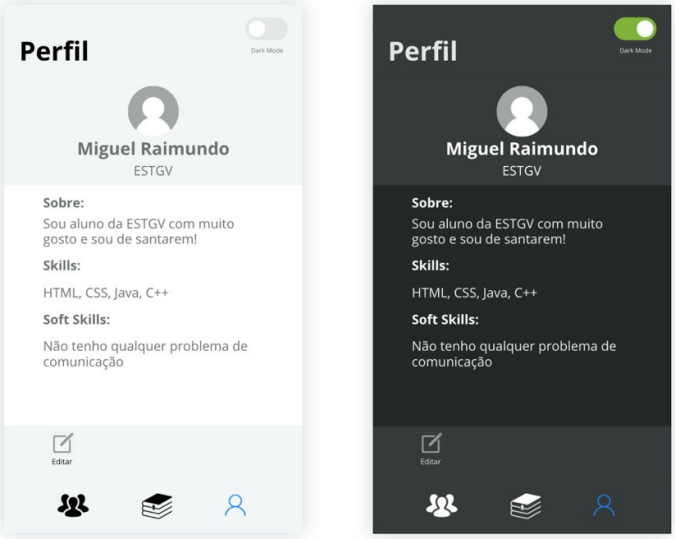

Figure 8 : DarkMode

RESULTS AND TESTS

This chapter describes the experimental setup and testing phase, one of the most important in the development of software. This is a process that has the goal of verifying whether the developed project performs the functionalities for which it was intended, in which both functional and non-functional requirements are validated.

Table 3: Nielsen Heuristcs

Nielsen Heuristics		
Number	**Heuristic**	**Adopted Solution**
1	System status visibility	In the application, the bottom bar or navigation bar shows the section icon where the user is in blue.
2	Correspondence between the system and the real world	Intuitive buttons were chosen, and the information was presented in a logical and natural way. The sub-menus are properly identified with suggestive text.
3	User control and freedom	In order to provide the user with escape mechanisms in the event of an error, the user can always use the “Back” option.
4	Consistency and standards	All menus and buttons are used in the application in the same way, so that the user, when already used to, immediately looks at and intuitively realizes its action.
5	Prevention of Error	Error or information messages are shown to the user as soon as he performs an operation involving other processes. Offering feedback to the user means that he is constantly informed about the actions he performs.
6	Recognition instead of remembering	To minimize the amount of information to be memorized by the user, the application provides skeuomorphic buttons that can be easily recognized.
7	Flexibility and efficiency of use	Experienced users can take advantage of "accelerators" to be able to act more quickly. An example could be to search for a specific shared profile instead of viewing all shared profiles.
8	Aesthetic and minimalist design	Taking advantage of the design of some existing application platforms, it was possible to achieve a very minimalist and easy-to-use design. Note the addition of DarkMode for even better viewing convenience.
9	Error recognition and recovery	Error messages are provided in plain text, so there is no error on the part of the user.
10	Help and documentation	Some screens have a “?” Icon which can be selected for help on that specific screen.

Bearing in mind that this application will be used in an educational institution environment the following devices have been used for the Experimental Setup: a emulator on the PowerApps platform running on Google Chrome on an MacBook Pro 2.7 GHz Dual Core i5 Intel Core, iPhone 11 PRO 256 GB, iPhone 6 32 GB and Google Pixel 3.

Among the many possible tests, the most relevant were taken into account, depending on the needs of the project. These are Usability tests and Acceptance tests

Usability tests, which are carried out by real users, provide very important information on the functioning of the final product. The quality attribute Usability has a high priority and, as such, the 10 Nielsen Heuristics were followed during the development of the application. Heuristic evaluation is an informal method in which a number of people or evaluators are asked about different aspects of the design (Nielsen J., 1995).

In order to satisfy the 10 Heuristics presented below in Table 2, the following solutions have been considered. From Table 3, it is possible to conclude that all Nielsen Heuristics were considered. Consequently, all the proposed solutions were well adopted by the final user. Highlighting the minimalist design and the consistency of menus and buttons. Note the efficiency of search bars to give the final user a more effective and quicker method of finding out the specific Shared Profile/Document/Training Course.

Acceptance tests were carried out by the customer and by a selected group of students, after the usability tests presented in Table 4. Although customers were in direct contact throughout the development of the project (i.e. during Scrum meeting), the functional requirements have been validated in the end. The requirements have been set out and, if implemented, it has been checked whether the behavior was as expected.

Using the MoSCoW prioritization technique the following priority levels were used to classify the functional requirements: *Must Have, Should Have* and *Could Have*. The *Must Have* are the most wanted requirements of the customer. The *Should Have* represents the programing team suggestions. Finally, the *Could Have* are more related with future features the app could integrate (Tufail, 2019), (Khan, 2015).

Note the presence of a requirement that has not been implemented but that presents a medium priority and thus does not invalidate the success of the project. The "Requests" feature to confirm that the user really wants to be added could not be implemented as a higher priority has been given to all other features. This feature will be described and discussed in greater detail in the next chapter.

Note that, at the current date the app is already in “production” available for a Polytechnique school in Portugal, and there is ongoing negotiation to make available in other 7. Statistical usage metrics are being collected, some of them are presented in chapter 6, “Conclusions”.

Table 4 : Acceptance Tests

Acceptance Tests - Functional Requirements			
Requirement	**Priority**	**Implemented**	**Result**
View profile	*Must Have*	Affirmative	Positive
Profile Editing	*Must Have*	Affirmative	Positive
Add a new document	*Must Have*	Affirmative	Positive
Add a new Formation via QRCode restricting via GPS coordinates	*Must Have*	Affirmative	Positive
Possibility of adding Certificate to the training course that the student attended	*Should Have*	Affirmative	Positive
Possibility to see which more people attended the same training course as the user logged in	*Should Have*	Affirmative	Positive
Possibility to remove training courses from the list of training courses the student has attended	*Must Have*	Affirmative	Positive
Possibility to remove documents from the student's document list	*Must Have*	Affirmative	Positive
Restrict viewing of other users' information if they are not in the "shared profiles" list	*Must Have*	Affirmative	Positive
Add a new user to the list of shared profiles for the logged-in student	*Must Have*	Affirmative	Positive

Notify user that was added by another user	*Must Have*	Affirmative	Positive
"Requests" to confirm that a user wants to be added	*Should Have*	Negative	Negative
"Search" function on all screens that makes sense	*Could Have*	Affirmative	Positive
Dark Mode	*Should Have*	Affirmative	Positive
Development of a separate desktop application to be used by the person responsible for the training course to create the QRCode	*Must Have*	Affirmative	Positive

CONCLUSIONS AND FUTURE WORK

The aim of this chapter is to provide the reader with a general perspective on the development of the project, accomplished results, and presenting a critical reflection, including a brief description of the future work.

The various phases of development were followed through the Software Engineering processes, where the functional and non-functional requirements of the project to be developed were identified and prioritized, formalized and approved through meetings with the client.

Bearing in mind that one of the most competitive applications of the application developed in this project is LinkedIn, one of the major advantages of the Digital Student application is greater personalization with regard to specific features for each educational institution. We also consider that, the learning curve to start using the mobile application is also very low when compared with solutions such as LinkedIn.

The application developed in this project is already deployed and being used in a polytechnic in Portugal, with an acceptance, in the computer science department, of approximately 91.45% (based on usage logs cross-referencing, with a questionnaire to which 300 students responded). We expect another 7 institutes to adopt the platform within a year and based on the application usage logs, 70% of users have a profile with 87% of personal information filled out. It is also noted that the average time that each user spends weekly in the application is 14 minutes (with a standard deviation of 3 minutes).

Overall, the proposed application presents the following contributions: in 3 months after the release of the app, 15 users gave positive feedback, reporting that they got a job and 33 users reported that they would suggest the app to a friend. Globally all users found the app easy to use and a good/fast way to keep the curricular information always organized and updated.

Future Work

The life cycle of a software project is never really completed, there is always something more that can be done to improve the quality, complexity and efficiency of the project. This project is no exception.

During the implementation of the project, situations leading to the formation of ideas for future implementation have been idealized and analyzed. Some of these ideas are outlined below.

Firstly, the missing functional requirements will be implemented, namely the "Requests" to confirm that the user really wants to be added. In the future, and in a longer period of time, it would be very useful to be able to integrate this functionality in order to make an even stronger application available to any educational institution.

Also, for future work, one of the most interesting features would be the addition of three more applications. One of these applications is used to mark the attendance of students in the classroom, the other for the purchase of food at the bar, and finally the last one for booking books in the library. These features were discussed with all team members who developed the applications described above, and it was concluded that there were numerous advantages added to all applications if they were unified or

at least interconnected. One of these advantages would be that students would not need to have more than one application to do everything the three do.

Another important point, of course, would be the combination of the functionalities developed in this project with the interface and user experience developed, for example, by professional application designer. This would eliminate any flaw our team of development couldn't eliminate.

Consequently, the importance of referring to the improvement of the complementary application of the creation of the QRCode. This could then present dynamic fields in which the user would choose which and how many would be presented in the QRCode for improvement and greater complexity.

Finally, we also propose an automatic darkmode, based on illumination and time of the day. Additionally, and already under development, indoor accurate location detection, based on BLE beacons and the WIFI signal fingerprinting (Martins P., 2019).

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An Overview on Azure Cloud Cognitive Services Oriented to Text, Face, Image, And Video

[1]Pedro MARTINS, [1]Cristina WANZELLER, [1]Filipe SA and
[2]Maryam ABBASI

[1]CISeD – Research Centre in Digital Services, Polytechnic of Viseu, Portugal
[2]University of Coimbra, Coimbra, Portugal
pedromom@estgv.ipv.pt, cwanzeller@estgv.ipv.pt filipe.sa@estgv.ipv.pt, maryam@dei.uc.pt

Abstract

Features analysis such as, sentiment, colors, faces, objects are nowadays provided by web services which are dedicated to text analysis, images, video, and face recognition services. These services are a part of an overall Cloud-Vision process to determine the match-likelihood of each object/text/face to a template element from a database. Microsoft Azure is a growing suite of services in the cloud that provide among other services face recognition, video analytics, image analytics, text analytics to the general public, for instance: banking, public services, private companies, cellphone users. All of these potential users raise the interest in services that can be easily used and if necessary, to scale without a substantial initial investment.
In this article are tested and compared four cognitive (Azure based) services, first oriented to text, second oriented to detect general purpose objects in images, third for face recognition applied to photos, and finally, the fourth service oriented to video. All the services are described, tested and compared, regarding, how to set up, pros and cons, points in common, and their learning curve.

Keywords*:* Azure; Visual computing; Text analysis; Face recognition; Video; Sentiment; Cloud service; Cognitive.

Introduction

For the last decade that, cognitive applications can automatically identify emotions, objects, and faces on captured everywhere (e.g., images or videos), for instance in applications such as surveillance, airport security, law enforcement, and border patrol. Recognition algorithms analyze texts, images, faces, and videos, to extract information such as the shape, size, and position features, and then use these extracted features to search for matches. The algorithms of highest accuracy (e.g., over 90% for face recognition) typically require intensive computation (Yang et al. 2002), thus making very attractive the use of cloud services for such processing purpose.

Mobile devices have increased their computational capacity, with more memory, more processing power, storage, and sensing capabilities. Additionally, it is possible to rent computational resources using the available cloud computing data centers (Varia & Mathew 2014) (Cusumano 2010) (Buyya et al. 2008). This paper describes and compares four cognitive Azure Cloud services. First, Text Analytic service, which provides text analysis that allows detecting the text language, sentiment, entities and key expressions present in the text. Second service, Computer Vision, analyses an image and returns the elements present on it (e.g., celebrities, landmarks, cloths). The third service, Face recognition, whose function is to detect, identify and analyze faces of people in an image. Finally, the video indexer, which allows to identify and classify what is on a video (e.g., people, sentiment, text, clothes, objects, sound). Based on the study performed in this paper the compared cognitive services have their features and others in common. This paper is organized as follows; Section 2 resumes the

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related work on the field of cognitive computation. Section 3 describes experimental setup for each service. Section 4 shows the comparison between the studied services. Finally, Section 5 Concludes the work and introduces some future work key points.

Resumed Related Work

Without a doubt, Artificial Intelligence (AI) is an important part of information technology today, and it will be more and more relevant in the future. Developers are using artificial intelligence in the form of services solutions offered by software giants.

Microsoft provides in their AI Platform a set of services and tools that applications can consume. The AI Platform includes services for creating bots; services for machine learning and deep learning; and services for analyzing pictures, real-time videos, and speeches (Del Sole 2018). In the same fields, other software services providers offer very similar services such as Google, Amazon, and IBM.

The access to services is done via APIs. Services are pre-trained and can be directly fed with the users' data to get instantaneous results. Thus, these services do not require machine learning expertise knowledge (Zhang et al. 2010).

Currently, these services APIs can be divided into four big groups:

1. Text Recognition, translation and text analysis (Cimprich et al. 2018);
2. Image recognition and analysis (Browning et al. 2018);
3. Video analysis (Yaseen et al. 2018);
4. Other related services (e.g. face recognition) (Dosaj et al. 2018);

When comparing speech and text processing from the four main cloud service vendors it is possible to find different support for different features. Table 1 enumerates the main features each one of the four main cloud services oriented to text analysis support.

Table 1: Text services comparison

	Amazon	Microsoft	Google	IBM
Speech to text	x	x	x	x
Text to speech	x	x	x	x
Entities extract	x	x	x	x
Key phrase	x	x	x	x
Languages	100+	120	120+	60+
Topics extract	x	x	x	x
Spell check		x		
Autocomplete		x		
Voice verification	x	x		
Intention	x	x	x	x
Metadata extract				x
Relations analysis		x		x
Sentiment	x	x	x	x
Personality				x
Syntax		x	x	x
Tagging		x	x	

Filter content		x	x	
Translation	6	60+	100+	21
Chatboot	x	x	x	x

From the analysis of Table 1, Microsoft cloud service for text recognition and analysis shows to be the most complete, i.e., with more features to offer.

Another cloud service featured by large software vendors is the image analysis service (Chang 2018). Table 2 compares the first image analysis clouds that provide this type of service(s).

Table 2: Image recognition services comparison

	Amazon	**Microsoft**	**Google**	**IBM**
Object detection	x	x	x	x
Scene detection	x	x	x	
Face detection	x	x	x	x
Face recognition	x	x		
Facial analysis	x	x	x	x
Inappropriate content	x	x	x	x
Celebrity recognition	x	x	x	
Text recognition	x	x	x	x
Written text recognition		x	x	
Search similar images			x	x
Logo detection			x	
Landmarks detection		x	x	
Food recognition				x
Dominant colors		x	x	

Based on the analysis of Table 2, Google cloud service, is the one with more features oriented to image analysis. Nevertheless, other services are also very complete.

Similar to text and image, video analysis of different software giants offers different features, except IBM that does not support video analysis. In the Table 3 is a comparison between cloud service providers for video analysis.

Table 3: Video analysis features comparison

	Amazon	**Microsoft**	**Google**
Object detection	x	x	x
Scene detection	x	x	x
Activity detection	x		
Facial recognition	x	x	
Sentiment analysis	x	x	
Inappropriate content	x	x	x

Celebrity detection	x	x	
Text recognition	x	x	
Person tracking	x	x	
Audio transcript		x	x
Speaker indexing		x	
Keyframe extraction		x	
Video translation		9 lang.	
Keyword extraction		x	
Brand recognition		x	
Annotation		x	
Dominant colors			
Real-time analysis	x		

Accordingly, with Table 3, Microsoft cloud is a winner. However, Amazon has the most efficient video analysis APIs as it supports streaming videos. This feature tangibly extends the spectrum of use cases (Li et al. 2018) (Varghese & Buyya2018).

Given all the previously studied related work topics, in this paper is focused on the Microsoft Azure cloud services oriented to text, image, face, and video analytic.

Experimental setup

In this section is introduced each cognitive service and the experimental setup used to compare the four services. For each service, a global description of the steps to set-up the services are given, then the description of the obtained output is enumerated. More forward in this paper, in Section 4, the results are shown, and features are compared.

Text Analytic

To test this service the following text of "Donald Trump" speech was analyzed:

> "Let us choose peace and freedom over domination and defeat. And let us come here to this place to stand for our people and their nations, forever strong, forever sovereign, forever just, and forever thankful for the grace and the goodness and the glory of God."

Then for the analysis of the text, the Azure API was set-up with the following steps:

- Get a subscription key on the azure portal on section "Cognitive Services".
- Use the http request URL:
  https : *//*[*location*].*api.cognitive.microsoft.com*
  */text/analytics/v*2.0*/*[*feature*]. The location can be set to "westeurope".
- Complete the feature of the URL depending on the desired return values; "languages" for the API to detect the language used; "Entities" will return the detected entities in the text;

"KeyPhrases" to return the key-phrases of the sentence; "Sentiment" will return a score of the detected sentiment of the text.

- Use the previous URL for the requests which can also be used to send the text to be analyzed (e.g.: the URL:
  https : *//westeurope.api.cognitive.microsoft.*
  *com/text/analytics/v*2.0*/language* will detect the language of the wanted text).

This service can as well detect text in an image. For that it uses an OCR service. Results are returned in JSON format and include:

- Detected language - returns a score between 0 and 1, the closer to 1, the more certain that the identified language is true.
- Entities - the recognized entities like company logos and celebrity names.
- Key Phrases - the most relevant key phrases in the text.
- Sentiment - Returns a score between 0 and 1 that indicates the sentiment of the text, being 1 a positive sentiment and 0 a negative one.

Face

The face recognition service receives a photo though an API, Figure 1, then Azure Face API processes the photo and return the results in JSON format. This service includes, face detection, find similar faces, group faces accordingly with face similarities and the face identification.

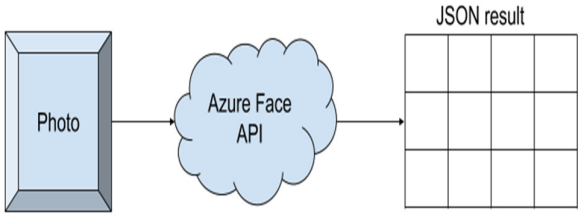

Figure 1: Azure Face API

This service was tested with two photos, Figure 2 and Figure 3.

The face detection includes several services. In this setup, we focus only on face detection. All the others follow the same logic. Then for the detection of faces, the service must be set-up by following the steps:

- Get a subscription on azure portal to face API, on section "IA-Machine Learning". In subscription its necessary choose an endpoint (location) and after that will be assigned the subscription keys.

  Create an HTTP request using the following syntax,
  https://[*location*].*api.cognitive.microsoft.com/face/v*1.0*/detect*[?*returnFaceId*][?*returnFaceLandmarks*][?*returnFaceAttributes*]

Figure 2: Face API test photo 1 **Figure 3: Face API test photo 2**

By default, is only returns the "FaceId" value, the other features are disabled, to obtain this value it is necessary to specify them. To return "faceLandmarks" values its necessary put "returnFaceLandmarks = true", and to return "FaceAttributes" it is necessary put the desired attributes, for example "returnFaceAttributes = age, gender, emotion".

- Put the subscription key on the request header.
- Put the image to detect on a *bytearraycontent*, with the header "application/octetstream".
- Execute the REST API call.

The outputted results include:

- faceId - unique values generated by API to identify detected faces.
- faceRectangle - rectangle coordinates for the face location on image.
- faceLandmarks - landmarks pointing to the important positions of face components.
- faceAttributes - specified visual attributes of a detected faces.

Digitized Image

This service detects objects in images (e.g., computer, piano, suite, animals) and text. This service provides more functionality; besides face detection, it also includes the text analytic among the detection of otherworldly objects.

Figure 4: Digitized image

In Figure 4, is the image used for testing the service. For the objects detection the service must be set-up by following the steps:

- Get a subscription key on the azure portal on section "Cognitive Services".
- Use the http request URL:

https : *//*[*location*].*api.cognitive.microsoft.com/ vision/v*1.0*/analyze*[?*visualFeatures*][*details*] [*language*].

- The location can be set to "westeurope".
- The visual features and details are based in what you want to receive in the output. The "language" is the one that will be used in the returned JSON can be for instance, "en" English (default) or "zh" simplified Chinese.
- Convert the image that will be analyzed in a byte-array. This array will be sent in the http request along with the previous URL.
- The subscription key needs to be sent in the http request header.
- Call the URL request with his header and the API returns a JSON file based on the information of the URL.
- For example, the URL to get a return of the categories and faces of an image it would be: "*https: //westeurope. api.cognitive.microsoft.com/vision/v*2.0*/analyze*? *visualFeatures = Categories,Faces*".

In this case the location was West Europe and the language was default (English).

The outputted results, in JSON format, include:

- Categories – categorizes image content according to categories defined.
- Tags - tags the image with a detailed list of elements related to the image content.
- Description - describes the image content with a complete English sentence based on the detected elements.
- Faces – Identify gender, age and face rectangle.
- ImageType – identify if the image is real, animated, clipart, draw etc.
- Color – indicate the dominant color and accent color.
- Adult – detects if the image is adult or racy content.
- Celebrities (details) – Identifies celebrities returning their names, face rectangle and the confidence (that is that celebrity).
- Landmark (details) – identifies landmarks returning their names and the confidence (that is that landmark).

Video Analytic

The video analytic service from Azure cloud applications (commonly known as Video Indexer) allows for a given uploaded video to detect all the previous services features, for instance: text, sentiment, sound, faces, persons, objects. Furthermore, it allows, other features, such as the creation of subtitles, jump in the video timeline to specific subjects or topics, follow where a person is on the video, detect textual or visual adult content and much more.

The following steps are required for the setup of the video detection service:

- Create an account at the web portal (https://www.videoindexer.ai/) made available by Microsoft, where the user will be able to upload videos and extract/analyze information through the use of a friendly interface.
- Sign-in into the Api-portal (https://api-portal.videoindexer.ai/).
- Subscribe the authorization Product.

- Start using the API services in “operations” through the use of access token (when required), generated by the authorization key, and the SubscriptionKey.

The output results can be viewed, through a web interface or via API, mostly in JSON format, which include the features of:

- Audio Transcription and visual text recognition.
- Automatic Language Detection (9 different languages)
- Caption of the videos(VTT, TTML and SRT).
- Detection of adult content, both visual and textual.
- Face detection.
- Celebrity identification.
- Speaker enumeration and statistics.
- Topic inference.
- Emotion detection (joy, sadness, anger, fear).
- Extraction of Artifacts (“next level of details”).
- Translation of the audio transcript to 54 different languages.
- Search of insights such as spoken words, actions, objects, people.
- Extraction of Artifacts (“next level of details”).
- Audio effects identification (hand claps,speech and silence).

The video used for the purpose of testing how this service can be setup and how it works can be found at the following link, https://www.videoindexer.ai/accounts/5ac76a34b397-41d5-ba1a-2f001891c357/videos/27152aad55/click here.

Comparison Evaluation

In this section the obtained results of the services are resumed and shown based on the input described in Section 3.

Text analytic

The previous results shown are relative to the quote in Section 3.1 where is being analyzed the language, sentiment, entities and key phrases (respectively). In the tests for analytic language detection output, it is possible to see the detected language with the level of certainty (in the case the score is 1.0, so it is certain that the used language is “English”).

Test performed to analytic sentiment, it is important to notice the score of the sentiment detected on the quote Being 1 a positive sentiment and 0 a negative one. In this case was 0.8 this means that the quote is a positive one.

For the detection of the entities present in the quote we can use analyze in Test done to analytic entities, in the results it we can see that the API detected the entity “Glory (religion)” and then it returns the “wikipediaID”, “wikipediaURL” and “bingID” for future searches related to the detected entity.

Finally, the output in tests with the analytic key phrases detection output result shows the key phrases detected on the quote.

Face Detection

The face API was tested with Figure 2, from which the returned result was not conclusive. After executing the face detection, the API does not return any results with the given image. This happens due to the fact that the faces, in image, are too small to detect, less than 36x36 pixels, leading to conclude that the face API is not efficient if the faces in the image are smaller than 36x36 pixels or image have very low quality. After this failed test, Figure 3 was uploaded and tested. This figure includes bigger faces and that make face detection better and more recognition precision. After execution, the Azure face detection on this image, the following result shows a resumed output in JSON with the detected face features.

Tests using Figure 3, the face API show output result having detected six faces (the JSON object shown only contain data from one detected face). For each detected face returned, is possible to observe values of coordinates of face location, FaceRectangle, and the important face components detected, faceLandmarks (e.g.: pupilLeft, pupilRight, noseTip). Also, it is possible observe other values of face attributes:

- Gender - it is the gender of a detected face, male or female.
- Age - is an estimated “visual age” in years.
- Smile - it is a number between 0 and 1 which represents smile intensity.
- Emotion - percentage of confidence for each emotion.
- Hair - this attribute returns three variables, if person is bald in percentage of confidence, if hair it is visible on image and, percentage of confidence for each common colors.
- Facial Hair - return a number between 0 and 1 for three areas: moustache, beard and sideburns. This number increases with the beard size.
- Exposure - It is a face exposure level, and can take 3 values: “GoodExposure”, “OverExposure” or “UnderExposure”.
- Accessories - Returns if detected face contains headwear, glasses or mask. If this attribute is empty, the face does not contain any of these accessories.
- Glasses - If person as wearing glasses, return which type of glasses (“ReadingGlasses”, “Sunglasses”, “SwimmingGoggles”), and if not wearing any, returns “NoGlasses”.
- Makeup - It is compound by two variables, eyeMakeup and lipMakeup, how can be true or false, depending of makeup detected in face.
- headPose - Contains the three angles for face direction (roll, yaw, pitch).

Digitized Image

The digitized service was executed with Figure 4, from which the following output was generated. For the Figure 4, it is possible to find, categories “abstract” and “outdoor” but due to low confidence, and it is possible to know that the API failed to return a trusted category. The description is separated into two topics: “Tags” - all the elements recognized; “Captions” - a brief description of the image with a confidence (between 0-1) based on the elements previously recognized.

Since with Figure 4 results were not the best, to better compare the results from this API and the Face API, Figure 3 was submitted to the digitized image API. For that we will only analyze the results that are more comparable between both APIs.

Tests with Figure 3, output results show that this API identified two of the people present in the image as celebrities presenting their names, the confidence and face rectangles. In the other important and comparable topic is the “faces”. Using the Digitized image, the output show the detection of the six faces presented in the image (only one example is shown because of its size). For each one of the detected faces there are three subtopics: “age” - age of the person based on his face; “gender” - gender of the person based on his face; “facerectangle” - subtopic that returns four positions for the caption of the face.

Now comparing this output result with the Face API result previously explained we can see that there are some similarities: Both API return the face rectangle, the gender and the age of a detected face. But they present some differences:

- Only the Digitized image API can detect and recognize a celebrity. The only way that the Face API can do that is if the face is compared with another face previously saved, in other words, the Face API only can recognize faces if that face was previously saved in the application made by the user.
- The Face API can not only return the face rectangle but also all the face landmarks, attributes and emotions being much more specific about the face analyze.
- Although not shown in this example, the Digitized image can detect text, landmarks and adult content.
- On the other hand, the Face API can compare faces and tell if it is the same person or not and organize many unidentified faces into groups, based on their visual similarity.

Video Analytic

The video analytic service besides the traditional API which returns a JSON file also includes a web-portal which allows the user to manage the output without having to write a single line of code, Figure 5. In this next example, in order to demonstrate the use of the API service we choose to use the “Get Video Artifact” API, that when called on a URL will retrieve insights or information, in format JSON, from a specified subject, in this case emotions that were detected on the video linked above which is located in our account. Test, video analytic output results demonstrate that it is possible to detect that all types of insights were indexed: the time range in the video where emotions were detected, as well as the duration; the dominant emotion detect on that time range and the probability, the dominant emotion is calculated by the fusion of the textual and vocal results, which contain the emotions detected and their probability, when merged they originate the fused results in which is determined the dominant emotion; the text in which the emotion was detected. This is just one of the many features that can be used through the API service. It can also be used to upload videos, extract and search all sorts of information to the developer’s applications, making them more intelligent, by having more discoverable content and engaging videos on their apps.

As we former mentioned Video indexer insights can also be viewed using a web portal. In this portal the information appears in a more engaging and accessible way to the user. In here we can play the video, Figure 5 on the left, and see the insights on the right. This portal can also be used for research of speeches, objects, people or topics, separately or as a group. Video indexing service has been and will suffer multiples updates through the years in order to not only

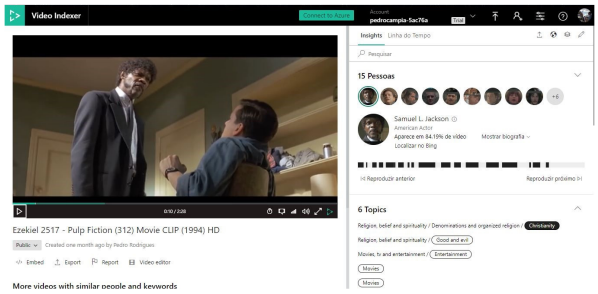

Figure 5: Web-portal video analytic output

extract information but also personalize, search or publish it. At this moment it can be best described as merger of Analysis Multimedia, Azure Search and Cognitive services being these, Face API, Microsoft Translator, the Digitized Image API and the Personalized Voice Service.

Conclusions and Future work

Text, image, face, and video cognitive recognition cloud services are becoming more accessible to the general public, without the need to acquire expensive hardware. In this paper, we make an overview of three services oriented for text, face, image, and video. The text detection service can also be found on the image and video service. Also, the face detection service is present on the service for the image (objects detection) and video. Table 4, shows a resumed comparison of the studied

Table 4: Different services Azure features comparison

	Text	Image	Face	Video
Text detection	x	x		x
Face detection		x	x	x
Objects detection		x		x
Emotion	x	x	x	x
Adult content	x	x		x
Celebrity Recog.		x		x
Language Recog.	x	x		x
Face comparison			x	x

cloud services. On the first horizontal row are the services, on the first vertical column the features. The "x" marks if each service feature is supported or not. Note that, during our tests, results from one service to the other, using the same input (e.g., same face), results were equivalent. As it is possible to observe from Table 4, different purpose services offer the same features. Also, necessary to refer that the emotion detection, is supported in all services, text, image, face, and video.

As future work, the studied services are going to be compared between different cloud services provides, namely, Amazon, Google, and IBM.

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Logistic Customer Service on The Example of Selected Logistics Companies

Iwona WASIELEWSKA-MARSZAŁKOWSKA

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, iwasielewska@umk.pl, ORCID: 0000-0001-6830-7859

Katarzyna SAMEK

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, katarzyna.samek@umk.pl, ORCID: 0000-0002-5519-8558

Abstract

Customer service is currently one of the tools for competing companies providing logistics services. The article is devoted to the logistic assessment of customer service provided by companies providing logistic services. The first part of the article focuses on the theoretical aspects in which the authors synthetically (based on a systematic review of the literature) explain the essence and elements of logistic customer service. The second part is devoted to the empirical analysis of the 3 surveyed companies providing logistic services. The article aims to present and evaluate the elements of logistic customer service according to division into pre-trade, transactional and post-trade elements in selected companies providing logistic services. The following companies were selected for the analysis: DHL, UPS, DB Schenker. The choice of these companies was dictated not only by the need to compare individual elements of customer service. It was also checked whether the methods of accepting orders / orders from recipients differ in the surveyed companies, as well as the methods and forms of measuring customer service and communication channels (information flow) between the company and the customer in the analyzed cases. The aim of this article is to present and evaluate the elements of logistic customer service, such as pre-trade, transactional and post-trade elements in selected companies providing logistics services.

Keywords: customer service, logistics customer service, logistics customer service management

Introduction

The saturation of the market with logistics companies means that the determinant of competition is not so much the availability of services, but the provision of them at the highest possible level. The quality of the services offered and the care for the needs and preferences of the client determine the competitive position of modern enterprises. The role of the final recipient and the importance of customer service are becoming increasingly important in business practice. Companies are trying to outdo each other in providing services at the highest level, at the best possible adjustment of the offer to the growing expectations of buyers.

Contemporary organizations are forced to look for new competitive tools that will allow them to stand out on the market and gain new customers. Therefore, in the competitive struggle, customer service, and above all its quality, is becoming more and more important. Biesaga-Słomczewska and Iwańska-Knop explain that this is the company's professionalism manifested in maintaining appropriate standards at every stage of the logistics process. It is about the moment when the customer places an order, up to the final delivery (E. J. Biesaga-Słomczewska, K. Iwańska-Knop). Current customers, when making purchasing decisions, are guided not only by the functionality and features of the product / service, but more and more often they take into account professional and fast service, which provides

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them with added value and increases their satisfaction and satisfaction with the purchase. Customer service, therefore, plays an important and indisputable role in this respect, which allows to build trust between the company and the customer, which turns into long-term partnerships.

The dynamics and competitiveness of the modern market makes logistic customer service an important success factor for enterprises operating on the market. Therefore, it is necessary to improve the elements influencing the level of logistic customer service. Taking appropriate actions in this area, and thus preparing and implementing an appropriate logistics strategy for customer service, becomes important from both the survival and development of the company, as well as achieving a sustainable competitive advantage. It is therefore reasonable to research and evaluate the logistic customer service in modern enterprises, taking into account its individual elements. This is particularly important in the logistics supply chain, where customer value, satisfaction and trust are capital that increases the market value of each link in the chain (Maik, 2012).

Methodology

A systematic review of the literature was carried out, the method of non-participant observation was used in the empirical research, and the texts (reports, notes and announcements) of the surveyed companies were analyzed. In the conducted research, the authors used the triangulation technique based on the approach of N. Denzin (Denzin, 1998) and M. W. Lewis (Lewis, 1998) and W. Czakon (Czakon, 2016). The literature review was carried out in 5 stages, i.e. defining the aim of the research, selecting the basic literature, selecting publications, developing a publication database and analyzing the content. Full-text foreign databases such as Emerald Insight, SinceDirect, Scopus®, Springer Nature Journals, Web of Science, Wiley and Polish databases - BazEkon and Ceon were analyzed. The EBSCO Discovery Service tool was used to search for publications. The non-participant observation method was used to conduct qualitative research (in the empirical part), based on the opinion of Z. Kędzior (Kędzior, 2005), M. Stickdorn, ME. Hormess, A. Lawrence, J. Schneider (Stickdorn et al., 2018), and J. Apanowicz (Apanowicz, 2002), treating this method as a method that differs from simple perception in that it is a continuous and purposeful process. Also, the authors share the views of F. Liu and S. Maitlis (Liu, Maitlis 2010), who claim that observation is often used in conjunction with other methods of data collection, at the same time allows the researcher to detailed and dynamically assess situations that cannot be so easily captured by implementing other methods. The observation method became the starting point for text analysis (Czakon, 2016). In the adopted method of text analysis, the data sources were reports, notes and announcements of the surveyed enterprises published on their websites.

Purposive sampling was used, (non-random, non-probabilistic selection): 3 deliberately selected logistics service providers. The selection in the targeted selection of the surveyed enterprises was based on the adopted criteria:

- the first criterion: the geographical scope of the logistics services provided: EU countries and / or North and South America),
- the second criterion: the range of services offered: courier services, logistics operator, customs services)
- the third criterion - the type of transport used in the logistics services provided: minimum road transport.

Conducting the research allowed the authors to invite scientists and practitioners to discuss the recommendations for companies proposed by the authors regarding effective customer service. Moreover, compared to previous research carried out by other scientists with the use of quantitative methods, the adopted methods allowed for an in-depth analysis of the problem and the issues raised.

The following companies were selected for the analysis: DHL, UPS, DB Schenker. The focus was also on checking whether in the surveyed companies due to changes in the manner of customer service, in the methods and forms of measuring customer service and in channels with the customer. In this regard, research questions:

- Are there indicated departments / units dealing with customer service in selected companies?
- How is customer opinion research carried out in the surveyed companies?
- What other solutions in customer service should the company introduce?

Characteristic and Elements of Logistic Customer Service - A General Theoretical Framework

The role of customer service in the activities of enterprises began to be noticed in the 1980s with the development of marketing evolution. It was identified mainly with the possibility of submitting complaints and grievances about the insufficient quality of services or products offered. Due to the changes taking place in the market, organizations began to attribute a different meaning to customer service. It was argued that the market success of an enterprise depends not on the number of submitted customer comments, but on attracting buyers and building long-term relationships with them. It was influenced by customer service provided at the highest level.

In the literature on the subject, there are many definitions relating to customer service, hence it is difficult to provide a universal explanation. When talking about customer service, we mean, first of all, "a whole range of needs that the customer has not identified and defined at a given moment" (Biesaga - Słomczewska, Iwińska - Knop, 2000). The task of the company is to recognize these needs and, if possible, to quickly respond to them. Thus, the level of customer service consists of many factors, such as (Leland, K. Bailey, 1999):

- "knowledge of not only the needs, but also the desires and expectations of customers,
- knowledge supported by experience,
- knowledge of the product and translating its features into the language of benefits,
- seller's involvement".

The modern economy is characterized by high volatility, creating increasingly difficult conditions for functioning. This, in turn, increases the risk of actions taken by the enterprise, and achieving success is much more difficult. A chance for success on the market may be for the company to focus all its activities around the needs of the final buyer as well as to satisfy higher and higher demands. The way to success is the ability to create a distinctive and unprecedented way of satisfying needs by offering a one-of-a-kind product with many benefits. However, simply acquiring a client is not enough, you have to keep him with you. In the concept of relationship marketing, attention is drawn to the fact that the company's success consists not only of the ease of acquiring an increasing number of customers, but most of all the ability to maintain regular and loyal customers (Wilmańska-Sosnowska, 2001). Regardless of whether the customer at the moment considers himself a person worthy of attention or not, he expects the service to take great care and understand his needs. Thus, the level and quality of the service provided are significant here.

The previously presented definitions of customer service can also be applied to logistic customer service, which K. Halicka and S. Święcicka define as "the ability to meet customer requirements and expectations, mainly concerning the place and time of ordered deliveries, using all available forms of logistics activity, including transport, storage, inventory management, information and packaging "(Halicka, Święcicka, 2012). In turn, D. Kempny defines logistic customer service as "a system of solutions that ensures such relations between the time of placing the order and the time in which the product was delivered to the customer, to fully satisfy him and maintain this satisfaction for the longest possible period" (Kempny, 2008).

The importance of customer service in logistics[1] processes and activities is so important that today we refer to the term "customer logistics". It is a process that guarantees a competitive advantage and

[1] The analysis of the literature regarding various interpretations of the essence of logistic customer service included in the literature was outlined in detail in the earlier article entitled *Customer Service in Logistics - a theoretical framework* (Samek, Wasielewska-Marszałkowska, 2020).

additional benefits by managing the supply chain in such a way as to constantly maximize the added value for the final buyer (Kempny 2001). The determinant of logistic customer service is therefore a logistics system that fulfills its role in creating the usefulness of place and time for the product, including customer support after the purchase (Kempny 2001). This in turn determines the level of customer satisfaction regarding time, communication, reliability and convenience of delivery.

Logistic customer service consists of such elements as (Biesaga - Słomczewska, Iwińska - Knop, 2000):

- order fulfillment time,
- service reliability,
- flexibility and completeness of deliveries,
- stock availability,
- ease of placing an order by the customer,
- constant and easy way to obtain information,
- simple forms of documents that must be filled in when placing an order,
- convenient payment terms,
- the quality of the packaging, which has a significant impact on transport and storage.

The high complexity of logistic customer service forces companies to strive to standardize service processes. This is a kind of response of the company to market needs, categorized according to individual customer segments. Accepting and categorizing individual elements of logistic customer service takes place through their positioning and assigning values to individual areas and components from a given area.

All activities related to logistic customer service can be divided into three phases. There are elements in the pre-trade, transactional and post-trade phases (Fig. 1).

ELEMENTS OF THE PRE-TRANSACTION PHASE:	ELEMENTS OF THE TRANSACTION PHASE:	ELEMENTS OF THE POST-TRANSACTION PHASE:
• Written customer service policy. • The client is familiar with the company's policy in the field of customer service. • Sensitive organizational structure. • Flexible delivery system.	• Stock level. • Information management. • Order cycle items. • Speed of shipping handling. • Special shipping operations. • Accuracy of ordering. • Substitute products.	• Installation, assembly, warranty service, changes, adjustments, repairs, spare parts. • Product monitoring in operation. • Customer complaints, complaints, returns. • Temporary availability of a replacement product.

Figure 1: Elements of logistic customer service

Source: La Londe, B. J., & Zinszer, P. H. (1976), Customer service: Meaning and measurement. Chicago, IL: National Council of Physical Distribution Management, p. 281, za: D.M. Labert, J.R. Stock, L.M. Elram, Fundamentaals of Logistics Management, McGrow-Hill, Boston 1998, p. 44, in Ciesielski M. (2006), Logistyka w biznesie, Wyd. PWE, Warszawa, p. 134.

The first phase of logistic customer service - pre-transaction - involves preparing the company for customer service. The elements included in this phase are particularly important because they determine the perception of the company in the market environment, as well as shape the client's needs and affect his overall satisfaction. Certainly, these are activities that require a holistic, non-routine view of the company and therefore the management team is usually responsible for this area (Sułkowski, Morawski 2012). These activities should be established before the customer service standards are launched in the company (Ciesielski, 2006, Kempny, 2001).

The second group of logistic customer service elements consists of the transactional phase elements that relate to the direct contact of the company with buyers. Their proper fulfillment depends mainly on the level of customer satisfaction. Therefore, enterprises are advised to constantly monitor these

elements, look for possible shortcomings and effectively eliminate problems that arise at this stage of customer service.
The last group of customer service elements are post-trade elements, enabling the company to extend contact with the buyer. Nowadays, when enterprises fight among themselves to provide the highest possible customer service, to retain regular and potential buyers, post-transaction elements are gaining in importance (Rutkowski, 2005). Figure 1 contains the elements of logistic customer service indicated for each of the phases.

Regardless of the phase of logistic customer service, the basis of the company's operation and the pillar of effective service is understanding the needs of end buyers. This is a challenge for contemporary organizations. It is helpful to develop an effective, modern and, above all, meeting the market needs of a logistic customer service strategy. And Baraniecka emphasizes that when creating it, organizations should remember about the principles of transparency, honesty and partnership with the client (Baraniecka, 2011). However, practice shows that these measures are not easy to implement. Enterprises struggle mainly with the problem of habits and mentality of employees who are responsible for customer service. The fault is also with the customers themselves, who are by nature opportunistic towards the introduced rules.

Logistics Customer Service – Presentation Selected Results of Empirical Research

Example Logistics Customer Service in DHL[2]

DHL is a leading global provider of logistics services. In 1969, Adrian Dalsey, Larry Hillblom, and Robert Lynn founded DH (Fig. 2). Currently, the company employs 380,000 people, and provides logistics services in over 220 countries (Fig. 3). The company offers a wide range of logistics services, including: courier services, Road Freight (Flexible and reliable. Comprehensive options - pallets, groupage, full and part truck loads), Rail Freight (Secure, reliable and cost effective transportation operating) , Customs (Reduce complexity, delays and penalties with our brokerage and consultancy services.), Transport Solutions (Customized transportation solutions across your value chain.), Integrated Solutions (Comprehensive, bespoke, holistic solutions covering transport, warehousing & management services.), Global Forwardins (Air and Ocean Freight - SeAir - Multimodal Air & Ocean Freight), Road Freight, Rail Freight), Additional Servicec (DHL Cargo Insurance), DHL Supply Chain (World's leading contract logistics provider). DHL provides services for many industries, for example: Automotive, Chemicals, Energy, Engineering & ManufacturingSector, Life Sciences & HealthcareSector, Public Sector e-commerce, Technology and Retail Sector.

[2] Own study, based on information available on the website https://www.dhl.com/en.html, [Retrieved July 12, 2020].

Figure 2: Historic dates at DHL

Source: https://www.dhl.com/global-en/home/about-us/our-vision.html [Retrieved July 16, 2020]

Figure 3: DHL in numbers

Source: https://www.dhl.com/gb-en/home/about-us/global-network.html [Retrieved July 12, 2020].

In Logistics Customers Service, DHL dedicates for clients a separate tab on the website and subpages of the services provided. Among the pre-transaction items at DHL Website, Vision and actual Strategy company - it covers the most important directions of the company's activities, the need to continue the previously adopted goals is indicated, the main motto "With its" Strategy 2025 - Delivering excellence in a digital world "the Group is laying the foundation to continue its successful growth trajectory beyond the horizon defined by the previous "Strategy 2020". "Deutsche Post DHL Group has never been in better shape. We are convinced that future growth will come from a consistent focus on our profitable core logistics businesses - and digitalization will become the greatest lever," said Frank

Appel, CEO of Deutsche Post DHL Group , during the presentation of "Strategy 2025" in Frankfurt am Main. "We need not reinvent ourselves. We will digitalize ourselves".

The observations show that there is no possibility of finding the organizational structure of the company on the company's website. A clearly defined organizational structure of the company would allow for efficient finding of data for the relevant departments of the organization, including managers managing individual departments.

Analyzing the observed pre-trade elements, such as the flexibility of the delivery system and service management, it was concluded that these elements were briefly and clearly described (both for potential customers and groups of regular service recipients). Among the information included, customers can find aspects related to the services offered, contact the customer service provided on the subpage dedicated to customers. The subpage contains contact details in the native language of the country the customer is looking for, in which country DHL provides logistics services.

Among the pre-transaction elements, it was noticed that the company's website contained information on training courses and instructions, reports in PDF for customers. Customers will also find information on how to search for an expected shipment (Track Your Shipment). Besides, detailed information on customs services (including preparation of customs documentation, terms of delivery INCOTERMS®2010 and INCOTERMS®2020) and answers to frequently asked questions by customers were included.

The transactional elements of customer service in DHL play a key role in the efficient and effective implementation of logistics services. The possibility of monitoring the shipment, the possibility of postponing the delivery date, the choice of an alternative means of transport as well as the convenience of placing orders is particularly important for the customer in this phase. During the observation of the elements of this phase, the authors noted that the designed page for logging in for regular and new customers (Customer Portal Logins) efficiently enables customers to find aspects of interest to the customer, from monitoring the shipment through monitoring "real-time inventory items and order statuses at the warehouse level in entire network, enabling you to transform newly available end-to-end supply chain operations into a competitive advantage. ”

Customer Portal Logins has been divided into sub-chapters in which the customer finds a wide spectrum of possibilities and solutions related to individual customer interests (Fig. 4).

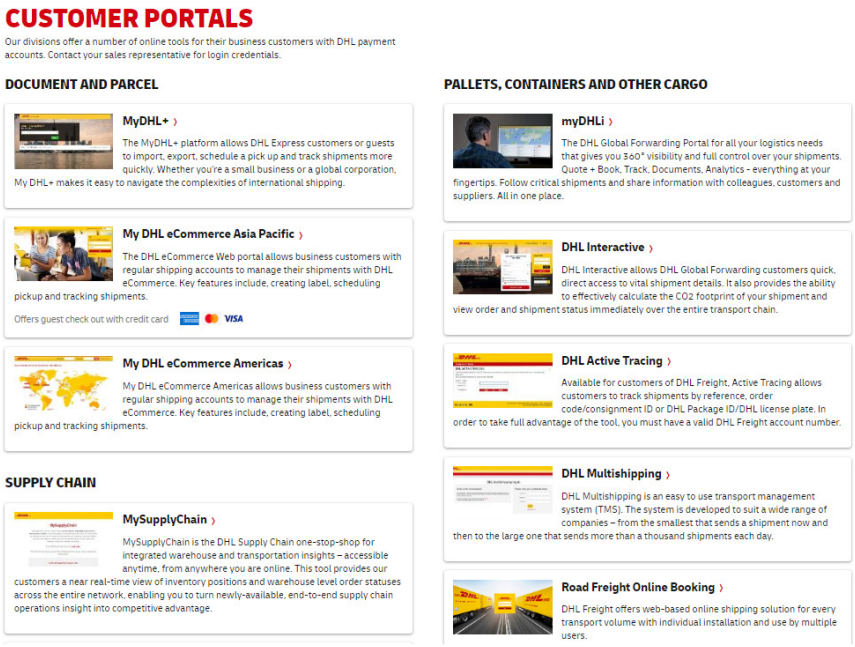

Figure 4: Customer portal in DHL

Source: https://www.dhl.com/global-en/home/login.html [Retrieved July 12, 2020].

Similarly to the elements of the transactional phase, as well as in DHL's post-transaction, the key role is played by a portal specially dedicated to customers, called "Customer portal". If there is a need to file a complaint, change the place of delivery of parcels or order statuses at the warehouse level (SCM), customers can immediately contact the customer service department or verify, file a complaint and solve the problem by logging into the portal.

According to the authors, an important role is played by the subpage "GLOBAL PRESS RELEASES", in which the company, apart from reports and current results of the group (EBIT), informs customers about plans and implemented projects. DHL also dedicates the "Media Center" subpage that has been created, which includes press releases, multimedia materials, a list of press events and a direct link to DHL spokespersons. Besides, customers will also find information on the certificates held by DHL, current messages on the COVID-19 epidemic (COVID-19 UPDATE) containing tips and guidelines relating to the sanitary regime and preventing the spread of the epidemic. This information is updated for both customers and employees of the group.

DHL also uses social media such as Linkedln, Facebook, Twitter, Youtobe and blog. Key information, publications and company reports are posted on social networks.

Undoubtedly, important information for customers are the information published on the DHL Sustainability Report website and information relating to the company's innovation and experience in the implemented innovative solutions tailored to the sectors served.

Example Logistics Customer Service in UPS[3]

UPS was founded in 1907 in Seattle, Washington, is now one of the global courier service providers (CEP), and offers a wide range of services, including: logistics and distribution; transport and freight (air, sea, road, rail); Freight shipped to 195 countries and territories; international trade management

[3] www.ups.com [Retrieved July 12, 2020].

and customs brokerage. As part of special services, the company offers: logistics of service parts; technical repairs and configuration; development and planning of supply chains, management of returns. Key information about the company, including the company's history, facts and figures, cooperation, locations and services offered, can be found on the "About UPS" subpage. The customer can efficiently find the information he is looking for. The strategy, vision, mission and values of the company were communicated to clients on a dedicated "About UPS" subpage (for example: "Our Enterprise Strategy: Create Value, Transform, and Invest to Grow"). The organizational structure of UPS, like that of DHL, has not been indicated on the website.

The results of the study by the authors, including the observation of elements of the pre-trade phase of UPS, indicate that the information for the customer was published transparently. By examining the elements of a flexible customer service system, as well as procedures, instructions and training in the field of customer service, it can be concluded that they are clearly described. On the website, UPS provides the customer with "Service Terms and Conditions" and "Customer Solutions Terms and Conditions". Each customer can use the website to search for the topic of interest, from checking the shipment number to selecting other services offered (for example, a separate "Help and Support Center" page) or by using the "search engine" field. In cases where the client does not find answers to the questions bothering him, he can use the virtual chat platform (Fig. 5). Customers starting their cooperation with UPS can find action steps, guidelines and helpful information on the dedicated "Get Started with UPS" subpage. The authors, after observing the elements of customer service in this phase, distinguished in favor of UPS, the activity of publishing, apart from information in the form of short instructions, an additional solution, such as videos with instructions for customers, including fundamental solutions for the customer, e.g. shipment preparation, shipment tracking, change of delivery etc.

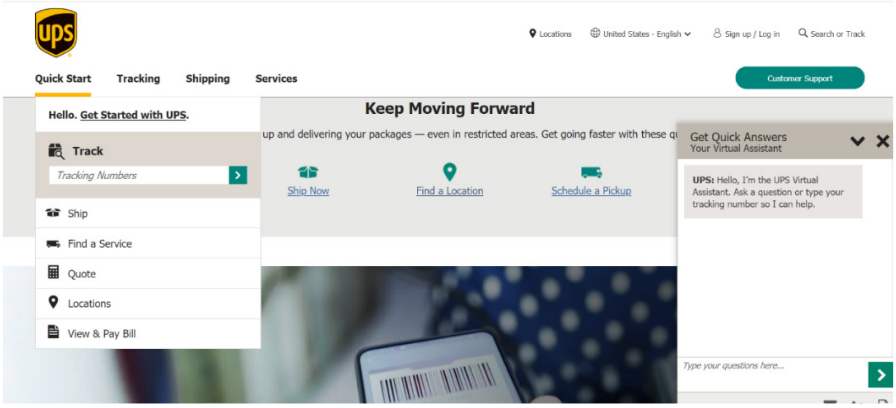

Figure 5: Customer portal and wirtual chat portal in UPS
Source: https://www.ups.com/us/en/Home.page [Retrieved July 12, 2020].

The transactional elements of customer service are closely related to the elements of the pre-transaction phase and indicated on the UPS website and dedicated subpages of Quick Start, Help and Support Center, Customer support. In this phase, time is a very important aspect, which plays a key role for the customer in the provision of services by logistics companies. The elements of the transaction phase observed by the authors correspond to the range of services offered. In each of the services, you can distinguish elements related to Inventory level, Order cycle elements, Substitute products - for example, "contract logistics" service, "supply chain planning and design" (https://www.ups.com/us/en/services/contract -logistics / design-planning.page?) ". The client finds detailed information on information management, including IT technologies and tools, logistics infrastructure as well as aspects related to customs services and supplier management. Elements of this phase, such as: speed of shipping service or operations related to shipping and accuracy of ordering, can be verified by the customer at every stage of the order / order using an individual / institutional login to the customer's account.

In the post-trade phase, a customer who intends to file a complaint can find detailed information regarding the complaint on the subpage: https://www.ups.com/us/en/help-center/claims-support.page? Customers may submit a complaint due to: loss of the parcel, damage or unclaimed parcel on delivery. All information relating to the complaint handling process and the required documentation are provided to customers in the form of information and answers to frequently asked questions.

It is also worth mentioning that to efficiently flow information for customers and acquire new customers, UPS uses social media. Among the social media, USP uses: Facebook, Linkedin, Twitter, Youtobe and UPS Blog. According to the authors, an important role is played by information on the results of sustainable development and corporate social responsibility (CSR) published in the form of reports on a dedicated subpage of the company. The website reads: "UPS is a global leader in logistics, employing more than 495,000 employees and serving 11.5 million customers daily in more than 220 countries and territories. In 2019, we made 5.5 billion calls worldwide, delivering over 21 million packages every day. Sustainability is an integral part of UPS's business strategy and operations[4]".

Example Logistics Customer Service in DB Schenker

The company was founded in 1872 in Vienna by Gottfried Schenker under the name of Schenker & Co. Today, DB Schenker is a leading provider of global logistics services - serving industry and trade in the global exchange of goods using land, air and ocean freight, contract logistics and supply chain management. The company is a logistics leader for the automotive and technology industries, consumer goods, trade fair logistics, special transports and special event logistics. DB Schenker Group is a transnational corporation operating in the TSL industry. It employs approximately 76.1 thousand. employees in about 2,000 branches around the world.

The company cares about customer relations, hence it provides high-quality services tailored to customer expectations. Employees responsible for customer service communicate with customers through all possible channels, e.g. through direct contact via couriers and sales representatives, managerial staff, daily operational support of Customer Service Departments, efficient invoice and complaint handling. Customer satisfaction is the key goal of the company's operations. Organization of regular surveys of clients' opinions on the quality of services with the help of independent research companies. The company publishes the results of the customer satisfaction survey on its website (the results of the survey from 2013 and 2014 are presented in Fig. 6). Additionally, the satisfaction of shipment recipients with the services provided by couriers is measured.

Year	Number of respondents	NPS[5]
2013	272	28%
2014	226	34%

Figure 6: Results of the Customer Satisfaction Survey in 2013-2014

Source: http://2014.dbschenker-csr.pl/ekonomia/relacje-z-klientami#, [Retrieved July 15, 2020].

DB Schenker offers a wide range of logistics services, such as: land transport, air transport, ocean freight, contract logistics, lead logistics and special products. Necessary information about the company, such as the offered products, solutions for various industries, information about the company

[4] https://sustainability.ups.com/media/sustainability-strategy_global-value-chain.pdf [Retrieved July 12, 2020].

[5] Customer satisfaction of DB Schenker Logistics is measured based on the NPS (net promoter score) approach. The survey consists in obtaining an answer to one question regarding the willingness to recommend our services to a friend or friend. Depending on the answer given on a 10-point scale, the respondents are divided into 3 groups of clients: promoters, passive clients and critics. By subtracting the percentage of critics from promoters, we get the net result, i.e. the net promoter score. The survey is carried out using the method of telephone interviews, website: https://www.dbschenker.com, [Retrieved July 15, 2020].

and career, was posted on the company's website. In the "About us" tab, the customer can read the company's description in detail, which includes such information as: company profile, management board of the DB Schenker Group, transport logistic trade fair, strategy, lean and quality, compliance with regulations, history, press releases, customer newsletter, sustainable development, social report, employee volunteering, security, career. The organizational structure of DB Schenker, similarly to that of DHL and UPS, has not been indicated on the website.

The study included the observation of elements of the pre-trade phase of DB Schenker. The results prove that all the information necessary for the client has been posted on the website transparently and understandably. Analyzing the secondary materials for this study, the authors state that the written customer service policy and service management have been clarified, including the data protection rules in dbschenker.com/global, which the customer can read on the website. When reviewing the company's website, it can be noticed that the organization cares for efficient and fast customer service, using an Internet solution for this purpose. The procedure for completing all formalities and specimen documents related to the establishment and implementation of cooperation, the company publishes on its website. The forms include: national land documents, ocean documents, international land documents, aviation documents, railway documents, complaint notification or e-invoice. Also, on the website, the company has a special tab "Connect 4.0" and the possibility of talking to the company's representative via a virtual chat (Fig. 7), thanks to which the customer can make an immediate quote, send an online order, and transparently track the order. In this way, DB Schenker offers trouble-free handling of B2B inland shipments. Regardless of whether the customer needs a truck or other means of transport, connect 4.0 will evaluate the transport in real time and show the estimated delivery time and ensure the transport of the shipment.

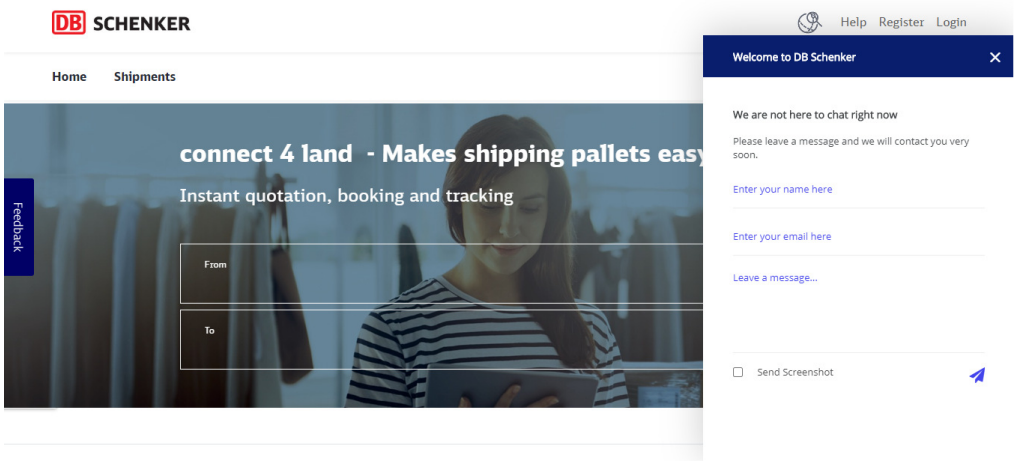

Figure 7: "Connect" tab and virtual chat on DB Schenker website

Source: https://connect.dbschenker.com/app/connect/land?step=landing&state=f8a02f06-6075-408a-b37f-fe9cd0719576. [Retrieved July 16, 2020].

Each client can use the website to search for a topic of interest, from reading the company's history to selecting the services offered or using the "search engine" field. After observing the elements of the pre-transaction phase and analyzing secondary data (reports, monitoring, customer service quality books), the authors also highlighted additional activities of DB Schenker in the area of customer service. The organization is focused on cooperation not only with individuals but also on establishing B2B relationships. The website also offers services targeted at specific sectors of the economy, which makes it much easier for potential business partners to choose the right products and logistics solutions. With customer satisfaction in mind, the company has additionally introduced a dedicated application "Drive4Schenker" as part of the DB Schenker Connect 2 Drive service (Fig. 8). Drive4Schenker is an internet exchange platform with offers for full truck loads and part loads. Intelligent search (load size,

location, prices) helps customers find exactly the kind of transport they are looking for. Therefore, it can be concluded that the elements of the pre-transaction phase of customer service at DB Schenker are not only available to customers but also tailored to the needs of individual customers (B2C) and business partners (B2B).

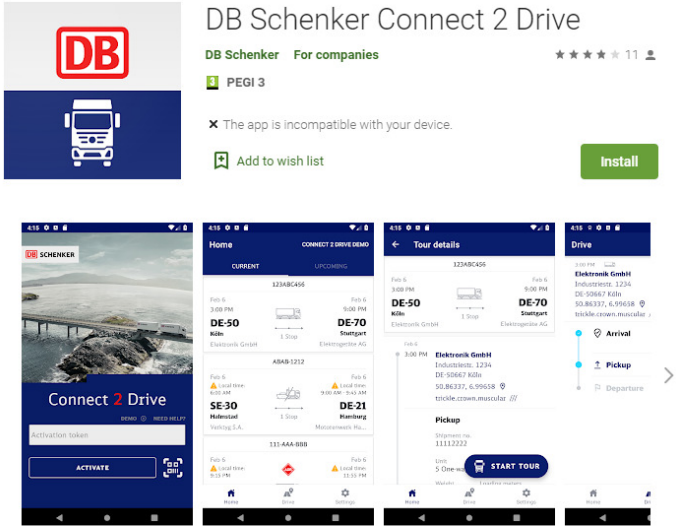

Figure 8: Dedicated mobile application from DB Schenker

Source: https://play.google.com/store/apps/details?id=com.dbschenker.mobile.drive4schenker&hl=pl, [Retrieved July 16, 2020].

Another subject of the observation of logistic customer service at DB Schenker was the elements of the transaction phase. This step looked at aspects such as inventory levels, information management, order cycle items, shipping speed, special shipping operations, ordering accuracy, and substitution products. Summing up, the authors stated that these elements work to the benefit of the examined company. Additionally, thanks to the innovative e-Schenker solution (Fig. 9), the organization efficiently and transparently manages the flow of information, providing customers with the necessary information about the shipment. The application brings together all the company's eServices for international land, ocean, and air transport. Gives customers visibility into all modes of transport - making it easier to manage the supply chain. The wide variety of services of the company include placing orders, advanced shipment tracking, reporting, and many other new logistics solutions.

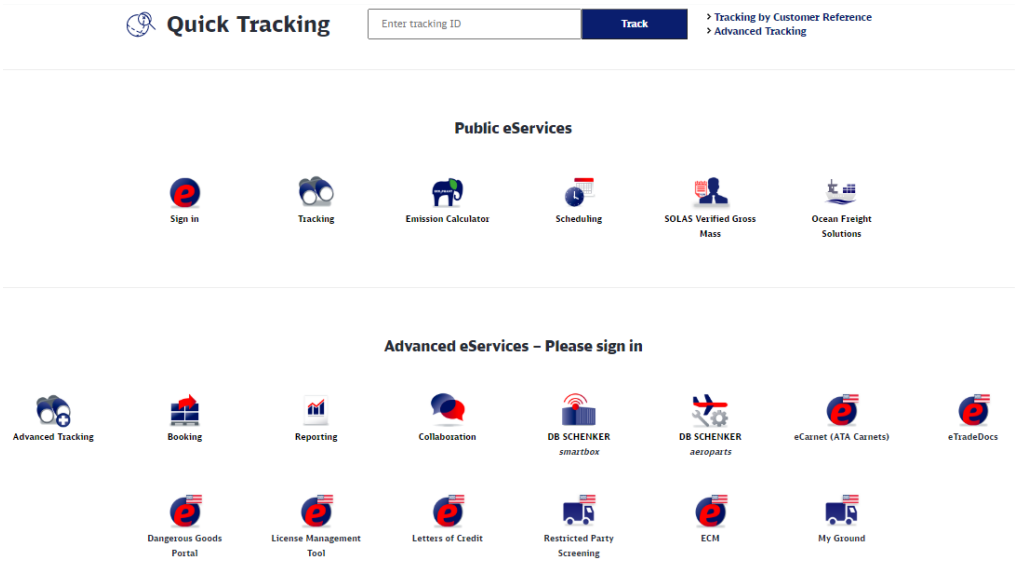

Figure 9: eSchenker service

Source: https://eschenker.dbschenker.com/app/launch-page/public?language_region=en-US_US, [Retrieved Lipiec 15, 2020].

Elements of the post-trade phase were the last subject of this study at DB Schenker. The following components were taken into account: installation, assembly, warranty service, changes, adjustments, repairs, spare parts, monitoring of the product in operation, customer complaints, complaints, returns. temporary availability of a replacement product. Customers can submit a complaint both using a dedicated form (available on the website) and using the dedicated e-Complaints service. Thanks to it, the entire complaint process is available on-line. All the customer needs to do is log in to e-connect and fill out a short electronic form, and DB Schenker employees will immediately start the complaint handling process. Information in the e-connect system allows for ongoing tracking of the complaint submitted by the customer. He is informed about each change of status by e-mail.

A definite advantage of the company is the implementation of e-Services, thanks to which all elements of customer service can be performed on-line. The company uses social media to reach new customers, and above all for the rapid flow of information. For this purpose, it uses YouTube, Linkedin, and Facebook, where it presents a wide range of multimedia and enters into relationships with customers, sharing logistics solutions with them. Overall, customer service at DB Schenker plays a key role. The company tries to provide clients with the highest quality of all elements included in the pre-trade, transactional, and post-trade phases, which translates into customer satisfaction.

Research summary

The results of the research presented in Figure 10 make it possible to answer the following research questions posed as part of the conducted research.

Elements of the pre-transaction phase	Elements of the transaction phase	Elements of the post-trade phase
• a dedicated subpage with information about the company (key data, facts, mission, vision, range of services offered, geographical locations of branches) • terms of cooperation, legal notices, regulations for the use of services • instructions, presentations, online videos: informing about the preparation of the shipment, location of collection / shipment points • virtual chat • online inquiry questionnaire • search • the most frequently asked question	• ongoing search and monitoring of the shipment, • change of delivery date • dedicated login pages for individual / institutional clients	• dedicated subpage for customers - complaint • necessary documents to consider the complaint • answers to frequently asked questions • use of social media

Figure 10: Customer service elements identified in the surveyed companies
Source: own study based on the results of conducted research.

Are there any departments/units dealing with customer service in selected companies?

All surveyed companies indicated on their websites departments that deal with customer service. Even though there is no organizational structure on the websites of companies, customers can contact the customer service department. You can contact the employees of the companies by phone or e-mail. A dedicated customer service hotline allows you to track the shipment, employees also solve various customer problems. In individual phases of the execution of orders/orders, the customer can also contact using online contact forms or log in to his account. Also, on the company's website, it is possible to ask questions to company representatives using a virtual chat. Unified and tailored to the client's needs interfaces placed on the websites of the surveyed companies allow for quick and trouble-free integration of all business processes, enabling direct customer contact.

How is customer opinion research carried out in the surveyed companies?

The high quality of the services offered in the surveyed enterprises is supported by the care of detailed information on the websites of the companies. Enterprises demonstrate a high level of responsibility and openness to implement changes, innovative solutions in the services offered to the client, publishing CSR, and sustainable development reports. Analyzing the aspect of the method of conducting customer surveys, the authors identified that only one of the surveyed companies publishes reports and results of customer satisfaction surveys. However, information on the form of monitoring customer satisfaction was not provided on the websites of other companies.

What other solutions in customer service should the company introduce?

The authors recommend publishing reports on opinion polls and customer satisfaction surveys as important for implementation in practice by enterprises. It is worthwhile for the organization to research and publish customer reviews in such places. Today, the analysis of opinions in the Internet space is a key source of information that customers reach for before using the services of a given company. The authors, therefore, recommend that logistics companies such as DB Schenker monitor and learn about customer opinions, especially in social networking sites, opinion portals, internet forums, or personal blogs. The analysis of opinions in the virtual space may indicate not only what elements of the offer

require changes, but also what areas of the customer service process should be improved. The organization could also extend the field of customer surveys (CATI and CAWI non-training quantitative surveys) with new online measurement tools that guarantee a quick return of results. Customer satisfaction surveys should be carried out with the use of ready-made tools - such as SurvGo. As a result, the company will receive results in less than 48 hours. Besides, employees will be able to track the progress of the survey in real mode, modify the content of the surveys, and generate automatic reports. On the one hand, reports and information from the conducted research provided to clients on the websites of enterprises mean that enterprises are open to react and improve the services offered, and on the other hand, they will enable the elimination of errors in the process of implementing new services.

Discussion

In this section, the authors refer to the analysis of the research results. Based on our empirical findings and based on a systematic literature review, we propose the following recommendations for companies providing logistics services in the field of logistic customer service:

1. Logistics companies must be aware of the fact that today's customers are more and more demanding and be aware of what they expect from the company. They want not only the correct service but also that companies keep up with the prevailing technological trends. It is about the need to support service activities with dedicated IT systems. It is mainly influenced by people from the Y generation, who currently drive the economy and set market trends. They are a group of highly demanding customers who are familiar with new technologies and who spend a lot of time on the Internet. Companies that want to serve customers from the Y generation, aged 20-30, must adapt customer service so that it is in line with current technological trends and growing market requirements.
2. Effective logistic customer service would not be possible without the support of IT systems. Companies aspiring to be competitive are forced to build relationships with customers based on modern IT tools, call center applications, CRM systems, or e-mail marketing systems. Currently, it is also more and more common to monitor social media in the SaaS model (software as a service).
3. Companies should be aware of the growing role of the customer, therefore periodically (e.g. once a quarter) they should survey their recipients, using the tools offered by social media. The survey questionnaires made available may concern the needs and preferences of customers, as well as their opinions on the services and products offered.
4. Companies that want to improve customer service should use personalized offers and modern service applications dedicated to customers.
5. Another solution recommended by the authors is to present the organizational structure of their enterprises. The published structure will allow clients to get acquainted with the contact persons of individual departments, it will allow them to find out which manager and department for which area they are responsible. Access to the organization chart can also be helpful for potential clients interested in starting a cooperation with the company.

According to the authors, the undertaken research issues and the proposed recommendations invite representatives of science and practice for further discussion in this field. Moreover, the authors, sharing the views of Daugherty et. al. (Daugherty et. Al, 2018) believe that contemporary research on the issues of logistic customer service should also be focused on aspects related to logistics services provided for customers under omnichannel and e-commerce supply chains.

Summary

This article focuses on the development of proposals to improve individual elements of logistic customer service in the surveyed companies, allowing it to be better adapted to the requirements and preferences of customers. The obtained results may, therefore, be useful for enterprises that want to achieve a permanent competitive position by improving the provided customer service. The presented solutions can be used as guidelines aimed at improving individual elements of logistic customer service. They can also be useful for those companies that are starting to operate on the logistics services

market and are looking for good practices in the field of logistic customer service. The results of this study may also be helpful for anyone who wants to use the services of the surveyed companies. The analysis may also bring benefits to potential clients who are considering establishing cooperation with one of the surveyed companies. However, the authors are aware that the effectiveness and efficiency of the customer service used to a large extent depend on the proper recognition of the needs and preferences of customers. As a result of the increasing technological progress, the requirements of current and potential customers are, however, constantly changing. Therefore, in this area, it is necessary to constantly monitor not only the level of customer service provided, but also (if not primarily) to observe market needs

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Systemic and Cybernetic Approach: Applications for Organization Research and Management Methodology

Rafał MIERZWIAK

Poznan University of Technology, Faculty of Engineering Management,
Poznań, Poland, rafal.mierzwiak@put.poznan.pl
Nanjing University of Aeronautics and Astronautics
College of Management and Economics, Nanjing, P.R. China

Abstract

The aim of the article is to present a systemic and cybernetic approach which is supplemented by a praxeological theory of human action in the context of creating theoretical framework for the analysis of the issues connected with management sciences. To achieve this goal, the essence of management sciences and the object had to be established with the consideration of the concept of organisation as a specific system capable of action. In the deliberations presented in the article, a systemic analysis of organisation was used for identification of its structure and a cybernetic approach was applied in order to describe control processes that take place in it. Moreover, due to the assumption stating that a constructive element of management is human occurrence in the system, basic praxeological postulates were also accepted which mark a starting point for the analysis of uncertainty issues in management. In the scope of defining concepts, the efforts were made to achieve maximum accurateness through accepting assumptions characteristic to methodology based on analytical philosophy. The result of the research demonstrated in the article was a precise statement of such fundamental concepts as organisation, management, management system, or management function according to a systemic approach. Afterwards, being in possession of an adequate terminological convention, a universal model of organisation in cybernetic terms was shown. In this model, basic elements, flows of information and flows of energy and resources were identified and described. Accepting functional and praxeological character of organisation as a system, the essence and elementary causes of uncertainty in management processes were established. In the article, a concept of management was introduced which uses a systemic approach and a cybernetic modelling for a specific class of systems that include people as elements. These systems in a praxeological sense are systems capable of acting. Accepting praxeological and systemic perspectives together with the principles of cybernetic modelling allowed to perform an original synthesis of knowledge from the scope of management sciences and keep the balance between methodological individualism characteristic to reflexion on human actions and a holistic and multi-perspective perception of the whole which is a basis of a systems theory and engineering. In addition, such a synthesis includes previous research and terminological traditions in the management sciences to the maximum extent.

Keywords: Systemic Approach, Praxeology, Organization, Management, Methodology

Introduction

Present state of management sciences is an intense development caused by the expectations of economic practice. It is definitely a positive phenomenon as it shows a big research potential of this knowledge discipline. What is more, it indicates that the issue, which is taken within its framework, responds to social demand. However, negative results connected with popularity of management issues should not be omitted. The fact is that frequently many authors, who try to stand out on a very competitive market of

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"managerial ideas", propose solutions which credibility is highly doubtful (Wooldridge and Micklethwait, 1998). Such a situation is possible because so far management sciences have been at pre-paradigmatic stage in their epistemological development (Gospodarek, 2009 pp. 410). Thus, it is more difficult to control genuineness of theoretical statements in this knowledge discipline in comparison with the natural sciences. Still, it does not change the fact that management issues have common denominators. Undoubtedly, the first is the fact that organisations are a subject of management. The second is the purpose of management, namely maximising the efficiency of those organisations. These two terms i.e. efficiency and organisation were defined in different ways in various management approaches. Considerations on these two terms have changed over the years, because management as a science and practice is embedded in a variety of contexts – historical, legal and cultural, but also in political and economic contexts. Such changeability and evolution in considering these two fundamental terms for management is not a weakness of management sciences, but an act of adaptation abilities to certain conditions and contexts.

An intense development of management sciences and the occurrence of interpenetration of many methods, concepts and ideas in this area have led to the appearance of an approach which integrates different management schools. A traditional integrative approach can be divided into a systemic approach and a situational approach.

A systemic approach is inspired by the ideas of L. Bertalanffy (1968). In the approach, an organisation is treated as a system coupled to the environment, which has its internal structure composed of subsystems that depend on one another. Such a consideration of organisation proposes holism in place of Cartesian approach used by a classic approach to management. It also indicates that optimisation of each part of organisation separately does not necessarily lead to optimisation of the whole. The best example of this can be a bullwhip effect in the supply chain (Lee et all. 1997). Furthermore, in the systemic approach the attention is paid to synergistic effects and a linkage analysis between the system's elements. Currently, the systemic approach is still developed, as evidenced by ideas proposed by Senge (2006). Their popularity, not only in academic community but also among managers, indicates that a systemic paradigm still addresses the needs of management theory and practice.

A situational approach in its essence is similar to a systemic approach. It takes the concept of a system as a starting point; however, it focuses on the fact that each sociotechnical system is an extremely complex system. There can be found a big amount of linkages and dependences between elements in it. A system of this type is a probabilistic system by nature. Therefore, a postulate seems to be reasonable which says that the existence of two identical organisations is not possible. That is why, the specifics and surrounding of a particular organisation should always be included in the choice of management tools and models. The situational approach is distinguished by high flexibility and a lack of dogmatism, while drawing attention to the surrounding where the organisation functions. Due to this fact, the situational approach might be still attractive for contemporary managers.

An integrative approach presented above, which is differentiated into systemic and situational approaches, is a classification proposal put forward by Griffin (2012). It results from traditions in management sciences rather than from substantive grounds of epistemological and terminological character. This is because when analysing the assumptions of a situational approach, it is difficult not to state that it is not of a systemic character. The attention is only switched to a specific context and the environment in which the organisation is functioning. Thus, what seems to be more appropriate and accurate is a systemic approach in management, which can take various research and analytical targeting.
Leaving out terminological inaccuracies and analysing previous output in management sciences, an uncontroversial statement is that systemic thinking is still continued and developed in management. In comparison to other ways of thinking, there is an emphasis on multi-perspective and comprehensive view on management issues in it. Such a research and practical attitude counteracts a tunnel vision thinking and

a research dogmatism. This attitude gives an epistemological impulse for the development of various and new specific research programmes and integration of existing research output that is scattered all over different management schools. In this research, it is important to use a conceptual and theoretical apparatus of a systemic analysis on the one hand and consider the fact that subjects in the organisation systemically understood are real people together with their individualities on the other hand. Otherwise, the systemic approach will lead to technocratic and excessively bureaucratic organisations instead of creativeness and innovativeness.

The essence of management from the systemic perspective

A systemic approach can take various forms depending on the choice of methods and tools that are used in research. In management literature, we can notice such variants of the systemic approach as an analysis based on the model of the complex adaptive system (Choi et al., 2001), an analysis using the concept of network (Ulrich and Probst, 1990; Snehota and Hakansson, 1995), an analysis using a social model of dynamic network (Watts, 2004) or an analysis using a system model of interdependent activities (Zott and Amit, 2010). A methodological pluralism of a systemic analysis leads to the situation that the concept of organisation and the essence of a management process are introduced in different ways. Therefore, in order to study these issues on the ground of the systemic approach, it is necessary to present the accepted research methodology in a clear manner.

Thus, let assume that a basic theoretical construct, which enables an analysis of the reality, is a system understood in the most general sense following Definition 1 (Lin et all., 1990, pp. 52-53).

Definition 1. A system is a set of elements and relations between them.

From a social practice point of view, extremely important are the systems which have set goals and they achieve them through processes leading to transformations of system's inputs into system's outputs. It should be assumed that in the identification or description of these kinds of systems, the following principles need to be respected (Mazur, 1987):

- *rule of accuracy*, which means that the system's goal should be formulated in such a way that there will not be any doubts concerning what elements are included in the system,
- *rule of immutability*, according to which in the course of the analysis it is necessary to stick consequently to the assumptions regarding the fact if any element belongs to the system or not. This rule does not mean the lack of variability in the system. It only says about immutability in establishing the system.
- *rule of separability,* according to which every system can be divided into subsystems; however, such a division must be separate i.e. if one element belongs to one subsystem, then it does not belong to any other subsystem.
- *rule of completeness*, which means that the division of the system into subsystems should be complete. In other words, there cannot be any element that do not belong to any subsystem.
- *rule of functionality* stating that the system and its subsystems ought to be distinguished due to a function they perform. They cannot be differentiated depending on spatial separateness.

When accepting an uncontroversial assumption that an organisation in a material sense is a system and the rules of accuracy, immutability, separability, completeness and functionality apply for its description and identification, we can formulate such conclusions as follows:

- in every organisation, two hierarchically linked subsystems can be distinguished, namely an information and decision subsystem, and an executive subsystem;

- elements included in the executive subsystem and information and decision subsystem always have to be people;
- a hierarchical link of the executive subsystem and information and decision subsystem is kept due to a relation of power in the organisation;
- a superior function of the information and decision subsystem is causing the realisation of goals being postulated by it by an executive system;
- a superior function of the information and decision subsystem can be decomposed on partial functions i.e. planning, organising, motivating, and controlling.

Taking the conclusions demonstrated above into account and accepting praxeological and cybernetic approaches, the concepts of organisation and management can be defined.
If an assumption is made that acting people are a constitutive element of organisation, then organisation is nothing more than a system capable of acting.

Definition 2. Organisation is a system capable of such an acting, in which in the structure of goals and acting resources there is at least one human.

In Definition 2, the concept of acting was used. Acting is understood here in terms of praxeology, and it means an intentional behaviour of a fully aware subject (Mises 2008; Kotarbiński, 2002).

Definition 3. Acting is any intentional and conscious behaviour of a human.

Presenting the concept of acting in such a way indicates that we can talk about organisation only when its elements are people. Thus, organisation is a specific case of a system, in which control processes take place due to people and through them.

Considering the concept of control as causing changes by one system in another one and integrating them with a category of acting, it is possible to define a concept of management.

Definition 4. Management is such control that is realised through the subject's actions, provided that there is at least one human in the structure of subject's goals and means of action.

If we assume that management in organisation has to be carried out by a system responsible for it, then such a system can be called a management system.

Definition 5. Management system of organisation is a system in organisation that comprises an information and decision subsystem and an executive subsystem both of which are capable of acting and hierarchically interdependent with the relation of power.

Each subsystem, mentioned in Definition 5, performs functions adequate for it. As a function, we might understand a set which was differentiated on the grounds of a system's goal and which consists of relatively repeatable events that were caused by the system.

Definition 6. Function of a system is a set, distinguished due to a system's goal, of relatively repeatable events caused by the system.

According to every information and decision subsystem of organisation, functions of this subsystem will be a set of actions targeted at an executive subsystem, which are traditionally called management functions. And these are:

- planning i.e. an action aiming at generating postulated goals,
- organising i.e. allocating and coordinating resources for the best implementation of the plan,
- commanding i.e. leading and motivating people engaged in the implementation of the plan,

- controlling i.e. actions aimed at measurement and assessment of action's results.

Determining management functions identifies and decomposes set managerial actions that are carried out by an information and decision system. It should not be forgotten that a similar functional decomposition can be conducted on an executive system of organisation. In practice, such a decomposition is performed through developing the so-called function-means tree. Identification and analysis of an organisational function-means tree have a fundamental meaning for projecting its organisational structure.

Apart from a functional perspective, an executive system of organisation can also be analysed from the perspective of its complexity criterion. This complexity might refer to subjects that constitute the system, processes which are performed by the system and resources which the system has. These criteria might be the basis for identification of management areas in organisation. Therefore, we can establish the following management areas (Mantura, 2008, p. 568):

- an area being subjectively structured, which can be focused on, for example, workstation management, department management, division management, office management, business management etc.,
- an area being structured in terms of actions, which can be focused on, for example, supply management, sales management, development management, quality management etc.,
- an area being structured in terms of resources, which can be focused on, for example, finance management, human resources management, asset management, product management etc.

In management practice, there are many possibilities for identifying management areas in organisation, because on the grounds of a situation a management area can be distinguished resulting from a combinatorial usage of criteria depicted above. A situational assignation of such an area depends on environmental conditions, potential and internal conditions of organisation. Assignation of management areas causes that they are treated like partial executive subsystems for which management functions are carried out. Such a dependence allows to combine management functions with an organisational structure and a scope of action of the whole organisation.

Cybernetic model of organization

When we adopt a systemic perspective in research concerning management and define management through interaction of an information and decision system on an executive system, we can construct a cybernetic model of organisation in an easy way. Such a model might be a good point in systematising the research issues in management in view of its universality and generality. Generality of cybernetic modelling and its multi-prospectiveness do not exclude other traditions in approaching and determining the essence of management concept (e.g. a resource tradition, an epistemological tradition, a tradition oriented towards management function or a strategic tradition). Due to this feature of a cybernetic modelling, the attempts of building cybernetic models of organisation and management processes have been made for a long time. Classical research in this area was conducted by Stafford Beer (Beer, 1959; Beer, 1970). In his works, he puts forward and develops a thesis that every economic organisation has a required variety, due to a social subsystem, which allows to overcome environmental interference. According to Beer, people are the weakest elements of a system in the routine and repeatable actions on the one hand. However, on the other hand in untypical situations due to possibilities of different behaviours, they can create and initiate flexible and adaptive processes in the whole system. A cybernetic approach to organisation, proposed by Beer, has been continued in many further areas. Attention was paid to the application of the cybernetic approach in the process of taking managerial decisions (Rob, 1984; Quin, 1993). It was also used in analysis of the issues connected with the processes of learning in organisation (Espejo et all., 1996). Cybernetics was also treated as a base for creating methods supporting management (Clemson, 1991). Nowadays, this utility attitude is profoundly continued in management

science. Currently, it is gaining in importance due to popularisation of advanced IT infrastructure of enterprises. Another usage of cybernetic models is the application proposed by Senge in his classic work titled "The fifth discipline" (Senge 2006). His approach is completely different from a mechanical understanding of organisation which is suggested by management science models. There were accusations that management science models omit a human factor in analysis and they treat a human in an instrumental way. Apart from the fact that at a declaratory level, especially in Beer's works, this problem was noticeable; however, in a research practice systemic thinking and cybernetic thinking were based on a mechanistic paradigm in the analysis of social phenomena on the grounds of their strong connections with technique. Innovativeness in Senge's approach is visible mainly in placing an emphasis on a humanistic dimension of management processes. The approach draws attention to the fact that success factors are elements difficult to measure and difficult to model in the quantitative way. Senge noticed that systemic and cybernetic models are intended to help to understand the reality; however, the understanding is of heuristic and qualitative character. Senge does not perceive a system in an ontological way, but he sees it from epistemological and cognitive perspectives as a convenient way to perceive the world. Such a way enables to release from wrong thought patterns, which interfere human rationality and creativity in organisations.

Combining an approach that emphasises the mechanistic perception of organisation on the one hand and a humanistic aspect of management processes on the other hand, we can propose a management model that eliminate too instrumental perception of human in organisation and too strong heuristic and intuitive approach to their role in management processes. Such a synthesis can be made with the use of a cybernetic model of quality management in organisations put forward by Mantura (Mantura, 2008, pp. 566-569). In order to make this model universal, it requires modification, what means that specific elements resulting from its pro-qualitative targeting have to be eliminated. A modified model is presented in Figure 1.

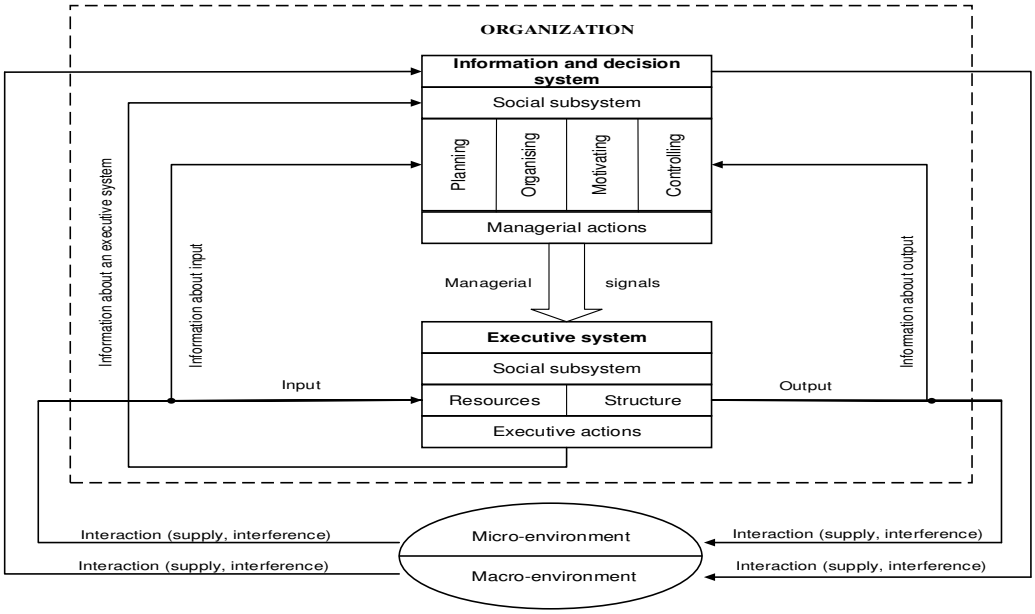

Fig. 1. Cybernetic model of organisation's functioning

In the model demonstrated in Figure 1, management is an action taken by an information and decision system and directed at an executive system. These actions take place thanks to people and through

people, who are elements included in both systems. The information and decision system and the executive system are interconnected in two ways. On the one hand, these are managerial signals which result from the functions of planning, organising, motivating, and controlling. On the other hand, this is information about the executive system's input and output. It is worth to mention that both systems are under the fundamental influence of environment of a particular organisation's functioning. It is a source of supply as well as interference. In the most general sense, the systems can be considered from the viewpoints of micro-environment (competitors, suppliers, customers, public institutions etc.) and macro-environment (economic environment, legal environment, cultural environment, demographic environment etc.).

Influence of the environment on organisation is beyond dispute. However, there is the question whether a reverse interaction i.e. a strong influence of organisation on the environment is possible. In a market situation very similar to a perfect competition, every organisation has an influence on the environment, but it is not capable to change fundamentally the environment's structure. Then, influence on the environment can be brought to the marketing issues and possibly an analysis of the influence on natural environment. It is different when there is a situation similar to a monopoly. In such a case, actions undertaken by this type of organisation affect the structure of the environment in a significant way in many aspects of its functioning, not just in an economic aspect. For instance, a monopolistic situation on the market of social media or Internet search engines might have an impact on elections, fashion or cultural trends. Another example is a dominant role of a big production company in some region. It can influence on a job market, demography or natural environment. Moreover, it can create a specific culture of such a region, which was especially visible in the areas dominated by coal mine companies. The model in Figure 1 predicts the possibility of interaction in two ways i.e. organisation on the environment and vice versa, the environment on organisation. It neither determines nor specifies in any way the size and range of this interaction. These elements are totally dependent on a status and context of functioning of a particular organisation.

Organisations, which function in a relatively stable economic environment of a free-market character oriented towards self-financing and development measured with economic categories, set out an interaction on the market with the use of offered products as a primary objective. These products can take different forms e.g. goods, where a value carrier is of a material character; services, where a value carrier is an action or works in which a value carrier is of informative character. In the model of organisation presented above, products should be treated as an effect of transformations of input into output. Success of the whole organisation depends on the efficiency of this process. The efficiency can be measured in such categories as profit, cost, income and revenue.

The model demonstrated in Figure 1, due to its universality, does not include many aspects like complexity or hierarchism of an information and decision system as well as an executive system. It does not determine complexity of organisation's objectives and people being its elements. This leads to the conclusion that every single time this model should be a subject to operationalisation which takes into account specific conditions of a particular organisation. Such a contextual and specialised approach seems to be consistent with contemporary trends in management, especially in a managerial consulting in which a targeting at activity in specific branches starts to dominate. A saying, according to which knowledge of management principles in isolation from context and specifics of a given branch is everything what a manager or a business consultant needs, is going down in history.

The significance of uncertainty in management processes

The essence of all management functions is to pursue information and decision processes. Thus, managers' role and assignment are to make decisions on the basis of collected and processed information, and then initiate communication processes which result from decisions that had been taken. Hence, it is

safe to agree with Herbert A. Simon's thesis that basically a word "management" can be treated synonymously with decision-making processes in organisations (Simon, 1960). Information and decision processes are initiated on all levels of the organisational structure. Such a phenomenon in many organisations is escalated through participatory and consultative management methods. This means that a boundary between an information and decision system, and an executive system in management systems is contractual and fuzzy. However, it can be noticed that with the higher position in the manager's organisational hierarchy, the significance of initiated information and decision processes at the expense of energy and material processes is increasing. In principle, such a statement is nothing new in management sciences as it is indicated and emphasised in an administrative approach to management (Fayol and Coubrough, 1930).

In managerial practice, we can notice that managerial decisions taken on a higher level of hierarchy are characterised by the fact that they are made in uncertain conditions or risk. On the executive level, frequently decisions are of a routine character. This tendency is being strengthened through the use of work standardisation methods. It is relevant for the efficiency of executive processes' functioning in the aspect of maintaining a stable quality of manufactured goods or provided services.

Apart from a level in organisational hierarchy, a kind of efficiency that is being maximised by a company or organisation has influence on a type of decision to be taken. A company might aim at maximising the static efficiency or dynamic efficiency. Maximising the static efficiency means achieving the best results of the actions on the assumption that the structure of resources and the purposes of the actions are stable. The opposite of this approach is maximising the dynamic efficiency, which assumes achieving the best results of the actions provided that the structure of resources and the purposes of the actions are variable. Maximising the static efficiency leads to the best and economical resource management. In this approach, managers are mainly interested in optimisation of running costs and a permanent improvement of processes in a company. Maximising the dynamic efficiency is related to looking for market opportunities and by its nature it is not focused on operational excellence, but on innovation. Following this approach, a company draws attention to costs to a lesser extent. It is more interested in potential revenue. Differences between static and dynamic efficiencies can be best illustrated by the example of differences between management concepts such as lean management and agile management. The former places emphasis on operational excellence, whereas the latter definitely focuses on searching for market opportunities (Trzcieliński 2016).

Depending on the fact whether a dominant approach is maximising the static efficiency or maximising the dynamic efficiency, the dominant type of decisions that are going to be taken is different. In the case of static efficiency, the emphasis will be put on decision rationality, risk elimination and striving for routinising the decision-making process. Therefore, there will be less decisions in the conditions of risk and uncertainty in comparison with companies oriented towards dynamic efficiency. This results from the fact that achieving dynamic efficiency requires looking for market opportunities and innovation, what in turn implies that managers will have to make decisions which results are unknown or fraught with relatively high risk.

Taking the direction on maximising the dynamic efficiency can significantly increase the level of uncertainty and risk in management. However, it is worth to underline that it does not mean that uncertainty will be eliminated when organisation is oriented towards maximising the static efficiency. A type of efficiency-based orientation might be an important modifier of risk and uncertainty levels in decision-making processes in management, but it is not their direct cause. This is because for a direct cause of risk and uncertainty in management we should consider complexity and dynamics of each management system. It results from the fact that people are subjects and creators of actions in those systems. They get into complicated networks of relationships between one another. Such a state causes the occurrence of a deterministic chaos phenomenon in these types of systems.

A deterministic chaos appears when there is a certain type of arrangement in a particular system, which simulates indeterminism and randomness, but also a high level of vulnerability on initial conditions. The level of uncertainty in these systems can be analysed through the application of differential equations in their descriptions. For economic systems, including management systems, such an approach has plenty of restrictions. On the one hand, they result from calculation problems connected with a possibility of solving a complicated system of differential equations. On the other hand, there are no constant values which describe a human activity (Mises 2000). What is more, even a formal mathematical modelling of a system does not eliminate a problem of vulnerability on initial conditions. This has a significant meaning, because these conditions are a subject to constant changes in management systems as well as in any other social system. It follows that, people performing actions constantly gain new knowledge in the learning process. This way they can change the structure of resources and objectives of succeeding actions at all times.

Despite the influence on initial conditions of a system, an important aspect worth to indicate is that frequently this knowledge is of hidden character, which is difficult to describe verbally. Only subject, who possesses the knowledge, has access to it often in an unconscious way. Hence, a very important conclusion for management is drawn, namely not only a rational analysis has a big impact on the efficiency of managerial decisions, but a manager's intuition has it too. Therefore, a very difficult problem emerges here, which has been repeatedly discussed in practice and theory, and this is whether management is art or possibly it is more like a craft that can be learned.

Conclusion

A systemic approach in management sciences allows to identify organisation as a system and basically show a structure of the system, whereas a cybernetic modelling gives us a possibility to introduce the interdependences between organisation's subsystems and recognise controlling processes which take place in organisations.

When management models are constructed, it is always worth to consider the fact that a social component is a constitutive element of every organisation. It is included in both an information and decision subsystem and an executive subsystem of the organisation. Taking this fact into account comes with the acceptance of organisation as a system capable of acting. This provides the necessity and an opportunity to apply a praxeological approach that supports a systemic analysis and a cybernetic modelling in management sciences.

Integration of the systemic approach and cybernetic knowledge with the praxeological approach enables to define and describe management as a process which is carried out by an information and decision system towards an executive system. This process in management is depicted with the use of classic functions such as planning, organising, motivating, and controlling.

Due to the division of organisation into an executive system and an information and decision system, it is easy to identify basic flows of resources in organisations and transformations that are performed on those resources. Referring economic measures to these processes is nothing more as accomplishment of tasks connected with financial management of the organisation.

An important and interesting element, which requires further analysis, is the matter of uncertainty in management systems. A few pressing issues appear here, namely when there is a possibility to model mathematically such uncertainty in a precise way and whether such a theoretical modelling is allowed and possible. These issues have a fundamental meaning for opportunities and restrictions in the development of operations research and mathematicised theories of decision-making in management. Further research

will be oriented towards examining this issue in the context of accepted in the following article systemic and epistemological assumptions concerning organisation and management sciences.

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The Drivers of The Transport Services Exports, Case Study: Romania: A Gravity Model Approach

Anca TAMAS

The Bucharest University of Economic Studies, Romania

anca.tamas@rei.ase.ro

Abstract

Purpose – The aim of this paper is to find out the major drivers of the Romanian transportation services export flows. **Design / Methodology / Approach –** The gravity model and the panel approach were used. The sample includes 12 years and 137 countries. EViews 10 was used for the panel regression, Panel Least Squares Cross section SUR, Panel Least Squares Cross section fixed effects and Robust Least Squares options were considered. The data were collected from World Bank and International Trade Centre databases. **Findings –** The economic size, measured by GDP and the unemployment rate of the receiving country, cultural similarities, like common border and common language, as well as EU membership, have a positive impact on the Romanian transportation services export flows. The geographical distance has a negative, small influence on the transportation exports. The Logistics Performance Index, the Consumer Price Index and the Landlocked of the partner country are not statistically significant. **Practical implications –** The Romanian transportation services exports could increase because the potential exports are greater than the real ones. **Originality / Value -** The paper offers a valuable insight on the Romanian transportation exports. The major drivers of the Romanian transportation export flows are the openness to transport services and the services trade openness of the partner country. **Limitations –** Further research is needed to compare the same services before EU integration. Logistics Performance Index was applied only for years 2007, 2010, 2012, 2014, 2016 and 2018, when the data were available.

Keywords: Gravity Model, Transportation Services Exports

JEL Classification: F14: Empirical Studies of Trade;

C33: Panel Data Models; Spatio-temporal Models

Introduction

Literature Review

Ever since it was introduced by Jan Tinbergen in 1962, the gravity model became the most successful, popular and reliable model to study the trade flows between two countries. The model took its name from the Newton's gravity law: the forces between two particles are positively influenced by their masses and negatively influenced by the square of their distance. The economic translation would be that the trade flows between two countries are positively influenced by the size of their economies and negatively influenced by the distance between them. At first, the model was applied based on this intuitive, simple and even beautiful economic application of the gravity laws, the theoretical foundations were established later on starting with Anderson (1979), Krugman (1980), Bergstrand (1985), Helpman (1987), Deardorff (1998), Baier and Bergstrand (2001), Evenett and Keller (2002), Anderson and van Wincoop (2003), Head (2003), Feenstra (2003), Rose and Spiegel (2004), Brun et al (2005), Martinez-Zarzoso and Suarez-Burguet (2005), Baldwin and Taglioni (2006), Egger (2008), Anderson (2010). Deardorff (1998) considered the gravity model as a fact of life, this is why it fits with all trade models and Head and Mayer (2014) said the gravity model is the workhorse, the toolkit and the cookbook for trade research. So far the researchers of trade flows for goods who used gravity models agreed on some issues: the economic size, measured by GDP or GDP per capita, has a positive impact on the trade flows, while the distance between countries has a

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negative impact. As for dummy variables, sharing a common border, a common language or an economic union membership positively influences the trade flows. The controversy persists on the range for the values of the coefficients or on the methodology used and new results come from introducing further determinants of the trade flows.

But when it comes for services trade flows, things are a quite different. The first study referring to services trade flows was the one of Francois (2001), the methodology was further developed by Francois et al (2003), secondly the literature on the services trade flows is scarcer comparing to the one on goods trade flows and it is more controversial as well.

According to Francois (2001), only the GDP of the receiving country influenced the services imports, but Grunfeld and Moxnes (2003) found that the GDP of the importers and the GDP per capita of the exporters matter too. The GDP per capita is an important determinant for the importers and the exporters as well (Walsh, 2006).

According to Grunfeld and Moxnes (2003), the distance between countries has a negative impact on the services trade flows and according to Park (2002), it is significant for all services considered, but Tharakan et al. (2005) found the distance to be insignificant for Indian software services exports. Kimura and Lee (2006) found that the distance is more important for services than it is for goods trade flows, while Lejour and de Paiva Verheijden (2004) found the distance less important for services compared to goods. The distance was not considered a significant determinant for services flows (Walsh, 2006). Geographical distance influence is greater reduced for online services (Alaveras and Martens, 2015) and not so important for air transportation services (Yamaguchi, 2008).

Park (2002) found a common language important for services trade flows, yet Kimura and Lee (2006) disagreed. Kox and Lejour (2005) found that sharing a similar language increases the services trade level. A common language was found as an important determinant for services by Walsh (2006) and by Nordas (2018). Sharing a common language was found important for passenger transportation services (Tsui and Fung (2016).

The membership in a free trade area (FTA) is not significant in the case of services (Grunfeld and Moxnes, 2003) and Kimura and Lee (2006) found FTAs to be positively correlated with the services trade flows. EU membership is not as important for services as it is for goods flows (Walsh, 2006). A FTA with a similar country has a positive impact on the services flows (Nordas, 2018).

According to Walsh (2006), sharing a common border doesn't increase the services trade flows, while Nordas (2018) considered that a common border almost triples the trade.

The comparative advantage of the home country was found to be important for services exports (Alaveras and Martens, 2015).

Transportation services are among the most protected in developed and developing countries as well (Borchert et al, 2012).

The Logistic Performance Index (LPI) created by the World Bank is used as a proxy variable for trade facilitation. The exporter logistics performance seems to be more important than the importer logistics performance (Host et al, 2019).

Remoteness of the receiving country is not significant for transportation services (Covaci and Moldovan, 2015).

All in all, services trade flows are better predicted by the gravity model than the goods trade flows (Kimura and Lee, 2006).

The gravity model has been successful in explaining the international transportation trade (van Bergeijk and Brakman, 2011).

EViews 10 was used in three models, cross section SUR, cross section fixed effects and Robust Least squares.

In the cross-section SUR model, EViews estimates a feasible GLS specification, correcting for heteroskedasticity and contemporaneous correlation.

Robust least squares is reffering to a variety of regression methods designed to be robust or less sensitive, to outliers.

Rose and Spiegel (2004) considered the cross section fixed effects as the best fit.

Romanian transport services exports between 2007 and 2018

When analyzing the Romanian export values in 2018 comparing with the corresponding values in 2007 using the data from International Trade Centre (ITC) and from World Bank, one can see that all exports almost doubled in value (1.99), the services export values are slightly more than double (2.14), while transportation exports almost tripled their value (2.99), that shows the increasing importance of transportation services exports. The share of transportation exports in services exports grew from 20% to 30% and the share of transportation exports in all exports grew from 5% to 10%.

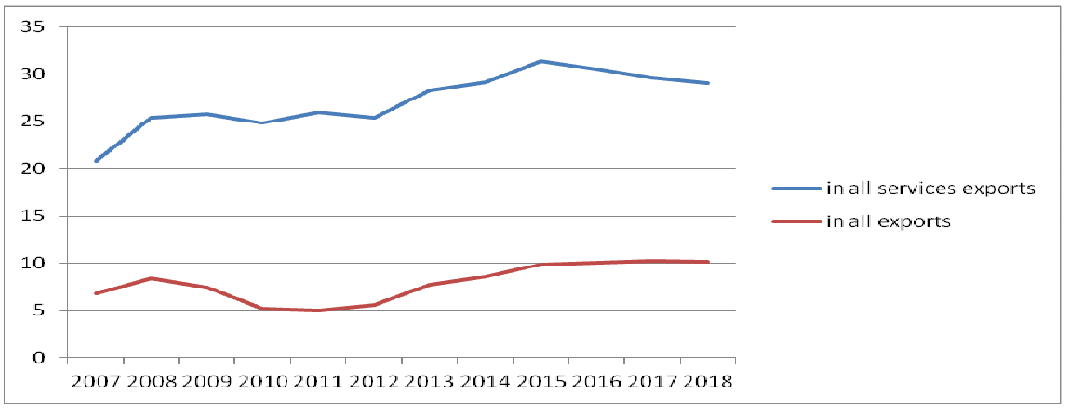

Fig. 1: The evolution of the Romanian transportation export values between 2007 and 2018

Source: International Trade Center, https://www.intracen.org/itc/market-info-tools/trade-statistics/

In the considered period of time, most of the Romanian tranportation exports are to EU countries, from 77% in 2007 to 92% in 2018.

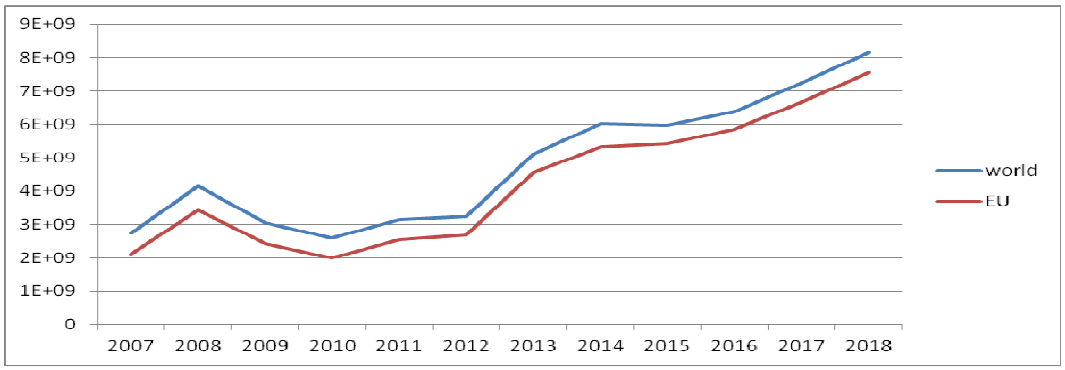

Fig. 2: Romanian transportation exports in 2007-2018

Source: International Trade Center, https://www.intracen.org/itc/market-info-tools/trade-statistics/

Although the number of countries where Romanian transportation exports went to increased from 16 to 56, the top three receiving countries is rather constant.

Table 1: Top three countries for the Romanian transportation exports 2007-2018

2007	2008	2009-2010	2011	2012	2013	2014-2018
UK	UK	UK	UK	UK	Germany	Germany
USA	Hungary	Canada	Hungary	Hungary	Italy	Austria
Swizerland	Bulgaria	Hungary	Canada	Swizerland	Austria	Italy

Source: International Trade Center, https://www.intracen.org/itc/market-info-tools/trade-statistics/

Methodology

The aim of this paper is to find the major drivers for the Romanian transportation services exports from 2007 to 2018.

The main research hypotheses are:

H1: The economic size of the partner country has a positive impact on the transportation exports.

H2: The geographical distance between countries has a negative small impact on the transportation export flows.

H3: The major drivers of the Romanian transportation export flows are the openness to transport services and the services trade openness of the partner country.

H4: The unemployment rate and the importance of transport services in the imports for the receiving countries have a positive impact on the transportation export flows.

H5: Sharing a common border, a common language or an EU membership have a positive influence on the transportation exports.

H6: The Consumer Price Index and the fact that the partner country is landlocked negatively influence the transportation export flows.

H7. The comparative advantage for Romania and the Logistic Performance Index for the receiving country positively influence the transportation exports.

The gravity equation is:

$$LNEXPVAL_t = C + c_1LNGDPP_t + c_2LNDIST + c_3LNEXPPRODS_t + c_4LNTSSGDP_t + c_5LNTSIMP_t + c_6LNUNEMP_t + c_7LNCP_t + c_8\ CB + c_9\ CL + c_{10}\ EU + c_{11}\ LL + \varepsilon$$

$LNEXPVAL_t$ is the dependent variable, it means (the logarithm of) the value of the Romanian transport services exports in US dollars. The data were collected from International Trade Centre (ITC). The independent variables were:

$LNGDPP_t$ (the logarithm of) is the GDP of the partner countries, it measures the economic size of the partner countries in year t. Other variables were tested as well, GDPT (the sum of the GDP of Romania and of the partner country), GDPPC (the GDP per capita of the partner country), GDPPCT (the sum of the GDP per capita of Romania and of the partner country), but GDPP proved to have the greatest explanatory power. The data were collected from World Bank database.

$LNEXPPRODS_t$ (the logarithm of) is the export product share of the partner countries in year t, it measures the openness to transport services. The data were collected from World Integrated Trade Solution (WITS).

$LNTSSGDP_t$ (the logarithm of) is the trade services share in the GDP of the partner country in year t, it measures the services trade openness. The data were collected from World Bank database.

$LNTSSIMP_t$ (the logarithm of) is the transport services share in the imports of the partner country in year t, it measures the importance of transport services imports for the receiving countries. The data were collected from World Integrated Trade Solutions (WITS).

$LNUNEMP_t$ (the logarithm of) is the unemployment rate in the partner country in year t, it measures the labour foreign demand. The data were collected from World Bank database.

All the above independent variables are expected to have coefficients with positive signs.

$LNCP_t$ (the logarithm of) is the consumer prices of the partner countries in year t, measuring the purchase power. The data were collected from World Bank database.

LNDIST (the logarithm of) is the geographical distance between the capital cities of Romania and of the partner country, it is considered a proxy for transport costs. The distances were collected using the distance calculator.

LNCP and LNDIST are expected to have negative coefficients.

The dummy dichotomic variables used are:

CB (common border), it takes the value 1 if Romania and the partner country are sharing a common border and 0 otherwise.

CL (common language), it takes the value 1 if Romania and the partner country share a common language and 0 otherwise.

EU (European Union), it takes the value 1 when Romania and the partner country are members of EU and 0 otherwise.

LL (landlocked country), it takes the value 1 if the partner country is landlocked and 0 otherwise.

All the dummy variables, except for LL, are expected to have coefficients with positive signs, while LL is expected to have negative sign.

t is the year and it takes the whole values between 2007 and 2018.

ε is the error term.

The Logistic Performance Index was realized just for the years 2007, 2010, 2012, 2014, 2016, 2018, therefore for these years the H7 hypothesis was tested. In this case, the gravity equation would be:

$$LNEXPVAL_t = C + c_1LNGDPP_t + c_2LNDIST + c_3LNEXPPRODS_t + c_4LNTSSGDP_t + c_5LNTSIMP_t + c_6LNUNEMP_t + c_7LNCP_t + c_8\ CB + c_9\ CL + c_{10}\ EU + c_{11}\ LL + c_{12}LNCOMPADV_t + c_{13}LNLPI_t + \varepsilon$$

Where the new introduced variables will be:

$LNCOMPADV_t$ (the logarithm of) is the comparative advantage for Romania regarding the partner country in year t. The data were collected from World Integrated Trade Solutions (WITS). It is expected to have a positive sign.

$LNLPI_t$ (the logarithm of) is the Logistic Performance Index of the partner country in year t. The data were collected from World Bank database. It is expected to have a positive sign.

t takes the following values: 2007, 2010, 2012, 2014, 2016, 2018.

Using a panel data approach can control the possibility that the unobserved effects might correlate with the regressors (Egger, 2005). Baldwin and Taglioni (2006) recommended using either exports or imports and not the bilateral trade.

The Results

Table 2: The regression results

Coefficients	Panel Least Squares Cross section SUR	Panel Least Squares Cross section fixed effects	Robust Least Squares
C	- 21.91*	- 21.31*	-20.65*
$LNGDPP_t$	1.19*	1.1*	1.09*
LNDIST	- 0,11**	- 0.04***	-0,04*
$LNEXPPRODS_t$	0.98*	1.04*	1.06*
$LNTSSGDP_t$	0.84*	0.99*	0.96*
$LNTSSIMP_t$	0.22***	0.46*	0.41*
$LNUNEMP_t$	0.57*	0.97*	1*
$LNCP_t$	-0.01	-0.15*	-0.12
CB	2.62*	2.42*	2.37*
CL	1.04**	1.4*	1.36*
EU	1.31*	1.3*	1.26*
LL	0.32**	0.12	0.14
R Squared	0.78	0.80	0.69

*Legend: *, **, *** means that the results are statistically significant at 1%, 5%, 10% level*

Source: Author's table based on EViews outputs

All the coefficients have the expected signs, except the ones for LL, which proved to be positive and they are statistically significant, except the ones for LL and LNCP in two models each.

The GDP of the partner country has the expected positive sign, with similar values, slightly over 1.

The geographical distance between countries has a negative influence, though the value is quite low, which is consistent with the statistical results and the fact that between 77% and 92% of the Romanian transportation exports go to EU countries.

Among the most powerful drivers of the transportation exports are the export product share and the share of services trade in the GDP of the partner countries, the coefficients being closed to 1 in all models.

The unemployment rate of the receiving country and the share of the transportation services in the receiving country imports have a significant influence on the transportation export flows, but the coefficients for unemployment rate are twice as the ones for imports share.

The consumer price index has negative signs as expected, but it is statistically significant only in the second model.

Among the dummy variables, the similar culture, the common border and the common language have the expected positive signs and values, the coefficients for sharing a common border over 2 and for sharing a common language over 1.

The EU membership has a positive influence on the transportation export flows, while the Landlocked variable has positive values and it is significant only in the first model.

Table 3: The regression results with LPI

Coefficients	Panel Least Squares Cross section SUR	Panel Least Squares Cross section fixed effects	Robust Least Squares
C	-21.96*	-19.01*	-18.43*
$LNGDPP_t$	1.1*	1.01*	1.008*
LNDIST	-0.05	-0.03	-0.04
$LNEXPPRODS_t$	0.97*	1.02*	1.03*
$LNTSSGDP_t$	0.76*	0.87*	0.87*
$LNTSSIMP_t$	0.43*	0.45*	0.36**
$LNUNEMP_t$	0.77*	0.99*	0.98
$LNCP_t$	-0.007	-0.19*	-0.12
CB	2.88*	2.35*	2.23*
CL	1.12	1.51*	1.46*
EU	1.21*	1.23*	1.20*
LL	0.07	0.04	0.15
$LNCOMPADV_t$	0.03	0.14**	0.14*
LNLPIt	1.23**	0.54	0.33
R squared	0.78	0.80	0.69

*Legend: *, **, *** means that the results are statistically significant at 1%, 5%, 10% level*

Source: Author's table based on EViews outputs

Some differences in the second set of results compared to the first one are to be noticed:

The distance between countries became statistically insignificant, although it has the same negative sign and the similar small values.

The share of services trade in GDP of the partner countries is a bit lower and the share of the transportation services in the imports of the partner country is a bit higher.

The consumer price index in the receiving countries became significant in the second model and Landlocked became statistically insignificant in all models.

For GDP, Export Product Share, Unemployment Rate, Common Border, Common Language, EU membership, the signs are the same and the values are similar with the ones in the first set of results.

For the new tested variables, the comparative advantage has the expected sign and small values and it is statistically significant only for the second and the third model, while Logistic Performance Index of the partner country has the expected sign, it is significant in the first model with a high value and insignificant in the other two models with smaller values.

Based on the coefficients from the gravity equation, the potential transportation exports was competed and compared with the real transportation exports. The results showed that the potential exports are greater than the real ones.

Conclusions

Both the GDP and the GDP per capita of the partner country, as well as the total GDP and the total GDP per capita of Romania and of the partner country were tested, but the best explanatory power was the one of the GDP of the receiving country. The results are similar with the findings of Grunfeld and Moxnes (2003), in contradiction with the results of Walsh (2006) and extending the findings of Francois (2001) for exports as well. Therefore the first research hypothesis is sustained, the greater the economic size of the partner country is, the greater need for transportation it will have, so more opportunities for transportation imports are.

The geographical distance between Romania and the partner country has a negative impact on the Romanian transportation export flows, which is consistent with the fact that most of the Romanian transportation goes to EU countries, therefore the distances are not too large. The results for the significance of the distance are similar to the ones of Park (2002), contradicting the findings of Yamaguchi (2008). The coefficients for distance are much smaller than the ones in the goods flows, in line with the results of Lejour and de Paiva Verheijden (2004) and Walsh (2006). So, the second research hypothesis is sustained for the first set of results and not sustained for the second set of results. Since the first set is a complete panel database, the H2 hypothesis was considered sustained.

The third research hypothesis is confirmed and the major drivers of the Romanian transportation export flows are the openness to transport services and the services trade openness of the partner country.

The fourth research hypothesis is sustained and the unemployment rate of the receiving country is found to be an important predictor of the Romanian transport exports.

The fifth research hypothesis is confirmed. EU membership proved to be a major driver for Romanian transportation exports, thus sustaining the results of Kimura and Lee (2006) and Nordas (2018) and contradicts the results of Walsh (2006). The common border is an important predictor, with the highest value of all variables, once more this confirming the findings of Nordas (2018) and contradicting the ones of Walsh (2006). Sharing a common language is found important for Romanian transportation export flows, in line with the results of Park (2002), Kox and Lejour (2005), Walsh (2006), Tsui and Fung (2016), Nordas (2018) and in contradiction with the ones of Kimura and Lee (2006).

The sixth hypothesis is rejected, although the Consumer Price Index has the expected negative influence, it is not statistically significant in two out of three models. As for the Landlocked dummy variable, it is not statistically significant, nor has the expected negative sign, therefore seen as a measure of remoteness, the results sustain the findings of Covaci and Moldovan (2015).

The last research hypothesis is rejected, although the comparative advantage and the Logistic Performance Index have the expected signs, they are not statistically significant in all models or the values are too small. The results are in contradiction with the findings of Alaveras and Martens (2015) and Host et. al (2019).

As the potential transportation exports are greater than the real transportation exports, there is enough room to improve the exports for these particular kinds of services.

All in all, the gravity model explained very well the Romanian transportation export flows from 2007 to 2018, considering the high values of R squared, confirming the results of van Bergeijk and Brakman (2011).

It seems somehow natural that the results of different empirical studies to be apparently contradictory, because the trade flows are highly sensitive to the specific characteristics of the trade countries.

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The Role of Job Insecurity, Perceived Organizational Support, and Organizational Justice on Organizational Commitment using Hardiness as Moderator at the Context of Printing Industry

Yohanes PRINCEN
Universitas Indonesia, Jakarta, Indonesia, yohanes.princen81@ui.ac.id

Fanny MARTDIANTY
Universitas Indonesia, Jakarta, Indonesia, fanny.martdianty@ui.ac.id

Abstract

Hardiness is a personality trait that makes individuals stronger, more stable and optimistic in dealing with stress and reduces the negative effects of difficult situations. The purpose of this study is to examine the moderation effect of hardiness on the relationship between job insecurity, perceived organizational support, and organizational justice to organizational commitment. Using data from 338 respondents from six printing industry company, the results showed that job insecurity and perceived organizational support significantly affect organizational commitment, on other hand, organizational commitment was found not influenced by organizational justice. It also found that hardiness significantly moderating job insecurity, perceived organizational, and organizational justice on organizational commitment. This study contributes to further understanding of the role of hardiness in employee's commitment whose companies are facing the challenge of reducing business scale and to managerial of printing industry in order to maintain their employee's organizational commitment better in the business that experiencing a decline. Practical suggestions are provided for managers or organizations who wish to increase employee commitment, and avenues for future research derived from the study's limitations, findings and focus are proposed.

Keywords: job insecurity; perceived organizational support; organizational justice; hardiness; organizational commitment; printing industry.

Introduction

The fourth industrial revolution is destined to have a large impact on work and organization, no longer limited to one industry, but to all industries. At the same time, many jobs will be lost and many people will lose their jobs (Lee, Yun, Pyka, Won, Fodama, Schiuma, Park, Jeon, Park, Jung, Yan, Lee & Zhao, 2018). Digital technology will massively enter all business sectors and will result in a new service and more interaction with customers. Efficiency will play a big role where the physical product will be displaced by digital products. This will cause new industries to emerge and old industries to disappear (Lee & Zhao, 2018). One of the old industry is printing industry, the surviving printing industry companies are fighting against future uncertainty; on how to survive. While printing companies do what they can to survive, their employees suffer its consequences. Compensation and benefits are reduced to cut the company's expenses. Lot of employees are terminated and those who stay, may feel an insecurity that they will be the next target. Talents are avoiding printing industry due to future uncertainty and making this issue harder for printing companies to hire good talents.

Unfortunately, there are limited or similar research about printing industry facing new era of digitalization. The main objective of the present study is to analyze the relationship between job insecurity, perceived organizational support, organizational justice on organizational commitment using hardiness as moderator. The findings of this study can be used by the top management as guidelines to handle their employees.

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Moreover, this study will benefit the printing industry in providing better information related with human resources management, objectives and strategies to survive in the current situation.

The paper proceeds as follows. In section 2, literature review related to this research is explored. Then, the methodology is presented in section 3. Result is presented in section 4. In section 5, discussion related to the result is explained. The final section 6 concludes the paper.

Literature Review

Organizational Commitment

Organizational commitment refers to an individual's feelings about the organization as a whole. It is the psychological bond that an employee has with an organization and has been found to be related to goal and value congruence, behavioral investments in the organization, and likelihood to stay with the organization (Joo & Park, 2013). There is distinction between two popular views of commitment, one provided by Porter and his associates and the other is by Becker (Meyer et al., 1990). Meyer (1990) described commitment as the tendency to engage in "consistent line of activity" because of the perceived cost of doing otherwise. Meyer and Allen used the terms of affective commitment and continuance commitment, respectively, to characterize these two views of the construct and noted that, although both views reflect a link between the employee and the organization that decreases the likelihood of turnover, the nature of the link is quite different. Employees with a strong affective commitment remain with the organization because they want to, whereas those with strong continuance commitment remain because they need to.

Job Insecurity

Job insecurity has been defined in various ways. For example, job insecurity has been described as an employees' expectations about continuity in a job situation, concern about the future performance of the job, and a perception of a potential threat to continuity in his or her current job (Sverke et al., 2002). Job insecurity is thought to reflect the degree to which employees perceive their jobs, or important features of their jobs, to be threatened and to which they perceive themselves to be powerless to do anything about it Job insecurity reflects the subjective anticipation of an involuntary event. As such, this anticipation has two components: one that is cognitive (beliefs) and one that is affective (emotional state) (Huang et al., 2010).

Cognitive job insecurity can be defined as the perceived threat to the continuity of one's employment and/or to features of the job, whereas affective job insecurity can be defined as the emotional reactions to the perceived threat to one's job (Huang et al., 2010). Recent research (Jiang & Lavaysee, 2018) proves that affective job insecurity has a stronger influence on attitudes towards job security than cognitive job insecurity. Based on this considerations, this research will use affective job insecurity as discussed in Huang et al., (2010).

Perceived Organizational Support

Perceived organizational support (POS) can be defined as an employee's perception that the organization values his or her work contributions and cares about the employee's well-being and has been shown to have important benefits for employees and employers (Eisenberger et al., 2016). Eisenberger, Huntington, Hutchison, and Sowa (1986) suggested that employees form a general perception concerning the degree to which the organization values their contributions and cares about their well-being. High perceived organizational support (POS) would (a) meet needs for approval, esteem, and social identity and (b) produce the expectation that superior conventional performance and extra role behavior, carried out for the organization, will be recognized and rewarded. On the basis of the norm of reciprocity, POS would

strengthen affective commitment to the organization and increase efforts made on its behalf (Eisenberger et al., 1986).

Organizational Justice

The term organizational justice was first introduced by Greenberg (1987) which represents individual's perceptions and reactions to fairness towards the organization. Justice refers to an action or decision that is morally and ethically right. Justice can be linked to, religion, ethics, equity, and law. Justice or fairness in organizations may include issues associated with perceptions of fairness in pay, equal opportunities for promotion and employee selection processes. Injustice examples maybe of unequal pay for and women doing the same job. Performance reviews conducted by a boss whom the employee had less contact, arbitrary dismissals etc. (Usmani & Jamal, 2013).

Organizational justice includes three dimensions: distributive, procedural and interactional. Distributive justice consists in the perception that the members' outcomes are commensurate with their efforts, contribution and performance. Procedural justice is the result of applying specific normative rules in evaluating whether a process is fair, as representativeness, consistency, bias suppression, accuracy, correctability and ethicality. Beyond the distribution of outcomes or formal processes, injustice perceptions arise when people had faced disrespect form others or the interactional dimension of justice (Rodriguez et al., 2019).

Hardiness

Hardy individuals held a view of the world as meaningful and demonstrated commitment through intention and action, rather than passive involvement in life events. When faced with new experiences, change, or adversity, hardy individuals exhibited feelings of self-reliance, sufficiency, courage, and control instead of dependence or helplessness. The theory of psychological hardiness suggested that change was healthy and stimulated individual development in lieu of presenting a threat to personal well-being and security (Kobasa et al., 1982). The constellation of commitment, control, and challenge altered human awareness of situations; positively affected cognitive appraisal and coping; and had the ability to mitigate and moderate the deleterious influence of stressful life situations (Crosson, 2015).

This study identifies the role of job insecurity, perceived organizational support and organizational justice to organizational commitment while using hardiness as moderator. The interaction effects of moderator are important to examine because they are a commonplace method of investigation in research, which can be rule instead of the exception (Crosson, 2015). Moderator interaction effects are also significant if researcher wants to learn whether relationships between predictor and outcome variables are greater for some individuals than for other individuals (Frazier et al., 2004). Consequently, researcher discovered that the examination of the moderator variable of hardiness was relevant to the study of job insecurity, perceived organizational support and organizational justice to organizational commitment.

There has been much research related printing industry; however, most of past research is when the printing industry is skyrocketing and unfortunately, there are limited research about printing industry when their business is disrupted with technology and their revenues are going down.

The objective to this study is to investigate the relation between relation between job insecurity, perceived organizational support, and organizational justice to organizational commitment and the moderating role of hardiness. It aims to determine whether hardiness plays a significant role between job insecurity, perceived organizational support, and organizational justice to organizational commitment.

Hypotheses 1. Job insecurity has a negative effect on organizational commitment.

Hypotheses 2. Perceived organizational support has a positive effect on organizational commitment.
Hypotheses 3. Organizational justice has a positive effect on organizational commitment.
Hypotheses 4. Hardiness moderates the effect of job insecurity on organizational commitment
Hypotheses 5. Hardiness moderates the effect of perceived organizational support on organizational commitment.
Hypotheses 6. Hardiness moderates the effect of organizational justice on organizational commitment.

Research Methodology

Sample and Procedures

In accordance with the introduction, the printing industry is the one that has the negative impact of the 4.0 industrial revolution. Researchers also conducted pleriminary studies, and found that printing industry employees showed indications of low commitment and high job insecurity. The participants are employees of 6 printing industry which listed a total of 338 employees. Subjects were encouraged to participate in a study about responses to organizational commitment and were informed the objective of the research, to investigate the link between job insecurity, perceived organizational support and organizational justice to organizational commitment with hardiness as moderator. All employees were sent questionnaires with prepaid return envelopes and using google form, respondents were guaranteed anonymity.

Measures

The statement items used in the questionnaire are taken with use a Likert scale where 1 means strongly disagree and 5 means strongly agree. Participation in the study was voluntary and participants were given the opportunity to maintain contact with the researcher in order to follow up the results obtained and to have the possibilities in further follow-up studies.

Job insecurity. This instrument was measured by using 7 items from Huang, Lee, Ashford, Chen & Ren (2010). e.g., “I wish I had more job insecurity in this company”.

Perceived organizational support. This instrument was measured using 8 items from Eisenberger, Cummings, Armeli & Lyncy (1997). e.g., “My organization cares about my opinion”.

Organizational justice. This instrument was measured using 12 items from Castano & Izquirdo (2018). e.g., “The rewards here are fair”.

Organizational commitment. This instrument was measured using 18 items from Meyer, Allen & Smith (1993). e.g., “I would be very happy to spend the rest of my career with this organization”.

Hardiness. This instrument was created to assess the role of hardiness as moderator of the relationship between job insecurity to organizational commitment, perceived organizational to organizational commitment and organizational justice to organizational commitment. This instrument was measured using 15 items from Jimenez, Munoz, Hernadez & Blanco (2014). e.g., “I Involve seriously in what I do, because it is the best way to reach my own goals”

Results

Data analysis was conducted in two stages. Firstly, checking for data entry for reliability of variables using SPSS computer program. Secondly, using AMOS computer program to utilized to run data from questionnaires.

Reliability Analysis

As can be seen in Table. 1 of the instrument used showed adequate indices of internal cosistency evaluated using Average Variance Extrated (AVE) and Construct Reliability (CR). The minimum value of AVE was .519 corresponding to the continuance dimension of organizational commitment and the minimum value of CR was .689 correspong to the job insecurity.

Table 1: Reliability analysis using Average Variance Extrated and Construct Reliability

Variable	Dimension	AVE	CR
Job Insecurity	-	0,632	0,689
Perceived Organizational Support	-	0,609	0,886
Organizational Justice	*Dimensional*	0,648	0,879
	Procedural	0,664	0,854
	Interactional	0,755	0,925
Hardiness	*Commitment*	0,517	0,762
	Challenge	0,484	0,762
	Control	0,465	0,719
Organizational Commitment	*Affective*	0,621	0,907
	Continuance	0,519	0,842
	Normative	0,599	0,899

Analysis of Hypotheses

The result corresponding to the hypotheses are displayed in Table 2. As can be seen in Table. 2, organizational commitment affected negatively by job insecurity (β = -0,085, p.value = 0,022), affected positively by perceived organizational support (β = 0,375, p.value = 0,005), and does not affected by organizational justice (β = -0,058, p.value = 0,691). Meanwhile, hardiness moderates job insecurity, perceived organizational support and organizational justice on organizational commitment.

Table 2: Result of Analysis Hyptoheses

No	Relation	*β*	*p.value*
1	Org. Commitment Job Insecurity	-0,085	0,022
2	Org. Commitment Perceived Org. Support	0,375	0,005
3	Org. Commitment Org. Justice	-0,058	0,691

4	Org. Commitment JI * Ha	0,003	0,001
5	Org. Commitment POS * Ha	0,01	***
6	Org. Commitment OJ * Ha	0,005	0,016

Discussion

The principal objective of this study is was to investigate the relation between job insecurity, perceived organizational support, and organizational justice on organizational commitment and the moderating role of hardiness. Firstly, it should be noted that the first hypotheses proposed in this research was upheld, which refers to the correlation between job insecurity and organizational commitment. The research confirms that people with high job insecurity level will feel insecure about their job and have less commitment. Secondly, the second hypotheses proposed in this research was upheld, which refers to the correlation between perceived organizational support and organizational commitment. The research confirms that people with high perceived organizational support level will show more commitment. Interestingly, it should be noted that the third hyptohses proposed in this research was rejected. The research confirms that organizational justice does not affect organizational commitment. Altough previous research showed organizational justice signifcantlly affect organizational justice positively, researcher also suspect that this condition occurs because of the situation where at the time of this research, printing industry was facing a bad situation, which forced many companies to undertake a massive efficiency strategy that resulted in layoffs in all industrial sectors. In situations like this, still having a job and being committed to the company becomes more important for employees than perceptions of organizational justice.

In terms of fourth, fifth, and sixth hypotheses, the aim was to test whether hardiness affects the relation between job insecurity, perceived organizational support, and organizational justice on organizational commitment. Result obtain confirm that hardiness does have a significant moderating effect between job insecurity, perceived organizational support and organizational justice on organizational commitment at certain level. From these results, two noteworthy conculusion can be drawn. Firstly, the hardiness factor which behaves best as a moderator is perceived organizational support, given that it moderates the relationship between perceived organizational support and organizational justice. This result is greatly relevant to the situation of printing industry as, if means are provided for workers to have greater commitment, for example through the praise or participation in decision making, it is proabel that they will display a greater level of commitment when treated well. Secondly, altough organizational justice does not affect organizational commitment, result showed that hardiness does have a significant moderating effect between organizational justice to organizational commitment. This shows that individuals with higher hardiness are able to maintain commitment to the company when the company does not treating them fairly. This was conveyed by what was delivered by Maddi (2013) that individuals with higher level of hardiness have higher endurance than individuals with lower hardiness, they need more help slumping, difficult and remain in accordance with the results and goals previously set.

Conclusion

In this paper, result showed that job insecurity and percevied organizational support affect organizational commitment, meanwhile organizational justice does not affect organizational commitment. Hardiness plays a moderating role between job insecurity, perceived organizational support, and organizational justice to organizational commitment.

This research is limited to a particular industry company in Indonesia whereas there are more industries in Indonesia. The results of this study cannot be used to explain the role of hardiness moderation on the effect of job insecurity, perceived organizational support, and organizational justice on organizational support in

different industries. For future research, it is recommended to be able to cover more than one industry, this can be used to make comparisons between industries in order to get a better understanding of organizational commitment.

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Determinants of Capital Structure among Listed Manufacturing Firms in Indonesia: Do Firm Size and Age Have Moderating Effects?

Reynaldi Hidayat WIRIAMIHARJA

Indonesia Education Endowment Fund, Jakarta, Indonesia
E-mail: reynaldihidayat@gmail.com

Arief Wibisono LUBIS

Department of Management, Faculty of Economics and Business, Universitas Indonesia, Depok, Indonesia
E-mail: ariefwl@ui.ac.id

Abstract

The aim of this research is to analyze the determinants of capital structure among manufacturing firms listed on Indonesia Stock Exchange from 2014-2018 with different age and size. The explanatory variables are growth, tangibility, profitability, size, liquidity, and age, meanwhile the dependent variables are total debt ratio and long-term debt ratio. The sample used in this research consists of 88 companies with 264 observation data. The results show that growth, tangibility, profitability, size, liquidity, and age have significant effects on capital structure by using data of all type company sizes or ages. Using a sample of all companies, growth has a significant effect on capital structure. However, growth does not have significant effect among big and old companies. Differences can also be found in other independent variables, particularly size and liquidity with different variations as the companies got older and bigger.

Keywords: liquidity; growth; profitability; capital structure; tangibility; size; age

Introduction

A formalised theory on capital structure began when Modigliani and Miller (1958) argued that under certain restrictive assumptions, the proportion of debt used by a firm is irrelevance to its value, since debt and equity are perfect substitutes. Therefore, the cost of capital used for discounting the expected future cash flows is not affected by the use of debt. These unrealistic assumptions were then relaxed, in which tax and bankruptcy costs are incorporated into the model and there is a trade-off in the effect of using more debt on the value of the firm. Another prominent capital structure theory is the pecking order theory (Myers and Majluf, 1984), which posits that when firms need to finance their projects, they will first attempt to raise debt when internal financing is not sufficient.

As the literature developed, it becomes evident that there is no single theory that can universally explain firms' behaviour when it comes to their capital structure decisions. The effects of some factors on capital structure are not uniform, and these might subject to the moderating effect of other variables. Mateev et al. (2013) showed that various factors have different effects on capital structure among firms with different age and size. Meanwhile, Yildirim et al. (2018) showed that there are differences in determinants of capital structure among sharia-compliant firms and sharia non-compliant firms. Related to these studies, Orlova et al. (2020) argued that capital structure is a complex phenomenon and the choice depends on borrowing access and capacity. Similarly, Ramli et

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al. (2019) highlighted the importance of leverage as mediating variable in capital structure determination.

Based on the study of Mateev et al. (2013), this study attempts to examine differences in factors affecting capital structure among firms with different age and size in the context of manufacturing firms in Indonesia. We used the model developed by Vo (2017), where growth, tangibility, profitability, size, and liquidity serve as the independent variables, and included age as an additional factor following Ahmad and Aris (2015). Firms in Indonesia are interesting to study since they tended to have lower levels of leverage compared to those in other countries. Gill (2011) shows that in the United States from 2005-2007, manufacturing firms had an average total debt ratio of 55.4% and long-term debt ratio of 32.2%. Similarly, according to Abeywardhana (2016), the total debt ratio and long-term debt ratio of small and medium enterprises (SMEs) in the United Kingdom from 1998-2008 were 56.1% and 16.45, respectively. Meanwhile, Lestari and Irianto (2017) shows that from 2011-2015, the average total debt ratio among firms in Indonesia was only 41.4%. In addition, in terms of debt market, Indonesia was ranked 7th among emerging Asia countries in December 2013. This study only focuses on one industry to avoid biases due to different financial characteristics among companies in different industries.

The following section of this paper discusses some theoretical backgrounds related to capital structure. The section afterwards elaborates in methods used in this study in more details. The fourth section presents the main results and discusses them, by comparing them with some findings in the existing literature. Finally, the last section provides an overall conclusion of this paper.

Literature Review

Capital Structure Definition

There are different conceptualisations of capital structure, as summarised by Kumar (2017). Some only include permanent financing, i.e. long-term debt, preferred stock, and firms' equity, while others equate capital structure with total capital, which includes claims of trade creditor, bank creditor, and bond holders. This last definition is especially relevant when short term financing dominates the right-hand side of the balance sheet, as often found among small firms.

Trade-off Theory

According to trade-off theory, firms need to maintain their debt ratio at moderate levels (Myers, 2001). This is due to the possibility of financial distress when firms use excessive debt. Financial distress refers to all costs associated when firms face bankcruptcy or reorganisation. Firms will thus borrow up to a point where tax shield benefit due to additional debt is equal to financial distress. This theory is based on strong rationality, and is consistent with several observations, such as the relatively low risks of firms with high tangible assets. Firms with higher levels of tangible assets tend to borrow more than those with low levels of tangible assets. However, this theory cannot explain why some big firms with high profitability levels had low levels of debt for years, such as Microsoft and big pharmaceuticals (Myers, 2001).

Pecking Order Theory

Myers and Majluf (1984) analysed firms' assets and growth prospects when additional financing is needed. They assumed a perfect financial market, except that investors do not have a full information on the value of assets or new investment opportunities. Hence, investors did not have the ability to accurately value the securities issued to finance investment activities. They further assumed that managers act based on the interests of firms' owners, and thus they refused to issue undervalued

stocks. Managers will issue stock if the transfer value from old shareholders to the new shareholdres is at least equal to the present value of existing growth opportunities.

On the other hand, firms can issue debt or equity to finance new investment opportunities. Debtholders' claims are prioritised over that of equityholders, and therefore the latter are known as residual claim holders. Debt investors are then less exposed to the risk in valuing firms. Managers who feel that their stock value is undervalued will prioritise debt issuance in the case of external financing needs. Rajan and Zingales (1995) concluded that under the pecking order theory, firms will (1) prefer internal financing; (2) set a targeted payment ratio based on the expected investment opportunities; (3) implement constant dividend policy; and (4) choose first internal financing, followed by low risk debt, high risk debt, and finally equity as their last option.

Size and capital structure

There are different evidence on the role of size in determining capital structure. Rajan and Zingales (1995) found that among firms in most developed countries, the impact of size on leverage is positive. One explanation for this is that bigger firms tend to have lower probability of default and have better diversification strategy. On the other hand, in countries like Germany, size is negatively correlated with leverage. This might be due to a higher probability of liquidation among bigger firms. The costs associated with liquidating these large firms are also large, and thus they are reluctant to increase their leverage (Rajan and Zingales, 1995).

From the risk perspective, Mateev et al. (2013) argued that larger firms are better diversified and rarely experience default; therefore size can be used as a reverse proxy of probability of default. We can then expect size as one variable that can predict the leverage level, with a positive coefficient. Limitations on credit maturity offered by debtholders can explain partly the structure of liability among SMEs. In this context, SMEs use less long term liabilities compared to the larger ones.

Size might also play a role as a moderating variable in the relationship between several factors and debt level, as Mateev et al. (2013) show. They found differences in coefficients' signs among the predictors of leverage, including sales growth, liquidity, size, and asset structure. Moreover, their roles in predicting leverage are more significant among large firms than small firms.

Age and Capital Structure

The impact of age on capital structure has been discussed by previous literature, although not as extensive as the discussions on other variables such as profitability. Age is normally used as an independent variable to predict capital structure. Age can also be seen as a proxy of reputation. Diamond (1989) posited that access to debt market problems will be higher among newly established firms due to their limited or absence of track record. Harris (1991) explained that the longer a firm's history of paying off debt, the higher the reputation ad the lower the interest payment. Hence, it is more optimum for older firms to select safe investment projects, since the odds of assets' liquidation due to the failure of the projects are lower. On the other hand, younger firms with lower reputation choose riskier projects. When they survive, eventually they will turn to relatively safe projects in the longer term. As a result, these firms will experience lower probability of default and cost of debt. In a similar vein, Abor (2008) mentioned that when a firm continues its operation, it shows a sign of sustainability and therefore can increase its debt capacity.

Another stream of literature argues that as a firm gets older, many of its characteristics and behaviour evolved. Kieschnick and Moussawi (2018), for example, showed that governance structures of old firms are different from the younger ones. They documented some differences in the effect of board of director's composition on capital structure among firms with different ages. Mateev et al. (2013) found that the effect of some factors on leverage depend of the age and size of the firm. The

coefficients' signs of sales growth, liquidity, size, and assets' structure are more significant among older firms.

Research Method

This study examines the issue of capital structure among firms with different age and size levels among listed companies in the basic industry and chemicals and consumer goods in Indonesia Stock Exchange from 2014-2018. By focusing on this specific industry, we try to avoid some biases due to different operational cycle and business environment. Table 1 provides a detail on the sample selection procedure.

Table 1: Sample selection procedure

No	Description	N
1	Manufacturing firms listed in 2019	125
2	Firms fulfilling criterion (1) and listed from 2014-2018	99
3	Firms fulfilling criterion (2) and have complete data	93
4	Firms fulfilling criterion (3) with positive book value of equity	88

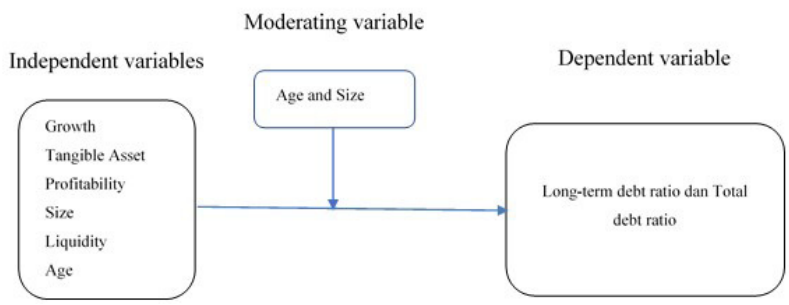

Fig 1. Conceptual framework

Both major capital structure that have been elaborated in the previous section provide different conclusion on the effect of several variables on leverage, as can be seen in Table 2.

Table 2: Expected coefficients' signs of the independent variables

Variable	Trade-off Theory	Pecking Order Theory
Growth	-	+
Tangible assets	+	-
Profitability	+	-
Size	+	-
Liquidity	+	-
Age	+	-

Trade-off Theory predicts that growth is negatively associated with leverage. Acaravci (2015) summarised that firms with higher growth levels should use more equity financing since firms can avoid underinvestment problems due to potential conflicts with bondholders. On the other hand, according to the Pecking Order Theory, growth has a positive effect on leverage. Firms that are in the development stage often do not have sufficient internal funds to finance their projects (Hossain and Ali, 2012). When this is the case, they will prioritise the use of external debt over external equity.

H1a : Growth has a significant effect on total debt ratio
H1b : Growth has a significant effect on long term debt ratio.
H1c : There are differences in the effect of growth among firms with different age levels
H1d : There are differences in the effect of growth among firms with different size.

Referring to the trade-off theory, tangibility is expected to have a positive correlation with debt proportion. Acaravci (2015) explained that tangible assets have high collateral value, and thus they can help firms to get more debt financing. Meanwhile, Pecking Order Theory predicts that tangibility affects leverage negatively. It is argued in the literature that firms with low tangibility are subject to asymmetric information problems and can lead to a lower equity. On the other hand, when assets tangibility is high, the probability of firms experiencing asymmetric information problem is lower, and thus its equity value will be higher. This leads a situation where it is more beneficial for the firms to have more equity financing (Hossain and Ali, 2012).

H2a : Tangibility has a significant effect on total debt ratio.
H2b : Tangibility has a significant effect on long term total debt ratio.
H2c : There are differences in the effect of tangibility among firms with different age levels.
H2d : There are differences in the effect of tangibility among firms with different size

Vo (2017) showed that following the Pecking Order Theory, firms with higher profitability levels attempt to substitute debt with retained earnings. With these firms' investment levels held constant, the effect of profitability on leverage is expected to be negative. On the other hand, the Trade-off Theory predicts that profitability has a positive effect on leverage. One explanation is that profitable firms are less likely to go bankrupt (Vo, 2017).

H3a : Profitability has a significant effect on total debt ratio.
H3b : Profitability has a significant effect on long term total debt ratio.
H3c : There are differences in the effect of profitability among firms with different age levels.
H3d : There are differences in the effect of profitability among firms with different size

Trade-off Theory predicts that size is positively correlated with debt proportion. Acaravci (2015) argued that larger firms tend to be more diversified and thus can minimise bankruptcy risk. If the risk is smaller, firms will be more eager to finance themselves with debt. Meanwhile, if Pecking Order Theory holds, size has a negative effect on leverage. As elaborated in Hossain and Ali (2012), the problem of asymmetric information is less prevalent in large firms. Asymmetric information can lead to undervalued equity, and discourage managers to issue new equity. When this problem is lower, the equity value will be improved and thus increases the preference for equity financing over debt financing.

H4a : Size has a significant effect on total debt ratio.
H4b : Size has a significant effect on long term total debt ratio.
H4c : There are differences in the effect of size among firms with different age levels.
H4d : There are differences in the effect of size among firms with different size

Referring to the Trade-off Theory, liquidity has a positive and significant effect on debt proportion. A higher liquidity means a better ability in fulfilling short term liabilities, and thus increases the firm's

credibility in repaying its debt (Hossain and Ali, 2012). Meanwhile, Pecking Order Theory suggests a negative relationship between liquidity and leverage. Firms with higher levels of current assets are expected to be able to generate more cash to finance investment projects. Since this theory posits that firms prioritise internal source of financing, the use of debt will be lower (Hossain and Ali, 2012).

H5a : Liquidity has a significant effect on total debt ratio.
H5b : Liquidity has a significant effect on long term total debt ratio.
H5c : There are differences in the effect of liquidity among firms with different age levels.
H5d : There are differences in the effect of liquidity among firms with different size.

Age is expected to have a positive relationship with debt proportion. According to Ahmad and Aris (2015), the older the firm, the greater the access to debt financing since the firm has proven its reputation to debtholders whose main concern is debtor's repayment ability. On the other hand, the Pecking Order Theory associated age negatively with debt proportion. Older firms tend to have higher accumulated retained earnings, which can be used to finance its investment projects. If this theory holds, firms will be discouraged from looking for external financing due to higher costs of fund.

H6a : Age has a significant effect on total debt ratio.
H6b : Age has a significant effect on long term total debt ratio.
H6c : There are differences in the effect of age among firms with different age levels.
H6d : There are differences in the effect of age among firms with different size.

Following Vo (2017) and Ahmad and Aris (2015), in testing the above hypotheses, this research uses the following regression model:

$$CapStructure_{i,t} = CapStructure(-1)_{i,t} + \beta_1 GROWTHi,t + \beta_2 TANG_{i,t} + \beta_3 PROFITi,t + \beta_4 SIZE_{i,t} + \beta_5 LIQUIDITY_{i,t} + \beta_6 AGE_{i,t} + \epsilon_{i,t} \quad (1)$$

The operationalisation of variables used in equation 3.1 is detailed in Table 3.

Table 3: Variables' operationalisation

Variable	Variable operationalisation	Source of definition	Data source
Total Debt Ratio (TDR)	Total Debt/Total Asset	Hossain and Ali (2012)	Bloomberg
Long Term Debt Ratio (LTDR)	Total Long-Term Liabilities/Total Asset	Vo (2017), Mateev et al. (2013)	Bloomberg
Growth (G)	Tobin's Q Ratio	Vo (2017), Mateev et al. (2013)	Bloomberg
Tangible Asset (TAs)	PPE/Total Asset	Vo (2017), Mateev et al. (2013)	Bloomberg
Profitability (P)	Net Profit/Total Asset	Vo (2017), Mateev et al. (2013)	Bloomberg
Size (S)	Ln(Total Asset)	Vo (2017), Mateev et al. (2013)	Bloomberg
Liquidity (L)	Current Asset/Current Liability	Vo (2017), Mateev et al. (2013)	Bloomberg
Age (A)	Ln(Total Asset)	Ahmad and Aris (2015)	Indonesia Stock Exchange

The sample was divided into different groups according to age and size using the median split technique, following Fama and French (1993). Using this technique, firms whose age or size below the median was included in the "low" category sample, while those with age or size above the median belonged to the "high" category sample (Decoster et al., 2011).

In data analysis, this study did not include the outliers, which is defined as observations in the highest 1% and lowest 1%. Panel data regression technique was performed using the Generalised Method of Moment (GMM) estimation. Specifically, the first-difference GMM developed by Arellano and Bond (1991) was used in estimating the model.\

Results and Discussions

Before proceeding with data analysis, we first ensure that there is no multicollinearity problem among the independent variables used in this study. Dohoo (1997) used a coefficient correlation threshold of 0.9 to decide whether multicollinearity persists. The result shown in Table 4 confirms that no multicollinearity found.

Table 4: Multicollinearity test

	Growth	Tangibility	Profitability	Size	Liquidity	Age
Growth	1					
Tangibility	-0.040	1				
Profitability	0.451	-0.203	1			
Size	0.129	0.275	0.175	1		
Liquidity	-0.065	-0.464	0.263	-0.104	1	
Age	0.153	-0.050	0.430	0.114	0.139	1

Table 5 presents the descriptive statistics of our sample, that consists of 440 observations. As total debt ratio and long term debt ratio are the dependent variables in this research, these two deserve further elaborations. Total debt ratio has a mean of 0.217, which means that on average, the total debt of the sample is 21.7% of the total assets. In our sample, there are 15 firms that had no debt in their capital structures. Meanwhile, the average long term debt ratio is relatively low, which is only 0.084. This means that the uses of long term debt among these firms are relatively low. Nevertheless, there is a firm with a long term debt of 52.5% of its total assets. We noted that there were 39 firms that did not use long term debt as part of their financing efforts.

Table 5: Descriptive statistics

Variable	Number of observation	Mean	Standard deviation	Minimum	Maximum
TDR	440	0,217	0,179	0	0,795
LTDR	440	0,084	0,120	0	0,525
Growth	440	2,381	4,189	0,304	37,232
Tangibility	440	0,407	0,193	0,034	0,966
Profitability	440	0,054	0,096	-0,176	0,921
Size	440	37,324	2,305	27,891	41,680
Liquidity	440	2,455	2,116	0,053	15,164
Age	440	3,578	0,419	1,609	4,727

Table 6 presents the regression's results using total debt ratio as the dependent variable, while table 7 shows the results using long term debt ratio as the dependent variable. It should be noted that since we employed GMM, the numbers of observations recorded in the regression models are lower than 440.

Table 6: Regression's result: Debt ratio as the dependent variable

TDR	Aggregate	Age: below median	Age: above media	Size: below median	Size: above median
TDR L1	0.240**	0.175	0.160	-0.074	0.180*
Growth	0.007*	0.011**	0.003	0.008**	0.001
Tangibility	0.015	0.007	-0.048	-0.127*	0.284***
Profitability	-0.420***	-0.527***	-0.370***	-0.360***	-0.419***
Size	0.062**	0.065*	0.044	0.027	0.136***
Liquidity	-0.011**	-0.007	-0.020***	-0.019***	0.004
Age	-0.272***	-0.470***	0.199	-0.169	-0.367***
Cons	-1.162	-0.644	-2.158**	-0.071	-3.904***
No Observation	264	132	132	132	132
Prob>Chi2	0.000	0.000	0.000	0.000	0.000

, **, and * denote significance at 10%, 5%, and 1%*

Table 6: Regression's result: Long term debt ratio as the dependent variable

LTDR	Aggregate	Age: below median	Age: above media	Size: below median	Size: above median
LTDR L1	0.551***	0.502**	-0.002	-0.858***	0.385***
Growth	0.000	0.000	-0.005	-0.002	0.000
Tangibility	0.301***	0.275***	0.274***	0.171***	0.610***
Profitability	-0.070	-0.061	-0.139	-0.128	-0.085
Size	0.075***	0.089**	0.053	0.000	0.187***
Liquidity	0.025***	0.024***	0.010	0.004	0.054***
Age	-0.188*	-0.293**	0.005	-0.045	-0.289*
Cons	-2.254***	-2.472*	-2.036**	0.175	-6.539***
No Observation	264	132	132	132	132
Prob>Chi2	0.000	0.000	0.001	0.012	0.000

, **, and * denote significance at 10%, 5%, and 1%*

Overall, the results suggest that Pecking Order Theory is the one that can explain capital structure decisions among listed manufacturing firms in Indonesia. We can see this from the relatonships between the independent variables and the dependent variabes. Growth is associated positively with leverage among firms belong to the below-median age and size. They tend to have lower internal financing capabilities compared to older and bigger firms. This finding is in line with those by Titman and Wessels (1988) and Chen (2003).

The negative relationship between tangibility and leverage among small firms when the dependent variable is total debt ratio also supports the Pecking Order Theory. Gaud et al. (2005) argued that firms with low asset tangibilities are subject to asymmetric information problem that can lead to

lower value of equity. In contrast, highly tangible firms are less susceptible to the same problem, and consequently the equity value of these firms will be higher. Issuing new equity becomes more attractive for these highly tangible firms. The result showing the negative relationship between profitability and leverage is in line with the Pecking Order Theory. Hossain and Ali (2012) explained that profitable firms tend to use their own internal finance to fund investment projects rather than looking for external financing. Another finding that is in line with the Pecking Order Theory is the negative relationships between age and leverage. As Ahmad and Aris (2015) argued, the older the firm, the higher the accumulated earnings, and thus firms tend to prioritise this internal funding to finance their investment projects. However, it should be noted that the significance of Age is not confirmed among older and smaller firms.

While most of the regression's results support the Pecking Order Theory, some findings can be justified by the Trade-off Theory. The positive effects of tangibility on leverage in most regressions using different sample are in line with the latter, where firms with larger proportions of physical assets can pledge more collateral in getting more debt (Acaravci, 2015). Firms will take more opportunity of having more debt as long as the tax shield benefit outweighs the financial distress costs.

The positive signs of Size and Liquidity also support the Trade-off Theory, and this is due to the tendency that larger firms are more diversified and have higher abilities in fulfilling their short term debt. These will increase the trust of debtholders in channelling funds to the firms, and lead to increases in debt proportion (Hossain and Ali, 2012). Interestingly, we found that Size is not a significant predictor of capital structure among older and smaller firms, both in the cases of total debt ratio and long term debt ratio as the dependent variables.

We found opposing signs of coefficients of liquidity between the regressions using total debt ratio as the dependent variable and those using long term debt ratio as the dependent variable. The negative effect of liquidity on leverage found when total debt ratio serves as the dependent variable supports the Pecking Order Theory. Hossain and Ali (2012) argued that highly liquid firms are better in cash-generating capacity, which further can be used to finance operational activities. The available emergency funds are also higher among these firms. On the other hand, liquidity has a positive and significant effect on leverage when the dependent variable is long term debt ratio. A higher liquidity signals firms' credibility in repaying their debt (Hossain and Ali, 2012).

Table 7: Dominant theories

Firms characteristics	Dominant theories – Total debt ratio	Dominant theories – long term debt ratio
All	Pecking Order Theory	Trade-off Theory
Age – below median	Pecking Order Theory	Trade-off Theory
Age – above median	Pecking Order Theory	Trade-off Theory
Size – below median	Pecking Order Theory	Trade-off Theory
Size – above median	Pecking Order Theory atau Trade-off Theory	Trade-off Theory

Table 7 summarises the findings and the supporting dominant theories that can explain capital structure behaviour among listed manufacturing firms in Indonesia with different age and size. The conclusions presented in this table are taken based on which theory is supported the most by looking at the relationship between each independent variable and the dependent variable. When total debt ratio is used as dependent variable, Pecking Order Theory dominates in all cases. However, looking into more details, Trade-off Theory has a similar power in explaining capital structure behaviour among large firms. On the other hand, when capital structure is perceived only consisting of long term debt, Trade-off Theory prevails in all firms across age and size levels.

Conclusions

This study aims to examine the determinants of capital structure among firms with different age and size levels. It is found that growth, tangibility, profitability, size, liquidity, and age play significant roles in determining firms' capital structures. While in most cases the effects of these variables on capital structure are consistent, we found differences on the effect of liquidity. In the model with total debt ratio as the dependent variable, liquidity has a significant and negative effect in most cases, leading to a conclusion that Pecking Order Theory can explain capital structure behaviour. On the other hand, with long term debt serves as the dependent variable, the sign of liquidity is positive, indicating that Trade-off Theory prevails. The regression results across age and size levels suggest that age and size matter in moderating the effect of independent variables, particularly Size and Liquidity, on leverage.

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User Identity Linkage Across Multiple Social Network Based on Profile Features

Xiaolin YAO
School of Information and Business Management, Dalian Neusoft University of Information, Dalian, China, yaoxiaolin@neusoft.edu.cn
Qi WEI
School of Computer and Information Technology, Liaoning Normal University, Dalian, China, qwei2009@163.com
Qisong ZHANG
School of Information and Business Management, Dalian Neusoft University of Information, Dalian, China, zhangqisong@neusoft.edu.cn
Fengjun SUN
School of Information and Business Management, Dalian Neusoft University of Information, Dalian, China, sunfengjun@neusoft.edu.cn

Abstract

The same user registers on different social platforms which scatters user data across multiple platforms, these data are incomplete, unreliable, and underutilized. Through the analysis of these cross-platform data, identify different accounts corresponding to the same user's real identity. Linking cross-platform user identities can help build detailed user profiles, recommendation systems and link predictions etc. Our research divides user basic attributes into three types: string attributes, short text attributes and semi-structured attributes, according to the characteristics of different attributes, we study the calculation method of similarity between attributes. In order to improve the effect of user identity recognition, this study selects the optimal machine learning algorithm for user characteristics of different dimensions and completes the learning process by constructing and integrating multiple models. Experimental results show that the integration model based on user profile features has a certain degree of user identity link ability, can effectively integrate multiple categories of attributes between platforms, and improve the accuracy of identity link algorithm. This paper provides a reference for the research on user identification across multiple social networks.

Keywords: user identity linkage; social networks; profile features; model ensemble

Introduction

Social network is a virtual community composed of interactions and connections between members of different societies, various social networking platforms have gradually penetrated every aspect of people's life and work, driven by the rapid development of the Internet. Due to the continuous increase

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of social network users, various social network platforms begin to refine their respective fields, and people begin to use different social network platforms to meet their various social needs. According to a report released by Global Web Index in 2018, the average Internet user has 8.5 social media accounts. However, the information of users in different social network platforms is rarely Shared and communicated, which makes it difficult to fully depict the persona profile. How to identify the same user on different social media is the key to obtain the complete user information in the social network. Through cross-social network user identity links, users can obtain more complete user profile information, provide users with better services such as preference recommendation and friend recommendation, and also help analyze the migration of users between social media and the development of social media, which has important scientific research value and commercial value. Therefore, user identity links across social networks have become a hot research issue in the field of intelligent information processing and have been reported in international authoritative journals and top conferences in recent years（Zhou et al, 2016; Korula et al, 2014）

In the feature extraction stage, feature extraction is carried out according to user profile features and identity attribute similarity is calculated. In the model construction stage, according to the features extracted in the previous stage, the machine learning model is adopted to train the data set, and the attribute similarity is input into the trained classifier to obtain matching results, and finally the same user of multiple social networks is identified（Shu et al, 2016; Iofciu et al, 2010; Cohen et al, 2003）.Due to the differences of social networks, different user information processing methods are different. Researchers at home and abroad have put forward user feature extraction methods from different perspectives, which can be summarized into three types: Identity link based on user profile, identity link based on user activity record and identity link based on user network structure (see Figure 1). Basic user information refers to the information provided by users that can be collected through public channels, such as user nickname, avatar, region, personal description, gender, age, occupation, educational experience, etc. The user network structure contains information about the nodes and edges of the user in the social network topology（Liu et al, 2014; Shen et al, 2014）. User activity record mainly refers to the text content, time and geographical location of text published by users in the social network platform（Malhotra et al, 2012; Vosecky et al, 2009）. In the three existing approaches, the scale of the user relationship topology is huge, this method has the disadvantages of poor universality and high requirements on the application field, as well as the disadvantages of massive, low quality and multi-noise user activity records. Moreover, due to the increasing attention paid to privacy protection, many user activity information is not open to the outside world. Therefore, it is very difficult to use these two kinds of information to achieve user identity linkage（Motoyama et al, 2009; Korula et al, 2014）.

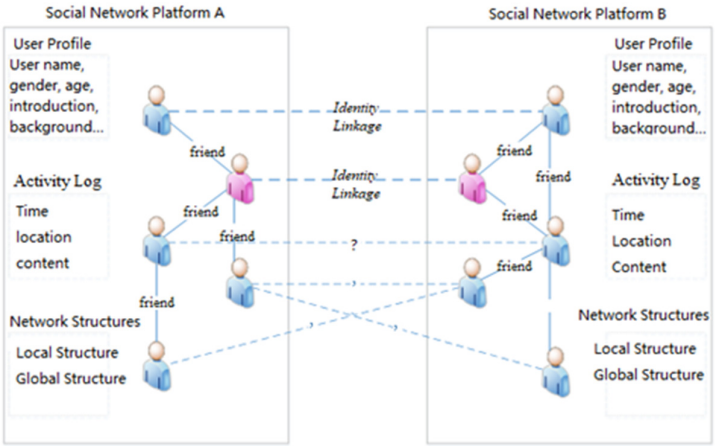

Fig. 1: User Identity Link Method

In a user's personal page, some basic public information in the user's information is easy to obtain, and the user's basic information data is common in different types of social network platforms. When the user's basic information can be utilized, the accuracy of this method is higher than the other two categories. Therefore, this paper chooses the basic user information commonly owned by social network users as the object to extract the features of identity links. Although the research on identity association based on basic user information has better recognition effect than the other two types of research, there are still some limitations. To fill the gap of previous studies, this paper makes algorithm improvement for the following problems: (1) In previous studies, the extraction method of user's basic attribute characteristics was single （Shu et al, 2017）. One feature extraction method only calculates the similarity of two users in a certain aspect. Applying the extracted features in this one-sided way to the subsequent identity link model will inevitably lead to poor effect, especially the problem of low recall rate. Therefore, it is necessary to apply a variety of similarity computing algorithms in the attributes of each dimension, to mine more comprehensive user similarity information from the limited user basic attribute data. (2) The previous user identity link algorithm is usually only applicable to a limited number of social platforms and is not scalable（Zhong et al, 2018）.Based on the text structure of basic user attribute information, this paper classifies the common user attribute information in social networks into three categories, namely, short string attribute, short text attribute and semi-structured attribute. Based on the idea of classification to calculate the similarity characteristics of attributes, this paper studies the suitable calculation methods on various attributes respectively and improves the applicability and expansibility of the algorithm on the premise of ensuring the calculation accuracy. (3) The previous classification algorithms are rigid and have weak adaptability. The machine learning algorithms used are too single and have poor adaptability to different data types and data sets（Ya, 2019）.Based on the characteristics of different dimensions, this paper adopts the integration model strategy, tries to select the most appropriate machine learning algorithm, and completes the learning task by integrating multiple models.

Related Work

Description of User Identity Link

We abstract the problem between the two social networks, and more social network situations can be extended from this. Set $G^s$and$G^t$for the given two social networks, U^s and U^t are the user sets of the two social networks, $u^s \in U^s$and $u^t \in U^t$are any user taken from two sets of social network users, User identity links across social networks determine whetheru^sandu^t are the same person, the predicate function can be described by the following formula: $F: u^s \times u^t \rightarrow \{0,1\}$, $F(u^s \times u^t) = \begin{cases} 1, \mathrm{u^s and\ u^t\ belong\ to\ the\ same\ natural\ person} \\ 0, \mathrm{u^s and\ u^t\ do\ not\ belong\ to\ the\ same\ natural\ person} \end{cases}$

Extraction Algorithm Based on User Profile Features

User base information in social networks often contains multiple types of attribute information, each of which is different in data format, data content and data characteristics. In order to improve the calculation accuracy of similarity features, this paper divides user's basic attributes into three categories according to text structure: string attribute, short text attribute and semi-structured attribute. According to the characteristics of different attributes, we study the calculation method of similarity among attributes.

Similarity algorithm for string attributes

String attribute refers to a short string in the virtual identity attribute information that cannot be divided or can be simply split for calculation. Among them, the non-separable string attribute is called atomic string attribute; String properties that can be simply split are called composite string properties. The home page URL and username in the user information belong to the combined string attribute in the atomic string attribute, while the URL suffix formed after splitting the URL and the last name and name formed after splitting the username belong to the atomic string attribute. The four commonly used atomic character attribute similarity algorithms are the longest common subsequence similarity algorithm, the longest common subsequence similarity algorithm, the edit distance similarity algorithm and the Jaccard similarity algorithm.

（1）Longest Common Substring. Given two strings, find the longest length of the same substring between them. For example, aaamnpdeff and MnpFFab, their longest common substring is MNP, length 3, and the similarity of two strings is calculated by the longest common substring. The similarity between $string_1$and $string_2$ is shown in Formula 1, cn is the number of comparison frequency, and lcs_i is the character length of the longest common substring.

$$Sim_{LCS} = \frac{\sum_{i=1}^{cn} lcs_i - cn + 1}{|string_1| + |string_2| + \sum_{i=1}^{cn} lcs_i} \qquad \text{（Formula 1）}$$

（2）longest common subsequence. The longest common subsequences of two strings are found, and then the length of two source strings is normalized to generate similarity based on LCS. The calculation method is shown in Formula. Where $|lcs(\mathrm{string_1}, \mathrm{string_2})|$represents the length of the longest common subsequences of $\mathrm{string_1}$ and $\mathrm{string_2}$. $\min(|\mathrm{string_1}|, |\mathrm{string_2}|)$ represents the length of the shorter strings in String1 and String2.

$$Sim_{LCS} = \frac{|lcs(\text{string}_1,\ \text{string}_2)|}{\min(|\text{string}_1|,\ |\text{string}_2|)} \quad \text{（Formula 2）}$$

（3）Levenshtein Distance similarity. The Levenshtein edit distance represents the minimum number of edits from one string to another. The smaller the Levenshtein editing distance between two strings, the higher their similarity. The similarity calculation method is shown in Formula 3.

$$Sim_{Lev} = 1 - \frac{\text{Levenshtein}(\text{string}_1,\ \text{string}_2)}{\max(|\text{string}_1|,\ |\text{string}_2|)} \quad \text{（Formula 3）}$$

（4）Jaccard similarity. The ratio of intersection and union between two strings is used as Jaccard similarity, which is a widely used similarity calculation method. The similarity calculation method is shown in Formula 4.

$$Sim_{\text{Jac}} = \frac{|\text{string}_1 \cap \text{string}_2|}{|\text{string}_1 \cup \text{string}_2|} \quad \text{（Formula 4）}$$

Attribute similarity algorithm for short text

Short text is a common type of content in social networks, generally a text description or description of users in social networks, such as a personal profile and self-introduction in social networks. Compared with the above two types of characteristics, short text type attributes have no fixed structure in format, so the calculation of similarity between attributes is more complex. Users may publish similar or even identical personal descriptions on different platforms, so the following three short-text attribute similarity algorithms are adopted.

（1）Word2vec Cosine Similarity. Word 2VEC is a Word embedding model, this model was proposed by Google company in 2013. Its core idea is a language probability model based on neural network, which uses the context information of words to train the vector representation with fixed dimension for each word in corpus. Word2vec includes two different training models: skip-gram model and CBOW model. In the training process, skip-gram model is the word that predicts its context through a certain word, while CBOW model is the word that predicts its current context through a certain word. After Word2Vec transformation, the cosine similarity between word vectors is calculated, and the cosine similarity between individual description texts is calculated using the cosine similarity.

（2）TF-IDF Cosine Similarity. TF represents the frequency of occurrence of a word in the text, IDF represents the importance of each word. If the number of other texts containing a word is less, the IDF of this word will be larger. The word frequency vector of personal description text is calculated by TF-IDF, and then the cosine similarity between sentence word frequency vectors is calculated as the similarity of personal description text.

$$\text{TF} = \frac{\text{The frequency of a word appears in a document}}{\text{The frequency of all words appears in a document}} \quad \text{（Formula 5）}$$

$$\text{IDF} = \log\left(\frac{\text{The total number of documents}}{\text{Number of documents containing an entry} + 1}\right) \quad \text{（Formula 6）}$$

(3) Word Mover's Distance similarity. Word Mover's Distance is a calculation method of text distance. Based on word embedding of Word2vec, text is represented as a standard word bag vector, word weight is defined, and the minimum cost of text transfer is obtained by minimizing the sum of

word weight transfer quantity and the product of transfer cost between words, to measure text Distance. The smaller the Word Mover's Distance between two sentences, the higher their similarity. Based on this method, the similarity of the personal introduction text can be calculated.

Semi-structured attribute similarity algorithm

Semi-structured attributes refer to the contents filled in by users in a prescribed format on social networking sites, including the work experience and educational background of users in the data set. Compared with the short string attribute, the content of such attribute is longer, and the discrimination effect of the direct calculation comparison on the virtual identity is not obvious, which generally needs to be processed. As the format of these attributes is relatively fixed, the attributes can be further split and sorted according to the format rules, and then calculated for each split item. The Kkuhn-Munkres algorithm is used to calculate the similarity of records. All attribute values of each record are treated as a long string. The string is divided into several substrings by the method of separator word segmentation. We calculate the similarity of each substring by using the maximum weighted matching algorithm of bipartite graph（Hailang et al, 2020）. The details are as follows, comparing two records string_1 and string_2 produces a fully qualified bipartite graph $B = \{V_1 \cup V_2, E, W\}$, the u of each node in V_1 represents substring $\mathrm{u_i}$ of string_1, the v of each node in V_2 represents substring $\mathrm{v_j}$ of string_2, $E = V_1 \times V_2$, the weight W function is defined as the similarity of two substrings, $W(u, v) = Sim(\mathrm{u_i}, \mathrm{v_j})$. $M = \left(V', E'\right)$ is the optimal match for B, $V' \subseteq V_1 \cap V_2$, $E' \subset E$, the semi-structured attribute similarity can be calculated by formula 7, Where m、n represent the number of substrings of string_1 and string_2, respectively.

$$Sim_{km} = \frac{\sum_{e \in E'} W(e)}{max\{m,n\}} \qquad \text{（Formula 7）}$$

Stacking model integration strategy

After completing the calculation of various attribute similarity features, it is necessary to use the classification model to classify the features on this basis. The classifier is the most core part of the model, which is crucial for the selection of the classifier and determines the accuracy of the classification results. The common machine learning classification models include Logistic Regression, Support Vector Machine, Decision Tree, Random Forest, KNN, Boosting, etc. Model Ensemble is an effective method to improve the effect of machine learning, different from traditional machine learning methods, it constructs a model on the training set, and Model Ensemble completes the learning task by constructing and integrating multiple models（Ghanbari et al, 2019）. Figure 2 shows a common model ensemble structure.

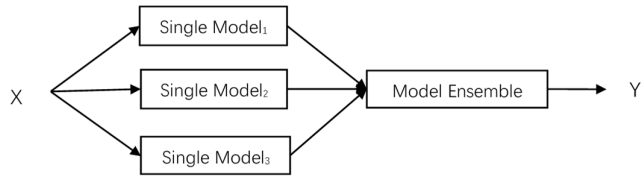

Fig. 2: A Common Model Ensemble Structure

Model ensemble mainly includes two stages: building several single models and model integration. A single model is usually obtained by learning the basic learning algorithm on the training set. It is also called a base learner. Model Ensemble uses different learning algorithms to build a single Model and integrates multiple weak models to produce a strong model. Mainstream model ensemble methods include averaging, voting, and learning. Stacking is a more powerful Model fusion method, proposed by Wolpert in 1992. Its basic idea is to integrate the prediction results of several single models through a model, in order to reduce the generalization error of the single model. These single models are called the level 1 model, and the Stacking model is called the level 2 model. Stacking produced single models from the initial training set, integrated the output of the single model as sample characteristics, and produced new training sets by labeling the original sample as new data sample. Then a new model was trained according to the new training set, and finally the sample was predicted with the new model. Algorithm 1 provided the Stacking operation process.

Algorithm 1: Stacking model ensemble algorithm

input：training set D= $\{(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)\}$；Single model learning algorithm $\xi_1, \xi_2, \dots, \xi_T$;model ensemble learning algorithm ξ。

1: for t= 1, 2,…,T do
2:$h_t = \xi_1(D)$
3: end for
4:$D' = \emptyset$
5: for i=1, 2,…,m do
6: for t=1, 2,…,T do
7: $Z_{it} = h_t(X_i)$
8: end for
9: $D' = D' \cup ((Z_{i1}, Z_{i2}, \dots, Z_{iT}), y_i)$
10: end for
11. $h'=\xi(D')$
output：H（x）$=h'(h_1(x), h_2(x), \dots, h_T(x)$

In the traditional Stacking model training process, the training set of the secondary model is generated using the primary model. If the first-level model is directly used to predict the initial training set sample to generate the second-level training set, there will be a great risk of overfitting. Therefore, we adopt the way of k fold cross-validation to get the input of the next layer model, k fold cross-validation is the training set into k shares, each time will be one of them as test data sets, another 1 k - data as the training set, using the corresponding training set and testing set for k times training model and predicted

respectively, k forecast result in accordance with the order together, will generate a complete set of the second classifier training set.

Experiments and Evaluation

Data set collection

In order to get the user accounts between different social network links, we take AngleList as collect user attribute information source site, through AngleList user home page URL to access the user access to the home page of Facebook and Linkedin personal public home page URL, filter to select which gives Facebook and Linkedin homepage link is not empty, failure and open access archives information page not AngleLis account, in the end, we got 2,879 Facebook accounts and 3,138 Linkedin accounts, among which, we only connected the user attributes of Facebook and Linkedin, and finally stored the information obtained from the two platforms into the database in a designed format. This paper selects intersecting contents of the two platforms for research, including personal home page URL, username, resume, work experience and educational background, which can be divided into string attribute, text attribute and semi-structured attribute according to data format.

Data pre-processing

Data formats in social platforms are different, so the differences between data formats need to be eliminated to form a unified data format and realize data comparison between different platforms. The string attributes in the collected data include the personal home page URL and the username. All personal home page URLs are uniformly converted into the format of "website domain name/specific string". In order to facilitate the comparison between URLs, the domain name part in the URL is further removed, leaving only the URL suffix. The username can be further split into last name, first name or last name, middle name, first name, etc. For semi-structured attribute processing, entity information can be extracted from HTML text block based on the relatively fixed position of data in the web page. The date of different formats cannot be compared directly, so the format of the date needs to be unified. For the processing of text attribute, the special symbols in the user's short text attribute are mainly processed by replacing the reference entities, English letters are uniformly converted to lower case, and the Numbers and special symbols in the text and short strings are removed.

Experimental Design

A universal feature extraction method is designed for the three attributes of different social networks. Various similarity computing algorithms are used in each dimension attribute to mine more comprehensive user similarity information as far as possible. Four user name feature extraction methods, namely, the longest common subsequences similarity algorithm, the longest common subsequences similarity algorithm, the edit distance similarity algorithm and the Jaccard similarity algorithm, were used to generate the four-dimensional string attribute feature vectors; Three feature extraction methods of Word2vec cosine similarity, TF-IDF cosine similarity and Word Mover's Distance similarity were used to generate 3d feature vectors of the text attribute; The similarity of semi-structured attributes is calculated by using the maximum weighted matching algorithm of bipartite graph, and the feature vector of semi-structured attributes in one dimension is generated. After the training of the basic model, the probability value of the classification result of the best classifier is

taken as the input of the integration classifier of the second model, and the integration model is used for training to establish the fusion model. Finally, the trained integrated model is used to predict, and the final prediction category is obtained. Stacking model of user identification model framework as shown in Figure 3, the model of the first layer with string property, short the semi-structured and attribute similarity as input, select Decision Tree, Logistic Regression, Logistic Regression, SVM, KNN, Random Forest and boosting for a total of six kinds of commonly used machine learning algorithm as the base line model training and testing, 5 fold cross-validation model training, and to make predictions on the test set, select the most effective classifier as the best classifier for the dimension.

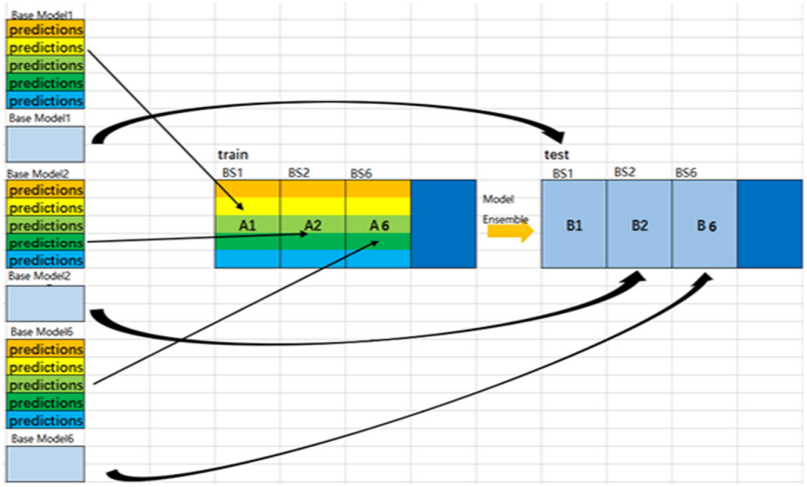

Fig. 3: Stacking Model Integration Diagram

Evaluation index

In this paper, standard evaluation indexes are used to evaluate the effect, including Accuracy, Precision, Recall and F1. The calculation formula is as follows, Where, TP represents the correct mapping result that is predicted to be positive represents the correct mapping result with negative prediction represents the error mapping results predicted to be negative; TN represents the result of an error mapping that is predicted to be positive.

$$\text{accuracy} = \frac{\text{TP+TN}}{\text{TP+FN+FP+TN}} \quad \text{（Formula 8）}$$

$$\text{precision} = \frac{\text{TP}}{\text{TP+FP}} \quad \text{（Formula 9）}$$

$$\text{recall} = \frac{\text{TP}}{\text{TP+FN}} \quad \text{（Formula 10）}$$

$$\text{F1} = \frac{2}{1/\text{precision}+1/\text{recall}} \quad \text{（Formula 11）}$$

Result Analysis

Analysis of similarity calculation results

Each similarity algorithm has a good distinguishing effect. The statistical results of similarity calculation for each attribute of users are shown in Table 1. In the experiment, the user's personal homepage URL suffix and the user name are mainly used to verify the string attribute similarity algorithm, the algorithm calculated the URL suffix and user name similarity of the same user with an extremely high value, with the mean value exceeding 0.8, this proves that the URL suffix of the same user's personal home page and user name have a high degree of similarity between different platforms, which is suitable as a key feature to determine whether the same user is the same. In the experiment, the user's work experience and virtual education background were mainly used to verify the semi-structured attribute similarity algorithm. The value of the semi-structured attribute similarity of the same user's virtual identity was significantly lower than that of the string attribute similarity. The user's personal introduction is mainly used to verify the similarity algorithm of the short text. The statistical results are like semi-structured attributes, and the similarity calculation results are lower than those of relatively string attributes.

Table 1: Statistics of attribute similarity of social network platform

Attribute types	Similarity	Mean	Median	Min	Max
String	Home page URL	0.86	1.00	0.00	1.00
	User name	0.92	1.00	0.02	1.00
Short text	Personal introduction	0.38	0.37	0.00	1.00
Semi-structured	Work experience	0.41	0.40	0.00	1.00
	Education background	0.44	0.50	0.00	1.00

Comparison of classification models

For classification model selection in the algorithm, the first to use training samples to train the model, and use test data to test of the trained classifier, evaluating classifier in the performance of the data sets, according to the comprehensive evaluation index to select the dimension of F1 best classifier, under the condition of this experiment data sets, string attribute dimension under the optimal classifier selection for logistic regression algorithm, short text attribute dimension under optimal classifier selection for KNN algorithm, a semi-structured attributes of the decision tree as the best distributor. In order to prove the effectiveness of the model fusion learning classifier, the effect of the best classifier with single dimension features is compared. At the same time, in order to verify whether each dimension feature contributes to the final effect of the ensemble learning classifier, an ensemble learning effect verification experiment is set up in the absence of any dimension feature. The experimental results are shown in Table 2.

Table 2: Effect comparison of classification model

Classifier	ACC	P	R	F1
M1	63.33%	71.90%	49.00%	58.29%
M2	66.40%	70.41%	55.85%	62.29%
M3	54.56%	50.36%	53.33%	51.80%
M1M2	51.84%	47.63%	54.18%	50.69%
M2M3	81.62%	83.66%	83.66%	76.11%
M1M3	73.16%	82.44%	82.44%	58.62%
Stacking Model	84.15%	85.34%	83.76%	85.09%

In Table 2, M1 represents string property of optimal classifier, M2 essay this attribute the best classifier, M3 represents half structural properties of optimal classifier, through integration of machine learning effect after Stacking model has increased significantly, When the integrator classifier lacks a certain attribute of the classifier the outcome of M1 M2, M2 M3, M1 M3 are not as good as those predicted by combining the three single models, the experimental results show the best classifier in each dimension classifier integration can improve effect of algorithm, the experimental results showed that the stacking model had the best effect in recall rate, F1 value and accuracy.

Comparison with other algorithms

In order to verify the effectiveness of the mapping algorithm proposed in this study, we choose the representative user identity link algorithm in recent years to compare with the algorithm proposed in this paper. MOBIUS algorithm was proposed by Reza Zafarani et al in 2013. This algorithm analyzes the implicit characteristics of social network users in the naming mode to identify whether users of different social networks correspond to the same user. The other is a cross-social network user identity identification method based on user nickname proposed by Li YongJun et al. By comparing the naming methods of user nicknames in different social network platforms and analyzing the similarity between nicknames, the algorithm realizes the mapping and matching of virtual identities among Foursquare, Facebook and Twitter. Three algorithms are run on the real data set, and the results of different algorithms are compared and evaluated, the experimental results are shown in Table 4. Since the above two algorithms are only compared for the single attribute of user nickname, and the feature extraction method of the algorithm and the machine learning algorithm are single, the results in this experiment show a general performance. Compared with the other two algorithms, the algorithm in this paper has better performance in many aspects.

Table 5 : Comparison of user identity link algorithms based on user attributes

	ACC	P	R	F1
Stacking Model	84.15%	85.34%	83.76%	85.09%
Li YongJun	82.48%	86.38%	83.16%	84.74%
MOBIUS	80.01%	84.99%	81.90%	83.42%

Conclusion

The rise of various functional social networks has enriched the daily life of users and correspondingly produced large-scale user information. However, fragmented information on multiple platforms cannot fully depict user portraits, which becomes an opportunity for the development of identity link technology. Using the user big data generated by identity association and relying on artificial intelligence technologies such as deep learning to realize accurate characterization of character portraits, it lays a data foundation for the application of discovering social network public opinion, analyzing user behavior characteristics and checking false news, thus providing effective help for group and individual decision-making. In this paper, the text structure characteristics of common user basic information in social platforms are designed and the attribute similarity calculation method is universal to most social networks. Meanwhile, by integrating different machine learning models, this paper improves the effect of user attribute-based identity linking technology by integrating different machine learning models.

There are still some deficiencies in this paper, which need to be further studied :(1) there are many kinds of social network platforms, and some platforms are quite different from each other. The experiment conducted on only two platforms cannot fully explain the universal applicability of the algorithm, so more social platforms should be combined for algorithm verification in the future. (2) The basic attribute information of users will change over time, which is not considered in the study. In the follow-up research, the time dimension should be added to combine with the historical data of identity attributes to further improve the accuracy of the linking algorithm.

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Transregional Airlift Networks

Larisa A. Ismagilova
Doctor of Technical Scien, Ufa State Aviation Technical University, Ufa, Russian Federation,
ismagilova_ugatu@mail.ru

Tatyana Matyagina
PhD in Economics, Ufa State Aviation Technical University Ufa, Russian Federation,
matyaginatv@mail.ru

Larisa V. Sitnikova
Doctor of Economic Scien, Ufa State Aviation Technical University, Ufa, Russian Federation,
s-larissa@yandex.ru

Nikolay Smolyaninov
PhD in Economics, Ufa State Aviation Technical University Ufa, Russian Federation,
nesmol@mail.ru

Abstract

Airports being a component of the air transport infrastructure make a significant impact on the economy of regions; on the other hand, the airport business performance is largely dependent on the regions' development. The article presents the results of analyzing a trans-regional market of airlift transportation, shows the connection and mutual dependence between the regional airport development strategies and the territory development strategies.

Keywords: airlift transportation market, transregional transport network, airport business, development strategy

Introduction

The transport network makes an important element of a territory's total infrastructure connecting individual regions and ensuring the territorial integrity of a country in general. The access to safe and qualitative transportation services determines the efficiency and growth of production, business, and social sphere. The transport sector and its infrastructure have a significant impact on the development of a territory, not only in the sense of its socio-economic development, but also from the standpoint of ensuring the regional stability and security in crisis situations.

At the same time, the vulnerability of transport sector's economic stability is determined by its interdependence with more than twenty sectors of national economy, as well as with labor, migration, demographics, educational and other social processes of the territories and the country as a whole. The economic analysis of regional airlift transportation is built on the principles of systematology and complexity [Ismagilova, 2016] and is aimed at identifying the reserves for ensuring the robustness of territorial airport networks, both while achieving strategic development goals and when experiencing any negative outer impacts.

Development Trends of the Transregional Airlift Networks

The Southern Urals and adjacent territories (the Republic of Bashkortostan, Orenburgskaya, Chelyabinskaya, Kurganskaya, Sverdlovskaya oblasts (regions)) host large manufacturing, mining, agricultural productions, well-known recreational zones. According to Rosstat (https://www.gks.ru/folder/12781?print=1), as of 01.01.2020, 5.8% of the Russian Federation

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population live on the territory that makes up 2.15% of its total territory, the average population density is 22 inhabitants per square kilometer.

The contributions by different types of transport to the total volume of passenger and cargo transportation vary significantly. According to statistics from the Russian Federation Ministry of Transport (https://www.mintrans.ru/documents/7/10301), in 2019, 79.8% of cargo was transported by road, 18.27% - by rail, 1.9% - by sea and inland waterways, 0.02% - by air. As for the passenger transportation: road transport is also in the lead - 88.3%, followed by rail - 10.37%, air - 1.14%, sea and inland waterways - 0.17%. However, in terms of passenger turnover (number of passenger-kilometers), it is the air transport who was in the lead - 56.67%, the railway transport accounted for 23.9%, and the share of automobile transport - 19.28%.

The air transport has the indisputable advantage over all other modes of transport - the air routes are practically unlimited. Besides, the air transport provides a large time gain (due to the high speed of aircraft and the straightening of flight lanes) compared to other modes of transport at medium and especially long distances. According to experts, at distances of more than 1,000 km, the air transport begins dominating in passenger traffic, so it is for a reason that the average distance of one passenger airlift on domestic routes reaches almost 2,000 km, which is 3 times longer than that for the railway transport (long distance passenger transportation). At the same time, the air transport is the first to find itself in the risk zone in case of any unique global-scale crisis situations which happen extremely rare. A pandemic and economic crisis manifestations, as negative synergies, do not change the principles of analysis. To determine the consequences of this influence, one must see the development potential of the industry and territories.

Due to geographical peculiarities of Russia, the air transport plays a special role in ensuring transport accessibility of regions and communities. As economic activity increases, so does the business travel raising demand for speed and convenience that characterize the airlift services, which provides the bulk of passenger traffic and goods and materials supply over long distances.

Airports make the crucial component of the airlift infrastructure. The largest competing airport complexes in the Southern Urals and adjacent territories are:

- State Unitary Enterprise "Airport Orenburg" provides international (customs) transit in the southern direction and communication with the largest transport and logistics hubs in the region and the Russian Federation;
- Orsk Airport (a branch of Orenburg International Airport), as well as State Unitary Enterprise “Airport Orenburg”, provides transit in the southern direction and communication with the largest transport and logistics hubs in the region and the Russian Federation;
- Kurgan Airport provides transit of passengers and cargoes towards Western and Eastern Siberia;
- JSC "International Airport Magnitogorsk" provides transit in the southern direction and communication with the largest transport and logistics hubs in the region and the Russian Federation;
- International airports - transport and logistics hubs: PJSC Airport Koltsovo (the leader in the Ural Federal District); JSC International Airport Ufa; JSC Chelyabinsk Aviation Enterprise.

The airport cargo and passenger traffic statistics allow analyzing the main trends in the development of interregional segment of airlift transportation market. The analysis included:

- the amount of passenger carriage by air;
- the volume of freight traffic through airports.

The dynamics of changes in passenger traffic through competing airports is shown in Table 1:

Table 1: Servicing passengers in competitor airports (departed + arrived), (passengers) (https://www.magnitogorsk.ru/content/ekonomika-i-finansy/upravlenie-ekonomiki-i-investitsiy/glavnaya-8/ekonomika-goroda/strategiya-sotsialno-ekonomicheskogo-razvitiya)

Airport	2014	2015	2016	2017	2018	2019
JSC International Airport Magnitogorsk	171 648	133 405	127 662	193 175	234 150	229 142
JSC Chelyabinsk Aviation Enterprise	1 394 142	1 229 435	1 188 865	1 469 769	1 640 535	1 713 532
JSC International Airport Ufa	2 356 467	2 291 502	2 295 446	2 794 407	3 222 825	3 556 533
PJSC Airport Koltsovo	4 473 239	4 170 737	4 207 328	5 277 343	5 953 782	6 232 318
State Unitary Enterprise "Airport Orenburg"	661 133	629 549	487 032	744 303	792 316	783 647
Kurgan Airport	81 541	74 837	64 472	63 709	n/a	n/a
Orsk Airport	77 548	80 917	65 680	26 310	n/a	n/a
TOTAL in the RF	1 577 54 515	159 324 590	159 597 356	186 764 116	206 596 814	220 891 207
incl. by the segment	9 215 718	8 610 382	8 436 485	10 569 016	11 843 608	12 515 172

The common trend for changes both in Russia and in the segment under review is the growth of passenger carriage volume. There are some differences in the change dynamics of passenger carriage (Table 2)

Table: 2 Passenger carriage growth rates by competitor airports (based on data in Table 1)

Airport	2015	2016	2017	2018	2019
JSC International Airport Magnitogorsk	77.72%	95.70%	151.32%	121.21%	97.86%
JSC Chelyabinsk Aviation Enterprise	88.19%	96.70%	123.63%	111.62%	104.45%
JSC International Airport Ufa	97.24%	100.17%	121.74%	115.33%	110.35%
PJSC Airport Koltsovo	93.24%	100.88%	125.43%	112.82%	104.68%
State Unitary Enterprise "Airport Orenburg"	95.22%	77.36%	152.82%	106.45%	98.91%
Kurgan Airport	91.78%	86.15%	98.82%	n/a	n/a
Orsk Airport	104.34%	81.17%	40.06%	n/a	n/a
Total by segment	93.43%	97.98%	125.28%	109.84%	105.67%
Total in the RF	101.00%	100.17%	117.02%	110.62%	106.92%

The imposition of sanctions in 2014 resulted in a drop in the traffic via almost all airports under review, with the most affected facility being JSC International Airport Magnitogorsk, the volume of its traffic decreased by 22.28%. In 2016, the traffic decline slowed down, while the two largest airports have begun growing. In 2017, all airports of the segment, except Kurgan and Orsk airports, showed good growth rates supporting the growth rate of the analyzed segment, which exceeded the growth rate of passenger traffic through Russian airports in general. JSC International Airport Magnitogorsk was second in 2017 growth rates. The years 2018-2019 saw a slowdown in growth rates, with most airports maintaining the overall positive growth trend in passenger traffic. In general,

the dynamics of passenger traffic through the segment airports supports the all-Russian dynamics. The distribution of market shares between competitor airports is shown in Table 3.

Table 3: The changing market shares of competitor airports within the "passenger traffic" segment (based on Table 1 data)

Airport	2014	2015	2016	2017	2018	2019
JSC International Airport Magnitogorsk	1.86%	1.55%	1.51%	1.83%	1.98%	1.83%
JSC Chelyabinsk Aviation Enterprise	15.13%	14.28%	14.09%	13.91%	13.85%	13.69%
JSC International Airport Ufa	25.57%	26.61%	27.21%	26.44%	27.21%	28.42%
PJSC Airport Koltsovo	48.54%	48.44%	49.87%	49.93%	50.27%	49.80%
State Unitary Enterprise "Airport Orenburg"	7.17%	7.31%	5.77%	7.04%	6.69%	6.26%
Kurgan Airport	0.88%	0.87%	0.76%	0.60%	n/a	n/a
Orsk Airport	0.84%	0.94%	0.78%	0.25%	n/a	n/a
Segment share in the total RF market	5.84%	5.40%	5.29%	5.66%	5.73%	5.67%

The 2020 data are likely to significantly change the transportation quantitative indicators, but the market structure will most probably remain. The total share of the reviewed segment airports in the passenger carriage through the Russian Federation airports is changing slightly as a percentage fraction. Within the segment under review, there is a significant reduction in the market share of Kurgan and Orsk airports. There were no significant changes in the distribution of market segment among other competing airports throughout the analyzed period. However, in November 2019, a new airport terminal was opened in Chelyabinsk, which made it possible to increase the number of annually served passengers to 2.5 million. Note that launching the new terminal is only a part of the strategy to make Chelyabinsk airport one of the leaders in passenger traffic and route network. This strategy includes, inter alia:

- implementation of the program of co-financing flights from regional and federal budgets. In 2020, it is planned to subsidize flights to such cities as Kazan, Samara, Surgut, Novy Urengoy, Krasnoyarsk, Krasnodar, Mineralnye Vody, Rostov-on-Don, Volgograd, Omsk, Nizhny Novgorod;
- development of high-speed railway access to the airport;
- development of the region's own basic airline and the resource base for it.

It is obvious that prospectively the Chelyabinsk airport's proactive strategy may lead to a reshuffle of market shares in the segment.

The dynamics of air freight traffic differs significantly from the dynamics of passenger traffic (Tables 4 and 5).

Table 4: Cargo transportation through competitor airports (tons) (https://www.magnitogorsk.ru/content/ekonomika-i-finansy/upravlenie-ekonomiki-i-investitsiy/glavnaya-8/ekonomika-goroda/strategiya-sotsialno-ekonomicheskogo-razvitiya)

Airport	2014	2015	2016	2017	2018	2019
JSC International Airport Magnitogorsk	406.30	333.10	347.90	374.10	n/a	n/a
JSC Chelyabinsk Aviation Enterprise	3 263.66	2 503.99	2 782.75	2 948.63	3 137.51	2 881.58
JSC International Airport Ufa	3 676.22	2 955.43	3 407.02	4 390.83	4 731.70	4 461.5
PJSC Airport Koltsovo	22 190.95	18 366.75	20 045.82	19 340.27	18 426.03	17 196.81
State Unitary	1 157.84	1 015.73	973.69	1 218.06	1 241.38	1 207.91

Enterprise "Airport Orenburg"						
Kurgan Airport	310.70	309.60	310.3	321.6	n/a	n/a
Orsk Airport	324.80	176.60	135.20	79.00	n/a	n/a
TOTAL for the RF	773 377.87	679 621.76	730 606.5	831 070.48	767 095.28	764 606.27
Incl. the segment	31 330.47	25 661.2	28 002.68	28 672.49	27 536.62	25 747.8

Table 5: Rates of changes in cargo transportation through competitor airports (based on Table 4 data)

Airport	2015	2016	2017	2018	2019
JSC International Airport Magnitogorsk	81.98%	104.44%	107.53%	n/a	n/a
JSC Chelyabinsk Aviation Enterprise	76.72%	111.13%	105.96%	106.41%	91.84%
JSC International Airport Ufa	80.39%	115.28%	128.88%	107.76%	94.29%
PJSC Airport Koltsovo	82.77%	109.14%	96.48%	95.27%	93.33%
State Unitary Enterprise "Airport Orenburg"	87.73%	95.86%	125.10%	101.91%	97.30%
Kurgan Airport	99.65%	100.23%	103.64%	n/a	n/a
Orsk Airport	54.37%	76.56%	58.43%	n/a	n/a
through the segment	81.90%	109.12%	102.39%	96.04%	93.50%
total in the RF	87.88%	107.50%	113.75%	92.30%	99.68%

In Russia as a whole, the dynamics of both the freight traffic and its change rate, with regard to the sanctions impact, has an up-and-down nature. Finding the general trend (growth or reduction) requires additional observations and analysis of the relevant performance indicators of competing freight carriers (railway, sea and inland waterways, road transport). According to the statistical data of the State Statistics Committee of Russia (https://www.gks.ru/folder/23455?print=1), the total freight traffic (the amount of transported cargo in ton-kilometers) was distributed among modes of transport as follows: 45.89% of freight traffic fell on railway transport, 47.37% - on pipeline transport (which is not a competitor to the air transport), 4.83% - road vehicles, 1.76% - sea and inland waterways, and only 0.13% - on the airlift. Since the early 2000s, both the total freight traffic, and the freight traffic on railway and road transport have shown an annual increase, albeit insignificant, within 10%. The years 2009 and 2014 have dropped out of the general trend. Freight traffic by the air transport with its up-and-down changes has a general downward trend both in Russia as a whole and in the segment under review. The prospects for fluctuations in the development trends of industries are highly likely in the coming years.

The difference in the growth rates of cargo transportation through the analyzed airports and across the Russian Federation in general has led to a decrease in the market share of the segment as a whole (Table 6).

Table 6: Changes in market shares of competitor airports within the freight traffic segment (based on Table 4 data)

Airport	2014	2015	2016	2017	2018	2019
JSC International Airport Magnitogorsk	1.30%	1.30%	1.24%	1.30%	n/a	n/a
JSC Chelyabinsk Aviation Enterprise	10.42%	9.76%	9.94%	10.28%	11.39%	11.19%
JSC International Airport Ufa	11.73%	11.52%	12.17%	15.31%	17.18%	17.33%
PJSC Airport Koltsovo	70.83%	71.57%	71.59%	67.45%	66.91%	66.79%
State Unitary Enterprise "Airport	3.70%	3.96%	3.48%	4.25%	4.51%	4.69%

Orenburg"						
Kurgan Airport	0.99%	1.21%	1.11%	1.12%	n/a	n/a
Orsk Airport	1.04%	0.69%	0.48%	0.28%	n/a	n/a
Segment share in the entire RF market	4.05%	3.78%	3.83%	3.45%	3.59%	3.37%

Within the segment under consideration, there is a significant reduction in the market share of Airport Orsk, PJSC Airport Koltsovo. No significant changes have been noted in the distribution of the market segment among other competing airports over the entire analyzed period.

Thus, the dynamics of airlift transportation market segment is characterized by the following:
- a growth in passenger traffic parameters, which expands opportunities for the airport business development in general;
- minor changes in the ratio of market shares between competing airports;
- reduction of the segment's total share in the freight traffic market of the Russian Federation as a whole against the background of the general trend for decreasing air freight traffic.

Despite all types of transport being the elements of united transportation infrastructure of the country, certain types of transport compete with each other in the cargo and passenger carriage markets. For the analyzed segment of the airlift transportation market, there also exist certain threats in terms of emerging substitutes – the services replacing airlift transportation.

In September 2019, a new Chelyabinsk-Magnitogorsk high-speed rail route was tested. The total travel time of the test "Lastochka (Russian for swallow)" train from Chelyabinsk to Magnitogorsk was about four hours. The route included two technical stops at Troitsk and Kartaly-1 stations. The speed in some areas during the experiment reached 140 kilometers per hour. In case this route is switched from the test mode to the regular one, this alternative may significantly redistribute the air passenger flows - residents of Magnitogorsk choosing the Chelyabinsk airport.

The spatial development strategies of cities and municipalities are laid along the general strategic priorities of the Russian Federation development and are aimed at increasing the competitiveness of regions (cities, enterprises) (Ismagilova, 2014, https://www.magnitogorsk.ru/content/ekonomika-i-finansy/upravlenie-ekonomiki-i-investitsiy/glavnaya-8/ekonomika-goroda/strategiya-sotsialno-ekonomicheskogo-razvitiya). The strategy of Magnitogorsk urban district (https://www.magnitogorsk.ru/content/ekonomika-i-finansy/upravlenie-ekonomiki-i-investitsiy/glavnaya-8/ekonomika-goroda/strategiya-sotsialno-ekonomicheskogo-razvitiya) provides for an active development of transport infrastructure. In particular, the strategy includes measures that can significantly affect the distribution of airport service consumer flows: implementation of the proposal to arrange regular domestic flights (to be subsidized from the Chelyabinsk regional budget) to the largest transport hubs: Yekaterinburg, Ufa, St. Petersburg; increasing the transport accessibility of the Magnitogorsk interregional agglomeration by rail, in particular:

- development of the proposal to resume the high-speed train "Chelyabinsk - Kartaly - Magnitogorsk";
- promoting the feasibility study for the electrification of Magnitogorsk - Sibai railway line. Assisting in its inclusion to the Strategy for the Development of Railway Transport in the Russian Federation till 2030 and the Development Strategy of the Russian Railways Holding;
- improving the transport connectivity of Magnitogorsk by railway with the largest economic centers: Chelyabinsk, Yekaterinburg, Tyumen, Perm;
- development of road transport infrastructure of interregional and intermunicipal significance;
- assistance in bringing the Chelyabinsk-Magnitogorsk highway to the normative state, formation of roadside service and camping zones;
- reconstruction of the Magnitogorsk - Beloretsk - Ufa highway within the framework of cooperation with the Republic of Bashkortostan;
- formation of the transport corridor "Yekaterinburg - Kyshtym - Miass - Magnitogorsk - Orsk" within the development of cooperation with Sverdlovskaya oblast.

Note that these measures, if successfully implemented, will result, on the one hand, in redistributing the existing structure of transport traffic, but on the other hand, they will contribute to the growth of passenger and freight traffic in the region.

The following conditions will make the basis of competitiveness when choosing travel options by consumers: convenience, comfort, a set of related services, fast communications with transport infrastructure operators, all-round services, including the integration of operators of various transport modes (for example, the purchase of transit travel documents "bus - train - plane" using the "one window" principle, etc.), as well as the price factors.

Results

The analysis results for airport complex enterprises as presented in this article made it possible to demonstrate the peculiarities of this sector businesses, revealing their indicative role in assessing the level of socio-economic development of territories. The role of airports is shown in the integrated development of interregional transport infrastructure. The analysis of dynamic and structural changes in the interregional segment of the air transportation market is an indicator of current trends in the development of territories.

The well-grounded scheme for analyzing the airport complex companies may be used in the development of sectoral strategies for the development of infrastructure of both municipalities and territorial agglomerations. The above analysis of interregional segment of airlift transportation market shows the possibilities for maintaining economic stability during socio-economic bifurcations of polyfactorial negative trends in the current state of the world economy.

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Polish *Impact Barometer* as a Tool to Measure Business Contribution to The Achievement of The Sustainability Development Goals

Joanna KRASODOMSKA

Cracow University of Economics, Krakow, Poland

joanna.krasodomska@uek.krakow.pl

Abstract

The important role of business in the realization of the *Agenda 2030* commitments is widely accepted. *Sustainable Development Goals* (SDGs), which are at the heart of the *Agenda*, are nowadays among the key topics in corporate practices and reporting. The paper aims to investigate the situation in Poland as regards the SDGs achievement with a particular focus on companies indicated as the first members of the *Impact Barometer* Programme. The research uses available official NGO's reports, information gathered via SDGs-related website and selected companies' communications. The study findings show that the engagement of the companies operating in Poland in practices and disclosures linked to the SDGs accomplishment has been increasing. However, according to the information currently available, the *Impact Barometer* is used by eight companies, and the identified examples show that corporate disclosure is fragmented and, in some areas, impossible to compare. The paper acknowledges the need for future research in the field of the corporate practice and reporting related to the SDGs and draws attention to the negative *SDGs-washing* phenomena. The results of this study might be useful for researchers, practitioners, and other stakeholders focused on striving for a more sustainable future.

Keywords: SDGs, non-financial reporting, sustainable development, Poland.

Introduction

The United Nations Member States adopted the *Sustainable Development Goals* (SDGs) in 2015 as part of the *2030 Agenda for Sustainable Development* (UN, 2020a). SDGs build on the *Millennium Development Goals* set in 2000 and address global challenges in health, education, social equity and justice, economic security, and environmental issues (Sullivan *et al.*, 2018). The SDGs are not only 17 goals, but also 169 specific targets. Their achievement is monitored and reviewed using a set of global indicators. Member States' governments (UN, 2020a) may also develop their own indicators. At the EU level, a set of 100 indicators has been created and is monitored by the Eurostat to assess the progress towards the SDGs in an EU context (Eurostat, 2020).

Although the SDGs achievement lies within the responsibility of the countries and governments, the business has a critical role in this process. Governments do not have enough resources to provide all the solutions necessary to achieve the SDGs (Sullivan *et al.,* 2017). As Mio *et al.* (2020) argue, businesses' contributions to achieving the SDGs have been already recognized in the literature (see, e.g., Garcia-Sanchez *et al*., 2020; Haffar and Searcy, 2018; Sullivan *et al*., 2018; Wicki and Hansen, 2019), and especially multinational corporations' (MNCs) inputs are seen as essential to the success in pursuing sustainable development.

On the business level, SDGs are linked to corporate social responsibility (CSR), defined as "the responsibility of enterprises for their impacts on society" (European Commission, 2011). Corporate CSR- related activities contribute to the SDGs and provide several advantages to companies (GRI, 2020b). Businesses wishing to treat SDGs as a guideline to modify their business strategies can use dedicated tips and tools, as the *SDG Compass* (GRI, UN Global Compact, WBCSD, 2020). Undoubtedly, the business can play a key role in achieving the SDGs. However, many companies have not traditionally viewed sustainability policies as an essential component of their financial and operational priorities (Sullivan *et al.,* 2017), and the lack of knowledge about the role of business in addressing SDGs

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and its relevance for sustainable development has been highlighted by professionals (Mio *et al*., 2020). There is a general agreement that SDGs are important to our common future. However, despite the initiatives undertaken so far, there is still not enough understanding of what exactly companies' concrete actions should be like (Pwc, 2019).

This paper focuses on the inclusion of the SDGs in corporate practice and reporting in Poland. This particular country has been chosen since a unique tool – *Impact Barometer* has been created here allowing companies to measure their progress in achieving SDGs. The study aims to present the current situation in Poland as regards the SDGs -related corporate practices and reporting with a particular focus on companies which are the first members of the *Impact Barometer* Programme. The study is based on the reports published by the largest NGO in Poland addressing the sustainability concept - Responsible Business Forum (RBF, 2017, 2018, 2019, 2020), as well as on the information posted on the Polish official SDGs-related website and selected companies' communications (reports and websites).

The paper proceeds as follows. The next section presents the SDGs in the business reporting context. After that, the SDGs implementation in Poland is discussed. The following section provides information on the *Impact Barometer* as a tool for SDGs achievement and reporting support. The last section offers conclusions and an indication of future research possibilities.

Corporate non-financial reporting and SDGs

Table 1 presents the 17 SDGs.

Table 1: Sustainable Development Goals

1 No poverty	2 Zero hunger	3 Good health and well-being	4 Quality Education	5 Gender Equality	6 Clean water and sanitation
7 Affordable and clean energy	8 Decent work and economic growth	9 Industry, Innovation and infrastructure	10 Reduced inequalities	11 Sustainable cities and communities	12 Responsible consumption and production
13 Climate action	14 Life below water	15 Life on land	16 Peace, justice and strong institutions	17 Partnership for the goals	**THE GLOBAL GOALS For Sustainable development**

Source: SDSN (2020).

The 12th SDG *Sustainable consumption and production* in its target 12.6 explicitly encourages companies, especially MNCs, to adopt sustainable practices and to integrate sustainability information into their reporting cycle. Indicator 12.6.1 requires data on the number of companies publishing sustainability reports (UNCTAD, 2019). The increase in the reporting on the companies' contributions to the SDGs is significant as it raises SDGs awareness among companies and their stakeholders and facilitates the implementation of good practices.

According to the latest *The Sustainable Development Goals Report* (UN, 2020b), sustainability reporting has been increasingly used by companies to demonstrate their commitment to the *Agenda 2030*, and the quality of disclosures has been improving. Currently, 92% of the world's 250 largest businesses report on sustainability measures, and 74% of these use GRI guidelines to do so. All of the more than 9,500 UN Global Compact participants, the majority of which are small and medium-sized enterprises (SMEs), report annually on their sustainability impacts (GRI, 2020c). Nevertheless, many companies' reports still fail to mention certain critical aspects of environmental, social and governance issues, such as water use, waste and emissions, gender equality, training in anti-corruption issues, and expenditures on employee health and safety (UN, 2020b).

There is no single, uniform methodology for measuring and reporting business progress and impacts on the SDGs. Most companies use reporting standards that predate the SDGs (such as GRI). The complexity and volume of targets under the SDGs also prevent some SMEs from reporting on their contributions to these goals (GRI, UN Global

Compact, 2020). Therefore, several initiatives have been launched to develop an agreed-upon and harmonized set of indicators for consistent and comparable sustainability reporting. One is the *UNCTAD Guidance* (2019) whose objective is to provide practical information on how indicators could be measured in a consistent manner and aligned with the common needs of many different stakeholders of the SDGs agenda.

SDGs are not only an essential practical issue but also a topic of academic research. According to an extensive literature review provided by Mio *et al.* (2020), the SDGs implementation is the most often investigated theme in scientific papers, and it is followed by the interest in the company's role in SDGs achievement or governance and the industry's role in this process. Most of the cited authors (Christ and Burritt, 2019; Isaksson, 2019; Muff *et al*., 2017; Raub and Martin-Rios, 2019; Vandenbrande, 2019) deal with the topic using conceptual and interpretative methodologies, mainly by developing frameworks for SDG implementation. They also mostly discuss or mention all 17 SDGs in their studies. Interestingly, disclosures on the SDGs are not a widespread research problem. As Mio *et al.* (2020) state, apart from Gunawan *et al*. (2020), the literature on SDG disclosure is almost nonexistent.

SDGs in Poland

SDGs in corporate practice

In Poland, the *Agenda 2030* and its objectives are implemented using the *Strategy for Responsible Development* (SRD), adopted by the Council of Ministers in 2017. In achieving SDGs, Poland ranks 16th in the ranking of EU countries (SDSN, 2019) and 23rd out of 166 in the world ranking "SDG Index" (SDSN, 2020). The Polish Main Statistical Office is responsible for monitoring the implementation of SDGs in Poland. According to the UN data for Poland, SDG 1 and 15 are perceived as achieved, major challenges relate to SDGs 7, 13 and 17. The implementation of SDG 12, as well as 2, 5, 9, 10 and 11, pose significant challenges (Sachs *et al*., 2020).

The initiative *Responsible Business in Poland. Good Practices* initiated by the Responsible Business Forum (RBF) allows getting an understanding of the Polish companies' CSR practices. Being referenced in the report issued by the RBF means that a company has proved its CSR engagement by voluntarily subjecting the CSR-related practices to RBF experts for evaluation . The CSR practices included in the report are classified into seven areas according to the ISO 26000 standard (Table 2).

Table 2: Number of good practices of companies operating in Poland according to the ISO26000 areas in 2016-2019

CSR area	2016 N=180	2017 N=177	2018 N=229	2019 N=214
Organizational governance	51	63	83	96
Human rights	27	37	61	74
Labor practices	205	312	417	473
Environment	117	171	235	321
Fair operating practices	45	48	55	73
Consumer issues	63	79	97	95
Community involvement and development	372	480	601	564
Total	**880**	**1,190**	**1,549**	**1,696**

Source: RBF (2017, 2018, 2019, 2020)

Both the number of companies and the number of their CSR-related practices included in the subsequent editions of the report have been growing from year-to-year. In 2020, the total number of submitted practices (new and long-term ones) equals 1,696 and is by 10% higher as compared to the previous year (RBF, 2020). 214 entities reported their engagement in CSR in the last edition (in 2020) and, compared to the 2016 report, their number has increased by 34. As table 2 presents, the highest number of practices relates to the area of community involvement and development and labor practices.

Table 3: Number of SDGs indicated by the companies as linked to their good practices in 2016-2019

	2016	2017	2018	2019
SDG 1	11	47	41	58
SDG 2	17	26	31	31
SDG 3	69	224	317	360
SDG 4	92	332	351	442
SDG 5	9	24	23	74
SDG 6	6	11	18	17
SDG 7	11	18	37	44
SDG 8	29	136	214	336
SDG 9	27	57	91	105
SDG 10	18	61	91	218
SDG 11	38	81	122	186
SDG 12	12	102	175	277
SDG 13	13	41	115	103
SDG 14	1	5	8	14
SDG 15	20	46	73	89
SDG 16	6	18	39	52
SDG 17	6	16	43	53
Total	**385**	**1,245**	**1,789**	**2,459**

Source: RBF (2017, 2018, 2019, 2020)

The same report links corporate good practices with the SDGs. Table 3 presents their number related to each of the 17 SDGs. SDGs 4, 3, and 8 are most often mentioned by companies. The number of references to the SDGs provided by the companies increases with time. The most significant increase in the companies' declared contribution to the implementation of the *Agenda 2030* relates to SDGs 12, 14, 10 and 8.

Sustainability and SDGs reporting in Poland

As far as sustainability reporting is concerned, GRI tool, *SDG Target 12.6/Country-Tracker* allows identifying the number of sustainability reports published in a particular country. In the case of Poland, the *Tracker* shows 44 reports for the publication year 2017 (latest available year), which seems low in comparison to such countries as, e.g., France (189 reports), Germany (176), or Sweden (186). However, the number of GRI reports is higher in Poland than in other Eastern European countries such as, e.g., Romania (8), Slovak Republic (8), or Bulgaria (4) (GRI, 2020a). The introduction of the Directive 2014/95/EU and subsequent changes in the Polish accounting law were important steps towards the increase in the non-financial disclosure volume. Starting from 2018, over 160 large public interest entities (PIEs) were required to provide a non-financial statement in the management commentary or in a separate report.

Some further insights into the sustainability reporting in Poland, with the focus on SDGs, can be gained by analyzing the results of the annual contest for the best sustainability report (*Konkurs Raporty Społeczne*) organized by the RBF and Deloitte (RBF, 2020b). Table 4 presents the winners of the last edition (2019). Five of the recognized reports show direct references to the SDGs. What is more, the title of Kompania Piwowarska's publication (*Sustainable Development Report 2018. Our inputs into the implementation of the Agenda 2030*), explicitly suggests the relation to the UN initiative.

Table 4: The winners of the Best Sustainability Report contest 2019 edition and information on the references to the SDGs in awarded reports

Co. Name	Award type	Direct reference to SDGs
Benefit Systems	Internet users award	Not provided
LPP	WSE award	4, 8, 9 10, 11, 12, 13, 17
Santander Bank Polska	Best Social Report award	3, 4, 5, 8, 9, 11, 13, 17
Grupa Energa	Minister of Investment and Development award	Not provided
Orange Polska	Best integrated report award	1,3, 4, 5, 8, 9, 10, 11, 12, 13, 16, 17
Kompania Piwowarska	Distinction award	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17

Source: Benefit systems (2019), LPP (2019), Santander Bank Polska (2019), Grupa Energa (2019), Orange Polska (2019), Kompania Piwowarska S.A (2019).

The *Impact Barometer* and its practical implementation by the first reporters

The *Impact Barometer* is a tool to measure the impact of business on the implementation of the *Agenda 2030* in Poland. It was developed in 2019, and it is available for any company free of charge. The idea of *Impact Barometer* originated from the view that many companies feel overwhelmed by the number and complexity of the *Agenda 2030* indicators and that UN national SDGs are not always adequate for business. In the expert consultation process, six priority SDGs for Polish companies were identified. Then, 30 key indicators were chosen to measure the most important areas of their influence. According to the tool's creators, with a transparent list of indicators, the company can measure its impact, compare the effects with the average values for the Polish business and present the results in its non-financial reporting. The cumulative outcome for all companies will allow monitoring the implementation of the *Agenda 2030* in Poland and identifying on an ongoing basis critical areas of action for achieving targets (GUS, SDG, 2020).

Despite the apparent logic that underlies the *Impact Barometer* development, there might be some criticism involved as well. According to some experts, companies should not focus on only a few SDGs, but assess their impacts in a more comprehensive manner. The research by PwC shows that firms may tend to focus on a small number of SDGs that are most relevant to their business operations or on those to which they already make substantial contributions with no significant efforts (the "easy wins"), such as SDG 8 *Decent work and economic growth*. Some firms might be prone to the "cherry-picking" of the SDGs, and show that they made progress in achieving some SDGs, while neglecting the negative impacts as regards others (MVO Platform, 2018).

Stena Recycling is the first company on the Polish market to use the *Impact Barometer* to report non-financial data. According to the information provided on the official *Impact Barometer* site, seven other companies joined this initiative (Kampania 17 Celów, 2020). Table 5 provides their main characteristics.

Table 5: The *Impact Barometer* initiative: first reporters

Company	No. of employees	Industry	Included in the latest RBF Report	Reference to the *Impact Barometer* in the latest available report
Benefit Systems	532	Activities of sports facilities	Yes	No
BOŚ	1,212	Other finance operation intermediation	Yes	No
Carlsberg Polska	1,300	Wholesale of alcoholic beverages	Yes	No
Carrefour	14,000	Grocery stores	Yes	No
Ergo Hestia	1,800	Life insurance	No	No
PGE	40,000	Electric energy	Yes	Yes
Rossmann	18,404	Retail sale of cosmetics, toiletries and cleaning products	Yes	No
Stena Recycling	541	Recovery and preparation for scrapping, international trade in steel, non-ferrous metals and crude oil; purchase and processing of waste paper and scrap purchase	Yes	Yes

Source: RBF (2020), Stena Recycling (2020), PGE (2020), Benefit systems (2020), BOŚ (2020), Carlsberg Polska (2020), Carrefour (2020), Ergo Hestia (2020), Rossmann (2020)

According to the data included in table 5, the *Impact Barometer* Programme Members are quite a diverse group as regards the size and industry profile. Benefit Systems and Stena Recycling are companies with around 500 employees, while PGE has 40,000 of them. However, despite the low number of employees, Benefit Systems is qualified as a large PIE, and it is required to provide non-financial disclosures under the Directive 2014/95/EU. The company issues a separate non-financial report and uses GRI Standards as a reporting framework.

Only Stena Recycling and PGE present the reference to the *Impact Barometer* in their reports. However, Stena Recycling does not provide values for 18 of the indicators included in the *Impact Barometer* and PGE for 11 of them. Out of 30 indicators, only 9 were disclosed by both companies, and the highest level of comprehensiveness was achieved in relation to SDG 4 and SDG 8 (the same indicators were disclosed by both companies) (Table 6).

Table 6: The *Impact Barometer*: Stena Recycling vs PGE

SDGs and indicators	Stena Recycling	PGE
Goal 3: Ensure healthy lives and promote well-being for all at all ages		
3.1 Average health care expenditure per employee	141.56 PLN	321.23 PLN
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all		
4.1 Average number of training hours per employee	**4.98**	**9**
4.2 Number of pupils and students covered by the company's activities supporting the education process in relation to the number of employees	Not reported	**45.03**
4.3 Percentage of employees trained in sustainable development	**61.87%**	**6.67 %**
4.4 Percentage of employees involved in sustainable development initiatives	Not reported	**17.86 %**
4.5 Number of people educated about sustainable development in relation to the number of employees	**301,708.32%**	**2,157.77%**
Goal 5: Achieve gender equality and empower all women and girls		
5.1 Percentage of women in managerial positions	**35%**	**23 %**
5.2 Women to men remuneration ratio	Not reported	Not reported
5.3 Difference in admissions of applicants in recruitment processes of women compared to men	Not reported	Not reported
5.4 Percentage of employees trained in countering mobbing, sexual harassment, violence or discrimination	**100%**	**9 %**
5.5 Difference in use of support programs facilitating care of children, senior parents and other dependents by women compared to men	Not reported	Not reported
5.6 Difference in use of parental leave by women compared to men	Not reported	Not reported
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all		
8.1 Value added of the company per employee	Not reported	Not reported
8.2 Percentage of employees employed under an employment contract	**97.23%**	**98.12 %**
8.3 Highest to the lowest salary in the company ratio	Not reported	Not reported
8.4 Ratio of low-level employees' remuneration to the minimum wage	Not reported	Not reported
8.5 Employee turnover	**10.57%**	**2.83 %**
8.6 Percentage of persons with disabilities among employees	**1.21%**	**1.51 %**
8.7 Ratio of number of reported violations of the Code of Ethics to the number of employees	Not reported	**0.44 %**
8.8 Percentage of purchases whose suppliers have been verified against CSR criteria	Not reported	**100 %**
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation		
9.1 Expenditure on innovations in relation to revenue	Not reported	**4.5 %**
9.2 Percentage of expenditure allocated to sustainable solutions as part of expenditure on innovations	Not reported	**97.5 %**
9.3 Number of research projects carried out in cooperation with scientific institutions in the last 3 years	Not reported	**26**
Goal 12. Ensure sustainable consumption and production patterns		
12.1 Material efficiency	Not reported	Not reported
12.2 Energy efficiency	**4.31%**	**10,89 %**
12.3 Percentage of energy from renewable sources	**20.00%**	Not reported
12.4 Greenhouse gas emissions	Not reported	**61,489,339**
12.5 Water efficiency	**7.52%**	Not reported
12.6 Percentage of recycled or reused waste	Not reported	**50.86 %**
12.7 Percentage of raw materials and materials from sustainable sources	Not reported	Not reported

Source: own elaboration based on Stena Recycling (2020), PGE (2010).

Conclusion and indication of future research

There are only 10 years left to the implementation of the *Agenda 2030* goals. 17 SDGs are a call for action to all countries in a global partnership and the business will play a key role in achieving them. With the initiative of this scale and complexity, only joint, true engagement, and uniform reporting will provide an opportunity for a real assessment of progress in the realization of its objectives (Korzeniewska, 2020).

However, apart from the obvious benefits, there are also some challenges involved. After commonly known "green washing" the new term "blue washing" appeared. It is defined as a situation in which firms figuratively drape themselves in the blue UN flag to distract stakeholders from their real, as opposed to cosmetic, poor environmental or human rights records (*New York Times*, 2010). More recent concern is "SDG-washing". The participation in the realization of the SDGs offers opportunities for businesses to demonstrate how they are actively facilitating sustainable development and improve their reputation. Due to this fact, they are keen to map their CSR initiatives to the 17 icons that represent the SDGs with a myriad of colorful infographics on websites and in reports. However, a more thorough analysis of their disclosures shows that they market their positive contribution to some of them and neglect negative impacts on others. According to Nieuwenkamp (2017), focus on the negative impacts on the SDGs is the most urgent and important. Ignoring that undermines the whole collaborative effort.

This study presents a preliminary and descriptive analysis of the Polish companies' actions related to UN SDGs. The findings suggest that, although Poland's situation as regards the progress towards the implementation of the *Agenda 2030* in comparison to other UN Member States might be evaluated positively, further encouragement for business to get involved in SDGs achievement is needed. The number of companies that undertake sustainability practices which are directly linked to the SDGs is growing. Four out of six companies recognized for their outstanding reporting practices included direct references to the SDGs in their reports. However, it should be noted that companies participating in the RBF's initiatives voluntarily submit their practices and reports for evaluation. Therefore, their approaches might not be representative of the problem.

The *Impact Barometer* might be a useful tool for companies even though its implementation does not seem to be at the very advanced stage at the moment. The likely reason is that it has only been a year since the tool was proposed, so its more comprehensive implementation and assessment of the results will be possible in the following years. In the author's opinion, the indicator 4.5 requires more clarification. The numbers like 301,708.32% might be confusing for the report's users without additional explanation. In 2019, 214 companies submitted over 2,400 practices with impacts on SDGs for the RBF evaluation. They seem to be a group of potential new members of the *Impact Barometer* Programme.

Further research is needed as regards the SDGs implementation and reporting by Polish businesses. The first step might be to analyze the reports of about 160 large PIEs, which are mandatorily required to provide non-financial disclosures in Poland, and identify their strategies in this regard. The following research questions seem worth asking:

RQ1. Do these companies provide information on how SDGs are linked to strategy?
RQ2. Do they measure their actual impacts as regards SDGs and report on them or just on activities?
RQ3. Do they only map activities they have already undertaken to the SDGs or evolve their strategies and operations to drive change?
RQ 4. Which NGOs, cause-related organizations, and think tanks do they cooperate with in their journey towards SDGs?
RQ5: How many of them perform "SDG-washing"?
RQ6: Does the *Impact Barometer* deliver the assumed outcomes?
RQ7: Which factors influence the companies' decision to contribute to the achievement of SDGs and join the *Impact Barometer* Programme?

This paper attempts to provide new insights into the SDGs implementation. Despite the limitations involved, it includes information on the unique SDGs implementation tool – *Impact Barometer* and its use by the Polish companies. It also formulates the research questions which indicate the desired direction of the possible future research. The findings of this preliminary study might also be relevant for practice. It seems crucial for the *Impact*

Barometer to be implemented by a large number of companies to achieve its aims. The negative phenomena of "SDG-washing" has to be monitored. The joined collaboration of governmental agencies, NGOs, businesses, and academia members is needed to take action that will contribute to sustainable future. Without a transparent approach to measure progress, the joined efforts might be hard to evaluate and manage effectively.

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The Impact of Chain of Command in an Organization

Malgorzata MATYJA

Wroclaw University of Economics and Business, Wroclaw, Poland
malgorzata.matyja@ue.wroc.pl

Magdalena RAJCHELT-ZUBLEWICZ

Wroclaw University of Economics and Business, Wroclaw, Poland
malgorzata.matyja@ue.wroc.pl

Abstract

Research motivation. This paper is in line with the assumption that the organizational structure of the future will be an adapting hierarchy, and its perfection will be expressed in adapting to nature and human needs. One of them is a chain of command, frequently replaced by the term "scalar chain" or "line of authority". The aim of the study is the theoretical and empirical examination of the influence of the chain of command on different fields in organizations. **Research design/methodology**. This paper uses the methodology of survey research on a representative example of one country (Poland). The data was obtained from a survey on 252 employees of various types of organizations. In the empirical data analysis the Mann–Whitney U test was used. **Main findings and implications**. The authors indicated fifteen fields of an organization which may be affected by the chain of command: attitude to innovation, initiatives, staff morality, decision-taking process, decision-taking process, managers' responses in case of their rating, or of their circumvention, overall performance, employees' performance, employees' wages, employees' commitment, conflicts and stalemates, supervisors' control, superior-subordinate relationship and choice of competitive strategy. However, they were able to empirically confirm the impact on only three of them: initiatives, decision-taking process and employees' wages. Nevertheless, the authors do not advise to resign from the chain of command in organizations. All its advantages stands up for it. They suggest to pay more attention to these three fields in the face of adherence to the idea of the chain of command.

Keywords: chain of command, hierarchy, authority, organization

Introduction

The hierarchy in organizations has not died. Although there are many opposing voices (Lichtarski, 2014). In one of the scenarios it is assumed that a perfect organization will not need an organizational structure at all (Hamel, 2011), in another one – that the organization is fully open and there are no internal boundaries (vertical and horizontal) (Ashkenas, 2002). On the other hand, as Leavitt (2005) argues, all highly flexible structural solutions are inconsistent with human nature, and therefore will not be able to replace traditional hierarchical structures. This paper is in line with the last assumption that the organizational structure of the future will be an adapting hierarchy, and its perfection will be expressed in adapting to nature (*homo hierarchicus*) and human needs. Therefore, it is and will be still justified to study the issues of hierarchical challenges in organizations.

One of them is a chain of command, frequently replaced by the term "scalar chain" or "line of authority". The original proponent of the chain of command was Henri Fayol in one of his 14 management

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principles. In the middle of the XX century Fayol stated: "the line of authority is the route followed – via every link in the chain – by all communications which start from or go to the ultimate authority" (Fayol, 1949). According to Crumpton (2013), the chain of command is an element of organizational structure which refers to an organization's hierarchy of reporting relationships. It has an important meaning for all personnel within the organization by determining a line of supervision for providing both direction and guidance and also to troubleshoot and advocate for resources and other needs related to the accomplishment of goals. The chain of command not only establishes accountability, but it also lays out the decision-making power in an organization. It should ensure that every task, job position and department has one person assuming responsibility for performance.

Despite its still valid and significant importance, the problem of the chain of command is insufficiently addressed in contemporary literature. Insufficiently in terms of lacking the complex systematization and practical verification of knowledge. Yes, there were relatively numerous attempts to recognize the impact of the chain of command in organizations. This impact may be positive, constructive (Qian, 1994, Aghion and Tirole, 1997, Kassing, 2009, Syriopoulos and Tsatsaronis, 2012, Oginni et al., 2014, Zydziunaite V. et al., 2015, Sanner and Bunderson, 2018) or negative, destructive (South and Matejka, 1990, Friebel and Raith, 2004, Hart and Moore, 2005, Yoo et al., 2006, Kassing, 2007, Abu Bakar and Mustaffa, 2008, Gaur and Ebrahimi, 2013). However, these attempts are fragmentary and often methodologically not consistent because they either remain purely theoretical or have no statistical validity in the case of empirical research.

The aim of the study is the theoretical and empirical examination of the influence of the chain of command on different fields in organizations. This paper contributes to integration, systematization and empirical confirmation of impact of chain of command. It uses the methodology of literature review and survey research on a representative example of one country (Poland), which can be used in further research across different countries.

Literature Review

Identification of the influence of chain of command

The arguments proving that the chain of command has an impact on the overall performance of an organization were forced not only by Fayol (1949), but also by South and Matejka (1990), Abu Bakar and Mustaffa (2008) and Hart and Moore (2005). The latter claim that "crisscross" hierarchies, such as the dualistic chain of command, are never optimal. Fayol (1949), as well as Syriopoulos and Tsatsaronis (2012) convince that the clear line of authority implies a faster decision-taking process. Oginni et al. (2014) and Sanner and Bunderson (2018) emphasize that it helps to avoid confusion, conflicts and stalemates. South and Matejka (1990), Abu Bakar and Mustaffa (2008), similarly to Oginni et al. (2014), report that correct superior-subordinate relationships have a major impact on employee commitment to the group and to the core beliefs and practices in the organisation as a whole. Interesting remarks on a positive impact of disturbed by circumvention chain of command are advocated by Kassing (2009). In his research, he finds out that regardless of whether or not employees expressed their concerns to the supervisor initially and directly, there were no accounts in which supervisors did not surface as significant characters. Evidently, employees practice circumvention while reflecting on the chain of command within their organization and the unmistakably cemented role of supervisors in that hierarchy. Thus, according to Kassing (2009), circumvention is a conscientious act that at once usurps and reifies organizational hierarchy.

However, from the few studies reviewed so far, we can also reveal some negative aspects of strict adherence to the scalar chain. The main critique, proposed by Yoo et al. (2006) and Sanner and

Bunderson (2018), refers to barriers of innovative thinking in an organization and slower adaptation to external environmental changes. Yoo et al. (2006) claim that it directly precludes implementation of Porter's differentiation strategy, yet without contradicting at the same time the application of a cost leadership strategy.

The works on constructive impact of the properly functioning chain of command discover its relationship with performance of employees. Such chain induces an increase in subordinates' efforts and wages (Qian, 1994) and their effectiveness (Gaur and Ebrahimi, 2013). Moreover, among positive outcomes for subordinates while breaking the chain of command by circumvention Kassing (2007, 2009) reports: achieving subordinates' goals and compelling supervisory action and corrective action that addressed either workplace conditions or corporate policies and practices that are beneficial to other employees. The increasing initiative or incentive to acquire information is the positive argument for scholars such as Aghion and Tirole (1997).

Simultaneously, the same authors point out that an unclear chain of command, affected by delegating downward to large authority, has its bad side in terms of causing supervisor's loss of control. Kassing (2007) suggests that it can often implicate inadequacies in supervisors' performance or capability. Falconi (1997) advocates that practise encouraging employees to avoid using the chain of command is demoralizing to supervisors, while Brutus et al. (1998), Friebel and Raith (2004) and Kassing (2007) pay attention to possible supervisors' retaliation in relation to the subordinate breaking the chain of command.

Finally, as its component, the chain of command also influences superior-subordinate relationships. Findings in this topic are extremely divided. For example, Kassing (2007) reports that the circumvented chain of command causes superior-subordinate relationship decline, and on the other hand, it may also build compromise, development and understanding in this kind of relationships. Oshagbemi and Gill (2004) come to similar conclusions while reviewing the contentions of different scholars on the impact of the hierarchy on the leadership style. They juxtapose opinions suggesting that properly structured hierarchy can release energy and creativity, rationalise productivity, and actually improve morale with those claiming that it can smother leadership. Abu Bakar and Mustaffa (2008) find out that superior-subordinate communication positively mediate the quality of the superior-subordinate relationship. Thus, it can be said that undisturbed by any communication problems, the chain of command favours maintaining good relations between supervisor and his subordinate.

Identification of fields influenced by chain of command in an organization

An organization is an extremely complex unit and it is difficult to profoundly identify its areas of existence. One of the relatively newest and comprehensive model of an organization was provided by Dauber et al. (2012) and based on the classes organization of theory (Hatch and Cunliffe, 2006). In their concept, which was named the organizational culture model, the authors involved the following areas of an organization (Fink et al. 2012):

• value and belief system: capturing the underlying assumptions of organisational behaviour,

• strategy: representing the overall orientation towards task achievement and impacts on structures and activities of an organisation. Strategies define what should be done,

• structural system: reflecting the manifestation of values and beliefs as norms, rules and regulations. It defines normative patterns of behaviour,

• operations: organisational behaviour and action are the observable manifestation of values, strategies and structures – how things are actually done and can be observed,

• external environment: giving feedback from the market and/or legitimacy as an influential factor on organisational culture.

The authors of this study believe, that their model has worked well for explaining the general fields of an organization. Therefore it has been used for ordering the detailed fields affected by the chain of command (table 1.). On the basis of the literature review the 15 fields of potential influence of scalar chain were identified and then subjected to empirical analysis.

Table 1: Fields of an organization affected by the chain of command on the basis of the literature review

General fields	Detailed fields		Authors
Organizational culture & identity	1.	attitude to innovation	Yoo *et al*., 2006, Sanner and Bunderson, 2018
	2.	initiative	Aghion and Tirole, 1997
	3.	staff morality	South and Matejka, 1990, Falconi, 1997, Zydziunaite V. et al., 2015
Organizational design, structure and process	4.	decision-taking process	Fayol, 1949, Syriopoulos and Tsatsaronis, 2012
	5.	division of tasks between superior and subordinate	Hart and Moore, 2005
Strategic response to organizational (internal) environment	6.	strategic responses of managers to internal environment in case of their rating by subordinates	Brutus *et al*., 1998
	7.	strategic responses of managers to internal environment in case of their circumvention in communication by subordinates	Friebel and Raith, 2004, Kassing, 2007
Organizational behavior and performance	8.	overall performance of organization	Fayol, 1949, South and Matejka, 1990, Abu Bakar and Mustaffa, 2008,
	9.	performance of employees (both supervisors and subordinates)	Oshagbemi and Gill, 2004, Kassing, 2007, Gaur and Ebrahimi, 2013,
	10.	employees' wages	Qian, 1994
	11.	employees' commitment and efforts	Qian, 1994, Abu Bakar and Mustaffa, 2008, Oginni *et al*., 2014
	12.	conflicts and stalemates	Oginni *et al*., 2014, Sanner and Bunderson, 2018
	13.	supervisors' control over resources	Aghion and Tirole, 1997
	14.	superior-subordinate relationship	Kassing, 2007, Abu Bakar and Mustaffa, 2008
Organizational strategy	15.	choice of competitive strategy (between differentiation or cost leadership strategy)	Yoo *et al*., 2006

Methodology

Data Collection

The data was obtained from a survey conducted in Poland on employees of various types of organizations (various companies, offices, social organizations or public utility organizations, etc.). The minimum size of the research sample was set at 240 units according to the calculations below:

$$n = \frac{P(1-P)}{\frac{e^2}{Z^2} + \frac{P(1-P)}{N}}$$

Where:

n – minimum sample size = 240 units

P – fraction size = 90% (it is assumed that hierarchical relationships exist in 90% of the population)

e – maximum error = 5%

Z – for the adopted confidence level α = 99%, this value is approx. 2.58

N – population size = 16,461,000 (this is the number of economically active people in Poland according to the Central Statistical Office data for 2019).

The method of random selection was used. Ultimately, responses from 268 people were collected, however to the analysis below, due to the lack of data, 252 were chosen. The research was conducted using PAPI (paper questionnaires) and CAWI (online questionnaires) in the proportion of 33%:67%, respectively.

Characteristics of the research sample

In terms of age, the research sample is quite diverse. Its largest part (35.1%) are employees aged 36-45. A slightly smaller proportion (30.6%) includes respondents aged 26 to 35 years. The least numerous group (1.1%) are people over 65. In the case of the respondents' education, the differentiation of the research sample is smaller. 62.3% are people with higher education. 28% of the respondents are people with secondary education, and 9.3% – with basic vocational education. Only one person (0.4%) has primary education. The structure of the research sample by gender includes both women and men. The first of these categories accounts for 56% of the research sample, and the second – the remaining 44%.

Diversity of the research sample is also visible in terms of seniority. Most people (34.7%) admitted that their overall professional experience is in the range of 11-20 years. In turn, approx. 19% of the respondents work for 6-10 or 21-30 years. 13.8% of the respondents had the longest work experience (over 30 years). 13,8% of the respondents admitted to relatively short employment – under 5 years.

The majority (76.9%) of the respondents work in economic organizations (eg enterprises, business unions). 10.4% are employed in administrative organizations (state or local government), and 9.3% in public benefit organizations (e.g. hospitals, schools, cultural or scientific institutions). A relatively small

part of the research sample indicated a military or police and social organization as the place of current employment (e.g. a foundation, association, social enterprise, political party, trade union). These groups account for 1.1% and 2.2% of the research sample, respectively.

The largest part (44.4%) is employed in large organizations (over 250 employees). A slightly smaller proportion (25%) work in medium-sized organizations (from 50 to 250 employees). In turn, small (10-49 employees) or micro (less than 10 employees) organizations employ 12.3% and 18.3% of the respondents, respectively.

Organizations of the current employment of respondents in the vast majority (84.7%) have been operating on the market for over 10 years. 9.7% of the surveyed organizations exist over 5 to 10 years. The remaining part (5.6% in total) are relatively young organizations, operating for up to 5 years.

In terms of the scale of activity of the surveyed organizations, the research sample is diverse. Most of them (56.7%) also operate abroad, on international markets. For 22.4%, the activity is limited to the local market. On the other hand, 20.9% sell their products or services in the territory of the country.

From the point of view of the purpose of the research, the question of the type of organizational position was particularly important. 36.9% of the respondents perform managerial functions, i.e. supervise the work of at least one subordinate. Moreover, the work of 88.8% of respondents is supervised by at least one supervisor. This proves that the vast majority of respondents is in some way involved in the existence of hierarchical relationship in their organizations. Inevitably, based on their own experiences, they can share knowledge and feelings about them. It is also worth emphasizing that the research results in this matter confirmed the correctness of the assumptions in calculating the size of the minimum research sample with regard to the size of the fraction.

Data Analysis

To examine the influence on chain of command on the empirical data the Mann–Whitney U test was used. The independent variable was the occurrence of chain of command in an organization. The respondents' declarations were divided into two groups: those having the clear chain of command in their organizations (212 employees), and those who cannot tell, that the clear chain of command is present in their organizations (40 employees). The respondents were asked to evaluate each of the 15 fields identified it table 1. They became dependent variables. The scoring of the respondents' answers was the following: definitely good – 4, rather good – 3, rather bad – 2, definitely bad – 1. The statistical significance of the results was set at the level of $\alpha = 0.05$.

Research Results

The non-parametric analysis of variance with the use of the Mann–Whitney U test recognized statistically significant differentiation between the variances in the following groups – the occurrence of chain of command and: initiative, decision taking process and employees' wages (table 2.).

Table 2: Results of the Mann–Whitney U test

Dependent variables	Z	p	N-yes*	N-no*
attitude to innovation	-1,56750	0,117000	194	38
initiative	-2,08417	0,037145	195	37
staff morality	-1,19444	0,232305	196	35
decision-taking process	-2,62240	0,008732	200	39
division of tasks between superior and subordinate	-0,58130	0,561042	203	37
managers' responses in case of their rating	-1,02416	0,305759	167	35
managers' responses in case of their circumvention	-0,66808	0,504085	170	35
overall performance	-1,19456	0,232261	204	39
employees' performance	0,45807	0,646904	205	36
employees' wages	-2,01325	0,044090	193	37
employees' commitment	0,05958	0,952493	201	37
conflicts and stalemates	-0,36896	0,712156	184	34
supervisors' control	-0,35913	0,719499	203	37
superior-subordinate relationship	-0,28622	0,774707	206	36
choice of competitive strategy	-1,35514	0,175375	187	36

It proves, that there is an empirically verified influence of chain of command in these three fields of an organization. Moreover, looking at the box and whisker plots of these three groups it can be concluded that the absence of chain of command favours the initiatives, decision-taking process and employees' wages. 50% of respondents without clear chain of command gave good (definitely or rather) ratings to the above fields, whereas only 25% of respondents involved in chain of command speaks positively about these fields. The impact of the chain of command on other fields of an organization has not been revealed.

Discussion

Our findings in general might sound quite provoking. In some way they are in contradiction with the findings of the existing literature, because they confirmed the influence of chain of command on only three from identified fifteen fields of an organization. However, it should be underlined that at the same time they did not deny its existence. Moreover, we support claims of Fayol (1949), Qian (1994), Aghion

and Tirole (1997) and Syriopoulos and Tsatsaronis (2012) on the direction of the impact of chain of command on initiatives, decision-taking process and employees' wages in an organization.

Fayol wrote: "the clearer cut the chain of command, the more effective the decision making process" (Fayol, 1949). Similarly claimed Syriopoulos and Tsatsaronis M. (2012): "the unification and integration of the command chain implies a faster decision-taking process". We add that nowadays in the era of employee participation, common access to information and intelligent systems supporting decisions in organizations decentralization should be developed. Rigid adherence to the established chain of command complicates and extends the time of the decision-making process. Even if employees are permitted to, they will refrain from making decisions and, using the idea of the chain of command on purpose, they will transfer this responsibility to their supervisors.

The obtained research results confirmed also the influence of chain of command on initiatives in an organization. It is in line with claims of Aghion and Tirole (1997) who studied, among others, the allocation of formal authority (the right to decide) versus real authority (the effective control over decision) in organizational hierarchy. They discovered that an increase in subordinate's real authority promotes initiative. In fact, increasing subordinate's real authority may be flattening, shortening, declining or even resigning from the chain of command. In our research in organizations where there was not clear occurrence of the chain of command the level of initiative was highly rated. People without close supervision may feel more free, more motivated, and more creative in approaching their tasks. And this, in turn, is conducive to undertaking initiatives of a different nature.

Moreover, our research provided the empirical prove of the influence of chain of command on the employees' wages. Precisely speaking, we discovered that it is better not to be entangled in the existence of the chain of command when somebody wants to achieve higher wages. In his theoretical study Qian (1994) links shortening of the chain of command, on the one hand, to the reduced costs of management staff. However, he also notes that "remaining employees have to be paid with higher efficiency wages to induce them to work, because the effectiveness of monitoring is reduced as the result of the increased span of control". His conclusions are therefore directly related to the results of our research.

Conclusion

This paper follows the approach on the presence of hierarchy in modern companies. We believe that hierarchy tends to be ubiquitous not only in business firms (Ishida, 2015), but also in other types of organizations. In a hierarchy, employees at different hierarchical levels are vertically related: the superior has authority over his subordinates and the subordinate provided information to, and followed instructions from, his superiors (Qian, 1994). This is how the chain of command works in practice.

In our study we contributed to explaining functioning of the chain of command. Precisely, we investigated the impact of chain of command in modern organizations. We integrated an systematized the knowledge on this impact on the basis of the existing literature. We discovered that the consequences of the chain of command actually extend to the entire organization – its culture and identity, structure and processes, relationships with environment, behaviour and performance, and strategy. We indicated fifteen fields of an organization which may be affected by the chain of command. They are the following: attitude to innovation, initiatives, staff morality, decision-taking process, decision-taking process, managers' responses in case of their rating, managers' responses in case of their circumvention, overall performance, employees' performance, employees' wages, employees' commitment, conflicts and stalemates, supervisors' control, superior-subordinate relationship and choice of competitive strategy. However, we were able to empirically confirm the impact on only three of them: initiatives, decision-taking process and employees' wages. Moreover, this impact is rather destructive in its character.

On the basis of the results of our analysis we can suggest some managerial implications. We do not advise to resign from the chain of command in organizations. All its advantages stands up for it. However, we suggest to pay more attention to these three fields in the face of adherence to the idea of the chain of command. For example, we would recommend to enforce the law to make decisions on the particular hierarchy levels instead of shifting responsibility. It significantly shortens the time of the decision-taking process. We also propose the use of incentives, including financial ones, for employees to undertake various pro-development initiatives. This will contribute to an increase in the level of initiative in the organization and, at the same time, better wages for employees.

We are aware of limitations of our research. First of all, although the research sample was representative, it was conducted only in one country – Poland. We intend to extend our research to other regions, and especially in the context of different cultures. Certainly, chains of command will function differently, e.g. in Japanese, American or German companies. We also believe that it takes a more in-depth look at the impact of chain of command on individual areas of the organization. For this, a more interdisciplinary literature review and a thorough operationalization of concepts is necessary, taking into account not only the perception of respondents but also hard, objective data. Besides, we recommend conducting also dynamic analysis. The chain of command could change over time – as every relationships are always dynamic and they don't follow a predetermined pattern of a life cycle (Piwoni-Krzeszowska, 2018). We believe that in the light of our assumptions about the longevity of hierarchies in organizations, this problem deserves further research.

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Applying the Kano Model for Analyzing Factors Affecting Patients' Satisfaction

Ruxandra DINULESCU

Bucharest University of Economic Studies, Bucharest, Romania
ruxandra.dinulescu@man.ase.ro

Cosmin DOBRIN

Bucharest University of Economic Studies, Bucharest, Romania
cdobrin@yahoo.com

Abstract

In the present society, medical services and processes are developed based on what patients want and expect, therefore creating an attractive quality, by the healthcare providers, has become fundamental. As a result, healthcare providers must anticipate patients' needs, as well as, expectations, by contributing with new service characteristics adjusted to patients' demands, in order to improve their level of satisfaction. The current research aims to explore how the Kano model can be used to identify various patients' needs towards a continuous improvement of the Romanian private healthcare system. The study's findings present that there is a variation in the patients' perceptions related to service quality attributes and so, the service features may be differently organized in Kano's model. The main objective of the research is to use the Kano model that would increase patients' satisfaction, by listening to the voice of the patients, as well as, attaining a competitive advantage on the market for the healthcare providers, by presenting high value-added features.
Due to its open approach, one of the main advantages of the presented framework is represented by its efficiency to integrate in the private healthcare units, tools for better understanding the voice of the customer, like Kano model.

Keywords: Continuous Improvement, Healthcare System, Quality Attributes, Kano Model.

Introduction

In a private clinic, patients become satisfied when the medical service has an attractive quality, when doctors emphasize with them, and when they obtain what they pay for (or even more).

However, the Romanian medical service did not improve as much as patients require. Moreover, the current patients' complaints are almost the same as they were a few years ago, especially at the public healthcare system (Dobrin&Dinulescu, 2019).

Therefore, there are elements and actions that, in a private clinic, represent necessary features (must-have characteristic) and their absence would cause patients' dissatisfaction.

On the opposite side, there are the indifferent characteristics which their absence would be entirely indifferent for the patients (would not have an impact on patients' satisfaction).

However, in a world where quality becomes more and more subjective, is rather hard to identify a certain level of quality that would suit each patient.

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In this case, the best alternative is to use a model that would categorize each characteristic depending on its level of importance for the patients.
Sometimes, the healthcare provider might not know entirely the voice of the patient and so it may prioritize a characteristic before other (when in fact, for the patient, that characteristic does not affect its satisfaction). This is why, surveying patients and then process the answer with the Kano model is a desirable option.

Literature Review

The Kano model was developed by Noriaki Kano, a Japanese consultant, and relates to design characteristics for customer satisfaction (Cohen, 1995).

As mentioned by Hejaili et al. (2009), the model proved its efficiency not only in obtaining the patients' service quality expectations, but also in better understanding the differences that might appear in expectations of patients from different nationalities and cultures.

Furthermore, the Kano model is being constantly endorsed in the healthcare industry, and also recognized as a significant tool in understanding a product or a service lifecycle (Mikulić and Prebežac, 2011).

The Kano model proposes a theoretical and dynamic methodology for perceiving customer needs and perceptions by offering a visual representation of the relationship between the functional performance of quality attributes and the level of satisfaction attained ((Kano et al., 1984; Berger et al., 1993; Robinson, 2009).

Also, Anderson and Sullivan (1993) sustain that service quality represents a pre-requisite of customer satisfaction, which depends on products' and services' performance, as well as whether this performance depends on consumers' expectations.

Generally, the expectations (or customer needs) are segmented into three main categories: basic needs (or dissatisfiers); performance needs (satisfiers) and excitement needs (or delighters), as it can be observed in figure 1:

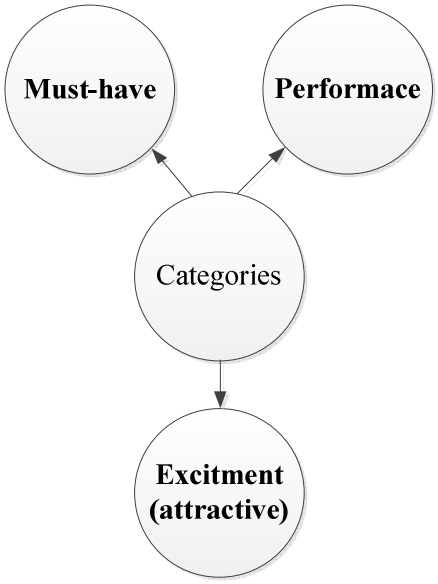

Fig. 1: Categories of expectations

Source: The author

a) *Must-haves (basic qualities)* – these elements represent a necessary condition or quality that a product or service must include before the customer considers starting a business with that certain company.
When including these elements, they do not necessarily cause customer satisfaction, however their absence will cause dissatisfactions for the customer.
Also, these needs are "unspoken"
Basically, in the customer's opinion, these must-have features must be included.
For example, in a healthcare system, a must-have feature is the cleanliness of the medical cabinets, the good preparation of the doctors, etc, a waiting room for the patients,

b) *Performance attributes* – represent standard characteristics that have the ability to increase or decrease satisfaction based on their degree. In comparison to the above mentioned features, these needs are generally clearly expressed by the patients (spoken). Thus, the better they are met, the more accomplished the patient will feel.
A poor performance of these attributes will lower the patients' satisfaction.
Generally, the performance attributes are directly proportional with the patients' degree of satisfaction (if a service/process performance is high, the patient's satisfaction will increase as well).

Example: waiting time before entering the doctor's cabinet, internet access in the medical healthcare units, modern medical equipment, etc.

c) Excitement needs (attractive needs or satisfiers) – normally, these are unexpected features or characteristics that are meant to impress the patient, even if they are generally "unspoken" needs.
However, the lack of these characteristics does not cause patients' dissatisfaction (Webber, 2007).

Example: free wifi in the hospital, tv in the hospital rooms,

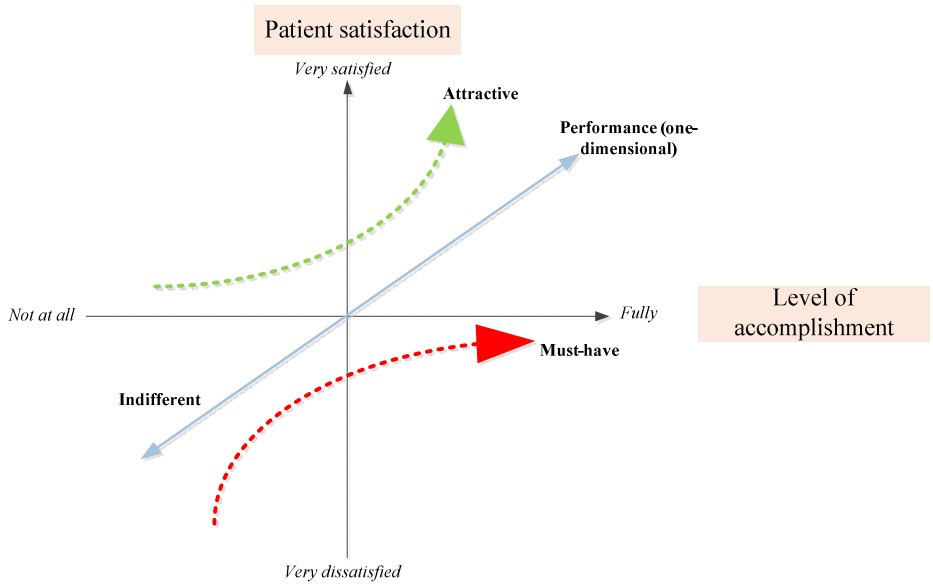

Fig. 2: Kano model

Source: Adapted from Robinson (2009)

Types of quality

In order to better understand its relationship to competition, Kano divides the notion of quality into four groups:

a) Indifferent quality – the kind of quality that the patient does not consider or appreciate;
b) Expected quality – the quality that the patient expects and requires;
c) One-dimensional quality (performance quality) – the quality that the patient hopes, however, the lack of it does not necessarily makes the patient dissatisfied;
d) Exciting quality – the level of quality that is beyond the patient's expectations; when present, it pleasantly surprises the patient (Besterfield, 1995).

Research Methodology – Case study: A private clinic from Bucharest, Romania

Data Collection

For the present research, a private medical clinic from Bucharest, Romania, was chosen, in order to identify the patients' healthcare needs for improving the quality of the provided services, as well as maintaining the clinic's top medical services.

The private clinic offers a wide range of medical services like cardiology, echography, orthopedics, ophthalmology, pediatrics, psychiatry, etc.

One of the main objectives for creating this research was to identify the patients' needs and requirements that could have an impact on the satisfaction's degree.

The questionnaire was shared, on the field, to a total of 134 patients on a time frame of 1 month (June 2020), out of which only 120 answers were valid (taking into account that some questionnaires had questions without answers, or double answer with the same attribute, etc).

Kano Questionnaire

Before creating our questionnaire, several Kano surveys were considered in order to identify the questions asked regarding the service quality features. Thus being said, the questionnaire was composed of paired questions (functional and dysfunctional) that gathered different information about the quality features. More precisely, the survey covered sets of paired questions, in which every individual set explored a single quality attribute.

Therefore, the operative (functional) form of every question explored how a patient would feel if an attribute were present and the non-operative form (dysfunctional) investigated how a patient would feel if an attribute were missing. In order to bypass the biased results, the questions were presented in a random order.

The questionnaire contained 42 questions on 21 service quality attributes. The patients were allowed to participate in the survey if they met two main criteria: must be at least 20 years old and must have used before the medical services offered by the clinic.

During the Kano questionnaire different attributes were analyzed like medical staffs' empathy, cleanliness, availability of qualified medical staff, provision of adequate information, correct treatment, etc. The answers used were: 1. Like it; 2. Expect it; 3. Don't care; 4. Live with; 5. Dislike.
Also, the Kano evaluation table proposed by Berger et al. (1993) is presented in table 1:

Table 1: Kano evaluation table

		Dysfunctional (X)				
Functional (Y)		**Like**	**Expect It**	**Don't Care**	**Live With**	**Dislike**
Like		Q	A	A	A	P
Expect It		R	Q	I	I	M
Don't Care		R	I	I	I	M
Live With		R	I	I	Q	M
Dislike		R	R	R	R	Q

Source: Matzler & Hinterhuber (1999)

All the attributes are part of one of the following categories of perceived quality as seen in table 2:

Table 2: Kano's attributes

Code	Result
M	Must-Be
P	Perfomance
A	Attractive
I	Indifferent
R	Reverse
Q	Questionable

Source: Adapted from Matzler&Hinterhuber (1999)

The questionable response category includes the number of answers that might have not been precisely understood by the patients.

After that the number of answers from each category for every service quality item is registered in order to settle the final category for each item (attribute).

The next computations included the *category strength* (the estimated value of certain feature and is computed as the percent difference between the highest category and the following highest category), *total strength (*the approximate value of a certain feature built on the amount of answers in attractive, must-be and one-dimensional category)*, better (satisfaction coefficient)* and *worse value (dissatisfaction coefficient)*.

The *better value* is the predicted value of the item to generate satisfaction and is computed as:

$$\text{Better} = (A+P)/(A+P+M+I) \quad (1)$$

Where A, P, M, I – the number of answers in the attractive, performance, must-be and indifferent sections.
The *worse value* represents the approximate value of the feature to generate dissatisfaction if it is not included and is computed as:

Worse = (P+M)/(A+P+M+I) (2)

Results of the Research

Out of a total of 134 questionnaires, only 120 were valid, while 14 questionnaires were excluded due to incomplete answers to Kano quality attribute questions.

The inquiry of the 120 surveys was operated by looking up each pair of answers (both functional as well as dysfunctional) in the interpretation table and after that the results were categorized for each individual attribute.

From the below figure (fig. 3) it can be noticed that the 21 service quality items were classified by the patients as follows:

- 8 service quality as performance attributes (one-dimensional);
- 5 service quality as must-have attributes;
- 6 service quality as attractive attributes;
- 2 service quality as indifferent.

Attribute	Q	M	P	A	I	R	Final category	Category strength (%)	Total strength (%)	Better (%)	Worse (%)
1	0	38	49	24	9	0	P	9.17	92.50	60.83	72.50
2	2	24	51	20	19	4	P	22.50	79.17	62.28	65.79
3	1	18	70	21	10	0	P	40.83	90.83	76.47	73.95
4	0	30	30	36	24	0	A	5.00	80.00	55.00	50.00
5	0	56	18	24	19	3	M	26.67	81.67	35.90	63.25
6	0	28	16	21	54	1	I	21.67	54.17	31.09	36.97
7	0	18	64	26	11	1	P	31.67	90.00	75.63	68.91
8	2	12	45	55	6	0	A	8.33	93.33	84.75	48.31
9	1	26	41	21	31	0	P	8.33	73.33	52.10	56.30
10	1	15	26	47	25	6	A	17.50	73.33	64.60	36.28
11	0	43	31	15	31	0	M	10.00	74.17	38.33	61.67
12	0	39	46	14	17	4	P	5.83	82.50	51.72	73.28
13	0	37	29	36	18	0	M	0.83	85.00	54.17	55.00
14	2	78	12	23	5	0	M	45.83	94.17	29.66	76.27
15	2	38	49	12	18	1	P	9.17	82.50	52.14	74.36
16	1	20	19	65	14	1	A	37.50	86.67	71.19	33.05
17	0	36	57	20	7	0	P	17.50	94.17	64.17	77.50
18	0	3	15	20	80	2	I	50.00	31.67	29.66	15.25
19	0	46	30	26	18	0	M	13.33	85.00	46.67	63.33
20	0	30	26	48	16	0	A	15.00	86.67	61.67	46.67
21	0	27	28	48	17	0	A	16.67	85.83	63.33	45.83

Fig. 3: Evaluation of the items using the Kano technique

Source: Authors' computations based on the questionnaire's answers

Furthermore, also from the figure 3 it can be observed the distribution of the service quality items using the Kano technique.

The next figure (figure 4), representing the better-worse graph, presents the four quadrants of Kano model with the specific categories (attractive, performance, must-have and indifferent).

The results are plotted in a two-dimensional graph, having a maximum value of 1, where the Worse value sets on the X-axis and the value of Better, on Y-axis.

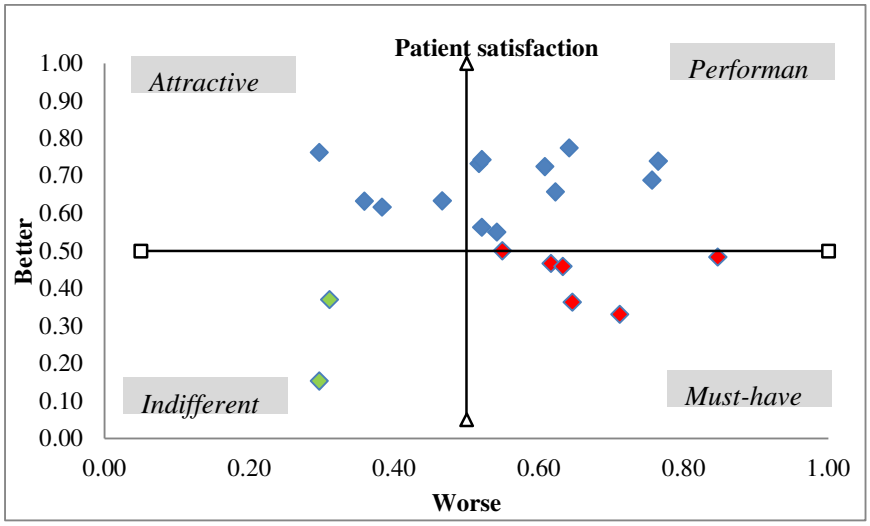

Fig. 4: Two dimensional graph of Better-Worse method

Source: The Authors

Recommendations

In order to increase the quality of the medical process, from the patients' point of view, the following steps must be followed:

- First of all, based on the results, it is necessary that the medical process has all the *must-haves*; there may be situations when removing attributes from the other two categories might be needed, but not including these mandatory features, might lead to process failure.
- Secondly, we should take into consideration the *attractive* (*satisfiers)* feature in order to see if we can add or improve the quality of the ones we already have. Rising above the competition could be done with the help of these features;
- A good way for increasing patients' satisfaction would be to increase the *performance* attributes within other constraints (like cost);
- Lastly, when the process is improved, *indifferent* attributes could be removed.

Limitations and future directions of the study

Our current research was limited to the application of the Kano model, with the use of a simple questionnaire, for better understanding the voice of the patients. The sample used, as well as the research timeframe were rather small, covering only a part of the patients that visited the private clinic in one month. Mainly there were patients that attended the same departments, so in some cases, the answers might be subjective.

However, to further develop the study, this research will be continued by integrating other methodologies like *Quality function deployment (QFD), SERVQUAL,* or the *analytic hierarchy process (AHP).*

Whilst applying the Kano model permits the healthcare providers to better understand patients' needs, when integrating it with QFD, it helps recognizing trade-offs and translating them into functional service requirements (Chiou and Cheng, 2008; Aghlmand et al., 2010; Nordin and Razak, 2014; Shamshirsaz and Dong, 2014).

By including these tools, a couple of sustainable improvement strategies will be developed.

Conclusions

Nowadays, an important action for the healthcare providers is to include patients in their treatment decisions, as well as exploring the multiple roles that a patient may have, for a better achievement of their expectations.

The fundamental contribution of this study is represented by the implementation of the Kano model in order to obtain various patients' needs correlated with the healthcare service unit, as well as driving the continuous quality improvement of the healthcare services.

This paper presents a systematic methodology for identifying the healthcare requirements, providing information on how to use the Kano model for healthcare services. Thus, for a continuous improvement of the healthcare service quality, the healthcare providers have to identify the changing patients' requirements by implementing analytical processes.

The current study represents still an ongoing research since the continuous improvement process of the healthcare units cannot stop at just discovering the patients' needs.

Thus, for providing quality healthcare services, we believe that a Lean Six Sigma program should be implemented, in order to examine the cause of variations, to create a root-cause analyze, to measure the variation, to improve the processes that present gaps and in the end, to continuously control the improvements achieved.

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A Comparative Analysis of Banking Secrecy Rules in Light of AML Rules

Anna V. SHASHKOVA

Full Professor MGIMO-University, Moscow, Russia
a.shashkova@inno.mgimo.ru

Abstract

The aim of the present article is to analyse the position of the Russian Federation and countries such as Spain, the United States and Switzerland concerning banking secrecy rules when executing anti money laundering legislation. We conclude on the necessity of the political establishment to improve Russian law-enforcement in practice as well as the legislation in this area. The banks having received the right to close an account of a legal entity or of an individual unilaterally are able to overdo anti-money laundering and anti-corruption laws. This results in individuals' problems with cash withdrawals and payments on the clearing basis. The authors analyse European practice and problems concerning 'secrecy matters'. Even within Europe the regulatory approaches relating to secrecy differ. Because of the 'secrecy' involving individuals and legal entities, they are deprived of appealing decisions taken by banks and thus restricting their Constitutional rights. The Constitution of the Russian Federation gives general guidelines in respect of human rights and shall be respected by laws and law enforcement practice.

Keywords: Bank Secrecy, Money Laundering, Panama Papers, Troika Laundromat

Introduction

State authorities and agents responsible for the supervisory function, and subsequently the courts, including the Constitutional Court of the Russian Federation are faced with the problem of secrecy in different aspects. This problem must be solved at the highest level with the direct application of the constitutional norms (Balakina, D'Andrea & Masciandaro, 2017; Gheorghe, & Dragomiroiu, 2017; Chilton & Versteeg, 2018).

The Bank of Russia sets requirements for the banks to execute Federal Law No. 115-FZ, dated 7 August, 2001, 'On Combating Legalization (Laundering) of Proceeds from Crime and Financing of Terrorism' too high. Under the threat of revocation of the license for banking activity such requirements simply drive banks into the corner. There is thus a need for the political establishment to act. Recent changes in Russian legislation, e.g. allowing banks to refuse opening of accounts unilaterally, simplified banking activities in Russia.

Such problems of contradiction and interaction of provisions of two laws – the Anti Money Laundering Law and the Law on Banks and Banking Activity – is a subject-matter of the Constitutional Court of the Russian Federation as well as a research in Russia and abroad. Most researches are dedicated to the cases when the law requires disclosure of banking information of a customer notwithstanding the consent of the latter (Croal, 2011; Dal', 1995; Dressel & Tonsakulrungruang, 2018). These situations tend to grow in number because of application of the law. The law does not change, but still more and more restrictive provisions are applied to maintenance of the banking secrecy by the banks themselves.

The aim of the present Article is to identify the problem: the Constitutional right to secrecy, provided under Article 23 of the Constitution of the Russian Federation, is under constant violation. In fact, it is abolished and not applicable in practice by law enforcement bodies as well as professional institutions accountable before the state. Banking institutions being under pressure of withdrawing the

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banking license choose to violate rights of their customers instead. Banking customers cannot withdraw banking licences. The maximum they can do is to apply to court (Elliott, 2006; Engibaryan, 2006; Emmenegger, 2017). The situations of cash withdrawal violations have not been studied before. It seems quite simple: legislation provides maximum amounts of cash withdrawal, so if an individual or a company within such admitted amount make a withdrawal, they can conduct withdrawals without any further restrictions. At the same time if they effect multiple withdrawals frequently it can be classified as a suspected transaction under anti money laundering laws. Still there exist situations when a bank denies to give money to an individual in case of a one-time withdrawal. Such situations happen in the Russian Federation where an individual is not limited to s specified sum of cash withdrawals and has never been seriously analysed. (Farquet, 2017; Galbraith, 2007; Gaman-Golutvina, 2010; Gandrud & Hallerberg, 2018).

Definition of Secrecy

Banking secrecy actually refers to a particular type of information that becomes known to a credit institution during the execution of banking activities. Certain other persons are acknowledged with such information as well. Such persons receive the information from credit institutions in the course of its examination and its application (Gololobov, 2014; Golubtsov & Kuznetsova, 2013; Masciandaro & Balakina, 2016).

The banking secrecy is a specific type of commercial secrecy. It consists, first of all, of the secrecy of a bank as an independent subject of economic relations and, secondly, of all commercial secrets of the clients, which the bank is aware of because of contractual relations with the clients.

Types of Banking Information

According to a Russian Professor of Law, Olejnik such problems of banking secrecy need to be considered considering the following general provisions:

- the banking secrecy is a type of legal regimes of information with limited access;
- the banking secrecy regime and regimes of religious, medical, commercial, investigative or judicial secrecy shall be considered as similar;
- the law establishes special regulations that govern banking secrecy (Olejnik, 1999).

Considering the nature of the legal relationships concerning banking secrecy the author distinguishes three kinds of relations:

- relations between the bank and the client;
- relations between the client and the government and
- relations between the government and the bank.

Such relations are governed by a set of rules of the Constitution, legal norms and regulations.

On the one hand, the banking secrecy protects the interests of the client and prohibits third party access to the confidential information of the bank. Such third parties include the state represented by the state agencies (Booysen & Neo, 2017; Tutikhtin, 2018).

On the other hand, legal acts and regulations reinforce the interests of the state, establishing the order of access to the banking secrecy. The author agrees with the opinion of a Russian judge and professor Sarbash that the legislative regulations of the access of the state to confidential information of individuals need to be improved (Sarbash, 1999). The state bodies carrying out public functions represent the state in a particular case.

Banking secrecy is determined by the law, which provides for:

- the legal status of subjects of legal relations concerning using, granting and protecting the information at the disposal the credit institution;
- the content of the information, which is subject to the regime of banking secrecy;

- the conditions and procedure to grant and use the information at the disposal of the credit institution;
- the procedure of legal protection of such information including responsibility for disclosure of such information.

Different legal regimes are applied to the banking information, depending on the content and purpose.

- *Open banking information*. Open banking information shall be provided to unlimited number of persons. Such information is available to anyone who applied to the bank, regardless of the purpose of obtaining such information. Such information may be disseminated through the publication as well. The scope of open banking information is determined by the Russian legislation and by the bank itself. Open banking information, e.g. the annual statements, is subject to publication in specialized official mass media. It shall be reliable, comprehensible not only for professional accountants and submitted timely.
- *Banking information of restricted use*. The dissemination of such information outside the bank is undesirable. It may prejudice the commercial interests of the bank (e.g., the data on the quantity of banking customers, etc.).
- *Closed banking information*. In this case the law is involved. The law generally prohibits the dissemination of such information. Closed banking information protects legitimate interests of the bank's customers. It may be granted to authorized persons only on exceptional basis according to certain rules, the existence of which is covered by the concept of 'providing information'. Such information refers to the banking secrecy itself.

Therefore, one of the sharpest current issues is the problem of compliance by credit institutions with banking secrecy rules while implementing anti-money laundering measures. These problems are of current importance not only in the Russian Federation, but also in the whole world.

Banking Secrecy Legislation in the USA, EU and Switzerland

The United States of America have liberalized its banking laws long ago. The USA simplified the whole approach to the concept of 'banking secrecy' in fact almost abolishing such secrecy. The Bank Secrecy Act 1970 (BSA), which is sometimes referred to as an anti-money laundering law, required financial institutions of the USA to assist the government agencies in detecting money laundering, filing reports on the daily aggregate activity of clients exceeding 10000 USD as well as on tax evasion. Severe penalties in case of non-reporting or non-proper reporting has made no secrecy in client-bank operations for the government agencies (Sykes, 2018).

At the same time Switzerland and several other countries seek to maintain historically established approaches to the organization of secrecy of banking information (Shashkova, 2019; Schumpeter, 1961). The tax evasion scandal in Switzerland of 2008 – 2009 threatened to criminally indict one of Switzerland's largest banks UBS. The scandal revealed the necessity of international cooperation in the area of banking activities, though historically the country tried to keep such matters low profile. Being a home of a significant number of international banks Switzerland has established mature and well-developed regulations of the banking sector. The country remains the world's leading provider of cross-border wealth management services. Data protection and data security are most important issues for private banking in Switzerland.

Most countries of the European Union started to implement transparency of banking deposits and transactions as well. The Finance Ministers of the 15 European Union countries signed a law that would prohibit banks to carry anonymous accounts. The Council Directive 2011/16/EU of 15 February 2011 'On Administrative Cooperation in the Field of Taxation' eliminates the concept of 'banking secrecy' in the matters of interexchange of information on taxation. Another Council Directive amending Directive 2011/16/EU as Regards Mandatory Automatic Exchange of Information in the Field of Taxation provides for interexchange of information on foreign investors. However, it shall be admitted that the liberalization of banking secrecy laws finally leads to customer and cash flow-out.

In the case of cash withdrawals in banks of the European Union, the bank shall complete a special form and notify the relevant state body for financial monitoring about such operation. In case of a significant amount of cash withdrawali, in addition to the traditional form of the notification of the state body for financial monitoring, the bank shall fulfil the form on suspicious transaction operation (Lerer; McGarrigle, 2018). There shall be of course exceptional cases not subject to the legislation on banking secrecy. The problem is in the balance between the compliance with the interests of private clients, based on the constitutional provisions on secrecy and compliance with the interest of state bodies, based on special legislation or even normative acts of the Executive power branch (Shashkova, Verlaine, Kudryashova, 2020). The following question concerning the banking secrecy arises: does the banking secrecy mean that not only the state authorities, but the bank itself does not know the identity of the beneficiary?

In the Russian Federation a number of cases involving the refusal of a bank to allow withdrawal of cash funds by individuals was reported. There is no limit for cash transfers for individuals in Russia. One can buy an apartment in the centre of Moscow paying cash rouble equivalent to USD 10 mln and this will be legal. Companies instead have a cash limit of 100000 RUR (approximately 1400 USD). In case of violation of anti-money laundering rules banks face revocation of a banking license. Within the last 4 years the Bank of Russia revoked more than 350 bank licenses (96 – in 2016, 51 – in 2017, 63 – in 2018, 5 – as of 7 March of the year 2019). Revocations of licenses may be imposed on a bank in case of dealing with 'bad customers', even in case of timely notification the Rosfinmonitoringii on suspicious transactions. That is the reason why banks refuse to withdrawal of cash funds, make the grounds for refusal secret (i.e. not subject to appeal by the customer) and face claims from customers in courts of general jurisdiction and the Constitutional Court of the Russian Federation.

Under the traditional opinion Switzerland has the best legislation on the banking secrecy in Europe. In this country a client can solve their investment objectives through a single bank. Such a bank protects the identity and commercial interests of the client from the rest of the world (Shashkova, 2019).

According to the Swiss legislation the Bank has no right to give out to a foreign state a dossier of clients suspected of tax evasion or of other fiscal crimes. The Swiss law interprets such situation as tax optimization, not tax evasion. Such situation concerns issues when a client 'forgets' to send additional forms of declaration of income from the accounts in foreign banks or 'forgets' to declare the entire amount of income. In this case the clients risk facing only a fine, no other punishment is supposed. A tax offence with the purpose of concealing illegal proceeds using forged papers and documents, entails much more serious consequences, including imprisonment. In fact, such Swiss understanding of the boundaries between the first issue and the second crime are not clear and not respected by all countries. The USA do not accept such Swiss demarcation of the two fiscal crimes. Some other OECD (the Organization for Economic Co-operation and Development) countries do not accept the Swiss point of view either, which result in different approaches to taxation at the international level and harsh criticism of Switzerland's tax policy by foreign governments (Kudryashova, 2019).

The law of the vast majority of countries is subject to changes due to the influence of political forces and processes. In a particular moment it is important to understand which political priorities the government realises. Sometimes such political priorities come into conflict with fundamental human rights. This can be seen in case of counterfeiting legalization of illegal income, money laundering. Most states implementing anti-money laundering procedures have both general legislation concerning rights and freedoms of citizens and specific legislation aimed directly at combating money launderingiii. In the UK, for example, disclosure of information is considered to be contrary to the law in case a person, disclosing such information, simultaneously fulfilled three following conditions:

- such person knows or suspects or has good reasons for knowledge or suspicion that another person is engaged in money laundering;
- the information or other materials on which such knowledge or suspicion or good grounds for such knowledge or suspicion is based, is derived by such person in the course of their professional activities;

- such person has not reported the information properly, as soon as such person received the information or other materials.

However, a person shall not be considered guilty of an offence if such person has good reasons not to provide information or other materials. The same happens in case the person is a professional legal adviser and the person obtains the information or other materials under confidential circumstances[iv].

In certain cases of money laundering the Spanish legislation provides for the possibility of derogation from the principle of the presumption of innocence (Golubtsov & Kuznetsova, 2013). That means that such constitutional conquest as the presumption of innocence loses its power and legality while considering money laundering. The burden of proof is transferred to the person accused of money laundering. At the same time the strict observance of the constitutional rights of such persons is required.

It should be noted that, when it comes to money laundering, especially in the context of the rejection of the presumption of innocence, the issue at hand is only a deliberate lucrative crime. The law establishes the deliberate purpose of the crime. That means that a person must understand that the source of funds or property is illegal while effecting concealment, non-provision of information, acquisition or transfer of such property. The source is not important itself. It can be tax evasion, concealing of the origin of property or injury to third parties[v]. When the action is deliberate the importance is in the orientability of such action: concealment, cover-up or assistance in the laundering of illegal proceeds.

Panama Papers as an Equalizing Factor

Eleven million leaked documents concerning financial and client-attorney information revealed more than 214 thousand offshore entities in 2015 (Schmidt; Myers, 2016). Panama papers showed that the USA received tax and asset information on American assets abroad while not sharing the same kind of information with other countries (Joaristi; Serra; Spezzano, 2018). Such privilege makes it beneficial for both foreign and American clients to hide their assets in the USA, dealing with only American laws and authorities and understanding that information will not be disclosed outside the USA (Swanson, 2016).

Such country as Switzerland was minorly affected by the Papers: some tiny art litigation did not disturb its banking system. The information that among the proprietors of these 214 thousand offshore entities were Swiss banks including HSBC, Credit Suisse and UBS did not make much noise. At the same time tax heavens of Cook Islands linked to New Zealand and Nordea bank of Sweden relations with Panama and British Virgin Islands signalize that official ranking and public information on a country and its banking system may have not much to do with the reality and its hidden resources.

The Russian banking system was not involved in Panama Papers' scandal. Rich friends of the head of the state were mentioned. This information concerns solely different corruption schemes used by Russian nations having close personal relations with Vladimir Putin, which infringes neither the financial system nor the image of people at power inside the country. Russian people are accustomed to distinct types of corruption scandals at the highest level, hence the Papers caused no political and economic effect inside the country.

In March 2019 a new Troika Laundromat investigation conducted by the Organized Crime and Corruption Reporting Project and Novaya Gazeta was based on the part of Panama Papers concerning President Vladimir Putin's old friend and godfather of his oldest daughter Sergei Rolduginvi. He could not explain the source of significant sums of money used by his offshore company in transactions with Russian companies. The Organized Crime and Corruption Reporting Project named Ruben Vardanyan – an owner of the Russian investment bank Troika Dialog – as a facilitator to launder USD 4.6 billion. A number of offshore companies of Ruben Vardanyan also paid fees to the International Economic Forum in Davos, Switzerland.

Revelations of Panama Papers describe more layers than the global financial services show on façade (Cloke; Brown, 2019). The analyses of the Papers showed that up to 10% of global market was managed by only the Panama firm Mossack Fonseca. Such "offshore" sector is outside the formal financial and banking services sector (Hendriksen, 2016). It has its own life and its own regulation, powerful economies and persons use and control it. Concealment of the true owner and bank accounts is performed at a very high level (Gaughan; Javalgi, 2018). Globalization brings business and financial providers of both legitimate and shadow sector of global financial services together. Given the role of national interests the process becomes even more complicated.

Banking Secrecy Problems

Systematic analysis of acts of foreign legislation reveals the following problems:

- Special legislation on anti-money laundering does not provide a clear list of organizations obliged to provide information to the body of financial control. Such entails a non-clear criterion of identification of such legal entities.
- Many countries apply principles of privacy of transactions[vii]. It may also provide a right of a person not to identify them in the transaction.
- Special legislation while using the principle 'Know your customer' provides for two kinds of client authentication: simple and advanced. Since in most cases simple identification is not enough to eliminate money-laundering suspicion, advanced identification shall be required. Such fact automatically results in the application of such advanced identification to the absolute majority of customers. Moreover, when applying a risk-based approach the client is likely to be assessed as having "high risk". Such characteristic affects the client. The client however is deprived of the opportunity to contest such characteristic.

- Lack of clear evaluation criteria leads to the excess of information, and subsequent failure to filter out the information regarding legalization, from the information provided by the organizations in order to avoid sanctions for failure to provide information. Application of sanctions for providing excessive information by the entities cannot eliminate the problem either. The criteria of information to be submitted are not clearly defined, particularly in relation to suspicious transactions.
- Since the information provided to the financial monitoring body has a secret character, no possibility of appeal is provided for the client. To crown it all such information has an evaluation character. This can lead to discrimination in the assessment of a client on grounds of race, appearance or behaviour. All this can result in a direct violation of the natural human rights provided in international documents, e.g. the Universal Declaration of Human Rights[viii].
- It is possible to use the information not only for the purpose of struggling against legalization, but, e.g., for abuse in case such information comes into the hands of unauthorized persons or, worse, criminal hands. The Russian market "Gorbushka"[ix] is a striking example of the above. Other countries also have more or less similar institutions unfortunately.

Currently in Russia there is quite a number of cases where courts clearly recognize violations of constitutional rights of citizens. It is not a single case of judicial practice. The burden of proofs and excuses falls on banks. Banks are forced to introduce some ridiculous limits, as the banks have to follow the law. And one law contradicts the other. No one knows how to implement all these contradictory provisions.

Meanwhile, the institute of banking secrecy is necessary for the effective functioning of the Russian economy. Adverse acquisition risks in the provision of information are still very high in Russia. Adverse acquisition main risks neither lay in the legal vulnerabilities of the assets (which gives skilled aggressors legitimate opportunities on buying controlling stakes) nor in the possibility of the abuse of rights (e.g., suiting a 'victim' with formally legal, but in fact groundless claims). On the contrary, the main risks are:

- illegal seizure of property (e.g., using fake documents) with the support of corrupt employees of all involved in the deal state bodies and courts, which have legal access to banking secrecy;
- a compulsion to convey the property title by personal pressure on the owner (usually under the threat of criminal prosecution).

This is the main reason why Russian, Ukrainian, Kazakh and other businessmen use protective technologies (Gaman-Golutvina, 2010): the fear to fall under the redistribution of property without the possibility of protection of rights in an independent court. In developed countries, e.g. in the United States, the main danger is different: the chance of becoming a victim of a ruinous lawsuit. Every year in the USA thousands of completely frivolous lawsuits are filed with the claims of billions of dollars. In such lawsuits plaintiffs claim millions of dollars for alleged defective goods, 'sexual harassment', 'emotional suffering', 'professional negligence'. A characteristic feature of such claims is that the primary defendants are not persons with a direct relation to the events, which form the basis of the claim, but wealthy companies and citizens related somehow. The aim is to get a legalized extortion 'payment' under the amicable settlement agreements. On this ground the culture in the United States is called 'compensation culture'[x].

According to Russian experts, the loss of 20% of the information consisting in commercial secret, leads to the bankruptcy of the company in 60 cases out of one hundred. Losses from the actions of unscrupulous competitors, using espionage in the financial sector amount to 30% of all damage, which is incurred by banks.

The practice of the Constitutional Court of the Russian Federation on the issue of banking secrecy recognizes violations of constitutional rights of citizens. The protection of information, including banking and professional, is considered by the Constitutional Court as the problem of primary importance, as a necessary constitutional guarantee of the principle of adversarial proceedings laid down in Paragraph 3 of Article 123 of the Constitution.

Conclusion

Globalization provides changes to financial relations and banking regulations. The famous example of Panama Papers shows the necessity for legal regulation of global financial relationships. More effort shall be put on it both nationally and internationally.

Considering all the above one has to acquit the justification to protect the property from the potential effect of such claims. Does banking secrecy provide problems for the state if it seeks to protect the interests of the citizens of this state? Why, once again, we have to oppose the interests of the individual and the system, which consists of such individuals? The answers to such questions are crucial for understanding the development of the constitutional system of the country at issue.

Cash payments are necessary for payment of bribes. Limitations to circulation of cash money in the country make it more difficult to pay them. Though the amount of cash withdrawal limits in a country and corruption perception of such country do not have direct correlation (Figure 1, 2) (e.g., both the United Kingdom and Russia have no limit to cash payments, but Corruption Perception Index in the United Kingdom is 17 times lower than in Russia), still it shall be noted that in countries with strict limitations of cash payments (e.g., Denmark) corruption perception is low as well. For further development Russia shall put restrictions on cash payments of individuals under law and not under practical actions of banks and other regulators.

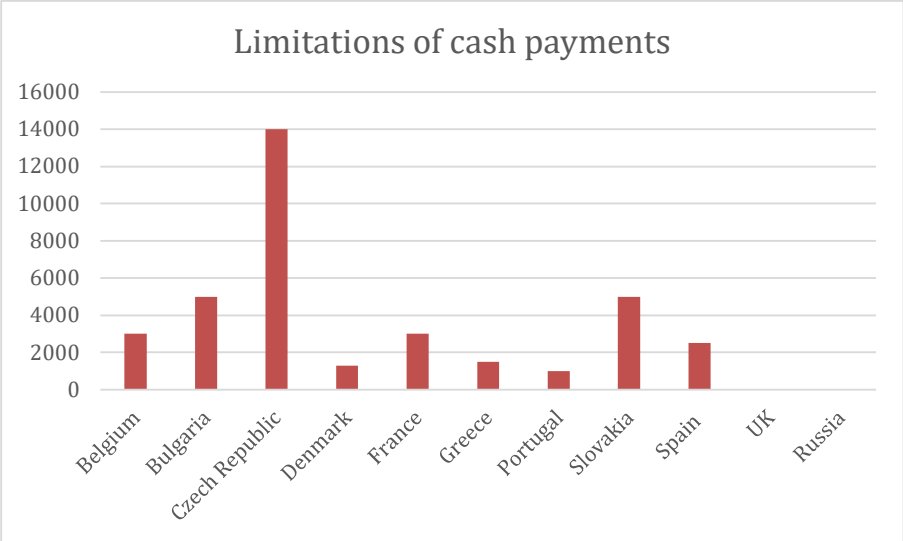

Fig. 1: Correlation between Limitations to Cash Payments

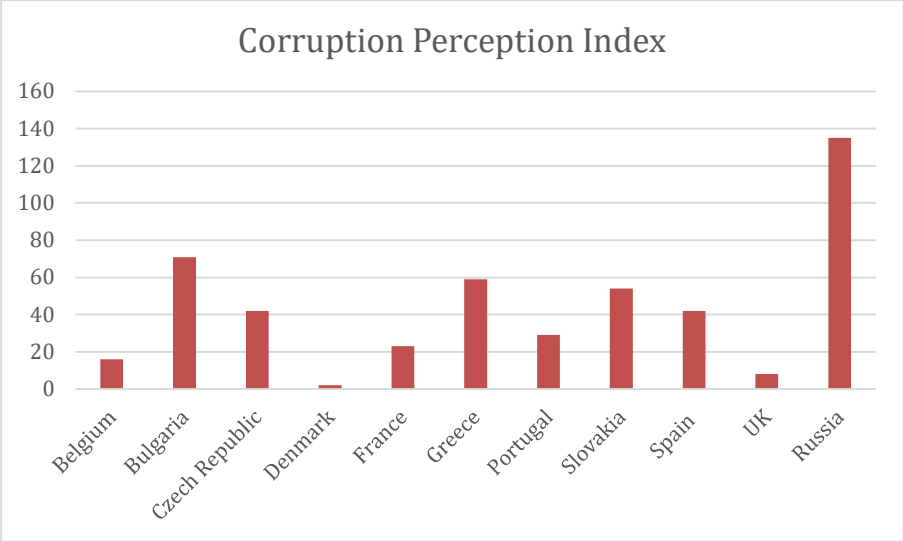

Fig. 2: Correlation between Limitations to Corruption

All the above makes the authors conclude about the necessity of the political will to improve the legislation of the Russian Federation with the aim of compliance with the provisions of the Constitution. It is also necessary to establish a clear balance between the constitutional rights of the individual and the limit of these rights when carrying out various control activities by public authorities.

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[i] The significant amount of cash withdrawal is the amount from € 15000.

[ii] The Federal Financial Monitoring Service of the Russian Federation (Rosfinmonitoring) is a Federal Service that was created by a Decree of the President Vladimir Putin, dated 1 November 2001. It is aimed to collect and analyze information about financial transactions in order to combat domestic and international money laundering, terrorist financing, and other financial crimes.

[iii] E.g. Australia has The Anti-Terrorism Act, 2005, that regulates disclosure of information on clients. The Privacy Act, 1988, contains similar questions, available at: https://www.oaic.gov.au/privacy/the-privacy-act/ (accessed 29 August 2020).

[iv] The Proceeds of Crime Act, 2002, Article 328, available at: https://www.legislation.gov.uk/ukpga/2002/29/contents (accessed 29 August 2020).

[v] Ley Organica 15/2003 de 25 de Noviembre, Art.301.1.

[vi] Available at https://www.novayagazeta.ru/articles/2019/03/05/79779-troyka-s-bubentsami (accessed 29 August 2020).

[vii] E.g., The National Privacy Principles in Australia form Part 1A of The Privacy Act, 1988, available at: https://www.oaic.gov.au/privacy-law/privacy-act/ (accessed 29 August 2020).

[viii] The Universal Declaration of Human Rights, 1948, was proclaimed and adopted by the United Nations General Assembly.

[ix] The famous revolutionary "market" was formed at the turn of the change of political power at the beginning of nineties'. It was a sort of a rebellion of youth against the "old" mastodons. With the collapse of the USSR a wave of music, films, cartridges for consoles and consoles themselves fall down on Moscow. During the period of transformation of Russia (and even nowadays) one could buy everything at "Gorbushka": from ballpoint pens to disks with the database of the Bank of Russia.

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Human Capital Management as an Indicator of Personnel Development in the International Company

Irina Yurievna EREMINA
Gubkin Russian State University of Oil and Gas, Moscow, Russian Federation
irinargung@mail.ru

Natalya Yurievna SOPILKO
Russian State Social University, Moscow, Russian Federation
sheremett73@gmail.com

Olga Yurievna MYASNIKOVA
Peoples' Friendship University of Russia, Moscow, Russian Federation
o_myasnikova@mail.ru

Alena Vyacheslavovna CHUPROVA
Gubkin Russian State University of Oil and Gas, Moscow, Russian Federation
chuprovaalyona@mail.ru

Abstract

The paper presents the results of research on improving the methodology of human capital management at enterprises, in particular, personnel efficiency increasing of international company of the oil and gas industry. The aim of the study is to find training methods for effective development of employees of the oil and gas industry for their labor productivity increasing. General scientific methods of analysis, logical generalization and comparison, as well as correlation analysis are used in the research. It is determined that human capital currently remains the most important competitive advantage in oil and gas companies' market. The analysis showed that there are lots of existing methods used by companies for improving of their activity efficiency, but the methods of employees training and development deserve special attention. Within the framework of investigated enterprise, we have obtained the data which indicated that, despite the active use of various off-site methods of employees' training, the company did not provide the economic feasibility of investing in personnel training. Developed complex workplace training methodology, based on coaching approach was introduced and tested and made it possible to obtain labor productivity indicator increasing. It is noted that such an approach is universal and in future it may contribute to strengthening in the relationship between labor productivity and training volume both for managers and workers of various categories of the other enterprises of oil and gas industry.

Keywords: Human Capital, Professional Education, Personnel Training, Coaching, Oil and Gas Companies

Introduction

In the current context, human capital development is of particular importance and becomes indispensable condition for successful functioning of industrial organization and its competitiveness increasing. Strategically oriented professional development of employees plays a crucial role.

Modern manufacturing organizations are forced to function in conditions of uncertainty, volatility and growing competition. In such a case, it is not enough just to be stable for industrial organization. Continuous development is required and it remains a leading factor in of company's competition in the market. At the same time, in this situation, competitive advantages are determined not only by innovative technologies of industrial production, the allocation of production forces and other components, but also by their ability to mobilize and effectively use the available human capital. The

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human capital of manufacturing organization is a knowledge holder, generator of ideas for processes and mechanisms improving, the main link in the process of production maintaining and developing, and ensuring source of efficient use of the material resources.

According to the experts, Global Human Capital Trends (2019), today professional development of the human capital plays a significant role. The frantic speed of new equipment and technologies introducing affects the obsolescence of professional skills, and requires constant knowledge extension and additional training of employees.

For Russian economy, oil and gas companies play a critical role, Sopilko et al (2020). Advanced equipment and technologies used by oil and gas companies will determine the development direction of Russia in future, as well as provide and stimulate the functioning of other industries in modern conditions. Therefore, special requirements are placed on learning ability, personal characteristics, and the degree of workers' adaptability in this field. There is a shift in emphasis from organizational costs minimizing to maximizing of human resources implementation. High-risk degree at various positions sets up qualitatively different requirements that are higher than in the other sectors of national economy for qualification level of personnel of oil and gas organizations.

Modern realities and global trends determine the transition of companies to more rational and dynamic management, mainly focused on human capital development. In this regard, a particularly urgent task is to provide certain recommendations for the personnel professional training of industrial company, in particular, of the oil and gas sector.

Current Trends in Human Capital Management

Over the past decade, the HR sphere has been dynamically developing. Approaches to human capital management are rapidly changing. The reports of the world's leading consulting companies reflect the main trends in this field, Global Human Capital Trends (2019). Trends represented in Figure 1 are predominating now.

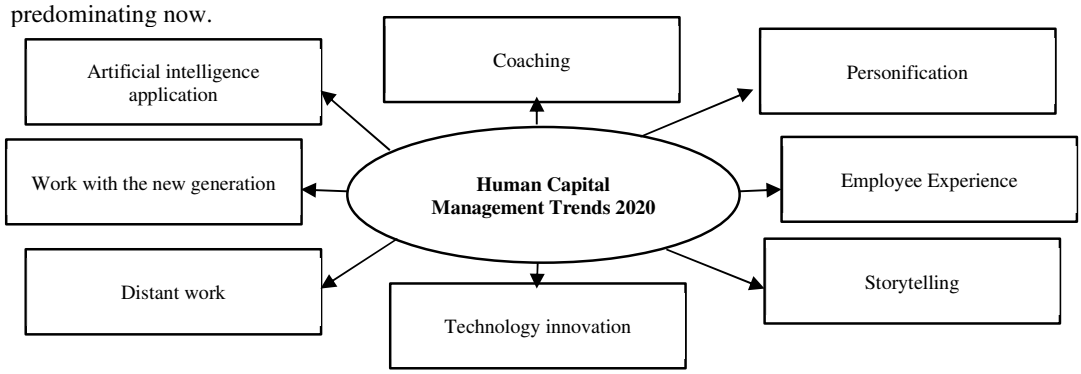

Fig. 1: Human capital management trends prevailing in the market in 2020
Source: compiled by the authors

High technologies capture the whole world today and the field of HR process management is not an exception, Alekseeva et al (2019), Korneeva et al (2020). However, we believe that such technologies are more effective for mass recruitment and cannot give high results if it is necessary to identify any special, individual competencies of the employee.

It's obviously that according to statistics, the representatives of generation Z (aged 21 to 23 years), Kuryshova et al (2019) have certain values and their ideas about the work and realization of their capabilities. They are very different from generations X and Y who dominate on the labor market today. They are fast, impatient and they want fast growth and results.

For a long time, human capital management focused on standardization and versatility. But now, the

orientation is changing towards individualization. Managers monitor personnel development within the company more closely, they create conditions for flexible career growth, introduce individual bonus packages, etc. That is can be highlighted as the trend of personalization.

Information opportunities also make it possible to work distantly, without being tied to the office. This trend is not entirely new, Sopilko et al (2018), however, this form is relevant during the current coronavirus pandemic in 2020, and can be solidly strengthened in many areas of economy. Such approach provides many benefits, including cost savings.

The employee experience trend is not new, Faggian et al. (2019), and is also currently used by many companies. And although this concept is considered to be quite effective, but, in our opinion, creates certain competencies for employees in relation to a specific company. But such approach will not fully meet the needs of worker, his development and mobility level.

The storytelling trend has emerged because of social media influence on human capital management, Kafidov et al (2017). Various stories are posted on blogs and websites to promote the image of both employees and the company.

The prevailing trend in human capital management is coaching today, Ellinger and Kim (2014). Coaching is a model for the development of so-called mentoring. There are many advantages and disadvantages of this method. On the one hand, experience can be really transmitted, but, on the other hand, it is like an imposition of one's own style and sometimes it might depersonalize staff.

And finally, in the era of “Industry 4.0”, it is impossible to develop something without using of innovative technologies. First of all, such technologies have a vector for labor productivity increasing. So-called “HR innovation laboratories” are being created in many companies nowadays, Zaborova and Markova (2019). Those companies that are engaged in new technologies in HR sphere receive many advantages, because they can work and make marketing researches on customers who have special requests. Human capital management process is becoming faster, more adaptive and innovative.

Within the framework of such trends, it is advisable to note which of them are relevant for the companies of the oil and gas sector of economy. As far back as 2015, KPMG International experts (2015), conducted a study “The Crisis of Qualified Personnel” and identified 5 main strategies that energy companies and enterprises of resources sector can use to overcome the crisis in the long term: human resources planning strategy developing, their maximum and efficient use, more effective management of interaction with third parties that affect enterprise activities, maintaining and increasing of accumulated experience and special knowledge, and its continuity, value proposition reviewing for employees.

The problem of qualified competent workers’ shortage in the oil and gas sector can be successfully solved only if a long-term strategic approach is formed.

Only 7% of the studied enterprises have developed programs for accelerated training for managers, and 44% of them confirmed that they were taking all possible measures to develop this area. When attracting young specialists, enterprises need to keep in mind that the financial component of activity is not the only priority. Many HR representatives of the oil and gas companies admit that their organizations pay little attention to training programs development that are adapted separately for older and younger generations, which differ greatly as in communication as in training style.

Over the past seven years, Deloitte has been conducting international research on trends in the field of personnel management and on difficulties identifying that staff service often face with. We have considered the results of the 2019 polls in Russia. The survey was conducted for 82 companies. Business representatives and HR services respondents were requested to evaluate the importance of such aims and companies’ willingness to work in such conditions. The results of the study are presented

in the Figure 2.

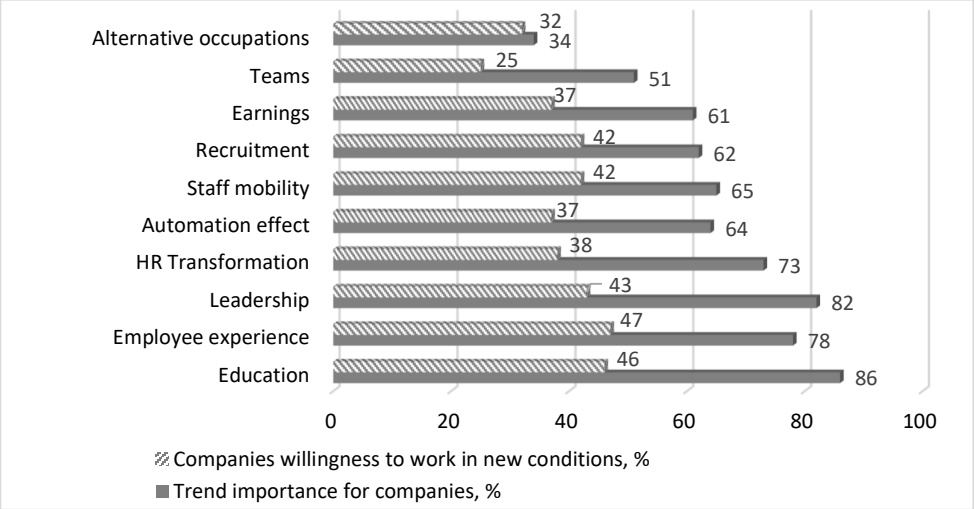

Fig. 2: The main trends in the field of human capital management in 2019 in Russia
Source: compiled from research materials of Global Human Capital Trends 2019, Deloitte

92% of all respondents consider that staff training, experience and leadership development is a top priority in human capital management. It is important to note that each of the business priority topics is observed in the context of large-scale automation and digitalization of the processes related to human capital management.

In the framework of Deloitte's research, industry results in the extractive industry and energy are of interest. According to these studies, in conditions of personnel shortage in these sectors, the emphasis should be made on existing resources and their development. The top 10 most important areas in HR, according to employers in the extractive industry and energy, are presented in Figure 3.

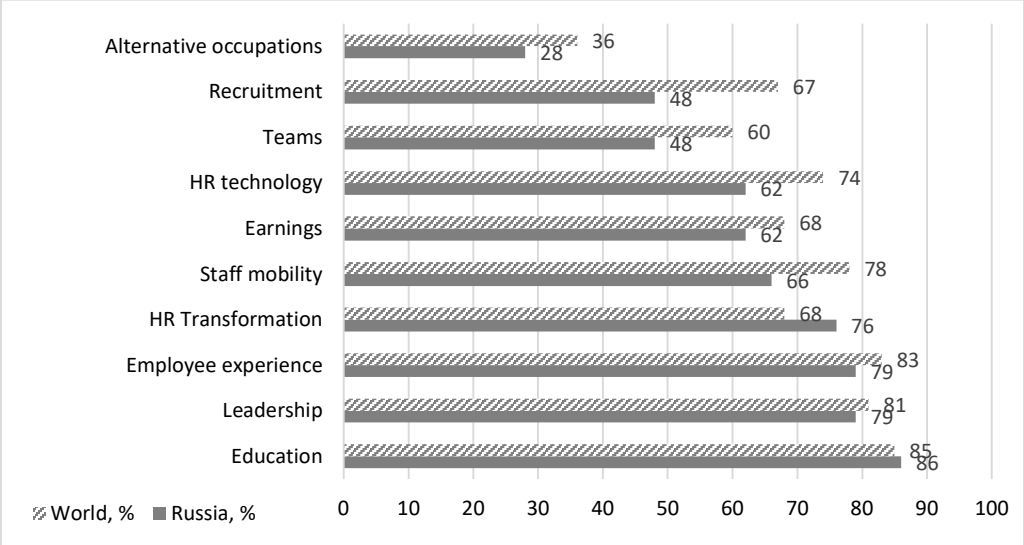

Fig. 3: Comparison of the importance of the main trends in the field of human capital management for extracting and energy enterprises in 2019 in Russia and in the world, %
Source: compiled from research materials of Global Human Capital Trends 2019, Deloitte.

More than 60% of industry representatives around the world noted the importance of organizational transformation of their companies for the growth rate maintaining and competitiveness increasing. 20% of industry representatives in Russia and about 30% in the world switched over to team organizational structure, more than 50% of them reported about a significant increase in business performance due to the activation of cross-functional and digital/virtual teams.

The overwhelming majority of Russian respondents (80%) consider that a key obstacle to the development of new organizational model is a lack of technologies. Foreign industry representatives mention that, first of all, there is a lack of clear understanding of the work principles in cross-functional team conditions among the leaders.

The transition of industry companies to team organizational structure, which implies more intensive interaction within and between departments, is conditioned by the need to ensure higher internal mobility of industrial companies' personnel, which is extremely important in the context of a shortage of qualified personnel in the labor market. Nevertheless, it must be borne in mind that the transition to a team structure involves approach review to career development, motivation and benefits.

Thus, it has been established that the system of professional staff training is crucial for the effective HR management at industrial organizations, for achieving and maintaining of a high level of personnel qualification.

Study of a Problem

The experience of the most successful domestic and foreign companies shows that investing in staff gives quick and high return. So, one monetary equivalent invested in human resources development brings from 3 to 8 monetary equivalent income. Studies devoted to learning and development promoting have shown that at the beginning of the XXI century the growth of the US economy through increase of employees professional training level amounted to 2.1%, it was 0.4% through the population growth, 0.5% due to the due increase in capital. In total, in the United States, increase in the labor force quality ensured 14% increase of real national income, Lee (2019), Agarwal et al. (2019). Researches have also shown that 10% increase in staff training costs gives an increase in labor productivity by 8.5%, while a similar increase in investment gives an increase in productivity by only 3.8%.

In Japan, experts of the Center for Increasing Labor Productivity determined that human resources are the main problem of industry and management and how important is to provide manufacturing and management structures with qualified personnel, Roy (2018). Later, the concept of lifelong education was developed, which has become one of the most effective tools to solve the problems of personnel correspondence to rapidly growing technical potential. The concept assumes that the process of staff professional development becomes permanent.

The training need for managers of the organization is determined both by the requirements of job and/or interests of organization, and by the individual characteristics of employee. Training need, new knowledge acquisition and certain professional skills development are influenced by age, work experience, abilities level and some motivation feature. The need for training may arise in response to current problems and/or may be associated with plans, with future problems of the organization.

Currently, personnel training methods at enterprises are systematic set of actions aimed at certain educational skills and competencies attainment, Kuryshova et al (2019). The choice of personnel training method depends on the specifics of the company's activities, the resources allocated for these purposes, as well as the specific areas of training.

In general, personnel training methods are divided into two groups:

1. Workplace training methods;
2. Off-site training methods.

Each group of teaching methods has its own advantages and disadvantages. So, the main disadvantage

of the off-site training methods (lectures, seminars, brainstorming, case studies, role-playing and business games) is the focus of these training types on the acquisition of theoretical knowledge.
The variety of workplace training methods and analysis of their main characteristics are given in Table 1.

Table 1: key features of workplace training methods

Workplace training method	Parameters			
	Two-way communication	No risks to production	Low financial expenses	High coverage of the number of employees
Briefing	-	+	+	+
Rotation	-	-	-	+
Mentoring	+	+	-	-
Increasing complexity method	-	-	+	+
Procedure instructions usage	+	-	+	+
Industrial training	+	-	+	-
"Secondment"	+	-	-	-
"Action learning"	+	-	+	-
"Shadowing"	+	+	+	-
"Buddying"	+	+	+	-
Coaching	+	+	+	+

Source: compiled by the authors

According to Table 1, it should be noted that the main part of training methods in the workplace has a strong two-way feedback between the mentor and the learner. Such training methods lead to costs minimizing for staff training since the training process takes place on existing educational and material base of the enterprise. However, the effectiveness of such methods as "Mentoring", "Buddying", "Shadowing" directly depends on the professional qualifications of the mentor. And at the same time highly qualified, experienced personnel are always in great shortage so the application of these training methods for a large number of employees is impossible. So, the "coaching" method most closely corresponds to studied parameters and training requirements.

As a result of effectiveness and absolute versatility, coaching approaches that are actively used in the field of human resource management of industrial enterprises, including the oil and gas industry, have recently gained considerable popularity. The coaching model is based on psychological principles that arise during the interaction of leader and subordinate person, as a result of which the employee understands and comprehends his internal capabilities with their further activation, Ellinger and Kim (2014), Kafidov et al (2017). Coaching is also aimed at stereotypical ideas upgrading about the performance of both an individual and the whole team, developing new strategies for the leader's behavior, Kafidov et al (2017). In addition, coaching application makes it possible to increase the qualification level of labor resources, to reduce the risk of qualified personnel loss, to improve employees' responsibility and competence, allowing them to identify and rely on their own deep motivation.

The comprehensive benefits of coaching are aimed at identifying and unlocking the potential of an individual or group of people in the professional field. Coaching can serve as an important tool for managers, as it can allow employees not only to perceive instructions as a guide to action, but also to initiate the thought and creative process of each individual worker, and it will help to increase the competence level of mass professions specialists of industrial enterprises.

The functionality and vectors of coaching are presented in Figure 4.

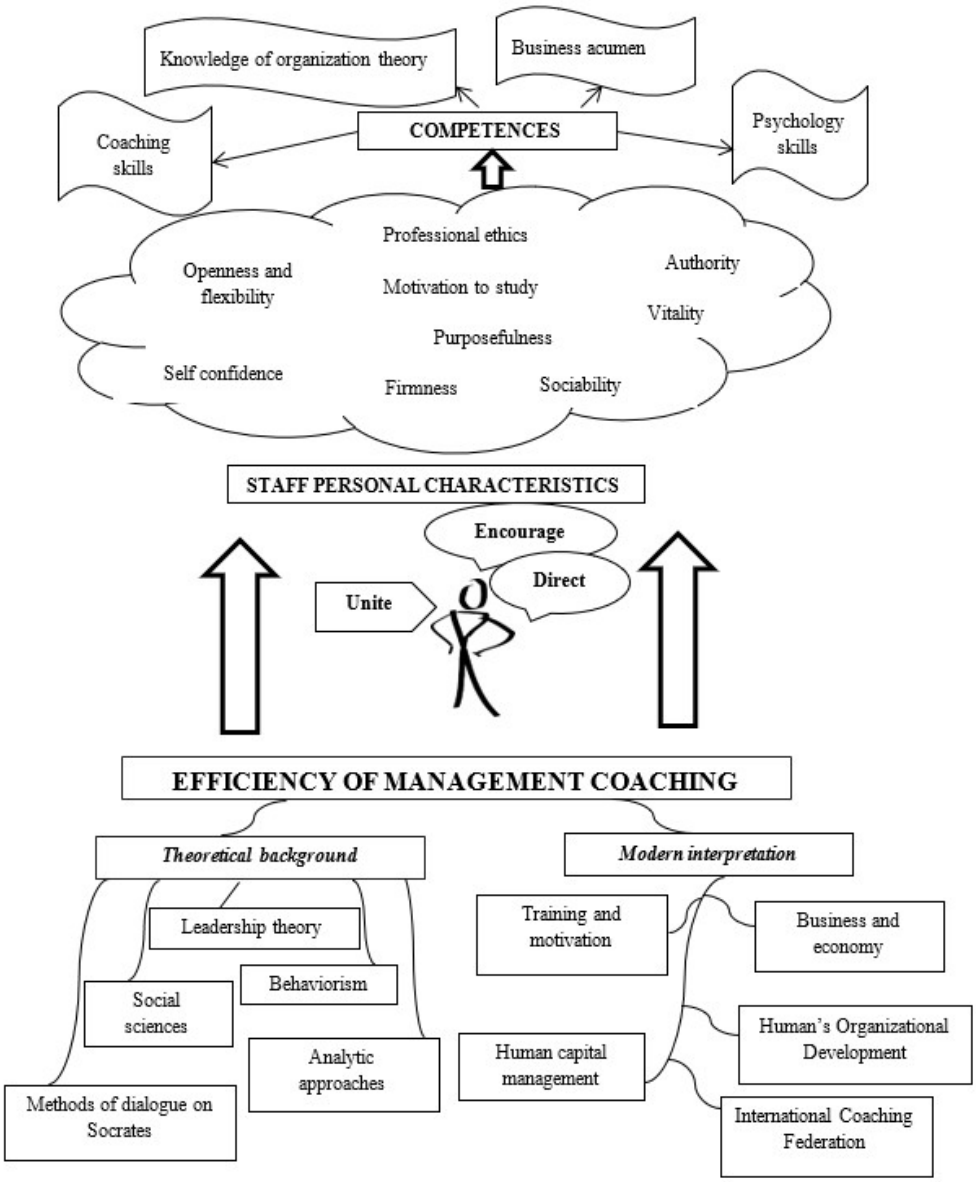

Fig. 4: Scheme of an extensive integrated coaching system

Source: compiled by the authors

Schematically, the coaching system structure for industrial enterprises can be characterized by interconnected and mutually subordinate blocks (theoretical, managerial and executive or effective), the foundation of which is management efficiency.

Thus, the advantages of coaching approach during staff business training determine the formation of corporate culture based on openness, coherence, actions and goals promptness, trust of the entire team. In an atmosphere of mutual understanding and close cooperation, the "synergy effect" of the leader and the employee is manifested. Joint efforts can help to achieve higher general performance. Each participant of the bundle makes a valuable personal contribution to tasks solving, while individual benefits and do not provide real and long-term success.

However, it should be mentioned that workplace training methods are more practical in nature and help to develop the necessary competencies in specific production conditions. At the same time, such a high practical orientation can impede the development of deep, systematized knowledge of scientific side of studied processes.

Theoretical and experimental studies in the field of professional training for managers of industrial organizations have demonstratively shown that there is no one universal method of training, Hurber et al (2018), Chitsaz et al (2019), Andalib et al (2019). Under the old "social contract", employers were looking for employees who would fill vacancies and perform certain functions. The employer had shown the way, and the task was to follow it. This model has been replaced by the concept that employers invest in staff training and employees become "main value creators" for the company. Value creation is closely related to the identification and key professional qualities using – unique driving forces that can make a company the leader in its sphere or the best in the world. In these new conditions, employers want to stimulate workers to grow professionally, achieve higher work efficiency level and strive to join the "team of creators", which makes the main contribution to creating and adding value. The growing role of intellectual capital in modern companies leads to the need to turn them into a constantly educating organization. Today, top foreign and domestic firms and organizations are personalized systems for the professional competence developing of their personnel, putting into practice the principle of the participation of all specialists in staff training, as well as ordinary managers in self-trainings.

Based on the considered methods of staff training, it is necessary to justify the economic feasibility of using the most promising for effectiveness increasing of industrial enterprises, such as in the oil and gas industry.

Researches and Results

The study of human capital development process, the nature of its components impact on the strategic development of the company was carried out. It was performed for the representatives of various professional groups of employees during some years in production organizations of PJSC Gazprom.

PJSC Gazprom is a global energy company, one of the largest in Russia, with many branches and representative offices abroad. In the opinion of the management, the company's staff is one of the main and most valuable resources of PJSC Gazprom. Therefore, it is of particular interest to analyze the main indicators of the company that characterize its personnel.

The process of gas production and delivery to consumers is an extremely complex and technological. It requires special training of workers, the availability of special knowledge and skills, as well as certain competencies. A main feature of companies in the oil and gas sector is the necessity to achieve accuracy and consistency in the working process of various specialists at each stage of activity.

Labor market monitoring (2018), of the oil and gas industry showed that despite the rather low rates of staff turnover over the past 5 years, every year companies face with a "staff shortage", as well as problems associated with insufficiently high labor productivity. In accordance with the current human resources management policy, PJSC Gazprom plans to solve these problems through the effective usage of human resources potential. Therefore, for several years, special training programs have been implemented using off-site training methods. Cooperation with leading specialized universities helps to carry out preliminary training of future personnel using innovative education technologies for the further implementation in strategic projects.

In its turn, PJSC Gazprom and its subsidiaries provide educational organizations with assistance in the formation of laboratories and training facilities, educational materials, in student practice organizing, etc. In their turn, educational institutions of higher and secondary vocational education attract managers and employees of the Gazprom Group for teaching.

Also, since 2014, the "The Corporate Continuous Education System (CCES)", Sustainability report

(2018) has been set. It is aimed at employees developing taking into account the increasing requirements of production and labor quality, new technologies introduction and regions expansion where the Gazprom Group operates. Trainings are carried out in educational organizations of PJSC Gazprom, production centers, as well as on the basis of leading Russian universities.

It's known that the personnel effectiveness is primarily determined by the labor productivity indicator (the ratio of the economic result of activities and the number of employees). Despite the fact that employees of the company were under professional retraining at universities in order to improve their qualifications in the period of 2015-2018, the analysis of the financial and economic activities of PJSC Gazprom for the period showed that the indicator of total labor productivity, Gazprom report (2019) did not have a stable tendency to increase from year to year (Figure 5, 6).

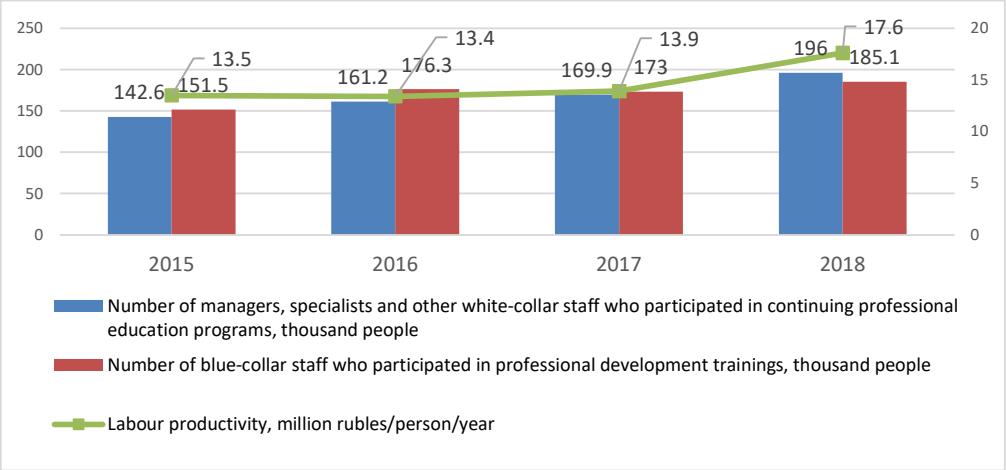

Fig. 5: Analysis of labor productivity indicators of employees trained under professional retraining programs in the Gazprom Group

Source: calculated by Gazprom report, 2019

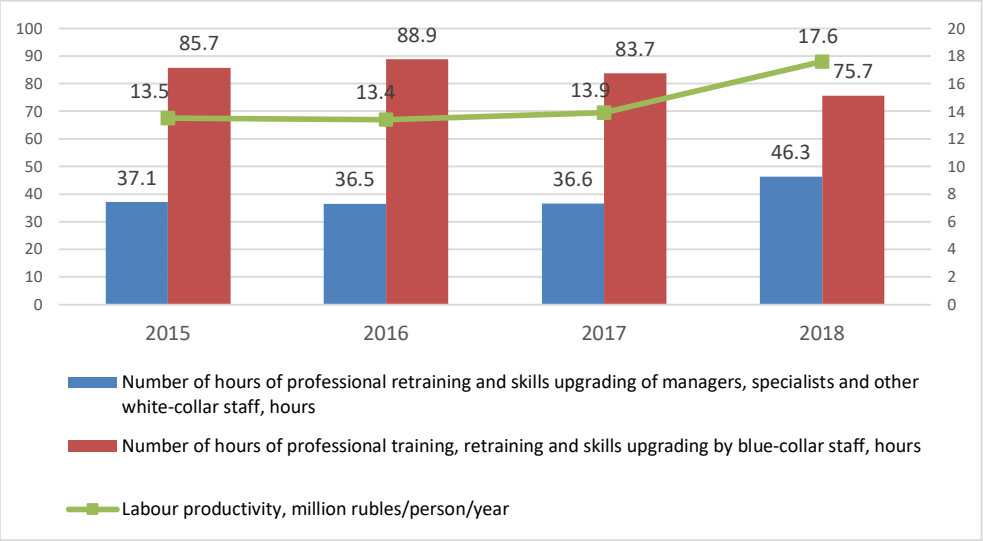

Fig. 6: Relationship between labor productivity and the average number of training hours per employee of PJSC Gazprom

Source: calculated by Gazprom report, 2019

The research of the dependence of the training volume of employees also revealed a weak relationship between the average number of training hours off-site the workplace per one employee of PJSC Gazprom in the main activities and the general labor productivity indicator.

Despite the fact that in 2018 the average number of training hours off-site the workplace per employee were 75.7 hours for workers and 46.3 hours for managers, specialists and other employees, which were significantly lower than in 2017, general productivity had increased by 22%. This fact also confirms the low dependence between indicators.

To confirm these conclusions, correlation analysis of the relationship between off-site training approach and labor productivity indicators of employees was also carried out (Table 2).

Table 2: correlation analysis of the dependence of labor productivity indicator on the volume of the off-site workplace training approach

	Workers, trained	**Managers, trained**
Pearson correlation (r)	0,651	0,887
Dual-sided value*	0,044	0,008

** Correlation is significant at the level 0,05 (dual-sided)*

The correlation analysis between labor productivity and the volume of off-side workplace training, carried out for the period 2015-2018, indicates the presence of a strong correlation between managers who have completed training. However, correlation coefficient value for the workers is 0.651 and is an average indicator, so it may not provide the economic feasibility of the funds invested in training. Significance testing of the linear correlation coefficient based on the Student's t-test did not show a statistical relationship between performance and training volume due to the short time period of the study.

Since 2017, Gazprom has expanded the opportunities for employees to receive education remotely, on the workplace. The study of the dependence of this approach to the employees' professional development and their labor productivity indicator was carried out at Gazprom marketing and trading. Thus, the average number of employees of Gazprom marketing and trading is 495 people (including managers – 206, specialists of various categories – 285, workers – 3). The company is distinguished by a professional and age composition of the personnel. There is a predominance of employees in the age of 30-40 years old.

In 2019, a comprehensive coaching system was tested during the workplace training in Gazprom marketing and trading. The share of specialists and managers who trained was 31.2% of the total staff of the company. Due to the expansion of such training program on the workplace as complex coaching method, the labor productivity indicators of various categories of employees has increased by 10.8% in this company.

Thus, it has been proven that complex coaching approach using contributes to the growth of labor productivity indicators, therefore, comprehensive coaching system can be advisably performed and applied at the other enterprises of PJSC Gazprom.

Conclusion

In the course of research, it was determined that methodology of human resource management improving is an effective direction for potential developing of industrial enterprises now. Human capital continues to be the most important competitive advantage in the market, including the oil and gas companies. Changes in the economy that took place in recent years had radically changed the attitude towards human resources usage and development.

The main methods of professional and personnel training trends are investigated. Their successful implementation is the most important condition for effective professional development. The results of analysis showed that there are variety of methods for activity efficiency improvement but the methods of personnel training and development deserve special attention.

We also analyzed the dependences of some educational methods application on employees' performance at the largest enterprises in the oil and gas industry, PJSC Gazprom. The results of the study made it clear that despite active using of different training approaches off-site the workplace, insufficient increase in workers' productivity was observed, so economic feasibility of investing in company's personnel education was not ensured.

Thus, in order to increase labor productivity indicators at Gazprom marketing and trading, comprehensive coaching method of workplace training was tested. Such complex coaching approach to training at this enterprise in 2019 made it possible to ensure the growth in labor productivity of various categories of employees by 10.8%.

Comprehensive approach to employees training directly at the workplace can further contribute to strengthening in the relationship between the labor productivity indicators and the training volume for both managers and workers of various categories on the other enterprises of oil and gas sector. The advantages of such method are due to the formation of mutual understanding atmosphere and close cooperation between the trainees and the coach, the manifestation of the "synergy effect" between the manager and the employee. So joint efforts can help to achieve a higher total performance. Each member of the team makes a valuable personal contribution to the solution of assigned tasks, since the individual success of employee does not ensure the real and long-term prosperity of the company.

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Comparison of Mobile Marketing Tools Used by Higher Education Institutions in Poland And Ukraine

Artur KISIOLEK
The Great Poland University of Social and Economics in Środa Wlkp, Środa Wlkp., Poland, a.kisiolek@wwsse.pl

Oleh KARYY
Lviv Polytechnic National University, Lviv, Ukraine, oleh.i.karyi@lpnu.ua

Liubov HALKIV
Lviv Polytechnic National University, Lviv, Ukraine, lubov.i.halkiv@lpnu.ua

Abstract

The need for marketing tools integrated into interactive communications with users of the global web-based hypermedia system led to the emergence of mobile marketing. The advantages of such communications and upward trends in the wireless telecom industry have resulted in the spread of mobile marketing. To find out how its tools are used in the higher education sector, a survey was conducted among the marketing representatives of Polish and Ukrainian higher education institutions. The authors studied the availability of mobile marketing resources in such institutions to prove the relationship between their mobile and desktop websites and to define the most (and least) common mobile marketing tools in this sector. The study was expected to show no significant differences between Polish and Ukrainian input regarding mobile marketing in higher education and confirm that a website adapted to mobile users in terms of marketing services supports achieving the site's goals.

Keywords: Higher Education Institution, Educational Marketing, Comparative Analysis, Mobile Marketing.

Introduction

The modern world is changing rapidly. Changes in the ways that marketing information is transferred are leading to the emergence of new concepts in marketing. The global intensification of development and the rapid expansion of interactive channels have resulted in the spread of Internet marketing. This has encouraged marketers to look for tools to be integrated into mobile phones, which are increasingly becoming an integral part of personality. Taking into account the needs of mobile Internet users has helped to improve the work of marketing services, especially in terms of attracting new customers and retaining existing ones. In scientific and everyday use, the term "mobile marketing" has started to be used to emphasise the integration of mobile devices into Internet marketing. A. Kaplan (2012) defined this as any marketing activity conducted through a ubiquitous network to which consumers are constantly connected using a personal mobile device. In general, we agree with this interpretation, but consider it expedient to emphasise the dualism of mobile marketing. On the one hand (with regard to information transfer), mobile marketing should be considered as a separate element of marketing activities, involving mobile communications. Modern formats and technologies for information transfer within a cellular network according to L. Kysliuk (2019) include a number of tools: voice information (IVP – Interactive Voice Response), text information (SMS), graphic information (EMS – SmartMessaging), photo and video information (MMS), non-voice interactive communications (WAP, Java), content (themes, images, melodies, slide shows), games and programs, Bluetooth marketing and advertising during the call. On the other hand (with regard to Internet marketing tools), mobile marketing should be considered as a specific marketing activity based on the synergy of mobile and Internet technologies. The main advantages of mobile marketing are: interactivity (receiving feedback in a short time); multimedia (use of text/audio messages along with graphics and video); personalisation (targeted focus on the characteristics and

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needs of a particular consumer); availability during the day (24/7 access to the media channel); audience coverage (simultaneous dissemination of information to a large audience); and profitability (simplicity and affordability of information transfer via mobile devices), etc.

The following factors promote the development of mobile marketing: the number of mobile users is constantly growing; mobile operators are motivated to develop the mobile web; mobile communications are diversifying and becoming more and more common; mobile devices are becoming dominant in remote communications. In 2019, as stated in Grand View Research (2020), the size of the global mobile marketing market was estimated to be 65.06 billion dollars and is expected to increase by 22.9% from 2020 to 2027.

While the importance and prospects of mobile marketing in various fields of human activity have been discussed and proven by both theorists and practitioners, the issues connected with its functioning in the educational environment need further study. The importance of these issues has increased during the coronavirus pandemic. In countries experiencing the pandemic, the established norms have been broken, while wide opportunities for digitalisation have opened up, thus ensuring the further development of educational processes. Educational institutions were forced to quickly master the latest remote access services. Obviously, such communications did not only take place in the educational process, but they also covered all areas of educational management, including the marketing system.

Among educational service providers, higher education institutions outreached schools and preschools in terms of the level of involvement of educational service recipients in their mobile communication processes. This is explained by the nature of higher education students (permanent, active, and progressive mobile users) and the specific character of higher education itself, which serves as a generator and disseminator of new knowledge, a producer and provider of innovations, a driver of economic and social effects, and an environment for innovation and intellectual potential. Therefore, the importance of conducting multifaceted research on the use of mobile marketing in higher education is beyond doubt.

The authors, who represent the scientific community of the higher education sector in Poland and Ukraine, set the goal of analysing the marketing activities of higher education institutions in their countries in order to:

– understand the availability of mobile marketing resources in higher education institutions;
– prove the positive impact of the mobile website on the desktop website strategy of a higher education institution;
– define the most (and least) widespread tools of mobile marketing used by higher education institutions in Ukraine and Poland.

Special focus is given in this article to the evaluation of: similarities in the mobile marketing practices existing in the higher education institutions of Poland and Ukraine, the usage of this new direction of Internet marketing in the higher education sector, the extent of the mobile website's impact on the performance of the higher education institution on the Internet, and the identification of weaknesses in the mobile marketing tools.

Analysis of recent research and publications on mobile marketing in higher education

V. Sharma and M. Berad (2019) as well as D. Rowles (2017) mentioned that mobile marketing is a new concept related to a multi-channel, digital marketing strategy, aiming to reach the target audience on their smartphones and mobile devices via websites, emails, SMS and MMS, social media and apps. This concept has spread throughout the higher education environment.

On the one hand, modern mobile marketing tools are able to meet the growing demand for students to establish deeper, meaningful connections with higher education institutions. But on the other hand, in

the context of a systematic reduction in the number of students and growing competition between higher education institutions, mobile marketing is the fastest and most accessible way to convey desired information to clients (enrolees, students and their parents). In particular, higher education institutions can use it to better show any prospective students the features, opportunities and benefits of student life in their institution. According to VONT (2018) research, 71% of students and 45% of their parents reported that they had viewed the website of a higher education institution on their mobile phone.

In modern conditions, the main potential client for higher education institutions is Generation Z, which is the first mobile and socially conscious population stratum. According to Grand View Research (2020), more than 90% of young people use smartphones to access information or content. Research of J. Fromm and A. Read (2018) shows that Generation Z combines the pragmatism and work ethic of the older generations with the high ideals and digital courage of youth. Accordingly, marketing tools used by higher education institutions to interact with their applicants need to be changed. The approaches used to communicate with the millennial generation do not help to achieve the desired result. For example, Kirk Daulerio and Adrian Serna (2017) have thoroughly studied the issue of supporting Generation Z students enrolled in college through intelligent mobile messaging. Given that the characteristics of this generation include interest in mobile platforms, highly personalised interaction, and instant real-time response, they proposed tools and strategies for higher education institutions to help them in attracting and retaining students.

Over the last decade, marketing strategies for higher education institutions have been rapidly transforming in order to respond to the demands of the new times. Higher education institutions are increasingly looking for new resources, competencies and opportunities to improve their corporate reputation. In his critical analysis of the marketing strategies used by higher education institutions, M. Camilleri (2019) considers mobile marketing to be an effective marketing communication tool in view of the increased competition between the institutions. In this context, Pranati R. T. (2018) has defined the impact of digital marketing tools in the management of educational brands. She notes that higher education institutions must use innovative approaches and special media strategies to improve the effectiveness of their digital marketing. At the same time, V. Sharma and M. Berad (2019) have acknowledged the low level of awareness on the part of business schools regarding the opportunities provided by mobile marketing. Andriani Kusumawati (2018) selected five Indonesian public universities and analysed the various methods of digital marketing they use, including mobile marketing, their effectiveness and the impact they have on students' decision-making processes when choosing a university. João Pedro Esteves Coelhoso (2019) conducted a large study of public higher education institutions in the United Arab Emirates to find out the factors which influenced students' perceptions of the mobile marketing tools used by higher education institutions. In particular, the author identified: risk acceptance, personal commitment, the provision of information, available content, content exchange and perceived value. Ryan De Kock and Lynn A. Futcher (2016), when studying the use of mobile devices in higher education institutions in South Africa, raised another important issue – the cyber security of this process, which is extremely important in today's conditions.

Mobile marketing combined with social media marketing has resulted in an innovative form of marketing known as mobile social media marketing, according to V. Sharma and M. Berad (2019). Therefore, higher education institutions are increasingly integrating or planning to integrate social media apps into their marketing programs. Kuzma and Wright (2013) selected 90 universities in Asia, Africa and Europe in order to investigate the use of social media in enrollment and educational marketing. They emphasise that the use of social media in the marketing and recruitment campaigns of higher education institutions can serve as a catalyst for strategic changes in the education sector as a whole. A similar opinion is shared by Bélanger, Bali and Longden (2014), who studied the social media marketing strategies used by Canadian universities as a tool for institutional branding, recruitment and the engagement of local and international students. Constantinides and Zinck Stagno (2011) identified market segments among prospective students based on the use of social networks and investigated their impact on the students' choice of programs and higher education institutions in the Netherlands.

However, the use of mobile marketing in higher education institutions in different countries differs significantly. For some institutions, it is quite a new experience, while for others it has become common practice. For example, in the United States, higher education institutions continue to implement numerous mobile applications that help in attracting as many students as possible. Mobile marketing strategies in higher education institutions in this country are becoming more personalised and influential. Moreover, according to Modo Labs (2019), US higher education institutions take part in best mobile app competitions in such categories as: the best recruitment and admission, the best app for attracting students, the most innovative app for communication, the best app for using XModule, etc.

Given the high importance and prospects of mobile marketing as a means of educational marketing, there is a need for further in-depth study of the practical aspects of its application in higher education institutions in Ukraine and Poland, in particular.

Materials and Methods

In this study, the authors focused primarily on the marketing activities of higher education institutions in Poland (P) and Ukraine (U). The analytical part, therefore, contains materials from a survey conducted among specialists involved in this type of activity. One questionnaire corresponded to one higher education institution. During the survey, 185 questionnaires were received (Table 1). The respondents comprised representatives of higher education institutions in Poland (66.5%) and Ukraine (33.5%), representing public institutions (52.4%) and private institutions (47.6%).

Table 1: characteristics of the higher education institutions covered by the survey

Country	Number of higher education institutions, total		Share of higher education institutions, %	
	units	%	public	private
Poland	123	66.5	31.7	68.3
Ukraine	62	33.5	93.5	6.5
Total	185	100	52.4	47.6

Source: own development

In this article, the authors will not focus on either a description of the surveyed institutions, or on substantiating the representativeness of the characteristics obtained in the general sample. This part of the research project has already been disclosed. Instead, the authors will present for the first time the results of the analysis of data related to mobile marketing in higher education institutions, in terms of the following three issues: 1) available web resources; 2) the relationship between the general web activity of a higher education institution and its mobile marketing activities; 3) the most (least) common tools of mobile marketing in higher education institutions.

To describe the results of the study, we used the indicator of the population structure (percentage of *i* answers (d_i) among k answer options; $\sum_{i=1}^{k} d_i = 100\%$). The similarity of the structure of responses provided by the respondents from the two countries – Poland (d_i^P) and Ukraine (d_i^U) – was evaluated according to the formula of the coefficient of structural similarity between two objects:

$$P(V) = 1 - \frac{1}{2}\sum_{i=1}^{k}\left|d_i^P - d_i^U\right| . \quad (1)$$

Some questions in the questionnaire have *n* answers, which can be digitised by ordinal points (R_{min} =1, …, $R_{max} = n$). For the generalised estimation of such answers in the form of a positive or negative value, the formula of a centred average has been used:

$$\overline{R_0(V)} = \bar{R} - \frac{R\max + R\min}{2}, \quad (2)$$

where $\bar{R}$ is an average value of ordinal points.

To assess the level of expert agreement regarding the values of these centred averages ($\overline{R_0(r)}$) in some questions in the questionnaire, Spearman's rank correlation coefficient was used:

$$\rho = 1 - \frac{6 \times \sum_{j=1}^{1} d_j^2}{n \times (n^2 - 1)} \quad (3)$$

where d_j is the difference between the ranks of the average centred rank of Poland and Ukraine according to the *j* statement; *n* – the number of statements.

Cramer's conjugation coefficient was used to evaluate the relationships between the two categorical features:

$$C = \sqrt{\frac{\chi^2}{n \times (m_{\min} - 1)}}; \quad (4)$$

where m_{min} is the minimum number of groups by factor (m_x) or resultant (m_y) feature; χ^2 – Pearson's quadratic conjugation:

$$\chi^2 = n\left[\sum_i \sum_j \frac{f_{ij}^2}{f_{i\Sigma} \cdot f_{\Sigma j}} - 1\right] \quad (5)$$

f_{ij} – is the frequency of the characteristic of the *i-th* row (of the *i-th* factor group) on the *j-th* column (*j-th* efficiency groups); $f_{i\Sigma}$ and $f_{\Sigma j}$ – are total frequencies by groups of factor and efficiency characteristics; *n* – is the sample size.

Research Hypotheses

1. There are no significant differences between the answers of the respondents from Poland and Ukraine regarding the available resources, role and tools of mobile marketing in higher education institutions.
2. The availability of a mobile-friendly website adapted as part of marketing services enhances the implementation of important goals of the general web strategy carried out by higher education institutions.

Results

Given the high importance of the various mobile marketing tools used to promote educational products by Ghose (2017), Kotler et al. (2017), Kulinich and Sorokata (2019), Scott (2017), Sznajder (2014), the authors first tried to find out how marketing services use the following tools (j=1,2,3): 1 – mobile site; 2 – responsive web design (RWD); 3 – strategies of mobile marketing activities. The question "Does your higher education institution use the following means of mobile marketing?" has three answer options (i=1,2,3): a) yes; b) no; c) we plan to introduce them within the next 6-12 months. All respondents provided answers to all questions. The calculated percentages of responses from the respondents from Poland (d_{ij}^P) and Ukraine (d_{ij}^U) for each i answer and each j tool are given in Table 2. Based on the values d_{ij}^P and $\overline{d_j}$, and using the formula of the weighted arithmetic mean (weight – the number of respondents in each country), the average percentage of responses in

the two countries (d_{ij}^{U}) was calculated for each j tool. According to the formula of the simple arithmetic mean, the average value of the fraction for each answer variant ($\overline{d_i}$) is determined. Formula (1) was used to calculate the indicator of structural similarity for each of the tools – P(V)j. These values were assigned ranks in ascending order – P (r)j.

Table 2: structure and similarity of the answers of the respondents from Poland and Ukraine regarding the availability of resources used by higher education institutions in their mobile marketing activities

Statement number	Proportion rate, %									P_j	
	yes			no			scheduled for completion within 6-12 months				
	d_{ij}^{P}	d_{ij}^{U}	$\overline{d_{ij}}$	d_{ij}^{P}	d_{ij}^{U}	$\overline{d_{ij}}$	d_{ij}^{P}	d_{ij}^{U}	$\overline{d_{ij}}$	$P(V)_j$	$P(r)_j$
1	53	58	54.7	44	43	43.7	3	0	1.6	0.950	1
2	50	65	55.0	41	36	38.4	10	0	6.6	0.850	3
3	39	45	41.0	60	50	56.6	1	5	2.3	0.900	2
$\overline{d_i}$	47.3	56.0	50.2	48.3	42.7	46.2	4.7	1.7	3.5	x	x

Source: own development

The data in Table 2 allow us to conclude the following. Firstly, there are no significant differences between the answers of the respondents from the two countries (the minimum value of $P(V)_j$ is high (0.850), and the squared coefficient of variation calculated on the basis of three values of P(V)j is 4.5%). The highest level of similarity was observed in response structures regarding the mobile site, while the lowest level was regarding the strategy of mobile marketing activities. Secondly, the marketing services of nearly half of the higher education institutions use all the tools which were analysed. The most common tool was responsive web design (RWD), while the least common was a mobile marketing strategy. In the higher education institutions in Ukraine, the availability of each of the tools is observed more often than in the higher education institutions in Poland. Thirdly, in the near future, Polish higher education institutions plan to use mobile site and responsive web design (RWD) more intensively than those in Ukraine. However, even after the implementation of these plans, Polish higher education institutions will lag behind those in Ukraine in terms of the availability of each of the three tools of mobile marketing separately and all the tools together.

In modern conditions, an effectively functioning web service significantly helps higher education institutions to ensure their mobile marketing strategy is implemented successfully as noticed by Grewal et al. (2016), Prokopenko et al. (2019), Rowles (2017), Tong et al. (2020). Therefore, in the research project, the respondents were also asked to arrange each of the eight goals of a higher education institution's web service according to their level of importance (j=1,…,8): 1 – Promotion of Educational Services; 2 – Creating the Image of the University; 3 – Acquisition of New Students; 4 – Conducting Online Recruitment; 5 – Online Student Service (e.g. Learning Performance, Schedule, Library, Administration); 6 – Interactive Communication with Students; 7 – Online Sales of University Publishers; 8 – Online Sales of Educational Services – e-learning. Respondents rated each goal from the most important (1) to the least important (8). If a certain goal was not considered by the respondent, it was assigned a score of "0". The answers of the respondents from both countries to this question were similar and did not contain any contradictions. On the basis of the received data, the authors grouped the answers into eight groupings based on two features, and made conjugation tables (Table 3). The first grouping feature was assessing the importance of the main objectives of the web service. Based on that, three groups of assessments were formed: high (1-3), medium (4-6), and low (7-8, 0). The second grouping feature was the respondents' statements about whether the marketing services in their institutions have ("yes") or do not have ("no") mobile-friendly web pages. For each

combinational grouping, the authors calculated Cramer's conjugation coefficient by formula (4) and Pearson's quadratic conjugation by formula (5).

Table 3: assessment of the connection between the respondents' answers regarding the availability of a mobile-friendly website as part of the mobile marketing strategy and regarding the importance of the main goals of a higher education institution's web service

The main goals of a higher education institution's website	Availability of a mobile-friendly website	Number of respondents who rated the web service of a higher education institution			Indicators	
		high	medium	low	χ_j^2	C_j
Promotion of Educational Services	Yes	89	11	1	27.7	0.387
	No	45	33	6		
Creating the Image of the University	Yes	85	15	1	62.3	0.580
	No	23	47	14		
Acquisition of New Students	Yes	99	1	1	84.4	0.675
	No	30	33	21		
Conducting Online Recruitment	Yes	74	22	5	86.7	0.684
	No	6	42	36		
Online Student Service	Yes	94	6	1	98.5	0.729
	No	18	55	11		
Interactive Communication with Students	Yes	60	27	14	52.4	0.532
	No	8	62	14		
Online Sales of University Publishers	Yes	46	44	37	37.3	0.449
	No	8	73	4		
Online Sales of Educational Services – e-learning	Yes	37	41	23	32.2	0.417
	No	4	36	44		

Source: own development

The calculated value of Pearson's quadratic conjugacy (χ^2) significantly exceeded the critical value at a materiality level of 0.99 ($\chi^2_{1-0,01}(2=(3-1)\times(2-1)=9,21$). This means that we can speak with 99% confidence about the significance (non-randomness) of the relationship between the features. That is, the respondents from educational institutions whose website is available as part of mobile marketing activities tend to evaluate highly the implementation of all the goals of the higher education institution's general web service. Thus, hypothesis No. 2 is confirmed.

As part of the research project, the respondents were also asked the following question: "What is your opinion on the role of mobile marketing in terms of promoting a higher education institution?" This question has 6 statements (j=1,…,6): 1. Attractive and interesting. 2. It complements other marketing activities. 3. Effective and result-oriented. 4. Promising – its role in marketing activities will grow was created. It should be considered independently of the previous "traditional" activity on the Internet. 6. It is a tool that is still marginally used by higher education institutions. For each statement, one of three answer options was proposed (i=1, 2, 3): a) I agree; b) I do not agree; c) Difficult to say. The majority of respondents chose a positive answer for all statements (Table 4).

The maximum value for the answer "I agree" (98% of respondents in Poland and 95% in Ukraine) was for the statement that mobile marketing complements other marketing activities. As for the minimum share of respondents who chose the answer "I agree", in both countries there were no differences: 11% of respondents in Poland and 24% in Ukraine gave this answer to the statement that

mobile marketing is a tool that is still marginally used by higher education institutions. At the same time, 43% of the representatives of Polish universities and 57% of the representatives of Ukrainian universities could not give their opinion on this statement. Even if they chose "I agree", however, the share of answers about the marginal use of mobile marketing would not exceed the statement about its role as a complement to other marketing activities.

Table 4: structure and similarity of the answers of respondents from Poland and Ukraine regarding the role of mobile marketing in the promotion of higher education institutions

Numbers of statements	Proportion of answers, %									P_j	
	I agree			I do not agree			Difficult to say			$P(V)_j$	$P(r)_j$
	d_{ij}^P	d_{ij}^U	$\overline{d_{ij}}$	d_{ij}^P	d_{ij}^U	$\overline{d_{ij}}$	d_{ij}^P	d_{ij}^U	$\overline{d_{ij}}$		
1	94	87	91.7	1	8	3.3	6	5	5.7	0.925	5
2	98	95	97.0	2	0	1.3	1	5	2.3	0.955	6
3	72	63	69.0	0	10	3.4	28	27	27.7	0.900	3.5
4	92	82	88.6	0	7	2.3	8	11	9.0	0.900	3.5
5	42	50	44.7	37	19	31.0	10	31	17.0	0.815	2
6	11	24	15.4	46	11	34.3	43	57	47.7	0.730	1
$\overline{d_i}$	68.2	66.8	67.7	14.3	9.2	12.6	16.0	22.7	18.2	0.871	x

Source: own development

For the statement "Effective and result-oriented" the share of answers for "Difficult to say" was 28% and 27% respectively, while for the statement "It should be considered independently of the previous "traditional" activity on the Internet" – it was 20% and 31%. The average share of respondents in Ukraine who did not give their opinion for all the statements was 22.7%, which is 5.0 points higher compared to the representatives from Poland. The minimum value of the similarity coefficient for the response structures of the respondents from both countries is high (0.730). The squared coefficient of variation, calculated on the basis of $P(V)_j$, was 8.7%. This testifies, firstly, to the homogeneity of the set of $P(V)_j$ values in the context of the 6 statements under consideration; and, secondly, to a typical average value of the coefficient of structural similarity (0.871).

Covino (2017), Raphaeli et al. (2017), Tseng and Wei (2020) mention, that the choice of a particular mobile marketing tool affects differently the behaviour of the consumers of educational services. They can both increase the investment attractiveness of higher education institutions, according to the researches of Camilleri (2019), Tkach (2015), and open new markets for them, as mention Chukhray and Kulyniak (2015) and Kusumawati (2018), but also negatively present the brand, according to the researches of Kall (2015) and Kvitka S. et al. (2019). In view of this, there was a question in the research project regarding the tools used by higher education institutions during the implementation of marketing activities using mobile devices (j=1,…,11): 1. Text/MMS Messaging. 2. Various Forms of Banner Advertising. 3. Mobile Search 4. Text Links. 5. Social Media Links. 6. Video Advertising. 7. Rich Media Advertising. 8. Dedicated Mobile Applications. 9. Mobile Games. 10. Sponsored Content Services. 11. Product Placement. Each of the tools provided a set of answers from six options: a) not used; b) bad; c) neither good nor bad; d) good; e) very good; f) I do not know. On the basis of the data received during the survey, Table 5 was created. The Polish representatives provided answers for all the statements. However, some respondents from Ukraine did not provide answers regarding eight tools (in Table 5 – the line "available"). Since $\overline{R_0^P(V)}_j$ and $\overline{R_0^U(V)}_j$ were calculated for 11 statements, the authors considered it appropriate to assign them ranks (for Poland – $\overline{R_0^P(r)}_j$, for Ukraine – $\overline{R_0^U(r)}_j$), as well as to assess the degree of correlation between these ranks. To generalise the usage of mobile marketing tools by higher education institutions, we determined the total values

of the average centred points (S $\overline{R_0(V)}_j = \overline{R_0^P(V)}_j + \overline{R_0^U(V)}_j$) for each tool and assigned them ranks (S $\overline{R_0(r)}_j$). The indicators of structural similarity were also calculated and assigned appropriate ranks.

Table 5: characteristics of the answers given by the respondents from Poland and Ukraine regarding the mobile marketing tools of higher education institutions

Indicator	The value of indicators for different tools													$\overline{d_i}$
		1	2	3	4	5		6	7	8	9	10	11	
a	d_{ij}^P	64	1	22	11	2		0	0	64	1	22	11	32.8
	d_{ij}^U	45	19	16	15	18		19	27	26	31	23	26	24.1
b	d_{ij}^P	1	2	0	4	2		0	2	0	9	4	4	2.5
	d_{ij}^U	7	7	2	3	3		7	2	2	0	3	3	3.5
c	d_{ij}^P	22	15	22	29	6		14	21	14	27	21	7	18.0
	d_{ij}^U	7	7	15	18	11		7	10	13	21	21	19	13.5
d	d_{ij}^P	11	36	47	41	62		32	11	30	3	13	2	26.2
	d_{ij}^U	27	52	48	50	48		53	26	27	18	24	8	34.6
e	d_{ij}^P	2	20	3	13	2		48	7	11	1	2	4	10.3
	d_{ij}^U	0	8	8	7	8		10	0	7	0	7	5	5.5
f	d_{ij}^P	0	2	4	8	3		0	21	12	16	24	23	10.3
	d_{ij}^U	8	7	11	5	10		3	32	21	27	22	28	15.8
available	d_{ij}^U	6	0	0	2	2		1	3	3	3	0	11	2.9
$\bar{R}_{o\,j}$	$\overline{R_0^P(V)}_j$	-1.14	0.25	0.05	0.58	0.14		1.16	-0.66	-0.16	-1.10	-0.78	-1.48	x
	$\overline{R_0^P(r)}_j$	10	3	5	2	4		1	7	6	9	8	11	x
	$\overline{R_0^U(V)}_j$	-0.81	0.25	0.34	0.33	0.28		0.29	-0.46	-0.17	-0.63	-0.14	-0.61	x
	$\overline{R_0^U(r)}_j$	11	5	1	2	4		3	8	7	10	6	9	x
S_j	$S^{\overline{R_0(V)}_j}$	-1.95	0.492	0.389	0.909	0.428		1.452	-1.12	-0.33	-1.72	-0.92	-2.09	x
	$S^{\overline{R_0(r)}_j}$	10	3	5	2	4		1	8	6	9	7	11	x
P_j	$P(V)_j$	0.64	0.74	0.85	0.79	0.79		0.55	0.71	0.85	0.71	0.84	0.65	0.74
	$P(r)_j$	10	6	1	4	4		11	8	1	7	3	9	x

Source: own development

The data in Table 5 make it possible to state the following. Firstly, the top 3 answers given by the respondents from the two countries were: d) good; a) not used; c) neither good nor bad. In general, this indicates the positive attitude of marketing services of higher education institutions to the use of mobile marketing tools. Secondly, the values of the similarity coefficient for the response structures

by the respondents of both countries vary from 0.550 to 0.850. The squared coefficient of variation, calculated on the basis of these values, was 12.6%. This indicates the homogeneity of the set of $P(V)_j$ values for the 11 statements considered in the study, and, consequently, the typical average value of the similarity of structures (0.788) and the absence of significant differences in the opinions of the respondents from the two countries. Thirdly, the value of Spearman's coefficient (r=0.836), which is calculated by formula (3) based on the ranks of the average centred points, exceeds the critical value ($r_{1-0.01}(11)=0.76$). This suggests that the conclusion regarding the high consistency of the expert opinions from both countries should be considered 99% relevant (non-accidental). So, we can say that the experts from both countries evaluated highly the sixth, fourth and second tools, and lowly – the eleventh, first and ninth.

For all the questions considered in this article, no significant differences were found between the answers of the respondents from both countries. This provides grounds for verifying hypothesis No.1.

Conclusion

Mobile marketing has been considered by the authors in terms of it having two roles: as a separate element of marketing activities, one which involves mobile communications, and also as an organised marketing activity based on the synergy of mobile and Internet technologies. The spread of mobile marketing in the field of higher education is primarily due to its students (active mobile Internet users) and the specific nature of its institutions (public institutions of an intellectual and innovative orientation).

The analysis of the responses provided by the representatives of higher education institutions regarding the use of mobile marketing tools, the role of mobile marketing in promoting the institution, the goals of the web service and the mobile marketing tools did not reveal significant contradictions or differences between Poland and Ukraine.

The study of whether marketing services in higher education institutions have their own mobile tools revealed that most of these services have both responsive web design (RWD) and a mobile website. About 40% of higher education marketing services have mobile marketing strategies. These strategies are somewhat more common in Ukrainian higher education institutions.

Combinational grouping of the respondents' answers regarding the importance of each of the main goals of the web service (Promotion of Educational Services; Creating the Image of the University; Acquisition of New Students; Conducting Online Recruitment; Online Student Service; Interactive Communication with Students; Online Sales of University Publishers; Online Sales of Educational Services – e-learning) and the presence/absence of a marketing service mobile-friendly page served as the basis for the analysis of these relationships. It was proved that the representatives of higher education institutions whose marketing services have a mobile website tend to highly evaluate the implementation of all the goals of the university's general web service. 98% of respondents in Poland and 95% in Ukraine agreed that mobile marketing complements other marketing activities.

The research has helped to outline certain reserves for the growing use of mobile marketing tools in higher education institutions at the expense of those tools which are used less often: (Product Placement; Text/MMS Messaging, Mobile Games, Rich Media Advertising, Sponsored Content Services, Dedicated Mobile Applications). The high level of use of tools (Video Advertising, Text Links, Various Forms of Banner Advertising) can serve as a guide for marketers to work effectively in those higher education institutions that do not yet use mobile marketing. There are also opportunities for Polish universities to use the following tools: Mobile Search and Social Media Links. The practice of using these tools was assessed positively by the respondents from Polish higher education institutions. However, they are used less often in Poland than in Ukraine.

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Development of Corporate Social Responsibility and Company Social Reporting

Inna Berzhanir
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: innaberzhanir@ukr.net

Anatolii Berzhanir
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: bal8@ukr.net

Tetiana Yashchuk
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: tetyanayashchuk@ukr.net

Oleksandr Kirdan
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: kirdan_alex@ukr.net

Nataliia Pacheva
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: nataliapacheva@udpu.edu.ua

Abstract

The formation of a modern market economy presupposes the functioning of a business aimed at increasing the return on invested capital, the implementation of a strategy for improving working conditions and personnel development, cooperation with local authorities, solving environmental problems. The immediate benefits for the company from the introduction of corporate social responsibility are the creation of a stable business environment, reduced operational risks, increased financial performance and sales, increased productivity, reduced costs, market expansion etc.
In Ukraine, the development of corporate social responsibility began with the establishment of a market economy. In the early 90's of 20th century, domestic businessmen began to form an understanding of the need for their participation on a voluntary basis in solving social and environmental problems. Responsible business conduct necessitates the preparation of a public report on the business activity results. Social reporting involves the disclosure of information about both positive and negative results of economic, social, environmental activities of the company. Recently, companies have been preparing not only financial statements but also social statements. Social (non-financial) reporting is becoming an integral part of corporate culture, and the management of corporate social responsibility programs in commercial organizations focused on sustainable development contributes to the balanced social and environmental development of society.
Formation and development of domestic socially responsible business should be based on further development of the fundamental institutional foundations necessary for its effective functioning.

Keywords: corporate social responsibility, company social reporting, socially responsible business

Introduction

The functioning of a modern market economy involves the new paradigm formation – business, classically aimed at increasing the return on investment, begins to implement strategies of working conditions improvement and staff development, cooperation with local authorities, solving

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environmental problems etc. The result of this policy is the investment of funds for the implementation of various social projects in education, health care and environmental protection.
Bukovynska (2010) mentioned that the immediate benefits for the company from the introduction of corporate social responsibility (CSR) are the creation of a stable business environment, reduced operational risks, increased financial performance and sales, increased productivity, reduced costs, market expansion and, consequently, increased market value.

According to the research of Reputation Institute 2019 Global RepTrak [1], the leading role of management factors and corporate citizenship in the formation of corporate reputation remains unchanged and is 15.1% and 14.2%, respectively. The impact of the working conditions factor for the year increased by 0.4% and now is 11.2%. Thus, the total «contribution» of the three CSR factors in creating the company's reputation is 40.5%. It is noteworthy that the importance of these three indicators increases in proportion to the decline in the overall level of the company's reputation.

The factor of responsible and effective participation of CEO in the processes related to corporate social activity is also extremely important. The leaders of all the companies included in the Top 10 ranking of the Reputation Institute are known as responsible top managers, supporters of ethical approaches to doing business and effective social activity.

The 2019 CEO of RepTrak identified factors that have the maximum impact on the formation of a positive image of the Director General. Social responsibility, care for staff and participation in solving environmental problems make up 32% of the reputation of every manager.

In a research study by Hosh and Kershys (2020) indicated that in Ukraine the development of corporate social responsibility began with the establishment of a market economy. In the early 90's of 20th century, domestic businessmen began to form an understanding of the need for their participation on a voluntary basis in solving social and environmental problems. A statistical survey of corporate social responsibility of Ukrainian companies conducted in September 2019 by Pro Bono Club Ukraine showed that an increase in the number of companies with CSR strategies/programs/projects took place in 2015–2016 (Fig. 1).

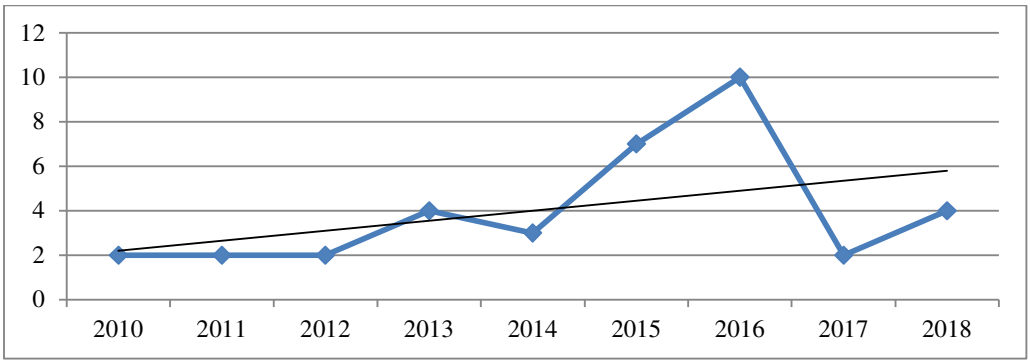

Fig. 1: Number of Ukrainian companies that have started to implement CSR programs, ea

Source: compiled by the authors

Zinchenko et al (2018) mentioned that the most significant CSR programs for domestic socially responsible business are:

- educational projects (50 companies);
- working conditions and staff development improvement (40);
- green office and other eco-initiatives (35);
- charitable fundraising (35);
- volunteering (arrangement of parks, painting of hospital premises) (31);
- intellectual volunteering (pro bono) (27);

- anti-corruption practices (25);
- development of regions (assistance to regional initiatives) (24).

Responsible business conduct necessitates the preparation of a public report on the business activity results. Social reporting involves the disclosure of information about both positive and negative results of economic, social, environmental activities of the company. Recently, companies have been preparing not only financial statements but also social statements.

Social (non-financial) reporting is becoming an integral part of corporate culture, and the management of corporate social responsibility programs in commercial organizations focused on sustainable development contributes to the balanced social and environmental development of society.

The social report (GRI standard) should reflect the economic, social and environmental policies of the corporation and serve as a tool for managing activities with corporate social responsibility. In each of the three areas, GRI offers a set of quantitative indices. It is based on the concept of sustainable development: the company must find a balance between the needs of today's generation in economic well-being, favorable environment, social welfare and similar needs of future generations.
The development of non-financial reporting is directly related to ensuring the information openness of companies, because today's market economy requires an appropriate level of information support. Large amounts of information operated by the business become a necessary factor in ensuring its competitiveness. In such conditions, the exchange of information is the basis of basic economic processes from production to consumption.

The problem of transparency becomes especially important in terms of conducting socially responsible business, which will not become a reality without transparency of economic decision-making, taking into account the social and environmental consequences for entrepreneurs and society.

By publishing social reports, companies ensure transparency, which, in turn, is one of the factors ensuring their competitive advantage. It has been found that more transparent companies attract investors and have a higher level of capitalization. Every year, the CSR Development Center compiles a transparency index of Ukrainian companies' websites on the basis of an international methodology developed together with Beyond Business (Israel). Thus, in 2017 the structure of the prepared social reports was as follows:

- 1 integrated report (DTEK);
- 1 report in accordance with GRI standards (PJSC «Myronivskyi Khliboproduct»);
- 5 reports in accordance with GRI 4.0 (ArcelorMittal Kryvyi Rih, NJSC Naftogaz Ukraine, SE NEGC Ukrenergo, Lifesell LLC, SE NEGC Energoatom);
- 1 report with GRI 4.0 elements (Nova Poshta LLC);
- 3 unstructured CSR reports (PJSC «Ukrsotsbank», PJSC «Credit Agricole Bank», «SAV-Distribution» LLC);
- 4 general reports of companies with coverage of some elements of CSR Metinvest Holding LLC, PJSC Shakhtar Football Club (Donetsk), PJSC Kyivvodokanal Joint-Stock Company, PJSC Raiffeisen Bank Aval, PJSC Joint-Stock Bank Ukrgasbank).
- 5 reports contain information on the implementation of the Sustainable Development Goals (ArcelorMittal Kryvyi Rih, DTEK, SE NEGC Energoatom, PJSC Myronivskyi Khliboproduct, Nova Poshta LLC).

In 2018, the social reporting of companies that were included in the TOP-100 largest taxpayers in Ukraine in 2017 was assessed according to the State Fiscal Service and the top 10 most transparent companies according to last year's transparency index. Among them: 20 state-owned and 79 private companies, 22 international companies (or their subsidiaries) and 77 national ones (Table 1).

Table 1: Dynamics of leadership in the transparency index of Ukrainian companies (TOP-10)

2014	2015	2016	2017
ArcelorMittal	ArcelorMittal	ArcelorMittal	PJSC «Myronivskyi khliboproduct»
DTEK	Obolon	DTEK	DTEK
SCM	DTEK	SCM	SE NEGC Energoatom
Obolon	Metinvest	Galnaftogaz	ArcelorMittal
Metinvest	Foxtrot Group	PJSC NAKNaftogaz Ukraine	Ukrenergo
Kyivstar	Kernel Trade	Kernel Trade	Lifecell
Carlsberg Ukraine	CKM	Metinvest	PJSC NAKNaftogaz Ukraine
Galnaftogaz	Galnaftogaz	PJSC «Myronivskyi khliboproduct»	Nova Poshta
Dniprospetsstal	Dniprospetsstal	LLC «SAVDistribution»	SCM
Mondelis Ukraine / Kraft Foods Ukraine	Nestle Ukraine	SE NEGC Energoatom	Carlsberg Ukraine

Source: compiled by the authors

Thus, the nature and extent of corporate responsibility are determined by a system of key institutional factors – the relevance of socially responsible behavior, the CSR conceptualization by the state, providing appropriate institutional conditions for social responsibility, active behavior of stakeholder groups, use of best foreign practices. Formation and development of domestic socially responsible business should be based on further development of the fundamental institutional foundations necessary for its effective functioning.

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Bank Lending Trends in Ukraine

Inna Berzhanir
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: innaberzhanir@ukr.net

Anatolii Berzhanir
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: bal8@ukr.net

Tetiana Yashchuk
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: tetyanayashchuk@ukr.net

Oleksandr Kirdan
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: kirdan_alex@ukr.net

Nataliia Pacheva
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine
e-mail: nataliapacheva@udpu.edu.ua

Abstract

The bank lending to economic entities is one of the factors that play an important role in the development of priority industries, ensuring economic growth and forming the country's competitiveness in the world market. The development of the banks' lending activities is the main element of a strong economic environment and will affect the assurance of the state's independence and realization of its national interests under the conditions of globalization processes. The main role in stimulating the reproduction processes in the economy is played by bank lending as the main source of providing monetary resources for current and investment activities of business entities. However, macroeconomic instability in Ukraine had a negative impact on the development of bank lending, causing a sharp decline in the creditworthiness of borrowers and a significant deterioration in the loan portfolio quality. The banking system in Ukraine has some problems that require improvement and changes in its functioning mechanisms. To develop bank lending and create financial stability, it is necessary to make banking services more qualitative in order to improve their competitiveness; to improve procedures in the banking sector, such as reorganization and liquidation of banks; to encourage commercial banks to lend innovative projects; to increase capital resources of state-owned banks, increase their number and strengthen their role in the financial and credit market in Ukraine. The above measures can contribute to recovery of the national economy and improvement of the overall condition of banking institutions.

Keywords: bank loan, interest rate, bank lending, working capital, borrowed capital.

Introduction

The state of the country's economy largely depends on the adequate functioning of the banking system, and bank lending to economic entities is one of the factors that play an important role in the development of priority industries, ensuring economic growth and forming the country's competitiveness in the world market. The development of the banks' lending activities is the main element of a strong economic environment and will affect the assurance of the state's independence and realization of its national interests under the conditions of globalization processes.

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Sokolova mentioned that an important role in stimulating the reproduction processes in the economy is played by bank lending as the main source of providing monetary resources for current and investment activities of business entities. However, macroeconomic instability in Ukraine had a negative impact on the development of bank lending, causing a sharp decline in the creditworthiness of borrowers and a significant deterioration in the loan portfolio quality.

In 2013–2019 the total volume of credit resources did not increase significantly. Thus, in 2019 it amounted to 827 billion UAH, which is 13.7% more than in 2013 (Fig. 1).

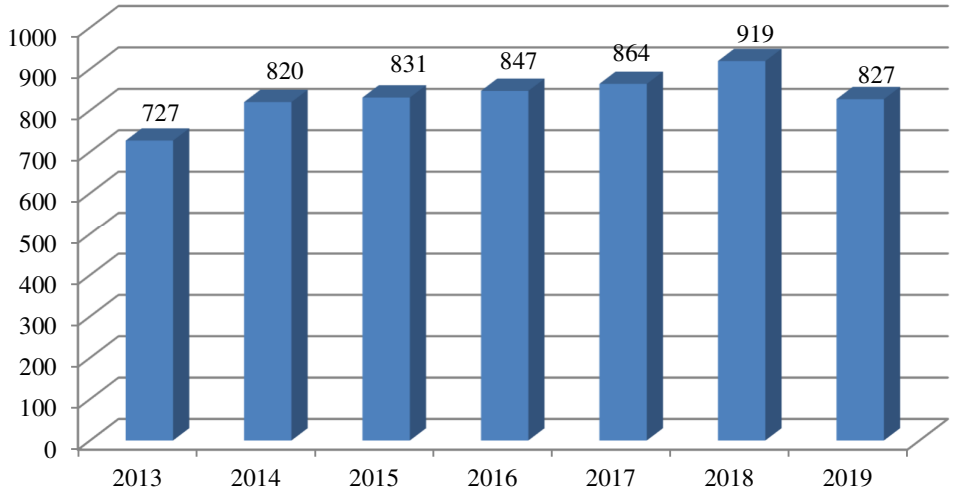

Fig. 1: Dynamics of total volume of credit resources in 2013-2018, billion UAH
[developed according to the official NBU data]

When lending, the size of the interest rate is essential. Average interest rates on loans to borrowers ranged from 4.68% in 2013 to 18.6% in 2019. (Fig. 2).

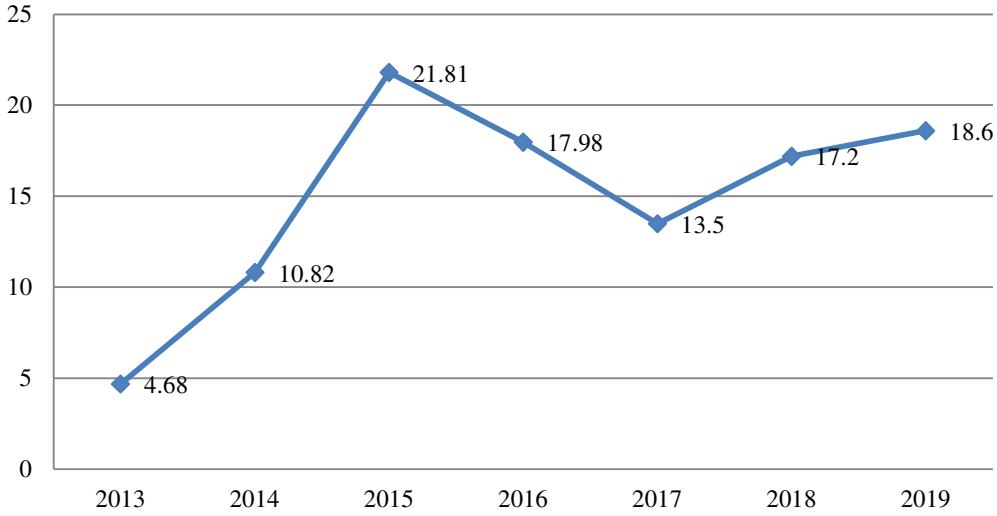

Fig. 2: Dynamics of average weighted interest rate in 2013-2019,%

The highest level of interest rate was in 2015 and amounted to 21.81%. During 2015–2019, the average weighted interest rate decreased by 3.21% and in 2018 it was 18.6%. This, the credit rates have now decreased and, but for many enterprises, lending remains an expensive tool to attract external funds.

Table 1: Dynamics of volumes of bank credit investments in Ukraine in 2013 2019 (as of January 01.)

Index	2013	2014	2015	2016	2017	2018	2019
Growth rate of loans provided by banks, in % compared to the previous year	98,79	111,78	110,42	95,90	104,23	103,06	107,92
Growth rates of loans granted to economic entities in % compared to the previous year	104,87	114,70	114,86	97,92	107,78	102,04	106,32
Growth rates of loans to individuals in % compared to the previous year	92,63	103,71	106,72	85,10	103,29	108,51	115,27
Ratio of loans granted to economic entities in loans granted by banks,%	74,71	76,67	79,75	81,43	84,21	83,38	82,14
Ratio of loans to individuals in loans granted by banks,%	19,84	18,41	17,79	15,79	15,65	16,47	17,59

Source: [calculated according to the NBU data]

Analysis of Table 1 data shows that in 2013–2019 there was an increase in the volume of loans granted by banks. Thus, in 2019, as compared to March 2013, the growth rate of loans granted by banks was 107.92%. The highest growth rates were in 2014 – 111.78%, and the lowest in 2016 – 95,90%.

In 2019, the growth rate of loans granted to economic entities was 106.32%, which is by 1.45% more than in 2013.

Growth rates of loans to individuals in 2013 were insignificant and amounted to 92,63%. However, during 2014-2019 this index increased by 11.56% and in 2019. It amounted to 115.27%.

In 2013-2019 the volumes of loans granted to economic entities significantly exceed the lending to individuals, which indicates the weakening of the banks' lending to the latter and orientation of the credit policy towards the cooperation with enterprises. It is proved by the growth of loans ratio granted to business entities from 74.71% in 2013 to 82.14% in 2019. Last year the portfolio of hryvnia business loans increased by 2.7% to 478 500 000 000 UAH, although in December it slightly decreased (by 1.5%).
The share of loans to individuals for the analyzed period decreased by 2.25 and in 2019 amounted to 17.59%.

During the analyzed period (Fig. 3), the percentage of general overdue indebtedness on loans increased significantly from 7.7% to 67.92%, which is a negative and threatening phenomenon, as large amounts of problem loans can destabilize the financial condition of banks due to loss of income assets and growth of expenses in reserves to cover losses on bank credit operations. As a result, this will be manifested in the bank efficiency decrease, restraint of lending activity, deterioration of liquidity and solvency of those banks which loan portfolios are overloaded with problem loans.

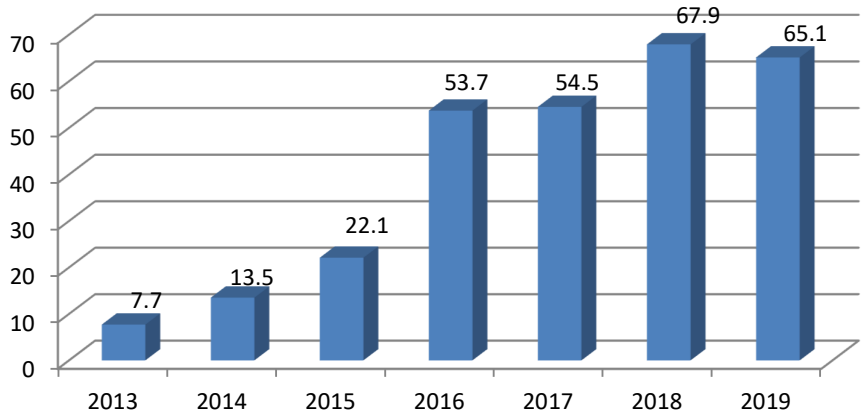

Fig. 3. The share of overdue indebtedness on loans in the total amount of loans for 2013–2019, %

In a research study by Kornijchuk (2017) indicated that the banking system in Ukraine has some problems that require improvement and changes in its functioning mechanisms. To improve the financial sector and economic growth in Ukraine, it is necessary to create an effective mechanism for improving bank lending policies. To develop bank lending and create financial stability, it is necessary to make banking services more qualitative in order to improve their competitiveness; to improve procedures in the banking sector, such as reorganization and liquidation of banks; to encourage commercial banks to lend innovative projects; to increase capital resources of state-owned banks, increase their number and strengthen their role in the financial and credit market in Ukraine. The above measures can contribute to recovery of the national economy and improvement of the overall condition of banking institutions.

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Inclusiveness of Development – A Challenge for A Post-Pandemic Global Economy

Iwona PAWLAS

University of Economics in Katowice, Katowice, Poland
iwona.pawlas@ue.katowice.pl

Abstract

Inclusiveness of development should be a response to exclusion, inequality and injustice in the global economy. The COVID-19 global pandemic strengthened the problem and scale of exclusion. Creating an inclusive post-pandemic global economy would require systemic, organizational and mental changes not only of the society of one or the other country, but of the entire international community. Special circumstances would be necessary for this sort of change, constituting turning points enabling the formation of a new paradigm of development. Author studied, explored and discussed the essence, dimensions and levels of inclusiveness, and then described the factors, instruments, barriers and measures of inclusiveness. Moreover, Author discussed selected studies in the field of inclusiveness undertaken by the authors in recent years and presented selected initiatives launched on international level in order to increase inclusiveness (by the United Nations, Organization for Economic Cooperation and Development, European Bank for Reconstruction and Development and the European Union).

Keywords: inclusiveness, development, global economy, COVID-19 pandemic.

Introduction

The global economy of the 21st century is characterized by huge and still rising inequalities. The increased scale of the problem of exclusion resulted from global financial crisis 2008+, the years of economic instability which followed and – to the greatest extent – the COVID-19 pandemic. Technological changes and development of information and communication technologies did result in higher visibility of the disparities. Technical progress is considered one of the most important factors determining socio-economic development, wealth creation, improvement of living conditions. Digital transformation resulting from technological revolution creates a turning point in regard to the development of the global economy. The significance of digitalization became even greater and more visible at the time of global lockdown in 2020. Radical changes in the conditions of economic activity are observed during the COVID-19 pandemic. Unfortunately, the 2020 pandemic strengthened the problem of inequalities in the global economy. The creation of a fair, more inclusive post-pandemic global economy could be the answer to the existing problem of injustice. The implementation of a new paradigm of inclusiveness of development on a global scale would require not only organizational reconstruction and systemic restructuring, but also considerable mental changes. Radical and global changes and transformations are accompanied by expectations and hopes that the new solutions will help reduce the problem of exclusion in the globalized world economy and the new system will be featured by inclusiveness in each and every dimension and on each and every level. The main problem of this article is inclusiveness of development. The article aims at discussing and presenting inclusiveness of development as a challenge for a post-pandemic global economy. The research tools used in the article included literature studies, analysis and synthesis, comparison and generalization of scientific literature, as well as critical thinking.

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The Essence of Inclusiveness

European Bank for Reconstruction and Development (EBRD) defines inclusiveness as „the opening up of economic opportunities to under-served social groups" and it describes an inclusive market economy as an economy which „ensures that anyone regardless of their gender, place of birth, family background, age or other circumstances, over which they have no control, has full and fair access to labor markets, finance and entrepreneurship and, more generally, economic opportunity" (EBRD a).

According to Mączyńska (2019) inclusiveness means „compromising social, economic and ecological targets and – at the same time – optimizing the use of socio-economic potential".

OECD (2019 a) defines inclusive growth as „economic growth, that is distributed fairly across society and creates opportunities for all".

Gupta, Pouw and Ros-Tonen (2015, 546) describe inclusive development as „development that includes marginalized people, sectors and countries in social, political and economic processes for increased human well-being, social and environmental sustainability, and empowerment". Moreover, they claim that inclusive development is „an adaptive learning process, which responds to change and new risks of exclusion and marginalization" (Gupta, Pouw and Ros-Tonen 2015, 546).

OXFAM defines inclusive development as a "pro-poor approach that equally values and incorporates the contributions from all stakeholders—including marginalized groups—in addressing development issues". OXFAM stresses that inclusive development promotes both transparency and accountability. Moreover, it also stimulates cooperation between civil society, governments and private sector actors (OXFAM 2019).

Inclusive wealth is defined as "the aggregate value of all capital assets. Increases in inclusive wealth indicate an improved productive base capable of supporting a higher standard of living in the future. To be truly inclusive, measures of inclusive wealth must include the value of all forms of capital that contribute to human well-being: human capital, manufactured capital, natural capital, and social capital" (Polasky, Bryant, Hawthorne, Johnson, Keeler and Pennington 2015).

According to Mączyńska (2019), inclusive economy is a „system based on the largest possible number of sovereign and equitable participants, connected more closely by ties of partnership and conscious interdependence than hierarchy and subordination in the state-citizen-business-social relations". Mączyńska indicates that contemporary world economy is an economy of surplus – excessive production capabilities, overproduction, excessive consumption, accompanied by excessive burden for natural environment. At the same time, however, despite the above-mentioned market surplus, multilayered and multidimensional exclusion remains a serious problem. Therefore, the creation of a new, pro-inclusive socio-economic system could be a possible solution of the problem of exclusion. Pro-inclusive system could stimulate full use of market potential and – at the same time – it would counteract exclusion on various layers and on various dimensions.

Achieving real inclusiveness of development of the globalized post-pandemic world economy would mean the situation in which each and every entity (citizen, household, company, region, state), and in particular entities and groups discriminated and marginalized in the current development model, had the opportunity to derive the broadly understood benefits of socio-economic and technological progress independently and on the principles of egalitarianism.

Dimensions and Levels of Inclusiveness

Inclusiveness can be considered on various dimensions (layers) and in regard to different levels. The following dimensions (layers) of inclusiveness should be listed (Gupta, Pouw and Ros-Tonen 2015):

social, political, economic, financial, digital, cultural, gender, relational, generational and intergenerational, ecological (environmental), managerial.

Social dimension of inclusiveness (also called social inclusion) is the process aiming at providing equal opportunities for achieving full life potential to all members of a society. Social inclusiveness can be promoted both by economic policy itself, and through activities stimulating equal access to public services, as well as enabling participation in decision making processes (United Nations 2019). Therefore, inclusive society is a society supplied with mechanisms promoting diversity, enabling and stimulating active participation of its citizens in political, economic and social life. Inclusive society offers equal chances no matter social origin, sex, social class, generation, religion, nationality, place of living. Moreover, inclusive society promotes activity of its citizens, and the activity is based on participative processes, and is not forced in any way. The term of social inclusion is very close to social cohesion: the two are somehow built around the concept of social integration. Socially inclusive society is a society in which all groups do have the feeling of belonging, participation, legitimization, appreciation. What is more, socially inclusive society does not have to be demographically homogenous; it can be characterized by heterogeneity and diversity, the diversity which is respected and perceived as a source of higher potential.

Political dimension of inclusiveness relates to the right to participate in political life and political representation of a society. Political inclusion promotes democracy and democratization. It also means the right to express political opinion. On the contrary, political exclusion, i.e. excluding certain groups (minorities and marginalized ones) from political decision taking is considered an essential pro-conflict factor and the one which results in destabilization (Cordenillo 2019). Political inclusiveness and exclusiveness are strictly connected with religious issues and the lack of gender equality. Moreover, to some extent, political exclusiveness relates to migration and migrants' rights; therefore, in a more-narrow meaning political inclusion is defined as the right of migrants to participate in political life and political representation (UNESCO b).

Economic inclusiveness consists in opening economic opportunities for all social groups. Economic dimension of inclusiveness is inclusion into the labor market and in the area of entrepreneurship. Promotion of economically inclusive economy results in a more efficient allocation of human resources. Therefore, economic inclusion constitutes an essential element of the creation of sustainable market economy (EBRD c).

Financial inclusiveness constitutes an important element of economic inclusiveness. Financial inclusion means access of both individuals and enterprises to necessary financial services and products. Access to current account is considered the number one step to financial inclusiveness. A more developed financial inclusion is connected with investment decisions' taking and a more conscious financial risk management (World Bank).

Digital dimension of inclusiveness is strongly connected with an increase of digitalization and development of digital economy. It consists of three dimensions: access to Internet, information and communication technologies (ICT), adoption of ICT and practical implementation and application of ICT (Digital Inclusion Survey). The COVID-19 pandemic proved the significance of digital inclusion and showed effects of digital exclusion in a new light.

The significance of cultural dimension of inclusiveness rises together with increased dynamics and intensity of international ties and interconnections in the world economy. Cultural inclusion requires increased awareness of cultural differences, sensitivity to cultural differences, as well as respect for cultural difference. Culturally inclusive society treats cultural heterogeneity as a chance and opportunity, rather than a threat or barrier. Building and promoting cultural inclusiveness within a society requires cultural competencies that can be defined as a set of values, behaviors, attitudes and practices within an

organization, system, society that enables effective functioning in a multicultural, intercultural environment or at the interface of cultures. Cultural inclusiveness is also about respect for different language, life style, religion, interpersonal behavior. Creating and learning cultural competencies is a long and difficult process, while the creation of culturally inclusive society requires a long-term engagement of local, regional and national entities (Mak, Barker and Anne 2014).

Gender dimension of inclusiveness focuses on promoting gender equality and strengthening the position of women, as well as active participation of women in political, economic, social and cultural life. Unfortunately, still in many societies systems of norms and values are far from gender neutrality; moreover, the status of women, is not equal to that of men, remain a problem in many societies. Gender inclusiveness is therefore essential for women to fully enjoy their human rights (UNESCO a). The COVID-19 pandemic strengthened the negative effects of the lack of gender inclusiveness; therefore, the need for creating increased gender inclusiveness became even greater.

The relational dimension of inclusiveness - is not only (and not exclusively) an attempt to respond to the needs of the most vulnerable and those most experienced by fate, but also to assess the fundamental and structural relations between various social groups and various social actors, which make it difficult to provide long-term social inclusiveness. The relational dimension of inclusiveness entails generational and intergenerational inclusiveness. On the one hand, we observe the exclusivity of the young generation as the rising problem in the 21st century world economy is; on the other hand, we note the exclusion of the growing number of older people. The exclusion of young people (who have had much easier and greater access to the education system than previous generations, and therefore also have a higher level of education) is connected with either unemployment (despite their education) or poverty (despite employment). Thus, from a society's point of view, incomplete use of workforce and skills mismatch are the main challenges from the perspective of relational inclusiveness aimed at the young generation. The aging society, i.e. the demographic implosion and the growing number of older people constitutes another problem of the developed economies of the 21st century. The exclusion of older people partly results from cultural, civilization and technological changes. Due to demographic trends, it is reasonable to increase the socio-occupational inclusion of older (Sobolewska-Poniedziałek 2017). It seems that COVID-19 pandemic has already increased the problem of exclusion of both the young (who lost their jobs) and the older (due to lockdown).

The ecological dimension of inclusiveness is sometimes described as environmental inclusiveness. The importance of this dimension of inclusion is determined by the fact that it is the poorest people who are usually the most dependent on the natural ecosystem, so they are the ones who are most affected by the negative impact of environmental changes both locally and globally, in other words by environmental and/or ecological exclusiveness. Again, the COVID-19 pandemic has enormously strengthened the problem of environmental and/or ecological exclusiveness.

Regional dimension of inclusiveness is particularly important large countries in terms of territory. In such countries, regional development disparities are observed. Peripheral regions are usually less developed, less urbanized. Therefore, their inhabitants do experience barriers in access to education, well paid job places, culture infrastructure. That's why regional exclusion is strongly connected with unequal development opportunities, i.e. it results in economic and/or financial exclusion (EBRD b).
Inclusiveness of management means respecting various dimensions of inclusiveness during the implementation of management processes in institutions, organizations, enterprises. It requires not only knowledge and management skills, but also appropriate interpersonal competences as well as sensitivity and empathy.

Each and every dimension of inclusiveness (described above) can be analyzed and evaluated on various levels, namely: on the level of an enterprise, on local, regional, national, international and – last but not least – global level. It's hard to imagine international and global inclusiveness without achieving a high

level of inclusion of national economies. Creating satisfying national inclusiveness, requires high local, regional and inter-regional inclusiveness. Rising international relations in a global economy of the 21st century, as well as the implementation of the 4th industrial revolution connected with intensive development and common use of information and communication technologies, resulted in the need for stronger actions aiming at reducing barriers for inclusiveness and creating conditions promoting inclusiveness and inclusive development. The coronavirus pandemic widened wealth and income inequalities and indicated the rising need for the promotion of inclusiveness of development on each and every level.

Determinants and Instruments of Inclusiveness. Barriers for Inclusiveness

Due to complexity, multidimensionality and multi-level character of inclusiveness, its determinants, instruments, as well as barriers for inclusiveness of development are diversified.

Determinants of inclusiveness embrace: education, infrastructure, ethics, investment, entrepreneurship, social care. The factors listed above are interrelated and mutually tied up. Creating and strengthening inclusiveness requires respective institutions, structural actions and economic policy settlements. World Economic Forum (WORLD ECONOMIC FORUM 2017, WORLD ECONOMIC FORUM 2018) listed seven pillars of inclusive growth and development:

- Education and skills (access, quality and equity of education);
- Basic services and infrastructure (basic and digital infrastructure, health-related services and infrastructure);
- Corruption and rents (business and political ethics, concentration of rents);
- Financial intermediation of real economy investment (financial system inclusion, intermediation of business investment);
- Asset building and entrepreneurship (small business ownership, home and financial asset ownership);
- Employment and labor compensation (productive employment, wage and non-wage compensation);
- Fiscal transfers (tax code, social protection).

Moreover, the significance of social capital as an essential factor stimulating inclusiveness of development should be underlined. Engagement in the activity of public benefit organizations and institutions, activity for local society, as well as volunteering do promote inclusiveness. Additionally, the creation of pro-inclusive system and promotion of inclusiveness can be achieved thanks to educational and informational actions. Moreover, internationalization, and in particular, contacts with the countries characterized by a higher level of inclusion and inclusiveness, and lower scale of exclusion of various character and different origin, can be treated as pro-inclusive factor.

Instruments stimulating inclusiveness of development embrace regulatory measures, economic and financial measures, as well as managerial measures. Pro-inclusive instruments can be adopted on various levels, beginning with an enterprise level, through local, regional and national levels, up to international and global cooperation. Pro-inclusive instruments can be both active and passive in their character. The application of pro-inclusive instruments should result in reduced exclusion and strengthened inclusion. The list of potential pro-inclusive instruments should include: tax solutions aimed at eliminating tax avoidance and tax fraud, inclusive insurance, microfinance (micro-credits and micro-loans), common education, intensive life-long learning programs, common computer and technological education, inclusive spatial planning, inclusive regional development, promotion of and respect for human rights, higher environmental and ecological standards. These instruments should be used together, due to the fact that none of them used separately can provide a more inclusive growth and development.

Unfortunately, there are many barriers for practical implementation of inclusiveness of development, creating inclusive socio-economic system. It'd be extremely difficult to make full and complete list of the barriers. Some of them, however, should be listed here, namely:

- weaknesses of education systems, including not adequate preparation of both educational institutions of all levels and teaching personnel, as well as lack of continuity of education (especially falling out of education institution too early);
- inefficient and ineffective legal system (both in regard to law making and law enforcement), which results in the exclusion of part of the society (due to complexity of regulations and constant changes of legal regulations);
- poor construction of tax system, which overburdens the weakest entities, while privileged entities (both natural and legal persons) obtain tax reliefs and tax exemptions;
- weaknesses of labor law (the weakest workers, often the least educated ones and – therefore – the least aware of their rights, the worst-paid employees are usually positioned in an asymmetrically worse situation);
- weaknesses of political systems, including lack of democracy in some countries and immature democracy in other countries, usually connected with abuse of power by those in power and lack of rights awareness by part of society;
- various psychological and mental barriers, which make it difficult (or even impossible) to create an inclusive (or at least pro-inclusive) society (e.g. prejudice and superstition regarding nationality, race, religion, culture, sex, age);
- insufficient attitudes and expectations regarding the increase of inclusiveness, both among the representatives of privileged groups and entities, as well as those marginalized and hurt by the binding rules;
- financial barriers, including lack of public funds for the implementation of pro-inclusive instruments, actions and solutions, and lack of the willingness of banks and commercial institutions to offer such pro-exclusive financial instruments;
- generational and intergenerational barriers, the classic generation gap, not only in individualistic sense, but also holistically at both national and international level.

Moreover, one should underline the significance of the 2020 pandemic and global lockdown as a possible new barrier for practical implementation of inclusiveness of development paradigm. The COVID-19 pandemic brought enormous negative economic, financial, social, educational, cultural, psychological and mental effects. It will be extremely difficult to promote inclusiveness in the post-pandemic global environment. On the other hand, however, the significance and importance of inclusiveness of development in the post-pandemic reality will be even greater.

Measuring Inclusiveness

World Economic Forum indicates three key performance indicators regarding inclusiveness, namely (World Economic Forum 2017, World Economic Forum 2018): growth and development indicator, inclusion indicator, intergenerational equity and sustainability indicator. Growth and development indicator is based on four elements, i.e. GDP per capita, employment, labor productivity and healthy life expectancy. Inclusion indicator reflects for elements, namely: median household income, poverty rate, income Gini and wealth Gini. Intergenerational equity and sustainability indicator is the resultant of four elements, i.e.: adjusted net savings, public debt as share of GDP, dependency ratio and carbon intensity of GDP (World Economic Forum 2018).

OECD evaluates inclusiveness with the use of two indicators, i.e.: I. Human well-being and II. Sustainability of well-being over time. When it comes to Current well-being, the following elements are taken into consideration: 1. Quality of life (health status, work-life balance, education and skills, social

connections, civic engagement and governance, environmental quality, personal security, subjective well-being) and 2. Material living conditions (income and wealth, jobs and earnings, housing). Sustainability of well-being over time is assessed in regard to preservation of different kinds of capital, i.e. natural capital, economic capital, human capital and social capital (OECD 2019 b; OECD 2011). The overall objective is to evaluate the chances and opportunities for future well-being through the protection of the four types of capital.

Discussion and Literature Review

Inclusiveness and its lack or shortage (i.e. exclusiveness), inclusive growth and development, as well as inclusive wealth are studied by many researchers worldwide. In-depth studies in the field of inclusiveness of development were undertaken by Gupta and Pouw (2017a), who applied an interdisciplinary approach.

Inclusiveness of an enterprise was studied by Dennis (1997), Desai (2014), Likoko and Kini (2017), as well as Shore, Cleveland and Sanchez (2018), Pilková, Jančovičová and Kovačičová (2016), Kourula, Pisani and Kolk (2017). Dobrea and Podgoreanu (2014) analyzed inclusiveness from a managerial perspective. Relations between inclusiveness and corporate social responsibility was studied by Grover (2014). The significance of leadership for the creation of inclusiveness was diagnosed by Blom and Alvesson (2015), Ye, Wang and Guo (2019), as well as the team consisting of Randela, Galvin, Shore, Holcombe Ehrhart, Chung, Dean and Kedharnath (2018).

The importance of inclusiveness from the perspective of educational systems was analyzed by Arocena, Goransson and Sutz (2015), as well as Jurkowski and Muller (2018).

Berkhout, Bouma, Terzidis and Voors (2018) studied the possibilities of creation and strengthening of local level institutions, so as to promote inclusiveness.

Biswas (2019) focused on inclusiveness of urban policy. Liu, Hu and Jeong (2019) studied the prospects for pro-inclusive development of cities on the example of selected Chinese cities. A city level of inclusiveness was also analyzed by Chu, Anguelovski and Roberts (2017), Hu and Wang (2019) and Esposito De Vita and Oppido (2016).

Inclusiveness of infrastructure projects was evaluated and assessed by Lenferink, Tillema and Arts (2013). Planning of inclusive development of national economies lied in the center of research conducted by Chimhowu, Hulme and Munro (2019), as well as Brand, Boos and Brad (2017). The significance of inclusiveness in the area of governance was analyzed by Karar and Jacobs-Mata (2016), as well as Eizagirre, Rodriguez and Ibarra (2017). Political dimension of inclusiveness was also studied by Ratinem and Lund (2015). Chapman and Shigetomi focused their research on interdependencies between the development of national systemic solutions for inclusive development and predominant life style factor (2018).

Financial dimension of inclusiveness in the context of specific micro-waqf instruments was studied by Mahat, Jaaffar and Rasool (2015). Mostak Ahmed (2016) analyzed financial inclusiveness from the perspective of tax evasion. Financial inclusiveness lied in the center of research conducted by Corrado and Corrado (2017), as well as Frączek (2017).

The importance of social capital and networks for inclusiveness' promotion was studied by Annen (2003). Pansera and Owen (2018) analyzed relations and ties between innovation and inclusive development (2018).

Antonelli and Gehringer (2017) focused on the assessment of relations and dependencies between technological changes and rising income disparities and inequalities. Toms, Verity and Orrell (2019)

analyzed the importance of technological development for increased inclusion of the old. Siddiqi and Collins (2017) evaluated impact of technological changes and new socio-technical solutions on inclusive development.

Gender dimension of inclusiveness was studied by Mansdotter, Lindholm and Lundberg (2006), Koralagama, Gupta and Pouw (2017), as well as Drori, Manos, Santacreu-Vasut, Shenkar and Shoham (2018). Kumar focused on the assessment of the possibilities of creation inclusive green economy (2017). Stiglitz studied prospects for inclusive and sustainable growth of emerging economies (2016). Prospects for inclusive growth of African economies was analyzed by Ngepah (2017), Imbaya, Nthiga, Sitati and Lenaiyasa (2019), as well as Whajah, Bokpin and Kuttu (2019). Mohanty, Gurpur and Beerannavar (2014) focused on inclusive development of South Asia, mostly in the context of human rights.
Inclusiveness of Asia was also evaluated by Aoyagi and Ganelli (2015) and Nath (2014).

Interdependencies between inclusiveness and human rigths lied in the center of research conducted by Arts (2017). Diaz-Sarachaga and Jato-Espino (2019) studied inclusiveness in the context of millennium development goals and their implementation. Kosiedowski (2016) made an attempt to evaluate the implementation of inclusive development concept in Central and Eastern Europe. Inclusiveness of the Polish economy was analyzed by Mączyńska (2014), whose proposals were critically discussed by Miszewski (2016).

Research on exclusive / inclusive wealth was conducted by Ahmad, Derrible and Managi (2018), Halford, Aktouf and Ebrahimi (2008), De Nardii and Fella (2017), Rabiul Islam (2018), Collins, Sellin, de Weck and Clark (2017), Yamaguchi (2014), Halkos, Managi and Tsylika (2018), as well as Engelbrecht (2016). The significance of more inclusive development of service sector was studied by Santana, Cardoso, Ferreira, Montanha, Catapan and Forcellini (2018). Pawlas, Talar, Dziembała and Czech (2020) studied opportunities and challenges for the world economy in terms of inclusiveness.

International organizations actively participated in the promotion of the concept of inclusiveness. United Nations (2000) stressed the need for increased inclusiveness in Millennium Development Goals. Moreover, inclusiveness lied in the center of other UN documents, like e.g. UN Global Sustainable Development Report 2015 (United Nations 2015) or 2030 Agenda for Sustainable Development (United Nations 2016). OECD (2019 a) implemented "Inclusive Growth Project", aiming at analytical and conceptual work in the field of inclusiveness, and establishing public policy options relating to the promotion of inclusiveness of growth and development. EBRD underlined the necessity to achieve higher inclusiveness in EBRD's Transition Report 2016 "Transition for all: equal opportunities in an unequal world" and, later EBRD launched Economic Inclusion Strategy 2017-2021 (EBRD 2017). The central position in EBRD Economic Inclusion Strategy was given to: regions, the young, the old, as well as people with disabilities. EBRD Economic Inclusion Strategy adopted the strategic themes: 1. Access to employment and skills, 2. Entrepreneurship and access to finance, 3. Access to services that enhance economic opportunities. EBRD Economic Inclusion Strategy is based on the assumption of active engagement of private sector in the creation of inclusive market economy. Additionally, it assumes strengthening strategic partnerships on both national and international levels. The European Union also promoted pro-inclusive growth and development. In 2010 the EU adopted Europe 2020 Strategy, which consisted of three priorities, namely: 1. Smart Growth, 2. Sustainable Growth, 3. Inclusive Growth. The Inclusive Growth priority fully corresponded with the concept of inclusiveness. The EU listed three measurable targets within this priority: reducing the number of people living below poverty line by 20 million, increasing employment rate of people aged 20-64 years up to 75%, reducing school drop-out rate to 10% and increasing tertiary education up to 40% by the year 2020. Therefore, education and activity on labor market were considered crucial factors stimulating inclusiveness by the EU (European Commission 2010; European Commission 2019). In 2019 the EU adopted next strategic documents stressing the need for further promotion of inclusiveness: A New Strategic Agenda 2019-2024 (European Council 2019) and Sibiu Declaration (Council of the EU 2019). EU leaders emphasized the vital need to

prevent further deepening of intergenerational, territorial and educational divisions, to ensure equal opportunities and adequate social protection, as well as to develop greater inclusiveness of labor markets and to promote social cohesion.

The COVID-19 pandemic made existing inequalities more visible. Moreover, the coronavirus pandemic further widened inequalities and enormously strengthened disparities on all levels (individual, sectoral, local, regional, national, global). The COVID-19 did hit both the rich and the poor, the young and the old, the highly educated and qualified and those with limited education and qualifications. The COVID-19 crisis is unique and radically different from previous crises. The post-pandemic global economy will be, therefore, radically different from the global world characteristic for 2019. It seems that the first post-pandemic years will bring the global economy featured by even greater inequalities and disparities. The question is, whether, the post-pandemic global economy actors will undertake the necessary efforts to minimize the inequalities and disparities, and to create social inclusiveness, economic and financial inclusiveness, digital, relational, generational and intergenerational inclusiveness, gender inclusiveness, cultural and political inclusiveness. If not, the post-pandemic global world will be characterized by strong and rising exclusiveness of development.

Conclusions

Inclusiveness is a relatively new concept. The process of its shaping and development is under way. Due to rising development disparities and inequalities in the world economy and persistence of instability which followed the global 2008+ crisis, and will (undoubtedly) follow the COVID-19 pandemic crisis inclusive growth, inclusive development, inclusive wealth, and finally construction of inclusive economy and creation of inclusive socio-economic system are considered as essential challenges for global economy in the 21st century. Higher level of inclusiveness could result in considerable benefits, and in particular:

- higher relational, psychological, social, material and environmental wealth;
- increased economic, social and ecological sustainability;
- development, diffusion and practical implementation of knowledge;
- greater control over raw materials in global terms;
- reduced susceptibility and higher resistance of an economy for external influence;
- increased ability to implement desired changes.

In 2020, however, inclusiveness remains – to a great extent – a utopian concept. There are numerous barriers and limitations (political, legal, financial, cultural, mental), which adversely affect the process of creation and practical implementation of inclusiveness and inclusive development in the global economy. They have been enormously strengthened by the COVID-19 pandemic crisis. Lack of inclusiveness results in a number of disadvantages and threats. Lack of inclusiveness is also considered a brake for development, due to the fact that exclusiveness causes limited social capability to use knowledge and assets, moreover exclusiveness results in rising local, regional, national, international and global conflicts.

The need for the creation of higher inclusiveness in a global scale was indicated by international institutions and organizations, including: United Nations, Organization for Economic Cooperation and Development, World Bank, European Bank for Reconstruction and Development, European Union. Therefore, inclusiveness can be treated as a precious development indicator, and at the same time as a difficult and actual development challenge for contemporary world economy. Due to the complexity, multidimensional and multilayered character of exclusiveness which will probably rise in the years to come, it can be considered a global problem for the post-pandemic world economy.

The COVID-19 pandemic is under way. The global economy is experiencing an unprecedented health crisis and socio-economic crisis. COVID-19 is affecting 213 countries and territories around the world; over 27.0 million coronavirus cases and almost 893 thousand coronavirus deaths were reported (as of September 6, 2020) (Worldometer 2020). The COVID-19 pandemic has already influenced individuals, sectors and industries, regions and national economies, as well as the global economy – both directly and indirectly (unprecedented fall in GDP, huge rise in public debt, financial markets and exchange-rates destabilization, worsening labor market situation – reduced employment, rising unemployment, higher rate of inflation, reduced international trade turnover, reduced investment; with entertainment, recreation, tourism, culture, air transportation and travel sector having suffered the most). At present, the number one task is to respond successfully to the COVID-19 pandemic, i.e. to limit the direct and the indirect impact of the coronavirus (to reduce mortality and to limit the depth of socio-economic crisis). The effects and impacts of the COVID-19 pandemic will shape the global economy for decades. The COVID-19 pandemic highlighted important questions regarding the relations between state and market, democracy and centralism, multilateralism and unilateralism, the role of international organizations. Therefore, the architecture of the post-pandemic global economy will have to be reorganized in terms of new coordination mechanisms, new relations between state and private sector, regulation and supervision, freedom and spontaneity, politics and market. The architecture of the post-pandemic global economy will embrace new supply chains and changed consumption models. In all those senses, the world will no longer be what it was. It'll not be possible to simply return to pre-pandemic routine, life-style and economic relations, to return to pre-pandemic normalcy. The COVID-19 pandemic experience, the global economy is going through in 2020, will necessitate changes on all levels and in all dimensions (Juetten 2020; Kołodko 2020; Rapoza 2020; Shih 2020). Additionally, due to the fact that COVID-19 strengthened the disparities and inequalities, creating inclusive post-pandemic global economy ought to be considered a true challenge in the next decades of the 21st century.

The inclusiveness of development requires further study. In subsequent research, it would be necessary to compare the situation in selected economies before the COVID-19 pandemic and in post-pandemic time in order to see the scope of disparities and inequalities. Moreover, further research should include the evaluation of actions and policies undertaken during the COVID-19 pandemic (and especially during the lockdown) by various states. Additional research should focus on changes in the role of international organizations (like the United Nations, World Health Organization, the European Union, the World Bank, the EBRD, the OECD) during the pandemic and in post-pandemic global economy.

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Improving the Regional Investment Policy Mechanism

Larisa AGUZAROVA
North-Ossetian State University named after K.L.Khetagurov, Vladikavkaz, Russia
aguzarova-larisa@ya.ru

Fatima AGUZAROVA
North-Ossetian State University named after K.L.Khetagurov, Vladikavkaz, Russia,
aguzarus@yandex.ru

Bimbolat DREEV
North-Ossetian State University named after K.L.Khetagurov, Vladikavkaz, Russia,
dreevbimbolat@mail.ru

Abstract

The article shows the improvement of the mechanism for implementing the investment policy of the region on the example of the Republic of North Ossetia-Alania. The features of the economic and geographical position of the republic and its natural resource potential are revealed. The investment potential and investment risks of the Republic of North Ossetia - Alania are analyzed. The main directions for attracting investments have been determined. The territorial advantages of the region as a whole and in individual areas have been studied. Considered and analyzed investment projects currently being implemented in North Ossetia-Alania. The planned investment projects were considered. The main problems that hinder the systematic increase in the investment attractiveness of the region are identified and the ways of their solution are proposed. The proposed approach can be used in the development of regional investment policy.

Keywords: Methods and Tools, Mechanism, Regional Investment Policy

Introduction

The potential for investment in a specific region is determined by a set of objective prerequisites, which depend on the presence and originality of areas and objects of investment. In addition, an important aspect of the investment potential is the socio-economic situation of the territory, herewith the advantages include the geographical, climatic, demographic and geostrategic components of this process [3, p. 132].

The relevance of the problem under consideration is due to the fact that the regions that have the main competitive advantages in terms of the availability of resources and climatic factors are faced with problems of increasing investment attractiveness.

The republics of the North Caucasus have the broadest potential for the development and promotion of the tourist and recreational complex. In this regard, the Republic of North Ossetia-Alania stands out.

In North Ossetia-Alania, which has absorbed the culture and languages of dozens of peoples living in it, traditional values are being brought to the forefront, which include respect for elders, the promotion of a healthy lifestyle, and the popularization of the cultural heritage of the region. Thus, a large number of centenarians was noted in Caucasus: according to some sources, more than 42 percent of all the inhabitants of the planet whose age has reached one hundred or more years live in this particular region [4, p.22]. Gerontologists scrupulously study the life and living conditions of long-livers of the region, along with such well-known long-lived territories of living as some regions of Italy.

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Materials and methods of research

The potential and most probable opportunities for the development of leisure and tourism promotion in North Ossetia-Alania, in our opinion, are:

- natural and climatic conditions, the uniqueness of which was repeatedly emphasized in the directories not only of modern Russia, but also in Soviet times, when tourists massively and in an organized manner arrived in the republic for a spa-vacation and to get acquainted with the amazing nature of the Caucasus;

- the historical and ethnic heritage of the republic, the development of which is on the agenda not only at the republican, but also at the federal level.

- the presence of a significant amount of legally free land, which may contribute to the organization of the construction of hotels of middle and upper class, which is a deficit in the republic. This is noted so far by a few tourists;

- the immediate proximity of resort sites to existing transport arteries and energy infrastructure;

- the accessibility and a high level of education, as well as the abundance of labor resources capable of changing the field of activity.

Significant positive prerequisites for development in the tourism industry should include the presence of mineral water sources on the territory of North Ossetia-Alania, the diversity and useful qualities of which are known not only in Russia but also in the world. They are a favorable factor in the development of the sanatorium-and-health-resort complex of the republic.

Protected areas are also the hallmark of a relatively small republic. Among them territories of federal subordination are allocated, which include the North Ossetian State Nature Reserve, "*Alania*" National Park, and the integrated nature reserve "*Tseisky*". The diversity of the republic's territories includes three hunting reserves and, in total, 216 natural monuments. In total, the area of specially protected natural territories of the republic is 192 011 hectares, which corresponds to 24% of its area.

The republican potential for expanding the tourist and recreational complex involves visiting 1.8 million tourists a year. 9 investment sites in this area today cover such areas as: Mamisonskaya; Vladikavkazskaya; Tamisk-Biragzangskaya; Kora-Ursdonskaya; Digorskaya; Kurtatinskaya; Kazbekskaya; Naro-Zakkinskaya, as well as the Tibskoye mineral water deposit, which is part of the Mamison investment site. All this is a bulwark of the powerful development of the base of the sanatorium component of the republic's recreational complex.

Tamisk field, which is about 10 thousand cubic meters per day proven reserves can serve as a reliable base for the treatment of over 20 thousand people.

Vladikavkaz, Digorskaya, Tseiskaya, Naro-Zakkinskaya, as well as Mamison investment sites are promising areas for the development of the tourist component of the republic's recreational complex. These investment sites are distributed throughout the republic, which in its turn will allow tourists to get acquainted with the multifaceted nature and resource potential of our region, and investments will be evenly distributed across all areas. Each of the destinations is unique and original in its own way and is able to attract large flows of tourists.

The next promising direction for the development of the tourist and recreational complex is the development of agritourism. The basis of this type of tourism is networks of small forms of collective accommodation (guest houses) in the most remote mountain villages. But this type of activity requires support from the state in the form of financial injections, tax benefits and information support. Such a development of agritourism is possible within the framework of the Agritourism Support Fund [7, p. 35].

Discussion

The republican authorities are undoubtedly ready to support the development of projects in the field of agriculture and agritourism, which will be implemented in the mountainous territories of North Ossetia-Alania. Active work in this direction (mountainous areas) includes the development of gardening, sheep breeding, milk processing, the creation of the basis of agritourism.

Dargavsky gorge will become the basis for laying pear orchards with an area of 8 hectares, the allocated grant will allow opening a milk processing workshop in the village of Unal. But this is not limited to the geography of development of similar industries: pilot projects will be implemented in Mozdok and Iraf districts. Another area of development of farm production is Mountain Kartsa, in which there is a lot of undeveloped land, and there is the possibility of creating a whole cooperation of young people united by one useful thing. State support from the republican authorities in this area consists in the issuance of more than 180 million rubles to grants to start-up entrepreneurs - the so-called "Agristartups". And the sum that will be invested in agriculture in this direction will amount to 1 billion rubles until 2024. This must be done for the development of mountainous territories in order to prevent the outflow of the population. Republican authorities should and will create conditions for business development in the mountains, as this is an important area for North Ossetia, where about half of all agricultural land is located in the mountains.

The republican authorities plan to open five tourist routes, covering all gorges and specializing in horseback riding, extreme sports and jeeping. Another of the directions of the territorial development of tourism in the republic may be the ecological type of tourism, the base of which can be the National Park of Alania, founded in 1998 in the Iraf district of North Ossetia-Alania. Its area is 54.926 thousand hectares, on which unique natural, historical and cultural complexes (monuments) of Mountain Digoria, the northern macro slope of the Greater Caucasus, are preserved. They have ecological, historical and cultural value.

The park is given the status of an international ornithological territory, as it is the keeper of many monuments of different eras. Unique in its beauty, a place that freshens the alpine air, seasoned with untouched nature, will become an attractive place for nature lovers from around the world.

These advantages are an important basis in the development and promotion of almost all types of tourism: extreme and skiing, ecological, rural, historical and ethnic, health-improving. These positive aspects are a powerful factor in attracting investment in both the tourism and hotel business of the republic.

The results of the study

The statistics of 2019 shows that over the past New Year holidays, about 1.3 million Russians visited the country's ski resorts, which is 16.7% more compared to the previous period. This suggests that a visit to Russian ski resorts on New Year's holidays confirms the need for further development of the ski infrastructure and the correct determination of the ski industry as one of the most important points of attraction of tourist and investment flow to the region.

Despite the huge potential in the development of the hotel business in the Republic of North Ossetia-Alania, there is a shortage of hotel services and similar accommodation facilities. The data are presented in table 1.

Table 1: The number of hotels

	2015	2016	2017	2018	2019
All inall	9	10	11	14	15

Table 2 reviews the full range of investment potential of the Republic of North Ossetia-Alania.

Table 2. Analysis of the investment potential of the tourism industry of North Ossetia-Alania [8]

Strengths	**Weaknesses**
Natural and climatic conditions that provide prerogatives for organizing business in the field of tourism of various directions, from recreation to treatment and prevention, which meet the standards of Europe and the world.	The unspecified positioning of the republic as a center of tourist and recreational services, providing high-quality rest of the medical and preventive direction.
The presence of investment sites, which in the future can serve for the development of the tourism industry.	Underdeveloped infrastructure for tourism business.
A high probability and possibility of developing the tourism business of the mountain-recreational direction (medical tourism, agritourism).	The target user cannot use the tourism products prepared specifically for him.
	Republic promotion programs are absent.

Source: Compiled by the author.

The characteristic of investment risk in North Ossetia-Alania is the likelihood of loss of investment and income from them. The difference between investment potential and investment risk is that the risk undergoes changes that occur over fairly short time periods. The degree of investment risk is affected by legislative, political, socio-economic, financial, criminal and environmental factors that occur in North Ossetia-Alania.

Recently, the indicators of the republican investment rating are characterized by the indicator 3C2, which means low potential and a high degree of risk. Another 8 regions in the Russian Federation have a similar indicator according to the RAEX Rating Agency: Karachay-Cherkess Republic, Kamchatka Territory, Kabardino-Balkarian Republic, Jewish Autonomous Oblast/Region, Chechen Republic, Republic of Kalmykia, Chukotka Autonomous Okrug/District, Altai Republic.

Ranks of investment risk and investment potential of the Republic of North Ossetia-Alania for the period 2018 -2019 presented in table 3.

Table 3: Ranks of investment risk and investment potential of the Republic of North Ossetia-Alania for the period 2018 -2019

Components of the indicator of investment potential and risk	Places occupied by the republic in the ranking	
	2018	2019
Investmentpotential	64	63
Share in the all-Russian potential, %	0.516	0.521
Laborpotential	59	62

Consumerpotential	64	67
Productionpotential	73	74
Financialpotential	69	70
Institutionalcapacity	72	73
Innovationpotential	67	68
Infrastructurepotential	7	8
Naturalresourcepotential	76	77
Touristpotential	74	75
Investmentrisks	77	78
WeightedAverageRiskIndex	0.438	0.394
Legislativerisk	-	-
Politicalrisk	-	-
Economicrisk	75	78
Financialrisk	73	76
Socialrisk	66	69
Criminalrisk	80	83
Environmentalrisk	42	45
Managerialrisk	72	75

Based on the data of table 3, it can be noted that the republic is located at 63 place in the rating of investment attractiveness of the regions of the Russian Federation.

The Republic of North Ossetia-Alania has certain prospects for the development of financial and economic activity, which is the basis for the investment development of the region. One of the promising areas for investors is the development of resort and recreation sphere and tourism.

32 promising investment projects of North Ossetia-Alania united various sectors of the real sector of the economy, from industrial and agricultural production to tourism and the social sphere.

The task that combined the investment projects is to implement the Strategy for the socio-economic development of North Ossetia-Alania until 2030. This document, which has been developing for over a year and a half and adopted in 2020, defines the direction of the region's growth, which consists in highlighting the vectors of further development and developing long-term target programs.

Systematically removing administrative barriers to the development of business and investment, defining dialogue with businessmen and diversifying the forms of state support, North Ossetia-Alania seeks to improve the investment climate. All actions and thoughts are aimed at enclosing potential

investors in an atmosphere of comfort and security, thereby determining that the republic is a favorable territory for life, safe business, professional and career growth.

One of the main projects that the republic has been promoting in federal departments for a year is the Mamison mountain recreation complex project, which meets all international standards for the development of the tourist complex. These are: unique natural beauties and riches of the gorge, the possibility of year-round skiing, numerous healing mineral springs, which allow developing a medical and sanatorium direction. It is assumed that Mamison, which meets international standards, will be launched in 2022. And there are positive trends in financing this project: since Mamison is the "brainchild" of public-private partnership (PPP), then at the meeting of former Prime Minister D.A. Medvedev and the head of the republic V.Z. Bitarov, an agreement was reached on the allocation of a federal share of funds for the implementation of this project.

It should be noted that, according to the legislation, updating of the subject's electric power development programs is annually updated. The programs for 2019-2023 and 2020-2024 are approved. Currently, the Scientific and Technical Center of the Unified Energy System is developing a program for 2021 - 2025.

In the program for 2019-2023, the emphasis was put on commissioning the ZaramagskayaHPP-1 with a capacity of 342 MW and the construction of a high-voltage line 500 kV Nevinnomyssk - Mozdok-2 (Alania) with a length of 265 km. The implementation of these two large-scale projects allowed us to move to a new level of electricity supply in the republic.

The program 2021-2025 will focus on the development projects of the city of Beslan and the resort complex "Mamison". Within the framework of the federal target project "South of Russia" for the power supply of the Mamison mountain recreation complex, the 110/10 kV Mamison substation and the high voltage line 110 kV Mamison - Zaramag with a length of 17 km were commissioned. After updating, previous programs are adjusted. Construction of facilities in accordance with the scheme and program for the development of the electric power industry is carried out at the expense of economic entities and the federal budget.

Despite the high rates of infrastructure development in the republic, they should be developed, since a tendency to decrease in the future is predicted.

The socio-economic development of North Ossetia-Alania indicates that:

- In the republic there are favorable natural resource and unique recreational conditions that are attractive to investors, both domestic and foreign;

- it is necessary to apply modern organizational and economic methods in the work of organizations in the field of construction and to increase the level of investment attractiveness of this industry by reducing the cost of materials, structures, as well as in the direction of training specialists in the construction industry; the cheapening of loans, though, remains the problem;

- the transport industry also requires increasing investment attractiveness in connection with the possible reconstruction of the Vladikavkaz airport;

- information technologies should permeate both the economic and social life of the republic in the future. This will help to introduce best practices in the practice of the republic more quickly;

- state support, both from the republican government and from the federal authorities, should be the basis for the provision of information services, the development of information products;

- reserves to increase the investment attractiveness of the republic of north Ossetia-Alania is concentrated not only in the development of tourism business services.

Attention should be paid to the experience of developing the investment potential of the neighboring republics of the North Caucasus Federal District, whose plans and their implementation can serve as

an example of investing not only in the tourism industry, including agritourism, but also in areas that can bring big dividends in the future. These are:

- construction of a modern fruit storage in the Stavropol Territory. The total project cost is estimated at 4.6 billion rubles;

- construction of a large dairy complex in the Chechen Republic;

- modernization of a mutton plant in the Karachay-Cherkess Republic;

- construction of a plant for the production of pipe fittings in Dagestan;

- construction of a storage for seedlings in the Stavropol Territory. Investments in the project will amount to 400 million rubles;

- construction of a greenhouse complex and the creation of an agricultural park in Ingushetia with a design value of 1 billion rubles.

On the example of successful investment in neighboring regions, in North Ossetia-Alania, one of the objects that will be embodied in 2020 will be the construction of a fruit storage for 2.5 thousand tons. This will be possible at the expense of the “Vladka” company’s own funds. This will be the second stage of the fruit store, in addition, the garden of the Saint-Germain pear variety will be laid. The implementation of this project became possible within the framework of the state program "Development of the North Caucasus Federal District". The republican part of the program began to be implemented as early as 2016 by the Ministry of the Russian Federation for North Caucasus Affairs together with the Ministry of Economic Development of the North Ossetia-Alania and JSC “Investment Development Corporation of the North Ossetia-Alania”.

The plans of the “Vladka” company include the implementation of an investment project that provides for the laying of an intensive apple orchard with an area of 122 hectares, which uses a drip irrigation system. The implementation of this investment project will create more than 30 permanent jobs, the number of seasonal workers attracted can increase to 100 people [8].

LLC “Vladka”, located in the village of Tsrau in North Ossetia, participated in laying the first garden of the enterprise, whose area at that time was 33 hectares. Experts from Italy, North Ossetia, Krasnodar Territory, Rostov Region and Kabardino-Balkaria participated in this process. The planned size of the garden in 2019 was 122 hectares, the yield of which should be 6 thousand tons annually. Varieties of grown apples: *Gala* (red), *Fuji* (violet-red), *Golden* (gold), *RedDelicious* (red), *GrannySmith* (analogue of the "semerenko" - green). Promising summer varieties *SummerFree*, *RedFree* and *Galmack* (red) are also grown.

Conclusions

Summing up the above, I want to say that North Ossetia-Alania, having huge potential for developing investment attractiveness, like other regions, faces a number of problems that are systematically being addressed by the current government of the Republic. Projects are being developed that will help to attract investment in spa and recreation complexes and various types of tourism, including agritourism, extreme tourism and sanatorium and recreation. But despite the huge natural resource potential, the government is not going to get stuck only in this direction. This is evidenced by the intention to build a meat factory in the republic. Investments in construction will amount to 700 million rubles. The creation of such powerful agri-industrial complexes will help to promote the republic in providing itself with high-quality products and their marketing to other regions of Russia, and accordingly, the development of the economy and improving living standards in the region.

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Does Investing in IPO's Pay-Off? Evidence from Indian Stock Market

T.Ramesh Chandra Babu Ph.D.

CHRIST University, Bangalore, India
email: aarseebee@gmail.com

Abstract

Purpose: (a) To ascertain the IPO's listing gain or loss and analyse the post IPO's performance. (b) To analyse the impact of IPO subscription ratio, IPO lead manager's (BRLM), sponsor bank's and IPO registrar's reputation on the listing gain or loss. **Design/ Methodology/Approach:** This research paper is based on empirical analysis. All the 16 IPO's listed in the NSE (National Stock Exchange, India) during the year 2019 were considered for the study. The study is based on secondary data. The daily share price and Nifty-50 index value were taken from NSE website (www.nseindia.com) and other relevant data from red-herring prospectus of the respective company. The research / statistical tools used are Event Study, ANOVA, multiple regression, correlation, covariance.**Scope of the study:** The scope of the study is limited to the IPO's listed only in the National Stock Exchange (NSE), India. **Period of study:** The study covers a period from January 2019 to December, 2019. **Limitation of the study:** The study considers only the influence of the external factors on the performance of IPOs. **Findings:** The analysis reveals that 68.75% of the IPO's have given a listing gain and in that only 43.75% of the IPO's have given listing gain more than 10% during the year 2019. The analysis clearly reveals that 68.75% of the IPOs were underpriced and 31.25% of the IPOs were overpriced. The abnormal return of only 56.25% of the IPO's were found to be significant on the listing day. The CAR was positively significant for only 56.25% of the IPO's. The CAAR of all the IPO's listed during the year 2019 was significant only on the first four trading days and the same has gradually disappeared by the end of 30 trading days. The subscription ratio of QIB has very high degree positive influence followed by RII on the listing gain and the subscription ratio of HNI has negative influence on the listing gain. The analysis shows that the Book Running Lead Manager (BRLM), the sponsor banks and the registrar of the IPO issue have no significant influence on the listing gain or loss. **Originality / Value:** This is an original work that analyses the listing gain or loss and the post listing performance of IPO's in India and other factors that might influence the listing gain or loss.

Keywords: IPO Underpricing, IPO performance, listing gains, subscription ratio, event study.

Does investing in IPO's pay-off? Evidence from Indian stock market

Introduction

Initial Public Offering (IPO) refers to the issue of shares by the company directly to the public for the first time. The subsequent issue of shares by the company directly to the public is referred to as Follow on Public Offer (FPO). It is really a tricky decision to put the money in a relatively new company. In IPO investing, there is a chance of getting a significant first day capital gains, or long-term capital gains. On the other hand, there is a chance of incurring a significant first day capital loss, or long-term capital loss.

Usually, a company hires an investment bank to manage an IPO before it goes for a public issue. The under-writers and investment bankers assess the quality of management, future cash flows and returns before arriving at the final offer price and the comparative valuation is done based on the listed peer company.

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The usual anomaly which an investor finds in an IPO issue are (a) underpricing or overpricing (b) information asymmetry (c) agency problem between the investment bank and the issuing firm. IPO underpricing refers to a situation where the listing day closing price is greater than the initial offer price and the overpricing refers to a situation where the listing day closing price is lesser than the initial offer price. An IPO maybe underpriced deliberately or accidentally. Sometimes, an IPO maybe deliberately underpriced to woo the investors or accidentally underpriced when the underwriters underestimated the demand. Information asymmetry refers to the imbalance in the knowledge of information among the investors (and other stakeholders) about the company and its potential growth.

Theories related to the study

The theories closely related with this study are the theories of Under Pricing. The IPO Underpricing theories can be broadly classified into (1) Information Asymmetry theories (2) Institutional theories (3) Ownership and Control theories (4) Behavioral theories.

The theories that support Information Asymmetry theories are: (a) Principal – Agent theory (b) Ex-ante Uncertainty theory (c) Book-Building theory (d) Signaling theory (e) Certification (f) Winner's Curse theory (g) Entrepreneurial Wealth loss theory (h) Partial adjustment theory.

The theories that support Institutional theories are: (a) Law-suit avoidance theory (b) Price Stabilization theory (c) Tax argument theory.

The theories that support Ownership and Control theories are: (a) Entrenchment Managerial Control theory (b) Agency-cost theory.

The theories that support Behavioral theories are: (a) Information cascade theory (b) Investor Sentiment theory (c) Prospect theory.

All the above said theories tried to give explanations as to why the IPO Under-pricing happens and the variations in in the IPO Under-pricing among different firms across different countries. Despite enough evidence of underpricing, all the available research papers show that there are no universal explanations for IPO underpricing.

Review of literature

Miller (1977) first hypothesis was that underwriters set the issue price based on the mean assessment of the investor. The second hypothesis is that the price in the secondary market is determined by the assessment of optimistic investors. Spatt and Srivastava (1991) stated that the under-writers fix the price based on the potential demand and supply equilibrium (market clearing bid price). Benveniste & Spindt (1989) was of the view that the IPO price is based on the intrinsic value. Serman and Titman (2002) stated that the method of pricing (market clearing bid price or intrinsic value) chosen by the underwriter is based on the cost-benefit analysis. Rock (1986), Boone et al (2016) and Chaplinsky et al (2017) proved that the information asymmetry lead to IPO underpricing. Aggarwal et al. (2002) stated that the underpricing is a strategic decision of investment banks Firms to maximize their wealth after the lock-in period of their shares. Loughran and Ritter (2002) explained that underpricing is the outcome of agency problems between the investment bank and the issuing firm.

Chang et al. (2017) gave evidence that agency problems between the investment bank and the issuing firm lead to excessive underpricing in Taiwan's stock market. Baron (1982) revealed that IPO underpricing is the outcome of agency problem between underwriters and issuing firm and the underwriting firm benefits more from the underpricing than from underwriting fees. Ljungqyist (2007) revealed that the underwriters' gain from underpricing exceeds the loss of underwriting fees. Lowry et al. (2017) stated that IPO underpricing can be minimized by minimizing 'information asymmetry' between investors and issuers and by minimizing agency conflicts between underwriters and issuers. Agarwal et al. (2008) measured the retail investor demand using the subscription ratio.

Statement of problem

Initial Public Offerings (IPOs) is considered to be an important source of finance for the business. Past experiences and several previous research works reveal that several IPOs have given a high capital gain on the listing day (underpricing) compared to its performance in the market. The reasons for the underpricing or overpricing can be attributed to internal and external factors of the firm. The usual anomaly which an investor finds in an IPO issue are (a) underpricing or overpricing (b) information asymmetry (c) agency problem between the investment bank and the issuing firm.

This study attempts to analyze and ascertain the IPO's listing day gain or loss as a consequence of underpricing or overpricing of IPO's and explore the influence of external factors on the performance of the IPO's.

Research objectives

1) To ascertain the IPO's listing day gain or loss and analyse the post IPO's performance.
2) To analyse the impact of IPO subscription ratio on the IPO's listing gain or loss.
3) To examine the influence of IPO lead manager's (BRLM), sponsor bank's and registrar's reputation on IPO performance.

Scope of the study

The scope of the study is limited to the IPO's listed only in the National Stock Exchange (NSE), India.

Period of study

The study covers a period from January 2019 to December, 2019.

Methodology

This research paper is based on empirical analysis. All the 16 IPO's listed in the NSE (National Stock Exchange, India) during the year 2019 were considered for the study. The study is based on secondary data. The daily share price and Nifty-50 index value were taken from NSE website (www.nseindia.com) and other relevant data from red-herring prospectus of the respective company.

Research / Statistical Tools

ANOVA, regression, correlation, covariance and Event study (including the following tools):

(1) Actual Return: $R = Ln(P_1/P_0)$
(2) Expected return: $E(R) = \alpha + \beta(R_m)$
(3) Abnormal return: AR = Actual return – Expected return

(4) 't' statistic of Abnormal return = $\frac{AR}{SE_{YX}}$

(5) 't' statistic of CAR = $\frac{CAR}{\sigma_{YX} * \sqrt{n}}$

Where Cumulative Abnormal Return: CAR = $\sum_{t=1}^{n} AR_t$

(6) 't' statistic of CAAR = $\frac{CAAR}{\sigma_{AAR} * \sqrt{n}}$

Where Average Abnormal Return: AAR = $\frac{1}{n}\sum_{i=1}^{n} AAR_i$

Where Cumulative Average Abnormal Return: CAAR = $\sum_{i=1}^{n} AAR_i$

Limitation of the study

The study considers only the influence of the external factors on the performance of IPOs.

Abbreviation:

a) R – Actual Return
b) AR – Abnormal return
c) E(R) - Expected return
d) CAR - Cumulative Abnormal Return
e) AAR - Average Abnormal Return
f) CAAR - Cumulative Average Abnormal Return
g) QIB – Qualified Institutional Buyers
h) HNI – High Net-worth Individuals
i) RII – Retail Individual Investors
j) BRLM - The Book Running Lead Manager

Analysis

Table - 1: IPO's listed in NSE during the year 2019

	IPO Issue details			Subscription details						
Srl No:	Company Name	Promoters holdings (%)	Issue Size (Rs.in crores)	QIB	HNI	RII	Total	Issue price (Rs.)	Listing day price Close	Listing Gain (%)
1	Indian Railway Catering And Tourism Corporation Limited	87.40	635.04	108.79	354.52	14.94	111.95	320.00	728.60	127.69
2	CSB Bank Limited	49.70	409.68	38.85	45.49	9.01	35.24	195.00	300.10	53.90
3	Ujjivan Small Finance Bank Limited	83.30	750.00	110.72	473.00	49.09	165.68	37.00	55.90	51.08
4	IndiaMART InterMESH Limited	53.00	474.12	30.83	62.13	14.07	36.21	973.00	1302.55	33.87
5	Neogen Chemicals Limited	70.00	131.48	30.49	113.88	16.06	41.18	215.00	263.55	22.58
6	Polycab India Limited	63.20	400.00	92.44	110.42	4.65	51.96	538.00	654.80	21.71
7	Affle India Limited	68.38	90.00	55.31	198.69	10.96	86.49	745.00	873.65	17.27
8	Metropolis Healthcare Limited	57.41	1200.18	8.88	3.03	2.21	5.84	880.00	959.55	9.04
9	Chalet Hotels Limited	71.41	1628.84	4.66	1.10	0.03	1.57	280.00	290.40	3.71
10	Vishwaraj Sugar Industries Limited	32.83	10.00	1.00	1.76	0.64	1.12	60.00	60.35	1.00
11	Rail Vikas Nigam Limited	87.80	430.88	1.36	0.80	2.92	1.82	19.00	19.05	0.26
12	Spandana Sphoorty Financial Limited	62.59	400.00	3.11	0.55	0.09	1.05	856.00	847.80	-0.96
13	Prince Pipes and Fittings Limited	65.80	500.00	3.54	1.21	1.89	2.21	178.00	166.60	-6.40
14	Sterling & Wilson Solar Limited	75.00	3125.00	1.02	0.89	0.30	0.85	780.00	725.35	-7.01
15	MSTC Limited	10.20	213.81	1.13	2.15	2.95	1.46	128.00	114.20	-10.78
16	Xelpmoc Design and Tech Limited	58.17	23.00	1.24	7.69	2.64	3.25	66.00	58.80	-10.91

Table-1 shows that only 11 out of 16 IPO's have given a listing gain. The table also clearly indicates that only 7 IPO's (43.75%) have given listing gain more than 10%. This analysis clearly reveals that 68.75% of the IPOs were underpriced and 31.25% of the IPOs were overpriced.

Table -2: 't' statistic of abnormal return during the first 30 days post listing performance

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DAY	PRINCEPIPE	UJJIVANSFB	CSBBANK	VISHWARAJ	IRCTC	SWSOLAR	SPANDANA	AFFLE	INDIAMART	NEOGEN	POLYCAB	METROPOLIS	RVNL	MSTCLTD	CHALET	XELPMOC
1	-2.378750881	4.733861169	4.874969518	-0.245952116	5.10612665	-2.19186	-0.6100522	3.940695	4.9418539	3.321882	4.821496	3.98454128	-0.25989	-2.20402	1.991696	-1.97134
2	-2.96163406	-1.200815136	0.002709901	-0.167849649	-0.36973485	-1.28168	-0.4893259	-1.43076	0.2718192	0.094206	-0.48769	0.80635099	0.325527	-0.69329	0.937152	0.898988
3	0.818123491	1.324379423	-0.647366995	-0.529817583	-0.33671677	-1.66761	-0.6221816	-0.09462	0.3085788	-0.91367	-0.46016	-0.71882947	3.52938	-0.20286	-1.28094	0.998806
4	-0.379442347	-0.272584424	-0.228289094	-0.310794597	-0.03364129	-0.8811	-0.5308927	-0.39044	-0.369759	-0.68256	0.180303	-0.75994252	1.058163	-0.78776	0.048604	0.885227
5	-0.642244033	-0.400305822	-0.176734241	0.308046115	0.23925203	-0.27419	-0.0866635	-1.28303	-0.1125441	-0.4545	-0.2099	0.35095742	0.367992	-1.53573	1.117126	0.772636
6	0.579010109	0.072509065	-0.982879595	0.11671598	0.33568171	0.714769	-0.109594	-0.64503	-0.1613057	-0.55947	0.12924	-0.3941257	-0.89205	1.071846	0.453562	0.832498
7	0.631092892	-0.358173007	-1.025832168	0.309591519	0.19768101	-0.2403	1.2380888	0.264666	-0.3857799	-0.89611	-0.08153	-0.23495383	-1.42998	0.853315	-0.3331	0.835062
8	0.093988442	-0.47612897	0.363327309	0.075518575	-0.19160581	0.371925	2.1770009	-0.49942	-0.5953597	0.032976	-0.30329	-0.59752345	-0.5259	0.854131	-0.41429	0.85587
9	1.327302715	-0.239004864	0.351564794	-0.158022911	-0.23285763	-0.55731	0.9245728	-0.05121	-0.3816196	0.397981	0.023026	-0.12744251	-0.06235	2.602421	0.504575	0.846373
10	0.663812862	-0.42134272	-0.024460116	-0.734676051	-0.16212138	-1.00658	-0.339027	-0.58641	0.3082325	-0.21359	-0.05164	-0.05329618	-1.20787	-0.7985	-1.2298	0.868833
11	0.687109935	-0.336906489	-0.399924908	0.195814555	-0.43796349	-0.19971	1.2953272	-0.64789	-0.3247421	1.184389	0.128415	0.1063096	-1.21723	0.565409	-0.6534	-2.21462
12	0.404493656	-0.038198426	-0.129279829	-0.21086024	-0.17447874	0.142019	0.9521616	1.704107	-0.5615424	0.002466	0.309144	-0.01665233	1.63679	-0.60473	-0.18349	-1.92894
13	-0.174590384	-0.037965476	0.158982787	0.388219467	-0.28497783	-0.14603	-0.4687028	-0.32503	-0.3299467	0.095898	0.03589	-0.35693952	-0.91252	-0.70399	-0.10907	-1.95541
14	0.858902596	-0.336252237	-0.029640363	-0.034015692	-0.15041483	0.297135	-0.0464699	-0.24292	-0.0677097	-0.04924	-0.00937	0.84176056	-0.173	-0.64071	-0.62122	0.027635
15	-0.840040716	0.27048323	0.006196642	2.029486625	-0.27765892	1.538531	-2.0085771	0.188021	0.0215627	-0.29451	0.318543	0.19638587	0.302561	-0.4568	0.140104	-0.67525
16	-0.25504182	-0.197113112	0.002456916	3.758754559	-0.21793501	0.282054	-0.7485237	0.239775	0.3509402	-0.96099	0.12091	0.3395516	0.192578	-0.24515	-0.7386	0.966653
17	1.450751972	-0.133405706	-0.336737625	-0.693136277	-0.20495733	0.75925	0.221544	-0.42118	-0.5089671	-0.08717	-1.07408	-0.87350089	0.207626	-0.05731	-1.35453	0.837327
18	0.534758713	-0.14148209	-0.300971635	-1.584524809	-0.24518007	2.723397	-0.7464996	-0.3705	-0.3054526	0.23032	-0.52316	-0.84789989	-0.24995	-0.23809	0.211375	0.447477
19	-0.208655254	0.011636134	-0.170922674	-0.169519209	-0.21362166	-0.04908	-1.2479661	0.026868	0.2124036	0.107689	-1.17365	1.15659951	-0.33242	2.286814	-0.47573	-0.51514
20	-0.44349106	-0.643858466	-0.528763522	-1.488100325	0.18901457	0.211809	0.2533408	-0.19792	-0.426062	0.043855	-0.51288	-0.87579095	-0.76697	0.389583	0.041713	-0.10679
21	1.110057984	-0.416037344	0.007166034	-0.971084883	-0.19471658	-0.03022	-0.1656385	-0.19472	0.1621443	-0.66021	-0.40981	-0.97267226	0.050668	-0.11717	0.082745	0.142566
22	1.143100457	-0.169544063	-0.000955178	0.214026458	-0.39496225	-0.52642	0.1575676	0.194992	0.0501242	-0.73896	0.109448	0.55487571	-0.84173	-0.22423	2.090123	-0.24757
23	-0.326685652	-0.185802495	0.198191826	-0.537269765	-0.07020624	0.174364	-0.809562	0.821743	-0.6022595	-0.73714	0.05548	0.89067184	-0.61591	0.440127	0.939757	-0.84683
24	-0.326482892	-0.299554629	0.317996157	0.465419096	-0.24995623	-0.54577	1.8764406	1.363185	-0.1155506	0.182003	-0.29675	-1.20579801	-0.46363	-0.5245	1.970053	-0.51403
25	0.715680858	-0.199725002	-0.119502963	0.258138796	-0.36691776	0.415663	0.602738	-0.05903	0.0374962	2.633308	-0.26799	-0.56879874	-0.23576	-0.30626	-1.8106	1.00766
26	-0.234095033	-0.388200503	-0.468865407	0.018683217	-0.27793861	-0.7613	-0.1478939	0.312621	-0.6539946	0.897369	0.406025	-0.34024695	0.124868	-0.35322	-1.42003	-0.04172
27	-0.491833067	-0.256049395	-0.2241959	0.877181123	-0.28106559	0.830432	1.2823187	-0.11485	-0.1530355	-1.18814	0.127137	0.71505692	-0.03041	0.863365	-0.02866	-0.37694
28	-0.155607632	0.172641295	-0.377053813	-0.641635371	-0.26019377	1.58004	0.0646917	-0.65991	-0.1579348	-0.71161	-0.22639	-0.38809634	0.55309	0.654612	0.127516	-0.13566
29	-0.980179266	0.300064734	-0.346131901	-0.548512913	-0.21239541	-0.40578	0.0202221	-0.21503	-0.5921801	0.414555	-0.27944	0.07699398	1.20788	-0.38613	-0.115	0.036147
30	-0.219412584	0.262875327	0.234946043	0.010176309	-0.22553788	0.723531	-1.8884444	-0.6268	0.1405901	-0.49104	-0.39731	-0.68754576	0.66044	0.498822	0.112344	0.270492

The 't' statistics of abnormal return shown in the table-2 clearly indicates that only 9 IPO's (56.25%) abnormal return are significant on the listing day. On the remaining days all the IPO's abnormal return were not significant.

Table - 3: 't' statistic of CAR during the first 30 days of post listing performance

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DAY	PRINCEPIPE	UJJIVANSFB	CSBBANK	VISHWARAJ	IRCTC	SWSOLAR	SPANDANA	AFFLE	INDIAMART	NEOGEN	POLYCAB	METROPOLIS	RVNL	MSTCLTD	CHALET	XELPMOC
1	-2.965641583	6.746747413	6.876416453	-0.342183862	7.32443137	-2.35942	-0.6537839	4.869318	7.0415084	4.599727	6.595805	4.67302845	-0.31582	-2.98707	2.33385	-2.83204
2	-4.707900387	3.560518382	4.865063596	-0.407086127	4.80413225	-2.64392	-0.8331041	2.193023	5.2529661	3.344736	4.192184	3.97302687	0.056398	-2.77658	2.426788	-1.08933
3	-3.255103036	3.996910754	3.445101976	-0.757958051	3.6436974	-3.19515	-1.0651939	1.723093	4.5428813	2.000538	3.059459	2.75723597	2.52223	-2.4258	1.114866	-0.061
4	-3.055531524	3.267181194	2.822538579	-0.872609302	3.13140631	-3.24131	-1.2069598	1.251022	3.670821	1.259958	2.772897	1.94221006	2.82725	-2.63462	0.993979	0.583035
5	-3.091034363	2.667111416	2.413067808	-0.588821864	2.95429536	-3.03111	-1.1210731	0.409947	3.2115665	0.845494	2.351739	1.92123825	2.728755	-3.28728	1.474461	1.017877
6	-2.527015353	2.476917125	1.636821369	-0.471225975	2.89346811	-2.4529	-1.0713439	0.048843	2.8379139	0.455562	2.219012	1.56513936	2.048454	-2.40782	1.562969	1.417444
7	-2.042180091	2.100239441	0.968489988	-0.273472505	2.78600711	-2.36871	-0.4903729	0.168827	2.4196356	-0.04722	2.012251	1.34488884	1.23971	-1.7921	1.299501	1.765725
8	-1.868856061	1.724678471	1.087133222	-0.218663617	2.50889793	-2.07418	0.3661593	-0.06026	1.9634385	-0.02802	1.735598	1.01026896	0.933698	-1.26708	1.043936	2.086395
9	-1.210381795	1.512498397	1.190259615	-0.279441798	2.25407157	-2.15553	0.6755019	-0.0779	1.6698946	0.157271	1.646838	0.90266963	0.855042	-0.01894	1.181318	2.372374
10	-0.886561978	1.244986575	1.118268814	-0.588326692	2.06486022	-2.38755	0.5259423	-0.30304	1.7230858	0.055675	1.539989	0.83658172	0.347009	-0.36019	0.664992	2.645338
11	-0.587018441	1.042273658	0.896139987	-0.478806945	1.77934782	-2.34126	0.9200192	-0.53032	1.5033837	0.547561	1.521289	0.83524144	-0.11513	-0.11238	0.403193	1.56296
12	-0.416451029	0.982185352	0.805346954	-0.543109024	1.63134643	-2.19745	1.1754204	0.100113	1.2084039	0.525235	1.578606	0.79404507	0.463954	-0.34419	0.323958	0.696464
13	-0.460482813	0.928646086	0.835949219	-0.372001313	1.4539708	-2.15484	0.989994	-0.0152	1.0306058	0.541458	1.530293	0.64679093	0.138204	-0.59531	0.2758	-0.10998
14	-0.157545543	0.76678612	0.794366796	-0.371117504	1.34341676	-1.99097	0.9406722	-0.09487	0.9673319	0.503541	1.471202	0.88710577	0.076992	-0.80573	0.071218	-0.09537
15	-0.422614487	0.840320272	0.769688076	0.370503352	1.19502715	-1.49585	0.3529865	-0.03167	0.9424643	0.381172	1.533831	0.91649378	0.169313	-0.93826	0.111193	-0.34261
16	-0.488686294	0.743404698	0.746113679	1.666091536	1.0789264	-1.37245	0.1412323	0.043407	1.0375483	0.036403	1.526476	0.98694693	0.222442	-0.99153	-0.10871	0.015447
17	-0.035424864	0.675094909	0.608635271	1.382460799	0.97540713	-1.13325	0.1945996	-0.08411	0.8306798	0.006043	1.124531	0.70901773	0.276993	-0.98076	-0.49042	0.306734
18	0.122714874	0.608546913	0.491422768	0.823907281	0.86502979	-0.41034	0.000552	-0.18965	0.7046907	0.081042	0.924159	0.45465713	0.197598	-1.02918	-0.41822	0.449613
19	0.059762793	0.596120686	0.423004591	0.747825756	0.7716589	-0.41151	-0.3062894	-0.17697	0.7553278	0.11309	0.531171	0.75372124	0.099654	-0.29071	-0.53496	0.267841
20	-0.065384905	0.375837445	0.245516646	0.265948822	0.81274657	-0.35011	-0.2378244	-0.22718	0.6004544	0.123805	0.360835	0.50496591	-0.11127	-0.16528	-0.51048	0.226754
21	0.238190015	0.237389525	0.241805479	-0.03528023	0.73220917	-0.34877	-0.2708292	-0.2742	0.6363995	-0.07867	0.2298	0.24386642	-0.09516	-0.19596	-0.47702	0.265983
22	0.536552119	0.18041461	0.235958737	0.029015035	0.59458575	-0.46156	-0.2286008	-0.21653	0.6369945	-0.29501	0.256438	0.37700043	-0.31104	-0.25624	0.056114	0.18404
23	0.439833268	0.121232764	0.289064618	-0.127483731	0.56051755	-0.41228	-0.4044821	-4.9E-05	0.4440578	-0.50135	0.266627	0.58652174	-0.46027	-0.12623	0.284496	-0.07367
24	0.347487223	0.031533831	0.37453852	0.007374896	0.47552773	-0.52352	0.0145184	0.343782	0.4011002	-0.43936	0.178149	0.28551091	-0.56558	-0.26867	0.749725	-0.22286
25	0.518917601	-0.026033306	0.333258186	0.079053638	0.36065583	-0.42346	0.1434141	0.322249	0.4036818	0.298776	0.101227	0.14632617	-0.61145	-0.34626	0.310248	0.071165
26	0.451603787	-0.134032407	0.197083011	0.082616166	0.27546334	-0.57595	0.1095456	0.391749	0.2130901	0.536661	0.208192	0.06522681	-0.56982	-0.43342	-0.02211	0.058029
27	0.325155456	-0.201756607	0.132538316	0.31593575	0.19272361	-0.39315	0.3719708	0.357115	0.1671419	0.210013	0.237772	0.22539833	-0.56628	-0.20013	-0.02816	-0.04727
28	0.282633861	-0.151621949	0.029638813	0.14154152	0.11871655	-0.06464	0.37837	0.196581	0.1216021	0.020015	0.174958	0.1353205	-0.42906	-0.02886	0.000587	-0.08325
29	0.050796318	-0.069571243	-0.061540271	-0.002629058	0.06007625	-0.14463	0.3758135	0.143822	-0.037199	0.12626	0.10093	0.14973478	-0.14903	-0.12554	-0.02445	-0.07216
30	1.02737E-16	-2.60334E-16	0	2.66867E-16	-1.1549E-15	0	0	1.81E-16	-2.514E-16	4.8E-16	1.23E-16	0	0	7.79E-16	1.19E-16	-1.5E-16

The 't' statistics of CAR (cumulative abnormal return) shown in the table-3 reveals that CAR was positively significant for 9 IPO's (56.25%), negatively significant for 4 IPO's (25%) and insignificant for 3 IPO's (18.75%). The table also reveals that all the abnormal return indicated during the first few days (2 to 10 days) has disappeared by the end of 30 trading days.

Table- 4: 't' statistic of CAAR of all the IPO's during the first 30 days post listing performance in the year 2019

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			t -statistics
DAY	PRINCEPIPE	UJJIVANSFB	CSBBANK	VISHWARAJ	IRCTC	SWSOLAR	SPANDANA	AFFLE	INDIAMART	NEOGEN	POLYCAB	METROPOLIS	RVNL	MSTCLTD	CHALET	XELPMOC	AAR	CAAR	of CAAR
1	-0.06399698	0.393979813	0.422037522	-0.010152531	0.78736018	-0.05821	-0.0110619	0.136517	0.2838437	0.182226	0.18651	0.0809828	-0.01169	-0.04739	0.037359	-0.10034	0.137999	0.137999	5.15823486
2	-0.07967864	-0.099938909	0.000234602	-0.006928579	-0.05701278	-0.03404	-0.0088728	-0.04957	0.0156124	0.005168	-0.01887	0.01638848	0.014644	-0.01491	0.017578	0.045756	-0.0159	0.122097	3.227129649
3	0.022010473	0.110222657	-0.056044076	-0.021870067	-0.05192143	-0.04429	-0.0112819	-0.00328	0.0177237	-0.05012	-0.0178	-0.01460967	0.158776	-0.00436	-0.02403	0.050837	0.003748	0.125845	2.715821754
4	-0.010208368	-0.022686081	-0.019763521	-0.01282913	-0.00518746	-0.0234	-0.0096265	-0.01353	-0.0212377	-0.03744	0.006975	-0.01544526	0.047603	-0.01694	0.000912	0.045056	-0.00673	0.119111	2.226115323
5	-0.017278681	-0.033315809	-0.015300297	0.012715677	0.03689245	-0.00728	-0.0015714	-0.04445	-0.0064642	-0.02493	-0.00812	0.00713295	0.016555	-0.03302	0.020954	0.039325	-0.00363	0.115476	1.930338528
6	0.015577461	0.006034631	-0.085090187	0.004817859	0.05176182	0.018983	-0.0019872	-0.02235	-0.0092649	-0.03069	0.004999	-0.00801031	-0.04013	0.023045	0.008508	0.042372	-0.00134	0.114137	1.741720347
7	0.016978675	-0.029809268	-0.088808692	0.012779469	0.03048224	-0.00638	0.0224499	0.009169	-0.0221579	-0.04916	-0.00315	-0.00477526	-0.06433	0.018347	-0.00625	0.042502	-0.00763	0.106505	1.504693891
8	0.002528628	-0.039626258	0.031454096	0.003117292	-0.02954544	0.009878	0.039475	-0.0173	-0.0341955	0.001809	-0.01173	-0.01214421	-0.02366	0.018364	-0.00777	0.043562	-0.00161	0.104893	1.386213131
9	0.035709231	-0.019891393	0.030435787	-0.006522946	-0.03590644	-0.0148	0.016765	-0.00177	-0.021919	0.021832	0.000891	-0.00259017	-0.00281	0.055953	0.009464	0.043078	0.006745	0.111638	1.390973321
10	0.017858961	-0.035066623	-0.00211757	-0.030326314	-0.02499897	-0.02673	-0.0061475	-0.02032	0.0177039	-0.01172	-0.002	-0.0010832	-0.05434	-0.01717	-0.02307	0.044221	-0.01096	0.100683	1.190093397
11	0.018485736	-0.028039343	-0.034622435	0.008082928	-0.06753358	-0.0053	0.0234878	-0.02245	-0.0186521	0.064971	0.004967	0.00216066	-0.05476	0.012157	-0.01226	-0.11272	-0.01388	0.086807	0.978323446
12	0.010882339	-0.003179098	-0.011192057	-0.008703991	-0.02690447	0.003772	0.0172653	0.059035	-0.0322531	0.000135	0.011959	-0.00033845	0.073634	-0.013	-0.00344	-0.09818	-0.00128	0.085525	0.922841156
13	-0.004697111	-0.003159711	0.013763512	0.016025111	-0.04394333	-0.00388	-0.0084989	-0.01126	-0.018951	0.005261	0.001388	-0.00725453	-0.04105	-0.01514	-0.00205	-0.09953	-0.01394	0.071589	0.742169877
14	0.023107578	-0.027984892	-0.002566036	-0.001404116	-0.02319383	0.007891	-0.0008426	-0.00842	-0.003889	-0.0027	-0.00036	0.01710815	-0.00778	-0.01378	-0.01165	0.001407	-0.00344	0.068148	0.680797366
15	-0.022600126	0.022511208	0.000536458	0.083774132	-0.04281476	0.040861	-0.036421	0.006514	0.0012385	-0.01616	0.012322	0.00399139	0.013611	-0.00982	0.002628	-0.03437	0.001613	0.069761	0.673278591
16	-0.006861545	-0.016404914	0.000212701	0.155155692	-0.03360538	0.007491	-0.0135728	0.008307	0.0201568	-0.05272	0.004677	0.00690113	0.008663	-0.00527	-0.01385	0.0492	0.007405	0.077166	0.721096027
17	0.039030462	-0.011102809	-0.029152164	-0.028611615	-0.03160424	0.020164	0.0040172	-0.01459	-0.0292334	-0.00478	-0.04155	-0.01775325	0.00934	-0.00123	-0.02541	0.042618	-0.00749	0.069676	0.631659252
18	0.014386939	-0.011774973	-0.026055819	-0.065406783	-0.03780655	0.072329	-0.0135361	-0.01284	-0.0175442	0.012634	-0.02024	-0.01723293	-0.01124	-0.00512	0.003965	0.022775	-0.00704	0.062632	0.551803215
19	-0.005613579	0.000968428	-0.014797176	-0.006997496	-0.03294027	-0.0013	-0.022629	0.000931	0.0121998	0.005907	-0.0454	0.02350701	-0.01495	0.049168	-0.00892	-0.02622	-0.00544	0.057188	0.490405315
20	-0.011931509	-0.053585694	-0.045776296	-0.061426526	0.02914588	0.005625	0.0045938	-0.00686	-0.0244716	0.002406	-0.01984	-0.01779979	-0.0345	0.008376	0.000782	-0.00544	-0.01442	0.04277	0.357475026
21	0.029864564	-0.034625079	0.00062038	-0.040084912	-0.03002512	-0.0008	-0.0030035	-0.00675	0.009313	-0.03622	-0.01585	-0.01976883	0.002279	-0.00252	0.001552	0.007256	-0.00867	0.034097	0.278121357
22	0.030753526	-0.014110456	-8.2692E-05	0.008834688	-0.06090283	-0.01398	0.0028571	0.006755	0.002879	-0.04054	0.004234	0.01127743	-0.03787	-0.00482	0.039205	-0.0126	-0.00488	0.029216	0.232824366
23	-0.008789023	-0.015463578	0.01715793	-0.022177682	-0.01082574	0.004631	-0.0146796	0.028468	-0.0345918	-0.04044	0.002146	0.01810223	-0.02771	0.009463	0.017627	-0.0431	-0.00751	0.021704	0.169164688
24	-0.008783568	-0.024930701	0.027529672	0.019211795	-0.03854303	-0.01449	0.034025	0.047225	-0.0066368	0.009984	-0.01148	-0.02450694	-0.02086	-0.01128	0.036953	-0.02616	-0.0008	0.020908	0.159525798
25	0.019254397	-0.016622291	-0.010345651	0.010655578	-0.05657839	0.011039	0.0109293	-0.00204	0.0021537	0.144453	-0.01037	-0.01156041	-0.01061	-0.00658	-0.03396	0.051287	0.005694	0.026602	0.198868617
26	-0.006298001	-0.032308333	-0.040590776	0.000771215	-0.04285789	-0.02022	-0.0026817	0.01083	-0.0375633	0.049226	0.015706	-0.00691526	0.005617	-0.00759	-0.02664	-0.00212	-0.00898	0.017624	0.129197885
27	-0.013232084	-0.021309939	-0.019409164	0.036208707	-0.04334006	0.022055	0.023252	-0.00398	-0.0087899	-0.06518	0.004918	0.01453299	-0.00137	0.018563	-0.00054	-0.01919	-0.0048	0.012825	0.092254362
28	-0.004186407	0.014368226	-0.032642431	-0.026485736	-0.04012165	0.041963	0.001173	-0.02286	-0.0090713	-0.03904	-0.00876	-0.00788777	0.024882	0.014074	0.002392	-0.0069	-0.00619	0.006631	0.046838453
29	-0.026370358	0.024973155	-0.029965449	-0.022641782	-0.03275118	-0.01078	0.0003667	-0.00745	-0.0340129	0.022741	-0.01081	0.00156484	0.054339	-0.0083	-0.00216	0.00184	-0.00496	0.001667	0.011573433
30	-0.00590299	0.021878033	0.020339829	0.000420063	-0.03477774	0.019216	-0.0342427	-0.02171	0.008075	-0.02694	-0.01537	-0.01397385	0.029711	0.010725	0.002107	0.013767	-0.00167	-1.1E-17	-7.69501E-17

The 't' statistics of CAAR (cumulative average abnormal return) of all the IPO's listed during the year 2019 (table:4) reveals that CAAR was significant only on the first four trading days. The table also reveals that all the abnormal return indicated during the first four days has disappeared by the end of 30 trading days.

Hypothesis: 1

H_0: The subscription ratio of QIB, HNI and RII does not have significant influence on the listing gain or loss.

H_1: The subscription ratio of QIB, HNI and RII have significant influence on the listing gain or loss.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.817[a]	.668	.585	22.81389

a. Predictors: (Constant), RII, QIB, HNI

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12568.687	3	4189.562	8.050	.003[b]
	Residual	6245.685	12	520.474		
	Total	18814.372	15			

a. Dependent Variable: Listing Gain
b. Predictors: (Constant), RII, QIB, HNI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.929	7.997		.116	.909
	QIB	.470	.368	.531	1.278	.225
	HNI	.152	.152	.609	1.003	.336
	RII	-1.135	1.092	-.392	-1.040	.319

a. Dependent Variable: Listing Gain

Coefficient Correlations[a]

Model			RII	QIB	HNI
1	Correlations	RII	1.000	.357	-.769
		QIB	.357	1.000	-.814
		HNI	-.769	-.814	1.000
	Covariances	RII	1.192	.143	-.127
		QIB	.143	.135	-.045
		HNI	-.127	-.045	.023

a. Dependent Variable: Listing Gain

Inference

1) Since the 'p' value of QIB, HNI and RII is greater than 0.05, the null hypothesis is accepted. So, it can be inferred from the coefficient table that none of the factors individually influence the listing gain or loss.

2) But, the R square and the global 'F' test reveals that all the factors jointly influence the listing gain or loss (since the 'p' value of QIB, HNI and RII is greater than 0.05).
3) The beta coefficient reveals that the subscription ratio of QIB has the maximum positive impact on the listing gain and the subscription ratio of RII has the maximum negative impact on the listing gain.
4) The correlation coefficient reveals that the HNI subscription ratio has high degree negative correlation with QIB and RII subscription ratio.

The researcher (myself) was wondering as to why the subscription ratio of QIB, HNI and RII had no significant influence on listing gain or loss. Since the market felt that the issue price of IRCTC was highly underpriced, which has led to enormous listing gain. I removed it and ran the regression. The output revealed a different scenario. Now the subscription ratio of QIB, HNI and RII had significant influence on listing gain or loss. RII (with 2.44 beta and p-value 0.12) and QIB (with 0.634 beta and p-value) positively influenced the listing gain and HNI (with -0.272 beta and p-value of 0.25 negatively influenced the listing gain.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	-4.936	4.169		-1.184	.2
	QIB	.634	.188	1.061	3.362	.0
	HNI	-.272	.105	-1.631	-2.601	.0
	RII	2.442	.815	1.450	2.997	.0

Hypothesis: 2

H_0: The promoters holding, issue size, issue price and the overall subscription ratio does not have significant influence on the listing gain or loss.

H_1: The promoters holding, issue size, issue price and the overall subscription ratio have significant influence on the listing gain or loss.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736[a]	.542	.375	28.00289

a. Predictors: (Constant), Issue Price, Promoters Holding, Subscription Ratio, Issue Size

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10188.589	4	2547.147	3.248	.055[b]
	Residual	8625.782	11	784.162		
	Total	18814.372	15			

a. Dependent Variable: Listing Gain

b. Predictors: (Constant), Issue Price, Promoters Holding, Subscription Ratio, Issue Size

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.032	25.768		-.351	.733
	Promoters Holding	.171	.447	.096	.384	.709
	Issue Size	-.002	.011	-.044	-.181	.860
	Subscription Ratio	.498	.174	.686	2.860	.016
	Issue Price	.004	.023	.043	.195	.849

a. Dependent Variable: Listing Gain

Coefficient Correlations[a]

Model			Issue Price	Promoters Holding	Subscription Ratio	Issue Size
1	Correlations	Issue Price	1.000	.059	.003	-.335
		Promoters Holding	.059	1.000	-.511	-.419
		Subscription Ratio	.003	-.511	1.000	.307
		Issue Size	-.335	-.419	.307	1.000
	Covariances	Issue Price	.001	.001	1.176E-005	-8.221E-005
		Promoters Holding	.001	.199	-.040	-.002
		Subscription Ratio	1.176E-005	-.040	.030	.001
		Issue Size	-8.221E-005	-.002	.001	.000

a. Dependent Variable: Listing Gain

Inference:

1) Since the 'p' value of promoters holding, issue size, issue price is greater than 0.05, the null hypothesis is accepted. So, it can be inferred from the coefficient table that all the factors except overall subscription ratio does not influence the listing gain or loss significantly. The global 'F' test confirms the same. Only the overall subscription ratio has significant impact on the listing gain or loss.
2) The R square reveals that only 54.2% of the variation in listing gains or loses is because of the variation in the promoters holding, issue size, issue price and the overall subscription ratio. The remaining 45.8% maybe due to others factors like speculative trading, nature of industry/business, investment in assets, capital structure, cost of capital, management and earning potential (including cash flows) etc.
3) The beta coefficient reveals that only the overall subscription ratio has the maximum positive impact (0.498) on the listing gain, followed by promoters holding (0.171).
4) The correlation coefficient reveals that all the factors have a low degree positive or negative correlation with each another.

Hypothesis: 3

H_0: The Book Running Lead Manager (BRLM) has no significant influence on the listing gain or loss.

H_1: The Book Running Lead Manager (BRLM) has significant influence on the listing gain or loss.

Tests of Between-Subjects Effects

Dependent Variable: LISTGAIN

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	18796.070[a]	14	1342.576	73.360	.091
Intercept	6629.083	1	6629.083	362.220	.033
BRLM	18796.070	14	1342.576	73.360	.091
Error	18.301	1	18.301		
Total	24668.534	16			
Corrected Total	18814.372	15			

a. R Squared = .999 (Adjusted R Squared = .985)

Since the 'p' value of BRLM is greater than 0.05, the null hypothesis is accepted. So, it can be inferred from the table that the Book Running Lead Manager (BRLM) has no significant influence on the listing gain or loss.

Hypothesis: 4

H_0: The sponsor banks of the IPO issue have no significant influence on the listing gain or loss.

H_1: The sponsor banks of the IPO issue have significant influence on the listing gain or loss.

Tests of Between-Subjects Effects

Dependent Variable: LISTGAIN

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	64.139[a]	1	64.139	.048	.830
Intercept	5195.633	1	5195.633	3.879	.069
Sponsor_bank	64.139	1	64.139	.048	.830
Error	18750.233	14	1339.302		
Total	24668.534	16			
Corrected Total	18814.372	15			

a. R Squared = .003 (Adjusted R Squared = -.068)

Since the 'p' value of sponsor banks is greater than 0.05, the null hypothesis is accepted. So, it can be inferred from the table that the sponsor banks have no significant influence on the listing gain or loss.

Hypothesis: 5

H_0: The registrar of the IPO issue has no significant influence on the listing gain or loss.

H_1: The registrar of the IPO issue has significant influence on the listing gain or loss.

Tests of Between-Subjects Effects					
Dependent Variable: LISTGAIN					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1713.002[a]	3	571.001	.401	.755
Intercept	3056.206	1	3056.206	2.145	.169
Registrar	1713.002	3	571.001	.401	.755
Error	17101.370	12	1425.114		
Total	24668.534	16			
Corrected Total	18814.372	15			
a. R Squared = .091 (Adjusted R Squared = -.136)					

Since the 'p' value of registrar of the IPO issue is greater than 0.05, the null hypothesis is accepted. So, it can be inferred from the table that the sponsor banks have no significant influence on the listing gain or loss.

Conclusion

The analysis reveals that 68.75% of the IPO's have given a listing gain and in that only 43.75% of the IPO's have given listing gain more than 10% during the year 2019 (i.e. 68.75% of the IPOs were underpriced and 31.25% of the IPOs were overpriced). The abnormal return of only 56.25% of the IPO's were found to be significant on the listing day and on the remaining days, all the IPO's abnormal return were not significant. The CAR (cumulative abnormal return) was positively significant for 56.25% of the IPO's, negatively significant for 25% of the IPO's and was completely insignificant for 18.75% of the IPO's. The analysis also reveals that all the abnormal return indicated during the first few days (2 to 10 days) has disappeared by the end of 30 trading days. The CAAR (cumulative average abnormal return) of all the IPO's listed during the year 2019 was significant only on the first four trading days and the same has gradually disappeared by the end of 30 trading days.

The subscription ratio of QIB, HNI and RII had significant influence on listing gain or loss. The subscription ratio of QIB has very high positive influence followed by RII on the listing gain and the subscription ratio of HNI has negative influence on the listing gain. The promoters holding, issue size, issue price does not influence the listing gain or loss significantly. Only the overall subscription ratio has significant impact on the listing gain or loss.

The analysis reveals that only 54.2% of the variation in listing gains or loses is because of the variation in the promoters holding, issue size, issue price and the overall subscription ratio. The remaining 45.8% maybe due to others factors like speculative trading, nature of industry/business, investment in assets, capital structure, cost of capital, management and earning potential (including cash flows) etc. The analysis shows that the Book Running Lead Manager (BRLM), the sponsor banks and the registrar of the IPO issue have no significant influence on the listing gain or loss.

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Enhancing potential of SME Financing through Blockchain Smart Lending

Alla IVASHCHENKO

Kyiv National Economic University named after Vadym Hetman (Kyiv), Department of Corporate Finance and Controlling, Ukraine, alla.ivashchenko@kneu.edu.ua

Yevheniia POLISHCHUK

Kyiv National Economic University named after Vadym Hetman (Kyiv), Department of Corporate Finance and Controlling, Ukraine, yivga_83@ukr.net

Serhii SMERICHEVSKYI

Kyiv National Aviation University (Kyiv), Marketing department, Ukraine, s_f_smerichev-sky@ukr.net

Liubov POPOVA

Yuriy Fedkovych Chernivtsi National University (Chernivtsi), Department of Public, Corporate Finances and Financial Mediation, Ukraine, l.popova@chnu.edu.ua

Abstract

The research is aimed to analyze the simplifying ways of getting access to finance by SMEs through such FinTech tool as Blockchain smart lending. The main focus of the paper is to give insight on potential benefits and probable risks of being involved into Blockchain lending as for potential borrowers, namely SMEs, as well as for lenders. The new trend of P2P lending via Blockchain was explored in details and cross-lending platform analysis was conducted regarding identification its potential strengths and weaknesses. Authors revealed that some Blockchain platforms could be controlled by financial or governmental institutions which could be considered as the approach for eliminating risk of mistrusting and probable fraud. Such innovation tools in relation to ensure digital assets, as stablecoins, CDP accounts and MKR tokens were observed. In spite of decentralization nature of Blockchain, it is relevant to establish due diligence procedure and some governmental control because of behavioristic component in relations between lenders, borrowers and platform administrators in order to eradicate possible cases of scam activity.

Keywords: SME, Blockchain, Smart lending, P2P platform

Introduction

It is well-known, that SMEs drive business dynamics at all stages, namely the creation, expansion, contraction and insolvency of firms, and can be considered as the fuel for general economic growth [1]. But SMEs are mainly dependent on financing level, though the issues of their challenges in access to finance should not be underestimated. According to a World Bank Group study [2], SMEs face lack of obtaining bank loans in comparison with large firms. Internal funds, or cash from friends and family, aimed at launching and running their business activities, are among their main financial sources.

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Taking into consideration World Bank Group study [2], approximately 70% of all micro, small and medium-sized enterprises in emerging markets have limited access to traditional bank credit. This trend is complicated not only by lack of successful credit history and relevant collateral, that SMEs could provide, but also by existent long procedure of bank approval. This procedure consists of a set of bureaucratic processes and complex legal requirements, which the majority of SMEs could not follow. Also, improvement of SMEs' access to finance and finding alternative sources of capital are the key issue regarding dynamical enhancing the role of SMEs in their contribution to GDP and jobs` offering. For solving the mentioned problems of SMEs access to finance it is reasonable to use decentralized ledger technology (DLT), exemplified as Blockchain 2.0, in such cases as P2P lending or smart crypto-lending with the aim to evade from any intermediary service and to reduce commission and interest rates for obtaining the loan. Taking into account the fact that Blockchain is the most secured data storage, in which any transaction, ever executed, could not be altered or removed and any party or authority can influence or control the DLT. These all features make the crypto-lending process via Blockchain more transparent, less risky and cheaper compared to traditional bank one.

DLT based on Ethereum blockchain allows to form global network of lenders, borrowers and financial professionals in such way make the background and infrastructure for crypto-lending, which will be appropriate for credit obtaining by SMEs.

The organization of this paper is as follows. Section 1 is the introduction to the importance of getting finance for SMEs and complexity of such procedures in the conditions of their underfunding. Section 2 outlines relevant opinions and concepts related to potential advantage of Blockchain usage in financial sector, P2P lending and smart contract execution regarding lending transactions. The other section describes methodology for conducting analysis. In the next section, the comparison of traditional and Blockchain lending is thoroughly explained. The following section studies the existent examples of Blockchain application in banking sphere. The further section explores the comparisons of Blockchain lending platforms according to set of criteria as profitability, stablecoins usage, collateral and so on. The features, that are taken into consideration as essentials for proper Blockchain lending platforms performance aimed at keeping safety of collateral and other financial resources, as stablecoin, CDP account and government token MKR are analyzed in the other section. The next section gives insight on possible consideration regulative issues concerning activity of Blockachain lending platforms within developing process of regional smart specialization strategies. Finally, the conclusions are presented, along with the further research directions.

Literature Review

Blockchain use cases in financial sector and potential advantages of its application inti financial services are widely discussed in scientific papers of the prominent researchers.

Ana Reyna (2018) et al underlined such benefits of Blockchain for finance services as transparency, verification system, opportunity to use smart contacts, as time and cost effective method for enterprise running. But along with the mentioned probable gains, a lot of drawbacks should be considered exemplified as lack of governmental and auditing control leading to increasing Blockachain usage for fraudulent and illegal usage; ongoing process of increasing the storage recourse capacity of Blockchain nodes related to the permanent blocks` number growth every 10 minutes; probability of attacks in the network.

Besides, in the paper of Maher Alharby and Aad van Moorsel (2017), the challenges of applying smart contracts and perspectives for its solution are described in details. Codifying, security and privacy issues should be underestimated among the main essential drawbacks due to possible errors of smart contract execution. Authors revealed that failure in any modification and termination of smart contracts could be eliminated through establishing a set of pre-defined rules and standards. The possible eradication of security risks namely as dependency vulnerability in transaction execution or ordering, timestamp and mishandled exception, could be performed by "Oyente" tool usage which was developed by the Decentralized Autonomous Organization (DAO). The mentioned tool is presented by smart

contract security analyzer aimed at elimination possible security hazards. Lack of transaction privacy could lead to limited smart contract users, regarding confidentiality of transactional value, so it useful to apply different encrypcion techniques.

In addition, Loi Luu et al. (2016) in their paper also confirmed the fact that the majority of probable bags regarding smart contract execution could be eradicated by tool Oyente providing pre-deployment mitigation and accurate estimation of gas consumption for contracts in the worst case. According to the mentioned scientists, Oyente usage might help "(1) developers to write better contracts; and (2) users to avoid invoking problematic contracts".

Mohamed Amine Ferrag et al. (2019) mainly paid attention to Blockchain applications in the internet of things (IoT), considering and explaining probable attacks on Blockchain in existent protocols taken into account possible counteractions due to possible attacks. The focus of the research was to develop potential threat models for blockchain aimed at avoiding plausible risks which are typical for distributed network.

Additionally, the work of Michele Marchesi et al. (2018) concerns that the core of successful smart contract execution belongs to Solidity program language which mainly performed on Ethereum Blockchain platform. So, the main results of the article include full modeling for successful implementation of Blockchain business model into traditional entrepreneurship, allowing firms or startups to use their potential advantage, namely BOS (Blockchain oriented software).

Such researchers as Tara Salman & Maede Zolanvari (2019) at their article explored the architecture of Blockchain, distinguishing the main peculiarities of it, exemplified as distributed nature, decentralized consensus, trustless system and cryptographic security. The main attention was paid to public sphere, in which cryptographic technics could be successfully carried out emphasizing the great potential for Blockchain usage in real sector of public security.

Ali Vatankhah Barenji et al. (2019) considered the use case of Blockchain as Peer to Peer (P2P) network, that provide the security into communication between network nodes without intermediation of any central party aimed at coordination and validation of transactions in order to provide cost- and time-efficient methods of its execution.

Tiago M. Fernandez-Carames & Puala Fraga-Lamasi (2019) explored that transactions executed through Blockchain require horizontal and vertical integration in order to provide processes` automatization and ensure communication means for suppliers and clients which could be useful not only in IoT platforms, but in different other spheres as ERP- and MES systems, as well as Blockchain lending. Paper of Kevin Delmolino et al. (2016) examines potential bugs which could occur in smart contract programming in case of smart contracts interaction. The mentioned specific Ethereum mistakes influence on potential Blockchain smart lending, therefore, predicting probable bugs regarding its further elimination.

The analysis, conducted by Fraunhofer-Gesellschaft (2018), gives insight on blockchain applicability in the financial sector, personified as compliance services like creation consolidated accounting register stored in Blockchain database and consortium blockchain for client data. The given application models in blockcahin could lead to higher level of automatization, prevention of double-spending cases, elimination of manipulative risks such as contract backdating, taken into account, reliability of Blockchain, as well as to reduction of review and facilitation encrypted transmission processes via use of smart contracts.

Mildred Chidinma Okoye and Jeremy Clark (2018) presupposed possible ways for risk elimination connected Blockchain lending as monetary instability and counter-party risk which could be presented as follows:

- limitation of currency circulation;
- establishing astute rate or some internal metrics in case of new currency creation;
- cryptocurrency usage as exchange tool and loan basis on stable real currency;
- collateral ensuring by Bitcoin-based solutions or token creation with some value;
- reputation risk in Blockchain could be enhanced by strong credit histories and excluded fake identities;
- providing insurance by credit default swap (CDS) use.

Moody`s report (2018) identifies credit implications via blockchain technology underlining such features as processes acceleration, cost reduction and competitiveness growth.
The essence of smart P2P lending through blockchain regarding probable exclusion of traditional bank services in this case was underlined in the paper of Bhaumik Choksi, Alisha Sawant & Sai Subhasree Pakina (2018). Along with this, authors revealed lack of dependence on currency fluctuations and central authority decisions in Blockchain lending.

Considering the fact of existing a lot of P2P lending platforms, Rainer Lenz (2016) argued that such platforms could be examined as disruptive business models regarding risks related to such type of borrowings. These risks, namely credit, fraud, money laundering, hacking, conflict of interest and operational ones, should not be unestimated and one of the possible solutions for its elimination is to create lending platforms, based on Blockchain.

Taken into account the report of Capgemini Consulting's Digital Transformation Institute (2016), there were selected such use cases of smart contracts in banking as trade finance, mortgage lending and different types of loans, in particular to start-ups and SMEs. Besides, the report claims that widespread adoption of smart contracts will begin in 2020 and save consumers over $500 in fees.

The authors of the paper, concerning the issues of Blockchain crowdlending platform (2017), underlined the main features of Blockchain crowdlending platform as follows: possibility for users to invest small amounts, provision tools for checking project reputation, establishing of platform rules and providing proper due diligence.

In the scientific article of K. Salah et al. (2018), idea of creation Consortium blockchains, formed by a group of organizations, was developed, which could be useful for internal needs of banks.

Pierangelo Rosati and Tilen Čuk (2019) developed the approach underlining the main potential features of lending through blockchain as simplification of decision-making by lenders, risk assessment and credit scoring for all borrowing nodes.

In the paper of Antoniuk Larysa et al. (2017) the essence of digitalization for SME development in the conditions of the Fourth Industrial Revolution is proved by experience of the high-income countries. Such benefits as productivity rate growth, reduction of manual processes, cost- and time-optimization were in the core of the mentioned analysis.

In monetary dialogue (2018) the cryptocurrency in banking sector is considered as potential mean for replacing traditional currency for the majority of services and products providing by banking system, especially in countries with weak monetary policies.

So, potentially, blockchain lending could simplify the procedure for obtaining credit as for bank institutions as well as for borrowers that is beneficial for SME development in the conditions of complicated procedure of access to credit finance, especially in emerging markets.
The main aim of the research is to develop recommendations for practical application of blockchain smart lending for SMEs regarding eliminating risk of their underfunding and increasing their capability into access to crypto-loans.

Research Methods

The research methodology includes quantitative and qualitative methods. Along with quantitative methods, the usage of qualitative methods is appropriate in assessment of surveys of different focus-groups, exemplified as business structures, SMEs in particular, financial institutions, crypto-users, financial facilitators and other stakeholders. This research provides comparative analysis of different types of lending based on the analysis of the main features of traditional bank credit and Blockchain loans considering benefits and potential risks for SMEs. Such methods as empirical research, including critical observation, comparative analysis, dimensional estimations and methods of theoretical research as feasibility analysis and theoretical modeling for applying in modern conditions have been taken in the given paper.

Cross-platform analysis was used to reveal the potential benefits and risks of its application into practice as for lenders as well as for borrowers. This analysis was based on data of reports and KPIs of the mentioned Blockchain lending platforms and was conducted with the aim to identify the most competitive ones from points of profitability, regulation existence, registration complexity on the platform and required collateral.

The content analysis was made by applying Maxqda software which allows to gather and analyze data from various media sources for representing: 1) comparison of traditional and blochchain lending; 2) key features and probable risks of being involved into blockchain crediting; 3) trends of Blockchain lending platforms development and its comparative analysis; 4) essentials of insurance issues in Blockchain lending as to use stablecoins, CDP accounts, etc. Besides, Maxqda software was used to reveal the existence of dependency between the term of obtaining credit resources and interest rate. Such research questions would be answered within this study: how existence of blockchain lending platfoms could simplify SME access to finance? What are the KPI for identification the most appropriate Blockchain lending platform for SME? What is the essence of Blockchain lending, including P2P one? What are the perspectives for regulation activity of such platforms within implementation of regional smart specilization strategy?

General comparison of Blockchain and traditional lending

The essentials for SME development can be considered as availability of loans and other external sources, but in many cases SMEs have risk of not meeting with the bank requirements in order to provide sufficient loan repayment and collateral. Additionally, inability to be competitive and to set required targets could be also among the causes of bank reluctancy in loan issuance to SMEs.

According to 'McKinsey & Company report' [4] such improvements should be made for SMEs in lending sphere as:

Simplification of application submitting by limiting paper confirmation required and automated credit execution through online bank web-sites;

Approval facilitation by credit diversification according to risk type, exemplified as loans with lower risks could be processed automatically and loans with higher risks could be performed under some verification;

Shifting the administrative burden to automatic processing means and focusing on customs support regarding issues of loan obtaining;

Creation of data base, including account, merchant and credit card information, in order to define potential of relevant clients, provide pre-approval if all terms follow to, reduce hand-to-hand application number and provide time-reduction.

Enforcement of all improvements, mentioned for traditional bank system, could be possible through automatic lending execution through DLT, namely Blockchain, which can be presented as Blockchain lending platform. These platforms could become an effective tool for SMEs loan obtaining without any requests for complicated approval process and demand collaterals.

Along with the benefits of Blockchain, namely alternative financing options, this technology provides opportunity to make financial relations between parties which could not provide their financial sources without DLT technology. Though, this process, e.g. peer-to-peer (P2P) based lending via Blockchain, allows potential lenders to make their capital available without interference of any central authority, that could be very beneficial for SMEs activity.

Therefore, such reasons for considering blockchain lending as way for enabling SME potentials could be discussed as:

universality (every participant of decentralized network, which is called nod, has no limited access to it, might perform some operations, but could not delete or remove anything that was added to the blockchain. Though, each nod could only add data to DLT after automatic approval by large number of other nods in the system. But some drawbacks also exist, which influence transparent concept of Blockchain, the anonymity of Blockchain users and sometimes elaborate process of smart contract execution can be underlined among them.

more complex than only cryptocurrency (Ethereum Blockchain is presented by open software program based on the blockchain protocol which allows to create various decentralized applications with the possibilities of practical usage for every stakeholder. So, smart contract execution via Ethereum Blockchain exclude any intermediary participation, when the decentralized application performs review, validation and authentication processes).

- decentralization (Every traditional bank is controlled by central one which in its turn is controlled by government and so on. Blockchain works without any central server control. Proof of validity is confirmed by the existent nods. Every transaction transfers through decentralized servers which allows exclude untrustworthiness).

Blockchain lending could be performed through smart contract execution, characteristics of which are shown at fig. 1.

Fig. 1 gives an analysis of potential benefits of SMEs by using Blockchain smart lending and possible consequences with detailed analysis of new market place for lending as specific platforms divided into centralized and decentralized ones.

But the problems, connected with public skepticism and mistrust towards lending systems performed via DLT, should not be underestimated. Despite this fact, it is business model innovation in which credit score of loan providers is influenced creditworthiness of decentralized network participants, confirming that it can be sustainable by using token-based approach.

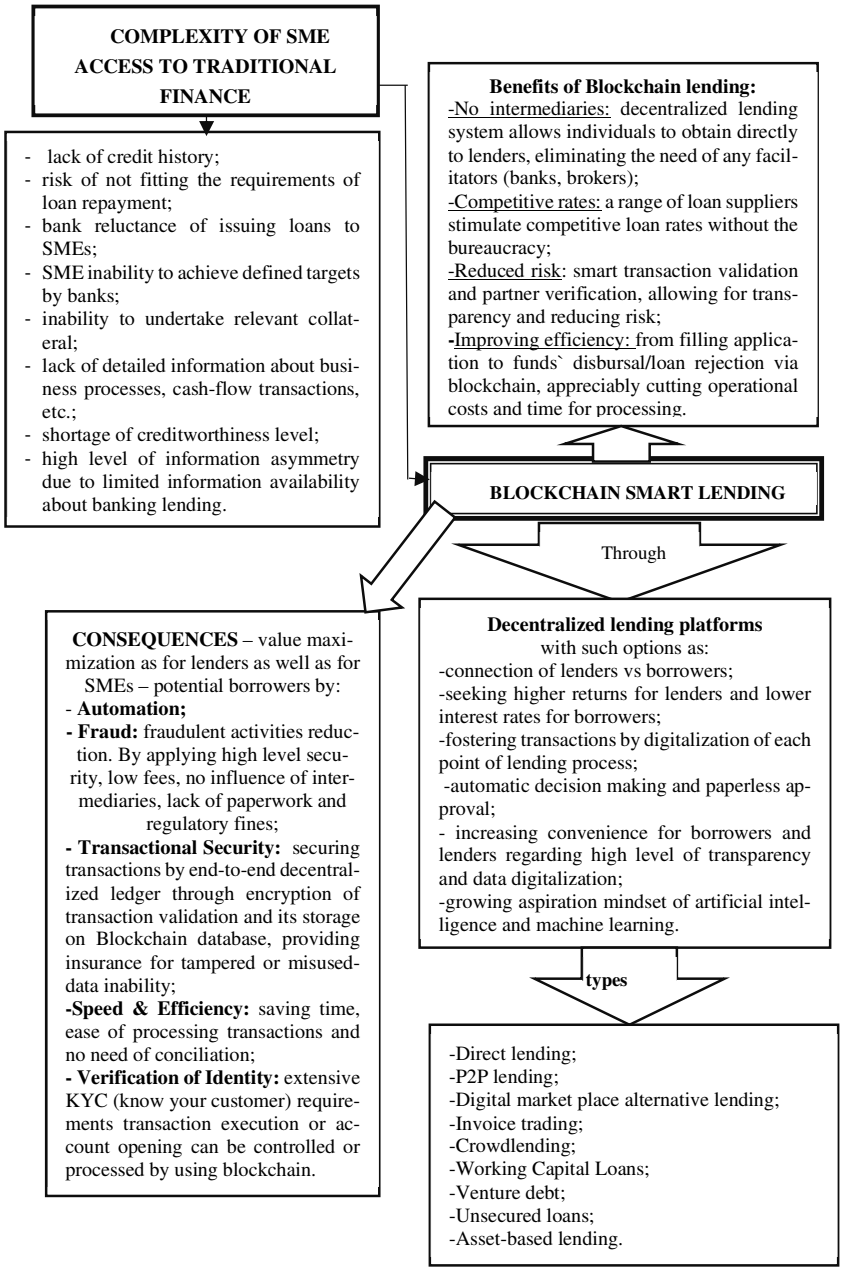

Fig. 1: Characteristic features of Blockchain smart lending (formed by authors)

Blockchain use cases in bank lending

However, blockchain lending simplifies the process of credit obtaining, it could lead to total business redefinition, especially, for SMEs. It is especially important in the conditions, when banks are reluctant in getting credits to SMEs due to lack of collateral, proper credit history, profitability level.

For developing countries SMEs more often face to obstacles in access to finance (see table 1), which could be somewhat eliminating by blockchain technology usage.

Table 1: Causes of limited access to credit finance for SMEs

Factor	Explanation
Information asymmetry	exists between potential financial institutions or other bodies, that are ready to lend some money, and business owners
Higher risks	are connected with performing business on the small scale
High transaction costs	commissions of banks and other financial institutions could be too high for SMEs in credit obtaining
Lack of collateral	limited possibility for SMEs to fit the bank requirements in case of providing relevant collateral

According to table 1 such factors as information asymmetry elimination and reduction of transaction cost level could be reached by usage of blockchain lending exemplified as business owner simplification of retrieval potential lender between existing blockchain nodes, which increase transparent level by providing clear conditions for credit obtaining which SMEs could easily identify as are favorable for them or not.

According to one of the leading Blockchain lending platform “WishFinance”, presented by Fintech company from Singapore, declares that Blockchain technology makes each loan transparent and simplifies the securitization process for investors and regulators [3]. In addition, the mentioned platform offers loans for business with fair interest rates based on indicator of net cash-flow and has instant access to POS terminals with data about all financial transaction and participants of local marker aimed at scoring conducting.

As the other example, that confirmed the fact that blockchain lending could be successfully performed, could be considered the British multinational bank Barclays. The mentioned bank established blockchain accelerator within which blockchain-backed credit transactions between Ornua and Seychelles Trading Company established have been performed [5].

Though, implementation of blockchain technology into banking and financial services could be beneficial by creating more responsive and flexible infrastructure. Santander, Spain’s biggest bank, estimates that implementing blockchain technology could save the financial industry up to $ 20 billion per year [7].

But, despite all potential benefits of Blockchain usage into banking services, central banks and official monetary frameworks do not often integrate DLT in the banking, which would lead to creation of new funding forms named blockchain consortiums or syndicates.

Market Analysis of Blockchain Lending Platforms

It is also possible to create syndicated loan market, based on blockchain technology, as the example of which collaboration of Credit Suisse, Symbiont, R3, and Ipreo could be considered [8]. Such international banks as BNP Paribas, BNY Mellon, HSBC, ING, Natixis and State Street initiated the blockchain platform aimed at providing syndicated loans, namely Fusion Lender Comm by Finastra [9].

Characteristic features of Fusion LenderComm include following [10]:
Cooperation between potential lenders and agents (banks) that lead to efficiency improvement, risk and cost optimization, time-efficiency and increasing transparency in syndicated lending;
Data accuracy allows to all parties have immediate access to information connected with all transaction;
Possibility for lenders to choose the agent bank according to their requirements;

Agents reduce all manual actions receiving data base of potential lenders in a syndicated lending that allow to achieve significant cost reduction;

Traders have the possibility to gather all required information for making their decisions smarter.

Other example of lending in financial services could be esteemed the platform Traxia which allows to get money through blockchain technology without any banks [6].

BTCjam [11] was represented by trading platform with services of lending and borrowing using bitcoin. This market place provides its users such gains as high IRR, being intermediary between lenders and borrowers, proper credit verification. From 1th of July 2018 it closed the activity with new loans, but from 2012 to 2016 more than 20,600 of loans were serviced in 122 countries with total value more than 64,000 Bitcoin loaned.

The other lending platform which should be considered is BitBond [12] because of its focus on borrowing to SMEs in Bitcoins. The key competitive elements are observed as follows: transparent pricing (the online calculator for estimating further interest rates and fees), low fees, free-of-charge membership in BitBond, interest rates are from 1 % per month. Till the current moments KPIs could be assessed like more than 165,000 users and 3,200 loans with total value more than 15 mln USD from over 120 countries.

The miscellaneous case of cryptocurrency lending is offered by BTCLend [13], presented by an application for pre-paid subscribers in order to get access to available loans for their account according to the rating based on repayment history based in the mentioned platform. BTC Lend loans also could be used for voice calls, data/Internet and sending SMS. The number of loans is unlimited for subscribers, but in case of negative user balance, e.g. unpaid previous loan, this option is closed till the moment of full credit repayment.

Loanbase [14] was created in Latin America aimed at SME support by providing direct lending to them. The advantages of the mentioned lending platform are cloud-based Big Data integration and real-time credit-scoring, that fostering decision-making about loan disbursement and allows to perform almost immediately.

The successful example of P2P lending performing via Blockchain is BTCPOP [15], which offers Instant Loans, Investment Pools, Collateral Tied Loans, etc. Along with this such services as saving accounts with 5% interest rates, ability to IPO initiation and BTC raise are integrated into platform tool range.

Along with the mentioned Bitcoin lending market place there are a lot of lending platforms with credit distribution in other cryptocurrency like Ethereum, Monero, Litecoin, etc.

For instance, ETHLend [16] is the unique lending platform, in which credit guarantee is presented by the borrower` digital assets, e.g. cryptocurrency. In other words, cryptocurrency act as collateral through smart contract execution. Minimal interest rate is 3 % per annum and possible duration is up to 1 year without any fee.
The other exemplification of Blockchain lending platform is CoinLoan [17], which is licensed as financial institution in Europe that presented as guarantee subject and insurance to fund safety. CoinLoan plays custodian role between potential lenders and borrowers, that allow to choose the most preferable mean of collateral, e.g. fiat money, stablecoins or cryptoassets; the option of loan issuance form in such

case providing high level of security for loan repayment. Unlimited boundaries as global coverage and currency diversity should be also underlined among the advantages of Coin Loan.

Additionaly to the considered platforms, there is a set of centralized and decentralized platforms aimed at providing Blockchain lending.

Platform “SALT-lending” [23] has its own token “Salt” based on Ethereum in order to provide additional collateral regarding interest rate and repayment reduction. This platform is focused on blockchain-backed loans amounted from 5,000 USD each with percentage rate starting from 5,99 per annum on perspective from 3 to 36 months with comparatively high LTV level and without any pre-payment fee. The indirect dependence between interest rate and loan term is explored, which means that with increasing the loan term the interest rate decreases.

Besides, this marketplace provides security and insurance with high level storage system of collateral and multi-signature verification; notification system and mobile application with access to all types of updates, concerning personal accounts and collateral wallets.

BlockFi [24] is akin to Salt because of providing loans in USD, but in addition provide services for management of digital assets via such offers as Bitcoin loans or interest account services or data base of registered lenders and borrowers.

Loans are mainly on short-term perspective (up to 12 months) and interest rates start from 4,5 % to 50 % loan-to-value ratio. The service as cryptocurrency deposit also exists in this platform with interest rate up to 6,2 %.

Moreover, BlockFi secures its loans by Gemini (trust company in New York), regulated by the New York Department of Financial Services, which increase the reliability of the platform and could be considered as the benefit from potential borrowers` and lenders` point of view.
\
Dharma Lever [25] is decentralized lending platform based on Ethereum presented by special marketplace with set of conditions for lenders and borrowers in order to make the most feasible choice. Dharma platform functions without own token, but works with Ethereum and such stablecoins as DAI and USDC.

The platform, which should be also considered as one of the widespread one, is Compound based on Smart contract execution on Ethereum protocol. Like in previous platform, namely Dharma, users can establish set of conditions as from lending as well as from borrowing side. The level of collateral should exceed borrowing value at rate 150 %.

So, the analysis of existing Blockchain lending platforms confirmed that such marketplaces provide SMEs with unique opportunity to find potential lenders and provide collateral in cryptocurrency ensured by stablecoins.

Essentials of Blockchain smart lending

As it was mentioned, the required block for safe cryptolending is presented by stablecoins which are a cryptocurrency with a stable or constant value over time in order to avoid potential loss in value fluctuations. In many cases, it could be tied in value to a stable fiat currency such as the USD.

But, sometimes, currency backed stablecoins could be used. One of the most widespread examples is Tether [18] which based on value keeping mechanism as every 1 issued or circulated Tether equals 1 USD in the ownership of the Tether organization. So, it means that buy out of Tether is equivalent to 1 USD, in other words, company should have the reserve in 1 USD for every token in circulation.

The potential risk of stablecoin system usage is the lack of decentralization, which is typical for Blockchain and cryptocurrency. It is the responsibility and control of organization, which is in charge of

stablecoin issue. And if reserves are not so reliable as it is required and their value fall down it leads to collapse of their stablecoin supply.

There are other stablecoins backed by traditional fiat currencies, namely USD Coin, TrueUSD, Paxos Standard and Gemini Dollar [19].

Along with the weaknesses of centralized stablecoins, there is potential need to use decentralized ones aimed at exclusion of any human control or interference trough programming execution.

The basis of this stablecoins` type is smart contracts execution, which allows to keep the coin value in constancy. Decentralized stablecoins are not dependent on actions of facilitators, managers, auditors and hold the coin price at steady level relied on smart contract code program functioning.

The most popular decentralized stablecoin, based on Ethereum, is DAI [20], created by organization "MakerDAO". The 3 KPI are the basis of the DAI stability as:

- security (each DAI is backed by different value assets. The diversification of company collateral portfolio allows to guarantee every DAI value by multiplying assets;
- transparency (the information about the collateral backing type for every DAI is easily available and accessed to everyone);
- resiliency (in extreme case, the system is to activate emergency disconnection in order to keep the stable price).

In spite of significant drop in Ethereum price at about 90 % in December 2017 and supply growth of DAI, it has been kept his stable ratio to dollar as 1 DAI equals 1 USD. This statement is confirmed by DAI price and other indicators shown in fig. 2-3.

So, in spite of increasing trend of the circulation of more than 364 mln DAI coins and a lot of DAI holders, the DAI price is determined about 1 USD with maximum value 1,09 USD and minimum 0,95 USD. This trend confirms that no dependence between DAI price and Ethereum price exists despite the fact that DAI is based on Ethereum platform.

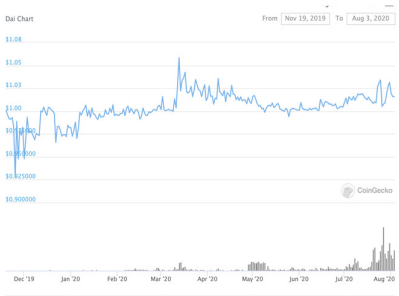

Fig. 2. DAI price, USD [21]

Dai Price	$1,01 USD
Dai ROI	1,41%
Market Rank	#34
Market Cap	$369 046 748 USD
24 Hour Volume	$18 996 795 USD
Circulating Supply	364 862 583 DAI
Total Supply	365 392 445 DAI

Fig. 3. DAI statistics [22]

Therefore, the decentralized stablecoins could be reliable collateral in case of Blockchain lending. Besides, for performing Blockchain lending it essential to issue new DAI, made through Collateralized Debt Positions, which are called CDPs. Every borrower could open CDP by blocking Ethereum as pledge and perform DAI withdrawal as debt. The ratio, in which it is possible to borrow, is at a minimum 150 % borrowed DAI in the CDP as Ethereum collateral.

This ratio indicates that for every 1 USD borrowed, user need to have 1,5 USD in Ethereum locked as the subject of pledge. In case of DAI amount repayment, borrower returns the locked Ethereum minus system fee.

So, the scheme of CDP usage does not eliminate the risk of significant price drop of Ethereum, but transparent system allows to check liquidity or state of each CDP.

The other element which is used for decentralized lending is MKR which is assumed as a governance token used for paying system fee in process of CDP repayment, after that MKR token is liquidated. This feature indicates that increased demand for DAI and CDP leads to increase in MKR request and in case of CDP repayment via verse process.

The other option of MKR is to provide sustainability to Blockchain lending system, if the collateral is not sufficient, new MKR tokens are issued and sold automatically in that way reducing their price. Thereby, all the mentioned components of smart blockchain lending could provide safety and reliability of borrowers to lenders and to offer borrowers unique opportunity to provide collateral in cryptocurrency which is almost impossible in traditional bank lending.

Blockchain lending in regional smart specialization

Taken into account the fact, that SMEs in many cases have limited access to finance, especially in obtaining credit resources. So, forming infrastructure for P2P lending availability and establishing regulation for Blockchain lending platforms should become the key priorities in strategies implementation on different levels.

As well known, regional smart specialization is regional result-oriented strategy mostly focusing on innovation and enhancing existing potential of region.

Blockchain-technology could be considered as potential innovation by its integration into financial services that might simplify the procedure of transaction execution, automatization of different processes and providing time- and cost-efficiency. In addition, Blockchain technology open access to P2P lending which is almost impossible in traditional financial services.

Therefore, forming conditions for improving access SMEs to FinTech into services, especially in simplification their access to finance should become one of the main task in action plan for implementation of each regional Smart specialization strategy. This relief could be achieved through development of Blockchain lending infrastructure and its regulation as for CoinLoan and BlockFi.

The regulation of such kind of lending platforms could eliminate potential risks of mistrusting, money laundering and other types of any fraud.

Conclusions

The conducted analysis confirmed the statement that one of the possible solutions for improving procedures of getting finance by SMEs could become Blockchain lending, which exclude all bureaucratic processes of providing almost all company documentation and exploitation diametrically opposite objects as collateral than in traditional lending, exemplified as fiat currency, cryptocurrency, stablecoins, etc.

Blockchain lending platforms with main focus on smart P2P lending could simplify procedure of getting credit by SMEs; offer favorable conditions regarding profitability level, low commission fees and credit termination; give possibility to choose the most appropriate credit variants on the market; stipulate ability to provide collateral in cryptoassets; render possibility to ensure digital assets; have an option of easily seeking potential creditors, etc.

But, apart from potential benefits of getting credit financial resources via smart lending platforms, some potential risks should be observed as lack of governmental regulation in case of fraud and money laundering, probability of scam activity from company-facilitator or administrator of such types of platforms, lack of due diligence for assessment financial condition of these platforms.

Instead, in this context the role of regional policy should not be underestimated in case of establishing some set of rules for regulation platforms` activities for avoiding risks of swindle activities. In this case regional smart specialization should become the tool for elimination the mentioned risk.

So, the following research, concerning issues of widening involvement SMEs in FinTech through getting finance by Blockchain lending, will be developing the methodology of assessing the reliability of such types of platforms in order to eliminate risk of mistrusting and improve underfunding level for SMEs.

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The Concept of the Method for Forecasting the Life Cycle Costs of Technical Objects Supporting the Process of Making Purchasing Decisions

Izabela DZIADUCH

Wrocław University of Economics, Wrocław, Poland
izabela.dziaduch@ue.wroc.pl

Abstract

The level of exploitation costs to be covered by the user of a technical object depends, to a great extent, on the accuracy of the investment decisions made. The selection of the optimal investment decision (i.e. the purchase of a technical object) in terms of how much to invest in order to obtain the highest possible savings over the technical object lifetime should be based on the life cycle cost analysis (LCCA), which covers, e.g., the costs related to an object purchase and its exploitation.

The literature on LCC is quite abundant. Articles, monographs, norms and standards present different scopes of this analysis and indicate the industry sectors it is applied in. It should be emphasized, however, that there are still no scientific studies related to LCC estimation considering the variability of exploitation costs of a technical object over time resulting from gradual changes in the object parameters caused by the processes of technical wear, apart from few exceptions. Therefore, the article describes a method aimed at solving the aforementioned problem and becoming a tool facilitating rational purchasing decisions (a buyer will be able to find out the technical object's estimated life cycle cost at the time of its purchase).

The developed method applies econometric modelling, probability distributions and certain elements of descriptive and mathematical statistics. In the method, while estimating cost parameters, the central tendency values and the values of lower and upper quantiles are used, which allows estimating costs in three variants: the expected variant (e.g. modal), the optimistic variant and the pessimistic one.

Keywords: Life cycle cost (LCC), exploitation cost, purchasing decisions.

Introduction

The decisions about purchasing a technical object[1] are usually made based on the investment cost criterion, i.e. its price. Technical objects are characterized by a long lifetime[2], which requires taking into account the total costs incurred for the object maintenance during its lifetime, which include: acquisition costs, exploitation costs and decommissioning costs (McKenzie, 1978; White and Ostwald, 1976). Therefore, it is important that the decisions about purchasing technical objects are preceded by an economic calculation based on which a decision-maker can obtain information whether a given investment in an object purchase is effective (profitable) or not (Dziaduch, 2017).

The subject literature offers many measures estimating cost-effectiveness of an investment. The analysis based on the life cycle cost methodology is a comprehensive measure combining the cost data related to the acquisition, exploitation and decommissioning of a technical object (Legutko, 2004; PKN, 2005; Woropay, 1996). The issue of LCC analysis in the effectiveness assessment of a technical

[1] The term technical object (exploitation object) refers to products serving as a tool for transforming (moving or processing) matter, energy or information. This term is usually used to describe machines, devices and means of transport.
[2] Lifetime (exploitation period) is the period of time from putting a technical object into operation until it reaches the limit state.

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object is quite well recognized in the subject literature, yet the problem of estimating its value remains to be solved. It is most difficult to estimate the exploitation costs of a technical object to be incurred by a user during its lifetime. These costs can be broken down into three basic cost categories (Adamkiewicz, 1983; Dietrich et al., 1999; PKN, 2005):

- damage costs including, e.g., costs of restoring the object's serviceability (in other words repair costs, corrective maintenance costs), penalties resulting from the object's unavailability for operation and the loss of revenues caused by the unplanned interruption of operation;
- preventive maintenance costs, which include the costs of performing preventive maintenance services (inspections and the related repairs) and also, if necessary, the loss of revenues resulting from the planned interruption of operation;
- operation costs i.e. the costs incurred in the course of operation (use) of an object, which include e.g. costs of energy consumption (e.g. fuel, diesel), labour costs of employees using the object.

In the existing research studies and publications, the measurement of exploitation costs related to a technical object is based on fixed parameter values, such as, e.g., damage intensity, propellant consumption, duration of preventive maintenance, etc. These parameters, however, do not represent determined values, but random variables. Referring to this problem, the purpose of the article is to develop the concept of a method aimed at forecasting the exploitation period costs taking into account the variability of costs over time, resulting from the gradual changes in the object parameters caused by the technical wear processes.

The proposed method consists of 10 stages. This method applies econometric modelling, probability distributions and certain elements of descriptive and mathematical statistics. The core idea of the method consists in forecasting the exploitation costs on the basis of the central parameter value and the value of its upper and lower quantiles providing the possibility of estimating costs following three variants: the expected (e.g. modal) variant, the optimistic variant and the pessimistic one.

If the purchase price of a technical object is added to the exploitation costs estimated using the developed method, then the total life cycle cost is obtained, which may be taken into account during the purchasing transactions of a technical object. This will allow selecting, from among several competitive technical objects offered by the industry which meet the same technical requirements, the one most economically effective, i.e. the cheapest in the long term perspective.

Related Works

Currently, the subject literature presents several dozen models and methodological approaches referring to estimating individual categories of technical object exploitation costs used in the LCC analysis.

The conducted analysis of the available publications, discussing the LCC analysis, shows that:

- the basic components of operation costs cover the costs of energy consumption (e.g. fuel, diesel) and also the labour costs of employees using the object;
- the average unit parameter values resulting from the analysis of previous years are adopted in the calculation of operation costs (e.g. average cost of energy consumption per time unit, average cost of human labour per unit of time, average purchase price of an energy unit and average energy consumption per time unit);
- operation costs depend on the value of the technical object readiness index (Dhillon, 1996; Kumar et al., 2004);
- operation costs are calculated on an annual basis and next multiplied by the number of years of the object operation or for the entire life cycle of the technical object.

In turn, the literature review addressing cost calculation methods for preventive maintenance in the LCC analysis results in the following observations:

- the basic cost component for performing preventive maintenance is the number of such maintenance processes performed, human labour cost and the cost of consumables and/or spare parts used in the course of planned maintenance;
- different categorizations of preventive maintenance can be identified – first of them take into account the type of element subject to maintenance (e.g. PKN, 2005; Szkoda, 2008), second – the type of activities performed as part of the maintenance process (e.g. Hokstad, 1998), third – the level of preventive maintenance (e.g. Jong-Woon et al., 2009), fourth – the type of activities performed in the course of defined maintenance levels (e.g. Hinow et al., 2008);
- cost accounting is based on average parameter values resulting from the analysis of previous years (e.g. average cost of human labour per preventive maintenance, average cost of consumables and spare parts used to perform preventive maintenance);
- costs of preventive maintenance are calculated on an annual basis and next multiplied by the number of years of the object operation or for the entire life cycle of the technical object expressed in years.

The literature review shows that the authors have developed different methodologies for estimating individual cost components of performing preventive maintenance. For example, the studies: Jong-Woon et al (2009) and Kumar et al (2004), present how to estimate the number of preventive maintenance performed during the lifetime of an exploitation object, Dhillon (2007) describes the method for cost measurement of one hour of maintenance personnel work, whereas Ntuen (1985) offers the formula for calculating costs of logistic support for preventive maintenance.

In turn, the analysis of available publications on estimating the corrective maintenance costs in the LCC analysis shows that:

- the basic component of the costs for restoring an object to its operational serviceability after the occurrence of damage is the number of corrective maintenance, the cost of labour and the cost of spare parts used in performing unplanned maintenance work;
- the analysis of damages and their division is usually not performed,
- the LCC account is based on the average parameter values resulting from the analysis of previous years (e.g. average cost of corrective maintenance personnel work per unit of time (expressed in PLN/hour or PLN/man-hour), average wear cost of spare parts necessary to remove the damage);
- costs of corrective maintenance are calculated on an annual basis and next multiplied by the number of years of the object operation or for the entire life cycle of the technical object

The literature review also shows that the authors have developed different methodologies for estimating individual cost components for removing the damage. The number of observed damages during the technical object exploitation is most often determined based on the overall, constant intensity of the object damages (Dhillon, 2007; Jong-Woon et al., 2009; Jun et al., 2007; Hokstad, 1998; Monteith, 1984; Norsok 1996a; PKN, 2005). The restoration function was used to determine the number of corrective maintenance in the study Kumar et al (2004). In the opinion of Jun et al (2007), when estimating the cost of worn parts during corrective maintenance, the repairability index should be used, which takes the value of 1 – if all damages were removed by replacing the element or 0 – if the corrective maintenance was completed without the need of using spare parts. However, according to Dhillon (1996), the cost of corrective maintenance personnel work should depend on the average downtime of an object caused by damage and the average time till the damage occurrence, which should be described with an appropriate probability distribution. It is worth noting that in some studies the authors, when estimating corrective maintenance costs, do not take into account such cost parameters as labour cost and the cost of spare parts used in the course of performing unplanned maintenance work. The examples of such estimation methods can be found in the studies Frangopol et al (1997), Hinow et al (2008) and Ntuen (1985).

As the literature review shows, only a few studies analysed costs related to the damageability of a technical object, other than the corrective maintenance costs. The analysis of available publications addressing LCC shows that the costs related to damage also include the costs of production losses and the costs of penalties resulting from downtime, as well as the fact that both of these components are frequently identified with the generally understood downtime cost (PKN, 2005; Anders et al., 2005; Hinow et al., 2008; Norsok 1996a, 1996b; Parra et al., 2006; Parra et al., 2009).

The concept of the method for forecasting the exploitation costs of a technical object taking into account the variability of costs over time

As a result of the conducted investigation, followed by collecting and organizing information on life cycle cost estimation, it was proposed to use the calculation procedure consisting of ten stages for the purposes of cost forecasting.

The procedure starts with defining the division structure of an exploitation cost, i.e. the cost categories, cost components and the included parameters. The exploitation cost structure is described by the following correlation:

$KE = \langle K_A, K_{AB}, K_{ABS} \rangle$ (1)

where:

KE- the exploitation cost of an technical object,
K_A- a set of exploitation cost categories,
K_a- a-th exploitation cost category, where $a = 1,2, \dots, \mathrm{A}$,
K_{AB} - a set of components assigned to the set of exploitation cost categories,
K_{ab} - b-th component of a-th exploitation cost category, where $b = 1,2, \dots, B_a$,
K_{ABS} - a set of parameters assigned to the set of components of the exploitation cost category,
K_{abs} - s-th parameter of b-th component of a-th exploitation cost category, where $s = 1,2, \dots, S_{ab}$.

For example: operation cost represents one of the exploitation cost categories, energy consumption cost is one of the operation cost components, whereas the parameters of the above-mentioned component include, among others, energy unit purchase price, energy consumption per unit of time and operating time of a technical object per unit of time.

Stage 2 consists in collecting the data necessary to calculate s- th parameter included in b- th component of a- th exploitation cost category.

Stage 3 consists in defining the same length (span) of time intervals, $\Delta t^1 = \Delta t^2 = \ldots = \Delta t^D$, while $d = 1,2, \dots, D$, where d stands for the time interval number, whereas D represents the number of intervals. The range span is the difference between the upper t_g^d and lower t_d^d time interval value. The range is bounded top, with the upper limit in the given range being the same as the lower limit of the next range.

Stage 4 of the method covers calculating the mean value of s- th parameter included in b- th component of a- th exploitation cost category for d-th time interval:

$$\overline{k_{abs}}^{d} = \frac{\sum_{q=1}^{Q} k_{abs_q}{}^{d}}{Q^d} \quad (2)$$

where:

$\overline{k_{abs}}^{d}$ $\overline{k_{abs}}^{d}$- mean value of s-th parameter included in b-th component of a-th exploitation cost category in d-th time interval,

$k_{abs_q}{}^{d}$ - values of s-th parameter included in b-th component of a-th exploitation cost category collected in d-th time interval, where $k_{abs_q}{}^{d} = k_{ias_1}{}^{d}, k_{abs_2}{}^{d}, \ldots, k_{abs_Q}{}^{d}$,

Q^{d} - number of measurement values of s-th parameter included in b-th component of a-th exploitation cost category collected in d-th time interval.

The estimated mean values of the parameter are assigned at the upper limits of d-th time interval, i.e. t_g^d.

Stage 5 of the method is focused on analysing the correlation occurrence between time - Y and the mean values of s-th parameter included in b-th component of a-th exploitation cost category calculated in d-th time intervals - X. For this purpose, correlation coefficient estimator ρ can be used between the two examined attributes in the population, i.e. correlation coefficient from r sample (Greń, 1982):

$$r = \frac{\sum_{d=1}^{D}\left(x^d - \overline{x}\right)\cdot\left(y^d - \overline{y}\right)}{\sqrt{\sum_{d=1}^{D}\left(x^d - \overline{x}\right)\cdot\sum_{d=1}^{D}\left(y^d - \overline{y}\right)}} \quad (3)$$

where:

x^d - X variable value, i.e. mean values of s-th parameter included in b-th component of a-th exploitation cost category in d-th time interval,

y^d - Y variable value, i.e. time reflected by the upper limit of d-th time interval t_g^d,

$\overline{x}$ - arithmetic mean X variable,

$\overline{y}$ - arithmetic mean of Y variable,

D - number of observations, the same as the number of time intervals.

To verify the significance of the correlation coefficient, the hypothesis that X and Y variables are not correlated should be checked, i.e. null hypothesis $H_0: \rho = 0$, against the alternative hypothesis $H_1: \rho \neq 0$. Student's t-distribution for the predetermined α significance level and for $D - 2$ degrees of freedom shows $t_\propto$ critical value, so that $P\{|t| \geq t_\propto\} = \propto$. If the comparison of t value calculated based on formula (x), i.e.

$$t_{(\propto, n-2)} = \frac{r}{\sqrt{1-r^2}} \cdot \sqrt{D-2} \quad (4)$$

with $t_\propto$ critical value results in $|t| \geq t_\propto$ inequality, then H_0 hypothesis about the absence of correlation between the variables has to be rejected. However, when $|t| < t_\propto$, there are no grounds to reject H_0 hypothesis, that X and Y variables are uncorrelated.

In the case when it is unfounded to reject H_0 hypothesis, the theoretical distribution functions (stage 6) have to fit the mean values of s-th parameter included in b-th component of a-th exploitation cost

category defined for d-th time intervals. For the probability distribution fitting of X variable, any central tendency value should be determined, i.e. the expected value $E(X)$, modal value $M_o(X)$ or median $M_e(X)$ as well as the lower $F(x_q)$ and upper quantile $F(x_{1-q})$.

If there are grounds to reject H_0 hypothesis, the trend line (stage 7a) should fit the mean values of s-th parameter included in b-th component of a-th exploitation cost category defined for d-th intervals.

Stage 7b consists in examining the model compliance with empirical data using R^2 coefficient of determination (Dittman, 2003):

$$R^2 = \frac{\sum_{t=1}^{z}\left(\hat{x}_t - \bar{x}\right)^2}{\sum_{t=1}^{z}\left(x_t - \bar{x}\right)^2} \qquad (5)$$

where:

x_t - cost parameter value in t period,
$\hat{x}_t$- theoretical cost parameter value in t period,
$\bar{x}$- mean value of cost parameter in z time series.

In order to verify the coefficient significance, statistics F should be used to check (Dittman, 2003)::

$$F = \frac{R^2}{1-R^2} \cdot \frac{D-k-1}{k} \qquad (6)$$

where:

D - number of the dependent variable observations (the same as the number of classes),
k - number of predictor variables in the model excluding the variable with the intercept,

which has Fisher-Snedecor F distribution with $k_1 = k$ and $k_2 = D - k - 1$ degrees of freedom, whether the model is inconsistent with the empirical data, i.e. $H_0: R^2 = 0$ null hypothesis against the alternative $H_1: R^2 \neq 0$ hypothesis. If F value is smaller than $F_\propto$ from Fisher-Snedecor F distribution tables for the adopted $\propto$ significance level and also for $k_1 = k$ and $k_2 = D - k - 1$ degrees of freedom, there are no grounds to reject H_0 hypothesis, which means that the coefficient of determination is not significantly different from zero – the model fit to empirical data is far too weak. In this case, such a trend model of the analysed parameter should be found, for which F statistics can show a correlation occurrence between the data (stage 7a).

However, if the coefficient of determination is statistically different from zero, the lower $F(x_q)$ and upper quantile values $F(x_{1-q})$ of s-th parameter of b-th component of a-th exploitation cost category for each Δt time interval should be determined (stage 7c).

Next, in the course of stage 7d, the correlation occurrence between Y time and the defined lower $F(x_q)$ and upper quantile values $F(x_{1-q})$ should be analysed using a correlation coefficient estimator (formula (3)). The hypothesis can be verified using Student's t-distribution with $D - 2$ degrees of freedom. If there are no grounds to reject H_0 hypothesis, the theoretical distribution function has to fit the quantile values of s-th parameter of b-th component of a-th exploitation cost category (stage 7h).

For the fitted probability distribution of X_q variable any central tendency value should be defined. However, if there are grounds to reject H_0 hypothesis, the theoretical distribution functions have to fit the quantile values of s-th parameter of b-th component of a-th exploitation cost category (stage 7e) and the analysis (stage 7f) – using R^2 coefficient of determination (formula (5))– of the developed model compliance with empirical data has to be conducted. The assessment of correlations is performed by testing $H_0: R^2 = 0$ and $H_1: R^2 \neq 0$ hypotheses. The hypothesis can be verified using statistics which has Fisher-Snedecor F distribution with $k_1 = k$ and $k_2 = D - k - 1$ degrees of freedom. If there are grounds to adopt $H_0: R^2 = 0$ null hypothesis, then such a trend model of the analysed parameter such be defined, for which F statistics will determine the correlation occurrence between the data (stage 7e).

In the case when R^2 coefficient of determination is statistically different from zero both in stage 7b and 7f, then in the course of stage 7g the future value of s-th parameter of b-th component of a-th exploitation cost category is determined. This value is obtained by extrapolating the trend function, i.e. by substituting time variable in the model with t moment number or T period for which the forecast is prepared:

- for mean values:

$$x^*_T = f(T) \quad (7)$$

- for $F(x_q)$:

$$x_q{}^*_T = f(T) \quad (8)$$

- for $F(x_{1-q})$:

$$x_{1-q}{}^*_T = f(T) \quad (9)$$

Stage 8 consists in the estimation of cost components. The estimation of cost components is based on analytical expressions defined in the second part of the article or by the researcher. The cost component value estimated for the entire life cycle of T technical object, for which at least one of the parameters remains time dependent is equal to:

$$K_{ab} = \sum_{t=1}^{T} K_{ab_t} \quad (10)$$

Whereas the cost component value for the T entire life cycle of technical object, for which none of the parameters depends on time should be determined based on the following correlation:

$$K_{ab} = K_{ab_{t=1}} \cdot T \quad (11)$$

Stage 9 covers adding up the cost components included in a-th cost category:

$$K_a = \sum_{b=1}^{B_a} K_{ab} \quad (12)$$

Exploitation costs are calculated in stage 10:

$$KE = \sum_{a=1}^{A} K_a \quad (13)$$

Conclusion

The article presents the concept of a life cycle cost forecasting method, which allows capturing the variability of exploitation costs over time arising from the gradually changing object parameters caused by technical wear, based on analysing the occurring correlations between such technical parameters as, e.g., diesel fuel consumption or failure stream and vehicle exploitation time.

The core idea of the method consists in forecasting the exploitation costs on the basis of the central parameter value and the value of its upper and lower quantiles providing the possibility of estimating costs following three variants: the expected (e.g. modal) variant, the optimistic variant and the pessimistic one. The course of the cost curve depends on, e.g.:

- the number of cost categories adopted for the analysis;
- the number of components and cost parameters identified within their framework;
- service life intervals;
- the adopted exploitation time unit;
- the adopted central tendency measure and the confidence interval for the quantile values adopted in the calculations.

The method presented in the article allows, e.g.:

- estimation of exploitation costs in the adapted lifetime period of a technical object;
- comparative analysis of alternative procurement solutions (variants);
- selection of an economically viable object in terms of the lowest total costs (i.e. total purchase costs and exploitation costs).

The carried out literature review on exploitation costs' modelling allowed not only learning about the methods for measuring individual categories of technical object exploitation costs, but, above all, confirming the fact that there is no method which allows determining exploitation costs, taking into account their variability over time resulting from the gradually occurring changes in object parameters caused by the technical wear processes. This article provides a method which solves the above-mentioned problem. In order for this method to be used in practice, its verification is necessary, covering as follows:

- conducting reliability studies of exploitation objects to obtain data of a technical and economic nature;
- entering data into the method and calculating cost forecasts;
- assessing the correctness of the results.

Empirical verification of the method is the next stage of the research work to be carried out by the author of this article.

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Use of Individual In-Depth Interviews (IDI) In Case Studies - Theoretical Background

Iwona WASIELEWSKA-MARSZAŁKOWSKA

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, iwasielewska@umk.pl, ORCID: 0000-0001-6830-7859

Katarzyna SAMEK

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, katarzyna.samek@umk.pl, ORCID: 0000-0002-5519-8558

Abstract

Nowadays, scientists wanting to study a given research phenomenon more and more often use the case study method. Thanks to it, they obtain a comprehensive picture of the studied phenomenon, learn about the economic reality, thus identifying and solving problems faced by enterprises. Additionally, if during the case study, they use other research methods (e.g. individual IDI in-depth interviews), the formulated conclusions are very accurate and much more useful in practice. The aim of the article is to describe and characterize the possibility of using the technique of individual in-depth interviews (IDI) in a case study. The literature review of the issue under study was based on the method of systematic literature review, based on the methodology proposed by Tranfield, Denyer, Smart (Tranfield, Denyer, Smart; 2003). The authors conducted a literature review in three phases, preceded by the determination of the purpose of the study. The first phase included planning the review, the second phase is the proper conduct of the research procedure (this phase consists of five stages) and the last third phase of the preparation of the research report (Tranfield, Denyer, Smart; 2003).

Keywords: individual in-depth interviews, case study

Introduction

Many research methods and tools are used in management sciences. In recent years, however, there has been a clear increase in interest in the case study method. This is evidenced by chapters appearing in many monographs (e.g. David 2006a, Czakon 2006, Yin 2015) as well as scientific articles (e.g. David 2006b, Matejun 2011, Wójcik 2013, Mielcarek 2014). In comparison to the methods of quantitative research, popular method of case study, due to the fact that it provides in-depth analysis of the problem and discussed research issues. S. Sudoł emphasizes that "descriptions of individual cases showing examples of bad management and best solutions or practices allow to provide organizations or managers with proposals for solutions to management problems for their practical application" (Sudoł 2007).

Carrying out a case study is a difficult and long-term process , requiring compliance with methodological rigor. When applying the discussed method , one cannot afford to be fragmented in activities. Only a holistic view of the studied phenomenon enables an objective view and planning of precise actions aimed at the best solution to research problems.

Individual In-Depth Interviews (IDIs) are increasingly used to carry out a detailed case study. IDI research is usually used as a supplement to other research methods - it aims to deepen the knowledge about the studied phenomenon and better observation of the respondent. Therefore, it allows, among others to reach the emotional and motivational patterns of the examined entity.

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For example, Escher, Brzustewicz (2020) use IDI in a case study undertaking research on sport issues in employee volunteering programs. The combination of different research methods (case study analysis and IDI) in management sciences is not accidental. The literature emphasizes that in the implementation of scientific research it is useful to combine various research methods and techniques (Stanisławski, 2017). Especially with regard to those sciences in which the knowledge of scientists with various research interests and from various scientific disciplines is used. This phenomenon is quite popular, especially in management sciences (Stanisławski, 2017).

The essence of case studies in management sciences

Case study analyzes in management sciences often supplement previous surveys and expert studies. Carrying out such an analysis enables an in-depth exploration of what quantitative research can only suggest. In the literature on management sciences, we can distinguish three goals that case studies serve - theoretical , theory-testing and practical (Fig. 1).

The first goal - theoretical

- enables the development of an existing theory and the explanation of phenomena that have not been explained yet.

The second goal - to test the theory

- it is testing an existing theory - it is mainly about determining the conditions under which a given theory proves itself, but also its falsification.

Third goal - practical

- has a practical and training character. It is mainly used to understand the course of the decision-making process in an organization, carried out under specific conditions.
- this forms the basis for the use of the case study to make managerial decisions in conditions similar to those presented in the case study. This case study is of an application nature.

Figure 1: Case studies objectives

Source: own study based on W. Czakon (ed.), Foundations of research methodology in management sciences, Oficyna a Wolters Kluwer business, Warsaw 2011, pp. 46–54.

The first goal, theoretical, makes it possible to develop the existing theory, provides explanations for hitherto unexplained and unrecognized phenomena, and makes it possible to understand the course of processes over time. The second goal, referred to in the literature as testing the theory. Contrary to the beliefs of verifying, testing a theory consists mainly in its falsification. You cannot prove the truth of the theory by empirical methods. It is justified to investigate, indicate or illustrate the circumstances in which a given theory does not work. The third goal of the case study is aimed at practical implication. Case studies are carried out to achieve this goal, they are illustrative, training and inspiring in nature (Czakon, 2016).

Moreover, some researchers indicate several aspects in which the use of the case study method is justified (Yin, 2014, p. 9-11; Eisenhardt, 1989, p. 547-548):

- there is little knowledge about the phenomenon,
- the available cognitive perspectives seem inappropriate due to insufficient empirical justification,
- available knowledge is marked by contradictions,
- looking for answers to questions like? or why? a given phenomenon occurs,
- the researcher has a very limited ability to control variables (events, circumstances) due to their location in the real context,
- the aim of the process is to study the phenomenon in its real conditions of occurrence (Donajewska, 2016).

It should also be emphasized that in management sciences, due to their close relations with practice, case studies enable the study of real economic phenomena (Grzegorczyk, 2015).

Vissak conducted a comprehensive analysis of the strengths and weaknesses of the application of case studies in management science research, presented in Table 1. A balance of strengths and weaknesses of the case studies (Vissak, 2010 [in:] Donajewska, 2016).

Table 1: Strengths and weaknesses of the case studies

Strengths	Weaknesses
popularity in many scientific disciplines,	underestimated and rarely used as a method of scientific research,
higher response rate than in the case of surveys,	allegation of a low degree of "scientific",
useful for creating a new theory and for criticizing or refining an existing theory,	low acceptability of case study results in prestigious magazines,
enable the explanation of new, complex and dynamic aspects of the organization's activities,	difficulty in interpreting the results,
appropriate to get answers to questions like? and why? concerning the cycle of events in the organization,	high time and labor consumption of research,
enable a holistic view of events and processes in their real context,	unsuitable for researching large groups,
enable the simultaneous conduct of qualitative and quantitative research,	difficulty in defining statistically true generalizations,
high flexibility of the process for the researcher (multiple feedback).	difficulty in obtaining confidential data in organizations - deliberate concealment of information by survey participants,
	the risk of bias and subjectivism of the researcher.

Source: own study based on Vissak (Vissak 2010, p. 379).

There are many definitions of case study analysis in the literature. T. Kaidesoja understands case studies as empirical research in which one or a small number of cases is thoroughly investigated using various data sources (Kaidesoja , 2018). On the other hand, J. Gerring stresses that the case study is probably best understood as an ideal type, not the methodswith hard and fast rules (Gerring, 2004). Schramm emphasizes that the essence of the case study, the main tendency of all its types, is to explain decisions: why they were made, how they were implemented and with what effect (Schramm, 1971). Case studies as a tool for theory generation and testing have provided management field strategy with groundbreaking insights (eg. Penrose, 1960; Chandler, 1962; Pettigrew, 1973; Burgelman, 1983). The case study method is prone to concerns about methodological rigor in terms of validity and plausibility (eg, Campbell, 1975; Miles, 1979; Daft and Lewin, 1990; March et al ., 1991; Yin, 1981).

Case study research is a form of empirical inquiry that investigates a contemporary phenomenon in-depth and within a real-life context, through circumscribing the area of study to a single or to a small number of units (Farquharab, Michelsc, Robsond 2020). Also vase Study research is characterized by the employment of multiple data gathering methods (Zahle, 2018).

Yin, Eisenhardt, (Yin, 1994; Eisenhardt, 1989) indicate that's studio cases are considered the most appropriate as a tool in the critical early stages of new management theory, when the key is tested variables and their relationships.

It should also be noted that the case studies are usually carried out in interaction and practices, who are practitioners cope with real management situations. Hence, case studies represent a methodology that is ideally suited for creating manageable solutions knowledge (Amabile et al., 2001; Leonard-Barton, 1990). Table 2 provides selected definitions case study method indicated in the publication ah different years.

Table 2: Summary of case study definitions

Author	Definition
KM Eisenhardt (1989, p. 534)	"A case study is a research strategy that focuses on understanding the dynamics that exist in specific conditions"
RE Stake (1995, p. Xi)	"Study of the singularity and complexity of a single case, leading to an understanding of its operation in relevant circumstances"
JW Creswell (2007, p. 73)	"A case study study is a qualitative approach where the researcher explores a specific system (case) or multiple specific systems (cases) over time through detailed, in-depth data collection covering multiple sources of information (e.g. observations, interviews, audiovisual material, documents, reports) and reports on the characteristics of the case and related topics "
JF Hair et al. (2007, p. 417)	"It focuses on collecting information about a specific event or activity, often a specific company or industry"
P. Erikkson and A. Kovalainen (2008, p. 303)	"A predominantly qualitative research approach where one or several cases (people, organizations, processes) are examined holistically in their social, economic and cultural contexts"
J. Blatter (2008, p. 68)	"A research approach in which one or several occurrences of a phenomenon are studied in depth"
DR Cooper and PS Schindler (2008, p. 700)	"A methodology that combines individual and (sometimes) group interviews with data analysis and observation, used to understand events and their consequences and processes, emphasizing the full contextual analysis of several events or conditions and their relationships for a single participant, type of pre- experimental research (one - shot case study)"
J. Dui and T. Hak (2008, p. 19)	"A study in which one case (single case study) or several cases (comparative case study) in their real context is selected and the results obtained from these cases are analyzed according to a qualitative approach"
H. Simons (2009, p. 21)	"In-depth study from different perspectives of the complexity and uniqueness of a specific project, policy, institution, program or system in a real context"
M. Saunders , P. Lewis and A. Thronhill (2007, p. 558)	"A research strategy that includes empirical research of a specific contemporary phenomenon in a real context, using multiple data sources"
G. Thomas (2011, p. 513)	"Case studies are analyzes of people, events, decisions, periods, projects, policies, institutions, or other systems that are investigated holistically using one or more methods. The case which is the subject of the research will be an instance of the phenomenon class that provides the analytical framework - the subject - within which the research is conducted and the case is explained and discussed"
E. Babbie (2011, p. 503)	"In-depth study of a single occurrence of a given phenomenon"

Source: M. Ćwiklicki, A. Urbaniak, Case study in management sciences, Publishing House of the University of Economics in Krakow, Krakow 2019, pp . 12-13.

The case study study has several characteristics (Zahle, 2018):

- the object of analysis is a single unit or several such units;
- detailed data that covers various aspects of the unit (s) are collected through multiple data collection methods;
- the end product is an in-depth case study.

The case study method has many advantages. Firstly, the correct conduct of the study using this method allows for an accurate presentation of the studied phenomenon. Secondly, it enables a thorough explanation of the sources of the analyzed situation and the factors influencing it. Third, a case-study study is based on more durable and deeper relationships between the researcher and the studied entity than in the case of quantitative research methods (Matejun, 2011).

It is also credited with disadvantages, such as labor- consumption, low objectivity and cost-effectiveness (Tsey, Lawson, Kinchin, Bainbridge, McCalman, Watkin, Cadet-James, Rossetto,2016). Moreover, the case studies are alleged to lack scientific reliability and the lack

of objective grounds for drawing conclusions. Critics point to the fact that using this method it is not possible to draw conclusions, because the studied units are only part of a larger community (Wójcik, 2013).

The case study uses individual in-depth interviews (IDI). The case study interview follows the delineated line, but it is flexible and allows for modifications (Rubin, Rubin, 2011). This type of interview is called "intensive interview", "in-depth interview" or "casual" (Weiss, 1994).

S. Kaczmarczyk emphasizes that the individual in-depth interviews (ang. (Individual in-Depth Interviews) are direct, personal interviews, which are conducted by professional interviewers with individuals who agreed to be interviewed (respondents). Kaczmarczyk NK Denzin and YS Lincoln present the broad specifics of individual in-depth interviews, according to them, the interviews are "an individual conversation between the moderator and the respondent, during which the issues contained in the scenario, previously agreed with the client, are discussed. Questions are open, and their order and method of asking depend on the moderator the respondent has the opportunity to fully express his feelings, beliefs or explain the motives of the conduct (...). The transcript from the study is the basis for the preparation of a detailed report " (Denzin, Lincoln, 2009). In turn, according to C. Boyce and P. Neale, this interview is qualitative. a technique that involves conducting intensive interviews with an individual among a small group of respondents in order to obtain their personal opinions on specific issues (Boyce, Neale, 2006).

The literature also indicates a number of features that characterize an individual in-depth interview. R. Miński includes these (Miński, 2017):

- direct contact between the interviewer and the interview participant,
- more or less structured interview scenarios,
- open nature of questions,
- recording the answers of the interview participant using e.g. a dictaphone,

An individual in-depth interview has advantages and disadvantages. The advantages most often include providing insightful data, ensuring a friendly atmosphere influencing the freedom of expression of the interview participant, the interview participant's sense of security as a result of direct interaction, the possibility of stimulating the interlocutor to answer and constant monitoring of the information obtained. On the other hand, the shortcomings include, first of all, the need to train interviewers, the requirement to carefully select interview participants, time-consuming and costly (Miński, 2017).

IDI in the Case Study

George Gaskell formulated the metaphor of an in-depth individual interview as "a conversation between two (or more) friends" (Bauer, Gaskell, 2000), which largely reflects the nature of the method itself and says a lot about the role of the researcher and the respondent in the research situation. However, it should be remembered that not every conversation and not every interview meets the methodological requirements of IDI (Bauer, Gaskell, 2000).

Zaharia Rodica Milena, Grundey Dainora, and Stancu Alin (2008) argue that an in-depth interview is a technique designed to elicit a vivid picture of the participant’s perspective on the research topic. During in-depth interviews, the person being interviewed is considered the expert and the interviewer is considered the student. The researcher’s interviewing techniques are motivated by the desire to learn everything the participant can share about the research topic. In depth interview is an effective qualitative method for getting people to talk about their personal feelings, opinions, and experiences. It is also an opportunity to gain insight into how people interpret and order the world.

The literature indicates that Individual in-Depth Interviews (IDI) should be conducted in 5 stages, as shown in Figure 2. In the first stage, **a strategy for selecting IDI participants should be developed**. K. M. Eisenhardt (Eisenhardt, 1989) indicates that the number of cases under study should

be in the range from 4 to 10 (cases) as a number appropriate for the case study, i.e. allowing for scientific conclusions. However, it should be borne in mind that the sample size in any research project will never be large enough to be used for statistical inference.

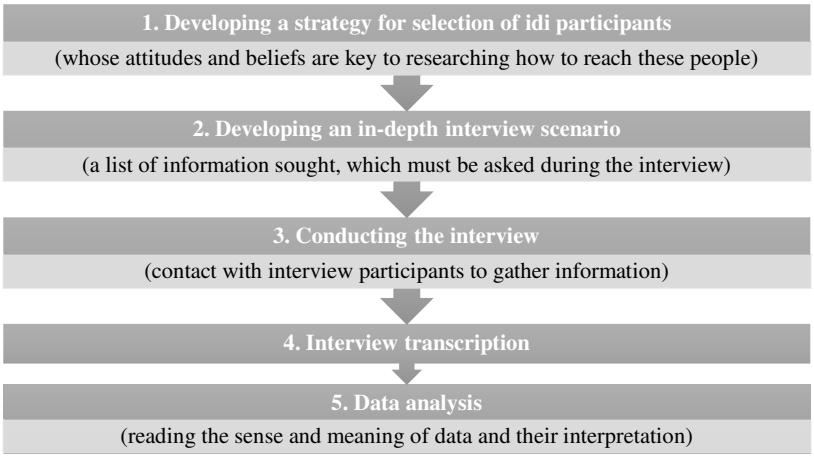

Figure 2: The steps of the implementation of depth interviews individual (IDI) in a test case (a case study)

Source: The Wallace Foundation, Conducting In-depth Interviews, Workbook E, website: http://www.wallacefoundation.org/knowledge-center/Documents/Workbook-E-Indepth-Interviews.pdf., [Retrieved July 19, 2019].

In the second stage should be **developed ay scenario of individual in-depth interviews** and a questionnaire interview. The selection of such different research tools as emphasized by MQ Patton (Patton, 2002) and SB Merriam (Merriam, 1998) will provide an appropriate answer to the research question and the issue raised in the study. Moreover, J. Gerring points out that case studies are carried out using methods such as individual in-depth interviews with the use of interview questionnaires (Gerring, 2004). Properly constructed scenario depth interview, (Minsk, 2017) consists of three elements:

- the measuring and recording part;
- a part containing information on issues that should be raised with the respondent along with exemplary forms of questions;
- the summary part.

Sometimes the interview scenario is extended with the information part, on which the respondent signs, agreeing to record the interview. The scenario of the individual in-depth interview should meet the following criteria:

1. contain specified topics on which information is sought;
2. not be too restrictive just to maintain the conversation, giving the respondent control over reporting his own experiences;
3. contain questions that evoke extensive (even effusive) answers;
4. contain clearly formulated and neutral questions (not suggestive);
5. contain a logical arrangement of questions (from general to specific).

As part of the third stage of carrying out the analysis of a case study with the use of an individual in - depth interview - **conducting an interview -** the interview should be conducted with direct research participation in the form of open questions addressed to persons representing the enterprise subject to the study. The literature indicates that the average interview time is 60 minutes. , it is stated that it is sufficient time for the respondent to speak freely (Boyce, Neale, 2006) .

Taking into account the fact that in-depth interviews require transcription, the obtained answers should be recorded - recorded on a dictaphone[1].

Steinar Kvale (2010) notes that the very transcription of interviews is not only a way of writing down the spoken word, but also a process of interpretation. Writing is a way of "remembering" to which one can return easily and objectively (Miński, 2017).

Even the best trained researcher is not able at the same time: to lead the interview, take notes and record the exact statements and reactions tested ... ". Interview transcription is one of the key elements of the entire study - it is to provide the researcher with text material necessary for further analysis of the research problem (Miński, 2017).

Transcription is therefore a necessary element, at least in the traditional form of recording interviews, but also causing specific difficulties - especially if it is performed by "subcontractors". Kvale indicates that an important methodological issue is not only the preparation of instructions for transcribers, their selection or training, but also stating in the final report how the transcription was performed (Kvale 2010, p. 157; Miński, 2017).

These activities constitute the fourth stage of the study, i.e. **the transcription of the interview**. The last stage of the research with the use of IDI is **data analysis**. It is important at this stage to check whether the obtained information is complete and meaningful. Moreover, it is necessary to read and listen to the transcripts of interviews many times in order to capture insights relevant to the research.

It is no less important to select information and segregate it, e.g. Miński indicates that the most popular segregation strategies are segregated by questions or segregated by topics (Miński, 2017). Silverman emphasizes that the key to the analysis of qualitative data is the status given by the researcher to the data obtained from the interviews (Silverman, 2007). Therefore, do the data serve the researcher to confirm the assumptions about the subject of the research (context caused by the researcher), or are they the basis for developing a new theory (context not developed by the researcher) (Zahle, 2018) .

Summary and Discussion

In research in the field of management sciences, the use of quantitative methods, which use various statistical tools and are as valuable as qualitative methods, should not be abandoned. Nevertheless, qualitative methods such as case studies using individual in-depth interviews enrich the study. They complement previous quantitative research. Conducting case studies using IDI allows you to explore in depth what quantitative research can only suggest. It may also prove the great universality of the research process, which is the basis for in-depth and reliable drawing conclusions from research.

The use of IDI in case studies is particularly important in the case of enterprise research. In management sciences, qualitative aspects play a fundamental role. Behind every company there is a man, hence learning about his attitudes, behavior and values through qualitative research becomes a necessity. On this basis, drawing conclusions from the implementation of the bubble is much more accurate and reaching into the essence of the issue, which makes it easier to understand. Significant here is the statement of Deniz and Lincoln that "a qualitative researcher (...) is like a patchwork maker (...), he connects, assembles and puts segments of reality together. This process creates and gives psychological and emotional unity - a model - for an interpretive experience" (Deniz, Lincoln 2006).

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[1] Yes , and the form of individual notes recording history depth recommended J. Zahle . J. Zahle , op. cit., access date: 23/07/2019.

Soil-saving Agricultural Technologies and State Support for Socially vulnerable segments of the Population in preventing Poverty

Victor F. STUKACH

Doctor of Economics, Professor, Department of Management and Marketing of the Federal State Educational Institution of the Omsk State Agrarian University. Omsk, Russia, in orcid: http://orcid.org/0000-0002-9911 - 6286, Researsher ID: H-1016-2012, vic.econ@mail.ru

Abstract

The article deals with a problem of high political and social significance: providing environmentally friendly food to socially vulnerable categories of the population. This category includes pregnant and nursing women, children, school children, clients of social institutions, and segments of the population whose real incomes are below the subsistence level. The amount of food consumed by this category of population can be 17-20% of the volume in the region. We need land resources that can be used to produce organic food without the use of pesticides with a limited amount of fertilizers.

Goal. To investigate the problem of providing environmentally friendly food to socially unprotected categories of the population. Consider mechanisms for coordinating market, distribution, and informal institutions to provide food to socially vulnerable segments of the population. It is proposed to use state support tools to encourage land users to use soil protection technologies, introduce degraded land into agricultural circulation, and create food aid infrastructure in the regions. It is proposed to use state support tools to ensure the use of soil-protecting agricultural technologies, to create a system of food aid to overcome the poverty of socially vulnerable segments of the population.

Keywords: degraded land, soil protection technologies, state support, poverty prevention, infrastructure of domestic food aid in the region.

Introduction

Due to the special social and political significance, the solution to the problem of the healthy nutrition of socially vulne rable groups is in the area of responsibility of the state. The state, using regulatory methods, have the opportunity to motivate the costs of entrepreneurs and infrastructure organizations in the social sphere and environmental programs within the "Green box Measures" of WTO. This area includes support for socially vulnerable groups and organic farming that related to environmental measures and the use of soils unsuitable for active exploitation; it also includes a system of services of market, distribution and informal institutions to provide for the needy of socially vulnerable groups. This approach has become economically viable for Russia and other countries with a transforming economy that has joined the World Trade Organization. Government support tools can create a mechanism to help farmers who produce on degraded lands.

Food manufacturing largely depends on soil fertility, so they must be healthy and productive. This determines the importance of returning to productive land turnover subject to fatigue, coming from economic activities of entities, as well as the influence of natural phenomena, wind erosion, and water erosion. This situation is typical for many countries and regions (China, Australia, Kazakhstan, Ukraine, in Russia - the Volga region, Siberia, the Caucasus, etc.).

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Methods of Research

Land resources and their condition, the problems of poverty and hunger reduction are the priorities of world social and economic science. In Russia, the problem of proper nutrition in general and for the young generation, in particular, is considered in the context of the health of the nation. In recent decades, large-scale research has been carried out within the framework of the Food and Agriculture Organization (FAO). That confirms the high scientific and practical importance of social protection of the population, the protection of natural factors and the behavioral reactions of the population in need to the state measures.

The FAO report “The State of the World's Land and Water Resources for Food and Agriculture” (SOLAW) notes that although there has been a significant increase in food production over the past 50 years, it has led to degradation of land and water systems on which food production depends [3,6,7,10]. In many cases such achievements in increasing have been linked to management practices.

Literary sources give a sufficient idea of the genesis of processes in the field of agricultural land use. First of all, the loss of soil fertility is associated with the irrational land-use system. A team of scientists from the Russian Academy of Agricultural Sciences (RAAS) prepared a report, based on official sources, that approves that “30 to 40 million hectares of tilth in Russia were withdrawn from land turnover at the beginning of 2008 and now are not used”(G. A. Romanenko, 2008) [1, p. 66].The transformation of land relations has occurred in post-socialist countries. As a result of denationalization and privatization, the forms of land ownership has changed. Then decision-making in the field of technology application was transferred from large state-owned enterprises to a large number of legal entities that owned land.

The decisions of commodity producers regarding the attitude to the used of farmland depend on macro-social factors (that are not controlled by the head of the enterprise; demographic situation); microsocial factors (poverty; the farmer’s desire to make a short - term profit; concern for the survival); public policy. There become relevant studies of informal institutions, identifying the patterns and relationships that affect the specific actions of workers on the use of environmental systems of agriculture in the individual enterprise. It involves identifying factors that go beyond self-preservation in the actions of economic entities. It is necessary to create conditions that shape organizational behavior (so-called “cultural code”) under which it is possible to solve long-term development tasks and, above all, to preserve the environment as the main condition for agricultural production. [4, p.133-142] ,[12]].

An assessment of the feasibility of using degraded land as a resource in the production of environmentally friendly food was maded. The problem of degradation exposed lands is addressed; the macro and micro social factors impacting the decision-making process in soil protection are identified; a comprehensive model for natural factor recovery in production by introducting organic agriculture technology for manufacturing environmentally friendly products. Research methods used in the article: Balance sheet method for agriculture, food production and consumption; written and oral survey. We polled leadership, directors, farmers, businessmen, agro technologists, managers, production managers, field foremen, farm and agriculture machinery operator. The survey had questions on the real-life business life and measures taken; respondents' opinion on the feasibility of

using certain methods and technologies, respondents' awareness of the problem and economic motivation as a result of using methods and technologies, and the social elements of the survey.

After Russia's accession to the World Trade Organization (in 2012), it became necessary to formulate the volumes of state support, taking into account the requirements of the WTO rules. The Concept of measures to support domestic producers and processors of agricultural products was adopted by the Russian Government based on domestic food assistance mechanisms within the "Green box Measures" of WTO. The Concept incorporates the idea of a phased expansion of state guarantees in the field of domestic food aid to the population in need of food products.

Based on domestic food aid mechanisms, the Government of the Russian Federation is implementing a program of "pilot" projects aimed at estimation of efficiency of support measures for domestic producers and processors of agricultural products. The decision was made on the realization in 2013-2015 of "pilot" projects in the republics of Buryatia and Mordovia, Omsk, Saratov and Ulyanovsk regions, in which "pilot" projects for testing the mechanisms of domestic food aid are being implemented. To judge the extent of the World Food Programme (WFP), the calculations were performed for the Omsk region, which is implementing a "pilot" project. The database on the number of people in need was formed [5].

For example, in the Omsk region, according to statistics of 01.01.2014, the population was 1 974 000 people, including 1417 000 in cities and 557 000 people in rural areas. Of the total: 868 000 people are pensioners and veterans of the Great Patriotic War; - 295 000 people are pregnant women, nursing mothers, and children under the age of 3 years; 27 000 people are single mothers (fathers) with children; more than 3 000 people are disabled. Besides, there are more than 1 000 people from large families and low-income families in the region.

According to the regional Ministry of agriculture, the needs of socially vulnerable segments of the population for various types of products are met by local production resources by 78-86%. The needs for bakery products, potatoes, milk and meat are fully met.

The Results

The data of a study carried out by the scientists of the Omsk State Agrarian University within the Russian Foundation for Basic Research grant (RFBR grant). First of all, it was revealed that the decisions of economic entities regarding the attitude to technologies in agriculture, in general, and environmental protection, in particular, are influenced by the conditions. The idea is that up to 80% of farmers in natural and climatic zones with a real risk of loss of fertility due to soil erosion, are concerned about short-term survival and do not care about soil conservation for future generations. About 75% of respondents are not sufficiently informed about the crop rotation system, plant protection, the use of fertilizers and pesticides[4, 5, 9].

The analysis of well-known sources in scientific literature allows us to formulate several regulations that form the attitude to land resources. The main groups of factors are detached. First of all, there are *macro-social factors,* among which - state policy, market conjuncture. *The next factor is "poverty"* - the farmers working in the waste ground use their resources to complete exhaustion; they are concerned about their survival, not about conservation of natural resources. *Microsocial factors* have a decisive influence on the choice of decisions regarding the use of technology. Among microsocial factors are a measure of awareness about the problem and actions taken, access to the information, economic efficiency (profitability), a measure of the acquisition of knowledge and skills regarding the technologies and others that directly affect human behavior, land management.

After identifying the possible points of making efforts to introduce soil protection technologies, the issue of motivation mechanisms for landholders was considered. It can be economic, organizational - legal and educational methods of influence. Among these, the main are state environmental

programs, legislation, economic sanctions, training for staff, educational programs, and activities of state consulting services. In the process of the reform, public authorities need to anticipate the social and economic consequences that directly affect the environment [9].

The dynamic of changing priorities in the range of the economic condition of the enterprise is traced from the level of survival to high profits (tab. 1). Studies have shown that enterprises and individual low-income farmers do not mention the prevention of soil degradation and destruction in the list of priorities.

First of all, farmers take care of their survival in the short-term perspective. And from this, we can deduce that economic entities solve socially significant long-term tasks only when the work is profitable. Moreover, the higher it is, the more the company is interested and able to take care of the environment and the use of soil protection technologies.

Table 1: Priorities of land users depending on the level of profitability of the production

	Priorities of land users depending on the economic performances of the production		
Приоритеты	**High profit**	**Modest profit**	**Low profit (survival level)**
1. Keeping the profitability and growth of agricultural producers			
2. Satisfying the consumer demand for products	1	1	2
3. Satisfying the needs of employees of the enterprise	2	2	3
4. Protection of land from negative processes (soil depletion, degradation, etc.)	3	4	not a priority

The results of this concrete study of the problem of supporting socially vulnerable groups and the eradication of poverty make it possible to mark down the ways to solve it. The main are: providing organic produce to people in need; allocation of land plot for organic production; creating a system of state support for consumers and producers of products; forming of the regional infrastructure of domestic food aid. The mechanism is proposed that motivates land users to conduct organic production, preserve soil fertility, and create service infrastructure, combine market, distribution, and informal institutions to provide goods for needy citizens. This mechanism work with tools of state support within the “Green box” of WTO.

Discussion

Within framework of the study problem, the process of forming a food aid system for disadvantaged groups at the regional level was studied. The research procedures were carried out:

> The number of socially vulnerable groups in the region and their need for food aid were determined;

> Practical measures have been developed to solve the economic and social problems of developing the institutions of the regional infrastructure of domestic food aid;

> The potential use of land, withdrawn from agriculture as a resource for food production, was explained;

> The possibility of creation is investigated and the parameters of the production and logistics center were determined;

> The list of production enterprises, infrastructure organizations included in

the region's food aid system as part of cluster interaction was explored;

> The mechanism for the interaction of the production-logistics center and raw materials suppliers for packaging and processing was developed;

> The project of workflow between production and processing enterprises, trading and payment systems was submitted;

> The assessment of the effectiveness and feasibility of raising the land withdrawn from agriculture for the production of organic food was taken;

> The mechanism for the interaction between production-logistics center and food consumers was developed.

Food aid infrastructure would help to create an institutional environment and infrastructural network that influence the processes of food production and consumption by the population of the region. Adding of missing elements to the infrastructure would attract an additional amount of food resources (up to 15%) using new technologies, reduction in the number of ineffective intermediaries, removing the barriers in the interaction of agents, reduction of raw materials losses. There will be an opportunity to create a stable social procurement for local agricultural producers and processors; to create mechanisms of state support for entrepreneurs implementing projects of domestic food aid, which directly stimulates them to increase production and services. Agricultural organizations and farms would be able to get involved with the distribution network with domestic produced goods.

The social effect consists in the fact that full and high-quality nutrition is provided to children in preschool and educational institutions and to low-income groups of the population; there is the possibility of subsidizing part of the costs for low-income parents.

Conclusion

The study revealed

- The motivation for developing the system of domestic food aid in economies of transition is to overcome the limitations of the WTO on direct state support for producers;
- Environmental technologies in agriculture and soil protection against destruction depends on macroeconomic, microsocial and state policies;
- Poverty in the agriculture carries economic and socio-cultural prerequisites for the development of a negative scenario, keeping the tendency to the destruction of fertility and the quality of the soil layer.

Priorities in the field of state regulation

- Equalization of income differences between farmers who work in undermanaged lands and agents engaged in intensive agriculture; preventing poverty in the agricultural sector using state support tools as part of targeted programs;
- Conducting research in the field of informal institutions, mechanisms for motivating farmers to adopt environmental technologies and use degraded land;

Practical recommendations

- The difference in income of farmers and infrastructure organizations working on unsuitable for intensive technologies land should be covered by targeted state support programs;
- To orient scientific researches to the creation of economically efficient and environmentally friendly technologies;
- To develop a system of retraining of personnel for the private sector and agricultural advisory

services;
- To include information services in work; state monitoring of the conditions of the rental work of farms, financing of soil conservation measures;
- To include pricing policy, subsidies and trade policies in agriculture;
- To control fertilizers and pesticides consumption, soil fertility, groundwater conditions.

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The Age of Exploited Persons in Romania – Is There A Difference by Sex, Type of Residency, Type of Exploitation, Relationship with The Recruiter or Country of Destination?

Glăvan Ionela-Roxana

Assistant Lecturer, PhD. Bucharest University of Economic Studies
roxana.glavan10@yaoo.com

Mirică Andreea

Assistant Lecturer, PhD. Bucharest University of Economic Studies
miricaandreea89@gmail.com

Necula Marian

PhD. Candidate Bucharest University of Economic Studies
neculamarian18@stud.ase.ro

Abstract

This study focuses on the findings revealed for the age of exploited persons in Romania, specifically through analysing differences by demographic characteristics in relation to the human trafficking phenomenon. The dataset that is modelled and analysed in this study originates from the National Agency against Trafficking in Persons in Romania (ANTIP). Analysis on the selected dataset points out that non-parametric procedures are more suitable. Due to heterogeneity of the age the median is more relevant than the mean thus the results of the Independent-Samples Median Test for variable "Age" across categories show a significant difference across categories for most of the variables, except for Type of residency. Boxplots where significant differences occurred are further presented for the variable "Age" across categories of the variables in order to describe the present variable distributions.

Keywords: exploitation, vulnerability, age, human trafficking, Romania

Introduction

A comprehensive approach to determine the ramifications of the human trafficking starts with determining the victims as supply and later identifying the nature of the labour that the victims ensure. Such view is shared by (Cho, 2015) mentioning the need to address the phenomenon in the view of the four pillars of human trafficking: *Migration*, *Vulnerability, Crime and Policy and Institutional Efforts*

Human trafficking as is demonstrated in the Trafficking in Persons Report (United States Department of State, 2020) remains "a global threat necessitating a global response". Progress in victim identification efforts and significant governments action are mandatory to ensure eliminating all forms of human trafficking.

The trafficking phenomenon is closely related to the poor economic climate in which the victims are struggling in their home country. With the advances in IT communication technologies recruiters gained the means to diversify their methods to carry out illegal activities. Such criminal activities in trafficking spread out diversely from labour workforce exploiting to, child begging exploits, sexual

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exploitation and international drug commerce. In order to address such a diversified field new adequate laws to combat all the recent forms and means of trafficking are necessary to be implemented.

The urgency to fight against human trafficking is more acute with the recent development of COVID-19 pandemic as its implications magnified the social discrepancies for all the victims. Starting with the fact that traffickers rely on vulnerable profiles in order to exploit them it is of great importance that an economic mitigation should be addressed. In the present context, the lack of jobs and access to medical services increased the number of vulnerable people which in terms created an expanse of the infarctional environment (United States Department of State, 2020).

Age is a relevant factor to address the human trafficking scourge as young victims are predisposed mostly to become later active crime offenders. As Cho (2015) has pointed out crime pillar explains mostly the human trafficking problem and a sense of urgency to adopt criminal justice and crime prevention measures is seen beneficial. In order to reduce the phenomenon complexity of human trafficking a solution approach is one which discourages it is by increasing the penalties for all offenders that exploit children along with the other Policy and Institutional Efforts. Such key observation relies on the fact that children are physically and mentally fragile and do not have the possibilities to anticipate and avoid human trafficking schemes, thus making them a vulnerable group (Gheorghiţă and Vădăstreanu, 2015).

Nevertheless, it is of great urgency to tackle the causes and ensure in Romania the economic means in which such cases are displaced away of the criminal environment, integrated socially and economically, with a proper work opportunity that offers better living condition for the victim in order to avoid re-trafficking or further misbehaviour in the community.

Furthermore, overall regional development policies are equally important because the human trafficking root causes are tied to local or regional underdevelopment issues such as “poverty”, “inequality” and “discrimination” which in terms increase the human security risks (Cho, 2015).

Methodology

Data with regard to the cases of exploited persons in Romania was retrieved from https://data.gov.ro/en/organization/agentia-nationala-impotriva-traficului-de-persoane (accessed 20 Jul. 20). The data contains demographic characteristics for the cases of human trafficking victims identified in 2015-2018. 5 records were deleted from the database as the country of destination is unknown. Next, 15 records were deleted as the type of residency is not available. Then, 35 records were deleted because the relationship with the recruiter is unknown. Considering the country of destination all the countries with under 50 persons were grouped into a new category “other countries”. These countries are: Albania Bahamas Belgium Cyprus Czech Republic Estonia, Finland, Greece, Hungary, Ireland, Libya, Netherlands, Norway, Poland, Portugal, Qatar, Serbia, Sweden, Swiss Confederation, Turkey, United Arab Emirates, USA.

For the purpose of this paper, data will be tested for normality by categories as follows:

- Sex: male, female
- Type of residency: rural areas, urban areas
- Type of exploitation: attempt, begging, labour, other, sexual exploitation, stealing
- Relationship with the recruiter family member, friend, neighbour, procurer, spouse, unknown person
- Country of destination: Austria, Denmark, France, Germany, Italy, Other countries, Romania, Spain, UK.

The Kolmogorov-Smirnov and Shapiro-Wilk tests, as suggested by Lund (2018), using a significance level of 5%. The null hypothesis states that the data is normally distributed. If the data meets the normal distribution assumption the ANOVA test will be performed in order to answer the research question. Otherwise, non-parametric tests will be used.

Results

The age of a person victim of human trafficking ranges between 2 and 75 years with a mean of 22.32 and a median of 18. The standard deviation is 10.6 years, making the variable heterogenous. Tables 1 to 5 present the results for the normality tests of the variable "Age" by each category of the following variables: Sex, Type of residency, Type of exploitation, Country of destination, Relationship with the recruiter. As one can observe, the null hypothesis of normality distribution is rejected. Therefore, non-parametric procedures are more suitable. Moreover, as the age is heterogenous, the median is more relevant than the mean.

Table 1: Tests of normality for variable "Age", by each category of variable "Sex"

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Sex	Statistic	df	Sig.	Statistic	df	Sig.
Age	female	.215	2008	.000	.742	2008	.000
	male	.100	728	.000	.959	728	.000
a. Lilliefors Significance Correction							

Table 2 Tests of normality for variable "Age", by each category of variable "Type of residency"

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Type of residency	Statistic	df	Sig.	Statistic	df	Sig.
Age	rural	.228	1457	.000	.794	1457	.000
	urban	.214	1279	.000	.809	1279	.000
a. Lilliefors Significance Correction							

Table 3 : Tests of normality for variable "Age", by each category of variable "Type of exploitation"

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Type of exploitation	Statistic	df	Sig.	Statistic	df	Sig.
Age	attempt	.205	154	.000	.812	154	.000
	begging	.153	194	.000	.914	194	.000
	labour	.083	469	.000	.974	469	.000
	other	.138	52	.015	.957	52	.059
	sexual exploitation	.182	1801	.000	.867	1801	.000
	stealing	.329	66	.000	.661	66	.000
a. Lilliefors Significance Correction							

Table 4: Tests of normality for variable "Age", by each category of variable "Country of destination"

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Country of destination	Statistic	df	Sig.	Statistic	df	Sig.
Age	Austria	.163	57	.001	.939	57	.007
	Denmark	.132	50	.030	.969	50	.205
	France	.164	64	.000	.923	64	.001
	Germany	.174	203	.000	.854	203	.000
	Italy	.227	248	.000	.763	248	.000
	Other co	.166	272	.000	.859	272	.000
	Romania	.277	1459	.000	.650	1459	.000
	Spain	.161	162	.000	.887	162	.000
	UK	.182	221	.000	.881	221	.000
a. Lilliefors Significance Correction							

Table 5 : Tests of normality for variable "Age", by each category of variable "Relationship with the recruiter"

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Relationship with the recruiter	Statistic	df	Sig.	Statistic	df	Sig.
Age	family member	.225	181	.000	.776	181	.000
	friend	.230	1371	.000	.771	1371	.000
	neighbour	.216	141	.000	.819	141	.000
	procurer	.182	115	.000	.904	115	.000
	spouse	.203	251	.000	.825	251	.000
	Unknown person	.191	677	.000	.862	677	.000
a. Lilliefors Significance Correction							

Table 6 presents the results of the Independent-Samples Median Test Results for variable "Age" across categories of the following variables: Sex, Type of residency, Type of exploitation, Country of destination, Relationship with the recruiter. As one can observe, there is a significant difference across categories for most of the variables, except for Type of residency.

Table 6: Independent-Samples Median Test Results for variable "Age" across categories of different variables

Null Hypothesis	Sig	Decision
The medians of Age are the same across categories of Sex.	.000	Reject the null hypothesis.
The medians of Age are the same across categories of Country of destination.	.000	Reject the null hypothesis.
The medians of Age are the same across categories of Relationship with the recruiter.	.000	Reject the null hypothesis.
The medians of Age are the same across categories of Type of exploitation.	.000	Reject the null hypothesis.
The medians of Age are the same across categories of Type of residency.	.664	Retain the null hypothesis.

Figures 1 to 4 display the boxplots for variable "Age" across categories of the variables where significant differences occurred. As one can observe, the median age for men is significantly higher compared to the one for females. Also, females present a median age below 18. With regard to the country of destination, persons exploited in Denmark register the highest median age while those exploited in Romania the lowest. Also, one can observe that the only country where the median age is under 18 is Romania. Considering the relationship between the victim and the recruiter, the lowest median age occurs for the cases where the recruiter is a family member. Moreover, a median age below 18 can be observed for the cases where the recruiter was a procurer. With regard to the type of exploitation, a median age below 18 can be observed for the cases of theft as well as sexual exploitation.

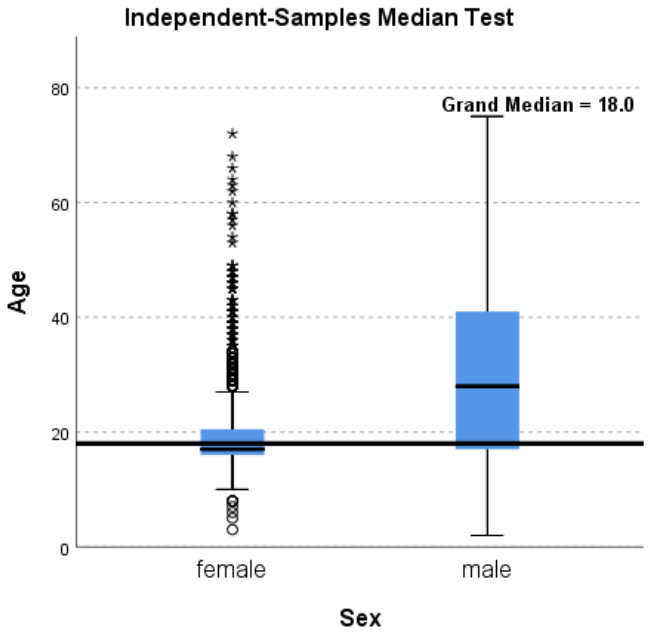

Figure 1: Independent-Samples Median Test for variable "Age" across categories of Sex

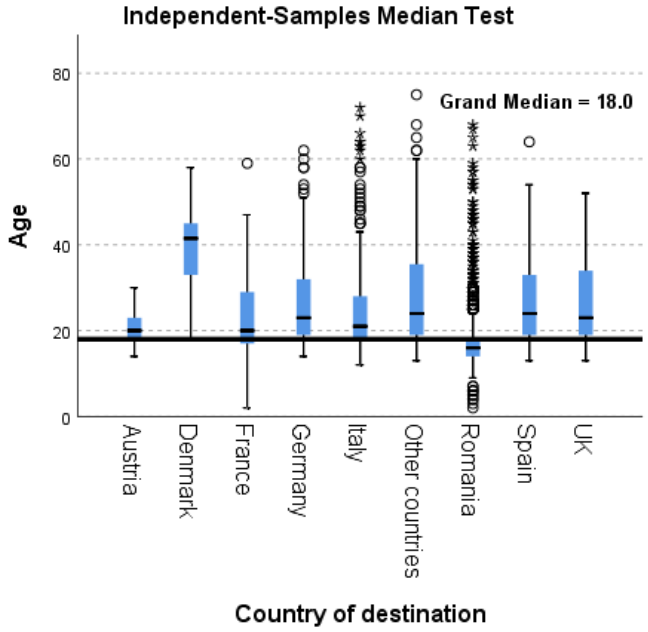

Figure 2: Independent-Samples Median Test for variable "Age" across categories of Country of destination

Figure 3 : Independent-Samples Median Test for variable "Age" across categories of Relationship with the recruiter

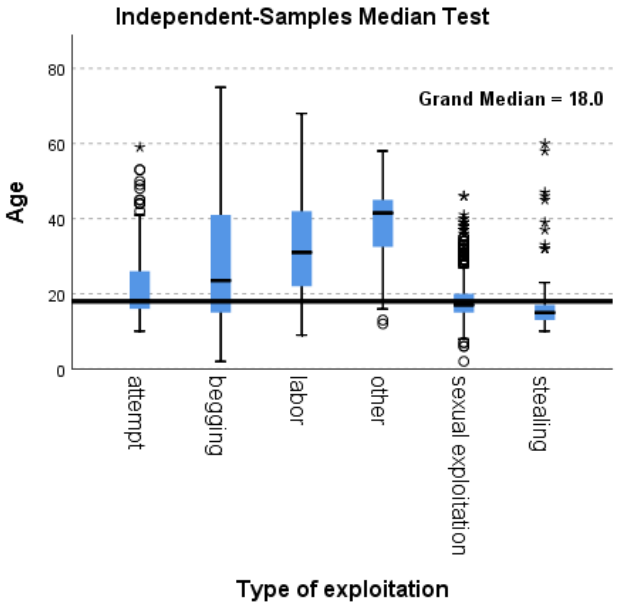

Figure 4 : Independent-Samples Median Test for variable "Age" across categories of Type of exploitation

Conclusions and Further Research

Among countries in the European Union (EU), Romania ranks at the top in terms of absolute number of victims and absolute numbers by gender (UNODC, 2018). In country with the lowest GDP per capita among EU countries, where nearly 30% of the population lives below the poverty line (Romanian NIS, 2018a) and a quarter of those are aged below 17 years (Romanian NIS, 2018b), the most affected category by human trafficking are children comes as no surprise.

The analysis presented in the paper highlights that nearly 50% of the cases reported in the judiciary system are comprised of individuals below median age equal or less than 18 years, with males are overrepresented. While some of the trafficked persons remain in Romania, the destination of trafficked person is comprised mostly by a cluster of Western and Central European countries, with higher living standards than Romania, where the victim is forced into some form of illegal activity. In terms of the recruiter, this person is usually someone the victim knows or has some form of relation based on trust. In terms of limitations we need to highlight that there are serious concerns of under reporting, mostly regarding the correlation between the case where the victim does not leave the country and the recruiter is part of the family. A topic for further research is the geospatial-temporal model between the number of victims aged below 18 years, the level of economic development or economic inequality at the level of regions, counties and municipalities , number of law enforcers and demographical data, taking into account as dummy variables the data at which different pieces of legislation which target the phenomenon where passed.

In a more general note, trafficking of persons is a very serious issue in Romania and should be pushed higher on the political agenda in order to increase awareness in the general public and take serious actions against it, taken into account the strong evidences from multiple sources.

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Intercultural Leadership in the Context of An Empirical Study in Iran and Switzerland

Radosław Ryńca

Wroclaw University of Science and Technology, Poland

Radoslaw.rynca@pwr.edu.pl

Yasmin Ziaeian

Wroclaw University of Science and Technology, Poland

Yasmin.ziaeian@pwr.edu.pl

Abstract

This paper presents an analysis of the differences in the leadership style and links the existing theories with practice. This study will show what kind of leadership styles exist and how they specifically affect the company's performance results. The aim of this paper is examining the leadership style of one company but in different countries, therefore, the answers provided by executive managers are essential, and the sample size is small. Here, the human resource management of a specific large company in two countries is examined. They are different in terms of political and economic aspects. For the needs of comparing the leadership style in one international company based in two different countries (Switzerland and Iran), cultural characteristics need to be determined. For this purpose, Bass & Avolio's MLQ is administered to executives and employees at Buhler AG in Switzerland and its Iran office to measure the leadership style. The result shows, that the cultural dimensions influence the tendency of managers/employees towards transformational/transactional leadership styles in one company but in different countries. According to this research, It is particularly recommended that the leaders in international companies in different environments take cultural aspects more seriously and become more open and supportive of new mindsets and changes, which – in turn – can increase employees' satisfaction and performance in the work environment.

Keywords: Leadership Style, Intercultural Leadership, Culture, External Factors

Introduction

In recent years, companies have had to strengthen their competitiveness due to internationalization so that they can secure their existence on the market. Personnel management is a crucial function of securing long-term competitiveness.

Leadership is one of the essential original fields of action. It describes the process of social influence, in the course of which every company needs to achieve its goals.1 Managers can influence their employees through their leadership behavior in order to achieve the qualitative and quantitative corporate goals. The management style applied is an essential factor for the success of the company.2

In an international environment, the leadership style requires a basic consensus as to the expectations of the manager and the leader. The challenge to the success of international companies is that cultural differences have to be taken into consideration and, accordingly, strategies have to be adapted.3 The increasing importance of intercultural leadership has spurred scholarly interests in this field, which results in the fact that many empirical studies are carried out on it. The research theories offered by Hofstede (1980, 1993), Bass (1981) and Hause (GLOBE study) are some of the most important outcomes of such studies.4

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Hofstede has found that there are no universal solutions to the problems of organization and management. Organizations are symbolic. They work according to the way their culture influences their members' thoughts.5

The results of all studies have shown that intercultural management and intercultural leadership are as important as other company's success factors (financial management).

Leadership

In the scholarly literature on the field under discussion, there are various approaches to the term *leadership* as well as various perspectives on it. Some of these definitions are shown below:

- Leadership is seen as a complex phenomenon linked to social relationships among several people.[6]
- Leadership is understood as goal- and result-oriented tool of mutual and activating social influencing for the fulfillment of common tasks in and with a structured work situation.[7]

Human Resources Management

A company aims to maintain long-term successful activity on the market. Therefore, employees are the most valuable asset and play a significant role in the company's success.[8] For this reason, personnel management in the company is of crucial importance. Personnel management can be characterized as an interaction process occurring in the company. In this process, the manager tries to control the actions, thoughts, and feelings of employees in their area of responsibility so that the corporate goals are successfully achieved.

The contributions made by employees, the avoidance and reduction of their undesirable behavior, job satisfaction and the company's improved performance are the most important goals of personnel management. In the area of personnel management, leadership tools, models and theories have been developed so that managers and employees are connected within a specific management situation.

Leadership styles are the most important form of leadership tools, which can be used to describe the manager's behavior.[9]

As this work deals with the comparison of leadership styles in two different countries, in the next section, different types of leadership styles will be explained.

Leadership Style

The leadership style is the way in which the supervisor leads the subordinate employees. It is a simplified model that describes the basic principles of action for the manager.10 There are many types and variations of leadership styles. Scholars are interested not only in the personal characteristics of leaders but also in the effectiveness and efficiency of leadership behavior in certain situations.11 In this context, the American political scientist and historian – Burns (1978) – made a distinction between transactional and transformational leadership. This distinction was further developed by Bernard M. Bass and is also discussed in this study:

- ***Transactional leadership style***

This leadership style is based on an exchange relationship. In this style, the goals of the organization are followed by the employees and they are rewarded for it. The manager is guided by his/her employees' corporate goals, wishes and needs. The work is based on employees' extrinsic motivation.[12]

Transactional leaders are those who approach their followers in order to promise them something and to expect something else. In this way, the manager can influence his/her employees under stress and find quick solutions addressing his/her employees' needs.[13]

Bass & Avolio (1994)[14] divided this leadership style into two components:

- contingent reward: here, managers and employees have mutual expectations of each other, and they agree on a goal for which the employees receive a reward when it is achieved;
- management-by-exception: in this model, employees act independently within a given framework. Managers will intervene in the decision-making process if it is only necessary.

- ***Transformational leadership style***

This style focuses on the manager's function as a role model, which is based on specific goals and motives. The manager pursues these goals, from which identification and personal engagement arise.[15]

The transformational leader recognizes the existing needs of his/her employees and he/she tries to satisfy those needs regarding Maslow's hierarchy of needs in order to engage employees. In this style, the work is based on employees' intrinsic motivation.[16]

Bernard Bass and Bruce Avolio (1994) characterized four basic components of transformational leadership in the following way:[17]

- charisma: the manager gives his/her subordinates a vision and achievable mission. Employees follow the leader because they trust him/her;[18]
- inspiration: the manager demands high performance from his/her employees. The manager pays attention to motivation and emotional appeals which contributes to the increase in the awareness and understanding of goal achievement;[19]
- intercultural simulation: the manager encourages his/her employees so that they can develop their ideas and optimize the opportunities for collaboration;[20]
- appreciation: appreciation is essential in personal development. Employees are treated equally and fairly.[21]

- ***The laissez-fair leadership style***

The word "laissez faire" comes originally from French and means "let's do it". This leadership style is a "non-leadership style".[22] Employees have complete freedom. The manager only passes the requested information on to his/her employees and does not make any management decisions. Besides, the supervisor has little opportunity to structure and control the work. Productivity might be very low here because the feelings of togetherness are missing. Aggressive behavior is often observed in this style.[23]

International Personnel Management

International human resource management, which takes national cultural differences in consideration, is characterized by three research traditions:

- intercultural personnel management focuses on the issue of personnel management in intercultural contexts within a country or in individual countries;
- international comparative human resource management not only focuses on culturally related behavior but also examines differences between human resource management practices in their different institutional environments;
- regarding international personnel management, the circumstances surrounding the emergence of employees abroad need to be examined.[24]

Because intercultural personnel management is the focus of this study, it is examined in more detail.

Intercultural personnel management:

Internationalization and globalization indicate global political, economic and social interdependencies. Since the beginning of globalization, the interconnectedness of the world in the different areas of society has increased. The intensity of competition and innovation on international markets has enormously increased. International management connected with intercultural risks is an essential term for the companies which want to remain on the competitive worldwide market. Intercultural personnel management is related to the type of internationalization strategy, the company's positioning in a foreign cultural environment and management position.[25]

Cultural Contexts

Because the concept of culture is very abstract and its meaning has changed over time, there are different definitions of the concept of culture.

Culture consists of patterns of behavior that are transmitted through symbols. The essential core consists of traditional ideas and their attached values. [26]

- *Culture concept, according to Hofstede*:

Culture is a "mental programming" of behavior. Before something else can be learned, the acquired patterns of thinking, feeling and acting have to be discarded in childhood.[27] Geert Hofstede introduced the concept of "national culture" between 1967 and 1973. In addition, the analysis unit of "national culture" has represented a meaningful unit through its empirical research that covers almost 74 countries. He examined the influence of national culture on organizational culture. His empirical study was done on the basis of the data of the multinational company – IBM. He recorded different values and attitude of employees, taking into consideration, for example, the criteria of the country, profession, gender, and age.[28]

As a result of factor analysis, Hofstede described initially four and later five dimensions which can be used for comparisons of cultures:

- Power Distance Index (PDI): Hofstede regarded power distance as a measurement of how a culture views the power relationship between people. According to the hierarchy of authority, high power distance cultures have higher levels of inequality.

- Uncertainty Avoidance Index (UAI): the term "uncertainty avoidance" comes from the American sociology of organization developed by James G. Marche. Marche and his team discovered how to deal with differences in one way or another in every institution and country. Uncertainty avoidance was defined as the degree to which members of a culture feel threatened by an ambiguous or unknown situation. Weak uncertainty avoidance means short-term planning and thus less stability and structure in life design.

- Individualism *vs* collectivism (IDV): this dimension deals with the relationship between the individual and the group. It has a significant impact on the behavior and structure of groups and cultures. Prevailing cultural values can shape relationships among the family, company and social structures. Societies in which the interest of the individual is greater than the interest of the group are called individualistic and societies in which the focus is on the group are considered collectivist.

- Masculinity *vs* Femininity (MAS): this distinction is based on the fact that men and women take on different emotional and social roles in society. The masculine certainty and selfish aspects such as competitive thinking are the strengths of men.

- Long-Term Orientation *vs* Short-Term Orientation (LTO): the focus of long-term orientation is based on the future while short-term orientation focuses on the present or past. Within the short-term orientation, the tradition as well as current social hierarchy and fulfilling social obligations are valued. Success in cultures with strong long-term orientation and availability *via* a network of personal contacts is influenced by collectivism.[29]

- ***Culture concept and leadership theory according to the GLOBE study***

The GLOBE study defines culture as common motives, values, beliefs, identities and interpretations or the meanings of essential events that result from the shared experiences of the members of collectives.[30] The GLOBE (The Global Leadership and Organization Behavior Effectiveness Research Program) study was initiated by Robert House at Pennsylvania University in 1991. He identified the attributes of a successful leader and leadership differences between cultures. The research aimed to develop an empirical study based on the theory. 62 countries are involved in this study and nine social and organizational cultural dimensions. Six leadership dimensions have been developed:

- cultural dimensions: in order to differentiate various societies and organizations, nine cultural dimensions were developed:

a) uncertainty avoidance: this dimension originally refers to Hofstede's dimension "uncertainty avoidance";[31]

b) power distance: this dimension shows the acceptance of the unequal distribution of power and has its origin in Hofstede's research;[32]

c) institutional collectivism: this shows the strengthening of collective resource distribution and collective trade;

d) group collectivism: this dimension demonstrates how far individuals have loyalty, pride and solidarity in culture and how they express them to their family or company;

e) gender equality: this determines the reduction in gender inequality. The origin of this dimension is Hofstede's "masculinity/femininity" criterion;

f) certainty: this dimension describes a culture member's specific confrontational-aggressive relationship behavior towards others;

g) future orientation: this dimension expresses the future-oriented behavior of individuals, such as planning activities and investment in the future;[33]

h) performance orientation: the "performance orientation" dimension determines how strongly a culture encourages and rewards its members for top performance and performance improvement;[34]

i) human orientation: this dimension illustrates how far a culture rewards fair, sincere, selfless, and compassionate behavior;[35]

- The influence of culture on implicit leadership theories: one of the central questions of the GLOBE study refers to this topic: Which specific characteristics of the leader generally lead to effective leadership and which of these characteristics are related to cultural peculiarities. Therefore, six global leadership dimensions have been summarized in the following way:

a) charismatic/value-based leadership: this leadership style is defined as the ability that leads to the motivation and inspiration of others as well as to high-performance expectations;

b) team-oriented leadership: this leadership style focuses on effective team-building and the implementation of shared goals among team members;

c) participatory leadership: this style can be defined as the degree to which the organization's employees feel involved in executives' decision-making and implementation;

d) human-oriented leadership: human-oriented leadership refers to supportive, considerate, and generous leadership;

e) autonomous leadership: this leadership style refers to independent and individualistic leadership traits;

f) self-protective leadership: this type of leadership focuses on ensuring the safety and security of individuals and groups through status improvement.[36]

Research Method

In this research, two groups of companies are studied – Bühler AG in Switzerland and in Iran. Bühler Holding AG is an international Swiss family company based in Uzwil which specializes in process engineering, especially in the field of production technology. Bühler AG was founded on February 10, 1860, and it operates in over 140 countries, with a global payroll of 10,640. In 2016, the company generated sales revenues of CHF 2,45 billion.[37]

In this part, an employee survey is done at Bühler AG with its headquarters in Switzerland and its branch in Iran. Thanks to the results of this survey, the management structure of the company and the expectations of the employees in terms of leadership behavior can be determined. Bass & Avolio's MLQ was administered to executives and employees at Bühler AG in Switzerland and its Iran office to measure the leadership style, the results of this behavior and the expectations of employees in a company in two different environments.

The MLQ is based on the evaluation of leadership behavior. Seven facets of leadership are recorded in the questionnaire in the MLQ, which can be assigned to three overriding factors.

Transformational leadership is represented by the following scales: charisma, inspiration, spiritual stimulation and appreciation. Transactional leadership applies the following two criteria: contingent reward and management-by-exception. The last factor is laissez-faire leadership which is related to avoiding leadership.

The questionnaires contain 21 questions. Gender, age, and education were also given in the questionnaires. Bass's leadership questionnaire was redrafted and, as a result, a questionnaire was structured based on employee expectations. In the leadership questionnaire, each item could be rated on a Likert scale from 0 to 4 (0: never; 1: rarely; 2: sometimes; 3: often; 4: always).The Likert scale for evaluating the answers provided by employees in the questionnaires is as follows: 0: strongly disagree; 1: disagree; 2: undecided; 3: agree; 4: strongly agree.

Since in this research, the leadership style will be examined, the answers provided by executive managers are essential, and the sample size is small.

Data

Bass & Avolio's MLQ was emailed to a total of 53 executives and employees at Bühler AG in Switzerland and its branch in Iran. An anonymous written survey was carried out. The response rate was around 90%. In other words, a total of 48 people answered the questions. The questionnaire was completed by 12 executives in Switzerland, 12 executives in Iran and 12 employees in Switzerland and 12 employees in Iran.

- Gender: the gender of the managers surveyed in Switzerland and Iran was distributed in the following way: 1/12 female, 11/12 male in Switzerland and 4/12 female, 8/12 male in Iran. The proportion of the employees in Switzerland is as follows: 7/12 male, 5/12 female and in Iran: 6/12 female, 6/12 male.

- Age: the age of the Iranian employees ranges from 27-40 while the range of the age of the Swiss employees is from 26 to49. What was also considered is the average older age of the Iranian executives in comparison to those from Switzerland.

- Education: the education of most of the respondents was related to engineering and technology (62.25% on average) and management/MBA (22.25% on average) in both countries.

Research Results

- *Executive manager – Switzerland*

The alpha coefficients of each scale show different reliabilities in the result of the Swiss executives, whereby factor 3 (intellectual stimulation) and factor 1 (idealized influence) have the highest reliabilities and "management by exception" and "laisser faire" have clearly lower values. Statistically, the results of the factors with $\alpha<0.5$ cannot be used. The following table shows that the Cronbach's alpha of the transformational scale of 0.824 can be described as good. The reliability measure for the transactional scale is 0.566 and is rather weak. The low-reliability measure of laissez-faire leadership with 0.281 can also be classified as weak.

Table 1: Reliability of the data collected on leadership styles among the Swiss executives

Leadership style	Number	Standard deviation	Standard error	Variance	Cronbach's alpha
Transformational	12	4.71	1.977	22.20	0.824
Transactional	6	2.89	1.908	8.38	0.566
Laissez-faire	3	1.30	1.104	1.69	0.281

Source: Author's own study.

- *Executive manager – Iran*

In the course of calculating the Cronbach's alpha from individual management dimensions (transformational, transactional, laissez-fair), the results show a relatively high rate of transformational and transactional leadership.

Table 2: Reliability of the data collected on leadership styles among the Iranian executives.

Leadership Style	Number	Standard deviation	Standard error	Variance	Cronbach's alpha
Transformational	12	3.75	2.746	14.08	0.465
Transactional	6	3.70	1.703	13.71	0.789
Laissez-faire	3	1.73	1.877	3.00	-0.174

Source: Author's own study.

- *Comparison of leadership styles between executives in Switzerland and Iran*

The following figure shows the comparison of the correlations of leadership styles between Swiss and Iranian executive managers:

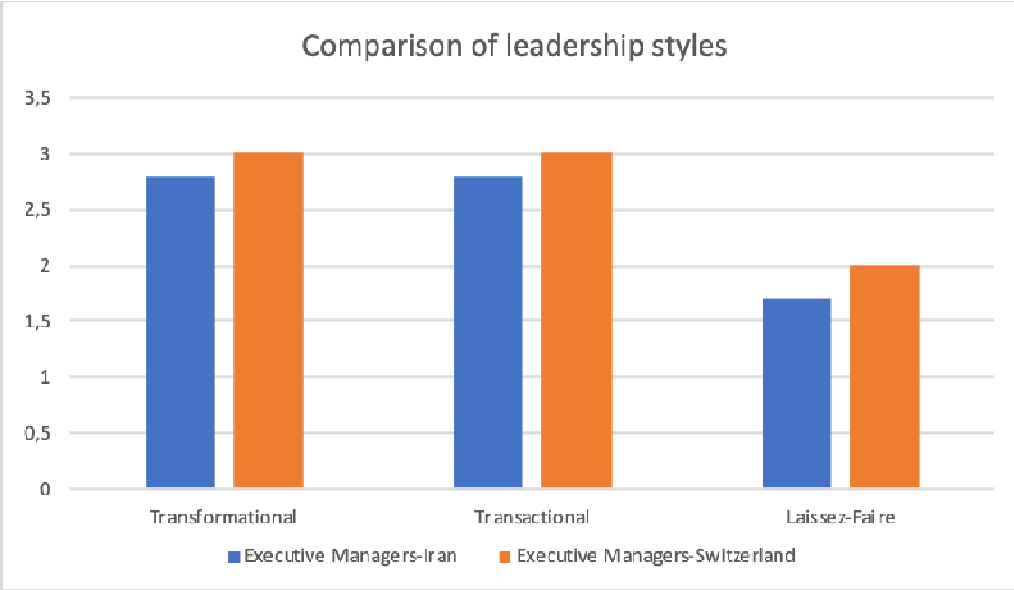

Chart. 1: Comparison of leadership styles between the executives in Switzerland and Iran.

Source: Author's own study

What should be noted when comparing the correlations of leadership dimensions between executives in Switzerland and Iran is the high relationship between transactional leadership and laissez-faire among Swiss executives although they are significantly weaker among Iranian executives. The same degree of correlation holds between transformational leadership and laissez-faire among executives from both countries.

- ***Employees in Switzerland***

In the table below, Cronbach's alpha has been calculated from the expected leadership styles. With α>0.7, the results of the expected transformational and transactional leadership styles are highly reliable.

Table 3: Reliability of the data collected on expected leadership styles among the Swiss employees.

Leadership Style	Number	Standard deviation	Standard error	Variance	Cronbach's alpha
Transformational	12	5.24	2.378	27.45	0.794
Transactional	6	3.96	2.034	15.71	0.737
Laissez-faire	3	1.43	1.145	2.06	0.364

Source: Author's own study.

- ***Employees – Iran***

For the Iranian employees, "laissez-faire" shows high internal consistency (α=0.507) in contrast to the Swiss employees and even to the Swiss/Iranian managers. In general, poor reliability could be caused by some factors, for instance, by the fact that the Swiss/Iranian employees have difficulty articulating socially undesirable behaviors. The reliability of the expected transformational leadership is particularly good with a value of α=0.886.

Tab 3: Reliability of the data collected on expected leadership styles among the Iranian employees.

Leadership style	Number	Standard deviation	Standard error	Variance	Cronbach's alpha
Transformational	12	6.10	2.061	37.27	0.886
Transactional	6	1.81	1.844	3.27	-0.039
Laissez-faire	3	2.61	1.832	6.81	0.507

Source: Author's own study.

- ***Comparison of expected leadership styles between employees in Switzerland and Iran***

As shown in the following chart, the expected leadership styles of the employees in transformational and transactional leadership in Iran are almost identical while the employees in Switzerland tend to be transformational leaders.

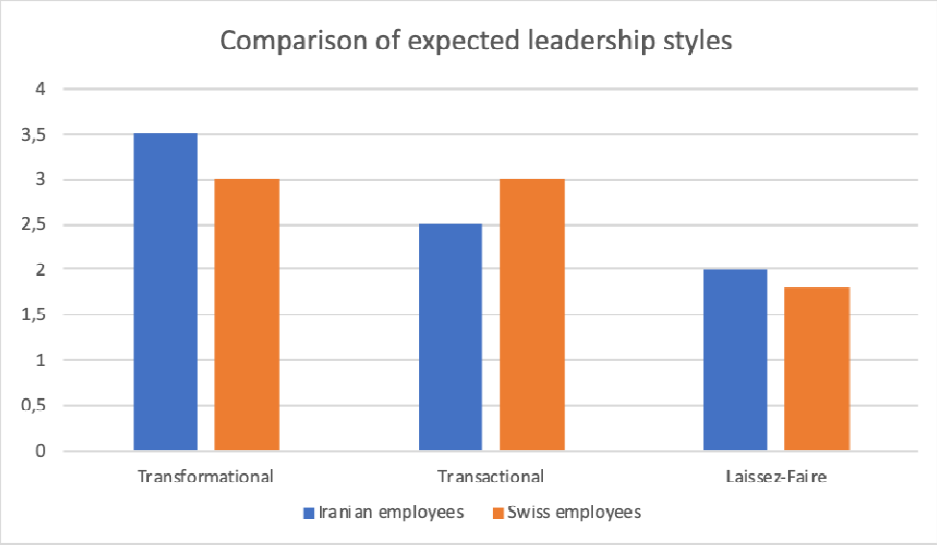

Chart. 2: Comparison of expected leadership styles between the employees in Switzerland and Iran.

Source: Author's own study.

The employees' expectations of laissez-fair leadership in both countries are low. However, it is interestingly higher in Iran than in Switzerland.

Hypothesis Testing

In this section, the results of the main hypotheses are introduced and summarized:

Hypothesis 1: Hofstede's cultural dimensions influence the tendency of managers/employees towards transformational/transactional leadership styles.

According to Hofstede's research into cultural differences, it was expected that the majority of the Swiss executives and employees would prefer to use the transformational leadership style while the Iranians tend to lean towards the transactional leadership style. This hypothesis can be confirmed, considering the Swiss employees and managers. The Iranian leaders also behave as it was expected and show a tendency towards the transactional leadership style. However, the Iranian employees consider transformational leadership to be an effective leadership style, which contrasts with Hofstede's cultural norms in Iran.

H2: According to Beukman's findings, there is a relationship between Hofstede's cultural dimensions (masculinity, individualism, avoidance of uncertainty and short-term orientation) and transformational leadership factors.

This hypothesis could be formulated through the information obtained on the basis of Hofstede's cultural dimensions about Iran and Switzerland, together with the information about the relationship of these cultural elements with individual transformational leadership factors.

Based on the data collected, the executives in Iran are very conservative and resistant to change or innovation, which, according to Hofstede, was to be naturally expected. Hofstede found that Iran has a high uncertainty avoidance society. Besides, such societies are resistant to innovations, changes and new ways of thinking. The results show that the employees are more open to change and expect managers to evaluate their new ways of thinking and innovations positively. In other words, this hypothesis cannot be confirmed regarding the connection between high uncertainty avoidance and low intellectual stimulation among the Iranian executives, in contrast to the Iranian employees.

Another point is the striking difference in the tendency towards "individualized consideration" among the Iranian employees and managers. A possible explanation for this difference is the masculinity/femininity (Hofstede's cultural dimensions) of Iranian society. According to Hofstede, Iran has a more feminine society. Nevertheless, many Iranian executives are dominated by masculine characteristics such as execution ability, independence and competition as well as insensitivity to feelings, which is not to be expected in Iran. The Iranian employees have feminine values, which has already been explained by Hofstede. It can be used to confirm the relationship between femininity and a high level of individualized consideration among the Iranian employees although this relationship cannot be confirmed (but not rejected) among the Iranian executives.

In contrast to the other two cultural dimensions, high collectivist mentality causes a high level of inspirational motivation among all Iranian respondents (managers and employees). Obviously, it was to be expected because, in a collectivist society, people like to pursue a common goal and work together to achieve it. For this purpose, the managers ensure that a vision is offered and focus on the importance of cooperation and the success of the team. However, this hypothesis could not be confirmed by either the Swiss executives or the Swiss employees.

Hypothesis 3: According to Gaspar's/Lowe's/Patterson's studies, the following (r) correlations are valid:

H3.1: Contingent reward *vs* transformational leadership style: $0.3<r<0.5$

H3.2: Management-by-exception *vs* transformational leadership style: $r\approx0$

H3.3: Laissez-faire *vs* transformational leadership style: $-0.0<r<-1.0$

The three empirical studies (Gaspar, 1992; Lowe, Koeck, & Sivasubramaniam, 1996; Patterson, Fuller, Kester, & Stringer, 1995) suggested that transformational MLQ scales correlate very positively with one another (0.50-0.80), whereby 0.3 correlate -0.5 with contingent-reward, close to zero with management-by-expectation and negatively with laissez-faire. However, this claim cannot be fully confirmed in this work. For example, except for the Iranian employees, a positive correlation between the transformational leadership style and the laissez-faire scale can be found in all other respondents. This positive correlation is particularly high (0.62) among the Swiss employees. "Management-by-exception" correlates more or less with the transformational leadership style as expected. The same is valid for "contingent reward", except for the Iranian employees.

Summary

This study aimed to determine whether there is a difference between Iranian and Swiss leadership styles at Bühler AG. Besides, the expectations of the employees regarding their superiors were examined. The data collected showed that there is a high degree of agreement between the opinions of the Swiss employees and managers. However, the Swiss employees prefer their superiors to intervene in the decision-making processes more often than they actually do.

In contrast, the majority of the Iranian executives focus on transactional leadership and apply the transformational leadership style to a smaller degree, which is against the expectations of their employees. It is particularly recommended that the Iranian leaders take intellectual stimulation more seriously and become more open and supportive to new mindsets and changes, which – in turn – can increase employees' satisfaction and performance in the work environment.

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The Effectiveness of Health Systems in Selected Countries of the Baltic Sea Basin. Challenges in Managing the Polish Health System

Sylwia NIESZPORSKA

Czestochowa University of Technology, Department of Management, Czestochowa, Poland
sylwia.nieszporska@wz.pcz.pl

Agnieszka STRZELECKA

Czestochowa University of Technology, Department of Management, Czestochowa, Poland
astrzelecka@poczta.onet.pl

Abstract

Assessment of the effectiveness of health systems has been an issue for a number of European countries for years. The aim of the present study is to evaluate and compare the functioning of the Polish healthcare system with the systems of the selected Baltic countries taking into account the opinion of the patients, as well as objective factors. Evaluate the effectiveness of health systems over the years 2012-2018 was made by comparing the Euro Health Consumer Index (EHCI) and using the methods of numerical taxonomy. The Polish health care system is one of the least effective systems in Europe. The results of the analysis allow us to conclude that the state and the organization remains similar to the so-called systems of the former Eastern European countries. Failures of the Polish system are the issue of patients' rights and the implementation of modern forms of patient care or prevention.

Keywords: Euro Health Consumer Index, numerical taxonomy, health systems management, effectiveness

Introduction

Health systems are extremely complex mechanisms, the operation of which is determined by the functioning of many institutions and organizations. But it combines them into a single system and a common overarching goal is to meet the health needs of society. Regardless of the country, each health system is characterized by the diversity of its stakeholders. Among them are public institutions, commercial organizations, public associations and finally individual recipients. The multiplicity of goals and interests to pursue, together with the mass character of the recipient's health benefits, force the entire system to need very precise and clear formulation of its functions and objectives (World Health Organization, 2000) and thus - conscious and responsible management.

A multitude of models, according to which health systems in the world work today (Bielecki and Nieszporska, 2019), as well as the complexity of the areas within which they can be considered (Bielecki and Nieszporska, 2017), give reason to believe that there is no universal way of managing them. However, at the end of the twentieth century, health systems of many countries were faced with a relatively uniform need to implement new ways of management (Frączkiewicz-Wronka, (ed.), 2010). This involved a significant increase in costs (common to many countries) resulting not only from the rapid development of medical technology, but also from changes in the age structure of populations (Van Eenoo et al., 2016; Jakovljević, 2017; Botrugno, 2018), increased health consciousness of societies, as well as an increase in spending on education and prevention (Taylor, 2016). There has been the implementation of innovative methods and techniques, and among them is New Public Management. It's primary purpose is to adapt to the public sector ideas, methods and techniques used in the private sector (Lubińska, (ed.), 2009) through the disaggregation of units in the

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public sector, a higher level of competitiveness in the public sector, clear standards and metrics to measure the effectiveness and greater emphasis on monitoring results (Woodin, 2011).

Common to almost all European countries, these challenges have resulted in diverse reactions, resulting in different and even radically different states of their health systems (Wilkens, Ovhed and Strandberg, 2012). While for example in the Nordic countries, the system has reached a kind of stability and the Scandinavian welfare states have public health care systems which have universal coverage and traditionally low influence of private insurance and private provisioning (Hofmann, 2013), the Polish system still suffers from underfunding, low availability of services, organizational issues and legal issues (Nieszporska, 2017). Therefore, the process of the management system in Poland should be supported by tools and methods allowing for continuous monitoring and supervision, indicators and metrics that allow you to assess the extent to which the intended objectives are met and laying out new strategies.

Given the above, the working assumption saying that in order to make appropriate management decisions in health care, you need to continuously monitor patients opinions about it, as well as to analyse the variables indicating the therapeutic activity of entities.

Accordingly to the Euro Consumer Health Index in selected countries of the Baltic Sea, taxonomic methods were used to evaluate the functioning of the health systems of these countries. These two methods of a health systems evaluation were chosen to compare the grading of health systems completely independent from patients' point of view with beneficiary's assessment.

Materials and Methods

Methods for Measuring the Performance of Health Systems

The primary and most important goal of any health system is to ensure public health at the highest possible level, in accordance with the applicable standards in the world. The achievement of such a goal is determined around the world on the basis of well-known and collected quantitative data such as life expectancy at birth, deaths, mortality rates of infants and other age groups, indicators of maternal mortality, causes of death, metrics representing the lifestyle of society (including: percentage of smokers, alcohol consumption, rates of overweight and obesity), immunization rates, the number of mental disorders. Research conducted in Poland and analysis of the health system seem to be largely based on data related to the above variables, while in the world, in practice there are a number of other methods (Zweifel, Breyer and Kofmann, 2009). Contemporary management of health systems requires the tools to monitor the achievement of goals. These metrics are called performance indicators (performance measures) (Kozierkiewicz, 2013). According to the WHO (Smith, Mossialos and Papanicolas, 2008), their main role is to improve the quality of decisions made by patients, providers and managers (Dymyt and Dymyt, 2018).

These metrics allow an assessment of the efficiency of the entire system at a national, regional level, as well as in individual institutions. They contribute to the determining and adjusting of goals to the realities of the system, conducive to assessing the capabilities of the system, communicating with stakeholders in the system, assigning responsibility to individual occupational groups, contributing to improving the quality of services, allowing you to track progress, provide stakeholders with information about the state of the system and the progress in achieving the objectives (Lichiello and Turnock /Consultant/, 2010). Among the areas affected are:

- health of the population (measured e.g. via: life expectancy, years of life lost, the metric DALY),
- health outcomes units (measured using the measurement condition of the patient, such as, for example EQ-5D, SF-36),
- Clinical quality and appropriateness of medical care (determined e.g. using measures of health status, postoperative mortality rates, incidence of blood pressure measurement),

- reaction of the system demand for benefits (e.g. reflected. by measuring the patient satisfaction),
- equality of access to services (e.g. determined by means of measures of usability, availability index),
- productivity of the system (represented by the measures: cost-effectiveness, efficiency technical and allocative).

Generally speaking, these metrics allow the measurement of the effectiveness of the strategy of health systems checked by practitioners and creators of public health services in many countries, but also managers of other public and private sector organizations. On the basis of exactly the same type of measurement in different countries, many initiatives were established among them (Kozierkiewicz, 2013):

- *Health for All in 2000* (WHO);
- *Health systems performance in 2000* (WHO);
- *Performance Assessment Tool for Quality Improvement in Hospitals* (WHO Denmark);
- *European Community Health Indicators* (The European Commission);
- *Australia's National Health Performance Committee's Framework* (Australia);
- *Canadian Institute for Health Information's Performance Framework* (Canada);
- *The National Indicator Project* (Denmark);
- *Netherlands National Health Care Report* (Netherlands);
- *NHS High-Level Performance Framework* (United Kingdom).

Determination of performance indicators systems, requires the use of multiple methods of measurement, indicators, analytical techniques and various methods of data collection and processing due to the large variety of areas analysed.

In the presented paper, the Euro Health Consumer Index and numerical taxonomy were used to evaluate the health systems in selected countries of the Baltic Sea basin.

Euro Health Consumer Index (EHCI) is one of the most interesting indicators for an assessment of health systems in different countries, due to the fact that its systems are evaluated from the perspective of the consumer health benefits. Universally it seems to be the fact that health systems are primarily for the patient and they have been created for him. However, nowadays the burden of analysis and critical reflection on the state system is rather transferred to an economic dimension; yet look at the eyes of the patient and just get an opinion from his perspective which is of greater importance.

EHCI beginnings date back to 2004, in which the report was published the Swedish Health Consumer Index. The comparison was made in 21 countries based on 12 indicators. These focused on creating health policies in different countries, the choices made by beneficiaries, the level of service and access to information. Over the years, measures have been changing. At the beginning of its existence, it focused on: infant mortality, cancer survival and the treatment of stroke and heart disease. Today we are enriched with data on access to information, quality of service, mobility funding benefits under the directives of cross-border, and e-health, as well as the introduction of more stringent data such as 30-day case fatality for heart infarction and stroke.

1. patients' rights and information,
2. accessibility (waiting times for treatment)
3. outcomes,
4. Range and reach of services provided,
5. prevention,
6. pharmaceuticals.

48 indicators derived from 6 groups of subjects included in the evaluation as well as COPD and mortality indicator, connected in one synthetic Euro Consumer Health Index, which value belongs to the range (0-1000); the highest value is the best estimate of the health system of the country.

Numerical taxonomy is also the method to evaluate and compare the health systems in selected countries. It enables to ranked the systems, and therefore rated them on the basis of the so-called of synthetic qualities of which one works best (taking into account the few selected features). In a second step, numerical taxonomy lets to assess a similarity of the systems using the method of clusters, according to which states are divided into groups and each of them included similar countries and these different assigned to other clusters. To analyse the similarities and differences in the functioning of health systems in some countries, cluster analysis can be carried out according to the so-called Ward method. It is a method binding, which seeks to minimize the sum of squares of any two clusters and to link objects (countries), so that the resulting clusters intragroup variance of characteristics of the objects is as low as possible. Each object is treated and analysed with this method, initially as a single cluster to the next stages of the study to reduce the number of groups thus formed by combining pre-existing in the so-called 'group of higher order'. The whole process ends with the creation of a single cluster, which includes all the analysed objects.

Results

Euro Health Consumer Index (EHCI) in the Countries of the Baltic Sea Region

There are many tools that can estimate the state of the health care system that are not popular in Poland. However, in accordance with the opinion of some Polish experts "due to vastness of international experience and resources held in Poland, the data allow us to conclude that the creation of assessment tools of the system, in particular assessing the state of health of services is possible" (Kozierkiewicz, 2013). However, an important factor in the creation of such a system is de-politicization of the health sector and entrusting the role of the organization and management of the sector such organizations, to ensure the political neutrality. The Polish model of health care, however, assumes that the system should be the idea of the concept of public health service financed by taxation of society. Under this assumption, one of the primary roles of system management belongs to the state. It is obvious that the role of each country's attention to social welfare in the context of health, "but the specific ability of interest groups to obtain influence can lead to seizure of regulatory processes" (Getzen, 2000), then the state ceases to place the welfare of society in the first place, realizing the interests of the ruling political groups.

However, EHCI is an international project, that also allows Poland to perform analysis. An important highlight is the fact that the counted metrics in EHCI are specific to how consumers of health care are served by systems of European countries. Taking countries of the Baltic Sea basin into account there are differences in terms of their health policies, systems and organizational structure, which does not mean that health activities have no common trends. As assumed, for example, ScanBalt® FMBA - Northern Europe's Leading Accelerator for Inter-regional Cooperation, the vision of cooperation between the countries of this region is realistic and it can create *a globally leading macro-region within health economy and biotechnology based innovation* (https://scanbalt.org/). Currently Denmark, Finland, Sweden, Germany, Netherlands and Norway, stand out in this group overall biotechnology innovation and are well placed in ScanBalt among other nations. A separate group is The East Baltic ScanBalt countries, Estonia, Lithuania, Poland and Latvia. Interestingly, the level of development of ScanBalt countries and their rank in the rankings ScanBalt® FMBA is to a large extent the level of assessment of health systems by patients within the EHCI. The lowest positions in the group of those countries when it comes to the value of the EHCI is occupied Estonia, Lithuania, Poland and Latvia (Figure 1).

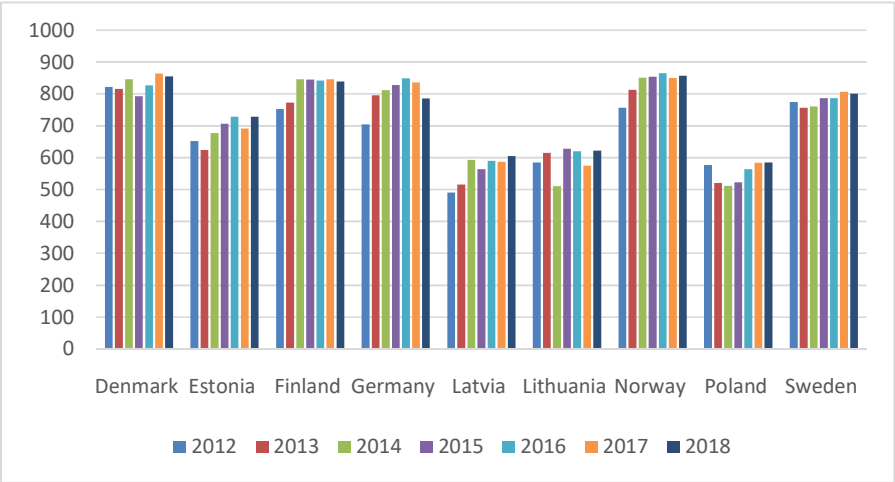

Fig. 1: The Euro Health Consumer Index for the period 2012-2018 in selected countries

Source: Björnberg and Yung, 2019

In the years 2012-2018 the average value of the index in these countries amounted to 687, 593, 552, 563 (own calculations based on reports). The report's authors see their lowest position in the Polish caused by negligence, abuse of management and poor organization of the system and in Lithuania and Latvia in the financial crisis (Björnberg and Yung, 2019).

In the group of the "800 Club", those countries for which the EHCI exceeded the value of 800, during the years 2012-2018 were Denmark, Finland, Germany and Norway. The country with the best result in the audited period, the health system, in the opinion of consumers was Norway with an average index of 835 points. And although, as the report emphasizes, Norwegian patients complained about waiting times, the first place in the rankings provides the sub-discipline Prevention (Björnberg and Yung, 2019). The countries with the highest index values stand out in the areas of health, which represent sub-disciplines: e-Health, Outcomes, Range and Reach of Services Provided and Patients' Rights and Information.

Ranking of Health Systems Using Numerical Taxonomy Methods

A quoted measure of the efficiency of the health systems but cannot be the sole determinant of the evaluation of a system. Many factors not included in the EHCI reports have no significant impact on the functioning of health systems, many of them cannot be assessed by the patient (even if as a result of ignorance of the consumer benefits, or ignorance of some of the data variables), and many have a subjective character. Therefore, each ranking of a health care system should be enriched with an objective and independent opinion from the patient and analysis of demographic and economic factors that characterize the country, as well as reflecting the structure and resources of the health system.

Complementing the above, the following variables characterizing the eight health systems (in the countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden) for the years 2016-2018 were collected and analysed:

X1 - the number of doctors involved in the total population,
X2 - the share of the number of nurses in the total population,
X3 - the share of the number of midwives in the total population
X4 - the number of hospital beds per capita,

X5 - the average length of stay in the hospital.
X6 - the share of people over 65 years of age in the total population,
X7 - public expenditure on health care in US dollars (USD) per 1 capita Purchasing Power Parity.

The above variables were chosen because they describe the complete situation of analysing systems and data which are relatively common for all countries.

Organizing health systems in selected countries began the normalization of attributes, using quotient mapping (Malina, 2004). As a measure of the distance we adopted the Euclidean distance (Panek, 2009) and that the best method, which gives results characterized by the greatest value of the directional variance (Kolenda, 2006). Then the weights were determined, while the method and anti-template were used to use the method based on orthogonal projection, in which the value of the third quartile for the nth-trait was adopted as the standard, and the anti-standard the value of the first quartile for the nth-trait. After calculations, the synthetic feature values were determined for each country and year under analysis (Table 1).

As is evident from the calculations, taking into account the seven noted above variables in each of the analysed years, Germany and Sweden occupied the first places in the ranking. The last two places were Estonia and Lithuania, and Poland consistently recognized as the third from the end.

Table 1: Values of characteristics of synthetic

Years Countries	2016	2017	2018
Denmark	2.35	2.36	2.34
Estonia	1.78	1.78	1.80
Finland	2.64	2.56	2.62
Germany	3.16	3.21	3.20
Latvia	1.52	1.51	1.54
Lithuania	2.02	2.02	2.04
Poland	2.03	2.02	2.07
Sweden	2.85	2.79	2.76

Source: Own calculations on the basis OECD 2020

The results shows the grouping mostly in graphical form by using the so-called Call or Dendrite tree (dendrogram). Dendrites present the sequential clusters of increasingly higher orders with specific binding distances, by indicating the similarities and differences between the objects studied from the point of view of the considered characteristics.

The results of analysis of the functioning of health systems in selected countries is presented in Figure 2, Figure 3 and Figure 4, which shows that the greatest similarity due to the characteristics studied showed Lithuania and Estonia. The distance between the regions in terms of the variables studied were the smallest group. One group with Lithuania and Estonia include binding at approx. 1.15 also Latvia and Poland. This leads to the conclusion that the past and the historical conditions of the functioning of these countries, as well as the so-called common Siemaszko model, according to which health systems were managed in those countries continue to make them similar and seem to have a continuous effect on the quality of their health systems. Quite different from European countries which form a group from behind the former Iron Curtain and so include Germany, Sweden, Finland and Denmark.

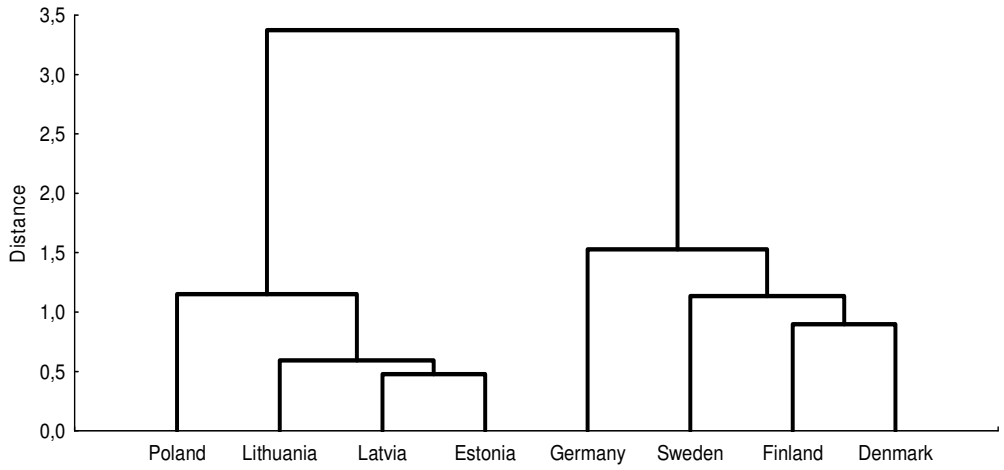

Fig. 2: Dendrogram for selected countries in 2016

Source: Own calculations with using Statistica 13.3

Fig. 3: Dendrogram for selected countries in 2017

Source: Own calculations with using Statistica 13.3

The analysis can also draw the conclusion that created and depicted in figs. 2-4 the group focused countries with similar levels of wealth and financial resources provided for health care. This confirms that GDP is the main determinant of health expenditure (Akca, Sonmez and Yilmaz, 2017; Strzelecka 2016) and describes the level of the health capacity of the system (Rabiej, 2017).

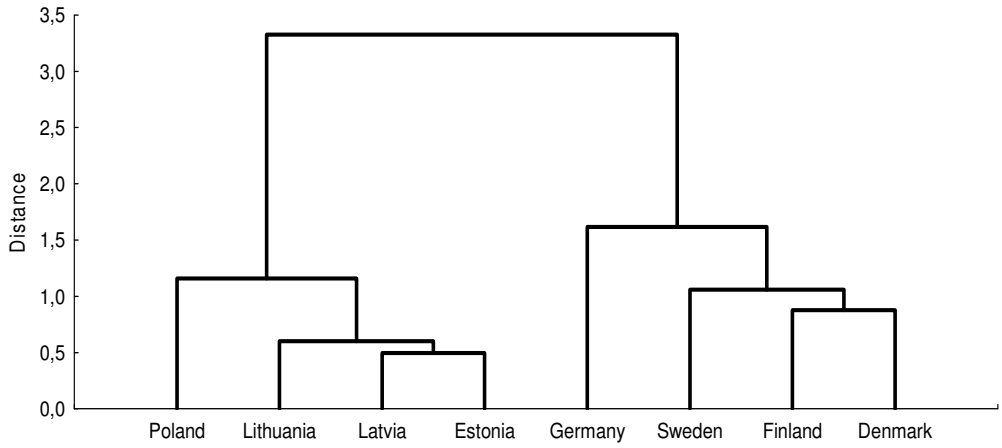

Fig. 4: Dendrogram for selected countries in 2018

Source: Own calculations with using Statistica 13.3

Conclusion

The smooth functioning of health systems in each country is a specific priority. This is due to the importance and great significance for the public health system – the parental entity of each of the sectors of the national economy. Decision making in health care, effective management and goal setting sector, it therefore appears one of the key conditions is not only the effectiveness of the systems themselves (Bui et al., 2015), but also the existence of healthy societies.

Taken in the development of analysis of the health system in Poland compared to other countries it had two objectives. The first is reflected consumers' opinion of benefits and thus identify critical points for patients of the functioning of the system. The second is to focus on the evaluation of health systems using objective factors affecting the operation of the Polish system and the systems of neighbouring countries.

Therefore, bearing in mind the opinions of Polish consumers of health services, as well as the relationships between them are independent of the factors characterizing the health systems in the countries bordering the Baltic Sea, it should be clearly stated that Poland is in such comparisons on one of the last places. The study indicates that one of the reasons for this may be the political past of our country, which still makes the Polish system similar to the system in Lithuania, Latvia and Estonia. Common to these countries is a model of human behaviour and functioning system of hierarchy of values so devalued and even distorted in the second half of the twentieth century it brought with it a multitude of already existing consequences in areas such as medical ethics, and a mutual doctor-patient relationship.

Polish similarity to Latvia, Lithuania and Estonia in terms of the functioning of health systems in them is also associated with a similar level of current expenditure on health. On average, they are in these countries 6.44% of GDP, which is in large differences in terms of expenditure with Germany, Sweden, Finland and Denmark, which account for an average of 10.38% of GDP. Underfunding of the health sector entails reforms so as to avoid financial instability in health care and thus contribute to increase investment in health care (Strzelecka, 2014).

Much of the quantitative data presented by OECD (OECD, 2020) such as life expectancy at birth, deaths, mortality rates of infants, indicators of maternal mortality, metrics representing the lifestyle of society (number of smokers, alcohol consumption) are also comparable for Poland, Latvia, Lithuania and Estonia. Maybe they also affect the similarity of the health systems in these countries.

Polish creators for health policy or health care managers this is an important signal of continuous years of lack of patient satisfaction with the functioning of the sector. According to reports, in Poland there continues:

- a competitive insurance market,
- characterized by extremely low public spending on the sector,
- is heavily politicized health system,
- does not keep up with demand for the services of an aging population,
- no patient organizations, which would affect the shape of the system,
- It characterized by a very low level telecare.
- There is no implemented patient information systems at all levels of health care,
- It does not guarantee their patients equal and universal access to medical services (Universal access to health care means that everyone has access to quality health services they need, without the risk grapple with financial difficulties associated with covering the cost of treatment. (World Health Organization, 2013)).

Practice and experience of neighbouring countries shows that it is well known from management practice, that if top management starts focussing on things other than producing the best products or services, the quality of products/services declines (Björnberg, 2017), which clearly sets out the directions of change in the management of Polish health system.

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Factors Affecting the Housing Affordability of Homebuyers In Perak: Measuring Transport Expenditure

Norhayati BAHARUN
Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA Perak Branch, Tapah Campus, 35400 Tapah Road, Perak Darul Ridzuan, Malaysia.
Email: norha603@uitm.edu.my

Suraya MASROM
Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA Perak Branch, Tapah Campus, 35400 Tapah Road, Perak Darul Ridzuan, Malaysia.
Email: suray078@uitm.edu.my

Afiqah ROSHIDI
Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Selangor Darul Ehsan, Malaysia.
Email: afiqah0812@gmail.com.

Abstract

An increasing housing price in Perak has made it difficult for homebuyers to own affordable housing. Housing affordability ensures that housing provided is affordable for every income group, especially the low and middle-income groups. It has brought the government and housing developers to take close the issue of housing affordability by supplying public low-cost housing schemes. The traditional measurement of housing affordability is by using the percentage of household income spent on housing. The important cost that is usually ignored in measuring housing affordability is transportation costs. Housing and transportation are the two largest expenses for most households. This paper aims to determine the factors affecting housing affordability by including transportation expenditures. A total of 65 questionnaires were distributed to the homebuyers in Perak Tengah. Multiple linear regression was conducted and the results revealed that locational, neighborhood, structural, and financial were significant factors influence housing affordability. It also showed that including transportation expenditure into the calculation of housing affordability can reveal true housing affordability measurement.

Keywords: Housing affordability, locational, neighborhood, structural, financial, transportation expenditure.

Introduction

Affordability concerns to make housing affordable for every household however it is not meant focused only on the low prices but concerns about the quality of the house. The government is responsible for providing housing for low-income households, but private sectors have concentrated on the high-end house due to a significant increase in house and land prices. To deliver affordable and quality housing, it is important to clarify what are the main factors that influence people to buy houses such as housing prices and location. Housing affordability is a crucial issue over the last decade since the continuous increase in property prices due to economic rapid growth. This is because the house price is the main consideration when to decide to own a house. Housing prices within an urban area in Malaysia are becoming severely unaffordable as compared to housing in rural areas. Housing prices are highly dependent on location since there is a relation to the role of location in the housing market. The location also has become the main consideration when purchasing a residential property, in particular, the distance between the residential neighborhood and employment centers. Housing is not truly affordable if located in an accessible area with high transportation costs. This is because of the transportation costs are highly associated with the selection of residential location.

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A significant number of previous research on housing affordability has been focused on housing costs and household income. Recently, there is a new indicator of housing affordability which includes transportation expenditure (Yusoff et al., 2014). This is because housing and transportation are the two largest expenses for most households. Previous housing affordability studies generally ignore the dimensions of transportation cost even though there is a strong influence on household expenditure (Mattingly and Morrissey, 2014). However, in research by Dewita et al. (2018) mentioned that incorporating transportation costs into housing affordability measurements reveal a different pattern of affordability. There has been little research to investigate how the combination of housing and transportation costs can impact housing affordability measurements. Therefore, this study seeks to measure housing affordability by considering not only the cost of housing but the condition and location efficiency by measuring transportation costs.

Literature Review

Housing affordability

Recently, researchers have changed from the traditional way of defining the measurement of housing affordability and wider the perspective of concept. Research in the USA suggests that housing that may be considered affordable in terms of price of the house is related to annual household income, however, transportation costs are often underestimated or ignore (Mulliner and Maliene, 2012). The research stated that the interaction between housing and transportation cost provides a more meaningful measure of housing affordability. Affordability is the ability of the person in providing something that usually referred to the ability in financial terms. The various definition and concepts of housing affordability give different approaches to measure housing affordability such as price to income ratio, residual income, and purchase and repayment affordability (Gan and Hill, 2009). Purchase affordability is considering whether the ability of the household to borrow enough funds to purchase a house. Repayment affordability is considering the burden on the household to pay the mortgage while income affordability is referred to the measurement of the ratio of house prices to the income of the purchaser. Besides, housing affordability is defined condition of when people have the potential to save a certain portion of income to buy the house and as well as other consumption (Mostafa et al. , 2006). In Malaysia, housing affordability is denoted as the rent-to-income ratio or house price-to-income ratio known as income affordability. The median multiple is a common measurement suggested by the World Bank and the United Nations which rates of affordability of housing by dividing the median house price and annual median household income. Affordability is rated on a scale of 0 to 5, as shown in Table 1. Housing markets are rated as affordable at or below 3 times the median multiple, moderately unaffordable at or below 4 times median multiple, seriously unaffordable at or below 5 times median multiple, and above 5 times rated as severely unaffordable (Suhaida *et al.*, 2011).

Table 1: Categories of housing affordability

Rating	Median multiple
Severely unaffordable	5.1 & above
Seriously unaffordable	4.1 to 5.0
Moderately unaffordable	3.1 to 4.0
Affordable	3.0 & below

Sources: The International Demographia (2006-2011)

Housing Attributes

Housing preferences will be determined by a set of various attributes of housing households (Tan and Cheah, 2013). Housing attributes have been shown in previous research as major factors influencing housing affordability such as structural, location, and neighborhood of housing.

Location attributes are highly related to the area or place where the housing is located whether an urban area or rural area. The distance is considered as the main factor that affects the buyer's preference in decision making such as distance to the workplace, schools, shops, and other facilities (Sean and Hong, 2014). Daly et al. (2003) mentioned that location has a primary value attribute on the buyer's preference in purchasing residential properties in Australia, UK, and Ireland. Besides, Kauko (2007) stated that location is an important factor to determines the success or failure of the residential housing project. Natasha and Hassan (2015) found that location attributes have a positive relationship and can give a positive impact on the intention to make a property investment. Location was considered as the highest contribution that influences on the housing price (Olanrewaju et al., 2018).

The neighborhood is also one of the most important attributes to measure housing affordability. According to Sean and Hong (2014), the neighborhood is defined as an area in which residents live together for the common interest. Previous research by Zrobek *et al.* (2015)has shown that cleanliness and low crime trends are examples of good neighborhood environments that are important aspects of the purchase of residential properties. The good neighborhood gives a positive impact on housing prices. According to Teck-Hong (2011), a house in a good neighborhood is preferred as households are willing to pay extra for a house of good environmental quality. Thaker and Sakaran (2016) mentioned that the good quality of residential property can be valued by an excellent indoor and outdoor environment. Besides, Thanaraju et al. (2019) mentioned that the safety of the neighborhood is also considered as another important aspect when purchasing a residential property. This is because due to an increase in the trend of crimes such as burglary and snatch. Besides, the security of the neighborhood is very important for the safety level of the residential area since the number of crimes in Malaysia is increasing (Mariadas et al.,2019).

Numerous empirical studies have identified structural attributes as influential components of households' in the house-buying decision. According to (Teck-Hong, 2012) structural attributes that can impact home-buying preferences including lot size, the number of bedrooms and bathrooms, and the presence of a garden in a house. Hurtubia et al. (2010) mentioned that the number of bedrooms and bathrooms in a house are important characteristics to be considered when purchasing a residential property. For instance, in Saudi Arabia, private living space such as the number of bedrooms, the size of bedrooms, and the number of bathrooms are considered to be the important factors because it will have a direct relation to the problem of privacy (Opoku and Abdul-Muhmin, 2010). A similar finding by Chia et al. (2016) concluded that private living space is considered to be a key housing attribute because it can be directly related to the issue of privacy. Besides, Sundrani (2018) also mentioned that the number of bedrooms and the size of bedrooms are the most important features to be considered in their homeownership decisions.

Financial attributes play important features that the household needs to consider in their homeownership decisions. Besides, financial attributes strongly influence the decision of homebuyers to purchase a residential property (Sean and Hong, 2014; Thaker and Sakaran, 2016). As mentioned by Mariadas et al. (2019), there are several key areas regarding financial consideration such as interest rate, house price, household income, and ability to obtain financing. According to Li et al. (2014) also mentioned that financial factors such as length of the period for the payment, interest rate, amount of monthly payment are the main consideration while choosing a residential property to purchase. Zainon et al. (2017) concluded that financial factor has a positive relationship on housing affordability.

Transport Expenditure

In recent years, there is a new indicator of housing affordability that includes transport expenditure (Sabri et al. 2013; Yusoff et al. 2014). Housing and transportation are the two largest expenses for most households. Besides, housing and transport expenditure show a more complete picture of affordability in the neighborhood. The traditional measure of housing affordability generally focused on housing cost alone, while ignores the transportation cost which incurs a relatively high proportion of income. Therefore, combining housing and transportation cost offers an expanded view of affordability. Previous research suggested that incorporating transportation costs into housing affordability calculations can reveal a different pattern of affordability, especially in less accessible locations

(Dewita et al. 2018). Several studies from European countries provide a similar result of the importance of incorporating transportation costs to reveal more appropriate measures of housing affordability. Transportation expenditure consists of three important variables which are vehicle ownership, vehicle usage, and public transit. Vehicle ownership is determined by the number of the vehicle, monthly payment of the vehicles, and the annual amount of insurance and tax. Vehicle usage is based on the amount of fuel consumption, monthly amount toll, and parking fees, and cost and maintenance of the vehicles. Public transit will be the total amount of monthly expenses on public transit.

Methodology

Quantitative research was utilized in this study whereby 68 questionnaires were distributed to respondents and 65 questionnaires which were answered without error were collected to be analyzed. The area for questionnaire distribution focused on Perak Tengah among home buyers between 20 to 59 years old. The data obtained were analyzed through the Statistical Package for Social Science (SPSS) software.

Conceptual Framework

In this present study, five independent variables (location, neighborhood, structural, financial, and transportation expenditure) and one dependent variable (housing affordability) were examined. The conceptual framework for this study was shown in Figure 1 shows the interrelationships between independent variables and the dependent variable.

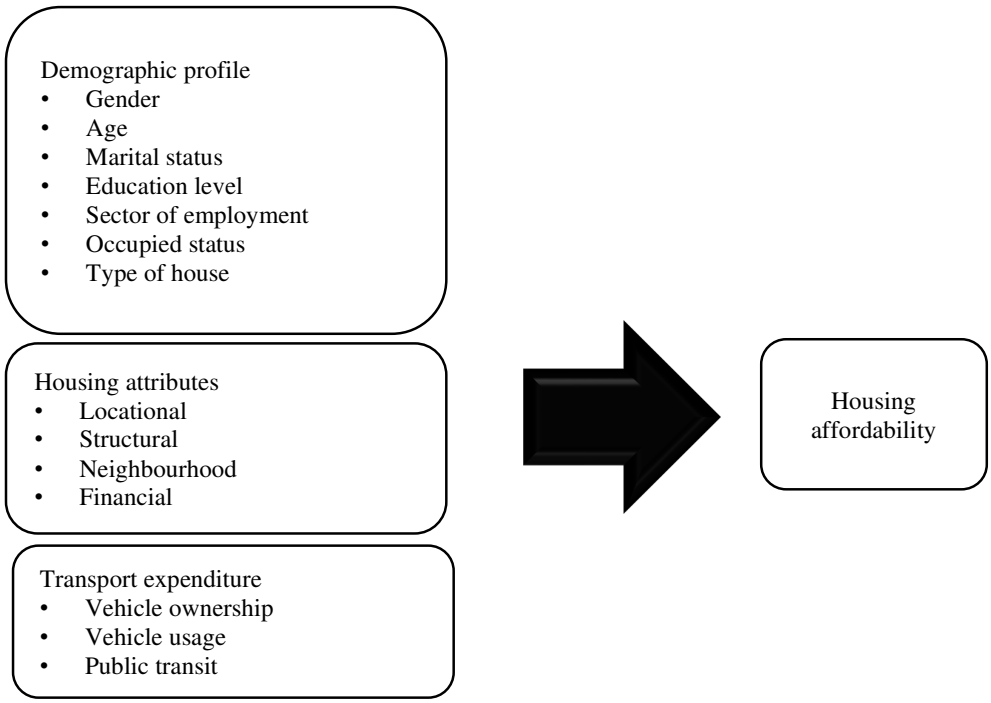

Figure 1: Conceptual framework

Variables used in the study

The measure of housing attributes, as defined by locational, neighborhood, structural, and financial housing attributes. Six locational housing attributes were considered in this study; access to shopping facilities (Shopping), public transport facilities (Transport), health care facilities (Health care), leisure facilities (Leisure), to school (School), and the workplace (Workplace). Neighborhood attributes

included in the study were the level of neighborhood crime rate (Crime), gated neighborhood (Gated), neighborhood cleanliness (Cleanliness), neighborhood pollution (Pollution), and green surrounding neighborhood (Green). The size of a living area (Living), size of the kitchen (Kitchen), number of bathrooms (Bathroom), number of bedrooms (Bedroom), eco-friendly home (Eco), and built-up area (Built-up) were included to indicate structural attributes of the housing. Lastly, four financial housing attributes included in this study, namely price of the house (Price), amount of monthly repayment (Repayment), amount of interest rate (Interest), and duration of loan repayment (Duration). Transportation expenditure is divided into three variables which were vehicle ownership, vehicle usage, and public transit. Vehicle ownership is determined by the number of the vehicle, monthly payment of the vehicles, and the annual amount of insurance and tax. Vehicle usage is based on the amount of fuel consumption, monthly amount toll, and parking fees, and cost and maintenance of the vehicles. Public transit will be the total amount of monthly expenses on public transit. The definition of independent variables used in the study is shown in Table 2.

Table 2: Definition of independent variables in the study

	Variables	Definition
Locational attributes	Shopping	1 if access to shopping facilities is the main consideration when purchasing a house, 0 otherwise.
	Transport	1 if access to public transport facilities is the main consideration when purchasing a house, 0 otherwise.
	Health care	1 if access to health care facilities is the main consideration when purchasing a house, 0 otherwise.
	Leisure	1 if access to leisure facilities is the main consideration when purchasing a house, 0 otherwise.
	School	1 if the access to school is the main consideration when purchasing a house, 0 otherwise.
	Workplace	1 if access to the workplace is the main consideration when purchasing a house, 0 otherwise.
Neighborhood attributes	Crime	1 if the level of crime rate in the neighborhood is the main consideration when purchasing a house, 0 otherwise.
	Gated	1 if the presence of a gated neighborhood is the main consideration when purchasing a house, 0 otherwise.
	Cleanliness	1 if the cleanliness of the neighborhood is the main consideration when purchasing a house, 0 otherwise.
	Pollution	1 if the level of pollution in the neighborhood is the main consideration when purchasing a house, 0 otherwise.
	Green	1 if the green surrounding of the neighborhood is the main consideration when purchasing a house, 0 otherwise.
Structural attributes	Living	1 if the size of the living area is the main consideration when purchasing a house, 0 otherwise.
	Kitchen	1 if the size of the kitchen is the main consideration when purchasing a house, 0 otherwise.
	Bathroom	1 if the number of the bathroom is the main consideration when purchasing a house, 0 otherwise.
	Bedroom	1 if the number of the bedroom is the main consideration when purchasing a house, 0 otherwise.
	Eco	1 if an eco-friendly home is the main consideration when purchasing a house, 0 otherwise.
	Built-up	1 if the built-up area of the house is the main consideration when purchasing a house, 0 otherwise.
Financial attributes	Price	1 if the price of a house is the main consideration when purchasing a house, 0 otherwise.

	Repayment	1 if the amount of monthly repayment is the main consideration when purchasing a house, 0 otherwise.
	Interest	1 if the amount of interest rate of the loan is the main consideration when purchasing a house, 0 otherwise.
	Duration	1 if the duration of loan repayment is the main consideration when purchasing a house, 0 otherwise.
Transportation expenditures	Vehicle ownership	Number of vehicles
		Monthly payment of the vehicles
		The annual amount of insurance and tax
	Vehicle usage	The annual cost of fuel
		The monthly amount of toll
		The monthly amount of parking fees
		The annual cost of maintenance
	Public transit	Amount of monthly expenses on public transport

Levels of Housing Affordability

The median multiple is a common measurement suggested by the World Bank and the United Nations which rates of affordability of housing by dividing the median house price and annual median household income. The affordability levels are categorized by four which are affordable, moderately unaffordable, seriously unaffordable, and severely unaffordable. The household is classified as affordable if the median multiple is lower than 3.0 while the household is classified as moderately unaffordable if the median multiple is between 3.1 to 4.0, seriously unaffordable if the median multiple is between 4.1 to 5.0 and severely unaffordable if the median multiple is higher than 5.1.

Results and Discussions

Table 3 shows the demographic profile of the respondent. The questionnaire was completed by 65 respondents. Out of 65 respondents, 47 were females (72.3%) and the remaining 18 were males (27.7%) thus female respondents were slightly higher than male respondents. In terms of age, 33.8% of the respondents were in the age of 20-29, followed by the age of 30-39 (30.8%), the age of 50-59 (20.0%), and the age of 40-49 (15.4%), respectively. The majority of the respondents were married with 66.2% while single with 32.3% and widowed with 1.5%. There was a total of 43.1% were have master's degree qualification followed by a bachelor's degree with 29.2% and diploma qualification with 15.4%. The public sector was the overwhelming majority of the respondents at 53.8%, followed far behind by private with 30.8% and self-employed with 13.8%. Most of the respondents were the owner of the house (52.3%), several are a tenant (27.7%) and a few stayed at family homes or home share. 33.8% of respondents stayed at a single storey terrace followed by a double storey terrace with 27.7% and stayed at an apartment or flat with 16.9%.

Table 3: Profile of respondent

Variables	Frequency	Percentage
Gender		
Male	18	27.7
Female	47	72.3
Age		
20-29	22	33.8
30-39	20	30.8
40-49	10	15.4
50-59	13	20.0
Marital status		
Married	43	66.2

Single	21	32.3
Widowed	1	1.5
Education level		
SPM	5	7.7
Diploma	10	15.4
Bachelor Degree	19	29.2
Master's Degree	28	43.1
Doctor of Philosophy	3	4.6
Sector of employment		
Private	20	30.8
Public	35	53.8
Self-employed	9	13.8
Unemployed	1	1.5
Occupied status		
Owner	34	52.3
Tenant	18	27.7
Family home/share	13	20.0
Type of house		
Single storey terrace	22	33.8
Double storey terrace	18	27.7
Semi detached	5	7.7
Bungalow	4	6.2
Condominium/Service residence	2	3.1
Flat/Apartment	11	16.9
Others	3	4.6

Regression Analysis

There were two equations presented in regression analysis. The first equation is solely based on the effect of housing attributes on housing affordability without taking into consideration transportation expenditure, whereas the second equations include transportation expenditure into the model. As shown in Table 4, the first and second equations explained about 77% and 80% of the variation in housing affordability, respectively.

The results from both equations revealed that the access to shopping facilities and school were negatively significant to the housing affordability. Additionally, access to public transport, leisure facilities, and workplace were positively significant to the housing affordability. However, the health care facilities was insignificant to the housing affordability. It showed that homebuyers in the study excluded health care facilities in determining the factors affecting housing affordability.

Since the crime rate in Malaysia increased significantly, thus homebuyers were slightly more concerned about their neighborhood condition. Based on estimation results concluded the level of crime rate, gated neighborhood, level of cleanliness, and green surroundings in the neighborhood were statistically significant and positively associated with housing affordability. This result consistent with the findings of (Teck-Hong, 2012) mentioned that neighborhood security is an important aspect when purchasing a house. Lastly, the level of pollution is not significant to the housing affordability in the first equation but positively significant after considering transportation expenditure in the equation.

For structural housing attributes, the size of the kitchen and the number of bedrooms were statistically significant and negative relationship to the housing affordability in both equations. This result is similar to Opoku and Abdul-Muhmin (2010), private living space such as the number of bedrooms is the main consideration when purchasing a residential property. Besides, the number of bathrooms and built-up areas of the house were positively statistically significant towards housing affordability. Nevertheless,

the size of the living area and eco-friendly home were no significant relationship with housing affordability. It indicates that the size of the living area and eco-friendly home were not the main consideration when purchasing an affordable house.

Furthermore, homebuyers more preferred houses that have good financial attributes. It shows that house prices, monthly repayment, interest rate, and duration of the loan were statistically significant to housing affordability. There was a positive relationship between monthly repayment and duration of loans with housing affordability in both equations. The finding is consistent with Mariadas et al., (2019a) that shows financial attributes considered as the important factors to the housing affordability.

After considering transportation expenditures to the model, the model is statistically significant. It shows that there was a significant relationship between housing attributes and transportation expenditures towards housing affordability. Additionally, the amount of insurance and tax and the annual fuel consumption was statistically significant to the housing affordability and negatively associated. The monthly payment, cost of the toll, cost of parking fees, maintenance, and public transport were no significant relationship with housing affordability.

Table 4: Effect of housing attributes on housing affordability

	Model 1				**Model 2**			
	Coefficient	**Std. Error**	**T**	**Sig.**	**Coefficient**	**Std. Error**	**t**	**Sig.**
Constant	3.731	0.723	5.160	<0.001	3.365	0.770	4.4368	<0.001
Shopping	-0.521	0.173	-3.018	0.004	-0.403	0.188	-2.147	0.039
Transport	0.449	0.222	2.027	0.049	0.559	0.233	2.401	0.022
Health care	0.240	0.167	1.434	0.159	0.167	0.159	1.050	0.301
Leisure	0.358	0.146	2.457	0.018	0.408	0.150	2.724	0.010
School	-0.797	0.128	-6.207	<0.001	-0.859	0.149	-5.783	<0.001
Workplace	0.379	0.143	2.651	0.011	0.492	0.145	3.392	0.002
Crime	-0.790	0.215	-3.670	0.001	-0.612	0.217	-2.823	0.008
Gated	-1.078	0.178	-6.059	<0.001	-1.274	0.206	-6.174	<0.001
Cleanliness	-0.389	0.119	-3.265	0.002	-0.520	0.121	-4.304	<0.001
Pollution	0.295	0.168	1.758	0.086	0.493	0.199	2.482	0.018
Green	-1.115	0.257	-4.339	<0.001	-1.154	0.269	-4.286	<0.001
Living	0.287	0.144	1.991	0.053	0.205	0.150	1.366	0.181
Kitchen	-0.615	0.230	-2.676	0.011	-0.480	0.228	-2.103	0.043
Bathroom	0.910	0.242	3.756	0.001	1.170	0.271	4.322	<0.001
Bedroom	-0.862	0.189	-4.549	<0.001	-0.969	0.231	-4.194	<0.001
Eco	-0.212	0.116	-1.825	0.075	-0.100	0.113	-0.884	0.383
Built	2.100	0.326	6.442	<0.001	2.239	0.354	6.328	<0.001
Price	-0.423	0.122	-3.477	0.001	-0.275	0.129	-2.128	0.040
Repayment	0.419	0.167	2.504	0.016	0.391	0.179	2.182	0.036
Interest	-0.568	0.145	-3.907	<0.001	-0.736	0.159	-4.633	<0.001
Duration	0.350	0.125	2.802	0.008	0.290	0.140	2.076	0.045

Number of vehicles					-0.029	0.124	-0.234	0.817
Monthly payment					0.0001	0.00009	1.073	0.291
Insurance and tax					-0.0001	0.00006	-2.284	0.029
Fuel					-0.0001	0.00003	-2.276	0.040
Toll					0.0002	0.00024	0.967	0.340
Parking fees					-0.000	0.00024	-0.789	0.436
Maintenance					0.0001	0.00004	1.769	0.086
Public					-0.0002	0.00086	-0.185	0.854
	F-statistics = 11.408 (<0.001)				F-statistics = 10.277 (<0.001)			
	R^2 = 0.848				R^2 = 0.895			
	Adjusted R^2 = 0.773				Adjusted R^2 = 0.808			

**Significance at 0.05*

Conclusions

There are appeared to be different for the current and previous conceptual measurement of housing affordability due to exclusion of transportation expenditure. This study also relevant to the housing developers because it provides information for improving the housing delivery system by including transportation expenditure. To ensure the success of affordable housing schemes, developers should be sensitive to homebuyers' interest by determining the factors related to homeownership priorities. The result of this study showed that variables associated with locational attributes such as access to shopping, public transport, leisure, school, and workplace were found to be significant to housing affordability. Homebuyers are not only paying attention to the quality of housing but they are also concerned about the good and safe environment. Homebuyers would prefer gated communities and guarded neighborhood. Besides, the financial factor is found to be an important consideration when purchasing a residential property. It shows that homebuyers are more concerned about the house price, the interest rate, amount of monthly payment, and the duration of the loan when purchasing an affordable house. Transportation expenditures such as the amount of insurance and tax and consumption of fuel were statistically significant to the housing affordability. Given the significant factors of transportation expenditure, local and state governments are encouraged to consider transportation expenditures when planning for affordable housing. This paper supported the argument that incorporating transportation costs into affordability measures reveal true housing affordability. Thus, the transportation expenditure should be a part of the definition of affordable housing as it influences household expenditure.

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Measuring Transport Expenditure On Housing Affordability: A Review

Afiqah ROSHIDI
Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Selangor Darul Ehsan, Malaysia.
Email: afiqah0812@gmail.com.

Norhayati BAHARUN
Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA Perak Branch, Tapah Campus, 35400 Tapah Road, Perak Darul Ridzuan, Malaysia.
Email: norha603@uitm.edu.my

Suraya MASROM
Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA Perak Branch, Tapah Campus, 35400 Tapah Road, Perak Darul Ridzuan, Malaysia.
Email: suray078@uitm.edu.my

Abstract

Housing affordability has been a major concern issue as the house price has increased significantly. Owning a house is significantly known as one of the major goals and reflects a single investment of a lifetime. Affordable housing is not mainly focused only on house prices, but it also includes the quality and amenities of the house. There are many indicators to measure housing affordability in Malaysia such as locational, neighborhood, structural, and financial attributes. However, the traditional measure of the affordability of housing has generally ignored the cost of transportation that incur a relatively high proportion of income. Therefore, this study aims to measure housing affordability by considering not only the cost of housing but the condition and location efficiency by measuring transportation costs. It is because combining transportation costs on the measure of housing affordability calculation can reveal a different pattern of affordability.

Keywords: Housing affordability, locational, neighborhood, structural, financial, transportation expenditure.

Introduction

Home has been recognized as one of the essential needs and significant component in the urban economy. Additionally, owning a house is one of a major goal and represents a single investment of a lifetime. It acts as a shelter to support household living. Besides, the need for housing is the main priority for the citizens to ensure their ongoing lives. However, one of the biggest problems lower-income Malaysian households face today is finding affordable, secure, and appropriate housing since housing within an urban area is more expensive as compared to housing in a rural area. Thus, the housing ownership should consider factors such as the financial capability of the buyers, development cost, and selling price.

Malaysians are facing problems in housing ownership since the house price has increased significantly. Besides, housing prices in the urban area in Malaysia are becoming severely unaffordable recently. The high rate of urban growth due to migration, increase in population size, and income level was significantly contributed to the housing market. The change in housing markets was due to increasing

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in demand and fluctuating price that affects the housing affordability. Housing affordability is not a new issue and it has taken over the global attention. Besides, housing affordability becoming one of the most critical development issues and considerable challenges especially for low incomes households. In most of the world including Hong Kong, Japan, Australia, Ireland, Nigeria, Indonesia, Singapore are facing the problem of housing is unaffordable. An affordable housing issue becomes the main focus on managing the growth of housing prices and reducing the effects of the housing issue.

A significant number of previous researches on housing affordability has been focused on housing costs and household income. Thus, a need for a broad and better understanding of housing affordability rather than simple measures based on housing expenditure and household income which cannot deal with issues such as housing conditions, location, and access to quality. Mulliner and Maliene (2012) criticized that pre-existing affordability literature focused on house prices rather than the condition, location, and neighborhood characteristics of the housing. Therefore, this study seeks to measure housing affordability by considering not only the cost of housing but the condition and location efficiency by measuring transportation costs.

Literature Review

Concept of housing affordability

In many countries, housing affordability has become the main considerable attention for several years. Affordability is the ability of the person in providing something that usually referred to the ability in financial terms. Housing affordability can be defined in three different ways (Gan and Hill, 2009); purchase affordability, repayment affordability, and income affordability. Purchase affordability is considering whether the ability of the household to borrow enough funds to purchase a house. Repayment affordability is considering the burden on the household to pay the mortgage while income affordability is referred to the measurement of the ratio of house prices to the income of the purchaser. Besides, housing affordability is defined condition of when people have the potential to save a certain portion of income to buy the house and as well as other consumption (Mostafa et al. , 2006). In Malaysia, housing affordability is denoted as the rent-to-income ratio or house price-to-income ratio known as income affordability. The median multiple is a common measurement suggested by the World Bank and the United Nations which rates of affordability of housing by dividing the median house price and annual median household income. Affordability is rated on a scale of 0 to 5, as shown in Table 1.

Table 1: Categories of housing affordability

Rating	Median multiple
Severely unaffordable	5.1 & above
Seriously unaffordable	4.1 to 5.0
Moderately unaffordable	3.1 to 4.0
Affordable	3.0 & below

Sources: The International Demographia (2006-2011)

Housing markets are rated as affordable at or below 3 times the median multiple, moderately unaffordable at or below 4 times median multiple, seriously unaffordable at or below 5 times median multiple, and above 5 times rated as severely unaffordable (Suhaida *et al.*, 2011).

Locational Attributes

Location attributes are highly related to the site or place where the housing is located whether an urban area or rural area. The distance is considered as the main factor that affects the buyer's preference in decision making such as distance to the workplace, schools, shops, and other facilities (Sean and Hong,

2014). Daly et al. (2003) mentioned that location has a primary value attribute on the buyer's preference in purchasing residential properties in Australia, UK, and Ireland. Besides, Kauko (2007) stated that location is an important factor to determines the success or failure of the residential housing project. Natasha and Hassan (2015) found that location attributes have a positive relationship and can give a positive impact on the intention to make a property investment. Location was considered as the highest contribution that influences on the housing price (Olanrewaju et al., 2018).

Neighborhood Attributes

The neighborhood is also one of the most important attributes to measure housing affordability. According to Sean and Hong (2014), the neighborhood is defined as an area in which residents live together for the common interest. Previous research by Źróbek et al. (2015) has shown that cleanliness and low crime trends are examples of good neighborhood environments that are important aspects of the purchase of residential properties. The good neighborhood gives a positive impact on housing prices. According to Teck-Hong (2011), a house in a good neighborhood is preferred as households are willing to pay extra for a house of good environmental quality. Thaker and Sakaran (2016) mentioned that the good quality of residential property can be valued by an excellent indoor and outdoor environment. Besides, Thanaraju et al. (2019) mentioned that the safety of the neighborhood is also considered as another important aspect when purchasing a residential property. This is because due to an increase in the trend of crimes such as burglary and snatch. Besides, the security of the neighborhood is very important for the safety level of the residential area since the number of crimes in Malaysia is increasing (Mariadas et al.,2019).

Structural Attributes

Numerous empirical studies have identified structural attributes as influential components of households' in the house-buying decision. According to (Teck-Hong, 2012) structural attributes that can impact home-buying preferences including lot size, the number of bedrooms and bathrooms, and the presence of a garden in a house. Hurtubia et al. (2010) mentioned that the number of bedrooms and bathrooms in a house are important characteristics to be considered when purchasing a residential property. For instance, in Saudi Arabia, private living space such as the number of bedrooms, the size of bedrooms, and the number of bathrooms are considered to be the important factors because it will have a direct relation to the problem of privacy (Opoku and Abdul-Muhmin, 2010). A similar finding by Chia et al. (2016) concluded that private living space is considered to be a key housing attribute because it can be directly related to the issue of privacy. Besides, Sundrani (2018) also mentioned that the number of bedrooms and the size of bedrooms are the most important features to be considered in their homeownership decisions.

Financial Attributes

Financial attributes play important features that the household needs to consider in their homeownership decisions. Besides, financial attributes strongly influence the decision of homebuyers to purchase a residential property (Sean and Hong, 2014; Thaker and Sakaran, 2016). As mentioned by Mariadas et al. (2019), there are several key areas regarding financial consideration such as interest rate, house price, household income, and ability to obtain financing. According to Li et al. (2014) also mentioned that financial factors such as length of the period for the payment, interest rate, amount of monthly payment are the main consideration while choosing a residential property to purchase. Zainon et al. (2017) concluded that financial factor has a positive relationship on housing affordability.

Transport Expenditure

In recent years, there is a new indicator of housing affordability that includes transport expenditure (Sabri et al. 2013; Yusoff et al. 2014). Housing and transportation are the two largest expenses for most households. Besides, housing and transport expenditure show a more complete picture of affordability in the neighborhood. The traditional measure of housing affordability generally focused on housing cost alone, while ignores the transportation cost which incurs a relatively high proportion of income.

Therefore, combining housing and transportation cost offers an expanded view of affordability. Previous research suggested that incorporating transportation costs into housing affordability calculations can reveal a different pattern of affordability, especially in less accessible locations (Dewita et al. 2018). Several studies from European countries provide a similar result of the importance of incorporating transportation costs to reveal more appropriate measures of housing affordability. Transportation expenditure consists of three important variables which are vehicle ownership, vehicle usage, and public transit. Vehicle ownership is determined by the number of the vehicle, monthly payment of the vehicles, and the annual amount of insurance and tax. Vehicle usage is based on the amount of fuel consumption, monthly amount toll, and parking fees, and cost and maintenance of the vehicles. Public transit will be the total amount of monthly expenses on public transit.

Summary of the previous research

Table 2: Summary of previous research on housing affordability

Author	Year	Objective	Independent Variables	Dependent Variable	Conclusion
Rahim and Munaaim	2008	To determine the indicator of housing affordability in Malaysia and variables that affect housing affordability amongst the low-income.	Household income, household expenditure, types of work, level of education, working household, and housing installment.	Housing affordability.	Household income and household expenditure are the main indicators affecting housing affordability.
Bujang et al.	2010	To study the relationship between demographic factors and housing affordability.	Demographic factors such as gender, race, age, marital status, education level, job sector, the status of the job, monthly income, and the number of households.	Housing affordability.	Marital status, number of households, age, education level, and household income have influenced the housing affordability.
Teck-Hong	2011	To examine the impact of neighborhood types on residential property values in Klang Valley	Location, structural and neighborhood characteristics.	Market price.	The neighborhood, structural, and location attributes are statistically significant related to house prices.
Teck-Hong	2012	To determine correct housing attributes required for first-time homebuyers in the urban area.	Location, neighborhood, structural, and social-cultural.	Homeownership.	Location and neighborhood play important attributes in the decision to purchase a house.
Tan and Cheah	2013	To determine the right housing	The locational, neighborhood, structural, and	Homeownership.	The locational and neighborhood have influence

		attributes required by potential first-time homebuyers.	socio-cultural housing attributes.		homeownership preferences by first-time homebuyers.
Eshruq Labin et al.	2014	To develop affordable housing performance indicators (AHPI) for landed houses.	Income ratio, facilities and services, safety and comfort, quality management and grow home.	Affordable housing performance indicators.	Income ratio, facilities and services, safety and comfort, quality management and grow home can be applied as AHPI for landed houses.
Sean and Hong	2014	To determine the key factors that investors before making an investment decision to purchase a residential property.	The locational, neighborhood, structural and financial factors.	The motivation of property investment.	The results revealed that 4 vocational, financial, and structural factors do affect property investors in making their purchases.

Author	Year	Objective	Independent variables	Dependent variable	Conclusion
Salleh et al.	2015	To identify the resident's preferences and influence factors on buying property buyers at the hill area.	Price, location, design, view and ventilation, type of neighborhood, facilities, and amenities in the neighborhood, Feng Shui elements, prestige, luxury, and style.	Property buyer decision.	The most influential factor in buying a property at hillside property was view and ventilation.
Chia et al.	2016	To examine the influence of housing attributes on house purchase intention.	The locational, financial, structural, neighborhood, socio-cultural, and developer brand.	Purchase intention.	Financing, location, structural, neighborhood, and socio-cultural have significant positive relationships with house purchase intention.
Zainon et al.	2017	To identify the determinants affecting the purchase decision among middle-income groups.	Price, design, location, quality, developer's success on the previous project, the number of the project done by the developer, developers' popularity, public facilities, and safety and security.	Purchase decision.	House price is the main consideration in buying the house followed by safety and security and public facilities.
Rameli et. al	2017	To identify the affordability levels and also the socioeconomic factors which affect the homeownership affordability of low-income groups in Kuala Lumpur.	Household income, household expenditures, type of employment, education levels, household sizes, monthly payment for housing, and household savings.	Homeownership affordability.	Household income, household expenditures, and monthly housing payments affect homeownership affordability significantly.

Khan et al.	2017	To evaluates the preferences of first-time homebuyers in buying houses.	Demographic, financial, location, structure, neighborhood, and economy.	Housing ownership.	Economic, financial, and neighborhood have a relationship with housing ownership.
Mariadas et al.	2019	To determine the first home purchase decision among middle-income earners in Selangor.	Finance, location, neighborhood, and structural attributes.	Residential property purchase decision.	Location and structural factors have a negative relationship while financial and neighborhood factors have a positive relationship with a residential property purchase decision.
Salleh et al.	2019	To understand the consistency in purchasing residential properties among homebuyers in Seri Iskandar, Perak.	Location, type of land ownership, neighborhood, concepts and building specifications, financial, developer reputation, and socio-cultural.	Purchase decision.	Respondents place high values on neighborhood variables when deciding to purchase residential properties.
Thanaraju et al.	2019	To evaluate the relationship between the three main factors identified which are financial, location, and neighborhood towards housing preferences of homebuyers.	Financial, location, and neighborhood.	House purchase decision.	Locational factors contribute significantly to the determination of a buyer's preferences when purchasing a house.
Mariadas et al.	2019	To determine the urban residential purchase decision in Klang Valley, Malaysia.	Finance, location, neighborhood, and structural attributes.	Residential purchase decision.	Three factors that influenced the urban residential property purchase decision in Klang Valley are finance, location, and structural.

Sources: Authors' analysis

Table 3: Summary of previous research on transportation expenditure on housing affordability

Author	Year	Objective	Method of data analysis	Conclusion
Mattingly and Morrissey	2014	To quantitatively examine intra-metropolitan combined housing and transport affordability in Auckland, New Zealand.	Combined Housing and Transport (CHT) affordability index	When transportation costs are incorporated into housing affordability measures, a different pattern of affordability emerges.
Saberi et al.	2017	To measure location affordability that incorporates both housing and transportation costs.	Housing + Transportation Index	There is a negative correlation between housing affordability and transportation affordability.
Dewita, Yen, & Burke	2018	To examine transport and housing affordability by exploring middle-to-low-income household's transport and housing expenses in the Bandung Metropolitan Area (BMA), Indonesia	Data envelopment analysis (DEA) method	DEA results showed that when transport cost is included, the impact on overall affordability differs based on the type of housing and income-related travel behavior.
Dewita, Burke, & Yen	2019	To quantitatively examine transport and housing affordability by exploring middle-to-low-income household's transport and housing expenses in the Bandung Metropolitan Area (BMA), Indonesia.	Housing and transport (H+T) affordability ratio and interval data envelopment analysis (DEA) method.	Household affordability is not only affected by housing type but also by the choice of transportation modes. Transportation cost is significant and should be incorporated into affordability measures.

Sources: Authors' analysis

Methodology

As discussed before, there are a plethora of attributes has been tested concerning their influence on housing affordability. In this study, however, these attributes are proposed to assess and absent in most previous research, especially in the local context.

Conclusion

Housing affordability is a major challenge currently facing by many countries. This paper stressed that housing affordability must be defined and assessed by a wider range of criteria. To determine whether the attributes matter, this paper includes several housing attributes. These include locational, neighborhood, structural and financial attributes of housing. This study also proposed a new factor

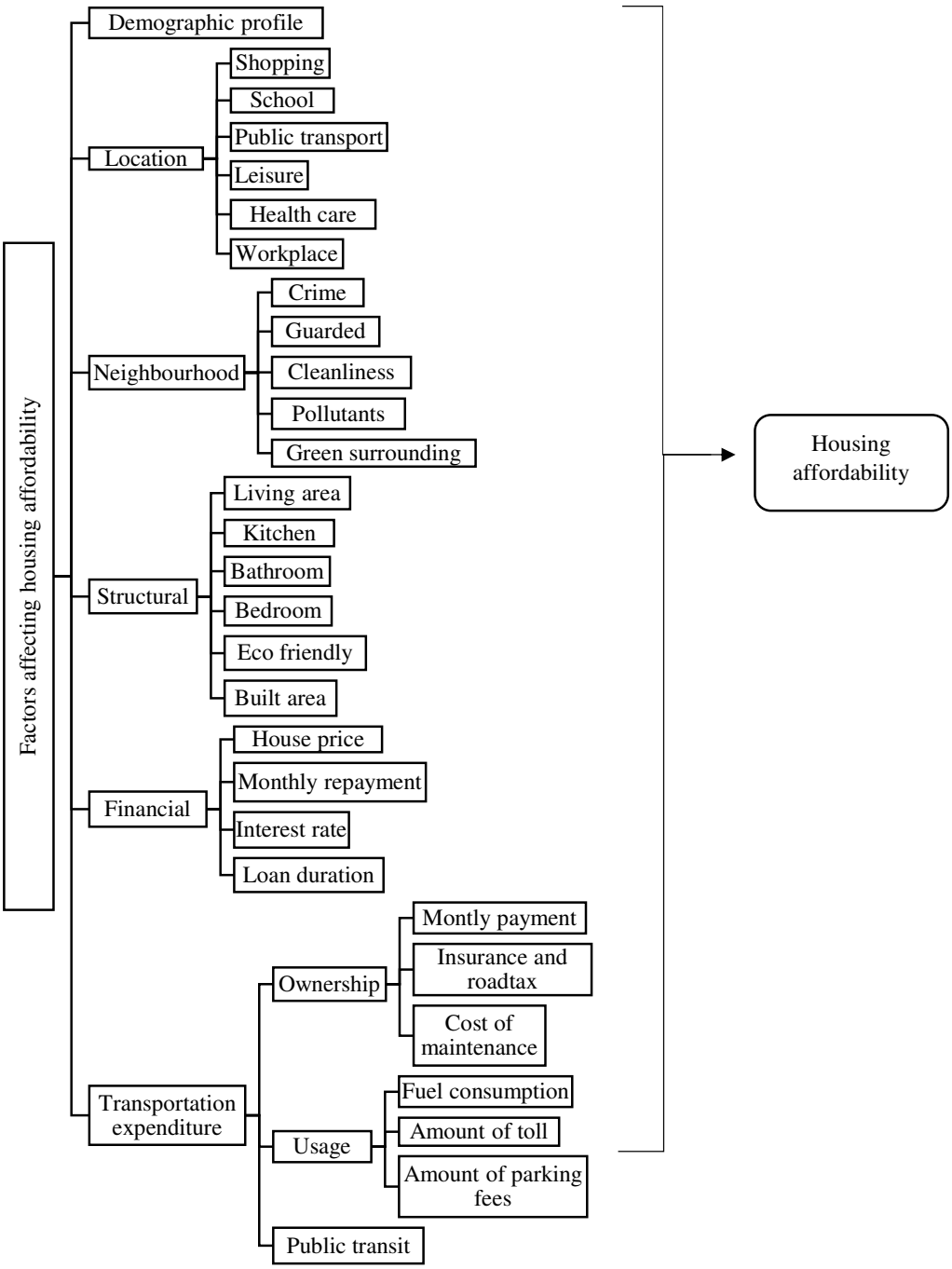

Figure 1: A proposed conceptual framework of the

namely transportation expenditure, along with other factors that were adopted from previous studies. These factors are expected to specifically highlight the issue of housing affordability. Finally, based on the review of the literature, a conceptual framework was proposed. This study is expected to identify the factors that influence the affordability issue, particularly involving transportation expenditure.

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The Archetype of Medium and Large Organization Structure and Its Simplicity

Dr Magdalena HOPEJ-TOMASZYCKA
General Tadeusz Kosciuszko Military University of Land Forces
Faculty of Management
51 – 147 Wroclaw, ul. Czajkowskiego 109
m.hopej@outlook.com

Dr. hab. Eng. Marian HOPEJ, Prof.
Wroclaw University of Technology
Faculty of IT and Management,
50-371 Wroclaw, ul. Ignacego Lukasiewicza 5
marian.hopej@pwr.wroc.pl

Abstract

The article addresses the organizational structure archetype as a solution to a dual problem adopted by the management of an organization at the second "top" level of the organizational hierarchy, i.e., on the one hand, organizational differentiation, and organizational integration on the other. An attempt is then made to define the features of the archetype of medium and large size organizations shaped according to the principle of simplicity. The final part presents the findings regarding the change of the archetype of the organizational structure.

Keywords: Management, Organizational Structure, Archetype, Simplicity

Introduction

It is assumed that the organizational structure is a set of rules ordering the behavior of the organization's participants. They are first introduced officially, but some remain spontaneous and pass the exam in everyday work (Steinmann, Schreyögg, 2001).

The organizational structure, which is an element of every organization, primarily serves the needs of management, in particular:

- defines the division of labor and introduces links between the activities carried out;
- shapes the division of powers and orders the components of the organization hierarchically, assigning them decision-making powers;
- determines the responsibility structure;
- ensures the continuity of the implementation of activities;
- regulates relationships with the environment (Nalepka, Kozina, 2007).

In general, an organizational structure's function is to shape organizational order by structuring the elements and activities of an organization. The process consists in grouping positions into organizational units, creating an organizational hierarchy, defining patterns of mutual influence, and setting the standards of the decision-making and action freedom of organization members (Mreła, 1983)

One of the principles of shaping the organizational structure is simplicity (Ashkenas, 2017), (Ashkenas, Siegel, Spiegiel, 2014), (Bodell, 2016) (Schneider, Hoffman, 2016), (Segall, K, 2016), (Worren, 2016)

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emphasized more frequently in literature reports in recent years. The known law of R.W. Ashby, by which all diversity should be balanced by the other, is disputed. As M. Crozier (1993, p. 47) writes, now, "… the effectiveness of responding to the complexity of the environment begins to depend on simplifying structures and procedures. Following the complication of social interdependencies by specializing structures and complicating procedures inevitably ends up getting bogged down in bureaucracy". However, it should be emphasized that it is not about "…negation of the complexity of social systems, but the reflection on the most effective ways of controlling it. Structures and procedures do not adequately respond to this complexity. They lead to stiffening and complications."

The principle of simplicity states that the organizational structure, due to its contextual conditions, should be the simplest possible, i.e., characterized by the least extensive hierarchy possible, and has the lowest degree of specialization, formalization, structuring, and centralization (Hopej-Kamińska et al., 2015). Therefore, the archetype of a structure, i.e., a kind of skeleton on which all organizational rules constituting the structure are based, should also be characterized by the greatest simplicity. Although it is mentioned in the literature on the development of the organization, it is usually indirect. For example, the analysis of different concepts of the life cycle of an organization leads to the conclusion that there are different structural solutions in different phases but within a specific framework.

Their change, in contrast to the small-scale modifications of the existing structural solutions characteristic for subsequent phases, is revolutionary and means the adoption of a new structure in connection with a change in the strategic direction in the face of a profound transformation of the industry (Greiner, 1972), (Steinmann, Schregögg, 2001). Girod and Karim (2017, p. 78) refer to the first type of change as reconfiguration, while the second - restructuring, which is a de facto alteration in the archetype of a structure defining the way "... in which its authorities group resources and coordinate actions". More precisely, it can be assumed that the organizational structure archetype is the solution of a dual problem adopted by the management board at the second "top" level of the organizational hierarchy, i.e., organizational differentiation on the one hand and organizational integration on the other." [**]

The archetype of organizational structure understood in this way contributes to shaping the organizational order, despite minor changes in organizational rules. One can also participate in building the identity of an organization in the sense that the way of organizational differentiation and organizational integration, corresponding to a specific organization, can distinguish it from the competition (Hopej, 2020).

In connection with the above, the following questions arise:

- what should the archetype of a structural solution for medium and large size organizations shaped according to the principle of simplicity be like?
- what are the relationships between the archetype and internal structural solutions of basic organizational units?
- how should the archetype be changed?

The article aims to find answers to them. The attempt to formulate them is based on:

- critical analysis of literature reports, which became the basis for defining the term of both archetype structure and archetypal concept, reflection in basic organizational unit as well as archetype changes
- calculating the simplicity of an archetype using fractal calculus.

[**] The organizational structure archetype should not be equated with its type, because the basic types of structural solutions are usually determined mainly by the organizational differentiation pattern (Steinmann, Schregögg, 2001).

Simplicity of An Organizational Archetype

The ideological scheme of the archetype of a structural solution of a medium or relatively large size organization is illustrated in Figure 1, in which the top management and managers of basic organizational units combine, as it is assumed in fractal calculus, branches with a length corresponding to their autonomy - the shorter the branch, the less autonomy, and vice versa, the longer, the greater the autonomy (Mandelbrot, 1983). Generally speaking, it is the product of two variables:

- horizontal autonomy, resulting from the organizational differentiation pattern adopted at the second "top" level of the hierarchy
- (organizing by function usually results in less autonomy than by objects);
- horizontal autonomy resulting from the dominant instrument of integration. It is greater in the case of integration based on self-agreement or plans and programs than based on the hierarchy (Steinmann, Schreyögg, 2001).

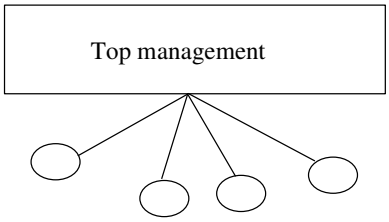

Fig. 1 : Ideological diagram of an archetype of organizational structure

Source: own study

Calculations carried out with the use of fractal calculus prove that the complexity (decrease in simplicity) of the archetype increases as the autonomy of basic organizational units decreases (Hopej, 2020). It means that:

- the most complex archetype is characterized by organizational differentiation by function and organizational integration through a hierarchy,
- the simplest archetype is characterized by differentiation by objects and organizational integration by means of self-agreement, possibly supported with programs and plans having a complementary meaning as an integration instrument (Steinmann, Schregögg, 2001).
- hybrid archetypes, i.e., with differentiation according to functions and objects and with various integration instruments (e.g., by means of hierarchy and self-arrangement simultaneously), are characterized by intermediate complexity (simplicity).

It follows that, if it is possible, basic object-oriented organizational units, the organizational integration of which is primarily based on self-agreement, should be created. Where it cannot be done (e.g., in conditions of poorly diversified activity), functionally oriented units should be set up with the greatest possible responsibility for the function performed. It is related to the limitation of the use of hierarchy as an instrument of organizational integration.

Due to the above, the following question arises: should more smaller or less larger organizational units be established in accordance with the principle of simplicity? Let us also try to answer them using fractal calculus, adopting the following assumptions:

- the measure of complexity is the so-called fractal dimension (Hopej, 2009);
- the autonomy (resultant of vertical and horizontal autonomy) of all basic organizational units is the same;

- the objects of analysis are two archetypes of structural solutions of an organization with the same number of employees (16), but differing in the number of basic organizational units (3 and 5) ***.

The performed calculations (Table 1) show that:

- the greater the number of basic organizational units, the more complex the archetype;
- the greater the autonomy, the simpler the archetype.

Table 1: The simplicity of the archetype of the structure depending on the autonomy of the basic organizational units

Basic autonomy of organizational units (scale 0-1) / Structure archetype	0,75	0,66	0,50
As 3 (complexity)	2,29	2,89	4,58
As 5 (complexity)	2,41	3,03	4,82

Source: based on (Tworek, Hopej, Martan, 2017)

That leads to the conclusion that the simplicity of the organizational structure archetype favors the creation of the smallest number of basic organizational units.

The Archetype and Structural Solutions of Basic Organizational Units

Basic organizational units obviously have their own internal structural solutions, the simplification of which also requires:

- increasing, as far as possible, the scope of decision-making and action freedom of managers of separate organizational units (cells) and their subordinates;
- limiting the number of distinguished organizational units (cells).

***According to these assumptions, one archetype covers 3 basic organizational units, and the other 5. Although the autonomy of all units does not differ, their values may range from 0 ÷ 1 (it was assumed that they are 0.75, 0.66, 0.5). The derivation of the formula for the value of the fractal dimension was presented in the paper (Hopej, Martan, 2009).

In consequence of applying the same guidelines for organizing activities, one can imagine a structure in which the internal structural solutions of basic organizational units are a mirror image of its archetype (Figure 2). [****] Such a structure, however, is a model abstracted from the organizational reality since in management practice structural solutions of basic organizational units usually differ more or less from each other, for example, due to different external and internal conditions (e.g., different qualifications of organization members), or limited rationality of management decisions. Nevertheless, it proves that when actions simplifying the whole organizational rules are consistently implemented, the basic organizational units contain the structural characteristics of the archetype (the archetypal reflection effect). It includes, perhaps even above all, the most significant possible scope of decision-making powers, which is, in a way, a crowning achievement of the simplicity principle, for there is no better way to reduce complexity than to give operating units and their members a great deal of discretion. They can "act in symbiosis with their clients, have a better chance to respond quickly to their expectations, learn from clients, and help them in their learning. Speed of action, mutual understanding, the ability to conduct dialogue, and innovative abilities are essential qualities to achieve true autonomy. Then, the necessity to constantly refer to standard rules is avoided" (Crozier. 1993, p. 50).

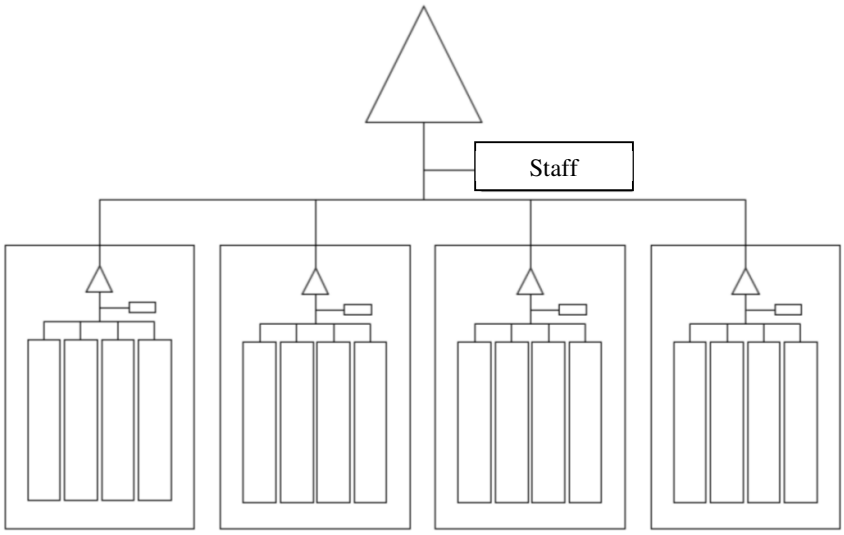

Fig. 2: Organizational structure in which the internal solutions of the structures of basic organizational units are a mirror image of its archetype

Source: own study

If the simplification of organizational rules is less consistent, the archetypal reflection effect is less apparent. It is the least visible when, in the opinion of the management of the organization, the principle of simplicity is still adhered to in relation to all organizational rules. That means that the least acceptable activities are implemented to simplify the structure within the autonomy of the basic units. In other words, it occurs when the structural characteristics in all units are correlated, to a slight but

[****] This structure resembles a fractal structure. The main difference lies in the fact that in the presented structural solution, the basic organizational units do not have to be linked by ties of cooperation, but they are present in fractal solutions (Hopej, 2004).

still acceptable degree, with the characteristics of the archetype.Therefore, it can be assumed that there is a continuum of the occurrence of archetypal reflection in basic organizational units (Figure 3). Its extremes are: mirror effect (l) and minimal reflection (m). Moving on the continuum towards the *m* point means increasingly less visible effects of the archetypal reflection, while towards the point l - more and more visible structural solutions of the organization, reflecting the growing simplicity structural solution in the organization.

1 _____ m

Fig. 3: Continuum of the occurrence of the archetypal reflection effect in basic organizational units

Source: own study

The consistency in striving to simplify organizational rules, and thus the appearance of the archetypal reflection effect in basic organizational units, seems to depend to a large extent on the organization members' trust in simplicity, as a directive of efficient operation. It is crucial for perpetuating the emotions related to the elimination of complexity, i.e., the feeling of discomfort from the bureaucratic way of carrying out activities. Therefore, the management of the organization must, among others convince its other members (with their actions, keeping promises, results, etc.) that simplicity has real value in a given organization and is not a mere declaration but one of the basic decision-making criteria. If confidence in simplicity can be built and maintained, the effects of archetypal reflection will be visible throughout the organization.

Changing the Organizational Structure Archetype

It seems that changing the archetype of a structure should be based on at least two assumptions. They are:

- avoiding addiction to organizing,
- non-existence of "good" organization.

The change of the archetype is a profound and large-scale change in the organizational structure and it can be compared to a very serious surgical intervention on a living organism, without anesthesia. Meanwhile, surgeons are, as Malik (2015, p. 211) writes, "… in a much more comfortable position than managers: they can immobilize the patient with anesthesia during the operation. The manager cannot do this. His/Her "patient" sees, feels and watches what is coming, and reacts accordingly. Good surgeons are aware that surgery should not be performed unless necessary. Only when other measures fail do they reach for the knife. Good managers do the same. "They know that while people are adapting to change better and better, they also need, perhaps even above all, stability and peace if they are to operate efficiently. It seems to be forgotten by managers who are addicted to organizing, and who pursue a strategy of continuous transformation of the organization so that "everything is on the move all the time" (Malik. 2015).

It should also be remembered that the change in the structure archetype is rather not conducive to shaping the identity of an organization which, in the light of Stadler and Wäldermann's (2012) research on long-lived companies (the so-called hundred-year-old champions) appears to be a key factor in their survival and success. It does not mean that the archetype should not be changed, because there are such situations that there is no alternative. However, it should be carried out after the best preparation and planning of the process, considering, if possible, the previous states of the structure, as the lack of structural continuity may result in difficulties in maintaining the organization's identity.

The second assumption is that there are no structural solutions without flaws. Each of them has not only its positive sides, but also negative ones. Moreover, they all generate conflicts, emphasize antagonisms between people, create ambiguities, and many other problems. "Moreover, it is very rare to choose a "pure" organizational form. Such forms only exist in textbooks. Existing organizations are practically always a mixture of several "pure" forms; hence they are hybrid creations. It is not something negative, except for management purists" (Malik, 2015, pp. 211-212).

As it is clear from the above considerations, a change in the archetype of a structure means either a change in organizational differentiation or an instrument of organizational integration, or both at the same time. In accordance with the principle of simplicity, it is about a change that increases the autonomy of basic organizational units, so it is, for example, replacing integration by hierarchy, integration by self-agreement, and not increasing the importance of organizational hierarchy in integrating activities. It will also be the creation of a new object-oriented unit next to the functional divisions, not one more product-oriented division, apart from a few existing ones.

Changes of the archetype can be made in either revolutionary or evolutionary ways. In the first case, the top management somewhat shakes up with its structural solution, depriving itself, as Girod and Karim (2017) write, of organizational cholesterol, namely organizational flexibility of operating rules. As mentioned earlier, it is inadvisable that the shocks are carried out too often - the authors cited suggest a period of at least 5 years.

In the other case, the change is introduced gradually, in a manner reminiscent of the surgical operations of a road accident victim, where first his/her life is saved, and subsequent surgical procedures are aimed at reconstructing the upper limbs first, and then the lower limbs. An example may be a change in the archetype of a structural solution of one of the Polish companies in the clothing industry, which consisted in:

- Increasing the autonomy of each of the several factories operating within the production division by locating units dealing with product design and marketing in each of them. Before the change, these activities were carried out in two different divisions supporting the activities of individual plants.
- Introducing, after several months, a divisional structure in place of the functional structures (integrated functional divisions), when favorable circumstances appeared (it was primarily about more efficient implementation of tasks in the conditions of greater decision-making and action freedom of employees).

The right way to do an archetype shift is balancing the pros and cons. Revolutionary change is undoubtedly a greater shock to the organization, but on the other hand it means longer periods of stabilization and favors the use of non-hybrid structural solutions. In turn, evolutionary change means a smaller shock spread over time, but shorter stabilization periods, as well as the possibility of real management actions based on hybrid solutions characterized by greater complexity.

Regardless of whether the archetype change is evolutionary or revolutionary in nature, it cannot be performed in isolation from other aspects of the organization's functioning because, separated from the context, the archetype transformations result in an internal mismatch that can paralyze it. The adjustment of the simplified structure to organizational culture, which is supposed to support a kind of civic community of the organization, seems to be crucial. In general, such a distant culture refers to the extent to which the organization members give themselves to others, and with its dimensions they become suppressed by selfishness and adherence to the norms of decency and good manners (Hopej - Kamińska et al. 2015).

Conclusion

The considerations lead to the following observations and conclusions:

- The organizational structure archetype, shaped in accordance with the principle of simplicity, should be characterized by the greatest possible autonomy of basic organizational units. It is favored by organizational differentiation by object and organizational integration through self-agreement.
- The number of basic organizational units should be possibly small (it is better to create fewer larger units than many smaller ones).
- The so-called archetypal reflection effect occurs in structural solutions of basic organizational units. It is most visible in the case of a mirror image, i.e., when the structural solutions of basic organizational units are a mirror image of the archetype of a structure.

– Changing the archetype can be both evolutionary and revolutionary, but frequent changes resulting from a strategy of continual restructuring is a management error.

Among the issues discussed in this article, some require further research. For example, the effect of the archetypal reflection should be considered more thoroughly, mainly the mechanism of its formation.

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Sustainability Performance: Tone in The Disclosure of Non-Financial Information in Sustainability Reports

José CABEDO
Universidad Jaime I, Castellón de la Plana-España
cabedo@uji.es

José TIRADO
Universidad Jaime I, Castellón de la Plana-España
tirado@uji.es

Dennis MUNOZ
Universidad Jaime I, Castellón de la Plana-España
al184996@uji.es

Abstract

The main objective of this paper is to analyze the state of the art in research on the use of tone in sustainability reports. We set out to select papers that analyze the existence of bias in the tone of disclosures, specifically in the field of environmental information, in favor of the interests of companies' managers. We carried out a systematic review in the Scopus database and selected 33 articles published between 2000 and 2020. We identified several lines of research that analyze the relationship between tone and the information disclosed in sustainability reports, including one that relates impression management (tone manipulation) to environmental performance. Our work reveals a lack of research on tone in mandatory sustainability reports prepared under the new GRI Standards. By identifying the main lines of research on the topic and the ones with a significant lack of research, this paper contributes to the debate on impression management (tone manipulation) and incremental information in sustainability reports.

Keywords: tone and disclosure, sustainability reporting, tone management, qualitative disclosure, textual analysis.

Introduction

The demand for non-financial information is undoubtedly increasing. In addition to financial information, investors, shareholders, and stakeholders now require companies to provide non-financial reports to help them make decisions on investments and other dealings with companies. For their part, companies are keen to publish non-financial information that will testify to their commitment to environmental and social sustainability.

Given the tendency for environmental disclosures to use qualitative rather than quantitative language, the writers of non-financial reports may be tempted to manage and control readers' impressions, so as to limit criticism by external stakeholders (Talbot and Boiral, 2018), while using concealment and attribution to cast their organization's performance in a favorable light (Merkl-Davies and Brennan, 2007; Grant and Booth, 2009; Talbot and Boiral, 2018), thus increasing the company's legitimacy and enhancing its image (Hopwood, 2009).

Tone and choice of language are therefore key elements in the narrative disclosure of environmental information and must be given proper consideration in any study of textual complexity (Fisher *et al.*, 2019) or of the relationship between disclosure and environmental performance (Cho *et al.*, 2010)—because they can be used to misinform as well as to inform.

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In this paper we explore the relevant research to determine the state of the art on the use of tone and choice of language in sustainability reports. To do that, we conduct a systematic review of a sample of 33 research articles, using the methodology and framework developed by (Talbot and Boiral, 2018). Our systematic review covers four streams of research on tone in sustainability reports.

The first stream of research analyses the relationship between tone and companies' environmental performance. In the second stream of research some authors claim that managers have no incentive to manipulate information whilst others argue that companies adopt the GRI methodology to give themselves visibility (legitimacy). The third line of research focuses on the determinants of the tone used by managers in their disclosures. Finally, the fourth stream of research addresses the relationship between tone management and economic performance.

The rest of the paper is organized as follows: section 2 describes the methodology and methodological framework for the systematic literature review. Section 3 sets out the findings of this review, i.e. the state of the art. Section 4 draws the main conclusions.

Methodology

We carried out a systematic literature review on tone in environmental information included in corporate sustainability reports. We applied Grant and Booth's (2009) four-step methodological framework—Search, Appraisal, Synthesis and Analysis[1] (SALSA). By following these four steps, we were able to determine the main lines of research on the topic, the tone-related variables in disclosures, the unexplored strands of thought, and the strands that, to date, have received least attention in the literature.

Search

This phase consisted of collecting the primary data. We used the Scopus database to extract the primary data. We started our search with a wide range of criteria focused on the tone of the information disclosed in sustainability reports:

a. The search was limited by titles, abstracts, and keywords. We chose the following words for the search equation:
    - tone and disclosure;
    - sustainability reporting;
    - tone management;
    - management disclosure;
    - linguistic tone;
    - qualitative disclosure;
    - textual analysis;
    - content analysis;
    - tone volatility.
b. We used a time slot from 2000 to 2020. We checked the papers published in the last two decades to study the evolution of non-financial disclosures and the determinants of that evolution.
c. We selected articles and reviews because the purpose of our systematic review was to examine scientific articles that focus on the subject of our study

From this initial search, we collected 103 articles. We then proceeded to the next stage: appraisal.

Appraisal

Codina (2018) suggests that the next task, after obtaining the initial data set, is to develop an evaluation system which will discard any documents that fall below certain quality standards.

Accordingly, when reviewing the abstracts and conclusions of the collected articles, we checked whether the documents could answer questions such as:

- Is the corporate report that is the subject of the study about sustainability?
- Does the paper analyze the impact of tone on information disclosure?
- Does the paper study the disclosure of environmental information?
- Does the paper analyze whether tone bias in sustainability reports can be linked to the interests of the producers of the reports?
- Does the paper study sustainability reports prepared under the GRI Standards?

We discovered that the scope of our search was too wide, as we found too many articles that did not fit our research objectives. We therefore decided to introduce a second search equation with different criteria for excluding and including articles from the Scopus database. Using these new criteria, we searched for the following terms in title, abstract and keywords:

- tone and disclosure;
- sustainability reporting;
- tone management;
- management disclosure;
- linguistic tone;
- qualitative disclosure;
- textual analysis;
- content analysis;
- tone volatility;
- environmental disclosure;
- GRI;
- Global Reporting Initiative.

We included the terms 'environmental disclosure', 'GRI' and 'Global Reporting Initiative' because they matched our research goals. We wanted to know whether there was any bias in the tone of the environmental information disclosed in sustainability reports and, overall, in sustainability reports prepared in accordance with the GRI Standards.

The study period and the kinds of documents used for this second equation were the same as for the first one.

We obtained 33 articles. We checked the abstract, conclusions and, for some of the papers, other sections of the document to determine whether the information contained in the paper was related to the objective of our study. We also checked some of their bibliographic references. We then moved on to the next stage.

Analysis of the information

We analyzed the selected data set in accordance with Grant and Booth's (2009) framework. To do that, we created a record for each paper, summarizing the main information: goals, methodology used, results, conclusions, and publication date. We compiled a summary of the papers and then proceeded to the next stage.

Synthesis

This synthesis represents the state of the art, which is the aim of a systematic literature review.

Having determined the state of the art, we found four main lines of research analyzing the relationship between tone and information disclosure in corporate reports:

- relationship between tone and environmental performance;
- impression management (tone manipulation) and environmental performance in sustainability reports under the GRI Standards;
- CEO characteristics as a determinant of tone in sustainability reports;
- management tone and economic performance.

Results

The growth in the number of sustainability reports issued by companies can be linked to the pressure from internal and external stakeholders for higher quality in the non-financial information disclosed by firms. This information is intended to give stakeholders (investors, regulators, shareholders, financial analysts, etc.) a deeper knowledge of firms' social and environmental performance (Berthelot *et al.*, 2003; Diouf and Boiral, 2017) to help these stakeholders in their trading and investing decisions (Cho *et al.*, 2010; Boiral, 2013).

Financial markets require sustainability reports to supplement financial information as a basis for risk assessment. Social and environmental investment funds use these reports to evaluate firms' social and environmental behavior (Boiral, 2013).

Nevertheless, some researchers remain critical of sustainability reports, which they say tend to be unrealistic, unaccountable, opaque, poor quality and unreliable, reflecting only the interests of the business (Cho *et al.*, 2010; Moneva *et al.*, 2006; Rodriguez *et al.*, 2015) Sustainability reports, they maintain, are used as marketing tools to enhance corporate image, boost companies' social legitimacy and recruit new shareholders (Deegan *et al.*, 2006; Prado-Lorenzo *et al.*, 2009; Hopwood, 2009; Cho *et al.*, 2012; Diouf and Boiral, 2017; Talbot and Boiral, 2018).

Furthermore, the use of qualitative, rather than quantitative, language in environmental (and social) disclosures allows report writers to manage and influence readers' impressions, so as to limit criticism by external stakeholders (Talbot and Boiral, 2018), while using concealment and attribution to cast their organization's performance in a favorable light (Merkl-Davies and Brennan, 2007; Hopwood, 2009; Talbot and Boiral, 2018), thus increasing the company's legitimacy and enhancing its image (Hopwood, 2009).

Tone and choice of language are therefore key elements of narrative disclosure in any study of textual complexity (Fisher *et al.*, 2019) or of the relationship between disclosure and environmental performance (Cho *et al.*, 2010)—because these elements can be used to misinform as well as to inform.

The role of tone in non-financial disclosures has therefore become a topic of research, in which we identify four main streams; the relationship between tone and companies' environmental performance, impression management (tone manipulation) and environmental performance in sustainability reports, CEO characteristics that determine tone in disclosures and the tone management and economic performance.

Tone and environmental performance

This research stream contains a large number of studies claiming that managers create impression management strategies to help maintain or improve the company's image or reputation and thus bias stakeholders' perception (Cong *et al.*, 2014; Talbot and Boiral, 2018). Managers can also bias stakeholders' perceptions by using concealment or attribution strategies (Merkl-Davies and Brennan, 2007), which involve extensive use of positive keywords and ambiguous, opaque, or evasive language (Cho *et al.*, 2010).

Some studies in this line of research consider the personality, management abilities, age, gender, duality and tenure of the chief executive officer (CEO) as determinants of impression management or tone manipulation (Cong *et al.*, 2014; Buchholz *et al.*, 2018; Liu and Nguyen, 2019; DeBoskey *et al.*, 2019).

Cho *et al.* (2010) analyze the existence of self-serving bias in the language and tone of environmental disclosures and the use of such bias to manipulate stakeholders' perceptions. In their view, the external pressures companies face provide an incentive to adopt a superficial, symbolic approach driven by self-interest rather than by any real concern to improve either transparency or environmental performance.

Cho *et al.*'s (2010) results show that poor environmental performance is significantly and positively related to optimistic language (impression management) and negatively related to certainty.

Based on these results, they conclude that organizations manipulate the presentation of information through choice of language and tone; and that they manipulate disclosure through the quantity, content, and attribution of the information provided.

Arena *et al.* (2015) focus on environmental reports. They look for evidence either of manipulation of stakeholders' perceptions (impression management) or of a genuine willingness to help stakeholders make good investment decisions through transparency and depth of information (incremental information).

Neither Clarkson *et al.* (2008) nor Arena *et al.* (2015) find any evidence of managers' having financial incentives to manage tone in their reports or to mislead stakeholders. On the contrary, these authors find optimistic language to be related to a higher probability of positive future environmental performance, thus confirming the incremental information hypothesis.

They also claim that the relationship between tone and environmental performance varies according to certain characteristics of the board of directors, in particular the board's stakeholder orientation and the existence of a social responsibility committee (CSR) within the board.

Within the research stream on tone management and environmental performance, Rodrigue *et al.* (2015) perform a comparative content analysis of the volume and tone of environmental information in reports prepared by companies and in disclosures by stakeholders (case study). The authors analyze annual reports, sustainability reports, brochures, and press releases between 2005 and 2007.

Rodrigue *et al.* (2015) argue that the differences they find in the volume and tone of environmental disclosures by the company and by stakeholders stem from the different tendency of the disclosed information. Both parties report biased information with the aim of impressing their readers. The disclosed information therefore does not reflect reality but plays a part in constructing, forming, and legitimating the parties' discourses within society.

Diouf and Boiral (2017) analyze stakeholders' perceptions of the quality of sustainability reports. They elicit the perceptions of responsible social investment specialists in Canada and analyze the extent to which those perceptions support the argument that sustainability reports are used as an impression management tool to influence stakeholders' investment decisions.

From their assessment they conclude that companies use sustainability reports to implement impression management strategies rather than to provide incremental information. Companies focus only on positive aspects, while concealing controversies and negative aspects of their performance, so as to influence or distort stakeholders' perceptions.

Impression management (tone manipulation) and environmental performance in sustainability reports under the GRI Standards

It is widely assumed that the information disclosed in sustainability reports is truly transparent and reflects the performance and real impact of the reporting entities' activities. However, the lack of transparency found in some sustainability reports shows them to be a tool for enhancing companies' social and environmental reputation (Deegan *et al.*, 2006) by creating a simulacrum (Boiral, 2013).

The literature shows mixed results on the relationship between environmental performance and the level of disclosure of environmental information. Clarkson *et al.* (2008), for example, report a positive relationship between level of disclosure and environmental performance, whereas Cho *et al.* (2010) and Huang *et al.* (2014) find a negative relationship.

Clarkson *et al.* (2008) find no financial incentive for managers to use the environmental information disclosed in corporate reports in an opportunistic manner. In their view, the stock market is capable of detecting bias in corporate reports and punishes companies that use such bias by lowering their stock price.

According to Clarkson *et al.* (2008), environmental performance is positively related to discretionary disclosure in environmental and social reports and thus also to similar disclosures on corporate websites.

Nonetheless, other studies (Moneva *et al.*, 2006; Boiral, 2013; Talbot and Boiral, 2018) claim that companies adopt the GRI methodology to give themselves visibility (legitimacy), even though their commitment to sustainability remains low.

It is worth noting that disclosures are likely to be more self-interested and to conceal compromising information when companies' environmental legitimacy is questioned. Such disclosures will display tone bias and language manipulation (impression management), regardless of whether the reports are published under the GRI Standards or not.

Talbot y Boiral (2018), Boiral (2013), Cho *et al.* (2010) and Moneva (2006) also analyze the relationship between tone (impression management) and environmental performance, taking a critical stance toward sustainability reports prepared in accordance with the GRI guidelines.

Talbot and Boiral (2018) evaluate the quality of the environmental information disclosed by oil and gas companies and the impression management strategies used to justify or conceal negative aspects of their performance.

Despite the fact that the chosen sustainability reports had high application levels and had been verified by external auditors, the researchers found significant gaps in the measurement of environmental performance. Furthermore, they were surprised by the lack of clear data and the lack of compliance with the GRI guidelines, highlighting the ineffectiveness of the report assurance process.

They also found evidence of the use of impression management to justify results, and strategic omissions and manipulation of figures to hide information.

The authors claim that sustainability reports are used as a legitimacy tool to mitigate social pressure and criticism from stakeholders.

Boiral (2013) performs a content analysis of the sustainability reports and compares the content with sustainability-related events published in the media. The author finds that, contrary to the principles of balance, integrity, and transparency, approximately 90% of the significant negative events were not reported. The fact that only 10% of the negative events were reported supports the theory that sustainability reports are an exercise to camouflage real sustainable development problems.

The use of tone or overly positive, almost narcissistic language contributes to the low credibility of sustainability reports and is consistent with voluntary disclosure theory and legitimacy theory, which predict that companies will use these reports to send positive signals to improve their competitive positioning and social legitimacy. The images used in the reports were found to be predominantly positive, thus failing the GRI criteria of balance and reliability.

CEO characteristics as determinants of tone in sustainability reports

Stakeholders have shown an interest not only in the tone (optimistic, pessimistic, or neutral) of the information disclosed in sustainability reports, but also in CEO characteristics as determinants of tone.

Several studies focus on intrinsic characteristics of the CEO and the impact these characteristics may have on tone in corporate reports. The characteristics of interest include personality (Marquez-Illescas *et al.*, 2018), age, gender (Liu and Nguyen, 2019), duality, experience, and career choice.

Some articles also examine board of directors' characteristics to determine the board's ability to constrain or minimize the use of tone by the CEO (DeBoskey *et al.*, 2019).

Other authors argue that impression management in reporting is strongly related to CEO narcissism (Boiral, 2013; Cong *et al.*, 2014; Buchholz *et al.*, 2018).

DeBoskey *et al.* (2019) investigate whether effective board oversight moderates the strength of the association between CEO power and earnings announcement tone.

The authors assess CEO power across two dimensions—expert power (CEO tenure) and structural power (CEO-chairman duality)—in order to assess the impact of each type of power on disclosures. They also build a model of tone determinants.

The authors conclude that CEO power and board oversight are determinants of tone in disclosures.

Marquez-Illescas *et al.* (2018) test the impact of CEO personality on corporate disclosures. To measure CEO narcissism, the authors use the indirect measurement proposed by (Olsen *et al.*, 2014). After controlling for various tone determinants, their results show that tone in earnings announcements is determined by CEO personality and age.

The positive relationship between narcissistic personality and positive tone in earning announcements proves that narcissistic CEOs tend to reinforce their self-image by applying a positive bias to disclosures. However, egocentricity decreases with CEO age.

The authors' results also show that stock markets react to the tone used by narcissistic CEOs, although the reaction curve is flatter. This suggests that markets take the bias of announcements by narcissistic CEOs into account. Tone can therefore significantly influence a stock's profitability.

In this context, Buchholz *et al.* (2018) assess the relationship between CEO narcissism and the use of an abnormal optimistic tone in financial disclosures. They find that CEO narcissism is positively related to abnormal optimistic tone. The transition within a company from a less optimistic CEO to a more optimistic one is also reflected in the tone of the company's reports, which shift towards abnormal optimism.

The authors also find that narcissistic CEOs are more likely to use abnormal positive tone when their organizations have plans for seasoned equity offerings or R&D investments, with the aim of giving their company more positive visibility and enhancing their own reputation.

Cong *et al.* (2014) examine the rhetoric employed by CEOs to determine CEO leadership and environmental commitment. They conclude that CEOs in companies with poor environmental performance use language in such a way as to highlight positive aspects and hide negative ones and thus legitimize the organization. The authors find a significant negative relationship between the tone used in CEOs' letters and environmental performance. This finding is consistent with legitimacy theory and impression management.

Cong *et al.* (2014) also argue that CEOs use tone as a strategy for environmental initiatives because a positive environmental reputation can improve both company visibility and CEO status.

Along similar lines, Liu and Nguyen (2019) evaluate two types of corporate disclosure, the Management Discussion and Analysis (MD&A) and the CEO letter to shareholders, to distinguish the tone used in each.

Based on a content analysis, they claim that, for the same level of firm performance, the MD&A has a less positive tone than the CEO's letter to shareholders. Furthermore, the MD&A provides incremental information to the financial statements, whereas the language in the CEO letter, influenced predominantly by the level of positive words, is largely inconsistent with current firm performance.

This inconsistency between tone and performance is attributed to overconfident CEOs, who tend to have an overly positive view of their ability. As Buchholz *et al.* (2018) put it, overconfident CEOs underestimate their company's operational risk. Liu & Nguyen (2019), meanwhile, find that the negative tone used by non-overconfident CEOs is consistent with their companies' performance and future risk.

These authors also find that gender affects the tone of CEO letters. Female CEOs use a more neutral tone, i.e. a more equal balance of positive and negative words.

The authors attribute the difference between the tone of the MD&A and that of the CEO letter to the fact that the CEO letter is a voluntary disclosure and is unregulated and unaudited, both in format and in content. CEOs are thus able to use asymmetric information to exercise impression management, overvaluing the positive aspects of company performance and obfuscating the negative ones.

Tone management and economic performance

This research stream can be divided into subgroups focusing on the relationship between the tone of earnings announcements and firm value, economic performance, different types of shareholder decision, stock market reactions, operational risk, litigation, shareholders and, in particular, managers' management capacity (Rogers *et al.*, 2011; Huang *et al.*, 2014; Triki *et al.*, 2015; Luo and Zhou, 2017; Baginski *et al.*, 2018; Bakarich *et al.*, 2019; Campbell *et al.*, 2019).

The above subdivision indicates that tone in earnings announcements is relevant for shareholders and the stock market. As noted by Chen *et al.* (2015), quoted in Luo and Zhou (2017), the reporting of quarterly economic performance is a core task for CEOs. A key factor in managing the tone of these statements is management team capacity (Luo & Zhou, 2017). In other words, tone reflects not only the information about the organization's operational performance provided by the CEO but also the management team's ability to turn organizational resources into earnings.

In their letters to shareholders and earnings releases, CEOs use a biased narrative to explain quantitative data. Neither of these documents is regulated as regards the information it contains. Researchers and scholars have therefore begun to study how these documents are used to manage tone both for incremental information and for impression management.

One of the most cited studies in this field is Huang *et al.* (2014). As qualitative information is used to interpret quantitative information, the authors argue that tone plays a special role in shareholders' appraisals of firm value.

Accordingly, they study whether managers use impression management strategies in earnings releases to misinform users by masking poor financial performance. Their findings suggest that older companies tend not only to have restrictions in their balance sheets but also to use impression management in their disclosures more than younger companies.

Baginski *et al.* (2018) suggest, like Huang *et al.* (2014), that the tone used in earnings announcements is complex and difficult to assimilate, especially for inexpert shareholders, who may be misled by an overoptimistic tone into making risky investments. On the other hand, an overoptimistic tone is likely to arouse mistrust in more expert shareholders, who will distrust any claims that sounds too good to be true.

Rogers *et al.* (2011) analyze the relationship between disclosure tone and shareholder litigation. They conclude that sued firms' earnings announcements are unusually optimistic relative to those of other firms in the same industry with similar economic performance. According to Davis and Tama-Sweet (2012), some CEOs make more optimistic announcements when litigation risk is low. Overly optimistic or biased language or tone is therefore associated with increased litigation risk.

Other studies focus not only on earnings announcements but on different types of corporate disclosure to identify differences in tone. In their study of narrative, Fisher *et al.* (2019) show how the various dimensions of tone vary significantly between different types of narrative. The type of report and the intended audience determine the type of disclosure used. The authors also confirm that tone is a determinant of readability. Like Huang *et al.* (2014), Fisher *et al.* (2019) find that changes in tone are associated with short-term market reactions. In contrast to Huang *et al.* (2014), they do not find that tone is used to obfuscate bad behavior.

In a similar vein, Bakarich *et al.* (2019) analyze how the tone of the reports varies according to the stage of the development cycle the company is at. According to their results, the development cycle stage determines the tone a company uses in its reports.

Triki *et al.* (2015) note that an overly positive tone or strong impression management has a bifurcated (positive and negative) effect on investment decisions. For non-professional investors, an overly optimistic tone has a positive and direct effect on willingness to invest, whereas for professional investors it has a negative indirect effect via reduced disclosure credibility.

Campbell *et al.* (2019) argue that volatility in managers' disclosure tone depends on companies' operational risk and the extent to which managers' disclosures transparently reflect that risk. However,

investors appear to respond as if disclosure tone volatility provides incremental information only about a firm's operating risk.

Concluding Remarks

Tone is an important element in corporate reports because it influences the way stakeholders interpret the disclosed information.

We performed a systematic review of the literature on this topic, from which we drew several lines of research. In general terms, the papers in these lines of research seek to determine whether the tone of discretionary disclosures reflects an impression management strategy that favors the company, or whether the disclosures provide incremental information that is useful to stakeholders. Our review also highlighted the lack of research on tone in environmental disclosures in sustainability reports and on report quality and assurance.

Previous research on the quality and tone of disclosures in sustainability reports under the GRI framework has focused on discretionary (non-mandatory) reports. Analysis of this research reveals that, for some authors, use of the GRI framework favors enhanced disclosure and better environmental performance, whereas for others it favors the use of tone strategies (impression management) to manipulate stakeholders' perceptions.

We did not find any studies that assess the perceived quality of sustainability reports under the new GRI Standards or that consider whether external assurance of sustainability reports is affected by disclosure tone or how such assurance affects investors whose decision making includes an assessment of corporate sustainability performance. Nor did we find any studies undertaken from a stakeholders' perspective.

On the other hand, we must underline the lack of research on how CEO characteristics affect tone in statutory reporting, especially in sustainability reports.

This paper contributes to the debate on impression management (tone manipulation) and the incremental information provided by sustainability reports. It also adds to the understanding of the role of tone in sustainability reports as a tool for financial analysts.

For scholars, the paper provides a basis for experimental studies aimed at analyzing the dominant features of tone in environmental disclosures under the new rules on non-financial reporting. The paper may be also useful to scholars investigating tone management strategies and key indicators of transparency in sustainability reporting, especially in the environmental field. It may serve to clarify the motivation behind firms' social and environmental strategies (e.g. are these strategies led by a desire for legitimation or by a commitment to sustainable development?).

Finally, given the lack of research on mandatory disclosures in sustainability reports, this paper may prompt further inquiry into tone and environmental performance.

Notes

1. Codina (2018) uses the term "systematic literature reviews" to refer to systematic reviews conducted from the healthcare field.

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Does Production Specialization Have an Impact on the Financial Efficiency of Very Small Farms?

Agnieszka STRZELECKA

Koszalin University of Technology, Faculty of Economic Sciences, Department of Finance, Poland
agnieszka.strzelecka@tu.koszalin.pl

Danuta ZAWADZKA

Koszalin University of Technology, Faculty of Economic Sciences, Department of Finance, Poland
danuta.zawadzka@tu.koszalin.pl

Abstract

The main goal of the research was to answer the question whether the type of production affects the financial efficiency of very small farms. The subjective scope covered very small farms in Poland. The basic source of data were statistics collected as part of the system for collecting and using farm accountancy data - Farm Accountancy Data Network (Polish FADN). Very small farms were identified based on the criterion of their economic size (economic size class: very small, from 4,000 to 8,000 EUR SO). Data for the years 2013-2017 were used for the analysis. The research showed, among others, that regardless of the direction of production, very small farms included in the analysis were characterized by a high significance of fixed assets in the structure of assets, a high degree of self-financing of agricultural activity and a high cost of production. It was also found that units focused on permanent crops had the highest production value and the highest level of costs. In turn, the highest level of agricultural income was characteristic of units focused on field crops, with the entire income coming from operating subsidies. In 2017, financial efficiency in all considered types of very small agricultural holdings decreased in relation to 2013. The lowest financial efficiency in relation to the assets and equity involved was found in non-specialized farms and units focused on the production of herbivorous animals. The obtained results also proved the significant role of external financial support in creating the level of agricultural income of very small farms.

Keywords: very small farm, farm income, ROA, ROE, ROS, FADN, Poland.

Introduction

The agrarian structure in Poland is dominated by small-scale farms. In 2018, according to the data of the Statistics Poland [SP, 2019], there were 1,428.8 thousand farms, of which 53.4% were units with an area of up to 5 ha. The average area of a farm is 11.5 ha, however, 75.4% of farms in the whole group have an area of less than 10 hectares. Statistical data confirm a significant share of small-scale farms in the structure of agriculture in Poland. Agrarian fragmentation in the context of the functioning of this group of entities is the subject of many studies covering, among others, economic, social and environmental aspects (Galluzzo, 2015; Forgacs, 2016; Burkitbayeva and Swinnen, 2018; Veveris and Puzulis, 2018; Żmija and Czekaj 2012; Żmija and Czekaj 2014; Żmija and Szafrańska 2015; Czyżewski and Stępień, 2013; Drygas and Musiał, 2013; Dzun, 2013; Halamska, 2011; Michalska, 2012; Czudec, 2013; Hornowski and Kryszak, 2016; Safa 2005; Van Huylenbroeck *et al.*, 2007; Strzelecka, 2018). The discussion revolves, among others, around the effectiveness of very small farms operation, the scope and amount of agricultural income support, as well as the issue of business registration and its taxation. In the social area, the important role of professional activation

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of rural residents is emphasized, as well as the benefits of cheaper retirement and disability insurance and, as a result, reduced demand for social assistance. It is emphasized that very small farms can be a form of counteracting poverty and social exclusion, supporting the sense of security of rural residents, especially in the context of caring for the elderly and children. In the environmental aspect, small-scale farms contribute to the protection of natural biodiversity and the landscape value of villages, due to, among others, extensive production methods, lower density of livestock and lower use of artificial fertilizers and plant protection products. Finally, small-scale farms can provide the basis for the diversification and multifunctionality of rural areas due to the possibility of using farm assets for non-agricultural purposes.

With regard to farms that sell the results of their agricultural production, one can speak of efficiency as a relation of results to inputs. These entities combine the activities of enterprises and households. The efficiency of agricultural production is dependent on various forms of subsidizing it. Therefore, the question arises whether the type of production conducted affects the financial efficiency of very small farms. We define financial efficiency as the profitability of a very small farm (Kulawik, 2008; Juszczyk, 2019).

The rest of the paper is structured as follows. Next section presents the survey methodology and data sources. Third section presents the results of the study, which consisted of three main stages. First, the production potential of very small farms covered by the study was analyzed and assessed. Next, the effectiveness of using this potential was calculated, taking into account changes in: production, costs and income from the family farm (agricultural income). The importance of operating subsidies in generating this income was also established. In the last stage of research, the financial efficiency of very small farms included in the study was assessed. The following measures were used to establish it: return on assets (ROA), return on equity (ROE) and return on sales (ROS). The last section concludes.

Data Sources and Research Methodology

The main source of data was statistics collected under the system of collecting and using accounting data from farms - *Farm Accountancy Data Network* (Polish FADN). These results are published in cyclical studies of the Institute of Agricultural and Food Economics - National Research Institute (IAFE-NRI). In order to achieve the set goal, the following scope of research was adopted: subjective, temporal and spatial. The subjective scope covers very small farms in Poland that keep agricultural accounting for the needs of the Polish FADN.

In the literature, among the criteria for distinguishing very small farms there are, among others: economic size of a farm (Dzun 2013; Hornowski and Kryszak, 2016; Beluhova-Uzunova et al., 2019) and agricultural area (Żmija and Czekaj 2012; Forgacs, 2016; Burkitbayeva and Swinnen, 2018; Beluhova-Uzunova et al., 2019). Due to the lack of a clear definition of a very small farm[1], in this study a classification criterion of the economic size of a farm was assumed. The *economic size* is determined on the basis of the sum of the Standard Outputs (SO) of all agricultural activities that occur on a given farm and is expressed in EUR (Goraj and Olewnik, 2011). Where Standard Output (SO) is the average value of production of a specific agricultural activity (plant or livestock), which was obtained during 1 year from 1 hectare or 1 animal, in the average production conditions for a given statistical region. The calculation of this parameter takes into account the average values over 5 years (Goraj and Olewnik, 2011).

On this basis, a very small farm was defined as a farm whose economic size does not exceed 8,000 EUR SO (due to the basic source of statistical data that was used in this study, the analysis covered very small farms with an economic size from 4,000 up to 8,000 EUR SO). The adopted assumption is justified due to the subject of the research, as the economic size determines the income potential of a farm and the possibilities of its development (Wilkin, 2013). Total number of very small farms included in the study in particular year is presented in table number 1.

Table 1: Number of very small farms included in the sample

Year	2013	2014	2015	2016	2017
Number of farms (SY 03)*	640	590	590	650	780

**Note: symbol according to FADN is given in bracket*
Source: Authors' own study based on FADN data: Standard results of Polish FADN agricultural holdings 2013-2017 [Online], IAFE-NRI [15.04.2020] http://fadn.pl/publikacje/szeregi-czasowe/

Temporal scope of the study was 2013-2017, while the spatial scope covered the entire area of the country (Poland). The agricultural type of an agricultural holding, which is defined on the basis of the share of the Standard Output (SO) value from individual agricultural activities in the total SO value of a farm (Floriańczyk, Osuch and Płonka, 2018), was included in the study. The following types of farming were subjected to comparative analysis: a) *field crops* - applies to farms focused primarily on the cultivation of cereals, oilseeds and protein crops for seeds and other field crops, b) *permanent crops* - includes entities that specialize mainly in the cultivation of fruit trees and shrubs, and olives c) *dairy cows* - this type of farming includes units focused on dairy cattle breeding, which is kept mainly for milk production, d) *herbivorous animals* - this group includes farms whose main production direction includes mainly: slaughter cattle, dairy cattle, goats and sheep, and e) *mixed* - this type of farming includes farms that do not meet the requirements for specialist types. The study did not take into account these types of farming: horticultural crops and granivorous animals, due to the fact that the number of entities targeting the above-mentioned types of production in each group did not exceed 15 farms. Thus, in accordance with the principles of disseminating the FADN data, these results could not be published in the Standard Results (Floriańczyk, Osuch and Płonka, 2018). All data presented in the study are the average values for the considered groups of farms.

The following categories of data collected and published in FADN reports were taken into account in the course of this research (Floriańczyk, Osuch and Płonka, 2018): a) *agricultural area* - total area of agricultural land (including land leased for more than one year); b) *total labor inputs* - total human labor inputs (own and hired) as part of the operating activity of a farm, expressed in work units (full-time employees AWU[2]); c) *own labor inputs* - labor input of unpaid persons, mainly family members as part of the operating activity of a farm, expressed in work units (full-time family employees FWU[3]); d) *total assets* - fixed and current assets owned by the farmer; e) *equity* - total assets decreased by the value of total liabilities; f) *total production* - the value of plant and livestock production and other agricultural production generated on the farm; g) *total costs* - all costs related to the operating activity of an agricultural farm and incurred for production in a given accounting year; h) *income from a family farm* - the concept introduced by the FADN - an economic surplus that remains for the farmer to pay for the production factors involved in the farm's operational activity (land, labor and capital) that are his property (Goraj and Olewnik, 2011); i) *subsidies for operating activities* - subsidies for plant and livestock production, subsidies for rural development, subsidies for intermediate consumption, subsidies for the costs of external factors, *decoupled* payments (including single area payment) and other subsidies; j) *farmhouse consumption* - value of production (plant and animal) transferred to the farmer's household; k) *farm use* - value of production (plant and livestock) produced and consumed as part of the farm's operating activity.

The following research methods were used to achieve the assumed goal: a) literature analysis, b) empirical data analysis - using descriptive and comparative methods. The results of the analyzes are presented in tabular and graphic form, c) statistical methods (average, structure indicators, dynamics indicators) and d) profitability indicators.

The production potential and the efficiency of its use as factors shaping the income of very small farms

Table 2 presents data on the production potential of very small farms included in the study. For the purposes of the analysis conducted, factors relating to land, labor and capital were distinguished**.**

Table 2. The production potential of very small farms participating in the FADN system in 2013-2017 - by production direction

Specification		Agricultural type*	Years				
			2013	2014	2015	2016	2017
Land							
Agricultural land area [ha]		Field crops	10.22	10.34	10.22	10.04	9.77
		Permanent crops	4.13	4.22	4.28	4.13	5.06
		Dairy cows	6.66	6.87	6.78	6.26	6.51
		Herbivorous animals	8.46	8.75	8.76	8.53	8.82
		Mixed	7.24	7.21	7.32	7.51	7.89
	incl: share of leased agricultural land [%]	Field crops	*9.78*	*10.93*	*9.39*	*10.76*	*11.57*
		Permanent crops	*4.36*	*6.64*	*6.07*	*6.54*	*12.65*
		Dairy cows	*13.96*	*15.28*	*16.52*	*11.82*	*20.89*
		Herbivorous animals	*7.68*	*9.37*	*10.39*	*11.02*	*10.43*
		Mixed	*12.02*	*11.93*	*10.11*	*11.58*	*11.53*
Labor							
Total labor inputs [AWU]		Field crops	1.21	1.25	1.16	1.17	1.18
		Permanent crops	1.74	1.38	1.32	1.42	1.47
		Dairy cows	1.27	1.38	1.41	1.17	1.32
		Herbivorous animals	1.33	1.20	1.21	1.27	1.15
		Mixed	1.29	1.31	1.28	1.28	1.27
	incl: share of own labor inputs [%]	Field crops	*97.52*	*97.60*	*97.41*	*95.73*	*94.07*
		Permanent crops	*73.56*	*75.36*	*83.33*	*73.94*	*73.47*
		Dairy cows	*100.00*	*98.55*	*100.00*	*100.00*	*100.00*
		Herbivorous animals	*99.25*	*100.00*	*100.00*	*99.21*	*99.13*
		Mixed	*99.22*	*99.24*	*100.00*	*100.00*	*99.21*
Capital							
Total assets [thousands PLN]		Field crops	358.33	386.83	378.32	392.32	417.54
		Permanent crops	330.25	290.69	283.61	306.41	376.17
		Dairy cows	267.11	266.07	246.79	284.38	278.07
		Herbivorous animals	333.65	361.07	403.76	374.50	385.04
		Mixed	280.39	299.36	306.93	309.98	326.02
	incl: share of fixed assets [%]	Field crops	*92.10*	*93.35*	*92.70*	*92.28*	*92.14*
		Permanent crops	*92.88*	*94.63*	*94.21*	*91.82*	*92.93*
		Dairy cows	*92.19*	*92.18*	*91.42*	*90.44*	*91.59*
		Herbivorous animals	*90.28*	*91.12*	*91.20*	*90.14*	*89.89*
		Mixed	*91.31*	*91.96*	*92.01*	*91.13*	*90.56*
Share of equity in the structure of financing sources[%]		Field crops	98.71	98.89	99.42	99.46	99.15
		Permanent crops	99.24	98.96	99.20	99.50	96.76
		Dairy cows	100.00	100.00	100.00	99.90	99.95
		Herbivorous animals	99.72	99.96	99.95	99.82	99.87
		Mixed	99.67	99.50	99.23	99.50	99.61

Note: calculated based on the following types of data - symbols according to FADN:SE 025, SE 030, SE 020, SE 015, SE 436, SE 441, SE 501
Source: Authors' own study based on FADN data: Standard results of Polish FADN agricultural holdings 2013-2017 [Online], IAFE-NRI [15.04.2020] http://fadn.pl/publikacje/szeregi-czasowe/

Among the very small farms included in the analysis, the entities specialized in field crops were characterized by the highest utilized agricultural area. In the years 2013-2017, these units used an average of 10.12 ha of agricultural land in the production process. It is related to the basic type of

agricultural production conducted on these farms, which requires the involvement of land resources with a larger area in the production process. In turn, the lowest arable land area was characteristic for very small farms focused on permanent crops (on average, 4.36 ha in 2013-2017). When analyzing the production potential related to labor inputs, it was observed that the greatest involvement of the human factor in the production process was characteristic of very small farms specialized in permanent crops (1.47 AWU on average in 2013-2017). Moreover, farms of this type were characterized by a relatively high involvement of external workers in the production process (on average in 2013-2017, almost 25% of the total labor inputs were done by hired workers). For comparison, in the remaining types of very small farms, work was performed mainly by the farm owner and his family members.

The highest value of assets was characterized by units specialized in field crops (ca. 387 thousand PLN on average in 2013-2017) and entities whose main production activity was rearing of herbivorous animals (ca. 372 thousand PLN on average). On the other hand, the lowest value of the discussed category was characteristic for units focused on rearing dairy cows (approximately 269 thousand PLN on average). It was also observed that regardless of the production focus, very small farms included in the analysis were characterized by a high importance of fixed assets in the asset structure. The share of assets involved in the agricultural production process for a period longer than one year accounted for over 90% of total assets (except for the herbivorous animals production type in 2017, when the level of the analyzed indicator was 89.89%). This is due to the fact that fixed production assets (including land, buildings, specialized machinery, technical equipment and others) are necessary for agricultural activity. When considering the production potential related to the capital of very small farms, it was also observed that these units mainly use their own resources to finance agricultural activity. For very small farms included in the study, in the analyzed period, the share of equity in the structure of financing sources fluctuated, on average, around 100%. Only in farms of the field crops type (in 2013-2014) and units focused on permanent crops (in 2014 and 2017), the share of outside capital exceeded 1%. It was also observed that the last of the mentioned groups of very small farms (permanent crops) in the last year included in the analysis increased the involvement of external financing sources (the share of outside capital exceeded 3%).

When analyzing the effectiveness of using the production potential, in the next stage of the research changes in the total production value and total costs in very small farms in Poland were assessed (Fig. 1).

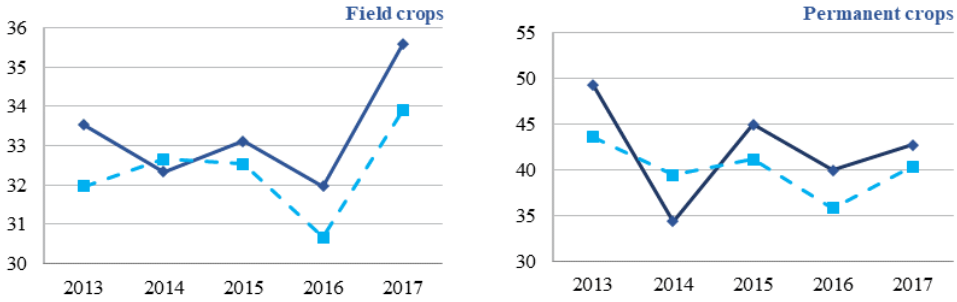

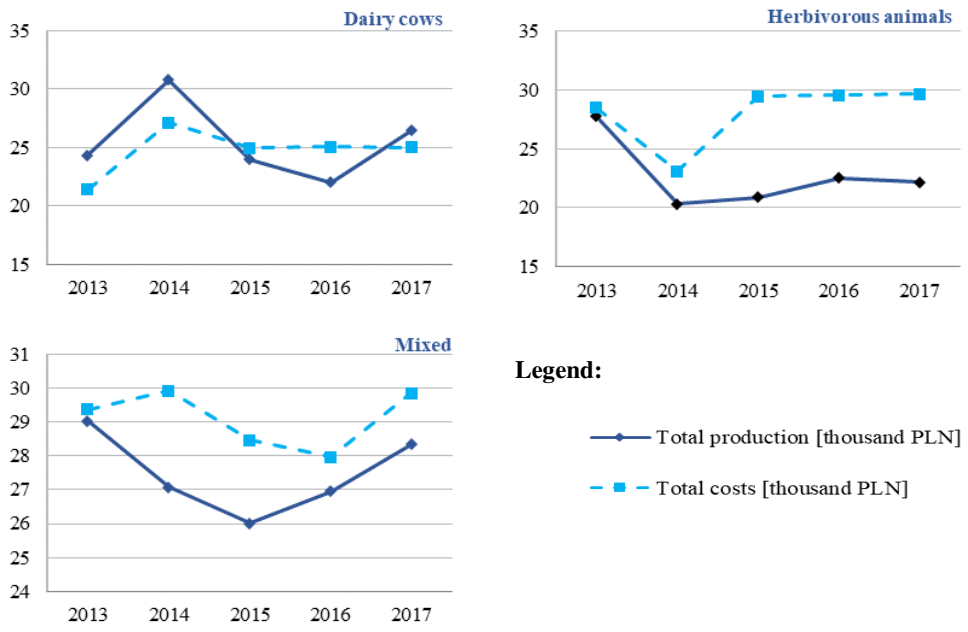

Fig. 1: Total production value and total costs in very small farms in Poland in 2013-2017 - by production focus [thousand PLN]

Source: Authors' own study based on FADN data: Standard results of Polish FADN agricultural holdings 2013-2017 [Online], IAFE-NRI [15.04.2020] http://fadn.pl/publikacje/szeregi-czasowe/

The obtained results showed that the units focused on permanent crops were characterized by the highest production value and the highest level of costs. On the other hand, the lowest average production values were recorded for farms specializing in the rearing of herbivorous animals and dairy cows (in this case except for 2014). It was also established that very small farms are characterized by very high production costs. Moreover, in the case of entities of the granivore type and units with a mixed production profile, in the entire period covered by the analysis, the costs related to agricultural activity exceeded the value of production. Continuing this research thread, the next step was to analyze and evaluate changes in the level of agricultural income and to establish the importance of financial support (in the form of operating subsidies) for the generation of this income (Fig. 2).

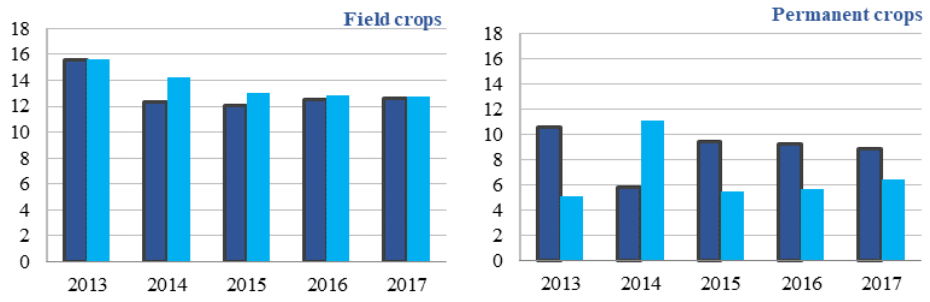

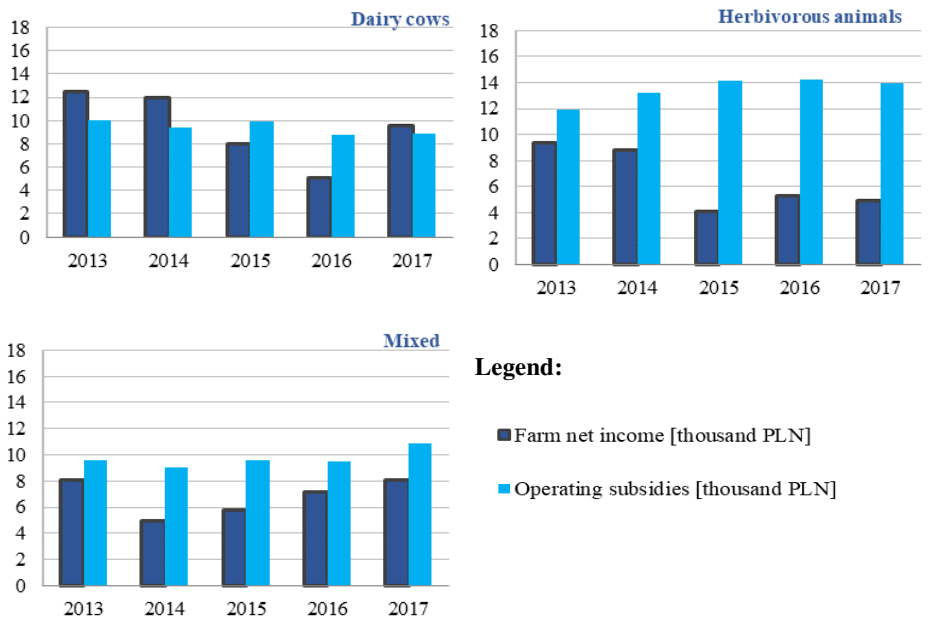

Fig. 2: Farm net income and operating subsidies in very small farms in Poland in 2013-2017 - by direction of production [thousand PLN]

Source: Authors' own study based on FADN data: Standard results of Polish FADN agricultural holdings 2013-2017 [Online], IAFE-NRI [15.04.2020] http://fadn.pl/publikacje/szeregi-czasowe/

By analyzing the obtained results, it was found that the highest agricultural income in the entire analyzed period was characteristic of very small farms with field crops as their main direction of production, and this income came entirely from operating subsidies (the ratio of subsidies to income from a family farm in the whole period took values higher than one). Units focused on permanent crops were characterized by the highest ability to generate income as part of operating activities (except for 2014, when the income came entirely from operating subsidies, and half of these subsidies was allocated to financing the costs of agricultural production). In 2013, more than half of the agricultural income of this type of farms was obtained as a result of operating activities, however, since 2015, an increase in the importance of external financial support for generating income for farms of this type has been observed (in the last of the analyzed periods, subsidies accounted for 73% of the discussed category of financial surpluses). Further analyzes showed that the agricultural income of farms focused on breeding herbivores and non-specialized farms in the entire period covered by the analysis came from financial support in the form of operating subsidies. A particularly unfavorable relationship in this respect was recorded among farms focused on breeding herbivores (in 2015 the ratio of subsidies to agricultural income was 3.5, in 2016: 2.7, in 2017: 2.8), which means that the financial results achieved by farms of this type depended entirely on the amount of operating subsidies, moreover, these subsidies were primarily intended to cover the high costs of agricultural activity.

The last stage of the research covered the assessment of financial efficiency of the analyzed group of very small farms. For this purpose, in accordance with the adopted research methodology, the profitability ratios were calculated for: assets, equity and sales in individual types of very small farms (Table 3). Following Wasilewski and Gałecka (2010), Ryś-Jurek (2013) and Hornowski and Kryszak (2016), taking into account the specificity of farms, the farm net income was assumed as the equivalent of net profit in an agricultural holding. According to Ryś-Jurek (2013), the level of sales was calculated as the difference between the value of total production produced in a given year and the value of production transferred to the household and the value of internal consumption.

Table 3: Profitability ratios for very small farms participating in the FADN system in 2013-2017 - by direction of production

Years	Agricultural type:				
	Field crops	Permanent crops	Dairy cows	Herbivorous animals	Mixed
Return on assets ROA [%]					
2013	4.35	3.21	4.68	2.81	2.88
2014	3.20	1.99	4.51	2.44	1.64
2015	3.19	3.34	3.26	1.00	1.89
2016	3.20	3.02	1.77	1.41	2.30
2017	3.02	2.36	3.45	1.28	2.46
Return on equity ROE [%]					
2013	4.40	3.24	4.68	2.82	2.89
2014	3.23	2.01	4.51	2.44	1.65
2015	3.21	3.36	3.26	1.00	1.90
2016	3.21	3.03	1.77	1.41	2.31
2017	3.05	2.44	3.45	1.28	2.47
Return on sales ROS [%]					
2013	51.78	21.82	74.45	43.13	40.64
2014	42.42	17.03	50.33	58.40	27.22
2015	40.70	21.37	47.00	25.89	32.59
2016	42.95	23.51	32.47	30.31	37.22
2017	37.94	21.07	48.65	28.01	38.65

*Note: Profitability indicators where calculated based on the following types of data (symbols according to FADN are given in brackets): Farm net income (SE 420), Total assets (SE 436), Net worth (SE 501), Total output (SE 131), Farmhouse consumption (SE260), Farm use (SE265). Profitability ratios formulas: ROA = (SE420/SE436)*100; ROE=(SE420/SE501)*100; ROS = (SE420/(SE131-SE260-SE265))*100*
Source: Authors' own calculations on FADN data: Standard results of Polish FADN agricultural holdings 2013-2017 [Online], IAFE-NRI [15.04.2020] http://fadn.pl/publikacje/szeregi-czasowe/

Profitability ratios decrease over time in 2013-2017. The exceptions are the ratios obtained in the group of very small farms focused on the rearing of dairy cows in 2017, field farms in 2016, units specializing in permanent crops in 2015, herbivorous animals in 2016 and farms with a mixed production profile in 2015-2017. Moreover, it was established that the highest return ratios were obtained on farms whose main production focus is dairy cows (except for 2016, ROA and ROE in 2015, and ROS in 2014). On the other hand, the lowest financial efficiency in relation to the assets and equity employed was characteristic of non-specialized farms and units focused on breeding herbivores (in 2014 and 2017 it was also entities representing the permanent crop type). On the other hand, the lowest financial efficiency, measured by sales profitability, was characteristic of very small farms whose main production direction was permanent crops.

Conclusions

The aim of the research was the answer the question whether the type of production affects the financial efficiency of very small farms. In the course of the research, an answer to the initially posed research question was obtained. Very small farms vary in terms of their financial efficiency. The production direction affects the profitability of assets and capital. Furthermore, based on the literature

review it was established, that small-scale farms are the dominant form in the agrarian structure of Poland. Due to their characteristic features, they fit into the concept of sustainable agricultural development. They perform significant social, economic and environmental functions.

A significant limitation of our research was the lack of a uniform definition of a very small farm. The classification criterion used in the research is the economic size of the farm, which does not exceed 8 thousand EUR of standard production (average production value of a specific agricultural activity which was obtained during 1 year from 1 hectare or per 1 animal, in average production conditions for a given statistical region). The results of our research showed that the highest area of arable land was characteristic for very small farms specialized in field crops. In the years 2013-2017, these units used an average of 10.12 ha of agricultural land in the production process. They were also characterized by the highest value of assets. The lowest area of arable land was characteristic for very small farms focused on permanent crops (on average 4.36 ha in 2013-2017). It was also found, that regardless of the production direction, very small farms included in the analysis were characterized by a significant importance of fixed assets in their asset structure. The literature stressed that farms in Poland are often over-invested, and they attach more importance to the amount of fixed assets and less to their effective use (Marcysiak and Marcysiak, 2018). Our previous study in the field of very small farms so far prove a negative relationship between the level of agricultural income and the increase in fixed assets expenditure per hectare of agricultural land in the production process (Strzelecka, Zawadzka and Kurdyś-Kujawska, 2019). As emphasized by Grzelak (2014), in the case of small-scale farms, maintaining too many fixed assets may be economically unjustified, as it may lead to ineffective use of resources and generate high costs.

The results of our research also showed that the highest production value and the highest level of costs was characteristic of units focused on permanent crops. The lowest average production values were recorded for farms specializing in rearing herbivores and dairy cows. Moreover, the obtained results indicate that very small farms are characterized by very high production costs. The reason for such a high cost-consumption of production in these farms may be the fact that they do not have modern agricultural machinery and equipment. Therefore, they cannot reduce production costs by replacing human labor with specialized technologies. Moreover, the small scale of agricultural production makes it impossible to reduce unit costs. This results in a lower efficiency of agricultural production compared to larger farms (Strzelecka, Zawadzka and Kurdyś-Kujawska, 2019).

The obtained results also proved that very small farms use their own funds to finance agricultural activities. Only in field crops type units (in 2013-2014) and units focused on permanent crops (in 2014 and 2017) the share of outside capital exceeded 1%. As evidenced by the research results so far, a high degree of self-financing is typical of units in the agricultural sector, especially in the case of very small farms (Hornowski and Kotyza, 2018; Prokop et al., 2019).

It was also found that the highest agricultural income was in very small farms whose main direction of production was field crops. This income came entirely from operating subsidies. It also contributed to the achievement of relatively high financial efficiency ratios measured by the return on assets, return on capital and return on sales in the examined group of very small farms. The great importance of operating subsidies in creating agricultural income of very small farms has been confirmed by the results of the research presented in the literature (Kołoszycz, 2017; Hornowski and Kotyza, 2018; Grzelak, 2019).

Further analyses, using profitability indicators, indicate that returns ratios of surveyed units decrease over time in 2013-2017. The exceptions are the ratios obtained in the group of very small farms focused on the rearing of dairy cows in 2017, field crops farms in 2016, units specializing in permanent crops in 2015, herbivorous animals in 2016 and farms with a mixed production profile in 2015-2017. The highest returns ratios were achieved on farms where the main production direction was dairy cows (except for 2016, ROA and ROE in 2015, and ROS in 2014).

The obtained research results contribute to the literature, constituting a thread in the discussion on the financial efficiency of very small farms, as well as practice - the obtained results may be useful source of information for institutions that develop support programs for very small farms. Further research stages should be carried out in order to identify the causes of the declining profitability of very small farms in Poland.

Endnotes

[1] More on this topic: (Dzun, 2013; Musiał and Drygas, 2013; Sroka and Musiał, 2013; Dudzińska and Kocur-Bera, 2013; Żmija and Czekaj, 2014).

[2] AWU (*Annual Work Unit*) - work conversion unit, equivalent to 2,120 working hours per year (Floriańczyk, Osuch and Płonka, 2018).

[3] FWU (*Family Work Unit*) - unit for converting the work of family members, equivalent to 2,120 working hours per year (Floriańczyk, Osuch and Płonka, 2018).

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Generation Y's Leadership Preferences and Their Influence on Work Performance

Jiri KOLENAK
NEWTON College, a. s., Brno, Czech Republic
jiri.kolenak@newtoncollege.cz

David ULLRICH
University of Defense, Brno, Czech Republic
david.ullrich@unob.cz

Veronika KOLENAKOVA
University of Defense, Brno, Czech Republic
veronika.kolenakova@unob.cz

Daria SEVCIKOVA
NEWTON College, a.s., Brno, Czech Republic
daria.sevcikova@te.com

Abstract

The objective of this article is to analyze the generation Y's leadership types preferences. We build upon the presumption that identifying preferences and the effort of satisfying them for a given group of workers, will lead to the enhancement of their work performance. We presume that, apart from higher performance, there will also be a lessening of its fluctuation as well as enhancement of the quality of life perception. The theory section of the article deals with the characteristics of individual generations and with major leadership theories. Research section examines the preferences of the generation Y members in the area of leadership and the subjective rating of the current state of affair in that area. The modified Full Range Leadership Model was chosen as a suitable tool for the analysis. The results of the analysis show that the preferred leadership style is the interviewed sample of respondents from generation Y is transformational leadership. 30% of respondents are dissatisfied with the current leadership style in the company, and the share of satisfaction with their direct superior is higher. The results showed that the way Generation Y is conducted at work is crucial to it; 96% of respondents said that management has a direct influence on their successful retention.

Keywords: Leadership styles, work performance, generation Y, MLQ

Introduction

The goal of this work is to analyze generation Y's leadership preferences and to bring forth suggestions, which could lead to increased generation Y's work team loyalty, increased work performance and enhanced life contentment. To understand this issue, there is the further goal to identify the characteristic traits of individual generations with the focus on generation Y. It is also necessary to identify individual leadership theories and the application of their principles. The aim of this work is also to analyze the millennials' various leadership type preferences in order to find out which one is the preferred one.

In relation to the given goals, this research provides answers to the following questions:

- What is the generation Y's preferred leadership type?
- Are the employees satisfied with the current status of leadership in their workplaces?
- Does the leadership play a role in their loyalty to the company?

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The research will increase the professionalism of leaders in the performance of their work. Professional leadership is not considered as a position, but as the quality of an individual's natural potentials, relating to an inner style that has the potential to follow and gravity and manifests itself in interpersonal contact. Professional leadership is an essential quality for leading people and human systems in today's environment (Ambrozova, 2019).

Generational Management

The goal of this chapter is to understand the generation Y's influence on work sphere in the contemporary world and how effective is their communication ability in the work environment. We will reach this understanding by specifying their characteristic traits. From a sociological point of view, the definition of a generation is as follows: "The term generation, in a sociological sense, describes a group of people growing up in the same time period, who share the lifestyle, thinking, problems and attitudes dictated by that time period. Members of each generation are influenced by the same historical, cultural, socio-economic and political events of the time period and therefore exhibit the same traits. These traits, however cannot be presumed automatically so as not to suppress the individuality of each member." (Kotler, 2007 cited from Heřmanová, 2015) The time frame of one generation is given as the period in which a member of the generation reaches the productivity age and begins to create a new generation. This time frame is usually accepted to be 20-30 years. Related to this, there is the nowadays frequently used term diversity. Currently there are number of scientific and popular articles dealing with the topic of diversity in the gender and ethnographic sense. With the massive entry of generation Y into the work environment, we now also encounter the term generational diversity. This is due to the difference of the generation Y from others in many areas.

It is important to understand the diversity and specifications of individual generations in order to understand their needs, preferences, behavior and decision making. When this is understood, it will be possible to correctly adjust the work environment and to apply effective types of leadership.

Generation Y

The needs and expectations of millennials in the work environment were described in the studies (e.g. Deloitte, 2016) and books (Spiegel, Crampton a Hodge et al.). Generation Y has a strong tendencies to autonomy and independence and prefers freedom and flexibility. These people like to fulfill their tasks in their own time and style (Martin, 2005). They expect an immediate and open feedback and positive evaluation for their effort (Spiegel, 2013). This generation also prefers to be given smaller tasks with tighter deadlines and to work on smaller parts of individual projects. This way their work is the most effective. They welcome the responsibility and the opportunity to show their skills and abilities. They also require enough growth and self-development opportunities, both inside and outside the company (Martin, 2005).

Generation Y grew up in the age of technological boom and information sharing. It is a generation with bigger grasp of technology than any other before it (Spiegel, 2013). Computer and internet use is their second nature and they regularly use modern technologies in their jobs. Greater technology understanding, we observe with millennials, has a positive impact in the form of ability to gather information faster and to utilize the information in their work. However, according to Simon Sinek (2017), a substantial negative impact is the fact that a big part of the generation Y is dependent on the modern technologies, which leads to a lack of concentration, absence of personal social interaction and therefore also to the inability to create and maintain stable and meaningful personal relationships.

Generation Y was actively supported by their parents and led to openly express their opinions and feelings. Thanks to the modern technologies and the internet, the millennials are used to communicate instantly and to make themselves to be heard at all times. They are willing to openly share their thoughts and opinions and they expect the same from the others. At work they are asking not only for the decision to be communicated to them but also the reasons behind these decisions (Spiegel, 2013).

As is shown in the Deloitte research (2016), open and unrestrained communication at work has a direct impact upon the satisfaction of the generation Y with their occupation, as well as on their loyalty to the company and so also on their willingness to stay; 47% of the people interviewed by Deloitte stated they would stay for longer than 5 years in a company allowing and supporting open communication.

A need for feedback, stronger than that of previous generations is another characteristic trait of the generation Y. Tulgan (2009) states that the reason for this is growing up in an environment where they have received a lot of attention and space to openly express themselves. Mentoring and feedback are therefore the tools to communicate with the generation Y effectively and to help them to self-develop. They are quick to apply constructive feedback, which significantly enhances their productivity and performance (Spiegel, 2013).

A feedback provided only once or twice per year at formal meetings is insufficient for generation Y. For more effective work of the millennials, the management needs to be trained in feedback provision and in the skill of these meetings in general (Crampton and Hodge, 2009).

Generation Y grew up in the environment of constant support, care and praise of their parents. This created a safe bubble which shielded them from any negative feelings towards themselves. They often heard that they are unique and that they can reach anything they wish for in this world. Positive style of upbringing like this, leads to a big confidence of this generation and largely influences their faith in their own abilities and knowledge (Spiegel, 2013). Simon Sinek (2017) thinks this to be a major failure of the parenting strategy. As a result of this strategy, millennials, when faced with the real world in their adulthood, suddenly lose the illusion of their uniqueness and exceptionality of their abilities. Sinek (2017) sees this fact as the reason why is generation Y, much more so than other generations, dealing with mental issues such as depression, anxiety and suicidal tendencies.

Flexibility and longing for change are other key attributes of the generation Y. Martin (2005) states that millennials are not only adaptable to change but are actually demanding it. They prefer a work environment, where they can skip from task to task, gain new knowledge, skills, experiences and contacts. If they are not offered enough flexibility, option to work on diverse tasks and in different environments, the millennials tend to get bored fast and they might start looking for new challenges. Thanks to that, they are viewed as unstable and disloyal. Generation Y is the fastest growing segment on the work market, being more than twice as numerous as generation X (Steelcase, 2011). Thanks to this, their work market influence is of a great importance. Because of their specific character traits, described in the previous part of this article, it is important to pay attention to the millennials' preferences regarding their work environment. In the research ran by Deloitte (2016), there were described the following preferences of the millennials, which form criteria for their job search and for their final decision which employer to chose (please note, the wages conditions were not included). The research showed the most important for millennials is the balance between professional and personal life, followed by the opportunity of a career growth. This is followed by flexibility, meaningfulness of the work and availability of professional development programs. Important finding is the fact, that millennials demand for their work to be meaningful, with a positive impact on society. Generation Y feels very low levels of loyalty to the company (Deloitte, 2016). 44% of respondents expect to leave their current job within 2 years.

Generation Y requires work environment with sense of humor and constant challenges (Susan Eisner, 2005). Eisner also states that the main principle of leadership of this generation is an immediate, concrete and constructive feedback. Due to fact that the generation Y prefers an environment which values relationships, they put more importance on the personality traits of their leaders, or managers.

Leadership styles

The basic leadership styles were chosen for the purposes of this research: Transactional, transformational and passive.

Transactional leadership is defined as a relationship based on exchange trade between the leader and the follower, with the goal to trade the valued objective without the intention to reach any higher goal (Burns, 1978). Transactional leader therefore works with the expectation of a reward for fulfilled task and/or a punishment for failure (Awamleh, Evans and Mahate, 2005) and is not motivated to perform above the expectation.

Awamleh, Evans and Mahate define transactional leadership as a style based on an exchange process, within which the leader deals out both rewards and punishments. According to Bass (1985) the transactional leadership is based upon supportive building of relationship between leader and follower, in the sense of establishing expectations, clearly stated responsibility, negotiating rules and giving out rewards for achieving given task. Transactional leadership is based on monitoring and controlling of followers and rewarding desirable behavior (Bass, 1985). Transactional leader gives followers what they want in exchange for what he/she requires. Judge and Piccolo (2004) differentiate between two basic tools for rewarding followers by the transactional leaders – contingency reward. This means the leader states beforehand the expectations (and the reward for success) and the rules for deviations from the goal, which are not in sync with the expectations. Tool for this is a negative stimulation (e.g. a punishment). Transactional leader leads the followers towards reaching his/her expectations and achieving set goals, but not towards exceeding the expectations and extra work effort. According to Bass (1985), the attributes of transactional leadership are:

- Contingency reward
- Management by exception: active and passive

Transformational leadership is a process concentrating on a change of behavior and perception of individual as well as social group. It focuses on satisfying higher needs of the followers. It deals with topics such as emotions, values, ethics, inspiration, long-term goals and strategy. Transformational theory of leadership is currently the most researched theory (Prochazka, 2015) and it is unique in its approach and focus on the highest human needs and on the transformation of the current situation. The first person to introduce the concept of transformational approach to leadership was James MacGregor Burns, in his 1978 book Leadership (Northouse, 2016, p.161). Burns defines the transformational leadership as a process, in which both leaders and followers help each other to achieve a higher level of morale and motivation. The theory of transformational leadership is considered a behavioral theory and it is assumed that transformational behavior can be a learned skill for a leader (Bass, 1990).

Northouse (2006, p.161-p.162) states that the transformational leadership can be used to describe a wide range of leadership styles: From the very specific intention to influence an individual follower, to influencing whole organizations, or even whole cultures. In his other publication “Leadership and Performance beyond Expectations”, Burns further develops his concept of transformational leadership and describes this type of a leader as follows:

- Fair and impartial
- Sets up clear goals
- Has high demands
- Encourages others
- Inspires
- Provides support and appreciation

Factors of transformational leadership (4 I's)

Charisma, Idealized Influence ("II")

Charisma is generally perceived as a very important factor in relation to leadership and was researched by many authors (e.g. Weber, Yukl and others). Transformational leader is a role model and sets an example for the followers. His/her moral and ethical standards are high. The followers perceive such leader as a person with extraordinary abilities, perseverance and determination. The followers admire, respect and trust their leader, which leads to them identifying with his/her goals and values and to the desire to do the right thing (Bass, 1985). As also stated by Yukl (1989, p.260-p.261), charismatic leaders show faith in the abilities of their followers by having high demands, which strengthens the followers' self-awareness and faith in their own abilities. Bass sees charisma as a key component of transformational leadership.

Inspirational Motivation ("IM")

Factor of inspirational motivation describes a leader who has the ability to express his/her vision in such a way, as to motivate and inspire the followers to the vision's achievement (Judge and Piccolo, 2004). Bass (1985) describes the basis of the dimension of the inspirational motivation as leader's ability to apply vision in individual steps and component goals, leading to its fulfillment. He also describes it as the ability to present the application of the vision in such a way, so the followers see the meaning in every performed task and that they understand the way they participate on the vision or the required goal. Many other authors work with the concept of vision and its influence and importance in the business structure. For example Simon Sinek (2017) claims that a vision is the key to the feeling of personal fulfillment and to loyalty and belonging with the company.

Intellectual Stimulation ("IS")

Intellectual stimulation factor specifies the influence of a leader upon the intellectual aspect of the followers. It is a behavior where leader challenges established customs, stimulates followers to see the problem from other perspectives and calls for innovation of thinking and acting.

Individual Consideration ("IC")

Factor of Individual consideration indicates a leader who cares for individual needs of every follower. Leader is often a mentor and coach and one of his/her main expressed behaviors is empathy towards followers and broader surroundings.

Full Range Leadership Model "FRLM"

FRLM has developed from the work of James MacGregor Burns. In 1978 Burns claimed that leadership is either transactional or transformational. Transactional leaders lead by social exchanges, whereas transformational leaders help develop their followers and motivate or inspire them to achieving extraordinary level of success.

FRLM is a tool frequently used to measure transformational, transactional and passive leadership. Below is shown a model which differs from the original one in grouping of the individual components and in the identification of passive approach to leadership. The original model contained the above described 4 attributes of transformational leadership "4 I's". In this new model, the component of Idealized Influence (charisma) was divided by Burns into two new components: Idealized Influence (attributes) and Idealized Influence (behavior). The attributes component focuses on description of leader's traits and the behavior component focuses on his/her actual behavior and acting. This brings it up to "5 I's". The original model includes the laissez-faire concept, but in the new model this system is changed to passive leadership category which became a synthesis of the laissez-faire concept and passive ruling of deviations (originally part of the transactional leadership). This change was made to more accurately diversify individual leadership styles (Bass, 2000).

Research Methodology and Results Interpretation

Multifactor Leadership Questionnaire (MLQ) is the tool used to collect the data. It consists of 36 research questions, whereas 4 questions were assigned to each of the attributes of leadership styles (e.g. CR, IIA, MBEP, etc.). A unipolar Likert scale was used to measure and analyze the data (from 0=Never to 4=Very often, if not always).

Participants of the research were individuals from Europe, working for global companies in the industrial area. The research was performed using a questionnaire sent to the individual groups. The total amount of respondents included in the research was N=44.

Research questions were developed based on the available version of MLQ5X-Short questionnaire, which is widely used tool for measurement in the area of Full Range Leadership Model. In its original state, this tool serves as means to a leader's self-assessment. To use this tool for the research project with the goal to find the respondents' preferences and to find the required ideal state, the individual statements were modified; instead of statement "I …" the statement "My ideal leader …" was used (for example, instead of statement "I prefer the good of the group over my own interests", a new statement was used: "My ideal leader prefers the good of the group over his/her own interest"). To each dimension of transformational, transactional and passive leadership is assigned one statement. The respondents rate the statement using the unipolar Likert scale.

As a measuring tool, the original model Likert scale was used (0=Never, 1=Rarely, 2=Sometimes, 3=Often, 4=Very often, if not always). For research of the questions in rating of the current state, the Likert scale of agreement was used (strongly disagree, disagree, neutral, agree, strongly agree).

Demographics of the researched group

More than half of respondents are men (61.4%) and the biggest part of respondents are in the age group 32-38 years old (54%). Most of the respondents have master's degree (61.4%). Almost half (45.5%) of employees are with a company for 2-5 years. In the second place there are two same size groups of respondents, being with a company 6-10 years and 16-20 years (18.2% both). Most of the respondents (43.2%) work in a Sales Management department as Account managers, or Sales engineers. Second biggest group consists of Project management department employees (25%).

Leadership style preferences

After collection and export of data corresponding to the age range of generation Y (as already stated, data of respondents above 39 years of age were removed from the analysis), average values were calculated for every individual component of leadership (Idealized Influence (Attributes), Idealized Influence (Behavior), Inspirational Motivation, Intellectual Stimulation, Individual Consideration, Contingency Reward, Management by exception: Active, Management by exception: Passive, laissez-faire). Next, the average values were calculated for individual leadership styles (transformational, transactional and passive).

Analysis showed that the most preferred style is transformational (3.26), then transactional (2.60) and the least preferred is the passive style (0.95). In individual components, the first place went to components of transactional leadership: Inspirational Motivation (3.24), followed by Idealized Influence (Attributes) (3.34). Third place is divided between two components reaching the same average (3.28): Idealized Influence (Behavior) of the transformational leadership and Contingency Reward of the transactional leadership.

Respondents' average scores of leadership preferences:

Transformational leadership	
Idealized Influence (Attributes) (IIA)	3.34
Idealized Influence (Behavior) (IIB)	3.28
Inspirational Motivation (IM)	3.42
Intellectual Stimulation (IS)	3.15
Individual Consideration (IC)	3.11
3.26	

Transactional leadership	
Contingency Reward (CR)	Management by exception: Active (MBEA)
3.28	1.91
2.60	

Passive leadership	
Management by exception: Passive (MBEP)	Laissez-Faire (LF)
1.49	0.41
0.95	

Source: self-processed

Influence of age and gender

Analysis of age, divided into sub-groups 19-25 years, 26-31 years, 32-38 years, shows score assigned to individual leadership style progressively decreasing with higher age. The exception is the passive leadership which, compared to other groups, scored the highest with the oldest group (1.04). Results show that the transformational leadership style is preferred by the youngest segment of respondents. According to analysis, the gender plays only a small role in the leadership style preference for transformational leadership (the score difference is 0.05) and for passive leadership (the score difference is 0.01). Only for the transactional leadership, we can see more significant difference; men's preference score is higher (2.71) than women's (2.41).

Satisfaction with the current state

Statement that the current leader satisfies the respondent's preference - 11% strongly disagree and 9% disagree. Strongly agree 14% and agree 32% of respondents. After summation of individual polarities of the scale (strongly agree + agree vs. strongly disagree + disagree), we find that total of 20% of respondents rate their current leader as unsatisfactory to their preferences and 46% as satisfactory. 34% chose the neutral rating. With the statement that leadership style in the company transforms to respondents' satisfaction, strongly disagree 5% and agree 25% of respondents. 32% of respondents agree, and no one chose the strongly agree option. After summation, the result is 30% of respondents rate the transformation of leadership in their company as unsatisfactory to their preferences and 32% as satisfactory. 38% of respondents chose the neutral option.

Respondent's loyalty to the organization

The goal of this part is to find out, whether is the leadership style a significant factor in deciding to stay with the company. Another goal is to find out how big a portion of respondents are thinking about leaving the company in near future (within 2 years). With the statement that leadership style plays role in respondent's staying with the company, 2% disagree and no one strongly disagrees. 55% of respondents agree and 18% strongly agree. After summation we get the result that for 30% of respondents the leadership style plays role in their loyalty to company. For 2% it doesn't play role. 2% of respondents chose the neutral option.

Ideal leader's preferred traits

The goal of this question is to find out whether characteristic traits of generation Y correspond with the traits the millennials expect to see in their preferred leader. We are also trying to establish, whether the typical traits and requirements of millennials we introduced in the theoretical part, are preferred by them in their leaders. In the question: "Name any leadership traits you consider the most important for your leader to have", respondents were asked to name the most preferred leaders'traits. It was an open question without pre-defined options and respondents could chose up to three arbitrary traits. Analysis of the quantity of words showed, that the most important traits correspond with the typical traits of the millennials, stated in the theoretical section (below chart shows the first 6 positions).

1.	Open communication	17
2.	Mentoring	11
3.	Trust	7
4.	Feedback	4
5.	Honesty	3
6.	Vision	3

Source: self-processed

Discussion

The results show a significant tendency towards the transformational leadership amongst members of generation Y, working in global corporations in the industry area. The only other significant rating was given to Contingency Reward, which is the transformational leadership's logical addition. Transformational leadership is preferred as a whole because there were no significant differences found between its individual components. More detailed age division rating of generation Y showed stronger preference for transformational leadership in the 19-25 years category.

Men prefer transactional leadership more than women. This can be explained by the fact that men are more competitive.

Questions about satisfaction with the current state of leadership show almost equal division between positive, neutral and negative ratings of this factor.

Significant conclusion is that applied leadership style is an important parameter in deciding whether employees stay with the organization long-term. It can also often be the reason for them leaving the company.

Likewise, a significant conclusion is that amongst preferred ideal leader's traits is namely the ability to communicate openly, the ability to help the employees grow using mentoring and credibility.

In the next phases of research of this problematic, it will be appropriate to do a broader qualitative research, not only with generation Y but also with their colleagues from generation X. Broader context and focusing on both generations, Y and X, and their differences (if any) is the next necessary step for understanding ties of the employees to their leader and to each other. This will lead to a better collaboration and satisfaction. Researching the relation of preferred leadership styles and personal parameters of individual respondents is the next big research opportunity. Their understanding of themselves, how do they work, their perception and their motivation for quality performance, is the primary step for further development.

Results of the research are well applicable in the area of education and training of ambitious individuals or of people with the responsibility to lead. Very useful is also discussion of this topic in

the workplace and, ideally, cooperation of the leader and his/her team. Co-activities of leader and followers may lead to the improvement of interpersonal relationships in the work environment.

Summary and Conclusion

The goal of this study was to analyze preferences of generation Y in the area of leadership and to offer suggestions leading to work performance increase and to higher loyalty of this generation to the work team.

The theoretical part introduces personality traits of generation Y and their contrast with other generations. Principal values are vision, honesty and open communication. Members of this generation require to feel challenged by demanding tasks, coached and mentored. Next were introduced basic approaches to leadership.

Next goal of the study was to analyze current state of generation Y members, who are working in a global industrial corporation. Also to analyze their satisfaction with the leadership style utilized by their direct superior as well as satisfaction with the company on the whole. Aim of this work was also to analyze generation Y's leadership style preferences and to find out which leadership style is the most suitable for them. A modified version of Full Range Leadership Model was chosen as an appropriate tool for the analysis. The results of the analysis showed the transformational leadership is the preferred style of the generation Y. Significant fact is also the result, that full 34% are considering leaving their companies within 2 years. 30% is unsatisfied with the current leadership style in the company, but the degree of satisfaction with their direct superior is higher. Results show that the way the generation Y is being led is fundamental for them. 96% of respondents stated that the leadership has a direct impact on whether they will stay in their current jobs, or not.

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Predicative Functions of Financial Literacy and Consumer Culture in Achieving Sustainable Development

Vladimir A. CHERNOV

Nizhny Novgorod, Russia
E-mail address: Chernovva@rambler.ru

Abstract

The author suggests one of the ways to achieve sustainable development in the economic, environmental and social spheres in the form of a complex that includes improving the culture of thinking, the level of rational consumption, and financial literacy of the population in the behavioral economy. The author recommends that projects aimed at improving financial literacy in the higher education system should be supplemented with training in predicative thinking, value orientations, and consumer culture. The author considers these categories as the fundamental foundations of economic culture and financial literacy, which are necessary for achieving sustainable development.

Keywords: Behavioral Economics, financial literacy, higher education, culture of thinking, rational consumption, culture of consumption, sustainable development, cognitive abilities, paternalism, dialectics

Introduction

The economy of many countries around the world is currently experiencing difficulties, which are compounded by the COVID-19 pandemic. Achieving sustainable development requires even greater efforts. The UN General Assembly Declaration of 25.09.2015 States: "We are determined to achieve sustainable development in its three components-economic, social and environmental-in a balanced and integrated manner»1 . The methodology for determining the degree of stable growth in sustainable development is proposed in the framework of the Global Reporting Initiative (GRI) and Dow Jones Sustainability (DJS). This system provides indicators that assess the organization's performance by economic, social and environmental components.

To achieve sustainable development, it is not enough to activate enterprises in activities aimed at preserving natural resources, protecting the environment, as well as increasing corporate social responsibility. Active participation of citizens is required. The hypothesis of the study is that citizens can make the greatest contribution to the conservation of natural resources by increasing the culture of consumption in conjunction with financial literacy.

The UN General Assembly Resolution proposes to protect the planet from degradation, including through the introduction of rational consumption and production models and the rational use of its natural resources2. The purpose of the study is to reveal the relationship between consumer culture, thinking culture, value orientations, financial literacy and their role in achieving sustainable development, as well as to develop recommendations for improving educational projects to improve financial literacy, economic culture in the behavioral economy in order to increase the culture of consumption and achieve sustainable development.

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[1] Resolution adopted by the General Assembly on 25 September 2015. 70/1. The transformation of our world: The agenda for sustainable development for the period up to 2030. P. 3/44.
[2] Resolution adopted by the General Assembly on 25 September 2015. 70/1. The transformation of our world: The agenda for sustainable development for the period up to 2030. P. 2/44.

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Research base steel curricula that provide entry level knowledge, skills that are necessary to establish the competence defined by the study plans of higher educational institutions. The work programs of the following disciplines were studied: Philosophy; Sociology; Psychology and pedagogy; life Safety; Legal bases of nature management and environmental protection; Mathematics, etc. Were used the normative, methodological and practical materials of the project of Moscow state University named M. V. Lomonosov, of the Ministry of Finance of the Russian Federation, the world Bank for improving economic culture, as well as research results and achievements of other scientists in this field. The research methodology is based on a dialectical approach, an inductive-deductive method, and a descriptive analysis of the causal relationships between the content of the educational environment and behavioral Economics.

The Sequence and Conditions for The Achievement of Financial Literacy

How can we achieve the most rational consumption? Can we count on the fact that citizens in large numbers to choose a preferences of an «inner rational agent' and those of the future over the present»? This requires a high level of self-control and self-discipline. The level of possession of such qualities depends on upbringing, starting from childhood. Is known, that people who delayed gratification longer as a child were academically more successful and socially more competent as grown adult individuals. Economists measure self-control mostly by means of present bias, which can be defined as not being able to resist instant gratification over a future and larger reward. The term "present-bias" has been used to refer several seemingly similar behavioral biases such as impatience, procrastination, self-control problems, etc.. It is "present-bias" that are the predominant factor that do not allow us to count on the willingness of the masses to sacrifice the preferences of the present in favor of the preferences of the future. Кроме этого the human mind has a limitation in assimilating the information often referred to as 'bounded Rationality', which also leads to deviations from rational human behavior.

What is the role of the state in improving behavioral Economics? Is it applicable for this purpose paternalistic government policies, aimed at changing an individual's behavior in the present so as to improve that individual's well-being in the future? This policy leads to contradictions between the freedom and welfare of citizens, between ends paternalism and means paternalism and indicate that the tacitly assumed existence of a trade-off between well-being and autonomy is either meaningless or illusory.

Nevertheless, the state cannot completely refrain from contributing to the improvement of the behavioral economy and the economic culture of its citizens. At the same time, this sector of sustainable development requires not prohibited measures, but constructive participation of the state in the formation of a culture of consumption through financial (tax), industrial, and legal policies, not encouraging, but regulating fiscal policy degradation-parasitic consumption. The instruments of such regulation are considered in the sources (Alan, 2019; Alberto, 2010; Michelle, Jeffrey, Joel, 2019; Scott et al., 2019].

It is also necessary to find the means that most contribute to resolving the contradictions between citizens ' preferences for the future and the present in the behavioral economy. In this regard, the goals of rationalization of consumption are achievable through the internal interests of the individual. Citizens, as a rule, are interested in preserving their own funds, reducing financial losses, expenses that are not caused by natural needs, do not promote health, a healthy lifestyle, spiritual and aesthetic needs of a person, and so on. Such irrational expenses are caused by the influence of thoughtless emotions, cognitive errors; sophisticated influence of neuromarketing with insufficient corporate social responsibility. Irrational behavior is not in the interests of citizens, as it leads to financial losses, infringement of rights, increase in excessive, irrational expenditures, financial losses, unjustified destruction of natural resources with a negative impact on the environment to the detriment of sustainable development of society. People who are not interested in unjustified losses of their own funds can exclude irrational actions by increasing the culture of consumption.

The basis of the culture of consumption is that the development of production of products, works and services should serve to meet the natural needs of people while preventing irrational, unjustified spending, waste of personal finances of citizens and the destruction of natural resources, littering the planet.

The **quality of consumption** is determined by the degree of its utility for society and its sustainable development.The culture of consumption affects the health of each person and society as a whole, the family budget and financial literacy, which depends on the consumer's preferences when choosing purchases. Irrational consumption leads to the destruction of natural resources, environmental pollution, and destruction of the biosphere.

And so increasing the culture of consumption is becoming more and more relevant, primarily in the interests of the individual and society. Culture, in turn, requires knowledge and rational thinking. Such qualities are achieved by education and upbringing.

Customers who receive education will get benefits, which will make it easier for them to achieve satisfaction. Customer learning focuses on providing skills in the use of information according to their needs. This is necessary because without the provision of adequate skills in the use of information, the activities carried out by marketers are not optimal; thus, customer learning can be used as one of the marketing strategies.

In neuromarketing in behavioral Economics, it is necessary to distinguish natural human needs from degradation-parasitic consumption that damages spiritual and moral values with negative legal, financial, somatic, physiological, and environmental consequences to the detriment of sustainable development. Financial literacy is required for awareness of needs. It is important that when responding to decoy effect in marketing techniques, the consumer is able to recognize signs of food quality and safety.

The Relationship Between the Culture of Thinking, Financial Literacy and Consumer Culture

Thus, training in rational spending of citizens ' funds is associated with economic culture, consumer culture, and, in particular, with increasing financial literacy. To do this, as part of the joint participation of Lobachevsky State University of Nizhny Novgorod (UNN) in the project of Lomonosov Moscow State University (MSU), the Ministry of Finance of the Russian Federation, the world Bank1 to increase economic culture, we proposed to Supplement the program with the theme of increasing consumer culture. For this purpose, the universal competence "Able to make informed economic decisions in various areas of life" developed within the framework of the Federal network methodological center project was used in terms of indicators of financial literacy among graduates of educational programs for preparing bachelors in non-economic areas and specialties.

The results of financial literacy training include knowledge of the basics of economic agents ' behavior: theoretical principles of rational choice (maximizing utility) and observed deviations from rational behavior (limited rationality, behavioral effects and systematic errors associated with them); consumer culture and neuromarketing: financial, legal, ethical, somatic, physiological, environmental consequences, the ability to critically assess the relationship between consumer culture and sustainable development; assess individual risks associated with economic activity and the use of personal financial management tools, as well as the risks of becoming a victim of fraud; in neuromarketing in behavioral Economics, distinguish natural human needs from degradation-parasitic consumption to the detriment of spiritual and moral values with negative legal, financial, somatic, physiological, environmental consequences, to the detriment of sustainable development.

[1] Faculty of Economics of Lomonosov Moscow state University and projects to improve financial literacy of the population of the Russian Federation. Financial literacy in universities. Federal network methodological center. URL: https://fingramota.econ.msu.ru/about/ (date of access 04.08.2020).

Here is one example of a sophisticated advertising company on an Internet page that advertises a specific product. Moreover, there may be several different pages that offer to try the same product for 10 rubles, 100 rubles, 1,000 rubles, and so on.each of them provides inexpensive contextual advertising. Then it is estimated which page more people will go to. Based on this, a decision is made on what price is best to set. This marketing technique is based on the lack of financial literacy of the population, on their false preferences, cognitive and behavioral biases, and low culture of thinking.

False values, false egos, false ambitions, in social attitudes, stereotypes, habits, emotions, and irrational thinking are often formed when a person is evaluated not by his moral qualities and benefits to society, but by the level of material superiority. It is on such principles that an immoral economy is built, on the one hand, when commercial interest prevails over corporate social responsibility. In this case, the business in the pursuit of profit ignores the needs and health of the consumer, manipulates his consciousness and subconsciousness, infringes on the rights, with characteristic crimes, corruption and other illegal phenomena.

On the other hand, a consumer with false value orientations "strengthens" their position in society by demonstrating a level of material superiority. Therefore, he seeks to buy and display more expensive goods and more of them, based not on natural needs, but from the desire to surpass others by demonstrating his achievements in material consumption, following a false ego, false ambitions. Thus, from the natural needs of the society moves to the degradation-parasitic consumption. This leads to an increase in irrational spending not only of the personal budget, but also of natural resources and increased environmental pollution, destruction of the biosphere.

Such a consumer is more easily subjected to manipulation, unfair marketing techniques, material tricks that use his material preferences, false ambitions, false ego, self-conceit, greed, unwillingness to work conscientiously, a tendency to immoral acts, corruption and crime, the desire to assert themselves and increase their authority through material superiority, to satisfy false ambitions, false ego. Manipulation of the conscious and subconscious mind is based on false values and false ambitions, greed and greed, and a tendency to corruption, when the more a person consumes, the more he considers himself worthy and authoritative in society. These shortcomings of a not fully enlightened worldview with false value orientations demoralize the consciousness and are one of the main factors in the decline of economic culture.

An insufficiently enlightened person is more likely to spend resources (material, labor, and financial) on false values and thus be manipulated, make cognitive mistakes, make irrational actions, and make false choices under the influence of sophisticated neuromarketing influences. A morally stable person with genuine value orientations, in contrast to a demoralized person, is more conscious and rational in choosing priorities and spending resources, which is due to the culture of thinking.

And so, the quality of consumption depends on the value orientations and culture of thinking, which is determined by the degree of utility for society and its sustainable development in the economic, social and environmental spheres.

To avoid such negative consequences, it is needed to be able to choose the right value orientations, possess a complex system of thinking based on the possession of dialectical logic and the ability to apply it when justifying and making decisions in various areas of life.

Individual differences in people's cognitive abilities are mediated by intelligence and working memory. These properties of the human brain are directly related to the individual's ability to formulate task structures when faced with economic choice scenarios. However, research in problem structure formulation shows that intelligence is the only predictor of behavior based on economic choice scenarios, without any effect of working memory.

To increase the level of intelligence and achieve these competencies, there is not enough knowledge in the field of Finance. As a result interdisciplinary elements (in particular from psychology) began to be incorporated into behavioral theories of finance, in attempts to understand the process of decision-

making under risk. Psychology is not enough to develop rational thinking. Are necessary: comprehension of philosophical foundations, social value orientations; moral education, spiritual aspirations; dialectical logic that forms predicative thinking on the basis of a complex, systematic approach, of cause-and-effect relationships, identifying the essence of ongoing processes, the ability to identify and comprehend established relationships between essence and phenomenon, form and content, part and whole, cause and effect, absolute and relative truth. It will require the ability to apply knowledge taking into account the place, time and circumstances, the use of induction and deduction; the ability to identify contradictions and find ways to resolve them; understanding of evolutionary processes with the transition of quantity to quality; knowledge of the fundamental laws of market interaction in their unity and contradictions, etc. Only in such a comprehensive education, cognitive abilities will be most complete in understanding financial literacy.

Cognitive ability is one of the fundamental factors in explaining financial literacy. Experimental evidence supporting the key role of cognitive ability in financial literacy acquisition. We find that individuals with higher cognitive abilities are more financially literate.

Conclusion

With the development of the culture of thinking in society, consumer demands in the socio-cultural sphere increase, leading to aesthetic, moral, intellectual, and spiritual satisfaction, which do not entail the expenditure of natural resources and environmental pollution. In General, with the development of a culture of thinking, the share of values that contribute to economic culture and sustainable development increases in human consumption. For example, studies of the relationship between religion and economic or financial decision-making showed that the influence of reminders of religious topics on time preferences for Finance reduced the percentage of “present-bias” by 10.4%.

Another example is when, during the great recession from 2005 to 2014, spending on beauty products increased among women aged 18-40. The increase occurred regardless of marital or employment status. We find evidence to support the claim that the lipstick effect is caused by a substitution away from spending on women's clothes. According to the U.S. census Bureau, between 2007 and 2010, real median household income declined by about 7.2% (from $ 59,500 to $ 55,500 in 2017). This example shows that young women in a period of declining income, saving money on such categories of expenses as food in restaurants, jewelry and clothing, direct them to buy more cosmetics. This means that in difficult times, the needs for aesthetic appearance for them were stronger than their property needs.

It also seems natural that education and increasing the culture of consumption contribute to the development of a taste for values in the socio-cultural sphere. As this trend develops, expenditures that lead to the destruction of natural resources will be replaced by expenditures on cultural consumption, activating the production of cultural values, preserving the environment, and promoting sustainable development.

And so, the increasing level of education in curriculum competencies leading to improvement of culture of thinking, the culture of consumption will contribute to the financial literacy of the population, growth of economic culture, preservation of environment, sustainable development.

To implement these conclusions, we have given recommendations for a comprehensive increase in the culture of thinking, the level of rational consumption, and financial literacy of the population in the behavioral economy by means of education and upbringing. Projects aimed at improving financial literacy in the higher education system are proposed to be supplemented with training in predicative thinking, value orientations, and consumer culture. These categories are considered as the fundamental foundations of economic culture and financial literacy, which are necessary for achieving sustainable development.

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Physical Contact with Material Objects – Sensory Marketing Perspective

Arnold PABIAN

Czestochowa University of Technology, Czestochowa, Poland
arnold.p@wp.pl

Aleksander PABIAN

Czestochowa University of Technology, Czestochowa, Poland
aleksander.pabian@hotmai.com

Abstract

Tactile marketing is a relatively poorly explored area of sensory marketing. The research that has been conducted so far in this area concentrates primarily on utilising the touch sense while selling material products. Researchers have predominantly focused on hands, which are the receivers of sensor stimuli. The authors of the present paper consider tactile stimuli that come from a number of various sources and appeal to several, diverse parts of human body. The objective of the paper is to present, based on own research, tactile preferences of consumers aged 15-23 in the aspect of their presence inside various types of commercial and service facilities. The research was conducted on the sample of 430 persons. Majority of young consumers prefer sufficient free space where they can move freely. Their remaining tactile preferences are as follows: walls covered with natural wood or paints put on plaster; floors made of natural wood, ceramic tiles, and also covered with carpets; soft floor coverings in the form of carpets, carpeting, rugs; bed places neither excessively firm nor excessively soft; seats covered with fabric or natural leather upholstery – soft or neither soft nor firm; objects that can be touched – rounded with soft surface.

Keywords: tactile marketing, tactile preferences, young consumers

Introduction

Tactile marketing is presently in its initial stage of development. It constitutes one of the elements of sensory marketing, whose aim is to appeal to all the five human senses: sight sense, sound sense, smell sense, taste sense and touch sense. As B. Hulten, N. Broweus and M. Gijk (2009) stress „the human senses have long been ignored in marketing, despite our awareness of their great significance". The research conducted in 13 countries demonstrate that as much as 99 percent of all brand communication concentrates on two senses – sight and sound (Martin Lindstrom 2005). However, sales can be increased not only through appealing to the sight sense, sound sense or smell sense, but also by engaging the touch sense (Brenda Soars 2009).

According to J. Peck (2010), despite its omnipresence touch sense has not been studied in marketing. This situation has not changed significantly over the years. The ones who miss out on this are manufacturers and sellers, as the touch experiences play an important role in the consumption of services and commodities.

Tactile marketing we define as influencing customers' sense of touch when customers purchase and use products and services in order to increase their satisfaction, which is conducive to achieving business goals. A satisfied customer returns to the company and makes purchases again. Moreover, according to the world's best seller, Joe Girard (2019), a satisfied customer spreads good opinion about the company to at least 250 people from his surroundings. As a result, the number of customers, sales volume, revenues and profits increase.

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In tactile marketing the primary focus of researchers is making use of the touch sense while selling material products (goods). Moreover, the research in the area of touch sense generally concentrate on the active seeking and perception by the hands (Joann Peck, 2010). Furthermore, researchers usually analyse single sources of tactile stimuli and their perception. However, the observations of the authors of the present paper show that during their presence inside facilities of various types, including the service ones, customers are subjected to the influence of a number of tactile stimuli, which are received not only by hands, but also other body parts. In such cases a significantly wider range of diversified stimuli determines tactile comfort or discomfort of customers. The touch experience is individual in its nature and as a result it involves different needs of individuals regarding touching brands and products in order to create a certain perception about them (A.V. Citrin, D.E. Stern, E.R. Spangenberg, M.J. Clark 2003) (J. Peck, T. Childers 2003). This means that touch experiences may differ in particular age groups and also with relation to gender.

The main area of interest for the authors of the present paper are poorly recognised tactile preferences of young consumers related to their presence inside various types of commercial and service facilities (shops, restaurants, cafes, hostels, youth hostels and others). Furnishing of such facilities is a source of tactile stimuli, which appeal to various parts of human body. The research conducted by the authors includes tactile stimuli received by feet, buttocks and thighs, front and rear part of the torso, hands. The authors have considered in their research various elements of interior furnishing that people have or may have touch experience with. Sensations that follow such a contact decide about tactile comfort or discomfort, which affects general satisfaction or dissatisfaction concerning the presence in the facility.

In order to satisfy touch needs and requirements of youngsters appropriately it is necessary to identify their preferences in this respect. The paper presents the results of the research that aimed to discover tactile preferences of persons aged 15-23 having regard to gender. The research was conducted in Poland on a representative sample of 430 persons, who were secondary school students and university students. The research determines preferences of young persons that concern size of free space, wall coverings, type of floor, flooring and its softness, seat type and softness, softness of bed places, shape and surface of objects, surrounding oneself with soft objects.

The research broadens the knowledge on behaviours of young consumers on the market. It discovers a wide spectre of tactile preferences of persons aged 15-23, which go beyond a simple form of a physical contact “hands-material object”. The presented results of the research may prove beneficial for companies that provide services for young consumers inside their commercial and service facilities as well as interior furnishing manufacturers, including furniture destined for youngsters.

Literature Review

The scientific literature does not include results of research that concerns tactile preferences of young persons considered in this paper. The research that focuses on touch comprises various themes. One of the vital issues is investigating the role of the touch in product evaluation and also the relationship between visual stimuli and haptic perception. M.S. Balaji, Srividya Raghavan, Subhash Jha (2011) investigated what influence multisensory evaluation has on overall attitude and purchase intentions. Andreas Aldogan Eklund and Miralem Helmefalk (2018) developed a conceptual framework of visual-tactile interplay and consumer responses in brand, product and service scape contexts. Gwenaelle Briand Decre, Caroline Cloonan (2019) investigated the cross-modal correspondence between a visual stimulus (glossiness), haptic perception and reactions of consumers. The impact of spatial proximity on visuo-tactile integration was the subject of interest of C. Spaccasassi, D. Romano, A. Maravita (2019). Helena M. De Klerk, Stephna Lubbe (2008) concluded, based on conducted research, that especially colour and texture play a decisive role in bringing about the necessary aesthetic experiences. Miralem Helmefalk, Adele Berndt (2018) explained based on their research how retailers can utilise a multisensory cue to positively influence consumer behaviours. It is formed by combining three single cues – specifically time spent, touching and purchase. Maria Fransisca Njoman, Galih Nugroho, Sonia Dwi Puspita Chandra, Yoeska Permana, Suhadi Suhadi, Mujiono Mujiono, Agist Dwiki Hermawan, Sugiono Sugiono (2017) evaluated

sensitivity variance and fatigue effect, in human sensory. The research by Miralem Helmefalk (2019) revealed the linkages between multi-sensory cues, browsing behaviour and purchasing.

The researches also investigated issues with regard to various kinds of products. In particular, they evaluated bipolar pairs of fabric tactile attributes in order to describe their tactile sensory properties (Henry Wang, Trevor Mahar, Ron Postle, 2013), influence of the touch sense on evaluation of wood-based materials (Siv Lindberg, Anders Roos, Annika Kihlstedt, Mikael Lindström 2013), investigating the differences in the haptic perception among clients and designers involved with leather inside vehicles (Wonjoon Kim, Yushin Lee, Joong Hee Lee, Gee Won Shin, Myung Hwan Yun 2018), investigating in psychological aspects aesthetic preferences for different surface textures (Roberta Etzi, Charles Spence, Alberto Gallace 2014).

Some products were subject to research in a wider sensory perspective with regard not only to touch but also the appeal to other senses. The research by Johan Bruwer, Anthony Saliba, Bernadette Miller (2011) demonstrated that there are specific differences related to the wine consumption behaviour and sensory preferences of males and females and between age groups. In the research by Esther Gyedu-Akoto, Stephen Yaw Opoku, Emmanuel Ofosu-Agyei (2019) sensory evaluation of biscuits demonstrated that coffee had a significant impact on improving sensory attributes such as flavour and colour. Therefore, coffee power can be used to enhance both the nutritional as well as sensory qualities of products.

In the research that has been conducted worldwide the researchers have undertaken various themes related to sensory properties of places and the environment where sales of products and services take place. G. Berger, A. J. Petutschnigg (2006) investigated impressions of customers who being blindfolded were asked to examine the floor with their hands and feet. As Binh Nghiem-Phu proved (2017) in an outdoor out-store environment of shops the prevailing sensory cues are visual ones where marketers make use of sensory cues to provide their customers with the information about their shops and products/services. According to Siwon Cho, Jane Workman (2011), consumers who demonstrated a higher need for touch and used more than one channel for shopping for clothes preferred local and non-local stores. Fashion innovativeness as well as opinion leadership and multi-channel choice had an influence on non-touch channel preference. The research conducted by Kendra Fowler, Eileen Bridges (2012) led to the following conclusion: service provider evaluations of the physical environment improve if an appropriate ambient scent is present. Then, providers are perceived as more courteous and customers more friendly.

Some research that has been conducted worldwide concerned exclusively behaviours of young consumers on the market. However, it does not explain what the preferences of persons aged 15-23 are in the aspects analysed by the authors of the present paper. The research on young consumers has been conducted among others by the researchers specified below.

1. Toby C. Y. Yip, Kara Chan, Evon Poon (2012): in the research young consumers evaluated attractiveness of food outlets and apparel retailers. Attractiveness of these sales venues was primarily associated with the quality and price of product or service. Location and the behaviour of shop assistants was also important to them.
2. Paolo Ribeiro Cardoso, Sara Carvalho Pinto (2010): determined the main factors that explained the shopping motivations among young Portuguese consumers. They identified seven shopping dimensions. They proposed a new consumer profile of a Portuguese young adult based on hedonistic and utilitarian shopping motivations.
3. Dipanjan Kumar Dey, Ankur Srivastava (2017) proved that the impulsive buying intensions of youngsters are positively associated with dimensions of hedonic shopping value.
4. Monica Chaudhary, Suhail M. Ghouse, Omar Durrah (2018) presented the role of a young Arab consumer in family decision-making concerning purchases of various products and services and across different stages of buying process.

The research targeted at young consumers has also explained various issues regarding brands. According to the research by Gurvinder S. Shergill, Yuli Rosmala, Andrew G. Parsons (2010), young

consumers from New Zealand represent mid-level internationally in terms of ethnocentrism and ethnocentricity, which do not influence their perceptions of brands. What matters to them is price perceptions and self/brand user congruency perceptions. The researchers Ting Jin, Wei Shao, Deborah Griffin, Mitchell Ross, (2018) determined that Chinese brands are perceived positively by young Chinese consumers. Their choice of Chinese brands is motivated by symbolic values such as: pride, lifestyle, feeling of home, being happy. Roman Sidorchuk, Sergey Vladimirovich, Boris Vladimirovich Musatov, Aleksey Aleksandrovich Meshkov, Timur Alekseevich Tultaev (2018) analysed motivational influence of „high-level values" (HLV) on brands in certain product categories-markers in order to develop a methodology allowing for segmenting young consumers. The research by Dalia Abdelrahman Farrag (2017) explained the attitude of youths from Qatar towards luxury brands and intentions to purchase them. A significant influence on this attitude demonstrate: fashion involvement, brand consciousness, social comparison and experiential needs.

Also, the research that has been conducted in the area of tourism and hotel industry, where the results of the research conducted by the authors of the present paper may be applied, does not account for the type of preferences characteristic of persons aged 15-23 with respect to furnishing the interior of facilities. The behaviours and preferences of consumers in the area of hotel industry and tourism have been the subject of research of, among others: Agapito, Patrícia Valle, Júlio Mendes (2014), Dora Agapito, Patrícia Pinto, Júlio Mendes (2017); Ksenia Kirillova, Janelle Chan (2018); Yosr Ben Tahar, Coralie Haller, Charlotte Massa, Sebastien Bede (2018); Lianping Ren, Hanqin Qiu, Caiwei Ma, Pearl M.C. Lin (2018); Carmen Lam, Grace K.S. Ho, Rob Law (2015); Jonas Karisen Astrom (2017).

As the extensive literature search conducted by the authors of the present paper has demonstrated there exists a research gap regarding tactile preferences of consumers aged 15-23 analysed from the perspective of furnishing the interiors of various facilities. The results of our research fill this gap. We have focused in our research on the following sources of tactile sensations: free space inside facilities, walls and floors, types and softness of seats and bed places, shape and surface of the objects as well as surrounding oneself with soft objects.

In the further two parts of the present paper its authors present research methodology and results with relation to previously specified sources of tactile sensations that occur in commercial and service facilities.

Research Method

The underlying objective of the research conducted by the authors of the present paper was to discover preferences of young consumers aged 15-23 with regard to: size of free space, wall coverings, type of floor, flooring and its softness, seat type and softness, softness of bed places, shape and surface of objects, surrounding oneself with soft objects in the aspect of furnishing the interiors of various facilities. For the purpose of the research its authors developed a research tool in the form of a survey questionnaire, determined the minimum sample population and defined the manner of communication with the respondents. Having conducted the field research its results were summarised, analysed and the authors formulated the conclusions.

To achieve the adopted research objective the authors conducted the research that utilised the representative method. The survey questionnaire was addressed to 430 persons aged 15-23, secondary school students and university students. The research was conducted in 2019 based on personal contact with respondents. The questionnaire forms were distributed, then collected and analyzed after being filled in by the respondents. The indicated population of respondents meets the requirement of minimum sample size. The minimum sample size was determined so as to formulate the conclusions about the investigated population, which are characterised by a defined accuracy and certainty level, based on conducted measurements. Once the minimum sample size had been determined, the following steps were taken:

- estimation accuracy was established, assuming a defined maximum estimation error,

- high trust level was assumed,
- assumptions regarding the proportion of the investigated population were adopted.

Given that the order of magnitude of p success probability is unknown the minimum number of units amounted to 385 at the following assumptions: statistical significance $\alpha=0,05$, maximum estimate error $d=5\%$ ($u_\alpha=1,959964$).

Empirical Results

The size of free space in a facility affects the number and type of tactile contacts that are experienced by persons inside it. The smaller the free space is, the more contacts with objects that are present in it. The research has proved that youngsters prefer much free space (65.1% of the respondents). They have as much free space here as they need to move freely without experiencing tactile sensations. Proponents of very large free space (much more space to move than required) are not as numerous (25.2%). Only 3.2% of the surveyed prefer rooms with little free space. For 6.5% of the survey respondents the size of free space did not matter. Figure 1 presents the results of the research regarding preferences of youngsters related to free space in accommodation establishments as well as their preferences related to wall coverings. Most of the youngsters prefer staying inside rooms whose walls are covered with natural wood (22.6%) or paints put on plaster (22.1%). Least favoured are coverings made of fabrics (1.4%), plastic panels (2.7%) and wallpapers (3.3%). For 28.6% of the respondents the type of wall and ceiling covering was unimportant.

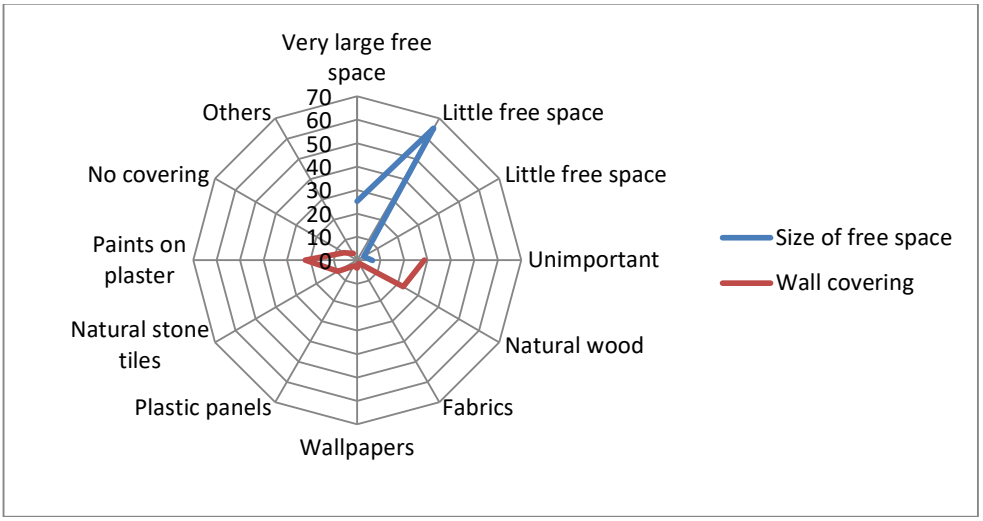

Fig. 1: Preferences of consumers aged 15-23 regarding size of free space and wall coverings.

An element of the building with which we remain in permanent tactile contact is the floor. Figure 2 demonstrates preferences of young consumers with regard to types, flooring and softness of floors. Similarly to walls, most youngsters prefer natural wood (34.7% of the respondents). In the second position come ceramic tiles (14.5%), while floors covered with carpets rank third (9.9%). Youngsters do not like walking on floors that are covered with PVC-based flooring (1.4%), other artificial materials (2.4%), natural stone (6.3%). Floor covering and its type did not matter in case of 18.8% of the survey respondents. Provided the floor is covered with a carpet, flooring or rug, then most youngsters prefer them to be soft (29.7%). Slightly fewer persons prefer coverings that are neither excessively firm nor excessively soft (27.5%). Very soft coverings are preferred by 24.9% of the respondents, while only 5.3% prefer them to be firm. Softness of the covering was unimportant for 12.6% of survey participants.

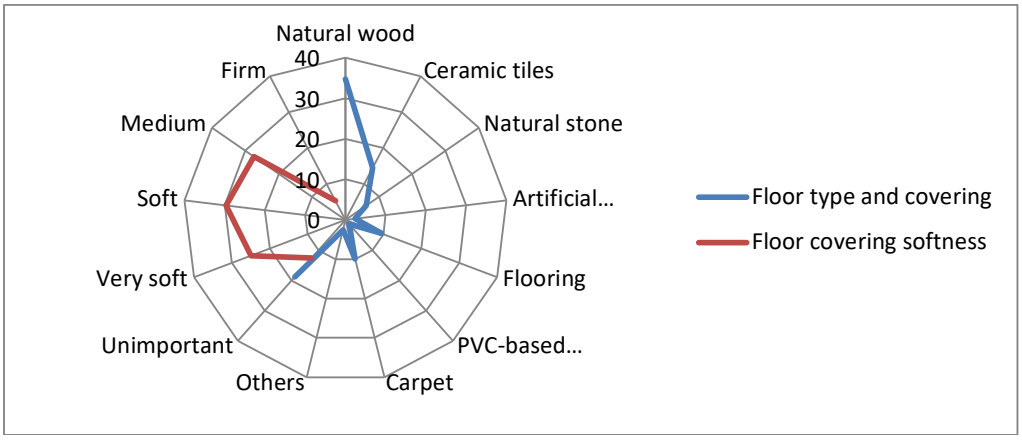

Fig. 2: Preferences of consumers aged 15-23 regarding floor covering, its type and softness.

The most important elements of facility furnishing constitute furniture in the form of beds, wardrobes, cabinets and seats. Most of young consumers prefer when beds, couches and sofas they sleep on are neither excessively firm nor excessively soft (41.5%). Proponents of soft surfaces constitute 31.8%, very soft ones – 14.0%, firm ones – 9.0%. This factor was considered unimportant by 3.7% of the respondents (Figure 3).

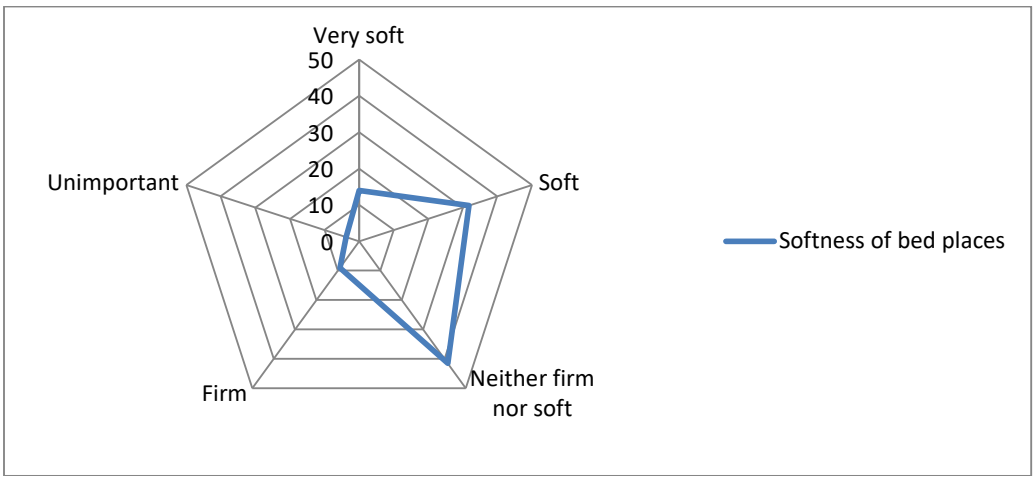

Fig. 3: Preferences of consumers aged 15-23 regarding softness of bed places.

The survey objective was also to determine the preferences of young customers with regard to seat type and softness (chairs, armchairs, coffee tables). These preferences have been presented in Figure 4. Youngsters like it most when seats are covered with fabric upholstery (34.3%), natural leather (22.8%) and made of natural wood (14.2%). The least preferred seats are made of aluminium (0%), metal (0.4%), natural stone (1.3%), plastic (2.3%) and other artificial substances. e.g. synthetic rattan (1.1%). For 13.3% of the survey respondents the type of seat was not important. Youngsters also demonstrate particular preferences regarding the seat softness. They prefer soft ones (36.7%) and neither firm nor soft ones (33.4%). Less popular are very soft seats (20.4%) and the least desired ones include firm (2.9%) and very firm (0.7%). Seat softness was unimportant for 5.9% of the survey respondents.

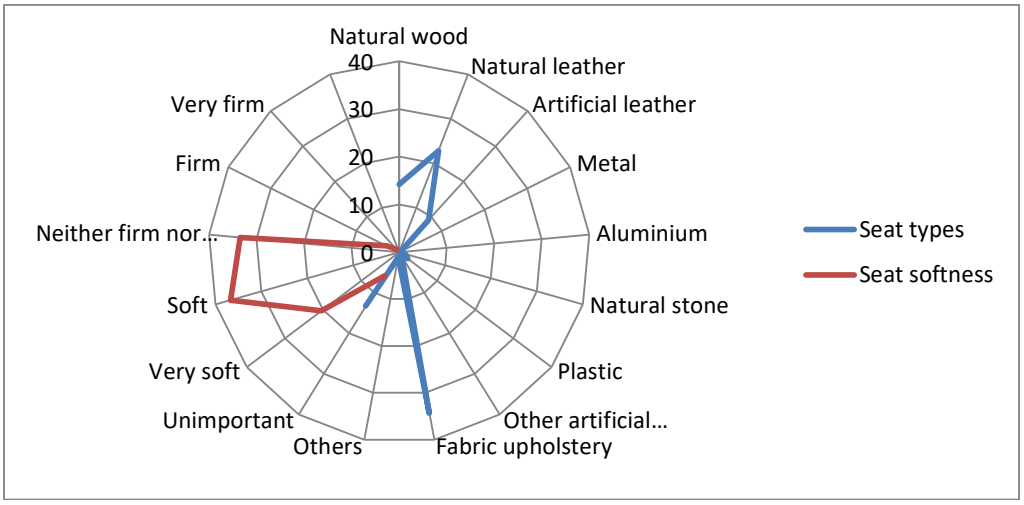

Fig. 4: Preferences of consumers aged 15-23 regarding seat type and softness.

Figure 5 illustrates preferences of youngsters regarding the shape and surface of objects and surrounding oneself with soft objects. Recognising the preferences in this scope is important as people being present in various types of interiors touch a lot of items, e.g. pieces of furniture, tableware in cafes and restaurants, fittings in toilets. They can also present various attitudes to soft objects that surround them (cushions on sofas and armchairs, decorations made of soft fabrics and others). As the research has proved, among youngsters there are over three times as many proponents of oval shapes (38.4%) as angular ones (12.1%). With regard to the surface youngsters mostly prefer smooth objects (48.3%) and very smooth ones (25.6%), while very rough objects are the least popular ones (1.6%). Soft objects in their surroundings are desired by 48.1% of the survey respondents and 23.6% do not like such objects around them.

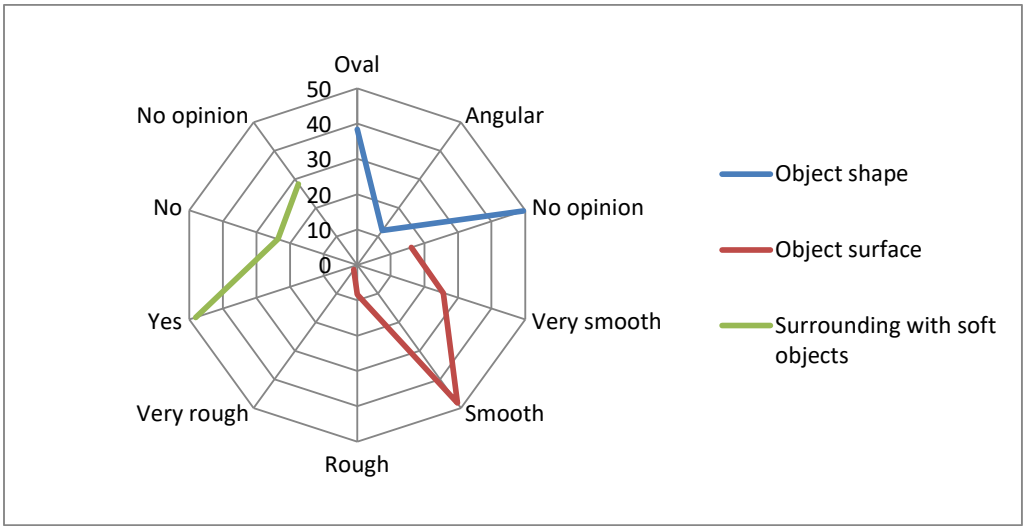

Fig. 5: Preferences of consumers aged 15-23 regarding shape and surface of objects and surrounding oneself with soft objects.

Conclusion

As mentioned in the introduction, increasing customer satisfaction with the purchase supports the achievement of business goals. Tactile sensations can be a source of comfort or discomfort in all places where the young customer purchases material products or uses services (shops, offices, hotels, restaurants, cafes, gyms, waiting rooms and others). Here are some examples of situations in which the customer experiences discomfort in such places. Due to insufficient free space, the customer squeezes between shelves with goods in a self-service store, between furniture in a hotel room. Materials such as stone, ceramic tiles, metals and glass on floors or walls are perceived by the customer as hard and cold. Too hard and uncomfortable chairs in restaurants, cafes, hotel rooms, offices, waiting rooms discourage people from visiting these places again. The purpose of tactile marketing is to shape the customer's tactile sensations so that they are a source of comfort, not discomfort. This problem affects all companies that serve customers having direct physical contact with them.

The research has proved that young consumers aged 15-23 demonstrate particular tactile preferences, which is important from the perspective of designing and furnishing facilities in which they spend time. Majority of them prefer much free space where they can move around freely, without experiencing negative tactile sensations. They prefer it most to spend time in rooms whose walls are covered with natural wood or paints put on plaster. In case of floors, the ones covered with natural wood, ceramic tiles or covered with carpets are most favoured. If the floor is covered with carpets, carpeting or rugs, then most youngsters prefer them to be soft. Slightly fewer persons favour coverings that are neither hard nor soft. As far as bed places are concerned (beds, couches, sofas), most youngsters prefer them to be neither too firm nor too soft. Youngsters also demonstrate definite preferences regarding seats (chairs, armchairs, coffee tables). They like it most when seats are covered with fabric upholstery or natural leather, they are soft or neither firm nor soft. They also prefer if the objects they touch in a facility are oval and their surface is smooth. Majority of the survey respondents, women in particular, like to be surrounded with soft objects.

Discussion

Young consumers constitute an important and large market segment. By utilising tactile marketing it is possible to increase the satisfaction level related to their presence in facilities that render services or conduct a commercial activity. Thus, the research cannot be limited to discovering tactile preferences of youngsters related exclusively to purchases of material goods, which are expressed in a simple arrangement of physical contact “hands – material products (goods)”. We suggest that research should be conducted that will aim to recognise tactile preferences also in the arrangements: “touch receptors” – material surrounding of product purchaser”, “touch receptors – rendered services”, “touch receptors – material surrounding of rendered services”. While using the term touch receptors we mean the ones that are not only present on hands but also on other parts of human body. This means a necessity to consider in the research various sources of tactile stimuli and various parts of human body they appeal to. Therefore, there should be a shift in the research from the arrangement “one source of tactile stimuli appeals to one part of human body” to an arrangement “numerous sources of tactile stimuli appeal to various parts of human body”. One should remember that sensory comfort or discomfort that goes beyond the arrangement “hands – material products (goods)” is conditioned by a number of various tactile sensations, which are experienced by consumers in the venues rendering services or conducting sales of products.

In the conducted research its authors have focused on a particular age group of respondents, i.e. consumers aged 15-23, as they concluded that generalising tactile preferences on the whole population in many cases is inappropriate. The distribution of tactile preferences in particular age groups varies and has an impact on designing the furnishing of facilities.

Tactile marketing plays an important role not only in physical contacts of customers with products offered for sale but also in the service area, as well as in the surrounding where the sales occur. This

requires the research regarding tactile preferences of customers considered from the perspective of various age groups to be widened and deepened.

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On the Impact of Information Flows on The Modern Formation of Competition and Foreign Economic Policy

Elena Vyacheslavovna ZENKINA

Center for International macroeconomics and foreign economic relations of Institute of Economics of Russian Academy of Sciences, Moscow, Russian Federation, evzenkina@mail.ru

Valery Maksimovich TUMIN

Department «Management» of Moscow Polytechnic University, Moscow, Russian Federation, vm@tumin.net

Petr Aleksandrovich KOSTROMIN

Department «Management» of Moscow Polytechnic University, Moscow, Russian Federation, farmc_kostromin@mail.ru

Abstract

The article considers the role of information technologies in the international economy and international relations' evolution. The article describes the place of the information space in the multinational companies and developed countries' global competitiveness formation. Information is presented as an important resource that affects the financial, industrial, innovation and investment spheres, and provides the companies and entire states' advantages in the global economy. The Internet's role in spreading planetary connections between people and infrastructure objects is analyzed. The world economy's transition to a new development stage is presented as a transition to the information and digital economy. The key Internet technologies' development stages are listed and the Internet state regulation problems are analyzed using examples of the Russian law "On information, information technologies and information protection", as well as the Chinese "Golden shield". The existing restrictions' key circumvention technologies with the use of Internet tunnels are characterized. This topic is particularly relevant in the context of numerous countries' accusations interfering in each other's internal affairs, including in the election process and influencing public opinion. Conclusions are made about the information and image confrontation's role in solving the developed countries' foreign policy problems.

Keywords: Global Challenges, International Economic Relations, Foreign Economic Policy.

Introduction

The dominant trends' change in the world economy continues. Tumin and Koryakov (2013) underlined that the industrial large-scale production that formed the world commodity markets in the last century was replaced by financial engineering, with its variety of financial instruments, speed and operations' globality. And if at the end of the 20th – first half of the 21st century the competitive advantage in the international labor division was obtained by multinational companies with a strong production base, design bureaus and research technology laboratories, able to open their branches in convenient areas of the earth, then at the beginning of the 21st century, the potential of companies was determined by the financial assets' market valuation, and international investment flows depended on changing stock prices. Bressanelli et al (2018) mentioned that little attention has been set on how new digital technologies can overcome in practice the main Circular Economy challenges. National financial spheres' globalization and unification with the total dollar domination generated a general belief in the inevitability of the entire world economy globalization. In the article by Sener and

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Delican (2019) said that every new technological development brings societies closer to each other in a global world and helps to increase trade relations between countries. However, Montenegro and Araral (2020) in their article warn, that here is a growing divide in Internet quality of service (QoS) between developed and developing countries.

Review of relevant studies and problem statement

In the world largest companies ranking we could see a change of leaders: the largest equipment manufacturers (cars, first of all) were replaced by banks in Western Europe, the United States and Japan. According to Yang and Meyer (2020) study, when foreign and local firms compete, they face competitors acting quite differently from themselves.

Tumin et al (2015) underlined that some economists consider a special stage to be the computer technology introduction based on silicon chips, which really radically changed the production's organization. Computers changed the communication system, accelerated the transition to paperless documentation, electronic money, payment cards, smartphones, etc., which qualitatively changed not only the end user's world, but also design, control, and marketing technology. The "computer revolution" and its founders' names (S. Jobs, first of all) are deservedly recognized in the public consciousness. In a research study by Navrotskaia et al (2018) is mentioned that the IT technology leaders and computer technology developers certainly dominate the world markets today. Salih et al (2019) made a research, investigating the interrelationships between information systems (IS)-related capabilities and their effects on firm performance. According to the study by Meltze (2014) there are a range of restrictions that are hindering the Internet's ability from fully serving as a platform for international trade.

However, it is usually a product market updating question. And according to Myasnikova et al (2018), in the future world economy configuration exactly the competition mechanism is important. The next stage in the world economy development is connected with the transition to an information economy: a new competition space, the space of information flows is being formed. In the modern world the information value, as it affects society, is higher than the money value. In the article by Suppatvech et al (2019) is mentioned that the internet of things (IoT) is gaining attention from both scholars and practitioners regarding its potential as a key enabler of servitized business models; academic research on this emerging concept is increasing but overall underexplored. Liu et al (2020) underlined that in the current socio-economic environment, to face challenges such as the emergence of new technologies, globalisation and increasing demands from their clients it is inevitable that enterprises will collaborate with others and progressively shift their boundaries.

Research Methodology

The research methodology provided for the Internet technologies development's retrospective analysis and their impact on the world economy, both in the states and large companies and individuals' context. As a practical basis for the research, we used the world's largest companies experience using Internet technologies, the Big Data and blockchain technologies usage practice, as well as the regulatory and legal experience of the Russian Federation and the China in the field of Internet traffic regulation.

Today, information is available (which is both sold and bought), which gives almost exhaustive data about potential consumers. It allows you to generate demand, direct the buyer's interest, impose preferences and change the goods and services consumption structure.

In the financial economy, the market affected the goods, services, and possible investments supply conditions. And the economy of information determines the consumption conditions: who, where, when, in what volume, for how long. The competition's subject and tools are changing.

The international communication's material basis is the Internet, which became the most incredible invention of the last century. At present, the Internet is not just a network, but an entire information

universe, which is subject to various technical, social and state laws. The date of the Internet's origin is October 29, 1969. A full-fledged network with acceptable bandwidth, representing a set of many different networks and communication via modem lines falls on the last decade of the 20th century. This period was marked by the emergence of websites. To be more precise, the year 1995 is considered to be the time of the Internet service providers' emergence. At the beginning of the 21st century, the Internet's commercial block was formed: search engines arose; various operating systems appeared; server technologies began to actively develop; the number of sites in all countries of the world increased. As a result, the Internet is now a huge entertainment, educational, trade, financial and political sector. The rapid development of the Internet has become possible due to the progress in the various networks' bandwidth (including wireless Internet and mobile communications (3G and 4G generations)), and due to the computer and mobile components' capacity increase. 2017 clearly showed another new trend: mobile Internet has become many times more popular than computer Internet.

The Internet provides horizontal "planetary" connections between people. On its basis, social networks of group communication are formed, which function almost outside the state control (which does not exclude significant interference in the largest companies functioning: Google, Amazon, Facebook, VK, etc.). It creates the illusion of complete anonymity and participants' independence in communication. But any search engine (Yahoo, Yandex, Google) by their programs directs the search in the desired direction. Moreover, it even organizes the search space, cuts off unwanted results and so on. At the same time, the activity is mainly concentrated around the companies' commercial interests that control communication networks.

According to Chang et al (2020) research study FinTech (Financial Technology) and blockchain are prevalent topics among technology leaders in finance today. The information base for policy in the Internet space is the accumulated information's array about all participants in information contacts. "Big data" technology has become another element (along with computer programs for processing received information, global international communication and automatic search technologies). Sivarajah et al (2020) emphasized that the digital transformation is an accumulation of various digital advancements, such as the transformation of the web phenomenon. The participatory web that allows for active user engagement and gather intelligence has been widely recognised as a value add tool by organisations of all shapes and sizes to improve business productivity and efficiency.

However, information often affects the state interests' sphere (the secret data transfer, communication with terrorists, which is most often declared in justifications for restricting contacts on the Internet). The state is also interested in processing a population database for predicting demographics, social conflicts, political voting results, and so on. This data is not protected and is now available to all major provider companies in telecommunications networks. Such information becomes an external influence instrument, a threat to the socio-economic situation stability in the country.

Yang et al (2020) mentioned that blockchain as an emergent decentralized digital technology has been widely explored in many sectors to remedy the deficiencies of centralized solutions. In combination with blockchain technology and a new currency (cryptocurrency, in all its modifications), the information economy appears as a new space not only for commercial competition, but also for the inevitable (in the future) state control and regulation. China is a leader in the direction of the Internet state regulation. Russia has yet to solve this problem.

1.11.19 the Federal Law No. 90-FZ of May 1, 2019 "On Amending the Federal Law "On Communications" and the Federal Law "On Information, Information Technologies and Protection of Information" entered into force, with the exception of certain provisions for which other terms of their entry into force are set. According to Consultant Plus (2019) the provisions of the Federal Law "On communications" (article 56.2, paragraph 8, subparagraph 3), regarding the national domain name system use, shall apply from January 1, 2021. These laws have already been informally called the "sovereign Runet" law.

According to the national program "Digital economy", the law implementing costs should amount to more than 30 billion rubles, of which 20.8 billion rubles should go to the equipment's purchase. This law prescribes:
- All telecom operators in the country must install special equipment, provided by the Federal Service for Supervision of Communications, Information Technology and Mass Media (Roskomnadzor), on their networks.

- In case of the integrity, stability and security threats of the Internet, the Roskomnadzor will be able to manage the traffic's routing through this equipment.

- The specified equipment will also filter traffic, restricting users' access to the prohibited resources in Russia.

- A traffic exchange points register must be created, and restrictions are imposed on connecting communication networks to such points.

- The communication networks' owners, Internet companies and other market players must take part in the exercises, which will be held once a year.

- By January 1, 2021, a national domain name system should be created that will duplicate the domain names list and autonomous systems' numbers delegated to Russian users.

In the book by Ristolainen et al (2020) are made conclusions that it turns out that the state intends to control Russian Internet traffic.

In the study by the Russian International Affairs Council (RIAC) (2018) said that the intention to control the Internet traffic movement has already been implemented in practice in some countries, although the most advanced in the world is the Chinese system for limiting Internet content, which is called the "Golden shield", or "Great Chinese firewall". This system is based on the analysis of traffic that passes through three international gateways – Beijing, Shanghai and Guangzhou. It was developed in 1998 and became fully operational in 2003. The idea is that the system blocks certain sites from the blacklist by their IP- or URL-addresses, and also blocks sites using filtering data packets by keywords.

However, as the example of China shows, there are ways to circumvent these restrictions. The most commonly used method in China is to set up a tunnel to another country (a tunnel is when a special program on your computer establishes a point-to-point connection with another computer on the Internet). In this case, the global network acts as just a transport system, and your computer thinks that it is connected to another network directly.

Unfortunately, there are almost no open services for creating the Internet-tunnels, and you will have to search for the purpose for connecting the tunnel. Many Chinese work for foreign companies and can simply set up a tunnel to their company's office in another country, where there are no Internet restrictions anymore. But not many residents of the People's Republic of China have this opportunity. Although, undoubtedly, the main advantage of this method is the high connection speed, which is ten times faster than the proxy servers' speed.

In fact, there are many ways to carry out covert unauthorized access to enemy information. In addition, there are opportunities for suppression or forgery in the information exchange in telecommunications networks.

Currently, there are many accusations of foreign elections' interference by the United States and Great Britain. Secretary of state Mike Pompeo says the US is preparing to resist foreign interference in the 2020 presidential election. In his opinion, countries such as Russia, China, North Korea and Iran are allegedly interested in influencing the outcome of the vote. In the 21st century, information

warfare is a complex of measures aimed at preventing the enemy from obtaining the necessary, often secret, information.

Results

In this century, the most important factor in information is the image factor, or, in other words, the negative impact on the enemy's reputation, which should lead to a lack of attention, disinteresting and, as a result, discrediting the opposing side interests in the international community. In this regard, the last decade has shown a phenomenal growth of information technology methods and tools.

At present, the most promising technological platform for the further development of the global (world) and country-wide media and communication infrastructure is the Internet and new types of media services based on it. Today, the World Wide Web is an integral component of most human life's aspects, but thanks to the spread and improvement of information and communication technologies, its influence on global political, economic, and humanitarian development continues to grow rapidly.

Information wars and media terrorism are the information globalization result, which make us carefully analyze their possible consequences. We emphasize that the information and image confrontation can greatly distort the reality in the mass public consciousness, and the results of this confrontation are markedly different from the armed actions' results.

Let us note that the information warfare's results for all its participants in fact become many times more important than the armed conflicts' results. In this case, we consider it appropriate to recall the postulate of behavioral sociology, which underlines that if a situation is defined as real, then it is real in its consequences.

Conclusions

Modern information confrontation manifests itself in the widespread use of disinformation when covering any events, information blackmail using the electronic control results over people's lives, their political activities and personal plans, in using the full power of modern media in order to obtain unilateral advantages.

Most developed countries have a strong information potential. Publications monitoring in the media clearly shows that the main information struggle trend involves increasing its role in solving foreign policy problems as informatization becomes more established.

Note that at present, the information conflict no longer plays a secondary role and is not an addition to the "main" events. This confrontation has become the most important mechanism for conducting wars, as well as the armed forces and equipment use, becoming a legitimate method of political struggle.

Currently, the information and communication technologies' development level is becoming one of the determining factors for the country's involvement in world economic processes, the economy's technological development and the demand for national goods and services on the world market. With the Internet's rapid development, the most effective business organization models are being transformed, and various international strategic alliances are coming to the fore in the field of cooperation between countries and companies in order to achieve common information and other goals.

Information and communication technologies in the Internet space significantly affect the modern political regimes' content parameters functioning, as well as contribute to the traditional democracy models evolution.

Today, a society is being formed in which the main value is no longer information itself, but communication technologies and communication channels. Not information, but communication connections and communication opportunities are the main value in modern society.
Political and economic information loses its traditional value outside the context of its possible use in communication processes. On the contrary, the main value, including political, today is the possibility of communication interaction, and therefore modern communication technologies are aimed at creating effective global communication forms, new communication interaction mechanisms.

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Key Performance Indicators and Dimension of Organisational Strategic Approach

Abd Rahman Ahmad
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia,
86400 Batu Pahat, Johor, Malaysia
arahman@uthm.edu.my

Lim Chen Bin
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia,
86400 Batu Pahat, Johor, Malaysia
mankuittho@yahoo.com

Alaa S. Jameel
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia 86400 Batu Pahat, Johor, Malaysia
salam.alaa23@gmail.com

Hairul Rizad Md Sapry
Faculty of Industry Logistics, Universiti Kuala Lumpur, Malaysia Institute of Industrial Technology,
81750 Masai, Johor, Malaysia
hairulrizad@unikl.edu.com.my

Abstract

This study provides the indispensable facts about the importance of the performance measurement for the organisation. Therefore, this paper will analyse one of the performance measurement tools – KPIs, by providing the theoretical details. After that, the strategy formed by the company to manage the KPIs will be identified. It helps to raise a milieu of awareness about the importance of implementation and maintenance of KPI among SMEs, particularly to the SMEs who are not aware about this. In addition, this study will serve as the basis for future plans of action by the SMEs. In this research, quantitative research methods were employed. This research is using a descriptive research design that seeks to describe the current status of SMEs implement the KPIs. A structured-questionnaire survey were used to collect the quantitative data by email and interview. The questionnaire of this research includes 5 sections. Multiple choices questions and Likert Scale questions were included in the questionnaire to collect the data. The questionnaire survey was developed in an easy-to-answer manner by providing options to survey participant. There are 155 SMEs that are registered with SME Corp. Malaysia in Batu Pahat, Johor. After all the completed questionnaires are collected from the respondent, 10 respondents' data is carried out to ensure the accuracy and the suitability of this research. After that, all the data were analysed by using the Statistical Package for the Social Science (SPSS) version 21.0 to interpret the data using descriptive and inferential statistics. This study helps to identify the significant relationship between the SME's strategic approach towards managing the business performance in their organisational strategy.

Introduction

In this paper, the concept of key performance indicators as well as small and medium sized enterprises will be defined. Besides that, the theoretical background of the KPIs will be stated. Issues that will be discussed through this chapter included of organizational strategic approach of managing KPIs with the business strategy, communication and monitoring system also discussed through this paper. Goodpasture (2003) defined the KPIs as tools for delivering measurement systematically and the management is needed to understand what is important to an organization, various techniques to assess

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the business present state and its key activities with the selection of performance indicators. KPIs are used to evaluate the factors or activity that are critical and crucial for the current and future success of an organization (Verzola, Bentivegna et al. 2009).

Key performance indicators (KPI) can be characterized as the navigational tools that empower the administration group of an association to have a straightforward picture of the association's execution and assist in real time decision making. This helps to enhance execution and decrease the up-coming negative outcomes to the association (Marr 2012).

Literature Review

KPI must be clearly and simple to understand, so that it can empower and enhance the management of company in resources allocation as indicated by the organization's business strategy (Parmenter 2015). KPI can be measured in various time periods. This can improve the effectiveness of real time decision making by the management. A KPI should be forwarded straight to the CEO of the organization to check the hierarchical execution, so that CEO can intercede on the matters to adjust the resources to the objectives (Parmenter 2015).

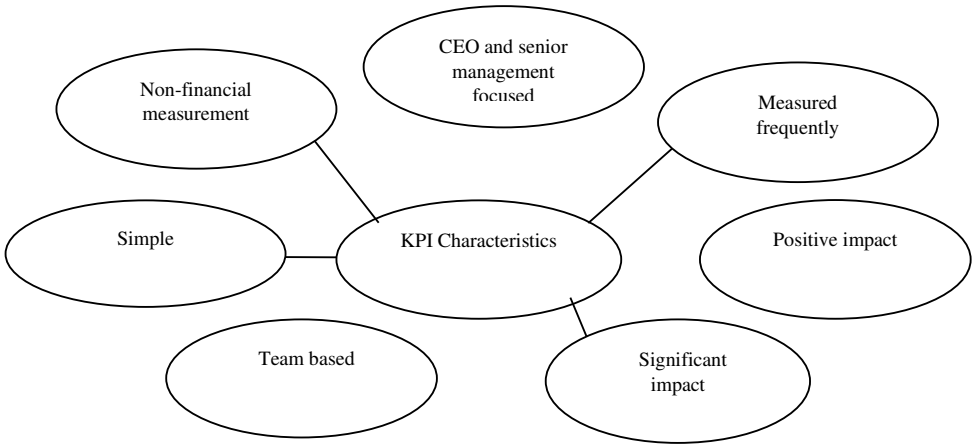

Figure 1: Characteristics of KPI

Source: Parmenter (2015)

A good KPI should be consistent with the particular organization's strategy, goals and vision. Besides that, KPI must concentrate on the organization wide vital values instead of non-critical business result. A wrong KPI selection can bring about counterproductive results (Parmenter 2015). A good KPI should fulfilled all the characteristics as shown in the Figure 1.

Balanced Scorecard (BSC)

Kaplan and Norton (1996) have introduced BSC in four perspectives. BSC includes of financial and non-financial measurement in one system and it recommends managers to view organization's performance based on the perspectives (as shown Figure 2). The KPIs are always linked to the BSC. Ayedh and Muslim (2007) found that BSC is the main tool to use to choose the KPIs and most of the Malaysian companies were widely adopted.

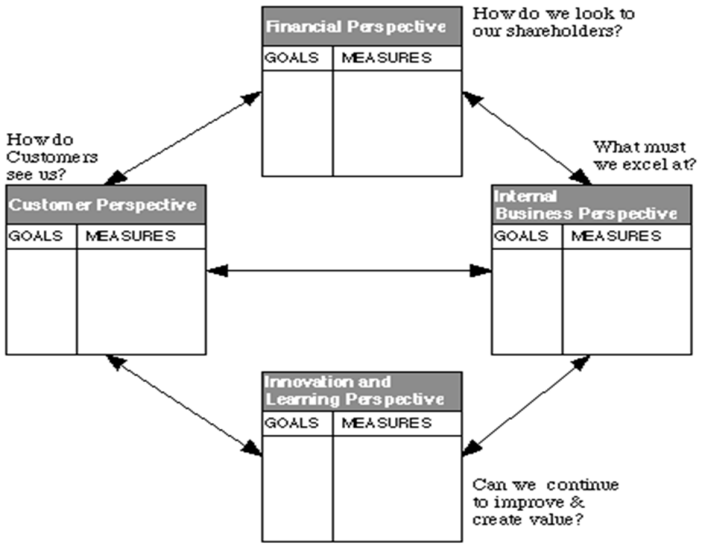

Figure 2: Four perspective of BSC

Source: Kaplan and Norton (1996)

There are four perspectives on the BSC approach which are customer perspective, financial perspective, internal process perspective and learning and growth perspective. The organization must develop performance measure strategy to improve these perspective in order to choose the right KPIs for the organization (Kaganski, Snatkin et al. 2013). With a combination of these perspectives, organization can translate their vision and strategy into actions across a balanced set of perspective (Kaplan and Norton 1996). Phusavat and Manaves (2008) have conducted a study which attempted to measure the SMEs performance through the KPIs for BSC design and development.

Small and Medium Enterprises (SMEs)

Small and medium enterprises (SMEs) are very important to the economic growth and the country's overall production network (Ueasangkomsate, & Jangkot, 2017). The Malaysian economy has been geared by the rapid development of SMEs since the 1970s. In the 1990s, Malaysia has started to alter its economics basis from local market to exports the products to the overseas (Zulkiffli 2009; Sapry et. al., 2020). There are many definitions for small and medium sized enterprises (SMEs) and different countries have different definition for SMEs. According to the National SME Development Council Official Website, a new definition was endorsed for SMEs in 2013. An enterprise is considered as an SME in each of the respective sectors based on the annual sales turnover or number of full-time employees. SMEs can be categorized into 3 types; there are micro enterprises, small enterprises and medium enterprises. Besides that, SMEs also divided into two sectors: (1) manufacturing, manufacturing-related service and Agro-based industries, and (2) services, primary agriculture and information and communication.

This research attempts to identify the significant level of SME's strategic approach towards managing the business performance as shown in Figure 3.

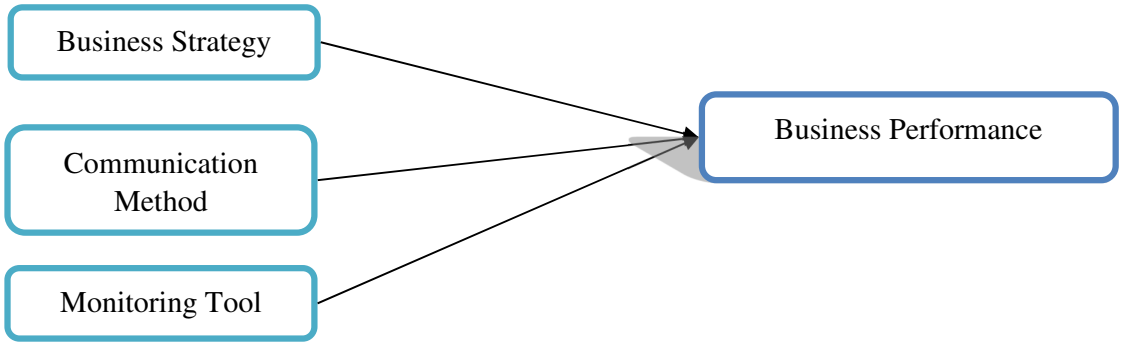

Figure 3: Conceptual Framework

The independent variables of the study were includes the business strategy, communication method and monitoring tool with the outcome of business performance.

Methodology

Before the real survey carried out, a pilot test was launched three weeks before actual test. 10 set of the survey questionnaires were distributed to the 10 SMEs by email and interview. This pilot test was a success and there were no special issues happened. In this survey, the section B, C, D and E of the questionnaire were tested in order to find out its validity and reliability before proceed to actual data collections. Section B contain items related to the business performance that measured by the SMEs in the performance measurement system. Section C was representing the link of business strategy with the KPIs. After that, section D representing the communication method among staffs and section E representing the monitoring method on business performance.

After all the questionnaires are collected from the respondents, the analysis process including identify the types of KPIs employed by SMEs; examine the methods for SMEs to link KPIs to their business; investigate the interaction of KPIs among staffs in SMEs; and determine the way of SMEs to monitor KPIs. After that, all the data will be analysed by using the Statistical Package for the Social Science (SPSS) version 21.0. Results and answer from the analysis is organized and presented in suitable forms such as charts, tables or graphs. Thus, the data could be interpreted and understood easily.

Results and Discussion

Demographic analysis was used to explain the pattern of the respondents' background who was involved in the survey. 62 respondents took part in this survey. The data collected included gender, age, designated position, number of employees at the company and category of the manufacturing firm because all these factors may influence the KPI that were adopted in a company towards the formation of business strategy, communication method and monitoring system. The data was analysed in the form of frequency and percentage. Following table shows the summary of average mean for all variables.

Table 1: Summary of Average Mean for All Variables

Variables	Average Mean	Mean Score Interpretation
Business Performance	5.05	High
Business Strategy	4.40	Moderate
Communication Method	4.63	Moderate
Monitoring Tool	4.56	Moderate

From Table 1, business performance obtained the highest average mean score, which is 5.05 at the high level according to the mean score interpretation. Communication method obtained the average mean score of 4.63; monitoring tool had the 4.56; the lowest average mean score was achieved by business strategy, 4.40. All of these three variables were at the moderate level according to the mean score interpretation. In other words, SMEs who took part in the survey was already employing distinct KPIs in the business. However, the strategic approaches which are business strategy, communication method and monitoring tool are requiring the more attention in managing the business performance.

Based on the finding of this research, the dimensions of the organizational strategic approach which are, business strategy, communication method and monitoring tools, will be used to analyse and observe their influence towards the SME's business performance measurement system. As state in the previous chapter, to create efficient KPIs, strategic planning processes are needed to be in conjunction with organization's goals and vision. Besides that, the cost and time frame problem might be influenced organizational strategic approach.

Conclusion

This study has proved the importance of organizational strategic approach towards managing the business performance. The finding of this research is to answer the research question and to achieve the objective establish in the early of the paper. By carrying out the appropriate analysis on research survey data, which has 62 respondents, it was found that there is a significant relationship between organizational strategic approach and business strategy. If there is a proper way of planning based on these three variables (business strategy, communication method and monitoring tool), it can improve the SME's business performance and sustain competitive advantages. Thus, the objectives of this research had been achieved.

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Safety and Health Awareness Program among Employees in Palm Oil Mill Industry in Malaysia

Abd Rahman Ahmad (Corresponding author)
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia,
86400 Batu Pahat, Johor, Malaysia
arahman@uthm.edu.my

Nanthini A/P Ganesan
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia,
86400 Batu Pahat, Johor, Malaysia
mankuittho@yahoo.com

Alaa S. Jameel
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia 86400 Batu Pahat, Johor, Malaysia
salam.alaa23@gmail.com

Hairul Rizad Md Sapry
Faculty of Industry Logistics, Universiti Kuala Lumpur, Malaysia Institute of Industrial Technology,
81750 Masai, Johor, Malaysia
hairulrizad@unikl.edu.com.my

Abstract

The practice of occupational safety and health (OSH) culture can prevent workers from getting injured in any activities carried out as well as improving factory productivity. In the processing of palm fruit oil, the factory use large machines with high risk, this can cause accident resulting in death, permanent disability and without disability. Such accidents can happen if there is negligence by the employer and the employee during the course of the operation of the machine. There are three objectives of this study. Firstly, to determine the factors contributed to the Occupational Safety and Health (OSH) awareness program in Palm Oil Mill in Malaysia secondly was to identify the dominant factors contributed to the awareness program and finally to investigate whether the awareness program could reduce the accident. The scope of the study include Malaysian workers in Palm Oil Mill. The study were conducted using quantitative method. There were 63 sets of questionnaire distributed but only 56 were returned. The data obtained was analysed using the software Statistical Package for Social Science (SPSS). The results showed that the behaviour factor contributed to the Occupational Safety and Health (OSH) awareness program is very high and the objectives of this research were achieved.

Introduction

According Richardson and Richardson (2014), safety and health of workers at the firm are important and need to be prioritized by employers because it can reduce the cost of panel clinics, treatment after the accident, reduce the risk of lawsuits and motivate employees to improve productivity of the firm. Moreover, the employee is an important variable inputs in the production process needs to be given attention on the state of safety and health so that they can work in a safe and secure situation to improve satisfaction and utility in carrying out the assignment.

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Literature Review

According to Le bouar and Chauvin (2006) occupational safety and health (OSH) is a situation where an employee requires a work environment that is safe and healthy for themselves and others who may be affected by its activities. Risk management and safety and health can handle and improve morale and motivate employees while performing their duties and responsibilities in the workplace. Meanwhile, Reinhold et al, (2014), added that every action in implementing safety and health at work require strategic planning of the management. To complete the implementation of health and safety, management is divided into five parts, namely the establishment of safety and health, safety and health policies, health and safety hazard inspection, safety and health training and health and safety audit.

National Institute of Occupational Safety and Health (NIOSH) is a training, information and research centre for occupational safety and health (National Institute of Occupational Safety and Health, 2013). Since the training is one of the important components of accident prevention, NIOSH was set up with its main functions to serve as an institute which provide training and curriculum development, information dissemination, consultation and research and development (Zein, 2008). NIOSH not only provide the basic construction safety course, but also the special program which conducted for the operator of mobile and tower crane, and scaffold erectors. The activities are the expanded to include the regular Occupational Safety and Health training program at NIOSH's premises, conducting seminars at state levels for the small to medium scale industries, conducting in-house training programs for various industries and others (Centers for Disease Control and Prevention, 2011).

Safety and Health

Safety is a determination of the relative freedom of any risk and danger. Safety is also a degree of freedom of the risks and hazards in various industrial environments as well as freedom from danger, however, is difficult to avoid all danger. Some of the risks to be addressed and controlled easily compared with one another. Safety associated with a situation where it needs to be assessed and determined by the relevant cases such as the use of equipment that could be dangerous (Boholm, Möller, & Hansson, 2016).

Kankaanpaa (2010) have made clear that security considerations associated with the acceptance of the risk that it is a determinant of the risk of potential injury to employees. Safety is a condition that has a relationship with risk and danger. Therefore safety is an issue related to the protection from exposure to danger. Assessment of safety is determined by how the management control of any risks inherent in the industry and ensure that dangers can be avoided. Health refers to efforts to protect and liberate employees from any kind of illness that threatens their physical and emotional (Mondy and Noe, 2013). According to the World Health Organization (WHO), the World Health Organization in the context of the objectives is to improve and maintain the health of the mental, physical and social workers in all forms of employment. The disease caused by work can lead to all kinds of abnormal conditions caused by exposure to environmental factors work due to chronic illnesses such as heart disease, stress, disability or death by inhalation or direct exposure to toxic substances. Moreover, to prevent any workers from occupational diseases caused by work processes and work environment and control any risks caused by the work process and working environment (Bernardin and Russel, 2008; Myzabella et. al., 2019).

Employee perception of safety and health

The general perception is subjective and often zero is defined as a personal view of the subject. The perception of an individual's perception is different from one individual to another. It depends on how a person is faced with a problem in his belief. According to Toole (2001), the perception is defined as a mental process that is used to focus or pay attention to signs or stimuli selected. There are two types of social perception and perception of physical perception. Employee perception of safety and health (OSH) does exist among workers in the workplace. According to John et al., (2002), defines the perception of workers is the collection in terms of belief and human emotion which they now have to

work. Workers have high job satisfaction will give expression to his satisfaction towards the work they do. Positive thoughts and emotions affect the employment or work experience of an individual (Landy and Conte, 2008).

Research Framework

Research framework is a logically structured representation of the concepts, variables and relationship involved in scientific study with the purpose of clearly identifying what will be explored, examined measured or described. Hence, the current study examines the relationship between a set on independent and dependent variables.

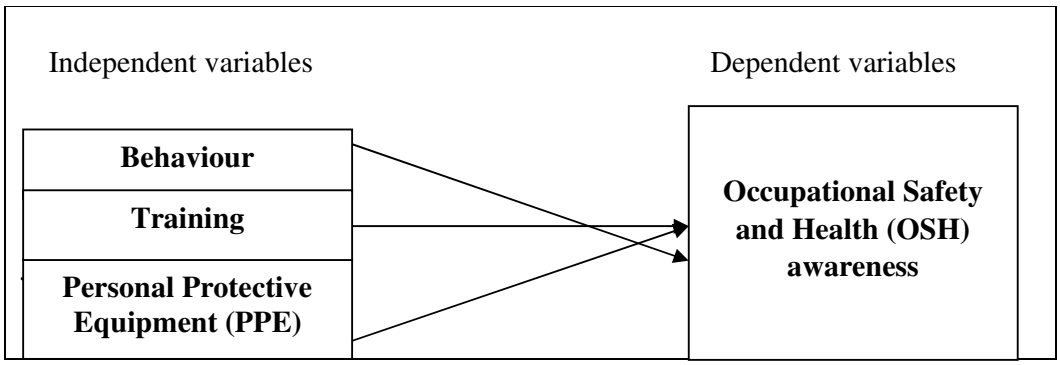

Figure 1: Research Framework Review

This research framework is developed based on Nasyrah Ibrahim et al., (2015) who used behavior as one of their model to find The awareness level of behavior based safety (BBS) in construction Industry. Hence, According to Ozturan & Kutlu (2010), they used training as one of their research framework to find out employee satisfaction of corporate e-training programs. Beside, personal protective equipment (PPE) is used in (Oguntona & Adedeji, 2012) to identify the awareness and use of personal protective equipment (PPE) and practice of safety precautions among funeral home workers in Lagos state.

Methodology

The population of this study focused on the Malaysian employees in Palm Oil Mill which located at Johor. Based on information obtained there are 75 Malaysian workers including management level, engineering department, production and operation department, quality control department and others which become a sample of the study.

Research instrumentation is a tool or medium used in conducting a study. Instrumentation consists of a few tools that are used to collect primary data. Among some of the common instrumentations were questionnaire forms. Questionnaire is a set of pre-established questions further to be answered by a number of respondents according to options and alternatives available, ultimately channel a series of feedback to researchers. Survey's result that subjects to ease of process and analyse attributes widely adoption of questionnaire survey. Data gathered process is rapid, simple, practical and dynamically relevant to research's objective.

Results and Discussion

Demographic background of those respondents who participated in answering the questionnaire were being analysed to get a clear view about which group or category of people had taken part in this study. The questionnaire consists of total 7 questions, asking for the details of the respondents which included

gender, age, race, length of service, academic level, have you ever participated in Occupational Safety and Health (OSH) training before and how many times have you followed the OSH training during your service in this company. The analysis of this section, findings in terms of frequency and percentage of the data collected from this research will be discussed.

The objective of this study is to explore the factor contribute to the Occupational Safety and Health (OSH) awareness program and to identify the dominant factors contribute to the awareness program and to investigate the awareness program could reduce the accident. Table 1 below shows that the summary results made based on the findings obtained. It shows that the objectives of the study are achieved and the question of the study made

Table 1: Summary of findings

No	Research objective	Research questions	Finding
1	To determine the factor contribute to the Occupational Safety and Health (OSH) awareness in Palm Oil Mill.	What are the factor contribute to the Occupational Safety and Health (OSH) awareness in Palm Oil Mill	Behavior, training and personal protective equipment (PPE) are the factor contribute to the Occupational Safety and Health (OSH) awareness in Palm Oil Mill
2	To identify the dominant factors contribute to the awareness program at Palm Oil Mill	What are the dominant factors contribute to the awareness program in Palm Oil Mill.	Employee behaviour toward safety has highest mean score and this factor most dominant for Palm Oil Mill (BBPOM).
3	To investigate the awareness program could reduce the accident in Palm Oil Mill.	Does the awareness program could reduce the accidents in Palm Oil Mill?	Yes. It does reduce the number of accidents in Bukit Palm Oil Mill. It is because the causes for accidents to happen have been explained in order to create the awareness for being safer at working place.

Employee training toward safety has mean score 4.32. According to Wachter (2013), safety training is a fundamental safety practice emphasized by most federal and state safety and health legislative bodies. Safety training works by increasing knowledge and awareness of safety and health in the workplace. There is considerable variation in the ways that safety training is designed and delivered. Employees can also use the knowledge gained in OSH training when performing tasks. However, there are still errors and accidents in the workplace. In addition, the assessment of the level of treatment is to determine whether the trainer transfers what is obtained during training to the workplace. Assessment at this stage needs to be done after the trainer completes the training and returns to work. A strong

rationale for the assessment of treatment is that someone who has succeeded in an undisciplined learning will apply what he has learned in the work of which positive transfers do not necessarily happen. Most effective training programs are not only dependent on employee behavior during training that may respond positively and negatively to the training being developed, but the effectiveness of the training depends on developing changes in work behavior.

Conclusion

Overall, this study was successfully completed as the question of the study and the objective of the study was achieved. The findings for this study are based on analysis from the data obtained from the Palm Oil Mill. All the factors used in this study are important and have an impact on the effectiveness of occupational safety and health (OSH) awareness programs within the organization. It is hoped that this study will benefit and benefit to the organization's production and human resources division in further enhancing the level of awareness of their employees. Additionally, some of the opinions and suggestion given in this study can also help further research in the future for those who are interested in the topics studied.

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Relation between the Introduction of Remote Teaching as a Result of the COVID-19 Pandemic and the Quality of the Academic Teaching of Accounting

Anna FUKS, MSc.
Wroclaw University of Economics and Business, Wroclaw, Poland,
anna.fuks@ue.wroc.pl

Abstract

The aim of this paper is to present the relation between the COVID-19 pandemic and the obligatory introduction of remote teaching and the quality of the academic teaching of Accounting. The aim was achieved through research. The selected research method was a survey questionnaire sent in an electronic form. The survey should be treated as a pilot study. It was carried out in 7 groups of first-year students pursuing a first cycle programme at a public institution of higher education in the field of Finance and Accounting (full-time and extramural modes) and Management (full-time mode), who attended classes in Financial Accounting run exclusively by the author of this survey during the summer term 2019/2020. The most important and crucial results of the survey permitted the formulation of new research hypotheses, which will be verified at successive stages of the research: (1) combination of elements of remote and traditional teaching (blended teaching) might lead to the best performance in teaching Accounting; (2) effective remote teaching cannot take place without building, sustaining, and improving proper interpersonal teacher–student relationships and, to an extent, relationships between students.

Keywords: teaching methods, remote teaching, blended learning, teaching Accounting

Introduction

In the initial months of 2020, Europe saw the arrival of the COVID-19 pandemic. As a result, many governments imposed various restrictions on social and economic activities. One of them was closure of higher education institutions by Polish authorities and introduction of obligatory remote teaching. Hence, the spread of COVID-19 considerably affected the way in which the academic community functioned. Remote education, which was merely an option in the early 2020, became the only possible solution during the pandemic.

This paper is an attempt at showing the influence of the introduced obligation to teach Accounting remotely on students' opinions and reactions as a measure of the quality of this type of teaching. The research is a pilot study carried out in July 2020, i.e. just after the summer term ended, when all remote classes finished and the students were properly examined.

The formulated hypothesis provided that the remote teaching of Accounting, despite the initial concerns about low quality of remote classes compared to the traditional ones voiced by students, could to a large extent replace the traditional teaching of Accounting and be of no lower quality. In order to verify the formulated hypothesis, research questions were asked in the survey questionnaire in the form of requests to indicate:

- the first reaction to the information about the necessity to have remote classes in Financial Accounting,
- the initial concerns and the actual drawbacks of such classes,
- the expected and real benefits from such classes,
- the opinion on the whole term with such classes,
- the preferred form of classes,
- the quality of the remote classes in Financial Accounting compared to other remote classes,

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- the intention to recommend the classes to other students,
- the willingness to attend other remote classes in Accounting.

The research questions in the survey questionnaire have the following forms:

- single choice questions,
- multiple choice questions with a request to select up to 4 out of a dozen or so possible answers – the variants included also the option of adding a new answer by the respondent to the variants mentioned in the survey questionnaire.

The presented results are only a part of the research on the opinions and reactions of students pursuing various programmes of study, without limiting the research to students pursuing programmes typically related to Accounting, and teachers concerning the application and effectiveness of diverse methods of the academic teaching of Accounting.

Remote teaching of Accounting in the context of the current pandemic

There have been numerous studies in the field of teaching Accounting in different forms to date. Already almost 10 years ago, researchers stated that e-learning in the teaching of Accounting could contribute to the development of self-reliance in students and perfectly fit into university teaching [Kasperowicz, 2011]. Moreover, the scholars admitted that most of the academic community accepted remote forms of teaching and treated them as the natural consequence of the development of ICTs, and the education model desired in that case was a model combining traditional teaching and elements of remote teaching [Lubina, 2009].

A term which has recently become popular in both the relevant literature and the economic practice is VUCA [Waller, Lemoine, Mense, Garretson, Richardson, 2019]. It is an acronym formed from the following words: volatility, uncertainty, complexity, and ambiguity, which briefly characterise the conditions in which the contemporary human being functions in different areas of the continuously changing environment. The COVID-19 pandemic is such an unprecedented situation that it has intensified and enhanced the idea behind the concept of VUCA environment. This is because the reality of people functioning in every imaginable environment changed almost overnight. The changes could not be avoided by the academia either and it became necessary to shift from traditional to remote classes very quickly. Therefore, teachers had to reorganise the way in which they ran their classes and adapt their teaching materials to the new reality overnight.

Hence, making use of the equipment provided to them by their higher education institutions, academic teachers running classes in Accounting had to devise, for their own use, such ways and methods of running classes as would ensure at least:

- the achievement of the best possible teaching effects,
- the maintenance of proper positive teacher–student relationships,
- the avoidance of a considerable deterioration in the quality of remote classes compared to traditional ones.

Results of the Conducted Research

The pilot study was carried out in July 2020 in 7 groups of first-year students pursuing a first cycle programme at the Wroclaw University of Economics and Business in the field of Finance and Accounting (full-time and extramural modes) and Management (full-time mode), who attended classes in Financial Accounting during the summer term 2019/2020. The person running the classes was the person carrying out the research.

The survey questionnaire was sent to 139 students electronically in a message addressed to students from individual groups by means of the MS Teams application in the Office 365 Education package, i.e. the one used for all remote classes. Completed questionnaires were returned by 80 subjects. Nevertheless, due to fact that the term ended and students logged in the remote teaching application

much less frequently, the study sample was considered representative and the pilot study was conducted.

The outcome was as follows:

Table 1: Results of the research

• What was your first reaction to the information about the necessity to have remote classes in Financial Accounting?		
definitely positive – 9%	positive – 15%	neutral – 61%
negative – 14%	definitely negative – 1%	
• What were your first concerns regarding the information about the necessity to have remote classes in Financial Accounting? [4 answers with the highest number of indications by the respondents out of 13 are presented]		
lack of direct contact with the teacher – 32	lower quality of remote classes compared to traditional ones – 40	
attendance in classes dependent on issues related to technology (hardware in working order, Internet access, etc.) – 36	lack of internal motivation and self-discipline to learn during the term – 40	
• What are the real drawbacks of remote classes in Financial Accounting in your opinion? [4 answers with the highest number of indications by the respondents out of 13 are presented]		
lack of direct contact with the teacher – 16	limited contact with other participants in the classes –23	
attendance in classes dependent on issues related to technology (hardware in working order, Internet access, etc.) – 29	lack of internal motivation and self-discipline to learn during the term – 34	
• What were the possible (expected) benefits from having remote classes in Financial Accounting in your opinion just after you received the information of the necessity to have them in this form? [4 answers with the highest number of indications by the respondents out of 11 are presented]		
time savings – 43	possibility to learn in any place – 56	
reduced costs of learning (commuting, photocopying notes, etc.) – 51	continuous access to teaching materials – 44	
• What are the real benefits from remote classes in Financial Accounting in your opinion? [4 answers with the highest number of indications by the respondents out of 11 are presented]		
time savings – 38	possibility to learn in any place – 51	
reduced costs of learning (commuting, photocopying notes, etc.) – 46	continuous access to teaching materials – 54	
• What is your opinion on the remote classes in Financial Accounting after the whole term?		
definitely positive – 68%	positive – 30%	neutral – 1%
negative – 1%	definitely negative – 0%	
• In the winter term, you attended traditional classes in Accounting run by another teacher. In the current term, in turn, you attended remote classes (in a majority of cases) in Financial Accounting. If you were to compare the form of running both of the classes, which would you rate higher?		
Accounting (traditional classes) – 23%	Financial Accounting (remote classes) – 65%	
none of these – 12%		
• How do you rate the classes in Financial Accounting compared to other remote classes which you attended during the current term?		
definitely higher – 67%	higher – 29%	neutrally – 4%
lower – 0%	definitely lower – 0%	
• Would you recommend attendance in remote classes in Financial Accounting to other students?		

definitely yes – 45%	yes – 40%	neither yes nor no – 13%
no – 2%	definitely no – 0%	
• Would you like to attend other obligatory classes in Accounting remotely again (in the future)?		
definitely yes – 30%	yes – 34%	neither yes nor no – 20%
no – 16%	definitely no – 0%	

Assessment of the Value of the Findings

The formulated hypothesis was verified positively in the course of the conducted research. The remote teaching of Accounting, despite the initial concerns about low quality of remote classes compared to the traditional ones voiced by students, could to a large extent replace the traditional teaching of Accounting and be of no lower quality.

The highest percentage of the examined group described their first reaction to the information of replacing traditional classes with remote ones as neutral. Only 1 respondent indicated a definitely negative reaction. In most cases, the subjects' indications of their initial concerns coincided with their indications of the real drawbacks of remote classes. However, it needs to be noted that:

- despite the initial concerns about the low quality of classes voiced by 40 respondents (50%), only three subjects confirmed that this was the real drawback of such classes, and so the respondents' concerns did not materialise,
- in the question about the real drawbacks of such classes, the number of the respondents who indicated the lack of direct contact with the teacher decreased by a half (a drop from 32 to 16 indications) – the teacher was in touch with the students also outside the class time by exchanging chat messages and having voice calls during consultations,
- limited contact with other participants in the classes was indicated as a real drawback.

The subjects' indications that attendance was dependent on issues related to technology also seem to be significant. If a respondent's computer (or another hardware used by the student for e-learning purposes) was out of order, or he or she did not have a microphone or loudspeakers, or had problems with Internet access, his or her ability to actively participate in classes was largely hampered. Such cases occurred, however, very rarely in practice.

Nevertheless, one of the challenges related to the introduction of effective remote education should be counteracting digital exclusion, which – in extreme cases – could result in educational exclusion of impecunious students. On the other hand, remote teaching might contribute to reduced social exclusion. This is because it could lead to popularisation of education among the disabled since an educated person is more likely to find a place for themselves in the society [Hołowiecki, 2014].

It should be mentioned that 78 out of 80 respondents expressed their definitely positive and positive opinions on the remote classes in Financial Accounting after the whole term. Only 1 person described his or her opinion as negative.

Moreover, more than 95% of the subjects rated the remote classes in Financial Accounting definitely higher and higher than classes in other subjects run in the same form. None of the subjects rated the classes lower or definitely lower. Additionally, more than 85% of the respondents would recommend attending in the classes to other students. 3 respondents would not do so (2%).

The highest percentage of the subjects (64%) declared that they would be willing to attend other remote classes in Accounting in the future. Other subjects, despite their positive opinions on the analysed classes, indicated that they were undecided (20%) and that they would not want to participate in such classes (16%), which might result primarily from the drawbacks of remote classes they indicated.

Conclusion

As a result of the analysis of the first part of the obtained results of the survey and as an effect of the conclusions drawn from it, it is possible to formulate new hypotheses, which will be verified at the successive stages of the research: (1) combination of elements of remote and traditional teaching might lead to the best performance in teaching Accounting; (2) effective remote teaching cannot take place without building, sustaining, and improving proper interpersonal teacher–student relationships and, to an extent, relationships between students.

It must be emphasised here that the results are only a part of the research on the opinions and reactions of students and teachers regarding the application and effectiveness of diverse methods of the academic teaching of Accounting. At the stage of further research, individual research groups will be analysed separately with the specification of the mode, field, year, and cycle of study. Moreover, more attention will be given to the dependence of the opinions and reactions of the individual groups under study on the applied method of teaching Accounting in the context of the subjects' sex and age.

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Towards The EU-Wide Non-Financial Reporting Standards: What Do Stakeholders Say?

Joanna KRASODOMSKA

Cracow University of Economics, Krakow, Poland

joanna.krasodomska@uek.krakow.pl

Abstract

The Directive 2014/95/EU is unquestionably an important step towards the development of non-financial reporting in the EU. However, the minimum harmonization approach and the considerable flexibility as regards the reporting frameworks that might be used by companies have resulted in a situation where stakeholders' information needs are not sufficiently met. Therefore, the European Commission (EC) announced the possibility of the introduction of a new set of European non-financial reporting standards (ENFRS). This paper aims to present the EU approach to the corporate non-financial disclosures in the Directive 2014/95/EU context, and the stakeholders' views on the new ENFRS. 588 responses obtained during the EC consultation process organized in February - June 2020 were analyzed. Research findings indicate that the ENFR should be based on the Task Force on Climate-related Financial Disclosures (TCFD) recommendations, developed by the body with the financial reporting expertise and with the active participation of preparers and investors. Also, the SMEs should be required to provide non-financial disclosures. The study contributes to the sustainability literature by providing new insights into the stakeholder views on the regulation of the non-financial disclosure and indicating possible avenues for future research.

Keywords: Directive 2014/95/EU, non-financial reporting, stakeholder engagement

Introduction

In October 2014, the European Union (EU) adopted the Directive 2014/95/EU. The Directive aimed to "increase the relevance, consistency, and comparability of information disclosed by certain large undertakings and groups across the Union" (EU, 2014, Introduction par. 21). Starting from 2018, around 6,000 large public interest entities (PIEs) in the EU, with an average of 500 employees or more, disclose non-financial information about their practices concerning environmental matters, social and employee-related issues, respect for human rights, and anti-corruption and bribery. Non-financial disclosures can be presented in the management commentary or in a separate report. They include a description of the company's business model, non-financial policies, as well as non-financial key performance indicators (KPIs).

According to the Directive 2014/95/EU, reporting companies can follow two sets of guidelines issued by the EC (2017, 2019) as well as various national, EU-based, and international recommendations. For example, EC guidelines (2017) reference 21 organizations involved in non-financial reporting and non-financial reporting frameworks (CDP (formerly the Carbon Disclosure Project); the Climate Disclosure Standards Board (CDSB); the OECD Due Diligence Guidance for Responsible Supply Chains from Conflict-Affected and High-Risk areas, and the supplements to it; the Eco-Management and Audit Scheme (EMAS) and the related Sectoral Reference Documents; the European Federation of Financial Analysts Societies' KPIs for Environmental, Social, Governance (ESG), a Guideline for the Integration of ESG into Financial Analysis and Corporate Valuation; the Global Reporting Initiative (GRI); Guidance for Responsible Agricultural Supply Chains of FAO-OECD; Guidance on the Strategic Report of the UK Financial Reporting Council (FRC); Guidelines for Multinational Enterprises of the

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Organization for Economic Cooperation and Development (OECD); Guiding Principles Reporting Framework on Business and Human Rights; ISO 26000 of the International Organization for Standardization; the International Integrated Reporting Council (IIRC) Framework; Model Guidance on reporting ESG information to investors of the UN Sustainable Stock Exchanges Initiative; the Natural Capital Protocol; Product and Organization Environmental Footprint Guides; the Sustainability Accounting Standards Board (SASB) standards; the Sustainability Code of the German Council for Sustainable Development; the Tripartite Declaration of principles concerning multinational enterprises and social policy of the International Labor Organization; the United Nations (UN) Global Compact; UN Sustainable Development Goals (SDGs), Resolution of September 25 2015 transforming our world: the 2030 Agenda for Sustainable Development; UN Guiding Principles on Business and Human Rights implementing the UN 'Protect, Respect and Remedy' Framework), which might be well used by companies, and this is not a definite list.

The Directive 2014/95/EU gives the Member States and companies a lot of flexibility. Still, at the same time, it is somewhat contradictory to the above-indicated aim of increasing the comparability of the information disclosed. As Venturelli *et al.* (2019) argue, the real role of the Directive was not to introduce a set of non-financial reporting rules but rather to provide a way to harmonize the content of non-financial disclosures to achieve a higher degree of information comparability (La Torre *et al*., 2018). However, the possibility of using different accounting standards presents several limits to achieving a sufficient degree of harmonization across the Member States. Although this minimal approach to harmonization has obvious advantages, the lack of a common standard may not help to improve the non-financial reporting transparency (Farneti *et al*., 2018, Muserra *et al*., 2019).

Out of the reporting frameworks referred to by the EC (2017), the GRI guidelines are used most widely. Recently, several initiatives have been put forward that aim at aligning GRI and other non-financial guidelines. One of them is *Better Alignment Project* (GRI, 2019). Within this project, CDP, CDSB, GRI, IIRC, and SASB are joining their efforts to drive better alignment of sustainability reporting frameworks, initially focusing on aligning standards with the recommendations published by the Task Force on Climate-related Financial Disclosures (TCFD). Another initiative is the publication of the *Sustainable Developments Goals Disclosure (SDGD) Recommendations* (Adams *et al.*, 2020), which align SDGs to the TCFD recommendations, the GRI Standards, and the IIRC International <IR> Framework. GRI and UN Global Compact also jointly issued a *Practical Guide to promote and facilitate corporate reporting on the SDGs* (GRI, UN Global Compact, 2020). Despite the apparent benefits of these initiatives, the idea of more standardized non-financial disclosure requirements appeared on the EU agenda.

On January 30, 2020, the EC published an initial, high-level roadmap for a consultation about possible changes to the Directive 2014/95/EU. In the related communication, EC stressed that the non-financial disclosures are not sufficiently comparable or reliable; they do not meet the stakeholders' information needs adequately, and companies providing them often incur unnecessary and avoidable costs. The causes for these problems are not sufficiently detailed Directive requirements, myriad of overlapping and sometimes inconsistent private non-financial reporting frameworks and standards, as well as the lack of enforcement (EC, 2020b). The process of consultation on potential revisions to the Directive that followed includes the possibility of establishing a new set of European non-financial reporting standards (ENFRS). The preparatory work is to be carried out by a multi-stakeholder Project Task Force (PTF) appointed by the European Financial Reporting Advisory Group (EFRAG). Therefore, the widely disputed issue of the legal status of non-financial reporting in the EU has become very up to date again (EFRAG, 2020).

This paper aims to present the EU approach to the corporate non-financial disclosures in the Directive 2014/95/EU context, and the stakeholders' views on the new ENFRS. This descriptive study uses 588 responses collected during the recent consultation process launched by the EC and provides new insights into the non-financial reporting landscape in the EU. It also indicates future research possibilities related to the unification of corporate non-financial disclosure practices.

The work is structured into three sections. The next section describes the mandatory, voluntary and *comply or explain* approaches to the non-financial disclosures and the role of stakeholder engagement in the reporting process. The section that follows provides information on the opinions about the introduction of the new common ENFRS expressed by the stakeholders participating in the consultations on possible changes to the Directive 2014/95/EU. The last section offers conclusions together with an indication of the potential avenues for future research.

Mandatory, voluntary or *comply or explain* approaches to the non-financial disclosures and the role of stakeholder engagement

There is an acknowledged need for access to reliable and comparable sustainability reporting. However, there is also a general lack of agreement on whether it should be mandatory or voluntary, and both approaches have certain advantages and disadvantages. When it comes to practice, despite the mixed opinions on that matter, it is observed that the voluntary approach is supported by the business. In contrast, stakeholders support a mandatory approach (Krasodomska *et al*., 2020).

The debate on voluntary versus mandatory non-financial reporting has been present in the literature (Stubbs and Higgis, 2018; Doni et al., 2019). The arguments in favor of the voluntary approach include its potential positive outcomes as regards corporate costs and social benefits (Gatti *et al.,* 2018). Regulation of non-financial reporting is seen as an unnecessary burden because companies' decisions to provide it are driven by the need to meet their stakeholders' expectations and legitimize their existence (Fallan and Fallan, 2009). So they would report even without legal obligation. However, the voluntary approach is also widely criticized due to the lack of transparency, credibility, comparability, accuracy, neutrality, objectivity, and the *ad hoc* nature (e.g., Stubbs and Higgis, 2018). Although non-financial reporting guidelines usually encourage reporters to use quantitative metrics (such as KPIs), voluntary reporting has tended to be heavily narrative and qualitative. What is more, voluntary disclosures are often released at different times than financial statements (e.g., on a less-than-annual basis), which makes an integrated analysis of financial and non-financial information difficult (Ho, 2017).

The positive consequences associated with the mandatory approach are better comparability and higher quality of the disclosures and an increase in organizations' accountability (Overland, 2007; Buhr *et al.,* 2014; Thirarungrueang, 2013, Gatti *et al*., 2018). However, legal regulations are also perceived as resulting in a reactive approach to non-financial issues and not a proactive approach. More specifically, mandatory disclosure might result in the reduction of corporate creativity and engagement in non-financial practices, and thus making them less effective (Gatti *et al*., 2018). Companies forced to provide mandatory disclosures are more likely to take the "tick-the-box" approach. The other possible drawbacks are high costs and a lack of independent assurance.

As regards the EU setting, the Directive 2014/95/UE is often referred to as a document, which has introduced mandatory non-financial reporting to the Member States (see, e.g., Matuszak and Rożańska, 2017; Caputo *et al*., 2019). However, the approach used in communication is *comply or explain.* As Ho (2017, p. 330) states, "*Comply or explain* (…) represents an intermediate approach to regulation, and there is some divergence of views on whether comply or explain is in fact a mandatory or voluntary approach." It might be seen as mandatory to the extent that all companies must either *comply or explain* why they did not comply based on the same code provisions. At the same time, because conformity to the code is not required, the codes themselves represent a form of soft law or self-regulation. It leads to the situation where *comply or explain* approach might be seen as neither fully mandatory nor entirely voluntary. Therefore, it is an attractive alternative in the EU context, where both flexibility and consistency are important, whether across jurisdictions or firms (Ho, 2017). The flexibility of a *comply or explain* approach to disclosure also makes it particularly well-suited to non-financial reporting, which is, to a large extent, driven by the industry in which a company operates and its specific characteristics (internal context). The principles-based disclosure approach also fits better with the nature of non-financial information, whether through regulatory guidance or a *comply or explain* disclosure regime, rather than prescriptive "one-size-fits-all" reporting rules.

In the situation where there is considerable flexibility as regards corporate reporting decisions, stakeholder engagement is seen as a crucial element of effective corporate communication. De Villers (2018) provides evidence that investors and other stakeholders not only use it in their investment decisions but also can demand such disclosures from companies. The GRI or IIRC reporting frameworks require that organizations establish who their stakeholders are and then engage with stakeholders to ascertain what material sustainability information should be disclosed. In line with this view, while issuing the Directive 2014/95/EU, the legislator assumed that the investors and other stakeholders would put pressure on corporate managers toward conducting business in a more sustainable way. This shift in companies' practice, in turn, was expected to result in the availability of reliable non-financial information provided by companies with the use of the available frameworks. It seems that by choosing the significantly cheaper minimum harmonization approach, not supported by detailed rules and standards on the collection and processing of the information, EC, in the end, did not obtain significant effects (Szabó and Sørensen, 2015). As noted in the EC communication (EC, 2020b), market pressures on their own have not proven to be sufficient to ensure that companies report the non-financial information that stakeholders say they need.

Stakeholders' opinions on the introduction of the new ENFRS

On February 20, 2020 the EC launched a public consultation to collect the views of stakeholders about possible revisions to the provisions of the Directive 2014/95/EU. In particular, the EC was seeking the opinions of preparers of reports containing non-financial information and of the end-users of such published information. The consultation period ended on June 11, 2020, and a total of 588 responses were received (EC, 2020a).

The selected results of the survey, according to the respondents groups' views are presented below. Because some responses were anonymized or incomplete, the final sample is smaller than the total number of consultation participants and varies across problems raised. The main stakeholders' groups were: academic/research institutions (e.g., universities, law schools), business associations (e.g., investment funds, banking associations, CIMA, BDO, accounting associations, insurers associations), company/business organizations (e.g., Microsoft Corporation, PepsiCo Europe, E&Y, PwC, KPMG, Daimler AG), NGO (e.g., WWF Deutschland, CSR Europe, World Business Council for Sustainable Development, Sustainability Accounting Standards Board, International Integrated Reporting Council, Transparency International UK, Climate Disclosure Standards Board), public authorities (e.g., European Securities and Markets Authority, national banks, member states' ministries, and supervisory authorities), trade unions (e.g., European Trade Union Confederation). The responses to the majority of questions were given on a scale from 1 to 4.

Table 1 presents the stakeholders' opinions on the extent of the incorporation of the existing reporting frameworks into the ENFRS. The mean of the scores assigned by the respondents is the highest with regard to the TCFD (3.40), which indicates that it is the most relevant framework on which the new standards could be based. The most popular GRI guidelines were assigned a lower score (3.23). Surprisingly, the <IR> Framework is seen as useful to some extent but not much in the development of the ENFRS. At the same time, the highest variability in the responses is observed in relation to this option (the coefficient of variation ratio equals 0.36).

Table 1: The respondents' opinions on the extent of the incorporation of the existing reporting frameworks into the ENFRS (N=268)

	Mean*	Standard Deviation	Variance	Coefficient of variation
GRI Standards	3.23	0.78	0.60	0.24
SASB Standards	2.90	0.82	0.68	0.28
IIRC <IR> Framework	2.56	0.92	0.85	0.36
TCFD Recommendations	3.40	0.74	0.55	0.22

**1= not at all, 2= to some extent but not much, 3= to a reasonable extent, 4= to a very great extent.*

Source: own calculations based on EC (2020a)

Table 2: The stakeholders' groups opinions on the extent of the incorporation of the existing reporting frameworks into the ENFRS

	N	GRI Standard Mean*	SASB Standards Mean*	IIRC <IR> Framework Mean*	TCFD Recommendations Mean*
Academic/Research institutions	17	3,06	2,59	2,76	3,00
Business associations	74	3,31	2,89	2,43	3,39
Company/Business organizations	89	3,13	2,93	2,58	3,47
NGOs	54	3,11	2,94	2,48	3,39
Public authorities	20	3,35	2,80	2,70	3,45
Trade unions	14	3,86	3,00	2,86	3,50

**1= not at all, 2= to some extent but not much, 3= to a reasonable extent, 4= to a very great extent*

Source: own calculations based on EC (2020a)

The analysis of the answers according to the respondents' groups allows stating that the stakeholders, who, to the largest extent, share the view that TCFD should be taken into consideration while developing the ENFRS, were business (business associations, companies and business organizations), NGOs, and public authorities' representatives. Academia and research institutions' members and trade unions representatives were more convinced that the future standard could be based on GRI guidelines (table 2).

Table 3: The stakeholders' groups opinions on the extent to which the body responsible for developing ENFRS should also have expertise in the field of financial reporting (N=327)

	N	Mean*	SD	Variance	Coefficient of variation
Academic/Research institutions	21	3.57	0.68	0.46	0.19
Business associations	92	3.41	0.68	0.46	0.20
Company/Business organizations	107	3.50	0.65	0.42	0.19
NGOs	63	3.40	0.55	0.31	0.16
Public authorities	27	3.44	0.64	0.41	0.19
Trade unions	17	3.06	0.24	0.06	0.08
Total sample	327	3.43	0.63	0.40	0.18

**1= not at all, 2= to some extent but not much, 3= to a reasonable extent, 4= to a very great extent*

Source: own calculations based on EC (2020a)

Table 3 presents the respondents' answers to the questions regarding the need to involve financial reporting specialists in the process of the development of a new ENFRS. The mean values of the scores assigned are higher than the mean value of 3.0, which suggests a positive attitude of the respondents towards the need to engage a body with the expertise in financial reporting in this process. Primarily, academics/researchers and companies/business organizations' representatives have supported this idea (mean scores are 3.57 and 3.50, respectively). The values of the coefficient of variation ratio are low, which indicates that the respondents were quite unanimous in their opinions.

Table 4: The respondents' opinions on the extent to which the various stakeholders' groups should be involved in developing ENFRS (N = 277)

	Mean*	SD	Variance	Coefficient of variation
Investors	3.57	0.72	0.52	0.20
Preparers	3.72	0.58	0.33	0.16
Auditors/ Accountants	3.08	0.80	0.64	0.26
Civil society representatives/ NGOs	3.03	0.84	0.71	0.28
Academics	2.79	0.86	0.73	0.31
National accounting standards-setters	2.74	0.91	0.83	0.33
Environmental authorities	2.62	0.97	0.93	0.37
Total sample	3.08	0.91	0.82	0.29

**1= not at all, 2= to some extent but not much, 3= to a reasonable extent, 4= to a very great extent*

Source: own calculations based on EC (2020a)

The survey showed that preparers and investors are the stakeholders' groups, which should be involved to a most significant extent in developing the new ENFRS (mean score 3.72 and 3.57, respectively) (Table 4). The inputs of such groups as environmental authorities, national accounting standards-setters, and academics are not seen as very relevant (mean score below 3.0). At the same time, the stakeholders' opinions on the involvement of the environmental authorities are the most diversified. The coefficient of variation ratio equals 0.37 and is higher than for the whole sample (0.29).

Table 5: The stakeholders' opinions on the extent to which the various stakeholders groups should be involved in developing ENFRS

	N	Investors – Mean *	Preparers - Mean *	Auditors/ Accountants - Mean *	Civil society representatives/ NGOs -	Academics - Mean *	National accounting standards-setters - Mean	Environmental authorities - Mean *
Academic/Research institutions	20	3,20	3,50	3,25	3,60	3,55	3,00	3,15
Business associations	78	3,60	3,90	3,09	2,56	2,44	2,65	2,19
Company/Business organizations	90	3,83	3,86	3,14	2,87	2,64	2,82	2,53
NGOs	50	3,66	3,62	2,90	3,58	3,06	2,74	2,90
Public authorities	24	3,63	3,71	3,38	3,17	3,29	2,92	3,04
Trade unions	15	1,93	2,60	2,53	3,67	2,73	2,07	3,00
Total sample	277	3,57	3,72	3,08	3,03	2,79	2,74	2,62

**1= not at all, 2= to some extent but not much, 3= to a reasonable extent, 4= to a very great extent*

Source: own calculations based on EC (2020a)

The analysis of the opinions by the respondents' groups allows concluding that businesses, NGOs, and public authorities see investors and preparers as the most important stakeholder groups as regards the ENFRS development process. Civil society representatives are perceived as important by academics, researchers and trade unions representatives. Businesses do not see the engagement of environmental authorities in the work on ENFRS as necessary. The mean scores assigned to environmental authorities by business associations and company/business organizations are 2.19 and 2.53, respectively. NGOs,

public authorities and academic/research institution members do not consider the involvement of national accounting standard setters as relevant.

Two questions in the survey were about the extension of the Directive's scope to encompass the SMEs. According to the respondents, the simplified standard and/or reporting format for SMEs should be introduced (table 6). Out of the 290 persons providing answers to this question, 89% expressed such an opinion.

Table 6: The stakeholders' opinions on the introduction of the simplified standard and/or reporting format for SMEs (N=290)

	N	Yes	No
Academic/Research institutions	19	15	4
Business associations	84	74	10
Company/Business organizations	94	66	6
NGOs	51	48	3
Public authorities	26	24	2
Trade unions	16	8	8
Total	290	257	33

Source: own calculations based on EC (2020a)

At the same time, the stakeholders' views on whether the simplified standard for SMEs should be mandatory or voluntary were quite diversified. Only 166 respondents out of 301 who expressed their opinions (55%) agreed that it should be mandatory (table 7).

Table 7: The stakeholders' opinions on whether the simplified standard for SMEs should be mandatory or voluntary

	N	No opinion	Mandatory	Voluntary
Academic/Research institutions	21	1	12	8
Business associations	99	8	30	61
Company/Business organizations	104	14	48	42
NGOs	71	14	44	11
Public authorities	27	1	15	11
Trade unions	17	0	17	0
Total	**339**	**38**	**166**	**135**

Source: own calculations based on EC (2020a)

Interestingly, more business associations' members share the view that it should be voluntary rather than mandatory (61 and 30, respectively). Company/business organizations' responses are almost equally divided: 48 respondents from this group opted for a mandatory, and 42 for a voluntary approach.

Conclusions and indication of future research possibilities

The EU initiative aimed at developing new ENFRS will introduce another reporting framework to a myriad of these that already exist. The question is, will it be truly mandatory, voluntary or introduced on the *comply or explain* basis. Given the nature of the EU, flexibility is an important advantage of the *comply or explain* approach. However, the experiences gained with regard to the EU Member States companies' non-financial disclosure practice and the need to make the disclosures more comparable may be an argument leading toward a more regulated approach.

The first stakeholders' reactions to the idea of developing ENFRS seem positive. According to the respondents' views, they might be based on the TCFD Recommendations to a larger extent than on the most popular GRI guidelines or <IR> Framework. TCFD recommendations, established in June 2017,

are "designed to solicit consistent, decision-useful, forward-looking information on the material financial impacts of climate-related risks and opportunities, including those related to the global transition to a lower-carbon economy" (TCFD, 2020). They are widely recognized as authoritative guidance on the reporting of financially material climate-related information and implemented into the national frameworks of several countries, including the EU Member States. TCFD Recommendations were also the basis of the EC guidelines on climate change issued in 2019 (EC, 2019). This opinion to use them when designing the new ENFRS is especially eagerly put forward by business representatives and might indicate their climate-change-related concerns. However, at the same time, the involvement of environmental authorities in the standard development process is not seen by them as necessary.

The low acceptance of the <IR> Framework as a concept that should be incorporated into the ENFRS might be explained by the fact that it is still a developing idea, which is currently under the revision process. What is more, despite several similarities between the Directive 2014/95/EU and the <IR> Framework (e.g., KPIs, business model), both initiatives are seen as having different addressees (providers of financial capital vs. stakeholders) and competing to some extent (Monciardini *et al*., 2017).

The need for the body responsible for developing ENFRS to have expertise in the field of financial reporting was unanimously supported by the respondents. In their opinion, preparers and investors should be the groups most extensively involved in their design. This finding indicates that the non-financial issues are relevant to the financial profession. Placing the responsibility for the development of the new non-financial reporting framework within the scope of their tasks and interests is supported by the stakeholders. They also acknowledge the need to extend the regulation scope beyond the large PIEs. According to the respondents' views, the simplified standard and/or reporting format for the SMEs should be introduced, but there is no evident agreement that it should be mandatory.

Given the fact that the current situation as regards the available non-financial reporting frameworks is very complex, the idea to develop a new ENFRS seems reasonable. Despite the various alignment initiatives, the companies might feel confused about which standards, guidelines or recommendations they should follow. Apart from the international and EU-based frameworks, they can also choose local guidance. Despite being understandable, this flexibility does not contribute to the comparison of non-financial reporting across the Member States. However, the development of the ENFRS should take into consideration the stakeholders' needs and opinions and should proceed with their engagement.

Despite the limitations, such as the descriptive character of the study, the paper's findings might be relevant to the researchers and practitioners interested in the future of the non-financial reporting. They might serve as a starting point for the subsequent research. Possible research questions might be as follows:

RQ1: Are there significant differences between the preparers' and users' opinions concerning the development of the new ENFRS or regulation of the non-financial reporting in general?

RQ2: What drives the reporters' decision to choose one non-financial reporting framework over another?

RQ 3: What is the role of academia and research institutions members in shaping the non-financial reporting landscape in the EU?

RQ 4: How do the Member States' characteristics (culture, economic and social development, religion, law system, capital market development, etc.) influence the opinions on the need for the new NFRS or regulation of the non-financial reporting in general?

Last but not least, the current COVID-19 pandemic might provide a new perspective to the research on corporate non-financial practices and disclosures. The way the companies will respond to the COVID-19 crisis, and the extent to which the non-financial issues will be considered in their strategies can shape the future of the non-financial reporting.

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Business Motivation Model for Information System Architecture Development Support

Malgorzata PANKOWSKA

University of Economics in Katowice, Katowice, Poland
pank@ue.katowice.pl

Abstract

Since the beginning of business management, optimization of enterprise's performance has been recognized as its main objective. However, a suitable motivation models had to be implemented to achieve that goal. This paper aims to present discussion on Object Management Group (OMG) Business Motivation Model (BMM) in theory and in practice. This model is confronted with ArchiMate model and Influence Diagram. The main finding is that discussed models expressed motivation comparably. Finally, SME Accountancy Bureau case study is presented to support conclusions.

Keywords: ArchiMate, Influence Diagram, Business Motivation Model, Accountancy Bureau.

Introduction

While business modelling does not provide business value per se, it serves as the backbone for many information system development projects and as such, can be considered a valuable discipline. In general, business models support communication among stakeholders, and aid their training and learning, persuasiveness and business situation analysis, compliance management, software requirements analysis, and knowledge management and reuse (Bridgeland and Zahavi, 2009). Business models are developed to present different organizational elements, e.g., business goals, organizational structure, business processes and rules. A model is always a certain abstract view of fragmented reality and as such is accepted as valid if it meets all the necessary constraints. The main focus of this paper is Business Motivation Model (BMM) (OMG, 2015), which describes what a business is going to accomplish. This model is considered in a business context, including business environment, strategy, stakeholders, resources, principles and assessments. The paper consists of four parts. The first part contains discussions on motivation of individuals and the whole business organizations. Next part focuses on motivation in business analysis and enterprise architecture (EA) frameworks, in ArchiMate model (The Open Group, 2019), and in Influence Diagram (ID) (Hall, 2010). The third part includes literature review on the Object Management Group (OMG) BMM. This article summarizes the twelve years of business motivation modelling experiences, taking into account the publications in prominent repositories of research papers. Finally, a case study of small and medium enterprise (SME) accountancy bureau is discussed and its business motivation models are presented.

Individual vs. Business Motivation

Generally, people perceive motivation in a positive aspect. Motivation is assumed as vital for social organization development and internal cooperation of its members. The factors, which encourage people to work intensively and creatively, are personal achievements, recognition, advancement, money and power. The need of power is the desire to have impact on other people, to be influential and recognizable, remembered, and to control others. Beyond that, motivation is defined as a mechanism, which influences people to reach organizational or community goals. The concept of motivation is particularly related to the business context and it includes the impact on work behaviour of the environmental factors, as well as business unit capacity, capability and competencies of individual employees (Gaque et al. 2014). The most popular motivation theories are as follows:

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- Maslow's Need Hierarchy, which orders the priorities, i.e., physiological needs, safety and security, associations with others, receiving acknowledgement from others, and self-actualisation needs;
- McClelland's Needs Theory, emphasizing the value of personal achievements pushing people to goals despite difficulties, and low rewards;
- Herzberg's Motivator-Hygiene Theory, according to which the achievements, recognition, the job itself, responsibility and advancement opportunities are encouraging people to huge efforts. Herzberg perceived institutional politics, the management methods, supervision, payments, relationships at work, and work conditions as demoralizing factors (Badubi, 2017);
- Vroom Expectancy Theory, which explains that motivation is a product of Valence (i.e., how much an individual wants a reward), Expectancy (i.e., probability that the effort will result in successful performance), and Instrumentality (i.e., estimation that performance will result in receiving the reward).

Business units' motivations concern business strategy, market, stakeholders, current and future economic situation in the enterprise location. At the top of hierarchy of business motives is to stay in market, survive or develop, maximize benefits for the owners and for other stakeholders. There are some other similar questions concerning motivations of business information systems development and the questions are just as important for system analysts, developers, and users. Business organizations choose one of the following strategies, i.e., aggressiveness, proactiveness, leadership, defensiveness, riskiness, market niche, low costs, or elimination of competitors (Bhattacharya, 2018). Business motivations results from these strategies and simultaneously they also play a role in creating business strategy, particularly business strategic goals and information processing strategic goals.

Motivation in Enterprise Architecture Frameworks

The Basic Motivation Model by Rheinberg (2008) explains human behaviour as a result of the current motivation. Motivation emerges from an interaction between personal values, goals, and needs, and the perceived potential incentives in a current situation. For example, analyses of e-business user's behaviour and motivations are useful for business forecasts formulation. Therefore, business analysts should ask:

- What personal motives drive users in online business to engage?
- How do the personal motives interact with incentives provided in online business?
- In what type of motivation do they result and what kind of engagement is achieved by what type of motivation?

In these questions, answers concern customers' behaviour, but beyond that, a similar set of questions can be formulated for business organizations. Business motivation is discussed and presented in enterprise architecture (EA) frameworks. The term "enterprise" is identified with a company, business organization or governmental institution. According to Robins, an enterprise is considered as a "consciously coordinated social entity, with a relatively identifiable boundary that functions on a relatively continuous basis to achieve a common goal" (Hoogervorst, 2009). The enterprise architecture is defined as a strategic information asset base, which defines the business mission, the information and technology necessary to perform the mission, the processes for implementing new technologies in response to the changing mission needs (Stenzel, 2007). For an enterprise, architectural framework as a conceptual structure related to a certain system type consists of areas of concern and a necessary and sufficient set of design domains. There are many frameworks that support the EA modelling and development, but only some of them (e.g., Zachman Framework, ZF, The Open Group Architecture Framework, TOGAF) consider the issue of motivation for architecture development. The ZF defines a basic structure for organizing business architecture through dimensions such as data, function, network, people, time, and motivation (Zachman, 2010). Zachman proposes the ontology for the creation of EA through negotiations among several actors. The ZF presents various views and dimensions of the enterprise architecture in a matrix form. It includes the following levels (i.e., rows) : Scope (contextual, planner view), Enterprise Model (conceptual, owner

view), System Model (logical, designer view), Technology Model (physical, builder model), Detailed Representation (out-of-context, subcontractor view), and Functioning Enterprise (user view). The lower the row, the greater the degree of detail of the level represented. The ZF model works with six aspects of the EA (i.e., columns): Data (what), Function (how), Network (where), People (who), Time (when), Motivation (why). All the views create a complete picture of the enterprise. The question "why" is asked at each level to explain the motivations of enterprise to develop the EA. This reveals the enterprise goals, business plan, and business rules.

Beyond enterprise architecture framework, business motivation issue is also included in business guidelines, i.e., BABOK, Business Analysis Body of Knowledge (BABOK, Guide 3, 2015), EABOK, and Enterprise Architecture Body of Knowledge (EABOK, 2004). Although BABOK primary goal is to define the profession of business analyst and provide a set of commonly accepted practices, this guide emphasizes the meaning of company's reputation value and employee morale. Therefore, these can be considered as motives of business and information system development. The EABOK presents the idea of drivers, which are stimulants for business and architecture development. The same concept is also included in the Federal Enterprise Architecture Framework (FEAF) (FEAF, 2012) and in ArchiMate language (The Open Group, 2020). In EABOK, the drivers are factors, conditions, resources, and other forces significantly impacting the organization and stimulating change. Although drivers are de facto outside the control of EA practices, the influence is important. The TOGAF model comprises three core layers, i.e., Business, Application, and Technology layers. They are supplemented by the Motivation layer extension. Elements of this layer enable modelling the strategy and motivation underlying an enterprise architecture. The Motivation extension in ArchiMate, the TOGAF language, is applied to support the Business Requirements Management, Preliminary and Architecture Vision phases' realization in the TOGAF architecture modelling process.

A key element of ArchiMate Motivation layer is the "stakeholder" that represents an individual or an organization interested in the EA modelling. By definition, customers, business partners, business and application architects, or legislative authorities are stakeholders. Each stakeholder is motivated, as they enjoyed and are challenged by cooperation on the EA development. Their intrinsic motivations can be as follows: culture, personal values, organizational goals, belief system, fairness issues, but extrinsic motivations include group's norms, values, principles, reward and penalty system, recognition, market position, organizational leadership, or group belief. Another key element in ArchiMate Motivation layer is the "goal", which represents some end that a stakeholder wants to achieve. The end is to represent anything a stakeholder may desire, such as a state of affairs, business value or real effect. Typical examples cover revenue increase, service time reduction, or online service duration. However, discussion about these issues needs to be extended. In the context of the EA modelling, a business organization should ask itself the questions: What information do we owe to people with whom we work, and on whom we depend? In what form? In what time frame? What information do we need ourselves? From whom? For EA development, the strategic information modelling needs to consider the purposes of information processing for business decisions. Therefore, the question of "Why" and the justification of information processing are important. Information system analysist should seek answers to the following:

- Why is information necessary to competing in the business today and in the future?
- What priorities for information use and management are appropriate?
- How should managers implement their strategic priorities and achieve improved business performance through people, information, and ICT?
- When and why will the users be satisfied?

The user-customer loyalty is visible in buying behaviour and in communication channel preference for each customer. The satisfaction is visible in repurchasing, revisiting or aftersales questioning.

Literature Review on BMM

The OMG Business Motivation Model (BMM) (OMG, 2015) contains a set of built-in concepts that define elements of business plan, and answer the question "Why" enterprise architecture is to be developed. They are associated in a structure which is technology-neutral. The BMM combines the enterprise goals, strategies and motivations. As usual in the model development process, the BMM identifies fundamental concepts essential for business functioning and the relationships among them. The proposed BMM is to be interpretable by software developers, to communicate with managers, to illustrate the most important issues. A business motivation model describes what a business is going to accomplish, i.e., goals, named here the Ends. The model should explain how the business organization intends to accomplish the goals, what opportunities and threats there are to the business and what the business organization's strengths and weaknesses are. These concepts are included in the Assessments. The Means address how to achieve the Ends and comprise concepts like Organization Units, Business Processes, and Business Rules. There is still the open question of what the fourth element of BMM is, i.e., the Influencers. In this paper, influencers are identified with motivators, incentives, stimulus, or drivers, as it is in the ArchiMate language. In this paper, tendencies of selected economic phenomena are treated as Influencers. Assuming that motivation refers to reasons upon which one acts, the literature distinguishes between intrinsic and extrinsic motives. For example, intrinsic business motives includes the pursue of profit, but it may also involve social responsibility and moral obligations. As regards extrinsic motivations, business managers are stimulated by competitors, customers, or governmental regulations.

This study outline is presented in Figure 1. The numbers of searching results are summarized in Figure 2. The rudimentary reviews were done using the following databases: Association for Information Systems Electronic Library, IEEE Xplore Digital Library, SAGE journals, Science Direct, Emerald Insight, Scopus, and Web of Science.

According to the suggestions on the systematic literature review (SLR) process, firstly, taking into account the mentioned above repositories, the phrase "Business Motivation Model" was searched. However, the number of received results was very high, due to the word "Motivation" appearing in various contexts different from the OMG BMM. Moreover, use of the "BMM" acronym for search did not yield desired results, because it also has other extensions, different from business motivation model. Therefore, further searching was conducted via the search string "Business" AND "Motivation" AND "Model" included in the paper title.

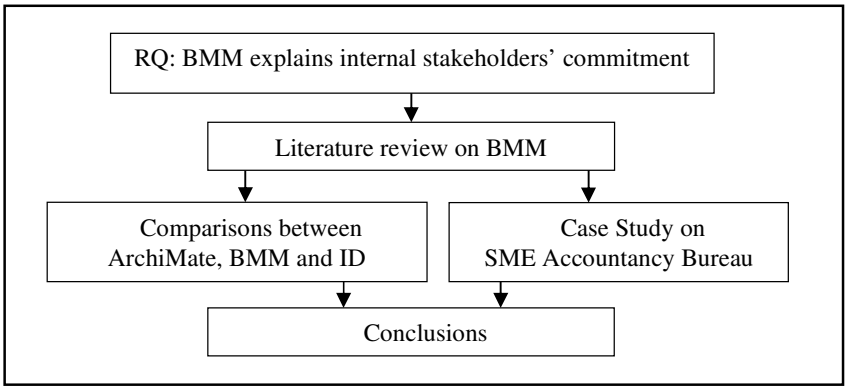

Fig. 1: This Study Structure

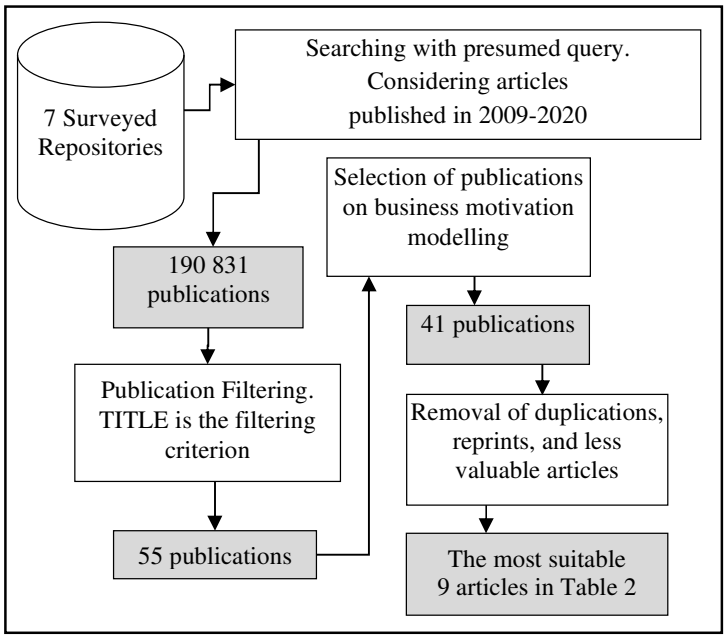

Fig. 2: Repository Searching Results

Table 1 summarized different research approaches and findings concerning the BMM characteristics and domains of usage. Regrettably, there are no papers, which strictly answer questions on the BMM for e-business system architecture development. Although the BMM is considered as the most appropriate for motivation analysis, there are also other techniques and notations, which should be taken into account. The Table 2 is about a comparison among ArchiMate, BMM and ID notation aspect. Generally, the influence diagrams are considered as probabilistic graphical models that are particularly suitable to deal with uncertainty as well as with incomplete and imprecise information. The influence diagram (ID) is a visual representation of a decision problem dependent on business functions, determinants, uncertain chances, and business values (Hall, 2010). In this paper, the ID decision reasons are considered as business motives. Business organization has got material and financial resources which are by rules well defined, described and maintained. Business functions have also deterministic character. Business objectives and values are criteria that are expected to be maximized. Constraints on business design and modelling are assumed to be decisions. Business rules, regulations, principles are treated as deterministic reasons.

Table 1: Findings on BMM application in Representative Research (RR)

No	RR	Findings
1	Cui and Paige, 2012	Proposal of a framework that integrates the development of motivation and requirements model at the business, product, system, and software levels. Authors focus on links between the OMG standardized BMM and Systems Modelling Language (Sims).
2	Hinkelmann and Pasquini, 2014	Authors conclude that current motivation model languages are mainly designed to model business strategy, and they do not give the opportunity to distinguish business view elements and IT view elements. Authors propose a modelling technique to improve transparency of the dependencies between business and IT elements.
3	Suri et al., 2017	Authors provide a model-based approach for creating and communicating business strategies and bridging the gap between the

		business strategies and operational processes using BMM model and BPMN notation. They simulate processes to check KPIs to different strategies.
4	Roubtsova, 2012	Author presents how Protocol Modelling semantics can be used both for business process modelling and motivation modelling. Author argues that OMG predicts that BPMN will be merged with the BMM.
5	Vicente et al., 2014	Authors define a specific EA to design organizations according to ITIL's best practices to perform ITSM. They aim to establish architecture's motivation model and the ITIL BMM
6	Lu et al., 2011	Authors extend WS-Policy4MASC language that specifies the BMM concepts for modelling business event.
7	Berkem, 2008	Author links business vision, goals, strategies, tactics and business rules according to BMM for Service Oriented Architecture (SOA) specification.
8	Tonisson and Matulevicius, 2016	Authors apply the semiotic quality framework to compare quality of the BMM and i* modelling language.
9	Feglar et al., 2006	Authors modify the BMM, so instead of SWOT analysis, they propose an ANP (Analytic Network Process) based BOCR (Benefit-Opportunity-Cost-Risk) analysis

Table 2: Similar constructs in ArchiMate, BMM and Influence Diagram

ArchiMate	Business Motivation Model	Influence Diagram
Stakeholder : role of individual, team or organization	Organizational Unit	
Motive: Driver, condition that motives an organization to define its goals	Motive: Influencer, cause of change	Motive: Uncertain reason, event, condition, a chance variable which cannot be controlled directly

Table 2: Similar constructs in ArchiMate, BMM and Influence Diagram (continued)

ArchiMate	Business Motivation Model	Influence Diagram
Assessment: outcome of SWOT analysis	Assessment: based on SWOT analysis, but also potential impact, like risk or potential reward	
Goal: achievable end state	Vision, Goal: desired result Objective: step on the way towards the Goal	
Outcome: end result	Ends: what an entity wants to be	Decision: choice, status, stakeholder has a power to control it
Principle: qualitative statement of intent	Directives: Business Rules, Business Policies	Deterministic reasons: rules
Constraints: restriction on the way in which system is		Decision on business design constraints

realized		
Meaning: knowledge in a particular context		
Value: utility, measure of satisfaction		Value: measure of satisfaction with possible outcomes
Equipment, Material, Facility	Mission, Assets, Means: resources to achieve Ends	
Service, Function, Process	Course of Actions: Strategies, Tactics, Process	Function of quantities

SME Accountancy Bureau Case Study

The enterprise architecture model is assumed to help business organizations to specify business requirements and transform them into system requirements to ensure the ICT is functioning in a cost-effective, flexible and reliable way. Modelling system architecture can be interpreted as modelling the structures of processes, information, application components and ICT parts. Taking into account Chandler's idea that "structure follows strategy", business analysis for information system development should begin with the strategy, mission, and vision formulation. However, Chandler (1962) argues that organizational structure is necessary for strategy realization, particularly for production volume expansion, geographic dispersion and vertical integration. The business structure modelling is derived from principles that are based on empirical deduction of observed behaviours or practices. Similarly to system requirements, principles define intended properties of the enterprise architecture (Stair and Reynolds, 2010). Business principles and the EA development principles are formulated not only in scientific research, but also in practice. They are the laws and observations of nature underlying the artefacts. Business analysis is defined as a set of activities that support discovery and creation of business and system architecture principles. The business analysis is an empirical process that is realized by defining the needs and recommending solutions that provide value to stakeholders.

In presented case study, the business analysis was realized at SME accountancy bureau. The selected business organization exists since 2000 and its offer is directed to micro, small and medium enterprises, which want to reliably realize their business. The SME enterprises employ fewer than 250 people. Generally, they focus on their core functions and use outsourcing for non-critical activities. Accountancy services, offered by the bureau, are highly customised in accordance with the client business organization profile. The accountancy bureau supports their customers in bookkeeping, taxpaying and insurance. It is responsible for bills and accounting documentation, and reconciliation. The accountancy services offered by the bureau include trading account books, books of income statements and expenditures, tax cards, payments and social insurance. The bureau provides advisory services on how to begin and decommission a business, as well as account books controls and auditing, tax payment review, financial analysis and reports elaboration. Mostly, the services are realized offline, however, the accountancy bureau needs e-business information system to present actual offers, forms of documents, information on prices and promotions, and current legal acts. This business organization's structure is stable view of the entire enterprise. Taking into account the SWOT (strengths, weaknesses, opportunities and threats) analysis for the accountancy bureau (Figure 3), this business unit's strategy is defined as market penetration and proactiveness. This organization aims to increase its revenue using its existing offers, i.e., accountancy services in existing market of SME clients. However, beyond that, the accountancy bureau is looking for opportunities for revenue increase by creating new services (or increasing the volume of services) targeted at its existing markets. The accountancy bureau has implemented service customisation. This organization does not consider the revenue increase through expanding into new markets, i.e., customer segments, geographic regions, countries. They are not interested in acquiring or merging with any other organization.

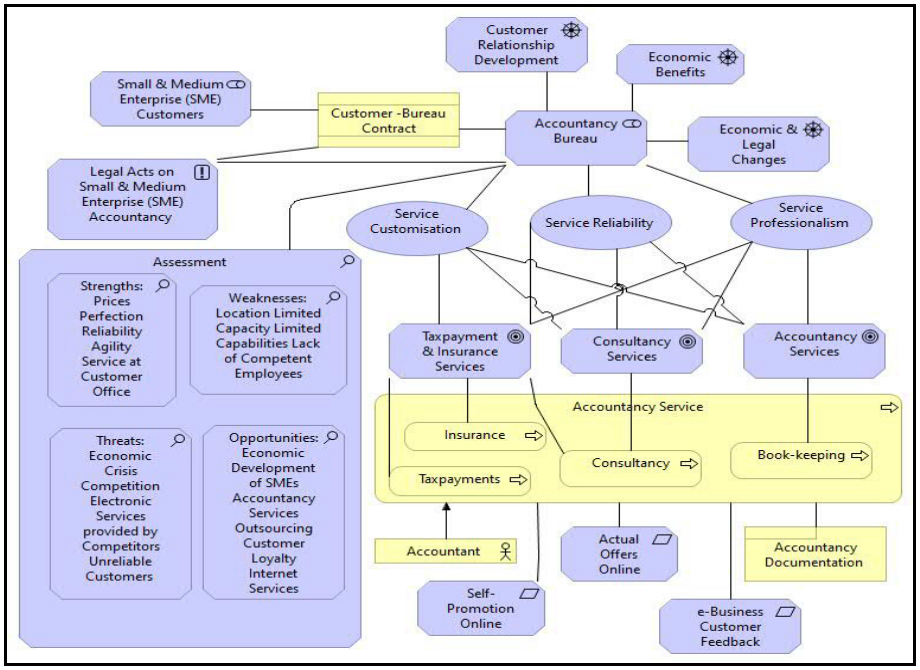

Fig. 3: Accountancy Bureau Architecture Motivation and Business Layer View in ArchiMate 3.1

Figure 3 includes Motivation and Business Layer View in ArchiMate language. This language is subordinate to the architectural semantics. In the EA modelling process, stakeholders focus on the following three issues:

- Business – ICT alignment context, i.e., the evolution of ICT systems to align them with business goals and business requirements (Figure 3);
- Context of strategic management of ICT, i.e., the implementation of a road map to transform business requirements into system requirements;
- Context of operating level management of the ICT systems.

The goal of business-driven ICT management is to determine mappings between business and technical requirements, and leverage these mappings to make ICT systems' management decisions that maximize business value metrics. These metrics are presented as key performance indicators (KPIs).

The OMG BMM is expected to specify the high level business motivations as input into design, development and implementation of ICT systems. Even though the BMM integrates four primary motivational elements, i.e., ends, means, influencers and assessment, one may additionally consider checking if the tool supports pursuing answers to questions asked by Zachman, i.e., Why, Who, What, How, Where and When. Similarly as it is in ArchiMate language, the Assessment is a judgement of the impact of an Influencer on the Organization Unit. Assessment includes SWOT analysis and evaluates potential impacts in terms of Risks and Rewards (Figure 3 and 4). On the one hand, the Organizational Unit is able to recognize External and Internal Influencers, define Goals, identify the Strategy and conduct the SWOT analysis. On the other hand, the business Strategy determines the Organizational Unit, what is strictly according to Chandler's thesis. The Strategy is formulated based on domain rules, i.e., SME Accounting Rules, and it is a component of the plan for the organization's Mission realization. The Organization Unit pursues the achievement of its Vision. Goals defined by the Organizational Units operationalize the business Vision. Realization of the

business Strategy requires Business Policy as well as Means, which are understood as human, material and financial resources (Figure 4).

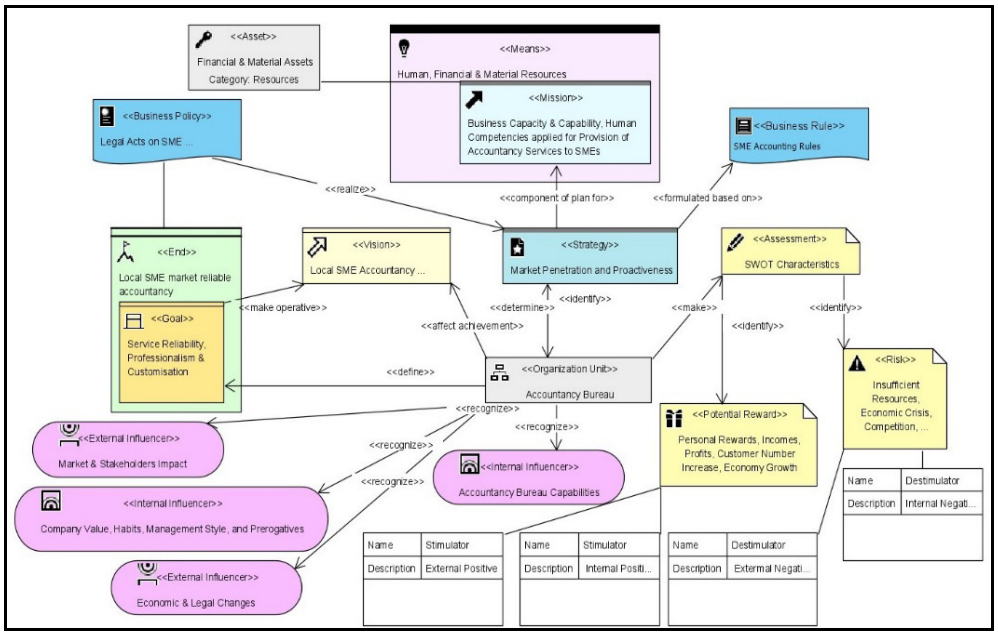

Fig. 4: SME Accountancy Bureau Business Motivation Model in Visual Paradigm 16.2

Regrettably, in comparison with the Zachman Framework, BMM does not contain a simple question of "Why". Nevertheless, the model concepts allow to define business rules, policy, strategy, mission, vision, assets, liabilities, offering, and even influencing organizations, so the model permits to better express an enterprise's governance and management than the models in ArchiMate. In the aspect of motivation, the concept of Value is needed, as it is defined in ArchiMate, because even the Goals and Objectives are not able to express the fundamental values. In fact, the Assessment and SWOT analysis are the basis for an enterprise evaluation in this model. A fundamental assumption of the BMM is that all enterprise activities are driven by how the enterprise decides to react to change. Therefore in the BMM, the changes of economic phenomena are hidden in influencers, as they are included in the ArchiMate drivers. The long term reactions to changes are visible in trends of Key Performance Indicators (KPIs). The recognition of changes caused by influencers and the assessment of their impact on the enterprise website design and e-business development are crucial. The problem is that BMM does not include a specific process on reaction to changes. The BMM is only to support the traceability of business processes, strategy, rules, means, goals, influencers and assessments. There is still the open question on the construction of KPIs. Usually, they concern fundamental economic metrics in a business organization, e.g., cost per sale, revenue, profit, customer satisfaction, margins, customer inquiries, invoice volume (Turban et al., 2011). However, beyond that, there are indicators which concern specific aspects of enterprise functioning, e.g., safety and security, e-commerce, or business sustainability (Parisi and Maraghini, 2010). Generally, they are associated with a process and monitored in real time. Managers are interested in the implementation of KPIs, because organization performance always refers to how well business unit is working to reach its goals. Although there are several typical Google Analytics metrics, the business analyst's task is to specify an idiosyncratic set of metrics for enterprise performance evaluation. Proposed KPI list for the accountancy bureau is included in Table 3. The indicators concern only the analysed accountancy bureau and the transfer of these indicators to another enterprise should not be proposed. Monitoring the KPIs motivates the company managers to constantly reformulate business strategy and operations. Figure 5 presents the business strategy as decision dependent of uncertain and deterministic variables in ID diagram.

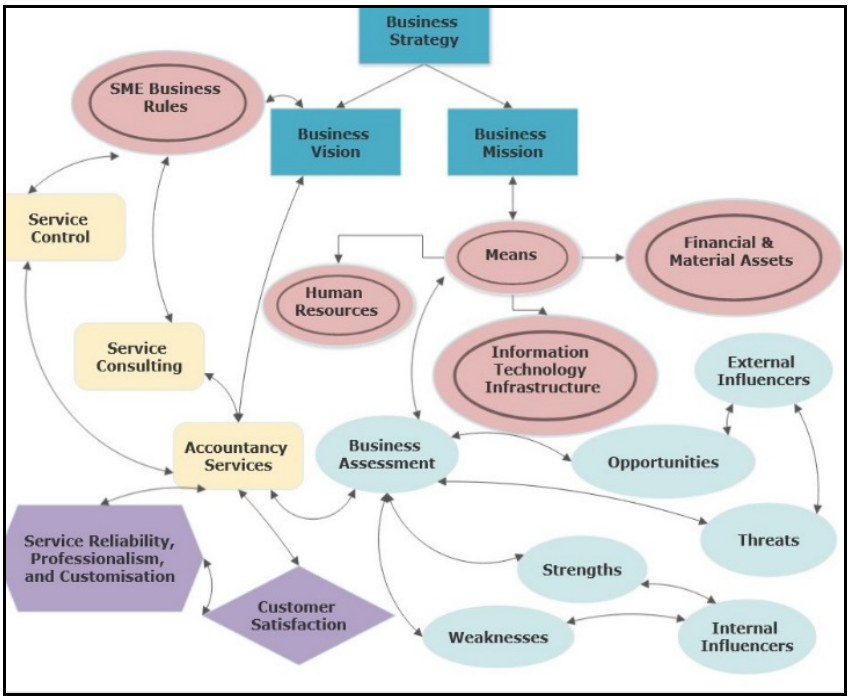

Fig. 5: Influence Diagram on SME Accountancy Bureau Motivation in SmartDraw Online

Table 3: Key Performance Indicators for Accountancy Bureau e-Business System

Assessment			
External Positive Impact	**Internal Positive Impact**	**External Negative Impact**	**Internal Negative Impact**
Users and New Users	Website Goal Completion	Bounce Rate	High Cost per Sale
Sessions	Number of Sessions/User	User Language different than Website Language	Long Time of Order Execution
Average Session Duration	Page View Browser	User Geographic Location	Amount of delay
Percentage of New Sessions	Sales per Download	Business Rules Changes in Year	Lack of Competent Employees
Returning Users	Profit per Sale	Legislation Changes	Lack of Knowledge Management to deal with Customer Requests
Frequency of Sales	Revenue per Sale	Insurance	Number of Questions per Employee
Website Content Downloads	Customer Satisfaction	Tax Payment	Number of Emails or Phone Calls per Employee
Valid Contacts	Profitability	Interest Rates	High Complexity of Business Procedures
Brand Image	Margins	Foreign Exchanges	Long Process Realization Duration
Reputation	Investments	Debt and Lease Compliance	Process Changes
Customer	Invoice Volume	Social Changes	Inefficient Cash Flow

Inquiries			
		Staff Turnover	Credit-bad Debts
		Salary Inflation	ICT Resources Obsolescence
		Theft	Fraud and Resource Misuse

Conclusions

Noting that a large volume of publications on work motivations exists, authors focus and justify mostly individual motivations, although there are journal papers and books on business organization motivations as a separate issue. However, there are still too few publications on the EA development motivations as well as on motivations for any computer application implementation and deployment. In motivation models the focus should be on drivers, influencers, motivators stimulating or discouraging to act. In this paper, case study has been presented and three different notations applied to emphasize the motivation of information system development. Proposed KPIs allow for an assessment of the Influencers' impact and they are connected with the business strategy.

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Need for Entrepreneurial Orientation from The Perspective of Different Organizational Levels

Agnieszka FILIPOWICZ

Czestochowa University of Technology, Częstochowa, Poland
agnieszka.filipowicz@pcz.pl

Assoc. prof. Małgorzata OKRĘGLICKA

Czestochowa University of Technology, Częstochowa, Poland
m.okreglicka@wp.pl

Abstract

The entrepreneurial orientation is a very important construct to assure the proper functioning of an organization. For the purpose of this article, a five-dimensional concept of the entrepreneurial orientation has been adopted. This article aims to identify the challenges and threats that must be faced by individuals within an organization, depending on their position in the hierarchy. In order to collect some necessary data we conducted interviews with employees representing various levels in the chosen organization. The data reveal that the perception of the entrepreneurial orientation differs depending on the held position. Based on the collected figures, we formulated an additional conclusion of how important it may be for all employees to stay informed and acknowledge the adopted strategy, regardless their position within the company. When being properly informed and thus entirely aware of the implemented strategy, employees are prone to entrepreneurial activities.

Keywords: Entrepreneurial Orientation, Organizational Culture, Organizational Level

Introduction

Recent decades have brought relentless interest in research into the role of the entrepreneurship in business development. Therefore, the entrepreneurial orientation (EO) is perceived as one of the most important elements having a significant impact on the position of enterprises in their business environment. Entrepreneurial activities undertaken by organizations require substantial commitment and courage to go beyond common operating schemes, focus on research and development, take risky activities, promote innovation, and autonomy in action. The entrepreneurship cannot be planned, and what is more, it cannot be caught up in the pre-defined variants, nor can it be subordinated to the vision imposed by power or belief (Bratnicki, 2007).

The EO is a strategic orientation of an organization that defines its strategic activities, its management philosophy and entrepreneurial behaviour (Anderson et al, 2009). It is based on a coherent set of interrelated activities and processes that support autonomous activities such as seeking for new solutions, readiness for risk-taking and being aggressive towards competition. Entrepreneurially oriented organizations have the ability to discover and seize market opportunities (Ferreira, 2015).

A substantial number of publications concerning the role of the entrepreneurship in various organizations encouraged me to carry out an analysis of the EO perception by employees on various levels of the hierarchy. However, we decided to focus on a company from the SME sector with an undeveloped organizational structure, since only very few research in this area have been published. This article aims to identify the challenges and threats to the entrepreneurial orientation and analyse them from different points of view, depending on the position in the company.

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For this purpose, we chose the case study method. Individual, partially structured in-depth interviews were conducted with people employed at various hierarchical levels of the selected enterprise. This approach can be considered as innovative in the field of research on entrepreneurial orientation in Poland.

The article consists of four parts. To begin, the first part introduces the theoretical background, followed by the second part describing the research methods, the third part presents the obtained results, and the conclusions and discussion end the article.

Literature Review

Entrepreneurial orientation and the impact of organizational culture on entrepreneurship development

Entrepreneurial orientation was originally defined as a three-dimensional construct, where innovation, risk-taking and proactivity were key aspects/dimensions describing entrepreneurial-oriented organizations (Covin, Slevin, 1991; Miller 1983). By the same token, these three dimensions are, so far, the most known and they have been the most studied (Rauch et al., 2009).

Ongoing research of entrepreneurial orientation let scientists supplement this construct with two new dimensions: autonomy and competitive aggressiveness. According to the definition proposed by Lumpkin and Dess, "construct EO"' is an aggressive, innovative, proactive, risky and autonomous process/behavior (Lumpkin, Dess, 1996), and a set of actions based on human, technical or managerial resources, requiring diverse skills and knowledge for its implementation (Illés, Dunay, Jelonek, 2015). These dimensions may occur with different intensities, depending, among others, on the environment of the firm (Dyduch, 2008).

According to the empirical research conducted so far, companies with a higher degree of the EO achieve better results (Wang, 2008; Wiklund, 1999; Zahra, 1991; Zahra, Covin, 1995). It is also important to outline that the entrepreneurial behaviour within the company can be, both, encouraged or impeded by the organization itself (Covin, Slevin, 1991). Therefore, the thorough understanding of the EO process by the firm and its added value for the development of the company is crucial. The key factors supporting the process of implementing the EO in an organization have been identified as follows: organizational structure, leadership and organizational culture. Covin and Slevin mention these three factors in their scientific work and emphasize that the organizational culture have a very strong impact on entrepreneurial attitudes (Covin, Slevin, 1991), since it is an integral part of the enterprise and should be treated as an important organizational tool (Zouhayer, 2013). The work environment of a given entity is essential for the development of entrepreneurship within this organization. Therefore, building a strategy based on autonomy, cooperation and commitment helps create a conducive environment for entrepreneurship (Kyrgidou, Hughes, 2010).

In consequence, it is pure evidence that a company focused on achieving better financial results, should constantly acquire entrepreneurial units, develop an organizational culture conducive to entrepreneurship and entrepreneurial leadership. D.F. researchers Kuratko, R.V. Montagno and J.S. Hornsby set five conditions that must be met to stimulate internal entrepreneurship:

a) adequate remuneration, which aims to stimulate entrepreneurial behaviour of the employee,
b) support from the management in undertaking entrepreneurial activities,
c) access to resources (including time) enabling undertaking entrepreneurial activities,
d) support of the organizational culture,
e) latitude at work (Kuratko, Montagno, Hornsby 1990).

The role of various hierarchical levels of an organization in shaping entrepreneurial attitudes of their subordinates, is the key factor to effectively develop entrepreneurship within a company. The input of an individual to their company and the time they work for it, is strongly connected with the quality of the relationship with their managers (Wudarzewski, 2012). The main challenge of modern management is to use properly the skills and commitment of individuals in the organization and to allow them participate actively in shaping the strategy of the organization (Bratnicki, 2004).

Challenges related to entrepreneurial orientation at various levels of the organizational structure

As revealed by the previously quoted scientific studies, entrepreneurship should be an inseparable element of every organization, and its employees should demonstrate a high degree of entrepreneurship, regardless of their level in the hierarchy. Nevertheless, the position in the hierarchy of the company may considerably influence the challenges to face by an employee. By consequence, the entrepreneurial orientation may be perceived in slightly different ways.

The highest level of an organization is responsible for developing and then communicating to subordinates the vision and mission of the firm coherent with the established strategy. It is the role of the top management to allow carrying out experiments or questioning the beaten tracks leading to success (Bratnicki, 2002). The top level of the organization is responsible for obtaining resources, assessing development possibilities, implementing new ideas or estimating risks associated with projects implementation (Belousova et al. 2010; Havierniková et al., 2019). Its role is to promote and encourage entrepreneurial behaviour among lower level managers or employees.

Lower level managers represent a real connection between low level employees and the top management of an organization, therefore their role in the good functioning of a firm is invaluable. They are supposed to apply a top-down approach not only to communicate the company's vision and strategy to lower level employees, but also to clearly express the company's expectations towards its employees. Lower level managers take actions to influence their subordinates to show entrepreneurial attitudes in their daily duties (Grzegorzewska-Mischka, 2010).

The role of an ordinary employee is, in essence, quite simple and they expect the company to clearly precise and communicate its requirements towards them. By consequence, it is crucial to eliminate all potential administrative and formal barriers between ordinary employees and their subordinates that could eventually impede a proper communication. The emotional support of an employee such as encouraging and comprehensive attitude towards their initiatives and sometimes unsuccessful attempts to introduce changes, is more efficient to develop entrepreneurship than general declarations or meaningless assurances (Francik, 2009).

In addition, the character of an individual, is also a strong factor which determines a capacity to adopt or not the entrepreneurial attitude. Personality may often become a source of difficult to overcome self-limitations and barriers. However, an access to some necessary knowledge at university, can help develop and stimulate entrepreneurial attitudes that will be transformed into an entrepreneurial behaviour at work (Okręglicka et al., 2017).

Methodology of empirical research

The aim of this article is to identify challenges and threats to the entrepreneurial orientation, perceived by members of the organization at various levels of the organizational structure. To this end, we carried out a qualitative study based on partially structured individual in-depth interviews with employees of a Silesian company, operating in the children's industry since the nineties.

The research was carried out at three levels of the organization - employees, managers and top managers/CEO. Two representatives were selected from each group. The selection of representatives from the group of ordinary employees and managers was based on the scope of duties and seniority.

Each interview consisted of two parts: the first part explains the purpose of the interview, while the second part is the substantive part of the interview. Each interview lasted about 60 minutes.

The research questions were related to the selected issue, and the interviewees were asked the following questions:

Table 1: Questions in the interview questionnaire

EO dimension	Question
Autonomy	1. Do you know what is a role of the autonomy as a component of the entrepreneurship orientation? 2. How do you assess the approach of the company to suggestions and ideas of change submitted by employees? Should employees at all levels submit their ideas? 3. How the company supports independent actions of employees, leading to the development of new products or services? 4. Can you evaluate, how many ideas of changes submitted by employees have a chance to be implemented?
Innovation	1. Does the company take into account the innovative ideas of its employees which have an impact on research, development and innovation? If yes / no, why? 2. What new products have been introduced to the market during the last 3 years. Have they let the company remain innovative in comparison with the competitors? How many of them were proposed by the employees? 3. What changes proposed by the employees have been implemented to the products, in order to make them innovative on the market? 4. Do you think that the implementation of innovative ideas, research and development is important for the company?
Proactivity	1. Do you think that it is important for the employees at all levels to be proactive? If yes / no, why? 2. What are the recent activities, undertaken by the employees, that you consider as proactive? 3. Do you think that the company tends to copy the solutions already available on the market or is the company more breakthrough-oriented to become a precursor of the industry? Please explain your answer. 4. What is the company's attitude towards competitors?
Risks-taking	1. How do you assess the risk-taking capacity of the employees at your organizational level? 2. Can any activity recently undertaken by the employees of a given organizational level be considered risky? If so, why?
Competitive aggressiveness	1. What actions should be taken at a given hierarchical level to strengthen the competitive position of the company on the market? 2. Please specify whether the actions taken towards other competitors can be considered as aggressive. If so, please list these actions and provide arguments.

Source: Own study

Results of empirical research

The employees on all levels of the organization mentioned the entrepreneurship as important for the company, no matter the held position. However, each of the five dimensions was assessed as more or less important for different hierarchical levels in the company. The study put on evidence how essential is for the company to clearly communicate the organizational culture and the adopted strategy to its employees on lower levels of the hierarchy. By the same token, getting a clear message from the top management helps the employees understand the company's expectations but also its long-term goals and priorities.

Perception of the entrepreneurial orientation from the level of senior managers

Top level management, represented by the CEO and the Head of Sales department, considers autonomy and proactivity as the most important dimensions of the entrepreneurial orientation on its level of responsibility, whereas the competitive aggressiveness and the risk-prone attitude do not seem essential

for the senior management. On the contrary, the last dimension of the EO concept, the innovation, is a subject of some substantial points of divergence within this group.

According to one of the managers: *innovation is "an important dimension because it has a direct impact on the development of products and offered services",* however, this opinion does not meet the CEO's approach to innovative ideas, who declares that:

"Some theories recommend not to involve the entire organization in this process, therefore, we decided to deal with innovative ideas on the ownership level. The rest of the organization comes into the process only when the idea has been approved. The initial process of changing the brand strategy or repositioning of products and services is entirely managed by the owners of the company. Our employees are invited to collaborate only when the idea has been set in motion. Recommendations of the marketing, sales and quality control departments are of course taken into account, but they represent only a small part of the innovation process. In other words, a new, innovative idea is always a result of long-term goals set by the owners. Therefore, we pay attention to a feedback provided by the aforesaid departments, but in fact the concept is initiated and elaborated by the owners or by cooperating companies, e.g. brand strategy specialists. "

Perception of entrepreneurial orientation by lower level managers

The group represented by lower-level managers put an accent on the three of the five EO dimensions: innovation, propensity to risk and competitive aggressiveness, whereas autonomy and proactivity were considered of moderate importance. Given that it is in the interest of all organizations to stimulate autonomy and proactivity among lower level managers, the results may seem surprising and rise questions. A strong focus on autonomy and proactivity within a company encourages its employees to take up independent actions and initiate improvements that contribute to a development of their position or of the whole organization. Moreover, a lack of support from the organization was pointed out, by one of the managers, as the real issue for a development of autonomous activities at the company: "*The person who submits an idea is immediately charged with the responsibility of its execution and supervision during the entire process, from the beginning up to its implementation, even if certain activities go far beyond their skills."*

Perception of entrepreneurial orientation from the level of an ordinary employee

In this group, we can notice the greatest discrepancies in the perception of individual dimensions of the entrepreneurial orientation. Almost all dimensions are poorly represented in this group. Ordinary employees see no need to take up autonomous or risky activities, and consider proactive behaviour at work as moderately useful. On the contrary, the innovation is seen as the only dimension having a strong impact. By consequence, the low-level employees declare a strong need for submission of innovative ideas, but can this attitude persist in the future if not supported and encouraged by the CEO? The risk to discourage the employees from submitting innovative ideas is real, and this not only regarding their own position but also when it comes to products or services of the company. Against the background of the entire organization, this group assesses the risk propensity dimension as the least important. This may result not only from the fear of taking risky actions but mainly from the fear of baring possible financial consequences resulting from these actions. By the same token, it is the responsibility of the organization to encourage ordinary employees to take up risky activities in a predetermined framework, if they can have a positive impact on the productivity of the entire organization. Senior or lower level managers should be responsible for setting the latitude framework of an employee in order to let him take up risky actions without being afraid of consequences.

Table 2: Perception of the entrepreneurial orientation at various levels of the studied organization

EO dimension	Ordinary employees	Lower level managers	CEO (owners)/ Senior managers
Autonomy	+/++	++	+++
Innovation	+++	+++	+/+++
Proactivity	+/++	++	+++
Risk-taking	+	+++	++
Competitive aggressiveness	+	+++	+

„+" – weak; „++" – moderate; „+++" – strong
Source: Own study

According to the collected data, there is a substantial difference in the assessment of the importance of the EO dimensions from the perspective of the particular hierarchical levels of the organization. However, the most striking aspect of this analysis is a completely different perception of the innovation by the ordinary employees and the lower-or higher-level managers in comparison with the perception of this dimension by the owners of the organization (CEO). By consequence, one can draw a conclusion that the company suffers from some significant lacks in the inter-hierarchical, top-down communication in terms of goals and priorities. The top-level management delivers an inconsistent message regarding the company's priorities to the employees of the lower hierarchical levels, which discourages them from submitting innovative ideas. An insufficient internal communication may also push the employees of the organization to focus on activities considered as irrelevant by the CEO. Therefore, the key factor to achieve better financial results is to properly formulate and deliver a clear message to the lower levels of the hierarchy, in order to synchronize the priorities of the top-management with the actions taken by the members of the entire organization. In addition, some special attention should be paid to the weak assessment of the proactivity and autonomy by one of the ordinary employees. During the research, the aforesaid employee clearly expressed that proactive or autonomous activities are not in his nature. In relation to the above, the HR department should consider to put a stress, during a recruitment process, on personal characteristics of an employee's character. This may help avoid later frustration on both sides caused by the discrepancy between an employee's attitude and expectations of the enterprise that cannot be met, because they are not in the nature of the employee. On the other hand, if the organization decides to hire without checking personal predispositions, it must, as an organization, put more effort to develop expected behaviours for each particular level of responsibility within the company.

Conclusion

As already presented at the beginning of my article, the EO is one of the most important parameters influencing the success of an organization. Without a highly developed EO, it is impossible to build an entrepreneurial organization, successful within its industry. The purpose of this article was to examine the perception of the EO dimensions from different organizational levels, in order to observe to what extent, the individual perception of each dimension may vary depending on the level of the organization. Nowadays, most companies must operate in the fast-paced business environment, therefore the entrepreneurship of owners becomes a key factor to guarantee the effectiveness of an organization they manage (Listwan, 2004; Havierniková et al., 2017). Furthermore, the entrepreneurial attitude should also become a priority for every member of the organization regardless of their role. Communicate long-and short-term goals to each member of an organization seems essential to let them have a full knowledge of the company's strategic choice, adjust their actions and thus build a coherent entrepreneurial orientation.

We would like to emphasize that this article has some limitations. The research was conducted within one enterprise only, each level of the organization was represented by only two members, and the respondents' answers may be affected by an error. The provided answers may not be fully consistent with the actual perception of the examined issue due to the willingness of the respondents to embellish the reality. The study contributes to increasing the knowledge resources in the field of the

entrepreneurship and encourages the authors of the article to further study the perception of entrepreneurial orientation by members of both Polish organizations and organizations located in other European countries or organizations based in e.g. Asian countries.

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The Measurement of Organizational Efficiency In Chosen Food Processing Enterprises in Poland

Anna ZIELINSKA-CHMIELEWSKA

Poznań University of Economics and Business, Institute of Economy, Poznań, Poland,
E-mail address: anna.zielinska@ue.poznan.pl

Abstract

The issue of efficiency of food processing enterprises is ever-present because of the continuous process of improving the quality standards of raw materials, complying with the procedures in food production, introduction of modern production technology and, above all, due to the large number of actors who are competing for customers in the domestic and foreign food market. In the coming years Polish food processing sector will be facing significant challenges with the inevitable slow and gradual decrease in the cost advantages of raw materials' prices, as well as ready to eat products. Enterprises, as they constitute the majority in manufacturing business, in the long run will need to determine the efficiency, and hence competitiveness of Polish food processing sector. The aim of the paper is to review the domestic and foreign literature in terms of classification and systematization of the concept of organizational efficiency in chosen food processing enterprises in Poland. In the theoretical part of the study methods of descriptive, comparative, deductive and synthetic analysis are used. In the practical part of the study appropriately selected qualitative methods such as questionnaire is presented. The results of the analysis is based on the results of authors' own calculations, as well specific findings from business practice both from inland and abroad.

Keywords: Effectivity, Efficiency, Organizational Efficiency, Food Processing Sector.

JEL Classification: C83, D24, L22, M2, Q17.

Introduction

Food economy is one of the most important sectors of economy in every country because of its significance for production and employment, but above all, in connection with the supply of food to the society. Food economy is a collection of many different economic systems that influence organizational structure, methods of operation and financial performance of the production chain actors. Entities in the food processing sector operate in an environment with high exposure to the risk of business activity (Zielińska-Chmielewska, 2014).

Food processing enterprises strive for continuous and steady supply of raw materials to carry out production which would correspond to the changing needs and preferences of the consumer. The food market is an arena where various operators, which are different in character, intensity, strength and direction of impact, come into play. One of the main obstacles for food processing enterprises is the difficulty of obtaining stable and predictable income which would guarantee the continuation of production and remaining a going concern. What is characteristic and typical for agriculture and agro-food industry, is the fact that prices of raw materials fluctuate all-year round but retail prices of finished products remain relatively rigid. All of the above strongly affect the efficiency of the agribusiness operators in the market. In Polish food processing enterprises occurs concentration and integration between entities in the production chains, which has accelerated after Poland's accession to the European Union. Existing foreign publications in this field based on decades-old experiments confirm the need for conducting multi-step quantitative and qualitative research, in the field of systematic identification and evaluation of economic efficiency of food processing enterprises. On the basis of theoretical analysis and empirical results of previous studies, a hypothesis has been formulated: The organizational efficiency of food processing enterprises results from optimizing the use of modified

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activity areas and trade policy which are affecting the level of effectivity achieved by the examined enterprises.

The paper consists of 5 sections: *Introduction*, which defines the problem, subject matter and puts forward the hypothesis of the research, *Discussion on the classification of efficiency measurement in the economic studies* defines efficiency and effectivity including modern context with crucial points referring to current knowledge based on the relevant results of recent research, presentation of *Methodology, empirical data and analysis* subjected to re-testing existing documentation background, *Results and discussion on the assessment of organizational efficiency* focused on explaining its economic significance and insights, and *Conclusions* supplemented by verification of the hypothesis, assessment of research results, attention to problems and limitations of the research, guidelines for future research and assessment of institutional and systemic implications and solutions for current state of research. In the last section of the article *References* are listed.

Developing research on efficiency of food processing enterprises is extremely needed and constitutes a useful tool for policy makers on food market in terms of obtaining information about the validity of its operations, the need to make the necessary modifications, eliminating the potential risk of operation, and thus minimizing risk of bankruptcy and liquidation (Zielińska-Chmielewska, A., Alihodzić, A., Smutka, L., 2019, p. 1087).

Discussion on The Classification of Efficiency Measurement in The Economic Studies

The article reviews domestic and foreign literature in order to present and make the necessary comparison of economic efficiency, methods of measuring it, taking into account various advantages and disadvantages of its use. The study applies method of analysis and reasoning, and in particular the methods of descriptive, comparative, deductive and synthetic analysis. The results of the analyses are based on the results of author's research and studies.

Based on literature, it can be concluded that the concept of efficiency consists of efficiency and flexibility. Efficiency (also known as economic effectiveness) includes economic, technical and non-economic efficiency. The economic effectiveness can be viewed from two independent perspectives: financial and productivity-related. Non-economic efficiency includes organizational, operational and dynamic efficiency. Economic efficiency is the ratio of the obtained result to inputs. According to the principle of rational economy, it means that certain results should be achieved at the lowest expenditures (costs) possible, or the best possible result should be obtained with a given quantity of inputs (costs). The higher the efficiency is, the greater result per unit of effort is. Efficiency is applied both in assessing the effects which are of a quantitative nature (as a ratio of the effects to expenditures) and qualitative (as the ability to achieve the desired effect). Methods commonly used for assessing overall efficiency are based on three approaches: relying on ratio, parameters and non-parameters.

Economic effectivity is the primary standard valuation in economics (Wilkin, 1997, p. 25). It should be distinguished from the English-language word effectiveness, often translated into Polish as *skuteczność*, meaning that a desired effect was eventually achieved by more or less effective method. Effective operation does not mean that it was at the same time efficient. For the process to be efficient and effective, goals must be properly planned, and the results have higher value than costs.

Table 1: Comparison of economic processes according to the criterion of efficiency and effectiveness

The economic process	Efficient	Inefficient
Effective	planned economic objectives of the process are achieved, and the final results are of higher value than expenditures set for the planned economic objectives	Planned economic objectives of the process are achieved, but the final results are of lower value than incurred expenditures
Ineffective	Planned goals of the economic process are achieved, but the value of final results is higher than incurred expenditures	planned economic objectives of the process are not attained, and the value of final results is lower than incurred expenditures

Source: (Nowosielski, 2008, pp. 39-46).

In the systemic approach efficiency is the ability of a company to shape its environment, so that it becomes favorable and has the ability to overcome any obstacles. From this perspective, businesses are open systems that try to optimize the processes of acquisition and use of scarce resources from the environment. In this way, they are able to gain or maintain a competitive position. Therefore, effectivity is the ability to overcome the uncertainty surrounding the company. The essence of effectivity are incurred expenditures, transformation processes and final results. Evaluation of effectiveness involves identifying the ability to obtain resources, and then determining the extent of their use.

Economic Efficiency – Concept, The Advantages and Disadvantages of Parametric and Non-Parametric Approach

The analysis of domestic and foreign literature in the field of measuring organizational efficiency, as a part of economic efficiency lead to the conclusion that the concept of efficiency is diverse, multi-dimensional and can be classified in various ways. Science and economic practice increasingly often use measures constructed on the basis of microeconomic definition of effectiveness (Domagała, 2007; Mielnik, Szambelańczyk, 2006). Economic efficiency can be measured in a parametric and a non-parametric manner. Table 2 presents advantages and disadvantages of parametric methods.

Table 2: Comparison of advantages and disadvantages of parametric methods

Advantages	Disadvantages
Not necessarily large in size, the population of research objects makes it possible to conduct an analysis on the basis of which it is possible to formulate substantive conclusions	The need to make assumptions about the form of the production function and define the relationship between inputs and outputs
	Difficulty of observing "all" possible combinations of inputs and outputs for the analyzed entity
	Difficulty in specifying the mathematical form of the production function and consequently its mathematically identified interpretation
	The necessity of averaging data when estimating its parameters, as a result of which the empirical values deviate from the values of estimated model
	The regression curve determined on the basis of model values is not a limit of effectiveness since it does not cover all observations

Source: own preparation.

In the parametric approach, efficiency is calculated on the basis of the production function, which determines the relation between inputs and outputs with regard to technologically efficient production

processes. The parameters of this function are determined using classic econometric estimation tools. The parameters of the production function are estimated or calibrated based on statistical observations. The values of the production function are determined on the basis of a normative efficiency model, and deviations from them result from random errors or inefficiency of the examined entity (Panek, 2002). In parametric methods, the measure of effectiveness can be the rest of the model or the quotient of the empirical value of the result and its value obtained from the model. Table 3 presents advantages and disadvantages of non-parametric methods.

Table 3: Comparison of advantages and disadvantages of non-parametric methods

Advantages	Disadvantages
The design of the model is not fixed *a priori*, but adapted to the data, making it more flexible compared to parametric models	The need for knowledge of linear programming procedures
Lack of knowledge and skills required by previous methods to divide input (inputs) and output (outputs) variables properly[1]	Achieving a similar level of materiality as in the parametric models requires more objects in the sample
No need to formulate the functional relationship between inputs and outputs beforehand	The results are less, or not at all, independent of population distribution and outlier observations
Multi-criteria evaluation, i.e. the impact of multiple input variables on multiple output variables	
Non-parametric methods are insensitive to outliers, which is why they are so-called robust methods.	
The interpretation of the results does not require the adjustment of parameters to any distribution, thus eliminating methodological and interpretation difficulties	
No need to take into account a random factor in determining the effectiveness of the entity and the impact of potential measurement errors	

[1] *In non-parametric models, it is possible to check which of the variables are input and which are output, such that if the input variable does not lead to an increase in efficiency, it is the output variable.*
Source: own preparation.

In a non-parametric approach, efficiency is calculated as the ratio of actual productivity to the highest possible productivity (Helta, 2009). Functional parameters are determined on the basis of models that do not require a functional relationship between inputs and outputs. Using mathematical programming methods and empirical observations the shape of the efficiency limit is determined. The value of the efficiency measure is determined on the basis of the position of the examined entity relative to the efficiency limit. The basic methods of non-parametric approach include DEA (Data Envelopment Analysis) and FDH (Charnes, Cooper, Rhodes, 1978). Table 3 presents advantages and disadvantages of non-parametric methods.

Organizational efficiency – concept, the advantages and disadvantages of questionnaire-based methods

The first documented measurements of the organization's performance id dated for the 13th century A.D. and concern the double accounting records (Bitititci, Garengo, Dörfler and Nudurupati, 2012). However, it was only in the 1990s that strong development of methods for measuring the efficiency of enterprises. Researchers agreed that the concept and measurement of effectiveness are of a complex nature and require the use of both internal and external information, both of a qualitative and a quantitative nature. Pun, White (2005, p. 50) are of the opinion that, by appropriately compiling all the

necessary information a company can compare its efficiency with its competitors and at the same time can identify areas for modification and improvement, as well as establish long-term monitoring plans for progress and achievements. In response new concepts that take into account multidimensional aspects of efficiency companies have been developed.

Katz and Kahn (1966, p. 164) proposed to understand the concept of organizational efficiency as 'maximizing the return to the organization by technical, economic and political means". On this basis Zbierowski (2008, p. 10) developed a model of a highly effective organization in which he took into account the most important features, such as: strategy, culture, people, structures, tasks, systems. Whereas Rummler and Brache (2000, p. 46) presented organizational effectiveness in three dimensions: organization, process and workplace. In each of these dimensions they indicated different factors that affect the organization's effectiveness. They found that effectively managed efficiency requires the formulation of objectives while managing each of the three dimensions. Bielski (1997, p. 114) identified the following dimensions of organizational effectiveness: factual, economic, systemic, political, cultural and behavioral patterns to which he assigned certain indicators and measuring instruments. According to Weiss (Szymańska, 2011, p. 42) effectiveness may be considered according to criteria: productivity, production, morale, adaptation, development organizational, survival, which should permeate each other, and the direction of their mutual. The impact depends on the system model functioning in the economy economic, financial or legal. Price and Lawless, on the other hand, believe that the evaluation efficiency requires taking into account productivity, morale, conformism, flexibility, institutionalism, stability (Skurzyńska-Sokora, 2011, p. 11).

In the paradigm of a new institutional theory organizational efficiency has its social and organizational context with the relationship between enterprises and people. The operational context of an enterprises is expanded. Table 4 presents advantages and disadvantages of questionnaire-based methods.

Table 4: Comparison of advantages and disadvantages of questionnaire-based methods

Advantages	Disadvantages
The study is of a systematic nature	Conducting the study is expensive
It is possible to determine the scale and size of data variables	The tests are time-consuming
Groups can be compared with each other	Difficulty in obtaining representativeness of studies
Determination of factors influencing the examined phenomenon	
The mechanisms of activities of the analyzed issues can be better understood	

Source: Creswell, 2013; Grabowski, 2013; Paluchowski, 2010.

The latest concepts for assessing organizational efficiency include models business excellence model taking into account the trend of a comprehensive quality management. These models define the management areas requiring the development and application of the best leading solutions to the lasting, long-term success of members of the organization, customer satisfaction and society. Ziębicki (2010, p. 12) presented the concept of organizational efficiency together with changes in the course of development and evolution of the theory of organization and management. The results of the assessment of efficiency are presented in the form of a comparison of contemporary concepts of effectivity assessments.

According to Bratnicki and Austen (2010, p. 41-48), the efficient organizational measurement system should consist of the following attributes:

- to analyze and discuss phenomena of interest in a clear and concise manner for stakeholders,
- to go beyond control and give credible insight to improve efficiency,
- to develop and continuously stimulate a company's improvement,
- to focus on processes and these issues of business, which are affected by them, such as:

quality, time, finances, customers' satisfaction, human resources,
- to help to predict a company's direction,
- to allow the use of measurement measures resulting from current combination of activities strategies with strategic objectives of a company,
- to provide quickly detailed information in order to support appropriate decisions and action which could have been taken,
- to be simple, understandable, economical,
- to take into account different analysis' perspectives as well as cause-and-effect relationships.

Methodology, Empirical Data and Analysis

In theory of organization and management the organizational efficiency is defined as the ability of an enterprise to adapt to current and strategic changes in the environment and the productive and economical use of the resources available to implement the adopted structure of objectives (Penc, 1997, p. 100). In the article a structured questionnaire with a clearly defined research objective to measure the organizational effectivity was used. All questions were presented to the respondents in exactly the same way as regarding content and form. The questionnaire contained closed questions, so called simple questions (answer: yes/no), questions with options for answers (a/b/c/d), questions requiring a scale of assessment of responses (1 - least, 5 - the most), deeply closed questions (deliberately reopening the question in another parts of the survey to check the accuracy of the respondent's answers) (Finstad, 2010, pp. 104-110; Sobczyk 2003), closed questions giving respondents the possibility of ticking and completing the answer "other - what?" and the questions to track changes over time were used. In the questionnaire, the options for answering were not exhaustive for a respondent. The order scale has been used for reasons of clarity and for the sake of mapping the diversity and ordering the measured characteristics.

Table 5: Presentation of the research characteristics

Research subject	Objects, territorial and temporal scope	Measurement methods and tools	Current application of methods
Evaluation of organizational efficiency	Database on enterprises operating in food processing sector in Poland	Questionnaire: CAWI technique	A few analyses in Poland and in the world

Source: own preparation.

According to Kaczmarczyk (2011), surveys belongs to qualitative measures, collected in a database that have to be cleaned, verified, and analyzed by means of statistical methods. The questionnaire consisted of the main part dealing with the organizational efficiency to indicate the scope of enterprises' operations, modified areas of their operations and trade. The supplementary part consisted of information on the spatial and geographical location, legal personality and the number of permanent employees in a company. The overall size of the research sample was determined on the basis of standard sizes for specific types of research presented in the literature on marketing research (Kramer, 1994). Entities were selected based on the EMIS Intelligence/Professional database from the period 2010-2017. The criterion for dividing meat processing enterprises into small, medium and large was determined by the volume of processing of the slaughter, the number of employees employed on a permanent basis and the volume of net sales revenue obtained. Small enterprises employ from 10 to 49 people, process more than 7.5 tons to 20 tons of slaughter per week, and generate sales revenue of up to 100 million PLN per year. Medium-sized meat enterprises employ 50 to 249 people, process 20 to 100 tons of slaughter per week, and earn sales revenue of 101-499 million PLN per year. Large meat companies employ more than 250 people, process more than 100 tons of slaughter raw material per week, and generate sales revenue of more than 500 million PLN per year. The main study was preceded by a pilot study conducted in chosen ten food processing enterprises in Poland. Analysis of completed questionnaires in the pilot study showed that the respondents had no difficulties filling them in. The same questionnaire was used in the main study. The data had been collected, processed and analyzed with regard to the following operations:

- editing and checking the questionnaires,
- entering and encoding the data in the STATISTICA worksheet (version 13.1),
- taking into account the level of measurement of the variables in the qualitative, orderly scales) and the value categories of the variables under investigation according to the format survey questions (answer categories, text/label values, numerical values, scales 0/1, 1-3, 1-5), thus enabling their categorization,
- random control of the results in terms of the completeness of the questionnaire answers,
- the final sample N = 100 companies functioning in domestic meat sector,
- all surveys with a single one lacked answer were rejected,
- to carry out tabulation, i.e. counting the cases belonging to different categories,
- statistical grouping by type and nature variables,
- determination of descriptive statistics depending on the type and nature of variables,
- conducting additional analyses for selected variables, cluster and factorial analyses,
- generating partial reports in STATISTICA (tables/charts),
- developing a collective result report with a graphical presentation data in the version for editing (WORD MS Office).

The aggregate raw data in the Excel file to the statistical package STATISTICA for further statistical treatment has been transferred. The CAWI method was carried out in the period from 1.01.2017 to 31.12.2017. The questions required answers about the state of the examined phenomenon in 2017 and 2010 to compare the changes taking place over time. The return of the online questionnaires was about 20%.

Research Results and Discussion

Table 6 shows the scope of activities of the analyzed meat processing enterprises. From the opinions of respondents, a picture emerges, in which small meat processing enterprises concentrated theirs activities in the production and sale of meat and meat products to the local market. Small meat processing enterprises are family businesses, most often established in the 1990s. Their owners gained experience and boast a tradition in production. They are not geared towards consolidation. Ownership changes follows the transfer of companies to younger members family, restructuring or disposing of unnecessary assets. Small businesses have maintained their presence on the market because customers have purchased meat and meat products from domestic producers at their home villages. Unfortunately, after 2013 the increase in consumption of poultry meat did not compensate for the fall in beef consumption and some small businesses went bankrupt (Chechelski and Krawczuk, 2015, p. 26). Difficulties of small and medium-sized enterprises meat results from a low level of specialization, producing several dozen types of products which does not allow for effective use of the equipment or to conduct effective marketing and advertising. On the meat market, the chances are good the largest and most specialized companies have to survive (Chechelski and Krawczuk, 2015, p. 27).

Table 6: Scope of activities of analyzed groups of meat processing sector in Poland

The most important trade markets	Meat processing enterprises					
	Small		Medium-sized		Large	
	2010	2017	2010	2017	2010	2017
Local	yes	yes	yes	-	No	-
Domestic	no	no	yes	yes	yes	yes
International	no	no	no	yes	yes	yes

Source: own study.

Medium-sized meat processing enterprises produced and offered products for the local and domestic market, and some of them tried to expand their activity outside the country. Large meat processing enterprises did not intensify their efforts to maximize sales of meat and products to the regional market, but maintained domestic sales and expansion outside Poland. The biggest threat to medium-sized and

low-turnover companies may be the so-called average revenue trap - about PLN 50-150 million (Soliwoda, 2012). The research shows that the following directions of business activity will develop (Drożdż, 2013, p. 20-24; Chechelski, Krawczuk, 2015, p. 28; Chyłek, Niepytalski and Śliwa, 2016, p. 2-6):

- concentration of small and medium-sized enterprises on production on the local market involves a search for market niches and/or holding an established position of a local brand, f. ex. production of traditional products on local markets, development of own store chains, cooperation with small retail chains on the domestic market;
- cooperation of medium-sized and large enterprises with retail chains involves the production of several product ranges in long batches, under the following conditions and under the brand name of retail chains, which means dependence on retail corporations and cost reduction;
- branded manufacturers' association under “brand name” (f. ex. *Polish sausage*, *Cracow ham*) involves a search for the expansion on the foreign markets by major meat companies with foreign capital. It means strong competition from transnational corporations and the need to increase sales revenue;
- building its own company brand involves a search for investment in research and development of innovative production and large financial outlays. It is a strategy suitable for large, economically strong companies as it requires competition with transnational corporations;
- building its own corporate brand and working with commercial corporations. It is a combination of cooperation of medium and large companies with retail chains and building its own corporate brand. This strategy is being pursued by large companies and global corporations with an established position in the market.

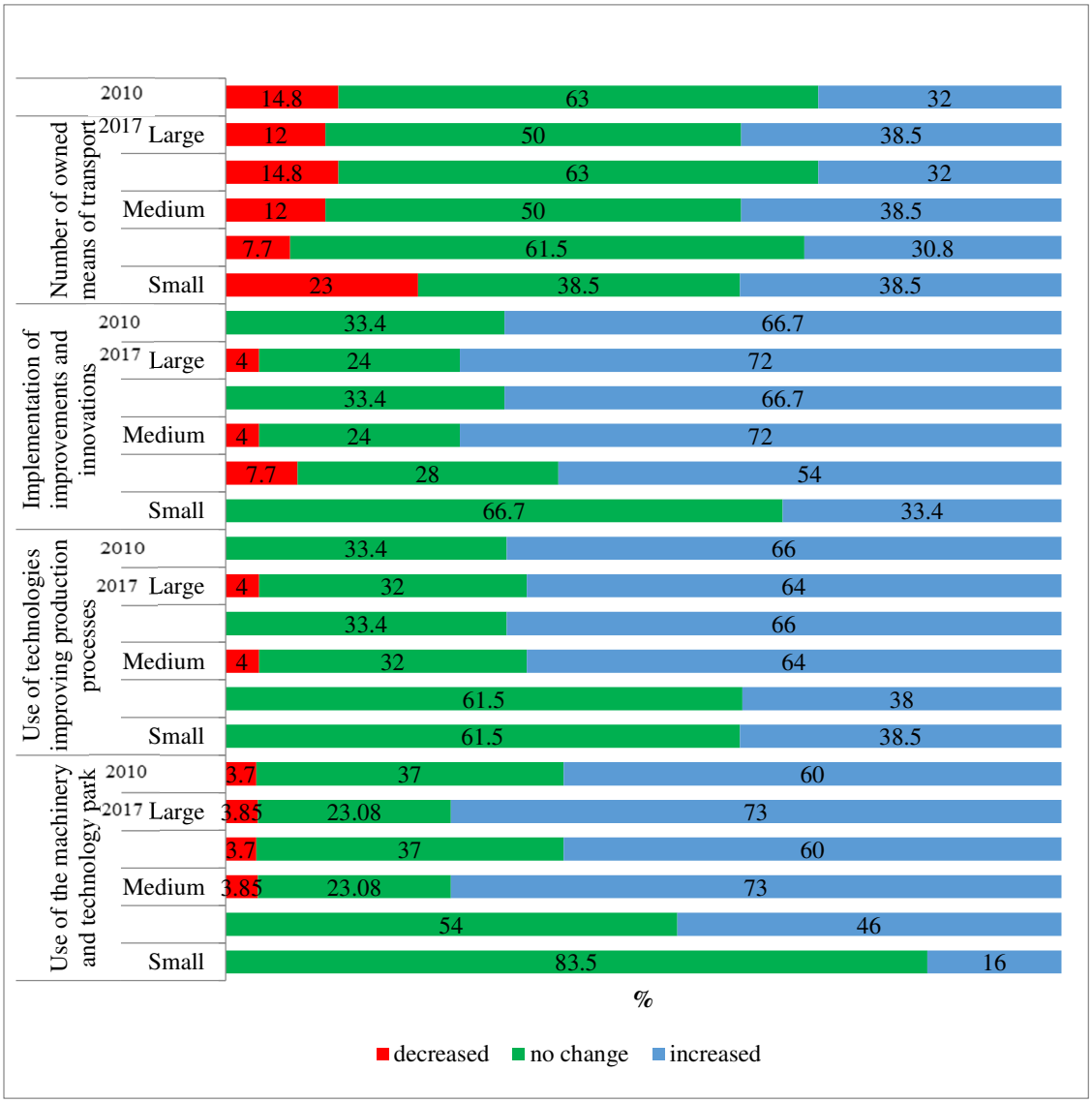

Fig. 1: The validity structure of modified areas of activities in meat processing enterprises in Poland

Source: own study.

Figure 1 presents the validity structure of modified areas of activities in meat processing enterprises in 2010 and 2017. In 2010 and 2017 the most frequently introduced changes in the functioning of all analyzed size groups of meat processing enterprises involved a search for increasing the number of improvements and innovations. In 2010, for 72% of medium-sized and 66.7% of large meat companies the key to improving their operations was the introduction of improvements, mainly organizational and innovations in the production process. The second, equally strongly modified area of functioning indicated by 64-66% of medium-sized and large meat companies and 38% of small businesses resulted from the increased use of technologies which improved the production processes. The implementation of so-called "modern" investment technologies, which are rationalizing the consumption of raw materials, materials and energy played the decisive role. The third area indicated in 2010 by 60% of large and 60% of medium-sized meat companies, and in 2017 by 72% of large and 72% of medium sized meat companies was an increase of the machinery and technology park use. This was due to the basic action to reduce material intensity and optimize the design of machines and equipment,

technologies and products. In 2010 54%, and in 2017 83.5% of small meat companies did not introduce changes in the use of the machinery and technology park. As the only ones they have intensively increased their means of transport from 7.7% (2010) to 23% (2017) and thus extended the territorial impact area.

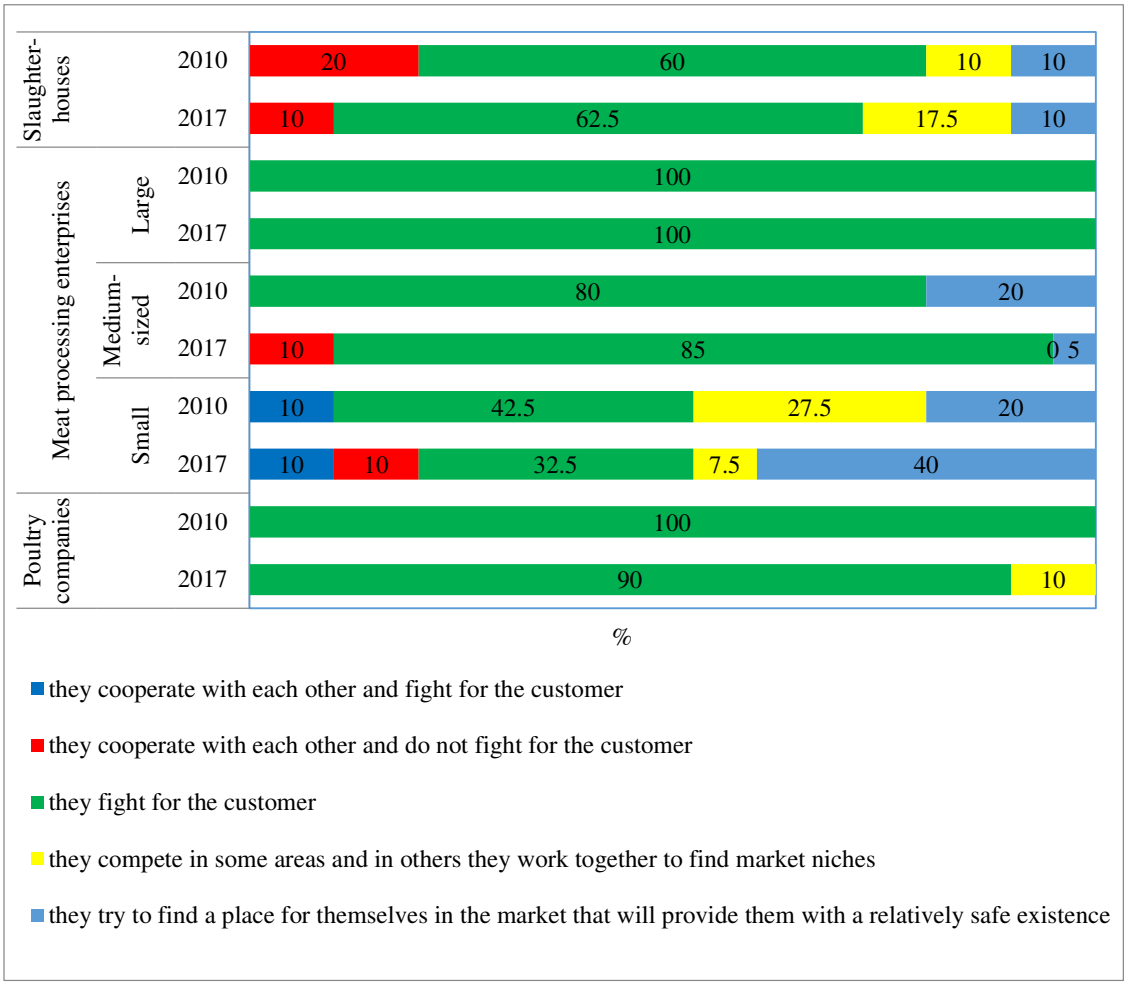

Fig. 2: Structure of the answers on existing marketing relationships in and between analyzed groups of meat processing enterprises in Poland

Source: own study.

Figure 2 presents the structure of answers to the question about the nature of relations in the analyzed groups of meat processing enterprises in Poland. In 2010 and 2017 60% of respondents in slaughterhouses indicated that they competed with each other and fought for the customer. Many of the small, local meat processing enterprises have cooperated with others slaughterhouses, which was due to the fact that all of them operated the same purchasing facilities. In 2010 20%, and in 2017 10% of the analyzed slaughterhouses were cooperating with each other and did not fight for the customer. In 2010, 10%, and in 2017, 17.5% of slaughterhouses tried to find niches for themselves, so as not to fight for the customer. This was the case with slaughterhouses producing cold cuts. Large and medium-sized meat processing enterprises competed with each other and fought for the customer. Outside the protocol, in backstage conversations, the owners of local slaughterhouses admitted to working with their rivals, which was due to the rigidity of demand and little chance of increasing the number of customers. Small meat processing companies took steps to find market niches. In the years 2010-2017 poultry enterprises did not cooperate with each other, but competed and fought for the customer.

Poultry enterprises operating on a local scale also searched for market niches in order to ensure a relatively safe area of operation. High competition and pressure to act very quickly was noted in poultry enterprises, finding market niches in poultry production and processing was difficult.

Table 7: Countries with which there was trade in analyzed groups of meat processing enterprises in Poland

Specification	Export		Import	
	EU countries	Non-EU countries	EU countries	Non-EU countries
2010				
Slaughter-houses	Germany, the Netherlands, Belgium, France	Bulgaria, Romania	-	-
Large meat enterprises	Austria, Germany, France, the Netherlands, Belgium	Sweden	Germany, Denmark, Spain	-
Medium-sized meat enterprises	Germany, Lithuania, Latvia, Estonia, Repubic of Ireland	Belarus, Bulgaria, Romania	-	-
Small meat enterprises	Germany, Czech Republic, Slovakia	-	-	-
Poultry companies	Germany, France, Belgium, the Netherlands, Austria	-	-	-
Commercial enterprises for meat and meat products	Germany, France, Belgium, the Netherlands, Austria	Switzerland	-	China, USA,
2017				
Slaughter-houses	Germany, the Netherlands, Belgium, France	South Korea	-	-
Large meat enterprises	United Kingdom, Italy, Germany, Slovakia	China, South Korea, USA, Japan	Germany, Danemark, Spain, the Netherlands,	Argentina
Medium-sized meat enterprises	Slovakia, Czech Republic	-	Germany	-
Small meat enterprises	Czech Republic, Slovakia, Germany	-	Germany	-
Poultry companies	Germany, France, Belgium, the Netherlands, Austria	Ukraine, Hong Kong, South Korea	Germany, Slovakia	-
Commercial enterprises for meat and meat products	Germany, France, Belgium, the Netherlands, Austria	South Korea	-	China, USA, Argentina

Source: own study.

Table 7 shows a list of countries with which the analyzed groups of meat processing enterprises have traded. In 2010 slaughterhouses exported carcasses to Germany, the Netherlands, Belgium, France, as well as Bulgaria and Romania, which at that time were not EU countries. In 2017, slaughterhouses continued to export to most EU countries as well as to non-EU countries such as South Korea. Large meat processing enterprises exported carcasses and meat products abroad. Between 2010 and 2017, the number of countries and directions of trade increased, mainly exports. In 2010, carcasses and meat products were exported to Western European countries, f. ex. Germany, France, the Netherlands, Belgium, Austria, Sweden, and to the south - Bulgaria and Romania. In 2017, Polish meat was exported to the UK, Italy, Germany and Slovakia, and outside the EU to China, South Korea, the USA and Japan. Large meat processing enterprises imported carcasses and meat products from Germany, Denmark, Spain and the Netherlands. Poultry companies in 2017 in comparison to 2010 expand their trade to include exports of meat products with non-EU countries, such as: Ukraine, Hong Kong, South Korea, and imported to a small extent alive from Germany and Slovakia. Trade and service undertakings for meat and meat products have been widely traded with countries both within and outside the EU. In 2017 they traded with China, the USA and Argentina.

To sum up, polarization on the Polish meat market is expected in the coming years. Small and medium-sized companies will cover local and regional demand. Large enterprises should be prepared for production on a large scale and in narrow specialization, f. ex. production of products for mass consumer (retail chains) and for export. Such a model is already implemented in developed European countries. A small number of large meat companies with national capital will compete with global companies. Most Polish meat companies will have to subject to conditions imposed by transnational corporations, which "push local companies into the role of subcontractors and sub-suppliers, leaving them as the main coordinators, organizers and market creators (Chechelski and Krawczuk, 2015, p. 27).

Conclusions

To highlight future reflections it has to be said that the basic process of human activity is management, which is a process of conscious, rational, unforced decision making, which, on the one hand, must balance unlimited human needs, and on the other hand, limitation of resources. It is extremely important to stress that in the environmental context, a company uses human resources, land, tangible and financial capital, so as natural resources, raw materials, energy carriers, geographical space and capacity assimilation of the natural environment. It means that the company has right to emit pollution due to the fact that results of the production process are pollution and waste (Hałasa and Rumianowska, 2000).

According to the conducted research, the hypothesis has been positively verified. Organizational efficiency depends on the level of optimizing of modified activity areas along with trade policy based on crucial foreign partners.

The analysis of domestic and foreign literature in the field of measuring organizational efficiency of food processing enterprises lead to the conclusion that the concept of efficiency is diverse and multi-dimensional and can be classified in various ways. The difficulties concerning the efficiency measurements have arisen from the characteristics and properties of different approaches and methods of its assessment.

Therefore, the obtained results will be used in further analyzes of factors affecting the level of maximization use of inputs using existing and modified methods of the efficiency measurement. An attempt to develop a new concept for measuring and assessing the efficiency of food processing entities may have an influence on actions, entities affected by those actions, and may lead to the redefinition of the state's role in the stabilization of domestic food processing sector.

The results can be helpful in creating a strategy for companies, development institutions and creating economic policy programs in agriculture, helping adjust the activities of related entities in the agro-food market, as well as determine the role of the state in terms of stabilization of the domestic meat market and to gain the significant competitive advantages.

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Loan Portfolio Structure and Banks' Profitability – Is There a Connection?

Alen STOJANOVIC
University of Zagreb, Faculty of Economics and Business, Zagreb, Croatia
astojanovic@net.efzg.hr

August CESAREC
University of Zagreb, Faculty of Economics and Business, Zagreb, Croatia
acesarec@net.efzg.hr

Jaksa KRISTO
University of Zagreb, Faculty of Economics and Business, Zagreb, Croatia
jkristo@net.efzg.hr

Abstract

The volume and the structure of bank's loans depend on a number of factors. They include the level of financial system development and market competition, the structure of the economy, market demand and risks, the relevant regulation, bank size, the management and the shareholders preferences, etc. The structure of loan portfolio directly affects the profit and loss account, as well as the level of bank's exposure to risks, which is in the core of bank management. The paper analyses the sectoral structure of banks' loans in the USA, the Eurozone and especially in the Republic of Croatia. The credit policy of banks in Croatia is in the focus of this research, with the aim to determine the causes and consequences of the loan portfolio structure among banks distributed by size. The results of the research confirm the dominant importance of granted loans in the balance sheets of all observed banks and regions, as well as the similarities in the sectoral structure of loans among banks. Finally, on a sample of Croatian banks, the paper presents some findings that sectoral restructuring of banks' loan portfolios in recent decades, at least from a profitability perspective, is not always justified.

Keywords: bank loan structure, bank credit policy, bank profitability, market trends, Croatia

Introduction

Banks are traditionally the most significant financial institutions. As financial intermediaries, they buy direct financial receivables characterised by a set of specific features, and transform them into indirect receivables with a different set of features. Essentially, Madura (1997) states that banks grant non-liquid and risky loans on the basis of liquid and non-risky deposits, given that they are familiar with the needs of their clients, and with required risk management of such transformations.

However, due to recent changes and developments in the global financial system, banks are slowly losing their specific and privileged position. Today's highly competitive local and international financial markets are marked by new and improved methods and models of financial services creation, distribution, by simplified and accelerated communication among financial market participants, and by lower costs of labour and of data storage and processing. In addition, there are new market participants, namely different financial specialists who base their business operations on applying modern technologies (FinTech).

The result of these trends and changes is increased competition among banks, as well as between banks and other financial institutions in nearly all segments of their business operations. Under these conditions, most banks in the developed countries are redefining themselves in order to adapt to the

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new environment. To accomplish business de-specialisation, banks are changing their strategies and business models. The idea that the de-specialisation of the banking business has become a pre-condition for their sustainability and market competitiveness has become widely accepted. Therefore, banks are engaging in a growing number of new, non-traditional and off-balance sheet activities. One of the consequences of these changes is the growing complexity of the structure of banks' profit and loss account.

However, the possibilities, needs and dynamics of banking business transformations are not the same everywhere, nor are they the same among banks of different sizes. As a result of either external or internal limitations, the share of modern, non-traditional credit and non-credit services and the related income differs among banks. For instance, small banks, due to the lack of economy of scale, do not have the same opportunities for modernising their business operations as do large banks, which frequently operate on the international market as well. This is due to limited financial and human resources, as well as the limited demand on the local market small banks usually serve.

Finally, in the bank-based financial system such as Croatian, banks, as the most dominant financial institutions on the market, do not have the same need to change their business philosophy and strategy, as do banks in market-based financial systems. In those markets the competition between banks and other financial institutions is much fiercer, hence their need for more frequent changes.

The aim of this research is to determine the impact of the structure of banks' loan portfolio on their profitability, particularly on the average return on assets (ROA). The paper is structured in following way. In the introductory part of the paper, the changes in the contemporary banking environment are presented, as well as their impact on banks' business policies. The second part of the paper looks at trends, significance and sectoral structure of loans in banking systems of selected developed countries (the US, Eurozone). The third part provides a descriptive analysis of the banking system of the Republic of Croatia, and the fourth part gives an overview of data sources, methodology and panel analysis variables. Research results are presented in part five, followed by discussion and conclusion.

The significance and structure of loan portfolio of contemporary banks

The volume and the structure of loans in bank's assets depend on a number of factors. They include the level of financial system development and market competition, the structure of the whole economy, the relevant regulation, market risks, bank size, affinities of the management and the shareholders, etc. In the traditional sense, loans generate the greatest income, but also pose the greatest risks. In other words, the structure of loan portfolio directly affects the profit and loss account, as well as the level of bank's exposure to risks, which is in the core of bank management. For those reasons, bank's specific credit policy is the concern not only of the management and the shareholders, but also of supervising authorities and, given its impact on the overall economic developments, of the general public.

The portfolio analysis approach usually implies that loans account for more than 50% of banks' assets, and the rest are other investments. These include investments in government and agency bonds, reserves with the central bank, or foreign currency receivables, etc. Likewise, banks invest little in stocks or shares, especially if investment in the subordinate financial institutions are exempt. On the other hand, Koch and MacDonald (2014) state that the most important source of loan financing and other forms of banks' investments are households' deposits, while deposits received from other sectors and other forms of debts hold much less significance.

The arguments suggesting the key importance of loans for banks' business conduct in developed countries are supported by the data published by Federal Deposit Insurance Corporation (2019) and European Central Bank (2019). At the end of 2018, granted loans made up an average of 56% of total assets of US banks, in the EU this percentage is nearly 63%. However, some countries in the EU deviate from the average (Fig. 1), so the share is around 89% in the Czech Republic, 76% in Austria, 75% in the Netherlands, around 72% in Poland and Italy, or quite low 55% in Great Britain.

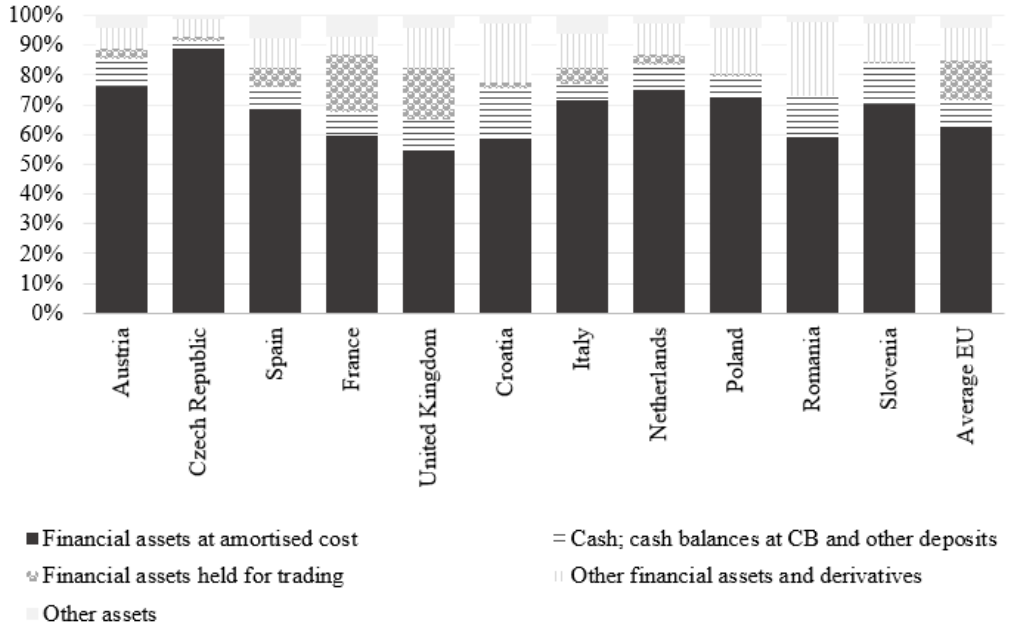

Fig. 1: The structure of banks' assets in selected EU countries, 2018

Source: Prepared based on ECB, Statistical Data Warehouse, 2019

The sectoral structure of loans provides a very important view of bank's business conduct. The analysis of the data on total loans granted to households and non-financial corporations (Table 1), as the two most significant sectors in the overall structure of loans, shows that the lending activity of banks, or of monetary institutions in the Eurozone (money issuing sector in the Eurozone; includes credit institutions and money market funds, excludes Eurosystem), was in almost any given year to a greater extent directed at households.

Table 1: Bank loans in the US and MFI of the Eurozone to non-financial corporations and households, 1997 – 2018 (%)

Year	US		EURO ZONE		EURO ZONE COUNTRIES, 08/2019		
	Households	Non-Financial corporations	Households	Non-Financial corporations	Country	Households	Non-Financial corporations
2018	53.4	46.6	56.7	43.3	Belgium	56.7	43.3
2017	54.4	45.6	56.5	43.5	Germany	61.2	38.8
2016	55.7	44.3	55.9	44.1	Estonia	54.5	45.5
2015	56.2	43.8	55.4	44.6	Ireland	59.5	40.5
2014	55.0	45.0	54.8	45.2	Greece	54.9	45.1
2013	56.3	43.7	54.6	45.4	Spain	60.2	39.8
2012	57.6	42.4	53.7	46.3	France	54.4	45.6
2011	58.5	41.5	52.6	47.4	Italy	48.9	51.1
2010	59.6	40.4	52.5	47.5	Cyprus	49.0	51.0
2009	56.2	43.8	51.4	48.6	Latvia	44.7	55.3
2008	52.6	47.4	50.3	49.7	Lithuania	52.9	47.1
2007	52.5	47.5	52.2	47.8	Luxembourg	39.6	60.4
2006	54.0	46.0	54.1	45.9	Malta	56.8	43.2
2005	54.7	45.3	55.2	44.8	The	58.3	41.7
2004	56.3	43.7	54.7	45.3	Austria	47.7	52.3

2003	55.6	44.4	53.7	46.3	Portugal	62.7	37.3
2002	53.6	46.4	52.9	47.1	Slovenia	52.7	47.3
2001	49.7	50.3	52.0	48.0	Slovakia	65.5	34.5
2000	48.6	51.4	52.6	47.4	Finland	59.3	40.7
1999	48.8	51.2	53.2	46.8			
1998	50.1	49.9	52.5	47.5			
1997	52.0	48.0	52.3	47.7			

Source: Prepared based on FDIC, Statistics on Depository Institutions, 2019; ECB, Statistical Data Warehouse, 2019

There are many reasons for this practice. In any case, the sectoral distribution of loans is a consequence of concrete decisions and perceptions of banks' management regarding the ratio of potential profit and risk in the conditions of a specific competitive market environment.

Therefore, the fact that banks target the household sector more is in some countries, such as the US, largely a result of increased competition in financing non-financial corporate sector on the financial market. Specifically, in the past several decades investment and pension funds, hedge funds, and other institutional investors have been taking a more prominent role in developed countries, thus becoming a more important source of financing of the non-financial corporate sector. Under these conditions, it becomes quite understandable that banks increasingly prefer granting loans to households as a pragmatic alternative. Household demand for loans is mostly predictable and stable, the loans granted to households are in most cases less risky and/or easier to foreclosure, and interest rates are usually higher than on loans granted to non-financial corporations. In addition, banks' lending and other activities related to households provide them with a growing number of services and non-interest income. It is therefore no surprise that banks focus their activities over last couple of decades at households, supported by modern technology.

However, greater focus of banks on the household sector can be found in the markets in which the described competition still does not exist, or has only a symbolic meaning. In these countries, banks are evidently motivated solely by commercial criteria and profitability, and they assume that the focus on loans to household will make it easier for them to meet their targeted profitability. In this process, the non-financial corporate sector's needs for external financing are to a large extent deliberately neglected, at their expense, of course. In the conditions of underdeveloped or unavailable alternative sources of financing, inadequate financing of the corporate sector results in multiple negative consequences. Policy paper by Deutsche Borse Group (2015) mentions following negative consequences which were all visible during the latest economic crisis in the EU: frequent cases of illiquidity and inability of fast recovery of a large number of non-financial corporations, increased job instability in the corporate sector, delaying key investments, which are in fact the precondition for their recovery and the overall economic growth, increased uncertainty and generally negative expectations.

Descriptive analysis of the Croatian banking sector

The situation in Croatia is similar to that in other countries analysed so far, as granted loans are by far the most important asset of the entire banking system. What is more, since the adoption of the first market-based Act on Banks and Savings Banks in 1993, banks have increased their lending activities significantly, and their share in the total assets has continually grown. In particular, from a very low 42.8% in 1993 to 67.6% in 2011, the year when granted loans reached their percentage peak, followed by a slight decline due to the 2008 recession and subsequent slow recovery of the Croatian economy. Finally, in late 2018 granted loans reached a respectable 58.1%, which matches its share in developed countries.

Table 2: The share of loans and their structure in Croatia's banks (%)

Year	Total loans / total assets	% loans to households	% loans to corporations
2018	58.1	60.1	39.9
2017	57.9	58.8	41.2
2016	60.7	58.0	42.0
2015	62.7	58.8	41.2
2014	63.9	57.8	42.2
2013	66.3	57.1	42.9
2012	67.0	57.3	42.7
2011	67.6	54.1	45.9
2010	67.0	55.8	44.2
2009	66.7	56.0	44.0
2008	66.7	57.2	42.8
2007	62.7	57.2	42.8
2006	61.6	55.3	44.7
2005	58.4	56.0	44.0
2004	54.6	55.2	44.8
2003	53.8	52.8	47.2
2002	53.0	47.9	52.1
2001	44.4	44.0	56.0
2000	45.8	42.5	57.5
1999	49.8	38.0	62.0
1998	52.1	32.6	67.4
1997	48.2	29.0	71.0
1996	49.7	22.3	77.7
1995	52.0	17.4	82.6
1994	50.2	15.7	84.3
1993	42.8	11.4	88.6

Source: Based on the Croatian National Bank's official data, 2019

The structure of granted loans by Croatian banks also points out to the general trend of a relative decrease of non-financial corporate loans compared to household loans, a trend which is much stronger in Croatia than in other analysed countries. The fact that in 1993 far more loans were granted to non-financial companies than to households (88.6% vs. 11.4%), whereas in 2018 the situation reversed and the ratio changed to 60.1% for households and 39.9% for corporations, represent one of the most significant changes that occurred in the Croatian banking system so far. Reaserch by Leko and Stojanović (2006) concluded that this trend of increasing loans to households is a result of a turn in credit policy made by large banks in Croatia.

Data and methodology

The data was obtained from the Croatian National Bank, which is, among others, responsible for the supervision of credit institutions. The research covers the period from Q1 2004 to Q2 2017 (54-time observations, quarterly and anonymized data). Although the retrieved data contains the information from the financial statements of all active banks in each quarter, the research focused on 26 banks which were active in the entire period, equalling to 1,404 observations for each variable. For the purpose of the statistical analysis, banks were divided into subgroups according to their size and loan portfolio structure, as shown in Table 3.

Table 3: Bank groups – size and loan portfolio structure

Groups by size		
Group name	Description	Number of banks
Small banks	Average individual assets less than 0.5% of total banking sector assets	11
Medium banks	Average individual assets between 0.5% and 5% of total banking sector assets	9
Large banks	Average individual assets greater than 5% of total banking sector assets	6
Groups by loan portfolio structure		
Group name	Description	Number of banks
Household	Percentage of loans to households greater than 50% of total approved loans	8
Neutral	Percentage of loans to households or non-financial corporate sector less than 50% of total approved loans	8
Non-financial corporative	Percentage of loans to non-financial corporate sector greater than 50% of total approved loans	10

Source: Prepared based on the data retrieved from the Croatian National Bank, 2018

At this point it must be highlighted that categorising banks into the first group (>50% of loans granted to households) or the third group (>50% granted to the non-financial corporate sector) by no means indicates that they do not grant loans to clients belonging to other sectors. It merely points to the majority share of the sector selected based on the credit policy. Therefore, despite the fact that none of the large banks granted more than 50% of their total loans to the non-financial corporate sector, in absolute terms these banks remain the most important creditor of all business sectors, including corporations. For instance, out of the total of 68.8 billion HRK of granted bank loans to corporations in 2016, large banks approved as much as 53.3 billion HRK, amounting to 77.5%.

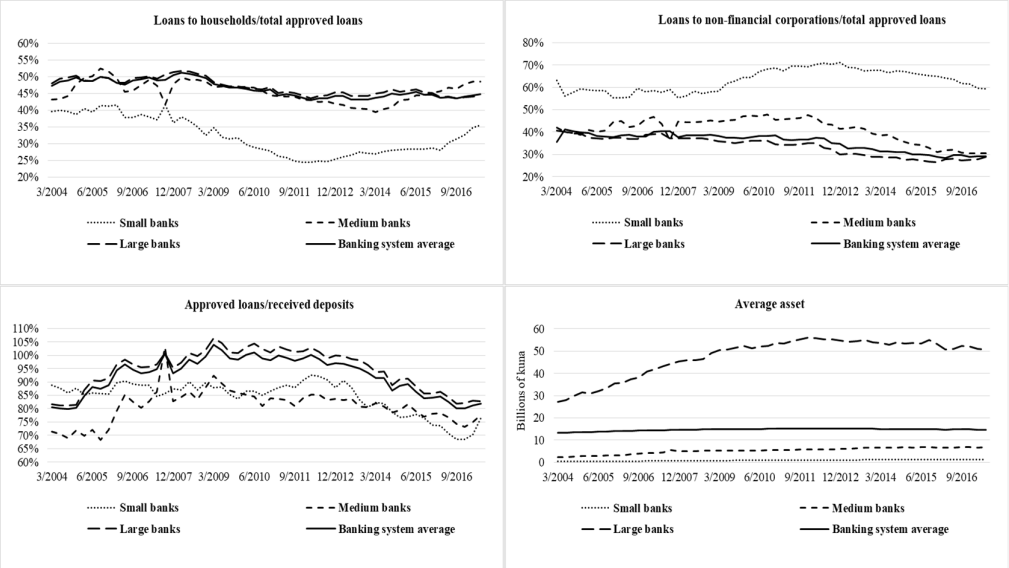

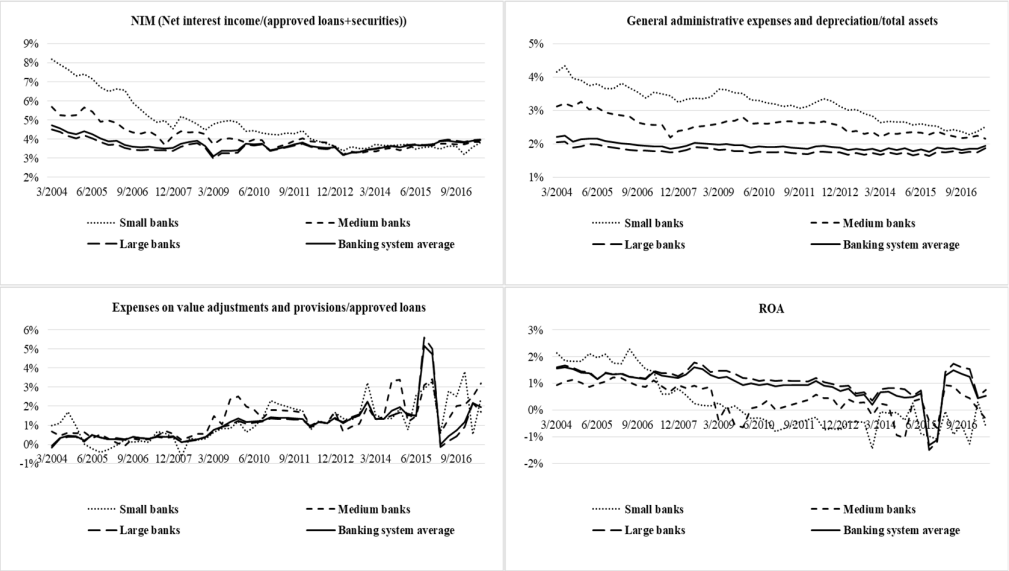

Fig. 2: Banks performance indicators, according to size and sectoral structure of loans, quarterly (%)

Source: Prepared based on the data retrieved from the Croatian National Bank, 2018

The data from Graph 2 indicate that in relative terms small banks approve far more loans to non-financial corporations than to households. On the other hand, the distribution of loans granted by large and medium-sized banks across sectors is quite similar, although the size of their average assets differs significantly. If the use of loan potential is analysed through the ratio of total approved loans and total received deposits, it seems that in the longest observed period the loan activity of medium-sized banks is the lowest, although that of small banks is not much better. Ultimately, in the past several quarters, small banks have achieved the lowest loans to deposits ratio. When also relatively high general administrative expenses and depreciation costs of small and medium-sized banks, their higher value of provisions and impairments (except for one quarter), and, finally, increasingly equalized net interest margin among all banks are taken into account, the dinamics of banks' ROA indicators distributed according to their size becomes quite understandable.

In other words, banks' lending policy across sectors is not decisive for their success or failure. The key variables of banks' acceptable profitability are size and economies of scale, cost efficiency, and finally the quality of loan portfolio. Under these conditions, it is no surprise that in the longest part of the observed period large banks achieved the highest and the most stabile ROA, whereas medium-sized banks, despite their quite similar sectoral loan distribution, achieved significantly worse results (even the worst in some quarters). Unfortunately, average ROA indicators of small banks were, for similar reasons, the lowest in most cases.

This hypothesis was tested using the econometrical analysis. In order to analyse the determinants of banking profitability and cover individual bank data (cross-sectional aspect) and time observations (longitudinal aspect), the panel analysis is used. ROA is used as a dependent variable and a proxy of banks' profitability. At the same time, the ROE indicator was not used due to its high dependence on financial leverage.

Since based on the Levin-Lin-Chu test certain variables had a unit root, all variables were transformed using first differences to ensure stationarity. Both fixed and random effects models were conducted, where the effects of omitted individual-specific variables are, by Hsiao (2014), treated as either fixed constant over time or random variables, depending on the model. Additionally, the Hausman test was conducted to estimate which of the two models should be preferred.

Upon choosing the dependent variable, a set of key independent variables was chosen to determine the factors influencing the level of banks' profitability. Most of the variables refer to bank-specific variables, while GDP was chosen as a key macroeconomic variable. The detailed description of all variables is presented in Table 4. Three sub-models were considered based on the inclusion of a different number of variables in each model. Firstly, only variables related to the loan portfolio structure, size and risk level were taken into account, followed by the addition of the loan-to-deposit ratio in the second model, as a proxy of loan scale potential. Finally, gross domestic product was added in the model as a macroeconomic variable. Panel analysis was conducted using EViews 10.

Table 4: Variables description

Notation	Variable	Measure
DEPENDENT VARIABLE		
ROA	Return on assets	Net profits after taxes/total average assets
INDEPENDENT VARIABLES		
Bank specific determinants		
L_COR	Loans to non-financial corporate sector	Loans to non-financial corporate sector/total loans
L_HOU	Loans to households	Loans to households/total loans
SIZE	Bank size	Logarithm of total assets (log)
RISK	Expenses on value adjustments and provisions	Logarithm of expenses on value adjustments and provisions (log)
LTD	Loan-to-deposit ratio	Total loans/total deposits
Macroeconomic variable		
GDP	Gross domestic product	Year-on-year rate of growth (in %, constant prices, quarterly)

Results

The descriptive statistics of all included variables is shown in Table 5. The average ROA in the Croatian banking sector in the observed period is 1.01%, ranging from -22.08% to 9.70% in different periods and different banks. A somewhat higher percentage of loans is on average given to households and the minimum and maximum values indicate that individual banks favour certain economic subsectors. The average GDP growth rate is 1.17%, demonstrating internal weaknesses of the Croatian economy and longer recession effects.

Table 5: Descriptive statistics of included variables

Variable	Mean	Median	Standard deviation	Minimum	Maximum
ROA**	1.01	1.12	0.58	-22.08	9.70
L_COR**	35.42	37.26	3.94	8.59	92.68
L_HOU**	46.38	45.78	2.48	5.61	91.41
SIZE*	13.22	1.89	22.53	0.08	110.89
RISK*	2.60	2.84	2.48	0.008	3.42
LTD**	92.30	94.41	7.09	0.29	1.91
GDP**	1.17	1.76	3.52	-8.24	6.72

** Billions of HRK (Croatian kuna). ** %.*
Source: Authors' calculation based on the data retrieved from the Croatian National Bank, 2018

The results of the panel analysis indicate key determinants of the banking sector profitability in the Republic of Croatia. Firstly, the size of the bank and the risk level are the key factors determining bank's performance and success, both in fixed and random effects model at the 1% level. According to the results of the Hausman test and relevant p values (which are greater than 0.005), random effects model should be preferred. The highest coefficient is assigned to bank size and positive value indicates that larger bank size increases the ROA indicator. The expenses of value adjustments and provisions have the highest negative effect on bank's profitability.

Regarding the loan portfolio structure, only the percentage of loans to non-financial corporate sector is significant at the 5% level, but with a very weak positive coefficient. The percentage of loans to households is additionally significant at the 10% level when loan-to-deposit ratio and GDP are added to the model, although with low coefficient level, similar to the one for non-financial corporations.

Therefore, other bank-specific variables besides loan portfolio structure seem more important for a bank's performance and profitability level. Surprisingly, GDP growth rate is not a significant factor for the banks' profitability. This can be explained by the fact that the Croatian banking sector maintained relatively stable profitability levels despite the recession between Q4 2008 and Q3 2014. Finally, at the onset of the economic recovery in 2015, the banking sector recorded losses of HRK 4.6 billion, associated with extraordinary one-time expenses arising from the implementation of regulatory changes related to the negative impact of the Swiss franc – HRK exchange rate growth, which was not related to the issue of sectoral credit policy of banks.

Table 6: Profitability determinants – Fixed and Random Effects (Dependent variable: ROA)

	Fixed effects			**Random effects**		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Constant	-0.101** (0.042)	-0.103** (0.043)	-0.102** (0.043)	-0.097** (0.043)	-0.098** (0.043)	-0.098** (0.043)
L_COR	0.027** (0.013)	0.032** (0.013)	0.032** (0.013)	0.025** (0.012)	0.030** (0.013)	0.030** (0.013)
L_HOU	0.023 (0.016)	0.034*** (0.018)	0.034*** (0.018)	0.023 (0.016)	0.033** (0.017)	0.033*** (0.017)
SIZE (log)	4.440* (0.729)	4.630* (0.739)	4.627* (0.739)	4.218* (0.712)	4.404* (0.720)	4.400* (0.721)
RISK (log)	-1.904* (0.132)	-1.904* (0.132)	-1.902* (0.132)	-1.899* (0.132)	-1.898* (0.132)	-1.897* (0.132)
LTD	-	0.932 (0.592)	0.927 (0.593)	-	0.935 (0.587)	0.930 (0.588)
GDP	-	-	0.012 (0.023)	-	-	0.012 (0.023)
Adjusted R^2	0.135	0.136	0.136	0.148	0.149	0.149
Hausman test (p value)	-	-	-	0.690	0.791	0.880

*Significance level: *significant at 1%, **significant at 5%, ***significant at 10%.*
Standard deviation in brackets ().

Discussion and Conclusion

The analysis of the structure of loan portfolio of the banks in the US, in the Eurozone and in Croatia indicate a general trend of a relative decline in granting loans to non-financial companies and growth of granting loans to households. There are multiple reasons for this development, and the two most significant ones are competition and focus on profitability in a risky environment. Strong competition between banks and other financial institutions, or banks and the capital market in some cases (e.g. in the US, where according to the The Federal Reserve System (2019) the share of banks' assets in total

assets of all financial institutions was only 20.4% in 2018;), resulting in the loss of a part of corporate clients, can be considered a justified reason for a change in banks' sectoral lending policy. The question is how the same trend observed in countries in which such competition is not present is to be explained.

In those countries, including Croatia, banks still do not have serious competitors in non-banking financial institutions, let alone in the capital market (the share of banks' assets in financial institutions' total assets in 2018 amounted to 64.9% according to the Croatian National Bank and Croatian Financial Services Supervisory Agency (2019)). In addition, the analysis of the sectoral distribution of bank loan portfolio in Croatia shows that the biggest relative turn from non-financial corporations to households was made by large banks, which in fact do not have strong competitors in either smaller banks or the rest of the financial system. Unfortunately, the available data do not enable the analysis or the quantification of specific reasons or expectations from banks' strategic decisions, but their business results and general market trends do point to some conclusions. It seems that banks motivated solely by commercial criteria and the imperative of profitability expect that their focus on extending loans to households will facilitate their profitability preferences.

And yet, the change of interest rate spread on selected sectoral deposits and loans justifies such expectations only partially. As Graph 3 shows, only the household interest rate spread on kuna deposits and loans deviates significantly from the interest rate spreads in other cases. On the other hand, given that Croatian households prefer saving in foreign currency, with kuna loans remaining the most expensive ones (due to limited household sector kuna deposits), the level of interest spread for kuna deposits and loans is not surprising, but it should not be the key reason for a strategic turn of banks' lending policy across sectors in Croatia. For instance, after the crisis arose in Croatia in the second half of 2008, the significance of household foreign currency deposits increased further. So, in late 2011 they reached nearly 80% of total deposits of that sector. On the other hand, that same year kuna loans dropped to only 23% of total granted loans to households. Data by the Croatian National Bank (2019) indicate that ffter the crisis, the trust in domestic currency increases again, so by the end of 2018 household foreign currency deposits dropped to a still high 65%, whereas the share of kuna - domestic currency loans grew to only 53% of total granted household loans, the level still unimaginable in developed countries.

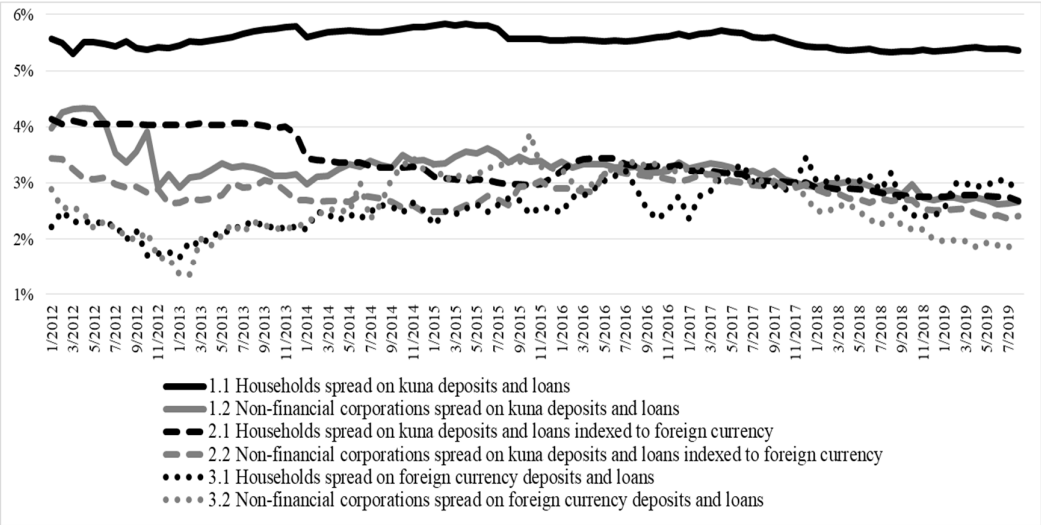

Fig. 3: Credit institutions' interest rates spread on deposits and loans to households and non-financial corporations (percentage points, on annual basis)

Source: CNB, Statistical data, Interest rates, 2019

On the other hand, the level of individual interest rates should not be analysed alone. That is, when interest rates and interest spread are combined with widely present, technology-enabled standardisation

and automatization of financial services provided to the household sector, it is not surprising that some banks have expectations that household loans will result in regular operational costs decrease, and eventually in greater profit. However, if this concept is right, why don't small banks follow the logic of the large ones? It seems that only reasonable answer to this question is – because they cannot, or, in other words, they have no choice. It can only be assumed that small banks would like to see the change in their existing credit policy, given that in the longest observed period they achieved the lowest average profitability on assets. However, they have no possibility of doing so in the very limited potential of local market they serve.

Finally, and most importantly, middle-sized banks' business results suggest that the sectoral structure of granted loans does not necessarily contribute to the rise in profitability alone; the panel analysis has shown that the volume and quality of loans contribute to the profitability to much greater extent.

The conducted analysis does not lead to definite and final conclusions on the appropriateness and justification of sectoral loan policies of the banks in either the Croatian or the global market. However, it does indicate that the expectations of some professionals and the market participants from the "easier path to profit" through the household sector alone are not justified. What is more, they can have direct negative consequences on economic development. Purposefully avoiding granting loans to non-financial companies, in the conditions of undeveloped or unavailable alternative sources of financing, has multiple negative consequences, which is an issue that requires further research. It must be emphasised that the described changes in sectoral lending policies are not the result solely of the of bank management decision. They are also the result of bank shareholders' expectations, created in coordination with the expectations from other, comparable investments. In addition, they are the result of the risks in the environment, and of regulatory institutions and the government, whose laws affect not only banks' lending policies, but also their entire business strategies, frequently without a clear vision of the potential consequences.

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Dynamic Causality between Energy Consumption and Non- oil gas Economic Growth in Indonesia

Dewi PUSPANINGRUM

Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
dewi.puspa@mhs.unsyiah.ac.id

Aliasuddin*

Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
aliasuddin@unsyiah.ac.id

Nazamuddin

Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia
nazamuddin@unsyiah.ac.id

*corresponding author

Abstract

This study aims to examine the dynamic causality relationship between energy consumption and nonoil-gas economic growth in Indonesia. ARDL and Granger-Causality model are used in this study for the annual data for the period from 1988 to 2018, or total samples are 31 years. The results show that energy consumption has a positive and long-run effect on nonoil-gas economic growth in Indonesia, vice versa. The effect of energy consumption on nonoil-gas economic growth than the effect of nonoil-gas economic growth on energy consumption. Besides, energy consumption has a short-run effect on nonoil-gas economic growth, and causality is a one-way direction. This means that energy consumption is crucial for nonoil-gas economic growth both in the short-run and in the long-run. Because energy consumption is essential to the Indonesian economy, it is recommended to provide green energy to support further economic growth as well as environmental protection.

Keywords: Energy Consumption, Nonoil-Gas Economic Growth, ARDL, Granger Causality

Introduction

Energy is a significant need for economic activities. With energy, the demand for goods and services will be created to impact the economic growth of the real sector (nonoil-gas) of a region. Besides being used to meet various needs, the energy itself can be used to achieve prosperity for the community for its management. The existence of energy influences the production of all goods and services, which is, therefore, very important in industrial development (Nnaji, 2013). Not only industrial and household activities that require energy, but technology, the creation of sophisticated manufacturing and transportation tools also require energy in its application.

Indonesia currently has a net oil importer status, where oil consumption is more derived from imports compared to production. This is done considering the energy needs in the country experienced a significant increase. Figure 1 shows Indonesia's energy consumption; there is an increase in comparative growth every year. The growth trend of energy consumption in Indonesia that moves significantly to achieve the economy in Indonesia not have too much impact on the slowdown in global trade, as is the case between the United States and China in 2019.

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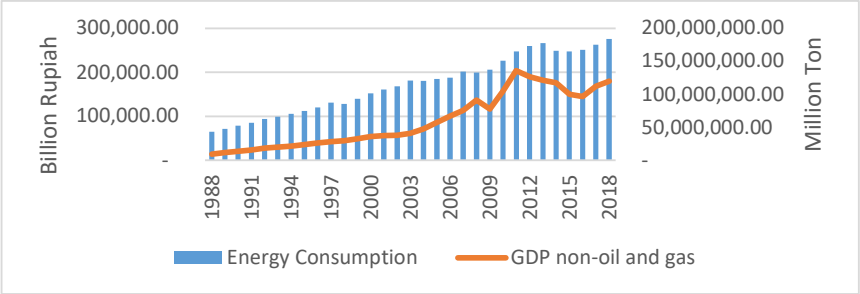

Figure 1: Energy Consumption and nonoil-gas GDP of Indonesia, 1988 – 2018
Source: BPS, 2018.

From 2003 to 2013, Indonesia's energy consumption continued to increase from year to year in line with the increasing rate of development and the improvement of people's lifestyles. The increase in almost all sectors of industry, transportation, commercial, household, power generation, and other sectors, in fact, the higher the level of national energy consumption is directly proportional to the economic improvement (Shen, 2018). Increasingly, the growing number of industries supporting the economy. With the increase in industry players in Indonesia, the economy has also shown an increase. The more widespread the industry that stands in Indonesia, they also helped improve the trade balance so that it directly affects the country's foreign exchange.

Indonesian economy continues to grow by 5.02 percent (YoY), while household consumption is still growing 5 percent which is one of the pillars of national economic growth, which is 2,298 9 trillion or 56.52 percent of the national gross domestic production (GDP) which reached 4,067.8 trillion in the third quarter of 2019. The increasing tendency of energy use also affects the increase in economic activity, which will automatically lead to the rise in society's economic growth. Also, there are obvious obstacles that can be seen with the increasing demand for energy. Meanwhile, the energy source itself has decreased, so it needs to be empirically assessed so that the role of energy consumption on economic growth can be analyzed empirically quantitatively. The study on the effect of causality between energy consumption and nonoil-gas economic growth is significant, considering that as one of the developing countries, development and supply of energy are substantial. This analysis can be one of the studies that can meet the shortcomings of this study in Indonesia. Based on these considerations, this study was conducted so that it could fill the gap in the absence of empirical evidence about this in Indonesia.

Literature Review

There are several studies between energy consumption and economic growth. Like Jaganath (2015), examining the difference between energy consumption and economic growth in India from 1970 to 2011 with the Granger causality and variance decomposition approach states that the level of GDP growth leads more to natural gas demand and no energy growth variable has an influence on GDP growth. In contrast to the decomposition variance test shows that there are two directions of causality between electricity consumption and future economic growth and shows the direct effect of economic growth on natural gas consumption. Dogan and Deger (2016) say that globalization and the economic growth of Brazil, Russia, India, and China affect energy consumption in the long run. They also find based on the Granger Causality Test, which states there is a direct causal correlation between total energy consumption and economic growth, and similar also occurs in the globalization variable on economic growth.

Faisal et al. (2017) examine energy consumption and economic growth in Belgium starting from 1960 to 2012, showing a long-term relationship between energy consumption and economic growth using the Granger Causality test. Besides that, economic growth is seen from GDP has a positive effect on energy consumption both in the long term or short term. Whereas Hasanova et al. (2017) assess energy growth in ten oil-exporting countries find some variables are co-integrated, but between GDP and energy consumption do not have a short-term causal relationship. They concluded that energy

consumption is cointegrated with GDP and has a positive effect in the long run. Based on tests, Granger shows the unidirectional causality between energy consumption and GDP. Yasar (2017) documents a causal relationship between energy users and economic growth, and in the long run, there is a positive causal relationship of economic growth to consumption energy.

The relationship between electricity consumption and economic growth in Southeast Sulawesi using the Granger Causality test and the Autoregressive Distribution Lag (ARDL) states there is a robust causal relationship and has a positive effect. From the results of this study, the researchers also concluded that every 1 percent increase in electricity consumption would increase by 0.3 percent. In the short term, there is a weak relationship between electricity consumption and economic growth but provides a substantial contribution to Southeast Sulawesi in the long run (Rahim et al. 2018). Aliasuddin and Ramadhana (2019) examined the economic growth of energy consumption in APEC countries and India with the Panel ARDL approach. This study uses alternative energy that is renewable energy, such as water energy. Alternative energy use, such as renewable energy, is an essential key in meeting future energy consumption. The study results explain that economic growth has a positive and significant effect on water energy in the short and long term. Increased water energy can reduce the number of carbon dioxide, especially for those producing carbon dioxide.

According to Ozturk (2010), there are four possible causal relationships between economic growth and energy consumption. Growth hypothesis (growth hypothesis) in which the condition of one-way (unidirectional) influence of energy on growth. Growth requires energy, and energy reduction will hinder growth. Furthermore, shows they also conclude that a country is not wholly dependent on energy for growth, and the policy of energy conservation can be done with little or no adverse effect on growth. When the economy grows, energy demand increases, and vice versa. The neutrality hypothesis, which confirms energy and economic growth, is neutral with each other, and the implications of energy conservation policies do not affect economic growth.

Research Method

This study uses annual data for non-oil and gas economic growth and energy consumption from 1982 to 2018, with a total sample of 31 years. Economic growth data uses nonoil-gas GDP data sourced from the Central Statistics Agency, while energy consumption is from the Ministry of Energy and Mineral Resources. The data used in thus study is very limited because the data are not available. This study uses the Autoregressive Distributed Lag (ARDL) model. The ARDL model is a method introduced by Pesaran and Shin (1999) and developed further by Pesaran et al. (2001). The ARDL model has the singularity of first, integration of various variables I(0) and I(1). Second, cointegration can be done with a small sample. Third, produce valid estimates (Harrism and Sollis, 2003). Fourth, the ARDL model allows different amounts of lag between variables. Following Odhiambo (2009), Ozturk and Acaravci (2010) and Aliasuddin and Reka (2019) who use log-linear models, the model representation is explained in equations (1) and (2):

$$\ln Y_t = \alpha_0 + \alpha_1 \ln ENERGY + \varepsilon_t \tag{1}$$

$$\ln ENERGY_t = \beta_0 + \beta_1 \ln Y + \varepsilon_t \tag{2}$$

Where Y is non-oil and gas economic growth (constant 2010 billion rupiah), ENERGY is energy consumption (total primary and secondary energy consumption of million tons), ε is errorterm. Because the equation is in the form of logs, the estimation is in the form of electricity. The ARDL cointegration model is expressed as follows (Rahim et al, 2018):

$$\Delta lnY_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i} \Delta lnY_{t-i} + \sum_{i=1}^{n} \gamma_{2i} \Delta lnENG_{t-i} + \gamma_3 \ln Y_{t-1} + \gamma_4 lnENG_{t-1} + \varepsilon_t \tag{3}$$

$$\Delta lnENERGY_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta lnENERGY_{t-i} + \sum_{i=1}^{n} \delta_{2i} \Delta lnY_{t-i} + \delta_3 \ln ENERGY_{t-1} + \delta_4 lnY_{t-1} + \varepsilon_t \tag{4}$$

Where Δ is the first-difference, γ1, γ2, δ1, and δ2 are the short-term coefficients, γ3, γ4, δ3, and δ4 are the long-term coefficients, t is the year, and i is the lag sequence determined by AIC, and ε is the error term. To determine the existence of short-term relationships in equations (3) and (4) are utilized, and the following hypothesis can be formulated (Bekhet and Matar, 2013):

H_0: No short-run relationship	H_1: There is a short-run relationship
$\gamma_1 = \gamma_2 = 0$	$\gamma_1 \neq \gamma_2 \neq 0$
$\delta_1 = \delta_2 = 0$	$\delta_1 \neq \delta_2 \neq 0$

And for the long-run hypothesis:

H_0: No long-run relationship	H_1: There is long-run relationship
$\gamma_3 = \gamma_4 = 0$	$\gamma_3 \neq \gamma_4 \neq 0$
$\delta_3 = \delta_4 = 0$	$\delta_3 \neq \delta_4 \neq 0$

Bound F-test cointegration procedure used Wald F-statistic restriction and compared it to the upper band and lower band critical value. Pesaran et al. (2001) explained that there are three possible results from the Bound F-test, namely (1) If the F-stat obtained is a greater upper band and lower band critical value, then cointegration occurs or rejects H0 (uncointegrated). (2) If the F-stat obtained below the upper band and lower band critical value, then receives H0. (3) If the F-stat obtained between the upper band and lower band critical value is no decision. The critical value used is the critical value Narayan (2004). Narayan (2004) used for small samples, while Pesaran et al. (2001) used when the sample is large enough.

If cointegration occurs, a short run error correction model / short-run dynamics is performed (Hasanova et al, 2017). This correction condition (ECT) is expected to have a negative and significant sign on the dependent variable (Ozturk and Acaravci, 2010). The specifications of the short-term correction model in this study are as follows:

$$\Delta lnY_t = \lambda_0 + \sum_{i=1}^{n} \lambda_i \Delta lnY_{t-i} + \sum_{i=1}^{n} \lambda_j \Delta lnENERGY_{t-i} + ECT_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta lnENERGY_t = \theta_0 + \sum_{i=1}^{n} \theta_i \Delta lnENERGY_{t-i} + \sum_{i=1}^{n} \theta_j \Delta lnY_{t-i} + ECT_{t-1} + \varepsilon_t \quad (6)$$

Through equations (5) and (6), it can be seen the relationship between non-causality Granger in the short and long term between energy consumption and economic growth (Faisal et al., 2017). The equation is a dynamic VEC model. In contrast to the traditional Granger causality, the future does not impact the past, but the past impacts the future (Takendesa and Odhiambo, 2007). The short-term energy consumption of economic growth is tested by using Wald test restriction, namely H0: λj = 0. While the short-term economic growth on energy consumption is H0: θi = 0, ECT both of these equations explain the long-term relationship.

Result and Discussion

Statistics of Variables

Statistics of variables are vital to explain the correlation among the variables. Both variables are transformed into natural logarithms. Table 1 describes the average economic growth of 11.12 with a standard deviation of 0.80, whereas the average energy consumption of fault is 18.47, with a standard deviation of 0.40. Based on this standard deviation, that fluctuation in economic growth is higher than energy consumption. Normally distributed data or symmetry can be determined by looking at the Skewness value is 0. The table results obtained equality or good enough because of the two Skewness values , namely -0.22 and -0.57, close to the amount of 0.

Table 1 : Statistics of Variables

	lnY	lnEnergy
Mean	11.12	18.47
Maximum	12.23	19.09
Minimum	9.56	17.57
Std. Dev.	0.80	0.42
Skewness	-0.22	-0.57

Correlation between Energy Consumption and Nonoil-Gas Economic Growth

Furthermore, the data are tested in advance on the closeness between energy consumption and economic growth. This test is done with the Pearson correlation approach. Also, the analysis serves as an initial estimate of the coefficient sign of the variable under study. Table 2 explains between energy consumption and economic growth, having a correlation of 98.3 percent with a positive and significant sign at a 99 percent confidence level.

Table 2: Pearson's Correlation between Energy Consumption and Economic Growth

Variable	Y	Energy
Y	1	
Energy	0.983 (0.000)***	1

*Source: Estimates Results, 2020. *** represents prob. < 0.01*

Stationarity Test

Stationarity testing is essential in the time series model. Table 3 explains economic growth at the level obtained t-stat value of -2.092 with prob 0.248. This result is concluded that it is not stationary, so transformation needs to be done in the form of first-difference. At this level economic growth has rejected H0 or stationary with a confidence level of 1 percent (t-stat = -4,452, prob = 0,000). Meanwhile energy consumption is stationary at the level of (t-stat = -7,293, prob = 0,000) and first-difference (t-stat = -3,888, prob = 0,000) with a confidence level of 1 percent. On the right side of the table is the conclusion of the integration of each variable. Economic growth in integration I (1) and energy consumption in integration I (0). Based on this conclusion, the use of the ARDL model in this study is appropriate because we obtain different integrations in the form of I (0) and I (1).

Table 3: Phillips-Perron Test for Stationarity

Variables	***At-level***	**Prob.**	***First-difference***	**Prob.**	**Integration**
Y	-2.092	0.248	-4.452	0.001***	I(1)
Energy	-7.293	0.000***	-3.888	0.000***	I(0)

*Sumber: Estimated Results, 2020. *** represents prob. < 0.01*

Optimum Lagged Length

Determination of the lag used in this study through the Akaike Information Criteria (AIC) approach. Unlike the VAR / VECM model, the use of lag in the ARDL model is not always the same or can use a different lag (Ozturk and Acaravci, 2010). For the economic growth model, the number of dependent lags is 9, and the independent lag is 5, while the energy consumption model shows the dependent and independent lags as much as 2.

Table 4: Lagged Length Selection

Dependent /Independent	AIC	Lag dependent	Lag independent
lnY/lnEnergy	-1.910	9	5
lnEnergy/lnY	-3.716	2	2

Source: Estimated Results, (2020).

Bound Cointegration Test

Cointegration testing in research is needed to see whether there is a long-term balance between the independent variable and the dependent variable. For this cointegration test, the bound test is used, which has several advantages, which can be integrated with different orders I (0) or I (1), or the number of samples used is small.

Table 5: Bound Cointegration Test

Dependent/Independent	F-statistic	Sample	Narayan (2004) Critical Bound Lower/Upper 5%	Conclusion
lnY/lnEnergy	4.705**	22	4.09/4.66	Cointegrated
lnEnergy/lnY	4.499**	29	4.09/4.66	Cointegrated

*Source: Estimated Results, 2020. ** represents prob. < 0.05*

In this study, there are two models examined: the economic growth model and the energy consumption model. Based on Table 5, it appears that the two models obtained f-stat values of 4,705 and 4,499. The F-stat obtained is greater than the critical value of Narayan (2004) at the 5 percent threshold, so that it concludes that there is a short-term cointegration to the long term.

Estimated Long-Run Model

The discussion of the first estimation of the ARDL model is to look at the long term of the economic growth model and the energy consumption model. The estimation results can be seen in Table 6. The long-term test results above show that in the economic growth model, energy consumption has a positive and significant effect (prob 0.000). The energy consumption coefficient of 2.006 explains that energy consumption will drive economic growth by 2 percent in the long run in Indonesia if there is an increase in energy consumption by 1 percent, assuming ceteris paribus. These results are consistent with research by Faisal et al. (2017), which explains the more energy consumption, the availability of this energy will have an impact on economic growth.

Table 6: Estimated Long-Run Model

Model	Economic Growth (Y)	Energy Consumption (Energy)
C	-26.27 (0.000)***	14.36 (0.000)***
lnEnergy	2.006 (0.000)***	
lnY		0.39 (0.000***

*Source: Estimated Results, 2020. *** represents prob. < 0.01*

The long-term estimation results for the energy consumption model explain that economic growth will increase energy consumption by 0.39 percent if it grows by 1 percent, assuming ceteris paribus. These results are consistent with research by Aliasuddin and Ramadhana (2019). In comparison, the impact of the coefficient on economic growth is not as significant as the impact of the coefficient on energy consumption. Indonesia is an importer of energy raw materials such as oil when importing; countries must consider the main component of energy, namely the price of energy itself (Berk and Yetkiner, 2014). With unstable prices, energy consumption becomes unstable too. Hasanavona et al. (2017) also

find another impact of this considerable difference: the reduction in energy consumption will jeopardize economic growth in Indonesia and explain that economic growth is highly dependent on energy consumption in the long run.

Estimated Short-Run Model

ECM short-term estimation results are carried out to determine the effect of lag variables and determine the balance. ECT serves to determine the level of speed of adjustment on short to long-term stability. One of the ECT requirements is a negative sign that explains convergence. If it is positive, it is divergent or away from the balance point.

Table 7: Estimated Short-Run Model

Variable	Economic Growth (Y)	Energy Consumption (Energy)
ΔlnY		0.136 (0.038)**
ΔlnY_{t-1}	1.212 (0.006)***	0.007 (0.911)
ΔlnY_{t-2}	1.126 (0.011)**	
ΔlnY_{t-3}	1.695 (0.004)***	
ΔlnY_{t-4}	1.56 (0.008)***	
ΔlnY_{t-5}	1.392 (0.012)**	
ΔlnY_{t-6}	1.626 (0.007)***	
ΔlnY_{t-7}	1.937 (0.004)***	
ΔlnY_{t-8}	1.169 (0.031)**	
$\Delta lnEnergy$	0.852 (0.111)	
$\Delta lnEnergy_{t-1}$	-2.811 (0.031)**	-0.057 (0.765)
$\Delta lnEnergy_{t-2}$	-3.695 (0.002)***	
$\Delta lnEnergy_{t-3}$	-2.851 (0.026)**	
$\Delta lnEnergy_{t-4}$	-1.923 (0.035)**	
ECT_{t-1}	-1.04 (0.004)***	-0.16 (0.000)***
R-Squared	0.854	0.405
Adj. R-Squared	0.617	0.334
Durbin-Watson	2.05	1.97

*Source: Estimated Results, 2020. **, *** represent prob. < 0.05 and prob. < 0.01, respectively.*

Table 7 shows the comparison of the two models in the short run. For the economic growth model, the lag of economic growth of 9 indicates a positive and significant effect. The range of effects of previous economic growth was 1.12 percent to 1.93 percent. The effect of lag 8 is close to the coefficient in the long run. However, different signs of the coefficient of energy consumption are not as expected. The effect of energy consumption from lag 2 to lag 5 shows a negative and significant effect. Only lag 1 has a positive but not significant effect.

Meanwhile, the energy consumption model shows the lag in energy consumption, which has a significant negative effect on decreasing energy consumption. While lag 1, economic growth as expected, is a positive effect. However, statistically, the variable is not significant. The speed of adjustment to economic growth is -1.04 and is significant at the 1 percent level. The ECM results explain 104 percent of the imbalances that occur in the short term can be adjusted in the 1.48 year.

According to the ECM concept, this adjustment is too far from the required 0-1. But this problem can be explained by Narayan and Smyth (2006). If the ECM coefficient is found to be -1 to -2 there will be a slowdown in reaching the equilibrium point so that it needs to be adjusted before convergence occurs quickly towards the equilibrium point. The meaning is in the short-term economic growth and energy consumption requires a long process, new to the long term. ECM energy consumption obtained by -0.16. Adjusting the short balance towards the long-term is very fast. The time needed is only 1.92 months.

Granger Non-Causality and Dynamic VEC

Answering the second problem about the relationship (direction), researchers used the dynamic VEC method by equations (3.5) and (3.6) in looking at the directional relationship of energy consumption and economic growth in Indonesia. This category of non-causality is divided into short-term and long-term represented by the ECM. Like Granger causality testing in general, if the variable X to Y is significant, then there is a relationship of X to Y and vice versa. Possibilities obtained in one direction, two directions, and no direction. The results of the Granger non-causality are shown in Table 8 as follows

Table 8: Granger Non-Causality between Economic Growth and Energy Consumption

Model	Short-run		Long-run (ECM)
	ΔlnY	ΔlnEnergy	
ΔlnY		12.94 (0.023)**	-1.04 (0.004)***
ΔlnEnergy	4.03 (0.132)		-0.16 (0.000)***

Source: Estimated Results, 2020.
*Note: **, *** represent prob. < 0.05 and 0.01, respectively.*

Short-term statistical results explain the energy consumption of 12.94 with a prob of 0.023. This figure shows energy consumption has a relationship to economic growth in the short term (unidirectional). While the economic growth statistics of 4.03 indicate that economic growth has no relation to energy consumption. It is supported by the evidence that the prob value obtained 0.131, greater than the 5 percent significance. Therefore, energy consumption and economic growth in the short term support the growth hypothesis.

This study's results are consistent with the study of Rahim et al. (2018), where the impact of energy consumption is weak but still contributes to economic growth. Meanwhile, both models have a significant sign at the level of 1 percent in the long run. This means that both are mutually influential (bidirectional) between energy consumption and economic growth. In the long term, the hypothesis that occurs is the feedback hypothesis (feedback hypothesis). The results of this study are consistent with studies conducted by Jaganath (2015), Dogan and Deger (2016), and Yasar (2017). The illustration of this non-causality relationship is shown in Figure 2.

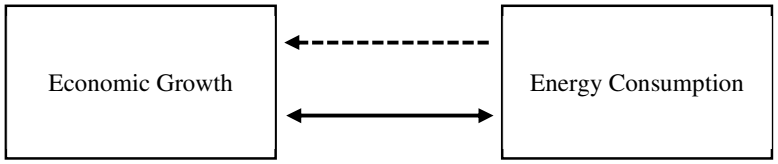

Figure 2: Granger Non-Causality between Energy Consumption and Economic Growth

Finally, testing the stability of the model (CUSUM and CUMSQ) is necessary to see the consistency of estimates throughout the year studied, especially in using the ARDL model. The test results of these two models were found not to cross the 5 percent significance line or to accept H0, so the estimated model obtained was quite excellent and feasible to use. An overview of CUSUM and CUSUMQ can be seen in Figure 3 and Figure 4.

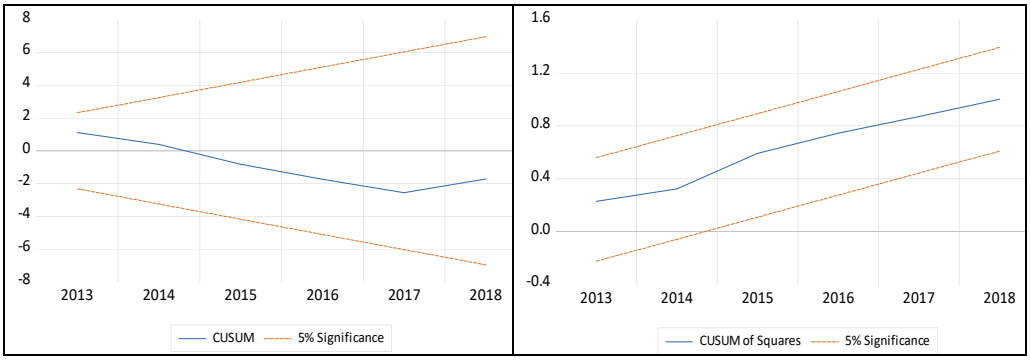

Figure 3: CUSUM and CUSUMQ for Economic Growth Model

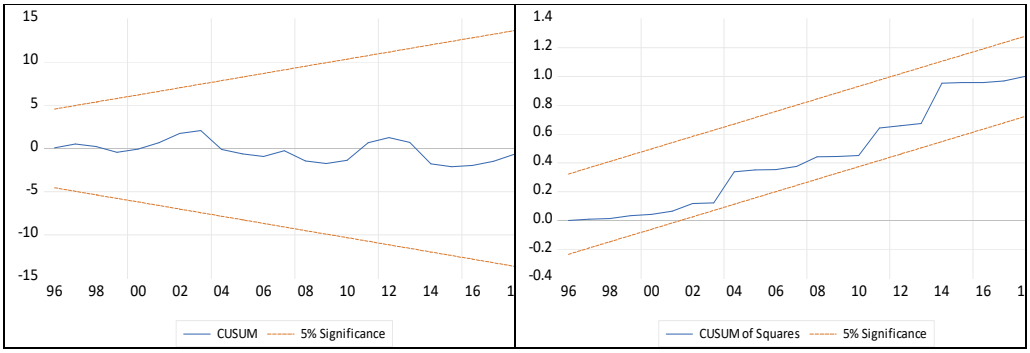

Figure 4: CUSUM and CUSUMQ for Energy Consumption Model

Conclusion

This study aims to examine the effect of energy consumption on economic growth and causality in Indonesia from 1988-2018. Based on the regression results between energy consumption and economic growth, a cointegration was found between the two. The effect of long-term economic growth is positive and significant. Meanwhile, energy consumption has a positive and significant effect on economic growth. The impact of energy consumption on economic growth is 2 percent, and the impact of economic growth on energy consumption is 0.39 percent. The Granger non-causality test explains that there is a one-way effect of energy consumption on economic growth in the short run. These results support the growth hypothesis. In the long run, there is a two-way relationship between economic growth and energy consumption to endorse the feedback hypothesis.

The advice taken in this study is that economic growth is highly dependent on energy consumption, so there must be an ongoing increase so that the economy continues to grow positively. Then Indonesia needs to increase energy consumption again so that economic growth increases on target. However, as a net oil-importing country, relying on energy consumption such as fossil oil, coal, and gas by way of imports is an obstacle for Indonesia, especially when the oil prices are unstable. The price instability will disrupt energy consumption and impact economic growth exploration, and the use of energy sources are needed. Another so that energy consumption is maintained. With this research study, it is hoped that the government will focus more on energy issues and their impact on economic growth. As the sole energy provider, the Government of Indonesia must continue to provide additional energy by building new power plants. Considering the consumption of energy derived from fossil oil, coal, and gas, which are non-renewable resources, the government also needs to use new and renewable energy alternatives that are environmentally friendly.

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Expectations of Students to Improve their Academic Performance: Case Study

Paulina SPANU
University POLITEHNICA of Bucharest, Bucharest, Romania
pauspa16@yahoo.com

Mihaela ULMEANU
University POLITEHNICA of Bucharest, Bucharest, Romania
mihaela.ulmeanu@upb.com

Cristian DOICIN
University POLITEHNICA of Bucharest, Bucharest, Romania
cristian.doicin@upb.com

Roxana MECHNO
University POLITEHNICA of Bucharest, Bucharest, Romania
mechnoroxana@yahoo.com

Abstract

Dropping out of school is a real problem, especially among first-year students, both at European and national level. In this context, the purpose of the research was to identify the main factors that determine Romanian students to drop out of college. Based on this results, it was identified solutions, means and tools useful in reducing the high dropout rate and increasing the academic performance of students. An online questionnaire was applied within the project ``*E-tutoring: web tools and resources for study and career management*`` in order to identify the main needs of students. The analysis of the data collected was performed using the Qualitative Content Analysis. The result of the analysis highlighted the fact that the main factors that contribute to school dropout are generated by financial problems, teaching methods, inappropriate choice of specialization and lack of support for counseling. The results demonstrate the need for an innovative system, based on peer learning and a lifelong career approach.

Keywords: career guidance, Cronbach's alpha, students` drop out

Introduction

Romania is the third country in the European Union in terms of early school leaving in education and training systems, for people aged 18-24 (EUROSTAT, 2019). According to data published in the ``Training and Education Monitor, 2019: The report for Romania`` early school leaving (18-24 years) indicates a percentage of 16.4% for young Romanians, compared to an EU average of 10.6%. Also, the share of graduates (30-34 years) is 24.6% for Romania, and the European average is 40.7%.

As noted EUROSTAT (2019), „the largest gender differences among the proportion of young people who were early leavers and not wanting to work were recorded in Romania (6.9 percentage points higher for young women than young men)". In 2018, Romania registered a high level of early school leaving, of 16.4%, as well as a low rate of the population aged between 30 and 34 who graduated from higher education (24.6%). In light of these data, study success is high on the policy agenda in Europe and one of the goals of the Europe 2020 strategy is that at least 40% of 30-34–year-olds complete higher education.

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In recent years, at the national level, the trend of school dropout is increasing and has a significant impact on the unemployment rate and social inclusion. The employment rate among students in Romania, on the age segment of 20-25 years, in the chosen field of study, is well below the European average of 80%. Moreover, the *National Council for Statistics and Forecasting of Higher Education* states that more than 53% of students come from rural and disadvantaged backgrounds. The reasons why they leave the education system are mainly financial. To these is added the diminished motivation of students to complete their undergraduate university studies.

Although the Europe 2020 program in the field of education and training aims to reduce the number of people leaving the education and training system early below 10%, in recent years, there has been an increasing trend in the drop-out rate at national level. According to U-Multirank, coordinated by the European Commission, the highest dropout rate of students was registered in Romania (U-Multirank 2014), most of them being students enrolled in the first year.

As G. Raftu (2019) said, students choose a faculty at the recommendation of their parents or out of the desire to leave home, being attracted by the "student life". Most of the time their expectations are not met. The academic and social difficulties they face, the inability to manage time, workload, budget and interpersonal relationships are factors that generate academic dropout.

Studies conducted at national level have shown that Romanian universities are facing a significant decrease in the number of students, especially students enrolled in the first year of college (SAVA S, 2015). The number of students is drastically reduced during the undergraduate studies, only about half of the enrolled students succeed in completing the undergraduate studies. The identification of solutions and measures of educational policy that would lead to the improvement of the phenomenon of decreasing the students' motivation represent objectives that the Romanian universities have assumed.

Numerous projects have been approved at European level, in order to reduce the number of students who do not complete their undergraduate studies. The pourpose of the projects are to identify the main factors favoring school dropout and to develop new resources to improve students' academic performance. One such project is E-tutoring. This is a project funded by the Erasmus + program (2018-1-IT02-KA203-048005) that works to reduce academic drop-out rates with the development of a set of tools and a new tutoring system that combine career guidance, peer learning, social networks and new digital technologies (https://www.etutoring.eu/). The project consortium involves eight partners from six countries: Romania, Italy, Turkey, Spain, Greece and Lithuania. The partnership wants to create the following resources that will improve the student's academic performance:A research report on Career Management Skills in academic students:

- E-tutoring in Europe, a collection of good practices.
- A methodological framework to guide the design of e-tutoring services.
- E-tutoring App.
- E-learning platform for training tutors.

Research Methodology

There are many reasons why students drop out of college, especially in the first year of study. Most of the time, these reasons are complex and interconnected. The main objective of this study was to determine the level of students` satisfaction and identify the difficulties encountered by them, respectively what are the determining causes of dropout, especially for students in year I. Studies on the tendency to drop out and the correlations between factors that determine such decisions have been made in recent years by many researchers. Van Sangodiah (2015) states that the age of students, gender, financial situation, specialization and form of education time management, etc. are factors that contribute to student dropout.

The research results presented in this article were obtained by applying an online questionnaire to students following the bachelor's program in the Faculty of Industrial and Robotic Engineering,

within the University Politehnica of Bucharest. The decision to implement the questionnaire at this faculty was based on a study conducted at the Faculty of Industrial Engineering and Robotics, on the situation of people who dropped out of undergraduate studies since the first year. According to this study, in the period 2013 - 2014, 112 students dropped out the faculty, representing 17.83% of the total number of students enrolled in the first year (628 students). In the next two years, there was a slightly decreasing trend as follows: in 2014 - 2015, 95 students dropped out of university, out of 600 enrolled in the first year (15.8%), and 2015-2016 the number decreased more significantly to 8 ,4. %, compared to the last years, the number of withdrawn students being 53 out of 627 enrolled students. In the following period, 2916 -2017 there was an increase in the dropout rate of 16.6% (81 students out of 500 students enrolled in the first year). In 2017 - 2018, 66 students out of 524 (12.59%) dropped out of school. Therefore, the university aims to identify the main reasons for school dropout and find solutions to achieve the proposed target by Europe 20 project to reduce the dropout rate below 10% by the end of 2020.

The survey was developed based on a procedure that was set up by a group of experts from the E-tutoring project consortium. The data were collected through an online questionnaire, which was elaborated using a validated framework and analyzed accordingly.

Data Analysis

The questionnaire was available for students on the E-tutoring project website, and the data was centralized by the project coordinator and made available to all partners. The study carried out at partnership level is much more laborious and includes the results obtained at European level, these being available free of charge and accessible on the project platform. This article presents the results obtained at the Faculty of Industrial Engineering and Robotics level, in order to identify the major requirements of students based on which recommendations will be made to improve the adaptation of students to academic life.

12 items were considered for this reasearch:

Q1. Gender
Q2. Have you ever thought about dropping out the faculty
Q3. Methods of teaching and evaluation
Q4. Personal learning difficulties
Q5. Personal difficulties in managing time and plans
Q6. Financial reasons
Q7. Relevance of courses for the chosen specialization
Q8. Perception that the degree won't be useful for accessing the world of work
Q9. No interest in the topics (perception of a wrong career choice)
Q10. Limited knowledge of the professional profiles associated with that university course
Q11. Lack of counselling services (tutoring services)
Q12. Not feeling socially included

The sample on which the research was carried out in the university consisted of 113 students, most of them being enrolled in the first year. Of these, 68 were boys and 45 were girls (Figure 1). This result is not a limitation for research.

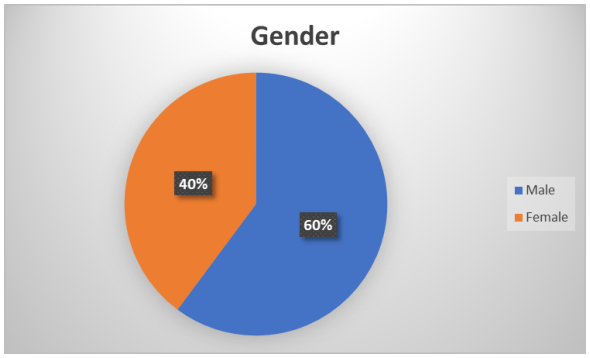

Fig. 1: Distribution of Gender participants

The participants` gendere (Q1) is not a limitation for research.

For items Q2 - Q12 a Likert scale was used which allowed respondents to choose from a linear set of answers on a scale from 1 to 5, where 1 threat "not at all" and 5 means very much. For each item analyzed calculated average, variance and standard deviation. The results obtained are presented in table 1.

Table 1: Q2 – Q12 results

ITEM	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Average	2.212	2.823	2.92	2.858	3.301	3.204	2.841	3.159	3.071	2.903	2.717
Variance	2.043	2.004	1.578	1.502	1.803	1.383	1.656	1.532	1.322	1.628	1.513
Standard deviation	1.429	1.416	1.256	1.226	1.343	1.176	1.287	1.238	1.15	1.276	1.23

Regarding the way in which the students evaluated the analyzed aspects, it was found that there were no significant differences according to gender.

The study of the internal consistency of the items was performed using the Analysis of Variance (ANOVA). The MS and Error values were used to calculate the Cronbach's Alpha coefficient (table 2) according to formula 1. Cronbach's Alpha is a measure used to assess the reliability of the internal consistency of a set of scale.

$$\alpha = 1 - \left(\frac{MS}{Error}\right) \tag{1}$$

Table 2: ANOVA result

Source of Variation	*SS*	*df*		*MS*	*F*	*P-value*	*F crit*
Rows	758.9992	112		6.776779	5.971499	8.09E-59	1.244463748
Columns	97.87289	10		9.787289	8.624273	1.09E-13	1.839140301
Error	1271.036	1120		1.134854			
Total	2127.908	1242					
Cronbach's Alpha				**0.832538**			

Based on the data in the table above, using formula 1, a value of the Alpha Cronbach`s coefficient equal to 0.83 was obtained. The obtained coefficient shows that the internal consistency level in the case of the applied questionnaire is very good for using the data obtained in the data analysis. As Keith S. Taber (2018) said, the values of the Cronbach's Alpha between 0.70 and 0.90 suggest a good internal consistency in science education studies.

In order to avoid the dependence between two quantitative variables of the sample of data collected by applying the questionnaire, Pearson's correlation coefficient (r) was determined. The obtained coefficients had values between –1 (perfectly negative correlation) and 1 (perfectly positive correlation). The sign of the coefficient represents the meaning of the correlation, namely: the positive value corresponds to the variations of the same meaning and the negative one to those of the opposite direction. The absolute values of the correlation coefficients, presented in table 3, express the intensity of the association between the items.

Thus, for α <0.05, values of the correlation coefficient from - 0.25 to 0.25 were obtained, representing a weak or zero correlation, from 0.25 to 0.50 (or from - 0.25 to -0.50) acceptable degree of association, from 0.50 to 0.75 (or from -0.50 to -0.75) very good correlation.

Table 3: Coefficients Correlation

	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Q2	1.00										
Q3	0.23	1.00									
Q4	0.02	0.35	1.00								
Q5	-0.06	0.35	0.54	1.00							
Q6	-0.19	0.14	0.34	0.43	1.00						
Q7	0.14	0.52	0.35	0.45	0.31	1.00					
Q8	-0.04	0.43	0.38	0.46	0.32	0.58	1.00				
Q9	0.02	0.46	0.33	0.41	0.34	0.40	0.43	1.00			
Q10	-0.01	0.34	0.46	0.48	0.27	0.46	0.40	0.53	1.00		
Q11	0.09	0.30	0.36	0.29	0.34	0.43	0.35	0.28	0.63	1.00	
Q12	0.08	0.32	0.29	0.26	0.31	0.39	0.31	0.27	0.48	0.59	1.00

As it results from the table of correlation coefficients, it is found that most correlation coefficients are positive, resulting in a direct correlation (the two correlated variables vary in the same direction) and only between perers Q2 - Q5, Q2 - Q6, Q2 - Q8, and Q2 - Q10, we have an inverse correlation, the pairs of correlated variables vary in the opposite direction (when one increases, the other decreases). A correlation coefficient of 0.63 was obtained between items *Q11. Lack of counseling services* if *Q10. Limited knowledge of the professional profiles associated with that university course*. Thus, in the students' opinion, the counseling services would help them to overcome the obstacles related to the association of the courses with their professional profile. A significant number of students consider that certain courses that they study in the first year of study, will not be useful in the profession of engineer.

As it can be seen in Table 3, there are items for which the absolute value of the correlation coefficient is weak, very close to zero. Between these variables there is a statistical link that can be taken in the analysis and interpretation of results, although the dependence is not linear.

A significant part of the students ernrolled in the first year (47%) stated that they had never thought about dropping faculty (Figure 2). But, at the same time, the extreme values are not to be ignored at all, namely 12% (5 - on the Likert scale) of the analyzed sample expressed their firm intention to

abandon the studies, respectively 12% (4 - on the Likert scale). The elements that leading the student to develop such thoughts are the `` *Methods of teaching and evaluation*``.

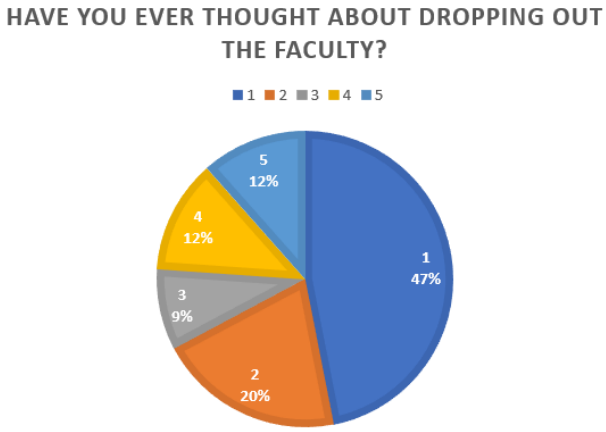

Fig. 2: Studetns` opinion related to leaving faculty

As it can be seen in Figure 3, 32% of students consider that ``Methods of teaching and evaluation`` *influences students' decision to drop out of school.``*

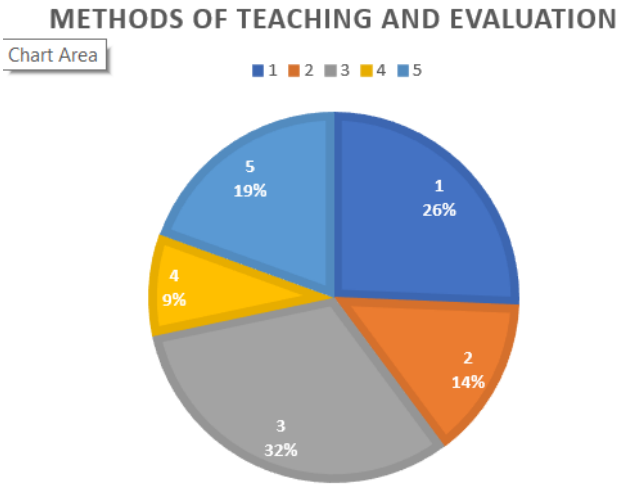

Fig. 3: Students' decision to drop out of school.

Higher averages for the analyzed factors were obtained, in decreasing urine for Items ``*Q6. Financial reasons*`` (3.301), *Q7. Relevance of courses for the chosen specialization* (3,204), *Q9. No interest in the topics (perception of a wrong career choice)* (3,159), *Q10. Limited knowledge of the professional profiles associated with that university course* (3,071).

A high percentage of students prefer to work while they study. Although some of them work part time, they have difficulty finding a balance between the work schedule and the teaching activities. Most jobs are not specific to college specialization, which is why students consider certain courses irrelevant, sometimes even unnecessary. This is also reflected in the significant number of students who appreciate that certain courses are not suitable for the specialization they have chosen.

Conclusion

From the analysis of the data obtained by applying the questionnaire, the following conclusions were drawn:

- The results of this study highlighted the main needs of students. These will be the basis for formulating recommendations to reduce the phenomenon of school dropout.

- Analyzing the distribution of options expressed by students, the lack of financial resources is the main factor that contributes to increasing the dropout rate. The implementation of programs designed to support students from vulnerable groups, the provision of scholarships and part-time jobs for students supports students in maintaining their academic careers. Employment agencies set up in universities can provide the necessary support to students in choosing a job that ensures a flexible schedule, appropriate to the students' schedule.

- Difficulties that students face are related to adapting to the specifics of higher education in terms of the pace of teaching - learning and managing the volume of information. To mitigate this effect of this factor, the Ministry of National Education and Scientific Research (MENCS), through the Externally Funded Project Management Unit (UMPFE), implemented the ROSE program. Within this program, through the project "Involved students, engineers for the future! (SIMPLE) - ROSE AG 150 SGU NC II there are remedial modules complementary to the courses taught by faculty members. These modules are needed to improve students 'knowledge of subjects where students' difficulties have been identified.

- The decision to drop out of college in the first year of study is also generated by the personal motivation of students. In the opinion of the students who participated in this study, the different personalities of the students and the environment from which they come influence the development of friendships and social integration in the university environment. Tutoring and counseling activities involving teachers, year tutors, counselors and student associations can be beneficial for increasing personal satisfaction. Personal counseling sessions help students identify sensitive points, self-knowledge, and increase a sense of belonging to a group. Facilitating the transition from high school to university life and adapting students to academic life can also be supported by intensifying mentoring activities by teachers and counseling and career guidance sessions.

- In the opinion of the interviewed students, not all subjects in the school curriculum are absolutely necessary in their profession. This aspect can be improved by involving students in joint activities with employers to confirm that what they will study in courses and laboratories is useful and has applicability in the labor market. In addition, by promoting job offers by employers, students will have the opportunity to know the employment options in the field studied, thus increasing students' interest in graduating. Visits to companies can also arouse students' interest in the fields they have chosen and increase their academic performance. Internships can help students identify a job according to the field studied and in accordance with their professional aspirations and interests, thus intensifying their desire to complete their studies.

- The recommendations made in this study should be among the major concerns of higher education institutions and career counseling and guidance centers to increase the pass rate at the end of the first academic year.

- The results demonstrate the need to design and develop an innovative system, based on peer learning and the lifelong career guidance approach. Improvements in the education system can be achieved through political cooperation, benchmarking and funding programs, such as the Erasmus + program. The E-tutoring project, supported by the Erasmus + program, aims to develop an innovative system and useful tools for tutors, teachers, counselors and students to help reduce the dropout rate.

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Leading Factors of the Effectiveness of the Legislative Regulation of Criminal Proceedings at the Stage of Criminal Case Initiation

Yaroslava RYAPOLOVA

Department of Criminal Procedure and Criminalistics,
Southwest State University
50 Let Oktyabrya str. 94, 305040 Kursk, Russian Federation
yarosslava@mail.ru

Abstract

The article deals with socio-economic, theoretical and legal issues related to the definition of key factors that should be taken into account when assessing the effectiveness of the legislative regulation of criminal procedural activities implemented at the stage of criminal case initiation. The assessment of the outcome of the initial stage of criminal proceedings in terms of reporting indicators of judicial and law enforcement activities cannot be considered sufficient, since criminal proceedings do not belong to the production sphere of activity. It is substantiated that the current and predictive assessment of the effectiveness of the legislative regulation of the criminal case initiation stage requires a pluralistic approach: it should address techniques developed by social sciences and criminal procedure science to identify criteria for this effectiveness and ways to improve it. It is necessary to take into account not only the law perfection in technical and legal and substantive terms, but also the social mechanism and regulatory potential of relevant criminal procedural rules.

Keywords: stage of criminal case initiation, factors of law effectiveness, criminal and procedural activities, criminal procedure legislation

Introduction

Currently, the issue of ensuring the effectiveness of legal regulation of criminal procedure at the pre-trial stage of criminal proceedings determines the existence of opposite approaches to determining the legal future of the stage of criminal case initiation in the Russian criminal justice system: the elimination of the stage itself or its components (pre-investigation check, the institution of dismiss of the initiation of a criminal case, etc.) (Gavrilov 2019, Aleksandrov et al. 2015, Smirnova and Shadrin 2019) or improvement of the criminal procedure regulation of the disputed stage within the framework of the existing procedural institutions (Spirin 2019, Rostova 2019, Bravilova 2019). At the same time, the studied doctrinal models of reforming pre-trial proceedings by means of initial stage elimination have been insufficiently investigated and the results of the assessment of the existing risks and potential adverse effects of the proposed reform are inadequate. In this regard, there is an urgent need to develop theoretical and legal issues related to the study of the current and predictive assessment of the effectiveness of the legislative regulation of criminal procedural activities implemented at the stage of criminal case initiation, and key factors definition that can influence certain indicators of such effectiveness (Dandurand 2014, Cameron, 1990). This issue becomes particularly topical in the time of discussion and anticipation of changes related to the modernization and rationalization of the pre-trial procedure (Kuntii et al 2019), ensuring its technological effectiveness (Maslennikova 2019), which is righty recognized as a priority direction of the criminal procedure strategy at the state level.

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Literature Review

Social sciences and criminal procedure science have developed a methodological basis for measuring the effectiveness and characteristics of its components in relation to various legal complexes, identifying conditions, criteria and means of its improvement (Holzer 1984). Even in the Soviet period, scientists - processualists determined the effectiveness of various criminal procedural categories by the ratio of the actual result of legal rules functioning and the social goals for which these rules were adopted (Petruhin 1975), while the modern approach to understanding effectiveness implies not only the goal and the result of a criminal procedural activity, but also other criteria for its assessment (Stefanou and Xanthaki 2016). In addition, approaches of various theoretical law schools to defining conditions and factors of the effectiveness of legal regulation in general have been updated (Mousmouti 2018, Zamboni 2018). Provisions of modern interdisciplinary research defined within the framework of "legal riskology", in terms of developing measures to reduce legal risks (planning of law-making activities; interpretative correction of laws and regulations by judicial decisions; legal experiment (Sivitsky and Sorokin 2016, Khayitov 2019), involvement of sociological techniques and methods in the processes of law forecasting (Xanthaki 2018), legal monitoring, 'effectiveness test' (Mousmouti 2012) etc.) have important applied significance since based on the findings in this relatively new research area it is possible to provide future efficient modernization of the initial stage considering and minimizing possible risks.

Research Methods

In the process of working on the research problem, the dialectical method was used. It allowed us to identify features, mechanism and existing contradictions of the legislative regulation of criminal procedural activities conducted at the stage of criminal case initiation. The methodological basis of the research also included a method of legal modeling, logical, formal legal, comparative legal, historical and other methods.

Results and Discussion

A formal goal-oriented approach describing a formula for measuring the effectiveness of regulations as the relationship between the actual result in the form of a positive change in the subjected to legal regulation public relations and social goals for which these rules were created, is widely recognized (Stefanou and Xanthaki 2016). The theory also distinguishes between the legal efficacy of the law (compliance of the behavior of the subjects of legal relationships with the requirements established by law provisions) and the social effectiveness of law (ensuring an appropriate balance of fundamental social values, reducing the level of legal coercion in the society) (Allott 1980, Rodgers and Hanson 1974).

In the doctrine of criminal procedure law, this approach was also developed while formulating the concepts of the effectiveness of various criminal procedure categories. According to one of the founders of the theory of criminal proceedings effectiveness, this phenomenon was defined as the achievement of the goals of a criminal procedure in every specific criminal case with a minimum of infringement of the legitimate interests of persons involved in a criminal procedure (Tomin and Popov 2015). A goal-oriented approach is used by researchers when assessing the efficiency of justice which depends on how accurately and realistically the goals of the law are defined and whether there are procedural and other means (guarantees) to achieve them; quantitatively it is determined by the degree of approximation of the achieved level of justice to its ideal goals (Petruhin 1975). When determining the effectiveness of a pre-trial investigation, the most acceptable concept is considered to be the goal-oriented concept of effectiveness which expresses a certain conformity (correlation) of the practical results to the targets of criminal proceedings at its pre-trial stages.

The dynamic component of the effectiveness is the mechanism of the process of goal achieving including features of means used to achieve it (Mousmouti 2018, Zamboni 2018) which are understood as the consumed time, financial resources, material and spiritual labour, adverse and perverse effects of the legislative act issue. In the field of legislative regulation of pre-trial proceedings, definition of the parameters of the goal achievement process inevitably involves a decision on the feasibility of measures of criminal procedural compulsion which at the stage of a criminal case initiation should be minimal.

Thus, the concept of legal regulation effectiveness of the stage of criminal case initiation implies a qualitative characteristic of the process of designing rules of a criminal procedure, and legal remedies contained in them which can, under current social circumstances, optimally and purposefully influence legal relationships arising at the stage of reception, registration and review of initial information about a crime with minimum statutory restrictions of the rights and interests of participants of such relations.

For the purpose of a comprehensive and systematic examination of the concept under study, considering theoretical aspects of assessing the legislative regulation of the stage of criminal case initiation, we will analyze the key factors that influence the indicators of such effectiveness.

- **Perfection of law in technical-legal and contensive terms** means clarity, specificity, comprehensibility of the language, completeness, absence of corruptogenic factors (Bulanova and Abramenko 2018), scientific validity, carefully adjusted balance between flexibility and stability of laws (Karpen 2012), compliance with the goals of legislation development, full incorporation of a law into the legal system, ensuring consistency and complementarity of regulations, etc. Examples of ineffectiveness of the legislative regulation regarding this criterion include examples of unstable legal regulation of the stage of criminal case initiation. It is estimated that during the 18 years of the new RF Code of Criminal Procedure in the 10 key articles of Section 7 of the Code dedicated to the regulation of the institution of criminal cases initiation, about 70 changes were made, at the same time there are examples when novels after a short period of their operation were excluded due to their inefficiency and negative assessment by the scientific community and practitioners. There are also cases when the provisions of some departmental legal acts come into direct conflict with the provisions of the Criminal Procedure Code of the Russian Federation; examples of asystem and unbalanced regulation of various institutions related to the initial stage of criminal proceedings (initiation and termination of criminal cases at the pre-trial stage, paralyzing the rules connected with the possibility of participation of a lawyer (defender) in legal proceedings involving a person in respect of whom reports of a crime are being reviewed, the issue of detention of a person before criminal case initiation, unresolved within the framework of the criminal procedure law and from the viewpoint of ensuring individual rights, etc.).

- **Expediency** as a factor of ensuring effectiveness of legislative regulation lies in the opportunity provided by law to choose a method of resolution of a criminal conflict, this is the freedom provided by law for the discretion of the prosecuting authority to make a procedural decision based on considerations of efficiency, benefits for achieving the public procedural interest protected by it (Hendry and King 2017). In general, effectiveness in the considered aspect of expediency, on the one hand implies application of mandatory rules that give the enforcer a certain discretion, but on the other hand, it calls for avoiding the actual substitution of legal instructions with the discretion of professional participants in the process.

- **Procedural economy factor** involves fixing a sufficient set of necessary procedural remedies for the highest productivity of procedural labor, correct and rapid review of reports (allegations) of a crime with the least expenditure of forces, resources and time of persons involved at the stage of pre-investigation check, and with a minimum legal criminal procedural compulsion. Considerations of procedural economy determine the legislative trend to differentiate the format of reviewing reports of a crime depending on the crime category, the type of the grounds for criminal case initiation, and so

on. Substantively, the condition under consideration provides for saving resources and costs, including budget funds when structuring the regulation. Despite the fact that, for obvious reasons, the amount of state funding is not a determining factor of the quality of criminal proceedings, today we cannot deny its influence on the stance of the legislator regarding the existing regulation of the procedural form of pre-investigation check. This condition also means that it is permissible to include “free” elements that are not related to strict formal requirements of the Criminal Procedure Code of the Russian Federation, for example, the existence of "free" grounds or the uncertain procedural status of the key participants of the check. The uncertainty of the contours of the evidentiary activities at the stage of criminal case initiation and associated with the systemic functioning of a number of provisions of the Russian Criminal Procedure Code and Criminal Code need for unnatural extensions of the circumstance and limit in proof of a crime report check should be noted as a disadvantage of the legislative regulation of the institution under study within the distinguished factor of effectiveness.

- **Rationality of techniques and methods for legal leverage contained in the rules of criminal law and procedure.** These are such characteristics as optimality of terms, procedural arrangements, etc., procedural possibility to use a variety of information sources, technologies, compliance with management rules, as well as reliability (legal opportunity to react to most of the grounds for criminal case initiating) (Stockiy 2020). In turn, a promising direction for improving the initial stage of pre-trial proceedings is replacing outdated written record keeping with the extensive use of modern information technologies. Criminal procedure rules that regulate the use of technical means and technologies in evidentiary activities at the initial stage of pre-trial proceedings require close attention of the law-making body in terms of appropriate development and modernization. According to many researchers it seems that the use of artificial intelligence systems to process the statistical data, assist in the preparation of legal documents, browsing the websites for information and making decisions on the criminal act qualification will be the most successful (Sushina and Sobenin 2019). At the same time, it is noted that the digitalization of pre-trial criminal proceedings is fragmentary, inconsistent and slow, the law-making body delays the integration of the proposed "electronic innovations" into the criminal proceeding, and even does not pay attention to the fact that the Criminal Procedure Code of the Russian Federation in this matter is noticeably behind other Russian procedural laws Kostenko at al.2019).

- **Realism –** is an adaptability (acceptability) of legal remedies to the current historical, socio-economic, psychological, political and ideological prerequisites for the development of the society and the state, the demand of the society (Karnaushenko 2020, Belyaev at al. 2020); the efficacy of the legal mechanics of the realization and protection of rights and freedoms of non-professional participants of criminal procedure relations at this stage. In respect to this stage, this condition mainstreams the issues of ensuring timely access to justice for the aggrieved, improvement of legislative measures to objectify criminal statistics and prevent abuse in record and registration work.

Conclusions

The study of the effectiveness factors of the legislative regulation of criminal procedure activities implemented at the stage of criminal case initiation in scientific terms contributes to the identification of promising directions for the development of the Russian criminal procedure legislation within the framework of the discussed modernization of pre-trial proceedings. The consideration of the formulated in the work key factors of the effectiveness of the legislative regulation of criminal and procedural activities implemented at the stage of criminal case initiation facilitates optimal selection of legal instruments when designing future rules of criminal procedure with regard to their regulatory potential, acceptability, potential risks and costs, environment parameters.

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Implementation of Electronic Document Management at The Stage of Crime Report Reviewing as a Factor in Ensuring Criminal Procedure Effectiveness

Yaroslava RYAPOLOVA

Department of Criminal Procedure and Criminalistics,
Southwest State University
50 Let Oktyabrya str. 94, 305040 Kursk, Russian Federation
yarosslava@mail.ru

Abstract

Prospects for the implementation of electronic document management in criminal procedure implementation at the stage of criminal case initiation are described in the article. Proposals to consolidate procedural capabilities of submitting and registering crime reports online are formulated. Creating, issuing and using electronic documents as court review materials are also described. The main attention is paid to theoretical aspects and practical applicability of modern computerization mechanisms for relations arising at the stage of criminal proceedings initiation. The study of foreign experience in legal regulation of electronic document management in criminal proceedings allows to enrich domestic regulatory system with current and effective developments, contributes to strengthening of legal means of individual rights ensuring. The author describes possible procedure of received crime reports in electronic form, analyzes advantages and positive changes that can happen due to digitalizing at the initial stage of criminal proceedings: the use of electronic documents and electronic signatures on documents will significantly speed up documents flow, simplify evidence collecting procedure and reduce time costs in legal proceedings. The limitations to be overcome in informational improvement at the stage of criminal proceedings initiation are described. It is advisable to make a list of procedural documents that can be compiled and signed in electronic form at the stage of criminal proceedings initiation, as well as to regulate the procedure for their document circulation. It should be done as a part of initial changes towards the reform of pre-trial proceedings and the creation of a regulatory platform for conducting so-called electronic criminal case in the future.

Keywords: Initiation of A Criminal Case, Stage, Verification, Crime Report, Electronic Document

Introduction

Modern criminal procedure form of crime reports checking does not meet the level of development of electronic document management technologies, which is successfully applied in other procedural branches of Russian law over the past years. There is no secret that current norms of the Code of Criminal Procedure of the Russian Federation in this part reflect mainly the level of technology that was in the 70s of the last century and which does not correspond to the modern state of human-technical relations. Only some recent legislative changes (federal laws of 04.03.2013 No. 23-FZ, of 03.07.2016 No. 323-FZ, of 27.12.2018 No. 533-FZ) are aimed at filling a certain gap, however, they unfairly ignored legal regulation of relations in this area at the stage of pre-investigation verification. Russian criminal procedure legislation provides for the possibility of using electronic documents in criminal proceedings (article 474.1 of the Code of Criminal Procedure of the Russian Federation). However, at present, this opportunity is realized exclusively during the judicial stage of a criminal process. And therefore there is scientific and practical interest in electronic reception and registration of a crime report and further proceedings on it. On the other hand, there is no absolute prohibition on the compilation of documents in electronic form in the Code of Criminal Procedure of the Russian Federation.

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Literature Review

The need to improve pre-trial criminal proceedings by introducing an electronic criminal case is discussed in scientific community and among practitioners. So it is necessary to regulate the possibility of using digital technologies. Desirability of limiting the operation of electronic document management only by judicial stages of a criminal process is questioned. Procedural scientists think that electronic document management can eliminate excessive formalism of criminal proceedings, increase openness, accessibility, economy and speed of justice, can systematize and structure criminal case materials automatically (Kachalova, Tsvetkov 2015; Abdulvaliev, 2013, Lazareva V. A., etc., 2019); can ensure remote interaction between the bodies of inquiry, other investigative units, prosecutors, courts; can strengthen guarantees of persons involved in criminal proceedings (Grishin, 2019). At the same time, many researchers rightly note that digitalization of pre-trial criminal proceedings at the legislative level is fragmented, inconsistent and non-operative. The legislator is slow to integrate proposed "electronic innovations" into the criminal process, not even paying attention to the fact that the Criminal Procedure Code of the Russian Federation is noticeably behind other Russian procedural laws in this area (Volunteer O.V., 2019).

Some researchers rightly note modern trends in the penetration of information technologies, the existence of "futuristic" forms of electronic document management that are not directly provided by the Code of Criminal Procedure of the Russian Federation, based on their application locally: sending a refuse decision to initiate criminal proceedings to the applicant, calls for giving explanations by e-mail and etc. (Haliullina, 2016).

It is also noted that relevance of this issue is due to the development of the society digitalization, objective factors of digital technologies development and the state as a whole. In addition, with considerable advance, creation of so-called electronic criminal cases in foreign countries is accumulated, for example, the USA, Kazakhstan, Turkey, Estonia, Canada, Germany, Belgium, South Korea, etc. (Nissan E. 2008; Zuev, 2017; Kuzhabayeva, etc., 2019).

Problem Statement

There is an urgent need to study, find and substantiate optimal directions for reforming Russian criminal procedure legislation, taking into account the experience of other countries and their own national interests in the rational use of electronic document management at the initial stage of a criminal process in order to increase effectiveness of preliminary investigation bodies.

Research Questions

The subject of the article is the norms of Russian and foreign legislation which can regulate the possibility of using electronic document management in the implementation of criminal procedure at the stage of crime report accepting and resolving, as well as theoretical provisions developed in criminal procedure science that reveal prospects for improving the stage of criminal proceedings initiating in this direction.

The aim of the study is to develop a set of proposals for improving criminal procedure legislation, fixing the possibility of introducing electronic document management technology in receiving and reviewing of crime reports.

Methodology

Methodological basis of the research: general scientific method of materialistic dialectics, comparative, formal-legal, logical methods, as well as method of legal modeling.

Results and the Discussion

Electronic document management can be defined as a systematic set of hierarchically organized automated processes for servicing criminal proceedings, as a structured system of interconnected document management tools when they are used and stored electronically.

The idea of electronic document management at the stage of a crime report reviewing is the creation of software (platform), which allows subjects of verification to receive, register and have further work on crime report in electronic form with the possibility to create electronic documents, sign them by electronic digital signature, store them, as well as to have access to it by employees carrying out departmental control. All incoming verification materials that are not electronic must be digitized and attached to so-called "electronic file" in the form of files. Documents are digitized by scanning, photographing or video recording.

The introduction of electronic document management would facilitate timely and proper registration of crime reports; ensure prompt monitoring of compliance with the fixed deadlines for verification and registration of its results. Therefore, latent violation of procedural deadlines by law enforcement officials can decrease, cases of crime hiding can also decrease, which also contributes to the implementation of legal certainty principle (Usachev, 2019, Chebotareva, 2019).

The system can notify the applicant and the person under review electronically by sending an electronic copy of procedural decision. This can be done after the completion of crime report verification. In case of disagreement with the decision taken as a result of the review, the person can also appeal against it by submitting a complaint to the prosecutor, to the head of the investigative body or to the court in electronic form.

At the same time, it is advisable to make a certain list of procedural documents that can be compiled electronically at the stage of criminal proceedings initiation. It is noteworthy that prerequisites for using electronic form of the report and reporting of committed crime or about a crime to be committed are in existing regulations. Unlike the Code of Criminal Procedure of the Russian Federation, the provisions of the Instruction approved by the Decree of the Ministry of Internal Affairs of the Russian Federation in August 29, 2014 No. 736, "On the procedure for receiving, registering and resolving reports and crime reports, administrative offenses, incidents in the territorial bodies of the Ministry of Internal Affairs of the Russian Federation" make it possible to receive crime reports in electronic form. Software that requires the applicant to complete details necessary to work with crime reports is used, while electronic reports are printed and further work is carried out with them in written form.

The possibility of operating on information about a crime received in electronic form and used as an alternative (along with written or oral) form of reasons for a case initiating should be in article 141 of the Code of Criminal Procedure of the Russian Federation, while the details of a completed form of a crime report should contain a note about warning of criminal liability for patently false denunciation.

It is difficult to determine the possibility of issuing an electronic digital signature for documents, when the party is obliged to confirm personally correctness of the information contained in documents and his personal attitude to them. Mechanism for performing a hand-written signature is connected to psychophysical characteristics of human body. So this signature is inextricably connected with biological personality of the signer (Fatkullin, 2018). In this regard, it is almost impossible to certify the text of explanations received, protocols of investigative actions (for non-professional participants - applicant, eyewitness, lawyer, interviewed person, etc.) by electronic digital signature and other analogues of a hand-written signature. Electronic format of such documents can be provided by creating scanned copies of corresponding paper copies or adapt videoconferencing for this purpose.

Due to the fact that transactions with personal data of participating persons will be carried out during the formation of electronic verification materials, it can be possible to store personal data of participants secretly, in separate encrypted computer files, modify and use them if pre-investigation situation requires this in order to protect potential witnesses, suspects, etc. The institute of information rehabilitation, introduced in the German Code of Criminal Procedure in 2017 (Zazulin, 2018), is also interesting. The essence of this Code is in relation to the area of legal relations and would be that personal information contained in electronic file can be removed from the archive if a decision was made to refuse to initiate criminal proceedings.

It is also necessary to mention the barriers that would require the introduction of an electronic format for crime report reviewing. There is a problem in ensuring information security in the field of identity identification, the possibility of unauthorized access and falsification of stored electronic documents from outside. High-quality technical solution is necessary to solve this problem (Zuev, 2017), because the effectiveness of any legal norms is directly dependent on the level of technical support of law enforcement agencies and the population. It is worth to mention the proven standards for ensuring information security and information protection in any electronic document management system: authentication of the system user, distribution of access rights for system users, support of electronic signature, data encryption, recording and auditing of users in the system in real time (Bychkov, Popov, 2013). The question of so-called "digital inequality" is still open, where individuals are still not able to understand or use the advent of electronic technology and this should not, in fact, become an obstacle to access the justice. Therefore, at first it is advisable to develop acceptance and recording of crime reports in electronic form as an alternative model for creating a reason to initiate criminal proceedings. So the development of an adequate program of electronic document management and measures for its application at the first pre-trial stage of a criminal process should eliminate negative consequences of digitalization.

Conclusion and Limitations

Thus, after a short period of "testing" the preparation and use of procedural documents in electronic form in criminal proceedings, it is necessary to make a clearly defined list of procedural documents, which can be drawn up electronically at the stage of criminal proceedings initiation. It is also necessary to regulate application procedure, which could be a starting point as a kind of pilot project towards reforming pre-trial proceedings and creating a future regulatory platform for conducting so-called electronic criminal case.

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Analysis of a Construction Company's Strategy With Allowance for Risk

Vladimir Viktorovich BREDIKHIN

Dr. of Economy, Professor of the Department of Real Estate Management, Mining Engineering, Southwest State University, Kursk, Russia, e-mail: bvv001@mail.ru

Natalia Vladimirovna BREDIKHINA

Associate Professor of the Department of Real Estate Management, Mining Engineering, Southwest State University, Kursk, Russia, e-mail: natalybredikhin@yandex.ru

Anna Ilinichna CHERNYAEVA

Student of the Department of Real Estate Management, Mining Engineering, Southwest State University, Kursk, Russia, e-mail: chernyaeva.a.i@yandex.ru

Abstract

Due to their complexity and longtermness, construction activities require a scientific approach to strategic management. To form and implement an effective strategy of a construction organization, a special place is given to the analysis of the macro environment and internal environment of a construction organization, identifying the risks faced by construction sector companies. The paper deals with strategies based on the analysis of management decisions with allowance for risk. The results of the study can be used by managers of construction organizations to plan their activities.

Keywords: construction sector, construction company, management, strategy, risk.

Introduction

The construction sector is a system that has a layered structure, bonds of different nature, a specific technology of production processes, based on the functional organization of activities of the construction sector's entities and various problems which are in the form of implementation of investment construction projects (Garretsen H., McCann P., Martin R., Tyler P., 2013). Modern construction is a variable dynamic system both in terms of management entities' selection and in the functional aspect of activity (Zabrodin Yu. N., Kolikov V. L., Shapiro V. D, 2014; Bredikhin V.V., Shleenko A.V., Bredikhina N.V., 2016; Bredikhina N.V., 2017).

The analysis of dynamic processes occurring in such systems under the influence of perturbations of different nature makes it possible to assess them, identify risks encountered by construction companies. In the end, it allows us to develop relevant approaches in making strategic decisions for development (Akifiev I. V., Khrustalev B. B., 2011; Kovan S. E., 2013; Bredikhin V.V., Bredikhina N.V., Aksenteva I.Y., 2019).

Risk factors in making strategic decisions

As part of our research task, the following three main groups of factors can be identified:

1. The first group includes factors, exposure to which is inherent in the structure of construction sector companies. Their action is continuously destructive (unprofitable). They can be divided into subgroups:

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- physical factors: noise, chemical pollution, temperature;
- economic factors: inflation, deflation, financial and credit instability of companies and suppliers, changes in demand for products, etc.;
- environmental factors: greenhouse effect, humidity, seismic activity;
- demographic factors: population migration, morbidity, birth rate, and mortality;
- social factors: living standards and others;
- geopolitical factors: the geographical location of the operating area, the effectiveness of tax and social policy, and so on.

2. The second group consists of discrete emergency factors that depend on the state of the environment in which a construction sector company operates, and it is impossible to influence the probability of their occurrence. However, it is still possible to reduce the degree of their impact on a construction company (their weight). Similarly as in the second group, these factors can be divided into subgroups:

- physical factors: fire accident, explosion, power delivery failures, transport disruptions;
- economic factors: fails to deliver materials, fluctuations in the financial market;
- legal factors: changes in tax legislation, administrative prohibition of activities;
- environmental factors: earthquake, flood, hurricane, etc.

3. The third group includes activities to reduce the impact of factors of the first and second groups, which can be implemented through preventive measures, the introduction of new technologies, insurance, the use of consulting and engineering services, and other measures.

The risk structure is different, and not all of these groups of factors will significantly affect the degree of a particular risk overall. However, it is important to pay attention to the factors presented in the classification under consideration. Those factors can have both negative (increase of risk factors of the 1st and 2nd groups) effect on the amount of risk and positive effect on it (stabilizing factors of the 3rd group).

The stabilizing factors can be directed both to weaken the destructive risk factors, and to reduce the probability of their manifestation.
The division of factors into groups is due to both the main provisions of the reliability theory and the approach to risk analysis and assessment applied in the research.

The Concept of Acceptable Risk in A Company's Strategy

During the development of a construction company's strategy, the concept of acceptable risk is implemented in the form of a two-stage set of procedures: risk assessment and risk management (see Figure below)

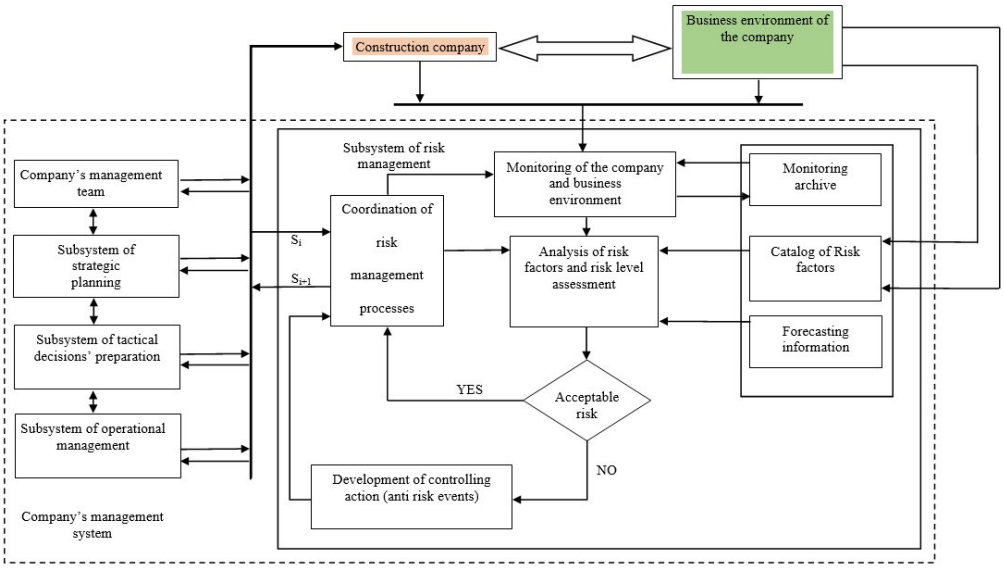

Fig.1: Risk management scheme for making strategic decisions in the company: S_i – tentative decision (strategy); S_{i+1} – risk-based solution: (strategy).

⇨ - material flows;

→ - functional and information flows

Risk assessment is a set of regular risk analysis procedures, i.e. identification of the sources of occurrence, revealing possible consequences of risk factors, and determination of the role of each source in the overall risk profile of a given company. Risk assessment of a company's strategy is based on a comprehensive (scientific, technical, technological, marketing, sociological, etc.) study of construction industry companies and their business environment as sources of risk, analysis of external and internal risk factors, building a risk profile under the influence of certain risk factors, determining indicators for assessing the level of risk, as well as establishing mechanisms and models for the relationship of indicators and risk factors (Grabovoi P. G., 2017).

In order to judge the significance of a particular risk factor and the adequacy of preventive measures taken, a risk must be shown in comparable terms. The risk level of strategies (strategic plan) is taken as a total characteristic of risk. That level of risk, as a result of a corresponding special study, is expressed by some integral indicator of risk level.

All types of risk factors must be taken into account to ensure reliable operation of construction sector companies under the conditions of transformational economy: both genetic, i.e. inherent in economic activity as a whole in any conditions, and specific ones, being inherent in the transition period (Pike A., Rodriguez-Pose A., Tomaney J., 2006). All risk factors must be identified, analyzed, and ranked by importance or contribution to the overall risk profile of a particular company.

A good result in the analysis of risk situations is shown by a systematic approach. This result is obtained by considering a complete set of all possible external structures and their connections with the object under study (Khrustalev B. B., Demyankova V. S., Ganiev M. G., 2012)

If one makes such an analysis:

1. Risk factors in internal and external environments are singled out;
2. An economic and mathematical model for the analysis and risk management in the system is developed;
3. The strategic function of a company is selected depending on the existing risk factors.

Thus, as a theoretical basis for creating an organizational risk management system for production and economic activities of construction sector companies, one can distinguish:

- risk in the company's activity is the result of objectively existing and fundamentally ineradicable uncertainty in the external and internal environment of its operation (it always exists);
- risk is a manageable parameter – its level can be affected;
- an integral indicator of the strategy's risk level is used to assess the risk level of strategic decisions made in construction sector companies;
- a systematic approach is applied to analyze risk situations in construction companies.

Company's strategy with allowance for risk

As is commonly known, there are three types of solutions in the activity of a construction company: strategic, tactical and operational ones. Following this division, risk is analyzed separately when making strategic, tactical and operational decisions.

The most important are strategic decisions for construction sector companies. They can dramatically affect the activities of such companies and determine their goals for the long term period. This means that the implementation of strategic decisions changes the potential of a company, and it is almost impossible to return to the previous state of management object. It is common with strategic decisions that their adoption is carried out by selecting the optimal one according to a given criterion.

The authors identify the following main strategies of production and economic activity of a construction sector company:

- product-market;
- resource-market;
- technological;
- investment;
- business management (development).

Strategic decisions are made and implemented under the conditions of ambiguity (uncertainty) caused by scientific and technological progress and in the presence of real socio-economic processes, a variety of ways and options for turning opportunities into reality, a range of possible states and situations of decision implementation. In practice, at the moment of decision-making, it is impossible to have accurate and complete knowledge about the environment for implementing a company's strategy being remote in time, about all existing or potentially emerging internal and external factors.

Strategic decisions of a company are assessment and management objects, strategic plan that contains proposals for future development of the external environment in relation to a company, recommendations on a course of actions of the management and staff of a company, forward-looking statements about the reactions to planned strategic activities of product consumers, raw-material suppliers, competitors, etc. (Fabrizio Barca, 2009).

Risk management includes the development and implementation of recommendations and measures that are economically justified for a given company, aimed at reducing the initial level of risk to an acceptable level.

The relationship of company's major strategies to various risk factors is shown in Table below.

Table 1: Major strategies of construction sector companies

Strategy	Range of accepted strategic decisions	Risks caused by uncertainty
Product-market	Product strategy (nomenclature and its updating; assortment; production volume; product quality); Market strategy (sales market structure; market expansion; market competition; pricing)	1. Risk of unrealization of manufactured products; 2. Risk of the buyer's rejection of the received and purchased products; 3. Risk of non-receipt or overdue receipt of payment for products sold without prepayment; 4. Risk of incorrect forecasting of a situation
Resource-market	Resource strategy (volume of resource reserves; quality of resources); Strategy in the resource market (structure and suppliers)	1. Risk of raw materials undersupply due to failure of concluded supply agreements; 2. Risk of non-return of prepayment by the supplier; 3. Risk of incorrect forecasting of a situation
Technological	Choosing the type of a company (technological, market, marketing); Technological dynamics of a company	1. Risk of unrealization of the core technology; 2. Risk of equipment failures; 3. Risk of incorrect forecasting of a situation
Investment	Strategy for attracting external financial resources (choosing the structure of funds' sources; determining the period of obtaining loans); Refund of funds raised; Investing existing funds	1. Risk of non-receipt of external funds and loans; 2. Risk of inefficiency of the current organizational structure; 3. Risk of incorrect forecasting of a situation
Business management	Choosing the type of management (strategic, tactical, operational); Organizational structure; Management structure	1. Risk of disruption of own production plans or innovative projects; 2. Risk of inefficiency of the current organizational structure; 3. Risk of incorrect forecasting of a situation

Conclusion

A fundamentally irremediable uncertainty that takes place when making strategic decisions always exists in reality and leads to the fact that the risk of strategic decisions never amounts to nothing. The current state of construction sector companies is characterized by a fairly high level of uncertainty of the external infrastructure. One should also note that due to the uncertainty of the external environment, there may be uncertainty of goals. By subjecting a new idea or solution to a rational critical analysis, it is possible to provide measures to neutralize or mitigate the undesirable manifestations of certain risk factors by identifying the potential danger and its sources and analyzing the consequences. In addition to that, in many real world situations, in order to support the reliability of a new solution or idea, it is sufficient to form some reserves (financial or material), insure the transaction, or provide other actions in case of an undesirable course of events.

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Humanitarian Culture of a Teacher in The System of Professional Education

Lyudmila Anatol'yevna SEMENOVA

Associate Professor of the Department of Real Estate Management, Mining Engineering, Southwest State University, Kursk. Russia
romahka31@yandex.ru

Lyudmila Ivanovna KONOVALOVA

Saint Petersburg. Russia
konovalovali@mail.ru

Natalia Vladimirovna BREDIKHINA

Associate Professor of the Department of Real Estate Management, Mining Engineering, Southwest State University, Kursk. Russia
natalybredikhin@yandex.ru.

Abstract

It follows from the current trends in the development of society that the current educational practice of professional training, aimed at transferring the maximum amount of knowledge, has lost its relevance. Accordingly, the formation of a new paradigm of training a competitive specialist, aimed at creating conditions for the formation and education of graduates of professional educational institutions, able to optimally dispose of the knowledge obtained, effectively self-realized, be in demand by society-the result of a conscious need. This determines the relevance of the presented work. The purpose of the article is to theoretically justify the need to overcome the value neutrality in the field of methods and technology of training a competitive specialist through the humanitarian culture of the teacher and the formation of the educational environment of the OU.
The main research methods in the work are such General logical methods as: analysis, analogy, generalization.

Keywords: teacher's humanitarian culture, educational environment, professional training, overcoming value neutrality, cognitive value of fiction.

Introduction

The process of learning accompanies modern man from the moment of his birth to his death. Speaking about professional training, we must understand that its purpose in the modern world is not so much to teach terms and professional knowledge, but to develop personal abilities and skills of students that allow them to become a competitive specialist. And, according to L. A. Semyonova (2014), the teacher plays an important role in this.

A teacher in a professional educational organization (professional colleges, technical schools, etc.) often does not have a special pedagogical education, but in his professional activity faces real pedagogical problems, the solution of which can not be found in textbooks or manuals. According to the authors, the basis of pedagogical activity of a teacher should be a humanitarian understanding of the pedagogical problems of forming a specialist. This includes humanitarian knowledge, conducting

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a dialogue with the subject of educational activities (students), and overcoming value neutrality in the field of methods and technologies of professional training. In this regard, the humanitarian culture of the teacher is considered by us as a condition that can ensure the professional development of the student's personality. However, the humanitarian culture of a teacher cannot exist in isolation from the educational environment, they are indivisible and are integral parts of the pedagogical culture as a whole.

The development of a student's personality largely depends on what educational environment they are in, what innovative methods and tools are used in it.

Methodological base of the research

The methodological basis of the research is the concept of professional formation of the individual, as well as the concept of B. G. Ananyev (1953) about functional and operational mechanisms of mental processes that act as driving forces for the development of the subject.

In the problem of forming the humanitarian culture of the teacher, the authors distinguish hermeneutical and axiological approaches based on the cognitive-heuristic and creative capabilities of students.

The subject-activity and contextual approaches described by Klim-Klimashevska, A. (2015) became the basis for the formation of the educational environment, since "all academic subjects in an educational organization should be studied in the context of the future activity of a specialist "and" the entire training system should be aimed at the formation of certain professional qualities " .

Research Results

It should be noted that along with the traditional approach to professional training of specialists, it is increasingly possible to see an innovative equal attitude to the student, which contributes to the faster formation of professional consciousness.

Pedagogical research of the last decades, devoted to the personal-oriented approach in pedagogical activity and technologies of its implementation, is aimed at understanding the deep meaning of this activity. In our opinion, the deep meaning of pedagogical activity is very accurately expressed in the Humanities. Speaking about the nature of humanitarian knowledge, about the birth of humanitarian thought, about the development of humanitarian thinking, we refer to the opinion of M. M. Bakhtin (1979), who noted its "special two-dimensionality and two-personality".

Pedagogical reality in practice is much more diverse than theoretical thought can suggest, richer than all models, technologies and pedagogical didacticism. That is why in their teaching activities, the teacher should be able to understand the Humanities and comprehend pedagogical problems and tasks. Consideration of the problems of pedagogy and pedagogical knowledge in the system of culture is reflected in the research of A. S. Robotova (2006) et al., where science and art are represented as correlating components that reflect the inner side of a person who knows this reality.

Innovative, according to the authors, is the definition of the subject position of the teacher in their activities as the most significant. In relation to the student, this allows us to actualize the positive motives of educational and cognitive activity and make the learning process personally significant for him.

And Russian classical literature, which is not used in professional education, has such opportunities. However, the huge cultural and artistic heritage of Russian classical literature would have enriched the content side of knowledge, forced the teacher to put value orientations in the center of training. However, the implementation of this provision requires a developed humanitarian culture of a professional education teacher. It is necessary to form the concept of artistic and imaginative

knowledge of pedagogical reality. The authors are convinced that the formation and implementation of such a concept is possible through the means of fiction, but this requires the development of methods, techniques and tools aimed at generating interest in professional disciplines based on a value attitude. Krylova (1990) also mentions this in her research.

At the same time, the humanitarian culture of the teacher , in the opinion Gessen, S.I. (1995) and Dyomina, O.A. (2001), is a reflection of the value-spiritual essence of the teacher's personality.

Teaching professional disciplines requires the teacher to be creative in teaching activities. Creativity combines both the logic of understanding pedagogical categories and the emotional and artistic component of pedagogical reality and the teacher's own emotional and imaginative sphere of personality, his emotions, feelings, experiences and empathy. However, modern education, "getting into the most distant abstractions", does not address emotions and imaginative thinking, its cognitive capabilities, and thus creates great difficulties for students. In the works of L. I. Konovalova (1996), it is said: "Thinking, devoid of elements of imagery, is formulaic, fruitless, formal".

Confirming this idea, let us recall the attitude of scientists from various fields of knowledge to artistic images and works of literature that are revealed when presenting their scientific ideas (P. F. Kapterev, S. I. Gessen, M. K. Mamardashvili, I. S. Cohn and others). In the works of B. M. Teplov (1985), based on literary works, the problems of abilities and giftedness (Salieri and Hermann), as well as temperament and character formation (Tatyana Larina) are considered.

Innovative is the understanding that the appeal to the world of artistic images, the study of various aspects of upbringing, education, human development, can and should become the basis of professional development of both the teacher of professional education and the student. Real opportunities to refer to works of literature in the course of professional training are impossible without analytical consideration of the text.

Thus, professional pedagogy, studying various aspects of upbringing, education, and human development, can and should turn to literature, which is a "form of personal existence of a person" (O. Mandelstam), and pedagogical culture will become a factor in the effectiveness of professional training.

Conclusion

In this article, the authors search for innovative ways and means to overcome value neutrality in the field of methods and technologies of professional training, in determining the significance of the humanitarian culture of the teacher in professional education. This will help to activate the student's subjective position in education, foster positive motivation for educational and cognitive activities, and make the learning process personally significant. Today, professional training does not use a huge cultural and artistic layer of Russian classical literature, which would enrich the content side of pedagogical knowledge, strengthen the value side of the educational process.

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Evaluating Founders of Start-Up Companies When Business Angels Decide on Investment

Levs FAINGLOZS

RISEBA University of Applied Sciences, Riga, Latvia, e-mail: lev.faingloz@gmail.com

Abstract

Business angels' investments are an important funding source of start-up companies at the earlier stages of development. Analysing the existing scientific literature in terms of the investment criteria applied by business angels made it possible to identify more than 200 various criteria. Within the framework of this study, in view of so large number of investment criteria, the author has decided to consider only the criteria applied by business angels to start-up company founders. This was decided because most of the previous studies authors singled out exactly the entrepreneur and the team as the most important criterion. At the same time, note that these authors used to make only qualitative assessment by comparing between the investing criteria. That is why the goal of this research is: making quantitative assessment and defining the level of assessment of start-up company founders at which business angels are ready to invest in the start-up company. To achieve the goal of the study, a survey took place among 118 business angels with different investment experience. The analysis of the survey has revealed that the most significant criterion for business angels making decision on investing is trust the founders - regardless of the business angels' experience, while the least significant criterion is the managerial skills of start-up founders. Moreover, it was stated that, with the growth of investment experience, the requirements of business angels to start-up founders are becoming more stringent.

Keywords: Business Angels, Founder's Assessment, Investment Criteria

Introduction

Business angels' (BA) investments are an important funding source of start-up companies at the earlier stages of development. Mason and Harrison (2015) note that, during the financial crisis of 2008, business angels played an important role in the UK economy, while banks and venture capital funds lowered their investment levels.

The question of how business angels decide on investments is very important for start-up companies looking for external financing sources. Analysis of the existing scientific literature in terms of the investment criteria applied by business angels showed a wide variety of these criteria. The previous studies have identified more than 200 various investment criteria. Most frequently, researchers mention the following groups of investment criteria: product characteristics and scalability, market size and growth rate, financial potential (business plan, profitability of the project, exit opportunities), entrepreneurs and management team (Bachler and Guild, 1996; Mason and Harrison, 1996; Rostamzadeha et al., 2014; Carpentier and Suret, 2015; Paul et al., 2007). However, despite the variety of investment criteria, many researchers agree that one of the most important investment criteria for business angels is the management team and the founders of start-ups (Bachler and Guild, 1996; Mason and Harrison, 1996; Landström, 1998; Brettel, 2003; Sudek, 2006; Harrison and Mason, 2007; Paul et al., 2007).

Unfortunately, researchers often do not separate between the investment criteria applied by business angels to the team and to the founders of a start-up company. Possibly such an approach is associated with the fact that the founders themselves are the project management team at the earlier stage of the project development. However, as the start-up company grows and new participants start joining it, there occur fundamental differences between the team and the start-up founders.

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Based on a large number of investment criteria, it was decided as a limitation of this study to consider only the criteria applied by business angels to founders of start-ups. This decision was because most of the previous studies authors single out the entrepreneurs (founders) and the team as the most important criterion. For example, Mason and Harrison (1996) indicate that, in terms of importance, the criteria related to the entrepreneurs are the first priority to business angels and only after them come the criteria related to the product and the market growth potential. Bernstein et al. (2017) are of a similar opinion concluding that experienced business angels deciding on the investment consider the management team related information as the most significant to respond.

Moreover, we can state the following research gaps based on studying the previous investigations. A small number of studies were identified wherein the investment criteria applied by business angels to start-up founders were assessed. Basically, investigations that took place before 2010 were revealed only. Only one study has been identified where BA were divided into groups: Virgin BA, BA with a brief experience and BA with a vast experience (Smith et al., 2010). Authors of previous investigations make only qualitative assessment by comparing between investment criteria; at the same time, they do not make any quantitative assessment.

To bridge the gaps described above, this study aims at the determination of the assessment level of start-up founders at which business angels are ready to invest into the start-up. We will consider the following as the investment criteria applied by business angels to start-up founders: entrepreneurial, managerial, and professional skills of the founders as well as the business angels' trust the founders and the founders' reputation.

The scientific novelty of this study is that quantitative assessment of criteria identified in the course of investment studies and applied by BA to start-up founders is made. Moreover, the level of importance of each of the investment criteria was assessed with respect to business angels with different investment experience.

Review of literature

Young innovative companies play an important role in the knowledge-based modern economy (Block et al. 2016). However, those companies frequently suffer from financial limitations (Brown and Earle 2015; Carpenter and Petersen 2002; Cosh et al. 2009). This is because start-up companies find it hard to attract bank financing at the early stages of their development, since they still lack a stable cash flow of funds and cannot pay deposits claimed by Bank (Hall and Lerner 2010).

In contrast to venture capital funds, business angels predominantly make investments at earlier stages of companies' development (Laukkanen, 2007; Wong et al., 2009; Van Osnabrugge and Robinson 2000; Sohl 2006; Dutta and Folta, 2016). According to the data from World Bank (2018) and Hellman and Thiele (2015), in terms of the amount of financing, transactions by business angels are minor as against those of the formal venture capital. However, the transactions are concluded at earlier stages of the companies' development. Aridi (2018) holds the same view, asserting that the vast majority of early stage investments are made not by venture funds, but business angels. According to the data from EBAN (2018), the total European early stage investment market is estimated to be worth of 12.3 billion EUR in 2018. In 2018, business angels represent the biggest share of the investment market with 7.45 billion Euros, equal to approximately 60% of the total market. The total number of business angels was 345,000 (EBAN, 2018).

Wessendorf et al. (2019) note that the assessment of start-ups at an early stage of development is a complicated and subjective process associated with risk and uncertainty. This especially refers to technological start-ups. On the other hand, it is very important for young start-up companies to understand based on which criteria business angels decide on investment.

The investigation of the previous studies has identified a wide variety of criteria. However, this study will consider only the criteria associated with founders and managerial team of start-up companies.

Haar et al. (1988) note that the project selection criteria applied by business angels significantly differ from those applied by venture capitalists. For instance, business angels are not interested in a well-elaborated business plan, which is a necessary condition for venture capitalists. According to Haar et al. (1988), business angels agree with venture capitalists on the importance of managerial team, consumer value of product or service, and high market potential for the product or service provided by the company. Haar et al. (1988) found out that the importance of the management team came first compared to other investment criteria.

The study performed by Bachler and Guild (1996) examines the investment criteria of Canadian investors, used when taking decisions on funding the early stages of technological companies. The authors have considered three types of investors: business angels, private funds of venture capital, and public funds of venture capital. Bachler and Guild (1996) have examined 95 investment criteria divided into 5 groups: characteristics of the entrepreneur, characteristics of the market, characteristics of the venture offer, investor requirements and characteristics of the investment proposal. Bachler and Guild (1996) have found out that, with regard to all the three examined types of Canadian investors, the characteristic of the entrepreneur is the most important criterion when deciding on investment.

Becker-Blease and Sohl (2015) examine other groups of investment criteria. The researchers assess projects possibly to be invested by business angels according to five criteria as follows: characteristics of managerial team, contents of business plan, product development stage, availability of advisors and employees. Becker-Blease and Sohl (2015) found out that positive assessment of the project by business angels is influenced by the management team, the presence of certain types of advisors and products/services already generating income at the time of the assessment.

Bretell (2003) describes the process of investment decision-making by German business angels. Bretell (2003) notes that, after a quick review of possible investment options, business angels, as a rule, take a quick decision on whether or not the project is worth of a more detailed consideration. At that stage, business angels are ruled by two considerations only: first, their initial impressions and, secondly – their investment preferences. Bretell (2003) notes that the majority of all projects are rejected already at the first stage. The next stage includes a detailed analysis of the projects, including personal contacts with the company seeking for financing. Bretell (2003) emphasizes that a detailed analysis of projects is carried out based on a number of criteria, the most significant of which are: managerial team, the market growth potential, and the uniqueness of the product or service.

Stedler and Peters (2003) have investigated the opinion of 232 business angels from Germany. They found out that business angels scrupulously study the business and the respective managerial team before they decide on investment. Moreover, investors assess such criteria as management, product, market, and financial and investment peculiarities. Stedler and Peters (2003) have discovered that the most important criterion is the entrepreneur and the managerial team.

The study by Sudek (2006) based on the investigation of 72 business angels from Southern California considers the kinds of investment criteria being of higher priority when assessing projects. According to Sudek (2006), business angels spend most of their time and energy on four main topics: the passion of a leading entrepreneur; the reliability of a leading entrepreneur; the quality of the management team and the availability of exit strategy.

Note that some specific studies were identified in the process of analysing the previous studies. Within their framework, the criteria associated with founders and managerial team were not of higher importance for business angels taking decision on investment. That situation could arise for a few reasons. The first one could be the country differences of the studies examined. For example, Bruton & Ahlstrom (2003), Bruton et al. (2004), Naqi & Hettihewa (2007), Burke et al. (2008) believe that the investment criteria applied by business angels may differ depending on their cultural (country) differences. The second reason could be a small number of business angels taking part in the above-stated studies. So, only four business angels took part in the study by Mason and Stark (2004), while in the study by Smith et al., (2010) the business angels were divided into three groups of four angels each.

Summing up the literature review, we can state that most of the researchers consider start-up founders as the most important investment criterion for business angels. When analysing the founders, researchers single out such aspects as leadership skills of entrepreneur, entrepreneur's previous experience, entrepreneurial motivation, relationship between the entrepreneur and the investor, entrepreneur's ability to develop his company, managerial skills of entrepreneurs, personal traits of entrepreneur (honesty, reliability, determination, enthusiasm, etc.), trust in the entrepreneur, and the passion of the leading entrepreneur.

Methodology and Data

To determine the level of assessment of start-up founders, at which business angels are ready to invest, a questionnaire was developed and a survey of business angels was conducted. The development of the questionnaire consisted of two stages. At the first stage, the questionnaire was developed based on a study of the existing scientific literature related to the investment criteria applied by business angels. At the second stage, there was a joint discussion of the content of the questionnaire. Five experts were attracted to take part in the discussion. The experts were five high-level business angels from the UK, Belarus and Latvia. Communication with experts has improved the structure and content of the questionnaire.

The final version of the questionnaire included issues associated with the assessment of entrepreneurial, managerial, and professional skills of start-up founders by business angels, as well as the level of trust of business angels in the founders and the reputation of the founders of start-ups. Thus, the questionnaire presented questions related to five groups of investment criteria.

In the course of the survey, Likert scale was used. When assessing the start-up founders, the respondents (business angels) had to choose one of the following answer options:

1. low evaluation;
2. below-average evaluation;
3. average evaluation;
4. above-average evaluation;
5. high evaluation;
6. very high evaluation.

The next stage of the study was associated with the search for respondents (business angels) ready to take part in the survey. The search for business angels was carried out through:

- the contacts of business angels' networks stated on the Home Page of European Business Angels Network;
- websites of business angels associations and networks;
- searching business angels at LinkedIn;
- personal contacts.

Looking for respondents resulted in finding 118 business angels from 32 countries who had undergone the survey. The largest number of respondents was business angels from Latvia – 40 people, next – BA from Lithuania (8 people) and from Belarus – 5 people. From other countries, 1 to 3 business angels took part in the survey. Unfortunately, this situation does not allow one to identify the peculiarities of the investment decisions taken by business angels from various countries. However, it allows us to assess the overall opinion of the respondents on the importance of evaluating the founders of start-up companies.

Note that, within the framework of the survey, the respondents were asked some questions about their investment experience. It turned out that 14 out of 118 business angels who have undergone the survey were Virgin BA – that is to say, they had not invested in start-ups yet. Therefore, the opinion of that group of business angels was not taken into account within the framework of the study in question. Therefore, the total number of respondents (business angels) based on which the founders of start-ups were evaluated was 104 BA. As a result, two groups of business angels evaluated founders of start-

ups: first, business angels whose investment practice was less than 3 years and, secondly - business angels who had been investing for three or more years.

At the next stage of the study, in order to pass over from qualitative to quantitative assessments, the respondent's answers were assigned scores from 1 to 6 (see Table 1).

Table 1: Translation of qualitative assessments from respondents (business angels) into quantitative assessments

Qualitative assessment	Quantitative assessment
Low evaluation	1 point
Below average evaluation	2 points
Average evaluation	3 points
Above average evaluation	4 points
High evaluation	5 points
Very high evaluation	6 points

This approach enabled one to calculate the average number of points with respect to each of five groups of the investment criteria used by business angels, and to compare between them.

At the final stage of the study, a comparison between the investment criteria used by business angels with different investment experience was made.

Research results and discussion

To start with, let us consider the overall scores of the survey among business angels, not splitting them up into groups according to investment experience. Table 2 shows the collective results of start-up founder evaluation by business angels.

Table 2: Average estimates of start-up founders at which business angels are ready to invest in a start-up

Start-up founders evaluation criteria	Average score
Business angels' trust in founders	5.08
Professional skills of founders	4.53
Entrepreneurial skills of founders	4.53
Founders' reputation	4.48
Managerial skills of founders	4.17
Total score	**4.53**

As we see from Table 2, business angels believe that their trust in start-up company founders gained the highest average score – 5.08 out of 6. The second main criterion turned out to be the entrepreneurial and professional skills of the founders, which gained 4.53 out of 6 scores. The next criterion of importance is the reputation of founders – 4.48 out of 6 scores, and the managerial skills of founders have gained the lowest average score, i.e., 4.17 out of 6.

At the next stage of the study, the answers of business angels were split up by the level of the angels' investment experience. Business angels were divided into two groups as follows: those who had been investing from 1 to 3 years and those who invested more than 3 years. As already described above, business angels who have not yet invested in start-ups were not included in this part of the study.

The results of start-up founders evaluation by business angels with different investment experience are presented in table 3.

Table 3: Average scores of start-up founders at which business angels are ready to invest in a start-up (taking into account the BA investment experience)

Start-up founders evaluation criteria	Business angels who have been investing from 1 to 3 years	Business angels who have been investing for 3 or more years
Business angels' trust in founders	4.75	5.21
Professional skills of founders	4.38	4.60
Entrepreneurial skills of founders	4.41	4.58
Founders' reputation	4.41	4.50
Managerial skills of founders	4.03	4.24
Total score	**4.39**	**4.63**

As we can see from Table 3, the most significant factor inherent in the two groups of business angels with different investment experience is trust in the founders of start-ups. The most experienced business angels rated the trust at 5.21 points, while the less experienced - at 4.75 out of 6 points. Next, we will consider the differences in the assessment of start-up founders made by different groups of business angels.

The results of the study show (see Table 3) that for the most experienced business angels, the next most important factor coming after trust is the professional and entrepreneurial skills of the founders who scored 4.60 and 4.58 points, respectively. Then follows the reputation of the founders (4.50 points). The least significant are managerial skills of the founders of start-ups (4.24 points).

Business angels with investing experience up to three years think that the entrepreneurial skills and founders reputation ranked second (4.41 points), followed by the professional skills (4.38 points) and managerial skills (4.03 points) of the start-ups founders.

The obtained results reflecting the importance of business angels' trust in start-up founders confirm the point of view of many researchers. For instance, Mason and Harrison (2002) having questioned 74 business angels of UK stated that one of the main drawbacks (which is a reason for projects' being rejected) is untrustworthy entrepreneur and team. Moreover, Mason and Harrison (2002) emphasize that, if the entrepreneur and his team had a high reputation, business angels are ready to reduce their investment criteria – for instance, financial ones.

Many researchers note that trust is a key component of economic relations (Gambetta, 1990; Fukuyama 1995; Kramer & Tyler, 1996) and entrepreneurial activities (Low & Srivatsan, 1993; Dibben, Marsh, & Scott, 1996). Besides, Low & Srivatsan (1993) note that, at the level of entrepreneurial activities, trust is an important factor in building relationships. Within the framework of this study, we can speak of the interrelations between business angels and start-up founders.

Gulati & Sytch (2008) and Dirks & Ferrin (2001) emphasize that trust is especially important in situations characterized by risk and uncertainty, directly related to venture capital investment. Indeed, business angels' investments are always associated with a high level of uncertainty and information asymmetry. Bottazzi, Da Rin, and Hellmann (2010) hold a similar position, proving that in venture capital investment, trust has a positive effect on readiness to invest.

Mason and Harrison (1996) note the importance of expertise possessed by entrepreneurs. At the same time, Hindle and Lee (2002) emphasize the significance of previous work experience of start-up founders. Wessendorf et al. (2019) hold a similar view. They believe that the key factors having impact on business angels' decision on investment are individuality and experience of founders as well as the

market potential. Let us consider the differences in assessing the entrepreneurial and professional skills of founders by business angels with different investment experience. As we can see from table 3, business angels with less investment experience gave higher marks to the entrepreneurial rather than professional qualities of start-up founders. We believe that the position of the most experienced business angels who gave higher marks to professional skills of founders looks more reasonable and substantiated. Indeed, exactly professional skills of founders allow one to turn dream into a feasible project and achieve high multipliers, which angels and other venture investors are counting on.

Now let us consider the influence of reputation upon business angels' decision on making investment in a start-up company. In previous studies like Shapiro (1983), Weigelt & Camerer (1988) the authors note that reputation is highly valuable in the conditions of high uncertainty – especially, at the initial stages of start-ups activities. Favourable reputation can help interested parties make decisions on investing in young companies. Stuart, Hoang and Hybels (1999) underline that start-up companies enjoying high reputation have easier access to capital even when their uncertainty level is high enough. Nicolò (2015) notes that, if the company's reputation is positive, with all other things being equal, the level of business risk is perceived as a lower one.

The results of this study show that the most experienced business angels ranked reputation only in the fourth place among other investment criteria. This situation could arise because, as some researchers point out, there is a connection between reputation and trust. For example, Nicolò (2015) and Zhukova (2017) note that a positive reputation allows the company to gain the trust of parties. Thus, we can assume that when choosing between trust and reputation, business angels lay greater emphasis on trust in the founders of start-ups.

Within the framework of this study, it was found out that, when taking decision on investing, managerial skills of start-up founders are the least important to all the groups of business angels.

Whereas Mason and Harrison (2003) point out in their paper that impression management skills of entrepreneurs are critical in raising finance from external investors, still we would like to comment on the result obtained.

First, a study by Mason and Harrison (2003) did not compare the importance of managerial skills of entrepreneurs with other investment criteria applied by business angels to start-up founders. Secondly, one can assume that the angels valued managerial skills at a low rate, ranking them as the least in importance, since, after investing in a business, angels can take an active part in the activities of the enterprise and help founders to adjust the managerial aspects of their activities.

In the final part of the study, we compare the general average scores for all the five groups of investment criteria applied by business angels to the founders of start-ups. As can be seen from Table 3, the most experienced business angels scored a higher overall average score of 4.63, while business angels who invested up to 3 years had a total average score of 4.39 out of 6 points.

The analysis of the data presented in Table 1 shows that for all five groups of investment criteria, the most experienced business angels place higher demands on start-up founders.

Conclusions

The results of the analysis of the opinions of 104 business angels show that when making a decision on investing regardless of experience, the most significant criterion for business angels is trust in the founders, and the least significant are managerial skills of start-up founders. The most experienced business angels are ready to invest at the following level of assessments of start-up founders: trust in the founders - 5.21 points, professional skills - 4.60 points, entrepreneurial skills - 4.58 points, reputation of the founders - 4.50 points and managerial skills – 4.24 points out of 6.

The results of this study show that, with respect to all five groups of investment criteria, the most experienced business angels place higher demands on start-up founders. Thus, we can conclude that with the growth of investment experience, the business angels' requirements to the founders become more stringent.

Business angels with different investment experiences can use the results obtained in order to make more reasonable and substantiated investment decisions. On the other hand, the results of this study will allow start-up founders to better understand expectations of business angels, increase their competencies, form the professional team and build their relationships with potential investors more efficiently.

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The Used of Technology Acceptance Model and Online Business Intention among University Students in Malaysia

Abd Rahman Ahmad

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia,
86400 Batu Pahat, Johor, Malaysia
arahman@uthm.edu.my

Nur Afifah Abdul Razak

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia,
86400 Batu Pahat, Johor, Malaysia
mankuittho@yahoo.com

Abstract

Technology plays an important role in our life and it has become a need for our day to day life. In tandem with the development of technology, social media entrepreneurship has become widely popular among university students in Malaysia. Here, they are the most extensively used social media as the medium of communication, searching for information, creating networking, and doing online business. With this regard, social media has a significant impact on online business activities in Malaysia. Therefore, this study aims to explore the relationship between factors that influence university students to use social media as part of the medium to do online business. This quantitative research with a survey questionnaire that contains questions related to information on the respondent profiles, factors that influence the university students of using social media in doing business, and the cause or desire for them to engage in the social media were being developed. 140 respondents got involved in this study which includes respondents from different backgrounds and universities. In this study, data were analyzed by using the Statistical Package for Social Sciences (SPSS) software and a descriptive type analysis method. The findings of the study showed that each defining factor had a significant relationship with the desire of factors that influence the university students venturing into the online business.

Keywords: Technology Acceptance Model**,** Online Business, Social Media, Youth, Human Capital Development

INTRODUCTION

According to Kaplan and Haenlein (2010) social media can be defined as an internet-based application that being develops using Web Technology of 2.0, and which enables the creation and exchange of information and networking. Media serves to convey a type of information that in the form of entertainment, such as Instagram, Twitter, Facebook, Youtube, and more than that has enhanced the way of sharing information and communication. According to Destiana, Salman, and Rahim (2013), social media has had an impact on the involvement of the community as a whole.

In this study, the focus on the relationship between social media involves university students in Malaysia who are venturing into entrepreneurship activities where it has transformed the collaborating and interaction (Aral, Dellarocas, & Godes, 2013). It is pointed out that the young generation is now more likely to use social media as a medium of communication and doing business. Thus five top social media platforms today are Facebook, followed by Instagram, LINKEDIN, Google + and Pinterest.

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Facebook, originally founded by Mark Zuckerberg as a medium to communicate and share information for Harvard students alone is now the world's most phenomenon social media.

According to Fadzil and Yaacob (2014), most of the customer have access to internet facilities such as social media platform and this has changed their lifestyle where they prefer to do online purchases. This is because the convergence of traders has changed towards the online platform. Furthermore, according to Rahim (2015) the global marketing, today focused on the digital market which is more effective the traders and buyers actively use social media as a medium of business. In regards to the research problem stated, this study seeks to answer the following questions on: (1) what are the factors that influence university students to use social media in doing business; and (2) is there a relationship between social media and online business intention among university students.

This study is significantly important to university students, entrepreneurs, and the public that has the intention to get involved in online business via social media. In addition, this study also provides an important knowledge gaps to the other researchers to be able to use the findings from this study to make future research related to the desire factors that influence the university students venturing into the online business/

LITERATURE REVIEW

This social media combines the internet, computer and information technology, networks, and digital media content. The information that is generated might differ from the traditional technology in the previous era because the new media has the characteristics of digital networks, global access, interactive, and communications that combine all elements of oral communication, writing, visual, data, and sound by using computers and telecommunication that available in a single platform.

The surge in Internet users has led to dramatic changes in the way of doing business. From our daily life to online businesses, the Internet has impacted and changed the way people managing their life. Business on social media offers a great opportunity for both users and businesses around the world (Lee, Park & Ahn, 2001; Pourkhani, Abdipour, Baher, B., Moslehpour, 2019). While in accordance with Erdoğmuş (2012) social media has tremendous advantages in assisting the businesses, particularly in developing product branding through networking and online communication.

According to Rawi and Omar (2012), several factors influence university students of using social media to exploit an online business such as the usefulness and convenience to use, social influences, beliefs as well as cost factors. The usefulness and ease of use were adapted from the acceptance model (TAM) which was developed by Davis (1989). Meanwhile, social influence and cost are based on a survey framework built by Rawi and Omar (2012). Based on the previous research, researchers can conclude that the usefulness and easy-to-use factors, social influences, beliefs, and costs are seen to have a relationship with the involvement of university students in entrepreneurship activities by using social media.

Perceived Usefulness and Easy to Use

According to Ramdhani (2007) the perceived usefulness refers to a technology that is easy to use, simple, and quick. While McCloskey (2004) states that easy to use is an important factor that affects or has a direct relationship in affecting consumers to do buying online or not. Based on the previous research discussed, the following is the hypothesis formed by researchers:

Hypothesis 1: There is a significant positive relationship between the perceived usefulness and easy to use among university students to engage in online business.

Social Influences

Rashotte (2007) defines social influence as a person that can influence others in terms of feelings, attitudes, and behaviors whether intentionally or unintentionally. Fan, Saliba, Kendall, and Newmarch

(2005) found that users like to provide suggestions and recommendations regarding a service that they used to others if they are satisfied with the services. They usually will then will try to influence others to try the services and sharing the same experiences (Fan and Friends, 2005; Olanrewaju, Hossain, Whiteside, & Mercieca, 2020). Therefore, social influences affect the user's desire to use the E-commerce platform (Wei, Marthandan, Chong, Ooi & Arumugam 2009). Here, it indicated that social influences have a profound impact on the use of an application such as online businesses. Based on the past study, the following is the hypothesis formed:

Hypothesis 2: There is a significant positive relationship between social influences and the intention to engage in online business.

Beliefs

According to Isaac (2015) beliefs refer to a level where a particular system will improve individual performance. Studies by Jarvenpaa, Tractinsky, and Vintale (2000) found out that confidence factors are important factors in sharing the risk and making electronic payments. In addition, Lim, Lim and Heinrichs (2008) stated that the confidence factor is a fundamental factor in doing business online. Based on that, the following is the hypothesis formed:

Hypothesis 3: There is a significant positive relationship between trust and intention to engage in online business.

Costs

According to Rahman (1998), the cost is a source that is taken into consideration in fulfilling the production requirement of a product, which is recognized in the form of currency value to producing new products or the establishment of a new company. Park (2010) and Aydiner, Tatoglu, Bayraktar, Zaim, & Delen, (2019), pointed out that the cost has a significant relationship to the involvement in online business intention. Therefore, consumers are very concerned with the cost of conducting business activities using social media. Based on the findings, the following were the hypothesis formed:

Hypothesis 4: There is a significant positive relationship between cost and intention to engage in online business

Methodology

Kerlinger (1973) pointed out that the survey questionnaire is more suitable in data collection due to its vast scope and has a wide range of information that could be obtained within a short time of period. In addition, information obtained is also more accurate.

The research design of this study is based on a model developed by Rawi and Omar (2012). In this study, researchers have identified a lean variable which is the deciding factor that influences the university students using social media in doing online business. Four deciding factors were used in this study which are the usefulness and convenience, social influences, beliefs, and costs. While the dependent variables used by researchers in this study was the intention to engage online business. In order to obtain the data, researchers have used online survey methods to distribute the questionnaire to the potential respondents who conduct business online. In this regard, a questionnaire is divided into three parts, namely section A, B and C. Section A of this questionnaire includes information on respondents, Section B deciding factors, while Section C is in respect of intention to engage online business. To analyze the data obtained, researchers use the software Special Package for the Social diminished (SPSS) for Windows" version 22.0

Table 1: Pilot Study

Dimension	*Cronbach Alpha (α)*	Items
Factors affecting	0.939	18
Invovlement	0.921	18

Prior to this study, the pilot study was carried out. A total of 20 survey questionnaires were distributed to the respondents. Questionnaires are used as a research tool as it is the main method for measuring the defining factors and involvement of university students in online business. Here, based on Table 1, the pilot study was carried out to the 20 respondents involved in business using social media. The Cronbach Alpha on the factors affecting the university students using social media is 0.94, meanwhile for the involvement of university students in the online business is 0.921. Thus, none of the items used in these studies were modified and being used in the next process of data collection.

Results and Discussion

Most of the respondents agreed that the perceived usefulness and ease of use, social influences, beliefs, and costs were highly influenced them to use social media in doing online business using social media. The deciding factor that influences the university students using social media in doing business is at a high level indicates that every factor surveyed has a similar level of influence to the previous study. They believe that the deciding factor is important in influencing them to use social media.

The perceived usefulness and ease of use factors have influence factors to the university students. Based on the analysis gather from the study, it is found that hypothesis 1 that mentioned previously in the study is accepted. Therefore, data shows that there is a significant relationship between the perceived usefulness and ease of use among university students involved in the online business activities. The findings supported by Hassan and Hassan (2008), where the perceived usefulness and easy-to-use factors have moderate significant relationships with the desire to use websites among non-user sites.

Meanwhile, the social influences factors have a significant relationship with university students involved in online business activities. This indicated that hypothesis 2 was accepted. Thus, there is a significant relationship between social influences and the university students involved in online business activities. Tsu Wei, Marthandan, Yee-Loong Chong, Ooi, and Arumugam (2009) argued that social influences might be contributed to the decision by the users to get involved in online business.

Furthermore, the confidence factor also has a relationship with the students involved in online business activities. Based on the findings, therefore, trust factors also have a significant relationship. The findings support the previous research statement by Yee-Loong Chong (2009) that the confidence factor had a positive significant relationship with the online purchase.

Finally, the cost factor has strong relationships with the involvement of university students in online business activities. Therefore, based on the findings of the study, the hypothesis of 4 built was accepted. This is because the cost factor has a modest significant relationship. However, the studies from Chu and Lu (2007), stated that the cost factor had a negative relationship with the desire to make purchases of online music which is $P = 0.001$ and $r = -0.63$.

Conclusion

Malaysia is also one of the country that emphasizes digital business that encourages entrepreneurs to use social media platform as a catalyst for business. The university students also take advantages of this technology in doing business online. Indeed, with the current features available in social media has create intention to the entrepreneurs in manage, equip, organize and advertise the information related to

their products and the services to be more attractive to attract customer interest. Here, the articles, writings, photos, videos, or any other forms of information can be included in social media that are visible to all users on the Internet.

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Innovation in The Smart City Concepts – Theoretical Framework, Solution and Research Fields

Blanka TUNDYS
University of Szczecin, Management Institute, Faculty of Economics, Finance and Management, Logistics Department, Szczecin, Poland, blanka.tundys@usz.edu.pl

Konrad Henryk BACHANEK
University of Szczecin, Management Institute, Faculty of Economics, Finance and Management, Logistics Department, Szczecin, Poland, konrad.bachanek@usz.edu.pl

Ewa PUZIO
University of Szczecin, Management Institute, Faculty of Economics, Finance and Management, Logistics Department, Szczecin, Poland, ewa.puzio@usz.edu.pl

Abstract

The main task of smart cities is to strive for sustainable development in such a way as to meet the needs of the present generation without compromising the living conditions of future generations. The limited resources and the need to maintain or increase the quality of the services offered at the same time as various problems arise, require the use of solutions, including innovative technologies and concepts, which by definition fall within the scope of smart city. The aim of the article is to discuss theoretical aspects related to the construction of smart city concepts, including an in-depth bibliometric analysis related to the topic, as well as to indicate the scope and areas of the innovations in the implemented concepts. The authors will define the concept of smart city, elements, dimensions and areas included in the main assumptions of the concept. Special attention will be paid to the aspect of sustainability and "green" practices taken in cities. In this paper will be show what areas are of interest to researchers, how popular this area of research is, what are the links between authors and to what extent articles on this topic are cited. Authors present the own taxonomy relating to the classification and assignment of the smart city concept to particular fields of science and to refer innovative solutions implemented in the smart city concepts.

Keywords: bibliometric analysis, smart city, innovation.

Introduction

The concept of the smart city is becoming increasingly popular not only among practitioners (city managers) but also among scientists. It is confirmed by the growing number of scientific publications, from various fields of science. Concepts are an innovative field of scientific considerations, and the constantly growing urban population requires the application of space management tools in a modern and sustainable way with using innovative and sustainable methods.

The aim of these considerations is to: (1) present the taxonomy of the smart city concept in terms of scientific domains (according to OECD), based on the adopted author's definition of smart city, (2) quantitative analysis of scientific publications in the field of smart city, (3) relate the smart city concept to the aspect of sustainable innovations and solution in the cities.

The considerations are accompanied with research thesis, indicating that the created classification of fields, whose research interest relates to the smart city, speaks about the high interdisciplinary of the concept and the need to link solutions with different areas of business, economy, social, legal or environmental aspects. The solutions have an impact on every field and every area of life of the

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inhabitants of urban areas. In addition, the focus on sustainable innovations within the smart city concept indicates a link between the concept and traditionally understood urban logistics supported by information tools and technologies and different research and economy fields.

A systematic and critical review of the literature made it possible to identify the directions of research undertaken. The architecture of the concept, links and main areas of research were also indicated. A novelty of the considerations is the selection of texts dealing with the above issues in economic and social sciences. The interdisciplinary of the concepts and assumptions of the smart city and the inseparable link with information technologies also indicate a business context that can be used for better organization of the pillars of the smart city concept. The concepts are linked to practical solutions and the implementation of sustainable innovations.

Problem Description

In 2018, 4.2 billion people (55% of the total population) lived in urban areas, and it number is projected to grow by 2.3 billion by 2050. This means that the proportion of the urban population will rise to 68% of the total population. (Revision of World Urbanization Prospects, 2018). Both the growth of the urban population and its pace pose a challenge to spatial managers and users, particularly with regard to environmental and social aspects. Cities consume about 70% of the world's resources, are major consumers of energy resources and account for a significant share of greenhouse gas emissions (Bibri, S. E., & Krogstie, J. 2017). This is related to both population density and development, as well as to the intensity of economic activity in urban areas. This situation points to a number of challenges facing cities, which are related to increasing pressures on their resources and infrastructure (Breetzke, T., & Flowerday, S. V. 2016). The limited resources and the need to maintain or increase the quality of the services offered at the same time as various problems arise, require the use of solutions, including innovative technologies and concepts, which by definition fall within the scope of smart city. Smart city is a complex and interesting research area, the results of which arouse interest of scientists, researchers and business practitioners. Cities use the smart city concepts to improve various aspects of their functioning and management. They use ICT technologies, which constitute one of the foundations of smart city in the scope: local economy, transport, traffic management, environment, quality of life for citizens, and electronic delivery of public services (Li et. al., 2017). It should be noted, however, that the subject matter itself is still in the research phase. A rich review of the considerations can be found in the literature, but there is no clear taxonomy to standardise the definition and terminological inaccuracies.

The multitude of emerging ideas and practical solutions related to smart cities often contributes to the lack of clarity of understanding of the concept. The presented deliberations have an aim, on the basis of an in-depth analysis of literature, using the method of content analysis, dedicated tools for bibliometric measurements and strategic documents, to define the concept of smart city, as well as the elements, dimensions and areas included in the main assumptions of the concept. Exemplification of literature helps to achieve the main objective. Collection of different shots and terminology related to smart city will contribute to the development of a broad definition and validation of the meaning of the term depending on the term used (for example: smart, intelligent, knowledge). Digital Smart city research is interdisciplinary, established theory and based on qualitative research. (Bibri, S. E., & Krogstie, J. 2017). The second part of the consideration will refer to the definition of concepts for practical implementations specifically related to sustainable innovation in cities.

A novelty in the considerations is the analysis of the content and its interpretation in the conceptual scope of the smart city as well as the presentation of this taxonomy. The reflections indicate how precisely this area is identified and understood in the smart city. The cognitive dimension, on the other hand, has a part of paper related to the sustainable innovations in the smart city concept.

Methodology

To achieve the research goals and presented objectives have been used different research methods. It was reviewed the literature, which refereed to: a systematic, explicit, and critical analysis for identifying, evaluating, and interpreting the existing scientific texts (Fink, 2013). The aim of such an activity was to collect as much information as possible concerning the definition of smart city, as well as the areas related to it. This method, including the selection of available which contain information, ideas, and data have written from a particular standpoint documents helps to fulfil certain aims and the effective evaluation of these documents in relation to area being proposed of the research (Hart, C. 2001).

Due to the rich and numerous sources of literature, in the research process the authors adopted the proposed 4 steps research model (Seuring, S., & Müller, M., 2008; Mayring, P. 2003). Research studies was applied with content analysis. This method is a type of qualitative study (Moldavska, Welo, 2017) and is used for this type of research. Content analysis enables a better understanding of the studied phenomenon and determination of correct and repeatable conclusions from the research (Griffin, 2013; Krippendorff, 2004).

This detailed analysis of Smart City publications were use a descriptive, qualitative content analysis design with conventional content analysis. The publications were searched in the Web of Science and Scopus databases, which contained the expression "smart city" or "intelligent city" in their title, abstract or key words. The literature review covered the years 2002-2020. A case study methodology was used to develop aspects related to sustainable innovations in the smart city concept to illustrate the contents and practical elements of the concept.

State of the art

Smart City as A Research Area

A detailed review of the scientific literature allows to observe the multifaceted development of urbanized urban areas. The concept has been communicated as: smart cities, knowledge-based cities, Smart City and City Logistics or digital city, intelligent city, cognitive city, and knowledge city (Peprah, C., et. al. 2019). The interest of scientists representing various fields of knowledge and areas of science indicates that it is difficult to identify and adopt a clear and universal definition of smart city. Practitioners and researches of smart cities have a different approach to the concept according to their main orientation and directions of the research, for example, technology, economy, society, environment, and governance (Yigitcanlar, T. 2017).

Smart City concept goes beyond the narrow understanding of "smart" development, based largely only on ICT. Technologies support smart city conceptions, as well as improve sustainability, economic development and quality of life. (Dawe, S. N., & Paradice, D., 2016). In the literature, in the absence of a uniform, generally accepted definition of the phenomenon of the Smart City concept, two main trends can be observed in defining this concept. A part of the work is defined by Smart City as a city where ICT technology co-creates the infrastructure of cities used to a large extent in economic and social initiatives aimed at improving cities' economic growth, creating social capital and improving the efficiency of using urbanized urban areas. The authors of this approach are N. Komninos, S. Mohanty et. al 2016; Zanella et. al 2014; who define Smart City as a city that uses network infrastructure to improve economic and political efficiency and enable the social, cultural and urban development of city users. Initiatives and concepts related to the implementation of smart city are aimed at improving a city's quality of life (Neirotti et. al, 2014). Other areas that can be upgraded and enhanced with smart city are: performance, efficiency and sustainability through the use of technology (Albino, et.al. 2015; Komninos, et. al, 2013). Smart City uses Information and Communication Technologies (ICTs) and other means, concepts and ideas to improve quality of life; efficiency of urban operation and services; competitiveness; while ensuring that it meets the needs of

present and future generations with respect to economic, social and environmental as well as cultural aspects (Ibrahim et. al, 2018; Khan, 2018).

According to S. Mohanty (Mohanty, 2016) Smart City is a place where traditional networks and services are made more flexible, efficient, and sustainable with the use of information, digital and telecommunication technologies, to improve its operations for the benefit of its inhabitants. In a smart city, the digital technologies translate into better public services for inhabitants, and for better use of resources while impacting the environment less. A smart city connecting the physical infrastructure, the information-technology infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city (Berardi, et. al. 2015). From the other side smart city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operations and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects (Sundaravadivel, et. al., 2017, https://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx). Describing a smart city it should be pointed out that it is an area of influence increasing urban efficiency with regard to energy, transportation, land use, communication, economic development, service delivery, and so forth (Bibri, S. E., & Krogstie, J. 2017).

On the other hand Batty et.al (Batty et. al, 2012) and Bibri, S. E., & Krogstie, J. (Bibri, S. E., & Krogstie, J., 2017) indicate exemplary smart city goals now and in the future. The most important of these include: mobility and travel behavior; modeling urban land use; integrated databases across urban domains; sensing, net-working, and the impact of social media; participatory governance and planning structures; modeling network performance; trans-port and economic interactions; and decision support as urban intelligence. All these elements must be based on ICT and advanced technologies, with the support and participation of citizens and other users of urban space. The concept of smart city has gained an increasing attention during the past decades with main focus on the hardware (e.g. technology, infrastructure) as well as the software (e.g. human, society). (Yadav et. al. 2019; Li et. al. 2019; Palomo-Navarro & Navío-Marco, 2018; Yigitcanlar et. al, 2018). The Smart City areas and paradigms were showed in Figure 1.

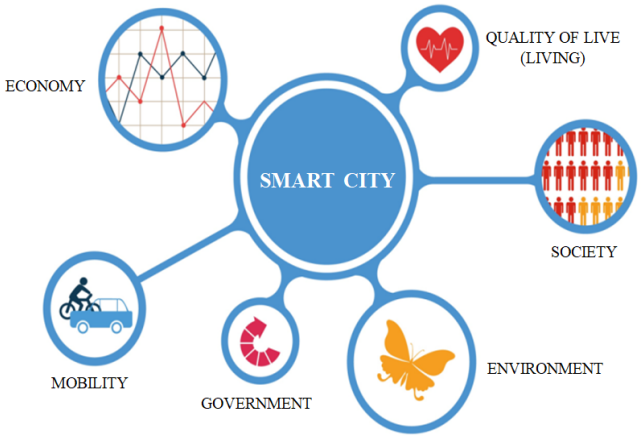

Figure 1: Areas of application of the smart city concept

Source: own elaborations.

Frequently indicated areas of smart city are: governance, citizen, energy, building, mobility, infrastructure, technology, healthcare (Frost and Sullivan, 2012; Peprah, C., Amponsah, O., & Oduro, C. 2019). The presented models and areas are not perfect, but they refer to the most important

elements of urban space in a comprehensive way. From a consideration point of view, attention will be focused on the area of mobility, which refers to the organisation of transport in cities, in accordance with logistical rules, taking into account the greatest possible use of ICT, in the implementation of projects. The most important goals of the smart city should be considered: pollution, reducing traffic congestion, increasing people safety, reducing noise pollution, improving transfer speed, and reducing transfer costs. It can therefore be concluded that Smart Mobility, included transport and information and communication infrastructure (ICT). This area includes: well organised public transport, transport accessibility of the city at national and international level, provision of ICT infrastructure, sustainable, modern and safe transport systems, implemented logistics solutions for freight transport (in terms of city logistics).

Sustainable Innovation in The Smart City Concept

Innovation plays a two-fold role for sustainable development: in the following, it is pointed out that innovation about sustainability, can both be a supporting means for attaining sustainability but innovation can itself be considered sustainable (Steiner, G. 2008). Both approaches can be applied to the smart city concept. Sustainable innovations include an economic, ecological and a social aspect, and their implementation takes place within the scope of the specific pillars of the smart city concept. Smart cities are mostly technology oriented advanced cities. The people must be motivated to use technology to get benefitted from the smart system (Kumar, H., Singh, M. K., Gupta, M. P., & Madaan, J. 2020). The area of innovative phenomena is extremely vast, they differ in the nature of events, the functions of the target and the ties between them. One of the most important and crucial aspects is the process of learning, knowledge management and supporting creativity. This approach fits perfectly into the smart city concept.

The concept of eco-innovation is not clear. It is interpreted differently and covers different thematic areas. In general, it can be pointed out that: sustainable innovation is defined as “the development of new products, processes, services and technologies that contribute to the development and well-being of human needs and institutions while respecting natural resources and regeneration capacities” (Tello, S. F., & Yoon, E. 2008). They are innovations in which the renewal or improvement of products, services, technological or organizational processes not only delivers an improved economic performance, but also an enhanced environmental and social performance, both in the short and long term have the capacity to generate positive social and environmental impacts (Cillo, V., et. al, 2019). The link to the smart city is clear. The pillars of the smart city include economics, life, social inclusion, environment, government and mobility. Smart cities are mainly about collecting and disseminating data (Lom, M., & Pribyl, O. 2020). Each of these areas uses modern technologies, which for most cities are associated with implementation of innovation, and the directions of development of cities and economies (sustainable development) in connection with the objectives of their inhabitants (including quality of life) clearly indicate that innovations should be sustainable.

Data collection and limitations

Data Collection

Taxonomic approach to smart city concepts is related to the identification (at this stage of research) of areas and fields of scientific research in which smart cities are described and considered from a scientific point of view. By performing bibliometric analyses of two databases Scopus and Web of Science, the following conclusions can be drawn. Scientific publication can be generally grouped according to the categories based of the OECD classification. The most popular areas show Table No. 1 Smart city is used by scientists from various fields and could be correlate with the areas and paradigms of the smart city to indicate and create the taxonomic approach to the issue under consideration.

Table 1 : Most popular areas of science related to smart city publications

Web of science	No. of publications	Scopus	No. of publications
Engineering Electrical Electronic	3650	Computer science	3787
Computer Science Information Systems	2308	Engineering	2316
Telecommunications	2143	Social science	1519
Computer Science Theory Methods	2119	Mathematics	765
Computer Science Artificial Intelligence	1117	Energy	576
Urban Studies	1,054	Business, management and accounting	561
Computer Science Interdisciplinary Applications	1,018	Environmental science	477
Green Sustainable Science Technology	853	Decision sciences	434
Computer Science Hardware Architecture	791	Physics and astronomy	298
Energy Fuels	769	Material science	205
Computer Science Software Engineering	545	Economics, econometrics and finance	199
Environmental Studies	485	Earth and planetary sciences	192
Transportation Science Technology	485	Chemistry	120
Environmental Sciences	484	Biochemistry, genetics and molecular biology	106
Regional Urban Planning	459	Arts and humanities	97

Source: own elaboration.

Analysing publications related to smart city, it should be pointed out that the interest in the subject is constantly growing, and the breakthrough year was 2012, when both the Scopus and the Web of Science databases exceeded 100 publications in this area (WoS -228, S - 118). The first scientific article containing smart city issues was published in 1985 in the Web of Science, in the Scopus database the first appeared in 1994. In 2017, both databases were published in more than 1000 publications, which even to some extent referred to the smart city. In 2019 there were over 2800 such publications in the Web of Science and over 1700 in the Scopus database. This clearly indicates the interest of researchers and an interesting area of scientific exploration.

Considering such a large number of publications, it is possible to create a taxonomic basis connecting the areas of implementation of smart city and fields of science, with the greatest publishing activity. Its construction results from bibliometric analysis. (Figure no. 2)

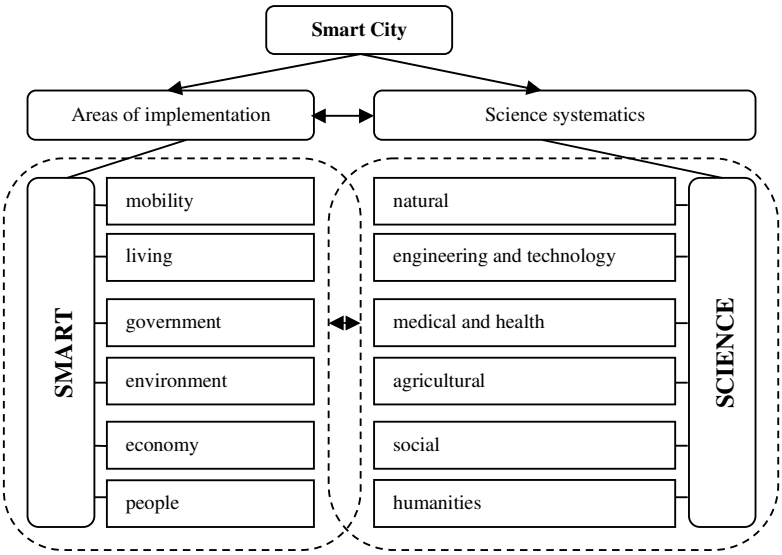

Fig. 2: Taxonomy of smart city

Source: own elaboration.

Moving on to further systematic, based on the OECD classification into scientific disciplines, we can indicate the dominating ones in the field of smart city. Thus, on the basis of Web of science (100 most popular areas), most publications assigned to engineering, technical and social sciences have been identified, natural and agricultural sciences also play an important role, medical sciences are less important and link them to defined smart city areas (figure no. 3).

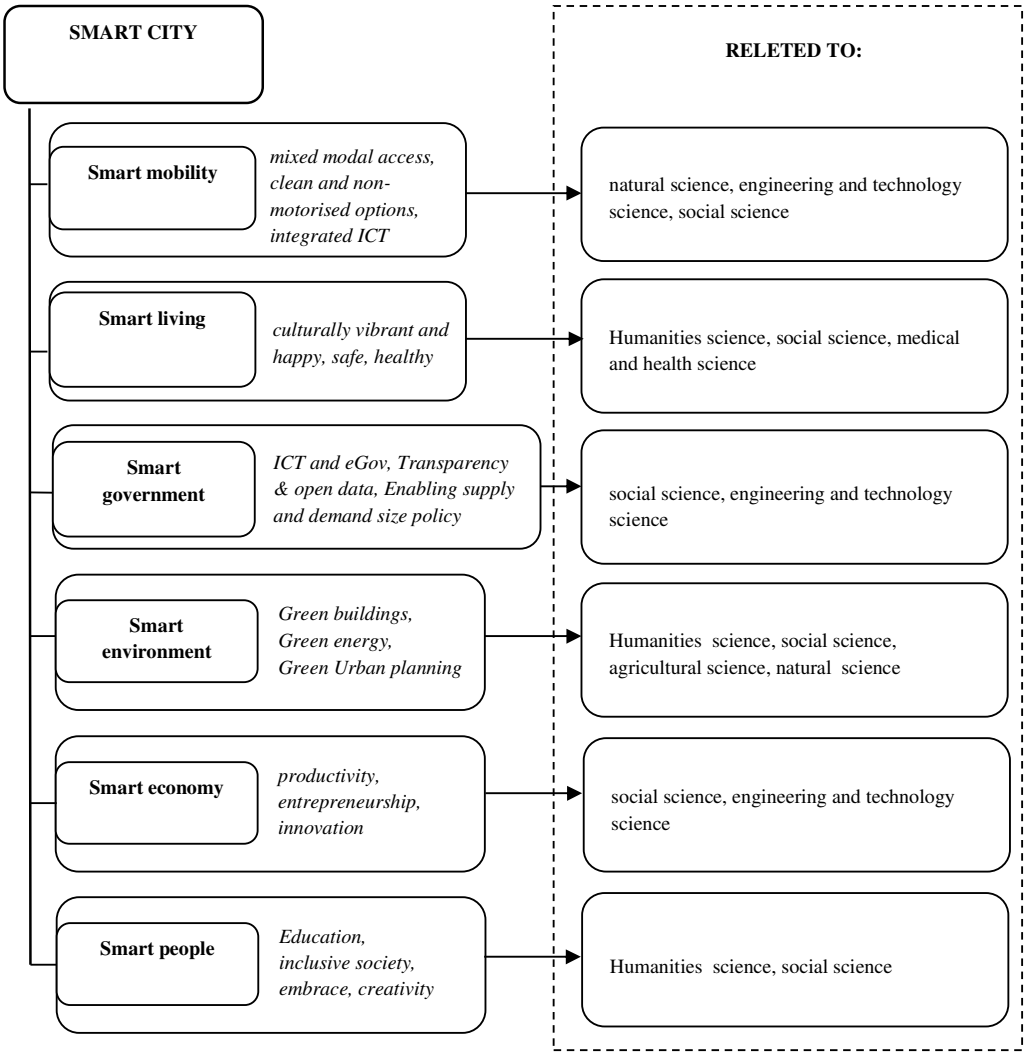

Fig. 3: The systematic of smart city areas with link to scientific fields.
Source: own elaboration.

By analysis of publications, it is possible to indicate in an in-depth analysis in which area of knowledge systematics (according to OECD) is reflected in the area of research interests of scientists (Table no. 2).

Table 2 : Most popular areas of science related to smart city publications

science systematic (OECD)	**area of knowledge**
engineering and technology	Engineering, Electrical Electronic, Computer Science, Information Systems, Telecommunications, Computer Science Theory Methods, Computer Science, Artificial Intelligence, Urban Studies, Computer Science Interdisciplinary Applications, Green Sustainable Science Technology, Computer Science Hardware Architecture, Energy Fuels, Computer Science Software Engineering, Transportation Science Technology, Environmental Sciences, Regional Urban Planning, Automation Control Systems, Engineering Civil, Engineering, Multidisciplinary, Construction Building Technology, Transportation, Operations Research, Management Science, Engineering Environmental, Architecture, Engineering Industrial, Materials Science, Computer Science Cybernetics, Engineering Mechanical, Communication, Robotics, Engineering Manufacturing, Planning Development, Mathematics Applied, Ergonomics, Ergonomics, Statistics Probability
natural sciences	Energy Fuels, Environmental Studies, Environmental Sciences, Geography, Electrochemistry, Chemistry Analytical, Geography Physical, Physics Applied, Water Resources, Multidisciplinary Sciences, Engineering, Chemical, Ecology, Mathematics Applied, Nanoscience, Nanotechnology, Physics Multidisciplinary, Meteorology Atmospheric Sciences, Engineering Aerospace, Chemistry Physical, Mathematics Interdisciplinary, Applications, Engineering Biomedical, Ergonomics, Mathematical Methods, Biotechnology, Applied Microbiology, Engineering Geological, Statistics Probability, Food Science Technology, Geochemistry, Geophysics, Microbiology
medical and health sciences	Optics, Multidisciplinary Sciences, Public Environmental Occupational Health, Hospitality Leisure Sport Tourism, Chemistry Multidisciplinary, Medical Informatics, Engineering Biomedical, Medicine General Internal, Neurosciences, Health Policy Services, Anthropology, Food Science Technology, Microbiology
agricultural sciences	Green Sustainable Science Technology, Environmental Studies, Environmental Sciences, Geography, Engineering Environmental, Multidisciplinary Sciences, Food Science Technology, Microbiology, Agricultural Economics Policy
social sciences	Telecommunications, Urban Studies, Green Sustainable Science Technology, Environmental Studies, Transportation Science Technology, Environmental Sciences, Management, Economics, Business, Transportation, Social Sciences Interdisciplinary, Operations Research Management Science, Public Administration, Political Science, Development Studies, Sociology, Business Finance, Social Issues, Law, International Relations, Social Sciences Mathematical Methods, Psychology Social, Psychology Multidisciplinary, Health Policy Services, Demography, Agricultural Economics Policy
Humanities	Social Sciences Interdisciplinary, Information Science Library Science, Multidisciplinary Sciences, Humanities Multidisciplinary, Education Scientific Disciplines, History, Psychology Social, Neurosciences, Cultural Studies, Psychology Multidisciplinary, Psychology Applied, Archaeology, Anthropology

Source: own elaboration.

Limitation

The structured literature review was conducted among documents written in English, in reviewed and indexed journals, covered the years 2008-2020. Documents that appeared in several databases have been eliminated. The total number of papers for further analysis is N=356. The final number of publications was achieved after in-depth analysis (Table 3).

Table 3: Stages of the research process

STEPS OF THE RESEARCH PROCESS			
Limitation	**Step**	**Scopus**	**Web of science**
"smart city"; "2008-2020'; "topic"	first	5431	5467
"smart city"; "2008-2020'; "title";"abstract"; "keywords", "article", "language -english"	second	1740	2240
"smart city"; "2008-2020'; "title";"abstract"; "keywords", "article"; "categories/subject area - social science, business, management, economy, technical science, architecture""; "language -english"	third	1682	1694
"smart city"; "2008-2020'; "title";"abstract"; "keywords", "article"; "categories/subject area"; "language -english"; "categories/subject area -business, management, economy"	fourth	183	230
"smart city"; "2008-2020'; "title";"abstract"; "keywords", "article"; "categories/subject area"; "language -english"; "categories/subject area -business, management, economy"; excluded - book chapter	fifth	182	173

Source: own elaboration.

Interpreting the results of the research from Table 2, can indicate that the interest in the concept of "smart city" is very high. Also interesting from the scientific point of view is the interdisciplinary of the research undertaken. However, the applied filters, and in particular the limitations related to the areas of business, economy and management, made it possible to select the appropriate number of articles for research. In the next table there is a descriptive statistical analysis concerning the increase of interest in publications related to "smart city" divided into individual years. In this case, only issues related to social sciences have been taken into account. The progress is clearly visible (Table 3).

Smart city solutions are interesting and popular, and we can draw such a conclusion taking into account the number of journals in which the above issues are published. In the Scopus database it was 84 and in the Web of Science it was 100 titles. The largest number of publications in one journals in a given field is more than 30 texts.

While analyzing the most popular journals, it can be pointed out that the authors most often publish in Cities, Technological Forecasting and Social Change (which can be found in both databases), Advances in 21st Century Human Settlements, Journal of Cleaner Production, Smart Economy in Smart Cities (Table 4).

Table 4 : Journal title (most popular) - in the field of economy, business, management

Scopus	**Web of Science**
Number of publications >10	
Cities(31)	Technological Forecasting And Social Change (34)
Technological Forecasting And Social Change (30)	Advances In 21st Century Human Settlements (29)
Journal of Cleaner Production (13)	Smart Economy in Smart Cities (29)
Number Of Publications < 10	
International Journal of Services Technology And Management; Journal of Science And Technology Policy Management; Knowledge Management And E- Learning; Journal of Theoretical And Applied Electronic Commerce Research; Production Planning and Control; Business Horizons; Innovation	Social Science Computer Review; Technology Innovation Management Review; Cambridge Journal of Regions Economy And Society; Smart Cities Atlas Western And Eastern Intelligent Communities; Springer Tracts in Civil Engineering; Energy Policy; Journal of Science and Technology Policy Management; Smart City Implementation

	Creating Economic And Public Value in Innovative Urban Systems; Ieee Systems Journal; International Journal of Services Technology And Management; Production Planning Control; Public Administration and Information Technology; Understanding Smart Cities a Tool For Smart; Government or an Industrial Trick.

Source: own elaboration.

Interesting for analysis are keywords. The most common (in both databases – table 6) are: smart city, smart cities, innovation and urban development and sustainability.

Table 5 : Frequently appearing keywords

Scopus	Number of repetitions	Web of science	Number of repetitions
smart city	**142**	**smart city**	**98**
smart cities	**167**	**smart cities**	**32**
Innovation	**25**	**innovation**	**13**
urban development	**24**	**sustainability**	**11**
sustainable development	20	big data	9
sustainability	17	open innovation	9
urban planning	16	internet of things	8
information and communication technology	15	City	8
big data	14	governance	8
internet of things	14	Cities	7
urban growth	14	ICT	7
decision making	13	case study	7

Source: own elaboration.

In scientific articles, innovation and sustainability appear just behind the smart city keyword. This approach shows that this area is extremely interesting and is one of the basic elements of the above concepts not only in terms of scientific development, but also practically.

Sustainable innovation solution in the cities – case studies

Innovative solutions in support of sustainable development in cities can be based on a variety of considerations. They can help cities to be more sustainable, they can be part of a smart city concept or a stand-alone innovative solution. Their implementation gives the city a distinctive, competitive advantage and meets the requirements of its stakeholders in terms of quality of life, friendliness, usability and environmental performance.

On the basis of case studies it is possible to indicate solutions that not only fit into the trend of innovative, sustainable solutions or smart city, but also show how cities can eliminate their development barriers, bottlenecks or problems occurring in them. The selected solutions are presented in table no. 6.

Table 6: The selected case studies for the sustainable innovation in the concepts of the smart cities

City	Name of concept/description	Characteristics
Laos (Nigeria)	Providing Incentives for Recycling in Low-Income Communities	Wecyclers is fueling social change for the environment by allowing people in low-income communities to capture value from waste using low-cost collection infrastructure. Wecyclers harnesses the power of urban communities to reclaim neighborhoods from unmanaged waste using a crowdsourced, rewards-for-recycling platform. Wecyclers uses a fleet of low-cost cargo bicycles to offer a convenient household recycling service in densely populated low-income neighborhoods.
San Francisco, USA	Mobilizing Behaviour Change for a Zero Waste City	Through extensive outreach and citizen engagement, San Francisco is pursuing a goal of zero waste by 2020 and has achieved an 80% land- fill diversion rate with environmental and social benefits. San Francisco's Zero Waste Program pursues the best use of materials, in collaboration with producer and consumer responsibility. The pro- gram conducts extensive outreach and assistance to encourage participation and mandatory compliance. It is entirely funded by "pay- as-you-throw" rates, providing financial incentives for both citizens and businesses to divert waste.
Washington D.C., USA	Energy Savings Finance the Switch to LED Lighting	By means of a 10-year performance lighting contract, Philips will install LED lights in the city at no upfront cost. Having secured a 10-year performance lighting contract with the Washington Metropolitan Area Transit Authority (WMATA), Philips will upgrade more than 13,000 garage lighting fixtures in the city. While Philips will be responsible for installation and continual maintenance, the city will benefit from the opportunity to circumvent the upfront costs of LED installation.
Lima, Peru	Waterless Toilets for Slums	-runner brings an appealing waterless sanitation solution to low-income households without access to conventional toilets in the capital of Peru, Lima. With subscription to a pick-up plan, households receive a waterless, resource-separating toilet combined with a weekly service that collects waste directly from the home. At the treatment hub, human feces are safely processed through composting, thereby generating a supply of natural fertilizers for farmlands.
Forres, Scotland	Floating Ecosystems for River Restoration and Water Quality	Biomatrix Water Active Ecosystems have been developed to provide a concentrated natural solution to improve water quality. The designs harness the power of nature to provide a long-term sustain- able water quality management solution, which uses no chemicals and gets better with time as the system grows.
Mannheim, Germany	Communication Platform for Integrating Renewable Energy	By means of a real-time communication platform, "energy butler" devices help homes to optimize consumption according to the availability of renewable energy. This solution, based in the German city of Mannheim, involves an intelligent power grid that balances energy demand and supply.
London, UK	Citywide Parking Sensors for Lowering Congestion	By installing parking bay sensors across the city, this solution allows motorists to directly access available parking spaces – reducing congestion, air pollution, and fuel consumption in the process. This solution delivers real-time information regarding parking space availability to smartphone users in order to improve urban air quality and reduce congestion.
Portland, USA	Porous Asphalt for Stormwater Management	By allowing rainwater to seep through it, porous asphalt is an effective stormwater management tool that can increase road safety, improve water quality, and replenish water tables. Made without the need for additional materials or equipment, this material achieves its porous qualities through the removal of fine particles. Coarse particles allow water to seep through to the underlying recharge bed, and ultimately to the soil, during rainfall.
Melbourne, Australia	Public-Private Partnership for Citywide Retrofitting	Melbourne's Environmental Upgrade Agreement (EUA) system is part of the city's efforts to meet its goal of reaching carbon neutrality by 2020. It consists of an agreement between a property owner, a bank, and local government that facilitates a building upgrade to improve energy efficiency.
Göteborg, Sweden	Innovation in port	To compete for the business of a company that wanted to green all aspects of its shipping, Göteborg, Sweden developed a wind-powered onshore electricity port to power ships. Typically ships are powered by diesel auxiliary engines. The system cuts port-side emissions by 94-97 percent.
Reykjavik, Iceland	Renewables energy	Using geothermal energy for heat isn't new to Iceland, Reykjavik has been doing it since 1930. So it's no surprise that they have the world's largest geothermal heating system and the city is powered completely by geothermal. Because of this, CO2 emissions have been reduced by up to 110,000,000 tons from 1944 to 2006. The system keeps 4 million tons of CO2 out of the atmosphere each year.

Bogotá, Colombia	Transport	One of the most advanced bus rapid transit (BRT) systems in the world can be found in Bogotá. The Bogotá Transmilenio system averages 1,600 passengers a day on each bus (nearly 1.5 million passengers daily). It has cut travel time by 32 percent, eliminated the need for many public service vehicles, reduced gas emissions by 40 percent, and decreased accident rates by 90 percent.
Copenhagen, Denmark	Waste	Copenhagen's waste management system sends only 3 percent of waste to the landfill. The city promotes waste prevention by encouraging recycling and composting. Consumers can recycle some of their waste at the stores where products were purchased. And about 40 percent of the city's waste is incinerated, which has generated about 1 million megawatt hours of energy.
Tokyo, Japan	Water management	Tokyo's water management system is one of the world's most advanced. Through an efficient leak detection system, the city has cut the amount of water it wastes in half. In the last 10 years the amount of wasted water dropped from 150 million cubic meters to 68 million. It's leakage rate has dropped from 20 percent to 3.6 percent.
Chicago, USA	Lighting system	By switching many of its traffic lights to LED lighting, Chicago has reduced its energy output from traffic lights by 85 percent. The change saves the city $2.55 million and reduces 23,000 tons of CO2 annually. So far 1,000 traffic lights have moved to LED and the rest will be completed in the next three years.
Berlin, Germany	Buildings	The "Berlin Energy Saving Partnership" is an innovative program that helps building owners invest in energy-saving retrofits. It's popular in the city because building owner don't have to make upfront payments on the retrofits. So far 1,400 buildings in the city have benefited from the program and are saving about 26 percent on their energy bill, while cutting their energy use by about the same amount.
Toronto, Canada	Energy	A lake water air-conditioning system is reducing energy use by 90 percent compared to traditional cooling systems. Enwave Energy Corporation uses cold water from Lake Ontario to air-condition 29 million square feet of buildings in downtown Toronto.

Source: own elaboration on the basis: https://www.zdnet.com/article/8-innovative-cities-leading-the-way-to-a-sustainable-future/ (15.08.2020).

When interpreting and analysing the indicated cases, it should be pointed out that innovative solutions are applied not only in rich countries, but also in developing countries or countries facing completely different problems in cities than highly developed countries. The solutions can serve as examples for implementation in other cities, and can be inspiration for the another.

Conclusions

Topics related to the implementation of the smart city concept are extremely interesting and popular among researchers. It is confirmed by the bibliometric analysis. Researchers from various fields undertake studies related to smart city, covering various fields of knowledge. A multitude of publications appearing in recent years, as well as the observed continuous progress indicate that research on smart city is one of the most interesting and popular areas of research. Knowledge of the concept, possibilities and above all the definition of smart city can contribute to better management of the city, increase the quality of life of its inhabitants, but also make cities more friendly to all stakeholders. Research on the smart city, and above all the new taxonomy, limited to the area of management and economy, indicates the directions of research, as well as the main centres dealing with this issue. Most of the inhabitants of the globe live in cities, which means that the subject matter is interesting and important for the majority.

In the presented deliberations, the taxonomy of the smart city was proposed in connection with scientific fields and areas selected on the basis of bibliometric analysis. Quantitative analysis was carried out in selected areas of the smart city. The considerations proved the high interdisciplinarity of the concepts and the need for further research in this area, including the linking of social sciences and technical research in particular. The study indicated that concepts should be understood as a holistic approach, including ICT solutions supported by traditionally understood implemented tools and

concepts of urban logistics. The introduction of the smart city is related to three categories of challenges that modern smart cities have to face: social, technological and governance. Helpful in implementing area will be both scientific studies and practical solutions.

As practical solutions show, sustainable innovations are present in smart city concepts, supporting them and at the same time distinguishing cities from others. Also the analysis of the literature shows that sustainability and innovation play an important role and are reflected in science and research.

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Implementation of The Cyber Terrorism Prevention, And Rehabilitation Policy in Polda Metro Jaya Police in Central Jakarta

Dian Damayanti

Institut Ilmu Sosial Dan Manajemen STIAMI DKI Jakarta Indonesia

DianDamayanti17@gmail.com

Abstract

Crime of terrorism is not only done through the internet, but can also be done through networks that can send signals such as telephone communications. Implementation this system, terrorism cases will decrease every year. Implementation of cyber terrorism policy at the Police. Implementation of policy to overcome the problem of terrorism in Indonesia. This study uses a qualitative method. Based on the results of research and discussion of the implementation of cyber terrorism prevention, and rehabilitation policy at the Polda Metropolitan Police, the following conclusions can be drawn: Researchers in analyzing the of cyber terrorism at the Polda Metro Jaya Police in Central Jakarta used the concept of Van Horn and Van Meter (1975). Whereas the line of communication is already underway, with the existence of cyber patrols to reduce the number of criminal acts involving terrorism in cyberspace, the police are cooperating with parties related to all providers, the police and anti-terrorism agencies and the Ministry of Communication and Informatics. The aim of the implementation of cyber terrorism policies at the central Jakarta police station is to realize domestic security that includes maintaining public security and order, orderly and upholding the law, carrying out protection, protection, and services to the community, and maintaining public peace by upholding human rights.

keywords: Policy Implementation, Cyber Terrorism, Prevention, Rehabilitation and Cybercrime.

Introduction

The risk of terrorist attacks in Indonesia in recent years can be classified as low. Compared to other countries, there are only a few incentives so far. During the last 5 years there were 121 terrorist cases, where 89 people were killed and 111 injured. Among them there are 7 suicides. In 9 incedents, a total of 1,310 people have been kidnapped or held hostage, although ransoms are rarely made for the 2013-2017 period. Terrorist organizations in Indonesia, namely Jamaah Ansharut Daulah, have attacked 2 times, killed 27 cases and injured 48 people. both Lekagak Tegangati organizations had 2 attacks, 9 killings and 2 injuries. and Jihadi-inspired extremists, the number of attacks was 1 time, 0 cases were killed and 2 were injured (https://badanpendapatan.riau.go.id/home/hukum/8495315769-doc-20170202-wa0015.pdf accessed on 13 August 2020 at 14.00 WIB).

The legal basis for implementing the cyber terrorism prevention, rehabilitation and reintegration policy is Number 19 in 2016 article 1, regarding electronic transactions of Electronic Information and / or Electronic Documents and / or printed results that are legal legal evidence, and law Number 5 of 2018 concerning changes to laws number 15 of 2003 concerning the stipulation of government regulations in lieu of law number 1 of 2002 concerning the eradication of criminal acts of terrorism into law.

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Literature Review and Previous research

Implementation Policy

The policy implementation approach model formulated by Van Meter and Van Horn is called the A Model of the Policy Implementation (1975). This implementation process is an abstraction or the performance of a policy embodiment which is basically deliberately done to achieve a high policy implementation performance that takes place in the relationship of various variables. This model presupposes that policy implementation runs linearly from political decisions, implementation and performance of public policies. This model explains that policy performance is influenced by several interrelated variables, these variables are:

1. Policy standards and objectives / measures and policy objectives
2. Resource
3. Characteristics of the implementing organization
4. The attitude of the implementers
5. Communication between related organizations and implementation activities
6. Social, economic and political environment

Van Horn and Van Meter (1975) effect on the rate of successful implementation of the policy. Disposition for Edward III (1980:53) is defined as the tendency, desire or agreement of the executive to implement the policy. If you want to be successful policy implementation effectively and efficiently, the executor is not just knowing what to do and have the willingness to carry out that policy, but they also have to have the will to implement the policy Meter & Horn (1975:472) states that there are three kinds of response elements that can affect the desire and willingness to implement a policy, among others, consist of knowledge (cognitive), and deepening understanding (comprehension and understanding) of the policy; toward their responses whether accept, or reject neutral (acceptance, neutrality, and rejection); intensity of the policy. An understanding of the general intent of the standards and policy objectives are important because after all, a successful policy implementation can fail (frustrated) when the executor (Officials) are not fully aware of the standards and policy goals. Directions disposition of the implementers of the standards and policy goals is also a crucial thing.

The executor might be failing in implementing policies because they reject what the objectives of the policy. Instead according to Kaufman in Meters & Horn (1975:473) and deep spread acceptance of the standards and policy objectives among those responsible for implementing the policy is a great potential to the successful implementation of the policy. The implementation of public policy in the context of local government bureaucracy is a matter that should be implemented, because they are there to serve the public. In the end, the intensity of the disposition of the implementers can influence the executive (performance) policy.

Cyber Terrorism

The world community hopes to predict acts of terrorism that will occur next because everyone believes that acts of terrorism will occur. One of the factors that can predict their actions is what methods they use to send their terror to the target population (Brenner, 2002: 149). This is where the media relate to terrorism as their means of communication. Terrorism is no longer a local problem for certain countries but an issue that covers a number of international aspects. Terrorism is an international phenomenon, so the response must also be international (Ganor,2002: 130). The terrorists are scattered everywhere by using the media as their means of communication as well as their communication medium in communicating their existence to the whole world. Their communication media starts from using books,

magazines, newspapers, music, films, software, games ranging from physical form (hardcopy) to softfiles which are distributed throughout the world (Brenner, 2002: 150).

Media and terrorism are two central themes that attract attention because they have a common thread. The common thread between the media and terrorism cannot be separated from the aspect of news commercialization. Terrorism is a social fact that can be used for the benefit of increasing news consumption. Meanwhile, modern terrorism makes use of communication media to create an effect on audiences through the form of propaganda terror. There is a symbiotic relationship between the two who meet at the point of interest in the need for information and the desire to be covered by the media. (Sukarno, 2011: 360-361). The relationship between terrorists and the media was also revealed by Hendropriyono (2009: 218) that there is a mutually beneficial situation (symbiotic mutualism) between terrorists and the media. The media have reinforced terrorist acts as politically out of proportion to what they should be. Terrorism is the deliberate use or threat of using violence against civil society or against civil society targets, to defend political objectives. The definition of terrorism is based on three important elements according to Ganor (2002: 126) including:

1. The essence of terrorism is in the use of threats or violence. Under this definition an activity that does not constitute violence or the threat of violence will not be defined as terrorism (including non-violent protests, peace demonstrations, tax rebellions, and the like).
2. The objectives of acts of terrorism are always political. Its goals are maintaining political goals, changing regimes, changing people with power, changing social or economic policies. In the absence of a political goal, a political act cannot be defined as terrorism. An act of violence against civilians that has no purpose, crime or criminal acts not related to terrorism. Some scholars include ideological or religious goals in the list of goals that are political.
3. The target of terrorism is civil society. Terrorism exploits the fragility of civil society to create great anxiety and and provokes an intense media reaction by striking against civilian targets.

Al-Qaeda's use of the Internet is based on the reason that mass media such as television and magazines have recently threatened the security of organizations and their members. Television has limited time to broadcast along, dense news as an application of their ideology. Even, mass media are considered unsafe by those who allows their message to be picked up by parties who have an interest and pervert the facts which influences public opinion on actions they. (Soriano, 2008: 16) Terrorists build a stronger network with the Internet. Even though there are many members who was jailed and died, an act of propaganda they are constantly being carried out and are expanding, even without a trace in the presence of this Internet.

Such that carried out by the Al-Qaeda in Pakistan after the American Air Force attacked Damadola Pakistan, they're trying to infiltrate United States web with its propaganda that they remind the Americans that they are will continue to terrorize. (Soriano, 2008: 15). Internet provides message boards and chat rooms for recruitment of terrorists, buy bombs, buy airplane tickets, coordinate attacks and gathered in one place without being physically present (Lumbaca & Gray, 2011: 47). The existence of the Internet they are trying to hack some sites belong to the United States government and some of its Western allies. Therefore, they try to erase their weakness by putting the organization into use new technology.

Osama Bin Laden's organization on it chooses to spread the word development they are mostly currently on the Internet. This internet then gave rise to the term cyber-terrorism where a group of terrorists using cyberspace (various Internet applications) in carrying out their acts of terrorism. Internet enables rapid dissemination of information, less risk, and cheap to a variety of constituents, ranging from potential to potential recruitment get prospective partners in the organization terrorists (Seib & Janbek, 2011: 21).

Many of them using cyberspace, for example a group found Abu Musab Al-Zarqawi from the Al Qaeda in Saudi has almost never been in direct contact with the mass media, they focus their activities their communication in cyberspace. This method keep them from receiving attention media at large. Paradoxically, the mass media himself using the web to find traces and messages about the latest terrorism they commit which will encourage the emergence of public opinion international. (Soriano, 2008: 15) For Al-Qaeda, the Internet is not the only method to reach for safer and more media fast, but also a turning point of its rise effective communication strategy compared to traditional media. First time to cyberspace able to allow direct communication between terrorists and the public.

The internet is not just fill the limitations of the mass media, but the Internet also allows them to avoid a number of moral rules contained in the media the masses and limit their actions, and this thing profitable for the strategy of acts of terrorism they. As did a group of jihadists along with the 2003 invasion of Iraq, the Internet not only lets them avoid operational risk, but allow them gain access by infiltrating the media system traditional such as Al-Jazeera (Soriano, 2008: 16-17).

Crime Prevention, Rehabilitation

Crime prevention has come to mean many different things to many different people. Programs and policies designed to prevent crime can include the police making an arrest as part of an operation to deal with gang problems, a court sanction to a secure correctional facility, or, in the extreme, a death penalty sentence. These measures are more correctly referred to as crime control or repression. More often, though, crime prevention refers to efforts to prevent crime or criminal offending in the first instance—before the act has been committed. Both forms of crime prevention share a common goal of trying to prevent the occurrence of a future criminal act, but what further distinguishes crime prevention from crime control is that prevention takes place outside of the confines of the formal justice system. In this respect, prevention is considered the fourth pillar of crime reduction, alongside the institutions of police, courts, and corrections (Waller 2006). This distinction draws attention to crime prevention as an alternative approach to these more traditional responses to crime.

In one of the first scholarly attempts to differentiate crime prevention from crime control, Peter Lejins (1967, p. 2) espoused the following"If societal action is motivated by an offense that has already taken place, we are dealing with control; if the offense is only anticipated, we are dealing with prevention." What Lejins was trying to indicate was the notion of "pure" prevention, a view that had long existed in the scholarship and practice of American criminology (Welsh and Pfeffer 2011). It is this notion of crime prevention that is the chief concern of this volume.

(p. 4)There are many possible ways of classifying crime prevention programs.2 An influential scheme distinguishes four major strategies (Tonry and Farrington 1995b). Developmental prevention refers to interventions designed to prevent the development of criminal potential in individuals, especially those targeting risk and protective factors discovered in studies of human development (Tremblay and Craig 1995; Farrington and Welsh 2007). Community prevention refers to interventions designed to change the social conditions and institutions (e.g., families, peers, social norms, clubs, organizations) that influence offending in residential communities (Hope 1995). Situational prevention refers to interventions designed to prevent the occurrence of crimes by reducing opportunities and increasing the risk and difficulty of offending (Clarke 1995b; Cornish and Clarke 2003). Criminal justice prevention refers to traditional deterrent, incapacitative, and rehabilitative strategies operated by law enforcement and agencies of the criminal justice system (Blumstein, Cohen, and Nagin 1978; MacKenzie 2006) In Building a Safer Society: Strategic Approaches to Crime Prevention, Michael Tonry and David Farrington (1995a) purposely did not address criminal justice prevention in any substantial fashion This was because this strategy had been adequately addressed in many other scholarly books and, more importantly, there was a growing consensus for the need for governments to strike a greater balance between these emerging and promising alternative forms of crime prevention and some of the more traditional responses to crime. Also important in their decision to focus exclusively on developmental, community, and situational

prevention is the shared focus of the three strategies on addressing the underlying causes or motivations that lead to a criminal event or a life of crime. Crucially, each strategy operates outside of the criminal justice system, representing an alternative, perhaps even a socially progressive, way to reduce crime. For these same reasons, we have adopted a similar approach in this volume.

A chief aim of this essay is to provide some background on this view of crime prevention. It also serves as an overview of the key theories that support these three main crime-prevention strategies, important research on effectiveness, and key issues that challenge the prevention of crime. Several observations and conclusions emerge:

• Crime prevention is best viewed as an alternative approach to reducing crime, operating outside of the formal justice system. Developmental, community, and situational strategies define its scope.
• Developmental prevention has emerged as an important strategy to improve children's life chances and prevent them from embarking on a life of crime. The theoretical support for this approach is considerable and there is growing evidence based on the effectiveness of a range of intervention modalities.
• Community crime prevention benefits from a sound theoretical base. It seemingly holds much promise for preventing crime, but less is known about its effectiveness. Advancing knowledge on this front is a top priority. Nevertheless, there are a wide range of effective models in community-based substance-use prevention and school-based crime prevention.
(p. 5)
• The theoretical origins of situational crime prevention are wide ranging and robust. The strategy boasts a growing evidence base of effective programs and many more that are promising. There is also evidence that crime displacement is a rare occurrence.
• Crime prevention is an important component of an overall strategy to reduce crime and is widely supported by the public over place and time. A special focus on implementation science and higher quality evaluation designs will further advance crime- prevention knowledge and practice. Striking a greater balance between crime prevention and crime control will go a long way toward building a safer, more sustainable society.

Reviewing the findings related to the motives and causes of terrorism, it can be concluded that rehabilitating terrorists is a complex job and requires a concept. This should include an individual assessment, a systematic plan and parameters of effectiveness. With the aim of rebuilding human capacities and functions in society, rehabilitation is always associated with efforts to return to a previous good condition. Rehabilitation must include the following steps: (1) The preparation stage, including the determination of rehabilitation objectives, survey and data collection, analysis and verification of information, initial assessment and needs analysis, detailed rehabilitation arrangements, analysis and risk management, coordination with related parties, preparation prisoners or rehabilitation participants, and prepare trainers or resource persons; (2) The stages of implementation, including general development activities, for example character development, basic economic skills, self-empowerment and specific development activities such as religious teachings, woodworking skills, anger management skills; (3) The follow-up stage, which includes ongoing counseling, friendship (discussion or dialogue), evaluation of the success of rehabilitation, receiving feedback for improvement, and community or service involvement. The target of the follow-up stage is prisoners who support ethical and social norms, display a positive attitude, and demonstrate readiness to rejoin the wider community. This aims to maintain the improvements that have been achieved by prisoners or former terrorism activists (Sukabdi, 2015)

Research Model

Law Number 19 in 2016 article 1, regarding electronic transactions of Electronic Information and / or Electronic Documents and / or printed results that are legal legal evidence, and law Number 5 of 2018 concerningthe eradication of criminal acts of terrorism into law.

Policy implementation variables, these variables are: Policy standards and objectives / measures and policy objectives, Resource**,** Characteristics of the implementing organization**,** The attitude of the implementers**,** Communication between related organizations and implementation activities**,** Social, economic and political environment**,**

Obstacles and efforts made in implementing cyber terrorism prevention and rehabilitation policies at the polda Metro Jaya Police Station in Central Jakarta

The aim of the implementation of cyber terrorism prevention and rehabilitation policies at the central Jakarta police station is to realize domestic security that includes maintaining public security and order, orderly and upholding the law, carrying out protection, protection, and services to the community, and maintaining public peace by upholding human rights.

Methodology

Qualitative research is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures. Data typically collected in the participant's setting. data analysis inductively building from particulars to general themes. and the researcher making interpretations of the meaning of the data. The final written report has a flexible structure. Those who engage in this form of inquiry support a way of looking at research that honors an inductive style, a focus on individual meaning. and the importance of rendering the complexity of a situation (Creswell. 2013).

Informant

- Head of Section of the Special Criminal Regiment cybercrime Unit of the Polda Metro Jaya Central Jakarta Regional Office.
- Head of the special criminal terrorism unit of the Polda Metro Jaya Regional Police of DKI Jakarta Office.
- Head Densus 88.

Research Results, And Research Discussion

The implementation of the cyber terrorism prevention and rehabilitation policy at the Metro Jaya Police Station in Central Jakarta

Based on the results of research regarding the implementation of cyber terrorism prevention and rehabilitation policies at the Regional Office of the Jakarta Metro Jaya Regional Police in accordance with Law Number 19 of 2016 concerning Electronic Transactions 1, concerning Electronic Information and / or Electronic Documents which are valid legal evidence and Law number 5 concerning the eradication of criminal acts of terrorism. and using the concept of Van Horn and Van Metter (1975) that policy implementation is influenced by six variables, namely: standards and policy objectives / measures and policy objectives, resources, characteristics of implementing organizations, attitudes of implementers, communication between related organizations and implementation activities.

The social, economic and political environment in the implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because the implementation of cyber terrorism prevention and rehabilitation policies for the community and the implementer knew what to do, where policy objectives and targets had to be transmitted to the target group, reducing distortions in implementation. , reduce the number of crimes to achieve domestic security which includes maintaining security. and public order, orderly and upholding the law, implementing protection, protection and services to the community, as well as maintaining public order by upholding high human rights.

How is the implementation of the cyber terrorism prevention and rehabilitation policy at the polda Metro Jaya Police Station in Central Jakarta?

The existence of cyber patrols to reduce the number of crimes involving children in cyberspace, we will collaborate with related parties such as the telkom and the Minister of Communication and Information. cyber patrols are carried out to prevention and rehabilitation cyber terrorism involving minors and the operation of the cybercrime investigation headquarters, the polda Metro Crime Police Office Cyber Crime Investigations Satellite Office implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because the implementation of cyber terrorism prevention and rehabilitation policies for the community and the implementer knew what to do, where policy objectives and targets had to be transmitted to the target group, reducing distortions in implementation. , reduce the number of crimes to achieve domestic security which includes maintaining security. and public order, orderly and upholding the law, implementing protection, protection and services to the community, as well as maintaining public order by upholding high human rights.

Policy standards and objectives / measures and policy objectives

Does in the polda Metro Jaya Central Jakarta Regional Office, Central Jakarta have an SOP for cyber terrorism services, conduct reviews and have units that manage cyber terrorism services, and evaluate the implementation of cyber terrorism?

In the polda Metro Jaya Central Jakarta police station, there is an SOP for Cyber terrorism services and also conducts reviews and has a unit that handles cybercrime and cyber terrorism cases. the evaluation of the Cyber terrorism prevention and rehabilitation policy The high occurrence of cyber terrorism cases in central Jakarta due to the lack of socialization on cyber terrorism prevention and rehabilitation policies by officers handling cybercrime and cyber terrorism cases, and many central Jakarta people who do not

know about cybercrime and cyber terrorism, there are still many people who easily access information without being processed properly so that it often occurs hoax news.

Standard and target policies / measures and policy objectives in implementing cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta were successful because the implementation of cyber terrorism prevention and rehabilitation policies has clear SOPs (Standard Operating Procedures) in preventing and rehabilitation cyber terrorism, reducing distortions in implementation, reducing crime rates to realize domestic security which includes maintaining security and public order, orderly and enforcing the law, implementing protection, protection and services to the community, as well as maintaining public order by upholding human rights. Based on the results of research regarding the implementation of cyber terrorism prevention and rehabilitation policies at the Regional Office of the Jakarta Metro Jaya Regional Police in accordance with Law Number 19 of 2016 concerning Electronic Transactions 1, concerning Electronic Information and / or Electronic Documents which are valid legal evidence and Law number 5 concerning the eradication of criminal acts of terrorism. and using the concept of Van Horn and Van Metter (1975). implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because the implementation of cyber terrorism prevention policies for the community and the implementer knew what to do, where policy objectives and targets had to be transmitted to the target group, reducing distortions in implementation. , reduce the number of crimes to achieve domestic security which includes maintaining security. and public order, orderly and upholding the law, implementing protection, protection and services to the community, as well as maintaining public order by upholding high human rights.

Resource

Is there an increase in quality and quantity and continuous improvement of employee performance and socialization of excellent service culture? explain what obstacles are in resources?

In the polda metro Jaya central Jakarta police station there has been an increase in the quality and quantity and continuous improvement of employee performance such as training and scholarships for employees. The socialization of the excellent service culture at the central Jakarta police station was aimed at providing an understanding of excellent service to the community and could be implemented in daily activities. Broadly speaking, the outreach material presented is as follows: Information & complaint desk clerk must have product knowledge so that they can provide excellent service. Reliable communication skills are also crucial in understanding what the public wants, Focus on the community, provide efficient service, personal approach, fostering good relations with the community. Show sympathy, talk with feeling, and provide solutions to show that you understand the wishes of the community. Ask for feedback from the community in the form of a service satisfaction survey to be able to improve if there are deficiencies in services. Limited constraints of personnel such as IT and cyber forensic experts, another crucial obstacle is the limited operational budget funds, a crucial problem besides legal instruments, namely insufficient human resources, budget and facilities and infrastructure to support disclosure of cybercrime cases. At present there is only enough budget for one case per month. Even though in fact one month can be up to 15 cases, the weak supervision of internet usage has the potential to create opportunities for cybercrime and cyber terrorism. The procedural constraints of UU IT Law and from the Ministry of Communication and Information (KOMINFO) which are directly related to the policy of using information technology and internet facilities in Indonesia. From the information obtained by the authors of the police department, they are still not too literate about technology, even many members of the cyber police Indonesia are still using computers. It could be said that Indonesian polyclinic ability in cyberspace is still in the standard stage or beginner.

Resource in the implementation of cyber terrorism prevention and rehabilitation policies at the polda Metro Jaya Police Station in Central Jakarta was successful because the implementation of cyber terrorism prevention and rehabilitation policies for the public and implementers knew what had to be done, where the goals and objectives of the policy had to be transmitted to the target groups, reducing reducing the distortion of implementation, decreased crime rate to realize domestic security which includes maintaining the security and public order, orderly and upholding the law, carrying out protection, protection, and services to the community, as well as maintaining public peace by upholding the public high human rights.

Characteristics

how Characteristics of the implementing organization in the implementation of cyber terrorism prevention and rehabilitation policies at the polda Metro Jaya Police Station in Central Jakarta?

Characteristics of the Directorate of Special Crimes of Polda Metro Jaya (Ditreskrimsus PMJ) is one of the police functions in the field of law enforcement at PMJ which performs investigative and investigative functions in the field of Industry and Trade; Fiscal, Monetary and Foreign Exchange; Environmental Resources sector; Cyber Crime and Corruption.

Ditreskrimsus PMJ is a division of the Criminal Research Directorate (Ditreskrim) and is under the Head of the Metro Jaya Police (Kapolri Decree No. Pol.: Kep1541X12002 dated 17 October 2002). Ditreskrimsus Polda Metro Jaya is regulated in Article 27 which regulates the definition, duties, functions, responsibilities and organizational structure of PMJ Ditreskrimsus. The Chief of Police's decision above was followed up by the Kapolda Metro Jaya by making an order letter for the Kapolda Metro Jaya No. Pol. : Sprin / 36 / I / 2003 dated January 15, 2003 concerning Orders for the Implementation of Duties of Dirreskrimum, Dirreskrimsus and Dimarkoba as well as a Letter of Order of Kapolda Metro Jaya No. Pol .: Sprin / 03 / I / 2003, dated January 28, 2003 concerning the Personal Pamen Ditreskrimsus Polda Metro Jaya. Based on the Kapolda's order, the Dirreskrimsus prepares a Job Description which regulates the organizational structure as well as the division of tasks and responsibilities, including the division of tasks for Operational Unit (Satopsnal) I to Satopsnal V. Departing from the organizational structure above, the tasks carried out Cybercrime Sub-Directorate, namely: Investigation of cases related to electronic transactions, money lounding, capital markets, taxes, banking, etc.)

Investigation of cases related to communication and information technology (telephone tapping, VoIP abuse, fraud via mobile phones). Crime investigation using Internet facilities (cyber gambling, cyber terrorism, cyber fraud, cybersex, cyber narcotism, cyber smuggling, cyberattacks on critical infrastructure, cyber black mail, cyber theatening, data theft, defamation, etc.) Crime investigation computer (entering the system illegally, ddos atack, hacking, tracking, phreacing, creating and spreading destructive things such as malicous code al viruses, worms, rabbitstrojan, etc.).

Crime investigations related to Intellectual Rights (Pirated Software, sound recordings, changing website appearance) Cybercrime organization unit is reflected in the organizational structure, the organization's position is the Sub-Directorate for Cyber Crime (Sub-Directorate IV of the Special Crime Directorate), has 5 (five) Heads of Unit and 'backed up' by the IT team which consists of an analysis team, a direction finder team, a digital forensic team, and an IT security team.

Characteristics of the implementing organization in the implementation of cyber terrorism prevention and rehabilitation policies at the polda Metro Jaya Police Station in Central Jakarta was successful because the implementation of cyber terrorism prevention and rehabilitation policies for the public and implementers knew what had to be done, where the goals and objectives of the policy had to be

transmitted to the target groups, reducing reducing the distortion of implementation, decreased crime rate to realize domestic security which includes maintaining the security and public order, orderly and upholding the law, carrying out protection, protection, and services to the community, as well as maintaining public peace by upholding the public high human rights.

Attitude

Does in the polda Metro Jaya Central Jakarta Regional Office have implemented reward and punishment for employees and carried out continuous improvements to employee performance in your opinion?

In my opinion the polda metro jaya central Jakarta police station has implemented reward and punishment for employees. Employees who get awards for their service and also promotions and salary increases. while employees who get punishment usually get a reprimand from the discipline, sekor sing or the worst is dismissal. The attitude of the implementers in the implementation of cyber terrorism prevention and rehabilitation policies at the polda Metro Jaya Police Station in Central Jakarta was successful because the implementation of cyber terrorism prevention and rehabilitation policies for the public and implementers knew what had to be done, where the goals and objectives of the policy had to be transmitted to the target groups, reducing reducing the distortion of implementation, decreased crime rate to realize domestic security which includes maintaining the security and public order, orderly and upholding the law, carrying out protection, protection, and services to the community, as well as maintaining public peace by upholding the public high human rights.

Communication

Has the polda Metro Jaya Police Chief in Central Jakarta informed the employee and has been socialized about the Cyber terrorism prevention and rehabilitation policy? explain the obstacles and innovations used in countering cybercrime!

The polda metro jaya Central Jakarta Police Precinct has conducted socialization of cyber terrorism prevention and rehabilitation policies using brochures posted on the bulletin board. the obstacle in providing information on the Cyber terrorism prevention and rehabilitation policy is the police officer Limited constraints of personnel such as IT and cyber forensic experts, another crucial obstacle is the limited operational budget funds, a crucial problem besides legal instruments, namely insufficient human resources, budget and facilities and infrastructure to support disclosure of cybercrime cases. At present there is only enough budget for one case per month. Even though in fact one month can be up to 15 cases, the weak supervision of internet usage has the potential to create opportunities for cybercrime and cyber terrorism.

The procedural constraints of UU IT Law and from the Ministry of Communication and Information (KOMINFO) which are directly related to the policy of using information technology and internet facilities in Indonesia. From the information obtained by the authors of the police department, they are still not too literate about technology, even many members of the cyber police Indonesia are still using computers. It could be said that Indonesian polyclinic ability in cyberspace is still in the standard stage or beginner. Innovation used in fighting cyber terrorism The existence of cyber patrols to reduce the number of crimes involving children in cyberspace, we will collaborate with related parties such as the telkom and the Minister of Communication and Information. cyber patrols are carried out to prevent cybercrime involving minors and the operation of the cybercrime investigation headquarters, the Metro Crime Police Office Cyber Crime Investigations Satellite Office

Communication between related organizations and implementation activities Communication in the implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central

Jakarta was successful because the implementation of cyber terrorism prevention and rehabilitation policies to the public and executors know what to do to prevention and rehabilitation cyber terrorism, where the objectives and policy objectives must be transmitted to the target group, reducing distortions of implementation, reducing the number of crimes to achieve domestic security which includes maintaining security and public order, order and law enforcement, implementing protection, protection and services to the community, and maintaining public order by upholding human rights .

Mention the results of the evaluation of the Cyber terrorism prevention and rehabilitation policy in the polda Metro Jaya Police Chief, Central Jakarta!

The high occurrence of cybercrime and cyber terrorism cases in central Jakarta due to the lack of socialization on cyber terrorism prevention and rehabilitation policies by officers handling cybercrime cases, and many central Jakarta people who do not know about cyber terrorism, there are still many people who easily access information without being processed properly so that it often occurs hoax news.

Communication between related organizations and implementation activities Communication in the implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because the implementation of cyber terrorism prevention policies to the public and executors know what to do to prevention and rehabilitation cyber terrorism, where the objectives and policy objectives must be transmitted to the target group, reducing distortions of implementation, reducing the number of crimes to achieve domestic security which includes maintaining security and public order, order and law enforcement, implementing protection, protection and services to the community, and maintaining public order by upholding human rights .

Socio- Economic and Political

How the socio-economic and political environment influence cyber terrorism prevention and rehabilitation?

The number of acts of terrorism taking place in Central jakarta is of course based on several reasons. These reasons are partly motivated by the conditions and environment in the community. Several causes for the emergence of acts of terrorism. poverty problems that exist in society that can lead people to commit violence which then leads to acts of terrorism. This economic factor can influence people to join terrorist networks or groups because of the guarantee of a decent life and freedom from poverty.

Political issues. The existence of influence and belief in political ideology sometimes causes a group of people to take actions that can violate a country's rules or regulations. In carrying out their actions, they usually carry out violence, as well as acts of terror against the civilian population and government, with the aim of changing the ideology of the State concerned. Acts of violence and terror then create public anxiety and fear and raise public opinion regarding State security as well as create doubts and a loss of public confidence in government because people think the government cannot protect their people from acts of terrorism. Social problem. The existence of a sense of injustice in society has resulted in the emergence of the thoughts of several groups who consider the government to be unable to prosper the community and lead to acts of violence as part of conveying the aspirations of the community. One of the acts of violence committed by these community groups is in the form of acts of terror which slowly lead to acts of terrorism in society.

Social, economic and political environment between related organizations and implementation activities. In the implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because Social, economic and political running stable and conducive.

To prevention and rehabilitation tackle terrorism, extraordinary measures are needed because terrorism is an extraordinary crime and is transnational in nature because it is cross-border in the prevention and rehabilitation of cyber terrorism, the social environment is very influential in changing people's behavior here. knowledge, mental attitude, and ability to control the social environment in activities in the community and there will be socialization from the family environment, RT, Rw and also at the village level and also at the sub-district and school places, worship and also workplaces regarding the prevention and rehabilitation of cyber terrorism, security / safety: people can carry out their activities without fear of disturbance, both man-made and natural. Comfortability: providing opportunities for every element of society to articulate deep socio-cultural values. peaceful state. Productivity: providing an effective and efficient infrastructure for the production and distribution process in order to increase added value. Sustainability: providing better environmental quality not only for current generations but also for future generations.

Economy is very influential in implementing the prevention and rehabilitation of cyber terrorism, among others, is the effort to meet the needs of human life, through the provision of market jobs, shops, recreational facilities, and sports paying attention to community welfare, increasing employment opportunities, and healthy economic growth, which are expected to improve quality. community life.

Politics is very influential in the implementation of the prevention and rehabilitation of cyber terrorism between the reactivation of the TNI Anti-terror Desk. Formed a Special Detachment called Densus 88 on August 26, 2004 which aims to maximize the countermeasures of terrorism. Densus 88 is part of the National Police which is prepared to be able to tackle the types and forms of terrorism. Prioritizing the issue of terrorism and increasing cooperation with Australia related to counter-terrorism to maintain Indonesia's national security. Enhancing international cooperation to prevent and eradicate terrorism, by means of multilateral or through the United Nations, bilateral, regional, which aims to increase capacity, enforce the law, improve legislation / legal framework, exchange information and share experiences, send experts and provide expert advice, and other technical cooperation. In addition, the government also prevents and eradicates terrorism by means of "soft power" or diplomacy, which includes efforts to cooperate in eradicating underlying causes of terrorism. This is assisted by the Ministry of Foreign Affairs by making efforts to increase encouragement for interfaith dialogue to build mutual care and trust and improve good relations between religious communities from countries in the world.

Obstacles have been faced in implementing the policy of implementing cyber terrorism prevention and rehabilitation at the Polda Metro Jaya Police Station in Central Jakarta

Resource constraints, namely limited expertise such as IT and cyber forensics experts, cyber terrorism. financial constraint is the limited operational budget funds. Crucial problems other than legal instruments are the lack of human resources, budget and facilities and infrastructure to support the disclosure of cyber terrorism cases. Currently the budget is only sufficient for one case per month. Whereas in one month there can be up to 15 cases, weak supervision of the use of the internet has the potential to open up opportunities for cyber terrorism. Procedural constraints on the IT Law and those from the Ministry of Communication and Information Technology (KOMINFO) are directly related to policies on the use of information technology and internet facilities in Indonesia and the law of terrorism. From the information obtained by the author from the police, they still do not really understand technology, even many members of the Indonesian cyber police still use computers. It can be said that the ability of Indonesian clinical polyclinics in cyberspace is still at the standard or beginner level.

The efforts made in implementing the cyber terrorism prevention and rehabilitation policy at the Metro Jaya Police Station in Central Jakarta.

There is training by either the police or public or private universities and colleges in information technology faculties. This step needs to be taken to recruit information technology experts, especially students and students who have expertise in the field of IT (Information technology). The roles of lecturers and students are very strategic because they are the ones who can keep up with IT developments. Practitioners can also play an important role in providing input to the government in securing computer networks and the internet. The urgency of the need for experts must also be balanced with the presence of sophisticated and sophisticated facilities and equipment to support network security and also to facilitate tracking criminals so that cases of cyber terrorism can be resolved quickly. in Jakarta it is implemented by empowering and employing cyber experts and experts in Indonesia for network security, although it requires a short time at least these steps can be implemented by the government to reduce the limitations of experts. and the formation of agencies and cooperation between the government and the private sector in countering cyber terrorism. With cyber patrols to reduce the number of crimes involving children in cyberspace, we will cooperate with related parties such as providers and the Minister of Communication and Information. Cyber patrols are conducted to prevent cyber terrorism involving minors and the operation of the cyber terrorism investigation headquarters, the Metro Crime Police Office.

Based on the results of research regarding the implementation of cyber terrorism prevention and rehabilitation policies at the Regional Office of the Jakarta Metro Jaya Regional Police in accordance with Law Number 19 of 2016 concerning Electronic Transactions 1, concerning Electronic Information and / or Electronic Documents which are valid legal evidence and Law number 5 concerning the eradication of criminal acts of terrorism. and using the concept of Van Horn and Van Metter (1975) that policy implementation is influenced by six variables, namely: standards and policy objectives / measures and policy objectives, resources, characteristics of implementing organizations, attitudes of implementers, communication between related organizations and implementation activities.

The social, economic and political environment in the implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because the implementation of cyber terrorism prevention policies for the community and the implementer knew what to do, where policy objectives and targets had to be transmitted to the target group, reducing distortions in implementation. , reduce the number of crimes to achieve domestic security which includes maintaining security. and public order, orderly and upholding the law, implementing protection, protection and services to the community, as well as maintaining public order by upholding high human rights.

Conclusion

That policy implementation is influenced by six variables, namely: standards and policy objectives / measures and policy objectives, resources, characteristics of implementing organizations, attitudes of implementers, communication between related organizations and implementation activities.

The social, economic and political environment in the implementation of cyber terrorism prevention and rehabilitation policies at Polda Metro Jaya, Central Jakarta was successful because the implementation of cyber terrorism prevention policies for the community and the implementer knew what to do, where policy objectives and targets had to be transmitted to the target group, reducing distortions in implementation, reduce the number of crimes to achieve domestic security which includes maintaining security. and public order, orderly and upholding the law, implementing protection, protection and services to the community, as well as maintaining public order by upholding high human rights.

Whereas the line of communication is already underway, with the existence of cyber patrols to reduce the number of criminal acts involving terrorism in cyberspace, the police are cooperating with parties related to all providers, the police and anti-terrorism agencies and the Ministry of Communication and Informatics.

Sociocultural approach and community outreach through seminars, training and competitions. Meanwhile, the efforts made in implementing the cyber terrorism eradication policy at the Polda Metro Jaya Police in Central Jakarta are improvements in all aspects, namely when coordinating the division of duties in implementing cyber terrorism policies, there must be an increase in human resources, facilities and infrastructure. Create a special standard operating procedure (SOP) for cyber terrorism because the police do not yet have a standard operating procedure (SOP) for cyber terrorism and still follow the standard operating procedure (SOP) for cybercrime. The aim of the implementation of cyber terrorism prevention and rehabilitation policies at the central Jakarta police station is to realize domestic security that includes maintaining public security and order, orderly and upholding the law, carrying out protection, protection, and services to the community, and maintaining public peace by upholding human rights.

Suggestion

1. The improvement of the cyber terrorism service delivery system must have experts who must be provided in the DKI Jakarta Polda Metro Jaya Regional Office and good coordination with the Ministry of Communication and Information.
2. Improvements from the private sector are in the form of providing service providers such as Telkomsel, and others. To improve the service system again and impact Implementation of the cyber terrorism policy at the polda Metro Jaya Police Station in Central Jakarta: Increase parental awareness and attention to child, women supervision. The National Police of the Republic of Indonesia has also launched a child protection program on the internet (save children on the internet). State Code and Cyber Codes (BSSN). Sociocultural approaches and community socialization through seminars, training and competitions.
3. Whereas the efforts made in the implementation of the policies to combat cyber terrorism in the DKI Jakarta Regional Office of Jakarta, namely improvements in all aspects, namely when coordinating the division of tasks in implementing cyber terrorism policies, there must be improvements in human resources, facilities and infrastructure Making operational standard procedures (SOP) specifically for cyber terrorism because the police do not yet have standard operational procedures (SOP) for cyber terrorism and are still joining cybercrime standard operating procedures (SOPs).

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The Application of Dynamic Relative Taxonomy to Study Professional Activity of Seniors in The Visegrad Group Regions In 2015-2019

Grazyna DEHNEL
Poznan University of Economics and Business, Poznan, Poland
ORCID 0000-0002-0072-9681
e-mail: grazyna.dehnel@ue.poznan.pl

Marek OBREBALSKI
Wroclaw University of Economics and Business, Wroclaw, Poland
ORCID 0000-0002-7030-7089
e-mail: marek.obrebalski@ue.wroc.pl

Marek WALESIAK
Wroclaw University of Economics and Business, Wroclaw, Poland
ORCID 0000-0003-0922-2323
e-mail: marek.walesiak@ue.wroc.pl

Abstract

The purpose of the paper is to measure the scope and degree of differences in the level of seniors' involvement in the labour market in the conditions of ageing population, covering the regions of Poland, Czechia, Slovakia and Hungary in 2015-2019. The involvement of senior citizens in the labour market is described using 4 variables: economic activity rate of the population aged 65 or over, employment at the age of 65-74 per 1000 total employment, employment rate of the population aged 65 or over, average number of weekly working hours in the main job of the population aged 65-74. The study was based on the data from Eurostat REGIO database. A dynamic relative taxonomy was adopted for the purpose of the study. The level of professional activity of seniors on the labour markets in the examined countries and regions shows an upward tendency. The seniors in Czechia presented a relatively high economic activity and clearly a lower one was recorded in the surveyed regions of Hungary and Slovakia. In Polish regions, however, significant interregional disparities were revealed in this respect. The results of the study also confirmed a significant correlation between the professional activity of seniors and the level of unemployment in a given region. A lower overall unemployment rate level in a region resulted in higher economic activity of seniors.

Keywords: silver economy, labour market, relative taxonomy, composite indicators

Introduction Rationale for The Study and The Related Works

Population aging is a global process. A significant increase in the share of senior citizens has been recorded both in Europe and in other parts of the world. At the same time, the European society remains much older than the societies living on other continents and, moreover, major differences have been observed in this respect among the European countries. The statistical presentation of this process is shown in Table 1.

While, on a global scale, the share of the population aged 65 and over increased in 1950-2019 from the level of 5.1% to 9.1%, in Europe it went up from 8.0% to 18.8% in the aforementioned period. It means that approximately every fifth European is a senior citizen. Among the Visegrad Group coun-

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tries, the society of Slovakia remains relatively the youngest (people aged 65 and over constitute 16.2% of the total population), whereas the oldest ones are the populations of Czechia and Hungary.

Table 1: The share of population aged 65 and over worldwide, in Europe and in the Visegrad Group countries in 1950-2050

Year	World	Europe	Poland	Czechia	Slovakia	Hungary
1950	5.1	8.0	5.2	8.4	6.6	7.8
1970	5.3	10.5	8.2	12.1	9.2	11.6
1990	6.2	12.7	10.0	12.7	10.2	13.5
2000	6.9	14.8	12.0	13.8	11.3	15.1
2010	7.6	16.3	13.5	15.4	12.5	16.1
2019	9.1	18.8	18.1	19.8	16.2	19.7
2030	11.7	23.0	23.2	22.2	21.0	22.0
2050	15.9	28.1	31.1	28.9	28.9	28.0

Source: authors' compilation based on the UN data (World Population Prospects 2019, Volume II: Demographic Profiles).

In addition, the increasing old-age dependency ratio has been recorded, which reflects the growing number of people aged 65 and over per 100 population aged 15-64. This indicator values in both dynamic and spatial perspective are presented in Table 2.

Table 2: Old-age dependency ratio worldwide, in Europe and in the Visegrad Group countries in 1950-2050

Year	World	Europe	Poland	Czechia	Slovakia	Hungary
1950	12.0	16.5	11.3	15.9	14.1	15.4
1960	12.1	17.8	12.2	18.1	14.4	17.5
1970	13.6	21.7	18.1	24.7	20.3	22.7
1980	14.8	25.2	21.2	27.4	22.6	26.7
1990	14.6	24.3	19.6	24.8	20.8	25.9
2000	15.2	27.4	23.4	25.4	21.8	28.4
2010	15.8	29.5	23.5	26.6	21.5	28.4
2019	18.4	34.3	32.0	35.7	27.9	35.6
2030	23.5	45.0	44.3	42.6	39.0	41.0
2040	28.7	52.4	50.2	50.3	46.5	48.7
2050	32.3	59.4	66.2	61.8	60.3	58.2

Source: authors' compilation based on the UN data (World Population Prospects 2019, Volume I: Comprehensive Tables).

The processes of population aging result in numerous and diverse consequences, both economic and social (Samorodov 1999; Krajňáková and Vojtovič 2017, p. 321). The scale of these consequences is reflected, e.g., in the level and systematic increase in old-age dependency ratio. Its level also varies in the Visegrad Group countries.

The economic implications of the population aging process are not only correlated with the growing costs of public services and benefits (primarily covering health and care) for seniors as well as high financial burden incurred by the budgets of states and local government units. They are also visible in the sphere of labour market functioning, changes in economic activity or transformations in the structure of workforce. The social consequences of population aging are noticeable in the sphere of living conditions, attitudes and behaviours towards social and economic rearrangements, or intergenerational relationships.

The range of needs reported by senior citizens remains abundant. Among them, the need for further professional activity despite reaching retirement age is becoming increasingly apparent. The seniors present on the labour market are subject to the same rules as other employees competing for work in the conditions of market economy (Schimanek 2012, pp. 83-84). Hence, the analysis of their professional activity on these markets should take into account both the supply and demand for their work, including the general trends on the labour markets, the level of socio-economic development in territorial terms, or the applicable labour law provisions.

The research focused on the situation of older adults on labour markets covered diverse populations and territorial cross-sections. The conducted analyses studying the problems of seniors functioning in the working environment included many European countries (Van Dalen et al. 2009; Heywood and Siebert 2009; Thalassinos et al. 2019; Aging Europe 2019, Working ... 2019; Wyszkowska 2020). For this purpose various methods of multivariate comparative analysis were applied as well as numerous indicators and sources of information were used. The review of the existing indicators and possible sources of information about the situation on the labour market was performed by, e.g., the International Labour Organization (Decent ... 2018). An interesting research covered, e.g., the problem of measuring the unemployment risk and the degree of stability level of employees by age on the labour market (Hijzen and Menyhert 2016), the probability of employment and professional deactivation of older people (Magda and Ruzik-Sierdzińska 2012) and the participation of seniors in trainings dedicated to work environment (Canduela et al. 2012). Many studies were also carried out addressing the multifaceted situation of seniors on the labour market in regional cross-sections (e.g. Steiner 2017; Obadić 2004). The scope of these studies, however, is limited, mainly due to the unavailability of some data characterizing individual regions.

A dynamic relative taxonomy in positional version was used in the article to analyse senior citizens' professional activity in the Visegrad Group regions in the period 2015-2019. Two research hypotheses were formulated in the study:

H_1 – professional activity of seniors in the regions is increasing and the disproportions between regions in this respect are declining.

H_2 – lower overall unemployment rate in the region enhances higher professional activity of seniors.

The second hypothesis was formulated based, e.g., on the results of the research carried out in Canada for 1991-2007 at the regional level (Galarneau et al. 2015; Bélanger et al. 2016). Galarneau et al. (2015) examined the relationship between the expected retirement age and the unemployment rate of the economic region. The authors concluded that over the considered period, the workers in economic regions characterised by higher unemployment rates were expected to retire two years earlier, on average, than the workers in economic regions presenting lower unemployment rates.

Research Methodology – Relative Taxonomy Method in Dynamic Version

The method of relative taxonomy in classical terms was proposed by Wydymus (2013) and its positional version was developed by Lira (2015). Both versions of the relative taxonomy method apply a static approach despite using it for panel data. The relative taxonomy method, although being comparatively new, has already had many empirical applications (see Walesiak and Dehnel 2020). The applications of relative taxonomy method are presented in the following studies: Szopik-Depczyńska et al. (2017), Müller-Frączek and Muszyńska (2016), Głowicka-Wołoszyn et al. (2018), Cheba and Bąk (2019), Ziolo et al. (2019), Cheba (2020), Lira (2015), Lira et al. (2014).

The article applies a modification of relative taxonomy for the purposes of a dynamic approach presented in the study by Walesiak and Dehnel (2020).

In the static version (see Wydymus 2013, Lira 2015), the relativization in formula (4) is performed separately for each period of the study $t = 1, \dots, T$. In the dynamic version, the value of *j*-th variable is relativized jointly based on the data matrix from *T* periods. The relative taxonomy procedure in its

dynamic version covers the following steps:

1. In the first step, the observations on m variables for n analysed objects and T periods are compiled into one data matrix:

$$[x_{ijt}]_{n\cdot T\times m} = \begin{bmatrix} x_{111} & x_{121} & \cdots & x_{1m1} \\ \vdots & \vdots & \cdots & \vdots \\ x_{n11} & x_{n21} & \cdots & x_{nm1} \\ \cdots & \cdots & \cdots & \cdots \\ x_{11T} & x_{12T} & \cdots & x_{1mT} \\ \vdots & \vdots & \cdots & \vdots \\ x_{n1T} & x_{n2T} & \cdots & x_{nmT} \end{bmatrix}, \tag{1}$$

where: $i = 1, \dots, n$ – object number (e.g. country), $j = 1, \dots, m$ – variable number, $t = 1, \dots, T$ – period number (e.g. year).

2. In the second step, stimulants S (where higher values are more preferred), destimulants D (where lower values are more preferred) and nominants N (where the nominal value is most preferred) are distinguished in the set of variables. Destimulants are transformed into stimulants using the quotient transformation (see e.g. Walesiak 2002, p. 18):

$$x_{ijt} = \left(x_{ijt}^{D}\right)^{-1} \tag{2}$$

Nominants are transformed into stimulants using the quotient transformation (see e.g. Walesiak 2002, p. 18):

$$x_{ijt} = \frac{\min\{nom_j; x_{ijt}^{N}\}}{\max\{nom_j; x_{ijt}^{N}\}}, \tag{3}$$

where: nom_j – nominal level of j-th variable.

3. In the third step, the values of j-th variable are relativized in accordance with the below formula:

$$\left[\frac{x_{1j1}}{x_{ijt}}, \dots, \frac{x_{njT}}{x_{ijt}}\right], \text{ for } i = 1, \dots, n \text{ and } t = 1, \dots, T \tag{4}$$

resulting in the matrix of relativized values for j-th variable presenting $n \cdot T \times n \cdot T$ dimensions. As a result of relativization the values of variables are dimensionless.

4. In the fourth step, the average similarity (using the arithmetic mean or the median) of a given relativized observation is calculated in relation to the other relativized observations of j-th variable:

   a. In the classical approach (arithmetic mean):

$$[z_{ijt}] = \begin{bmatrix} \frac{1}{n\cdot T}\sum_{t=1}^{T}\sum_{i=1}^{n}\frac{x_{111}}{x_{i1t}} & \cdots & \frac{1}{n\cdot T}\sum_{t=1}^{T}\sum_{i=1}^{n}\frac{x_{1m1}}{x_{imt}} \\ \vdots & \vdots & \vdots \\ \frac{1}{n\cdot T}\sum_{t=1}^{T}\sum_{i=1}^{n}\frac{x_{n1T}}{x_{i1t}} & \cdots & \frac{1}{n\cdot T}\sum_{t=1}^{T}\sum_{i=1}^{n}\frac{x_{nmT}}{x_{imt}} \end{bmatrix} \tag{5}$$

   b. In the positional approach (median):

$$[z_{ijt}] = \begin{bmatrix} \text{med}\left(\frac{x_{111}}{x_{111}}, \dots, \frac{x_{111}}{x_{n1T}}\right) & \cdots & \text{med}\left(\frac{x_{1m1}}{x_{1m1}}, \dots, \frac{x_{1m1}}{x_{nmT}}\right) \\ \vdots & \vdots & \vdots \\ \text{med}\left(\frac{x_{n1T}}{x_{111}}, \dots, \frac{x_{n1T}}{x_{n1T}}\right) & \cdots & \text{med}\left(\frac{x_{nmT}}{x_{1m1}}, \dots, \frac{x_{nmT}}{x_{nmT}}\right) \end{bmatrix} \tag{6}$$

5. In the fifth step, the values of SM_{it} aggregate measure are calculated using one of the below formulas:

   a. Classical approach:

$$SM_{it} = \sum_{j=1}^{m}\frac{1}{z_{ijt}}/m \tag{7}$$

   b. Positional approach:

$$SM_{it} = \text{med}\left(\frac{1}{z_{i1t}}, \cdots, \frac{1}{z_{imt}}\right) \tag{8}$$

The values of SM_{it} measures presenting (7) and (8) form can be higher or lower than 1. The lower the value of SM_{it} measure the better the position of i object in relation to the remaining objects in the time interval from $t = 1$ to $t = T$. Contrary to the static approach, the dynamic approach not only shows the relationships between the objects in particular periods, but also the occurred changes in the level of the analysed phenomenon between the objects in the entire period covered by the study. The dynamic version allows for the presence of NA values in matrices. Such data are not included in the calculation of the aggregate measure SM_{it} presenting (7) and (8) form.

Empirical Results

A dynamic relative taxonomy in the positional version was used in the article to analyse professional activity of seniors in the Visegrad Group regions in the period 2015-2019. The following variables were applied in the study:

x1 – economic activity rate of the population aged 65 or over (%)

x2 – employment at the age of 65-74 per 1000 total employment

x3 – employment rate of the population aged 65 or over (%)

x4 – average number of weekly working hours in the main job of the population aged 65-74

Variables x1-x4 represent stimulants where higher values are more preferred. The study was based on the data from Eurostat REGIO database.

Table 3 presents SM_{it} aggregate measure values showing changes in the level of professional activity of seniors in the Visegrad Group regions in 2015-2019. The positional approach of SM_{it} measure was applied in the study, using the median presenting (8) form. The lower the SM_{it} measure value, the better the position of *i*-th object in relation to other objects in the individual analysed years and the entire 2015-2019 period. The dynamic approach shows not only the relationships between the objects in particular periods, but also the occurred changes in the level of the analysed phenomenon between the objects in the entire period under study.

Table 3: SM aggregate measure values of (8) form showing changes in the level of professional activity of seniors in the Visegrad Group regions in the years 2015-2019

Unit	*SM*					Unemployment Rate				
	2015	**2016**	**2017**	**2018**	**2019**	**2015**	**2016**	**2017**	**2018**	**2019**
European Union	0.899	0.867	0.838	0.797	0.760	9.4	8.6	7.6	6.9	6.3
Czechia	0.874	0.778	0.772	0.685	0.681	5.1	4	2.9	2.2	2
Jihovýchod	0.853	0.778	0.838	0.784	0.681	4.9	3.7	3.1	2.3	1.9
Jihozápad	0.942	0.778	0.700	0.778	0.731	3.9	3.1	2.1	1.5	1.5
Moravskoslezsko	1.114	1.169	1.000	0.797	0.980	8.2	6.9	4.7	3.7	3.7
Praha	0.554	0.533	0.522	0.426	0.373	2.8	2.2	1.7	1.3	1.3
Severovýchod	0.899	0.867	0.748	0.685	0.700	5.2	4	2.8	2	1.7
Severozápad	0.942	0.772	0.803	0.690	0.838	7.3	5.2	3.4	3.4	3
Strední Cechy	0.838	0.705	0.826	0.760	0.772	3.5	3.1	2.1	2	1.3
Strední Morava	1.410	0.990	1.043	0.852	0.845	5.3	3.9	3.3	2.2	2.2
Hungary	2.178	1.879	1.675	1.376	1.119	6.8	5.1	4.2	3.7	3.4
Budapest	1.309	1.147	1.521	1.205	0.860	5.1	4.3	2.9	3.1	2.5
Dél-Alföld	1.803	1.499	1.407	1.312	1.199	7.9	5.6	4.1	3.3	3.5
Dél-Dunántúl	2.722	1.565	1.924	1.416	1.343	8.1	6.2	6.3	5.6	4.8
Észak-Alföld	1.826	2.280	2.125	1.502	1.071	10.9	9.3	7.4	6.6	6.3

Észak-Magyarország	1.797	1.656	1.741	1.361	1.493	8.7	6.3	5.8	4.7	4.5
Közép-Dunántúl	3.063	2.130	1.587	1.426	1.230	4.4	3	2.2	2.2	2
Nyugat-Dunántúl	2.681	3.267	1.489	1.495	1.244	3.8	2.7	2.4	2	1.8
Pest	2.569	2.404	1.925	1.672	1.114	5.7	3.1	2.6	2.2	2.4
Poland	1.043	1.000	0.891	0.907	0.891	7.5	6.2	4.9	3.9	3.3
Dolnośląskie	1.246	0.952	0.766	0.810	0.857	7	5.5	4.7	3.3	3.3
Kujawsko-Pomorskie	1.607	1.175	0.959	1.057	0.890	7.9	7.4	5.5	4.3	4
Łódzkie	1.011	0.907	0.907	0.899	0.916	7.7	5.6	4.6	4.4	3.7
Lubelskie	0.850	0.970	0.980	0.907	0.899	9.3	8	7.2	6.3	5.5
Lubuskie	0.982	0.918	0.912	0.942	0.875	6.4	4.7	3.7	3	2
Małopolskie	0.886	1.140	1.065	0.907	0.892	7.2	5.2	4.2	2.9	2.8
Mazowiecki regionalny	1.400	1.181	0.961	1.052	0.935	8.3	7.8	6.4	5.7	4.6
Opolskie	1.485	1.400	1.065	1.074	1.137	6.5	5	4.3	3.2	3.2
Podkarpackie	0.973	0.957	0.755	0.845	0.942	11.6	9.6	8.4	6.5	5.1
Podlaskie	1.256	1.531	1.262	1.365	1.164	7	6.7	4.7	3.2	3.1
Pomorskie	0.742	0.765	0.725	0.748	0.764	6.6	5.7	4.2	3	2.8
Śląskie	1.401	1.562	1.326	1.230	1.287	7.2	5.4	3.9	3.4	2.4
Świętokrzyskie	1.000	0.891	0.721	0.845	0.772	10.1	8.9	7	5.8	4.2
Warmińsko-Mazurskie	1.445	1.033	1.079	1.288	1.227	9.5	8.8	7.2	5.6	3.3
Warszawski stołeczny	0.797	0.629	0.531	0.544	0.507	4.9	3.7	3.5	2.4	2.1
Wielkopolskie	1.225	1.000	0.913	0.847	0.925	5.8	4.8	3.1	2.2	2.6
Zachodniopomorskie	1.133	1.101	1.051	0.998	0.931	7.5	7	4.7	3.8	3.2
Slovakia	1.922	1.850	1.381	1.225	1.065	11.5	9.7	8.1	6.5	5.8
Bratislavský kraj	0.721	0.740	0.589	0.461	0.390	5.7	5.1	4.2	2.9	2.4
Stredné Slovensko	2.722	2.882	2.179	2.001	1.225	12.8	10.8	9.4	7.5	6.1
Východné Slovensko	2.579	2.514	2.514	2.579	1.960	15	13.2	12	10.1	9.1
Západné Slovensko	2.882	2.333	1.343	1.256	1.523	9.7	7.7	5.5	4.3	4
Parameters (for regions only)										
Mean	1.450	1.328	1.157	1.076	0.986					
Standard deviation	0.698	0.664	0.488	0.424	0.310					
Median	1.246	1.101	1.000	0.942	0.925					
Median absolute deviation	0.533	0.480	0.389	0.374	0.281					

Source: authors' calculations using R.

The graphic presentation of changes in the level of seniors' professional activity covering the Visegrad Group regions in 2015-2019 is provided in the form of line charts for the regions of V4 group countries (Fig. 1 – Fig. 4) and also a line chart comparing V4 countries against the EU average (Fig. 5).

The verification of H_1 research hypothesis was carried out using the dynamic approach of relative taxonomy method (Table 3 and Fig. 1 – Fig. 5) and dispersion measures (standard deviation and median absolute deviation).

Throughout the entire analysed period, a systematic decrease in both the mean value of aggregate measure and its differentiation can be observed (see Table 3, Fig. 1 – Fig. 5). This proves that, firstly, a systematic improvement in the level of seniors' professional activity in the Visegrad Group regions is recorded. Secondly, the differentiation between the regions of V4 group (standard deviation and median absolute deviation values in Table 3) and between the regions within each of the analysed countries (Fig. 1 – Fig. 4) is declining. H_1 research hypothesis has been verified positively. In addition, it is worth adding that the recorded higher professional activity of seniors occurred at a faster pace in Hungary (Fig. 2) and Slovakia (Fig. 4), i.e. in the countries where active presence of older people on the labour market was the lowest at the beginning of the analysed period.

The verification of H_2 research hypothesis was performed using the Pearson correlation coefficient. The significance and strength of the correlation between SM aggregate measure (Table 3) measuring

the economic activity of seniors (relative taxonomy method – dynamic version) and the overall unemployment rate in the regions (Table 3) were examined separately for each year. The results are presented in Table 4.

Table 4: Pearson correlation coefficients between SM aggregate measure (measuring economic activity of seniors) and the overall unemployment rate in the regions of V4

Specification	2015	2016	2017	2018	2019
Pearson correlation coefficient	0.3160	0.2913	0.4437	0.5580	0.5486
$p - value$	0.0207	0.0306	0.0016	6.156e-05	8.433e-05

Source: authors' calculations.

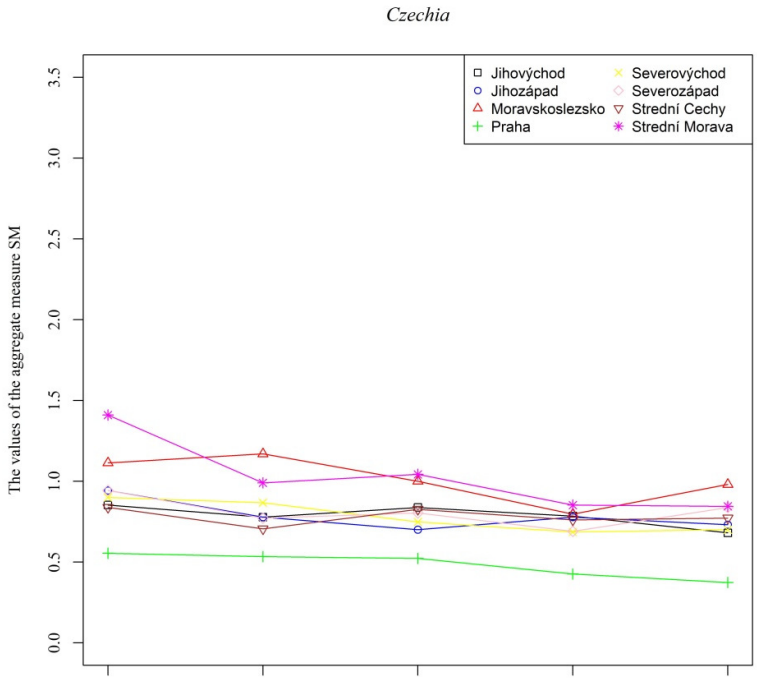

Fig. 1: Graphic presentation of changes in the level of professional activity of seniors for Czechia in 2015-2019

Source: authors' compilation.

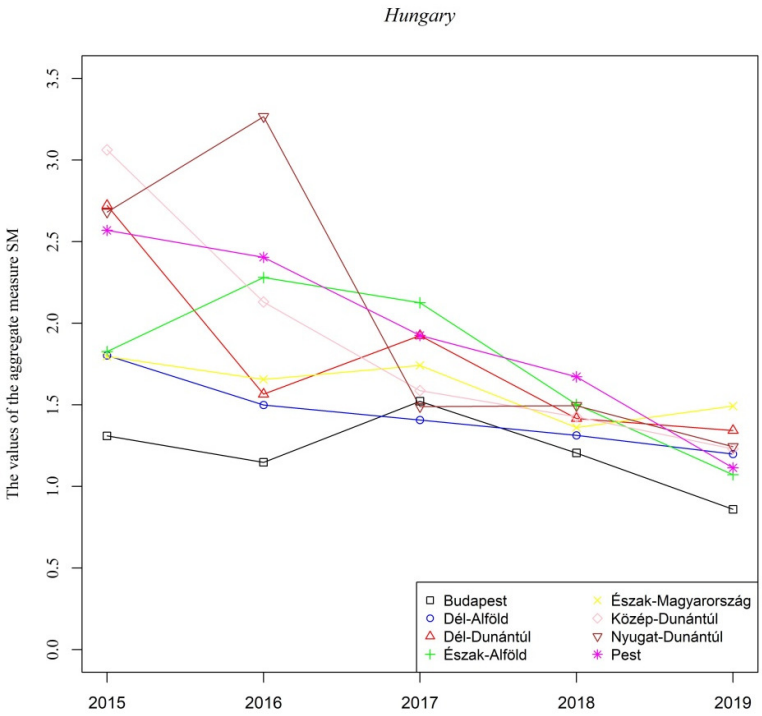

Fig. 2: Graphic presentation of changes in the level of professional activity of seniors for Hungary in 2015-2019

Source: authors' compilation.

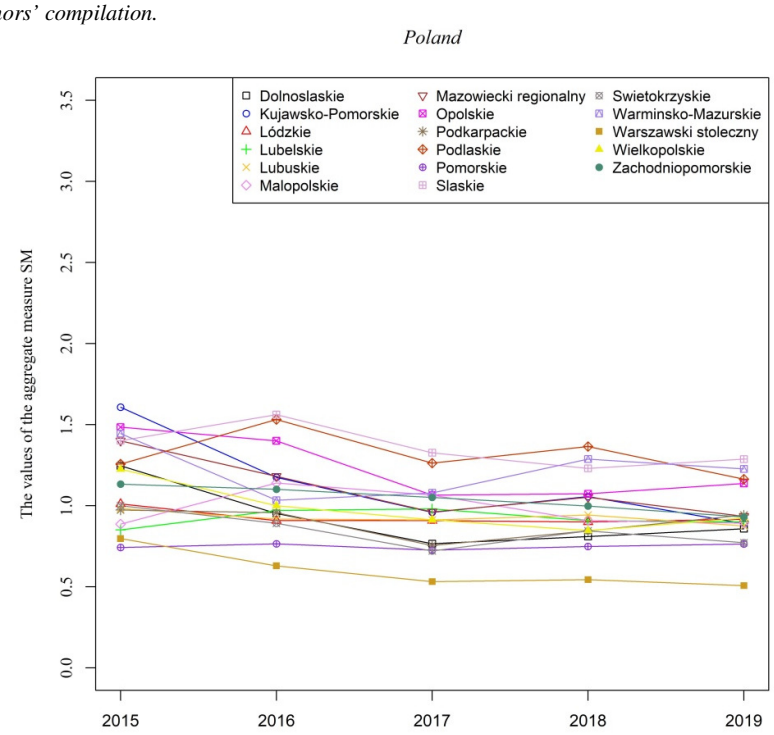

Fig. 3: Graphic presentation of changes in the level of professional activity of seniors for Poland in 2015-2019

Source: authors' compilation.

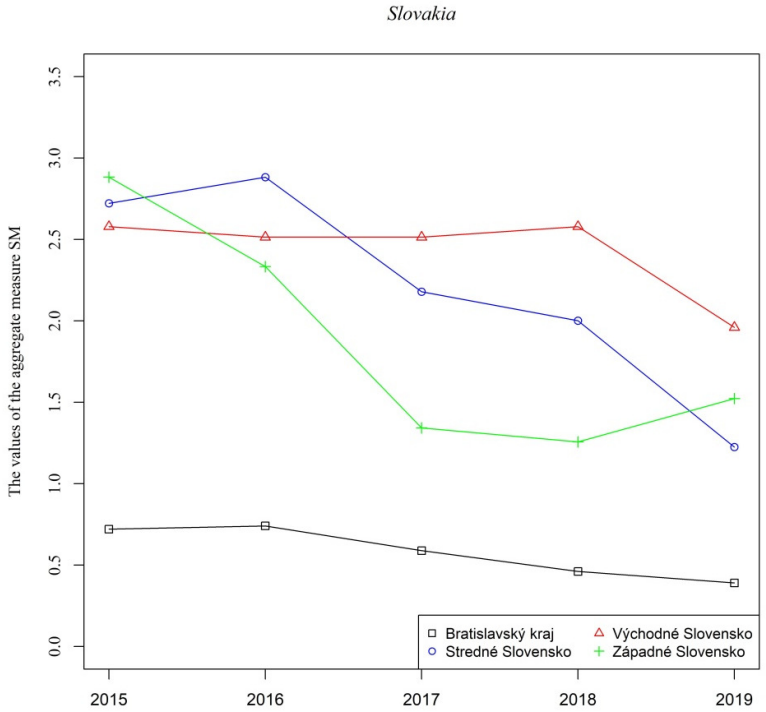

Fig. 4: Graphic presentation of changes in the level of professional activity of seniors for Slovakia in 2015-2019

Source: authors' compilation.

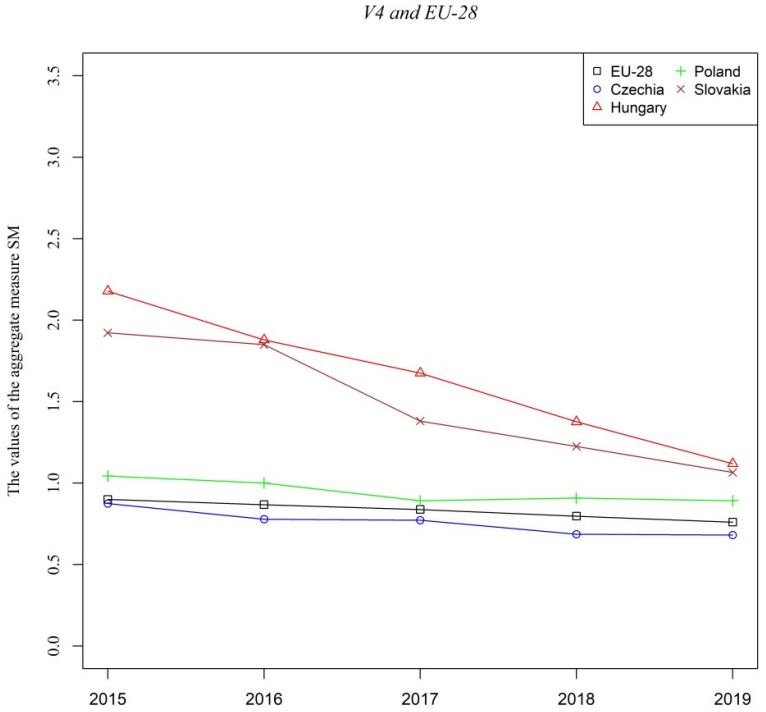

Fig. 5: Graphic presentation of changes in the level of professional activity of seniors in the Visegrad Group (*V4*) and European Union (*EU-28*) in 2015-2019

Source: authors' compilation.

H_2 research hypothesis has been verified positively. All Pearson correlation coefficients are statistically significant with the declared significance level of $\alpha = 0.05$. A lower overall level of unemployment rate in a region is conducive to greater economic activity of senior citizens. Moreover, a clearly stronger correlation takes place if the situation on the labour market is better – the unemployment rate is lower. It has been observed at the end of the analysed period, when the Pearson correlation coefficient level went up from 0.3160 in 2015 to 0.5486 in 2019.

Additional conclusions can be formulated on the basis of the conducted research after analysing the graphic presentation results of the changes in the level of professional activity of seniors in the Visegrad Group regions in 2015-2019 (Fig. 1 – Fig. 5):

1. In the analysed period, the above average level of professional activity presented by seniors in the European Union can be observed for Czechia only (Fig. 5). The situation is much worse in this respect with reference to Hungary and Slovakia.

2. The level of professional activity of senior citizens is the highest in the capital regions of the Visegrad Group countries (Praha region for Czechia, Budapest region for Hungary, Warszawski stołeczny region for Poland and Bratislavský kraj for Slovakia).

3. The strongest differentiation between V4 group regions in 2015 was observed in Slovakia and Hungary. In 2019 only Slovakia recorded a strong differentiation.

4. In the analysed period, the level of professional activity presented by seniors was significantly higher for the regions of Czechia and Poland comparing to the regions of Hungary and Slovakia.

Concluding Remarks

The demographic processes taking place in recent years, referred to as *Population ageing*, have resulted in major changes on the labour market. A growing potential ingrained in senior citizens has been noticed. The development of economic conditions delaying the moment of retirement, and thus extending the working life of seniors, has become one of the essential goals to be followed by the regional social policy. It is, therefore, crucial to perform a multidimensional assessment of the trends and the situation in terms of seniors' economic activity, taking into account such factors as, e.g., demographic variables or employment conditions in a given region.

The article presents an attempt of carrying out such an analysis. Its novelty consists in the application of a dynamic relative taxonomy following a positional approach to assess changes in the economic activity of older people at the regional level of V4 countries. As a result of the dynamic approach application it was possible not only to assess the correlations occurring in the phenomenon level between the regions in individual years of the analysed period, but also to assess mutual relationship between them in the entire period covered by the analysis. Thus, the application of a dynamic relative taxonomy allowed tracing the changes which took place both in the cross-sectional and longitudinal perspective.

The results of the study clearly indicate that between 2015 and 2019 the level of professional activity presented by seniors on the regional labour markets of V4 countries was systematically improving, although the rate of these changes was diversified. On average, it was faster in those countries where the activity of seniors was lower at the beginning of the reference period. The changes which occurred over the course of 5 years brought about a decrease in the number of variations between the regions in terms of professional activity presented by seniors. Regardless of the above, the highest level of seniors' professional activity was recorded, in all analysed years, in the capital regions of the Visegrad Group countries. In addition, the results of the study confirmed a significant correlation between the professional activity of seniors and the unemployment rate in a given region. A lower overall level of unemployment rate in the region was conducive to greater economic activity of senior citizens. Along with an improving situation on the labour market the discussed relationship was becoming increasingly recognized.

The calculations were performed using R scripts developed by one of the authors (R Core Team 2020).

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The Idea of Anthropological Key in the Sociotechnical Landscape Concept

Vladimir BUDANOV
Southwest State University, Kursk, Russia
E-mail: budsyn@yandex.ru

Vladimir ARSHINOV
Southwest State University, Kursk, Russia
E-mail: varshinov@mail.ru

Irina ASEEVA
Southwest State University, Kursk, Russia
E-mail: irinaaseeva2011@yandex.ru

Abstract

The new super-sophisticated technological pattern forming at the beginning of the 21st century demands its interpretation from the human and societypoint of view. The purpose of this interpretation is the search of adequate ways of human and new technical environment synergy. It is necessary to create new instruments of representation, monitoring and managing the complex phenomena of social techno sphere in order to explicate these processes. We are continuing to study this topic through constructionist development of sociotechnical landscape (STL) concept, the formation of anthropological keys of its understanding and interpretation. The methods of synergy, quantum theory and quantum synergy anthropology are used to search of the instruments and work with STL, create local landscapes based on different taxons in the conditions of complex topology and create anthropological keys in order to find out the basic characteristics of evaluating STL.

Keywords: Sociotechnical Landscape, Digitalization, Anthropological Key, Generalized Embodiment, Anthropological Profile.

Introduction

The problems of the digitalization of modern technological pattern reflected in generally accepted concept economics of Industry 4.0, Big data, Internet of Things, Blockchain and the theory of complexity with imminence assumes the understanding the processes of the engagement of the new technological way into the human and social lifeand its synergy with them. In order to explicit these processes it is absolutely necessary to create the new instruments of representation, monitoring and management of the complex phenomena of social and technological sphere, and we develop this topic in our research through deepening the concept of sociotechnical landscape (STL), creating the anthropological keys of its understanding and interpretation.

Methodology

In the recent decade's attempts have been taken to explain many phenomena of anthroposphere and sociality through holistic phenomena of coherence, dynamic chaos and quantum RCS effect being viewed as the new basis of holism (A. Mindell, R. Penrose, I.V. Danilevsky, B.M. Mensky). The same ideas form the foundation for the quantum-synergetic anthropology developed by V.G. Budanov [1]. This theory unites the methodologies of synergetic [2] and quantum approach, which enables us to explain the complex developing hierarchic systems of our generalized embodiment [3], and is used to create the anthropological key of reading the Sociotechnicallandscapes.

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The second ground of our methodology is the concept of sociotechnicallandscape. Let us remind you the conceptual understanding of STL, the coordinate network of which is set by the direct product of an array of meaningful social practices (SP) and an array of digital technologies (DT) or SPxDT [4]. The elements of these arrays are the taxons of generally accepted digital technologies and social practices accordingly. Due to the fact that these arrays are finite, the coordinate network will be set not by the coordinates of points on the continuous surface, but by discrete elements organized in the form of a table or matrix. Let us make the convention that the elements of SP array mark the rows of the table and the elements of SP array mark its columns. Further on we will call this coordinate matrix the matrix base of Sociotechnicallandscape. We point out that the choice of the taxons and practices as well as the formation of their tuple is a result of the expert' agreement and the convention of the researchers. In other words, unlike the geography we are used to with its metrical characteristics(closer-further), digital geography has more variety in building the coordinate base and thus introducing landscapes, which is definitely in the character of naturally not orderable or incommensurate objects.

As the third dimention («height») the degrees of social demand on technologies, riskogenics and other actual characteristics, indicators and markers, construction and analysesare used forecasting the behavior of which is the final objective of finishing the construction of the landscape. Thus over the matrix base various profiles arise(surfaces in three dimensions) which we will call suspensions or responses over the base which define particular sociotechnical landscapes. Their combination is an integral sociotechnical landscape or, to be more precise, multilandscape.

Every sublandscape creates an effective, sensitive, specific and resultative three dimension profile, which is an observable and controlled object in the terms of cybernetics possessing definite interface in order to be bound with the other sublandscapes. This allows us to organize the process of monitoring, diagnosis and analyses of the condition and the development of techno and anthroposphere on one of its characteristic (chosen indicative) parameters with the help of well-known techniques of registration, measuring and qualimetry. Such concept of STL was offered by us earlier in basic articles [5], [6] and was developed in a monography [7]. Further development of the STL concept demands a constructive definition of the understanding of suspensions over the base and the criteria of its estimation via anthropological key which is offered below.

The structural design of the STL concepts described

In the definition of landscape which we gave above we factually deal with the symbolic presentation of the direct product of practice and technology sets into the sets(clusters, assembles of objective functionals) of results: risks, perspectives and competences which are symbolically specified as SPxDT→ RI - (Results, Response of Interaction). It is principal that for every taxon and its subtaxons or response a special identification is set, which is its symbolic narrative part or its name, which allows us to create both its disposal in the symbolic databases and digital or quality description of its characteristics and concepts if such are possible in the alphabet and terms of the language being used in the topical area under analyses.

The symbolic and the digital parts together are defined as a "container" (Kont) for this taxon. We suppose the term "container" to include linguistic and digital data to represent the taxons and the responces. This understanding is close to the concept of syndromocomplexes, frames, set containers in programming, but it is used in a specific for us application area, in representating the phenomena of anthropotechnosphere.

Results or responses of interaction or RI can be reflected in symbolic as well in digital form and can be described with the help of corresponding containers. We must point out that the digital form allow us to use not only semantic and logical analyses, but to use detailed methods of applied mathematics (including the grammar of various degrees predicates). Then using the analogues of syndrome-based approach and the theories of fussy sets a contained can be presented as a linguistic variable. In this case the digital landscape is set through building a function or objective functional (heights)

prescribed on the digital components of containers of the base which reflect them into the digital containers of responses-results.

Digitalized landscape is an array of function representations Kont (SPxDT)→ Kont (RI), in which the response (vertical) is set by a traditional definite metrical axis. We should pay attention to the fact that the containers of the base and the response may have different dimensions and, generally speaking, we deal with the reflection of the multitude of different dimensions into each other which is the subject of catastrophism. For our purposes of visualization when constructing the landscape we usually observe the behavior of one parameter. If we are able to represent the base container as the direct product of containers in the taxon Kont (SP)×Kont (DT), we will get a typical image of a landscape in a three dimension system of coordinates. If in the containers of all the taxons there is a general characteristic (like levels of financing or popularity), we get a landscape imminently over the semantic matrix base.

The anthropological key of digitalization or the ontology of generalized embodiment

Let us now turn to thehuman-like parameters which are often badly formalized. They inevitably arise when estimating the anthropological and social risks and deformations when introducing this or that technology into the social practices. At the ground of the approach that we offer the idea of introducing the concept of "anthropological key" lies or, to be more precise, the functional ontologies of generalized human embodiment, which are the subject of digitalization and can characterize the degrees and the risks of human nature deformations. We should point out that such problem definition is offered in the book by B.Ju. Judin [8]. We suggest to use the original methodology of quantum synergetic anthropology mentioned above.

Any instants of human external activity or internal being are reflected in the functional bodies of the human and the society [9]. Let us introduce our system of generalized embodiment.

Somatic body is viewed by us as the description of the object at a minimum rate of stimulation when we abstract from its reactions. This is the description of the material body and its elements in the space.

Energetic body (vitality) describes the degree of body mobility itself, the speed of its elements' relative position change, the intensity (the ability to produce work) without external stimulations. This is the body of connections between the elements and the energy of these connections.

Reactive emotional body describes the simplest reactions of the body on the contact with the reality, perception from sensory organs, the ability of the body to localize the energy and the actions in response to particular stimulations. This body allows to resist the environment and support homeostasis (if the type of the reaction corresponds). The physical body together with the reactive body can be called the body of flesh or the body of desire. It is important to mention that in our classification a robot also possesses flesh (in the form of non-protein material). The emotional body(the second component of reflective emotional body) is connected with psychosomatic reactions and reflective processes.

Logical or algorithmic body is characterized by the reaction of the body to multiply repeated stimulations, on constant contact with the environment and the reactions it remembers. As a result behavior reflexes, logical bounds "if-then", algorithms formed by the environment are worked out. Logical or algorithmic body in its turn is activated by emotional and motif-based motives of the body of desire. That is why we can speak of the logical body as of the body of common sense. This body is most effectively developed and inherited in semiotic systems of human culture and is effectively modeled by the computer systems of artificial intelligence. Notice that the bodies described(1-4) have until present time been well modeled by the modern methods of nature studies an information technologies and have recently been fulfilled by the principles of synergetic and quant coherence.

The following bodies of high mental organization are impossible to understand without bringing in the synergetic and quantum holistic principles. *Intuitive creative body* appears in emergent acts of

valuable information generation such as imagination, recognition, insight, foreseeing which are not given in the forms of reflective or logical action and are not connected with search operations or mechanical imitation. In particular the intuitive body is responsible for changing the algorithms without long "transitive" procedures of working out a new behavioral pattern, which is an integral part of creativity. Sometimes it turns long logical stages into the act of insight or suggests you a "crazy" hypothesis. It gives us a ground to speak about a particular type of working with time, memory and forecast, converted knowledge. This body enables the system to be superadaptive in the new circumstances.

The complex of interaction of the emotional, logical and intuitive bodies is sometimes often called a psychomental body (sphere). It is particularly responsible for the perception and the recognition of our internal embodiment, for forming the image of remote body of culture and body of senses. The central body or reasoning, the monitor of being is the logical body, it includes the codes of recognition and the body of senses, the subject body after Husserl. From the mentioned above we can make a suggestion that the intuitive body can "connect with", communicate with theother systems, tune to them. It delocalizes and its boundaries are ambiguously larger than the boundaries of the physical body, which enables to read the specific, noosphere informational potential.

Coherent empathic body is responsible for the states of superopenness and unity with the other bodies, phenomena, parts of reality, people and world. For example they are the states of experiencing the love towards yourself, fellow human beings and the "oceanic" feeling of love for the whole world which is the peculiar feature of saint, spiritual people. However the feelings can be different, even opposite, for example, hate. The intensity of these states, their subsequences set the measure of coherence. It is also the state of empathy or the concentration on the object which has always been the basis of religion, art, science, in-depth communication, psychotherapy, concentration, hypnoses and magic. The mechanisms of realization of this body are the same as in the case of the intuitive body, i.e. holistic phenomena of dynamic chaos and the phenomenon of Podolsky-Rosen.

The body of will declares itself as an instant state of readiness, determination, potential of action and power. The body of will is an aspiration for the aim in all the bodies (apart from the physical one perhaps), i.e. beginning with the body of flesh. The power of will depends on the degree of coherence, sub bodies of will in the other bodies, that is why the body of will is delocalized as well as the intuitive and the coherent body and is described with the same transconscientious holistic mechanisms. It shows in the rigidity of the negative feedback while achieving the goal: in the body of reflex it is will for life, in the body of emotions it is will for pleasure, in the body of logic it is will for explanation. We must point out that the bodies of intuition, coherence and will are mostly transpersonal and transconscientious. They are often referred to as the spiritual body of the human. Here we followed our works [10, p.162-163] and [11].

In addition to the 7 functional bodes mentioned, in order to describe the social communication which is radically deformed in the age of digitalization, we will introduce 3 more bodies of communication. Communication can be easily measured if divided into three types.

The body of material reality communication (MRC) is the immediate communication with the other people eye-to-eye, with nature and with gadgets. Here we fully realize the processes of empathy and socializing, the communication channel here is straight, without mediation.

The body of virtual reality communication (VRC) is the communication in our imagination with people and nature, autocommunication, communication through art, books, television, radio, virtual digital game characters and so on. Here a great potential of upbringing, education and translation of cultural examples and knowledge, the language of science and creativity can be seen.

The body of augmented reality communication (ARC) is the communication with other people and material reality via technology, gadgets, navigators, internet of things, networks in the web, distance learning tools and so on. In this type of communication the information exchange goes with

tremendous speed, we can witness fast processes of social, political self-organization and manipulation, creating new actors of social development – digital platforms and social networks.

Conclusion

For the representation of sociotechnical landscapes the ontology of states built enables to represent the anthropological profile of personality rather structurally and vividly in particular activity states. The visual realization on the anthropological key can be conveniently pictured in the form of Cartesian orasterial diagrams of anthropological profile basing on 12 quantitative characteristics of activation mentioned above functional bodies. These may be for example states of involvement into different types of free time games, every day or professional activities. Such profile diagrams are a basic part of anthropological key that describes the influence of digital technologies of different social and personal practices and it enables us to introduce the criteria of their anomaly, possible risks and ways of managing them, compensation correction of the anthropological key.

Further on the ontologies and social and personal states reviewed should be completed by temporal activity aspects and to understand the reason and the tendency of the change in the state it is necessary to consider life processes, take into account the activity and environmental factor of human and society development. We hope to dedicate our next work to these problems.

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Diseño Y Estructuracion De Una Guia Metodologica Para Consultoría Empresarial Y Contable Para Las Mipymes Del Sur De Bogotá – Colombia

Manuel Ricardo REY ROMERO
docente investigador Corporación Universitaria Minuto de Dios UNIMINUTO, Bogotá D.C., Colombia, mreyromero@uniminuto.edu.co

Cliden Amanda PEREIRA BOLAÑOS
docente investigador Corporación Universitaria Minuto de Dios UNIMINUTO, Bogotá D.C., Colombia, cpereirabol@uniminuto.edu.co

Resumen

El presente artículo evidencia los resultados derivados del proyecto de investigación titulado Propuesta de una guía metodológica para consultoría empresarial y contable para las micro, pequeñas y medianas empresas MiPymes del sur de Bogotá Colombia; clasificadas así dichas organizaciones por su número de empleados y volumen de ventas y cuya actividad económica atiende los sectores económicos industrial, comercial y servicios; el proyecto ejecutado surge luego de haber diagnosticado en un estudio previo la problemática y necesidades en las áreas funcionales administrativa y financiera de las organizaciones objeto de estudio del proyecto, es decir de las empresas mencionadas en temas de asesoría y consultoría externa, pues a partir de los resultados obtenidos en dicho estudio, y después haber realizado una referenciación conceptual, teórica y legal, pertinentes con las categorías del estudio, se genera el interés de formular una herramienta de apoyo que atienda esas necesidades identificadas, siento esta, una guía metodológica de apoyo para que por un lado, los estudiantes y profesionales de ciencias empresariales implementen en sus procesos prácticos de asesoría y consultoría; y desde otro, los empresarios obtengan beneficios al recibir apoyo funcional y efectivo en la atención de sus requerimientos detectados. Se presentan en el documento, los aspectos inherentes al desarrollo de la investigación, su conceptualización y diseño metodológico, así como los resultados y conclusiones generadoras de futuras discusiones en la formulación de proyectos orientados a la generación de herramientas de apoyo a las gestiones gerenciales de una organización.

Palabras Clave: Guía metodológica, consultoría empresarial, consultoría contable, MiPyme.

Introducción

La generación de riqueza y de valor en un sistema económico se determina entro otros factores, por la creación y fortalecimiento de la estructura organizacional bajo figuras empresariales, de los diferentes sectores productivos. Por esta razón y desde las instituciones de educación superior IES y los programas de ciencias empresariales de las mismas en sus procesos de formación profesional, se hace necesario la generación de nuevas estrategias y herramientas que contribuyan al fortalecimiento del sistema productivo; orientadas todas ellas, al crecimiento, desarrollo y proyección de las organizaciones que lo componen, así como a la mejora en la gestión integral de las mismas.

Para la generación de dichas estrategias es necesario que de manera estructurada y en forma periódica se identifiquen las necesidades y problemáticas de las organizaciones en sus diversos niveles funcionales con el objetivo de formular alternativas de solución; siendo justamente la identificación de dichas necesidades el punto de partida para el diseño del producto final del proyecto ejecutado como lo es la guía de consultoría; para el logro de la misma se tuvo en cuenta el diagnóstico realizado

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en un estudio previo sobre MiPymes, , una revisión documental desarrollada sobre consultoría y temas relacionados así como un análisis de las actuales estrategias educativas de formación estudiantil y proyección social de las IES, como convenios, contratos, pasantías y práctica profesional, que buscan apoyar a alas empresas; la suma de todas ellas condujo a la creación de la guía metodológica de consultoría empresarial y contable para las MiPymes como herramienta de trabajo de los estudiantes y futuros profesionales en sus procesos de asesoría organizacional desde espacios como la práctica profesional y obviamente en el ejercicio ya pleno de su disciplina, atendiendo de esta manera al empresario y sus necesidades.

El desarrollo de la investigación desde su planteamiento se reseña en el siguiente documento, presentando luego de aplicar un diseño metodológico de enfoque cualitativo, de carácter descriptivo y soportado en la revisión documental y trabajo de campo (grupos focales y cuestionarios [2,3,4], los resultados alcanzados al diagnosticar funcionalmente las organizaciones así como las conclusiones al contextualizar y conceptualizar la guía metodológica diseñada como estrategia educativa a ser utilizada por las IES junto con otras alternativas existentes, para acercarse y fortalecer a las empresas; la guía es susceptible de ser aplicadas en cualquier contexto educativo siendo simplemente ajustada a las necesidades del mismo y al cumplimiento de las normativas institucionales y legales en materia educativa y laboral [1].

Como aspecto introductorio para abordar el proceso investigativo desarrollado, se evidencian los referentes teóricos y legales que enmarcan la actividad empresarial en Colombia, y se describen los conceptos conducentes a la definición de la guía como producto final, destacando la metodología empleada, así como los resultados y conclusiones generadoras de discusión en entornos educativos con relación al diseño de instrumentos como la guía propuesta. Finalmente y antes de continuar es importante mencionar que las pequeñas y medianas empresas objeto de estudio del proyecto, a nivel mundial se han convertido en un tema relevante en la actualidad económica para muchos países; los cuales, generan interés en la creación y fortalecimiento de empresas cada vez competitivas como motor de desarrollo de sus gobiernos [5] Dicho interés se refleja en el incremento porcentual que de manera considerable ha tenido el empleo, la producción y el comercio gracias al desarrollo de las Pymes [6]; razones todas válidas para entender que el sector educativo debe abordarlas investigarlas y proponerles soluciones desde su alcance.

Metodología

La investigación realizada fue de tipo descriptiva con un enfoque cualitativo, que permitió conocer el contexto general de las MiPymes en su gestión, como insumo para el análisis de su situación interna en los sectores de industria, comercio y servicio. Se realizó un análisis general utilizando la técnica de revisión documental con relación al estudio de las empresas y específicamente de las ubicadas en el sur de la ciudad de Bogotá - Colombia; para dicha revisión se consultaron fuentes secundarias de orden cibergrafico y bibliografíco tales como informes, investigaciones y estudios de carácter gremial, público y privado a nivel internacional, nacional y local de los últimos cinco años de vigencia. De la misma manera en el proceso investigativo se utilizó la técnica de Grupo focal para el trabajo de campo, pues esta permite identificar desde la fuente empresarial las necesidades de las MiPymes en la gestión organizacional para la búsqueda de soluciones; tal y como lo afirma [7] quien menciona que para el desarrollo de un producto o servicio, es útil probar el mismo en el contexto real; de igual es importante destacar que a través de los grupos focales se puede trabajar con instrumentos de análisis en profundidad y detalle, donde la discusión grupal se utiliza como un medio para generar entendimiento profundo de las experiencias de los participantes.[8] Para la recolección de datos de los Focus Group se trabajaron: memorias en audio, notas de campo durante la sesión donde se identifican las ideas principales y observaciones relevantes y grabación en video [9]

Para la selección de la muestra se utilizó el muestreo probalistico aleatorio simple en el cual, cada una de las pequeñas y medianas empresas tuvieron la posibilidad de ser elegidas del total poblacional de las mismas ubicadas en el sur de la ciudad de Bogotá- Colombia. Los participantes en este muestreo, son seleccionados porque tienen alguna experiencia en común en grupos homogéneos para que se produzcan fácilmente el intercambio de ideas. [10] Considerando lo anterior se determinó

realizar un total de 6 grupos focales abordando la problemática en cinco localidades del sur de Bogotá - Colombia, con el fin de conocer conductas y actitudes de los pequeños y medianos empresarios en cada sector y de acuerdo con la actividad económica que desarrollan. Adicional a los grupos focales se aplicaron encuestas semiestructuradas a los empresarios, para la recolección de la información de conocimientos explícitos necesarios para analizar las características socioeconómicas, laborales y empresariales; con el fin de complementar la información recolectada en la investigación cualitativa para un análisis con mayor profundidad. [11] Para el análisis de la información se toman los documentos relacionados con el tema, y los resultados obtenidos en el estudio; que tienen como objetivo documentar las experiencias de los empresarios en su gestión empresarial a partir de los aspectos administrativos, contable y financiero, de tal manera que permita desde la realidad elaborar supuestos que aborden la problemática. Una vez aplicados los instrumentos de recolección de información; se procedió a tabular y sistematizar la totalidad de datos recolectados para lo cual se utilizó la técnica de triangulación metodológica, en la cual y mediante la observación directa del investigador, el cuestionario semiestructurado y el grupo focal se generaron las conclusiones conducentes a identificar el contexto de gestión organizacional de las MiPymes analizadas. La aplicación de diversos métodos para obtener información que pueda ser comparada y retroalimentada entre sí como insumo para llegar a conclusiones. [12]

Resultados

Una vez sistematizada la información luego de haber realizado la revisión documental y el trabajo de campo establecido, se obtuvieron los siguientes hallazgos por categoría de contexto del proyecto, es decir desde la situación a nivel internacional de las empresas en su desarrollo funcional, hasta la identificación de necesidades en el ámbito local en los diferentes sectores económicos; como insumo para la generación de la guía. Los resultados fueron los siguientes:

Aspectos Relevantes De La Revisión Documental A Nivel Internacional

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Varias organizaciones no gubernamentales adelantan estudios sobre el comportamiento de las MiPymes en los países, como es el caso del Grupo del Banco Mundial y la Corporación Financiera Internacional [13] quienes realizaron encuestas a 45.000 empresas en 106 países en desarrollado, en función de la medición basada en la percepción de indicadores ampliamente utilizados para la clasificación y calificación crediticia e inversionista a nivel internacional, estos resultados dan a conocer los principales obstáculos que atraviesan las Pyme en el sector privado; se identifican las 15 dificultades más relevantes: el acceso al financiamiento con un 16.5%, el acceso a la electricidad 13.5, informalidad con casi 12%, tasas impositivas 11.3%, inestabilidad política 8.2%, mano de obra calificada 8%, corrupción 6.5%, robo y crimen asociado 5.3%, reglamentos, licencias comerciales, permisos, transporte, administración de impuestos, regulación personalizada y laboral un 3% y tribunales 1% como se muestra en la Figura 1.

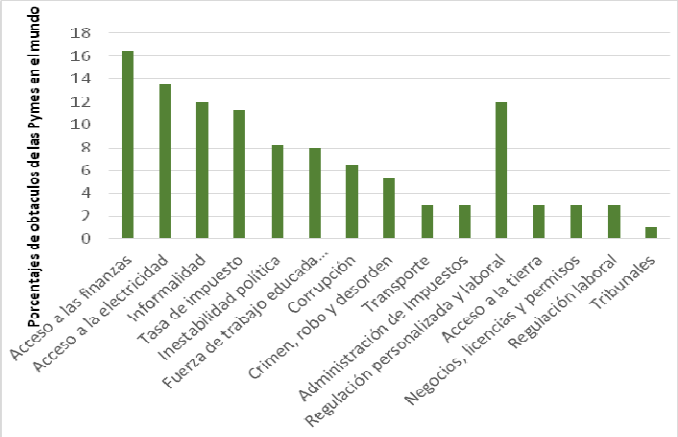

Figura 1: Principales restricciones que afrontan las empresas para sus operaciones.
Fuente: IFC Jobs Study Assesing Private Sector Contributions to Job Creation and Poverty reduction January 2013. World Bank Group Enterprice Surveys

Resultados Significativos Por Sector Económico Caso Colombiano

Las MiPymes en Colombia constituyen un grupo sobresaliente de empresas, se considera que: "Su estructura productiva se caracteriza por la existencia de pequeños establecimientos que contribuyen significativamente a la creación de empleo, a la generación de riqueza y a satisfacer necesidades de mercados poco atractivos a las grandes empresas" [14, p.33]. Como se ha dicho en el mundo las Pymes representan un sector empresarial importante para la economía de cada país y requiere un estudio detallado para conocer su comportamiento. El sector empresarial de las pequeñas y medianas empresas, desempeña un papel importante en el desarrollo actual del país, ya que influye en el crecimiento de la economía; en cierto modo, este sector de pequeños empresarios es uno de los más vulnerables frente a las exigencias del mercado que los obliga a ser cada día más competitivos, enfrentándose a problemas como escasa capacitación técnica y empresarial, así como su gestión administrativa, financiera y operacional entre otros, son algunas de las dificultades por las cuales atraviesan las pymes actualmente, tal como lo afirma la Universidad Escuela de Administración de Negocios EAN en la investigación realizadas por el grupo de investigación en Pymes.

Según el grupo de investigación G3Pymes de la Universidad EAN, las pymes representan el 99,9% del total de las empresas en Colombia, cerca de 1,6 millones de unidades empresariales las cuales de igual manera han aportado cerca del 38% del PIB total, teniendo una importancia muy relevante en la generación de empleo. Sin embargo, el tiempo de sostenibilidad de las mismas es muy corta; solamente el 50% de ellas sobreviven el primer año y solo el 20% al tercero, debido a la poca importancia que le dan a la innovación y al conocimiento; lo que genera falta de competividad y permanencia en el mercado [15]. Entre las grandes debilidades de las pequeñas y medianas empresas que se han identificado en Colombia se encuentran: capacitación, programas de emprendimiento, falta de proyección operacional, desconocimiento legal para exportación, manejo logístico entre otros [16]. De igual manera las pymes colombianas presentan dificultad en la proyección de su negocio de manera global, muy pocas exportan porque cuentan con limitaciones organizacionales, financieras y técnicas, desconocimiento de normas de otros países para exportar rezagándolas al mercado local; las operaciones logísticas se considera otra limitante referente a canales de distribución y volúmenes de producción, De esta forma como lo mencionan Codina, Pagan, Brown, Carmona, Cursi, Dorsey del Ángel, Sandoval. (2005) citado en [17]. la administración de las Pymes demanda un profundo conocimiento de las áreas que afrontan problemas por la globalización, ya que no solo se trata de manejar empíricamente un negocio, sino también es necesario tener conocimientos de administración para enfrentar el mercado actual en las áreas de: gerencia y planeación estratégica, mercados, recursos humanos, comportamiento organizacional, análisis financiero y evaluación de proyectos y adopción de las tecnologías de la información y comunicación Tics. En este orden de ideas otros aspectos de la problemática de las Pymes son: obstáculos del entorno, problemas macroeconómicos, barreras institucionales de infraestructura y de servicios y dificultades a nivel empresa; limitaciones que impiden llevar a cabo procesos de fortalecimiento para su crecimiento económico [18]

En lo que respecta a la diferentes problemáticas que los empresarios enfrentan, se puede decir, que según un estudio de la Asociación de Emprendedores de Colombia ASEC, radica en la falta de capacitación en lo que se refiere al emprendimiento; tal estudio revela que el 56% de los colombianos consultados creen que en las instituciones de educación superior no se brinda suficiente formación en emprendimiento, lo que indica que el empresario busca la forma de crear un mercado más competitivo pero la falta de oportunidades en adquirir las herramientas suficientes para competir y obtener resultados a largo plazo, radica en las falencias en la academia.

Según el análisis de las experiencias de la gestión de los empresarios analizados en los diferentes grupos de enfoque y encuestas aplicados a los mismos se puede concluir que hay aspectos propios para cada actividad económica posibilitando identificar las principales necesidades de cada grupo de

empresarios dedicados al comercio, industria y prestación de servicios como se muestra en la Figura 2.

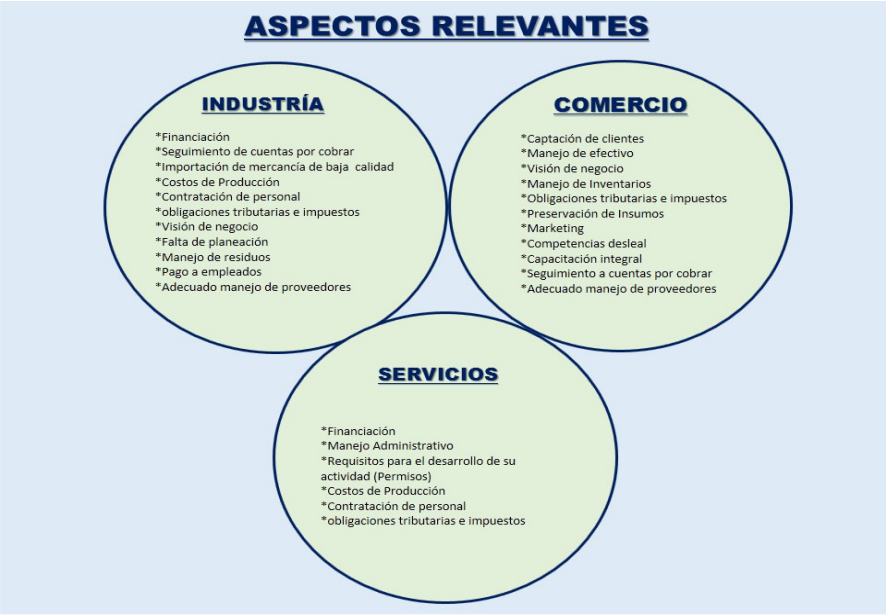

Figura 2: Aspectos relevantes de las necesidades según actividad económica de las mipymes de las localidades del sur de Bogotá

Fuente: Elaboración propia resultado de la investigación. Triangulación de caracterización económica, empresarial y laboral, Focus Group y encuestas

Así mismo y a partir de la información obtenida en realización de los Grupos focales, se genera una triangulación de dicha información junto con la revisión documental de orden internacional y nacional; evidenciándose las necesidades de los empresarios que predominan en cuanto a temas administrativos, contables, y financieros. Ver figura 3

Figura 3: Principales necesidades en gestión empresarial mipymes del sur de Bogotá

Fuente: Elaboración propia resultado de la investigación. Triangulación de caracterización económica, empresarial y laboral, Grupo focal y revisión documental internacional y nacional.

Bajo dichos resultados se puede concluir que las principales temáticas que requieren atención en la gestión del empresario obedecen a diversos procesos y procedimientos de carácter administrativo, financiero y legal, elementos claves en el momento de proponer los contenidos de la guía producto del proyecto.

La Guía Metodológica

Las guías didácticas o guías de estudio constituyen un recurso esencial utilizada para el proceso de aprendizaje de la educación superior fundamentada en el constructivismo. Las guías son técnicas utilizadas para la formación técnica, tecnológica y profesional de la modalidad virtual, semipresencial y presencial, puesto que constituyen herramientas para los docentes no solo para orientar sino también también contribuir a la estructuración del proceso de aprendizaje del estudiante y organización de su propio trabajo.

Estructura Guía Metodológica

Establecer la estructura de una guía metodológica no solo obedece a unos requerimientos definidos quizás desde un referente teórico, sino a las necesidades y particularidades de quien la diseña en función de sus prioridades, así como del usuario final de la misma.

Por lo tanto, no existe una única estructura recomendada o definida para elaborar una guía metodológica, sino que esta atiende los objetivos mismos de ella y la funcionalidad que se busca al elaborarla y aplicarla. Morales, Martínez y Carrillo, (2015) afirman que la consultoría indistintamente de su ámbito de aplicación, presenta una serie de fases de asesoramiento que buscan contribuir al logro de los objetivos de la organización que interviene. Aplicando técnicas y herramientas puntuales que contribuyan a su cometido; un consultor puede diagnosticar, emitir juicios, recomendar y proponer entre otras tareas, acciones concretas para contribuir a solucionar un problema específico dentro de la organización que lo contrata. Sea cual sea su tarea y alcance definido en el objeto mismo de la consultoría, es recomendable seguir un proceso claro y específico que permita desarrollar con éxito, la labor encomendada.

Dicho proceso constituye entre otras, una de las bases más sólidas para generar una guía metodológica de trabajo en consultoría, y en el caso puntual en las áreas empresarial y contable; constituyendo a la misma en un instrumento a través del cual el orientador o usuario de la guía sigue un procedimiento estándar paso a paso que le permite intervenir de forma clara, las áreas y necesidades de la organización, de manera planificada, organizada y direccionada hacia la obtención de lo que se requiere, a saber: la detección de un problema o necesidad, la identificación de un punto crítico, la generación de una propuesta de acción; o la implementación de una estrategia en algún área empresarial. Mediante una guía estructurada, el beneficiario final, es decir el empresario de la MiPyme podrá ser atendido en sus expectativas de manera ágil y objetiva; y encontrar respuestas que dependiendo de su interés y aceptación puede validar dentro o no dentro de su organización para el logro de los objetivos buscados.

Bajo esta apreciación, y atendiendo el desarrollo de la guía a estructurar, se puede mencionar de manera específica que, para el ámbito empresarial, se debe definir inicialmente un modelo de consultoría a seguir, pues existen varios de ellos, dependiendo de la disciplina y el objetivo de la misma; pensando en ello, se puede establecer pensar que aquel que puede aplicar, es el de Consultoría de Procesos; Shein (1998), lo define como "el conjunto de actividades del consultor que ayudan al cliente a percibir, a comprender y actuar sobre los procesos que ocurren en su medio o ambiente, se busca transferir prácticas y teorías al empresario" (p. 80).; pues caben dentro de los contextos organizacionales de una empresa. El modelo mencionado, se evidencia en el cuadro 1 bajo la denominación de procedimientos aplicados. Como se muestra en Figura 4.

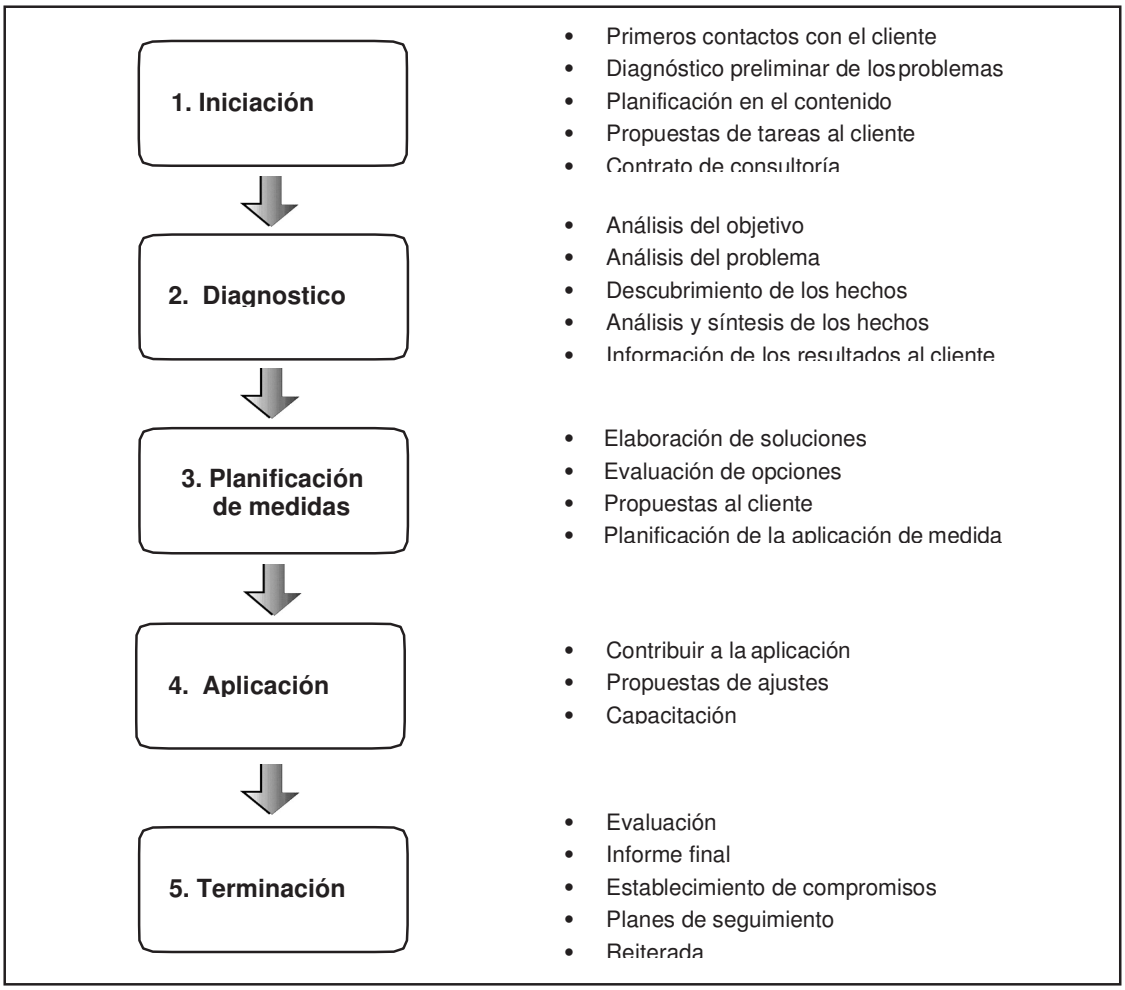

Figura 4: Etapas de la Consultoría

Fuente: Kubr (1997)

Como se puede apreciar en el cuadro, los numerales 1 al 5 corresponden a las fases del proceso de consultoría, destacando en la columna de la derecha frente a cada etapa, las tareas a realizar en cada una de las mismas, iniciando estas, con un diagnóstico y finalizando con una evaluación integral de todo el proceso desarrollado; acotando en todo caso, que no se definen como tal los procedimientos a seguir en cada tarea, pues sería sin duda muy dispendioso hacerlo y muy detallado dependiendo de la naturaleza y complejidad de la empresa de la que se hable. Lo planteado permite entender que junto con el modelo de consultoría, es importante definir el proceso como tal, como insumos para acercarse a la estructura y desarrollo de una guía metodológica del asunto, pues sienta las posibles etapas que de carácter genérico se definirán para ejecutar un proceso de consultor; destacando de igual forma que las tareas vistas en cada fase pueden asimilarse a parte de las intervenciones a realizar en cada

una de las áreas de la organización que pueda ser objeto de consultoría; siendo también insumo final de la estructura a plantea

Componentes de la Guía Metodológica

En la figura 5 se aprecia la estructura básica de la guía diseñada, sus componentes en su estructura y los servicios que prestará, entendiéndose la misma como un documento estructurado en el cual se presentan los siguientes elementos:

1. Título de la guía.
2. Objetivo de la guía.
3. Contenido por área de gestión a atender.
4. Procedimiento a seguir en el abordaje de cada área de gestión.
5. Formatos de protocolos y procedimientos sugeridos en cada área de gestión a intervenir.

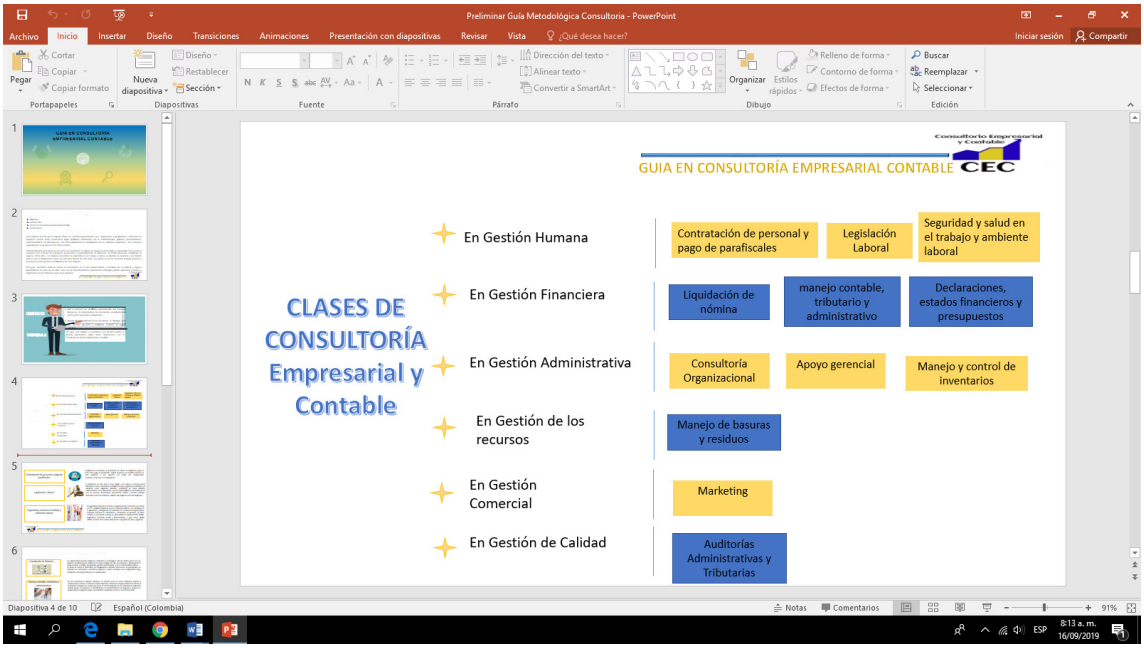

Figura 5: Estructura de la guía metodológica

Fuente: Elaboración propia resultado de la investigación. Triangulación de caracterización económica, empresarial y laboral, Grupo focal y revisión documental internacional y nacional.

Conclusiones De Discusión

Una vez analizado los resultados ya presentados de manera global, así como la estructura de la guía propuesta se puede concluir entre otros aspectos con relación al contexto del sector productivo evaluado, los siguientes elementos:

1.A nivel interno la problemática se genera principalmente por falta de apoyo de entidades financieras, que les permitan a las pequeñas y medianas empresas adquirir créditos para la ampliación de su negocio, debido a que no tienen capacidad de endeudamiento, respaldo o vida crediticia.

2. Las necesidades mencionadas en los resultados se basan en capacitación oportuna y asertiva en los campos relacionados con el área administrativa, contable y financiera, puesto que el principal interés de los empresarios se ha limitado a la comercialización de productos.

3. En aspectos financieros y comerciales se destacan como relevantes, la deficiente estrategia para la fijación de precios, así como la ausencia de gestión en mercadeo ventas y publicidad.

4. De igual manera la influencia del entorno externo como por ejemplo las políticas del gobierno en materia laboral, fiscal y tributaria, la competencia desleal, la incursión de productos extranjeros en el mercado colombiano entre otros factores ha generado disminución en ventas considerablemente afectando la estabilidad de sus negocios.

5. Las problemáticas son comunes en los diversos sectores económicos a los cuales pertenecen las empresas.

Finalmente, a partir de los resultados obtenidos se genera la necesidad de proponer estrategias de gestión para fortalecer la formación de los estudiantes universitarios de ciencias administrativas específicamente desde la visión de la práctica profesional en el sector real productivo; dicha premisa debe generar en la academia, la revisión de sus actuales mecanismos de acercamiento a la realidad empresarial de las organizaciones en las cuales se desempeñaran sus egresados, para conocer de mano no solo las necesidades de las mismas sino el interés y mecanismo que pueden preferir dichas organizaciones en el momento de ser abordadas para recibir procesos de consultoría y asesoría.

Qué mecanismos se convierten en los ideales para realizar dicha tarea debe ser el interrogante a resolver, máxime cuando estamos en la era de la transformación digital y el uso de las Tics, que obliga a indexarse al empleo efectivo de la tecnología en los procesos mencionados.

De igual manera para el académico e investigadores de las organizaciones empresariales es relevante el analizar cuáles serán las futuras necesidades a atender en las MiPymes en la era de la cuarta revolución industrial como insumo para genera nuevas habilidades y fortalecimiento de las actuales en tema de gestión en la consultoría empresarial.

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Exploration in strategic planning

Irina V. SHARF
National Research Tomsk Polytechnic University, Tomsk, Russia, irina_sharf@mail.ru

Natalia V. CHUKHAREVA
National Research Tomsk Polytechnic University, Tomsk, Russia, Natasha@tpu.ru

Anna V. ANTOSHKINA
Kuban State Technological University, Krasnodar, Russia, annaant@yandex.ru

Abstract

The perspectives of resource-producing regions are closely connected with the state of mineral resource base, which at present is deteriorating qualitatively and quantitatively, hence, in many strategic programs of socio-economic development particular attention is paid to the increase of exploration activities, development of the Earth sciences to expand the knowledge on poorly studied areas based on latest technologies and innovation. The article presents a comparative analysis of socio-economic aspect of exploration in strategic programs of the chosen countries, namely, Canada, Australia, and Russia, to reveal similarities and differences. The research has shown various approaches toward development of new areas and practices of stimulating exploration activities as well as similarities in socio-economic consequences of field prospecting, exploration, and development.

Keywords: mineral resource, strategic planning, stimulation of exploration, region, socio-economic development.

Introduction

In the international practice, planning of exploration is performed at two levels. At the level of production companies interested in resource replacement to maintain long-term sustainable production, and at the governmental level to provide mineral resource safety to sustain socio-economic development.

It should be noted that in the scientific literature efficiency of exploration is often considered as growth reserve rates as compared with current oil and gas production that can be achieved with high costs, but the efficiency [1, 2], in authors' opinion, should be considered not only from the standpoint of proper choice of trends in exploration, but also with regard to sustainability of regional socio-economic development [3].

In the modern condition of deteriorating qualitative and quantitative characteristics of resource base, this aspect is becoming of particular significance and reflected in the programs of mineral resource base (MRB) development.

The goal of our research is comparative analysis of different aspects in planning exploration activities in foreign and Russian practices in connection with the objectives of regional socio-economic development.

Materials and Methods

The basic research materials are statistic and official data from Ministries and Offices of the countries involved, namely: Canada, Australia, and Russia. The choice is conditioned by the fact that these countries are the leaders in both production and export of mineral resources and hydrocarbon

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resources. The main research method is empirical one, which is in demand to reveal the major common and different trends in planning of regional socio-economic development with regard to the significance of exploration activities.

Results

The International Practice in Involving Exploration in Socio-Economic Development of The Regions

The significance of exploration for a country development is observed in the work by Ericsson M., Löf O. [5], where in the analysis of statistic data over the recent 20 years (1996-2016) one of the authors' chosen input indicators were prospecting and exploration costs along with extraction costs and government revenues, whereas output indicator were human development index, different governance indicators as well as the Governance and Inequality based on the GINI coefficient that allowed them to estimate MCI (Mining Contribution Index). The authors intentionally included geologic exploration expenditures since it enables to create working places and contributes to the GDP growth as well as increases geologic potential and expand the information on the national wealth of the country in addition to contribution to growing reserve recovery. The analysis showed that 10 economically underdeveloped countries with high MCI moved up on the rating list of World Bank in terms of per capita income over 20 years. Some countries, for example Canada, decreased their MCI. Besides, comparison of resource producing countries and those with underdeveloped mining and petroleum industries has shown that in the former the human development index grew by 48 %, whereas in the latter only by 24% within the period under consideration. Nevertheless, the authors are concerned about low costs of explorations, as a mismatch between supply and demand is expected as a consequence of growing demand for mineral resource in next supercycle of the third decade, hence, a negative effect on the rate of economic growth is anticipated in both countries and territorial and administrative divisions.

In many countries exploration is an element of strategic planning. For example, in Canada mining resource industry provides 634 thousand direct and indirect jobs, of which 16,5 thousand are taken by indigenous people.

A number of important strategic documents were adopted in Canada, for instance, the Canadian minerals and metals plan, the Geo-Mapping for Energy and Minerals (GEM), Targeted Mineral Exploration Incentive (TMEI), the Government of Saskatchewan's Mineral Development Strategy, the Emerging Resources Program etc. The following significant aspects should be underlined in strategic planning in the sphere of exploration and mineral resource production.

1. Considering indigenous people's interests to maximize socio-economic benefits, first of all, for increasing indigenous people's employment, which leads to changes in corporate and staff strategies and policy in relation to indigenous people, the key element of which is creation of educational centers.
2. Development of northern, remote, and isolated regions, where socio-economic effect of mineral exploration and development is particularly significant, as it was underlined in the Canadian minerals and metals plan [6]. For example, in 2019 in Saskatchewan province the mineral exploration costs were $ 264 mln.
3. Additional financing of geologic sciences and extension of international cooperation in the sphere of innovation in Earth sciences, since it is promoting economic development and fostering Canada's role as a global leader in mining and petroleum industry. Mineral resource base depletion results in growth of mineral discovery cost and the fact that exploration methods are more in demand for smaller and more hard-to-recover fields that would also allow meeting the demand for some minerals in Canada, which are necessary to provide engineering, environmentally-oriented development of the industry.
4. On the basis of modern microeconomic environment, tax policy needs to be corrected to maximize investment attraction in geologic exploration, in spite of the fact that in Canada, in accordance with the Geo-Mapping for Energy and Minerals (GEM) program of 2008, there are federal tax incentives

for mineral exploration in the northern regions [7]. Though, it is important to highlight a positive momentum of financing stimulating measures, as a result of which five Saskatchewan exploration companies got $50 thousand each for exploration drilling. In oil-producing province Alberta reduced royalty tax is used as a stimulating measure.

In Australia production of mineral resource complex (MRC) is more than 70 % of export. Its share in GDP of the country increases by 7% [8]. More than 234 thousand people work in MRC, but if we consider related industries, there are more than 1,1 mln people, including indigenous people. MRC underpins the nation's high standards of living, notably reflected in Australia's high-quality education and health services.

On the whole, the analysis of MRC development plan has shown that Australia has similar problems with Canada. Let us point out some facts.

1. Focus on the plans of developing regional sustainability based on maximizing the benefits of resource development and favorable geographic location of the Australian continent with respect to fast-growing countries of Asia-Pacific regions.
2. Extension of intersectoral cooperation as a factor of increasing international MRC competitiveness in the world market. To eliminate any errors in strategic planning in future taking into account previous experience, it is proposed to support local communities, discover new resources, and develop workforce skills.
3. Changes in approach towards exploration. While in previous years there was a trend for better exploration of brownfields due to companies' attempts to minimize investment risks, now it is also necessary to extend exploration and prospecting new fields in the underexplored regions (two-thirds of the continent remains unexplored) to discover new perspectives for investment attraction and improve the access to new and existing geoscientific data and advanced scientific research.
4. Promotion of the Australian resources sector as the best place to invest into mineral resource production taking into account the well-established MRC in the world market as the most state-of-the-art and innovation-sensitive one. In the resources sector, new technologies and innovative solutions are resulting in new jobs, skills opportunities, support services and infrastructure in regional and metropolitan Australia. However, it is important to be fully aware that the uptake of new and increasingly digital technologies is broadening public concern about the impact on jobs, businesses and communities.
5. Development of stimulation mechanisms in regional exploration and prospecting based on co-financing of geologic exploration to create high-quality resources base for future generations for the coming decades. In recent years, investments in exploration were mainly made at the cost of risk capital, but due to new research trends the government participation is requested. As a result, the task is set to more precisely capture and quantify true greenfield exploration expenditure and activity of government in the new fields, as the data from the Australian Bureau of Statistics (ABS) is used to feasibly study the field development, which over-inflates the spend in greenfield developments from the beginning.

Thus, strategic plans in exploration activities are inseparable from regional socio-economic development programs of the resource-producing countries. Their success depends upon the efficiency of exploration, prospecting and development of mineral resources.

Russian Experience in Incorporating Exploration Activity into Socio-Economical Development of The Region

It is worth noting that exploration planning was inextricably linked to socio-economic development of the region, and as a consequence was documented in national economic plans and corresponding legislative and executive orders.

The issue of exploration impact on socio-economical and sociodemographic development is of particular relevance with the growing imbalance of economic development of oil and gas producing regions of the RF and in the context of unfavorable demographic trends specified in the "Concept of

Long-Term Socio-Economic Development of the Russian Federation for the Period up to 2030". In accordance with the Concept, the number of persons over working age will change from 32.1 million people to 40.7 million people by 2030. As a result, there will be 831 persons of over working age per 1000 persons of working age [9]. In order to reduce the proportion, a set of various activities is planned, however, the Concept neglects the issue of population increase in scarcely populated areas of the West Siberia, precisely the right bank of the River Tom, Eastern Siberia and the Far East.

The issues of inhabiting sparsely populated areas, improving quality of life in these areas, and providing the staff required for exploration activity were of particular importance during the period of the planned economy. There was also a crucial trend to transfer the employers who expressed a desire to move to a permanent job in petroleum and geology engineering companies operating in oil and gas provinces located within West and East Siberia and the Far East. This, in turn, stipulated the growth of towns and settlements and allowed providing oil and gas fields with qualified personnel for the long term, even up to the present day. As a result, infrastructure and field facilities required for producing both hydrocarbons and minerals were constructed. This led to a road-building boom, construction of houses, communal, welfare and recreation facilities for the labors of petroleum industry. It is worth noting that improved housing conditions and welfare services was a priority task which was resolved by "developing social welfare infrastructure, particularly, significant growth in construction of houses and recreation facilities, improvement of health care, trade and consumer services [10].

Therefore, the exploration activity mainly contributed to the need for the personnel who lived in close proximity to the place of work. Due to the absence of direct correlation, the indirect factor of growing economic and production potential of the region is population and standard of living. At the same time, it decreases with the growth of socio-economic and technological development of the region. In addition to the exploration and production costs, the other factor that might be considered as indirectly affecting socio-economic development of the region in particular and country as a whole is production and work conditions, transport, consumption points, and opportunities to combine [11].

At the present stage of the Russian history the development of the regions and territories are stipulated by the adopted strategies and programs (Figure 1). Under article 11 of the Federal Law "On the Strategic Planning in the Russian Federation", the documents developed for a certain region and industry involve the sector-related documents of strategic planning of the RF, the strategies of spatial development of the RF and socio-economic development of macro regions. Under article 19, fuel and energy complex provides the general plans which specify the sector-specific and cross-sectoral strategies. They should include priorities, goals and objectives, as well as governance indicators of state and municipal authorities and principles of national security of the RF, the most effective ways to achieve the goals in a certain sector of economy, spheres of State and municipal governance, region of the RF, and municipal entity [12].

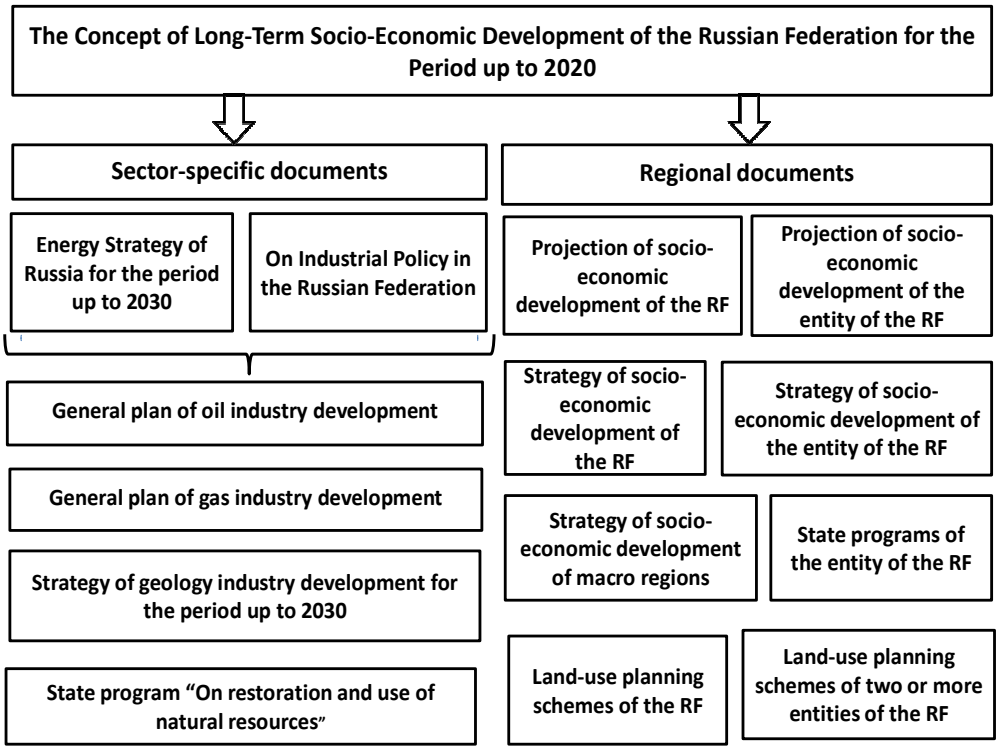

Fig. 1: Sector-specific and regional documents which may embrace socio-economic aspects of exploration activity

Source: compiled by the author

"The Strategy of Socio-Economic Development of the RF for Medium and Long Term Period" and "The Projections of Socio-Economic Development of the RF For and Long Term Period" contemplated with regard to projections are referred to the documents of strategic planning. When planning, state programs and land-use planning schemes of the RF are compiled. Table 1 presents the author's view on socio-economic aspect of exploration activity in the above-mentioned documents.

Table 1: impact of exploration activity on the socio-economic development of the region presented in the strategic programs and documents

Document	Socio-economic aspect of exploration activity
The Concept of Long-Term Socio-Economic Development of the Russian Federation for the Period up to 2020 [13]	✓ Emergence of new centers of socio-economic development, which is stipulated by the development of energy and transport infrastructure, and introduction of regional-production clusters intended to realize the competitive potential of the region. ✓ Establishment of regional growth centers both within new petroleum and mineral producing regions and well-known densely populated areas. ✓ Reduction of inequality in living standards and quality of life in the RF by means of social and regional policy interventions. ✓ Strengthening the system of strategic governance of regional development, improving integrity and sustainability of regional development and production force management.
The Projection of Long-Term Socio-Economic Development	✓ Emergence and development of new big oil-producing centers and corresponding infrastructure.

of the Russian Federation for the period up to 2030 [9]	✓ Fostering exploration activity within new sites located in the well-known regions.
Land-use Planning Scheme of the Russian Federation [14]	✓ None
Energy Strategy for the Period up to 2035 [15]	✓ Well-balanced energy development of the RF regions. ✓ Emergence of new fuel and energy complexes.
General Plan of Oil Industry Development [16]	✓ Enhancing the resource potential to assure sustainable oil production rate in 2017-2035 and beyond 2035. ✓ Promotion of small and medium-sized enterprises in the various sectors of oil industry including exploration activity and oil production. ✓ Insuring an increase in oil reserves per annual oil production at the level not less than 1.2 up to 2020 and 1.3 for the period from 2021 to 2035. ✓ Russian technologies and equipment used in exploration, oil production and transportation, refinery (in each sector of petroleum industry) should account for not less than 55% up to 2020 and not less than 80 % up to 2035.
Strategy of Geology Industry Development for the Period up to 2030 [17]	✓ Revision of socio-economic development programs of the regions in order to improve energy and transport infrastructure involved in the development of mineral resources.

The aim of the government to encourage population growth within the new oil-producing regions is worth noted. However, the initiatives to expand and inhabit the territories by developing industrial, transport, and social infrastructure are not laid down by the law.

The development of market relations has shifted regional exploration activity from socio-economic issues to the corporate social responsibility, with special attention being given to the industrial and environmental safety, the guaranteed social package for the employers, their families and pensioners, adequate working conditions, and social and economic support of the regions. In this regard, the socio-economic focus is mainly rooted in voluntariness, not in a set of laws, and financial support of the mineral-producing regions with well-developed transport infrastructure. The main implementation mechanisms are as follows:

a) agreements on socio-economic cooperation with the RF entities in order to "coordinate the selection and implementation of the construction and renovation projects for critical social infrastructure" [18];
b) own social programs.

However, despite the socio-economic focus of regional development, due to the difference between planned and market economies there is a discrepancy between the exploration activity and the strategic demographic objectives that concern population increase within the scarcely populated areas located beyond the Urals. Today, there is a trend to eliminate socio-economic aspects of exploration activity, which, in turn, may contribute to demographic imbalance between the European part of the RF and West and East Siberia and the Far East. It has been happening for the past 20 years. In addition, shift work policy of oil producers, which is based on the attraction of the staff from the other regions, increases the number of emergency situations. It can be explained by the fact that the oil-producing companies have to hire service companies based on the tender procedures. As a rule, these companies, located in the other regions, have no sufficient experience in mineral and oil production within the regions in interest. Another crucial point is free-riding attitude towards the environment which slowly suppresses the attentive attitude towards the territory and, as a result, there is no place for sustainable use of natural resources.

Conclusion

1. Socio-economic significance of exploration activity is more prominent at the first stages of territory development. The results of such impetus depend on the scale of the involved work. Subsequently, the impact of exploration activity declines due to socio-economic and geological factors. The increase in population, employment, and welfare is more rapid at the first stage, and then it slows down. The amount of explored reserves proved at the first stage of the territory development increases only due to further exploration which does not involve numerous staff. As a result, there may be stagnation in staff demand. In addition, industry, transport and social infrastructures have been already developed. In the absence of large and unique fields or in a case of undiversified economy, socio-economic indicators may improve slowly.

2. The state of natural resource base urges the countries to implement measures to attract investment into exploration sector in order to stimulate socio-economic development of the regions [19].
3. Russian and foreign experience are similar in the fact that the State defines the focus of prospecting and exploration activity, while business is free to decide what exploration programs to implement. In a case of adequate and attractive stimulating measures, it is possible to expect the implementation of regional socio-economic development programs in the medium-to-long term.

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Interoperability of Traditional and Distributed Ledger-Based Payment Systems

Victor DOSTOV

Saint-Petersburg State University, St Petersburg, Russia; Russian Electronic Money and Remittance Association, Moscow, Russia, leonova.v.anna@gmail.com, https://orcid.org/0000-0003-4518-2883

Alexander IVANOV

Saint-Petersburg State Institute of Technology, St. Petersburg, Russia, a@ivanov.im, https://orcid.org/0000-0001-7730-1168

Victor TITOV

Saint-Petersburg State University, St Petersburg, Russia, v.o.titov@spbu.ru, https://orcid.org/0000-0002-2005-0123

Abstract

The article defines the theoretical basis for the interoperability of payment systems, presents its structural classification. As part of the structural classification, levels, types, forms of interoperability for payment systems are specified. Interoperability of distributed ledgers is reviewed. One of the main tasks of the development of the payment services market is the integration of conceptual, technical, organizational, regulatory solutions into a unified project that allows for the successful implementation and development of interoperability. Recommendations are made to the regulator on the implementation of interoperability in the payment services market, the participants of which are both credit organizations and fintech companies, which will allow them to increase efficiency and reduce costs.

Keywords: Interoperability, Payment System, Fintech, Cashless Payments, Ecosystem, Mobile Payment, Mobile Account, Electronic Wallet.

Introduction

The purpose of this article is to determine the possibility and feasibility of implementing interoperability in the payment services market. Currently, most of scientific research on this topic focuses mainly on the technical aspects of this problem.

The scientific novelty of this paper is based on the following:

1. The theoretical base for studying the interoperability of payment systems has been developed, the conceptual apparatus used for unification and comparative analysis of the interoperability of payment systems both abroad and in the Russian market has been expanded, and a structural classification of interoperability has been proposed; we also reviewed the issue of interoperability in distributed ledgers.
2. A conceptual framework for the interoperability of payment systems has been formulated.
3. We have also analyzed the current state of the payment services interoperability as well as the prospects for its development, underlying trends.

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Theoretical aspects of payment system interoperability

There is no single definition of interoperability. It is generally considered that the definitions given by official standardization organizations, primarily ISO should be used. But even ISO provides at least three definitions of interoperability:

- The ability of two or more systems or components to exchange information and to use the information that has been exchanged according to ISO/IEC 24765:2009 (2009).
- The ability for two or more Object Request Brokers (ORB) to cooperate to deliver requests to the proper object according to ISO/IEC 19500-2:2003 (2003).
- The capability to communicate, execute programs, and transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units according to ISO/IEC 2382-1:1993 (1993).

In Russia Government Standard (GOST) R 55062-2012 (2012) defines interoperability as a set of related terms: such as interoperability barrier, external enterprise interoperability, internal enterprise interoperability, interoperability Glossary, interoperability system, enterprise interoperability, organizational interoperability, approach to achieving interoperability, interoperability profile, semantic interoperability, technical interoperability, interoperability level, interoperability reference model.

A comparison of different definitions of interoperability is presented in Table 1.

Table 1: Comparative characteristics of the concept of interoperability

	ISO/IEC 24765:2009	**ISO/IEC 19500-2:2003**	**ISO/IEC 2382-1:1993**	**GOST P 55062-2012**
Subject of the determination	System or component	Object request Brocker (ORB)	Function block	Information system or component
Purpose	To exchange information and to use it	Delivery of requests to the desired object	Exchange of information, run programs, and transmit data	Exchange of information and use of information obtained as a result of exchange
Additional condition			The user does not need to know the unique characteristics of functional blocks	

Source: compiled by the authors.

Interoperability may also have different levels. The classification of those is shown in Table 2.

Table 2: Interoperability levels

Interoperability level	Characteristic
Technical	Ability to exchange digital and analog signals.
Syntactic	Ability to exchange data
Semantic	Ability to exchange information
Pragmatic	Ability to share information in the context of tasks
Dynamic	Ability to share information in response to changing operating conditions
Organizational	Ability to function in a coordinated manner based on information exchange
Conceptual	Ability to share information under conditions of the agreement of assumptions and restrictions
Based on an exchange	Ability to transform information to the needs of the consumer
Integration	The ability to create a space in which the consumer does not feel heterogeneity of the environment

Source: compiled by the authors using the data from Batovrin V. K. et al (2009).

Because modern payment systems are open systems and are closely integrated with information technologies, the infrastructure, standards, and legal documentation that all elements of the payment system depend on, are currently being actively developed. Additionally, 'legal' level of interoperability might be added. We also believe that it is appropriate to define another additional level of interoperability for payment systems – currency-related interoperability. Currency interoperability soon will play a significant role, both inside and between individual currency zones, as well as to ensure the interoperability of cryptocurrencies.

There are several different classifications of interoperability, but these classifications define and characterize interoperability in terms of unrelated groups of properties, so in addition to levels, we propose to distinguish types, degrees, and forms of interoperability.

The types of interoperability of payment systems are shown in table 3.

Table 3: The types of interoperability of payment systems

Type of interoperability	Definition	Characteristic
Systemic	Interoperability at the level of a single payment system	Banks and payment system operators, when connecting to a payment system, agree to comply with the rules, standards and interfaces established by this system
Networking	Interoperability between different payment systems	It is most often used for cross-border or interregional payments, which allows the cardholder to use this card in another country
Parallel system	Allows a merchant or agent accepting a payment from a customer to participate in multiple payment systems	Although the seller accepts payments in different payment systems, this is simple and looks like achieving some compatibility from the outside

Source: compiled by the authors using the data from Interoperability in Electronic Payments: Lessons and Opportunities (2012).

There are two main types of interoperability:

- horizontal interoperability - is the compatibility of competing products, services, or platforms, such as the compatibility of data networks or different payment cards.
- vertical interoperability - is the compatibility of products, services, or platforms with products and services that extend their functionality (related products).

Technically, some products may be fully interoperable or non-interoperable as well as there may be different degrees of interoperability, for example, with respect to the functionality of these products. In addition, interoperability and openness can be symmetrical or asymmetric (products from one platform can be used on another platform, but not Vice versa).
In addition, interoperability can take various forms, as shown in Table 4.

Table 4: forms of payment system interoperability

At the platform level	At the agent level	At the client level
Allows clients of one Payment System Participant (PSP) to send money to clients of another PSP	Allows agents of one service to serve clients of another service	Allows customers to access their account via any card of the subscriber identification module (SIM card)

Source: compiled by the authors.

Interoperability for Novel Technologies

Interoperability is relevant for such novel technologies as distributed ledgers as well. Technically, distributed ledgers are specific type of the database. While historically all distributed ledgers were isolated from each other, with the growth of technology the demand for interoperability is getting stronger. The case in point is Bitcoin: bitcoin users can exchange tokens between each other, but this system is effectively closed loop. In other words, if Bob holds bitcoins and wants to transfer value to Ethereum, he needs to use third-party exchanger. The same logic applies to most distributed ledgers: lack of interoperability has detrimental effect on added value.

There can be different froms in interoperability, as discussed in Koens T. and Poll E (2019):

- Interoperability between a distributed ledger and legacy systems. For example, Bitcoin and a traditional banking payment system.
- Interoperability between distributed ledger platforms. For example, between Bitcoin and Dogecoin (two permissionless ledgers), or Corda and Ethereum (a permissioned and permissionless ledger).
- Interoperability between two smart contracts within a single ledger. For example, between Corda apps, which are smart contracts on a single Corda ledger.

As seen above, interoperability between distributed ledgers extends far beyond payment functionality. Schulte S. et al (2019) defined, that this affects such functions as smart contracts as well: in other words, interoperability would evidently have a large impact since users could select and combine blockchains based on their current demands while not being locked-into one technology.

As in other sectors, distributed ledgers interoperability, according to McLean S. and Deane-Johns S. (2016), might require agreements “about data interoperability, policy interoperability and the effective implementation of the international standards”: hinting on the fact that ‘anarchic’ ledgers (where there is no entity managing the development of the technology) might find it more difficult to become interoperable.

For example, Meaning J. et al (2018) believe that central bank digital currencies (i.e. central bank issued tokens recorded on a distributed ledger) should be interoperable with the legacy system. This means that “any deposit account could make a payment to any CBDC account and vice versa”). In more

general terms, distributed ledgers (at least in payment functionality) follow the same logic as other payment infrastructures that tend to move away from being closed loop, favoring free flow of funds and information.

At this moment interoperability of distributed ledgers is primarily technical rather than legal challenge. Meiklejohn S. (2018) states, that although different approaches to ensure interoperability between ledger exist and some of them are being tested, there is still no definitive answer to whether they ensure appropriate level of efficiency and quality. It is unclear if interoperability of distributed ledgers will be anyway different from interoperability of centralized databases from legal or institutional point of view. This makes the analysis of interoperability even more important and relevant.

Problems of Interoperability

Although interoperability is expected to benefit consumers and the payment services market, its implementation faces several problems.

The first type of problem for interoperability's implementation is the need to define and enforce a common set of rules and standards in both the technical and legal fields. Typical problems of interoperability development are:

- lack of a definition of what it means to become interoperable. This leads to confusion in the industry, as different operators have different ideas about what interoperability is;
- the advantages associated with interoperability are not always immediately obvious, and its true impact on the payment services market can only be proven after its implementation;
- distrust of competitors can make it difficult for operators to work together, even if they understand the benefits of interoperability;
- understanding and coordination on a technical and commercial model for managing interoperable processes;
- a conflict of organizational priorities may be barrier to implementation of interoperability;
- introduction of adverse control modes for PSP and interoperability.
- the introduction of interoperability can have negative consequences because of the concerns over competition, and because of the differentiation of products in the same network. The cost of implementing and operating an interoperable network increases and this may lead to payment system providers trying to protect their existing business while remaining isolated.

From a market perspective according to the State of the Industry Report (2015), a significant challenge in creating a viable mobile payment ecosystem is to ensure strong network effects. In particular, it is necessary to overcome the typical network market problem: while there are not many users, the service is not very popular for other potential users, but once a certain critical number of users is surpassed, its attractiveness as well as the number of users, begins to grow rapidly.

Factors, that affect the development of interoperability, can be divided into 4 large groups:

1. Economic factors: participants of payment systems voluntarily develop interoperability to make a profit, but economic factors in any case are derived from the participants' business strategies, and not just from the wish to make a profit.
2. Regulatory factors: industry associations can contribute to the "voluntary" development of the Association members interoperability, especially if this development is supported by the regulator.
3. Using national payment systems for the development of interoperability.
4. Market monopolization by one or more participants: the dominance of a single payment service provider can slow down the development of interoperability (why should other participants develop interoperability if 90% of payments are made by a single bank).

Let us look at some of the factors that influence the development of interoperability in more detail. One of these factors is the influence of monopolies.

Payment System Participant (PSP), that have monopolized the market by introducing new technologies ahead of their competitors, are reluctant to open their network of clients and agents, even under government programs, because this reduces their competitive advantage. On the other hand, if in the short term the economic effect of implementing interoperability is negative for this operator, then in the medium-term interoperability brings advantages, especially if there is a large overall market growth potential. On the other hand, if the short-term economic effect of implementing interoperability is negative for this operator, that in the medium-term interoperability brings advantages, especially if there is a large overall market growth potential. It is better to be a less dominant operator in a large market than a dominant operator in a small one.

From the market point of view, the failure of interoperability by a major operator (such as the case of Safaricom in Kenya, considered by Dahlberg et al (2015) or Sberbank in Russia) may lead to a lack of competition. Thus, the rejection of interoperability can freeze the asymmetric market structure to the detriment of payment system customers.

Thus, the development of interoperability in the payment services market depends on several factors, such as: the level of the sector development, the current state of the market, the political and economic landscape, regulatory maturity of regulators, the level of implementation and development of technological innovations, etc. This also requires coordination between various regulators, such as, for example, the Russian financial sector regulators: The Central Bank of the Russian Federation, the Ministry of Finance, and so on.

International experience in implementing interoperability

Mobile payment services are most often offered by banks or mobile operators as independent providers. Also, in some countries, the regulator has proposed initiatives for «full integration» of mobile payments with the dominant mobile payment operator or partnership schemes. Examples of such initiatives are Peru, Japan and Kenya. For example, according to Pierre Biscaye et al (2015), the Association of banks of Peru (ASBANC) launched a national "ecosystem" of mobile money, inclusive of all banks and Telecom operators in 2014. Other examples of "full integration", described by Bourreau, M. and Valletti, T (2015), are Japan and Kenya, where a single operator controls mobile payment services for a large Agency network. However, these models remain relatively rare.

Let us look at the most successful examples of interoperability introducing.

In September 2016, Visa launched the mVisa app for smartphones. mVisa is a QR-based payment service operating in India, Kenya, Rwanda, Egypt, Ghana, Indonesia, Kazakhstan, Nigeria, Pakistan and Vietnam. The mVisa press-release (2017) shows that the mVisa mobile solution provides the benefits of simple and reliable digital Commerce to financial institutions, sellers, and buyers in emerging markets, accelerating the global transition from cash to electronic payments.

mVisa helps to solve trade infrastructure problems by enabling customers to use their mobile phones to make non-cash purchases in stores, pay bills remotely, and even transfer money to friends and family by linking their Visa debit, credit, or prepaid account to the mVisa app. It digitalizes the base account and allows consumers to transfer funds from their account to the merchant's account in a reliable and secure way by scanning a QR code.

In Europe interoperability has been developed in recent years by the European payments Council (EPC) (2019) by developing the SCT (SEPA credit transfers) system to SCT Inst (SEPA instant credit payment system) as part of SEPA initiatives. SCT Inst implements an instant payment system at the pan-European level, facilitating the integration of interoperable solutions developed at the level of individual countries. Italy and Spain have updated their mobile payment systems (jiffy and Bizum, respectively) to match the EPC scheme, while Portugal, France, Belgium and the Netherlands have developed new systems and CSM that match SCT Inst. However, at the end of 2017, only 1,000 banks complied with the SCT rulebook, which is only 20% of the region's banks.

As for mobile payment systems, at the end of 2019, the European Association of mobile payment systems (EMPSA) which included seven payment systems from various EU countries — TWIN (Switzerland), Bancontact Payconiq (Belgium), Bluecode (Germany and Austria), Mobile Pay (Denmark and Finland), SIBS (Portugal), Swish (Sweden), and VIPPS (Norway), was established. Later, Bancomat Pay and Plick (Italy), BLIK (Poland), and Flick (Slovenia) also joined the system. Thus, according to EMPSA Press release (2020), EMPSA currently unites 11 mobile payment systems and 45 million users.
The goal of the Alliance is to ensure interoperability between these payment systems, which will allow end users to make payments within the services of the member systems of the Association. In June 2019, as FINTECH Switzerland (2019) informed, Vipps and Bluecode have already created an Association with four other mobile payment operators and Alipay to allow payments using QR codes in their apps.

Summarizing the entire range of approaches to implementing interoperability in various markets, we can focus on Camner's (2012) proposals for implementing a three-step process to consider interoperability, which involves:

- identifying the perceived problem or market opportunities;
- understanding whether solving the problem benefits both consumers and operators;
- decisions on how partnerships and relationships can help achieve the goal.

According to these steps, when interoperability is implementing, the actual choice of interoperability mode is the last one.

The first step is to try to identify market opportunities and regulatory barriers which may slow down market development and the usage of implemented solutions by customers.

Conclusions and Recommendations

Currently there are three main options for implementing interoperability at least for mobile payments:

1. Voluntary implementation of interoperability through the conclusion of bilateral agreements.
2. Voluntary implementation of interoperability using the services of a national integrator.
3. Implementation of interoperability mandatory with the usage of the national integrator's services.

The first option was implemented in Indonesia, Tanzania and Rwanda ('Achieving interoperability in mobile financial services' (2015)). The second one was implemented in Pakistan and Peru. Finally, the third option was adopted in Ghana, Nigeria and Mexico. Thus, the way taken in a country may depend on the technical readiness of the existing financial ecosystem.

Regulatory intervention to ensure interoperability can have its advantages - each individual mobile payment system becomes part of one large network. But mandatory interoperability requires investments that must be justified, and the solutions proposed by the regulator are not always the most cost-effective. On the other hand, mandatory interoperability can hinder market development, reduce competition, and discourage technical innovation. In some cases, the implementation of mandatory interoperability forced several operators to leave the market (for example, some cases was reviewed in the ESRB Report (2016)).

Regulators do not use only two extreme approaches: complete non-interference or mandatory implementation of interoperability. There are a lot of compromise solutions. For example, it is possible to let the market's participants not only find an acceptable solution for everyone but to take measures to accept it and regulate tariffs independently. Regulators can also monitor the process of interoperability integration by market participants and intervene in this process only if it is necessary for development.

Two conclusions can be drawn from this. First, regulation should ensure that no one operator did not take actions that increase the cost of interoperability. Second, decisions made by the regulator should

be based on the degree of symmetry of the market. Probably in an asymmetric market, the regulator should play a more active role to introduce interoperability.

Among the key problems faced by new and established companies in the market of electronic payment services is to force different systems to interact with each other and quickly adapt to the new rules. Against this background, we can see two trends in interoperability development:
1. Development of proprietary APIs to simplify data exchange between market participants, as well as protect your own data.

2. Implementation of ISO 20022 as a common language for various financial organizations.
For the purpose of interoperability efficiency, it is necessary to combine 3 functional elements:

1. organizational management;
2. business model;
3. technical integration.

Unfortunately, in most countries, the focus is on technical interoperability and not enough on other aspects that are critical to the development of interoperability.

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On the Significance of Physical Culture in Shaping Health. Implications for Social Security

Ilona URYCH

War Studies University, Warsaw, Poland
i.urych@akademia.mil.pl

Abstract

Observation the negative impact of the lack physical activity of people on their health and social security were the main motivation for undertaking the research. Therefore, the aim of this article is to diagnose and analyze the importance of physical culture in shaping health in the field of social security. The research goal was achieved by providing answers to the following questions: How should health in the field of social security be understood? What are the opportunities for developing health in the field of social security through the participation of individuals in physical culture? What is the relationship between physical culture and human health in ontogenesis? The methods used were deduction and induction. Health is a fundamental human value and social security is a fundamental human need to ensure survival and physical, mental and social development (1). Thanks to an individual's participation in physical culture, the opportunities for the development of social security are broad and concern in particular positive structural and functional changes in the human body, whereas limiting physical activity leads to negative health consequences (2). The basis for the development of health and social security in the whole personal development of a person is their active participation in physical culture, which in childhood primarily serves to support the development of individuals, and in adulthood to maintain the level achieved, and in old age to actively counteract involution (3). Therefore, the challenges of fostering social security should be met by a parents and teachers.

Keywords: Social Security, Physical Culture, Health.

Introduction

The elementary factors causing civilizational diseases include reduced physical activity and a passive lifestyle. Consequently, many students are characterized by deviations from proper health, including posture problems and obesity. On the other hand, in the case of adults, the more and more common cardiological problems and oncological problems, as well as the negative consequences of stress are a true plague.

Little wonder that prevention of lifestyle diseases with physical activity is a topic that is widely discussed among doctors, educators, teachers, and psychologists. Increased systematic physical activity can mitigate or eliminate many factors that lead to diseases. Physical work, practicing sports and tourism, recreation, as well as any daily physical activity are becoming a necessity. An excellent opportunity to provide an appropriate dose of movement to children and youth are physical education classes at school, as well as extracurricular sport and recreation classes.

The above observation the negative impact of the lack physical activity of young and older people on their health and social security were the main motivation for undertaking the research.
The aim of this article[1] is to diagnose and analyze the importance of physical culture in shaping health in the field of social security. The research goal was achieved by providing answers to the

[1] This content of this article is a revised and expanded fragment of the following monograph: I. Urych, *Kultura fizyczna w kształtowaniu bezpieczeństwa zdrowotnego*, ASzWoj, Warsaw 2018.

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following questions: How should health in the field of social security be understood? What are the opportunities for developing health in the field of social security through the participation of individuals in physical culture? What is the relationship between physical culture and human health in ontogenesis? The research methods used were deduction and induction.

In order for the narrative goal to be achieved in this article, first, the understanding of health in the field of social security is given. Discussed next are the possibilities for developing health in the field of social security through the participation of individuals in physical culture. Because physical activity is an important element of human health in individual development as a whole, the subsequent part of this article will discuss the correlation of physical culture with individual health in ontogenesis. The article ends with a summary.

The understanding of health in the field of social security

The dynamically changing reality brings with it many dangers and challenges concerning nearly all dimensions of human existence, including health, and more broadly, health security.

Along with the development of medical science, the concept of health has also changed. Many different ways of defining health have been proposed. One of these was to define health as the absence of pathological changes occurring in the body. It was also believed that health is an indicator of the level of functioning in society. Dąbrowski (1979) it also defined as a state that is the opposite of disease. Next, health was based (as it is often still) on a biomedical model, according to which medicine cures the physical body, which is completely separate from the psyche, which is important because of the emotions and convictions, but which have nothing to do with the body. Over time, researchers have pointed to interactions that prove that the purely biomedical model of health is not confirmed by reality. For example, Gerring and Zimbardo (2009) have been proven that positive and negative events affect the functioning of the immune system, people tolerate the negative consequences of stress differently, and appropriate social support can reduce the risk of death.

In the book by Gerring and Zimbardo (2009) health is understood through the prism of a biopsychosocial model, in which *bio* is the biological component of health and *psycho* represents the psychological component. These complement the social dimension. This model combines physical health with the state of mind and the world around the individual. In other words, health is understood as a state of complete balance and social, physical and mental well-being, which allows a healthy person to achieve his or her life plans and aspirations. However, health psychologists highlight the dynamic and multidimensional nature of health. They also identify it with welfare, which encompasses the physical, spiritual, intellectual, social and environmental elements of human life.
World Health Organization (1998), in turn, defines health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity (disability). In a research study by Woynarowska (2007) such an approach is important in that it not only emphasizes the negative dimension, namely the absence of disease as had been done earlier, but also emphasizes the positive dimension of health, namely welfare. In other words, the commonly used definition of health accentuates its dependence on active human participation, links it with inner and social life, as well as with the personal care an individual takes his or her own physical and mental condition. Health is a term referring to the general state of the body and mind, characterized by vigor and strength.

In the discourse surrounding health, one should also refer to the broader category of health security. Skrabacz and Sulowski (2012) pointed out that this in turn constitutes the foundation of social security and is also defined differently. On the one hand, it may refer to actions of the public authorities aimed at coordinating the diverse elements of health care, social and rehabilitative care, accident compensation, pensions, sickness benefits, employee health and other benefits in order to meet the needs of health services and living expenses. On the other hand Supranowicz et al. (2012) mentioned that health security can be considered from the perspective of individuals who consider the available health care services to be sufficient and treatment costs to be well-adjusted to their financial capabilities and trust that in case of a loss of the ability to earn a living, they will have

secured financial resources enabling them to lead a dignified life. Ruszkowski (2010) notes that the lack of health security corresponds to the subjective sense of danger faced by individuals in the event of illness. "We can regard the reduction of this feeling as much as possible as the achievement of a kind of well-being – a sense of full health security" – wrote Ruszkowski (2010, p. 6). Therefore, the level of health security may be determined by both access to health care and the ability to use it to such an extent as to satisfy health needs. This egalitarian point of view, originally formulated by the British Labour Party, has been successively adopted in contemporary Europe. As Sanecki (2011) although access to health care has become a civil right, it still depends on need and the citizen's ability to benefit from the opportunities offered by the system.

Cianciara and Wysocki (2006) draw attention to two closely related aspects, which are essential for the analysis of health security objectives and related terminology, i.e.: protection against the risk of illness and health loss, as well as protection against the effects of illness and loss of health. The first type of health security includes elements of financing and delivery of preventive and curative services. It therefore refers to the organization, mobilization and accumulation of financial resources, the purchase and delivery of services, as well as the development of human and physical resources, the knowledge capital and the management of the whole system. Ensuring health security is one of the tasks of public administration and, as a result, all citizens should have access to adequate services. Understood in this manner, security is discussed from the perspective of protection against global health threats, with a particular focus on terrorism or new communicable diseases. Safeguarding against disease and loss of health includes "the coordination of diverse elements of health care, prevention, social care, rehabilitation and occupational medicine services, and the payment of sickness, accident and disability benefits to meet the regular individual needs for a variety of health services and income earned" – wrote Cianciara and Wysocki (2006, pp. 79-80).

A definition of health security also needs to address three theoretical conceptions of health: biomedical, behavioral and socio-environmental health. The biomedical approach focuses on groups at high-risk for the diseases in question and on disease detection and treatment. The behavioral conception refers to high-risk attitudes and behaviors and is geared towards the development of educational programs to support changes in behavior. According to the socio-environmental approach, however, attention should be directed toward psychosocial and economic living conditions that pose a high risk to health. The socio-environmental conception therefore focuses on adapting individuals and groups to specific conditions and on improving their living conditions. While the first two approaches are geared towards individuals (particular persons), the third concept is geared towards communities and structural conditions. However, health is still commonly regarded as the absence of disease, and in a more sublime sense as a resource and the strength needed for everyday life. Meanwhile, the means used to achieve public authorities' health policy objectives, policies relating to the preservation and improvement of health, will come down to the concept of public health. As Opolski (2011, pp. 16-17) notes, public health is at the same time an art - the art of solving the health problems of individuals or communities. According to the World Health Organization (1998), public health can be considered as the art of applying science so as to reduce inequalities in health and ensure the best possible health for as many people as possible. Winslow (1920) of Yale University Medical School in the early part of the twentieth century also understood public health as both science and the art of preventing disease, prolonging life, and promoting physical health and fitness.

The discussion above shows that there is no holistic definition of health in the field of social security in the literature, and therefore Urych (2018) shall adopt own understanding of the term, according to which health in the field of social security is the shaping of optimal conditions to ensure the survival and development of a person in terms of his or her physical, mental and social health. Such an interpretation of health in the field of social security indicates that it is a process in which a person strives for biological, psychological and social wellbeing that allows him or her to function multidimensionally and to achieve his or her life plans and aspirations. Health is the highest value here, focused on the active participation of the human being in various forms of physical culture. Autotelic actions within the framework of the creation of one's own health are all the more necessary

today, when lifestyles in a globalized society are conducive to passive behaviors. These behaviors are decisive in the emergence of many diseases, referred to as lifestyle or civilization diseases.

It is equally important in the context of defining social security to refer to security culture. According to Cieślarczyk and Filipek (2017), security culture not only entails the body of knowledge characteristic for a given subject, but also the ways of thinking about security, as well as the related ways of feeling and achieving it. The components of security culture include a range of sectors corresponding to its subject areas, particularly, in this context, information security, cultural security, political security, ecological security, economic security, military security or public security. One of the components of security culture is health security, which is underpinned by health culture. At its root are the values and norms that guide a person acting to ensure his or her security. If the next few decades are accompanied by an increase in the level of risk in various spheres of human activity, i.e. in various areas of human security, the level of security culture, which to a significant degree is determined by health security, must also be raised in individuals and in social groups. As a panacea for satisfying the health needs of particular segments of the population, this should be guided toward the concordance of entities participating in building the health care system, and holistically, of entities creating a broadly understood health culture. In a research study by Kuczabski (2018) such actions are all the more justified in preparing for a possible crisis situation in which the protection of the life and health of citizens is essential.

The possibilities for the development of health in the field of social security through participation in physical culture

The health of contemporary people is determined by many factors. Yet the important connection between movement and human health has long been noted by many scholars. Its primary importance was pointed out by in antiquity by the philosopher: “Movement is life”. Physical activity is necessary for every process of creation, regardless of what it concerns. Movement creates and perfects the human being, enabling not only motor development, but also intellectual development. Human beings develop in motion and through movement. The great value of this was also noted by orthopedist Alfons Senger, who claimed that “Movement is life – life is movement”. Another philosopher, Arthur Schopenhauer, professed the principle: “Life is about movement and movement is its essence”. The importance of active participation in physical culture for shaping health was aptly expressed in the sixteenth century by Wojciech Oczko, physician to Polish kings, who pointed out that “Movement can replace almost every medicine, but all medicine taken together cannot replace movement”. In this statement, he emphasized that in order to maintain health, a person should engage in physical activity, which is the best medicine ever discovered.

The health of contemporary people is affected by many factors which may have both negative and positive effects. Drabik (1996) includes among those having a positive influence physical activity, proper nutrition, weight control, coping with stress, only moderate use of stimulants, not smoking, and an appropriate amount of sleep. Observance of all these pro-health recommendations will, in Drabik’s view, guarantee the maintenance of good health, a slim and healthy body, and will prolong lifespan as well. It is worth noting that Drabik (1996) lists physical activity as the factor with the most significant positive affect on human health. The researcher supports this position with the fact that active forms of recreation help to control weight and keep the body in good condition. Proper nutrition, providing nutrients in the right proportions, determines proper functioning. Also important is the ability to cope with stress and the strains of everyday life, as well as limiting or abstaining from the use of any kind of stimulant and not smoking. On the other hand, a sufficient amount of sleep allows the body to rest and regenerate.

Starosta (2003) called these pro-health factors “the spiral of life”, recommending for contemporary people a lifestyle based on systematic physical activity, rational nutrition and a hygienic lifestyle.
According to Starosta (2003), a healthy and fit person, thanks to systematic physical activity, a hygienic lifestyle, rational nutrition and living in an ecologically clean environment, permanently improves the fitness, efficiency and resistance of his or her body. Moreover, by means of physical activity of increasing intensity with elements of sports, the health and psychological resilience of the

person is improved. The high level of psychomotor efficiency and efficiency achieved helps to maintain normal body weight. On the other hand, properly organized short and long periods of rest extend biological youth, which results in an optimistic attitude towards life, satisfaction with life and with oneself, and consequently a successful and healthy life.

Starosta (2003) argues that the opposite of the "spiral of life" may be the "spiral of death", when a person, as a result of an inappropriate, sedentary lifestyle, enters into hypokinesis. The lack of movement results in pathological processes in organisms deprived of movement, which then grow ill and age more rapidly. This deficiency, together with other negative factors, causes many lifestyle diseases (e.g. hypertension, overweight, spinal deformations, flattening of feet). The accumulation of these leads to irreversible changes and consequently to many illnesses and premature death.

According to Starosta (2010), technological progress has deprived most people of the possibility perform physical labor. People stopped moving and began to lead a sedentary lifestyle while consuming too much food. According to scientists, the motor activity of the average person in the hundred-year period 1864-1964 decreased by 93%. The effects of reduced motor activity, excess calories and laziness were summarized by the World Health Organization, indicating that in 2007 there were 1.6 billion overweight people, and by 2017 this number was expected to increase by up to 40%. In this race for the top, the United States is the leader, with over 75% of its population being overweight, and Poland is approaching 50% of its citizens being overweight or obese. Recognizing this dangerous developmental trend, the World Health Organization tried to brake it by proposing a simple physical activity that could be used in any circumstances, namely in the form of a number of steps to walk: 10,000 per day for blue-collar workers, and 15,000 a day for white-collar workers.

Numerous studies by Grabowski (1999) have shown that even a short-term reduction in motor activity leads to far-reaching structural and functional changes in the human body, such as decalcification of bones, muscle atrophy, decreased efficiency, increased response time, etc. The results of these studies are presented below. There are also reasonable grounds to assume that the pace and intensity of involutionary processes (aging) in the body depend to a large extent on lifestyle, and especially on the role of motor activity. It was found, for example, that passive and sedentary lifestyle leads to the appearance of signs of motor aging already at the threshold of maturity, while physical activity allows one to maintain (and even periodically restore) physical fitness and bodily efficiency until late old age. Moreover, the effects of technological progress are not only more convenience in life and an increase in prosperity, but also the development of lifestyle or civilization diseases, such as atherosclerosis, hypertension, obesity, discopathy, etc., that are directly or indirectly related to the lack of physical activity.

On the basis of what is known about the main causes of death in highly developed countries, which are mainly associated with lifestyle diseases such as heart disease, cancer, stroke, obesity, or depression, Gerring and Zimbardo (2009) were formulated recommendations for human health in the field of social security:

1. Regular physical exercise.
2. Consumption of nutritious, well-balanced meals (high in fruits, vegetables and grains, low in fat and cholesterol).
3. Maintaining proper weight.
4. 7-8 of sleep per night; some rest and relaxation each day.
5. Fastening seat belts in a car and wearing a helmet when bicycling.
6. Not smoking and not using drugs.
7. Abstinence from alcohol or drinking in moderation.
8. Practicing safe sex with proper protection.
9. Regular check-ups with a GP and a dentist; following doctor's instructions.
10. Developing an optimistic view of life as well as maintaining friendships with others.

In this classification as well, the basis of health in the field of social security is physical activity as part of participation in physical culture. This is all the more important because, as research by Starosta (2010) has shown, the element of lifestyle determines 53% of human health.
The health benefits of systematic physical activity are comprehensive. Physical activity in the book by Starosta and Wangryn (2012) increases the range of joint motion, makes bones more flexible and less susceptible to decalcification and more resistant to fractures; it improves the use of lung capacity, improves the circulation of blood and lymph, prevents the formation of atherosclerotic changes, normalizes blood pressure,, improves the regulation of blood glucose levels, supports better elimination of waste products from the metabolism, improves concentration and intellectual functions.

Urych (2014) indicated that systematic active participation in physical culture, at 30% of maximum exertion, improves the health of both children and the elderly. The results of physiological, motor, epidemiological and other studies prove that physical exercise is an important factor shaping the structure and functions of the body. Movement is also irreplaceable in primary and secondary prevention of many non-infectious diseases, called lifestyle or civilization diseases, as well as in geriatric prevention (Urych 2014, p. 78-87).

The significance of the role of physical culture in shaping health in the field of social security is why scientists point to what is known as the minimal physical activity, which is a vital necessity, even a biological imperative or also a moral and social duty that individuals work toward their own health. The minimum physical activity indicates the amount of daily exercise necessary per week to maintain well-being. World Health Organization (1998) guidelines indicate that amounts to daily 30-minute endurance-building workouts, at an intensity of 40-60% of maximum exertion. Other authors define it as 10-15 thousand steps a day in the form of intensive walking or burning 1200-2000 kcal per a week in physical exercise. At very least, the preventative aspect of physical activity is an essential element a healthy lifestyle.

The essential promotion of health in the field of social security occurs not only in the primary educational environment of a child, such as his or her family home, where such activities are undertaken with varying degrees of diligence, intensity and frequency, but is also taken up in schools. In 2008, a team of experts appointed with Wiynarowska leader (2009) by the Ministry of Education in Poland decided to include a health education module in the core curriculum of physical education in middle and high schools. An important task of the school is also to provide health education, carried out by teachers in many subjects, whose aim is to develop students' ability to care for their own and other people's health. This statement places a high priority on health education among the tasks given to schools.

The leading role in the implementation of the health education module has been assigned to the core curriculum of physical education, which is "saturated" with content on various aspects of health (especially physical education), to a much greater extent than before. This completely new approach makes physical education the leading subject in the implementation of school health education. Thus, the appeals that had been made for many years by scholars of physical culture have been met. At the same time, it is a solution that is simultaneously one of the models recommended by the World Health Organization (1998), which singles out a leading subject (physical education) and the inclusion of health-related content in many other subjects.

The health education module in Poland is implemented in physical education classes which are compulsory for all pupils and are taught at each stage of education for one semester, i.e. approximately 30 hours. The decision regarding in which year and semester they take place is made by the school administration. These activities have been a clear success, extending the scope of health education to include psychosocial aspects of health, with particular emphasis on life skills (personal and social). However, it should be understood that schools and teachers cannot left to cope with a new task on their own. Health security should be developed primarily in the family environment, which still often remains little more than wishful thinking.

It should be pointed out that owing to participation in physical culture, not only is there a development of an individual's health in the field of social security, but also of their national awareness, identity and patriotism. Urych (2017) pointed out that patriotic attitudes can be shaped in the context of physical culture by, among other things, conscious and active care for the development of fitness, health and personality in various forms of physical culture, and by the student – especially during physical education classes.

The Relationship Between Physical Culture and Human Health in Ontogenesis

Over the past several decades, we have witnessed dynamic advances in science and technology that have made human life more productive. However, technological progress is also accompanied by phenomena that are detrimental to human life, such as the elimination of physical exercise and physical work, which adversely affects human health and physical development. The conveniences of contemporary civilization, means of transportation, automation, and computerization all reduce physical activity to a minimum. The growing popularity of passive leisure time activities with the use of mass media, especially television and the Internet, also contributes to a reduction of meeting a natural need of the human body, movement. The effect of these changes is the spread of lifestyle or civilization diseases (mainly cardiovascular, diabetes and neuroses), as well as negative social phenomena among youth and adults (alcoholism, nicotinism, drug addiction).

Daily physical activity is essential for the achievement, maintenance and improvement of human health. This is evidenced by the fact that it accompanies every human being at ever stage of their personal development or ontogenesis.

In the book by Gerring and Zimbardo (2009) in the human life cycle, the following periods can be distinguished:

- infancy (from birth at full-term do 18 months),
- early childhood (from 18 months to 6 years),
- late childhood (6-11 years of age),
- adolescence – (11-20 years of age),
- early adulthood (20-40 years of age),
- middle adulthood (40-65 years of age),
- late adulthood (over 65 years of age).

Urych (2014) mentioned infancy is a period of relatively slow motor development. The movements of the child are mainly uncontrolled and involve only large muscle groups. Congenital (unconditioned) reflexes, which are characterized by their reliability, invariability and instantaneity of occurrence, are predominant. In a research study by Dega (2003) unconditioned reflexes include saliva secretion, pupil constriction, respiratory reflex, yawning, sucking, the Babinski reflex (after stimulating the appropriate area of the foot, the big toe is stretched out and the others are spread), the Moro reflex (upon a proper stimulus, the child makes a clasping motion with hands and feet). As a result of motor learning, unconditioned reflexes become conditioned.

Gerring and Zimbardo (2009) pointed proper motor development in this period is as follows:

- 2 months – lifts up head,
- 2.8 months – turns over sideways,
- 4 months – sits with support,
- 5.5 months – sits without support,
- 5.8 months – stands with support,
- 7.6 months – stands up independently,
- 9.2 months – walks holding on to furniture,
- 10 months – scoots and crawls,
- 11.5 months – stands independently,

- 12.1 months – walks independently.

Moreover, the most rapid physical development in all periods of human ontogenesis takes place in infancy. Intentional movements, and above all the adoption of a vertical posture, are a signal of transition to the next period of motor development.

Based on research by Dega (2003)we know early childhood is characterized by a child learning to walk, climb, run, jump, throw and grasp. Walking can already take place in different ways, controlled forms of running are beginning to appear, the first signs of being able to help oneself are developing and jumping and throwing skills are emerging. The child starts to carry different objects, which is related to improving balance, and thus the ability to balance one's own body. At around 16-18 months of age, it is possible to overcome small obstacles. In the third year of life there the beginnings of a combination of, for example, running and jumping, as well as gripping and throwing are observed, which are the basis of the advanced motor skills used in sports and play.

The development of motor skills in this period is closely related to the mastery of speech and a gradual transition from concrete-image to abstract thinking. At the turn of the second and third year of life, praxis appears, i.e. deliberate movements using an object for its intended purpose. Nevertheless, children often have problems with actions that require more precise hand movements, e.g. buttoning, tying shoelaces, or eating independently.

The pre-school period in early childhood is conducive to the dynamic development of all motor skills. Research conducted by Denisiuk and Milicerowa (1969) shows that agility increases particularly in this period. It is also the time when various forms of movement are acquired, and functional games become imitation games. Because strength, speed and endurance are as yet underdeveloped, there are often difficulties in catching an object. The child has a biological need for movement but gets bored easily.

Sexual dimorphism in motor skills, although already distinct, is not yet as strong as in later periods of life. Boys show a visible advantage in running speed, throwing and jumping, while girls show superior flexibility and manual dexterity.

Late childhood begins when the child starts school. The shock of a sudden change in living conditions has an impact on the child's physical activity. According to Przewęda (1981), the following can be observed in children in the first years of primary school:

- a quite rich range of simple movements (these are generally harmonious, rhythmic, fluid, flexible),
- little development of motor skills, with the exception of high flexibility and considerable agility, and often a particular kind of speed,
- understanding the content of movements, which allows exercise to move from forms of play to forms of learning in the strict sense,
- increasing strength,
- enriching the variety of types of activities involving movement, which allows the teacher to shape the student's athletic interests.

Denysiuk, Milicerowa (1969) pointed visible ontogenetic changes can also be observed in capabilities regarding strength and speed. With the growth in mass, height and the changing proportions of the body, the relations of these parameters to the amount of the absolute force change. As a result, both girls and boys find it difficult to exercise. The changes taking place in the system also have an impact on the increase in the capability for speed during this period. Moreover, in the late school period there is a phase in which the assimilation of complex new movements comes with exceptional ease.
The process of maturation influences the propagation of developmental lines of motor activities that are characteristic for women and men. In the first phase of puberty, significant changes in body proportions take place, and sexual maturity is also accompanied by psychological anxiety. This

affects the development of motor skills and a certain stagnation in the development of the coordination of movements, as well as a slower increase in physical fitness.

One can observe the differences in the physical development of girls and boys, as well as the intensive development of individual interests. Young people often avoid active participation in physical culture, and there are also difficulties in teaching physical activity. In addition, changes in the cardiopulmonary system are not conducive to exercise requiring endurance, after which, however, an increase in endurance follows.

In a research study by Przewęda (1981) An important measure of motor development in adolescence is the level of agility. Research has shown that boys in the age range of 7-10 improve their agility very quickly. This process continues to be discernable up to the age of 18, but it does proceed more slowly. Girls, on the other hand, after a notable improvement in results at the age of 12-15 years, show a tendency to stagnate at that level.

Whereares Denysiuk and Milicerowa (1969) added at the stage of adolescence, there is a certain stagnation of motor skills, as well as sexual and individual differences. Boys in this period are much more proficient than girls. There is a growing interest in physical activity. There is a great increase in strength in boys and an improvement in their ability to sprint. On the other hand, girls improve their dexterity and agility. Endurance peaks in girls aged 15-16 years and in boys between 18 and 22 years of age.

Early adult age (20-30 years of age) is characterized by a relative stability of motor skills and increased intentionality and economy of movement in men. This is the period of peak performance in sports Middle adulthood is characterized by the fact that the motor activity of a person appears to be lower, although these movements are still agile and economic. Those who train regularly maintain high motor and physical fitness. The possibility of learning new motor activities decreases. The frequent loss of fitness around the age of 40 is not the result of biological aging, but of neglect.

Late adulthood in an adult who does not engage in any sport is characterized by involutionary processes in physical fitness, and a decisive decline in speed, strength and endurance

Conclusion

The aim of this article has been to identify and analyze the importance of physical culture in shaping health security. The research methods used were deduction and induction. It should be noted that the article does not constitute an original contribution either in the field of physical culture or in the field of health in the field of social security. Instead, it is to serve as introduction to the subject, the knowledge of which – in the author's estimation – may help contemporary and future theorists and practitioners in education or security to augment their knowledge and understanding of the essential function of various aspects of physical culture in the creation of health in the field of social security. It is also an attempt to broaden the awareness of the audience, especially parents and teachers of physical education, about how important it is to address contemporary educational needs through actions that develop health in the field of social security in and through physical culture.

The preceding analysis allows the following conclusions to be drawn:

1. Health is a fundamental human value and social security is a fundamental human need to ensure survival and ensure physical, mental and social development.
2. Participation in physical culture ensured that the potential for the development of health in the field of social security is multifaceted and mainly regards positive structural and functional changes in the human body, whereas restriction of physical activity leads to negative health consequences.
3. The foundation for the development of health in the field of social security in all areas of personal development is active participation in physical culture, which in childhood serves

primarily to support individual development, in adulthood to maintain the level of fitness, and in old age to actively counteract involutionary changes.

These considerations lead to the general conclusion that the building of health in the field of social security should be achieved both through the immediate meeting of the needs of children and youth, in particular in terms of their somatic and motor development (because it is impossible to make up for negligence in this respect) and through preparing them to maintain and improve these abilities later in life (because they do not constitute lifetime capital). These activities fall in particular within the scope of such forms physical culture as school physical education and extracurricular athletic activities.

The harmonious achievement the development of health in the field of social security through physical culture is very difficult due to the variability in how its processes impact both the body and the personality. The effectiveness of these may sometimes even be reduced, however. It is possible, for example, to increase bodily efficiency using methods that will simultaneously lower a given individual's level of motivation to exercise. Capacity - as a physiological category - depends mainly on the intensity and regularity of training, and motivation - as a psychological category - on the social climate in which the process of physical education takes place.

The task of shaping health in the field of social security can be met only by a conscious and thoroughly prepared parent or teacher, who is prepared both for physical training and to teach how to develop a personality able to work independently on their body, who is able to develop every area of the personality of children in their care, not only physically, but also mentally, morally and aesthetically. Meeting this task will enable the educator to focus not only on short-term goals, but also on long-term ones. This is manifested not only in the development of the physical abilities of the students who show outstanding physical fitness, but also in the development of the knowledge, skills and attitudes all young people need to take care of their own body, health and physical fitness throughout their lives.

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E-Learning Adoption in the UAE: An Emirical Investigation of The Higher Colleges of Technology

Saeed ALBLOOSHI
sayeedalblooshi6@gmail.com
Faculty of Technology Management and Business
Universiti Tun Hussein Onn Malaysia
86400 Parit Raja, Batu Pahat,
Johor.

Nor Aziati Binti ABDUL HAMID
azati@uthm.edu.my
Faculty of Technology Management and Business
Department of Manufacturing and Operating Management
Universiti Tun Hussein Onn Malaysia
86400 Parit Raja, Batu Pahat,
Johor.

Abstract

This paper examines the mediating role of behavioral intention on the relationship between the three determinants of technology adoption and actual use of e-learning. Therefore, a quantitative method was used and the data was collected from the Higher Colleges of Technology (HCT) in the United Arab Emirates particularly from the HCT Abu Dhabi campus. Hence, out of the 490 questionnaires administrated, a response rate of 82.9 percent was reported, corresponding to a total of 406 respondents that participated in the study. Findings from the analysis revealed that performance expectancy and effort expectancy had a positive effect on students' actual use of e-learning. However, the results revealed there is a negative correlation between social influence and the actual use of e-learning. In addition, the result shows that behavioural intention mediates the relationship between performance expectancy, effort expectancy, social influence and actual use of e-learning.

Keywords: Unified theory of acceptance and use of technology; E-Learning; Higher Colleges of Technology; UAE.

Introduction

Although the United Arab Emirates launched the transition from the country's largest national education system to e-learning, distributing approximately 14,000 electronic device computers to federal college students (Mostafa et al., 2016). However, the students using smart electronic learning face issues such as interactivity and connectivity (Zahran Khaimah, & Pettaway, 2016). Recently, the solicitation of electronic technology in the ground of education has aroused great interest, although the technology is still developing (Kamali, 2013). According to Alhebsi et al. (2015) in the Gulf region, the UAE played a leading role in developing high-end electronic devices for students teaching (Ati & Guessoum, 2014). However, the effectiveness of the e-learning system still not reached its expected position due to the lack of awareness on perusing students to adopt the e-learning in the education environment, and with the increasing integration of electronic learning in the community, there is a strong need for practical guidelines and recommendations to promote and provide an effective teaching and learning environment for income generation (Iran, 2011). Similarly, Universities in UAE are investing for many years in e-learning systems in order to improve the quality of student's education. Nevertheless, the utilization among students has not fulfilled a satisfactory level (Salloum, & Shaalan, 2018). Hence, the slow-paced adoption of e-learning by students in UAE's HEIs is worrisome, given that the infrastructural requirements for operating a robust e-learning system are in place. Thus calls for an investigation into the factors or determinants that enables the successful deployment and adoption of e-learning.

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The developed nations are successfully implementing the e-learning technology besides realization of its massive benefits. However, the developing countries have failed, either fully or partially, to implement the e-learning technology. For instance, in United Arab Emirate, one of the developing countries, a growing number of universities are investing for many years in e-learning systems in order to improve the quality of education. However, their utilization among students have not achieve it is expected desire (Salloum & Al-Emran *et al.,* 2019).

Research Questions

The following research questions were formulated in line with the objectives of the study to guide the inquiry. They include:

1. What is the effect of social influence on HCT students' behavioural intention to use e-learning?
2. What is the effect of effort expectancy on HCT students' behavioural intention to use e-learning?
3. What is the effect of performance expectancy on HCT students' behavioural intention to use e-learning?
4. Does HCT students' behavioural intention to use e-learning mediates the relationship between their actual use of e-learning and the three dimensions of the unified technology acceptance model (i.e. social influence, effort expectancy and performance expectancy)?

Significance of the Study

This study was driven by the need to address the issues surrounding the adoption of e-learning by students in the UAE HEIs. The literature of e-learning is still an emerging one, and prior studies have investigated issues relating to e-learning adoption in general business setting as well in a western and developed country context, but there is need to focus on aspects such as higher education and in a developing nation context. Hence, the overall significance of this study was to provide a clearer understanding of the determinants that influence the acceptance of e-learning technology from a student perspective faculty in selected HEIs in the UAE. The findings will be an addendum to the body of literature by reporting the direct and mediating effects of the determinants of e-learning adoption and the actual use of the technology as well as provide a strong foundation that can be used to develop strategies for management and other stakeholders who are interested in successful implementation of e-learning that students can quickly adapt and use.

This research is of significance to the field of information systems and educational management as insights into the direct effect of the determinants e-learning adoption and the behavioural intention as well as the mediating effects of student's behavioural intention to use e-learning and their actual use of e-learning. Also, this study will enable the development of an adapted model of acceptance and use of technology, which in turn can be used to better enhance the deployment and implementation of e-learning systems across HEIs in the UAE.

Likewise, the research will be beneficial to higher education stakeholders, university management and faculty members in providing the feedback needed to design efficient e-learning systems that curb the inhibiting role of language, culture, improperly designed user interfaces as well as accessibility issues. With this, effective e-learning systems can be created to allow the students to tap into the enormous potentials and benefits it has to offer. It can provide university management with the necessary insights needed to formulate e-learning policies and standards for more efficient implementation. On the part of faculty members, findings from the study can be used to plan for effective integration of e-learning and contemporary teaching and learning, taking note of the significant determinants of e-learning adoption from student's perspective.

Literature Review

Unified Theory of Acceptance and Use of Technology

Numerous studies had used the Unified theory of acceptance and use of technology (UTAUT) to measure technology acceptance, adoption, intention or willingness to use, and many other technology-related topics specifically e-learning. For instance, Anderson *et al* (2006) used UTAUT in their in study titled "The Drivers for Acceptance of Tablet PCs by Faculty in a College of Business". Similarly, Jairak *et al* (2009) adopted Unified Theory of Acceptance and Use of Technology (UTAUT) model to determine the factors that influence the students' intention to use m-Learning in Thailand. The results show that the acceptance level of students on m-Learning is in the high level. Likewise, another study from Thailand done by Pinpathomrat & Gilbert (2013) who also applied Unified Theory of Acceptance and Use of Technology to investigate the factors that affect a Thai student's decision to take up and continue using E-learning.

In addition, previous studies from Arab countries had also used UTAUT model to measure technology acceptance. For example, Nassuora (2013) examine the possibility of acceptance in mobile learning (m- Learning) and study main factors that affect using m- Learning that focus on higher education students in Saudi Arabia. He Nassuora (2013) used UTAUT to determine the factors that influence the students' intention to use m-Learning. Furthermore, Emmanuel Awuni Kolog *et al* (2015) used Unified Theory of Acceptance and Use of Technology model to ascertain students' behavioral intention to adopt and use e-counseling in Ghana. The results of the research suggests Performance Expectancy and Social Influence as the influencing constructs (factors) towards students' behavioral intention to adopt and use e-counseling, Facilitation Condition and Effort Expectancy had no significant effect on the behavioral intention of students to adopt and use e-counseling in Ghana (Emmanuel Awuni Kolog *et al.,* 2015).

Moreover, Olatubosun et al (2015) utilize the modified versions of the unified theory of acceptance and use of technology (UTAUT) model in explaining e-learning adoption in higher education in a developing country and evaluate the size and direction of the impacts of the UTAUT factors on behavioral intention and use behavior to adopt e-learning in higher education. The results suggest that, it is well established that the latent variables significantly explain the UTAUT model in Nigeria. Also, Abdekhoda et al (2016); Ngampornchai & Adams (2016); Sarabadani et al (2017); Mostafa & Rachid (2017); Radovan & Kristl (2017); Zawaideh (2017); Soedarto et al (2018); Alasmari & Zhang (2019) all these authors used Unified Theory of Acceptance and Use of Technology model to examine the adoption of e-leering.

Empirical studies on E-learning

Grabinski *et al* (2020) investigate the benefits and drawbacks resulting from the implementation of e-learning in accounting modules among educators. They used survey questionnaire to collect the data among 79 accounting lecturers, employed by the leading Polish economic universities. Although they have found that the most important benefits of the e-courses included the enhancement of efficiency and flexibility of the teaching process. However, the survey has shown that e-learning is not widely used by accounting academics in Poland Grabinski et al., (2020). Furthermore, Al-Emran & Teo (2020) stated that studying the factors that affect the e-learning adoption is not a new research topic. However, exploring the effect of knowledge acquisition and knowledge sharing on e-learning adoption is a relatively new research trend that has not been featured in the existing previous studies. Therefore, they Al-Emran & Teo (2020) conducted s atudy to build a new model by extending the technology acceptance model (TAM) with knowledge acquisition and knowledge sharing to examine the e-learning adoption. They have distributed a total of 403 questionnaires to students enrolled at Al Buraimi University College (BUC) in Oman. The collected data was analysing via Partial Least Squares-Structural Equation Modelling (PLS-SEM) to evaluate the proposed model.

Another study conducted by Al-Fraihat *et al* (2020) aims to investigate the factors that are considered for the evaluation of e-learning system success and has led to the development of an e-learning success model that incorporates these factors. To test the model, an empirical study was conducted. Thus, the model of the study has been empirically validated by fitting the model to data collected from 563 students engaged with an e-learning system in one of the UK universities through a quantitative method of Partial Least Squares-Structural Equation Modelling (PLS-SEM). According to Al-Fraihat *et al* (2020) the determinants of e-learning perceived satisfaction are information quality, technical system quality, support system quality, learner quality, instructor quality, service quality and perceived usefulness, which together explain 71.4% of the variance of perceived satisfaction.

Alqahtani (2019) the usage of E-learning in the Kingdom of Saudi Arabia (KSA) academic institutions is still in its early stage and its impact is insignificant. In Saudi Arabian universities, there is a need to improve the understanding of how to deal with the new technology, how to meet the staff and student's requirements for teaching and learning, and how to tackle students' lack of motivation concerning independent learning. Alqahtani (2019) identify the main issues that are hindering the use of modern techniques of E-learning in Saudi Arabian educational system effectively, such as personal factor, and learning attributes. This study provides an initial framework that can be used as a detailed, structured E-learning roadmap by stakeholders in Saudi universities, as well as those in developing countries (Muhammad Ali et al., 2018).

An interesting study on COVID-19 and emergency e-learning done by Murphy (2020). The COVID-19 pandemic quickly led to the closure of universities and colleges around the world, in hopes that public health officials' advice of social distancing could help to flatten the infection curve and reduce total fatalities from the disease. Likewise, Murphy (2020) used Copenhagen school securitization theory and analyzing 25 declarations of emergency e-learning at American universities, Murphy (2020) argue that in addition to COVID-19 being framed as a general threat, face-to-face schooling was also presented as a threat through these policies. He (Murphy) concludes that securitization theory is an important tool for educators not only for observing (and understanding) the phenomenon of emergency e-learning, but also for supporting the de-securitization of schooling after the COVID-19 crisis passes (Murphy, 2020).

Theoretical Framework and Hypothesis of the Study

The unified theory of acceptance and use of technology (UTAUT) identified performance expectancy, effort expectancy, social influence and facilitating conditions as some of the factors that may influence the behavioral intention and actual use of a technology. The propositions of the UTAUT model have been severally tested in western and developed nation context, but there exist inadequate empirical validations of the propositions of the UTAUT model in non-western context as well as in countries categorized as developing nations. Thus, this study has only focus on the three dimensions of the independent determinants of UTAUT model; the facilitating conditions has been excluded in this study; hence, figure 1 shows the framework of the study that tested in the UAE context.

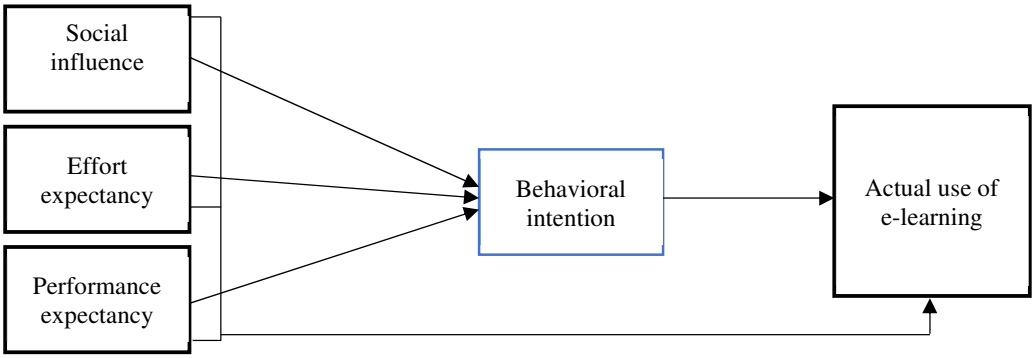

Figure 1: Framework of the study

H1: Social influence has a positive effect on Actual use of e-learning.
H2: Effort expectancy has a positive effect on Actual use of e-learning.
H3: Performance expectancy has a positive effect on Actual use of e-learning.
H4: Behavioural intention has a positive effect on Actual use of e-learning
H5: Behavioural intention mediates the relationship between effort expectancy, performance expectancy, social influence and actual use of e-learning.

Methodology

The purpose of this study was to determine student's views of the factors of e-learning adoption in higher education institutions in the UAE, by scrutinizing the effects of performance expectancy, effort expectancy, social influence on behavioural intention, as well as the examine the mediating role of the behavioural intention on the relationship between the three determinants of technology adoption and actual use of e-learning. Therefore, a quantitative method was used and therefore the data was collected from the Higher Colleges of Technology (HCT) in United Arab Emirates particularly from HCT Abu Dhabi campus. In addition, the survey consists of 5 different sections; each variable has five (5) items. The questions were adopted and adopted from Venkatesh et al. (2003) with further adjustment to fit the scope of this study. Actual use of e-learning was referred to as the physical and mental acts associated with the use of e-learning by students. This was measured using five items also. All scales in the questionnaire were structured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Therefore, out of the 490 questionnaires administrated, a total of 406 valid data was used. Therefore, to display hypothesized relationships between variables, the study determines, estimate, analyse and present the model in a causal path figure. Similarly, the research assessment model present must be validated using the PLS-SEM technique. Assessment of conceptual or theoretical models for the purpose of validation in PLS-SEM; thus the validation includes a two-staged approach that begins with the assessment of measurement model followed by the assessment of the structural model. The essence of validating the model using this approach was to empirically measure it performance with existing criteria that support the validation of measurement and structural models.

Results

The data analysis was presented in line with the main research objectives of this study. Thus, after data collection, a response rate of 82.9 percent was reported, corresponding to a total of 406 respondents that participated in the study.

Convergent Validity and Reliability

According to Hair *et al.* (2014) convergent validity can be assessed using the factor loadings, composite reliability and the Average Variance Extracted (AVE). Therefore, to succeed convergent validity, each construct should have an AVE of ≥ 0.50, and the factor loadings should be preferably greater than 0.70. Although Byrne (2013) suggest that factor loadings of 0.50 are acceptable if the summations of the loading results in high loading scores contributing to AVE scores of 0.50 or greater.

Table 1: Convergent Validity and Reliability

Variable of the study	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Actual Use of E-Learning	0.791	0.855	0.544
Behavior Intention	0.776	0.847	0.529
Effort Expectancy	0.795	0.861	0.557
Performance Expectancy	0.788	0.855	0.546
Social Influence	0.798	0.824	0.515

The results of the cronbach alpha and composite reliability scores exceeded the minimum threshold values as recommended by George and Mallery (2003); all the Cronbach's Alpha values were excellent as shown in Table 1. Similarly, composite reliability values were above 0.7 and therefore, it is acceptable (Bagozzi & Yi, 1988; Hair *et al.*, 2014).

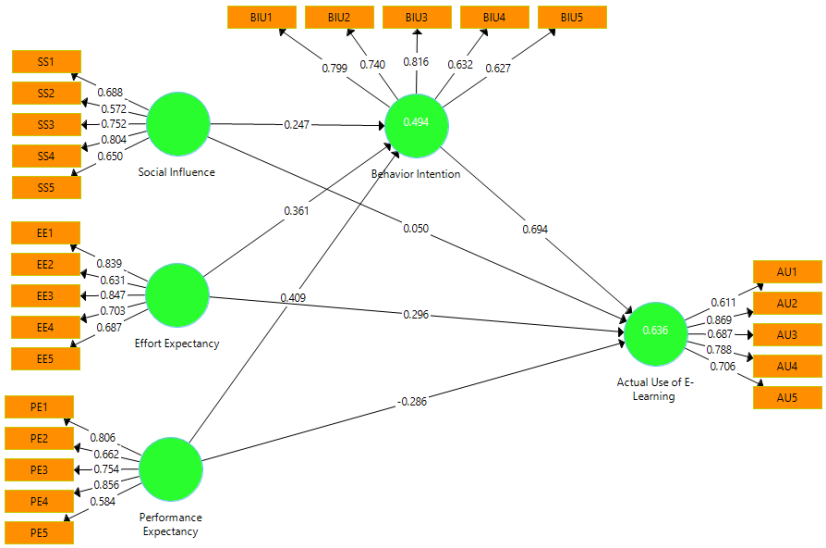

Figure 2: Research Measurement Model

Byrne (2013) suggest that factor loadings of 0.50 are acceptable if the summations of the loading results in high loading scores contributing to AVE scores of 0.50 or greater. Figure 1 shows the factor loadings of each of the items in the study. All factor loadings ranging 05.72 to 0.847 as shows in the measurement model. Therefore, none of the item was deleted as no item had to factor loadings less than 0.5.

Discriminant Validity

According to Ramayah *et al* (2016) Discriminant validity is the degree to which indicators differentiate across constructs or measures distinct concepts by examining the correlations between the measures of potentially overlapping constructs. Thus, the significance of conducting a discriminant validity test is to assess whether the constructs are distinct from others in the measurement and structural models. Therefore, Table 2 shows the results of Discriminant validity using Fornell and Lacker Criterion.

Table 2: Discriminant validity using Fornell and Lacker Criterion

	Actual Use of E-Learning	Behavior Intention	Effort Expectancy	Performance Expectancy	Social Influence
Actual Use of E-Learning	**0.737**				
Behavior Intention	0.708	**0.727**			
Effort Expectancy	0.587	0.499	**0.746**		
Performance Expectancy	0.160	0.534	0.226	**0.739**	
Social Influence	0.322	0.386	0.185	0.178	**0.698**

The factor loadings criterion was also used to evaluate discriminant validity. Table 2 shows that all indicator loadings loaded highly on their own respective constructs compared to other constructs. Thus, there was no issue of high cross-loading between the latent variables. Hence, discriminant validity is established.

Table 3: Heterotrait Monotrait ratio criterion

	Actual Use of E-Learning	Behavior Intention	Effort Expectancy	Performance Expectancy	Social Influence
Actual Use of E-Learning					
Behavior Intention	0.785				
Effort Expectancy	0.716	0.595			
Performance Expectancy	0.228	0.698	0.285		
Social Influence	0.250	0.367	0.197	0.257	

In addition, Heterotrait Monotrait (HTMT) ratio criterion was also used to support the establishment of discriminant validity. As Table 3 the discriminant validity is established since all the ratios were below the threshold values of HTMT .90 as indicated by Gold, Malhotra, & Segars (2001) and Kline (2015).

Path Coefficients

The path coefficient or estimates from the structural model relationship have standardized values that typically range between -1 and +1, with path coefficient close to +1 representing a strong positive relationship while those close to -1 represents a strong negative relationship according to Hair *et al* (2016). In this study, bootstrapping of 500 subsamples to ascertain the t-values for 0.05 significance level was used to determine the path coefficients. Table 4 shows the results of the bootstrapping significance analysis for the structural path model coefficients, *t*-statistics and *p*-values.

Table 4: Significance test for the Structural model path coefficient, t-value and p-values

	Std β	Std Error	*t* Statistic	*p* Value	Hypothesis
Social Influence -> Actual Use of E-Learning	0.050	0.036	1.385	0.167	H1 Not Supported
Effort Expectancy -> Actual Use of E-Learning	0.296	0.039	7.562	0.000	H2 Supported
Performance Expectancy -> Actual Use of E-Learning	-0.286	0.036	8.056	0.000	H3 Supported
Behavior Intention -> Actual Use of E-Learning	0.694	0.036	19.474	0.000	H4 Supported

There are three direct path coefficients of which 2 (effort expectancy and performance expectancy) were significant with t-values exceeding the t- Statistic value of 1.96 and p-values value less than 0.05 as recommended by Hair *et al* (2016). However, social influence was not significant as the results shows that the t- Statistic value and p-values value less the required values. Therefore, Table 5 presents the results of the mediating role of behavior intention on the relationship between expectancy, performance expectancy and social influence and actual use of e-learning.

Table 5: Mediating Role of Behavior Intention

	Std β	**Std Error**	***t* Statistic**	***p* Value**	**Hypothesis**
Effort Expectancy -> Behavior Intention -> Actual Use of E-Learning	0.251	0.028	9.032	0.000	H5a Supported
Performance Expectancy -> Behavior Intention -> Actual Use of E-Learning	0.284	0.035	8.186	0.000	H5b Supported
Social Influence -> Behavior Intention -> Actual Use of E-Learning	0.171	0.026	6.512	0.000	H5c Supported

The result shows that behavior intention mediates the relationship between expectancy, performance expectancy and social influence and actual use of e-learning. This implies that in an e-learning content, student's behavior intention to use e-learning influences their actual use of e-learning when performance expectancy, effort expectancy and social influence are high.

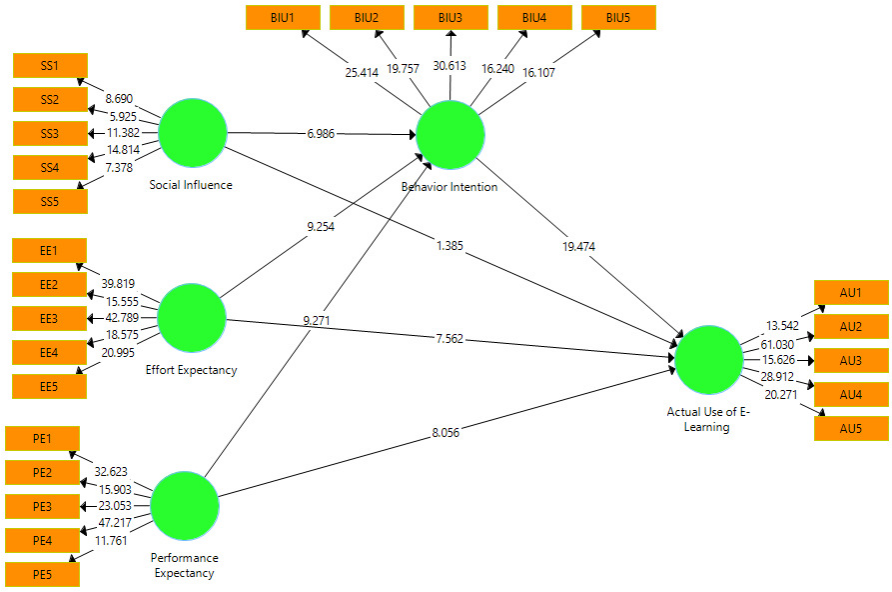

Figure 3: Research Structural Model

Also, the results of the path coefficient and t- Statistic value is shown in Figure 3, the structural model of the study.

Discussion and Conclusion

Venkatesh *et al.* (2003) described performance expectancy as the extent to which an individual believes that using a system will help him or her attains gains in job performance. In the context of this study, performance expectancy was described as a student's belief that using e-learning will be beneficial and interesting in achieving high performance in learning. Thus, findings from the analysis revealed that performance expectancy had a positive effect on students' actual use of e-learning. Therefore, positive perceptions of the gains of e-learning will ultimately result in the intention to adopt it, whereas a negative perception of the gains of e-learning will result in student's intent to reject it as part of their learning activities. This finding is in line with previous empirical results of Alsumait & Al-Musawi (2013); Chauhan & Jaiswal (2016); Lowe & Boucheix (2016); Luzón & Letón (2015); Stebner *et al* (2017); Suki & Suki (2017); Tosuntaş *et al* 2015). Therefore, (H3) Performance expectancy has a positive effect on actual use of e-learning is supported.

Similarly, the findings from the study revealed that there was a positive linkage between effort expectancy and actual use e-learning. Venkatesh *et al.* (2003) described effort expectancy as the "degree of ease" associated with the use of a system. In this study, effort expectancy was conceptualized as students' belief that using e-learning in facilitating their learning will be easy for them, i.e. it will require little effort. This, therefore, indicates that effort expectancy is a strong determinant of the behavioral intention to adopt or reject e-learning. This finding is consistent with those of the original UTAUT model by Venkatesh *et al* (2003), as well as most of the studies reported in e-learning studies. For example, Dečman (2015); Raman *et al* (2014) Tosuntaş *et al* (2015); Yakubu & Dasuki (2019). Therefore, hypothesis (2) Effort expectancy has a positive effect on actual use of e-learning is supported.

However, the results revealed there is a negative correlation between social influence and actual use of e-learning. Venkatesh *et al.* (2003) described social influence as the degree to which individuals believe that significant others expect the individual to use the system. In the context of this study, social

influence was described as the extent to which student perceive that significant others (i.e. friends, social cycle, university management, academic administrators, educators etc.) expect them to use the e-learning system. This, therefore, implies that social influence is not satisfactory based on the behavioural intention to use e-learning among the Higher Colleges of Technology's students. However, this result is not corresponding with some of the findings reported in the literature (Dečman, 2015; Raman *et al.*, 2014; Suki & Suki, 2017; Yakubu & Dasuki, 2019).

Lastly, the mediating effect of behavioural intention in the relationship between the three UTAUT dimensions (i.e. performance expectancy, effort expectancy and social influence, and students' actual usage of e-learning. Hypotheses (H5a,b,c) were formulated to test the mediating role of behavioural intention. Therefore, the results show that behavioral intention mediates the relationship between performance expectancy, effort expectancy, social influence and actual use of e-learning. This finding is consistent with the findings of several studies reported in the literature (Chauhan & Jaiswal, 2016; Isaac *et al.*, 2019; Suki & Suki, 2017; Tosuntaş *et al.*, 2015; Yakubu & Dasuki, 2019).

Recommendations for Further Research

Future studies can include more variables such as culture, language and other contextual variables to study the effects of the determinants of technology adoption on students' use of e-learning systems. This will be particularly interesting if the role of culture and language can be explored in e-learning adoption. Such a study would lead to the development of a more comprehensive model for e-learning adoption that highlights the role of contextual variables such as culture and language. Also, there is a need to also examine the integration of several theories in order to come up with a unified and holistic overview of e-learning adoption. Several models and theories exist in technology acceptance, therefore integrating these models to test hypothesized relationships and factors can better improve our understanding of e-learning adoption. Finally, this study considered only the perspectives of students in establishing the findings of the study. It would be interesting to explore a comparative view of a faculty member and student's views regarding e-learning adoption. Factors crucial to both faculty members and students could be well understood if such a study was conducted.

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Cybersecurity, A Priority of The Modern World

Dan-Alex Ceaușescu-Constantinescu
University of Economic Studies, Bucharest, Romania
alexceausescu@yahoo.com

Andreea-Alexandra Chiriac (Roșca)
University of Economic Studies, Bucharest, Romania
r.andreea90@yahoo.com

Claudiu Chiriac
University of Economic Studies, Bucharest, Romania
chiriacclaudiu14@stud.ase.ro

Abstract

Data is probably the most valuable resource of our time, similar to what represented oil a century ago. Technology giants built their competitive advantage on the huge amount of data they are dealing with to drive the biggest societal changes. Cybercrime became a threat not only for the processes of the organizations but also for individuals as unethical data use can change people's attitudes and behavior not only towards the products and services, they are buying but also their political views and values. The purpose of this paper is to assess the dimensions of data security, ethics, and compliance in the context of new regulations.

Keywords: Technology, People Behavior, Data Security, Data Compliance, Regulation

Introduction

There are 2.5 quintillion bytes of data produces by us every day especially generated by internet, social media, communications, digital photos, services and the internet of things [1]. Impressive statistics regarding the main sources of data:

- More than 4.5 billion people use the internet [2], so about 60% of the entire population.
- On average, there are more than 40,000 searches on Google every second, so more than 3.5 billion searches every day [2].
- More than a third of the world's population is active on Facebook monthly [2].
- Every minute on Facebook there are 510,000 comments posted, 293,000 statuses updated, and 136,000 photos uploaded [3].
- Every minute we send 16 million text messages [2].
- In 2017, there were 4.7 trillion photos stored [2].
- Every minute there are more than 45,788 uber trips [2].
- There will be more than 20.4 billion connected things by 2020 according to Gartner [4].

Moreover, the systematic progress makes the technology even more affordable even free when it comes to services such as GPS, camera, news, banking all being integrated today in our mobile phone without any cost associated. Freemium, the combination of "free" and "premium" is a new business model especially for app developers who design the app adding premium features but make it free so as to attract a considerable user base while the source of revenue is coming from in-app advertisement or from a small portion of users which is paying for some additional features [5].

On the other hand, all this data reveals precious information about us from our usage behavior to what are our preferences, interest, opinions, and hobbies. These insights are the fuel for the brands and organizations to make data-driven decisions to design customized products or services according to

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our needs and interest. Personalized products or services are becoming a significant part of our life because of their applicability and usability in different areas, allowing us to monitor our health and personal finance, shop online, play games, listening to the favorite songs and taking online courses to grow the skills we are interested in. But this is the mechanism of generating more and more data about us, data that makes the algorithm proficient in predicting our preferences and expose us to advertising that fits our desires and lifestyle.

At the same time, companies are looking for new ways of making sense of the huge amount of data to enhance the current products and services, to innovate in new areas, but also to optimize and automatize the business processes. This is why a new set of tools to analyze structured and unstructured data had been developed recently and there are some new skills in demand on the human resources market. Data guru, so the person who knows how to extract data, analyze it and look for patterns - skills that can improve the use of resources, value chains, managerial operations, industry knowledge, and growth opportunities, is a type of employee the companies are looking for [6]. Moreover, data scientist is one of the most promising jobs in 2019 [7].

According to McKinsey, data, and analytics not only changed the business practice, but data monetization is becoming another source of revenue by adding new services to current offerings, developing new business models, joining with similar companies to create a pool of related data that can benefit all of them [8].

Knowing what the main sources of data are, how this data is generated and the technological premises, it is quite easy to imagine that the process of producing, analyzing and integrating data in the main sources that generate them is intensifying continuously its peace.

Technological trends impact data collection and processing

Technology is rapidly shaping the way companies work and how we interact with the world. Specialists encourage to closely look over five new areas: Artificial Intelligence, Augmented Reality, Blockchain, Automation and Internet of things [9].

Artificial Intelligence (AI) is a computer area which has as the main purpose to mimic how people acquire the necessary knowledge, resonate, solve problems, perceive, learn, plan, manipulate and move objects. Machines can act and react as humans only if they have enough information to be used by its algorithms to identify patterns [10].

Augmented Reality (AR) is the technology that overlaps the virtual objects in the existing environment, as a result, the information addon creates a new artificial reality. Many augmented reality apps have been developed recently to enhance different industries from gaming to constructions, this technology having the potential to influence even more our lives [11].

Blockchain is a huge distributed database that runs on millions of computers and it is open source, so anyone can access the code to see what any structured information from banking transactions to information about who married whom or who owns what land or what light bought power from what power source. This is a way of proving the truth through mass collaboration establishing a source of trust in a world of distrust [12].

Automation is the process that increases efficiency and reliability by replacing manual operations or increase the speed for repetitive tasks. The potential of automation is huge, its impact in manufacturing is already known by decreasing the workforce in this industry but now it moves to more sophisticated jobs replacing the car drivers, pilots, public sector jobs or teachers [13].

Internet of Things (IoT) is the concept of connecting any device through the internet such as smartphones, coffee makers, washing machines, lamps, wearables or any other objects including components of different machines. The purpose of having all these objects inter-connected is to make

life much easier, for example, if the alarm clock is set for a specific hour, it can be linked with the coffee maker to have coffee prepared in the morning [14].
These trends are connecting with the data generation or processing. While IoT is the main source of data and AR is bringing data from a different reality, AI and automation bring new opportunities to process data and drive actionable insights and Blockchain collects data in an immense database.

Technology came with many risks associated to data

The expansion of data volume has many risks associated as the data protection regulations and the set of tools that ensure security doesn't keep the same pace with what we produce every day. Risks include applications, users or devices.

There are a few famous examples of data breaches. Cambridge Analytica is a name that resonates with the USA elections and the Brexit campaign because of its involvement as a data analytics firm that accessed 87 M of Facebook profile to build an algorithm that was able to predict an influence vote choice. This was the biggest data breach that involved the tech giant. Everything started with a group of thousands of Facebook users that were incentivized to take a personality test and agreed to have their information collected for an academic purpose. Not only their personal information was collected, but also their Facebook friends which allowed the algorithm to learn from more data and to improve the prediction accuracy and microtargeting with the customized campaign messages. Facebook denies that the harvesting of the Facebook profiles was a data breach as Cambridge Analytica and the companies they worked with got access to the information legitimately, the only rule breaker was the fact that the information was used for third parties. Cambridge Analytica, Facebook, and the other companies are investigating by the British Information Commissioner's Office for the Brexit campaign, by the Electoral Commission for the role played in the EU referendum and by many US institutions from House Intelligence Committee to FBI. The only price paid by Facebook so far was the drop in its share value [15].

There are other examples of the sensitive data that has been exposed over the last years [16]:

- About 15 Bn. of data records have been lost or stolen since 2013.
- Only 4% of breaches were secure, the data were encrypted to be useless
- 86% of the incidents occurred in North America.
- There are 6.5 M of data compromised every day, so 75 records compromised per second.
- 42% of data breaches are caused by hackers or criminals while 29% are caused by system glitches.
- ¼ of the incidents is caused by the employees.
- In the US the main data breaches were in Business (45.9%) and Medical (29.2%) sectors.
- Top 3 data breaches from the last 15 years were generated by American Online in 2013 impacted 92 M screen names and email addresses, Yahoo in 2013-2014 compromised all 3 Bn. accounts and Target in 2013 impacted 110 million accounts [16].

With the new technological advancements, there are many ways to use the technology to process apparently inoffensive personal data to create algorithms that are able to manipulate every choice we make not only regarding the brands we buy or use but also regarding the political options or the general opinions and values. Hacking humans is the ultimate risk for our data as a deeper understanding of the human decision-making process; the algorithms become more reliable at these types of tasks, at the same time making us less reliable. After the human operating system is hacked, a precise kind of manipulation, advertisement and propaganda will follow [17].

For 2020 companies there are ten risks when it comes to data privacy [18]:

- **Accidental sharing**, so the company's employees share sensitive information with someone outside the organization.
- **Overworked cybersecurity teams**, as the incidents number increases, and the security specialists are quite rare.

- **Employee data theft** means the insider threat which is coming mainly from employees who are not in leadership positions.
- **Ransomware attacks** that are designed to block a computer system until a sum of money is paid are on the rise, in 2019 the cost of a ransomware attack more than doubled.
- **Bad password hygiene** as some of the login credentials are already compromised by previous data breaches or other employees that have redundant or easy to guess passwords.
- **Bribery** of the employees to expose the company's data or to plant malware on the network.
- **Too much data access** as data is one of the main resources of the company, each employee should access only what he or she needs to know for that position.
- **Phishing emails** are on the rise, the technology makes the attack even more sophisticated.
- **Fraud** by taking the email addresses and passwords that enable even more elaborate attacks.
- **Denial** of the companies to understand the risks associated with the data to be equipped and train the employees to avoid the risks [18].

The biggest challenge of the companies is the sense of losing control over data that comes with utilizing third-party solutions for cloud, data management and analytics [19]. Moreover, according to a survey of 250 C-level leaders in the UK, data breaches and hacking attacks is the new reality for the companies [20].

Data security and cybersecurity

In this context with many risks associated with data, there is a focus on big data security market which is expected to register a CAGR of 17% between 2019 to 2024, concerns associated with data exposure being both for on-prem and on cloud systems [21]. New threats related to data privacy emerge and it is impossible to invest in eliminating them, but there are some preventive practices to help companies protect their data and their clients' data such as [22]:

- **Strong security policies and practices** and here everything starts with the efficiency of the data collection to have the optimal amount of data that can be manageable, but also the strategy for the incident response and backup recovery and the employees' familiarity with the procedures.
- **Access control** is related to giving the employees access only to the part of the network necessary for their activity.
- **Network Protection** through antiviruses, firewalls, and proper maintenance.
- **Encryption** which assures the data privacy even if the data is stolen because encrypted, it becomes useless [22].

Going even further, Gartner identified top security trends for this year and beyond that should be monitor over time to see the traction they get [23]:

- **Risk Appetite Statements Are Becoming Linked to Business Outcome**: IT strategies are aligned to business goals, security and risk management is gaining importance in the business decision.
- **Security Operations Centers (SOCs) Are Being Implemented With a Focus on Threat Detection and Response**: the focus in security shifts from prevention to detection and this involve building SOCs that will be able to integrate threat intelligence, consolidate alerts and automate response.
- **Data Security Governance Frameworks (DSGF) Will Prioritize Data Security Investments**: DSGF identifies data and defines data classifiers and data security policies, information that can be used to select technologies that minimize the risk.
- **Passwordless Authentication Is Achieving Market Traction**: authentification through Touch ID OR face recognition is becoming more popular and it increases both usability and security.

- **Security Product Vendors Are Increasingly Offering Premium Skills and Training Services**: Vendors' security services range from partial to full support to complement the unfulfilled cybersecurity roles.
- **Investments Being Made in Cloud Security Competencies as a Mainstream Computing Platform:** the shift to the cloud brings even more discussions related to security as it is the cloud customers' responsibility to keep it secure [23].

Data security is a growing area that fulfills the growing need of protecting the huge amount of data. Still, there is still a need of changing the paradigm to prevent the data breaches by simplifying the business processes, but also of developing easy to use security solutions that are abe to quick response to attacks and the stringent need of covering the skills gap on data security.

Data Protection Through Regulations

Data protection and ethical use of personal information is not only the company's responsibility, but it is also necessary to have a uniform standard applied by the governments or other types of institutions to protect citizens' personal data. Recently European Union came with regulations on both general data protection and also on artificial intelligence, the technology that uses a big volume of data to learn and develop dynamic algorithms based on the input data to take accurate decisions in different fields.

General Data Protection Regulation (GDPR) came into effect starting with May 2018, it applies only to the EU and it affects every company that stores and processes customer data from tech companies to marketers and research agencies that connect them. The directive is giving the individuals more power over less data, at the same time the companies that collect data and use it for the monetary purposes have less power. GDPR is giving to individuals 8 basic rights: to access their data; to be forgotten in the case they are not clients anymore or withdraw their consent; data portability, so the right to transfer their data from one provider to another; to be informed before data is gathered so the consent is necessary not implied; to have the information corrected; to restrict the processing; to object, to stop processing for direct marketing; to be notified in 72 hours in case of data breaches [24].

Moreover, the tech companies updated their politics to comply with GDPR, for example, Facebook created privacy options to put the users in control over their information to find and delete specific information on the site. Apple revealed its privacy dashboard while Google quietly updating its products and privacy policies [25].

On April 2019 European Commission's published the Ethics Guidelines for Trustworthy Artificial Intelligence (AI) designed by a set of experts and followed by a piloting program to collect feedback on how the guidelines should be implemented. The guidance sets key requirements to achieve Trustworthy AI: human agency and oversights; technical robustness and safety; privacy and data governance; transparency; diversity, non-discrimination, and fairness; societal and environmental wellbeing; accountability [26].

US lawmakers have introduced a bill – the Algorithmic Accountability Act planned for the companies with a large volume of data to assess the algorithms behind the automated systems to be sure these are not discriminatory or pose privacy or security risk [27].

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Conclusion

Data is one of the most valuable resources of this century but, at the same time, it can make us as individuals extremely vulnerable to manipulation, propaganda or impact the business processes or resources of the companies. Data can be an easy target as it can be compromised in different stages of the process from data collection to storage and analysis. On the other hand, the cyberattacks are becoming more sophisticated with the technology progress; this is why the security industry is developing new tools and skills and the authorities design regulations to better protect data.

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Evaluating Technologies for The Development of Open-Source Component-Based Educational Software

Irina-Miruna RADU

Bucharest University of Economic Studies, Romania
miruna.radu@outlook.com

Abstract

The current social distancing context of COVID-19 makes a huge impact on the way people are living. Systems and procedures are forced to move into online to be able to continue. The educational system makes no exception. This paper proposes to find the best tools for implementing open-source component-based educational software by evaluating the most popular web frameworks that are structured on the concept of component development. To achieve the goal, this paper identifies and analysis different evaluations of the three chosen frameworks through a two-step selection process. As a result, the evaluation criteria and the winner highlighted by the authors of the sources are emphasized in a table that can be easily used in future decisions. This way, the paper offers an overview of how the chosen software tools are perceived by the market with the recommended utilization purposes. It also proposes one of them for the development of open-source component-based educational software.

Keywords: Component, Component-Based Software Development, Education

Introduction

Our world is unfolding in a rapid rhythm, trying to evolve and create a better life than yesterday for its inhabitants. To help with achieving this goal, the programming world is trying every day to come with better strategies and technologies. The actual context of COVID-19 where currently, more than half of the people of Earth have experienced a form of lockdown and social distancing (WorldHealthOrganization, n.d.), has forced the people to move most of their daily tasks into online. This unfolding of events has accelerated even more the development of solutions and increased the significance of new technologies and innovative ways of thinking.

The domain of education was not a lucky one and it was pretty affected by this crisis as none of the actors involved in the process of education were prepared for a fully online process. And when primary education is the topic of the discussion this is where the things are even harder. The teachers did not have the knowledge and the right tools for this situation, the parents were not prepared to become all of a sudden an important pawn in the learning process of their children and the inspectors did not know how to lay a stable path to follow that would not upset the other actors.

This crisis has drawn attention to the fact that the word needs to innovate and bring solutions faster to market. The insights exposed by Stack Overflow's 2019 survey (Stackoverflow, n.d.) have shown that the developers have already concentrated their attention to technologies that help them develop easier and faster. Having a look at the result the most popular programming language was JavaScript, with its two web frameworks that encourage the component-based architecture, React.js and Vue.js, being the most loved ones. When it comes to the web frameworks that are used at this moment the top 3 include jQuery, React.js, Angular/Angular.js. These findings suggest a shift from object-oriented programming to the component reuse paradigm, where small items that can be put together like Lego pieces are developed to help in building different applications. The survey also unveiled the developer profile, a developer that cares about the community with more than half of professional developers on Stack Overflow contributing to open-source projects once a year or more.

The purpose of this paper is to analyze which web framework would be best to use for the development of open-source components for education. Having components will help the education system in creating personalized applications based on the needs of the curricula, teachers' wishes and

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children learning paths. The web frameworks that will be analyzed are the ones that were on top of the Stack Overflow survey (Stackoverflow, n.d.) and that are known for introducing components as part of the implementation: Angular/Angular.js, React.js and Vue.js. To have a better evaluation, articles that compared the three frameworks were analyzed and their learnings were quantified to create a view on how they are seen on the market. As a result, the outcome of this analysis can offer the developers a view on the advantages of each one of the frameworks, helping in choosing the right one.

The rest of this paper is organized as follows. Section 2 provides the background and related work in regards to this research. Section 3 describes the frameworks. Section 4 presents the methodology and how the study was conducted. The findings are presented and discussed in Section 5. The final section presents the conclusions of this study.

Literature Review

More than fifty years ago, the Component-Based Software Engineering methodology arisen when McIlory (McIlroy, 1976) proposed to the world the idea of developing little pieces of software that can be used in different projects, an idea borrowed from the industry of commercial component production. As the years passed by, the idea grew and got traction in the programming community as in 1991, software reuse was seen as the (only) realistic approach to gain the productivity and the quality that the software industry needed (Mili, et al., 1995).

The domain of software reuse is still wrapped in some mystery as the latest trends study (José L. Barros-Justo, October 2019) has identified more than 120 proposals for future work. While identifying the gaps the authors of this paper have brought to light that two points stand out as recurrent in several topics: the need for more tools to support the development and the need to run more empirical studies.

When it comes to open-source software, the authors of (Papamichail, et al., 2019) observed that with the increased number of demands the open-source community faces, the developers' strategies shifted from doing everything on their own to relying more on reuse to minimize the cost and the time of the development. The article also provides a methodology of evaluating the reusability degree of software components which is based on metrics for five different properties: complexity, cohesion, coupling, inheritance, documentation and size.

In the matter of technical debt of components, one study encourages developers to perform open-source code reuse, as the technical debt is not a problem and it can be managed (Feitosa, et al., 2020). Furthermore, the paper provides evidence that reuse is a promising technology for preventing the accumulation of technical debt.

On the subject of whom application domains contain the most reusable-friendly software projects, the author of (Paschali, et al., 2017) proposed a list. At the top of the list there are domains such as Science and Engineering Applications and Software Development Tools. The Home and Education projects are on the bottom as they present the worst level of complexity and quality. This suggests that the identification of tools to improve the development of open-source components for education is necessary.

With regards to the impact component-based software development has on the education domain, in (Radu, 2019) it was concluded that component development can help through its' advantages (reducing development time, reducing costs, increase quality, increase reusability) with the current problems that the education system faces (lack of funds and teacher empowerment, lack of access to resources, curricula updates and personalized learning paths), only when keeping in mind the challenges this methodology has (choice of components, updates, maintenance, testing).

The Chosen Web Framework

To complete the goal of this paper, the chosen web frameworks are the ones that are the most popular in the Stack Overflow survey (Stackoverflow, n.d.) and that are known for introducing components as part of the implementation. The chosen ones are: Angular/Angular.js, React.js and Vue.js.

A. Angular

Angular (Angular, n.d.) is an open-source TypeScript-based framework powered by Google and released in 2010 as Angular.js. This version lacked a lot of essential features due to the changing trends of the markets (Casey, n.d.). So, in 2016 Angular 2 appeared and they dropped the "JS" part from the name. Even though AngularJS (version 1) still receives updates, the evaluation will concentrate on Angular.

In regards to the known projects that use Angular, there can be listed names as Google, Forbes, Telegram, healthcare.gov.

B. React

React (React, n.d.) is a JavaScript library developed by Facebook and released in 2013 which has a large community of users and developers around to maintain it. It was a competitor of Angular and in November 2019, it surpassed it, by recording the highest number of downloads.

The most known projects that are relying on React are Facebook, Instagram, Uber, Netflix.

C. Vue

Vue.js (VueJs, n.d.) is the youngest solution on the market from the list. It was released in 2014, by former Google employee, Evan You. It appeared from the need to have a lighter framework. Nowadays, this framework is rapidly growing in the hearts of developers.

Even is newer on the market, big companies like Alibaba, GitLab, Baidu trust Vue.js with their projects.

Research Method

To accomplish the goal of this article, the research method included different stages: searching for articles that compared the chosen technologies, evaluating their information, determining which ones are relevant for this paper and drawing conclusions.

First of all, searches were conducted with keywords as "Angular.js vs React.js vs Vue.js", "Angular vs React vs Vue" , "Angular vs React vs Vue.js for building components". After, the articles were read entirely to see if they are relevant for the study. Taking into consideration that the topic of this study is concentrated around specific technologies, most of the sources that responded to the search criteria are web sites and certain blog pages of experts from the field. Their opinions are valuable as they are familiar with these technologies and have insides from a practical point of view because they are using them every day.

For the paper, the quantitative approach was used. The articles that did not compare all the chosen technologies or that did not state clearly what criteria of comparison they used or what the ranking is, were excluded from the analysis. From 32 articles obtained in the first step, only 11 were selected for the review. For each one of them, the evaluation criteria and the winner were marked down. The results are presented in Table 1.

Results

From Table 1 it can be easily observed that the main advantage of Vue.js is the learning time, while React has a great community and nobody can contradict the level of maturity Angular has achieved.

On the subject of performance and flexibility the writer in (Martin, 2019) concludes that Vue.js and React give the user better performance and flexibility which makes them suitable for light-weight applications while Angular helps with large UI applications as it offers possibilities for routing, templates and even testing. The topic of performance is also the main subject that the author of (Borrelli, 2019) indicates. However, he is still able to provide an overview to offer a better understanding of the advantages and the challenges each of the analyzed frameworks has to offer. He recommends using Angular when working on very large applications with very dynamic content and React for applications that necessitate speed, versatility and an international audience. According to him, Vue.js seems to be good with lightweight applications that require speed and international audience. The same opinion is shared by the writer of (Kumar, 2018), who concludes that Vue.js is ideal for beginners to be used in small teams and small projects. For bigger applications he recommends looking into React when searching for flexibility and JavaScript and into Angular for object-oriented programming and TypeScript.

Regarding the job market (Refai, n.d.) shows that the Angular and the React job offers are very similar, but when comparing the average income of a developer from the USA, React is paid better, 64.10 $ hourly, while 59.85$ Angular.

The interaction of the audience through the comments can unravel other insights that can help in creating a clear picture. The author of (Daityari, 2020) was noticed by the audience that should have pinpointed a winner or at least explain in which context each technology can bring benefits as a comparison must give a result. When choosing a solution the majority of people who commented in the dedicated section of this article, choose Vue.js as a solution because it is easy and fast to develop in. The second best in their opinions was Angular because is architecture driven and generates good code quality. There were only few people that were on React side pointing out that big companies are using it and it has support for building mobile apps. Even though the author of (TechMagic, 2018) did not draw a clear conclusion of which framework to choose between the three of them, the article presents the pro and cons of each of them separately increasing the engagement of the audience. It had the biggest number of comments from all the analyzed articles. 52% of the responders in the comment section showed appreciation for Vue.js, while for Angular and React, the audience was equal. (24%)

Table 1: Assessment on how component-based technologies are seen

Criteria	Angular	React	Vue.js
Popularity	(Binariks, 2019)	(Binariks, 2019); (Duomly, 2020); (Refai, n.d.); (Sumon, 2020); (Casey, n.d.); (Kopilevych, n.d.); (IntelegainTeam, 2020)	(Daityari, 2020); (Sophia, 2019); (Kumar, 2018);
Job market	(Kopilevych, n.d.); (Daityari, 2020); (Kumar, 2018);	(Duomly, 2020); (Refai, n.d.); (Sumon, 2020); (Kopilevych, n.d.); (TechMagic,	

		2018);	
Community	(Refai, n.d.); (Casey, n.d.); (IntelegainTeam, 2020); (Sophia, 2019); (Kumar, 2018);	(Binariks, 2019); (Duomly, 2020); (Refai, n.d.); (Casey, n.d.); (Kopilevych, n.d.); (IntelegainTeam, 2020); (Daityari, 2020); (Sophia, 2019); (Kumar, 2018)	
Flexibility		(Binariks, 2019); (Sumon, 2020); (Kopilevych, n.d.); (IntelegainTeam, 2020); (Daityari, 2020); (Sophia, 2019); (Kumar, 2018); (Borrelli, 2019);	(Daityari, 2020);
Size & Performance	(Kumar, 2018)	(Binariks, 2019); (Refai, n.d.); (Kopilevych, n.d.);	(Duomly, 2020); (Refai, n.d.); (Sumon, 2020); (Casey, n.d.); (Kopilevych, n.d.); (Daityari, 2020); (Sophia, 2019); (Borrelli, 2019)
Components		(Daityari, 2020); (Kumar, 2018);	
Learning curve		(Binariks, 2019); (Duomly, 2020); (Sumon, 2020)	(Binariks, 2019); (Duomly, 2020); (Sumon, 2020); (Casey, n.d.); (Kopilevych, n.d.); (IntelegainTeam, 2020); (Daityari, 2020); (Sophia, 2019); (Kumar, 2018); (Borrelli, 2019);
Maturity	(Daityari, 2020);		

Conclusion

When it comes to finding good results, combining multiple sources of data together can be a plus, as multiple sources mean an improvement of the robustness of the analysis. This was the idea that guided this paper. In the context of COVID-19 social distancing it is important to find fast solutions for moving processes into online environment. As the schools should restart, it is necessary to find outside the box solutions for the development of software for education. In this context, the creation

of open-source reusable components is important as it can help with many of the problems the educational system faces. This study proposes to analyze tools for developing these components through a quantitative method. The developers' perspectives are considered by searching studies that are comparing these technologies and quantifying into a list the results of their observations. Taking into consideration the point of view of the developers, this study concentrates on the 3 most popular web frameworks: Angular, React and Vue.js. The results show that the developers do not see a clear solution when choosing a web framework and it all depends on what is needed to be developed and the experience of the people working on the project. Angular is the mature one that helps developers in having a better structured code, with respect for patterns and tools to help with templates, testing or routing. Though the years, Angular gained contributors and a devoted public. React came fast from behind and managed to sway the public and gain popularity. Even if is just a web framework and you need different libraries for routing and testing, developers enjoy the flexibility it offers and the structure of component building functionality. Vue.js has its public that helps it evolve even though it does not have a big company behind the development. Developers love how easy it is to learn and the size and performance it proposes. The overall indications are that Angular is ideal for complex applications and an organize code, React is ideal for applications that need versatility and speed, while Vue.js is ideal for beginners and light weighted applications.

When it comes down to choosing the framework there is no right or wrong decision. It is all depending on the people that work on the project, what is the purpose of the project and what resonates with the goals of the organization. From my point of view, for building open-source component-based educational software I would choose React because of the big community and popularity. This means that more developers are willing to work on this kind of project. Having a big demand for job offers for this technology implies that more people are willing to build up skills and experience and working on open source projects it is always nice to have on the resume. Furthermore, the gained points for the building components features from the analyzed articles recommend it for this job. The flexibility and the performance that were mentioned through the evaluations enhance the idea that React is a good choice for this kind of project.

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Analysis of Methodological Approaches to Assessing Economic Consequences of Anthropogenic Environmental Pollution

Oleksii KRAINIUKOV
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine
alkraynukov@gmail.com

Ivetta KRYVYTSKA
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine
ivkrivicka@gmail.com

Andrii KRAINIUKOV
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine
kingsparrow666@gmail.com

Valeria TIMCHENKO
Research Institution «Ukrainian Scientific Research Institute of Ecological Problems», Kharkiv, Ukraine
lera4441@yandex.ua

Abstract

The purpose of the article is to analyze scientific publications, assessing the risk of anthropogenic pollution of aquatic landscapes and its environmental and economic consequences. **Results.** Theoretical and practical aspects of calculating the amount of economic compensation for the effects of anthropogenic pollution of water bodies are considered in the article. It is shown that in conditions when it is practically impossible to eliminate or reduce the level of environmental pollution to harmless biocenoses, economic compensation of losses necessitates the search for alternative and additional sources of funding for contaminated regions. Adequate and accurate forecasting of the amount of economic compensation plays an important role. At this stage, the legislation approves the need for economic compensation for damage to the environment caused by its anthropogenic pollution. **Conclusions.** An economic mechanism ensuring the expanded reproduction of natural resources, their protection, regulation of rational use of nature, should be based on the principle of compensatory in terms of nature use system of appropriate payments. The main economic tool of it is the payment for natural resources and environmental pollution.

Keywords: water body, ecological condition, water quality, economic damage.

Introduction

In the twentieth century the use of natural resources became so intensive and environmental pollution so great that there was a need to charge payments for their use and environmental pollution. Ukraine joined this process in 1991. Introduction of such payments is justified by the need to accumulate funds to replace the used natural resources and to restore the environment. But natural environment in Ukraine and the world is constantly deteriorating. Domestic economy of environmental protection and nature management is legally formed simultaneously with the incipience and development of environmental legislation and the management system of environmental activities and nature management. This process is not complete yet and has not reached the level of world and European requirements. The legislation defines the structure and content of the economic mechanism of

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environmental protection and rational use of nature but the regulatory framework ensuring effectiveness of these provisions is still imperfect and needs development, especially in the field of financial and incentive mechanisms. The legislative process of economic compensation for damage to human health and the environment from emissions and discharges of pollutants has gone through several stages, namely: the process of creating a legal framework began in 1991 - 1992, first of all, there was a transition from free use and natural resources pollution to a paid one.

One of the first ecological and economic instruments of environmental protection was the mechanism of payment for environmental pollution, introduced by the Cabinet of Ministers of Ukraine from 13.01.1992 № 18 "On approval of the Procedure for determining charges and payments for environmental pollution" (Resolution, 1992). Considering the crisis in the economy, the amount of payments for emissions and discharges of pollutants and the disposal of waste attributed to production costs did not exceed 5% of total taxable income in the reporting year.

Modern state policy in the field of environmental protection from pollution is based on the principle of "a polluter pays". This principle reflects the policy of making polluters responsible for all actions that harm the environment. The "polluter pays" principle was substantiated by the Organization for Economic Community and Development in 1972 for the first time at the international level. Since then, this principle has been actively used in the legislative practice of European and other countries (Boreyko, 2010). In Ukraine, the "polluter pays" principle was introduced in 1991 by the Law of Ukraine "On Environmental Protection" of June 26, 1991 № 1264-XII, which established (Article 3) that in Ukraine there is payment for environmental pollution. The mechanism itself for determining and charging the payment for environmental pollution was regulated by the Cabinet of Ministers of Ukraine "On approval of the Procedure for determining charges and payments for environmental pollution" from 13.01.1992 № 18 and the relevant resolution of the Cabinet of Ministers of Ukraine "On approval of the Order norms of the fee for environmental pollution and charging of this fee "from 01.03.1999 № 303 (Resolution. 1999). Payments were charged from enterprises regardless of ownership and departmental affiliation. Payment for pollution does not exempt companies from complying with environmental measures, as well as from paying penalties for environmental offenses and full compensation for damage to nature (Antonyuk, 2013).

The purpose of this work is to analyze scientific publications, assessing the danger of anthropogenic pollution of aquatic landscapes and its environmental and economic consequences.

Results and Discussion

Freshwater ecosystems are crucial for social development (Naiman, 1998) but rapid socio-economic development within watersheds as a result of human activities has negative environmental consequences for ecosystem's structures, processes and functions (Western, 2001). Human activities in the watershed can lead to the loss of key species and functional groups, nutrients, low self-healing capacity and loss of productivity for aquatic ecosystems. Therefore, it is necessary to restore them based on understanding of the relationship between catchment changes and the corresponding impact on the aquatic ecosystem. The relationship between a society and ecosystems should be harmonized on a watershed scale, and the water body and watershed ecosystem and society should be seen as integrated systems (Kramer, 1997; Roe, 2002).

Water quality problems of surface water bodies are caused by many different point and non-point sources from urban and agricultural areas (Conley, 2009), (Wittmer, 2010). Pollution of environmental components is caused by various substances, including nutrients, heavy metals and organic pollutants in microquantities (Ippolito, 2015; Destouni, 2017; Spycher, 2018; Pospelov, 2019). As surface water can only be effectively managed on a catchment scale and in an integrated manner, all sources of pollution and substances must be considered for (cost-effective) decisions in water quality management. Such decisions require an understanding of the catchment extent and should take into account future changes due to factors outside the scope of water quality management, such as climate change and socio-economic development in catchments. Ideally,

management alternatives should be selected according to their contribution to improving the overall quality of water in catchments, their cost and possibly other relevant public objectives.
The implementation of environmental measures is reflected in the costs and consumption of living and social labor, quantitative and qualitative impact on the production and use of consumer values in the national economy, as well as on the process of reproduction in general.

Indicators of damage are expressed in value terms. The damage includes monetary actual and possible losses, caused by environmental pollution to the territorial organization of society, as well as additional costs for compensation of all environmental damage. There are costs associated with prevention of pollution, formed at the source in order to reduce harmful emissions. There are three types of expenses:

- construction and operation of specialized systems and facilities - various types of treatment and disposal facilities and devices for sources of harmful emissions, as well as the creation of protection zones around these sources;
- development and implementation of closed (low-waste) technological processes, ensuring integrated use of all components of the material and energy flow with minimal inflow of harmful emissions into the environment;
- creation of a control and management system of environmental pollution, including subsystems of automated control of air and water pollution, industrial emissions control in periods of dangerous hydrometeorological situations and a subsystem of control and regulation of air pollution *(Karaeva, 2014).*

These expenses are aimed at reducing the total amount of economic damage and can not be classified as damage: costs incurred as a result of compensatory losses. There are actual and potential damages. The first characterizes the actual damage or additional costs associated with elimination of environmental pollution consequences. Potential damage is determined by the current state of the environment and the costs that society may incur in the future due to complex ecological condition of the territory. Socio-economic consequences of environmental pollution are manifested in four main forms:

- deterioration of the "quality of life", which consists in the deterioration of public health, violation of working and leisure conditions in contaminated areas;
- loss of working time associated with increased morbidity of the population due to environmental pollution which reduces the efficiency of labor resources in the region;
- reduction of national economic value of natural resources as a result of falling productivity of agricultural and forest lands in polluted areas, increased costs for water treatment by industry and communal services, reduction of fish productivity of reservoirs, their recreational value, etc.;
- intensification of corrosion processes in the polluted environment, increased pollution and clogging of technological equipment, leading to accelerated depreciation of fixed assets in the pollution zone.

The above consequences also cause economic losses from environmental pollution.

Economic losses consist of the total major local losses. The value of economic damage depends on three factors.

1) the amount of pollution and the degree of impact of a component of the environment.
2) elements of impact, which are all sorts of objects that take the negative influence of pollution.
3) elements of the state reflecting the level of regulatory economic indicators. These include the amount of produce manufactured by the staff during the working day, all sorts of hospital payments within the working day per employee, etc. (*Karaeva, 2014).*

All of the above factors form the total damage and are inextricably linked. The size of economic damage without one of them is unthinkable.

A number of foreign publications have assessed the economic costs of water pollution of water bodies.
The article (*Garza-Gil, 2006)* assesses the short-term economic losses from oil spills in the Galician coastal sectors for fisheries and aquaculture. The areas that received more oil spills suffered the greatest economic losses. The oil spill can be considered one of the worst in recent years, the amount of oil spilled (59.000 tons) and a wide area of influence: almost the entire coast in northern Spain and southwestern France.

The publication *(Reddy, 2006*) estimates the economic costs of water pollution in rural communities in terms of agricultural production losses, human health and livestock. Cost estimates are based on detailed primary data collected from an intensive study of two villages - one is affected by pollution and in the other pollution is less intense. The villages are located in the industrial zone in South India. The cost estimates show that the impact of industrial pollution on rural communities is very large in monetary terms. The document states that the principle of compensation can work if the damage estimates are realistic.

The article (*Douglas, 1999*) examines the economic losses from marine pollution associated with recreational activities in New Jersey and assessment of economic losses from the long-term fish pollution. During the summer seasons of 1987 and 1988, marine pollution and leaching occurred almost simultaneously in New York and New Jersey, leading to the closure of beaches, reduced use of beaches and reduced sport fishing. According to economic estimates, the total economic losses from pollution and floods in 1988 in New Jersey ranged from $ 379.1 million to $ 1,597.8 million (1987). In addition, the mouths of the Hudson River and New York Bay were contaminated with toxic substances (PCBs, DDTs, etc.) found in fish products.

Payment for the recycling of food waste on the basis of the "polluter pays" principle are widely recognized as a way to alleviate the financial stress associated with solving the problems that arise from water pollution (OECD, 1992). Environmental spending is also of growing concern due to the introduction of stricter quality standards for pollutants discharged into water bodies *(Maalouf, 2017).*

Economists James and Lee presented a concentration-pollution curve that shows that the relationship between the concentration of pollutants and the degree of contamination hazard demonstrates functional characteristics of the S-type *(James, 1971).* Many scientists have used this method to assess the degree of pollution risk caused by pollutants and the environmental and economic costs of water pollution (*Miural, 1990; Xu, 2013; Ofiara, 2001).*

In Ukraine, the main initial data for calculating compensation for the amount of damage caused to fisheries may be acts, reports, notices, memos, photographs, film, video and other documents. These are prepared by officials authorized to exercise state supervision (control) over compliance requirements of the legislation on protection, use and reproduction of aquatic bioresources or persons who directly observed cases of loss of aquatic bioresources, pollution of reservoirs and other damage to fishery reservoirs, direct calculations and measurements, results of control catches, and official data of competent research organizations of aquatic bioresources, including fish resources of this water body.

Damage is calculated on the basis of formulae (1-10), separately for each species (or a group of biologically related species), for each stage of aquatic bioresources development, followed by the compilation of these results (Order, 2011).

First, the total losses of fisheries in kind are determined, then - in the value at the current retail market prices of the region at the time of calculating the amount of compensation (UAH).

The amount of damages to fisheries caused by pollution of the reservoir is calculated on the basis of direct losses and losses from the loss of offspring.

Direct losses are calculated by the number of dead aquatic bioresources, including fish, juveniles *, larvae and eggs ** per unit of area, its average weight and the area of negative impact on aquatic organisms according to formula 1:

$N = P * S * M + (P_1 * M * S * K_1)/100 + (P_2 * M * S * K_2)/100,$

(1)

Where:

N - losses in kind, kg;

P - average number of dead fish, pcs / m2;

P1 - average number of dead larvae, pcs / m2;

P2 - average number of dead eggs, pcs / m2;

S - area of negative impact of damage, m2;

M - average weight of an adult, kg;

K1 - coefficient of industrial return from larvae,%;

K2 - coefficient of industrial return from caviar,%.

* - young fish are taken as mature fish.

** - larvae and caviar in the calculations are accepted as mature fish, taking into account the coefficient of industrial return for the period of their development to the adult.

For aquatic plants according to formula 2:

(2)

Pk2 = p * Z

where Pk2 - the amount of damages for the death or illegal harvesting of plants (UAH);

p - total mass of dead or illegally harvested plants (kg);

Z - cost of products made from 1 kg of raw materials, at current retail market prices in the region at the time of calculation of losses (UAH).

Calculation of damages for the loss of offspring is based on the number of dead fish, female fertility, spawning rate, the rate of industrial return and the average weight of fish according to formula 3:

N = P * Z / 100 * Q * C * K / 100 * M, (3)

where:

N - the amount of losses in kind, kg;

P - the number of dead fish, pcs .;

Z - share of females,%;

Q - average fertility of females, thousand pcs. eggs;

C - multiplicity of spawning (times);

K - coefficient of industrial return from caviar,%;

M - average weight of an adult, kg.

Losses from death of forage organisms are defined:

a) for plankton according to formula 4:

N = (S * H * P * p / b * K1 * A) / 100 * K2, (4)

b) for benthos according to formula 5:

N = (S * P * p / b * K1 * A) / (100 * K2) (5)

where:

N - losses in kind, kg;

S - area of damage, m2;

H - depth of the reservoir, m;

P - average concentration of forage organisms, g / m3 (for plankton) and g / m2 (for benthos);

p / b - conversion factor of biomass of feed organisms in products;

K1 - indicator of the maximum possible use of feed base by fish,%;

K2 - feed ratio for the conversion of feed organisms into fish products;

10-6 - conversion factor of grams into tons;

A - 10-6.

Coefficients for the feed base (feed organisms) of fish are given in Supplement 2 of the methodology [28].

Losses from spawning are calculated depending on the availability of initial data according to formulae 6 or 7:

a) on fish productivity of spawning grounds by formula 6:

N = S * P, (6)

where: N - the amount of losses, kg;

S - area of damage, ha;

P - average fish productivity of spawning grounds on industrial return, kg / ha.

b) from the loss of offspring according to formula 7:

N = S * P * Z / 100 * Q * C * K / 100 * M, (7)

where: N - the amount of losses, kg;

S - area of damage, ha;

P - the number of broodstock in spawning grounds, pcs / ha;

Z - share of females,%;

Q - average fertility of females, thousand pieces;

C - spawning rate (times);

K is the coefficient of industrial return from caviar,%;

M - average weight of an adult, kg

The amount of damage caused to the caviar, larvae and young fish in the refill of the dredge is determined by formula 8:

N = P * V * R * K / 100 * M, (8)

where:

N - the amount of losses, kg;

P - the number of caviar, larvae, young fish of each species, pcs / m3 of water;

V - volume of selected soil, m3;

R - multiplicity of soil dilution with water;

M - average weight of an adult, kg.

Losses from fish productivity of the reservoir during blasting are calculated according to formula 9:

N = S * P, (9)

where:

N - the amount of losses, kg;

S - area of damage, ha.

P - fish productivity of the reservoir, kg / ha.

The final value of losses is taken as the maximum of the calculated values of losses from the death of fish or the death of food organisms. Addition of these values is not allowed.

The amount of damages is calculated by formula 10:

Nuan = N * G, (10)

where: Nuan - monetary losses (UAH);

N - volume (kg);

G - cost of production, per 1 kg, at the current retail market prices of the region at the time of calculating the amount of damages (UAH).

Taking into account the growing anthropogenic pressure on water resources, the state's influence on regulating the use of water resources should be significantly strengthened and associated not with expanding its scale, but with changing the role determined by the nature of interaction between the state, economy and politics. The basis for an economic mechanism, ensuring the expanded reproduction of natural resources, their protection, regulation of rational use should be the principle of paid, compensatory in terms of nature use with the creation of a system of appropriate payments. Its main economic tool is the payment for natural resources and environmental pollution. This charge

should be high enough to force companies to introduce resource-saving, low- and waste-free technologies into production, efficient treatment facilities, dust and gas cleaning devices, waste disposal (*Antonyuk, 2013).*

Discussion and Conclusion

1. Environmental payments carry a wide variety of burdens in the system of public relations regulation in the field of environmental protection - incentive, coordination, control and compensation. The stimulating side of the pollution charge is manifested in its impact on the economic interests of environmentally hazardous enterprises by increasing or decreasing the economic pressure on them depending on the volume of emissions (discharges) into the environment. The stimulating nature of payment for excess emission (discharges) of pollutants is the withdrawal from the profits of polluting enterprises in multiples of the fixed payments for limited emissions (discharges) and makes it economically unprofitable to exceed the permitted emissions (discharges). This plays the role of a financial sanction and a compensatory means at the same time.

2. The coordinating aspect of the pollution charge is in the fact that it determines the financial share of each polluter in ensuring collective efforts in the field of environmental protection from pollution (fee standards are set according to each ingredient of pollutants (waste), taking into account their degree of danger to environment and public health).

3. The controlling function of the pollution charge is in using it as a means of responding to the achievements of polluting enterprises in reducing pollution. Depending on these results, the controlling body may leave the fee unchanged or increase it, as well as partially or completely exempt from the fee for environmental pollution, if effective technological measures are implemented to reduce emissions (discharges) of pollutants into the environment.

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Logistic Workers' Know-How as a Component of Knowledge Management in Companies

Marcin KOMANDA

Opole University of Technology, Faculty of Economics and Management, Opole, Poland, m.komanda@po.edu.pl

Edyta KLOSA

State University of Applied Sciences in Konin, Faculty of Economics and Technical Sciences, Konin, Poland, edyta.klosa@konin.edu.pl

Abstract

This paper undertakes the task of determining contemporary challenges of implementation of employees' aspects of knowledge management in the area of company logistics and answers the question whether the size of a company influences the level of perceived significance of the aspects of organisational procedures that are manifested in the logistic workers' know-how. The conducted analysis of the literature reveals the principles that govern the placement of the human capital concept with regard to knowledge management and exemplifies organisational conditionings of their impact on the efficiency of an organisation in the context of logistics as well as participation of companies in the supply chain. The revealed role of employees' tacit knowledge for the development of a company justified the conduction of a survey among the so-called logistics professionals (non-probability sampling, PSAQs, n=197). The analysis of the results obtained revealed that, from the point of view of respondents, company's acknowledgement for employees' behaviour consistent with the procedures as well as employee's acquaintance with and understanding of organisational procedures increases together with the size of a company which is measured as the number of workers. The presented article broadens and offers a new perspective on the description of the issue of organisational procedures. Their description that has been present in the literature on the subject so far was related to employees' point of view and relationship between organisational procedures and achieved job satisfaction.

Keywords: Logistics, Employees, Knowledge Management, Know-How.

Introduction

The linkage between the issue of knowledge management and logistics in a company occurred still in the 1990s. Originally, this linkage was considered in the context of operations management and the significance of the concept of knowledge management for managers at this management level (Wiig, 1997; Armistead, 1999). This approach quickly exposed the problems in the flow of knowledge between the departments of a company. It also made it possible to reveal the lack of tools for the assessment of knowledge exchange within a company (Wijnhove, 1998; Ahmed et al., 1999). The results of further studies led to the statement that knowledge management solutions in companies should be regarded as the ones that support the whole organisation and the whole personnel (including individual employees) as well as the application of IT systems. From the perspective of logistics, it was also assumed that all and any applied and planned knowledge management tools should be designed in order to support logistic processes in a company (Neumann, and Düring, 2008). As a consequence, the development of logistic skills in a company occurred which over time was more and more frequently regarded as a competitive advantage factor (Morash et al., 1996; Wong and Karia, 2010). However, maintenance of this advantage required the ability to obtain and exploit knowledge to become a part of the company's business activity (Esper et al., 2008).

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While referring to the aforementioned issues, it should be mentioned that progressive orientation of the researchers' deliberation towards the strategic aspect of the executed logistic processes (Sum et al., 2001) was related to the increase in significance and broadening of the economic role of supply chains. Therefore, the context of cooperation between economic entities appeared (Juga, 1996; Pfohl and Buse, 2000). As a result, it was quickly noticed that the issue of knowledge management in the field of logistics is, to a larger extent, dependent on the situational context of the company and logistic processes related to it (Stentoft and Halldorsson, 2002). The context, especially in case of the flow of information, included also relationships with clients (van Hoek, 1998; Zhao et al., 2001). Therefore, paying particular attention to the issue of action integration and coordination in supply chains (which again emphasized the role of obtaining and exploiting knowledge) was postulated (Stadtler and Kilger, 2002).

The importance of exploited knowledge resources also comes from an ever greater complexity and dynamics of the business environment and an increasing diversity of logistic problems within companies (Neumann and Tome, 2006). In order to tackle the uncertainty that is connected with running a business, companies should not only develop their skills and competences within the scope of logistics, but also knowledge management since they have a positive relationship with the human capital (Cooper, 2016). The role of the human factor is, in turn, emphasized with regard to the dynamics of contemporary business environment and its influence on the generation of profits from the collaboration with cooperating parties (Bode and Müller, 2013).

Transformations in the area of execution of logistic processes and the context of their course in companies led to an observation that contemporary comprehension of these issues is much broader than the traditional understanding of the issue of logistics (Niine and Koppel, 2014). It results in the fact that logistic workers in the company are expected to have broader professional competences than before. There is also a positive attitude towards having additional formal education (from outside of logistics) or even managerial experience (Kotzab and Wünsche, 2015). This issue creates also specified challenges that companies have to face and that regard such issues as planning, organising and conducting employees' trainings, motivating employees and engaging them in the development of skills (Mohamad et al., 2020) as well as building job satisfaction (Kim and Kim, 2020). Questions about the purpose of trainings as well as the selection of their methods appear in this context (McKinnon et al., 2017). From the perspective of operating activity, the major objective is to ensure effectiveness and efficiency of task performance which may also result in training needs depending on the placement of a worker in the company, including his or her placement within the framework of logistic processes (Klosa, 2016). The objective of the paper with regard to the outlined issues is as follows: (1) to recognise contemporary challenges of knowledge management implementation in the area of logistics of the companies in the context of human resources; (2) to determine whether the size of a company influences the level of perceived significance of the aspects of organisational procedures that are manifested in the logistic workers' know-how.

Employees' context in knowledge management implementation into business logistics

While defining the relationship between knowledge management skills of the company and execution of logistic processes, it should be stipulated that these issues can be considered from the perspective of a single company or a supply chain (system of cooperating companies) (Pérez-Salazar et al., 2019). However, it may be assumed that knowledge management skills of a company have a positive influence on the practices implemented within the framework of the supply chain as well as on the results obtained by the company (Bahar et al., 2020). It is also emphasized that reaching a competitive position as a result of reduction of costs of conducting a business activity depends both on the appropriate exploitation of knowledge resources and technologies applied (Karia, 2018; Bahar et al., 2020). This technology refers both to logistic processes and the issue related to knowledge resources. Therefore, in a conceptual and planned way it must also encompass the issues related to the flow of information in the company/between companies, their forms (form of organisational documentation and databases) (Kivits and Furneaux, 2013) as well as the aspect of employees' access to them and skills of their creation and exploitation (Komańda, 2019). Relationships of this kind explicitly indicate also the issue of the situational context of the implementation of knowledge management solutions.

It is emphasised that contemporary logistic workers should therefore possess skills within the scope of supply chain management, handling of technological solutions as well as interpersonal and managerial skills, including especially communication skills (Gammelgaard and Larson, 2001). These skills seem to be of key significance for shaping behaviours of entities within the framework of the supply chain. This is, in turn, a significant issue for the integration of the chain itself (Yang, 2013) as well as for the development of relationships with clients (Marra et al., 2012) for the purposes of offer modification with regard to their expectations (Del Giudice et al., 2016). Taking also a broad spectrum of stakeholders into consideration in the studies in the analysed problem area (at least both suppliers and clients) makes it also possible to capture, in a more visible manner, the relationships between knowledge management and business results achieved within the framework of the supply chain (Wowak et al., 2013).

The arrangements made make it possible to state that human resources are one of the main factors shaping the development of logistics, and therefore also conditioning the possibilities for the implementation of knowledge management solutions in this area of company's business activity to a large extent (Durst and Evangelista, 2018). Human resources, however, keep a dynamic relationship with the remaining pillars of knowledge management which are also important for the performance of logistic tasks in a company. These are the processes and technology applied (Schniederjans et al., 2020). It is worth stating that the potential of technological solutions is wholly implemented only with their proper combination with the solutions in the area of human resources management (Andreeva and Kianto, 2012).

However, in this context certain incompatibility appears which is related to practical application of knowledge management solutions in the area of company logistics. On the one hand, a positive relationship between knowledge management application and operating efficiency and organisational results is emphasised (Fugate et al., 2009). It results in the pursuit of implementation and exploitation of knowledge management solutions. On the other hand, some research results point out that in spite of the existence of the aforementioned benefits from the implementation of knowledge management solutions, there is a lack of proper understanding of this subject among decision makers. They frequently lack knowledge about how to do it in a way adjusted to their own needs (Neumann and Tome, 2009). Unfortunately, the issue of barriers in the implementation of knowledge management solutions in the area of company logistics and the supply chain has not developed with due dynamics in the literature (Cerchione and Esposito, 2016).

The outlined conditionings for employees' development (including logistic professionals) working in the companies that frequently function within the framework of supply chains make it possible to state that the implementation of new technologies and training on how to use them will not suffice (Kianto et al., 2018). The attention should also be paid to individual competence gaps and training needs. This entails the introduction of properly prepared evaluations within this scope as well. They should take into consideration the individual employees' context that impinges upon the scope and level of indispensable competences (Klump et al., 2019). Moreover, two significant aspects should be taken into consideration. These are the aspects that shape prospective solutions within the scope of knowledge management and that, as a result, translate to the possibility of proper support of the course of logistic processes in the company and supply chain. Firstly, it is postulated that, as a consequence of conducted researches, a challenge of taking into account both formal and informal flows of knowledge in the knowledge management should be undertaken. The latter are frequently reduced in the conducted analyses. However, due to organisational culture dominating in a given company, informal flows of knowledge may play a very significant role in efficient knowledge exploitation as well as in obtaining business results (Blome et al., 2014). Secondly, the knowledge that is subject to exchange either within the framework of a company or the supply chain, can be diversified with regard to its substantial content and managerial problems it concerns (Done, 2011). It may also represent diverse forms which, depending on the accepted knowledge classification model and implemented solutions within the scope of information policy as well as technological solutions, will be a part of specific interpretative and design framework (Sudhindra et al., 2014). It requires the assumption that individual employees play different roles in the processes of knowledge creation and use (Dziubińska, 2017).

Following the Japanese knowledge management model, at the level of individual employees it may be assumed that their personal knowledge (referred to as tacit knowledge) is expressed in two dimensions. The first one is a cognitive dimension which is related to personal convictions, personal perception of reality and ideas and values the person believes in. The other dimension is the so-called technical component that concerns practical expertise and skills, known, above all, as know-how (Nonaka et al., 2000). It should be emphasised at this point that it is the tacit knowledge that is perceived as an element which will influence the results obtained by supply chains with ever greater power (Schoenherr et al., 2014). It also means that the tacit knowledge of logistic professionals employed in the company can be of key importance for the efficiency and effectiveness of the activities conducted by them.

It should be noticed that in the context of developmental perspectives of companies as well as employees themselves, a certain regularity can be observed in case of the organisation of employees' trainings. Companies of a higher level of procedure formalisation are willing to implement employees' trainings regarding documentation and databases of a higher level of organisation (that is of a specially dedicated subject matter for a selected group of employees, conducted regardless of performed professional duties) (Komańda, 2019). This relationship, however, may point out a more general trend related to the issue of the company size and implemented knowledge management solutions. Not only do large companies know more potential knowledge management solutions but also implement their broader set. Smaller companies may possibly search for knowledge about such solutions by getting involved in cooperation with other companies (Hörisch et al., 2015). The scope of implemented solutions related to sharing information in order to manage risk can be an example of such result concerning companies operating within the framework of the supply chain (Komańda and Klosa, 2020).

Methodology

The issue of know-how regarded as an element of tacit knowledge of logistic employees in the company became a key element of the research aim. Simultaneously, an organisational perspective towards this issue was assumed. The questions concerned determination of the role of manifestation of organisational procedures in the workers' know-how for the company. The project is a result of combination of two aspects resulting from the literature review. Firstly, it results from the significance of tacit knowledge for efficient operations of the companies that function in the conditions of supply chains (Schoenherr et al., 2014). Secondly, from the necessity to popularise organisational and technological solutions within the framework of the supply chain (Stadtler and Kilger, 2002). The size of a company, also as a result of the literature review, became the control variable (Hörisch et al., 2015). Therefore, the following hypothesis (H) was formulated: The significance level of manifestation of organisational procedures in logistic workers' know-how in respondents' opinions depends on the size of a company.

The specified variables concern an opinion expressed by the respondents about the significance, from the perspective of the company, of manifestation of organisational procedures in logistic workers' know-how in the following aspects: *behaviour consistent with procedures*, *acquaintance with procedures*, *understanding of procedures*. The respondents expressed their opinions on a five-point scale.

The invitation to participate in the research was aimed at persons who met the condition of being employed on the position that made it possible to qualify them as the so-called logistics professionals (they performed the functions of a logistics manager or a logistics specialist). The companies represented by them operated on the territory of Poland. The respondents were obtained for the research by means of convenience sampling (therefore, it was a non-probability sampling determined by the availability of participants). They answered questions independently using a paper questionnaire (Paper Self-Administered Questionnaires).

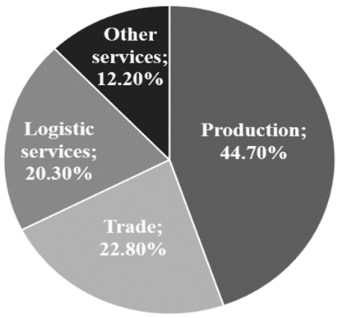

Fig 1. The main activity of the companies represented by the respondents

The answers of 197 persons each time representing another company operating on the territory of Poland were altogether qualified for the research. At the same time, the companies participated in supply chains. The respondents indicated production (44.7%) as well as trade (22.8%), logistic services (20.3%) and other services (12.2%) as the main activity of the company represented by them (Fig 1).

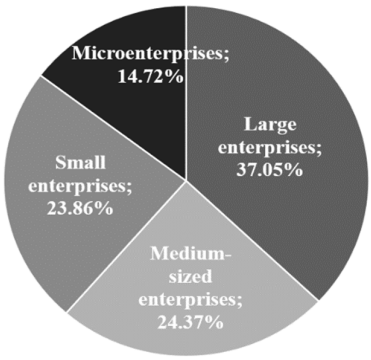

Fig 2. The size of the companies represented by the respondents

While analysing the size of companies represented by the participants (measured by a number of employees), it should be stated that microenterprises (employing up to 9 persons) constituted 14.72%, small enterprises (employing from 10 to 49 persons) 23.86%, medium-sized enterprises (employing from 50-249 persons) 24.37%, whereas large enterprises (employing at least 250 persons) constituted 37.05% (Fig 2).

Results

The Cronbach's alpha coefficient of the respondents' indications regarding an opinion about the significance of manifestation of organisational procedures in logistic workers' know-how for the company equalled 0.866. It is therefore at a high level. The values of mean, median and standard deviation are shown in table 1.

Table 1: Value of descriptive statistics

Variables	Behaviour consistent with procedures	Acquaintance with procedures	Understanding of procedures
Mean	4.0355	4.1218	3.8832
Median	4.00	4.00	4.00
Mode	4.00	5.00	5.00
Standard deviation	0.9917	1.0027	1.0746

It should be noticed that the values of medians for the variables are the same. The values for the mode *behaviour consistent with procedures* equals 4.0, whereas for the two remaining variables (i.e. *acquaintance with procedures* and *understanding of procedures*) they amounted to 5.0. It may therefore be stated that the respondents' indications expressing high significance of these aspects of logistic workers' know-how in the light of manifestation of organisational procedures were the most popular. The highest value of standard deviation and the lowest value of the mean is characteristic for the variable *understanding of procedures*. Therefore, it may be assumed that the respondents' answers differed most in case of this variable.

In order to verify the hypothesis made, the Kruskal-Wallis test was used. The results of the test are presented in table 2, whereas its ranks are shown in table 3.

Table 2: The results of the Kruskal-Wallis test for the variable grouping the size of a company

Statistic values	Behaviour consistent with procedures	Acquaintance with procedures	Understandin g of procedures
Kruskal-Wallis H	9.837	8.067	10.271
df	3	3	3
Asymptotic significance	.020	.045	.016

Table 3: Kruskal-Wallis test ranks for the variable grouping the size of a company

Variables	Workforce size	N	Mean rank
Behaviour consistent with procedures	Up to 9 persons	29	78.81
	10-49 persons	47	89.24
	50-249 persons	48	101.63
	At least 250 persons	73	111.58
	In total	197	
Acquaintance with procedures	Up to 9 persons	29	79.28
	10-49 persons	47	91.62
	50-249 persons	48	101.75
	At least 250 persons	73	109.78
	In total	197	
Understanding of procedures	Up to 9 persons	29	75.64
	10-49 persons	47	89.65
	50-249 persons	48	106.77
	At least 250 persons	73	109.19
	In total	197	

While analysing the test results, it should be stated that the hypothesis (H) made can be verified positively. The respondents' answers for three variables depend on the size of a company they represented (level of statistical significance $p \leq 0,05$). While taking into account the test ranks, it should be noticed that for the variables *behaviour consistent with procedures*, *acquaintance with procedures* and *understanding of procedures*, together with the size of a company, the significance of these issues increases in the respondents' indications.

Discussion

The hypothesis that the significance of manifestation of organisational procedures in logistic employees' know-how in respondents' opinions increases together with the size of a company was proven. The rank and role of organisational procedures results from the popularisation of methods of operation and applied organisational solutions in areas of business operations or in dimensions of its cooperation with other entities. Popularisation of these procedures favours effectiveness and efficiency

of employees' actions which results in the fact that they find themselves in the context of organisational processes and structure. It is more important if the scope of business operations is more diversified and conducted on a greater scale. The confirmation of this hypothesis completes previous findings within the scope of the role of organisational procedures since there are opinions expressed in the literature that organisational procedures regarding employees' activity favour their emotional and normative engagement (Valaei and Rezaei, 2016). In case of the presented research, however, it was possible to take into consideration the point of view of a company on this issue, although only in the dimension of know-how (which is more related to a normative engagement).

The literature review indicated that appropriate shaping of the human capital aspect is the main challenge of implementation of organisational solutions both within the scope of knowledge management and logistics as well as supply chain management. It is the human capital aspect that conditions proper exploitation of the implemented organisational solutions and efficient execution of organisational processes. It should be highlighted that properly planned and conducted personnel trainings constitute a significant element of knowledge management that translates, as a consequence, to building organisational competences. What is more, these trainings may and should also concern a broader set of problems than those resulting directly from the scope of employees' duties. It means that individual workers' knowledge (including logistic employees) should be shaped more broadly. This necessity frequently results from the participation of a company in the supply chain. As a consequence, these trainings may not only translate to the development of workers' know-how but also their level of motivation and engagement (Barrett, A. and O'Connell, 2001).

Conclusions

The conducted research meets a series of limitations. Above all, the non-probability sampling and the way of answering questions can be mentioned among them. It should also be noticed that only the companies that operate on the territory of Poland participated in the research. It means that generalisation of the obtained results should not be made freely onto broader groups of companies both within the scope of the Polish and international markets.

The results obtained as a consequence of both literature review and conducted analysis of the respondents' answers can, however, outline further directions of studies. Firstly, due the fact that the role of employees' tacit knowledge in the development of a company is raised in the literature, a research may be designed that will at the same time concern both its components, i.e. know-how and cognitive dimension. It may be tempting to state that know-how will be, above all, connected with the operating dimension of business activity, whereas the cognitive dimension significantly more with strategic aspects. Secondly, in the light of the survey results pointing out the dependency on the size of a company, it would be worth examining the existence of potential dependencies of the age of a company, since it may be assumed that not only smaller companies but also younger ones search for knowledge management solutions as well as logistic aspects that are suitable for them (especially if they already are a part of the supply chain). This situation can, in turn, also translate to the way they perceive the importance of the implemented organisational procedures.

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Remote Learning and Teaching in Self-Isolation Mode: Challenges, Perspectives

Nataliya SAMOYLENKO

Sevastopol State University, Russia
sevschool@yandex.ru

Ludmila ZHARKO

Sevastopol State University, Russia
luda041@yandex.ru

Alexandra GEORGIADI

Sevastopol State University, Russia
alexandra.georgiadi2010@gmail.com

Maria SHEVCHENKO

Sevastopol State University, Russia
sggu_kpp@mail.ru

Abstract

Rapid development of information technologies and the need to implement their achievements raise the issue of digitalization of education. As universities and colleges are preparing for the remote learning and teaching in the 2020-21 academic year, we focus on such challenges as academic staff prepositions, respective collegial governance processes, and collective agreements. The article aims to study the peculiarities of e-learning organization using remote learning technologies in secondary vocational and higher education in self-isolation mode, caused by COVID-19. The study identifies the peculiarities of e-learning in the transitional period at the Theater College of the Crimean University of Culture, Arts and Tourism, and the Sevastopol State University. It defines the concept of "remote learning" and describes the legal documents for its implementing. The method of analysis, generalization, and classification was used to process information about current and expired legal documents to design the algorithm for implementing e-learning and remote learning technologies. Assessing the quality of the regulatory framework allowed developing proposals aimed to create the educational environment characterized by individual educational technologies and independent curriculum. They correspond to the goals of the Russian education system reform focused on the development of the digital educational environment to provide multiple opportunities for quality education of various categories of students at the national and international level. The experience of using e-learning and remote learning technologies during self-isolation mode makes it possible to analyze its positive aspects, mistakes, regional and national specifics, "professional" peculiarities of educational institutions for further optimization of the educational process

Keywords: E-Learning, Remote Education, Remote Learning Technologies, Self-Isolation Mode.

Introduction

In materials of the Meeting of the Presidium of the presidential Council for strategic development and priority projects (2016) the new challenges were mentioned: rapid development of information

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technologies in the era of globalization and the need to use the world's achievements "here and now" have led to raising the issue of digitalization of education. In the reform of the Russian education system, special attention is paid to the digital educational environment, since it will contribute to creating conditions for providing multiple opportunities for quality education of various categories of students, not only at the national level, but also at the international level.

In research studies by Krasnova G. A., Mozhaeva G. V (2019), Zharko L. N. (2018), Samoylenko N. B. (2018) the issues of organizing e-learning and using distance learning technologies are highlighted as the subject of active discussion in the scientific world.

On May, 12 UNESCO Institute for Information Technologies in Education released Guidelines on Distance Education during COVID-19 (2020). The document encloses practical directions for the use of distance education tools pointing out the key elements of effective design and delivery of a distance learning program: learning resources (content design to support self-learning), pedagogy (sound pedagogical principles of guided-didactic conversation), learner support (psychological and emotional support of learners in academic interaction), and administration (management on the part of an efficient and accountable administration). As an industrialized form of teaching and learning, effective distance learning is characterized by the division of labor, where governments, educational institutions, academic and support staff, students and student bodies, parents as well as quality assurance/accreditation and academic recognition bodies become active participants contributing to the joint success.

After the outburst of COVID-19 pandemic lack of time and need for concrete actions resulted in the development of road maps by governments, ministries and educational institutions. The adopted solutions were to be implemented by the academic staff who faced the challenges of the disrupted teaching/learning process in their daily interaction with administration and students. The increased workload, working days of unfixed duration, lack of experience in remote teaching have provided the experience to reflect on so that to take more effective solutions in cooperation with administration and students in future.

Decree of the President of the Russian Federation dated (2020) proclaims that on the eve of the forthcoming academic year 2020-21 as universities and colleges are preparing for the continuation of remote instruction either fully or in part, the analysis of the solutions can provide new valuable knowledge.

As universities and colleges are preparing for the remote learning and teaching in the 2020-21 academic year, we focus on some studies concerning remote teaching during COVID-19 (2020) challenges: academic staff prepositions, respect collegial governance processes, and collective agreements.

We agree that academic staff associations should seek to protect the following core principles: academic decisions, including those involving changes to the mode of delivery of courses, should be made through normal collegial processes; academic staff should determine how best a course or program might be delivered remotely and maintain copyright over the course materials they produce; academic staff associations should be vigilant in protecting the work of the bargaining unit from outsourcing; extra time required for the preparation and delivery of remote courses should be recognized and compensated.

In March 2020 many countries have decided to close their higher education institutions because of the Coronavirus (Covid-19). Most of these institutions try to keep up to the normal schedule by switching to online teaching in self-isolation mode. Apart from using the institution's Learning Management System (e.g. Moodle, Blackboard, etc.), there are many other tools you can use for teaching from home. The following list does not contain everything that is out there. We have collected just a few ideas, tools and articles to make it easier to teach in these challenging times.

Purpose and Objectives of the Research

The article aims the study of the organization of e-learning using distance learning technologies by the implementation of educational programs in the educational institutions of secondary vocational and higher education in the self-isolation mode; the analysis of the organization of e-learning using distance learning technologies by the implementation of educational programs in the self-isolation mode.

The purpose of the work is the analysis of the experience of organizing e-learning with the application of distance education technologies when implementing educational programs during self-isolation mode.

The objectives of the paper included:

1) analysis of the national legal and regulatory framework with a view to ensuring effective educational process under the new conditions;
2) description of the decisions taken by educational institutions authorities to organize education during self-isolation and their implementation;
3) analysis of possible emergency situations when operating systems fail and the teacher / academic has to make solutions on the fly to sustain the teaching/learning process.

The research questions are:

1) What are the features of e-learning in self-isolation mode? Are there any challenges which are only for such a period?
2) What are the legal and regulatory problems of e-learning? The review of existing problems, and proposal of new solutions, an assessment of the quality of the regulatory framework in the organization of e-learning.
3) What is the algorithm of the educational process and the description of the set of actions for entering and working in the educational information system of the university.
4) E-learning problems in self-isolation mode, research and comparison with other educational institutions, with various information systems.
5) How to take advantage of the opportunities offered by the remote learning environment and how to make the next transition to remote education?

The paper highlights the main regulatory framework of implementing e-learning and organizing the educational process using distance learning technologies; analysis was conducted and prepositions for improvement of the regulatory framework of implementing e-learning and organizing the educational process in the higher education institutions are designed.

Literature Review

In UNESCO Guidelines on Distance Education during COVID-19 (2020) remote learning is viewed as “an emergency measure, which attempts to replicate the classroom teaching and learning process in an online mode and can also be considered a form of distance learning”.

Before conducting the course we work out how to evaluate. For this we need to know the purpose of evaluation (the key questions); the most appropriate methodology; how to carry out an evaluation.

Analyzing information about online Learning Strategies, we investigate the work of the Centre for Teaching Support & Innovation (CTSI). It provides leadership in teaching and learning at the University of Toronto and provides support for pedagogy and pedagogy-driven instructional technology for all teaching staff and teaching assistants (primarily through the Teaching Assistant’s Training Program) across the university’s campuses and divisions (https://teaching.utoronto.ca/).

Harrison, L. et al (2016) offered in Online Learning Strategies some elements of Online Learning & Teaching.

Online Course Observation Template consists of such sections:

Section 1. General Course Overview and Introduction**:** Setting the stage for learning and preparing students successful participation in the course activities.

- Does the instructor provide a thorough description of the course as well as introduce students to the course and the online format?
- Are the learner requirements such as basic technology needs and/ or participation expectations described?
- Are practice use of tools and/or community building activities included to prime the students for learning?

Section 2. Assessment of Student Learning: Alignment of activities and assessments with learning outcomes is evident in the course design.

- Are learning outcomes communicated?
- Is there a variety of activities and assessments?
- Is there alignment of learning activities and assessments with learning outcomes?
- Are formative and summative assessment opportunities part of the design?
- Are assignments clearly described, including grading scheme or rubrics?
- Is student workload appropriate to course level and duration?

Section 3. Instructional Design: A clear path to learning opportunities for students is provided, including interaction with the content, their peers, and their instructor.

- Are there opportunities to interact or seek guidance from the instructor?
- Are there opportunities to participate in community activities or peer-to-peer sharing?
- Is learning scaffolded, guiding students toward increasingly independent learning and/or application of relevant skills?
- Are there opportunities for student reflection on learning and/or feedback to the instructor?

Section 4. Online Organization and Design: Instructor's design and choice of technology effectively delivers course content and supports learning processes.

- Overall, is the navigation and structure of course easy for students to follow?
- Do the tools and media formats selected support the course learning outcomes?
- Are guides and protocols for use of the course tools provided?

Considering the course as a whole, provide feedback on the following:

- What aspects of the course do you see as strengths that will contribute to effective student engagement and learning?
- Are there any strategies or resources that you would recommend to enhance the design of this course?
- Final comments or observations?

Pearson collated research on effective online teaching and found nine strategies used by successful faculty:

1. Know the technology
2. Create and maintain a strong presence
3. Set clear expectations for the course
4. Establish a sense of comfort and develop a community of learners
5. Promote reflection and communication through quality asynchronous discussion
6. Have a good balance of active leader and active observer

7. Request regular feedback and be cognizant of misinterpretation
8. Regularly check content resources and applications
9. Expect the unexpected and remain flexible.

(https://www.pearsoned.com/9-strategies-for-effective-online-teaching/).

Methodology

The study was conducted at the Theater College of the Crimean University of Culture, Arts and Tourism, and the Sevastopol State University. This research is supported by the grant "Methodology and methods of using information technologies in training and support of teachers-facilitators' professional activities" registration number 48/06-31, 06.04.2020 Sevastopol State University. The method of analysis, generalization, and classification was used to process information about current and expired legal documents and to design the algorithm for implementing e-learning and organizing the educational process using distance learning technologies. The oral questioning, conversation, observation were used as the empirical methods.

Firstly the regulatory framework of implementing e-learning and organizing the educational process using distance learning technologies analysis was conducted.

Our paper presents the results of the experience where we have trained higher education teachers for the online course designing in the process of teaching and learning.

The main goal of the research was to present the organization of e-learning using distance learning technologies by the implementation of educational programs in the educational institutions of secondary vocational and higher education in the self-isolation period.

Results

The algorithm of implementing e-learning and the algorithm of the educational process itself using distance learning technologies are described.

The final result of its implementation in the educational process will be the creation of the educational environment with the designing of individual educational technologies and the independent curriculum.

Following the Russian Federation Laws (2012), the Order of the Ministry of education and science of the Russian Federation (2014), the first stage of the digital educational environment development, in our opinion, was the possibility of implementing educational programs using e-learning and distance learning technologies.

Moreover, according Recommendations of the UNESCO policy in the field of mobile learning. UNESCO (2015) E-learning involves the mandatory use of the Global Internet and / or local network of educational institutions and multimedia. Distance learning, in our opinion, is the implementation of the educational process at a distance.

Legal support for the implementation of e-learning is one of the challenges.

We started our research on this issue by analyzing the legal framework (table 1).

Table1: Legal support for the implementation of educational programs using e-learning and distance learning technologies

Level of document approval		Regulatory document	Date of adoption / approval	Articl, part №	Summary of document / article
		Federal law No. 273 "On education in the Russian Federation".	29.12.2012	16	Provides an opportunity to implement educational programs using e-learning and distance learning technologies.
				18	Describes printed and electronic educational and information resources.
	Federal Executive authority	On the priority projects in the field of education. Materials of the Presidium of the presidential Council meeting for strategic development and priority projects.	24.08.2016		Describes the development of the digital educational environment.
Acts of the Ministry of education and science of the Russian Federation and other ministries and departments		Order of the Ministry of education and science of the Russian Federation No. 816 "On the approval of the procedure for the use of e-learning and distance learning technologies by organizations engaged in educational activities in the implementation of educational programs".	23.08.2017		Describes the procedure of using e-learning and distance learning in implementation of educational programs.
Local acts of educational institutions		Regulations, orders, and bylaws of an educational institution on the use of e-learning, distance learning technologies in the implementation of educational programs.	As necessary.		Regulate the mechanism of e-learning and distance learning technologies implementation in the educational programs of an educational institution.

Obviously, the implementation of educational programs based on the use of e-learning and distance learning technologies is the focus of attention at all levels. The analysis of the legal framework promoting the use of e-learning and distance education programs has shown the possibility and approximate procedure for its full/partial use, as well as possible mechanisms for its regulation. Meanwhile, only odd bits of information have been found on the issue of degree programs where the use of e-learning is not possible even partially due to objective reasons and the specifics of the discipline taught. Thus, there is a need for an order at the level of relevant ministries to outline a list of specialties (with codes and names) where the use of e-learning is impossible, as well as guidelines for conducting remote classes in corresponding disciplines in force majeure conditions, for example, self-isolation.

The transition period to e-learning in self-isolation mode lasted 2 weeks.

The introduction of the general self-isolation regime due to the spread of a new coronavirus infection (COVID-19) has significantly accelerated the transition of educational institutions to e-learning. In our opinion, this transition did not always proceed in an orderly manner and at a high level, since not

all educational institutions were in equal conditions, and there was no preparatory stage, or it was short (1-3 days).

The paper describes the transitional period experience of the Theater College of the Crimean University of Culture, Arts and Tourism (fig.1) and the Sevastopol State University.

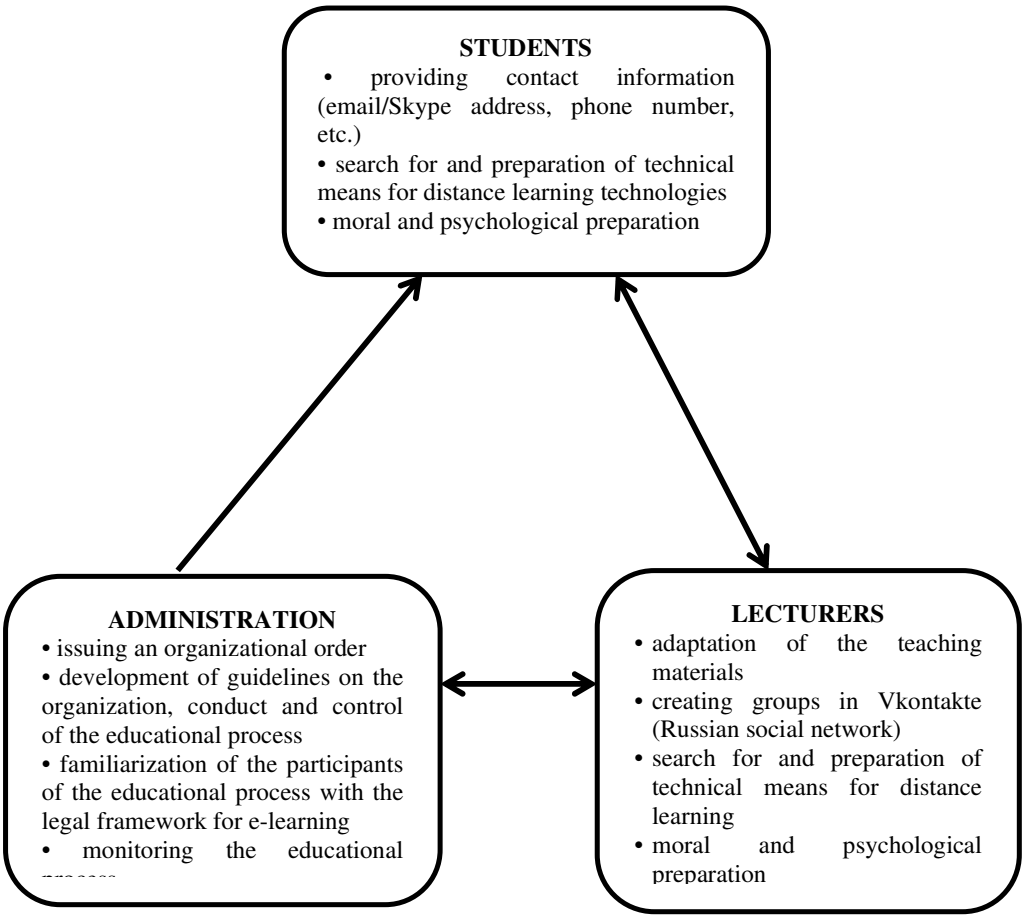

Fig. 1 Algorithm for the transition to e-learning

The Theatre College administration issued "An order on the temporary transition to the implementation of educational programs with the use of e-learning and distance learning technologies in special circumstances". By the order, the director was put in charge of the educational activities, and the working hours of the staff were established in accordance with the academic load, as well as the plan of methodological and educational work for the 2019-2020 academic year. The teachers were asked to update the calendar and thematic plans for the academic disciplines. The teachers and students were informed about the remote communication channels: the Skype and closed groups in the Vkontakte social network were offered as the training platform. A responsible consultant was appointed to assist teachers in the use of e-learning and distance education technologies. A report form, which teachers had to provide on the day of classes, attaching a screenshot of the lesson, was developed to control the conduct of training sessions (table 2).

Table 2: Report on the implementation of educational programs using e-learning and distance learning technologies during the period of self-isolation

№	Name of the discipline, Full name of the teacher	Date of the session	The theme of the lesson	The type o the lesson	Self-study work	Year	Number of students present

Lesson report

Teacher's name	Subject/ Discipline	Group	Date	Student	Lesson report using resources
Samoylenko N.B.	English for academic purposes	Phil/м -19-1	11.06 11.50 - 13.20	10/10	Topic: Unit 6. Research Papers. Key Words. Introduction Sections 1)Video: Research Paper Introduction https://www.youtube.com/watch?v=tSkb7KZ5yw0 Key Words. Developing Keywords for Your Research https://www.youtube.com/watch?v=PCUjnPS2_1g (present recommendations for writing research paper introduction and key words); 3) Preparing mind maps for theoretical material: 11. Research paper: general structure 12. Research paper: structure of introduction section Platform Big Blue Button https://bbb.is.sevsu.ru/b/fd3-v6q-9ke.

The students were informed that they had to continue their learning in the new mode to be admitted to their term or final exams (but for cases of legitimate excuses).

According to Order of the Ministry of education and science of the Russian Federation "On approval of the list of professions and specialties of secondary professional education, implementing educational programs which are not allowed using only e-learning, distance educational technologies" (2014) there are educational programs which are not allowed using only e-learning, distance educational technologies. That is why at the initial stage, there were difficulties with the academic disciplines of purely practical character, requiring additional equipment ("Solo singing", "Stage movement and fencing", "Dance", "Make-up", "Acting").

Aged teachers, in our opinion, did not overcome the psychological barrier when switching to e-learning, since they did not have enough knowledge of the technical tools of e-learning and it took them longer to adapt. It should be noted that the teachers' working day was no longer standardized.

The Regulation "On the Electronic Information and Educational Environment (EIEE)" defines the purpose, structure and procedure for the functioning of the electronic information and educational environment in SevSU.

To ensure the functioning of EIES at SevSU, the following information and telecommunication technologies are used: official e-mail (https://mail.sevsu.ru), a file server, webinar tools (Mirapolis Virtual Room, BigBlueButton, Discord, etc.), tools for videoconferencing (Skype, Zoom, etc.), remote communication information system (https://chat.is.sevsu.ru).

To inform the participants of the educational process, a community the VKontakte social network (https://vk.com/sevsu.online) was launched on. In the group news and teaching materials for organizing the learning process in a digital environment are quickly posted. Methodological materials, lecture notes and practical lessons, video instructions for teachers and students are posted and periodically updated on the website org.sevsu.ru in the folder "EES and DL Distance Learning SevSU" (https://www.sevsu.ru/novosti/item/7621-gde-najti-informatsiyu-o-distantsionnom-obuchenii).

Operational information about direct communication and feedback ("learning -teacher", "student - administration", "teacher - administration", "student, teacher, administration - technical support service") is located on the SevSU page of the official website in the "Education" section.

The educational process is carried out according to the following algorithm (table 3).

Table 3: Algorithm of the educational process in SevSU

Learner	Tutor
• Login / password verification, possibility of entering EOES "SevSU. RU". • Login to http: //test_moodle. sevsu.ru / • Search for the direction of training, course, group of students. • Choice of discipline according to the schedule. • Completing assignments, participating in online classes. • Sending completed assignments to the teacher for review.	• Login to http: // test_moodle. sevsu. ru / • Search for the direction of training, course, group of students. • Choice in the section "Course" of the name of the taught discipline. • Download PD, lecture notes and / or practical classes, presentations, assignments for independent work, links to online courses, additional resources if necessary. • Description of instructions for different types of work. • Determining the timing of assignments, time for online classes

Thus, the participants successfully pass all stages of training following the considered algorithm of the educational process.

Teachers were offered webinars from the educational platforms Yurayt, Lan. The ELS team "Lan" together with the St. Petersburg "Center for Educational Services" conducted an intensive online course "Technology for creating e-learning courses based on LMS Moodle", including a series of webinars (https://www.youtube.com/watch?v=-VM8elNM7-U&feature= youtu. be).

However the university administrators foresaw the problems that teachers could face in the distance learning in self-isolation period in the previous algorithm of the educational process at SevSU. The office of educational programmes SevSU has developed the course " Basics of Working in Moodle"

for methodological support of the distance learning organization (https://testmoodle.sevsu.ru/ mod/page/view.php? id=45750&forceview=1). The aim of the course is to help teachers develop their e-learning resources based on e-learning templates. The content of the course is presented with the guidebook.

The course offers to listen to the recording of the webinar "Implementation of electronic educational resources in the Moodle LMS" aimed to train teachers for the academic year by designing electronic course templates.

The structure of the course "Basics of Working in Moodle" includes a number of steps.

Step 0. Introduction
In this section, the system administrators of SevSU made a video instruction which is offering to get acquainted with the structure of the course home page, with a template, to make personal settings for a personal profile, and to study the stages of the structure of the electronic training course.
Step 1. Course setup
This video contains a detailed algorithm for setting up a course, informative sections of a course template, principles of course editing.
Step 2. The Section "General"
This step describes the structure of the section "General", the content of each element of the section "General" (abstract, forums, curriculum-thematic plan, and list of basic and additional literature, attendance) and the principles of its editing are described.
Step 3. Webinars
This section presents the possibilities of simultaneous classroom training in the form of webinars in the system "SevGU. Conference" based on BigBlueButton.
Step 4. Lecture materials
The video shows the organization of the presentation of theoretical material in e-course templates in two formats: in the form of lecture elements and in the form of file resources (lecture notes or presentation). The placement of theoretical material in the format of a lecture summary and presentation, settings the element "Lectures" and editing it in the author's course template is described in detail.
Step 5. Workshop
The organization of practical tasks in e-learning templates is presented in text format, the possibilities of working with the elements "Assignment", "Forum", "Seminar", "Test" and their editing methods are described.
Step 6. Other Moodle Elements and Resources
The teacher is offered a wide variety of resources and course elements that can be used for creating authoring courses in a distance learning environment. A separate part of the section is devoted to the electronic element of the course – "Chat". The algorithm of "Chat" creation and edition, its features, as well as its capabilities in synchronous written communication of course participants in real time are considered.

The last step of the course consists of the video instructions and text instructions for the guideline in Moodle.

Each step of the course ends with an anonymous survey of teachers, where they are asked to rate the usefulness of the content of the sections, indicate what incomprehensible material was in the sections and what other information they would like to receive on the studied sections.

After the end of the course teachers will learn how to create e-courses, design them in accordance with the requirements, place and organize educational materials in the course elements, and work with the course users.

Over the first weeks after the transition to remote learning, partially due to the lack of LMS experience of work on the part of academics, and for such technical reasons as LMS upsets, popular solutions taken by the university authorities and the staff included application of social network

VKontakte (Russian social network analogue of Facebook) and Skype. Although the platforms are not secure in terms of information and communication protection, they provided the necessary opportunities for conducting lectures and practical sessions online.

The popular decisions in the organization of lectures were basically live broadcasting (with or without the audiovisual recording) or group chats with downloaded texts and tasks to them.

The use of live broadcasting was very similar to the real-life lecture but conducted on the internet platform it got an additional tool in the form of a chat where students could ask questions and discuss the material. However, this kind of interaction was not very effective. Following the conversation and delivering the lecture simultaneously was time-consuming for the lecturer and could be ineffective and distracting for the students if interrupted by strangers.

The potential of group conversation based on learning material from the downloaded text was found more interactive if it was presented in portions with pre-reading, while-reading and after-reading questions discussed in the chat synchronically and followed by summative thematic tests. This feature was also appreciated by the students who for some reason missed the lecture but could read the conversation in self-study format.

Real practical classes and seminars were held in virtual classrooms on university's LMS or in Skype. The platforms offered opportunities both for implementing online resources enriching and diversifying the content of the disciplines, and, supplying teachers and students with interactive tools available across the Internet.

Thus, immediate decisions taken to compensate the lack of real interaction varied, but they all tended to fulfill the requirements of the educational process. Still, the experience proves their application has serious limitations which include security and copyright issues, technical and financial availability, as well as organizational potential for university, academic staff and students.

Georgiadi A.A. et al (2017) mentioned that the criteria for selecting a web resource from the position of a teacher can be availability, safety, reliability and functional compliance with the tasks of teaching a particular discipline with regard to the needs of the student audience. The main discipline content in the form of interactive abstracts, lecture materials, monographs, textbooks, that are copyright objects, should be stored and used on a secure platform with the limited access (for registered users). It can be a learning management system (LMS) such as Moodle or free cloud services that allow regulating access to the materials. Automation of learning control requires selection and acquisition of a test platform. The use of such a product in its turn requires a web resource with specific technical characteristics. Test platform performance can be ensured by adequate learning management system (LMS) or a web site. The area of creative interaction between teacher and students is associated with transformation of educational activity forms (classroom, extracurricular, independent and individual work). In this context, access to open cloud services is inevitable.

In the book Distance Teaching Syrvival Kit (2020) we studied the materials and documents:

1) Collections of tools recommended for online teaching
• https://en.unesco.org/themes/education-emergencies/coronavirusschool-closures/solutions
• https://techagainstcoronavirus.com/
2) How to move your course online and be successful - article
• https://medium.com/@contact.josecc/how-to-move-your-courseonline-and-be-successful-6098b4a0823d
3) Conducting Distance Education Effectively - article
• https://www.opencolleges.edu.au/informed/teacher-resources/resources-for-distance-education/

4) Characteristics of Successful Distance Learning Programs – article https://www.sutori.com/story/characteristics-of-successful-distancelearning-programs--Aw7yxYFMjDqUHGKMeAZ2yPMb

Many universities implement the flipped classroom, which is characterized as an instructional strategy and a type of blended learning that reverses the traditional learning environment by delivering instructional content, often online, outside of the classroom. *We recommend to study such resources:* https://www.heacademy.ac.uk/knowledge-hub/flipped-learning-0; https://flippedlearning.org/.

Discussion

E-learning is one of the components of the improvement system, both in the providing educational services and in receiving them. The end result of its implementation in the educational process will be, in our opinion, the expansion of the boundaries of the educational environment with the ability not only to design individual educational technologies and trajectory, but also designing the curriculum independently; creation of a unified information space in a separate educational institution; unification of information spaces within the domestic specialized educational institutions with the possibility of reaching the international level; providing the opportunity to repeatedly study the covered material; use of the latest information in the field of the taught discipline, will make the learning process more visual.

Conclusion

The experience of implementing educational programs using e-learning and distance learning technologies during the period of self-isolation made it possible to analyze the positive aspects, take into account the made mistakes, the regional, national specifics, "professional" features of educational institutions for further optimization of the educational process, for designing specialized training programs, approving the relevant standards; generating a unified communication format within the educational process. Although the forecast of UNESCO, the World Bank, and other organizations about increasing inequality in access to distance education is quite realistic, since not all students can cope with connecting to video broadcasting independently; not all students have technical means; Internet connection is not available everywhere.

In general, the research results confirm the need for full/partial implementation of e-learning and distance learning technologies for educational programs realization. The experience of using e-learning and distance learning technologies during the period of self-isolation makes it possible to analyze the positive aspects, take into account the made mistakes, regional and national specifics, "professional" peculiarities of educational institutions for further optimization of the educational process.

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Strategy and Methods of Personal Brand Promotion

Elena A. DAVYDENKO
St. Petersburg State University, 7-9 Universitetskaya nab., St. Petersburg, 199034 Russia, elenadavidenko1@yandex.ru

Yulia V. KRYLOVA
St. Petersburg State University, 7-9 Universitetskaya nab., St. Petersburg, 199034 Russia, krylova-julia@yandex.ru

Dariya V. KURITCYNA
St. Petersburg State University, 7-9 Universitetskaya nab., St. Petersburg, 199034 Russia, darya.dkv@yandex.ru

Abstract

The authors of this study have managed to explain in what way the methods of strategic analysis can be used to build a personal brand development strategy. To solve this problem the authors have identified the features of each method of strategic analysis and its application for the formation of a personal brand development strategy. The promotion method proposed by F. Kotler within the framework of the concept of marketing development of 4C was successfully transformed and applied to such an object as a personal brand.

Keywords: Personal Brand, Promotion, Development Strategy, Content Plan.

Introduction

The term "personal brand" was first coined by Tom Peters in 1997: "Big companies understand the importance of brands. Today, in the age of the Individual, you must be a brand. To be in business, our main job is to be a marketing Director who manages a brand called YOU" (Piters, 2012). Over the past 20 years, the term has migrated from business to almost all areas and the development of digital technologies and, in particular, social networks have had a great impact on this process. Today, personal branding is one of the key trends in the field of PR, since the concept of H2H (human-to-human) is increasingly coming to the fore in all areas (Marranco, 2015). Regardless of the market or professional activity, interaction is always carried out not between companies, but between people. Internet technologies replace people, but they also give the opportunity to actively develop and find their target audience to those who previously had almost no chance of doing so. The same rules apply to a personal brand as they apply to product brands. Information must be created as part of a content plan that is subordinate to solving specific tasks for creating a personal brand of the Manager. The rule for generating content is one – there should be enough of it so that the Manager is interesting to the target audience, but also does not spam it with dozens of posts a day (Hall, 2018). At the same time, if possible, the Manager should try to communicate with subscribers not only in social networks or through the site, but also to meet people in person. Knowing about the Manager personally, in the future, if a person needs a service as part of the professional activities of the Manager, they are more likely to give their preference to him, rather than to those with whom they have only communicated on the Internet or seen only in videos (Long, 2018). Of course, the person who creates a brand must constantly maintain contact with their potential customers, because their opinions and location are extremely important to them (Davydenko, 2009). The authors of this study aim to analyze the features of a personal brand and develop a strategy for its promotion.

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Research Methodology

The authors conducted an empirical study aimed at identifying opportunities to using methods of strategic analysis to build a personal brand development strategy, presented a list of methods that are appropriate to use for these purposes. The following hypotheses are supposed to be tested:

- Strategic analysis methods can be used to develop a personal brand development strategy.
- The use of strategic analysis methods in relation to the development of a personal brand has its own characteristics.

An in-depth interview method was used in order to confirm the hypotheses (Glock, 1987). The results of an in-depth interview of individual entrepreneur who are dealing with organizing online conferences allowed to draw following conclusions:

- When developing a personal brand promotion strategy, traditional methods of strategic analysis are quite applicable, which allow analyzing the internal and external environments of brand development and promotion.
- In the course of the research, research directions were developed for building a personal brand development strategy (see Table 1).
- Table 1

Table 1: Methods for building a personal brand development strategy

N	Method	Features of method application in personal branding
1.	SWOT - analysis (Andrews, 1987)	Internal factors: analysis of the brand's strengths and weaknesses relative to its main competitors. External factors: opportunities formed in the external environment – technology development, consumer ecosystem development, etc., as well as threats – industry and macroeconomic factors that affect the development of the brand.
2.	Analysis of the value chain (Porter, Kramer, 2019)	It is necessary to define the types of values that can be created by the brand. This can be on-line courses, lessons, practical recommendations on various issues, webinars, conferences, useful content on the site. Internal factors: analysis of relationships between values, assessment of the possibility and economic feasibility of using various marketing tools for each direction of marketing activities of the brand involved in creating value. External factors: analysis of the organization of relationships with partners, competitors and loyal users, assessment of the possibility of using additional tools to engage users and increase brand loyalty, creation of a user ecosystem.
3.	7S (McKinsey 7S)	If we consider this tool in relation to the promotion of a personal brand, it is obvious that in the process of its development, there is a need to develop a strategy, hire staff and resolve issues about team management.
4.	PESTEL	The method is aimed at conducting a comprehensive analysis of the company's external environment: the development of legislation, the tax system, technologies and innovations that can be used by the brand, the presence of relationships between competitors, etc. Using the method allows you to systematize all factors of external influence on the brand ecosystem, both at the industry and macro-economic levels.
5.	Analysis of Five competitive forces (Porter, Kramer, 2019)	The method allows you to study in detail the level of competition-the presence of personal brands in this industry, application of actual promotion tools, the demand for the offered values.
6.	Ansoff Matrix	The analysis performed using this matrix allows you to develop 4 strategy options, depending on the type of product being promoted and

		the type of market.Личный бренд сам по себе является новым товаром для рынка, кроме того, он предлагает новый контент.
7.	Technology analysis by Christensen (Christensen, 2011)	The method involves analyzing the technologies used by the brand, including "breakthrough" technologies that radically change the process of creating value.

Thus, using these tools, we assess the real strategic position of a personal brand and form an approach to developing a marketing strategy for its promotion.

Based on the step-by-step process of developing and implementing a content marketing strategy proposed by F. Kotler (Kotler, 2017) the authors proposed an algorithm that includes 8 steps for developing a strategy for promoting a personal brand:

1. Goal setting and formulating objectives to achieve it. The strategic goal is to increase brand awareness and increase audience loyalty.
2. Determining the target audience.
3. Drawing up a content plan.
4. Generating content. Content can be generated based on studying the requests of the target audience, personal brands of competitors, as well as directions for the development of partner Internet communities.
5. The distribution of content.
6. Amplification of content. Search for opinion leaders-influencers who have a serious influence and can connect to the distribution of high-quality content.
7. Efficiency evaluation. In accordance with the concept of Marketing 4.0, new metrics are proposed for evaluating the effectiveness of marketing based on 5A: Aware – visibility (A1), Appeal – relevance (A2), Ask – search efforts (A3), Act – evaluation of actions (A4), Advocate – frequency of recommendations to others (A5). The user of the brand content moves sequentially from A1 to A5, and the conversion between each two values is measured along the way.
8. Selecting the most interesting content for the audience as well as the most effective platforms for brand promotion and attracting new users.

Results of The Empirical Study

An 8-step algorithm for developing a personal brand promotion strategy was tested on a specific example of a personal brand of an individual entrepreneur-an organizer of online conferences. In the process of developing a promotion strategy, digital tools Buzzsumo, SimilarWeb, and SEMrush were used, which allow you to analyze the process of promoting a personal brand and its effectiveness not only for a specific personal brand, but also to compare it with competitors by a set of parameters. As a result of the research, recommendations were developed for using SMM to increase audience engagement and activity. To develop content marketing, taking into account the trend for on-line education, including in connection with the COVID-19 pandemic, the brand owner was asked to develop and launch their own online courses on digital marketing,

Conclusion

Traditional STP process (segmentation, targeting, and positioning) can be successfully implemented using digital marketing tools and, above all, the Business Intelligence platform that aggregates OLAP and Data Mining tools for managing consumer experience and conducting in-depth consumer analysis.

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The Impact of Packaging Elements on Consumer Buying Behavior in Food Industry

Shafig AL-HADDAD

Princess Sumaya University for Technology. Amman – Jordan
s.haddad@psut.edu.jo

Hala ABURADAHA

Princess Sumaya University for Technology. Amman – Jordan
Hal20188046@std.psut.edu.jo

Esraa KHATER

Princess Sumaya University for Technology. Amman – Jordan
esr20178033@std.psut.edu.jo

Abstract

This research aims to study the factors that affect "consumer buying behaviour" in the food industry in Jordan. The main objective is to know if there is any influence of different packaging elements on the behaviour of consumer buying method through investigating the influence of multiple independent variables on research's dependent variables, this study has been considered in Amman-Jordan, a questionnaire has been used to collect data. Moreover, for analysis purposes, SPSS software was used. The study sample consisted of a hundred respondents and tested the following packaging elements: "packaging material, packaging colour, packaging printed information, design of wrapper in packages, font style and innovation", it studied the extent of their influence on "consumer buying behaviour". According to the findings, the material of packs and the design of wrapper have an obvious influence on "consumer buying behaviour" in the food industry, while the other elements do not influence "consumer buying behaviour". Independent variables influence by a percentage of 45% on the dependent variable, this means other elements are influencing "consumer buying behaviour".

Keywords: Packaging Elements, Buying Behavior, Food Industry.

Introduction

Firms nowadays face pressure from different types of consumer behaviours, inside and outside the market, that each is specialized in, which make them more curious to know better about the tools that push the consumer to choose their product or service. Therefore, they started from tens of years from now to study "consumer buying behaviour", one tool that researchers found previously is packaging and how much positive or negative the packaging elements may give an impact on the business profits. Many marketers believe that packaging is the last "P" of marketing "4Ps" that are price, place, promotion and product. (Adam & Ali, 2014).

The research purpose is based on the hypothetical analysis of the elements of packaging and their impact on the buying behaviour decision of the consumer. The tentative study covers the features of packaging which have an influence on "consumer behaviour" in the case where there are many other choices available.

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Research Problem

The obvious effect on "consumer buying behaviour" by packaging elements has so much attention from scholars, previous researchers found that packaging can be a valuable tool in the marketing communication giving more details of its elements and the impact of these elements on the behaviour of the consumer (Raheem et al., 2014), the "consumer behaviour" various depending on the packaging colour, quality, innovation and many different packaging characteristics (Raheem et al., 2014), it has been found that "consumer buying behaviour" is affected by the material of the product package (Adam & Ali, 2014). Some researchers gathered the elements of packaging in seven categories; colour, attractiveness, printed information, beautiful background, transport and handling facility, style of the front and availability of wanted information on the packaging (Abdullah, & Akterujjaman, 2013), each one of the seven has a separate impact on the buying decision.

Researchers found that labels give a value to the product, the reason they mentioned for that is consumers can get the information of the product itself, the origin of it and the purpose of usage (Zekiri, & Hasani, 2015). The impact of packaging for getting a competitive advantage is higher than the impact of advertising, it reinforces the decision to purchase, furthermore, it affects each time the consumer uses the product not just when he buys it (Deliya, & Parmar, 2012). The packaging is an important part of strategic marketing decisions. Therefore, it is a crucial managerial implication (Rundh, 2016).

This study seeks to answer the following question: what is the impact of packaging elements ("packaging colour, packaging material, printed information, font style, design of wrapper', innovation") on "consumer buying behaviour" in the food industry in Jordan?

Research Objectives

-To investigate the impact of packaging on "consumer buying behaviour".
-To know the impact of packaging elements on "consumer buying behaviour".

Literature Review

Nowadays, with the high competition in different markets around the world to seize consumer attention and purchase products of a company, packaging should be under the spotlight of the company priorities to get a competitive advantage in the marketplace (Wells et al, 2007).

The "consumer buying behaviour" is considered as a group of decision-making and the concerned individual action process to buy. In addition to product usage (Sharma, 2014), the "buying behaviour" of consumer indicates the individual buying method of a Product which works to satisfy the consumer needs, desires and the usage way (Mitul& Bhavesh,2012).

Wrapper Design, Packaging Material and Printed Information Influences Consumer Buying Behaviour, these elements when they purchase Nestle products during short time period. (Ahmad, et al 2019)
The packaging is considered important in its meaning for the consumer to communicate with the trademarks, also works to identify the product and the organization, and works to protect the quality of the product (Silayoi & Speece, 2007).

The study (Raheem et al.,2014), investigated the influence of packaging on "consumer buying behaviour" through studying the number of the independent variables which are packaging colour, material, design of wrapper, and innovation, to show the influence of the dependent variable which is "consumer buying behaviour", the study has indicated at the presence of a positive relationship between packaging and "consumer buying behaviour", besides of, the packaging is one of the most crucial factors that work to influence consumers buying decision, and it is considered one of the most important instruments in the marketing communication. The study indicated the need for understanding the influence of packaging elements on "consumer buying behaviour".

"Consumer buying behaviour" depends on the packaging and its features, such as the "font mode, innovation, printed information", background image, and the cover design, since there is an increasing interest in the packaging part because of the change in consumers lifestyle, the packaging as a tool to enhance the "consumer

buying behaviour", moreover, the sale point packaging one Important factor That works to influence the "consumer's buying behaviour" (Mitul& Bhavesh,2012).

$H_{01:}$ There is no statistically significant impact of packaging on "consumer buying behaviour" at $\alpha \leq 0.05$.
Packaging colour is considered one of the most important factors to potential customers when the customer undertakes the process purchase decision for juices since the colours contribute to attracting the customers' attention (Raheem et al.,2014; Mitul& Bhavesh,2012). Moreover, colours have different Meanings according to consumer's perception. (Shah et al, 2013).

According to (Farooq et al, 2015), the colour of the packs is the packaging scope, the selection of the colour and the colour of the visual parts is crucial to give the consumer what he expects. Researchers discussed the importance of packaging colour in visual designs of being a tool to give the ability of marketers at the same market to act harmoniously with each other.

H_{011}: There is no statistically significant impact of packaging Color on "consumer buying behaviour" at $\alpha \leq 0.05$.
Packaging Materials are the used materials to protect the product (Raheem et al., 2014). Because the packaging material works for protecting the product from loss and damage (Shah et al, 2013). According to (Raheem et al., 2014), packaging material contributes to changing the consumers' purchase decision and influences the quality level and consumer attraction for juices.

The material of the pack makes an important element, (Shah et al., 2013) shows that the high-quality material attracts more consumers than the low-quality products, which in this case, increases the profit margin of the firm and gives them an advantage over their competitors.

$H_{012:}$ There is no statistically significant impact of packaging Material on "consumer buying behaviour" at $\alpha \leq 0.05$.
Font style plays an important role in packaging impact; successful companies are characterized by having Specialists in studying, selecting and innovating the best attracting font modes. (Mitul& Bhavesh, 2012; Shah et al, 2013).

To attract the customer, one basic element according to (Shah et al., 2013) is to choose the right and appropriate font style, firms that understand the importance of this element and use the best font style get to have a market success.

$H_{013:}$ There is no statistically significant impact of font style on "consumer buying behaviour" at $\alpha \leq 0.05$.
Generally, product design has a role in attracting customers, so the companies seek to design attractive packages for customers, from different ages. (Mitul& Bhavesh, 2012; Raheem et al.,2014)
Researchers at the same time showed that the design of the wrapper is a way firms can use to identify their product. And firms need to know carefully which market segment they are working in and based on that they choose the right product design, for example, the production of wrappers that are safe to the children and attracts them as well (Shah et al.,2013).

H_{014}: There is no statistically significant impact of wrapper design on "consumer buying behaviour" at $\alpha \leq 0.05$.
Printed information on the packaging contributes to promoting the product, enhances its trademark, and helps the potential customers in distinguishing it from other competing products. The consumer might undertake the evaluation decision based on this information (Mitul& Bhavesh, 2012), these printed information includes product price, description, quality and other features (Shah et al, 2013).

H_{015}: There is no statistically significant impact of printed information on "consumer buying behaviour" at $\alpha \leq 0.05$.
The packaging is more affordable when we put the element of innovation in (Farooq et al, 2015), when the product has a touch of innovation in it, even if it was a little, it brings the consumer the feeling of attractiveness and the need to purchase it again, which leads to customer loyalty and an increase in the market share.

To satisfy consumer's needs and desires in design, packaging should be done to increase the product value introduced to the customer, such as ease of carrying the product, the possibility for recycling, and ability to

store it (Raheem et al, 2014; Shah et al, 2013). The companies seek for innovation in the packaging to preserve their trademark and to create a competitive advantage for it with low cost (Mitul& Bhavesh,2012).

According to (Adnan & Ahmad, 2013), the background image is considered to be what is printed in the customer mind, helps him to distinguish the product trademark from other trademarks, also the image on the product works in building the familiarity relationship with specific product and increases interest in it.

H_{016}: There is no statistically significant impact of innovation on "consumer buying behaviour" at $\alpha \leq 0.05$.

Contribution of the study

Even of the importance of studying the impact of packaging on "consumer buying behaviour" in the food industry, there is no research that clears the factors that shows this impact in Jordan. Therefore, this paper covers this issue.

Research Framework

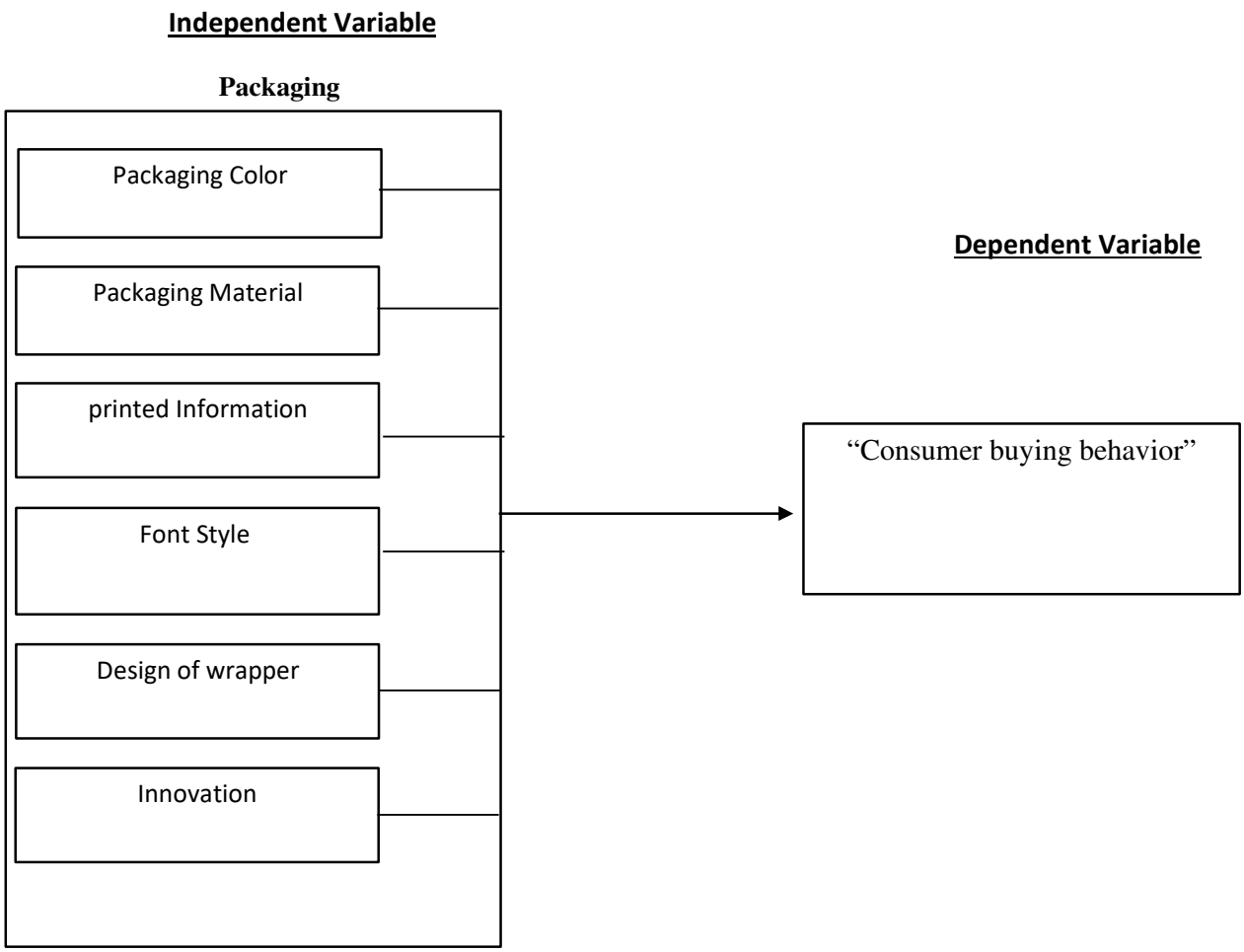

Fig.1: Research Model

This model has been developed by the researchers based on the previous researches; (Adam & Ali, 2014), (Raheem et al., 2014), (Abdullah,& Akterujjaman, 2013), (Zekiri& Hasani, 2015), (Deliya& Parmar, 2012), (Rundh, 2016), (Wells et al,2007), (Sharma, 2014), (Silayoi & Speece, 2007), (Mitul& Bhavesh,2012), (Shah et al.,2013), (Zekiri & Hasani, 2015).

Research Methodology

Sampling Technique & Sample

The study population consisted of consumers who buy food products in Amman, the sample has been selected to study the influence of packaging elements on “consumer buying behaviour”, a sample of 100 individuals has been taken to conduct the study, it was a convenience sample to generalize the result in the food industry sector.

Tools of Data Collection

To receive data relating to the role of packaging on the buying behaviour of the consumer, data will be collected regarding seven variables, through designing a questioner consistent of questions about all the variables they will be analyzed using SPSS software.

Measure

The questionnaire contained 23 questions to receive data relating to each variable. Each variable was measured through presenting between 2-4 questions for each one of the variables, a five-point Likert scale was used which consists of five points 5-1. Reliability statics table shows that the sample's variances value is 86% this indicates the presence of reliability for all variables together.

Results and Discussion

Items responsiveness was measured using a 5 points Likert-scale followed by strongly disagree to strongly agree, value 5 refers to strongly agree and value 1 refers to strongly disagree.

Reliability statistics table shows the number of items and the Cronbach's alpha value. The variance of the sample is 86%, which indicates that there is high reliability for all 8 variables together.
Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.674[a]	.454	.419	.56787

The results of model summary show that there is no impact of all independent variables upon the dependent variable because R=.674, the independent variables has 45% impact on the dependent variable which means there are other factors that have an impact on it.

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.685	6	4.114	12.758	.000[b]
	Residual	29.668	92	.322		
	Total	54.352	98			

In the ANOVA table, it is obvious that the statistical model is significant because the value of significance is less than 0.05which means that there is a relationship between independent and dependent variables.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.747	.459		1.627	.107
	Packaging colour	.179	.109	.171	1.646	.103
	Packaging font	.154	.103	.147	1.487	.141
	Design of wrapper	.267	.129	.238	2.064	.042
	Packaging material	.306	.129	.271	2.367	.020
	Packaging information	-.199	.111	-.173	-1.799	.075
	innovation	.113	.099	.109	1.143	.256

The dependent variable is “consumer buying behaviour”.
The regression equation is:
$Y=A+Bx_1+Cx_2+Dx_3+Ex_4+Fx_5+Gx_6$
S= α+ β1 (PC) + β2 (PF) + β3 (FD) + β4 (PM) + β5 (PS) + β6 (BSH) .747+.179PC+.154PF+.267PD+.306PM-.199PS+.113PSH

The coefficient table shows that there are two independent variables has an impact on the “consumer buying behaviour” variable which are the design of wrapper (sig. = .042) and packaging material (sig. =.020), but other independent variables have no impact.

Discussion

Packaging colour results from the study have presented that there is no impact of this variable on the “buying behaviour of customers” (r = 0.179). This means that the packaging factor is not an important factor to affect the decision of the consumer to purchase the product in the food industry in Jordan and hypothesis 011 is accepted. In comparison with previous researches, the results in Jordan are not the same because they revealed that there is an important and strong impact of the colour of packages on “consumer buying behaviour”.

The findings of this study for packaging font represented a no impact of this factor on the dependent factor (r = 0.154). Therefore, hypothesis 013 is accepted. When these results compared with other scholars results in other countries than Jordan, it seems that there is a huge difference between them because their results revealed that the impact of this factor on “consumer buying behaviour” is positive.

Wrapper packaging design findings in this study presented that there is an impact of the design of food packs on “consumer buying behaviour” (r = 0.267) which indicates that hypothesis 014 is rejected. The previous studies revealed in the positive impact of wrapper packaging design on the “consumer buying behaviour”, the same as this study.

For packaging material, the findings were positive and there is an impact of this factor on the dependent factor (r = .306). Therefore, hypothesis 012 in this study was rejected. There is a similarity between this research that has been done in Jordan and other researches outside Jordan; they all found that the packaging material is a strong factor to impact positively on “consumer buying behaviour”.

The packaging information factor results are less than zero (r = -0.199) which means that there is no impact of this factor on “consumer buying behaviour” for food products in Jordan, in comparison with other countries based on scholar researches, there is a huge hole between them because previously studied in outside Jordan showed that there is a big impact of this factor on the “buying behaviour of consumer”. Therefore, hypothesis 015 is accepted.
Hypothesis 016 is accepted because there is no impact of innovation on “consumer buying behaviour” when they buy food product (r = 0.113). Studies that have been discussed in the literature review of this paper said that there is an impact of this factor on the dependent one, which makes somehow an opportunity to make more studies for the reason behind this.

After finding that there is a significant impact of two factors (packaging material and packaging design) included in this study, the researcher discovers that there is an impact on the "buying behaviour of consumer" in the food industry in Jordan (r = 0.674). Therefore, hypothesis 01 is rejected.

Conclusion

The study took place in Jordan to see if there is any impact on "consumer buying behaviour" by different elements in food product packs. No study in Jordan shows this impact. Therefore, this study has been done. The study has investigated the factors depending on the previous studies, and depended on six variables from different studies ("packaging colour ،packaging material ،printed information ،font style ،design of wrapper, innovation") the questionnaire was designed based on these variables and distributed to a sample consisted of 100 individuals, (SPSS) software was used to analyze the data. The study reached that product packaging has a clear influence on "consumer buying behaviour". The material of packs and the wrapper design has an impact according to the findings of this research, the influence of the independent variable was by (45%) this indicates that other factors are influencing "consumer buying behaviour" other than the variables that have been included in this research and these should be searched for and do research including them, there is the need for more interest-in packaging material and design of wrapper in the food industry because of the extent of their influence on "consumer buying behaviour".

Recommendation

- Researchers advise the companies and the units of marketing in the food industry to care about different elements in their products packs.
- Companies producing the food products are advised to pay more attention to packaging two elements; packaging material and packaging design of wrapper because of their effect on consumer buying behaviour when he buys food products. Also advised to set a strategy for packaging the products in the food sector and care about that.
- Among the other recommendations in the food industry, the packaging is not considered the single element influencing consumers' buying behaviour since other important elements need to be investigated and studied.
- The next step in this research field for future researches is to include more elements of packaging.

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The Scale and Structure of the Online Gig Economy

Izabela OSTOJ

University of Economics, Katowice, Poland
izabela.ostoj@ue.katowice.pl

Abstract

The gig economy is a part of the platform economy, mediating the transactions of labour services. The online gig economy is its important element. This segment is experiencing global growth, crossing national borders. This leads to the emergence of markets that can be analyzed traditionally – both in terms of types of work performed and in terms of countries where contracts for labour services and bids from contractors originate. Their development can be monitored using data from the Oxford Internet Institute. The article aims to assess the scale and structure of the online gig economy. The analysis revealed the leading role of the USA on the demand side and its important position on the supply side, which is dominated by crowdworkers from Asia. In terms of types of activities, the global online gig economy is growing in the area of software development and technology the most dynamically.

Keywords: Digital Platforms, Gig Economy, Online Labour Index.

Introduction

The segment of the economy referred to as gig economy has been growing for the last decade. Nowadays, it is associated with the process of instantenous adjustments of many independent contractors to the demand for services through a specially created digital technological platform, which also regulates pay for jobs performed (Stewart and Stanford, 2017; Lepanjuuri et al., 2018; Hunt and Samman, 2019). Digital platforms act as intermediaries in the delivery of services online or offline. The first platforms operating in this way were Amazon Mechanical Turk for services provided online and Uber for services delivered offline. Their relatively short presence in the economy led to the emergence of a new segment of the economy and labour market. By the end of 2019, about 30 platforms operating either on a global scale or locally, but modelled on the global idea, were identified (Schwellnuss et al., 2019). The very term gig economy was coined earlier, during the 2007+ crisis, and referred to any occasional, task-based work, especially with payment for individual jobs, which emerged at that time (Minter, 2017; Cambridge Dictionary), but with the advent of digital platforms acting as intermediaries coordinating demand and supply, its narrower meaning was adopted in literature.

The growth of the gig economy has changed the character of the modern labour market. The possibility of crossing national borders for requesters and crowdworkers operating in the online gig economy became one of its important characteristics. It was then that studies into the emergence of the planetary labour market were initiated (Graham and Anwar, 2019). This new segment of the labour market is relatively underresearched. The article aims to assess the structure of the market of the online gig economy defined as a process within which labour services provided online are offered and acquired via global specialized digital platforms. This was achieved by identifying the countries or regions playing a major role on the demand side in different parts of this market according to the types of activities, as well as the main players on the supply side, i.e. those who deliver services. The Online Labour Index (OLI) and the data from the Oxford Internet Institute (OII) were used.

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The online gig economy as the segment of the platform economy – literature review

Digital platforms constitute the basic element of the platform economy. Each digital business platform aims to directly or indirectly mediate between the parties who wish to complete a transaction. Parker et al. (2016) defined the platform as a business facilitating value creation through interaction between external producers and buyers, whom the platform provides with and an open, participatory infrastructure, which, at the same time, it also manages. The primary goal of the platform is to build conditions for the exchange of goods or services, thus creating value for all its participants. The platforms that intermediate in the exchange of services are growing particularly dynamically.

Stewart and Stanford (2017) proposed several classifications of digital platforms. In terms of the function of the platform, they identified: 1) matching platforms, i.e. platforms that allow contact between the parties to a transaction, e.g. buyers and sellers, or contractors and service users, 2) platforms that allow information analysis and sorting (e.g. referrals or reviews), 3) platforms that allow adding new value, as is the case of online work. Additionally, they distinguished the following platforms according to the subject of intermediation: 1) labour platforms, intermediating the performance of labour services (which are the basis of the gig economy); 2) capital platforms, intermediating the rent or sale of assets. They form the platform economy (Farrell and Greig, 2016; Radonjic-Simic and Pfisterer, 2019).

Based on the results of the studies conducted by Stanford (2017) and Florisson and Mandl (2018), several major characteristics can be attributed to platform-mediated work:

- contractors are mainly motivated by end users, usually consumers, sometimes firms; they imply a triangle of mutual relationships: contractor – end user – intermediary platform;
- the service is commissioned (contracted) by the buyer (company or consumer);
- a paid task is organized through the platform and often breaks down into separate subtasks;
- work is performed in response to the current demand; contractors work when their service is acquired quickly, with no guarantee of continuity;
- work is remunerated exclusively for single performed tasks and when it is approved by the buyer; payment corresponds to an individual effect, such as an activity, a task or a product, and usually does not depend on the time involved;
- contractors are responsible for equipping their own workplace, which applies both to the place where the service is provided – a flat – and other elements of equipment such as a telephone or a computer;
- the platform acts as an intermediary in commissioning a task, evaluating its performance and handing its outcome over to the end user, as well as paying out remuneration.

Howcroft and Bergvall-Kåreborn (2019) proposed a model typology of crowdwork platforms, distinguishing four types according to the actor initiating the performance of a service and the stability of payment. The first type offers online paid work performed at the request of the buyer; tasks are modular, they can be microtasks forming a part of larger projects, addressed to the waiting crowd, a classic example is the MTurk platform; it is the most common type of platforms for the provision of labour services. The second type combines the idea of work and entertainment. Work is initiated by the requester, while the concept assumes that it is possible to combine pleasure, creativity and autonomy and cross the borders between them if work can also be treated as a type of leisure. This work can be paid, but it also helps workers develop their skills. Threadless.com is an example of such a platform, as its platform community together creates unique T-shirt projects. Another one is InnoCentive.com, which mediates discussion and solving of a variety of research and practical problems (e.g. in the field of software development), where contributions to a solution are rewarded with money. The third type includes platforms for mediating offline services that are provided for remuneration and within a limited territorial scope. The initiating actor is the crowdworker in the sense that he prepares the assets necessary to deliver the service and declares his readiness to work,

usually via a relevant app. This is often referred to as the hiperoutsource model and it informs such platforms as TaskRabbit or Uber. The fourth type mediates the provision of online services by highly skilled freelance professionals. The initiating actor is the contractor, who makes a bid, while payment is difficult to predict and uncertain. These services include, for example, the development of mobile applications for Apple or Google platforms or those offering extensive collections of photographs, such as iStockphoto. The platform collects bids and provides access to a customer base, distribution and marketing on a global scale, which are not available outside the platform. The rate is not fixed in advance, but when a buyer expresses interest.

The typologies of platforms correspond with the classification proposed by Bogenhold et al. (2017), who distinguished: 1) platforms for online work – performed by crowdworkers, including freelancers; 2) platforms mediating offline services – performed by those working on demand via apps, but delivered in the traditional way, outside the Internet (De Stefano, 2016).

Platforms that intermediate labour services have already attracted intensive research, focusing mainly on their impact on the quality of work (Kessler, 2018; Prassl, 2018, Ravenelle, 2019; Hoang et al., 2020). The key issues remain the conditions in which work is performed and the extent to which competition between crowdworkers is possible, especially price-driven competition. This, in particular, concerns offshorable services, which can be delivered remotely without an adverse effect on their quality (Author, 2013).

The online gig economy is therefore a key element of the platform economy in the part concerning labour service transactions. Online services provided via platforms are of particular importance to the development of a global, or so-called planetary, market in which orders and services are formed irrespective of national borders (Graham and Anwar, 2019). Gradually, its structure is taking shape, with its main actors, sources of competitive advantage and the characteristics of the online gig economy revealed, which makes a worthwhile research proposition.

Methods

The evaluation of the structure of the market of the online gig economy was carried out based on the OLI indicator, developed in the OII, and partial data collected in the process of observation of its changes. Platforms mediating online work are defined here as enterprises via which the service provider and its end user conduct a transaction entirely digitally, so both the order is placed and the service (e.g. a project) is delivered online by the platform, moreover, payment is also regulated this way, so is the final product received (Kassi and Lehdonvirta, 2018). Based on observations and initial measurements of the performance of most types of activities (from the so-called piecework to projects completed by freelancers), the authors of the indicator selected a representative sample of five platforms: Upwork.com, Freelancer.com, Mturk.com, Peopleperhour.com and Guru.com. They identified the following types of activities and corresponding sample areas of tasks and projects (Kassi and Lehdonvirta, 2018): 1) software development and technology (data science, game development, mobile development, QA and testing, server maintenance, software development, web development, web scraping); 2) creative and multimedia (animation, architecture, audio, logo design, photography, presentations, video production, voice acting); 3) clerical and data entry (customer service, data entry, transcription, tech support, web research, virtual assistant); 4) writing and translation (academic writing, article writing, copywriting, creative writing, technical writing, translation); 5) sales and marketing support (ad posting, lead generation, search engine optimization, telemarketing); 6) professional services (accounting, consulting, financial planning, legal services, human resources, project management).

The OLI-based measurement has been conducted since 3 May 2016. The indicator was constructed and standardized in such a way that 100 points mean the average daily number of new orders placed online in May 2016, i.e. the month when the measurement was first made. Therefore, the assessment of changes in the size of the online gig economy is relative and is performed with reference to the value described above as the base one, while changes can also be expressed as a percentage. The

indicator is presented on the Oxford Internet Institute website so that its level can be observed by country of origin of the order, as partial components of the indicator.

To assess the scale and structure of the online gig economy, the data concerning different aspects of the OLI indicator were used, including data on orders and bids by types of activity, countries of origin, or world regions. The author calculated the market shares of its participants on the demand and supply side by countries and regions as well as by types of tasks, which allowed her to create rankings. The Oxford Internet Institute repository was also used to present the actual number of countries of origin of crowdworkers. The examination of the structure of the online gig economy adopted the date of the initial observation period – 19 September 2016 – and the dates of late February and early March 2020, a period when the long-term effects of the pandemic were not yet experienced and the indicator remained relatively stable, since the aim was to identify the permanent characteristics of the global online gig economy.

Results

The scale of the online gig economy

Adopting the OLI indicator at 100 on the first day of measurement, i.e. 3 May 2016, we could observe an increasing trend on an annual basis, but also its high volatility in particular months or even days. Taking into account the more stable version of OLI, i.e. a 28-day rolling average over the 7 days preceding the selected date, the peak levels in subsequent years were recorded in the weeks prior to 20 May 2017 – 139.9 points, 12 March 2018 – 137.8 points, 12 April 2019 – 139.7 points, 16 May 2020 – 172.3 points, which means that the indicator was approx. 40%-70% higher than at the initial measurement. The indicator recorded the lowest values for subsequent years during the weeks prior to 7 January 2017 – 96.7 points, 11 January 2018 – 108.5 points, 11 January 2019 – 109.7 points, 9 January 2020 – 120.1 points, so generally even in the weakest periods, usually at the beginning of the year, it was higher than the initial level in 2016 and in the preceding year.

During the COVID-19 pandemic, which spread globally in March 2020 and affected most regions most dramatically in April (with the exception of China, where this happened about 1-1.5 months earlier), the OLI indicator initially recorded a slight drop from 150.1 points to 131.3 points in the period of 10 February 2020 to 7 April 2020 (on average within 7 days from a given date). By mid-May the indicator recorded an increase to its maximum for the entire period of measurement, as it reached 172.3 on 16 May 2020. It can be assumed that the initial drops were associated with the pessimistic assessment of the future condition of the economies and a decrease in economic activity in most countries; later on, despite the overall economic downturn, the importance of remote work and orders delivered remotely increased, so it can be assumed that some companies and contractors made wider use of platforms mediating online services in their business activity and it is possible that the trend will continue due to a growing awareness of the risks associated with similar random events.

The characteristics of the demand side

An important breakdown in the analysis of the demand side of the online gig economy is the origin of orders by country. Table 1. shows the rankings of the twenty countries playing the most important role in generating online orders as of 19 September 2016 and 25 February 2020. The first five positions additionally include the share of the countries in the total number of orders for online services.

Table 1: The first twenty countries by the origin of orders for online services

19 September 2016	25 February 2020
USA (52%)	USA (41%)
United Kingdom (6.3%)	United Kingdom (8%)
India (5.9%)	Australia approx..(6%)
Australia (5.7%)	Canada (approx..6%)
Canada (5%)	India (approx. 6%)
Germany	Germany
Singapore	Singapore
Hong Kong	UAE
Philippines	France
Spain	Israel
France	Netherlands
Brazil	Pakistan
Izrael	Saudi Arabia
Switzerland	Switzerland
UAE	Spain
Belgium	China
Norway	Hong Kong
Malaysia	Russia
Denmark	Italy
Ireland	Ukraine

Source: own elaboration based on the Oxford Internet Institute data.

Apart from the USA, which plays a leading role by generating about half of demand in this market, the next five countries had a share below 10%, while the rest just about 1% or less. The rankings show a certain reshuffle among the countries generating the most orders via online platforms within a few years of the initial measurement date. New European countries joined, but in some cases (Russia, Ukraine) this may be related to the implementation of the intermediary model, while other countries, such as Denmark, Ireland or Norway, dropped out of the ranking. On the other hand, Australia, Canada, the AUE, and Israel grew in importance. This shows the emergence of a new balance of power, in which both the most developed countries and emerging economies play a role, although the major actors do not change.

Another important breakdown of the structure of the global online gig economy is presented by type of activity grouped in main categories. Initially, the OLI indicator showed the structure of demand by the type of tasks in the following way: approx. 36% of all ordered services were jobs related to software development and technology, less than 20% involved creative and multimedia tasks, approx. 17% – writing and translation, approx. 13% – clerical and data entry, approx. 9% – sales and marketing support, while professional services accounted for less than 5%. More than half of the orders came from the USA, approx. 16% – from Europe (as of 19 September 2016 according to OII data). Table 2. presents the structure of orders by type of activity and a share in their markets, the five leading countries in terms of ordering online services or their larger groups by continent as of 28 February 2020.

Table 2: A share of the five leading countries and groups of countries in terms of a number of orders for online services by type of activity in % (28 February 2020)

Type of activity and a share in the structure of services	USA	Other Europe	Other Asia and Oceania	United Kingdom	Canada	Australia	India	All Africa	Other Americas
Software development and technology (43%)	40.8	14.6	11.3	7.9	6.3	5.0	7.9	3.2	2.0
Creative and multimedia (20.5%)	44.1	13.5	10.7	8.1	7.2	8.0	4.4	2.7	1.0
Writing and translation (13%)	31.6	23.6	14.6	8.8	5.8	4.4	6.2	3.3	2.0
Sales and marketing support (12%)	45.4	12.6	10.2	9.0	7.6	6.9	5.1	2.2	1.0
Clerical and data entry (8%)	48.3	14.2	10.0	8.3	6.6	7.0	2.9	1.6	1.0
Professional services (3%)	46.0	12.2	11.1	9.0	6.8	5.8	4.2	3.1	2.0

Source: own elaboration based on the Oxford Internet Institute data.

The data show that software development and technology continued to hold the largest share, which increased further compared to the initial period. Sales and marketing support also grew in importance. The USA had the largest share of orders for online services in all the markets by type of activity, with a clear advantage over the "Other Europe" group; the positions of particular countries according to their share in all groups of activities were similar, only India had a higher position (5th) in the first and third category of activities than in others. The advantage of the USA is particularly visible compared with other individual countries included in the ranking, as their market shares were below 10%, i.e. several times lower.

Table 3. shows the structure of demand for online services delivered via platforms, reported from the main five countries or groups of countries – participating in the segment, by type of activity as of 28 February 2020 (their share approximated to the nearest whole number).

Table 3: The structure of demand for online services in a country/region of their origin by type of activity (%) (28 February 2020)

Country or group	Software development and technology	Creative and multimedia	Writing and translation	Sales and marketing support	Clerical and data entry	Professional services
USA	42	22	10	13	10	3
Other Europe	41	19	20	10	8	2
Other Asia and Oceania	43	20	17	11	8	3
United Kingdom	41	20	14	13	9	3
Canada	41	23	11	14	9	3
Australia	40	26	9	13	9	3

India	56	15	13	10	4	2
All Africa	49	20	15	9	5	3
Other Americas	53	16	14	8	6	3

Source: own elaboration based on the Oxford Internet Institute data.

The structure of demand for services delivered via online platforms in all the countries and regions was dominated by orders for software and technology development; orders from India had by far the largest share. In Australia, on the other hand, creative and multimedia orders were relatively important, while writing and translation orders ranked highest in the European countries (except the UK). Orders for sales and marketing support came, to a slightly larger extent, from the UK, Canada and Australia.

The characteristics of the supply side

In some areas, phenomena measured by the OLI indicators are explored more comprehensively. This concerns in particular the number and structure of crowdworkers. The measurement is conducted on a periodically selected sample of contractors from the four main – for the survey – platforms intermediating online services, namely: Fiverr, Freelancer, Guru, and PeoplePerHour. Activity is recorder for each platform once a day, according to the country of origin of each contractor, type of activity and potential participation in a project. In the measurement, each contractor was treated as "currently active" if he performed tasks during at least the previous 28 days, which reduced fluctuations in a small sample. In 2018, approximately 3.5 million contractors were registered on the four platforms under examination. Out of this number, about 100,000 contractors worked at least once a week. The authors of the measurement concept assume that on a global scale these numbers are at least twice as high (Kassi, Lehdonvirta, 2018).

An important characteristic of the supply side of the online service market is the location of crowdworkers. The origin of contractors by type of tasks performed points to their irregular distribution around the world. Online work involving software development and technology definitely dominates worldwide, which is particularly clear in North America, Asia, Australia and parts of Eastern Europe. On the other hand, in South and Central America and some Western European countries (France, Spain, Finland) writing and translation are the main services provided, while creative and multimedia projects are important in South America, Algeria, Sweden; sales and marketing support dominate in Iceland, the UK, Germany, Norway and Morocco. Accordingly, particular activities can be mapped out in terms of their prevalence, with a definite advantage of software development and technology on a global scale (OII data).

Table 4. shows the rankings of countries with the highest number of online contractors as of 19 September 2017 and 02 march 2020. The share in the total number of online contractors was additionally given for the countries in the top positions. Contractors from other countries accounted for less than 2%.

Table 4: Leading countries by the origin of online contractors (%)

19.09.2017	2.03.2020
India (24%)	India (35.5%)
Bangladesh (15.5%)	Bangladesh (12%)
USA (12%)	Pakistan (11%)
Pakistan (8%)	USA (6%)
Philippines (6.5%)	United Kingdom (4%)
United Kingdom (6%)	Philippines (3%)
Ukraine	Ukraine
Canada	Russia
Romania	Indonesia
Egypt	Sri Lanka
Germany	Egypt
Russia	Australia
Kenia	China
Nigeria	Canada
Italy	Kenya

Source: own elaboration based on the Oxford Internet Institute data.

In both readings contractors from India ranked first. Their share increased compared to the first measurement date, so they further strengthened their dominant position. Bangladesh ranked second, yet their share decreased, as was the case of the US and the Philippines. Pakistan's share went up, so did Russia's and Sri Lanka's. The dominance of Asian countries was reinforced. New countries that found their way to in the second ranking were Indonesia, Australia and China. Countries such as Germany, Italy, Romania and Nigeria dropped out.

Table 5. shows the structure of contractors by type of activity in total and by continent.

Table 5: The share of online contractors from particular continents by type of activity

(2 March 2020)

Type of activity and a share in the total number of contractors	Asia	Africa	Europe	South America	North America	Oceania
Software development and technology (39%)	79.0	2.5	10.5	1.6	5.3	1.0
Creative and multimedia (32%)	72.2	3.2	12.7	5.6	5.1	1.2
Writing and translation (10%)	41.5	14.9	16.6	2.2	20.7	4.1
Sales and marketing support (10%)	68.7	2.1	17.5	1.5	9.5	0.8
Clerical and data entry (5%)	73.5	2.2	6.1	2.6	14.8	0.8
Professional services (4%)	38.4	4.7	31.5	0	24.2	1.2

Source: own elaboration based on the Oxford Internet Institute data.

The first two categories of crowdwork dominated among online contractors. In all groups of activities contractors from Asia had the largest share. On the other hand, contractors from Europe also held a significant position particularly in professional services, and so did crowdworkers from North America, especially in the area of writing and translation. The distribution of contractors by type of activity between the continents can be interpreted as very uneven. Service providers from South America and Oceania have the lowest share in all types of activities in the online service market globally.

Table 6. presents data on the share that contractors hold in the market by type of activity in the fifteen countries (TOP-15), ranking highest in terms of the number of online contractors.

Table 6: The structure of online contractors by type of activity in TOP-15 countries (2 March 2020)

Country	Software development and technology	Creative and multimedia	Writing and translation	Sales and marketing support	Clerical and data entry	Professio-nal services
India	59	21	3	12	4	2
Bangladesh	19	54	7	11	9	1
Pakistan	41	31	12	7	5	4
USA	24	15	23	12	12	14
UK	17	17	15	27	2	23
Philippines	12	41	8	8	24	7
Ukraine	45	36	6	8	1	3
Russia	59	27	3	5	0	6
Indonesia	10	71	1	6	8	5
Sri Lanka	19	66	2	5	5	2
Egypt	33	41	18	4	1	3
Australia	31	29	28	6	3	4
China	82	10	3	3	1	1
Canada	28	23	32	7	4	6
Kenya	7	3	82	2	3	3

Source: own elaboration based on the Oxford Internet Institute data.

These figures show huge differences between the countries where most contractors originate from when it comes to what types of activities they specialize in, expressed as the share of particular contractors in the total number of crowdworkers in a given country. The dominance of software development and technology is strong in India, China, Pakistan, Russia and Ukraine. The creative and multimedia category is the domain of contractors in Bangladesh, Philippines, Indonesia, Egypt and Sri Lanka. Sales and marketing support have the largest share among contractors in the UK, so do professional services. Clerical and data entry contractors have a relatively large share in the Philippines. Writers and translators are the main category of crowdworkers in Kenya. In Canada, Australia, and the USA no single type of activity has gained prevalence. This shows that some countries of origin of crowdworkers in the online gig economy, especially the less developed ones, developed specialization in certain types of activities, while in the most developed countries do not seem to specialize in one particular type of activity.

According to a reading from the Online Labour Index repository containing complete data on the number of contractors from all the countries whose activity was recorded on the platforms included in the project, crowdworkers from 133 countries were active on 24 February 2020.

Discussion

Graham and Anwar (2019) argue that the online gig economy is an imperfect planetary labour market because of incomplete access to information for workers. This does not change the fact that a new market is emerging. The balance of power on the demand and supply side, as presented above, determines the price of services and payment for workers. The scale and types of jobs are decided by buyers, usually enterprises, from the USA; they benefit from reduced labour costs. As estimated by Cherry (2016) and Rogers (2015), a shift from hiring employees to engaging independent contractors has reduced US labour costs by about 30%. The average hourly rate is about 2 euros, while pay for small jobs at Amazon Mechanical Turk, which is settled on a monthly basis for work of about 20-40

hours per week, ranges from 200-750 euros, which is very low (De Stefano, Aloisi, 2018). The supply of labour services is dominated by crowdworkers from Asia. This has an impact on the overall low level of pay for services, which is the result of oversupply of labour services for many platforms and workers' consent to undercut rates. De Groen and Maselli (2016) give the example of a rate for low-skilled worker of Amazon Mechanical Turk, which was lower than the minimum wage in the USA (it accounted for 74% of this amount at that time), yet still it was fourteen times as high as in India. Profit for the platform is estimated at 10-20% of the value of each transaction (De Stefano and Aloisi, 2018). The findings of the above analyses can be treated as preliminary, requiring the adaptation of research methods to the global scale of the market and significant dispersion of requesters and crowdworkers.

Conclusion

The results of the analysis reveal that in the online gig economy the USA plays the leading role on the demand side and an important, but not dominant, role on the supply side, which can be considered obvious given the origin of digital platforms. Demand for online services is generated mainly by highly developed countries. In the ranking of crowdworkers by country of origin, the first seven positions have not changed since 2016. The Asian countries dominate, while the USA and the UK are the only highly developed countries in the top 10. The specialization of crowdworkers from particular countries is becoming clear, especially software development and technology in India and China, creative and multimedia tasks in Bangladesh and Sri Lanka, writing and translation in Kenya. On the other hand, the most developed countries follow a different trend and tend not to develop specializations. As different types of activities form separate markets, the situation in these markets, including pay rates, will be influenced by workers from these countries. The dominance of Asian crowdworkers determines the low level of payment for services, which becomes a problem for those who earn their living in this market.

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Offerors' Image in The Relationships Context – Final Purchasers' Point of View

Agnieszka Izabela BARUK

Lodz University of Technology, Faculty of Management and Production Engineering,
Department of Management and Innovation Systems; Łódź, POLAND
agnieszka.baruk@poczta.onet.pl; tel. 48 515270767
ORCID: https://orcid.org/0000-0003-2864-509X

Abstract

The article has theoretical and empirical character. Its aim was to identify the importance attributed by purchasers to good mutual relationships with offerors and to identify the importance of the perception of offerors as entities listening to purchasers' opinions and profiting from purchasers' spontaneous willingness to cooperate with offerors. The results of the cognitive-critical analysis of the world literature indicate a cognitive and research gaps. In order to reduce them, empirical studies were conducted. The survey method was used to gather primary data. The collected data were subjected to quantitative analysis (including statistical analysis methods). Between the importance attributed to good relationships with offerors and the perception of them, a statistically significant relationship was identified for each of the three analysed groups of offerors. The perception of offerors turned out to be a feature differentiating respondents' opinions on the importance of good relationships with offerors for producers and traders. The perception of offerors turned out to be a feature differentiating forms of prosumer activity undertaken by the respondents for three behaviours of an inter-purchase nature. The results obtained have a significant cognitive and applicability value because the aspects presented in this article have not been analysed so far.

Keywords: Offeror, Image, Relationships, Final Purchaser

Introduction

The contemporary consumer market can be defined as a relationship-based system, in which the quality of interaction is largely determined by the perception of other entities. Relationships between final purchasers and offerors acquire an exceptional importance in this system. No offeror could function without purchasers exhibiting particular activities. Although the activities may be of different nature and scope, ranging from typical purchase, through communication to creation, each of its manifestations affects the activity of an offeror as it can either contribute to the development of offerors or constitute a destructive factor for their further market activity. The fact whether the activity will support the development or not depends to a large extent on the following factors: 1) the manner of assessing mutual relationships by purchasers, 2) the perception of offerors in various market roles, including the role of knowledge user and the spontaneous creativity of final purchasers.

On the base of the results of the world literature analysis, which are presented in the further part of the article, one can state that the dependencies between the two categories have not been analysed so far, and no attempt has been made to investigate the significance of the categories in relation to the extra-purchase activity of final purchasers. So there are cognitive and research gaps in this area.

That's why the starting point for the considerations presented in this study is the following research problems: 1/how do purchasers assess mutual relationships with offerors?; 2/how do they perceive offerors' activities as regards listening to purchasers' opinions and taking advantage of their spontaneous willingness to cooperate?; 3/how significant is the perception of offerors as a factor shaping the prosumer activity of purchasers?

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To solve these problems the aim of the study was to identify the significance attributed by purchasers to good mutual relationships with offerors and to identify the importance of the perception of offerors in relation to the specificity of the prosumer activity of final purchasers.

Literature Overview

Establishing a particular relationship with another entity is tantamount to entering into closer interaction with it, which allows a better understanding of it, each time associated with the acquisition of particular market experiences (Schmitt, Brakus, Zarantonello, 2015). This leads to specific arguments for a particular way of perceiving the entity, which results in its image. Of course, the perception does not have to be a consequence of one's own experience gained as part of a relationship with the particular entity. It may also be based on opinions provided by other people (Cheung, Thadani, 2012).

In relation to offerors, a particularly important role is played by opinions of people with authority (Litterio, et al., 2017) and people who set some trends. A purchaser's own experiences which accompanied him/her during previous contacts with a given offeror and were the consequence of these contacts are also significant. The sources of a specific attitude towards an offeror may therefore be internal or external. The attitude is characterized by two determinants (Maciejewski, 2018): mark and strength. As for the first determinant, one can speak of a positive, negative or indifferent attitude. In the case of the second determinant, a weak attitude and strong attitude are distinguished. The effect of a particular attitude is the perception of an offeror, leading to their specific image. In the case of a positive attitude, the image will be rather good, and in the case of a negative attitude it will be bad.

The image may be viewed in a wide or narrow perspective. In the case of a wide perspective, the overall image of an offeror is in question, whereas in the case of a narrow perspective, it is about the image of an offeror referring to the fulfilment of a particular market role, including the image of the supplier, the employer (Baruk, 2017; Moser, Tumasjan, Welpe, 2017; Coldwell, et al., 2008; Balmer, 2001), the social activist, that is a socially responsible enterprise (which is mentioned by Shwu-Ing Wu and Hsin-Feng Lin (2014); P. Mudrack (2007); S. Valentine and G. Fleischman (2008), etc.).

Each of the partial images determines the overall picture of an offeror, which is the resultant of these images. A good overall image is conducive to purchasers' behaviour favourable to the offeror. This applies to both purchase behaviour (re-shopping, more frequent purchases (Cachero-Martínez, Vázquez-Casielles, 2017), etc., and extra-purchase (expressing positive opinions, sharing ideas about products, etc.). In the case of the latter, a final purchaser becomes an active co-creator of positive material values (e.g. products) and / or intangible assets (e.g. image) which strengthen the marketing potential of an enterprise.

The literature on the subject rightly emphasizes that including all stakeholders in the process of joint value creation is the main factor of success (Grimonpont, 2016). This also applies to purchasers, without whom no contemporary offeror could effectively function. A bad overall image may lead to purchasers' behaviour unfavourable to the offeror, which concerns in particular purchase behaviour and communication behaviour. Not only can purchasers give up the purchase of products of a given enterprise, but they can also become active destructors (Bolton, 2016) of its potential, for example by giving unfavourable opinions about a offeror, which results in a deterioration of his image.

In the literature the focus is placed on the analysis of the overall image and the above-mentioned partial images, as well as on the image of the products offered by an offeror (among others Rijsdijk, Hultink, 2009; Petrescu, Petrescu-Mag, 2015). In the literature known to the author, however, the issues related to the perception of an offeror have not been analyzed so far through the prism of listening to purchasers' opinions and taking advantage of their spontaneous willingness to cooperate. The significance of offeror image in this role has not been examined in the aspect of the importance attributed by purchasers to good relationships with offerors. The perception of an offeror has been mainly analysed as a determinant of purchase behaviour (Uddin, Parvin, Rahman, 2008; Hansen, 2005; Karmoker, Haque, Uddin, 2016), as a determinant of attitudes towards products (Karami,

Siahpoush, Olfati, 2013; Khan, Bamber, Quazi, 2012; Rodrigo, Khan, Ekinci, 2018), etc. The more so, the importance of the perception of offerors in the aforementioned role as a factor potentially differentiating forms of prosumer activity has not been examined. A simultaneous analysis of these issues in relation to three groups of offerors, that is, producers, traders and service providers, has not been conducted, either.

To reduce the cognitive gap and the research one the following research hypotheses were checked:

H1 - there is a dependence between the importance attributed to good relationships with offerors and the way they are perceived in relation to listening to purchasers' opinions and taking advantage of their spontaneous willingness to cooperate;
H2 - the perception of offerors is a feature differentiating respondents' opinions on the importance of good relationships with offerors;
H3 - the perception of offerors is a feature differentiating forms of prosumer activity of purchasers.

Methodology

In order to check the formulated hypotheses, primary research was carried out in the third quarter of 2018 among 1,200 people representing Polish adult final purchasers. A total of 1012 completed questionnaires were qualified for statistical analysis. 61% of the surveyed population were women, which corresponded to the structure of the general population of adult Poles (http://www.polskawliczbach.pl/#ixzz4F3Nogl1N). Non-random selection of a quota-type sample was applied. The research was direct in nature, requiring the interviewer's personal contact with respondents. This made it possible to obtain a high return rate of completed questionnaires.

The scope of the research included: 1/the perception of offerors regarding their listening to purchasers' opinions and taking advantage of their spontaneous willingness to cooperate; 2/the importance attributed to good relationships with three groups of offerors, that is, producers, traders and service providers; 3/15 forms of prosumer activity of final purchasers. These forms were selected on the basis of the literature analysis and on the basis of unstructured interviews which were carried out before the survey was completed. The use of the Likert scale determines the possibility of conducting a factor analysis.

The primary data were statistically analysed using the Pearson chi^2 independence test, V-Cramer contingency coefficient, Kruskal-Wallis test (KW), exploratory factor analysis. The statistical analysis was performed using the Statistica 22.0 package.

Research Results

In total over half of the respondents attributed at least great importance to good relationships with representatives of each of the three analysed groups of offerors (table 1). However, for each of them, a relatively high percentage of respondents believed that such relationships are of little importance or even completely invalid. This was particularly evident in relation to producers, in the case of whom over 41% of respondents considered good relationships to be invalid or of little importance. This percentage was more than 10% higher than for traders and service providers. This may have resulted from the specificity of contacts with each of the analysed groups of offerors. Purchasers' contacts with producers in practice are much less of a personal nature than in the case of contacts with traders and service providers. The percentage of indications reflecting little importance attached by respondents to good relationships can, however, be considered high also for these groups of offerors. Perhaps this results from the not very good perception of offerors when it comes to listening to purchasers' opinions and taking advantage of their spontaneous willingness to cooperate. As many as 60.8% of all respondents believed that offerors do not listen to purchasers and do not want to take advantage of purchasers' expressed willingness to cooperate. Therefore, it seems worth analysing the importance of respondents' opinions about offerors in this regard in relation to the role attributed to respondents by good relationships with offerors.

Table 1: The dependencies between the significance of good relationships with offerors and the perception of offerors in relation to offerors' listening to purchasers' opinions and taking advantage of purchasers' spontaneous willingness to cooperate

The importance of good relationships with offerors		Offerors' listening to purchasers' opinions and taking advantage of purchasers' spontaneous willingness to cooperate (in %)				Total (in %)		Chi^2 test value	V Cramer contin-gency ratio	Level of signifi-cance 'p'
		yes		no						
with producers	totally unimportant	6.0	35.7	8.6	44.5	7.6	41.1	11.107	0.105	0.011
	of little importance	29.7		35.9		33.5				
	important	44.1	64.3	41.7	55.5	42.6	58.9			
	very important	20.2		13.8		16.3				
with trader	totally unimportant	3.0	22.9	5.0	31.3	4.2	28.0	8.981	0.094	0.030
	of little importance	19.9		26.3		23.8				
	important	52.9	77.1	48.1	68.7	50.0	72.0			
	very important	24.2		20.6		22.0				
with service providers	totally unimportant	3.3	23.7	6.2	30.4	5.1	27.8	7.983	0.089	0.046
	of little importance	20.4		24.2		22.7				
	important	49.1	76.3	42.4	69.6	45.0	72.2			
	very important	27.2		27.2		27.2				

Source: own study

Similarly to the results obtained for the total of the respondents, both among those who positively perceive offerors as well as those who perceive offerors unfavourably, the majority of respondents attributed at least high importance to good relationships with offerors. It can be noted, however, that the proportion of such indications was noticeably greater among the respondents who had a good opinion of offerors. This was tantamount to the fact that respondents who unfavourably perceive offerors attributed relatively less significance to good relationships with offerors. This was clearly visible for each group of offerors.

Results of chi-square test confirm a statistically significant dependence between the aforementioned variables for each of the three analysed groups of offerors. For each of them, the significance level 'p' had a value lower than the adopted limit value 0.05 (table 1). The H1 research hypothesis is therefore valid for the respondents. However, the dependencies are not strong, as evidenced by the low values of the V-Cramer contingency coefficient. Relatively the strongest dependence can be noticed in the case of producers, for whom the value of the coefficient is the highest. It is worth recalling that in relation to producers, the largest part of the respondents attributed little or no significance to good mutual relationships.

The KW test was carried out in order to check possible differentiation between respondents' opinions on good relationships with particular groups of offerors according to their perception. Statistically significant differences occur for two groups of offerors (producers and traders). It is relatively larger in the case of producers. The difference wasn't identified in relation to service providers. The hypothesis H2 turned out to be valid for manufacturers and traders.

In the next stage of the research process, 15 forms of prosumer activity reflecting communication and creation behaviours were analysed. Statistically significant difference was identified for 4 forms of activity (table 2). Three of them had the nature of communication behaviours undertaken in the context of relationships with other purchasers (that is, as part of inter-purchase prosumption),

whereas one activity consisted in independent manufacture of products, which did not require entering into relationships with other entities. Statistically significant differences were not identified in relation to any form of activity undertaken as part of the relationship with offerors. The hypothesis H3 for respondents can be considered valid only for the aforementioned forms of activity.

Table 2: The significance of differences between respondents' answers regarding the demonstration of selected forms of prosumeric activity according to the perception of offerors related to listening to purchasers' opinions

Analysed forms	Sym-bol	Offerors' listening to purchasers' opinions	KW test value	Level of signifi-cance 'p'
I express my opinions about products I use via the Internet (e.g. on the online forum or on the store's website), but I don't contact the producer directly	a	yes	527.63	0.063
		no	493.70	
I express my opinions about products I use without using the Internet (to friends / family, directly in the store, etc.), but I don't contact the producer directly	b	yes	513.21	0.564
		no	503.00	
I add comments about the products I use to other consumers' opinions in the Internet	c	yes	529.99	**0.038**
		no	492.18	
I get acquainted with opinions of other consumers posted in the Internet about the products I use or intend to use	d	yes	531.92	**0.024**
		no	490.94	
I get acquainted with opinions of other consumers, not posted in the Internet, about the products I use or intend to use (e.g. from friends / family, seller, etc.)	e	yes	536.56	**0.006**
		no	487.95	
On my own initiative I contact producers via the Internet expressing my opinion / giving advice about products I use or intend to use	f	yes	525.22	0.086
		no	495.26	
On my own initiative I contact producers without using the Internet to express my opinion / give advice about products that I use or intend to use	g	yes	509.10	0.842
		no	505.65	
On my own initiative, I contact producers in various ways via the Internet, asking questions about products I use or intend to use	h	yes	519.25	0.249
		no	499.11	
On my own initiative, I contact producers in various ways without using the Internet, asking questions about products I use or intend to use	i	yes	503.84	0.767
		no	509.04	
I participate in activities / actions organized by companies via the Internet, thanks to which I'm a co-creator of the product or its attributes, e.g. packaging, brand	j	yes	524.73	0.096
		no	495.58	
I participate in activities / actions organized by companies otherwise than via the Internet, thanks to which I'm a co-creator of the product or its attributes, e.g. packaging, brand	k	yes	518.94	0.262
		no	499.31	
I participate in activities / actions organized by companies via the Internet, thanks to which I'm a co-creator of promotional activities, e.g. advertising slogans, advertising campaigns	l	yes	515.21	0.440
		no	501.71	
I participate in activities / campaigns organized by companies otherwise than via the Internet, thanks to which I'm a co-creator of promotional activities, e.g. advertising slogans, advertising campaigns	ł	yes	508.08	0.919
		no	506.30	
I participate in activities / actions organized by companies, thanks to which I'm a co-creator of any other activities / elements of the company, apart from the product and promotion	m	yes	510.49	0.745
		no	504.75	
I produce products myself (without contacting the producer whatsoever), for reasons of economy or practicality	n	yes	543.33	**0.001**
		no	483.59	

Source: own study

Aiming to identify and compare the internal structure of the forms of activity undertaken by the respondents, a factor analysis was carried out for the total of the respondents as well as for the respondents who positively perceive offerors and for those who perceive them in a different way. On the basis of the Kaiser criterion, in each case 4 factors with an eigenvalue exceeding 1 were separated. The first factor explains over 45% of the total variability of the studied phenomenon both for the total of the respondents and for the respondents who positively perceive offerors and those who perceive them negatively. It is worth adding that in each case, the first and second factor together explain significantly more than half of the total variability. Variables having factor loadings with the value of at least 0.7 were taken into consideration (table 3).

Table 3: Factor analysis for three groups of respondents analysed

Analysed form	Factor											
	1			2			3			4		
	total	yes	no	total	yes	no	total	yes	no	total	yes	no
a	0.401	0.533	0.307	0.201	0.305	0.141	0.685	0.568	**0.736**	0.305	0.320	0.297
b	0.075	0.042	0.102	**0.802**	**0.792**	**0.800**	0.078	-0.101	0.155	-0.017	0.028	-0.054
c	0.274	0.351	0.234	0.249	0.332	0.195	0.642	0.464	**0.720**	0.440	0.549	0.359
d	0.181	0.217	0.168	0.419	0.539	0.342	0.686	0.540	**0.746**	0.116	0.147	0.100
e	0.006	-0.001	-0.005	**0.812**	**0.837**	**0.793**	0.112	0.006	0.158	-0.002	-0.082	0.055
f	0.121	0.071	0.290	0.008	-0.011	0.024	0.132	-0.033	0.291	**0.763**	**0.785**	**0.778**
g	0.357	0.510	0.215	0.032	-0.031	0.070	0.010	-0.048	0.050	**0.795**	**0.713**	**0.856**
h	0.465	0.513	0.405	-0.015	0.015	-0.036	0.190	0.150	0.208	**0.706**	0.660	**0.768**
i	0.491	0.571	0.413	0.010	-0.048	0.052	0.014	-0.014	0.030	0.664	0.609	**0.708**
j	**0.778**	**0.839**	**0.712**	0.026	0.049	-0.004	0.157	0.085	0.193	0.348	0.218	0.457
k	**0.852**	**0.889**	**0.808**	0.066	0.079	0.056	0.090	0.066	0.089	0.280	0.198	0.365
l	**0.860**	**0.892**	**0.839**	0.034	0.051	0.026	0.208	0.158	0.221	0.223	0.207	0.247
ł	**0.870**	**0.888**	**0.866**	0.051	0.063	0.050	0.121	0.065	0.137	0.191	0.195	0.194
m	**0.846**	**0.860**	**0.839**	0.077	0.059	0.095	0.162	0.108	0.180	0.231	0.233	0.238
n	0.012	0.009	0.001	0.442	0.281	0.487	-0.669	***-0.809***	-0.587	0.231	0.154	0.247

1/letters ‘a’ - ‘n’ as in table 2
2/for the total of respondents, the adequacy measure of the Kaiser-Meyer-Olkin (KMO) = 0.894, which is greater than 0.5; Bartlett's sphericity test is valid (variables are statistically significantly related to each other); chi2 = 2478.376; p = 0.000;
3/for the respondents who answered 'yes', KMO = 0.892; Bartlett's sphericity test is valid; chi2 = 1307.295; p = 0.000;
4/for the respondents who answered 'no', KMO = 0.852; Bartlett's sphericity test is valid; chi2 = 1210.543; p = 0.000

Source: own study

Table 4: A comparison of identified segments of respondents

Factor	Segments of respondents		
	total	yes	no
1	Prosumers inspired by offerors (active on the Internet and beyond)	Prosumers inspired by offerors (active on the Internet and beyond)	Prosumers inspired by offerors (active on the Internet and beyond)
2	Inter-purchase prosumers (active beyond the Internet)	Inter-purchase prosumers (active beyond the Internet)	Inter-purchase prosumers (active beyond the Internet)
3	-	-	Inter-purchase prosumers (active on the Internet)
4	Spontaneous prosumers initiating joint activities with offerors (active on the Internet and beyond)	Spontaneous prosumers initiating joint activities with offerors (active on the Internet and beyond)	Spontaneous prosumers initiating joint activities with offerors (active on the Internet and beyond)

Source: own study

In the case of variables such as people's attitudes and behaviours, the factors distinguished in the factor analysis method can be interpreted as referring to segments of people (Horn, Huang, 2018). For each of the three studied groups of respondents segments can be identified, whose representatives show analogous forms of prosumer activity (table 4).

Discussion

The results of the research conducted indicate that the majority of the respondents negatively evaluated offerors as entities listening to purchasers' opinions and taking advantage of their spontaneous willingness to cooperate. Although in the literature on the subject attention is drawn to a new business model based on the inclusion of purchasers as active contributors to the process of value creation (Dellaert, 2019; Sundararajan, 2016), the feelings of purchasers themselves deny the practical application of such an approach by many offerors. It is all the more worrying that offerors should constantly search for new ways of satisfying the growing expectations of purchasers by providing them with valuable values. This allows offerors to gain a competitive advantage (McAfee, Brynjolfsson, 2017). One of such values, which are difficult and even impossible to copy by other enterprises (Wernerfelt, 2014), is building and strengthening good mutual relationships. The formation of relationships turned out to be at least important for the majority of respondents, especially for those who positively evaluated offerors in the role, and moreover, statistically significant dependencies between the two analysed variables were identified.

The results of this research indicate that key segment of respondents distinguished for each of the three analysed groups includes people undertaking prosumer activity both on the Internet and beyond. The second group in each of the three cases, in turn, includes people with off-network activity. This confirms, therefore, that communication and creation behaviours are undertaken not only on the Internet, but also in the real world, and in the case of inter-purchase activity, behaviours undertaken in the real world are relatively more important than behaviours undertaken in the virtual world. Therefore, many authors' highlighting the fact that prosumer activity is undertaken only or mainly on the Internet was not confirmed (Frenken, Schor, 2017; Brodie, et al., 2013).

Another feature common for the representatives of the main segments selected for each of the three analysed groups of respondents is the fact that they are prosumers showing activity when inspired by offerors. The importance of attracting purchaser activity is also highlighted by other authors, including T. Haumann, P. Güntürkün, L. M. Schons and J. Wieseke (2015), or E. Martineau and Z. Arsel (2017), although the fact that the respondents negatively evaluated offerors in this respect indicates that offerors' actions are frequently not effective. The fact of identifying a group of respondents undertaking only inter-purchase activity may prove that the results obtained are part of the approach presented in the literature regarding the creation of values by purchasers for other purchasers (Grönroos, Voima, 2013). However, it does not take place only in the virtual world, for which it is often analysed (Chu, Manchanda, 2016), but also in the real world, as evidenced by the demonstration of prosumer activity by representatives of this group outside the Internet.

Conclusions

It can be concluded that the majority of respondents attributed at least great importance to good relationships with offerors. This was particularly evident in relation to traders and service providers. At the same time, over half of the respondents believed that offerors do not listen to purchasers' opinions and do not take advantage of their spontaneous willingness to cooperate, which is tantamount to the negative perception of offerors. Between the importance attributed to good relationships with offerors and the way they are perceived in the market role mentioned, a statistically significant dependence was identified for each of the three analysed groups of offerors. Hypothesis H1 turned out to be valid for the respondents.

In turn, the perception of offerors turned out to be a feature differentiating opinions on the importance of good relationships with offerors only for two groups, which are producers and traders. The H2 hypothesis is therefore valid only for both groups of offerors, and it is not valid for service providers.

The perception of offerors turned out to be a feature differentiating the form of prosumer activity undertaken by the respondents only for three behaviours of an inter-purchase nature. It can be said that hypothesis H3 in the case of respondents is valid only for these three behaviours. Both in the case of the total of the respondents, as well as in the case of the respondents who positively perceive offerors and those who perceive them negatively, four homogeneous segments were identified, and they were characterized by very similar differentiating features. In each of the three analysed groups, the relatively largest role was played by the group of respondents who can be described as prosumers inspired by offerors, showing activity on the Internet and outside it.

By reducing a cognitive gap, the results are a contribution to the theory of marketing and consumer research. They also have management and social implications. They can, among others, facilitate the development of good mutual relationships between offerors and final purchasers as important partners cooperating with offerors in the marketing process. As a result, it becomes easier to meet the growing expectations of final purchasers and to build a competitive advantage, difficult to imitate by competitors.

Conducted research has some limitations including: subjective scope (only adults), geographical scope (only representatives of adult Polish final purchasers), objective scope (selected forms of prosumer activity and one aspect of the perception of offerors). The pursuit to eliminate these limitations will guide the future stages of the research process, within which it is planned to extend the scope of research.

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Assessment of Exposure to Disorders Among Building Industry Workers Performing Selected Tasks

Łukasz KUTA *

Institute of Environmental Protection and Development, The Faculty of Environmental Engineering and Geodesy, Wrocław University of Environmental and Life Sciences
pl. Grunwaldzki 24, 50-363 Wrocław, Poland

*corresponding author; e-mail; lukasz.kuta@upwr.edu.pl

Daniel SZYJEWICZ

Institute of Agricultural Engineering, The Faculty of Life Sciences and Technology, Wrocław University of Environmental and Life Sciences, Wrocław, Poland

e-mail; d.szyjewicz@gmail.com,

Wanda PATRZAŁEK

Institute of Sociology, Department of consumer behavior, University of Wrocław, Wrocław, Poland

e-mail; wanda.patrzalek@uwr.edu.pl

Kamil GÓRECKI

e-mail; kamilos19944@wp.pl

Iwona RYBKA

e-mail; i.rybka@biuroinwestorskie.pl

Abstract

Work performed in the building industry contributes to the formation of many threats for employees. Microclimate factors, working at heights as well as dangerous substances used in the building space may cause a negative impact on the worker's health. In order to evaluate the safety and comfort of work in the construction industry, a questionnaire consisting of closed and open questions was carried out. The aim of this paper was to assess the level of safety in the construction industry. The study was carried out on construction of buildings in the area of the Lower Silesia Voivodeship. A survey among construction workers was conducted. Based on the studies, a number of factors have been identified that affect the level of occupational health and safety at work. The functional relation between seniority, the employee's age and the length of breaks at work was determined. It turns out that a lack of sufficient breaks during construction works was the main reason for overloading of employees. According to the respondents, the most common symptoms of the neck and lower spine were related to the work performed. In connection with the above-mentioned circumstances, more effective methods of improving the organization and safety of work in this industry should be developed.

Keywords*:* building, load, muscle, safety

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Introduction

The construction industry makes a large contribution to each country's gross domestic product (GDP) (Korkmaz et al., 2018). Work in the construction industry can be classified as one of the most dangerous professions (Ganah et al., 2015). The wide range of work carried out in construction means that many accidents are registered in this industry every year (Latza, 2000). Among the most common causes, organizational, human and technical factors were mentioned (Bust et al, 2005). Poor work conditions directly affect a level of occupational safety and satisfaction while performing the duties of construction workers. The specificity of the construction industry results from its diversity and conditions under which the work was performed (Haslam 2002). Safety is increasingly emphasized as an indicator of success in a construction project (Mahmoundi et al., 2014). Ensuring safety on a construction site is one of the most important elements of the entire project. In addition, providing an accident-free workplace on the level of occupational safety required the reduction of excessive physical and mental load among the employees (Hansson et al, 2004; Whysall et al, 2006). Current medical studies show that load on the musculoskeletal system is a common and social problem in many countries (Buckle et al, 2002). Many reports determine a wide scale of this problem and the causes of illnesses among manual workers (e.g. farmers) as well as white-collar workers Fabunmi et al., 2005). Musculoskeletal disorders are one of the most common health problems at work and affect millions of employees every year (Boschman et al., 2015). According to a study of the European Foundation for the Improvement of Living and Working Conditions in Dublin, the social costs incurred due to the reduction of diseases in the musculoskeletal system of employees amount to approx. 15% of the costs of accidents at work. It should be emphasized that about 33% of manual workers working in the European Union suffer back and spine pain, almost 23% of respondents complain about general fatigue, and about 13% feel overload of the hands. Employees in the construction industry were also surveyed (Jarosiewicz, 2006). In their case, the load on the musculoskeletal system may be higher by 16% compared to other professions (Boschman et al., 2015).

Due to the wide range of work performed by construction workers, repeatability of activities, uncomfortable body position and environmental conditions, construction workers are particularly exposed to musculoskeletal disorders (Stomberg et al., 2010). An important factor affecting the comfort and productivity of construction workers is the ergonomic factor (van der Molen et al., 2005). Proper employee awareness in the aspect of ergonomics lies primarily in the daily work with the use of tools, machines and devices that do not adversely affect comfort and safety at work. Ergonomics is an adaptation of the work environment in which a person works to his physical capabilities (Smith, 2015). It is mainly about designing working elements used on a daily basis to facilitate work as much as possible (Albers et al., 2005; Buckle, 2005). It is also important to reduce injuries as result of the use of construction tools (Sang, 2008). The disorders of the musculoskeletal system were described by (Bobick et al., 1995; Oude et al., 2011; Murphy et al., 1992) as a very serious social problem, which occurred in many professions. It was mainly observed in the construction industry, where employees were exposed to external loads (Bust et al., 2005; Latza, 2000). So far, many authors have described the methods to improve safety in the construction industry (Moir, 2000). Mobeda et al. (Mobed, 1998) paid special attention to the problem of seasonal workers working on US farms. Employees who lived in California often performed very hard work. They had low social status, often a lack of valid health insurance, and significantly limited access to professional healthcare. The work environment in relation to musculoskeletal disorders was described by the physical and psychological factors that accompany the generation of this group. The following elements are characteristic for many physical activities: high repeatability of arm and hand movements, uncomfortable body position during work and monotony of movements. In the Polish construction industry, over 1 million workers perform their tasks in an uncomfortable position, and about 0.6 million are exposed to high work monotony. Nearly 1.5 million are forced to carry heavy loads over distances of 10 m. From the presented results it follows that the scale of the occurrence of musculoskeletal disorders is high and therefore, as the authors suggest, more attention should be paid to the conditions in which people work. According to Occhipinti et al. (2007), musculoskeletal disorders may result from a performed task with high repetition frequency, accompanied by a small mass of the operated object. Marras and Schoenmarklin confirmed the thesis that, while performing

physical work with a high repetition frequency, a risk of wrist disorders occurs (Marras et al., 1993; Johnston et al., 2005; Sari et al., 2010; Osborne et al. 2007). The particularly high level of this risk concerns women. Particularly dangerous are loads resulting from lifting loads above the human shoulder line (Sluiter et al., 2001). Neck, back, arm and wrist strains are especially dangerous (Hales et al.,1994). Often disorders in the musculoskeletal system result in absence from work (Hansson et al., 2004; Oude et al., 2011; Roelen et al., 2007). They cause very high costs during the recovery of the employee (Szeto et al., 2009). In order to identify the causes of musculoskeletal disorders among construction workers more precisely, a survey was conducted in which the relevant information was obtained.

Methodology

This paper had qualitative and quantitative features, hence a standardized questionnaire was prepared to collect the needed information. The authors assessed the level of safety and comfort among workers who met some criteria while performing selected works in the building industry. These criteria included: working at least one year in this industry and performing a similar activity in this period. The total number of participants were 160 men. The study was conducted in the Lower Silesia Voivodeship (Poland) on four construction sites. During these studies the workers were asked e.g. about their age, work experience and type of workstation. Information received from the studies was used to develop work instructions and to creative preventive actions aimed at improving working conditions by reducing the possibility of hazardous situations in the work environment. The aim of the study was to determine the relationship between age, work experience of the workers and their suggestions regarding determining breaks at work. This approach can lead to improvements in effectiveness and safety during the working day.

The studies were conducted between May and November 2019 on basis of a prepared questionnaire, own observations and analysis of reports describing the health level of employees in the building industry. Main research problem in this study was to verify whether it is possible to improve work safety on the construction site. Prepared questionnaire included 17 questions (10 closed and 7 open). The collected items in the survey were: age, work experience, scope of tasks, effort and discomfort level, usability felt, complaints and disorders, time needed for rest within working day as well as body workload connected with a performed task. On the basis of the obtained data, eight groups of workers were selected: drivers (D), roofers (R), plasterers (P), carpenters (C), physical workers (Ph), machine operators (M), steel fixers (Sf) and pavers (Pa). Basic time at work was 8 hours.

An important issue of the studies was to obtain information from the respondents allowing the improving of working conditions and assessment of employee satisfaction obtained from daily work. On the basis of the collected data and relationships between age, work experience and time needed for breaks, an improved schedule of the working day was proposed. Each respondent was asked to assess a pain/dissatisfaction level (PDL) at work. Their evaluation ranged from '1' ("little pain") to '5' ("extreme pain"). Based on this information the (PDISSevalution) for each type of ailment was calculated. In square brackets, an average percentage of pain duration (PAINduration) during work shift was described. All participants were informed about the study aims, and they then declared their participation in this study.

For determining the breaks at work, the following procedures were used;

- For heavy work, the number of breaks should be greater than three during the working day,
- For one break, its time should be set about half of the working day,
- It is preferable to use more breaks, because the effectiveness of breaks decreases when their length increases.

The data were processed in Microsoft Excel. This program enabled the calculation of mean and standard deviation. The t-Student test was used to analyze the differences between workers' answers by means of the STATISTICA 12 program. It was assumed that the difference is

statistically significant where $p<0.05$ (p-value probability). The relationship between the effectiveness of surveyed workers on working time by means of the STATISTICA 12 program was calculated. The accuracy coefficient R^2 of the determined function was also determined.

Results

The structure of examined workstations was dominated by pavers (25%), steel fixers (21%) and machine operators (15%) (Table 1). The total number of surveyed workers was 160 men. The age of workers ranged from 20 to 60 years. Taking into account the age of workers, the most numerous group of workers were 30-39 years' old, as well as persons with experience between 2-9 years.

Table 1: Description of the surveyed workers

Number of workers									
	Age (years)				Work experience (years)			N=160	
Profession	20-29	30-39	40-49	50-60	2-9	10-19	20-30	n	%
D	1	2			3			3	2
R		2	2	2	2	3	1	6	4
P	3	3	6	3	5	7	3	15	9
C		13	5	1	4	12	2	18	11
Ph		11	8	2	12	8	1	21	13
M	5	15	3	1	18	4	2	24	15
Sf	8	11	10	4	21	8	4	33	21
Pa	5	25	8	2	23	15	2	40	25
Total	**22**	**82**	**42**	**15**	**88**	**57**	**15**	**160**	**100**
SD	*2*	*8*	*3*	*1*	*9*	*4*	*1*		

Table 2 presents disorders and complaints as the consequences of daily performed work by surveyed workers. A majority of the respondents indicated pains in the lower part of the spine as well as in the neck. The pavers reported nearly one third of symptoms among all questioned, whereas only nine of the drivers had experienced pain or disorders.

Table 2: Number of complaints reported by respondents. In brackets a mean pain/dissatisfaction level (PDISSevaluation) of the respondents was presented. In square brackets, an average percentage of pain duration ($PAIN_{duration}$) during the work shift was measured.

Type of aliments	D	R	F	C	Ph	M	Sf	Pa	Total numer of respondents
Ankles / feet $PDDISS_{evaluation}$ $PAIN_{duration}$ (%)	-	-	1(3)[5]	-	1(3)[5]	-	-	2(3)[25]	**4**
Knee/s $PDDISS_{evaluation}$ $PAIN_{duration}$	-	2(2)[15]	-	-	2(5)[20]	-	-	9 (4)[25]	**13**

(%)									
Thighs / hips PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	-	1(3)[10]	3(2)[10]	-	1(2)[15]	-	-	3(2)[10]	**8**
Lower spine PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	6(4)[15]	1(2)[5]	3(4)[15]	3(1)[5]	6(3)[5]	6(2)[10]	3(2)[10]	6(1)[25]	**28**
Neck PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	1(2)[5]	2(4)[10]	3(2)[10]	2(2)[15]	-	3(2)[5]	2(1)[5]	6(3)[10]	**23**
Elbow/s PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	-	3(2)[30]	-	-	2(1)[5]	-	3(2)[25]	6(2)[10]	**14**
Arm/s PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	2(1)[5]	2(3)[10]	1(2)[40]	2(2)[25]	-	4(1)[5]	3(2)[5]	5(2)[15]	**15**
Wrist/s PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	-	-	-	-	2(2)[5]	-	4(2)[20]	2(4)[25]	**8**
Muscle stiffness PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	-	-	1(1)[35]	2(2)[25]	2(4)[5]	-	3(3)[5]	-	**8**
Tingling in the limbs PDDISS$_{evaluation}$ PAIN$_{duration}$ (%)	-	2(1) [10]	1(2)[5]	1(5)[5]	-	-	-	5(4)[15]	**9**
Total	**9**	**11**	**9**	**10**	**22**	**13**	**18**	**44**	**124**

** respondents could indicate more than 1 answer*

On the basis of statistical analysis, it was found that the results including assessment between analyzed professions differ significantly from each other by p=0.0000004 ($p < 0.05$).

Assessment of body-posture load of the employees while performing selected activities in the building industry

Many different tasks performed during the working day as well as wide range of held postures was observed (Table 3). The most numerous workers held an uncomfortable bent and twisted position which resulted e.g. from laying paving stones (paver). The smallest group of men used a shovel during their work. Some workers maintained a different position during the working day; for instance they lifted heavy objects of various shapes and dimensions, while adopting an uncomfortable position, for instance standing or sitting without the possibility of changing body position.

Table 3: List of the tasks or workers' positions taken during working day

Task/Postures	**N**	**%**
Lifting	11	6
Pushing the object	4	2
Bending the torso	14	8
Digging with a shovel	1	1
Lifting heavy objects often in an uncomfortable position	6	3
Many hours work in a sitting position (without the ability to change position)	12	7
Many hours work in a standing position (without the possibility of changing the position)	10	5
Many hours work in the neck inclination	12	7
Many hours work in the kneeling position (without the possibility of changing the position)	11	6
Many hours work in the squat (similar position)	9	5
Frequent twist of the torso	17	9
Doing work in position with a bended or twisted torso	19	10
Work in a position with bend or pulled head	21	11
Work with arms raised above shoulder joints	8	4
Work with excessively bent or twisted wrists	18	10
Work with a high degree of repeatability (>5 times per minute)	11	6
Total	**184**	**100**

** respondents could indicate more than 1 answer*

Among the solutions that could reduce the level of disorders or complaints resulting from work activities, respondents most often indicated a need to use a 30-minute break in the middle of work time. Undoubtedly, such an approach including longer breaks could result in improved work efficiency (Fig.1).

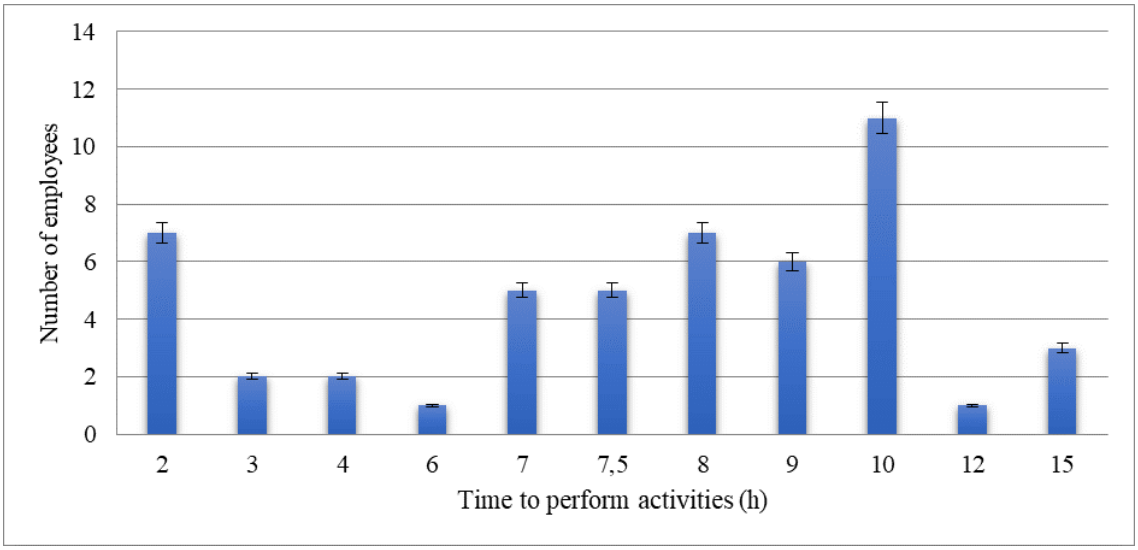

Fig. 1: Estimated time for performing required tasks during work shift reported by workers.

As many as 48% of respondents declared that they perform a required task during one work shift (8-10 hours), another 26% for a given activity needs 8-9 hours, and 8% of respondents took 12-15 hours. Necessary time for the rest in the opinion of 48% of respondents should take 10-20 minutes, 16% confirmed that it should be longer than 30 minutes, or even 60 minutes (Fig.2).

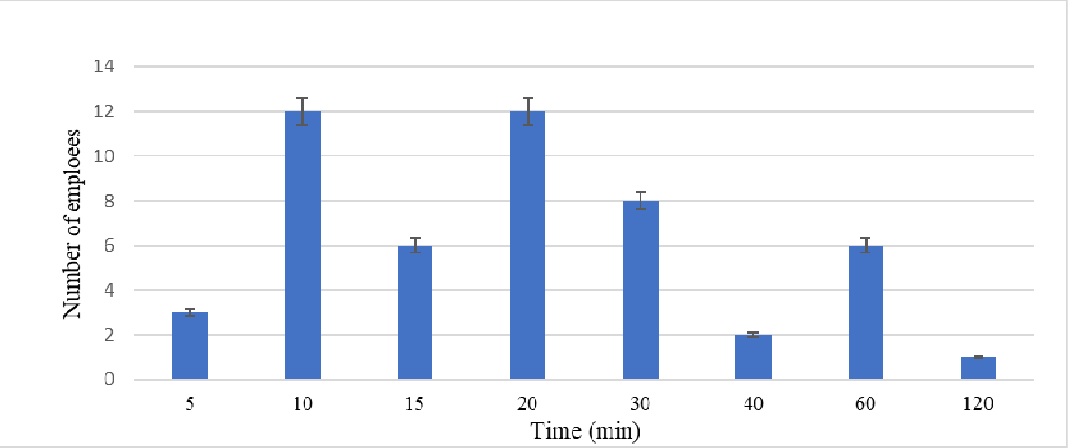

Fig. 2: Time for the rest during shift work, expected by the respondents.

The minimum time for recovery depends on the age of the respondent and increases especially in the range of 48-55 years of age and differed from 60 to 120 minutes. Younger employees up to the age of 35, for a minimum regeneration time, declared nearly 20 minutes (Fig. 3). It increased particularly sharply among more experienced employees (over 25 years of work) and ranged from 60 to 90 minutes. It is more diversified among employees with an average length of employment (7-15 years) and definitely decreased among employees who had worked for up to 5 years and results in only 10 minutes per 8 hours.

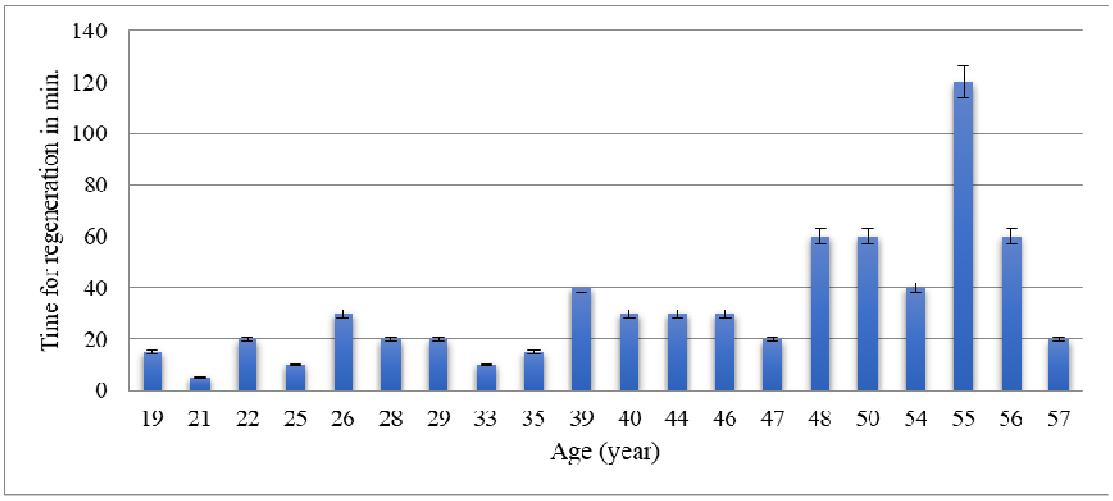

Fig.3: Time for rest according to the workers' opinions in relation to their age.

Figure 4 (a-g) presents the courses of workers' effectiveness (a ten-point scale) at work resulting from time of work (range 1-8 hours) based on the opinions of the respondents in the building industry. From these figures it can be shown that comfort decreases during the next working hour. Poor effectiveness of work was observed between the fifth and sixth working hours, when starting work at 8.00 am. The highest comfort at work occurred from 10.00 am to 11.00 am. During an eight-hour working day, the pace was at its lowest. Based on this information, the organizational aspect of the work should be improved. The best solution could include a modified schedule of breaks during the working day.

a)

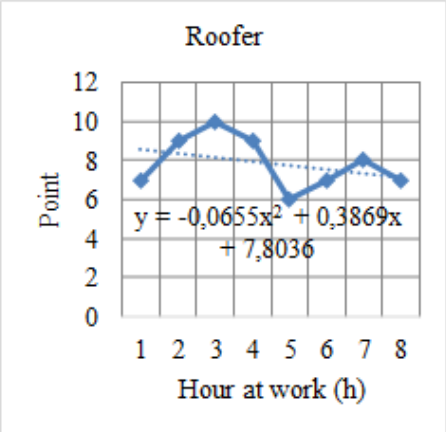
Roofer
Point
Hour at work (h)
y = -0,0655x² + 0,3869x + 7,8036

b)

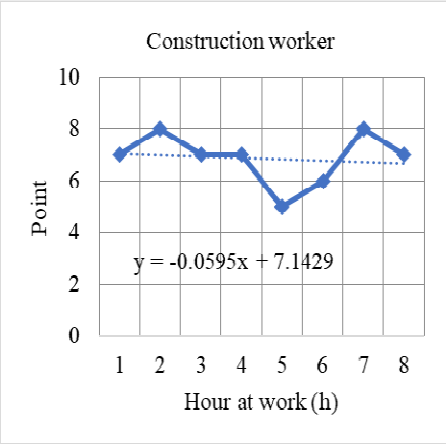
Construction worker
Point
Hour at work (h)
y = -0.0595x + 7.1429

c)

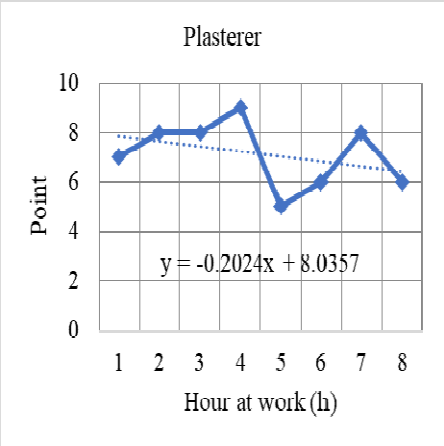
Plasterer
Point
Hour at work (h)
y = -0.2024x + 8.0357

d)

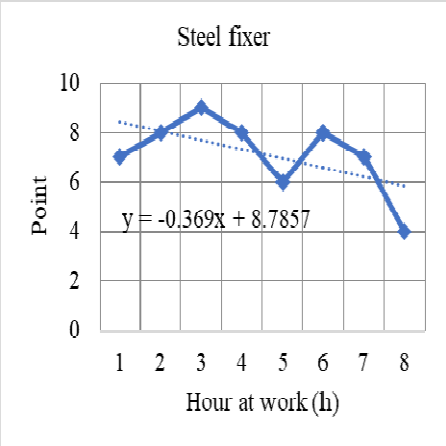
Steel fixer
Point
Hour at work (h)
y = -0.369x + 8.7857

e)

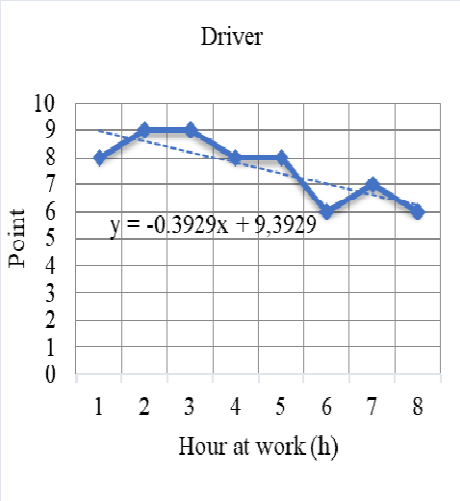
Driver
Point
Hour at work (h)
y = -0.3929x + 9.3929

f)

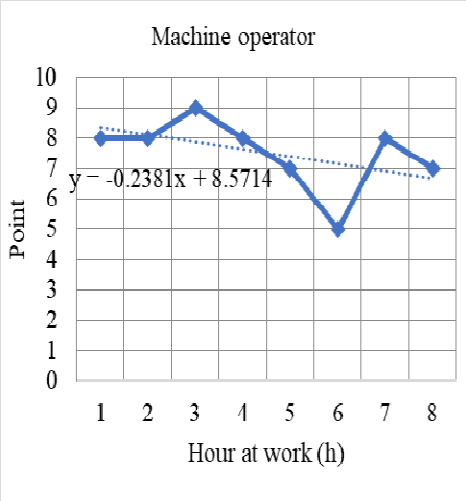
Machine operator
Point
Hour at work (h)
y = -0.2381x + 8.5714

g)

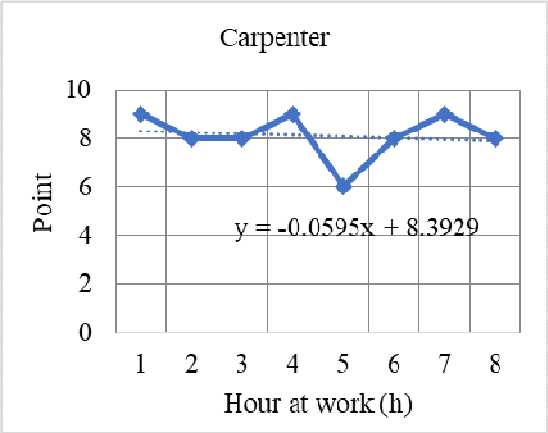

Fig. 4: (a-g). Assessment of work efficiency declared by workers in relation to a moment at work: a) roofer, b) construction worker, c) plasterer, d) steel fixer, e) driver, f) machine operator, g) carpenter.

Figure 5 (a-d) presents an evaluation of work comfort and effectiveness according to the workers' opinions while working overtime. Based on the obtained results, only the drivers, plasterers, physical workers, machine operators and pavers worked overtime. There were consequences of technological processes and work organization on the construction site. In some cases the total time at work exceeded 13 hours.

a)

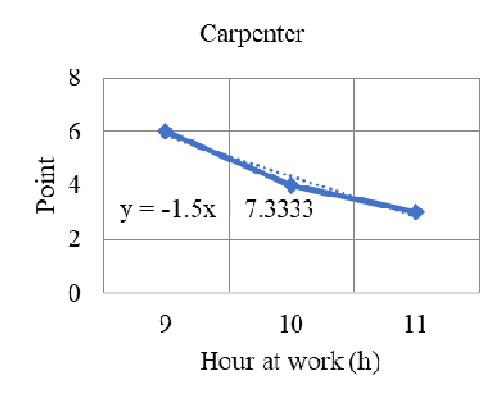

b)

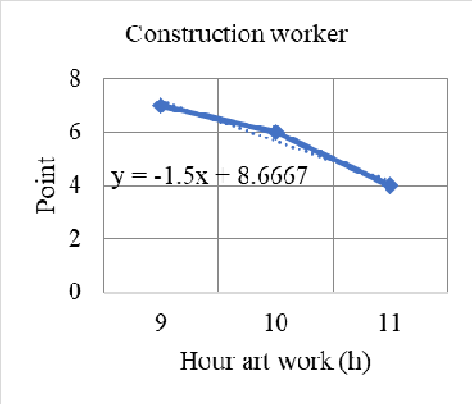

c)

d)

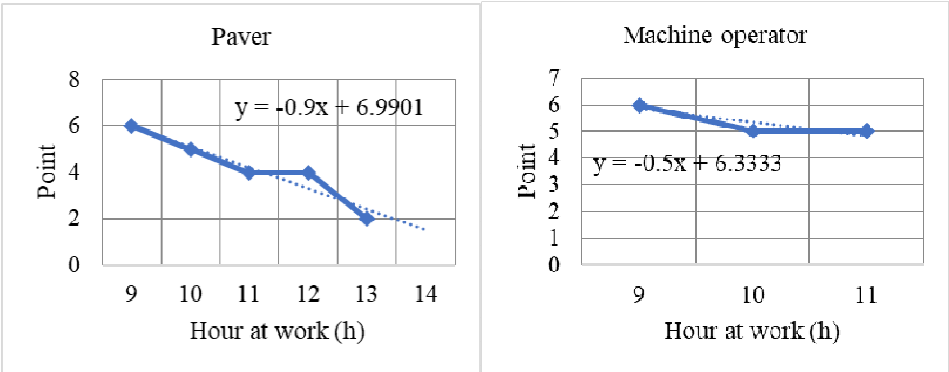

Fig. 5: (a-d). Assessment of work efficiency while working overtime: a) carpenter, b) construction worker, c) paver, d) machine operator.

Determining breaks during the working day

Among the solutions which could reduce the level of complaints and risk of disorders resulting from performed work, respondents most often indicated the need to use the right moment for a break during a shift. Based on these expectations and the author's own observations, it was proposed that there should be a schedule of the rests during the working day (1-8 hours) and during overtime.

Based on the circumstances as well as the procedures listed in the methodology chapter, the breaks were worked out. The schedules were presented in Figures 6 - 7.

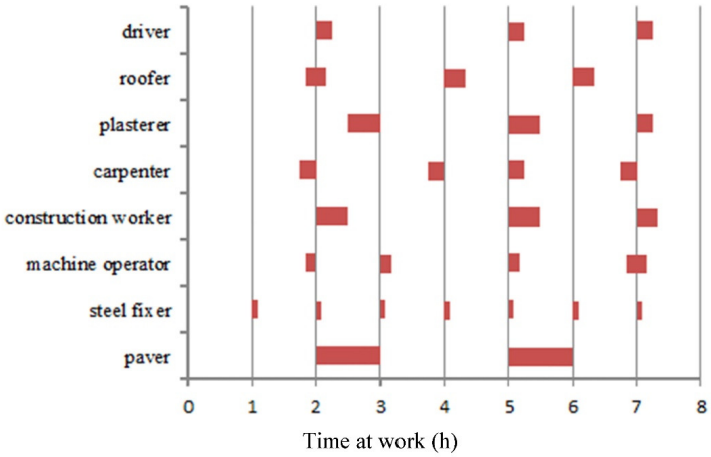

Fig. 6: Proposed distribution of the breaks during the working day for all groups of workers.

Repetitive tasks as well as work organization required the preparation of some specific solutions. For instance, in order to reduce the monotony of steel-fixer workers it was proposed that there should be a 5-min break after each performed hour. Due to working at heights, three breaks for a roofer have been proposed. The basic rule in designing breaks was a period in which the effectiveness of workers decreased. A similar approach was used for workers who worked overtime. Usually, the physical workers were the longest at work, hence breaks after each hour at work were proposed.

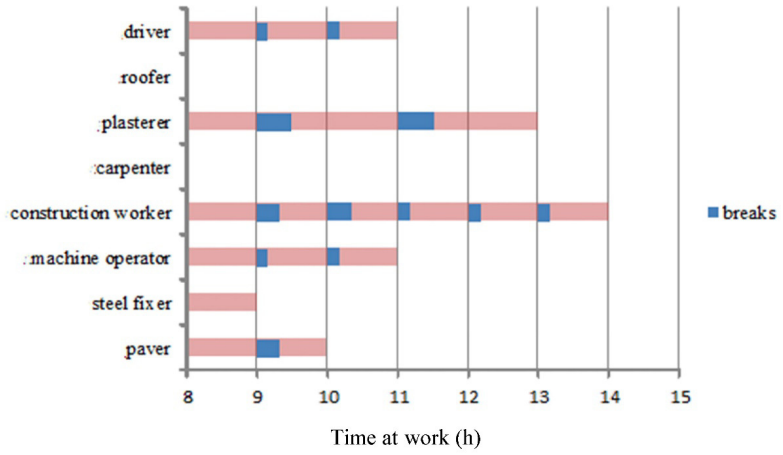

Fig. 7*:* Proposed distribution of the breaks during overtime work for selected groups of workers.

The tasks of the building industry require the use of workers' physical force, hence in order to minimize a risk of musculoskeletal disorders or pain development it is obvious that it is necessary to ensure the right level of comfort of work and organizational issues during the working day.

Discussion

According to van Tulder et al. 1995 and Silverstein et al. 1997 (van Tulder et al., 1995; Silverstein et al., 1997), activities involving overcoming musculoskeletal disorders require high financial outlays. The health problems related to the overloading of construction workers also appeared in the Netherlands. The local Ministry of Social Affairs promotes activities to improve work safety on construction site (Arbo, 2006). As emphasized by Gillen et al., (2004) and van der Molen et al., (2005), very often employers do not have sufficient funds for preventive actions or do not engage in cooperation with entities that provide technical solutions in the field of safety and ergonomics of work in the market. Referring to the research conducted among Dutch masons, it should be noted that about 45% of them suffer from ailments in the lumbar region of the spine and, in the shoulder area, about 27% (van der Molen et al., 2005). In the conducted research, 25% of workers complain of complaints in the lower part of the spine, while about 5% complain of shoulder pain. The most frequent external load during such work was in the range of 1-6 kg. The total working time in an uncomfortable body position was over 4 hours a day. A significant external burden also occurs during surgeons' work, especially during operations on patients. This is mainly due to the lack of a break during the procedure (Slack et al., 2008). It is necessary to introduce breaks because it will avoid medical errors and eliminate mental and physical overload (Geurts et al., 2006). Research conducted by Hassan and Abou El-Soaud (1997) among physical workers in the IT industry confirmed that the areas most exposed to pain and musculoskeletal disorders are the shoulders and neck (66.7% of the subjects) and the lower part of the spine (33% of people). The authors pointed out that static loads combined with dynamic loads such as wrists are particularly dangerous because in many cases it ends with employee injuries. As a consequence, symptoms of dysfunctions of the nervous and circulatory systems of these employees often appear. According to the Authors if employees will follow the rules of working hours and breaks at work, the level of work safety will be satisfying.

Summary

Based on conducted studies in the real work environment, it was found that more frequent breaks for industry workers should be introduced. A positive correlation was prepared between the seniority of industry workers and the time needed to regenerate during described works. In the 48-58 age group, a reasonable break-time duration should total 120 minutes, hence 15 minutes after each work hour.

Workers aged 20-30 have confirmed that their time to regain their strength is 20 minutes over an 8-hour working period. Despite many organizational and technical solutions, as well as applied individual protection solutions, there are a number of risks in the industry space that impact negatively on workers' health and life, which result in disorders of the musculoskeletal system in the cervical and lumbar parts, which may lead to the development of occupational diseases and result in time off work. As demonstrated during twenty-four hours, industry workers performed their activities for up to 12 hours per day, which additionally affects overload of the musculoskeletal system.

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The Spillover Effects of the Digital Economy

Evgeniya K. KARPUNINA

Tambov State University named after G.R. Derzhavin, Tambov, Russia,

https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru **corresponding author**

Natalia N. GUBERNATOROVA

Financial University under the Government of the Russian Federation, Kaluga branch, Kaluga, Russian Federation, https://orcid.org/0000-0001-5199-6360, drozdik2006@yandex.ru

Amira A. DAUDOVA

National University of Oil and Gas «Gubkin University», Moscow, Russian Federation,

https://orcid.org/0000-0002-6099-3601, amira-07@bk.ru

Zarema N. STASH

Kuban State Technological University, Krasnodar, Russian Federation,

https://orcid.org/0000-0002-2660-9952, stashzn@rambler.ru

Larisa A. KARGINA

Russian University of Transport, Moscow, Russian Federation,

https://orcid.org/0000-0002-3914-1017, kargina_larissa@hotmail.com

Abstract

The research is aimed at identifying the specifics of spillover effects that occur in the economic system in the process of digital development, as well as developing conceptual principles for their assessment. The authors attributed the direct effect of investing in digitalization to the growth of the digital economy's share in GDP, increased labor productivity, expanded market volumes and additional profit, and increased exports of ICT products. The authors adapted the concept of the "spillover effect" to research on the digital economy. The authors revealed the specifics and systematized the spillover effects of the digital economy (spillover-the effect of changes in the labor market and employment, spillover-the effect of social and regional asymmetry in the use of digital technologies, spillover-the effects of information risks), and justified their positive and negative impact on the national economy. The analysis of approaches to evaluating spillover effects allowed the authors to formulate recommendations for their evaluation based on the statistical method of variance and mean square deviation.

Keywords: spillover effects, digital economy, labor market, unemployment, digital inequality, digital gaps, information risks, social and regional asymmetry

Introduction

Digitalization processes change the essence of production processes – digital technologies and information resources become the basic factors of production, and the process of creating goods and services becomes remote and integral (OECD, 2017). The mechanisms and nature of relations between

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economic entities are changing, they acquire features of network and virtual interaction, most often reaching the global level.

The habitual human environment, as well as the consumption model, is being transformed. Multifunctionality, personification and intelligence become the determining characteristics of a product or service that define its position in the market (Molchan et al., 2019).

Such fundamental changes, on the one hand, require appropriate investments related to the introduction of digital technologies and the restructuring of the main socio-economic processes, and, on the other hand, provide the benefits of digitalization in the form of additional profits, increased productivity and accelerated economic growth.

Many authors, studying the effectiveness of the digital economy, note that the real economic consequences of digitalization are much broader and more multifaceted (Volodina et al., 2011). Companies that implement digital technologies receive both private benefits from investment and related benefits-spillover effects-for example, in the form of improving the reliability of services, increasing the company's competitive advantages, obtaining a wider set of technologies and opportunities for their flexible application (Kuzovkov et al., 2019).

The existence of spillover effects of the digital economy or “digital side effects” is stated in the report «Digital Spillover» of Huawei company and Oxford Economics (2017). The calculations presented in the report confirm that digital transformation affects not only an individual company, but also covers the supply chain, as well as related industries, which ultimately leads to a significant positive impact on the economy as a whole (United Nations, 2019b).

The related results of digital technology implementation often exceed direct results, however, they are currently little identified and practically not evaluated. In addition, the spillover effects of the digital economy are not always positive.

Thus, the study of spillover effects of the digital economy is currently relevant.

Methodology

The purpose of the study is to identify the specifics of spillover effects that occur in the economic system in the process of digital development, their systematization, as well as the development of conceptual principles for their assessment.

The authors conduct a theoretical analysis of approaches to understanding the spillover effects of the digital economy, systematizing them by the nature of their impact on the economic system (vertical and horizontal; positive and negative).

The authors suggest using the statistical method of variance (a measure of the spread of a value relative to its mathematical expectation) and the mean square deviation to evaluate spillover effects.

The authors propose to use the following formula to estimate the spillover effects by using dispersion:

$$\sigma^2 = \frac{\sum(x-\bar{x})^2}{n} \quad (1)$$

The average square deviation formula has the following form:

$$\sqrt{\sigma^2} = \sqrt{\frac{\sum(x-\bar{x})^2}{n}} \quad (2)$$

The initial indicators for evaluating the spillover effects of the digital economy can be: Unemployment rate (TakeProfit, 2020); Human Development Index (HDI), adjusted for inequality in access to technology (United Nations, 2019a); Cybersecurity Index (ITU, 2019).

Literature Review

A significant number of scientific papers have been devoted to the study of the digital development patterns. Thus, the attempt to determine a logic for the digital economy formation through the allocation of digitalization waves belongs to Katz (2017). Atkinson et al. (2009), Varian et al. (2002) , Gillett et al. (2006) focused on identifying the economic and social benefits that the economic system and society receive from the introduction of digital technologies. For example, increased productivity as a result of implementing more efficient business processes supported by ICT, as well as optimizing the supply chain, reducing overall costs.

Brynjolfsson and McAfee (2014), Katz (2017), and Gordon (2012) describe both the positive and negative consequences of digitalization (for example, the reduction of the medium-and low-skilled workforce as a result of particularly strong capital replacement, as well as a slowdown in labor productivity). However, the authors do not separate the main and side results of digitalization.

Meanwhile, the concept of "spillover effect" (that is, the manifestation of any economic activity that affects the activities of third parties that are not directly involved in the interaction process) is most often found in the innovation management theory (Pittaway, 2003), when assessing the intra-industry impact of foreign companies ' investments and identifying positive effects (Buckley et al., 2007; Wang & Zhao, 2008), analyzing the R&D sphere (Coe et al., 2009; Kim & Lee, 2004), as well as in the process of assessing the spread of knowledge (Kesidou & Szirmai, 2007; Wang et al., 2009).

In the process of innovation management, there are horizontal spillover effects (innovations are copied by other companies, which leads to raising productivity), vertical (increasing productivity when delivering goods and services along the supply chain) and internal (through training in practice) (Teece, 1977).

Researchers point to the emergence of spillover effects from foreign direct investment both within the industry and along the technological chain, as well as the likelihood of not only positive, but also negative side effects (Fedorova and Barikhina, 2015). The methodology for studying spillover effects in the process of knowledge dissemination is based on two approaches: 1) MAR Spillovers (Knowledge spillover) explains how the concentration of firms in one industry helps move knowledge between firms (Edward et al., 1992); 2) Jacobs Spillovers shows how the concentration of different industries in one place encourages innovation (Carlino, 2001).

Researchers identify the following causes of spillover effects: the economic effect of scale of production and consumption of services; the specifics of the production of goods and services and the formation of added value; the social consequences of the impact of scientific and technological progress on the quality of human life (Kuzovkov et al., 2019). These reasons can probably be the source of spillover effects in the digital economy as well.

Thus, the specifics of the spillover effects of the digital economy remain poorly covered and unsystematic

Results

Direct Effects of The Digital Economy

Considering the digital economy in terms of a resource approach allows to identify the resources and factors that make up its basis: 1) generated human knowledge and skills; 2) digital infrastructure resources in the form of Internet access and information use opportunities; 3) research and development as the basis of technological innovation; 4) digital technologies based on artificial intelligence, robotics, AR/VR and blockchain. Creating and managing these resources requires significant investment from individuals, businesses, and the state.

The education sphere is the base for the digital economy formation. Access to education for all categories of the population, as well as the level of professional competence, is largely determined by

the standard of living of the population in a particular country, their income level, as well as support from the state. Experts use the Global Index of Cognitive Skills and Educational Attitude to assess the effectiveness of national education systems (Pearson, 2016). It is based on a ranking on two groups of international indicators: cognitive skills and educational level (including the literacy index and the index of the total percentage of students receiving secondary and higher education). In 2016, the United States ranked first in the world (100 points), Switzerland was second (87.2), Denmark ranked third (84.2), and the United Kingdom was fourth (84.8). Germany (70.3) was on 16 positions, Japan (64.2) - on 20, China (51.8) - on 30, Russia (49.1) - on 34, South Africa (45.6) - on 37, Brazil (45.1) - on 38, India (45.8) - on 49. In turn, the effectiveness of the education system determines the opportunities for human development. Thus, in 2018 Germany (0.939), the United Kingdom (0.920), the United States (0.920), and Japan (0.915) were included in the group of countries with a very high level of HDI; Russia (0.824), Brazil (0.761), China (0.758) are middle-level HDI countries, while South Africa (0.705) and India (0.647) are classified as low-level HDI countries (United Nations, 2019a).

The formation of a digital infrastructure is a prerequisite for the digital economy development. The gap in Internet access between countries and regions of the world remains significant. For example, the values of the indicator "ICT access and usage by households" in 2019 are as follows: in the US-79.88% of households have Internet access from home (79.1% - broadband access), in the UK-96.85% (95.84%), in Germany-94.83% (93.93%) China – 59.6% (54.3%), in Russia -76.3 % (21.4%), in Brazil -71.4% (63%) (OECD, 2020). The level of access to the Internet and the use of digital technologies by business structures also differs significantly. For example, in the UK, 94.68% of business structures have fixed and mobile Internet connections, 23.87% of all business structures use ERP technologies, 30.51% use CRM services, and 17.85% of enterprises have connection speeds above 100 MB/s, while in India and a number of developing countries, the value of similar indicators remains low (OECD, 2020). The structure of R&D financing varies from country to country. For example, in the United States, Japan, European countries and China, a large share of all investments in the ICT sector is taken by businesses, while in developing countries such as Russia and India, government support is high (table 1).

Table 1: Expenses of some countries for the R&D sphere development

Country	GDP (current prices) /billion US$), 2019	Gross domestic spending on R&D, % of GDP	R&D spending by government, % of total R&D	R&D spending by Business, % of total R&D spending in PPP$	R&D spending by Universities and Private non-profit, % of total R&D	Number of researchers per million inhabitants	Direct government funding of business R&D and tax incentives for R&D, 2015
USA	21 427	2,7	11,4	71,5	17,1	4 205	0,13
China	14 342	2,0	15,8	77,3	6,9	1 089	0,06
Japan	5 081	3,4	8,3	77,8	13,9	5 328	0,02
Germany	3 845	2,9	14,6	67,65	17,7	4 320	0,07
United Kingdom	2 827	1,7	7,26	65,1	27,64	4 227	0,09
Russia	1 699	1,1	30,48	59,6	9,92	3 075	0,38
India	2 875	0,7	56,5	37,1	6,4	156	0,008
Brazil	1 839	1,3	x	x	x	887	0,09
South Africa	351	0,8	23,5	45,3	31,2	432	0,01

Source: compiled by the authors according to OECD (2020), Unesco Institute for Statistic (2020), World Bank (2020)

For example, in the UK in 2016, the total amount of investment in R&D was 1.67% of GDP, including the amount of public investment was 0.67% of GDP, private investment – 0.86% of GDP, 0.34% of GDP accounted for other investments by private non-profit organizations from abroad, including business financing programs outside the UK and the EU. Thus, the British innovation Agency is the main source of funding for British public innovation (more than 8000 organizations received support), in addition, other organizations (regional agencies, the Fund for energy entrepreneurs of industrial strategy, the Royal Academy of engineering, etc.) have provided positive experience of public funding. The UK government plans to increase investment in this area to 2.4% by 2027, and in the long term - to 3% of GDP (Royal Academy of Engineering, 2018). At the same time, increased government funding will also require growing business investment and more R&D projects to achieve success.

According to IDC (2020), 4.7 trillion US dollars were spent on ICT technologies in 2018, including 4.0 trillion US dollars on traditional technologies and 0.7 trillion US dollars on new technologies. In 2019, ICT spending increased by another 5.5%. At the same time, traditional spending on hardware, software, services, and telecommunications is gradually losing its importance in overall ICT spending, as cost savings due to automation lead to a redirection of spending to new technologies such as artificial intelligence, robotics, AR/VR, and blockchain. The introduction of new technologies is uneven across the world's regions and countries, but enterprises in emerging markets, following countries with mature economies, have moved to adopt new technologies that provide a rapid return on investment for targeted industrial applications (for example, the introduction of IoT and robotic solutions by manufacturing firms in China and the rest of Asia). Governments in developing countries are encouraging investment in new technologies and initiating the creation of smart cities, thereby integrating ICT with economic planning. In any case, almost every country focused on achieving the goals of digital development has adopted a national strategy in the field of informatization, which reflects special steps to expand the digital infrastructure, increase the level of education and competence of specialists to serve the digital sphere, strengthen the industry of scientific research and innovation, and ensure cybersecurity. For example, Germany implements the concept of “Industry 4.0”, Japan - New Strategy in Information and Communications Technology, the United Kingdom - Digital Economy Act, the United States - Digital Economy Agenda, China – “ Internet +”. These countries are aimed at achieving an increase in the quality of life due to the intensive development of the ICT sector (Karpunina et al., 2019a).

The direct effects of investing in digitalization are the level of digital development that has been achieved. For its assessment, McKinsey Global Institute uses the indicator “the share of the digital economy, as a % of GDP” (Fig. 1).

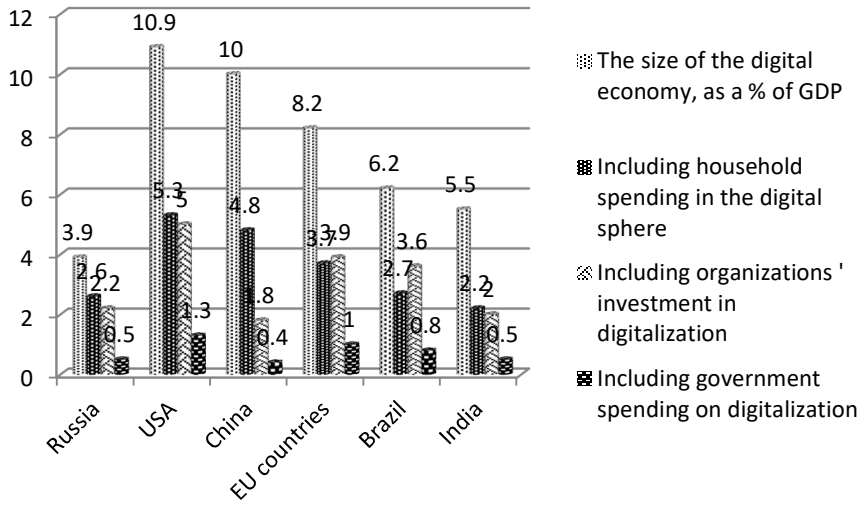

Fig. 1: The size of the digital economy in 2016, as a % of GDP
(Source: compiled by the authors according to McKinsey, 2017)

Huawei estimates that the global digital economy was worth $ 11.5 trillion in 2016, or 15.5% of global GDP – 18.4% of GDP in developed countries and 10% of GDP in developing countries on average. Experts emphasize that the digital economy has grown two and a half times faster than global GDP over the previous 15 years, almost doubling since 2000 (Huawei and Oxford Economics, 2017).

The maximum volume of exports of ICT goods, as a reflection of the costs of digitalization, in 2019 was reached by China - 138,651 million US dollars, the second place in the world remains with the US-138,651 million US dollars (Fig. 2).

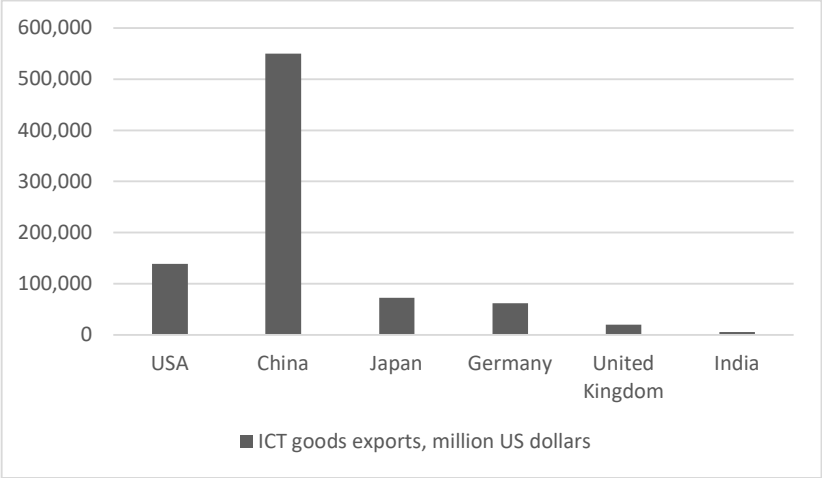

Fig. 2: The structure of ICT goods exports, million US dollars
(Source: OECD, 2020)

The direct effects of digitalization are estimated as productivity increases.

Jorgensen et al. (2005) assessed the impact of ICT on multi-factor productivity in the United States and concluded that there is a delayed social and economic impact of various digitization waves.

The digital economy removes scalability constraints (digital technologies create an increased need for factor resources and meet additional final demand) and allows traditional sectors to grow at a faster pace. Growth is reflected in increased revenue from expanding market coverage (Varian et al., 2002, Gillett et al., 2006).

Katz (2017) notes that using broadband Internet access increases the efficiency of business processes and services and reduces overall costs.

An increase in the index of the digital economy ecosystem development by 1%, (due to the development of e-Commerce, e-government, e-health), led to an increase in GDP per capita in Latin America by 0.13%, noted Katz and Callorda (2017).

Barefoot et al. (2018) argue that the digital economy is the engine of GDP growth in the US. Thus, in 2016, the real value added of the digital economy (adjusted for inflation) amounted to 1,302.2 billion dollars, which is 82.2 percent more than in 2005. From 2006 to 2016 the real value added of the digital economy outpaced the overall growth of the economy each year and mitigated the decline in GDP during the recession in 2008-2009.

Identification and Assessment of Spillover Effects of The Digital Economy

Potential spillover effects from digital investments also affect certain areas of social and economic life and the national economy.

The classification of spillover effects can be based on various features. Traditionally, the "nature of interaction of subjects" is used as a criterion for classifying spillover effects in innovation and investment activities. According to this criterion, there are vertical spillover effects that occur between companies that are in a relationship, and horizontal spillover effects between other companies operating in the same market. They also identify technological spillover effects that occur when technologies are diffused, such as assimilation of foreign technologies or productivity gains resulting from the use of more advanced technologies (Chengqi and Zhongxiu, 2008).

Researchers emphasize that spillover effects can be manifested in the form of providing the market with new products of high quality, diversifying product lines, increasing the efficiency of companies in terms of costs and profit margins.

In our opinion, we can distinguish the following spillover effects of the digital economy.

1) Spillover-the effect of changes in the labor market and employment.

Thus, in the first wave of digitalization, a positive spillover effect was obtained in the form of employment growth (Katz, 2017). For example, Crandall et al. (2007), Shideler et al. (2007) empirically proved that a reduction in resource constraints during this period led to an increase in demand for labor and job creation, usually in service industries (such as financial services, education, health, etc.), as well as in manufacturing. Katz and Callorda (2016) also confirmed that between 2004 and 2015, a 1 percent increase in the digitization of the consumption index resulted in a 0.07 percent decrease in the unemployment rate.

However, Akerman et al. (2015) indicates that digital technologies and automation contribute to the polarization of jobs in most developed countries due to the limited digital skills of the population. Low- and medium-skilled jobs are prone to disappearing due to the introduction of advanced technologies.

Fossen and Sorgner (2019) conducted a mapping of the impact of digitalization on professions based on the values of destructive and transformative digitalization. The calculation of median values of indicators weighted by the number of employees in the corresponding professions in the United States allowed the authors to conclude that the impact of digitalization on the profession can not be considered solely as destructive or transformative.

However, when experts study the impact of digitalization on the employment structure, they often focus on the destructive effects - the probability of replacing human labor with machines (Brynjolfsson and McAfee, 2014; Acemoglu and Restrepo, 2019).

Indeed, on the one hand, automation can reduce employment in certain professions (medium and low-skill), while work platforms can increase the number of non-standard jobs (short-term, part-time, or low-paid jobs), as well as widen the gender wage gap. On the other hand, e-services, in particular e-health, can help society solve the problems of population aging and increasing social expenditures (OECD, 2017). Therefore, it is advisable to distinguish positive and negative spillover effects of changes in the labor market and employment. In this case, changes in employment can spread both horizontally (within the industry) and vertically (supply chain effects) (United Nations, 2019b).

2) Spillover-the effect of social and regional asymmetry in the use of digital technologies.

This spillover effect is a manifestation of digital inequality resulting from uneven implementation and use of digital technologies within countries and regions (Reimer, 2016; Greenstein and Prince, 2006;Van Ark, 2014; Karpunina et al., 2019c).

OECD experts pointed to the emergence of digital gaps between individuals, households, businesses and regions in terms of access to the Internet and the use of digital technologies in daily life and professional activities. On the one hand, access to the Internet and its use, the nature of the technologies being implemented are determined by the level and quality of life of the population, income and material capabilities of business, as well as needs for the realization of human potential and targets for

long-term development, and, on the other hand, by the implemented state policy in the field of digital development (Ragnedda and Muschert, 2013).

Thus, there is both a social vertical (in the form of a gap in the realization of development opportunities) and a regional horizontal (in the form of differences in the level of socio-economic development of regions) asymmetry in the use of digital technologies, which can be defined as a spillover effect of the digital economy, which has both a positive and negative impact on the development of the national economy (Hargittai, 2002; Stiakakis et al., 2010; Novak and Hoffman, 2000).

3) Information risks as a spillover effect of the digital economy.

In the digital economy, information risks become an integral part of objective reality. They affect the activities of individuals, businesses, and the national economy. They cause direct economic and image damage (McKinsey and Company, 2018). The OECD report says that the digital economy development requires addressing the risk of failures in areas such as digital privacy, security and trust (OECD, 2015).

Individuals face information threats in the form of personal data leaks, bank card fraud, spam and virus infections, and unauthorized computer access. In 2018, 27.9% of users experienced problems with loss of information, violation of its integrity and confidentiality, and hardware failures (Kevesh et al., 2019),

Competition conditions provoke the emergence of cyber attacks and cyber espionage in the industry to steal business information through faulty nodes and information systems, access to web servers, the use of malicious software, phishing, and others. They cause direct financial damage or loss of business reputation of the business company (Molchan et al., 2019). Sobers (2019) notes that a significant portion of cyber attacks (31%) are committed against the operating technology infrastructure of companies. There is a high probability of infection with virus programs (for example, in 2017, the Wannacry virus affected 400,000 machines in 150 countries, and the total cost of damage was about $4 billion).

Information threats also affect public administration systems and create conditions for conducting large speculative transactions that disrupt the natural information structure of markets and lead to an increase in unproductive spending on creating security systems, as well as to the loss of GDP (Karpunina et al., 2019b). Information risks reduce the potential benefits of digitalization by spreading both horizontally and vertically.

Conceptual framework for evaluating the spillover effects of the digital economy.

The spillover effects of investment are estimated using a simulation method based on the Cobb-Douglas production function, which shows the functional relationship between the volume of effectively used factors of production and the output achieved (Javorcik, 2004; Stančík, 2007; Fedorova et al., 2016). Such calculations are performed at the level of an individual company, industry, or region.

The impact of the spillover effect of investment in R&D on the knowledge stock and economic growth is estimated using econometric modeling (Griliches, 1992).

The assessment of socio-economic efficiency of the use of ICT is carried out by an integral and expert method, which consists of a point evaluation of parameters and calculation of the integral efficiency coefficient (Adzhemov et al., 2015; Kuzovkov, 2016).

In our opinion, these approaches to the digital economy are not applicable due to the lack of statistical data for assessment on an international scale, as well as in the context of individual countries and regions.

In this regard, we consider it appropriate to use the statistical method of variance (a measure of the spread of a value relative to its mathematical expectation) and the average square deviation to assess the spillover effects of the digital economy. The initial indicators in the calculations are: Unemployment rate - to assess the spillover effect of changes in the labor market and employment (TakeProfit, 2020); Human Development Index (HDI), adjusted for inequality in access to technology

– to assess the spillover effect of social and regional asymmetries in the use of digital technologies (United Nations, 2019a); CybersecurityIndex - to assess information risks as a spillover effect of the digital economy(ITU, 2019).

The accuracy of calculations and the objectivity of the results obtained will depend on the accuracy of statistical data provided by national statistical agencies and international organizations.

Conclusions

The article reveals the specifics of the effects obtained from the digital economy development. The direct effects of investing in digital economy come in the form of GDP growth, increased productivity, expanded markets, and additional profits.

The authors studied the spillover effects of the digital economy. The specifics of the spillover effect of changes in the labor market and employment, the spillover effect of social and regional asymmetry in the use of digital technologies, as well as information risks as spillover effects of the digital economy are revealed. It is proved that spillover effects can have both positive and negative effects on the national economy.

The authors investigated approaches to estimating spillover effects and proposed a variant of their estimation based on the statistical method of variance and mean square deviation.

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Ecological and Social Aspects of Sustainable Consumption and Gender-Based Differences[1]

Ariana NEFAT, PhD
Associate professor
Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirkovic"
Croatia
E-mail: anefat@unipu.hr

Dragan BENAZIC, PhD
Associate professor
Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirkovic"
Croatia
E-mail: dbenazic@unipu.hr

Abstract

In the current situation which is characteristic for the environmental pollution and increasingly evident climate changes, the sustainable development is becoming an imperative, and the sustainable consumption is turning into a relevant component of its achievement. The aim of this paper is to contribute to the better understanding of sustainable consumption by young Croatian people and to emphasise the gender-based differences in this sense. There was used the scale which takes into account the consumption process, that is, the phases of purchase, use and disposal of product; all the important categories of product are included (food, housing, mobility and clothing) in terms of the pro-environmental behaviour and also the social dimension. According to the results, young people reveal the sustainable behaviour to an average extent – they are the strongest energy savers, but their awareness of meat consumption is the weakest. Regarding the gender, as in the majority of other studies, the females practice the pro-environmental behaviour stronger in eight behaviours, while the males show a statistically significant difference in their preference towards online shopping. Young people are a reflection of social values and behaviour, so what should be emphasised is the importance of interaction between all stakeholders for achieving the stronger sustainable consumption and, consequently, the sustainable development.

Keywords: sustainable consumption, pro-environmental behaviour, social dimension of sustainability

Introduction

Problems concerning the environment and society with which the humankind is faced today in its unavoidable ongoing development, especially climate changes threatening to significantly alter the way in which people may live in the future, inevitably impose the sustainable development, which was recognised as early as in 1987 to be the ''development that meets the needs of the present without compromising the ability of future generations to meet their own needs"(United Nations, Our Common Future, 1987, p. 45). An important component of the sustainable development is the sustainable consumption of individuals as the subjects of social change who share their responsibility to sustainability (Luchs and Miller, 2017). In the context of attention recently paid to the environment and development, particularly after 2006, there has been an abrupt increase in research into the sustainable consumption, among other things, mostly associated with the term such as the consumer's behaviour. (Liu et al, 2017).

The aim of this paper is to contribute to the comprehension of sustainable behaviour by taking into account a series of individual sustainable behaviours. Although certain studies are focused only on some of the behaviours, for instance, recycling (Hornik et al, 1995) or categories of products such as

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food (Vermeir and Verbeke, 2006), the current study – like many others – combines the different forms of behaviour (Liu et al, 2010; Wang, Liu and Qi, 2014; Roberts, 1996; Gatersleben, Steg and Vlek, 2002; Ukkena and Nkamnebe, 2017; Whitmarsh and O'Neil, 2010; Bulut, Kokalan and Dogan, 2017; Kaiser and Wilson, 2004).

As for its structure, the current paper first contains the definition and dimensions of sustainable consumption; sustainability is originally viewed through these three core dimensions: environmental, social and economic (Elkington, 1999). Then there is an analysis of some studies into the pro-environmental behaviour and behaviours related to the social sustainability, with an emphasis on the first dimension. The research has been modelled upon Geiger, Fisher and Schrader (2017), taking into account the three phases of consumption: purchase, use and disposal; each consumption area (food, housing, mobility and clothing) has been included to a different extent. A special aim of the study has been to determine gender-based differences in sustainable behaviours in particular, so some of the previous investigations are surveyed here. The current study has been focused on the population of young people, that is, students in Croatia. Its conclusions are preceded by the contributions, limits and potentials of the paper to consider for the future research.

Definition and dimensions of the sustainable consumption

The sustainable consumption, so closely related to the term of sustainable development, is regarded as "the use of services and related products which respond to basic needs and bring a better quality of life, while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations"(United Nations, no date, p. 1). Emphasising the system of individual consumption, the sustainable consumption behaviour can be defined as the "individual acts of satisfying needs in different areas of life by acquiring, using and disposing goods and services that do not compromise the ecological and socio-economic conditions of all people (currently living or in the future) to satisfy their own needs" (Geiger, Fisher and Schrader, 2017, p. 20). The sustainable consumption is mostly associated with the pro-environmental behaviour, and can be also recognised as the environmentally friendly behaviour, ecological behaviour, etc. (Kurisu, 2015). The pro-environmental behaviour refers to the "behavior that harms the environment as little as possible, or even benefits the environment" (Steg, 2009, p. 309). The definitions of the pro-environmental behaviour can be essentially purpose-oriented and fact-oriented. In other words, it is possible to achieve the environmental preservation when one is motivated, which may truly lead to the environmental preservation, but not necessarily; on the other hand, the motive can be different, e.g. the health preservation that actually results in a positive impact on preserving the environment. As Kurisu (2015) claims, what is acquired is the perception of pro-environmental behaviours like the ones that actually contribute, or are perceived to contribute, to the environmental preservation.

The concept of sustainability is usually seen with the help of the triple bottom line model uniting the ecological, social and economic dimensions (Willard, 2007). An interesting example of the conceptualisation of sustainable behaviour is given by Quoquab, Mohammad, and Sukari (2019) who, accepting the definition of sustainable development, determines the scale with 24 items and 3 dimensions: quality of life, care for the environmental well-being and care for future generations; however, they do not mention the social dimension. As for the categorisation of sustainable consumption, apart from three fundamental dimensions related to the mere perception of sustainable consumption, it is possible to discuss the phases and areas of consumption. The sustainable consumption is commonly viewed through the following phases: purchase, use and disposal (Geiger, Fisher and Schrader, 2017; Kurisu, 2015; Macinnis and Folkes, 2010). Numerous pro-environmental behaviours can be differently categorised according to the areas of consumption. Based on the UK Department for the Environment, Food and Rural Affairs (Defra, 2007), they are recognised as energy and water efficiency/usage in the home, waste and recycling, purchase of eco-friendly products and personal transport. Geiger, Fisher and Schrader (2017) confirms that, from the viewpoints of greenhouse gases, acidification emissions, tropospheric ozone and resource/material requirements, food, housing and mobility represent the relevant areas. In a review of the sustainable consumption in China, Liu, Oosterveer and Spaargaren (2015) consider this behaviour similarly by taking into account these categories: food, housing energy and transport. Household consumption can be also divided into

the consumption of food, clothing and housing (Kurisu, 2015). Since the issue of sustainable consumption is a mixture of the intent and the impact (Di Giulio et al, 2014), a tendency of consumers to commit to the environmental preservation is important in their choices, but the final effect is also important, consequently, displaying those behaviours with a stronger impact on the environment is of significance. For instance, changes in the frequency and ways of transportation have a stronger impact than consuming water in a more responsible manner or carrying your own shopping bag with you (Defra, 2007; Steg and Vlek, 2009). The component of sustainability which refers to the society is also important, but it is less emphasised and understudied in literature. It is considered differently and, apart from the ethical characteristic of a firm and the fair working conditions, it can also include the frugal consumption, which, nevertheless, means economic considerations at purchase events (Pepper, 2009).

Research into some pro-environmental behaviours

When it comes to the conservation and preservation of the environment, consumers can practice a variety of behaviours. Measuring the pro-environmental behaviours, researchers used many unidimensional or multidimensional scales which make the comparison between studies difficult. In the studies into the sustainable consumption, a larger number of researchers is focused on the determinants of sustainable behaviour, mostly considering lots of different behaviours in the unidimensional scale linked with the pro-environmental behaviour (Arzu, 2008; Biswas, 2017; Kaiser and Gutscher, 2003; Liu et al, 2010; Wang, Li and Qi, 2014; Roberts, 1996). Advocating a wide approach to the social responsibility, Roberts (1995) has developed the scale for measuring the socially responsible consumer behaviour based on 26 items, including the dimensions of socially conscious consumer behaviour and the ecologically responsible consumer behaviour, and determining the four clusters of consumers. Considering numerous behaviours with regards to the main aims of the environmental preservation and conservation, Kurisu (2015) divides even 200 pro-environmental behaviours orientated towards the environmental preservation into 12 categories: eco-house/building, energy saving, enhancement of low carbon society, appropriate transportation, appropriate combustion, avoidance of pollutant discharge to water, water saving, reduction of waste generation, avoidance of overexploitation, protection of biodiversity, purchase of environment-friendly products, endowment for environmental activities. Gatersleben, Steg and Vlek (2002) include a wide range of behaviours related to the following groups: home heating, preparation and storage of food, laundry washing, bathing, audio-visual entertainment, transportation and holidays; Gilg, Barr and Ford (2005) consider many different behaviours within the groups of purchase decisions, habits and recycling, including also the social component thanks to the purchase of fair trade products; Ukkena and Nkamnebe (2017) determine these groups: purchase decisions, recycle behaviour, renewable energy/transportation and waste management/reduction; Whitmarsh and O'Neil (2010) divide behaviour into two groups: purchase and installation of durable goods and many other behaviours that contribute to the environmental protection. A variety of the researched factors and categories can be additionally found in Bulut, Kokalan and Dogan (2017), who consider sustainable behaviours across four dimensions, putting them into the categories of environmental sustainability to measure the environmental consciousness of consumers, savings to measure the propensity to save when shopping, and reusability to measure the using of items multiple times or in multiple ways, also related to the environmental protection, and the specific unneeded consumption which measures redundant shopping. Kaiser and Wilson (2004), analysing the conservation (ecological) behaviour, take into account 50 conservation behaviours and categorised them into the following six groups in the six-dimensional scale: energy conservation, mobility and transportation, waste avoidance, consumerism, recycling and vicarious, social behaviours toward conservation. They think that the multidimensional model predicts data better than the unidimensional model. Some studies, e.g. the one by Tanner and Kast (2003), investigates the determinants of purchasing a lots of different no other than food products, also including fair trade products.

Research into a consumer relation towards the social dimension of sustainability

Firms generally tend to be socially responsible. According to Mohr, Webb and Harris (2001), so many respondents have a positive relation towards firms that acquire corporate social responsibility. However, for the majority of them, such activities are not a purchase criterion, apart from a smaller

group in which the socially responsible consumer behaviour is actively participated. One of the earlier studies into the social dimension within the socially responsible consumer behaviour, which also includes the ecologically conscious consumer behaviour, was conducted by Roberts (1995), using 8 items of the socially conscious consumer behaviour. Based on the comprehension of socially responsible consumption suggested by Mohr, Webb, and Harris (2001), also considering the measures suggested by Roberts (1993; 1995; 1996), Webb (2008) developed the scale of socially responsible purchase and disposal, which includes both social and ecological criteria. The social aspect of sustainability is described with the help of 13 specific dimensions with regards to purchase founded on the corporate and social responsibility of firms. The social aspect of sustainability encompassing 7 items is included in one of the most complete scales that measure the consciousness about the sustainable consumption, developed by Balderjahn et al (2013), with the environmental and economic dimensions along with the already-mentioned one. In the framework of social implications of consumption behaviour, attitudes of consumers towards fair trade products drew a special attention. Connolly and Shaw (2006), thus, consider the perception of fair trade within the context of green and ethical consumption, and voluntary simplicity. De Pelsmacker, Janssens and Mielants (2005) determine and define different groups of consumers regarding their beliefs, attitudes and buying behaviour in relation to fair trade products. More detailed results about the features of consumers buying fair trade products are by Ambrožova and Častek (2013) claiming that even 71% of respondents who buy fair trade products did not buy any product because they could not accept the production and distribution policy of producers, that is, 72% of them did buy fair trade products guided by moral principles or to support those in need in this way. They also confirm that the buyers of fair trade products are primarily young and more educated people.

Gender-based differences regarding the sustainable consumption

Although demographic features do not lead to final conclusions when the socially and ecologically responsible consumers are described (Roberts, 1995), it is generally thought that they are older consumers, well-educated, better paid, and females (Gilg, 2005). Young people are increasingly becoming a more significant segment of consumers; they develop the pro-environmental behaviour through the consumer socialisation (Yan and Xu, 2010). Gender-based findings are not consistent, but it is still largely believed that women show more concern about the environmental issues and are more included in green shopping, which is likely related to their household and family (esp. children) health care (Middlemiss, 2018; Rawat and Garga, 2012). Roberts (1993) investigates the influence of gender on the socially responsible behaviour and finds that women are more socially responsible than men. Studying the ecologically conscious consumer behaviour, Roberts (1996) concludes that women show such behaviour more strongly. Focused on the sustainable consumption across four dimensions, Bulut, Kokalan and Dogan (2017) claim that the level of the overall sustainable consumption behaviour and the dimension within this, related to the reusability behaviour, is significantly higher in women than in men. Liu (2010) states that women show more concern about the environmental issues and acquire the habit of green purchasing more than men. As for the purchase of sustainable food products specifically, Vermeir (2006) claims that young women have significantly more positive attitudes towards buying sustainable food products and higher intentions to buy them. Doing research only on the female sample, Azru (2008) finds out that women behave more carefully in those cases in which there are economic costs, so they turn off the lights in empty rooms, they also switch off TV sets and other appliances when these are not used; that is, they are more careful then in comparison to the behaviours only related to the environmental protection, e.g. they do not buy those personal care products that are harmful for the environment. This finding has not been confirmed by all studies, so Wang (2014), focused on rural residents, discovers that women are less active in their sustainable consumption behaviour, which is linked, however, with the higher level of education of men in rural settings. In their survey into the social aspect of sustainability, it is possible to mention the study by Ambrožova and Častek (2013), according to which the gender-based differences in purchasing fair trade products are neither statistically nor factually significant.

Research Methodology

Questionnaire Design

The entire study was orientated towards the two dimensions of sustainability: ecological and social. At designing the items of ecological dimension, the principle of phases of the pro-environmental behaviour was followed, so all the behaviours are put in the phases of purchase, use and disposal. The study is not focused only on one consumption area, but encompasses the items that are related to each consumption area: food, housing and transportation; it also includes one item with regards to clothes. Certain items have been chosen, as the author estimated, according to their frequency in the previous research and the likeability of their use by the population of young people.

Regarding the purchase phase, four items are related to the environmentally friendly products in the area of food: I buy locally produced food (Kurisu, 2015; Gilg, 2005), I buy fruit imported from the overseas countries (R) (Tanner, 2003; Geiger, Fisher and Schrader, 2017), I buy ecologically labelled food (Kurisu, 2015; Tanner, 2003), I buy food even if I think or know that it is genetically modified (R). The latest item is mostly under-represented in literature although Tanner and Kast (2003), for instance, examine the attitudes towards the genetically modified food. The following question also considers the purchase of environmentally friendly products: I buy cleaners, shampoos and cosmetics that are environmentally friendly (Whitmarsh and O'Neil, 2010). The energy saving is dependent on these choices of purchase: I buy energy saving devices (Bulut et al, 2017; Kurisu, 2015; Azru, 2008; Liu, 2010; Gilg, 2005) and I buy energy saving bulbs (Bulut et al, 2017; Roberts, 1996; Kurisu, 2015; Gilg, 2005) and. The reduction of waste generation is contributed throughout purchasing the following products and shows certain behaviours: I buy products made of recycled materials (e.g. paper) (Roberts, 1996; Liu, 2010; Gilg, 2005; Kurisu, 2015) and I prefer buying products in smaller packages (Roberts, 1996; Kurisu, 2015; Wang, 2014; Gilg, 2005; Whitmarsh and O'Neil, 2010). As for today's options, it is possible to choose to reduce pollution by avoiding means of transportation: I prefer shopping online to going to a distant shop (Whitmarsh and O'Neil, 2010). The behaviour that has an impact on the reduction of waste generation throughout decreasing the unnecessary use of plastic bags is reflected in this: I carry my own shopping bag with me (Kurisu, 2015; Liu, 2010; Gilg, 2005). The excessive consumption is so obvious with regard to many fashion products (Sheth, 2011) due to different trends, constantly requiring consumers to buy new clothes items and throw away those still functional, which does not reflect any thriftiness (Corral-Verdugo et al, 2011) and also increases the quantity of waste: Following fashion I buy new clothes and throw away old clothes (R) (Bulut et al, 2017).

Considering the phase of use, what has been researched is the pro-environmental behaviour in terms of eating habits since the production of meat has a negative impact on the environment and is also related to the ethical treatment of animals (Spiller and Nitzko, 2017): I eat meat (R) (Whitmarsh and O'Neil, 2010; Geiger, Fisher and Schrader, 2017). Mobility and transportation can have a high CO2 impact (Defra, 2008), so the following pro-environmental behaviours are important: I use the public transportation (Azru, 2008), I walk or cycle to cover shorter distances (Kaiser 2004), I share a car with others following a similar route (Whitmarsh and O'Neil, 2010). Consumers can also produce energy saving: I turn off the lights in rooms where they are not needed (Kurisu, 2015; Azru, 2008; Gilg, 2005; Whitmarsh and O'Neil (2010), I turn off the TV, the computer, etc. when not in use (Kurisu, 2015; Azru, 2008). Water saving has a low CO2 impact (Defra, 2008), but it is of significance as water is becoming a more critical resource, so the following items are included here: When I brush my teeth or use a soap, I turn off the tap (Kurisu, 2015; Azru, 2008; Gilg, 2005; Whitmarsh and O'Neil, 2010) and I save water by spending less time under the shower (Gilg, 2005; Whitmarsh and O'Neil 2010).

The items within the disposal phase include collecting and recycling: I recycle over-used packages (Gilg, 2005; Whitmarsh and O'Neil, 2010; Webb, 2008), I use the services of special recycling firms to take care of e-devices, which contributes to the reduction of waste generation (Kurisu, 2015). A decrease in particularly toxic influence on the environment has been researched via the following item: I leave batteries on the places specially designed for their disposal. The reduction of waste generation is also supported by long-time use: I rather fix devices instead of throwing them away (Kurisu, 2015; Wang, 2014; Whitmarsh and O'Neil, 2010).

No detailed division of items has been applied to studying the social dimension. The first item When buying some product I consider the ethical profile of its producer (Webb, 2008; Carrero, Valor and Redondo, 2020) is used here to examine the general relation of the respondents to the social responsibility of company; the second item specifically considers the working conditions available during the production of goods as well as the care about the environment: I buy products labelled "fair trade" (produced by taking into account the fair working conditions) (Kurisu, 2015; Gilg, 2005; Tanner, 2003; Balderjahn et al, 2013). The 1-5 point scale was used for all the dimensions of sustainable development (1=never, 5=always).

Sample

The study was conducted on the sample of 280 students at the Dr. Mijo Mirković Faculty of Economics and Tourism (all the study years and all the study programmes) in Pula from March to May 2020. The convenient sample was used, that is, only those students who were present in classes when the study was conducted were asked to fill in the questionnaire. Since 16 questionnaires could not be included in the analysis, the results are based on the total of 264 acceptable questionnaires. The sample comprised 70.83% females and 29.17% males, with the average age of 21.25 years.

Results and Discussion

Analysis of the sustainable consumption

Table 1 shows the means and differences across the items of sustainable consumption with regard to gender.

Table 1: Means of particular consumption behaviours and differences regarding gender

	$\overline{X}$	$\overline{X_F}$	$\overline{X_M}$	t-value
n	264	187	77	
ECOLOGICAL DIMENSION	3.05	3.10	2.96	2.30*
Purchase	2.87	2.89	2.82	1.173
1) I buy locally produced food.	2.70	2.695	2.701	-0.048
2) I buy fruit imported from the overseas countries (R).	2.97	2.967	2.961	0.056
3) I buy ecologically labelled food.	2.49	2.524	2.416	0.901
4) I buy food even when I think or know that it is genetically modified (R).	3.29	3.272	3.350	-0.543
5) I buy eco-friendly cleaners, shampoos and cosmetics.	2.86	2.957	2.662	2.200*
6) I buy energy saving devices.	3.23	3.220	3.260	-0.267
7) I buy energy saving bulbs.	3.32	3.412	3.117	1.718**
8) I buy products made of recycled materials (e.g. paper).	2.68	2.727	2.571	1.234
9) I prefer buying products in smaller packages.	2.76	2.743	2.805	-0.449
10) I prefer shopping online to going to a distant shop.	2.25	2.134	2.558	-2.999*
11) I carry my own shopping bag with me.	3.08	3.332	2.506	4.718*
12) Following fashion I buy new clothes and throw away old clothes (R).	2.79	2.754	2.883	-0.887
Use	3.35	3.43	3.15	3.836*
13) I eat meat (R).	1.75	1.866	1.468	3.364*
14) I use the public transportation.	2.57	2.770	2.104	3.875*
15) I walk or cycle to cover shorter distances.	3.98	4.070	3.753	2.011*
16) I share a car with others following a similar route.	3.07	3.059	3.091	-0.172
17) I turn off the lights in rooms when they are not needed.	4.45	4.460	4.429	0.269

18) I turn off the TV, computer, etc. when not in use.	4.13	4.166	4.013	1.067
19) When I brush my teeth or use soap, I turn off the tap.	3.93	4.086	3.571	2.925*
20) I save water by spending less time under the shower.	2.93	2.994	2.805	1.134
Disposal	3.02	3.04	2.98	0.484
21) I recycle over-used packages.	3.22	3.240	3.181	0.333
22) I use the services of special recycling firms to take care of e-devices.	2.80	2.823	2.727	0.563
23) I leave batteries on the places specially designated for their disposal.	3.07	3.042	3.142	-0.569
24) I rather fix devices instead of throwing them away.	3.00	3.059	2.857	1.312
SOCIAL DIMENSION	2.36	2.36	2.36	-0.02
25) When buying some product I consider the ethical profile of its producer.	2.33	2.289	2.442	-1.121
26) I buy products labelled “fair trade“	2.39	2.433	2.286	1.212

p<0,05,p<0,10*
Source: author, n=264

Following the means (average values) of sustainable development dimensions, it can be noticed that the respondents are more inclined to the pro-environmental behaviour (AVG=3.05), although slightly above the average, than to the social aspect of behaviour, which is lower or below the average (AVG=2.36). As for the consumption phases, they practice the pro-environmental behaviour during the phase of use most (AVG=3.35), and during the phase of purchase its practice is the least (AVG=2.87), although the values are above the average for each phase. Food is a product that is essential for human life with a significant effect not only on health but also on the environment. In Croatia it is largely possible to buy locally produced food, but the respondents take this particular opportunity a little (AVG=2.70). On the other hand, they do not buy a large quantity of fruit imported from the overseas countries, which burdens the environment because of transportation (AVG=2.97). In the food category, the respondents buy ecologically labelled food to the least extent (AVG=2.49), which may reflect their lack of consciousness about the environmental protection and their own health, but also a lack of such products. They mostly avoid the food that, they think or know, is genetically modified (AVG=3.29), which can show their relatively high consciousness about the harmful effects of such food on the ecological system and health. Further, only slightly above the average, they buy eco-friendly cleaners, shampoos and cosmetics (AVG=2.86), which may stem from a lack of the environmental consciousness, or they do not believe in the functionality of such products in comparison to classical products. Among all the product categories, they buy energy saving devices (AVG=3.23) and bulbs (AVG=3.32) most. Almost the least purchased products are those made of recycled materials (AVG=2.68), actually not quite on offer. The respondents also do not take great care of buying products in smaller packages (AVG=2.76). Unexpectedly for young people, they do not prefer on-line purchase (AVG=2.25), as opposed to their decision to travel somewhere in order to find a particular product. On the other hand, relatively well, they acquire the behaviour of carrying their own shopping bags with them (AVG=3.08). As expected for young people, they are not particularly prone to save when it comes to clothes, despite the unfavourable economic situation, so they mostly buy and throw away their clothes following the fashion trends.

In the phase of use, there is just one item closely related to food and it considers the meat consumption, showing a relatively high level of loyalty to the traditional nutrition including meat (AVG=1.75). A group of the transportation-based items reveals that the respondents use the means of public transportation averagely (AVG=2.57), but they are more inclined to share a car with others along a similar route towards more distant destinations (AVG=3.07). It is positive that, to a very large extent, they tend to walk or cycle in order to cover shorter distances (AVG=3.98). Regarding the electrical energy consumption in households, they are very conscious or economical, so they turn off the lights in rooms when they are not needed (AVG=4.45) or a bit less turn off the TV, the computer and similar

appliances when they do not use them (AVG=4.13). They are rather economical in terms of water consumption when they brush teeth or use soap (AVG=3.93), but they do not give up their desired way of using shower (AVG=2.93).

The disposal of products is within the average behaviour when the given phases are discussed (AVG=3.02) with the largest contribution of over-used package recycling (AVG=3.22), probably due to the currently available disposal systems in many Croatian cities. Although different firms collect e-waste and some shops take care of it, this is not much practiced (AVG=2.80), perhaps because of a lack of knowledge and efforts required to find such places. The respondents are more careful about regular battery disposal (AVG=3.07). The behaviour that regards the use of products and leads to huge quantities of waste refers to the disposal of existing devices and the purchase of new devices as opposed to their maintenance and mending. The value here is slightly above the average (AVG=3.00), probably reflecting the acquired habit of maintaining a product poorly to prolong its expiry date, which is contributed also by the activity of producing and selling different devices which encourages the purchase of new ones, in particular mobiles.

The purpose of studying the social dimension has not been to gain detailed insights into particular aspects. Therefore, the first item is here to examine whether consumers take into account the ethical characteristic of a company, which can actually include several aspects, with the result below the average (AVG=2.33). A similar value is recorded also in the purchase of "fair trade" products, with a slightly better result (AVG=2.39), perhaps because of an obvious scarcity of offer in shops when it comes to such products, and perhaps because of somewhat lower commitment to this aspect of social responsibility.

Analysis of the gender-based sustainable behaviour

When compared to the males, the females show a statistically more significant pro-environmental behaviour ($\overline{X_M}$=2.96, $\overline{X_F}$ =3.10, t=2.30, p<0.05), which is a reflection of higher means in the majority of items. This is in accordance with the majority of studies presenting females as more ecologically conscious; besides, they acquire the pro-environmental behaviour more strongly than males. There is a statistically more significant difference for the phase of use ($\overline{X_M}$=3.15, $\overline{X_F}$ =3.45, t=3.836, p<0.05) in which the females prove themselves as more responsible, which may be a reflection of their ecological responsibility, but also of their thriftiness. In terms of the social dimension, the value is equal for both genders (2.36).

Analysed across certain pro-environmental behaviours, statistically significant differences have been identified for 8 items. The obtained results show that the female respondents ($\overline{X_F} = 2.957$)purchased eco- friendly cleaners, shampoos and cosmetics more than their male colleagues $\overline{X_M} = 2.662$) (t-test = 2.20; p<0,05. This finding may reflect the consumption of such products, which is usually more present among females for the purpose of maintaining households, especially cleaners, but also a wider range of eco-friendly shampoos and cosmetics on offer, without neglecting neither the care nor tendency of women to buy natural products. Besides, the female respondents purchased energy saving bulbs more frequently $\overline{X_F} = 3.412$) than the male respondents ($\overline{X_M} = 3.117$) (t-test =1.718, p<0,10). On the other hand, the male respondents more frequently preferred shopping online than going to shops ($\overline{X_F} = 2.134$, $\overline{X_M} = 2.558$; t-test = -2.999, $p < 0.05$) ; the female respondents seem to be more orientated to traditional shopping. They also carry their own shopping bags more frequently than their male colleagues ($\overline{X_F} = 3.332$), $\overline{X_M} = 2.506$; t-test = 4.718, $p < 0.05$) , showing that they do care about the environmental protection when they go shopping, at which the males are probably less careful. In the phase of using different products, as expected, there is a statistically significant difference in the meat consumption ($\overline{X_F} = 1.866$, $\overline{X_M} = 1{,}468$; t-test = 3,364, $p < 0{,}05$) , which is more present in the males. It turns out that the females are more responsible in choosing transportation, since significantly more they use the public transportation ($\overline{X_F} = 2.770$, $\overline{X_M} = 2.104$; t-test = 3.875, $p < 0.05$), walk or cycle ($\overline{X_F} = 4.070$, $\overline{X_M} = 3.753$; t-test = 2.011, $p < 0.05$). This result may be explained by the general belief that males tend to buy a car earlier. The females show a statistically significant difference in water waste when they brush their teeth or use soap in comparison to the males ($\overline{X_F} = 4.086$, $\overline{X_M} = 3.571$; $t - \text{test} = 2.925, p < 0.05$) .

Contribution of the paper and its Limitations for Future Research

The contribution of the current paper is evident in making the sustainable behaviour of young people clearer through developing the original scale which takes into account the ecological and social components of sustainability; the ecological component has been analysed according to the phases of consumption experience: the purchase, use and disposal of products. The above-presented results have several limitations that can be a foundation for future research. The study is more general, that is, it is not focused only on a particular category of products or type of behaviour, but gives some hints about different sustainable behaviours, and, thus, represents a starting point for more detailed studies into particular dimensions. In order to enable us some deeper insights, research into the determinants of particular behaviours would be also useful in the future. Since the social dimension is not developed here in more detail, the future studies might include a more developed scale within the sustainable behaviour or a separate study only into the social dimension can be recommended. Apart from the above-mentioned dimensions, it would be also possible to include the economic dimension in some more comprehensive study.

Its additional value lies in the identification of gender-based differences in sustainable behaviour, due to which the current study also contributes to this group of previous studies. Besides, the obtained result can be a foundation for further research aimed at explaining particular behaviours, for instance, why male persons more significantly choose online shopping or female persons more significantly use the public transportation or walk to cover shorter distances.

The current study provides insights into the awareness and sustainable behaviour of young people, university students, but some further research could include the youth from different socio-cultural settings to show potential differences. Since this study was conducted with university students, some behaviours are excluded from the sample structure, especially pro-environmental ones that they unlikely practice such as the use of solar collectors, therefore, future research could be conducted on the population with different demographic characteristics, and with more different sustainable behaviours included.

Conclusion

The sustainable behaviour of consumers is a relevant factor of the environmental protection and fairer social relations on the Earth. With his/her own consumption choice, every consumer also makes producers to offer more sustainable products. In this paper, upon the analysis of many previous studies, 26 sustainable behaviours have been included and considered, of which 24 are related to the pro-environmental behaviours (obviously the most represented component in research on the sustainable behaviour of consumers); the rest of 2 items touches upon the social dimension. Based on the obtained results, it can be stated that the young people, university students, in this sample acquire the sustainable patterns of behaviour averagely, but they are more prone to the pro-environmental behaviour. It does not necessarily mean that they are less ecologically conscious; the better results in the phase of use compared to the phase of purchase may signify that eco-friendly products, practically not advertised in the national media, are less available. The average result in terms of the adequate sustainable disposal of products may indicate a lack of knowledge about this and a lack of options for such disposal of waste and over-used products. As in the majority of previous studies, it has been confirmed that the pro-environmental behaviour is stronger in females, in this study it refers to 8 behaviours, whereas males more significantly prefer shopping online to going to some distant shop. It is noticeable, therefore, that women prefer some behaviours, naturally, they are more engaged in maintaining the household (e.g. purchase of eco-friendly cleaners, shampoos and cosmetics). Compared to men, women are also traditionally supposed to make more efforts to find and choose products in shops, use cars less, so these are some of the issues that would be interesting to study in more details. Finally, it can be concluded that the respondents are not orientated to the sustainable behaviour enough, which reflects the awareness of sustainability in the society, but it does not need to be a reflection only of their values or attitudes but also a reflection of insufficient offer of sustainable products or their prices are not simply appealing to them. The goals of sustainable development can be accomplished only through the interaction of all stakeholders.

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Is There A Link Between Corporate Rebranding Motives and Strategies? Evidence from The Warsaw Stock Exchange

Natalia K. WOJCIECHOWSKA

University of Economics and Human Sciences in Warsaw, Warsaw, Poland,
n.wojciechowska@vizja.pl

Abstract

Purpose: This study examines the relationship between the motives and corporate rebranding strategies. Such link was proved on Western markets. **Methodology:** The research was carried out on the sample of 121 joint-stock companies listed on WSE Main Market and New Connect in Poland. The chi-square test of independence was carried out for each combination of motives and strategies.
Findings: Statistical significance was proved for six pairs: micro- and macroeconomic factors and brand name shortening, acquisition and complete brand name change, merger and co-branding, acquisition and brand name shortening, strategic factors and co-branding, strategic factors and brand name shortening. The strongest effect was shown by Cramer's V for micro- and macroeconomic factors and brand name shortening. **Research & Limitations/Implications:** The results confirm that there is a link between motives and corporate rebranding strategies. Further research is required in terms of specific types of mergers and acquisitions and their relations with rebranding strategies. **Originality/value:** The research makes a notable input in terms of conceptual framework and systematization of definitions as well as new classifications of both rebranding motives and strategies. Empirical study investigates the relationship between corporate rebranding motives and strategies on the Polish market.

Keywords: Competitive Strategy, Motive, Corporate Rebranding, Joint-Stock Company

Introduction

Modern enterprises operate in an extremely competitive and turbulent environment. Challenges that organizations have to deal with include globalization process, technological progress, cultural and demographic changes as well as increasing competition (Rindell and Strandvik, 2010). The task of enterprises is to adapt to the rapidly changing environment on a micro and macro scale, especially in terms of their development strategy, including marketing (Chad, 2016). In the face of challenges companies devise miscellaneous strategies such as rebranding which may entail a brand name change. Harris and de Chernatony (2001) underline that a brand can be a source of a long-term competitive advantage of an enterprise.

The rising interest in the topic of rebranding observed in the last decade years results from several reasons. Rebranding is a salient phenomenon as it concerns a brand (Kapferer, 2012), which may constitute the most valuable intangible asset of an enterprise (Yeboah and Addaney, 2016). Choosing a brand name is one of the key tasks and challenges in marketing management (Turley and Moore, 1995). Furthermore, corporate rebranding is becoming increasingly common due to an increased frequency of sundry rebranding motives in the micro- and macro-environment of enterprises (Hatsu et al., 2016). However salient this phenomenon is, it still remains insufficiently researched, especially in Central and Eastern Europe.

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Existing Conceptual Framework

The scholars who investigate rebranding refer to various management and marketing frameworks, such as, Prahalad's and Hamel's resource-based view (RBV) (Otubanjo, 2010), Porter's positioning school (Ohnemus and Jenster, 2007), Spence's signalizing theory (Goettner and Limbach, 2011), change management theory (Chad, 2016), Keller's CBBE model (Sarkar and Roy, 2015). The brand itself has recently been regarded also as a Teece's dynamic capability (Brodie et al., 2016).

In spite of the aforementioned, there are not many papers which analyze the theoretical framework of rebranding. Many researchers, however, touch upon other scientific disciplines, such as psychology or biology. For instance, Tevi et al. (2009) make references to Darwin's evolution theory by comparing a developing organization to a human organism. Peterson (2015) cites Loewenstein's information gap theory on curiosity when explaining consumer attitudes towards rebranding. Ing (2012) makes use of Anderson's information integration theory as he analyses consumers' manner of collecting information and shaping their own opinion.

In this paper I underline the strategic role of rebranding, particularly its corporate type, which can stem from – or lead to – crucial changes in and out of an organization. Hence, corporate rebranding can be analyzed from the perspective of change management theory as well as dynamic capabilities (of an organization) theory. With reference to the research question included in the article's title: Is there a link between corporate rebranding motives and strategies? – I assume, backed by the literature review, that indeed, such a relationship exists. The aim of this study is to check it empirically.

Rebranding

The essence of rebranding

American Marketing Association (AMA) does not explain rebranding perhaps because it explicitly refers to the word brand meaning "a name, term, design, symbol or any other feature that identifies one seller's good to those of other sellers" (www.ama.org).

Yet the lexical meaning of rebranding is not unambiguous. According to Merriam-Webster Dictionary to rebrand means "to change or update the brand or branding (of a product, service)" (www.merriam-webster.com). Rebranding, as stated in Collins Dictionary, is "the process of giving a product or an organization a new image, in order to make it more attractive or successful" , while to rebrand is "to present it to the public in a new way, for example by changing its name or appearance" (www.collinsdictionary.com). In a similar manner this term is explained by Oxford Learner's Dictionaries, i.e. "the act or process of changing the image of a company or an organization or one of its products and services, for example by changing its name or advertising it in a different way" (www.oxfordlearnersdictionaries.com). Cambridge Dictionary's definition focuses on the brand image as it reads "the act of changing the way that an organization, business company or product appears to the public" (www.dictionary.cambridge.org). Some of these explications seem incomplete as rebranding pertains not only to brand image or even only to the name itself. Aaker and Joachimstaler (2000) emphasize that image is one of the elements of brand equity.

In the management and marketing literature rebranding is defined in two distinct manners: from a broad and narrow perspective. According to the former view rebranding denotes any change in any element of the visual identity system or brand identity with or without a change in a brand name. In the latter view rebranding is predominantly a brand name change which may be additionally accompanied by a change in other elements of visual identity system or brand identity. This differentiation is shown in the tables 1 and 2 below.

Table 1: Broad perspective of rebranding

Author, year	Definition
Keller, 2002. (In: Tsai et al., 2015)	Change in name, symbol or design that can occur in any layer of a brand's hierarchy, including the corporate, business unit, or product levels.
Muzellec and Lambkin, 2006	The creation of a new name, term, symbol, design or a combination of them for an established brand with the intention of developing a differentiated (new) position in the mind of stakeholders and competitors.
Bradbury and Catley, 2007	A more radical strategy than revitalization. It is possible to rebrand a product or service and, in situations where corporate identity is strongly tied to the brand, to rebrand the organization itself.
Hankinson, Lomax, Hand, 2007	Rebranding is a strategy designed to signal change. Its most obvious signals surround its visual identity, its name, logo, strapline and colours either singlely or plurally.
Weissner, 2007 (In: Mutsikiwa, 2011)	The process of creating a product or service labelled with a given brand under a different identity through radical changes of logo, brand name, image, marketing strategy, advertisement, including brand or enterprise repositioning.
Perzanowski, 2010	Rebranding occurs any time a company alters an existing brand identity, creating a new name, symbol, or design associated with its offerings.
Khandy, 2011	Creating a brand anew or revitalizing the brand when it loses its market position.
Chawuruka 2011	The process of giving a product or an organization a new, more attractive image.
Shetty, 2011	Revitalization and permanent brand refreshment.
Dubey and George, 2012	Change in brand positioning and identity.
Luck, 2012	Rebranding is a delicate balance of retaining valuable brand equity and awareness, while also grasping any aspects of the business that are missed with a current brand.
McGraw, Schwartz, Tetlock, 2012	Making changes to the organization's name, logo, building and enacting marketing communications.
Dugar, 2012	Refreshing the corporate visual identity.
Juntenen et al. (2009) (In: Tevi, 2013)	A systematically planned and implemented process of creating and maintaining a new favourable image and consequently a favourable reputation of the company as a whole by sending signals to all stakeholders and by managing behaviour, communication and symbolism in order to pro-act or react to change.
Gomoescu, 2015	The rebranding process does not imply only a change of image, but also implementation of know-how, access to international expertise, launching of new products and services and business lines, doubled with the development of clients and partners portfolio.
Bolhuis et al.,	Changes in brand visual identity system.
Ramachandran, 2016	Branding again, implying that the branding is done for the second time, leading to the creation of a new name, symbol, design for an already established brand with the intention of developing a differentiated position in the mind of stakeholders and competitors.
Chad, 2016	A strategy typically used to signal a change of image.
Dixon and Perry, 2017	A process for updating and building better experiences, more so than it is about launching a new ad campaign.

Even though I present only a selected number of collected definitions, the majority of them pertain rather to the broad rather than the narrow perspective, as in table 2.

Table 2: Narrow perspective of rebranding

Author, year	Definition
Ljumovic, Marinkovic, Milanovic-Golubovic, 2010	Creating a new brand name.
Goetner and Limbach, 2011	Major or minor name changes pertaining to a person, product or a company.
Delassus and Descotes, 2011	Brand name substitution.
Opuni and Baffoe, 2013	Changing an organization's name, targeting and repositioning the organization's offer to its customer and other publics. It is usually done to assign new meaning to an existing product or organization.
Collange, 2015	Changing brand names.
Collange and Bonache, 2015	Removing one brand name (the initial brand name) and replacing that name with another for a product, whether a good or service.
Agha et al., 2016	Brand name change.

This typology is distinct from the one of Muzellec and Lambkin (2006) as it does not include the aspect of time-span. I included it as a different kind of rebranding strategy (see next paragraphs).

This paper is limited to corporate rebranding only as one can notice a surge of attention to corporate brand in the recent decades (Fetscherin and Usunier, 2012). I refer to a definition of a corporate brand formulated by i.a. Ohnemus (2007), Ormeno (2007), Chailan (2009), Aaker (2010) and Keller (2011) who state that corporate brand is a brand which represents all or the majority of products offered by an enterprise and distinguishes them from the competitors' product offer.

Rebranding Strategies: Literature Review

Researchers analyzing rebranding strategies focus on four main aspects: developing a typology of rebranding strategy (Kapferer, 1992), identifying determinants of successes and failures of rebranding strategy (Coles, 2003), analyzing the relationship between rebranding motives and strategies (Gussoni and Mangani, 2012), and analyzing the relationship between rebranding strategies and both financial and non-financial enterprise performance (Gupta and Aggarwal, 2014).

The first typology of rebranding strategies was presented by Kapferer (1992) who distinguished the following four types which were later referred to by numerous researchers (Daly and Moloney, 2004). The researchers also indicate two basic types of rebranding strategies distinguished due to its scope: rebranding strategies without a brand name change (Singh et al., 2012; Tsai et al., 2015) and rebranding strategies including brand name changes. The second group is further subdivided into strategies with a partial brand name change (e.g. Goettner and Limbach, 2011) and strategies with a complete brand name change (e.g. Branca and Borges, 2011; Koku, 1997). Among the strategies with a partial change of the brand name, one can distinguish: co-branding (Basu, 2006), retention strategy, i.e. maintaining both brands, but also using them separately (Muzellec and Lambkin, 2008), shortening or extending the name by the number of letters that make up the brand name (Ferris, 1988) and shortening or extending the name by the number of words that make up the brand name (Mase, 2009).

Typology of corporate rebranding strategies

On the basis of the literature review presented above, I propose the following typology of rebranding strategies:

1. Brand name change strategies distinguished due to the scope of the brand name change:

    1.1. Rebranding with a complete brand name change
        1.1.1. Substitution – replacing the present brand with a new one (A → B).
        1.1.2. Retrobranding – replacing the present brand with a previous brand (A → B → A).
    1.2. Rebranding with a partial brand name change
        1.2.1. Modification – shortening or exteding brand name (Aa→A).
        1.2.2. Co-branding – new brand consists of two or more previously known brands or their elements (A+B→AB).
2. Brand name change strategies distinguished due to a brand's geographic scope:
        2.1.1. Brand localization strategy (global brand → local brand).
        2.1.2. Brand internationalization strategy (local brand → global brand).
        2.1.3. Counter-localization strategy (local brand → local brand).
        2.1.4. Counter-localization strategy (global brand → global brand).
3. Brand name change strategies distinguished due to the number of stages:
        3.1.1. One-stage strategy (A→ B).
        3.1.2. Multistage strategy (A → AB → B).

Rebranding motives

Literature Review

Rebranding motives are the subject of many studies. According to researchers, rebranding is a result of many different factors such as, for example, weaker brand performance in a given consumer segment (Ponnam et al., 2015), loss of brand market position, an outdated image or poor reputation (Le at al., 2014). Mergers and acquisitions are one of the most frequently mentioned reasons (i.a. Brophy, 2013).

According to the Institute for Mergers, Acquisitions and Alliances (IMAA, 2020), in 2019, the number of mergers and acquisitions in the world amounted to more than 49 849 transactions with a total value of over 3 701.4 billion USD. Although the value of transactions has decreased in comparison with the previous year, as well as compared to the peak years 2007 and 2015, the number of transactions has been growing steadily and continuously since 1985. Consolidation of entities can be also observed on the Polish market. The reports of IMAA indicates that the number of mergers and acquisitions in Poland has increased since 2014, reaching a record number of 792 in 2015 (IMAA, 2020). In 2019, 582 transactions worth nearly EUR 9 billion were carried out in Poland (IMAA, 2020). According to the data collected in this research, mergers and acquisitions are the most common motive for rebranding.

Gussoni and Mangani (2012) indicate that mergers, horizontal acquisitions, high value mergers or private equity mergers and acquisitions determine the use of strategies defined as innovative, i.e. when the target brand consists of the brands of both entities or is newly created. In other cases, the enterprises choose strategies called by the authors as conservative, when the brand of the acquiring or acquired entity is the target brand.

According to Ettenson and Knowles (2006), mergers and acquisitions determine as many as ten different types of corporate brand rebranding strategies. For example, mergers and acquisitions most often lead to the application of strategies 1) retaining all elements of the visual identity system, including the brand name only of the lead company (in most cases), 2) retaining name and other visual identity elements of the target company, 3) retaining name and visual identity system elements of the

lead company and only the name of the target company, 4) retaining only the brand name of the lead company, 5) retaining names and all elements of visual identity system of both brands, 6) retaining only names of both brands, 7) retaining name of the lead company and elements of visual identity system of the target company, 8) retaining both name and elements of the visual identity system of the target company and only the name of the lead company, 9) creating a completely new brand, 10) both brands still exist independently.

However, mergers and acquisitions are not the only motives for rebranding. The researchers enumerate other factors, such as diversification (Muzellec and Lambkin, 2006), repositioning (Weisnner, 2007) or mistakes in company management (Todor, 2014). Some researchers, such as Rhee and Han (2006) emphasize that apart from the abovementioned motives there occur others e.g. high expectations of consumers towards the company pertaining to reputation and compliance with corporate governance principles.

One of the more frequently mentioned motives for rebranding are image problems, regardless of whether it is outdated, inappropriate, misleading or in crisis (Luck, 2012). Changes in the target group are also widely described in scientific publications as one of the reasons for rebranding (e.g. Bradbury and Catley, 2007).

An increasingly important group of rebranding motives constitute market fashions concerning, e.g., the name of a corporate brand containing a reference to a currently popular technology. At the beginning of the 2000s, it was popular to add the word dotcom to an existing brand name or to replace it with another name by adding dotcom (Cooper et al., 2001). The latest trend regarding changing the name of a corporate brand (often identical with the company) is its change by adding the word blockchain (Zhao et al., 2018). This phenomenon was some time ago so ubiquitous that the US Securities and Exchange Commission (SEC) verified companies that decided to suddenly change company, corporate brand name and business profile due to a suspicion that the only motive may be a desire to quickly increase the valuation of shares of listed companies (Price, 2018).

A similar phenomenon has been described by Byun (2012) based on the research on a group of South Korean enterprises, where the name of the brand which was to evoke positive associations and ultimately increase the market value of enterprises was the name of the chaebol. Legal regulations to a trademark may also constitute a motive for rebranding (Perzanowski, 2010).

Muzellec and Lambkin distinguish four groups of rebranding motives: changes in a company's internal structure, changes in a company's competitive position, changes in a company's corporate strategy and changes in the environment. In turn Goi and Goi (2011) indicated several internal and external rebranding motives.

Typology of rebranding motives

On the basis of the literature review I developed a typology of rebranding motives.

Internal motives comprise of:

1) factors pertaining to the structure and form of ownership of an enterprise, such as: mergers, acquisitions, divisions, initial public offering, spin-offs;
2) factors pertaining predominantly to a company's strategy (at the level of an enterprise, strategic business unit or function, including marketing) or enterprise results, such as: brand results (e.g. loss of brand position or brand value), image (outdated, inappropriate, indistinct, broken, damaged, in crisis), reputation (problematic, weakened), organizational culture (inadequate), management mistakes, technology (obsolete), enterprise performance (poor, low market value, financial problems), separation of the value chain, change of company business activity, diversification, internationalization, location strategy (adaptation/standardization), infrastructure development, foreign market entry, changes in customer value proposition, brand repositioning, sponsorship, targeting new groups.

External motives include:
3) macroeconomic factors (political and legal, economic, socio-cultural, technological, demographic) such as: fiscal policy, legal obligations, development of technology, random disasters, new consumer preferences, regulations to a trademark, changes in market trends, changes in the economic legal environment, cultural trends;
4) microeconomic factors: target group (loss of trust, saturation, ageing, changes in demand, shrinking of a target group), competitors (market position, entry of new competitors, new strategies of competitors), intermediaries (contract termination, change of rates for services, conflict of interest).

According to the literature review, it can be concluded that the most typical internal motive pointed out by many rebranding researchers constitute mergers and acquisitions (Kapferer, 2012), and changes in ownership structures of enterprises (Muzellec and Lambkin, 2006). The most common external motives are consumer trends, inadequate or outdated image (Stuart and Muzellec, 2004,) and repositioning (Kaikati, 2003). Changes in legislation (Ljumovic et al.., 2010) and technology (Perzanowski, 2010) are rarely pointed out by the researchers.

Research Method

Data and sample

The quantitative research was conducted on the sample of 121 joint-stock companies listed both on the Main Market of the Warsaw Stock Exchange and its alternative trading system New Connect[1]. The research timeframe covers years between 2000 and 2015 for WSE Market and 2007-2015 for New Connect. In this 15-year period I identified 138 cases of corporate brand name changes, which means that some enterprises rebranded more than once.

The data concerning rebranding strategy and also main and detailed motives were obtained from the secondary sources – publicly available data of enterprises listed on the Main Market of the Warsaw Stock Exchange (WSE) or New Connect. In addition, I used the following sources of information: periodic information (annual and quarterly reports), current information (corporate), confidential information (e.g. mergers, divisions, separations, restructuring, reorganization, legal disputes, new patents and licenses, registered trademarks and other) and publicly available data posted on the websites of the companies being the subject of the study (e.g. press releases), industry reports and business intelligence reports, as well as interviews with CEOs and directors of marketing and corporate communications departments. The characteristics of the companies included in the sample is presented in table 3 below.

Table 3: Sample characteristics – number and size of enterprises, type of market and economic activity

Type of economic activity	No. of enterprises	Type of economic activity	No. of enterprises
Construction	8	Manufacturing	34
Finance and insurance	29	Transportation and storage	2
Information i communication	19	Real estate	4
Electricity, gas, steam and air conditioning supply	1	Professional, scientific and technical	2
Wholesale and retail trade	20	Public administration	2
Type of market			
Main Market	91	New Connect	30
Size of enterprise[2]			
Large	62	Medium	22
Small	37		

Number of cases of corporate brand name change per enterprise			
1 case	105	3 cases	3
2 cases	20	4 cases	1

The vast majority (91) of entities included in the survey that changed the name of the corporate brand were listed on the main market of WSE during the period considered, while 30 of the surveyed companies were listed on New Connect. The largest number of enterprises was represented by manufacturing (34), the finance and insurance (29), while companies in the wholesale and retail trade as well as information and communication sectors were represented in almost the same number (20 and 19 respectively). The least represented industries were: construction (8), real estate (4), as well as transport and storage, also professional, scientific and technical activities; public administration (2 companies each from each industry), while one enterprise operated in the industry of electricity, gas, steam and air conditioning supply.

Large enterprises constitute the majority of the surveyed population (62 entities), small enterprises – a smaller group (37 companies), while medium-sized enterprises are the least numerous group (22).

Measures

The empirical study included the following motives for changing the corporate brand name change: 1) mergers, 2) acquisitions, 3) strategic factors, 4) microeconomic and macroeconomic factors. In addition, the following rebranding strategies included: 1) complete brand name change), 2) co-branding, 3) extension of the corporate brand name and 4) shortening of the corporate brand name.

The study was testing following hypothesis: *H.: The type of the motive for rebranding differentiates the corporate rebranding strategy implemented by an enterprise listed on Main Market or New Connect on Warsaw Stock Exchange*

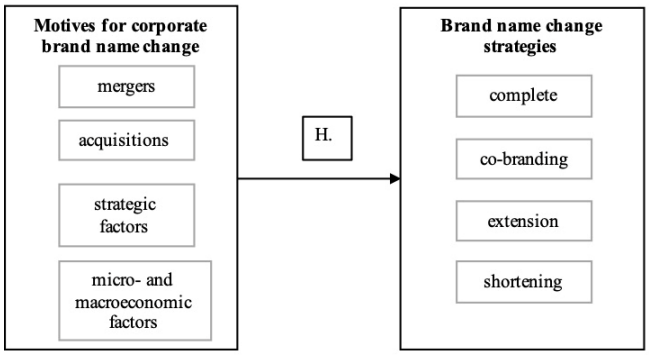

Fig. 1 : The relationship between the motives and corporate rebranding strategies of WSE companies

Independent variables constitute the type of the strategy: substitution, co-branding, extension, shortening and the type of the motive: mergers, acquisitions, strategic factors, macro- and microeconomic factors. In the chi-square independence test, both categorical variables were coded in words.

Research Analysis

In order to verify the hypothesis the chi-square test of independence was carried out – see table 4 below.

Table 4: Contingency table and chi-square test of independence for motives and strategies

			Motive				Total
			merger	micro- and macroeconomic factors	acqusitions	strategic factors	
Corporate brand name change	complete	Frequency	13	3	40	30	86
		%	50,0%	30,0%	72,7%	63,8%	62,3%
	co-branding	Frequency	4	0	4	0	8
		%	15,4%	0,0%	7,3%	0,0%	5,8%
	extension	Frequency	4	0	5	3	12
		%	15,4%	0,0%	9,1%	6,4%	8,7%
	shortening	Frequency	5	7	6	14	32
		%	19,2%	70,0%	10,9%	29,8%	23,2%
Total		Frequency	26	10	55	47	138
		%	100,0%	100,0%	100,0%	100,0%	100,0 %

	Value	df	Asymptotic significance (two-sided)
Pearson chi-square	27,507[a]	9	,001
Likelihood ratio	28,017	9	,001
N significant observations	138		

a. 56,3% cells (9) have expected frequencies less than 5. The minimum expected frequency is ,58.

The chi-square test of independence for the above variables gave the following results – chi square is 25,507 and df equals 9. The statistically significant results of the chi-square test suggest that the dominant type of rebranding motive is linked with the applied strategy type of brand name change. The contingency table indicates that the complete brand name change strategy was chosen most often chosen by enterprises which rebranding motive was acquisition and least often by enterprises which rebranded due to micro- and macroeconomic factors. Co-branding and brand name change extension are strategies which are more often applied in case of mergers and other motives, while brand name change shortening is the last choice of enterprises in case of acquisitions.

The analysis above is not yet fully credible due to a limited number in many cells in the cross-tab. The assumption in chi-square independence test reads that the number of cells for which expected frequencies are less than 5 should not exceed 20% of all cells in a cross-tab. In this analysis this value is 56,3%, which means that the estimated chi-square statistics might be exceeded. This, in turn, may lead to a higher probability of type I error (erroneous rejection of a true null hypothesis of independence of two variables). One of the solutions to avoiding this problem is sample expansion. In this particular case it is, however, impossible as I included all enterprises listed on WSE which rebranded in 2000-2015 in the sample. The only solution is to carry out individual chi-square tests for the pairs of variables referring to all 16 combinations of motives and strategies. These tests are shown in tables with four cells for partial frequencies (in the original table there are 16 of them), which makes it possible to increase expected frequencies and avoid rejection of the null hypothesis.

Out of sixteen individual chi-square tests six proved to be statistically significant – the results are discussed below. In all of the cases the null hypothesis of chi-square was not rejected as in none of the cells the expected frequencies was less than five.

The relationship between corporate brand name shortening and acquisition was checked in the second individual chi-square independence test – see table 5 below.

Table 5: Contingency table and the chi-square independence test for corporate brand name shortening and acquisition

			Acquisition		Total
			no	**yes**	
Corporate brand name shortening	**no**	Frequency	73	49	122
		%	73,7%	89,1%	79,2%
	yes	Frequency	26	6	32
		%	26,3%	10,9%	20,8%
Total		Frequency	99	55	154
		%	100,0%	100,0%	100,0%

Table 6: Contingency table and the chi-square independence test for corporate brand name shortening and strategic factors

			Strategic factors		Total
			no	**yes**	
Corporate brand name shortening	**no**	Frequency	89	33	122
		%	83,2%	70,2%	79,2%
	yes	Frequency	18	14	32
		%	16,8%	29,8%	20,8%
Total		Frequency	107	47	154
		%	100,0%	100,0%	100,0%

The results in the cross-tab (chi-square=3,334; df=1; Cramer's V=0,147) indicate that 29,8% enterprises which rebranded because of strategic factors applied corporate brand name shortening, while the majority of enterprises (70,2%) chose a different strategy. The relationship between the variables is also statistically significant though not very strong as p value is 0,068.

The next individual chi-square independence test analyzes the relationship between shortening of corporate brand name and micro- and macroeconomic factors (table 7).

Table 7: Contingency table and the chi-square independence test for corporate brand name shortening and micro- and macroeconomic factors

			Micro- and macroenomic factors		Total
			no	**yes**	
Corporate brand name shortening	**no**	Frequency	119	3	122
		%	82,6%	30,0%	79,2%
	yes	Frequency	25	7	32
		%	17,4%	70,0%	20,8%
Total		Frequency	144	10	154
		%	100,0%	100,0%	100,0%

The results in the cross-tab (chi-square= 15,739; df=1; Cramer's V=0,320) imply that 70% of companies which rebranded due to micro- and macroeconomic factors shortened its corporate brand name, whereas only 17,4% chose a different strategy. The link between these two variables is not only statistically significant as p equals 0,000 but also strong.

The relationship between corporate co-branding and merger was checked in the following individual chi-square independence test – see table 8 below.

Table 8: Contingency table and the chi-square independence test for co-branding and merger

			Merger		Total
			no	**yes**	
Co-branding	**no**	Numbers	124	22	146
		%	96,9%	84,6%	94,8%
	yes	Numbers	4	4	8
		%	3,1%	15,4%	5,2%
Total		Numbers	128	26	154
		%	100,0%	100,0%	100,0%

The results in the cross-tab (chi-square=6,595; df=1 and Cramer's V=0,207) imply that merely 15,4% of enterprises which rebranded owing to a merger decided to co-brand. Whereas up to 84,6% of enterprises chose a different strategy. In spite of being statistically significant (p equals 0,010), the relationship between the merger and co-branding is weak.

The fifth individual chi-square independence test verifies co-branding and strategic factors (table 9).

Table 9: Contingency table and the chi-square independence test for co-branding and strategic factors

			Strategic factors		Total
			no	**yes**	
Co-branding	**nie**	Frequency	99	47	146
		%	92,5%	100,0%	94,8%
	tak	Frequency	8	0	8
		%	7,5%	0,0%	5,2%
Total		Frequency	107	47	154
		%	100,0%	100,0%	100,0%

The results in the cross-tab (chi-square=3,707; df=1 and Cramer's V=0,155) imply that 100% of enterprises which rebranded due to strategic factors applied a different strategy than co-branding. None of enterprises which rebranded because of strategic factors applied co-branding. Therefore, the relationship between strategic factors and co-branding is statistically significant but weak as p value equals 0,054.

Table 10 shows the results of the chi-square independence test for complete change of corporate brand name and acquisition.

Table 10: Contingency table and the chi-square independence test for complete change of corporate brand name and acquisition.

			Acquisition		Total
			no	**yes**	
Complete change of corporate brand name	**no**	Frequency	53	15	68
		%	53,5%	27,3%	44,2%
	yes	Frequency	46	40	86
		%	46,5%	72,7%	55,8%
Total		Frequency	99	55	154
		%	100,0%	100,0%	100,0%

The results in the cross-table (chi-square=9,890; df=1; Cramer's V=0,253) imply that the vast majority of enterprises (72,7%) which rebranded due to an acquisition replaced their corporate brand name. The smaller group of enterprises (27,3%) which rebranded due to this motive decided on a different strategy. The relationship between these two variables is both statistically significant and strong as p value is 0,002.

Analysis Summary

To sum up all the analyses – the empirical data proved the hypothesis as there are statistically significant differences between the dominant motives and strategies of rebranding. It should be emphasized that not all motives differentiate all types of rebranding strategies. Statistically significant differences have been observed in 6 out of 16 pairs of motives and strategies. The strength of association between the nominal variables in each of the 6 pairs is presented according to the Cramer's V – see table 11 below.

Table 11: Cramer's V ranged from the highest to the lowest value for the pairs strategy of corporate brand name change and motive with statistically significant results of chi-square independence tests only

No.	Pair of strategy of corporate brand name change and motive	Cramer's V
1.	Shortening of corporate brand name and micro-and macroeconomic factors	0,320
2.	Complete change of corporate brand name and acquisition	0,253
3.	Co-branding and merger	0,207
4.	Shortening of corporate brand name and acquisition	0,181
5.	Co-branding and strategic factors	0,155
6.	Shortening of corporate brand name and strategic factors	0,147

The strongest effect was observed for the pair shortening of corporate brand name and micro- and macroeconomic factors. This means that the enterprises which rebranded as a result of micro- and macroeconomic factors were identified as these which more often chose the strategy of shortening the corporate brand name. Strong effect has been identified also for pair 2,3 and 4. This means that the companies which rebranded due to an acquisition were more often identified as these which replaced their corporate brand name. The enterprises which rebranded because of a merger were more often identified as these which co-branded. Moreover, the enterprises which rebranded as a result of an acquisition were more often identified as these which shortened the corporate brand name. A weaker effect was observed for pairs 5 and 6. The enterprises that rebranded due to strategic factors were more often identified as these which co-branded, while those that rebranded due to strategic factors were more often identified as these which shortened the corporate brand name.

Conclusions

This study made a notable input in the field of rebranding. The reason for this is twofold; first, this field is still underresearched in terms of conceptual framework and systematization of definitions, and second, the particular relationship between the motives and strategies also remains insufficiently researched. Moreover, the few researchers investigating this subject-matter (i.a. Basu, 2006, Ettenson and Knowles, 2006, Mangani and Gussoni, 2012) scrutinized only the correlation between mergers and acquisitions and rebranding strategies. This research included also strategic factors as well as micro- and macro-economic factors. I did not identify a similar research to be carried out on the markets of the Central and Eastern Europe.

The study confirmed the hypothesis that the motive differentiates corporate rebranding strategy. Basu (2006) claimed that various types of mergers and acquisitions lead to one of the four following strategies: retaining one brand, co-branding, creating a new brand, retaining both brands but each for a different market or situation. The results of this research are in line to some extent with results of Basu's study as among enterprises that rebranded due to an acquisition or a merger the majority created a new brand or co-branded. However, this study also proved that among the enterprises which rebranded as a result of an acquisition many of them chose the strategy of shortening the corporate brand name. It should be added, however, that I did not differentiate between various types of mergers and acquisitions. The results of my study are also partially in line with the results of the research of Gussoni and Mangani (2012) as mergers may lead to co-branding. Yet, in contrast to the researchers' results, this study proved that in case of the Polish joint-stock companies acquisitions may also lead to the so-called innovative strategies, such as complete brand name change (substitution). The results of the study conducted by Ettenson and Knowles (2006) indicate that almost 40% of enterprises that underwent M&A changed both the brand and other elements of the visual identification system of the acquired company. It is also confirmed in this study as one of the strongest correlations was identified between the complete change of corporate brand name and an acquisition.

Nevertheless, these are not only mergers and acquisitions that differentiate corporate rebranding strategies. Rapid technological growth is of rising importance. In this research this motive was included in the group of micro- and macroeconomic factors. Euromonitor International reports of 2010-2020 (Gordon et. al) indicate that at least five out of ten key consumer trends are primarily shaped by technological progress. Therefore, what is also backed by the research results, it has an undoubtedly significant impact also on brand management strategies, especially rebranding.

Limitations and Further Research

The data was collected only from the secondary sources. I included only one type of corporate rebranding strategies in the research which was distinguished due to a range of changes in the brand name. The sample is limited solely to joint-stock companies listed on Warsaw Stock Exchange Main Market and New Connect.

It is recommended to deepen the research on the relationship between the motives and corporate rebranding strategies, including diversification of variables (e.g. many types of rebranding strategies or types of mergers and acqusitions). What is more, a similar study could be carried out on other markets of CEE (or other markets in the world). Finally, a comparative analysis between various countries and markets would enable the scholars to deepen the conclusions and formulate universal managerial implications in this matter.

Endnotes

1. New Connect was established in Poland in 2007 for companies "*with large growth potential, operating in innovative sectors mainly with intangible assets, looking for equity between several hundred thousand and several million PLN and a possibility of an IPO in the exchange market in near future*", in: https://newconnect.pl/basic-info. (31.03.2020).

2. Microenterprise: less than 10 employees, annual turnover or balance below 2 mln EUR. Small enterprise: less than 50 employees, annual turnover or balance below 10 mln EUR. Medium-sized enterprise: less than 250 employees, annual turnover below 50 mln EUR or balance belowe 43 mln EUR." In: *Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises, updated in 2015*, http://eur-lex.europa.eu/legal-content/PL/TXT/?uri=LEGISSUM:n26026 (21.05.2019).

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Long-Term Dynamics and Features of The Russian Arctic's Economic Development

Natalia A. SEROVA

Luzin Institute for Economic Studies of the Federal Research Centre "Kola Science Centre of the Russian Academy of Sciences", Apatity, Russia, nataleks13@yandex.ru

Abstract

This research aims at studying main trends in the economic development of the Russian Arctic region since 1950-2018. In accordance with the results of this analysis, the author has identified three conceptually different periods in the development of the Russian Arctic zones which involve an intensive economic development stage in 1950-1990; a nascent stage for market relations in 1990-1999; and a modern development stage or a re-development stage for the Russian Arctic region that started in 2000 and has lasted ever since. The paper also demonstrates major features of the Arctic zones' economic development at each stage.

Keywords: Arctic zone of the Russian Federation, Region, Economic Development.

Introduction

At present, the Arctic region is one of the most essential vectors in the Russian domestic and foreign policies on an assumption that the Arctic region is rich in natural resources and may guarantee its sustainable development and secure national safety in the 21st century. Due to the fact that a clear idea of the features and mechanisms to the economic processes typical of this region is necessary for the identification of priority trends and tasks in the development of the Arctic zones, this research was focused on studying parameters describing certain aspects of the Russian Arctic's economic development in 1950-2018 within the boundaries of an area which is defined as the Arctic zone of the Russian Federation (or the RFAZ) pursuant to Decree of the RF President No. 296 dated 2 May 2014 'Concerning Land Territories of the Arctic zone of the Russian Federation.'

Materials and Methods

The analysis was executed on the basis of official data from the Russian Federal State Statistics Service on the social and economic status of Russia and RFAZ regions over a period of 1950-2020, as well as on the basis of statistical data from the Historical materials project (http://istmat.info). Due to the unavailability of the major economic indices, the research included only main indicators of the industrial production and investment activities. Using the indices of the actual industrial output/capital investment volumes that describe the changes as compared to the previous year, the author has calculated relative indicators of industrial and investing dynamics which are the growth rates and increment rates, as well as annual average growth rates. For the first period (1990-1999), the year 1950 was applied as a base year (the year 1970 was used for the investing dynamics); the year 1990 – for the second period; and the year 2000 – for the third period.

The calculations of the growth rates were made by the following formula: $Tr = I_1 / I_0 \times 100$ where Tr is the growth rate, in %; I_1 is the index of the actual industrial output/capital investment volumes in the current period, in %; and I_0 is the index of the actual industrial output/capital investment volumes in the base period, in %.

The calculations of the increment rates were conducted by the following formula: $Tp = Tr - 100$ where Tp means the increment rate, in %.

The calculations of the annual average growth rates were executed by the formula of the geometric mean from the indicators of the indices of the actual industrial output/capital investment volumes for certain periods.

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Results and Discussion

The second half of the twentieth century was marked by an increased economic significance of the Arctic territories in the USSR's national economy. Due to the discovery of large mineral deposits, the industry there developed faster than that on a national average value in a period from 1950 to 1990; a mean five-year increment rate in the RFAZ was +34.9% against a USSR's national rate of +31.9%.

The generalized view of the industrial production dynamics in the RFAZ is shown in Figure 1 as compared to the Russian national average values for a period of 1950-1990.

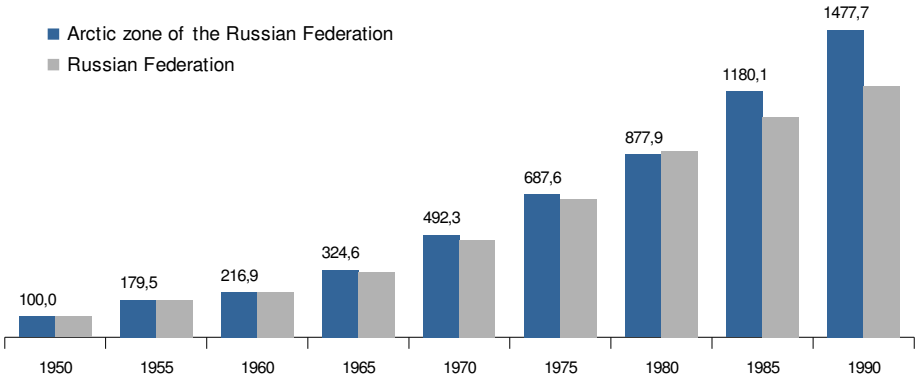

Figure 1: Dynamics of industrial production (1950 = 100%)

Source: author's calculations

The extensive exploration of the Arctic territories was mainly promoted by the development of navigation in the Northern Sea Route (or NSR) that connected the mining industry of the European and Eastern Arctic regions at a poorly available onshore traffic infrastructure. During the whole Soviet period, the NSR cargo carriage scope grew annually having reached its maximum in 1987.

In general, Leksin and Porfiriyev (2019) reported that the presently used economic and infrastructural resources in the Arctic macroregion were created for over 90% during the Soviet (socialist) time.

In the mid-1980s, the industrial production in the Arctic regions started demonstrating a clear trend of rundown. Thus, the average growth rate of the RFAZ gross industrial output in 1980-1985 was 31.0% and dropped down to 29.7% in 1985-1990. Upon the breakup of the USSR, the scaling back of the economic activities in the Arctic region became drastic, and by the late 1990s, the industrial output had reduced almost by one third. The most negative dynamics for that period was demonstrated by the Chukotka Autonomous District where the production output in 1999 was 38.6% of the year 1990 value. Kumo and Litvinenko (2016) assume that the downturn in the district's key branches related to the gold and tin mining became unprofitable because of the development of market relations and resulted in the shutdown of the largest mining and processing enterprises in Chukotka and dismantling of the majority of mono-industry workers settlements and townships.

The slump in production in the Arctic regions was accompanied by an abrupt diminution of investment inflows. It mostly affected Chukotka where the capital construction for the considered period was almost curtailed (the volume of investments to the region in 1999 was only 3.7% of the year 1990 value). The lowest recession was registered in Yakutia and on Yamal, but even in those regions the scope of investments at the end of 1999 was contracted by almost three fourths as compared to the year 1991 level.

The generalized view of the industrial production dynamics and actual capital investments to the RFAZ is shown in Figures 2 and 3 in comparison with the Russian national average values.

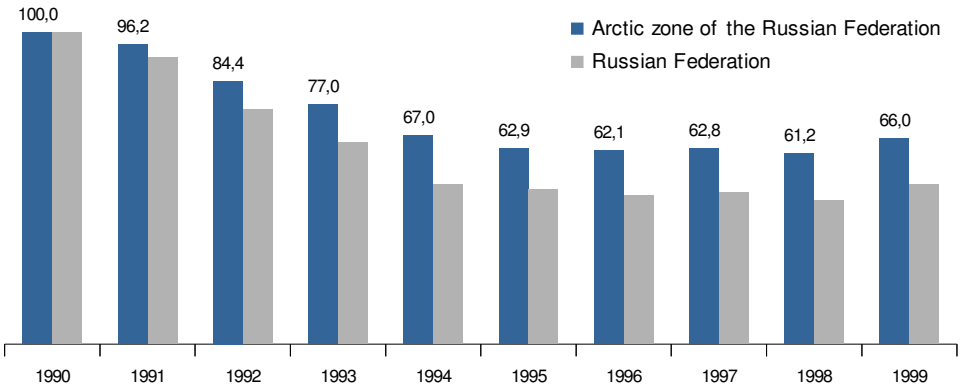

Figure 2: Dynamics of industrial production (1990 = 100%)

Source: author's calculations

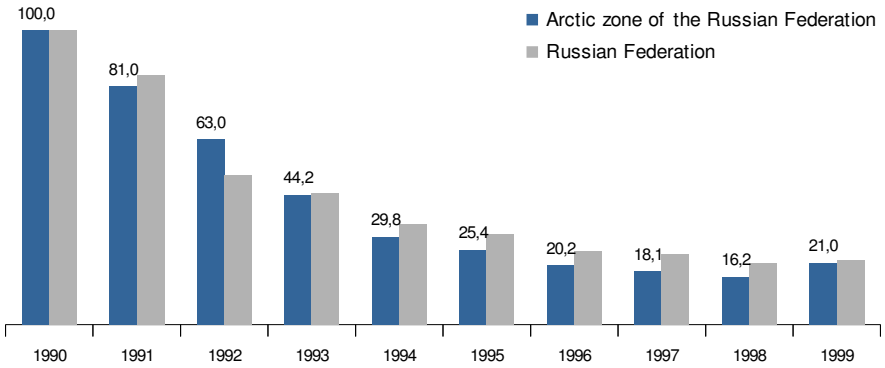

Figure 3: Investment dynamics (1990 = 100%)

Source: author's calculations

In general, the investing recession to the Arctic regions was deeper as compared to the national average level (by the late 1990s, capital investments to the Arctic regions dropped by almost four fifths) and could not be compensated by a relatively more favourable situation in the oil-and-gas regions, for example, on Yamal. Moreover, a faster investment slump took place against the background of a less reduction in the industrial production as compared to the national average value. Thus, the Arctic regions 'became some kind of a buffer damping negative consequences of the national setback in production during the economic crisis, but faced a worse situation in terms of the conditions for the fixed assets reproduction' (Didyk and Serova (2005)).

At the same period, the whole Arctic transportation system started breaking up (Konovalov (2011); Selin (2002)). The discontinued public supply of materials and machinery to the High North and Arctic regions and abolition of the public administration authorities for these challenging territories led to the unprofitability of the majority of Arctic harbours, reduction in the number of polar stations, and decommissioning of a greater part of ice-class vessels (Ulchenko and Bashmakova (2018)). This also caused the closure of many civil aerodromes, ultimately, only branches of former combined forces were what had been left of the unified Arctic aviation system in 1993; afterwards, over 70% thereof ceased to exist.

With the breakup of the centralized Soviet system, all state programs aimed at the support of the High North and Arctic regions were aborted because the public policy was focused only on the reduction of costs in those regions (Lukin (2010); Ponomarev (2009)). It resulted in the degradation of the social sector, abrupt increase in life costs, growth of unemployment, etc. (Bradshaw (1995); Heleniak (1999); Shaparov (2019)), having caused mass depopulation of the Arctic regions. In general, the number of inhabitants in the RFAZ dropped by 9.7% in 1990-1999. The largest depopulation was faced by Chukotka (by 2.4 times), Nenets Autonomous District (-21.0%) and Murmansk region (-19.1%). The main reason for the arisen social problems lied in the breakup of the Soviet system

for the legislatively established mechanisms of attracting and fixing human resources in the Arctic regions that stipulated various allowances and increased locality pay factors (Oleinikov (2013)).

In the early 2000s, the Arctic territory became one of the priority trends of the Russian foreign policy. The giant resource potential of the (Gautier et al. (2009); Kontorovich, A.E. (2015)) region and emerging opportunities for the development of the strategically vital traffic routes (Smith and Stephenson (2013); Biev (2018)) have stirred up an unprecedented interest to the Arctic region from leading countries of the world and largest oil-and-gas and mining companies. This, in turn, had caused an acute necessity for the development of a conceptually new national public policy towards Arctic territories. Russian Federation National Security Concept No. 24 dated 10/01/2000 set a task to 'promptly design mechanisms for supporting the economic development of the Arctic territories.' Three months later, there was the Public Concept of the Support to Northern regions adopted and afterwards draft Fundamentals of the Russian Arctic public policy and Concept of the sustainable development of Arctic territories compiled.

The attempted measures along with the increasing prices at the global feedstock (oil, gas, nonferrous metal ores, and diamonds) market had promoted the economic growth and amplified the investment activities in the Arctic territories. Already by 2000, the scopes of investments to the RFAZ had grown by 76.5% as compared to 1999 while the mining industry became the main economic sector in that region. However such impressive investing growth indices should not be overestimated because no conditions for a sustainable investment process ensuring an extensive fixed assets reproduction on the basis of own regional resources, had not been created in the RFAZ at that moment and this created risks of an economic slack after a period of the investment boom. It is well exemplified by the Chukotka Autonomous District where the investing activities were boosted upon the election of the prominent businessman, Roman Abramovich, as a governor (capital investments grew 108 times in 2003 as compared to 2001). However after the expiration of his governor's powers in 2005, the inflow of investments to the region significantly reduced.

In general, an intention of the state to apply a comprehensive approach to the Arctic's development mainly distinguished the third stage from the second one of the development of the Russian Arctic territories. Despite the fact that social problems emerged in the 1990s still remain unsettled, in particular, that the trends of depopulation and declining living standards continued (Kiseleva and Gokova (2016); Shelomentsev et al. (2018); Rybakovsky and Kozhevnikova (2019); Korchak and Serova (2019)), exactly this period has marked the initiation of the RFZA institutional and legal framing.

In 2008, the foundation of the Arctic-related legislation continued with the approval of the Fundamentals of the Russian Arctic public policy in accordance with which the primary national interests included 'the application of the RFAZ as a strategic resource base ensuring the resolution of the issues related to the social and economic development of the country' and 'using mass-media as a national Arctic transportation communication.' Upon the approval of the above Fundamentals, dozens of federal law and strategic documents were published to directly or indirectly provide an insight into the RFAZ as an independent governmental unit (Skufyina (2016)). In particular, there was the composition of onshore RFAZ territories identified, the Strategy for the development of the RF Arctic zone development and provision of national security for a period till 2020 approved. As well, the State Program for the Social and Economic development of the RF Arctic zone for a period till 2020, and other documents were applied.

The economic development of the Arctic regions in that period was defined by sustainable growth trends of the industrial production and capital investments (Figure 4-5). Gadzhiyev, Akopov and Krestovskikh (2012) suggest that the major factors of the investment recovery included profits from an extensive export of raw materials, attraction of foreign low-interest loans by the companies and public financing. At a regional level, the Chukotka Autonomous District became an economic growth leader due to the started development of certain new gold deposits there in 2008-2012. Over the considered period, the regional industrial output increased by 8.2 times and an arrival of investments grew by 7.3 times. Due to large-scale investments to the oil-and-gas production, high growth rates of the industrial output (by 3.6 times) were also typical of the Nenets Autonomous District.

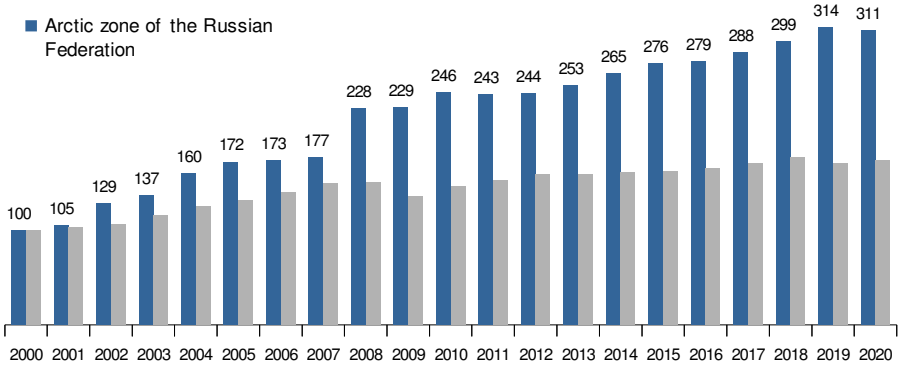

Figure 4: Dynamics of industrial production (2000 = 100%)

Source: author's calculations

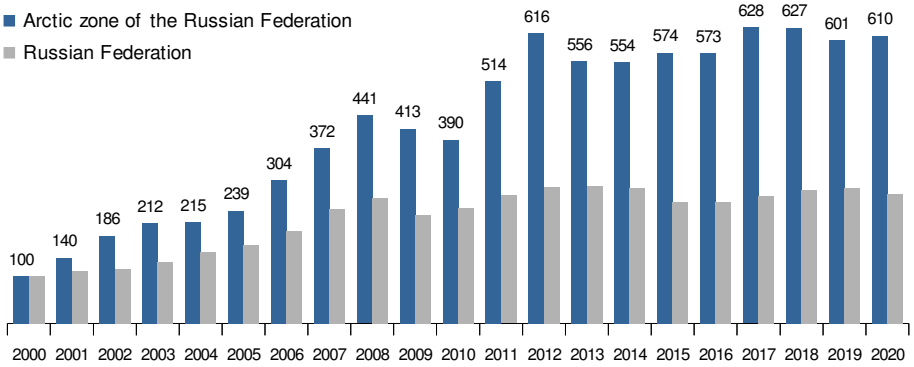

Figure 5: Investment dynamics (2000 = 100%)

Source: author's calculations

It shall be noted that this stage of the Russian Arctic's development has not settled social issues. Korchak (2020) points out that the issues of poverty, unemployment, depopulation, etc. still remain urgent in the Arctic regions indicating a low efficiency of the public policy in the field of social development in the RFAZ.

Conclusions

The analysis has shown that the development of the Russian Arctic territories took place in three conceptually different stages defined by the intensity of their economic development, scales of public support and long-term interests of the national economy, and namely:

1) 1950-1990: an intensive economic development stage of the Arctic territories. It involves an economic growth in the regions where large-scale mineral deposits and oil-and-gas fields were discovered, mainly on Yamal;

2) 1990-1999: a nascent stage for market relations. In the course of domestic economic reforms, the Arctic regions fell into a profound crisis accompanied by an abrupt drawdown of investment activities, a reduction of industrial production output, a fall of living standards, and a mass exodus of the local population; and

3) 2000-present: a modern development stage for the Arctic territories which is characterized by an investment activity revival based on an active national policy related to the RFAZ development on the one hand, and by continuing negative events in the social sector on the other hand.

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Ecological and Eco-Friendlier Importance of Bamboo in The Era of Single-Use Plastic Ban in Kerala

Ms. Sreelekha E K
Amrita School of Arts and Sciences, Kochi
Amrita Viswa Vidyapeetham University, Coimbatore, India
sreelekha1206@gmail.com

Dr. Ambily A S
Amrita School of Arts and Sciences, Kochi
Amrita Viswa Vidyapeetham University, Coimbatore, India
ambilysanjayan@gmail.com

Abstract

Plastic is a very harmful material for nature. It is reported that 40 per cent of the pollution in the globe is happening due to plastic. Some of the reports (Patrick J Kiger, 2015; Claire Le Guern, 2019; Laura Parker, 2015; Erik Van Sebille, 2016) show that around 8 million tons of plastic waste are gone to the ocean each year which affects the marine life extremely. Plastic is not biodegradable material. In all dimensions, we can say that plastic is an adversary to the earth. It is very essential to reduce the use of plastic to protect our nature. Many of the countries have banned single-use plastic products such as water bottles, bags, straws, etc. by considering environmental issues. Kerala state in India banned the same from 1 January 2020. In this situation, bamboo products can be considered as an alternative to plastic products. The present paper tries to describe the environmental challenges of plastic and also the ecological and eco-friendlier importance of bamboo and its products in the period of single-use plastic ban in Kerala. The needed data is gathered by reviewing various literatures. The paper proves that bamboo has an inevitable role in environmental sustainability like soil erosion protection, conservation of soil and water, check dams, bamboo railing in river banks, carbon absorption, reconstruction of land, etc. It can be used for making many of the products instead of plastic such as household items, decorative items, bathroom products, musical instruments, ornaments, etc. due to its eco-friendly characteristic.

Keywords: Plastic, Bamboo, environment, eco-friendly

Introduction

Plastic pollution is one of the important environmental challenges that increase day by day and simultaneously there is an increase in the manufacturing of single-use plastic products. The globe is becoming incapable to deal with them. Plastic pollution can be shown in many areas of the globe even though it is mostly clear in African and Asian continents where the waste management system is not efficient. Plastic is made from fossil fuels for more than a century. Laura Parker (2019) demonstrates that, after World War II, the manufacturing and use of plastic are enlarged heavily so that the modern world is not identifiable without plastic. Plastic is used in many areas, but it has numerous dark sides. The single-use plastics have planted a use and throw culture among humans. So the usage time of its products is very less whereas the lifespan of the plastic waste in the environment is around a hundred years. According to Charles Moore (2020), plastic pollution is the accretion of plastic products in the environment and the creation of various issues to animals and humans. Many of the species in the land and ocean consume single-use plastic products by mistaken as their food. It may lead to the death of them or create health issues to the human by eating these species.

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When we throw the plastic waste in the land, the soil also becomes polluted. It prevents the ways of rooting of the plant. Land becomes unable to save rainwater due to plastic waste. Plastic is harmful material to the environment in any way. By considering the fact many countries banned single-use plastic products. In India, some of the states are banned completely and the remaining states are in the way of a complete ban of single-use plastic products. Kerala government has banned the production, selling, storing, and transportation of single-use plastic products in the state from January 1, 2020. In this circumstance, bamboo products can be an alternative for plastic products due to its environment-friendly nature. The paper describes the environmental challenges that create plastic products. Along with this, the paper depicts the ecological and eco-friendlier significance of bamboo and its products in the epoch of single-use plastic ban in Kerala.

Statement of the Problem

Plastic pollution is an immense problem faced by the world nowadays. Plastic is a useful material for human but it involves abundant side effects on the environment. It can ruin the sustainability of the environment. So it is important to realize the downsides of plastic products and to reduce the dependence on them. Single-use plastic products are a powerful enemy to the environment. Because it is thrown to the environment immediately after use. It can create many problems for the environment and its species. Certain countries have banned the manufacturing and use of single-use plastic products. Kerala state in India has also banned it from 1 January 2020. In this situation, bamboo products can be used as a substitute for most of the plastic products. Bamboo is available in Kerala abundantly. The present paper narrates the drawbacks of plastic to the environment and also describes the ecological and eco-friendlier value of bamboo as an alternative for plastic products in the circumstance of single-use plastic ban in Kerala.

Objectives

Following are the objectives of the paper:

- To study the drawbacks of single-use plastic products by considering the environment.
- To understand the ecological importance of bamboo to protect the environment.
- To know the eco-friendlier value of bamboo products in the era of single-use plastic ban in Kerala.

Methodology

Secondary sources are used to collect the needed data for the study. Various research papers, articles, newspaper reports, magazines, government reports, etc. are reviewed for gathering data.

Plastic as an adversary to the environment

According to Prof. Mahendra Nath Roy (2019), the ages of man are categorized into four parts like stone age (man started to use the weapons and tools made from stone), bronze age (man used tin and copper to make articles), iron age (man-made items with iron) and last one is plastic age since 20th century. Plastic is a polymeric material that can be shaped or moulded into various articles by applying pressure and heat. Ferdinand Rodriguez (2019) mentioned that plastic is a raw material for a wide variety of products due to its properties of the low level of density, transparency, low level of electrical conductivity, and toughness. Anthony L. Andrady and Mike A. Neal (2009) reveal through their study that in the packaging sector plastic has a role especially to pack foods and drinks. The features of plastic like lightweight, durability, easy installation, easiness in removal and recycling, etc. are used in many areas.

In the industrial viewpoint, plastic has tremendous uses and benefits. But it has many of the downsides when looking to the environment side. Production and consumption of different kinds of plastic lead to pollution which affects the human, animal, and environmental health. Christopher J Rhodes (2018) emphasizes that the world has produced more quantity of plastic than the preceding half century since 2004. Along with this, the total quantity of pure plastic is calculated as 8.3 billion

tonnes which are largely made from crude oil and natural gas. In the period of 1950 and 2015 entirely 6.3 billion tonnes of plastic waste including primary and secondary was produced. Out of this almost 9% of the plastic waste is recycled, 12% are burned and the rest of 79% is either being kept in landfills or being disposed to the environment directly. Over the years, the quantity of plastic waste disposal in the earth and ocean is increased. Vietnam, Philippines, Indonesia, Sri Lanka, and China are the most plastic polluters in the world who produce 56 per cent of worldwide plastic waste.

UNEP (2018) says that plastics are not biodegradable. They slowly divide into small pieces which are called micro plastics and it remains in the earth. Plastic containers and bags are made from Styrofoam that needs around thousand years to decay in the land. The most commonly founded single-use plastic products in the environment are plastic drinking bottles, bottle caps, food packets, straws, plastic grocery bags, plastic containers, etc. These products are thrown in the environment immediately after use. Plastic waste can make plentiful problems when it is dumped in the environment. Plastic bag obstructs the path of water and increases natural calamities. When the drainage is blocked by plastic the mosquitos and other insects are breeds in that water, ultimately the transmitted diseases are increased. Many of the species like dolphins, turtles eat the plastic bag, etc. by misunderstanding them as their food. The toxic chemicals that added in the plastic bags at the time of production either kill the species or reach the human body by eating them. These chemicals can damage the lungs, nervous system and reproduction system. In many countries, the plastic waste is burned and it releases toxic emissions. It is very dangerous to the health of humans and animals. The plastic also creates economic damages. The dumbed plastic waste in the water affects fishing, shipping and tourist industries heavily. It needs to spend a high cost on maintenance due to plastic. There is also having an additional cost on clean beaches and coasts.

Various studies show that plastic bags are capable to make serious pollutions in the environment which also leads to animal and human health issues (Riyad Moharam and Maher Ali Al. Maqtari, 2014). There are 13 countries including United Kingdom, Taiwan, New Zealand, Kenya, Zimbabwe, Canada, France, Morocco, Rwanda, Antigua and Barbuda, United States, Bangladesh, South Korea banned single-use plastics to protect the environment. In India, single-use plastic ban is not yet completed even though some of the states are banned single-use plastic.

Table 1: Plastic banned states in India

Completely banned states	Partially banned states	Not banned states
▪ Jammu and Kashmir ▪ Himachal Pradesh ▪ Uttarakhand ▪ Punjab ▪ Haryana ▪ Rajasthan ▪ Madhya Pradesh ▪ Uttar Pradesh ▪ Maharashtra ▪ Karnataka ▪ Chhattisgarh ▪ Sikkim ▪ Arunachal Pradesh ▪ Nagaland ▪ Tripura	▪ West Bengal ▪ Goa ▪ Kerala ▪ Gujarat ▪ Odisha	▪ Manipur ▪ Bihar ▪ Telangana ▪ Tamil Nadu ▪ Assam ▪ Jharkhand ▪ Meghalaya ▪ Mizoram ▪ Andhra Pradesh

Source: Central Pollution Control Board

The Prime Minister of India Narendra Modi declared on Independence Day of 2019 that single-use plastic to be banned from 2 October 2019 which is the 150th birth anniversary of Mahatma Gandhi. He expects to accomplish the mission by 2022. Many of the states in India have already banned single-use plastic before this declaration. Sikkim is the first state which banned disposable plastic

bags as a first step to ban single-use plastic. In 2006, Sikkim banned packaged drinking water, Styrofoam, thermocol plates and cutlery to protect the state from plastic pollution (Vikaspedia).

In Kerala, the state government banned the activities of production, selling, storing, transporting single-use plastic products from 1 January 2020. It is declared by Chief Minister Pinarayi Vijayan on 21 November 2019 after considering the environmental issues faced by the state due to the plastic waste which is calculated as around 45000 tonnes per year (Rashmi Shrivastav, 2020). Kerala government banned the following single-use plastic products;

Table 2: Single-use plastic products banned in Kerala from 1 January 2020

Plastic carry bags irrespective of thickness	Non-woven bags
Plastic sheets which are used as table spread	Plastic flags and plastic buntings
Thermocol and Styrofoam cups and plates	Plastic water pouches, non- branded plastic juice packets
Decorative items made from Styrofoam	Drinking water bottles less than 500 ml
Single-use plastic plates, tumblers and cups	Plastic garbage bags
Plastic straw, fork, spoon, stirrer	PVC Flex material
Plastic coated paper plates, cups, bags, and bowls	Plastic cover used to pack vegetables and fruits

Source: Suchitwa Mission, Govt. of Kerala

Single-use plastic products are dangerous to the environment because it is thrown immediately after use. All of the banned items were useful to the man so that it is needed to make the items with other alternative materials. It is very important to keep in mind that the alternative should not be harmful to the environment. In this sense, we can use bamboo as a substitute for many of the plastic products. Bamboo is the everlasting evergreen flowering plant and it has enormous uses.

Bamboo and its uses

According to New World Encyclopedia, bamboo consists of more than 1200 species in the grass family of Poaceae, growing in tropical lands in Africa, America and Asia. The distribution of bamboo is more than 90 genera in the subfamily of Bambusoideae and the tribe of Bambuseae. Bamboo is a grass which has a commercial value. Bamboo can grow very quickly than any other grasses. It provides food to pandas, elephants, gorillas etc. and it is useful to humans for medicinal, ornamental, constructional and so on purposes. Bamboo is a symbol of culture in various countries.

There are many miraculous stories about bamboo plants and the popularity of it is growing day by day. The word bamboo is originated from the Malay word “Mambu”. Malay is the national language of Indonesia and Malaysia. Dutch named it “Bamboes” in the 16th century after it acquired the name “Bambusa” which is its Neo-Latin name. Some states that bamboo got the name due to its sound of an explosion when it is heated in the fire. Because it makes an “explosive bam-boom sound” in the fire.

Bamboo is grown in the tropical and subtropical regions of Africa, Asia and Latin America. It can be seen in five continents including Asia, Australia, Africa, South America and North America. Bamboos have in all continents excluding Europe and Antarctica. The majority of the bamboo species are grown in the climate of a warm atmosphere. But some of the species also can be found in various climates from warm tropical regions to cool mountainous regions. China has the first position in the production of bamboo in the world. India is the second largest producer of bamboo. In India, many of the peoples of different states depend on bamboo. Bamboo is useful for many of the purposes including medicines, food, construction, ornaments, and household and so on.

Means of Food Security

Bamboo ensures food security in the form of the shoot to many of the people around the world. According to Hossain M.F. (2015), when the bamboo shoot is reached about 15-16 cm height, it can be harvested. The shoots from the monopodial (running) and sympodial (clump-forming) bamboos

are mainly used as food. The tender portion of the bamboo shoot is used for cooking after avoiding the outer fibrous portion. These shoots can be used along with or without meat and vegetables to make soups or curry and even pickles. Divakar Prasad Nirala (2017) acknowledges that many of the food items can be prepared by bamboo such as bamboo shoot chutney, pakoda, pulav, bhaji, pickle, soup, beer, juice etc. Vinegar made from bamboo is utilized for bio insecticide. In the words of Hossain M.F. (2015), varieties of nutritional components are included in various species of bamboo shoots. This is used by the tribal communities as traditional way over many years. Bamboo shoot is a good source of dietary fiber, protein, minerals, amino acid and also contains low fat. From bamboo shoots, soft drinks and wines also can be made.

Act as Medicine

Bamboo is considered as medicine since ancient times. Various parts of the bamboo are used for different purposes as traditionally. P. Nongdam. (2014) concedes through his study that the bamboo shoot has the high potential to use as the healthy food due to its medicinal values such as proteins, carbohydrates, vitamins, minerals, amino acids and also contains less fat. It has the ability to control cholesterol and diabetes and it also helps to reduce hypertension, paralysis and sweating. Various parts of the bamboo have their own medicinal benefits. According to Hossain M.F. (2015), the root of the plant is used to treat the bleeding gums and arthritis. The bamboo shoot is helpful for digestion and the tender shoot of Bambusa bambos species is beneficial for birth control. Jun Panee (2015) says that it is used in traditional Chinese medicine to facilitate labour easily and discharge of the placenta. Bamboo is accepted as a calming, cooling and phlegm resolving plant. It is used along with traditional methods to treat stomach and lung heat, febrile illness etc. Bamboo leaf extract is useful for urinary dysfunction and eczema owing to a high level of heat. Hossain M.F. (2015) reveals that it also includes the properties of cancer prevention and helps to reduce cholesterol and blood pressure.

As a Construction Material

Thi Bich Van Ngu yen (2018) demonstrates that bamboo has the feature of texture which is greatly helpful to make distinctive designs for the interiors. Many of the designers use bamboo for making the unique design of furniture and they say that materials from bamboo are strong, flexible and highly powerful both internally and externally. Bamboo is highly resistant and durable than many other kinds of woods such as maple, oak etc. It has different finishes that encourage the interior designers to use bamboo for their works. Bamboo gives natural grace and utility of woods without environmental hazards. According to Asia-Pacific Network for Global Change Research, in construction, dependency on materials like timber, brick, cement etc. create environmental hazards like discharge of green-house gas at the time of production. Bamboo can be considered as a trustable material for construction because it uses less amount of energy for the production compared with other materials.

Ecological Impacts of Bamboo

Ramakrishnan M. (2018) acknowledges that bamboo can be found in various climatic situations and Korea, China, Australia, Japan and India consist of different types of species of bamboo. Bamboo has an important role in the environment because it protects from ultraviolet rays and assists in lower light intensity. It also has the ability to lower the rate of deforestation. Bamboo can decrease the pollution level by delivering more oxygen to the atmosphere and also reduces carbon dioxide up to 35%. Sijimol K (2016) celebrates the fact that bamboo can hide away carbon dioxide and convert it into oxygen. So that it can reduce Carbon dioxide which causes global warming and it doesn't leave back the carbon dioxide to the environment. According to H. Lalhruaitluanga (2009), some of the bamboo species absorb around 12 tons of carbon dioxide per hectare that leads to the existence of a high volume of fresh air in the atmosphere. It can also release 30% more oxygen than trees. Divakar Prasad Nirala (2017) shows through his study that bamboo is a rapidly growing plant around the world. A single bamboo can protect the soil up to 6 square meters. One hectare of the bamboo growing area can take 12 t of Carbon dioxide from the atmosphere and also it can keep 1000 t of water. Sijimol K (2016) considers that the colonization of bamboo has an inevitable effect on soil as biological, chemical and physical.

H. Lalhruaitluanga (2009) argues that bamboo can perform various ecological functions such as soil erosion management and water and soil conservation. Bamboo considerably reduces rain flow and averts enormous soil erosion by its expanded root system. The vast nitrogen consumption characteristic of bamboo reduces water pollution. It can also replace land which is degraded. So it is capable of preventing land degradation. The study of Sijimol K (2016) concedes that bamboo is helpful for the stabilization of the riverbank because it is mainly growing near to the river. It can improve the fertility of the soil in chemical and physical aspects by adding a large quantity of vegetation, dry stalks and culms to the soil. It also gives the survival for many of the species in the ecosystem.

According to Stephane Schroder (2012), bamboo can absorb a high quantity of carbon dioxide from the atmosphere. Scientific studies reveal that Guada Angustifolia species of bamboo can absorb about 21.41 tons per hectare in a year. One hectare of matured Guada bamboo has the capacity to generate 5.8 times extra biomass than most of the other trees. It is renewable as well as a sustainable resource because it grows continuously. So that it can develop a forest more quickly than other forest species can. Bamboo has the ability to regulate water in both qualitatively and quantitatively. It acts as a fence to manage the water flow in rivers. The widespread root system of Guada bamboo is helpful for the conservation of soil in the bank of the river. Bamboo can be planted in the areas where the chance for landslide has. Bamboo has a great capacity for water storage because it reserves the water in the soil and stems throughout the rainy season. Along with this, in the dry season bamboo gives back the water to the river and soil. Bamboo enables the scattering of raindrops by its leaves. It can prevent soil erosion. Bamboo also contributes a massive quantity of organic matter by its leaves and dry culms which lead to the increased fertility of the soil. Bamboo beautifies the nature with its wonderful leaves and culms.

Akwada D.R. (2016) reminds us that climate change is becoming rapidly as a global circumstance. The main reason for climate change is deforestation. Deforestation is happening mostly due to the use of timber in various industries which is slowly grown. The production and utilization of fast-growing plants such as bamboo are useful in industries as the best alternative for wood. The quality of the bamboo species in safeguarding soil and water is recognized by the government. Absorbed carbon dioxide is neutralized partly within a short period by products from bamboo. Dr. Jim Bowyer (2014) observes that the rate of timber production and harvest cycle in a forest area is normally managed to 80 to 100 years while the rate of bamboo production and harvest cycle is 4 to 6 years which reveal that the yield of bamboo is 7 to 10 times than hardwood. J.Atanda (2015) says that in construction, bamboo reduces the utilization of wood and it has a glassy surface which reduces the use of paint. So that it can eliminate the health problems arising from paints. Bamboo can be used as the reinforcement for concrete due to its good quality. It has the potential for decreasing deforestation and soil erosion. It helps to safeguard biodiversity and assist a sustainable environment.

Eco-friendly products from bamboo

Rushabh A. Shah (2013) explains that bamboo is an important fast-growing woody biomass non-timber forest product. It can be considered as a substitute for wood. Bamboo is one of the important construction materials and it is extensively available in India. It can protect the environment and also enhance the development of the economy.

Thi Bich Van Ngu yen (2018) argues that bamboo is recommended by its use, natural characteristics and also by its specialty of sustainable material. It is used in construction because it is a versatile plant and it is a replacement for wood. According to Asia-Pacific Network for Global Change Research, the demand for timber in the construction industry will be increased whereas the supply will be decreased in the future years. As per Planning Commission, the timber demand is approximated to 153 million cu m in 2020 while the supply will be 60 million cu m in 2020. It reveals that the price of the timber may be increased so that the products from bamboo get enough scope. Bamboo is eco-friendly because of its characteristic of fast production than wood.

Thi Bich Van Ngu yen (2018) agrees through his study that bamboo has the ability to protect our remaining forests. Planting this wonderful plant especially in the banks of the river helps to preserve

the dyke, lowering the breaking of dyke, reduces the effect of flood and also safeguards the environment. Bamboo is known as Green steel because of its properties of making environment-friendly products.

It is a great sustainable, natural material that has the characteristics of antifungal and antibacterial and also an environment-friendly like against plastic. Plastic is one of the most important origins of pollution around the globe. Bamboo has many of the good qualities than plastic. So that it is called as green gold. Our earth is becoming a trash bin for waste that is harmful to our environment. Plastic is the main reason for this situation. Wanda Thompson emphasizes that fossil fuels are required to make plastic which leads to the increased quantity of carbon discharge in the atmosphere. There have many reasons to use bamboo instead of plastic. Bamboo can grow without pesticides and fertilizers and it can also harvest within three to five years. Bamboo needs only less amount of water to grow so that no need of irrigation facilities.

According to Better meets reality (2019), bamboo is more sustainable than plastic under many of the reasons. It arises from renewable resources of bamboo fibre while plastic is a synthetic material that arises from a non-renewable resource. Bamboo is energy-intensive and eco-friendly than plastic. Bamboo products don't have synthetic contents and it is biodegradable. So that it never creates any harmful effects on the environment. On the contrary, plastic is not biodegradable and has a negative impact on the environment. Nidhi Sankar says that bamboo is antimicrobial. This is the reason for preferring the bamboo to make kitchen utensils and cutting boards in many countries. Bamboo properties can kill harmful bacteria and provides long-lasting safety.

According to Foundation for MSME clusters (2019), bamboo is one of the main alternative for timber, plastic, steel etc. It has the potential than plastic to lower the carbon and build a market opportunity. Plastic is produced from petrochemicals which pollute the environment while bamboo discharges 35% more oxygen and takes carbon dioxide from the environment. Bamboo products are not polluting the environment and not become an opponent to environment sustainability. It is totally ecological friendly so that bamboo can become a best alternative for many of the plastic products.

Table 3: Products that can make from bamboo

Household items	Decorative items	Bathroom products	Stationery items	Other products
* Basket * Trays, plates * Carry bags * Water bottles * Spoon, fork * Table coaster * Spoon holder * Chopstick * Skewers * Chopping board * Steamer * Curtain	* Flower vase * Flowers * Photo frame * Lampshade * Holding hand fan * Sculptures * Clock	* Tooth brush * Tooth brush holder * Liquid soap dispense * Tray * Tissue paper holder * Soap dish * Towel holder * Mat * Garment rack	* Pen * Pen holder * File rack * Phone holder * Shelves * Card holder * Exam pad	* Musical instruments * Agricultural tools * Garments * Ornaments * Furniture * Toys * Construction

Conclusion

Bamboo is known as "poor man's timber" and it has the capacity to provide livelihood not only to humans but also to animals. It has many uses and it is a good substitute for timber, steel and plastic. Bamboo helps to protect the ecosystem from many of the problems such as deforestation, soil erosion, decayed land etc. It beautifies the nature and discharges the fresh air to the atmosphere. Bamboo can grow quicker than any other plant so that in construction it can use instead of timber. Bamboo is more durable than many other timbers like oak, maple etc. The products made from

bamboo are eco-friendlier and it is not harmful to nature like plastic. Even plastic has many of the advantages to the human it is totally disadvantaged to nature. Plastic cannot be degraded in the soil or water and the smoke from the plastic is polluting the air when it is burned. By considering the negative effects of plastic products, single-use plastic is banned in Kerala from 1 January 2020. The manufacturing, selling, storing and transporting of single-use plastic products is punishable under the law in Kerala. In this situation, bamboo can be considered as an alternative to many of the plastic products. Bamboo especially Ochlandra Travancorica species is abundantly available in this state and it has been used traditionally for making many of the products. In this era of single-use plastic ban the artisans and industries that depend on bamboo can catch the market if it is utilised better. If the govt. and concerned organisations provide more support to the bamboo sector, it will be a great success in making and selling both traditional and modern bamboo products and ultimately reduce the dependence on plastic products. So through the use of the bamboo product, we can protect the environment from pollution.

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Elucidating the Consumer Perception for Coir Composite Furniture: A Move towards Sustainable Consumption

Gayathri RAMESH
Research Scholar
Department of Commerce and Management, School of Arts and Sciences,
Amrita Vishwa Vidyapeetham, Kochi, Kerala, India
E-mail: gayathri.ramesh25@gmail.com

A.S. Ambily
Assistant Professor
Department of Commerce and Management, School of Arts and Sciences,
Amrita Vishwa Vidyapeetham, Kochi, Kerala, India
E-mail: ambilysanjayan@gmail.com

Abstract

The present research aims to understand the perception of respondents pertaining to furniture made of Coir Composite Board. The study made an attempt to measure the strength of various attributes in order to get a better insight with regard to CCB as an environment friendly furniture stock. A survey was conducted through structured questionnaire for people who visited the International Coir Fest in Kerala, India 2019. Of the attributes chosen, the results highlighted the greatest strength of CCB furniture being 'environment friendly', 'good finish' and 'surface smoothness'. The research could aid the management and manufacturers to target their customers with proclivity towards Environmental-Economical-Societal Sustainability. With advent in its competitive price, the market potential of furniture made of CCB is to bring a major change in the panel board industry, the construction industry in totality.

Keywords: Coir Composite Board, perception, environment sustainability.

Introduction

World environment consciousness has been to the rise due to exorbitant environmental issues. An equitable and viable economy, a viable and bearable environment, an equitable and bearable society has been the key to sustainable development. 'It is indeed the development that meets the needs of the present without compromising the ability of the future generation to meet their own needs' (Brundtland Commission). It is a well-established fact that the current pattern of consumption will result in ecological unsustainability and that in order to mitigate the adverse effects of the same; different ways of living and consumption are adopted worldwide indicating environment sustainability as a very crucial work in today's date. A sustainable consumption is the key to foster the same. The United Nation's Environment Programme has emphasised on the need for 'sustainable consumption' as it is about consuming differently, consuming efficiently and having an improved quality of life. Environmental problems and its immediate and adverse impact on human health has become a relevant issue among academicians, governments and organisations (Haytko and Mutulich, 2008).This results in various issues pertaining to sustainability which implicitly brings about a major change in consumer demand and behavior (Mendelson and Polonsky, 1995). Though eco-friendly consumption called 'green consumerism' has been welcomed by developed nations, developing nations like India has been receptive about the same (Khare, 2015). Thus, it becomes all the more crucial and relevant for the marketers to have a better understanding of their consumers and consumption pattern. An antecedent to this could be to measure the perception level and preference of the consumers towards eco-friendly products.

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Coir products have always withstood the test of time and are well addressed for being eco-friendly in nature. 'Coir' is mere a waste material processed from the coconut husk. The Coir Industry has been a part and parcel of the Indian culture and tradition and has been an important cottage industry significantly contributing towards economic development and withstood as a sign of recognition on various international platforms. The country accounts for more than two-thirds of the world production of coir and coir products. The State of Kerala is the home of Indian coir industry, accounting for a major share in coconut cultivation and of coir products. A wide range of coir products are manufactured which not only meets the domestic demand so also the global demand, fetching huge inflow to the country. An innovative product of the industry, the Coir Composite Board, CCB often called Coir Ply, is paving way for an entry into the market. The Coir fibre and waste incurred at the time of processing the coir husk serves as the main raw material for the production of CCB. It is similar to that of any other panel board widely used in the furniture industry. The major competition of this product comes from the wood based panel industry, inclusive of materials like plywood, laminates MDF so also composites made of wood veneers. Wood based panel industry is facing a big gap in supply mainly in view of the restrictions imposed in sourcing of wood, the main raw material. This opens up a window of opportunity for Coir Composite based building and furnishing products, with added advantage of it being wood substitute and environment friendly. Holding the properties such as lightweight, corrosion resistance and other advantages, CCB will be an important composite material in building and civil engineering. It is ideal for home and office interiors, as an exact wood substitute and subsequently economic. Studies by Levitt (1980) and Bennington (1996) have all pointed out that inadequacy in market analysis is the main reason for failure of new furniture products. It becomes utmost important to develop customer-oriented products based on their needs and desires. Previous study by Chitra (2007), have stipulated that of the environment friendly products chosen, furniture was the only product that 11 percent of the respondents were not aware of being eco-friendly. It was based on these foundations that the objective of the study has been derived as to analyse the perception about CCB furniture based on intrinsic attributes.

Methods and Materials

A structured questionnaire was prepared to collect data from the attendees of The Coir International Annual Fair held at Alleppey district, Kerala in the month of December 2019. The questionnaires were administered to 100 respondents who visited the stall and agreed to take part in the survey. The stall was exclusively for the display of Coir Composite Furniture. Probability sampling was the technique initiated to select an adequate sample for the study. A real time perception of the customers was analysed and documented through the distribution of questionnaires. The questions chosen for the same were adapted from similar research work already published in similar context such as Ratnasingam, 2007; Shahsavar et.al, 2019; Ratnasingam et.al, 2009. All the 100 respondents who participated in the survey completed the questionnaire. The software of "Statistical Package for Social Sciences" (SPSS) has been used to analyse the data. This software is commonly used for much of the multivariate analysis used, which makes it suitable for the study. The research questionnaire developed contains eight attribute which describes CCB as a premier furniture material (Table.1). The respondents rated these attributes on a five-point scale: 1=Totally Disagree and 5=Totally Agree.

Table 1: Attributes of CCB as a furniture material

Environment Friendly
Cost
Attractive
Fashionable
Youthful
Strength
Surface Smoothness
Good Finishing

Results and Discussion

The analysis indicated the perception of the respondents based on the attributes of CCB furniture. It is a proven fact that consumers' perception can to a greater extent influence their decision making process. Perception is the process by which information inputs are well selected, organized and interpreted to create a meaningful picture of the world. Factor analysis has been the tool used to find the factors that influence the perception of respondents. It is indeed a technique used to determine the underlying structure among the variables considered. The Eigen values of the selected factors were greater than 1. A total of eight factors were extracted with a cumulative percentage marked at 52.25 of the total variance. The Kaiser-Meyer-Olkin (KMO) and Barlett's Test of Sphericity has been used to analyse the sampling adequacy and correlation among the variables. The test in the study is found to be significant with p=0.000. The KMO measure is an index used to measure the appropriateness of factor analysis. A value in between 0.5 to 1.0 indicates an appropriate result and a value below 0.5 indicates inappropriateness to conduct a factor analysis. The KMO value derived stood at 0.896 as shown in Table 2 which indicates the appropriateness. The Cronbach's α (Alpha) was run to test the reliability of variables considered. Generally an alpha value above 0.7 is considered acceptable (Hair et.al., 1998). The alpha value derived was 0.862 for the study which is in the acceptability range as shown in Table 3 in reliability statistics.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.896
Barlett's Test of Sphericity	Approx.Chi-Square	306.318
	df	28
	Sig.	0.000

Table 3: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.862	.866	8

The mean value of most of the attributes was quite satisfactory. Though a variation occurred for variables like 'cost', 'fashionable' and 'youthful', it is high in terms of variables like 'environment friendly', 'surface smoothness' and 'good finishing'. This depicts that most of the respondents agreed to the statement that CCB furniture are environment friendly, has good surface smoothness and a great finish. As far as the cost consideration is concerned, the respondents showed varied opinions, though mostly disagreed to the fact that it is low on cost consideration. There were respondents who opined the fact that the product is innovative, environment friendly and has a great finish unlike any other furniture stock.

Table 4: Inter-Item Correlation Matrix

	Environment Friendly	Cost	Attractive	Fashionable	Youthful	Strength	Surface Smoothness	Good Finishing
Environment Friendly	1.000	.346	.418	.371	.218	.427	.432	.405
Cost	.346	1.000	.322	.327	.223	.419	.376	.387
Attractive	.418	.322	1.000	.507	.498	.551	.517	.657
Fashionable	.371	.327	.507	1.000	.551	.449	.427	.545
Youthful	.218	.223	.498	.551	1.000	.455	.442	.508
Strength	.427	.419	.551	.449	.455	1.000	.550	.639
Surface Smoothness	.432	.376	.517	.427	.442	.550	1.000	.547
Good Finishing	.405	.387	.657	.545	.508	.639	.547	1.000

The results of the study imply that CCB furniture could be the future of furnishing and construction industry. People showed a positive response towards the material for being environment friendly and good finish. Experts suggest that the furniture made of CCB are highly durable for it being water resistant, termite resistant, fungal resistant even after undergoing various treatments during the course of processing and production exerting the biggest strength of CCB. Cost consideration was perceived to be little unconvincing, but every effort should be made to reduce the cost of processing and production of CCB so that it can be made available to every class of individual. The furniture made of CCB is innovative and it is a thought process in need of further enhancement to rightly make it highly competitive in the market.

Conclusions

This study is one of the first attempts to analyse the market perspectives pertaining to CCB furniture. The furniture made of Coir Composite Board is perceived to be environment friendly which reasserts the title as, 'a move towards sustainable consumption'. Building a positive social, environmental and sustainable image of coir composite furniture will enhance the products value and this will tilt up consumer preference for the product and their intention to purchase it. The study is also a piece of valuable information to the furniture manufacturers, policy makers and environmentalists. The study helped to identify the very basic factors with positive as well as negative responses which should be incorporated into the design of CCB furniture. The findings will also allow the marketers of CCB furniture to device strategies for how to present the product to the consuming public. For instance, the environmental and societal benefits associated with CCB furniture can be used as leverage to increase the market share. Through better market strategies, the marketers of the product can target consumers who are pro-environmentalists in character, thus attracting a price premium on the product, Apart from all these there are limitations that need attention. Firstly, a small size sample survey was initiated which may caution the generalisability of the research. Secondly, the demographic background of the respondents was not considered limiting the findings to an extent. Thus, in future research endeavors the demographic factors need attention. Moreover, apart from the attributes there are a lot more other factors that can be put for consideration. So also the same can be brought under different conceptual framework exhibiting a better insight in the field.

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Coordination of The Process of Creation, Implementation and Adaptation of Innovative Technologies by Russian Companies

Elena A. BORKOVA
Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia
e-mail: e.borkova@mail.ru

Natalia V. Sopina
Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia
e-mail: nsopina@mail.ru

Elena A. MUTAREVA
Siberian University of Consumer Cooperation,
Novosibirsk, Russia
e-mail: matareva@rambler.ru

Lina V. VATLINA
Siberian University of Consumer Cooperation,
Novosibirsk, Russia
e-mail: vatlina01@mail.ru

Tatiana N. RODIONOVA
Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia
e-mail: pechura@bk.ru

Abstract

Innovative development is relevant for companies of any type, size and any specificity. Global trends, such as the emergence of new disruptive technologies, digitalization and accelerated product life cycles, are driving radical changes in most industries. Changing value chains, shifting profitability zones, emerging new players - and this fundamentally changes the balance of power in industries, significantly accelerating the introduction of new ideas and developments. Every year new technologies penetrate our life faster and faster, and companies have less time to implement them. As a result, the usual structure of industries is changing: the share of innovative companies in many sectors already reaches 10-20% and will grow rapidly in the coming years. Thus, a prerequisite for the leadership of companies in the market and the guarantee of sustainable competitive advantage is the need to use a wide range of innovative levers. Today, in order to gain a significant place in the industry, any company needs to comprehensively engage in innovations, applying all three of their main types - product innovations, process innovations and innovations in building a business model.

Keywords: Innovations, Innovative Development, Innovative Technologies, Global Trends, Investments, Economic Growth, Solar Energy, Ecology.

Introduction

There are industries in the Russian economy that are the most promising points for the introduction and development of innovations. Innovation requires large investments and large-scale sales markets. It is an industry using a scale of production such as oil and gas industry, energy, mechanical engineering, metallurgy. Such industries are becoming engines for the introduction of disruptive technologies.

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However, the rapid emergence of new technologies in the world today requires the company to radically change its approach to work and allocate a fundamental amount of investment for innovative development.

Innovations can also be created in small industries, for example, in certain promising niches in pharmaceuticals. In any industry there are promising areas where Russian companies can create value through innovation and accumulated competencies, thereby forming a platform for further development.

But for the large-scale growth of innovations in the country, coordinated interaction of big business, the state, science and technology entrepreneurs is necessary, since large companies and fundamental research with the support of the state become the sources of global innovation. Global innovation requires serious investment, which is often not enough for an individual company, so partnership plays a fundamental role for the successful commercialization of innovation.

The interest of the state in the innovation process can contribute to the inflow of new investments and the acceleration of the rates of development of industries. Since today the role of the state is not only in sponsoring R&D, but also in determining priority areas that can contribute to ensuring the necessary inflow of investments.

Innovation in The Modern World

New inventions and innovations have become an integral part of our daily life. The pace of development and innovation continues to accelerate, with business models emerging that were difficult to predict just 20 years ago. The speed of progress and the emergence of new solutions have increased many times, as a result, many companies that face new challenges of innovative development are forced to introduce new ideas and technologies in order to stay in trend.

New times require new solutions and management models. Today it is no longer so important who invented, it is important who quickly implemented and adapted his business and his products to the needs of the client. Therefore, the speed of decision making, the speed of bringing new products to the market, the openness of companies to interaction with the outside world, scientific organizations and other large companies are no less important than fundamental science and their own research.

In every industry, there are a myriad of examples of new technologies emerging, such as breakthroughs in genetic engineering in healthcare or the creation of ultra-strong alloys in metallurgy. There are also drivers of innovation common to all industries - the digitalization of industries and the introduction of Industry 4.0 tools, including robotization and automation of many processes, from the work of call centers to production.

The Relevance of Innovation for Companies

Each company is essentially unique and is at a certain stage of its development, therefore, the method of strategic decision and selection of projects is individual: for example, for a new company it will be premature to talk about the rapid achievement of any results in innovation, if the company has been successfully innovating for a long time. activities, then she must clearly track her results in order to understand the reasons for the failure to fulfill the previously established plans.

As practice shows, for the successful implementation of innovations, it is necessary to adjust the management model; for this, the company needs to determine the appropriate method of building it, appoint responsible employees, allocate resources, optimize or re-develop the processes for making investment, commercial and personnel decisions. In addition to the formation of an operational management model, it is necessary to provide employees not only with resources, but also with appropriate tools in terms of finding and implementing new technologies and solutions.

To achieve the required level of motivation of the company's employees, it is necessary to create a favorable corporate culture that is favorable to innovation. The key role in its formation belongs to the head of the company and the overall success of the implementation of innovative projects depends on him.

The creation of the correct corporate culture largely depends on the quality of the processes formed in the company, as well as on the tools used, among which 2 key ones should be noted: training (first of all, top and middle management), as well as the translation of the values of an external positive innovation culture through more active interaction with other participants in innovative activities (successful companies or startups). 94% of the surveyed top managers of companies singled out the development of corporate culture among their employees as the main driver and innovation (Pirogova O., Plotnikov V. 2020.)

Thus, a wide range of employees are involved in the implementation of innovative initiatives - from initiators of innovative ideas to supporting units providing financial and legal support. In this regard, for the successful implementation of innovations, it is important to understand the participants in the innovation process of the main goal, remove barriers and adapt current activities to the new needs of the company.

Focus on Innovation

Innovations are one of the key factors in the development of the company, which, during systematic work, has a significant socio-economic effect and affects both private business and state institutions, and society.

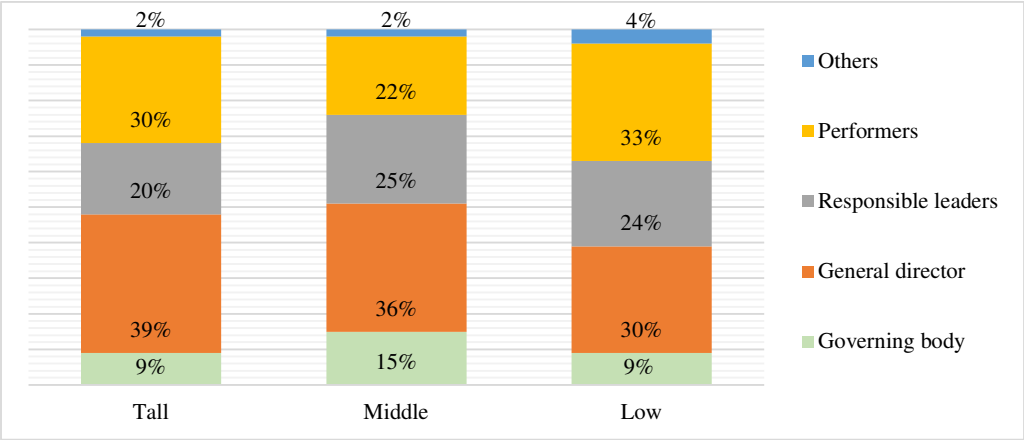

Fig. 1: Involvement of management in the implementation of innovations in the company (research by CB Insights, State of Innovation (2018)).

A deep understanding of the need for change at the level of all employees of the company will remove the barriers that prevent the introduction of innovation. At the same time, in order to achieve long-term sustainable development of the company, it is necessary to focus not on individuals, but on all employees involved.

The key factors in the implementation of innovation (leadership of the company leader and a clear strategy) are confirmed by the PWC study, see Fig. 2. (PWC, 18th Annual Global CEO Survey 2018).

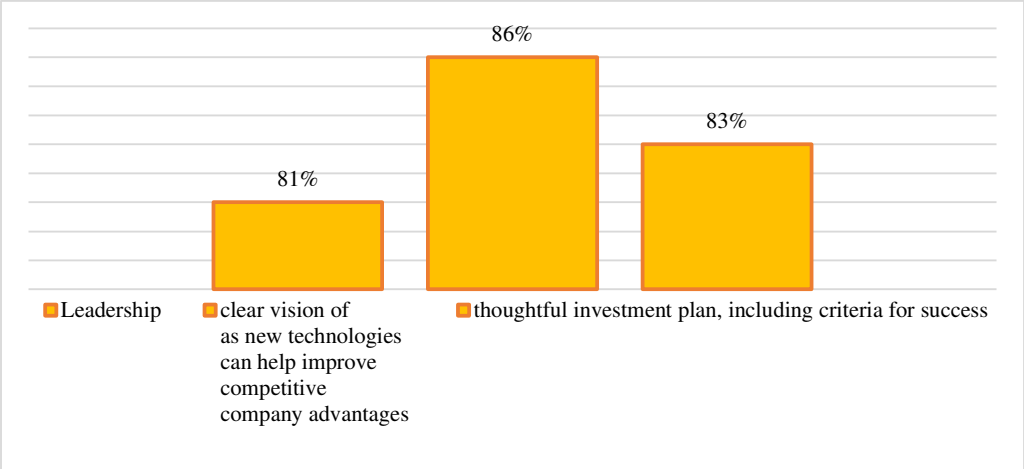

Fig. 2: Key success factors for innovation.

In addition, during the research conducted in preparation for the article, it was revealed that companies that launch more than 10 pilots per year are more successful in innovation and receive significant or breakthrough effects from innovation. The survey of Russian companies during the study is shown in Figure 3.

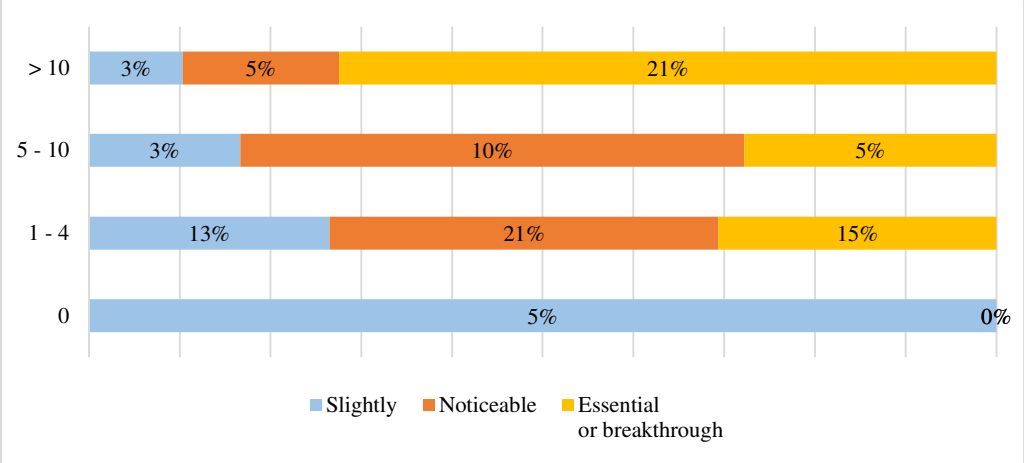

Fig. 3: Impact of innovation, %.

Разные цели и намерения компании задают различную повестку для инновационной деятельности. Инновационная стратегия зависит от внешней среды и общей корпоративной стратегии компании и может быть ориентирована на работу с разными типами инновационных решений. Задачами инновационной стратегии компании являются формирование целей инновационного развития, формирования плана реализации стратегии, определение инструментов внедрения и подходов к управлению инновациями.

For companies whose goal is to improve operational efficiency, incremental and process innovations may be most relevant. As an example, the Russian company Evraz has launched the MineShed mine planning system. On average, for mining companies, the use of lasers and big data technologies to process its results can reduce annual costs by hundreds of thousands of dollars in each of the quarries (Union of mining engineers 2020).

Here is an example of a strategic decision made by another Russian company: Rostelecom's main market is traditional telephony, and when it began to decline by 10% per year, this led the company to decide to diversify its core business and enter new markets. This required significant organizational

changes and investments in new products and services, infrastructure development. However, the results justified the resources and efforts spent - today the company occupies a leading position in the Russian market of broadband Internet access and Pay TV services (Rostelecom, https://spb.rt.ru/b2b).

The company creates innovative solutions in the field of cybersecurity, cloud services, solutions in the field of healthcare, education and housing and utilities. The changes led to the fact that the share of revenue from communication services decreased due to the emergence of new flagship business segments.

It is important that the strategy for working with innovations is a consequence and continuation of the overall strategy of the company. This will allow synchronizing innovation activities with the strategic goals of the company and eliminating conflicts between innovation and operational tasks.

As an example, we will cite the practice of the strategy of PJSC Severstal, which has formulated the main priorities for the company's development (information from the company's website):

• "cost leadership" - to achieve significant cost advantages in terms of production of main products compared to competitors, while maintaining the global industry leadership in efficiency;

• "excellent customer experience" - providing unique offers in all target markets;

• "new opportunities" - access and successful application of advanced technologies and new business models that appear on the market.

• improving the corporate culture of the company.

These priorities were adopted by the company for 2018, and they largely determine the directions and tools for working with innovations.

Thus, corporations should remember that in the context of the rapid development of technology and technology, innovation becomes the key to a competitive advantage and the basis for the company's sustainable development. Disruptive innovation is the most important, as it carries the greatest risks for any company, so the company must pay special attention to its innovative development in the long term.

Three Horizons Model

To maintain competitiveness, a company must balance its innovation budget across three groups of innovation: incremental, radical, and disruptive. Following this rule, over the past decade, the following budget allocation for innovation has been extended among foreign companies: 70% - for incremental innovation 20% - for radical innovation 10% - for disruptive innovation.

From an organizational point of view, the formation of a portfolio can be carried out by dividing the corporate budget into innovations into three baskets. The largest budget basket for incremental innovation, the medium budget basket for radical innovation, and the smallest budget basket for disruptive innovation. This will eliminate competition between projects from different baskets (projects of different horizons): when incremental innovation projects are preferred because these projects, unlike projects of radical and disruptive innovation, are at a higher stage of readiness, have a sound economic and risk assessment.

The three-basket approach ensures that there is a budget and a corporate focus on radical and disruptive innovation (the basis for maintaining its competitiveness over the long term). According to a study by KPMG (KPMG, Benchmarking Innovation Impact 2018), over the past 7-8 years, there has been a significant shift in resource allocation priorities towards radical and disruptive innovation.

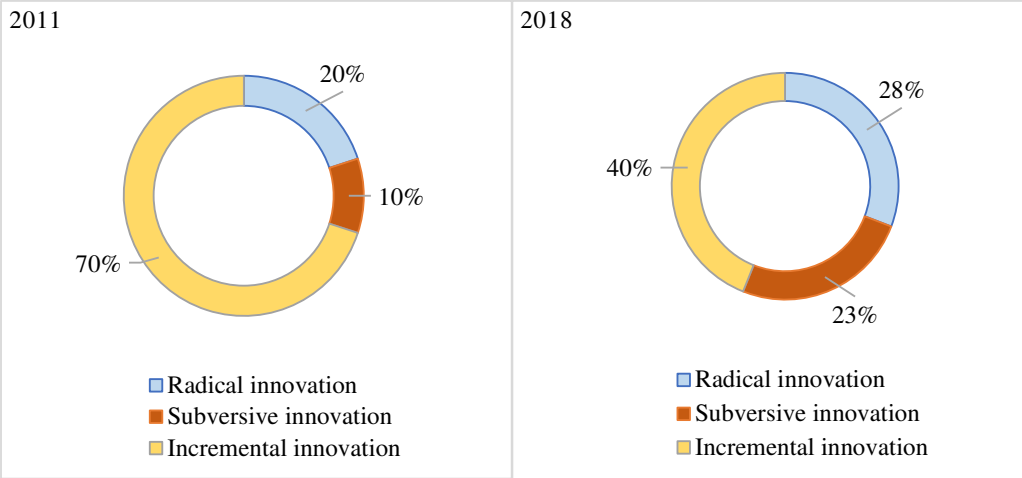

Fig. 4: Changes in the distribution of companies' investments in different types of innovations

The Role of The State in The Development of Innovations

Previously, the role of the state in the innovation process was to create an innovative environment in which all market participants could effectively develop and implement innovations, as well as to sponsor fundamental science and new developments. In the modern world, due to the large number of variables, the high degree of mutual penetration of industries and the growing speed of change, the role of the state becomes even more important.

The active position of the state in the innovation process can significantly accelerate the rate of development of individual industries. Pursuing a policy of innovative development of the country, including the development and implementation of a strategy for the development of industries, the state not only provides funding for strategically important promising projects, for example, in the military-industrial complex and fundamental science, but also directly affects how industries develop. Determining the most promising industries and niches, the state provides a wide range of service support to businesses in these areas, including technology brokerage and assistance in the export activities of innovative companies.

The state also stimulates cross-sectoral cooperation, bringing together stakeholders to build relationships and search for synergistic opportunities, promotes the creation of joint programs, including organizing platforms for dialogue between large businesses from various industries, science and start-ups to search for new ideas and work together on large-scale tasks.

Finally, the state identifies obstacles to the development of innovations (legislative, infrastructural) and actively works to eliminate them. In other words, the role of the state is important for the development of all five key factors for the success of innovation in a country: the demand for innovation, infrastructure, funding, competencies, and a culture of innovation.

• The state can act as a customer of innovations, ensuring the demand for new technologies and products.

• The state provides an environment and conditions for the development of innovations in the country, creating the necessary infrastructure.

• The state plays an important role in funding innovative research.

• The state supports the formation of competencies and technologies for the development of innovations in the country.

• The state promotes the development of an entrepreneurial and innovative culture.

A striking example of a successful domestic innovative company is «Transas», one of the world leaders in the production of high-tech equipment, software and system integration for maritime shipping.

«Transas» accounts for over 35% of the global electronic mapping and navigation systems (ECDIS) market, about 25% of VTS installations and over 45% of the global maritime simulator market. (http://www.transas.ru/about).

Ecology Issue

A separate important trend influencing many areas is increased attention to environmental issues and environmental awareness, the development of renewable energy sources and a change in the structure of the energy industry. Recently, the availability of natural gas worldwide has grown significantly as a result of the development of shale gas extraction technologies. This allows you to gradually replace less environmentally friendly and less efficient sources of raw materials. (Borkova, 2020).

China has set a strategic goal to switch its fuel and energy complex from coal to cleaner fuels, thanks to which in 2017 the consumption of natural gas in the country increased by 15% (National Development and Reform Commission, 2018).

In the field of alternative energy, there is also a significant increase in the use of solar and wind electricity, including due to a rapid decrease in its cost, over the past three years, the cost of building solar power plants has decreased by 68% and will continue to decline further. In India, it is cheaper even without government subsidies (Vedomosti 2020).

If 10 years ago solar energy accounted for less than 1% of the world's electricity generation capacity, then at the end of 2019 it was already 9%, according to the International Energy Agency (IEA). According to his forecasts, by 2040 the share will increase to 24%.

Much of the capacity is boosted by India, where the cost of building solar power plants has dropped 84% in eight years, according to the International Renewable Energy Agency (IRENA). Costs have dropped dramatically in Australia, the United States and China, and the cost of solar energy in these countries is now one of the lowest in the world.

In Russia, contrary to the commonly held opinion that there is no sun in the country, our country with its vast territory spread over different geographic zones has favorable conditions for the development of various segments of solar generation - from microgeneration for private households to large-scale grid stations. In about 2/3 of the territory from the southern to the Far Eastern parts of the country, the level of solar radiation allows solar power plants to operate with an installed capacity utilization factor (ICUF) exceeding 14%, which corresponds to, say, French and Spanish solar energy. For comparison: in Germany, where the installed capacity of solar energy is about 50 GW, the average ICUF of photovoltaic plants is at the level of 10% (https://www.ng.ru/ng_energiya/2019-09-09/12_7671_growth.html).

In addition to the construction of renewable generation, several plants to produce solar cells and other electric power equipment have appeared and are successfully operating in Russia over 5 years. Their total production capacity is 600 MW today and will reach 700 MW by 2020. Thanks to the domestic development of heterostructure technology, the efficiency of which in cells exceeded 23%, Russia entered the top-3 world manufacturers of solar modules in terms of efficiency. These results made it possible to start the first export deliveries of solar cells and modules to Italy, Switzerland, Finland, Austria, India, Thailand, and in 2019 Russian companies entered the Kazakhstan market - the current portfolio of solar generation projects to be built using Russian equipment is 238 MW. In the electricity economy, the main indicator that allows comparing alternative types of generation is the present value of electricity production (Levelized Cost of Electricity – LCOE).

LCOE represents the estimated cost of electricity generation over the entire design life of a power plant. It is calculated by dividing the reduced (discounted) total costs during the life cycle of the facility by the estimated volume of electricity generation for the same period.

According to the latest report from the International Renewable Energy Agency (IRENA) published in 2019 Renewable Power Generation Costs in 2018, solar and wind energy are the cheapest generation technologies in most regions of the world. According to the global IRENA database, more than four-fifths of solar photovoltaic installations, due to become operational in the world in 2020, will provide cheaper electricity than the cheapest new coal, gas and diesel generation facilities.

Energy storage technologies are rapidly developing - the cost of a lithium-ion battery has decreased since 2010, according to McKinsey, by almost three times. As a result of changes in this area, the architecture of the electricity industry could change dramatically. The development of innovations in several related industries, for example, in transportation (electric vehicles), industry (new materials) and construction (modular structures) also reduces the harm done to the environment.

At the same time, from a technical and technological point of view, a fast and capacious energy storage system is a useful device for integrating solar energy into a single power system. Russian generating companies began to implement energy storage systems in the infrastructure of grid solar power plants and to work out with the system operator joint actions of generating facilities in various modes. Bashkiria has become a pilot region, on the territory of which a solar power plant project using industrial energy storage will be implemented for the first time.

Power supply in this area is carried out by a single-circuit power transmission line with a length of 100 km with a dead-end substation. Two solar generation facilities with a capacity of 5 MW each will be equipped with energy storage systems with a capacity of 4 MWh. Batteries will allow the stations to operate both in parallel with the network and autonomously. Thus, solar power plants will provide electricity to the entire area, and in the event of an emergency shutdown or repair work on the power line, they will supply hospitals, schools, kindergartens with electricity in an autonomous mode. Such so-called island power plants continue to gain popularity today, due primarily to the demand for distributed generation facilities.

Conclusion

Thus, today the Russian economy is faced with a choice - what technologies to stake on so as not to be left behind the "innovative board" in the future. An increase in investment in innovation in the domestic market will create conditions for a natural increase in the production of equipment that is competitive in world markets and will allow Russia to be competitive in the global market. The Russian experience, like the experience of other countries, shows that the market can quickly "absorb" and adapt innovative technologies on the market.

Therefore, when considering the issue of state support for innovative projects, it is necessary to take into account not only money, but also the development of Russian innovative technologies, industrial development, global competition in world markets, as well as the impact of these technologies on the environment.

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Technology Transfer as A Generator of New Knowledge and Innovative Products in The Educational Sphere

Natalia V. SOPINA
Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia
e-mail: nsopina@mail.ru

Elena A. BORKOVA
Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia
e-mail: e.borkova@mail.ru

Elena S. GAVRILYUK
University of Information Technologies, Mechanics and Optics, Saint Petersburg, Russia
gavrilyukes@gmail.com

Anastasiia V. POTAPENKO
Federal Customs Service State Higher Educational Institution of Higher Education «Russian Customs Academy» Saint-Petersburg named after V.B. Bobkova Branch Saint-Petersburg, Russia
e-mail: potapenkonastya@rambler.ru

Nadezhda A. KUDROVA
Federal Customs Service State Higher Educational Institution of Higher Education «Russian Customs Academy» Saint-Petersburg named after V.B. Bobkova Branch, Saint-Petersburg, Russia
e-mail: kudrova-n@list.ru

Abstract

Currently, the technology transfer process is being actively carried out in Russia. The direct participants in this process are scientific organizations and higher educational institutions of the country, which account for a large share of research and development. The work examines the legal status of scientific and educational institutions in the issue of the disposal of the results of intellectual activity for the implementation of technology transfer. The issues that hinder the growth of efficiency of technology transfer in education are considered. Measures are proposed to address these problems.

Keywords: Technology Transfer, Technology Transfer Centers, Scientific Developments, Intellectual Property, Innovations.

Introduction

Technology transfer is the process of transferring the results of intellectual activity and rights to them from one person to another. The purpose of technology transfer is the commercialization and scaling of technologies. There is an opinion that technology transfer is a process of transferring ideas that arise in the process of fundamental research and are implemented at the stage of development work (Rybkina E., et al. 2018). And in this case, it does not have the goal of earning income, which, from our point of view, does not correspond to reality.

Technology transfer should be viewed as a process of using the state's scientific potential. This process is one of the key factors in the development of the country and the world economy. How actively a country participates in the process of implementing the results of scientific activity determines the prospects for its scientific and technological development and the level of competitiveness. The goal of any state is to take a leading role in the emerging economy of a new type. A new type of economy

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is an innovative economy. It is characterized by the constant development of science and technology, the growth of production and the transfer of high-tech products.

The issues related to the technology transfer process are considered by many authors. The works (Dudin et al., 2013; Luksha et al., 2009) highlight the theoretical concept and methodology of technology transfer. There are studies that note the role of technology transfer in the development of the country's innovative economy (Leholetov et al., 2017; Selishcheva et al., 2018). Many authors consider the problems that arise during the operation of infrastructure facilities of a technology transfer institute, such as technology transfer centers (Aleksandrova et al., 2015; Zharova et al., 2018). In their works, researchers often compare the level of development of the institution of technology transfer in Russia and abroad. But despite the large amount of research devoted to the study of technology transfer, there are still many questions to be considered.

The aim of this work is to identify the features of the implementation of technology transfer by scientific and higher educational institutions in Russia.

To achieve this goal, the authors used theoretical and empirical methods of scientific knowledge, the system-structural method, the method of analysis and synthesis, the comparative legal method.

Results and its Discussion

The level of the country's innovative development can be assessed using the global innovation index (Tab. 1). The main leaders in the field of innovation are European countries. The leading role among them is occupied by Switzerland, which has been in the first place in the ranking for 10 years. Switzerland ranks first in terms of both “entry” into innovation and “exit”. And this trend is typical for all countries that occupy the first positions in the ranking. The opposite situation is observed in Russia. Indicators characterizing the development of innovative activity have a better value than indicators characterizing its results. According to the index, one of the strengths for the development of innovative activity in Russia is the number of issued patents and developed utility models and the amount of payments received for the sale of intellectual property objects. All these indicators, in our opinion, characterize a positive result in the implementation of the technology transfer process in Russia.

Table 1: The leading countries on the global innovation index 2016-2019.

2016		2018		2019	
Number in the rating	**Country**	**Number in the rating**	**Country**	**Number in the rating**	**Country**
1	Switzerland	1	Switzerland	1	Switzerland
2	Sweden	2	Netherlands	2	Sweden
3	Netherlands	3	Sweden	3	USA
4	USA	4	United Kingdom	4	Netherlands
5	United Kingdom	5	Singapore	5	United Kingdom
45	Russian Federation	46	Russian Federation	46	Russian Federation

Compiled by authors from the https://www.wipo.int/publications/ru/details.jsp?id=4434&plang=RU

The technology transfer system that has developed in the country has its own characteristics. In modern conditions, the innovation system and Russian legislation must resolve issues of ensuring the entry of Russian technologies into international markets. In countries with developed economies, the degree of development of the innovation component can be judged by the structure of exports and imports. So, mature technologies should prevail in exports, and new science-intensive technologies should prevail in the structure of imports. According to official statistics, Russia still acquires technologies to a greater extent, rather than sells them (Tab. 2). And only on scientific research export exceeds import.

Table 2: Trade of technologies with foreign countries on the transaction's objects in 2019.

	Export			Import		
	Number of agreements	**The cost subject agreements, US $ million**	**Admission funds, US $ million**	**Number of agreements**	**The cost subject agreements, US $ million**	**Admission funds, US $ million**
Total	4196	66565	3520	5518	12323	4837
Patent for invention	8	2,4	1,4	34	89,0	4,6
Patent license for invention	163	141	34,0	277	742	220
Know-how	75	22,7	4,7	235	955	486
Utility model	6	1,3	1,3	12	8,7	7,2
Commodity sign	95	13,4	4,1	416	1017	580
Industrial model	9	1,6	0,1	22	4,1	4,1
Engineering services	1144	64302	2588	2382	7326	2824
Scientific research	1142	1230	397	512	157	120
Others	1557	850	489	1609	2023	590

Compiled by authors from the https://rosstat.gov.ru/storage/mediabank/GOyirKPV/Rus_2020.pdf

The number of advanced production technologies developed in Russia is increasing every year. The share of new technologies is about 87%, and the share of fundamentally new only 13% (Tab. 3).

Table 3: Developed advanced manufacturing technology groups.

	Number of technologies total	**From them**		**Technologies with patented inventions**
		New for Russia	**Completely new e**	
Advanced manufacturing facilities total technology:				
2019	1620	1403	217	589
2017	1402	1212	190	485
2015	1389	1223	175	530
from them: design and engineering				
2019	456	403	53	168
2017	417	358	59	163
2015	359	323	36	145
Production, processing, assembly				
2019	510	447	63	173
2017	485	417	68	185
2015	548	471	77	247

Automated transportation of parts, automated loading and unloading operations				
2019	29	25	4	10
2017	34	27	7	14
2015	12	10	2	6
Automated surveillance equipment				
2019	159	98	61	88
2017	134	107	27	44
2015	117	82	35	53
Communication and management				
2019	316	295	21	55
2017	218	194	24	45
2015	232	218	14	92
Production information system				
2019	81	73	8	18
2017	44	44	-	11
2015	84	78	6	33
Integrated management and control				
2019	69	62	7	18
2017	70	65	5	23
2015	46	41	5	13

Compiled by authors from the https://rosstat.gov.ru/storage/mediabank/GOyirKPV/Rus_2020.pdf

The technology transfer system that is currently being formed dates to the Soviet period. The first stage of its creation can be attributed to the 1950s, when the process of integration between the university and academic environment began. Scientific, technical, and educational centers and laboratories began to be created in academic institutes. (Solov'eva Yu., 2013). In higher educational institutions, divisions appeared that were engaged in scientific research and development.

In the 1970s, the integration process intensified, and the institutional framework for innovation began to form. Interuniversity educational and production complexes were formed.

The 1990s became a turning point for the structures that were called upon to ensure the transfer of scientific results to the innovation sphere. Due to the destruction of production ties, and the reduction in the number of research organizations, imbalances arose in the institutional structure of science. The number of organizations engaged in the creation of new developments and research has sharply decreased from 1992 to the present time. But, since 2010, there has been an active growth in the number of departments in higher educational institutions of Russia and individual enterprises that have begun to carry out scientific and technical activities (Tab. 4). This process can be explained by the active policy in the field of innovations, which has begun to be carried out by the state.

Table 4: Number of organizations performing research and development

	1992	2000	2005	2010	2015	2018
Number of organizations total:	4555	4099	3566	3492	4032	3950
Research and development organizations	2077	2686	2115	1840	1708	1574
Design Bureau	865	318	489	362	322	254
Design and survey companies	495	85	61	36	29	20
Experimental enterprise	29	33	30	47	61	49
The organization of higher education	446	390	406	517	1040	917
Research and development design divisions in enterprises	240	284	231	238	371	419
Other organizations	303	303	234	452	644	717

Compiled by authors from the https://rosstat.gov.ru/storage/mediabank/GOyirKPV/Rus_2020.pdf

The main participants in the technology market in Russia are government organizations and higher educational institutions, and not high-tech companies, as in other countries (Salitskaya E. 2018). Russian science, in this regard, plays an important role in solving the problems of technology transfer from the academic environment to the real sector of the economy, to ensure the innovative development of the state.

From a legal point of view, technology transfer should be considered as a process of making transactions related to the disposal of rights to the results of intellectual activity, which in general represent a new or improved technology for the production of products (rendering services, doing business) (Salitskaya E. 2018). In this regard, regulation of technology transfer is carried out by regulatory legal acts related to the results of intellectual activity. The results of intellectual activity are objects of intellectual property and are regulated by the relevant legislation. Since 2008, technology transfer has been regulated by articles of the Civil Code of the Russian Federation.

In Russia, there is a developed system of laws in the field of intellectual property, but legal acts directly regulating the transfer of technologies were adopted only in 2016 (Rybkina E., et al. 2018). Therefore, legal regulations in the field of technology transfer are relatively new.

However, the state, despite the lack of a legislative framework, implemented measures aimed at conducting fundamental and scientific research. In 2018 alone, the country's budget allocated 30 billion rubles for grants and 115 billion rubles in subsidies for research and development. Within the framework of the Strategy for Innovative Development of the Russian Federation, a direction is being implemented to form an innovative infrastructure and to create technology transfer centers. Today in Russia there are more than 100 technology transfer centers. And most of them work based on Russian universities. However, their territorial distribution is uneven (Zharova E., et al. 2018). Most of the technology transfer centers are concentrated in Moscow, St. Petersburg, the Republic of Tatarstan.

It is the state academies of sciences and state universities that carry out research activities in Russia. Here, such results of intellectual activity as databases, inventions, selection achievements, know-how, etc. are created. These institutions carry out most of the scientific and technical developments related to high technologies.

What is the legal status of these institutions? State educational institutions and scientific organizations, according to the current legislation, are budgetary and autonomous institutions, but at the same time they are non-profit organizations (Salitskaya E. 2018). The difference in legal status between budgetary

and autonomous institutions is as follows. For budgetary institutions, a list of governing bodies has not been established and there is a ban on placing funds on deposits and conducting transactions with securities. Autonomous institutions do not have such financial restrictions, but their activities should be carried out under the supervision of a supervisory board. And in general, autonomous institutions are more independent than budgetary ones.

Budgetary and autonomous organizations must carry out their main activities based on a state assignment, from which they cannot refuse. The state task is determined and formed by the founder. The Government of the Russian Federation acts as the founder. The difference arises when a state assignment is issued to conduct fundamental and exploratory research. In relation to higher educational institutions, in this case, the founder is the Ministry of Education and Science of the Russian Federation, in others the organization is the Federal Agency for Scientific Organizations.

The activities of state universities and institutes, scientific organizations can be divided into two categories. The first is the work that is carried out within the framework of the state assignment. The second is work that is performed more than the state assignment. This division is important from the standpoint of understanding who owns the rights to the results obtained during research activities. Since this directly affects the speed of the transfer of technologies that are created in universities or scientific organizations. When the work is completed within the framework of a state order, the owner of the rights to the results of intellectual activity will be determined by the contract. Otherwise, the contractor becomes the owner under a contract that did not provide for obtaining a scientific result.

There is a problem of determining the owner of the results of intellectual activity when it is carried out within the framework of a state assignment. There is no such provision in the documents regulating the implementation of the state assignment. In accordance with the current practice, the rights to the results of intellectual activity performed under the state order belong to the contractor. The executor is a university or scientific organization. In this case, the customer (state) has the right to demand to provide him or another person with a non-exclusive license for the results of activities.

Despite the existing shortcomings in the legislation, the general conclusion is as follows. When a university or scientific organization carries out research activities commissioned by the state, in most cases they will become the owners of the rights to the results they have obtained. But this right is limited by the legislation under a government contract when the customer can request a non-exclusive license free of charge. If the research work is not carried out within the framework of a state contract, then the exclusive rights to the results of intellectual activity belong to the performer. In this case, the customer can use the result obtained only in accordance with the purposes specified in the contract.

Consequently, scientific organizations and state universities have the exclusive right to the results of intellectual activity that they create in the performance of a state assignment, within the framework of a state contract and under R&D agreements, unless otherwise provided by additional agreements.

In order for scientific and educational organizations to dispose of the rights to the results of intellectual activity, they received the right to create appropriate economic societies. Small innovative enterprises have become the missing link between scientific institutions and the real sector of the Russian economy. Small innovative enterprises can apply a simplified taxation system, a reduced tariff for paying insurance premiums. The legislation allows scientific and educational organizations to contribute monetary funds and other property to the authorized capital, lease property belonging to them without holding a competition. But even in this case, universities or a scientific institution can use the right to the development carried out only with the permission of the founder. The state is most often the founder. And this is where the problem arises, since the process of negotiating a deal can be delayed. Therefore, for the commercialization of the obtained developments, it is not enough to find a buyer, which is also difficult in Russian realities. It is necessary that the buyer still agree to a postponement of the conclusion of the contract in connection with the approval of its founder. And most importantly, the buyer must agree to acquire the right, which is limited by the state's ability to require a license to use the results of intellectual activity.

It turns out that research organizations can transfer technology, but they have several limitations that can slow down the implementation of this process.

Today, in addition to imperfect legislation, other problems are observed in the implementation of the technology transfer process. First, there is a shortage of personnel, and secondly, there is a lack of funding. Since the institution of technology transfer is just beginning to develop in Russia, employees of scientific institutions do not have practical experience to bring the results of intellectual activity to the market. An obstacle is the low salaries of scientific specialists compared to the commercial sector, which leads to an outflow of qualified personnel. It should be borne in mind that the stages of technology transfer require the participation of not only scientists, but also marketers, lawyers, designers.

In addition to small innovative enterprises, technology transfer centers are opening at universities and research organizations. If the development is carried out within the framework of a state order, then the revenues of technology transfer centers come from the state. Moreover, developments created by the state are not always required on the market. In this case, the government's money was simply wasted. Therefore, technology transfer centers need to attract third-party customers, but at the same time, such orders may always be insufficient to ensure the work of all specialists. Today, almost every educational institution in one form or another is opening innovative departments that are engaged in scientific research. And if there are several such institutions in the city, then they simply cannot always provide themselves with work. Working only on government orders is not effective. That is, the supply of such services may be several times higher than the existing demand. Therefore, it is necessary to apply measures aimed at stimulating the demand for scientific products.

There are several solutions to this problem. It is possible to create large technology transfer centers in the region, which will coordinate the innovative activities of educational and scientific organizations. These centers can be specialized by industry, can concentrate human and financial resources. That will allow them to gain the experience and information necessary for the successful commercialization of developments. Such centers operate in France, Norway (Salitskaya E. 2018). However, the creation of such centers will require significant budgetary funds and will lead to the reform of the existing system of technology transfer. Which will entail significant economic and transaction costs. Therefore, in our opinion, the creation of such centers can be taken up by the universities and scientific organizations themselves. But for this, the state needs to create conditions for them to have a desire to create unified technology centers. This process will proceed progressively and will allow them to reduce costs and build a new system for organizing technology transfer. State assistance can be as follows. The first one is the improvement of the legal framework governing the transfer of intellectual property rights to the resulting developments in the transfer of technologies. The second is to provide direct government support to scientific organizations involved in technology transfer.

Conclusion

As practice shows, there are problems in the implementation of technology transfer. One of them is the weak regulatory framework on the disposal of rights to the results of intellectual activity in relation to educational and scientific organizations. This is essential, since it is they who carry out a large proportion of research and development, which can then be directed to the real sector. Another problem is the weak business interest in these developments. This leads to low commercialization of the results obtained. It should also be noted that the number of technology transfer centers in the intellectual property market far exceeds the demand for the services they offer. The creation of large technology transfer centers operating within the region can solve these problems.

From our point of view, in addition to creating unified technology transfer centers, to increase the efficiency of technology transfer, it is necessary to take measures aimed at:

– Increased demand for scientific products from business.
– Bridging the gap between science and business in the direction of creating new scientific developments.
– Increasing the level of commercialization of scientific developments.
– Taking measures aimed at developing innovative infrastructure in the field of technology transfer.
– Application of measures of state incentives for technology transfer.

The increase in the efficiency of technology transfer to the scientific and educational environment will contribute to the successful integration of higher educational institutions and scientific organizations with the national innovation system.

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Modern Managers' Values in a Multicultural Environment - An Introduction to An In-Depth Study

Agnieszka KNAP-STEFANIUK

Jesuit University Ignatianum in Krakow, Faculty of Education, Institute of Political and Administrative Sciences, Department of Law, Management and Economics, Krakow, Poland, agnieszka.knap.stefaniuk@ignatianum.edu.pl

Łukasz BURKIEWICZ

Jesuit University Ignatianum in Krakow, Faculty of Philosophy, Institute of Cultural Studies, Krakow, Poland, lukasz.burkiewicz@ignatianum.edu.pl

Abstract

In the context of growing business internationalization, values held by modern managers and their importance on people management in a multicultural environment are a topical and pertinent area of research. Values support managers in the realization of their visions, missions, and goals, all of which directly influence the effectiveness of the whole organization. Values play a significant role in multicultural environments, where they can act as a team bonding factor. The study described in the article is a mixed methods study: it combines traditional analysis of the subject literature and an empirical study. The results of the Corporate Values Index (CVI) study are described in the first part and used as the starting point for the preliminary study conducted by the authors of the article. The aim of CVI study was to answer the questions what values dominate in companies and how widely these values are incorporated in management. The next part presents the findings of the pilot study (8 telephone interviews) conducted by the authors, which they held with Polish managers working in multicultural environments. This pilot study is an introduction to a larger research project which will be conducted among managers working in international companies in Poland, Spain, and the Czech Republic. The article ends with the conclusion that the values held by managers are extremely important and affect a multicultural work environment. The main aim of the article is to demonstrate the role and significance of values held by managers working in multicultural environments.

Keywords: Values, People Management, Multicultural Environment, Managers

Introduction

The authors' decision to investigate values stemmed from their interest in this issue and the present crisis of values in business caused by companies' excessive focus on profit. Many people consider values to be uncountable, thus difficult to describe and measure and translate into measurable profit. This is a very interesting issue, especially because many organisations declare their willingness to manage by values, although, unfortunately, they do not put these declarations into practice (Le, Fuller, Muriithi, Walters, Kroll 2015). However, it should be emphasised that there are managers who attempt to build organisational culture on the basis of values shared by all or a vast majority of employees. This is due, among other things, to the development of such areas as motivation and employee involvement, which are used to increase the overall efficiency of an organisation. A widespread trend in contemporary business, called Motivation 3.0, assigns the role of motivators to various internal elements, including values (Pink, 2009). When it comes to the internationalization of business, Poland occupies an important place not only in Europe, but also worldwide, hence the issue of values and their influence on people management is of an increasing interest for Polish managers. For example, the Polish sector of modern business services intends to employ nearly 340 thousand

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people in 2020. The increase in employment in service centres in Poland since the first quarter of 2016 amounted to 43%, which is why this sector is so important from the point of view of people management. Employment in the first quarter of 2020 is predicted to reach over 336 thousand employees (ABSL 2019). These data motivated the authors of the article to investigate values held by modern managers and their impact on people management, especially in a multicultural environment.

The interest in values in management is relatively young. The first study in this areas was conducted by Thomas J. Peters and Robert H. Waterman, who, based on observations of the American economy in the early 1980s, recommended that entrepreneurs create a value system that would become a vital element of their competitive advantage (Peters, and Waterman, 1982). This research trend was continued by Ken Blanchard and Michael O'Connor, who led to a change in thinking in business in terms of values (Blanchard, and O'Connor, 2003): while managers used to focus on hard elements in management, such as systems and structures, the new trend encouraged them to focus on the organizational culture, which, built on values, was to form the foundations for employee involvement.

The theoretical part of the article describes the concept of values and the role they play in people management, taking into account the multicultural context. Next, it discusses the results of studies carried out by the ECCO Network and the results of the authors' study (8 telephone interviews); the latter are of a preliminary nature and will serve as a starting point for an in-depth study on values among Polish, Spanish, and Czech managers.

The aim of the article is to demonstrate the role and significance of values held by managers working in multicultural environments. Bearing this aim in mind, the following research questions were formulated: Do managers employed in international companies in Poland are familiar with and understand the concept of values? What values do they hold? Do they manage by values in practice? Can managers identify the impact of values prevalent in a given enterprise on people management in a multicultural work environment?

Values in contemporary organizations - definitions and the role they play in people management

Values are present in all organizations and held by all managers, and manifest themselves in organisational artefacts, behaviours, processes, and structures (Schein, 2004). Without a doubt, values represent the deepest level of cultures (Alas, 2009). In this context, it should be remembered that an organisation, being an institution, does not have and does not create its own internal values (Stackmanet, Pinder, and Connor), as it is the people working in an institution who implement values in an organisation (Thomsen, 2004).

The subject literature offers numerous definitions of values. The authors of the article focus of those of them that facilitate the understanding of the role values play in an organization in the context of their impact on people management. One of the definitions that best reflects this meaning of values is presented by Pucik, Ticy, and Barnett (1993). In their opinion, values are broadly understood convictions, often unconscious and non-negotiable, about what is good or bad, beautiful or ugly, rational or irrational, normal or abnormal, natural or paradoxical, or decent or indecent. Yukl (2002, p. 190) describes values as "constructs representing generalised behaviours or states of affairs that are considered by the individual to be important". Another definition states that values are ideas and beliefs that influence and guide our choices and actions (Gini, 2004). Henderson and Thomson (2003) define values as the sum of our preferences and priorities; preferences are what we would like to achieve, while priorities indicate how important particular preferences are in relation to one another.

Analysing values from the business perspective, some researchers claim that values determine how an organization and the people who make it work (Lebow, and Simon, 1997). Moreover, suggestions to replace management based on traditional control with management based on values were already made some time ago (Pruzan, 1998).

Initially, values within management were presented as a simple and mechanical concept of management (Blanchard, and O'Connor, 2003). However, the attempt to manage by values at the organisational level is not clear or obvious (Speculand, and Chaudhary, 2008). One of the first definitions of management by values (MBV) was given by O'Reilly and Chatman (1996, paragraph 168): "[...] a combination of identifying strategically relevant values and norms, as opposed to irrelevant values and norms, and promoting agreement as opposed to chronic conflict among organizational members [...]". In management by values (MBV), the main role played by values is to regulate employees' behaviour in order to achieve maximum efficiency. This means that the effectiveness of MBV depends in part on the effectiveness of the defined values in value statements; in order to assess their effectiveness, different value categories should be analysed (Jaakson, 2010, p. 795).

People work effectively and efficiently when they share a common vision, mission, and goals. This sharing is achieved by a set of shared values, which is most often implemented by management. However, in order to skilfully manage people, managers should be aware of their own system of values and of the values that are shared and accepted in a given organisation. If these values are consistent with the expectations of the multicultural work environment in which a manager operates, and if they are actually respected, then management by values brings the expected results. It should be emphasized that a manager who is aware of the importance of values is able to integrate employees around shared values and convince them to apply these values in practice. If this happens, values contribute to employee involvement, which is of particular significance in international companies, in which work environments are based on cultural diversity (Barnett, and Karson 1989).

The authors would like to point out three main reasons which, in their opinion, have a significant impact on the growing role of management by values in business, especially in multicultural organisations. They are based on the aforementioned study by Thomas J. Peters and Robert H. Waterman, who already 40 years ago predicted that the creation of a cohesive value system shared by all employees will become a vital element of a company's competitive advantage (Peters, and Waterman, 1982).

First of all, the financial crisis that hit the world over ten years ago triggered an interest in values in business. At that time, managers were faced with a great problem of the market recession. The previous conviction about the need to build long-term relationships with customers turned out even more prominent; such relationships should be based on communicating to customers their benefits. At present, it is not the transaction itself and short-term relationships that matter most but long-term relationships with customers. Such an approach must account for the implementation of certain values in management (Dixon, and Adamson, 2011).

Second, the values prevalent in an organization make it possible to build its uniqueness and to increase its competitiveness. It is values that distinguish one company from other companies in the market. They are a key element of successful multicultural organizations, which owe their success to an ability to dynamically, flexibly, and quickly adapt to the changes in the market. It is vital to adhere to and promote those values that clearly indicate what is respected and appreciated in a given company, what all employees strive for, and what is crucial in building positive, long-term relationships with clients. Cherishing shared values helps, especially in a multicultural environment, to avoid misunderstanding, both in relations inside and outside the organization, and to achieve objectives, which is possible thanks to efficient team management.

Third, an appropriate set of values allows managers to implement effective knowledge management, which is indispensable in the successful functioning in the international market. If an organization fosters its employees' independence and creates conditions that allow them to develop their creativity and innovation, it will achieve success by increasing the effectiveness of its operations. It is worth mentioning that employees working in a multicultural environment have more experience and this experience is more diverse than in monocultural ones, while the possibility of sharing knowledge allows them to use it to increase the effectiveness of their company. "Creativity thrives on diversity" (Morgan 1989), which is a great asset of multicultural teams.

Multiculturalism in organizations affects managers' attitudes, behaviours, and the values they hold, such as openness, tolerance, and acceptance of employees' cultural differences (Knap-Stefaniuk and Burkiewicz, 2018). In addition, managers of multicultural teams should be empathic and sensitive to the values held in diverse cultures, and, at the same time, have a strong personality and charisma to face specific challenges posed by a multicultural environment (Knap-Stefaniuk and Burkiewicz, 2020). They should also try to create the appropriate atmosphere in the workplace, especially in view of work-related stress and mental strain (Knap-Stefaniuk and Burkiewicz, 2019), which is particularly important in a culturally diverse work environment.

It is crucial to hold and promote those values which clearly indicate what is respected and appreciated in a given company, what all employees strive for, and what is the most significant in building positive, long-term relationships within the company and with customers. This allows managers (especially those who work in international companies in which cultural differences are a part of everyday functioning in culturally diverse teams) to make the right decisions and to avoid conflict or misunderstanding (Świątek-Barylska, 2010).

Management by values motivates employees to work faster and better than traditional management. What is more, studies confirm that compatibility between employees' personal and organisational values and the transparency of these values increase the level of their organisational involvement (Posner, and Schmidt, 1993). Thus, shared transparent values are indeed of great importance (Blanchard, 2006).

It is not only the multiculturalism of an organization that influences what values are held and promoted in it by managers. Generational differences are also a key factor affecting people management, especially in organisations with employees from diverse cultural backgrounds.

Employees belonging to different age groups display different attitudes towards work and values (Pendergast, 2009). Currently four different generations are present in the labour market: Baby Boomers (born between 1949 and 1963), Generation X (born between 1964 and 1979), Generation Y (born between 1980 and 1994), and Generation Z (born after 1995 or even 2000), (Shephard, 2006). The oldest employees (Baby Boomers) primarily expect tolerance, stability, teamwork, and consensus. Generation X looks for stable employment and values low-stress and secure jobs that do not require facing new challenges and changes (Deverson, Hamblett 1964). Generation Y, called Millennials, is the first generation that is not afraid of change and appreciates freedom of speech, choice, and activity (Heaney, 2007). The same is true of Generation Z, which holds similar values in its professional and private life to Generation Y, but does not pay attention to long-term relationships with employers (McCrindle, 2014).

"As business leaders strive to accomplish great achievements in our global economy, it is important to always remember that values endure. They are absolute, unchanging and non-negotiable" (Dean, 2008, p.7). Values connect employees, bind teams together, support the achievement of goals and facing new challenges, shape employees' attitudes and behaviour, their relations with managers and contacts with clients. Values held by managers significantly affect people management, for example, communication between team members, motivating employees, resolving conflict, or, more generally, treating people and appreciating their work and achievements. In a multicultural environment managers' values are often the foundation that unites employees from diverse cultures around what is shared, acceptable, and understandable to all of them.

Summing up, it is worth referring to Rokeach's (1973) definition of a value: for him it is simply an enduring belief that is personally or socially preferable. Following this definition, values can exist at individual, organizational, and societal levels. At individual or organizational levels values act as a guide or a standard for people's behaviour. They represent the way in which people think and behave.

It should be remembered that, as the company develops, organizational values are shaped by all members of the organization and events that affect its functioning (Gorenak, Ferjan, 2015). Managers

and their values have a paramount impact on how effectively teams work and organizational objectives are implemented, especially in a multicultural environment.

Methodology

The research method adopted by the authors of this article is a mixed method based on the analysis of the subject literature and the discussion of the results obtained in the empirical study. The article first discusses the results of secondary studies conducted in a number of countries by the ECCO Network, an international network of advisory, consulting, and research companies, which were a continuation of the study devoted to business values carried out in 2003 only in France. Next, the results of the authors' study (8 telephone interviews with Polish managers working in international companies in Poland) are presented. This study is an introduction to a larger research project.

The first edition of the international study conducted by the ECCO Network in 12 countries (Poland, Germany, France, Italy, Hungary, the Netherlands, Spain, Finland, Norway, Great Britain, India and the USA) took place in 2006 an was named "Corporate Values Index 2006". It covered the employees of several thousand companies from fourteen different industries (ECCO Network 2006).

The second edition was carried out in 2009 and included over 3800 companies from the financial sector from 10 countries (including Poland, Germany, India, Spain, Great Britain, Ukraine, and the United States). It yielded over 18 500 different terms referring to the values held by employees of these organizations. For the purpose of the analyses, in the "Corporate Values Index 2009" their number was reduced to 89 values, which were subsequently used to compile a list of 10 values that were the most popular internationally, based on the frequency with which they appeared in respondents' answers (ECCO Network 2009).

The "Corporate Values Index 2013" was the third study of this kind conducted by the ECCO Network; it took place in 2013, covered 4300 largest companies representing 14 industries in 13 countries around the world and identified nearly 23,000 values (ECCO Network 2013). The questions regarding values were answered not only by top executives, but also by managers, employees, and customers. The ECCO Network did not reveal the research tool used in the studies, and the first and third editions covered companies from various industries, while the second edition focused on the financial industry.

The study conducted by the authors of the article was based on the interview method and telephone interview technique. Such a solution proved to be the most effective, taking into account the epidemiological situation in Poland related to COVID-19. The authors developed a short interview questionnaire with closed and open questions directed to managers; the questionnaire was based on the study carried out by the ECCO Network.

The key criterion for selecting respondents was their employment in managerial positions in international companies (with over 100 employees) located in Poland and their experience in managing multicultural teams (at least 2 employees of different nationalities in the team).

The interviews with 8 managers who had been holding managerial positions for more than 3 years (the authors assumed that 3 years is a sufficient period to acquire experience in managing a multicultural team) were conducted between July and August 2020.

Some respondents agreed to have the interviews recorded (3 people), while 5 did not, so the respondents' answers were written down by the authors. The answers to the interview questions were coded and categorised, and served as the basis for a short quantitative data analysis.

The respondents participating in the study were Polish managers (2 women and 6 men) aged between 35 and 49.

The results of studies on values held by managers working in multicultural environments

Studies on modern managers' values and their impact on people management in diverse cultural contexts have been conducted for some time. Searching a popular JSTOR digital library reveals the extent to which these studies have been undertaken internationally, for example, in India (Roy S., Dhawan 1984), Slovenia (Kovač, Jesenko, 2003), Iran (Alavi, Yasin, 2003), Kuwait (Ali Abbas J., Al-Kazemi, 2005), Turkey (Askun, Oz, Aşkun, 2010), USA (Posner, 2010), South Africa (Mayer, Louw, 2013), Iceland (Sigurjonsson, Vaiman, Arnardottir, 2014), Bulgaria (Petkova-Gourbalova, 2015) and many other.

To the best of the authors' knowledge, there are no Polish studies that in a practical way investigate contemporary managers' values and their influence on people management in a multicultural environment.

The first edition of the study conducted by the ECCO Network in 2006 revealed that at that time values became one of the leading trends in people management. A set of values held by a manager and their skilful implementation considerably facilitates the process of shaping employees' desired attitudes and behaviours. What is important, the results of this study indicated that values in management are an important step forward compared to e.g. management by objectives. The study demonstrated that the values that guided managers in shaping the strategy of people management and also enterprises in general, included: quality (listed by 38% of respondents), innovation (38%), customer satisfaction (37%), honesty (21%), care for the environment (18%), teamwork (18%), and know-how (17%). Interestingly, at that time as many as 77.5% of the companies analysed in the study applied the concept of management by values, while in Poland the percentage of such companies was only 21.5% (ECCO Network 2006).

In the "Corporate Values Index 2009" the analysed values were grouped by importance and category, which yielded 8 main groups:

- *professional values* are linked to the quality of the offer and the company's core business, company characteristics and products, all of which translates into customer trust and satisfaction,
- *combative values* are related to 'soft' abilities that are conductive to high competitiveness, including ambition and initiative,
- *behavioural values* describe the way in which a company and its employees operate, i.e. adaptability, freedom, and commitment,
- *societal values* define the attitude to the environment in which the company operates,
- *relational values* refer to the way in which a company communicates with its environment (e.g. accessibility, trust, and partnership),
- *fulfilling values* are linked to a company's attitude to employees' individual feelings and characteristics, such as humanism, personal development, or sensitivity,
- *moral values* concern a company's attitude to the principles of ethics, morality, and honesty,
- *social values* are the ones that are shared with society, such as democracy and equality.

The values most frequently indicated in the study were: quality (39%), innovation (39%), customer satisfaction (26%), honesty (19%), and environment (18%).

The 2009 edition of the study revealed values important for different nationalities. For example, the managers from Spanish companies appreciated social values and societal values the most, with social responsibility (39% of the respondents), responsibility (36%), and innovation (30%) heading the list. However, managers from other countries in southern Europe put relational values, including accessibility (38%), innovation (31%), cooperation (31%), and sharing (31%), on top. Honesty (34%) was the most important value indicated by the Italian managers. Vales rated the highest by the Germans were societal values, e.g. social responsibility (67%) and professional values, e.g. customer satisfaction, reliability, and work quality (29%). For the Austrians, social responsibility and health (38% each) were significant values. Professional values (e.g. customer satisfaction, 40%) and moral

values (e.g. honesty, 30%) were the top ones for the Dutch, while the Ukrainian managers most frequently indicated combative values (e.g. innovation, 96% and success, 81%), professional values (e.g. quality, 92% and know-how, 85%), and relational values (e.g. communication, 62%). In the UK, innovation and know-how were the ones most respected (60% each), followed by reliability (44%) (i.e. professional values), and combative values such as customer satisfaction (32%) and success (32%). The American managers most often pointed to professional values and combative values, i.e. trust (39%), customer satisfaction (33%), and innovation (28%). In the Indian companies, innovation (53%) (a combative value), customer satisfaction (42%) (a professional value), and reliability (39%) (a relational value) were rated the highest (ECCO Network 2009).

In the "Corporate Values Index 2013" study the most frequently chosen values were innovation (40%), quality (30%), customer satisfaction (28%), honesty (20%) and concern for the environment (17%). Also in this edition, values were divided according to the respondents' nationality. In the UK, the ones from the top included: honesty (62%), innovation (31%), and know-how (31%), in the USA: customer satisfaction (63%), competitiveness (53%) and honesty (47%), while in Switzerland: quality (43%), responsibility (38%), and innovation (29%). Managers from Norway valued: customer satisfaction (39%), ambition (24%) and innovation and flexibility (19% each), from Finland: customer satisfaction (70%), responsibility (25%), and teamwork (25%), and those from Australia: integrity (85%), service (40%), teamwork and customer satisfaction (35%). Crucial values for the French managers were: accessibility (34%), innovation (31%), efficiency and team spirit (25%), for the German ones: customer satisfaction (50%), quality (41%), and social responsibility (36%), whereas for the Spanish ones: innovation (52%), customer satisfaction (48%), and know-how (48%). In Dutch companies, the most important value indicated by respondents was customer satisfaction (35%), which was in line with the result obtained in the previous study. Also the Italians remained faithful to their values: honesty (35%) was again chosen as the most important value at work. The Austrians pointed to two values on the top of their list: innovation and quality (50% each).

Comparison of the values indicated by managers in the studies conducted in 2009 and 2013 is presented in the table below. Unfortunately, the studies did not include managers of all nationalities of interest to the authors, hence below only comparison of those nationalities that were included in both studies is given.

Table 1: Comparison of the most important values indicated by managers from the countries included in the study

The most important values indicated by managers from the countries included in the study		
Country	Corporate Values Index 2009	Corporate Values Index 2013
USA	trust (39%)[1]	customer satisfaction (63%)
United Kingdom	innovation and know-how (60% each)	honesty (62%)
Spain	social responsibility (39%)	innovation (52%)
Netherlands	customer satisfaction (40%)	customer satisfaction (35%)
Italy	honesty (34%)	honesty (35%)
Germany	social responsibility (67%)	customer satisfaction (50%)
Austria	social responsibility and health (38% each)	innovation and quality (50% each)

Source: own elaboration based on: ECCO Network 2009; 2013.

The questionnaire used in the study conducted by the authors of the article was based on the eight main groups of values identified in the ECCO Network study (professional values, combative values,

behavioural values, societal values, relational values, fulfilling values, moral values and social values). As the authors assumed that it is managers who determine what values are appreciated in a given company, they decided to focus on values held be managers who worked in a multicultural environment. It should be remembered that the study described here is a preliminary one; it will be continued on a broader scale in the near future.

The purpose of the interviews was to obtain information whether the managers who took part in it were familiar with and understood the notion of values, whether they were able to indicate what values they held (which of the above mentioned groups were the most important for them), and whether they managed by values in practice. Moreover, the authors also wanted to find out whether managers were able to determine the impact of values prevailing in their company on people management (in the teams they lead) in a multicultural work environment.

As was already mentioned, the respondents included 2 women aged 35-42 and 6 men aged 36-49. At the time of the interviews, all of them worked in international companies, in which they were in charge of multicultural teams (that consisted of employees of at least 2 nationalities), and had been working in managerial positions for over 3 years (between 5 and 14).

All the respondents (8 people) were familiar with the concept of values, which they defined as: convictions that allow people to determine what is good and what is bad, rational or irrational, decent or indecent (6 people), ideas and beliefs that influence and guide people's choices and activities (5 people), and as a sum of people's preferences and priorities (5 people). All mangers agreed with the statement that "values determine how an organisation and the people who make it work" (8 people).

When asked about the 8 main groups of values described in the ECCO Network study, the respondents' answers were as follows: professional values (8 people), combative values (6 people), behavioural values (6 people), societal values (7 people), relational values (5 people), fulfilling values (7 people), moral values (6 people), social values (5 people).

Most respondents indicated professional values, societal values, and fulfilling values as the vital ones. Only 4 of them declared that they implemented the concept of management by values in their work (and stated that this concept had been present in their companies for several years).

Managers were able to determine the impact of values prevailing in their company on people management (in the teams they were in charge of) in a multicultural working environment. The most important values they listed included: communication (7 people), innovation (7 people), quality (7 people), teamwork (7 people), responsibility (6 people), cooperative spirit (6 people), and customer satisfaction (6 people). The respondents declared that the values they held had a significant impact especially on such areas of people management in their teams as: efficient communication (7 people), shaping employees' motivation and involvement (7 people), cooperation in the implementation of group projects (7 people), building team relations – inside and outside the company (6 people), planning trainings for employees and their development (6 people), designing objective evaluation systems (6 indications), building relations with clients (6 people), sharing knowledge and experience (6 people), building the atmosphere of cooperation (6 people), and solving conflict (6 people),.

Discussion

The results of the studies carried out by the ECCO Network in the area of values in the organizations that participated in them lead to the following conclusions:

- the values in individual companies in 2006, 2009, and 2013 were similar,
- among the values indicated in 2006, 2009, and 2013, quality, innovation, customer satisfaction and honesty were the most frequently indicated,
- in 2006 the key values included quality, innovation, customer satisfaction, honesty, and care for the environment,
- in 2009 these were quality, innovation, customer satisfaction, honesty, and care for the environment,

- in 2013 it was innovation, quality, customer satisfaction, honesty, and care for the environment,
- in 2013 several new values were listed, including society, corporate spirit, global approach, reliability, customer satisfaction, and leadership,
- the studies confirmed that different values were significant for different nationalities.

Interviews conducted by the authors revealed that the managers who took part in them were familiar with the concept of value (8 people). Most of them defined values as convictions that allow people to determine what is good and what is bad, rational or irrational, decent or indecent (6 people). The groups of values they respected most included professional values (7 people), societal values (6 people), and fulfilling values (6 people). Only 4 managers declared that they applied the concept of management by values in their companies.

The respondents also listed the values that prevailed in their companies. These were: communication, innovation, quality, teamwork (7 people), and responsibility, spirit of cooperation and customer satisfaction (6 people each). The respondents indicated that the values dominant in their enterprises (in a multicultural work environment) had an impact on people management, especially in such areas as: efficient communication, shaping employees' motivation and involvement, and cooperation in group projects (7 people each). Other areas included building team relations, sharing knowledge and experience, building the atmosphere of cooperation, or resolving conflict. These areas are very important in managing employees who come from diverse cultures.

Limitations

The authors of the article are perfectly aware of the limitations that result from conducting a primary study with a small research sample (8 managers). Nevertheless, as mentioned in the Introduction, the study was an introduction to a larger research project that will investigate, among others, the role and importance of values held by managers working in multicultural environments that the authors intend to conduct among Polish, Spanish and Czech managers.

The primary study was conducted with the use of the interview method and the telephone interview technique, which was also a certain limitation. However, the authors made such a decision because of the situation related to COVID-19. Originally, the authors had intended to conduct in-depth individual interviews, which would certainly yield more insightful and detailed results.

The results obtained in the study allowed the authors to signal the role of values held by managers on the area of people management. The authors are aware that this is an area of research that requires a more in-depth approach in further research projects.

Conclusion

In the authors' opinion, values are absolutely essential for effective people management, especially in companies where multiculturalism of employees is a widespread, permanent element of the manager's daily work.

Therefore, it should be emphasized that the results of the studies conducted by the ECCO International Communications Network in 2006, 2009, and 2013 revealed a growing role of values for managers and organizations; it can be even said that nowadays values are becoming a "must have" in business. When companies implement certain sets of values, they 'prompt' their managers to use these particular sets for proper communication and cooperation with employees.

Managers who are able to implement a flexible work culture based on shared values, especially in a culturally diverse work environment, are highly effective in utilising the potential of multicultural teams, e.g. their innovation, creativity, knowledge, and experience sharing. Tolerance and acceptance for diversity should be on top of the list of values held by managers who work with employees from diverse cultures.

Modern organizations, if they want to develop and be competitive, must hold values on the basis of which managers will be able to effectively manage employees and build well-tuned, efficient teams. The values that managers hold are particularly pertinent in environments characterised by cultural diversity, as they allow them to unite people from various cultures around what should be transparent, shared, and accepted by all employees.

The authors believe that the values held by contemporary managers exert a great impact on people management, also in Poland, where the sector of modern business services is developing very dynamically. Therefore, it should be emphasized that in the future not only technological development and its consequences, such as robotic process automation (RPA), machine learning (ML), and artificial intelligence (AI), will pose a challenge for managers working in an international environment. An equally challenging area they will have to face will be skilful management by values and the continuous improvement of human capital in order to direct employees towards values shared in a multicultural working environment.

Summing up, it should be emphasized again that respecting shared values – by managers and employees – is conductive to, especially in an intercultural work environment, developing innovation and team spirit, avoiding misunderstandings and difficult situations, and thus to effectively achieving team and organizational goals. Values held by managers are particularly important in such environments, as they influence the attitudes, behaviours, and values of employees. They affect various areas of management, especially people management.

The in-depth study the authors are planning to conduct in the near future will investigate values held by managers in Poland, Spain, and the Czech Republic. Further studies in this area should examine whether the values held by managers are consistent with those held by employees. Additionally, it is worth analysing whether and to what extent the values held by different generations active in the labour market at present differ, especially in the context of cultural diversity of work environments.

Notes

1.The number expressed as percentage indicates the percentage of managers of given nationality who have indicated this particular value as significant in their daily work.

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Perceived Stress and Nomophobic Behavior Among Junior Medical Students in Russia And Uzbekistan

Evgeni NIKOLAEV

Ulianov Chuvash State University, Cheboksary, Russia
E-mail: pzdorovie@bk.ru

Igor POVERINOV

Ulianov Chuvash State University, Cheboksary, Russia

Laziz NIYAZOV

Bukhara State Medical Institute, Bukhara, Uzbekistan

Abstract

The paper presents the results of a study of the features of manifestation of nomophobic behavior and its interrelationships with perceived stress in junior medical students from two countries with different cultures. The anonymous survey using the FIE-Stress Inventory and Mobile phone use related anxiety questionnaire was attended by 292 students in the first two years of study - 210 students from Ulianov Chuvash State University in Cheboksary and 82 -from Bukhara State Medical Institute. The data on the similarities and differences among students of Russia and Uzbekistan in the level of stress, manifestations of nomophobic behavior and their interconnections which can be taken into account when planning preventive work with students at a medical university were obtained.

Keywords: medical students, stress, nomophobia, Russia, Uzbekistan.

Introduction

The topic of smartphone and digital media overuse is attracting the attention of an increasing number of researchers. Such behaviors are widespread among those in the digital age (Scott et al., 2017) and are closely associated with mental health problems (Nikolaev and Kulygina, 2020), especially among students (Cain, 2018).

Nomophobia is a relatively new and insufficiently studied psychological phenomenon arising in the process of human-smartphone interaction, the clinical consequences of which are widely discussed today (Yildirim and Correia, 2015). First described in 2010 (King et al., 2010), this condition is characterized by anxiety arising in a mobile phone user, anticipating a situation in which he may be left without access to his phone (Yildirim et al., 2016). Researchers find in nomophobia traits of both social phobia and addictive behavior (King et al., 2013) which can be considered in the frame of compulsive use of online social networking sites (Kuss and Griffiths, 2017).

Medical students are known to be at high risk of mental health threats (Voltmer et al., 2008), incl. due to the specificity of attitudes towards death and suicide (Chistopolskaya et al., 2016; Chistopolskaya et al., 2017). Among them, problematic smartphone use is also widespread which not only negatively affects

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health but is also associated with academic failure (Prasad, 2017). Scientists believe that this problem is becoming more and more urgent for medical students (Farooqui, 2018) and is already gaining socially significant character (Basu, 2018).

The aim of this study is to study the features of the manifestation of nomophobic behavior and its interrelationships with perceived stress in junior students studying medicine and living in countries with different cultures - in Russia and Uzbekistan, in order to identify the extent of similarities and differences in the consequences of smartphone and digital media use.

Method

The study was conducted on the basis of Ulianov Chuvash State University, UCSU (Cheboksary, Russia) and Bukhara State Medical Institute, BSMI (Bukhara, Uzbekistan). The anonymous survey involved 292 medical students in their first two years of study - 210 students in Russia and 82 - in Uzbekistan.

The average age of students of the two medical universities did not differ statistically ($p>0.05$) and amounted to 19.63±1.32 years at UCSU and 19.59±1.51 years at BSMI. The sex composition of the surveyed at UCSU was 41.43% of men and 58.57% of women, in BSMI - 43.90% of men and 56.10% of women. These ratios in the two study groups of students also did not differ statistically ($p>0.05$), which made it possible to carry out a quantitative and qualitative comparison of the groups.

The level of perceived stress was determined using the FIE-Stress Inventory which made it possible to establish both the severity of the general level of stress and its three components - physiological, informational and emotional (Ivanova, 2008). To establish the severity of nomophobic behavior, students filled in a 35-item Mobile phone use related anxiety questionnaire (Nikolaev et al., 2018).

Mathematical processing of the results was carried out using basic statistics and correlation analysis (with a significance level of $p<0.05$).

Results

The results of the study showed that the general level of stress among Russian medical students was significantly higher than that of their Uzbek peers ($p<0.0001$). Evaluating the qualitative structure of stress it can be noted that Uzbek medical students in comparison with Russian medical students had a lower severity in all of its components - physiological, informational and emotional stress ($p<0.0001$). In other words, Uzbek students were less likely to report general somatic symptoms (headache, sleep disturbances, poor appetite), less often felt a lack of time, information overload, impairment of memory and thinking abilities, less experienced various negative experiences (fear, anxiety, irritation, uncertainty, dissatisfaction).

In the Russian group, students with varying intensity of stress were represented in different proportions - more than half of the students (58.57%) had an average level, every fourth (26.19%) had a high level, every seventh (14.76%) had a low level, and one person (0.48%) - a very high level of stress. In the Uzbek group, only two levels of stress intensity were presented - an average level (63.44%) and a low level (36.56%). At the same time, the significance of differences between the groups was determined only in relation to the low level ($p<0.0001$) - medical students from Uzbekistan were significantly more likely to have a low intensity of stress than students from Russia.

An analysis of the results of filling in Mobile phone use related anxiety questionnaire revealed both similarities and differences between Russian and Uzbek medical students. In particular, students from

Russia and Uzbekistan with the same frequency ($p>0.05$): prefer that the phone was always within the field of view; keep it next to them in a bag, pocket or hand; put the phone closer to the bed at night so as not to miss a call; do not part with him in the bathroom, shower or toilet, as well as for food; check the phone to find out if messages have come, if there have been calls; return home for the phone, even if it threatens to be late; worried and fussed if the phone suddenly disappears; get angry and have poor control over themselves if left without a phone; when the phone is off, they feel anxiety; experience anxiety when they are out of the coverage area of the network for communication; feel anxious if the connection is lost, or if the phone is turned off; nervous and angry when it is not possible to turn on the phone; carry a charger with them in case the phone battery runs out; are afraid of stealing their phone; try to browse social networks in their free time; trying to update the phone; follow the novelties in the world of mobile technologies and purchase new accessories for the phone; feel a phantom vibration or a phantom call from a phone, incl. when it is off.

Uzbek medical students reliably more often than Russian students enter the necessary information into the phone instead of memorizing or writing down ($p=0.0037$); turn off their phone ($p=0.0169$); are afraid of losing their phone ($p=0.0208$); waking up in the morning, first of all, they pick up the phone ($p=0.0445$); after a temporary stay without a telephone, they immediately clarify whether there were calls or messages ($p=0.0493$).

Russian medical students are significantly more likely than Uzbek peers to carry two telephones with them at one and the same time ($p=0.0018$); envy those who change their phone more often ($p=0.0081$); get annoyed and answer rudely when there is no way to check the phone or if someone is distracting ($p=0.0083$); being on a visit, they try to follow the telephone and communications (whether there is a connection, whether calls or messages have been received) ($p=0.0107$); consider that sometimes “digging” in the phone is much more interesting than communicating with relatives or others ($p=0.0316$); do not spare money to buy a new phone model or accessories for it ($p=0.0372$).

To clarify the nature of the relationship of the studied parameters, a correlation analysis of the obtained results was carried out separately in the Russian and Uzbek samples.

Two pairs of significant correlations were common for both samples. The first positive relationship is between the student's age and the frequency of switching off the phone ($r=0.20$ and $r=0.23$). The second is between the level of informational stress in the student and the feeling of vibration of the phone for no real reason ($r=0.25$ and $r=0.22$).

Negative correlations between the student's age and the following symptoms became characteristic only of the Uzbek sample: phantom call syndrome ($r=-0.31$), phantom vibration syndrome ($r=-0.31$), placing the phone next to the body ($r=-0.41$). The latter practice, in turn, positively correlated with the level of emotional stress ($r=-0.28$) and the average level of general stress ($r=-0.23$).

More significant correlations were found among Russian students. The older students had a lower level of information stress ($r=-0.16$). Boys turned off their phones more often ($r=-0.27$), girls more often feared theft ($r=-0.16$) or loss of their phone ($r=-0.20$) and more often had a higher physiological level ($r=-0.22$), informational ($r=-0.23$), emotional stress ($r=-0.24$), and general stress ($r=-0.26$). Russian students of both sexes also showed positive relationships between the general level of stress, its various forms (physiological, informational and emotional stress) and anxiety symptoms associated with the use of a mobile communication device, including phantom vibration syndrome and phantom call syndrome.

Conclusion

In this study of the features of nomophobic behavior and its interrelationships with perceived stress among medical students from two countries it was found that the level of general stress among Russian students exceeds that of Uzbek students who are more likely to have low stress intensity. Most of the manifestations of nomophobic behavior occur with the same frequency in students from both countries. The frequency of phantom vibration syndrome corresponds to a higher level of information stress in them, and the frequency of switching off the smartphone corresponds to an older age.

Among Uzbek BSMI students, there is a higher willingness to use a smartphone as a storage device and turn it off at night. In older students phantom call and phantom vibration syndromes are less common. Younger Uzbek medical students are more likely to place their smartphones next to their bodies and have higher levels of emotional stress.

Among the Russian students of UCSU, the guidelines for the possession of several phones and the desire to change them more often were noted. All forms of stress are interconnected with the frequency of phantom ringing and phantom vibration. With age, the frequency of information stress among Russian medical students decreases.

The obtained comparative data can be refined using a larger sample of students from different universities in the two countries. However, they can already be taken into account when planning preventive work with undergraduate medical students.

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Agriculture in Poland And the Protection of The Natural Environment. Results of Expert Studies

Arkadiusz PIWOWAR

Wroclaw University of Economics and Business, Wrocław, Poland
arkadiusz.piwowar@ue.wroc.pl

Abstract

Agricultural activity has a considerable impact on shaping of the natural environment. It is directly associated with the consumption of natural resources and changes in the spatial development, and hence it becomes necessary to take into account environmental issues in the agricultural economics in the macroscale, mesoscale and microscale (in agricultural policy, analyses of economic effectiveness in agriculture in specific spatial ranges, ethical dimension of the economic activity, social responsibility of farmers, etc.). The article presents the opinions of experts regarding the causes of problems related to the threat to the natural environment in rural areas in Poland and the proposed remedial measures. The survey was conducted at the turn of 2017/2018 and concerned current problems in the studied subject area. The main objective of the research was to identify the reasons why farmers did not take actions aimed at protection of the environment, as well as to indicate the measures (at the central and local levels) that could improve this situation. The experts indicated many possible actions that may contribute to an improvement of the condition of the natural environment in rural areas in Poland.

Keywords: Rural Areas; Agriculture; Environmental; Protection; Tag Cloud

Introduction

Production activity in agriculture, especially in the open-field crop cultivation and grazing livestock farming, is inseparably associated with the nature. Agriculture is a very important element of the landscape and it fulfils many non-production functions related to protection of the natural environment. The industrial model of agriculture, which is characterized by a high degree of chemicalization and mainly economic measures of productivity of agricultural holdings, creates many threats in the ecological sphere (Babin et al. 2019; Balsalobre-Lorente et al. 2019; Ren et al. 2019; Englund et al. 2020; Chen et al. 2020; Bereznev et al. 2020; Möhring et al. 2020). The use of a combination of expenditures that allows obtaining the highest income, which is characteristic of the industrial agriculture, is not optimal from the social point of view. In agriculture, negative external impacts are mainly of environmental character (Lanz et al. 2018; Hou and Hou 2019; Rose et al. 2019; Ahmad et al. 2019; Armstrong and Stedman 2019; Zhu et al. 2019; Piwowar 2020; Balogh and Jámbor 2020). They include reduction of biodiversity, disturbances in the natural circulation of nutrients, pollution of soil, water and air, as well as excessive consumption of water resources. The internalization of negative external impacts of agricultural production is a challenge of the present times – both in the theoretical and practical sphere (Van Grinsven et al. 2015; Hsianget et al. 2019; Pravia et al. 2019; Zheng et al. 2019; Gong et al. 2019). Currently in Poland there is a relatively high level of mineral fertilization. The use of pesticides, especially herbicides, is also relatively high (Piwowar 2018b; Zalewski 2020). Environmental side effects, which result from the livestock production activities, also concern emissions of pollutants into the soil and air (Piwowar 2018a). In addition, the issues related to the emission of pollutants, caused by grass burning, spot soil contamination during preparatory work associated with the use of agrochemicals, etc., are also important from the point of view of shaping the low-emission economy in the agriculture (Van den Berg et al. 2020). There are also many other challenges in rural areas associated with the protection

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of the natural environment, such as reduction of low-altitude emissions (Adamczyk et al. 2017; Samsonstuen et al. 2019; Piwowar and Dzikuć 2019; Kaczmarczyk et al. 2020).

The issues at the point of contact between the environmental protection, ecology and agricultural activity are very often taken up in the Polish literature of the subject. The interactions between the agricultural production and preservation, protection and shaping of the diversity of agroecosystems were presented inter alia by Marks and Markowski (2012), and Anderson et al. (2020). There are also studies conducted at the point of contact of economy, agriculture and environment, but it is difficult to determine how and to what extent the agriculture can ensure an environmental balance while maintaining the current level of profitability (Robertson and Swinton 2005; Roesch-McNally et al. 2018; Dominati et al. 2019). The studies show that farmers' sense of responsibility for the state of the natural environment and their awareness in this scope are important here (Gołębiewska and Pajewski 2015). Legal regulations and acts play a significant role in the protection of natural resources and prevention of the loss of natural values (Janiszewska and Ossowska 2017). Institutional frameworks and the level of support for the agriculture under rural development programs should take into account the problems of environmental protection even to a greater extent (Gała 2017). In addition, implementation of innovations in agricultural holdings may bring positive effects for the natural environment (Kagan 2011; Piwowar 2017; Piwowar 2018a). The necessity of incorporating environmental aspects into the theory of production in the agriculture as well as into the measurement of productivity has been presented in the Polish literature inter alia by Góral and Rembisz (2017).

Environmental protection is one of the most important challenges of the present times in Poland. This paper presents results of questionnaire surveys and expert studies, which have been a part of the research concerning the problems associated with the low-carbon agriculture in Poland. The research project is funded by the National Science Centre. The main objective of the research was to identify the reasons why farmers did not take actions aimed at protection of the environment, as well as to indicate the measures (at the central and local levels) that could improve this situation.

Research Methodology and Characteristics of The Test Sample

The survey, the results of which are presented in this paper, was a part of the research process carried out under a research project in the area of basic research. The surveys were carried out in the period from November 2017 to March 2018. Along with the expert studies, there were conducted surveys among farmers (nationwide and representative; size of the test sample: 1101 agricultural holdings). The experts in the studies included primarily employees of agricultural advisory centers in the provinces, in which the surveys of farmers were conducted (Mazowieckie, Opolskie, Lubelskie, Wielkopolskie, Małopolskie and Pomorskie Provinces). The randomly selected territorial area of research well characterizes the diversity of agriculture in Poland, including the intensity of agricultural production. It is very important because the specialization of agricultural production, its scale and intensity largely determine the condition of the natural environment. For example, in the Opolskie voivodeship, high mineral fertilization is noted, it is an area with a dominant share of intensive plant production. On the other hand, the Wielkopolskie voivodeship is characterized by developed animal production, especially of pigs.

In each of the six randomly selected provinces where the surveys were conducted, at least 3 experts completed the questionnaire surveys. The agreement with the Agricultural Advisory Centers included clauses saying that the questionnaire surveys can be conducted among other experts in the analyzed material scope (not employed at the Agricultural Advisory Centers), recommended by the Principal. The questionnaire for the experts consisted of three thematic blocks:

1. general information about the respondent;
2. rural areas and protection of the natural environment in Poland;

3. quality of the natural environment in rural areas in the province (district) which the respondent represents and knows the conditions occurring there.

24 experts took part in the research, including 14 women and 10 men. The average age of the respondents was 36 years. The youngest participant in the survey was 29 years old, while the oldest – 65 years old. Almost all experts (23 respondents) had a higher education. The experts were characterized by considerable experience in the subject of agriculture development and rural development. 14 people indicated that they has over 20-year experience, 8 experts indicated the experience of 5–10 years, while only 2 persons indicated the experience of less than 5 years.

A traditional form of presentation (tables, drawings, descriptions) as well as a modern form of data presentation, i.e. a tag cloud, were used in this study. This modern form is more and more often used in scientific studies, also in the research in the fields of ecological economics and sustainable development (White 2013; Smółka-Dolecka 2016). Using a web application (Wordle tool for online data visualization), the statistics of the occurrence of individual keywords in the verbal descriptions provided by the experts (open-ended questions concerning opinions of the experts) were examined and the results were graphically presented in the symbolic structure of the cloud.

It is worth noting that the opinions expressed under this research project were provided by the people closely linked to the agricultural activity, who observe the work of farmers on a daily basis, help them to formulate plans (e.g. concerning crop rotation, fertilization, chemical plant protection) and elements of strategies of agricultural holdings, as well as complete application documents under the Common Agricultural Policy (CAP).

Results of The Research and Discussion

Two research questions addressed to the experts concerned their assessment of the current state of environmental protection in Poland and their assessment of this state in rural areas (Fig. 1).

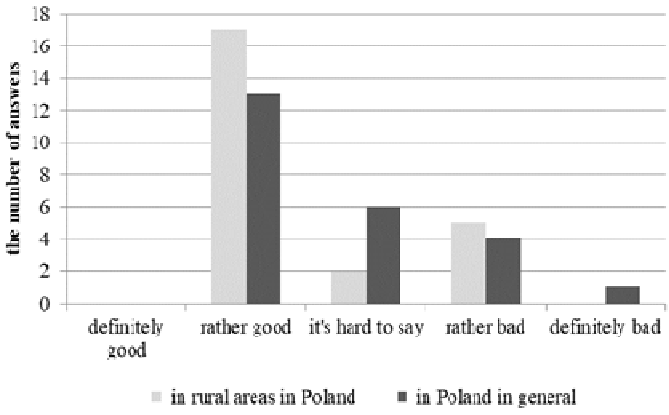

Fig. 1: Experts' assessment of the current state of the environment in Poland in general and in rural areas in Poland

Source: own study based on questionnaire surveys (N=24)

As it results from the research, none of the experts assessed the state of the environment as "definitely good". Most of the respondents assessed the state of the environment as "rather good" (71% of the respondents surveyed in terms of the state of the environment in rural areas and 54% of the respondents surveyed in terms of the state of the environment in Poland in general). It is worth noting

that negative assessments (rather poor and definitely poor) of the state of the environment were declared by five respondents in each group.

In response to the question whether farmers in Poland disregard the problems of environmental protection, an affirmative answer was given by 7 respondents, 10 people answered "no", while 7 persons had no opinion on this subject. The respondents indicated (multiple choice question) the reasons why farmers did not take measures aimed at environmental protection (Fig. 2).

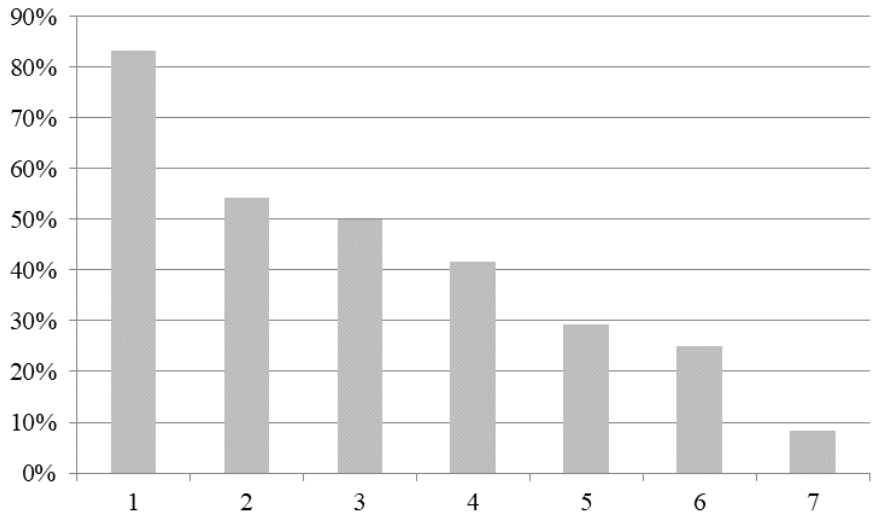

1.	Concern for financial costs of such measures
2.	Lack of faith in the effectiveness of individual actions
3.	Lack of motivation and interest in the problem of improving the effectiveness of agriculture in terms of environmental
4.	Reluctance to change habits in the scope of production technologies and techniques
5.	Lack of incentives from local authorities
6.	Persistence in the conviction that "others also do nothing"
7.	Lack of knowledge in the scope of modern, pro-environmental technologies and techniques

Fig. 2: Declarations of experts concerning the reasons why farmers did not take measures aimed at environmental protection in Poland

Source: own study based on questionnaire surveys (N=24)

The experts most often indicated that farmers were afraid of financial costs of measures aimed at the protection of the natural environment. In addition, a relatively high percentage of responses concerned the lack of faith in the effectiveness of individual actions taken by a farmer and the lack of motivation and interest in the subject of environmental protection.

The respondents also provided their opinions on the subject of emphasizing the negative impact of agricultural activity on the natural environment in the selected media. The results of this part of the analyzes are presented in Table 1.

Table 1: Declarations of the experts on emphasizing the possible negative impact of agricultural activity on the natural environment in the selected media, normative acts and other elements of communication in the society

Specification	Definitely yes	Rather yes	Hard to tell	Rather not	Definitely not
	[%]				
Legal regulations	8	63	17	13	0
Scientific publications	17	42	38	4	0
Popular science papers	8	58	17	17	0
Training programs for farmers	33	38	13	17	0
Discussions, public debates	0	33	25	29	13

Source: own study based on questionnaire surveys (N=24)

According to a vast majority of experts, the possibility of a negative impact of agricultural activity on the natural environment is emphasized in the area of legal regulations (8% of "definitely yes" answers and 63% of "rather yes" answers) and in the area of training programs for farmers (33% of "definitely yes" answers and 38% of "rather yes" answers) and thus consequences of such actions are determined. The lowest number of positive indications by the experts concerned public discussions and debates. Almost every third respondent stated that the importance of the above-mentioned topic rather had not been emphasized in them, while 13% stated that "definitely not".

The questionnaire also included open-ended questions that allowed experts to speak freely about the actions that should be taken at the central and local levels to improve the state of the natural environment in rural areas. The results of this part of the analyzes are presented in Figures 3 and 4.

Fig. 3: A tag cloud for the respondents' indications concerning the actions to be taken at the central level in order to improve the state of the natural environment in rural areas

Source: own study based on questionnaire surveys (N=24)

Fig. 4: A tag cloud for the respondents' indications concerning the actions to be taken at the local level in order to improve the state of the natural environment in rural areas

Source: own study based on questionnaire surveys (N=24)

Among the actions at the central level, the experts mentioned inter alia:

- informational, promotional and educational actions in the media in order to raise the public awareness and to increase the extent of use of modern technologies;
- development of nationwide programs concerning, inter alia, subsidies for soil liming;
- changing the legal regulations (e.g. in the scope of the obligation of analyzing soils in terms of nutrients content and preparing fertilization plans on this basis);
- co-funding of projects concerning support for low-carbon agriculture as a part of consortia that will be created, inter alia, by scientific units;
- rigorous enforcement of legal regulations in the area of environmental protection;
- increasing the expenditures under the Rural Development Program for the activities related to reduction of smog (inter alia, subsidies for replacement of coal stoves), increasing the expenditures on water supply and sewage systems; subsiding the investments in household sewage treatment plants (groundwater protection), subsiding the investments in solar collectors, etc.;
- introducing additional direct payments for agricultural holdings that conduct agricultural production in accordance with the integrated methods;
- changing the rules of agri-environmental programs in the scope of sustainable agriculture to more accessible to farmers;
- conducting training for farmers in the scope of low-carbon economy in rural areas; promoting and implementing precision farming techniques;
- conducting training in the scope of the use of fertilizers, plant health products, and agrotechnical treatments in the conditions of climate change, etc.

In turn, the actions at the local level proposed by the experts include:

- creating clear, transparent spatial development plans, taking into account the interest of investors and other residents of rural areas;
- local (communal, district) support for organic farming, inter alia, through organization of sites for selling organic products (without any costs for farmers);
- development of local programs in the scope of monitoring of the environment – air, soil, water;
- subsiding replacement of stoves from municipal funds;
- local initiatives in the scope of education (promoting good practices).

Summary

In conditions of intensive farming and an excessive extent of chemicalization of agriculture as compared with the needs, the environmental pressure increases and the degradation processes in the field and meadow-pasture ecosystems are strengthening. There appear potential threats to the sustainability and stability of the structure of the agricultural landscape as well as threats to the biodiversity. Despite the fact that environmental protection issues were taken into account in legal regulations and despite additional financial benefits for farmers for a minimization of environmental risks (especially for farmers implementing agri-environmental programs), the analyzed problems still constitute challenges for the agriculture.

According to the research carried out among experts, limited financial resources are the main reasons why farmers did not take measures aimed at environmental protection in Poland. Actions this scope (including replacement of heat sources in farmers' households, construction of household sewage treatment plants, thermomodernization of residential and farm buildings) are costly and thus support programs should be created both at the central and local levels. In addition, the experts indicated other reasons: the farmer's lack of faith in the effectiveness of individual actions, the lack of motivation and interest of farmers in the problem of improving the effectiveness of agriculture in terms of environmental friendliness, and farmers' reluctance to change habits in the scope of technology and production techniques.

The experts indicated many possible actions to be taken at the central and local level, which can contribute to an improvement of the condition of the natural environment in rural areas in Poland. They pointed out, inter alia, the role of the state and the economic policy, with a particular emphasis put on the stabilization of incomes of farmers who conduct organic and integrated production, as well as indicated the actions that could be taken by local authorities. Education had a special place in almost all of the experts' opinions. Educational projects are necessary to eliminate the backwardness in terms of environmental protection. In addition, local governments in rural communes should head in the direction of new strategic thinking, where the low-carbon economy should be the central point of reference. Conditions conducive to realization of pro-environmental attitudes of farmers should be created. To a small extent, the respondents mentioned actions carried out or potentially initiated by the agricultural self-government. According to the experts, the issues associated with threats to the natural environment are clearly emphasized in various forms, in particular in legal regulations and training programs for farmers, and to a lesser extent – in scientific and journalistic articles. In the opinion of the respondents, this subject is insufficiently emphasized in public discussions and debates.

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Global Investment in Renewable Energy: Evolutions and Challenges Brought by Covid-19 Crisis

Andreea-Emanuela DRĂGOI

Institute for World Economy, Romanian Academy, Bucharest, Romania, andreeadragoi@iem.ro

Paul CALANTER

Institute for World Economy, Romanian Academy, Bucharest, Romania, paul.calanter@yahoo.com

Abstract

Investments in renewable energy are considered a major objective of sustainable economic development all over the world as they are a driver of technological progress and a cornerstone in combating climate change. Our paper aims to present the progress made on investments in renewable energy globally, but also to highlight, through a comparative quantitative analysis, the impact of the COVID-19 crisis in the field. The research methodology is based both on a screening of the most relevant global reports, but also on the use of case studies presenting progress and challenges in two of the most advanced economies: US and China, given that prior to the COVID-19 crisis both states had ambitious targets for the development of renewable energy. The concluding part of the paper will present whether the pandemic crisis and its economic impact are an impediment to investments in renewable energy or may bring some opportunities for the future of these clean energy.

Keywords: Renewable Energy, Investment, US Economy, China Economy, COVID-19 Crisis

Introduction

It is now unanimously accepted that renewable energy represents a key element of sustainable economic development around the world, while some studies show that investment in renewable energy remains an indispensable factor for the technological progress, but also a guarantee of prosperity for the future generations (Aslani, 2013).

Although it is currently well known that renewable energy development programs are one of the most important challenges for both advanced economies and developing countries, numerous analyses (Aslani et al., 2012; Damon, Sterner, 2012; Filibi, Alonso, 2012) indicated that in all these economies the authorities are developing strategies for a greater involvement of the private sector in making investments in the field, thus being more likely to achieve the ambitious targets in the field. It is worth mentioning that according with Global Trends in Renewable Energy Investments 2020 Report (GTR, 2020), both governments and companies around the world have committed to adding some 826 gigawatts of new renewable power capacity in the decade to 2030, at a likely cost of around $1 trillion.

Considering the importance of involving private investors in renewable energy, our analysis aims to highlight the economic impact of the COVID-19 crisis in the field against the consequences of the pandemic, highlighting the pre and post pandemic situation in two advanced economies: USA and China. While COVID-19 crisis has slowdown deal-making in renewables in recent months, along with that in other sectors, it is undoubtedly that the pandemic economic consequences will affect investment levels in 2020. However, our research aims to highlight if the COVID-19 crisis may also enable governments to tailor their economic recovery programs to accelerate the phase-out of polluting processes and the adoption of cost-competitive sustainable technologies.

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Investments in renewable energy in 2019 - global trends and challenges

According to the report "Global Trends in Renewable Energy Investments 2020" (GTR, 2020) in 2019, private investors have contributed massively to the financing of renewable energy globally, while supporting the energy transition to sustainable economic development. The report shows, in 2019, a net increase in global renewable energy capacity, which increased by a record 184 gigawatts (GW). However, in 2019, total investment costs were only 1% higher, amounting to 282.2 USD billion. Meanwhile, the full cost of electricity production has continued to fall for solar and wind energy, amid technological advances and fierce competition in the field.

In 2019, several of the trends highlighted in previous years in terms of investments in renewable energy continued. Thus, the overall level of investment amounted to 282.2 USD billion, an increase of 1% compared to 2018 with a continuous decrease in costs for solar and wind energy, and China remained the world leader in investments in renewable energy (Chart 1), although the US recorded the largest increase in these investments compared to the previous year (Table 1).

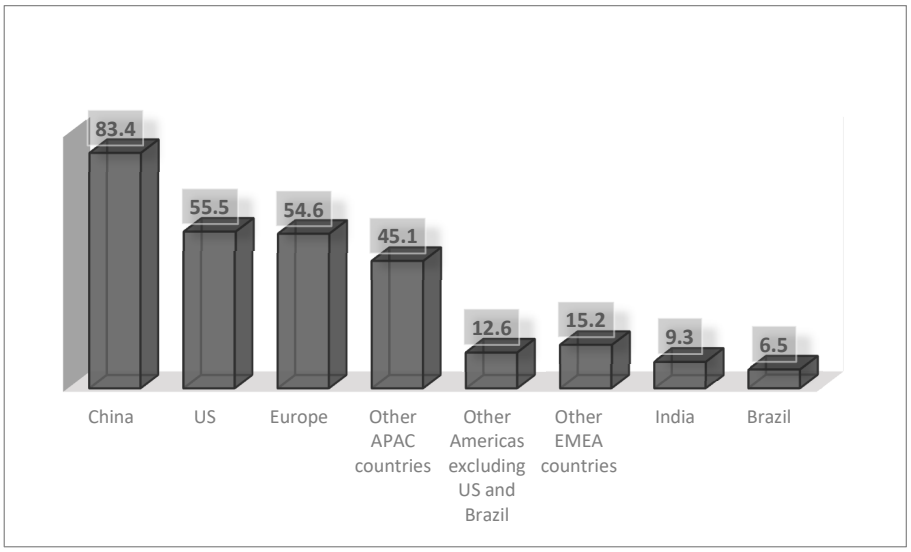

Chart 1: Global ranking of renewable energy investments in 2019 (USD billion)

Source: Authors based on the GTR 2020 Report.

Note on abbreviations: The EMEA includes countries in Europe, the Middle East and Africa, and the APAC includes countries in the Asia-Pacific region.

As can be seen from table 1, in 2019, Taiwan recorded the most spectacular increase in investment in renewable energy compared to 2018, while the first ranked (China) recorded a decline compared to the previous year.

Table 1: Investments in renewable energy in 2019, compared to 2018

Country	Investment in 2019 (USD billion)	Growth, compared with 2018
China	83.4	-8%
US	55.5	28%
Japan	16,5	-10%
India	9,3	-14%
Taiwan	8.8	390%
Spain	8.4	25%
Brazil	6.5	74%
Australia	5.6	-40%
Netherland	5.5	25%
United Kingdom	5.3	-40%

Source: Authors based on the GTR 2020 Report.

Even in the face of the economic difficulties generated by the COVID-19 pandemic, renewable energy have proved their resilience (Chart 2), but according to recent international analyses (Turk, Kamiya, 2020) future progress on investment in the field cannot be achieved without massive government support. Thus, according to official statistics (GTR, 2020), the growth of renewable energy sources will slow down towards the end of 2020, due to delays in the construction of new facilities caused by supply chain disruptions and social distancing measures. In this context, many projects, such as photovoltaic installations for businesses and households, could have a strong downward trend in the medium term, without government support.

This is all the more possible as, apart from electricity production, many renewable energy sectors have proved to be much less resilient. According to the GTR report, the production of biofuels for transport will be reduced by 13% in 2020, this being the first significant decrease in the last two decades. Also, the consumption of heat produced from renewable energy sources is likely to decrease in 2020, mainly due to low activity in the industrial sector. Adding to these difficulties, low oil and gas prices make biofuels and renewable thermal technologies less competitive.

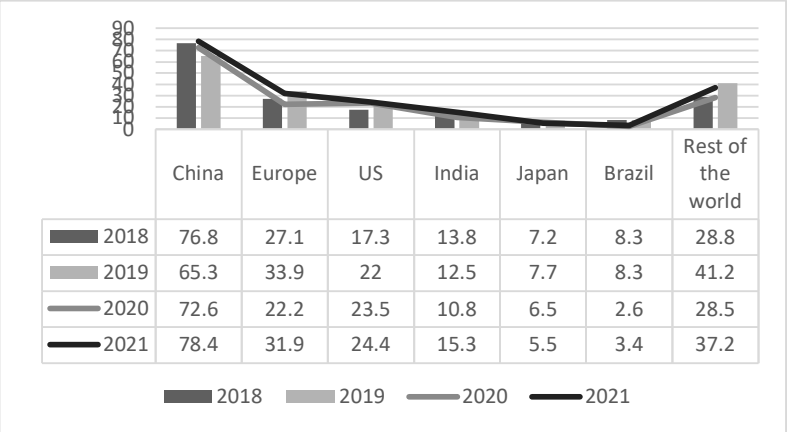

Chart 2: New capacities for electricity generation through renewable energy in the period 2018 - 2021 (GW)

Source: Authors based on IEA data (https://www.iea.org/data-and-statistics/charts/renewable-electricity-capacity-additions-2007-2021-updated-iea-forecast).

Note: Data for 2020 and 2021 are estimates and forecasts based on current trends.

Challenges for the development of renewable energy in 2020

According to the latest international statistics (IEA, 2020) in 2020, the global demand for renewable sources has increased due to their use in the electricity sector. Even if the demand for electricity for end-use has fallen significantly due to the lockdown measures imposed by the health crisis, low operating costs of electricity based on renewable sources along with priority access to the grid in many markets have allowed renewable networks to operate almost at full capacity and even expand. However, supply chain disruptions, construction delays and macroeconomic challenges increase uncertainty about new investments in renewable energy capacities in 2020 and 2021.

A recent IEA report (2020) predicts that net renewable electricity additions in 2020 will be 13% lower than in 2019, due to delayed construction activity from supply chain disruptions, but also amid blockages and social distancing and emerging financial challenges. Hence, it should be noted that many of the renewable energy projects (whether in the field of solar, wind or biomass) are expected to face implementation delays in terms of the stages allocated for 2020, amid financial difficulties caused by the economic crisis, but also due to the new investment priorities of companies triggered by the new challenges brought by the pandemic.

Thus, the IEA report estimates that additions to photovoltaic capacity will decrease by 17% in 2020, compared to 2019, while for wind energy projects there is a decrease of 12%. Moreover, due to the forecast uncertainty for the projects that were to be financially completed in 2020 and become operational next year, it is estimated that total PV additions in 2021 will decrease from 2019 due to the slower recovery of distributed photovoltaic applications, because individuals and small businesses need to reset their investment priorities.

It is currently an undeniable reality that the pandemic has the potential to change the priority of government policies and budgets, as well as having a strong impact on companies' investment decisions on financing renewable energy in the coming years.

This new reality implies a high degree of uncertainty for the renewable energy sector, despite its rapid expansion over the last five years. At the same time, several countries are introducing significant stimulus programs to respond to the current economic development and support their economies. Some of these incentives may be relevant for renewables, especially in the context where competitive technologies developed for renewable energy can provide structural benefits such as economic development and job creation, while reducing emissions and encouraging innovation.

While capital expenditures for renewable energy increased moderately in 2019, by 1%, due to onshore wind energy and the fact that hydropower has surpassed solar energy, capital costs for some technologies have continued to fall. For example, solar installation costs for utilities have fallen by more than 10%, continuing a downward trend due to support policies (e.g., expanding competitive bidding) along with expanding implementation in large, lower-cost markets, such as India. Practically, nowadays, thanks to new technologies, with the same level of investments, much more renewable energy can be produced compared with the previous years. Thus, the necessary expenses for the production of 1 MW of renewable energy in 2012 allow the generation of 1.5 MW today.

The decrease in capital costs contributed to the reduction of the average costs of electricity production currently calculated taking into account the entire lifetime of the installation (leveled costs of electricity - LCOE), for solar energy and onshore wind energy, along with other factors, such as average load factors. For wind projects, for example, larger turbines and increasing the height of the hub means that wind farms are able to produce more energy with a smaller number of turbines. This trend also leads to reductions in operating and maintenance costs driven by efficiency gains from digitization. Financing costs are also a key component of the LCOE, and low average capital costs (WACCs) have been vital to expanding investment in renewables globally.

For example, applying a standard average WACC of 8% to a US solar project in 2019 would produce an LCOE of about 80 USD / MWh in 2019. The LCOE for the same project with access to lower cost financing (4% on average) is just over 50 USD / MWh. The actual return required depends very much on the degree of risk from the associated market. The involvement of public finances has been key to reducing the cost of capital in emerging markets, such as India, which on average face higher financing costs (given higher risks to the country, technology and revenue).

In terms of loans, financing conditions have improved globally. This is due to lower base interest rates and lower debt risk premiums. For example, according to the IEA (Clean Energy Investment Trends, 2019), lower risk perceptions have contributed to improved availability and pricing of project financing in India for solar photovoltaic and wind projects in 2014-2018. The risk premiums applied to loans decreased by 75-125 basis points for both technologies during that period, with banks wishing to provide longer-term loans. In terms of equity, their expected returns have also declined globally, as support policies and growing market experience have helped reduce risk perceptions for investors.

The result is that LCOE for utility installations and wind turbines have fallen to levels between about 35-55 USD / MWh in China, Europe, India and the United States (assuming low-cost financing). Even lower prices have appeared in the tenders for the capacities that will be put into operation in the coming years, e.g. prices below 20 USD/ MWh in Brazil, Mexico, Portugal, Qatar and the United Arab Emirates.

To stimulate growth, central banks are likely to keep interest rates low. However, some emerging countries may face challenges as sovereign risks increase and there are signs that commercial banks could increase lending margins to offset higher liquidity costs. Uncertainty can also lead to more difficulties in mobilizing capital globally. A smaller annual decrease in LCOE is expected in 2020, with financing costs remaining at the same level or increasing as a result of new risks.

The impact of the COVID-19 crisis on investments in renewable energy

In the current international environment, governments have an unprecedented opportunity to accelerate clean energy transitions, making investment in renewables a key part of stimulus packages to revitalize their economies in the wake of the COVID-19 crisis. Investments in renewable sources, whose costs continue to fall rapidly, can stimulate job creation and economic development, while reducing emissions and fostering further innovation (Box 1).

Box 1: Promoting investment in renewable energy – driver of economic recovery after the pandemic crisis

Energy efficiency recovery - While it is now unanimously accepted that citizens' health remains the number one priority for governments facing the COVID-19 pandemic, it is also clear that there is a need to limit the economic impact of the COVID-19 crisis. In these efforts to protect economic stability and to support the recovery of global economies, energy efficiency can play a key role in stimulating jobs, while supporting clean energy transitions around the world. Energy efficiency can stimulate an intensive increase in employment globally. Even before the pandemic crisis, in the United States and Europe alone, more than 3.3 million people were employed in the energy efficiency industry, most of them employed by small and medium-sized enterprises. Given this reality, investments in well-designed economic recovery programs can use the potential of energy efficiency to support existing jobs, create new jobs and stimulate economic activity in key labour-intensive sectors such as construction and manufacturing. In addition, energy efficiency offers a number of long-term benefits, through improved competitiveness, improved energy accessibility and lower energy bills, while reducing the dependence on energy imports and the greenhouse gas emissions.

Stimulating technological advancement - Governments often provide incentives directly to consumers (or through manufacturers or retailers) to replace old, inefficient products with new and

more efficient models through technology replacement programs for cars, refrigerators or other appliances. This may include investments in so-called "cash for clunker" programs for machines, refrigerators or other digital devices and devices. Applied to the manufacturing industry such governmental programs could provide substantial job creation results, while achieving significant environmental benefits. Of course, the global environmental impact of early technology replacement must be taken into account: jobs can be created in the recycling industry through specific circular economy programs. Some analyzes (Li, Linn, Spiller, 2013) show that cash replacement programs such as “cash for clunkers” can help create an effective economic stimulus and support jobs and production which is particularly important given the imperative of the post-pandemic economic recovery. Moreover, investment in technology replacement programs can support the manufacture and launch of new technologies, such as heat pumps, digital building management systems and electric vehicles. Moreover, supporting investment in fleet modernization programs focused on buses, trains, vans or taxis can also lead to economic stimulus and energy efficiency.

Contributing to economic digitalisation in the context of post-pandemic challenges - government investment in the post-pandemic period could focus on large digital infrastructure projects, including those related to renewable energy that generate economic efficiency and new jobs. Such projects include investments in energy-efficient infrastructure, such as smart grids and charging stations, as well as next-generation digital connectivity for a more efficient and resilient future energy system. To further support jobs even in the face of increased digitalisation, infrastructure projects could also include investment in public transport infrastructure, the creation of bicycle lanes and pedestrian areas and the widespread implementation of smart upgrades. Smart street lighting upgrades can provide, for example, more infrastructure services, as street light poles can also serve as charging stations for electric vehicles and can include 5G telecommunications infrastructure.

Source: Authors, based on studied literature.

Case studies: US and China

USA

In January 2020, the US Government's Energy Information Administration (EIA) predicted a record year for wind and solar power in the US, with 18.5 GW of wind power and 13.5 GW of solar power for consumption, which will begin commercial operations. However the outburst of COVID-19 crisis had inevitably complicate or even postpone some of these projects. Presently, the pandemic is likely to cause a temporary, albeit significant, disruption to the growth of renewable energy on the US energy markets, while renewable energy ownership and investment landscape will be transformed.

In terms of the investment level in energy produced from renewable sources (Chart 3), we can see that the trend was increasing in the period 2013-2019, with the exception of 2018. Due to the Coronavirus pandemic, experts forecast a further slowdown in renewable energy investment for 2020, which may be even more pronounced than the one registered in 2018.

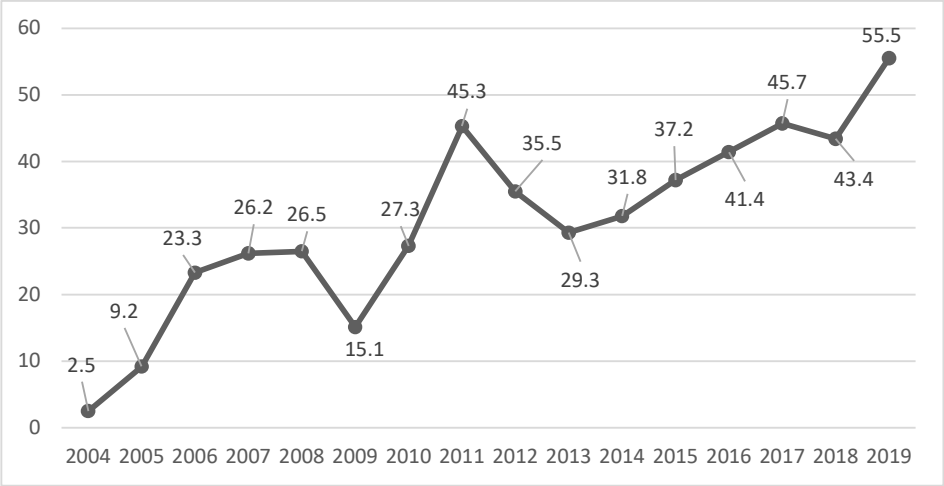

Chart 3: Investments in renewable energy in the US (USD billion)

Source: Authors based on GTR 2020 Report

According to the American Wind Energy Association, the year 2019 was the third best year in terms of new wind power capacities to the United States (9.1 gigawatts), bringing the total to 105.6 gigawatts. At the same time, the Solar Energy Industry Association registered the entry into service of 13.3 gigawatts of solar energy, bringing the total solar power capacity to 77.7 gigawatts. Together, the two sources accounted for 2/3 of the new United States energy generation capacity in 2019.

The projected increase in facilities in 2020, especially wind power, is largely the result of projects that began construction in 2016 and must be operational before the end of the year to qualify for the entire Production Tax Credit. This federal tax incentive represents about USD 24 / MWh for 10 years.

In the case of solar energy, the tax credit for investment has begun to emerge for projects that will begin construction this year. A similar increase in solar installations is likely to occur in 2023, the last year in which projects must be put into operation to claim their full value (representing 30% of the eligible costs of the project).

The imposed lockdown had severe economic consequences in US, but may not have a significant impact on the long-term prospects for renewable energy, although the imposed measures in response to the health crisis have certainly caused short-term disruption. In April, EIA revised by 5% and 10% the 2020 forecasts for the addition of solar and wind capacities.

Many wind projects working on a strict schedule in order to qualify for Production Tax Credit (PTC). The inconveniences caused by COVID-19, such as supplying, moving of equipment through the supply chain and personnel issues, could halt projects and affect their capacity to be authorised for PTC or tax credit for investment (ITC) credits. The risks posed by a delayed installation, which put a project outside the regulations, have pushed the investors to seek guidance from the Government on the situation in which the pandemic delays could be an exception to the regulations.

Looking into the future, some entities from the industry are concerned that an economic slowdown caused by the coronavirus will reduce the investors' appetite for tax capital for tax credits. These traders, usually investment banks, are likely to have lower tax revenues in the short term to offset these loans. However, the signals from investors are positive about their permanence in the market.

While the coronavirus is a short-term impediment to renewables, the long-term outlook remains favourable. One of the powerful engines of this sector is the clean or renewable energy goals set by a growing number of countries.

Thirteen states, including New York and California, have set 100% targets to be reached in the period 2040-2050. Additionally, the improved performance and low costs of renewables, along with growing concern for corporate sustainability, have encouraged utility distribution workers to consider renewable energy sources when building new facilities.

Persistent low natural gas prices as a result of the economic slowdown have the potential to shift investment decisions in favour of energy production through natural gas-fired facilities, although the likely scale is currently unclear. The EIA still forecast that the renewable energy will rise to 38% of electricity by 2050, from the current 19%, with natural gas falling slightly, to 36% from the current 37%, and coal from 24% to 13%.

The industry is pushing for the support of the United States Congress as part of broader stimulus funding. In this case, concern about job losses caused by the coronavirus will be critical to gain support; the Solar Energy Industry Association warned that 50 percent of the 250,000 jobs in the solar sector could be affected, while the American Wind Energy Association estimates that 35,000 wind jobs are at risk.

According to Eroglu, H. (2020), the number of employees laid off in the US renewable energy sector was significant: around 70,000 people. To overcome this hurdle, some suggestions proposed by specialists in the field are related to allowing companies in the solar energy sector to use the Investment Tax Credit (ITC) or to double the "Green Incentive" stimulus.

In this context, although at a lower than expected level, government actions following COVID-19 crisis have specifically targeted at the renewable energy being linked to the fact that the Treasury and the IRS have provided tax incentives for renewable energy projects by further extending the deadlines for financially supporting tax credits.

A domain with an unique demand for support is the offshore wind power. Because the technology is less mature than the onshore one, and because it can offer new capacities and jobs, there is momentum in Congress to offer a special treatment for the offshore sector. The American Wind Energy Association forecasts that the market will grow from almost zero today to 20-30 GW by 2030.

Energy storage is also poised for strong growth. The sector registered a record development in the last quarter of 2019, with a new added capacity of 186MW / 364MWh, according to indications of the Energy Storage Association. This Association and Wood Mackenzie forecast the market to grow to 7.3 GW in 2025 after the annual rollout of 523MW in 2019, with growth largely driven by public procurement.

While the pandemic undoubtedly caused short-term challenges and disruptions, cost cutting, technological advancements, and financial innovation will remains powerful drivers for the renewable sector development in the US especially because the strong user demand and the clear environmental imperative.

China

In 2020 China lost its spot on the Renewable Energy Country Attractive Index (RECAI) for the first time since October 2016, ranking second behind the United States in its quest to cut costs from its renewable energy subsidy regime.

As shown in Chart 4 the level of investments in renewable energy in China for the period 2004-2019, expressed in billions of dollars indicate that over the past three years China has reduced the amounts allocated to investments in renewable energy. It is also forecast that the COVID-19 pandemic will further slow these investments.

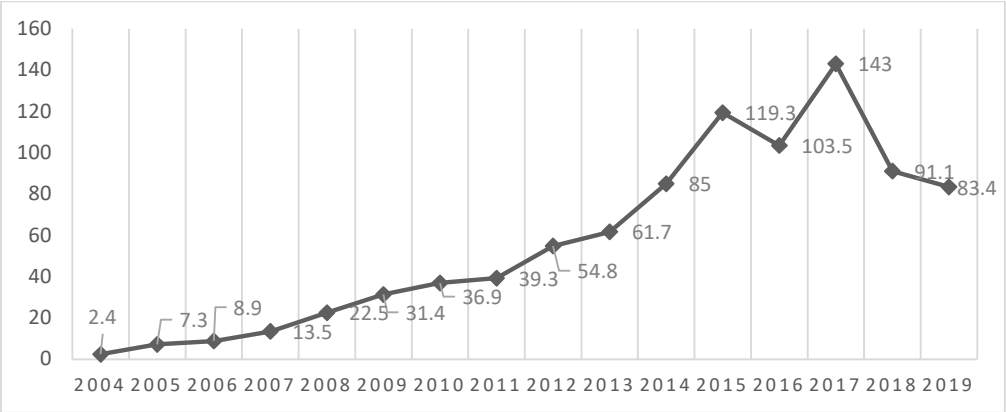

Chart 4: Investments in renewable energy in China (USD billions)

Source: Authors based on GTR 2020 Report

The government has gradually reduced subsidies paid for onshore wind and solar power projects, which currently support around 210 GW of wind capacity, while trying to reduce the USD 14 billion deficit in its Renewable Energy Development Fund. According to Wood Mackenzie (WoodMac), the Ministry of Finance has budgeted just USD 700 million to subsidize new renewable capacities in 2020, which is expected to support 8-10 gigawatts of new onshore wind capacity (Wood Mackenzie, 2020).

As a result, the Chinese government is encouraging wind energy projects that at the moment receive feed-in tariff payments to move to an unsubsidized system, through which they will be offered energy purchase agreements and privileged payments of unpaid subsidies for the long-term. WoodMac estimates that approximately 60 gigawatts of previous capacity, which had recovered its initial capital investment, can keep its current yield by making the change, removing some of the subsidies.

Despite these issues, WoodMac estimates that the annual onshore additions to 18.8 gigawatts in 2021 will increase to 23 gigawatts by the year 2028. However, WoodMac warns that a surge in the offshore wind market will be obstructed by the political unpredictability, limited share of subsidies and disruption caused by the pandemic in supply chains.

In the base scenario, total capacities will reach 14.5 gigawatts by the end of 2021, and new capacities will drop to just 2 gigawatts the next year before recovering to 5 gigawatts in 2025. At worst, China could reach to 11 gigawatts by the end of next year, followed by less than 0.5 gigawatts added each year for the rest of the decade if the sector does not have the support of local governments and low demand fails to produce local supply chains.

While the short-term outlook for new domestic capabilities looks bleak, Chinese companies continue to invest and position themselves for the low-carbon global transition. GCL system integration technology for the solar producer invests USD 2.5 million in a solar module factory in Hefei, Anhui Province, which will have the capacity to produce 60 gigawatts of modules, the world's largest production platform, capable of meet about half of current global energy demand for solar modules.

According to Norouzi et al. (2020), it is possible that in China, in terms of the fight against climate change, an advantage will be gained from the coronavirus pandemic, given the decline of greenhouse gas emission sectors. At the same time, they consider that there is the possibility of rapid development of renewable energy due to major energy security problems.

However, following the analysis of the stimulus package, it can be seen that the Chinese government is not focusing on renewable energy. Many investments are focused on fossil fuel industries, while support policies for the renewable energy industry are absent from the Beijing recovery programme.

China could have chosen to follow the example of the EU and Germany and direct COVID's incentive towards sustainable mobility, the hydrogen-using industry and renewable energy sources, which are the sectors where China is trying to be competitive. A small incentive was indeed created for electric vehicles, which benefited from tax exemptions in response to the COFID crisis, although only as part of a measure aimed at stimulating demand for vehicles. Until recently, Beijing promoted the use of hydrogen through several local pilot projects. Although it would have been the right time, China did not want to launch a national hydrogen strategy, leaving only in the project phase (Gosens, 2020).

Conclusion

Although renewable energy in several markets were already facing some funding uncertainties in early 2020, the COVID-19 crisis has brought new challenges. However, the post-pandemic situation could give governments the opportunity to make progress in the field, making investing in renewable sources a key part of stimulus packages designed to revive their economies. They can take advantage of the structural benefits that increasingly affordable renewables must offer, including job creation and economic development opportunities, while reducing emissions and fostering innovation.

Far from being a major impediment to the development of renewable energy the COVID-19 crisis could be an incentive. The dramatic decrease in production in the fossil fuel sector thanks to COVID-19, combined with the fact that renewable energy have proven their resilience, could stimulate new investment from the public sector, but also from the private sector, many financed even with aid to the financial support and economic reconstruction packages allocated by most states in the context of the COVID-19 crisis.

However, in order to be able to play a role in boosting economic recovery in the post-pandemic period, investment in renewable energy should take into account lessons in good practice from previous funding programmes, focusing on two major factors: expanding existing programmes with new incentives, but also reducing unnecessary regulatory barriers (given that excessive regulatory barriers, such as planning and development rules, can often hinder energy efficiency and renewable energy projects, hence requiring the elimination or simplification of red tape in order to facilitate the successful implementation of economic incentives).

In the United States, while at a lower-than-expected level, government actions following the coronavirus pandemic targeted specifically at renewable energy that have been adopted so far have been linked to the fact that the Treasury and the IRS have provided tax incentives for renewable energy projects. As for China, the government is not focusing on renewable energy, with many investments being targeted to fossil fuel industries, while support policies for the renewable energy industry are absent from the recovery programme.

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Organisation Development Paths – Exemplification of Cultural Institution's Orientation

Grzegorz KRZOS
Wrocław Univeristy of Economics and Business, Wrocław, Poland,
grzegorz.krzos@ue.wroc.pl

Anna SCHNEIDER
Wrocław Univeristy of Economics and Business, Wrocław, Poland,
anna.schneider@ue.wroc.pl

Abstract

The aim of the article is to identify the orientation elements describing the path of the cultural organisation development, which will constitute the basis for developing the method and tools for measuring orientation of the cultural institution. The paper presents the research that was carried out on the basis of an exploratory, single case study, which answers the question whether the assumptions about these orientations made by the authors of the publication were correct. The following data analysis methods were used in the study: referring to theoretical assumptions and the participant observation, which took place in 2018/19. The empirical study confirmed that a sufficient, but not limited, set of cultural organisation's activities orientations describing the path of its' development includes categories like products/market, processes, functions, projects, innovation and technology, geographic expansion and inter-organisational networks. The question about the undertaking measurement of these orientations remains open. Filling in this gap requires further qualitative empirical research. The results obtained from this research should become a subject to quantitative research, which would also provide an answer to the question, whether it is possible to propose a universal set of orientations for the cultural institution's activity, which could be used to present and discuss its' development paths.

Keywords: Developmental Path, Cultural Institution Developmental Path, Organisational Development, Organisational Orientation

Introduction

The history of every organisation can determine and evidence through time its' own evolutionary development. The nature of this evolution is influenced by a variety of determined factors both internal and external. In theory these developments should drive the organisation closer to a desired conclusion, however in reality these advances do not always impact positively on the profile of the organisation. Therefore, a more defined examination of the history of the organisation provides a clearer based on its' direction. This allows us to comprehend better those impacts that have had the most important effects at any given point in time and how these can future shape its' desired targets. Earlier models of organisation development do not necessarily provide an accurate reflection of the organisation for a specific point in time. Therefore, developing a theoretical model of the organisation's development based on its' orientation can provide a clearer understanding and picture of the successes or issues faced in any given point of its' evolution. This model can be utilised for further organisation's research purposes and to identify the universal orientations of its' development (Krzos, Piwoni-Krzeszowska, 2018).

The article is a continuation of theoretical considerations and an extension of the exemplifications presented in the article titled "A conceptual pattern of organisational development path – the proposal and theoretical assumptions" that was published in "Przedsiębiorczość i Zarządzanie" (Krzos, Piwoni-Krzeszowska, 2018). The aim of the article is to identify the orientation elements describing the path of the cultural organisation's development, which will constitute the basis for developing the

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method and tools for measuring orientation of the cultural institution. The article is empirical. An exploratory, single case study was conducted to determine whether the assumptions about these orientations made by G. Krzos and E. Piwoni-Krzeszowska in the context of the cultural organisation are correct (Krzos, Piwoni-Krzeszowska, 2018).

The basic theoretical background of the organisation's development path.

The development of the organisation is a multi-faceted process and as such there is no specific classification for its' description. Figuratively speaking we can describe the organisation's development as a progression of qualitative and quantitative measurements of various types at any given point whether these are positive or negative. (Krzos, Piwoni-Krzeszowska, 2018). The process may include changes in various areas of its' functioning (Adamik, Zakrzewska-Bielawska, 2014).

The substance of our deliberations are studies undertaken by N. Siggelkow (Siggelkow, 2001, 2002). However their range is constrained to displaying the issues related to the organisation's development and any endeavour to mark out specific areas of development. The aforesaid studies do not include efforts to present descriptions of the overall direction of the organisation and any orientation variances over time.

Development can be considered in the following dimensions: economic, organisational, personal, informative, technical and production (Stabryła, 1995), and also from the financial and strategic perspective (Bratnicki and Austen, 2005). From a theological point of view, development should lead to the improvement of the organisation's position in the environment. And this, in addition to the development of the organisation's infrastructure, requires the development of products and markets (Flamholtz, Hua, 2003). Given the specificity of the cultural sector, researchers emphasized that marketing draws attention to the twin-track approach and take the product and market orientation as two separate images (Burkiewicz, 2014). This has been supported by Sobocińska who says that "Contrary to production, product, or sales orientation, market orientation involves thinking about the way in which a market entity functions" (Sobocińska, 2019). Moreover, it is impossible to disregard the inter-organisational relations, which is evolving, and determines adaptation to changing resources needs (Stańczyk-Hugiet, 2013) and shape the conditions of competition and cooperation (Czakon, 2012).

From the standpoint of the organisation's development path as the progression of the course and differences in the direction of its' activities, the advancement of this gap appears to be a fundamental component of the functioning of the organisation's images, given that different companies consist of various images, which are utilised to describe their scope.

Based on the literature (e.g. Stabryła 1995, Bratnicki and Austen 2005, Flamholtz and Hua 2003, Siggelkow 2002) we can ask ourselves:

1. Should the cultural institution orientation set be limited to:
   a) Products/market
   b) processes,
   c) functions
   d) projects
   e) innovations/technology
   f) geographic expansion,
   g) networking.
2. How to undertake the measurement of each orientation?

Researching the solutions to these issues, requires an approach utilising in-depth empirical study and refined measurement tools.

Research Methodology

The research assumption presumes that data is incomplete, but sufficient to describe the activities of the cultural institution and its' set of orientations will be the baseline for relating the cultural organisation' development path. This provided the basis for the theoretical model of the cultural organisation' development path. As such, this focused on identifying a range of orientations and estimating them. Splitting this set of orientations was undertaken following various discussions and critiquing the literature. Therefore the foundation for the description of the orientations is primarily in the direction of: products / market, processes, projects, functions, innovations/ technologies, geographic expansion or networking.

In order to undertake the measurement of these orientations, regardless of which should be elected for the presentation of the description of the organisation's activities, there is at the same time, transparency in the option of structuring a combined measurement of each of these orientations. The measurement should be an indicator of the concentration of these orientations and the changes taking place throughout.

The following conventions were utilised for the undertaking of the orientation's measurement.

a) the dimensions of the product/market orientation can be: the number of products, the number of product modifications, the orientation of the organisational structure on the product,
b) the dimensions of process orientation can be: number of processes, number of process modifications, orientation of the organisational structure to the process,
c) the dimensions of function orientation can be: number of functions, number of function modifications, orientation of the organisational structure to functions,
d) the dimensions of project orientation can be: number of projects, number of project modifications, orientation of the organisational structure for projects,
e) the dimensions of the innovation/technology orientation can be: the number of innovative technological solutions used, the level of technological maturity, the number of patents, patent applications and know-how,
f) the dimensions of the geographic expansion orientation can be: the number of regional markets, the number of foreign markets,
g) the dimensions of network orientation can be: number of entities, frequency of relationships, nature of relationships, place in the network.

The incapacity to specifically define the cultural institution's development path, the inability to stipulate the research data, and the lack of provisions for the undertaking of its' description and fundamentally, the various inadequacies in theoretical clarifications determine the choice of the *case study* method. According to K.M. Eisenhardt (Eisenhardt, 1989) and R.K. Yin (Yin, 2013), case study is appropriate when it has relevance due to its' potential for generalization and when the research is unique and extreme.

Based on the previous conventions of the project, this research is exploratory and is a pilot study. It was the overview to the beginning of a multiple study. It is founded on a single case study, at the same time demonstrating whether the set of orientations made about the organisation's development do establish that the basis for the depiction of the path is accurate.

In the theoretical model of the organisation's development path, supposing that the expansion of the organisation, is in line with achieving maximum profit – in accepted functioning conditions, is an anticipated state, given consideration that in real conditions, organisations instigate a set of goals, and within the life cycles of organisations , relatively sudden and instrumental changes in the direction of the orientations can occur. This leads to the question: what evidence is apparent to determine that the intended aims have been achieved or not? The path of the organisation's development indicates, the progression of the pathway and alterations in the direction of its' activities which contain various images of the organisation which can be described succinctly using the

orientation's dimensions set out by the organisation; what determined these alterations, and finally, whether such changes are caused by exceeding the numerous barriers to development that the enterprise faces on its' path.

Key questions from the research methodology were posed:

1. What orientations of the cultural institution activity should be taken into account in order to comprehensively describe the picture of its' development path,
2. Can the set of these orientations be limited, but sufficient to describe the functioning of the cultural institution, when it is included in the orientations for: products/market, processes, functions, projects, innovations/technologies, geographic expansion, networking,
3. How to undertake the measurement of these orientations?

The following data analysis methods were used in the study: referring to theoretical assumptions and the participant observation, which took place in 2018/19.

The main weakness of the applied research method is analytical generalization. Increasing the probability of its' accuracy requires conducting iterative case studies in order to develop the concept of the cultural institution development path for further research and to generate a hypothesis about its' model.

Dimensions of the cultural institution orientations

The *cultural institution X* was established in 1960s and is one of the leading ballet companies of the United Kingdom. The Company performs not only across the UK but also abroad. Its' broad repertoire includes new versions of the classics, signature pieces by living choreographers, seminal pieces from the 20th century modern ballet canon and new commissions. Its' primary aim is to provide programmes of world-class dance performance and educational activity at all scales. The *cultural institution X* presents a wide range of dance to audiences across the country and abroad and employs 38 professional dancers, 65 staff and a part-time freelance orchestra of up to 60 musicians.

The dimensions of product orientation

Indisputably, in the cultural sector, performance is perceived as a product and audience as a recipient/customer. Among the products offered by a *cultural institution X* the products of high and mass culture are distinguished. The *cultural institution X* delivers a comprehensive programme with a range of access point for people with all ages and abilities, from children to elderly people, from classical to modern pieces of art. Therefore, there is a need to adopt twin-track approach and expand a product orientation to: product orientation and market orientation.

Table 1: Twin-track approach

	Product Orientation	**Market Orientation**
Concept	Traditional	Modern
Goal	Mission fulfillment	Profits
Culture type	High culture	Mass culture
Offer	Offering recipients what they need	Offering recipients what they want

Source. Own ellaboration

Authors have identified the following dimensions of a product orientation:

- number of high-culture orientated products,
- number of high-culture products modifications.

Authors have also identified the following dimensions of a market orientation:

- number of products adapted to recipient's expectations.

- growth of participation in cultural events.

The Dimensions of Process Orientation

The main process in a *cultural institution X* is the creation of a dance production. The fundamental elements which comprise this dance production would include: choreography creation, music adaptation, costumes design, promotion and stage preparation. The leaders of the processes are the managers of the respective departments.

Therefore, the dimensions of process orientation have been listed as:

- number of main processes,
- number of support processes,
- number of functions associated with processes.

The Dimensions of Function Orientation

The *cultural institution X* as with the majority of cultural organisations has functional organisational structure. The main departments are: the board, artistic team, dancers, orchestra and administration. The identified dimensions of function orientation are:

- number of functions (departments) in the organisational chart,
- number of modifications changing the functional character of organisational structure.

The dimensions of Project Orientation

During the research, it became clear that cultural projects are based on intuition and own experiences rather than project management methodologies. Despite the lack of formal project management techniques, authors have recognized wide range of projects run by the institution. Apart from dance productions which are strategic projects, the institution have been implementing educational, digital and interdisciplinary projects.

The following dimensions of project orientation have been recognised by authors:

- number of strategic projects,
- number of operational projects,
- number of interdisciplinary projects.

The Dimensions of the Innovation and Technology Orientation

The digital infrastructure and skills have indisputably been the strength of the institution. The openness of the entire organisation to new technologies and non-traditional ways of creating work acquired new online content and developed relationships with digital partners. With the spreading of the Covid'19 pandemic the cultural sector has noted lots of cancelations and postponements. "Out of the box thinking" has always been a strong feature of the *cultural institution X*. Recognising the damage the *cultural institution X* could face, existing digital event formats have been further improved and implemented.

Authors have identified following dimensions of innovation and technology orientation:

- number of implemented innovations,
- the level of technological maturity.

The Dimensions of the Geographic Expansion Orientation

The *cultural institution X* long history includes touring across the country and invitations to international arts events. As part of these cultural exchange international guests are invited to perform with the *cultural institution X*.

Therefore, the following dimensions have been identified:

- number of national performances,
- number of international performances,
- number of artists/institutions visiting and performing with the cultural organisation.

The dimension of networking orientation

The *cultural institution X* plays an integral role in the cultural networks. High level cooperation between the *cultural institution X* with other cultural institutions and art universities worldwide has produced the range of innovative artistic projects followed by long-term relationships. Thanks to this, joint degree programmes have been established between *cultural institution X* and educational sector. Moreover, strong focus is laid on collaboration with sponsors and donors.

Therefore, the following dimensions have been identified:

- number of strategic partners,
- number of long-term relationships with stakeholders.

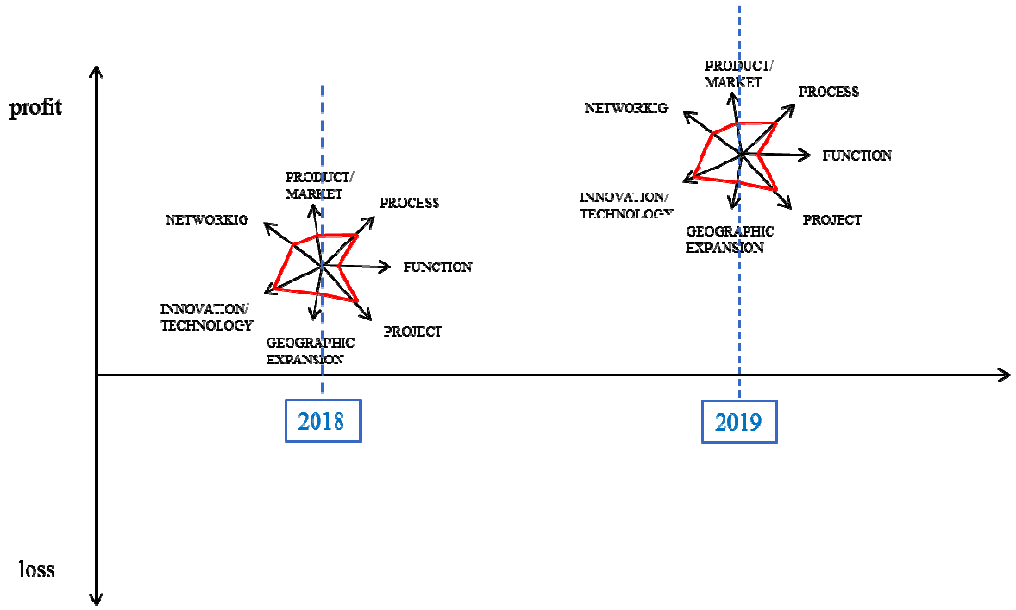

Fig. 1: Development path of the cultural organisation.

Discussion on the Results

The empirical study confirms that the established set of orientation of the organisation's activity describing the path of its' development can be applied to the cultural institution. (Krzos, Piwoni-Krzeszowska, 2018). The study showed that the development of *cultural institution X* covers complementary changes in various spheres and areas of its' functioning, which is in line with the view of A. Adamik and A. Zakrzewska-Bielawska (2014).

However, it should be emphasized that this study is a pilot study, so it can be concluded that the orientations of the cultural institutions activity that should be taken into account to describe the picture of its' development path is:

- product orientation that has been highlighted by A. Stabryła (1995) and E. Flamholtz and W. Hua (2003); market orientation, which has been emphasized by Burkiewicz and Sobocińska,
- focus on processes, functions and projects in the context of the organisation's development indirectly mentioned A. Stabryła (1995) and E. Flamholtz and W. Hua (2003),
- innovation/technology orientation and the relevance of the technological dimension of development, which has also been emphasized A. Stabryła (1995),
- orientation towards geographical expansion, which has been reflected in the opinion of E. Flamholtz and W. Hua (2003),
- network orientation, which is in line with the view of E. Stańczyk-Hugiet (2013) that one cannot detract from inter-organisational relations, which are evolving, and determine adaptation to the changing resources needs.

Nevertheless, the question of how to describe the orientations of the cultural institution activity reflecting the path of its' development remains open. At this stage of research, one can only assume that the set of these orientations is sufficient, but it is not limited. The research results also show that the dimensions of cultural institution orientation are not the same as the assumptions made. This indicates the need for further, in-depth research in this field and prompts to consider, whether there is a common set of dimensions describing individual orientations, whether it is perhaps determined by the specificity of the cultural institution activity, e.g. size or type of the institution. Therefore, the analytical generalization of this conclusion requires further research in the form of multiple case studies, which should be conducted within cultural institution of different size and type.

The open question about the implementation of the orientation of the cultural institution's activity, reflecting the path of its' development inspires to set the question, whether it is possible to build an aggregate measure of each of these orientations, which would indicate their relevance and the changes taking place in them.

Conclusions

Literature reviews have shown that there is a research gap in the field of cultural organisation's development path. A single-case study confirmed that sufficient but not limited set of orientations describing the path of cultural institution development includes product/market, process, function, project, innovation/technology, geographic expansion and networking orientations. The question about the undertaking measurement of these orientations remains open. Filling in this gap requires further qualitative empirical research. The results obtained from this research should become a subject to further quantitative research, which would also provide an answer to the question, whether it is possible to propose a universal set of orientations for the cultural institution's activity, which could be used to present and discuss its' development paths. Further longitudinal research would enable the presentation of development paths of cultural institution and identification of possible accuracy in their course within the studied population. The empirical research discussed in this article indicates the directions of future research on the paths of the cultural organisation development in the methodological and empirical layer.

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Activities of Marine Industries in the Russian Sector of the Caspian Sea in the Context of Modern Transformations in Eurasia

Nikolay W. GONTAR

Southern Federal University, Rostov-on-Don, Russian Federation
passat01@mail.ru

Abstract

Modern Eurasia is developing under the influence of a number of unifying projects of the countries of Eurasia itself and external actors to it. In 2015, Russia put forward a project of the Eurasian Economic Union (EAEU). At the same time, the idea of a "shift to the east" was put forward in Russia (the orientation of politics towards closer relations with the countries of the East of Eurasia). In addition, Russia proposed the integration of the EAEU and the Chinese project "One Belt-One Road", including through the North-South corridor through the Caspian Sea. The article explores Russia's strategy in the Caspian Sea, strengthening its ties on the continent and the development of the Caspian regions of Russia. The development of key sectors of the regions of the Caspian Sea (oil and gas production, shipbuilding, fishing) involves an expansion of the industry structure and an increase in its efficiency. It is also planned to improve the institutional conditions for the movement of goods along the North-South corridor, the creation of a fleet, navigation conditions and a single tariff policy for the effective operation of the sea route within the corridor. The SWOT analysis of Russia's implementation of its Eurasian priorities in the Caspian Sea reveals the strengths of the process (geographical location, developed marine complex, proximity to the countries of the region), as well as its weaknesses (inefficiency of specialization industries, limited markets, logistics problems), as the basis for the formation of Russian strategies in the Caspian Sea.

Keywords: Eurasia, Caspian Sea, Russia, Marine Industries

Introduction

The emergence of new vectors of Russian policy in Eurasia is directly related to the changing conditions of development on the continent. Thus, Russia found itself in a situation of deteriorating relations with Western countries, which gave rise to the project of a "shift to the east" and the creation of the EAEU. On the other hand, in 2015, the creation of the EAEU was dictated by the development of the PRC project “One belt one road”. As part of a strategy to maintain influence in the post-Soviet space, Russia proposed a project for the integration of the EAEU and an integration project for China (EAEU). One of the regions where such an interface is possible is the Caspian region. The basis for Russia's influence in this region is the project of the North-South transport corridor from India through Iran and Russia to Europe. Full implementation of the corridor project is only possible with the acceleration of its sea route along the Caspian Sea and the Volga. This requires the development of ports and the maritime complex of the Russian Caspian region as a whole. The relevant sectors can be seen as supporting the implementation of the North-South corridor project, as well as a tool for integrating this corridor and the OBOR in the Caspian section. The development of the maritime economy and other sectors of the Caspian regions can form a new quality of the economy of the Russian regions. This will serve to strengthen the North-South corridor, and strengthen the integration influence of Russia in Eurasia.

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Methodological Framework

Modern approaches to the analysis of Eurasian processes take into account the diversity of forces that shape the development trajectory of the continent's countries. In this regard, the author has carried out a comparative analysis of modern projects of Russia and China on the integration of the Eurasian space. Thus, T. Summers (2016) pays attention, for example, to the role of the One belt one road project in the transformation of the subnational level. Also the formation of trans-Eurasian projects is seen as a challenge and an opportunity for China itself as Clarke (2016) says about it, and also as a challenge for other countries of the continent, according to Druzhinin et al (2018).

The issue of integration of Eurasian associations, including the Russian project of the EAEU and OBOR, is discussed in detail in the monograph by Druzhinin (2020). Also noteworthy are the works of Vardomsky (2019) and Bezrukov (2016) on the prospects for a "shift to the east" in Russian politics. Also in the Russian literature, the topic of the North-South corridor is being developed as a variant of Russia's integration aspirations in Eurasia (for example, in the work of Gontar (2019).

As a toolkit for studying the role of the maritime complex in the formation of Russia's position in the Caspian region, we used a structural analysis of the economics of marine industries. To formulate recommendations regarding the positioning of Russia in the Caspian region, a SWOT analysis was used taking into account the potential of the North-South corridor.

The Impact of Modern Transformations of The Eurasian Space on The Position and Economy of Russia

Modern geo-economic processes in Eurasia are formed under the influence of a significant complication of the trade, economic and cultural interaction of actors. Such actors are represented both by countries and associations of countries within Eurasia itself, and by external forces. The modern trend of their interaction is the formation of competing integration projects that significantly complement the previously established alliances (EU, ASEAN, APEC). Such relatively new integration ideas and projects were formed by China (OBOR), Russia (EAEU). India proposed unification within the framework of the North-South vector, the USA proposed the project "Freedom and Security of the Indo-Pacific Region". The Republic of Korea and Japan have also put forward projects to unite the countries of the continent. Another form of interaction between the countries of the continent is bilateral ties, relations between countries and associations of countries, as well as between the associations themselves (for example, in the process of uniting the EAEU and OBOR). Free trade zones are also being formed between individual countries and economic unions (for example, between the EAEU, Vietnam and Iran).

Within the framework of the trend towards the formation of new associations in Eurasia, the formation of economic unions dominates, while defense unions are significantly less. In addition, even, for example, the Shanghai Cooperation Organization, China is trying to give an economic direction. At the same time, a number of financial institutions have been formed in Eurasia that ensure the functioning of unification projects (Silk Road Fund, BRICS New Development Bank, SCO Development Bank).

The PRC project "One belt one road" is designed to cover such areas as infrastructure, trade, finance, policy coordination, people-to-people contacts. At the same time, the continental projects within the framework of "One belt one road" still account for a small part of China's investments. The research "Connectivity Wars" (2016) notes that this project creates a partnership structure in which countries become dependent on China, and this structure fully reflects the center-periphery model. Thus, the countries of Central Asia have already formed a deficit in trade with the PRC, and with the development of the transport network and an increase in trade, it will continue to grow, as will the volumes of export of natural resources to China, according to China’s ... (2017). China offers cheap loans, but these involve Chinese contractors who often overcharge for their services and demand preferences in labor, procurement and environmental regulations, as noted by Kratz (2015).

Since 2003, a "school of sea power" has been developing in China, and today China's attention to sea routes is extremely great. Thus, the PRC directs up to 90% of its exports (including the export of electronics to Russia) by sea. However, today China is developing a Eurasian path to hedge risks in its relationship with the United States. Transit across Eurasia is not great yet. The project faces the task in

the future to bring the transit of Chinese goods along continental routes to 15-20%. Also, the use of the Northern Sea Route can help reduce China's global risks.

Russia is also an active participant in the formation of modern trends in Eurasia, in particular, developing the project of the Eurasian Economic Union. This project started in 2015 and brought together Russia, Armenia, Kazakhstan, Belarus and Kyrgyzstan. Today the EAEU is focused on ensuring the customs union, but the powers of the EAEU executive body - the Eurasian Economic Commission, do not include issues of transport, investment, trade. This hinders integration into the EAEU. As a result, as well as the conservative policy of the EAEU countries regarding the opening of external borders, the trend for the growth of economic ties within the community in 2009-2018. was absent. The percentage of mutual trade in the EAEU, according to the calculations of V.L. Vardomsky (2019), was only 9%. The volume of mutual trade per person in the EAEU was $ 300, and in the EU it reached $ 7,400. The reasons for the low connectivity of the economies were their small size, the peculiarities of their structure (dominance of raw materials industries, including fuel and agricultural) and the lack of mutual investments of companies (80% of investments were represented by investments of Russian companies). In the absence of horizontal ties between companies, at the same time, social ties were well developed (as a result of the general development of the EAEU member states within the USSR). The restraint of ties between the EAEU countries was also facilitated by the orientation of the Union countries towards import substitution.

In response to the deterioration of relations with Western countries since 2014, Russia has formed the idea of a “pivot to the east” (increased interaction with countries in the east of Eurasia). However, this idea ran into problems. For example, Russia has more significant trade ties with the western rather than eastern countries of Eurasia (trade between Russia and the EU is twice as large as trade between Russia and China, Japan and South Korea taken together). The most significant infrastructure projects in Russia (ports, pipelines) are also oriented towards the West. In addition, the trading partners of the Russian Federation in the east - Japan and China, are not focused on the Russian Federation as a significant trading partner, despite the fact that China has taken the 1st place in the foreign trade turnover of the Russian Federation since 2019.

Russian export to the east is only approx. 16% of its exports. Poor transport accessibility greatly increases the cost of delivering resources from Siberia to the countries of East Asia. Thus, according to the calculations of L. Bezrukov (2016), supplies by rail increase the prices of Russian resources for the countries of East Asia by 50-70%, which makes Russian resources uncompetitive. It is cheaper to ship coal, gas, oil, metals to China and Japan by sea from other countries. As a result, Russian supplies today cover only a few percent of China's resource needs, and the capacity of the cargo ports of the Russian Far East is ten times less than the total capacity of the ports of the APR.

Finally, according to A. Druzhinin (2020), Russia actually did not make sufficient efforts to develop its regions in the Far East, despite the creation of free economic zones and the development of a number of projects in shipbuilding (Bolshoy Kamen') and transportation of hydrocarbons («Power of Siberia»).

In these conditions, Russia's unification projects are reoriented towards strengthening contacts with China, India and Iran. In 2015, the idea of pairing the One Belt One Road projects with the EAEU was put forward. In 2018, a trade and economic agreement between the PRC and the EAEU was concluded. Also, to activate Russia's position in Eurasia in 2015, the idea of creating a "Greater Eurasia" was put forward, including through the development of the "North-South" corridor.

An agreement on the creation of a North-South corridor was signed by Russia, India and Iran in 2000. Today, Azerbaijan, Armenia, Belarus, Kazakhstan, Syria and Oman joined the project. The main idea of the project is the formation of transport links between the countries of South Asia and the Middle East with Europe through the Caspian region. The advantages of the project are more than half the distance for the supply of goods to Europe as compared to the route through the Suez Canal, and a decrease in the cost of transit. Within the framework of the project, the railways of Russia, Azerbaijan and Iran, the countries of the eastern coast of the Caspian Sea were united, the routes of transporting goods through Russian ports on the Caspian Sea were tested.

Taking into account the economic advantages of sea routes, the maritime economy sectors are acquiring key importance in the implementation of Russia's Eurasian priorities in the Caspian, the development

of which is an instrument of Russia's response to the processes in Eurasia, and a proactive strategy of Russia in the Caspian region.

Marine Activities in The Caspian Regions of Russia

The analysis of the development trajectory of the sea-economic complex of the Russian Caspian regions is based on the recognition of the relevance of its two elements:

- development of the maritime complex as a reaction to the strategies of Eurasian actors on the continent,
- development as a proactive strategy to enhance the role of the Caspian region as an economic pole within the framework of Eurasian projects.

Today the Russian sector of Caspian region is represented by three regions (Astrakhan region, Dagestan and Kalmykia) where approx. 4.4 million. In the economy of Kalmykia and Dagestan, agriculture occupies approx. 25%. The industrial sector is developed in the Astrakhan region (hydrocarbon production, shipbuilding, production of equipment for oil production). In Astrakhan there are consulates of the states of the basin, their trade missions, a representative office of the Russian Foreign Ministry.

The current position of the Caspian region is characterized by peripheral position in relation to the key trans-Eurasian corridors. Thus, two key "branches" of the "One belt one road" project run north and south of the Russian Caspian region. The sea route of the Chinese project will involve the Kazakh port of Aktau, as well as the ports of the Caspian Sea (Makhachkala, Baku). At the same time, the North-South corridor is a strategically important area in which the Russian Caspian region can be involved. According to estimates, the cargo traffic through the Caspian Sea on the line "India - Iran - Russia - Europe" can reach 40-50 million tons per year. Also, in the Russian Caspian region, it is possible to integrate the latitudinal vector of the OBOR and the North-South corridor. However, today Russia accounts for less than 1% of transit within the Euro-Asian transport corridors. In the Caspian region, 80% of cargo traffic also passes by the Russian Federation.

The role of the maritime economic complex of the Russian regions in achieving the strategic goals of the Russian Federation is of paramount importance, the most cost-effective for exchange in the North-South corridor is sea traffic, including transport of the "river-sea" type. In contrast, the inclusion of railways in a corridor results in a loss of cost advantage. It is the sea traffic that can provide the advantages of the North-South corridor. The key Russian ports of the corridor, Astrakhan and Olya, have a total capacity of 11.2 million tons. The cargo turnover of the Caspian seaports of Russia amounted to 7.4 million tons.

Today, up to ½ of the structure of exports through Astrakhan (and to a large extent through the port of Olya) is grain. In the port of Olya, it is planned to develop a container terminal, while the port of Makhachkala is specialized in oil transshipment. The main export destination from the ports of Olya and Astrakhan is Iran, while Makhachkala ensures the receipt of oil from the countries of the basin and its pumping through the Makhachkala-Novorossiysk pipeline in the latitudinal direction.

The maritime complex serves as the basis for the development of the North-South corridor. Within the framework of its development, important tasks are: development of railway approaches to ports, fleet renewal, dredging in the Volga delta, construction of ferries and development of ferry crossings, development of the Olya port and construction of a new port in Dagestan. These measures should be accompanied by the formation of contracts that would ensure the sustainability of supplies to the countries of the region, the formation of a single tariff for the entire corridor, and a reduction in the procedures for its passage. To increase the competitiveness of ports, measures have been taken to reduce the number of pilotage services, which reduces the cost of pilotage

Shipbuilding of the Russian regions in the Caspian is key for the development of the North-South corridor. An impetus to the industry is given by orders from oil companies (LUKoil) for the supply of drilling platforms and vessels for oil and gas production on the Caspian shelf. Also, Russian shipyards fulfill orders from companies in Iran, Turkmenistan, Kazakhstan, and European countries.

In the segment of river vessels and vessels of mixed navigation area, an increase in orders is expected due to the aging of the fleet (more than 78% of vessels are more than 20 years old) and an increase in cargo transportation by inland river transport as Dubinina (2016) notes.

However, for the development of the industry, the problems of the low share of Russian components and low labor productivity must be solved. Thus, most of the bulk carriers, container ships and tankers are delivered to Russia from abroad. In the beginning. 2010s orders for 1.1 million tonnes of displacement for Russia were placed abroad. In Russia, a comparable order could be completed in 2–2.5 years, abroad, in 8 months, as A. Bezborodov (2010) says. To improve the efficiency of shipbuilding in the Caspian region, a free economic zone "Lotos" has been created.

Offshore oil and gas production has developed significantly in the region. According to the estimates of the Russian Government, the proven oil reserves in the Caspian are about 3 billion tons, and over 3.1 trillion cubic meters gas. The deposits of Russia can ensure the production of up to 40 million tons of oil per year. The expansion of production will require the construction of up to 10 drilling rigs for exploration, oil platforms, auxiliary vessels and tankers. LUKoil envisages the construction of about 30 large oil production infrastructure facilities. Investments in the development of the Filanovsky field and other projects in the Caspian were estimated at $ 20 billion according to Kasimova (2013). Today, the production of Russian oil on the Caspian shelf exceeds 7 million tons. It is planned to build petrochemical plants in the regions of the Russian Federation on the Caspian Sea.

A significant role in the development of the North-South corridor belongs to the Volga-Caspian Canal - a shipping route from the Caspian Sea to the Volga. Today, programs are being adopted to deepen and maintain the canal, which will make it possible to make communication along it stable for ships with a large draft.

The prospects for increasing Russian exports along the North-South corridor are associated with grain exports to Iran, Iraq, Afghanistan, where the population is growing significantly, and the consumption of grain significantly exceeds the global indicator with insignificant domestic production.

In the future, oil exports from Makhachkala may be established along the North-South corridor to Iran, which is interested in swap deals with the supply of products to the north of the country, while providing similar volumes in its southern ports.

However, container transportation has the greatest prospects for the development of the North-South corridor, especially when connecting supplies from India.

The development of the Caspian sea economic complex includes plans to increase the turnover of dry cargo by small-tonnage vessels through Astrakhan and Olya, as well as by river-sea communication, to increase transportation by large-tonnage large vessels, for which it is planned to build a new deep-water port with a container terminal by 2030. Vessels built at Russian shipyards should participate in the construction of the port. The port will allow the creation of terminals for transshipment of grain and edible oils. Container cargo turnover may increase to 300 thousand TEU by 2030.

At the same time, the potential of the port of Makhachkala is associated with the integration of the North-South and West-East corridors (OBOR) by organizing a ferry connection with Turkmenistan. The construction of ferries to saturate the route is planned at Russian shipyards.

The offshore option of the North-South corridor is promising due to Iran's 12 modern ports in the Caspian.

The task of Russia in the Caspian is the development of logistics. In general, according to Connecting to Compete ... (2018), Russia ranks 105th in terms of international supplies, and 131st in terms of customs procedures. LPI ranks 85th among 155 countries in terms of the integrated logistics indicator. In the conditions of the Caspian region, the solution to the problem can be the creation of multimodal transport and logistics centers.

The precondition for realizing the potential of the corridor may be preferential rates of railway tariffs for goods traveling along the corridor, a reduction in customs payments, and simplification of customs clearance in Russian ports on the Caspian Sea (Green Customs Corridor).

Development of Economies of The Caspian Region in The Context of Increasing the Role of The Region in The Implementation of The Eurasian Priorities of The Russian Federation

Ensuring Russia's participation in Eurasian projects and increasing the importance of the Russian Caspian Sea complement each other. Thus, the activity of shipbuilding in the Astrakhan region solves the issues of providing ships with the North-South sea corridor, and also contributes to the development of a number of economic sectors. The development of the agricultural sector makes it possible to increase the economic weight of the regions of the Russian Caspian Sea region, as well as to increase the role of the region in foreign trade.

Speaking about the development of industries that can shape the exchange of goods within the Caspian basin, we note that this is, first of all, agriculture. However, today the Astrakhan region and Dagestan cannot meet their own demand for vegetables, meat and milk. Among the reasons for this are the inefficiency of production, poorly developed infrastructure, lack of logistics, capacity for processing agricultural products, a shortage of personnel, outdated agricultural equipment, and insignificant foreign investment. Thus, labor productivity in agriculture and the food industry in Dagestan is 2.7 times less than in Russia as a whole, according to the calculations of Magomedov (2013).

Modern tools for solving problems are: the allocation of benefits by the state, for example, for updating equipment, joint projects with foreign investors (an example of which is a poultry farm with the participation of Israel in Dagestan), improving the logistics of agricultural products (for example, a trading house was created to supply products from Dagestan to Moscow).

The industrial complex of the Caspian regions (with the exception of the supply of hydrocarbons and shipbuilding products) has a limited potential for external exchanges due to insufficient production volume and an orientation towards import substitution. Thus, the Dagdizel plant in Dagestan, within the framework of such a strategy, increased the fulfillment of orders for LUKoil several times.

The fishing industry in the Caspian also does not fully use its potential. Thus, there is a shortage of courts; the existing vessels are in poor technical condition; aquaculture is not fully developed. The degree of processing of catches is low, the coastal infrastructure is not developed. Port infrastructure facilities for fish transshipment are located in Makhachkala and Astrakhan and require modernization and reconstruction. The level of development of Russia's aquatic biological resources in the Caspian reaches only 20% of the possible, which does not allow providing for the population and forming the export of products.

Development measures in these areas are provided for by state strategies and programs for the development of the fishing industry. Thus, the development of a fish terminal in Makhachkala, including fish processing capacities, is envisaged. At the same time, such capacities can be oriented towards processing fish from Iran in the amount of up to 100 thousand tons per year.

The development of the economic structure of the regions of Russia in the Caspian is possible with the creation of industrial and agro-industrial clusters focused on the demand of Iran, India, the countries of the Persian Gulf and East Africa. For example, supplies of pedigree and commercial livestock, as well as mutton from Kalmykia and Dagestan, and the organization of meat production for export were in high demand among Russia's neighbors. Prospects for cooperation with Iran are associated with the creation of a joint company for the transportation of oil from Russia by large-tonnage fleet. For this, a dock for the construction of tankers has been built in the Iranian port of Neka.

The positions and problems of the Russian Federation in the basin, taking into account its maritime potential, are reflected by the SWOT analysis presented in the table.

Table 1: table title here
SWOT analysis of Russia's implementation of its Eurasian priorities in the Caspian

	Opportunities	Threats
Strengths	Direct waterway along the Caspian and Volga to Europe, Developed shipbuilding and shipping industry, Development potential of Caspian hydrocarbon processing, Significant trade turnover between South Asia and Europe	The proximity of the Russian Federation to the Caspian countries, in contrast to other actors of processes in Eurasia (USA, China), Unification of the Caspian countries and the Russian Federation within the framework of the EAEU, SEZ, "Greater Eurasia", Resources for increasing port capacities and ferry services, Removing Barriers to Mutual Access to Caspian Markets
Weaknesses	The demand for agricultural products of the countries of the North-South corridor, The need for sales markets for the Caspian states, Conjugation potential of North-South and East-West corridors in the Caspian, Resources for diversifying the economy	National disunity of the North-South corridor sections, Competition of the Caspian countries in the markets of hydrocarbons, agricultural products and logistics, Instability of demand for goods of the regions and countries of the basin, Small volumes of own product offer for filling the corridor

Based on the SWOT analysis, it can be recommended to use such resources to strengthen Russia's position in the region as: increasing the activity of foreign trade through the creation of joint ventures with the countries of the corridor, the integration of the North-South and OBOR, the integration of Iran into the Eurasian Economic union, development of the sea "branch" of the North-South corridor. Such measures could turn the Russian Caspian Sea region into a continental hub.

Conclusion

Modern integration associations in Eurasia are numerous and are in complex interaction. An example of this kind is the Russian EAEU project and China's “One belt one road” project. Russia's initiative to integrate these projects can be successfully implemented in the Caspian region. This region is peripheral in terms of the Russian economy, and in relation to the continental projects of transport corridors. However, the maritime economic complex and ports of the Russian regions in the Caspian are the key infrastructure that ensures Russia's response to the continental projects of other countries, and also allows it to pursue an initiative policy in the Caspian region. The basis for the formation of the strategic policy of Russia in the Caspian region can be a SWOT analysis, which will allow to connect sectoral and regional priorities and form a new quality of development strategies for the Russian Caspian region.

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The European Union's R&D potential after Brexit – Opportunities and Threats

Anna ODROBINA

Cracow University of Economics, Cracow, Poland
e-mail: odrobina@uek.krakow.pl

Katarzyna STABRYLA-CHUDZIO

Cracow University of Economics, Cracow, Poland
e-mail: stabrylk@uek.krakow.pl

Abstract

Brexit poses a great challenge to the EU, whose R&D potential will be significantly weakened. In general terms, this would mean a downturn in EU research and development, considering the necessity of gaining some distance on the USA and East Asia. In the paper, the authors attempt to identify opportunities and threats to the development of R&D in the EU after Brexit. The study also aims to establish the impact of the UK on the EU in the area of R&D and the importance of the EU in the global economy as well as determining opportunities for the development of R&D potential after Brexit and possible threats arising from this process. It seems necessary to specify postulates regarding actions to avoid negative effects on the R&D potential of the EU. Therefore, directions and areas of desirable actions will be developed for strengthening EU R&D, especially in the aspect of shaping the EU's innovation policy.

Keywords: Research and development, EU industrial R&D, EU innovation policy, EU funds, Brexit, global system of R&D.

Introduction

The United Kingdom's withdrawal from the European Union involves various social and economic changes for both parties. However, no agreement has been reached with regard to specific arrangements (other than the Political Declaration) concerning bilateral EU–UK relations after 2020[1]. As early as 2017, there were first clear conditions for the necessity to design critical changes in the EU to respond to the effects of the looming Brexit for the future of a disintegrated Community. The initial step was the White Paper prepared by the European Commission (2017a) as an introduction to an in-depth discussion, the development of scenarios for the future EU-27 and the nature of the EU–UK relations. The consequences of Brexit have been widely studied and analysed from the perspective of the EU economy (Sapir et al., 2017; Huhe et al., 2017; Hix, 2018; Etiubon and Ibietan, 2018; Vandenbussche et al., 2019). Various scenarios and forecasts of the future relations between the EU and the UK have also been described by HM Government (2016), Darvas et al. (2017), Hook and Szomszor (2016), Núñez Ferrer and Rinaldi (2016), Duff (2020).

It must be pointed out, however, that relatively little attention has been given in the literature to sector-specific relations between the UK and the EU in the future; in particular, such a neglected sphere is R&D, the present-day basis for building competitiveness and innovation. Therefore, R&D is a key area in which the UK and the EU should design a favourable partnership framework to achieve permanent growth of their respective economies (Leigh et al., 2020), also bearing in mind global competition in

[1] As at 14 July 2020.

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this field from the USA and East Asia. Taking into account the impact of Brexit on EU R&D and the considerable importance of the R&D area to modern economies, this article attempts to outline possible benefits and threats in the field of R&D.

This study aims to determine the influence of Brexit on the European Union's R&D potential in the global economy from the point of view of its development opportunities and the threats involved as well as to identify measures to be taken to mitigate negative effects of Brexit s. The following research hypothesis was adopted: despite the EU's weakened position in R&D, Brexit may be an impulse to introduce changes aimed at reinforcing the EU's R&D potential.

The study is composed of two parts. Part one attempts to analyse the EU's post-Brexit position in the global R&D system. Part two discusses the issue of future relations between the EU and the UK, including the financing of R&D. The examination was conducted using the critical analysis of the existing literature and available statistical data as well as the observational and experimental methods. The statistical material was retrieved from the databases of Eurostat, the OECD and the rankings of the top business investors in R&D.

Brexit and the EU's position in the global R&D system

From the 1990s, the world's R&D system experienced major changes due to the decentralisation process; as a result, in addition to the traditional triad, developing countries gradually gained in importance as well (UNCTAD, 2005a; 2005b). After the mid-1990s, the world's top performers (the USA, Japan, Germany, France and the UK) were joined by South Korea, soon followed by China (Huang and Sharif, 2015). Therefore, the global R&D system underwent substantial changes, with a steadily growing role of East Asia (Japan, China, Korea and Taiwan), whose total expenditure on R&D exceeded that of the EU in 2004 and that of the USA in 2010. Thus, the global R&D system is based on three centres: East Asia, the USA and the EU. But other characteristic features of the system include the incessantly dynamic growth in East Asian R&D, mostly due to remarkable activities of China and Korea, and a relatively steady but minor increase in R&D spending in the USA and the EU (Figure 1).

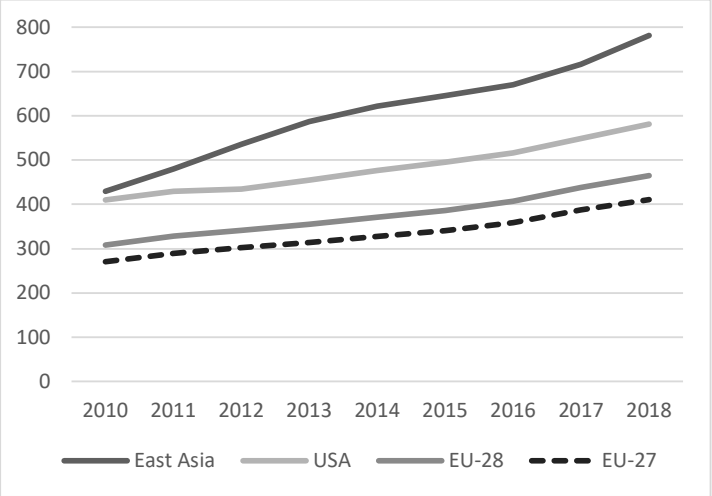

Figure 1: Three centres of global R&D – Gross Domestic Expenditure on R&D (USD billion)
Source: calculated by the authors based on OECD (2020).

In 2018, the overall R&D expenditure of the Asian centre was USD 781.1 billion, whereas the USA and the EU spent on R&D USD 581.6 billion and USD 464.9 billion respectively. It must be emphasised that the Asian centre has been clearly strengthening its position as the leader, particularly since 2016, leaving the USA and the EU increasingly farther behind. The Asian centre account for ca. 38.6% of global R&D expenditure , whereas the USA and the EU represent ca. 26.3% and ca. 20.7%

respectively. In this context, the impact of Brexit seems very alarming as the UK played a major role in building the EU's position in the global system. Figure 1 also illustrates R&D expenditure in the EU without the UK (the EU-27), which shows a marked weakening of that centre of global R&D as in 2018 the UK's spending on R&D was USD 54 billion; as a consequence, it pushed down the EU-27's share in global expenditure on R&D to ca. 18.3%.

Another significant post-Brexit threat to the EU is a distinct fall in human potential in R&D, due to the impressive resources of the UK: the R&D personnel of 463,500, including 305,800 researchers. In 2018, the EU-28 had R&D personnel of 3.3 million, including 2.1 million researchers (OECD, 2020); therefore, Brexit will involve an abrupt fall in the EU-27's human potential by ca. 14%. A decrease in human potential will undermine capabilities to create new knowledge, especially due to the EU's low efficiency: the number of researchers in the EU is higher than that in the USA (1.4 million in 2017), but the EU performs worse in the magnitude or intensity of R&D activities. In this context, the fact that after Brexit the EU-27 will still have more researchers than the USA seems to be of secondary importance. At the same time, the human potential of East Asia is impressive: R&D personnel of 6.0 million, including 3.1 million researchers in 2018 (OECD, 2020).

Therefore, Brexit gives rise to considering the issue of maintaining the EU's position as an attractive global R&D centre, or a cooperation partner for the other two centres, which will certainly pose a major challenge to the EU. It seems necessary to intensify endeavours to dynamise and speed up the EU-27's technological progress, thus to boost funding within the EU R&D policy and to improve efficiency in the area. It will be essential for individual Member States to increase efforts to boost expenditure on R&D. Although Member States have been making progress in improving innovation, it seems insufficient, as reflected in the European Innovation Scoreboard results (European Commission, 2020a). The Innovation Leaders in the EU are small economies (Sweden, Finland, Denmark, Luxembourg, the Netherlands), unable to substantially strengthen the EU's global position. Simultaneously, the largest Member States, such as Germany and France, are classified as Strong Innovators (together with Austria, Belgium, Estonia, Ireland and Portugal). Italy ranks among Moderate Innovators, the largest group of the EU Member States. Furthermore, in comparison with the other two global centres, the EU has noted the least significant progress since 2012 – 3%, against 4.9% in the USA and 17.3% in China, 15% in Korea and 8% in Japan. Therefore, Brexit has further aggravated the problem of maintaining the EU's position in the global R&D system.

The key to maintaining the EU's position seems to be stimulating cooperation in research and innovation with the UK as well as with the global R&D centres. Whereas the shape of mutual relations between the EU-27 and the UK in that area remains an open question, the EU formalised the rules of cooperation with the world's R&D leaders years ago and has gradually developed its scope and principles. The cooperation framework includes the EU–China Science and Technology Cooperation Agreement signed in 1998, again renewed and upgraded in 2018 (European Commission, 2018b); the multi-annual science and technology cooperation agreement with the USA, repeatedly updated and extended, dated 1990 (European Commission, 2018c); or the Agreement on Science and Technology Cooperation with Japan from 2011, subsequently renewed (European Commission, 2018d). Under the above-mentioned agreements, researchers from those countries participate in the EU's science and technology programmes (e.g. FP7, Horizon 2020, Euratom), whereas the established relationships favour the transfer of knowledge and the building of science and technology cooperation networks.

A particularly important role in building R&D potential is played by business, including transnational corporations (TNCs): on account of their global operations, TNCs are very active in R&D investment, gaining competitive advantages in a competitive international environment . Thus, they become drivers of global R&D, not only due to the amounts spent but also as initiators of R&D internationalisation, building cooperation networks, knowledge and technology transfers and the commercialisation of created knowledge (Karlsson, 2006; Moncada-Paterno-Castello et al., 2011; De Prato and Nepelski, 2013; Zimmermann, 2015).

The current situation of the EU is hardly favourable; although EU-based TNCs rank among firms with the highest R&D investment, the EU is outperformed by East Asia and the USA. The 2500 best-

performing TNCs in terms of R&D expenditure (Top 2500) included 551 enterprises from the EU-28, whereas the respective numbers for the Asian centre and the USA were 984 and 769. However, taking into account R&D expenditure, the US corporations unquestionably led the way with investments of EUR 312.5 billion in 2019. At the same time, TNCs established in the EU-28 spent EUR 208.4 billion, less than East Asian corporations, accounting for EUR 253.3 billion; the Asian centre is led by Japan-based TNCs (European Commission, 2020c, pp. 27–28).

Considering that the position of EU TNCs is much less favourable than those of US and Asian firms, Brexit entails a considerable deterioration in that regard; 127 TNCs from the Top 2500 are headquartered in the UK, i.e. the number of corporations from the EU-27 decreased by 23% to 424 firms and R&D expenditure fell to EUR 179.1 billion (Table 1). Although the strong core of EU-based TNCs includes German businesses (130 TNCs with R&D investment of EUR 82.9 billion) and French companies (68 firms – EUR 30.9 billion), the impact of Brexit is very significant in that field and changes the balance of power in the global R&D system towards the USA–East Asia axis.

Corporate R&D activities are strongly concentrated in specific sectors: in the Top 2500, as much as 76.6% of R&D investment is made in four industries: the automotive industry – 17.2%, health sectors (biotechnology, pharmaceuticals, medical equipment and health care services) – 20.7%, ICT producers – 23.3% and ICT services – 15.4%. In their R&D operations, the EU-based TNCs primarily specialise in the automotive industry, aerospace and defence, whereas the whole ICT industry plays a relatively limited role (with the USA leading the way – 67% in ICT services and 41% in ICT producers – and high performance of East Asia in ICT producers). The contribution of health industries is crucial as well: EU TNCs are behind US firms accounting for 49% of the sector's R&D expenditure in the Top 2500 (European Commission, 2020d, pp. 29–50).

Table 1: EU TNCs' R&D in the Top 2500 by industrial sector

Industrial sector	EU-28			EU-27		
	Number of companies	R&D investments (EUR billion)	R&D in % of the total industry in the Top 2500	Number of companies	R&D investments (EUR billion)	R&D in % of the total industry in the Top 2500
Automobiles	46	64.6	46	40	63.1	45
Health industries	110	45.4	27	78	33.8	20
ICT producers	63	26.9	14	56	25.7	13
ICT services	49	14.8	12	29	11.6	9
Industrials	82	12.1	26	70	11.5	25
Aerospace & Defence	16	9.2	46	10	7.3	37
Chemicals	21	5.2	24	18	4.8	22
Other	164	30.2	29	123	21.4	20
Total	551	208.4	25	424	179.1	22

Source: calculated by the authors based on the European Commission (2020d).

It follows from the data presented in Table 1 that Brexit will bring about the most serious changes in the EU's health industries, with the share of EU-based TNCs in the Top 2500 dropping from 27% do 20%. It results from the fact that the health sector is characterised by significant activities of UK TNCs, third in the world behind US and Swiss corporations. Although the EU's potential is also created by German, French, Irish and Danish TNCs, the EU's diminished role after Brexit is a distinct threat. However, opportunities can be seen in the strong position of the EU's automotive TNCs: the industry will be hardly hit by Brexit. In that sector, EU-based TNCs will maintain their leading position and global attractiveness. In contrast, there will be a marked post-Brexit drop in the share of R&D expenditure in aerospace and defence (from EUR 9.2 billion to EUR 7.3 billion). A mild deterioration will be noted by EU TNCs in ICT, an industry that is not the EU's domain, as already mentioned. It is

also worth adding that in the group of other industries Brexit will involve a loss of the EU's position in sectors such as banking, media and entertainment, dominated globally by TNCs from the UK.

Therefore, it seems justified to rely on the automotive industry, the source of the EU-27's R&D power, in building the potential of EU TNCs after Brexit. It is also desirable to strengthen the health sector to maintain the global attractiveness of EU TNCs. A certain opportunity in that regard is offered by the allocation of EU funds of ca. EUR 1 billion for research related to the coronavirus pandemic in 2020 (European Commission, 2020e).

The future relations between the EU and the UK in R&D policy

The UK largely contributed to the EU's position in research activities, also due to its openness to attracting foreign talents (European Commission, 2020b). As noted by Meulenaer and Veugelers (2019), there are two crucial pathways to excellence: openness to scientific talent and the capacity to engage in research partnerships. In order to maintain its status, the EU must ensure that research mobility and exchanges with the UK should be hampered as little as possible after Brexit.

Scientific cooperation and joint research can be facilitated by various international research programmes established, possibly financed from national funds; undoubtedly, however, the EU programmes create European Value Added, also attracting non-EU countries such as the UK. Further cooperation between the EU and the UK will be beneficial to both parties through shaping scientific excellence, although the very financing from the European Commission, in relation to other external sources, will not be vital to the UK.

To date, the European countries most exchanged in cooperation with the UK have been Denmark, Norway, the Netherlands, Germany, Switzerland; those countries could lose the most to Brexit in terms of research partnerships. As regards the ability to attract talent, the European Research Council (ERC) is another important body for researchers' mobility. The UK attracts talents from the EU, especially from Italy, Germany and Spain; therefore, in this aspect, the countries concerned would also suffer losses due to Brexit should no framework for continued cooperation be established (Meulenaer and Veugelers, 2019).

Although for several decades certain fields of research have been international, recent years have witnessed increasingly globalised and multi-polar networks of scientific and technological entities (European Commission, 2018a). In this context, the EU's policy priority, i.e. keeping up with key competitors in the global R&D system, requires closer cooperation with partner countries, including the UK, to ensure access to world's best talents, expertise and resources in research and innovation (European Commission, 2017b).

In May 2018, the European Commission submitted a proposal for the 2021–2027 Multiannual Financial Framework (MFF), taking into account the result of the 2016 referendum in the UK. However, despite the departure of the UK from the EU, some funds covered by the new MFF will undoubtedly be connected with EU–UK relations. Participation in the EU's future programmes will require the UK's appropriate financial contribution to the EU budget (European Scrutiny Committee, 2018). A likely solution is to apply the mechanism also used for Norway and Iceland (EFTA, 2020), with the financial contributions of those countries calculated on the basis of the GDP of the country concerned relative to the total GDP of the European Economic Area. But it must be stressed that detailed provisions of agreements with the EU vary between countries (Keep, 2019, p. 13). In such a scenario, the UK might become the second-largest payer after Germany. In terms of EU funds received for R&D in 2014–2018, the UK was also the second-largest beneficiary after Germany, but in relative terms (in relation to GDP) the country ranked outside the top ten (Figure 2).

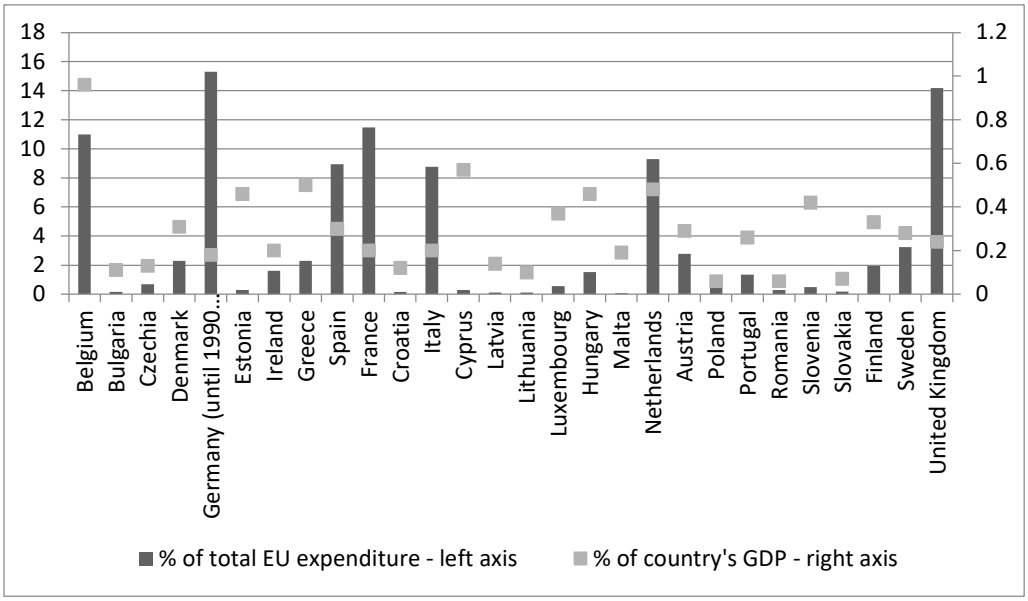

Figure 2: Expenditure on R&D from the EU budget (2014–2018)
Source: prepared by the authors based on Eurostat (2020).

Due to the UK's high research potential, the advantage of improving the quality, scope and critical mass in science and research by combining national and EU funds may be less important than to other countries. As a third country, the UK will be able to collaborate under EU projects, but access to them may be more hindered for procedural considerations, whereas the UK will have no influence on their shape, i.e. the objectives and tasks contained in EU programmes intended to finance R&D. It must also be pointed out that EU measures are increasingly interrelated to produce a synergy effect, i.e. for the results in certain fields to be useful in other areas. In this context, the UK's selective participation in EU programmes may prevent such a synergy effect (Beun and al., 2019). In February 2020, the position of the UK government on the future relations of the UK with the EU emphasised possible participation in several EU programmes, including Horizon Europe (at present: Horizon 2020). In contrast, engagement in the student mobility programme Erasmus+ was indicated as optional and only considered on a time-limited basis (UK Parliament, 2020). As emphasised by Mazzucato (2018), the complexity and specialisation of today's science make openness and cooperation key success factors. In this case, it is difficult to predict whether the UK's being a non-EU country leads to deteriorated arrangements since both parties need one another (Mazzucato, 2018, p. 5).

Indisputable advantages of the joint creation of a European R&D area should not prevent the consideration of the drawbacks of EU funding: multiple sources, i.e. funds and programmes, red tape complications, excessive and non-transparent legislation. Creating a new MFF every few years should be an appropriate solution leading to the implementation of good practices and learning from mistakes, but many programmes and procedures become increasingly complex (cf. Leceta et al., 2017; European Commission, 2017c). Nevertheless, the procedures of the functioning of the EU and its growing focus on innovation and support for research must be appreciated as they go beyond national structures which may hinder scholars through national financing policies (unless private support can be acquired).

It is a rather widespread belief that the EU funding of scientific research brings additional benefits such as (Arnold, 2012; SFIC, 2012; European Union, 2014; European Commission, 2016; European Commission, 2017c, p. 90; Schout and Bevacqua, 2018):

- the creation of EU-wide cooperation networks,
- increasing the geographical scope of research projects,

- project coordination,
- cross-border externalities and the economies of scale,
- improving science and research quality,
- greater research mobility, combining experience and skills,
- the distribution of costs and risks,
- increased access to funding research projects – the pooling of funds,
- more efficient resolution of complex scientific problems,
- influence on national R&D policies,
- coping with global competition,
- efficient use of limited public resources allowing to avoid overlapping and the optimisation of efforts or financial benefits.

However, it is difficult to measure specific benefits due to the lack of sufficient data (European Commission, 2014, 2017c). Nevertheless, the concentration of funds and the above-mentioned advantages of cross-border cooperation in R&D confirm that the beneficiaries create more innovation, whereas the quality of their publications was assessed significantly above the world average (Craciun and Orosz, 2018).

Therefore, it seems that the EU's relationships with the UK are strong enough for representatives of the 27 Member States to recognise the necessity to continue cooperation in research and development to avoid any weakening of the EU and to prevent negative (non-constructive) rivalry between the UK and the EU. The UK is also aware of the need to maintain and develop cooperation with the EU-27 for mutual benefits; therefore, it should be a priority for both parties.

Conclusion

According to the analyses conducted, Brexit has a significant impact on the European Union's R&D potential and poses a major challenge in the context of building the EU-27's position in the global R&D system, with the fast-growing role of East Asia and a strong position of the USA. Any weakening of the EU-27's potential may lead to the creation of a strong East Asia–US axis, characterised by diminishing interest in the EU centre. An important threat is the reduction of human resources in the EU-27's R&D, which may drive down its attractiveness as a cooperation partner for the other two centres and result in weakened capabilities to create new knowledge.

In this context, it is worth pointing out that supporting the potential of EU TNCs could stimulate their participation in global R&D and becoming a transmission channel for the international knowledge transfer and commercialisation as well as for attracting talents. Certainly, an opportunity for the EU-27 is further specialisation in the automotive industry where EU-based TNCs are unquestionably strong. However, measures should be taken to reinforce the potential of the health sector to maintain the EU's role in the global system. The orientation of the EU's research programmes towards health industries might speed up the creation of their potential.

Measures to be taken by the EU-27 to mitigate the consequences of Brexit certainly include the acceleration of and growth in funding within the EU R&D policy, including a focus on improving the efficiency of R&D activities, as postulated in the new financial perspective. Nevertheless, it also seems necessary to mobilise the Member States to increase their spending on R&D and to enhance innovation. Furthermore, it seems crucial to develop R&D cooperation with the other two centres and the UK in order to create global networks and to stimulate knowledge transfer. After all, cooperation and the generation of synergy effects have long been the EU's priorities, whereas its research programmes, attracting non-EU talents as well, represent a strong point in the research policy. Cooperation with the USA and East Asia should be in the spotlight in the EU, especially in industries particularly affected by Brexit (the health sector, the aerospace and defence industry), to rebuild their potential based on global cooperation networks, but it will also be fundamental to maintain cooperation with the UK partners. It seems to be in the UK's best interest as well; however, the UK may seek non-EU-27 partners. It will be of crucial importance to design a mutually beneficial framework for further cooperation in R&D.

Certainly, Brexit is a difficult time for the EU's R&D potential, involving various risks in the above-mentioned aspects; nevertheless, it may also offer an opportunity to re-orient attention and expenditure on R&D, to mobilise the reinforcement of the R&D potential at the EU and Member State levels, to re-define EU policy priorities towards improving the innovation potential and the valorisation of R&D cooperation – today's key to success.

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A New Generic Model for The Management System of University's Third Mission. Case Study in Romania

Maria POPESCU

Department of Management and Economic Informatics, Faculty of Economic Sciences and Business Administration, Transilvania University of Brasov, Romania
mariapopescu@unitbv.ro

Lidia MANDRU

Department of Management and Economic Informatics, Faculty of Economic Sciences and Business Administration, Transilvania University of Brasov, Romania
lidia.mandru@unitbv.ro

Abstract

The article aims to support the better understanding and actions related to the university's Third Mission, through a holistic and process-based approach. The study includes: a theoretical background; a review of some publications that address to the system approach and management of technology transfer, knowledge transfer and entrepreneurship, three fields generally associated with the university's Third Mission; a new generic model for the management system of the university's Third Mission. The proposed model is based on the European standard CEN/ TS 16555-1- Innovation Management System, but its adaptation to higher education institutions is a novelty. The case study included in the paper illustrates some fundamental aspects of this approach. The research findings are important for academics and researchers, creating the framework for future studies on the ways for developing and optimizing innovation systems appropriate to university particularities. They can also be a useful guide for decision makers on institutional development in the context of the Third Mission, both at national and institutional level.

Keywords: university's third mission, technology transfer/ knowledge transfer, entrepreneurial university, model for innovation management system.

Introduction

The university's Third Mission refers to "activities concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments" (Mollas-Gallart et al., 2012). The engagement in this activity domain is not new, but it became more important in the last decades, being defined as a distinct mission (or function) of the university, which aides to education (the first mission) and research (the second mission). As many studies show, the development of the third function ensures a better capitalization of the resources available to universities and the increase of their role in solving the problems faced by society, contributing to its development and sustainability (Howard&Sharma, 2006), (Trencher et al., 2014), (Piirainen et al., 2016).

The importance given to the Third Mission can be seen in the general context of enhancing university role in knowledge-based society. According to Snelman, "knowledge society is primarily focused on knowledge production and generation of innovation", and assumes continuous changes in order to improve knowledge production and to make it more effective (Snelman, 2015). As the author states, universities have always been producers and disseminators of knowledge and generators of innovations, but in recent decades the socio-economic changes have forced major transformations in universities to address these issues.

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These changes in Higher Education institutions are the subject of many publications (Etzkowitz et al., 2000), (Etzkowitz et al., 2008), (Atkinson&Blanpied, 2008), (Zomer&Bennworth, 2011), (Etzkowitz, 2013). Chronologically, the emphasis was first on academic research as a source of new knowledge on materials, nature and society. Starting from the reality that discovery of new in itself does not generate advantages, the attention has been focused on the university technology transfer, knowledge transfer and entrepreneurship, which have become distinct fields of study and action, generally associated to the university's Third Mission.

The collocation "Technology Transfer" (TT) refers to the formal transfer of discoveries from one entity to another for their valorisation (Popescu 2016). In universities, the TT was related to academic research, including as basic activities: licensing intellectual property rights, creating new companies, doing research projects based contracts or in partnership with industry, providing consultancy and other services for third parties (Popescu&Totu, 2014), (Van Norman&Eisenkot, 2017). These activities have an important role in research-based universities, and also in education & research universities.

The collocation "Knowledge Transfer" (KT) encompasses a broader range of activities related to the collaborations between universities and society (OECD, 2014). In addition to TT activities, the university KT includes exchange of both explicit and tacit knowledge, through: people mobility, temporary placement of students and graduates, professional training courses, and university involvement alongside community in public events in many different ways (public conferences, exhibitions, media exposure, etc.) (Liyanage et al, 2009), (Ankrah&AL-Tabbaa, 2015), (Rossi, 2014), (Rossi, 2018). These activities are important in all universities, regardless of their profile (technical, sciences, arts, etc.).

The third concept, Entrepreneurial University, represents another approach related to university's Third Mission, and it is regularly associated to Higher Education institutions that play an important role in innovation and economic growth (Etzkowitz&Leydesdorff, 2000), (Gulbrandsen&Sliperslaeter, 2007). The results of the university entrepreneurship are usually measured by new spin-off and start-up companies (number of, generated employment and turnover) carried out by university members, including students. But in a broader sense, the results of the entrepreneurial universities are closely related to academic research and entrepreneurial education, being associated to KT and other innovation processes performed in universities. As Gibb (2013) states, "entrepreneurial higher education institutions are designed to empower students and staff to demonstrate enterprise, innovation and creativity in teaching, research and engagement with business and society" (Jameson&O'Donnell, 2015).

Despite the differences in their focus, these three concepts have as common element the accent on innovation, and share the idea that universities can play a significant role in solving the society problems, ensuring its development and sustainability. In the Higher Education forecasts, focusing on innovation and entrepreneurship, and the central position within regional ecosystem and knowledge valorization are presented as determinant characteristics of the future university (Blass&Hayward, 2014). The achievement of these goals implies changes at national level in policies applied both in the innovation and Higher Education sectors, but it ultimately depends on how the third function is performed in universities. According to Blass & Hayward (2014), "universities need to embrace an approach to innovation and its management that re-establishes them as the perceived centers of innovation".

Starting from these desiderata, the present paper aims to contribute to a better understanding of the factors on which the performance of the university' Third Mission depends, through a holistic and process-based approach. The paper addresses to the system approach of the university engagement in innovation, focusing on the management system. The research objectives are: 1) to analyze the publications that address to the university participation in innovation from the perspective of management; 2) to describe a model for a holistic approach of activities presumed by the university's Third Mission, based on the European standard CEN/ TS 16555-1- Innovation Management System (2013); 3) to illustrate the application of the new model on a case study. The conclusions presented at the end of the paper highlight the advantages of introducing a generic model for the management of

university engagement in innovation, which facilitates a better understanding of the complex field of university's Third Mission activities, and enables the systematic improvement of the university performance in this domain.

It has to be highlighted that the dysfunctions observed by the authors in the Higher Education sector and the actual needs of society/labor market are the ones that led to the creation of this new management system model. Before elaborating the model, the authors had a profound study of the existing specialty literature, including the latest edition of European standard CEN/ TS 16555-1 - Innovation Management System. The main objective was to create a useful, practical tool both for the educational system and for the business environment looking toward sustainability.

Overview of Studies on Models for the Management of University's Third Mission

Review Stage

The publications on the university's Third Mission are numerous. The studies are generally focused on some aspects related to university TT, KT or entrepreneurship, without a vision on the ensemble. The analysis in this section of the paper aims to be a review of the studies that address to system approach and management of TT, KT and entrepreneurship in universities.

In their study on Entrepreneurial Universities and TT, Bercovitz & Feldmann (2005) provide the conceptual framework that guides the analysis of university–industry relationships. The authors consider as important components of the TT system, university strategies, structures, mechanisms of the TT operations, and funding. They also stress the importance of the people in innovation, which is "at the heart of TT", and as a consequence, the need to implement training programs and incentive reward systems, as well as the importance of leadership in influencing behaviours and the degree of involvement in innovation of university staff. The context of innovation policy and other external parameters with impact on effectiveness of university participation in innovation are also considered.
In their study, Arenas & Gonzales (2018) present a conceptual model of TT in the context of collaboration between university and industry, based on a review of TT models described in other papers. The authors underline that TT is a complex domain, which involves as key elements, processes, behaviours, and social factors. The complexity is determined by the external factors too, which are also critical for the TT system. The TT model presented in the article is defined considering the elements of a communication process: transmitter, receiver, medium and mechanism, and the message. The role of TT offices is also discussed, as "communication supports between the transmitter and the receiver", in the particular case of the transfer in university-industry collaboration.

A more complete analysis is carried out by Kalnins & Jarohnovich (2015), which addresses the TT processes not only from the perspective of TT channels between Research & Development (R&D) and industry, but also from the complex interactions between innovation and the other two functions of the university - education and research. In the authors' opinion, the main elements of the TT model are: "educational level, government R&D funding, number of graduates, flow of brain drain, attractiveness of science field for young practitioners, industry and environment of TT system, decision making level, and information level of public". The authors listed some of the internal and external factors that can influence the TT performances. The idea that fragmented approaches are not sufficient, "only system approach and self-consistency between the elements of the system can guarantee successful TT", is also noticeable.

The study of Geuna & Muscio (2008) refers to models of the university KT in the area of licenses, spin-off and research collaboration, but the authors admit that such an approach does not provide a complete picture of the extent of university KT. The article section addressing to KT governance presents comments based on literature related to: developing right organizational support in order to facilitate the KT from university to business and society; creating strong incentive for academics in order to improve KT activities and eliminate conflicting goals; promoting policies that encourage

innovation dissemination and commercialization; developing the culture of open science in university. Starting from the finding that there is a great diversity in the KT approach in universities, the authors believe that it is not possible to produce common formulas for the governance of KT processes and support organizations. They recommend the exchange of good practices in the management of university KT.

Analyzing the literature on KT from university point of view, Schofield (2013) identified the most frequently mentioned factors that affect the KT success. In his opinion, three main categories of factors influence the potential collaboration between universities and industry: internal, environmental, and relational and cultural. The internal factors are related to organizational, individual, process and resource contexts, and can be partly controlled. The external factors are linked to market conditions, political, economic and legal risks, and can be mitigated. Relational and cultural factors are also critical for developing viable collaborations. The author recommends continuing research focused on the holistic approach of the critical success factors for university-industry research collaboration.

Entrepreneurship in university is generally treated in literature as a distinct theme. In most of these publications, approaches on the entrepreneurial university are more complex, including the TT/ KT domains, and focus on management system. Some of these studies are mentioned below.

In their paper, Vorley & Nelles (2009) make a link between the entrepreneurial university and the changes that accompany the development of the university's third function. They define the "entrepreneurial architecture" of university considering five dimensions: structures, systems, leadership, strategies and culture. As the authors underline, "the elements of the architecture are mutually supportive" and "coordination of all five is required in order to secure successful adaptation to the Third Mission". In their opinion, the entrepreneurial architecture is a theoretical framework for a comprehensive approach of university that helps to understand, analyze and develop the university's Third Mission. This model was used by Gibson & Foss (2017) within the narrative analysis conducted in several universities, aiming to identify "what actors and forces are most important in motivating institutional change in developing a university's entrepreneurial architecture". The authors underline the need to approach the entrepreneurial university in terms of process, which allows a better control of its functioning and development, in relation to the organizational context.

Referring to the development of the entrepreneurial university, Guerrero & Urbano (2010) show that "each university community is unique and its attitudes towards entrepreneurship are defined by a combination of factors". Considering the key role of human capital (staff, academics and researchers, and students), the authors state that universities would develop strategies, structures and a culture oriented to reinforce methods of quality education and incentives. They also consider as critical factors the alliances and the resources associated with the commercialization of new technologies.

In their study, Salarnzadeh et al (2011) propose a new way of approaching the entrepreneurial university, considering the specific elements of the system: inputs, processes, outputs and outcomes (in abbreviation, IPOO model). The model supposes a comprehensive vision of the university, including education and research processes. According to the authors, the entrepreneurial university is a dynamic system that contains a series of processes, namely: "teaching, research, managerial processes, logistical processes, commercialization, selection, funding and financial processes, networking, multilateral interaction, and innovation, research and development activities". It is mentioned that this classification of processes reflects the opinion of the experts who participated in the study, but other views should be considered.

A complex analysis on the phenomenon of entrepreneurial universities is conducted by Silva et al (2018), which had a systematic literature review in order to provide information for establishing a conceptual framework on entrepreneurial universities. The study illustrates the existence of a great diversity of definitions, models, actions and methodologies used in selected papers, generating multiple perspectives on the subject.

The existence of several entrepreneurial models is also highlighted in the study conducted by Sánchez-Barrioluengoa and Benneworth (2019) on UK universities. The authors refer to entrepreneurial university, engaged university and regional engaged university. Exploratory analysis on several universities that have adopted these models reveals how internal institutional configuration affects the third mission output.

A special place in the literature on university entrepreneurship belongs to the evaluation models developed in the last years. In his paper, Hannon (2013) states that the entrepreneurial university involves a way of managing that provides the ability of responding strategically and coherently to opportunities in the environment. The author points out the model created by European Commission & OECD (EC&OECD, 2012), as a guiding framework for the entrepreneurial university, which focuses on seven key pillars: leadership and governance; organizational capacity, people and incentives; entrepreneurship development in teaching and learning; university-business/ external relationships for knowledge exchange; entrepreneurial HEI as an internationalized institution; pathways for entrepreneurs; measuring the impact. A similar vision of the entrepreneurial university system is included in the accreditation methodology proposed by the Accreditation Council for Entrepreneurial and Engaged Universities (ACEEU, 2017). The entrepreneurial dimension of the university is measured taking into account the following five elements: orientation and strategy; people and organizational capacity; drivers and enablers; education, research and Third Mission activities; innovation impact. These models and other schemes actually used to the assessment of university's Third Mission are reviewed in the study written by Popescu & Mandru (2019).

Conclusion

Previous presentations bring in discussion some widely accepted ideas:

- The universities' engagement in innovation is a complex activity field that presumes approaching as a system;
- The university performances on TT, KT, and entrepreneurship are not dependent only on the internal environment, but also on external factors;
- In terms of internal environment, the TT/ KT processes and entrepreneurship involve, as key components, processes, procedures, tools, behaviours and social factors;
- The human resource represents a core element of the university's Third Mission system, but other elements are important too, namely: university strategies and policies, structures, leadership and organization culture, etc.
- Although each university has its peculiarities, introducing specific models, principles and methods in the management of Third Mission is necessary. The exchange of good practices in the management of university KT and entrepreneurship is also recommended.

As it results from the above analysis, the description of university engagement in innovation systems, TT/ KT and entrepreneurship, differs from one author to another, as well as the language used, making it difficult to understand the phenomena. In our opinion, it is imperative to introduce a common language and to develop a generic model for the system approach of university's Third Mission, with universal applicable requirements. This does not mean introducing patterns in addressing innovation activities: the application of the model requirements in universities will be different, taking into account the context and the particularities of each university.

New Generic Model of University's Third Mission Management

Given the large number of activities associated to university's Third Mission and their complex interdependencies, implementing a system approach of the university engagement in innovation represents an important way to improve the university performance in this field. The concept of system suggests that the actions are not isolated, solving the specific issues of university participation in innovation, being done in a coherent and systematic manner (Popescu et al. 2017).

The model proposed in this paper is based on the European standard CEN/ TS 16555-1- Innovation Management System (2013), which sets out the principles and guidelines to the systematic approach of innovation in organizations. Fig. 1 illustrates schematically the Innovation Management System (IMS) model as stated by CEN/ TS 16555-1 standard (CEN, 2013).

The IMS model presents similarities with other more popular patterns for management systems described in some international standards (e.g.: ISO 9001 for Quality Management Systems, 2015 Edition; ISO 14001 for Environmental Management Systems, 2015 Edition, etc.) (ISO, 2015a), (ISO, 2015b). All these models are based on principle of process approach. Using a process-based approach means that the management system is described by the processes developed within the organization in order to achieve the established goals. It also means that managers administrate the processes' interactions as a system (ISO, 2015c).

Similar to quality management, the IMS processes can be classified, considering their purpose, in the next three categories: basic processes, management processes and support processes (Popescu et al, 2017).

The basic IMS processes are those that directly contribute to innovation. Fig. 2 shows the main basic processes related to university's Third Mission, grouped into four categories: human resource development; technology transfer; entrepreneurship; other activities for regional development. This classification corresponds to the structure of the evaluation model "Regional Innovation Impact Assessment Framework for Universities", proposed by the Joint Research Center (the European Commission's science and knowledge service), which includes specific indicators for the next four domains: Education and human resource development; Research, technological development, knowledge transfer and commercialization; Entrepreneurship and support to enterprise development; Regional orientation, strategic development and knowledge infrastructure (Jonkers et al, 2018).

Fig. 1: Inovation Management System (IMS)

Source: CEN, 2013

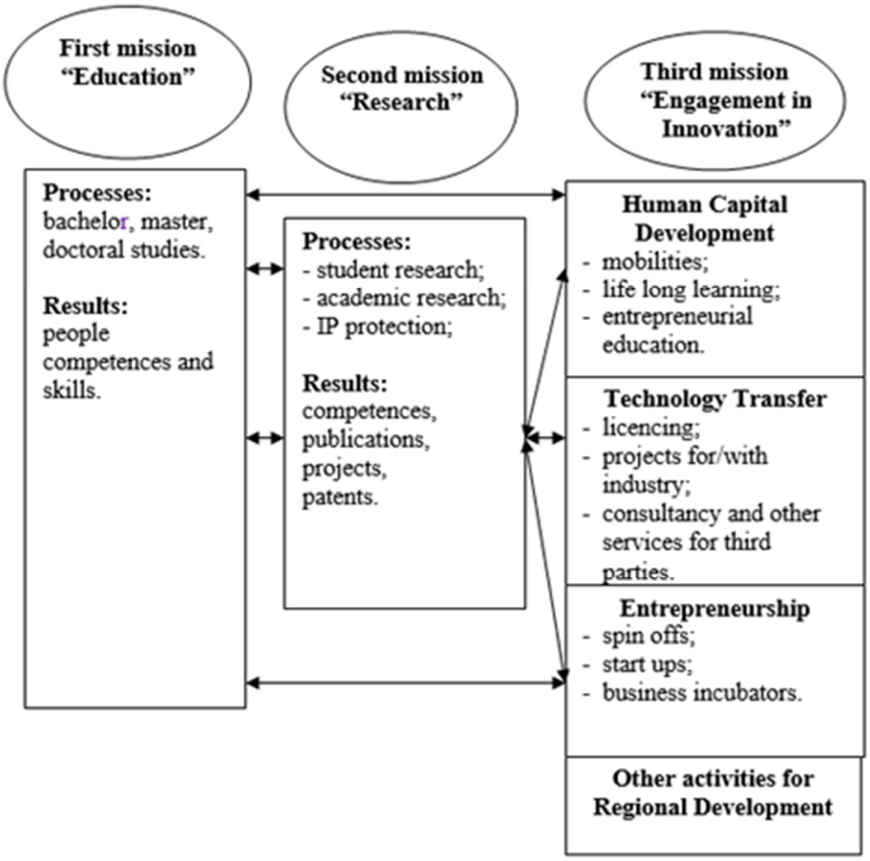

Fig.2: The Basic Processes of University's Third Mission and Their Conections with the Education and Research Domains

The Fig. 2 also illustrates the complex connections between the Third Mission and the other two functions of university: education and research. The relationship with education refers to the fact that university entrepreneurship includes entrepreneurial education, as a basic process, whose development became a strategic objective of HE institutions in the last decades (Wilson, 2008), (Gautam&Singh, 2015), (European Commission/EACE/Eurydice, 2016). The entrepreneurial education basically focuses on developing entrepreneurial abilities. In this regard, the formal education has a significant role to play, by inclosing entrepreneurship in the curricula of bachelor, master and doctoral study programs, and also through extra-curricular activities. Nowadays, universities are encouraged to open the extra-curricular offering up to all disciplines and all levels. This orientation is on the line of the increasing quality in education, but it is also important for the development of the university's Third Mission. The second connection, between the Third Mission and academic research, is also significant, especially in research-focused universities. Licensing intellectual property, the creation of new firms and other forms of knowledge valorization largely depend on the research findings. The performances in this area are associated with the university' Third Mission development, but they are also defined as quality criteria and objectives in academic research (Popescu et al. 2007), (Panda&Gupta, 2014), (Belcher et al., 2016). Concluding, one can say that there are synergic links between the three functions of the university: the education and research contribute to the Third Mission development, but the latter in turn influences the other two, the Third Mission having the capacity to reinforce the missions of education and research.

The second category of processes, management processes, includes activities associated to the management attributes: planning, organizing, directing, and controlling. The main management

processes of the IMS are synthesised in the box “Leadership for Innovation” (see Fig. 1), which refers to: establishing innovation strategy, policies and objectives; defining roles and responsibilities related to innovation; top management commitment and fostering a culture of innovation. The scheme shown in Fig. 1 also highlights the importance of systematically carrying out the assessment and improvement activities, segments of the management process included in the “planning-doing-assessment-improvement” cycle. This cycle is specific to any effective management approach, and defines the mechanism of continuous improvement, also known as the PDCA (abbreviation from Plan-Do-Check-Act) mechanism (ISO, 2015c).

The third category of processes, generically named “support processes”, refers to providing resources for innovation, and includes specific processes for human resource, infrastructure, information management, and financial resources.

In addition to the above description of the IMS processes, it has to be emphasized that the participation in innovation of the university, as well of any organization, is made from top to bottom, with direct and decisive involvement of the superior management. In this regard, an important place within the IMS processes has the establishment of the university's strategy related to the Third Mission. By developing a strategy addressing to this domain, usually Research & Innovation strategy, the relevance and visibility of the university research and engagement in innovation activities are increased, assuring: connection to the strategic directions of the Research & Innovation established at national and European level; consistent development of the university's intellectual capital taking into account the long-term and medium-term objectives; increasing the efficiency of the "Third Mission" related changes made in university, etc. Another key responsibility of the superior management consists in making the cultural changes necessary to effectively implement the IMS and achieve sustainable results. Related to this issue, it must be highlighted that the efficient functioning of the new structures, the activity planning and controlling systematically carried out with appropriate tools, and generally, the compliance with the new working rules, depend on the promotion of a new system of values in university, specific to a new culture of organization. Saying it simply, it is about a “culture of innovation”, a culture that supports the creation of knowledge, TT and entrepreneurship. If there is no a culture of innovation in university, the IMS has a formal character (Popescu, 2016).

The effective implementation and operation of IMS empower not only the top management, but all university departments and people, including the students. In this regard, it is worth mentioning the importance of creating specialized support structures for TT and entrepreneurship in universities (Keld&Foss, 2012). In addition to the organizational aspects, there are many other aspects of human resource management with impact on innovation performance that universities need to address. They represent a key element of the university’s IMS (Popescu, 2016), (Keld&Foss, 2012), (Piciocchi, 2018).

It should be emphasized that the application of the generic model presented above does not mean the inclusion in a template: the definition of IMS processes, the structures created and the tools used must be adapted to the particularities of each university. For example, in a technical university, the TT processes occupy an important place, but this category is less important or does not exist in arts universities. Harmonization with the university's strategy is also essential in partitioning the IMS. Therefore, the engagement in innovation approach is very different in research-focused universities, in comparison with the education-oriented universities. In this regard, the Rossi’s study (Rossi, 2018) on the drivers of KT performance shows that the university KT entails varied activities, and managers should identify the KT strategies that best fit the university's particularities and improve performance in specific KT activities. The relevant aspects regarding the implementation of such a system are illustrated in the case study presented in the next section of the paper.

A Case Study on the Application of the New Model in University

The case study is conducted at the Transilvania University of Brasov (UniTBv) - a state higher education institution from Romania, the largest university in the Center region. There are 18 faculties within the university, nine technical faculties and nine non-technical faculties. The university has about

19,000 students and is served by over 1300 employees (of which about 770 teachers and researchers) (Annual Report, 2019). Teachers and students perform, in addition to educational activities, research activities and other services for society. The evolution of these activities, both in terms of volume and requirements, has been significant since 2002 (the period preceding Romania's accession to the EU), the aim being to improve performance and align with the values and lines of action promoted in the European Higher Education Area.

The changes refer to both the services offered by the university and the management system. New management structures and tools have been created to adapt to the socio-economic environment and internationalize the university, increase quality, staff involvement, achieve continuous flows of change based on innovation and incremental improvements. These changes are presented in the evaluation reports published on the university's website: annual quality assessment reports, institutional reports for the re-accreditation of the university (at 5 years); international evaluation reports (2010-2011, 2012-2013) (www.unitbv.ro).

From the published data, it can be said that in UniTBv mechanisms and tools specific to a modern management system of the third function have been implemented. A few more important ones are mentioned below.

a) **Entrepreneurship is a major part of university strategy**. The strategy promoted since 2002 had as central objective "the integrated development of education with scientific research, with an emphasis on excellence, in the context of sustainable development" (Institutional self-evaluation report, 2013). The strategic objectives for the period 2016-2020 as well as the measures to achieve them aim to increase the quality of all processes within the institution, the final goal being to transform the University into an elite one in the Romanian academic environment (Strategic Plan 2012-2016). Three of the five strategic objectives for this period can be associated with the university third mission, namely: the development of research-innovation and technology transfer; expanding relations with the economic and socio-cultural environment (collaboration with economic agents at local, regional and national level in carrying out cultural and sports activities, human resource training, research, and with local authorities for projects of common interest); internationalization of the university.

b) **Systematic actions - planning, implementation, control and improvement - related to the university third function are developed**. The strategies were translated into multi-level action programs, each change project being coordinated at a high level. Every change project was monitored and evaluated, but there are also global evaluations of the actions associated with the university third function. So far, analyses have been fragmented, due to several structures subordinated to several vice-rectors. The centralization of these data was done through the Quality Assurance office, subordinated to the vice-rector for quality, which annually prepares reports on institutional quality. The reports present both result indicators and specifications regarding the processes and tools used.

c) **Change programs.** Some of the major changes promoted in the last decade are: introducing teaching courses in entrepreneurship in many study programs; developing new structures related to the entrepreneurial dimension of university, like the Department of Technological Transfer and Entrepreneurship, the Bureau of Relations with the Socio-economic Environment, the Student Entrepreneurial Society, etc; implementation of a new system for evaluating teachers and stimulating performance in entrepreneurship, and so on. Management processes and tools have been continuously improved.

d) **Leadership.** All the change actions were based on institutional policies that promoted entrepreneurship and continuous innovation in university, simultaneously with changing organizational culture. The communication (discussions and meetings) was the main way to attract faculty staff to align with the university vision and to be part of it. The actions were also promoted on the university's website through monthly newsletters, internal and external institutional reports and other documents.

e) **Regional relationship**. An important part of this new approach was the development of a strong network, through contacts and working alliances with entrepreneurs, companies, and other individuals

and organizations concerned about innovation. The university provides continuing education, scientific research, consulting and expertise services. These activities are coordinated and carried out through the Centre for Continuing Education, the Institute of Research and Technological Development, the Bureau of Economic Relations, and other structures, but involve staff, teachers and students from all faculties. Although brief, the above presentation reveals that UniTBv has many elements associated with modern management systems regarding the commitment to innovation. It can be noted the university enrollment in the HEInnovate exercise initiated by the OECD and the European Commission, which involves the systematic evaluation of the potential and outcomes of university KT and entrepreneurship. The program started in 2018 and is based on the Guiding Framework for Entrepreneurial Universities (EC&OECD, 2012). The use of the model for IMS proposed in the paper will allow the further improvement of entrepreneurship within the institution. The starting point is an evaluation report of the current system, highlighting the strengths and weaknesses, and establishing priority directions for action. An element to consider is the integration of the new system with the quality management system implemented in the university.

Conclusions

University's Third Mission is a domain of wide interest that is the subject of numerous publications. The approaches are diverse, many of them focusing on certain aspects and activities associated with the university TT, KT and entrepreneurship, without describing the whole system. This article analyzes publications that attempt a more complex approach of the university participation in innovation from the management point of view. Many authors state that, although each university has its peculiarities, introducing some methods and rules in the management of university engagement in innovation is necessary and possible. In this respect, several studies propose different models, but the diversity of solutions makes it difficult to understand and, above all, apply them.

The proposal presented in this study is to develop a generic model for the management system of university's Third Mission based on IMS model as stated by the CEN/ TS 16555-1 standard. In the authors' opinion, using an IMS model based on a European standard is an advantage, creating the prerequisites for its recognition and adoption at national and institutional level. In this regard there is a similarity with other recognized standards, such as ISO 9001 - Quality Management Systems, IS0 14001 - Environmental Management Systems and other generic models for management systems that have been implemented in many universities around the world. In order to facilitate the use of the European standard in universities, establishing a certain configuration of IMS processes adapted to Higher Education institutions is necessary. In this paper, a possible structure proposed by the authors is described, but the setting of a better model with the participation of a wider group of experts is recommended.

As it was already mentioned, the implementation of IMS based on a standardized model does not mean enrollment in templates, each university has to adapt the requirements of the generic model to its particularities. It is to stress that the model applies to any university, whether it is focuses on education, on research, or on education & research. Also, it is not specific to business universities, but encompasses technical, medical, art, science and humanities universities and departments. The application of the model will be different from one university to another, the superior management of university having the responsibility to set the strategic objectives and actions for the development of the entrepreneurial dimensions that best fit to the university profile and capabilities.

The implementation of IMS in university ensures a better coordination of engagement in innovation activities, by: directing activities of the university's Third Mission through strategies and policies harmonized with the national and European ones; developing IMS processes and managing them; optimizing the organizational framework and clearly defining the responsibilities for engagement in innovation; ensuring the necessary material, financial and human resources correlated with the established objectives; monitoring and evaluating the processes and results of the Third Mission; continuous improvement of the university performances and IMS. Introducing a unitary model creates

the premises for optimizing the IMS processes and tools used, such as tools for assessing the Third Mission, TT and entrepreneurship.

The implementation of such a system implies a new approach to the university's Third Mission, based on principles of the modern management: focusing on the processes on which the university performances in engaging in innovation depend; opening up to the socio-economic environment; developing leadership; emphasis on staff involvement; continuous improvement, and so on. Practically, the implementation of these principles implies complex changes in university, related to structures, processes, working methods, and organizational culture. Difficulties arise especially in terms of organizational culture: when the assumed values and employee behaviors remain constant, the new management system does not work, even if the structures and working procedures have been modified.

Another important underlining is that the innovation system as described above refers only to the TT, KT and entrepreneurship activities associated with the university's Third Mission. Other internal changes, related to education, research, management, etc., made by universities in order to increase market, services' quality and efficiency, were not considered (e.g.: opening of subsidiaries; introducing new teaching-learning technologies; developing infrastructure in university campus etc.). Similar to the innovation management system in business organizations, the generic model for the system approach of innovation in university can be applied considering the whole organization and all forms of innovation. But such an approach does not exclude the distinct reporting to the components associated with the university's Third Mission, given their importance.

Originality Value

The novelty of the paper is the proposal of a unitary model for the Third Mission management in universities, based on the European standard CEN/ TS 16555-1 (2013). This standard is known and applied in industry, the novelty consisting in its adaptation to universities. It comes as an alternative to the various models more or less similar proposed by other authors, and creates the framework for developing a generic model specific to the Higher Education institutions, adapted to the particularities of this domain. Developing the model also involves defining the concepts with which it operates.

It can be noticed that there are similarities between the IMS model based on the CEN/ TS 16555-1 standard with other models presented in various publications, especially with the university "entrepreneurial architecture" proposed by Vorley & Nelles (2009), and the configuration of the management system from "A Guiding Framework for Entrepreneurial Universities", produced under the aegis of the European Commission in cooperation with the OECD (2012). The existence of common elements with other models applied in universities is auspicious; it reflects the convergence of the views of specialists and increases the chances of implementing the new model.

Implications

Implementation of the proposed model enables the systematic achievement of the Third Mission activities and the improvement of the university performance in this domain. It also facilitates the understanding of the complex field of university's Third Mission and the training of specialists in management and leadership of university KT and entrepreneurship. It is widely accepted that achieving good results in the university Third Mission requires a professional approach.

The paper creates the premises for other theoretical studies on university IMS and also contributes to improving public policy and management in HE.

As a theoretical approach, the first step should be to develop a specific model for the IMS in HE institutions, based on the by CEN/ TS 16555-1 standard. The existence of such a model has many advantages. First of all, it offers a comprehensive framework to understand the dynamics of the Third Mission within the university and the influence factors. Secondly, the IMS model creates the

framework for a new approach, in an integrative manner, to areas defined as components of the university innovation system, such as: entrepreneurial education, research and innovation strategies, structures and networks, resources, evaluation, leadership and culture of innovation, etc. In all these areas, a process-based approach can lead to an increased optimization and formalization of the working rules, methods, procedures and tools used.

Regarding the public policies and the management of the HE institutions, the generic IMS model can be a useful guide for decision makers on institutional development in the context of the Third Mission, both at national and institutional level.

In this regard, the role of the state is important in all countries, regardless of the degree of governance centralization, relying on national strategies and HE programs, regulations on the evaluation of Higher Education institutions, funding systems and support structures in innovation. A suggestive example is the introduction of national tools for assessing the entrepreneurial dimension of universities, which can contribute to the emergence and development of the Third Mission in Higher Education institutions.

As regard the implications of the present study on the Third Mission management at institutional level, universities can move on to a more systematic approach of the changes for the development of the third function, setting their goals and projects of change to the overall strategy. The existence of a generic and standardized model of IMS gives more rigor and coherence to the actions focused on the development of university's Third Mission, supporting the projects of the university management that address to the IMS implementation/ evaluation and improvement. It also allows a better understanding of the IMS integration with other management systems: e.g. integrated quality-innovation management systems in universities, a subject of great importance that has not been studied so far.

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Regional Export Standard Tools 2.0

Violetta M. Kuzmina
PhD in History, Associated Professor, of the Department of International Relations and Public Administration of SWSU (Southwest State University) 305040, Kursk, 50 Let Oktyabrya Street, 94, Russia. kuzmina-violetta@yandex.ru

Marina A. Parkhomchuk
PhD in of Economics, Associated Professor, of the Department of International Relations and Public Administration of SWSU(Southwest State University) 305040, Kursk, 50 Let Oktyabrya Street, 94, Russia marinaanatollevna@yandex.ru

Aleksey A. Golovin
PhD in of Economics, Associated Professor, of the Department of International Relations and Public Administration of SWSU(Southwest State University) 305040, Kursk, 50 Let Oktyabrya Street, 94, Russia dr.golovin2013@yandex.ru

Abstracts

To ensure the sustainable development of the national economy, export potential plays a big role, the formation of which occurs at enterprises that are independent participants in foreign economic activity. The implementation of export simultaneously indicates the efficient operation of the enterprise in terms of its counterparties and the external environment. Gradually, the regions move to work according to the regional export standard, which is being improved more and more every year. Regional export standard 2.0 as a set of measures is necessary for local authorities and business communities to become more actively involved in export activities and act within the framework of institutional guidelines. The phased introduction of a regional export standard will allow regions to adapt and adopt the experience of other regions in its implementation.

Keywords: Export, Regional Export Standard, Rating, Russian Export Center.

Introduction

Regional Export Standard 2.0 is one of the national projects that was developed by the Russian Export Center JSC and so that the regions could fully realize their foreign economic potential. This project has a wide variety of tools to support the foreign economic (export) activities of the constituent entities of the Russian Federation. The staged implementation of the Standard will allow you to see errors in its implementation in a timely manner. The first 10 "pilot" constituent entities of the Russian Federation in 2019 made an important step in the formation of new ways of developing the national economy. In 2020, a total of 40 more subjects will join this project, and in 2021 - 35 subjects of the Russian Federation. Russia is now going through a difficult economic period. Therefore, it is necessary to support exports with financial and non-financial instruments. In world practice, there is a large number of export promotion infrastructure. Financial measures include government loans, customs and tax incentives, compensation for transportation costs. Non-financial includes technical assistance to events abroad and providing the necessary information to experts.

The constituent entity of the Russian Federation must ensure the availability of an advisory infrastructure to support existing exporters and companies. This object can be both a legal entity and a structural unit in the municipality of the infrastructure for supporting entrepreneurship.

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The functional of the object of the consulting infrastructure to support export activities can be endowed with an association of entrepreneurs an industry union or a public organization that has the necessary information and status

Review Methodology

The research information base includes materials of various types: decrees, decrees of the government of the Russian Federation, the Ministry of Economic Development of the Russian Federation, messages from leading Russian news agencies, materials from the official website of the Ministry of Industry and Trade.

As the fundamental methods, we used separate methods of statistical evaluation of the phenomenon under study, the method of theoretical analysis of the sources of the problem under study, and the illustrative-graphic method.

The export potential of this or that country has always been subject to assessment among researchers, specialists, economists. But the study of export standards at the level of regions, oblasts, districts or lands (in different states, administrative units are called differently) is a completely different area of knowledge, more specific, more applied. Chinese researchers have made significant progress in this area. BingqianYan, Yuwan Duan, Shouyang Wang showed that the export model and the regionalized model that distinguishes the export of processing at the national level [1].

Hong-Hao Zheng and Zheng-Xin Wang believe that based on traditional export difficulty indices, it is necessary to develop and use standards at the national level. The authors propose to apply such a development in the field of new energy products and new energy industries at the national and transnational level [2].

Julie Regolo examines the extent to which export diversification is associated with trade regionalization by examining the destination structure of new exported goods. The author uses a panel database on bilateral trade between 116 countries producing 1,090 goods over the period 2000–2010. Based on the results, the author concludes that export diversification is accompanied by trade regionalization, at least in the medium term [3].

Regional and sectoral indicators of export development are considered in the works of Xuemei Jiang, Yuwan Duan, Christopher Green [4], Yan Zhang, Jingbo Cui, Chenghao Lu [5], Daniela Federici, Valentino Parisi, Francesco Ferrante [6].

In domestic science, at least two approaches have developed, in which the assessment of the country's export potential appears. The first approach is associated with the assessment of the data itself of the export potential of the country as a whole, the second approach assesses exclusively the potential in the export direction of enterprises through their foreign trade activities. Both approaches associate their data and their assessment not only with quantitative indicators, but also with those factors and conditions that create a potential environment for the development of the export potential of either a country or individual enterprises. Moreover, these factors and conditions are quite diverse: from natural and climatic, to political, legal and economic, related to customs regulation or its absence.

The difference in these two approaches consisted in the specifics of the application and analysis of factors influencing the export potential.

To analyze the export potential of the country, the factors controlled and uncontrolled by the state are identified. For example, export control procedures are necessary in the implementation of foreign economic transactions related to a special group of goods and technologies. Export control as a system of state regulation of foreign economic activity is enshrined in the following legal sources:

1. Federal Law of 18.07.1999 No. 183-FZ "On Export Control";
2. Decrees of the President approving six Checklists;

3. Government decrees;
4. Orders and other orders of the FSTEC of Russia.
5. Order of the Ministry of Economic Development of Russia dated September 25, 2019 No. 594 "On approval of the requirements for the implementation of measures for the creation and development of export support centers carried out by the constituent entities of the Russian Federation."The presented review of the literature suggests that Western researchers are already in practice implementing the rules of the export standard for individual raw materials sectors of the economy, domestic - these problems have yet to be solved.

The research goal. The goal is to study the theoretical and methodological foundations for the implementation of the regional export standard 2.0.

Tasks:

1 To highlight the factors that determine the export potential of the enterprise;
2. Analyze the rating of innovative development of the constituent entities of the Russian Federation;
3. Describe the monitoring activities of the analytical conjuncture centers of the Joint Stock Company "Russian Export Center"

The Main Research Results

During the course of work there were studied the Regional export standard 2.0 and also studied the complex plan of measures and tools for the development of export activities within the regional export 2.0 standard technique of index of export activity of subjects of the Russian Federation, monitoring the activities of the center of export support.

Was developed the model form of the certificate on export of subjects of the Russian Federation, namely the Leningrad region, Nizhny Novgorod region, Novosibirsk region, Rostov region, Smolensk region, Sverdlovsk region, Perm Krai, Primorsky Krai, Stavropol Krai, Republic of Bashkortostan, the Republic of Tatarstan[7].

Having identified the evaluation criteria and factors that determine the effectiveness of the export potential implementation, we can say that the study of the criteria and evaluation of factors that determine the effectiveness of the export potential implementation leads to the conclusion that exports simultaneously act as a factor and as a result of the effective work of enterprises that are independent participants in foreign economic activity. The effectiveness of the export potential implementation is determined by factors that affect the competitiveness of the enterprise, the quality of the assortment, and the ability to produce products in the required volumes. Regarding the multi-factor assessment of the export potential of the organization, all the problems that require attention for the company to enter the international market can be formulated.

After conducting a study of the export promotion infrastructure and support system for domestic producers, it is revealed that at the moment Russia is making more and more efforts to support its exporters. The initiative is primarily aimed at supporting domestic producers, as it creates a more or less guaranteed market for Russian products. However, the experience of other countries where other measures and support institutions have shown positive results should also be taken into account. The existing tools and infrastructure to support Russian exports allow manufacturers to effectively promote their national products to the world market.

We have developed checklists for the tools of the regional export standard 2.0 that will improve the convenience and efficiency of quality audits of the regional export standard, reduce the response time to identified inconsistencies, and ultimately reduce losses and improve the quality of the regional export standard[8].
A standard form of export certificate for the subjects of the Russian Federation (Leningrad region, Nizhny Novgorod region, Novosibirsk region, Rostov region, Sverdlovsk region, Smolensk region) was developed.based on the analysis of the Smolensk region's exports, it was determined that the

priority markets for Smolensk exports were Belarus, Kazakhstan, Poland, Uzbekistan, Turkey, and Armenia. Priority sectors of Smolensk export: diamond industry, chemical industry, timber industry, agro-industrial complex, light industry, power engineering. Priority products of Smolensk export: finished food products, agricultural and agro-industrial products, children's clothing, lighting equipment, construction materials, packaging. All economic indicators are growing in the Leningrad region. The Leningrad region was among the top five regions in terms of social, economic and political indicators, and also received a Federal grant of almost one and a half billion rubles.

In the Nizhny Novgorod region during the study period, exports suffered significant decreases, this change was influenced by a decrease in the rate of import of machinery and equipment to the region, and a decrease in the volume of import of metals. The decrease in the volume of trade in metals produced in the Nizhny Novgorod region affected the export indicators[9].

There has been a significant change in the structure of foreign trade in the Novosibirsk region: if earlier imports prevailed over exports, last year it was almost balanced, with a slight advantage of exports. Exports increased due to deliveries to China (growth of 5%), Germany (growth of 38%), Kazakhstan (growth of 13%). The leaders of the rating of countries with the largest export supplies from the region included Saudi Arabia, Bulgaria, Korea and India.

Key economic indicators of the Rostov region have fallen below the level of previous years, mainly in the industrial region. However, the Rostov region has achieved a significant positive balance of foreign trade: sales of don goods in foreign markets almost tripled (2.7 times) exceeded the volume of purchases of imported goods.

After analyzing the standard form of the export certificate of the Russian Federation subjects (Perm Krai, Primorsky Krai, Stavropol Krai), it was found that foreign economic activity in the Perm territory is export-oriented: the volume and specific weight of exports significantly exceed the volume of imports. The Perm region's export structure is dominated by mineral products and chemical industry products, which characterizes the region as the largest supplier of raw materials. The largest trading partners for exports are the Netherlands, Brazil, the United States, and China[10].

According to the study of the Stavropol territory, it was revealed that it is one of the pilot regions for the introduction of a new model of export support aimed at improving and increasing the export potential of industrial and agricultural enterprises in the Stavropol territory. Exports from the Stavropol territory prevail over imports, which determines the high level of development of foreign economic activity with foreign countries. For Stavropol territory, the development of industry (20.2%), wholesale and retail trade (15.8%) and agriculture (14.7%) is becoming the most important direction of the economy and social sphere of the pilot region[11].

Regarding Primorye territory, it can be argued that the predominance of exports from Primorye in China (50.5%) and the Republic of Korea (27.5%) determines that exports from Primorye are an important destination for East Asian countries. The implementation of the national project "international cooperation and export" will increase the volume of exports of industrial products of local production. The growth of investment attractiveness is the basis for the growth of GRP – an important economic indicator of the Primorsky territory.

As for the Republic of Tatarstan, which exports raw materials, it is important to carry out the following activities: to concentrate efforts in promoting the product on competitive advantages; to clearly identify the sources of export growth in the segment (from the position of competitors and consumers); to build a clear strategy to fight competitors against whom companies have clear advantages. However, it should be noted that in the current economic conditions, which differ by complex political and economic processes, it is necessary to ensure diversification of the export potential of the Republic and the country as a whole, since the maintenance of the export structure with the raw material orientation, as well as unjustified increase in foreign trade may result in the maintenance risks from fluctuations on global commodity markets[11].

Having identified the methodology of the index of export activity of subjects of the Russian Federation, we can say that after analyzing the ranking of "Export activity" and considered the methodology of the index of export price of subject of the Russian Federation, it can be argued that Regional export rating tool created by the export centre for the comparative analysis of constituent entities of the Russian Federation key indicators of export activity and export environment. Despite the difficulty of comparing export statistics due to the variety of initial conditions for export activity, the "pilot regions" found this rating a useful tool. The rating "Export activity" was created by THE HSE in connection with the need to analyze the results of export activities of the Russian Federation's subjects. It allows you to get up-to-date information about the results of export activities of regions, as well as to assess the dynamics of development of each of them. I would like to note that the rating takes into account the results of export support in the region and the activities of the Executive authorities of the Russian Federation to implement the Regional export standard.

Conclusion

Making a general conclusion about the instruments of the Regional Export Standard 2.0, we can single out: firstly, the implementation of the standard will make it possible to adopt acts of simplification of foreign exchange control on the territory of the Russian Federation, expand access to the customs procedure for servicing exported goods.

Secondly, the “Export Activity” rating was created by the NRU HSE in connection with the need to analyze the results of export activities of the constituent entities of the Russian Federation. It allows you to receive up-to-date information on the results of the export activities of the regions, as well as assess the dynamics of development of each of them.

Thus, the Regional Export Rating is a tool created by the Russian Export Center for the comparative analysis of the constituent entities of the Russian Federation in terms of key indicators of export activity and the export environment.

An analysis of the practice of implementing the standard at the regional level will allow adopting administrative acts and adjusting the directions of development, improving export control, highlighting areas of liberalization of administrative responsibility, adjusting customs procedures for exported goods, and also finding suitable incentives to involve regions in the work under the Regional Export Standard program. 2: 0.

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Current key Rate Policy of the Bank of Russia

Marina E. Lebedeva

Doctor of Economics, Professor, Department of banks, financial markets and insurance, St. Petersburg State University of Economics, Saint-Petersburg, Russian Federation, lemar3@yandex.ru

Sergey N. Slavin

Senior lecturer, Department of Economics, Faculty of Economics and Finance, North-Western Institute of management - branch of Ranepa (Federal State educational institution of higher education " Russian presidential Academy of national economy and public administration»), Saint-Petersburg, Russian Federation, sergeys19@yandex.ru

Abstract

The article provides a brief analysis of the reasons for lowering the Bank of Russia's key rate to 4.25% in July 2020. Based on this analysis and identification of the main factors for lowering the key rate, a forecast is made for further changes in the Bank of Russia's key rate level in the short term. The article also briefly highlights the main forms of state support to increase the availability of credit and reduce its cost.

Keywords: Bank of Russia, Key Rate, Inflation, Credit.

Introduction

The Central Bank of the Russian Federation at its regular meeting on July 27, 2020, decided to lower the key rate to 4.25%. At the moment, this level of the Bank of Russia's key rate is historically low. The real rate level, taking into account the forecast value of inflation in Russia, has also significantly decreased and is approximately 0.25%. The reduction of the Bank of Russia's key rate to the level of 4.25% has seriously strengthened the intention to implement a soft monetary policy in the short term.

Analysis

In order to analyze the reasons for the reduction of the key rate level to the above value, we will turn our attention to the main macroeconomic indicators of the Russian Federation in the conditions of quarantine restrictions in the spring of 2020. Pic.1 reflects the dynamics of changes in inflation in the first half of 2020. Based on the data shown in Pic.1 it can be seen that there was a slight increase in inflation in March and April 2020, which was caused by seasonal factors rather than other reasons.

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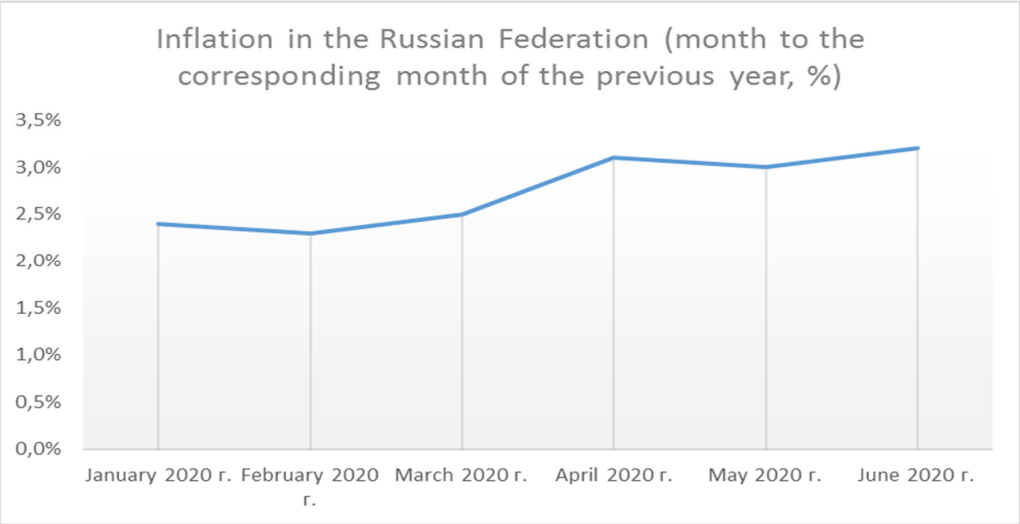

Pic. 1: Consumer market inflation (month to the corresponding month of the previous year,%) [2;4]

However, starting from May 2020, due to lower consumer activity and quarantine measures, deflationary processes took over, and inflation begins to decline.

Also noteworthy is the decline in inflation expectations in the Russian economy. This decrease is due to a drop in demand, which is likely to be deeper than initial forecasts, which will slow the recovery of the Russian economy after the quarantine measures caused by the fight against a new coronavirus infection. However, with the return of business activity around the world, the recovery in the price of one of the main Russian export products – oil is also noticeable. This circumstance supports the Russian ruble and helps reduce the risk of financial stability. If 3 April 2020, the price of Russian oil grade Urals was at the level of 17.39 USD per barrel of oil of this brand, on 29 June 2020 price of this brand of oil recovered to the level 42,59 USD per barrel. In June 2020, there was a positive trend in the strengthening of the Russian ruble. Pic.2 reflects the dynamics of changes in the Russian national currency in relation to the US dollar. At the same time, it is necessary to understand that the strengthening of the Russian ruble is a process that contributes to deflationary processes in the Russian economy.

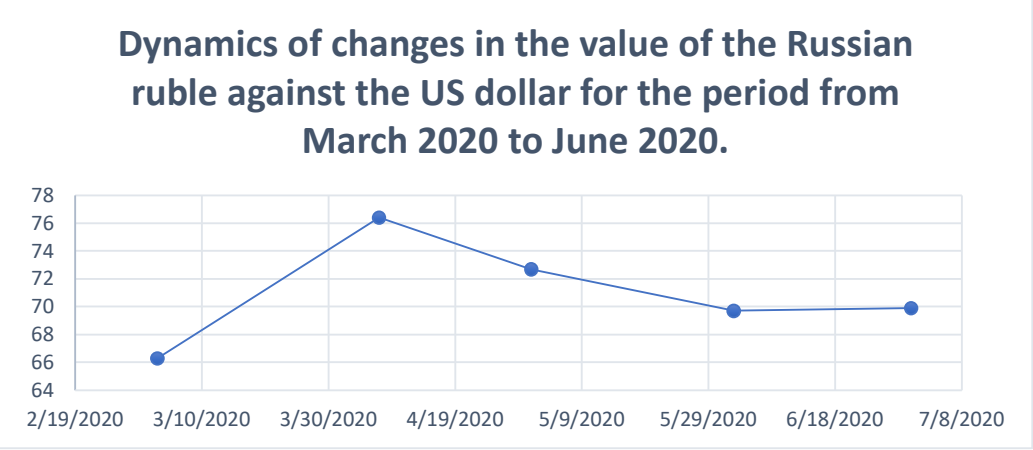

Pic. 2: Dynamics of changes in the value of the Russian ruble against the US dollar for the period from March 2020 to June 2020 [3; 1]

This circumstance is due to the high share of imported goods on the Russian market. Thus, the strengthening of the Russian ruble also contributes to the easing of monetary policy.

Attention is also drawn to the fact that in the conditions of the Russian economy's exit from the quarantine regime, it is necessary to support business activity by reducing the cost of borrowing. The price of credit, of course, depends not only on the price of the resource, but also, in many ways, is determined by the level of credit risk, which is certainly growing. For example, a commercial Bank, when considering a loan application of a potential borrower, will analyze its financial position and ability to service the loan. Different criteria are important: the ability to service loans based on current income and existing liabilities, the client's reputation, collateral, and the cost of resources for a commercial Bank. At the same time, short-term financing is more sensitive to changes in the Bank of Russia's key rate, as other factors become less significant in the short funding interval. Moreover, with increasing uncertainty in the crisis, commercial banks are trying to adhere to a more conservative credit policy, which contributes to an increase in short-term lending. Short-term lending, in this case, is less risky, since it is easier to predict the repayment of a loan for a short period. With such a credit policy of commercial banks, the key rate becomes more significant. Credit risk analysis is also important. When risks increase in the national economy, commercial banks are more attentive to the analysis of this risk and increase credit rates. At the same time, the role of the key rate in credit pricing is slightly reduced. Another situation is typical for an economic situation in which the Central Bank significantly increases the key rate. This situation was typical for December 2014 in Russia. The Bank of Russia tried to hold the exchange rate of the national currency in order to keep inflation in the planned corridor. The task was to set virtually barring conditions for issuing loans, which led to a certain deficit of the ruble in the short term. Also, the currency position on REPO transactions was increased. In this case, the instrument of changing the key rate, together with other factors, had a significant impact on the market. The fourth quarter of 2014 was characterized by a rapid fall in oil prices, which caused pressure on the ruble. If in September 2014 oil prices were at the level of 94 us dollars per barrel, by December 2014 the price had already fallen to 57 us dollars per barrel. Back in May 2014, the market could not have predicted such a sharp collapse in the price, despite the existing downward trend in the price of black gold. This circumstance could not but affect the Russian economy and, taking into account the significant import component of the national economy, it promised a surge in inflation. The measures of the Central Bank of the Russian Federation were really revolutionary for the money market of that time. On 16.12.2014, it was decided to raise the key rate of the Central Bank of the Russian Federation from 10.5% to 17%. The banking market reacted by significantly reducing the supply of money to the economy. Commercial banks have actually suspended lending even under previously approved loans and existing credit agreements. With these measures, the Central Bank of the Russian Federation actually artificially, using existing tools, contributed to the creation of a" deficit " of the ruble. The goal of this policy was to keep inflation within the specified forecast limits. Many experts blamed the Central Bank of the Russian Federation for the belated measures, many were surprised by such a sharp increase in the key rate, which actually indicated that this level of the price of money in the market is a barrier to lending operations. The fears of the Central Bank of the Russian Federation were not groundless because monthly inflation in the Russian economy has been growing rapidly since August 2014. In our view, this growth was primarily due to the decline in oil prices, combined with the expectation of a planned devaluation of the ruble (at that time, the Central Bank of the Russian Federation had already switched to a policy of free pricing of the ruble). The population showed an increased demand, the purpose of which was to transfer money savings to property, which is confirmed by the expectation of accelerated inflation. The decision was made not in favor of the development of the economy and the consumer market. The increase in the key rate of the Central Bank of the Russian Federation to 17% led to the actual suspension of lending by commercial banks, which in turn significantly reduced the supply of money. Moreover, many commercial banks, including system-forming ones, have started to change the terms of existing loan agreements in terms of increasing the interest rate. The Bank of Russia has been subject to global criticism from both the banking community and real business.

Therefore, the reduction of the key rate of the Bank of Russia, with a time lag, has some impact on the final price of credit in the economy. Simultaneously with the easing of the Bank of Russia's monetary policy, the Government of the Russian Federation, under quarantine restrictions, is implementing a number of programs to reduce the cost of credit (interest rate subsidies under government Resolution No. 422, a loan to resume operations under government Resolution 696, and preferential mortgages

under Government Resolution No. 566). At the same time, for example, within the framework of a loan to pay salaries to employees, commercial banks participating in this program receive a subsidy if they meet the established criteria [1,1-3]. Thus, this loan, issued for a year, for the first 6 months is free for the borrower, and then it is serviced at a preferential rate of 3.5% per annum.

Taking into account the above, we will highlight the main factors for reducing the key rate of the Bank of Russia on July 27, 2020 by 0.25% to the level of 4.25%:

 Reduction of short-term inflation expectations in the Russian economy;

 Slowdown in inflation growth in may-early July 2020;

 Recovery in the price of one of Russia's main export products (oil prices), which helps reduce the risk of financial stability;

 The decline in consumer activity due to quarantine measures, as well as the propensity of the population to save due to increased economic instability – is one of the factors of the deflationary process;

 The need to reduce the cost of credit in order to increase business activity and the need to restore the Russian economy after the quarantine regime;

 Some strengthening of the Russian ruble is one of the factors reducing the risk of financial stability.

Conclusions

It should also be noted that the reduction of the Bank of Russia's key rate by 0.25% to the level of 4.25% is an exception to the rules, rather than a reason for further rapid reduction. The target for inflation in 2020 is in the range of 3.8% - 4.8%. At the same time, the desired target is not higher than 4%. The Bank of Russia will closely monitor further changes in the macroeconomic indicators of the Russian economy for the purposes of further implementation of monetary policy. At the moment, there are no significant grounds for further rapid reduction of the key rate of the Central Bank of the Russian Federation. The probability of a negative real key rate simultaneously with the low level of investment attractiveness of the Russian economy will lead to a rapid increase in inflation in the country. Therefore, a further sharp reduction in the key rate in the short term is unlikely.

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Development of the Methodological Approach to Applying Synthetic Integral Indexes for Evaluation of the Social Protection System Functioning

Mykhaylo MALYOVANYI
Uman National University of Horticulture, Ukraine, E-mail: malyovanyi1980@gmail.com

Olena PROKOPCHUK
Uman National University of Horticulture, Ukraine, E-mail: olena_prokopchuk@ukr.net

Nataliia BONDARENKO
Uman National University of Horticulture, Ukraine, E-mail: nv_bondarenko@ukr.net

Oleksandr ROLINSKYI
Uman National University of Horticulture, Ukraine, E-mail: eskanderol1977@ukr.net

Maria MALYOVANA
Uman National University of Horticulture, Ukraine, E-mail: malyovanyi1980@gmail.com

Abstract

Development of the social security system is viewed at present in close relation to the level of economic development. The present study is aimed at the development of methodological approaches to the evaluation of the functioning of the social protection system with the account of the reciprocal influence of social and economic determinants. Theoretical part of the research deals with the review of the research papers written by different authors about the reciprocal influence of the social protection level and the country's economy and methodological approaches to their evaluation. Methodology describes the authors' approach to the evaluation of the functioning of social protection systems using two synthetical integral indexes: integral index of economic development (IIED) and integral index of social development (IISD) that are aggregated into the final integral index – integral index of social protection system functioning efficiency (IISPSFE). Specific features of this methodology are: 1) author's suggestion of the gradation of the value of each integral index; 2) suggested by the author graphic interpretation of the interaction of two integral indexes using modified Gartner quadrant (Gartner magic quadrant) that makes it possible to make the gradation of the countries according to the development level and functioning of their social protection systems (Magic Quadrant for Evaluating the Functioning and Development of Social Protection, term suggested by the author.). In the empirical part the author evaluates the interaction of social and economic development of the OECP countries over the period from 1995 to 2015 based on the suggested methodology.

Keywords: social protection, economic development, integral index, Magic Quadrant, OECP.

Introduction

Social protection of the population has always been in the close interrelation with the economy and its main determinants (labor market, wage rate (income level), labor productivity, investment level, economic growth, etc.). Therefore scholars consider the social protection system not only from the social point of view, but as a mechanism of stimulating economic development of a country. This

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approach requires an in-depth analysis of the interrelation of social-economic factors and social protection of the population. As studies show this relation has a reciprocal character.

Thus, it means that not only social and economic factors influence social protection, but its tools as well (various social services and benefits) exercise the influence on the dynamics of some or other factors. Economic and social components of the state are closely interrelated and influence each other. At the same time, science and practice prove that social expenses (total expenses on the funding of all social payments and programs in the state within the system of social protection of the population financed by the state and private funds) should be in harmonious connection with economic indexes of the country that directly influence the formation of the main funding sources of social protection of the population. Thus, economic resources should create a fundamental basis and be the form of the economic content of social protection. Difficult demographic situation and permanent economic and financial crises generated serious problems in the financial provision of the social protection of the population, which negatively affects not only the welfare level of the population but also the economy in general.

This makes the governments of the OECP countries search actively the ways to reform their social protection systems, leading to the establishment of new social policy models aimed at the elimination of the contradiction among the laws of the market and social goals. One of the main conditions of further stable functioning of the social protection system is to ensure the balance between economic and social goals that, on the one hand, provided maximum possible social protection of the population and, on the other hand, didn't have considerable negative pressure on the economic development of the state. It can be achieved provided that effective tools are created that would give the possibility to evaluate the level of economic and social development in their interaction.

Analysis of the latest studies and publications

Social protection and economic development have always been in close interaction. On the one hand, economic indexes influence directly the formation of financial resources to provide various social payments and programs, and, on the other hand, social protection can be the driver of economic growth as well as the reason for recession. Fig.1.

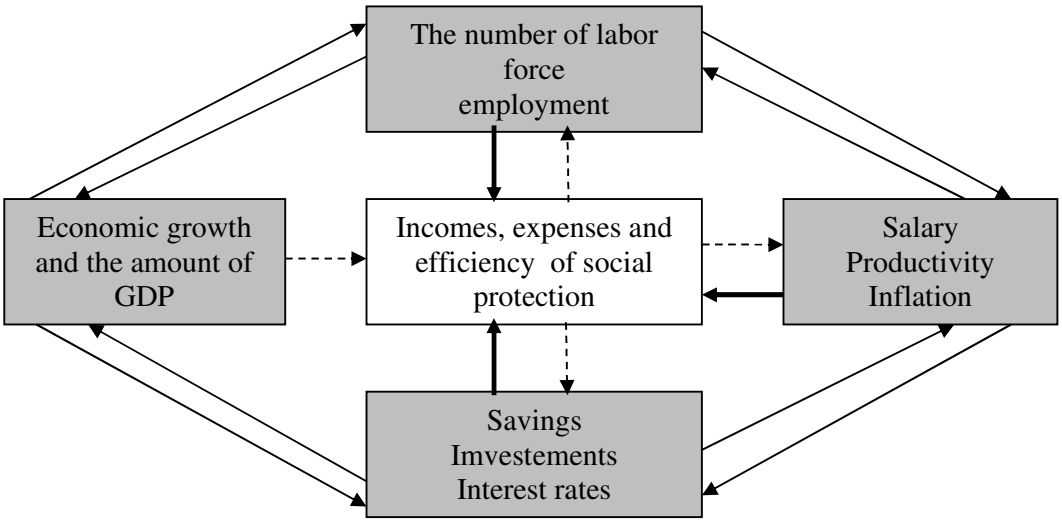

Fig 1: Main interrelations of social protection and economic factors
[Source: proposed by the authors].

Reciprocal influence of economic development and social protection depends to a great extent on the economic policy implemented in the country. Therefore, direct influence on the amount of social payments cannot be accurately defined, since it is formed under the influence of different market and non-market factors. For example, unemployment and early retirement directly influence on the growth of social expenses, but have a negative influence on the economic growth because of the reduction of employees and insurance contribution payers or tax payers. At the same time, financing of medicine increases labor productivity, reduces economic losses as a result of the reduction of the diseased and duration of sick leaves.

It is necessary to remember that social protection is in the first place a compensation mechanism that regulates relations which present no interest from the point of the market economy like helping the poor, compensation of the lost income because of various social risks, etc.

However, social protection influences the economic development of the country without producing any products. That is why, as far back as the XX century the governments understood that social protection could be an effective tool to stimulate the economy and the growth of the national income. In particular, J.M. Keynes substantiated that public expenditures directed to social goals are simultaneously incomes, because they stimulate consumer demand that increases the amount of paid taxes as a result of expanding production [Keynes, J. M. (1937)]. American economist B. Eichengreen (1994) notes that it was the state social expenses that gave the impulse of economic growth in the developed countries after the WW II. There is a great amount of studies of many scholars dealing with a reciprocal influence of social protection and economic growth: Alderman, H. and R. Yemtsov, R., (2012); Arjona, R. et all., (2003); Barrientos, A., (2012); Cichon, M., et all., (2004); Feld, L.P. and Schneider, F, (2010); Dafermos, Y. and Papatheodorou, C., (2010); Furceri, D. and Zdzienicka, A., (2011); Piachaud, D., (2011); Damerau, T.M., (2011); Gebregziabher, F., (2014); Egger, P. et all., (2016); Murshed S. Mansoob, (2017); Tridico, P. and Meloni, W., (2018). These studies and findings outline the main tools with the help of which the social protection system can potentially influence the factors determining the economic growth in a country.

It is worth mentioning that quite often some social-economic factors being the catalyst of a positive influence on the economic development of a country can have a negative impact on other social-economic determinants, which sometimes cancels out their positive influence.

Therefore, in many studies, the influence of social protection on economic growth turns out to be quite ambiguous. For instance, one group of scientists Furceri, D. and Zdzienicka, A., (2011); Furceri, D., (2010); Alderman, H. and Yemtsov, R., (2012); Alderman, H. and Hoddinott, J, (2010); Barrientos A. and Scott D., (2008); Li, Y., Wang, X., Westlund, H., (2015) in general note a positive influence of social expenses (or payments from a state budget on social goals) on economic growth. However, some of them interpret the results of their studies with caution. Arjona, R. et all. (2003) indicate in their research that the countries worldwide with a high level of economic development have a developed system of social protection of the population, which receives considerable funding, though it remains unproved whether this growth of social payment causes faster economic growth. Other authors Hansson, P. and Henrekson, M., (1994); Commander, S. J., Davoodi, H. R. & Lee, U. J., (1997); Gwartney, J. D., Lawson, R., Holcombe, R. G., (1998);, Levy, S., (2007); Sahn, D. and Alderman, H., (1996) prove that the increase of expenditures on social protection, in general, has a negative influence on the economic growth.

According to the point of view of some authors, such differences in the obtained results can be explained by specific features of social policy models and chosen methods of the financing principles. The part of scientific research focuses on investigating the influence of different economic factors on social protection (as a whole as well as in the context of some social programs) in short-, medium- and long term perspectives. Thus, for example:

- implementation of micro-financial programs makes it possible to reduce unemployment and to increase the level of income of the population, which positively influences the reduction of the burden on the system of social insurance for fighting unemployment and poverty rate [Lustig, N. C.

(2010); Lelkes, O. (2007); Zhen, Z. (2019)];
state support of the agrarian production development reduces the social vulnerability of the households (Tirivayi, N., Knowles, M., & Davis, B. (2016); Devereux, S. (2001)];
-state financing of active labor market programs that (ALMPs) is used to reduce the risk of unemployment and to increase the earnings capacity of workers [Betcherman, G., Dar, A., & Olivas, K. (2004)];
-activation of the non-state social insurance systems (including state financial support in the form of tax benefits, partical financing, etc.) in the future reduces financial burden on the state system of social protection and has a positive influence on the poverty rate among elderly people [Piljan, T., & Brzaković, T. (2017); De Freitas, N., Clark, G., & Legendre, B. (2009); Doerr, U., & Schulte, K. (2012)] etc.

Thus, there is a close interrelation between social and economic development that should be taken into account when making decisions as to the changes in the social protection system as well as in the economic policy of the state.

At present, a considerable number of various indexes and indicators characterising the state and development of social protection systems is being used in the world practices. A comprehensive analysis of scientific studies showed different approaches to the evaluation of the state of the social protection and well-being of the population. Some approaches are based on the evaluation of the general level of the social protection using already existing indexes and indicators that are calculated in statistics (for example, the size of the subsistence minimum, poverty level, income level of some population strata, etc.) and used by international organizations (indexes that are the part of Human Development Index are used most frequently) [Netoiu, L., & Cârstina, S. (2014); Atkinson, T., Cantillon, B., Marlier, E., & Nolan, B. (2002); Paetzold, J. (2013); Arredondo-López, A., & Orozco-Núñez, E. (2014)].

In this case, integral index of social protection efficiency is expressed by such categories as quality of life, standard of living or well-being. Other approaches are based on the calculations and the use of synthetic indexes of well-being. Somarriba, N., & Pena, B. (2009) consider three possible methodologies for obtaining synthetic indicators for the area of welfare and quality of life. Furthermore, in their paper they analyze the quality of life in the European Union (EU) as a methodological exercise to demonstrate the principles of calculation, implications and differences among three indicator-construction approaches.). Espina, P. Z., & Arechavala, N. S. (2013) suggest using the synthetic indicator of welfare that comprises information on different social indicators from various life domains and enables classification of Spanish provinces, as well as a study of the impact of each individual indicator in order to determine provincial disparities in social welfare levels.

Some researchers propose to calculate and use special integral indexes characterizing the state of social protection systems functioning in different countries throughout the world. Thus, for example, Baulch, B., Wood, J., & Weber, A. (2006) recommend using social protection index that systematically and consistently quantifies activities at the national level. It consists of four summary indicators representing the cost, coverage, poverty targeting and impact are scaled and weighted to produce an additive index of the overall level of social protection provision. The index is calculated for six very different Asian countries: Bangladesh, Indonesia, Mongolia, Nepal, Pakistan and Vietnam. Considerable contrasts are revealed between their levels of social protection provision.

Despite a considerable number of existing scientific approaches to the evaluation of the state and efficiency of social protection, it is necessary to mention that they are focused on the evaluation of separate aspects of the research object without taking into account the reciprocal influence of social and economic development indexes of a country.

The purpose of the article

The aim of the article is to develop methodological approaches to the evaluation of the social protection system functioning with the account of the reciprocal influence of social and economic

determinants.

Materials and Methods

To evaluate the functioning of social protection system with the account of the influence of economic as well as social elements the author suggests using two synthetic indexes: integral index of economic development IIED and integral index of social development IISD that will be combined in one integral index of social protection functioning efficiency IISPSFE.

When developing the data of integral indexes it was taken into account that they should be simple at calculations, and some of their components are available in statistical databases and understandable for interpretation. The methodology of evaluation of social protection system functioning suggested by the author is based on the calculation and comparison of the interrelation of two integral indexes that depict the level of economic and social development of every single country.

Specific features of the present methodology are: 1) suggested by the author gradation of the values of each integral index; 2) suggested by the author graphic presentation of the interrelation of two integral indexes using Gartner magical quadrant that enables the scaling of the countries according to the level of the development and functioning of their social protection systems (author's term - Magic Quadrant for Evaluating the Functioning and Development of Social Protection). Succession of the steps undertaken to evaluate the functioning of social protection systems is presented in fig.2.

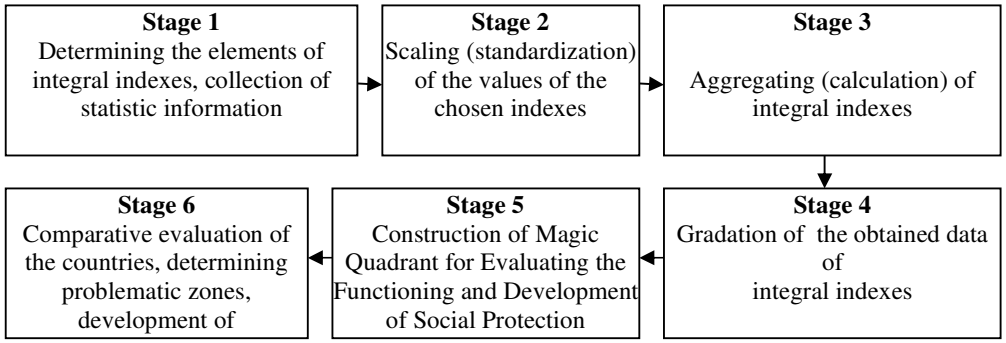

Fig. 2: Succession of the steps undertaken to evaluate the functioning of social protection systems

[Source: proposed by the authors].

Data

Economic and statistic research covered 36 OECP countries over the period from 1995 to 2005. Two factors were considered to choose the given period: 1) availability and completeness of the data that were necessary for calculating integral index of economic development and integral index of social development; 2) this period is characterized by a gradual deviation of OECP countries from the concept of the state as a welfare state. All quantity indexes used to construct integral indexes were taken from the open statistic database of OECP (OECD Data https://data.oecd.org/).

To form the integral index of social development the author suggested using 9 separate indexes that characterize the achievements of different goals of social protection (the number of index values can be changed by other researchers): 1) Gini index (GI); 2) Poverty rate (PR); 3) Net pension replacement rates (PRR); 4) Total fertility rate (per woman) (TFR); 5) Life expectancy (LE); 6) Infant mortality rate (IMR); 7) Elderly poverty rate (EPR); 8) Replacement rate (RR); 9) Unemployment rate (UR).

To construct integral index of economic development the author used 11 separate indexes that

indicate the level of economic development of the country: 1) GDP per hour worked (GDPHW); 2) Gross domestic product per capita (GDPPC); 3) Real GDP (RGDP); 4) Gross fixed capital formation (GFCF); 5) Household savings (HS); 6) Pension funds' assets (PFA); 7) Saving rate (SR); 8) Inflation (CPI); 9) Social security contributions (SSC); 10) Tax revenue (TR); 11) Average annual wages (AAW)

Scaling

On having chosen the parts of integral indexes and having defined their values it is necessary to conduct their scaling (standardization) at the second stage since their values are presented in different absolute and relative indexes.

The following method is suggested. It is the range scaling method used by the Human Development Index [Bob Baulch, Joe Wood and Axel Weber (2006)]:

$$ScaledValue = \frac{V_i - V_{\min}}{V_{\max} - V_{\min}}$$

where Vi is the value of the selected indicator for country i and Vmax is the maximum value for this indicator across all countries in the data set, Vmin is the minimum value for this indicator across all countries in the data set.

This scaling method results in a scaled value which varies between zero and one. Thise scaling method provides summary indicators that are simple to understand, as they always vary between zero and one, and provide a direct comparison with the maximum achieved by any country in the data set.

Aggregating (calculation)

Aggregating (calculation) of integral index of economic development and integral index of social development based on separate parts whose values should vary from 0 to 1 in the process of scaling can be conducted in following ways:

1. Summing up the values of all obtained variables.
2. Summing up the values of all obtained variables with the account of weighting factors
3. Calculation of mean arithmetic value of all obtained variables with equal weighting coefficients of all components of the integral index.

Calculation of mean arithmetic value of all obtained variables with different weighting coefficients of all components of integral index. Since in our case it is quite difficult to detect weighting coefficients of some components in the context of different the countries, the method for aggregating was suggested that is based on the calcucation of the mean arithmetic value of all obtained variables with different weighting coefficients of all components of the integral index:

$$S = \frac{1}{n}\sum_{i=1}^{n}(\pm 1) * x_i^{(Un)}$$

The same method of aggregating is also used to calculate the summary integral index – integral index of social protection system functioning efficiency (IISPSFE).

Gradation of the obtained values of the integral indexes

The gradation of the values of the summary integral index (integral index of social protection system functioning efficiency IISPSFE) is performed at the fourth stage. The author's gradation of the values

of integral indexes presented in table 1 includes the division of the obtained values into 5 levels and establishing their range which allows us to perform objective comparative characteristics of the development level of social protection systems in different OECP countries as well as to detect problematic zones (table. 1).

Table 1: Gradation of the values of the integral index of social protection system functioning efficiency IISPSFE

The name of the level	high	sifficient	average	unfavorable	low
values range	[0,8 … 1,0]	[0,6 … 0,8]	[0,4 … 0,6]	[0,2 … 0,4]	[0,0 … 0,2]
brief description	High level of the balance between economic and social indexes, accompanied by by their stable growth. Income level of the population is high. The population is satidfied living standards.	There is a shift of the balance level towards one of the sides. Despite the growth of economic and social indexes their slowing down is observed. Income level of the population is quite high. In general, the population is satisfied with a living standard, however there are some catagries that need additional help.	There is a considerable disbalance towards one of sides. There is slowing down of all indexes and even their reduction. The income level of the population is decreasing. The population is at the marginal level. The number of poor population is increasing.	The indexes of economic and social development tend to decrease. The income level of the population is low. Significant number of the population needs social help. Poverty level is quite high.	The country is in a deep and long-term economic and social crisis. Most population doesn't have means of living and needs help. The country isn't able to provide social support of people at the minimal level at the cost of own resources. The most population is on the verge of poverty or beyond the poverty line.

[Source: proposed by the authors]

Graphic interpretation of the obtained results

To give the graphic interpretation of the obtained results and to grade the countries according to their development level it is suggested to use modified Gartner magic quadrant (Magic Quadrant for Evaluating the Functioning and Development of Social Protection). In the Magic Quadrant for Evaluating the Functioning and Development of Social Protection the values of the calculated integral index of social development are arranged on the Y-axis and the values of the integral index of economic development are arranged on the X-axis. Magic Quadrant for Evaluating the Functioning and Development of Social Protection is divided into 4 sectors (the value 0.5 is the division center on both X and Y axes). Every OECP country is located in the square on the ground of the interaction of two calculated integral indexes – integral index of economic development (IIED) and integral index of social development (IISD).

Each of the four squares is given a title and attributed a corresponding description (fig. 3), that enables us to define the present state of the development of the social protection in each OECP country (with the account of the interaction of achieved economic and social indexes). On that

ground, it is also possible to develop recommendations as to the desirable development of the country's social and economic indexes.

Leaders are the countries that managed to provide the relative balance between economic and social goals. Provided that quite a high level of economic development is maintained, the system of social protection is quite developed and covers the most population of the country and the level of social payments is high. Due to this fact, there is a low level of poverty, reduction of disparity in the income of some social categories, reduction of unemployment rate and increase of life expectancy as well as health care of the population. The main aim of such countries is to support this balance and to develop gradually both economic and social indexes. The main threat is the desire of the politicians to increase their popularity among the population through ungrounded increase of social payments, which can lead in the future to the transition of such countries into the socialist countries with gradual movement to quadrant Unhappy.

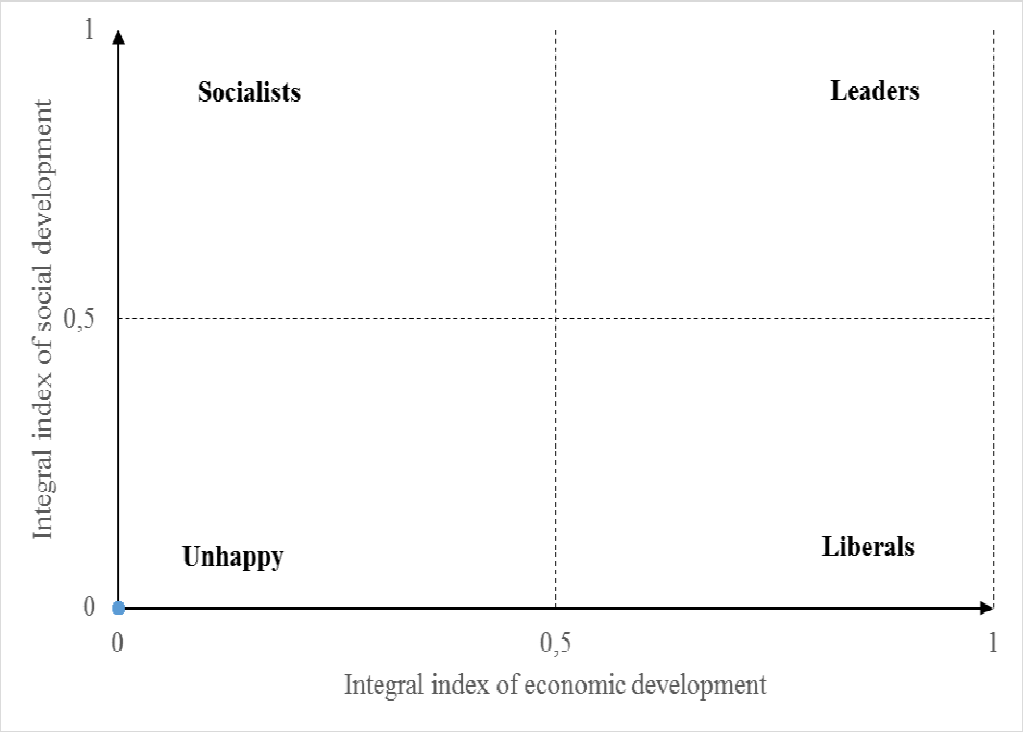

Fig. 3: Magic Quadrant for Evaluating the Functioning and Development of Social Protection
[Source: proposed by the authors on the basis of Gartner Magic Quadrant https://www.gartner.com/en/research/methodologies/magic-quadrants-research]

2. Socialists are the countries that have highly developed systems of social protection with a maximum level of state paternalism. To provide high levels of social payments these countries have a considerable burden on the payroll budget and significant expenses from the budget on the social goals. In this group of the countries there is a transition of the focus to social goals, which has a negative influence on economic development. Conducting this policy in the long run can lead to the deterioration of the social situation as a result of the increase of financial resources deficit for the support a considerable part of social programs. On the other hand, there is a low level of poverty in these countries, income disparity is not high, and high expectancy life. The goal of these countries is to build up economic potential to to join Leaders-countries. In this period it is necessary either to keep social payments at a stable level or, if necessary, to reduce them. Revision and reformation of social programs and payments is necessary because the increase of financial resources deficit to

provide social goals can lead to the enhancement of negative trends in the economic development and transition of such country to the quadrant Unhappy.

3. Liberals are the countries with a focus on the achievement of economic goals. Despite a developed system of social protection, it functions according to an excessive principle. A state supports only low-income social groups. Despite high indexes of economic development, a large part of the population has a limited access both to social services and to health care system. Indexes characterizing the level of social protection (poverty level, income disparity, life expectancy, etc.) are lower if compared to the Leaders- and Socialist Countries. At the same time, there is sufficient economic potential in these countries to improve indexes over certain period of time to the level of Leaders-countries. Measures on the expansion of social protection system to increase the level of social payments should correlate with economic indexes since there is a threat of transition of such countries into the quadrant Unhappy.

4. Unhappy are the countries with low indexes of economic development and relatively low level of social protection. The main way of development for such countries is to build up economic potential in order to transfer to the Leader-countries, since the transition to Socialist-countries is impossible because of the scarcity of resources for the financing of the social protection system. To achieve this it is necessary to conduct serious structural reforms in economic and social systems. Over a certain period of time it is necessary to conduct unpopular reforms that will be accompanied by freezing and even by reduction of social programs and social payments.

Results

Based on the suggested method, the authors calculated two synthetic integral indexes: integral index of economic development (IIED) and integral index of social development (IISD) for 36 OECP countries over the period from 1995 to 2005. They were combined into the summary integral index – integral index of social protection system functioning efficiency (IISPSFE). Calculation of IISPSFE was performed for separate years (to evaluate the dynamics of the index change) and on average over the period from 1995 to 2015 (to minimize the influence of the appearance of sudden maximum and minimum values of some indexes that are involved into calculated integral indexes).

The table 2 presents the gradation of OECP countries according to the value of the obtained IISPSFE. None of the OCEP countries according to IISPSFE corresponds to the indexes of high level and only IISPSFE of 9 OECP countries equals to sufficient level. At the same time, the obtained results show that over the period from 1995 to 2015 the most OECP countries worsened their indexes. Only IISPSFE of Ireland increased form 0.650 to 0.710. According to the obtained results, it appears probable that social and economic changes in some OECP countries over the analyzed period didn't lead to noticeable changes in the resultative indexes, they worsened the economic and social situation as well.

Table 2: Gradation of values of the integral index of social protection system functioning efficiency

The name of the level	high	sufficient	average	unfavorable	low
Values range	[0,8 … 1,0]	[0,6 … 0,8]	[0,4 … 0,6]	[0,2 … 0,4]	[0,0 … 0,2]

years / countries	1995	2015	On average in 1995-2015	1995	2015	On average in 1995-2015	1995	2015	On average in 1995-2015	1995	2015	On average in 1995-2015	1995	2015	On average in 1995-2015
Australia				0,629		0,612		0,563							
Austria				0,615				0,538	0,571						
Belgium							0,585	0,496	0,551						
Canada							0,592	0,517	0,549						
Chile							0,569	0,483	0,532						
Czech Republic							0,562	0,510	0,525						
Denmark				0,664	0,617	0,625									
Estonia									0,411	0,394	0,345				
Finland				0,600				0,524	0,569						
France							0,588	0,520	0,544						
Germany							0,592	0,535	0,553						
Greece							0,509		0,435		0,389				
Hungary							0,461	0,442	0,462						
Iceland				0,655	0,612	0,637									
Ireland				0,650	0,710	0,628									
Israel							0,585	0,523	0,561						
Italy							0,539	0,422	0,482						
Japan							0,557	0,441	0,494						
Korea				0,612				0,508	0,522						
Latvia										0,377	0,346	0,365			
Lithuania										0,399	0,373	0,391			
Luxembourg				0,726	0,653	0,693									
Mexico										0,394	0,373	0,397			
Netherlands				0,695	0,661	0,649									
New Zealand							0,578	0,519	0,536						
Norway				0,644	0,603	0,637									
Poland							0,435	0,405	0,441						
Portugal							0,583	0,474	0,507						
Slovak Republic							0,465	0,454	0,447						
Slovenia							0,540	0,493	0,524						
Spain							0,506	0,441	0,476						
Sweden				0,636	0,615	0,606									
Switzerland				0,711	0,674	0,691									
Turkey							0,447		0,401		0,358				
United Kingdom				0,657				0,562	0,581						
United States							0,580	0,519	0,533						

[Source: the data of the OECD https://data.oecd.org/ (calculated and proposed by the authors)]

Special attention should be payed to the countries that over the period from 1995 to 2015 shifted in

the value range from the top group to the low one (Australia, Austria, Estonia, Finnland, Greece, Corea, Turkey, Great Britain).

The authors used Gartner quadrant (Magic Quadrant for Evaluating the Functioning and Development of Social Protection) for the graphic interpretation of the obtained results and the gradation of the countries according to their development. To construct a modified Gartner quadrant (Magic Quadrant for Evaluating the Functioning and Development of Social Protection) the mean values of the calculated integral indexes were used over the priod from 1995 to 2015 (fig.4.).

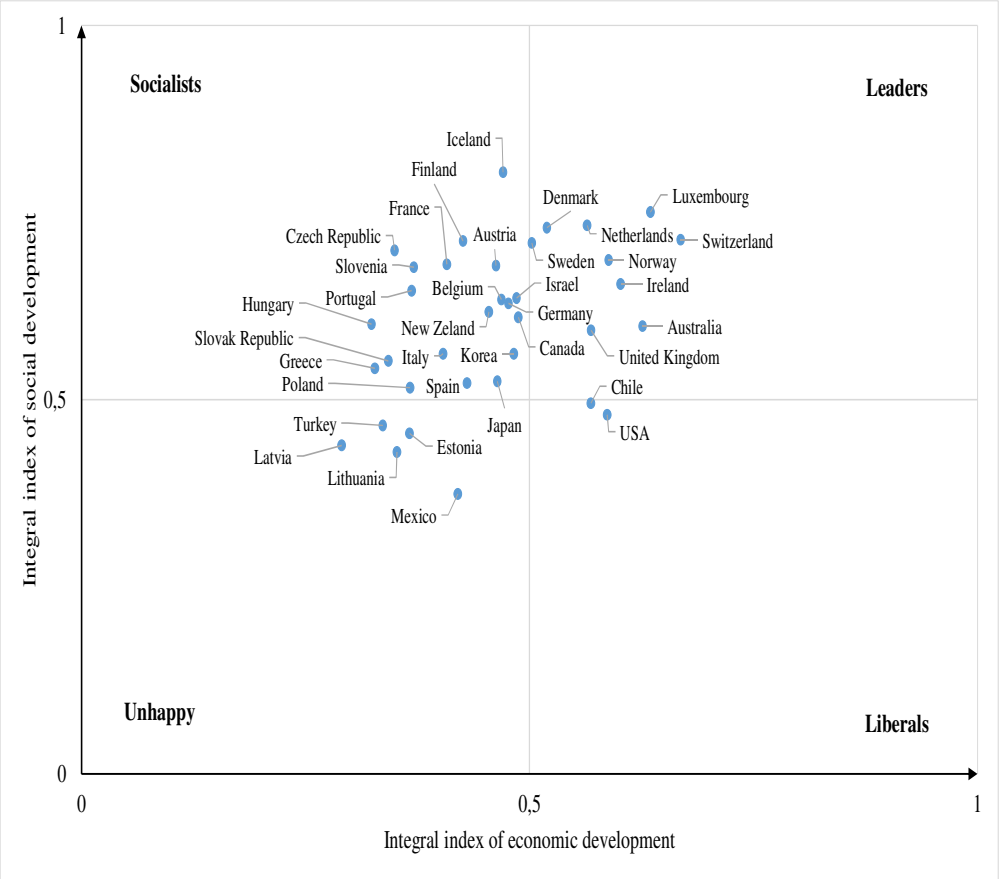

Fig. 4: Magic Quadrant for Evaluating the Functioning and Development of Social Protection (країни OECPcountries, indexes from 1995 to 2015 – mean value)

[Source: the data of the OECD https://data.oecd.org/ (calculated and proposed by the authors)]

Fig. 4 shows that 2 OECP countries get into the quadrant Socialists and quadrant Leaders according to the mean values of integral indexes over the period from 1995 to 2015. However, it is necessary to mention, that the number of the countries in the quadrant Leader is the lowest and some of them are close to the quadrant Socialists. Such results show that in most OECP countries there is a shift of the main focus of the state policy towards social goals. On the one hand, it is a positive trend, since it provides high living standards of the population due to a great number of social programs and high level of social payments, and, on the other hand, highly populist state policy will have a negative impact on the economic development in the future. A great number of the countries are in the critical zone of getting into the quadrant Unhappy.

Using suggested methods it is possible to make calculations for some OECP countries and to trace the dynamics of their movement in Magic Quadrant for Evaluating the Functioning and Development

of Social Protection. It enables us to evaluate in what way social or economic changes influence the resultative indexes. For example, fig. 5 presents the evaluation for the USA.

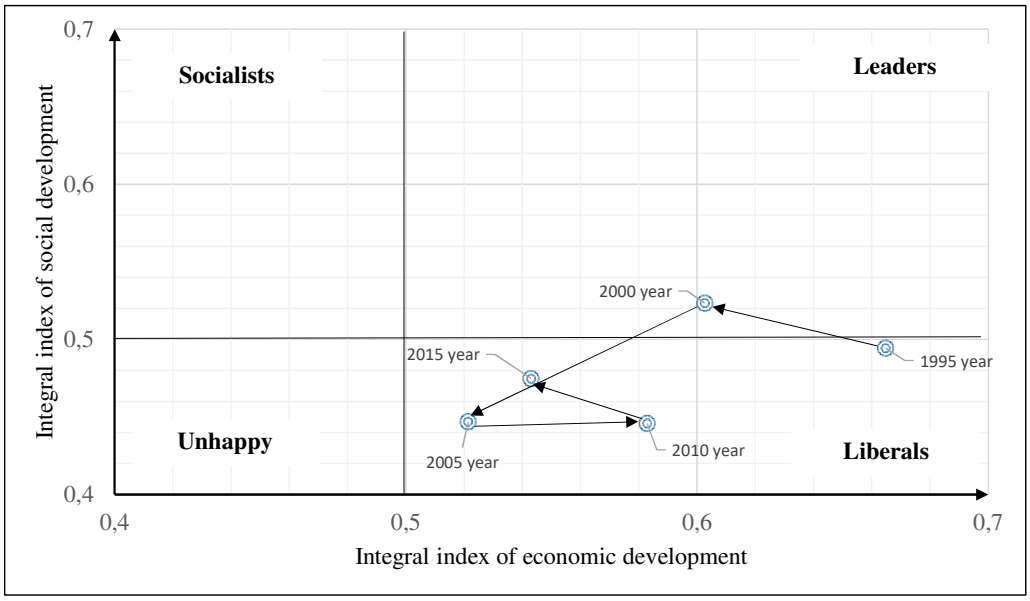

Fig 5: Magic Quadrant for Evaluating the Functioning and Development of Social Protection (USA, indexes from 1995 to 2015)

[Source: the data of the OECD https://data.oecd.org/ (calculated and proposed by the authors)]

The USA was in the quadrant Liberals form 1995 to 2005. However, the level of both IISD and IIED went down in that period. Such lowering can be the result of: 1) reduction of absolute values of some social and economic indexes; 2) low growth rates of some social and economic indexes compared to the OECP countries-leaders over this period.

Conclusions

Social protection is considered by scholars not only from a social point of view but also as a mechanism to stimulate the economic development of a country. At present, the approaches to evaluate the development of the social protection system with the account of the reciprocal influence of social and economic determinants are insufficiently worked out.

We consider that the present research will complement the existing approaches as to the evaluation of social protection and create effective tools for consideration of the reciprocal influence of social and economic development indexes.

The methods suggested by the authors:

- imply a clear succession of the steps to evaluate the functioning of social protection systems;
- suggest using different indexes to calculate integral indexes, that show very different aspects of the social and economic development of a country. In this case, a set of data of the indexes can be easily changed (increased or decreased) proceeding from the set goals of the research and availability of statistic data;
- are based on simple calculations;

- enables to conduct a comparative analysis of the countries according to summary integral index;
- imply a graphic interpretation of the obtained results using a modified Gartner quadrant (Magic Quadrant for Evaluating the Functioning and Development of Social Protection), which makes it possible to understand and interpret obtained results to substantiate further ways of development of the social protection system for each country.

Application of the suggested methods will allow the governments of different countries to perform effective control and to model scenarios of the development of the national social protection systems with account of changeable social and economic indexes compared to the indexes of other countries.

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Models for Scheduling Batch Production of Items with Lot Streaming in Hybrid Flow Shops

Madalin-Gabriel CATANA

University POLITEHNICA of Bucharest, Manufacturing Engineering Department, Bucharest, Romania, mg_catana@yahoo.com

Abstract

Being a common concern faced by nowadays production managers, the problem of minimizing the makespan of batch production schedules of items by using the lot streaming strategy in hybrid flow shops is insufficiently studied by operations researchers. To address to the limitations found in the literature on this subject, this paper formulates two comprehensive mathematical models to solve the problem, a linear programming model and an enumeration model. The following general production conditions are supposed to exist by the models: a processing cycle time limit prescribed for the batch production of item; no-idling of batch operations; not-negligible times for transportation of streamed lots between processing stages; a multi-machine or a single-machine processing of lots at the parallel machine group in each stage; not-negligible times for set-up the stage operations; an anticipative or a reactive scheduling of the setup work; a fixed number of equal-size lots used for streaming the batch production. Under these conditions, the models minimize the length of batch production schedule by minimizing the start time lag between pairs of successive process operations. OpenSolver add-in for Microsoft Office Excel was used for implementing the linear programming model, and a Visual Basic for Applications procedure was coded in Excel for the enumeration model. A numerical example for the utilization of the models was used to discuss the quality of scheduling solutions under different models' settings, and also to compare in terms of quality and feasibility the solutions implying equal-size lots with other possible scheduling solutions, assuming optimally-sized, different-in-size lots.

Keywords: operations research, lot streaming, hybrid flow shop, scheduling, linear programming, spreadsheet optimization.

Introduction

A review of scientific literature concerning managerial solutions possible to be applied for reducing the makespan of batch production schedules of items is presented in the followings. Conclusions of the review are used to define after that motivation and scope of the study presented in this paper.

Literature Review

In the book by Catana (2019) is mentioned that batch production is the most prevalent manufacturing strategy that is employed in industry for an efficient fabrication of items. A batch for an item to be produced represents the quantity or the number of units of item that will be processed continuously in the shop after the setup of machines allocated for processing operations. Catana (2019) also observed that the size of a batch of item may be optimally determined by using production cost minimization mathematical models or may be imposed by production managers based on important manufacturing restrictions, such as the size and the frequency of distribution orders for the produced item.

To reduce the duration or makespan of batch production schedule for an item with multi-operational or multi-stage processing at different machines, the strategy of lot streaming is frequently used in industrial practice and, therefore, studied by operations researchers. As defined by Defersha (2011), lot streaming is the technique of splitting the production batch of an item in smaller-sized lots with

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individual transportation among the processing machines of a multi-stage manufacturing system, denoted flow shop, so that different processing operations of the batch can be overlapped in time, in order to shorten the makespan of batch production schedule. A comprehensive review of traditional settings and terminology of a lot streaming operations research problem is presented by Chang and Chiu (2005), who evoked the following main concerns of a problem of this nature: single-item or multiple-item batch production; equal, consistent or variable size for lots of item to be transported among the processing stages; integer or non-integer sizes of streamed (transported) lots; no-idling or intermittent idling of batch processing operations of item; an anticipative or a reactive operation and machine setup for processing the item batch; transportation time dependent or not-dependent on the streamed lot size; cost-based or time-based performance measures to be minimized. Typical decision variables for a lot streaming problem are considered to be the number and size of streamed lots in each item batch and the processing sequence or schedule for these lots at the machines in flow shop. As observed by Defersha (2011), most researches of lot streaming problem assumes the production environment of a pure flow shop, having only one processing machine available in each operational stage. Significant research contributions on traditional lot streaming problem in pure flow shops are presented within the books of Baker and Trietsch (2019) and of Sarin and Jaiprakash (2007), where numerous mathematical models and algorithms for making lot streaming decisions in both single-item and multiple-item batch production situations are shown. Other contributions relating specific solution procedures for different settings of lot streaming problem in pure flow shops are presented also by Chen and Steiner (1998), by Huang (2010), by Kalir and Sarin (2001) and by Low, Hsu and Huang (2004). Finally, the work of Catana, Neagu and Tonoiu (2009) uses the restrictions of a lot streaming strategy with known, equal-size streamed lots and no-idling of batch operations within a resource-constrained scheduling model for multiple-item batch production projects. The model was implemented in a Microsoft Office Excel workbook, with specially designed cell ranges for initial data input, and cell formulas and Visual Basic for Applications (VBA) code modules for solution output.

An other possible strategy to reduce the makespan of production schedule in the case of single-item or multiple-item batch manufacturing is to allocate the multi-operational processes to a hybrid flow shop (HFS), which comprises more than one machine available for utilization in several bottleneck processing stages and, therefore, permits different processing operations of items to be overlapped or even shortened in time. However, as observed by Defersha (2011), the majority of researches about the problem of production scheduling in hybrid flow shops with makespan minimization objective does not take into account the application of lot streaming strategy. Important contributions relating specific solution procedures for different formulations of multiple-item hybrid flow shop scheduling problem, with makespan minimization objective and in the absence of the lot streaming strategy, are presented in the books of Emmons and Vairaktarakis (2013), of Lopez and Roubellat (2008) and of Pinedo (2016). Besides, all the above studies and also the works of Burtseva et al (2012), of Defersha (2011), of Liu (2008) and of Zhang, Liu and Linn (2003), which investigate the use of lot streaming strategy in hybrid flow shops, consider the number of parallel machines available for the production of items in each processing stage of hybrid flow shop to be known beforehand, as an initial data for the scheduling problem. In the book by Catana (2019), it is commented that if there exists an average cycle time limit C to be met by a batch production process of an item with m operations performed in a hybrid flow shop with m processing stages, then the number of parallel machines M_k that should be allocated in stage k ($k = 1,\ldots, m$) for the execution of operation with unit processing time P_k must be sized with the following equation:

$$M_k = \left\lceil \frac{P_k}{C} \right\rceil \qquad (1)$$

Mathematical symbol $\lceil\ \rceil$ used in equation (1) denotes the round-up to the smallest integer function.

An even higher degree of batch production makespan reduction can be obtained when employing the strategy of lot streaming for multi-operational processes run in hybrid flow shops, as demonstrated by the researches of Burtseva et al (2012), of Defersha (2011), of Liu (2008) and of Zhang, Liu and Linn (2003). All these researches propose mixed integer linear programming (MILP) formulations for the specific hybrid flow shop lot streaming problem taken into account. All the models are constructed

with the constraint that a streamed lot is to be allocated for processing on exactly one machine from those, several, available for utilization in a manufacturing stage of hybrid flow shop. This constraint corresponds to the application of a single-machine processing scheme (SP) for streamed lots at the manufacturing stages of hybrid flow shop. It will be demonstrated in this research that for streamed lots of large size, SP scheme becomes less effective in ensuring a high utilization level for the group of M_k parallel machines throughout the processing time of operation k, in order to meet the required process cycle time C. A different processing scheme for lots that will be investigated in this research is expected to improve the utilization level for the group of M_k parallel machines. This is the multi-machine processing scheme (MP) for streamed lots at the manufacturing stages of hybrid flow shop, implying the split of each lot in balanced shares to be processed in parallel by all the machines in the group. This scheme may easily be implemented in production by maintaining unique work-in-process input buffers in front of the groups of parallel machines available in processing stages of hybrid flow shop. Another constraint that is used in the MILP models of Liu (2008) and of Zhang, Liu and Linn (2003) concerns a so called "rotation" method to be applied for deciding the allocation of streamed lots to individual machines in a stage while using SP scheme. This method proved to be supportive for makespan minimization of single-item batch production schedules by allocating evenly the lots to machines in a group, as follows: lot 1 to machine 1; lot 2 to machine 2; …; lot M_k to machine M_k; lot M_k +1 to machine 1 and so on. An adapted allocation method that will be used in this research for the case of MP scheme implies a unit-based allocation of item to machines, as follows: unit 1 in the batch to machine 1; unit 2 to machine 2; …; unit M_k to machine M_k; unit M_k +1 to machine 1 and so on. As all the four researches mentioned before do consider a negligible transportation time of streamed lots between processing stages, this research will examine also the influence of the lot transportation time on the makespan of batch production schedule. Moreover, there will be studied the influence exerted on schedule makespan by each stage setup time required before processing the item batch, by taking into consideration two alternative setup schemes possible to be applied according to item's process plan: the anticipative setup (AS), which can be started at the machines in a stage before the arrival of any streamed lot from the previous processing stage; reactive setup (RS), which can be started at the machines in a stage only after the arrival of required number of streamed lots coming from the earlier processing stage. The schedule for setup work in a stage will depend on both the adopted streamed lot processing scheme (SP or MP) and operation setup scheme (AS or RS), and on general requirements to achieve the continuity of entire batch operation (no-idling requirement) and to ensure the highest possible utilization level for machine group in the stage during the batch operation execution time. A direct consequence of the latter requirement is that all the parallel machines in a processing stage will have a common setup schedule, in order to be set-up for the stage operation in the same time interval.

Motivation and scope of present research

Literature review from above clearly indicates that the use of lot streaming strategy in a hybrid flow shop is the most effective option for reducing schedules makespan for single-item multi-operational batch production processes with cycle time limits that must be met. However, the review concludes also that the research contributions on lot streaming batch production in hybrid flow shops should be much more numerous, diverse or complete, in order to effectively be applied in managerial practice.

Present research is primarily focused on the sequencing and scheduling components of lot streaming problem, in the case of a single-item multi-operational batch production process run in a multi-stage hybrid flow shop. The number of machines in each processing stage of hybrid flow shop is sized in accordance with the cycle time limit prescribed for entire process. Research objective is to find the batch production schedule of shortest length, given by the combinations of SP and MP lot processing schemes with AS and RS operation setup schemes, under the restrictions of no-idling the operations and of best-using the operational time of parallel machines in hybrid flow shop. A "rotation" method adapted for streamed lot processing schemes SP and MP is used for allocating the lots to individual machines in a group. Transportation time of streamed lots between processing stages and setup time of stage operations are taken into account in scheduling. The number of streamed lots in the batch is considered to be known in advance, as it could come from limited number of available transporters as mentioned by Kalir and Sarin (2001) or from the solution of a transportation cost minimization model as indicated by Catana (2019). The streamed lots are considered to be integers of equal size for easy

management, but solutions of the problem with different, optimized integer sizes of lots will be also provided and compared in terms of quality and feasibility with equal-size lot scheduling solutions.

To address to the issues mentioned above, two models for scheduling batch production of items with lot streaming in hybrid flow shops, a linear programming (LP) model and an enumeration model, are proposed in section 2 of this paper. Implementation of the proposed models in Microsoft Office Excel spreadsheet formats, by means of OpenSolver optimization add-in by Mason (2012) and VBA code, is then presented in section 3. A numerical example for the utilization of the models is provided after that in section 4, and comparisons are made on the quality and feasibility of solutions under different models' settings. Research conclusions are displayed in section 5 of the paper.

Models for scheduling of batch production with lot streaming in HFS

For describing the two mathematical models proposed for scheduling the batch production with lot streaming in HFS, it is necessary to previously define the underlying problem parameters as shown below. These parameters will be subsequently used in the formulation of the models.

Definition of Problem Parameters

Let be:

m Number of processing stages in HFS where stages are indexed by k with $k = 1,\ldots, m$;

P_k Processing time for one unit of item in the operation performed in stage k;

C Average processing cycle time limit to be met in each batch production operation of item;

U_k Setup time for operation on each machine available for batch processing in stage k;

T_k Transportation time for each lot streamed from processing stage k to the following stage;

M_k Number of parallel machines required to be set-up and used for item batch processing in stage k of HFS, which comes from equation (1);

B Size of processing batch of the item in each operation performed in HFS;

n Number of streamed lots in the batch where lots are indexed by i with $i = 1,\ldots, n$;

L Size of each streamed lot throughout the process run in HFS, which is given by equation:

$$L = \frac{B}{n} \quad \text{.....(2)}$$

b_{SP} Binary data equal to 1 if SP scheme will be used for scheduling the processing of streamed lots at parallel machines allocated to operations, and equal to 0 otherwise;

b_{MP} Binary data equal to 1 if MP scheme will be used for scheduling the processing of streamed lots at parallel machines allocated to operations, and equal to 0 otherwise;

b_{AS} Binary data equal to 1 if AS scheme will be used for scheduling the setup time of parallel machines allocated to operations, and equal to 0 otherwise;

b_{RS} Binary data equal to 1 if RS scheme will be used for scheduling the setup time of parallel machines allocated to operations, and equal to 0 otherwise;

$S_{k,i}$ Start time of the part of operation in stage k related to the process of streamed lot i, which is expressed relative to the beginning of operation setup with general equation:

$$S_{k,i} = b_{MP} \cdot \left(P_k \cdot \lfloor L \cdot (i-1)/M_k \rfloor + X_{k,i}\right) + b_{SP} \cdot \left(P_k \cdot L \cdot \lfloor (i-1)/M_k \rfloor + Y_{k,i}\right) \quad \text{.....(3)}$$

In equation (3), mathematical symbol $\lfloor\ \rfloor$ stands for the round-down to the largest integer function and terms $X_{k,i}$ and $Y_{k,i}$ control the inclusion of setup time in value $S_{k,i}$ as follows:

$$X_{k,i} = \begin{cases} 0, & \text{if } \lfloor L \cdot (i-1)/M_k \rfloor = 0 \\ U_k, & \text{if } \lfloor L \cdot (i-1)/M_k \rfloor > 0 \end{cases} \quad \text{.....(4)}$$

$$Y_{k,i} = \begin{cases} 0, & \text{if } \lfloor (i-1)/M_k \rfloor = 0 \\ U_k, & \text{if } \lfloor (i-1)/M_k \rfloor > 0 \end{cases} \quad \text{.....(5)}$$

$F_{k,i}$ Finish time of the part of operation in stage k related to the process of streamed lot i, which is expressed relative to the beginning of operation setup with general equation:

$$F_{k,i} = b_{MP} \cdot \left(P_k \cdot \lceil L \cdot i / M_k \rceil + U_k\right) + b_{SP} \cdot \left(P_k \cdot L \cdot \lceil i / M_k \rceil + U_k\right) \quad (6)$$

S_{k+1_k} Start time lag of successive operations k and $k+1$ with respect to the item batch, which is the minimum positive distance in time that may exist between the starts of operations k and $k+1$ under all the constraints of scheduling models (this parameter will be optimized by models);

$T_{k+1_k,i}$ Transfer time lag of successive operations k and $k+1$ with respect to the streamed lot i in the batch is deduced with the following equation and should suit the required transportation time of lot i between operational stages:

$$T_{k+1_k,i} = S_{k+1_k} + S_{k+1,i} - F_{k,i} \quad (7)$$

D_k Duration of batch operation in stage k is dependent on the processing scheme of streamed lots and may be obtained with the following general equation in case of equal-size lots:

$$D_k = b_{MP} \cdot \left(P_k \cdot \lceil B / M_k \rceil + U_k\right) + b_{SP} \cdot \left(P_k \cdot L \cdot \lceil n / M_k \rceil + U_k\right) \quad (8)$$

In general, D_k is the distance in time between the start and the finish of operation in stage k;

D Duration (makespan) of the schedule of batch production process is given by the equation:

$$D = \sum_{k=1}^{m-1} S_{k+1_k} + D_m \quad (9)$$

In general, D is the distance in time between the start of first batch operation (in stage 1) and the finish of the last batch operation (in stage m).

It is worthy to be pointed out that all terms in equations (3) and (6) besides $X_{k,i}$, $Y_{k,i}$ and U_k define the limits of scheduling interval for processing the lot i in operation k, under the conditions of no-idling the batch operation and of the specific "rotation" method used for scheduling the processing time of equal-sized lots within MP and SP schemes.

Definition of Linear Programming Model

By using the parameters introduced above, the linear program for scheduling the batch production of an item with lot streaming in HFS is described below. The objective function and the constraints of LP model concern the part of production schedule relating to a pair of generic, successive operations k and $k+1$.

Minimize S_{k+1_k} .....(10)

Subject to:

$$S_{k+1_k} \geq 0 \quad (11)$$

$$T_{k+1_k,i} \geq b_{MP} \cdot \left(b_{AS} \cdot (T_k - U_{k+1} + X_{k+1,i}) + b_{RS} \cdot T_k\right) + b_{SP} \cdot \left(b_{AS} \cdot (T_k - U_{k+1} + Y_{k+1,i}) + b_{RS} \cdot T_k\right) \quad (12)$$

$$\forall (i = 1, \ldots, n).$$

The objective function in equation (10) is to minimize the start time lag of successive operations k and $k+1$, which is equivalent to minimizing the schedule makespan for batch production process, in the conditions of equations (8) and (9). The constraint in equation (11) ensures the condition of non-negativity for the model variable and objective function S_{k+1_k}. The group of constraints in equation (12) provides that the transfer time lag of successive operations k and $k+1$ for each streamed lot i is larger than or equal with a minimum value required to accommodate the transportation time of lot under different combinations of schemes applied for lot processing and operation setup. It is evident that despite the comprehensiveness of this model accompanied by the data given by equations (1) to (7), to solve the model one should use proper binary values for the parameters b_{SP}, b_{MP}, b_{AS} and b_{RS} according to the schemes chosen for lot processing and operation setup.

Definition of Enumeration Model

The enumeration model designed for scheduling the batch production of an item with lot streaming in HFS is based on the algorithm shown in pseudocode below. The approach of the model is to calculate repetitively, for each operation k with $k = 1,\ldots, m-1$ and each lot i with $i = 1,\ldots, n$, the minimum start time lag $S_{k+1_k,i}$ required to exist among operations k and $k+1$ under the constraints of needed transfer

of lot i between operational stages and of applied schemes for operation setup and lot processing. The largest value of $S_{k+1_k,i}$ for all lots streamed from operation k is retained as the start time lag S_{k+1_k} and it is used afterwards to compute start and finish times S_k and F_k for each operation k with $k = 1,\ldots, m$. Specific equations that are used in the model for the calculation of parameter $S_{k+1_k,i}$ are as follows:

$S_{k+1_k,i}$ For the combination of MP and AS schemes:

$$S_{k+1_k,i} = U_k + P_k \cdot \lceil L \cdot i / M_k \rceil + T_k - U_{k+1} - P_{k+1} \cdot \lfloor L \cdot (i-1) / M_{k+1} \rfloor \quad (13)$$

For the combination of MP and RS schemes:

$$S_{k+1_k,i} = U_k + P_k \cdot \lceil L \cdot i / M_k \rceil + T_k - X_{k+1,i} - P_{k+1} \cdot \lfloor L \cdot (i-1) / M_{k+1} \rfloor \quad (14)$$

with term $X_{k+1,i}$ obtained with equation (4);

For the combination of SP and AS schemes:

$$S_{k+1_k,i} = U_k + P_k \cdot L \cdot \lceil i / M_k \rceil + T_k - U_{k+1} - P_{k+1} \cdot L \cdot \lfloor (i-1) / M_{k+1} \rfloor \quad (15)$$

For the combination of SP and RS schemes:

$$S_{k+1_k,i} = U_k + P_k \cdot L \cdot \lceil i / M_k \rceil + T_k - Y_{k+1,i} - P_{k+1} \cdot L \cdot \lfloor (i-1) / M_{k+1} \rfloor \quad (16)$$

with term $Y_{k+1,i}$ obtained with equation (5).

The algorithm for enumeration model is as follows.

```
Read initial data: m, C, B, n, L; P_k, U_k, T_k, M_k for each k; D_k for each k and scheme MP and SP
For k = 1 To m - 1
  Let S_{k+1_k} = 0 for each of AS and RS schemes
    For i = 1 To n
      Calculate S_{k+1_k,i} with equation (13) for the combination of MP and AS schemes
      Calculate S_{k+1_k,i} with equation (14) for the combination of MP and RS schemes
      Let S_{k+1_k} = max (S_{k+1_k} , S_{k+1_k,i}) for each of AS and RS schemes
    Next i
Next k
For k = 1 To m - 1
  Let S_{k+1_k} = 0 for each of AS and RS schemes
    For i = 1 To n
      Calculate S_{k+1_k,i} with equation (15) for the combination of SP and AS schemes
      Calculate S_{k+1_k,i} with equation (16) for the combination of SP and RS schemes
      Let S_{k+1_k} = max (S_{k+1_k} , S_{k+1_k,i}) for each of AS and RS schemes
    Next i
Next k
Let S_1 = 0, F_1 = D_1 for the first operation in each of the four schedules given by combined schemes
For k = 2 To m
  Let S_k = S_{k-1} + S_{k_k-1} for each of the four schedules given by combined schemes
  Let F_k = S_k + D_k for each of the four schedules given by combined schemes
Next k
Write solution data S_k and F_k for each operation k in the four schedules given by combined schemes
```

Spreadsheet implementation of Scheduling Models

For an easier testing and utilization of the proposed models by scheduling scholars and practitioners, both models were implemented in Microsoft Office Excel worksheets, with required solution tools embedded inside the sheets as shown below.

Implementation of Linear Programming Model

Linear programming model and initial data required to be used by the model were arranged inside an Microsoft Office Excel worksheet as displayed in figure 1. The range of cells with green background in figure 1 contains manually-entered or formula-based calculated initial data. Data within this region

is used by the formulas provided in the range of cells with yellow background, where the LP model is located. Only the binary data indicating the alternative use of AS or RS and MP or SP schemes in the model is required to be manually-entered in the yellow part of the sheet. As OpenSolver optimization add-in for Microsoft Office Excel was used to declare the structure of the model (objective function, variables and constraints), this structure is indicated by highlighting and labeling the included cells as shown in figure 1. This feature and many other advantages of OpenSolver over Excel built-in Solver that were shown by Mason (2012) made that this add-in to be preferred for the implementation of LP model. As seen in figure 1, the implemented LP model locates in cell L7 the objective function and single decision variable described in equation (10), in range L7:M7 resides the constraint in equation (11) and in range J7:K11 are placed the constraints in equation (12). Optimal solution to the model is given by OpenSolver with the incorporated Coin-OR CBC linear optimization engine.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Sch	Pk	Pk+1	C	Uk	Uk+1	Tk	Mk	Mk+1	B	L	n	Dk	Dk+1
2	MP	3.00	5.00	2.00	20.00	30.00	10.00	2	3	25	5	5	59.00	75.00
3	SP	3.00	5.00	2.00	20.00	30.00	10.00	2	3	25	5	5	65.00	80.00
4														
5	Linear programming model for scheduling with OpenSolver for Excel													
6	i	AS	RS	MP	SP	Sk,i	Fk,i	Sk+1_k + Sk+1,i	Sk+1_k + Fk+1,i	Tk+1_k,i	Tk+1_k,i>=	Sk+1_k=?	Sk+1_k>=	
7	1	1	0	1	0	0.00	29.00	10.00	50.00	-19.00	-20.00	min 10	≥ 0	
8	2					26.00	35.00	45.00	60.00	10.00	10.00			
9	3					35.00	44.00	55.00	65.00	11.00	≥ 10.00			
10	4					41.00	50.00	65.00	75.00	15.00	10.00			
11	5					50.00	59.00	70.00	85.00	11.00	10.00			

Fig. 1: Excel worksheet with data of LP model

Implementation of Enumeration Model

A similar arrangement of model's data in a Microsoft Office Excel worksheet was preferred also in the case of enumeration model, as observed in figure 2. The green range of cells in figure 2 contains manually-entered or formula-based calculated initial data, while the yellow range of cells holds the solution given by the VBA procedure attached to the brown command button with label "Schedule". After initial data is entered and button "Schedule" is clicked, model solution will be written within the dedicated cells. The algorithm for enumeration model shown in previous section was translated into VBA code, as can be remarked in the portion of the code window displayed in figure 3. Slight difference may be observed between the names of some parameters in VBA code and in description of the model from previous section.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	k	C	Pk	Uk	Tk	B	n	Mk	Dk_MP	Dk_SP			Sk_AS+MP	Fk_AS+MP	Sk_RS+MP	Fk_RS+MP	Sk_AS+SP	Fk_AS+SP	Sk_RS+SP	Fk_RS+SP
2	1	2.00	3.00	20.00	10.00	25	5	2	59.00	65.00	Schedule		0.00	59.00	0.00	59.00	0.00	65.00	0.00	65.00
3	2	2.00	5.00	30.00	10.00	25	5	3	75.00	80.00			10.00	85.00	39.00	114.00	30.00	110.00	60.00	140.00

Fig. 2: Excel worksheet with data of enumeration model

```
CommandButton1                                                    Click
Private Sub CommandButton1_Click()
'VBA procedure for scheduling single-item batch production operations under lot streaming in multi-stage HFS,
'with anticipative/reactive setup of operations (AS/RS) and multi-machine/single-machine processing of streamed lots (MP/SP)
On Error GoTo Err
'Reading of initial data from Excel worksheet
m = WorksheetFunction.Max(Range(Cells(2, 1), Cells(1002, 1)))
ReDim Pk(1 To m), Uk(1 To m), Tk(1 To m), Mk(1 To m), DkMP(1 To m), DkSP(1 To m)
ReDim SkkASMP(1 To m - 1), SkkRSMP(1 To m - 1), SkkASSP(1 To m - 1), SkkRSSP(1 To m - 1)
ReDim SkASMP(1 To m), FkASMP(1 To m), SkRSMP(1 To m), FkRSMP(1 To m)
ReDim SkASSP(1 To m), FkASSP(1 To m), SkRSSP(1 To m), FkRSSP(1 To m)
B = Cells(2, 6).Value
n = Cells(2, 7).Value
L = B / n
For k = 1 To m
Pk(k) = Cells(1 + k, 3).Value
Uk(k) = Cells(1 + k, 4).Value
Tk(k) = Cells(1 + k, 5).Value
Mk(k) = Cells(1 + k, 8).Value
DkMP(k) = Cells(1 + k, 9).Value
DkSP(k) = Cells(1 + k, 10).Value
Next k
'Calculation of the minimum start time lags for operations on process batch in the case that MP scheme is applied
For k = 1 To m - 1
SkkASMP(k) = 0
SkkRSMP(k) = 0
For i = 1 To n
SkkASi = Uk(k) + Pk(k) * WorksheetFunction.RoundUp(L * i / Mk(k), 0) + Tk(k) - Uk(k + 1) - Pk(k + 1) * WorksheetFunction.Rou
Select Case WorksheetFunction.RoundDown(L * (i - 1) / Mk(k + 1), 0)
Case 0
SkkRSi = Uk(k) + Pk(k) * WorksheetFunction.RoundUp(L * i / Mk(k), 0) + Tk(k) - Pk(k + 1) * WorksheetFunction.RoundDown(L * (
Case Else
SkkRSi = Uk(k) + Pk(k) * WorksheetFunction.RoundUp(L * i / Mk(k), 0) + Tk(k) - Uk(k + 1) - Pk(k + 1) * WorksheetFunction.Rou
End Select
'Case that AS scheme is used
SkkASMP(k) = WorksheetFunction.Max(SkkASMP(k), SkkASi)
'Case that RS scheme is used
SkkRSMP(k) = WorksheetFunction.Max(SkkRSMP(k), SkkRSi)
Next i
Next k
```

Fig. 3: Portion of Excel VBA code window implementing the algorithm of enumeration model

Numerical Example

A numerical example for the utilization of proposed models is presented in the following, by using the initial data already displayed in figures 1 and 2 from previous section. It can be noticed that the example concerns a batch production process with two operations, performed in a hybrid flow shop with the number of machines in the two stages sized in accordance with an imposed limit for process cycle time C of 2 minutes/unit. All the other times taken as initial data are also expressed in minutes. To compare the quality of scheduling solutions with respect to the level of utilization ensured for the group of parallel machines allocated for each stage, the average processing cycle time of operations will be used. A small average processing cycle time of an operation corresponds to a high utilization level of allocated machines. Average processing cycle time C_k concerning the operation with index k will be calculated with the following equation:

$$C_k = \frac{D_k - U_k}{B} \quad \text{.....(17)}$$

The four schedules given by the models with the provided initial data are depicted in figures 4, 5, 6 and 7. It can be checked that in the case of schedules from figures 4 and 5 based on MP scheme, C_1 is 1.56 and C_2 is 1.8, while for the schedules in figures 6 and 7 based on SP scheme, C_1 is 1.8 and C_2 is 2. Despite that all values meet the process cycle limit of 2 minutes/unit, the solutions obtained with MP scheme prove generally to be of a higher quality than those given by SP scheme. The makespan of batch production schedule is shortened by the usage of MP scheme instead of SP scheme for lots processing and also by the application of AS scheme instead of RS scheme for setup of operations.

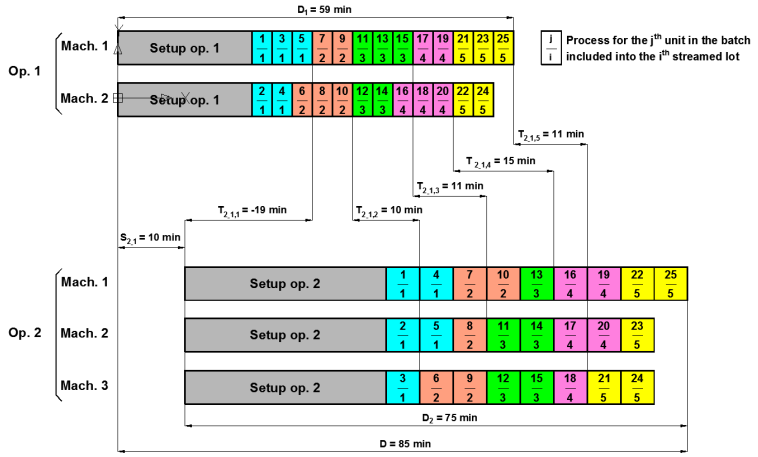

Fig. 4: Allocation and schedule of equal-size streamed lots at machines under MP and AS schemes

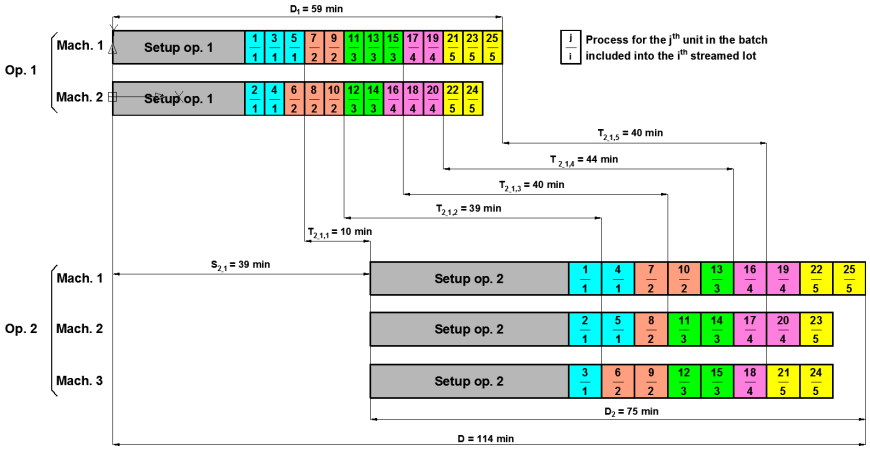

Fig. 5: Allocation and schedule of equal-size streamed lots at machines under MP and RS schemes

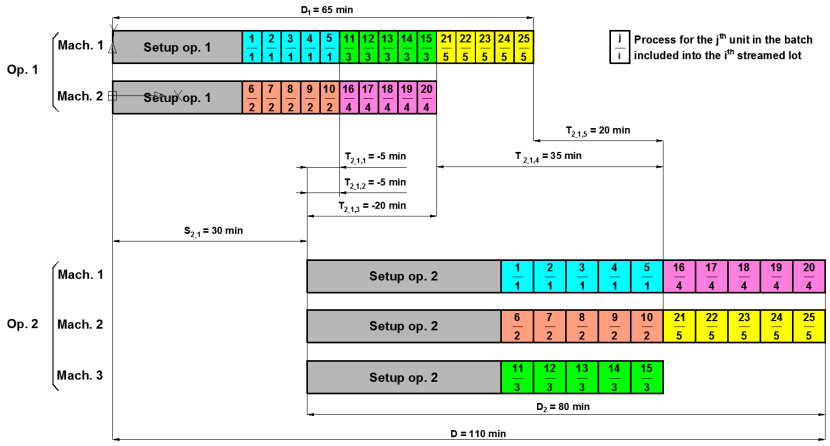

Fig. 6: Allocation and schedule of equal-size streamed lots at machines under SP and AS schemes

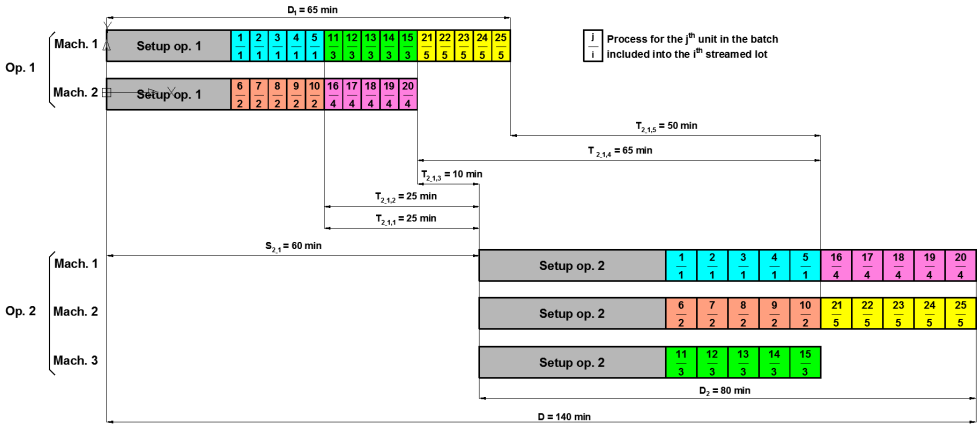

Fig. 7: Allocation and schedule of equal-size streamed lots at machines under SP and RS schemes

In order to know if and how much the makespan of batch production schedule can be shortened more by the relaxation of the restriction to use equal-size streamed lots, the LP model discussed within this paper was radically adapted and transformed into a MILP model with the following main features: for a known number of not-nil streamed lots in the batch, the integer sizes of lots are optimized in order to give the shortest possible makespan of production schedule and the highest quality of the schedule (measured by C_k values) under different combinations of MP or SP and AS or RS schemes. Solution shown in figure 8 relates the combination of MP and AS schemes, while that in figure 9 refers to the combination of SP and RS schemes. It can be remarked that the schedule makespan is shortened by the solution in figure 8 only with one minute as compared to the solution in figure 4 (with equal-size streamed lots). However, schedule in figure 9 is eleven minutes shorter than the equivalent schedule in figure 7 (with equal-size streamed lots). The roughly 2 percent reduction of production makespan in the first case may not worth the difficulties of monitoring the streaming of variable size lots, while the nearly 8 percent reduction in the second case may probably be worthy.

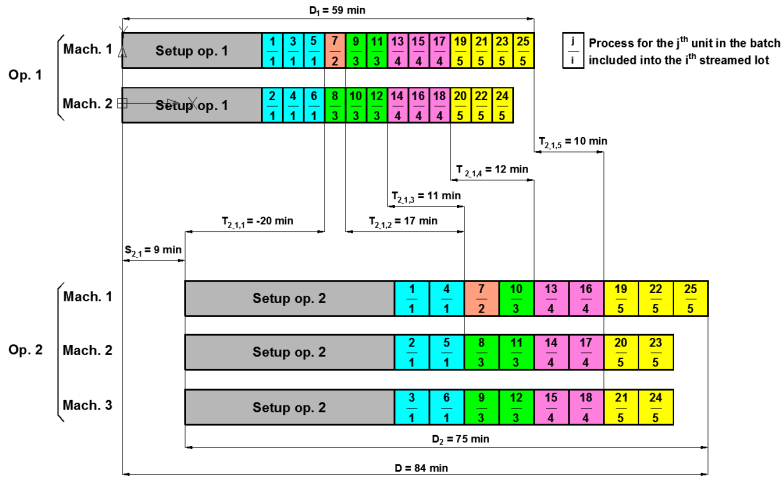

Fig. 8: Allocation and schedule of optimally-sized streamed lots at machines for MP and AS schemes

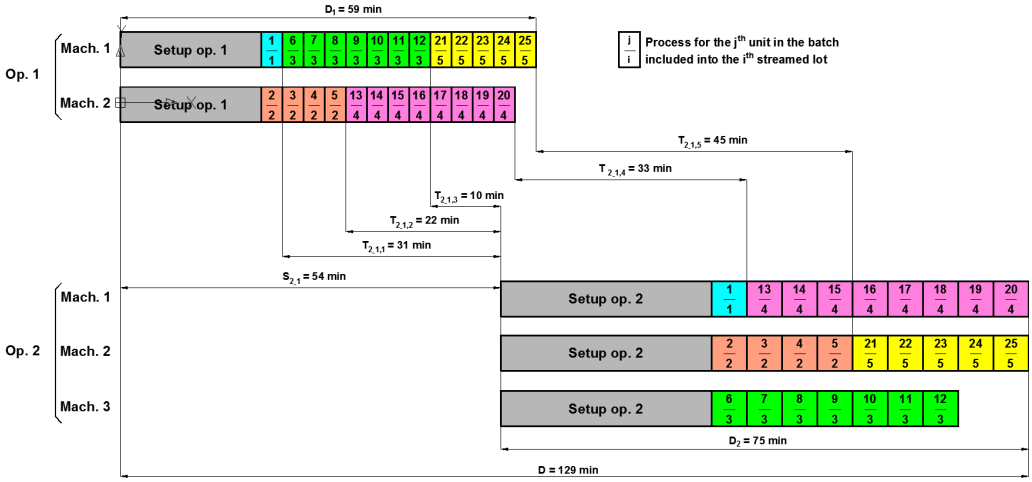

Fig. 9: Allocation and schedule of optimally-sized streamed lots at machines for SP and RS schemes

Conclusions

Present study was motivated by the observed limitations of the published researches in addressing to the scheduling issues related to the problem of streaming the batch production of items in multi-stage hybrid flow shops. There is made no connection in the relevant researches between the sizing of the processing stages of hybrid flow shops and the cycle time limits commonly prescribed for the batch production processes of items. Furthermore, existing researches on the optimization of lot streaming production in hybrid flow shops don't mention the multi-machine processing as a possible scheme to allocate the streamed lots to parallel machines in a processing stage, and also they do not investigate the combined influence exerted on the production schedule makespan by the transportation times and processing schemes adopted for streamed lots and by setup times and setup schemes that are used for operations. Under these circumstances, this paper proposes two comprehensive mathematical models, a linear programming model and an enumeration model, that can be used for optimal scheduling the batch production of an item in the case of lot streaming in a hybrid flow shop, under the most general production conditions. A fixed number of streamed lots and an equal size of lots are considered in the models. Proposed models were implemented in Microsoft Office Excel worksheets and were solved to optimality with OpenSolver optimization add-in, in the case of first model, and with a VBA coded procedure, in the case of second model. A numerical example for the utilization of scheduling models was also presented, and obtained solutions were compared with respect to their quality. Two solutions of the lot streaming problem having optimally-sized, different-in-size lots were finally revealed and compared with equal-size lot solutions in terms of makespan length and of feasibility for application in practice. The models presented in this paper are flexible enough to be applied without modification for optimizing batch production schedules of items produced with lot streaming in pure flow shops or even without lot streaming in pure or hybrid shops.

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Evaluating the Impact of a Country's Scientific Activity on the Provision of Its Economic Security

Victoria KHAUSTOVA
Doctor of Sciences (Economics), Professor. Currently working in the Research Centre for Industrial Problems of Development of the National Academy of Sciences of Ukraine, Kharkiv, Ukraine, v.khaust@gmail.com

Olena RESHETNYAK
Ph.D. in Economics, Associate Professor, doctoral student, Research Centre for Industrial Problems of Development of the National Academy of Sciences of Ukraine, Kharkiv, Ukraine, olena.reshetnyak@karazin.ua

Roman LOBODIN
Ph.D. student, Kharkov University of Humanities "People's Ukrainian Academy", Kharkiv, Ukraine, lobodinu@gmail.com

Abstract

The purpose of the article is to assess the impact of individual countries' scientific activity on their economic security. Research methods are as following: index method, ranking, cluster analysis and regression models development. The research of the dependence of a country's economic security on the science development level includes the following stages: calculating the science development index; determining groups of countries depending on the science development level; modeling economic security depending on the level of a country's science development. In the work based on the development of regression models the hypothesis about the influence of scientific developments on the economic security indices is confirmed. The calculation of the world countries' scientific development index was carried out which is a complex index and includes scientific potential evaluation, scientific activity results and evaluation of scientific activity and potential growth rates for 72 countries in the world. This allowed ranking countries by the level of their scientific development and grouping them by scientific results and scientific potential. Three groups of countries were identified: catching-up countries by the science development level, potential leaders in science development and leaders by the science development level. Economic security indicators were modeled according to the scientific development level in the groups of countries. The models developed allow forecasting the values of economic security indicators depending on the scientific developments management in the country.

Keywords: scientific development, scientific development index, modelling, economic security.

Introduction

Providing economic security is one of the main national priorities since it not only guarantees economic independence of a country, stability, efficiency of the society's activity and economic development sustainability, but also facilitates human capital development and stability of a country's national production facilities and institutions. Emergence of economic threats, which have a negative impact on a country economy, infringing upon its economic interests, requires studying factors and indicators of economic security assessment. The problem of economic security identification in the context of a society's scientific and technological development requires studying dependence of the economic development results on the main factors, which determine it.

The urgency of ensuring a country's economic security determines numerous studies among the scientists from all over the world. The studies cover the following problems: identifying economic security as it is (Grigoreva and Garifova, 2015; ILO, 2004), characterizing its main components (Petrova, 2018), determining factors of impact on its provision (EU, 2018; Denezhkina and Suzdaleva,

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2014; Karanina, and Loginov, 2017; Astakhova, Reshetnyak, and Ilchenko, 2019; Kyzym, Reshetniak, and Lelyuk, 2019; Kyzym, Khaustova, Reshetnyak and Danko 2020) and identifying its assessment indicators (Shvaiba, 2019; Muzichenko, 2015). Having profiundly studied research on this topic, we have come to conclusion that a country's economic security level is most often assessed by the following (1) single macroeconomic indicators: GDP per capita (current USD), manufacturing and value added (% of GDP) and (2) complex indicators: Human Capital Index (HCI) and the Global Competitiveness Index.

Economic threats are divided into two types: internal and external (EU, 2018; Karanina and Loginov, 2017). Internal threats are a country's inability to provide self-preservation and self-development, weakness of the innovative, scientific and technological development, inefficiency of the state economic regulation system and so on. External threats emerge against the background of changes in the world situation, scientific and technological progress, global problems, excessive import dependence, domination of primary products exports over science-intensive ones, etc.

The country's economic security depends to a significant extent on creating new innovative technologies and production facilities based on the advanced scientific achievements. Scientific activity development is one of the main priorities for government policy in many world countries, because only an ongoing process of the own scientific developments with their further use in the innovative activities at enterprises can ensure the state's global competitiveness. The leading world countries, providing sustainable growth of GDP per capita, use an innovative development model, which means applying and commercializing the results of scientific and scientific-technological activities to ensure the release of new competitive goods and services to the market.

The research of the world countries' scientific-technological development level is carried out by many foreign scholars, e. g., A. Ghani (2009), A. Muzichenko (2015), M. Desai (2002), M. Shahab (2016), D. Shvaiba (2019) and others.

Measuring scientific-technological activity at the national level began in the 1930s. Later. In 1963, «The Measurement of Scientific and Technical Activities: Proposed Standard Practice for Surveys of Research and Development» (known as Frascati Manual (OECD, 2015)) was published, providing a unified approach to measuring the industrial research and technological development was formed.

Now, the most important and reliable information banks that provide information to match the individual world countries' development level, including in terms of science and technology, are the World Bank, the OECD and UNESCO.

The World Development Indicators, a compilation by the World Bank (2020), including the indicators reflecting scientific and technical development for 217 economies and more than 40 groups of countries, is published annually, among others containing the data for several indicators, accumulated for the period of above 50 years. The main indicators that characterize the scientific activity development level include inter alia: internal research and development costs (% of GDP); number of researchers (per 1 million people); share of ICT goods in exports (% of all goods); share of ICT goods in imports (% of all goods); number of scientific articles in the journals that are reviewed; number of technical staff, engaged in scientific research and developments (per 1 million people), share of high-tech goods in exports (% of all goods); number of patent applications, etc.

Taking into account the world economy globalization, implementation of the sustainable development strategy by the leading economies, the idea of the role science plays in a particular country compared to other countries can contribute to its dynamic development and more grounded decision-making as for strategic management in the scientific sphere, justifying its financing support. To evaluate the state of scientific activity in the selected world countries relative to other countries it is necessary to generalize all the individual indicators. A comprehensive assessment of world countries according to different characteristics and determination of their positions relative to other world countries traditionally takes place on the basis of the international rankings and by computating various indices. But, as shown in the analysis (Reshetnyak, 2020), there is no index that would

evaluate scientific development to the fullest. There are indices that include the scientific development assessment as a constituent of the general indices that characterize a country's scientific-technological development, its competitiveness, economic development level, human resources, etc. Therefore, it is necessary to develop an index that would fully reflect the state and trends of scientific development in the country, taking into account the scientific potential, scientific activity results and ongoing changes in the scientific policy, and exploring its impact on the provision of the country's economic security.

Thus, a hypothesis could be suggested that a country's economic security depends on the national scientific development level and a possibility to ensure the scientific potential formation. This paper tries to check this hypothesis.

The purpose of the article is to evaluate the impact of individual world countries' scientific activity on the provision of their economic security.

Materials and Methods

Methods of studying the dependence of a country's economic security on the national scientific development level include the following steps (Figure 1):

(1) calculating the Index of Scientific Development (ISD);
(2) identifying country groups depending on the scientific development level ; and
(3) modelling economic security depending on a country's scientific development level.

In order to assess the impact of scientific development indicators on a country's economic security level it is necessary to calculate an integral indicator, which would take into account indicators of the scientific potential formation, scientific activity results and scientific activity growth rates. Methods of calculating the Index of Scientific Development, which are offered in this paper, are based on the identification of its main three components, or sub-indices: that of the scientific development potential, scientific development results and scientific growth. Sub-index of the scientific development potential characterizes potential possibilities to form scientific resources through two components: education (capabilities in creating specialists of the highest qualification) and science (capabilities in developing the scientific potential through using high-level professionals and financing scientific research). Sub-index of the scientific activity results characterizes scientific activity results through registered scientific products (patents and articles in scientific journals), using intellectual property and income from the high-tech exports. Sub-index of the scientific growth characterizes dynamics of scientific potential growth and scientific activity results .

The Science Development Potential Index includes 10 indicators available from the World Bank database (Reshetnyak, 2020). Indicators F1.1 - F1.9 are direct indicators presented in the World Bank database. Indicator F1.10 (Research and Development expenditure per researcher, USD / person) is calculated on the basis of World Bank data as:

$$F1.10 = \frac{x_1 \cdot x_2}{x_3 \cdot x_4}, \quad (1)$$

where x_1 is the Research and development expenditure (% of GDP), x_2 is the GDP (current USD), x_3 is the Researchers in R&D (per million people), x_4 is 1 million people.

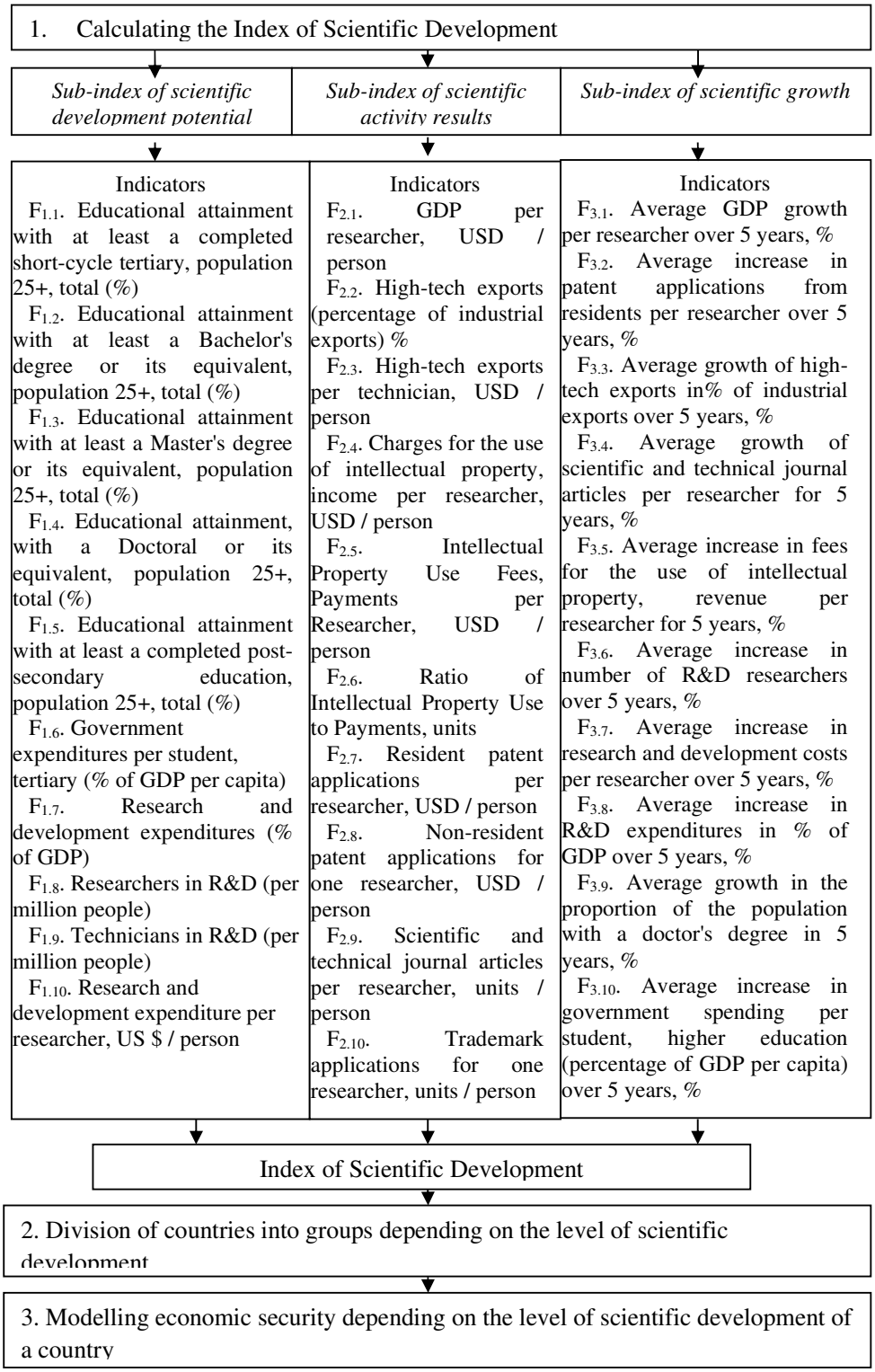

Fig. 1: Model of calculating the index of scientific development (ISD)

Source: own modelling

The sub-index of the scientific activity results includes 10 indicators, the calculations are given in table 1.

Table 1 : Calculating indicators of the scientific activity results index

Indicator	Calculations*
$F_{2.1}$. GDP per researcher, USD / person	$F_{2.1} = \frac{x_2}{x_3 \cdot x_4}$
$F_{2.2}$. High-technology exports (current USD), %	$F_{2.2} = x_5$
$F_{2.3}$. High-tech exports per technician, USD / person	$F_{2.3} = \frac{x_5}{x_3 \cdot x_4}$
$F_{2.4}$. Fees for Intellectual Property Use, Researcher Revenue, USD / person	$F_{2.4} = \frac{x_6}{x_3 \cdot x_4}$
$F_{2.5}$. Intellectual Property Use Fees, Payments per Researcher, USD / person	$F_{2.5} = \frac{x_7}{x_3 \cdot x_4}$
$F_{2.6}$. Ratio of Intellectual Property Use to Payments, unit	$F_{2.6} = \frac{x_6}{x_7}$
$F_{2.7}$. Patent applications from residents for one researcher, unit / person	$F_{2.7} = \frac{x_8}{x_3 \cdot x_4}$
$F_{2.8}$. Non-resident patent applications for one researcher, per person	$F_{2.8} = \frac{x_9}{x_3 \cdot x_4}$
$F_{2.9}$. Scientific and technical journal articles per researcher, unit / person	$F_{2.9} = \frac{x_{10}}{x_3 \cdot x_4}$
$F_{2.10}$. Trademark applications for one researcher, unit / person	$F_{2.10} = \frac{x_{11}}{x_3 \cdot x_4}$

*where x_5 is the High-technology exports (current USD), x_6 is the Charges for the use of intellectual property, receipts (BoP, current USD), x_7 is the Charges for the use of intellectual property, payments (BoP, current USD), x_8 is the Patent applications, residents), x_9 is the Patent applications, non-residents, x_{10} is the Scientific and technical journal articles, x_{11} is the Trademark applications, total

Source: own compilation

Indicators of the Scientific growth sub-index are calculated on the basis of the World Bank data for 5 years as a geometric mean of their growth rates.

All variables are normalized in the [0, 1] range for adjusting for differences in terms of the index indicators and variation ranges. Data scaling is carried out taking into account the minimum and maximum values of each variable in the index indicators using the formula:

$$I_{indic} = \frac{x_f - x_{\min}}{x_{\max} - x_{\min}} , \quad (2)$$

where I_{indic} is the index, which is calculated for individual indicators, x_f is the actual value of an individual indicator, $x_{\min}$ is the minimum indicator value, which is observed in the studied countries, $x_{\max}$ is the maximum indicator value, which is observed in the studied countries.

Sub-indices of the scientific development potential (SDP), scientific activity results (SAR) and scientific growth (SG) are calculated as an arithmetic mean of the obtained values of individual indicators, which characterize them. Index of scientific development (ISD) is a geometric mean of these three sub-indices: $ISD = \sqrt[3]{SDP \times SAR \times SG}$.

Further, we analyze the obtained results and divide the countries into groups taking into account data by three sub-indices and resulting index with the use of the cluster analysis. In order to identify a number of clusters and proximity of countries with respect to scientific development, we apply the hierarchy classification applying the rule of unification by the complete-linkage clustering with the Euclidian distance used as a proximity measure.

Dependence models of indicators, which characterize a country's economic security , on the scientific development level by specified clusters are developed at the final stage. The paper uses the linear regression model $f(x, \beta_0, \ldots, \beta_k) = \beta_0 \phi_0(x) + \ldots + \beta_{k-1} \varphi_{k-1}(x)$, where $\varphi_0(x), \ldots, \varphi_{k-1}(x)$ is a system of functions. The obtained models are assessed using the criterion of R^2, which is calculated as:

$$R^2 = 1 - \frac{\sum_{i=1}^{k} (y_i + \tilde{y}_i)}{\sum_{i=1}^{k} (y_i - \bar{y}_i)} \tag{3}$$

where k is the number of observations, y_i is the value of the economic security indicator, $\bar{y} = \sum_{i=1}^{k} y_i \Big/ k$ is an average value of the economic security indicator and $\tilde{y}_i$ is a model value, obtained by the assessed parameters.

Results and Discussion

In accordance with the offered methods (Figure 1), the paper contains calculations of sub-indices of the scientific development potential, scientific activity results and scientific growth, as well as the index of scientific development for 72 countries in the world [13]. The paper also contains ranging of the world countries in accordance with the calculated index of scientific development. Thus, the United States took the 1st place in the rating (ISD – 0.463), Singapore – 2nd place (ISD – 0.425), Switzerland – 3rd place (ISD – 0.419), Japan – 9th (ISD – 0.327), China – 12th place (ISD – 0.317), Greece – 46th place (ISD – 0.191), Ukraine – 59th place (ISD – 0.153) and Pakistan – 72nd place (ISD – 0.081). However, the country rating was different by individual indices: (1) sub-index of scientific development potential – 1st place in the rating is taken by Switzerland (SDP – 0.742), 2nd place – by the US (SDP – 0.637), 3rd place – by Denmark (SDP – 0.615), 47th place – by Ukraine (SDP – 0.238); (2) sub-index of the scientific activity results – 1st place in the rating is taken by the US (SAR – 0.286), 2nd place – by Singapore (SAR – 0.278), 3rd place – by Luxemburg (SAR – 0.257), 64th place - by Ukraine (SAR – 0.035); and (3) sub-index of scientific growth – 1st place in the rating is taken by China (SG – 0.604), 2nd place - by the US (SG – 0.545), 3rd place – by Slovak Republic (SG – 0.542) and 47th place – by Ukraine (SG – 0.424).

Further, we conducted the cluster analysis of the obtained results in order to divide the world countries into groups taking into account the data by the three sub-indices and index of scientific

development using the Statistica 10 package. Hierarchy classification was applied, which allowed allocating 3 clusters. The cluster nature was checked using the K-average method based on the variance analysis to identify the significance of difference between the obtained clusters (Table 2).

Table 2: Variance analysis to identify the significance of difference between the obtained clusters

Indicator	Between SS	cc	F	Level of significance *p*
Index of scientific development (ISD)	0.247	69	243.423	0.000
Sub-index of scientific potential	0.201	69	12.581	0.000
Sub-index of scientific activity results	0.156	69	9.168	0.000
Sub-index of scientific growth	0.247	69	243.423	0.000

Source: calculated by the data (WB, 2020)
So, $p < 0.05$, which shows a significant gap between the clusters.

Thus, we obtained the following country groups by the level of their scientific development:
Cluster 1 represents catching-up countries in the scientific development. These are countries, which insufficiently invest in the scientific potential development, demonstrate insignificant results of scientific activity with low rates of increase in the scientific potential and scientific and technological activity results. This cluster includes the following countries: Columbia, Malaysia, Mexico, Chile, Philippines, Croatia, Tunisia, Romania, India, Salvador, Bulgaria, Venezuela, Ecuador, Montenegro, Ukraine, Argentina, Kazakhstan, Moldova, Serbia, Madagascar, Guatemala, Bosnia and Herzegovina, South Africa, Morocco and Egypt.

Cluster 2 represents potential leaders in scientific development. These are countries, which invest in the scientific potential development, use new technologies, ensure achievement of significant scientific results; however, the rates of their growth are lower than those of the leaders. This cluster includes the following countries: China, Malta, Panama, New Zealand, Italy, Cyprus, Czech Republic, Hong Kong, Spain, Hungary, Costa Rica, Lithuania, Slovak Republic, Poland, Latvia, Estonia, Brazil, Greece, Portugal, Uruguay, Turkey, Russian Federation and Georgia.

Cluster 3 represents leaders in scientific development. These are countries, which are on the frontline of independent scientific research and implementation of scientific results, which demonstrate high achievements in formation and development of the scientific potential, have significant scientific and technological achievements and ensure high rates of growth of the scientific potential and results. This cluster includes the following countries: the United States, Singapore, Switzerland, Luxemburg, Finland, Ireland, South Korea, the Netherlands, Japan, Denmark, Sweden, the United Kingdom, Germany, Norway, France, Belgium, Israel, Australia, Austria, Canada, Slovenia and the United Arab Emirates.

The next step of the study is to identify the dependence of economic security indicators on the country's scientific development level. Thus, the impact of the index of scientific development on GDP per capita is assessed as significant, as the correlation ratio is 0.8401. The obtained results are confirmed both by the regression model and graphically (Figure 2). It is possible to separate the country groups, obtained in the result of the cluster analysis.

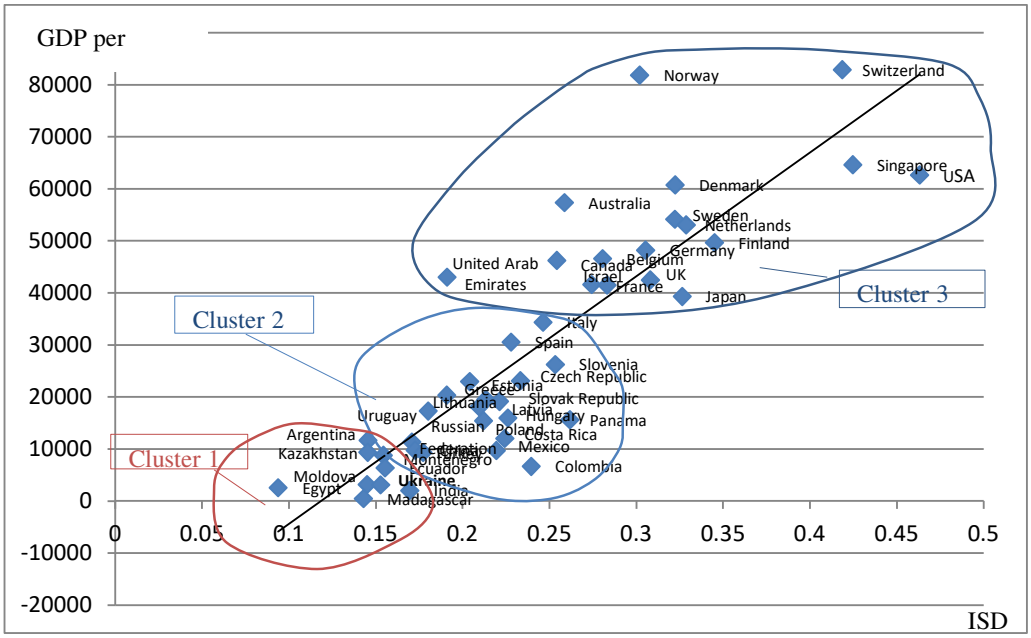

Fig. 2: Dependence of GDP per capita in the countries on the Index of Scientific Development (ISD)

Source: built using our own calculations and data (WB, 2020)

Models of the dependence of other economic security indicators on the countries' scientific development level and by the country groups are presented in Table 3.

Table 3: Models of the dependence of other economic security indicators on the economic development level by the country groups

Indicators of economic security	Cluster 1	Cluster 2	Cluster 3
GDP per capita (current USD)	y = 227371x – 26411; R² = 0.8401		
	y = 13242x² + 24830x - 101.91 R² = 0.5778	y = -615520x² + 352496x - 29056 R² = 0.6307	y = 117754x + 15764 R² = 0.7387
Manufacturing, value added (% of GDP)	y = 60.587x + 1.2022; R² = 0.7765		
	y = 51.974x + 4.6102 R² = 0.4542	y = 126.6x – 15.486 R² = 0.6069	y = 106.3x – 15.3 R² = 0.5431
Human capital index (HCI)	y = 0.7271x + 0.5123; R² = 0.628		
	y = 0.775x + 0.6581 R² = 0.3154	y = 0.1576x + 0.725 R² = 0.3048	y = 0.2518x + 0.8704 R² = 0.5235
The Global Competitiveness index	y = 5.9395x + 3.2581; R² = 0.7182		
	y = 6.0366x + 3.2331 R² = 0.498	y = 5.767x + 3.2518 R² = 0.5758	y = 3.5374x + 4.1342 R² = 0.6006

Source: calculated on the basis of the data [(WB, 2020; WEF, 2018; WB, 2018)]

Thus, it is possible to confirm the hypothesis of the dependence of the economic security indicators on the country's scientific development level using the analysis of the obtained regression models and indicators of their adequacy R^2. Impact of the scientific development on individual economic security indicators is different: the biggest impact is on GDP per capita ($R^2=0.8401$), while the smallest one is on the Human capital index ($R^2=0.628$). Impact of the scientific development level on individual economic security indicators in different country groups is also different: it is less than in

the analysis of the general impact (which is justified by the proximity in economic and scientific development of countries, which belong to a respective cluster). However, despite the different levels of impact of the scientific development level on economic security indicators, we can be sure that scientific activity development in a country is a positive phenomenon, which strengthens a country's economic security.

Conclusion

Ensuring economic security is among the main tasks of any country government. Namely, that is why it is very important to identify the main threats and drivers of strengthening economic security within the globalization process. In accordance with the paper goals, it confirms the hypothesis that scientific development influences economic security indicators. To achieve this goal, we calculated the index of scientific development in various countries, which is a complex indicator and includes assessment of the scientific potential, scientific activity results and the growth rates of scientific activity and potential for 72 countries in the world. This allowed ranging the countries by the level of their scientific development and grouping them in accordance with their scientific results and scientific potential. We allocated 3 country groups: catching-up countries in scientific development, potential leaders in scientific development and leaders by the scientific development level. Modelling the indicators of economic security was conducted depending on the level of scientific development in the country groups. The models built give a possibility to forecast values of the economic security indicators depending on the management of a country's scientific development.

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Green Economy and European Politics

Mihaela MUŞAT

PhD. Student, The Bucharest University of Economic Studies, Bucharest, Romania
musat.mihaela11@gmail.com

Elvira NICA

Professor, PhD., Dean Administration and Public Management Faculty, Bucharest University of Economic Studies, Bucharest, Romania

Elvira.nica@ase.ro

Maria Gabriela HORGA

Professor, PhD, University Ovidius, Constanta, Romania

Gabihorga@gmail.com

Abstract

Through this study we want to generate an overview of the concept of "Green Economy", considered by some specialists a solution to the problems facing all mankind. In the latest research conducted over the last 30 years, it has been found that new concepts have emerged in the global economy, concepts that start from the same premise, namely, how society will manage to create a balance between available resources, which are limited, and the needs or wishes of its members, which are potentially unlimited. Thus, currently it is pursued which of these concepts is more comprehensive, more appropriate, what similarities and differences are between them, and which will answer the best to the present and future needs of society.

Keywords: Green Economy, Development, Policies, European Union.

Classification JEL: F63, O10, O17, P26.

Introduction

As a concept, *the green economy* precedes the bio-economy and the circular economy. It made its debut in 1989 in the Blueprint for a Green Economy report (Pearce et al., 1989), a report requested by the British government in order to see if there is a consensus on the term sustainable development and its implications for measuring the economic progress. A most commonly used definition is the one proposed by the United Nations Environment Program (UNEP) in 2011 which states that the green economy is "the one that results in improved human well-being and social equity, significantly reducing the risks to the environment and the ecological deficit, generate low carbon emissions, is resource efficient and socially inclusive. "

As the concept of the "Green Economy" is hotly debated, it has recently been concluded that it is essential for the proper development of the world economy. Thus, it is followed to find concrete solutions with applicability in the international issue of environmental development as a result of the massive problems generated by the multiple crises that can no longer be solved. At the same time, the international community aims to find long-term alternatives in order to improve the quality of life and eradicate the population poverty as much as possible.

Sustainable economic development requires transformation, but this requires a transition with multiple implications both at the level of governments, as well as at the level of the private sector.

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Thus, a joint effort is needed between the public and private sector, an effort that aims to separate the economic growth from excessive use of resources, and the main objective remains to pursue an increase in quality of life along with reducing environmental risks and social deficit. In order to implement the green economy, it is necessary to ensure a transition and to pursue an economy based on policies and investments that link economic development, biodiversity, ecosystem, climate change, health and well-being of the population in the medium and long term. The transition to the "Green Economy" implies an appropriate focus on knowledge, research and innovation that will create a favourable framework, meant to favor long-term sustainable development.

The new economy, the ecological economy, promotes the economic growth in conditions of increased environmental protection, accelerating the reduction of physical consumption, in favor of capitalizing on information and knowledge, shifting the center of gravity from investment in fixed assets to investment in human capital.

The European Union and the transition to the green economy

The European Union plays a key role in the transition to the green economy, being actively involved in order to relaunch the sustainable development among the European population, as well as among institutions around the world.

The transition to a green economy is mainly driven by a long-term global trend of diminishing resources and rising energy and raw materials prices, a trend exacerbated by Europe's growing dependence on resource imports. To face these challenges, the EU has implemented a number of policies and strategies aimed at supporting the transition to a low-carbon and resource-efficient economy, while strengthening the E.U.'s competitiveness.

The EU is, therefore, trying to create a coexistence of a public-private sectors partnership in order to actively support the special importance of sustainable development both for society and especially for the global economy.

In the European Union development, the phenomenon of globalization is considered as a paradigm, being a double-edged sword, as it supports economies in developing, but at the same time the threat of "falling" does not disappear. In order to follow the European Union development, we must analyze both the economy and the population, which in case of shortages suffers the most.

One of the main actions pursued by the green economy, in the context of the European Union development, is the eradication of poverty, so as to guarantee a better quality of life without affecting the natural resources. For this reason, spreading the green economy concept without taking into account the needs of vulnerable groups and natural deterioration is a mistake, given that a recovery of environmental and social dynamics can be achieved in the short, medium and long term. In 2015, Biswas & Roy proposed the following to achieve these objectives.

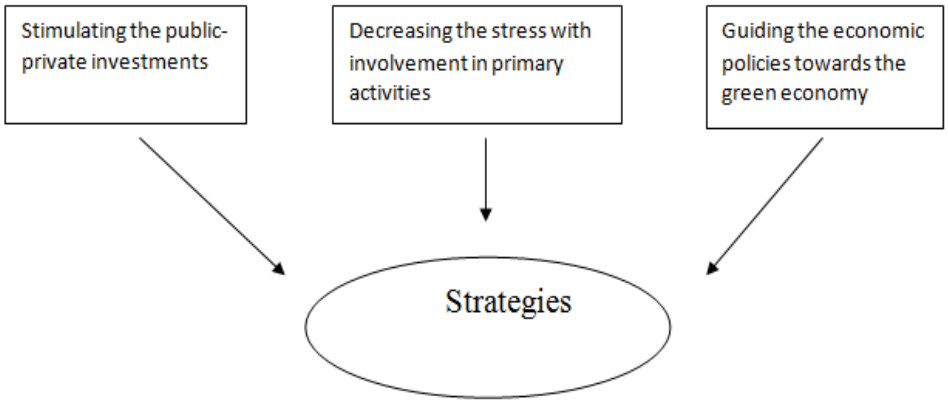

Figure 1: Strategies for achieving the objectives of the green economy

Source: Biswas, A. & Roy, M. (2015). Green products: an exploratory study on the consumer behaviour in emerging economies of the East

The green economy development in the European Union

In order to support the green economy implementation in each state, there is a need for the consumers and the business environment deep involvement, along with the implementation of the main framework of measures proposed and adopted at the level of national and international governing bodies. Thus, the objectives of the state on the one hand, and the policies that could be used in the ecological economy on the other hand, must be taken into account.

Table 1: The objectives of the EU member states and political instruments for the green economy development

The long-term goals of states	The political tools that could be used within the green economy
The population well-being and health on long-term	Public investment in sustainable infrastructure
The economic development	Correct pricing
Poverty eradication	Public support for research and development in the field of green technologies
Food security	Social policies for reconciling social objectives with economic policies

Source: Made by the authors

Over the time, the European Union's economy has been severely affected by economic crises, with a slowdown in sustainable economic growth, and Europe's population has become more cautious, avoiding to make investments and seeking to reduce its own expenditure, all these actions being fueled by the strict conditions in the field of bank lending, as well as by the alarming figures of the unemployment rate.

At European level, for the population aged between 20 and 64, the unemployment rate has increased from year to year, according to Figure 2. presented below.

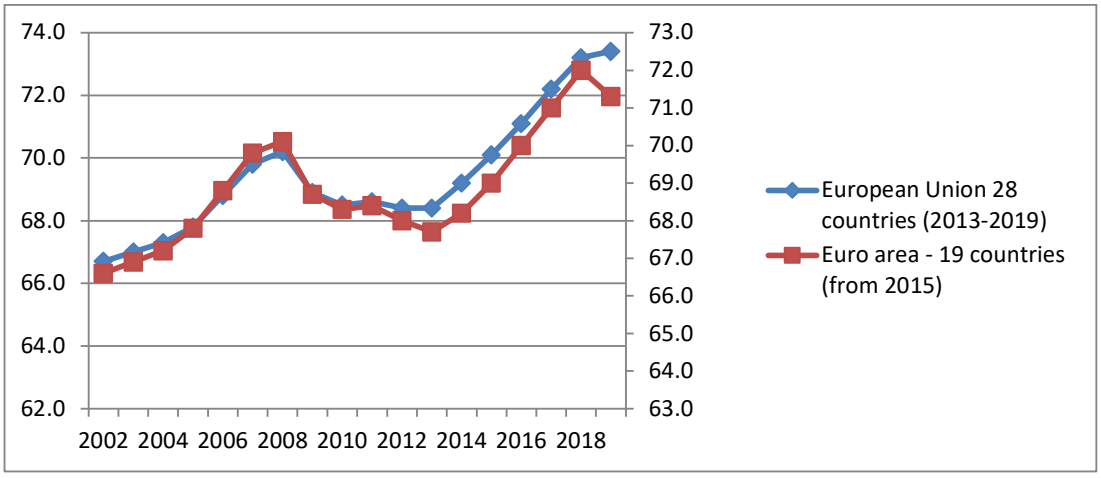

Figure 2: Employment rate at European level

Source: Eurostat

According to data published on Eurostat, the employment rate was 66.7 of the total population in 2002, and a value of 73.4 in 2019.

The increase with the highest value has been visible since 2008, when there was registered a value of 70.2 of the total population in Europe, then there was registered a slight decrease starting with 2009. Since 2015, the employment rate at the European level has registered new increases, registering the value of 70.1 and increasing to 73.4, a value for 2019. It is very important that this rate to reach the highest possible values, because once they have a job, the inhabitants of the European Union ensure their standard of living, and their well-being is visible.

As the well-being of citizens is a key objective of the European Union, it must ensure that the welfare economy is at the heart of policy and decision making process. At the same time, people's well-being and economic growth are interdependent and mutually supportive, and economic development at the European level pursues the rate of GDP growth.

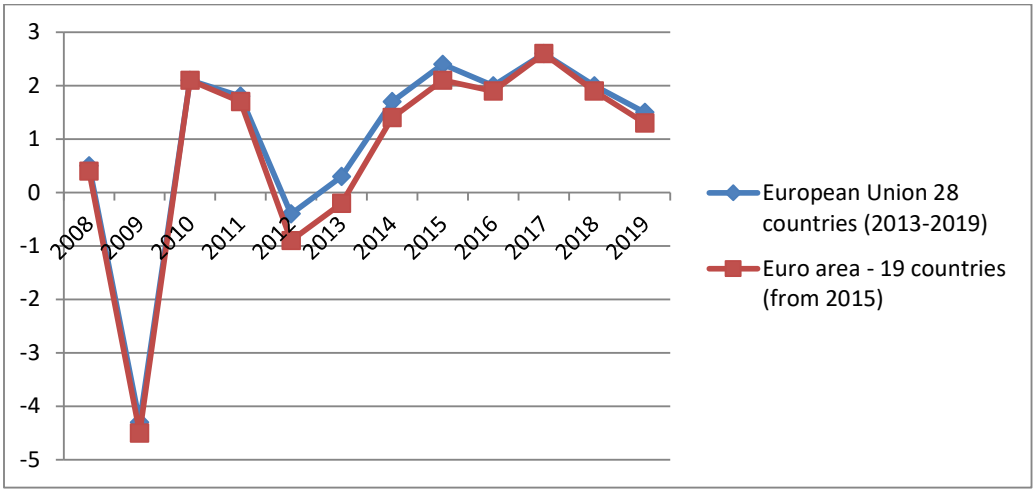

Figure 3: GDP growth rate

Source: Eurostat

The global financial and economic crisis has been present in the EU-28 since 2008, when a considerable reduction in the GDP growth rate was seen, but in 2009 it proved to be a severe recession, when it was registered. a decrease of 4.3%. A recovery was registered in 2010, when the recovery at EU-28 level meant a GDP growth, this being 2.1%, and in 2011 a new growth of 1.8% was seen.

Subsequently, in 2012, the GDP decreased by 0.4%, before to be progressively registered higher positive rates of change in 2013 (0.3%), 2014 (1.7%), 2015 (2.4%), and starting with 2015, the growth was relatively stable.

Conclusions

The green economy, as defined by the recent United Nations Environment Program Report (launched in February 2011), results in improved social welfare and equity, while significantly reducing environmental risks and ecological deficit. The transition to a green economy means policies and investments that will separate economic growth from increasing current intensive consumption of raw materials and energy. A green economy can be thought as a low-emission economy, through the efficient and sustainable use of resources and social inclusion ensuring. In a green economy, revenue growth and employment should be driven by public and private investment which reduce carbon emissions and pollution, increases energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. The transition to the green economy involves an appropriate focus on knowledge, research and innovation that will create an enabling environment for long-term sustainable development.

As the time goes by, the green economy becomes a model that promotes growth, income and job creation, "green jobs" which automatically generate change when productivity is pursued. The green economy shows a substantial contribution to reducing social inequality between countries and eradicating world poverty. Similarly, it is necessary to address ways of overcoming the ideas of market liberalization and to promote the trade relations on equality terms at European level. At the same time, the green economy involves using natural resources, energy and new technologies along with clean production methods in order to favor the economic growth and the new jobs creation. Because the green economy can lead to a healthy environment and the correct use of ecosystem services, both for the current generation and for future generations, it is necessary to create new models of sustainable consumption and production that do not force the ecosystem.

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Regional Development and Cross-border Public Services in the Field of Security

Stepan KAVAN

Faculty of Health and Social Science, University of South Bohemia in České Budějovice
Czech Republic, E-mail: stepan.kavan@email.cz

Abstract

The paper focuses on the topic of regional development and cross-border public services in the field of security. The topic is dealt in the conditions of cross-border cooperation of the German, Austrian and Czech sides of the Euregion. The aim of the paper is to characterize the basic public services in the field of security and to describe the individual areas that are contractually treated. The research process and methodology for this case study was very demanding, as a comprehensive analysis cross-border public services. In order to present a lively picture of cross-border public services, an extensive on-line research had to be realised because relevant information was scattered across a wide range of different sources and different languages. The Euregio-wide introductory analysis and especially the assessment of future development perspectives sucurity in the fields of helicopter emergency medical care shows that there are still considerable potentials for optimising existing cross-border public services and for developing new cross-border public services in the trilateral cooperation area.

Keywords: Cross-border Public Services; Disaster Management; Emergency; Regional Development, Security

Introduction

The trilateral Euregio Bayerischer Wald-Böhmerwald-Unterer Inn (hereinafter: "Euregio") was established in 1993 and consists of three sub-sections: (1) the Bavarian section "EUREGIO Bayerischer Wald-Böhmerwald-Unterer Inn e. V." with its office seat in Freyung, (2) the Austrian section "Euregio Bayerischer Wald-Böhmerwald / Regionalmanagement Mühlviertel" with its office seat in Freistadt and (3) the Czech section Euroregion Šumava-jihozápadní Čechy with its office seat in Klatovy. (Dušek, 2013; Dušek, 2015) Across borders, these three sections form a working community with the trilateral "Euregio Assembly" as the supreme cooperation organ.

On the German, Austrian and Czech sides of the Euregio, the cooperation area includes different territorial administrative units. In Germany, within the federal free state of Bavaria (hereinafter: "Bavaria"), the Euregio covers the county of Cham in the government district Upper Palatinate (Regierungsbezirk Oberpfalz) and the counties of Regen, Freyung-Grafenau, Straubing-Bogen, Deggendorf, Passau and Rottal-Inn in the government district Lower Bavaria (Regierungsbezirk Niederbayern). In Austria, within the federal state of Upper Austria, the Euregio covers the political districts of Perg, Freistadt, Rohrbach and Urfahr-Umgebung (i.e. the part called Mühlviertel is not a territorial administrative unit). In the Czech Republic, the Euregio covers the districts Domažlice and Klatovy in the Pilsen Region (Plzeňský kraj) and the districts Prachatice, Český Krumlov and Strakonice in the South Bohemian Region (Jihočeský kraj), with Strakonice not being adjacent to the state border.

These administrative units account for around 1.2 million inhabitants, of which two thirds live on the Bavarian side - 901,507 inhabitants and the remainder third on the Czech and Austrian sides - Czech part: 262,598 inhabitants; Austrian part: 187,632 inhabitants (Dokoupil, 2014; Kročová, Kavan, 2019).

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Recently elaborated spatial analysis for the entire Bavarian-Czech border area clearly recommends that a maintenance and supply of reasonably accessible services of general interest to the population in the border areas should be done by cross-border municipal cooperation in order to better cope with the consequences linked to demographic change (i.e. population aging and declining population numbers). This cross-border municipal cooperation should coordinate the service offer on both sides of the border and open up the use of facilities for residents of the neighbouring country (e.g. hospitals, doctors, kindergartens, schools). This can also involve the conclusion of local-level cooperation agreements by which a shared use of sports facilities, swimming pools, theatres or libraries is agreed (Kováčová et al., 2014; Malerova, Pokorny, 2017). In both cases, the goal is to avoid duplication of structures, to reduce costs and to offer the broadest possible service supply (Bayerisches Staatsministerium der Finanzen, für Landesentwicklung und Heimat, 2015; Kazansky, Adašková, 2011).

The aim of the paper is to characterize the basic public services in the field of security and to describe the individual areas that are contractually treated.

Methodology

The research process for this case study was very demanding, as a comprehensive analysis cross-border public services (hereinafter: "CPS") in the Euregio did not yet exist for policy areas other than public local transport. In order to present a lively picture of CPSP, an extensive on-line research had to be realised because relevant information was scattered across a wide range of different sources and different languages (e.g. articles in local newspapers, press announcements, websites of stakeholder organisations etc.).

This broad information base was used for analysing the current state-of-play The analysis addresses a number of core elements that were introduced by the "conceptual framework" elaborated in the Inception Report for this study project. These are (Stumm, 2018):

- the cross-border needs / opportunities motivating a set-up of CPS,
- the legal framework conditions for CPS,
- the production base for a provision of CPS,
- the tasks and intervention approaches of CPS for addressing identified needs and lastly,
- the organisational structures and processes for delivering CPS.

The entire analysis devotes particular attention to unveil the complex interplay between border-related or country-specific contextual factors and CPS, and also takes a closer look at the different types of actors that are directly involved in delivering the CPS. Only this way it is possible to fully understand why and how the CPS were established and in what way these services are provided on a day-to-day basis.

A good understanding of the interplay between contextual factors and CPS is also relevant for "Euregio-external" readers who seek finding good practices for addressing challenges faced in their own cross-border areas. It helps them judging on whether the chosen cross-border solutions and forms of service (Lošonzi et al, 2016; Kavan, Brehovská, 2016) organisation / delivery include aspects that might fit with their own context conditions and needs.

Results - effects associated with the political dimension of the border

During the past four decades, the status of the politically defined borders within the trilateral Euregio has substantially changed (Dokoupil, 2014). From the pre-1990 status as an already open EEC-EFTA border (DE-AT) or as largely closed "Iron Curtain" borders that divided political and economic systems (DE-CZ, AT-CZ), they gradually evolved in the period 1994-2004 to "contact zone borders". This allowed in some parts of the Euregio a stronger cross-border integration due to EEA/EU and EU membership (DE-AT), while in other parts still important closure effects existed due to the presence of external EU-borders (DE-CZ, AT-CZ).

The current borders of the Euregio are all internal EU borders, either between old EU Member States (DE-AT) or between old and new Member States (DE-CZ, AT-CZ), with all three countries being members of the Schengen area. Since the lifting of last mobility restrictions for Czech citizens in 2011, the borders facilitate in principle all sorts of cross-border exchange relations. However, a "currency border" still separates Eurozone Members (DE, AT) from a non-Eurozone Member (CZ).

Nevertheless, the political borders between the three countries continue to be "meeting points" of different national governance systems and of diverging legal provisions or administrative proceedings. These differences may lead to obstacles that adversely affect all kinds of cross-border interactions. Due to the complex trilateral border context within the Euregio, adequate legal framework conditions for cross-border cooperation have to be in place so that an ongoing provision of existing CPS or the development of new CPS is facilitated.

However, the three countries concerned by the Euregio have not concluded bilateral interstate agreements on general decentralised cross-border cooperation that apply the Council of Europe's Madrid Outline Convention of 1980. This meant for a long time that the scope of themes and practices by which local or regional authorities are allowed to act across borders as well as the legal tools they may use for formalising cooperation have mostly derived from different country-specific constitutional provisions and other domestic secondary laws on territorial authorities.

In 2006, however, Regulation (EC) 1082/2006 introduced the "European Grouping of Territorial Cooperation (EGTC) as a new EU-wide legal instrument that also regional and local authorities from the Euregio can use to formalise their cooperation. For the period 2014-2020, the amended Regulation (EU) 1302/2013 was adopted. New domestic legal implementing provisions were adopted already in 2015 by the Czech Republic, but only in 2017 also by Upper Austria and Bavaria (CoR, 2018).

CPS may also be initiated and further developed on ground of theme-specific interstate agreements or that provide for cross-border cooperation in particular policy areas. The area of the trilateral Euregio is covered by a number of theme-specifc agreements concluded between the national governments or between neighbouring regions, which often also allow CPS to be developed or further deepened. Some agreements exist already since a while (i.e. police cooperation; mutual assistance in the event of disasters or serious accidents), while others were concluded more recently with a view to put already existing but largely informal cooperation on a more solid legal ground (i.e. rescue services; fire-fighting services).

(1) The German-Czech interstate agreement on cooperation between police and border authorities was signed already in 2000 (Regierung der Bundesrepublik Deutschland, 2002), on ground of which cooperation between police and border control authorities of both countries is taking place since 2002. Just before the Czech Republic's joining to the Schengen Area, a "Joint Centre of German-Czech Police and Customs Cooperation" in Petrovice (CZ) / Schwandorf (DE) was established in 2007; i.e. located outside the Euregio area. This Joint Centre also coordinates police cooperation in the German-Czech border zone covered by the Euregio.

(2) The Austrian-German treaty on cross-border police security and criminal law cooperation was signed in 2003 and entered into force on 1 December 2005 (Republik Österreich, Bundesministerium für Inneres, 2018b). In the event of cross-border operations, for example, this agreement makes it possible that Bavarian police officers are subordinated to Austrian security authorities for the performance of police enforcement tasks, including sovereign powers, which in practice puts them legally on an equal footing with their Austrian colleagues (Bayerisches Staatsministerium des Innern und für Integration, 2018).

Bilateral police cooperation has developed further between 2015 and 2017, first in form of a common reaction to growing flows of migrants from countries of the Middle-East that had as their destination Austria and Germany. In November 2015, the ministries of the interior of Germany, Bavaria and Austria had set up a provisional Joint Centre for border police cooperation in Passau. The center had worked well and made an important contribution to police cooperation, even beyond the then special

situation. Therefore, in March 2017, the Ministers of the Interior of Germany and Austria signed an agreement on the permanent establishment of the Joint Centre in Passau. Officials of the German Federal Police, the Bavarian State Police and the Austrian police will work closely together to support police cooperation in the border area (Bundesministerium des Innern, für Bau und Heimat, 2017), Wochenblatt, 2017).

(3) Interstate agreements on mutual assistance in the event of disasters or serious accidents were concluded between Germany and Austria - in force since 1992 (Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, 2018a), between Austria and the Czech Republic - in force since 2000 (Republik Österreich, Bundesministerium für Inneres, 2018a) and also between Germany and the Czech Republic - in force since 2003 (Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, 2018b). These agreements cover also the area of the Euregio and usually regulate various technical/procedural and financial matters linked to voluntary assistance missions in the neighbouring countries, e.g. cooperation procedures for preventing and combating disasters, the setting up of contact points, rules for facilitating border crossings of disaster relief teams and the import / export of relief goods or equipment; questions of operational management, reimbursement of costs, claims for damages or the performance of joint exercises etc. However, these agreements do not explicitly provide for cross-border cooperation between regional- or local-level authorities in this matter.

(4) A framework agreement on cross-border cooperation between rescue services was signed in 2013 between the Federal Republic of Germany and the Czech Republic, which entered into force in July 2014 (Regierung der Bundesrepublik Deutschland, 2015; Bundesministerium für Gesundheit, 2013). This agreement sets a legal framework for expanding the already existing informal cross-border cooperation along the borders of the German federal states of Saxony and Bavaria with the Czech Republic. It enables the deployment of German and Czech rescue teams in the border area of the other country and significantly improves the provision of emergency medical care on both sides of the border. The rescue service closest to the place of accident can now provide help across the respective border. Injured people are thus helped more quickly and reliably, because ambulance services can bring patients to the nearest and most appropriate health care facility.

This framework agreement needs to be implemented by additional “cooperation agreements” (Article 4) that are concluded between the competent administrations or the concerned territorial authorities in Saxony, Bavaria and the Czech Republic. The framework agreement therefore specifies what should be regulated in such cooperation agreements (i.e. organisation of the ambulance service, requirements for carrying out an assignment, definition of quality and safety criteria, details of liability insurance or communication methods etc.).

For implementing this framework agreement, a regional agreement on cross-border cooperation of rescue services was signed between Bavaria and representatives of the Czech regions of Karlovy Vary, Pilsen and South Bohemia in October 2016. The agreement sets out guidelines for the coordination of cross-border rescue service operations, for instance on the alerting of emergency services or the carrying out of operations and on the admission to a suitable medical care facility. Responsibilities for its practical implementation are on the Bavarian side with the public “local purpose associations for rescue service and fire alarm” operating the integrated dispatch centres Hochfranken (Hof), North Upper Palatinate (Weiden), Amberg, Regensburg, Straubing and Passau (Bayerisches Staatsministerium des Innern und für Integration, 2016).

This regional agreement will help to further develop the already long-standing and good dayto-day cross-border cooperation between ground-based rescue services from Bavaria and the Czech Republic (BASt, 2006). Some practical implementation question still need to be resolved. Options for this are, among other aspects, currently explored by the cross-border project “Competence and coordination concept cross-border rescue service” that is supported under the programme Interreg V-A Bavaria-Czech Republic and was terminated in 2019 (Bayerwald Echo, 2017; Da Hog’n, 2017).

(5) In January 2016, the Austrian-Czech framework agreement on cross-border cooperation between rescue services was signed (Republik Österreich, Parlament, 2016). This agreement stipulates that in

the neighbouring regions of Lower Austria and Upper Austria as well as in the border regions of the Czech Republic, it will now be possible to provide quick and un-bureaucratic mutual medical assistance in case of emergencies. The emergency service closest to the casualty is coordinated by the dispatch centres of the involved regions implementing the mission.

On ground of the framework agreement, detailed provisions on cross-border cooperation are laid down in regional implementing agreements that were concluded in autumn of 2016 between the Austrian Länder Lower Austria and Upper Austria with their neighbouring regions in the Czech Republic (Guten Tag Österreich, 2016). The Land Upper Austria and the Region South Bohemia signed a rescue agreement in České Budějovice and thereby paved the way for closer cooperation in field of emergency rescue (meinbezirk.at, 2016). Lower Austria concluded a cross-border rescue agreement with the regions South Bohemia and South Moravia (Jihomoravský kraj), which was also extended to the Highlands Region (Vysočina kraj) that has no direct border with Lower Austria (Amt der Niederösterreichischen Landesregierung, 2018).

(6) In May 2017, a cross-border agreement on assistance and cooperation in fire protection was signed between the Bavarian country of Cham and the Czech region of Pilsen. Cross-border contacts and cooperation between fire brigades of the Bavarian and Czech border towns / municipalities are already very good, but they have initiated the conclusion of this agreement to put their cooperation on a legally secure basis. The agreement provides for a clear definition of assistance demand procedures, contact persons and operational sequence, but also includes requirements for the coordination of cross-border firefighting missions (e.g. alerting of emergency services; implementation of assistance missions) as well as for regular joint training and exercises to overcome existing language barriers (Chamer Zeitung, 2017).

Discussion and Results

Nearly all identified services in the Euregio are bilateral CPS, as there is only one CPS involving partners from all three sides (i.e. trilateral forest fire-fighting). For the 16 bilateral CPS within the Euregio, it can be observed that most CPS are established between Bavarian and Czech partners (12 CPS) and that CPS between Bavarian and Upper Austrian partners are fewer in number (4 CPS). Consequently, there exists not yet a bilateral CPS involving Czech and Upper Austrian partners. Two bilateral CPS are examined in more detail under the stock-taking analysis; these are the integrated seasonal cross-border rail / bus tourism service developed around the Ilztalbahn and the first truly cross-border helicopter emergency medical service “Christophorus Europa 3”.

The Euregio-wide introductory analysis and especially the assessment of future development perspectives sucurity in the fields of helicopter emergency medical care shows that there are still considerable potentials for optimising existing CPS and for developing new CPS in the trilateral cooperation area. Nevertheless, especially the joint preparatory work processes for developing new CPS will most likely last for several years and must therefore be thoroughly prepared and continuously supported by relevant stakeholders in the Euregio.

Within the Euregio, a larger number of bilateral theme-specific interstate agreements were concluded between the involved countries. Some exist already since a while, e.g. police cooperation; mutual assistance in the event of disasters or serious accidents, while others were concluded more recently with a view to put already existing but largely informal cooperation on a more solid legal ground, i.e. rescue services; fire-fighting services.

Within the Euregio, shared needs or joint development potentials emerging from the physicalgeographical dimension of the border were and still are the most important reasons for establishing CPS. Related needs and potentials are addressed by more than half of the existing CPS: they concern policy fields such as public local transport, nature protection, emergency medical care, e.g. cross-border helicopter service or civil protection and disaster management, i.e. joint forest fire fighting and flood prevention.

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3D-Quarry: Digitization of The Geological Model of Deposit Based on A Semi-Structured Data Model

M. ZARUBIN
Rudny Industrial Institute, Rudny, Republic of Kazakhstan
zarubin_mu@mail.ru

V. ZARUBINA
Rudny Industrial Institute, Rudny, Republic of Kazakhstan
zarubina_v@mail.ru

B. SALYKOV
Kostanay State University named after A.Baytursinov, Kostanay, Republic of Kazakhstan,
salykovbulat@mail.ru

O. SALYKOVA
Kostanay State University named after A.Baytursinov, Kostanay, Republic of Kazakhstan,
solga0603@mail.ru

I. IVANOVA
Kostanay State University named after A.Baytursinov, Kostanay, Republic of Kazakhstan,
valera_irina_69@mail.ru

Abstract

The article deals with the problems of building a digital geological model of fourth-generation mineral systems. The places and causes of errors in the digital model of the deposit, and methods of their minimization are considered. The problems of transformation of information on the deposit into structured data models are revealed. The data structure based on the presentation of semi-structured data is developed. The structure is adapted for a relational DBMS and oriented for use in a Web application.

Keywords: Digital Models, Quarry, Database, Semi-Structured Data, Information Systems, Deposit.

Introduction

The beginning of the 21st century was marked by explosive development of information technologies and active digitalization of all aspects of human activity. Mining is no exception. The level and complexity of digital control systems for mining over the past decade has changed dramatically. The introduction of digital solutions has led to a change in the activities of mining companies, and to a natural increase in their productivity. Modern programs for open-pit mining belong to the third generation and are characterized by the developed tools of 3D geometric modeling and visualization, the programs combine the functions of optimizing the main processes.

However, at present, productivity growth in the mining industry has slowed significantly, as mining companies use information technology to improve individual processes, and not the whole production. Enterprises continue to spend efforts to automate old methods instead of upgrading and improving them. A new, fourth generation of information technologies, which is now being formed, should provide a dynamic improvement in productivity.

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But for the total optimization of processes it is necessary to have comprehensive and reliable information, both about the processes themselves, and about the developed field, its structure. The understanding of such processes is based on the concept of "geological model". It should be noted that the concept of the geological model has not yet been formalized.

In the most commonly used understanding, a geological model is a volume imitation of a field stored in a computer memory as a multidimensional object, allowing to investigate and predict the processes occurring during the development in the volume of the field, continuously refined based on new data throughout its operation.

The founders of the theory of geological models in the subsoil were: D. Krige, H. Davis, J. Serra, M. David [1], I. Clark [2], G. S. Koch, Jr., Richard F. Link [3], P. Goovaerts [4], I. B. Tabakman.

In the Russian-language scientific environment the most famous works of Yu. E. Kaputin, M.V. Lesonen, M. S. Sen [5]. The principles of optimization are given in the works of O. V. Stagurova [6]. In the works of A. A. Tverdova, A. V. Zhur [7] carried out an analysis to identify the advantages of the career optimization method based on block models relative to traditional methods used in the Russian Federation.

In Kazakhstan, the issues of digital modeling of deposits were consecrated in the scientific works of K. Kh. Rakishev, A.I. Ivlev, A.F. Tsekhov, D.G. Bukeikhanov and many others.

However, recent studies have established a rapidly growing discrepancy between the true heightened level of complexity of the geological structure of the fields being developed and the simplified concepts of traditional geological exploration, oriented to large deposits with simple averaged parameters.

Methods

In work classical theoretical, mathematical and experimental methods of scientific research has been used. From classical methods used: analysis of the state of design methods for mining, analysis of modern digital systems and algorithms used, analysis of control systems based on artificial neural-like networks and analysis of semi-structured data.

In the development of digital models of deposits, the mathematical and logical apparatus of the theory of artificial neural networks, probability theory-the semi-structured data, methods of discrete mathematics and integer programming used. It also assumes the use of modern programming environments using web- languages.

At the stage of assessing the adequacy of the developed models and systems, the use of methods for planning and setting up experiments, as well as statistical processing of the experimental data, is assumed.

To determine the error of the input data at the inputs and outputs of models, the correlation regression analysis method applied.

Results and Discussion

These discrepancies began to accumulate due to the depletion of rich surface deposits and the need to develop deep deposits with a complex spatial morphology of the boundaries of mineral deposits.

The degree of "adequacy" of geological models is determined primarily by the volume and accuracy of empirical data, the completeness of the use of a priori information, as well as algorithms and methods used in the construction of models.

The causes of inaccuracies in modern geological models can be:

– mismatch of initial data volumes with the size of the Deposit and the complexity of its geological structure;
– low accuracy of initial data;
– inconsistency of modeling algorithms with the volume and accuracy of empirical data;
– a false conceptual model.

At the same time, we should not forget about the use of different units at different stages of field research. When evaluating the field, we use tens, and often even hundreds of meters: when evaluating the location of wells – meters, when evaluating cores – centimeters, microsection – millimeters. Naturally, it also generates systematic errors and loss of accuracy. Although modern automatic measuring systems and positioning systems "try" to reduce these errors to a minimum.

To improve the accuracy in the area of occurrence of mineral resources, firstly, use the methods of hole mesh compaction.

Secondly, in the majority of modern information systems a method of spatial modeling is implemented according to the testing of exploratory boreholes with the possibility of specifying the parameters of ore body placement according to geophysical studies or vice versa [8].

In modern conditions of the state of computing systems, it is possible to refine models based on the results of deposit development, for example, on mining of sides. Although this requires either recalculation of the entire previously created model or the use of “flexible” modeling mechanisms. So now, for example, in most oil and gas companies they are already actively applying the principles of support and updating geological models at all stages of field development. There is a legitimate question why this is not applicable for other types of deposits.

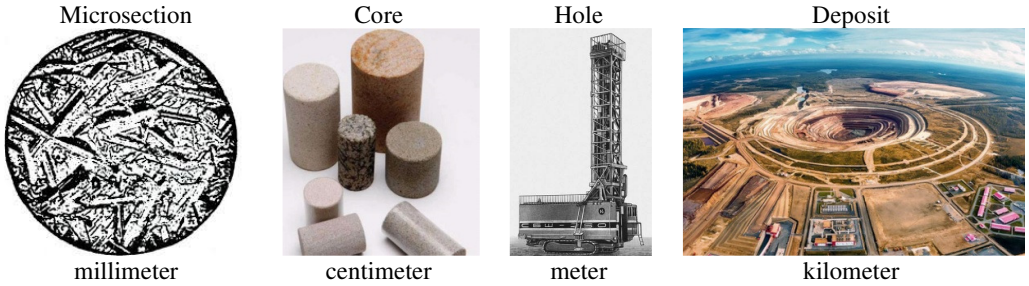

Fig. 1: Units of measure for the elements of the formation of the model of the deposit

The fourth way to improve the adequacy and accuracy of the field model are the methods of paleogeographic reconstruction of the deposit. However, the methodology of paleogeography as a geographical science is under development. There are no monographic studies in this scientific field. Separate articles in Russian-language literature devoted to theoretical and methodological issues in different years were published by M.F. Beklich, A.A. Velichko, K.K. Markov, A.A.Svitoch, Yu.G. Simonov, N.G. Sudakova and etc.

However, neither EurAsEC nor abroad found published generalizing theoretical works that would consider the methodology of paleogeography from a geographical position [9].

Currently, in digital systems to solve the problems of paleographic reconstruction using, as a rule, neural network methods or "closed" algorithms built on the basis of sequestration-stratigraphy and tectonic models

Naturally, the interpolation of exploration data, taking into account geophysical methods, reconstruction and refinement in the process of mining, can significantly improve the accuracy and adequacy of the model.

However, the construction of such a model of the field is associated with a number of problems of new problems. So the explosive development of information technologies forces the enterprises to constantly introduce more and more new methods and approaches to optimize production and enrichment. At the same time, given the diversity and heterogeneity of the tasks being solved by a modern industrial facility, the formation of optimization indicators has to be approached on the basis of a multi-criteria analysis with maximum consideration for the specifics of the production in question.

A characteristic feature of recent decades in the development of digital systems of mineral of the 21st century has been the emergence of new methods and data processing algorithms.

This gives rise to the constant emergence of new, previously unforeseen by the developers of the software data, parameters and values of the simulation objects. Naturally, this also generates a permanent change in the structures of the software databases.

The problems of constant modification of data structures can be reduced to the problems of presenting semi-structured data. Currently, data that is poorly structured is for which the exact structure is not known in advance or may change during use. Naturally, their analysis requires the use of both their own presentation models and processing algorithms, which is in bad agreement with the most common relational DBMS.

According to [10], there are four most significant systems of initial data representation: a tabular method, a method of representing data by multisets, a phase trajectory method, and a procedural representation.

Due to the fact that the implementation of the system still has to rely on the available DBMS, it was decided to partially structure the data and implement the data warehouse based on the tabular method.

For the formation of an adequate geological model, as a minimum, geodata is required, which were preliminarily recorded in essence:

- deposit;
- hole;
- core.

Thus, the structure of the data model for the exploration geological data for the field can be represented by the structure as in Figure 2.

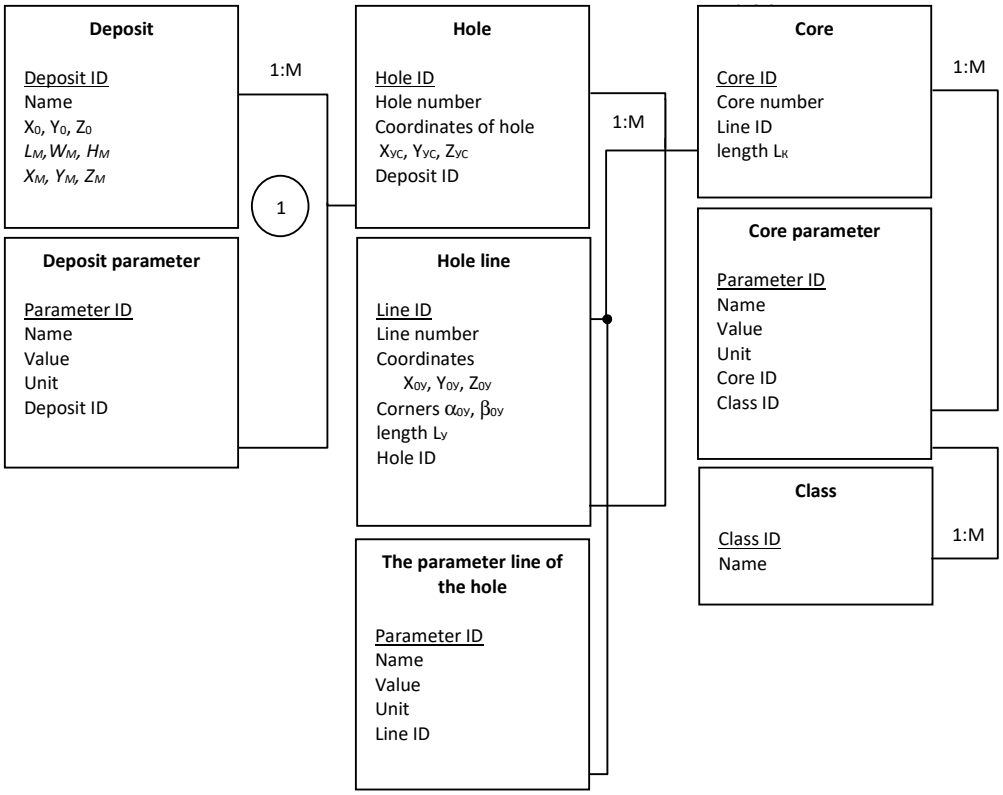

Fig.2: Fragment of the datalogical model based on the geological data of the deposit

For ease of presentation, the field model does not display domains by date/time of data modification/entry, data owner, and who entered them.

To be able to refine the model based on geophysical research methods or to substantiate the well grid, a structure for storing and analyzing the results of these studies is necessary. Research results are usually presented in the form of 2D or 3D maps (sections).

The problem is that currently using various methods of geophysical research: magnetic, gravitational, electrical, seismic, radioactive and geophysical research methods in holes. And each of these methods gives a different accuracy of the study. For example, seismic research methods and magnetic exploration work with clusters of a minimum size of ±5 meters [11], and radiometric can be produced in increments of up to 10-20 centimeters [12].

All geophysical methods of exploration are based on the fact that ore bodies and the surrounding rocks, having different physical properties, either create around themselves in space physical fields that differ from the environment, or react differently to different, artificially created physical phenomena. Accordingly, the analysis can be reduced to the allocation in the space of a deposit of clusters with the same properties and putting them in accordance with various minerals.

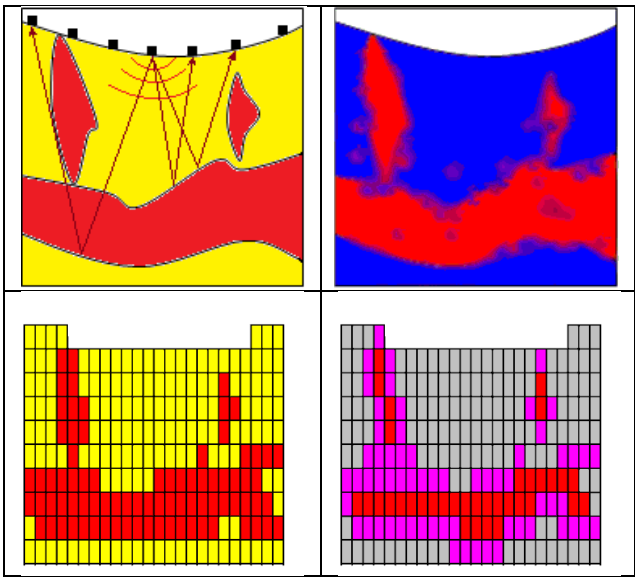

Fig.3: Representation of geophysical research methods (seismic and magnetic) and their digitization for geological model

Since for most studies the results are obtained in the form of analog values, an important criterion for the selection of clusters is the choice of the sampling step. Since algorithms for finding an optimal step is not detected, it is decided about the manual step.

For simplicity of presentation the structure of a decision on the presentation of the results in the form of parallelepipeds with dimensions specified by Xb, Yb, Zb.

Thus, a fragment of the datalogical model for the results of geophysical studies can be represented as a 3D model (Figure 4).

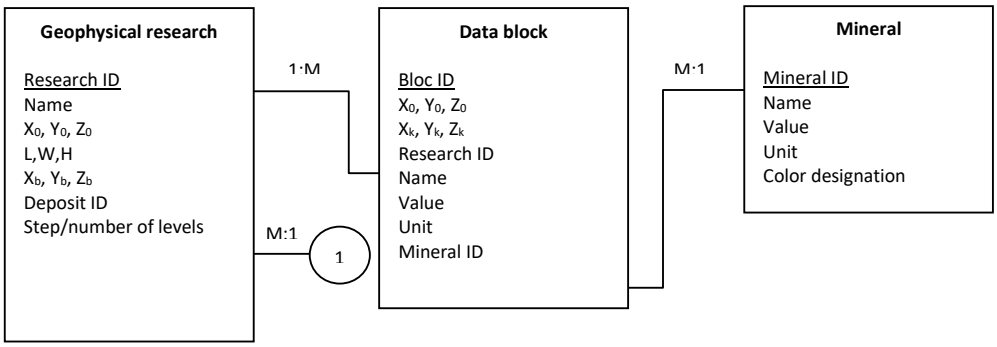

Fig.4: Fragment of the datalogical data model for geophysical research of the deposit

In the presented fragment of the datalogical model, for ease of presentation, the structure for storing research documents is not presented.

To implement the mechanisms of paleogeographic reconstruction, a data structure based on data from sequestrant stratigraphy and a tectonic deformation model of the field is required.

Taking into account the above requirements, it is still more rational to use a geological model built on the basis of a unified block model. To present the following restrictions to it:

– use a fixed and uniform for the whole model size and shape of the blocks;
– use the effect of subunits only when necessary for individual mining sites (through the use of additional models of sites);
– to lay the possibility of expanding the number of simulated parameters (strength, fracturing, the content of several useful components, their enrichment for a specific consumer, the content of several components of harmful impurities, etc.).

In this case, the model can be represented by a number of interrelated entities:

– model (the model name, the initial coordinates of the model, the final coordinates of the model, the dimension of the blocks of the model);
– design parameters of the model (the parameter name, the value, the unit of measurement);
– data block (the initial coordinates of the block, the final coordinates of the block);
– block parameter (the parameter name, the parameter value, the parameter class).

For the convenience of describing the components of the block, it is advisable to select a table with a description of the classes of the components of the block (mineral, harmful impurity, etc.).

Due to the fact that more than 90% of the DBMS are relational, the development of datalogical and physical models is currently still more efficient to perform in this form, although you can use nonrelation DBMS. The datalohic model can then be represented by a diagram as in Figure 5.

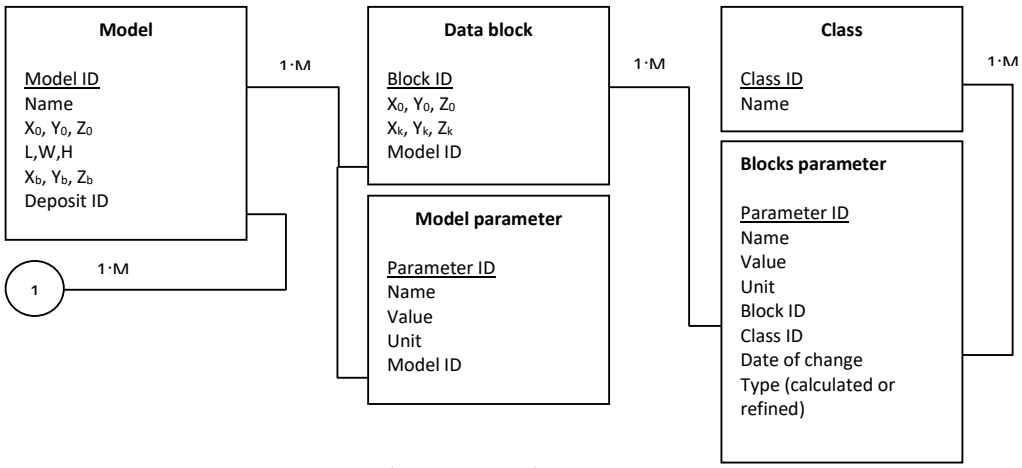

Fig.5: Datalogical model

In the framework of the project [13], for the implementation of a data warehouse, an analysis of freely distributed web-based DBMS was carried out. It was decided to reject the use of proprietary DBMS immediately for commercial reasons. The analysis of the compliance of the capabilities of the DBMS made it possible to identify and select the relational DBMS MySQL as one of the most common for web projects.

In connection with the preparation of security documents for the developed system, the full physical structure of the database implemented in the MySQL DBMS is not disclosed in this article.

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Corporate Social Responsibility in COVID-19 Times – From Work-Life Balance to Work-Life Blend

Simona CINCALOVA

College of Polytechnics Jihlava, Jihlava, Czech Republic
simona.cincalova@vspj.cz

Abstract

Corporate social responsibility is an important factor in how it is accepted by the environment. It influences customers' purchasing decisions and can be taken into account by job seekers. CSR activities have proven to be important and visible during the ongoing crisis. The COVID-19 pandemic has put the organization under the greatest pressure on the technology they have ever encountered. Most companies and their employees have adapted to the changes in the working regime they introduced during the pandemic. The goal of the article is to analyze how to move from Work-Life Balance to Work-Life Blend. It provides a few steps for the smooth progress of work-life blending in each company.

Keywords: Corporate social responsibility, COVID, employees, work-life blend

Introduction

The past decades have seen a growing pressure from various stakeholder groups on corporate firms to consider social and environmental consequences of their operations within their decision making (Engida et al., 2020). There are many of them, companies that have realized that generating nice profits and sending people a paycheck. That they want to bring something good back to the companies where they do business and create. And that they want to do more than just once in a while, fill out a check and send money to charity. There is a simple term for this in English - CSR - Corporate Social Responsibility. Profitability is a famous topic for studies of a lot of authors (e.g. Fiala et al., 2020; Hedija et al., 2017), but has not been the only goal of companies for a long time

A company that subscribes to this concept behaves responsibly not only within its stores but also in the field of environment (Norberg, 2020; Scholz et al., 2020), community (Mahmut et al., 2020; Glonti et al., 2020), education (Haski-Leventhal, 2020); considers the social impacts of the operation of the company.

It's actually a simple idea: If I do business decently and take an interest in the people and the environment around me, I will also gain a competitive advantage. Because what companies build with this approach is a good reputation. And customer confidence. A customer or client who trusts a given brand is a loyal client who likes to return.

Corporate Social Responsibility and COVID-19

The COVID-19 pandemic has put the organization under the greatest pressure on the technology they have ever encountered (Talbot and Ordonez-Ponce, 2020; Galetska, 2020). The outbreak of the pandemic forced organizations to be perhaps the most important social experiment in the future of work, and social distancing fundamentally changed the way we collaborate and interact. Hongwei and Lloyd (2020) argue that Covid-19 pandemic offers a great opportunity for businesses to shift towards more genuine and authentic CSR and contribute to addressing urgent global social and environmental challenges. However, it changes not only where the employees do the work, but also how and what we do.

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Many employees perform tasks they could not even imagine before. Examples are textile and clothing companies, which have shifted from day to day to manufactures of protective equipment. Food companies, in turn, produce disinfectants, and IT companies, for example, are developing platforms to allow small traders to sell online while their brick-and-mortar store is closed. (Butler, 2020)

According to Aguinis et al. (2020), CSR policies in response to COVID-19 are created by organizations but are implemented by individual employees. The goal of the article is to analyze how to move from Work-Life Balance to Work-Life Blend. It provides a few steps for the smooth progress of work-life blending in each company.

The current situation is actually a great opportunity to start reorganizing jobs in the organization and let employees take on various responsibilities to better respond to the evolving needs of companies and customers. It's a great opportunity for agile transformation, about which so much has been written. How to prepare for it?

For most full-time employees who are used to commuting to the office, the transition to working from home can be challenging. People communicate more often across a variety of digital communication tools and expect immediate responses. Many of them experience cognitive overload. He gets lost in the organization.

How to Work-Life Blend

With a changing demography and social structure, the work-life balance is according to Bhattacharya et al. (2020) a major concern felt by employees of most organizations. Work-Life Balance is a term for the relationship between the type of working day and housework or family care (balance between paid and unpaid work). Alonso-Dominguez et al. (2020) came to conclusion, that their data indicate that the type of working day affects the balance between paid and unpaid work less than might be expected, since in all cases, it is women who do more unpaid work, while men’s involvement in housework changes little, whether they have a continuous or a split working day.

At present, it seems that Work-Life Balance, when it comes to finding a balance between work and private life, its structure and content, is no longer working (Bhende et al., 2020). We live in a time when it is not possible to separate all our aspects of life well enough. Or even if it were possible, for many people the traditional model with the division of time into working and free time and necessary to ensure the physiological needs of life does not work.

Thanks to - for some because of - technology, our careers, personal and social lives are integrated and difficult to separate. Not only do we mix our personal lives between work responsibilities, but on the contrary, even during holidays or our evening "free time", technology brings us closer and brings us back to work. Moreover, the concept of seeking balance suggests to us that one side is negative. There is nothing negative about "having a job" or "having a personal life". (Alvarez-Perez et al., 2020; Rahman et al., 2020; Chaudhuri et al., 2020)

And that's why Work-Life Blend comes in handy instead of creating individual fixed time zones. Forget the work-life balance. Instead, try to achieve a natural blend of work, social and personal life without remorse. The truth is that to achieve satisfaction with the reality connecting the world of work and private, you will need to make some effort (St-Jean and Duhamel, 2020). It will be difficult, but it will be worth it.

According to available literature and studies of different authors (Mansour and Tremblay, 2018; Peters et al., 2020; Shaw, 2014), a few steps or tips could be determined for the smooth progress of work-life blending in each company (see Figure 1).

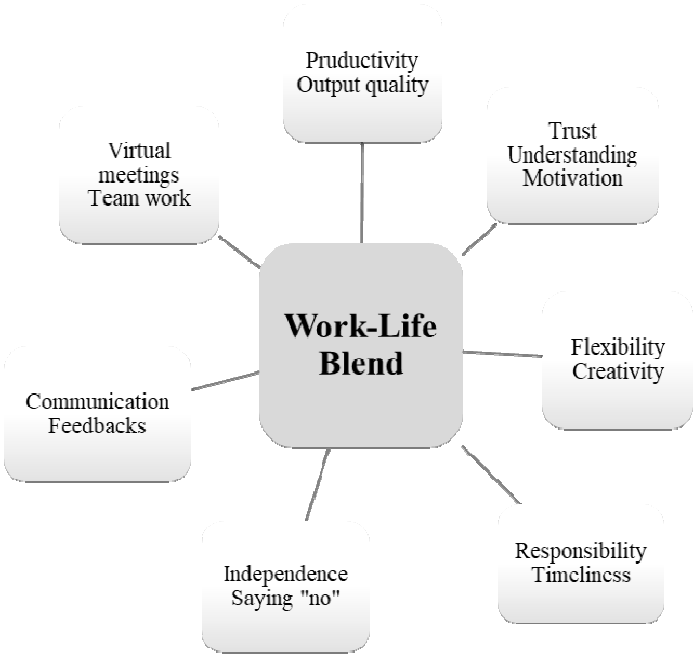

Fig. 1: Model for work-life blending. Source: own processing

Today, the deadlines are getting tighter and an individual's job is not only to match that deadline but also to give **quality output**. Due to this work pressure, it becomes exceedingly difficult to maintain a family life. It doesn't matter what work styles and habits you have, but what really matters is the quality of the output for the client.

Trust is essential on the part of the employer. Believe that the employee can set aside time to work. He has **independence** and **responsibility** in his hands and when he needs to, he will receive support and consultation. The employee wants to feel that what one is doing is one's own choice. If I can determine for myself what, when and how I will do it, I will be more motivated than if everything is prescribed to me in detail. This applies not only to employees. Too structured program, kills motivation and destroys **creativity**.

In many companies, driven by orders and prohibitions still prevails. However, for the satisfaction of employees, a functioning mutual **communication** between them and the management is necessary. In these turbulent times, open communication is a prerequisite for transparency. **Talk to people** and find out how people want to do the work activity and try to give them space to implement their ideas. Allow them to freely organize their time and the way they will perform the activity. Teams that organize themselves through “what works and what doesn't”, “what is more or less effective”, etc. feedback loops have the best performance. The boss can design the basic structure of the work and help people with implementation, monitor progress and give constructive feedback.

For many of us, this is unthinkable, and anything to **refuse** is simply not worn now. We are afraid that we will look arrogant in the eyes of others. But then we spend most of our free time doing work that is beyond our normal content. Of course, the occasional help is fine but provided that the person in question or someone on the team repays you. If it's just one-sided, then get paid for your time, or politely decline. But be prepared for strong reasons for rejection. Or suggest that you complete the task instead of another one you were supposed to work on at the time. You will show willingness, but at the same time, you will clearly define the rules.

In a pandemic situation where even cafes and bars are closed in many cities, working from home with limited **interpersonal interaction** (no community life) can evoke feelings of loneliness in some people, which can undermine productivity and engagement. However, it can be beneficial for each employee to participate in regular business phone calls or video calls with their colleagues or to use digital tools for easier collaboration. Examples of suitable measures include virtual coffee sessions, happy hours, book clubs, online gaming and other ways of virtual socializing. While these activities may not replace common rooms, kitchens, and community events in the workplace, they at least help maintain the spirit of the community until life returns to normal.

Conclusions

Modern technologies give us enormous opportunities, but at the same time deprive us of a balance between privacy and work. It's getting harder to keep her. Widespread use of work from home. A mixture of work and personal and family and social life. The phenomenon of recent months.

The coronavirus crisis has caused profound mental changes in thinking about how to continue working and organizing the work of its people. And not only from where to work but also how to (in) flexibly approach the reconciliation of work and personal life from the employee and the employer. The well-grasped Work-Life Blend model allows companies to survive periods of change and crisis. And it can be the answer and potential for the more challenging challenges of today's volatile world.

However, all steps must be individualized and adapted for a specific company. Flexible settings may not work for everyone. Needs change over time, depending on the things we are currently experiencing and solving (childcare, help for parents, health problems, internships abroad, etc.).

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The Process of The Household Financial Surplus with Incomplete Retirement and Fixed Consumption Needs

Pawel ROKITA
Department of Financial Investments and Risk Management
Faculty of Economics and Finance
Wroclaw University of Economics and Business
Wrocław, Poland
pawel.rokita@ue.wroc.pl

Krzysztof PIONTEK
Department of Financial Investments and Risk Management
Faculty of Economics and Finance
Wroclaw University of Economics and Business
Wrocław, Poland
krzysztof.piontek@ue.wroc.pl

Abstract

If consumption needs of a household are deterministic (except the stochastic factor of life-length) and a life-long financial plan allows for incomplete retirement, dynamics of a cumulated net cash flow (cumulated surplus) reflects a financial situation of the household in the best manner. The goal of the paper is to combine a two-person survival process with the expected discounted utility model, so that it suits Feldman, Pietrzyk and Rokita (2013) framework. This will constitute a theoretical basis for constructing an algorithm that will facilitate household financial plan optimization based on Monte Carlo method. The outcome of a financial plan is reflected by a set of term structures of cumulated surplus, corresponding to a set of scenarios. For a cumulated net cash flow model to be utilized as a tool for facilitating an optimization plan, it is required to capture and analyse the entire process, not just the expected trajectory. In a discrete version, all trajectories of the process may be generated. The article presents a proposal of their further use. This concept differs significantly from the traditional approach in which discounted utilities of consumption have been multiplied by the subsequent conditional probabilities of survival. That might function well for an individual for whom only two survival states (alive or not) are possible. In our proposal, each possible trajectory of the process is weighted with its unconditional probability. Such an approach seems to be much better tractable than any one with conditional probabilities applied to each moment on the timeline.

Keywords: household life-long financial planning, cumulated surplus, optimal financial plan, longevity risk, early-death risk

Introduction

Household life-long financial planning is already a well-established area of research, but there is still vast potential to implement improvements to the yet existing models. Having led critical discussions and presented conclusions on the state of the art, Feldman, Pietrzyk and Rokita (2013) proposed a sketch of a model that could help to overcome some deficiencies of the existing approaches. This article develops a component which lies fundaments for a model to be created by the authors. Such a model is a cumulated surplus process. The discussion is limited here to a discrete version which coincides in many respects with an operation mode of a personal finance planner. A two-person household is taken into consideration (single individuals are recognized as specific kinds of two-person households, with non-existent domestic partner). Any financial manifestation of other persons is treated as part of a financial situation in which two main

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members are considered (e.g. children, parents dependent due to an old age, etc.).

Classical models (Modigliani, Brumberg (1954), Yaari (1965)), as well as the majority of newer approaches stemmed from the former (e.g., Bodie at al. (2007), Bodie at al. (2012), Huang at al. (2011)), are more appropriately suited for individuals rather than households.

The process of survival lies the foundation for a two-person household financial plan. Consumption or a cumulated surplus process may be constructed on its basis. Therefore, as a consequence of facets raised by Feldman at al. (2013), a cumulated surplus process will be discussed.

The model

The proposal is composed of two main components: the two-person household survival process and a set of cumulated surplus trajectories derived from it. The cumulated surplus depends, among others, on an income, consumption and cumulated investment, and thus it is crucial to establish whether two or one household member is alive, who is alive (a member whose income is higher or lower) and, finally, if the moment of death was before or after the expected natural death time of a given person. In the further discussion it is assumed that the survival processes of the two persons are independent.

Survival Process

Let $Ai(t)$ denote random variable with value of 1 if person i is alive in period t and 0 otherwise. The composition of a household, namely – the information who is alive, will be further on denoted as $St(t)$. Formula 1 defines values of random variable $St(t)$:

$$St(t) = \begin{cases} State1 & if & A1(t) = 1, A2(t) = 1 \\ State2 & if & A1(t) = 1, A2(t) = 0 \\ State3 & if & A1(t) = 0, A2(t) = 1 \\ State4 & if & A1(t) = 0, A2(t) = 0 \end{cases} \tag{1}$$

The unconditional probability of $State\ i$ (given that at the moment t_0, when the financial plan is prepared, both household members are alive, i.e.: $St(t_0) = State1$) will be denoted as:

$$P(State(t) = State\ i) \equiv P(State\ i; t).$$

The unconditional probabilities of states are as shown in Formula 2:

$$\begin{aligned} P(State1; t) &= S(t; x_1) \cdot S(t; x_2) \\ P(State2; t) &= S(t; x_1) \cdot [1 - S(t; x_2)] \\ P(State3; t) &= [1 - S(t; x_1)] \cdot S(t; x_2) \\ P(State4; t) &= [1 - S(t; x_1)] \cdot [1 - S(t; x_2) \end{aligned} \tag{2}$$

where:

$S(t; x_i) = P(D_i \geq t; z_i(t_0) = x_i)$ – the unconditional survival probability,
$z_i(t)$ – the age of a person i at the moment t,

x_i – the age of a person i on the day of planning.

Survival probability $S(t; x_i)$ is estimated by applying a survival model (e.g., Gompertz (1928)).

Nine types of conditional probabilities are used. Let symbol $p.(t)$ denote the conditional probability of survival by Person 1, $.p(t)$ – the same for Person 2, $q.(t)$ – the conditional probability of not surviving to period t by Person 1, under the condition that this person was alive in period $t-1$, $.q(t)$ – the analogous conditional probability for Person 2. And, just for the sake of order: $\theta.(t)$ – the conditional probability of not surviving to period t by Person 1, under the condition that such a person was already dead in period $t-1$, which naturally equals 1. And finally: $.\theta(t)$ – like $.\theta(t)$, but for Person 2. Then, for example, the symbol $pp(t)$ denotes probability that Person 1 is alive at the moment t, under the condition that this person has survived to $t-1$, and, at the same time, Person 2 is alive at t, under the condition that this person was alive in $t-1$ (i.e., $pp(t) \equiv p.(t) \cdot .p(t)$).

If evolution of the survival process was described in the form of a scenario tree, its branches would be assigned to the conditional probabilities of the following types: $pp(t)$, $pq(t)$, $qp(t)$, $qq(t)$, $p\theta(t)$, $\theta p(t)$, $q\theta(t)$, $\theta q(t)$, $\theta\theta(t)$.

The construction of the the scenario tree is subordinated to the following simple rule: $State1$ may be preceded only by $State1$; $State2$ – by $State1$ or $State2$; $State3$ – by $State1$ or $State3$; $State4$ by any other states. And inversely: each $State1$ may generate in the next step either of these states: $State1$, $State2$, $State3$ or $State4$; each $State2$ may generate in the next step either $State2$ or $State4$; each $State3$ may generate in the next step either $State3$ or $State4$; each $State4$ may generate thereafter only next $Stete4$.

The phenomenon, however, becomes to some extend more complex because each particular trajectory of the survival process generates a different trajectory of the surplus. Since the surplus process is cumulative and yet path-dependent, it is far insufficient to recognize the conditional probability in a given period and possible evolution of the process in the future. Therefore, each trajectory should be treated individually throughout the entire analysis process (usu. the period when all conditional probabilities of survival diminish below some margin).

Even a component of the survival process tree (fig. 1) indicates how fast the number of trajectories grows with the period index.

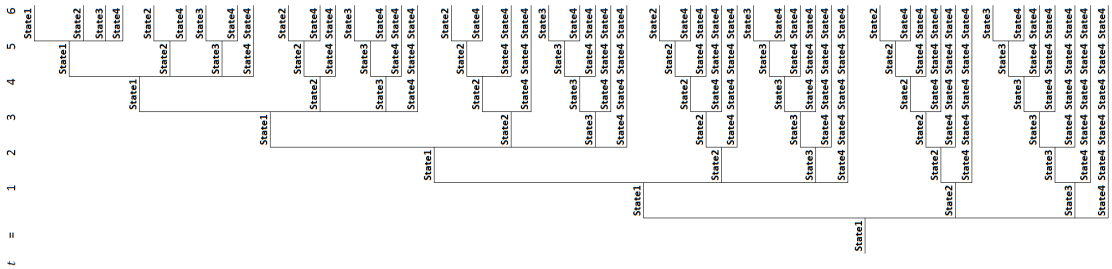

Fig. 1: Survival process tree – a developed version; shortened to the first 6 periods

It is now important to be able to construct a simple algorithm of generating all trajectories in an organized way and build trajectories of cumulated surplus on them. A good start for this is to determine the number of all trajectories, which is of course equivalent to the number of branch-ends in the tree. The rule in this respect is simple:

- each Stete1 may generate in the next step either of the states: Stete1, Stete2, Stete3 or Stete4;
- each Stete2 may generate in the next step either Stete2 or Stete4;
- each Stete3 may generate in the next step either Stete3 or Stete4;
- each Stete4 may generate in the next only next Stete4.

The conditional probabilities change periodically. The unconditional probability of a trajectory is just a product of the conditional probabilities along this trajectory.

Numbers of subsequent scenarios that may originate from a node with a given state value are provided in Table 1.

Table 1: Number of future scenarios from period t up to t_n

State in period t (parent node)	No. of new branches originating
$State1$	$(t_n - t)^2 + 2(t_n - t) + 1$
$State2$	$(t_n - t) + 1$
$State3$	$(t_n - t) + 1$
$State4$	1

The main conclusion from Table 1 is depicted as the total number of possible different scenarios. Assuming that at the moment $t_0 = 0$, both persons are alive ($St(0) = State1$), the number of all trajectories is:

$$N = (t_n - 0)^2 + 2(t_n - 0) + 1 = t_n^2 + 2t_n + 1 \tag{3}$$

Having identify the number of the survival process trajectories and the unconditional probability of each, it is possible to build the process of financial surplus.

Cumulated Surplus Trajectories

As the only stochastic element of the model so far is the survival process, being familiar with all its trajectories is sufficient to determine all trajectories of a cumulated surplus process.

A general concept of the model may be captured by examining its input and output.

1. Input:

- Age at t_0 $(x_1,\ x_2)$
- Retirement age ($zR_1 = z_1(R_1; x_1),\ zR_2 = z_2(R_2; x_2)$)
- Expected length of life at t_0 $(E(D|z_1(t_0; x_1)),\ E(D|z_2(t_0; x_2)))$
- Income from job at t_0 $(Ic_1,\ Ic_2)$
- Income growth rate ($g_{Ic_1},\ g_{Ic_2}$)
- Replacement rate ($\zeta_1,\ \zeta_1$)
- Constant common consumption at t_0 (FC)
- Individual consumption at t_0 $(VC_1,\ VC_2)$
- Consumption growth rates ($g_{FC},\ g_{VC_1},\ g_{VC_2}$)
- Proportion of investments (into private pension schemes) by Person 1 and Person 2 ($\upsilon_1,\ \upsilon_2 = 1 - \upsilon_1$),

- Return on investment (r_{Iv})
- Return on 'uninvested' surplus (r_{Spl})

2. Output:
(a) Direct:

- Trajectories of consumption process
- Trajectories of surplus process

(b) Indirect:

- Income process (stochastic, but not path-dependent)
- Consumption process (in pre-retirement period – stochastic but not path-dependent; in retirement period – stochastic and path-dependent; financed partially by private pension, thus – depending on cumulated investment – and partially by accumulated surplus)
- Cumulated investment process (stochastic and path-dependent – succession to pension capital of a spouse who dies before her/his retirement age)

Numerical Example

Household parameters: a 32 year old woman (Person 1) and 34 year old man (Person 2), with income at t_0 25 000 p.a. each. Income growth rate (real terms): 2% (both). Individual consumption of Person 1 at t_0: 10 000, individual consumption of Person 2 at t_0: 10 000, Common household consumption (not attributed to any particular person) at t_0: 20 000. Individual consumption growth rate (real): 2%. Common household consumption growth rate: 1.6%. Individual share in total investment (pension scheme contributions) in pre-retirement period: $\upsilon_1 = 60\%$ – Person 1, $\upsilon_2 = 40\%$ – Person 2. Retirement age: 67 for both. Expected further length of life at t_0: 50 years for Person 1 and 40 years for Person 2. Dispersion parameter (for Gompertz model): 10 years for both. Rate of return on investments: 4%. Rate of return on 'uninvested' surplus: 0% in real terms (i.e., makes up for inflation only).

To accelerate the calculations, the scenario generator employs 5-year periods. Analysis horizon (t_n): period no. 18 (corresponding to 90 years since t_0). The younger household member would be 122 year old then.

The surface plot in Fig. 2 shows how the shape of the cumulated surplus trajectory is influenced by realizations of a survival scenario. As it can be observed, for the set of parameters defined above, a financial stability of a household is more immune against the longevity risk than a premature death. For long-life scenarios (those with low indices) a cumulated net cash flow is increasing with relatively high slope and never falls below zero. Certainly, setting different retirement goal profile (υ_1, υ_2) would result in different set of cumulated surplus trajectories. What a financial planner is obliged to do in this respect is, however, not just to compare plots like the one depicted in Fig. 2, but rather to use an optimization model that takes all these trajectories together.

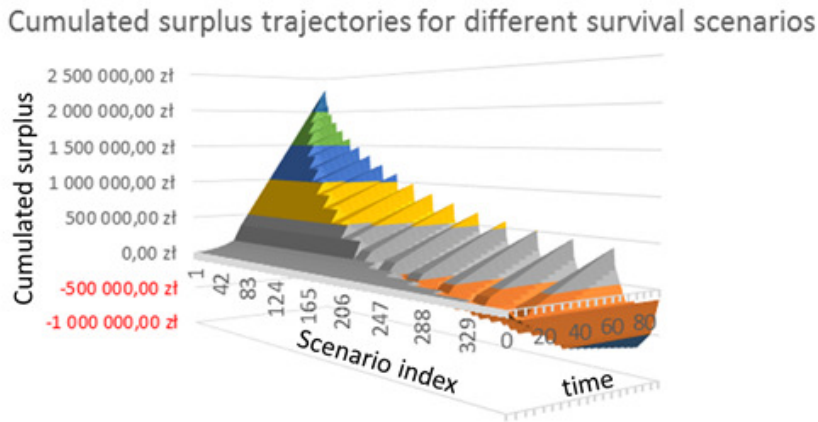

Fig. 2: Cumulated surplus built on survival scenarios

Remarks on further application

Having calculated trajectories of the cumulated surplus and the unconditional probability for each, one may calculate the expected discounted utility or, more generally, the expected discounted value function. Under the assumptions of the model, the decision variable lies in the proportion of means invested by a household in a private pension scheme, attributed to particular persons ($\upsilon_1,\ \upsilon_2 = 1 - \upsilon_1$). It provides a definition for a retirement profile (whether it is $2\times$ *full*, *full–partial* or $2\times$ *partial*, as stipulated by Feldman, Pietrzyk and Rokita (2013)).

The survival process is the same for each combination of financial parameters. Thus, it is sufficient to determine all possible survival scenarios only once and afterwards apply them in the engine to calculate consumption and cumulated surplus with different values of decision variables. This is applicable also in any extensions of the basic financial plan model, however complex, unless a financial situation is assumed to influence survival probabilities.

The value function to be used in a financial plan optimization procedure might adopt the following pattern:

$$V(\upsilon_1;\gamma,\delta,\zeta,\Xi,s) = \\ = \sum_{s=1}^{N} P(s)\cdot\sum_{t=0}^{t_n}\left[\frac{1}{(1+\rho_C)^t}\cdot V_C(C(t;\Xi,s);\gamma,\delta) + \frac{1}{(1+\rho_B)^t}\cdot V_B(B(t;\Xi,s);\zeta)\right] \\ \rightarrow \max \tag{4}$$

where:

$C(t;\Xi,s)$ – consumption (in monetary terms) at the moment t, for scenario s and set of household financial characteristics Ξ,

$B(t;\Xi,s)$ – bequest (cumulated investments and surplus of both household members) at the moment t, for scenario s and set of household financial characteristics Ξ,

γ – parameter describing longevity risk aversion,

δ – parameter describing premature death risk aversion,

ζ – bequest motive parameter,

$V_C(.)$ – value function of consumption,

$V_B(.)$ – value function of bequest,

$$V_C(C(t;\Xi,s);\gamma,\delta) = \begin{cases} u_C(C(t;\Xi,s);\gamma,\delta) & if \quad St(t;s) \neq State4 \\ 0 & if \quad St(t;s) = State4 \end{cases}$$

$$V_B(B(t;\Xi,s);\zeta) = \begin{cases} v_B(B(t;\Xi,s);\zeta) \\ \quad if\ \ (St(t;s) = State4\ \ \wedge\ \ St(t-1;s) \neq state4) \\ 0 \\ \quad if\ \ (St(t;s) \neq\ \ State4\ \ \vee St(t-1;s) = State4) \end{cases}$$

$u_C(.)$ – utility of consumption, $u_B(.)$ – utility of bequest,
$\rho_C,\ \rho_B$ – rates used for discounting consumption, and bequest,
$P(s)$ – unconditional probability of scenario s.

This concept differs significantly from the traditional approach in which discounted utilities of consumption have been multiplied by the subsequent conditional probabilities of survival. That might function well for an individual for whom only two survival states (alive or not) are possible. In our proposal, each possible trajectory of the process is weighted with its unconditional probability. As the survival process is binominal, such an approach seems to be much better tractable than any one with conditional probabilities applied to each moment on the timeline.

Summary

The proposal demonstrated in this article provides a more thorough view on how to apply the concept by Feldman, Pietrzyk and Rokita (2013). One of important questions left unanswered there was just how to combine two-person survival process with expected discounted utility of consumption and bequest. Now, it seems that this problem may be recognized as solved (at least for a discrete version).

The potential research in the future should extend the model so that it allows for any number of financial goals to be considered. It should also take into account multiple ways of financing such goals. One shall acknowledge not only investments with different levels of risk and expected returns but also post-financing with loans. The latter is certainly inapplicable for a retirement goal but still exercises great significance for housing or education goals. Including many goals and investment opportunities will impose the necessity to refer to the dynamic portfolio analysis. The literature on the portfolio management from an intertemporal-choice perspective is already well developed (ref., e.g., Samuelson (1969), Merton (1971), Bodie at al. (1992), Bodie at al. (2004)). Combining these findings with the two-person household life-cycle would be a natural generalization and a valuable contribution.

The further direction of the research study might be realized by applying more advanced survival models like the stochastic mortality force (Huang at al. (2012)), or by allowing for dependence between survival processes of individual household members to be considered. Moreover, even introducing dependence between the survival and a financial situation estimated with the pattern proposed by Scholz and Seshadri (2012) may contribute to the potential development of such research. It should be stated that the scholars treat health as an important parameter not only for the survival process underlying the model but also for its financial part.

Also attempting to develop a continuous generalization of the proposed model might be worthwhile. A continuous version of the model might be a starting point for a further research aimed at finding an analytical solution to the financial plan optimization task. In the form in which it is now, the model allows only for numerical optimization, with high utilisation of computing power.

Acknowledgement

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Towards Proergonomic Project Management- Initial Assumptions for The Application of Agent- Based Model in The Context of Project Success Factors

Wiktoria CZERNECKA

Poznan University of Technology, Faculty of Engineering Management,
Poznań, Poland
wiktoria.j.czernecka@doctorate.put.poznan.pl

Abstract

Projects are becoming an increasingly popular form of business activity in modern organizations. They allow for a structured approach to problem solving and thus increase the potential and competitiveness of the organization, as well as support the fulfillment of customers requirements. It is even intuitively assumed that the implementation of the project in the enterprise should be successful. With this in mind, criteria for project evaluation and methods of their analysis are sought. The same needs also occur in the case of projects with an ergonomic link, which, due to their specificity, can be assessed in many categories in relation to project management, but also implementation practice. This article presents a preliminary study of the applicability of agent-based modeling in assessing the success of a proergonomic project in the context of success factors identified on the basis of a literature review and expert recommendations. The process of selection of critical criteria for the project success was presented and the initial assumptions for the development of agents characteristics were indicated. Further directions of the model development and limitations of the conducted research were also listed.

Keywords: project management, ergonomic project success criteria, agent- based modeling, proergonomic approach in project management

Introduction

The activities of modern production companies are customer-oriented. This requires the flexibility of production processes to meet emerging or changing needs and requirements. This imposes on enterprises the need to create the possibility of a quick change of the production profile, which along with the development of the Industry 4.0 concept (processing large amounts of data, often with the use of artificial intelligence) contributes to the search for effective methods of managing production and other processes within the organization (Weyer, Schmitt, Ohmer and Gorecky, 2015, p. 580).

In order to meet new requirements, companies more and more often develop and implement projects. Thanks to the structuring of activities and the division of tasks into individual stages, such organizations deal more easily with the problem of flexible adaptation to customer requirements through, among others, identification and definition of procedures in the event of risk occurrence, integration of knowledge and skills of various company members, the possibility of a systemic look at identified problems, obtaining innovative solutions at various stages of projects. For this reason, such organizations are perceived on the industry market as more innovative and competitive (Gemünden, Lehner and Kock, 2018, p. 147-150).

With the growing importance of projects, criteria for their evaluation began to be searched. It is indicated that the basic parameters of project evaluation are the elements of the so-called "iron triangle" - time, cost and quality. If the project was completed within the assumed time, without

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exceeding the budget and the result meets the client's requirements, it can be considered a success (Atkinson, 1999, p. 338). It was quickly noticed that these are not the only factors qualifying the project as a success and other factors should also be taken into account, e.g. customer and end-user satisfaction, benefits for the organization, payback time, no violation of occupational health and safety rules. Along with the evaluation criteria, a proposal for their qualitative presentation was also introduced (Shenhar, Dvir and Levy, 1999, p. 7- 9; Jugadev, Perkins, Fortune, White and Walker, 2013, p. 544- 545; Alexandrova and Ivaniva- Stankova, 2013).

Similar criteria are also sought in the case of ergonomic projects (Pikaar, 2007, p. 8; Silva e Santos, 2012, p. 2647). This article presents the initial assumptions for the application of the agent-based model based on the success factors of a proergonomic project. It is a recognition of this issue, therefore the final part of the article presents the limitations of the research.

Project in Scientific Research

The term "project" began to be used in the 1950s and 1960s, thus defining initiatives of a unique nature. The Project Management Institute (an international non-profit organization operating since 1969, promoting good practice in project management) described it then as a temporary effort to create a product or service. Over the years, this definition has evolved and a project can now be defined as a highly complex, pre-planned activity that is unique and has a specific purpose. Its characteristic features are also: determination of the beginning and the end in relation to time, team performance of tasks, targeting a specific group of stakeholders, specific resources necessary to implement the project, going beyond the daily activities of the organization, specific organization of activities (Wysocki and McGary, 2005, p. 47).

Regardless of the type of project, it is subject to a specific life cycle, which covers the time from determining the feasibility of the project to its official completion. Due to the differences in the perception of projects in various industries, it is not possible to indicate one binding definition of the project life cycle, but the following stages are usually distinguished: conceptualization, planning, testing, implementation and closure (Labushagne and Brent, 2005, p. 161).

It is advisable to consider the project in a broader time perspective (apart from the period from start to completion), because, as Engwall (2003, p. 789) points out - "no project is an island", which means that the project is part of the implementation of the company's strategy, therefore its assumptions must at least to some extent be part of it.

Project management, on the other hand, is defined as a process of deliberate planning and control of project activities and appropriate allocation of resources using appropriate techniques and methods of project management (A Guide to Project Management Body of Knowledge, 2008, p. 5). There are the following phases of project management: planning, preparation, execution and completion.

A specific type of project is an ergonomic project, the aim of which is to improve working conditions in terms of optimizing various types of loads by proposing a new technical and organizational solution or by changing the awareness of employees working at a given workstation (Suszyński, Butlewski, Stempowska, 2019). Ergonomic project may involve part or all of the work system and is typically structured as follows: feasibility determination, problem definition, current state of work system analysis, functional system analysis, initial solution proposal, detailed design, implementation, real-life verification and project completion (Pikaar, 2007, p. 8). In this article, as a proergonomic projects, projects having the character of ergonomic analysis and projects with elements of ergonomics, supporting to some extent the improvement of ergonomics of workplaces are considered.

The interest of various organizations in focusing their activities on project management is a response to the changing customer requirements and the growing importance of teamwork in solving problems, which is signaled in scientific research in the field of management. However, it is noted

that in the case of many projects there are problems with defining the requirements for each of the implementation stages and thus classifying the project as a success or failure after its completion.

Project Success as the Main Goal of Project Management

Project success is defined as a complex, multi-dimensional, subjective evaluation of the project results. It takes into account the detailed and general assessments of the project participants. The project is considered successful if all involved stakeholders assess the quality of the solution (effectiveness) as well as meeting the time and cost targets (efficiency) as generally positive (Gemünden and Lechler, 1997). The success of project activities should be viewed from the perspective of: end user, project manager and project client (Dvir, Raz and Shenhar, 2003).

The project is a component of many aspects, and its perception has evolved over the years- initially the focus was on project evaluation by its stakeholders, then began to pay attention to the importance of risk as well as to the project management processes. Some researchers note that the success of the project is a reflection of the success of the project management process, and this is reflected in the positive perception of the project outcome (Fig. 1).

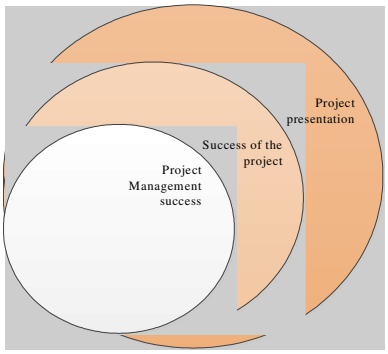

Fig. 1 : The three levels of project success

Source: Caccamese and Bragantini, 2013, p. 2.

Based on the analysis of the literature referring to the project success factors, it is possible to divide the project success factors into endogenous and exogenous. Examples of such factors are shown below (Fig. 2).

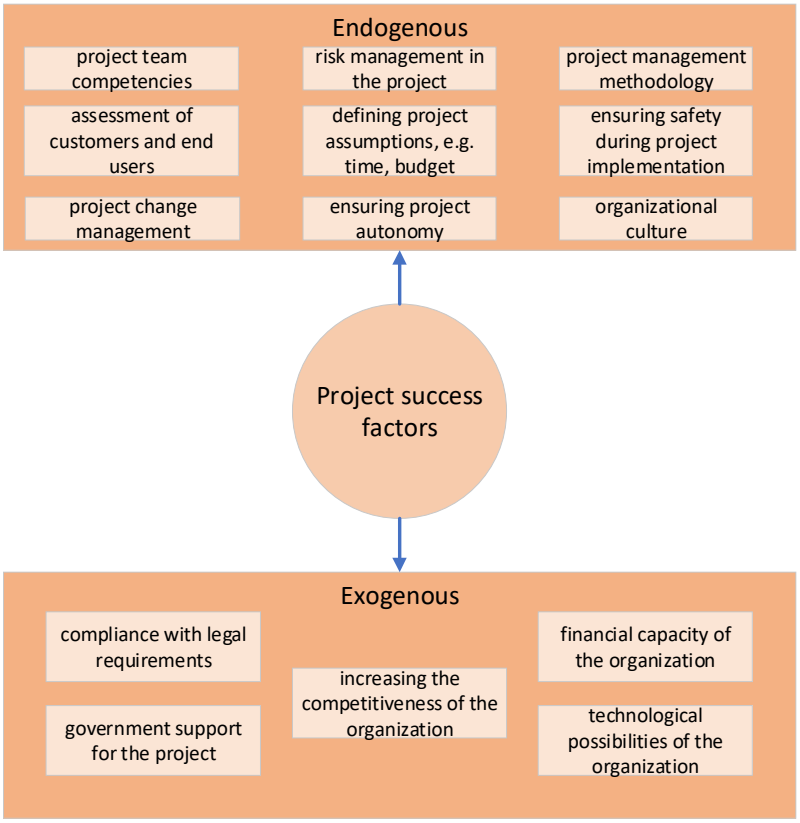

Fig. 2: Project success factors

Source: own preparation based on: Joslin and Müller, 2015, p. 1388; Gemünden, Sören and Krieger, 2014, p. 368- 370; Pace, 2019, p. 62; Hyväri, 2006, p. 36; Gabryelewicz, Krupa and Sadłowska–Wrzesińska, 2017, p. ; Williams, Ashill, Naumann and Jackson, 2015, p. 1845; Caccamese and Bragantini, 2013, p. 7; Gunduz and Ali Yahya, 2018, p. 69.

The endogenous factors of success include: factors related to the project itself, factors related to project management, factors related to project stakeholders and factors related to the internal structures of the organization. The exogenous factors of the project success include those related to the micro- and macro environment of the organization running the project.

Agent- Based Modeling Assumptions

The agent- based model is defined as a tool that allows for the analysis of the behavior of groups represented by so-called "agents" who are autonomous units, e.g. people, buildings, cars, landscape elements, features of a given thing, etc. (Bonabeau, 2002, p. 7281). There is a problem in the literature in presenting an unambiguous definition of agents, but most often it is indicated that they show the following features: autonomy, heterogeneity, goal and reactive orientation, interactivity and communicativeness, mobility, adaptability and learning (Crooks and Heppenstall, 2012, p. 87- 88). Agents are usually represented by computer program units and on the basis of data entered into the system, they can propose a decision aimed at achieving the assumed goal. Principles of agent-based modeling are presented below (Fig. 3).

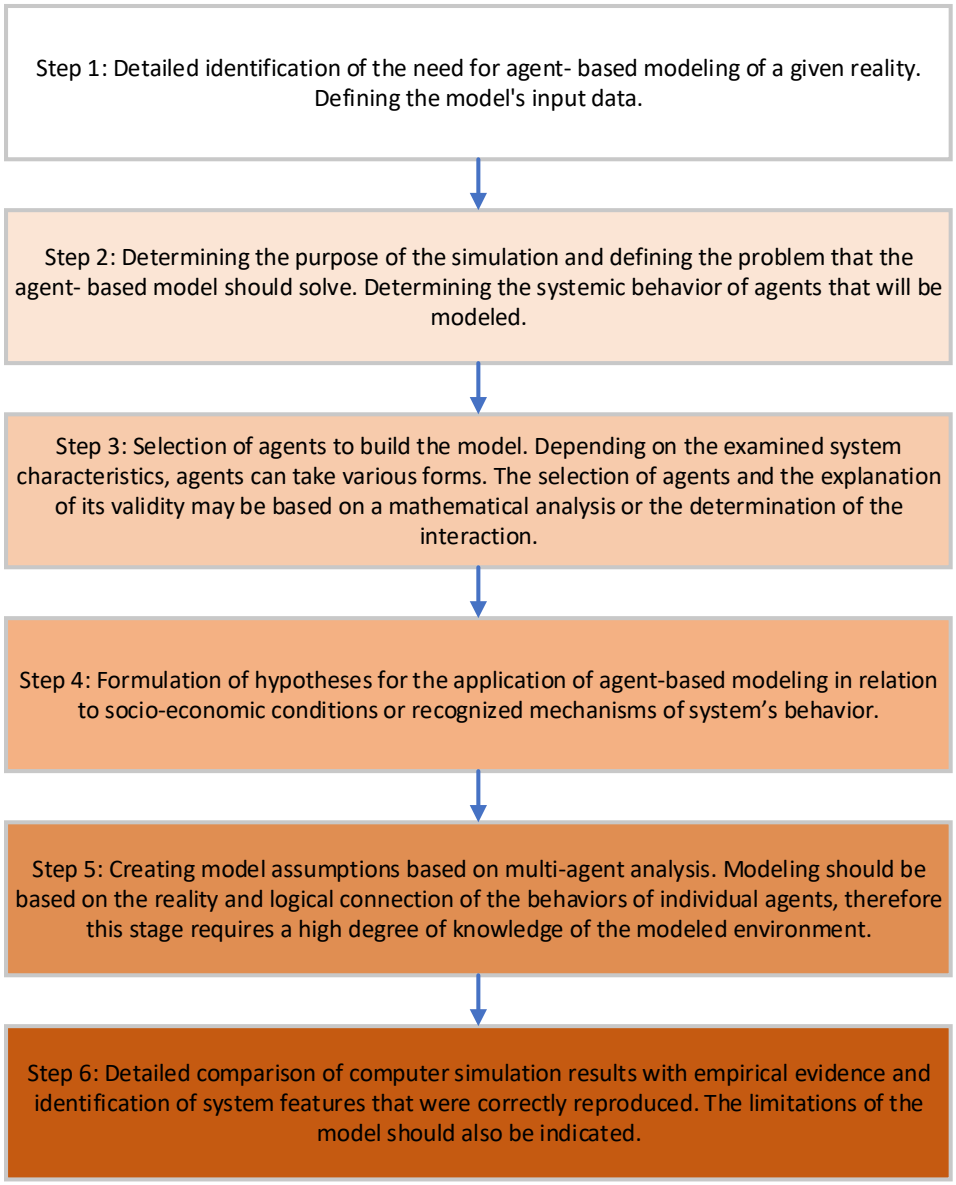

Fig. 3 : Agent- based modeling steps

Source: own preparation based on: Helbing and Belietti, 2011, p. 11- 12.

Agent-based modeling is supported by IT tools that provide the defined agents with appropriate descriptions and create the possibility of adaptive decision- making support. For this purpose, it is possible to use:

- Spreadsheets: e.g. Excel,
- Dedicated agent- based environments: e.g. Repast Simphony, StarLogo, NetLogo,
- General Mathematics Systems: e.g. MATLAB,
- Repast Large-Scale Agent Development Environments e.g. Swarm,
- General Programming Languages: C++, Java, Python (Macal and North, 2009, p. 94- 95).

Materials and Methods

The development of the initial assumptions for the use of the agent- based model in supporting the management of proergonomic projects (in order to complete them successfully) was carried out in the following stages:

1. Initial identification of the need to support project management on the basis of the identified success factors.
2. Identification of the project's success factors (endogenous and exogenous) on the basis of the analysis of the literature, experience in conducting ergonomic projects of the author of this article and factors indicated by 6 experts participating in the study (the experts were deliberately selected from the group of project managers or specialists dealing with ergonomics in production enterprises).
3. Assessment of the importance of the project success factors by 6 experts (Sossa, Halal and Zarta, 2019, p. 526- 530). Experts were selected based on the position held in the company (OHS Specialist, Ergonomics Specialist or Project Manager). Experts work in large production companies (over 700 employees) in the Greater Poland Voivodeship in Poland.
4. Selection of project success factors for building an agent- based model and indication of the required degree of their definition by experts on a scale from 1 to 5 (5- very high level of definition necessary, 4- high level of definition necessary, 3- medium level of definition, 2- basic definition, 1- no need to define).
5. Presentation of assumptions for building an agent- based model.
6. Identifying the limitations of research and further development directions.

Research results and assumptions of the agent- based model

The results of experts' assessments in both rounds of the expert study (taking into account the choice of factors for building the model and identification of the required degree of their definition) are presented below.

Table 1 : Identified success factors of the project and the results of the expert study (own preparation)

Success factor category		Project success factor	Indication by experts (%)	The required level of definition (d)
1	The Project Team	Ergonomic knowledge of the project manager	87	4,8
2		Project team qualifications	56	3,8
3		Involvement of the project team and their motivation	71	3,8
4		Project manager team management skills	77	4,4
5		Correct definition of customer requirements	74	4,8
6		Correctly identifing end user requirements	62	4,8
7		Commitment of top management	38	
8	Organization of the project	Reliable identification of the project goal and its measurability and reality	66	4,4
9		A realistic project implementation plan	71	4,2
10		Determining the exact project schedule	56	3,8
11		Establishing the project budget	37	

Success factor category		Project success factor	Indication by experts (%)	The required level of definition (d)
12		Identifying the characteristics of the project: type, size, complexity	56	3,8
13		Defining the milestones of the project and specifying how to monitor their achievement	70	4,2
14		Defining communication methods in the project	61	3,8
15		Ensuring the autonomy of the project in relation to the activities of the organization	48	
16	Project Management	Risk identification and response plan development	60	4,4
17		Monitoring the performance of tasks and assessing the degree of their implementation	53	4,2
18		Determining the future performance potential for the organization	44	
19		Appropriate selection of project management methodology	42	
20		Application of techniques and tools supporting project management	43	
21		Adaptive change management in the project	45	
22		Defining the satisfactory quality of the final project result	43	
23	Internal conditions of the organization	Implementation of the project based on sustainable development	27	
24		Ensuring safe conditions for the implementation of the project	37	
25		Providing ergonomic conditions for project implementation	35	
26		Organizational culture of the company leading the project	30	
27		The openness of the enterprise	53	4,2
28		The atmosphere in the company	40	
29	Factors outside the organization	Exchange of experiences with organizations that run a similar project or operate in a similar industry	43	
30		Application of modern trends in project management	18	
31		Correct identification of the legal conditions of the project	46	
32		The project will have a positive impact on the company's competitiveness	38	
33		The organization's financial capacity to carry out the project compared to other companies	40	

Success factor category		Project success factor	Indication by experts (%)	The required level of definition (d)
34		Technological advancement of the organization compared to other companies	37	

Project success factors, the importance of which were indicated by experts in 50 percent or more, were selected for the construction of the proposition of an agent-based system to support project management in the proeconomic context. It allowed to take into account 15 factors. It can be noticed that the factors that were rated highest by the experts belonged to the group of factors related to the project team and project organization, as well as project management. One factor (company openness) is a factor related to the internal conditions of the organization.

Based on the above results, the following elements (agents) of the agent-based model can be proposed:

1. Database Agent (DA) - an agent containing a database of project success factors. Each of them is described in detail and the ergonomic context that needs to be taken into account is indicated. The data that the agent has at its disposal comes from the analysis of the literature and the experience of specialists in the practical implementation of projects in enterprises. The agent is not interactive, but requires detailed preparation and description of each factor.
2. Project Data Agent (PDA) - an agent communicating with the user (project manager). It contains user data (login data, verification, basic information) and also allows the user to enter information about the current degree of definition of the project data for each success factor identified in the Database Agent section.
3. Processing Agent (PA) - an interactive agent that processes data entered by the user of the system and saves it in an appropriate format for later reporting to the Definition Gap Agent.
4. Definition Gap Agent (DGA) - an agent determining the differences between the current state of the analyzed project (p) indicated by the project manager and the data held by the Database Agent (d).
5. Possible Action Agent (PAA) - an interactive agent proposing, on the basis of the identified definition gap, possible actions that can be taken by project team members in order to better pre-identify individual project elements and thus increase the chances of success of the final project result.

The structure of the proposed model is shown below (Fig. 4).

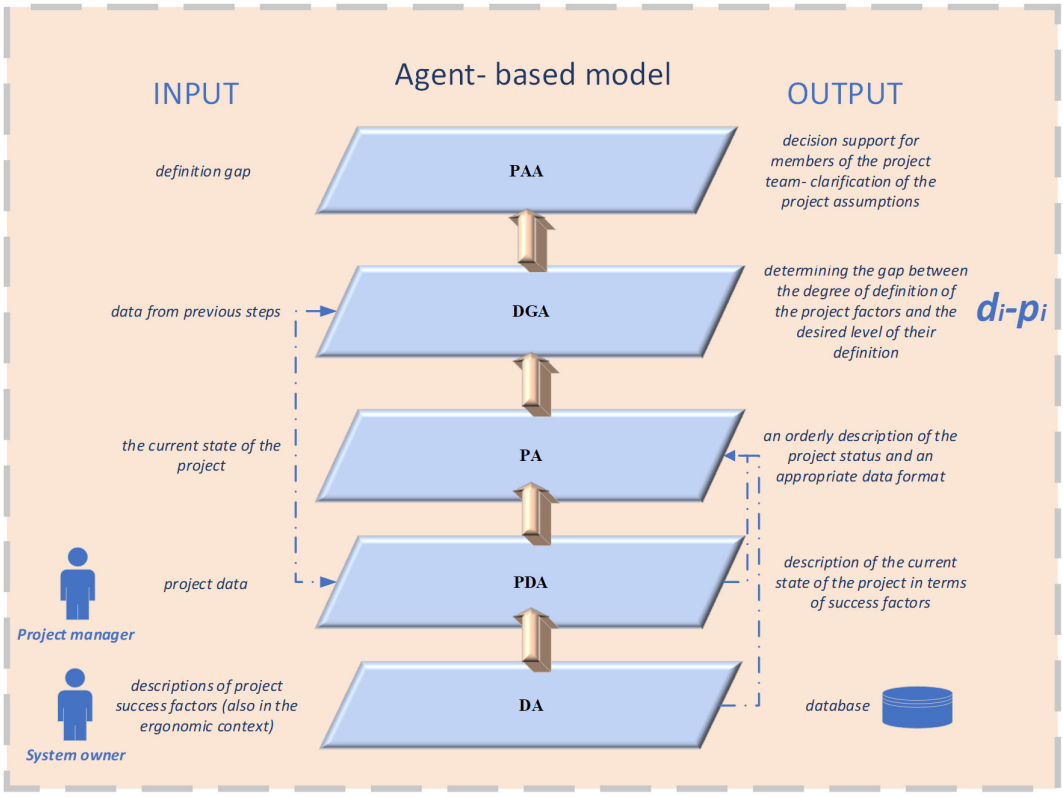

Fig. 4: Agent- based model in proergonomic project management
Source: own preparation.

The diagram above presents the basic assumptions of the agent- based model supporting pro-ergonomic project management. It should be noted that the assumptions of the model should be supported by an IT tool that enables data linking and obtaining appropriate outputs from the agents' activities. Correct preparation of data in the model requires the cooperation and involvement of the project manager and the model owner, whose task will be to supply the model (Database Agent) with input data.

Limitations

The above research was aimed at preliminary determination of the possibility of using agent-based modeling in supporting proergonomic project management. Therefore, the following limitations of this approach can be identified:

1. Failure to indicate an IT tool organizing the presented issue. This will be taken into account in the further development of the model.
2. Assessment of project success factors by only 6 experts- increasing the number of experts would provide more representative results.
3. Failure to define the input data of the Database Agent- the development of a set of precisely characterized project success factors will take place in the phase of building the final version of the model.
4. Failure to take into account the factors of project success related to the external environment of the organization in the model. The results of the experts' assessment did not allow for taking into account these factors, however, they may have a significant impact on the project, therefore they should be taken into account in the improved version of the model.

5. Due to the characteristic type of the considered projects, difficulties arise in comparing the results and the proposed model with the models presented by various researchers who take up the subject of agent-based modeling.

Conclusions

The conducted preliminary research indicates that it is possible to use agent- based modeling in supporting proergonomic project management and it is justified. The research proves that the project success factors may be the basis of the model, but at the same time the necessity to modify the conduct of the study is noted- the use of a different division of factors in the expert study and the involvement of a larger number of experts is considered. Other limitations identified in the study summary should also be considered in further development. By eliminating them, it will be possible to obtain a model correctly theoretically defined and possible to be implemented in practice, e.g. in production companies carrying out various types of projects. The model will be further developed. The assumptions of agents' activities will be expanded and an IT tool will be proposed that will ensure the application possibilities of the model. For full practical implementation, validation of the tool in real- life conditions will also be necessary.

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Ergonomic Evaluation with The Use of Grey System Theory

Wiktoria CZERNECKA
Poznan University of Technology, Faculty of Engineering Management, Poznań, Poland
wiktoria.j.czernecka@doctorate.put.poznan.pl

Dorota WALCZAK
Poznan University of Technology, Faculty of Engineering Management, Poznań, Poland
walczak.dorota.elzbieta@gmail.com

Marcin BUTLEWSKI
Poznan University of Technology, Faculty of Engineering Management, Poznań, Poland
marcin.butlewski@put.poznan.pl

Rafał MIERZWIAK
Poznan University of Technology, Faculty of Engineering Management, Poznań, Poland
Nanjing University of Aeronautics and Astronautics, College of Management and Economics, Nanjing, P.R. China
rafal.mierzwiak@put.poznan.pl

Marcin NOWAK
Poznan University of Technology, Faculty of Engineering Management, Poznań, Poland
marcin.nowak@put.poznan.pl

Abstract

The article proposes a new method of assessing the ergonomics of workplaces using the theory of grey systems. The developed method allows the calculation of partial quantitative indicators of classification employee's position during work using grey number arithmetic and a standardized normal distribution cumulative. The selection of assessment criteria in the method includes the criteria contained in standardized guidelines. The presented method uses the data obtained from the chronological observation of work activities. The developed method allows for a assessment of the ergonomics of workplaces in terms of the risk of developing musculoskeletal disorders. For assessment, standardized ergonomics criteria for workstations were used based on PN-EN 1005-4 + A1: 2009 and ISO 11226:2000 standards. Assessment scales using grey numbers and a general algorithm for determining ergonomics indicators were developed. The finally developed method was used on a practical example of a production workstation on the assembly line.

Keywords: Grey System Theory, Ergonomic Evaluation, Ergonomic Evaluation Indicators, Ergonomic Criteria

Introduction

Ergonomics is defined as the level of adaptation of workplaces to the physical and mental capabilities of human. Due to the modern organization of production systems, excessive repetition of forced and unnatural movements and static body positions during work have become one of the most important ergonomic problems. Repeatability and unnaturalness of movements put a strain on the worker, reduces his productivity and increases the risk of musculoskeletal disorders (WRMSDs) from a long-term perspective (Punnett and Wegman, 2004). This phenomenon was described by Bernardino Ramazinni, but it was the later development of ergonomic risk prediction methods that gave the opportunity to value the risk (Franco and Fusetti, 2004). By using such methods, it is possible to identify the impact of work organization on the development of musculoskeletal disorders in

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employees and to take actions to reduce ergonomic risk at various levels of the organization's functioning. The link between working conditions and real costs for enterprises is more and more often observed (Morse, Dillon, Warren, Levenstein and Warren, 1998). and ergonomic solutions are being implemented in various companies, e.g. with the use of Human-Centered Design (HCD). Such implementations are not always successful due to, among others, insufficient recognition of ergonomic problems and the lack of consideration of ergonomics at the initial stages of design- usually technical solutions are verified and validated after their implementation, in real industrial processes (Peruzzini, Carassai, and Pellicciari, 2016), This results in unnecessary costs that could be avoided by properly performed ergonomic analysis.

Ergonomic analysis results from the need to evaluate production situations and requires the introduction of indicators determining the ergonomic quality of workstations or tasks. Ergonomic assessment presents a major research challenge due to the complexity of the process of ergonomic risk assessment and the factors influencing it (Hales and Bernard, 1996), variability of which cannot be precisely predicted even with the use of relatively complex risk assessment methods This is due to the fact that in industrial conditions it is impossible to determine precisely the state of the assumed biomechanical criteria, especially the angular position of individual body segments. Therefore, there is a large uncertainty in the data collected in the assessment process. To solve this problem, it may be useful to use the theory of grey systems which is one of the approaches to uncertainty analysis. It is used in conditions of limited data availability in the analyzed system and determines the relationships between elements of this system.

Aggregated Ergonomic Assessment at Workstations

To assess the ergonomics of workplaces, normative guidelines are needed regarding the method of workplace evaluation, ergonomic design and evaluation of the results of ergonomic analyzes obtained. One of such standards is PN-EN 1005-4 + A1: 2009, which is used to assess designed machines and their components in terms of ergonomic risk associated with their subsequent operation by the worker or maintenance engineer. The standard specifies the rules for assessing the body posture and movements of the person operating the machine (Klembalska, 2011).

There are many methods to evaluate the different dimensions of human work. The assessed aspects of work can therefore be:

- the assumed (usually static) body postures at work assessed with the use of such methods as OWAS (Ovako Working Posture Analysis System) (Karhu, Kansi, Kuorinaka, 1977), REBA – Rapid Entire Body Assessment (Hignett and Mcatamney, 2000), RULA – Rapid Upper Limb Assessment (Mcatamney and Corlett, 1993),
- characteristics of manual works - Strain Index (Steinberg, 2005) or Key Indicator Method Manual Handling Operations (KIM MO) (Waters, Putz-Anderson and Garg et al., 1993), The Occupational Repetitive Actions Methods: OCRA Index - ISO 11228-3:2007,
- weight lifting - NIOSH Lifting Equation (Wickens, 2017),
- manual or forklift transport, for which the Snook and Ciriello tables (Snook and Ciriello, 1991) or the KIM method are used,
- energy expenditure assessed on a shift or momentary basis and the risk of fatigue as an important factor in fatigue management (Butlewski, Czernecka, Pojasek et. al., 2019),
- decision and operation processes, especially mental workload, which can be evaluated by NASA-TLX (Hart, Staveland, 1988) or Subjective Workload Assessment Technique (SWAT) (Reid, Nygren, 1988),
- subjective assessment of work strain for individual tasks - e.g. the Borg scale, where fatigue is assessed by selecting an appropriate statement describing the employee's perception. The evaluation scale in the Borg's approach relates to the employee's heart rate (Borg, 1982),
- aggregated methods of work evaluation taking into account a number of load factors, the result of which is a number interpreted as an ergonomic indicator of work severity - ERA or EAWS (Schaub, Mühlstedt, Illmann et. al., 2012),
- psychomotor load (Sadłowska- Wrzesińska, Gabryelewicz, Krupa, 2017).

Despite the existence of a significant number of methods, more are being sought that will allow a more accurate ergonomic assessment of workstations. Solutions that allow better prediction of the position of motor organs by modeling them, e.g. with the OpenSim program (Panariello, Grazioso, Caporaso et. al., 2019) as well as solutions leading to a better understanding of the reasons for the obtained differences in final ergonomic risk (Joshi and Deshpande, 2019) are sought after. The qualitative nature of the ergonomic risk factors, which is expressed in quantitative quazi indicators, causes the search for models of transition from the observed factors to the numerical value. An example of this can be the assessment of biomechanical loads using the QEC method or fuzzy logic techniques (Kose, Karabayir and Cevikcan, 2019; Akay, 2011; Akay and Kulak, 2007). In this article, it was decided to solve the problem of relatively quickly obtaining the cumulative value of ergonomic risk by using grey system theory and position classification methods according to ISO 11226 (PN-EN 1005-4+A1:2009) and the REBA method.

Grey System Theory and Grey Numbers

Over the last 30 years, Grey Systems Theory has found a number of applications (Bouzon, Govindan and Rodriguez, 2018; Sun, Zhang, Baleanu, 2018; Delcea, 2014). GST methods are used to solve a wide range of problems in technical, social and economic sciences (Liu, Lin, 2006). GST is particularly applicable to modeling systems with a high degree of uncertainty. This uncertainty is associated with incomplete information about the system, scarcity of information, or the risk of incorrect information (Liu, Yang and Forrest, 2016; Xie and Liu, 2010). This is due to the fact that when observing the functioning of systems, information about their boundaries, internal structure and their interaction with the environment is needed. However, to a large extent such information is incomplete and uncertain (Mierzwiak, Xie and Nowak, 2018). GST is suitable for analyzing this type of systems, with particular emphasis on testing problems on small samples and residual information. This theory analyzes partially information insecure systems by generating, extracting and detecting useful relationships from available information resources. Such actions enable previously impossible description and monitoring of operational behavior in systems. This allows GST to be widely used in business practice because, as a rule, social engineering systems are characterized by the fact that their quantitative description is characterized by a high level of uncertainty and a small amount of data possible to obtain (Mierzwiak, Xie and Dong, 2019).

One of the basic concepts of grey systems theory are grey numbers. They can be very useful in all assessment processes because they allow for easy modeling of approximate numerical evaluation of a given element or phenomenon. Approximations of this type are characteristic for evaluation of workstations' ergonomics.

The grey number $\otimes \in [a, b]$ is an unknown number d^* with the following known characteristics: $d^* \in Ra \leq d^* \leq b$. Basic arithmetical operations include addition, subtraction, multiplication, and division. These operations are performed on grey numbers in the way presented below.

The assumption is that there are the following two grey numbers: $\otimes_1 \in [a, b], a < b$ and $\otimes_2 \in [c, d], c < d$. The following basic operation rules for grey numbers apply (Sun, Zhang, Baleanu 2018; Delcea, 2014):

$$\otimes_1 + \otimes_2 \in [a + c, b + d] \tag{1}$$

$$\otimes_1 - \otimes_2 \in [a - d, b - c] \tag{2}$$

$$\frac{\otimes_1}{\otimes_2} \in \left[\min\left\{\frac{a}{c}, \frac{a}{d}, \frac{b}{c}, \frac{b}{d}\right\}, \max\left\{\frac{a}{c}, \frac{a}{d}, \frac{b}{c}, \frac{b}{d}\right\}\right] \tag{3}$$

$$\otimes_1 \cdot \otimes_2 \in [\min\{\mathrm{ac}, \mathrm{ad}, \mathrm{bc}, \mathrm{bd}\}, \max\{\mathrm{ac}, \mathrm{ad}, \mathrm{bc}, \mathrm{bd}\}] \tag{4}$$

$$-\otimes \in [-\mathrm{b}, -\mathrm{a}] \tag{5}$$

$$\otimes^{-1} \in [\frac{1}{\mathrm{b}}, \frac{1}{\mathrm{a}}] \tag{6}$$

An important operation that can be performed on grey numbers is whitening. This operation converts a grey number into the corresponding real number. Assuming that no additional information about the grey number $\otimes_1$ and $\otimes_2$ is available, the whitening operation proceeds according to formulas (7) and (8):

$$\otimes_1 \in [a, b] \Rightarrow \widetilde{\otimes}_1 = \frac{1}{2}(a + b) \tag{7}$$

$$\otimes_2 \in [c, d] \Rightarrow \widetilde{\otimes}_2 = \frac{1}{2}(c + d) \tag{8}$$

The above-described grey number whitening operation can be carried out with the use of special functions representing the experts' beliefs about a given phenomenon or object.

Materials and Methods

The methodology for evaluating workplace's ergonomics requires empirical data to be collected taking into account the guidelines included in ISO 1005 and ISO 11226 standards. Definition of the assessment criteria constitutes the starting point for the methodC_i (9):

$$C = \{c_1, c_2, \dots c_m\} \tag{9}$$

A detailed description of the criteria in accordance with the guidelines of ISO 1005 and ISO 11226 with an assessment scale using grey numbers is presented in Table 1.

Table 1: The fragment of the method for assessing criteria C_i adopted according to the criteria of the ISO 11226 standard (own preparation)

C_i	Name of the criterion/attribute	Visualisation of the attribute	Detailed description	Grey number value range
1	Twisted torso (left or right side)	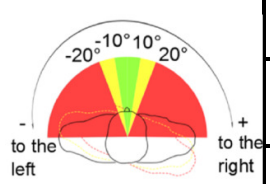	from 60° to 90° (left or right)	[0.0, 0.2]
			from 40° to 60° (left or right)	[0.2, 0.4]
			from 20° to 40° (left or right)	[0.4, 0.6]
			from 10° to 20° (left or right)	[0.6, 0.8]
			from 0° to 10° (left or right)	[0.8, 1.0]
…	…	…	…	…

Using Table 1 it was possible to determine an assessment matrix according to formula (11). The data for this matrix was obtained from chronological observation with a fixed time interval. As a

minimum, the duration of observation covered one full work cycle. The values of attributes in individual criteria are determined in the time coordinates *T*.

$$T = \{t_1, t_2, \dots t_n\} \tag{10}$$

$$[\otimes G_{ik}] = \begin{bmatrix} \otimes G_{11} & \cdots & \otimes G_{1n} \\ \vdots & \ddots & \vdots \\ \otimes G_{m1} & \cdots & \otimes G_{mn} \end{bmatrix} = G \tag{11}$$

where:

$\otimes G_{ik}$ – the attribute value in the *i*-th criterion *C* in the *k*-th interval *T* expressed in terms of a grey number;

i = 1,2,…, *m;*

k = 1,2,…, *n.*

For each attribute C_j it is possible to calculate the arithmetic mean and standard deviation according to formulas (12) and (13).

$$\otimes \mu_i = \frac{1}{n}\sum_{k=1}^{n} \otimes G_{ik} \tag{12}$$

$$\otimes \sigma_i = \sqrt{\frac{\sum_{k=1}^{n}(\otimes \mathrm{G}_{ik} - \mu_i)^2}{n-1}} \tag{13}$$

To facilitate calculations, parameters $\otimes \mu_j$ and $\otimes \sigma_j$ are whitened according to formulas (14) and (15).

$$\otimes \mu_i = \left[\underline{\mu}_i, \overline{\mu}_i\right] \Rightarrow \mu_i = \frac{1}{2}(\underline{\mu}_i + \overline{\mu}_i) \tag{14}$$

$$\otimes \sigma_i = \left[\underline{\sigma}_i, \overline{\sigma}_i\right] \Rightarrow \sigma_i = \frac{1}{2}(\underline{\sigma}_i + \overline{\sigma}_i) \tag{15}$$

The next step in this method includes determining the partial evaluation indicators P_i^j, which determine the level of probability for the occurrence of each of the ranges of the five-point scale expressed in grey numbers $\otimes_j$, i.e. [0.0; 0.2], [0.2; 0.4], [0.4; 0.6], [0.6; 0.8] and [0.8; 1.0]. For the calculation of partial evaluation indicators, it is assumed that the value $\otimes G_{ik}$ is a random variable in the normal distribution (μ_i, σ_i). With this assumption and using the cumulative distribution function of a standardized normal distribution, five more indicator P_i^j can be determined in line with formula (16) to (20).

$$P_i^1 = P([0.0, 0.2]) = P\left(z_{\frac{0-\mu_i}{\sigma_i}} < Z < z_{\frac{0.2-\mu_i}{\sigma_i}}\right) \tag{16}$$

$$P_i^2 = P([0.2, 0.4]) = P\left(z_{\frac{0.2-\mu_i}{\sigma_i}} < Z < z_{\frac{0.4-\mu_i}{\sigma_i}}\right) \tag{17}$$

$$P_i^3 = P([0.4, 0.6]) = P\left(z_{\frac{0.4-\mu_i}{\sigma_i}} < Z < z_{\frac{0.6-\mu_i}{\sigma_i}}\right) \tag{18}$$

$$P_i^4 = P([0.6, 0.8]) = P\left(z_{\frac{0.6-\mu_i}{\sigma_i}} < Z < z_{\frac{0.8-\mu_i}{\sigma_i}}\right) \tag{19}$$

$$P_i^5 = P([0.8, 1.0]) = P\left(z_{\frac{0.8-\mu_i}{\sigma_i}} < Z < z_{\frac{1.0-\mu_i}{\sigma_i}}\right) \tag{20}$$

With the indicator P_i^j it is possible to determine the weighted average assessment coefficient P_i for each attribute C_i using formula (21).

$$P_i = \frac{a_1 P_i^1 + a_2 P_i^2 + a_3 P_i^3 + a_4 P_i^4 + a_5 P_i^5}{P_i^1 + P_i^2 + P_i^3 + P_i^4 + P_i^5} \tag{21}$$

The coefficients a_i are whitened values of relevant items of the scale $\bigotimes_j$ and their values are: $a_1 = 0.1$, $a_2 = 0.3$, $a_3 = 0.5$, $a_4 = 0.7$, $a_1 = 0.9$.

The result of these activities and their main objective is to enable the determination of an overall synthetic indicator for ergonomics assessment in accordance with the formula below (22):

$$P = \frac{m}{\sum_{i=1}^{m} \frac{1}{P_i}} \tag{22}$$

The indicator $P \in \langle 0,1 \rangle$ is thus a standardized indicator in the range from 0 to 1. The higher the indicator value and the closer it is to 1, the better the ergonomics is assessed. When analyzing the mathematical form of the indicator P, it can be noted that the poorer the evaluation of a given partial indicator P_i, the stronger its impact on the final result.

$\otimes\, \mu_i = \left[\underline{\mu}_i, \overline{\mu}_i\right] \Rightarrow \mu_i = \frac{1}{2}(0.68 + 0.88) = 0.78$

$\otimes\, \sigma_i = \left[\underline{\sigma}_i, \overline{\sigma}_i\right] \Rightarrow \sigma_i = \frac{1}{2}(0.22 + 0.22) = 0.22$

Table 2a: Calculation results for grey mean value and grey standard deviation for criteria 1-6 (own preparation)

C_i	1		2		3		4		5		6	
$\otimes\, \mu_i = \left[\underline{\mu}_i, \overline{\mu}_i\right]$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$
	0.6764	0.8764	0.6800	0.8800	0.7055	0.9055	0.7164	0.9164	0.6000	0.8000	0.6182	0.8182
$\otimes\, \sigma_i = \left[\underline{\sigma}_i, \overline{\sigma}_i\right]$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$
	0.2160	0.2160	0.1789	0.1789	0.2068	0.2068	0.1424	0.1424	0.2722	0.2722	0.2412	0.2412

μ_i	0.7764	0.7800	0.8055	0.8164	0.7000	0.7182
σ_i	0.2160	0.1789	0.2068	0.1424	0.2722	0.2412

Table 2b: Calculation results for grey mean value and grey standard deviation for criteria 7-12 (own preparation)

C_i	7		8		9		10		11		12	
$\otimes \mu_i = [\underline{\mu}_i, \overline{\mu}_i]$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$	$\underline{\mu}_i$	$\overline{\mu}_i$
	0.4945	0.6945	0.5891	0.7891	0.4509	0.6509	0.5964	0.7964	0.7018	0.9018	0.7709	0.9709
$\otimes \sigma_i = [\underline{\sigma}_i, \overline{\sigma}_i]$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$	$\underline{\sigma}_i$	$\overline{\sigma}_i$
	0.2978	0.2978	0.2477	0.2477	0.3293	0.3293	0.2419	0.2419	0.1920	0.1920	0.1511	0.1511
μ_i	0.5945		0.6891		0.5509		0.6964		0.8018		0.8709	
σ_i	0.2978		0.2477		0.3293		0.2419		0.1920		0.1511	

$$P_1^1 = P([0.0, 0.2]) = P\left(z_{\frac{0-0.7764}{0.2160}} < Z < z_{\frac{0.2-0.7764}{0.2160}}\right) =$$

$$P(z_{-3.594} < Z < z_{-2.668}) = 0.4991 - 0.4961 = 0.003$$

$$P_1^2 = P([0.2, 0.4]) = P\left(z_{\frac{0.2-0.7764}{0.2160}} < Z < z_{\frac{0.4-0.7764}{0.2160}}\right)$$

$$= P(z_{-2.668} < Z < z_{-1.742}) = 0.496 - 0.4591 = 0.037$$

$$P_1^3 = P([0.4, 0.6]) = P\left(z_{\frac{0.4-0.7764}{0.2160}} < Z < z_{\frac{0.6-0.7764}{0.2160}}\right)$$
$$= P(z_{-1.742} < Z < z_{-0.817}) = 0.4591 - 0.291 = 0.1681$$

$$P_1^4 = P([0.6, 0.8]) = P\left(z_{\frac{0.6-0.7764}{0.2160}} < Z < z_{\frac{0.8-0.7764}{0.2160}}\right)$$
$$= P(z_{-0.817} < Z < z_{0.109}) = 0.291 + 0.0398 = 0.3308$$

$$P_1^5 = P([0.8, 1.0]) = P\left(z_{\frac{0.8-0.7764}{0.2160}} < Z < z_{\frac{1-0.7764}{0.2160}}\right)$$
$$= P(z_{0.109} < Z < z_{1.035}) = 0.3485 - 0.0398 = 0.3087$$

With partial indicators P_i^j, it is possible to determine the value of the indicator P_i for each criterion C_i according to the formula (21). The calculations depicting the process for the first criterion are given below:

$$P_1 = \frac{(0.1 \cdot 0.003) + (0.3 \cdot 0.037) + (0.5 \cdot 0.1681) + (0.7 \cdot 0.3308) + (0.9 \cdot 0.3087)}{0.003 + 0.037 + 0.1681 + 0.3308 + 0.3087} = 0.7136$$

The cumulative calculation results for the indicators P_i^j and P_i for all the assessment criteria are given in Table 3.

Table 3: Calculations results for indicator P_i and indicator P_i^j (own preparation)

C_i	P_i^1	P_i^2	P_i^3	P_i^4	P_i^5	P_i
1	0.0030	0.0370	0.1681	0.3308	0.3087	0.7136
2	0.0004	0.0164	0.1417	0.3851	0.3450	0.7381
3	0.0006	0.0164	0.1417	0.3851	0.3450	0.7380
4	0.0000	0.0018	0.0637	0.3907	0.4435	0.7836
5	0.0285	0.1021	0.2237	0.2812	0.2237	0.6326
6	0.0143	0.0789	0.2205	0.3137	0.2477	0.6603
7	0.0701	0.1644	0.2462	0.2177	0.1614	0.5549
8	0.0217	0.0986	0.2402	0.3068	0.2244	0.6376
9	0.0971	0.1818	0.2293	0.2177	0.1397	0.5280
10	0.0181	0.0910	0.2371	0.3145	0.2316	0.6458
11	0.0007	0.0174	0.1286	0.3531	0.3485	0.7431
12	0.0000	0.0009	0.0358	0.2861	0.4795	0.8102

The averaged ergonomics indicator P_i allows for a quick analysis of the ergonomics for the individual assessment criteria and the calculation of the overall ergonomics indicator using the formula (21). For the analyzed workstation, indicator calculations are shown below:

$$P = \frac{12}{\frac{1}{0.7136}+\frac{1}{0.7381}+\frac{1}{0.7380}+\frac{1}{0.7836}+\frac{1}{0.6326}+\frac{1}{0.6603}+\frac{1}{0.5549}+\frac{1}{0.6376}+\frac{1}{0.5280}+\frac{1}{0.6458}+\frac{1}{0.7431}+\frac{1}{0.8102}}$$

$$= 0.6731$$

The value of the indicator is between 0 and 1. The higher the indicator value and the closer it is to 1, the better the ergonomics is assessed. Partial indicators for each attribute should be interpreted similarly. The following criteria allow for a substantive and evaluative interpretation of these synthetic indicators P and partial indicators P_i (Kosacka, Golinska-Dawson and Mierzwiak, 2015; Więcek-Janka, Mierzwiak and Kijewska, 2015):

- a value above 0.7 informs of a good ergonomic quality of the workstation and thus no intervention in ergonomics is required,

- a value between 0.5 and 0.7 (inclusive) indicates an average ergonomic quality level of the workstation; interventions should be considered,
- a value between 0.3 and 0.5 (inclusive) is indicative of a low ergonomic quality level of the workstation; interventions in workstation are absolutely required,
- a value between 0 and 0.3 (inclusive) indicates extremely low level of ergonomic quality; it is necessary to stop work immediately.

Research Results

The set of partial indicators P_i allows for analytical interpretation according to individual criteria. With the use of analytical indicators, it is possible to set a priority for actions related to ergonomic interventions. The indicator P constitutes only a general and averaged representation of workstation's ergonomic quality and should be treated as an auxiliary value in the process of determining activities that must be taken.

Table 4 : Improvement proposals for the analyzed workstation taking into account the partial results obtained (own preparation)

C_i	Criterion name	P_i	The result of the analysis by the developed method	Description of improvements
Total indicator value $P = 0.6731$				
1	Twisted torso (left or right side)	0.7136	With this aspect, work does not require interventions	Inspection only is recommended
2	Torso extension/flexion	0.7381	With this aspect, work does not require interventions	Inspection only is recommended
3	Head - neck side bending	0.7380	With this aspect, work does not require interventions	Inspection only is recommended
…	…	…	…	…
6	Arm inward/outward rotation	0.6603	Work requires to consider interventions	Working in a line and the resulting positioning of the worker causes frequent stretching beyond the body axis. Spatial modification of the site should be considered.
7	Arm flexion/extension of shoulder joint	0.5549	Work requires to consider interventions	Work should be carried out in the so-called golden zone located at the elbow height.
8	Forearm supination/ pronantion	0.6376	Work requires to consider interventions	The gripping method should be taken into account, which allows to maintain a neutral position in the elbow joint

				(supination, pronation up to 45 degrees).
…	…	…	…	…

The significant limitations of the developed method include: the necessity of measuring constant time intervals and the limited number of ergonomic risk factors analyzed. The use of the REBA method as well as the ISO 11226 standard to develop the assessment model meant that the proposed approach did not take into account the repetition of movements and no other risk factors were included. In future studies, the assessment model could also take into account factors such as the microclimate at workstation or exposure to mechanical vibrations.

Conclusions

The aim of the research presented in this paper was to develop a quick method of assessing production workstations' ergonomics using the theory of grey systems. The developed method can be modified and improved by changing the evaluation scale to improve the accuracy of calculations. Due to the fact that the developed evaluation model is a quantitative model, it can be easily implemented in IT systems. The method allows for analytical and synthetic evaluation of the workstation.

An important direction for further research in the development of the proposed methodological solution is to compare the results obtained in the method with other assessment methods such as ERA, EAWS, QEC. Such a study would require collecting a large amount of data and developing methodological principles for comparing the results obtained from various assessment methods. This approach at the methodological level would therefore require the development of methodical triangulation procedures**.**

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Aspects Regarding Some Theories Preceding the Emergence of the New Public Management

Florina POPA

Institute of National Economy, Romanian Academy, Bucharest, Romania,
florinapopa289@gmail.com

Abstract

The forms of manifestation of public administration, present until the end of the last century, were based on the traditional model, an expression of the principles of bureaucracy formulated by theoreticians of the time. The study follows the forms of approach of public administration and the theories that they were based on, prior to the emergence and development of the New Public Management (classical and neoclassical public administration, respectively, the theory of public choice, the new public administration, public management). Briefly, some elements of the theories formulated are presented, as well as their representatives, which generated the initiation of reforms and changes in the administration. The conclusions of the study point out, among other things, the fact that the management formula applied in the administration is not unique, but differs by countries, depending on the existing public administration and the priorities required for its proper functioning.
The aim of the paper was to capture the main moments and forms of changes in the administration that evolved towards the paradigm shift and the emergence of the New Public Management.
The research methodology was based on the identification and study of some materials from the foreign and autochthon specialized literature, corresponding to the chosen topic, the processing of the selected ideas and the author's own interpretation.

Keywords: Public Administration, Classical, Neoclassical, Theories.

Introduction

The great changes that have taken place worldwide in the context of globalization, as well as the diversification of services, were significant for the practice of traditional public administration, which is facing challenges.

Beginning with the last decades of the last century, the traditional model of public administration whose basic principle is Max Weber's bureaucracy theory has undergone changes by moving to a flexible public management model (Katsamunska, 2012). This meant moving away from the doctrines of traditional good administration of the progressive stage, with an emphasis on hierarchies, to a modern managerial approach, called the New Public Management, signifying a paradigm shift (Falconer).

The framework of the paper pursues forms of public administration approach and the theories that were underlying them, predecessor to the emergence and definition of the New Public Management; some elements of the stated principles, as well as their representatives who have generated reforms launch and changes in the administration are briefly shown.

The research is considered to be important from the perspective of knowing the main moments and forms of changes in the administration that preceded the emergence of the New Public Management, as an element of modernization of public administration.

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Approaches to public administration prior to the New Public Management

Significantly for the emergence of the new current of thought was the change of the ideological perception concerning the state. As early as the eighth decade of the last century, the penetration of the neoclassical current and the transition to the new form of liberal government, which rejected the welfare state, led to the emergence of new reforms aimed towards reducing the public sector (whose superiority it denied), as well as the openness to market competition, at first, in developed countries [1]. (Świrska, 2014)

Regarding the origins of the New Public Management, Gernod Gruening (2001) shows that the opinions of theorists are different, for example:

- ✓ Some authors (Aucoin, 1990, pp. 115; Dunsire, 1995, pp. 21–29; Lueder, 1996, pp. 93; Naschold et. al., 1995, pp. 1–8; Reichard, 1996, pp. 245f; Schedler, 1995, p. 155) [2] argue that *public choice theory and managerialism* are at the origin of the New Public Management;
- ✓ Others (Aucoin, 1995, p. 3; Borins, 1994, p. 2; Kamensky, 1996, p. 250; OECD, 1995, pp. 8, 25; Osborne and Gaebler, 1993, p. 321; Reinermann, 1995, p.6) [3], considers that New Public Management represents *a paradigm shift*.

The author Marilena Ortansa I. Moraru (2012) shows that the New Public Management is based on *reforms regarding the role of government and public administration* in the delivery of public services, reforms that have taken place in Western Europe.

Currently, there is a general view that the New Public Management (NPM) is a *global paradigm* that emerges in response to the challenges produced by economic, institutional, political and ideological changes. The opinions that formed the basis of the NPM definition had as a common aspect "the implementation of management ideas from business and private sector into the public services" (Haynes, P., 2003) [4].

In essence, it can be considered that the New Public Management is based on a series of theories: classical public administration, neoclassical public administration, public choice theory, New Public Administration, political analysis, principal-agent theory, management theory and others (Gruening, 2001).

In the following, it is briefly presented the elements of some theories that preceded the emergence and development of the New Public Management.

Classical Public Administration

Against the background of some dysfunctions manifested in the public administration system (the distribution of posts, in the administration, on political criteria, the consequences being frequent changes of staff and an administrative system dominated by inefficiency and corruption) (Weber, 1956, p. 839; Van Riper, 1987; Stone and Stone, 1975; Schachter, 1989) [5], the progressive current emerged. The new movement pursued eliminating these shortcomings and stood out through initiating reforms that led to changes in the administration (Gruening, 2001, p. 3).

The *progressive* current (influenced by Frederick Taylor's scientific management practices) emphasizes efficiency, considered an important element in eliminating lack of training and qualification. To implement the objectives (efficiency, competence, elimination of corruption), practitioners of the progressive movement used performance indicators (Schachter, 1989) [6].

The science of public administration is established on the results obtained by the progressive reform. Practitioners of this science formulated *the organization theory* to which they added the concept of management, based on the following principles: division of labour and the specialization;

homogeneity, single command, hierarchy in the delegation of authority, responsibility, control of personnel (Gulick, 1937; Urwick, 1937; Mooney, 1937; Graicunas, 1937) [7].

References concerning the organization develop in the early twentieth century, along with the acceleration of industrialization and the emergence of large enterprises whereat capital (belonging to the owners) is dissociated from power (leaders). It is an empirical approach based on observation, belonging to industrialists and refers to *the rules of organization and rationalization of functioning* (Taylor, Foyol) [8].

The public managers within the organizational structures built on these principles came to certain functions: planning, organization, staff, guidance, coordination. (Gruening, 2001)

Among the representatives of the current are exemplified:

Frederick Taylor has as main element of the theory, "the standardization of work, the systematic control and the hierarchical organization"[9]. (Katsamunska, 2012, p. 77)

Henri Ford distinguished himself by standardizing the industrial production, introduced the working principles and the production chain, and implemented Taylor's scientific ideas with respect to the industrial administration of the organization (Bouri, 2016).

Herni Foyol introduced the modernization of management practices. He formulated the administration methods of an enterprise, establishing the principles underlying the administration and operation of the company: planning, organization of resource management, coordination, control (Bouri, 2016).

Max Weber supported a model of hierarchical administration of functions, competencies, control of the activity. Analyzing the interaction between the individual and the authority, he considered bureaucracy as an ideal way in the organizational field. Weber defined *three types of authority* within an organization (Bouri, 2016):

- *charismatic* refers to the natural qualities that an individual possesses, ensuring a potential for ascendancy in relation to others, such as, the situation of group leaders;
- *traditional* - authority is transmitted through tradition, as is the case of family businesses, through father-son succession;
- *rational or legal* [10] is in relation to the function; it occurs between management and the members of an organization; the latter perform the function established by the management authority.

The classical system of thought treated in correspondence with the economic and industrial structure of the era, also stood out by limits, such as (Bouri, 2016):

- it outlined the principles of an ideal, universal model of organization;
- neglecting the needs and interactions between individuals;
- neglecting the interactions between organization and environment.

Neoclassical Public Administration

After the Second World War, some criticisms of scientists, about the scientific nature of classical administration emerged, the orientation being towards *the neoclassical public administration*. In this sense, Herbert Simon (1976) [11] contributed by introducing new elements, such as:

- ✓ foundation of the public administration on scientific bases and on laws derived from the human behaviour;
- ✓ separating the facts from appreciations related to value.

Following these directions, scientific knowledge could lead to the observation and monitoring of the social environment.

Neoclassical public administration is based on elements of behavioural psychology, structural functionalism and systems theory and on the theoretical foundations of welfare economics and decision-making theory.

Although Simon's conception influenced many scientists in studies elaboration concerning the behaviour and decisions in administrative organizations, in the implementation of governmental reforms, the ideas of the progressive current and classical theory were taken into account. Also, it was aimed the organizations and jurisdictions simplification, strengthening and the unitary nature of the executive power.

Practitioners of neoclassical administration have improved the methods of analysis in measuring performance, audit, budgeting, streamlining jurisdictions and organizations and have sought to move to a more rational management style, different from the bureaucratic style (Gruening, 2001).

Not all specialists in the field have followed Herbert Simon's conception but the new scientific standards. There were scientists who refused to accept the separation of facts from values, considering that this will move away public administration from its foundations (political element and the public interest) (Waldo, 1965; Subramaniam, 1963) [12].

Thus, the classical approach was present both in the progressive structures of governmental practices and in the theory of public administration.

In the late 60s, of the last century, there were two schools of thought in the field of public administration, one *classical* and a *neoclassical* one, both based on the progressive orientation and objective knowledge (Gruening, 2001, p. 5).

Beside these approaches, new ones emerged.

The theory of public choice

It is based on the idea of the freedom of choice of individuals in their actions, in order to achieve their own objectives, in relation to their options. The term of *rationality*, in this theory, has a different meaning from that observed in Simon's conception, in the sense that in this theory, the rational behaviour is not related to an optimal level (from a theoretical point of view), but consists in the capacity of action of individuals in relation to the information they have, in order to achieve their goals (Tullock, 1965) [13]. In this sense, public choice theorists have tried to explain the social phenomena (Gruening, 2001).

Using this information, the scientists, follower of the theory of public choice, assessed the modern welfare state founded by progressive practitioners and those of public administration.

Public choice theorists have noticed some distinctions between the bureaucratic organizations and polycentric systems, as shown in the table below:

Table 1: Peculiarities distinguishing between bureaucratic organizations and polycentric systems

Bureaucratic organizations	Polycentric systems
- the traditional budgeting system can lead to inefficient use of resources (Niskanen, 1971) [14] or - an accumulation of tasks and resources, difficulties in performing certain tasks (Downs, 1966; Tullock,	- the existence of several decision-making centres; - decisions of individuals relate to the preferences and information they own (Hayek, 1960, 1969) [16];

1965) [15].	- the provision of services is separated from production; - there is competition in obtaining contracts between the producers from the private sector and those in the public sector.

Source: processing from Gernod Gruening (2001) "Origin and theoretical basis of New Public Management", International Public Management Journal 4 (2001) 1–25.

The component elements of the theory of public choice (methodology, recommendations, ethics) are opposed to the two currents of public administration - classical and neoclassical (Ostrom and Ostrom, 1971) [17]. Public choice theoreticians have contributed with a number of initiatives towards reform. Among the aspects concerned, these sighted the formation of a polycentric administrative system as opposed to the monocentric one (in the progressive version) (Gruening, 2001).

New Public Administration

There were a number of schools of thought that followed the classical and neoclassical public administration.

→ *The New Public Administration* (initiated by Dwight Waldo, 1968) meant a challenge for classical and neoclassical public administration. The concept includes elements from the *human relations segment and the political side* of public administration (Marini, 1971) [18].

In La Porte's opinion (1971, p. 31) "the purpose of a public organization is the reduction of economic, social, and psychic suffering, and the enhancement of life opportunities for those inside and outside the organization." [19]

The Human Relations Movement; Theorists

At this stage, the importance of the human factor and the tendency to humanize work relations increase.

Elton Mayo emphasizes the consideration of working conditions. Research achieved in the period 1927 -1932 referred to employee behaviour at the workplace [20]. His studies have shown that, unlike organizational, formal factors that can influence productivity increase in an organization, the employee behaviour can also be influenced by an informal system, respectively, feelings, as well as the way in which individuals interrelate; there is a positive correlation between the psychological factors and working conditions, with effects on productivity (Bouri, 2016).

The important element of novelty is the understanding of the importance of interpersonal relationships in workplace performance.

Maslow takes into account the secondary needs of employees. The analysis is focused on work motivation, establishing a pyramid of needs where it distinguishes primary and secondary needs. The motivation of an individual's work is determined by knowing how to meet his needs [21]. Among the needs of lower rank there are considered the psychological ones, security, respect and others.

Douglas Mac Gregor takes into account of the individual and organizational needs and formulates two theories regarding the different attitude of individuals towards work. (Bouri, 2016).

- Theory X - corresponds to the ideology and practices of the era; in the case of individuals with aversion to work, command, control of their activity, including coercive measures, are required. There are individuals who choose security, prefer to be directed and have no responsibilities;
- Theory Y - associates the individual needs with those of the organization. It is the situation of individuals who set their own goals, take over responsibilities and have the capacity for self-control. This category includes individuals who have an untapped knowledge potential, in reserve. (Bouri, 2016).

Chris Argyris At the heart of the organization is the individual and his knowledge. Organizational effectiveness depends on (Bouri, 2016):

- Satisfying the staff's need to self-manifest, by participating in the process of work conception, of decision.
- Ability to integrate change, organizational innovation.

Political Analysis

The discipline of political studies or political analysis emerged in the early '70s (Parsons, 1995) [22] and is focused on *two sides* of analysis concerning policies (Gruening, 2001):

⇒ pursuing practical policies, significant actors and results achieved (Anderson, 1975) [23]; it is oriented towards behavioural elements;

⇒ providing solutions for overcoming political problems (Nagel, 1980) [24].

Practitioners of political analysis considered this discipline to be modern, in relation to the public administration that focused on institutions (Lynn, 1996) [25].

✓ Philip Kronenberg and Orion White Rohr and others developed the *Blacksburg perspective*, which included elements of the New Public Administration (Wamsley et al., 1990) [26].

✓ *Communitarianism*, developed in the '80s, emphasized on the normative framework of the New Public Administration and had as its central idea, the high participation of individuals in political life, by creating some political and administrative structures with a higher degree of participation (Cooper, 1991; Barber, 1994) [27].

✓ *Public administration discourse theory* - another school of thought of the New Public Administration. Its representatives Fox and Miller (1995) [28] focused on the role of moderator of public administration in the sphere of public policies, in which individuals and organizations participate in solving public issues (Gruening, 2001).

The three schools of thought (Blacksburg perspective, communitarianism and discourse theory) had as basing element, the New Public Administration, the normative framework and reform proposals. These emphasize *participation, community, self-actualization and human resource development, as a central element of reforms in public and private organizations. It is considered that reality is based on social aspects.*

Public Management

It is an institutional approach that emerged in the '70s. The neoclassical research was implanted, through certain elements, in the private sector, and these were taken over in the public sector, through the public management. Taking over these elements from the private sector has two orientations (Gruening, 2001):

✓ *Rational or mechanistic* management styles and tools. It focuses on the measurement of performance and the remuneration of organizational leaders in relation to the results

achieved. It is highlighted through some policies: zero budgeting (Lerner and Wanat, 1992), management by objectives, techniques of performance measurement and accounting (Henry, 1990), public sector marketing (Kotler, 1975) and strategic, rational management (Wechsler and Backoff, 1986) [29].

- ✓ *Humanistic or organic* management styles and tools, such as [30]:
  - organizational development (Golembiewski, 1969);
  - Total Quality Management (Milakovich, 1991; Swiss, 1992);
  - strategic management (Moore, 1995).

From the above, one can signalize a close correlation between public management and public administration, accompanied, at the same time, by competition. The public management is considered by scientists to be *a new discipline, different from public administration*. (Gruening, 2001)

Conclusions

The manifestations forms of public administration, which crossed the last century were based on the traditional bureaucratic model having theoretical foundations in the United States, Great Britain and Germany (Fr. Taylor, W. Wilson, M. Weber) [31].

Considered a good way of organizing work, the classical administration is a hierarchic model of bureaucracy, based on centralized control, with a system of regulations, the professional bureaucrats being separated from the political system (Katsamunska, 2012).
Emerged after the Second World War, the neoclassical current sought the foundation of public administration on scientific basis, on rules and elements of human behaviour (Simon, 1976) [32].

A challenge for the two current of thought (classical and neoclassical) was the New Public Administration, scientists considering the change is necessary, a new direction in the administration thought, by creating democratic structures that emphasize participation, social equality (Gruening, 2001).

Public management, the new institutional approach of the '70s, meant taking over some elements in the public sector, from the private sector, being the expression of the correlation between the public management and public administration which is accompanied by competition (Gruening, 2001).

The process of change continued in the '80s - '90s, along with the emergence of the new managerial form in the public sector, called the New Public Management, in which the emphasis is on economy, efficiency, government efficacity, a higher service quality (Katsamunska, 2012).

There was no implemented a single formula of management in the public administration, the institutional reconstruction and finding the necessary solutions to solve the problems being different by countries, depending on the existing public administration and the priorities which it calls for its proper functioning against the background of administrative traditions (Naschold, 1996, p 19) [33].

One possibility may be to adopt a mix of changes that offer solutions to meet the interests of citizens, taking into account the need for an efficient public service.

Endnotes:

[1] Anna Świrska, 2014, p. 150, "Performance-Based Budget as an Element of New Public Management in the Public Finance System In Poland", *Hyperion International Journal of Econophysics & New Economy*., Vol. 7 Issue 1, p. 109-124. 16p, quotes M. Shamsul Haque, *New*

Public Management: origins, dimensions, and critical implications, http://www.eolss.net/sample-chapters/c14/e1-34-04-01.pdf 31.05.2014;

[2] Gernod Gruening (2001), p.1, „Origin and theoretical basis of New Public Management", *International Public Management Journal* 4 (2001) 1–25, quotes Aucoin, 1990, pp. 115; Dunsire, 1995, p. 21–29; Lueder, 1996, p. 93; Naschold et al., 1995, p. 1–8; Reichard, 1996, p. 245f; Schedler, 1995, p. 155;

[3] Gernod Gruening (2001), p.1, quotes Aucoin, 1995, p. 3; Borins, 1994, p. 2; Kamensky, 1996, p. 250; OECD, 1995, pp. 8, 25; Osborne and Gaebler, 1993, p. 321; Reinermann, 1995, p. 6;

[4] Moraru I. Marilena Ortansa (2012), p.116, "New Public Management Elements in Romania's Public Services in the European Context", *Annals of Faculty of Economics*, University of Oradea, Faculty of Economics, vol. 1(2), pages 115-120, December, quotes Haynes, P., 2003;

[5] Gernod Gruening (2001), p.3 quotes Weber, 1956, p. 839; Van Riper, 1987; Stone and Stone, 1975; Schachter, 1989;

[6] Gernod Gruening (2001), p. 3 quotes Schachter, 1989;

[7] Gernod Gruening (2001), p. 3 quotes Gulick, 1937; Urwick, 1937; Mooney, 1937; Graicunas, 1937;

[8] Mohamed Bouri (2016), *Le nouveau management public,* Mémoire de Maîtrise, 2016 quotes Taylor, Foyol;

[9] Polya Katsamunska (2012) p. 77, „Classical and Modern Approaches to Public Administration" *Economic Alternatives,* issue 1, 2012, pages 74-81;

[10] Mohamed Bouri (2016) "Le nouveau management public" quotes "Management des organisations et stratégies «approche théorique des organisations" G.Lévrain p.5;

[11] Gernod Gruening, 2001, p. 4 quotes Herbert Simon, 1976;

[12] Gernod Gruening, 2001, p. 5 quotes Waldo, 1965; Subramaniam, 1963;

[13] Gernod Gruening, 2001, p. 5 quotes Tullock, 1965;

[14] Gernod Gruening, 2001, p. 6 quotes Niskanen,1971;

[15] Gernod Gruening, 2001, p. 6 quotes Downs, 1966; Tullock, 1965;

[16] Gernod Gruening, 2001, p. 7 quotes Hayek, 1960, 1969;

[17] Gernod Gruening, 2001, p. 7 quotes Ostrom and Ostrom, 1971;

[18] Gernod Gruening, 2001, p. 8 quotes Dwight Waldo, 1968, Marini, 1971;

[19] Gernod Gruening (2001), p. 8, "Origin and theoretical basis of New Public Management", *International Public Management Journal* 4 (2001) 1–25, quotes La Porte, 1971, p. 31;

[20] Mohamed Bouri (2016) quotes,"Management des organisations et stratégies «approche théorique des organisations" G.Lévrain p.5/6;

[21] Mohamed Bouri (2016) quotes, "Management des organisations et stratégies «approche théorique des organisations" G.Lévrain p.7;

[22] Gernod Gruening, 2001, p. 9 quotes Parsons, 1995;

[23] Gernod Gruening, 2001, p. 9 quotes Anderson, 1975;

[24] Gernod Gruening, 2001, p. 9 quotes Nagel, 1980;

[25] Gernod Gruening, 2001, p. 10 quotes Lynn, 1996;

[26] Gernod Gruening, 2001, p. 8 quotes Wamsley et al.,1990;

[27] Gernod Gruening, 2001, p. 8 quotes Cooper, 1991; Barber, 1994;

[28] Gernod Gruening, 2001, p. 9 quotes Fox and Miller (1995);

[29] Gernod Gruening, 2001, p. 11 quotes Lerner and Wanat, 1992; Henry, 1990; Kotler, 1975; Wechsler and Backoff, 1986;

[30] Gernod Gruening, 2001, p. 11 quotes Golembiewski, 1969; Milakovich, 1991; Swiss, 1992; Moore, 1995;

[31] Polya Katsamunska, 2012, p. 75 *Classical and Modern Approaches to Public Administration,* quotes Fr. Taylor, W. Wilson, M. Weber;

[32] Gernod Gruening, 2001, p. 4 quotes Simon, 1976;

[33] Marino Calogero, 2010, pag. 32, „The Introduction of New Public Management Principles In The Italian Public Sector", *Transylvanian Review of Administrative Sciences* 6(30), No. 30E/2010, pp.30 – 54 citează Naschold (1996, p 19).

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Assessment of Modern Trends in The Development of Accumulative Pension Schemes in The Russian Federation

Yulia Y. FINOGENOVA

Plekhanov Russian University of Economics, Moscow, Russia
Finogenova.YY@rea.ru

Abstract

The paper discusses the possible transformation of the existing accumulative pension system in Russia, taking into account the concept of the guaranteed pension plan (GPP) announced by the Government at the end of 2019. The main difficulties of transition to the concept of GPP, taking into account the peculiarities of savings strategies of Russian citizens, are presented. The analysis of existing strategies for investing pension assets in mandatory and voluntary pension systems in Russia is carried out. As well as an analysis of foreign experience of pension savings' investment. The main ways of reforming the accumulative pension system are shown, as well as approaches to forming the structure of the investment portfolio of non-state pension funds are proposed.

Keywords: non-state pension funds, guaranteed pension plan, pension assets investments strategies, compulsory pension assets allocation, voluntary pension assets allocation.

JEL Classification: H55; H69; J26; J38.

Introduction

The global trend associated with the decline the role of the state in financing citizens ' pensions is becoming more noticeable during the crisis, when governments are trying to reduce the budget spending on social needs, as this becomes a very burdensome task.

At the end of Q3 2019, there were about 6.2 million people, or 8,2% of the economically active population, participated in the system of non-state pension provision (contributions at their own expense or within the framework of corporate pension programs). For comparison, in the system of mandatory pension insurance, where savings were formed at the expense of mandatory deductions of the employer before the "freeze" of 2015, implemented through the NPF, the number of insured persons was according to the Bank of Russia at the end of Q3 2019. 37,4 million people, which is 6 times more.

Against the background of a record drop in the consumer confidence index over the past five years, citizens will need additional incentives to encourage them to make voluntary contributions, in addition to the tax deduction, this is associated with a number of structural problems: low wages, high illegal employment, distrust of domestic financial institutions, etc.

The government of the Russian Federation has already made attempts to increase interest in the independent formation of pension savings among citizens in 2008 by offering a rather attractive program of co-financing pensions. For every 2 to 12 thousand rubles of annual voluntary contributions to the cumulative program of the compulsory pension system, the state was ready to add the same amount from the budget. Moreover, contributions could be made for 10 years from the date of entry into the program, the application period for joining which expired on December 31, 2014. Unfortunately, even a 100% return did not become a decisive factor for participation in pension savings. According to the Pension Fund of Russia, about 16 million citizens participated in the program, or no more than 12% of the economically active population at that time.

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Another option that could potentially become an incentive for citizens to independently make pension contributions is the resuscitation of the decision announced in November 2019 to launch a guaranteed pension plan (further "GPP"). Recall that the pension moratorium, imposed in 2014, was then extended until 2022, which means that the insurance pension contribution bypasses the accumulative system goes to the insurance one. However, the question of how to properly manage the savings generated before 2015 remains open. Last fall, the Ministry of Finance proposed to transfer the savings formed in the mandatory pension system to the voluntary one, and the amount of contributions and their frequency in the new system is determined by the citizen himself. The transferred savings accounts will be registered in a single Central administrator, and the safety of pension savings must be guaranteed by the state (at the savings stage, full compensation for the amount of the nominal contribution with the established upper limit, and at the payment stage – the assigned pension also in the established guaranteed amount). Payments as in the state pension system are supposed to be indexed to a level not lower than inflation. GPP can be the first step towards the unification of pension programs, which means to increase the efficiency of investments in pension assets, provided that investment companies that manage these assets compete, and, most importantly, to better understand the essence of pension products offered on the market.[13]

In the accumulative pension system, the investment income received from pension savings is of particular importance, since the level of pension provision in this system depends on its size. Therefore, it is particularly important to develop investment strategies that would provide moderate risk in the long term with a return exceeding at least the return on banks' deposits.

Literature Review

In many researches, the main criterion for evaluating the effectiveness of investment portfolio management is the level of return received, as well as the need for regular pension contributions from the individual income. In the article of Martellini et al (2020) were considered, that in order to "supplement retirement benefits received from public and private pension systems, individuals need to make voluntary contributions and decide how to efficiently invest these contributions. Goal-based investing principles can be used to create retirement solutions that secure a minimum level of replacement income while delivering a high probability of reaching higher levels defined as aspirational goals".

In the study of Estrada and Kritzman (2018) was declared, that "the predominant metric for evaluating retirement investment strategies is the failure rate", but this rate "fails to distinguish between strategies that fail early in retirement from those that fail near the end of retirement" and "it fails to account for potential bequests". These authors proposed "a new metric, the coverage ratio, which is more comprehensive and informative than the failure rate", as far as it "measures the number of years of withdrawals (during and after retirement) supported by a strategy, relative to the length of the retirement period considered. Importantly, this metric accounts for everything the failure rate accounts for".

Another authors, for instance, Clare, Glover et al (2020) considered "the nature and importance of the concept of sequence risk, the risk that a bad return occurs at a particularly unfortunate time, such as around the point of maximum accumulation or the start of decumulation". They also proposed "three different measures of sequence risk, each of which is intended to inform investors of the probability that a chosen investment strategy may not deliver desired withdrawal rates, and hence these measures are intended to aid investment choices; conventional performance measures such as Sharpe or Sortino ratios are only indirectly related to this ability to achieve a given withdrawal experience"

Unfortunately, in the existing Russian reality, the savings rate of citizens does not exceed 3% of the income received, and the infrastructure of the investment market is not sufficiently developed. In addition, the constant transformation of pension legislation, as well as unresolved issues regarding assets formed in the mandatory pension insurance system for the "young" cohort of Russian citizens, do not add to confidence in pension savings.

Hypotheses

Currently, there are a number of possible directions for further development of the accumulative component of Russian pension system:

- continue to develop the mandatory accumulative element of the pension system (without GPP) through a return to its basic insurance principles of forming the pension system, the development of the accumulative component while maintaining its mandatory nature.
- to abandon the mandatory nature of the formation of the accumulative component of the pension system and switch to the principle of voluntariness, using the GPP model, in which a non-state pension in the GPP will exist along with other types of non-state pensions in the voluntary pension system;

In addition to the above hypotheses, it would also be possible to implement an option that would adopt a modified version of the GPP, which would develop a mechanism for possible financial participation of the employer in the financing of employee pension contributions. The employer will be given the right to choose: (1) to continue existing corporate programs, providing for the option of voluntary payment of pension contributions by the employee without participating in programs based on the GPP, and (2) to develop a new program based on the GPP, with the possibility of maintaining the previous programs.

Methodology and Data

Currently, one of the reasons for the lack of dynamic development of non-state pension provisions is the low level of wages of Russian citizens and the lack of necessary financial resources for their participation in voluntary pension programs, so the introduction of the GPP will not add to the number of non-state (voluntary) pension system participants. The issues of improving the living standards of the country's population should be resolved simultaneously with the reform of the wage system and increasing the share of wages in the country's GDP.

It is important to create a full-fledged three-level pension system (compulsory accumulative element, corporate pension programs, individual pension programs), which requires the creation of a system of effective incentives that encourage the employer to actively participate in the development of corporate pension programs for their employees, and the employee to participate in individual pension plans as well. Therefore, a set of measures is also needed to stimulate the development of individual pension insurance programs.

To increase the level of return on investments of pension funds, it is also necessary to fully develop the financial market with a variety of different financial instruments for long-term investment that provide returns above the level of inflation and have an acceptable level of risk.

The purpose of the GPP is to provide citizens "with the opportunity to form additional sources of funding for pension income through personal contributions in the NGO system, with the stimulating support of the state and strengthening mechanisms for protecting and guaranteeing pension rights.

The possibility of the employer's participation in the formation of pension contributions is not excluded, but the specific mechanism for this participation is not specified. Among the possible measures to encourage employer participation in the GPP, the following is mentioned: "the base for income tax can be reduced by the amount calculated depending on the listed contributions" , it is also proposed not to tax personal income tax on the amount transferred by the employer as co-financing of the employee's pension contribution (while a number of restrictions are introduced).

The concept of a guaranteed pension plan provides the number of incentives. In particular, for individuals, a tax deduction is offered for the amount of the contribution to the GPP, but no more than 6% of the income. For employers, when co-financing employee pensions, it is proposed to reduce the

tax base for income tax. One of the important points of the concept is the possibility for citizens to transform their pension savings into GPP within the framework of compulsory pension insurance

The compulsory insurance pension in RF is awarded upon reaching the age of 65 for men and 60 for women (taking into account the transition period until 2028). Her appointment requires at least 15 years of work experience (including the transition period until 2024) and a minimum amount of individual pension coefficients of 30 points (including the transition period until 2025). Now you can, if a citizen does not have enough experience or points to receive an insurance pension, "buy" them in the State Pension fund. To do this, an individual must voluntarily enter into legal relations on pension insurance and independently transfer pension insurance contributions. The period of payment of insurance premiums is counted in the insurance experience, the minimum payment for purchase per year in 2020 is just over 30 thousand rubles. This amount can be paid at once, in multiple payments, or monthly throughout the one year.

It is for the payment of these amounts that the funds generated in the GPP, including those converted from pension savings under the OPS, can be used.

If a Guaranteed pension plan is adopted, the role of the non-state pension funds (NPFs) is not fully clear, since the investment of pension savings will be carried out by management companies, accounting for accounts and pension schemes, and the pension operator. In these circumstances, the role of NPFs in the new pension system becomes redundant (see fig.1).

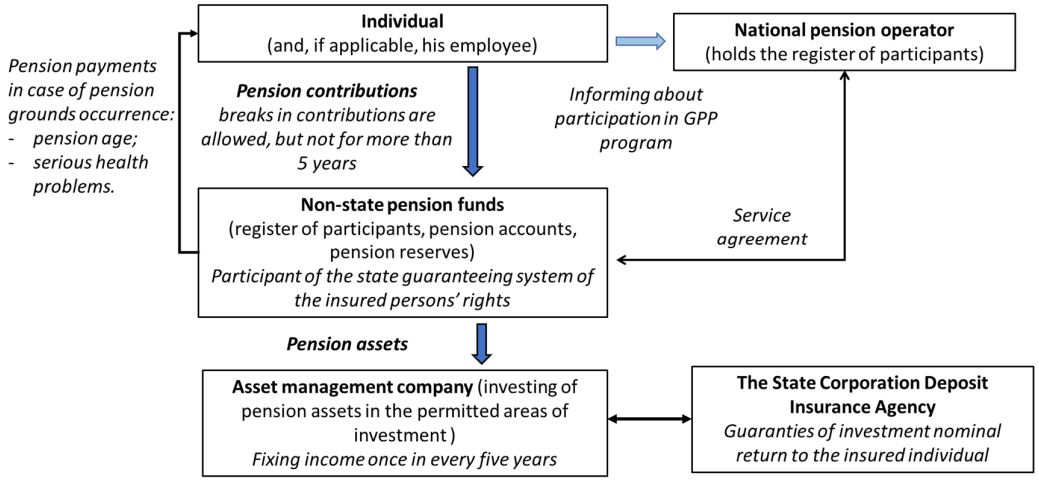

Fig. 1: Illustration of the proposed structure of Guaranteed pension plan (GPP) in Russia.
Source: compiled by the author based on [5]

In view of the planned introduction of the concept of GPP, it would be appropriate to use the experience of those countries where depositors (participants) of the pension fund are offered different risk portfolios depending on their belonging to a particular age category. Thus, more risky investment portfolios could be offered for younger participants, while conservative ones could be offered for older participants. With age, investment strategies for participants will change from risky to conservative, thus maintaining a balance of income growth and saving pension funds.

Obviously, in the accumulative pension system, the amount of return is important, but in the first place, nevertheless, the safety of pension savings, i.e. moderate long-term returns that exceed inflation, while meeting all the established requirements for such investment of pension assets by the state.

As indicators of the effectiveness of pension funds investment are used: indicators (annual, medium-term, long-term, for example, accumulated returns) of the return on pension funds; the growth rate of the investment portfolio (increase in the value of net assets in which pension funds are invested.

Currently, the Russian financial market does not provide the necessary financial instruments to fully diversify the investment portfolios of pension funds, and there are no long-term financial instruments that are adequate to meet the Fund's pension obligations in the time period.

The types of basic investment strategies used by NPFs are shown in table 1.

The time interval (long-term, medium-term and short-term periods) in which the effect of external factors is considered plays an important role. For example, the accumulated inflation of NPFs and their asset management companies may be bypassed in the long run, but in some years their profitability may be significantly lower than the level of inflation.

Over the 8-year period (2012-2019), the average accumulated return (67.28%) and the median return (72.32%) exceed the accumulated inflation for this period (65.57% For three years (2017-2019), accumulated inflation was about 10%, while the accumulated return on investment of pension assets (compulsory) is 16.74%, and pension assets (voluntary) is 15.74%.

The main goal of the non-state pension funds' investment strategy is to preserve pension assets, and this requires that the projected return is maintained at a level not lower than inflation; a certain level of liquidity is provided; the investment portfolio consists of securities with a high level of Issuer quality, low market and credit risks, and the investment/placement of pension funds is carried out in assets with high liquidity that bring stable, predictable income.

Table 1: Types of investment strategies used by non-state pension funds

Type of strategy	The share of investments	Minimum guaranteed return	Projected return (nominal)
Balanced (medium risk level)	Fixed income instruments 80-90%; promotions 5-10%	not defined	Up to 8%;
Basic (moderate risk level)	The fixed income instruments 70 - 80%; Promotions 10-20%	not defined	Up to 9%
Income guarantee (low risk)	Fixed income instruments 100%	Defined (may be revised due to changes in the key rate of the Central Bank of the Russian Federation	Up to 10%;

Source: compiled by the author, based on [1], [7], [11]

In order to provide long-term income, even though there may be short-term losses, the proposed structure of the investment portfolio could look like this: 10% (high-risk assets, risk portfolio) and 90% (non-high-risk assets, main portfolio). This structure allows you to generate additional income (at the expense of riskier assets), but in the event of their loss, maintain financial stability.

In addition, the list of permitted assets for the placement of pension assets in the compulsory system could be supplemented with investments in close-end mutual funds. The analysis of foreign experience has shown the active development of alternative instruments (which include hedge funds, private equity funds, which include venture funds, etc.) for investing pension funds (the share of which in investment portfolios can reach up to 30%). The return on such investments may be higher than in traditional investment objects. At the same time, there are problems of increased risks of such investments, such as the difficulty of exiting venture funds.

The structure of the investment portfolio of the NPF of the Russian Federation in relation to pension savings formed in the mandatory pension insurance system and pension reserves in the system of voluntary pension provision in non-state pension funds is shown in fig.2 and fig.3.

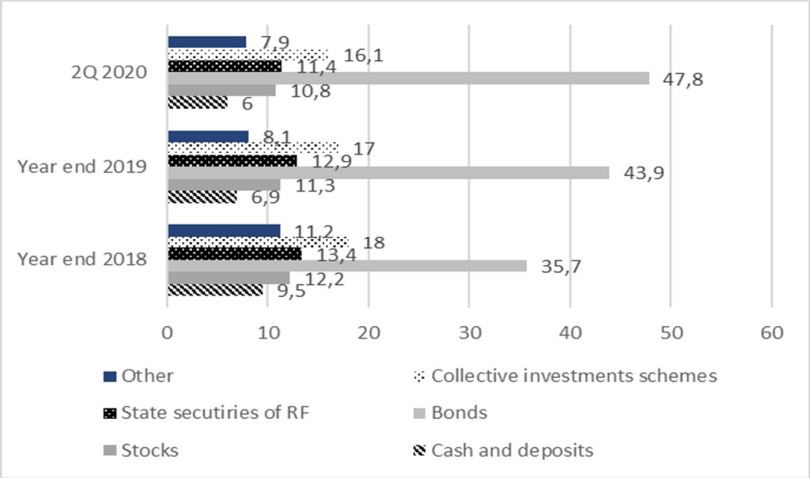

Fig. 2: Voluntary pension assets allocation [2], [3]

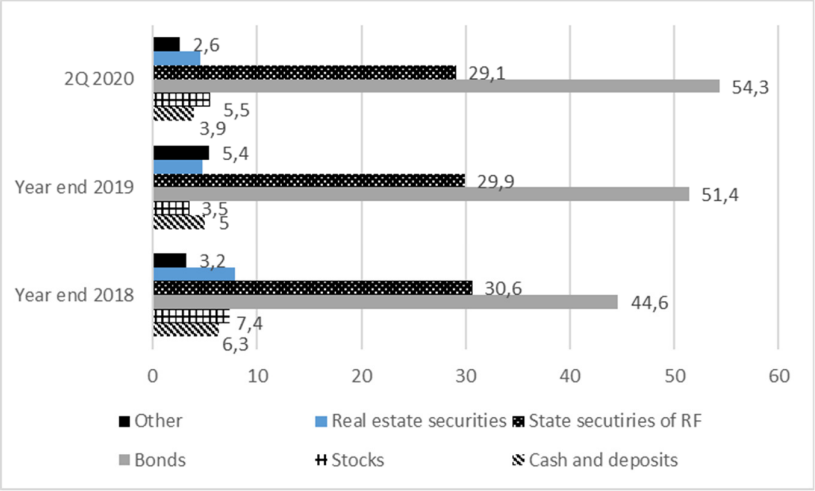

Fig. 3: Compulsory pension assets allocation [2], [3].

The analysis of private pension fund's returns showed that in the vast majority of economically developed countries that reported accumulated real returns in private pension funds, they were positive at 5-year, 10-year and 15-year intervals, which also affected the level of pension provision for Fund clients in these countries (in some of them, the aggregate pension replacement rate for lost earnings formed on the basis of a multi-level pension system reaches 90% or higher, such as in Portugal, Austria, Luxembourg, Italy etc.).

In a number of countries, the security of pension funds is determined in connection with either guaranteed returns or the avoidance of negative returns, and involves an annual review of the value of pension assets, taking into account the return over the past year. At the same time, the safety is adjusted to a certain level of profitability. It is very important that the reporting of pension funds in the OECD member countries involves, in addition to the nominal return (the actual investment result), taking into account an indicator of real return equal to the nominal return minus the inflation rate in a particular

country. The established guaranteed yield in the analyzed countries is usually set at 2-3% above the inflation rate (the indicator is calculated based on the average inflation rates for a certain period).

There are also various guarantee structures: floating or fixed minimum income, valid only at retirement or at each time interval, as well as their terms (calculated and paid annually or at the end of the accumulation period).

It is important to clarify that the safety of pension funds is considered in the long term (the minimum term of this perspective is 5 years, when the amount of pension funds is fixed in the accounts of the pension funds' clients).

In spite of the former conservative investment strategies of the pension funds, nowadays more and more pension assets are invested not in fixed-income instruments, but rather in the alternative instruments. The analysis confirmed that highly developed pension markets provide greater flexibility when it comes to investments not implying any restrictions on the structure of investment portfolios comprised of pension assets.

According to the reports of the OECD member countries, the concept of profitability is identified with the concept of "received result", and the result from investing pension funds can be either negative or positive. At that time, as a yield is a positive result from the investments of pension funds assets (see table 2).

Table 2: Return of pension assets in voluntary pension programs and the investment portfolio's structure in some OECD countries in year 2018 [10]

Country	In % of investment portfolio					Nominal investment return, %		Real investment return, %	
	Equities	Bills and bonds	Cash and deposits	Collective investment schemes	Other	2018	5-year annual average	2018	5-year annual average
Austria	32,8	45,4	7,7	n/a	14,1	-5,3	2,7	-7,1	1,2
Ireland	28,4	41,9	3,1	n/a	26,6	-5,2	n/a	-5,9	n/a
USA	30,7	24,5	2,5	31,6	10,6	-4,9	2,3	-6,7	0,8
Latvia	27,7	61,3	6,0	n/a	5,0	-4,4	1,5	-6,7	0,0
Lithuania	43,3	46,3	7,2	n/a	3,1	-4,3	3,1	-6,0	1,7
Belgium	49,1	41,1	5,6	n/a	4,1	-3,2	4,3	-5,4	2,8
Spain	13,1	45,2	10,1	22,3	9,3	-3,1	2,2	-4,3	1,6
Estonia	34,2	62,5	3,1	n/a	0,2	-2,3	2,3	-5,5	0,7
Italy	18,2	45,1	6,3	n/a	30,4	-1,7	2,2	-2,8	1,7
Hungary	7,5	61,8	3,8	25,1	1,8	-1,7	5,0	-4,3	3,6
Finland	38,2	27,4	3,6	n/a	30,9	-1,5	4,5	-2,6	3,9
Netherlands	28,6	46,2	3,1	n/a	22,1	-1,2	6,1	-3,1	4,9
Portugal	12,2	70,7	7,8	n/a	9,2	-1,1	2,8	-1,8	2,2
Greece	11,9	54,7	12,6	19,1	1,8	-0,8	3,8	-1,4	4,1
Slovenia	2,2	60,1	9,2	26,8	1,7	-0,5	5,0	-1,9	4,3
Mexico	18,2	78,1	1,0	n/a	2,7	-0,3	4,2	-4,9	0,0
Norway	35,8	56,2	2,0	n/a	6,0	-0,1	4,9	-3,4	2,3
Slovak Republic	2,5	58,6	11,2	23,5	4,2	0,0	1,8	-2,0	1,1

Czech Republic	0,7	76,5	19,7	2,2	0,9	0,4	0,8	-1,6	-0,5
Chile	38,8	60,6	0,3	n/a	0,3	1,5	6,5	-1,0	3,1
Germany	5,4	49,9	4,2	n/a	40,6	1,9	3,5	0,4	2,5
Canada	28,7	31,7	4,0	n/a	35,6	2,7	6,5	0,7	4,7
Korea	2,7	42,5	18,5	7,2	29,0	3,3	3,6	2,0	2,3
Indonesia	16,9	45,9	27,5	n/a	9,7	3,8	9,5	0,6	5,0
Iceland	30,6	45,0	6,9	n/a	17,4	5,6	6,4	1,8	4,2
Brazil	18,4	61,6	0,1	n/a	19,9	5,9	n/a	2,1	n/a

If we look at the profitability of pension assets in Russia during the last three years in the state (compulsory) and non-state (voluntary) pension systems, we can see, that most of the time actual profitability was lower, then the forecasted profitability of the standard investment strategies. Moreover, the compulsory system demonstrated even better investment return in some years compared to voluntary system. In the same time, the return on the pension assets in the compulsory pension system was also greater for the last three years except the year 2018 (see table 3).

Table 3: Profitability of pension assets in Russian non-state pension funds for the years 2017 – 2019 compared to the required rate of return in the voluntary pension schemes and inflation rates

Rate of return and its comparison with the key benchmarks	Year 2019	Year 2018	Year 2017
Return on pension reserves (voluntary system)	*5,17*	*5,38*	*5,20*
Profitability spread (if annual return 6% required)	-0,83	-0,62	-0,80
Profitability spread (if annual return 8% required)	-2,83	-2,62	-2,80
Return on pension assets investments (compulsory system)	*9,46*	*0,79*	*6,49*
Profitability spread (if annual 6% required)	3,46	-5,21	0,49
Profitability spread (if annual return 8% required)	1,46	-7,21	-1,51
Inflation, %	*3,06*	*4,3*	*2,52*
Spread between inflation and investment return in the voluntary system, %	2,11	1,08	2,68
Spread between inflation and investment return in the compulsory system, %	6,4	-3,51	3,97

Source: compiled by the author based on [12], [3]

The weighted average return on investment of pension savings in the compulsory accumulative pension system on the basis if non-state pension funds was 10,5%, which is higher than the return on other financial instruments. The profitability of placing pension reserves in the framework of the voluntary pension system was lower only than the profitability of mutual funds and investments in gold.

The introduction of risk-based supervision funds, stress testing, fiduciary responsibility, a new system of compensation funds, the formation of each system risk management allowed the Bank of Russia (the state regulator) to expand the rights of non-state pension funds in terms of increasing their role in the management of pension assets and, in particular, to provide the funds the right to invest pension

reserves in any assets permitted by the Bank of Russia, whose list has expanded considerably. At the same time, the non-state pension funds retains the right to attract the asset management companies for the purpose of placing pension reserves in the voluntary pension system. Expanding the possibilities of self-placement of pension reserves helps to reduce the cost of non-state pension funds payments under trust management agreements and, accordingly, increase the amount of money transferred to the registered accounts of participants of the non-state pension fund.

Results and Conclusion

The results of the study showed that it is necessary to finalize the version of the GPP Concept, including the need to clearly identify and consolidate the role of non-state pension funds and their asset management companies in this system.

It also makes sense to expand the list of permitted assets for pension funds' investment for non-state pension funds and heir asset management companies. It also worth developing special financial instruments for the pension market (for example, pension bonds issued by the state with a long maturity of more than 15 years) with increased reliability (state and banks' guarantees, tax benefits to the issuer of such pension products) and guaranteed rates of return (at the level of inflation plus 1,5-2%).

It is also important to identify ways to further liberalize the requirements for pension funds' investment, thus focusing funds on the choice of real assets and long-term investment (for instance in the infrastructure projects);

In addition, it is important to differentiate the structure of risk-based supervision for different age groups of non-state pension funds' clients.

Discussion

It is important to identify the main priorities of the current stage of reforming the Russian pension system: the integration of non-state pension funds into the Russian economy, improving the living standards of pensioners, filling the budget of the State pension fund and reducing dependence on investments in it from the state budget. From the analyzed concept of the GPP it is not disclosed how the introduction of the GPP will affect the income of future pensioners.

As a solution to the problem with pension contributions to the State pension fund - the development of parity programs with the employer. We should also consider the possibility of co-financing the GPP program with the participation of the employee, the employer and the state, or the employee and the state (similar to state co-financing pension program). The total rate for pension contributions to the GPP (4-6% of the salary) can be distributed equally (2-3%) between the employee, the employer and the state, which will increase the rate of replacement of lost earnings by the received pension.

It is necessary to create an effective system of measures to encourage the participation of employees and employers in the GPP (voluntary non-state accumulative pension system) system:

- exclude any payments in the GPP system from the income tax base (personal income tax);
- withdraw from the taxable base of income tax pension contributions under contracts of GPP in favor of employees (you can specify this proposal by specifying the required work experience in the organization, for example, 5 years).

The Bank of Russia is once again trying to "restart" the motor of the accumulative pension system by agreeing to increase the size of the pension tax deduction to 52 thousand rubles per year by increasing the limit for calculating the tax deduction to 400 thousand rubles. If this limit is set separately for pension savings and a similar limit applies separately for other types of socially significant expenses (voluntary health insurance, education, etc.), then the potential maximum amount of tax deduction that citizens can receive will increase by more than 3 times compared to the current one.

In order to be entitled to the maximum tax deduction of 52 thousand rubles per year, a citizen must make monthly deductions of 4.3 thousand rubles. In principle, you can make deductions in a smaller amount, but then the maximum effect of the proposed innovation will not be achieved. And then the question arises, what percentage of the population is ready to make monthly contributions in this amount, for at least 15-20 years?

If we take official data on the average levels of nominal wages in Russia for the 1st quarter of year 2020, amounted 48 390 rubles, the size of pension contribution will be 8,9%. If we compare this value with the average amount of savings even for a relatively "prosperous" year 2019, it turns out that according to official data, citizens could save no more than 3% of their salary for the year. If we take into account the growing risks of unemployment and slowing economic growth due to the pandemic, then at the end of 2020, the savings behavior of Russian citizens is likely to be even more restricted.

Conclusions

The analysis allows us to conclude that a conservative portfolio for investing pension assets in NPFs may consist of the following assets: 30/70 ratio of shares and corporate bonds, while ensuring a return not lower than inflation. The share of state bonds and municipal bonds should not exceed 10%, and shares of Russian issuers should not exceed 10%, while shares of emerging market companies should not exceed 15%, and Russian corporate bonds should not exceed 65-70% of the portfolio.

The structure of a portfolio with an average level of risk may look like this: the ratio of stocks/bonds at the level of about 50/50. At the same time, Russian corporate bonds must account for at least 45%, shares of Russian issuers for at least 30%, and shares and bonds of emerging market companies for about 15% and 10%, respectively.

In the structure of a portfolio with a high level of risk and an investment horizon, the most optimal ratio of stocks and bonds is possible at the level of 70/30. The proportion of shares of Russian issuers at 50%; shares of emerging market companies 15%, corporate bonds of Russian companies 20%, bonds of emerging markets' countries 15%.

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Smart Waste Management Application for Pet Bottle Compactor

Bogdan Felician ABAZA

University POLITEHNICA of Bucharest, Bucharest, Romania
bogdan.abaza@upb.ro

Bogdan Alexandru JUGRAVU

University POLITEHNICA of Bucharest, Bucharest, Romania
bogdan.jugravu@upb.ro

Paulina SPANU

University POLITEHNICA of Bucharest, Bucharest, Romania
pauspa16@yahoo.com

Abstract

Millions polyethylene terephthalate (PET) bottles are produced every day and get in landfills, rivers, seas and oceans. PETs lasts 700-800 years until they begin to decompose and will only disintegrate after about 1000 years. Although very difficult to disintegrate, PET is a 100% recyclable material. PET / recycled polyester is used as raw material for textile fibres or other PET packaging. Recycling is a solution both to reduce environmental pollution and to save natural resources. Recycling and selective waste collection is a major issue worldwide for which innovative technical solutions are sought. This paper presents the results of experimental research for an intelligent waste management system, conducted by a team of researchers in the frame of master's program Complex Projects' Engineering and Management from University POLITEHNICA of Bucharest. The customized macroplanning for the developed technical solutions with multiple design phases, was based on business strategy, needs analysis, concept generation and selection eventually ending up with the building and testing of a functional prototype. Also, based on a customized electrical and software architecture, a Smart Management Application for controlling the prototype is described in this work.

Keywords: Industry 4.0., New Product Development, Project-Based Pedagogy, Smart Management Application, Waste Compactor.

Introduction

The European Union aims to make all plastic packaging recyclable by 2030. Under current European legislation, all countries are required to recycle a certain percentage of the amount of waste from PET packaging. However, Romania recycles an insignificant amount of the entire volume of waste it produces, the rest being thrown in the landfill.

Polyethylene terephthalate (PET) packaging can be recycled and used for the manufacture of new containers or for raw materials in the textile industry. The diversity of types of packaging and the materials from which they are made complicates the recycling process. The recycling process sometimes becomes difficult and expensive. The quality and price of the recycled product compared to the original plastic is also a problem that complicates the recycling process.

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A team of researchers from master program Complex Projects' Engineering and Management from University POLITEHNICA of Bucharest works to design and develop an innovative compactor system with selective waste collection controlled through a Smart Management Application developed in LabVIEW as a virtual instrument.

This paper is based on a master team research coordination regarding an initiative to empower and educate the public about the importance of recycling, providing effective means for selective waste collection with minimal user effort. This idea was generated in the frame of the master program Complex Projects' Engineering and Management from University POLITEHNICA of Bucharest. A key component of learning strategy is Project-Based Pedagogy (PBP) for a new product development according to ABAZA B. et al. (2015).

During last two academic years two master teams chosen to develop different innovative technical solutions for home use systems dedicated for compacting recyclable containers, designed with selective waste collection capability thus facilitating the recycling process. The development process included building and testing functional prototypes based on which the optimization of technical solution was made.

Initially student's research was focused on development of mechanical system architecture designing different technical solutions for compacting the waste and for selective waste collection. This paper investigates and propose solutions for the electrical architecture and for the software component which should be designed as a Smart Waste Management Application dedicated to be compatible with all these mechanical concepts but also to integrate Industry 4.0 concepts and principles.

Macroplanning

Based on customized macroplanning for new product development and PBP teams developed technical solutions which have gone through multiple design phases, while having continuous improvements made based on: business strategy, needs analysis, concept generation and selection eventually ending up with the building and testing of a functional prototype. Figure 1 explains the macroplanning defined according with academic program. This is another key element to take in account which influenced teaching activities and project development from the perspective of PBP integration, as Abaza mentioned (2020).

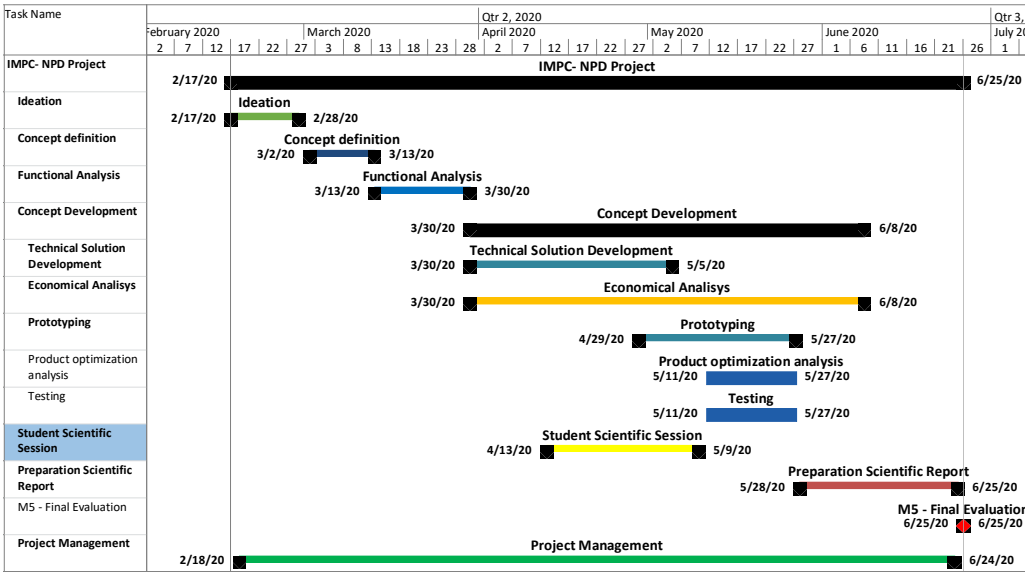

Fig. 1: Macroplanning

Preliminary Experimental Trials

To determine the forces required to compress the waste, a series of preliminary experimental determinations were made using a large variety of types of waste: cans, PET bottles, Tetra Pack, of different heights and thicknesses. It was used a Zwick/Roell ProLine table-top testing machine (Figure 2).

The results of the experimental determinations are presented in table 1.

Figure 3 shows the forces – deformation diagram during the experimental research, where:

- F1 – is the force required to initiate compression.
- F2 - the force at which the compression is performed.
- F3 - the maximum force it reaches at the end of the deformation.

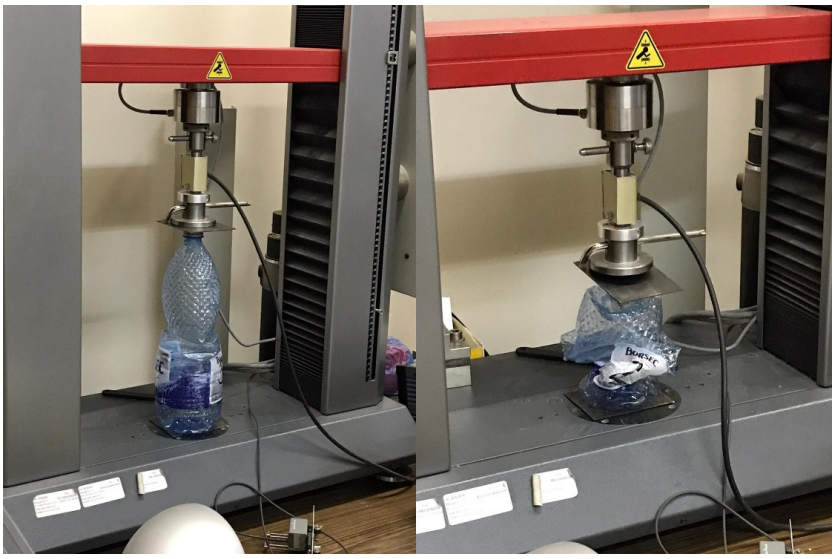

Fig. 2: Zwick/Roell ProLine testing machine

Table 1: Experimental results

Waste Type	Material	Compression Ratio	H waste [mm]	v [mm/min]	F1 [N]	F2 [N]	F3 [N]
Can	Al	1/5	150	600	540	110	545
Can	Al	1/5	120	480	460	110	755
Bottle	Pet	1/4	330	1000	220	120	229
Bottle	Pet	1/5	355	1000	140	90	348
Bottle	Pet	1/5	350	1000	290	100	290
Tetra Pack	Paper	1/4	250	1000	100	150	170

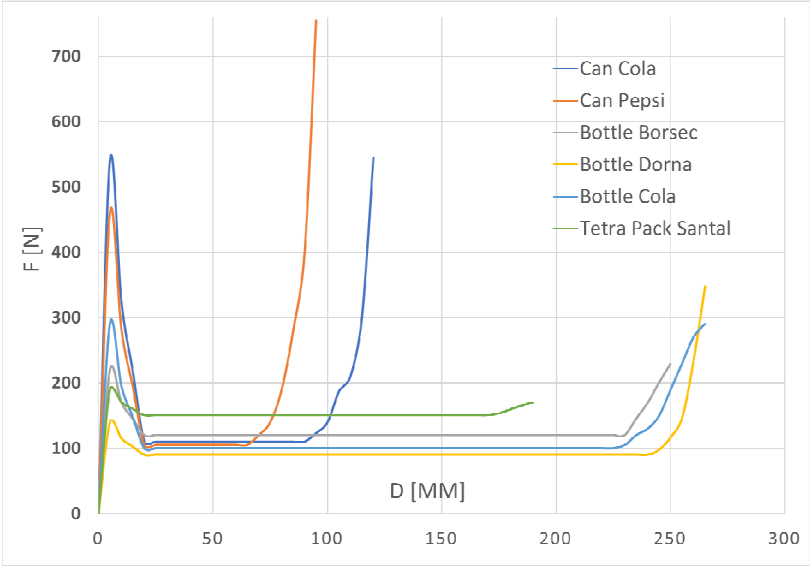

Fig. 3: Force – deformation diagram

On the x-axis is deformation nominal D of the waste (bottle/can/tetra pack) in millimetres from start point until the point where the deformation was completed. On the y-axis is variance of force F in N during the deformation of the waste.

All experimental trials showed that during the deformation process there are 3 main forces thresholds to take in account: F1, F2 and F3. F1 is the spike of the force when initiating the deformation, F2 is the force during the deformation after F1 and F3 is the force at the end of deformation when there is no more volume reduction to be made. Based on this force variance the compactor should provide the F1 and F2 and to stop deformation just before F3. In this case the most relevant are the highest values for the force F1 required to initiate the deformation process. Based on the F1 values from all waste tested it results that the most disadvantaged case to be cover it is the case of the deformation of can where the force F1 it is about 600N. This is an important design input to take in account in the next design phases.

All experiments showed that stability of the waste is very important during deformation process and in any concept design of the compactor should provide solution for proper guidance and orientation of the waste.

Concept Generation

Based on these preliminary experiments the development process of the compactor followed all design phases according with macroplanning from figure 1.

Below in figure 4 is a selection of 2 design concepts for the compactor (Sevastian, 2019). The teams generate more versions but most of them used a screw nut mechanism for the compression subsystem of the waste. The screw is driven by an DC electric motor. Each concept proposes different solutions for compressing active parts taking in account the preliminary experimental trials.

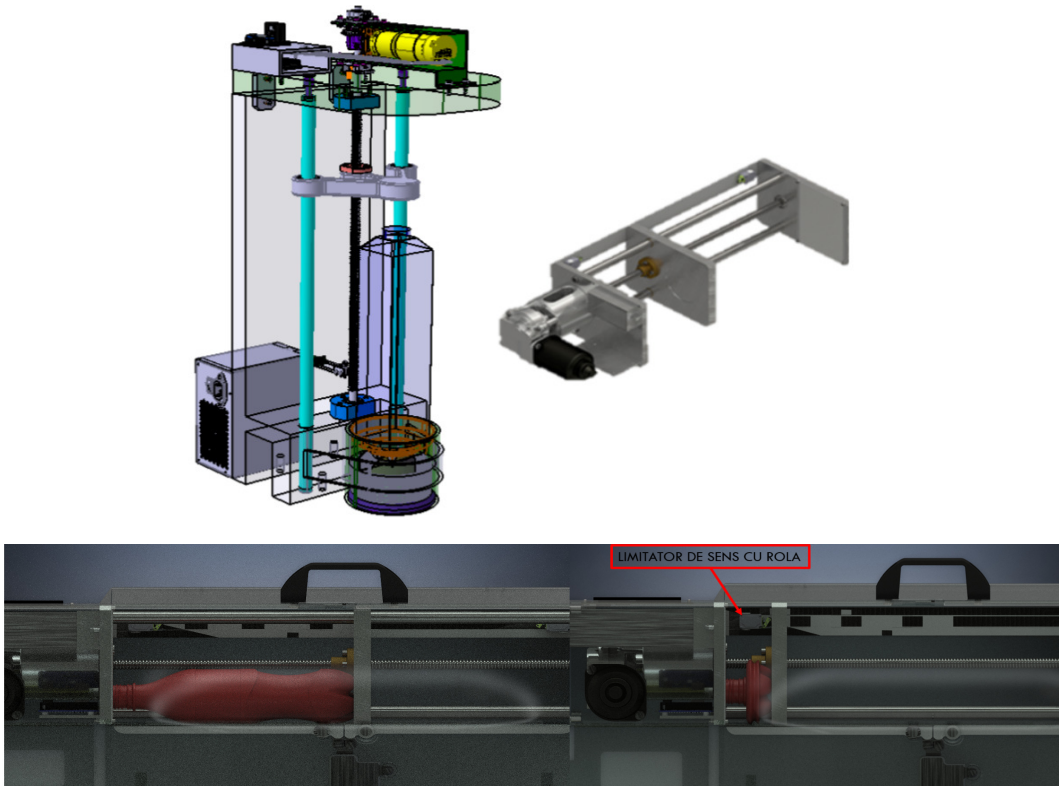

Fig. 4: Concept design

The global design of the compactor (Figure 5) took in account the home use integration together with all main integrated functions: reducing the volume and selective waste collection.

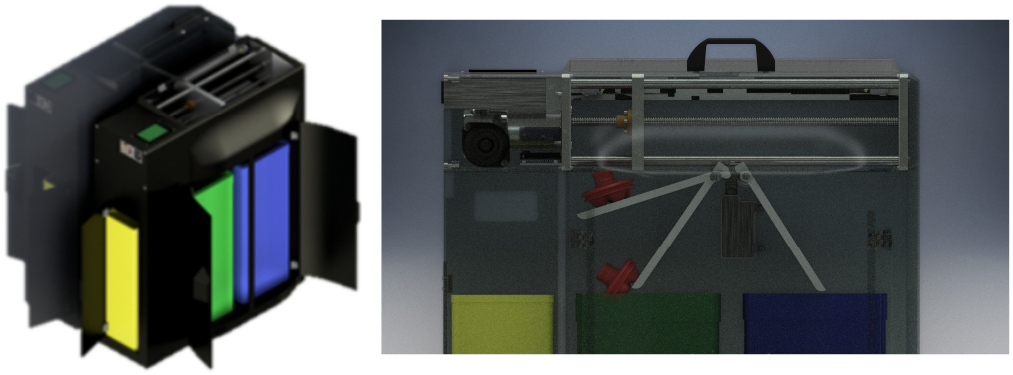

Fig.5: Global design (Sevastian, 2019)

Development of Smart Management Application

Based on high accelerated development of Based on these preliminary experiments the development process of the compactor followed all design phases according with macroplanning from figure 4 (Sevastian, 2019)

Waste management domain is also affected by the high accelerated digital transformation proposed by Industry 4.0. A lot of research effort was focused on defining effective smart city concepts which integrate also wate management solutions. Basically, smart management applications use sensors to measure fill levels from waste container (bins) and generate different kind of notifications for assisting decision when to empty those bins and to collect the waste in an effective way. Many solutions where studied and developed using different kind of modern technologies like Cloud-based smart waste management (Aazam 2016) or Smart Waste Collection Monitoring and Alert System via IoT (Hisham Che Soh 2019).

This paper proposes a different development approach for the whole waste management ecosystem based on Industry 4.0 concepts and principles where the is a vertical integration with a hierarchical level component. It is about the integration of all IT system components at various hierarchical levels into one comprehensive solution. In our case these hierarchical levels are respectively the field level, the control level, the process line level, the operations level and the ecosystem planning level represented by the Waste Management Ecosystem (Figure 6).

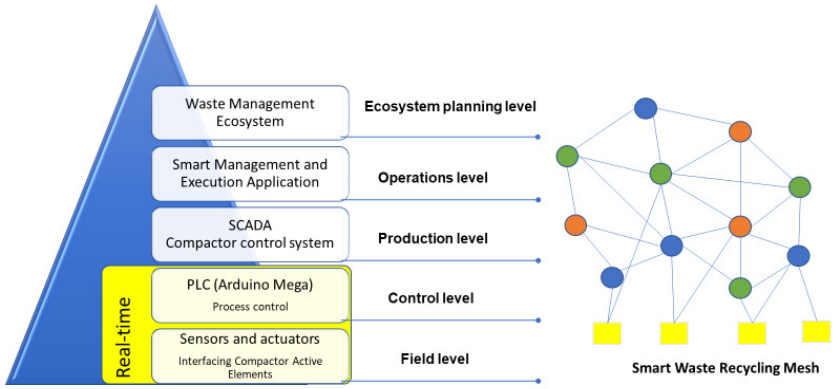

Fig. 6: Waste Management Architecture

From this perspective our system will have similar levels like those from an automation pyramid:

1. Level one: sensors and actuators – connecting what should be connected at the level of compactor physical active parts representing the 'things and device' layer)
2. Level two: systems and internal services – monitor and manage in real time process at the level of the controller
3. Level thee: connectivity – connect for new applications and capabilities of the compactor
4. Level four: new services and ecosystems – transformation from the Waste Management Ecosystem.

Smart Waste Management and Execution Application plays a central role in development of the first stages of this approach based on Industry 4.0 transformation representing the digital hub of information and connectivity. In our case this will be represented by a virtual instrument software developed in LabVIEW able to cover all main roles and capabilities relates to:

- Remote control.
- Remote Diagnosis.
- Conditioning Monitoring.
- Systems Health Monitoring.

Smart Waste Management and Execution Application

Designing the Smart Waste Management and Execution Application was made based mechanical architecture of the compactors and based on electrical system architecture presented in the figure 7. Basically, this architecture describes the main components from level 1 and the way how these are interacting with components from level 2 from the automation pyramid.

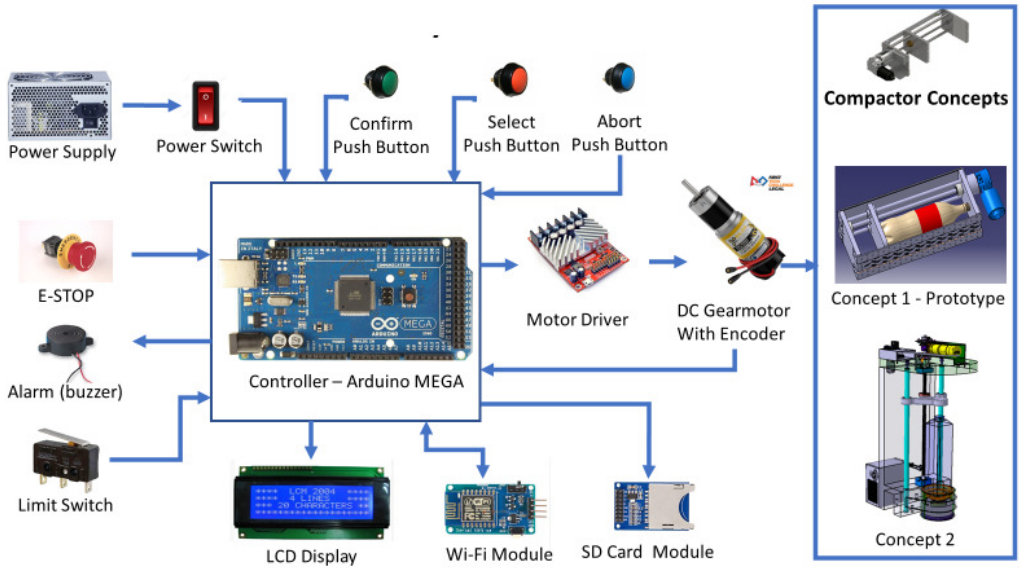

Fig. 7: Electrical System Architecture

According to this figure, the software development should take in account interaction between main components from the level 1 with components from level 2 of the automation pyramid.

The components belonging to the level 1 in our case are:

- Limit switches which give the feedback about the position of the active compression plate.
- Active compression plate driven by screw nut mechanism. The 12V DC electrical motor will rotate the screw according with the compacting parameters given by the controller state machine through the motor driver connected between them. The nut will slide the active compression plate for producing the compression or for homing (repositioning to the home position).
- Confirm, Select and Abort buttons which allow to the user to select and interact with the compactor.
- 12V Power supply with power switch.
- Display connected to the controller. A local display is necessary even that the software may will have different remote interfaces on different devices.
- Safety devices like buzzer (generation of different audio signals), E-STOP button for stopping the compactor in any moment.

The main components belonging to the level 2 in our case are:

- Controller – in our case it was used and Aduino Mega 2560.
- WiFi Module type ESP8266 used for wifi communication.
- SD Card Module used for local logging data to the micro SD card.

Programming the Controller State Machines

Based on functional analysis and previous electrical architecture there were defined 8 states machines for the controller:

- DEBUG_STATE // 0 (System start-up and check all connected devices). In this state the system when is power up will check the status of all connected devices and will define the start-up states for all components. Figure 8 shows the interface for debug state when it can be seen that system by default will pass through automatically or, if necessary, it can be active the manual mode when a series of settings can be made for setting up the compactor: serial port selection (if wired connection is necessary), setup a new home position.

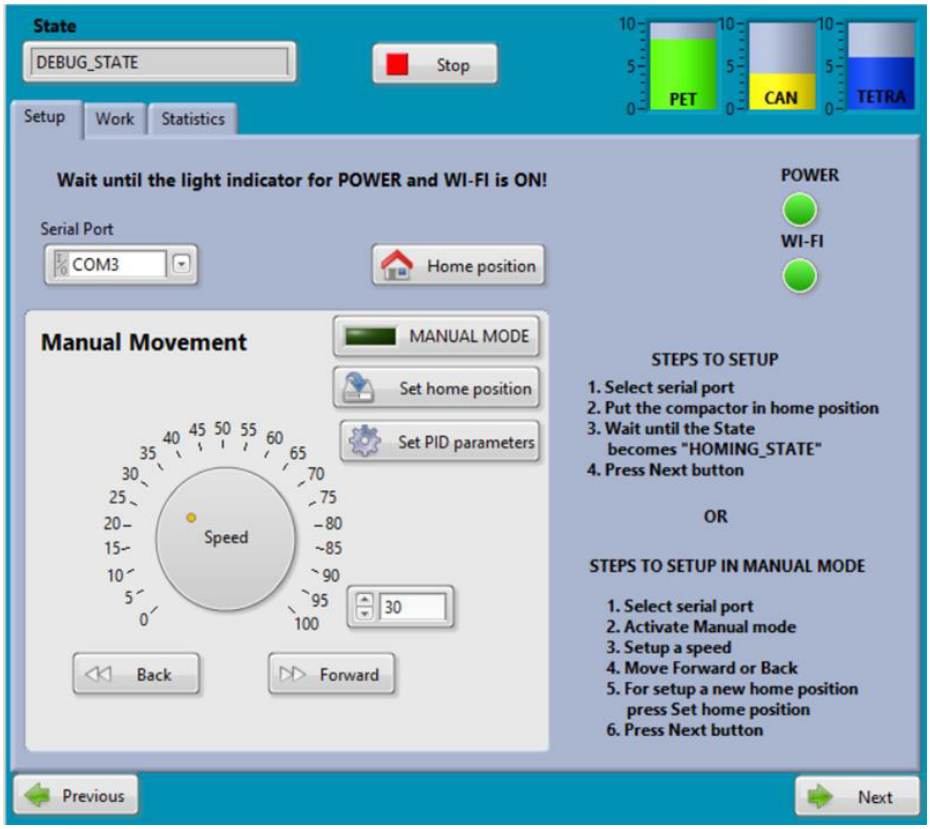

Fig .8: The interface for Debug State

- PET_STATE (Figure 9) // 1 (Compactor plate moves with to the left for compacting a pet). In this state the system will compact a PET moving the active plate, which generate the compression of PET, with a specific speed until the desired deformation is obtained. The speed is tuned using dedicated proportional–integral–derivative controller parameters (PID) for producing the proper speed of compressing plate to obtain deformation to a desired volume ratio compression. These parameters were defined based on experimental trials of the prototype for PET waste according with the combination of DC motor type, motor driver and mechanical components from the screw nut mechanism.

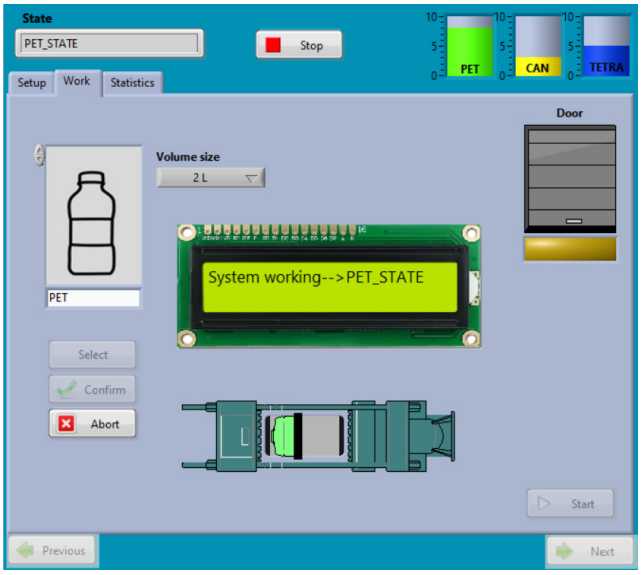

Fig. 9: The interface for PET state

- CAN STATE (figure 10)//2 (Compactor plate moves to the left for compacting a can). This is similar with the PET sate the difference being given by the PID parameters which are adapted for compressing a can.

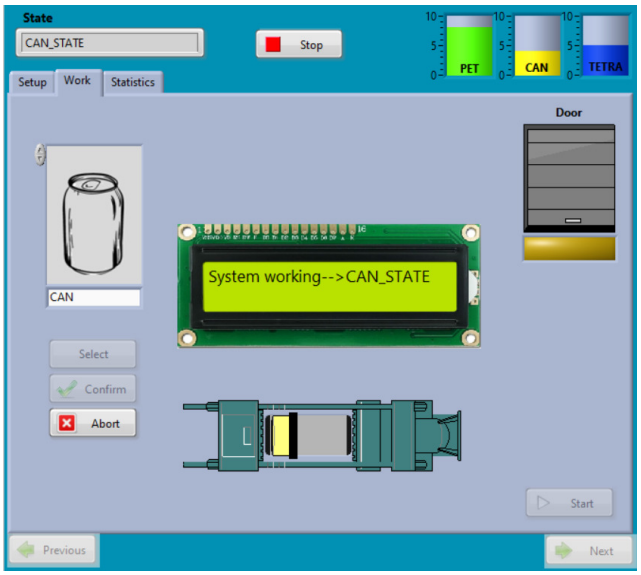

Fig. 10: The interface for CAN state

- TETRAPACK_STATE (Figure 11)// 3 (Compactor plate moves to the right for compacting a tetra pack). This is similar with the PET sate the difference being given by the PID parameters which are adapted for compressing a can.

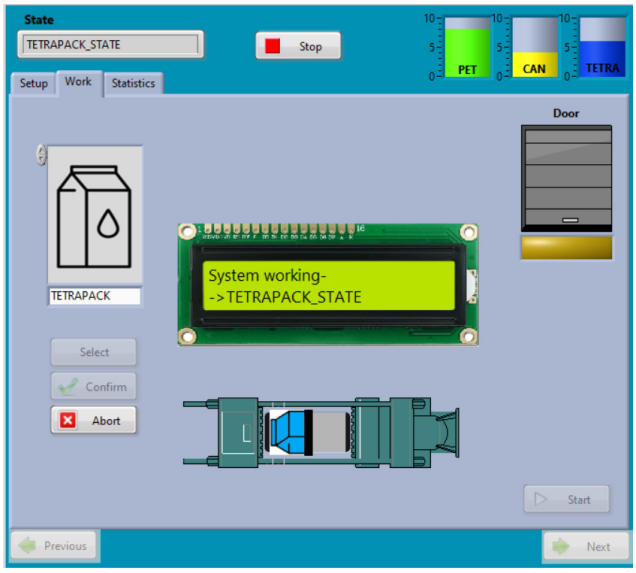

Fig. 11: The interface for TETRAPACK state

- HOLD STATE //4 (Hold a specific time the compactor plate is the position). When limit switch will be activated the active plate will stop and will remain hold in position for a defined time (1500ms).
- PREHOME_STATE (Figure 12) // 5 (Positioning to the neutral position -reference). In this state the active plate is start moving from current position to the home position (baseline) using dedicated home speed parameters.

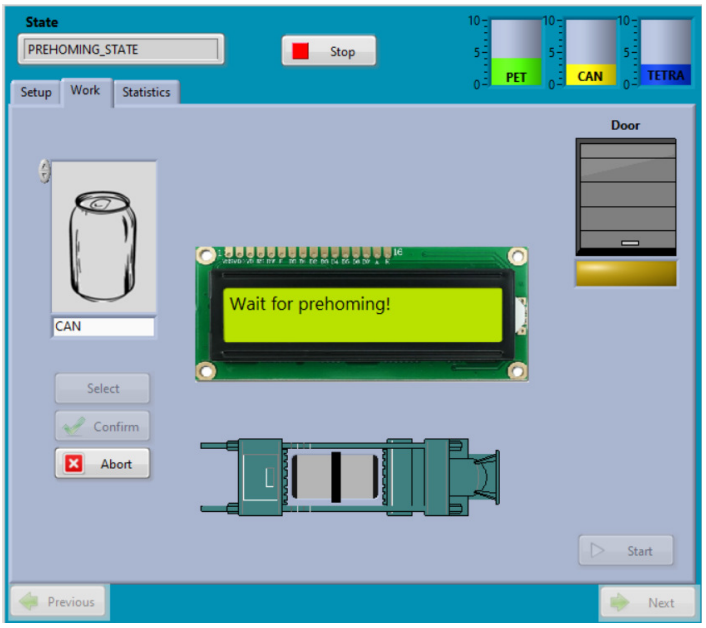

Fig. 12: The interface for PREHOME state

- HOMING_STATE (Figure 13) // 6 (Compactor plate is in the neutral position waiting for a new compacting state). This is the state when the active plate is hold in home position waiting to start a new cycle. In this state the user can set parameters and insert a new waste in compactor.

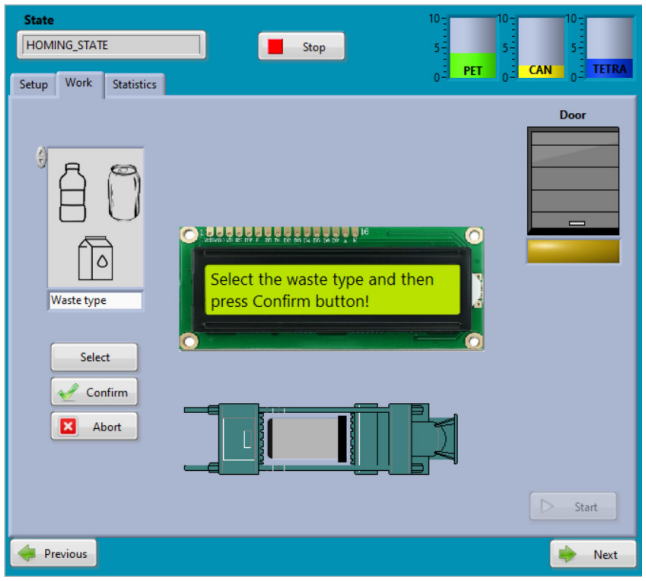

Fig. 13: The interface for HOMING state

- OFF_STATE // 7 (System is freezing). This case freezes the compactor when an error occur or the E-STOP is activated. Is the safe mode state if anything happen and the user want to stop any activity.

Smart Waste Management and Execution Application was developed as a Virtual Instrument in the graphical programming environment LabView (Savu 2014). The virtual instrument is capable to integrate all roles and capabilities assumed for level 4 at the operational level from the pyramid with Waste Management Architecture presented in figure 5. This software application communicates and exchange data with the controller from level 2 integrating the level 3 represented by SCADA (Supervisory Control and Data Acquisition) (Abaza, 2014). A sample from the data flow programming code is presented in the Virtual Instrument Diagram (Spanu, 2018) from the figure 14.

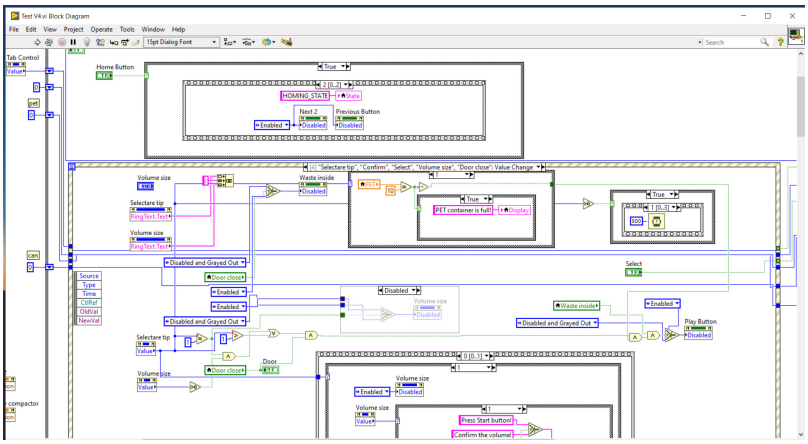

Fig. 14: Sample of Virtual Instrument Diagram for Smart Waste Management and Execution Application

Statistics and data management is another section belonging to the Smart Waste Management and Execution Application. A sample of this is presented in the figure 15.

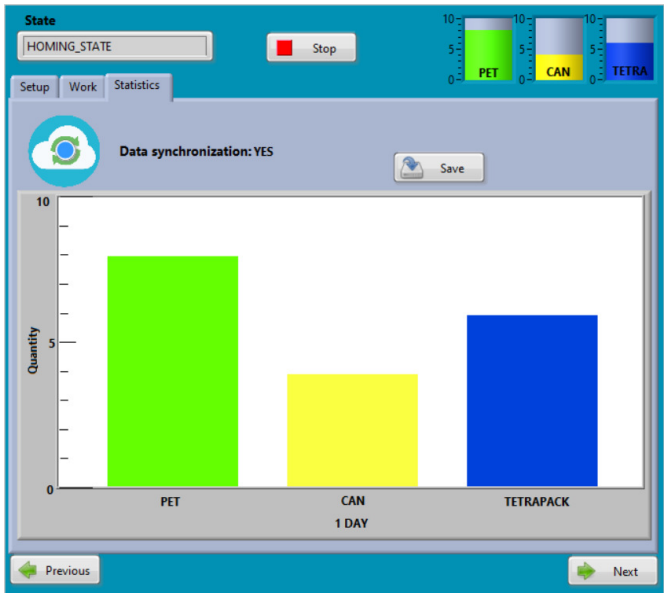

Fig. 15: The interface for Statistics

Actual version integrates basic functionalities for managing the loading status of the selective waste bins and can alert when the bin is almost full, and this can be empty. This functionality could be improved by integrating it in the whole process of monitoring a cluster of several compactors and to take operation decisions for collecting the compacted waste in an optimized way.

Based on logging and data exchange from all subordinate levels the system become capable to collects data from the sensors and states machines modes and more than that. This open another direction of development which is related to designing new graphical and data analysis tools relevant for the operational level.

Prototype Tests

Smart Waste Management and Execution Application presented in previous chapter was developed during the tests prototyping phase. According with the macroplanning the prototyping phase aims to reproduce and test the main function: reducing the waste volume. Another CAD version of the compactor was generated based on the materials and parts availability. In the Figure 16 is presented the CAD concept and the prototype made based on it.

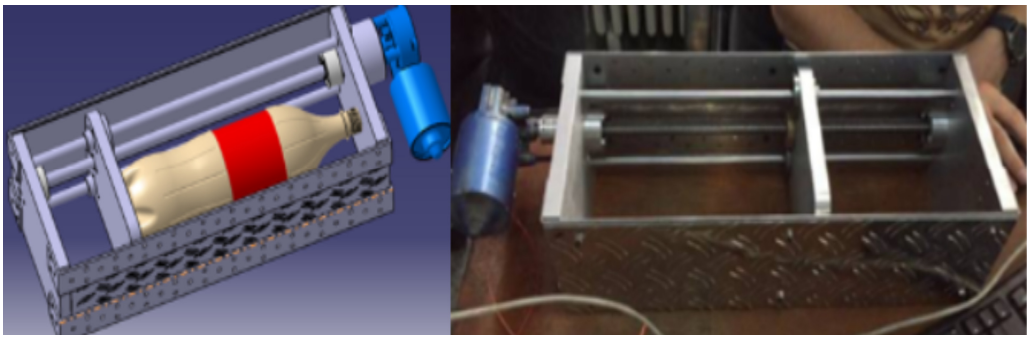

Fig.16: CAD concept (Sevastian, 2019)

The prototype tests were aimed at assessing the behaviour of the comparator using all types of waste (figure 17). It has proven to be functional, successfully performing the functions for which it was designed. At the end of the test process, good behaviour in terms of noise and vibration during operation was observed, without the need for further improvements in this direction. In addition, several things have been identified that can be improved.

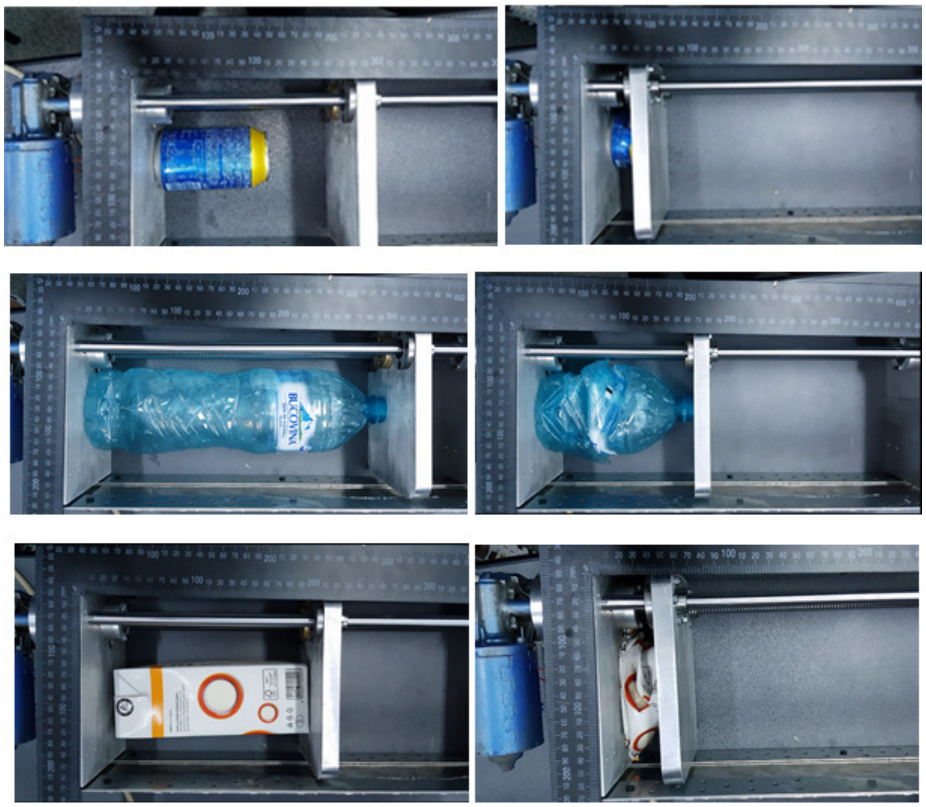

Fig. 17: Tests for different type of waste

Table 2 shows, by comparison, the initial dimensions with the dimensions of the compacted waste obtained from the testing of the prototype and using several types of waste.

Table 2: Dimensions of products

Waste Type	Material	Dimensions Initial [mm]	Dimensions after compacting [mm]	Compression ratio
Can 1	Metal	113	40	2.83:1
Beer Can	Metal	166	45	3.69:1
Can 2	Metal	131	40	3.28:1
Tetra Pack	Carton	202	40	5.05:1
PET 2l	Plastic	350	85	4.12:1
PET 1 0,5l	Plastic	187	65	2.87:1
PET 2 0,5l	Plastic	213	60	3.55:1

Product Optimization Analysis

According to the macroplanning the activity for product optimization analysis was performed during the prototyping process. It was used the method FMECA (Failure Modes, Effects and Criticality Analysis). The results of this analysis conducted to further development directions for the next version of the compactor and Smart Waste Management and Execution Application. Here are some relevant aspects:

- Reducing the section of the active pressure plate by using another nut with a larger flange diameter improving the position of stress concentrations and reducing stress in the holes areas. No residual deformations were found in the pressure plate, but at high stress it was elastically deformed.
- The possibility to reduce the section of the marginal plates. No deformations were found during the tests.
- Resizing the guide rods. Elastic buckling was found under conditions of maximum effort.
- Improving solution for evacuating air from waste during compression.
- Improving solution to protect the area where the lead screw is located from the pressing area.
- Modification in the architecture of the structure so that its stroke is not obstructed by the bearings and their fasteners.
- Improve PID adaptive optimization by extending the trials on different types of waste.
- Improve the customization and sensing for Controller State Machines. New interfaces can be developed for customization of PID and configuration parameters.
- Improve the usability of interfaces from Front Panel for the virtual instrument developed in LabView.
- Extend and improve tests of communication module. Testing them in different scenarios.
- Extend the cloud computing and analysis capabilities

The current chosen solution for compactor and Smart Management Application has gone through multiple design phases, while having continuous improvements made based on performed analysis and performance criteria, eventually ending up with the building and testing of a functional prototype.

Conclusion

This paper presented an educational development model of a Waste Management System. Based on a well-defined macroplanning different teams proposes concepts designs and technical solutions for waste compactors. Based on these a Smart Waste Management Application was developed synchronized with the same macroplanning.

The innovative system was developed based on Industry 4.0 concepts and principles.

Experimental research for prototype design has highlighted the forces needed for efficient compaction of different types of recyclable materials.

Based on the experimentally determined forces, the main mechanical and software components of the system were designed and optimized.

Smart Waste Management and Execution Application was developed as a Virtual Instrument based on Waste Management Architecture with a customised Electrical System Architecture and Programming Controller State Machines. The virtual instrument is capable to integrate all roles and capabilities from automation pyramid assumed for level 4 at the operational level. This software application communicates and exchange data with the controller from level 2 integrating the level 3 represented by SCADA.

Based on product optimization analysis performed during the prototyping process the actual version of Smart Waste Management Application integrates also basic functionalities for managing the loading status of the selective waste bins and can alert when the bin is almost full, and this can be empty. This functionality could be improved by integrating it in the whole process of monitoring a cluster of several compactors and to take operation decisions for collecting the compacted waste in an optimized way.

Based on logging and data exchange from all subordinate levels the system become capable to collects data from the sensors and states machines modes and more than that. This open another direction of development which is related to designing new graphical and data analysis tools relevant for the operational level.

This paper proved that iterative product development using Project-Based Pedagogy (PBP) synchronised with vertical integration approach from Industry 4.0 can become a new integrative education model for developing technical and transversal competences in engineering.

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Non-Life Insurance Distribution Channels in Poland Compared to Selected European Countries

Anna SZYMAŃSKA

Department of Insurance, Faculty of Economics and Sociology, University of Lodz, Lodz, Poland,
E-mail: anna.szymanska1@uni.lodz.pl

Abstract

Increased competitiveness on the insurance market forces insurance companies to change their sales strategy. The development of domestic insurance markets and consumer preferences directly affect both the models of distribution of insurance services operating in them and the directions of changes in the structure of these channels. The aim of the paper is to compare the non-life insurance sales models in Poland with selected European countries. A research hypothesis was made that models of non-life insurance distribution channels on domestic European markets can be distinguished. Research results indicate three groups of countries in Europe with a similar level of development of non-life insurance markets. Four models of insurance sales have been distinguished on the market.

Keywords: Non-Life Insurance, Insurance Distribution

JEL codes: G22, M31, C38

Introduction

Domestic insurance markets are undergoing constant transformation which leads to changes in the way of purchase of insurance products by consumers. As a result, distribution channels in the insurance sector are changing rapidly. This is favored by dynamic technological changes. One of the most important trends in the financial services sector, including insurance, is the increasing use of new technologies by entities operating on the market (Waliszewski and Czechowska, 2019).

The form in which the consumer purchases an insurance service depends on many factors, such as the type of insurance, policyholders' preferences related to habits, and the availability and ability to use new technologies. According to Eurostat data, in 2017, the most common reason for not purchasing services via the Internet in EU countries was the preference for direct contact with the seller, loyalty to the seller and habit (69% of respondents), followed by fear about the security of such a transaction (25%) and the lack of sufficient skills (19%) (Szymańska and Klapkiv, 2019). Legal regulations on the domestic insurance market related to the protection of consumer rights are also of vital importance when it comes to choosing the distribution channel. Especially in the case of non-traditional distribution channels such as direct and bancassurance, there comes the risk to protect the interests of policyholders. In the case of the direct channel, for example, regulations on the possibility of withdrawing from the contract are mentioned, and in the case of bancassurance, it often happens that access to contract conditions is limited. Both in the case of non-traditional and traditional insurance distribution channels, legal regulations limiting the phenomenon of so-called *misselling*, i.e. offering products not adapted to the customer's capabilities or needs, are also important. It is also worth paying attention to trends outside the insurance market that affect the distribution of insurance. In Poland, there is an increase in insurance sales through the dealership channel in connection with the increase in sales of new cars or the use of leasing financing. The factors that affect the insurance sales strategy also include the economic situation directly affecting the demand for insurance services (Witkowska, 2016). All this influences the structure of domestic insurance distribution channels.

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According to the Global Insurance Pools McKinsey (2020) research, over the years the insurance industry in Europe has been dominated by direct sales through agents and brokers. However, new sales trends appear in the direct channel, also with the participation of "aggregators".

In Poland, agency sales have been the dominant insurance distribution channel for 20 years. Out of non-agency channels, the most popular is the sale of insurance in banks (Głowski, 2019 p. 14). It should be emphasized that, unlike banks, some insurance companies in Poland do not yet have a mobile application that would help clients, for example, in liquidation of claims or renewal of contracts. In Poland, sales of insurance via call centers were first introduced by LINK4 in 2003, and in 2005, sales via the Internet were offered by 25% of UKNUiFE insurance companies (2005). At that time, due to the growing access to the Internet, a significant increase in insurance sales via this channel was forecast. These forecasts turned out to be wrong. You can read more about the trends in changes in insurance distribution channels in Poland in the work (Laskowska, 2019). According to aleBank (2020), the coronavirus epidemic may have an impact on a more intensive than currently development of the insurance market sold remotely in Poland.

The aim of the paper is to compare the sales model of non-life insurance in Poland and selected European countries, taking into account the level of market development. A research hypothesis was made that models of non-life insurance distribution channels on domestic European markets can be distinguished.

The first part of the study is devoted to issues related to insurance distribution. The second part discusses the methods of assessing the degree of development of the insurance market. The research methodology is presented in the next section. The next part of the study is devoted to the analysis of the non-life insurance market in Poland against the background of European countries and the insurance sales models using cluster analysis. The last part of the work presents trends in the development of insurance distribution channels presented in available publications.

Insurance Services Distribution Channels

Distribution, in economic terms, is an activity consisting of the preparation, implementation and control of the flow of products or services from the place of their origin to the place of sale. Distribution is not only a way of delivering products or services, but also determining the place and method of contact with the customer. This is one of the areas of business activity that allows for the greatest diversification of activities towards clients. Distribution channels are independent entities involved in the process of making a product or service available for use, which create permanent links between the company and other entities, operate on the market and affect the economic results achieved (Kucka, 2009 p. 109).

Distribution of insurance services includes all activities related to planning, organizing, and especially transporting finished products from the insurer to the buyer (Otto, 2001 pp. 40-44). The most important activities in the field of distribution include: insurance protection, insurance risk, insurance consultancy, information, payments, negotiations, conclusion of insurance contracts, insurance documents, claims settlement and promotion. The distribution channels themselves are defined differently in the literature on the subject. On the one hand, these are all entities that participate in distribution, and on the other, the number and sequence of intermediaries involved in moving the product from the manufacturer to the buyer (Ostrowska and Jamróz, 2016 p. 128). It is a mistake to identify the sales channel of insurance services with the distribution channel. The sales channel is only a subsystem of the distribution channel. However, in most works, these terms are used interchangeably. In this paper, the terms of distribution and sale will be used to refer to the method of selling insurance.

There are many classifications of insurance service distribution channels. Most often, distribution channels are divided into direct, where there is direct contact between the insurance company and the policyholder, and indirect, where the service is provided with the use of third parties (Otto and

Materka 2003). Traditional forms of direct distribution include the sale of insurance services by full-time employees of insurance companies employed in the branch network. Insurance companies may also employ agents on a full-time basis with fixed or mixed remuneration (monthly fixed remuneration plus commissions depending on sales results). A non-traditional channel of direct distribution is the sale of services over the telephone and the Internet, often referred to as the direct channel. The indirect channels include insurance agents, multiagents, insurance brokers, banks and other institutions (Bojanowska and Wójcik, 2015 p. 427). Bancassurance, which is a combination of banking and insurance services, is becoming an increasingly important channel here. You can read more about insurance mediation, for example, in the works (Bednarczyk, 2016 pp. 126-144; Carter and all, 2009; Mehr, 1969).

Digitization is changing insurance distribution channels. A new model of insurance sales is a hybrid model in which the client is obtained traditionally or on the Internet, while the agent prepares the contract and sends the policy in an electronic version for signature. Another popular model is the mixed model (ROPO - research online, purchase offline), which consists in searching for an offer on the Internet, for example using a comparison engine, and then finalizing the contract in traditional channels, most often multi-agencies. These models are reported differently by insurers, which distorts the statistical data. So-called internet "aggregators", ie entities initially specializing in one area, are gradually expanding their offer also with insurance, such as the German portals Check24 and Verivox and the British MoneySuperMarket. This sales model is gaining ground in Western Europe, especially in the UK. According to McKinsey's analysis in Great Britain, in 2017 aggregators became the primary distribution channel for motor insurance in direct sales (53%) (Rychlik et al., 2019).

In each country, insurance distribution is subject to separate legal regulations, which directly affects the development of individual distribution channels. In Poland, in 2017, the Insurance Distribution Act (the Act of 15 December 2017 on Insurance Distribution) was adopted, which implements the provisions of the Directive of the European Parliament and of the Council (EU) on insurance distribution (Directive of the European Parliament and of the Council (EU) 2016 / 97). The EU's IDD (Insurance Distribution Directive) aims to increase the protection of consumers concluding insurance contracts and to harmonize the provisions on insurance mediation. The Act on Insurance Distribution covers all entities distributing insurance, regardless of the distribution channel.

Measures for Assessing the Maturity of The Insurance Market

Assessing the degree of development, or in other words, the maturity of the insurance market is not easy. The most frequently conducted research analyzes: the share of the gross written premium of a given country in the global premium, for example for the whole Europe, the gross written premium rate *per capita*, the insurance penetration rate and the CRx insurance market concentration factor.

The ratio of gross written premiums *per capita*, often called the density index, is the ratio of gross premiums written to the number of inhabitants of the country (total premiums per inhabitant). The insurance penetration rate is the ratio of gross written premium to GDP (total Premium to GDP). The degree of market concentration is reflected by the CRx concentration ratio, i.e. market share, measured by the gross written premium, of the x largest insurers of the Central Statistical Office (2018).

Often, surveys also assess the number of insurance companies authorized to conduct insurance business in a given country, which allows to assess the competitiveness on the market. The degree of maturity of the insurance market can also be measured by the number of insolvencies of insurance companies (Balas-Noszczyk, 2019).

Research Methodology

The research was carried out on the basis of quantitative data taken from Polish and European public statistics: GUS[1], KNF[2], PIU[3] and Insurance Europe[4].Due to the lack of data for 2018, the data from 2017 was analyzed. It should be emphasized that the data published on the Insurance Europe website is incomplete, which makes statistical analysis difficult. There is no data for all European countries, and many countries are sampled. Not all countries collect data on distribution channels, and the records themselves are imprecise and interpreted differently by supervisory authorities (Gąsiorkiewicz, 2016 p. 22). In Europe, premiums written are broken down into five primary distribution channels: direct sales, agents, brokers, bancassurance and other distribution channels. This makes it difficult to analyze sales data in online channels or in a mixed model.

Statistical methods of structure analysis and cluster analysis were used in the research.

The main purpose of cluster analysis is to study the similarity or distinctiveness of objects. The aim is, therefore, to divide the objects into classes containing objects that are similar due to the observations on variables, and different from each other (Gatnar and Walesiak, 2004, p. 318).

One of the classification methods was used for the research, which is the two-stage cluster analysis, which is quite resistant to assumptions about the distribution of variables, allows to assess the quality of grouping using the Silhouette measure and enables automatic determination of the number of groups.

After elimination of missing data, the study analyzed 16 European countries, including Poland.

Results

The study consisted of two stages, including the classification of European countries in terms of the degree of development of the insurance market and the structure of non-life insurance distribution channels.

In the first stage of the research, a two-stage cluster analysis was carried out in order to divide countries into groups with a similar degree of development of the non-life insurance market. The following variables were used for the classification: density index and penetration index. As a result of the classification, three clusters were obtained for which the measure of cohesion and distinctiveness was at a good level (the Silhouett measure was 0.7), which proves a good division of the studied countries into groups. The importance of the classifying variables was 1 for the penetration index and 0.95 for the density index. The results of the classification are presented in Table 1.

Table 1: The results of the classification of European countries in 2017 in terms of the level of development of the non-life insurance market

Cluster number	1	2	3
Countries by clusters	Bulgaria, Croatia, Finland, Malta, Poland, Portugal, Turkey, Italy	Belgium, France, Spain, Germany, Slovenia, Great Britain	Ireland, Luxembourg
Average value of the penetration rate in the	1,67	3,20	1,85

[1] Central Statistical Office: https://www.google.com/search?client=firefox-b-d&q=GUS
[2] The Polish Financial Supervision Authority: https://www.knf.gov.pl/
[3] Polish Insurance Association: https://piu.org.pl/
[4] Insurance Europe: https://www.insuranceeurope.eu/

group [%]			
Average value of the density index in the group [euro]	330,25	1028,33	1420,00

Source: own calculations using IBM SPSS Statistics

The applied classification method enabled to distinguish three groups of non-life insurance markets, as presented in Table 1. The first group includes countries with density and penetration indicators below the average for the EU non-life insurance market (EUR 919 and 2.27% respectively).). Among them, Poland. The second group includes countries with a high penetration rate and a density index above or slightly below the EU average. Great Britain, France and Germany are here. According to Insurance Europe data, in 2017 these countries were leaders in the EU in terms of written premium, with a total share of 60.1% of the premium. The third group consist of two countries: Luxembourg and Malta, with a high density and low penetration rate.

In the next stage of the research, a two-stage cluster analysis was carried out in order to distinguish classes of countries with a similar structure of non-life insurance distribution channels. The following classification variables were used: direct sales, agency sales, broker sales, bancassurance. The variables determined the share of gross written premium obtained in a given distribution channel in the premium of a given country. As a result of the classification, four clusters were obtained. The measure of consistency and distinctness indicates a good fit of the model (Silhouette value 0.6). The importance of the predictors was: 1 for the broker channel, 0.74 for direct sales, 0.7 for bancassurance and 0.57 for the agency channel. The results of the classification are presented in Table 2.

Table 2: The results of the classification of European countries in 2017 in terms of non-life insurance distribution channels

Cluster number	**1**	**2**	**3**	**4**
Countries by clusters	**Belgium, Bulgaria, Malta, United Kingdom**	**France, Spain, Portugal, Turkey**	**Germany, Poland, Slovenia, Italy**	**Croatia, Finland, Ireland, Luxembourg**
Average share of the brokerage channel in the group [%]	53,92	18,39	14,69	7,26
Average share of direct sales in the group [%]	24,7	17,65	13,17	50,40
Average share of bancassurance sales in the group [%]	3,84	14,62	4,29	3,17
Average share of agency sales in the group [%]	20	45,84	66,45	24,47

Source: own calculations using IBM SPSS Statistics

Charts 1-4 show the obtained models of insurance distribution by country.

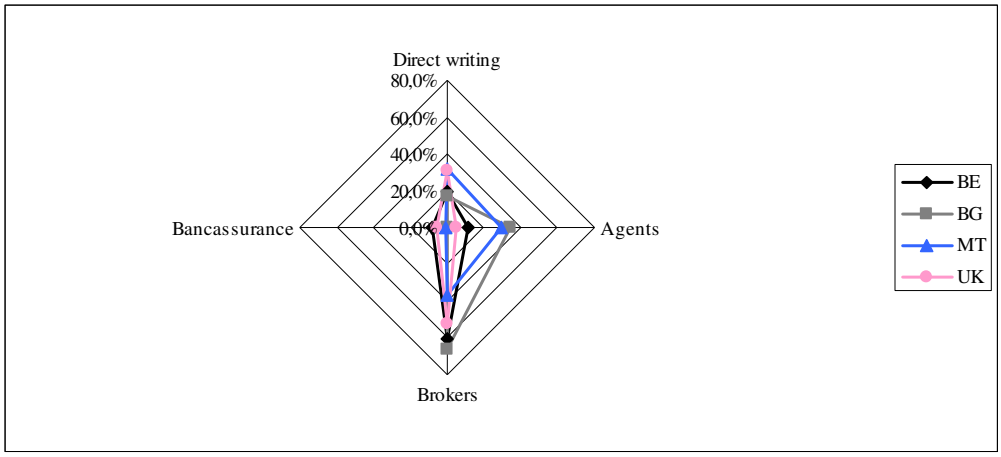

Fig. 1: Distribution channel models in cluster 1

Source: own calculations using IBM SPSS Statistics

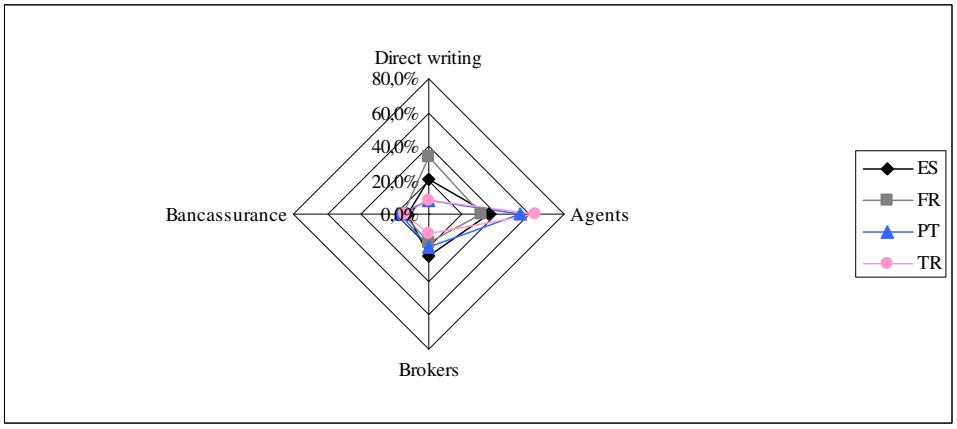

Fig. 2: Distribution channel models in cluster 2

Source: own calculations using IBM SPSS Statistics

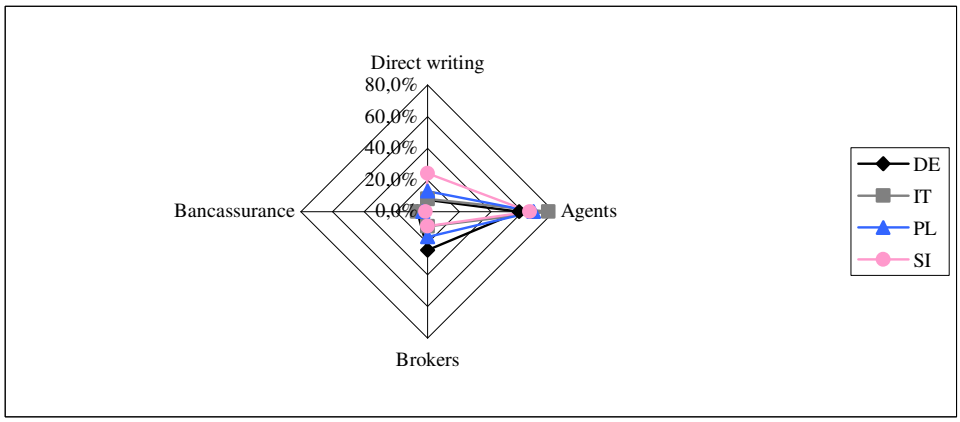

Fig. 3: Distribution channel models in cluster 3

Source: own calculations using IBM SPSS Statistics

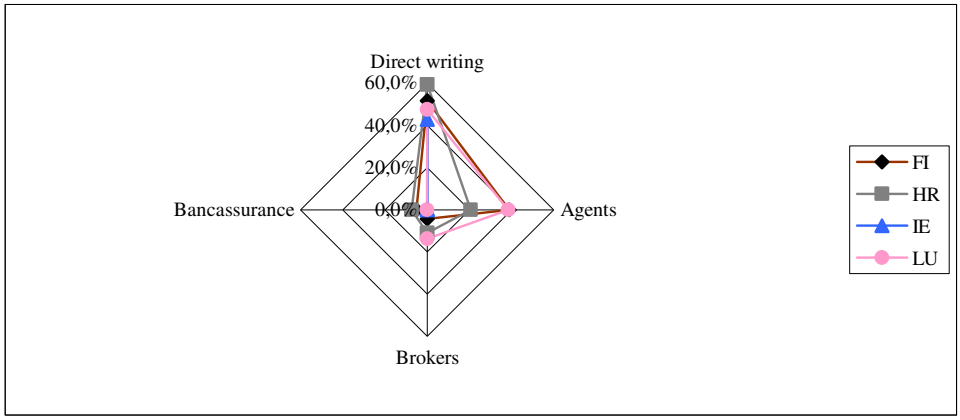

Fig. 4: Distribution channel models in cluster 4
Source: own calculations using IBM SPSS Statistics

The analysis of the classification results presented in Table 2 and Figures 1-4 allows us to conclude that there are four models of distribution channels in the European non-life insurance market. The first one is characterized by a vast majority of sales by brokers (on the domestic market on average 53.92%). The second one, with sales in the bancassurance channel relatively high to other models (14.62% on average). The third model is the dominant agency sales (66.45% on average). The last, fourth model - countries with a clearly dominant direct sales channel.

In 2017, Poland recorded gross premiums written in Section II at the level of over EUR 8.9 billion, which accounted for 1.9% of the entire EU premium written, amounting to EUR 470 billion of PIU (2018). Poland has the penetration rate of the non-life insurance market similar to the so-called "new" EU members (1.9% for Poland, 3.1% on average in the EU), ie much below the EU level. Non-life gross written premium *per capita* amounted to EUR 234 compared to the EU average of EUR 919 and it was a better result than in the countries of the "new Union". In the structure of Section II insurance distribution channels, sales through insurance agents dominate. Germany, Italy and Slovenia have a similar distribution model.

Trends in The Development of Distribution Channels

According to specialists „*Key to the success of an insurer is the ability to establish cost-effective distribution channels to enable it to make contact with potential policyholders for the sale of its products"*. (Carter et al.,2009).

You can read about the future of the development of distribution channels in Europe and in the world both in scientific studies (Laskowska, 2019; Bhattad, 2012; Marzai, 2018), and in various reports (Capgemini, 2017; McKinsey, 2020; KPMG, 2018).

The Capgemini advisory agency in its publication (2017) lists four basic trends in changes in insurance distribution:

1.Rise in customers' use of the internet to buy insurance products,
2.Increased use of social media as a distribution channel.
3.Rise in usage of SaaS solutions to enable the insurance distribution process across multiple channels.
4.Rise in usage of technological solutions to automate the underwriting process and increase direct sales.
According to the study, the preferences for purchasing insurance will change with the new generation of insurance consumers. The use of the Internet in selecting insurance offers and purchasing insurance is expected to increase. However, this trend is not as growing as expected a few years ago

due to the lack of appropriate distribution networks in developing economies and consumer habits. In the case of life insurance, customers still prefer the advice of agents, but for less complex products, such as motor and property insurance, they increasingly choose the Internet. The challenge for insurers is acquiring customers through social media such as Facebook, LinkedIN and Twitter. Social channels will be gaining ground in the insurance industry. As the number of distribution channels grows, insurers have to implement new technologies and automated insurance systems into their online sales processes.

McKinsey & Company (2020) in the report presented trends and forecasts for the insurance industry, including the development of distribution channels. According to this study, the current trends indicate a clear change in the approach to insurance sales, both in traditional and direct channels. In the future, sales in direct channels are expected to slow down in most European markets.

Summary

Nowadays, insurers use many distribution channels, from traditional ones, such as agents and brokers, to modern ones, such as call centers, bancassurance, the Internet, and mobile. Unfortunately, changes in statistical reporting have not kept pace with the development of new distribution channels. Not all European countries systematically collect data on sales channels, and published data is often estimated. Therefore, it is difficult to say what the exact shares of each channel in the distribution of insurance on domestic markets are. On the basis of Insurance Europe data, four models of insurance distribution were distinguished for the non-life market in Europe, which allowed for a positive verification of the research hypothesis put forward in the paper. European countries can be divided into those where the market is dominated by the sale of non-life insurance through brokers, into those where agency sales with a significant bancassurance channel dominate, then into countries with a clear dominance of the agency channel and those where the market is dominated by direct sales with a significant share of agency sales. However, on the basis of the available data, it is not possible to unequivocally link the type of insurance distribution model to the level of market development. The most important predictive variable in distinguishing the sales model classes was the market share of the brokerage channel. This shows the greatest diversity of the surveyed countries in this area.
It is a pity that the availability of statistical data does not allow for more accurate research in this area.

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Peculiarities in the Development of Investment Processes in the Russian Arctic

Natalia A. SEROVA

Luzin Institute for Economic Studies of the Federal Research Centre "Kola Science Centre of the Russian Academy of Sciences", Apatity, Russia

nataleks13@yandex.ru

Abstract

The research is aimed at defining possibilities of increasing the investment activity in the Russian Arctic. It involves an economic and statistical analysis of the investment process development in the Russian Arctic for 2000-2018, including the investment structural analysis in terms of financing sources, forms of incorporation and investment media. Main trends observed in the field of investments in the studied regions and Russian Arctic in general are revealed during the research. These include a 15,3 times increase in the inflow of investments over the study period, a growing share of own funds in the cumulative investments indicative of the improvement of financial stability in the majority of arctic regions and a rising portion of investments to the core capital of joint ventures with Russian and foreign ownership that suggests an efficient development of the public and private partnership. It is concluded that the Russian Arctic has a substantial potential for the activation of investment activities.

Keywords: Arctic Zone of The Russian Federation, Regions, Investments.

Introduction

Investments constitute an integral part of any economics and the most significant factor of the socio-economic state systems. Quantitative changes in investments affect all fields of national economies reckoning the issues of their attraction among the most essential objectives of the governmental investment policy.

In Russia, main consumers of investments are represented by regions, where the Arctic zones of the Russian Federation (RFAZ or Russian Arctic) are of particular importance for the development of national economy. Due to the special nature of arctic territories, which include extreme climate and environmental conditions, remoteness from national economic centers, infrastructural underdevelopment, peculiarities of settlement, unattractiveness of living conditions causing the migration outflow, etc. (Zaykov et al (2019); Kondratov (2017); Shelomentsev et al (2018); Moskalenko and Kropaneva (2013); Badylevich and Verbinenko (2017); Pavlov and Selin (2016)), their exploration and development is not possible without encouragement of investments.

Results and Discussion

The earlier investigations of the methods designed for the management of investment activities in the Russian Arctic (Serova (2019); Serova (2020); Skufina et al (2019)) demonstrated that the investment policy of Arctic regions was aimed at the activation of investment processes. In order to reveal possibilities of increasing investment activities in the Arctic regions, the author has analyzed the development of investment processes in the Arctic regions for 2000-2018.

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Analysis of the dynamics of investments to the core capital

The volume of investments to the core capital for the Russian Arctic in general in 2018 was RUB 2 367.5 billion (13.5% in the All-Russian volume of investments), of which 59.3% (RUB 1 275.3 billion) covered the wholly Arctic regions (Murmansk Region, Nenets, Yamalo-Nenets and Chukotka Autonomous Districts) and 46.1% (RUB 1 092.3 billion) accrued to the partly Arctic regions (Arkhangelsk Region, Krasnoyarsk Territory, Republics of Komi, Karelia and Yakutia). The largest volume of investments (43.3% in the cumulative investments to the Russian Arctic) was traditionally accumulated in the main gas-producing region of Russia – the Yamalo-Nenets Autonomous District.

The analysis has shown that for the Russian Arctic in general, the incoming investments for 2000-2018 grew 6,1 times. The greatest grow was typical of the Chukotka Autonomous District with a gold-mining industry as a basis of the economics (incoming investments to the region for the whole study period increased 7,3 times) and of the Nenets Autonomous District with an oil and gas production industry as a core business (incoming investments grew 5,9 times). Despite the investment expansion having been observed in these regions since early 2000s, the relative share of the cumulative investments to the Russian Arctic still remains the lowest among all Arctic zones (except for the Republic of Karelia) (Table 1). The investment rates to the level of the year 2000 below the average Russian value have been demonstrated by the Republic of Komi (131,3 %) and Karelia (168,8 %) due to the lack of large-scale investment projects in these regions that could be of interest for potential investors.

Table 1: Relative share of the region in the cumulative investments to the Russian Arctic, %

	2000	2005	2010	2015	2016	2017	2018
Wholly Arctic regions							
Nenets Autonomous District	2.3	5.6	4.0	6.1	3.7	4.5	3.9
Murmansk region	4.3	5.0	3.6	5.4	3.7	4.7	6.1
Yamalo-Nenets Autonomous District	49.8	35.1	36.4	41.8	47.6	44.7	43.3
Chukotka	0.4	1.8	0.5	0.8	0.6	0.5	0.6
Partly Arctic regions							
Republic of Karelia	3.9	3.8	2.1	1.8	1.5	1.7	1.7
Republic of Komi	10.3	12.5	10.6	9.1	8.7	5.6	5.3
Arkhangelsk region	4.0	6.3	5.4	3.1	3.6	4.5	4.2
Krasnoyarsk Territory	15.4	17.7	25.1	21.3	18.5	17.6	17.8
Republic of Sakha (Yakutia)	9.5	12.2	12.3	10.6	12.0	16.2	17.0
Source: calculated by the author.							

There is a negative trend expressed in a reduced inflow of investments over recent years and related to the deterioration of the geopolitical environment, oil price downturn, imposition of Western sanctions and other adverse factors, which significantly limited the investment opportunities of the Arctic regions (Vyakina (2017); Serova (2019); Baqheri and Akbarpour (2016); Tyll et al (2018)). In particular, sanctions mean prohibition of supplies of tailored offshore oil-and-gas production machinery and technologies to Russia and force many international companies to suspend or significantly reduce participation in various projects on the Russian Arctic shelf (Krapivin (2014)).

Analysis of the structure of investments to the core capital

In terms of structure, the largest share in the Russian Arctic falls at the investments to mining (56.9 %) and this value is even higher (75.5%) in the wholly Arctic regions. These investments are mainly concentrated in the Nenets Autonomous District (relative share of mining as a type of business in the cumulative investments of the region in 2017 was 93.0 %), on Yamal (79.5 %), in the Republic of

Komi (55.6 %), Chukotka (51.3 %), and Yakutia (46.2 %). The analysis of the investment distribution in terms of forms of incorporation is indicative of mainly Russian investments arriving to the Russian Arctic. Notably, in 2000 these mainly prevailed in the east (for example, in Yakutia, the relative share of Russian investments was 99.6% in the total volume for the region), but in 2017 this trend shifted to the west of the Russian Arctic. As well, an increase in the joint form of incorporation in the distribution of investments comes under notice particularly in the Yamalo-Nenets Autonomous District suggesting an efficient development of the public and private partnership in the region.

The trends observed in the structure of investment sources for the Russian Arctic have their own specific nature. In the developed countries, where internal (own) company's sources cover the financing of the demand for investments at 70-80%, during the economic recovery and growth periods, the share of internal sources reduces against the rise of external (attracted) funds (Igonina and Opryshko (2011)). In Russia, the economic revival during the period of overcoming the consequences of the global economic crisis was not accompanied by the reduced share of own funds in the Arctic regions. Moreover, their relative share in the cumulative investments to the Russian Arctic for 2000-2017 was on average only 41.7%.

However, the majority of Arctic regions have recently demonstrated an emerging trend of increasing share of own funds in the structure of investment sources (Table 2) to imply the improvement of their financial stability (Naumov (2013)). The most noticeable changes over the whole study period are common for the Nenets Autonomous District, where the share of own funds in the cumulative investments of the region grew 3.1 times. The opposite trend is observed in the Krasnoyarsk Territory (share of own funds reduced from 70.8% to 46.7%), Yakutia (60.3% to 38.2%), in the Murmansk Region (62.2% to 56.8%), and Yamalo-Nenets Autonomous District (26.6% to 23.1%).

Table 2: Share of own funds in the investments to the core capital, %

	2000	2005	2010	2015	2016	2017
Wholly Arctic regions						
Nenets Autonomous District	24.9	33.1	66.9	65.5	63.8	79.0
Murmansk region	62.2	61.9	34.9	43.4	53.3	56.8
Yamalo-Nenets Autonomous District	26.6	43.2	26.9	34.7	23.1	23.1
Chukotka	37.5	9.4	34.4	45.1	24.7	44.9
Partly Arctic regions						
Republic of Karelia	54.8	41.9	39.2	42.7	51.6	61.4
Republic of Komi	57.5	33.7	31.2	53.8	43.4	72.3
Arkhangelsk region	46.6	31.3	50.4	61.4	52.5	60.9
Krasnoyarsk Territory	70.8	61.5	58.4	51.1	49.5	46.7
Republic of Sakha (Yakutia)	63.0	55.3	46.3	56.3	44.2	38.2
Source: calculated by the author.						

A negative trend may be seen in the share of budgetary funds in the investment structure reduced from 14.5% in 2000 down to 13.1% in 2017. This mainly happened due to the decline in the relative share of budgetary allocations in the cumulative investments of Yakutia (from 29.3% in 2000 down to 8.2% in 2017) and Yamalo-Nenets Autonomous District (8.4% to 2.6%).

Conclusions

The analysis of the development of investment processes in the Russian Arctic in 2000-2018 has demonstrated that the Arctic regions have a significant potential for the activation of investment activities. Despite the sanction pressure and departure of international partners from joint ventures on the Russian Arctic shelf, the international cooperation in the Arctic region continues and the volumes

of national investments are growing year by year. However, due to the fact that the significant part of investments to the Arctic region was generally aimed for the development of mining, the issue of the balanced development of the investment climate in the Russian Arctic still remains urgent and requires improvement of the mechanism for the formation and implementation of a regional investment policy.

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Advantages and Limitations to Application of Telematics Systems in The Road Transport Industry in Poland

Wojciech Zalewski

Nicolaus Copernicus University, Toruń, Poland

w.zalewski@umk.pl

Abstract

The article attempts to make an in-depth analysis of the level of application and use of telematics systems based on GPS/GSM/GPRS technology in Polish road transport companies, which support transport in the implementation of goods deliveries in integrated supply chains. The article is based on a survey conducted in 2019 based on a group of 500 Polish road transport companies. The presented results clearly show a relatively low level of the use of telematics systems in management by Polish road transport companies, with a simultaneous significant level of awareness of managers as to the need to use them in the context of contractors' requirements. Based on the results of the survey, it was shown that the application of these solutions, despite the observed barriers, leads to companies obtaining significant added value in the quality of services provided. The SEM structural equation model was used to assess the impact of customer requirements and barriers to the application of solutions, as well as to assess the value added.

Keywords: Road Transport, Telematics, GPS, GSM, SEM Model.

Introduction

Today, globalization processes in the world economy have set new demands for modern transport systems. Currently, in many parts of the world, almost 80% of the mobility needs of people and goods are met by road transport. Therefore, the effective use of this mode of transport, the improvement of its forms of operation, the creation of more and more modern transport systems and the constant modernization of transport means and road infrastructure is an inevitable process.

In Poland, international road transport has become one of the most dynamically developing sectors of the economy. The proper functioning of a transport company on the international or intra-Community transport market, its financial and human resources stabilization, financing its activities, dynamics of development, the use of modern conceptual, technical and technological solutions, depend mainly on the professionalism of the company's management staff. In the light of the rapidly growing competition and the situation caused by the COVID-SARS2 pandemic, the chance to improve both the efficiency and safety in road transport, and thus the company's survival on the economic market, is created by modern telematics and IT systems, which are becoming a very important executive tool of modern supply chains, Deshpande (2012), Singh and Teng (2016). Technologies that use telematics solutions based on GPS (Global Positioning System) and GPRS (General Packet Radio Service) are of major importance in the supply chain, where road transport plays a key role.

The study is a continuation of the research and the presentation of its results related to the use of telematics systems in international and domestic road transport enterprises in Poland (Zalewski, 2019). The research objective of the article is an in-depth analysis of the level and scope of the use of telematics systems based on GPS/GSM/GPRS technology by road transport companies in Poland as well as to show to what extent barriers in the application of these solutions affect the scope of their use and the obtained added value for the company. The novelty of the paper lies in the application of recently surveyed primary data and estimation of a structural equation model (SEM) to investigate causal relations among the scope of use, contractors' requirements, value added and barriers to a wide exploration of telematics in management.

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The achievement of the intended objective resulted in the formulation of the following two research hypotheses:

1. Barriers in the use of telematics devices affect both the scope of their use in the company and the requirements for their use by contractors.
2. The requirement to use telematics devices by contractors and the scope of their use in a company have an impact on the added value achieved by them.

The research methodology included the analysis of the available literature as well as primary data obtained as a result of a survey conducted in 500 road transport companies in Poland.[1]

Telematics in Road Transport

Telematics makes it possible for road transport to use technologies and methods of remote access to vehicles or loads via a wireless teleinformatic network. As one of the logistics executive tools, it serves not only to support management processes, but also to increase the efficiency and competitiveness of the transport market. Thanks to the use of telematics elements (ICT networks, traffic control systems, electronic systems for locating vehicles and loads, electronic exchange of documents), it is possible to optimize vehicle routes (Cattaruzza *et al*., 2017), which significantly contributes to reducing the time of cargo transport (Schuessler and Axhausen, 2009). Telematics technologies that are used to track vehicles and loads are of particular importance in the transport of hazardous and high-acid materials (Minni, 2013).

The use of telematics solutions in road transport allows obtaining a lot of data, extremely useful in a transport company. Combining this with their processing by modern IT systems allows the following:

- planning optimal transport routes with the use of accurate digital maps and regularly updated system data,
- analysis and control of the routes of movement of vehicles or loads, including the minimization of their length, time and costs of transport, elimination of fraud, and, consequently, more dynamic handling of transport orders,
- registration of the basic operational parameters of the vehicle, *i.e.*, speed, distance travelled and route, engine speed, fuel consumption, axle loads, as well as monitoring the condition of the cargo space, control of on-board operation systems, *etc.*;
- control of the driver's work in the light of the regulations on maximum driving times, as well as in the scope of using the optimal driving technique ensuring economic operation of the vehicle, *etc*.,
- increasing the broadly understood safety in transport;
- precise determination of the dates of loading, customs clearance, deliveries, *etc*., and thus the optimal implementation of the goods distribution process.

When analysing the presented scopes of application of telematic systems in road transport as well as the literature in this area, we can divide these applications into the following research areas:

- the research area related to ITS (Intelligent Transport Systems) Sowman J., Box S., Wong A., *et al*. (2018), Novikov A., Pribyl P., Vasileva V., *et al.* (2017), Santa J., Fernandez P. J., Zamora M.A. (2016).
- the research area related to safety, infrastructure charges, road congestion, vehicle flow control, Khaalil Omar. K. (2017), Moriarty P., Honnery D. (2013), Mishra S., Bhattacharya D., Gupta A. (2018).
- the research area related to vehicle navigation systems, technical and telematics equipment, vehicle on-board equipment, autonomous vehicles and their control and others, Ballarin C.,

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Zeilinger M. (2017), Szigeti S., Csiszar C., Foldes D. (2017), Di Fazio A., Bettinelli D., Louette E. , *et al.* (2016).

In the literature, it is difficult to find research describing the level of application of telematics systems in road transport, which, as mentioned above, is a basic component of supply chains. In many publications, including Pflaum *et al*. (2020), Kolar *et. al*., (2010), Michel (ed.) (2017), Saenz (2019), Guhathakusta (2017), authors describing the use of modern technologies that support supply chain management using the general term digital supply chain, and on this basis analyse their efficiency or digital integration. The exception is the study by Kiba-Janiak and Tronina (2017), in which the impact of selected telematics systems on the improvement of transport tasks was assessed. The use of telematics in transport is the subject of an article by Minea and Surugiu (2013), presenting research related to transport in supply chains as the most time-consuming and cost-generating factor and the possibility of real-time analysis of events occurring in distribution processes.

The use of telematics systems in road transport in the light of the survey research carried out

The achievement of the assumed research objective, which was to determine the level and scope of the use of telematics systems by road transport companies, as well as the verification of the hypotheses proposed was, as mentioned in the adopted methodology, to conduct a survey on the basis of a specially prepared questionnaire. The study was conducted using the CATI method in 500 randomly selected road transport companies in 2019.

The study was performed on a sample of companies taken from the database of members of the Association of International Road Transport Carriers in Poland (ZMPD) and from the databases of regional associations of road carriers. The characteristics of the research sample are presented in Table 1. As a result, by combining the databases of ZMPD and the regional associations, 4,500 companies were pulled together for selection. The number of 500 respondents selected for the survey purposes was dictated by the adopted assumption of obtaining an estimated error of no more than 5%.

Table 1: The structure of the studied sample due to the selected criteria

Participation of companies due to the form of conducted activity	**[%]**	**Share of companies in terms of the number of employees**	**[%]**
Entry into the business register	40.4	Up to 49 employees	63.8
Limited liability company	36.2	50 up to 249	31.2
Joint-stock company	2.8	250 employees and more	5
Other (limited partnerships and other)	20.6		
Experience in running a business	[%]	Number of transport units	[%]
More than 10 years	60.6	From 1 to 9	49.4
From 5 up to 10 years	22.8	From 10 to 19	25
From 3 up to 5 years	12.4	From 20 to 49	6
Up to 3 years	4.2	From 50 to 100	6
		Above 100	3.8
The range of services	[%]	The leading direction of the service portfolio	[%]
International transport	66.2	Poland - other EU countries	57.8
Domestic	23.4	Poland	33
Regional	7.1	Poland - Eastern European countries	4.8
Local	3.3	Inside the EU - outside Poland	4.4

The share of companies due to the homogeneity of the conducted activity	%	The nature of the transport	%
At least 80% of revenues generated from transport activities	49.2	Universal	91.0
Less than 80% of revenues generated from transport activities	50.8	Special	9.0

Source: own study

By analysing the data presented in Table 1, it can be concluded that the sample of 500 companies selected for the study reflects the structure of transport companies providing transport services in domestic and international transport, in line with the data presented in the report https://gitd.gov.pl/fileadmin/user_upload/BTM/ZEZWOLENIA_ZAGRANICZNE/Dane_statystyczne_dotyczace_transportu_miedzynarodowego_w_2019_r..pdf. Therefore, the results of the research can be generalized to the entire population of transport companies in Poland. In addition, the analysis of the sample showed that in 85% of cases, companies had a license for domestic and international transport, and only 15% of transports were carried out for purposes of the so-called own needs.

One of the key elements of assessing the level of application of telematic solutions and, at the same time, the level of support in management processes was data analysis, which resulted from the answers to the questions to what extent Polish companies use their telematics systems. The second important measurement was the determination of the independence of the characteristics in relation to the number of vehicles (the company size), the form of business or the scope of transport orders. The majority of the information on the analysis of these data and the results are presented in the article by Zalewski (2019).

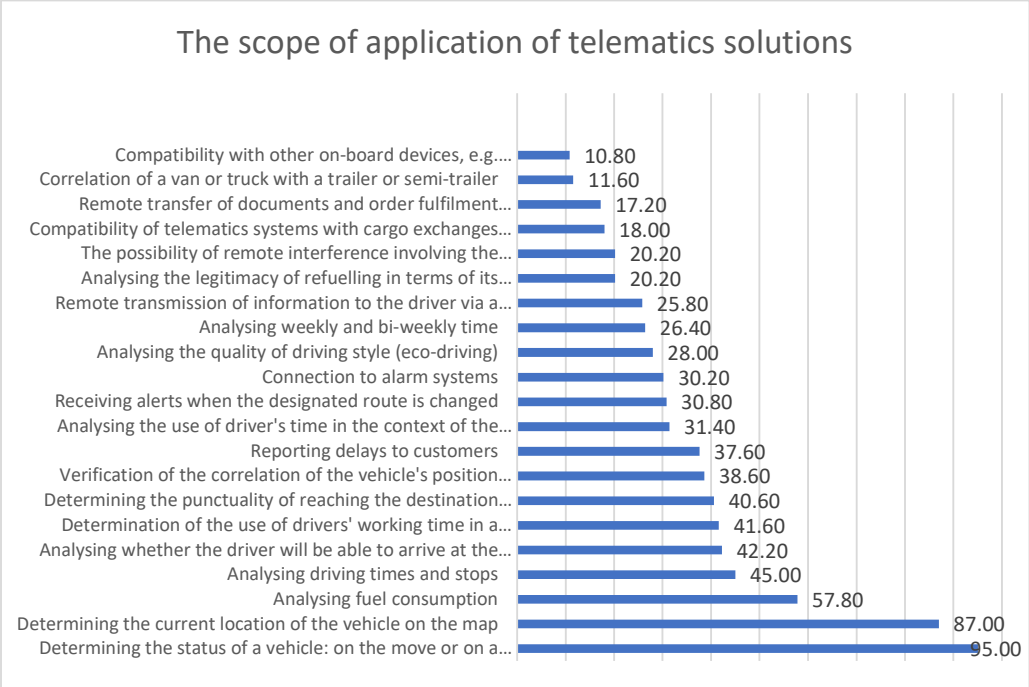

Fig. 1: The scope of application of telematics systems (numbers in %)

Source: Own study based on survey research and Osińska, Zalewski (2020).

Analysing the data presented in Figure 1, it can be concluded that despite the widespread use of telematics solutions (92% of respondents possess telematics systems) their scope and level of use is low and mainly focuses on three basic elements related to the implementation of the transport task by

the driver and the vehicle. This is the knowledge about the current condition of the vehicle (the vehicle is on the move or on a stop) - 95% of respondents consider this element important. What is the current position of the vehicle in relation to the digital map - 87% of respondents consider it important, as well as the amount of fuel consumed per 100 km - 57.8% of the answers in the affirmative. The remaining variables are less or completely irrelevant to the respondents. Information about the timely implementation of transport tasks, *i.e.*, the level related to the supply chain and the possibility of digital analysis of planning and execution, is important for only 42.2% of respondents. The result of this variable may come as a real surprise because it is closely related to the timeliness of the services provided.

In order to achieve the research objectives of this study, further analysis of the data obtained from the survey was carried out. The analysis of descriptive statistics data performed with the support of the SPSS 2.6 system allowed to state that:

- In most cases, customers do not require the carrier to have telematics systems for the implementation of transport tasks. This is the opinion of 63.2% of the respondents, 36.8% indicated such a necessity (answers on the Likert scale ranging from 1 to 7). Moreover, 31% of respondents indicated the need to present and share data online with their principals.
- 53.6% of the respondents agree with the statement that the possession and use of telematics systems is important for acquiring new orders and clients. However, taking into account the fact that the use of the systems, their scope, is at a low level, it could be concluded that it is rather a marketing benefit and not a real willingness to use.
- An important scope of using telematics systems was the question to what extent the use of telematics systems affects the support of management processes in the company. 59.4% respondents believe that this impact is important, which may confirm the level of awareness regarding the support of management processes in various systems with a high technological level, but again contradicts the findings regarding the level of application of these solutions.
- It is worth noting that 49% of the respondents did not have a dedicated TMS IT system that would cooperate with the telematics system, 52% of the respondents were not integrated with cooperating systems and in 81% of cases there was no person employed in the company who would be dedicated to carrying out analyses of the effectiveness and profitability of transport tasks using telematics data. This fact indicates that despite the management's awareness of having systems, they may not have sufficient analytical knowledge due to the lack of staff that deals with these problems. Confirmation in this case is obtained from the analysis of the question about the active participation of managers in the analysis of telematics data. Almost half (49.8%) do not participate in this process.

The key element for the implementation of the objective set out in this study was the determination and indication of the size and significance of the added value obtained by the company due to the use of telematics solutions. 51.2% of the responses indicated that the use of these solutions increases the quality of transport orders implementation through the real-time tracking of transports by customers. Similarly, over 54% of respondents believe that the systems allow to forecast the punctuality of deliveries, which directly affects their harmonization. 50.8% of entrepreneurs also indicate a significant improvement in the security of supply as a result of the use of telematic systems and over 50% indicate an improvement in flexibility and speed of response in emergency and unforeseeable situations. In addition, over 48% of respondents believe that customer relations are improving and the level of information flow increases significantly.

With regard to the physical use of the systems indicated, a question arises about the barriers to their application. In this regard, in the seven-point Likert scale, the questions were defined as to what barriers are important for entrepreneurs. Over 50% of the respondents consider the high level of investment necessary to implement the system and the current operating and maintenance costs to be the most important barrier. Moreover, the study has identified other barriers and limitations, such as the complexity of the systems proposed by suppliers, the need to employ dedicated service personnel, reluctance of drivers to be controlled by forwarding services, or difficulties in setting data standards for analysis. The share of responses pointing to these limitations did not exceed 30%.

Structural equations in the assessment of barriers and the added value of using telematics systems in road transport

In order to verify the research hypotheses put forward in the study regarding the impact of barriers and customer requirements on the use of telematics solutions, as well as the requirement of their use by contractors on the level of obtained added value, it was decided to propose a structural equations model (SEM), which is used to test hypothetical relationships between observable and latent variables.

Since both the barriers to the use of telematics devices, contractors' requirements and the scope of use of these devices cannot be measured directly with one observable variable, they must be treated as latent variables. Each of these factors should therefore be measured with the help of several observable variables, verified in terms of scale reliability. Table 2 contains the final list of observable variables selected by confirmatory factor analysis and constituting a given latent variable to ensure the highest possible level of reliability, as measured by the Cronbach's Alpha statistic.

Table 2: Latent variables including the observable variables and the Cronbach's Alpha statistics

Factor	Observable variables*	Cronbach's Alpha
Barriers to the use of telematics devices	P26_2, P26_3, P26_5	0.90
Contractors' requirements to use telematics devices	P12_1, P13_1, P14_1	0.94
The scope of use of telematic devices	P17_2, P17_3, P17_4, P17_5	0.87
The added value of using telematics devices	P24_1, P24_2, P24_3, P28_2	0.97

**Full description is presented in the annex.*
Source: Own study

All of the considered factors reached the value of the Cronbach's Alpha statistics above 0.7, which confirms the high reliability of the scale and the correctness of including a given set of observable variables as components of individual latent variables (Żurek, 2016).

Structural econometric models (SEM) allow for the recognition of latent variables in the model of a cause-effect nature. For this reason, it was decided to use them for further data analysis. The SEM model developed to verify the hypotheses posed is shown in Figure 2.

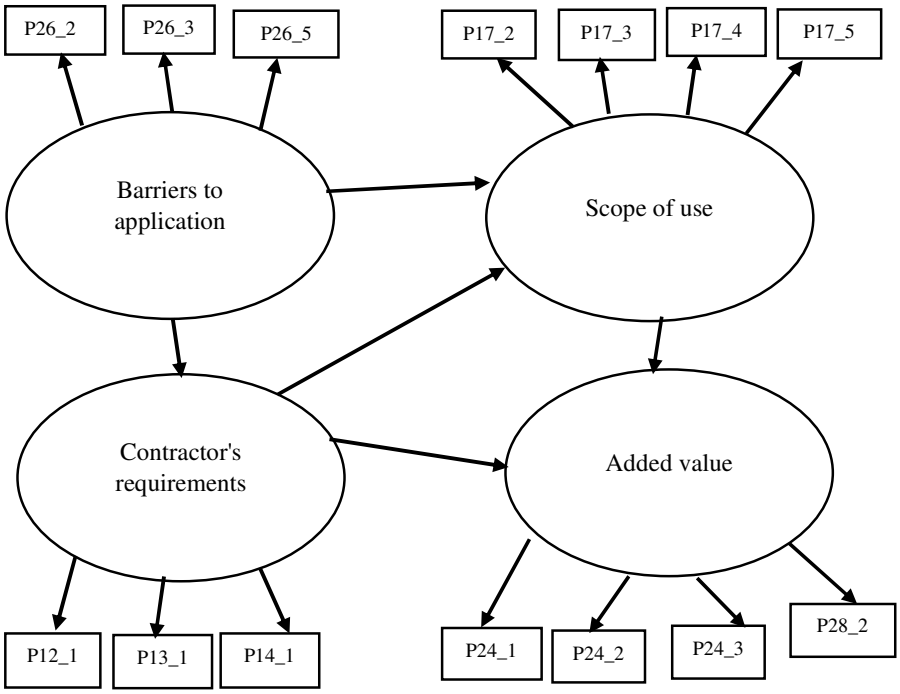

Fig. 2: Hypothetical SEM model. (Full description observable variables is presented in the appendix).

Source: Own study.

The assumed model was estimated in the SPSS AMOS v. 16 package using the maximum likelihood method with the assumed significance level at 0.05. The results of the estimation of the external SEM model, *i.e.*, the factor analysis, are included in Table 3. The results of the internal (cause-and-effect) model in Table 4, and the measures of the degree of model fit to the data in Table 5.

Table 3: Estimation results of the external SEM model

Relation	Parameter	Parameter evaluation	P Value
P26_5 ← Barriers to application	α_1	0.454	
P26_2 ← Barriers to application	α_2	0.764	0.000
P26_3 ← Barriers to application	α_3	0.751	0.000
P12_1 ← Contractors' requirements	α_4	0.946	
P13_1 ← Contractors' requirements	α_5	0.881	0.000
P14_1 ← Contractors' requirements	α_6	0.829	0.000
P17_2 ← Scope of use	α_7	0.862	
P17_3 ← Scope of use	α_8	0.787	0.000
P17_4 ← Scope of use	α_9	0.917	0.000
P17_5 ← Scope of use	α_{10}	0.881	0.000
P24_1 ← Added value	α_{11}	0.926	
P24_3 ← Added value	α_{12}	0.902	0.000
P28_2 ← Added value	α_{13}	0.828	0.000
P24_2 ← Added value	α_{14}	0.935	0.000

Source: own study based on the results of the study.

Table 4: The results of the internal SEM model estimation

Relation	Parameter	Parameter evaluation	Standardized parameters evaluation	*P* Value
Barriers to application → Contractors' requirements	β_1	0.414	0.175	0.015
Barriers to application → Scope of use	β_2	0.291	0.140	0.003
Contractors' requirements → Scope of use	β_3	0.706	0.805	0.000
Contractors' requirements → Added value	β_4	0.118	0.119	0.092
Scope of use → Added value	β_5	0.872	0.774	0.000

Source: own study based on the results of the study.

Table 5: Measures of the degree of fit of the SEM model

Model	IFI	NFI	RMSEA	CMIN/DF
Estimated	0.966	0.947	0.076	2.731
Saturated	1	0.000		
Independent	0	0.000	0.139	7.688

Source: own study based on the results of the study.

The results obtained for the external model presented in Table 3 indicate that all factor loadings are statistically significant. Some parameters do not have a given *P* value, which is due to the need to assign a constant value to some parameters in order to ensure the traceability of the model (Byrne 2010).

When interpreting the results obtained, it should be noted that the barriers to application of telematics devices significantly increase the contractors' requirements in this respect (β_1) and the scope of their use by transport companies (β_2). Furthermore, as expected, the contractors' requirements for transport companies are reflected in the use of telematics devices in a given company. The relationship between these factors was statistically significant (β_3). However, increasing the scope of using telematics devices influences the growth of the added value generated by them (β_5), which fully verifies the proposed research hypotheses.

Despite the fact that the direct impact of the contractors' requirements on the added value turned out to be statically insignificant with the assumed significance level at 0.05 (β_4), it should be remembered that their influence is indirect through the scope of use.
The value of the IFI index is 0.966, and the RMSEA is at the level of 0.076, which allows to conclude that the model is correctly fitted to empirical data.

Conclusion

The research objective of the study was to assess the scope and degree of use of telematics systems based on GPS/GPRS technology, which are used by Polish road transport companies that carry out the transport of goods services, which are the main processes of supply chains. Despite the widespread use of systems and the significant share of transport in the European market, the scope and level of use of data obtained from telematics systems is still very diverse and very low in the elements of key importance for the functioning of supply chains. The low level of use of telematics solutions may be caused by the need to employ an additional person who will conduct data analysis and inform management boards of companies about it in order to take corrective actions. Moreover, an important

element may also be the lack of standardization in the telematics systems used, which makes it difficult to present a comparable format of results.

In Polish road transport companies, there is a significant popularity of having telematics solutions based on GPS/GSM/GPRS technologies, which is confirmed by the research results obtained (92%). The scope and professionalism in the use of the systems is, however, at a very low level, despite the fact that the awareness of the management of enterprises is at a high level as to the need for increasing integration with contractors in supply chains. The results presented in the paper clearly show that the knowledge about the status of the vehicle, its current position, fuel consumption and the time remaining to be used by the driver on a given day is still important for entrepreneurs. The punctuality of deliveries, the size of delays, the efficiency of using the driver's working time or matching the places of return loads are much less important. This is due to the lack of reporting of such data to principals or a low level of awareness among managers of the impact of these elements on the quality of services provided.

The estimated model (SEM) clearly shows that an increasing motivator to use the full potential of telematics solutions are primarily customers ordering transport services, who in the era of significant restrictions resulting from the situation related to the COVID-SARS2 pandemic will want to use remote tools to monitor and analyse deliveries by carriers. Furthermore, transport companies see that the added value in the form of an increase in the quality of transport services that they obtain as a result of having solutions allows them to reach new sources of transport orders. The proposed model of the structural equation also allowed, first of all, to verify the hypotheses and, based on the observable variables, indicated the indirect impact of the requirements of contractors on the generation of added value in their logistic service. Similar models can be used to identify factors influencing defined variables in other sectors and countries. The research carried out and the results obtained indicate a further necessity to conduct research in this field. The author's new research (which has not been published yet) indicates a significant change in the application of telematics solutions that the author will probably soon describe.

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Appendix: Observable variables (on Likert scale from 1 to 7)

Observable variable	Question
P12_1	Please indicate how often your customers require telematics systems for transport.
P13_1	How often do your customers request you to provide data about the vehicle that carries out the order for them (visualization on the map plus data related to the time of loading or unloading)?
P14_1	Please indicate to what extent the possession of telematics systems in your vehicles is important for getting new orders and transport contracts.
P17_2	Control of the number of kilometres travelled by the vehicle in accordance with the mapped route.
P17_3	Matching return loads after unloading to vacant vehicles.
P17_4	Ensuring efficient use of working time by the driver.
P17_5	Analysis of the legitimacy of stoppages during the execution of the order.
P24_1	Improving the quality of the execution of transport orders by enabling the customer to track transports.
P24_2	Forecasting on-time delivery in the supply chain, which affects the harmonization of supplies.
P24_3	Increasing the security of supply.
P26_2	Availability of systems on the market
P26_3	The complexity of the systems proposed by the vendors
P26_5	Reluctance of drivers to supervise their work by forwarding services
P28_2	The system allows you to track transport tasks on an ongoing basis in the context of mileage control, the quality of order fulfilment and thus costs.

Source: Own study

Digital Copyright Asset as an Investment and Paradox of Publicity

Victor S. VORONOV

Dr., Professor, St. Petersburg State University of Economics,
St. Petersburg, Russia, box864tmn@yandex.ru

Alexander V. KAZANSKY

Ph. D, Associate Professor, St. Petersburg State University
St. Petersburg, Russia, a.kazanskiy@spbu.ru

Neli R. ABRAMISHVILI

Ph. D, Associate Professor, St. Petersburg State University,
St. Petersburg, Russia, neliko5@gmail.com

Abstract

The purpose of this work is to establish whether the placement by the author of his own digital copyright assets (DCA) in the microstock portfolio can be considered as an investment. The second goal is related to the fact that the leading intermediary companies of this type entered the stock market, and their publicity made possible fundamentally different ways of implementing investments. Therefore, part of the work is devoted to the analysis of problems and paradoxes of publicity. The research methodology is based on comparative analysis using the so-called Howey test. As a result of the analysis, it was found that DCA meet the criteria for belonging to investment activities, and can be considered as a new promising investment resource.

Keywords: Digital Copyright Asset, Howey Test, Investment, Public Company, Risk.

Introduction

In recent years, quite a few scientific publications have appeared on the analysis of investment opportunities for using digital financial assets (DFA) - cryptocurrency, smart contracts and all kinds of derivatives based on them. However, this article focuses on another class of digital assets, namely, digital copyright assets (DCA). It should be noted that there is practically no literature on the analysis of investment opportunities for using such assets. At the same time, in the work on DFA, some techniques were successfully used that can be applied to the analysis of DCA. In particular, the so-called Howey test was applied. So, for brevity, called the legal criterion used by the US Supreme Court and the Securities and Exchange Commission (SEC) to determine whether a particular transaction, security or asset relates to investment activities (Gabaldon, 2000; Telpner and Ahmadifar, 2017). The criterion has been applied since the late forties of last century, and its starting points are quite simple: in order for a transaction or instrument to be classified as an investment one, four conditions must be met:

- It is an investment of money;
- There is an expectation of profits from the investment;
- The investment of money is in a common enterprise;
- Any profit comes solely from the efforts of a promoter or third party.

Further in the article, each of these conditions will be considered from the point of applicability for the analysis of DCA.

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Another aspect of this work is related to the analysis of the impact of the entry of intermediary companies on the stock market. There are very few such companies so far, and this paper considers only those of them that form the market turnover of such copyright assets as stock digital images, sound and video files. That is, we are talking about the so-called microphotostocks. Today, Shutterstock Ink and Adobe Stock are present on the stock market. The question of the influence of the company's publicity on the investment opportunities for using assets of this class is of great scientific interest. Therefore, further in the work, the analysis within the Howey test will be combined with the analysis of problems and paradoxes of publicity.

An Investment of Money

The first test condition has not been considered in such a limited way for a long time. In various documents of the US Supreme Court and SEC, as well as in scientific works, a broader interpretation of the possibility of investing both cash and non-cash funds, and various classes of assets of a tangible and intangible nature was given (Telpner and Ahmadifar, 2017).

In our work, we consider intellectual property - copyrights in digital form, which, like any property that has a monetary value, certainly belong to assets. Such assets are specially prepared digital files of images, video, sounds, text, as well as composite objects that include the listed elements. The value of such assets depends substantially on the quality of preparation that the author/investor is able to undertake in order for the asset to be brought to the market. This aspect, in principle, is associated with the creation of an intellectual asset as property that has a monetary value. The fact is that until the mid-2010th in the scientific literature, questions have been discussed about whether a "private" file with a text or image recording can be considered an asset, and from what moment such a file can be considered an asset.

At present, with the accumulation of more experience, we can more confidently indicate the stage in the sequence of the investor's actions, as a result of which a "raw" file of this type is transformed into a more complete asset. Namely, in order for the attributes of property to become an integral part of the latter, they must be included in its information (documentary) structure. The file should be structured, for example, in accordance with the electronic document standards (ISO 10303-21:2016; ISO 8879:1986). The essence of these standards is that such a file can have both content and descriptive sections (metadata sections) in its structure. Then, in addition to the actual pictorial or literary content, it can include sections of metadata, including those that specify the attributes of property.

Modern technologies form the specified sections of an electronic document file in such a way that some of them are created automatically, and some must be filled with data manually, or programmed to perform this function for a large number of similar files belonging to one author/investor. For example, when generating an image file, a digital camera, regardless of the shooting scene, automatically generates several such sections, recorded in special generally accepted formats. In particular, in EXIF (Exchangeable Image File Format) the camera enters metadata about its own parameters (Camera data 1), and image parameters (Camera data 2). In IPTC (International Press Telecommunication Council) format, the camera prepares (but does not fill in) sections with full information about the image itself (including keywords) and copyright (see Table 1).

Table 1: Standard digital image metadata structure

Camera Data 1 (EXIF)	Camera Data 2 (EXIF)	Description (IPTC)
1	**2**	**3**
Make: NIKON CORP. **Model:** NIKON D3200 **Date:** 2019-01-27T14:37:04+03:00 **Exposure Program:** n/d **F-Stop:** f/8.0 **Max Aperture Value:** f/4.8 **ISO Speed Ratings:** 100 **Focal length:** 122.0 mm Etc.	**Pixel Dimension X :** 6016 **Y:** 4000 **Orientation :** Normal **Resolution X:** 300 **Y:** 300 **Resolution Unit:** Inch **Compressed Bits per Pixel:** 4.0 **Color Space:** sRGB **Light Source:** Unknown **File Source:** DSC	**Document Title:** Squirrel **Author:** nickname **Description:** Black squirrel in city park, close-up. **Description Writer:** nickname **Keywords:** animal; forest; fur; nature; park; sciurus; sciurus niger; summer;…(etc.) **Copyright status:** fixed **Copyright notice: -** **Copyright info URL: -**

Source: compiled by the authors based on own research

At this point, the resulting "raw" file may already be of some value and have a value estimate. In particular, we can indirectly judge that a file created with an amateur camera may have less value due to less volume and lower image quality.

However, the whole value of the received file can be realized and it can be put into commercial circulation only by filling additional attributes and fixing the author/owner, therefore, the following metadata must be included in the descriptive section of the received file (see "Description" column in Table 1):

- information about the author/owner;
- title;
- description of the plot;
- keywords;
- copyright information.

It is quite obvious from the description of this section why no machine (yet) is able to fill it in automatically. Only after the completion of this transaction, the asset can be legally recognized and its sale (transfer of rights) becomes possible. In addition, it becomes possible to search for it in a huge array of similar assets stored in databases (portfolios) of authors, owners, and most importantly, in portfolios of market intermediaries who organize the investment process. However, running a little ahead, we note that this completes only the first stage of asset preparation.

The Investment in a Common Enterprise

In the classic version of test, the second condition on common enterprise implies that investors unite their funds or assets into a common pool, and (possibly) divide the profits made in proportion to their participation. In order to correlate this condition with investing in DCA, it is necessary to clarify now which investors work with such assets and how the investments are made, i.e. what is the investment process?

Let's start with the fact that in relation to the DCA of the studied class, investors can be:

- authors who created these assets;
- any market participants who legally obtained or acquired the rights of ownership (disposal) of these assets;

- companies that create such assets on an industrial level, have their own photo, video, sound production or acquire rights from direct authors. At the same time, we note that copyrights by law may remain with the authors for life.

The investment process consists of several stages, the first of which consists in obtaining a DCA and its preparation. Otherwise, as noted above, it cannot acquire full investment characteristics. Thus, the production or acquisition of the original ("raw") digital file and the initial preparation of the corresponding sections of its metadata is an integral part of the investment process.

The next stage is the conclusion of a contract with a network financial intermediary, who organizes the market of the DCA. Note that digital copyright assets are now operated by new institutional intermediaries that emerged in various e-commerce segments in the mid-2000s. Their appearance, in fact, marked a kind of investment breakthrough in the intellectual property market. New intermediaries operate ultra-large DCA portfolios. For comparison, it can be shown that if the investment portfolios of large technology companies and patent intermediaries (aggregators) include tens of thousands of patents and other industrial property assets, then the portfolio of only one network company (microstock) Shutterstock Ink., by the beginning of 2020, confidently exceeded a mark of 300 millions of DCA (see Table 2).

The conclusion of a contract with a network intermediary implies that the author/investor agrees to fulfill the necessary requirements of the latter. Basically, these requirements relate to the quality of the preparation of the DCA, including the quality of metadata. Some requirements may relate to the content and thematic of assets, interaction with payment services and tax authorities.

After the conclusion of the contract, the author/investor gets the right to transfer his DCA to the intermediary. However, this stage also begins with the preparation of metadata. The transfer process itself is organized in such a way that it is impossible to upload a file to the intermediary's portfolio without filling in another one, this time an external metadata section, which will be stored on the intermediary's servers. This section contains data: on thematic categories the image will be exhibited by the mediator; whether the image is raster or vector; what sizes (in mega pixels) and in what formats (jpg, tiff, etc.) the images will be offered to the market; what price frames can be set for licenses of different types, etc. Each company can have this set individually, but the stage itself is mandatory.

Table 2: Largest microphotostocks as in 2020

№	Microstock	Portfolio, millions of DCA.	Author's contingent	Stock ticker
1	Shutterstock	330	More 1 million	SSTK
2	Adobe Stock	200	-	ADBE
3	Dreamstime	140	640 thousand	-

Source: compiled by the authors based on own research

Formally, after the completion of this stage, the intermediary brings the asset to the market, and the author/investor gets the hope to expect receiving investment income, which happens in practice. Thus, the third condition of the Howey test is also satisfied. However, due to many individual characteristics of the DCA, the investment process with their use has very individual features.

Expectation of Profit

First of all, we note that unlike ordinary securities, foreign currencies, and even more standardized financial derivatives, each DCA is, in fact, an author's work, reflecting the individual (including genre) preferences and creativity of the author. Moreover, compliance with this quality is one of the requirements of the intermediary, i.e. by definition, there cannot be two identical DCA in the

portfolio of the same intermediary. From this point, the pool of assets operated by the intermediary is not depersonalized, as is the case of traditional investment funds.

The next feature concerns the ability of the author/investor to manage their individual portfolio. The fact is that after concluding a contract with an intermediary, the author/investor gets at his disposal a personal account with many convenient functions. Guided by his own strategic motives, the author/investor transfers his portfolio to the intermediary, and then may not take any action, for example, not replenish it with new assets. The mediator, performing his part of the work, carries out market exposure, promotion (marketing) of all DCA at his disposal using the modern network technologies available to him. As a result of the implementation of this, the simplest strategy, the market demand for DCA may appear, and the sale of licenses for their use may occur. We are talking specifically about the sale of licenses, since the ownership rights to the DCA in this case generally (there are exceptions) remain with the authors/investors. The intermediary, in turn, has the right to sell licenses for the use of each asset multiple times, and undertakes to pay the authors/investors a predetermined portion of the income (net of commissions and other expenses), but only if the income take place.

The latter circumstance is the most significant, since the risks and uncertainties associated with digital, as well as with any other intellectual assets, are known to be the highest in the economy. Let us repeat once again that, in our opinion, this factor is one of the most significant for confirming belonging to investment activities in terms of the riskiness of obtaining the expected investment income from a common enterprise. Returning to the Howey test, we also note that the high risks inherent in the activities of an intermediary (promoter) or third party, according to many researchers, confirm the fulfillment of the last, fourth condition of the test (Telpner and Ahmadifar, 2017).

The Efforts of a Promoter or Third Party

In our opinion, the principle of participation of shares (portfolios) of individual authors/investors in the aggregate portfolio of an intermediary should be attributed to the justification of the same condition. Here, the broker's portfolio as a whole should be viewed as the aggregate intellectual capital in digital form that generates profits. In order to maintain and improve the return on investment, the intermediary commits itself to apply reasonable management efforts that affect the success of the enterprise, and the authors/investors reasonably expect a return from these efforts.

However, in addition to the general goal of profit growth, there is also a contradiction between the authors/investors and the intermediary. In particular, the intermediary is interested in multiplying the total portfolio of the company, and seeks to solve this problem in any way, including by attracting new participants. For example, the contingent of authors/investors officially registered by the aforementioned Shutterstock Ink by the beginning of 2020 exceeded 1 million people (see Table 2). The continuous expansion of the intermediary's portfolio, as in the case of a regular joint-stock company, leads to a dilution of the shares of individual participants. To mitigate this effect, they have to take steps to increase their portfolios. This is the simplest and most obvious way to preserve the return on investment, but due to the risks and uncertainties inherent in intellectual assets, even a proportional increase in individual portfolios does not guarantee that income will be maintained. In this area, as noted above, other market laws are in force.

Other important aspects of the intermediary's activities are, firstly, the development, creation and improvement of the network itself (network platform). Authors/investors expect the intermediary to further develop the network in order to ensure the growth of its value and profitability. Secondly, the task of the intermediary is, in principle, to create and then develop the market of the corresponding DCA and the formation of market prices. In particular, the intermediary is engaged in marketing, publishes its price lists in order to form market representations of the current prices of the DCA in various thematic and price categories. The intermediary also plays a key role in establishing the rules for the network trade turnover, price and other categories of the DCA, and criteria for their quality. Finally, he also conducts all transactions related to the DCA trade. Thus, it is the intermediary work to ensure the liquidity of the DCA.

The authors/investors expect that, receiving the part of the profit, the intermediary will direct it, among other things, to expand the network, which will ultimately lead to an increase in the company's total capitalization. The intermediary also assumes responsibility for ensuring the information security of the entire network. He also undertakes to control the protection of copyright (i.e. intellectual property rights of the DCA owners), and by his authority and concrete actions seeks to ensure control over their observance.

So, back to the description of the investment process algorithm, which we interrupted on the fact that the authors/investors have the right to expect receiving a specified part of the income, but only if it takes place, i.e. there have been events of (licenses) sale of their DCA. This moment is interesting in that it marks the appearing of the third, most important, administrative section of metadata for each DCA (Voronov et al., 2017). This section is also external, stored on the intermediary's servers, and the following data is automatically entered into it:

- how many times licenses for a particular DCA were sold;
- how much revenue was received from each sale. The fact is that this value is not constant and depends on a combination of many factors;
- by what keywords the buyers were looking for the asset, and which of these words are in the primary metadata section formed by the author;
- what formats and sizes were in demand, etc

Thus, if the sale of licenses for a specific asset has occurred, then due to the formation of the third (administrative) section of metadata, its value increases significantly. This is because the market sees sales data and it is a clear signal that a particular asset has moved into a higher probabilistic demand category. Uncertainty about the investment attractiveness of such a DCA decreases, and the likelihood of additional income increases with each sale. The mediator continues to add metadata to the administrative section continuously. It should be noted that if without the creation of the first, internal (see Table 1) and the second, external descriptive sections of the DCA metadata, in principle, it is impossible to bring DCA to the site of an intermediary, then the appearance of an administrative section can significantly increase its investment attractiveness, and, consequently, profitability.

The creation and improvement of all three sections of metadata can be roughly called the "Information Enhancement" of a particular DCA, by analogy with the well-known financial term "Credit Enhancement". At the same time, as in finance, information improvement can be both internal and external.

In the process of studying the strategic possibilities of managing portfolios of the DCA, we identified the momentum effect, both in individual assets and in portfolios of a similar class in general. In its most simplified form, this property consists in the fact that a portfolio, brought to a certain level of income, continues to generate it even in the absence of any control actions from the author/investor. The presence of momentum in DCA has been proven on the basis of more than 10 years of observations on the digital images portfolio as a whole, and on individual record-holding assets, demonstrating clear historical series of returns. We used the obtained experimental data to develop a generalized structural model of DCA portfolio, as well as to study financial risks using Bayesian network models (Voronov et al., 2020).

Paradoxes of Publicity

So, the analysis based on the Howey test generally confirms that the placement by the author of his DCA in the microstock portfolio meets the criteria for belonging to investment activity. However, as shown in Table 2, the leading microstocks have already entered the stock market and went public. This means that, on the one hand, any investor, regardless of whether he owns a DCA, can freely purchase microstock shares and become a participant in the intellectual property market. On the other hand, participation in the aggregate intellectual capital of a microstock is available only to authors/investors who own the DCA. This paradox leads to the fact that two diverse groups of investors have different rights to participate in equity and intellectual capital.

Another problem is that microstock equity investors are better protected because their earnings are affected only by market fluctuations in the value of the company's shares. The public microstock cannot arbitrarily lower the profitability of its shares. At the same time, as shown above, the microstock does not have any obligations regarding the share of sales revenue distributed to authors. As a result, for example, Shutterstock cut royalties by three times in 2020. Earlier, income was $ 0.25-0.33 from the sale of one license for an image by subscription, but now this value has dropped to the base $ 0.1. In response to this, a number of authors/investors turned off their portfolios in order to "wait out losses", but this is unlikely to affect the company's policy, since there are not very many of these among 1 million authors. Of course, Shutterstock is guided by its own corporate strategy, and with a portfolio of 340 million assets, there is little risk. Most likely, this is just an attempt to fix its financial problems, to which the company has every right.

In conclusion, we note one more unusual feature of microstocks, associated with the fact that, due to the fixed value of the DCA, the total value of the company's digital asset portfolio is practically independent of fluctuations in the stock market. Obviously, such companies may be of interest to hedge funds looking for opportunities to invest in assets and companies whose value is less dependent on stock market fluctuations.

Conclusion and Further Research

Finally, applicability analysis of the Howey test to digital copyright assets (DCA) showed the following:

The investigated digital copyright assets are a kind of intellectual property - copyrights in digital form, which, like any property that has a value, are classified as assets. A feature of DCA forming process is the need for special preparation of digital files in order to introduce property attributes and other metadata into their information structure. The last, administrative section of metadata is formed based on the results of asset sales, if any.

Investing in a common enterprise is carried out using the organizational structure of specialized market intermediaries, which bring the DCA of individual authors/investors into a common pool, and ensure the subsequent investment process. However, unlike ordinary financial assets, DCA are not depersonalized in the process of marketing and trading. The risk of investing in DCA significantly exceeds the risk of investing in conventional financial assets.

The intermediary allows the author/investor to independently vary the strategies for managing the DCA portfolio. At the same time, the revealed momentum effect in DCA portfolios allows generating income even in the absence of control actions. The momentum property in DCA has been confirmed by our long-term observations of digital image portfolios. Despite the fact that the momentum effect of standard financial assets has been discovered for a long time (Asness et al., 2013), there have been no reports of such a property in the DCA in the literature. Therefore, the aspect of momentum, in our opinion, is promising for further research. Among other things, in public companies, different properties of this effect can be used by both ordinary investors who own shares (for example, of microstocks) and authors/investors who manage DCA portfolios. In particular, stockholders can feel the momentum effect in the price trend of their securities, and authors/investors can use the momentum of their portfolios when choosing strategies for replenishing them with new assets.

As the leading microstocks have already entered the stock market and went public, then on the one hand, any investor, regardless of whether he owns a DCA, can freely purchase microstock shares and become a participant in the intellectual property market. On the other hand, participation in the aggregate intellectual capital of a microstock is available only to authors/investors who own the DCA. This leads to the fact that two diverse groups of investors have different rights to participate in equity and intellectual capital.

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National Culture as a Moderator in Organizational Research

Mate DAMIĆ
Faculty of Economics and Business, University of Zagreb, Croatia
mdamic@efzg.hr

Dora NALETINA
Faculty of Economics and Business, University of Zagreb, Croatia
dnaletina@efzg.hr

Luka BUNTIĆ
Faculty of Economics and Business, University of Zagreb, Croatia
lbuntic@efzg.hr

Abstract

National culture is a master variable that defines ways in which societies function and differ one from another. Organizations competing on the global market need to take national culture into account when organizing their daily operations. There exists a significant body of literature that deals with different ways in which national culture affects organizations. The aim of this paper is to analyze national culture as a moderator in organizational research. In order to systematize the most recent findings we analyzed relevant literature since 2010 with a special emphasis on methodological and theoretical implications of using national culture as a moderator. Our paper identifies key research areas and avenues for future research of the moderating role of national culture in organizational research and provides methodological and theoretical suggestions for scientists entering the field.

Keywords: national culture, moderator, organizational research

Introduction

Activities and processes within an organization are influenced by various factors from its surroundings. One of the most important factors is the national culture within which an organization does business. National culture influences an organization through the dominant norms and values of its employees, management, owners and founders. The construct itself has origins in cultural anthropology and works of Kroeber & Kluckholn (1952) and Inkeles & Levison (1969) which hypothesized that national culture can be observed as a set of values that explain ways in which individuals form their attitudes towards authority, gender roles in a society and conflict resolution. Before the 1980-s national culture was viewed as an exogenous and unidimensional variable in organizational research. Hofstede (1983) was the first to define and quantify national culture as a multidimensional construct consisting of value dimensions. Over the course of time different scientists proposed similar models of national culture (Schwartz, 1994; Trompenaars & Hampden Turner, 1997; House et al., 2002). However, these models define and measure national culture in similar fashion as Hofstede's model and are all focused on societal values. Some scientists argue that analyzing national culture only through the lens of societal values is somewhat vague (Caprar et al., 2015), but this approach is still dominant in business research and our paper will also focus on national culture value dimensions as moderators in organizational research.

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National culture value dimensions are derived from key societal issues that exist in a society and they reflect the way members of a society tackle these issues. Hofstede's national culture value dimensions model identifies six different dimensions. Power distance measures how willing are the less powerful members of a society to accept and expect that power is distributed unequally. Individualism versus Collectivism is the second dimension of Hofstede's national culture dimensions model. Societies that rank high on individualism have a stronger preference for loose social connections and individuals in these societies are expected to take care of themselves. Collectivist societies on the other hand prefer a tighter social structure and take care of the members of a wider social group. Masculinity versus Femininity is the third dimension of the model. Societies that are more masculine have a higher preference for goal achievement, assertiveness and rewards for success. Feminine societies on the other hand have a preference for cooperation, caring for other members of the society and focus on the quality of life. Uncertainty avoidance is the fourth dimension of the model and it measures how societies cope with uncertainty and ambiguity. This dimension should not be confused with risk aversion. Long term versus Short term orientation is the fifth dimension of the model. Long term oriented societies are viewed as being more pragmatic, as they easily give up tradition in order to embrace new practices that are better than the existing ones. Short term oriented societies are more focused on tradition and do not prefer social change. The sixth dimension of the model is called Indulgence versus Restraint. Societies that score high on Indulgence do not oppose leisure and are more open to activities related to enjoying life. More restrained societies do not promote leisure and are keener to regulate it by social norms.

Schein (1983) theorized that a business organization reflects different components of its external surroundings, and above all else the nationality of the management and founders of the organization. Laurent (1983) also hypothesized that assumptions and values of the local population will have a significant influence on management behavior in organizations competing on the local market. Differences in national culture often led to different outcomes of various initiatives and processes in an organization. The interest for the construct of national culture has led to a large body of literature, and a number of research streams. Two broad research streams that can be identified are the main effect and moderator studies of national culture at the individual, organization and country level of analysis (Kirkman et al., 2006). The main effects studies are dominant in the literature, and Kirkman et al. (2017) proposed that more research should focus on the role national culture plays as a moderator of different relationships within an organization. In this paper we tried to identify relevant moderator studies since 2010 with a focus on the organizational level. We hope our findings will offer a good starting point for scientists preparing to enter the research of national culture.

Methods

In order to analyze the most common theoretical and methodological approaches used we conducted a bibliography analysis using key words related to moderation, national culture and organizational research. We searched the Web of Science Social Sciences Citation Index with the year range from 2010. Our search produced a total of 22 papers which was significantly lower than expected. Kirkman et al. (2006) state that there is a lack of studies on the moderating role that national culture plays in organizations. However, there seems to be a relatively small number of contributions to this research stream, although it provides an interesting avenue for inter cultural research.

After analyzing the topics and findings of the papers we included a total of 10 papers in our literature review. We find that these paper offer relevant insights into the moderating role of national culture in organizational research. These papers also provide sound theoretical foundations for the analysis of the moderating role national culture plays in organizational research and can therefore be used as a good starting point for future cultural research. The main contribution of this paper is the systematization of a number of relevant research studies that analyze the moderating role of national culture in organizational research as well as the identification of key research areas and limitations related to existing research.

Literature Review

A number of critiques for the use of Hofstede's national culture model can be found in the literature. Taras et al. (2016) state that many other dimensions shape culture more than the nation, primarily socioeconomic and demographic factors. In addition, they conclude that national culture dimensions represent average values and do not take into account many variations that exist within a national culture. One of the problems that often occurs in intercultural research is the assumption that the influence of national culture equals the influence of the country. National culture can be seen as the most important informal institution of a country, and the dominant features of national culture are often reflected in the design of formal institutions and the way organizations operate in a country. Nevertheless, the overall national effect consists of a number of institutional and other factors, so it is very important to correctly assess not only whether national culture is important, but also to what extent it is important, i. e to assess the strength of the cultural effect (Kirkman et al., 2017). Kirkman et al. (2006) state that the common issue with the use of Hofstede's model in scientific research is that country scores cannot be lowered to the level of organization and individual directly from the national level, i.e generalize that what is valid for the country level is valid at lower levels. In addition to this, Hofstede et al. (2010) explain that national culture dimensions should only be used in studies that evaluate country differences as they represent a national average and are usable only when compared to other national averages, and not on their own. According to Steel et al. (2010) the power of prediction for cultural variables increases with the level of observation. The reason is probably that aggregating the data reduces the measurement error. Therefore, studies of the relationship between national culture and organizations should avoid ecological fallacy, i.e. assigning values from higher levels to lower levels, as well as atomic fallacy, i.e. assigning values from lower to higher levels. Taking all of this into account, and following advice from Kirkman et al. (2017), more research should focus on exploring the role of national culture as a moderator in various organizational processes and activities. An overview of relevant research that analyzed the moderating role of national culture on organizations can be found below.

Naor et al. (2010) used hierarchical linear modelling to draw conclusions about the impact of organizational and national culture on production plant performance. In doing so, they come to the conclusion that there is no significant influence of the national on the organizational culture. This result of the analysis can be partly explained by the fact that the analysis was conducted in the production facilities of large multinational companies that "imported" their organizational practices and values and in no way adapted to national culture.

Engelen (2010) analyzed the moderating role of individualism and power distance on the relationship between organizational structures, organizational culture, leadership style and entrepreneurial orientation in China and Germany. He theorizes that if there is a strategic fit between observed organizational factors and national culture, that their effect on entrepreneurial orientation will be stronger than in the absence of such fit.

In a more recent work, Engelen et al. (2015) analyze the moderating impact of individualism and uncertainty avoidance on entrepreneurial orientation. In doing so, they conclude that a combination of institutional factors has a stronger effect on organizational outcomes than each factor individually, and that it is important to observe layers of cultural values to clarify their impact on organizational outcomes.

Wiengarten et al. (2011) analyzed the impact national culture as a moderator of the relationship between investment in quality practices, factory and equipment investment on the operational performance of enterprises. They concluded that the low level of individualism has a positive effect on investments in production equipment as well as in quality practices. On the other hand, low levels of masculinity and uncertainty avoidance only affect investments in quality practices.

Engelen et al. (2012) analyzed the impact of inter-functional integration, defined as the process of interaction and collaboration between functions in an organization and organizational and national culture. In doing so, the authors show that there is a positive impact of the collectivism dimension on the relationship between interaction and collaboration between functions in the organization and the success of new products, while the impact of organizational culture was significantly smaller. On the other hand, the stronger the organizational culture itself, the stronger the positive moderating effect of collectivism in the organization.

Škerlavaj et al. (2013) analyzed the moderating impact of national culture on organizational learning culture, where organizational learning culture consists of obtaining and interpreting information as well as behavioral and cognitive changes in the organization. Research has shown that there is a moderating effect of power distance on the relationship between information interpretation and behavioral and cognitive changes, while individualism, masculinity, and uncertainty avoidance have had a negative impact on the relationship.

Černe et al. (2013) analyzed how managerial innovation affects the propensity to innovate and innovative performance in terms of commercialization and whether this relationship is affected by individualism. In doing so, they take the position that individualism has a different role in different phases of the innovation process, and especially that the impact of individualism will depend on the breadth of the definition of innovation. Based on the analysis conducted in thirteen countries, they conclude that individualism helps greatly in the invention phase, while collectivism has shown a positive impact in the commercialization phase when the company's cooperation with other stakeholders is more important.

Unger et al. (2014) analyzed the relationship between organizational culture and strategic fit of projects that an organization is engaged in. In doing so, they observed the influence of the dimensions of national culture as potential moderators of that relationship. According to the authors, masculinity, collectivism and people-orientation proved to be significant moderators of the relationship between organizational culture and strategic compliance of the project and explained a good part of the model variance.

Bachmann et al. (2016) conclude that the relationship between strategic planning and the entrepreneurial orientation of an organization will be more pronounced if the organization operates in a national culture characterized by a high level of uncertainty avoidance, collectivism and a low level of masculinity. They also state that the constructs observed at the organizational level are grounded in the interaction of variables at higher levels. A result of this is that it is often possible that observing models at only one level will lead to overlooking important factors of an observed relationship. A similar recommendation is made by some other authors engaged in national culture research (Gelfand et al., 2006; Kirkman et al., 2017;).

Strese et al. (2016) analyzed the impact of national culture on the relationship between organizational culture and the absorptive capacity of the organization. They state that power distance has a significant impact on vertical communication in an organization, individualism on the horizontal exchange of information, while uncertainty avoidance has an impact on the general attitude towards new ideas. In addition, they show that the relationship between each type of organizational culture and potential absorptive capacity is very stable regardless of national culture. However, when looking at the realized absorptive capacity, it can be concluded that a high level of power distance negatively moderates the relationship between market culture and realized absorptive capacity. Also, it can be concluded that the relationship between adhocracy culture and realized absorptive capacity is positively moderated by both high levels of power distance and uncertainty avoidance.

Based on the above, it can be concluded that a number of authors have analyzed the influence of national culture as a moderator of various organizational relationships. In doing so, they all used Hofstede's model

of national culture value dimensions. Majority of the studies has shown that national culture has an influence on different organizational processes and outcomes. The theoretical foundation for analysis of national culture as a moderator in organizational research can be traced to the contingency theory and the Venkatraman's (1989) contingency model of „fit for moderation“.

According to the contingency theory, national culture can be seen as a superior system which influences the subordinate system, i.e. the organization that operates within in. The traditional contingency model for analyzing the impact of external factors on an organization will therefore consist of three sets of variables: application of an organizational practice, contingency factors, i.e. national culture, and organizational performance following the application of the organizational practice. Following the contingency model of „fit for moderation“, the influence of an independent variable on a dependent one can vary depending on the different value of the moderator. In the case of national culture as a moderator, the strength of the effect on an organization will depend on its strategic fit (Strese et al., 2016), i.e. the degree of correspondence between organizational and national culture.

Two most commonly used methods for the analysis of national culture as a moderator in organizational research are moderated regression and hierarchical linear modelling (Kull & Wacker, 2010; Strese et al., 2016;). These methods allow the researchers to avoid ecological and atomic fallacy. Hierarchical linear modelling allows for testing of multiple research models. The testing usually starts with the null model, which is also called the no-limit model. The goal of the null model is to determine the variability in dependent variables with respect to intra-group and inter-group components and it does not contain defined predictors. After that, variables are added to the model at the first level of analysis. Following the contingency model, these variables will usually be the organizational practices and outcomes of the practices. At the first level of analysis, constants and regression coefficients are estimated. In the next step, variables of the second level of analysis are added to the model. In the case of national culture these will be the measures of different national culture value dimensions that are expected to influence the relationships defined at the first level of the model. The aim of the second level model is to examine whether the dimensions of the national culture within which a company operates affects the strength of the relationship between different organizational practices and outcomes. It is important to note that the use of hierarchical linear modelling is independent of the number of analyzed organizations from a particular country, which is very useful when conducting intercultural research (Kull and Wacker, 2010). However, the research sample should include at least ten different countries.

Conclusion

National culture is one of the most important external factors influencing organizations. It is present in the values, norms and behavior of employees, management and the founders of an organization. The dominant view on national culture is still the Hofstede value dimensions model, which was first proposed in the 1980s. This models presents national culture as a six dimensional construct, and provides country measures that make inter country comparison possible and easy. National culture literature can be broadly divided into main effect and moderator studies. The main effect studies outnumber moderator studies significantly. However, analysis of national culture as a moderator is an interesting avenue for future research due to a number of reasons.

The common issue in national culture research is that scientists tend to equate country scores with organizational and individual scores. However, values at the national level cannot be transferred to lower levels and vice versa, since doing so would mean committing either ecological or atomic fallacy. Observing national culture as a moderator can therefore be used as an elegant solution for this common issue. Another recommendation for national culture research is to try and take as many countries as possible into the research sample. Although this may lead to difficulties in data collection, national

culture dimensions should only be used in studies that evaluate country differences, and observed as national averages.

The theoretical foundations for observing national culture as a moderator in organizational research are solid, and the methods are well established and allow the researchers to avoid ecological and atomic fallacy, some of the most common issues in intercultural research. Future research should also try to focus more on similarities and differences of culture effects on different levels, therefore, hierarchical linear modelling is perhaps the most appropriate quantitative method for use in national culture research.

Future research should also try to broaden the construct of national culture. A number of authors have proposed interesting new ways of looking at national culture. Gelfand et al. (2006) proposed a cultural framework of loose and strict societies that could be used to expand the national culture value dimensions model. Leung et al. (2005) propose that future research should be more qualitative and experimental in nature since most national culture studies are quantitative and use self-reported measures. As we stated earlier in the paper, researchers should bear in mind that national culture is one among many external factors influencing organizations. Market competition, legal framework, macroeconomic environment and state institutions also have a significant impact on activities of an organization. Therefore, it is always important to measure the strength of the effect of national culture on an organization.

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Changes in The European Audit Services Market

Malgorzata KUTERA

Jagiellonian University, Cracow, Poland
malgorzata.kutera@uj.edu.pl

Abstract

In-depth changes are now taking place in the audit services market in Europe. They are mainly caused by the implementation of new rules laid down in European regulations. However, Member States have relatively broad freedom in drafting detailed regulations. In light of the above, the main purpose of this article is to identify disparities between financial audit systems in different European countries and to assess them in the context of changes introduced in the EU as a whole. Particular attention is paid to aspects connected with the organisation and the structure of the audit services market. Rules applicable in 30 countries have been analysed and differences identified concerning the scope of Public Interest Entities, the obligatory audit firm rotation, the ban on providing selected non-audit services, and joint audits. Disparities were found in key aspects of statutory auditor activities which are still very controversial. The biggest ones concern the obligatory auditor rotation and the maximum duration of engagement by a given entity. This has a negative impact on the effectiveness of the whole market and its competitiveness.

Keywords: Statutory Audit, EU Audit Reform, Audit Firm Rotation, Non-Audit Services.

Introduction

A series of scandals stemming caused by falsifying corporate financial results has significantly undermined trust in auditors globally. They started in 2001 with the collapse of Enron and the situation deteriorated further during the last economic crisis. As a result, the last several years have seen a process of in-depth changes to the financial audit system. In the European Union, this mainly entails implementing new regulations which became binding in audits of 2017 financial statements. The above regulations significantly impact formal aspects of practising the profession of a statutory auditor and the operation of audit firms. They concern, among other things, precisely defining the role of the statutory auditor, effectively preventing conflicts of interest in the provision of various services and restricting market concentration. There have also been major changes to the supervision system of statutory auditors and the rules of reporting audit results.

Directive 2014/56/EU and Regulation 537/2014 form the legal grounds for the most recent system changes. The Directive lays down a number of guidelines concerning all obligatory audits in a given country, while the Regulation introduces additional requirements for auditing the statements of Public Interest Entities (PIEs). These new regulations apply within the European Union as well as in Iceland, Liechtenstein and Norway, which are members of the European Economic Area (EEA). Even though the UK has recently left the EU, it has also implemented them.

Still, it must be said that the above regulations leave a lot of leeway in setting national rules. Altogether, they contain about 50 different options to choose from. Member States were happy to use these options and have actually implemented highly varied rules, including those governing matters that are key for the organisation of the audit services market. Significant discrepancies between national financial audit systems hinder harmonising the market within Europe as a whole and definitely reduce its efficiency. What is of fundamental importance in this context are, in particular, the regulations adopted on the scope of Public Interest Entities (which have always been subject to more detailed and demanding rules of auditing), the obligatory rotation of audit firms and the maximum duration of engagement by the client, the ban on providing certain non-audit services and the rules of conducting joint audits.

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In the light of the above, the main purpose of this article is to identify disparities between financial audit systems in different European countries and to assess them in the context of systemic changes made in the EU as a whole. Particular attention is paid to aspects connected with the organisation and the structure of the audit services market. In the introduction, EU regulations are analysed in detail, mainly to determine the degree of decision-making freedom during their transposition into national law. Then, the rules adopted by individual countries are verified in depth and key differences between them are identified.

The following research questions have been formulated:

1) What is the scope of Public Interest Entities implemented in EU countries?
2) How did individual countries approach the problem of market concentration when implementing regulations on the obligatory rotation of audit firms and the maximum duration of their engagement?
3) Which non-audit services were ultimately prohibited in the EU?
4) What solutions for joint audits have been adopted by Member States now?

In this context, there has always been a significant problem with the relatively high concentration of the audit services market, which inhibits its competitiveness. This is why the final solutions adopted by countries in this regard, including those concerning joint audits, are particularly interesting. However, the starting point of an analysis of the situation is the definition of public interest entities, as only for this group of entities is auditor firm rotation obligatory.

Theoretical Background

Serious changes to the financial audit system in Europe were initiated in 2006 as a result of very public scandals involving the falsification of company results in the early 21st century. Directive 2006/43/EC introduced a series of regulations governing the provision of statutory audits, the organisation of audit firms, introducing public supervision of statutory auditor activities and the cooperation between supervisory organisations in the EU, as well as the systematic and obligatory training of statutory auditors. More stringent requirements for audits of public interest entities were also introduced, e.g. the application of uniform standards during these audits (International Standards on Auditing) or the greater liability of statutory auditors. However, these changes turned out to be insufficient, particularly during the last financial crisis. There were widespread concerns about insufficient information in auditors' reports, lack of credibility of their contents (particularly with regard to financial accounts of banks, financial institutions and listed companies), too cosy relationships between audit firms and entities they audited, doubts as to the actual objectivity and independence of auditors, as well as the high concentration of the audit services market increasing systemic risk. In response to these concerns, another reform was carried out at the EU level, by adopting Directive 2014/56/EU and Regulation 537/2014.

The new audit regulations came into effect on 17 June 2016 and applied to the financial year starting after this date. An exception was made for the obligatory audit firm rotation, the implementation period of which was extended. However, the implementation of these regulations in individual countries followed very different paths and has still not been completed. By June 2016, 12 EU Member States had implemented the revised regulations, a year later the number was 25, and in June 2018 there were 27 such EU states. The last country in the EU to implement these regulations was Slovenia. As of July 2020, of all obligated states, the new rules had not been completely implemented yet by Norway.

Matters addressed by these new legal regulations have been the subject of many research projects over many years. In the context of this article, the most important subject is the concentration of the audit services market and the problem of auditor independence. The dominance of several audit firms significantly limits the unbiased selection of an auditor and leads to systemic risk. It also directly drives the prices of services provided by statutory auditors and the quality of their work. This is because an excessively long engagement of an auditor by their client may also limit the objectivity and the professional scepticism of the statutory auditor. This is why new EU regulations have introduced

mandatory rotation of audit firms auditing the financial statements of key entities in every Member State. Other new rules require joint audits, which force statutory auditors to cooperate, and ban the provision of certain services to the audited economic operators.

The concentration of the audit services market concerns, in particular, the services provided to the largest economic operators in each country (Simunic, 1980, pp. 161-190). The market is significantly dominated by the Big 4 audit firms. It is worth remembering that significant mergers and acquisitions occurred in the group of the largest global audit companies, which exacerbated this unfavourable development further. This has been confirmed in the research of, among others, Minyard and Tabor (1991, pp. 79-90), Wootton et al. (1994, pp. 58-74), Choi and Zéghal (1999, pp. 1-21) and Pong (1999, pp. 451-475). Institutions responsible for the security of trading have been warning for years that this high concentration may have a negative impact on price competition, the unbiased choice of an auditor and the quality of statutory auditors' work (FRC, 2006; Oxera, 2006, 2007; OECD, 2009). These warnings were particularly resounding at the beginning of this century, right after a series of spectacular company collapses initiated by the bankruptcy of Enron in 2001. However, the reforms made then in the audit services market turned out to be ineffectual, and the very same problem reappeared during the 2008 financial crisis. Analyses continued confirming the high concentration of the statutory auditor market and linking it directly with the systemic risk of the financial sector (European Commission, 2010; Oxera, 2011; Treasury Committee, 2008). It is worth noting that in the literature, the concentration of the audit services market was mainly studied from the perspective of various competition factors. In particular, its impact on the price of financial statement audits and the quality of statutory auditors' work was analysed.

Statutory auditors' independence is also the subject of many research projects. The important analyses in this context concern the prohibition on providing non-audit services to the client whose financial report the firm audits and the obligatory rotation of audit firms. However, the results are not clear cut. Some studies demonstrate a negative relationship between non-audit services provided by a statutory auditor and the quality of the annual audit of the financial statements of the entity (Sharma & Sidhu, 2001, p. 563-594; Kinney et al., 2004, p. 561-588; Khurana & Raman, 2006, p. 977-1016). On the contrary, other studies show that providing non-audit services does not actually impair the accounts auditing process (DeFond et al., 2002, p. 1247-1274, Knechel & Sharma, 2012, p. 60-81, Koh et al., 2013, p. 1-33). For example, DeFond proved that there is no significant relationship between the fees charged by auditors for non-audit services and their tendency to express other than positive opinions on the audit of the annual financial statements of the same clients.

Another aspect connected with the independence of auditors is their obligatory rotation and the maximum duration of their engagement by a given entity. In this context, both the change of the key audit partner and the rotation of the entire audit firm are analysed. The obligatory change of the key audit partner had already been introduced before. The current regulations govern the rotation of audit firms. Most scientific research does not support the thesis that a longer duration of auditor engagement by the audited company has a negative impact on the quality of services provided. On the contrary, research more often indicates a positive relationship between these aspects (Johnson et al., 2002, p. 637-660; Myers et al., 2003, p. 779-799). For instance, Myers has proven that the longer the engagement of the auditor by the company, the more sceptical the auditor is about risky decisions taken by the board of the audited entity. There are also other studies demonstrating that in the early years, the quality of financial statement audit is worse than later (Geiger & Raghunandan, 2002, p. 67-78).

The last element is the joint audit. Some analyses of this subject proved that the obvious increase of the fee for this type of audit does not necessarily lead to better service quality (Guo et al., 2017, 1595-1627). Other researchers have, for example, carried out a broad comparative analysis of joint audits in France and single audits applicable in the United Kingdom. A clearly higher level of the total fee paid in France was observed, but there was no significant improvement in the quality of the service provided (Andre et al., 2016, p. 245-274). Similar conclusions are drawn from Deng's research. He analysed the results of work of individual pairs of audit firms involved in joint audits and demonstrated that the joint work of a smaller firm and a Big4 firm does not necessarily improve the final audit quality (Deng et al., 2014, p. 1029-1060).

Methodology of Research

The main purpose of this article is to identify disparities between financial audit systems of individual European countries, particularly with regards to the organisation of the market for audit services.

First, EU regulations are analysed, mainly to determine the degree of decision-making freedom during their transposition into national law. The verification concerns mainly the provisions of Directive 2014/56/EU and Regulation 537/2014 which define a public interest entity, lay down rules of audit firm rotations, the ban on non-audit services, and regulate joint audits. This is followed by an in-depth analysis of legal texts governing the financial audit system in all obligated countries in which the reform has already been completed. This research thus covers EU Member States, the UK, Island and Liechtenstein, i.e. altogether 30 states. It excludes Norway, as the implementation in this country has not yet finished.

Detailed rules of audit service provision in individual countries were also identified by analysing secondary data, mainly form reports of the European Commission, of public authorities supervising activities of statutory auditors and of global audit firms.

Research Results

One major aspect of the audit market reform was to define Public Interest Entities (PIEs). Principally, the scope of PIEs in the new directive is not significantly different than in previous European regulation. However, Member States were given the opportunity to broaden the set of such entities and make it more precise. It should be noted that this is of key importance for the interpretation and adoption of other regulations connected with the reform. This is because the second document adopted by the EU– Regulation 537/2014 – contains important solutions envisaged specifically for the PIE group, so delineating the scope of Public Interest Entities is a starting point for implementing further changes in the audit market.

According to the definition form the directive, all the following should be treated as Public Interest Entities (Directive 2014/56/EU, article 2):
- entities governed by the law of a Member State and listed on regulated markets in the European Union;
- credit institutions operating within the EU, regardless of whether they are listed on a regulated market;
- insurance undertakings operating in a Member State, also regardless of whether they are listed on a regulated market and of their business line (i.e. type of insurance);
- other entities included in this group by individual Member States due to their significant public relevance (because of the nature of their business, their size, or the number of their employees).

The last item of the aforementioned provision offers complete freedom to expand the scope of PIEs. The majority of EU Member States took advantage of this opportunity, which led to significant differences between the criteria adopted. Consequently, attention must be paid to the definition adopted in a given country, particularly when considering the activities of multinational corporations. The conditions defined for PIEs apply to every individual company domiciled in a selected Member State regardless of where its mother company conducts its business and whether the latter is also treated as a PIE.

Of all the countries obligated to reform the system, 19 have extended the scope of Public Interest Entities while 11 adopted the definition from the EU directive. The relevant details are presented in table 1.

Table 1: Scope of Public Interest Entities

PIE defined according to the EU directive	Extended scope of PIEs
1. Ireland	1. Portugal
2. United Kingdom	2. Spain
3. Netherlands	3. France
4. Germany	4. Malta
5. Denmark	5. Slovenia
6. Finland	6. Italy
7. Estonia	7. Croatia
8. Greece	8. Austria
9. Cyprus	9. Czech Republic
10. Liechtenstein	10. Hungary
11. Luxembourg	11. Poland
	12. Bulgaria
	13. Romania
	14. Slovakia
	15. Latvia
	16. Lithuania
	17. Belgium
	18. Sweden
	19. Iceland

Another important but controversial aspect of the reform of the financial audit system in Europe is the obligatory rotation of audit firms. It applies only to services provided to Public Interest Entities. Consequently, the change of the audit firm is not obligatory for other entities, even if they are subject to the statutory duty of having their financial statements audited. The basic rule of the EU law stipulates that after 10 years of service, the audit firm must be obligatorily changed (Regulation 537/2014, article 17). The key audit partner representing a given audit firm and auditing the statements must be changed after the maximum 7 years. If a company wants to bring back its former audit company, it must wait at least 4 years before doing so.

However, the regulations have given Member States many additional possibilities of modifying this obligation, particularly during the interim period of implementing the new regulations. Namely, it its legislation, every country can:

- extend this basic duration once by another 10 years under the condition that the audited entity carries out an independent tendering procedure (so the maximum duration of engagement will amount to 20 years);
- extend this period once by another 14 years if the engagement is based on a joint audit;
- shorten the period of obligatory rotation to below 10 years.

It should also be added that authorities supervising the financial audit system in a given state may, in exceptional cases, permit the 10 year duration of engagement of the audit firm by the audited company to be prolonged by another 2 years (upon a request of the audited entity). This can, for example, occur when the entity underwent some complex restructuring processes or there were serious problems with the tendering procedure conducted.

An analysis of rules finally adopted by individual Member States shows major discrepancies between them. Limits concerning the obligatory auditor rotation are summarised in Table 2.

Table 2: Rules of audit firm rotation (in years)

Country	Minimum engagement duration	Maximum engagement duration	Possible engagement extension (by tendering)	Possible engagement extension (by joint audit)
Austria	1	10	Not possible***	Not possible***
Belgium	3	9	9	15
Bulgaria	1	7	Not possible	Not possible
Croatia	1	10	10	10
Cyprus	1	10*	10*	14**
Czech Rep.	1	10	10	Not possible
Denmark	1	10	10	14
Estonia	2	10	10	Not possible
Finland	1	10	10	14
France	6	10	6	14
Germany	1	10	10**	14
Greece	1	10*	10	Not possible
Hungary	1	10*	Not possible	Not possible
Iceland	1	10	10	14
Ireland	1	10	Not possible	Not possible
Italy	9	9	Not possible	Not possible
Latvia	1	10	10	Not possible
Liechtenstein	1	10	Not possible	Not possible
Lithuania	2	10	Not possible	Not possible
Luxembourg	1	10	10	Not possible
Malta	1	10	10	Not possible
Netherlands	1	10	Not possible	Not possible
Poland	2	5	Not possible	Not possible
Portugal	2	8 or 9	1-2	Not possible
Romania	1	10	10	Not possible
Slovakia	2	10	10	Not possible
Slovenia	3	10	Not possible	Not possible
Spain	3	10	Not possible	4
Sweden	1	10	10**	14**
UK	1	10	10	Not possible

** other rules for banks and financial institutions*
*** not possible for banks, insurance undertakings and pension funds*
**** possible for contracts concluded in 2003-2014*

The above data clearly shows that individual countries have made significant use of the scope of freedom they were afforded when implementing EU legislation. With regards to the minimum duration of audit firm engagement, most countries adopted 1 year (20 states). Only 10 countries adopted other rules, with Italy and France choosing the most demanding ones. With regards to the maximum engagement duration, the solution adopted in EU regulations is the most popular (10 years). However, there are also clear restrictions: the shortest duration of engagement is effective in Poland, namely 5 years. There are much greater disparities in the rules allowing the possible extension of the engagement duration of the audit firm. For normal audits, this possibility was generally not introduced in 11 countries, and for joint audits in 20. An overall analysis of data shows that Europe now has about 17 different solutions for the obligatory audit firm rotation adopted by the total of 30 countries. It should be noted that these rules apply only to PIEs, but the definitions of a PIE differ in various states. This brings about major disparities between national systems of financial audit.

The third aspect of the reform of the audit services market concerns the prohibition of providing certain types of services to entities whose financial statements are audited by the specific audit firm. This prohibition applies only to selected non-audit services provided to Public Interest Entities and their affiliates.

Under EU rules, the provision of the following additional services to the audited company is prohibited (Regulation 537/2014, article 5):

a) within the scope of tax and tax compliance services:
   - preparation of tax forms;
   - payroll tax;
   - customs duties;
   - identification of public subsidies and tax incentives – unless the provision of this service by the auditor is required by law;
   - support and client representation during tax inspections by state authorities – apart from exceptions defined by law in which representation by the auditor is obligatory;
   - calculation of direct and indirect tax and deferred tax;
   - tax advice;
b) valuation services;
c) accountancy, keeping books of accounts and executing financial reports;
d) payroll services;
e) designing and implementing internal control or risk management procedures related to financial information or designing and implementing financial information technology systems;
f) internal audit activities;
g) legal services:
   - the provision of general counsel;
   - negotiating on behalf of the client;
   - acting in an advocacy role in the resolution of litigation;
h) promoting, dealing in, or under-writing shares in the audited company;
i) human resources management services with respect to:
   - exerting significant influence over accounting or the preparation of financial statements (e.g. searching for or recommending candidates for the financial department);
   - structuring the organisation design;
   - cost control;
j) other services:
   - related to financing, capital structure and investment strategies of the client;
   - involving the auditor in the client's management and decision-making processes.

It should be noted that the regulations have left certain freedom to Member States in fine-tuning their regulations also in this area. In addition, every state may define other prohibited services and lay down more restrictive rules of providing non-audit services. What is more, the state may permit the provision of services related to tax law and asset valuation, on the condition that

- they have no direct or have immaterial effect on the audited financial statements;
- the estimation of the effect of these services on the financial statements is comprehensively documented and explained in an additional report to the audit committee;
- the principles of auditor independence are fully complied with.

In every case, the audit committee is obliged to set additional, detailed conditions for the provision of these services by the audit firm.

When analysing the rules adopted by individual Member States, it should be noted that they generally followed two approaches: either only defining prohibited services in their legislature (“black list”), or presenting a clear, exhaustive list of allowed services (“white list”). The second solution is obviously

more restrictive, as it severely curtails the scope of non-audit services. However, it has been applied in some cases. A full list of solutions applied in this area is given in Table 3.

Table 3: Implementation of rules on non-audit services

Country	Restrictions in line with EU regulations	Conditional provision of tax and valuation services
Austria	Yes	Yes
Belgium	Yes	Yes
Bulgaria	Yes	Only tax services
Croatia	Yes	Yes
Cyprus	Yes	Yes
Czech Rep.	Yes	Yes
Denmark	Yes	Yes
Estonia	Yes	Yes
Finland	Yes	Yes
France	No (additional prohibitions)	No
Germany	Yes	Yes
Greece	Yes	Yes
Hungary	Yes	Yes
Iceland	Yes	Yes
Ireland	Yes	Yes
Italy	Yes	No
Latvia	Yes	Yes
Liechtenstein	Yes	Yes
Lithuania	Yes	Only tax services
Luxembourg	Yes	Yes
Malta	Yes	Yes
Netherlands	No (white list)	No
Poland	No (white list)	No
Portugal	Yes	No
Romania	Yes	Yes
Slovakia	Yes	Yes
Slovenia	Yes	No
Spain	Yes	Yes
Sweden	Yes	Yes
UK	No (additional prohibitions)	Yes

The above table clearly shows that most countries adopted rules identical with EU solutions. Only four countries decided to expand the scope of prohibited services, including two which created white lists. With regard to the conditional provision of tax and valuation services it is clear that the majority of countries decided to adopt a flexible solution in this regard. A definite ban on the provision of these services was imposed by only 6 countries.

The last part of changes in the audit services market which significantly impacts its structure is the explicit introduction of a joint audit, i.e. an audit of financial statements conducted independently by two audit firms. This auditing model had been followed before and was particularly popular in France. The new regulations emphasise its importance in the context of improving the credibility of auditors' work. However, there is no obligation to introduce joint audits, even under engagements by Public Interest Entities. Member States enjoy complete freedom in this regard. To date, joint audits have been introduced as obligatory in three countries: France, Bulgaria and Croatia. In France, they are obligatory for auditing financial statements of all PIEs, in Bulgaria – only for banks, insurance undertakings and

pension funds, while in Croatia – for the largest PIEs (when conditions concerning employment or total assets are met). In other countries joint audits are optional, but some are trying to promote this form of cooperation between audit firms, e.g. by extending the time before the obligatory auditor rotation.

Conclusions

Research results presented above answer the key research questions asked in the introduction to this article. Member States adopted different definitions of a Public Interest Entity. In 19 of them the scope of PIEs is now definitely broader than proposed by the EU directive. Only 11 adopted a definition identical as in European regulations. This ultimately means that in individual states, different groups of economic operators are subject to more stringent rules of financial statement auditing. Even greater disparities were identified between solutions concerning the obligatory rotation of audit firms. An analysis of the minimum engagement duration shows that only 10 countries adopted a duration greater than 1 year. In the majority, the auditor must be changed after 10 years, which is what was proposed in the directive. However, there are also countries in which the change must occur earlier (e.g. after just 5 years in Poland). Significant discrepancies are also visible when one analyses the rules for extending the auditor engagement. For normal audits, no such possibility is envisaged in 11 countries. On the other hand, 19 countries introduced conditions for extending the engagement, but these are quite diverse. In case of joint audits, longer engagement is impossible in 20 countries. Only 10 decided to intentionally promote this form of financial statement auditing and introduced some criteria for extending the auditor engagement in this regard. In most cases, the ban on providing selected non-audit services is equivalent to the proposal from the directive. Four countries introduced more stringent restrictions. There are greater discrepancies concerning the conditional provision of tax and valuation services by an audit firm. A outright ban on their provision was adopted by 6 countries, while the remaining ones allow it. The last research question related to the organisation of joint audits. In this context, it is worth noting that this solution was not adopted generally as obligatory. Only 3 countries chose it (France, Bulgaria and Croatia), and to very different extents. In the remaining countries joint audits remain optional.

To summarise the results of this research, it should be said that European countries adopted solutions for the financial audit system that differ quite a lot in many aspects. This also applies to key issues related to the activities of statutory auditors, which have led to many controversies over the years. Consequently, the audit services market in Europe cannot be called fully harmonised. The discrepancies certainly limit its effectiveness and negatively impact the level of competition. However, one should add that this this reform represents another good step in improving the transparency of audit firms' activities and the quality of services they provide.

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Health Promoting Lifestyle among Domestic and International Students in Russia: A Comparative Analysis

Evgeni NIKOLAEV
Ulianov Chuvash State University, Cheboksary, Russia
E-mail: pzdorovie@bk.ru

Elena LAZAREVA
Ulianov Chuvash State University, Cheboksary, Russia

Nadezhda LANTSOVA
Ulianov Chuvash State University, Cheboksary, Russia

Lyubov ROMANOVA
Ulianov Chuvash State University, Cheboksary, Russia

Rahmatulla YAKUBOV
Ulianov Chuvash State University, Cheboksary, Russia

Abstract

Students belong to population groups that have a high risk of health problems and risky behaviors. The use of the Health-promoting lifestyle profile allows the identification of factors influencing health keeping behavior. The study involved 205 students from various Russian universities, 97 of them were domestic students, 108 – international students. Participants filled out the Health Promoting Lifestyle Profile. According to the results, both groups of students had sufficient resources to maintain psychosocial well-being. The adherence to a healthy lifestyle in the groups of domestic and international students had its own gender and age specifics. The reason for these differences may be not only cultural factors associated with religious, educational, health-improving traditions. The differences may also be based on economic factors.

Keywords: Health Promoting Lifestyle, Domestic Students, International Students, Russia.

Introduction

Despite their young age, students belong to those population groups that have a high risk of health problems and risky behaviors (Chistopolskaya et al., 2016; Chistopolskaya et al., 2017). The origins of such health disorders in students can lie both in the specifics of relationships in the parental family (Nikolaev et al., 2016), and in the influences of the modern social environment, pushing young generations to excessive using mobile communication devices (Nikolaev and Kulygina, 2019).

The use of the Health-promoting lifestyle profile (Walker et al., 1987) allows the identification of factors influencing health-promoting behavior. This questionnaire is widely used in the world in many languages - Malay (Kuan et al., 2019), Russian (Petrash et al., 2018), Turkish (Soylar et al., 2017), Farsi (Baygi et al., 2017), Kurdish (Kamali et al., 2016), Spanish (Mullins et al., 2013), Chinese (Meihan and Chung-Ngok, 2011), and others. It serves as a tool for studying healthy lifestyles of population, in particular, students in Saudi Arabia (Alzahrani et al., 2019), Croatia (Mašina et al., 2017), South Africa (Roomaney et al., 2017), sailors in Iran (Baygi et al., 2017), pregnant women in Turkey (Soylar et al., 2017), postmenopausal women in Sri Lanka (Rathnayake et al., 2020).

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This work is an attempt of a comparative study of health-promoting lifestyle profile in two groups of university students living and studying in Russia. The first group - students from different regions of Russia, the second group - students who came to study at a Russian university from abroad. These university students have the same conditions of study and living. Possible differences between groups can only be related to socio-cultural specifics.

Method

The study involved 205 students aged 17 to 27 years from various Russian universities, who studied full-time at different faculties. 115 of them were women (56.10%), 90 were men (43.90%). 97 students (47.32%) were citizens of Russia, 108 (52.68%) were citizens of Azerbaijan, Egypt, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. In the groups of domestic and international students, there were no significant differences in the ratio of subjects by sex and age ($p > 0.05$).

To study health promoting lifestyle among domestic and international students, study participants anonymously filled out the Russian version (Petrash et al., 2018) of the Health Promoting Lifestyle Profile (Walker et al., 1987). The standard values of the questionnaire scales obtained by the authors of the questionnaire validation in Russia in St. Petersburg (Petrash et al., 2018) were taken into account in the comparative analysis of the data obtained in this study.

Statistical analysis was carried out by using basic statistics and comparing mean values and standard deviations with a normal distribution of indicators using the Student's t-test at a significance level of p not less than 0.05.

Results

Comparison of the indicators of healthy lifestyle in domestic and international students of Russian universities with the normative sample data of the HPLP Russian version showed that statistically significant differences in behavioral activity are identified (Fig.). In particular, domestic and international students reliably more often have a more responsible attitude to their health and more often understand how important it is to maintain and improve their health ($p<0.001$). Domestic ($p<0.05$) and international students ($p<0.001$) are significantly more likely to have regular physical activity. Following a certain nutritional system and choice of certain foods that support health are reliably more often found in international students in comparison with the norm ($p<0.05$).

The cognitive and emotional components of healthy lifestyle in domestic students do not differ from the normative data. In the group of international students, significant differences with the norm were revealed according to the characteristics of spiritual growth ($p<0.05$) and stress management ($p<0.001$), which is manifested by their greater desire in self-realization and developing internal resources and taking more active measures to overcome stress and relieve emotional tension.

Generalized characteristics of healthy lifestyle in domestic and international students also significantly exceed the normative indicators. Significant differences are more pronounced in international students ($p<0.001$) than in domestic students ($p<0.05$).

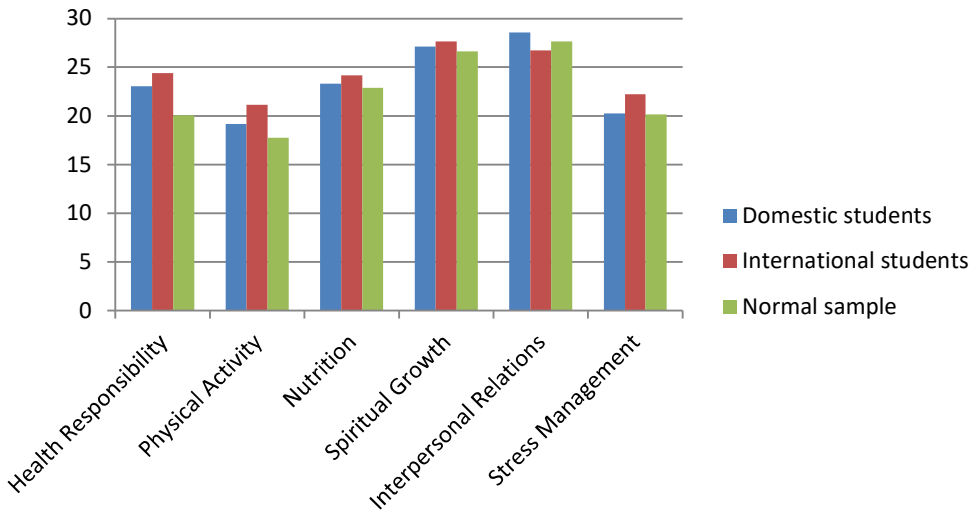

Fig. Health-Promoting Lifestyle Profile in domestic, international students and normal sample

At the next stage of the analysis, a comparison was made between the indicators of healthy lifestyle in domestic and international students. Significant differences between the studied groups on the scales of Physical Activity ($p<0.001$), Interpersonal Relations ($p<0.001$) and Stress Management ($p<0.001$) are revealed. The results indicate that international students are more likely to exercise regularly than domestic students, they are better able to recognize sources of stress and take measures to eliminate it. At the same time, international students are less able to use interpersonal communications to establish close relationships.

Further, a comparison was made between domestic and international students in gender subgroups. As the analysis showed there are no significant differences between male domestic and male international students in characteristics of healthy lifestyle. In female subgroups significant differences are revealed in parameters of Physical Activity ($p<0.05$), Interpersonal Relations ($p<0.001$) and Stress Management ($p<0.001$).

In line with this, male domestic and international students share the same models of health promoting behavior. Female international students have more physical activity through regular exercise. They are also better able to recognize stress and take measures to eliminate it. Domestic female students are more likely to use communication to build close relationships.

The study of the healthy lifestyle among domestic and international students was also carried out taking into account the age factor. Thus, it is found that at the age of 17-20, international students not only more often resort to regular physical exercises to maintain health ($p<0.001$) but also manage stress better than their Russian peers ($p<0.05$). At the same time, domestic students use communication skills better than international students for close and trusting contacts ($p<0.05$). At an older age of 21-27, international students cope with stress better than domestic students of the same age ($p<0.001$).

Conclusion

From the results obtained, it is obvious that in the studied groups of domestic and international students in Russia the health promoting lifestyle is well formed and both groups of students have sufficient resources to maintain psychosocial well-being. However, the adherence to a healthy

lifestyle in the group of domestic and international students has its own specifics. Overall, healthy lifestyle indicators are more pronounced among international students. Domestic students, in comparison with international students, can better use communication skills to maintain close relationships. This is more pronounced among younger female domestic students. International students are more eager to maintain good physical shape through regular exercise, as well as deal better with emotional stress and stressors. These features are more pronounced among young international students and among female students. Older international students are more likely to have more developed stress management abilities.

The reason for these differences may be not only cultural factors associated with religious, educational, health-improving traditions of a particular country from which the student comes. The differences in the healthy behavior of students may also be based on economic factors, explaining the greater attention of international students to health issues by the need to protect it in terms of payment for medical services. All this should be the subject of further comparative studies.

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Psychosocial Characteristics Related to Health in University Undergraduates in a Context of Cultural Background

Evgeni NIKOLAEV
Ulianov Chuvash State University, Cheboksary, Russia
E-mail: pzdorovie@bk.ru

Elena LAZAREVA
Ulianov Chuvash State University, Cheboksary, Russia

Svetlana PETUNOVA
Ulianov Chuvash State University, Cheboksary, Russia

Natalia MAKSIMOVA
Ulianov Chuvash State University, Cheboksary, Russia

Elena LITVINOVA
Ulianov Chuvash State University, Cheboksary, Russia

Abstract

The purpose of the research is a comparative study of the psychosocial characteristics of health related behavior in undergraduate students with diverse cultural background who live and study in one cultural reality. A group of 97 native students and group of 108 foreign students of several Russian universities took part in an anonymous survey through social networks. Students motivated to healthy behavior prevail among the studied university undergraduates. The revealed specific psychosocial risk factors for native and foreign students may become a guideline for cultural relevant preventive programs and regular activity of university medical and psychological services.

Keywords: Health, Psychosocial Risk Factors, University Undergraduates, Native Students, Foreign Students, Cultural Background.

Introduction

Behavioral health risk in undergraduate university students is the subject of research by scientists from many countries (Kang et al., 2014; El Ansari et al., 2018; Di Benedetto et al., 2020). The researchers focus on the issues of illegal drug use by students (El Ansari et al., 2020) and use of other psychoactive substances (Delgado-Lobete et al., 2020), attitudes towards death (Chistopolskaya et al., 2016) and suicidal behavior (Chistopolskaya et al., al., 2017), eating behavior (Kabir et al., 2018) and specificity of body weight control (Alipour et al., 2015), determinants of health-related lifestyles (Aceijas et al., 2017) and mobile phone use related anxiety (Nikolaev et al., 2018).

At the same time, psychosocial health issues are closely related to the specifics of the family environment (Nikolaev et al., 2016) and the cultural context (Powell, 2018). That is why the purpose of the research is a comparative study of psychosocial characteristics of health related behavior in groups of undergraduate students with diverse cultural background who at the moment live and study in one cultural reality.

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Method

The study, which was conducted in the form of an online survey, was attended by students studying at Russian universities. The first research group, representing native Russian students, consisted of 97 people with an average age of 19.96 ± 2.49 years. These students were residents of Russia. The proportion of men in the group was 42.27%, women - 57.73%. The second research group of 108 participants was represented by foreign students who came to study at Russian universities from 6 countries of Central Asia and the Middle East. The average age of students was 20.53 ± 1.87 years, the proportion of men - 45.37%, women - 54%. Students received an offer to take part in an anonymous survey through social networks in Internet. The questions of the online-form dealt with student's socio-demographic status and attitude to health-risky behaviors. The primary data obtained were processed using common statistical techniques including descriptive statistics, chi-square test and correlation analysis..

Results

Comparative analysis of socio-demographic characteristics of native Russian and foreign students reveals significant differences in adherence to religion (χ^2=137.48; p<0.001), employment (χ^2=6.59; p<0.05), place of residence (χ^2=118.46; p<0.001). The distribution by sex and age in these groups does not have significant differences. The majority of foreign students (94.44%) are adherents of Islam, the majority of native students (75.26%) are Orthodox Christians. The percentage of students consider themselves to be non-believers is about ten times higher in native students (11.34%) than in foreign students (1.61%). More than three quarters of native and foreign students do not work (76.29% and 89.81%, respectively). At the same time, native students are more likely to work officially (9.28% vs. 4.63%) or officially and periodically (14.43% vs. 5.56%). The overwhelming majority of foreign students live in a hostel (92.59%). More than half of native students live in their own housing (57.73%), less often in rented housing (23.71%) or in a hostel (17.53%).

The specificity of the cultural background also manifests itself in undergraduate university students in differences in perceived stress (χ^2=35.41; p<0.001). More than half of native students (56.7%) experience moderate and 22.68% high levels of stress. While foreign students are more likely to rate perceived stress as insignificant (38.89%) or high (26.85% of students) (Table).

The study of attitudes towards suicide among native and foreign undergraduate students shows that the majority of students in both groups believe that suicide is unacceptable behavior (91.75% and 84.26%, respectively). At the same time, 12.96% of foreign students consider suicide acceptable and 7.22% of native students believe that suicide can be a way out of an unsolvable situation.

In the course of further analysis, significant differences are obtained between native students and foreign students in consumption of alcohol (χ^2=8.53; p<0.05) and other psychoactive substances (χ^2=5.71; p<0.05). Most of the surveyed students do not smoke cigarettes (84.54% and 83.33%, respectively) and hookah (70.10% and 67.59%, respectively). Among native students 6.19% often smoke cigarettes, 13.89% of foreign students rarely smoke cigarettes. Hookah is rarely smoked by 29.90% of native students and 26.85% of foreign students. Hookah is often smoked by 5.56% of foreign students. In general, native and foreign students are more inclined to smoke hookah than cigarettes, possibly considering this type of tobacco intake as safer for health.

Table: Psychosocial characteristics related to health in groups of students (%)

Indicator	Variables	Native students	Foreign students
Conventional and electronic cigarette smoking	often	6,19	2,78
	seldom	9,28	13,89
	none	84,53	83,33
Hookah smoking	often	-	5,56
	seldom	29,90	26,85
	none	70,10	67,59
Alcohol consumption	often	2,06	2,78
	seldom	38,14	19,44
	none	59,80	77,78
Other psychoactive substances consumption	often	-	-
	seldom	-	5,56
	none	100,00	94,44
Attitude towards suicide	suicide is permissible	1,03	12,96
	suicide can be a way out of an insoluble situation	7,22	2,78
	suicide is unacceptable	91,75	84,26
Perceived stress level	none	2,06	14,81
	low	18,56	38,89
	moderate	56,70	19,44
	high	22,68	26,86

Significant differences are determined in the attitude of undergraduate university students to alcohol consumption: native students are more inclined to drink alcohol in comparison with foreign students. 59.79% of native students and 77.78% of foreign students do not drink alcohol. 38.14% of native and 19.44% of foreign students rarely drink alcohol. Alcohol is often consumed by 2.06% and 2.78% of students, respectively.

To determine the content of the relationship between the studied parameters in cultural groups of students, a correlation analysis is carried out separately. Thus, in the group of foreign students, significant interrelationships are revealed between the level of stress and suicidal ideations ($r=0.27$; $p<0.01$), the level of stress and the use of psychoactive substances ($r=0.29$; $p<0.01$), suicidal ideations and cigarette smoking ($r=0.29$; $p<0.01$), hookah smoking ($r=0.23$; $p<0.001$), frequency of alcohol consumption ($r=0.28$; $p<0.01$), frequency of other psychoactive substances consumption ($r=0.43$; $p<0.01$). In the group of native students, the number of reliable relationships is much less. Positive correlations of suicidal ideations with cigarette smoking ($r=0.41$; $p<0.001$) and alcohol consumption ($r=0.42$; $p<0.001$) are revealed.

Conclusion

The presented research has shown that students motivated to healthy behavior prevail among the studied university undergraduates. This applies to both native students and foreign students. However, differences in cultural background are accompanied by differences not only in sociodemographic characteristics, but in psychosocial characteristics related to health as well.

If the values and behavior of native students are more connected with Orthodox traditions, Islamic traditions occupy an important place in the life of foreign students. These influences, in our opinion, are manifested in the fact that foreign students perceive stress to a lesser extent and more often than native students refuse alcohol. This is on the one hand. On the other hand, Islamic traditions do not have an absolute protective effect. Every twentieth foreign student uses psychoactive substances other than tobacco and alcohol. Every fifth of them uses alcohol with varying frequency; every sixth of foreign students lacks an anti-suicidal barrier. Especially alarming is the relationship between suicidal ideations, stress and substance use, incl. tobacco and alcohol.

These psychosocial risk factors for native and foreign students should be taken into account by university authorities. They can also become a guideline for cultural relevant preventive programs and regular activity of university medical and psychological services.

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The Effectiveness of 'Travel Fair' Social Media Marketing Activities towards Customer Response in the Airlines Industry

Terrylina Arvinta MONOARFA

Universitas Negeri Jakarta, Indonesia
terrylina@unj.ac.id

Rahmi RAHMI

Universitas Negeri Jakarta, Indonesia
rahmi@unj.ac.id

Nofi Dewi MUSTOFAH

Universitas Negeri Jakarta, Indonesia
NofiDewiMustofah1707617001@mhs.unj.ac.id

Abstract

This study aims to analyze the effectiveness of using Social Media Marketing Activities (SMMA) on brand equity and customer response in the aviation industry. The survey was conducted on 173 respondents who knew the ad of the travel fair program through social media and had made purchases at the travel fair program. The method used to analyze data is Structural Equation Modeling (SEM). Where the results of the study indicate that SMMA influences brand awareness, brand image, and customer response both directly and indirectly.

Keywords: Social Media Marketing Activities, Brand Awareness, Brand Image, Customer Response.

Introduction

The digital age has changed consumer behavior. Various information and offering that are presented through social media and various applications have changed the shopping behavior of consumers. At present the use of social media marketing has penetrated to the aviation industry. Social media marketing is a media that is considered capable enough to inform and promote a program to the public with an exponential effect. Various data shows that most tourists have conducted various information searches on tourism destinations to accommodation facilities using digital media. The digital lifestyle that occurs in most tourist behavior is a reason why airline companies have websites and social media as media in marketing activities. One of the aviation promotions programs that has recently come under the spotlight of young people is the travel fair program. Where in the travel fair program, the public gets information about airlines that offer special prices for next year's flight schedule to various foreign destinations.

For young people, traveling is not just a pleasure but a lifestyle. If previously it was considered a luxury item, but now it is considered a mass luxury. The life of young people who cannot be separated from social media and the desire to display the latest photos is one of the drivers why the number of tourists traveling the world is dominated by young people (Starcevic, Konjikusic, & Metropolitan, 2018). Local airlines such as Garuda Indonesia and AirAsia Indonesia also hold regular travel fairs where prospective tourists get more information through social media such as Twitter, Facebook and Instagram. Even some foreign airlines, such as Singapore Airlines, Japan Airlines, Cathay Pacific, Silk

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Air, All Nippon Airways (ANA), Asiana, Korean Air, Thai Airways, now routinely hold travel fairs in Indonesia by collaborating with several banking companies in Indonesia and Indonesian travel agents as a partner program.

It is undeniable that the existence of social media has the opportunity to increase Brand Awareness and Brand Image, even further able to increase Customer Response. This is in line with studies conducted by Kim & Ko (2012) in testing the role of social media marketing activities of leading fashion brands (LV) in Korea, as well as research on the existence of social media on several well-known brands (Burberry, Louis Vuitton, Dior, Gucci , and Hermes) who are able to have a positive influence on Brand Equity (Brand Awareness and Image) and Customer Responses (Preferences, Premium Prices, and Loyalty) also have been conducted by Godey et al. (2016). In addition, Seo & Park (2018) in his research on the aviation industry has tested the effectiveness of social media and its effects on Brand Equity (Brand Awareness and Image) and Customer Response (e-Word of Mouth and Commitment) on airline companies in Korea.

In this case, what needs to be addressed is whether the strategy to increase the ease of accessing air transportation modes through the travel fair program can be an effective step for Indonesia to increase its tourism appeal to drive its economy. Meanwhile, foreign airlines are also implementing the same strategy in Indonesia, by offering more diverse foreign flight routes and competitive flight facilities.

Based on the phenomena that occur in the aviation industry in Indonesia, which are then corroborated by several studies that have been done before, the researcher wants to evaluate the effectiveness of social media, especially in the travel fair program in the aviation industry in Indonesia. Whether when a customer makes a purchasing decision at a travel fair, it can be said that Social Media has been effective in encouraging the formation of Brand Equity (Brand Awareness and Image) and providing an optimal influence on the Customer Response, both directly and indirectly.

Literature

Social Media Marketing Activities (SMMA)

Richter and Koch describe social media as an online application program, platform, or media that facilitates interaction, working together, or sharing content (Kim & Ko, 2012). In other words, social media is a space to express opinions openly or comment on anything raised by others, whether in the form of text, images, sound, or video. Communication that occurs on social media is two way. This communication creates community quickly because of the same interests with each other (Kotler & Keller, 2019). Social media marketing is the latest addition in the world of marketing, which is used to establish communication on an integrated marketing plan. Hemsley & Dann (2014) defines it as a commercial marketing event or process that uses social media in an effort to positively influence consumer buying behavior. Lee classifies Social Media Marketing Activities (SMMA) in the form of communication, information providers, carrying capacity of daily life, media promotion and sales, as well as forms of social response and activity response. Nowadays, consumers tend to trust information obtained through social media more than advertising in a marketing or promotional activity (Seo & Park, 2018).

Kim & Ko (2012) have described Social Media Marketing Activities (SMMA) into several dimensions, such as entertainment, interaction, and word of mouth, on the objects of research in the fashion industry in Korea. Godey et al. (2016) in the same industry added dimensions of trendiness and customization. Whereas Sano (2014) in a study of insurance companies in Japan, has added the dimension of perceived risk in explaining SMMA. Seo & Park (2018) in his research on the aviation industry in Korea, explained SMMA through several dimensions, namely: entertainment, interaction, trendiness, customization, and perceived risk.

Manthiou, Chiang, & Tang (2013) mentioned that entertainment is an important dimension to measure SMMA. That a person often uses social media for reasons of seeking pleasure and the virtual

community that is in it that has presented something and gives attraction. Furthermore, in the dimensions of interaction Delerue, Kaplan, & Haenlein (2012) explain that social media is an interaction space so that between brands and customers or between customers can meet, discuss, exchange ideas in virtual communities (Seo & Park, 2018). Muntinga, Moorman, & Smit (2011) explain that the trendiness of social media drives consumer behavior, such as the desire to see new things, curiosity for something new, and the desire to get information before making a purchase decision. Customization, according to Nam & Yeo, is a tool for companies to communicate the uniqueness of their brands (Seo & Park, 2018). Perceived risk is used as a dimension of SMMA where it is explained that social media serves to reduce customer concerns for a brand (Sano, 2014).

Brand Equity and its drivers

Bong na, Marshall, & Keller (1999) explain that brand equity is divided into brand awareness and brand image. Customer-based brand equity is defined as the differential effect of brand knowledge on consumer responses to brand marketing. So that the explanation of brand knowledge is divided into two components, namely brand awareness and brand image. Brand equity is formed in consumers' memories as a unique value that distinguishes one brand from another by combining various brand properties.

Brand Awareness

Brand awareness is the ability of consumers to recognize a brand (brand recognize) and recall a brand (brand recall) in a particular product category (Atilgan, Aksoy, & Akinci, 2005; Bong na et al., 1999; Keller, 2005). In other words, that the level of one's brand awareness of a product can be measured when consumers are able to recognize and recall a brand at different times. Brand awareness has four levels namely unaware brand is the lowest level in the brand pyramid, where consumers are not aware of a brand. Brand recognition is the minimum level of brand awareness which is important when a consumer chooses a brand when making a purchase. Brand recall is a reminder of a brand without passing assistance / stimulation to mention certain brands in the market. Top of mind is the brand that first appears in the minds of consumers and is mentioned when asked about a product category on the market.

Brand Image

Brand image shows something positive about a brand. Brand image can be made when the association linked to the brand is in a profitable, strong, and unique position; which refers to brand networks in the minds of consumers, because brand knowledge is seen from the perspective of associative network memory models (Bong na et al., 1999; Keller, 2005; Pappu, Cooksey, & Quester, 2005). Additionally, creating a profitable, strong, and unique brand image uses for sustainable competitive advantage with attractive economic returns. Brand image is formed from the following factors: 1) Quality, related to the quality of products offered by producers with certain brands; 2) Trusted or relied upon, related to opinions or agreements formed by the public about a product consumed; 3) The usefulness or benefits, associated with the function of a product that can be utilized by consumers; 4) Price, which in this case is related to the high or low of the amount of money spent by consumers to influence a product, can also affect the long-term image; and 5) The image of the brand itself, which is in the form of views, agreements and information relating to a brand of a particular product.

Customer Response

Customer response is measured through customer preferences, willingness to buy premium prices, and customer loyalty. Parguel, Delécolle, & Valette-Florence (2016) explain that preference for a brand is a condition where among the many brands competing in the market, a consumer only chooses one main brand choice based on the knowledge and feelings consumers have towards that brand. Yann, McColl, & J. Kitchen (2010) explain that the measurement of preferences can be done by asking consumers questions to show which brands are consumers' favorite among several categories or brands.

Willingness to pay is a form of buying behavior where there are conditions in which consumers are willing to pay whatever price is offered, when compared to other brands (Godey et al., 2016; Netemeyer et al., 2004). Jacoby illustrates that customer loyalty to a brand is a form of buying behavior (consumer response) in which of several existing brands, a consumer only focuses on one brand. Some literature states that loyalty is a psychological process in which consumers have made purchases and plan to make repeat purchases in the future (Godey et al., 2016).

Design of Hypotheses

Mangold and Faulds explain that social media in their activities is part of the marketing mix in communicating a brand. Similarly, Bruhn et al. stated that social media had a significant impact on brand equity, specifically brand awareness (Godey et al., 2016). Hutter, Hautz, Dennhardt, & Füller (2013) in his research stated that social media user interaction influences brand awareness and purchase intention of MINI Cars. Likewise, (Seo & Park, 2018) in his research concluded that social media marketing activities have a positive effect on the formation of brand awareness. Furthermore, brand awareness has a positive effect on customer response. The hypotheses in this study are:

H1: Social Media Marketing Activities have a positive effect on Brand Awareness.

Social media has a dramatic impact on a brand's reputation. As concluded from his research that customers will respond positively to a brand's reputation when a company has social media (Kim & Ko, 2012). This is in line with Godey et al. (2016) and Seo & Park (2018) explained that social media had a positive effect on brand image formation and subsequently brand image had a positive effect on customer responses. The hypotheses in this study are as follows:

H2: Social Media Marketing Activities have a positive effect on Brand Image.

Seo & Park (2018) in a research on the aviation industry in Korea, concluded that Brand Awareness has a positive effect on customer commitment which is one form of Customer Response. Godey et al. (2016) in his research concluded that the brand equity measured has a positive influence on customer responses in the fashion industry. The hypotheses in this study are as follows:

H3: Brand awareness has a positive effect on customer responses.

Brand image as a variable forming brand equity has a positive influence on Customer Response (Godey et al., 2016). This is in line with research conducted by Seo & Park (2018) that Brand Image has a positive influence on commitment and e-WOM which is the variable forming Customer Response.

H4: Brand Image has a positive effect on Customer Response.

According to Kim & Ko (2012) in his research it has been proven that Social Media Marketing Activities effectively have an indirect effect on Customer Response manifested in the Purchase Intention variable. Next, Sano (2014) in a research on an Insurance company in Japan also concluded that Social Media Marketing Activities had a direct or indirect effect on Customer Response manifested in the Positive Word of Mouth and Commitment variables. Godey et al. (2016) also agreed that Social Media Marketing Activities contribute to an increase in customer response, both directly and through Brand Equity variables. Likewise Seo & Park (2018) has concluded that Social Media Marketing Activities indirectly have a positive effect on Customer Response as measured through Commitment and Electronic Word of Mouth. Thus, the hypothesis in this study are:

H5: Social Media Marketing Activities have a positive effect on Customer Responses.

Methodology

This research is a qualitative method with a descriptive approach. The data collection technique used is purposive sampling technique by setting certain criteria in selecting respondents. The respondent is someone who has seen the promotion of a travel fair program on social media and has purchased flight tickets through a travel fair program. The number of respondents in this study were 173 people. The data analysis method in this study is to use Structural Equation Modeling (SEM) using Amos 18. All

scale was adapted from previous research and measured using five-point Likert scale ranging from 'strongly agree' to 'strongly disagree'. Social media marketing activities used five dimensions (entertainment, interaction, trendiness, customization, perceived risk) adapted from Seo & Park (2018). Brand equity explained brand image and brand awareness adapted from Godey et al. (2016) and Seo & Park (2018). Customer response was measured by three indicators (preference, willingness to pay, loyalty) and adapted from Godey et al. (2016). A pilot test was carried out 30 participants who had experience dealing with 'Travel Fair' social media activities. According to their comments and feedback obtained from the participants, some modification was made on the arrangement of the questionnaire.

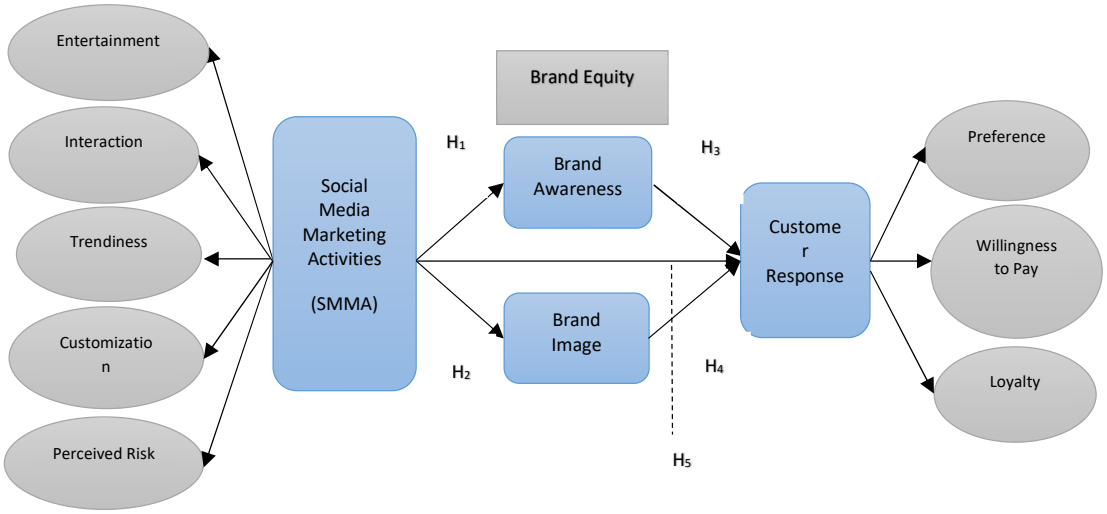

Figure 1: Research model

Table 1: Questionnaire Items

Concept	Construct	Items
SMMA (Seo & Park, 2018)	Entertainment	1. The social media of this airline is enjoyable. 2. The content shared about by the social media of this airline is enjoyable.
	Interaction	3. Information sharing is possible in the social media of this airline. 4. The discussion and exchange of opinions is possible in the social media of this airline. 5. The expression of opinions is easy in the social media of this airline.
	Trendiness	6. The information shared in the social media of this airline is up to date. 7. The use of social media by this airline is fashionable.
	Customization	8. The information that I need can be found in the social media of this airline. 9. The social media of this airline provided the information that I needed.
	Perceived risk	10. The social media of this airline alleviated my concern(s) regarding the airline's service. 11. The social media of this airline alleviated my concern(s) about using the airline.

Brand Equity (Seo & Park, 2018)	Brand Awareness	1. I am always aware of this airline's brand when I come to the travel fair event. 2. I am aware of the characteristics of this airline when I come to the travel fair event. 3. I can always remember the logo of this airline when I come to the travel fair event.
	Brand Image	4. This airline is a leader in the industry. 5. I have an impressive memory regarding this airline. 6. This airline is customer-centered.
Customer Response (Godey et al, 2016)	Preference	1. Although another brand has the same features, I would prefer to purchase from this airline. 2. It seems smarter to purchase from this airline. 3. Although there is another brand as good as this airline, I prefer to buy from this one.
	Willingness to pay	4. When brand x increases the price a little bit, then I will keep brand X. 5. I am willing to buy any price offered from brand X 6. I am willing to buy from brand X, although other brands offer better promotions.
	Loyalty	7. I will suggest brand X to other consumers. 8. I would love to recommend X brand to my friends. 9. I regularly visit brand X. 10. I intend to visit X brand again. 11. I am satisfied with brand X with every visit. 12. Brand X would be my first choice. 13. Brand X is my choice in a future.

Table 2: Profile of respondents

Sample Characteristic (N=173)		
Categories	N	%
Airline using social media		
Garuda Indonesia	96	55.5
Singapore Airlines	31	17.9
AirAsia Indonesia	32	18.5
Japan Airlines	11	6.4
Cathay Pacific	3	1.7
Gender		
Male	78	45.1
Female	95	54.9
Age		
30 or younger	64	37.0

31-40	60	34.7
41-50	38	22.0
51 or older	11	6.4
Marital Status		
Married	102	59.0
Single	71	41.0
Occupation		
Employee	86	49.7
Entrepreneur	10	5.8
Public Employee	27	15.6
Students	13	7.5
Housewife	36	20.8
Others	1	0.6

Exploratory Factor Analysis

This analysis is used to classify variables based on similarity. The similarity is shown by the high correlation value. Validity and reliability tests were measured using factor analysis. The first thing to note is to test the KMO (Kaiser-Meyer-Olkin) value.

Table 3: Exploratory Analysis

	Customer Response	SMMA	Brand Awareness	Brand Image
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0,947	0,863	0,890	0,827
Bartlett's Test of Sphericity (Sig.)	0,000	0,000	0,000	0,000
Cronbach's Alpha	0,964	0,911	0,918	0,881

It can be said that each variable represents a statement on the questionnaire that can form factors or dimensions. Where the KMO value >0.5 and the level of significance in the Bartlett's Test of Sphericity is <0.05. The results of the factor analysis that formed the variables look valid in this test. In addition, through Cronbach's Alpha it can be concluded that all statements used to measure variables are reliable.

Confirmatory Factor Analysis

This analysis is used to identify the relationship between variables by conducting a correlation test. Second order construct is used to test the model per variable which consists of several dimensions and indicators to get a fit model according to index criteria.

Table 4: Confirmatory Factor Analysis

	Customer Response	SMMA	Brand Awareness	Brand Image	Cut-Off Value	Evaluation Model
P	0,250	0,512	0,222	0,214	≥ 0,05	*Fitted*
CMIN/DF	1,130	0,969	1,397	1,451	≤ 2,00	*Fitted*
TLI	0,996	1,001	0,992	0,991	≥ 0,95	*Fitted*
CFI	0,997	1,000	0,997	0,996	≥ 0,95	*Fitted*
RMSEA	0,028	0,000	0,048	0,051	≤ 0,08	*Fitted*

Based on the following table describes the results of the Second Order Construction test produced by the variables in the research model. As a result of testing the model obtained from research in accordance with the criteria, which proves that the model is in accordance with existing data.

Empirical Results

Table 5: Fitted Model

	Dependent Variable		Independent Variable	*Regression Weights Model*	
				C.R	Result
H1	Brand Awareness	<---	SMMA	5.124	Accepted
H2	Brand Image	<---	SMMA	3.410	Accepted
H3	Customer Response	<---	Brand Awareness	5.595	Accepted
H4	Customer Response	<---	Brand Image	5.951	Accepted

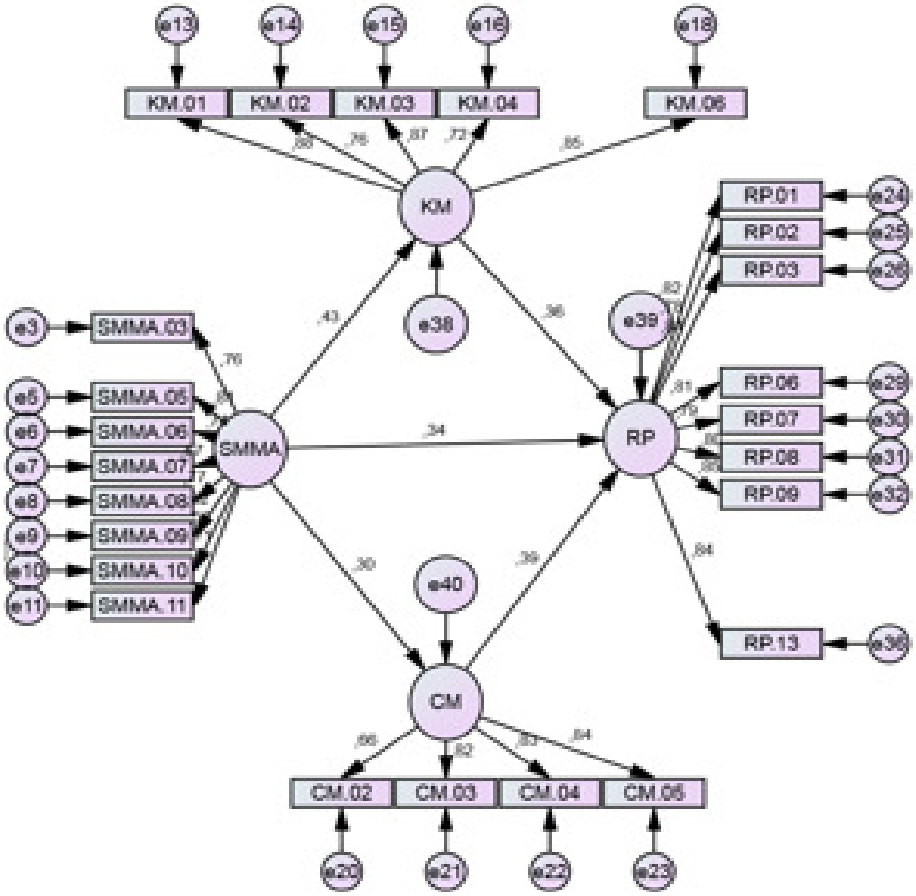

Figure 2: Hypothesis Testing Result

Result and Conclusion

This study investigated the impact of social media marketing activities about airlines travel fair which can drive the improvement of brand awareness and brand image, also customers response. The result of this study can summarize as follows: *First,* SMMA has a positive and significant effect on Brand Awareness, with C.R value of 5.124. *Second*, SMMA has a positive and significant effect on Brand Image, with C.R value of 3.817. *Third*, Brand Awareness has a positive and significant effect on Customer Response, with C.R value of 5.595. *Fourth,* Brand Image has a positive and significant effect on Customer Response, with C.R value of 5.951. *Fifth*, SMMA has a positive and significant effect on Customer Response, with C.R value of 4.939.

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Accounts Receivable Management at the Enterprise

Tetyana DEMCHENKO
Ph.D. in Economics, Professor of the Department of Finance, Accounting and Economic Security,
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: demchenko.tanya7@gmail.com

Maksym SLATVINSKYI
Ph.D. in Economics, Professor of the Department of Finance, Accounting and Economic Security,
Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: slat.maks@gmail.com

Liudmyla CHVERTKO
Ph.D. in Economics, Associate Professor of the Department of Finance, Accounting and Economic Security, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail:luda_um@ukr.net

Nataliia GVOZDEJ
Ph.D. in Economics, Associate Professor of the Department of Finance, Accounting and Economic Security, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail:gvozdej@ukr.net

Nataliia IVANOVA
Ph.D. in Economics, Associate Professor of the Department of Accounting and Taxation,
Uman National University of Horticulture, Uman, Ukraine,
e-mail: nn_ii@ukr.net

Abstract

It is determined an interdependence of the amount of receivables and its management. It is substantiated that timely and appropriate measures taken to settle the optimal amount of receivables lead to the financial recovery of all activities of the enterprise and ensure its financial security. It is investigated that the issues of the optimal amount of receivables at the enterprise are very important and relevant for the activities of any enterprise. An economic and mathematical model of calculation the optimal ratio of receivables is proposed, which will help in the management of receivables at the enterprise and increase the efficiency of its activities.

Keywords*:* Management, Current Assets, Accounts Receivable, Modeling, Optimization.

Introduction

At the current stage of economic development, enterprises are not able to effectively manage their receivables, which make a significant share of the current assets. Most enterprises practically are not able to normally function due to the receivables, as this withdraws funds from the turnover. Under such circumstances, the role of effective accounts receivable management, its timely return and prevention of bad debts increases significantly, and it cannot be done without proper analysis and use of economic and mathematical modeling.

It should be noted that the problems of accounts receivable management, its availability and amount at the enterprise are considered in the researches of many foreign and domestic economists, but the issue still remains topical, and the definition of its optimal ratio at the enterprise is becoming urgent in the current conditions of managing a market economy.

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Literature Review

The study of literary sources on the accounts receivable management and the determination of its influence on the enterprise activities, as well as its functioning in modern economic conditions, showed a variety of approaches to study of this issue. Thus, the analysis of domestic scientists who considered the above-mentioned issue in their works showed the following:

Chukhno (2014) defines that receivables can have a significant influence on the volume and structure of the money supply, payment turnover, the rate of funds turnover at the enterprise. At the same time she states that the increase in accounts receivable and its share in the current assets of the company indicates the unconscionable credit policy of the company with regard to buyers or the increase in the volume of sales of goods, or indicates the financial insolvency of some buyers. It is indicated that a long-term non-return of accounts receivable causes a cash deficit that can reduce the financial activity of the enterprise. The author also notes that an important stage in the accounts receivable analysis is the factorial analysis, which is aimed at quantifying the impact of various factors on the level of receivables. It is also noted that enterprise managers must explore the amount of their receivables in different ways. Very often they do not pay due attention to the implementation of a comprehensive financial analysis of the company, which is very important as the accounts receivable management requires a truly well-considered scientific approach.

Khokhlov (2017) also emphasizes the importance of the accounts receivable management. In his works he examines the main stages and models of accounts receivable management at the enterprise, highlighting its main advantages disadvantages. The author notes that the financial resources management of the company is closely connected with the optimal ratio of accounts receivable, as well as its size, the term of its payment and the impact of such receivables on the financial support of the enterprise. Investigation of this issue also focuses on the fact that the excessive receivables lead to an outflow of equity, while its excess to a certain extent can cause both a loss of liquidity and a stop of the production at the enterprise. In addition, accounts receivable management is defined as a process of development and implementation of managerial decisions regarding the coherence of its size and turnover ratio to provide the necessary profit from activities and obtain the optimal amount of available funds at the enterprise.

Sarapina (2014) pays considerable attention to the methods of managing receivables at the enterprise. In particular, she notes the importance of determining the optimum size of receivables, which would not prevent the normal functioning of the enterprise. Also, in her studies it is noted that insignificant amounts of receivables may indicate a low sales of company, but significant volumes will indicate a large amount of cash outflow from the company. Both of these will significantly affect the economic activity of the enterprise.

In particular, Sobekova-Majkova and Ključnikov (2017) identified in their research the risk of insolvency of small and medium enterprises and their problems with the receivables, noting its significant impact on their development and functioning.

Siekelova et al (2017) also consider the accounts receivable management in their research work. The authors note that its timely payment plays a positive role in economic activity, but the presence of a significant amount of debt leads to the risk of delayed payments, as well as additional costs associated with the accounts receivable management. It is being noted that the capital invested in receivables does not bring income to the enterprise. Also, the authors point out that the accounts receivable management is a very powerful tool for the elimination of the non-payments risk, being an integral part of the financial management of any enterprise. They consider the optimal ratio of receivables size and assessing the creditworthiness of buyers to be the basis of the research. Since receivables for goods, works and services are an integral part of an enterprise's assets, its availability and size are extremely important to control.

Kubíčková and Souček (2014) in their studies pointed to the importance of the availability and use of accounts receivable in the management system of companies, paying particular attention to the forms and methods of managing it.

Casalin et al (2017) note the importance of researching relations between suppliers and buyers of material assets, in particular, they analyzed such an interconnection on the example of Chinese industrial relations, using different approaches to analysis of the impact of receivables and payables on the activities of the enterprises.

Kojo et al (2017) analyzed the determination of the place of working capital and its individual components in the enterprise management system, using the regression date analysis.

Sutjiati Njotoprajitno (2017) emphasizes that in the modern realities of settlement relations when the receivables are an integral part of the economic life of the enterprise, accounts receivable management is of particular importance. In the author's opinion, enterprises, which activities lead to an increase in receivables, have a greater potential to increase their income. At the same time, if there is an existing receivable that is uncontrolled by the enterprise, it can lead to financial problems and, eventually, even to bankruptcy. In the course of the research, the emphasis is made on the importance of managing receivables, establishing a link between it and the turnover of assets at an enterprise, and determining the impact on the efficiency of the activity and the equity capital use.

The above mentioned studies are of unquestionable importance but it should be noted that there continues to be a need for further research on the accounts receivable management at the enterprise, determination of its optimum ratio, in particular, using the economic and mathematical methods.

Objectives Statement

Accounts receivable affects the economic activity of the enterprise in such a way that it is almost always a probability that it will remain unrecoverable for a certain period of time, and this, in the first place, leads to a crisis in the financial state of the company, as there is a situation of shortfall in available cash. Therefore, the purpose of the study was to find the directions of the effective available receivables management at the enterprise through the application of economic and mathematical modeling.

Methods

During the study, a number of methods were used, in particular, statistical method, graphical method, methods of regression analysis, method of simultaneous equations solution.

Results and discussion

In the process of assessment, an enterprise is considered as a business entity and, at the same time, is a property complex consisting of elements that can be assessed more or less independently of each other. Among these elements, it is common to distinguish the tangible ones, such as land, real estate, equipment, liquid assets, accounts receivable, and intangible ones, namely an image, business reputation, technical competence, and the quality of enterprise management. The importance of these issues is substantiated by Demchenko (2011). An important indicator characterizing the enterprise activity is the state of settlements with debtors. Accounts receivable of the enterprise arises as a result of non-cash settlements with buyers, contractors, depositors, accountable persons etc. The incurring of debts is due to the coincidence of the moment of finished products shipment, performance of works or delivery of services with the time of their payment. Significant amounts of accounts receivable lead to working capital redistribution. The issue of the optimum amount of receivables at the enterprise is very important and relevant for the activity of any enterprise, especially in the current conditions of economic performance.
Size of available receivables leads to the need for an optimal risk management and profitability management solution. It is important to consider the comparison of the benefits that an enterprise wants

to receive by investing funds in accounts receivable, with the costs that it will incur as a result. The accounts receivable management includes special procedures and models of company behavior in regard to buyers and customers while selling them the assets with a payment delay and control of its final receipt.

To improve the efficiency of the enterprise in the current conditions of management and taking specific management decisions on the availability and size of receivables, it is advisable to analyze the availability and change of accounts receivable at a specific Ukrainian company “Agroservice” LLC of Odessa region and to determine the directions of forming its optimal size for the economic process optimization.

The analysis of the receivable’s status of the “Agroservice” LLC as a whole and in the context of individual articles is shown in the table 1.

Analyzing these indices, it can be noted that the main part of the receivables in the "Agroservice" LLC make other current accounts receivable. As a whole, this type of receivables has increased from UAH 20147 in 2014 to UAH 92400 in 2019. The average annual amount of receivables of all types in this case in 2019 amounted to UAH 132570, which is UAH 103331 more than in the base year of 2014. As it can be seen, the size of settlements receivable decreased, namely, the prepaid expenses receivables – by 20 thousand UAH. The average annual amount of accounts receivable for products, goods, works and services increased significantly by UAH 30860.

An important index of the accounts receivable analysis is its turnover. Its acceleration helps to reduce the duration of its repayment, which allows improving the payments quality and indicates the improvement of payment discipline.

Table 1: Composition and dynamics of accounts receivable of the “Agroservice” LLC, thousand UAH

Index	2014	2015	2016	2017	2018	2019	2019 to 2014, (+;–)
Accounts receivable for products, goods, works, services	8640	7380	107	22992	36557	39500	30860
Settlements receivable							
incl. due for taxes, levies and other statutory charges paid	414	255	1384	582	547	650	236
prepaid expenses	38	1376	651	1087	19	20	-18
Other current accounts receivable	20147	20070	35739	39426	91047	92400	72253
Total	29239	29081	37774	64087	128170	132570	103331

Source: calculated according to the financial statements of the enterprise

To analyze the dynamics of the receivables turnover ratio and the duration of its payment at the "Agroservice" LLC, let us consider the data given in Table 2.

Table 2: Receivables turnover ratio dynamics at the "Agroservice" LLC

Index	2014	2015	2016	2017	2018	2019	2019 to 2014, (+;–)
Net income (revenue) from sales of products (works, services), thousand UAH.	10600	15637	29261	44105	52361	54212	+43612
Average annual amount of receivables, thousand UAH.	30008	29160	66855	50984	96128	101230	+71222
Receivables turnover ratio	0,35	0,54	0,44	0,87	0,54	0,53	0,19
Duration of accounts receivable payment, days	1033	681	834	422	670	695	-338

Source: calculated according to the financial statements of the enterprise

The net income of "Agroservice" LLC for 2014-2019 increased by UAH 43.6 million, while the increase in average annual receivables amounted to UAH 71.2 million, that is, more than three times. This led to a low value of the receivables turnover ratio, an as a result the period of receivables payment in 2014 was 1033 days, and in 2019 - 695 days.

Since the accounts receivable make a certain share of current assets, there is a correlation between the working capital value and the amount of receivables. The simplest and, at the same time, objective enough to detect a correlation relationship between the investigated values is the regression analysis method.

Data analysis showed the importance of receivables in 2014. It can be assumed that this is due to the complex social and political situation in Ukraine, caused by events in the East of the country.

The dependence of average annual receivables (AAR) on the average annual value of working capital ($AVWC$) (Fig. 1) was obtained using the linear regression method. In order to find the linear regression coefficients, we used the least squares method, according to which the model parameters are chosen in such a way that the sum of squares of empirical values deviations from the model ones is minimal according to Kovaliov (1997).

$$AAR = 3203{,}287 + 0{,}798 \cdot AVWC \quad (1)$$

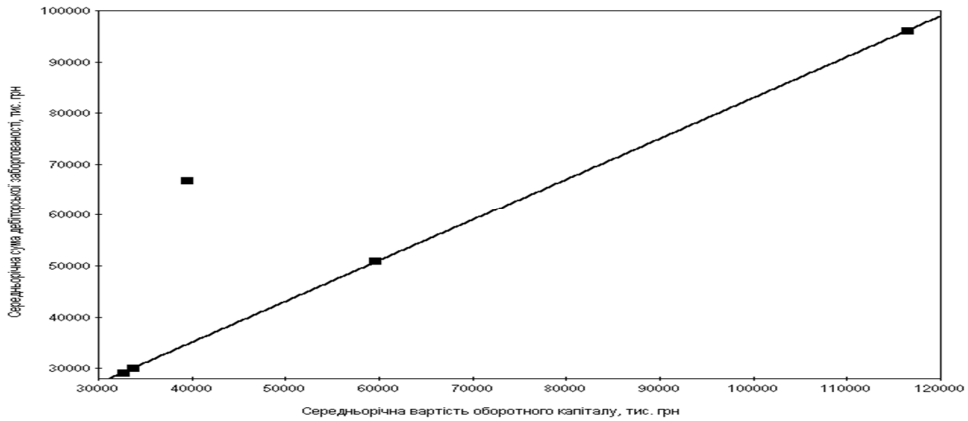

Fig. 1: Dependence of average annual accounts receivable on average annual working capital value

To evaluate the model quality, we calculated the determination coefficient (for linear regression it is equal to the squared multiple correlation, which value ranges from 0 to 1 and the more it approaches to 1, the more appropriately the model describes the empirical data.

The determination coefficient for the model (1) equals to $R^2 = 0{,}999$. The determination coefficient does not differ much from one, indicating that the conditional variance of the model differs little from the real significance variance and with a sufficient probability indicates that the model is not bad enough to describe the data.

The coefficient of argument in dependence (1) is equal to 0.798, that is, with the increased working capital cost by 1 UAH, the amount of accounts receivable increases by UAH 0.798.

Settlements with debtors are of dynamic character, and therefore require constant control of the company management. This activity is inextricably connected with the processing of large streams of economic information, which largely depends on the accounting system efficiency of the enterprise. For proper management and functioning, it is necessary to have reliable and timely information on the status of accounts receivable, legality and verifiability of economic operations. Thus, the study of the optimal ratio of receivables available at the enterprise is one of the key tasks in solving problems that arise during the current management of the enterprise, including from the position of liquidity.

To develop an economic and mathematical model, we assumed that the impact of liquidity on the enterprise profitability is statistically significant. At the same time, the growth of the liquidity ratio leads to an increase in the profitability of assets, but to a certain limit, after which the connection becomes inverse. Consequently, at the functional dependence of the current assets profitability ratio on the liquidity ratio the maximum value should be observed.

Fig. 2 shows the dependence of the current assets profitability ratio (*APR*) on the total liquidity ratio (*TLR*).

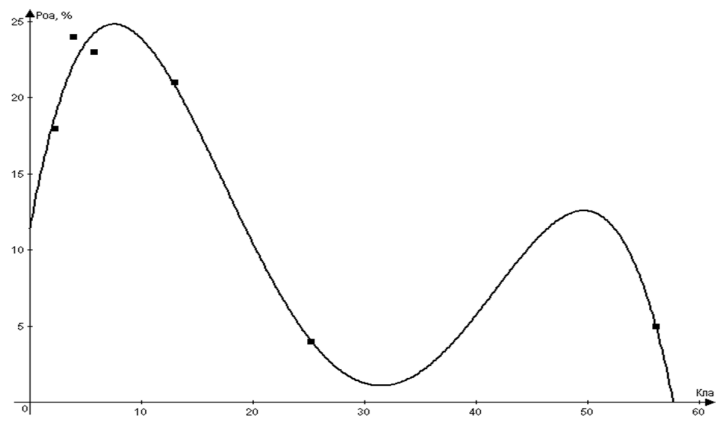

Fig. 2: Dependence of the current assets' profitability on the total liquidity

The regression curve has been found using the least square method

$$y = -8{,}65 \cdot 10^{-5} \cdot x^4 + 0{,}01022 \cdot x^3 - 0{,}37559 \cdot x^2 + 4{,}06554 \cdot x + 11{,}42979. \quad (2)$$

The determination coefficient $R^2 = 0{,}986$.

The maximum values of the general liquidity ratio cannot be considered as a result of the absence of experimental points nearby. Thus, the profitability ratio reaches its maximum value at $TLR = 7{,}6$.

Fig. 3 shows the dependence of current assets profitability on the intermediate liquidity ratio.

The regression curve

$$y = -1{,}46 \cdot 10^{-4} \cdot x^4 + 0{,}01474 \cdot x^3 - 0{,}46610 \cdot x^2 + 4{,}32245 \cdot x + 12{,}59064 \quad (3)$$

The determination coefficient $R^2 = 0{,}984$.

The profitability ratio reaches its maximum value at $LPR = 6{,}4$.

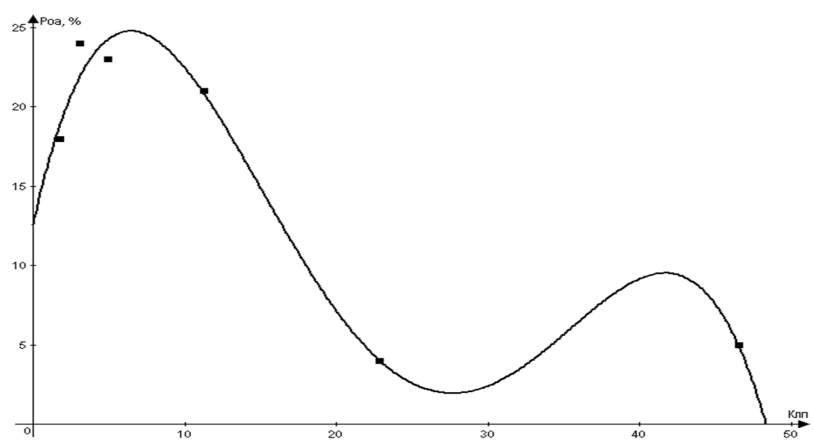

Fig. 3: Dependence of the current assets profitability on the intermediate liquidity ratio

Figure 4 shows the dependence of the current assets profitability on the absolute liquidity ratio.

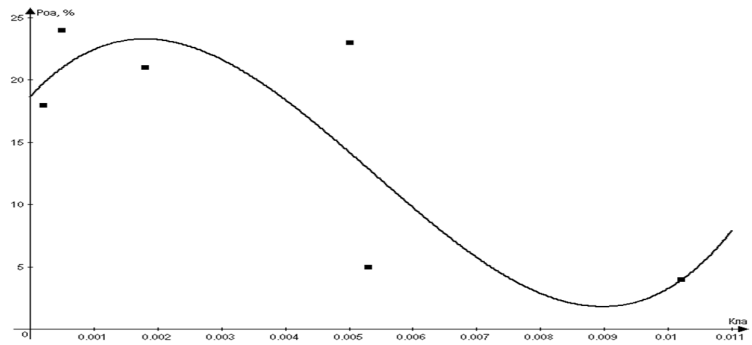

Fig. 4: Dependence of the current assets' profitability on the absolute liquidity ratio

The regression curve

$$y = 1{,}596 \cdot 10^8 \cdot x^3 - 1{,}87 \cdot 10^6 \cdot x^2 + 5564{,}098 \cdot x + 18{,}659. \quad (4)$$

The determination coefficient $R^2 = 0{,}616$.

The determination coefficients' value indicates the high quality of the models and the close relationship between the factors.

The profitability ratio reaches its maximum value at $APR = 0{,}002$.

Using the maximum points of functional dependences (2), (3) and (4), three equations can be written for estimating the optimal ratio between receivables and other components of current assets.

$$TLR = \frac{CA}{CO} = 7{,}6;$$
$$LPR = \frac{MA+AR}{CO} = 6{,}4;$$
$$APR = \frac{MA}{CO} = 0{,}002,$$

where CA means current assets; MA means monetary assets and their equivalents; AR means accounts receivable; CO means current (short-term) obligations.

The following ratios can be easily found from these equations:

$$\frac{AR}{MA} = 3200;$$
$$\frac{AR}{CA} = 0{,}84.$$

In accordance with these ratios, the monetary assets should be in 3200 times less than the accounts receivable, and the latter should make 84% of the current assets volume.

In order to construct the models of accounts receivable management, it would be useful structural models proposed by Omelyanenko et al (2019). They demonstrate the structure of the system, which is the subject of the survey, its internal parameters, and features of external fluctuations. These models are reasonable to create the optimization models.

Conclusions

At the enterprise a certain amount of receivables will always be present, as it is the result of its financial and economic activity. At the same time, important for the company managers should be not the problem of its complete elimination, but optimization of its volume. The tools for managing and controlling the level of accounts receivable and its structure should be developed at the enterprise. In addition, the main factors that have a significant impact on its dynamics and structure should be taken into account. The accounts receivable management essentially depends on the analysis of such factors, and it, in turn, affects the entire financial activity of the enterprise.

The values of the optimal amount of receivables in the enterprise are very important and relevant for the activities of any enterprise, especially in the current conditions of the economy. The received assessments of the optimal ratio between the accounts receivable and monetary and working assets cannot be considered accurate. But one can make a fairly sure conclusion that accounts receivable cannot be less than the sum of all other components of current assets. This is primarily due to the issue of the expediency of large stocks storing at the enterprise, as it is better to sell them and have a certain amount of receivables than hold significant volumes of finished stock products.

The use of the developed economic and mathematical model of the optimal accounts receivable ratio will have a positive impact on the enterprise management as a whole and the improvement its financial status in particular.

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Assessment in Remote Teaching Contexts: Theory and Practice

Nataliya SAMOYLENKO

Sevastopol State University, Russia
sevschool@yandex.ru

Ludmila ZHARKO

Sevastopol State University, Russia
luda041@yandex.ru

Alexandra GEORGIADI

Sevastopol State University, Russia
alexandra.georgiadi2010@gmail.com

Maria SHEVCHENKO

Sevastopol State University, Russia
sggu_kpp@mail.ru

Abstract

At present higher educational institutions are integrating into the global educational space. As a result, e-learning implemented at various levels of Crimean educational institutions becomes relevant. Technology as the area of big opportunities for improvement in higher education impacting the development of new ways of assessment can enhance motivation, self-reflection, and washback.
The research aims to determine the capabilities of open educational resources implemented in the educational process for Bachelor's / Master's Degree Programmes based on the data obtained at the Sevastopol State University. Viewing integration of digital and web technologies in the educational process in terms of developing students' and professors' new skills and professional competencies, the paper describes the benefits and challenges of e-learning assessment resources. The analysis of literary sources and conducted empirical study allows presenting and substantiating e-learning features, various examples of electronic resources, their efficiency, and feasibility in developing the modern digital educational environment. It is stated that the effective implementation of the electronic assessment depends on the federal, regional, and local legal framework; personnel qualification, technical equipment, access to technology; quality methodological support; teachers' and students' readiness to electronic assessment application. The practice-based look reveals the potential of online testing in foreign philology education as an instrument of the students – academic staff – authorities interaction along with evaluation, whose strong points include enhancement of communication where fast feedback based on reliable statistics is needed; saving time for live interaction both in real classroom and in synchronic teaching/learning sessions in remote education; individualization of studies.

Keywords: Assessment, Assessment Mode and Tools, Remote Teaching, Higher Education.

Introduction

Over the past 20 years, Higher Education in Russia has changed greatly. Samoylenko N.B. (2018) mentioned that with the transition to e-learning format of the 21st Century class, educators' attention has been drawn to studies of the characteristics of new online and real communication; the

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importance of changing interaction and autonomous learning; the issues of conducting effective learning.

In a research study by Harrison, L., Heikoop, W. (2016) new ways of assessing are described. The new context allows pointing out assessment as the area of modern technology that can have a direct impact on the teaching-learning process and its result. Technology can offer affordances that provide new ways of assessing. We can now assess and evaluate students in ways that simply were not available to us even ten years ago.

The introduction of new technology at all levels of education at the Sevastopol State University has been boosted by COVID-19 pandemic. On the one hand, like in all higher educational institutions, the lockdown has emptied campuses, but on the other hand, it impacted on how students access the courses and how academics work across all disciplines.

The learning process at all educational levels will be considered complete after evaluation whose essence lies in establishing feedback ("student – lecturer") and informing the lecturer on how successful the process of mastering new knowledge, and developed skills is. The introduction of new pedagogical technologies in the educational process as well as changes in the format of all types of classes have led to a discrepancy between the national assessment system and the modern requirements of the education system.

We note insufficient consideration of age and individual characteristics of the students; standardization and formalization of the assessment tools; the predominance of episodic assessment; pronounced subjectivism; psychological discomfort of the students while being assessed; limited possibilities of the assessment scale; the absence of an optimally objective mechanism for summing up assessment results.

In the Federal law "On education in the Russian Federation" (2015) the digital educational environment is presented. Functioning of the digital educational environment, in our opinion, became possible due to the implementation of educational programs based on the application of e-learning and distance learning technologies. E-learning, by article 16 of the Law "On education in Russian Federation" (2015), refers to the organization of educational activities with the application of the information contained in databases and used in educational programs; information technologies and technical means ensuring its processing; as well as information and telecommunication networks used for the transmission of this information via communication lines for the interaction of students and teaching staff.

Recommendations of the UNESCO policy in the field of mobile learning (2015) stress that E-learning implies the use of the Global Internet and/or local area network of educational institutions and media.

We believe that the evaluation system at the present stage should not be reduced to mechanical fixation of results. Borissova, D. and Keremedchiev, D. (2020) mentioned that rather, it is a continuous process of collecting, analyzing and systematizing information about the educational, cognitive, scientific and practical activities of students, which allows determining the level of their knowledge and developing recommendations for possible educational process adjustments. In this regard we analyzed the assessment methods that proved to be practically effective for online training.

Purpose and Objectives of The Research

The aims of our study are to describe theoretical and practical aspects of assessment in remote teaching contexts in higher education; discover assessment mode and tools, the benefits and challenges of e-learning assessment; investigate the guidance from experienced test developers and international assessment experts; to explore and present practical ways of assessing skills which we use in our classroom.

We focus on ways of defining what is meant by student experience and how it may be measured. We situate the student experience in our context and examine ways of measuring aspects of the student experience including effectiveness of methods and tools for evaluation.

In the book by Jen Harvey (1998) one of the aims of evaluation is highlighted as clarification if tests have a positive or negative influence where we teach and why. When we plan an evaluation, we must consider the purposes, the interests of those involved and the practical limitations.

Literature Review

In the Draft Recommendation on Open Educational Resources (2020) New System of Higher Education is recommended as open, flexible, user-friendly, and attractive system for students to meet their needs. It should also support the interactive style of learning. Moreover, according to UNESCO Draft Recommendation on Open Educational Resources "in building inclusive Knowledge Societies, Open Educational Resources (OER) can support quality education that is equitable, inclusive, open and participatory as well as enhance academic freedom and professional autonomy of teachers by widening the scope of materials available for teaching and learning".

At the same time, "Open Educational Resources (OER) are learning, teaching and research materials in any format and medium that reside in the public domain or are under the copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others". It is also associated with popular e-learning, distant learning, web-based learning, and online learning practices.

From the proposed tools we choose the digital platform to use – Institution's LMS; the tutors use the publicly available platforms – Google Classroom, Microsoft Teams; try to agree with colleagues on the platform, to share materials/cooperate in creating materials with colleagues. In a research study by Erzsébet Csibi (2020) the recommendations offered to professionals are described. From the recommendations we consider the most important are: plan and set up your course; consider timetable, content, assessment, communication; think over the way to communicate with your students; use the educational platform, to deliver the content: short videos, readings, critical thinking problems, research, consultation hours; search or create your additional resources if necessary; share knowledge.

The requirements of New Federal State Educational Standards of Higher Education 3+, 3++ and laws in Russia underline the importance of e-learning implementation starting from the Bachelor's Degree Programme through all further stages (Federal State Educational Standards of Higher Education (Bachelor's Degree Programme) 3++, 2019). Researchers, scientists, and educators integrate digital technologies and web opportunities in the learning process at Russian universities developing new skills and professional competencies for students and professors.

In our opinion improving the effectiveness of using e-learning assessment resources can be achieved due to the skillful combination of the application of such resources that would suit the demands of the three main participants (students, academic staff, authorities) of the educational process and implementing the electronic testing platforms which are either provided by universities as an integral element of their LMS or are chosen by educators from the range of open resources (mostly cloud technology).

Methodology

The study involved students of Bachelor's, Master's Degree Programs (Sevastopol State University in 2018-2020). Most of them are ESL students. These students were randomly selected from ESL 9 courses designed as content or non-content-based.

The research was organized to identify the examples of open assessment online resources and technologies in the educational process and to analyze their effectiveness in teaching procedures and developing students' learning autonomy.

The study is based on the results of the empirical study devoted to the implementation of remote learning into the educational process.

The problem of professional online assessment process is relevant. We analyzed the opportunities for implementation of online assessment tools for the improvement of online education in the foreign language teaching process.

We researched on the use of online assessment tools in English language class on a group of students in higher educational institution learning. We analyzed the role of students' digital skills and new trends of online education in a higher educational institution.

We would like to describe the opportunities for virtual education and communication. It is obviously necessary to generalize today's students' skills for providing education online course.

The goal of this study was to identify whether the use of online assessment tools in learning process has positive response on students' skills.

Results

The study aimed to identify the advantages and disadvantages of using such assessment methods as testing, portfolio, oral survey, survey with digital applications in electronic educational environment (table 1).

Table 1: Advantages and disadvantages of methods for assessing the level of students' knowledge using electronic educational technologies

№	Method	Type of control	Advantages	Disadvantages
1	Testing	Current, intermediate, final	• Standardization, ability to ensure validity of content and measurement, practicality; • insignificant time spent on conducting, analyzing results, getting instant results for students; • possibility of statistical processing on the computer; • creating equal conditions for students; • objectivity of the obtained results; • relative accuracy of determining the level of students' achievements.	• Preparation of high-quality tests by a lecturer; • assessment of students' general knowledge; • lack of ability to evaluate higher-level thinking skills; • limited time frame; • no "lecturer-student" contact; • no choice of multiple answers; • full dependence on technical conditions; • exposure to man-made accidents and catastrophes.
2	Portfolio	Final	• Continuous accounting of quantitative and qualitative achievements of students in various activities, their personal achievements, metasubject results, self-assessment/mutual assessment of students; • creating equal conditions for	• Possible negative attitude of "age-related" lecturer; • lack of study time; • lack of uniform requirements for the structure, content, and design of the portfolio; • exposure to man-made accidents and catastrophes.

			students; • focus on checking the reproductive level of information, on the cooperation of all participants in the educational process: lecturer-student-parents; • personal contact “lecturer-student”; • self-analysis and self-control of the student; • ability to explain when defending/presenting your portfolio online.	
3	Oral interview	Current, intermediate, and final	• Personal contact “lecturer-student”; • the opportunity to correct, clarify, respond the student in real time; • development of the student's speaking skills.	•Much time spent on the preparatory stage (selection of questions, etc.); • the teacher's authority pressure; • significant amount of time for individual interviews; • exposure to man-made accidents and catastrophes.
4	Survey (digital: smartphone apps, QR codes, Google forms, and other resources)	Current, intermediate, and final	• Ability to reach all students and get an instant response; • reduced time for verification; • creating equal conditions for students; • evaluation in % ratio of the completed tasks to the total with subsequent transfer to the traditional domestic 5-point scale; • completing the state standard requirements.	• Possible absence of apps on students' mobile devices; • exposure to man-made accidents and catastrophes.

The analysis of the advantages and disadvantages of assessment methods used in electronic educational environment has led to pointing out the unsolved questions of 1) simplification of the learning process; 2) cheating and plagiarism prevention; and 3) motivation of "aged" lecturers to use technology.

In a research study by Zharko L. N. (2018) the effective implementation of the mentioned methods is revealed. It is possible under the application of specific organizational and pedagogical conditions (Figure 1).

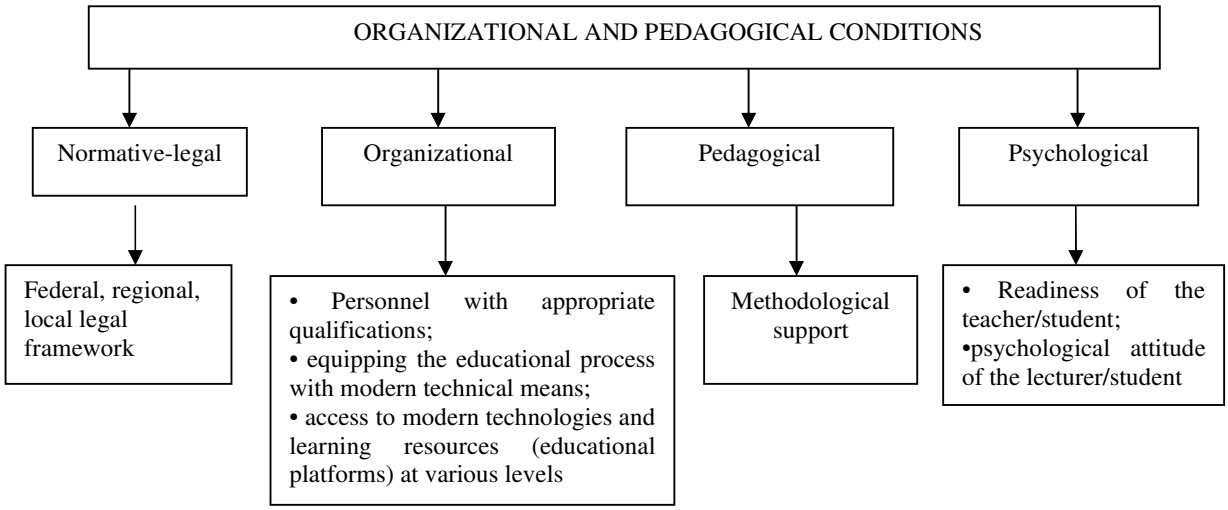

Figure 1: Organizational and pedagogical conditions for implementation of methods for assessing the level of students' knowledge using electronic educational technologies

Thus, assessment of students' achievements can be viewed as a tool for measuring the efficiency of the educational process, means of transforming roles of its participants, and a condition for quality improvement of online learning. At present, the emphasis is placed on the dynamics of changes in the achievements of students as active participants of the assessment process. Their involvement in self-assessment, stimulation of responsibility and independent planning of actions help to obtain quality results.

The university platform (http:// testmoodle.sevsu.ru) presents in the distance learning environment of the Sevastopol State University online courses, created by lecturers and professors in different areas of university students training: Institute of Humanities and Pedagogy, Institute of Information Technologies and Management in Technical Systems; Institute of Finance, Economics and Management; Institute of Nuclear Energy and Industry; Maritime Institute; Polytechnic Institute; Law Institute.

The lecturers and professors of the Sevastopol State University learned: how to design the course; prepare and organize students for distance learning and interaction with the tutor; place the materials (lectures, files, books from electronic library, assignments, tests, etc.) in LMS Moodle; they studied the organization of testing and assessment; how to analyze the educational process; they studied the legal resources of the use of distance learning technologies and e-learning in the Russian Federation.

In the process of online courses learning for various programs, they learned the technology of creating electronic training courses in the distance learning system, received practical recommendations for working in the Moodle system, they were presented with the format of the course; technology for designing testing and assessment materials for the distance learning system, and the organization of testing and assessment in the distance learning system.

We present the example of one of the courses "Technology of Teaching Foreign Languages at the University" (https://testmoodle. sevsu.ru/course/view.php?id=872) for first-year master students by the "Philology" specialist. It includes a promo video about the course, lecture material, interactive lectures and assignments, professionally oriented assignments, development of lesson fragments, a glossary, 60 tests, microteaching tasks.
The results of learning at these courses can be set off for the disciplines implemented at the university: code and training specialty; the name of the discipline and its place in the curriculum of the educational program; level of education; the form of training; the curriculum position; basic or

optional part, elective discipline or elective; the number of credits and hours for the discipline within the curriculum.

Implementation of remote learning in traditional higher education is provided regarding the demands of the ministry and corresponding decisions made by university authorities. Gotskaya, I.B. et al (2013) mentioned the choice of the technical platform, which entails the benefits and limitations the academic staff will have to cope with, and is made at the level of the institution. It is regularly a Learning Management System (LMS) like Moodle, Edmodo, WebTutor, or Prometheus used for administration and control of the education process. From a functional perspective, the platforms serve to automate the tasks of delivering educational content to the right people at the right time, monitoring the use of learning resources, administration of individual students and groups, organization of interaction with the teacher, making reports. The range of the instruments offered by such platforms must be mastered by the academic staff and students to meet the new demands of the teaching/learning process. Haphazard actions at the technical level may seriously affect the result. Thus, obvious becomes the need for theoretically substantiated decisions.

Teaching/learning process is a vibrant interaction of the three main parties (student (learner), academic staff, and university authorities), whose communication under the current circumstances occurs through the introduction of remote learning in the traditional educational environment. Fast transition from common pedagogical practices (everyday live classroom communication) reveals the need to find a way that would open new opportunities for constructing efficient interaction. Knowing whether the students have learnt, whether teaching has been effective, and how to address students' needs best are the teachers' concerns that are not new but require choosing adequate approaches and technology. In other words, the situation requires the development of the evaluation system.

The term "evaluation" in teaching foreign languages is used along with "assessment" and "testing", but they are technically different. Evaluation surpasses the student's achievements to consider all aspects of teaching and learning and is used to look at how educational decisions are made. Desheng, Ch. et al (2013) described assessment as an ongoing process of gathering data to measure students' progress which has multiple forms: a) formative assessment (administered during the learning process with the aim of using the results to improve instruction); b) summative assessment (performed at the end of a course often for purposes of providing aggregate information on program outcomes to educational authorities); c) traditional test-based assessment (involving written or oral tests); and d) task-based assessment (which are activity-based tasks, and includes teacher-student interaction, student-student interaction, body movement, teamwork, portfolios, and other language requirement and activities). Evaluation is the process that follows this collection of data, including analysis and reflection, as well as decisions based on the data. From Hughes A. point of view (2003) testing is the process of applying tests that in language teaching are generally viewed as instruments of evaluation that measure ability, knowledge, or performance by eliciting observable behavior from the test taker. Thus, a test can be considered as a minimal unit of the assessment process that provides information meaningful for the general evaluation of a student's foreign language performance.

Under the new circumstances, the application of tests in teaching implies wide use of electronic testing platforms. The effectiveness of evaluation founded on the application of such resources depends on their availability and reliability as well as characteristics that would suit the demands of the three main participants (students, academic staff, authorities) of the educational process.

In the book by Bulanova-Toporkova, M.V. (2002) electronic testing platforms are analyzed in technical terms. The electronic testing platforms are either provided by universities as an integral element of their LMS or are chosen by educators from the range of open resources (mostly cloud technology). Application of a testing platform in the educational process presupposes the development of the subject content base whose stages include: 1) choosing the task content; 2) choosing the task presentation; 3) creating instructions and descriptions; 4) practical assessment (collecting empirical data); 5) processing the collected data; 6) interpreting the processed data; 7) test quality assessment.

In the paper by Georgiadi A.A. and Georgiadi A.K. (2019) the test content inputting into the system is viewed as a time and energy-consuming process carried out by the academic staff which can become useless in the current geopolitical situation. Using open cloud resources (chosen by university or individual) is risky because it can be easily restricted by sanctions.

A significant effort made by universities to take control of the education transition into its new format should be accompanied by well-balanced decisions regarding information security. One of the possible solutions can be the development of the university's testing platform. An attempt to create a system targeted at the needs of students and academic staff was the development of the UWebTutor testing system by Apatova, N.V. et all (2017). The web application written in the PHP programming language with elements of JavaScript whose test and user data are stored in a MySQL database powered by the InnoDB engine is a product of student-professor collaboration.

Another reason to create the university's testing platform lies at the organizational level. Educational process based on remote learning/teaching implies specific interaction of its participants where statistics becomes an important element. The statistical data can be used by a student, a group, a teacher, a chair, or authorities as a source for self-evaluation, evaluation, and reflection. An important characteristic of a platform to choose is the ability to request detailed statistics of test completion by students where a teacher can review the grades a student has received, as well as the time they have taken to complete the test. Apatova, N.V. et all (2017) highlighted that along with statistics for individual students, the system should allow access to overall statistics for groups and tests which would provide a quick assessment of the results of all students on a certain topic. The feature is not provided by open platforms as it presupposes the transfer of administrator rights from the owner to the user. This could be the fertile ground for university authorities' initiating development of safe university testing platforms by teams of university engineers.

Basically, modern electronic testing platforms provide templates for multiple choice, multiple answer, true/false, and direct input of information tasks. These essential instruments can serve various educational purposes, but they are often viewed as a rigid set of opportunities (but for direct input) that enables students' remembering the order of questions and answers while doing the test and technical processing the information by guess rather than thinking. The foreseen problem can be avoided by question mixing and provision of a relatively bigger bank of tasks. The solution was tried out within the UWebTutor system, where each test taken by a student is in a way unique: questions are randomly selected from a question bank (the number of questions in the bank is higher than the number of questions presented in the test), and answers to the questions are presented in random order. In a research study by Georgiadi A.A., and Gavrikov I.V. (2016) this feature is mentioned as the one which also allows extending the system's functions from control to self-control and learning through testing.

Teaching practice in the context of remote learning became an area of implementing testing in the preparation of the second-year undergraduate students of the Sevastopol state university. The practice (216 hours (6 credits)) took place in the fourth semester after the course of «Fundamentals of counselor activity». The entrance test was introduced to determine the quality of the students' preparation for counseling activities in a children's health camp.

The test located in Moodle electronic educational environment was offered to 102 students from 6 groups of 44.03.01 Pedagogical education direction. The tasks contained 54 open and closed questions, as well as compliance tests. The results of testing in Moodle showed that 56% of students passed the entrance test with good and excellent results; 44% received satisfactory marks; and 87% of students passed the test on the first try. The test results showed that students are better at coping with theoretical questions than practical ones. The most difficult were open tests on solving pedagogical situations. The questions aimed at checking skills and abilities of interaction with children, team organization, overcoming problems and making independent decisions, preventing and resolving conflicts in a group of children. The difficulty in solving pedagogical situations can be explained both by the lack of practical experience of work with children and practice-oriented preparation for

counseling activities on the part of students. Thus, the testing provided information about the level of the students' preparation for the teaching practice.

The results of the teaching practice were presented in the form of the electronic portfolio. The program of the pedagogical practice describes the students' results assessment system (table 4).
The public presenting of the practice results took place online in Skype relying on the above-mentioned rating system.

Table 4: Assessment of students' practice results

№	Assessment materials	Scores	Checked Result Codes
1.	Portfolio	0-20	PC-6 - Able to design and implement educational programs that contribute to the development of students' cognitive activity, independence, initiative, creativity, the formation of a civic position, the ability to work and life in the modern world, the formation of a healthy and safe lifestyle among students; PC-8 - Able to interact with parents and cooperate with teaching staff.
2.	Report	0-20	
3.	Student' teaching practice review	0-20	
4.	Practice diary	0-20	
5.	Presentation	0-20	
	Total	100	

Thus, the use of testing in theoretical courses has shown its limitations as regular templates (true/false, multiple choice, and multiple answer tasks) need extracting specific information on the discipline content. Depending on the purpose, the tasks are either questions eliciting information about students' general understanding and knowledge of the subject (used before or during the lecture) or glossaries that serve to diagnose the result of teaching/learning (control of the basic knowledge). Deeper evaluation in theoretical disciplines requires other assessment procedures of knowledge and skills.

Testing is a tool of evaluation that can be used in different organizational forms and at different stages of the teaching/learning process at university. Its strong points include a) enhancement of communication where fast feedback based on reliable statistics is needed; b) provision of space for live interaction when transferred outside the classroom (both real classroom and synchronic teaching/learning sessions in remote education); c) creation of conditions for individualization of studies. Possible limitations of test application lie in the sphere of organization (availability of good testing platforms at the university's LMS), technical issues (availability of the Internet connection as well as the necessary hardware and software); and contents of the discipline (purposes and logic of the teaching/learning process presuppose the use of a much broader range of instruments; testing cannot be a substitute for teaching/learning). Despite the weak points, the potential of testing for evaluation in foreign language teaching needs more research. As a fast-developing sphere of technology, it has become part of our everyday life and the number of ways, templates, and fields of its application is sure to grow.

Conclusion

The results of the research reveal important conclusions. To organize successful teaching and learning at university there must be approved free access to applied electronic resources, integrated into the courses.

Moreover, it is recommended to present full course structure, possible reporting forms, set deadlines, assessment details/criteria, forms of control. Methodological support and consultation by professors are key issues in e-learning implementation at universities.
Potentially the efficacy of evaluation based on the use of modern remote learning technology depends on the choice of a testing platform that must be 1) constantly available for all the participants of pedagogical interaction (students, academic staff, and authorities must be able to use them with the

help of available hardware and software at any time and place); 2) reliable in terms of the information storage (the importance of the content bank should not be underestimated as it becomes a valuable instrument of the uninterrupted educational process); 3) technically correspond the demands of the pedagogical interaction in regard to collecting and processing statistical data both for personal and organization use, sustaining the testing procedure.

The research data clarify that methods of managing students learning are focused on taking into account the individual characteristics of participants in online learning, their needs and the implementation of the principles of the organization of practice-oriented learning.

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The Assessment of The Image of a Non-Public Higher School – A Case Study

Radosław Ryńca and Robert Łojko

Wroclaw University of Science and Technology, Poland

Radoslaw.rynca@pwr.edu.pl; robertlojko@interia.pl

Abstract

The changes taking place on the market of educational services require changes in the way higher schools are managed. The key to success is to find and undertake solutions that will allow a higher school to maintain a good competitive position. It seems that image activities carried out by tertiary education institutions may be of great importance, as a result of which it will be possible to satisfy the needs and expectations of various higher school stakeholders. This article aims to present the assessment of the image of a non-public higher education institution as well as to offer the proposal of the improvement measures. Based on the surveys carried out, the authors identified the factors which have a decisive influence on the image of a higher school.

Keywords: higher school image, higher school image improvement

Introduction

The dynamic and unpredictable situation brought about by the first half of 2020 caused unprecedented changes in the surrounding reality of tertiary education institutions. In the conditions of intense competition between both public and non-public higher schools (Olędzki, Tworzydło, 2009), the importance of the image of higher education institutions is continually growing. Such an image enables them to stand out from the group of other higher schools, which affects the decision-making process of students (Barich, Kotler, 1991). Those tertiary education schools which have strong, distinctive images are in a better position (Azuory, Daou, El Khury, 2014) which allows them to compete more effectively on the market of educational services. During the times of the population decline, the best reputable organisations with a strong image are the least affected by the fluctuations in demand due to high buyer loyalty (Obłój, 1998). A positive image is associated with the credibility of the organisation and the services it provides to its environment. The image that precisely positions a higher school in the target awareness of its stakeholders is a significant source of competitive advantage (Altkorn, 2004). The studies conducted in this field (Alves, Rapso, 2010) contribute to a better understanding of the image of a higher school and its importance for higher education institutions in keeping and attracting new students.

As results from the studies on this issue (Cercincova, Mugur, Palea 2015), growing competition and integration in the European Higher Education Area make image creation an essential process for most European tertiary education institutions. The changes occurring during the first decade of this century have led to the fact that higher education institutions have allocated more resources to strengthening and consolidating their images (Curtis, Abratt, Minor, 2009). It was shown in the study by Perozo and Alcala (2008) that the image of a higher school is essential both for its source-organisation and for the addressee, *i.e.* the entity that receives its components from the stimuli, which directly affects the effectiveness of the organisation (Druteikiene, 2011). According to several studies conducted in this field, the image has a significant impact on the Reputation of higher schools.

The resulting evidence (Del-Castilo-Feito, Blanco-Gonzales, Gonzales-Vasquez, 2019) about the relationship between the image and Reputation allows developing and implementing the strategies

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used for managing these values. This creates the opportunity to benefit from the synergy and increase the efficiency of the practices with the concurrent reduction of the costs of managing these assets, which is a crucial aspect of attracting and retaining stakeholders (Plew, Ho, Conduit, Karpen, 2016).

Numerous studies (Duarte, Alves, Rapso, 2010) on the importance of the image for higher education institutions indicate the need for more and more in-depth analyses as well as empirical research which would enable a better understanding of what elements and strategies may be crucial for the effective management of the higher school image. The current contemporary interest in the image (Helgesen, Nesset, 2007) translates into the possibility of identifying the practical features of the image of higher schools. Some studies (Weissman, Petruzzellis, Romanazzi, 2010) indicated a vital role of higher school image in the development of educational service management strategies, thereby confirming the validity of the additional analysis of the concepts used as positioning tools which influence the choice of a higher school.

Generally speaking, the purpose of this article is to analyse and assess the image of a non-public higher education institution located in Wrocław, which belongs to the largest group of private higher schools in Poland. For this reason, the article provides a description of the importance of the higher school image. Moreover, it presents an analysis and assessment of higher school image, based on the example of a non-public tertiary education school. Finally, the article also offers some proposals for improvement measures.

Higher School Image – Literature Review

The image (*imago*) is a holistic picture of an organisation; it is variable and depends on subjective experiences (Widerski, 2015) created in the consciousness of the environment (Alvesson 1990), which is the entirety of direct and indirect experiences and feelings (Cian, 2011). The image is a cumulative effect of the organisation's impact (Zawadzka, 2010). Most organisations have a distinctive image (Aaker, Keller, 1990) which can be relationally perceived (Kazoleas, Kim, Moffitt, 2001) as positive, neutral or negative. In the course of the studies into consumer behaviour (Knoll, Tankersley, 1991), it was found that consumers have many images of organisations that are continually changing (Knoll, Tankersley, 1991). The image is (Wiśniewska, 2012) a cumulative effect of the influence of the organisational behaviours and its visual identification system. The image is the sum of beliefs, attitudes and impressions a person or group has about a given object. The object may be an enterprise, product, brand, place or person. Impressions can be real or false, real or imaginary. A good or bad image guides and shapes behaviours (Kolter, 1991).

The image is an essential tool of market impact (Kall, 2001); it is an attribute resulting from conscious or unconscious communication activities undertaken by higher schools. Image creation, in which two primary groups of factors are involved (Wójcik, 2013) (the state of the organisation and the intensity and quality of communication) is strategically important for many organisations, especially for those which are service providers (Zabala, Panadero, Gallardo, Amate, Sanchez-Galindo, Tena, Villabla, 2005). A positive image (Kończak, Bylicki, 2018) requires systematic commitment and consistency in its creation; it is a set of unique, distinctive features, reflecting individual character (Dewalska-Opitek, 2010). It is an added value (Ociepka, 2003) which increases the level of buyers' satisfaction. Moreover, it is a source of buyers' loyalty and the guarantee of the good quality of the services provided (Budzyński, 2002).

In the context of tertiary education, the image (Duarte, Alvaes, 2010) is the result of all the individual person's opinions about a higher school. It is the audience that is the actual creator of the image (Avenarius 1993). For a higher education institution (Theus, 1993) that seeks to improve its image or create a new one, it is necessary to take into account the diversity of the organisation stakeholders and the effects of the influencing factors, mainly of an organisational, situational, personal and business nature. The research carried out in this field (Kazoleos, Kim, Moffitt, 2001) shows that the organisational structure, apart from the environmental factors, is the most basic and critical factor for the image of a higher school.

The image of a tertiary education institution represents the perception of students (Sung, Yang, 2008) and the frequently rare concepts which should be introduced in the higher education sector. The statistically significant differences identified (Perez, Torres 2012) in the perceived organisational image of higher schools indicate that each of them has different levels of the organisational image as a result of the perception of students and teaching staff as well as other stakeholders. The image may vary depending on the environment or context (Figiel, 2013). It may vary depending on the geographic market concerned. It may also differ on the same market of the educational services provided since different stakeholders can identify the organisation differently. According to the studies (Rozwadowska, 2002), depending on image type as well as the context and addressees, who subjectively filter the information reaching them, the image of the organisation will be different.

What is clearly visible on the market of higher schools is that there is competition (Olędzki, Tworzydło, 2007) for candidates for studies, teaching staff, research funding, external funding, statutory objectives or sponsors. According to the research (Foroudi, Yu, Gupta, Foroudi, 2019, Krzyżak, 2009), the data obtained from current students and graduates are quite frequently a source of information shaping the image of a given tertiary education institution. Higher schools use their images to attract new students (Ivy, 2008). They rely on the fact that their images directly translate into student loyalty (Helgesen, Nesset, 2007).

The Analysis and Assessment of The Image of a Non-Public Higher Education Institution – A Case Study

Study Method

The study aimed to assess the image of a non-public higher school. The assessment of the image of the entity under analysis involved the analysis of image creation instruments used by the higher school. What was also investigated was the importance of the image of higher schools for the respondents' decision related to the choice of studies in a given higher school.

In the study, the test sample was randomly selected. The survey questionnaire contained twenty questions about the research problem and five metric questions. The survey included closed alternative questions as well as a disjunctive and conjunctive cafeteria. A survey to assess the image, including the instruments used, was conducted in January 2019 in the form of an anonymous questionnaire distributed among one hundred and twenty-seven students of the higher school.

Following the typology of questionnaires developed on the basis on the ways, in which they are submitted (Kaczmarczyk, 2003), the survey under analysis was conducted as an auditorium survey, during which the respondents are gathered in one place. The individuals taking part in the survey were informed about the anonymous nature of the survey and its purpose.

The results of the survey

As already mentioned, one hundred and twenty-seven higher school students took part in the survey. Most of the respondents (82%) are women while 18% of them are men. The majority of the respondents are between twenty-six and thirty years old and constitute 35% of the respondents. Another group in terms of the age of its members includes people between thirty-one and thirty-five years old who constitute 24% of the respondents. The third group, including 16% of the respondents, is composed of people between thirty-six and forty years old. The fourth group is made up of the respondents whose age rages from twenty-one to twenty-five years old; they constitute 12% of the respondents. In the fifth group (8% of the respondents), there are people under twenty years. The sixth age group is made up of people over forty-one years old.

The majority of the individuals who participated in the study are those with higher undergraduate education (bachelor's degree) – 72% of the respondents. 19% of the respondents completed secondary education while 9% are those who completed their studies and obtained their master's

degrees. When asked about their work, the largest number of the study participants (57% of the respondents) work on the basis of an employment contract, 24% are employed under a contract of mandate or contract for a specific task, 13% of the respondents have their own businesses while 6% of the respondents did not work professionally during the survey.

When asked what industry they currently work in, 29% of the respondents indicated that they work in commerce, 23% in the finance sector, 17% in marketing, 17% of the study participants indicated other answers and 6% of them – at the time of the survey – did not work.

Among the respondents, 49% of those surveyed assessed the current image of the higher school as good whereas 34% of them as very good (Chart 1).

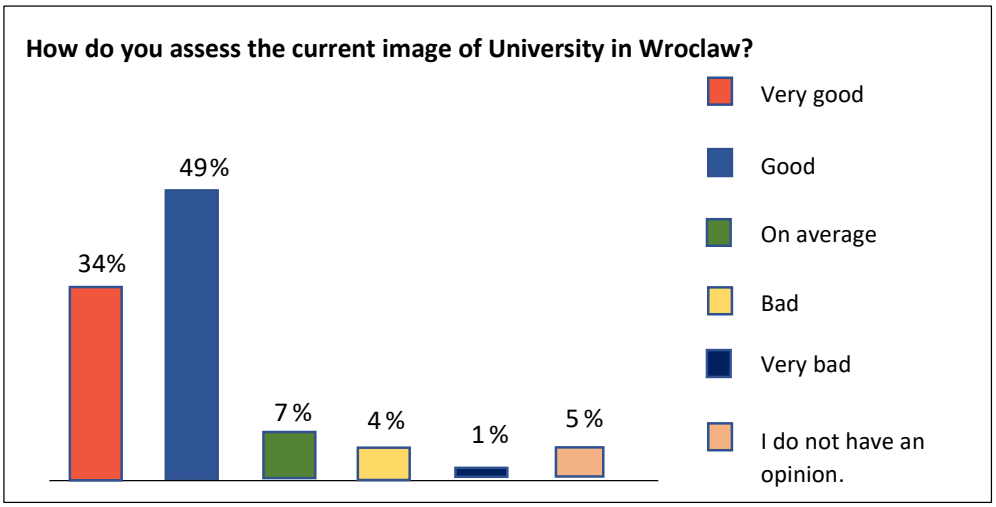

Chart 1. Answer to the question: How do you assess the current image of University in Wroclaw?

Source: The authors' own study based on the survey data.

When asked about the way, in which the respondents found out the most about University' offer, 82% of the survey participants pointed to Internet advertising, 48% pointed to radio advertising, 47% found out about the university's offer from friends or family. On the other hand, 43% of the respondents learned about the offer of the studies thanks to the information on banners and city lights while 24% of them learned this information from press advertisements (Chart 2).

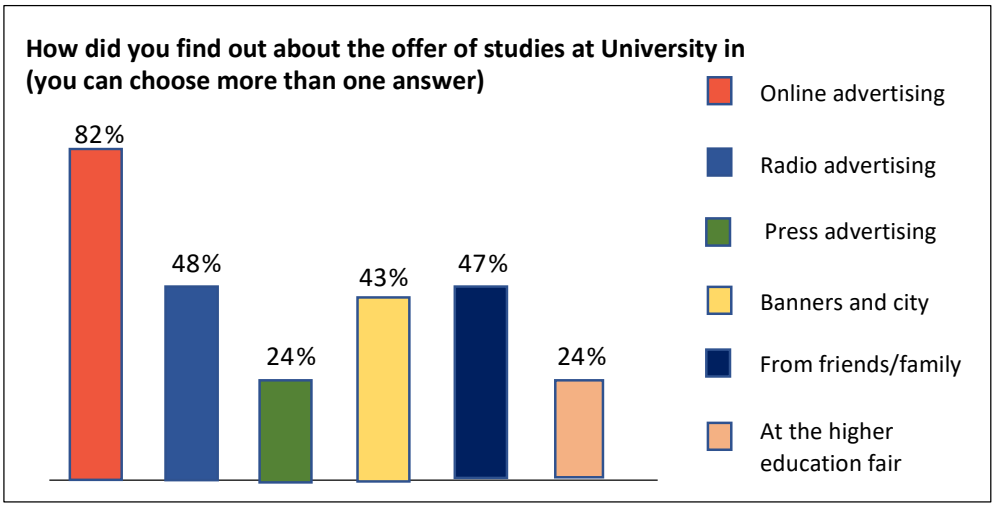

Chart 2. Answer to the question: How did you find out about the offer of studies at University in Wrocław?

Source: The authors' own study based on the survey data.

According to 78% of the surveyed respondents, an attractive study offer was the main reason for choosing this university. 76% of those surveyed said that the university is highly prestigious. For 68%, the reason for choosing the university was the competitive amount of the fee for studies. 53% of the respondents were persuaded by third parties when choosing the university. 19% justified their choice by the proximity of the university (Chart 3).

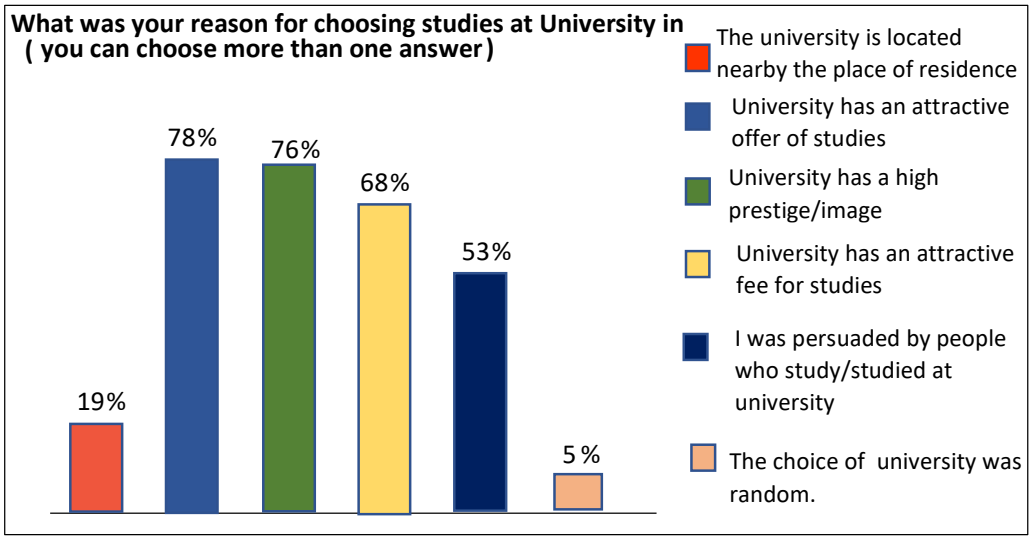

Chart 3. Answer to the question: What was your reason for choosing studies at university in Wrocław?

Source: The authors' own study based on the survey data.

When asked about what form of reaching out to future students with the educational offer of the university is in their opinions the most effective, 40% of the respondents indicated social media advertising, 23% – radio advertising, 12% – another form of Internet advertising, 10% of the respondents indicated billboards and city lights while 3% had no opinion on this issue (Chart 4).

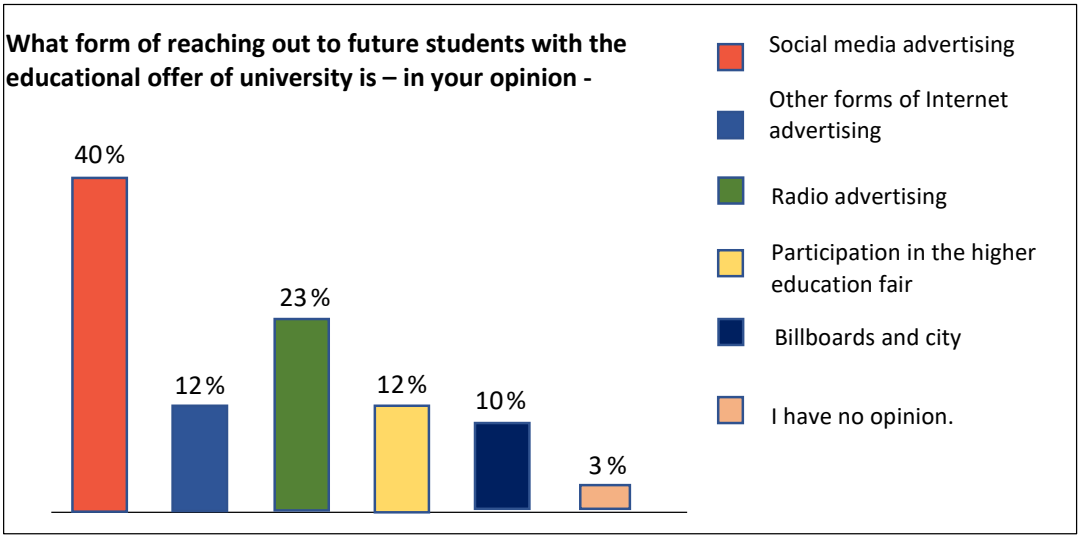

Chart 4. Answer to the question: What form of reaching out to future students with the educational offer of university in Wrocław is – in your opinion – the most effective?

Source: The authors' own study based on the survey data.

As shown in Chart 5, 73% of the respondents positively assessed the educational offer of the university. Only 15% of respondents are dissatisfied.

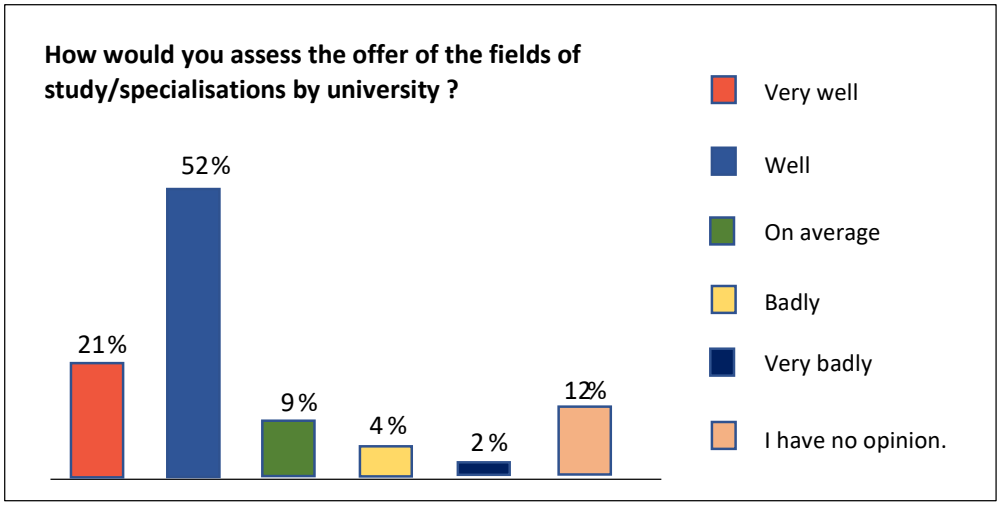

Chart 5. Answer to the question: How do you assess the offer of the fields of study/specialisations offered by University in Wroclaw?

Source: The authors' own study based on the survey data.

63% of the respondents also positively assessed the promotional activities conducted by the university. 17% of the respondents assessed it on the average level while less than 11% of the respondents assessed negatively the promotional activities performed (Chart 6).

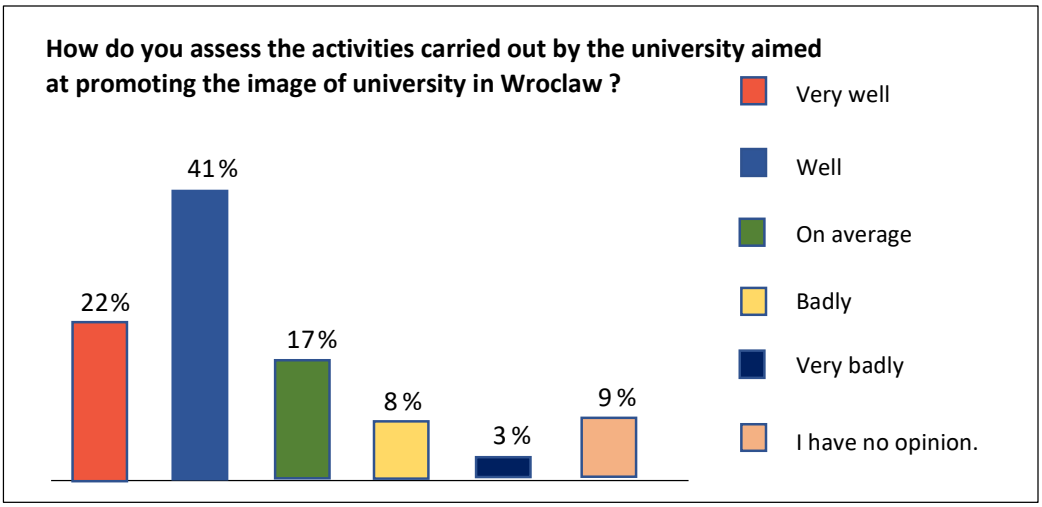

Chart 6. Answer to the question: How do you assess the activities carried out by the university aimed at promoting the image of University in Wrocław?
Source: The authors' own study based on the survey data.

When asked if you are satisfied with the choice of studies at in Wroclaw, 37% of respondents answered that they are satisfied with the choice of university, 31% are satisfied with the choice of the field of study and 24% with the choice of specialization, 4% of the respondents believe that they are not is satisfied with the choice of the faculty, 3% of respondents do not feel satisfied with the choice of specialization, and 2% of respondents are not satisfied with the choice ofuniversity.

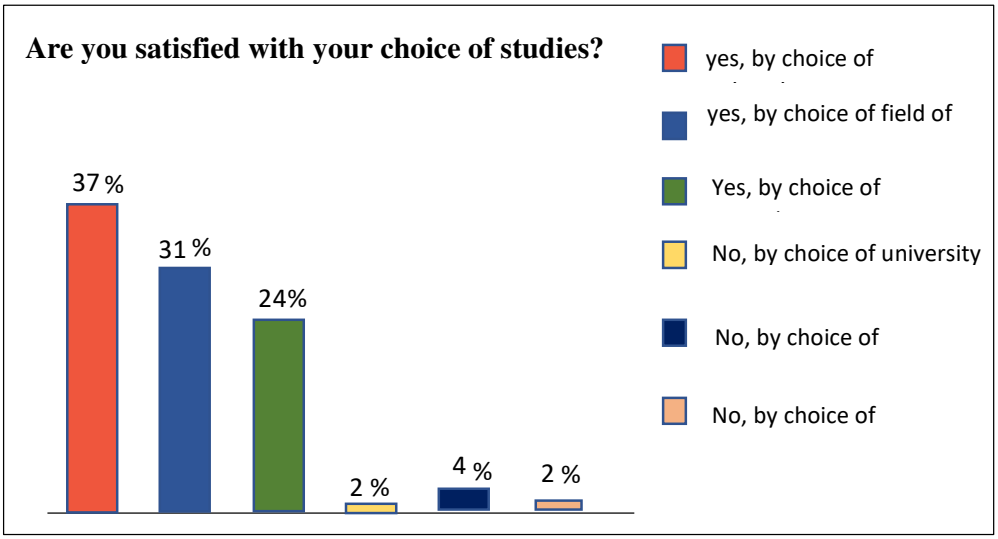

Chart 7. Answer to the question: Are you satisfied with your choice of studies.
Source: The authors' own study based on the survey data.

When asked if you would recommend studying at, 88% of respondents answered yes, while 12% of respondents do not recommend studying at the university.

Proposals for Improving the Image of The University Under Analysis

What emerges from the survey data it that – from the perspective of the respondents – the surveyed university has a positive image. This is the result of over 20 years of intensive activities and investments in this area. Therefore, in the opinion of the authors of the article, it is reasonable to maintain the current image as well as to continue the activities in the realm of public relations. It would therefore be advisable to organise, among other things, conferences on the practical aspects of business, such as the Congress of Family Businesses which was held last year and which attracted much interest from its participants. The positive reception of the congress indicates high demand for such projects in the region. The university should also intensify its cooperation with the companies which are the leaders in particular fields and which stand out in terms of innovation and investment in technology development.

What is more, the first academic LTE technology laboratory in Lower Silesia which has been opened this year, is highly popular. It prepares students to work in the 5G super-fast Internet environment. Thanks to the efforts of the university authorities, students studying at Lab powered by Nokia based in the studied university will learn about the technologies that will revolutionise Internet and telecommunication services in the coming years.

The group of proposals for improving the image should also include the activities which, in the opinion of the respondents, may positively influence the perception of University in Wrocław. The educational offer should be continuously improved so that it meets the expectations not only of graduates but also of potential employers. Therefore, it seems appropriate to establish cooperation with employers through regular meetings.

The sponsorship and patronage of cultural events granted by the university should also be taken into consideration. Likewise, conducting image campaigns outside the period of recruitment for studies should also take place. The proposal to improve the image of the studied university should also be accompanied by the possibility to participate in sports competitions organised in Wrocław and Lower Silesia. What is worth considering is the participation of the university team in sports events which are very popular, such as, for example, Wrocław Night Half-Marathon, Wrocław Marathon or Company Race which are organised on a regular basis. These events are of interest to tens of thousands of people. They are broadcast on the radio and television. Among the proposals to improve the image of the university, it is also worth considering offering courses and workshops for secondary school students in their final years to make it easier for them to prepare for the secondary school final examinations as well as to learn about the educational offer of the university. As results from the answers provided by the respondents, the university should improve the functioning of MojaUczelnia mobile application and Moodle platforms. More than half of the respondents had reservations about the functioning of the application – about its readability and liquidity. What is worth emphasising is the high level of students' satisfaction (which was confirmed in the research) with the choice of the educational offer of University in Wrocław.

Concluding Remarks

The growing role of competition on the market of educational services, the population decline and the increasing difficulties in obtaining a service recipient have led to the fact that a number of higher schools started attaching particular importance to their images. The essence of these activities is to communicate systematically with the internal and external environment in order to gain (meet or exceed its expectations) and thus achieve an advantageous market position. Shaping the image of the university in a proper manner requires performing monitoring activities and carrying out regular analyses as to whether the activities undertaken are appropriate for achieving the assumed results. According to W. Budzyński, shaping the image of an organisation should include several actions aimed, among others, at diagnosing the initial situation, thanks to which it will be possible to answer the following questions: what is the current competitive position of the image of the higher school in the different groups of its environment and what are its strengths and weaknesses. Additionally, it is

also vital to have an action plan which would allow determining what image the organisation intends to create and by what means it wants to do so. The actions undertaken should shape and promote a positive image of the higher school. Therefore, contacts with both high school students, who will be the potential customers of a higher education institution in the future, as well as higher school graduates and employers seem to be necessary. Higher education rankings also play an essential role since they constitute a valuable source of information for higher school candidates.

The authors are aware that the tested research sample could be larger. However, due to the COVID pandemic, it was not possible to collect a larger number of completed surveys. The aim of further work will be an attempt to compare the obtained research results with the research conducted in public and other non-public universities of a similar profile.

To sum up, the article aimed to analyse and assess the image based on the example of a non-public higher school. Based on the surveys carried out, the authors identified the factors which have a significant influence on the image of a higher school. An indirectly achieved objective was also to offer some actions which would improve the image of a non-public higher education institution.

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Measuring Teachers' Readiness to Adopt Organizational Loyalty Philosophy

Joanna Rosak-Szyrocka[1] and Ali Abdulhassan Abbas[2]

[1]Czestochowa University of Technology, Department of Production Engineering and Safety, Poland,
joanna.rosak-szyrocka@wz.pcz.pl
orcid id: 0000-0002-5548-6787

[2]University of Kerbala, College of Administration and Economics, Department of Accounting, Iraq,
fuhrer313@gmail.com , ali.abd.alhassan@uokerbala.edu.iq,
orcid id:0000-0001-6860-2583

Abstract

Primary school education is one of the basic issues in society. The effectiveness of schools and the extent of its impact on society are measured on the basis of teachers' loyalty, love, attachment to school and their desire to continue their work in the school. This gets reflected in the increased level of creativity in displaying scientific material and its delivery to students clearly. The current study is aimed at identifying the degree of organizational loyalty among teachers in Aleamid School for boys and girls and the most important obstacles that lead to weak organizational loyalty.

Keywords: Organizational Loyalty, Emotional Dimension, Constant Loyalty, Standard Loyalty.

Introduction

Organizational loyalty is one of the important topics of concern among business organizations, thanks to its implications and influence in increasing productivity. It is a vital topic characterized by originality and innovation while it is linked with many new concepts which an organization experience. If an organization desires to carry out its work successfully, it must strike a balance between its goals on one hand and the goals of organizational employees on the other hand. This fine balance remains a reason to satisfy the needs of working individuals which contributes in the development of their loyalty towards the organization. Further, this phenomenon reflects positively upon the organization and helps in achieving its goals. It is an inevitable fact that human element is the most important resource for any organization to produce renewable intellectual energy. Human resources ensure that the work is continued without any flaws. So, those organizations that possess highly efficient human resource and high degree of organizational loyalty exhibit positive performance, while at the same time, it also increases the company's efficiency in a sustainable way (Kim et al, 2016).

Organizations, irrespective of whether service-oriented or goods manufacturer, compete among each other to achieve excellence in the services provided or the goods produced. The organizations rely on their employee's competitive capabilities. In any organization, workers represent the backbone of their competitive capabilities because of their role in achieving their goals. Therefore, majority of the management concepts revolve around working individuals. These concepts are conceived to enhance their role in raising the efficiency of the organization, and improving their performance to fulfill the required role to the fullest extent. In order to maintain and develop a role, the organizations seek to ensure that its employees are closely related to their organizations, making keen observations on them, ready to do everything so that they can achieve success, elevate them to higher levels in the organizational hierarchy and remain on top compared to other organizations. One of the most important directives and determinants of job performance for an employee is the value that the manager holds and adheres to, when executing multiple tasks. The values of the leaders are also considered as the core structures in shaping the organization's culture (Cha& Hwang, 2018), (Suker, 2018).

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Organizational Loyalty

Organizational loyalty is considered as one of the basic concepts in administrative and behavioral sciences. This concept focuses on understanding the feelings and behavior of an employee towards their organizations in which they work. In other terms, organizational loyalty is a collective term to denote the degree of loyalty, fulfillment, and connection that an individual feels with the organization where he or she works (Ghreeb, 2012), (Bae & Kim, 2019).

Organizational loyalty is the willingness of an employee to take utmost effort for the organization and his/her strong desire to stay in it. The employee tends to accept the organizational goals and values which can be understood from his/her unwillingness to leave the organization for reasons related to increase in salary, job position, professional freedom, or issues related to work. Organizational loyalty is associated with the concept of organizational symmetry. This concept represents a certain degree of belonging and loyalty where the workers experience that the organization creates opportunities for them to accomplish and create self-development practices. The organization has powers within the organization and when there is no contradiction in executing these powers, the degree of organizational loyalty tends to increase dramatically. Therefore, organizational loyalty is the degree to which an individual corresponds to his organization and the strength of his/her association with it. Organizational loyalty can be considered as a sort of psychological bond between individuals and the organization at all levels (Eazima et al, 2007), (Rodivilov & Shin, 2019).

Researchers (Al-Rousan, Al-Amoush, (2013); Sukor et al, (2020)) mention that Organizational loyalty is a state of mind which unites the worker with organization where he or she is employed. It connects the employees' goals and their desires with that of the organization and maintain their employment in the company. It creates a sense of positive feeling in the employee towards his or her organization. Organizational loyal further enhances the commitment of an employee towards his/her company values and devotion to achieve its goals. It acts as a lasting sense of association between the employee and the organization. Organizational loyalty is based on three areas for instance, organizational emotional loyalty is one the areas which gets reflected through the individual's affiliation with the organization and his/her association with its goals and the pursuit of it.

Dimensions of Organizational Loyalty

According to various researchers (Kazim, (2014); Hasan, (2016); Owais, (2019); Mahmoud & Jar, (2019); (whiting et al, 2008)), organizational loyalty is decided based on three dimensions continuous loyalty, coherent loyalty and directed loyalty. Among these, the first one is intended to devote one's life and sacrifice his/her interests for the survival and continuity of the organization. In the goal dimension, i.e., coherent loyalty, the employee intends to practice social relations that bind the individual with others in a manner that results in cohesion and continuity of the group. The third dimension is directed loyalty which refers to the individual's attachment based on the values and principles of the organization. Organizational loyalty studies used the term 'loyalty' instead of 'commitment' since there is a great rapprochement present between these terms. Loyalty expresses the strength of commitment as this concept stems from the emotional commitment and normative commitment as long as there is a rapprochement with values and the principles of the organization. So, loyalty represents the highest degree of commitment towards an organization. Based on this point of view, the three most common dimensions, used by the researchers, and considered in the current study are presented here.

1. Emotional loyalty: This loyalty is an affiliation of employees with the organization and their awareness of distinctive characteristics of their work in terms of degree of independence, importance of the job, required skills, availability of supervision and direction. This loyalty type indicates the level of sense and awareness of the employee about his or her job's distinctive characteristics and their compatibility with the job. This loyalty type allows the employee to participate effectively in administrative activity. Further, this dimension is influenced by the degree of individual awareness about the distinctive characteristics of his/her work, to the degree of independence, importance of the job, diversity of skills, proximity to supervisors and clear

instructions to work. These variables develop an organizational climate which is equivalent to all its employees and has a positive impact on their level of loyalty.

2. Standard (moral) loyalty: This loyalty type denotes employee's commitment and how they feel attached with the organization through the promotion and supporting of the organization well. The loyalty is found among its employees when it allows them to participate in socially-interactive events.
   In addition to the implementation of work procedures, the employees feel connected to the company by knowing their contribution in the development and achievement of company's goals, planning and organization policy.
   It is the employee's sense of commitment towards continuing their work at the organization. In other terms, it denotes an employee's sense of morality to stay back in the organization without looking at utilitarian aspects that can be achieved in case of joining another organization. This type of loyalty reflects a sense of responsibility and commitment towards the institution. This loyalty makes the employee stay with the organization and pay back what the organization provided to him. An employee feels this way only based on the values that stem from their background such as family or social normalization (or after joining the organization) before joining the organization or during organizational normalization.
3. Continuous loyalty refers to the value of investment that can be achieved if an employee continues to stay with the organization or the amount of loss if he/she decides to join another organization. It indicates the degree to which the employees understand the benefits that can be attained if they stay back and continue, rather than the loss which they may undergo when they leave the organization. This component is based on the assumption that organizational loyalty expresses the accumulations of common interests such as promotions, compensation and rewards between the individual and the organization, more than being an emotional or moral process. These three components affect each other and a common bond present among these three components is 'perception' that loyalty is a psychological state which expresses the relationship between an employee and his/her organization. The authors find that the nature of psychological state is different among the previous types. So, the employee who has emotional loyalty has a desire to achieve something alike those who have strong and continuous loyalty.

Methodology

Research assumptions and purpose

Schools are one of the most important educational institutions. The efficiency and effectiveness of schools depend mainly on how the schools are administered and how does the principal perform his/her duties with teachers in the school? The success of a school administration is decided based on the extent of their efficiency in achieving the required goals, proper planning to execute their efforts, increase cooperation and harmony, connect all the stakeholders of the institutions, nurture loyalty among the employees of the organization, increase their commitment towards the values of the school, efforts taken to make the organization successful and spread a spirit of enthusiasm among the teachers.

By clarifying the purpose of this study, it can be observed that organizational loyalty is an important measure to assess the extent of harmony among the individuals with one another and with their organization. It represents the extent of sincerity and integration that the individual exerts towards their organization. Organizational loyalty includes basic components such as feeling safe, participation in business plan implementation, belonging to the organization, complacency, desire of an individual to take responsibility, feel valued and respected. Therefore, the importance of the current research is evident from the following points.

1. Disclosure of organizational loyalty to teachers
2. Identify the most influential dimensions in increasing organizational loyalty

Research sample and tools

Al-Ameed Primary School for Girls and Boys is one of the distinguished private schools in Karbala/Iraq and is affiliated with Imam Abbas Holy Shrine, Karbala/Iraq. The shrine supervises the school directly. This school surpassed rest of the schools in terms of performance in the recent years while it is deemed to be one of the best schools in existence. A high success rate was achieved during the previous years. The school introduced e-learning in teaching processes, added advanced curricula in teaching, and competed with both private and government schools in the region. Therefore, the current study is aimed at understanding the experiences of this school and introduce new proposals to further develop their work while at the same time, circulate these experiences to rest of the schools for them to incorporate. A questionnaire was used to collect data and Likert scale was used to generate results for the practical side. Table 1 shows the sample size of the study i.e., 119.

Table 1: research sample

Aleamid school for boys and girls									
Number of years of service			**Academic achievement**		**Sex**		**age categories**		
- 21 more	-11 20	-1 10	master	Bachelor	female	Male	more - 46	45 - 35	Less than 35
1	17	101	3	116	77	42	8	19	92

The table is prepared by researchers.

In order to achieve the best results, an already-established scale used in different studies earlier ((Al-Rousan& Al-Amoush, 2013); (Kazim, 2014); (Jahjouh, 2014)) was used in the current study too with few minor modifications to suit the current study objectives. The scale has three dimensions such as emotional dimension, constant loyalty and standard loyalty. The scale is included as a practical aspect.

Research hypothesis

The main hypothesis in this study is that there is a significance difference in organizational loyalty between males and females. There are three sub-hypotheses present for this main hypothesis.

H1: There is a significance difference in emotional dimension between males and females
H2: There is a significance difference in constant loyalty between males and females
H3: There is a significance difference in standard loyalty between males and females

Statistical Analysis

The current study used few statistical techniques listed herewith.

1. Descriptive statistics for demographic variables (frequencies & percentages)
2. Descriptive statistics for main variables (means & standard deviations)
3. Pearson correlation
4. Mann Whitney U test

Table 2: Frequencies and Percentages for Years of Experience

Experience	Freq. (%)
1-10	101 (84.87%)
11-20	17 (14.29%)
21 or more	1 (0.84%)

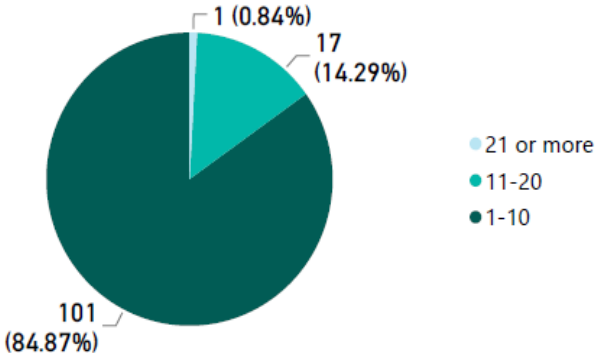

Fig 1. Pie chart for Years of Experience

Table (2) shows the frequencies and percentages for 'years of experience'. It can be understood from the table that the respondents with 1-10 years of experience possessed the highest frequency and percentage (101, 84.87%) in the study. The next level of experience was 11-20 years with a frequency and percentage (17 and 14.29%). Finally, there was one respondent with 21 or more years of experience with 0.84%. Figure 1 shows the results as a pie chart.

Table 3: Frequencies and percentages for academic achievement

Academic achievement	Freq. (%)
Master	3 (2.52%)
Bachelor	116 (97.48%)

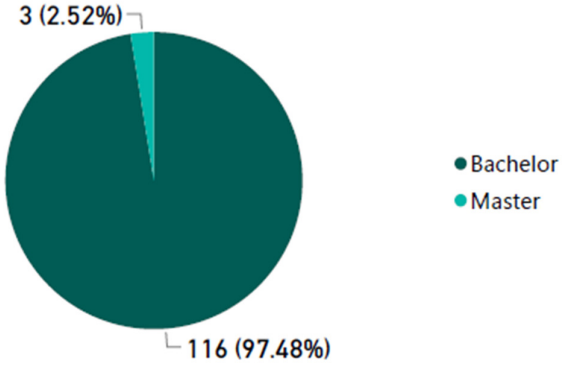

Fig 2. Pie chart for Academic achievement

Table (3) shows the frequencies and percentages for academic achievement. The table infers that the 3 respondents hold master's degree as their academic achievement with 2.5% percentage frequency. The respondents who hold bachelor's degree were 116 in number with the greatest frequency of 97.48% in the study. Figure 2 shows the results as a pie chart.

Table 4: Frequencies and Percentages for Sex

Sex	Freq. (%)
Male	42 (35.29%)
Female	77 (64.71%)

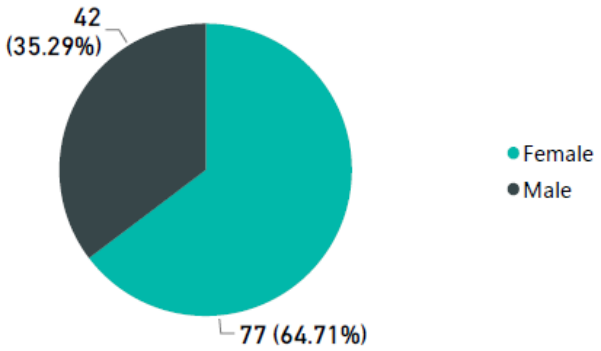

Fig 3. Pie chart for Sex

Table 4 shows the frequencies and percentages for gender. Most of the respondents were females i.e., 77 in total with a frequency of 64.71% whereas the male respondents accounted for (35.29%) i.e., 42 respondents. Figure 3 shows the results as a pie chart.

Table 5: Frequencies and Percentages for Age Category

Age Category	Freq. (%)
Age Category	**Freq. (%)**
Less than 35	92 (77.31%)
35-45	19 (15.97%)

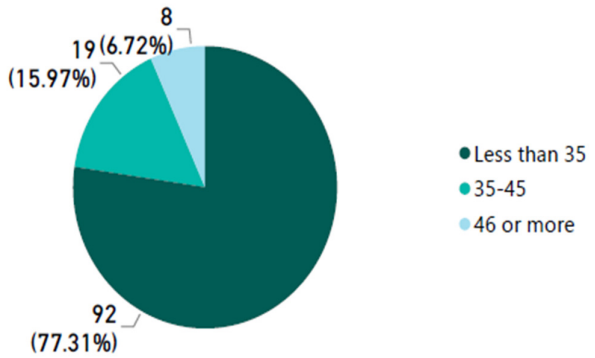

Fig 4. Pie chart for Age Category

Table (5) shows the frequencies and percentages for age category. The respondents aged above 35 were high in number with great frequency i.e., (92, 77.31%). The respondents in the age range of 35-45 were 19 in number with a frequency of 15.97%. The final category respondents belonged to age range 46 or more years with 8 respondents and a frequency percentage of (6.72%). Figure 4 shows the results as a pie chart.

Table (6) shows the descriptive statistics for items of the study. The range of the mean was between (4.39- 3.08). This denotes that agreement about the questions of the study was higher. The values of Standard Deviation (SD) were in the range of (.875-1.527). This denotes that there existed some deviations in the respondents' answers.

Table 6: Descriptive Statistics for items of the study

No.	Item	Mean	SD
q1	Employees feel the desire to spend the remainder of their career in the organization	3.46	1.103
q2	Staff speak with pride about the organization	3.55	1.226
q3	The organization has a high position in the hearts of workers	3.56	1.293
q4	Staff treat the organization's problems as their personal problems	3.73	1.430
q5	I feel that I would be happy to work for the rest of my life with this organization	3.62	1.426
q6	Enjoy the discussion about the organization with people outside	3.32	1.127
q7	I feel that the organization's problems are among my own problems	3.94	1.019
q8	The organization's concerns are among my interests	3.95	1.268
q9	I feel a strong sense of belonging to this organization	3.80	1.176
q10	I feel that the advantages offered in this organization are greater than those offered in other organizations	3.49	1.213
q11	I feel that many things will be affected by my life if I decide to leave the organization	4.39	.875
q12	I am afraid of leaving the organization because it is difficult to find another job	3.32	1.142

No.	Item	Mean	SD
q13	I feel that my stay in the organization stems from my need to work in it	3.33	1.113
q14	I feel that leaving the organization at the moment will cost me a lot	3.08	1.527
q15	I feel the necessity of commitment and loyalty to the organization	3.53	1.103
q16	I feel that moving to another organization is unethical	4.08	1.161
q17	I feel a moral obligation that motivates me to continue working in this organization	4.19	.941
q18	I feel guilty if I left the organization	4.20	.917
q19	I feel that the organization deserves sincerity and loyalty to her	4.26	1.029
q20	I feel a sense of commitment and responsibility towards some of the employees, which motivates me to stay with the organization	3.81	1.361

The table is prepared by researchers.

Table 7: Ranking Criteria for the Selection of Items

Variable	Item	RII	Ranking by category	Overall ranking	Importance level
Emotional dimension	q1	0.692	8	16	H-M
	q2	0.710	7	13	H-M
	q3	0.712	6	12	H-M
	q4	0.746	4	10	H-M
	q5	0.724	5	11	H-M
	q6	0.664	9	18	H-M
	q7	0.788	2	7	H-M
	q8	0.790	1	6	H-M
	q9	0.760	3	9	H-M
Constant loyalty	q10	0.698	2	15	H-M
	q11	0.878	1	1	H
	q12	0.664	4	18	H-M
	q13	0.666	3	17	H-M
	q14	0.616	5	20	H-M
Standard loyalty	q15	0.706	6	14	H-M
	q16	0.816	4	5	H
	q17	0.838	3	4	H
	q18	0.840	2	3	H
	q19	0.852	1	2	H
	q20	0.762	5	8	H-M

The table is prepared by researchers

According to Chen et al. (2010), the importance levels in table (7) from Relative Importance Index (RII) are derived as follows:

Table 8: Importance Levels

Importance Levels	Range
High (H)	0.8 < RII < 1.0
High-Medium (H-M)	0.6 < RII < 0.8
Medium (M)	0.4 < RII < 0.6
Medium-Low (M-L)	0.2 < RII < 0.4
Low (L)	0.0 < RII < 0.2

The table is prepared by researchers.

The results of Relative Importance Index are reported in table (7) along with corresponding ranking and their importance level. It is evident from the ranking table that five items were identified as 'High' importance levels and were considered of prime importance for the selection of its constructs. These 'High' importance indicators attained RII in the range of 0.806-0.878. However, the remaining 15 items were identified as 'High-Medium (H-M)' importance levels with secondary importance in the selection of its constructs. These 'H-M' importance indicators had RII in the range of 0.616-0.790.

Table 9: Descriptive statistics, test of normality, and correlation matrix

Variable	Mean	SD	K-S Test	1	2	3	4
Emotional dimension	3.6601	.59683	.066	1			
Constant loyalty	3.5227	.65722	.092*	.499***	1		
Standard loyalty	4.0126	.54035	.093*	.456***	.496***	1	
Organizational Loyalty	3.7318	.48512	.089*	.805***	.840***	.782***	1
*P < 0.05, **P < 0.01, ***P < 0.001.							

The table is prepared by researchers.

Table 9 is divided into three parts; the first part is concerned with descriptive statistics. Among the three dimensions of organizational loyalty, standard loyalty achieved the highest mean and least SD, i.e. $(M = 4.01, SD = .54)$, whereas emotional dimension secured second position with $(M = 3.66, SD = .597)$. The third was constant loyalty with least mean and highest SD of $(M = 3.52, SD = .657)$. One sample Kolmogorov-Smirnov (K-s) test was conduct to test the normality in the second part of table 9. The results indicate that the two dimensions of organizational loyalty were not normally distributed alike the main variable i.e. organizational loyalty, since the p-value was less than 0.05. So, it can be firmly concluded that the data was not normally distributed.

Table 9 also shows the matrix of Pearson correlation coefficients among the variables in the study. The correlation coefficients suggest that there is a significant positive correlation among all the variables. Pearson product-moment correlation coefficient was calculated to confirm a significant, positive and moderate correlation between emotional dimension with constant loyalty, where $(r = 0.499, P < 0.001)$, and standard loyalty, where $(r = 0.456, P < 0.001)$. The correlation between constant loyalty and standard loyalty was computed as $(r = 0.496, P < 0.001)$. Finally, there was a strong positive and a significant correlation exists between the organizational loyalty with its dimensions where $(r = 0.805, P < 0.001)$ for emotional dimension, $(r = 0.840, P < 0.001)$ for constant loyalty, and $(r = 0.782, P < 0.001)$ for standard loyalty.

Testing of hypothesis

In order to test the main hypothesis, the sub-hypotheses were tested as shown below

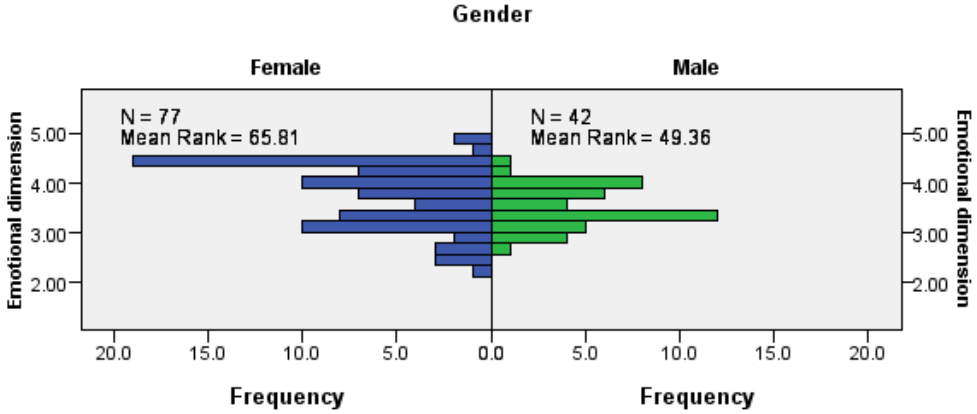

Fig. 5: The distribution of emotional dimension for males and females

Table 10: Independent-Sample Mann Whitney U test between males and females for emotional dimension

Total N	119
Mann-Whitney U	2,064.000
Wilcoxon W	5.067.000
Test Statistic	2,064.000
Standard Error	179.420
Standardized Test Statistic	2.491
Asymptotic Sig. (2-sided test)	.013

The table is prepared by researchers.

Figure 5 shows the distribution of emotional dimension for males and females. It can be understood that the distributions of males was somehow normal and consistent while the distribution of females left skewed. Table 10 shows the results of Mann Whitney U test between males and females for emotional dimension. The results suggest that there is a significance difference between males and females since $(U = 2064, p = .013)$. *So, the first sub-hypothesis is confirmed.*

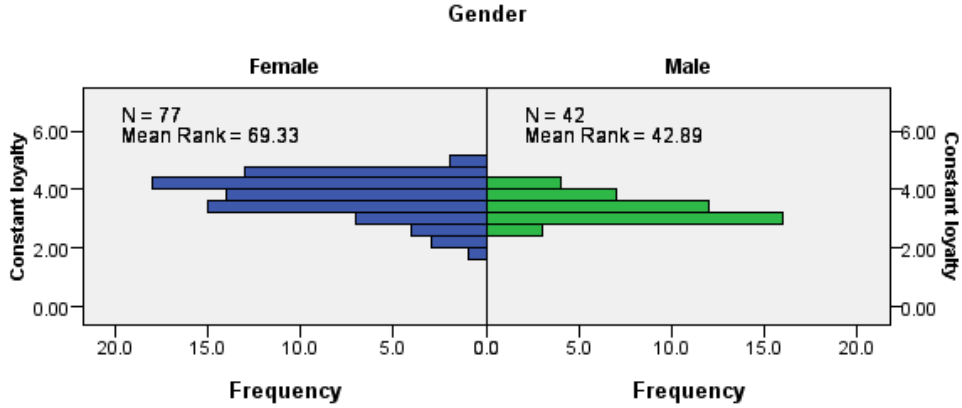

Fig. 6: The distribution of constant loyalty for males and females

Table 11: Independent-Sample Mann Whitney U test between males and females for constant loyalty

Total N	119
Mann-Whitney U	2,335.500
Wilcoxon W	5,338.500
Test Statistic	2,335.500
Standard Error	179.028
Standardized Test Statistic	4.013
Asymptotic Sig. (2-sided test)	.000

The table is prepared by researchers.

Figure (6) shows the distribution of constant loyalty for males and females. It can be inferred that the distributions of males was somehow normal and consistent, while the distribution of females left skewed. Table (11) shows the results of Mann Whitney U test between males and females for constant loyalty. The results suggest that there is a significance difference between males and females, since $(U = 2335.5, p < 0.001)$. *So, the second sub-hypothesis is confirmed.*

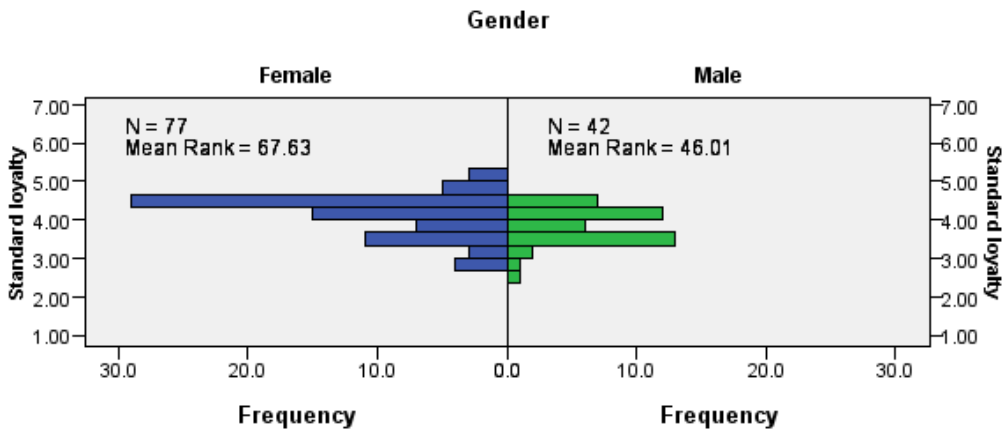

Fig. 7: The distribution of standard loyalty for males and females

Table 12: Independent-Sample Mann Whitney U test between males and females for standard loyalty

Total N	119
Mann-Whitney U	2,204.500
Wilcoxon W	5,207.500
Test Statistic	2,204.500
Standard Error	178.970
Standardized Test Statistic	3.283
Asymptotic Sig. (2-sided test)	.001

The table is prepared by researchers.

Figure (7) shows the distribution of standard loyalty for males and females. It can be observed that the distributions of males was somehow normal and consistent, while the distribution of females remained skewed. Table (12) shows the results of Mann Whitney U test between males and females for standard loyalty. The results suggest that there is a significance difference between males and females, since $(U = 2204, p = 0.001)$. *So, the third sub-hypothesis is confirmed.*

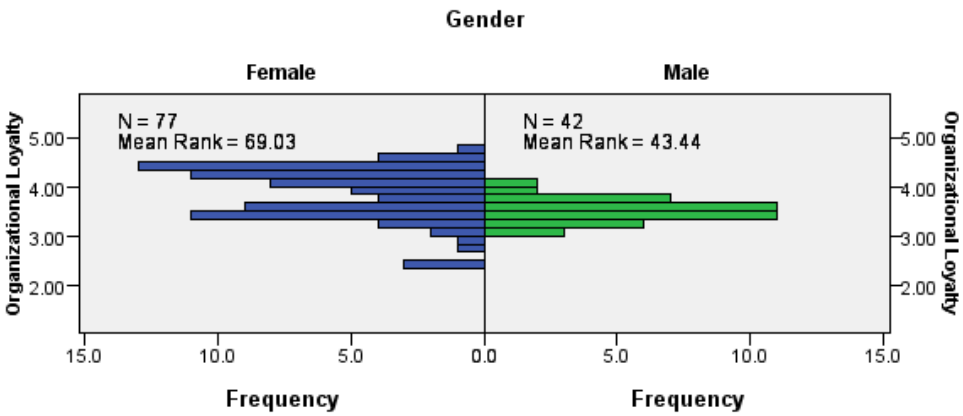

Fig. 8: The distribution of organizational loyalty for males and females

Table 13: Independent-Sample Mann Whitney U test between males and females for organizational loyalty

Total N	119
Mann-Whitney U	2,312.500
Wilcoxon W	5,315.500
Test Statistic	2,312.500
Standard Error	179.827
Standardized Test Statistic	3.868
Asymptotic Sig. (2-sided test)	.000

The table is prepared by researchers.

Figure 8 shows the distribution of organizational loyalty for males and females. It can be understood that the distributions of males was somehow normal and consistent, while the distribution of females got skewed. Table (13) shows the results of Mann Whitney U test between males and females for organizational loyalty. The results suggest that there is a significance difference between males and females, since $(U = 2312.5, p < 0.001)$.

Table 14: Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of emotional dimension is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.013	Reject the null hypothesis and **accept** the alternative hypothesis
2	The distribution of Constant loyalty is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis and **accept** the alternative hypothesis
3	The distribution of Standard loyalty is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.001	Reject the null hypothesis and **accept** the alternative hypothesis
4	The distribution of Organizational Loyalty is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis and **accept** the alternative hypothesis
Asymptotic significances are displayed. The significance level is .05.				

The table is prepared by researchers.

Table 14 summarizes the testing of both main and sub-hypotheses for the study. The null hypotheses were rejected while the alternative hypothesis i.e., difference between males and females regarding organizational loyalty and its dimensions got accepted.

Conclusions and Discussion

The respondents participated in the study expressed their desire to work with the school and expressed organizational loyalty. It was found that there are significant correlations among the dimensions of organizational loyalty. Based on the statistical analysis, it is found that all the dimensions of organizational loyalty got fulfilled which, in other terms, all the research hypotheses got fulfilled. The teachers, both women and men, are ready to work with a high moral spirit since they possessed organizational loyalty within themselves towards the school. Since the teachers feel comfortable with the work environment, they desire to work in the school itself. The statistical ratios attained infer that the school administration showed much interest in providing a comfortable work environment for employees in terms of tools, devices, programs and means of communication. The school administration further provides means of transportation, put great efforts in clarifying the school's policies, objectives and procedures for teachers, making them accept decisions and all practices and generate high organizational loyalty among them.

In order to increase the proportion of organizational loyalty to higher levels, the leaders must work hard to raise the morale of teachers by increasing material rewards. Further, they should also design a fair incentive program for teachers and increase their participation in decision-making, since it is important in enhancing organizational loyalty. Further the leaders should also emphasize the activation of human relations among teachers in the work environment. The leaders must work out new mechanisms for promotion based on competency of the teachers. The teachers must be educated to increase their positive participation in achieving the goals of the school. The teachers further should be encouraged and urged to learn positive thinking in order to increase their loyalty to the school. The leaders should work to develop challenges that are appropriate to the aspirations of teachers. The teachers should get motivated out of this challenges so that their thinking, creativity and loyalty towards the school are increased.

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Regulators of Financial Invulnerability of Ukraine: International Factors of Influence and Accounting Methodology

Tetyana CALINESCU
Doctor Science in Economic; Professor,
Head of Finance, Accounting and Taxation Department
National Aerospace University «Kharkiv Aviation Institute», Kharkiv, Ukraine
e-mail: tetyana.calinescu@gmail.com

Ganna LIKHONOSOVA
Doctor Science in Economic; Associate Professor
Professor of Finance, Accounting and Taxation Department
National Aerospace University «Kharkiv Aviation Institute», Kharkiv, Ukraine
e-mail: a.likhonosova@gmail.com

Olena ZELENKO
Doctor Science in Economics; Associate Professor,
Professor of International Economic and Tourism Department
Volodymyr Dahl East Ukrainian National University, Severodonetsk, Ukraine
e-mail: zelenko.olena@gmail.com

Abstract

Currently in Ukraine, the problems of external financial vulnerability, assessment of external stability of the economy, analysis of monetary and financial and debt risks do not attract due attention of specialists and civil servants. Based on this, Ukraine is gradually but surely immersed in a new economic and financial crisis, one of the causes of which is the COVID-19 pandemic. *The aim of the article* is to identify the level of financial invulnerability of Ukraine in modern conditions and under the presser of world pandemic. *Methods / approaches*: research methodology based on methods of statistic, correlation and comparative analysis; logical and heuristic; extrapolation; Feedback. *Results*. Is was identified what the most suitable instrument for analyzing the situation in financial system of Ukraine in the international context is the Macroeconomic Imbalance Procedure. The mane indicators of this procedure show what with a high level of external debt burden, the national economy is characterized by low and unstable growth rates, as well as significant vulnerability to external factors Particularly dangerous is the so-called avalanche effect, when high credit risks of investors push up market interest rates, which, in turn, cause an increase in the debt burden, thus triggering a spiral of crisis events. It is determined that a significant trade deficit, low level of international reserves, the negative balance of the international investment position, excessive foreign debt of Ukraine and the unbearable burden of debt payments signal the possibility of a debt crisis and balance of payments crisis in Ukraine in the near future. *Conclusions.* Thus, the analysis shows that the process of macro-financial stabilization in Ukraine is quite unstable and can be destroyed at any time under the influence of large-scale external shocks or internal shocks. In particular, it is dangerous to reduce the absolute and relative indicators of international reserves; the size of the external debt burden remains at a critically high level, and the amount of short-term debt continues to increase. What is why when it is necessary to choose a methodology for assessing the vulnerability of the financial system and identifying indicators that may indicate its stability, it is impotent to use not individual, but a system of indicators. containing directly as elements of the financial and macroeconomic sector.

Keywords: Financial Invulnerability, International Factors, Accounting Methodology, Macroeconomic Imbalance, Indicators, Financial Regulators.

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Introduction

Ukraine's financial system has suffered losses due to previous crises, continues to lose due to the global pandemic at COVID-19, and further trends in the global and national economy do not allow us to hope for optimistic expectations. Therefore, there is a high probability of another global financial crisis and the need to assess the readiness of Ukraine's financial system. It is the identification of key vulnerabilities of the financial system of Ukraine that allows us to determine the right tactics to protect against instability and adjust to the situation in international financial markets.

Ukraine is twice as vulnerable to external financial instability as its neighbors (Europe and Central Asia), and four times more vulnerable than low- and middle-income countries (in terms of GDP per capita) (Zimovets, 2019). Over the last ten years, business financing models have been gradually tested and introduced in Ukraine, which mainly minimize losses and quickly take capital out of the country's financial system. And hence the risks of capital outflows in 2019. were significantly higher than in the two previous crises. Today, offshore big business plays a key role in the international capital cycle in Ukraine. Therefore, the stability of the country's financial system increasingly depends on the efforts of big business to change the location of its capital. Over the last ten years, the share of large and medium-sized enterprises controlled from offshore has increased from 26% to 36% (Zimovets, 2019). Therefore, a natural consequence of the use of withdrawal schemes was an artificial shortage of equity in the country.

Traditionally in Ukraine, the problems of external financial vulnerability, assessment of the external stability of the economy, analysis of monetary and financial and debt risks do not attract due attention of specialists and civil servants.

However, a review of economic activity published by the Ministry of Economic Development, Trade and Agriculture (Macroeconomic analysis, 2020) indicates a reduction in Ukraine's GDP in January-May 2020 by 5.9%. Based on this, Ukraine is gradually but surely immersed in a new economic and financial crisis, one of the causes of which is the COVID-19 pandemic. The new agreement with the International Monetary Fund should help Ukraine get out of the crisis with the least losses, but whether the proposed program will be realistic for the current conditions of Ukrainian business is not yet clear.

Ukraine has agreed with the IMF on a new $ 5 billion loan program. Of this, the country has already received $ 2.1 billion, and will be able to receive the remaining funds in four tranches over the next year and a half (IMF memorandum, 2020). These funds are needed for Ukraine to finance budget and balance of payments deficits, due in particular to COVID-19.

The IMF has identified four priorities for Ukraine: 1) to support households and businesses during the crisis; 2) preserve the independence of the National Bank of Ukraine; 3) recover state losses from the owners of bankrupt banks; 4) continue anti-corruption measures. Two of the four priorities concern the financial sector, which the International Monetary Fund considers most vulnerable.

The National Bank of Ukraine promises to keep inflation within the 5% target range, maintain a flexible exchange rate and buy currency to replenish reserves. Among the priorities of the state: strengthening the capital requirements of banks after the crisis; reduction of non-performing loans and return of assets of bankrupt banks; reforming state-owned banks; improving the finances of the Individual Deposit Guarantee Fund; development of the non-banking financial sector.

At the same time, in its communication, the International Monetary Fund paid unusually much attention to the risks of the program on the part of Ukraine, says the head of the macroeconomic research department of the ICU group (Nikolaychuk, 2020).

In particular, it is about the uncertainty of the government's economic policy, the potential impact of related interests and the adoption of populist decisions instead of prudent structural reforms. An important priority of the new program with the IMF is the return of bank funds lost due to the past crisis. No less important is another task - to reduce the level of problem loans in state banks.

The President of the Ukrainian Society of Financial Analysts Yu. Prozorov considers the implementation of the program of the Cabinet of Ministers of Ukraine, which would focus on the development of Ukrainian industry, export support, the functioning of the Development Bank, economic diplomacy (Kislyak, 2020), to be an alternative to cooperation with the IMF. On the positive side, the first tranche of the loan went to the budget to finance domestic expenditures, not to the NBU's international reserves. In this case, Ukraine's credit ratings will rise.

Results

Preventing excessive volatility of the main indicators of the stability of the financial system of Ukraine, increased sensitivity to fluctuations in global conditions requires coordination of actions of the authorities to counteract existing and potential imbalances. This will require cooperation between the National Bank of Ukraine and the executive within a single system for identifying and overcoming macroeconomic imbalances, which should include testing of draft state budgets, decisions on setting the discount rate, planned actions of the government and the National Bank of Ukraine in the foreign exchange market, public debt in terms of their likely effects. on macroeconomic stability and financial stability. In view of this, we consider it expedient to introduce a system for detecting macroeconomic imbalances and crisis prevention on the European model. An important component in the structure of European economic governance is the Macroeconomic Imbalance Procedure which is created to analyze macroeconomic imbalances. As a monitoring mechanism it is aimed to discover potential risks at early development stages to prevent negative macroeconomic imbalances and correct already formed adverse situations (Eurostat, 2016; Eurostat, 2012; The Macroeconomic Imbalance Procedure, 2016). Macroeconomic Imbalance Procedure as part of financial and economic management has three components:

- notification mechanism that facilitates early detection and monitoring of imbalances based on qualitative economic analysis and financial evaluations;
- a system of indicators, which is a set of indicators and indicative thresholds used in the first stage of detection of external and internal imbalances and which are differentiated for the Eurozone countries and other non-member countries;
- an in-depth review aimed at identifying or identifying at an early stage whether potential imbalances are benign or problematic (Eurostat, 2016).

The dispute over the Macroeconomic Imbalance Procedure shows both the disadvantages and advantages of this mechanism. They concern both the order and the choice of indicators. In particular, the usefulness of the procedure for EU candidate countries has been proven, but on the other hand it is considered that this procedure does not take into account the specifics of catching-up countries. The discussion continues.

The list of indicators selected for the Macroeconomic Imbalance Procedure was formed based on four principles (Shumska, 2018):

1) the choice of indicators focuses on the most relevant aspects of macroeconomic imbalances and losses of competitiveness (with special emphasis on ensuring the proper functioning of the euro);
2) indicators and thresholds in the table are selected so as to provide reliable signals regarding potential imbalances and losses of competitiveness at an early stage of their occurrence;
3) the table plays an important role of communication. To this end, the table includes a limited number of indicators, their selection and conversion should be as simple and easy to reproduce by third parties, and statistics should be available;
4) indicators should be based on high statistical quality data and ensure comparability for different countries (Eurostat, 2016; Eurostat, 2012).

As a result, the list of indicators includes indicators that reflect external imbalances, competitiveness positions and internal imbalances. This combination of indicators and the format of their calculations can reflect both short-term rapid deterioration and the gradual accumulation of imbalances in the long run (Eurostat, 2012).

The European documentation describing the procedure for assessing imbalances often emphasizes that the indicators included in the system should not be taken purely mechanically, but additional information should be taken into account to draw conclusions in a broad financial and economic context. The setting of indicative thresholds is not very strict, it is aimed at avoiding a significant number of false alarms, but also to identify problems as soon as they arise. The thresholds were determined by European experts on a detailed analysis of the results of existing empirical research.

The threshold limits for changes in financial indicators in European practice are as follows (Shumska, 2018):

- net investment position: -35%;
- credit to the private sector: + 14%;
- private sector debt: 133%;
- debt of the general government sector: 60%;
- total liabilities of the financial sector: 16.5% (Eurostat, 2012; The Macroeconomic Imbalance Procedure, 2016).

Threshold values of indicators are not constants, they are periodically revised depending on other factors influencing the functioning of the financial and economic system.

Currently, Ukraine's financial system is not ready for future global (international) challenges, but has become a vulnerability (Zimovets, 2019):

high level of external debt dependence, which has grown from 91.5% to 98.4% of GDP over the past 10 years. According to this indicator, Ukraine is twice as vulnerable as in Europe and Central Asia and has significantly less reserves to cover external debt compared to the same countries (reserves cover only 15.7% of external debt, which is three times less than in the above-mentioned countries);

progressive dysfunction of the banking system of Ukraine, a manifestation of which is the curtailment of business lending against the background of inertial stagnation of the banking resource base. Imbalances between the size of public debt and domestic sources of its financing are 142.2% and almost three times higher than the maximum allowable value;

shifting the focus of currency risks in the sector of non-financial corporations, which accounts for 84% of the country's short-term external debt. The share of total foreign currency debt in total business financing is 19.1%, which means that the majority of Ukrainian business is controlled by non-residents.

In the first half of 2020, a number of negative trends were observed in Ukraine, indicating a deterioration in the country's international liquidity and solvency, and a deepening balance of payments imbalances. Among them: the widening of the trade deficit and weak inflows of foreign capital, the reduction of international reserves and the growth of short-term external debt, the preservation of a high level of debt burden and the actualization of the problem of external debt service.

At the same time, the imposition of global trends on domestic realities will yield disappointing results. Thus, the reduction of portfolio investment in the world with low credit ratings of Ukrainian economic entities will lead to the prolongation of the dependence of the financial condition of the state on attracting external official financing.

The current account balance, the country's net international investment position, the size of external aggregate debt and short-term debt, the volume of external debt payments and the level of official foreign exchange reserves are generally accepted indicators of external vulnerability or resilience to external shocks. Table 1 shows a standard set of indicators of external stability, calculated for the period 2015 - 2019 on the basis of data from the National Bank of Ukraine.

Table 1: Financial indicators of Ukraine's external stability and their limits

Indicators	2015	2016	2017	2018	2019	Limits
Gross external debt,% of exports of goods and services	248	246	216	210	205	200
Gross external debt,% of GDP	130,4	121,8	103,9	100,3	97,1	60
Short-term debt,% of gross external debt	43,3	41,6	40,1	40,6	34,1	20
Short-term external debt,% of exports of goods and services	107,3	102,7	86,9	88,0	78,1	40
External debt payments,% of exports of goods and services	58,3	29,4	28,1	27,1	26,1	25
International reserves,% of short-term external debt	25,9	32,9	40,2	38,5	35,7	100
International reserves, months of imports	3,2	3,6	3,6	3,4	3,2	3,8
Current account balance,% of GDP	1,8	-1,4	-1,9	-0,3	-0,1	-2,3
Net international investment position,% of GDP	-41,7	-37,1	-23,7	-23,3	-22,1	-35

Source: developed by the authors on the basis of official data of the National Bank of Ukraine

The obtained quantitative values of the indicators were compared with the limit values (last column of the table), which were determined according to the Alert Mechanism of the European Commission and the statistical department of the Central Bank of Indonesia (Alert mechanism report).

When these limit values were exceeded, the corresponding indicators were marked as signaling an increased level of danger. According to the results of the analysis, in 2019, out of nine indicators of external stability, only two - the current account balance, the net international investment position - showed a low degree of vulnerability to the impact of shock situations. According to other indicators of the size of external debt, debt payments and the size of the country's international reserves, the level of relevant risks is assessed as very high.

Thus, a significant trade deficit, low international reserves, a negative international investment position, excessive foreign debt of Ukraine and the unbearable burden of debt payments signal the possibility of a debt crisis and a balance of payments crisis in Ukraine in the near future.

In 2018, Ukraine, together with China and Argentina, is ranked among the most vulnerable among the developing countries among the developing countries in terms of external financing needs, adequacy of international reserves, asset valuation and foreign trade stability (Shavalyuk, 2020).

Thus, Ukraine's cooperation with the IMF and maintaining foreign economic and debt stability should become one of the priorities of the state in the short term. But in the medium term, to balance the country's financial and foreign economic imbalances, it will be of paramount importance to rehabilitate the institutional system and pursue an active structural policy that ensures the development of domestic entrepreneurship and the departure from the raw material model of the economy.

In our opinion, a very important aspect that should be taken into account in the process of Ukraine's interaction with the IMF is that the Fund does not have a permanent set of measures to achieve the goals of macro-financial stabilization in a particular country. IMF specialists can quickly adjust the initial parameters of stabilization programs while justifying by the national government measures / criteria different from those proposed by the IMF, but effective enough to bridge the existing gaps in public finances, monetary and external sectors. Therefore, in order to achieve the long-term goals of socio-economic development and restore the full sovereignty of the state, it is undeniable to develop an active position of state institutions in problematic issues of cooperation with the IMF and professional advocacy of national economic interests.

According to the latest data from the World Bank, in 2016 the ratio of external debt to exports in Ukraine (233.7%) was more than twice as high as for low- and middle-income countries (106.7). And the Ukrainian ratio of external debt to gross national income (127.8%) exceeded the average level in low-income countries by almost five times (Figure 1).

Figure 1 shows the main external debt indicators of Ukraine in the dynamics from 2014 to 2019. These data indicate that all of these indicators of the external debt burden of Ukraine significantly exceed the threshold values.

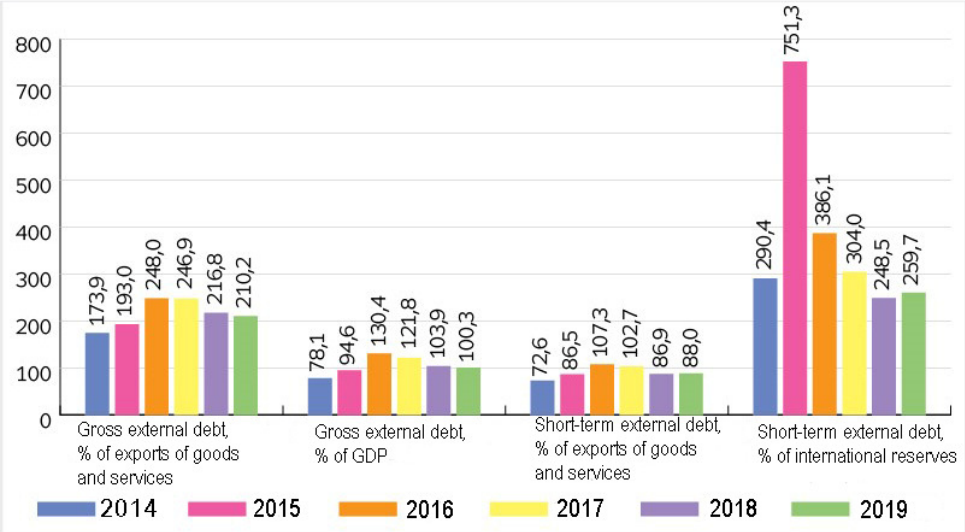

Fig. 1: External debt indicators of Ukraine in 2014-2019

Source: developed by the authors based on World Bank data

With a high level of external debt burden, the national economy is characterized by low and unstable growth rates, as well as significant vulnerability to external factors - fluctuations in interest rates, exchange rates, prices for exported goods, the level of demand in partner countries. In addition, the high amount of external debt requires significant costs for its maintenance. Particularly dangerous is the so-called avalanche effect, when high credit risks of investors push up market interest rates, which, in turn, cause an increase in the debt burden, thus triggering a spiral of crisis events.

Discussion

Ukraine's national financial system is currently showing much greater resilience than on the eve of the 2008 global crisis. This fact, according to experts, there are certain reasons for the development of the domestic economy, namely (Shemaueva, 2020):

1) the international reserves of the NBU have significantly increased in recent years. At the beginning of March 2020, they amounted to 26.6 billion dollars. US and increased over the year (compared to March 1, 2019) by 6.4 billion dollars. US dollars (at the beginning of 2008 the reserves amounted to 32.5 billion US dollars);

2) in 2019, the capitalization of commercial banks significantly improved. Balance sheet capital increased by a third, from UAH 155.7 billion to UAH 200.9 billion. During the recovery, weak banks were withdrawn from the market, the total number of banks decreased to 75, of which only 6 were unprofitable (at the beginning of 2008 there were 214 banks in Ukraine). Confidence in banks is growing: the volume of hryvnia deposits of the population for the year increased by 17%, foreign currency - by 15%. The share of non-performing loans in the loan portfolio of banks in 2019 decreased from 52.9 to 48.4%;

3) in the structure of commodity exports 44.3% were agricultural and food products, the elasticity of demand for which in the crisis period is insignificant (in 2007 42.2% of exports were metallurgical products, 17.2% - machinery and instrumentation, demand for which fell sharply due to the global crisis).

4) Ukraine has a moderate level of debt burden: in 2020 the planned cost of repayment and servicing of public debt is UAH 375 billion, of which the share of external debt is about UAH 160 billion. Gross external debt amounted to 121.7 billion dollars as of December 31, 2019. US dollars and increased by 6.1% over the year (in 2007 - 80.0 billion US dollars, an increase over the year was 46.7%);

5) there was a significant strengthening of the hryvnia against major currencies. Thus, in 2019 against the US dollar the hryvnia rose by 18%. At the same time, the consumer price index decreased to 4.1% from December to December (16.6% in 2007).

Thus, there are grounds to state the existence of a certain "reserve" of strength accumulated by the Ukrainian financial system, which can withstand both short-term fluctuations in global markets and the inhibition of economic activity within the country. But we must keep in mind that this stock is not unlimited.

In order to minimize the vulnerability of the financial system of Ukraine, it is necessary at the level of state regulation to take measures to:

1. Restoration of the functionality of the country's banking system by reducing public debt and directing the released capital to lending to productive sectors of the economy;
2. Creation of special foreign exchange reserves sufficient to compensate for possible capital outflows through the productive sector of the economy, and taking into account the trends of progressive offshoring of business, the level of corporate debt refinancing that have developed during previous financial crises;
3. Increasing the liquidity of the banking system to the level of meeting the hectic demand of the productive and non-financial sectors of the economy in the face of various global challenges.

Therefore, in Ukraine it is time to develop a clear action plan to prevent the likely development of future crises under pessimistic (unfavorable) scenarios (Ukraine 2030, 2017). The main guideline for future development doctrines should be a clear definition of potential sources and specific regulatory mechanisms for the formation of financial reserves and liquid sectors of the economy. This is not possible without a methodology for taking into account existing signs of vulnerability and indicators of stability and steadfastness of the financial system. Of course, the national methodology of each country is based on the ideology of its own and international scientific schools, which should be based on certain principles of thinking and recognized ways of action that are not related to personal or social benefit, but only to the principles (Vugalter, 2007):

the axiom that deprives a priori of the assessments formed by modern scientific schools is not tied to anyone or anything, but only to the axiom that the best theory cannot give more than it already has in reality;

truthfulness, which explains reality based on the results of specific research conducted by man, who builds a logical model of existing (true) reality. So, following Aristotle - no other scientific model, recognized in the world, cannot correspond to the existing nature of things and cannot be plausible (Aristotle, 2001);

productivity - proves that every scientific theory should be aimed at establishing bridges between idea and reality, ie to build a productive model as close as possible to the truth. And hence - for each country there are different methodological approaches;

limitations - emphasizes the presence of the development process, which should gradually lead to negative (negative indicators). So, if this does not happen, then in reality we are dealing with erroneous dogmatic ideas;

plurality, which emphasizes the impossibility of recognizing any alternatives as equivalent, equivalent and relevant to the existing reality. However, without multi-valued explanatory methodologies, it is not possible to solve any problem and achieve productivity (as close as possible to reality);

subjectivism, which is based on the economic behavior of a person (individual) or a typical average subject, his psychology and is not related to the analysis of certain facts;

objectivism - tied to the behavior and psychology of the masses, intergroup relations, takes into account social facts and other interdisciplinary aspects (Calinescu, 2014) that can explain the economic phenomena that occur in modern reality.

Despite the existence of generally accepted methodological provisions and methods of accounting, each country in the formation of the national accounting system focuses on the characteristics of its own economy, a set of principles; valuation of assets and liabilities and methods of their recognition; existing methods of unification of accounting procedures; forms of financial statements, etc. Today, Ukraine is in the process of harmonizing accounting to the requirements of the European Union and other international institutions, resulting in the active introduction and use of International Financial Reporting Standards. In this regard, it should be recognized that the accounting methodology is a general scientific concept that goes beyond its perception only at the national level, and therefore should determine the main starting points through the prism of principles, valuation techniques, financial reporting structure that exist in other countries. Europe and the World Economic Community. It is taking into account the general international approaches that each country should determine its own harmonious set of methodological tools for the national accounting system.

Quite common national accounting systems implemented by various financial regulators are the following (Getmanchuk, Parieva, 2016):

continental (introduced in European countries and based on state regulation of accounting standards);

British-American (used in the United States and the United Kingdom and focuses on a professional approach to the development and approval of accounting principles);

South American (common in South America: Argentina, Brazil, Chile, etc., takes into account and evaluates the conditions of inflation),

Islamic model (characteristic of the East and takes as a basis the rules of the Qur'an).

This division of accounting systems allows us to identify the characteristics that are more appropriate to use in different countries and to identify the nature of their development at the international level. The definition of accounting methods becomes even more relevant in the context of the use of digital technologies (Calinescu, Likhonosova, Zelenko, 2019) of accounting and reporting.

Conclusions

Thus, in recognizing and choosing the methodology of accounting for financial vulnerabilities should be based on the state of the economy, the economic nature of the objects, the nature and content of the subject of study. It should be developed in close connection with the development of national and general international theory and practice, which, together with a harmonized legal and legislative framework, will help level the internal and external factors influencing the financial vulnerability of Ukraine.

When choosing a methodology for assessing the vulnerability of the financial system and identifying indicators that may indicate its stability (or volatility) in the long run, it is necessary to use not individual indicators of the financial system and its institutions, but a system of indicators containing directly as elements of the financial sector economics (in particular, the share of overdue loans, the level of deposits, interest rates on loans and deposits, others) and macroeconomic (such as the dynamics

of prices, exchange rates, balanced movement of goods and capital, fiscal discipline, etc.). It is the choice of such a methodology for assessing the stability of the country's financial system that will reveal its ability to absorb negative unforeseen consequences and correctly identify (sufficiently) those regulators that will help stabilize the financial system at the national level.

Thus, the analysis shows that the process of macro-financial stabilization in Ukraine is quite unstable and can be destroyed at any time under the influence of large-scale external shocks or internal shocks. In particular, it is dangerous to reduce the absolute and relative indicators of international reserves; the size of the external debt burden remains at a critically high level, and short-term debt continues to grow. Restoration of the external stability of the economy, reduction of currency and debt risks require a new quality of macroeconomic regulation and the development of a comprehensive program of revival and restructuring of the financial sector of Ukraine.

All this is really necessary so that after the end of the COVID crisis, the country can return to the trajectory of sustainable economic growth. However, any progressive changes, even minor ones, affect the interests of different groups. Although the risks to Ukraine's implementation of the IMF program remain. The COVID-19 crisis may deepen and the global economic and financial environment may worsen.

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Strategic Approach of Managing Key Performance Indicators for Outstanding Business Performance

Abd Rahman Ahmad
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia
Email: arahman@uthm.edu.my

Lim Chen Bin
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia
Email: mankuittho@yahoo.com

Abstract

In today's economic environment, performance measurement is important for industries to grow especially for SMEs in order to sustain in the global market. This study is focused on the Malaysian SMEs' strategic approach to managing KPIs for their business performance. The strategic approach here is looking at business strategy, communication method and monitoring approach that support for the internal business processes with the development of KPIs. This study is based on a quantitative approach where the survey questionnaires were distributed among SMEs in Malaysia. The findings show that most of the SMEs put more attention to measuring the financial and customer perspective performances. In addition, the strategic approach includes the business strategy, communication method and monitoring tool that are implemented to manage the related business performance. Moreover, the finding also shows that SMEs lack of attentiveness on the monitoring and evaluation of a real time-factor KPIs. Communication among staff within the organization was found that had a significant relationship with managing the SMEs' business performance. In this study, communication methods implemented by SMEs are at a moderate level. The management has clarified the KPIs in the company and all employees understood the proposed KPIs.

Keywords*:* Key Performance Indicators, Small and Medium Enterprises, Strategic Planning.

Introduction

Rapid market change and global competition create an environment where organizations have to act responsively and comprehensive. In Malaysia, SMEs are facing the challenge from the domestic company as well as the international competition and new competitors (Saleh & Ndubisi, 2006; Podmoskovnov, 2018). Yet, the industry is fairly small. The impressive track records demonstrated by these competitors pose more pressure for the SMEs to enhance their competitive edge. To cope with today's market, SMEs need to radically improve its operating performance in order to sustain. Here, SMEs need to clearly understand how to deliver outcomes efficiently and effectively (Soosay et. al., 2016). Furthermore, Wu (2009) stated that performance measurement is a tool that can help an organization to identify the weakness in the business process and continuous improvement. In the performance field, numerous performance models have been introduced to enable companies to assess their performance. The most notable model is the Key Performance Indicators (KPIs). KPI attempts to overcome the limitations of financial instruments in measuring performance. Furthermore, a set of structured KPIs helps companies to figure out the key indicators that are critical for the success of the organization (Kaganski, Snatkin, Paavel, & Karjust, 2013). SMEs in some developing countries such as China (Chen, 2011) and Thailand (Phusavat & Manaves, 2008) have implemented key performance indicators and benchmarking mainly to identify the opportunities for improvement in the business process. However, there is still a lack of research about Malaysian SMEs. It seems that key performance indicator remains an untapped field of inquiry in the industry, thus it motivates this study's exploration of the subject.

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Problem Statement

Many studies have shown that the strategic planning process is the basis for an organization to set up and manage business performance. The organization's strategic approach is designed to address the needs of an organization to measure and monitor the performance continuously. Eckerson (2009) stated that efficient KPIs must be supported by the organizational strategy, planning and management process. Even though the research by Char, Yasoa, and Zakiah (2010) showed that there is 76 percent of Malaysian SMEs have implemented strategic planning in their organization, however, this study is limit the sample to the northern states of Malaysia (Kedah, Perlis, and Penang). The result cannot show that all the SMEs in Malaysia will be the same of the characteristics. In addition, the ways of the Malaysian SMEs link their planned strategy of managing the business performance is need to be further studied. SMEs have a simple organizational structure and their management is always controlled by the owner-manager (Giannopoulos, Holt, Khansalar, & Cleanthous, 2013). Therefore, the method of managing business performance is probably different. However, Parmenter (2015) suggested the KPI design in SMEs follows a similar process to the large firm includes of identifying the strategic planning process, assigning the KPI team to support the KPIs, and set up the system of managing KPIs. The key difference between SMEs and large firms is the duration of the process. The process in SMEs always quick because there are fewer employees and generally less complex if compared to the large firms. Therefore, the strategy of SMEs communicating and monitoring KPIs need to be further studied (Bhuinyan *et. al.*, 2019)

Literature Review

Key Performance Indicators (KPIs)

Goodpasture (2003) defined the KPIs as tools for delivering measurement systems and the management is needed to understand what is important to the organization, various techniques to assess the business present state and its key activities with the selection of performance indicators. “KPIs are used to evaluate the factors or of a particular activity that is critical and crucial for the current and future success of an organization” (Verzola et al., 2009; Bhuinyan *et. al.*, 2019). As identified from the above definition, KPI has been developed mainly to enable measurement of organizational performance and it can be used to identify opportunities for improvement through comparison both within the organization over time or between different units or companies. In the research by Wu (2009) has set out a list of performance indicators mainly employed by SMEs in Australia and South China.

Business Strategy

The management play a vital rule to clarify and manage business strategy includes of planning, establish goals, translates the vision into strategy, align the strategy of initiatives, and get feedback and continuous improvement. The research by Kaplan and Norton (2001) was stated that only 5 percent of the workforce understands the strategy and 15 percent of executive teams spend more than one hour per month discussing strategy. Meanwhile, Parmenter (2015) pointed out that the KPIs enable the organization to keep aligned with its strategic objectives. KPIs must emanate from vision level and cascade through the organization. We can see that translating the organization's vision into KPIs and key action initiatives requires several intermediary steps such as leadership, customer focus continuous improvement and business results.

Communication Methods

KPIs should be fully understood and integrated into management in order to maintain a successful performance measurement system. Therefore, Parmenter (2015) suggested a KPIs reporting line, the KPI project team must have excellent communication skills, knowledge about the organization, ability to drive change and mix of old experienced people of the organization. The KPIs project team

needs to report directly to the CEO and there should not be any intermediate barrier in between them. However, the interaction of the process will be different depends on the size of the organization (Kaplan & Norton, 2001). According to the research by Singh (2015), SMEs have much less complexity in performance measurement to manage and continuously monitor the system. Therefore, with the low number of employees in SMEs, the method of interaction KPIs in the organization will different from the large organization (Basuony, 2014).

Monitoring System

According to Parmenter (2015), the KPI dashboard can be employed in monitoring the overall business performance. A good KPI dashboard will show the right direction and confidence in the management to know whether their strategy is being implemented in the right way. So that, the organization can directly look at the graphic and device improvement for the process that is underperforming. Parmenter (2015) added that the critical success factors are daily basic operational activities and a past indicator cannot be a "key" for a business. So, a good dashboard requires a timely measure and the KPI team must be experts in graphical displays ensuring. However, Wu (2009) stated that SMEs usually have no time to conduct real-time performance measurements. Moreover, the size of the organization will influence the complexity of performance measurement and monitoring system (Singh, 2015; Hammerl *et. al.,* 2019; Md Sapry, Mohamed Yusof., 2019). But Parmenter (2015) suggested that the monitoring system of SMEs have the same characteristics as other large organizations.

Small and Medium Enterprises (SMEs)

According to the National SME Development Council Official Website, SMEs divided into two sectors: (1) manufacturing, manufacturing-related service and Agro-based industries, and (2) services, primary agriculture and information and communication. Table 1, show the details of the new definition for SMEs in Malaysia.

Table 1: New Definition of Small and Medium Enterprises (SMEs) for Malaysia

Category	Micro	Small	Medium
Manufacturing	Sales turnover of less than **RM300,000** OR employees of less than **5**	Sales turnover from **RM300,000** to **less than RM15 mil** OR employees from **5 to less than 75** Sales turnover from **RM300,000 to less than RM3 mil** OR	Sales turnover from **RM15 mil to not exceeding RM50 mil** OR employees from **75 to not exceeding 200**
Services and Others Sectors	Sales turnover of less than **RM300,000** OR employees of less than **5**	employees from **5 to less than 30**	Sales turnover from **RM3 mil to not exceeding RM20 mil** OR employees from **30 to not exceeding 75**

Source: www.smecorp.gov.my

Methodology

The quantitative research method was employed in this research by distributing questionnaires to collect the data from SMEs. Questionnaires were distributed through email to obtain the data. After that, SPSS v21.0 was employed to interpret all the data obtained. Descriptive and inferential statistics were used to describe the current status of SMEs' strategic approach towards managing business performance. Lastly, discussions were made about the theories and the actual situation. According to SME Corporation Malaysia official website, there are 155 manufacturing SMEs in Batu Pahat that are registered under SME Corporation, however, after communicating with the officer of SME Corporation Malaysia, the list was created in 2014 and not updated. Therefore, this study followed the population in the list and selected the target sample to study. Moreover, this study is concerning the micro, small and medium-sized enterprises in with the number of employees from 1 to not exceeding 200. Owner managers, managers, supervisors and any full-time employees were selected as the respondents for this study.

The given population is 155 companies, by referring to the table developed by Krejcie and Morgan (1970), the sample size would approximately be 110 companies. For this research, a random sampling method was used to select the respondents from the population. Each population has an equal chance of being selected to become a sample in this study.

Survey Questionnaire Design

In this research, a questionnaire is formed to gather the information needed. The questionnaire consists of 5 sections as shown in Table 2.

Table 2: Survey Questionnaire Structure

Section	Content	Data Categories
A	Demographic of respondents and company profile	Nominal Scale
B	Business performance	Likert Scale
C	Business strategy	Likert Scale
D	Communication method	Likert Scale
E	Monitoring system	Likert Scale

In section A, the information about the respondent and company profile was gathered by using a nominal scale with a few variables to get clear information. While, for sections B, C, D and E, there were given in the form of a Likert scale with seven scales from strongly agree to strongly disagree. This research attempts to identify the significant level of SME's strategic approach towards managing business performance.

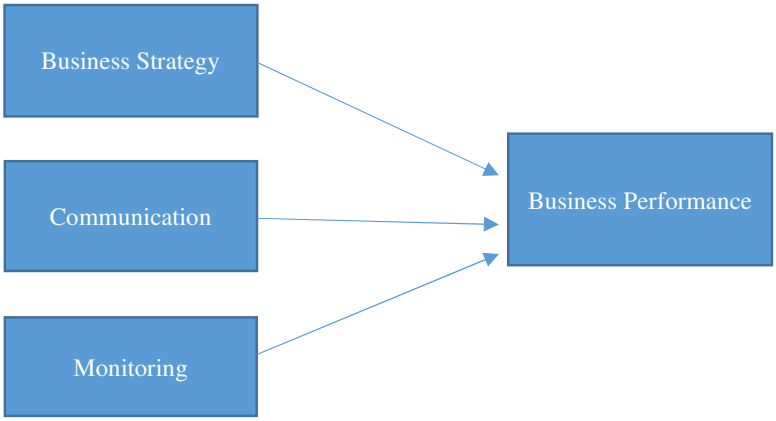

Figure 1: Research Framework

H1 - There is a significant relationship between business strategy and business performance.
H2 - There is a significant relationship between the communication method and business performance.
H3 - There is a significant relationship between monitoring tools and business performance.

16 sets of the survey questionnaires were distributed to the 10 SMEs by email and interview. These pilot test results were indicated in the table below.

Table 3: Reliability analysis from Pilot Study

Items	No of Question	Cronbach Alpha
Business Performance	8	0.84
Business Strategy	6	0.88
Communication	7	0.91
Monitoring	5	0.76

According to the Table 3, there were a total of 26 questions and a total of 16 respondents took part in this pilot study. The Cronbach's Alpha value for business performance, business strategy and monitoring tool are 0.839, 0.881 and 0.860 respectively. This showed that the questions are understandable by the respondents participated. For the communication method, the Cronbach's Alpha value is 0.910 which means that the design of the questionnaire excellent and high in reliability allow in the real study.

Reliability Analysis of Administrative Questionnaire

There were a total of 62 respondents who took part in the data collection. The reliability analysis was conducted according to the items asked in the questionnaire. Business performance obtained 0.805 of Cronbach's Alpha value where the communication method obtained 0.890 of Cronbach's Alpha value.

Table 4: Test reliability

Items	No of Question	Cronbach Alpha
Business Performance	8	0.87
Business Strategy	6	0.76
Communication	7	0.87
Monitoring	5	0.77

These two items obtained the result of good in the internal consistency level. However, for the business strategy in section C and section D (monitoring tool) obtained the result of acceptable internal consistency with Cronbach's Alpha value was 0.805 and 0.872 respectively. This proved that the data collected in the real study is valid and reliable.

Data Analysis

The number of registered SMEs in Batu Pahat under SME Corporation was 155 and the sample used in the study was 110. Among the 110 questionnaires distributed, 62 were returned with a return rate of 56.36%.

Demographic Analysis

Referring to Table 5, the frequency of the female respondents is 37 out of 62 respondents. Female respondents occupied 59.7% in this survey. Besides, there were 25 (40.3%) male respondents. All the respondents' ages were within the range of 18-60 years old. The ages of the respondents are mostly between 26 – 35 years old with 23 (37.1%) respondents involved in the survey. This is followed by 16 (25.8%) respondents are within 18 – 25 years old age group. Besides, for ages between 36 – 45 years old, there are 14 (22.6%) respondents involved in the survey. There are only 9 (14.5%) respondents that age between 46 to 60 years old. Table 5 shows a summary of the background of respondents.

Table 5: Summary of Respondent's Background

Items		Frequency	Percentage
1	Gender		
	Male	25	40.3
	Female	37	59.7
2	Age		
	18 – 25 years old	16	25.8
	26 – 35 years old	23	37.1
	36 – 45 years old	14	22.6
	46 – 60 years old	9	14.5
3	Current Position		
	Owner	5	8.1
	Manager	7	11.3
	Supervisor	18	29.0
	Officer	32	51.6

Items		Frequency	Percentage
4	Number of Employees		
	1 to 5	12	19.4
	6 to 75	35	56.5
	76 - 200	15	24.2
5	Industry		
	Paper	8	12.9
	Food and Beverage	4	6.5
	Chemical	16	25.8
	Rubber and Plastic	14	22.6
	Others	20	32.3

On the other hand, all 62 respondents were holding different job positions as well. By referring to Table 5, the highest position of the respondents that are involved in the study is the staff and officer position with 32 (51.6%) respondents in it. The second highest is the supervisor position with 18 (29.0%) involved in the survey. 7 (11.3%) respondents are involved in this survey are managers and followed by the owner-manager position with 5 (8.1%) respondents. In this survey, the numbers of employees at the company that the respondents currently work with are within the range of 1-200. There were no respondent workings at the company with more than 200 employees. According to the table above, the number of employees in the manufacturing firm that took part in the survey was quite small. The highest response was from the small-sized manufacturing firm with 6 to 75 employees, with 35 (56.5%) of the returned questionnaire. Then, it is followed by manufacturing size with 76 – 200 employees and 1-5 employees with 15 (24.2%) respondents and 12 (19.4%) respondents respectively.

Last but not least, the highest category of manufacturing firms involved in the survey is the “Others” category which achieved 32.3% of the response. The “Others” category includes manufacturing of electronic products, metal products, non-metallic mineral products, machinery equipment, palm oil and transport equipment. This is followed by 16 (25.8%) respondents from chemical products and man-made fibers category. Next, there were 14 respondents from the rubber and plastic products category which is 22.6% of the overall number. About 12.9% or 8 respondents were from paper products and printing categories. Category of food products and beverages achieved the lowest number, with 4 (6.5%) respondents involved.

Descriptive Analysis of the Variables

In this study, the statistical descriptive analyses were used on the data collected to observe the frequency, means and standard deviation.

Business Performance

Table 6 shows the mean and standard deviation for every question related to the business performance of SMEs.

Table 6: The mean and standard deviation of types of KPIs

No	Items	Mean	SD	Mean Interpretation
1	Customer satisfaction	5.27	1.22	High
2	On-time deliveries	5.58	1.37	High
3	Share market	3.73	1.47	Moderate
4	Employee Turnover	4.73	1.22	Moderate
5	Revenue	5.69	1.26	High
6	Revenue growth from new products	5.31	1.26	High
7	Quality	5.47	1.38	High
8	Corporate responsibility	4.61	1.38	Moderate
Total Mean				High

The average mean for the business performance is 5.05, which proved that SMEs who took part in the survey were already employing distinct KPIs in the business. The dispersion of data is at a moderate level, with 1.30 of standard deviation value. There are three items with moderate in mean tendency level which were asked items about the evaluation on employee turnover rate, evaluation on market share, and corporate responsibility. This shows that these three business performances are relatively less measured when compared to other business performances.

Business Strategy

Table 7 shows the mean and standard deviation for every question related to business strategy.

Table 7: The mean and standard deviation of business strategy

No	Items	Mean	SD	Mean Interpretation
1	Critical Success factors	4.37	1.47	Moderate
2	Establish goals and strategic initiative	4.68	1.34	Moderate
3	Vision	4.27	1.50	Moderate
4	Vision into strategy	4.26	1.49	Moderate
5	Feedback to enhance strategy	4.06	1.49	Moderate
6	Continues improvement	4.77	1.19	Moderate
Total Mean				Moderate

From the table above the average mean for the business strategy is 4.40 which shows a moderate tendency level. This shows that the level of implementing the business strategy of SMEs have to be enhanced in order to link with managing the business performance. The dispersion of data is at a high level, with 1.41 of the standard deviation value.

Communication Method

Table 8 shows the mean and standard deviation for every question related to the communication method.

Table 8: The mean and standard deviation of the communication method

No	Items	Mean	SD	Mean Interpretation
1	Clarification of KPIs from the management	4.81	1.21	Moderate
2	All employees understand the purpose KPIs	4.60	1.09	Moderate
3	Employes and their role about KPIs	4.77	1.24	Moderate
4	Training and empowerment to support KPIs	4.73	1.09	Moderate
5	KPIs and team	4.16	1.24	Moderate
6	KPIs and team training	4.47	1.02	Moderate
7	KPI within stakeholders	4.85	1.16	Moderate
Total Mean				Moderate

By referring to the Table 8, the average mean of communication methods is 4.63 with the mean tendency level being moderate. This shows that communication of KPIs within the organization had to improve, especially in terms of appointing staff to the KPI team which obtained the lowest mean score. Besides, the dispersion of data is at a moderate level with a 1.15 standard deviation value.

Monitoring Tool

Table 9 shows the mean and standard deviation for every question related to the monitoring tool.

Table 9: The mean and standard deviation of the monitoring tool

No	Items	Mean	SD	Mean Interpretation
1	The management and financial review	5.43	0.99	High
2	The management and non-financial performance	5.08	1.14	High
3	KPIs dashboard – to monitor performance	3.95	1.36	Moderate
4	Immediate action on KPIs performance	4.22	1.25	Moderate
5	Day to day monitoring	4.11	1.29	Moderate
Total Mean				Moderate

From the table above, the average mean of monitoring tool is 4.56 which indicates a moderate mean tendency level and the dispersion of data is also at a moderate level with 1.21 of standard deviation value. However, two items obtained high tendency levels which were management has periodically reviewed financial and non-financial performance, with obtained 5.43 and 5.08 respectively. This is indicating that these two practices have been implemented by the SMEs to monitor business performance.

Normality Test

Before proceeding to correlation analysis, the data collected have to be tested for its normality. Table 10 shows the result of the normality test for business strategy, communication method and monitoring tool.

Table 10: Result of the normality test

Items	Kolmogorov		Supiro	
Business Strategy	0.26	0.00	0.94	0.04
Communication	0.20	0.00	0.91	0.00
Monitoring	0.19	0.00	0.92	0.02

The table above shows that the p-value is lower than 0.05. This indicated that the data distribution is not normal. Therefore, a non-parametric test was used to identify the direction and the strength of the relationship that exists between all three variables and business performance.

The Relationship between Business Strategies towards Business Performance

Hypothesis 1:

There is a significant relationship between business strategy and business performance.
There is a significant relationship with the p-value is 0.006 and with the correlation coefficient of 0.344. This value indicates that there is a significant but low positive relationship between business strategy support and business performance.

The Relationship between Communication Method towards Business Performance

Hypothesis 2:

There is a significant relationship between communication methods and business performance.
There is a significant relationship with the p-value is 0.005 and the correlation coefficient of 0.327. This represented that there is a significant but low positive relationship between communication methods and business performance.

The Relationship between Monitoring Tool towards Business Performance

Hypothesis 3:

There is a significant relationship between monitoring tools and business performance.
There is a significant relationship with a p-value of 0.05 and the correlation coefficient of 0.349. This means that there is a significant but low positive relationship between monitoring tools and business performance.

Summary of Hypotheses Testing

With respect to the objectives of this study, the following findings were obtained as shown in Table 11.

Table 11: Summary of hypotheses testing result

H1	There is a significant relationship between business strategy and business performance.	Accepted
H2	There is a significant relationship between communication methods and business performance.	Accepted
H3	There is a significant relationship between monitoring tools and business performance.	Accepted

These three dimensions, business strategy, communication method and monitoring tool have shown a significant relationship with business performance. The significant value achieved was less than 0.05. This was able to support the relationship between organizational strategic approaches toward managing KPIs in SME's business performance.

Discussion of Findings

Based on the finding of this research, KPIs belonging to the customer and financial and perspectives appear to have more attention from the participating SMEs than that of the internal business and learning perspectives. In this study, SMEs are concerned about the revenue growth, quality of products and customer satisfaction. This could be attributed to the nature of Malaysian SMEs in measuring business performance. There is a need for more appreciation of innovation and human capital. This finding was consistent with the findings of other researchers who stated that the key non-financial indicators usually will not be so concentrated by SMEs (Phusavat & Manaves, 2008; Wu, 2009; Zahid et. al., 2017)

The second part looked at the business strategies by the SMEs towards managing the KPIs. Business strategies include implementing the BSC to develop the strategy. In this study, the business strategy implemented by SMEs is at a moderate level. This shows that the level of implementing the business strategy of SMEs has to be enhanced in order to link with managing the business performance. This is also consistent with that of Giannopoulos et al. (2013) who produced evidence from UK SMEs that only 25 percent of the companies used BSC to develop a strategy in the performance measurement system.

In addition, the finding also shows that SMEs in this study is the lack of attentiveness on the monitoring and evaluation of a time-factor KPIs. Management has periodically reviewed the financial and non-financial performances. They are lack of monitoring on the real-time performance and daily basis. This result supports the studies by Hudson, Smart, and Bourne (2001) which indicated that SMEs usually use historical data to measure business performance.

Communication among staff within the organization was found that had a significant relationship with managing the SMEs' business performance. In this study, communication methods implemented by SMEs are at a moderate level. The management has clarified the KPIs in the company and all employees understood the proposed KPIs. A training program is provided to support the KPIs. Therefore, the communication method suggested by Parmenter (2015) applies to the SMEs managing KPIs.

Limitations

In order to contact each of the respondents, communications are to be established one by one. This method would not be an ideal way also due to the sheer size of the number is extremely time-consuming. Moreover, some respondents were unaware that they are measure one of the KPIs in the performance measurement system. Time constraint is a major consideration due to the limited time

given to complete this research. Besides, most of the companies will not give cooperation in taking part in this survey. Thus, many methods were used to collect the questionnaire in order to acquire sufficient data for the SPSS to analyze.

Recommendation and Conclusion

If the organization intends to enhance the performance measurement system, it would need to plan the strategic approach of managing the KPIs' efficiency and effectiveness. Good preparation is needed for organizations to enhance the SME's business performance. This can be prepared from the business strategy support. The management should establish goals and translate them into a strategy. In addition, training and education need to provide for the KPI team to empower employees to support the KPIs. After the organization has installed the system, continuous communication and monitoring are needed to support the KPIs performance. This study had small sample sizes that are gathered from manufacturing SMEs in Batu Pahat only. Therefore, future researchers can consider gathering data from SMEs in the whole of Malaysia. It is best if the future researcher can focus on a sector. Future researchers can also use a mixed approach rather than only the quantitative method. It can incorporate interviews into the research as well as having a quantitative approach.

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Trust as An Indicator of Social Capital: Study Opportunities in The Russian Federation

Oleksii KRAINIUKOV
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine
alkraynukov@gmail.com

Ivetta KRYVYTSKA
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine
ivkrivicka@gmail.com

Andrii KRAINIUKOV
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine
kingsparrow666@gmail.com

Annotation

The article discusses theoretical approaches to the study of social capital. Conceptualization of social capital always includes “trust”, which can be interpreted from the perspective of various sociological paradigms. By viewing trust as recognition of obligations and expectations as well as their concentration, we move to the level of strategies analysis of social agents. Subjective assessment of trust in authorities, institutions, organizations, movements, associations and commissions shows the extent to which social agents perceive the results of various social institutions’ functioning, how they evaluate them and whether they rely on them. This, in turn, influences the chosen strategies of social agents in various fields of social space.

Keywords: Social Capital, Distrust, Trust, Social Connections.

Statement of the Research Problem

Social capital is a multicomponent subject of sociological, anthropological, sociocultural, economic and political research, aggregating the problems of various scientific approaches (Burkinskij, Gorjachuk, 2013). It includes conventionality and the importance of social norms, necessity, impossibility or contingency of certain (social) ties, their stability and reproducibility, ways of correlating the formal and informal. This follows from contingency which, in the language of N. Luhmann, is an immanent property of the social. Social capital also regards vertical and horizontal social relations and inclusion in social groups, constructivist and structural, i.e. collective agents and individual actors, subjective and objective, arbitrary-spontaneous and deterministic. The complexity of a given object is explained not only by the variability in the choice of sociological theoretical constructions for further empirical sketch but also by the integrity of the concept itself, meaning its validity when applied to questions of the essence of economic, political, culturological, etc. This explains the popularity of “social capital” in the rationale for resource allocation, civil society, policies of openness and representation, democratic institutions, pluralism and tolerance.

In the same way that M. Weber spoke about the "ethos of economic thinking", scientists referred to "trusting relationships", inscribed in social ties and in the principles of their effective mobilization (Weber, 1990). J. Coleman notes the dual structure of social capital and then approves the relationship between obligations and expectations at the micro level and the reliability of the system at the macro level (Coleman, 2001). If obligations and expectations for their fulfillment take the form of an informal “trust receipt”, the very reliability of the system presupposes production methods and assimilation of value patterns and attitudes, as a result of which a complex of expectations about “outstanding credit” occurs, i.e. obligations. As in the case of R. Putnam and F. Fukuyama, we are talking about "trust", which can be both a cause and a consequence of stable social relations networks functioning (Putnam,

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1996; Fukuyama, 2008). In this understanding, social capital is the implementation of norms and trust in various social situations that seem possible for a particular subject due to its involvement in certain systems of relationships.

As J. Coleman writes, the definition of social capital can be derived from its functionalist approach (Coleman, 2001). P. Sztompka proposed to consider trust and its (dis)functionality according to the principles of R. Merton, that is, the principle of functional relativity (trust in one institution may be dysfunctional, in another - functional) (Sztompka, 2012). If only its functional properties in the sense of R. Merton are considered, in our research we come to what F. Fukuyama says, characterizing social capital as a connecting link of trusting and normative-regulatory relations that constitute liberal, democratic, representative and civil society (Fukuyama, 2008). At the same time, the research axiomatic position is that in the social groups, formal and informal institutions we are analyzing, whether it be labor collectives, cooperatives, trade unions, associations, social movements, in predominantly horizontal relations, and in state, political, legal institutions, - in vertical relations, a functional (contributing to the support and adaptation of this system) set of stable expectations is always produced and reproduced, forming and strengthening trust (Krivopuskov, 2013).

Considering the consistency of different interpretations of trust-based interaction, we can refer to its phenomenological interpretation as an institutionalized process of social interaction. It contains self-evident and habitualized typification schemes with their everyday grading according to pragmatic interests. This interaction also includes knowledge of recipes for interpreting the intended interaction outside the assumption of a crisis with the corresponding legitimations. On the other hand, it is a more systemic interpretation of N. Luhmann, according to which trust is the minimization of risks (Berger, Lukmann, 1995; Luhmann, 2002).

In the first case, trust excludes or presupposes the exclusion of a partial crisis from everyday life; in the second case, it presupposes system operations reducing the complexity of the surrounding world and subsequent operations of (repeated) selection of the elements, minimizing risks. Trust, in both cases (phenomenological and systems theory), contains schemes of interpretation assimilated by the subject / system which through description refer a particular social situation to the code of trust and distrust. Social capital, therefore, acts not only as effectively mobilized social ties for the accumulation of other types of resources and their conversion but also as a product of internalized schemes of assessment, perception and action, in accordance with which these social ties are constructed and classified.

Combination of these schemes of assessments, perceptions and actions generates stable social ties that are in a specific relationship with those being actually constructed, and the ones already constructed - already established social relationships between agents that affect their habits and vice versa (Bourdieu, 2002). If we imagine various social structures in the form of collective agents who delegate rights and corresponding competences in their own representation to a certain person or group of persons, we can conclude that the accumulation of symbolic capital by a representative of a given collective allows it to maximize benefits and minimize costs in their favor. This implies redistribution of trust and distrust, recognition and non-recognition. The agents included in this collective can judge the legitimacy of this appropriation, recognition and non-recognition, trust and distrust, even though this occurs in terms and categories of the collective itself (Bourdieu, 1985).

We proceed from the position that social institutions, represented by collective agents, are capable of accumulating and monopolizing symbolic power, influencing the social capital of agents and their strategies. Thus, our research problem is to determine the factors influencing redistribution of trust and distrust, affecting the strategies of social agents.

The aim of the work

is to determine the key factors, influencing distribution of subjective trust and distrust in the Russian Federation.

The theoretical basis of the study

Almakaeva A., Volchenko O., Belyaeva L., Petro N. (an authentic structural study of social capital in one of the regions of the Russian Federation can be found in his works), Schrader H. (Almakaeva, Volchenko, 2018) studied social capital and its transformation in Russia.; Belyaeva, 2016; Petro, 1999; Schrader, 2004). We have chosen the theoretical constructions of P. Bourdieu from the fundamental sociologists (Bourdieu, 2001). Referring to the work of V. Radaev, trust, in our case, is defined as “concentration of expectations and obligations” (Radaev, 2003). But it should be noted that they can occur in qualitatively different situations. L. Théveno and L. Boltanski wrote about this, speaking of different ways of judging “fair”, which take place in different situations. (Boltanski, Théveno, 2013).

We argue, relying on P. Bourdieu, that the concentration of expectations and obligations presupposes recognition and non-recognition (symbolic capital), in accordance with which any concentration of these expectations and obligations is possible in general (Bourdieu, 2002). The first level of such recognition and non-recognition is the "matrix of social relations" in the language of P. Berger and T. Lukman, or "official", "state", in the language of P. Bourdieu (Berger, Lukman n 1995; Bourdieu, 2016). Indeed, to judge recognition and non-recognition, obligations and expectations, it is necessary to act in the logic of the space that forms the taxonomic principles, “codes”, in accordance with which any recognition and non-recognition is then possible. To trust someone, one must trust the very trust schemes by which other agents are judged in the categories of recognition / non-recognition (Bourdieu, 2002). The second level of such recognition is "mundane", where agents are already acting in accordance with their strategies in one field or another. That is, the first level is theoretical for the agent. It is reflected in his categories, which he combines.

It can be said that social agents concentrate their obligations and expectations in accordance with the recognition and non-recognition of one instance or another, that is, an increase in the recognition of an instance by social agents will mean both increased obligations in relation to this instance and increased expectations.

The more agents are inclined not to recognize this instance at the level of strategies as a legitimate representative of the values of the first level of recognition, the less they are inclined to implement strategies aimed at fulfilling obligations in relation to this instance and the fewer expectations will be placed on the functioning of this instance.

Trust, including a complex of obligations and expectations, implying recognition or non-recognition of their significance, is at the heart of not only social capital as a network of social connections between social agents located close to each other in the social space we have constructed. This will mean closeness and possible structural homogeneity of the totality of social, cultural, economic capitals. Trust is also at the heart of symbolic capital, making it possible to establish social ties for their further use (conscious or unconscious) in obtaining maximum benefits.

If the expansion and accumulation of social contacts depends on symbolic capital and its volume, then the possibility of further recognition and non-recognition within the framework of the constant expansion, maintenance and accumulation of social ties depends on social capital and its constant maintenance, like the circulation of gifts (Bourdieu, 2002).

There is a relationship between symbolic capital, often manifested as social capital. Social capital is practical, involving constant work to maintain and accumulate one form of capital in favor of another - and vice versa (Bourdieu, 2002). In our opinion, every instance, be it a state, educational, church institution, is always in the process of constant production and reproduction, which presupposes self-legitimation and all the tools necessary to accomplish such legitimation, which is a second-level construct that supports the institutional order itself – the first level construct (Bourdieu, 2016). Such social institutions within the framework of the sociocultural environment under consideration should accumulate symbolic capital of the supra-individual level, create millions of “weak” ties, which, by recognizing this institution, will legitimize its existence in various forms - as institutions, authorities, commissions, departments, ministries. Using this logic, trust relationships between institutionalized

political, legal, economic platforms and external social agents, not directly being part of a closed group of functionaries, party members, parliamentarians, judges and big businessmen, legitimize the existence of such an institution not only as a closed sect. It also legitimizes it as a “relatively open”, “reciprocal”, “transparent” system. It means that the social base increases, inclined to fulfill additional obligations for this institute and which expects it to fulfill its expectations.

The Results of The Study

The respondent's subjective assessment of trust in the direction of a social institution or authority may indicate what a person expects from this or that institution and what obligations he is ready to fulfill so that the institution can make the expected changes. Sociological structuralism, especially in its structural-functionalist branch, does not view the agent's strategies as meaningful. However, structuralist constructivism tries to understand first, generating social action structures and, secondly, how structures are realized in these actions, that is, to interpret the functioning of structures in the strategies of agents (Bourdieu, 2001). We want to understand what factors influence distribution of trust and mistrust in the social space, what social institutions comes the recognition and non-recognition of obligations and expectations from, related to these and other institutions. This, of course, affects the design of agent strategies that can exclude the significance of the institution by virtue of its non-recognition (and vice versa - to enhance its importance.

In our study we use the information provided by the WVS (World Values Survey), namely, the seventh wave of the study, conducted in 2017-2020 (methodology in the source) (Inglehart et al., 2020). Considering our theoretical part, we decided to analyze the data set on the Russian Federation obtained during the seventh WVS wave. The indicators of subjective trust were the respondents' answers regarding trust in their family, friends, neighbors, people they know personally, as well as those regarding trust in various instances - the state, political parties, churches, universities, etc. To determine the factors affecting the distribution of trust and distrust in the Russian Federation, we used the factor analysis procedure for the data set, provided by WVS as a data packet in SPSS. There were 1810 (N = 1810) respondents from the Russian Federation.

The suitability of a factor analysis is described, using the Kaiser-Meier-Olkin (KMO) sample adequacy test at 0.898 with the Bartlett sphericity test of 300 at a significance level of $p = 0.000$ with approximate chi-square of 15973.048. Factor analysis by the method of principal components identified 6 main factors, the first of which explains 28.563% of the total variance, the second - 8.669%, the third - 6.768%, the fourth - 5.045%, the fifth - 4.504%, the sixth - 4.349%. Together, six factors explain 57.898% of the cumulative variance. We used the varimax rotation method with Kaiser’s normalization, the rotation was converged in 9 iterations. The results of the factor analysis are given in two tables, representing the component matrix (Table 1) and the rotated component matrix (Table 2). To extract the factors, the following variables were used: subjective trust in the family, neighbors, acquaintances, strangers, people of other nationalities and religions (this forms the micro-level of perception and interaction). Further, the macro level of perception and interaction with organizations, institutions - trust in the church, the armed forces, the press, television, trade unions, the police, the legal system, the state, political parties, parliament, civil services, universities, the electoral system, large corporations, banks , conservation movements, women's movements, charities and regional organization.

Table 1: Factor analysis component matrix

Variable	Component					
	1	2	3	4	5	6
How much you trust: Your family	.176	.217	.009	.519	.361	.295
Trust: Your neighborhood	.285	.484	.211	.420	-.207	.239
Trust: People you know personally	.331	.521	.097	.298	-.052	.319
Trust: People you meet for the first time	.272	.583	.147	-.022	-.378	.032
Trust: People of another religion	.323	.739	-.212	-.346	.175	-.213
Trust: People of another nationality	.325	.747	-.205	-.324	.170	-.202
Confidence: Churches	.486	-.051	.190	.117	.033	-.203
Confidence: Armed Forces	.494	-.060	.137	.160	.462	-.109
Confidence: The Press	.458	-.016	.411	.223	-.038	-.544
Confidence: Television	.508	-.038	.436	.206	-.093	-.442
Confidence: Labor Unions	.525	.013	-.054	.073	.033	-.105
Confidence: The Police	.571	-.089	.278	-.123	.317	.167
Confidence: Justice System/Courts	.572	-.127	.237	-.205	.284	.223
Confidence: The Government	.701	-.090	.260	-.224	.094	.113
Confidence: The Political Parties	.654	-.086	.200	-.214	-.152	.146
Confidence: Parliament	.697	-.097	.069	-.305	-.060	.126
Confidence: The Civil Services	.623	-.146	.020	-.115	-.019	.153
Confidence: Universities	.568	-.079	-.139	.074	.113	.088
Confidence: Elections	.650	-.098	.183	-.098	-.230	.103
Confidence: Major Companies	.626	-.118	-.188	-.032	-.265	.049
Confidence: Banks	.549	-.114	-.107	.019	-.393	.061
Confidence: The Environmental Protection Movement	.634	-.106	-.397	.113	-.077	-.057
Confidence: The Women´s Movement	.596	-.093	-.506	.206	.061	-.077
Confidence: Charitable or humanitarian organizations	.608	-.150	-.450	.179	-.018	-.101
Confidence: Major regional organization (combined from country-specific)	.632	-.083	-.386	.047	.066	-.057

Table 2: Rotated matrix of factor analysis components

Variable	Component					
	1	2	3	4	5	6
How much you trust: Your family	-.007	.120	-.025	-.051	.411	**.615**
Trust: Your neighborhood	.046	.044	.146	.045	**.775**	.085
Trust: People you know personally	.130	.090	.000	.175	**.704**	.182
Trust: People you meet for the first time	.095	-.008	.134	.356	**.583**	-.292
Trust: People of another religion	.076	.122	.019	**.920**	.152	.012
Trust: People of another nationality	.071	.122	.022	**.910**	.176	.019
Confidence: Churches	.269	.218	.447	.022	.068	.079
Confidence: Armed Forces	.323	.212	.346	.086	-.044	.488
Confidence: The Press	.138	.100	**.832**	.036	.060	.014
Confidence: Television	.226	.112	**.786**	-.014	.118	-.023
Confidence: Labor Unions	.245	.383	.250	.119	.087	.074
Confidence: The Police	**.658**	.090	.168	.056	.020	.287
Confidence: Justice System/Courts	**.706**	.106	.086	.049	-.015	.227
Confidence: The Government	**.735**	.190	.225	.090	.054	.044
Confidence: The Political Parties	**.659**	.233	.169	.022	.144	-.166
Confidence: Parliament	**.682**	.322	.101	.120	.034	-.129
Confidence: The Civil Services	.553	.360	.086	-.004	.066	-.012
Confidence: Universities	.344	.461	.080	.035	.076	.173
Confidence: Elections	.571	.286	.229	-.043	.199	-.191
Confidence: Major Companies	.358	.562	.092	-.006	.127	-.212
Confidence: Banks	.306	.484	.120	-.092	.206	-.302
Confidence: The Environmental Protection Movement	.193	**.735**	.099	.062	.049	-.003
Confidence: The Women´s Movement	.088	**.793**	.065	.085	.011	.152
Confidence: Charitable or humanitarian organizations	.123	**.777**	.114	.034	-.004	.066
Confidence: Major regional organization (combined from country-specific)	.239	**.688**	.077	.142	-.021	.095

Values in bold are critical factor loadings for definition and interpretation. The obtained 6 factors can be classified as follows (Table 3):

Table 3: Obtained factors and their interpretation

Trust in structures (macro level)	Trust in agents that implement structures in strategies (micro level)
Factor 1 influence on the distribution of trust and mistrust on the part of political and legal institutions that are interested in maintaining the official and its reproduction.	**Factor 4** influence on the distribution of trust and mistrust on the part of people with a different nationality and religion
Factor 2 influence on the distribution of trust and mistrust on the part of social movements, associations and regional campaigns	**Factor 5** influence on the distribution of trust and mistrust on the part of the people around who interact with the subject
Factor 3 influence on the distribution of trust and distrust of information institutions and channels.	**Factor 6** influence on the distribution of trust and mistrust on the part of the family - the closest group of people

It should be noted that the attitude towards people of a different nationality and religion depends on internalized structures which are then implemented in social practices. Distribution of trust and distrust, as we can see, depends on the variables loading the given factor the most. It can be noticed that the field of economic collective agents in the form of large corporations and banks does not load any factor sufficiently. Therefore, we can say that they do not have such an impact on the distribution of trust and distrust as political and legal institutions, public organizations, media and the immediate environment of the agent, which he interacts with intensively on a daily basis. Likewise, we do not notice a significant factor load on the part of the church, military forces, universities - probably because they are perceived as part of political and legal institutions. But we cannot assert this with certainty without additional data. This hypothesis is opposed by the performed correlation analysis, not showing a single significant correlation (> 0.7), except between the variables "trust in people of other nationalities" and "trust in the church."

The study shows that trust and distrust as a combination of obligations, expectations and recognition, are formed mainly by 6 factors, taking into account their division into the structural level (macro) and the strategic level (micro), at which the structures perceived by the agent are implemented. This is closely related to social capital, which is a group resource, but is used by a single agent. On our part, such structures as the state, represented by a certain group of agents, also have their own social capital, “credit of trust”. It may seem that "social capital" as a concept can only be applied in considering the strategy of social agents. But if we break with structuralism towards constructivism, we notice that structures are represented by different people and different groups of people. They are delegated the rights to speak on behalf of the entire group, that they are a concentrate of the symbolic capital of this group, allowing them to mobilize social ties to allocate resources in their favor. Empirical research presupposes making such a gap. Otherwise the theoretical constructs of the "state" may remain only constructs without the possibility of research.

We can say that the distribution of trust and distrust in the Russian Federation is influenced by the factors we have identified. This affects the strategies of agents, which, in turn, affect the attitude towards authorities, commissions, institutions, movements, organizations - how this or that institution can be represented and what expectations it will fulfill in exchange for fulfilling the obligations of social agents.

Discussion and conclusion

The main element of social capital is trust as a concentration of obligations and expectations, implying a symbolic minimum of generating this type of relationship - recognition. Consideration of trust in this respect is fundamental in the study of social capital.

The concept of "social capital" can be applied in studying the structures and strategies of their perception, assessment and action. Distribution of trust and distrust in the society shows the tendency of social agents to fulfill obligations in relation to the authority in return for fulfilling expectations. Of course, this requires recognition, but it often acts as a construct of the first level, as something without which it is impossible to perceive the social and the entire surrounding world. With such an approach it is possible to explain, for example, particularistic or communitarian value attitudes, crime and deviations in general. Obligations in relation to political and legal institutions, in this case, are unfulfilled due to non-recognition of the second level construct (legitimation) or collapsed expectations in relation to this institution. Formalization and transparency, and, of course, implementation of structures in the strategies of social agents, especially in a theoretical sense, can be also explained by it.

If it is possible to investigate strategies of social agents and the place of various authorities in their lives, relationships with different variables can be found, reflecting the intensity of interactions between social agents and authorities. The preference of one instance or another in the eyes of respondents can be determined, that is, social capital can be studied according to a structural methodology, not institutional one.

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Metodología Para Optimizar La Financiación Presupuestaria Del Deporte En Rusia: El Aspecto Regional

Andrey V. LITVIN
candidato de ciencias económicas,
Universidad Estatal de Udmurt, Izhevsk, Federación de Rusia
E-mail: litvin-andrey@mail.ru

Dmitry P. ARKALOV
Estudiante de posgrado,
Universidad Estatal de Economía de los Urales, Ekaterimburgo, Federación de Rusia
E-mail: lao48@yandex.ru

Resumen

El artículo presenta, desarrollado por los autores, el método de asignación de fondos presupuestarios por deportes (federaciones deportivas). La metodología se basa en el conocido enfoque de costo-beneficio en economía, es decir, el criterio principal para determinar la cantidad de fondos para un deporte en particular para el próximo año calendario serán los resultados logrados por los atletas en períodos anteriores (lapso de tiempo - 4 años) en competencias de varios niveles. El uso de métodos de la teoría de la probabilidad y la estadística matemática le permite evaluar cuantitativamente un resultado deportivo específico y monetizarlo. Por lo tanto, es posible realizar fácilmente el control público y el examen de la validez de los gastos presupuestarios destinados a apoyar un deporte específico (federación deportiva).

Palabras clave: Deportes, Financiamiento Presupuestario, Distribución Del Financiamiento.

Introducción

Muy a menudo, cuando se distribuye apoyo financiero para el desarrollo de industrias con orientación social, especialmente si este apoyo proviene de los presupuestos estatales o regionales, surge el problema de la distribución de los recursos asignados.

En la Rusia moderna, una parte significativa de estos sectores de la economía nacional está sufriendo serias dificultades en la financiación presupuestaria, a pesar de la existencia de varios programas específicos y el deporte no es una excepción. Una de las principales razones de la mala gestión del deporte en las regiones rusas es la falta de criterios matemáticamente justificados para usar los recursos disponibles y, sobre todo, financieros. Es muy difícil desarrollar y financiar simultáneamente decenas de deportes diferentes en el nivel necesario. El procedimiento existente para la distribución de la financiación presupuestaria por deportes en las regiones se caracteriza por un bajo nivel de objetividad, transparencia y eficacia. Por lo general, se da prioridad a la práctica de deportes (fútbol, hockey, baloncesto, voleibol), pero no se tienen en cuenta los intereses de deportes más exitosos y efectivos. Tambien es importante el estatus y cargo que ocupa el titular de la federación deportiva correspondiente, así como su relación con las autoridades autonómicas.

Modelos De Financiación

Como se sabe, en la práctica mundial hay dos modelos principales de financiación deportiva: europeo y americano [5]. El modelo europeo (Rusia) asume una financiación mixta con un predominio significativo de los fondos presupuestarios. El modelo estadounidense (EE. UU.) se caracteriza por la falta de apoyo directo al deporte desde el presupuesto nacional y la presencia de un gran número de

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incentivos fiscales para la inversión en el deporte por el sector privado. Ambos modelos de financiación implican la implementación de funciones para asegurar las siguientes áreas del deporte: deportes de masas, deportes de élite (olímpicos) y profesionales [1].

La clasificación de deportes también es una práctica generalmente aceptada en la mayoría de los países del mundo, pero no existe un enfoque uniforme para la clasificación. Cada país procede de sus propias características de financiación deportiva.

Los intentos de crear métodos que resuelvan el problema de asegurar una distribución objetiva, equilibrada y transparente de los fondos presupuestarios por parte del deporte no son nuevos. Muchas regiones de Rusia están desarrollando y aprobando sus propios sistemas para clasificar los deportes basándose en los fondos presupuestarios asignados. Al mismo tiempo, los principales criterios de clasificación son: disponibilidad de instructores, base material y técnica, componente nacional y cultural del deporte, logros en competiciones de varios niveles, etc. La mayoría de estos métodos son bastante subjetivos, ya que se basan en el juicio de expertos y no están respaldados por cálculos y conclusiones matemáticos.

Una de las formas de resolver este problema es la metodología propuesta por los autores será la suma de indicadores que tengan un cierto peso específico, que se calcula por los resultados de los períodos anteriores (lapso de tiempo es 5 años) [2]. La solución está basada en el conocido enfoque 'costo-beneficio' en economía, es decir, el criterio principal para determinar el volumen de financiamiento para un deporte en particular para el próximo año calendario. El uso de métodos de la teoría de la probabilidad y la estadística matemática le permite evaluar cuantitativamente un resultado deportivo específico y monetizarlo. Por lo tanto, es posible realizar fácilmente el control público y el examen de la validez del gasto presupuestario asignado para apoyar este deporte o federación deportiva en particular [4]. La metodología se basa en un algoritmo de distribución de fondos entre las federaciones deportivas en base a los puntos ganados en función de los resultados de su trabajo en el año anterior al previsto. Para evaluar los resultados del trabajo, se seleccionan indicadores que están contenidos en los datos oficiales de observaciones estadísticas estatales. Por un lado, ellos permiten hacer una valoración bastante completa de los resultados en cada deporte; por otro lado, estos indicadores están disponibles, son fácilmente verificables y no requieren fondos adicionales para recolectar información.

Metodología de financiación

La novedad científica del método propuesto es la siguiente:

- por primera vez en la práctica rusa, la distribución de la financiación presupuestaria por deporte se calcula basándose en un modelo matemático que tiene en cuenta datos fácticos objetivos sobre los resultados (logros) de los representantes de un deporte en particular;
- basándose en los formularios de informes estadísticos estatales, se han desarrollado criterios para evaluar la efectividad y eficiencia del trabajo de las federaciones en diferentes deportes;
- se ha escrito el código y se ha desarrollado un software que permite automatizar completamente el proceso de asignación de fondos presupuestarios por deporte.

De manera convencional, todos los indicadores de la metodología se dividen en los siguientes grupos:

1. El número total de atletas involucrados en deporte particular;
2. El número de atletas de la región incluidos en los equipos nacionales;
3. Infrastuctura y personal del deporte;
4. Coeficiente olímpico / paralímpico.

Consideremos el algoritmo de cálculo de puntos utilizando indicadores individuales como ejemplo.

Sea 'N' el promedio para un cierto período base (t años) el número de atletas involucrados en un deporte en particular:

$$(1)\ N = \frac{\sum_{i=1}^{n} M5\ (SFi)}{t},$$

donde,

i de 1 a n – número de deportes;
M_5(SFi) – número de atletas en un deporte en particular;
t – franja horaria.
y k_j – el número de victorias que se suman para todas las federaciones deportivas registradas en la región. En este caso, los puntos se calculan en base a los resultados mostrados en las competiciones durante el período base de acuerdo con el algoritmo que se muestra en la Tabla 1.

Tabla 1: algoritmo para el cálculo de puntos basado en los resultados de victorias en competiciones

Lugar	Victorias totales	Puntos	
1	k_1	(2)	$x_1 = \frac{N}{k_1 + 1} + x_2$
2	k_2	(3)	$x_2 = \frac{N}{k_2 + 1} + x_3$
3	k_3	(4)	$x_3 = \frac{N}{k_3 + 1} + x_{4-6}$
4–6	k_{4-6}	(5)	$x_{4-6} = \frac{N}{k_{4-6} + 1} + x_y$
Participación	k_y	(6)	$x_y = \frac{N}{k_y + 1}$

Además, por ejemplo, el valor de puntos del personal (entrenadores) se calcula como la cantidad media de entrenadores ($COACH_{5av}$) por la cantidad media de atletas (M_{5av}) que practican deportes de manera organizada y participan en competiciones durante el período base.

$$(7)\ \mathrm{COACH} = \frac{\mathrm{M_{5av}}}{\mathrm{COACH_{5av}}},$$

Se propone que el 'coeficiente olímpico / paralímpico' se tome como una unidad sumada al recíproco de la relación entre el número de deportes olímpicos y paralímpicos y todos los deportes desarrollados en una región o área en particular:

$$(8)\ \mathrm{O(P)C} = 1 + (1 - \frac{\mathrm{OSD+PSD}}{\mathrm{SD}});$$

где:
O(P)C (Olympic/Paralympic coefficient) – coeficiente olímpico;
OSD (Olympic sport disciplines) – los deportes olímpicos;
PSD (Paralympic sport disciplines) – los deportes paralímpicos;
SD (sport disciplines) – los deportes inscritos en El Registro de deportes de toda Rusia.

Después de calcular todos los indicadores, se calcula la suma de los puntos total ganados por una federación deportiva en el i-ésimo deporte,

El volumen de financiación presupuestaria destinada a un deporte específico (federación deportiva) se calcula de acuerdo con el siguiente algoritmo.

a) Calculación de la suma de puntos total:

$$(9)\ \mathrm{SUMtotal} = \sum_1^n \mathrm{SUMtotal(SFi)}\ ,$$

donde:
SUM_{total} – la suma de puntos total ganados de todas las federaciones deportivas;
$SUM_{total(SFi)}$ – puntos totales ganados por una federación deportiva individual.
b) Calculación de valor de un punto:

$$(10)\ \mathrm{VAL(1\ point)} = \frac{\mathrm{BF}}{\mathrm{SUMtotal}},$$

donde:
VAL(1 point) – valor monetizado de un punto;
BF – volumen de financiación presupuestaria.

c) Calculación de volumen de financiación presupuestaria para un deporte (federación deportiva):

$$(11)\ FUND(SFi) = VAL(1\ point)*SUMtotal(SFi),$$

donde:

FUND(SFi) – volumen de financiación para un deporte (federación deportiva) dentro de las asignaciones presupuestarias.

La tarea de evaluar adecuadamente estos resultados y traducirlos en puntos condicionales es, quizás, la más difícil en el desarrollo de esta metodología. Para solucionarla, se hicieron los siguientes supuestos:

- cuanto menos probable es la victoria en una competición, más valor esa victoria tiene. Asimismo, un evento deportivo realizado en el territorio de una región se califica cuanto más alta es la probabilidad de que este evento se realice en esa región en particular;
- la probabilidad de ganar coincide aproximadamente con la frecuencia relativa de las mismas victorias en competiciones similares durante el período base;
- la probabilidad de celebrar un evento a nivel ruso en el territorio de la región es inversamente proporcional al número total de regiones rusas en las que podría realizarse este evento;
- los valores acumulados se utilizan al calcular los puntos.

Riesgos potenciales

El volumen de financiación presupuestaria destinada a un deporte específico (federación deportiva) se calcula de acuerdo con el siguiente algoritmo:

a) calculación de la cantidad total de puntos ganados por todas las federaciones;
b) calculación del valor de un punto (monetización);
c) calculación del volumen de la financiación para un deporte específico (federación deportiva).

También notamos que el uso de esta metodología puede estar asociado con el surgimiento de algunos problemas que requieran investigación adicional.

En primer lugar, es necesario comprender si tal situación es posible cuando una o más federaciones deportivas actúan juntas, es beneficioso para ellas distorsionar la información, logrando así puntuaciones más altas y, en consecuencia, mejor financiación. Por ejemplo, ellas podrían retrasar deliberadamente el envío de información, negarse a realizar eventos deportivos en el año en curso para recibir más puntos más por su celebración en el futuro, etc. Hay que hacer siguientes comentarios aquí. Las funciones mediante las cuales se calculan las puntuaciones se eligieron de modo que sería beneficioso para una federación individual mostrar los mejores resultados posibles. Y dado que el tamaño de las asignaciones presupuestarias es un valor constante, la colusión entre federaciones no tiene sentido, lo cual es fácil de demostrar usando métodos de teoría de juegos. De hecho, en el caso de dos federaciones, obtenemos un juego de suma constante que es estratégicamente equivalente a un juego de suma cero, de modo que los intereses de los jugadores son mutuamente opuestos. En el caso general, podemos asumir que tratamos con un juego cooperativo insignificante, en el que el ingreso total máximo, el tamaño de las asignaciones presupuestarias, es igual a la suma del ingreso máximo posible de todos los jugadores (federaciones) combinados. En un juego así, unirse a jugadores en una coalición no tiene sentido, ya que esto no puede afectar de ninguna manera sus ingresos.

El segundo problema surge cuando la federación no puede utilizar plenamente la cantidad de fondos que las autoridades ejecutivas regionales están dispuestas a proporcionarle, es decir, puede resultar que la federación presente una solicitud que sea significativamente menor que el volumen de fondos

requeridos. En este caso, se trata del llamado problema de asignación de recursos, cuyos mecanismos de resolución son bien conocidos.

Significado práctico

La importancia práctica del estudio radica en la aclaración de las herramientas de cálculo y análisis para la clasificación de los deportes, evaluación su efectividad y eficiencia [3]. También el estudio puede ser útil para:

- el desarrollo de políticas públicas y planificación estratégica en el campo deportivo;
- autoridades estatales, autonómicas y locales, empresas privadas en el desarrollo y ejecución de proyectos de inversión en el ámbito del deporte;
- jefes de organizaciones deportivas de todo tipo cuando quieran resolver sus propias tareas específicas;
- especialistas en diseño de inversiones para evaluar la efectividad de proyectos de inversión existentes y prometedores en el ámbito social;
- desarrollar nuevas formas de informes sociales, documentación contable y analítica, manuales de formación, etc.

Además, el uso de aparatos matemáticos modernos permitirá no solo evaluar objetivamente un resultado deportivo específico, sino también hacer un pronóstico del desarrollo de un deporte en particular en la región.

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Late Adolescent Decision-Making Style Concerning Academic Achivement

Ivana BULOG
Faculty of Economics, Business and Tourism, University of Split, Croatia
ivana.bulog@efst.hr

Luka DADIC
Faculty of Economics, Business and Tourism, University of Split, Croatia
lukadadic@gmail.com

Abstract

This paper targets the late stage of adolescence by observing decision-making styles among young adults-university students. The main research goal was to evaluate the late adolescent decision-making styles in terms of their academic achievement. The study comprises 77 final-year students on the Croatian Faculty of Economics, Business, and Tourism-University of Split. The results revealed that intuitive decision-making style is the dominant decision-making style among university students. Findings show a negative statistically significant association between dependent, avoidant, and spontaneous decision-making styles with objective and subjective academic achievement variables. However, results indicate that students prone to rational decision-making are positively associated with their academic achievement level. Further, female students are found to show a greater tendency toward intuitive and spontaneous decision-making than male students. Lastly, research results and limitations of the study regarding future research directions are provided.

Keywords: University Students, Decision-Making Style, Academic Achievement

Introduction

One of the most critical periods in an individual's life is adolescence (Dere Ciftci, 2015). It is a susceptible development stage of an individual. It is a crucial period for identity formation (Ericson, 1959) because adolescents face making many essential life decisions influencing their future (Bacanli, 2012). According to many researchers, the adolescence development stage is very relevant for studying decision – making competence (Baiocco et al., 2009) because the decision made in that phase can have significant consequences for the whole individual's life (Tuinstra et al., 2000). It is a crucial period in which decision-making skills are developed, and vital decisions need to be made (Cenkseven-Onder and Colakkadioglu, 2013).

The adolescent period can be roughly divided into three different phases. Each is different regarding individual characteristics that concern physical, intellectual, emotional, and social development; early adolescence (approximately 10-13 years of age), middle adolescence (14-17 years of age), and late adolescence (approximately 18-24 years of age). Final-year university students fall into the category of the late adolescent period. Among plenty of activities that university students in this period need to make on their own are activities that concern decision making processes. As Ericson (1959) stated, major development tasks involve the exploration of various dimensions of identity and the commitment to identity during the late adolescent stage. University students in this stage of life need to make plenty of decisions related to their personal development, which will reflect on their social life (social relations) and their professional areas - on their career pathways.

University education is an upgrade stage in one's education process. Knowledge, skills, values, and beliefs are enriched through many different activities like learning, researching, training, reading, etc.

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Consequently, they shape attitudes and behaviors concerning many decisions they need/must make. Logically, these decisions have an impact on their academic achievement. In this stage of life, youth have been consolidated their mental life, crystallized their attitudes and opinions, and reached rational mental maturation. They have developed self-esteem, confidence, independence, and personality and can make vital real-life decisions. Decision-making engages many cognitive processes, such as information gathering and processing, problem-solving, judgment, memory, and learning (Baiocco et al., 2009). Piaget (1972), at the forefront of cognitive development, pointed out that decision-making forms part of the adolescent phase of an individual's development process.

Ozturk et al. (2011) believe that during adolescence, the independent decision-making style develops. Individual decision-making style is influential in his/her well-being. Decision-making styles differ from person to person, and the same decision-making style cannot be suitable for every decision-making scenario. However, not all decisions are made in the same manner. In accordance to the situation, type of the decision-making problem, characteristics of identification and problem-solving, and interaction with others in the realization of certain activities, decision-makers use different decision-making styles (Bulog, Matić, Dadić, 2018).

Although adolescence is a crucial stage in one's life, relatively few studies investigated the relevance of decision making in this development stage (Crone et al., 2003; Tuinstra et al., 2000 in: Baiocco et al., 2009). Most empirical research has examined the relationship between decision-making style and career development variables (Mau, 1995; 2000; Payne, Bettmen and Johnson, 1993; Phillips, Friedlander, Pazienza and Kost, 1985 in: Bacanli, 2012), but the rare are the ones that focused on the relationship between decision making and academic achievement. Namely, some studies analyzed secondary school students' decision-making styles and academic achievement (Bala, Kaur and Singh, 2017), targeting middle adolescence.

However, according to the authors' knowledge, these analyses were not done among university students, targeting the late adolescent stage, especially in the European context. Thus, this paper targets the late adolescence stage, aiming to analyze decision-making styles in terms of academic achievement among young adults; final-year university students in Croatia. This research can help students and higher institutions recognize the importance of decision-making in this development stage of life.

Literature Review

Decision-Making Style

Decision-making is a part of every, big or small, private or business, individual, or group activity. As a term, it is defined from several different perspectives, mainly depending on the researcher's primary discipline and his point of view. Decision-making is a reasonably complex process that characterizes every human being because without making decisions, we cannot live, develop ourselves or make achievements. It is an essential aspect of every individual's daily activity (Bulog, Matić, Dadić, 2017).

We all differ in the way we make decisions. The processes or approaches that individuals follow in making decisions are known as decision-making styles (Janis and Mann, 1997; Scott and Bruce, 1995; Davids, Roman and Leach, 2016). According to Scott and Bruce (1995) decision-making style can be understood as (1) a habitual pattern that individuals use in decision-making, and (2) as individuals' characteristic mode of perceiving and responding to decision-making tasks. Decision-making style has been defined as an individual's typical model of interpreting and responding to decision-making tasks (Harren, 1979). Namely, through decision-making style, we have a way to understand why a person, while facing, apparently identical situations, uses such different decision-making processes (Nutt, 1990). Although most persons tend to use a specific decision-making style more often than the others and possess a preferred, dominant style, individuals may adopt their decision-making style according to a given situation (Pennino, 2002 in: Bulog, Matić, Dadić, 2017).

Decision-making style is called a situation that includes the approach, reaction, and action of the individual who is about to make a decision (Philips, Pazienza, and Ferrin in, 1984 in Deniz, 2011, p. 106). The decision-making style refers to the unique manner in which individual approaches, responds to, and acts in decision-making situations (Arroba, 1977; Payne, Bettmen and Johnson, 1993 in: Bacanli, 2012).

Several researchers have proposed different decision-making styles, starting with Janis and Mann (1977), who proposed a decision-making style that ranges from vigilant to defensive avoidant. Johnson (1978) proposed decision-making styles regarding the manner individuals gather information and how they understand it. Harren (1979) identified three styles that are researched the most and studied the most in the literature: rational, intuitive and dependent. Pazienza and Ferrin (1984) added the avoidant style, while Scott and Bruce (1995) added a spontaneous decision-making style. These decision-making styles ranged from processes in which there was a thorough evaluation of the available decision making alternatives to those based purely on intuition and feelings (Davids, Roman and Leach (2016). Further, Leykin and DeRubeis (2010) identified nine decision-making styles that range from a methodological and systematic approach to dependent, spontaneous, avoidant and anxious forms of decision-making.

In their systematic review, Davids, Roman, and Leach (2016) provided a precise categorization of the plethora of different decision-making styles in the literature and often overlapped one another. They underwent them under one common denominator and divided them into two categories: adaptive and maladaptive decision-making style. As seen in their review paper, an adaptive decision-making style concerns processes that could yield the best course of action. In contrast, maladaptive concerns decision-making processes that would hinder or interrupt an attempt to achieve the best course of action.

For this paper's purpose, the most accepted and commonly used in decision-making styles research - Scott and Bruce's (1995) definition and classification of decision-making styles will be followed. Namely, they define decision-making style as a habitual pattern individuals use in decision-making or individuals' characteristic mode of perceiving and responding to decision-making tasks, and they distinguish the following decision-making styles:

- Rational decision-making style (RDMS), characterized by thorough research for and logical evaluation of alternatives.
- Intuitive decision-making style (IDMS) relies on hunches and feelings.
- A dependent decision-making style (DDMS) is characterized by a search for advice and direction from others.
- Avoidant decision-making style (ADMS) is specific to individuals who attempt to avoid or postpone decision-making.
- Spontaneous decision-making style (SDMD) is determined by a feeling of emergency and by trying to finalize the decision-making process as soon as possible.

Academic Achievement

Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university (Steinmayr et al., 2014). Academic achievement can also be seen as the aftereffect of education, best determined by continuous assessments and examination throughout students' education period. This approach would define academic

achievement as the level of schooling one has completed and the ability to attain success in their self-studies (Kaloiya et al., 2017).

Among the many criteria that indicate academic achievement, some indicators are rather general, such as procedural and declarative knowledge acquired in an educational system, while grades or performance on an educational achievement test represent more curricular-based criteria. Educational degrees and certificates are seen as cumulative indicators of academic achievement (Steinmayr et al., 2014). Academic achievement greatly influences a person's life, as it defines whether one can take part in higher education, determining their vocational career. Besides the utmost importance for an individual, academic achievement reflects a nation's wealth and prosperity (Steinmayr et al., 2014).

Endya Stewart (2008) differentiates two characteristics that significantly influence student achievement: individual-level and school-level characteristics. The first includes student effort (characterized by the level of school attachment, involvement, and displayed commitment), peer associations (an essential factor in adolescent socialization and motivation influencing the outlook students to adopt toward achievement), and parental school involvement (presence of parents through attendance at teacher conferences and taking part in school activities such as open houses and social activities). School structural characteristics comprise a school's structure, staffing, organization, resources, and climate.

Decision-Making Style and Academic Achievement

Decision-making is an activity taking part in everyday business and individual situations. Decision-making is incredibly complex during adolescence, which is a critical period of transition, as the adolescent has to undergo the evolution task of making the best choices for his future independently (Filippello et al., 2013).

Decision-making style, as a potential predictor of academic achievement, has been subject to thorough research with various outcomes and conclusions. Filippello et al. (2013) found no significant differences in how students with high and low academic performances make their decisions. However, significant differences in self-efficacy suggested that students with high academic performance are more efficient in making decisions in daily life than individuals with low decision-making self-efficacy, whose academic performance was also lower. In research on secondary school students, Bala et al. (2017) found a significant relationship between decision-making styles and academic achievement. Furthermore, they suggest a significant relationship between academic achievements and rational, avoidant, and spontaneous components of decision-making style. In contrast, such a relationship does not exist between an intuitive component and academic achievement.

In a study among university students, Aly et al. (2017) determined a significant effect of career decision-making self-efficacy (a student's belief about the achievement of tasks necessarily required for making career decisions) on academic achievement. Also, they found no significant gender differences in both career decision-making self-efficacy and academic achievement. Although the mentioned studies do not come to a joint conclusion, indicative is that a particular characteristic linked to decision making has always been determined as significantly influential on the students' academic achievement.

Methodology

Research Goal

Considering that decision making styles influence human behaviors in many aspects, this paper targets final-year university students in Croatia, examining their decision-making styles in terms of academic achievement. Thus, the main research goals are:

- to evaluate decision –making styles in the late adolescence stage, and
- to evaluate the association between decision –making styles and academic achievement among late adolescents.

Measures

Due to its wide application and confirmed validation, the General Decision - Making Style (GDMS) instrument (Scott and Bruce, 1995) was applied. It encloses 25 items that measure five different decision-making styles: rational (RDMS), intuitive (IDMS), dependent (DDMS), avoiding (ADMS), and spontaneous (ADMS) – five items per each style. The scale uses Liker's responding, with items ranging from 1 to 5 (1 indicates strong disagreement and 5 strongly agree with the statement). High scores represent the high tendency of respondents to use a particular decision-making style when making decisions. Cronbach¨s Alpha coefficient for the whole instrument was .74.

To measure academic achievement level, two variables were concerned: objective academic achievement (OAA) variable, and subjective academic achievement (SAA) variable. OAA includes a question about grade point average, while SAA refers to the item that rates satisfaction with the overall academic achievement level on a 5-point scale.

Data Analysis

An online questionnaire was used as the primary research instrument. The statistical processing of gathered data was made using SPSS software. Correlation analyses were performed to evaluate the relationships among decision-making styles variable and variables of academic achievement. Group differences were analyzed using multivariate analysis of variance (MANOVA). The internal consistency of the overall GDSM scale was measured by Cronbachs alpha.

Sample

The sample comprises 77 final year students at the Faculty of Economics, Business, and Tourism at the University of Split. As Table 1 shows, the research sample was dominated by female students (64.9%), and the age range was between 23-25 years representing the late adolescent stage. Further, 88% of students had some work experience during studies indicating their proactivity and motivation for practice knowledge.

Table 1: Research samples' main characteristics (n=77)

Variable		Mean	SD	Percentage
Gender	*M*	1.65	.480	*35.1*
	F			*64.9*
Age	*21*	*23.31*	*1.029*	*3.9*
	22			*19.5*
	23			*28.6*
	24			*37.7*
	25			*10.4*
Working experience	*Yes*	1.12	.323	*88.8*
	No			*11.7*

Results and Discussion

In order to answer the research questions, the statistical analysis is presented in this chapter. Table 2 displays means, standard deviations, and associations between all measured variables: five decision making styles and two academic achievement variables. Results show that the intuitive decision-making style (IDMS) is the dominant decision-making style among university students. It is prevalent in the research sample (M=3.10). It is followed by RDMS, which relates to the decision-making forms of a thorough investigation of possible options (M=2.73). Next is DDMS that refers to the assistance of others in advice and directions when making decisions (M=2.61), then style that refers to the avoidance of taking action (M=2.34), and the last one is SDMS (M=2.19). It can be concluded that students are prone to use intuitive and rational style when making their decisions. The low mean value of dependent, avoidant, and spontaneous style indicated that students avoid these styles when making important decisions related to their academic achievement.

As data presents, an intuitive decision-making style can be considered a primary and dominant style among late adolescents. Considering that the research sample is dominating by females, these results are not surprising. Namely, women are much more prone to rely on emotion, feelings, and details when making decisions than men. The most substantial relationship is found between avoidant and dependent decision-making style (r=0.817) and spontaneous decision-making style (r=0.716), while there is no correlation between rational and dependent, avoidant, and spontaneous styles.

Considering the association between decision –making styles and academic achievement among late adolescents, Table 2 reveals that there is a negative statistical significant relation ($p<.05$) between three decision-making styles (DDMS, ADMS, and SDMS) and the objective academic achievement variable (OAA) as well as with subjective academic achievement level (SAA). As decision-makers' tendency toward DDMS, ADMS, and SDMS increases, academic achievement level decreases, and vice versa, meaning that when academic achievement level increases, students will show a lower tendency to use DDM, ADM, and SDM styles. Thus, the dependent, avoidant, and spontaneous component of the decision-making style is negatively associated with young adults' academic achievement. Since these decision-making styles are characterized by an absence of self-control over the decision-making process (search for advice and directions from others, attempts to avoid decisions, fast decision-making process), it is quite understandable why these styles lead to the decrease in academic achievement. Among plenty of factors that affect adolescents decision-making behaviors; poor indecisiveness, self-control, low self-esteem, loss of self-confidence, emotional arousal, sensitivity, sudden emotional reaction (Cifti, 2015) are factors that can result in making poor decisions affecting his/her academic, private or business achievements.

Table 2: Summary of means, SDs, and correlations between measured variables (n=77)

	OAA	SAA	RDMS	IDMS	DDMS	ADMS	SDMS
OAA	1						
SAA	*.701***	1					
RDMS	.123	.208	1				
IDMS	-.143	-.185	*.396***	1			
DDMS	*-.284**	*-.387***	-.008	*.457***	1		
ADMS	*-.432***	*-.493***	-.091	*.468***	*.817***	1	
SDMS	*-.366***	*-.412***	-.096	*.433***	*.545***	*.716***	1
Mean			2.73	3.10	2.61	2.34	2.19
SD			.689	.478	.760	.820	.595

**. Correlation is significant at the 0.05 level (2-tailed).*
***. Correlation is significant at the 0.01 level (2-tailed).*

It could be stated that a positively active decision-making style concerning academic achievement in the late adolescence period among university students is a rational decision-making style. As shown from the table, RDMS does not show a significant relationship with academic achievement level variables (p>.05), but the associations are positive.

Further, to test whether or not final-year university students' tendency toward decision-making styles differ concerning the gender variable, a multivariate analysis of variance (MANOVA test) is performed. RDMS was excluded from the model because the dependent variable must correlate well to use this test. These differences are presented in Table 3. The MANOVA analysis indicates that F value in the test of gender is significant at the .000 alpha level. Two differences (IDMS and SDMS) are significant at the .05 alpha level, and two are not significant (DDSM and ADSM), where the alpha level is above .05.

Table 3: Results of MANOVA test for gender (n=77)

Source	Dependent Variable	Female Mean	Male Mean	F	Sig.
Gender	IDMS	3.21	2.90	7.980	.006
	DDMS	2.61	2.60	.008	.930
	ADMS	2.39	2.24	.591	.444
	SDMS	2.35	1.89	11.732	.001
Hotellings Test value=.362, F=6.519 Error df=72.000 Sig. .000					

The female students are found to show a greater tendency toward the use of intuitive and spontaneous decision-making style than male students do. These differences regarding intuitive and spontaneous decision-making style may be dominant because of the general differences between man and woman. The idea that men and women differ in their emotional responses has been present in the literature for years. However, the model's insignificant differences indicate that students, regardless of their gender, are prone to rely on dependent and avoidant decision-making styles when making decisions.

Conclusion

The study's primary research goals were oriented to the evaluation of decision–making styles, as well as the association between decision–making styles and academic achievement among late adolescents. The target population was final year university students. The findings suggested that most students tend to use intuitive decision-making styles when making their own decisions. Hence, intuitive decision-making style is the prevailing decision-making style among late adolescents in our sample. Female students are found to show a greater tendency toward intuitive and spontaneous decision-making than male students.

Further, results revealed a statistically significant negative association between dependent, avoidant, and spontaneous decision-making styles with objective and subjective academic achievement variables. It is conditional that decision-making styles impact, but negatively on the students' academic achievement and vice versa. It seems that with an increase in academic achievement, students' orientation toward dependent, avoidant, and spontaneous decision-making styles will decrease. However, rational decision-making is positively associated with academic achievement, but this relationship is not significant.

Such finding highlights the importance of recognizing students' decision-making styles. University teachers also should be aware of the usefulness of decision-making styles for learning and overall achievement level, because a specific characteristic linked to decision-making style can be significantly influential on the students' academic achievement.

Decision-making style is just one of the plenty variable that influences academic achievement, and there are so many contexts in which decision-making style can be studied. So, considering these two variables, in this kind of context, can be a limitation of this study, meaning that future research could consider some other contexts and some other variables - contextual factors. The research sample has its limitations also, and the broader sample could upgrade insights and knowledge of the analyzed issue. In that line of taught, a more significant number of observations could be accomplished, observing not just one university in the country. Nevertheless, data were collected using self-report questionnaires with subjective opinions of respondents. Some other report instruments could suit better for this topic.

Nevertheless, even with these and many other limitations one can find for this study, the findings of this study will be useful for late adolescents - current and future university students and teachers. Namely, it can help students better understand how they are making decisions and how it can help them improve their achievements. This study represents the only first step in understanding the relations among decision making styles and academic achievement in a late adolescent sample. These results extend the previous knowledge related to the decision-making process.

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Benefits of Implementing The 5S Method in The Production Company Survey Results

Damian OSTROWSKI

WSB University in Wrocław, Wrocław, Poland
damian.ostrowski@wsb.wroclaw.pl

Agnieszka PIASECKA – GLUSZAK

University of Economics in Wroclaw, Poland
agnieszka.piasecka.gluszak@ue.wroclaw.pl

Abstract

One of the basic objectives of implementing the lean management concept in companies is to achieve adequate operational efficiency, eliminate waste and reduce operating costs. Lean Management is the concept that focuses on the long-term perspective in its approach. One of the most frequently implemented methods of this concept is 5S. 5S is an easy to implement set of rules for eliminating waste, organizing the workplace or increasing employee involvement. The implementation itself is quite simple, however, the problem is to maintain the benefits resulting from the implementation activities in the long term. 5S comes from 5 Japanese words - Seiri (Sort), Seiton (Set in order), Seiso (Shine), Seiketsu (Stadardize) and Shitsuke (Sustain). The aim of the article is to present the results of a survey conducted in a production company regarding the effects of implementing this method in a factory in Wroclaw, Poland. The article discusses issues such as the evaluation of the method implementation, employee involvement, benefits of implementation processes

Keywords: lean management, 5S, process optimization, employee involvement

Introduction

Ghodrati et al (2012) claims that 5S is a method used to ensure that the quality of the working environment is maintained in order to reduce the area used, enhance employee involvement, reduce errors, create a proper and well-organised workplace, maintain discipline and cleanliness. Osada (1991) claims that the first step in the process of taking care of production quality should involve the implementation of 5S. The 5S method is a practical way of visual control which consists in creating, maintaining appropriate organization and continuous improvement of the workplace. It does not matter what the nature of the work is. 5S concerns not only production workers - physical work, but also administration workers - office work. Gapp et al (2008) emphasize that the 5S method was first applied in the automotive industry and later extended to other industries and sectors. 5S is a key element of TPS (The Toyota Production System) and is known to have been implemented for the first time in this factory.

Silveira (2006) states that the practical 5S approach is beneficial to every organisation as it helps to increase the quality of "life" for all the links in the company, i.e. employees, customers, suppliers, etc. In his article, Hubbard (1999) highligts that the implementation of 5S also contributes to the identification of problems arising in everyday operational activity. Singh et al (2014) mentioned that the implementation of 5S makes it possible to increase the involvement not only of operational employees but also of managers in making good decisions.

Masaaki Imai (2006) a guru and a forerunner of continuous improvement of kaizen, points out the benefits of implementing 5S from the point of view of the employee as well as management. Employees should know that with 5S their work environment will be clean, hygienic, pleasant and safe, and that all kinds of waste will be eliminated by minimizing the need to look for equipment, making the work

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of operators easier, reducing workload and freeing up space. Whereas the management should be aware of the fact that the successful implementation of 5S at the position:

- helps employees to learn self-discipline so that the employees involved will strive for standardisation;
- allows to pay more attention to the emerging waste, and recognizing the problem is the first step to eliminate waste and strengthen 5S;
- easily regulates malfunctions in different areas of operation;
- makes quality deficiencies visible;
- improves work efficiency and reduces operating costs;
- reduces unnecessary movements, unnecessary transports, unnecessary inventory;
- allows you to identify and solve problems with storage processes such as receiving, storing, sorting or picking and delivering materials;
- identifies and resolves problems related to production imbalances, machine breakdowns, forklift trucks or delayed deliveries;
- reduces the number of accidents at work.

The 5S method is widely known and accepted in many industries - in particular in manufacturing and services. Due to the limited number of pages of the study, the authors of the paper have decided to present only its abbreviated description from theoretical perspective. The table below presents the theoretical approach to the 5S steps including its definitions.

Table 1: Particular 5S steps

Japanese term	Definition	English term	Typical definition
Seiri	Organized: Distinguish between the less essential and necessary	Separate	Get rid of everything not needed.
Seiton	Neat: Put things where they best meet their functional purposes.	Straighten	Put things away
Seiso	Clean: Inspect for and eliminate waste, dirt and damage.	Scrub	Clean and paint.
Seiketsu	Standardized: Maintain known, agreed upon conditions.	Standardize	Develop rules to keep everything clean and organized.
Shitsuke	Disciplined: Practice the habit of doing what is required even if it is difficult	Systematize	Audit the workplace to ensure the rules are being followed.

Source: Patten, 2006

The aim of the article is to present the results of a survey conducted in a production company regarding the effects of implementing this method in a factory in Wroclaw, Poland.

Survey Results

The subject of the survey involved a production company from the paper industry employing over 350 people in Poland. It is one of 10 factories operating in Europe, belonging to an international concern - a leading supplier of products for European customers, as well as the world's leading manufacturer providing top quality selected paper products for all individual and institutional customers. The company, including the Polish one, is constantly developing its activities so that the products and services are the best for all target customers. It puts emphasis on the high quality of its products with

absolute observance of the rules of occupational health and safety. The company is aware of the fact that in order to improve the effectiveness of the implemented processes it is necessary to minimize or even eliminate activities that do not add value. Aiming to gain a competitive advantage, better quality of products, increase efficiency, improve working conditions, safety at given positions, but also to enhance the efficiency of employees, machines and equipment, the company has decided to use the concept of lean management starting with numerous training and then introducing the 5S method in selected pilot areas. According to the managers, success depends to a large extent on the employees and above all on teamwork. Every employee plays an important role in the production process and their involvement in improvement processes has a significant impact on the efficiency of the entire company.

Test Methods and Survey Group

The aim of the research was to assess the use of 5S method on two production lines in the company as well as to identify the involvement of employees in its practical implementation. Based on the obtained results, the analysis and evaluation of the implemented 5S method will be carried out to enable better implementation of 5S in other areas of the company. The article will present the answers of the employees concerning, inter alia, their evaluation in terms of the implementation of the 5S method, training, involvement in 5S actions, benefits.

The survey was conducted in July, August 2019 with the use of a survey questionnaire among production-related, administration and direct production employees working at workstations. The questionnaire was anonymous and, considering the way the survey questionnaire was delivered, the method of distribution and in-depth face-to-face interviews were mainly used. Another tool used included observation sheets. An Excel spreadsheet was used to analyse the survey data.

The information obtained by the authors was not only quantitative (measurements of results), but also qualitative (direct interview, direct observation, possible statement of an employee). The respondents were supposed to answer 20 questions, including two from particulars. The questions were mainly closed questions, but also open questions, where the respondents had the opportunity to indicate their own answer, express their opinions. This article will present the answers to 12 questions including 2 regarding the particulars.

The production company has more than 10 production lines. An average of 20 people work on each of them in 3 shifts. A few years ago there were attempts to implement the 5S method in many areas simultaneously, but unfortunately it ended up being a failure. The first step was taken then - the 5S method was introduced, but unfortunately it turned out to be more difficult to sustain and continue it. There was less commitment on the part of employees, there was no standardization, self-control and above all self-discipline. This time a decision was made not to implement it everywhere, only 2 pilot production lines were selected where 5S audits are being carried out at the moment. Therefore, the target research sample included 43 employees of only these two production lines. The respondents included managers, area engineers and operational employees. All respondents were employed on a permanent basis. 36 employees responded to the survey which constituted about 83.72% of all classified employees. Such a percentage of completed questionnaires was mainly due to the involvement of area engineers and people cooperating with them, who were willing to help and support them in achieving the survey results.

The largest group in terms of age was made up of employees aged between 30-40 i.e. 12 employees, and later successively up to 29 year-olds in the number of 11 employees, 41-50 year-olds i.e. 7 respondents and the last age groups 51 year-olds and above with the total number of 6 employees (Figure 1).

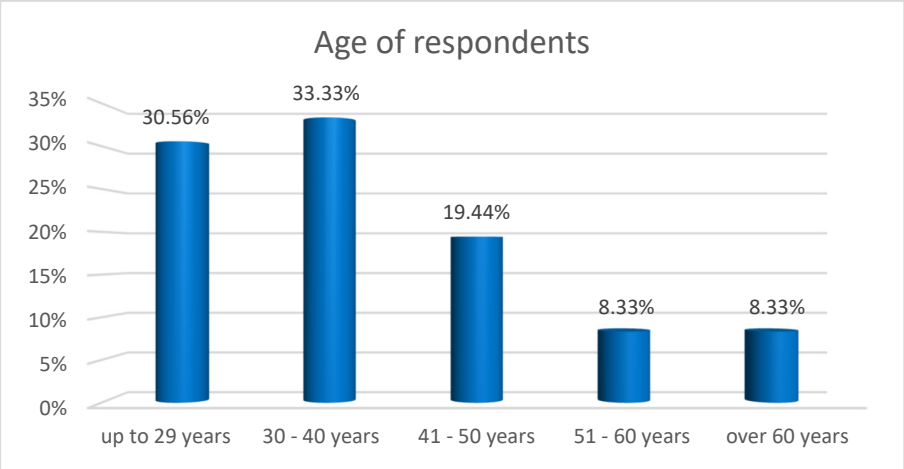

Figure 1: Age of employees in the analysed enterprise
Source: Elaboration based on the surveys carried out.

As far as seniority is concerned, 35 respondents replied, 1 person did not respond (Figure 2). The largest group were employees who worked less than 1 year, i.e. 11 people. The second group differing only in one employee were employed for 1 to 3 years. The third and fourth group consisted of employees with experience from 11 to over 20 years in the total number of 11 people. These employees are very experienced and have a lot of interesting ideas. At the very beginning of the implementation of the 5S method, this group was resistant to changes, saying very frequently "that they have more important things to do at work, that it is unnecessary, just a waste of time", knowing that previously there were attempts to implement 5S and unfortunately it ended in failure. Nevertheless, this group has a big impact on other employees and now most of them know the benefits of introducing 5S in the company. The least numerous group included workers employed for 6-10 years, i.e. 2 people and for 4-5 years, i.e. only 1 person.

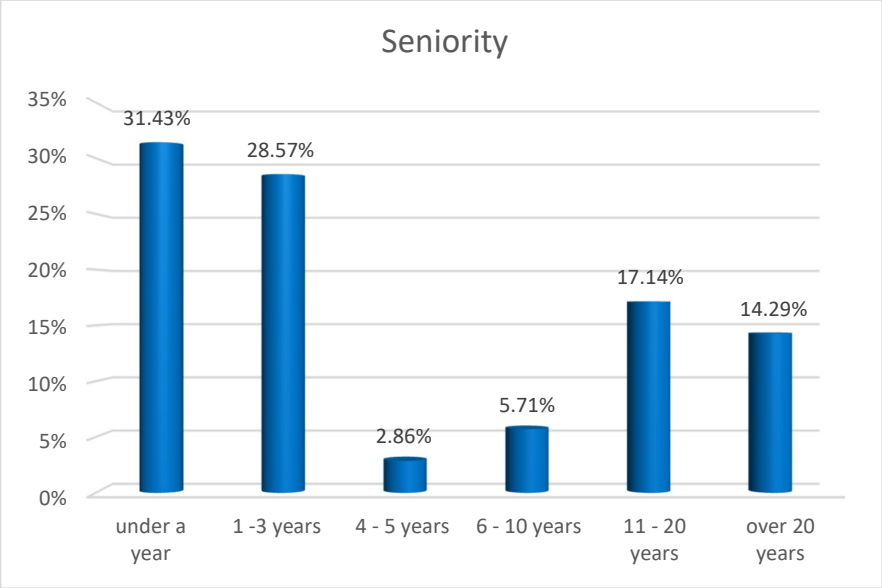

Figure 2: Seniority of employees in the surveyed enterprise.
Source: Elaboration based on the surveys carried out.

Detailed analysis of research results concerning the implementation of the 5S method in the analysed company

The first question concerned the employees' assessment of the implementation of the 5S method in the company (Figure 3). The authors wanted to check how the respondents perceive the introduction methodology, what attitude they have, what is their assessment of the implementation method. It is therefore noteworthy that the answer "very badly" was indicated by only 1 person, although three employees had no opinion at all on this subject. Based on the data obtained from the survey, it turned out that out of all the respondents, four people, i.e. 11.76%, do not know what 5S is at all. On the basis of other subsequent questions asked in the survey, it turned out that these 4 people have not participated in previous training on the 5S method, so they are not entitled to make assessments. According to the direct interview, the author concluded that people who did not have training do not know all the benefits of using the 5S method, but they see its effects and notice the problems that arise. Out of 34 answers given, almost 62% evaluated well and probably well. 5.88% rated it very well. The result achieved in this way indicates that the employees of these two selected production lines are aware of the possibilities and benefits that can be obtained from the implementation of the 5S method.

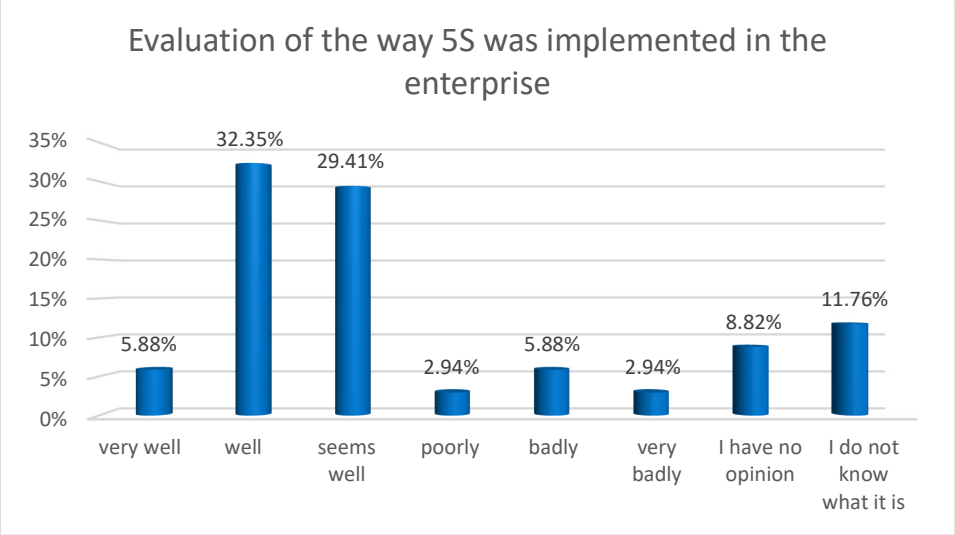

Figure 3: The structure of answers to the questions about the evaluation of 5S implementation in the enterprise

Source: Elaboration based on the surveys carried out.

When asked about their training in the 5S method (Figure 4), almost 70% took part in it and they understood it. 13.89% of respondents do not remember if they had any training at all. This result is related to the employees with longer work experience who seem to have already had training, but are not entirely sure. Considering the failure of the first approach to the implementation of the 5S method, this time they did not participate in it. Ex aequo 8.33% of the respondents did not undergo training at all and did not know what the method was. They were mainly newly hired employees. It is important that after the survey and the results were presented, the company's managers made a quick decision to internally train the staff and display on board 5S method's characteristics of the benefits and types of waste for better understanding and recognition.

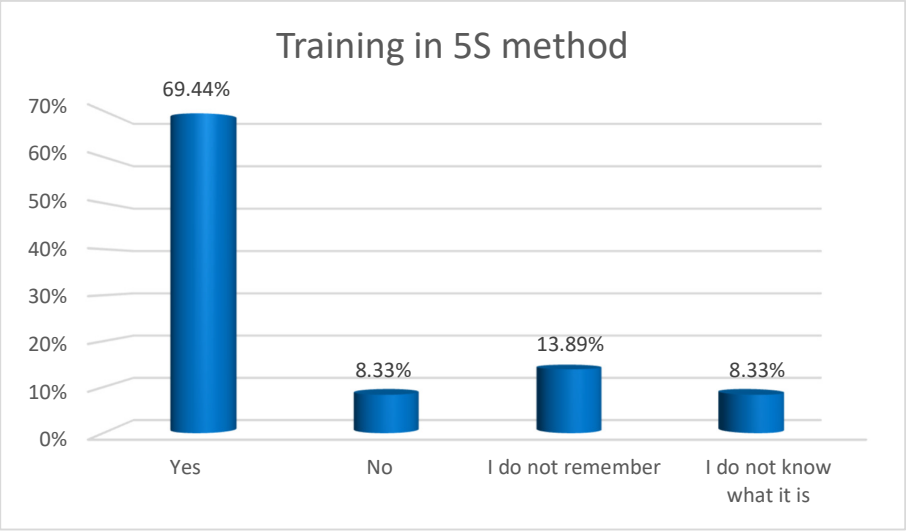

Figure 4: The structure of answers to the questions about the training in 5S method in the enterprise

Source: Elaboration based on the surveys carried out.

In response to the question about understanding the 5S method training in terms of changes in the company (Figure 5) there were over 83% of positive answers (yes and a little). Only 11.11% did not know what these changes are and why which was obviously due to lack of previous training. To 5.56%, i.e. 2 employees, it did not matter at all.

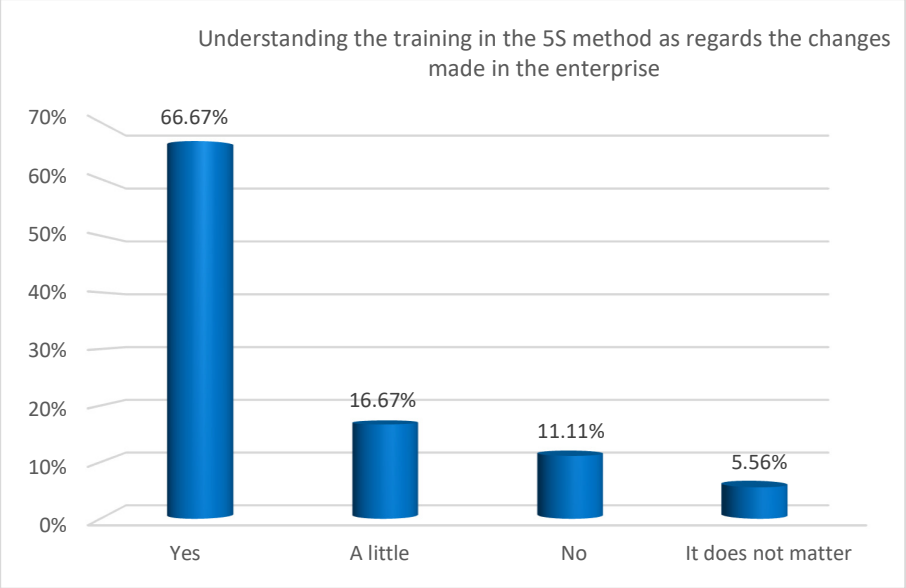

Figure 5: The structure of answers to the questions about understanding the training in the 5S method as regards changes carries out in the enterprise.

Source: Elaboration based on the surveys carried out.

The next question concerned the employee's assessment of his department/line's involvement in 5S operations (Figure 6). The results can be considered satisfactory, as 70.59% indicated a good, very good and even excellent answer. 2 people did not give an answer. Only one person marked terribly, and 5 employees assessed it poorly. In this question, the respondents had the opportunity to write down

why they assessed this way. Not many of them gave the reasons for such a situation, but those who did, probably know about the hardships and are aware that the 5S implementation is a long-term process and may be subject to various fluctuations, which are related to the involvement of employees or the dynamics of company development. Not all employees observe the introduced changes, they do not want to adapt, they resist because they do not see the need for changes. While conducting interviews with employees or 5S audits, not all employees seemed to know and understand exactly the essence of 5S. Most often, they identify it only with cleaning, tools arrangement, or marking out the put-down boxes, forgetting that 5S brings also other benefits. Other reasons for the lack of involvement in 5S actions mentioned by the employees also include: the lack of discipline, no self-discipline of the staff, no time or just "no, because I don't - because I have to".

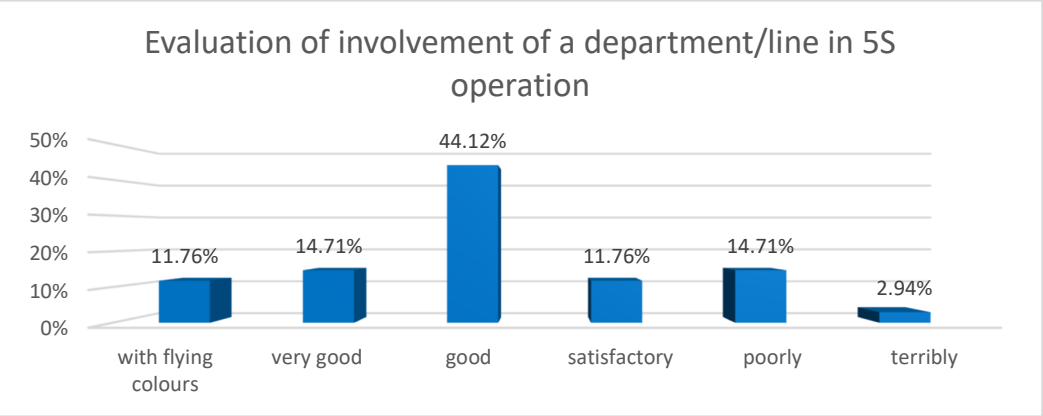

Figure 6: The structure of answers to the questions about the evaluation of involvement of a department/line in 5S operation

Source: Elaboration based on the surveys carried out.

After the introduction of 5S, do you see an improvement in your job? - This is another question asked to the respondents. 61.76% of employees answered yes (Figure 7). They have the potential and they share the whole burden of implementing 5S, they can see that they can work more effectively than before. They think 5S means easier work, better ergonomics, a friendlier work environment, the possibility of doing something more, realizing one's own improvement at the workplace, but also safer work. 5.88% respondents do not think that 5S improves work because the most important thing - as they say - is production, not "some sort of cleaning" or tidying up the tools in the cabinet and documentation. The fact that you use, for example, 5 tapes or films on one shift, and the supply is for the whole week or month, does not matter. According to the employees: "there has always been a supply and unfortunately will be, and you shouldn't worry about it," because "it will be used anyway." According to some employees, it does not matter whether it happens in one month, two or six months - the company will still have to pay the costs. It is regardless of the fact that this is frozen money, which could be used for other purposes, such as new investments or dissemination of an employee suggestions system . Moreover, there are cases when an employee looks for tools - no problem, after all - "always has and will always look for them". For 26.47% of the respondents it does not matter whether there is a visible improvement of work at the workplace. 5.88% of respondents consider it only a bother, a new idea, which, as with the earlier implementation of 5S in the factory, may not succeed. The latter workers claim that they know where to look for tools, or they openly say: "why should we make a selection, after all, it may be useful" in the near future.

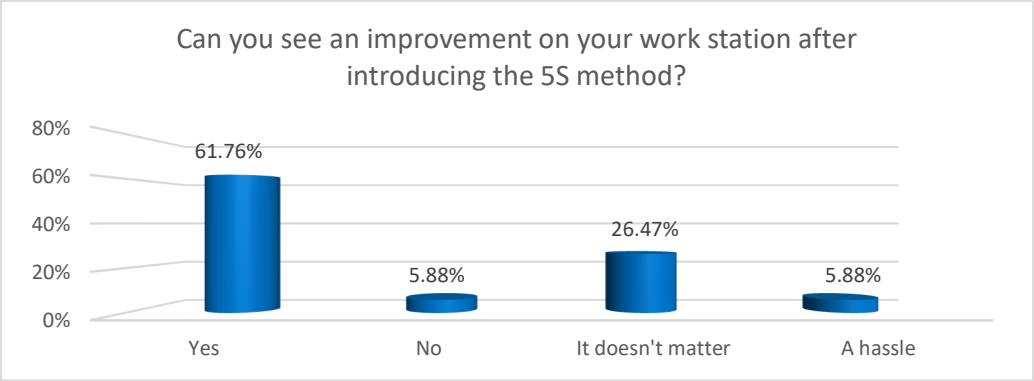

Figure 7: The structure of answers to the questions about a visible improvement in the job after implementing the 5S method.

Source: Elaboration based on the surveys carried out.

In response to the question about the greatest influence of particular 5S on the good organization of the workplace (department, warehouse, production area), so that it is clean, ordered and properly organized, the respondents had to choose one of six indicated answers, such as: selection, systematics, cleaning, standardization, self-discipline, all of them are important (Figure 8). 66.67% of employees indicated that all of them are important. This means that most are aware of the effects that can be achieved in the short and long term. Knowledge of individual 5S, implementation and control should become a natural action and a habit of every employee in their daily work. At the beginning of the implementation path most employees associated 5S only with cleaning and even said "I'm not here to clean", "this cleaning has to be done by someone else, I have more important things to do", "there is an outside company to clean" or "we can clean, but only when the machine is stopped" etc. Many people were against it, and now they know that 5S is not just about cleaning, they take all the steps.

23.33% of the respondents answered that systematics. Searching for tools, tapes, documents, forklift trucks was everyday life. At the beginning of the 5S implementation in the company, employees often expressed their negative opinions such as: "I know where it is, there is no need to create a special place", "why do it, on the second shift and they will do it their own way", "only I use these tools", "it can all come in handy". And now employees realize that all the things they need should be in the right amount and in the right place because only this approach will make work easier, use resources properly, reduce unnecessary employee movements, reduce time, increase job efficiency and give more opportunities for optimization. The third place was taken by cleaning. This is a very important element noticed by the respondents. The employee should know that by keeping the workplace clean, he/she has an impact on reducing breakdowns, prolonging the time of use of a machine or a given device. Cleaning is also a prevention, preventing damage, destruction. Selection, standardization and self-discipline have obtained the same number of indications each 6.67%.

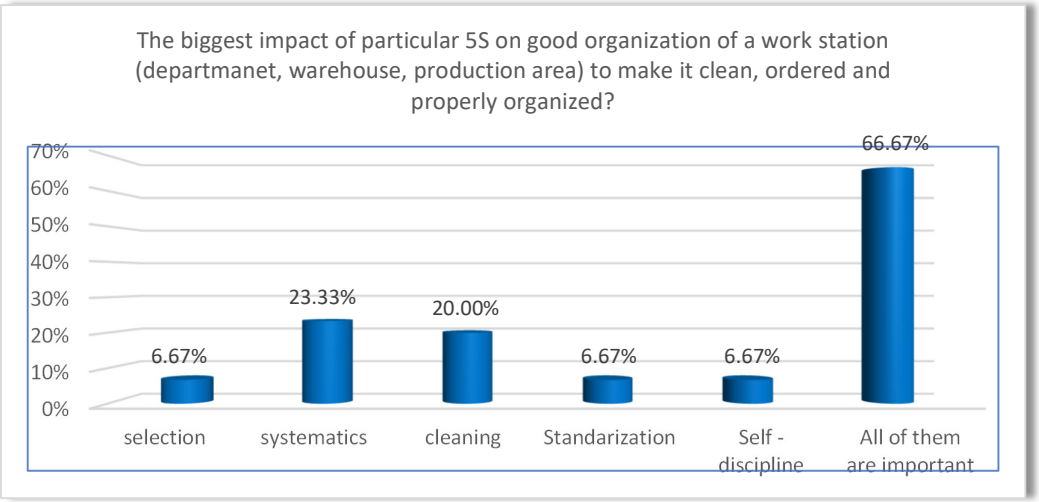

Figure 8: The structure of answers to the questions about the impact of particular 5S on good work organization to make it clean, ordered and properly organized

Source: Elaboration based on the surveys carried out.

The growth in labour efficiency is a very important indicator for each company allowing to identify the products produced by one employee in a given unit of time. Thanks to higher efficiency, a company can produce more with a constant effort and thus improve its competitive position in the market. Factors influencing the increase of work efficiency include proper work organization, condition of machines and equipment used at work, competence, involvement or experience of employees. In response to the question whether the implementation of 5S is associated with an increase in work efficiency - 47.06% answered “rather yes” and “definitely yes” (Figure 9). This is a satisfactory result and indicates a high level of employees' awareness of the effects of the 5S method. In total, 32.35% of respondents indicated answers "rather not" and "definitely not". 20.59% of the respondents do not know or have no idea about it at all. Analysing this result, the management should carry out a 5S method reminder training, explain the impact of 5S on work efficiency and at the same time explain what work efficiency is, how it is calculated and what benefits it can bring to the company.

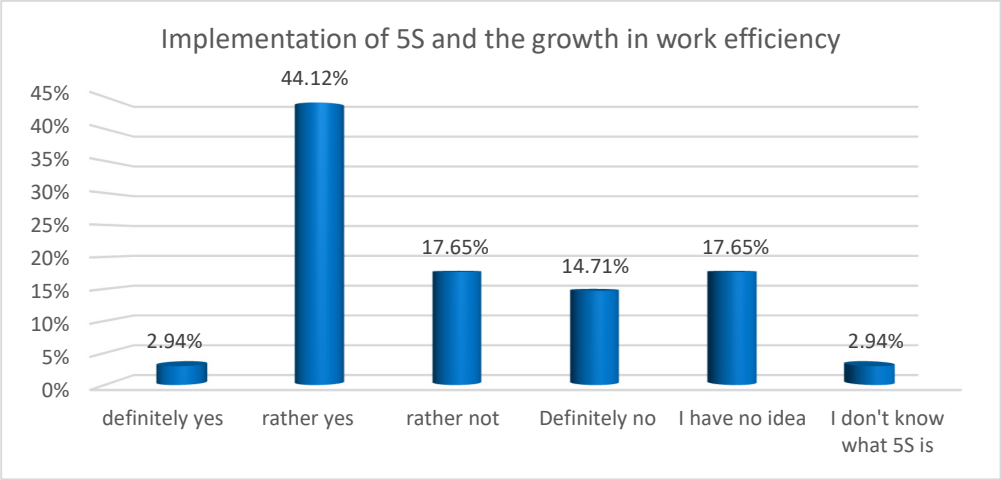

Figure 9: The structure of answers to the questions about the impact of 5S implementation on the growth of work efficiency

Source: Elaboration based on the surveys carried out.

The next question concerned the employees' knowledge of the benefits of using the 5S method (Figure 10). The result is really very good. 80% of the employees have answered that they know. 16.67% i.e. 5 respondents do not know what the 5S method is at all and what the benefits may be. Only 1 person does not know the benefits at all. It is very important to note also the fact that nobody indicated the answer that they know what the benefits are, but do not want to apply them. 6 people did not give an answer at all. During an in-depth interview with the employees it turned out that most of the employees know the benefits of using the 5S method, they can list them. As mentioned earlier, employees know about the waste on their production lines, their areas. They were very much involved in the training and were not afraid to talk about waste in their jobs, as demonstrated by the losses they noticed and written down. Respondents know that if 5S is not implemented in a given area, they may be more or less exposed to the occurrence of losses resulting from e.g.:

- waiting for needed raw materials, materials for production,
- waiting for the truck,
- the inability to find the right tools on time, because they can be put away anywhere, or only some employees know where certain tools or materials are,
- too much stock,
- overdue products,
- misused space due to over storage of things in particular areas,
- defects caused by the lack of order and damage to components,
- unnecessary movements by employees,
- dirty machine and equipment surfaces, or
- lack of standardization and others not mentioned.

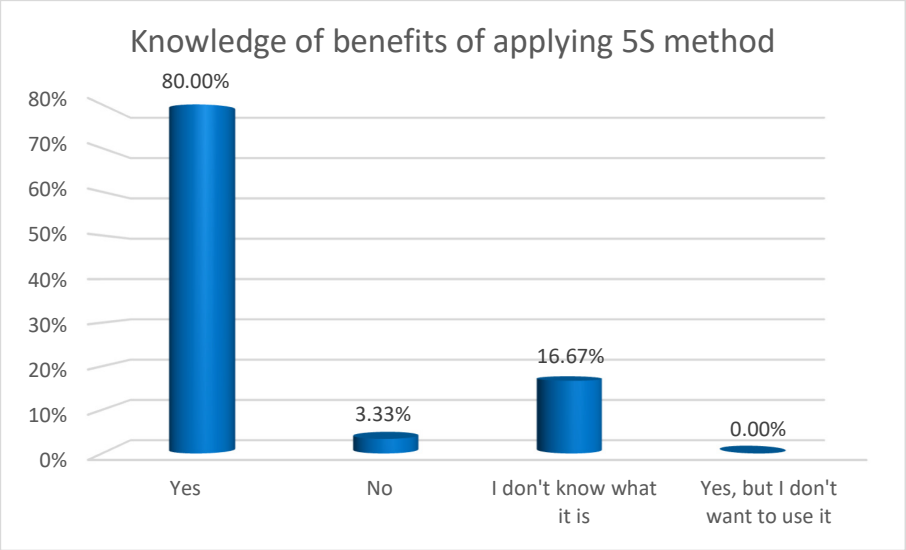

Figure 10: The Structure of answers about the knowledge of applying 5S method

Source: Elaboration based on the surveys carried out.

Benefits from the use of 5S observed by employees - this is another question asked to the respondents (Figure 11). Employees could indicate more than one of the 8 different benefits contained in the survey on the basis of the author's knowledge and experience, they could also write down the benefits they noticed that were not mentioned in the survey form. The employees added only one benefit - a faster access to materials, tools - which ranked last. In total 69 different benefits were marked. The biggest benefit the employees observed was the facilitation of work, i.e. 23.19% of the marked answers. The result is the best, but it is a pity that not greater. Unfortunately, still many employees perceive 5S as an additional job, an additional duty rather than a facilitation of everyday, routine activities. The second

advantage noted by the respondents with 23.19%, i.e. a higher level of health and safety at work is worth noting. This is a very good result and very important as it contributes to avoiding hazards, dangers, accidents at the workplace in the future. Through its systematic approach 5S allows staff to work in an orderly place. Cleaning, as mentioned earlier is prevention against unexpected failures. A failure to clean machines on an ongoing basis, according to the adopted schedule, may contribute to sudden unplanned downtime - breakdowns and repairs. A mess after a sudden, quick repair can lead to accidents, reduced productivity, a limited use of machines and equipment. Standardization simply requires working in compliance with health and safety regulations. Self-discipline allows workers to keep a particular workplace safe, and self-improvement contributes to even better improvement and elimination of waste, paying attention to even better standards while respecting the applicable health and safety rules. The third place, with a share of 17.39%, was occupied by improved well-being of employees resulting, among other things, from better ergonomics of work, possibilities of self-improvement, possibilities of improvement and better communication with the management. The fourth benefit consists in the reduction of pollution with a share of 8.7%. The fifth place, i.e. 7.25%, is the reduction of problems from the machine park, as mentioned earlier. There are fewer breakdowns, less downtime because the machine is not left on its own, it is systematically cleaned. The sixth place is the cost reduction with 5.8%. The seventh position with a 4.35% share was occupied by quality improvements and increased production capacity ex aequo.

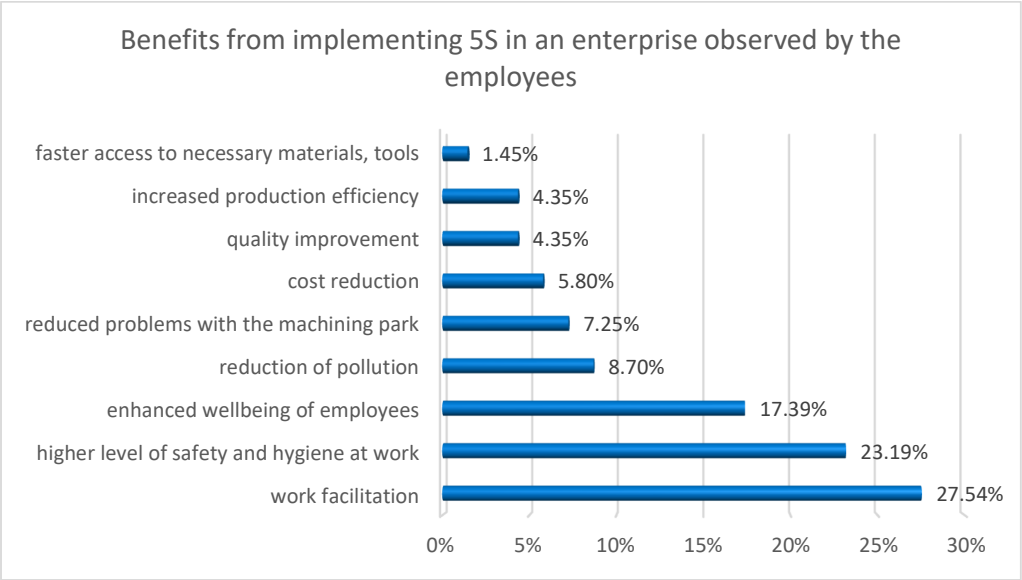

Figure 11: The structure of responses regarding the benefits observed by the employees resulting from the application of 5S method in an enterprise

Source: Elaboration based on the surveys carried out.

Only about 53% of the respondents answered the open question about the greatest benefits of implementing 5S. 21% of the respondents wrote that there are no benefits, whereas the remaining employees indicated the four most important ones in their opinion. These are: everything in its place - it is easier to find the desired item, greater efficiency, cleanliness and shorter introduction period of a new employee. The latter advantage allowed the production lines to save time through the creation of fixed put-down places, and the introduced instructions, OPL (one point lesson) significantly improved work and contributed to the elimination of frequently made mistakes.

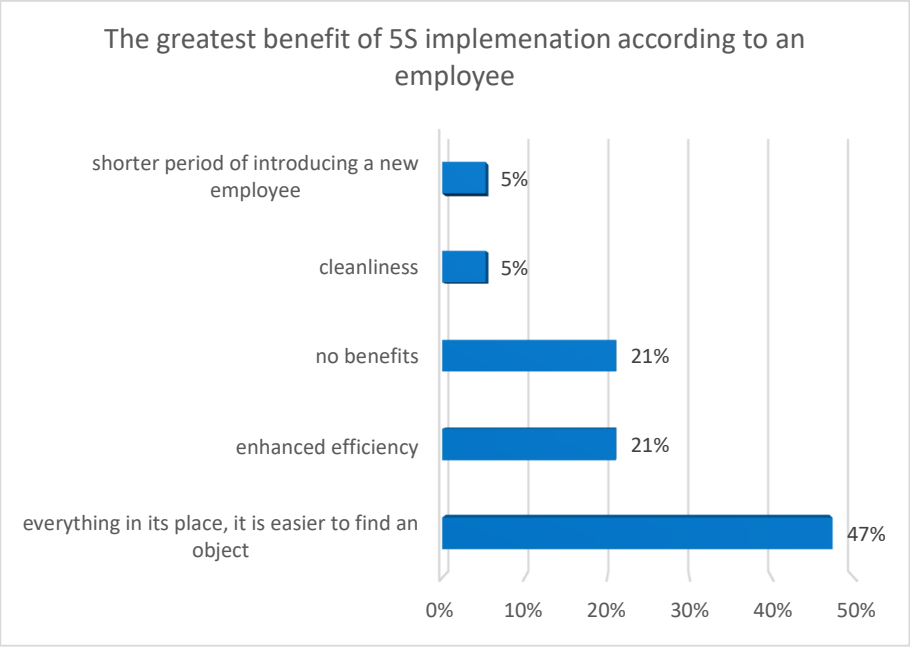

Figure 12: The structure of responses regarding the greatest benefits of 5S implementation in an enterprise

Source: Elaboration based on the surveys carried out.

Conclusion

The 5S method is a natural step towards continuous improvement, the beginning of future changes, obtaining greater productivity, a method that also allows the introduction and successful implementation of other lean management tools, methods such as TPM, Just in Time, SMED and others. Many small improvements at workstations can contribute to a better result in the future. A similar opinion on the benefits of implementing 5S in the enterprise can be found in Falkowski et al (2013).

The 5S method often seems to be simple to implement, but unfortunately it is more difficult to maintain the introduced changes. From the very beginning you can see both enthusiasts and opponents. Resistance to change, fear of additional duties or something new - these are often barriers that appear during implementation. Not everyone is ready to change the culture of work to more productive than before.

5S requires the involvement of all employees, management in the implementation of tasks, improved communication. It requires a change in the attitude of employees to eliminate waste at workstations and therefore in processes. It is important that employees are aware of the appearance of various waste in their actions leading to errors and defects, and consequently to costs. The 5S method can prevent their occurrence. However, in order for the 5S method to function as a method of continuous improvement, the whole company should know what benefits it can bring to the employee, management and organization. Every employee from the lowest to the highest level should be aware of the implementation, know the basic rules and undergo appropriate training. The benefit for the company will then include identification of the employee with the company and customer satisfaction. Conducted surveys have shown that employees of two production lines know the main benefits of 5S. At present, they are open to implementing changes and willing to introduce improvements. All they need is: knowledge, resources and support of the management. Employees know waste, they know the benefits of implementing the 5S method, but it is difficult with self-discipline. And now the role of the management and the person responsible for 5S implementation is important. Every day employees

should be made aware of the goals, benefits, until 5S becomes a habit of everyone in everyday work. Employees can see the changes, they work more smoothly, but still have to be motivated to follow and watch 5S every day. Compliance with the 5S method in the workplace guarantees among other things: cost reduction, inter alia, eliminating all waste, unnecessary activities, unnecessary movements, prevents losses and defects, makes work easier, shortens the time of performing individual tasks, clarifies work instructions, reduces delays, ensures better, constant and even high quality, higher efficiency of both workers and machines, higher level of health and safety at work by eliminating failures and accidents at work (e.g. the inspection of machines when cleaning), improves well-being of employees, promotes good contacts between employees of different departments and, most importantly, provides the necessary basis for further improvement of work and product quality. The results of the research carried out are consistent with the results of other researchers, e.g. Gupta et al (2014) in his article, authors stated "that introducing the 5S and kaizen rules brings great changes in the organisation, for example, increasing of effectiveness and efficiency in the processes, improved visibility of the process, improved morale and safety of the employees, reduced delays, searching time and dangerous conditions." Other authors Singh et al (2014) emphasize that "5S is an effective tool for improvement of organizational performance, regardless of organization type, size, its production or its service. Consequently, 5S technique would strongly support the objectives of organization to achieve continuous improvement in performance and productivity." Other authors Patel et al (2014) emphasize another aspect (corresponding to the research results presented in the article) that very essential is training of workers about the 5S rules.

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The Dualistic Model of Strategic Planning - Russian Experience

Sergey O. SHOKHIN
the Moscow State Institute of International Relations (MGIMO-University, Moscow, Russia
doctorsos07@rambler.ru

Ekaterina V. KUDRYASHOVA
the Institute of Legislation and Comparative Law under the Government of Russian Federation
Moscow, Russia, ev_kudryashova@inbox.ru

Abstract

This paper aims to demonstrate the dualistic model of strategic planning with reference to Russian experience. There are two mainstreams of strategic planning. First is the social-economic strategies and the Federal law on strategic planning in Russian Federation. Second is formed by strategic presidential orders known as "may executive orders". We try to provide the systematic view on the institutionalization of strategic planning in the dualistic model. The model turns to be acceptable for the public management practice. However, it shows controversies and there are difficulties in implementation of the model. Inductive and deductive reasoning combined with critical analysis are employed in this paper. The contextual approach is used in this study as well.
By now the dualistic model of strategic planning was not identified. This paper will contribute greatly to the understanding of strategic management practices. The critical analysis of the strategic planning in a specific country helps to compare and improve the public governance in different countries around the world.

Keywords: Strategic Planning; Strategic Management; Public Management; Russian Federation; Legal Regulation.

Introduction

The planning as an inherent part of public management passed in Russia a complicated way from the predominant role in soviet times to the disuse in the post-Soviet first decades and back to the new start as strategic planning in 2000. The priority national projects were the first experiments in the goal-setting in 2000. Later the strategic planning started to institutionalize. Russia started to develop strategies of different kinds. Russia even has adopted a special federal law on strategic planning announcing that there will be a system of strategic planning. Quite a rare example of the legal regulation of strategic planning.

The topic of strategic planning in different countries with comparative elements became popular recently (Joyce, Bryson &Holzer (eds), 2014; Drumaux & Joyce, 2018). There were studies of the approaches to strategic planning in public sector (Joyce, 2015;). Some elements of strategic planning in Russia are discussed in academic publications in Russian academic circles (Vilisov 2016) and in international studies (Kudryashova E., 2014). However, the problem of the dualism in strategic planning shaping a special model was not in the focus of the academic publications. This paper is focused on this issue and to certain extent fills the gap in the current academic discussion.

Due to the complex and interdisciplinary nature of this research it requires the mixed-methods to be applied. The study shall cover both the content of the strategic documents and the practice of their application. We shall refer to the inductive and deductive reasoning as well as the critical analysis of the political trends. The contextual approach shall help us to identify the patterns and prospective of strategic management.

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The paper aims to show the specific model of strategic planning elaborated during the recent decade in Russia. This model can be characterized as the dualistic model and can be identified not only in Russia. In the dualistic model the presidential strategic planning and other strategic documents form two parallel streams. The dualism has its implication for the political process and strategy implementation. This study contributes to the understanding of contemporary practices of strategic planning and gives a basis for further comparison and improvement of the public governance.

The main Features of Strategic Planning in the Russian Federation

The contemporary long-term strategic vision in Russia started from the national projects in 2002-2003. The national project of the 2000 were experiments and were presented in political statements.

By the 2008-2009 strategic planning started to institutionalize in two mainstreams. The first mainstream of strategic vision is the set of executive orders issued by the President of Russian Federation in 2009, in 2012 and in 2018. The executive orders of 2012 and of 2018, issued in May shortly after the inauguration. Together they are known in mass media under the term “May executive orders”.

The starting point of May executive orders was in 2009 - the Executive order of the President of Russian Federation N 536 of 12 May 2009 “On the basis of the strategic planning in Russian Federation”. Paragraph 12 of this document vested the general ruling of strategic planning in the President of Russian Federation as the head of Security Council. Following this on the 7th of May 2012 just after the beginning of the presidential term President Putin signed a bunch of 11 executive orders:

Executive order N 596 “On long-term state economic policy”;
Executive order N 597 “On the measures for implementation of state social policy”;
Executive order N 598 “On the advance of state health service policy”;
Executive order N 599 “On the implementation of state policy in the education and science”;
Executive order N 600 “On the measures aimed at provision for Russian citizens with affordable and comfort housing and at advancing the quality of utility services ”

Executive order N 601 “On the main directions of development of public management system”
Executive order N 602 “On the provision of inter-ethnic harmony”;

Executive order N 603 “On the implementation of the plans (programs) of building and development of the Russian Army, military forces and authorities and modernization of defense industry”;
Executive order N 604 “On the further development of the military services in Russian Federation”;
Executive order N 605 “On the measures for realization of foreign policy of Russian Federation”
Executive order N 606 “On the measures for realization of demographic policy in Russian Federation”

These executive orders outlined the main goals of development and articulated 218 tasks for the Government of Russia during the period of 2012-2020. The meaning of the May executive orders as the mainstream of strategic planning in Russia was not so clear at the beginning. With the time more and more attention was paid to those executive orders. It was steadily repeated that the failure to perform the tasks of May executive orders 2012 would be followed by personal public political liability of every member of the Government and of every head of the region.

154 of the tasks were accomplished and withdrawn from the special presidential control by May 2016. So, performance of the May executive orders 2012 was 88%. The information on the May executive orders is presented in a special section of the Russian Government web site http://government.ru/orders/selection/406/ .

In 2018 tradition of the May executive orders as strategic planning framework was affirmed by the only one new executive order. On the 7th of May 2018 the President issued the Executive order N 204 "On the national purposes and strategic tasks of development of Russian Federation for the period till 2024". This Executive order presented the following goals to be achieved by 2024: the provision of sustainable growth of population; increase of the expectancy of life till 78, increase of the effective revenues of the citizens and growth of pension benefits overhead inflation rate; double decrease of the poverty; improvement of the housing conditions for more than 5 millions families; speed up of the technological development and 50 % increase of the technological entities; accelerated implementation of digital technologies in economy and social sphere; Russia's entry in five major economies of the world and the speed of economic growth higher than average in the world keeping the macroeconomic stability including inflation rate not higher than 4%. One of the goals is formation of the high productive export oriented manufacturing and agriculture sector within the main sectors of economy. This sector is expected to develop on the basis of contemporary technologies and highly qualified personnel.12 national projects became key instrument of its implementation. National projects have no legal status and rather political instruments and means of accountability. The Government intended to introduce 91 indicators of the national projects into the statistic accounts in order to provide accountability and transparency.

The may executive orders tradition was interfered by the presidential order issued in July 2020. This order followed the constitutional reform 2020 in Russia (Verlaine M., Shashkova A.V. and Kudryashova E.V., 2020) and reflected the deep crisis in economy. The new Executive order N 474 "On the national goals of Russian Federation development for the period till 2030". The strategic goals were tailored for the reality and the crisis context.

The second mainstream of strategic planning initialization in Russia origins from programs of social-economic development issued according to the Federal law of Russian Federation of 20.04.1995 № 115-FZ "On the state prognosis and programs of social-economic development of Russian Federation". Programs of social-economic development were issued in 2001, 2003, 2006 non-systematically following the political needs (Smirnova, 2011). In 2008 the Concept of long-term social-economic development of Russian Federation for the period till 2020 was adopted. Finally, in 2014 the Federal law № 172-FZ of 28 June 2014 "On strategic planning in the Russian Federation" (further The Federal law on strategic planning) was adopted as a culmination of this second mainstream.

The Federal law gave the formal definition of strategic planning. According to the law of 2014 planning is elaborating and implementing the main guidelines of the Government of Russian Federation, plans of the federal state bodies and other plans. Planning focuses on the goals and priorities of the social-economic development and the goals of the national security articulated in the strategic documents. Goal setting is defined as the directions, purposes and priorities of the social-economic development setting and ensuring the Russian Federation's national security.

The mismatches in strategic documents

The Federal law on strategic planning aimed to streamline the strategic process in Russia. The system of strategic planning understood as the mechanism of cooperative interaction of the participants within drafting and implementing the strategic planning documents as well as their monitoring and controlling. The legislator meant to create a system of strategic planning including certain level of coordination of strategic documents.

However, it did not succeed in building a coherent system. The rhetoric question could be heard in publications if the Federal law on strategic planning is a "technocratic utopia" or a "sleeping institution"? (Vilisov, 2016). Strategic documents of the same level are in conflict with each other and the hierarchy is not clear.

The Law on strategic planning said nothing about the strategic documents issued before it's coming into force. The massive of strategic documents before the 2014 was not abolished. For example, the

status of the concept of long-term social-economic development of Russian Federation on the period till 2020 is unclear.
There are certain mismatches in the strategic documents. The strategic goal set in the concept of social-economic development in Russia till 2020 was to achieve the level of economic and social development corresponding to the status of Russia as the world leading state in XXI century, having the advanced position in the global economic competition with guaranteed national security and promotion of it's citizens' constitutional rights.

According to the Executive order N 536 of 2009 the goal of strategic planning was to create institutional, organizational and other measures to ensure the constitutional rights and freedoms, high standard of living for citizens and the sustainable development, defense and security for Russia on the basis of its resources' efficient use and capacities of civil society involvement.

It follows from the May executive order of 2018 that the strategic goal till 2024 is to facilitate breaking scientific, technological and social-economic development, increase of population, enhanced standard of living and comfortable living environment, opportunities for every person to develop.

The mentioned strategic goals are not completely different, but still the different emphasis is obvious. The goals of strategic planning are not unified and this causes further problem of communicating and delivering the goals for implementation (Kudryashova, 2019; Sattarova, Shokhin, 2018).

In 2016 the High school of economics issued the Report on monitoring of the implementation of Federal law on strategic planning. The Report stated that the system of strategic planning was not fully developed (High School of Economics 2016). Although the law always wish to impose order on chaos that was not the case for the Federal law on strategic planning and the strategic documents which keep on conflicting with each other.

The Report was focused only on strategic planning documents without general assessment of the strategic management after the Federal law on strategic planning. It gives general assessment and conclusions without case studies of the particular documents and mismatches in the specific goals. For example, it is stated that the goal-setting documents in the field of security were adopted on different levels from 1996 till 2015, cover different spheres related to the security issues and the list of those documents is provided. According to the Report all the security goal-setting documents are completely different in terms of general approaches. They include policies, concepts, doctrines. The methodologies of those documents have nothing in common.

The Report especially points to the whole array of sectoral or industry-oriented goal-setting documents. The Energy strategy of Russia till 2030 adopted by the Federal Ministry of energy and approved by the Government resolution of 13 November 2009 No 1715-p can be mentioned as an example of the industry-oriented document. The scopes of industry-oriented strategies were voluntary. The Rules on elaborating, drafting and adjusting the industry-oriented (sectoral) strategic documents (adopted by the Government decree of 29 October 2015 No. 1162) allow to define the scope of industry or sector quite discretionary. By the same way the coordination and the methodic are left to the ministry drafting the strategy, although the strategy has to be approved by the Government. This regulation opens to each ministry the way to work on its own agenda and contribute to the chaos in the industry-oriented strategic documents.

The industry-oriented strategies were adopted without coordination and consistency both before the Federal law on strategic planning and after it's coming into force. Those documents are found by analysts to be very difficult to interlink between each other and to match them against the main goal-setting social-economic documents of Russia. The bulk of the sectoral and industry-oriented documents are overlapping, conflicting or leaving the gaps.

The cross-cutting idea of the Report is the lack of unified comprehensive methodology for the strategic documents in Russia. Although the Federal law on strategic planning provided that there shall be a methodic support for strategic planning. The methodic support includes the adoption of guide-lines and

directives on the drafting and adjusting the strategic documents (part 12 of the article 3, Federal law on strategic planning).
The lack of comprehensive methodic support for strategic documents is considered to be the main reason for the chaos in strategic documents. In this respect we should spot one debatable assumption made in the Report. The analysts of Hight School of Economics assume that the strategic planning system is intended to be not a "centrally-organized" and "centrally-maintained", but a "distributed" system of strategic planning (High School of Economics, 2016). This assumption is not supported by facts or argumentation in the Report. In the historic retrospective and in the first decade of 2000s before the Federal law on strategic planning it was a top-down public strategic management.

The strategic planning which is not based on the presidential orders is heavily criticized and even not very well understood as we could see from the Report of High School of Economics. The presidential part of strategic planning is considered to be better organized and in fact it is better delivered to the public. Still both streams are developing as parallel or as complimentary.

Discussion and Findings

Two mainstreams of strategic planning were developed in Russia during recent decades. First is the Federal law on strategic planning in Russian Federation, the social-economic strategies and other related strategic documents. Second is formed by strategic presidential orders known as "may executive orders". These two mainstreams could not be considered just a long term and medium-term strategies within one system. At least the actors of strategic planning do not consider these two main streams to be parts of one strategy. The balance of two parallel strategic planning streams has been functioning already nearly a decade and it can be admitted that here we have a specific dualistic model of strategic planning. Although this model is far from being ideal.

In 2018 the Ministry of Finance proposed to scale down the strategic documents massive. The May executive order 2018 was considered by The Russian Government and the federal ministries to be de-facto the main strategic document. Therefore, it was suggested by the Ministry of Finance to establish it de-jure. The May executive order could be the "root document" of the strategic planning along with the Presidential Addressing to the Federal assembly. The May executive order according to the initiative of Ministry of finance could be on top of the hierarchy of strategic documents with the key role. It may be adjusted by annual Presidential Address to the Federal Assembly if necessary. This approach was presented by Ministry of Finance as a solution for the chaotic strategies and the spontaneous non-public interactions between different public bodies.

The Ministry of finance has given an example of conflicting strategies. The Energy strategy sets as a goal of the coal mining the increase up to 245M tons per year and another overlapping document - the State program of energy production development - requires 365-410M tons per year. The sectorial strategic documents as a category the most difficult for systematization. In 2018 the industry-oriented strategies give the best illustration for the overlapping and conflicting provisions.

The main political reason of the Ministry of Finance scale down proposal was that the numerous strategic documents make possible the non-public political processes at the interface of government, presidential administration, regions, State Council and Security Council (Dyachkov, 2019; Davydov, 2020). The communication between political and administrative sector has certain level of ambiguity. The vertical and horizontal communication between different actors within the strategic planning organized properly.

The initiative of the Ministry of Finance could destroy the diversity envisaged by the Federal law on strategic planning. The sophisticated set of strategic documents with levels, short, medium and long-term horizon could be simplified and diminished to only one or two documents. However, it never happened. The initiative to zoom in the strategic planning was not implemented. There was a wide discussion, but no substantial changes were made. Finally, the solution of the issue was referred to the technological field. The problem of the strategic planning documents systematization was considered later in the framework of the digitalization of official documents. The digital platform for the public

management shall include among others the concise compilation of strategic documents showing their scopes and links.
Therefore, it looks like the dualistic system is accepted by the actors of strategic planning process and even supported by them. There is a need both in concise presidential documents and sophisticated regulation with levels, terms and scopes even with the lack of unified methodological approach to the strategic documents. It is unlikely that one of the two strategic streams will be eliminated. This study is focused on Russian experience, however, within the Eurasian economic integration there is an intensive interchange of political practices and public management experience. It should be mentioned here that according to the survey on the systems of strategic planning the Eurasian Common Economic Space member-states (Eurasian Economic Commission 2014) the approaches to strategic management still have much in common on the post-soviet space. We can expect that the same dualistic model may appear in the countries -members of the Eurasian economic integration.

The dualistic model of strategic planning in Russia has its disadvantages but it has withstood the political and social tests. The problems of dualism have not been solved yet, but both streams of strategic planning are developing and compliment each other.

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The Impact of Big Data on Financial Management: Labor Market Perspective

Olga PILIPCZUK

University of Szczecin, Szczecin, Poland
olga.pilipczuk@usz.edu.pl

Abstract

The paper examines the impact of big data technologies on financial management. The main contribution is the model of perspectives of big data impact on financial management supplemented with skills influenced the finance manager profession. The paper fulfills the research gap about the impact of big data technologies on the financial management considering both the literature analysis and labor market research. The purpose of the literature study was to identify the dimensions which drive the big data technologies in financial management. The labor market study was conducted to analyze the current core skills for finance managers influenced by big data. The common skills model with main perspectives of big data impact and core skills related was created.

Keywords: Financial Management, Big Data, Skill Model, Labor Market

Introduction

"In the past years, big data in finance has led to significant technological innovations that have enabled convenient, personalized, and secure solutions for the industry" (Talend 2020). As a result, big data (BD) analytics has managed to transform not only individual enterprises but also the entire financial services sector (Talend 2020). It also contributes to the sustainable development goals (Alvarez 2019).

Data volumes from unstructured and structured sources have been growing exponentially in recent years. Large complex data create business value for organizations, especially in finance domain, although almost all the industries are under the impact of big data.

The traditional analytical tools are not yet such efficient as big data technologies. Big data is based on advanced technologies and fast algorithms. Big data technologies help to complete the predictable tasks. Therefore, the finance managers will have more time to focus on complex, higher-risk, strategic work, instead of making routine operations. This will result in a link to the new skills of data management and IT technology skills and will bring new challenges to the labor market (CPA 2019).

According to Deloitte company "firms in the financial sector are under coming pressure to exploit big data to enhance service differentiation, reduce risks and improve performance" (Deloitte 2012).

Moreover, big data combined with Analytics 3.0, creates a substantial value by offering new business models which could help in better understanding of financial market needs (Ke, Shi 2014). Through processing transactional data and mining financial information using big data and

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Analytics 3.0 algorithms, the enterprise could improve the financial management, lower cost of capital, and generate the gross profit (Ke, Shi 2014).

The experts noticed that nowadays there is also a growing need for students to learn financial data analysis and reporting (Houser 2018). This drive the labor market's need to recruit the new generation of managers in sphere of finance. The universities should be prepared, offering education courses that meet market needs for new specialists.

The 2016 survey revealed that 59 percent of employers say data science and analytics skills will be necessary for accounting managers by 2020 (Forbes 2019). The number of companies deploying Big Data will double in the near future (Lawson et al. 2019). Big data, machine learning, AI, and the cloud computing are fueling the finance industry toward digitalization (Hasan et al 2020).

However, the current situation with COVID-19 has generated great uncertainty, that could have impact on finance labor market. The uncertainty powered by COVID-19 leads to fear and extreme volatility in financial markets (Chang et al. 2020).

Moreover, COVID-19 has not only caused uncertainty and volatility across global financial markets and economies but has also disrupted the college experience for many and has impact on the job market for finance students (FMA 2020). European Commission estimates that the most vulnerable segments of the working population will be impacted, such as low-wage workers, women, and young professionals (European Commission 2020).

The labor market impact of COVID-19 related confinement measures is expected to be higher in some Southern European Member States and Ireland. These are the countries in which the share of sectors forcefully closed are higher (European Commission 2020). The countries which noticed the high impact of COVID (contracts loosed) are Greece, Bulgaria, Romania, Spain, Slovenia, Ireland, Italy.

Despite of uncertain situation the enterprises still looking for experienced finance managers. The main directions of the finance manager profession's transformation are related to cloud computing, sustainability, big data, artificial intelligence, and cognitive analytics.

The main contributions of this paper are the research using the hybrid approach based on the literature study and the labor market research to check the impact of big data technologies on financial management. As the result the model of perspectives of big data impact on financial management with skills related was created. The literature study was focused on scientific papers and non-scientific literature sources, such as market reports and experts' opinions. Therefore, the results of the present study could have meaningful practical implications.

The paper is structured as follows. First, a literature study is provided, outlining the issues raised by the research on the dimensions of the impact of big data technologies on financial management. This is followed by a survey conducted on selected labor markets and the discussion of the results of that survey. Finally, conclusions and future perspectives are described. The complete research framework is shown in Figure 1.

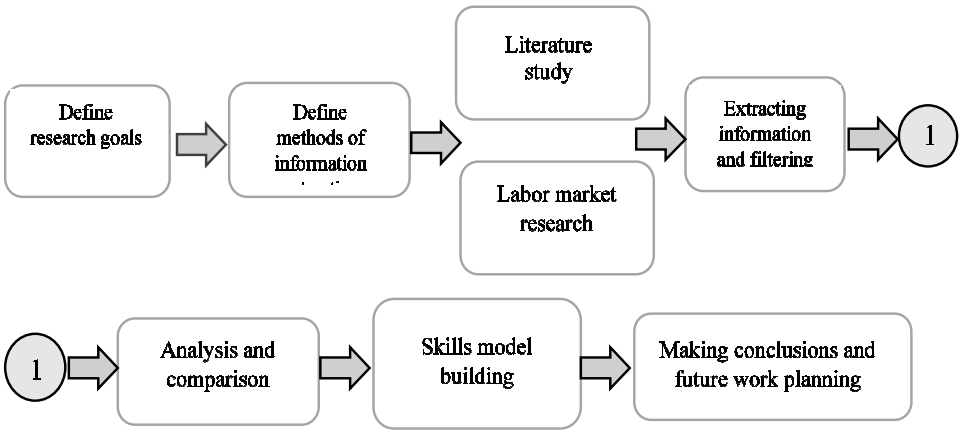

Fig. 1 : The research framework

Literature study

Big data has not only influenced many fields of science and society, but has had an important impact on the finance industry (Begenau et al. 2018, Choi, Lambert 2017, Schiff, Cafferey 2017, Shen, Chen 2018, Sun et al. 201913, Hasan et al. 2020, Pilipczuk et al. 2019).

Many papers describe the impact of big data on financial management. The paper of Ke and Shi (2014) makes an analysis about the changes "that big data brings to accounting data processing, comprehensive budget management, and management accounting through affecting the idea, function, mode, and method of financial management" (Ke, Shi, 2014). The authors of the paper "Big Data: Implications for Financial Managers" take a close look at what big data means for financial managers (Fanning, Grant 2013). The paper of Sophie Cockcroft examines the literature on "potential research opportunities for the use of big data in the cross disciplinary space of information systems, accounting and finance area and identify the current research approaches" (Cockroft 2016). In paper of Sun, Shi and Zhang (2019) authors states that "finance big data is becoming one of the most promising areas of management and governance in the financial sector. It is significantly changing business models in financial companies" (Sun et al. 2019). The paper of Yang et al. (2017) explore the current landscape of big data in financial services. The authors propose a framework, which facilitate the way how big data influence on finance (Yang et al. 2017).

The preliminary literature analysis revealed that big data could be concerned from several perspectives (Weinberg et al. 2013). It is caused by different definitions of big data what could be found in the literature, as well by different opinions as among practitioners.

The paper of Demchenco et al. (2014) contributes to the emerging big data research by analyzing current definitions of big data from different perspectives, suggesting enhancement to the terminology as well as describe new research opportunities (Demchenko et al., 2014). The authors point out the importance of delivering the results to consumers (Demchenko et al., 2014; Baro et al., 2015).

In work of Ekbia et al. (2015) several definitions with different perspectives available in literature, namely the product-oriented perspective, the process-oriented perspective, the cognition-oriented perspective and the social movement perspective are presented (Ekbia et al. 2015).

The further literature review was based on works described the definition of big data and related conceptions which were grouped according to appropriate perspectives (Chang 2018).

As the result, the following eight perspectives were created:

Value Perspective

The analysis made by authors in work (Ylijoki, Porras 2016) shows that the evolution of the definition started with data to infrastructure topics and followed by the business value of data.

Becker and others (2016) provide the following definition: ”Big Data technologies are a new generation of technologies and architectures designed to extract value economically from very large volumes of a wide variety of data by enabling high-velocity capture, discovery, and/or analysis” IDC (Becker et al, 2016).

The Capgemini company argues that success of big data projects lies in realizing business value (Capgemini 2016). On the other hand, in work OECD (2015) authors argue that creating value from big data relies on supporting decisions with new knowledge generated from data analysis (OECD 2015).

The study of Olszak and Zurada (2020) investigates an issue of big data and elements shaping big data based on business value creation (Olszak, Zurada 2020).

“Value creation from big data occurs through the process of data management, where managers are able to democratize, contextualize, experiment and execute data insights in a timely manner” (Zeng, Glaister 2018).

Process Perspective

The literature review made it possible to select several definitions connected with process perspective. According to Networked European Software and Services Initiative” Big Data is a term encompassing the use of techniques to capture, process, analyze and visualize potentially large datasets in a reasonable timeframe not accessible to standard IT technologies” (NESSI 2012). ”Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization” (Laney 2001). Big data is also ”growing technological ability to capture, aggregate, and process an ever-greater volume, velocity, and variety of data” (Podesta et al., 2014).

In work by Sakr et al. (2018) the situation when massive amounts of event data generated as business processes are executed and stored in transaction logs, databases, e-mail correspondences, social media is described (Sakr et al. 2018). The business process analysis and big data connection can play an effective role in improving the efficiency and the quality of various data-intensive business operations using a wide spectrum of emerging big data systems (Sakr et al. 2018). Big data analytics can help in business processes management by providing actionable data to all stakeholders throughout the policy lifecycle (Van Grondelle 2013).

Similarly, the purpose of the Fosso Wamba and Mishra's paper (2017) was to improve the understanding of the integration of business process management, business process re-engineering and business process innovation with big data.

The purpose of the Battisti et al. (2019) paper was to improve understanding of the integration between big data and risk management in business processes, with special reference to corporate real estate.

Moreover, in 2017 the framework for business process data management based on big data approach was created (Sonia 2017).

Cognitive Perspective

Appel, Candello and Gandour (2017) from IBM Research state that "the era of big data is the bases for innovative cognitive solutions that cannot rely on traditional systems" (Appel et al. 2017). Likewise, Hurwitz and Bowles (2015) highlight that emerging solutions for cognitive computing must gather huge amounts of data about a specific topic, interact with subject matter experts, and learn the context and language of that subject (Hurwitz et al. 2015). They also emphasize the significance of this technologies in high-risk situations. Moreover, the authors underline the importance of ability to predict outcomes with the high degree of accuracy in abovementioned situations, especially the automated trading algorithms for stock market (Hurwitz et al. 2015).

In work 'Cognitive Big Data. Introduction of Cognitive Big Data as concept and framework" authors proposed a 5-Trait Framework (Lugmayr et al. 2017). They also provide the definition for cognitive big data: "human understandable data supporting mental capabilities as socio-technical system, in the right application context, right granularity with knowledge and wisdom processing in the foreground" (Lugmayr et al. 2017).

In work of Han and Du (2018) the different aspects of interaction between big data and cognitive science are discussed (Han, Du 2018).

Several papers are focused on interrelations between AI and financial functions: analytics, accounting management, auditing, management, and more others (Garrido et al. 2010, Myers et al. 2007, Li, Vasarhelyi 2018, Greenman 2017, Lee 2016). Cognitive assistants are useful for business situations when users need information retrieval support from a large number of financial sources (Li and Vasarhelyi, 2018, Garrido et al., 2010; Myers et al., 2007).

Sustainability Perspective

In paper "Big data and open data as sustainability tools" authors describe the main aspects of connection between big data and sustainability (Vijay, Farkas 2018).

In work of Etzion and Aragon-Correa (2016) authors contend that "big data are naturally aligned with sustainability concerns (e.g. multidimensional nature, collective actions, smart allocation of resources, efficiency priority)". Additionally, they point out that "sustainability reporting will become increasingly data driven, employing a wider array of real time, data-rich entryways into exploring organizational sustainability performance" (Etzion, Aragon-Correa 2016).

Several works described the spectrum of issues of connection of big data and sustainability concepts also appears (Perez, Barreiro Quintans 2019, Serban 2017).

Data and Knowledge perspective

In literature several definitions related to data perspective are provided. According to Wang et al. (2016) ”Big Data exceed the reach of commonly used hardware environments and software tools to capture, manage, and process it within a tolerable elapsed time for its user population (Wang et al., 2016).” Another definition “data sets whose size is beyond the ability of typical database software tools to capture, store, manage and analyze” provide the McKinsey Global Institute (Manyika et al. 2011).

The paper of Sam Hijazi describes the attempts to combine knowledge management and big data fields together (Hijazi, 2017).

The study in work of Michael Kaufmann (2019) proposes a knowledge-based and value-oriented approach to big data management, focusing on knowledge processes and value chains when designing technical information systems for coping with big data (Kaufmann, 2019).

Change Perspective

The big data phenomenon involves the global changes in social sphere. The change perspective within the enterprise usually interrelated with management, particularly with change management.

Domański and Jędrzejczak (2015) argue that big data is changing not just the nature of the evidence, but also the ways in which it is presented, and the skills needed for its analysis and interpretation (Domański, Jędrzejczak 2015). From the other hand, Polese et al. in 2019 define the big data as “the potential to quantify and change various aspects of contemporary lift, to revolutionize the art of management” (Polese et al. 2019).

Change management is becoming increasingly data driven (Tushman et al. 2017). That brings new challenges for the enterprises. It also brings changes from analysis based on result to mining based on process (Ke, Shi 2014).

In addition to changes within organizations themselves, there are also implications for other stakeholders, such as education providers (Pugna et al. 2019).

Product Perspective

The product perspective the most extensive one. It interrelated with many other concepts such as process, sustainability, data, and knowledge perspective.

To integrate the business processes of an organization and more effectively manage and utilize volumes of data generated during product lifecycle need a more advanced analysis approach to develop a solution on a strategic level (NSF 2011). In more narrow context the big data could be defined as ”large, diverse, complex, longitudinal, and/or distributed data sets generated from instruments, sensors, internet transactions, emails, videos, click streams, and/or all other digital sources available today and in the future” (NSF 2011).

Quality Perspective

The literature analysis reveals connection of big data and quality management (Ge, Dohnal 2018). Several papers were concentrated on the big data quality (Ge, Dohnal 2018, Loshin 2020, TIP

2020). The paper of Ramasamy and Chowdbury (2020) discuss the main aspects of the big data quality and analyses the quality dimensions (Ramsamy, Chowdbury 2020).

All the changes related to abovementioned perspectives have influence on financial labor markets and the transformation of the finance managers profession.

Finance (financial) manager (FM) - a person responsible for the supervision and handling of the financial affairs of an organization (Collins Dictionary 2020).

Finance manager skills are those that help individuals in this role oversee all aspects of a company's financial transactions, including budget analysis and calculation of return on investment as well as purchasing and staffing decisions. Finance managers provide accurate data analysis and strategic propositions to create profit and reduce loss. A finance manager's skills are built from a wide array of roles and responsibilities (Indded 2020).

Finance managers skills are in continuous transformation. It involves the need to enlarge the skills models with new conceptions.

It has been found that the needed skills for next decade are (Wang and Wang 2016; Chua, 2013, Indeed 2020): value management, business process management, sustainable management, cognitive analytics, knowledge management; project management; change management skills; sustainability management, product management, IT skills.

Information technology (IT) skills requirements for finance managers are very extensive. They cover the following areas:

- Knowledge of data extraction tools in the mining of business intelligence.
- Use of tools that support data modelling and analysis.
- Knowledge of emerging payment platforms.
- Better working knowledge of connectivity and IT security.
- Knowledge on how IT applications integrate.

The next part of the paper focuses on checking the requirement on technical skills in selected labor markets.

Labor Market Research

The research was conducted in July – August 2020. The data were collected at the beginning of July, and after that the study was repeated two times. The empirical research was conducted according to the framework presented in Figure 1.

The selection of labor markets was made according to following criteria: differentiation in GDP level, IT development level, geographical position (different regions: two from American continent with high GDP level, one from EU, one outside the EU with high GDP, and one from region outside the EU with low level of GDP), population differentiation. The language factor also has had influence on selection. The 5 following countries were taken into consideration: the United States of America, Canada, Poland, the United Kingdom, and Ukraine.

At the beginning, the most popular job search websites were compared. The following selection criteria were used: 1) the largest number of current finance managers posts, 2) ability to provide “advanced search” with the finding options, which allowed to search for specific key words within the job posts’ textual content, 3) popularity in studied countries. Consequently, the “Indeed” job

search website, britishjobs.co.uk, pracuj.pl, rabota.ua were chosen. The study was associated with following indeed job group category: Finance & Accounting > Finance Management Occupations > Finance Managers & Directors.

The website searching engines were used to filter the job positions. The following key words were studied: “finance manager”, “finance director”, “big data”, “sustainability”, “sustainable”, “cognitive”, “cognition”, “business process”, “business process management”, “ value management”, “product management”, “value management”, “IT management”, “data management”, “knowledge management”, “change management”, “quality management”, “project management”, “customer management” etc.

The total number of jobs offers for finance manager profession and the number of offers finance managers (FM) with big data skills requirements were calculated during the July-August period. After removing the duplicate job posts, and that obviously did not meet the eligibility criteria the extracted job posts were analyzed. After that, the average number of offers for the research period was calculated and the share of the job offers related to perspectives studied. Table 1 presents the results of these calculations.

Table 1: The number of jobs offers for finance managers and core big data perspectives share.

Perspective/Country	USA	Canada	UK	Poland	Ukraine
The average number of job offers	11524,67	2709	3808	756	657
Big data	22%	2,2%	1%	2,7%	0,5%
Sustainability	10%	6,1%	15,6%	3,8%	0%
Cognition	8%	1,5%	0,4%	0%	0%
BPM	17,7%	5,2%	26%	2,9%	2,7%
Value management	3,2%	0,3%	11%	0%	0%
Knowledge and Data management	5%	5%	5,5%	1,3%	2,7%
Change management	22%	8,7%	9,1%	2%	0,5%

The research reveals differences in big data skills demand among the studied countries (fig. 2). The highest impact of big data on finance managers positions was noticed in USA labor market. 22% of analyzed job posts here contain the big data experience requirements. The demand on big data skills in rest of the countries vary from 0,5 to 2%. The number of offers with big data skills requirements for finance managers was at the comparatively similar level in Poland and Ukraine.

Fig. 2 : The total number of jobs offers for finance managers and the number of jobs offers with BD skills requirement.

The graphical interpretations of size of the demand on skills related to big data (Table 1) in different counties are presented on Fig. 3-7. The less significant dimensions were product and quality perspective. These skills were required more for positions related to financial operations in production management.

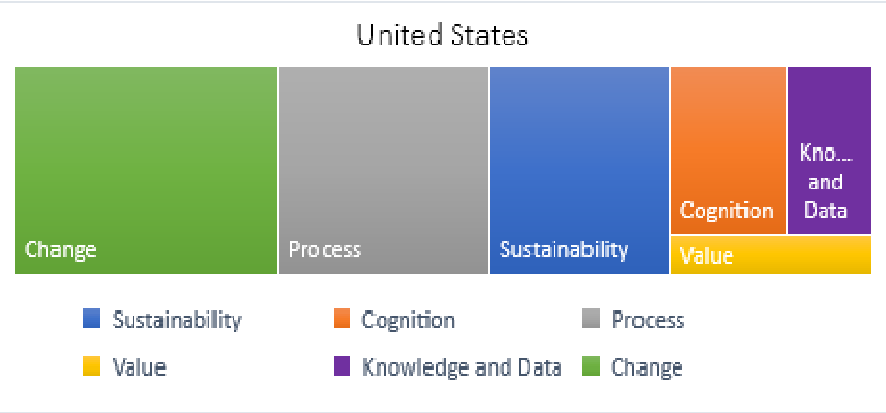

Fig.3 : The tree map of demand on FM skills related to BD impact dimensions in United States

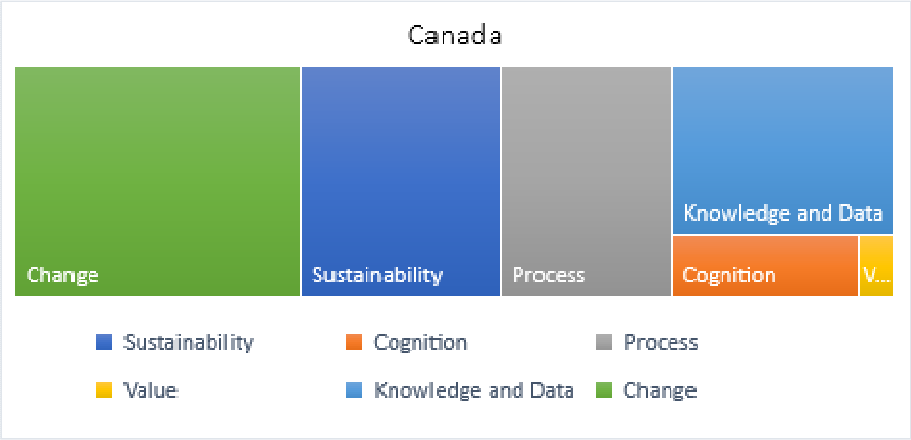

Fig.4: The tree map of demand on FM skills related to BD impact dimensions in Canada

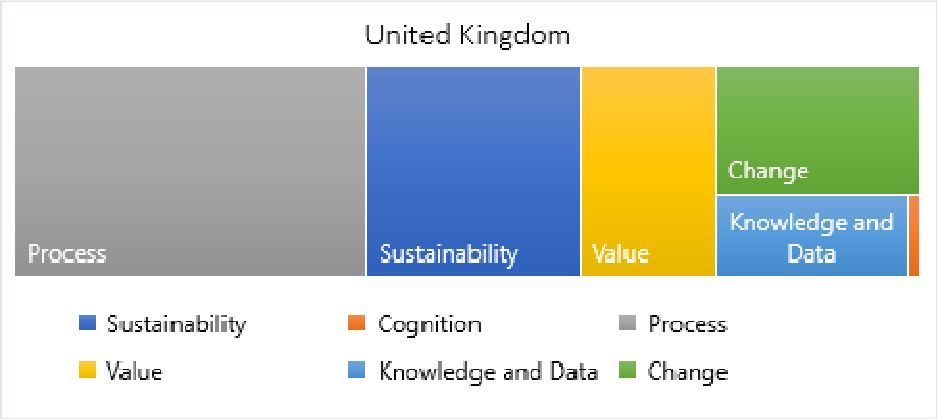

Fig.5: The tree map of demand on FM skills related to BD impact dimensions in United Kingdom

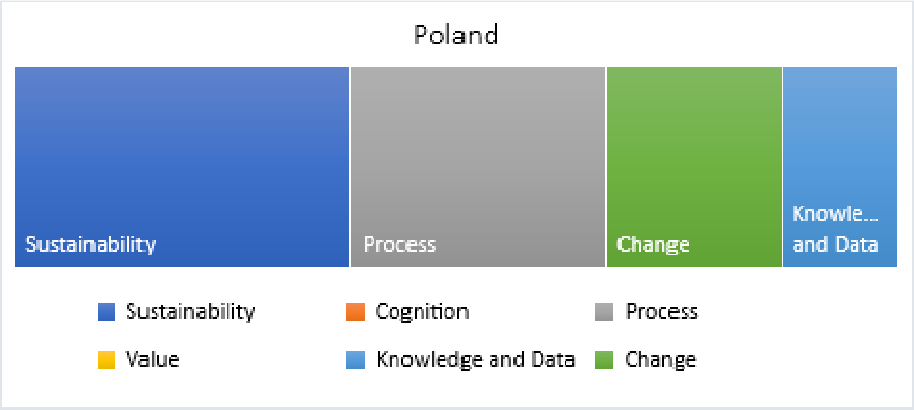

Fig.6 : The tree map of demand on FM skills related to BD impact dimensions in Poland

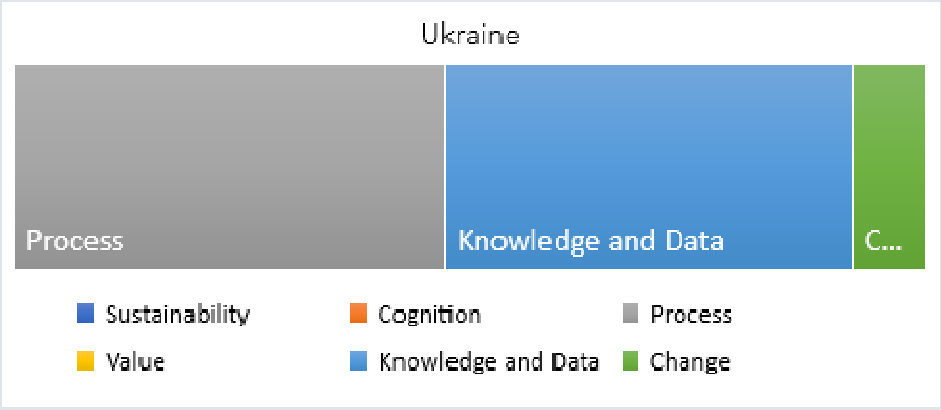

Fig. 7: The tree map of demand on FM skills related to BD impact dimensions in Ukraine

Moreover, the analysis of IT skills requirements reveals that IT experience was related mostly to following tools: ERP systems (for example SAP software, MS Dynamics and Navision, Oracle software, Sage software, QuickBooks); analytic platforms (for example Cognos, Tableau) and MS Excel calculations.

Likewise, successful finance managers are adept at several of the following social and behavioral skills: leadership, problem solving, communication, analysis, interpersonal skills, attention to detail, organization, ability to work independently, cognitive abilities (indeed.com 2020).

Results and Discussion

The analysis of the big data impact shows that sustainability management, business process management, change management, data and knowledge management and value management are currently the most required dimensions in analyzed countries.

The labor market research reveals that financial managers core skills related to perspectives currently needed in labor market are:

- Forecasting, planning, maintain financial models, budgeting and accurate reporting required mathematical and statistical skills.
- Data and Knowledge Management skills.
- Business Processes Management.
- Change management.
- Quality management.
- IT knowledge.
- Supply chain management.
- Project management.
- Product management.
- Value management.
- Sustainability management
- Customer relationship management (CRM).
- Cognitive analytics.

Finally, the perspectives were grouped in pairs and connected with the core skills (Fig. 8). The figure 8 presents the details of this connection.

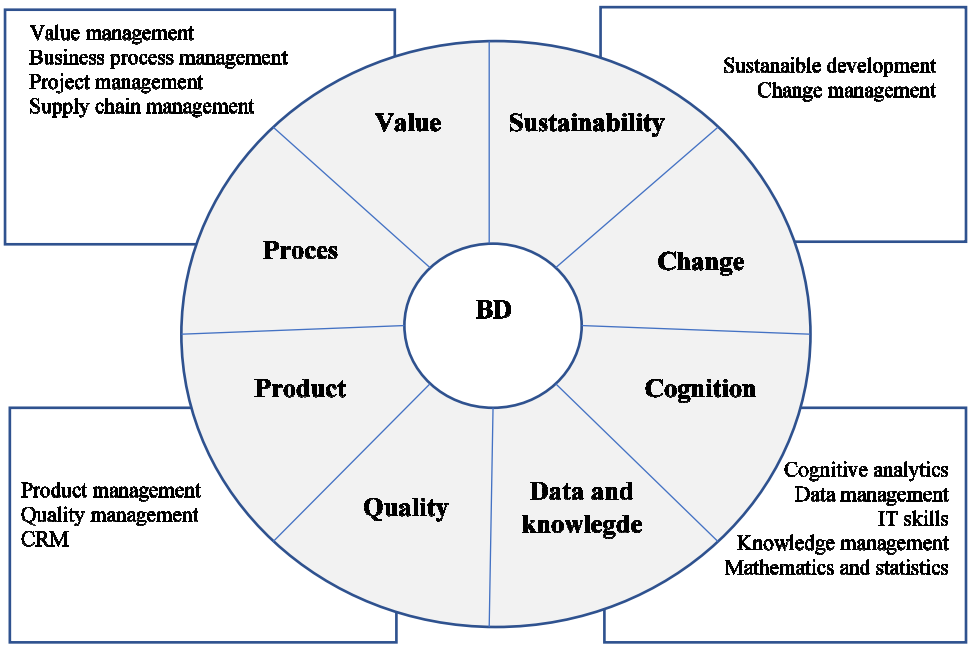

Fig. 8 : The model of big data (BD) impact on finance managers skills - perspectives and skills related

The research has several limitations. First, the study was based on the jobs offers which usually contain the unprecise formulations of skills and job posts. It was necessary to remove the

duplicates and fuzzy wording. Furthermore, many offers contain requirements related to the several perspectives. Product perspective was often associated by searching engine with the product managers job posts rather than finance manager posts, so it was hard to define the "borderline". The quality perspective also was associated with production management, so it has the less significant impact on finance managers competencies.

Conclusions

Today big data technologies have a significant impact on financial management. This impact increases the meaning of sustainable development and cognitive analytics for financial managers as well as several other modern conceptions.

The developed model underlines the core drive streams influenced the finance managers profession. The further research will be based on enlarging this model with social, behavioral, and cognitive skills.

There is a wide range of practical applications for the developed holistic model. First, it can serve as the basis for developing a finance manager competency models in enterprises. In addition, the model can be used in universities as a starting point for the development of up-to-date curricula and training courses.

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Development of Business Platform Technology for Further Education in Modern University in the Tourism and Economic Forum Context

Anastasiya KOPYTOVA
Tomsk State Pedagogical University, Tomsk, Russia
kopitovaai_21@mail.ru

Olga LOYKO
Tomsk Polytechnic University, Tomsk State Pedagogical University, Tomsk, Russia,
olgaloyko@tpu.ru

Valerii SIZOV
Tomsk State Pedagogical University, Tomsk, Russia
v4.sizov@yandex.ru

Olga SANFIROVA
Tomsk State Pedagogical University, Tomsk, Russia
sanfolga@yandex.ru

Oksana NESTEROVA
Tomsk State Pedagogical University, Tomsk, Russia
pavelberiy@yandex.ru

Abstract

The article considers the theoretical and methodological tools for the development of the business platform technology design for further education in a modern university in the context of the tourism and economic forum, which objective is to form the project skills of innovative brand project products, improving the skills of communicative interaction in an unconventional, artificially created market realities. The forum is defined as one of the educational technologies for the implementation of topic-centered interaction between educational entities in the format of a tourism and economic profile. The main components of the forum such as mission, main task, opportunity are described in the topic. The situation analysis is carried out, the project is presented, its main structural and thematic sections are indicated, and the technology for its implementation is described in detail. The main training profiles can be regional and international. Related types of educational tourism can be carried out within each module: linguistic, sports, communicational, business-oriented. The final part of the article contains the main business platform problem field, which includes the use of the following factors: cultural, psychological, and pedagogical. The article describes the forum thematic module in detail: "Market participants' brand communicative cooperation skills construction". There are other modules topics, which can be the basis for any project content for the forum. Article presents the results of the forum elements approbation.

Keywords: Educational Process, Commercial Education, Development of Business Platform Technology, Forum Building Technologies, Forum Content.

Introduction

The development of project business platform technology for further education in a modern university in the context of the tourism and economic forum is rather new direction, which is evoked by the crisis in the interaction between science and practice (Ndou, Mele, Vecchio, 2019). Today it is proposed for consideration by many authors, in various scientific areas, for example, as an "inductive empirical generalization scheme in the context of intersubject communication" (Pugacheva, 2014;

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Sizov, Irkutskaia, 2014; Yamaguchi, 2020). In this case, the intersubject communication is mainly emphasized.

The development of project business platform technology allows not only engaging in the above aspect, but also restoring the disturbed balance of the scientific and practical approach in the announced profile formation. This direction is also updated by the methodological contradiction: young generation is ready and wants to receive new knowledge in their free time from studies, participate in projects of interest to them, and choose eventful forms of leisure. On the other hand, there is no such practice in higher educational systems. Therefore, the relevance of creating business platforms is obvious today. Tourism and economic regional projects of any profile are extremely popular at all units' administrational layer of the university. Developed as part of a business platform, student's projects may be products of international exchange. Experience has proven that Chinas, Mongolias, Koreas surrounding countries are interested in joint project activities. The most popular international technology in this format is the “forum”. In the system of this direction, it is very possible to carry out educational constant content, using interactive international exchange in the school-university system. In this case, it is advisable to take into account the importance of interdisciplinary approaches of any profile, which determine competitiveness and complexity (Chervonnii, A. A. Vlasova, T. V. Shvaleva, E. I. Tsvenger, 2013, P 14).

For example, a successful combination of interchanged specialties, such as economics, law, geography, tourism that function at the Faculty of Economics and Management can be an excellent basic start to the development of an entire educational movement, a new relevant direction - the organization of project activities in the forums' context. It is such a scientific combination that allows the faculty acting as a moderator for any scientific profile, because the education's goals today are to prepare the education's subjects to create a cost-effective business product of any configuration. Such experience already exists in the Russian Federation, for example, the Seliger All-Russian Youth Forum which is an active discussion platform in the system of recreation, science, education and leisure. These areas pose serious competence tasks both for the organizing teachers and students participating in the forums (Artemenko, 2013, P 14). Teachers need to take into account market requirements and introduce into additional education system the formation of precisely this knowledge, skills and abilities of students.

In the situation of fierce competition and information oversaturation, a broad specialist who can manage information resources, create new innovative projects on the basis of interdisciplinary research, be able to interact in a team, be flexible and adaptive to changing realities, have strategic vision and adequately evaluate the current situation is required (Artemenko, 2013, P 9-14; The future of education). All this skills set can be successfully developed in the declared activity.

In the context of fast-evolving socio-cultural dynamic it is impossible to base only on economic aspects while business products development and implementation. Economics more than any other science tends to behavioral domain. Modern marketplace had long ago drifted away from accustomed economic indicators. It increasingly includes in social and psychological dimensions, where emotions became a product. To develop and implement this aspect the wider range of different knowledge of sciences are needed. In this case the issue of the forum's technological development arises. This development based, first of all, on the dominant of cultural personality values and its interaction with important economic indicators. In this connection forum's theoretical, methodical, technical objectives would be:

1. To master fundamental psychological, cultural, philosophical concepts and the ability to apply them in economic practice, in connection with its transition into an emotional, behavioral field. The basic concept for the entire model is the logical triad: activity, behavior, perception.

2. To form the axiological foundations of economic education as a basic category of behavioral economics. It is solved basing on the studies of the major philosophers, culturologists, artists, writers, theologians, etc., who have works on economic topics, by analyzing the economic material from a cultural point of view, using the basic concepts of the forum model. At this stage, it is important that

students master the basics of reflexive analysis, can critically assess the targets, value attitudes, tools and methodological arsenal necessary for behavioral economics.

Now as the relevance and the main research questions have been posed we can dwell on the definitions of the article.

In this case, "forum" will be the main definition. The encyclopedic meaning of the “forum” has Latin origin (lat. Forum). In ancient Rome, it is a square, a market that has become the center of political life, while the modern, adapted definition has the meaning of a mass representative assembly, congress. For example, the World Youth Forum (Big Encyclopedic Dictionary).

In our case, the forum is an educational technology for the implementation of a theme-centered interaction between educational entities in tourism and economic profile's format with a selected market segment in a system of constant interdisciplinary approach using non-standard conditions. The tourist profile allows implementing the forum as an educational product in the context of educational tourism.

The main components of the “forum” concept: mission, main task, technology, goal, place, content.

1. ***The mission of the forum*** in educational tourism context is the creation of a business platform where any young person and team can demonstrate their talent, enrich human capital, find like-minded people, get professional training on issues of interest, build a system of business relations, relax, etc.

2. ***The main objective of the forum*** within the business platform framework is to provide further education for the participants' projects presentation and international targeted exchange. it is the opportunity to show your project, your program or idea to all interested structures. This is a direct access to investments, grants, funds of the largest private companies and state corporations, to state programs; obtaining new knowledge, skills in an interactive interaction system. Ensuring a high level of quality in terms of the educational programs tension should be comparable, at least, with a semester training course on the theme.

3. ***General technology of holding a forum*** within a business platform: the main macro component is a forum which context made micro-components to be possible: information lectures, quests, quiz, master classes, brainstorming, interactive project “case studies”.

4. ***The objectives of the forum*** business platform are:

- To form an interest to research activities.
- General and specific knowledge consolidation and deepening in the declared area.
- To form the design skills, their use in tourism and economic multidisciplinary research.
- Creation of scientific ideas about the forms and structures of the cultural, religious and spatial organization of society.
- Formation of skills to use the historical and cultural approaches in solving economic and tourist profile's theoretical problems.
- Practical skills formation.

5. ***The venue of the forum program*** is the university, its assets.

6. ***The forum program's place in the educational modules' system***. Students can consider the forum's thematic format in many disciplines of the economic and advertising module, and can also take it as an independent section of the variable part of the disciplines.

Materials and Methods

Let us give an example of a possible educational tourism and economic forum, which, with a basic concepts' detailed study, can be included in the work of the university.

***Topic**:* "Formation of brand communicative interaction skills among market participants."

Objectives: Development of brand communication skills created by innovative, joint service projects, PR - promotion of branded tourism products; introducing innovative technologies for creating territories' tourist brands and tourism products' brands.

Tasks:

Training the skills of a business approach to innovative products and services (teams, workshops, laboratories, etc.),
Introducing the cultural and ethnic diversity of the Russian Federation,
Establishment of cultural relevance presented in brands.

Program content

Program summary

The program includes theoretical and practical blocks, reveals the modern brands component value, contains experimental creative tasks.

Content component

"Value as the main component of brand communication." A small information block is being hold:

- "Values in modern society."
- "Socio and cultural systems on the political map of the world."
- "The concept, essence and tasks of branding".
- "Reasons for branding".
- "Economic product-history". Later teams are invited to find certain correspondences in the author's model of the societies' subjects value hierarchy, presented in the form of a figure. Then they are given a set of cards illustrating the value preferences in the tourism and economic sphere of the market interaction's subjects. It is necessary to find correspondence between the level of values and the tourist product-service. Based on the selected criteria, it is supposed to develop in teams an assessment of the existing personality types as the main subjects of society, to determine the level of their preferences in choosing tourist products and services on the value model basis.
- "Global brands assessment." The team should give an expert assessment of the world's leading brands in value criteria terms studied in the previous assignment.
- "Symbols and meanings of culture as the main value components in creating a brand." Work with existing world cultural symbols, search for their correspondence to modern market brands. In this section it is necessary to understand the brands' language, to decipher the information of the proposed brands, to evaluate the professionalism of creating such brands.

Practice-oriented block

Staging as the main technological element of branding. Design types:

- staging through the word;
- staging through visualization.
- staging through action.

All staging types are some way or another involved in this module:
- Work with the world philosophers' sayings on this issue.
- Solving problems associated with changes in brand attractiveness in connection with changes in social values, social events, market conditions, etc.
- Staging the fairy tale “How a man sold a cow” (staging is a show-off based on drawing the main actions of the tale through recognizable characters in society. Fulfillment technology: each team is given extract, the other team guesses it, then the storyline is built fairy tales by drawings. Winners are evaluated according to developed criteria, such as: accuracy of the storyline, speed, symbolism, originality).

- Drawing of paroemia.

- Capture the brand market. Creating a planned situation. At the beginning, the market situation in a particular product segment is declared, then tasks for capturing the market are offered. Products for sale on the market are selected.

- Presentation of your brand.

Theoretical sections may include:

1. Monitoring the target audience, competitors and market conditions. The current state of the existing brand in the market is assessed.
2. Formation of the idea, development strategy and staging and brand positioning conception.
3. The value tools use discussed above. Promotion of brand values, not products.
4. Creation of brand elements: brand name (naming), legend, slogan, logo type, brand book, guide book, label design and packaging.
5. Definition of promotion's tools and methods, the choice of interaction with the target audience methods.
6. Monitoring the state of the brand, evaluating the effectiveness of its development, corrective measures creating.

The time of the forum can vary from a week to two, depending on many factors: the degree of employment, organizational issues, etc.

Due to the requirements to the article wordage, we were able to provide only a brief summary of one forum example. In this regard, the remaining thematic forums will be presented only in the title.

1. Emotional intelligence, psychological maze.
2. The motivation for building a value pyramid.
3. Team work forms. Formation of a systematic approach to the development of own team. The principles of creating an "anti-fragile" team and key processes of its activities. Command Options. Work with patterns.
4. Change management.
5. Product technologies: building a pyramidal system of goods' consumption by various types of people.
6. Development of business thinking: flexibility and adaptability, a systematic approach, customer focus. The solution of situational economic problems.
7. Technologies for creating service products.
8. Digital city, the design of the digital city. My place is in the digital city. My business is in a digital system. My society in a digital city. Digitalization - myth or reality, ways of survival. Basic information and communication technologies and Digital tools.
9. The concept and essence of interactive innovative business technologies for travel catering.
10. Interactivity as a psychological category.
11. Modern interactive techniques.

12. The concept of innovation and tradition in building a business.
13. Tourist services ethics and culture. Sorts and types of interactive business technologies. Interactive innovative business technology for tourism services. The philosophical aspect. Social and cultural problems of interactive business technologies.
14. Symbols and meanings embedded in the objects of the world heritage presentation and retelling.
15. Values in social and cultural systems as the basis of modern interactive business-related projects.
16. Prerequisites for the development of an innovative business environment in the tourism sector.
17. Management of interactive innovative business technologies typical variety.

Given the continuity of education, which was announced above, we turn to the thematic sections for kids.

1. Economics for kids. Analyze emotions and types of people, work on their preferences' recognition, both business and security skills.

2. Game "The adviser" - "What will we advise to people from the picture to buy on the market considering their gender, age, nationality, religion, values)?".

3. Game "The store". Testing concepts: how much does it cost, what kind of products and goods are there in the store. Work with banknotes, search for genuine one. Playing "The store" we train memory and attention. The buyer points to the goods, and the seller must give it without asking again.

4. Home, nature, man. The interaction of the three systems, a game quest. A game of association.

5. The game "Agent 007": the development of multifunctional tasks aimed at developing skills such as prioritization, a short way to complete tasks, and another way to complete the order of tasks.

Formation of the value-semantic foundations is based on the stages, factors and criteria presented in Table 1. The main problem field of a business platform is identified when using cultural, psychological, and pedagogical factors.

Table 1: Model of value-semantic foundations formation on the forum

Stages of the value-semantic foundations formation			
First stage. Theoretical	Second stage. Theoretical-experimental	Third stage. Practical	Fourth stage. Monitoring
Understanding the peculiarities of countries' and regions' development; identification of the role of economic and geographic, cultural, religious, psychological factors. Search for the system-building idea that can only rely on value attitudes of respect for national individuality	Teaching the core of cultural analysis of countries and regions, their in-house urban space	Formation of a sustainable value-semantic attitude in an understanding of the man and the world unity. The person acquires new operational means to realize his relationship to the world.	Study the abilities of a holistic characteristic of any economic object or phenomenon with the involvement of all previously acquired knowledge.

Factors	
Psychological	Expressed in the evaluation of informational orderliness on personal experience and the proposed information basis.
Cultural	Expressed on the basis of ideas about the social and cultural tradition associated with the use of one or another element in this context. In more detail, this factor is reflected in the knowledge of national-specific realities features considering the forum's international format.
Pedagogical	Expressed in the search for the most effective pedagogical tools. The use of the classic practices of the “Pedagogical Management” considering the possible levels of training, mood, self-confidence of the subjects of training while this material perception.
Criteria	
Scientific and educational	Search for ways to solve economic problems using a systematic various sciences data analysis. The main objective of this block is to understand the development patterns of the value component of objects, social systems and the person himself, as a key figure capable of performing a cognitive function.
Emotionally-resilient	Includes the education of emotional and associative thinking. Emotional perception of the surrounding world is an integral part of the existing dynamic "human" system balance.
Transformative through the action	Includes not only active, but also distinct knowledge, understanding and confidence in the value of cultures and geo-subjects.

The forum program effectiveness is assessed on the basis of systematizing the data from written questionnaires and verbal surveys among forum participants, building a systematic observation of each forum participant, according to the following indicators: knowledge of basic economic laws, orientation in the geopolitical and value-semantic world space, analysis of personal value and the semantic field of the forum participants, etc. These aspects are carried out through pedagogical guidance based on coaching and nudging (soft, guiding influence), which constitute pedagogical tools.

Results and Discussion

Preparations for the international forum is in prolonged nature, fragments of the forum have been implemented by the teachers of TSPU since 2016. There were held weekly events: ecological marathon "Die Naturwelle" with economic aspects for pupils of Tomsk gymnasium № 6 (2017), excursion "Little Motherland: Northern Way" for students of the "Boarding School for Students with Hearing Disabilities" within the framework of inclusive education, for school № 51, and also Japanese and Chinese students (2018), financial training "Soft and Hard-skills in financial literacy" for domestic and foreign students of economic and non-economic specialties of TPU, TSPU, TUSUR, pupils of Tomsk lyceum № 51 (2019), regional competition on financial literacy in TSPU for pupils of Tomsk and the Tomsk region (2019), quest "I am in the financial world" for students of

TSPU (2020), economic and pedagogical online forum on the topic "Audit in education" with the preschool practicing specialists involvement, school and additional education (2020) and others. The total number of participants is 100 people. To assess the event effectiveness the forum participants were interviewed before and after the event implementation on the basis of verbal and written questionnaires. Thus, the declared base demonstrates a fragmentary study of all forum aspects: cross-cultural, pedagogical, psychological, economic.

During the forums' idea implementation, it was found that one or another picture of the world prevails among the participants:

1. Contemplative and domestic picture of the world. It corresponds to the subjective human perception. There is an obvious cultural limitation of the subjects in it, which affects the entire creative process of life.

2. The formal picture of the world is used by the natural sciences. This picture of the world presents our world not from a subjective point of view, but in the form of descriptive models. The study revealed that these students can easily create layouts of economic products, draw brand elements on a specific topic, but in this case, there is a big problem with the internal ideological content.

3. Value-semantic, reflecting the sum of knowledge and ideas that connect, first of all, to the issues of origin, meaning and purpose of our world. In terms of behavioral economics, this aspect is the most important, and as the experience has shown, it is the most effective.

The picture of the world leaves its imprint both on its further economic behavior and on the creative component of this behavior associated with the economically efficient product development.

Analysis of the survey conducted before the implementation of the forum program showed that the participants did not understand the significance and importance of the cultural, psychological, philosophical component in the economy (Table 1 and Table 2). All attention was paid to assessing the economic efficiency of one or another process or phenomenon, perceiving them exclusively as economic objects.

There is opposite picture after the forum's implementation in the survey: it was confirmed that the participants realized the importance and significance of this approach to the economy, showed great interest in the proposed activities (Table 2).

Table 2: The results of the survey on the formation of a picture of the world among the forum participants

Title of the picture of the world	The prevalence of the picture of the world among the forum participants, %	
	before the forum	after the forum
Contemplative and domestic -50%	50	27
Formal picture of the world -29%	29	29
Value-semantic - -21%	21	21

The conductions of forums allowed forming new values among the participants and setting priorities (Table 3). The survey results led to the conclusion that the participants realized the importance of the above aspects in behavioral economics, understood their practical application.

Table 3: Values formation among forum participants

Title of the picture of the world	Formation of values among forum participants, %	
	before the forum	after the forum
Material values	32	11
People around	24	14
Nature	4	7
Government	13	14
Morality	7	22
Science and art	4	32

The results of the student survey system helped to clarify some gaps in the formation of value attitudes in the teaching economic disciplines cycle:

1. Weak capacity to integrate acquired knowledge into various subjects (75%).
2. Lack of knowledge about the value components that have developed in different cultures (90%).
3. Negative attitude to their native country, ignorance of its "comparative advantage" over other countries, and, accordingly, a complete lack of citizenship (50%).
4. There are no general concepts in economics, lack of information about modern technologies of many production processes (40%).
5. Little understanding of their future profession, lack of systematized knowledge about its prospects at the present stage, its connection with real life (70%).

Evaluation of psychological, cultural and pedagogical factors formation revealed a good tendency in the educational orientation of the forums (Table 4 and Table 5). The survey expanded the understanding of the digital series, it was found that the participants paid the great attention to the emotional component, which was embedded in the first psychological series, and also showed interest in cultural values, sought to expand their ideas on them (the second range - cultural). But most importantly, the participants reconsidered the modern economic knowledge, realized the importance of transcendental interaction in this knowledge, saw their undeniable capabilities and their comparative advantage in developing their own business products, thereby increasing their economic activity. Individual participants were ready to create their own forum.

Table 4: Psychological and cultural factors formation

Title of the picture of the world	**Formation of factors among forum participants, %**	
	before the forum	**after the forum**
Psychological	35	65
Cultural	30	70

Table 5: Formation of the pedagogical factor among the forum participants

Index	Forum participants self-assessment, %	
	before the forum	after the forum
Ready and configured	50	90
Ready and confident	12	90
Don't ready and configured	7	9
Don't ready and confident	47	15

These indicators were supported by a conversation, during which conclusions were formed, supported by an analysis of the self-assessment of the participants in the forum of the pedagogical factor (Table 5). Before the beginning of the events, the indicator of general readiness and interest showed that participants were interested and actively motivated to participate; after the event, this indicator was increased, which indicates the expressed interest in the event and the desire for further cooperation. The Confidence and Readiness Indicator, which demonstrates attitudes towards the innovative nature of the event, showed typical results: uncertainty among participants before the forum. The indicator of motivation (not ready and not configured was not high, both before and after the event. As we found out, it could change depending on the professionalism of the forum organizers. The fourth indicator, reflecting the participants' willingness to act independently, turned out to be a floating indicator and was in direct proportion to the professionalism of the organizers.

In general, the forum participants, regardless of the age and gender structure, are positively disposed towards the continuation of scientific and educational economic activities in various inter-subject areas.

Conclusion

The task of the business platform is to create the new knowledge through the project activities of the interaction subjects. A new pedagogical communication system in the social and cultural services and tourism field should become the final components of the forms, methods and technologies of the business platform's project activities. This system involves the knowledge and management skills development, on the one hand, in a paradox of information saturation, and on the other - in a paradox of uncertainty, which involves in processing a large amount of information and understanding its purpose for making a decision. Future specialists training for scientific, innovative, market-oriented activities in any field is substantially the basic final component. (Konstantinov, Filonovich, 2005).

Thus, during research process the authors worked out the concept of a forum as a social and cultural, innovative, pedagogical phenomenon, the approved forum technology was developed and presented in detail, examples of new topics for further development in the system of lifelong education was provided, the data of testing the forum technology was analyzed. It can be concluded that certain elements of the forum have been implemented in practice. The business platform technology model described and proposed by the authors was maximally implemented in the "Die Naturwelle" project. As a result of four years of testing the forum fragments, the participants developed the skills of an interdisciplinary approach, project activity, self-assessment, economic analysis of environmental problems, expert activity, tutoring and mentoring. A pilot study may qualify for organizing an event with international participation. For the future, it is planned to hold an interuniversity event in Tomsk on the issue "Post-crisis economic thinking. Generation Z in the multicultural world" on the basic tools for the forum implementation described in this article and its adaptation to digital realities, as

well as the implementation of the partnership idea based on the creation of joint projects with SI TPU, the Tomsk Region Branch of the Siberian Main Directorate of the Central Bank of the Russian Federation and other organizations interested in cooperation.

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The Impact of Subsidised Employment on Exiting Unemployment in Poland: An Analysis Based on Unconditional Competing Risks Models

Beata BIESZK-STOLORZ

University of Szczecin, Institute of Economics and Finance, Szczecin, Poland,
beata.bieszk-stolorz@usz.edu.pl
ORCID: 0000-0001-8086-9037

Abstract

The main objectives of employment programmes implemented in Poland by labour offices are professional activisation of the unemployed and reduction of structural mismatches in the labour market. Demand-oriented instruments include intervention works, public works, socially useful works and funds for undertaking business activity and for equipping the workplace. They constitute the so-called subsidised employment. Costly implementation of the programmes forces evaluation studies and research on the effectiveness of these instruments. The aim of the article is to use unconditional risk models of competing events (*Unconditional Competing Risks – UCR*) to analyse the impact of subsidised employment on the probability and intensity of exiting unemployment. The study used individual data of persons registered in the Poviat Labour Office in Szczecin. The analysis showed that the impact of subsidised employment on the probability and intensity of exiting unemployment was marginal. the resignation from mediation of labour office was a very strong cause for de-registering the unemployed. This may indicate that the willingness to take up employment was not the main cause for the unemployed to register with the office and that the unemployed were not always interested in the proposed forms of activisation.

Keywords: Cumulative Incidence Function, Hazard Model, Competing Risks, Subsided Works, Unemployment

Introduction

After 2004, since joining the European Union, the Polish labour market has undergone major changes. There was a significant increase in activities related to professional activisation of the unemployed. Poland is implementing the objectives of the European Employment Strategy, i.e. it aims at full employment, improvement of the quality and productivity of work and strengthening social cohesion and integration. An important role is played by active employment programmes implemented in Poland. Their aim is economic activisation of the unemployed, reduction of structural mismatches on the labour market, improvement of the productivity of the labour force and verification of readiness of the unemployed to work. To this end, the following labour market policy instruments have been established in Polish legislation: trainings, intervention works, public works, professional preparation in the workplace, internships, funds for job creation and socially useful works. The implementation of active employment programmes is connected with large expenditures from the Labour Fund, hence research on the effectiveness of these instruments is undertaken and evaluation studies are conducted. The main task of the labour offices is to activate the unemployed and help them find work. It is important for work to be permanent, but in a particularly difficult situation on the labour market, the offices also offer subsidised work.

The aim of the article is to use risk models of competing events to analyse the impact of subsidised employment on the probability and intensity of exiting unemployment in a particularly difficult situation on the labour market. The observation of the unemployed started in 2013, when the unemployment rate in Poland reached its maximum. The study used individual data of persons registered in the Poviat Labour Office (Polish abbreviation PUP) in Szczecin.

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Literature Review

In many countries, activisation programmes for the unemployed are widely implemented to promote employment among disadvantaged groups in the labour market, for example young people, older people or people with disabilities. These programmes are often implemented as temporary measures in response to unexpected major recessions. Economic theory shows that subsidies can increase employment. However, individual actions should also be considered in the context of the cost effectiveness of such policies. However, such programmes do not always produce the expected results.

Kim and Lee (2019) evaluated the Special Employment Promotion Zone programme implemented by the South Korean government in 2013 and 2014. It was implemented in a medium-sized city, which experienced a long-term breakdown after the global crisis of 2008 affected its main industry, the shipbuilding industry. Under this programme, employers were able to receive subsidies to cover a substantial part of their wages for maintaining employees or creating new jobs for their residents. The evaluation study showed that this scheme was not fully used in its first year of implementation and had little impact on employment. In the second year the programme increased the level of employment, mainly in the non-productive sector. The magnitude of the effect was small, but the effect continued after the programme was completed. The city and its industrial structure required greater structural adjustments, not temporary assistance. The temporary aid granted under the programme distorted the incentive for companies to take certain long-term corrective measures.

The employment crises accompanying the economic crises, which were observed in most European countries, were less noticeable in Norway. Before the economic crisis in 2008/2009, Norway had a period of strong economic expansion, high growth rates, falling unemployment and increasing employment. In the years preceding the crisis there was a lack of labour supply, which was partly solved by offering employment to immigrants from European countries, particularly Poland and Sweden. The employment subsidies applied are primarily targeted at groups of people with limited ability to work. Employers who employ such a person will receive compensation from the Labour and Welfare Administration (NAV). Employment grants in combination with other forms of action seem to promote the employment of people from vulnerable groups. The EEPO report (2014) points to the lack of long-term effects of these measures.

Gupta, Larsen and Thomsen (2015) evaluated the effectiveness of the subsidy programmes of wages of the disabled persons. These programmes were implemented as part of the reform of the Danish Flexjob system, aimed at employing people with long-term (partial) disabilities. Companies were reimbursed for all employees who were granted Flexjob. It has been shown that after the reform the employment structure has changed significantly in favour of permanently employed. However, the reduction in subsidies led to a reduction in the employment of disabled people.

Göbel (2007) studied the impact of Belgian programmes on the employment of young, long-term unemployed workers. He showed that participation in subsidised employment significantly shortened the time to take up regular employment, had a significantly positive impact on the duration of the first period of employment, but had no significant impact on the duration of unemployment after participation in programmes. The investigation showed that subsidised employment had a greater impact on the unemployed in a disadvantageous situation in the labour market.

Forslund, Johansson and Lindqvist (2004) analysed the impact of grants on the employment of the long-term unemployed in Sweden since the beginning of 1998. They showed that this programme had a positive impact on the employment of participants. The probability of taking up employment after the end of the programme increased and the time of unemployment shortened. However, these results were in contradiction with the results of most other Swedish programmes applied in the analysed period, which showed a negative or insignificant impact on the employment of the long-term unemployed.

Subsidised Employment in Poland

The level of the registered unemployment rate in Poland in the years 2004-2018 was changing. In 2004 (the year of Poland's accession to the European Union) it was 19% and in the following years it decreased to 9.5% (2008). Then, as a result of the global financial crisis it increased to 13.4% (2012). It remained at the same level in 2013, followed by a period of recovery from the crisis, which was reflected in a decreasing unemployment rate. In 2018 it was 5.8%. According to the Statistics Poland (the Local Data Bank; https://bdl.stat.gov.pl/BDL/start) the number of registered unemployed people changed similarly (Figure 1).

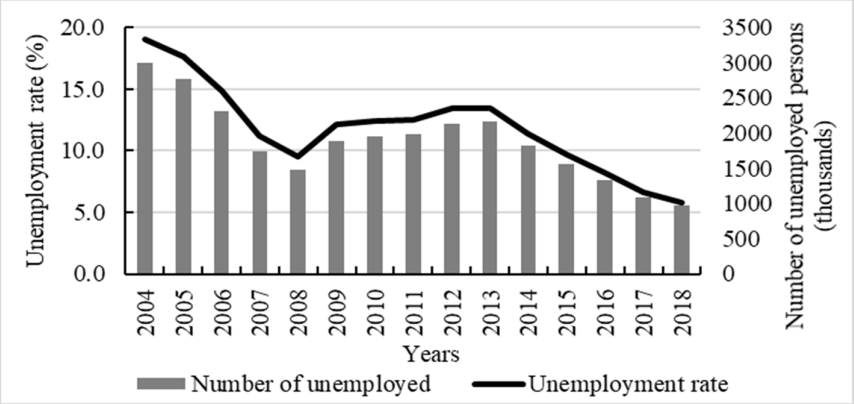

Fig. 1: Registered unemployment rate (%) and the number of registered unemployed (in thousands) in Poland in the years 2004-2018

Source: own study based on data from the Local Data Bank.

Table 1: Structure of the unemployed starting to participate in basic forms of activisation in Poland in the years 2005-2018 (%)

Year	Basic forms of professional activisation							
	Training courses	Intervention works	Public works	Internships	Business start-up funding	Retrofitting or equipment of the workstation	Performing socially useful work	Preparing adults for the workplace
2005	26.8	12.6	12.3	29.0	11.9	5.0	-	2.3
2006	24.7	11.6	5.5	28.5	9.8	5.9	10.4	3.7
2007	26.5	8.8	6.1	24.5	6.7	5.6	10.9	9.1
2008	25.8	7.1	6.8	26.0	8.0	4.3	9.8	12.2
2009	24.6	5.9	7.9	37.5	9.3	4.1	9.6	1.1
2010	23.1	5.5	9.5	38.0	9.8	5.5	8.6	-
2011	17.8	9.4	7.6	36.6	8.6	3.5	16.5	-
2012	18.8	7.4	7.1	41.3	9.2	5.2	11.0	-
2013	18.4	7.4	7.1	42.1	9.8	5.1	10.1	-
2014	17.8	7.0	7.4	49.7	11.3	6.8	-	-
2015	15.4	11.0	7.4	49.6	9.8	6.8	-	-
2016	13.8	12.6	7.8	50.6	9.9	5.3	-	-
2017	13.9	13.4	8.5	48.5	10.3	5.3	-	-
2018	12.6	15.8	8.0	47.5	11.0	5.1	-	-

Source: Own study based on data from MRPIPS.

The instruments most frequently used by labour offices in Poland are: job placement and vocational counselling, trainings, internships, professional preparation of the workplace, grants for starting up a business, public works and intervention and socially useful works. They affect two sides of the labour market: supply and demand. Training, internships and vocational preparation at the workplace are supply-oriented instruments. Demand-oriented instruments, i.e. the so-called subsidised employment, are: intervention works, public works, socially useful works and funds for the unemployed to take up economic activity and to equip the workplace for the referred unemployed. The latter two instruments are defined as measures to create jobs. Subsidised employment is a form of financial aid for the employer which provides an incentive to employ, assuming the reduction of costs (also full coverage of costs) incurred by him/her for employing employees. Subsidised employment is envisaged mainly for unemployed people in a special situation on the labour market. They are to enable them to enter the labour market and prevent the effects of long-term unemployment. The catalogue of basic forms of activisation of the unemployed in the years 2005-2018 was changing. Ministry of Family, Labour and Social Policy (MRPIPS) in Poland serves on its website every year, which forms are in given year the basic ones (https://www.gov.pl/web/rodzina/efektywnosc-form-promocji-zatrudnienia). Table 1 presents the structure of the unemployed starting to participate in basic forms of activisation in Poland in the years 2005-2018. Registered unemployed persons were most often offered internships. In the second place, there were trainings.

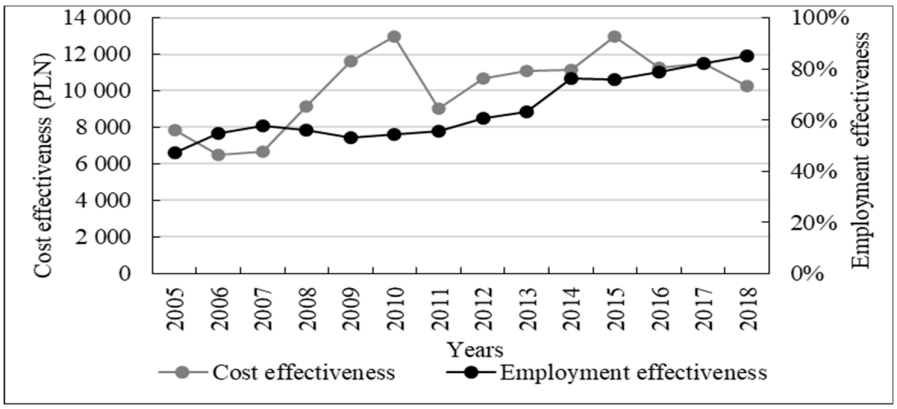

Fig. 2: Total cost and employment effectiveness of activisation programmes in Poland in the years 2005-2018

Source: Own study based on data from MRPiPS.

In order to assess the effectiveness of the implemented programmes, employment and cost effectiveness coefficients of basic forms of professional activisation are determined. Both forms of effectiveness are published in the MRPiPS elaborations (https://www.gov.pl/web/rodzina/efektywnosc-form-promocji-zatrudnienia). Employment effectiveness is an indicator allowing to determine the chances of finding employment after the end of participation in the programme. The assessment of the cost of getting an unemployed person into employment is assessed by means of cost effectiveness. Figure 2 shows the values of both indicators in the years 2005-2018. In the years 2006-2010, a large increase in cost effectiveness (from about 6.5 thousand PLN to about 13 thousand PLN) was accompanied by a relatively constant employment effectiveness at the level of about 55%. In 2011, there was a significant decrease in cost effectiveness compared to the previous year from about 13 thousand PLN to about 9 thousand PLN. Then, by 2015, both effectiveness showed upward trends, and after 2015, the employment effectiveness continued to increase with a decreasing value of cost effectiveness. All this indicates better use of funds for economic activisation of the unemployed in the years 2015-2018. In general, it can be concluded that over the years there has been an improvement in the effectiveness of basic forms of economic activisation – this is visible in the growing values of employment effectiveness, which at the end of the analysed period increased significantly compared to its beginning (Bieszk-Stolorz, Dmytrów 2019, 2020). From the point of view of social policy, it is important to bring the unemployed into employment (high value of employment effectiveness). On the other hand, from the point of view of state finances, it is important that this employment should have the lowest possible financial cost (low value of cost effectiveness). Analysing both of these efficiencies for subsidised

employment, it can be observed that the highest employment efficiency is characterised by co-financing of starting a business, followed by intervention works and refunding the costs of equipping or retrofitting workstations, while the smallest socially useful works. For this reason, the latter form was removed from the catalogue of basic forms of activisation in 2014-2018, despite the fact that in 2006-2013 it was the most frequently proposed form of subsidised employment. The costliest form (the highest cost effectiveness) of subsidised employment was the subsidised employment, which was followed by the refunding of the costs of equipping or retrofitting workstations.

Research Methodology

Selected methods of survival analysis were used in the study. It is a set of methods that investigate processes in which the time that passes to the occurrence of a certain event is analysed. The duration in a given state of units belonging to a certain cohort is observed. The duration that elapses from the beginning to the end of an event is a random variable T. Since the observation period is limited, certain units belonging to the cohort under consideration may not experience the final event before it has occurred. Such observations are considered to be right censored. Situations where the unit under investigation disappears from the field of view or another end-of-entry event occurs that excludes the occurrence of a specific event are also considered as such observations (Pepe, 1991). The latter type of event is called a competing event. Competing risk is defined as an event that excludes or fundamentally changes the probability of occurrence of another event (Gooley, Leisenring, Crowley, Storer, 1999). It is assumed that different types of events occur independently of each other (Crowder, 1994, 1996, 1997). The entity under investigation is exposed to different risks at the same time, but the possible event is due to only one of these factors, which is called the "cause of failure". (Aly, Kochar, McKeague, 1994). In addition to *unconditional competing risks, conditional competing risk models* are also considered. In the case of the first type of events their independence is assumed. For the latter, the probabilities of transition between states depend on explanatory variables and the time and type of being in the previous state. In the analysis of unemployment, the time of registration in the labour office may be observed, and the methods of survival analysis enable the assessment of the probability and intensity of exiting unemployment (Bieszk-Stolorz, 2017a, 2017b; Bieszk-Stolorz, Markowicz, 2015, 2019).

The survival analysis is based on two functions: survival and hazard (intensity) ones. The survival function is defined as follows:

$$S(t) = P(t > T) = 1 - F(t) \tag{1}$$

where: t is the duration of the phenomenon, $F(t)$ is the cumulative distribution function of the random variable T.

The survival function can be said to be a complement to the unity of the cumulative distribution function. In a situation where the distribution of the duration of the analysed process is not known, the Kaplan-Meier estimator (Kaplan, Meier, 1958) can be used to estimate the survival function:

$$\hat{S}(t) = \prod_{j:t_j \le t} \left(1 - \frac{d_j}{n_j}\right) \tag{2}$$

where: d_j – number of events in time t_j, n_j – number of units exposed to risk in time t_j.

The hazard function describes the intensity of the event at time t provided that it survives to time t and is defined as follows (Kleinbaum, Klein, 2005):

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t \le T < t + \Delta t | T \ge t)}{\Delta t} \tag{3}$$

The cumulative hazard function, on the other hand, is the sum of hazard up to time t and for discrete time is determined by a formula:

$$H(t) = \sum_{j:t_j \le t} h(t_j) \tag{4}$$

The cumulative incidence function ($CIF_k(t)$) is used to assess the probability of an event occurring due to k before time t. This function is defined as follows (Klein, Moeschberger, 2003, p. 52):

$$CIF_k(t) = P(t \le T, \delta = k) = \int_0^t S(u)\, h_k(u) du = \int_0^t S(u)\, dH_k(u) \text{ for } k = 1,2,3,\ldots,K \tag{5}$$

where: $H_k(t)$ – cumulative hazard function; $S(t)$ – survival function; $\delta = 0$ for censored observations; $\delta = 1,2,\ldots,K$ for observations ending with an event of k-th type (one of the K competing events).

CIF_k is a function of the cumulative probability of an event of k-th type occurring before or at time t (Bryant, Dignam, 2004). This function is often called a subdistribution. The estimator of cumulative frequency due to the occurrence of k-th cause is given by the following formula (Marubini, Valsecchi, 1995):

$$C\hat{I}F_k(t) = \sum_{j:t_j \le t} \hat{S}(t_{j-1}) \frac{d_{kj}}{n_j} \text{ for } k = 1, 2, 3, \ldots, K \tag{6}$$

where: t_j - time j of the event; d_{kj} – number of events due to the occurrence of cause k in time t_j; n_j – number of units exposed to risk in time t_j.

Because $\sum_{k=1}^{K} d_{kj} = d_j$, it is true that:

$$\sum_{k=1}^{K} C\hat{I}F_k(t) = 1 - \hat{S}(t) \tag{7}$$

For the different types of competing risks ($k \ge 1$), the hazard function is described by the formula (Klein, Moeschberger, 2003, p. 50):

$$h_k(t) = \lim_{\Delta t \to 0} \frac{P(t \le T < t + \Delta t, \delta = k | T \ge t)}{\Delta t} \text{ for } k = 1, 2, 3, \ldots, K \tag{8}$$

The estimator of the $h_k(t)$ gambling function for cause k at the moment t_j is as follows:

$$\hat{h}_k(t_j) = \frac{d_{kj}}{n_j} \text{ for } k = 1, 2, 3, \ldots, K \tag{9}$$

where d_{kj} and n_j have the same meaning as in the formula (6). This model is also called the empirical hazard model.

Data Used in the Study

Methods of survival analysis require access to individual data. In the case of analysis of registered unemployment, their sources are the poviat labour offices. The Syriusz IT system implemented in them allowed to create a rich database for this type of analysis. In the study, anonymous individual data of 22,078 unemployed people, registered in 2013 in the PUP in Szczecin, were used. The time from the moment of registration to the moment of de-registration from the office due to a specific cause was analysed. The end of the observation was assumed to be the end of 2014. Numerous causes for de-registration were grouped (Table 2). The study was conducted in two stages. In the first stage, the causes were divided into four groups: non-subsidized work, subsidized employment, removal and other causes. In the second stage, the first two groups were combined into one – work. Since some of the observed units did not experience an event before the end of the observation, the study included right-censored observations (Table 3).

Table 2: Groups of causes for de-registration from the labour office

Stage I of the study	Cause for de-registration	Stage II of the study
Unsubsidised work	taking up job, other employment or non-agricultural business activity	Work
Subsidised employment	undertaking public works, intervention works or socially useful works, working within the framework of an additional job created by virtue of a granted loan or subsidy, granting one-off funds for undertaking business activity,	
Removal	refusal to accept an offer of employment or any other form of assistance; failure to appear in the labour office within the prescribed period,	Removal
Other	the right to a retirement pension, rehabilitation benefit, disability pension, permanent benefit, pre-retirement benefit/assistance allowance, nursing benefit, supplement to family allowance for single parenting of a child, receiving a guardian's benefit, being subject to pension insurance for permanent work as a household member in an agricultural holding, residence abroad longer than 30 days, change of residence/stay outside the area of operation of the labour office, illness or staying in a closed detoxification centre, participation in training organised by an entity other than the labour office, death, military service, taking up full time education	Other

Source: own study.

Table 3: Types of events ending the observation process and censored observations

Cause for deregistration	Number
Unsubsidised work	8.704
Subsidised employment	929
Removal	8.965
Other	1.624
Censored observations	1.856
Total	20.078

Source: own study.

Analysis of the Impact of Subsidised Employment on Exiting Unemployment

In the first stage of the study, cumulative incidence function (CIF_k) and hazard functions were determined for four different events ending the observation process ($k = 1,2,3,4$). Figure 3 shows the values of cumulative incidence function estimators for the following causes: unsubsidised work, subsidized employment, removal and other causes. In this way, the probability of de-registration for various causes up to time t or at time t was determined. The probability of de-registration due to taking up non-subsidised employment and being removed from the register was similar, but from 10th month onwards the probability of removal was slightly higher. The probabilities of de-registration for subsidised employment and other causes were marginal and did not exceed 5% and 8% respectively. Noteworthy is the fact that the survival curves for non-subsidized work and subsidised employment are regular. The probability curves for removal and other causes do not have this property. In their course, one can notice short value jumps. For the group, the remaining small value spikes occurred in the seventh month after registration. The analysis of data indicated that it was caused by an increased number of de-registrations in that period due to granting the registered unemployed person the right to receive a pre-retirement allowance/benefit. However for the removal a significant jump in the first month was connected with an increased number of de-registrations due to the fact that the unemployed person did not appear in the PUP within the prescribed period.

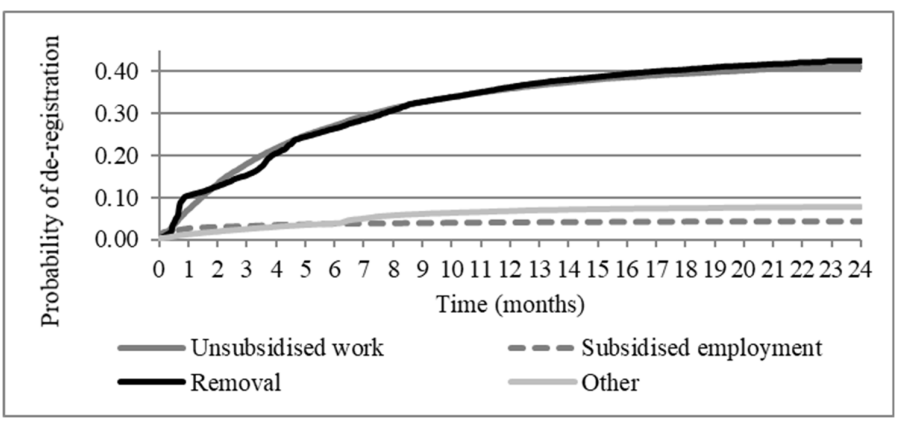

Fig. 3. Values of the CIF_k estimators determined in stage I of the research

Source: own study.

The intensity of exiting unemployment was then examined for the four identified causes (Figure 4). It was the highest for de-registrations due to the removal and taking up unsubsidised work. The intensity of removal and taking up subsidised employment was marginal. The high value and rapid decrease in the intensity of removal and subsidised employment in the first two months after registration is characteristic.

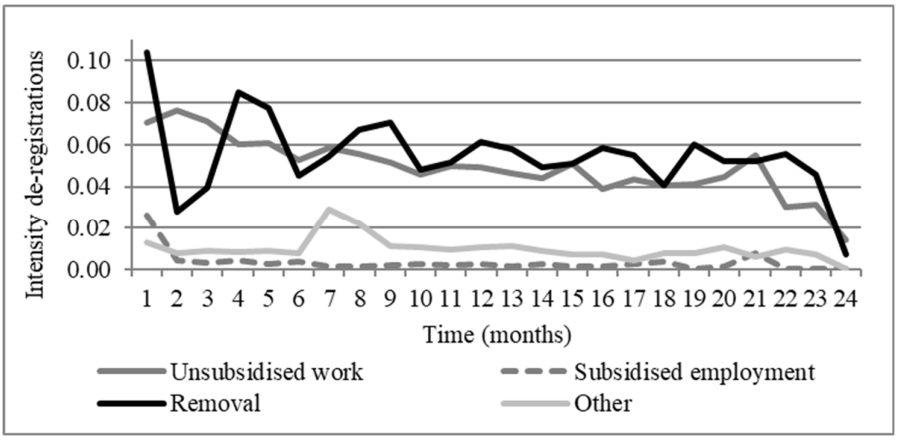

Fig. 4. Values of the hazard function determined in stage 1 of the research
Source: own study.

For an unemployed person it is important to take up a job in general, that is why in the second stage of the study the events of taking up a non-subsidised job and subsidised employment were combined into one group – work. CIF_k estimates and hazard functions were determined for three events ending the observation: work, removal and other. With this classification, the probability of de-registration due to taking up any job was higher than the probability of removal starting at the second month after registration. The other causes had a marginal impact (Figure 5).

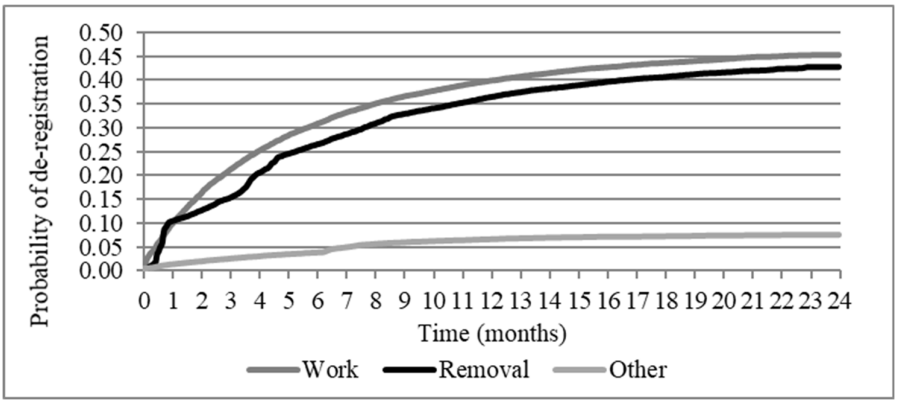

Fig. 5. Values of the CIF_k estimators determined in stage II of the research
Source: own study.

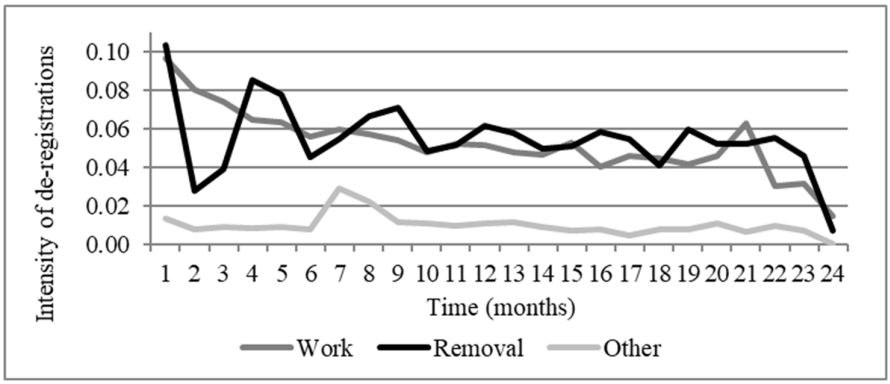

Fig. 6. Values of the hazard function as determined in stage II of the research
Source: own study.

Figure 6 shows the hazard functions for the three types of events. The intensity of de-registrations due to taking up a job still does not exceed the value of hazard for removal; however, it is now clearly decreasing and reaches its highest value in the first months after registration.

Conclusions

Public provision of vocational training, wage subsidies and job search assistance are features of the modern welfare state. These measures are primarily the basis for a European "active labour market policy". They have also been present in the USA for several decades (Heckman, Lalonde, Smith 1999). This policy is also postulated as a way to alleviate the shocks in labour markets in the economies of the former Eastern Bloc and the countries of Latin America, which are currently moving to market systems.

The main characteristic of a modern welfare state is the need for "objective" knowledge of the effects of various government tax and transfer programmes. Different entities derive benefits and losses from such programmes. The assessment of these benefits and losses often plays a key role in policy decisions. Recently, interest in evaluation has increased as the number of countries with modern welfare states and the costs of running a welfare state have increased.

The methods of survival analysis used in the study: cumulative incidence function and empirical hazard model allowed to assess the impact of subsidised employment on the probability and intensity of exiting unemployment in Poland. The analysis showed that it was of marginal importance, which results from the limited resources available to the office. The probability of taking up subsidised employment within 24 months of registration did not exceed 0.05, and its intensity was highest within the first two months of registration. However, this had the effect of increasing the probability and intensity of employment in general. In addition, the study showed that the removal of an unemployed person or, in fact, the resignation from mediation of labour office was a very strong cause for de-registering the unemployed. The probability of de-registration for this cause was higher than in the case of taking up unsubsidised employment. This may indicate that the willingness to take up employment was not the main cause for the unemployed to register with the office and that the unemployed were not always interested in the proposed forms of activisation. It should be noted that the period covering the highest unemployment rate in Poland and the subsequent period of improvement in the labour market situation was analysed. The emerging greater employment opportunities may have induced the registered unemployed to look for a job without the mediation of the office and less interest in subsidised employment.

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Variants of Exiting Unemployment – Duration Tables

Beata BIESZK-STOLORZ

University of Szczecin, Institute of Economics and Finance, Szczecin, Poland,
beata.bieszk-stolorz@usz.edu.pl
ORCID: 0000-0001-8086-9037

Iwona MARKOWICZ

University of Szczecin, Institute of Economics and Finance, Szczecin, Poland,
iwona.markowicz@usz.edu.pl
ORCID: 0000-0003-1119-0789

Abstract

Analysis of the phenomenon of unemployment is an important issue in socio-economic research. According to the literature on the subject, analyses concerning the labour market are focused on reducing the resources of the unemployed by taking up employment. However, there are more reasons for the outflow of the unemployed from labour office registers. The proposed job offers often do not suit the unemployed. They refuse to take up the offered employment, do not show up at the office within the set deadlines, interrupt participation in activisation programmes for no reason. As a result, they are removed from the register. In order to pursue an effective labour market policy, it is important to identify such groups of people. The aim of the study is to compare the duration in unemployment of three groups of de-registered people. These are de-registrations due to taking up work, removal and other causes (resignation from the mediation of the labour office). In the empirical example, a cohort of the unemployed, de-registered persons in 2017 from the Poviat Labour Office in Szczecin was used. As a research tool, a non-parametric model of the duration of a specific phenomenon was used – duration tables. Cohort tables for particular types of exiting unemployment were built on the basis of individual data of 19,931 people (SYRIUSZ IT system). In the construction of the tables the following features of the unemployed were taken into account: gender, age, education, seniority and number of subsequent registrations.

Keywords: Survival Analysis, Duration Tables, Registered Unemployment

Introduction

In 2004, in connection with Poland's accession to the European Union, labour market regulations were changed. The scope of activities related to counteracting unemployment was extended. The Act of 20 April 2004 on employment promotion and labour market institutions-imposed tasks related to employment promotion and activisation of the local labour market on poviat labour offices. One of the main tasks is to help the unemployed to find work.

It should be noted that the measurement of unemployment is defined differently. In Poland, usually registered unemployment or a panel survey are taken into account (Labour Force Survey; LFS). For international comparisons, a harmonised unemployment rate is usually used. Harmonised unemployment rate is calculated by Eurostat for the needs of monthly statistics. For Poland, the data are calculated by Eurostat on the basis of quarterly results of the Labour Force Survey (LFS), in accordance with the definition of the International Labour Organization (ILO) and the monthly results from the registered unemployment. This indicator in January 2020 in the European Union was 6.6% (Eurostat, 2020). Poland was ranked second among countries with the lowest unemployment rate (2.9%) after Czechia (2.0%). The highest unemployment rate was recorded in the following countries: Greece (16.5%), Spain (13.7%) and Italy (9.8%).

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In Poland, statistical data on registered unemployment is collected in poviat labour offices. They provide rich information on all causes for de-registration. There are several dozen of them. In addition to taking up employment, the unemployed take a pension, retirement pension, pre-retirement allowance, go abroad, change their place of residence, and start education on a daily basis. Very often, registered people refuse to take up employment or participate in the forms of activisation proposed to them, and they do not appear at the office within the prescribed period. They are then removed from the register and lose their unemployment status.

The aim of the study was to compare the duration in unemployment of people who had been de-registered due to taking up work, removal and other causes. The non-parametric model of unemployment duration – duration tables – was used as a research method. The probability of remaining in the register and the intensity of de-registration were analysed depending on selected characteristics of unemployed people. In the study, individual data of 19931 people registered in the Poviat Labour Office in Szczecin (Poland) from the SYRIUSZ IT system were used.

Outflow of Unemployed from Labour Offices

Starting from 2013, the registered unemployment rate in Poland decreased from 13.4% (XII.2013) to 5.2% (XII.2019). In June 2020, the unemployment rate increased to 6.1%, which may be a result of the COVID-19 pandemic. At the same time, the number of people inflowing into and outflowing from unemployment was decreasing, while the number of de-registered people was higher. The structure of people was also changing due to the cause for de-registration. All variants of exiting unemployment from the office's records can be grouped into three groups: taking up work, removal and other causes. Taking up work should be understood as employment, taking up business activity and taking up subsidised work (e.g. public works, intervention works, refunding part of wage costs). Removal takes place due to failure to appear in the office within the prescribed period, rejection without reason of a job offer or discontinuation of participation in activisation forms or at the request of registered person. These are the reasons that prove a lack of interest in cooperating with the office. In the years 2008-2018, they accounted for between 19% and 32% of all de-registrations in Poland and in the years 2008-2013, they were slightly lower than taking up work (Fig. 1). Other causes include acquisition of the right to a pension, retirement pension, retirement benefit, receiving benefits, obtaining income, going abroad, death of the registered person or change of residence.

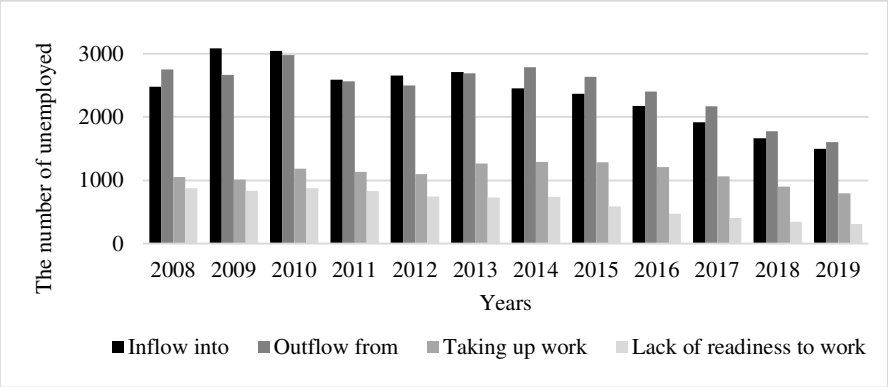

Fig. 1. Inflow into and outflow from unemployment from labour offices in Poland in 2008-2019 (in thousands)

Source: own study on the basis of the study: Statistical Yearbook of Labour 2010, 2012, 2015, 2017; CSO 2020, Registered unemployment I quarter 2020.

People registered in labour offices can be divided into two groups: real and seeming, i.e. people who are not interested in work (they are not looking for it or are not ready to take it up) and those working in the black economy or otherwise earning not less than 1200 PLN per month (Kotowska, 2014, p. 197). The seemingly unemployed constitute a large percentage of people registered – 43% in 2015

(Czapiński, Panek 2015). Analyses of the labour market indicate that not all registered unemployed people are interested in taking up work. They give various reasons for not looking for work. In 2015, women most often indicated childcare (36.1%), the belief that they will not find a job (18.4%) and activities related to housekeeping (13.9%). Men, on the other hand, expressed the belief that they would not find a job (30.3%) or indicated their poor health (19.3%) (Czapiński, Panek 2015, p. 415).

Data Used in the Study

Most methods used in the survival analysis require the use of individual data for each analysed unit. This is certainly a major difficulty due to the lack of access to such information. In the case of registered unemployment, such data are collected in Poland by poviat labour offices thanks to the SYRIUSZ IT system. In the presented study, individual data on 19,931 unemployed de-registered in 2017, obtained from the Poviat Labour Office in Szczecin, were used. These data included the date of registration, the date and cause for de-registration, thanks to which the duration of registration was determined. In addition, it included the age of the unemployed person, their gender, education, seniority and information on whether it was the first or subsequent registration with the office. Six age groups and five education levels were designated. Due to seniority, the persons were divided into those without and those with seniority. The study took into account the number of subsequent registrations. This feature has two categories: first and subsequent registration. The causes for de-registration were divided into three options: taking up work, removal and other causes. The structure of the unemployed, together with the designations of particular groups, is presented in Table 1.

Table 1: Structure of unemployed persons de-registered from PUP in Szczecin in 2017

Group		Total		Work	Removal	Other causes
		Number	%	Number	Number	Number
Total		19,931	100	8,120	10,582	1,229
Gender	Women (K)	9,217	46.24	4,139	4,451	627
	Men (M)	10,714	53.76	3,981	6,131	602
Age	18-24 (W_1)	2,343	11.76	804	1,478	61
	25-34 (W_2)	5,855	29.38	2,647	3,097	111
	35-44 (W_3)	4,776	23.96	2,034	2,633	109
	45-54 (W_4)	3,180	15.96	1,323	1,746	111
	55-59 (W_5)	1,939	9.73	822	961	156
	60-64 (W_6)	1,838	9.22	490	667	681
Education	At most lower secondary (S_1)	4,904	24.60	1,232	3386	286
	Basic vocational (S_2)	4,235	21.25	1,498	2,421	316
	General secondary (S_3)	2,589	12.99	996	1,460	133
	Vocational secondary (S_4)	3,622	18.17	1,608	1,723	291
	Higher (S_5)	4,581	22.98	2,786	1,592	203
Seniority	Without seniority (D_1)	7,041	35.32	2,016	4,712	313
	With seniority (D_2)	12,890	64.67	6,104	5,870	916
Number of registrations	First (Z_1)	3,514	17.63	1,635	1,625	254
	Subsequent (Z_2)	16,417	82.37	6,485	8,957	975

Source: own study.

Research Methodology

In the study, the duration tables were used, i.e. the non-parametric model. It is one of the oldest statistical methods used in medical and actuarial statistics (Merrell, 1947; Greville 1948; Kaplan, Meier, 1958; Cox, 1972; Namboodiri, Suchindran, 1987). Unlike parametric models, assumption of theoretical distribution of analysed variable is not required (Namboodiri, Suchindran, 1987). When the subject of research is the registered unemployment duration, it is difficult to assume a specific distribution. In such situation the non-parametric models are used, examples of which are duration tables (Balicki, 2006; Markowicz, 2012) or semiparametric ones (Bieszk-Stolorz, Markowicz, 2012; Bieszk-Stolorz, 2013; Bieszk-Stolorz, Markowicz, 2015, 2017; Markowicz, 2019). Durations tables are a tabular model, most often used in demography, as life expectancy tables. However, it is used in many other fields of science to study the duration of phenomena (Gołata, 1994; Gazińska, Mojsiewicz, 2004; Markowicz, Stolorz, 2006; Landmesser, 2013; Matuszyk, 2015; Wycinka, 2017; Markowicz, 2017, Mikulec, 2018).

In life expectancy tables, the annual age groups (full tables) are the most commonly adopted. In this study, for duration in unemployment, a 3-month range is used. The cohort in this case is the unemployed de-registered in 2017 for various causes (three options). The observation duration was maximum 7 years, so the last range in the tables was 81-84 months. The tables of unemployment duration present the process of changes in the composition of the cohort over time (Bieszk-Stolorz, Markowicz, 2016). The analysis used two basic functions: survival $\hat{S}_t^*$ (survival) and hazard $\hat{h}_t^*$ ones (Markowicz, 2018):

$$\hat{S}_t^* = \prod_{k=1}^{t} \hat{p}_k^* \tag{1}$$

$$\hat{h}_t^* = \frac{z_t}{\left(n_t^* - \frac{z_t}{2}\right) a_t} \tag{2}$$

where:
t – beginning of the duration interval $\langle t, t+1)$,
$\hat{p}_t^* = \frac{n_t^* - z_t}{n_t^*}$ – the probability of survival in the particular time intervals,
$n_t^* = n_t - \frac{c_t}{2}$ – number of units exposed in the interval,
z_t – number of units affected in the interval,
c_t – number of censored units in the interval,
a_t – interval of duration (3 months).

The survival function determines the probability that a unit will not experience a particular event until the end of a given period. The hazard function determines the risk of a specific event occurring in a short period $(t; t + \Delta t)$, provided that it has not occurred by time t.

Empirical Results

The main study was preceded by the determination of the median time to de-registration. It was determined separately for each of the three causes (Table 2). This preliminary analysis indicated that the fastest de-registration was observed in the case of removed persons, especially men under 24 years of age. The median time to start of working was slightly higher. Men up to 24 years of age were also the fastest to take up work. People that were de-registered due to other causes had the longest registered unemployment duration.

Table 2: Median time to de-registration by characteristics of unemployed persons

Variables	Taking up work			Removal			Other causes		
	Total	Women	Men	Total	Women	Men	Total	Women	Men
Total	1.94	2.23	1.64	1.77	2.07	1.58	6.77	6.87	6.66
W_1	1.22	1.45	1.08	0.72	0.89	0.69	1.81	2.15	1.22
W_2	1.84	2.19	1.45	1.38	1.92	1.05	2.43	3.25	1.91
W_3	2.10	2.65	1.58	1.81	2.56	1.51	2.40	3.85	2.33
W_4	2.17	2.27	2.10	2.60	3.35	2.27	3.78	2.83	4.04
W_5	2.10	2.63	1.87	3.75	4.34	3.37	6.48	6.48	3.88
W_6	2.22	1.33	2.48	5.29	4.09	5.39	13.28	16.07	11.93
S_1	1.32	1.48	1.15	1.28	1.32	1.28	8.45	9.00	8.25
S_2	1.61	1.91	1.51	1.91	2.37	1.76	8.28	6.97	8.96
S_3	1.78	2.10	1.50	1.74	2.07	1.35	6.48	7.15	3.52
S_4	2.24	2.63	1.84	2.40	3.19	1.84	6.81	6.81	6.84
S_5	2.40	2.55	2.20	2.66	3.16	2.24	4.57	5.42	3.68
D_1	1.68	1.84	1.51	1.28	1.38	1.18	5.42	4.80	5.95
D_2	2.04	2.40	1.71	2.33	3.02	2.01	7.05	7.04	7.13
Z_1	2.27	2.53	2.07	1.68	2.20	1.38	6.36	6.41	6.18
Z_2	1.84	2.17	1.57	7.33	7.5	7.07	7.33	7.5	7.07

Source: own study.

The survival function of unemployment duration, as one of the functions in the durations tables, informs about the probability of exit from unemployment for each group of causes (Figures 2-6: 1 – taking up work, 2 – removal, 3 – other causes).

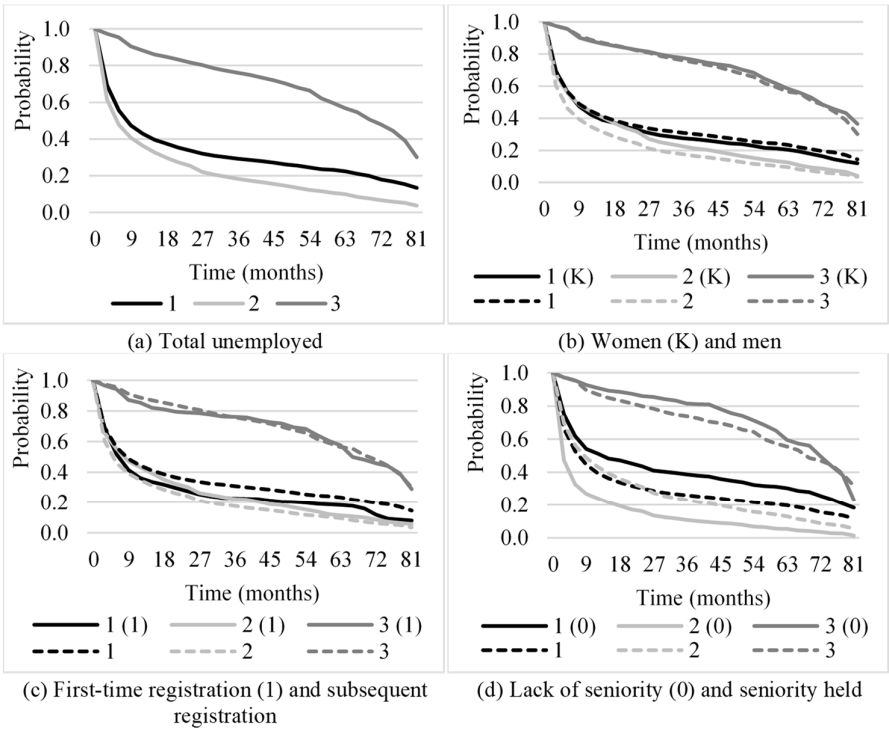

(a) Total unemployed

(b) Women (K) and men

(c) First-time registration (1) and subsequent registration

(d) Lack of seniority (0) and seniority held

1 - taking up work, 2 - removal, 3 - other causes

Fig. 2. Function of survival in unemployment (in months) – total and by gender, number of registrations and seniority

Source: own study.

Unfortunately, it turns out that the state of unemployment is most quickly exited by people that are removed (Fig. 2a), especially men (Fig. 2c). For example, 80% of the cohort left the register up to 33rd month due to removal (women to 45th and men to 30th) and to 69th month due to taking up work (women to 66th and men to 72th). The unemployed registered for the first time than for the next time (Fig. 2c) and those with seniority than those without (Fig. 2d) take up work faster. Taking into account the age of the unemployed, one should note the equalisation of functions for taking up work and removal for the first two years in the case of young people (25-34 years, Fig. 3b). Taking into account education of the unemployed, the following observations are worth noting: much slower leaving the cohort due to taking up employment than due to removal for people with the lowest education (Fig. 4a), equalisation of both functions during the first year of unemployment for people with vocational secondary education (Fig. 4d) and faster leaving for work than by removal for people with higher education (Fig. 4e).

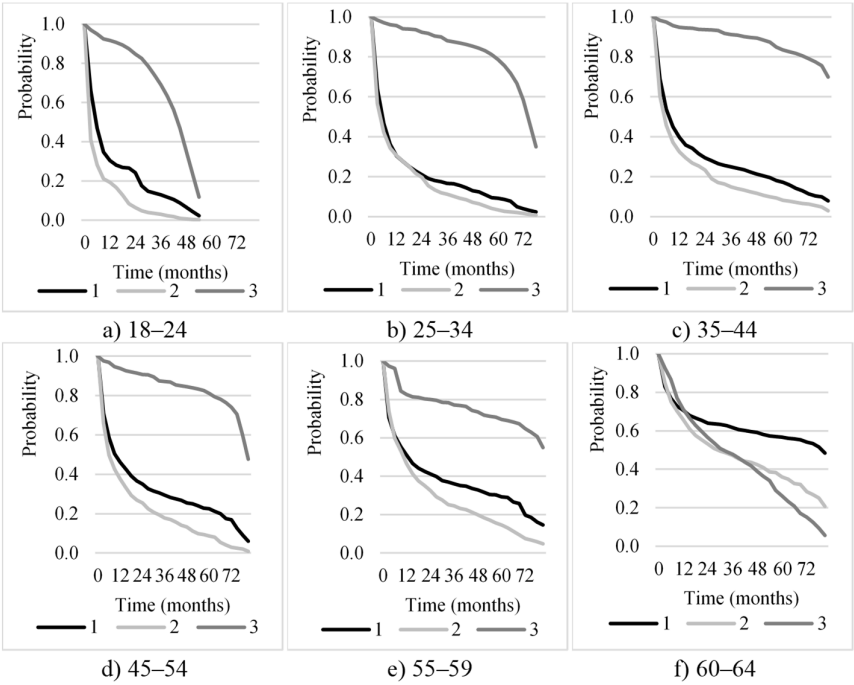

Fig. 3 Function of survival in unemployment (time in months) – by age (years)

Source: own study.

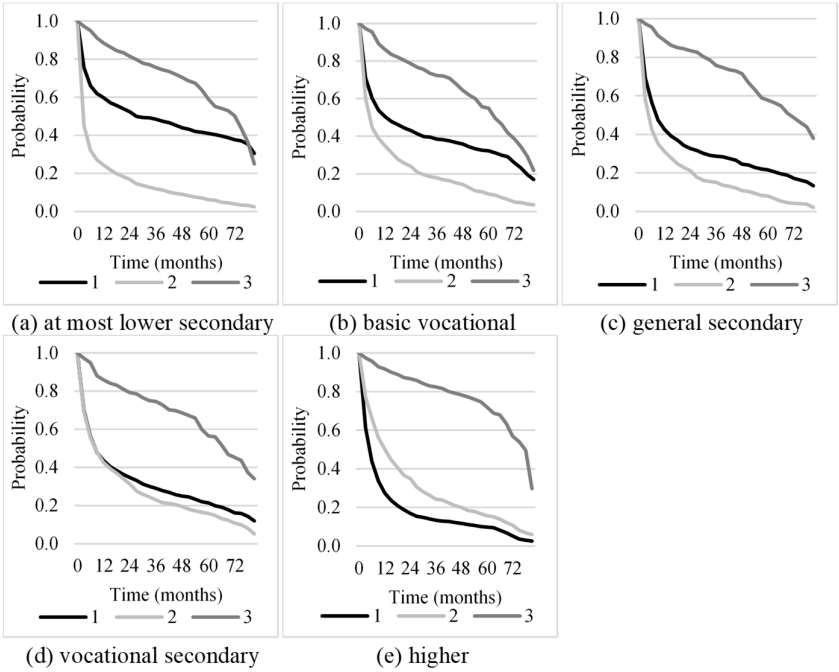

Fig. 4. Function of survival in unemployment (time in months) – by education

Source: own study.

The second of the presented functions, the hazard function, indicates the intensity of de-registrations in subsequent time intervals. The highest intensity was observed in the first half of the year of unemployment (taking up work and removal, Fig. 5a). A larger jump of the function in the final period of observation results from a small number of people remaining in the cohort. After 24-25 months from the registration, more people were removed due to failure to appear in the office within the prescribed period (higher value of hazard function). However, a jump of values of the function for the remaining causes at about 6-7 months results from granting the right to pre-retirement benefit to a larger number of people.

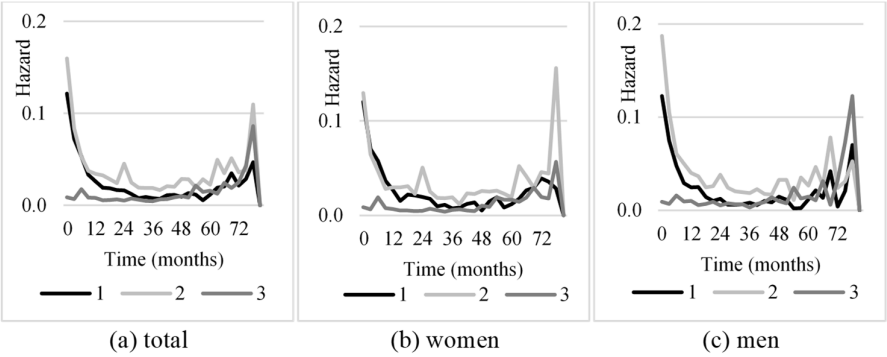

Figure 5: Hazard function (time in months) – total unemployed and by gender

Source: own study.

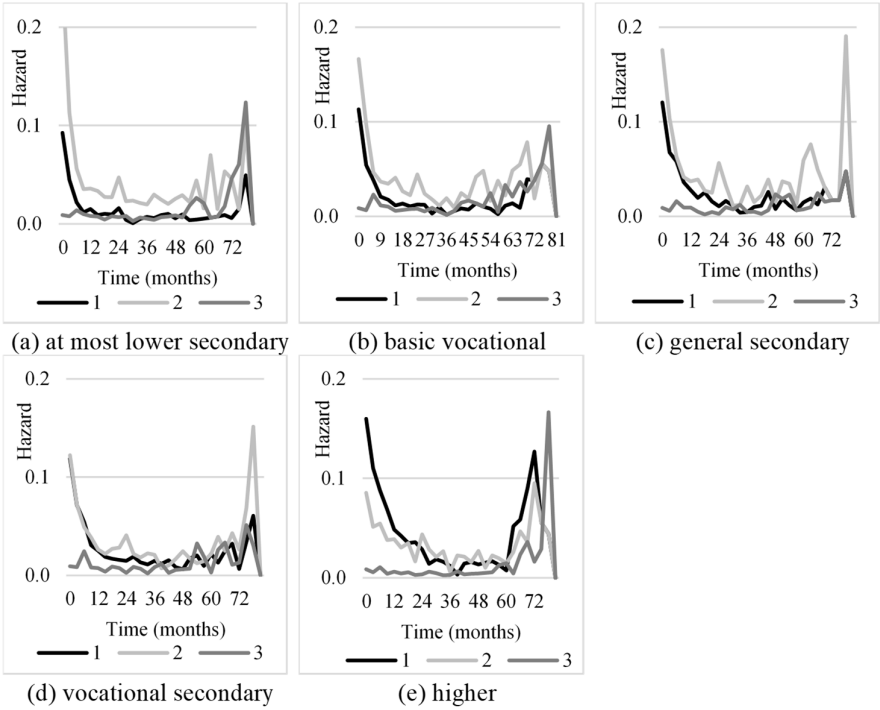

Fig. 6. Hazard function (time in months) – unemployed by education

Source: own study.

When analysing the course of the hazard function for the unemployed by gender (Fig. 5b-c) and by education (Fig. 6), attention should be put on the following: higher intensity of men's removals than women's removals in the initial period since registration (fictitious registration) and higher intensity of exits to work than removals in the initial period of unemployment for persons with higher education.

Conclusions

In order to lead an effective labour market policy, it is necessary to identify people at risk of unemployment. The unemployment rate is the basic indicator used in such analyses. The second, but no less important, is the time of seeking work. Methods of survival analysis allow to assess the probability of staying unemployed and to determine the intensity of exiting unemployment in relation to its duration. The tools useful for this type of research are the survival and hazard functions. Their undoubted advantage is the possibility of using incomplete data when the observed unit disappears from observation. Its presence in the cohort until censorship affects the results of the analysis. A barrier to using such methods may be the lack of access to individual data. A very good source of such data in Poland is the SYRIUSZ IT system implemented in poviat labour offices. It provides information about registered unemployment. The analysis of exiting unemployment should focus not only on people taking up employment, but also on people who resigned from mediation of the labour office for unknown reasons. The presented study showed that the people who were removed from the labour office, left the cohort most quickly. The course of the survival curves informs about the fact that during the analysed period, women took up work faster and men were removed from the cohort faster. Also, people registered for the first time, with seniority, young people, with higher education, took up work faster. The course of the hazard function indicated that the intensity of de-registrations due to taking up work and being removed was high in the initial period of unemployment. The course of this function was different for other causes. A detailed analysis makes it possible to identify the moments in which unusual changes occurred. In the case of the conducted study, these were described earlier: 6-7 months for de-registration for other causes and 24-25 months for removal.

The conducted research indicates a lack of willingness on the part of the unemployed to cooperate with the labour office. They are not determined to accept job offers, training or internships. These are people who expect different proposals to earn money than those made ex officio. They often work in the black economy or expect only to receive social benefits. In order to prevent such practices, it is essential to change the legal conditions.

The analysis presented in the article was based on data for the year 2017. It should be noted that these data are reliable. Information for subsequent reporting periods is still being verified, and once it has been verified and corrected, the authors will have access to it (they have permanent cooperation with the office) and will continue their research. Certainly, the analysis of data for 2020 will be interesting due to the impact of the COVID-19 pandemic on the phenomenon of unemployment in general, and especially on the change in the number of unemployed people (in particular subgroups) and on job search time. These data are not yet available. Due to the methods used, they require observation for a certain period of time – at least one year. Signals coming from the economy indicate that not only the unemployment rate but also the unemployment duration will increase. There may also be a decrease in the intensity of de-registration to work.

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Benchmarking Big Data Architectures with BABEL

Mohamed Mehdi BEN AISSA
Tunisia Polytechnic School (University of Carthage),
Tunis, Tunisia,
mehdi_benissa@yahoo.fr

Lilia SFAXI
INSAT (University of Carthage), Tunis, Tunisia,
lilia.sfaxi@insat.u-carthage.tn

Riadh ROBBANA
INSAT (University of Carthage), Tunis, Tunisia,
riadh.robbana@gmail.com

Abstract

Choosing the right design, architecture and technologies for an application can be difficult for architects and engineers, especially when dealing with big and fast data. Indeed, these platforms need to deal with the data growth and variety, while generating insights in a timely fashion. These constraints, combined with the wide range of available storage and processing technologies, are hard to satisfy. On the other hand, and with the lack of clear methodologies, best practices and validation tools, testers struggle to perform end-to-end evaluations for the developed Big Data solutions. The need for a generic benchmarking solution, able to integrate with any multi-layered Big Data architecture, is manifest. In this paper, we present and evaluate BABEL, a generic, scalable, distributed and end-to-end Benchmarking Platform for Big Data architectures.

Keywords: Benchmark testing, Big data applications, Distributed management, Software architecture, Performance analysis

Introduction

The need for Big Data platforms in modern companies is increasingly pressing, as the value extraction is the main source of competitiveness. Handling such "big and fast data" is essential not only for automated decisional needs but also for a wide range of operational activities such as transactional systems, machine learning, and Internet of Things (Chen, Chiang and Storey, 2012). However, these platforms need varied types of expertise and a consequent investment in terms of hardware, human resources and implementation time. On the other hand, with the lack of standard architectures and predefined platforms (Braun, 2015), it is difficult to choose the right design for a complex Big Data system.

In fact, Big Data architects can pick nowadays from an expanding array of technologies (Azarmi, 2016) which makes the choice of the adequate architecture very complicated, especially while taking into consideration all the functional and non-functional parameters, such as business requirements, technology, tuning, integration between layers, costs, etc. (Malik, Rafatirad and Homayoun, 2018)

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We propose in this article an evaluation framework to help infrastructure engineers, architects and developers decide which architecture suits best their needs. We use in our case benchmarking as an evaluation tool. Benchmarking (Anand and Kodali, 2008) helps to compare the performance and efficiency of a set of systems regarding certain predefined metrics.

Defining a generic benchmarking framework to compare the adequacy of an architecture to the needs of the client can be rather tedious, as each architecture can have different characteristics: distribution and parallelism degree, used technologies and patterns, relation and integration between layers, supported workloads, generated data and events, etc.

On the other hand, existing benchmarks like YCSB (Cooper *et al.*, 2010), TeraSort (O'Malley, 2008) and BigBench (Ghazal *et al.*, 2013) are technology-oriented, and don't support multi-layered architectures. This is due to the fact that Big Data systems follow different patterns and constraints depending on the application and the technical and physical architecture, in addition to other constraints, such as processing type, data schema, and distribution policy.

This is why we introduce in this article a new benchmarking framework called **BABEL** (the name is inspired from the myth of the Tower of BABEL, used to justify the origin of the presence of multiple spoken languages), the **B**ig d**A**ta **BE**nchmarking p**L**atform. It is a generic tool, defined by a set of interconnected components that are destined to work for any Big Data architecture. In the following, a literature review study was addressed in order to identify the existing Benchmarking solutions, their benefits and limits. Then, we introduce BABEL by detailing its features, architecture and design. Finally, we explain in the experimentation part how to get started with the tool, accompanied by performance and overhead tests.

Literature Review

Many research papers tackled the problem of Big Data Benchmarking, each one of them using a different approach and targeting a different system. Some review works performed a classification of the existing benchmarks following several characteristics, such as the solution type (micro-benchmark, end-to-end benchmarks or benchmarking suites). We choose to classify them according to the type of targeted benchmarked systems. We noticed that the overwhelming majority of these benchmarking solutions target either a specific technology, or a specific type of application.

Technology-Specific Benchmarking Solutions These solutions are created to study the performance of a specific technology when varying the platform, the workloads or the testing environment. Most of the technology-specific Big Data benchmarking solutions are targeting the Hadoop framework. The ALOJA benchmarking platform (Poggi *et al.*, 2014), for instance, a set of open-source configuration management tools, coupled with a data analytics web application, is used to benchmark the Hadoop environment when varying the system's architecture. MRBench (Kim *et al.*, 2008), HiBench (Huang, Huang and Dai, 2010) and MRBS (Sangroya, Serrano and Bouchenak, 2012) are benchmarking suites destined to test MapReduce workloads while TPCx-HS (Nambiar, 2014) defines a standard produced by the Transaction Processing Performance Council (TPC) for benchmarking Hadoop runtime, API and MapReduce layers. PigMix (Ouaknine, Carey and Kirkpatrick, 2015) tracks the performance of the Pig query processor and SparkBench (Li *et al.*, 2015) targets all layers of the Spark framework.

Application-Specific Benchmarking Solutions Each one of these solutions targets a specific type of Big Data applications. We can distinguish for example solutions dedicated to storage systems, going from relational to NoSQL databases and distributed file systems such as HDFS. We cite in this category BigBench (Ghazal *et al.*, 2013) an application-level Big Data analytics benchmarking suite that captures

operations via SQL queries and data-mining operations to be analyzed via Batch-oriented processing; BigDataBench (Wang *et al.*, 2014), which is an open source benchmarking solution coupled with a data generation tool, that uses an iterative and incremental approach for its design, rather than a top-down one; and XBench (Yao, Özsu and Khandelwal, 2004), a benchmark that targets XML databases. Other solutions focus on streaming applications, like Chronos (Gu *et al.*, 2015), a framework for generating and simulating streaming data; the benchmarking platform for streaming computation engines proposed by Chintapelli et al. (Chintapalli *et al.*, 2016), which constructs a data pipeline to generate and process realistic streaming data to be computed by the three most popular streaming engines: Flink, Storm and Spark Streaming; and StreamBench (Qian *et al.*, 2016), which proposes a middleware between the data generator and the data processors. Several works, such as those of (Armstrong *et al.*, 2013; Capotă *et al.*, 2015; Nai *et al.*, 2015; Ngomo and Röder, 2016), focus on graph processing and storage, while others such as those of (Cooper *et al.*, 2010; Luo *et al.*, 2012; Ferrarons *et al.*, 2014), specifically tackle Big Data solutions in the cloud.

All the solutions cited above fail to offer a generic design that can be applied to any Big Data system and architecture. On the other hand, most of these benchmarks evaluate individual system components (either hardware components like the CPU or Networking, or software components like HDFS), specific systems or operations (Han, John and Zhan, 2018), and must be combined or modified to be applied to Big Data applications with complex architectures. To the best of our knowledge, very few existing solutions are architecture-level, such as the one presented by Persico et al. (Persico *et al.*, 2018), which provides several analyses to compare the performances of Lambda and Kappa architectures for Online Social Networks. Even though this work focuses on the impact of the used architecture on the performance of the system, it does not provide a general design for benchmarking Big Data architectures, that is dynamic, agile and adaptable to any architecture with any number of layers.

BABEL: Design and Implementation

Features

Our objective is to design a solution able to provide a set of custom and standard end-to-end performance metrics such as throughput, latency, power efficiency, and client CPU/memory consumption, under custom test cases. It must be agnostic to the System Under Test (SUT) and its architecture, and applicable to any multi-layered system using Big Data technologies.

Our focus is to present a conceptual design and a concrete implementation of a generic benchmarking framework, whose main features are:

Genericity It should be technology-, application- and architecture-agnostic.

Dynamicity It should run in parallel with the system, without interfering with its behavior, and with negligible overhead.

Adaptability It must adapt to any number of layers in the Big Data application, as well as to any type of data and workloads.

Multi-Paradigm It should be able to benchmark streaming and batch processing systems, as well as operational and decisional platforms.

End-to-End Solution It needs to evaluate the behavior of the whole system, by measuring application- and system-level metrics.

Real-time Reporting It must offer a real-time reporting layer, illustrating the system's metrics on the fly.

Distribution and Scalability It must be configurable, and offer a scalable collection, processing engines and storage, in order to enable the continuous archiving of metrics for a better analysis.

Agility The platform should be flexible: during the different integration phases and also at run-time, new layers, metrics, and processing jobs can be added on the fly.

In this solution, a great importance is given to *usability*. In fact, in addition to a user-friendly reporting, the tester should have little code to write, thanks to an easy extension of the connectors.

Architecture and Components

As shown in Figure 1, two main layers are defined in this platform: the *Benchmark Core Layer*, destined for the orchestration of the evaluation process, and the *Benchmark Integration Layer*, in charge of the communication with the SUT.

System Under Test (SUT) The SUT is the physical implementation of the architecture that we want to benchmark. It can include an unlimited number of layers and technologies with different levels of dependency, distribution and service agreements. BABEL is compatible with different types of workloads: transactional, decisional or mixed, easily customizable by the tester. BABEL can also support other advanced and complex multi-layered architectures, such as Business Intelligence, Complex Event Processing, Data Science, or Internet of Things systems. In addition to that, it ensures a full support of cloud native applications and platforms.

Benchmark Integration Layer This layer's goal is to inject generated data to the SUT and to collect the performance metrics from its endpoints.

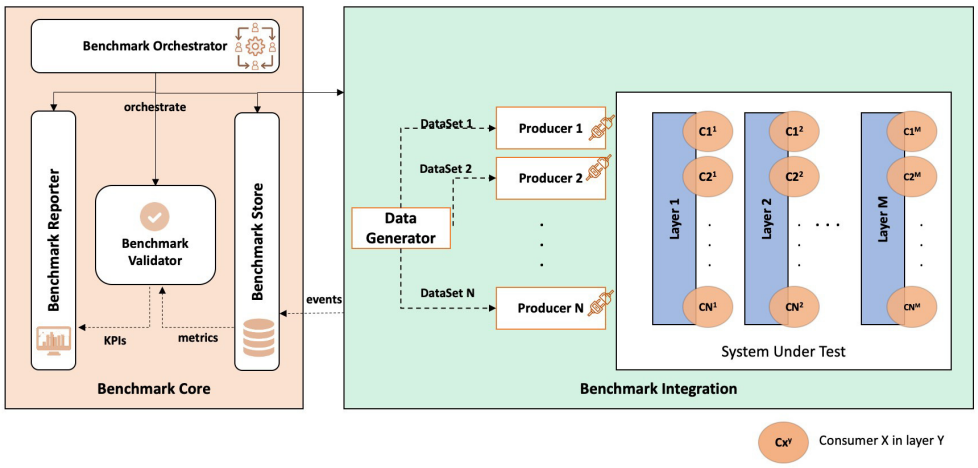

Fig. 1: Architecture of BABEL

Data Generator According to Han et al. (Han *et al.*, 2015), using real data in benchmarking is not always recommended, from a security point of view. On the other hand, it can be really hard to replay these data in the right chronological order with a realistic frequency. This is why, most benchmarks such as those presented by (Kim *et al.*, 2008; Cooper *et al.*, 2010; Capotă *et al.*, 2015; Qian *et al.*, 2016), use data generators for performance monitoring, which guarantees the respect of Big Data constraints: high data volume, velocity and variety.

The data generator is in charge of generating test data for the benchmark. The tester can manage the generated data flow by defining several configuration parameters for the generated data (number of fields, field length, etc.), producers (parallelism level, number of threads per producer, etc.) and SUT (connection parameters, hosts, ports, etc.)

The data generation module is an extension of the Yahoo! Cloud Serving Benchmark YCSB (Cooper *et al.*, 2010). It includes several Big Data connectors and gives a very high flexibility level, while integrating real use cases and a functional data generation. The data generation logic is managed by the orchestration layer and executed by the producers.

Benchmark Producers and Consumers The benchmark includes a set of scalable and distributed Producers and Consumers, in charge of connecting to the SUT. The producers are agents that help to disseminate streams to the entry points of the system. On the other hand, the consumers are in charge of collecting the metrics at the output of each one of the SUT's layers.

The producer and consumer's API can be enriched in order to respect the target business and technical logic. The API is generic and can be configurable to have a specific Producer's or Consumer's personality.

Each producer is identified by a unique *injectorId* in order to guarantee the consistency of the reports. However, as a unique producer is multi-threaded, we have to manage two levels of parallelism: a parallelism between different producers managed by the orchestrator, and a multi-threaded parallelism for a specific producer managed in the producer's configuration.

Consumers have also the same flexibility level and can be deployed using multiple approaches:

- **Agent mode**: the default mode. Just like the producers, consumers are deployed via agent processes that listen to specific layers and send metrics to the benchmark store.
- **Embedded mode**: in this mode, the consumer is deployed in the SUT layer via the API or using other techniques, such as the Aspect-Oriented Programming (AOP).
- **Plugin mode**: this mode is used when existing metrics are available in the SUT by default and can be integrated in the benchmark store via specific plugins.

Benchmark Core Layer The benchmark core layer includes its main components, in charge of configuring the integration layer. It doesn't depend on the SUT and target workload that we want to execute, as all its components are generic and extensible.

Benchmark orchestrator The orchestrator is the bandmaster of the system, in charge of triggering all the benchmark components with the adequate configuration. The orchestrator is in charge of the data generation distribution between the producers and their consistency with the metrics sent by the consumers. In order to be efficiently managed by the orchestrator, all benchmark components are listed and classified in configuration files, along with the SUT, the consumers and producers. This approach decouples the configuration from the implementation of the benchmark, and facilitates its portability and maintainability.

Benchmark Store This component is a scalable storage system, in charge of storing all the events and metrics reported by the producers and collected by the consumers of the integration layer. The metrics sent by the producers and consumers are stored as independent events with the real timestamp referring to the source system and the network time protocol server. We use asynchronous communications, in order to avoid the possible performance impact that can be caused by the integration of the consumers in the SUT, especially when using the embedded mode.

Benchmark Validator This component consumes the events from the store and transforms them into significant metrics and KPIs in order to prepare the next phase and simplify the reporting process.

Benchmark Reporter The reporter generates convivial graphs and reports for the tester, to help the decision-making process and enable a user-friendly display of the performance metrics. The generated reports can include independent metrics and KPIs for a specific layer or combined graphs representing performance lags between successive layers. It is also possible to compare workload results for the same or for different SUTs. The reporter component is in charge of the metrics indexing and visualization with the same scalability level as the previous layers.

BABEL Internal Execution Scenario

The main component and the entry point for the benchmark is the *orchestrator*, which has the responsibility to orchestrate all the other framework's components and to initialize the workflow with the appropriate configuration parameters. It first triggers the integration layer by sending the parameters to the *Data Generator*. This component has the responsibility to load the configuration from the orchestrator and to delegate to each *Producer* a test dataset based on time series as metadata for metrics traceability. Producers are distributed components in charge of the injection of data to the SUT. In parallel and for each layer of the architecture under test, the *Consumers* are managed by the benchmark orchestrator to consume results from the appropriate layer.

All integration components send asynchronous events to the distributed *Benchmark Store*. The *Benchmark Validator* pulls the new stored events, and performs a real-time validation of the performance metrics (throughput, latency ...), to be able to send the results to the *Benchmark Reporter*. The latter will start by indexing all the KPIs and metrics, to finally generate real-time and dynamic reports.

Implementation

We used Big Data technologies (Figure 2) for the implementation of BABEL in order to handle the complexity of the SUT, the volume of the generated data and the need of real-time processing in the validation and reports generation. Indeed, the Benchmark Store needs to be horizontally scalable and sustain a high throughput and a low latency. The Benchmark Validator needs to perform real-time validation of the event flow received from the store.

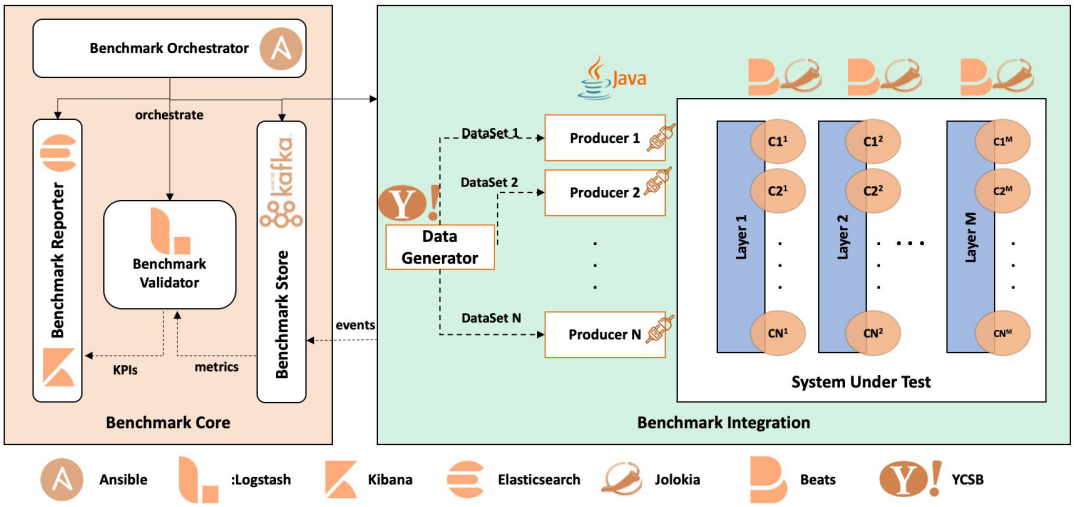

Fig. 2: Technical Architecture of BABEL

BABEL has a modular architecture and is composed of generic modules that can be adapted to different use cases independently of the SUTs, thanks to the use of interfaces and abstract classes.

You may find the open-source code of BABEL in the following GitHub repository: **https://github.com/mehdibn/BABEL**.

BABEL is developed in Java and uses the following technologies:

- The Data Generator extends YCSB APIs. The tester can keep the default data generation configuration, if random generated data are enough for the testing process. If not, he can easily develop his own data generation logic by overloading the **lastValue()** and **nextValue()** methods of the **Generator<V>** abstract class. He then just needs to specify it in the orchestrator configuration.
- We use the configuration and deployment management tool Ansible as an orchestrator. It supports a distributed execution and deployment, has a declarative approach, is idem-potent, and easily integrates with Big Data technologies. It centralizes all the definitions of the variables and parameters in two configuration files: the *inventory*, which defines the node groups, and *group_vars* which lists the producers and consumers with their installation and workload parameters.
- The benchmark store is implemented with Apache Kafka, a distributed ingestion tool, for a high performance, resilience and scalability. Kafka topics are automatically generated by the orchestrator when deploying the benchmark.
- For the benchmark validator, Logstash is used, because of its scalable and high-performance capacity for event collecting, cleansing and enrichment. The most important feature of this layer consists in transforming metrics to a unique BABEL schema to combine them in reports and dashboards. In case an advanced stateful processing is needed, as a perspective, Apache Flink can be used to implement more complex metrics' validations, requiring an event processing engine for advanced SUT architectures.
- For the reporter, Elasticsearch is used as an indexing system with time series design, plugged with Kibana for the visualization features. Indexes are automatically created by the orchestrator including a generic template of different metrics with pre-configured Kibana Dashboards.
- Basic Consumers and Producers are already developed and can be enriched by implementing the **GenericConsumer** and **GenericProducer** abstract classes. We consider that the effort is minimal as

only few methods will be overloaded by the tester: one to four methods from the specific CRUD operations of the SUT's first layers. Once specific producers and consumers are developed, they must be referenced in the configuration files by specifying their class names and binaries repository after compilation. For Java Management Extensions (JMX) consumers -one of the most used monitoring agents-, automatic on-demand deployment and integration are possible just by defining the SUT parameters in the *group_vars* configuration files.

Data generation BABEL supports customized data generation that testers can enrich easily in order to simulate their specific business logic.

The default benchmark generator can be used for performance testing when random data processing is supported by the SUT. Many parameters can be configured in the BABEL configuration file, such as the number of records to generate, the number of fields per record, the length of field, etc.

Supported Workloads Han et al. (Han *et al.*, 2015) argued that the workloads must be *relevant*, which means that they have to cover the typical behaviors of the evaluated system, *portable*, able to execute on different software systems and architecture, and *scalable*, adaptable to systems of different loads and scales. In order to respect these constraints, we offer the following workloads:

- **Write only [DEFAULT]**: can be used in order to simulate ETL systems, transaction systems, data collection, etc.
- **Read only**: can be used for user profile caching, when they are constructed elsewhere.
- **Update heavy workload**: a mix of 50% reads and 50% writes, and can be used for example for session storage and recording recent actions.
- **Read-modify-write**: in this workload, the client will read a record, modify it, and write back the changes. It can be used for example in user databases, where the records are read and modified by the user, or to record his activity.
- **Customized workloads**: Customized workloads can be configured by defining the proportion of each operation's type. In case of very specific workloads, testers can extend the **Workload** abstract class.

Both batch and streaming workloads are supported and can be configured by adjusting the number of records to generate, as well as the generation rate, that can be unbounded in order to simulate streams.

Getting started with BABEL

In order to use this framework to benchmark a Big Data architecture, we recommend the following approach:

1. Install Ansible on a separate node dedicated to the benchmark core and deploy its *ssh key* on the SUT nodes.
2. Clone the BABEL project from GitHub: https://github.com/mehdibn/BABEL
3. Check if the default data generator, producers and consumers are enough for your needs, or develop your own adapters.
4. Create your inventory describing the SUT and BABEL nodes.
5. Specify the configuration and architecture parameters in the *group vars* files by defining:
   a) Workload: parallelism level, number of fields and records, etc.
   b) Data Generator, consumers and producers' configuration
   c) SUT environment: servers addresses, number of layers, resources name like tables, topics, queues, etc.
   d) BABEL installation parameters

6. White-test the framework by running the various components without actually calling a real SUT, and simulating its behavior using dummy events. This will measure the cost of basic benchmark communications.
7. The reporting dashboards will be automatically generated based on the SUT parameters defined by the tester in the configuration files.
8. Deploy and start the different benchmark components by using the existing Ansible playbooks that will use the defined variables.
9. Real time automatically-generated reports and dashboards will be refreshed in order to show the pre-defined metrics.

SUT Evaluation Methodology

In order to evaluate the performance of the SUT, you first need to answer the following question: do we need to perform a load test (with a predefined reasonable workload) or a stress test (with an unbounded workload)? BABEL is configurable at runtime to support both approaches, depending on the needs of the tester.

Once this objective is fixed, testers need to answer the second question: what type of performance measures and metrics do we need to collect? In this perspective, different test scenarios can be considered:

- For a *performance tuning* purpose, it is advisable to maintain the same system and application configurations and to change one SUT parameter at a time to test its impact, such as: consistency level, partitioning, availability, memory, etc.
- For a *scalability or resilience testing* purpose, we can scale up and down the SUT by adding and removing nodes to its clusters.
- To test the *deployment environment*, we recommend maintaining the same architecture, while deploying it to various environments, that can be cloud based or on premise.
- To test the *performance of the chosen technologies*, we can keep the same architecture while switching from one technology to another.
- To evaluate and compare *multi-layered architectures*, we can keep the same technology stack but change the way they are composed and how they communicate.

BABEL is developed in a way that makes the benchmarking environment almost oblivious to the changes in the SUT. In fact, you just need to adapt the necessary producers and consumers by extending the existing APIs.

Benchmark Overhead and Processing Time

Inherently, the design of BABEL aims to minimize its overhead, by using asynchronous operations in the benchmark integration layer, when interacting with the benchmark core. In order to validate and measure the overhead, different tests were designed and implemented. Every operation is sent to the Benchmark Store, along with its timestamp, in real-time. For the test purpose, a Hadoop Cluster was deployed, including 10 Unix workers with 512GB of RAM, 64 cores and 10 SSD disks for each node. At this stage, a basic Big Data architecture is used including Apache Hadoop and Apache Spark. Producers inject generated data into HDFS, then a Spark batch job consumes it, executes a sort algorithm using each time a new consumer type.

Producers' Performance We compare BABEL with two standard Hadoop benchmarks: TeraGen (O'Malley, 2008) and HiBench (Huang, Huang and Dai, 2010). In Table 1, the results of three test

scenarios are presented. The workloads consist in injecting 500GB then 1TB and finally 100TB of data into HDFS, via the benchmark tools, and by keeping the same configuration: number of files, file format, parallelism level, basic SUT environment, etc. The values displayed below represent the average value obtained after executing the benchmark three consecutive times for every scenario.

During the BABEL and HiBench tests, we observed in the monitoring tools that the SUT was maximally stressed. This behavior was also confirmed by the execution times that were approximately the same. Comparatively, TeraGen is clearly less efficient.

After these tests, we can consider that the producer and data generation layer give acceptable performance results compared to their competitors and are able to stress the SUT by generating a lot of data via a distributed and scalable architecture.

Table 1: Comparative matrix between producers (Unit: second)

Workload	HiBench	TeraGen	BABEL Producer
500 GB	406,05	413,05	405,63
1TB	810,58	831,38	811,75
100TB	4081,76	4188,62	4078,81

Producers' Overhead Once we validated the producers' performance, the goal now is to measure their overhead. The first test scenario is executed without the integration of BABEL, only the producer was submitted by executing the same workloads. Then, in the second scenario, we re-execute the tests by integrating the producer with the BABEL core.

As presented in Table 2, the tests results show a very light overhead with values between 0,03% and 0,04% thanks to the asynchronous calls between the producers and the benchmark store. We consider that the producer's overhead is close to zero, which is only relevant when dealing with very precise SUT benchmark tests.

Table 2: Producer Overhead with Benchmark core integration (Unit: second)

Workload	Producer without core integration	Producer with core integration	Overhead
500 GB	405,63	405,75	0,0305%
1TB	811,75	812,04	0,0355%
100TB	4078,81	4080,31	0,0367%

Consumers' Overhead Following the same approach, we integrated several BABEL consumers with a Spark sort job using different modes. For every data load (500 GB, 1 TB and 100 TB), we compute the processing time of the spark job, without any consumer integration, then with an agent-based, embedded and plugin consumers. Table 3 shows the obtained results.

Table 4 summarizes the overhead of each consumer type compared to the execution time of the spark job without any consumer integration.

As expected, the lowest overhead belongs to the agent mode with values between 0,019% and 0,023%. This mode is based on independent processes deployed in the same SUT nodes with an indirect impact. We also note that the plugin mode's overhead has values between 0,038% and 0,041%, and, finally, that the embedded mode has the highest values between 0,049% and 0,053% as that it's the most intrusive one.

To conclude, even though all the overhead values are acceptable, we recommend the usage of the consumer agent mode when possible.

Table 3: Consumers Overhead (Unit: second)

Workload	SUT without consumers	Agent Consumer		Embedded Consumer	Plugin Consumer
500 GB	81,62	81,64		81,66	81,65
1TB	159,13	159,16		159,21	159,19
100TB	8050,43	8051,96		8054,70	8053,57

Table 4: Consumers Overhead compared to SUT tests without consumers

Workload	Agent Consumer	Embedded Consumer	Plugin Consumer
500 GB	0,021%	0,049%	0,038%
1TB	0,023%	0,052%	0,041%
100TB	0,019%	0,053%	0,039%

Conclusion

We present in this paper BABEL, a generic and scalable benchmarking platform for Big Data architectures. The idea behind BABEL is to offer a robust platform that collects the performance metrics from the system under test, stores and analyses them, to display real-time evaluations. BABEL is developed in a way that makes the effort to integrate it minimal, and the overhead to execute it close to null. Thanks to the scalable storage of BABEL, we are able today to keep a historical repository of the different test scenarios, an excellent use case for a machine learning application, helpful for automatic recommendations about the right behavior, configurations and load management of the system.

On the other hand, in order to facilitate the usage of Big Data architectures and technologies, we intend to integrate BABEL as a benchmarking platform in a flexible and adaptable methodology for governing, managing and applying data throughout the enterprise. BABEL is a project in progress. With the support of the open source community, the tool can be extended and adapted to communicate with various technologies by developing adequate consumers and producers.

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Towards a Better Management of Decisional Big Data Systems: A Design Methodology

Mohamed Mehdi BEN AISSA
Tunisia Polytechnic School (University of Carthage),
Tunis, Tunisia,
mehdi_benissa@yahoo.fr

Lilia SFAXI
INSAT (University of Carthage), Tunis, Tunisia,
lilia.sfaxi@insat.u-carthage.tn

Riadh ROBBANA
INSAT (University of Carthage), Tunis, Tunisia,
riadh.robbana@gmail.com

Abstract

Decisional systems are dedicated to support the decision-making activities, based on the available data in the organization. Decision-makers nowadays are more demanding in terms of accuracy, speed and availability of the analytics. This induces the need for complex platforms, managed by big teams and integrating data from various sources. Implementing these platforms requires a meticulous organization and a well-honed process that takes into consideration the team workforce, governance issues and agility requirements. In this context, we present a design methodology called DECIDE, intended for large-scale decisional Big Data projects.

Keywords: Data management, Design methodology, Distributed decision-making, Quality assurance, Big data applications.

Introduction

Managing big data projects is a great challenge for many organizations (Katal, Wazid and Goudar, 2013). Indeed, one of the most stringent aspects is to find the right approach to use for a complex and large-scale project. These characteristics apply strongly to decisional projects, as they unify data from various sources, and involve heterogeneous and numerous actors. Decisional projects are meant to be complementary to operational platforms by adding a decision-making layer to the main business process (Popovič *et al.*, 2012). In some contexts, they even have their place at the core of the business, for platforms such as trading, fraud detection, etc. A decisional project can follow one of two approaches (Golfarelli, Rizzi and Cella, 2004): (1) descending (**top-down**), that starts by defining the KPIs from the business needs, then proceeding with the collection and analysis of data, or (2) ascending (**bottom-up**), that consists on first understanding data in an exploratory approach that will define the analysis to be performed.

According to Vidgen *et al.* (Vidgen, Shaw and Grant, 2017), the main three management challenges that big companies face in creating value for decision-making are: defining a clear data strategy, finding the right people to conduct a data-driven cultural change, and following information ethics. It is therefore

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necessary to define the right methodology, that helps organizations address these challenges and determine the desired business and analytics goals (Saltz, 2015). A study conducted by Pricewaterhouse Coopers (PwC) and Iron Mountain (Reid *et al.*, 2015) on 1.800 businesses, shows that, even though most of the organizations are confident that they can extract value from their data, very few are actually getting full advantage from it. In fact, three out of four enterprises extract very little business value from their information.

According to Gartner (Moore, 2015), in addition to the lack of technical skills, the reasons for these failures are mainly the lack of organization and strategy. And this is where design methodologies provide value. Pahl *et al.* (Pahl *et al.*, 2007), define a design methodology as *"a concrete plan of action for the design of technical systems (...). It includes plans of action that link working steps and design phases according to content and organisation"*. In other terms, it is a process that formalizes and standardizes the rationale for system development decisions. Failing to use a consistent and documented methodology in a project, especially one involving new and fast-changing technologies, will most certainly reduce the likelihood of success and make it more difficult to continuously evolve by applying lessons learned across initiatives. PWC (Reid *et al.*, 2015) states that the good practices that should be applied by businesses to get the most out of their data, are mainly a well-established data governance, robust controls and data protection, the usage of fit-for-purpose data analysis and taking into consideration the business needs and goals.

The diversity of possible approaches and the fast-evolving ecosystem make it an imperative to define a more comprehensive and adaptable methodology. We refer to this methodology as **DECIDE**, which stands for **DEC**isional B**I**g **D**ata M**E**thodology.

Literature Review

Several decisional methodologies are defined in the literature (Romero and Abelló, 2009; Selma *et al.*, 2012; Abai, Yahaya and Deraman, 2013). These methodologies are mainly (but not exclusively) categorized into three types: **requirement-driven** approaches (Kimball *et al.*, 1998; Hüsemann, Lechtenbörger and Vossen, 2000; Winter and Strauch, 2003), that focus on the business users requirements, which should be collected beforehand, documented and formally defined to ease automation; **data-driven** approaches (Moody and Kortink, 2000; Jensen, Holmgren and Pedersen, 2004; Song, Khare and Dai, 2007), that focus on the underlying data sources to establish the Data Warehouse design, and **hybrid** approaches (Cabibbo and Torlone, 1998; Golfarelli and Rizzi, 1998; Boehnlein and Ulbrich-vom Ende, 1999; Bonifati *et al.*, 2001; Romero and Abelló, 2006), that combine the advantages of both data- and requirements- driven approaches, by designing the Data Warehouse according to available data sources, while taking into consideration the requirements of the business users.

The methodologies cited above apply specifically to classical Business Intelligence applications, where data is provisioned from stable and static sources, the data warehouse is centralized and structured, and ETL jobs are complex and periodic. But these constraints do not always apply to decisional Big Data projects, where data sources can be unstructured or/and generate data flows with a high velocity. Our approach is more exploratory, where the design of the storage systems and global architecture depend strongly on the data sources that include all sorts of real-time and near-real-time events. This is why we qualify our approach as **Event and Data-driven Approach**, as we are adapting to fast-moving and large-scale data sources.

For decisional projects, some teams, such as D2D CRC (D2D-CRC, 2019), tend to use Agile principles to organize their work, considering these architectural issues like any other development project. However, agility is difficult to implement in decisional systems, mainly because of the dimensional modeling's rigidity. In fact, the lack of planning and clear architecture can be a hindrance when designing the system,

especially when it comes to defining conformed dimensions. Dimensional modeling requires a global view of the users' needs to define the right model for the Data Warehouse, and it can be problematic to consider the KPIs from a limited set of users. But for Big Data decisional projects, we are not constrained by a frozen structure of the storage system. Agile methods can be very adequate, as the sources change and evolve constantly, and the user's needs can also vary depending on the type and content of these sources. This is why we opt for **agility** as a basis for our methodology.

On another perspective, Data Mining methods, such as SEMMA, KDD (Fayyad and Stolorz, 1997) and CRISP-DM (Shearer *et al.*, 2000), can be considered as alternatives for Big Data projects. Contrary to classical BI methodologies, Data Mining methodologies can easily adapt to Big Data projects, thanks to their bottom-up approach helping to apply data discovery to make complex analytics (Provost and Fawcett, 2013). In fact, their main goal is to understand and discover data, in order to deploy adequate data mining models that will help prediction and decision-making.

Some works (Angée *et al.*, 2018) tried to adapt these Data Mining methodologies to Big Data constraints. However, these solutions are still very strongly related to the specific case of data mining projects, contrary to our more global solution. On the other hand, pure Data Mining solutions do not take into account all transversal but crucial requirements of Big Data systems, such as the choice of the architecture, technologies, tools and roles. In addition, data governance, DevOps and team workforce considerations are neglected.

DECIDE: Design and Implementation

Features

The **DEC**isional B**I**g **D**ata M**E**thodology respects five fundamentals:

- **Agility**: it follows the Agile principles (Beck *et al.*, 2001).
- **Bottom-up Approach**: it is designed independently of specific KPIs.
- **Data and Event Driven**: it relies on the type and structure of the data sources, and on the various events generated by the environment, to design the data storage.
- **Multi-architectures**: it supports all decisional architectures that respect Big Data constraints.
- **Multi-technologies**: it is designed for any technology or stack.

DECIDE defines three main phases (Figure 1): (1) Data Preparation, (2) Data Collection & Storage, (3) Data Analysis & Presentation. Each of these phases is composed of a set of steps, with iterations in the same phase and between phases, showcasing the agility of the methodology. Every step defines data governance rules, as well as a data team-force distribution of roles and privileges, and a list of deliverables to be maintained all over the project.

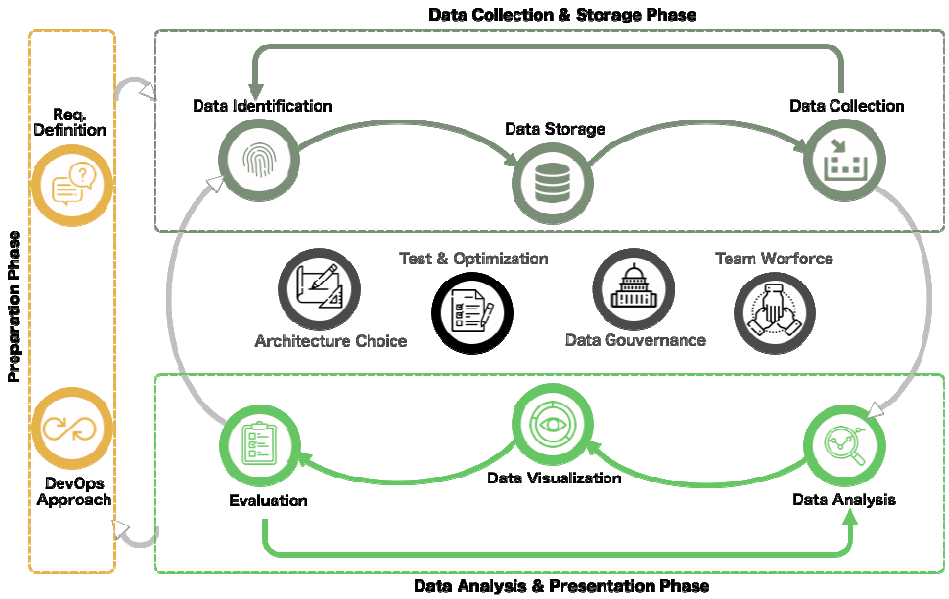

Fig. 1. DECIDE Steps

Preparation Phase

The preparation phase helps to prepare the building blocks of the project. A successful and solid Big Data project should start by defining the initial requirements, considering the target business impact and putting the deployment and automation infrastructure into place.

Initial Requirements Definition The initial requirements' definition is the result of the first encounters between the developing team and the clients. It is done at the beginning of the project to identify the needs that triggered the implementation of such a system. There are two types of initial requirements:

- **Business Requirements**: Where the client states the global needs of the application, and the necessary Business Success Indicators (BSI), to be extracted and represented.
- **Quality Requirements**: The definition of the quality requirements justifies many choices, such as the architecture, required tests, or technologies. Several quality attributes can be taken into consideration, such as availability, consistency, security, monitoring, etc.

Agile Approach Once the requirements and success criteria are defined, the team should produce a first project plan. This first version will be split into different sprints with equal duration, going from one to four weeks. A sprint can include one or many DECIDE steps depending on the context: number of data sources, complexity of the implementation, ecosystem, complexity of the analysis, etc. This part of DECIDE was mainly inspired from the SCRUM methodology. A sprint is considered validated only if all transverse steps are respected and the BSI evaluation confirmed by more than one team member. The sprints' definition is different from one team and context to another. The idea is to optimize the delivery process using tasks tracking, while keeping a high delivery frequency and a proximity between business and IT teams.

DevOps Approach Big Data and DevOps are becoming a very close team in big projects. While agility is about adaptation to change and communication, DevOps makes sure that the operations constraints (hardware and deployment environment) are taken into consideration from the beginning at the same level as the functional requirements. It is even more crucial in Big Data systems, as the technology choice and even the programming paradigms are related to the way your storage system will be deployed. DevOps considerations imply the use of the CI/CD practices (Continuous Integration/Continuous Deployment), which induce the use of tools and frameworks to automate the testing, release generation and deployment processes. It also goes hand in hand with the use of virtualization and containerization to help with the easy deployment on different production environments and the lessening of the dependencies between the implemented services and the underlying system and hardware.

Transversal Phase

The transversal phase represents recurring actions and operations that occur throughout the execution of the project.

Data Governance Data governance is a set of rules, processes, roles, policies and standards used to ensure the overall management of the availability, usability, understandability and correctness of the data in the company. It helps the organization in several aspects: to create a shared understanding of the data, to improve data quality in an efficient and cost effective manner, to represent a clear data map to locate needed data and have a single version of the truth for business entities, to ensure that the data strategy is compliant with government and corporate regulations, and finally, to continuously improve data management policies by defining proper codes of conduct and best practices.

The DECIDE methodology defines the necessary governance activities throughout the entire data life-cycle. Every operation in a decisional project (extraction, transformation, storage or linkage) should be recorded and monitored. This enables the construction of the data lineage and the verification of its integrity and confidentiality. A data governance tool should be set up, and used regularly at every step.

Architecture Choice Choosing the right architecture helps to ensure that the quality requirements defined in the beginning of the project are respected. It depends on several metrics, such as the data and processing characteristics, the quality attributes and the restitution type. The choice of the architecture is not a one-step operation. It is done all over the development phases, as every step of the methodology will contribute in refining your idea of the adequate architecture.

Team Workforce Distribution The distribution of the team workforce throughout the different phases and steps of the methodology is represented in Figure 2. A scaling system from 0 to 10 is defined, representing the implication of every role in each step of the process. 0 means *absent*, while 10 says *essential*.

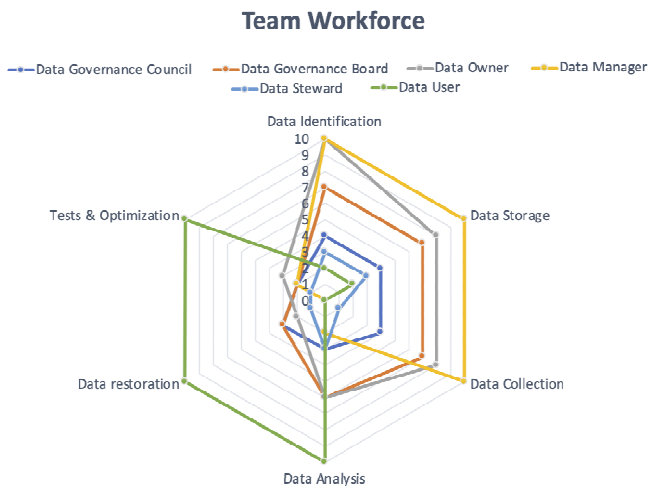

Fig. 2. Team Workforce

Tests and Optimization Testing is a critical operation that should occur not only at the end of the project, but also at the end of every step of the methodology. It will determine whether this step needs another iteration, or if we can proceed to the next one. Iterations can be used to optimize code, architectural choices or performance. DECIDE stands out compared to other bottom-up methodologies such as CRISP-DM, where the evaluation takes place at the end of the cycle, instead of at each step, which impacts the agility of the solution and the early detection of faults and design problems.

Data Collection and Storage Phase

This first phase's purpose is to prepare the environment for the data analysis. This preparation helps mainly in designing the storage system depending on the data to be collected.

Data Identification The design of a system following a bottom-up approach always starts with a data identification step, where various data sources are defined, for immediate use or in anticipation of a future need.

Data Sources Identification Data can come from many varied physical sources (mainframes, database servers, distributed systems, etc.) that can be of various types (production bases, logs, archived data, etc.). We first need to identify these sources, define their type (streaming, batch or mixed), and reliability. For the latter, a source reliability rating can be used, like for example the *Intelligence source and information reliability rating system*, which rates sources from A "completely *reliable*" to E "*unreliable*".

Datasets Identification From each data source identified in the previous steps, we list the datasets to be collected by describing their characteristics, such as structuring, type, data sensitivity, frequency and throughput, etc.

Data Models Identification This step is designed to prepare and simplify the dimensional representation of the data storage system that will store the final aggregated data. The idea is to represent each source dataset individually in an abstract way, by extracting its multi-dimensional view. This representation

must respect the standard OLAP naming convention, by tagging each attribute or entity in the dataset with one of the following types: identifier, measure, dimension, timestamp or non-decisional attribute. Once all datasets attributes and entities are tagged, you can now design or auto-generate the Data Models Graph including all the data sources, datasets and their attributes. Such a graph can be either drawn by hand or generated from a data source using a tool such as Collibra. For a starter, a graph is created for each dataset. Then, a set of tags can be added to the attributes in order to create dependency relations between the attributes of different datasets. Once all the graphs put together, we can use them to design the destination storage system, as well as the architecture and features of this system.

Data Cleansing and Enrichment Cleansing and/or enrichment of datasets improves their quality score and prepares the analytics steps. This is a first data scrubbing phase, done individually for each dataset, and can contain operations like identifying and removing duplicate records.

In a Big Data approach, as the cost of storage is very low, it's recommended to keep the different versions of the datasets before and after every data cleansing operation.

Deliverables The Data Identification step should produce, as an end result, the following deliverables:

- **SID** - *Source Inventory Document*: describes the data sources and datasets used in the system and the overall characteristics of each one.
- **DMD** - *Data Model Document*: contains a graphical representation of each data source using DMGs (Data Model Graphs).
- **TPD** - *Transformation Pipeline Document*: illustrates with diagrams the transformation workflow that every source dataset went through in order to be cleaned and enriched.
- **IED** - *Identification Evaluation Document*: lists the evaluation actions undertaken in this step.

Data Storage We identify the data stores to be implemented for persisting the data, their relationships and the data routing process between them.

Data Stores The data stores used in order to keep the archived and time-variant data are decomposed into four main logical layers, as described in Figure 3.

- **Integrated Raw Data Lake**: where the data is stored from the sources as it is, conserving their structure, relations and possible redundancies. The main objective of this store is to keep a repository containing all the company's data, without alteration.
- **Integrated Refined Data Lake**: where a denormalized and integrated version of the data is created, after an extraction phase, from the raw data lake.
- **Big Data Marts**: which represent a set of dedicated, single subject, schema-on-read, structured and decisional stores, where data destined to the same users are consolidated.
- **Serving Stores**: which are used to persist the results of the analysis phase. These stores are the only ones made accessible to the decision makers via visualization tools.

Data denormalization The architecture of the refined data lake is composed of a set of entities (tables or collections). These entities must be independent and completely non-correlated, respecting the principles of Big Databases: replication of attributes is thus favored over any dependency relation. The usual normal forms are no longer respected, which makes our refined database *denormalized*.

The advantage of this design is that the transformations can be executed via the ELT (*Extract-Load-Transform*) pattern thanks to the Big Data technologies and their high locality level (data storage and processing are localized on the same nodes) independently of the data sources.

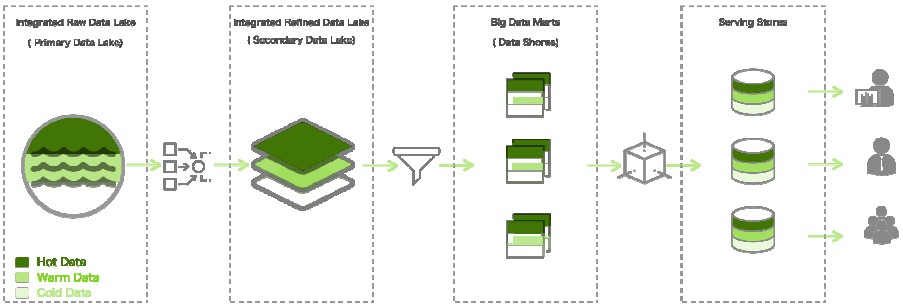

Fig. 3. Big Data Stores

It is important to underline that the raw and refined data lakes are two logical structures of the same global data lake, and should be located in the same physical infrastructure. The DMG (Data Models Graph), generated in the preceding step, can be used to generate a new physical data model (**PDM**), that unifies the different data sources in the same physical data structure, driven by the measures and based on the identified tags.

Data Storage Modes We need to deal with a multi-temperature decisional architecture, that can be composed of three types of data: *Hot Data*, which is frequently used, and must be persisted on a fast storage system, *Warm Data*, a less-frequently accessed data, that must be persisted on a slightly slower storage system, and *Cold Data*, which is rarely used, but that is generally the most voluminous. This type can be stored in the slowest storage system, but also the most scalable.

Implementation and Deployment In order to choose the adequate storage technologies, it is recommended to establish a comparative matrix based on benchmarking solutions.

Once your storage systems chosen, you can transform your **PDM** into technical structures or deployment resources like topics in Kafka, namespaces and tables in Hive, etc. In this step, the Data Governance rules must be respected by defining private and public spaces. The Private Space is a technical group of resources reserved to a specific application or module, distinguished by naming rules. The Public Space represents data that can be shared by more than one application or module.

For each resource and structure, and before the deployment in a Big Data context, the replication factor and distribution policy must be defined, as being either Round Robin, by request, by relationship or by order.

Deliverables We can define here three main deliverables:

- **PDM**: The *Physical Data Model* describes the physical model of the stored data, as well as the governance aspects, such as the public and private spaces.
- **TDS**: The *Technical Data Sheet* describes the technical properties of the storage systems.
- **SED**: The *Storage Evaluation Document* keeps the pros and cons of each store with a specific evaluation, especially since the stores can be complementary to respond to different needs.

Data Collection

Definition of the Collection Processes In a modern decisional architecture and especially for streaming analytics, fresh data must be collected fast and with a high frequency without impacting the data

sources. For each data source and its adequate storage, you have to define the collection processes while taking into consideration the transformation type (pre-load or post-load), the pattern (distributed or centralized) and the execution engine (streaming, batch processes or Change Data Capture paradigm).

Estimation of the denormalization cost The cost of denormalization must be defined for batch and streaming resources, to choose whether denormalization is done in real time along with the collection process, or later after the data storage. In order to keep the initial datasets intact and avoid data loss, the second choice is, most of the time, recommended.

Choice of the right technology(ies) and deployment mode Before choosing the right technology to use for each process, performing a comparative matrix is recommended in order to benchmark two or three technologies. As data collection technologies and stacks, we identified the following families: Classical ETL (e.g, Talend Data Integration, Pentaho), Big ETL (e.g, Talend Big Data, Pentaho Big Data), Change Data Capture CDC (e.g, Attunity CDC, IBM Infosphere CDC), and DataFlow Management (e.g, Apache Nifi, Streamsets).

Deliverables In this phase, the **TPD** defined in the identification phase, must be enriched with information about the technical choices, processes and the pipeline for the transformation and refinement of the data. This file can be automatically generated by the governance tool. Like every other phase, an evaluation document, called **CED** - *Collection Evaluation Document* is created, in order to evaluate the data collection phase and identify the different postponed or potential actions and steps in an iterative approach. Team members give a score for each process by taking into account the different tests described in the transversal step.

Data Analysis and Presentation Phase

This phase aims to design, implement, test, automate, optimize, present and manage the required analysis. The data collected during the first phase is raw, with a low-density level. This means that it is difficult to exploit it directly or extract information from it natively. In this direction, the next steps allow the end users to explore existing data by building KPIs, graphs and dashboards via analytic processes. In fact, the Integrated & Refined Raw Data Lakes and the Big Data Marts should never be directly accessed by decision makers. Data users, such as Data & Business Analysts and Data Scientists should be the ones that make the information more accessible to them.

Data Analysis Identification and design of the analysis jobs Data users must collect the needs of the end users and decision makers. Each needed analysis is described, along with its attributes, pipeline, the frequency and latency of its operations, its type (OLAP, complex non-linear analysis, machine learning or customized), distribution and scalability, and application pattern (mono- or multi-threading, map-reduce, multi-agent paradigm, etc.).

Implementation and Deployment As usual for every implementation step, a benchmark of potential technologies is needed in order to choose the right one. The implementation of the analysis jobs has to consider the Big Data constraints, patterns and best practices, such as data locality, partitioning, design by query, minimization of disk usage, reduction of shuffle operations and nodes' exchanges, etc.

Deliverables In this step, we identify two deliverables:

- **APD**: The *Analytic Pipeline Document* describes the pipeline of each analytical job including the input, output, intermediate results and the characteristics of each operation.
- **AED**: The *Analysis Evaluation Document* describes the quality of each processing job depending on the used data, resilience, consistency, scalability and performance.

Data Visualization The aim of data visualization is to restore the results of the processing layer via reports, graphs, dashboards, etc. Data restoration tools and technologies need to use ergonomic and modern features, such as auto-refresh, maps and geo-data, in order to improve as much as possible the user experience. Several choices need to be made, such as the visualization types (reports, graphs, dashboards, etc.), their refresh frequency, whether it is on-demand or pre-built, and other specifications such as their security constraints or multi-tenancy.

Choice of the right technology(ies) and deployment mode Before the deployment, it is important to check the integration of the visualization technology with the other layers of the architecture. Beware that performance issues can be identified in this step, but not necessarily related to the chosen visualization tool, rather to its integration with the previous layers.

Deliverables In this step, we identified two deliverables:

- **DVD**: The *Data Visualization Document* describes the visualizations and reports with the following details: analytic job, serving layer, visualization type and its characteristics.
- **VED**: The *Visualization Evaluation Document* describes the quality of each visualization and the potential optimizations that will be treated in the next iterations.

Evaluation: Global Optimization and Testing End-to-end testing and optimization is the step where a complete use case is automatically run on the system, and where KPIs' compliance is evaluated. The key indicators that are considered are: performance, scalability, charge and resilience.

This phase will ensure the integration of the different layers, look for the optimization issues and perform the integration, consistency and global performance tests. There is also a possibility to add other data sources and other analysis thanks to the layers' independence. This phase is essential in order to validate the global functional and technical specifications, while taking into consideration other constraints, like: cost, pooling resources, global configuration tuning, etc. By contrast with the local tests done during each of the previous steps, the global test phase goes through all the architecture layers and ensures the correct integration between them by the implementation of end-to-end:

- **Integration Tests**: determine if independently developed units of architecture are correctly integrated when they are connected to each other and respond to the expected functional and technical needs.
- **Performance, Scalability and Charge Tests**: verify if the system, as is, satisfies the performance expectations of the end users.
- **Resilience Tests**: check the way the system reacts to real-life events, by verifying its compliance to the expected behavior, its ability to recover when any part of the infrastructure or application is failing, etc.

Deliverables The expected deliverable is **3ED**: The *End-to-End Evaluation Document* describes the evaluation of the entire platform based on the global architecture and integration constraints. All the potential architecture and configuration optimizations should be traced.

DECIDE Overhead Estimation

We discuss the cost of different DECIDE phases and their overhead compared to classical decisional methodologies. Before giving more details, let's recall that DECIDE was designed for Big Data decisional projects that usually have to deal with a large-scale, multi-tenant business deployment, with the ability to serve different departments. It is when we deal with these sorts of projects and platforms

that DECIDE shows its benefits. We already stated that most of the classical decisional methodologies have a top-down approach. It consists of designing the platform from an initial need without taking into account the business evolution and new opportunities. From a technical point of view, these approaches aim to collect and transform only the data that will be used for actual decisional needs, neglecting crucial considerations such as the data governance or the team workforce.

In order to measure the cost of each DECIDE phase and its overhead, we compare it to traditional decisional methodologies, when applied to an e-commerce use case. This platform aims mainly to improve the decision-making process in order to optimize stock, provider and customer relationship management. A classical approach can perfectly help to deploy an OLAP platform based on production databases using a centralized data-warehouse with adequate data visualization tools.

Let's imagine now new business opportunities that can be implemented via new decisional features, such as customer behavior analytics based on navigation logs and metrics. The problem with classical methodologies is that: (1) unstructured data like logs can't be managed and designed using a multi-dimensional approach, (2) once the data is collected, it is difficult to dynamically add new data sources, such as logs in this example, and (3) even if (1) and (2) were possible, the data schema must be modified, in order to implement new analytics related to new business needs, which is very costly and can cause a non-negligible down-time of the system.

We reckon that DECIDE's data collection and storage phase is more expensive when we have to deal with small projects. However, the medium- and long-term benefits fully cover this overhead thanks to the gain in terms of time to market and refactoring costs in the case of rapidly evolving needs. We notice the same cost impact of the governance, DevOps and documentation operations that help to maintain a solid link between the different team members. Governance, in particular, shows its benefits with data mining and exploration, as all lineage and metadata can be accessible for all team members from any place. Indeed, DECIDE enforces a collaborative approach and helps data reuse and analysis.

We thus recommend to use DECIDE for Big Data projects with at least six team members or more than one team in order to benefit from its advantages. It is also recommended for enterprise decisional platforms that require the management of different heterogeneous data sources and datasets in multi-department organizations.

From an infrastructure point of view, avoiding useless data duplication by reusing and tracking it helps to reduce the overall costs. The other advantage of Big Data technologies is that infrastructure is horizontally scalable with cheap scalability units. We consider that the cost of the data analysis and presentation phase is optimized in DECIDE thanks to the data collection and storage phase coverage. Indeed, if the data is collected with high quality scores and if the governance rules are respected, the analysis and presentation will be much easier in DECIDE compared to classical methodologies.

Conclusion

We present in this paper a new design methodology called DECIDE, dedicated for decisional Big Data projects. This methodology is agile, data and event driven, and places a strong focus on data governance and team management. Communication is crucial via shared deliverables and collaborative tools. DECIDE is intended for large scale projects involving big and heterogeneous teams. It is not a theoretical methodology designed for academic needs, as it was successfully applied on two financial use cases for a French corporate and investment bank: a cash management and a risk management platform. Thanks to DECIDE, both projects observed a noticeable increase in the quality scores of their data sources, and the improvement of the business success indicators of the company. Our methodology

relies strongly on automation and DevOps principles, where continuous integration, testing and deployment are appreciated and recommended. These constraints give rise to the need of Big Data Test frameworks and benchmarking systems, adaptable to any Big Data design, along with a strong ability to capture and process all events generated by the system. In this perspective, we propose in a future work, a new benchmarking framework, designed for Big Data systems with Big Data technologies.

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Environmental Risk in Construction Company Management - Bibliometric Analysis

Anna ŁUPICKA
Poznan University of Economics and Business, Al. Niepodległości 10, 61-875 Poznań, Poland
anna.lupicka@ue.poznan.pl

Magdalena ZIĘTEK
Hipolit Cegielski State University of Applied Sciences in Gniezno, ul. Ks. Kard. Stefana Wyszyńskiego 38 62-200 Gniezno, Poland
mgdzietek@gmail.com

Abstract

Modern companies strive to achieve a competitive advantage in their industry, while streamlining logistics processes in such a way as to minimize costs, effort, and time. It is no different in the construction industry, the developer industry. While conducting business activity, entities make decisions in conditions of risk. This phenomenon is complex and does not have one universal definition. The risk can be considered from the point of view of both the effects and the degree of achievement of the assumed target. The authors distinguish different classifications of risk according to the area in which it arises or the factors that cause it. The type of risk, around which the article focuses, is environmental risk. The bibliometric analysis shows that environmental risk is a concept that has been present in the literature for several decades, and the trend of publications in this area is constantly growing (Web of Science - WoS). The situation is different in the case of narrowing the search to environmental risk in construction, the Web of Science database contains a small number of publications on this subject - although here too the trend is growing. This situation indicates a gap in the area under study. It should also be noted that it is the bibliometric analysis that is helpful in areas not yet recognized.

Keywords: Environmental Risk, Construction, Bibliometric Analysis, Management.

Introduction

Modern companies strive to achieve a competitive advantage in their industry, while at the same time streamlining logistics processes in such a way as to minimize costs, effort and working time. It is no different in the construction industry, the development industry, which is presented in the article. While conducting business activity, entities make decisions in conditions of risk. This phenomenon is complex and does not have one universal definition. The risk can be considered from the point of view of both the effects and the degree of achievement of the assumed goal. The type of risk around which the article focuses is environmental risk. Risk is the objective uncertainty of an undesirable event. A risk changes with the uncertainty, not with the degree of probability. Environmental risk has a negative dimension and refers to threats of environmental pollution by economic operators. Environmental problems in construction are not new but are still rarely considered in terms of risk management. The area under study is also important from a scientific point of view, and authors of scientific publications point out that construction has a high environmental impact[1,2,3,4,5] Construction, together with energy and transport, are the three largest sectors that contribute to greenhouse gas emissions and consequently pose a threat to the climate [6]. Construction has a negative impact on the environment through factors such as pollution, climate change, carbon emissions, dwindling natural resources, waste generation and land use change [7,8]. The article presents the results of a bibliometric analysis of environmental risk management in the construction industry. As it turns out, it is helpful in case of analysis of areas so far poorly recognized, unknown to analysts or when organizations operating in each area do not provide information [9]. The aim of the

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study is to try to determine which areas of knowledge are the main ones in research on environmental risk, as well as how the research trend is shaped.

The main objective, together with the specific objectives, is the scope of the research, so that environmental risks are considered in the context of logistical processes in construction, while taking into account the impact of innovation.

Further research has established the following hypothesis:

H1. Innovation is the main factor reducing environmental risk.

The subject of the research in the theoretical part is environmental risk, which is the starting point for further considerations. In the empirical part, the subject is the developer companies.

the bibliometric analysis carried out is intended to determine the further steps of the research, taking into account the specific objectives:

to identify the barriers that businesses face in reducing environmental risks;
- to establish a link between a company's position in the construction industry and its commitment to minimise the negative environmental impact of its activities;
- to define the factors for selecting the supplier and assess to what extent environmental risk is an important criterion for making decisions;
- to identify the impact of innovation on the reduction of environmental risk.

The Characteristics of Bibliometric Analysis

Bibliometric analysis is a method of measuring scientific literature. It allows to assess the size of scientific output based on the assumption that the essence of scientific activity (research and development, R&D) is to create knowledge reflected in the scientific literature. The analysis of literature with the use of bibliometric tools allows to identify thematic areas, but it may also be helpful in establishing new areas of research. Moreover, on this basis it is possible to estimate the concentration of individual researchers on specific areas of science. Quantitative methods in science, used to study development trends, were applied as early as in the 19th century in libraries and publishing houses. Over the years, these statistics were used to assess the contribution of a researcher to a field of science. However, the dynamic development of bibliometrics took place when the citation index appeared [10]. The citation index was first published in the 1960s by Eugene Garfield, founder of the Institute for Scientific Information[9]. It has been noted that the term "bibliometrics" is used alternately with "scienceometry". Scienceometry, in turn, according to the definition, deals with "quantitative methods of researching the development of science as an information process". [11]. Bibliometrics is a frequent tool used worldwide by scientists, companies, and institutions of public use, however, in Poland it is still relatively rarely used [9]. Bibliometric analysis, as already mentioned, often practiced around the world, is used to organize knowledge, manage it, search for new directions and possibilities. Studies on green supply chains have been developed so far[12,13], green innovations [14], green production[15], sustainable logistics [16] and reverse logistics [17].

Research Methodology

The method adopted in this article is the Systematic Literature Network Analysis (SLNA) method introduced by Colicchio and Strozzi [18], which combines a systematic review of literature on the one hand, and allows for the analysis of the bibliographic network on the other. These are the two stages according to which the analysis will take place. The first stage consists of the following parts [19]:

a. determining the scope of the analysis,
b. defines keywords, type of documents, time range, databases,
c. selection and evaluation of scientific works in a selected database.

The result of this stage is a set of scientific papers which will be used for later quantitative research. Then you can proceed to the second stage, which is the analysis and visualization of the bibliographic network based on quotations and keywords. The analysis of the citation network is based on references to articles in journals and other publications. The network is created by the author's references to other researchers, and then he himself joins the network. The nodes of such a network are individual publications, and the connecting elements, "arrows", are the citations [20]. It is assumed that citations represent the influence of the cited work on the author's new research [21].It is acknowledged that citations can be a measure of the importance of a publication, even though scientific papers with high citations do not always make a significant scientific and qualitative contribution to the area under study[22]. Based on citations, trends, and areas of interest in science can be identified. The bibliometric analysis will be conducted using the Web of Science Core Collection (WoS). Clarivate Analytics, formerly Thomson Reuters, is responsible for its release. WoS is a collection of scientific journals, conference materials, books. It is characterized by the ability to search by a specific topic, a specific author, title, language, time, and place of publication. The database contains many indicators for bibliometric analysis. In the further part of the analysis, VosViewer software was used, which enables analysis of the network created from keywords. It is possible to determine the strength of links between individual areas of research or the direction of development of a given idea.

Preliminary Results

First, an analysis of scientific work on environmental risk was carried out. As shown in Figure 1, the number of publications in this area continues to grow. The year 2020 is much smaller, since the analysis was conducted in March 2020. Therefore, it is considered reasonable to conduct research on environmental risk in construction for selected entities.

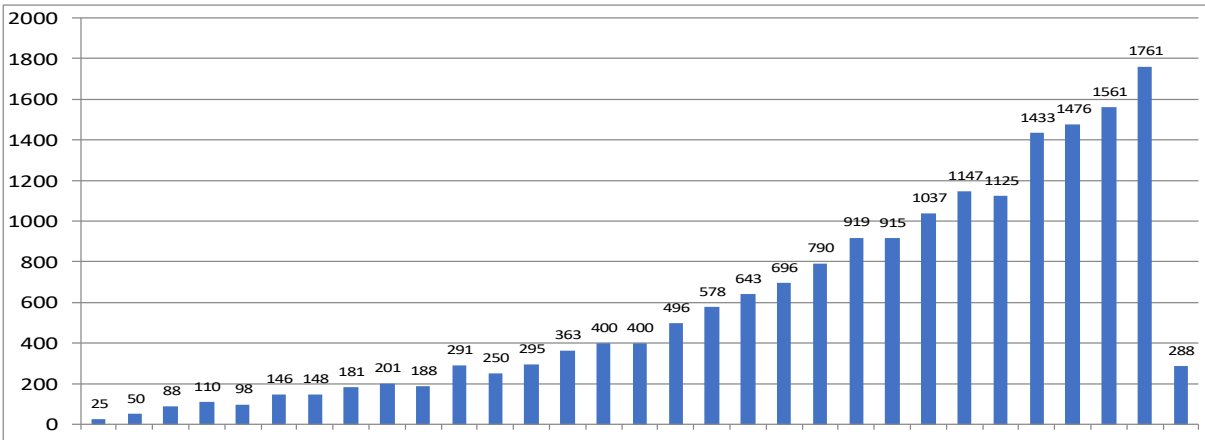

Figure 1: Number of publications on environmental risk based on the Web of Science, March 2020

Table 1: Search results for keywords environmental risk

Keywords	Search results
Environmental risk	18 291

Bibliometric analysis for the slogan environmental risk

From the activities carried out so far, preliminary statistics have already emerged, which are presented in Table 2. 18 291 results were collected in the database, which are as follows. The total number of authors working on the area under study is 61,782 scientists, coming from 172 countries. The authors represent 11 331 scientific entities. Most of them are publications from scientific journals, and the source titles are 5 584.

Table 2: Bibliometric indicators for keywords environmental risk

Publication statistics	
Number of records	18 302
Number of authors	61 782
Number of countries of origin	172
Number of science centres	11 331
Number of source titles	5 584

Years of publication

The further part of the analysis will follow the next available data in the Web of Science database. First, the years in which the scientific papers available for the set of selected keywords were published will be analysed.

The beginnings of the discussion in the area in question date back to the mid-70s, but the chart includes data from 1990-2020 (chart 1). The first source comes from 1976. It can be seen that the initial phase of development of environmental risks lasts until about 2000. Each year the number of publications has been gradually increasing. Slight fluctuations are visible, but the trend is constantly increasing until the current year. It is not clear whether the current number of publications is reaching its peak and the trend will be downward in subsequent years. It can be speculated, however, that the growing public awareness and growing legal restrictions of sectors concerning the environment will result in a further increase in scientific publications in the field of searched keywords. However, it is difficult to determine how long the trend will be upward and at what point the saturation of this area of science will occur.

According to the Web of Science database, the first scientific publication is the article Urban ecological containers, environmental risk cells and use of medical services, published in the United States. According to the source, the paper concerns preliminary empirical research between the concepts of urban ecology, environmental risk cells and use of medical services. The article discusses the need for the development of urban ecology as it is crucial for the understanding of urban space as a framework in which health risks are structured [23]. The same year there was also a publication on environmental risk factors influencing mortality in Norway. However, this is closely related to smoking and medicine [24] The most recent publication of this year is Energy, ecosystem development and environmental risk, which mainly concerns the insurance industry. The article notes that society increases environmental risk and that natural disasters are increasingly caused by people. It was recognized that if people feel responsible for the increase in natural disasters, they can certainly correct their mistakes. The conclusion of the article is that the best thing for the insurance industry may be to focus on saving energy, and unnecessary confrontation with the forces of nature wastes energy.

Knowledge area and scientific centres

At this stage, the scientific areas where environmental risks most often arise and the scientific centres where researchers deal with this phenomenon will be discussed. From the Web of Science, it can be determined that environmental risk is a multidisciplinary phenomenon that cannot be attributed to one area of science alone. The issue is extraordinarily complex, as can be seen in the number of domains to which they are assigned, and their diversity. The number of areas of knowledge is 145 and concerns, among others, such sciences as medicine, engineering, environmental sciences and even religion (2 studies). The interpenetration of disciplines is a natural step in scientific progress. This gives rise to new directions of research which combine at least two areas of knowledge. A similar phenomenon occurs in this dissertation. On the one hand, a risk is being discussed which, it would

seem, is mainly focused on environmental sciences, while on the other hand, the construction industry is considered as an engineering and logistical process. The combination of different scientific disciplines makes the research become interdisciplinary in nature. Table 3 contains the main areas of knowledge in which environmental risks are addressed.

Table 3: Main areas of knowledge identified for keywords environmental risk

Area of study	Number of scientific publications	% of 18 302 scientific publications
Ecology, environmental sciences	5 811	31,75
Engineering	1 764	9,638
Toxicology	1 503	8,212
Environment and health and safety	1 477	8,070
Neurobiology and neurology	1 426	7,791
Psychiatry	1 172	6,404
Psychology	860	4,699
Scientific technology (other topics)	771	4,213
Agriculture	747	4,082
Chemistry	674	3,683

The WoS database also makes it possible to carry out an analysis of the centres that dealt with the area in question. The data shows that the first 5 centres, out of the total number of 11 331, can be considered the most important. The number of publications is presented in Table 4, and the percentage share of those institutions in the total number of publications is 12.23%, which gives the total number of 2238 studies. The origin of the centres confirms the share of individual countries around knowledge examined, which are at the forefront of research on environmental risk. Looking in detail at the studies of the institution in first place (University of London), it was noted that the number of publications on environmental risk is on an upward trend and the h-index is 93. The upward trend in publications means that the researchers at this centre still see a need to develop and study the problem. A review of publications has shown that the main research is in the field of medicine [25,26,27].

Table 4: Main scientific centres identified for keywords environmental risk

Scientific centre	Number of scientific publications	% of 18 302 scientific publications
University of London (UK)	574	3,136
University of California System (USA)	511	2,792
Chinese Academy of Sciences (China)	440	2,404
Kings College London (UK)	366	2,000
Harvard University (USA)	347	1,896
National Institutes of Health (USA)	276	1,508
Helmholtz Association (Germany)	237	1,295
Virginia Commonwealth University (USA)	235	1,284
Consejo Superior de Investigaciones Cientificas (Spain)	225	1,229
Centre National de la Recherche Scientifique (France)	213	1,164

Based on the data contained in the Web of Science database, a visualization of the connections of individual keywords was performed, which is shown in Figure 1. The map was created in VOSviewer. Keywords of all publications form clusters based on which it is possible to identify areas of knowledge in which scientific works are created and connections between them. For the keywords "environmental risk" five clusters can be specified, marked with different colours. The number of keywords in each area indicates the development of a given area.

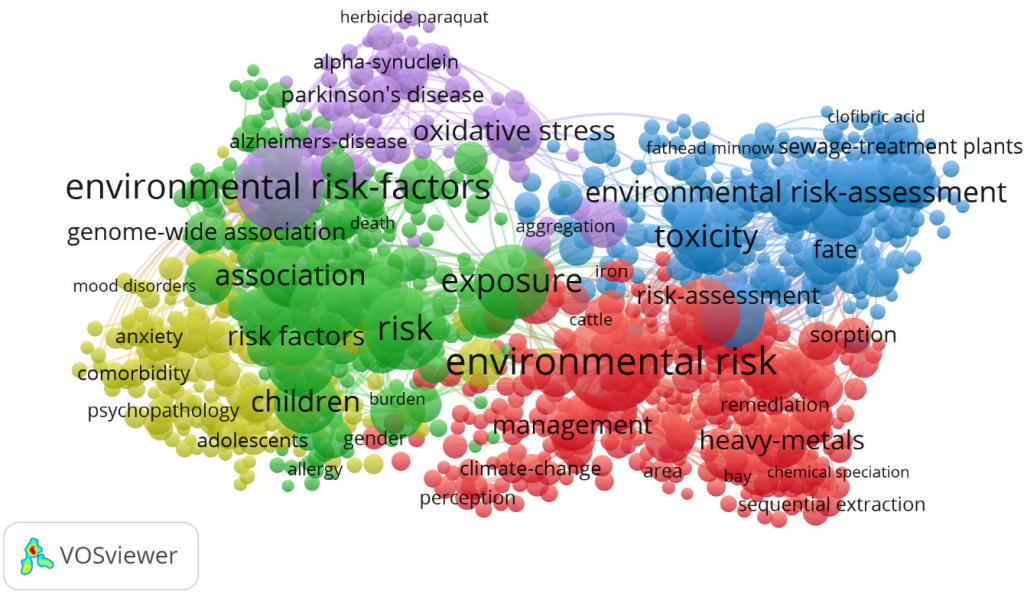

Figure 1: Map of key word clusters

Literature review on environmental risks in the construction industry

The next step is to narrow down the keywords. The article focuses mainly on the environmental risk, occurring in logistics processes in the construction industry. Therefore, the basic concept of environmental risk was used to find the publication, and the second one was defined as the construction industry. In the first stage, the total number of publications obtained for the research area is 18 302 results. However, using the second keyword this number was limited to 9 publications only. Table 5 presents the search results. Filtered data were also saved on an external data carrier for further analysis.

Table 5: Search results narrowed down to keywords

Keywords	Research results
Environmental risk AND construction industry	9

There is little work on this area of knowledge, but this does not mean that the topic is irrelevant. To date, the topic is insufficiently researched, which is a research gap. For the h-index search results it is 4, while the average citation is 8.56 and the total sum of quotations is 77. The first publication was made in 2007. It shows that concrete is the second most used substance in the world after water. In the process of cement and concrete production, demolition of concrete structures, recycling, there are activities which are potential threats to the environment and at the same time cause financial losses. In order to create a sustainable industry, it is necessary to reduce environmental risk. The authors presented a simulation of a system that examines the optimal flow of concrete materials, a company

strategy to minimize this type of risk [28]. So far, this is not enough to determine the trend. From the Web of Science database, it can also be seen that there is no leading centre that specialises in publishing with these keywords. Also, it is not possible to list the leading authors, their total number is currently 40. The analysis shows that 9 publications come from several areas of knowledge, such as environmental science, construction technology, engineering, scientific technology covering other topics, materials science, chemistry, and polymer science. The division into individual categories is presented in Table 6.

Table 6: Main areas of knowledge identified for the keywords environmental risk and construction industry

Area of science	**Number of scientific publications**	**% of 18 302 scientific publications**
Ecology, environmental sciences	4	44,44
Construction technology	3	33,33
Engineering	3	33,33
Building technology	3	33,33
Materials Science	2	22,22
Chemistry	1	11,11
The science of polymers	1	11,11

The most frequently quoted article is Life cycle carbon dioxide emissions simulation and environmental cost analysis for building construction. From the point of view of article it is an important publication, because it confirms the rightness of addressing the topic. The article states that the building industry has a large impact on the environment, especially carbon dioxide emissions. The authors emphasized that the recent years in the construction industry have been mainly focused on economic costs, and not on the impact of activities on the environment. The change took place recently, when the dependencies between industry, product life cycle (in this case buildings) and environment were noticed. The study presents a carbon assessment system with a function of calculating environmental costs. The presented method can be used in economic practice and will be helpful for engineers, architects, who will have the ability to assess the environmental risks for the building's life cycle, resulting in the choice of an appropriate construction method [29].

An interesting item that concerns the area under consideration is the article that discusses how construction tasks expose workers to many ergonomic risk factors - including environmental risk, which causes the possibility of musculoskeletal disorders to varying degrees. The result is problems that cause costly delays[30]. In Malaysia, on the other hand, an industrialised construction system was implemented to focus on mass production and modular products. A study of the site selection criteria for new production facilities was conducted and one of the most important conclusions of the article was that environmental risk proved to be an important selection factor[31]. The fact that the criterion of environmental risk is gaining importance was also visible in the amendment to the Environmental Protection Act of 2001, as well as in the laws and regulations on environmental protection in construction[31].

Feedback logistics is an important process for building logistics. This is what the next article focuses on the substance hexabromocyclododecane (HBCD). This product is often used in the construction industry but has a negative impact on humans and animals. It was mainly used in polystyrene foams. Most of these products will soon become construction waste, partly resulting from demolition, when the objects finish their life cycle. Such waste usually goes to landfills or incinerators. However, recycling of HBCD represents a small share compared to landfill, and this poses a risk to the

environment. It has been noted that little attention has been paid to this topic, so the article draws attention to the global environmental risks associated with HBCD.

Another publication confirming the importance of environmental risk for the construction industry is a study on transaction costs. They are a common problem in the construction industry and pose a threat to project implementation. The researchers used the risk as a phenomenon influencing transaction costs, which translate into the success of the investment. The study was carried out in Pakistan with 475 respondents. The results considered the impact of environmental risk on transaction costs as a significant risk factor. The respondents described it as critical because the phases of the investment depend on external factors which are not directly affected, and the projects are exposed to uncertainties. At the same time, environmental risk was divided into subcategories: unforeseen working conditions (25.62%), unforeseen events (25.48%), adverse weather conditions (24.84%) and employee strikes (24.06%) (Ali et al., 2018).

Conclusions

The bibliometric analysis, which initially listed 18,302 publications, showed that the problem of environmental risk is discussed very broadly in many areas, which proves that it is an interdisciplinary phenomenon. The trend of publications is still growing, so there was no exhaustion or saturation of the topic. After narrowing the keywords to the construction industry, the number of publications decreased significantly, there were only 9. This can be considered a research gap to be filled. The publications published so far confirm the significance of environmental risk for the construction industry. In addition, there are publications in the literature that include research aimed at identifying construction materials that are rapidly renewable and have little environmental impact. So far, such materials have been, for example: bamboo [32] sugar cane and even, interestingly, rice husks [33] Construction, alongside energy and transport, is one of the three most important factors contributing to greenhouse gas emissions that pose a threat to the climate[34]. This has forced industry to take measures that are sustainable and have a positive impact on the environment [35]. In the past, reducing costs, increasing productivity and quality have been the main reasons for companies to make changes. However, the growing awareness of the public, entrepreneurs, and contractors of the environmental impact of construction is setting a new course of action[36]. It should be noted that bibliometric analysis is a flawless tool. Unfortunately, despite the vastness of the database, it does not include all available publications on the area of knowledge under study. Nevertheless, bibliometric analysis allows to systematize the existing literature, to show the trend. On this basis, it can be concluded that the study of environmental risk in the logistics processes of the construction industry is the right direction of research. In addition, as mentioned earlier, bibliometric analysis is helpful in areas not yet identified. The bibliometric analysis showed the interdisciplinary nature of the term. The multitude of sciences in which the studies have been produced shows the importance of environmental risk for the economy, but also for health and life. In addition to such recurring fields of knowledge as medicine, engineering and environmental sciences, there have also been far fewer - such as religion, for example. The interpenetration of areas is natural in the progress of science. It provides an opportunity to develop new areas of knowledge. This phenomenon is recognized in the article.

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Comparative Analysis of The Logistic Capabilities of Seaports with The Use of Management and Applied Logistics Methods

Bohdan PAC

WSB University in Gdansk / Wyższa Szkola Bankowa w Gdańsku, Gdansk, Poland,
bpac@wsb.gda.pl

Abstract

The logistic capabilities of seaports is a factor which affects competitiveness in a particular water region and service quality in land-sea transport chains handled by seaport facilities. It is also a factor which defines the universality of seaports. Logistic capabilities can be measured by means of methods which are used in management and applied logistics. In this paper, such methods are presented as tools applied for the evaluation of the logistic capabilities of seaports, described with a hierarchical multi-criteria model. The result of the research comes as a classification of the Polish seaports which are of primary significance to the national economy. This classification makes it possible to define the advantages and disadvantages of the analysed facilities and their port performance profiles. The paper is of a conceptual nature and is part of an individual project implemented by the author at the Baltic Centre of Applied Logistics on the modelling of the strategic capabilities of the maritime economy on the example of Poland – in terms of its economic and defensive aspects.

Keywords: Seaports, Logistic Capabilities, Multi-Criteria Model, Management And Applied Logistics Methods.

Introduction

Maritime transport plays a key role in the handling of international trade. The positions taken by particular countries in this field depend on their access to a transport network, and seaports where cargo handling terminals and other transportation, forwarding and logistics companies are located.

Logistic capabilities come as a defined set of resources/possibilities for providing the supplies, services or products required to implement particular productive, commercial, service or public operations. Logistic capabilities significantly affect the efficiency and effectiveness of a logistic system, thanks to which logistic processes and operations are implemented. The operation of a seaport is based on the implementation of particular processes related to cargo and vessels, based on its logistic system (Fig. 1).

Logistic operations performed at seaports determine the efficiency and effectiveness of sea-land transport chains. Therefore, the logistic capabilities of a seaport influence its position and attractiveness for many potential and current customers. Seaports play a significant role in the integration of various transport modes. They provide a wide range of services involving both cargo and seagoing vessels. Seaport capabilities can be evaluated in a measurable way by means of the appropriate methods applied in management.

The aim of the paper is to present a method for evaluating the logistic capabilities of seaports which are of primary significance to the national economy. Based on this, a comparative analysis of the discussed port facilities will be provided. In this paper, the research objective is to provide an answer to the following problem: how to evaluate the logistic capabilities of a seaport, based on methods used in management and applied logistics, in order to provide a comparative analysis of the discussed port facilities in this field ? A working hypothesis which needs to be proved in order to solve the above-mentioned problem has been formulated as follows:

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A multi-criteria model applied to measure the logistic capabilities of seaports can be an efficient tool to provide a classification of such facilities in terms of their operational and systemic competitiveness, service quality, and universality in particular sea areas, and in handling land-sea transport chains.

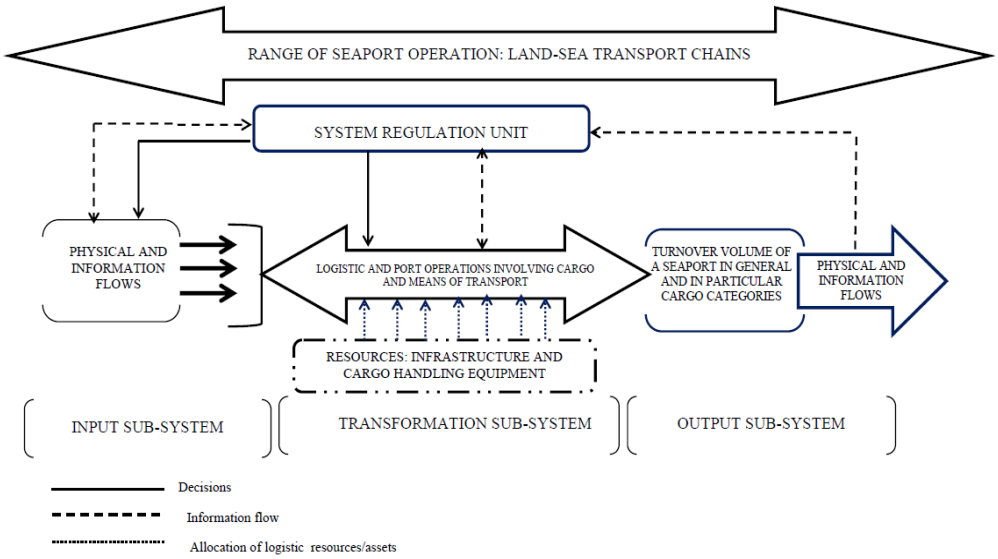

Fig. 1. Operation of a seaport logistic system.
Source: Author's own elaboration

In the research process, the following limitations have been assumed:

- the research area is limited to Polish seaports, in view of the availability of indispensable statistical data;
- the statistical data refer to 2016.

In order to achieve the aim, to solve the research problem and to prove the working hypothesis, a number of research tasks have been performed:

- a review of specialist literature on seaports and their logistic capabilities;
- the development of a hierarchical multi-criteria model of seaport logistic capabilities, based on the available data on the logistic capabilities of the analysed port facilities;
- the selection of a method to evaluate the logistic capabilities of the analysed seaports;
- an evaluation of the logistic capabilities in accordance with the accepted method;
- a comparative analysis of the logistic capabilities of seaports – conclusions and recommendations.

Research Process

The research process, during which the above-mentioned research tasks have been implemented, is divided into eight stages (Fig. 2):

Stage 1 – A review and selection of sources: monographs and specialist periodicals on the operation of seaports and their logistic capabilities, with consideration of the assumed limitations;

Stage 2 – An identification of modules of seaport logistic capabilities. Based on the review of selected specialist literature (Link, 2016 and Winkelmans, 2003), seaport logistic capabilities have been defined in the following way:

$$\Pi_{log} = \{M_i; i = \overline{1,5}\} \quad (1)$$

where:

Π_{log} – seaport logistic capabilities,

M_i – the subsequent module of seaport logistic capabilities, i=5 – the number of modules of seaport logistic capabilities.

The following modules of seaport logistic capabilities have been defined:

- seaport efficiency (M_1), which refers to the general capabilities of a seaport in the field of passengers and cargo handling;
- cargo-type interoperability (M_2), which refers to the capabilities of an analysed seaport facility in terms of handling particular cargo categories and passengers (Cf.: NATO, 1997);
- handling seagoing vessels (M_3), where the types of seagoing vessels handled at a seaport are identified;
- operational scope of a seaport (M_4), which defines the sea-land area handled by a seaport;
- infrastructure of a seaport (M_5), which comes as a significant resource, indispensable for handling seagoing vessels.

Stage 3 – Identification of the components of seaport logistic capabilities (C_{ij}) and their allocation to the particular modules (M_i). Based on the specialist literature review (see: Link, 2016, Central Statistical Office, 2017 and Winkelmans, 2003), the identified modules have been attributed with the following components of logistic capabilities:

- the M_1 module has been attributed with: the maximal annual cargo handling capacity, given in thousands of tonnes (C_{11}), the actual turnover of a seaport in terms of cargo handling during the analysed period, given in thousands of tonnes (C_{12}), the total dead weight tonnage (DWT) of seagoing vessels handled during the analysed period, given in thousands of metric tonnes (C_{13}), the number of maritime specialist (C_{14}) and universal/multi-purpose (C_{15}) cargo handling terminals;

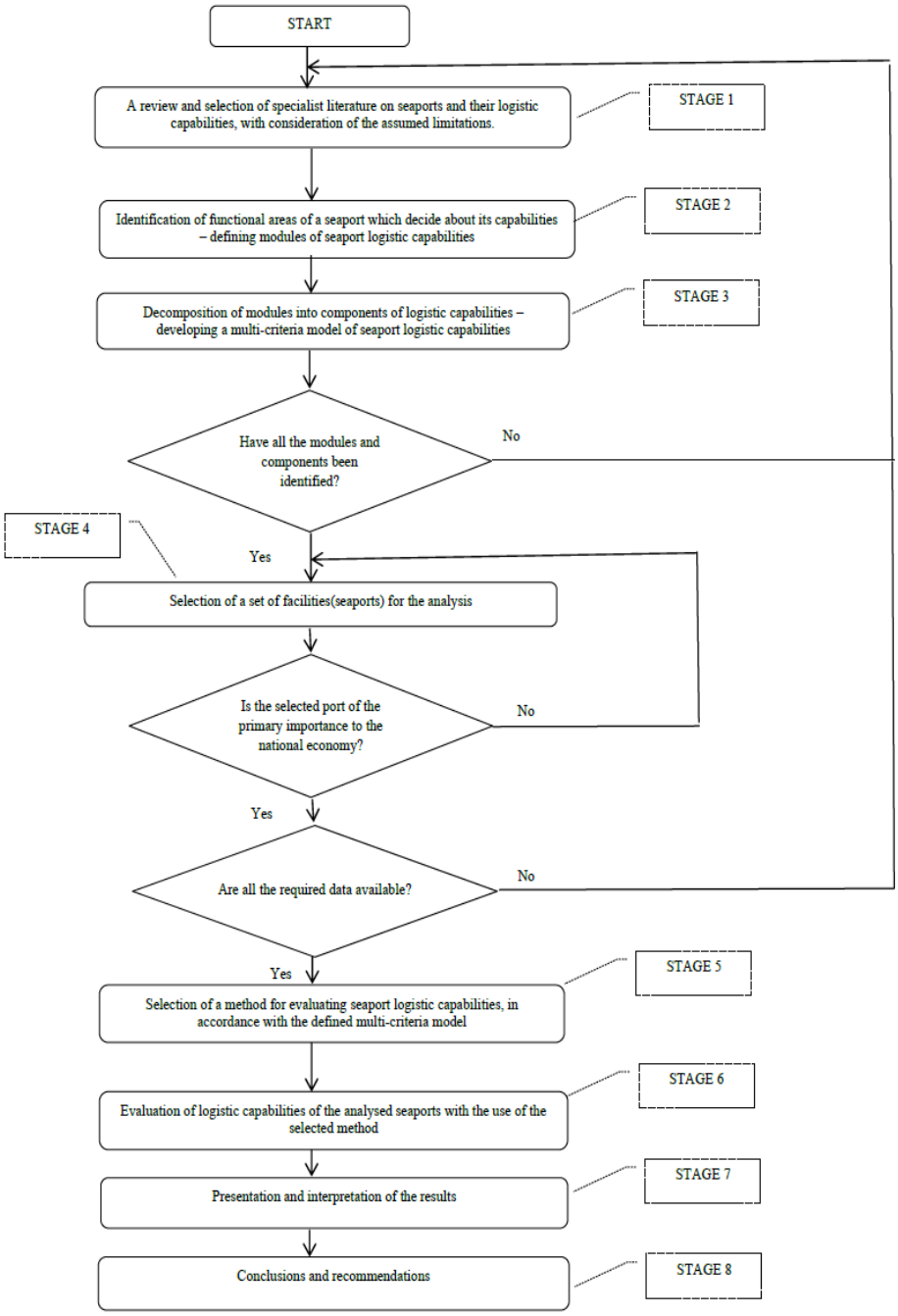

Fig. 2. The course of the research process.

Source: Author's own elaboration.

- the M_2 module has been attributed with: the actual volume of seaport turnover during the analysed period, given in thousands of tonnes of liquid bulk cargo (C_{21}), dry bulk cargo (C_{22}), container cargo (C_{23}), self-propelled ro-ro and non-self-propelled ro-ro cargo (C_{24}), other general cargo (C_{25}) and passengers, given in thousands of passengers (C_{26});

- the M_3 module has been attributed with: the total value of the dead weight tonnage (DWT) of the types of seagoing vessels handled at a particular seaport, given in metric tonnes for tankers (C_{31}), bulk carriers (C_{32}), container vessels (C_{33}), general cargo vessels (C_{34}), special vessels

(C_{35}), passenger vessels (C_{36}), barges and other vessels (C_{37}). DWT is the basic parameter which defines the size of a vessel and its loading capacity; it defines the total mass of the cargo, crew, supplies of fuel, supplies of drinking water and water for technical purposes, supplies of food, spare parts, etc., which can be taken on board without exceeding the maximum draft (for the draft up to the Plimsoll/load line)(Cf.: Hayler W., 2003);

- the M_4 module has been attributed with: seaport foreland (C_{41}), seaport hinterland (C_{42}), the integration scope of transport modes in the area of a seaport (C_{43}). A seaport foreland is formed by overseas areas and markets linked by regular shipping services to the seaport. A seaport hinterland is considered to be a land space over which a port has the dominant market share; the great majority of activities thus use that port for imports or exports (Cf.: Rodrigue J-P, 2020*)*. Integration of transport modes refers to the transport modes which are related to maritime transport in the seaport area;

- the M_5 module has been attributed with the following components: length of operational wharfs (C_{51}), length of operational wharfs of the depth ≥ 11 m (C_{52}), length of new and modernised wharfs (C_{53}), maximal draft of seagoing vessels handled at the seaport (C_{54}), area of warehouses (C_{55}), area of storage yards (C_{56}).

As a result, a multi-criteria model has been developed for evaluating seaport logistic capabilities (see: Belton V., Stewart T, 2002), as presented in Figure 3.

Stage 4 – Selection of seaport facilities for the analysis. In view of the assumed limitations, the analysis refers to the Polish seaports of primary significance for the national economy, namely: the Port of Gdańsk, the Port of Gdynia, and the Szczecin and Świnoujście Seaports, which are treated as one entity considering their complementary nature and one authority body managing the operation of both entities.

Stage 5 – Selection of a method for evaluating seaport logistic capabilities, in accordance with the model presented in Fig. 3. To evaluate the logistic capabilities, a rate-score-based method has been selected from those, which are used in management and applied logistics (CF.: Stabryła, 2006). This is an aggregation method which is applied to design and diagnose various facilities or phenomena. It allows interested parties to evaluate the value of a particular facility after the particular evaluation criteria are taken into consideration altogether. Using this method, makes it possible to provide a multi-criteria qualification of a seaport in terms of its logistic capabilities, presenting its actual status in a more comprehensive way. Combining the particular criteria allows us to answer the question of what the value of the facility really is in terms of the analysed aspect.

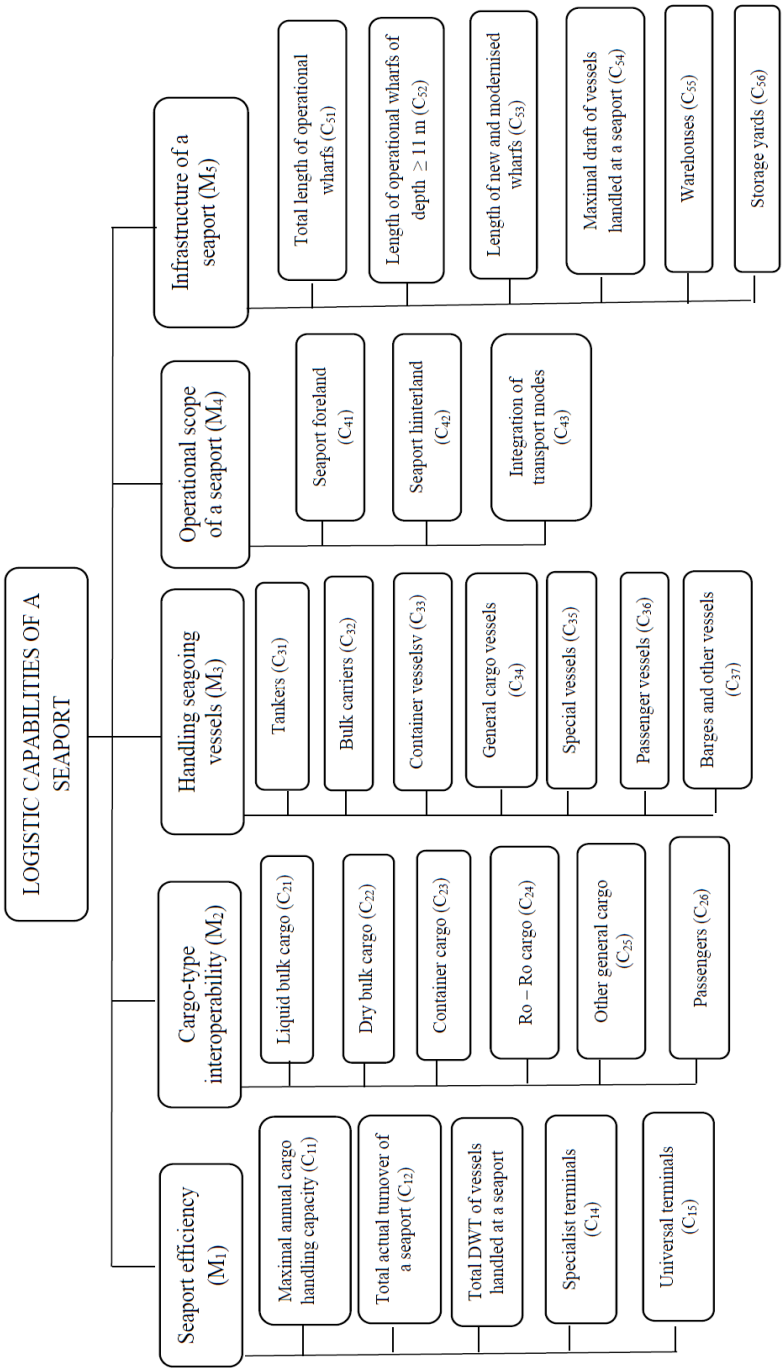

Fig. 3. A multi-criteria model of seaport logistic capabilities.
Source: Author's own elaboration, based on Belton V., Stewart T, 2002 and Link, 2016.

The solution based on this method refers to seaport logistic capabilities within the scope of the five defined modules, which are the evaluation criteria. The components attributed to the modules come as the evaluation sub-criteria. Based on the applied method, the benchmark status, the actual status and the rating evaluation have been determined for the analysed facilities, in accordance with the defined components of logistic capabilities, as presented in Table 1.

Table 1. List of the benchmark status, actual status and rating evaluation.

Evaluation criteria	Measurement unit	Benchmark status PC_{ij}^{BS}	Actual status PC_{ij}^{AS}	Rating evaluation $W_{ij} = \frac{PC_{ij}^{AS}}{PC_{ij}^{BS}}$
M_1				
C_{11}	thousands of tonnes	Maximum annual current cargo handling capacity of all the analysed seaports	Maximum annual current cargo handling capacity of the analysed seaport	
C_{12}	thousands of tonnes	The total actual turnover in the field of cargo handling of all the analysed seaports	The actual turnover in the field of cargo handling of the analysed seaport	
C_{13}	DWT in thousands of metric tonnes	The total DWT of vessels handled at all the analysed seaports	The total DWT of vessels handled at the analysed seaport	
C_{14}	pcs	The total number of specialist terminals at all the analysed seaports	The number of specialist terminals at the analysed seaport	
C_{15}	pcs	The total number of universal terminals at all the analysed seaports	The number of universal terminals at the analysed seaport	
M_2				
C_{21}	thousands of tonnes	The total turnover of liquid bulk cargo at all the analysed seaports	The turnover of liquid bulk cargo at the analysed seaport	
C_{22}	thousands of tonnes	The total turnover of dry bulk cargo at all the analysed seaports	The turnover of dry bulk cargo at the analysed seaport	
C_{23}	thousands of tonnes	The total turnover of container cargo at all the analysed seaports	The turnover of container cargo at the analysed seaport	
C_{24}	thousands of tonnes	The total turnover of ro-ro cargo at all the analysed seaports	The turnover of ro-ro cargo at the analysed seaport	
C_{25}	thousands of tonnes	The total turnover of other general cargo at all the analysed seaports	The turnover of other general cargo at the analysed seaport	
C_{26}	thousands of passengers	The total number of passengers handled at all the analysed seaports	The number of passengers handled at the analysed seaport	
M_3				
C_{31}	DWT in thousands of metric tonnes	Tankers handled at all the analysed seaports	Tankers handled at the analysed seaport	
C_{32}	DWT in thousands of metric tonnes	Bulk carriers handled at all the analysed seaports	Bulk carriers handled at the analysed seaport	

C_{33}	DWT in thousands of metric tonnes	Container vessels handled at all the analysed seaports	Container vessels handled at the analysed seaport	
C_{34}	DWT in thousands of metric tonnes	General cargo vessels handled at all the analysed seaports	General cargo vessels handled at the analysed seaport	
C_{35}	DWT in thousands of metric tonnes	Special vessels handled at all the analysed seaports	Special vessels handled at the analysed seaport	
C_{36}	DWT in thousands of metric tonnes	Passenger vessels handled at all the analysed seaports	Passenger vessels handled at the analysed seaport	
C_{37}	DWT in thousands of metric tonnes	Barges and other vessels handled at all the analysed seaports	Barges and other vessels handled at the analysed seaport	
M_4				
C_{41}	pcs	The total number of regular vessel continental and intercontinental connection lines of all the analysed seaports	The number of regular vessel continental and intercontinental connection lines of the analysed seaport	
C_{42}	km^2	Hinterlands of all the analysed seaports	Hinterland of the analysed seaport	
C_{43}		Possible integration of the following transport modes at all the analysed seaports: sea–road transport; sea-rail transport; sea-inland waterway transport; sea-pipeline transport; sea-air transport	Integration of sea transport with other transport modes at the analysed seaport	
M_5				
C_{51}	meters	The total length of operational wharfs at all the analysed seaports	The length of operational wharfs at the analysed seaport	
C_{52}	meters	The total length of operational wharfs of the depth ≥ 11 m at all the analysed seaports	The length of operational wharfs of the depth ≥ 11 m at the analysed seaport	
C_{53}	meters	The total length of new and modernised wharfs at all the analysed seaports	The length of new and modernised wharfs at the analysed seaport	
C_{54}	meters	Maximum draft of handled vessels recorded in the analysed set of seaports	Maximum draft of vessels handled at the analysed seaport	
C_{55}	m^2	The total area of port warehouses at all the analysed seaports	The area of port warehouses at the analysed seaport	
C_{56}	m^2	The total area of storage yards at all the analysed seaports	The area of storage yards at the analysed seaport	

Source: Author's own elaboration, based on the Central Statistical Office, 2017.

Stage 6 – Evaluating the logistic capabilities of the analysed seaports with the use of the rate-score-based method, as follows (CF.: Stabryła, 2006):

1) The values of rating evaluations which refer to the identified components of logistic capabilities have been calculated, based on the following equation:

$$W_{ij} = \frac{PC_{ij}^{AS}}{PC_{ij}^{BS}} \quad (2)$$

where:

$W_{ij} -$ rating evaluation for the subsequent component of the logistic capabilities of the analysed seaport;

$PC_{ij}^{AS} -$ actual status for the analysed component of the logistic capabilities of the analysed seaport, given in the respective measurement units;

$PC_{ij}^{BS} -$benchmark status (to which the actual status is compared) for the analysed component of the logistic capabilities of the analysed seaport, given in the respective measurement units.

2) Weight coefficients (($\overline{WC_{ij}^{V}}$), which refer to the significance of the components of logistic capabilities, have been defined, based on the opinions given by 10 experts, as presented in Table 2. The scale adopted for the expert evaluations is from 1 to 10;

$$\overline{WC_{ij}} = \frac{\sum_{y=1}^{10} WC_{ijy}}{10} \quad (3)$$

where:

WC_{ijY} – evaluation presented by the subsequent expert, where y=10 – the number of experts selected to provide the evaluation. The members of the expert panel were recruited from academic representatives who conduct scientific research on seaports, and practitioners from the field of the maritime economy;

Table 2. List of weight coefficients ($\overline{WC_{ij}^{V}}$) for the significance of the particular components of logistic capabilities.

LOGISTIC CAPABILITIES OF A SEAPORT																											
MODULES	M1					M2						M3							M4			M5					
EXPERTS (evaluations - WC_{ijy})	COMPONENTS OF LOGISTIC CAPABILITIES																										
	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{26}	C_{31}	C_{32}	C_{33}	C_{34}	C_{35}	C_{36}	C_{37}	C_{41}	C_{42}	C_{43}	C_{51}	C_{52}	C_{53}	C_{54}	C_{55}	C_{56}
E_1	8	10	5	7	5	8	7	10	9	4	4	9	7	10	7	6	5	2	8	7	9	8	10	8	10	7	5
E_2	7	8	6	8	6	8	5	9	10	4	5	8	6	9	6	5	6	2	7	6	10	7	10	9	8	6	5
E_3	8	10	7	9	6	9	7	10	8	3	4	9	7	10	7	5	4	2	8	7	8	6	9	7	10	7	7
E_4	9	9	6	8	6	7	6	9	8	3	5	9	8	10	8	3	5	3	6	8	9	6	10	8	9	8	6
E_5	9	10	8	7	5	9	7	10	8	2	4	7	8	9	8	4	4	3	9	7	8	8	8	7	8	7	5
E_6	7	10	6	9	8	8	6	9	8	4	3	8	7	9	8	5	5	2	7	9	9	6	9	8	9	9	4
E_7	8	8	7	8	5	9	6	10	8	3	4	8	6	10	9	5	6	3	6	7	8	7	10	8	8	7	6
E_8	9	9	8	7	6	7	5	10	9	3	4	9	8	10	7	6	7	2	9	7	9	6	10	7	8	7	7
E_9	8	9	8	7	4	8	7	9	8	4	3	8	6	9	6	5	6	2	8	8	8	6	9	8	10	8	5
E_{10}	9	8	7	8	5	9	6	10	9	2	3	8	7	10	8	5	7	2	8	9	10	5	10	8	8	9	6
$\sum WC_{ijy}$	82	91	68	78	56	82	62	96	85	32	39	83	70	96	74	49	55	23	76	75	88	65	95	78	88	75	56
$\overline{WC_{ij}}$	8.2	9.1	6.8	7.8	5.6	8.2	6.2	9.6	8.5	3.2	3.9	8.3	7.0	9.6	7.4	4.9	5.5	2.3	7.6	7.5	8.8	6.5	9.5	7.8	8.8	7.5	5.6
δ_{ij}	0.748	0.871	0.98	0.75	1.02	0.75	0.779	0.632	0.671	0.68	0.86	0.64	0.77	0.632	0.916	0.831	1.02	0.458	1.02	0.921	0.748	0.92	0.670	0.6	0.872	0.921	0.92
$v_{ij} = \frac{\delta_{ij}}{\overline{WC_{ij}}}$	0.091	0.096	0.144	0.096	0.182	0.091	0.125	0.066	0.079	0.158	0.179	0.077	0.11	0.066	0.124	0.169	0.185	0.199	0.134	0.122	0.085	0.141	0.071	0.077	0.099	0.122	0.164
Verified evaluations → $\overline{WC_{ij}^{V}}$	8.2	9.1	6.8	7.8	5.6	8.2	6.2	9.6	8.5	3.2	3.9	8.3	7.0	9.6	7.4	4.9	5.5	2.3	7.6	7.5	8.8	6.5	9.5	7.8	8.8	7.5	5.6

Source: Author's own elaboration.

$\overline{WC_{ij}}$ – is the arithmetic mean of the experts evaluation for each component.

Next, the expert evaluations referring to particular components were verified in terms of consistency based on the classical coefficient of variation (Everit B., 1998) (see: equation 4 and Table 3)

$$v_{ij} = \frac{\sigma_{ij}}{\overline{WC_{ij}}} \tag{4}$$

where:

v_{ij} – the classical variation coefficient (calculated for the particular components);

σ_{ij} – average standard variation of the expert opinion at the component level.

Table 3. The preference scale of classical variation coefficients.

v_{ij}	**Preference scale**
$v_{ij} \leq 0.1$	Weak differentiation of the coefficient (a satisfactory level)
$0.1 < v_{ij} \leq 0.3$	Moderate differentiation of the coefficient (an acceptable level)
$0.3 < v_{ij} \leq 0.5$	Strong differentiation of the coefficient (an unacceptable level)
$v_{ij} > 0.5$	Very strong differentiation of the coefficient (an unacceptable level)

Source: Author's own elaboration

$\overline{WC_{ij}^{V}}$- the weight coefficient provided to each component on the basis of the expert evaluations, where the $v_{ij} = \frac{\sigma_{ij}}{\overline{WC_{ij}}} \leq 0{,}3$ (see: Table 2).

3) The weighted values of logistic capabilities at the component level have been calculated in accordance with the following equation:

$$WW_{ij}^{Log} = \overline{WC_{ij}^{V}} x W_{ij} \quad (5)$$

where:

WW_{ij}^{Log} - the weighted value of logistic capabilities at the component level.

4) The values of the logistic capabilities of the analysed seaports at the levels of the defined modules have been calculated in accordance with the following equation:

$$PWW_{i}^{Log} = \sum WW_{ij}^{Log} \quad (6)$$

where:

PWW_{i}^{Log} – logistic capabilities of a seaport at the level of the subsequent module.

5) The total values of the logistic capabilities of the analysed seaports have been calculated in accordance with the following equation:

$$\Pi_{log} = \sum PWW_{i}^{Log} \quad (7)$$

where:

Π_{log} – the total value of seaport logistic capabilities.

Stage 7 – Analysis and interpretation of the results. The analysis and interpretation of the results includes the following:

1) A comparison of the values of the logistic capabilities of the analysed seaports has been presented.

2) The share of logistic capabilities in the total logistic capabilities of each analysed seaport has been calculated at the module level, in accordance with the following equation:

$$MR_i = \frac{PWW_i^{Log}}{\Pi_{log}} \quad (8)$$

where:

MR_i – the share of logistic capabilities presented by a particular seaport at the level of the subsequent module within the total logistic capabilities of that particular seaport.

3) The port performance profile in the discussed group of port facilities has been analysed.

Stage 8 – Conclusions and recommendations. Based on the results obtained during the research on the status of the seaports in the discussed field, some possible areas for development of the analysed port facilities have been discussed, along with the utility of the applied qualitative method.

Results of the research

Based on the calculated values and verified weight coefficients, which define the significance of the subsequent components in the identified modules of seaport logistic capabilities, and based on the values of the rating evaluations of the particular components for the analysed seaports, the following parameters have been calculated, as presented in Table 4:

- the weighted values of logistic capabilities at the level of the components (WW_{ij}^{Log}) for the analysed seaports;
- the values of logistic capabilities according to the defined modules (PWW_i^{Log}) for the analysed seaports;
- the total values of logistic capabilities for the particular analysed seaports (Π_{Log});
- the shares of logistic capabilities. according to the identified modules (MR_i), within the total logistic capabilities of the analysed seaport.

Table 4. Parameters which define the logistic capabilities of a seaport

Evaluation criteria	$\overline{WC_{ij}^{V}}$	Port of Gdańsk		Port of Gdynia		Ports of Szczecin and Świnoujście	
		W_{ij}	WW_{ij}^{Log}	W_{ij}	WW_{ij}^{Log}	W_{ij}	WW_{ij}^{Log}
M_1							
C_{11}	8.2	0.528	4.33	0.223	1.84	0.249	2.04
C_{12}	9.1	0.446	4.06	0.251	2.28	0.303	2.76
C_{13}	6.8	0.404	2.75	0.271	1.84	0.325	2.21
C_{14}	7.8	0.357	2.78	0.25	1.95	0.393	3.06
C_{15}	5.6	0.35	1.96	0.3	1.69	0.35	1.96
		PWW_1^{Log}	15.88		9.60		12.03
		MR_1	0.188		0.144		0.184
M_2							
C_{21}	8.2	0.688	5.64	0.103	0.84	0.209	1.71

C_{22}	6.2	0.372	2.30	0.288	1.79	0.340	2.11
C_{23}	9.6	0.576	5.53	0.390	3.75	0.034	0.32
C_{24}	8.5	0.025	0.21	0.270	2.30	0.705	5.99
C_{25}	3.2	0.171	0.54	0.195	0.63	0.634	2.03
C_{26}	3.9	0.056	0.22	0.334	1.30	0.61	2.37
		PWW_2^{Log}	14.44		10.61		14.53
		MR_2	0.171		0.160		0.222
M_3							
C_{31}	8.3	0.664	6.25	0.119	0.67	0.217	1.38
C_{32}	7.0	0.339	2.24	0.277	2.1	0.384	2.66
C_{33}	9.6	0.657	5.07	0.291	3.6	0.052	0.73
C_{34}	7.4	0.103	0.89	0.323	2.17	0.574	4.24
C_{35}	5.1	0.561	2.7	0.247	0.33	0.192	0.87
C_{36}	4.9	0.385	0.84	0.557	3.56	0.058	1.1
C_{37}	2.3	0.239	0.4	0.163	0.14	0.598	2.06
		PWW_3^{Log}	18.39		12.57		13.04
		MR_3	0.217		0.189		0.199
M_4							
C_{41}	7.6	0.28	2.13	0.5	3.8	0.22	1.67
C_{42}	7.5	0.5	3.75	0.5	3.75	0.5	3.75
C_{43}	8.8	0.8	7.04	0.6	5.28	0.6	5.28
		PWW_4^{Log}	12.92		12.83		10.70
		MR_4	0.153		0.193		0.164
M_5							
C_{51}	6.5	0.36	2.34	0.24	1.56	0.4	2.6
C_{52}	9.5	0.494	4.69	0.347	3.30	0.159	1.51
C_{53}	7.8	0.495	3.86	0.435	3.39	0.07	0.55
C_{54}	8.8	1.0	8.8	0.87	7.66	0.6	5.28

C_{55}	7.5	0.21	1.57	0.45	3.38	0.34	2.55
C_{56}	6.5	0.36	2.34	0.24	1.56	0.4	2.6
		PWW_5^{Log}	22.92		20.85		15.09
		MR_5	0.271		0.314		0.231
		Π_{Log}	84.55		66.46		65.39

Source: Author's own elaboration

Based on Table 4, a graphic interpretation of the following parameters has been provided:

- the values of logistic capabilities of the analysed seaports (Fig. 4), both: the total values (Π_{Log}) and the values referring to the particular modules (PWW_i^{Log});
- the shares of logistic capabilities, according to the identified modules for the particular seaport, within the total logistic capabilities of this seaport (Fig. 5) - $MR_i = \frac{PWW_i^{Log}}{\Pi_{log}}$;
- the port performance profiles of the analysed seaports (Fig. 6).

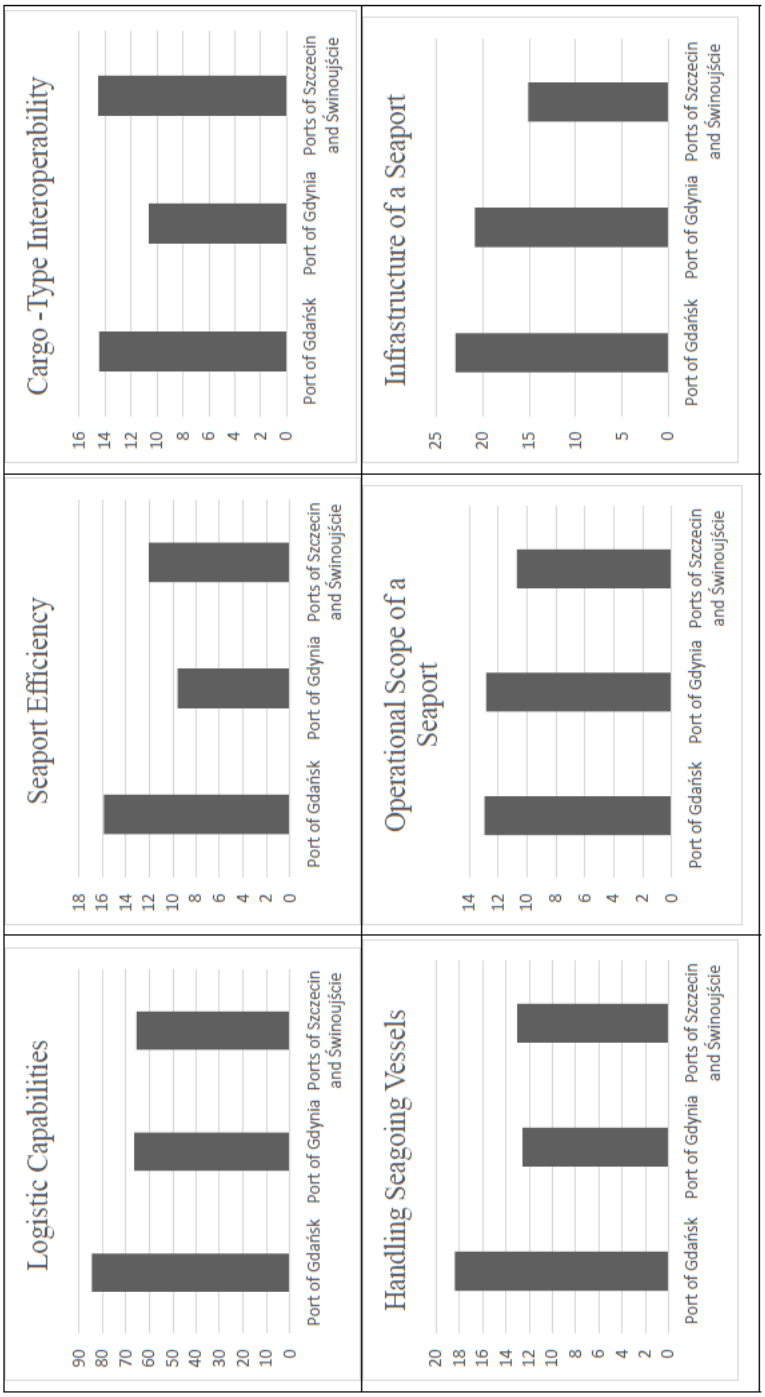

Fig. 4. The values of the logistic capabilities of the analysed seaports.

Source: Author's own elaboration

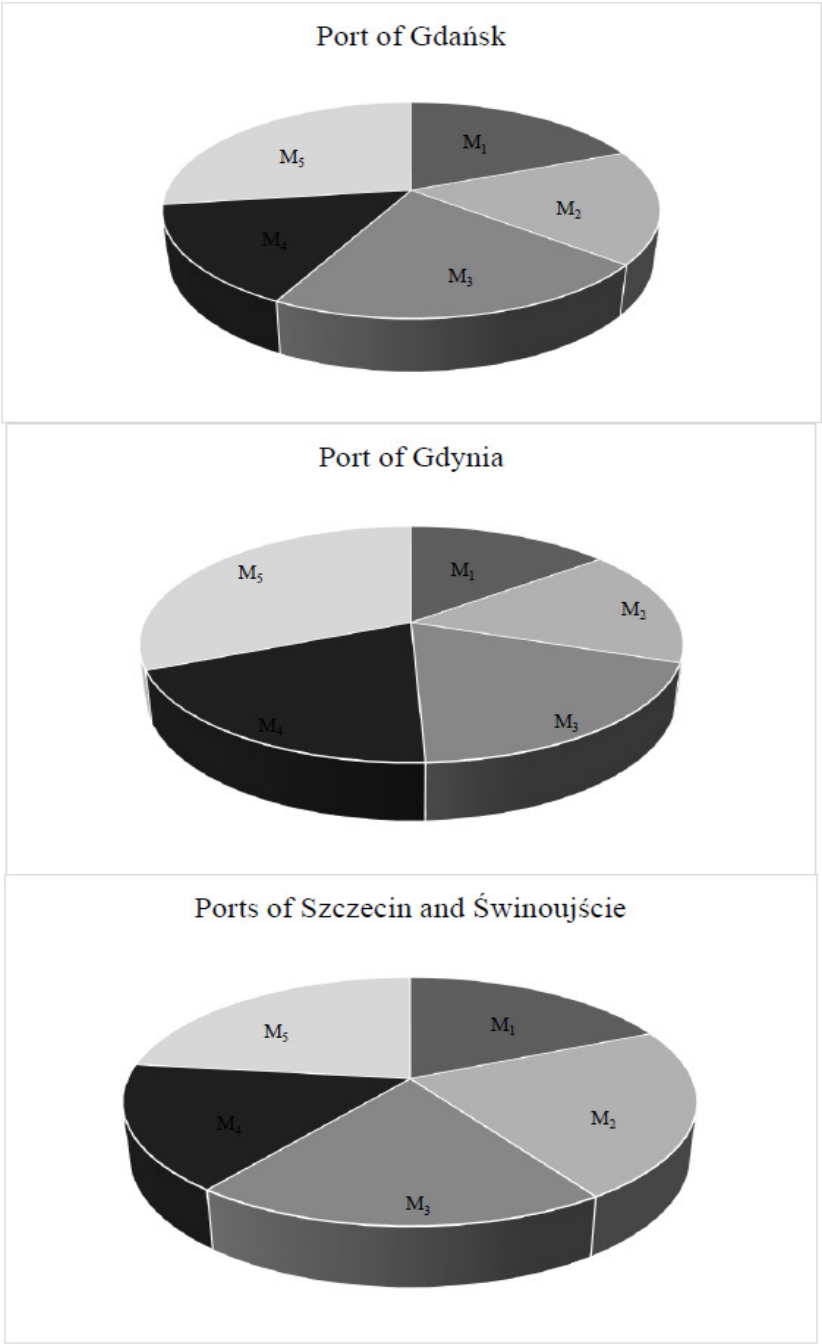

Fig. 5. The shares of logistic capabilities within the total seaport logistic capabilities, according to the identified modules.

Source: Author's own elaboration.

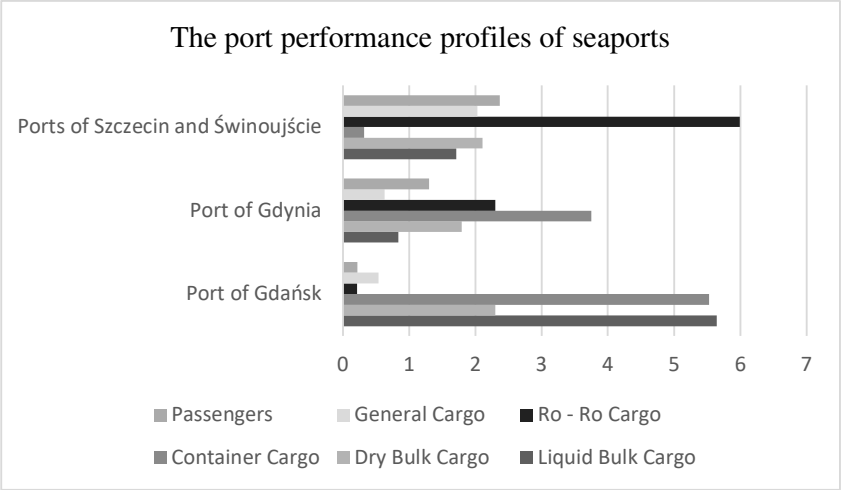

Fig. 6. The port performance profiles of the analysed seaports.
Source: Author's own elaboration.

Based on the results obtained during the research, it is possible to state the following:

- the dominating seaport is the Port of Gdańsk in terms of the total value of logistic capabilities and its logistic capabilities at most of the module levels (with exception of the M_2 module where some slight dominance of Szczecin - Świnoujście seaports can be observed). This fact results from the volume of investments which have been undertaken over the years, such as the Northern Port, Gdańsk Refinery (now LOTOS) and the Deepwater Container Terminal (see: LINK, 2016);
- the levels of the total logistic capabilities of the Port of Gdynia and the Szczecin-Świnoujście Seaports are similar;
- compared to the Szczecin-Świnoujście Seaports, a strong asset regarding logistic capabilities presented by the Port of Gdynia is its operational scope (M_4) and its seaport infrastructure (M_5);
- during the analysed time period, the performance of the Szczecin-Świnoujście Seaports is better than the performance of the Port of Gdynia in terms of seaport efficiency (M_1) and cargo-type interoperability (M_2);
- a disadvantage observed for the Szczecin-Świnoujście Seaports is the current limitation referring to the draft of vessels handled at the Port of Szczecin (max. 9.15m), in view of the depth of the port basins (see: LINK, 2016);

Considering the port performance profiles during the analysed time period, it is possible to observe the following:

- the Port of Gdańsk takes the leading position among the seaports of primary significance to the national economy in terms of container cargo and liquid bulk cargo turnover;
- the Port of Gdynia presents high levels of container cargo and ro-ro cargo turnover. and it takes the second position among the analysed seaports in terms of passenger transport;
- the Szczecin-Świnoujście Seaports take the first position in terms of ro-ro cargo handling; the seaports also present a high level of liquid and dry bulk cargo turnover. and they take the leading position in passenger transport.

Conclusions and Recommendations

Summing up the research presented in the paper, it should be noted that the Port of Gdańsk presents significant prospects for further development, in view of the possibilities of further development of the

outer port and possible development of the Eastern Port in the future. The construction of a floating LNG terminal is also planned. However, placing such a facility in the Bay of Gdańsk may generate some negative implications in terms of safety, considering the fact that this small area is already characterised by a high concentration of port and logistics installations. The economic justification of such a facility should also be taken into consideration, not only in terms of costs, but also in terms of the capability volume indicated by such an installation on the Polish coast in relation to supply chains handled in the area.

A major disadvantage of the Port of Gdynia is its limited seaport area (see: LINK, 2016) and hence restrained opportunities for spatial development. Considering the above-mentioned facts, the idea of constructing a deep-water outer port has been presented (for vessels of a maximal draft up to 16m), and the operation of a dry dock at the hinterland of the Port of Gdynia (outside the port area) in order to provide most logistics services.

It should also be noted that almost all the operations which involve handling container cargo shipped by sea take place at both above mentioned ports. Considering the aspect related to the rationality of distribution port and logistics resources, there is the threat of overinvestment in seaport infrastructure in the Bay of Gdańsk area. An additional problem is also the question of security related to the close vicinity of Kaliningrad Oblast.

A major disadvantage observed at the Szczecin-Świnoujście Seaports refers to the insufficient depth of port basins at the Port of Szczecin.

As a result, some dredging work has already begun in order to deepen the waterway between Świnoujście and Szczecin to improve the access to Szczecin from the sea for vessels of a maximal draft up to 12 m and dead weights of 50 000 DWT and 2 500 TEU. The Port of Świnoujście handles vessels of a maximal draft of 13.5 m. The strong points of the Szczecin-Świnoujście Seaports include an LNG terminal (located at the Port of Świnoujście), and a plan for the construction and operation of a container terminal of a maximal annual cargo handling capacity up to 1.5 million TEU.

It should be noted that the implemented strategy of developing seaports in Poland does not include the development of port infrastructure in the coastal area between the Bay of Gdańsk and the Bay of Pomerania (a distance of over 400 km) at all, leaving it underinvested and undeveloped in terms of the maritime economy and the distribution of port and logistics resources. The last element which should be noted in the strategy for the development of Polish seaports is the modernisation or even reconstruction, for navigability purposes, of rivers which connect seaports and the national economic hinterland - up to, at least, the 4th navigability level along the entire length of rivers, i.e. the Vistula River for the Port of Gdańsk and the Oder River for the Szczecin-Świnoujście Seaports. Such an investment would definitely improve the accessibility of these facilities from the land and it would contribute to the reduction of transport costs in the supply chains handled there.

Considering the method and the multi-criteria model applied to evaluate seaport logistic capabilities, it is possible to state that they allow us to provide a relatively precise evaluation of the logistic capabilities presented by the selected seaports. The results of the research can be used to provide an evaluation of the operational and systemic competitiveness levels of the analysed seaports, which can be observed in terms of their logistic capabilities.

The application of the solution presented in the paper depends on the availability of data. The evaluation of the shares of logistic capabilities, according to the identified modules within the total logistic capabilities of a particular seaport, makes it possible to identify its advantages and disadvantages referring to the specific facilities. Moreover, it is possible to identify a port performance profile in a measurable way. Subsequently, comparing the geographical location of the seaports and the hinterlands they handle, it is possible to define some possible areas for the development of land-sea supply chains. Summing up, it should be stated that the solution presented in this paper allows us to provide a comprehensive evaluation of the logistic capabilities presented by a particular seaport, along with its capabilities in performing numerous port operations.

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Poland's Economic Growth at the Pre-accession Stage and in the Conditions of Membership in the European Union against the Background of Other Visegrad Countries

Bogumila MUCHA-LESZKO

Maria Curie-Sklodowska University, Lublin, Poland, mucha@hektor.umcs.lublin.pl, http://orcid.org/0000-0002-1288-4662

Magdalena K. KAKOL

Maria Curie-Sklodowska University, Lublin, Poland, mkakol@hektor.umcs.lublin.pl, http://orcid.org/0000-0003-4825-422

Abstract

The subject of the paper is the analysis and assessment of Poland's GDP growth and dynamics of economic convergence within the EU. Results of economic growth were evaluated in comparison with the EU28 averages and the other Visegrad countries (Czechia, Hungary, Slovakia). The aim of the assessment in the paper is to verify a hypothesis, constructed by theorists of international economics, that regional integration is an opportunity for the caching-up countries to accelerate growth as well as diminish the economic and technological gap. Results of the empirical analysis, which encompassed both the pre-accession period and the European Union membership period of the V4 countries, confirmed that they had higher GDP growth rates compared with the EU-28 averages, however, the rates varied within the analysed group. The largest economic gap pertained to Poland and the dynamics of closing it was the highest in 2008-2019. The opportunities for Poland's economic growth in the first half of the 1990s and in 2002-2007 were not fully exploited. Nevertheless, Poland had the highest capacity for economic growth during the recession - stagnation years (2008-2013) out of all EU members and was able to maintain high growth rates in 2014-2019. Even though economic convergence measured by the GDP growth and per capita GDP can be considered Poland's impressive achievement, the assessment of the GDP growth supply and demand sources points to only slight technological changes in the economy. The major factors of Poland's economic growth in the entire period of 2002-2019 included non-ICT capital contribution and increase in consumption demand. Only in Czechia a higher contribution of ICT capital to GDP growth allowed for a decrease in the technological gap. In the remaining V4 countries non-ICT capital contribution to the GDP growth was also not conducive towards a significant technological modernisation of the economies.

Keywords: benefits from economic integration, GDP growth, supply and demand factors of economic growth, economic convergence

Introduction

The Visegrad Group (Visegrád Four or simply V4) consists of Czechia, Poland, Slovakia and Hungary. During the post-war development of Central and Eastern Europe dominated by the Soviet Union these four countries had the strongest economic ties. At the turn of the 1980s and 1990s, the institutional base of the system controlled by the USSR fell apart and the CEE countries turned towards closer cooperation with the Western European countries, which were undergoing final stages of liberalising the flow of merchandise, services, and factors of production. As a consequence a disintegrated space was created in Europe which became in the centre of political interest of both the European Union and the United States. They expected that Western Europe would undertake steps

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encouraging closer economic ties with the CEE countries, which were already undergoing reforms leading to democratisation of their political systems and pro-market changes in the functioning of their economies.

The European Union authorities were uncertain about formulating a strategy that would define the rules and timeframe of integrating the post-socialist countries with the EU economy that reached an advanced stage of regional interdependence. For the first time, the Community was faced with a need to prepare a model of integration with a large group of countries (12) with a clear development gap even towards the economically weakest members (Spain, Portugal, Greece). There were more factors against another territorial enlargement of the European Communities.

Firstly, there was a considerable acceleration of the integration process within the 12 members of the European Community as a result of the Delors plan adoption (1989) and initiation of its realisation (introduction of the Economic and Monetary Union). The basis for the next, higher stage of integration was The Maastricht Treaty (1992). Coincidence in time between the introduction of the EMU and preparation of the EU for another enlargement was particularly difficult to reconcile even more since in the late 1980s the EFTA countries (European Free Trade Agreement)[i] started negotiations to join the European Communities. Since 1990s, leaders of the EU were focused on overcoming challenges connected to the adoption of the common currency and were not ready to discuss institutional reforms required to significantly increase the number of member countries - by a dozen of new CEE members.

Secondly, intensification of globalization processes began in the 1990s, followed by a new wave of technological progress known as the ICT revolution. These phenomena impacted the acceleration of structural changes both in domestic economies as well as the world economy and led to the new international distribution of economic potential enhancing the global competition. Therefore, the European Union began tightening economic cooperation with CEE countries with extreme caution, focusing on trade liberalisation within the framework of association agreements known as Europe Agreements. First deals of this kind were signed with Czechoslovakia, Poland and Hungary on the 15th December 1991[ii].

Aim and Research Method

The aim of the paper is to indicate the formal grounds and decisions of the European Union leading to Poland's accession, to assess the effectiveness of the adjustment process determining the fulfillment of membership criteria, and to evaluate the process of reducing the development gap at the pre-accession stage and under the conditions of functioning in the EU in 2004-2019. Poland's macroeconomic outcomes in terms of the dynamics of convergence were assessed on the basis of quantitative and efficiency indicators, such as: GDP growth rate, GDP per capita, changes in the level of labor productivity (in relation to the EU average), as well as on the basis of supply and demand factors contributing to GDP growth. The method of separate appraisal of supply and demand sources of GDP growth becomes increasingly useful in the conditions of low and declining economic growth in the EU. It is designed to better understand the reasons behind the diversity of countries in terms of their capacity to economic growth and tendency to weaken the convergence process.

The assessment of Poland's economic dynamics in 2002-2019 was carried out with the distinction of three 6-year periods in order to obtain an answer regarding the diversity of Poland and other V4 countries (Czechia, Hungary, Slovakia) in terms of economic dynamics depending on the phase of business cycle and the results of economic convergence. In the long-term analysis, the following years were distinguished: 2002-2007 (relatively good economic conditions), 2008-2013 (recessive-stagnant), 2014-2019 (post-crisis recovery). Contribution of supply factors to the GDP growth includes: quantity of working hours, quality of labour, non-ICT capital, capital in the ICT sector and TFP growth. Demand factors illustrate the contribution of private and public consumption, investment and net exports. The aim of the empirical analysis is to answer the question: Does Poland properly use the opportunities of more dynamic growth arising from the accession to the EU and are

the effects in reducing the economic gap satisfactory? The answer to this research question is formulated by confronting Poland's economic growth and its sources with the results of other V4 countries. The analysis was based on the use of primary statistical data obtained from the databases of the European Commission (Ameco, Eurostat) and The Conference Board, as well as the results of research by other authors.

Benefits from Regional Economic Integration - Theoretical Introduction

Countries are interested in creating regional integration blocs in order to dynamise economic development and improve the efficiency of allocation and use of production factors. Various approaches and criteria are applied to assess the potential and real benefits that can be derived from integration. One can consider short-term, long-term, macroeconomic, sectoral, structural, microeconomic, social, civilization, political, cultural benefits etc. From the economic point of view, the most important are the sources of benefits leading to higher economic growth and improved efficiency of the use of production factors.

Contemporary theorists of international economic integration take advantage of the vast achievements, that were created in this field in the second half of the 20th century, and still remain the basis for assessing the effects of integration depending on the degree of its advancement. The starting point is the concept of B. Balassa (1961), who adopted - as the determining criterion - the following stages of integration: free trade zone, customs union, common market, economic union and full economic integration. The theoretical foundations of international integration developed in close connection with the advancement of economic ties within groups of countries. The greatest influence on the growing importance of the theory of regional integration in international economics resulted from reaching higher stages and pioneering experience in the field of integration in Europe.

In the beginning, theorists focused on the benefits of market integration, inter alia: J. Pekmans (2001), R. Baldwin and Ch. Wyplosz (2009), W. Molle (2006), B. Rosamond (2000), D. Swann (2000), P. Bożyk and J. Misala (2003), J. Ładyka (2001). The benefits of market integration are primarily analysed and assessed in two aspects: 1) sources of origin, 2) the effects of liberalisation of trade (goods and services) and flows of production factors (capital and labor). In the first case, the benefits are derived from the market size and the scale of production, the deepening division of labor, including the fragmentation of technological processes and specialization in economic activity, but also the increase in competition, its effects and competition protection policy. In the second case, the assessment encompasses: the effects of trade liberalisation, and liberalisation of capital and labor flows. The greatest threat to the participants of the internal market of integrated group of countries is the low competitive ability of economic entities from catching-up countries.

Protection of competition is an essential condition for achieving the goals of market integration, it is intended to eliminate less efficient producers and limit the expansion of national monopolies. Research in this area is focused on (Mucha-Leszko 2017, p. 77): 1) the functioning of market mechanism, with particular emphasis on changes in its structure, the behavior of market participants and the impact of market situation on economic efficiency at the micro- and macroeconomic levels, 2) the analysis of market-state relations justifying the desired scope of interference and state activity in order to remove the imperfections of the market mechanism and optimise the competition policy aimed at increasing economic efficiency. An advocate of controlling the "invisible hand of the market" was the influential Italian professor of economics T. Padoa-Schioppa, who participated in the preparation and implementation of integration plans (Ross 1995, p. 42).

The acceleration of market integration in the second half of the 1980s resulted in an increased interest and discussion on the benefits of monetary integration. This was justified by the desire to obtain greater benefits of the common market due to the introduction of the common currency. Liberalisation of capital flow contributed to the growth of its mobility. Sudden outflows and inflows of capital and changes in demand for currencies led to an increase in the frequency and extent of fluctuations in exchange rates. The destabilisation of the global foreign exchange market was an

important argument for the supporters of the monetary union in convincing that the benefits of introducing the single currency would be even greater than those predicted by the authors of the optimum currency area theory (Commission of the European Communities 1990).

Representatives of neoclassical economics believe that a diversified economic development and income per capita result from differentiation of the accumulation rates of production factors and their declining productivity. An important addition to their method of proof stemmed from breaking down investment into real capital and human capital. Previously, the analysis was limited to investment in physical capital (Ben-David and Loewy 2003; Lucas Jr. 1988, p. 39). The usefulness of analyses of economic growth increased as a consequence of adding another important element, which is the productivity of production factors resulting from knowledge (human capital) and research and development activities accelerating technological progress (Romer 1990; Grossman and Helpman 1991; Siwiński 2005, p. 734–738). The works of R. Barro and X. Sala-i-Martin published in 1990–1992 constituted a breakthrough in the development of research on the processes of economic convergence, which inspired the introduction of new research methods based on econometric models and the development of concepts to better assess the results of convergence (Barro and Sala-i-Martin 1990, 1991, 1992). There were also proposals to measure different types of convergence. The most common subjects of research are *beta* and *sigma* convergence. The first (*beta*) is defined as the ability of countries at lower stages of development to achieve a higher rate of economic growth than highly developed countries. The dynamics of reducing the economic gap (catching-up) in relation to the more developed countries depends on the GDP growth rates. *Sigma* convergence is the result of *beta* convergence and occurs when the variation in GDP per capita between countries decreases and is measured by the standard deviation (Mucha-Leszko 2014, p. 18–19).

Diminishing the development gap depends on the strength of the influence of economic growth factors - labor input and labor productivity. Capital expenditure and the Total Factor Productivity (TFP) contribute to the increase in labor productivity. Potential abilities of achieving and maintaining a high pace of economic growth depend to a large extent on the economic policy of a country which influences shaping of more or less favorable conditions for the inflow and use of foreign capital and technology in order to increase economic activity, create new demand and structural changes. The impact of foreign direct investment on GDP growth is multilateral and therefore their economic effects may accumulate as a result of a higher investment rate, economies of scale of production, the use of modern technologies and methods of work organisation and management, through spill-over effects derived from developing cooperation with local companies which under the pressure of competition become more innovative, and employees improve their qualifications (Mucha-Leszko 2014, p. 20).

The Polish "road" to the European Union - the Formal Grounds

Analysis of the contractual relations between Poland and the European Union points to the following documents and facts:

1. Europe Agreement establishing an association between the European Economic Communities and their Member States, of the one part, and Poland of the other part signed on the 16th of December 1991. The document entered into force in two stages. In order to accelerate the liberalisation of trade the part pertaining to that (Interim Agreement) entered into force on the 1st of March 1992, and the full application commenced on the 1st of February 1994.

2. Poland made a formal request for membership in the European Union on the 8th of April 1994.

3. European Council Summit in Copenhagen (June 1993) - for the first time the European Union officially confirmed that membership was the common goal for the countries that signed the association agreements as well as the EU. However, the statement in Copenhagen was much too general to satisfy the association countries which expected much more binding declaration from the EU.

4. European Commission began working on an integration strategy for the associated CEE countries in 1994. The first part was presented in July 1994 and contained details on the Copenhagen Summit final conclusions, and the second, in September, pertained to the institutional cooperation, harmonisation of law, competition policy and trade, macroeconomic and structural policy, policy in the major areas of the economy, regional and social policy including EU aid for integration and reforms (URM 1995, p. 34-48). Looking back, the European Council meeting in Essen in 1994 had the crucial impact on the process of Poland's integration with the EU. The Council issued a report describing the strategy of preparations for the CEE countries to become members of the EU. The report was accepted by the European Council and included in the final documents of the Summit as Annex IV.

5. Other documents containing tasks for Poland and the other CEE countries in order to adjust their economies to the fulfillment of the EU membership criteria were created in 1995. During the Cannes European Council meeting in June, the EU leaders adopted the European Commission's White Paper on the preparation of the associated CEE countries to integration with the Single Market of the European Union. In December 1995, during the Madrid Summit, the European Council tasked the European Commission with issuing an opinion on the membership applications. Thus, the formal process of the CEE countries accession to the EU was initiated.

6. In July 1995, the European Commission presented a positive assessment of Poland's membership application (avis) and recommended initiation of the accession negotiations to the EU Ministerial Council. Apart from Poland, the first group qualified by the Commission for EU membership, meaning the most ready to fulfill EU membership criteria, included Cyprus, Czechia, Estonia, Hungary and Slovenia. In the Conclusion, Commission recommended initiating negotiations with Poland and the other countries in order to accept them as members of the Union (Komitet Integracji Europejskiej 1997a, p.102).

7. As a result of undertaking political and economic reforms as well as the process of negotiations, Czechia, Hungary, Poland and Slovakia together with Estonia, Latvia, Lithuania, Slovenia, Cyprus and Malta became members of the EU on the 1st of May 2004.

Assessment of The Adjustment Process and Economic Growth of Poland, Czechia, Hungary And Slovakia In the Pre-Accession Period

Fulfillment of membership criteria by Poland and the other CEE countries required economic adjustments in three areas: 1) in respect of economic indicators, 2) structure of the economy, 3) rules of macroeconomic policy. Nevertheless, from the point of view of closing the development gap towards the EU countries and getting a positive evaluation of the economic adjustments, rather than the level of GDP, the more important factor was an upward trend in GDP growth, including GDP per capita. Hence, the National Strategy of Integration emphasised that "one of the most important factors contributing to the appraisal of Poland's readiness for membership will be economic trends (capacity to balanced growth in the conditions of declining inflation and simultaneous liberalisation of access to the domestic market)" (Komitet Integracji Europejskiej 1997a, p.13).

Analyses of growth trends pointed to the losses in development suffered by Poland in 1978-1994, when the average annual per capita GDP growth was negative (-0.97%), while the rate in Western Europe ranged from 0.79% in Sweden to 2.06% in Spain. In Denmark per capita GDP growth was 1.99% and in other European countries it ranged from 1.56% to 1.84% (in Belgium, Italy, Austria, Portugal, Germany and the UK), (Felbur 1996, p. 429). Hence, Poland's economic gap towards the more developed European Union countries increased significantly.

Improvement of economic conditions in Poland followed suit with the systemic transformation and increasing role of the market mechanism as a regulator of economic activity. However, in the early 1990s, Polish economy did not regain the full capacity for economic growth after the shock therapy reforms of Balcerowicz, production capacity was not fully used. According to the calculations of P.

Białowolski (2005, p. 46) the highest negative deviation of real to potential product occurred in October 1993 and equaled 4%, but during the period of 1993-1994 it gradually declined from 2% to 0. A more profound change happened in 1995 when the degree of production power utilisation increased noticeably and real product was higher than potential product by 1% to 2% until October 1998 (Białowolski 2005, p. 46). In the late 1990s, the negative factors affecting economic activity in Poland sourced from the Asian crisis (1997) and the Russian crisis (1998), but the latter one had a bigger impact due to stronger economic ties. Once again, the real product was below the potential product in January 1999, and the most extreme deviation occurred in the second quarter of 2002 and equaled 4% (Białowolski 2005, p. 47).

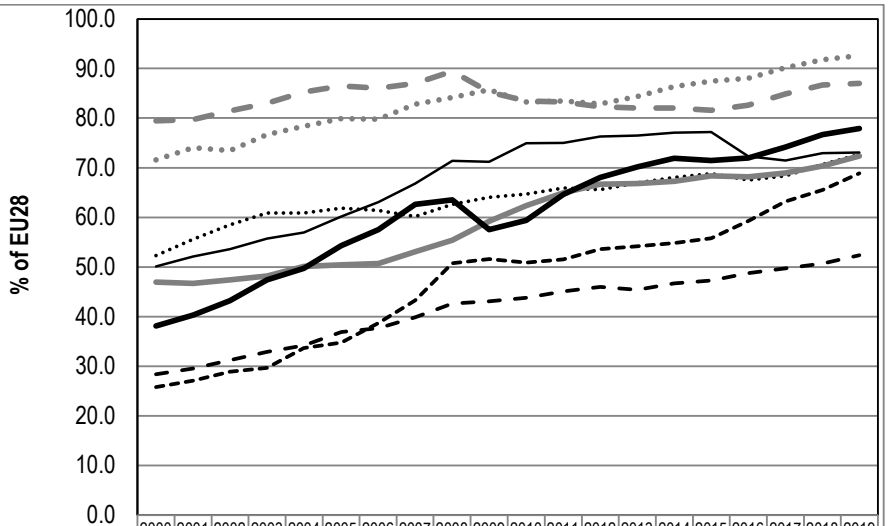

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Czechia	71.6	74.1	73.5	76.7	78.4	79.9	79.8	82.8	84.2	85.7	83.3	83.5	82.9	84.4	86.4	87.5	88.0	90.2	91.8	92.6
Hungary	52.3	55.6	58.5	60.9	60.9	61.9	61.4	60.2	62.6	64.1	64.7	65.9	65.6	67.0	68.1	68.8	67.5	68.4	70.7	72.7
Poland	47.0	46.7	47.4	48.2	50.1	50.4	50.7	53.1	55.4	59.2	62.4	65.0	66.7	66.8	67.3	68.4	68.2	69.0	70.4	72.4
Slovakia	50.1	52.1	53.6	55.7	57.0	60.2	63.1	66.8	71.4	71.2	74.9	75.0	76.3	76.5	77.1	77.2	72.3	71.5	72.9	73.1
Bulgaria	28.4	29.6	31.2	32.9	34.2	36.9	37.7	39.9	42.6	43.1	43.8	45.1	46.0	45.4	46.7	47.3	48.8	49.7	50.7	52.4
Romania	25.8	27.1	28.9	29.7	33.7	34.8	38.7	43.3	50.8	51.6	50.9	51.5	53.6	54.2	54.8	55.8	59.3	63.2	65.5	68.9
Slovenia	79.5	79.7	81.5	83.0	85.3	86.5	86.0	87.0	89.5	85.3	83.5	83.3	82.3	82.0	82.1	81.6	82.6	84.9	86.7	87.0
Baltic countries average	38.1	40.3	43.2	47.4	49.7	54.3	57.5	62.6	63.5	57.5	59.4	64.6	68.1	70.2	71.9	71.5	72	74.2	76.7	77.9

Figure 1: GDP per capita in PPS as percentage of EU-28 average in selected CEE countries in 2000 and 2019

Source: Own elaboration based on: Eurostat (2020).

In the early 2000s, Poland's GDP per capita was only 47% of the EU-28 average, and significantly lower than in Czechia (71.6%) and Slovenia (79.5%). On the other hand, worse results pertained to Romania, Bulgaria and the Baltics. In the Visergad Group, Poland was last (in 2000). Nevertheless, the difference from Hungary and Slovakia was slight - respectively 5.3 pp and 3.1 pp (fig. 1).

During the pre-accession period, after the signature of the Europe Agreements, the GDP growth rate rose in the Visegrad countries as a result of increased trade and inflow of foreign direct investment. In 1995-1999 the annual averages of GDP growth were: in Czechia 2.3%, Poland 5.9%, Slovakia 4.3% and Hungary 2.7% (European Commission 2014, p. 145). During the period directly before accession (2000-2004), economic growth in Poland decreased noticeably to 3.2% (annual average), only slightly in Slovakia - to 4.0%, while Hungary and Czechia had growth rates of 4.5% and 3.7% respectively (European Commission 2014, p. 145).

According to research by R. Dobrinsky and P. Havlik (2014, p. 4), in 1995-2000, the average annual GDP growth in the EU-27 was 2.84% and in CEE-10 3.38% so the convergence factor was 0.54 pp, that included 2.57 pp in Poland, 0.56 pp in Slovakia and 0.10 pp in Hungary. In Czechia the economic gap towards the EU-27 continued to increase by an average of 1.00 pp per year. According to these calculations, in the second half of 1990s, Poland had the highest GDP growth among the Visegrad countries thus having achieved a high dynamism of the convergence process. During the final years before the EU accession, the average annual growth rate in Poland decreased to 3.08% (2000-2005), whereas in Czechia and Hungary it was above 4.0% and in Slovakia it reached 4.91%. As a consequence, the Visegrad Group significantly improved its economic position in the EU - by 2.51 pp, and the convergence indicator for Poland was 1.28 pp (per annum) (Dobrinsky and Havlik 2014, p. 4).

In total, in 1995 - 2005, after the coming into force of the Europe Agreements, the adjustment process which encompassed the decrease of the economic gap measured by the level of GDP per capita and GDP growth rates was effective in Poland, Slovakia and Hungary. While Czechia was not up to par with the three mentioned countries, its economic gap was still significantly lower since Poland, Slovakia and Hungary reached Czech GDP per capita from the year 2000 as late as 2019 (fig. 1). Basically Poland's economic gap, just as Hungary's and Slovakia's towards Czechia slightly declined. Much better results in the convergence process pertained to the Baltics (fig. 1).

Economic growth and contribution to the increase in GDP of supply and demand factors in 2002-2019

Table 1 contains the real GDP dynamics in 2002-2019 divided into three 6-year cyclically differentiated periods. The period of 2002-2007 includes the economic slowdown of 2002-2003 following the demand shock in 2001 in the United States and the economic prosperity of 2004-2007. The years 2008-2013 are considered as recessive-stagnant while in 2014-2019 the post-crisis recovery pertained to all the European Union member countries. The distinguished periods allow for the evaluation of the capacity for economic growth of individual countries during economic prosperity, crisis or revival and ability to regain lasting recovery after a deep recession.

GDP growth indicators in the years directly preceding accession as well as post-accession (2002-2007) reveal that all the Visegrad countries had growth rates almost double or more than the EU-28 average (2.4%). A clear leader in terms of GDP growth was Slovakia (annual average of 6.6%). GDP growth in Poland and Czechia ranged from 4.5% to 4.7%. Hungary was a "catching-up" country with the lowest growth rates (3.6%) which, nevertheless, still allowed to continue closing the economic gap towards EU-15 (tab. 1). In 2008-2013, Poland, Czechia, Slovakia and Hungary were characterised by more varied GDP growth rates. Poland had an exceptional capacity for economic growth during the two recessions and a period of stagnation - annual average GDP growth rate was 3.1%. Slovakia also achieved good results in terms of economic growth with the average of 1.8%. Czechia diminished the economic gap only slightly with the convergence factor of 0.1 pp. The only Visegrad Group country where the divergence process took place (the average annual decline in GDP of 0.5%) was Hungary. This result was worse than the average growth rate for EU-28 (0.0%) (tab. 1).

Table 1: Growth of real GDP in the EU-28 and V4 countries in 2002-2019 (percentage change, periodic averages)

Countries	2002-2007 Annual Average	2008-2013 Annual Average	2014-2019 Annual Average
European Union - 28	2.4	0.0	2.1
Czechia	4.7	0.1	3.3
Hungary	3.6	-0.5	4.0
Poland	4.5	3.1	4.0
Slovakia	6.6	1.8	3.1

Source: Own calculations based on: The Conference Board (2020).

After the 2008-2009 crisis, Hungary dropped from third to sixth rank in the analysed group of CEE countries in terms of per capita GDP (fig. 1). Sizeable losses to Hungarian GDP were caused by deep recessions in 2009 and 2012. A decline in economic activity was a consequence of a large domestic demand shock (in the case of both investment and consumption). In 2008-2012, average annual decrease in investment in Hungary was 4.3% and private consumption 2.4% (European Commission 2018, p. 7; Mucha-Leszko 2019). Post-crisis recovery in 2014-2019 was the strongest in Poland (4.0% per year) and Hungary (4.0%) with growth rates double of those for EU-28. The weakest results in the Visegrad Group pertained to Slovakia - by 0.9 pp lower growth rates than in Poland and Hungary (tab. 1).

The process of convergence as well as comparative advantage in trade depend on the increase in labour productivity. Table 2 contains an increase in the level of labour productivity per hour worked in relation to the EU28=100. According to the data, in 2002-2007 Poland had the lowest labour productivity which was below 50% of the EU-28 levels. On the other side of the spectrum were Czechia and Slovakia with productivity around 2/3 of the EU level (tab. 2).

Table 2: Labour Productivity per hour worked in the EU-28 and V4 countries in 2002-2019 (EU28 = 100, periodic averages)

Countries	2002-2007 Annual Average	2008-2013 Annual Average	2014-2019 Annual Average
European Union - 28	100.0	100.0	100.0
Czechia	68.4	72.1	75.6
Hungary	60.6	68.8	65.1
Poland	48.8	56.2	60.8
Slovakia	65.5	75.8	74.5

Note: Percentage of EU28 total (based on million purchasing power standards), current prices.

Source: Own calculations based on: Eurostat (2020).

During the recession and stagnation years, all the analysed countries increased their levels of labour productivity, but the highest increase pertained to Slovakia - by 10.3 pp, Hungary - by 8.2 pp , Poland - 7.4 pp and Czechia - 3.7 pp. During the economic downturn all the countries improved their economic effectiveness indicators measured by the level of labour productivity in relation to the EU average. Nevertheless, these positive tendencies occurring in all the Visegrad Group countries - which encompassed improvements of this basic measure of effectiveness which is labour productivity - reversed during the post-crisis recovery. In Slovakia and Hungary the indicators of labour productivity declined (in relation to EU-28). An increase persisted in Poland and Czechia (4.6 pp and 3.5 pp) (tab. 2).

Concluding, changes in the levels of labour productivity in Czechia, Poland, Slovakia and Hungary point to a significant advancement in the convergence of effectiveness. The most improvement in relation to the average labour productivity in 2000-2007 pertained to Poland (in 2014-2019) - by 12.0 pp, which was followed by Slovakia (9.0 pp), Czechia (7.2 pp), Hungary (4.5 pp) (tab. 2). Despite a sizeable increase in labour productivity in Poland, it still remains the lowest within the Visegrad Group, and in particular in comparison with Czechia and Slovakia (by about 15.0 pp).

Table 3: Contribution of labour, capital and TFP to GDP growth in Czechia, Hungary, Poland and Slovakia in 2002–2019 (in percentage points, periodic averages)

Countries	2002-2007 Annual Average	2008-2013 Annual Average	2014-2019 Annual Average
Labour Quantity Contribution			
Czechia	0.3	-0.1	0.7
Hungary	-0.6	-0.5	1.4
Poland	0.6	0.0	0.5
Slovakia	0.5	0.0	0.6
Labour Quality Contribution			
Czechia	0.2	0.3	0.0
Hungary	0.5	0.4	0.1
Poland	0.6	0.5	0.2
Slovakia	0.2	0.3	0.0
Non-ICT Capital Contribution			
Czechia	1.1	0.7	0.6
Hungary	1.6	0.8	1.3
Poland	1.4	1.7	1.5
Slovakia	1.8	1.6	1.6
ICT Capital Contribution			
Czechia	1.0	0.7	0.6
Hungary	0.4	0.2	0.3
Poland	0.4	0.4	0.3
Slovakia	0.8	0.4	0.1
Total Factor Productivity			
Czechia	2.2	-1.5	1.4
Hungary	1.7	-1.4	1.0
Poland	1.4	0.4	1.6
Slovakia	3.3	-0.4	0.8

Source: Own elaboration and calculations based on: The Conference Board (2020).

Table 3 contains data on the input to the GDP growth of various factors of production in the analysed countries. As emphasised, high economic growth in 2002-2007 occurred in Czechia, Poland and Slovakia. The lowest dynamics pertained to Hungary, where a slowdown in economic activity started sooner. By 2007, its growth rate was close to zero which affected the annual average for the entire period of 2002-2007. Considering the impact on the decline in economic growth of the supply factors it appears that, different from the other countries, a decrease in the contribution of labour quantity occurred (-0.6 pp). On the other hand, contribution of labour quality was comparable to Poland and higher than in Czechia or Slovakia. Capital contribution to the GDP growth in Slovakia, Hungary and Poland was focused mainly on the non-ICT areas of the economy. Czechia was exceptional in this respect with lower contribution of non-ICT capital compared with the ICT sectors. The structure of supply sources of economic growth in Slovakia is also worth mentioning. The basis for a high GDP growth in Slovakia (6.6% per year) stemmed from non-ICT capital, ICT capital and increase in TFP. Similarly to Slovakia, Czechia had a favourable structure of supply growth factors in 2002-2007 - the highest contribution of ICT capital, the lowest in terms of non-ICT capital and a high input of TFP growth. ICT capital contribution created technological progress, and high growth of TFP contribution impacted the increase in labour productivity. Czechia and Slovakia's structure of supply sources of

economic growth in 2002-2007 proves that they achieved good results in closing the technological gap. Within the Visegrad Group, Poland did not stand out in terms of economic growth and had the lowest contributions to GDP growth of both ICT capital and TFP growth as well as generally low capital contribution (non-ICT and ICT). To sum up, in 2002-2007 Polish economic growth was mainly based on labour contribution and the opportunities of technological adjustment to the EU levels were not seized (tab. 3; Kąkol 2018).

A phenomenon of Poland's economic growth during the EU membership was a relatively high economic growth during the recession and stagnation of 2008-2013. Poland was the only European Union member that did not experience recession in 2009, only an economic slowdown. Polish macroeconomic results were also impressive within the Visegrad group during the entire period of 2008-2013. Average annual GDP growth was at a high 3.1%. During the same time in Slovakia it was 1.8%, in Czechia 0.1% and Hungary suffered from a decrease of 0.5% per year. It is worth noticing that despite unchanged labour input (no deterioration in the labour market), an increase in the contribution of the quality of labour occurred in Poland. The major change, compared to 2002-2007, was a sizeable increase in the contribution of capital and TFP to GDP growth. However, capital was mostly invested in the non-ICT sector which was not conducive to the creation of technological progress in Poland. ICT capital contribution remained low (0.4 pp). Capacity to economic growth during the two waves of recession in the EU and lack of sustained recovery until 2014 in the other Visegrad countries was lower compared to Poland and in particular in Hungary and Czechia.

Assessing the supply factors contribution to economic growth in the post-crisis period of 2014-2019, it is worth noticing the increase in labour contribution in all four countries, particularly Hungary, since in 2008-2013 it experienced a sizeable decrease in employment (Białowąs et al. 2019, p. 17-18). Return to work resulted in the decrease in the contribution of the quality of labour to GDP growth in all the V4 countries, since workers with lower qualifications which lost their jobs during recession were rehired. The most important factor of economic growth in 2014-2019 in all the analysed countries was non-ICT capital contribution, with the exception of Czechia where the contributions of both ICT and non-ICT capital were proportionate what allowed Czechia to speed up the technological adjustment of the economy to the EU level.

In conclusion, one needs to answer a question - whether supply sources of high economic growth in 2002-2019 were favourable for technological progress, increase in labour productivity and TFP. Within the Visegrad Group, Poland had the highest economic dynamics, but the supply sources of economic growth did not ensure creation of technological progress. Capital contribution to GDP growth was relatively high, but it was not concentrated in the ICT sector, which affects increase in labour productivity and allows for a higher growth of labour productivity in services developed due to the utilisation of ICT technologies which are carriers of technological progress. In the Visegrad Four, capital contribution led to the decline of technological gap only in Czechia. In Poland, Slovakia and Hungary non-ICT capital contribution to GDP growth was not conducive towards significant changes in technological bases of the economy and structural changes.

In table 4 the indicators of contribution to economic growth in terms of demand factors have been compiled. Domestic demand includes private and public consumption and investment, while external demand represents net exports of goods and services. In general, consumption has been an important factor in maintaining economic activity in the EU countries for many years.

At the beginning of the period 2002-2007, there was a slowdown in GDP growth and influencing the increase in demand became an essential condition for economic recovery. The indicators illustrating the contribution of private consumption to GDP growth in Slovakia, Poland and Hungary in 2002-2007 prove its great importance in achieving high economic dynamics of the analysed countries. Public consumption was a significant source of economic growth in Poland, but also in Slovakia, Czechia and Hungary. In total, private and public consumption in Poland accounted for 2.99 pp contribution to GDP growth, which was 4.5%.

Table 4: Contribution to the GDP growth of demand factors in Czechia, Hungary, Poland and Slovakia in 2002–2019 (in percentage points, periodic averages)

Country	2002-2007 Annual Average	2008-2013 Annual Average	2014-2019 Annual Average
Private Consumption			
European Union - 28	1.02	-0.06	0.96
Czechia	1.83	0.22	1.55
Hungary	2.16	-1.12	2.12
Poland	2.33	1.76	2.17
Slovakia	2.99	0.44	1.74
Public Consumption			
European Union - 28	0.37	0.19	0.30
Czechia	0.49	0.05	0.42
Hungary	0.40	0.20	0.43
Poland	0.66	0.34	0.60
Slovakia	0.55	0.31	0.51
Gross fixed capital formation (Investment)			
European Union -28	0.67	-0.56	0.77
Czechia	1.59	-0.51	1.04
Hungary	1.03	-0.49	2.10
Poland	1.42	0.43	0.85
Slovakia	1.42	-0.22	0.88
The balance of goods and services (Net exports including intra-EU trade)			
European Union - 28	0.04	0.52	-0.01
Czechia	0.63	0.83	0.13
Hungary	0.30	1.38	-0.18
Poland	-0.40	0.98	0.26
Slovakia	1.62	1.79	-0.33

Note: GDP at constant prices.
Source: Own elaboration and calculations based on: Ameco, 2020.

The level of private consumption depends on employment and wages, tax policy, social transfers and access to cheap loans. In Poland, the main sources of private consumption growth were (Mucha-Leszko 2020, p. 19): 1) high (with the exception of 2002) growth of GDP and population income, 2) increase in propensity to consume resulting from improved living conditions and well-assessed economic growth prospects, 3) easy access to credit, especially housing loans. The increase in the level and quality of consumption of the Polish society led to a decline in the propensity to save. This process proceeded very quickly and from January 2002 to January 2006 the savings rate in Poland dropped from 10% to 0% (NBP 2016, p. 43).

The most sustainable demand sources of GDP growth occurred in Czechia in 2002-2007, and their contribution was as follows: private consumption 1.83 pp, investment 1.59 pp, net exports 0.63 pp and public consumption 0.49 pp. The demand sources of GDP growth in Slovakia and Poland were dominated by consumption (private and public). Consumer demand was significantly supported by investment, which constitutes the basis for long-term economic growth (Mucha-Leszko and Twarowska 2016). Czechia, Poland and Slovakia had a comparable contribution of investment to GDP growth, and Hungary had a lower contribution.

In the case of Slovakia, there was a large contribution of external demand to GDP growth as an effect of export competitiveness (tab. 4). Czechia was second in this respect. In 2002-2007, Poland imported more than it exported, so external demand was not a source of economic growth. During the recession-stagnation period (2008-2013), the most considerable factor of economic growth in all Visegrad countries was foreign demand, and its largest contribution to GDP growth pertained to Slovakia and Hungary. It was also of great importance in Poland and Czechia. Private consumption was the major source of economic growth in Poland. Slovakia and Czechia stood out with low rates of private consumption contribution to GDP growth, and its significant decline was recorded in Hungary. Public consumption played a minor role as a factor of GDP growth in all four countries. However, the decline in investment had the most regressive impact on the economic situation in 2008-2013. Its largest fall was recorded in Czechia and Hungary, slightly lower in Slovakia. Only in Poland the contribution of investment to economic growth was moderately positive. In conclusion, it is worth recalling that in the period of two recessions and post-crisis economic stagnation in the EU, Poland achieved an average annual growth rate of 3.1%, and the most important demand sources of GDP growth were: private consumption, investment and net exports.

After two waves of recession (2009, 2012), the economies of the EU countries could not achieve a stable recovery for a long time. It was only in 2014 that they recorded an increase in GDP, which in 2014-2019 amounted to an average of 2.1% (EU-28). The economic dynamics of Poland and Hungary was almost twice as high as the EU average (4.0%), and the growth rate of Czechia and Slovakia was 3.3% and 3.1% respectively. The lower average annual GDP growth rate (2014-2019) in Slovakia as compared to Poland was the result of the deep recession in 2009 (-5.5%) as well as the stronger, and longer than in Poland, economic downturn after 2010, which persisted in the period of 2011-2014 (Mucha-Leszko 2017, p. 84-85). In Czechia, the lower periodic average of GDP growth rate in 2014-2019 was a consequence of the two-fold slowdown in economic activity in 2016 and 2018 (Mucha-Leszko 2019, p. 70).

Concentrating on the demand factors of economic growth in the Visegrad countries, it should be emphasised that private consumption, supported by public consumption, had the greatest share in GDP growth in all of them. The contribution of investment was comparable in Czechia, Poland and Slovakia, but relatively low after their large decline in 2008-2013. While investments in Hungary played a significant role in reviving the economy. The impact of external demand on the strength of economic recovery in the surveyed countries varied, from moderately positive in Poland and Czechia to negative in Slovakia and Hungary (tab. 4). It should be pointed out, however, that the decline in foreign demand was a consequence of regressive trends in international trade (Wojtas 2017).

Conclusion

When assessing the results of Poland's economic growth and the pace of the convergence process against the background of the V4 countries, it should be emphasised that Poland suffered significant development losses, measured by the negative GDP growth rate in 1978-1994 (-0.97% annual average). The fundamental change in development trends took place in 1995. The exceptionally high economic growth was maintained in 1995-1999 - an annual average of 5.9%, while in Slovakia it was 4.3%, Hungary 2.7%, and Czechia 2.3%. In 2000-2004, Poland's economic growth rate decreased to 3.2% per year, and in the remaining V4 countries it increased and amounted to: 3.7% in Czechia, 4.0% in Slovakia and 4.5% in Hungary. To sum up, in the pre-accession period, the possibilities of reducing the economic gap were not fully used, especially in the first half of the 1990s and in the years 2000-2004.

Poland's economic growth under the conditions of EU membership was more dynamic and stable. In 2002-2007, Poland's convergence coefficient with the EU-28 amounted to 2.1 pp, in Czechia 2.3 pp, Slovakia 4.2 pp and Hungary 1.2 pp, i.e. in the V4 group at a level close to the average. Poland's success was the high dynamics of reducing the economic gap in 2008-2013 and 2014-2019. In the recessive-stagnant period, the convergence ratio in relation to the average EU-28 GDP growth reached the level of 3.1 pp in Poland, in Slovakia 1.8 pp, Czechia 0.1 pp, and Hungary increased the

economic gap by 0.5 pp annually. During the post-crisis recovery period, all the V4 countries achieved a higher growth rate than the EU-28 and the convergence coefficients were varied, Poland 1.9 pp, Slovakia 1.9 pp, Czechia 1.2 pp, and Hungary 1.0 pp. The highest dynamics of economic growth and convergence under the conditions of EU membership was achieved by Slovakia and Poland.

As emphasised, an important aspect of the analysis of economic growth results is the appraisal of the contribution of supply and demand factors. When assessing the contribution of supply factors to GDP growth, it is necessary to answer the question whether the structure of supply sources of growth was favorable from the point of view of influencing technological progress, increase in labor productivity and TFP. The contribution of capital to GDP growth was relatively high, but it was invested outside the ICT sector, while the contribution of ICT capital remained low, and it is the carrier of technological progress. Only Czechia had a proportional contribution of ICT and non-ICT capital. Thus, the structure of supply sources of GDP growth did not ensure Poland, Slovakia and Hungary reducing the technological gap, but ensured achievement of this goal for Czechia. The structure of demand sources of GDP growth was also unfavorable for Poland. Consumption was the dominant factor throughout the period considered. In summary, the weakness of economic growth in all the V4 countries were low investment and concentration of capital expenditures outside the ICT sector (in the latter case, with the exception of the Czechia).

To conclude the evaluation of Poland's economic dynamics during the EU membership, it is worth pointing to the forecasts of Poland's diminishing the economic gap published in the 1995 report "The Polish Economy in 1995" (1996, p. 3). The authors of the report predicted that Poland would have achieved a GDP per capita level of 75% in relation to the EU by the year 2022 or 2025 (the second scenario). The analysis carried out in the paper confirmed the nearly 100% accuracy of these forecasts (fig. 1).

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[i] Austria, Finland, Norway and Sweden. They became members in January 1995 (with the exception of Norway where the accession treaty was rejected in a national referendum).

[ii] Czechoslovakia was divided into two sovereign states - Czechia and Slovakia in 1993.

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Big Data in Finance: Redesigning Risk and Cash Management Platforms by introducing Big Data Technologies

Mohamed Mehdi BEN AISSA
Tunisia Polytechnic School (University of Carthage),
Tunis, Tunisia,
mehdi_benissa@yahoo.fr

Lilia SFAXI
INSAT (University of Carthage), Tunis, Tunisia,
lilia.sfaxi@insat.u-carthage.tn

Riadh ROBBANA
INSAT (University of Carthage), Tunis, Tunisia,
riadh.robbana@gmail.com

Abstract

Faced with a new set of challenges ranging from international cash and risk management, to Open Banking and various types of regulations, the financial services sector is undergoing a phase of digital transformation thanks to the adoption of the latest Big Data technologies. This transformation is enabling banks and financial institutions, as a whole, to modernize their information systems whilst maintaining the highest levels of compliance and security. With raw data seen as the main asset to address key business requirements, financial institutions embarked on a mission to innovate their core services. Their main aim is to exploit the data to better serve customers, meet increasingly stringent financial regulations and compliance, as well as growing the business as a whole. Empowered by in-depth coverage of security, data governance, storage and processing, new financial platforms must be able to respond to the business needs and support a variety of mission-critical requirements. Such needs can vary from critical regulatory frameworks to the highest security requirements set out across the industry. Thanks to new Big Data platforms, financial institutions are now able to reduce time-to-market for new applications as well as the costs of maintaining a rather expensive legacy infrastructure. We show in this article how Big Data concepts and technologies were applied to two financial use cases: a Risk Management and Cash Management Platforms.

Keywords: Finance, Risk Management, Cash Management, Regulation, Business Intelligence, Data Warehousing, Big Data.

Introduction

In the financial domain, information represents the main source of competitiveness and income for businesses (Yu and Guo, 2016). Having the most reliable information as soon as it's available means you are ahead of your competitors. Also, mutualizing data from several sources in a unified storage, purifying it and performing parallel computing on massive amounts on historical data is a huge advantage for financial companies. Indeed, modern financial companies are using data characterized by the 3Vs (Volume, Velocity and Variety) (Yu and Guo, 2016).

A study conducted on the US market (Zhang, Shi and Khan, 2018) shows that the number of financial transactions noted 50 times increase in only a decade. Even before the outbreak of the COVID-19 pandemic, and due to the noticeable increase of mobile payments and e-commence, the size of the payments market was predicted to reach 2 Trillion US$ by the end of 2025 (QYResearch, 2019). But volume is not the only issue for financial data. The need for a low latency when processing financial

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requests is at its peak, as a constantly increasing amount of trades are executed online (Tian *et al.*, 2015). In fact, nowadays, financial markets can experience up to 500 quote changes and about 150 trades in 1ms. Aside from that, financial data is composed of structured data, mostly in the form of time series, such as those provided from global stock exchanges, and unstructured data, gathered from social media, web articles and videos, and that are becoming valuable sources in modern trading strategies (Zhang, Shi and Khan, 2018).

The characteristics cited above justify the need for Big Data tools, methods and best practices, in order to extract meaningful values from raw data in a timely fashion. However, and despite the awareness of the decision-makers about the importance of this technological shift, it is still a struggle for most of them (Goes, 2014). Indeed, financial companies have resorted for a long time to high performance computers to deal with intensive processing (Tian *et al.*, 2015). But the constant increase of data volume generated the need to scale out the system, and thus use new storage and processing paradigms. This shift comes with a whole set of challenges, and calls for the use of Big Data analytics as well as transactions' management.

Big Data platforms are beneficial for the financial market in many aspects (Tian *et al.*, 2015). They can help organizations add a layer of intelligence to their trades, by exploiting all available data in a reasonable time. They help to avoid indiscernible risks, give more accurate customer profiling and detect fraud in real-time. Enforcing a robust data governance to safely use the data while maintaining the usability is a key success factor for these types of applications. On the other hand, integrating accurate structured data with high-volume social networks insights can reveal hidden market opportunities, contrary to more classical means (Yu and Guo, 2016).

Due to the requirements of the CAP theorem (Brewer, 2012), that states that consistency, availability and partition tolerance cannot be applied simultaneously, developers and architects are faced with the difficult task of finding a reasonable tradeoff between the performance of the system and the correctness of the data. The 3V properties of Big Data encourage in general to favour availability over complete consistency. But in financial applications, and especially in the risk and cash management contexts, this can be problematic, as consistency is a crucial requirement. This justifies the need for an evaluation system that helps to extract valuable metrics for an appropriate decision-making.

In this paper, we detail the impact of Big Data on decisional platforms compared to classical Business Intelligence ones. We then show how Big Data technologies were integrated in two financial platforms: Risk and Cash Management, by taking into account the different financial constraints and requirements.

Decisional Platforms from Business Intelligence to Big Data

Business Intelligence and Big Data Business Intelligence applications use tools, techniques and technologies allowing the exploitation and the consolidation of the heterogeneous data, in order to facilitate decision making within the company and to allow the decision maker to have an overview of his activity. They are based on Online Analytical Processing (OLAP) that structures data as a set of facts and dimensions. They rely on a well-defined process: data extraction, transformation, loading into the data store, analysis and visualization.

On the other hand, Big Data technologies allow collecting, storing and analyzing massive data characterized by volume, variety and velocity via varied terminals, in real time and from any geographical zone. They represent, today, powerful tools for companies in the decisional world thanks to their distribution, scalability and modern architectures. The introduction of these technologies gives companies many opportunities to improve their information system and to make it more efficient by supporting new features and options that did not exist before. Big Data systems use distributed storage systems to benefit from their (theoretically) unlimited capacity, and the computation power they can offer thanks to the multiplication of resources. Technologies differ in

this area, from those that enable the processing of huge quantities of inputs in order to have a complete view of the existing data and extract value with a high throughput, to those that process high velocity data in real-time to render results at a low latency.

Big Data technologies can be integrated in every layer of the information system, and in all types of applications: transactional, analytical, or transverse, such as monitoring, business process management, and security. In this article, we are only dealing with OLAP architectures and the impact of Big Data technologies on them, which introduces a new concept known by **Big-OLAP**. In fact, Big Data systems can also be used in the decisional world, as they provide powerful and precise tools for extracting value and facilitating decision-making and prevision. Some even tend to declare that, now that Big Data is evolving and maturing, the classical Business Intelligence is about to disappear.

Architecture Contrary to BI solutions, Big Data systems don't follow a rigid and well-defined decisional chain, but are characterized by the flexibility and adaptability of their architectures. Moreover, Business Intelligence applications are always driven by Key Performance Indicators (KPIs), contrary to Big Data solutions that support a schema-less approach applicable to all decisional KPIs and requests (Herodotou, 2011). Decisional Big Data systems are known to be data-driven, which means that the business needs are extracted from the existing data, and can evolve with them. While BI systems work the other way around: the business needs (illustrated by KPIs) are defined first, and from these needs, the structure and type of the stored data are deduced.

Data Collection Data Collection in a BI architecture must go through a rather heavy and long transformation phase that must happen periodically, preferably at night or in the weekend when the source systems are at rest. But in Big Data systems, and due to the velocity property of the data to be stored, subjecting them to a long processing step before storage is impossible. This is why they need to be collected and stored in a real time fashion first, as they are. This important distinction drives the need to very different types of storage systems: for Business Intelligence applications, we are talking about Data Warehouses, versus Data Lakes for Big Data systems.

Data Storage: Data Warehouse and Data Lake The Data Warehouse is a structured store that respects either a star (Gopalkrishnan, Li and Karlapalem, 1999), snowflake (Levene and Loizou, 2003) or fact-constellation schema (Geetika Saxena1, 2014). It is a centralized, structured and KPI-driven storage system. On the other hand, a Data Lake is a data store designed for Big Data applications, characterized by its distribution and capacity to store and treat a high volume of data. In addition, the most important advantage of a Data Lake is its capacity to manage a schema-less data that is often denormalized, redundant and stored in bulk (Fang, 2015).

The choice of the terminologies "Data Warehouse" and "Data Lake" explains very clearly the main difference between these two notions. Being a warehouse, a Data Warehouse is there to store the data in an organized manner meant to facilitate searching and extracting valuable information. Whereas a lake is there just to engulf all the goods you intend to throw in it. It doesn't care about classifying it, filtering it or structuring it at first. It is just intended to store a huge amount of data, and it's up to the user later to go through all the mess and see what he can do with it.

In Data Warehouses, data needs to be shaped before it is stored, as it uses a *schema-on-write* processing type, while Data Lakes do not use any predefined structure while writing data, but defines the necessary structure for processing when reading it (*schema-on-read*). In Data Warehouses, data is generally read using multi-dimensional queries and transformed into in-memory hyper-cubes before being sent to the reporting tool, while with Data Lakes, treatment is co-localized with the data, supports distribution and parallelization, and can be pretty complex. Both data stores are historical, which means that data is not supposed to be deleted or modified, only added and read. All data are tagged along with timestamps, and any modification or new addition will just be appended to the old value, thus enabling archiving and applying a next-to-zero-data-loss strategy. As a summary, we present in the Table 1 a more exhaustive comparison between these storage systems.

Table 1. Data Warehouse VS Data Lake

	Data Warehouse	**Data Lake**
Data Structuring	Structured	Not (necessarily) structured (denormalized)
Subset	Data Mart	Lake Shore
Data Volume	Important	Very High (100*TB*)
Information Density	High	Low
Distribution	Centralized	Distributed
Co-localized Treatment	Not supported	Supported
Scalability	Vertical	Horizontal and Vertical
Users	Business Professionals and Decision Makers	Data Scientists and Data Engineers

Data Analytics Data Analytics in BI solutions are characterized by their centralized nature, and are mainly focused on the OLAP approach. Big Data technologies, on the other hand, are broader, and can benefit from the underlying infrastructures' scalability. Big Data technologies can also be used and integrated in the analytics phase of a decisional chain based on new compute patterns like map-reduce. Usually, these patterns rely on Big Data concepts like distribution and data locality, which are hindered by the centralization property of the Data Warehouse. Nevertheless, even without a real distribution of the data, these technologies support a massively parallel processing phase, that improves in a spectacular way the performance of machine learning algorithms, for example.

Decisional Big Data Architectures

In this section, we present different Big Data architectures for decisional projects based only on Big Data technologies, patterns and tools. These architectures are seen as a revolution in the decisional world thanks to their modern design, overall scalability and features such as real time stream processing.

There are two well-known Big Data architectures for decisional projects:

Lambda Architecture A generic architecture (Kreps, 2019) designed to store and process a massive amount of data while taking into account the volume, the velocity and the low latency constraints. This architecture solves complex problems that involve real-time stream processing as well as batch jobs. It aims to provide complete and dynamic views and satisfy the needs for a scalable, robust and fault-tolerant system (Persico *et al.*, 2018). It consists mainly of three layers: the first layer is called the Speed Layer, and aims to produce real-time views only on recent streaming data. The data is processed on the fly, without any access to the historic store and only resulting views are stored. The second layer is the Batch Layer, and its main goal is to perform on-demand historic analysis. Data is first stored in a distributed batch storage, as it is, without or with very little loss. Once stored, any analytical request can be performed, and its result will be stowed in batch views. Speed Views and Batch Views, resulting from the speed and batch processes, are managed by the Serving Layer, which is responsible of their creation, their maintenance and their eventual fusion and integration. This layer is also the only communication endpoint provided to the decision makers, that can perform batch low-latency analysis along with real-time visualization.

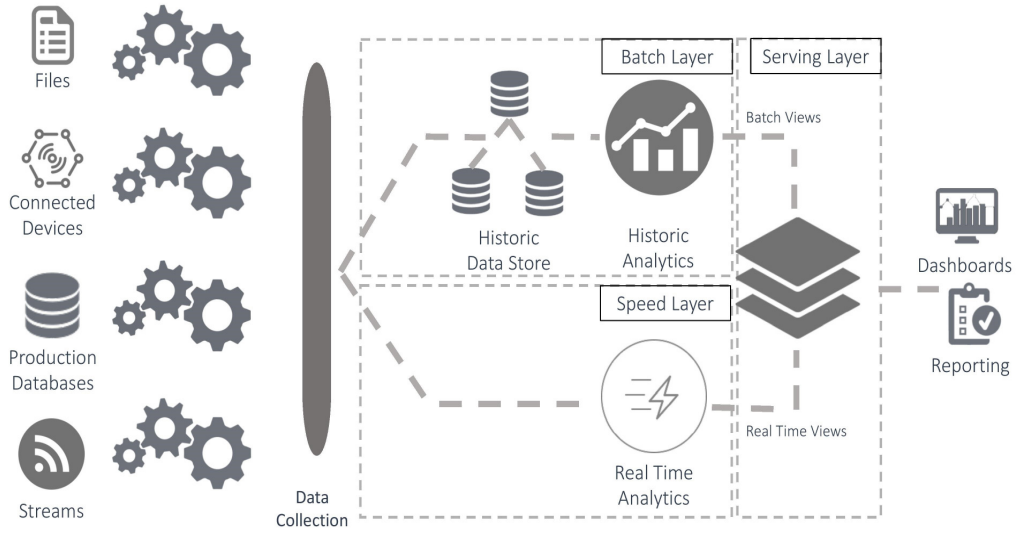

Fig. 1. Lambda Architecture

Kappa Architecture The Kappa architecture is designed in order to simplify the Lambda architecture by combining the speed and batch capabilities into one layer known as real-time layer. In fact, this layer is mainly used for real-time stream processing, while taking into consideration historical data. Since there is no batch processing layer, only one set of code needs to be maintained, which can decrease the complexity of the system, the biggest hindrance in the lambda architecture (Lin, 2017). Because the final user is no longer connected directly to the historical store, he cannot trigger any on-demand processing and all historic analysis must go through the streaming factory.

Other Big Architectures Lambda and Kappa architectures can be the most famous Big Data architectures, but they are not the only ones. In fact, some other less known greek-lettered-architectures exist, such as *i*ota (Apache Incubator, 2016) which is a lambda-inspired architecture specifically designed for internet of things applications. Other than that, a lot of companies choose to combine Kappa and Lambda characteristics into a customized architecture specifically adequate for their needs.

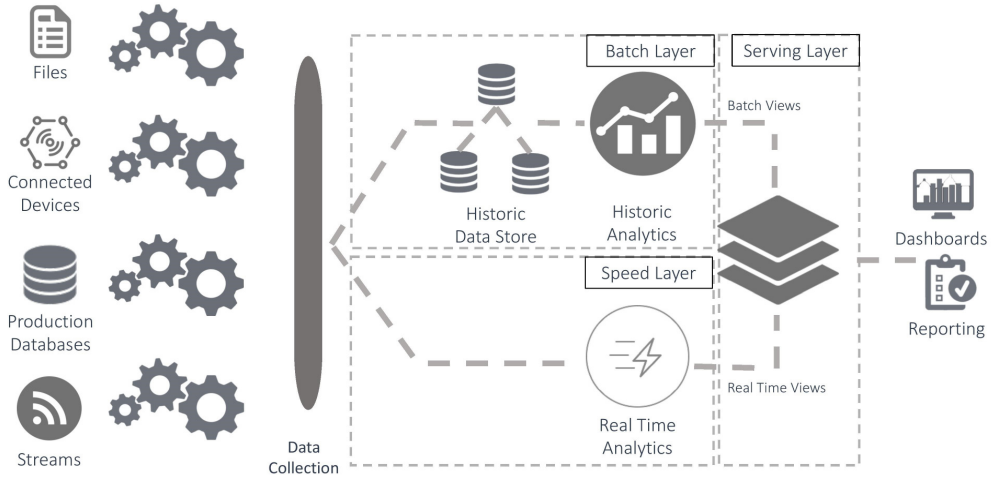

Fig. 2. Kappa Architecture

Benefits: The Big Data architectures for decisional projects are as advanced as they are today thanks to their support for real-time Big Data analytics, their overall distribution and scalability and their high availability. In addition, they support schema-less design for historical storage and analytics. On the other hand, these architectures enable us to consider and handle data differently, depending on their types and characteristics. In fact, data can be classified according to its access date, and access and change frequency. So, distinguishing a multi-temperature data management solution involves having **hot**, **warm** and **cold** data, the first being the most recent and frequently accessed data, and the last the oldest and rarely accessed ones. This data classification is very helpful to optimize data access and change operations particularly for Big Data architectures. For example, we can choose the type of storage depending on the type of the data it contains, putting the hot data on stores privileging access speed, while the cold data can be put on stores supporting enormous volumes, but not necessarily fast. In the Lambda architecture, the hot data is immediately processed by the stream layer, while the cold data is archived in the Data Lake and processed on demand for Analysis, Historical Lookup or Auditing.

Limits: Implementing Big Data systems in a decisional context faces several challenges. In fact, designing and setting up a Big Data architecture represent a major revolution in the company, that requires a broad and quite scarce expertise. In an existing and implemented decisional project, these architectures are not easy to integrate because they represent a major architecture revolution. Moreover, to implement them, a broad expertise in Big Data systems and technologies is required, as they are known to be less documented and less regulated than other technologies, in addition to the lack of any Big Data methodology for decisional projects. On the other hand, using Big Data technologies can be too complex and extreme for some simple and straightforward use cases where plain old BI solutions can do the job. If real-time processing is not needed, if KPIs are clear, fixed, and well-defined from the beginning, there is no need to go for a haphazard Big Data decisional architecture with less support and documentation.

Compatible technologies: Some of the well-known OLAP decisional technologies that respect the Lambda architecture is Druid (Yang *et al.*, 2014). Indeed, it is an open source, end-to-end solution meant to offer flexible, low-latency analytic queries on real-time data. The solution combines the low latency guarantees of stream processors and the correctness and flexibility guarantees of batch processors. It also introduces a serving layer specifically designed for interactive analytics. Another

technology, called Samoa (Bifet and Morales, 2015) implements the Kappa Architecture, by introducing machine learning models in the streaming context, combining both batch and streaming jobs into the same layer.

Big Data and Decisional Risk Platform

Context

At a French corporate and investment bank, the first Big Data need consists in building a new scalable decisional Risk Management Platform based on Big Data technologies.

The existing Risk Management solutions have already shown their benefits, by allowing to manage the significant complexity of market risks indicators. However, they had also some limitations when it comes to dealing with Big Data. In fact, the legacy infrastructure didn't scale well to data which volume increases steadily and continuously. This is due to the fact that only vertical scalability is supported, which makes its maximum capacity quite limited, and calls for very expensive infrastructure changes. In addition to that, new compliance and regulation requirements like the BCBS239 principles (ECB, 2018) (data dictionary, normalization, data lineage, audit trail, KPI, etc.) and the Fundamental Review of the Trading Book (FRTB) (BCBS, 2013) regulation, require advanced and complex analytics.

In this direction, a new scalable and international Big Data Risk Management Platform was designed and implemented, in order to reach a high level of data integrity and quality. This platform aims to ensure a rationalization of the entire ecosystem, deprecation of obsolete systems, harmonization of pricing libraries and optimization of operational and decisional processes. We have subsequently been able to optimize the generation of different regulatory reports and distribute each one to the various regulators, leading to better compliance across every department.

Specific training sessions were arranged for development, infrastructure and project management teams in order to present the Big Data fundamentals and prepare the kick-off of the first Big Data program of the company. On the other hand, the focus of the team on this particular project was on data governance, being the first priority of the program. Then, we accompanied the team in the different phases of this program from the proof of concept and prototyping to the production run. The project is still ongoing. Following the Agile and DevOps approach, the solution is already in Production, while the clients' needs are still changing and evolving.

Architecture and Implementation

The developed platform aims to store and process a massive amount of data while taking into account the volume, velocity and low latency constraints. The system respects the Lambda architecture as presented in figure 3. It aims to solve complex problems that involve real-time stream processing as well as batch jobs. It provides complete and dynamic views and satisfies the needs for a scalable, robust and fault-tolerant system. Data governance rules were applied from the beginning, in order to guarantee high data quality that will directly impact the analysis phase.

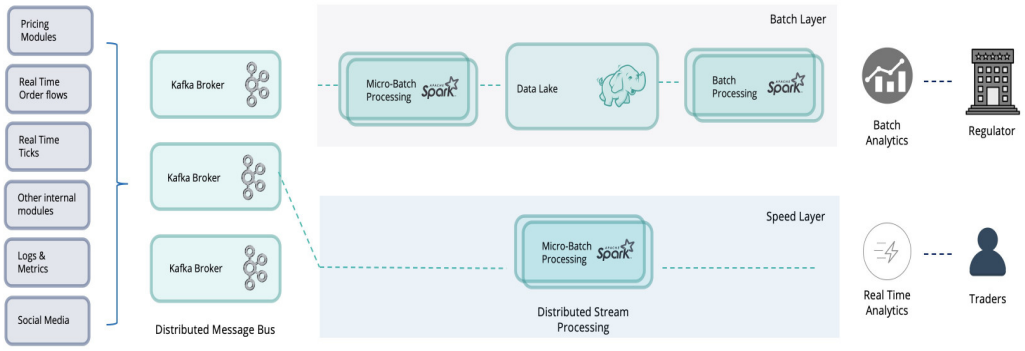

Fig. 3. Risk Management Platform Architecture

Data Sources Different data sources were identified from internal (pricing modules, real time order flows and ticks) and external systems (social media and partners' data). From a technical point of view, these sources were classified as batch (relational databases, Rest APIs) and stream sources (real time streams, logs and metrics). The data collection processes were designed and implemented via StreamSets, which is a Big Data integration tool facilitating the collection of these different datasets. Two different execution engines were used by StreamSets to distribute the collection processes: (1) Change Data Capture for relational databases (Ankorion, 2005), and (2) Apache Spark using micro-batch for the other sources. A big part of the data is collected from social media like Twitter, LinkedIn, etc., and injected into Apache Kafka without any transformation in order to keep their original content and ease the evolution of the platform for new needs.

Speed Layer Implementation Two sorts of streaming jobs were defined:

1. Transformation jobs that execute cleansing and enrichment operations to prepare data to be analyzed. As different sources were identified, an important homogenization phase was implemented by creating different streaming views traced in the data governance tool which is Colibra.
2. Analytics jobs that consume real time events from internal and external datasets in order to make the decision-making easier for traders by reducing the time to market. Real time streaming jobs consume transformed data and execute real time analytic algorithms using the structured streaming API of Apache Spark combined with other machine learning tools like Tensorflow and Scikit-learn. Thanks to this layer, traders can have a unified real time dashboard that reports several business indicators like trading activities combined to real life activities like news, weather, social media, public opinion, etc.

Batch Layer Implementation Apache Spark (mainly Spark SQL API) and Apache Hadoop were used in the batch layer. The analytics jobs aimed to execute three types of jobs:

1. Historical data exploration: these jobs produce on-demand and interactive reports with specific and temporary queries requested by regulators or traders and executed by Hive LLAP.
2. Daily trading activities summarizing: these jobs produce scheduled reports, and use Apache Spark to consume internal data, then send the analyzed data to regulators as required by the financial regulations like FRTB and MIFID II.
3. Data mining and discovery: these are machine learning jobs using Apache Spark ML, that help to understand the relation between datasets and create new business opportunities in a trading context that can be impacted by various internal and external factors.

Business Impact

From a functional point of view, the implementation of this platform was very beneficial for both regulation and trading activities.

As described in the context section of this use case, building daily regulator reports was not possible with the legacy technologies as we had to deal with high data volume. Without these big batch reports, trading activities could not be maintained, as it was required by the regulator for business continuity. Data quality and analysis precision were the biggest challenges in this part, as very important sanctions can be applied in case of inconsistent reports communicated to the regulator that can freeze bank activities.

In addition to that, the platform delivered real time analytic reports for trading activities by taking into account different sources from national and international financial markets, internal systems like pricing modules and other external sources like social media. Thanks to this module, more efficient predictive algorithms, based on new explored data like tweets, news and weather, gave better scores and helped the decision-making process. Real time reports based on an event-driven approach also helped traders to reduce time to market thanks to the low latency processing engines.

For this use case, the most important thing was to manage the datasets collected from the different intra- and inter-projects data sources, or from partners, customers and the internet. The data sources and datasets were well traced and defined in the governance tools, which helped the company to continue the enrichment of the Data Lake in order to improve existing modules and implement new needs.

Big Data and Decisional Cash Management Platform

Context

For several years, banks have been working on cash management solutions servicing both international trade and transactional banking product lines. In this context, a new decisional cash management platform was implemented by transforming its operational and decisional models using Big Data technologies. This platform enables decision makers to form an opinion in a timely fashion, while taking into consideration the financial context where the competition is increasingly harsh. In addition, it will make real time transactions' management possible thanks to real time fraud detection and transactional modules supporting high data volume with low latency. It also aims to modernize the decision-making with real time and streaming analytics for fraud detection and KYC (Know You Customer) modules.

Respecting Service Level Agreements requires real time validations of B2B important transactions. In parallel, KYC reports are generated on-demand, based on high data volume.

The team committed to deliver one minor and major release per month in order to accelerate the deployment with Agile best practices and by respecting the production service level agreements. The biggest challenge in this use case is the consistency, by insuring the *exactly once* semantics that will avoid transactions loss and their duplication. This feature is essential in a cash management context that requires high consistency and integrity levels, which directly impact the platform's performance.

Architecture and implementation

The cash management platform, presented in figure 4, is divided in two sub-platforms. The first one is fully operational and aims to manage the different B2B transactions with an event processing approach. The second one is decisional via two different layers:

1. *Fraud detection module*: respects the Kappa architecture and helps to validate the different transactions managed by the operational platform.
2. *KYC (Know Your Customer) module*: implements a Data Lake architecture and aims to store and analyze data collected in real-time from internal and external sources, using change data capture technologies.

Different types of data sources are identified: the operational and transactional internal system, social media and web crawling services that provide important information about different customers, internal accounting services, bank referential, internal CRMs, and various logs and metrics.

A big part of the legacy system is implemented using MQ-Series, representing operational transactions deployed all over the world. Real-time data collection jobs use Apache Storm, an event processing technology that helped to integrate real time transactions into the Kafka topics of the decisional platform. Thanks to these jobs, transactions can be consumed immediately by the fraud detection modules. Other in-house collection jobs were implemented with Apache Spark and Apache Storm in order to integrate the rest of the datasets form external and internal data sources.

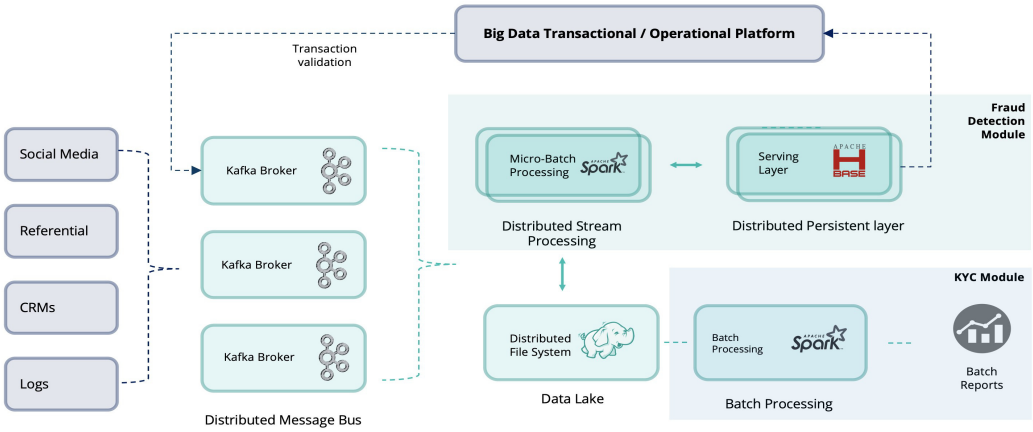

Fig. 4. Cash Management Platform Architecture

Apache Kafka is used as a centralized message bus for event collection. It is also the point of contact between the different modules and sub-platforms. Once the data is collected into Kafka, Spark batch and streaming APIs are used for processing. In addition, Atlas was chosen as the governance tool for both data and analysis workflows.

In the fraud detection module, Apache HBase was used to persist different states of the Spark Streaming jobs and referential with a high consistency level. Fraud detection modules implemented with Spark Streaming checked the conformity of the B2B transactions by verifying if one of the actors is blacklisted or has any fraud proof from social media and official institutions. It was designed to have real time interactions with the operational platform with a high scalability level in order to respect the real time aspect of the transactional platform.

In the second module, raw data is stored into HDFS, then consumed by Spark jobs with a batch approach including: prediction algorithms, OLAP queries and customer behavior analytics.

Once the data is collected into the Data Lake, KYC analytic jobs consume it from different storage layers. In this module, data is prepared for OLAP queries via Spark then presented via other data visualization tools like Tableau and QlikView. Data from the Data Lake is collected and processed using machine learning algorithms for a better customer behavior understanding thanks to the combination of different datasets.

Business Impact

From a functional point of view, this use case is similar to the first one, when we compare the situation before and after Big Data integration. Indeed, it was not possible to implement a real time transactional platform with fraud detection due to the high data volume and the complexity of the fraud analytics. In addition, the real time specificity of these sorts of platforms requires an end-to-end low latency processing. Today, and thanks to Big Data, it's possible to maintain a real time cash management platform deployed in an international B2B context.

The decisional platform had to respect high service level agreements while making the right compromise between the availability and consistency levels. Data governance and security were also important in order to respect the compliance and regulations across the different countries. It also helped decision makers to have a global view of the different customers and partners. Prediction and data mining allow to explore new opportunities and create customized services and products.

Conclusion

In financial decisional use cases, the classical decisional platforms show some shortcomings. In fact, the traditional storage and processing models in Business Intelligence systems are not sufficient anymore when confronted with data that becomes more and more massive, varied and with a high velocity. This is where Big Data solutions can be of great use. In fact, these solutions have proven their efficiency when dealing with enormous constantly increasing amounts of data with a changing schema. On the other hand, Big Data technologies are evolving, day after day, by offering new features and capacity to deal with the demanding users. However, architects and developers find it increasingly hard to implement adequate solutions for their needs. They try to initiate internal Big Data and decisional projects, which tend to be very complex, with a high level of risk, and the need to involve a big number of actors with various skills. The lack of Big Data decisional methodology and tools with adequate governance rules and fundamentals make it an imperative to define new standards, especially in the finance domain.

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Holiday Niches and their Impact on Mainstream Tourism – Future Trends

Corina Larisa BUNGHEZ

Bucharest University of Economic Studies, Bucharest, Romania
E-mail: corinabunghez@yahoo.com

Abstract

This research paper describes the emerging trend of niche tourism and focuses on some of the most important forms of this type of tourism activity, analyzing both current development and future evolution of these tourism trends, also being aware of the current global pandemic context. We assess the enormous versatility and potential of the selected niches, and we highlight the impact that these activities will have on mainstream tourism, both economically and socially, in the near future. The trends presented in this research paper will benefit both the tourism industry and the consumer and will fundamentally transform tourism in the near future.

Keywords: Niche Tourism, Future Trends, Economic Impact

Introduction

Mass tourism is by now an important part of our daily lives. But niche tourism is also growing at a rapid pace. Initially an expensive and elitist concept, targeting sophisticated travelers, who were enthusiastically interested in pursuing a diverse range of activities, niche tourism is now readily accessible to most people, being one of the fastest growing sectors within the domain of tourism.

The term *niche tourism* has been borrowed mostly from the term *niche marketing*, which has adopted the concept from a newer discipline, ecology. Hutchinson is considered to be the first who used the term niche, referring to a region in a vast area, region characterized by environmental factors which disturb the welfare of species. (Hutchinson, 1957) In this sense, niche tourism can be linked to the particular natural and anthropogenic resources of a region, to the characteristic lifestyle of the tourists that engage in this type of activity and to their social status and their financial resources, etc. The niche tourism market, which is characterized by its name, targets a small number of consumers when compared to mass tourism, but, at the same time, it is a constant tourism market. Niche tourism is more identified with what tourists are doing than their number in a particular destination, at a particular time.

Any discussion of niche tourism needs to be considered against the other extreme of mass tourism. The rise of mass tourism, fueled by the growth in the aviation sector in the 1950s and 1960s, also gave rise to the backpacker tourist who later became the highly specialized and sophisticated middle-class traveler of the developed world. (Lew, 2008)

Over time, the transition from mass tourism to niche tourism has been a slow and cumbersome process that necessitated a large amount of material and human resources in order to develop the much needed new and specialized infrastructure. The development of infrastructure in the past decades has allowed people to reach destinations all over the world in record time. Keeping with the accelerated technological advancement, tourism will continue to expand its digitalization process. There are more and more applications for niche services nowadays, that are extremely personalized. These special applications perfectly know their target consumers and make them suggestions based on their budget, their family

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structure and their traveling and browsing habits. On the other hand, for destination managers and traveling planners, who want to use tourism as a mechanism for economic growth, focusing on niche tourism offers greater opportunities because this attracts consumers that are willing to spend more money.

In order to position niche tourism products, Novelli considers the notion of an increasingly experienced group of tourists demanding specialist holidays to meet their specific desires. (Novelli, 2005) The presence of activities, tourist attractions, settlements, food services and other facilities make up the fundamental components of niche tourism regarding mixed destinations, being aware of consumer needs and wants. The focal point of the niche tourism market is the focus on the demands and the expectations of the customers. The relation between supply and demand is well taken into consideration because tourists are in a never ending search for a more satisfying experience during theirs holidays. (C.T., 2010) In a world in which monotony is becoming more pronounced due to globalization, niche tourism is defined by its diversity and by new ways in which it can differentiate itself from the competition. Niche tourism doesn't have the negative implications that mass tourism has gotten along with its expansion, namely the negative impact on the environment and the degradation of socio-cultural relations.

If mass tourism is a standardized product aimed at a large segment of the market, niche tourism is situated at the opposite end of the tourism spectrum, being heterogeneous by nature and based on a larger demand for a more exclusive, unique and distinctive product.

The consumer is actively involved in the formation of a specific niche through its own consumerist practices. Because of this, in order to escape from the competition of mass tourism, the producer is no longer the sole identifier of adequate niche markets, because these niches are formed and developed by both producers and consumers, who act in a symbiotic mode in order to mutually benefit by it. (Richards, 2011)

Over time, the different types of niche tourism have been presented in specialty literature in a random fashion. There are, however, some authors that have categorized them based on different criteria.

In order to better analyze the impact that certain types of niche tourism have over mass tourism, we will utilize the classification made by Alex Papathanassis in his book, The Long Tail of Tourism. (Paapathanassis, 2011) Tourism niches are built on persisting social trends such:

- Sustainability (e.g. Eco-, Inclusive-, Agro-tourism)
- Experience-economy (e.g. Space-, Sport- & Extreme-, Military-, Film-, Dive-tourism)
- Self-development & individuality (e.g. Cultural-, Educational-tourism)
- Hedonism & voyeurism (e.g. Armchair-, Drug-, Sex-, Dark-tourism)
- Consumerism (e.g. Shopping-tourism)
- Conscious living (e.g. Health- & Medical, Religious-, Wellness-tourism)

Consumer experience in tourism is defined as a conglomerate of personal reactions and emotions associated with tourism activities. (Sugathan & Ranjan, 2019). The creation of memorable experiences is necessary in order to attract new consumers and to keep the ones you already have loyal. All of the aforementioned tourism forms satisfy this requirement.

Next, we wish to present and analyze the impact of these forms of tourism, focusing on one form of tourism in each of the categories presented.

Ecotourism

Ecotourism is considered to be a niche segment that targets a small category of tourists, when compared to mass tourism. Nevertheless, ecotourism is the sector with the biggest growth in all the niche tourism markets.

The consequence of broadly defining the borders of what constitutes to be ecotourism is the cause behind the difficulty of properly measuring and assessing the market share and the size of this segment. Even so, estimates tell us that ecotourism makes up for roughly 20% of the tourism global market.

The eco tourist is the individual who visits the less developed areas with an appreciative, participatory and selfless attitude. They interact in a noninvasive way with local flora and fauna and use natural resources in a conscious, reserved manner, while contributing through voluntary work or funds that are directed to the preservation of the area and the economic welfare of the local community. (Ziffer, 1989)

Ecotourism has two specific components: specialized operations and non-specialized operations. The non-specialized ones include all common elements characteristic to all forms of tourism: tourist guides, adequate clothing, tourism agencies, hotels and transportation. The specialized ones are those which refer to the specific activities of ecotourism: eco cabins and hotels in urban or more secluded areas (resorts), protected areas, eco thematic attractions, services in otherwise inaccessible areas by interesting means and local tour operators (natives).

There are independent groups successfully promoted as ecotourism products: aboriginal/indigenous tourism (related to cultural tourism), ornithology, celestial ecotourism (aurora borealis, astronomical observations, astrophotography), hiking and nature observation, landscapes photographing, outdoor education and research, etc. (Weaver, 2008)

Ecotourism attractions are primarily based on biodiversity and natural habitats that are, for the most part, unaffected by human activities. Thus, taking place in relatively isolated places, the current pandemic crisis will not impact this sector as severely as others. On the contrary, people will tend to visit more isolated places and ecotourism could benefit by this crisis. These zones require a specific conduct, in order to properly preserve and protect the tourism destinations so that they may keep their natural qualities and their sense of wilderness.

Ecotourism could indirectly compete with two tourist segments in terms of content and characteristics of the tourism product. These are cultural tourism and adventure tourism and they form, together with the ecotourism, what we call alternative tourism. (Papathanassis, 2011)

It is estimated that the future development of ecotourism in terms of application will depend on several factors. These are: revenue growth; increasing the education level; increased leisure time; population growth; easier, cheaper, faster and safer access to ecotourism destinations; greater care for the natural environment and people's feeling of alienation from it because of increasing urbanization and the development of technological elements.

Beyond all these elements, there is a necessity for properly trained people to educate the general tourist regarding the importance of nature conservation. Also, practicing ecotourism in these areas brings significant financial benefits that can be directed to further develop and maintain the natural parks and protected areas within the zone. Thus, ecotourism is a viable alternative for economic growth for these communities.

Space Tourism

Space tourism is an industry with extraordinary potential, but at present is limited by the conditions in which it can be done, because the prices are huge. Until the year 2019 the cost of a trip to the International Space Station aboard the Russian Soyuz spacecraft was 30 million dollars/flight. At present, the collaboration between NASA and SpaceX will inevitably lead to a commercial development. Axiom Space has already started the selling of tickets aboard the SpaceX capsule, at the price of 55 million dollars/ticket. The trip will last 10 days and will be directed to a privately funded orbital space station. Further technological advancement will massively lower the prices for space travel, starting with the amount of $200,000 that Virgin Galactic assigned in the beginning. Space travel will become more accessible to a greater number of people, especially in relation to the results of a market analysis, which has found that potential consumers are very price sensitive. (Goehlich, 2005) A study shows that at least 10 million people from around the world would be willing to spend a year's salary for space travel. (Smith, 2001)

It is expected that the number of space travelers will grow somewhere to a million per year when the price of a ticket will be under $ 10,000. According to research, rich and adventurous young people seem to form the most suitable target market due to their care-free rebellious component and the low level comfort that they will accept in return of the fact that they would be among the first passengers in space. (Crouch, et al., 2008) A study made by Futron Corporation in 2002 made the prediction that by 2021 the suborbital flight market will reach 15.000 passengers/annually, bringing in revenue of about 700 million dollars. (Futron, 2002) We are almost in 2021 and this approximation is totally unattainable in the current global context. But we can safely assume that the number is not unachievable and we may see this happen in a number of years. Another study made in 2006, in which 783 high income Australian respondents participated, showed that those who were mostly interested in space travel were thrill-seeking young men. (Devinney, et al., 2006)

The economic potential of the development of space tourism is extraordinary. This type of tourism will bring massive economic and social benefits in the future, because we can estimate that it will undoubtedly surpass aviation on Earth.

The progress of the space tourism sector would generate, alongside the indirect technological and scientific advancements, an important direct economic component that will lead to the exponential growth of this sector. Because space tourism has the potential of becoming its own branch in the tourism industry, the effects of this economic development will be significant, both for the companies and industries involved in the process, and for the evolution of society as a whole. In this type of endeavor, the investor's primary concern is the return of the investment and the generation of profit. In order to do so, every process involved will be thoroughly made as efficient as possible. Space activities will therefore become a massive economic generator and the launch costs will dramatically plummet, which will lead to an acceleration in the further development of this industry.

Space tourism will become an activity that will include a very large number of people (both operators, and beneficiaries) and will generate important commercial profits in the next few decades. It is imperative that we recognize this fact and that we realize that, in the near future, space tourism may become as common as other forms of tourism. But because the reality of space tourism is still quite far away, we may safely assume that the current Covid pandemic will not influence this branch of niche tourism. Because of the sensational experiences offered to the consumer, space tourism will become a major sector of the entire tourism industry, transforming this niche branch of tourism into one of the most important tourism activities of humanity.

Cultural Tourism

Cultural tourism is the most dynamic contemporary form of tourism, being interested in the lifestyle and traditions of particular communities or regions, built or natural heritage, artistic performances and products, cultural hubs and landscapes.

The first appearance of cultural tourism as a research topic has its origins at the beginnings of the 20th century, but only in 2002 did the International Council on Monuments and Sites publish a formal definition regarding this form of tourism: cultural and cognitive-cultural tourism is the form of tourism that is focused on the cultural environment and that includes historical and cultural landmarks within a destination, and the values, arts, crafts, traditions, habits and lifestyle of the local populace.

Cultural tourism is defined by the World Tourism Organization (WTO 2012 Report) as "journeys whose primary or secondary purpose is the visiting of sites and the participation in events that represent a cultural and historical component which is part of a communities' cultural heritage." There are serious cultural and heritage/historical tourists who are motivated by the inherent characteristics of cultural sites and, at the other end of the spectrum, there are people who accidentally visit such venues but are not truly interested in the sites' inherent cultural and heritage assets. (Morrison, 2013)

Cultural tourism includes, besides visiting historical sites, the opportunity to learn more about past human achievements. As a part of domestic tourism, these visits are a great source of admiration, national pride and learning about ancestors.

The complexity of cultural tourism is further generated by customer motivation diversity, induced by differences in education levels, tourism experience, quality of life and quality of the tourism products being offered. (Davidson, 1993) Also, cultural tourism has been identified as one of the most rapidly growing areas of global tourism demand. (Richards, 2005)

Cultural tourism is an instrument for economic growth, generated by attracting visitors from outside the local host destinations. These visitors are partially or generally motivated by an interest in historical, artistic and scientific components, or by information regarding the lifestyle, the realities and the traditions of a particular community, region, group or institution. This kind of voyage focuses on the study of the cultural landscape, and this includes visual and theatrical arts, values, traditions, events and lifestyle. Cultural tourism is especially interesting for suppliers because, as a rule of thumb, people that focus strongly on cultural attractions spend more money than regular tourists. Also, they show a tendency toward staying longer at the destinations, which, in turn, brings even more revenue. (Richards, 2007)

Because cultural tourism is primarily focused on the visiting of cultural venues or museums and experiencing artistic products and performances, the current global pandemic has affected, to some extent, this important tourism sector. But people will always be interested in the lifestyles and traditions of different cultures, and as soon as the Covid pandemic loses momentum, we will definitely see a resurgence in cultural tourism demand.

Armchair Tourism

The one thing that history has taught us is that people are most innovative in difficult times. This also applies to the travel industry, where professionals and brands are doing their best to keep the interest in traveling at a high level, despite the current global Covid pandemic situation. This has resulted in the surprisingly successful overnight growth of armchair tourism. This adaptation happened because tourism is going through one of its darkest periods in a long time, and tourism specialists find themselves in the impossibility to change this situation. Indeed, this isn't the greatest of times for classic travels, but, in the

meantime, we can opt for virtual travel. If until more recently the trend of virtual tourism was relatively ignored, because people preferred real experiences, more and more people are now glad that technology has advanced so much, in order to allow this type of tourism practice.

Because lately, due to the current global pandemic, tourism has been mostly relegated to rescheduling holiday plans or postponing them, the phenomena of armchair tourism is currently growing at a rapid pace, enabling us to travel all over the world, virtually.

If tourism is not seen as a physical change of the hereabouts but rather as a change of ones' psychological state of recreation, education, adventure, or other purposes associated with tourism, armchair-tourism can also be included. (Mazanec, et al., 2002)

Armchair-tourism has three main parts: books, television and the internet. Until the emergence of the internet, books were the armchair-tourism media because they were the best information source for life there. Nevertheless, new media has slowly overtaken the time spent on reading. Armchair-tourism such as travel magazines or cultural documentations are more focused on the market aged 40 and older. Nevertheless, the younger generation should not be neglected since new developments will enhance the experience of watching TV, increasingly attracting younger viewers. (Papathanassis, 2011)

Many tourist boards are nowadays using more and more virtual content in order to attract customers and to encourage future visits. These can come in the form of digital events, which provide enriching cultural content and livestreaming video talks using live content from experts, partners and notable individuals. Tourist boards will also use dedicated web pages on which they will promote virtual experiences. Museums, safaris, or other interesting venues can therefore be experienced from the comfort of your own home.

There are destinations and travel brands which can keep the magic and inspiration of travel alive for now – even if it is virtually, from the armchair. Many travel brands and destinations are working on the premise that if the travel consumer can't come to us, we will go to the travel consumer. There are digital platforms where a plethora of extraordinary destinations can be accessed and visited by virtual means. Over 2500 museums all over the world are providing virtual tours for those who are interested. During these tours they can enjoy rooms, shows and events, in which the tourist can participate virtually.

Also, the exponential evolution of technology has another benefit. Even if virtual reality is, at present, only capable of recreating to a limited degree the destination that is being visited, we now have another tool at our disposal: augmented reality. This changes the way in which a visitor can explore a destination in real time. Augmented reality is the technology that gives the visitor information that can be superimposed over the real time landscapes or streets, using a digital device. This technology is being used in order to animate history and to bring back life into exhibits found in the most important museums and venues of the world. Having all these means at our disposal, we can therefore travel anywhere, anytime and we are no longer dependent on the caprices of weather or the uncertainty found in difficult times, such as the one we are experiencing nowadays.

Shopping Tourism

As studies have shown, shopping is one of the most sought out activities no matter where tourists go. (Timothy, 2003) This activity gained traction with the development of theme parks, of malls and designer shops. Visiting a theme park or going shopping in another country and even inside the borders of your own country has become, for many tourists, a purpose in itself. Bill Bryson, an American travel and humor book author said that in the past he used to build civilizations, but now he builds shopping malls. Another American author, Erma Bombeck, affirms that the chances of entering into a store to buy a loaf of bread and exiting with just a loaf of bread are three billion to one. These aspects emphasize the worldwide consensus that, in our society, humans are unable to function without constantly going shopping.

When trying to define this special tourism sector only one facet can be defined clearly, namely that this kind of tourism includes the purchase of goods, the most typical being clothes, shoes, leather goods and luxury foodstuff. (Friedrich, 2006)

The main advantage a tour operator could enjoy is the fact that shopping tourism has a positive economic impact on the destinations as well as at least no negative environmental and socio-cultural effects. Meaning local life, natural environment and cultural sites are not going to be disturbed nor destroyed since many traditional malls, factory outlets, and markets do already exist. To be more precise, economically this implies: more secure jobs, as the malls will have a continuous number of visitors; tax income will increase due to the value-added tax (VAT) of more sales; shopping tourism does not seem as seasonal as other tourism products; in addition foreign tourists will increase the balance of payments. (Papathanassis, 2011) Also, the environmental impact is almost non-existent, this not being the usual norm with tourism activities. This happens because, neither accidentally nor by design, wildlife killing or vegetation being destroyed by tourists do not occur. There is also a socio-cultural impact: a shopping mall is visited by locals as well as national or international tourists and as such it is seen as a positive attraction since access is not limited to neither of the two groups. (Swarbrooke, 2002)

The Covid situation has temporarily shifted this type of tourism to a more domestic focused approach. People are now more inclined to go shopping in local tourism destinations. But shopping has become a life-dictating activity for many people. And even in the current difficult pandemic context, everybody goes shopping and we have become dependent on it.

Wellness Tourism

In our fast-paced society, we tend to often forget about ourselves. Because of this, health issues can arise due to stress, exhaustion and living a sedentary life. All these problems can be fixed by escaping into wellness centers. For more and more people, wellness is no longer a trend or a necessity, but has become a lifestyle.

The wellness industry has grown substantially in the last years, at a global level. The numbers are continually growing and the market value of the wellness industry has reached 580 billion Euros. Lots of hotels, airports and corporations have understood the importance of wellness and thus provide some kind of wellness services to both guests and staff.

The wellness world is a global economy made out of multiple components: beauty and care, fitness, nutrition and alternative medicine. Popular perception regarding the importance of healthy diets, fitness and other health practices has been developed into whole new business sectors. As the healthy lifestyle movement gains more and more traction, auxiliary markets, ranging from food and beverage to hospitality, start offering more products that reflect the values of the health-conscious consumers. This is another example of the multiplier effect of tourism. Additionally, the Covid situation is the perfect incentive for healthier lifestyle choices. Thus, people are becoming more aware of the importance of overall health management and are more readily willing to pay for these kinds of services.

Wellness tourism is defined in the specialty literature as traveling associated with the practice of maintaining or improving personal states of being.

From 2015 until 2017, the wellness tourism market has grown annually by a margin of 6,5 %. Until 2022, GWI anticipates that this market value will reach 919 billion dollars – representing 18% of global tourism – with over a billion wellness-oriented travels all over the globe. (GWI, 2018)

Today, wellness tourism is much more than just the destination or the activities – it is an extension of the traveler's lifestyle and values. The wellness tourism sector is a large spectrum one, and offers are divided

between many categories: fitness, healthy nutrition, therapeutic treatments (massages, beauty procedures). But every one of them is centered around enhancing the tourist state of being and state of mind.

Further opportunities are given to current trends, such as the alternative forms of medical therapies from Asia. However, these trends have to be recognized early enough and then must be implemented into serious, high-quality products. Besides from competitive criteria, such as price, or the kind and quality of services provided, the importance of attractiveness of the surrounding area as a choice criterion should not be underestimated. (Papathanassis, 2011)

Specialists estimate that, if the consumer appetite for wellness services maintains its rate of growth, the wellness global tourism industry will reach one trillion dollars in the shortest of time.

Conclusions

There is enormous potential with all of the emerging niche tourism products presented in this paper. All of them arguably represent what one may designate as a megatrend, either at present or in the near future. Additionally, each of the selected products have incredible versatility because they don't target a particular "special" group of consumers, but instead they appeal to a larger proportion of the population. In other words, the niches examined are not mutually exclusive in terms of target market. The phenomena of tourism globalization by developing infrastructure and thus new destinations, and the technological advances in human transportation, with the usage of the mega-ship or the implementation of large-scale commercial space travel, will transform these megatrends into tourism behemoths, and will result in the creation of new specialized holiday niches that will generate huge profits and further expansion. The examples we have presented show a promising outlook for each of the niches examined, as the current global pandemic cannot but temporarily slow the inevitable growth of these tourism sectors.

There are three main aspects of the tourism industry that we can synthesize from this paper. Firstly, the tourism sector is in a constant, ever-growing direction, with more and more people willing to spend money in tourism activities. Secondly, the mainstream holiday package isn't as stable as it used to be, and we can say that the current crisis in the world is a major influencing factor. Thirdly, there are some tourism niches that have great appeal and show incredible potential for the near future.

But there are three more tour operating aspects that we have to take into consideration when making assertions: the capacity risk, the consumers' perceived risk and the unknown reaction of the large tourism groups.

Higher profits can be generated when entering and developing niche markets. Because of this, there are many mainstream companies that have already entered into a number of niche markets. The technological advancement can thus be utilized by specialists in order to benefit in a sustainable way from each particular niche selected. And the tourists are more pleased because the holiday experiences are tailored to their needs and wants, making the product more individualized and consumer-oriented. For the tourism industry as a whole, the growing of niche markets can be seen as a "holiday" from the usual negative practices regularly associated with mainstream tourism, such as environmental irresponsibility and questionable ethics. This means that when niche tourism fully matures and inevitably integrates itself into mass tourism, becoming mainstream, it will carry its benefits into the new tourism industry.

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Water Resources and Achieving a Comprehensive Balance of The Three Components of Sustainable Development

Vladimir A. CHERNOV

Nizhny Novgorod, Russia
E-mail address: Chernovva@rambler.ru

Abstract

Conservation of water resources is extremely important for achieving sustainable development in its three components: economic, social, and environmental. The author examines the existing environmental problems and identifies the most significant ones that require urgent solutions. A review of measures to preserve the environment, waste water sludge disposal technologies and individual production facilities in the field of ecology was conducted. Fundamental indicators of environmental efficiency and ecological and economic efficiency in the construction of a green economy have been introduced. A set of measures to combine the efforts of environmentalists, economists and the population in achieving sustainable development is proposed.. For this purpose, technical means of preserving and protecting the environment are studied, economic indicators for managing sustainable development are found, and measures are proposed to improve the culture of consumption of the population, leading to the transformation of irrational production in order to preserve natural resources and the biosphere. Increasing the culture of consumption is considered not only as a way to preserve the environment, but also as a natural phenomenon that contributes to the balance of supply and demand, reducing labor costs to ensure human life, reducing inflation, increasing the reliability and convertibility of the national currency, and strengthening the country's financial sovereignty.

Keywords: Waste water sediments, ecological economy, ecological efficiency, ecological-economic efficiency, recycling, thermal drying, waste treatment, waste-free technologies, integrated reporting, natural capital, consumption culture, balance, currency reliability, financial sovereignty.

Introduction

Every year, environmental problems become more complex, and their solution becomes more and more necessary for the survival of mankind. The problems are the need to preserve the biosphere, natural resources and achieve sustainable socio-economic development. Environmental issues are usually handled by ecologists, biologists, and specialists with technical education. However, economic solutions need to be increasingly linked to environmental concerns in order for any economic decisions to take into account environmental impacts. In order to solve environmental problems by economic means, it is necessary that environmental issues become an essential component of financial policy. The economic impact of new projects should be compared with the environmental damage of the project and the impact of conservation activities. The total elimination of adverse effects on environmental impacts in industrial production is impossible, but it is necessary that the damage caused can be replenished by natural processes and human involvement in environmental conservation, and nature can be restored. Therefore, economists need to join forces with ecologists and work more closely in this direction. This article is one form of such interaction.

For example, let's consider the problems of ecology of the Volga basin, which includes, first of all, the largest water bodies in The middle Volga basin. Among them: Gorky, Cheboksary and Kuibyshev reservoirs of the rivers Volga and Oka. The quality of water in them is determined by natural factors (landslide processes, erosion, etc.) and anthropogenic (waste water, storm water, surface runoff from territories, water transport, etc.)

No matter how much talk about the prevalence of domestic water consumption, From industrial consumption in Russia, but an increase in domestic water consumption, Wasteful consumption of water

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in apartments, increase water costs, but do not significantly increase waste water pollution, Since the water is then returned to the ground without industrial contamination, And the human body is the natural product of the earth, which contains the same elements that exist in the earth. Human consumption of water is a natural exchange process. Therefore, the presence of household meters for water consumption in Russia cannot become a significant factor of water purification, as the number of water resources and their provision to the population in Russia are not comparable to European, African and other countries, where due to the small number of fresh water bodies, water supply costs much more. And therefore in these countries household meters significantly increase savings, unlike Russia. The country 's water resources are contaminated primarily by industrial pollutants, transport, garbage, detergents, etc., washed away by precipitation and melting snow, and the sale of domestic water meters in Russia is more needed by business than by solving environmental problems.

According to Rosstat, 40% of contaminated wastewater in the Volga basin is discharged into the Cheboxary reservoir. In these effluents the content of harmful components is many times higher than the established norms. The bulk of harmful substances come from the industry of the Nizhny Novgorod region in the area of the inflow of Oki. Among the pollutants: heavy metals (copper, zinc, manganese), nitrogen-containing (nitrites, nitrates) and organic (easily and hardly oxidizable substances) and inorganic components. Many scientific publications are devoted to this problem.

According to research data from Moscow State University (MSU), Oka is most polluted by many industrial enterprises, including Dzerzhinsk chemical plants, discharges of large livestock complexes, and other pollutants. The problem is compounded by outdated treatment facilities, garbage dumping in water protection zones, pollution during snowmelt, etc.

From the river, the Cheboksary reservoir is filled with nutrients that cause blue-green algae to bloom in the summer. According to research, this flowering is accompanied by the release of toxic substances.

As noted in MSU research, in the Oka basin, in addition to the Nizhny Novgorod region, there is a Moscow region that pollutes the Oka riverbed with household sewage through the Moscow river .

Oka brings significant environmental damage to Gorkovsky and Cheboxary reservoirs, which are considered the most eutrophic bodies of water. In them, water quality, oxygen regime deteriorate, valuable fish breeds disappear, recreational conditions deteriorate.

A comprehensive solution to these problems has not yet been found, but the United Nations General Assembly Resolution sets out universal goals and objectives that cover the whole world, are comprehensive and indivisible and ensure a balance between the three pillars of sustainable development. Certain actions are also taken, technologies are being developed to reduce the negative impact on the environment in accordance with the standard (GOST R 56828.12-2016).

Goal 6 of the UN General Assembly Resolution aims to improve water quality by 2030 by reducing pollution, eliminating discharges and minimizing emissions of hazardous chemicals and materials, halving the proportion of untreated wastewater and significantly increasing recycling and safe reuse of wastewater worldwide.

AVAILABLE TECHNOLOGIES USED IN SOLVING THE PROBLEM

Storm water treatment facilities are used to treat wastewater generated during rains, snowmelt, and road irrigation from petroleum products and suspended solids. They are used to clean drains in shopping centers, gas stations, residential areas, warehouses, bridges and roads. When diverting industrial effluents, sorbing materials are used.

One of the advanced enterprises of Russia for the development, introduction and manufacture of equipment for water treatment and water disposal is Argel Group of Companies. In particular, it produces storm treatment facilities "Veksa" of different sizes and different productivity, depending on the customer 's needs.

The technology of treatment of more complex waste water, such as mine, quarry, sub-product, etc., provides for additional methods, including preliminary reagent treatment of effluents with coagulants and flocculants.

The waste water treatment carried out does not sufficiently contribute to solving environmental problems. During the biochemical treatment of 15 billion m3 of wastewater annually in Russia, about 1 billion m3 of wastewater precipitation with a humidity of 98% with a content of 70-90% organic and 30-10% mineral substances is formed. Sewage sludge from urban treatment facilities is classified as a hazard class IV. Such sediments contain heavy metals, sulfur-and chlorine-containing compounds, which prevents their disposal. Therefore, their processing is required.

As a result of the analysis of scientific and technical information of technologies for processing mechanically dehydrated sludge of waste water, thermal recycling technology - thermal drying - was recognized as the most appropriate. The use of such technology allows to disinfect and reduce the moisture content of sewage sludge from 83-86% to 10-20%, which facilitates the removal of sludge from the territory of treatment facilities and simplifies their further disposal.

Thermal (thermal drying, combustion, pyrolysis, thermolysis, etc.) and biothermal (composting, vermicompost, etc.) methods are used to treat dehydrated sediments.

The method of sediment recycling is selected individually for each enterprise taking into account the composition of precipitation and local conditions (availability of territories, ecological situation, interest of enterprises of the region in recycling products, etc.).

Application of advanced technologies of waste water sludge disposal contributes to reduction of payments for waste placement, increase of revenues from sale of product radiated as a result of thermal drying. This dried product may be used:

- As organomineral fertilizer;
- For filling mining sites;
- For construction of waste storage sites;
- In road construction;
- For soil reclamation purposes;
- For creation of fill slopes, greening of highways;
- In the production of cement, asphalt, ceramics;
- As additional fuel in power plants and incinerators;
- To produce combustible gas during pyrolysis (gasification).

Thus, the technologies of thermal treatment of waste water sludge allow to reduce environmental payments for waste placement, restore land areas for economic use, obtain commercial products for subsequent reception.

Modern waste water sludge thermal drying plants have a number of advantages, including simple design; Efficient drying at low temperatures; Does not require large investment investments; they are completely automated; Waste is used to generate heat required for drying; Complete disposal without generation of waste to be disposed of; Compliance with fire and environmental safety requirements.

New directions of waste-free technologies of waste water sludge utilization with their use as alternative fuel are developed for cement plants in Karlstadt (Bavaria). The main costs of such dryers are the cost of the energy needed to evaporate the water. Such technology is cost-effective. It allows the enterprise to free itself from fuel price volatility.

One example of corporate solutions for environmental protection in the Russian Federation is the investment project "Ensuring environmental safety" within the framework of the environmental strategy of Open Joint Stock Company "Russian Railways". The project provides for construction, reconstruction, modernization of treatment facilities, equipment for cleaning of polluting emissions to the

atmosphere, waste disposal, acquisition of equipment and installations for environmental protection purposes, equipment of environmental laboratories, purchase of analytical devices, equipment for elimination of emergency spills of oil products, etc.

In the Nizhny Novgorod region, in 2018, the largest automated waste sorting complex in Russia with an investment of 1.2 billion rubles was opened on the territory of the existing solid waste landfill "MAG-1" near Dzerzhinsk. At the same time, part of the sorted waste is subject to burial at the landfill, and the other part (plastic, paper, metal) is sorted, processed and sold as secondary raw materials. This project is one of the examples of public-private partnership in solving the problem of solid municipal waste processing.

In Nizhny Novgorod, a high-tech plastic processing plant with innovative polymer processing equipment has also been opened, which will mutually operate with the waste handling complex MAG-1. The plant produces polyethylene granules and flakes, which are raw materials in the production of plastic bottles, automotive products, pipes, furniture, cable insulation, etc.

This is a very important project, especially in the context of Russia 's acute shortage of polyethylene granule manufacturers and the underdevelopment of the secondary raw material market. Granules produced at the plant have high quality - said Sergey Halevsky, Director of the Fantastic Plastic Plant. Half of the plastic for processing at the plant will come from the largest waste handling complex "MAG-1" in Russia, located in the Nizhny Novgorod region, and the second half - from other regions of the country. Plastic recycling helps solve the problem of particular importance, as plastic waste accounts for a quarter of the world 's total waste.

The complex of equipment for solid plastic processing for the plant was delivered from the Russian manufacturer StankoPET. In terms of productivity and quality, the operation of this equipment is not inferior, and in certain parameters - exceeds European analogues, and in price - significantly lower than them. At the same time, the company "StankPet" is not limited to the production of high-quality equipment, but also offers ready-made solutions for opening business in this sphere.

Taking into account the construction of significant projects supported by the Government in the ecological sphere, experts still assess the Nizhny Novgorod region as one of the most disadvantaged in the level of purity and careful treatment of nature. According to the summer of 2019 in the ecological rating of the subjects of the Russian Federation it occupies 81 positions out of 85. Information sources - reports of mass media, organizations, authorities, appeals of citizens, documents, etc. - were used in the rating. Unfortunately, the rating of the region has not improved in recent years. Chairman of the Board of the All-Russian Public Organization Green Patrol, expert of the ONF Monitoring Center on Ecology and Forest Protection, member of the Public Council under the Russian Federation Andrei Nagibin notes problems with garbage disposal as the main negative factors of poor environmental situation in the regions.

In this regard, work is continuing to improve the environmental situation in the region. In particular, in the village of Ilino-Transborskoe Semisovsky district of Nizhny Novgorod region on 28.08.2019 began the construction of two sewerage treatment facilities within the framework of the federal project "Recovery of Volga" of the national project "Ecology." Financing of the project from the federal, regional and local budgets amounted to 71,368,000 rubles. The working capacity of the structures is 250 m3 per day. Terms of construction of facilities - 2020.

In order to preserve the environment, law enforcement agencies prosecute subjects of illegal business - organizers of landfills.

Comprehensive Solution to The Problem

The above-mentioned state of environmental pollution and the measures taken to clean and preserve it indicate that the actions of highly specialized environmental actors are insufficient to solve environmental problems, and the involvement of as many producers as possible is necessary. An im-

portant factor in solving environmental problems is the joint work of main production technologists, ecologists, economists and programmers at the beginning of the choice of technological solutions. One example of such cooperation is the production of efficient heat insulation materials from waste production. The main principle in solving environmental problems in production should be to minimize the ingress of pollution to treatment facilities, as it is more effective to prevent water pollution than subsequently to clean contaminated water.

The conservation of natural resources, the reduction of waste and harmful emissions will be facilitated by lean manufacturing technology («lean manufacturing» or «lean production») as part of the Total Toyota Production System (T-TPS), which was further supplemented by the methods of other corporations. The basis of the complex of lean production technologies is improvement of production quality and efficiency due to reduction of losses, reduction of actions that do not add value to the product of production.

The introduction of the Internet of Things (IoT) into information and communication technologies (ICT) in the digital economy will allow real-time tracking of the progress of raw materials throughout the production chain from supply to production, release of wastes of this raw materials and to their further use in production as recycled waste, processing, transfer, sale as raw materials for others, etc. The Internet of Things is able to provide, in an automated manner, the most accurate data on the level of waste in production, the proportion of its use in the production of other types of products, the extent to which production is waste-free and the extent to which waste is not subject to further use. The environmental purity of production will be assessed by the smallest proportion of waste not subject to further use, both direct and as a result of processing, by the lowest emission of dirty substances and by the degree of their purification in the automated mode of artificial intelligence.

In economic solutions the problem of ecology is connected with the international concept of sustainable development and integrated reporting - the main source of information for economic solutions in ecology. The UN General Assembly Declaration provides for sustainable development in its three pillars - economic, social and environmental - in a balanced and integrated manner.

Integrated reporting on natural capital, including indicators on the use of natural resources, their conservation and improvement in the environmental dimension of production, should be used more widely to reflect environmental performance data from enterprises. Such data are given in the section "Natural capital" of integrated reporting (Figure. 1).

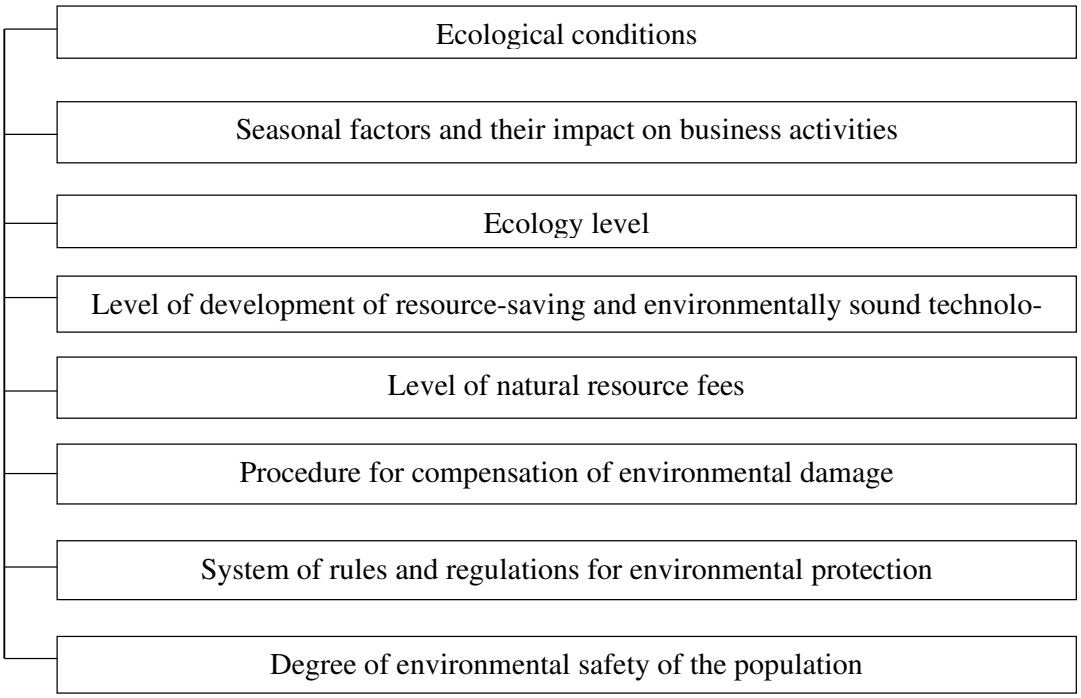

Fig 1. Indicators of natural capital

Increasing environmental problems and the need to address them had led to the emergence of a new environmental economy. The economy involved in solving environmental problems has been called the Eco-friendly economy «Green Economy». Its main task is to ensure maximum people 's economic effect with minimal load on the environment. The efficiency of such an economy is achieved by measures that increase economic efficiency. The economic efficiency of waste water sludge utilization is estimated by the completeness of the use of resources from sediment processing in production, as well as the return of each resource in the growth of output volumes taking into account the use of the best technologies.

Existing environmental regulations are becoming an essential tool for competition among environmental technology and equipment producers. The competitive development of this industry has the main advantage over other sectors of the economy in that they lead not to pollution of the environment, but on the contrary - create products for cleaning and preservation of nature and at the same time become full competitive profitable production. Environmental technologies and their products are most in demand in all developed countries. Therefore, the advanced development of the environmental sector of the economy leads not only to the preservation of natural resources. Highly technological competitive development of the economy in this sphere is the most important component in achieving strategic sustainable development of the Russian Federation. Therefore, in this market segment it is necessary to achieve advantages at the international level. Leadership in this industry most ensures environmental cleanliness and strengthens the economy. It will be assisted in the development, transfer, diffusion and development of environmentally sound technologies, as provided for in paragraph 17.7 of the UN General Assembly Resolution.

In order to ensure the competitiveness of highly technological domestic production in the field of ecology, priority financing of research and development (R & D) in this field is necessary. This will

be facilitated by the UN Multilateral Forum on Science, Technology and Innovation, which will be convened once a year for a two-day meeting.

The Forum will provide a platform for facilitating interaction, networking and networking among relevant stakeholders and multi-stakeholder partnerships to identify and analyse technology needs and gaps, Including in the areas of scientific cooperation, innovation and development, Transfer and diffusion of relevant technologies to achieve sustainable development goals.

Environmental performance indicators are an important tool for monitoring sustainability of development, taking into account the environmental dimension. The degree of perfection of environmental interaction with the environment is typically measured by the following displays:

- Amount of raw material and energy used;
- Volume of emission into atmosphere;
- Quantity of waste per unit of output;
- Frequency of environmental incidents;
- Number of emergency incidents;
- Proportion of recycled waste;

Service mileage per unit;

- Quantity of emissions of individual pollutants;
- Investment in environmental protection;
- Number of legal actions in this area.

Detailed instructions on the selection and use of environmental performance indicators are given in ISO 14031 "Environmental Management. Assessment of ecological effectiveness. Guidelines "and ISO/TO 14032" Environmental Management".

In the agricultural industry, the economic assessment of the efficiency of any agricultural reception, together with energy and environmental assessments, is one of the main evaluation parameters. The economic factor encourages the use of waste and, in particular, sewage sludge in the production of various types of fertilizers. Sewage sludge is used, for example, as a fertilizer in wheat growing.

For economic assessment of consumption and measures for economy and safety of water resources it is necessary to use such indicators as:

- Dynamics and structure of consumed water resources;
- Water consumption per unit of production;
- Average daily water consumption;
- Return on average daily water consumption on revenue;
- Dynamics and structure of investments in environmental facilities, water protection investments;
- Environmental safety indicators: the amount of pollutants discharged into water bodies;
- rationality of water consumption;
- Cost of water resources, etc..

For example, the analysis of water consumption at enterprises is carried out by comparing the volume of production and the 1 of water consumption per ton of production. In addition, the return of water consumption in the form of the ratio of revenue to water consumption of the enterprise is considered (Table 1).

This indicator characterizes industrial and at the same time natural capital. According to the table, we see an increase in the volume of consumption of the organizations involved in economic activities of natural resources. The enterprise needs to decide whether the consumption of this amount of water is justified relative to the growth of production and sales. In the dynamics of change, there is a lag in the rate of sales growth from the rate of water consumption growth, that is, the yield of consumed water

resources is decreasing (Table 1). Thus, increased water consumption is not justified by a proportional increase in production and sales.

Table 1: Average daily water consumption and return as revenue from sales

№	Indicator	Year			Rate of gain, %	
		2016	2017	2018	2017	2018
A	Б	1	2	3	4	5
1	Revenue, thousand rubles.	285545215	344526645	361485474	120,66	104,92
2	Average daily water consumption, m^3/day.	750	900	1100	120	122,22
3	Return on average daily water consumption on revenue. 1 string/2 string	888,4	869,23	858,09	97,8	98,7

The average daily water consumption shows a negative impact on the sustainability of the organization, since in 2018 the company used more water than in the previous reporting period. 22,22% (122,22% – 100%) (table 1). Water resources are used less efficiently, which means that the intensity of waste for future generations is increasing. It is necessary to reduce the average daily consumption of water. In order to increase savings, increase the efficiency of water resources use and reduce harmful emissions to the environment, the Holding company is beginning to actively use a closed water supply system.

As a result of these measures, there have been positive changes: the return on water consumption in 2018 decreased by 0.9% compared to 2017 (98.7% - 97.8%). Such a small increase in efficiency nevertheless marks a commitment to rationalizing the still inefficient consumption of water resources.

It is important to compare the cost of saving water with the cost of preparing it for reuse in production. If the costs of preparing such production, attracting additional equipment, material costs and the resulting additional environmental pollution are higher than the savings from the re-production of water or from the closed water supply system, the project will not justify itself in terms of environmental preservation.

Our research and review of the methods used to preserve the environmental environment have shown that they are almost insufficient for an integrated environmental solution. A comparison of growing environmental problems and approaches to their resolution indicated that the planet was unable to withstand the unreasonable growth of human consumption of natural resources.

The resolution of the UN General Assembly adopted on 25.09.2015 is intended to protect the planet from degradation, including through the introduction of rational models of consumption and production, and the rational use of its natural resources. For this purpose, in accordance with goal 12 of the General Assembly Resolution, by 2030, it is envisaged to halve the global amount of food waste per capita and reduce the loss of food in supply chains. By 2030, it is planned to significantly reduce the volume of waste by taking measures to prevent its formation, reduce it, recycle it and reuse it. Paragraph 8.4 of the Resolution provides for a gradual increase in the global efficiency of resource use in consumption systems, so that economic growth is not accompanied by environmental degradation, as envisaged in the strategy for the transition to rational consumption and production models. From the author's point of view, these measures need to be developed and expanded.

Introduction of rational models of consumption and production, rational use of natural resources is directly related to the need to increase the culture of consumption. Attempts to discuss the problem of consumer culture are considered by some participants to be "utopian". But utopia does not consist in the attempts of mankind to strive for a culture of consumption, but in the opposite, that is, in the delusion that humanity can immensely and unreasonably consume to infinity, and nature and in particular – the planet will allow it to do so to infinity. This is utopia.

Pollution and the reduction of natural resources objectively challenge humanity to more rational and less wasteful consumption, which is becoming increasingly evident. The depletion of the planet in the form of irreparable losses already leads to an increase in the cost of natural resources and to forced significant restrictions in consumption, to an increase in diseases caused by environmental degradation. As V.D. Kalner notes:... "the natural environment cannot change at the same speed as the volume of innovations of the fourth technological revolution into world politics and economy". The most important task of humanity is to minimize the loss of natural resources and to prevent irreparable losses that nature cannot recover. And if consumption is not rationalized, the damage caused to nature and, as a result, to the conditions of human existence, health and life will be much greater.

In particular, the UN General Assembly calls for a radical change in the nature of production and consumption of goods and services. According to item 28 of the General Assembly Declaration, governments, international organizations, the business sector and other non-state actors and individuals should contribute to changing unsustainable patterns of consumption and production, including by mobilizing financial and technical assistance from all sources to strengthen the scientific, technical and innovative potential of States.

Thus, over the years, the contradiction between the growth of consumption and the need to preserve the environment as the most important condition for preserving the health and survival of mankind is growing and becoming more acute. The carriers of this contradiction are the producer of consumer goods and the consumer.

The interests of producers (business) are to increase the volume of production and sales. Following its interests, the business is engaged in artificial generation of demand for products where demand for it is insufficient to increase sales. With sophisticated ways of promoting products, the business industry creates models of goods, the demand for which is formed not by the utility and natural needs of buyers, but by the promotion of false values, false perceptions of prestige and priorities. For example, the prestige of a high price, or when a product is acquired not from natural needs and not for benefit, but because it is "prestigious," the desire for a rapid change of consumption items. The fashion business industry aims to change consumer goods as soon as possible by buyers in order to increase demand in pursuit of profits regardless of the degree of wear and tear of the goods being replaced.

Business often creates varieties of products in which people do not experience natural needs, and which are full of ingredients harmful to the human body. But at the same time the business industry by means of media, media spaces, sophisticated advertizing and PR-actions artificially forms demand for such products, in large quantities inspiring the prestigiousness of consumption contradicting common sense, advantage and human health. Well-being is often replaced by the imposition of unreasonable, unnecessarily wasteful consumption. All this increases the burden on the environment, increases its pollution, leads to depletion of the resources of the planet. His attitude to such processes was expressed by V.D. Kalner: "This increases the contradictions of the" zombie economy "and the global" post-truth "with the flora and fauna surrounding us, the billion-dollar world of living organisms of the Earth 's biosphere, expands the environmental risks and threats faced by our closest descendants".

In order to resolve the contradictions between the interests of the producer and the consumer in order to preserve the environment, it should be taken into account that the business is not able to abandon its interests noted earlier, since they are an important condition for its existence and development. So the business can work through his interests, then a change in demand, which the market will be more in demand products that meet the natural needs of man and bringing him benefit. In this regard, it is important to cultivate a more rational attitude to consumption, so that people get what they really need, first of all, for their benefit, satisfaction of natural needs, comfortable existence, and not for the profits of sellers obtained by any means that cause unjustified damage to natural resources and the environment, human health and life on the planet.

It is believed that more rational consumption will lead to a reduction in demand and, consequently, to recession and crisis. This is possible in tactical terms in terms of current narrow interests of business.

In strategic terms, reducing human consumption will only balance demand and supply. The relative reduction of purchase requests will lead to a relative reduction in the demand for income growth of the population in those areas that do not cause natural needs and do not benefit the consumer, but are artificially, sophisticated imposed by business through mass influence on the consciousness and sub-conscious of consumers, the formation of false values (manipulation of mass consciousness and sub-conscious). This is also one of the important problems of mankind, which will require relatively less human labour to provide life, thus reducing the relative need for jobs, thus contributing to a relative reduction in unemployment. And the relative reduction of business revenues and revenues to the state budget from reduced demand will be compensated by the relative reduction of demand for these revenues by the population.

Inertial formal adherence to the usual dogmas, limited to narrow business interests without taking into account changing conditions, without sufficient care to preserve the bio-sphere, has exhausted itself in the face of increasing contradictions between consumption and the preservation of the health of the planet. Formal (undialectic) adherence to outdated, self-sustaining dogmas creates new risks and threats to nature and the survival of mankind. A new complex, systematic approach to industrial management with integrated interaction in solving environmental problems is required. The time is passing when nature allowed society to follow certain laws of the market, removed from the context of the more General laws of existence. Individual market laws require their complex linkage and systemic interaction with the more General objective laws of nature, society, and thought development in order to achieve such a coordinated harmonious interaction between man and nature that would serve not only narrow short-sighted business interests, but also nature conservation, fundamental economic growth, and the strategic survival of mankind on the planet.

In this case, we are talking about the need to transform demand and then the structure of production in order to form useful consumption, preserve human health, the environment and life on the planet. At the same time, the stimulation of demand to increase business activity should be achieved on the basis of natural needs and benefits for the person through instruments of more equitable distribution and redistribution of income in financial, tax policy. Discussions on income redistribution have also been expressed in sources (Kim D.H., Lin S.C. 2018, pp. 825-848; Oechslin M., 2009, pp. 313-344).

This way is built on the basis of the fundamental principles and laws of the development of nature, society and thought, a dialectical approach that takes into account the place, time and circumstances. In this case, a relative economically justified reduction in demand will help reduce inflation, strengthen the purchasing power of the national currency, its stability, reliability, and therefore convertibility on the world market. This is a necessary condition for strengthening the state's finances and financial sovereignty.

The reverse approach - the desire not for well-being, health, meeting the natural needs of society, but for sophisticated manipulation of the consciousness and consciousness of the population in the narrow interests of business, is based not on the fundamental laws of economic development, but on speculative manipulation, deception of citizens to sell them what they do not need. Such disregard for the foundations of economic development with their substitution for speculative manipulations, formal (undialectical) follow-up to obsolete dogmas cannot lead to stable development of the economy, the State, improvement of the quality of life, well-being of citizens, preservation of the environment for present and future generations, but exacerbates social contradictions, causes political and economic crises, causes unjustified damage to the environment and natural resources. Similar processes in separate publications give names in the form of "zombie economy" and global "post-truth," creating... "threats dangerous to our closest descendants" (Kal'ner V, 2019, p. 50).

Increasing the culture of consumption is achieved, first of all, by common sense and awareness of one's own choice in consumption, which brings benefits; awareness that consumption is not an end, but a means in human life, which distinguishes it from the animal. Ethics and aesthetics are the most important components of consumer culture. A person makes a purchase choice based on aesthetic preferences. The widespread promotion of epatage under the guise of "creativity" destroys aesthetic education, harmony of tastes, and leads to subcultural aesthetic perversions in order to expand de-

mand that is not conditioned by the natural needs of a person and the utility of a consumer item. As a result, the consumer purchases a product based not on natural needs, but on false value orientations, perverse ideas artificially formed by business. Thus, the consumer spends the earned money not for their own benefit, but in the short-sighted interests of the business, which is subtly manipulating their consciousness.

Education, upbringing, and enlightenment lead to a culture of consumption. An uneducated, unenlightened person is more easily deceived, replaced by concepts-manipulating the mind and subconscious, accepting false values and following them. When such manipulation takes hold of the masses, there is a mass fanatical adherence to false values. The destruction of culture generates cynicism and indifference to the problems of humanity and nature.

On the other hand, an unspoiled, immoral person in business is more inclined to deceive consumers, manipulate their consciousness and subconscious in achieving narrow-minded short-sighted business interests to the detriment of the interests of society and the preservation of the environment. Therefore, the role and importance of education, culture, morality and spirituality is increasing in solving problems of ecology and sustainable economic development.

The Findings and Conclusions

Upbringing, education, and enlightenment should be achieved in the system of preschool, school, secondary, and higher education. In the system of higher education it possible in the formation of General cultural, General professional competences stipulated by the Federal state educational standards and universal competencies under the project of Moscow state University named M. V. Lomonosov, Ministry of Finance, world Bank to enhance economic culture and financial literacy of the population. To do this, it is necessary to strengthen the programs of basic disciplines with knowledge of ethical norms, moral values, culture of thinking based on dialectics, as well as to include courses in financial literacy and behavioral Economics in the curriculum of non-economic educational areas.

Thus, to solve the problem of preserving the biosphere, natural resources, and achieving sustainable socio-economic development, a comprehensive approach is needed that combines the capabilities and efforts of environmentalists, businesses, and citizens. Business is able to solve these problems based on corporate social responsibility by improving integrated indicators of sustainable development. Citizens are able to contribute to the solution of this problem by improving the moral level, culture of thinking, economic culture, financial literacy and consumer culture, which must supplement the system of education and upbringing.

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Digital Economy and Social Capital On the Example of Selected EU Countries

Michal GOLINSKI

Warsaw School of Economics, Warsaw, Poland
mgol@sgh.waw.pl

Abstract

A new civilization revolution – commonly referred to as digital - is unfolding before our eyes. The changes it entails will affect the society, economy, culture and politics - virtually all areas of our reality. The world that is being created will be subject to constant change.
An analysis of the relationship between digitalization processes and social capital in EU countries, with special attention to Central and Eastern Europe (CEE), is the objective of this paper.
Its results reveal a low level of social capital (SC) in the countries of this region, which constitutes a development barrier that may exclude CEE countries from fully benefiting from civilization transformations and catch them in the middle-income trap.

Keywords: Information Economy, Digital Economy, Digital Multiverse, Social Capital, Online Social Capital, E-Metrics.

Introduction

In the last decades we have been observing sustained efforts aimed at bridging the development gap between the CEE region and the rest of Europe. The effects of these efforts are noteworthy, however, more needs to be done, also with regards to digitalization. Overcoming technological, financial and organizational barriers has been unproblematic as CEE countries have access to the same cutting-edge solutions, and in some areas – even more advanced. Having bypassed certain development stages and implemented the latest solutions immediately, CEE countries have benefitted from a rapid technological transformation. These are often social and cultural barriers – one of them being the low level of social capital – that pose a greater challenge.
The article endeavors to explore the relationship between the level of digitalization and the level of social capital in CEE countries.

Digital Economy or Digital Multiverse

We are beginning a new era of civilizational expansion, the magnitude and weight of which are comparable to the great civilizational revolutions known from history. Unquestionably, the exponential development of information and communication technologies (ICT) lies behind this transformation.

A plethora of terms is used to address the unfolding changes, digital society or digital economy being most popular recently. Regrettably, they fail to fully mirror the impact of ICT on our whole reality. The author proposes to use the phrase "digital multiverse" to do justice to the complexity and multidimensionality of the research area, and it is the author's own definition of this term that will be used in this elaboration.

Digital multiverse (DM) is a network of people, organizations, communities, devices, systems, applications and data and their relationships of a global nature, where the mainspring is the exponential

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scientific and technological progress. The constitutive elements of DM are: intensive use of ICT, integration of physical and digital systems, hyperconnectivity forcing interdependence and cooperation, automation of information exchange and data analytics, unpredictability of development, disappearance of barriers and the arising new development opportunities. The motive forces determining the nature of DM are the processes of digital destruction and digital transformation. The described phenomena determine the characteristics of DM, such as: flexibility of structures and processes, high level of innovativeness, increasing efficiency, globalization, speed of reaction to signals generated by the environment, creation of new consumer needs, intensification of business interactions, creation of intelligent products and services, progressing servitisation of the economy and rise of new occurrences and phenomena. The rise of DM spawns new opportunities, but also threats in practically all areas of human existence.

Modern technological progress is exponential, digital, and combinatorial (Brynjolfsson and McAfee 2014). These generate the phenomenon of digital disruption, which is responsible for the collapse of the organizations, industries or societies unable to adapt to the changes taking place. Today, however, it affects not only the economy but the whole existence. This means a constant change of the existing rules and an unremitting necessity to adapt. Such a dynamically changing reality places new demands on both our skills and education and on our cultural and social competences. The latter are also determined by the level of social capital. For a long time now, social capital has played a significant role in economic and civilizational development, and it can be assumed that as the complexity of the reality around us increases, its role will grow.

The Issues Regarding Measuring Digital Multiverse

Traditional telecommunications statistics gave rise to quantitative DM studies. They focused on the development of infrastructure, neglecting social aspects. Such approach had significant drawbacks as analyses limited to technical infrastructure failed to describe DM. The use of ICT is inseparably linked to the skills and motives of those using them. Information in a society plays an economic, social, technological, political and cultural role, therefore, while pondering on DM, social and human factors cannot be overlooked. This increasing interdependence between ICT and the social sphere requires new tools for the evaluation of access to ICT, its use, influence and barriers to its adoption.

It seems appropriate to postulate that social and cultural factors – such as social capital - also be included in the research on the level of digitalization. The importance of SC is evidenced by the fact that in the Report by the Commission on the Measurement of Economic Performance and Social Progress (Stiglitz et al., 2009) the term *social capital* appears 41 times.

Social Capital

In traditional societies, the “prestige” of individuals and social groups depended on their physical capital - most often land, and later their financial status. Currently, the role of human capital has proliferated. Nowadays, the importance of social capital is increasingly emphasized. This obviously does not mean "replacing" these forms of capital as the most important factor of production or social diversification. On the contrary, one of the features of digital economy is the already growing economic inequalities. Numerous forecasts (MGI 2017, MGI 2019) predict the collapse or fundamental change of many professions as a result of an ongoing automation process. The growing complexity of the modern world will require greater and more diverse stock of capital.

We will all face the change in the nature of our professional activity, which will often require higher levels of education or new skills such as teamwork, creativity, emotional intelligence, social and other soft skills (MGI 2018). The role of social capital is therefore likely to grow.

Offline and Online Social Capital

For last two decades the concept of social capital has been popular among authors representing different scientific disciplines, and used in various, often distant contexts due to its ambiguous nature. Some sceptics - such as Solow (2000: 6-10) – question the validity of this term. According to the principle that too broad a term loses its meaning, the concept of social capital has become very vague. The development of ICT has reinforced these uncertainties. In addition to the traditional understanding of social capital (let us refer to it as offline social capital), a new phenomenon of online social capital has emerged, already omnipresent in scientific literature (see Spottswood and Wohn 2020).

In the introduction to his book, Faucher (2018: xiii) proposes a definition, which aids further deliberations over this phenomenon: "1) At the user-end, online social capital is a product of online exchanges that in many cases can be expressed in some numeric form, which may or may not be correlated with a perception of an online user's value in a digitally networked community. Online social capital becomes a kind of offering to the social marketplace when users attempt to leverage the quantifiable measures of friends, followers, views, and likes for some goal. 2) On the network owner's end, online social capital is the labour of users that can be mined as a data commodity and converted into profit, while also existing as a strategy to keep a digitally networked community active in providing their unpaid labour."

Digital per se and relatively new, online social capital is inextricably linked to the development of ICT, particularly social networks and platforms. Offline social capital arose from a long-lasting and culturally conditioned process of people's interaction in the real world. In their famous work, Putnam, Leonardi and Nonetti (1993) explain the differences in the level of social capital in Northern and Southern Italy through social phenomena occurring hundreds of years earlier.

The two types of social capital are therefore fundamentally different, but in today's digital world they are inseparable and interdependent. On Faucher's (2018: xiii) words: "This is not to say that the affordances of digital networks do not permit considerable overlap between the two types of social capital, but that these digital networks upon which ever more social interaction occurs, manifest a whole new host of opportunities and problems that are unique to the nature of online interaction".

The relationship between the two types of social capital is exceptionally complex and interesting. However, the subject matter goes far beyond this article. Therefore, in its further part, offline social capital, understood in a traditional way, will be analyzed according to the classics of this issue: Bourdieu 1986, Coleman 1988, Fukuyama 1995 or Putnam 2001. The term social capital (SC) will be used hereinafter. We can assume the simplest understanding of it: Putnam's (2001: 21): social resources that enable "cooperation for mutual benefit", or Fukuyama's (1995: 10): "the ability of people to work together for common purposes".

The Importance of Social Capital

Based on reciprocity and trust, social capital influences the willingness to cooperate and its effectiveness. A noteworthy feature of social capital is that it enables achieving objectives that would otherwise not be achieved at all or would require much more work.

Social capital boasts distinctive features that distinguish it from other forms of capital. Unlike human capital, it is not individual. Like human capital, but unlike physical capital, stocks of social capital do not

depreciate as a result of use, but grow, which is supported by Ostrom (2000, p. 179): "social capital does not wear out with use but rather with disuse."

Social capital significantly affects the development process. Its impact is stronger after reaching a certain level of economic development. In relatively less developed countries, human capital influences economic growth more potently than social capital (Czapiński and Panek 2009: 277). The role of social capital increases with economic development, which results in increasing complexity of social, economic, institutional and interpersonal structures.

Krishna (2002:16) emphasizes social connotation of SC: ”The level of social capital is thus a critical variable affecting overall societal achievement. Development, democracy, as well as community peace—all three social domains examined in this study—benefit, it is concluded, in situations of high social capital.”

More than two decades ago, Fukuyama envisaged the role of SC also in the development of DM: “Societies well supplied with social capital will be able to adopt new organizational forms more readily than those with less, as technology and markets change. (…). Such a society will be better able to innovate organizationally, since a high degree of sociability will permit a wide variety of social relationships to emerge” (Fukuyama 1995: 27, 30).

Digital multiverse and social capital

Previously, the attention of quantitative DM studies was put to the areas: ICT infrastructure, its use and indispensable skills. These elements exist in majority of DM research, irrespective of whether they employ numerous set of basic indicators (e.g. Eurostat) or composite indices (e.g. The Digital Economy and Society Index - DESI).

Interesting, yet less recognized are the social and cultural environments favorable to the creation of DM. It seems reasonable to claim that, at a certain level of digitalization development, such issues can be essential. Broad and multifaceted, the social and cultural contexts of DM may involve a wide spectrum of problems as a research object.

In modern economy, the importance of intangible forms of capital (human, social, institutional) is increasing. According to World Bank's estimates, intangible capital may constitute from 60% to 80% of the total wealth of developed countries (Scrivens and Smith 2013: 9).

Digital multiverse and social capital are interrelated. The development of ICT entails increased complexity of social and economic environment. Effective functioning in such complex conditions requires a high level of social capital, which boosts the formation of DM, characterized by growing information needs of its participants. Consequently, the growing information needs trigger a demand for new ICT solutions. Therefore, high level of social capital is conducive to the creation of DM, which amplifies the impact of social capital. Social capital in DM is of great significance as it leads to better economic outcomes, lowers transaction costs, and fosters innovation and dissemination of technology (Fidrmuc and Gerxhani 2007: 2). It is the author’s opinion that the impact of social capital on the development of DM justifies its incorporation into the quantitative analysis of DM.

Methodology

DESI - Digital Economy and Society Index (EU2020) will be applied as a measure of DM development level. The DESI is a composite measure created by Directorate-General for Communications Networks, Content and Technology (DG Connect) to assess the degree of the implementation of the Digital Single Market strategy (DSM 2020).

As already mentioned, the concept of social capital is ambiguous, multifaceted and difficult to measure. Many authors assume various proxies as numerical depictions of SC.

Scrivens and Smith (2013: 17-18) give several definitions of social capital that can be found in academic literature. For the purposes of this article, in which the idea of social capital is compliant with the understanding of the "founding fathers", Fukuyama's (1995:10) definition seems appropriate: "the ability of people to work together for common purposes in groups and organizations". The issue of measuring social capital is equally difficult. Various methods and approaches are described in the works of Van Deth (2003) or Scrivens and Smith (2013).

Since this article only attempts to incorporate SC into the concept of digitalization, a simplified approach will be used - with regards to the issues of definition and measurement. Paldam and Svendsen (2000: 339) state in the simplest words: "Social capital is defined as the density of trust". This approach may be restrictive, however, it mirrors the traditional understanding of SC. Trust reduces transaction costs, increases the efficiency of resource allocation and promotes social control. This approach allows for the selection of simple measures representing this phenomenon. Van Deth (2003: 83, 85), who, admittedly, defines social capital more broadly, distinguishes personal trust and social trust in the trust category. The author proposes specific measures of both categories: trust in other people and confidence in institutions. For the purposes of the deliberations presented here, such limitation seems justified and sufficient.

Data from the World Values Survey and European Values Study joint survey round (2017-2020) published in July 2020 (WVS 2020 and EVS 2020) will be used as measures of SC defined as above. Two questions from this study were used to quantify trust:

- Q57.- Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people? The prevalence (%) of the response *Most people can be trusted* serves as the level of trust in other people.

- Q73.- I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? Parliament.
The sum of the responses *A great deal* and *Quite a lot* serves as the level of confidence in institutions.

As the WVS and EVS were conducted in the period 2017-2020, and the replies for most countries relate to 2018, the article - for all characteristics, also DESI – adopts the 2018 values. The analysis included 22 EU countries for which data were available.

Chosen characteristics for trust and digitalization are shown in Table 1. The following figures show the interrelations between the aforementioned trust and DM characteristics. The following indicators were selected as relevant for further considerations:

- As a measure of DM, the DESI indicator (values and ranks) was chosen: Table 1 - column 4-5.
- Two indicators were chosen as measures characterizing trust:
- trust in other people - columns 6-7,
- confidence in institutions - columns 8-9.

Table 1: Values of characteristics describing the level of SC and DM

No. (1)	Country (2)	Code (3)	DESI Value (4)	DESI Rank (5)	Personal Trust value (6)	Pesonal Trust rank (7)	Social Trust value (8)	Social Trust rank (9)
1	Austria	AT	51.9	8	49.8	5	43.7	4
2	Bulgaria	BG	35.5	20	17.6	18	15.6	18
3	Croatia	HR	43.8	15	17.1	19	6.5	22
4	Cyprus	CY	43.2	16	6.6	22	26.0	14
5	Czech Republic	CZ	47.6	13	21.7	16	13.0	21
6	Denmark	DK	66.1	4	77.0	1	49.7	2
7	Estonia	EE	57.2	6	33.8	9	31.1	12
8	Finland	FI	66.3	3	70.9	2	47.2	3
9	France	FR	47.7	12	26.6	13	34.6	9
10	Germany	DE	51.8	9	43.4	6	40.0	7
11	Greece	EL	34.9	22	8.4	21	14.2	20
12	Hungary	HU	43.2	17	28.1	11	35.5	8
13	Italy	IT	38.9	18	26.4	14	27.4	13
14	Lithuania	LT	49.2	10	31.7	10	22.3	15
15	Netherlands	NL	66.8	2	58.5	4	41.9	5
16	Poland	EN	38.8	19	24.7	15	20.1	16
17	Romania	RO	35.4	21	12.1	20	15.1	19
18	Slovakia	SK	44.5	14	20.8	17	41.0	6
19	Slovenia	SI	47.9	11	26.9	12	16.3	17
20	Spain	ES	53.2	7	40.9	7	31.8	11
21	Sweden	SE	66.9	1	63.6	3	63.0	1
22	United Kingdom	UK	58.8	5	40.2	8	32.4	10
-	average	-	49.5	-	33.9	-	30.4	-

Data source: DESI (2018a), WVS(2020), EVS(2020)

Results

The charts below show a graphic representation of the relationship between digital multiverse and social capital. DM (Y-axis) is described by DESI, and issues regarding social capital (X-axis) are presented using the characteristics listed in Table 1. Each chart depicts two characteristics divided according to average values. This allowed for clustering countries into four groups:

- DM above the average value and the characteristics corresponding to trust above the average value - right, upper part of the chart – "digital-confident",
- DM below the average and trust above the average - right, lower part – "analog-confident",

- DM below the average and trust below the average - left, lower part – “analog-unconfident”,
- DM above the average and trust below the average - left, upper part – “digital-unconfident”.

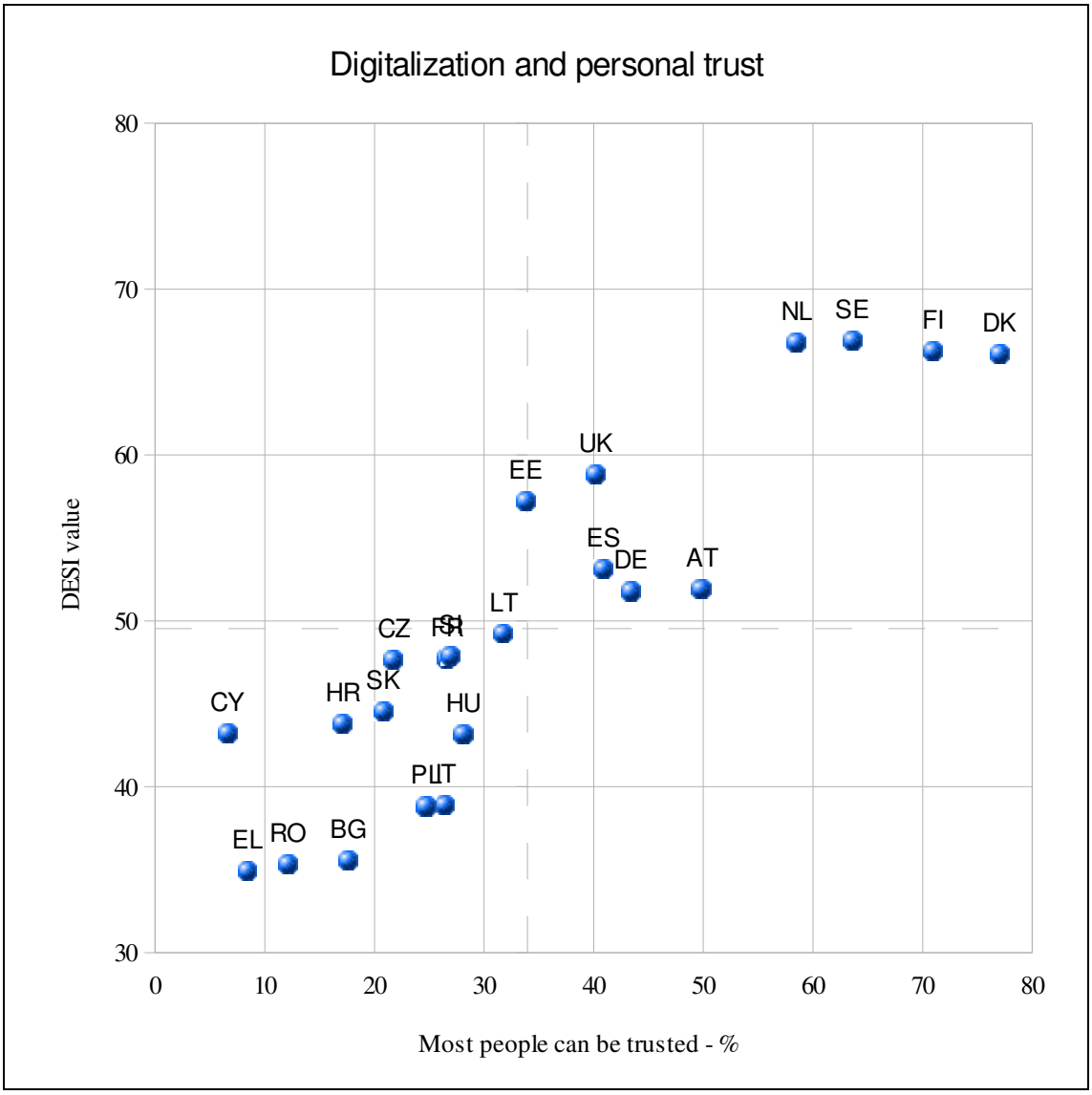

Fig. 1: DM vs. the level of personal trust

Date source: DESI (2018a), WVS(2020), EVS(2020)

Sweden is the frontrunner in the field of digitalization. Only Estonia is well ahead in comparison to other CEE countries with respect to the EU average. Slightly below this reference point are Lithuania and Slovenia, ahead of France or Italy. Bulgaria, Romania and Greece come last in the race.

In the personal trust category the first three places are occupied by Denmark, Finland and Sweden. Only the countries of the "old Union", except for France, Italy and Greece, are above the average. All CEE countries are below it. Romania, Greece and Cyprus bring up the rear. The values representing trust, however, are drastically more varied than those representing DM. 77% of Danes, 24.7% of Poles and only 6.6% of Cypriots agree with the statement: Most people can be trusted. The least trusting are the

inhabitants of CEE and Southern Europe. Left top and right bottom parts of the chart are empty, which means that countries with a higher level of digitalization are also characterized by a higher level of personal trust. The low average is also noteworthy - only one in every three citizens of a surveyed group of countries trusts other people.

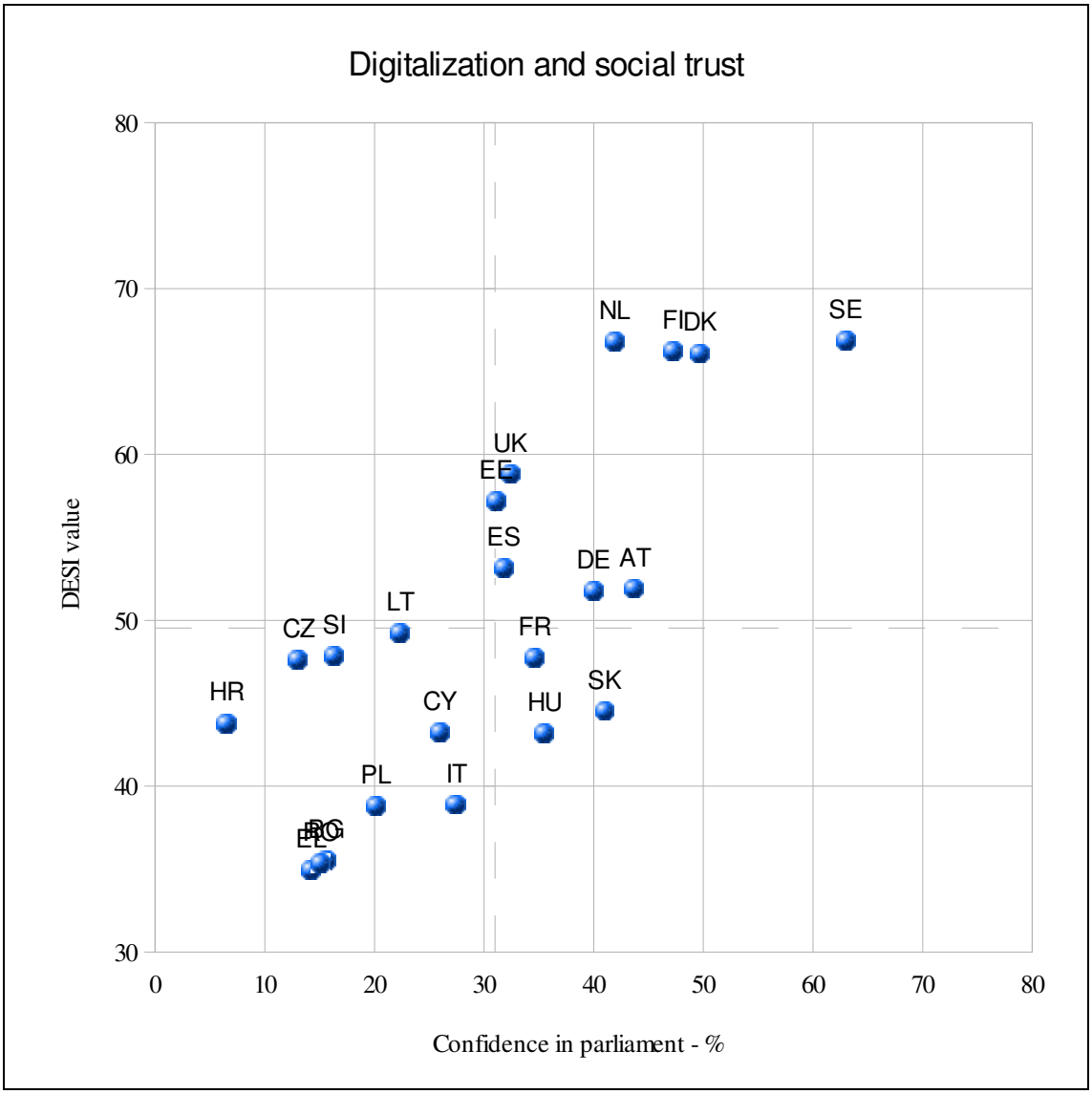

Fig. 2: DM vs. the level of social trust

Data source: DESI (2018a), WVS(2020), EVS(2020)

In the social trust category, Sweden, Denmark and Finland take the first three places. It should be emphasized that confidence in parliament representing social trust is the sum of two answers - affirmative and accepting. Three CEE countries - Slovakia, Hungary and Estonia – rank above the average. Interestingly, Hungarians have more than 4 percentage points more trust in their parliament than Estonians. Other CEE countries, as well as Italy, Cyprus and Greece, classify below the average. Greece, the Czech Republic and Croatia come last. Also in this case, individual countries are very different from each other. Trust in their parliament is declared by 63% of Swedes, 20.1% of Poles and only 6.55%

Croats. The average for the surveyed group of countries is also low, only 30.4% of citizens have any confidence in the legislative power. The left, upper part of the graph is empty - there is no "digital-unconfident". There is "analogue-confident", however, in the right lower part of the graph there is Hungary, Slovakia and France.

The findings presented above reveal a relatively low level of SC in CEE countries. For both characteristics studied, the values are usually lower than the average, and significantly lower than in the leading "old EU" countries. Therefore, CEE countries cannot benefit from economic and social opportunities offered by high level of SC. This may constitute a significant barrier to development in the future.

Poland can serve as an interesting example here. Over a decade ago, the authors of "Social Diagnosis" - one of the most important research, comprehensively analyzing the situation in the country, which ceased to be published in 2015 - stated: "We live in a country of ever more efficient individuals and an ever more inefficient community" (Czapiński and Panek 2009: 149).

A significant economic advancement of many individuals and the country as a whole has been, to a large degree, the result of rapidly growing human capital. Human capital allows for the promotion of individuals, social capital is essential for the implementation of community projects and the promotion of the whole country. To a large extent, the challenges related to DM concern joint tasks.

The existing sources of growth, such as cheap labour, are running out. Without a significant growth of SC, Poland is at risk of a slowdown and being caught in the middle-income trap. The level of wealth, above which human capital is no longer the decisive factor for development, has probably already been reached. There is little time left for building social capital.

Human capital is created by individual investments. A rapid increase in enrolment rates in Poland with respect to higher education over the last three decades can serve as the best example for this fact. Social capital cannot be built solely on the basis of individual investments. Its creation is a long-lasting, culturally and historically conditioned process, related to the formation of a civic community as a result of daily experiences of individual citizens in the public sphere. It seems that the above remarks apply not only to Poland but to most CEE countries.

Conclusion and Further Research

It emerges from many empirical studies regarding DM that success is linked to infrastructure and education. Although weighty and noteworthy, social and cultural aspects are still insufficiently documented. It is, however, only reasonable to claim that - at a certain stage of DM development - these aspects might become crucial. Being a complex area, the social and cultural context of DM – as a research object - may pose a plethora of questions. One of such surfacing issues is social capital, which - as arises from the case of CEE countries - calls for increased efforts aiming at its development.

It is the author's opinion that the importance of the issues connected with social capital for DM development justifies including them in the quantitative analysis of DM. It is supported by significant interdependence between DM level and personal trust (correlation coefficients 0.9) and social trust (0.76).

The considerations presented in this paper are of groundwork nature. However, the discussed topics seem to be quite thought-provoking and worthy of further research. Such studies will help determine which characteristics should be analyzed and which indicators should be used in order to better analyze the relationship between DM and social capital. The complexity of DM will increase exponentially. The answer to the question what tools to use to measure such a complex reality will become a great challenge for the researchers involved. The limitations of the analysis presented in the paper should be clearly

indicated. First of all, it is subjective and the views expressed in it are those of the author. SC characteristics have been selected arbitrarily by the author. It is an invitation to discussion, rather than a final assessment. The analysis carried out is rather simplified, as only one element of social capital – trust – is taken into consideration. The data available allowed for evaluating only 22 EU countries.

The following may serve as directions for further research:

- Applying a set of measures to define social capital more broadly.
- Possibly, applying an aggregate measure of SC for an analysis of relations with DM, quantifying social capital (although devising such a measure may pose problems).
- Extending the analysis to include developing countries, where the role of social capital is crucial for development.
- Including online social capital into the analysis - its importance is already visible and will only continue to grow.

Low level of SC in CEE countries results from the interaction of many cultural, social and historical factors. Their detailed analysis would go far beyond the scope of this article. The dominant factor appears to be the complex history of these countries. Starting from the feudal times, through the recovery of self-determination in the early twentieth century and ending with the heritage of communism and centrally planned economy. The situation is not improved by the wave of populism and the rule of political groups that are moving away from the principles of liberal democracy. These phenomena lead to deep social divisions, further reducing social capital.

It is to be hoped that the retreat from populist tendencies will lead to further gradual harmonization of formal rules and informal standards in "old" and "new" Europe. This will reduce the gap in social capital across Europe and enable CEE countries to achieve the vision of digital multiverse. This is one of the conditions for these countries to avoid the middle-income trap and continue their civilization development.

One can hope that the intra-European gaps in SC and also in formation of DM should gradually disappear as new member states catch up economically, institutionally and culturally with the old ones. The stakes are high because countries characterized by increased generalized trust tend to be more prosperous.

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Extraordinary Events as A Consequence of Hazards

prof. dr hab. Bernard WIŚNIEWSKI

WSB University in Dąbrowa Górnicza, Poland
bfwiśniewski@o2.pl

Summary

Conclusions from research run in the field of security allow to distinguish many of its determinants. Among them are primarily: threat, uncertainty, risk, opportunity, challenge. Researchers are constantly trying to find cause and effect correlation between later. It seems indisputable that among the elements of safety exists a phenomenon known as an "extraordinary event", which is not granted its rightful place in the research fields of security specialists. No doubt it is, after all, a consequence of a peril, which results from a logical sequence of phenomena that may favor or compromise security. The problem situation outlined in this light was used to present considerations on the affinity between "threats" and "extraordinary events". The article is preceded by a synthetic introduction. In the view of assumptions made, the first part of the article focuses on presenting the criteria for threat identification, that was utilized in the further part of the paper to present issues related to extraordinary events. This presentation was based on a review of selected and adopted positions of recognized experts in security research field. The article concludes with a summary that addresses the main issues raised in this study.

Keywords: Security, System, Threat, Extraordinary Event, Cataclysm, Catastrophe, Accident, Incident

Introduction

Security and its determinants are challenging to define on account of the immense, overwhelming range of their categories, highly difficult, if not impossible to be described concisely [1].

Security is most frequently perceived as:

- a guarantee of the inviolable survival of the security entity and its free development [2];
- a state of certainty, calm, absence of danger and protection against it [3];
-the status obtained as a result of a duly organised defence and safeguarding against all hazards using powers and measures from the entity's various spheres of activity [4].

Security as a state attained through deliberate, complex and collective human action can also be regarded as a praxeologically understood, socially significant human creation [5].

The level of security is dependent, inter alia, on the adequate identification of and reaction to emergencies and the resulting extraordinary events.

For the aforementioned reasons, both safety and dangers and emergencies require scientific research that does not permit naivety and taking anything 'on the word'. Any content of a scientific task can be validated, verified, and if it is not checked, it is not a task of scientific theory and as such does not need to be researched at all. The scientific worldview (as long as this can of course be said) does not adopt any solutions to the reality around us if they are not the product of activities that are in line with the correctness of scientific research, does not mean at all that it is merely sceptical; on the contrary, it is precisely the awareness of scientific methods, the nature of scientific cognition, that makes it possible to identify facts that may be laudable as truth [6].

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The multi-facetedness of security is related to the subjective evaluation of the phenomena occurring around or within a particular body. As long as in his opinion these developments have little negative impact on his existence, the entity then feels safe. Which concerns are considered unimportant depends primarily on ones assessment of his own abilities. In some circumstances, the same problems, of the same magnitude, will be hazards that violate the sense of security, while not in others. In view of the above, it must be stated that there is a wide range of intermediate states between insecurity and complete security, frequently classified as safety appropriate to the level of development of civilisation and socio - cultural conditions. Because it is an effect of the subject's perception of reality, and in it- oneself, in the perspective of further existence and development [7].

In thinking on security, one of the most desirable and appreciated assets of mankind, two fundamental approaches can be distinguished. The first concentrates on measures to be taken to prepare for protection against hazards, while the second focuses on shaping the environment in such a way as to distance and mitigate the possibility of their emergence. In both instances, although with a different approach, the threat is a key category [8].

Threats are becoming increasingly complex and hard to present. These problematic qualities make it particularly relevant while being dealt with, to acquire expertise, information, knowledge and the ability and readiness to recognize them. After all, it is more beneficial to detect a threat reliably and without any undue hesitation than to prevent or minimize the consequences of extraordinary events. The omnipresence of extraordinary occurrences, on the contrary, causes a great deal of attention and thus many attempts to define them. They may be classified on the basis of characteristics and criteria such as location of the source, nature, scale, duration, extent, occurrence, frequency, symptoms additionally propagation rate and effects [9].

The danger is only of a negative nature. It is a harbinger of qualitative changes in safety, both for the subject and the environment. It is frequently downplayed by a probe of knowledge, a skilfully organised system of information flow and a test of the ability to use conclusions from its analysis and evaluation.

An emergency event, on the other hand, is a rare occurrence in scientific studies, while in legislation it has become a permanent aspect of domestic security in particular. Must this be the case? It seems not to be, because an extraordinary event is a natural consequence of a threat which cannot be contained and is hard to control.

As a consequence, problems relating to safety determinants must be continuously investigated. Frequently, these studies focus on the issue of hazards, overlooking matters associated with emergencies. Perhaps not quite right?

Methodology

The research findings reflected in this study were derived from the research problem formulated in the form of a question: what is the relationship between 'threats' and 'emergencies'?

The rationale for launching research is to be found in a situation in respect of which the basic scientific and practical activities consist essentially of dealing with risks and mitigating the consequences of extreme incidents.

The above circumstances determined that the main objective of the research presented in this paper was to enrich knowledge of security and its key determinants, which are "threats" and "emergencies". [10]. Whereas the specific objectives were:

- to define the nature of "threats and "emergencies";
- determination of the boundaries between hazards and extraordinary occurrences.

In the research leading to this study, theoretical methods were used [11], which have been applied to research scientific literature on safety and legal provisions.

The subject-object scope of the hazards

The threat is a safety antonym. However, while security determines a specific state, the danger, in the fundamental sense of the word, is associated more with a phenomenon violating this state [12].

The term 'threat' is commonly associated with the verb 'threaten', which means as much as [13]:

- to threaten with something, to frighten, to announce something under threat;
- to face a state of danger, to become menacing, dangerous to someone;
- endanger health, safety, freedom.

It ought to be emphasised that to threaten - to intimidate someone, to announce something under threat, to create a state of danger, to become a menace to someone. Danger, on the contrary, means a state, condition, a situation, a grave danger, threatening something bad, jeopardizing somebody [14]. In the dictionary of national security terms, "threat" is defined as a situation in which there is an increased probability of creating a dangerous state for the environment [15]. A hazard also means something that may pose a threat to someone or something, cause harm or loss to anyone or anything [16]. A threat is also defined as any situation that may lead to damage. Normally, when thinking about damage, the harm includes primarily the damage consisting of loss of life, health or property, although in reality this is not the only damage that can occur in relation to the threat [17].

In common language, the term 'threat' is intuitively understood and related to a person's fear of losing values such as health, life, freedom, liberty or material goods [18].

There is a certain ambivalence in the perception of danger [19], which is, on the one hand, a purely subjective feeling resulting from the assessment of the phenomena occurring and, on the other, an objective factor causing uncertainty and concern [20]. Subjectivity in the reception of the external world is the result of the brain, which always provides a filtered vision of reality [21]. Objectivity in the perceiving of threats, on the contrary, is associated with the knowledge and experience and the application of adequate research techniques [22].

The threat can be viewed in two dimensions - narrower and wider [23]. In the first meaning, a hazard occurs when a person is anxious to lose highly cherished values, with his or her own life in the first place, which leads him or her to the belief that the hazard is understandable by the subject. In a broader sense, however, the threat will be regarded as a situation that is not consciously experienced by the individual [24].

In the context of what has been contemplated so far, it needs to be emphasised that threats can lead to conflict situations. A possible absence of goodwill of the parties involved to make concessions in their demands and mutual indictments may result in a security breach [25].

A characteristic feature of threats is their variability. It is possible to point out phenomena which in the past used to be threats, and no longer are, and also phenomena that, although previously not harmful, are currently a problem and pose a challenge. The strength of the existing hazards also evolves over time, i.e. the dangers diminish or intensify [26].

And let us also recall the position according to which „a threat is the set of events and processes that accompany human civilisation and that occur in different configurations, causing (or preventing) an imbalance. These concern not only entities that are permanently linked or temporarily correlated, but also all the components that create the material and spiritual environment of human life. These processes and events take specific forms - cataclysms, disasters, epidemics, wars, social pathologies and many other phenomena with destructive potential - creating significant impediments to the effective protection of values that underpin security" (life, health, freedom, quality of life, development prospects) [27].

The typology of risks is approximate to the one employed in the approach to safety. There are many attitudes to such a division. Nonetheless, allow us to recognise that the decomposition of risks can be achieved through the prism of subjectivity, objectivity and procedure.

In conclusion, let us assume that threats are circumstances brought about by random (natural) or non-random (intentional) causes, which have a negative impact on the functioning of a given system or cause adverse (dangerous) alterations to its internal or external environment [28] and result in the occurrence of an emergency event. While assuming that a security determinant should not be prioritised, it is necessary to emphasise that the vulnerability affects all other determinants and they remain all dependent on it.

An extraordinary event - what is it?

The dictionary meaning of an event is translated as what happened, occurred, took place; an accident, an episode [29].

The word "extraordinary", in turn, means something that stands out above average, very rarely occurs, uncommon, exceptional, unique [30]. But it also stands for an event caused by special circumstances which was not foreseen in a specific scheme or intended action plan and requires special measures to be undertaken. While it is quite common for an exceptional event to be regarded as negative due to its "unexpected" nature, an exceptional event may, in terms of its effects, have positive and negative significance, arising from the specific additional characteristics of the exceptional event in question.

By combining the terms, one would consider an extraordinary event to be above average. Does such a definition fully correspond to the consideration given to an exceptional occurrence regarded as a security determinant? Of course not. Then allow us to look at the concept that interests us in the context of other definitions.

An extraordinary event may also be understood as an undesirable event causing material damage or loss of health or life to people in or around the system [31].

An exceptional occurrence may be regarded as a foreseeable and spatially limited accident, caused by the impact of a natural, technical or technological disaster, damage to the operation or the deliberate action of a person, which compromises the stability of the system or of events and activities occurring therein, jeopardises human life and limb, material and cultural assets or the environment. It introduces a change in the quality of components of the system, and thereby changes in the quality of affiliation and relations amongst them [32].

An emergency event is a peculiar materialised phase of a growing hazardous situation, formed as a result of negative circumstances or conditions arising. An exceptional occurrence is the tangible consequence of a threat not eliminated in time. The event may be more or less extensive, it may have a different threshold, duration, but each time it terminates the existing state of affairs [33].

A slightly different attitude to the interpretation of the notion of an extraordinary event is included in the regulations governing the functioning of formations performing tasks in the area of general security and public safety.

Accordingly, in the first case, it is defined as an event in which the number of people at risk and affected, the extent and degree of environmental and property damage and destruction of infrastructure make it virtually impossible for public authorities to control the course of the event [34].
As far as public safety is concerned, an outstanding event is, according to the regulations in force in the Police, an exceptional situation brought about by an intentional or unintentional breach of the law [35].

Extraordinary events can be broken down into several categories:

−calamities, which are exceptional and violent events with a devastating impact arising in the course of human activity, as well as natural or technical conditions, covering an unlimited area and leading to serious danger to people and the creation of immense destruction that can be contained by the consolidation of efforts of one' own forces and support services;

−catastrophes seen as rare, tragic events resulting from human action, natural forces or the development of civilisation, extending over a vast area and causing grave danger to human beings and substantial loss of human life, which may be contained by the use of self-contained means with the possible participation of a support force;

−accidents considered to be exceptional occurrences resulting from human activity or from natural or technical conditions and resulting in hazards to human beings and causing injury of a limited magnitude, which can be dealt with by means of self-management;

−incidents which are above-average events which may compromise human health and/or result in minor losses that can be controlled by limited forces of one's own.

A solid evaluation of the consequences of potential extraordinary events and the likelihood of their occurrence appears to be possible only by incorporating a method of identifying the consequences. If the verification is performed from the perspective of the learning entity, the emergency event concerns only that party. On the contrary, if the identification is made from the point of view of the community, it only relates to accepted values considered important for the security of a community member and is bound to its culture [36].

Under the circumstances of an abnormal event, it is common for decisions to be made under time limits. In these situations, there may also be an element of surprise, not necessarily, for it is entirely predictable what impact the decisions taken and the solutions applied will have. Extraordinary events are very often accompanied by strong time and environmental pressure, which makes it extremely hard to pinpoint new threats and subsequent incidents. What is crucial is that an extraordinary event can take place under conditions of an action that is incompatible with the present one or a failure to act.

The basis for the interpretation of events and, above all, for predicting the consequences, are the pieces of information that get to us and the accumulated and structured facts from the past, partially interpreted by the cognitive entity and representing their knowledge base. The accuracy of assessment results from the reliability of the collected data [37].

The spectrum of the emergency comprises those situations which violate people's serenity and certainty of well-being - in purely physical terms. They can entail the loss of life, health or property - which are the basis of existence and allow the further development of the individual as well as the community in which he or she functions and is dependent on. There are a great many phenomena in line with the aforementioned term. The 'extraordinary' quantifier refers not only to the singularity and unpredictability, but also to the scale of those phenomena, which is manifested by the extent of the impact of a dangerous condition, evaluated by the number of people at risk [38].

In conclusion, it can be stated that an extraordinary event is an above-average situation resulting from a threat, undermining the sustainability of the system or the operations that take place in it, which harm the health and life of people and the needs for their daily existence.

Summary

The variability of the security environment directly affects the perception of security and thus also of threats and emergencies.

"Threats' and 'emergencies' are concepts with a strong affinity to the notion of "security". In short, if you are safe, you are not in danger. If you are at risk, you cannot be safe. This is an apparent dependence that results from subjective human perceptions. Even when a state of consciousness views a certain phenomenon as not posing a hazard, it has an unbiased effect on the subject, often invisible at first. It implies that we most commonly encounter a subjective sensation and an objective state of vulnerability [39]. It is definitely not the case with extraordinary events. They have nothing to do with subjective perception. They are simply an individual entity.

It transpires from the considerations presented that threats and emergencies are physical or social phenomena which are closely interconnected. They cause uncertainty and concern. Since this sense affects all areas of human life, therefore, hazards and emergencies cover a broad spectrum of phenomena. It can thus be said that 'threats' and 'emergencies' remain in such a close dialectic connection with each other as to make it pointless to consider them apart.

A synthesis of the definitions of "threats" and "extraordinary events" can be confined to the fact that a risk is a possibility of one of the negatively assessed phenomena [39] and an unusual event is not as much a possibility as the occurrence of the phenomenon.

Despite differences in interpretation of both threats and emergency events, the two have common traits. This mainly refers to the scope. Adopting this criterion, they can be divided into [40]:

- of limited scope, that is to say, occurring in a limited area or relating to a specific field of operation of the state and not giving rise to crisis situations, outside that area or fields;
- extending, i.e. gradually evolving from limited crisis situations to nationwide cases;
- nationwide, that is to say, those which, from the very beginning of their emergence, cover a significant part of the country or a major part of the domains of operation of the country.

In spite of the common qualities, one can also see discrepancies. They relate to the boundaries among these phenomena. For where a threat that was impossible to prevent expires, there is an extreme event.

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Crowd Communication Management– Theoretical Perspective

Jan Skonieczny

Wroclaw University of Science and Technology, Faculty of Computer Science and Management, 50-370 Wroclaw, Wybrzeze Wyspianskiego 27, Poland, jan.skonieczny@pwr.edu.pl

Yasmin Ziaeian

Wroclaw University of Science and Technology, Faculty of Computer Science and Management, 50-370 Wroclaw, Wybrzeze Wyspianskiego 27, Poland, yasmin.ziaeian@pwr.edu.pl

Abstract

An organization can be successful when it is supported by various groups of its stakeholders. Therefore, it is especially important to identify stakeholders and apply an appropriate way to manage and communicate with them. The article presents the crowd as a strategic force influencing an organization. Various definitions and types of crowd have been described based on the literature review. In addition, it has developed its own model of crowd management and communication. Its structure is based on the grid of emotions and engagement. It allows to distinguish four types of crowds: crowder, seeker, spectator, actor. The proper process of communicating with the crowd enables the organization to manage it. The article is theoretical in nature and is the authors' contribution to the discussion on crowd management by contemporary organizations.

Keywords: Crowd, Types of Crowds, Communication, Management.

Introduction

A crowd is a collection of different people who have gathered by chance. G. Le Bon (2009: 15), who was considered a pioneer of crowd research in the 19th century, defined it as a collective subject governed by the law of unity of mind. This law is characterized by the individual's abandonment of himself in favor of the thoughts and actions of the crowd. The crowd can be impulsiveness, changeability, irritability, suggestiveness, credulity, exaggeration, intolerance, authoritarianism, conservatism, and cruelty (Le Bon, 2009: 15-32). In this perspective, the crowd is a nameless, random, impermanent, and irresponsible community that destroys. It does not have to be criminal destruction - there are cases, for example, of heroic deeds and the overthrow of criminal systems. But no matter what the result of the crowd's actions, the way to achieve them is always to destroy the system, not to build it. When exploring only the negative qualities of the crowd, it ignores the fact that its character gradually changed at the end of the 20th century and at the beginning of the 21st century. Today, the subject of scientific reflection has become to know not only the "angry crowd", but the crowd as a community of wisdom. The modern crowd is very diverse, it is both viewers of game shows, as well as corporations or crowds of people betting on sports, as well as clusters of drivers trapped in traffic jams. They are not subject to any formal order. The crowd also includes stock exchanges and organizational management teams. The latter have their own identity and are constantly influenced by changing information. Such an understanding of the crowd is the subject of research by J. Surowiecki (2010: 18). In his opinion, the crowd today is a collection of various interest groups, who share the ability to act together, influence decisions and solve problems in the organization, even if group members are not always aware that they are doing it. Such interest groups have purpose, are intelligent and even "collective wisdom" and are effective at problem solving. For this reason, the crowd may constitute an opportunity for the organization or a threat to the pursued economic and social goals and activities. It can therefore be assumed that the crowd is of strategic importance. For this reason, it is the subject of research by scientists representing various scientific disciplines (psychologists, sociologists, management theorists), as well as practitioners (innovators,

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entrepreneurs, managers). The subjects of this research are behavior, attitudes, influence and power of the crowd on the organization, and ways of influencing and managing it.

The aim of the article is to diagnose the crowd as a strategic force in the market game and to discuss communication tools that may be useful for any organization conducting a dialogue with it. The study assumes that organizations should use the wisdom of the crowd to achieve their own goals. Such a change in management requires the organization to identify those interest groups in the crowd that will provide it with the necessary data, information and knowledge. For crowd management purposes, the Crowder-Seeker-Spectator-Actor model was developed to identify and transform crowd participants into an active market operator. The basis for building this concept is the communication process (screening, investigation, identification, cooperation, and management) of the organization with the crowd. The authors believe that effective communication and management with the crowd will enable the organization to build beneficial relations with them, which will enable building a competitive advantage as well as formulating and implementing effective strategies.

The Essence of The Crowd - Literature Review

In classical terms, a crowd is a collection of different individuals and groups. G. Le Bon (2009: 15), who studied the crowd in a psychological dimension, claims that it is organized and is governed by the law of mental unity. He distinguished heterogeneous and homogeneous crowds. Heterogeneous crowds are collections of individuals who are diverse in work and mental development. They can be nameless (street crowd, crowd of onlookers) and non-anonymous (parliament, jury). On the other hand, homogeneous crowds include sects (religious, military), castes (solders, priestly, workers) and strata (middle class and peasants).

In economics and sociology, the crowd is seen through the prism of collective behavior. His behavior may be different and contribute to creating market bubbles, developing panics with the large-scale financial effects, or leading the destruction of persons and prosperity. H. Blumer (1951: 167-222) developed his theory based on different behavior, there are four types of crowd: causal, conventional, expressive, and acting. In the causal crowd individuals interact very little, if at all, with one another. The conventional crowd results from deliberate planning and follow a clear set of norms. The expressive crowds are a typically form around an event packed with excitement. The acting crowd is motivated by an intense, single-minded purpose. This crowd are set in motion by powerful emotions.
More recent research on the management of mass victories of people has distinguished the following types (Zeitz, et al., 2009: 36): ambulatory - walking, usually calm; disability/limited movement - crowd has limited or restricted movement; requires additional planning; cohesive/spectator - watching specific activity; expressive/revelous - emotional release, for example, community fun runs; participatory - involved in actual event, for example, pickets, marches; aggressive/hostile - pickets, marches; escape/trampling - danger may be real or imaginary; dense/suffocating - reduction of individual physical movement; rushing/looting - attempt to acquire/obtain/steal something, for example, tickets; violent - attacking/terrorizing.

According to research study by L. Wang and T. Michoel (2019), the contemporary crowd is characterized by wisdom. The wisdom of the crowd is defined as the collective intelligence resulting from many people answering the same questions. The sum of the collective responses may be more accurate than the responses of each individual person. Through the wisdom of the crowd, the accuracy of prediction and decision making in organizations can be improved. Crowd wisdom estimates each individual's error level and minimizes the overall error in the crowd consensus.

Crowd wisdom research was conducted by S. de Oliveira and R.E. Nisbetta (2018: 2066-2071). Based on own research studies, they argue that demographically diverse crowds tend to be a bit wiser than homogeneous crowds. They suggest that in order to improve the quality of decisions made on the basis of crowd opinion, it is necessary to increase their variety, not just numbers.

V. L. Kendrick et al. (2012: 3223-3226) in a case study, examined the organization, coordination and security of crowds. The results of this study showed that the organizers lacked information about the

crowd, which made it difficult to plan and manage. Research findings challenge the availability, relevance, and placement of information on crowd satisfaction and comfort in event planning. In addition, researchers believe that inadequate communication and management systems existed to ensure compliance with internal procedures in the absence of any useful guidance to help with the organization of mass events.

In a research study by V. Fillingeri et al. (2018: 18-27), crowd is usually a meeting of people with different experiences. The aim of the study was to better understand how organizers approach the management and operational aspects of the crowd situation. They identified the following crowd influencing factors (V. Fillingeri et al., 2018: 20):

- Physical design of crowd spaces and facilities - organization of crowd, sectioning, one-way or contra flow system, exit routes, view, car parking (venue layout); sufficient personal space (space available); able to fulfil intended purpose, conflicting goals, barriers to goal achievement, competition between crowd member (goal achievement);
- Crowd movement - time considerations, presence of rushing/hurrying (time constraints); being in control of the situation; crowd participant confusion, choice, discretion (control); physical height, age, special needs (individual factors); trolleys, wheelchairs, pushchairs, bags, luggage (encumbrances);
- Communication of information - ability to find way around, disorientation, losing people (navigation); signage, information availability, language barriers (communication);
- welfare and wellbeing - seating, toilets, refreshments (welfare facilities); weather, heat, lighting, noise, pollution, odours, ventilation (environmental factors); presence of crowd participant anxiety, frustration, vulnerability, intimidation and claustrophobia (stress); participant desire to be in the crowd, enjoyable purpose, functional purpose (motivation);
crowd participant prior experience and expectations, familiarity with surroundings, cultural norms, and stereotypes (preconceptions).
- Public order - involvement at participants' discretion, unavoidable experience of a crowd (avoidance); presence of factors that distract from the crowd situation, positive and negative (distraction);groups of crowd participants, individuals isolated in crowd (company); feeling safe, fall risk, trampling risk, violence, other hazards (safety and security); appropriate, antisocial, pushing, jostling, competition (behavior); good mannered, boredom, hostility, excitement, anticipation, atmosphere (mood).

By analyzing the results of the researches, the authors found that the organizations need better understanding of the sociotechnical complexity of crowds and appreciation of the factors influencing crowd behavior.

Apart from the literature in the field of sociology, the problem of the crowd is discussed in the scientific works on strategic management. The crowd is defined as one of stakeholders that has an influence on the process of formulating and implementing the strategy. This impact can be positive or negative, may constitute an opportunity or a threat to the organization. For this reason, it is subject to strategic analysis. The relationship of crowd with strategy is described by R.P. Rumelt (2013: 319), who writes: "(...) The wrong strategy is to follow the crowd, replacing revealing visions with popular slogans". Such an approach to the problem, in his opinion, is related to the phenomenon original called "social herding". In his interpretation it notion means: “When we don’t know about something, it may be sensible to look at the behavior of others, assuming that at least some of them know things that we do not. But if everyone else is doing the same, then this process of mutual calibration can result in all the members of a group undertaking uniformed actions (…)” (Rumelt, 2013: 335).

K. Obłoj (2014: 187) presents the crowd as a public opinion. Describing and analyzing the company's environment, he draws attention to the importance of public opinion (crowd) as an important stakeholder influencing the organization's behavior. According to him, stakeholders are different groups, institutions and organizations that meet two conditions - they have their “stake” in the functioning of the organization, in its decisions and their effects, and are able to exert pressure on the

organization. As an example of positive behavior of the public opinion, he mentions forcing an international corporation to change its strategy taking into account environmental protection.
Although the concept of wisdom of the crowd is known in social sciences for over a hundred years (Galton, 1907: 450–451), his problem related to organization management has been little studied.

P. Wack (1985: 73-90) in the article on the development of scenarios about the future oil price, presents four types of stakeholders: players, subjects, referees (context settlers) and crowd. In his interpretation crowd is a type of stakeholders with the following features: unaffected (or low) interrest (stake) and low power. The success of an organization depends to a large extent on the support given by different groups of stakeholders. It is therefore very important to identify different groups of stakeholders and chose an appropriate way to manage them.

In the book by K. van der Heijden (2005: 260-263), the crowd is an actor whose influence the organization does not have to take into account when creating strategic scenarios compared to other stakeholders. The actor's strategic analysis reveals inconsistencies, confronting the internal logic of the scenarios with the organizational intuitive insight into the logic of the various key actors in the market game. Its purpose is to identify opportunities and threats related to various groups operating in the organization's environment. In the scientific study by A.M. Deren and J. Skonieczny (2016a: 7-15), the crowd is shown by the relationships with traditional market participants in the form of a model CMSA (crowd-movement-spectator-actor). In this model, the crowd is the force that creates the new market space, the crowd initially acts as an observer of market events. The development of such a chain in practice makes it possible to transform the crowd participants into an active participant in the market game. Their use by the organization enables the emergence of interactions leading to the transformation of the crowd into active actors (customers, competitors, regulators, and stakeholders).

In another scientific study by A.M. Deren and J. Skonieczny (2016b: 173-180) present the crowd as a force creating innovation in the organization. Without questioning the role of creative individuals in generating innovation, they point out to the increasing use of crowd wisdom by organizations in creating innovation and / or needs, which then feed into innovation.

To summarize above considerations, it should be stated that crowd is the subject of research by various authors, most often as a community of people who have a common goal and behave similarly towards other market participants. In the literature on management, crowd, as one of the stakeholders, is the subject of the market game. Having his awareness and wisdom can influence the behavior of the organization. For this reason, organizations should take into account the interests of the crowd in their strategies or activities. The condition for this is direct communication with him.

Crowd management using information technologies

Various methods of crowd management are discussed in the literature. The four most important ones that an organization can use in its decision-making process are presented below.

Crowdsourcing is a neologism created from the combination of the English words "crowd" and "outsourcing" (using external resources). This process derives from the free innovation sector and describes the outsourcing of tasks and creative processes to the masses of internet users. Within crowdsourcing, a number of categories are distinguished, such as: crowdfunding (joint financing of a project by the community), co-creation (co-creation - the joint performance of creative work by communities), microtasking (performing small tasks by the community included in a larger project, e.g. recognizing text) (Kasprzycki-Rosikon and Piatkowski, 2013: 15).

The crowdsourcing concept or method is coined by J. Howe (2006: 1-4) and defined as follows: "crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call". Crowdsourcing is an emerging topic and it has received great attention from scholars and practitioners. It overlaps with other contemporary concepts such as open innovation,

collaborative innovation, and user innovation. Some scholars believe that it falls under the umbrella concept of open innovation (Ebner et al, 2009: 342-356).

In the book by D.C. Brabham (2013) presented the following definition of crowdsourcing: "[it] is a type of participate online activity in which a individuals, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, a number, via a flexible open call, the voluntary undertaking of a task". The participation of the crowd in such an endeavor consists in carrying out work, providing money, skills, knowledge and experience to the organization that needs them as resources necessary for the implementation of the adopted goals and activities related to them.

Similar method to crowdsourcing is crowdfunding. It is a form of financing various types of projects by crowd (community) that is or is organized around these projects. The project is then financed by a large number of small, one-off payments made by persons interested in the project. According to the definition presented by K. Krol (2013), crowdfunding is a type of accumulation and allocation of capital transferred to the development of a specific enterprise in exchange for a specific return, which involves a wide group of capital donors, is characterized by the use of ICT technologies, as well as a lower entry barrier and better transaction conditions, than generally available on the market.

In addition to traditional financing instruments, a new way of raising money via the Internet has recently established. This form of raising capital is called "crowdfunding" and allows companies and individuals to make a direct call to the public (the "crowd") via the Internet to raise money for their innovative and new ventures (Schwienbacher and Larralde, 2012: 369-391). The mechanisms of crowdfunding and the platforms that offer their users these specific online services vary greatly between the individual forms of crowdfunding. They differ on the one hand in how the financial resources are used and on the other hand in whether and in what form consideration is provided (Belleflamme et al., 2013: 313-333). Crowdfunding is an open call over the internet to acquire financial resources. Most project initiators use web-based platforms to launch their project or plan publicly. Most of those active in the market Crowdfunding platforms are within the last seven years originated and can be considered special understand forms of social media applications (Wu et al., 2013: 257-282).

Another method is crowdcasting. It is a problem-solving and idea-generating process in which an organization defines details of a specific problem or situation to a carefully chosen community of crowd for possible solutions. The process is often conducted as a contest. The results may be used to resolve difficult or complex development in technology or management. Sigismund et al. (2011: 101) argue that crowdcasting can be compared to a closed event that cannot be entered without invitation. They give an example of creating innovations for an international company. The players in this innovation event sign confidentiality agreements, and the solutions proposed by them become the property of the sponsoring company. Typically for crowdcasting is the selection of the target group in a crowdcast who is well-educated but not part of the culture of the company seeking the solution for technological and/ or organizational problems.

Relatively new, associated with the development of a democratic society and information technologies is crowdvoting. It is a method by which ideas for new products or services are voted on by the crowd (eg. Internet community). Internet users' voting does not generate such costs as experts' or consultants' fees. Additionally, voting by the crowd can bring tangible benefits to both the organization and other market participants. First of all, potential customers, feeling committed and appreciated, choose what they would like to use. In the case of a crowd vote, it becomes ratings, votes, opinions or recommendations (Lemeister, 2012: 388-392) that can be included in the decision-making processes in the organization regarding products, technology, quality of life, or the protection of natural resources in a smart and cost-effective way.

The common core for the distinguished methods of crowd management is social communication and cooperation. Social communication is a process where meaning is shared through information and knowledge exchange. M. Castells (2013: 65) writes that the course of this process is determined by

technology, features message senders and recipients, their cultural codes, references and communication protocols and the scope of the communication process. The tasks are fully completed with modern communication and information technologies, such as the Internet and social media.

On the other hand, cooperation is the ability to create bonds and cooperate with others, the ability to work in a group and with different groups (crowd) to achieve common goals, the ability to perform tasks in a team and solve problems together. This ability is one of the emotional competences that affect the quality of relationships between individuals, groups or organizations. Real cooperation is conducive to engagement and leads to the creation of internal bonds among members of the group to achieve common goals.

Crowd Classification – New Approach

The presented literature studies on crowd justify the conclusion that the crowd is a strategic force influencing the organization. The crowd can be a driving force both as a provider of information, knowledge, and other resources, and as a threat to the organization's goals and activities. In the first case, the crowd is an ally of the organization, while in the second, the crowd is hostile, which can significantly reduce the organization's operation on the market, and even destroy it. To counteract this, the organization should, to the best of its strength and capabilities, manage the background. It requires the use of analytical and management instruments that will enable the organization to recognize the crowd and determine those forces with which the organization can cooperate or reduce their negative impact. The understanding of collective behavior by different types of crowds as well as the social dynamics of crowd behavior as a strategic force allowed the authors to generate a new crowd management model. Due to the fact that collective behavior in a psychological and social perspective relates to an emotion - engagement grid, these own criteria were chosen for the crowd analysis in diversity management.

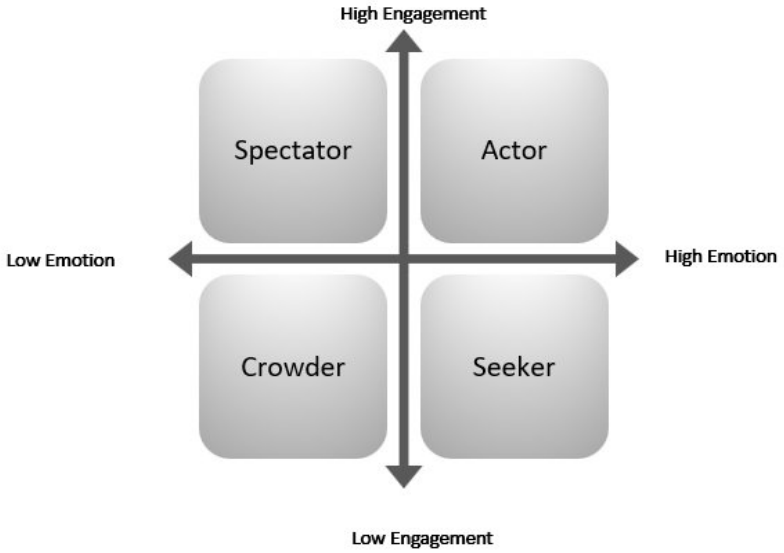

Figure 1: Diversity management's Crowds

Source: Provided by authors

Figure 1 shows four types of crowds:

- Crowder – group of people with low emotion and low engagement to organization.
- Seeker – group of people with high emotion and low engagement to organization.

- Spectator: group of people with low emotion and high engagement to organization.
- Actor: group of people with high emotion and high engagement to organization.

This model helps to identify the types of crowds and enables the establishment of basic communication strategies between the organization and the distinguished crowd types.

The process of Communicating with The Crowd

Communication with the crowd is critical to manage them. Communicating with the crowd is critical to managing it. This in turn means prioritizing the organization's communication systems. In connection with the developed typology and crowd, the process of communication of the organization with the crowd was developed and communication strategies were defined adequate to the selected types of crowds.

Figure 2 shows crowd communication management process elaborated by authors. The communication process consists of four steps to successfully communicate with crowd:

1. Monitoring/Screening: it is a routine activity of collecting information that can be used to make informed management decisions. Monitoring can take place at project or organizational level. Monitoring regularly provides managers and other stakeholders with information on progress towards goals and results (Project Management Institute, 2017: 105).
2. Investigation: it is an examination and research about specific topic and the goal is to determine the stakeholder in the organization.
3. Classification/Identification: In this activity, type of crowds will be identified and classified.
4. Communicating with crowds: Finally, different internal communication ways as will be categorized.

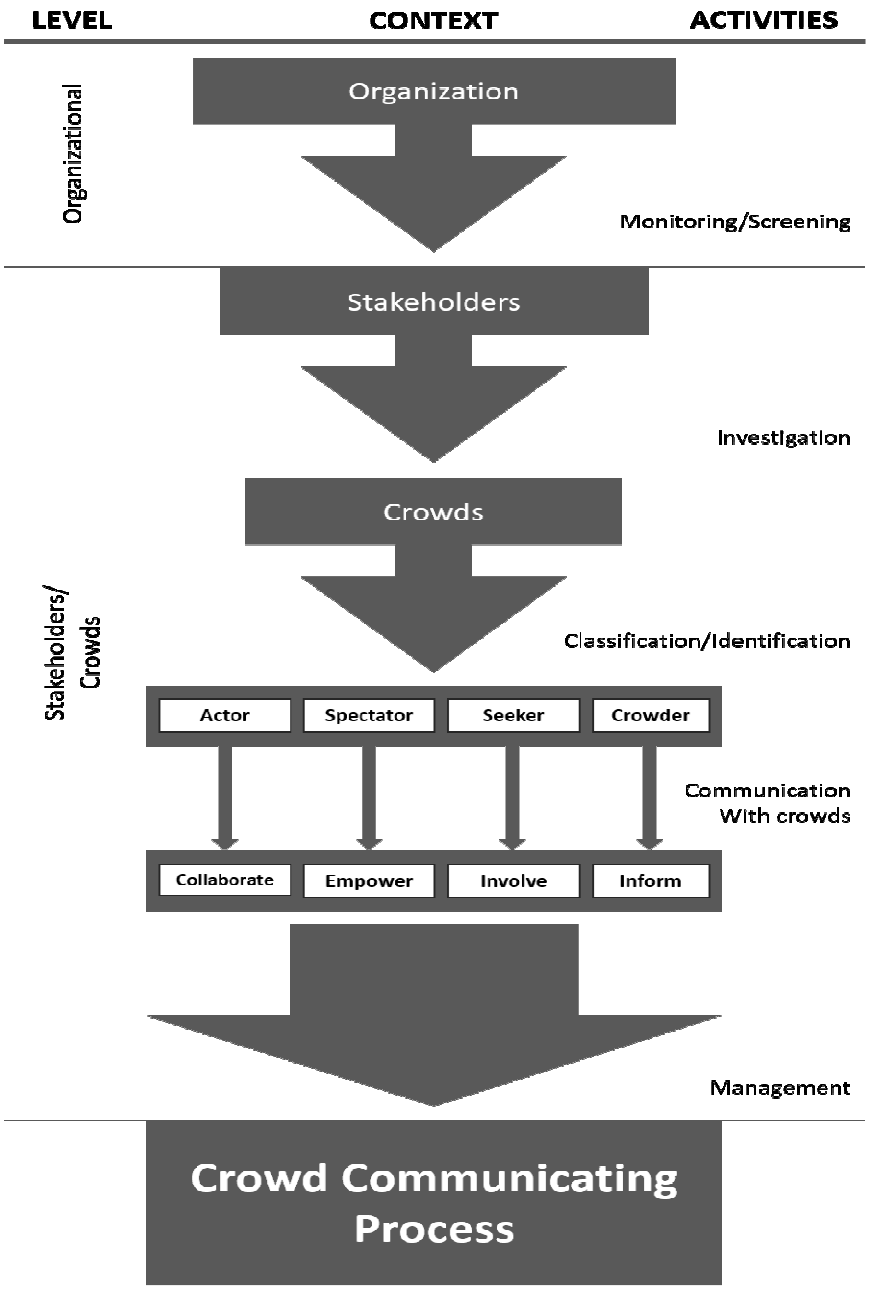

Figure 2: Crowd communication management process

Source: Provided by authors

The adjacency of the typologies presented on Figure 1 indicates communication strategies appropriate for each crowd group and the concept of crowd management was built, i.e.:

- to collaborate with actor: as the group of people with high engagement and emotion need to be engaged and organization must collaborate with them to change them as positive stakeholders.

- to empower the spectator: as a group of supporters with low emotion and high engagement, they should be empowered, and all the steps should be discussed.
- to involve the seeker: as they have high emotion and low engagement, they are potentially can be as actor, they need to be involved.
- to inform the crowder: an information exchange between organization and this type of people, whom have low emotion and low engagement, can help to increase their emotion and their engagement.

Conclusion

Crowd management can be considered as a strategic activity that is important to the organization. As shown in the article, the crowd is not a homogeneous group of people. Influencing the organization and engaging in its activities is a low-power stakeholder. The organization can use the crowd to achieve its own goals and objectives. Such action may contribute to strengthening the competitive position of the organization. Crowd management can be key to this. To this end, the organization should identify the crowd, defines its types and assigns an appropriate communication strategy. For this purpose, the crowd communication management process presented in the article may be a useful tool.

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Quality of Life Monitoring: Opportunities for Digital Methods

Evgeny SHCHEKOTIN

Novosibirsk State University of Economics and Management, Novosibirsk, Russia
email: evgvik1978@mail.ru

Abstract

The article deals with the application of computer technologies in social sciences. Computer technologies have been actively used in the social sciences in recent years, especially in the applied and commercial sections. The digital world also opens up new data sources for researchers – all sorts of "digital footprint" that users leave in the digital environment. These digital methods in the social sciences are also applicable to the study of the quality of life of the population. The data source in this case is the subjective judgments of users in social networks about the state of quality of life in a particular region of Russia. A new method for assessing the quality of life of the population of regions based on data mining and big data technologies is proposed. The results of a study of the quality of life according to social networks in 83 regions of the Russian Federation are presented.

Keywords: Digital Methods, Digital Sociology, Quality of Life, Social Network

Introduction

All currently quality of life theories represents two large groups: objective and subjective methods (Nugaev and Nugaev 2003). Objective methods employ various statistic data sets, while subjective methods assess quality of life based on what people report and think of their lives themselves; such reports and opinions are collected by means of surveys or psychological and sociological experiments. In this research we analyze subjective quality of life as an individual's personal and subjective assessment of his or her own quality of life.

New information and communication technologies offer new opportunities to study subjective quality of life (Antenucci et al 2014; Appel et al 2016; Chen et al 2017; Sabatini and Sarracino 2017; Verduyn et al 2017; Yang and Srinivasan 2016). Thus, nowadays social media is the one of the principal information sources on mood, emotional experiences and behavior of people. Compared to surveys, social media as a source of information have both virtues and shortcomings (see Cody et al 2016; Dudina and Iudina 2017; Kryshtanovskaya 2018; Sanchez et al 2017; Schober et al 2016; Shchekotin et al 2020). We suppose that quantitative analysis of human behavior in social networks is a way to obtain sufficient information on the people's emotions and worries, as well as to assess their subjective quality of life. In this article we offer a way to study the subjective quality of life based on the information on online activities of social networks users.

Methodology

The methodology of our study consists of several subsequent stages:

1) development of a subjective quality of life model;
2) selection of VK communities;
3) classification of posts and messages in those communities;
4) automatic content analysis in the selected communities;
5) calculation of life quality index for different regions of Russia.

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Quality of life model

There are lots of methods and models of quality of life and life quality available, with lots of common elements. Gavrilova (2004), for instance, distinguishes 17 most mentioned life quality parameters: standard of living; social infrastructure level; environmental condition; health condition; personal safety; education level; employment; quality of work life; quality of accommodation; quality of leisure and recreation; demographic situation; social confidence (social payments, various preferences); family; social connections; inequality; financial and economic condition in the area; nature and climate. In our model we have used several of these parameters; however, we have not included the others due to their complexity and the specific character of the selected communities. For example, such things as income level, family life, demographic situation and social connections are not widely discussed in the mass regional communities. We have also excluded quality of work life, quality of leisure and recreation and inequality as separate parameters, because studies of these indicators require a deeper analysis. However, we have included several additional parameters.

First of all, we have added the assessment of various administrative solutions and political situation in the region, because today the Russian authorities have direct and strong impact on the other parameters of quality of life and life quality. We have also included such parameters as general emotional state (psychological subjective life quality) and relationships between people to assess the emotional environment in the region. One more parameter of life quality, very important but frequently forgotten in the Russian studies, is the situation with political rights and freedom (Veenhoven 1996). Table 1 gives an overview of subjective quality of life parameters we have used in our study.

Table 1: Structure of life quality parameters

Categories	Indicators/Topics
Education	pre-school; secondary; secondary professional; higher; extended
Housing and utilities sector	housing and utilities services for population; administration (bureaucracy, work of employees, service quality, attitude towards people, rates)
Healthcare	service (conditions, technical equipment, bureaucracy, waiting time); treatment quality; work with certain population groups (elderly, children, disabled, pregnant)
Infrastructure	roads (quality); fuel; accessibility (between settlements and to housing, etc.); congestions; snow cleaning; storm water draining; affordability of housing, etc.
Safety (situation in cities)	special services work (Police, Ministry of Emergency, Road Police, Rosgvardiya); criminal situation (crimes, fraud, theft, administrative crime)
Environment	deforestation; ozone depletion; reduction of biodiversity; water and air pollution; overpopulation; soil degradation; biological waste; influence of politics and economics on environment; consequences of human impact on environment; measures of environmental disasters prevention, etc.
Relationships between people	friendliness/hostility of passerby, neighbors, strangers (co-travelers, passengers, etc.)
General emotional state	expression of feelings (happy/unhappy, satisfied/not satisfied, annoyed/inspired, sad/glad, etc.)
Work	unemployment level; salary; work conditions; official/unofficial employment; full/partial employment
Products	prices and inflation; competition between manufacturers
Taxes	bureaucracy; tax rate; tax burden; tax allocation
Lending and entrepreneurship	loans and mortgage; entrepreneurship (barriers, bureaucracy, etc.)

Social support on behalf of the state	subsidies; pensions; benefits; retirement age
Media freedom	censorship/freedom of speech; trustworthiness of information; objective character, etc.
Remonstrative potential (resentment of population)	political protest (protests addressed to the authorities) social protest (protests against social inequality, social problems); cultural protest (protests caused by some cultural event resulting in resentment)
Election freedom	election integrity; undue influence; transparency; information attack; attendance; competition during elections
Attitude towards authorities	attitude of population towards some personalities (president, prime minister, deputies, governors, mayors, members of the authorities) and their actions
Political resolutions	assessment of regional problems; managerial and staff decisions of the authorities; legislation (new laws and amendments); violation of the people's rights; attitude towards population; budget (generation and allocation); assessment of adopted decisions by the population
Domestic politics	assessment of functions of the regional authorities: - ability to set up and maintain regional economic activities - ability to maintain stability in the region and in the country - socially fair material wealth allocation - safe use of domestic - maintenance of lawfulness and order

Selection of VK communities

In our study we have included 83 out of 85 regions of the Russian Federation. We have not managed to collect data on two regions: Chechnya and Mordovia. In each of these 83 regions we have determined 3 largest cities and selected 10 VK communities discussing life there. We have defined them as 'urban communities'. We have filtered the communities according to several criteria:

1. They publish informative posts on social, economic and political life;
2. They publish posts of their subscribers with info on social, economic and political life;
3. The published posts contain sentiments on news and events;

We have excluded the following communities:

- online shops and other commercial groups;
- groups with information on sports and cultural events and personalities;
- communities of public places (restaurants, clubs, cinemas, etc.);
- food delivery services;
- communities on health, nutrition, fitness, etc.;
- communities on exchange of items and charity;
- communities with storytelling, stories and questions;
- dating communities;
- job offers communities.

In some regions (the Buryat Republic, Dagestan, Ingushetia, Tatarstan) we have included 10 regional groups not connected with any definite city. In these regions there are more than 3 large towns where the majority of the population is concentrated, so here we have included general regional groups to increase representativeness. In some regions with high population density in large towns we have selected only two or even one of them (like in Nenets Autonomous Area). We have searched for the communities manually and selected the largest ones corresponding to the above mentioned criteria. In doing so, we have built a cluster of 2410 communities.

Classification of messages and posts in communities

At the next stage of our study we have used the social media data collection and analysis platform of the University consortium of big data researchers (www.opendata.university), developed by the team of the Laboratory of Big Data in Social Sciences of Tomsk state University to download the materials from the selected communities. We have downloaded all messages, posts and comments for the period between January 1 and December 31, 2018. After that we have deleted all 'junk' like advertising, as well as the information beyond the scope of this study (job offers, sports and cultural events, free exchange, contests and campaigns, recipes, delivery and food, astrological predictions, sales of items, dating offers, discussions of private life of participants, etc.). We have deleted the 'junk' in two stages: 1) manual cleanup of approximately 60 thousand messages; 2) automatic cleanup based on the specially designed algorithm trained during manual cleanup. We have left only the messages of 20 words and longer and we have deleted all repeated messages. After cleanup we have left only approximately 3 300 000 messages. At the same time we have categorized the messages according to topics (given in Table 1) and style (positive, negative, neutral).

Automatic content analysis in selected communities

The database set includes posts from the walls of the regional VK communities retrieved through its public API (Application Programming Interface). Each post had to be categorized into one of the 19 categories or as 'junk'. The method is based on machine learning technologies of retrieval of unknown patterns from these texts. To create an automatic algorithm of texts classification we have used the following conventional libraries of machine learning: Scikit Learn (https://scikit-learn.org/stable/), Pandas (https://pandas.pydata.org/), Numpy (https://www.numpy.org/), as well as a set of tools known as NLTK (Natural Language Toolkit, https://www.nltk.org/) for the natural language analysis. The algorithm is based on Python 3 programming language.

At the data preprocessing stage we have deleted symbols belonging to neither English nor Russian alphabet. We have used stemming to bring all words to their basic forms. We have deleted all rare terms, which could have been typos. To be able to use different classification methods we had to present the texts in the vector form. To transform the texts into the terms significance vector we have applied TF-IDF (TF – term frequency, IDF – inverse document frequency), where the word weight is used in proportion to the frequency these words occur in a document and in inverse proportion to the frequency of the words use in all documents from the sample. TF-IDF is frequently applied to present documents as numeric vectors reflecting the significance of each term from a certain term set (a number of terms determines the vector dimension) in each document. For each vector we have taken into account not only separate terms but also digrams, that is, pairs of consecutive terms.

We have conducted a number of experiments to determine the best data for learning. To do that we have checked several data sets including: number of comments, likes, reposts, views, number of words in a post. All these values have been scanned in accordance to their average value in a community the corresponding text was taken from. We have also considered the vectors of significance for the comments to the posts retrieved the same way, as well as for the posts texts. After that we have determined the best data set for this task: significance vectors of the words in the posts, the scanned number of words and the number of comments, likes, reposts and views.

Based on the obtained data we have built the machine learning models. We have conducted a number of experiments, where we have categorized the samples as the one for learning and the one of a text, with their subsequent validation to select the most accurate model to classify categories and attitudes. After that we have checked the models of Gradient Boosting, where we have used a prediction model as an ensemble of weak predictive models and the Random Forest with variations of hyper parameters. In the end we have selected the models demonstrating the best result for the corresponding task. We have implemented the gradient boosting from LightGBM library. We have validated the data to determine the accuracy of the obtained models. The accuracy of the categories classifier is 73%. The accuracy of the attitudes classifier is 77%.

Subjective quality of life index for regions of the Russian Federation

After that we have built the subjective quality of life index (SQoL) for each selected region. The method of aggregates such as the index is widely used in various quality of life and life quality studies. In this article we have also used the indices of online activities to calculate the SQoL. We have calculated the SQoL according to the following formula:

$$I_{kjt} = \frac{A_{kjt}}{B_k} \quad (1)$$

where

I_{kjt} – Online Activity Index (OAI) for the region (k) for this subjective quality of life value (j) for the certain attitude of message. This index determines the intensity of discussion of this topic in the certain attitude in the certain region. The online activity index demonstrates how topical the subject of the message is (quality of life value) for the region and subjective assessments of this value by the social network users.

A_{kjt} – value on online activity in the certain region for the certain value of subjective quality of life; it is calculated according to the formula:

$$A_{kjt} = L + 2 \times C + 5 \times R \quad (2)$$

where

L – the amount of likes collected by the messages on or around a certain value of subjective quality of life in the certain region in the certain attitude.

C – the number of comments collected by the messages related to the certain value of subjective quality of life in the certain region. We have equated each comment with 2 likes, because, in our view, this action of a user is an evidence of importance of these messages for the commentator. Here a like is a passive form of demonstrating support of this message.

R – a number of reposts of the messages on the certain value of subjective quality of life in the certain region. We have equated each repost with 5 likes, because, in our view, a repost is an evidence of complete and active support of this message by the user. This action means that the user not only expresses his or her consent with this message but also openly demonstrates his or her solidarity with the message. As compared to various forms on online activities, a repost is an evidence of the greatest topicality of this subject for the user.

B_k – total number of subscribers in all selected communities in the region. This value demonstrates a relative value of online activity for this region.

k – number of each region (1 to 83). The study involves 83 out of 85 regions of the Russian Federation. We have not managed to collect reliable data for two regions: Mordovia and Chechnya.

j – topic of messages, that is, an indicator of quality of life, which we have included into the model of life quality (1 to 19) (according to Table 1)

t – attitude of messages (0, 1 or 2).

Thus, I_{kjt} shows intensity of discussion of a topic in the selected communities in the selected region. It is an evidence of urgency and topicality of this subject for the population of the region. I_{kjt} has been calculated for each attitude, that is, for each region OAI has three values: one for positive attitude, one for negative attitude and one for neutral attitude. Attitude is defined as an emotional evaluation of a message, thus, the positive attitude means that the message contains some positive evaluation or expression of approval of some news or situation mentioned in the message; the negative attitude means it contains disapproval, resentment towards the contents of the message, while the neutral attitude means the message is purely informative and contains no evaluation.

We have calculated the monthly value of the index for each subject and each attitude; after that we have calculated the mean monthly value for each subject and each attitude. Mean monthly values have been calculated by addition of the online activity index for definite attitude and dividing the sum by 12. Later, by simple subtraction of mean values of the online activity index for positive and negative attitudes, we have calculated the mean value of the subjective quality of life index $SQoL_{kj}$ for the corresponding region and for the corresponding topic/value of subjective quality of life:

$$SQoL_{kj\Delta m} = I_{kjm1} - I_{kjm2} \quad (3)$$

where

I_{kjm1} – monthly online activity index with the positive attitude;

I_{kjm2} – monthly online activity index with the negative attitude.

We have not included neutral messages into the SWBI. We have calculated the total Russian value of subjective quality of life $SQoL_{sum}$ as the sum of the index for all quality of life subjects/values for each region:

$$SQoL_{sum} = \sum SQoL_{kj\Delta m} \quad (4)$$

The suggested method is perfect to study the life quality of the 'digital' population in the region, that is, the part of the population, which can be referred to as active users of social media. This study does not include the population groups, which, for whatever reasons, do not use social media. The second limitation is caused by technical aspects of this method: we have not used botnets in the social networks to manipulate the public opinion. We have not managed to level up this issue. Another limitation is related to psychological peculiarities of the users' behavior. It is a well-known fact that users tend to react to negative messages, thus, the obtained results demonstrate the general subjective 'ill-being' rather than quality of life. Besides, this method enables obtaining the general subjective quality of life assessment for the region, but quality of life of a separate person cannot be assessed. Surveys are a better option for that.

As compared to surveys, this method has some advantages. It is fast, relatively cheap and scalable. In future the method of life quality assessment based on the social media data should be coordinated with the results of surveys; some objective data have to be identified, which influence the online assessment of life quality.

The indices were calculated based on statistics obtained from the largest Russian social network VKontakte. This social network was created in 2006; as of the beginning of 2020, it had more than 581 million registered users. It should be noted that it is the total number of users registered within the whole period Vkontakte exists, that is, since 2006. Some accounts were already deleted by the users, while some users create more than one account. Nevertheless, its monthly audience is 97 million people. According to the SimilarWeb, VKontakte is at the 10th position among all websites according to popularity and at the 4th position among the world's social networks. This social network is used by 65% of Russians (among those who use social networks, as of December 2017) (Pol'zovanie Internetom 2018). According to the results of the same study, 20% and 7% of Russians of those who use social networks visit Facebook and Twitter respectively. Another study demonstrates that 28% of Russians having accounts in social networks use VK every day or every other day, while only 4% and 1% respectively use Facebook and Twitter on the daily basis (Kazhdomu vozrastu - svoi seti 2018). VK is more popular among young users (aged 12 to 34). It should be noted, that VK is used by people living in settlements of all sizes and types. According to Mediascope, in November 2019 the monthly audience of VK (number of users logging in the social network at least once) was 70.5 million users living in all types of Russian settlements (cities, towns and villages) (Web-index VK.com 2020).

Results

Based on our results we are able to draw conclusions on two parameters of online discussions of various subjective quality of life indicators: attitude and intensity of these discussions. On the one hand, we see prevalence of negative publications (we observe negative values in all indicators), which means that the online activity index value for the negative attitude was higher than the one for the positive attitude (Table 2). Thus, we come to the conclusion that in general the population is not satisfied with its quality of life. On the other hand, we see that safety is an unprecedented leader of all parameters, meaning that this topic is a subject of the most heated online discussions. Such topics as relationships between people, infrastructure, housing and utilities, and environment attract far less attention. Then, we have a close group consisting of such parameters as the condition of medicine, employment, remonstrative potential in the region, goods (assessment of the commercial state of the region), and assessment of political decisions taken by the regional authorities.

Table 2 : Subjective Well-being Index for specific well-being indicators

Quality of life indicators	$SQoL_j$
Education	-0.01495
Housing and utilities sector	-0.15315
Medicine	-0.0596
Infrastructure	-0.17183
Safety (situation in the city)	-3.75174
Environmental science	-0.10836
Relationships between people	-0.2136
General emotional state	-0.0005
Employment	-0.04948
Goods	-0.04006
Taxes	-0.00533
Lending and entrepreneurship	-0.00778
Social support from the state	-0.00722
Media freedom	-0.00011
Remonstrative potential	-0.04253
Election freedom	-0.00678
Attitude to authorities	-0.00923
Political decisions	-0.03837
Domestic politics	-0.01864

Such topics as domestic politics, education, assessment of actions of certain political figures, as well as lending and entrepreneurship, social support by the state, freedom of elections and taxation attract even less attention. Thus, the suggested quality of life index is an indicator of social problems. It demonstrates the degree of dissatisfaction of the population with living conditions and indicates the most urgent issues for the people.

Such topics as freedom of speech in the media and general emotional state of the population cause the least interest. Low intensity of discussion of one's own emotions can be explained by both cultural factors (reluctance to openly discuss one's feelings and spirits) and the specific character of the selected communities (mostly they are informative communities discussing general problems typical for a certain region and settlement, problems faced by communities and not by individuals). It is possible that surveys can help to obtain more accurate data on this parameter. Low interest in freedom of speech in the media can be explained by the fact that this topic is discussed within the context of general political issues. So, freedom of speech in the media is blended with the general discourse on protests.
If we look at the data on the regions (Table 3), we see that in most regions the subjective quality of life index is negative. The exception is the Chukotka Autonomous Region, where the online activity index with the positive attitude is higher than the one with the negative attitude. The total positive life quality index in this region is made up from such parameters as the condition of infrastructure, employment, social support by the state, assessment of political decisions and domestic politics. The remaining parameters are either negative or zero.

Table 3: Total Subjective Well-being Index for all regions for 2018 (sum of all life quality parameters for a certain region)

Region	$SQoL_{sum}$	Region	$SQoL_{sum}$
Adygei	-0.04637	Nenets Autonomous Area	-0.07537
Altai Territory	-0.18246	Nizhny Novgorod Region	-0.06259
Amur Region	-0.02586	Novgorod Region	-0.09415
Arkhangelsk Region	-0.07722	Novosibirsk Region	-0.10585
Astrakhan Region	-0.04684	Omsk Region	-0.07532
Bashkortostan	-0.03384	Orenburg Region	-0.19532
Belgorod Region	-0.05497	Orel Region	-0.04635
Bryansk Region	-0.08234	Penza Region	-0.08399
Buryatia	-0.04452	Perm Territory	-0.00481
Vladimir Region	-0.06636	Primorye Region	-0.0101
Volgograd Region	-0.02053	Pskov Region	-0.00093
Vologda Region	-0.15559	Altai Republic	-0.00463
Voronezh Region	-0.04727	Rostov Region	-0.09866
Dagestan	-0.03179	Ryazan Region	-0.00225
Jewish Autonomous Region	-0.00869	Samara Region	-0.00711
Zabaikalye Territory	-0.03046	Saint Petersburg	-0.00326
Ivanovo Region	-0.0245	Saratov Region	-0.15107
Ingushetia	-0.00102	Sakha (Yakutia)	-0.00924
Irkutsk Region	-0.0589	Sakhalin Region	-0.11088
Kabardino-Balkaria	-0.00212	Sverdlovsk Region	-0.05464
Kaliningrad Region	-0.07651	Sevastopol	-0.05698
Kalmykia	-0.05434	North Ossetia – Alania	-0.00453
Kaluga Region	-0.04576	Smolensk Region	-0.01138
Kamchatka Territory	-0.00313	Stavropol Territory	-0.03365
Karachai-Cherkessia	-0.00374	Tambov Region	-0.11993
Karelia	-0.06089	Tatarstan	-0.05849
Kemerovo Region	-0.10255	Tver Region	-0.05037
Kirov Region	-0.02238	Tomsk Region	-0.11716
Komi	-0.03621	Tula Region	-0.03143
Kostroma Region	-0.09263	Tyva	-0.00853
Krasnodar Territory	-0.04428	Tyumen Region	-0.07588
Krasnoyarsk Territory	-0.05809	Udmurtia	-0.09363
Crimea	-0.0212	Ulyanovsk Region	-0.069
Kurgan Region	-0.07369	Khabarovsk Region	-0.02739
Kursk Region	-0.05522	Khakassia	-0.0664
Leningrad Region	-0.08755	Khanty-Mansiysk Autonomous Region	-0.0202
Lipetsk Region	-0.04889	Chelyabinsk Region	-0.07561
Magadan Region	-0.00687	Chuvashia	-0.01696
Mari El	-0.0412	Chukotka Autonomous Region	0.009571
Moscow	-0.01925	Yamal-Nenets Autonomous District	-0.04034
Moscow Region	-0.03322	Yaroslavl Region	-0.08844
Murmansk Region	-0.08631		

The regions with a 'high' negative subjective quality of life index, but close to 0, include a number of national republics in the North Caucasus (Ingushetia, Kabardino-Balkaria, Karachai-Cherkessia, North Ossetia - Alania), as well as Altai Republic. The Pskov and the Ryazan Regions, the Kamchatka and the Perm Territories, and the city of Saint Petersburg have somewhat negative value of the life quality index. At the opposite pole of this list we see the highest value of the life quality index represented by the Orenburg Region and a number of regions in the Western Siberia (Altai Territory, the Tomsk, the Novosibirsk and the Kemerovo Regions). This group also includes the Vologda, the Saratov, the Tambov and the Sakhalin Regions.

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Factors That Determine the Market of Security Tokens Offering in The World

Joanna WIEPROW

WSB University, Wroclaw, Poland
joannawieprow@wsb.wroclaw.pl

Abstract

The financial industry was the first to perceive a huge potential in the blockchain technology. With the emergence of blockchain and smart contracts, a new method of raising capital for business projects has developed: digital tokens. Issuing tokens, through Initial Coin Offering (ICO), has become a popular method of financing projects, mainly technological ones. As a result of irregularities and frauds related to this, there was a loss of investor confidence and the ICO market collapsed. Hence, there is the emergence of Security Token Offering (STO). This innovative business model has an opportunity to revolutionize the financial market, while offering to its participants new opportunities to raise capital for startups and, on the other hand, new opportunities for investors. The aim of this article is to identify the factors that have an impact the development of the market of Security Token Offering in a global perspective and to create a model of interrelations between these factors. On the basis of the goal formulated in this way, a thesis was put forward that the STO market has a large growth potential; however, there are a number of factors that determine its development. The identification of those factors that have an impact on the development of the market under examination is based on an empirical analysis of the global STO market and an evaluation of its potential. Those challenges that face this market are also identified.

Keywords: Security Token Offering (STO), Initial Coin Offering (ICO), blockchain, security tokens.

Introduction

The dynamic development of blockchain technology and the accompanying development of electronic forms of payment, including cryptocurrencies, has led to the creation of new forms of investment activity and opportunities for enterprises to obtain financing. The central role in this area is played by the so-called token concept. It has made a rapid career in the digital world, to the extent that it is perceived by some as a means with a potential of revolutionising traditional financial and capital markets, while being a common and simple instrument for raising capital. This is possible by ICO, i.e. issuing utility tokens and raising capital through crowdfunding.

The year 2018 saw the largest development of ICO, where, in global terms, more than 7 billion dollars were raised (*4-th ICO/STO Report 2019, p. 1*). However, many investments were misleading, which resulted in a loss of investor confidence and the need to create safer financial instruments. Therefore, utility tokens started to be replaced by security tokens. Since 2019, there has been a dynamic increase in the number of the issues of security tokens, which translates into the amount of capital raised for investment projects, mainly technological ones, as well as an increasingly growing ecosystem of cryptocurrency markets. The advantage of security tokens is that they reflect real assets such as stocks, bonds, real estate or works of art. Furthermore, they are liquid and are widely available to investors. This creates opportunities to raise capital for businesses, especially startups, and offers new investment prospects.

One of the major challenges facing this market is the issue of an appropriate regulatory framework, related to the cryptocurrency market, including the issue of security tokens. Many countries are adapting legislation to the changing market requirements as well as to the development and use of

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blockchain technology. However, there are countries where trading in security tokens is still prohibited; examples include China, South Korea, Ecuador, Algeria (*The Ultimate Guide to Security Token Offerings, p.27*).

The aim of this article is to identify those factors that have an impact on the development of the market of Security Token Offering in the global perspective and to create a model of interconnections between the said factors. On the basis of the goal formulated in this manner, a thesis was put forward that the STO market is characterized by a large growth potential; however, there are a number of factors that determine its development. The identification of factors that have an impact on the development of the market under examination is based on an empirical analysis of the global STO market and an assessment of its potential. The challenges facing this market were also identified.

The originality of this article is evidenced by a comprehensive analysis of the global STO market, including the ecosystem, benefits for issuers and investors, an identification and an assessment of those factors that have an impact on the market development and an identification of the potential and challenges facing the market. This analysis complements the theoretical gap in the functioning of the global market of security tokens.

Literature Review and Clarification of Concepts

Blockchain is a decentralised electronic database. This is a method of data collection based on global and decentralized registers. Individual blocks are linked by cause and effect relationships with other blocks, and together they form the so-called chain, i.e. a blockchain. Each block contains the end of the previous block, allowing them to be linked into a chain (Yan, Shi, 2017, pp. 220-230). Therefore, this is a decentralized electronic database, which is based on the records of subsequent data blocks. Each block contains information about the operation performed (including the date and result), and it is linked to the previous and the subsequent blocks as links in the chain.

The blockchain technology differs from other distributed database solutions in that it possesses the following characteristics (Schatsky, Muraskin, 2015, pp. 2-3):

- reliability and accessibility: the number of participants in the blockchain network guarantees that even if one participant fails (e.g. it registers incorrect data), the remaining participants will still maintain correct, verified and authenticated data,
- transparency: blockchain operations are available to participants in the network, who may control them, thus ensuring their safety and reliability,
- permanency: in order to reverse the operation, information contained in the blocks of all the participants of a given network would need to be changed, which is practically impossible (Skinner, 2016, p. 189),
- irreversibility: cancellation of a registered operation is practically impossible,
- digitization: the document can be saved and stored in a block in a digital form.

Blockchain operations are tamper-proof and fraud-resistant as they are constantly confirmed by a decentralised network of computers. Each new record in the chain is verified by a peer to peer (P2P) network and any false records are rejected. Therefore, in order to manipulate blockchain data, at least half of the computing power of the entire decentralised network would have to be controlled. It is Bitcoin that is based on a decentralized, transparent and anonymous blockchain database (Houben, Snyers, 2018, p. 31).

Bitcoin is the first virtual currency, known as cryptocurrency, created with the use of the blockchain technology. According to the definition provided by the European Banking Authority, "virtual currencies constitute digital representations of values, not issued by a central bank or a public authority, not necessarily linked to a specific country's currency, yet they are recognised by natural and legal persons as a means of payment that can be transferred, stored or traded electronically" (European Parliament, 2016/2007(INI)). Given that cryptocurrency systems are based on open source software

and P2P networks, there are already several hundred units – that are alternatives to Bitcoin - in the network. Ether is considered to be the most serious competition.
One of the possibilities of intelligent contracts is to issue tokens that may represent any asset: real estate, works of art, securities, metals and precious stones as well as any other tangible and intangible goods.

The issuance of tokens is to a significant extent easier than the creation of a new cryptocurrency, it does not require the creation of a new chain of blocks; what it only needs is an adjustment to the standards of the network within which they are issued. For the ethereum network, the ERC-20 standard has been created, which defines the common features of tokens and facilitates their uniform management. Tokens created in this manner can immediately be traded. They can be treated as successive cryptocurrencies or as shares in ventures (Żuława, 2018, p. 64). Tokens can be created primarily in the Ethereum network using smart contracts, i.e. applications that run within the protocol.

Tokens possess no material dimension, they constitute a digital record based on the blockchain technology. A vast majority of tokens are created on the Ethereum platform, or more precisely in the ERC20 standard (other less popular platforms include Nem, Neo, Waves and Omni). They have a number of applications: they may serve as a utility, marketing, billing or investment purpose as well as being a hybrid of these. Depending on their intended use, they are used in settlements for an access to specific resources of IT systems, they are a tool to raise funds required for a start-up and development of a start-up or a specific project; they reflect the shareholdings of the company, and they prove to be a marketing tool (Burilov, 2019, p. 8).

Tokens have many similarities to bitcoins, yet there is much more to them than merely a currency because they can be used in a wider range of applications. Due to their different application possibilities, tokens can be divided into (*The Ultimate Guide to Security Token Offering*, p.11):

- Utility tokens: these provide access to the functionality of IT systems, applications and services, and they are the means and method of payment;
- Security tokens: these are instruments that are analogous to securities and reflect their ownership.

"Another category that can be emphasized might be called as "real cryptocurrencies" or payment tokens — this type has its own blockchain and is often considered as a mean of payment. However, there is one big difference between SEC (United States Securities and Exchange Commission) and FINMA (Swiss Financial Market Supervisory Authority): while SEC focuses on comparing tokens with securities, FINMA is focused on the economic functions of tokens. Each type of token has key features" (*Types of tokens. The four mistakes beginner crypto-investors make*).

Tokenisation is an innovative form of business digitisation, based on the decentralised blockchain technology. It consists in creating tokens and assigning these strictly to a given company, specific project or person. Along with the development and adaptation of the blockchain technology, the potential of tokenization is enormous and it allows one to tokenize all kinds of assets while reducing the cost of their transfer. The most common method to use tokenization is ICO (Initial Coin Offering). ICO is a means of community funding for start-ups by raising capital through newly created cryptocurrencies and tokens. It consists in selling them in exchange for another legal tender, especially Ethereum and Bitcoin. It is based mainly on the business model recorded in the form of the White Paper document, which is equivalent to the prospectus for shares. ICO can be defined as a process where tokens are presented for purchase to an unlimited number of customers. The funds collected in this way are allocated for the purposes of launching an investment project.

Security Tokens Offering

Blockchain technology based projects can raise funds using ICO, which enables investors from all over the world to invest in innovative projects. However, the low credibility of ICO, high risk and regulatory issues have led to the development of a new method of financing: STO (Security Token Offering). STO

offers tokens that possess the characteristics of securities and are regulated and meet all the requirements associated with them. It is therefore a much safer method of financing considering the obligation to issue asset tokens in the blockchain network, within the legal requirements for the prospectus, thus allowing token buyers to hold shares in a real company.

It is worth mentioning that all over the world, every country has its own definition of the security token. In the context of American law, the Howey test is used to assess whether a given token is a security token. "According to the Supreme Court's judgement, a transaction is to be called an investment contract if it fulfills the following criteria, and thus becomes subject to the securities registration requirement, (*Security Token Offering: what, where and how, p. 5*):

- it must be an investment of money or anything of value,
- there is an expectation of profit,
- the investment is in a common enterprise,
- the profit is to be generated by the efforts of a third party".

Security tokens represent assets such as shares in actual primary titles, companies or profit streams, and rights to dividends or interest payments. In terms of their economic function, tokens are analogous to shares, bonds or derivatives (*Types of tokens. The four mistakes beginner crypto-investors make*).

The following can be distinguished among security tokens (*The Ultimate Guide to Security Token Offerings,* pp. 13-14):

- equity: partial ownership of a company or project;
- debt: a company's outstanding liabilities, comparable to a bond or mortgage;
- royalty: a return on your investment, and a form of passive income.

All security tokens must comply with the legal rules set out by a regulatory body in each country. This ensures that all tokens are legal and secure, thus protecting the token holder's investment. Unlike most ICOs (which were start-ups without a proven business model and they frequently did not have any product on the market), many of the emotions associated with security tokens come from their ability to create tokenized digital asset-backed securities. Asset-backed tokens are based on established real resources. This means that they open up opportunities for investors to buy and trade those assets that were previously very difficult to access.

The possibility to create security tokens has a great potential and it may bring a number of benefits to investors and issuers alike. Table 1 presents the most significant benefits of issuing security tokens.

Table 1: Security tokens: benefits for issuers and investors

Investors	Issuers
Increased investment opportunities Easier access to global markets Regulated by law: greater security Transparency of transactions Liquidity: possibility to sell tokens on the secondary market No intermediaries Low entry threshold	Possibility to reach investors all over the world Increased liquidity through the possibility to split the underlying assets into smaller units Faster and cheaper transactions Wider opportunity to raise capital to finance investments Lower costs of raising capital compared to listing on a regulated stock exchange

Source: author's own study.

Market of Security Token Offering: current state

The popularity of ICO began to grow rapidly in 2017 and early 2018, which was influence of growing cryptocurrency rates and the ability to raise capital in a relatively simple manner. In 2017, ICO collected USD 6,226,689,449 (875 transactions). In 2018, this was USD 7,812,150,041 (1,253 transactions). This means an increase in the value of capital raised by 25.5%. However, by the end of August 2019, projects on the global ICO market raised USD 346 million in 88 issues. It seems that the value of the ICO market in 2019 may not exceed the barrier of USD 0.5 billion (*Funds raised in 2018*).

According to the report from the InWara analytical platform (*3 Reasons why Token Sales are raising less funds*), in the first quarter of 2019, the number of ICOs decreased by nearly 60% on a year-on-year basis. In 2018, the sale of tokens within ICO accounted for 94.85 per cent, while for STO this was 4.23 per cent. These shares significantly changed their proportions in 2019, as the sale of tokens within ICO accounted for 52.94 per cent and for STO: 10.08 per cent. It is worth adding that about 37 per cent of all tokens sold worldwide were IEO (Initial Exchange Offering), which may, apart from STO, replace ICO in the coming future. IEO is characterized by the fact that the sale of tokens takes place through cryptocurrency stocks, and not directly to investors, as in the case with ICO (*Executive Summary of InWara's Half-Yearly report - H1 2019*).

According to a report prepared by ICObench, the amount of funds raised in the first quarter of 2019 by ICO was about one billion dollars: half a billion less than in the last quarter of 2018 (*ICO Market Trends. ICObench*, 2019). In 2018, the ICO raised a total of USD 2.94 billion. This is related to two well-known ICO projects. The first is the Telegram, a project that raised USD 1.8 billion. The second one is a government project for the emission of the Petro Token in Venezuela, which is covered by natural resources, mainly crude oil. The amount collected was USD 5 billion. However, there is still controversy surrounding this project, especially as there was a violent change of power in Venezuela in January 2019.

It can be concluded based on the data presented above that the value of the ICO market is decreasing. To a certain extent, this is due to the reversal of the general trend in the crypto market. However, a very important reason for the problems with ICO is the loss of the reputation of this form of crowdfunding caused by numerous scams, which could affect up to 78% of the issuances (*Cryptoasset market coverage initiation: network creation*, 2018). These irregularities included forged documents for investors, false promises of profit or false data related to the managers. Inexperienced investors had no access to tools required for assessing such information. Furthermore, there is a persistent problem with hacker attacks.

Security Token Offering offers a response to these problems and the lack of trust in ICO. STO is a digital representation of real assets that can be admitted to trading on secondary markets after the creation of dedicated platforms. These in turn have to comply with regulatory requirements related to investor identification (know your client, KYC), anti-fraud and anti-money laundering (AML). Security tokens have built-in compliance mechanisms, the violation of which prevents any operation on such value tags. After all, they are smart contracts, i.e. computer programs that have clearly defined mechanisms of operation. In this way, conditions are created to ensure security both for issuers and investors. Needless to say, however, this depends on the legal regulations that are in force in a given country. Many countries have taken steps to adapt their laws to the changing conditions on the cryptocurrencies market and to guarantee security to the participants of this market. Table 2 provides examples of legal solutions in selected countries in the context of digital token trading.

Table 2: Exemplary STO jurisdictions in selected countries

Country	STO jurisdictions
United States	Regulator (SEC) generally regards tokens distributed via ICOs as securities, with the exception of cryptocurrencies. Howey Test is applied to determine securities (very broad application). Additional state regulation supporting STOs (e.g. Wyoming).
Germany	Regulator (BaFIn) regards cryptocurrencies in general as financial instruments. Regulator approved first German STO in Q1 2019.
Switzerland	Regulator (FINMA) distinguishes between asset tokens, utility tokens und payment tokens; asset token based ICOs can be considered as STOs.
Estonia	Regulator (EFSA) categorizes tokens: donations, utility tokens, security tokens. Token can be defined as security token, if it gives the investors rights in the issuer company or is tied to profits.
China	China has announced a ban on STO. Hong Kong Securities and Futures Commission (SFC) has announced a set of regulations for exchanges and STOs, opening the Chinese market to the benefits brough about by security tokens.

Source: author's own study based on 4-th ICO/STO Report, Strategy&pwc, 2019.

Favourable legal and economic conditions for the development of the blockchain technology and the issue of security tokens translate into the number of STOs conducted in particular countries. Chart 1 shows the percentage share of countries in the total number of STOs performed in the first quarter of 2019.

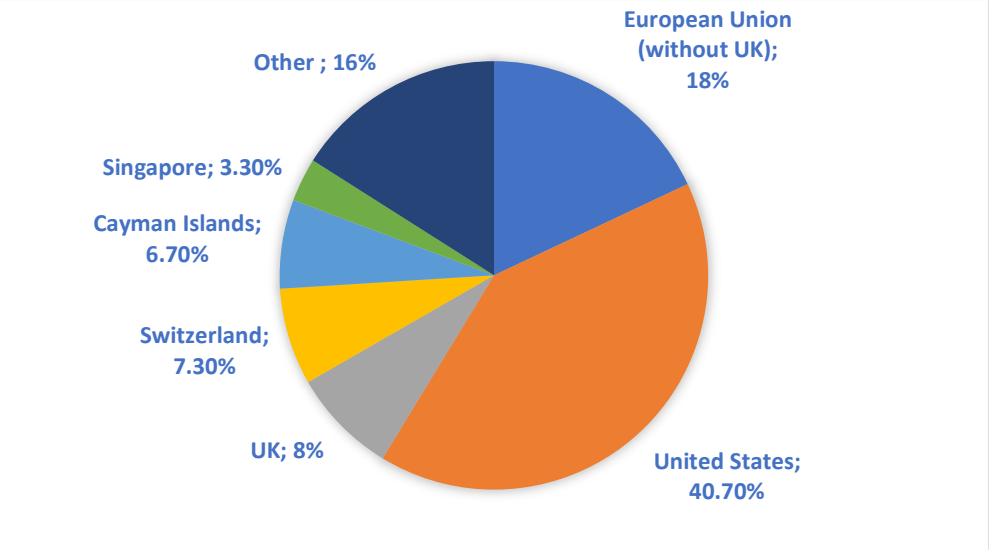

Chart 1. Participation of countries in the distribution of STO (Q1 2019)

Source: author's own study based on data from State of the Security Token Ecosystem: Part One – Security Token Offerings (2019).

As evidenced by an analysis by the STN Platform, the largest number of issues in the first quarter of 2019 were carried out in the US, accounting for 40% of all the issues. The European Union comes second in the world (excluding the UK) with 18%. The EU leader is the UK with the STO number

representing 8% of the total. Switzerland is also an important player on this market (7.3%). Another significant player in the global STO industry is the Cayman Islands, where 10 companies have decided to introduce their offers. Despite a relatively small population and economy, the absence of corporate tax and other business-friendly regulations, the Cayman Islands constitute a friendly centre for the development of STO (*The Security Token Ecosystem, STN*).

An important element worth noting is a very small representation of Asian countries (5.3% of the research sample). Paradoxically, the largest cryptocurrency exchanges: Binance, Huobi and OKEx operate in Asian countries. This is influenced by several factors. As The STN Platform analysis indicates, Asian countries still focus on ICO, and they invest in projects that classify their tokens as utility tokens. In conclusion, it can be stated that the increasing concentration of projects in certain regions is linked to the creation of the necessary legal framework for STO in order for it to become the main method for raising capital (*The Security Token Ecosystem, STN*).

One of the main elements of the STO ecosystem are exchanges where tokens are traded. In order to function, token exchange platforms need to obtain regulatory approval from regulatory bodies in connection with the management of STO and cooperation with the relevant authorities. Currently, there are many cryptographic exchanges in the world where security tokens can be traded. The STO market is mainly concentrated in North America and in Europe. This proves that the market is currently highly polarised between the two continents. The low share of Asia is mainly due to the lack of a favourable climate for the development of the cryptocurrencies market on this continent. Binance, one of the largest stock exchanges in the world, may serve as an example here, where 8 million users from all over the world are registered, and the average daily trading volume amounts to one and a half billion dollars. Shanghai used to be the original seat of the exchange, which then moved to Hong Kong and, finally, it moved to Malta. Malta has introduced a number of regulations aimed at attracting investors operating in the area of new technologies. Whether Asian countries will start catching up remains uncertain and this will depend on decisions on the part of those in power.

As the analyses of the token market indicate, the is a growing interest in STO. In 2017, ca. USD 22 million were raised in the framework of 2 STO issues. In 2018, 28 STOs raised USD 442 million. The biggest STO in 2018 was tZERO (i.e. a subsidiary of eCommerce giant overstock.com), which managed to raise USD 134 million in Q3 2018. From January to May 2019, a positive development of STO continued. The largest STO introduced in 2019 was BoltonCoin, which managed to raise ca. USD 68 million (*5-th ICO/STO Report*, 2019).

In second half of 2019, STOs did not experience any significant growth, but continued to strengthen their general scope/relevance in global crypto token offering sphere (6-th *ICO/STO Report*, 2020). In 2020, a further growth and an increased importance of this financing method is expected, provided that regulations related to the issue and trading of tokens are introduced.

Potential for STO

There is a growing interest on the part of investors around the world in digital assets due to a number of related benefits. Security Token Offering allows one to use digital solutions while complying with legal regulations. Many markets are implementing their own solutions in this area, aimed at efficient, but above all, secure use of the potential of security tokens. The growing popularity of STO, the emergence of new markets and the increasing value of capital raised for investment projects: they all prove an enormous potential of security token offering.

Instead of issuing paper certificates for equity, a small company, a start-up or even a corporation can tokenize its equity and make fractional ownership of the organization available to the public. This significantly increases liquidity while offering an opportunity of possessing micro-shareholdings in the company and a creation of completely new business models.

While financial markets are becoming increasingly complex, security token offerings constitute an alternative to traditional institutional investments. Their compliance with legal regulations reduces the

barrier of trust faced by ICO or traditional crowdfunding. In addition to this, companies can raise capital from the global community, including investors outside of financial markets or with a limited access to them.

STO also offers the possibility of tokenization of less liquid assets, such as real estate or works of art. Security tokens allow individual owners to sell shares in real estate and convert these into cash. Token holders may obtain capital gains from future cash flows resulting from the ownership of a part of real estate.

The same is true for works of art. Owing to security tokens, smaller investors have an access to valuable works of art in the world. An additional advantage is that both the issuers and holders of tokens do not bear any costs associated with the mediation, as they do when buying a work of art in auction houses (*Art Tokenization: What Is It? How Does It Work?*).

Another possibility of using STO is the music industry. STOs enable individual musicians to finance their projects and tours. Artists can offer tokens through platforms such as Soundeon. The holder of a token is entitled to a portion of royalties, intellectual property licenses and access to music (*Unlocking Value in the Music Industry*).

The potential of STO can also be used for charity purposes. Many charities face a lack of trust from the public. Blockchain transparency and the ability to track funds accurately will enable these organisations to act more openly. Token holders may be kept informed on how their funds have been used for the project that they have supported.

Sports betting market can also benefit from the potential of security tokens. By adopting the developing digital technology, betting markets can dramatically reduce fees, better organize the hierarchy of prizes and protect themselves against fraud.

Factors that have an impact on the development of STO market in the world

The potential of STO is wide. Its use is determined by a number of interconnected factors which may contribute to the dynamic development of the STO market, or which may constitute a barrier to its growth. Therefore, these factors may both constitute an opportunity and a threat to the development of this business model. On the basis of an analysis of the current state of the security token market, certain groups of factors can be distinguished which form this market. The groups of factors including their description are presented in Table 3.

Table 3. Factors that have an impact on the development of STO market

Factors	Description
Economic	State of the world economy Number of enterprises including start-ups Level of capital demand for enterprises Development of innovation Risk
Legal/organizational	Legal regulations that enable security tokens trading Introduction of global standards of token trading Adaptation of legislation to market requirements Cooperation between regulators, central banks, banks Development of market ecosystem to facilitate token trading
Social/educational	Level of investor confidence Knowledge of how to use the possibilities of blockchain technology, including the issue of security tokens
Technological	Blockchain technology development Access to the Internet Protection against cyber attacks

Source: author's own study.

One of the groups of factors that have an impact on the development of the STO market includes economic factors. The investment activity of entities in the financial market depends on the overall condition of the economy. This is also related to the development of innovation and the number of enterprises, including start-ups, and the demand on the part of these entities for capital. At the same time, it is worth emphasizing here that the number of participants involved in the security tokens market is determined by social and technological factors. In the case of social factors, trust on the part of investors is of a great importance because its level, after numerous irregularities in ICO and cyber-attacks on cryptocurrency exchanges, is currently quite low. The issue of tokens would not be possible without the existence of the blockchain technology. Therefore, its development determines the development of the token market. Furthermore, one of the benefits of the issue of tokens, both for investors and companies, is their availability. This in turn is linked to the wide availability of the Internet. An important factor that has an impact on the functioning of the entire market is the existence of national legal frameworks for tokens trading, as well as cooperation with regulators and central banks. The lack of legal standards prevents tokens trading. Therefore, it can be concluded that it is the lack of legal adaptations that constitutes the greatest threat to the issuance of security tokens and the development of this market. What is also required for smooth operation is an introduction of standards for security token exchange worldwide.

On the basis of the analysis of the security market conducted, its elements and logical inference, the author created a model of connections between those factors that determine the development of the market described herein. In the model, both factors and mutual relations between them are indicated.

Figure 1 presents a model of relations between the factors that determine the development of the STO market.

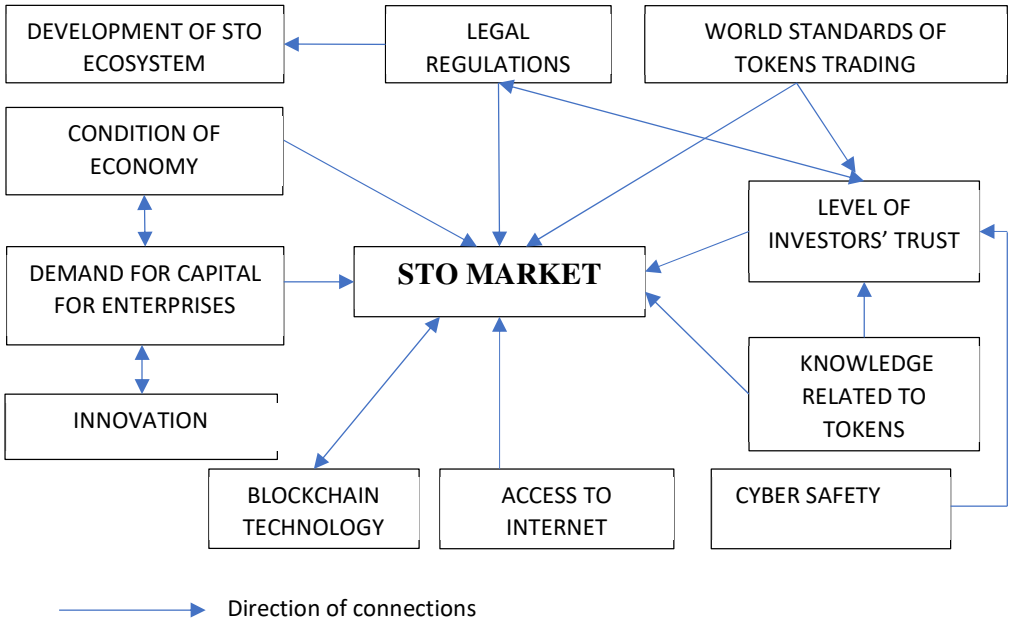

Figure 1. Model of relations between the factors that determine the development of STO market

Source: author's own study.

Challenges facing STO market

The ICO crisis should be treated as a stage in the evolution of cryptocurrencies. The development of STO is a consequence of decreased investors' confidence in ICO; hence, since 2019, a clear increase in the popularity and development of the Security Tokens Offering market has been observed worldwide. Although security tokens are promising both for investors and entrepreneurs, they have to overcome several challenges to become a permanent element of the investment portfolio and a source of project financing. Currently, STOs are available to accredited investors only. Table 4 presents the most important (in the author's opinion) challenges that are currently facing the STO market.

Table 4. Challenges facing STO

Challenges	Description
Introduction of legal regulations	For the safety of investors and companies, it is necessary to introduce legal regulations in individual countries. Many countries have already introduced such solutions, others are in the process of adapting the law, but still in countries such as China, Algeria, Ecuador or South Korea, token trading is prohibited.
Appropriate infrastructure for the global exchange of security tokens	In order for the market to function properly and efficiently, it is necessary to create an appropriate infrastructure. This will allow buyers and sellers to smoothly exchange security tokens around the world.
Building investor confidence	ICO anomalies have caused investors and companies to lose confidence in the issue of tokens. It is therefore necessary to restore confidence in new investment instruments.
Blockchain is a young technology.	Blockchain, owing to which STO is possible, is a new and still developing technology, with a variety of applications.

Source: author's own study.

Conclusions

Blockchain is yet another stage in the development of the Internet. Owing to its properties, such as accessibility, security through a distributed ledger and transaction transparency, a new possibility to raise capital for investment projects has been created by issuing tokens. Hence, the emergence of ICO. However, the irregularities related to the issue of utility tokens caused a loss of trust among investors and a collapse of the ICO market. The appearance of STO was a natural consequence of this crisis, as security tokens have the characteristics of securities, they are subject to legal regulations, meet all requirements related to them, and they reflect real assets.

The development of STO is strongly connected with an introduction of regulations related to cryptocurrencies trading and token emission. The largest number of emissions is observed in those countries where the regulatory framework for the functioning and development of cryptocurrency exchanges has been created. Switzerland appears to be a promising market, where the decision issued by the Swiss Financial Market Surveillance Authority (FINMA) came as a breakthrough in the issue of Security Token Offering. This decision authorized companies from the fintech category registered on the territory of that country to store deposits from raising funds in the amount of 100 million USD. In 2020, the Swiss SIX Digital Exchange announced the introduction of STO, while the Tokenstate platform announced that it had conducted the first digital transaction based on the Ethereum blockchain technology using Swiss francs.

The development of the STO market is determined by economic, legal, social and technological factors. Of all these, the most important factor seems to be the one related to legal regulations in a given country, as it determines the tokens trading. Apart from this, the introduction of legal standards has a positive influence the level of trust on the part of market participants and the risk related to investments in the STO market. The general condition of the world economy and investors' moods are also important.

Security Tokens are bringing fundraising to a new and, above all, more secure level. They solve the existing liquidity problems in connection with paper assets. In traditional financial institutions, many intermediaries are involved, which increases the time required for the transaction to be performed. Security tokens allow one to bypass these, which significantly speeds up the processes (e.g. the payment of dividends), and it reduces fees (no commission for intermediaries). It is automation that makes security tokens gain strength and become an attractive investment. Undoubtedly, this will be a challenge for the traditional financial market. However, this market is facing a number of challenges: an introduction of legal regulations adapted to technological changes, the necessary development of cryptographic market infrastructure or a restoration of trust of on the part of investors and enterprises. STOs constitute a certain bridge between the traditional world of finance and the blockchain technology, and they will certainly contribute to the development of the capital market.

The coming years will prove it whether the STO market can meet the challenges it is facing. It can be assumed that in the nearest future, the full potential of the blockchain technology will be revealed. STOs may appear to be a breakthrough in investing and raising capital, especially if those obstacles that limit a global adaptation can be overcome.

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Co-Creating Enterprise Innovation with Users of Social Media

Katarzyna SAMEK

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, katarzyna.samek@umk.pl, ORCID: 0000-0002-5519-8558

Abstract

Contemporary organizations should be aware that current users of social media have the potential to create and develop new innovative solutions, constituting a valuable tool for competing in the market environment. Information posted on social media is a unique source of innovation sourced from customers. Their use can take place at any stage of the innovation process. Enterprises can create crowdsourcing platforms to collect ideas at the stage of creating innovations, or improving products at the stage of innovation development, as well as test virtual products at the stage of launch. Getting ideas from social media users is not a simple task, however. Companies must create the conditions and incentives that will encourage users to co-create innovation, as well as take into account the risks associated with it. The specificity of social media is based on high interactivity and quick evaluation, which makes it difficult for companies to control the actions taken by users (Peters, Chen, Kaplan, Ognibeni, Pauwels 2013). This requires constant monitoring of the actions taken by social media users, especially in the innovation process. The key task of modern organizations is to encourage and monitor the actions of social media users to create innovation. The aim of the article is therefore to describe social media and the actions taken by clients in order to co-create innovation in enterprises. For this purpose, the Internet survey method was used. 356 social media users participated in the study. Research results show that customers accept the trend of co-creating innovation using social media. Few of the respondents, however, contribute to the creation of a new product / service offer using dedicated crowdsourcing websites. This suggests that enterprises should make better use of customers' potential in social media and encourage them to become more involved in the process of co-innovation.

Keywords: Social Media, Innovation, Business

Introduction

Modern enterprises face a huge challenge, which is to function and compete in a turbulent and changing market environment. The current ways of communicating with customers, their needs and preferences are either questioned or irretrievably passed. The offered products and services are constantly modified to meet new consumer expectations, and it is increasingly difficult to maintain a stable competitive position.

The experiences of leading companies on the market prove that the winners in the market battle are those companies that provide innovative products and at the same time respond to customer needs. Scientists and business representatives agree that the main task of modern enterprises is to constantly improve the products already offered and create new ones (Cushman, King, 1995). It is emphasized in the literature that innovations are changes consisting in the absorption of the knowledge obtained by an organization. Therefore, for companies aspiring to be innovative, an extremely important task is to constantly obtain information enabling the improvement of products and technologies, in accordance with the needs of the changing market and current technological trends (Sosnowska, Łobejko, 2007).

The rapid development of Internet services is an opportunity for companies which, striving to become competitive and innovative, focus their attention on new communication channels. Virtual communities are no longer passive members of the Internet. These communities more and more often begin to interact with business entities which, using the knowledge and experience of customers, create innovation (Hildreth, Kimble, & Wright, 1998).

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Customers are more and more often involved in the process of creating innovation, which is why the concept of co-creation was introduced to the subject of innovation. It is defined as the conscious involvement of the client in the design of a new product or modification of the current product (Tseng, Kjellberg, Lu, 2003). For this purpose, enterprises use social media, which gathers more and more users, i.e. potential customers, from year to year. They are an effective tool for obtaining information about consumer preferences and suggestions, improving the current or creating a new product offer. Currently, direct marketing is less and less effective, and online communities shape opinions about enterprises and the goods or services they propose.

The process of creating enterprise innovations with the participation of social media users

The traditional innovation process consists of several stages, from the idea of innovation to the launch of the finished product on the market.

W. D. Hoyer and others emphasize that **at the stage of generating ideas**, companies use social media in order to increase customer expenditure and the costs of acquiring ideas lower than in traditional methods (Hoyer, Chandy, Dorotic, Krafft, Singh, 2010). For example, netnography, which is used by companies, allows them to capture the attitudes, behaviors and needs of customers reported on social media. This allows you to get ideas and innovative solutions by reading the conversations of social media users. An example is the company Beiersdorf, which has collected the insights of social media users using netnography to find out what antiperspirant they need. Thus, the company found out that customers wanted an antiperspirant that leaves no stains on their clothes. Responding to the needs of consumers, Beiersdorf introduced the innovative Nivea Black & White deodorant (Bilgram, Bartl, Biel, 2011). At the stage of creating ideas for innovation, monitoring texts as part of the netnography method is an alternative way of collecting innovative ideas without actively involving customers. The information used in the innovation process is extracted by the company from informal texts and data posted on social media. On the other hand, organizing online competitions or crowdsourcing already requires active participation of social media users in the process of creating innovation. For example, American Express launched the "YourBuzz" application to collect customer feedback from media such as CitySearch, Yelp, Facebook and Twitter. Clients exchanged comments about the company. American Express, on the other hand, launched the "YourBuzz" application, from which it obtains customer opinions about the company from such social media as Facebook, Twitter and Yelp (Chan, Li, Zhu, 2015). A company may use various social media activities to generate ideas for innovation. Organize online contests to generate ideas or provide prototypes of products for testing for the purposes of innovation development. The literature lists proactive and reactive activities carried out by companies in social media. The first group is the creation of online competitions or word of mouth campaigns, and the second - media monitoring and data mining. Therefore, each company should define its range of possibilities in social media to ensure an efficient and effective innovation process (Roberts, Piller, Lüttgens, 2016).

At the stage of implementing innovations, awareness of the use of social media is key. H. Kim and D. M. Hanssens emphasize that the company's activity in social media before introducing innovations to the market is an effective form of advertising (Kim, Hanssens, 2017). It encourages potential users to search for these new products and triggers the phenomenon of viral marketing. In turn, once the innovation is implemented, social media allows companies to access feedback. At the same time, strengthening relations with the environment and increasing customer involvement in the activities of the organization.

At the stage of diffusion of innovation, social media such as wikis can create a space for the joint development of concepts, product prototypes. They enable active interaction and knowledge exchange between people. As a result, companies can develop their own design tools and use them effectively in product development (Cui, Wu, 2015). A relatively small number of contemporary companies use social media at the stage of development of the innovation process. Instead, it seems that many organizations at this stage rely on internal systems and closed networks within their own structure. For example, BMW uses the "BMW-Mini" wiki to personalize car designs by internet users and then post them on social media to gather feedback (Piller, Vossen, Ihl, 2015).

The relationship of social media and innovation

The relationship between social media and innovation is described in the literature. Table 1 presents selected authors of publications on innovations in which they emphasize the importance of social media.

Table 1: Social media and innovation - the approach of selected authors

AUTHOR	DESCRIPTION
H. Bugshan	Social media is an engine for online participation and free expression, and an economic source of open innovation
D. Roberts, F. Piller, D. Lüttgens	The use of information from social media can be beneficial for the development of new products and lead to a competitive advantage
A Androutsopoulou, Y. Charalabidis, E. Loukis	The characteristics of social innovation determine the degree of use of social media
F. von Briel	Social media can be a driver of innovation, but the success of its use is based on creating a social culture and employee readiness
H. Simula	Social media can help create innovation, but how much information a company should provide to its customers in the innovation process remains debatable
C. Laurell , C. Sandström	Social media can facilitate innovative activities in practice
W. Ooms, J. Bell, R. A. Kok	Social media is a tool that allows companies to improve their innovation capacity
J. Q. Dong, W. Wu	Social media enables the creation of open innovations, and allows organizations to take advantage of strategic management opportunities based on user-generated content

Source: own study based on H. Bhimani, A.-L. Mention, P.-J. Barlatier, Social media and innovation: A systematic literature review and future research directions, "Technological Forecasting and Social Change", 17 October 2018, p. 124.

There is also a typology of social media used by organizations for innovative activities in foreign literature. The first group of *Public Social Media* includes platforms such as YouTube, Facebook, Twitter and LinkedIn. They enable companies to communicate with customers and create a space for discussion about the company and products. In this way, organizations obtain feedback, which they use to improve products. The second group of *Company-built social media*, which includes platforms based on social functions developed internally by the organization. They are used to interactively use interactions (e.g. NASA @ work) or measure the perceptions of external users (e.g. IBM JAM, Dell IdeaStorm, etc.) (Guinan, Parise, Rollag, 2017). The third group consists of the so-called *Company-licensed social media* are proprietary solutions developed by companies that are usually used as an internal social media platform (e.g. IdeasProject, MS 365 Yammer). They enable employees to communicate internally and collaborate on projects. The last group consists of the so-called *Innovation intermediary social media*, represents organizations referring to specialized innovation tools, such as Innocentive, Get Satisfaction, etc., to create innovative services tailored to the needs, such as internal or external competitions on social media (King & Lakhani, 2013).

Social media is changing the way companies communicate with the internal and external environment. They are based on participation, creativity and low entry barriers. Thus supporting the process of creating innovation. There are two main approaches to using social media to drive innovation in today's organizations. In the basic approach, already innovative companies use them to obtain ideas to improve existing products and services or to develop new ones. Such organizations actively participate in the life of Internet communities, listen to and participate in online discussions (Nambisan, Nambisan, 2008). In turn, at an advanced level, companies adapt social media for internal use. They use Facebook groups for internal communication or build their own social media. For example, the IBM project "Innovation Jam" allows the company to transform the sources of ideas into new products and solve problems reported from its colleagues and partners (O. M. Bjelland, R. C. Wood, 2008).

The use of social media in innovation can take many forms. It can be creating ideas, broadcasting information, creating a communication forum, tracking trends, motivating and collaborating users to

participate in the company's activities. The purpose of all these activities is to collect and analyze information from the stakeholders who make up the social media environment. Choosing the right type of social media depends on the complexity of the information sought. It can therefore be assumed that organizations deliberately use various types of media to obtain rich and diverse sources of information.

Co-creating innovation of enterprises with users of social media - selected research results

Methodology

Data on the co-creation of enterprise innovations by users of social media were obtained as part of a survey with the use of a questionnaire. Due to the specificity of the studied phenomenon - the general availability of social media - the spatial extent of the study was not defined. The study covered 1,500 people from closed groups of social media users, of which the feedback was 4.21%, in the number of 356 correctly completed questionnaires. Moreover, it was assumed that only people using social media would take part in the survey. For this purpose, a convenient method of sample selection (from the group of non-random methods) among 356 women and men was used. Microsoft Excel 2016 spreadsheet was used to analyze the data obtained from the study. In the future research will be continued using a more extensive research methodology.

The population covered by the study was homogeneous in terms of age (it is almost entirely composed of people aged 19-35), with a vast majority of women (69.40%) and people with secondary education (56.50%). The average user of social media is therefore, in the light of the obtained empirical material, a woman aged 19-35 with secondary education. This social media user profile is taken as the essential benchmark for further analysis. In addition, the specificity of social media allows us to say that they are mainly used by young people, aged 19-35. This justifies such a large representation of this age group in the sample covered by the study.

Before identifying the actions taken by users in social media to create innovation in enterprises, the types of media they use were analyzed. The list of social media in which the respondents declared their activity along with its frequency is presented in Table 2. In order to determine the frequency, a 5-point scale was used, the individual categories of which meant, respectively: 5 - very often, 4 - often, 3 - sometimes, 2 - rarely, 1 - very rarely, 0 - never. A median value was also determined for each value in the generic group. This allowed us to see what and to what extent it is preferred: the higher the median value, the clearer the preferences, the smaller - the more blurred and dispersed. More than one answer could be chosen.

Table 2: Average frequency of using social media by the surveyed users

SOCIAL MEDIA (SM)	AVERAGE FREQUENCY OF SM USE BY USERS (scale 1-5, where 0 - never 5 - very often)
Facebook	4
YouTube	4
Instagram	3
Wikipedia	3
Google+	2
Snapchat	2
Chats	1
Forums	1
Myfiles	1
Pinterest	1
Bank of Ideas	0
Blip	0

Blogger	0
Blogspot	0
Blox	0
Dailymotion	0
GoldenLine	0
Linkedin	0
Myspace	0
Picasaweb	0
Tumbrl	0
Twitter	0

Source: own study

Among the various social media, the respondents often (4) use Facebook and YouTube. Sometimes (3) from Instagram and Wikipedia. As for other social media, respondents rarely (2) use Google+ and Snapchat, and very rarely (1) use Pinterest, chats and internet forums. However, they do not use (0) such social media as: Bank of ideas, Blip, Blogger, Blogspot, Blox, Dailymotion, Flickr, GoldenLine, Linkedin, Myspace, NaszaKlasa.pl, Picasaweb, Tumblr, Twitter and Wordpress.com.

Later, the main issue of the activity that users undertake in social media in relation to co-creating innovations of enterprises will be discussed. This activity was divided into two groups:

1. Activities undertaken by enterprises in social media aimed at users of these media aimed at using their ideas to co-create innovation (Table 3).
2. Actions taken by users of social media on their own initiative that can be used by enterprises to co-create innovation (Table 4).

Table 3: Activities undertaken by enterprises in social media aimed at users of these media aimed at using their ideas to co-create innovation

ACTIVITIES UNDERTAKEN BY ENTERPRISES IN SOCIAL MEDIA AIMED AT USERS OF THESE MEDIA AIMED AT USING THEIR IDEAS TO CO-CREATE INNOVATION	PARTICIPATION OF SOCIAL MEDIA USERS	
	n	%
Reacting to company posts (e.g. using the buttons "I like it", "great", "ha ha", "I'm sorry", "wrr")	68	19,1
Share company posts with friends	38	10,7
Active participation in competitions organized by enterprises	35	9,8
Reporting product defects	34	9,6
Report product benefits	34	8,7
Active contact with company employees (e.g. reporting problems via Facebook Messenger, chat, etc.)	23	6,5
Reporting willingness to test products of enterprises	21	5,9
Reporting opportunities to improve marketing activities	9	2,5
Reporting product improvement opportunities	8	2,2
Active participation in crowdsourcing websites of enterprises	5	1,4
Reporting opportunities for improvements in ongoing business processes (e.g. customer service)	4	1,1

Source: own study

The results of the survey show that a small proportion (21.9%) of the surveyed users of social media participate in activities undertaken by enterprises in these media aimed at using their ideas to co-create innovation. Significantly more respondents (78.1%) do not participate in this type of activity. Users who engage in pro-innovation activities carried out by enterprises in social media show their activity

mainly in responding to company posts (19.1%), sharing company posts with friends (10.7%), and actively participating in competitions organized by enterprises. The smallest number of social media users surveyed reported to the company the possibility of improvement in their business processes (1.1%). It is noteworthy that only 1.4% of users actively participate in crowdsourcing websites of enterprises, which means that the use of this tool in the process of creating innovation is not very popular. This may result from the fact that most enterprises still create innovations in a "top-down" manner, relying solely on the knowledge and skills of their employees. To a small extent, using external ideas, tips or ideas inherent in social media.

Contemporary users of social media also take their own initiative to co-create innovation. Consequently, Table 4 shows the own-initiative actions taken by social media users that can be used by enterprises to co-create innovation.

Table 4: Actions taken by users of social media on their own initiative, which enterprises can use to co-create innovations

ACTIONS TAKEN BY USERS OF SOCIAL MEDIA ON THEIR OWN INITIATIVE, WHICH ENTERPRISES CAN USE TO CO-CREATE INNOVATIONS	PARTICIPATION OF SOCIAL MEDIA USERS	
	n	%
Posting your own opinions, recommendations and reviews of products / services	126	35,3
Like company fanpages	77	21,6
Observation of company fan pages	60	16,9
Evaluating products (e.g. using the so-called "stars")	58	16,3
Posting information that enables the improvement of marketing activities	43	12,1
Responding to the company's activity	36	10,1
Posting information about preferences and shopping needs	11	3,1
Post solutions to problems related to the use of products	6	1,7
Posting information that enables the improvement of ongoing business processes	5	1,4

Source: own study

The most common activities undertaken on their own initiative by social media users to co-create innovation include:

- posting own opinions, recommendations and reviews of products / services (35.3%),
- liking the company's fan pages (21.6%),
- monitoring company fan pages (16.9%).

The smallest number of users publish information that enables the improvement of their business processes (1.4%).

Discussion

Research shows that customers accept the trend related to co-creating product innovations in social media and undertake various activities in this area. Most of them post their own opinions, recommendations and reviews about products or services. Few of the respondents, however, contribute to creating a new product / service offer, for example through crowdsourcing websites. This suggests that companies should make better use of their clients' potential in social media and encourage them to become more involved.

Today's social media businesses demonstrate top-down communication, which means conveying certain content to buyers. However, the presence of companies in social media cannot be based only on the exchange of information, but should be based primarily on gaining opinions and ideas. Therefore, organizations should focus less on creating controlled messages, and more on creating

online communities whose members freely exchange opinions about products and services, as well as willingly co-create innovative solutions.

However, it should be hoped that the experiences of leading companies will be an example for other companies of how to effectively use social media in creating innovations, and that a new phenomenon - social media marketing - will be discovered by an increasing number of marketing specialists. The task of modern companies is to make social media users aware of the role they play in the development of their organization. They must not forget about encouraging customers to conduct pro-innovation activities in social media. Clients and users of social media must perceive themselves not only as the recipient of enterprise innovations, but also as their co-authors. Customers decide about the success of innovative solutions.

Summary

Due to the dynamics of changes in both domestic and international markets, modern companies are required to function flexibly, react quickly to changes, and above all, an innovative approach to management. Organizations that base their competitive position on stability, do not respond to market changes, do not provide innovative solutions, have no chance of market success. Permanent observation of the market, quick reaction to changes and delivery of innovative products and / or services are a must today. Such activities bring the company many benefits. However, changes must be implemented and approved by employees. Innovations often affect changes in the organizational structure of the company. The involvement of employees, their mobility and flexibility significantly affects the effectiveness of the introduced changes and the company's market position. The level of the company's competitiveness depends on the activity and courage of an enterprise in introducing innovative, innovative ideas.

In the era of globalization and increased competitiveness, the ability to create innovation becomes the main condition for the success of an organization. Most modern companies recognize, and others seek to recognize innovative activities as a fundamental issue. Innovations increase the attractiveness of products and services, which entails an increase in sales, and this in turn determines the competitive position of the company.

Modern models of mass collaboration differ from the existing ones. More and more companies are open to cooperation with customers. For this purpose, they transfer their problems, ideas and activities to the virtual world. The analysis of the research results obtained in the course of this study allows us to identify several solutions for enterprises. Their use will allow organizations to take advantage of the opportunities offered by social media in creating innovation. The following tips should be indicated:

- Organizations aspiring to be innovative should "listen" to their clients who are present on social media. Users, feeling a certain anonymity, signal problems related to the use of a given product or the operation of a given company, as well as indicate market needs and expectations. These are the key issues in creating innovations that every company should take care of - catch these problems and try to solve them. In this way, the company, acquiring the knowledge of customers, is able to better match the shape, functionality, usability of new products or services to market needs. The information obtained in this way can be used by the company to create innovations within the product;
- Companies should be aware that through their activity in social media they acquire new customers who constitute a new source of ideas and information for them to create innovations
- A company conducting pro-innovation activities in social media should not focus only on one age group of its recipients. It is worth reaching younger users with the message and advertising. Young people more often than older people know what is popular on the market, what products are popular, what activities of companies are the most desirable, and finally what innovations they would like to be available to them. This is valuable knowledge for any company. The key is to encourage the young generation to take actions aimed at co-creating innovation in a given enterprise. In this context, it is important to adapt the form of communication to the appropriate age group. However, this does not change the fact that in

order to obtain the so-called Feedback from social media users must encourage them to do so and demonstrate creativity that will stand out from the competition. An effective solution here are prizes, gadgets, products to be tested, which are handed over to customers in return for the ideas submitted.

– On the one hand, the widespread use and growing popularity of social media bring benefits to companies, but on the other hand, the abundance of information makes it difficult to extract the information that is important in creating innovation. On social networking sites, customers are eager to share their opinions on products and services of various companies. Often, these opinions provide guidance on what needs to be improved, improved or implemented. A company that captures such information in time can deliver innovation to the market in line with customer needs, and at the same time strengthen its position on the market. It is therefore necessary to constantly monitor social media. The use of solutions such as Brand24, Squarelovin, Sotrender, Social Blade, SentiOne or Google Analytics facilitates constant monitoring of the content posted by social media users. These tools allow you to analyze statistics on any brand and provide tips and recommendations in the field of company activities in social media. In the context of creating innovations, this data provides the company with information on whether the introduced innovation is popular with potential recipients or requires some improvement.

Many modern enterprises treat social media only as an effective marketing tool (for promotion, for communication with clients). They are rarely seen as an instrument for creating innovation. On the Internet, there are invaluable amounts of knowledge, information and tips that can be successfully used in designing a new or expanding the current product offer. It will be an innovative and competitive enterprise that sees this information and the innovative potential of social media sooner than its competitors. In order to achieve this, the company must know not only the mechanism of operation of these media, but also know how to monitor the content posted on them. It is necessary here to constantly expand knowledge in the field of new technologies by employees responsible for marketing and innovation. The modern, highly competitive market is characterized by social media monitoring tools. The competitive position of an organization depends not so much on the awareness that such tools exist, but on their effective use.

Due to the fact that social media is a phenomenon that has only gained popularity in the last few years, there is a lack of scientific studies devoted to social media in business. These topics are so far only a small part of scientific publications on the Internet and Internet marketing. However, it is hoped that the examples of large companies will become an inspiration also for smaller entities that will learn to successfully use new possibilities of communicating with customers and obtain valuable information from them, which is carried by social media.

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Consumers, Are You Ready to Accept Blockchain Technology In Purchasing Food?

Helen WONG
College of Professional Continuing Education, The Hong Kong Polytechnic University, Hong Kong, helen.wong@cpce-polyu.edu.hk

Carmen SUM
College of Professional Continuing Education, The Hong Kong Polytechnic University
Hong Kong, carmen.sum@cpce-polyu.edu.hk

Hau-ling CHAN
College of Professional Continuing Education, The Hong Kong Polytechnic University
Hong Kong, ling.chan@cpce-polyu.edu.hk

Abstract

Manufacturers and retailers of the food industry in Hong Kong are adapting their businesses to the disrupted market triggered by the coronavirus pandemic, social and political issues, economic recession, and trade tensions. The adoption of blockchain technology is revealed as a breakthrough to transform the food industry for serving the market with new consumption behaviours and adjusted supply-chain practice. Industry giants like Nestlé and Walmart are utilising the blockchain technology to improve business performance, while consumers' acceptance of using the blockchain-enabled application in purchasing food is not yet known. This conceptual paper aims to explore literature and propose a conceptual model related to consumers' acceptance of blockchain-enabled applications in purchasing food to address this research gap. Combining the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT), social influence and self-efficacy are proposed to determine consumers' intention to use the blockchain application with perceived usefulness and perceived ease of use as the intermediating variables.

Keywords: blockchain, food market, TAM, UTAUT

Background

Hong Kong business market is facing a tough situation owing to COVID-19 outbreak, social unrest, China-US trade tensions, global financial recession, and political uncertainty. The retail sales are expected to shrink 19.7%, approximately HKD 346 billion, for the full year of 2020 (PricewaterhouseCoopers, 2020). According to the statistics released by Census and Statistics Department (2020), the value of total retail sales for the first six months of 2020 dropped by 24.8% compared with the same period of last year. The sales of medicines and cosmetics had the most significant drop of 57.4% and followed by jewellery and luxury goods (-56.5%), books, newspapers, stationery and gifts (-41.3%), footwear and clothing accessories (-39.7%), wearing apparel (-38.8%), as well as food, tobacco, and alcoholic drinks (-13.%). However, there are segments showing resilience. The sales of commodities in supermarkets (+4.5%), fuels (+8.4%), and furniture and fixtures (+0.3%) recorded a slight increase in the same period.

Although the market was disrupted, new consumption behaviours and supply chain practice evolved that open up new opportunities and plans for food retailers. Consumers shifted their shopping practice from brick-and-mortar stores to online shops (PricewaterhouseCoopers, 2020). They have more expectations on the purchase experiences than before, and this change will become permanent. Also,

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the supply chain has been reconfigured to apply dual or multiple channels in response to the supply chain disruption. Some manufacturers and retailers also integrate the C2M (customer to manufacturer) model into physical channels to meet customer demands. Online and social channels are used to facilitate transactions with ultimate customers.

The market disruption and behavioural change ignited food retailers' transformation towards digitalisation to catch up with the emerging trend (Xiao & Fan, 2020). Manufacturers and retailers are heading to different recovery and revitalisation strategies to restart their businesses, and that directed the spotlights on the use of blockchain technology. Nestlé and Walmart are embracing blockchain technology to improve operational costs and efficiency, transaction speed and transparency, as well as data security and trust (Castillo, 2020). However, are customers ready to accept the blockchain technology or its application when purchasing food? Lian *et al.* (2020) raised the perception gap existed between service providers and consumers, and that deserved further investigation. Consumers' acceptance of using blockchain application in the food industry has not yet been covered in the literature. This conceptual paper intended to explore the literature about consumers' acceptance of blockchain technology, and then propose a conceptual model to measure their acceptance of blockchain-based applications in the food retailing sector.

Literature Review

Blockchain Technology

Blockchain technology is a distributed ledger. It was first created by Satoshi Nakamoto for the cryptocurrency network (Reiff, 2020). It began with the digital currency, Bitcoin, in October 2008 (Clohessy & Acton, 2019). Its second generation was applied to assets and trust agreements – smart contracts. This idea was initiated by Ethereum, which was a blockchain-based software platform. The coming generation of blockchain will focus on scaling and address the problems in transaction process times and bottlenecking (Reiff, 2020).

Blockchain could be categorised as public, private, and permissioned blockchains (Seth, 2018). A public blockchain has a self-governed, decentralised, and authority-free nature. It is open to everyone to join, leave, read, audit, and contribute to the blockchain network. Bitcoin is an example of the public blockchain. A private blockchain is a closed network with an authentic and verified invitation that is available for selected and trusted parties. The owner of the blockchain has the rights to edit, delete, or override the entries on the blockchains. The last one is permissioned blockchain, which allows anyone to join after verification of the identity. Each participant will be granted designated permissions to perform certain activities on the network. For example, suppliers could manage a permissioned blockchain for its business partners and customers with different access rights. Wholesalers and retailers are permitted to access and edit information about the products and distribution while customers may be granted to read product information only.

Blockchain Technology for Food Retailing

Every food product has a story from birth to consumption. Blockchain technology enables the traceability, certifiability, verifiability, and trackability of food products (Montecchi *et al.*, 2019). These blockchain capabilities enhance the transparency of provenance and supply-chain information for food products (Edwards & Strathcole, 2020) and minimise customers' perceived risks in transactions (Montecchi *et al.,* 2019). Payment and loyalty programme could be facilitated as well (Baird, 2019; Bryanov, 2019).

The origins and supply chain histories of foods could be traced and revealed without faults (Montecchi *et al*., 2019). Suppliers, channel partners, and consumers could trace the food journey about the origin, the processing stages and handlers, and other supply chain information, which instil confidence in the products and transactions among trade partners and the ultimate consumers (Accenture, n.d.). More information about the foods, for example, fair trade, environmental initiatives, potential allergens, and

specific ingredient could also be accessed in an easy way (Accenture, n.d.). Ultimate consumers can get accurate product information to facilitate their purchase decision. Perceived financial risks could be minimised (Montecchi *et al*., 2019).

Moreover, blockchain technology allows for certifications and verifications (Montecchi *et al.*, 2019). Its digital ledger record could certify the authenticity and integrity of goods, which offers an anti-counterfeiting solution for food products. Under the permissioned setting, some permitted parties could add or edit the information on certifications while some other parties like retailers and consumers could only access the certificate information. This function could avoid any unauthorised changes and ensure the information validity. To the manufacturers, the food quality is affirmed while the brand image is enhanced. This verification system also allows them to differentiate from those without such a system. To the customers, they could avoid fraud and counterfeiting goods. It could ease their decision-making process. Customers' perceived psychological, physical, and social risks could be reduced (Montecchi *et al*., 2019).

When blockchain technology is used, product custody could be tracked and assured (Montecchi *et al*., 2019). The food quality, storage and delivery information are revealed along with the supply chain process. Consumers can easily access provenance knowledge, like faulty logistics and transportation and improper product storage, which reduce the performance risks in their purchase (Montecchi *et al*., 2019). To suppliers, they could rely on the information to evaluate the quality of intermediaries and determine the partnership or cooperation in the future. The corporate image of suppliers could be enhanced.

Blockchain technology could also facilitate transaction payment with cryptocurrencies without any intermediaries and enhancing customer experiences and loyalty with a more flexible loyalty programme (Baird, 2019; Bryanov, 2019). Blockchain is safe and secured to provide the above functions, provided that no more than 50% of blocks are controlled by one group of miners (Binance Academy, 2020).

Development of Conceptual Model and Research Propositions

Research Gap

As a kind of technological innovation for different industries, blockchain technology is receiving more focus in the literature. Related research is lacking, and scholars are asking for more investigation, for example, further empirical validation (Grover *et al.,* 2019), additional constructs or drivers (Albayati *et al.,* 2020; Knauer & Mann, 2020), supplier and consumer perception gap (Lian *et al.,* 2020), different samples (Lee *et al.,* 2019; Queiroz & Wamba, 2019), analytical research (Nuryyev *et al.,* 2020), updated study to address the innovation diffusion stage (Lian *et al.,* 2020), and the inclusion of more factors for the retail industry (Miraz *et al.,* 2020). Given the above gaps, we suggest focusing on the food retailing sector and address essential drives in the acceptance model.

Research Scope

We propose to study the blockchain application in the food retailing sectors, including fruits, meats, dairy, and vegetables. They are necessities that consumed daily. More product information could minimise consumers' perceived risks, facilitate their decision-making process, and enhance their satisfaction and repurchase intention. Blockchain technology could take an essential role in the food business. It facilitates the traceability, certifiability, verifiability, trackability and payment of food products. Although some corporations and brands are using blockchain technology in business, there is a need to examine consumers' acceptance of blockchain application in purchasing food (Miraz *et al.,* 2020).

Conceptual Model & Research Propositions

In the information system research, technology acceptance model (TAM) developed by Davis (1985) was mostly used. It received significant support in its simplicity, generalisability, and validity across domains and technologies (Nuryyev *et al.*, 2020; Turner *et al.*, 2010). TAM had been adopted to examine the acceptance of blockchain technology with reliable support in its model fit and explanatory power at both end-user and supplier levels in the literature (e.g. Albayati *et al.,* 2020; Francisco & Swanson, 2018; Kamble *et al.* 2019; Lian *et al.*, 2020; Nuryyev *et al.*, 2020). It has four core constructs: intention to use, attitude towards technology, perceived ease of use, and perceived usefulness (Davis, 1985). Different factors were to have a significant effect on perceived ease of use and perceived usefulness of blockchain technology or its application. Examples included social influence (Albayati *et al.,* 2020; Nuryyev *et al.*, 2020), Individual-technology fit and task-technology fit (Lian *et al.*, 2020), innovativeness (Nuryyev *et al.*, 2020), subjective norms (Kamble *et al.* 2019), and self-efficacy (Nuryyev *et al.*, 2020). The effect of some other factors was absent in blockchain research, for instance, perceived safety and network externality (Lian *et al.*, 2020), discomfort and security (Kamble *et al.* 2019).

Another popular model used in predicting the adoption of blockchain technology is the unified theory of acceptance and use of technology (UTAUT). It was formulated by Venkatesh *et al*. (2003) through unifying eight information system acceptance models in research. It contains one dependent variable (use behaviour) and one intermediating variable (behavioural intention), and four predictors (performance expectancy, effort expectancy, social influence, and facilitating conditions). Its performance expectancy overlapped TAM's perceived usefulness, whereas its effort expectancy equals to perceived ease of use (Venkatesh *et al*., 2003). Social influence corresponds to the social image, social factors, or subjective norms. Facilitating conditions imply perceived behavioural control, self-efficacy, or compatibility. The path relationships and model fit derived from UTAUT in blockchain research received mixed support. Some of the UTAUT predictors were considered as the antecedents of attitude and behavioural intention of the TAM in other blockchain research.

Considering the generalisability, reliability, and validity of TAM and UTAUT in blockchain research, we propose to combine these two models to explore consumers' acceptance of blockchain technology in the food industry with internal and external predictors (Figure 1). The interrelationships among perceived usefulness, perceived ease of use, and behavioural intention will be examined, following the study of Nuryyev *et al.* (2020). The following research propositions are proposed:

P1: Consumers' perceived usefulness positively influences their intention to use the blockchain application.

P2: Consumers' perceived ease of use positively influences their intention to use the blockchain application.

P3: Consumers' perceived ease of use positively influences perceived usefulness of blockchain application

Secondly, two antecedents are proposed to predict consumers' acceptance of blockchain application – social influence and self-efficacy. Social influence is an external factor (e.g. peers or people surrounding) that drives consumers to adopt new technology. It interchanges with subject norms and social image. Its effect on perceived usefulness was mostly supported across studies using TAM or UTAUT, for instance, Albayati *et al.* (2020), Kamble *et al.* (2019), Nuryyev *et al.* (2020), and Queiroz & Wamba (2019). Another predictor is self-efficacy, which is an internal factor about an individual's belief in their ability to use new technology (Nuryyev *et al.,* 2020). It equals to facilitative conditions or behavioural control, which has been considered as the direct predictor of behaviour intention in UTAUT. However, mixed findings were reported in blockchain research, no matter TAM or UTAUT was used. Self-efficacy was found to have a strong effect on perceived ease of use (Nuryyev *et al.*,

2020) while its influence on behavioural intention was weaker (Kamble *et al.,* 2019; Queiroz & Wamba, 2019). We propose to measure the effect of self-efficacy on perceived ease of use. The following two research propositions are presented:

P4: Social influence positively influences perceived usefulness of blockchain application

P5: Self-efficacy positively influences perceived ease of use of blockchain application

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On the State of The Social Security System in Greece in 2020 And Projections of The Strength of The Merged Social Security Funds After the Economic and The Health Crisis of Coronavirus

Christos C. FRANGOS
Ph.D., Head of the Panhellenic Institute of Quantitative, Social, Biomedical and Economic Issues, Athens,Greece
E-mail: christos.frangos@gmail.com

Konstantinos C. FRANGOS
Medical Doctor, Ph.D., University College Hospital NHS Foundation Trust, London, U.K.
E-mail: C.C.Frangos@gmail.com

Panagiotis PLAKUDAKIS
Bank of Greece, A.E., Athens, Greece
E-mail: pplakudakis@bankofgreece.gr

Panagiotis EVANGELOPOULOS
Assistant Professor, University of Peloponnese, Dept. of Economics, Tripolis, Greece
E-mail: panevans@uop.gr

Abstract

In this paper we review the state of the Social Security system in Greece in September 2020, after the economic crisis and during the health crisis of coronavirus. **A**. The major reforms to the Social Insurance System were initiated by the Laws **4387/2016 and 4670/2020.**The above Laws are important and need to be analyzed because International assignees, their assignment program managers and their international tax service providers need to take note of these important changes, which will impact the administration of social security in Greece. **B**. More specifically, the new rates and thresholds may raise international assignment costs as a greater number of employees are now part of the Social Security "net" and employees and employers may be subject to higher contribution rates**. C.** We present the functions of the Unified Social Security Fund, named **"E.F.K.A."** and the Unified Supplementary Insurance and One-Off Benefits Fund, named "**E.T.E.A.E.P**." **D**. Furthermore, we compare the countries which belong to the Organization for Economic Cooperation and Development (OECD) with respect to two important and internationally recognized measures for the depth and intensity of Social Policy. The measures which we use are the following: **Net Pension Replacement Rate (NPRR) and Gross Pension Wealth (GPW).**

Keywords : Social Security System ,Greece, Coronavirus

Introduction

Greece's *Law 4387/2016* has reformed the country's social security system. It has streamlined the system and its very disparate programs and introduced a number of new concepts. Furthermore, the new law expands the application of insurance coverage to other areas of compensation and imposes *revised contribution rates*. It also attempts to defer some contributions to the future. Because of the extent of the changes, there remain a number of uncertainties that we expect will be clarified through the issuance of Ministerial Decisions.The new Social Security funds,introduced by Law 4387/2016 are presented in the sequel.(See KPMG)

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Unified Social Security Fund (E.F.K.A.)

A new Social Security fund is established, the "Unified Social Security Fund" (E.F.K.A.). As from 2017 it has absorbed the existing main social security funds (i.e., I.K.A. – E.T.A.M., E.T.A.P. – M.M.E., E.T.A.A., O.A.E.E., etc.).

Unified Supplementary Insurance and One-Off Benefits Fund (E.T.E.A.P.)

The existing "Unified Supplementary Insurance Fund" (E.T.E.A.) is renamed "Unified Supplementary Insurance and One-Off Benefits Fund" (E.T.E.A.P.).

New Common Registry

A Common Registry is to be established for all persons and entities that are liable to pay both social security contributions and taxes. The Registry will provide for common policies for registration, filing, payment and the issue of certificates of payment.

Social Security Contributions: Base and Rates

Fixed amount of Renumeration Included in the Base

Employee renumeration of any type, excluding extraordinary benefits of a social nature (wedding, birth of children, death, and severe disability benefits) and up to a stated ceiling (see below), is subject to social security contributions.

As of the publication of the law, the maximum monthly remuneration (ceiling) which is subject to insurance contributions of any type is limited to ten (10) times the basic employment salary of a non-married employee of over 25 years of age.

Therefore, the current ceiling is now increased to EUR 5,860.80 from EUR 5,543.55 per month.

However, due to uncertainty in the law, it appears that the basis of calculation for the health element of social security contributions might not be limited to the above ceiling.

Individuals/Employees Covered

In accordance of the law, the following categories of people and earnings are covered, for the first time, under the provisions governing "earned income from employment":

- managers, general managers, managing directors, or cooperating board members, administrators of companies or cooperatives.
- members of Boards of Directors.
- salaried lawyers, irrespective of the year they were insured,
- insured persons who, until the entry of the law in force, were insured with E.T.A.A. and are employed by virtue of an employment agreement (for instance, engineers, doctors), irrespective of the year they were insured,
- self-employed persons paid on the basis of invoices issued for their services to one or two clients (it is not clear from the law how this provision will be applied in practice).

Contribution Rates

Main Pension Contributions

All the above employees and professionals are subject to the main pension contributions of 6.67 percent of their total remuneration as defined above, plus 13.33 percent paid by the employer.

Supplementary Pension Contributions

- As of 1 June 2016 and until 31 May 2019, the supplementary pension monthly contributions rate is set at 3.5 percent for the employee and 3.5 percent for the employer calculated on amounts as above described.
- The above rates are reduced to 3.25 percent and 3.25 percent respectively as of 1 June 2019 and until 31 May 2022, and thereafter at the rates in existence at 31 December 2015, i.e. 3 percent each.
- The above supplementary pension rates can be reduced during the six-year period from 1 June 2016 to 31 May 2022, by a decision of the Ministry of Employment, Insurance and Social Solidarity depending on the level of collectability achieved.

Health Care Contributions

Health contributions for employees and other categories insured with E.O.P.Y.Y. are set at 7.10 percent of the remuneration of any nature, with 4.55 percent being borne by the employer and 2.55 percent being borne by the employee. The E.O.P.Y.Y. is the National Organization for Healthcare Provision, which resulted from the unification of most of the health-care funds in Greece, including the Private Employees' Fund (I.K.A.), the Farmers' Fund (O.G.A.), the Public Employees' Fund (O.P.A.D.), and the self-employed/Entrepreneurs' Fund (O.A.E.E.). The E.O.P.Y.Y. furnishes health services to participating members, pensioners, and their registered dependents.

One-off Benefit

As of 1 January 2017, the one-off benefit contributions payable by insured persons who were insured as of 1 January 1993 and after to funds to be absorbed by E.F.K.A. will be set at 4 percent of the employees' remuneration subject to insurance and of the net taxable income of the self-employed individuals. No employer's contributions are envisaged.

The contributions of persons insured before 1 January 1993, continue to be regulated by the provisions of the original funds absorbed by E.T.E.A.P., as long as they provide for such a benefit.

Consequences of implementation of Law 4387/2016

According to Mouratidou(2019),the implementation of Law 4387/2016 is a severe step backwards which inhibits people from being optimistic about the future of social security in Greece,for the following reasons:

(a). Law 4387/2016 has introduced the establishment of the Unified Social Insurance Institution (EFKA).

(b). It also changed the pension system from "pay as you go" to a "funded" pension scheme based on individual accounts from 2002 onwards. However, the earnings of prospective pensioners have been shrinking since after the

onset of the crisis. This means that in the future the pensions will be very low.

©. This Law also sets the gradual abolition of the Social Solidarity Pension Allowance (EKAS) and repeals it in full from those who retired after its enactment. EKAS was granted to support pensioners with low income (Law 2434/1996). The abolition of this allowance is expected to have negative impact on those pensioners.

(d). This Law also includes harsh limitations on survivors' pensions.National pension amounts to €384.00 but it is reduced proportionately for those who have not completed 20 years of insurance throughout their working lives or for those residing in Greece for less than forty years.

According to Tinios(2010), Robolis(2013), Fragos et.al. (2012), Petmesidou(1991;1996;2006;2010;2011;2012;2013a;2013b;2014), although the country still needs to

deal with effects of the latest economic downturn,the interventions of the post-crisis governments do not differ from those in the past.

New Social Security Law enacted

Law 4670/2020, enacted on 28 February 2020, introduces significant changes to the Greek social security system, some with retroactive effect to 1 January 2020.

Key features of the new law include the following amendments applicable from the dates shown.

Main features of Law 4670/2020

As from 1 January 2020:

- The social security contributions (SSC) payable by salaried lawyers, engineers, and doctors in respect of welfare (lump-sum pension), are calculated according to certain SSC categories and not the individuals' gross income.
- For lawyers, the same basis (certain SSC categories) applies to SSC in respect of the supplementary pension.
- The SSC payable by freelancers and self-employed individuals is calculated according to certain SSC categories and not the individual's taxable income.

As from the date of enactment of the legislation (28/02/2020):

- Individuals receiving a pension who also derive income on which SSC are payable (e.g., from salaried employment, freelance work, or self-employment) will be subject to a 30% reduction in their gross pension.
- Salaried employees who also are self-employed may be exempt from paying SSC in respect of their income from self-employment where their gross monthly salary exceeds EUR 930.
- Directors whose monthly gross fees exceed the statutory minimum gross salary (EUR 650) will be entitled to benefits for 25 days per month.

As from 1 March 2020:

- The Social Security Institute for Main Pension & Medical Care (EFKA) will be renamed e-EFKA. The Social Security Institute for Supplementary Pension & Welfare (ETEAP) will be abolished and its functions transferred to the e-EFKA on the same date.
- New insured persons will be registered electronically with the e-EFKA, and no longer will have to go to the local social security office.
- Employers involved in private construction projects will be registered electronically with the e-EFKA.
- Medical opinions provided by doctors authorized by the e-EFKA, required for the payment of sickness allowances, maternity allowances, and salary paid during sick leave, must be submitted electronically by the doctor to the e-EFKA. Salaried employees must apply electronically to the e-EFKA for the payment of sickness allowances.
- The data contained in employers' monthly SSC return (Form APD) will be electronically cross-checked prior to submission with the data on the "ERGANI" database system. The APD must then be finalized and submitted by the deadline.

As from 1 June 2020:

- The SSC rates for full time salaried employees will be reduced by 0.9% (a 0.42% and 0.48% reduction in the employee and employer contribution, respectively). The reduction will apply

to employees who are insured with the e-EFKA with respect to the unemployment (OAED), Workers' Health Organization (OEE), and Workers' Housing Organization (OEK) components of the social security scheme. (see Miltsanidis,A.(2020)).

Comparison of the Countries which belong to OECD with respect to Net Pension Replacement Rate (NPRR) and Gross Pension Wealth (GPW).

First of all,we give the following definitions:

Definition 3.1
Net pension replacement rate

In a study by OECD (2020) The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking into account personal income taxes and social security contributions paid by workers and pensioners. It measures how effectively a pension system provides a retirement income to replace earnings, the main source of income before retirement. This indicator is measured in percentage of pre-retirement earnings by gender.

Source: OECD (2020), Net pension replacement rates (indicator). doi: 10.1787/4b03f028-en (Accessed on 12 September 2020)

Definition 3.2

Gross Pension Wealth

Gross pension wealth shows the size of the lump sum that would be needed to buy a flow of pension payments equivalent to that promised by the mandatory pension system in each country. It is affected by life expectancy and by the age at which people take their pensions, as well by as indexation rules. This indicator is measured as a multiple of annual gross earnings by gender.Table 1 presents the Data for Net Pension Replacement Rate for each country of OECD. Table 2 presents the Data for Gross Pension Wealth for each Country of OECD. Men. Multiple of annual Gross Earnings by Gender.

Table 1: Data table for: Net pension replacement rates, Men, % of pre-retirement earnings, 2018 or latest available

Location ▾	▾ Latest
Argentina	92.8
Australia	41.0
Austria	89.9
Belgium	66.2
Brazil	64.8
Bulgaria	89.3
Canada	50.7
Chile	37.3
China (People's Republic of)	79.4
Croatia	53.8
Cyprus	82.8
Czech Republic	60.3
Denmark	70.9
Estonia	53.1
European Union (28 countries)	63.5
Finland	64.2
France	73.6
Germany	51.9
Greece	51.1
Hungary	84.3
Icelandc	69.8
India	94.8
Indonesia	59.0
Ireland	35.9
Israel	57.8
Italy	91.8
Japan	36.8
Korea	43.4
Latvia	54.3
Lithuania	31.0
Luxembourg	90.1
Malta	48.2
Mexico	28.6
Netherlands	80.2
New Zealand	42.8
Norway	51.6
OECD - Average	58.6
Poland	35.1
Portugal	89.6
Romania	41.6
Russia	57.0
Saudi Arabia	65.4

Slovak Republic	65.1
Slovenia	57.5
South Africa	18.5
Spain	83.4
Sweden	53.4
Switzerland	44.3
Turkey	93.8
United Kingdom	28.4
United States	49.4

Table 2: Data for Gross Pension Wealth for each Country of OECD. Men. Multiple of annual Gross Earnings by Gender.

Location	Latest
Argentina	**11.7**
Australia	**5.6**
Austria	**14.2**
Belgium	**8.2**
Brazil	**14.7**
Bulgaria	**11.2**
Canada	**7.3**
Chile	**5.7**
China (People's Republic of)	**15.2**
Croatia	**6.9**
Cyprus	**12.4**
Czech Republic	**8.6**
Denmark	**10.1**
Estonia	**6.7**
European Union (28 countries)	**9.2**
Finland	**9.8**
France	**11.0**
Germany	**7.7**
Greece	**10.2**
Hungary	**9.3**
Iceland	**11.9**
India	**14.9**
Indonesia	**8.2**
Ireland	**5.3**
Israel	**9.0**
Italy	**12.5**
Japan	**6.1**

Korea	**7.0**
Latvia	**6.8**
Lithuania	**3.8**
Luxembourg	**18.7**
Malta	**8.6**
Mexico	**4.3**
Netherlands	**12.3**
New Zealand	**8.7**
Norway	**8.6**
OECD - Average	**8.8**
Poland	**5.0**
Portugal	**11.7**
Romania	**5.3**
Russia	**7.6**
Saudi Arabia	**14.7**
Slovak Republic	**8.5**
Slovenia	**8.9**
South Africa	**4.7**
Spain	**11.2**
Sweden	**9.6**
Switzerland	**8.5**
Turkey	**13.0**
United Kingdom	**4.1**
United States	**6.7**

Concluding Remarks

Considerable progress has been done on the improvement of Greek Social Security System by Law 4670/2020.

From table 1 we find that Greece occupies the 34th position out of 49 Countries,with score 51.1 below the European Union(28 Countries average(=63.5))

From table 2 we find that Greece occupies the 17th position out of 49 Countries,with score 10.2 above the European Union(28 Countries average(=9.2))

This shows that the size of the lump sum that would be needed to buy a flow of pension payments equivalent to that promised by the mandatory pension system in Greece is large because the life expectancy rate in Greece is the biggest out of all the Countries in European Union.

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The Evolution of the Types of Public Procurement Contracts in Romania

Ionel PREDA
PhD Student, The Bucharest University of Economic Studies, Romania
E-mail: predaionel4@gmail.com

Doina I. POPESCU
PhD Professor, The Bucharest University of Economic Studies, Romania
E-mail: doinaipopescu@yahoo.com

Cezar-Petre SIMION
PhD Associate Professor, The Bucharest University of Economic Studies, Romania
E-mail: cezarsimion@yahoo.com

Abstract

Given the very large sums being spent in public procurement systems, it is very important to analyse the distribution of procurement contracts by types (products, services and works) as it may reveal a number of deficiencies in terms of value, evolution and distribution by destination (consumption or investment) in various economic periods. The article describes the significant particularities of public procurement of services, products and works, the differences between them, analyses the use of public procurement of works (investment) as a factor for accelerating the economic recovery in case of the 2009-2010 economic crisis and studies the evolution of the types of public procurement contracts awarded in Romania between 2007 and 2017. Also, an estimate of the value of the contracts of works attributed by simple exponential smoothing method is developed in the article, the result of the estimation being compared with the actual data.

Keywords: Public Procurement, Procurement Procedure, Contract, Framework Contract, Works, Outsourcing.

Introduction

According to art. 3, paragraph (1), letter l) of Romanian Law no. 98/2016 regarding public procurement, public procurement contracts are of three types: products, services and works.

Product supply contracts may include procurement by the contracting authorities of products such as: cars, tractors, computers, phones, pharmaceuticals, food, construction equipment, fuels, IT equipment, sanitary equipment, etc.

Service contracts cover the purchase of services such as: security, vehicle repair, transportation, catering, cleaning, compulsory and optional insurance, etc.

Works contracts may include the purchase of landscaping works, building, motorways, bridges construction, overhead electric lines, upgrades or capital repairs for buildings, etc.

Compared to product purchases, the purchase of services has a peculiarity.

To a large degree, the government sector is a domain where a large part of the external sourcing refers to services. In Europe around 50% of the overall external sourcing in central, local or regional

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government is services contracts, such as maintenance work, social services, construction work, garbage collection, network services, public transport, etc. Due to an developing service industry situation (caused by a global trend that led to the increase of outsourcing in both the private and public areas), buying services is becoming a more and more important matter. Now, support services like security, catering and cleaning are contracted out. Furthermore, outsourcing is chosen for other types of services, more precisely services provided for all the citizens. For the implementation of outsourcing, the keyword taken into consideration is value, which means making taxpayers' money to better fulfil the needs of the public (Thai et al., 2009).

Among the most important issues of service procurement are the setting of specifications included in the tender book and the monitoring of their performance (Audit Commission, 1993). In fact, one of the most important things is keeping in the organization the skills for determining specifications and for controlling the performance of the services provided, because if these skills are lost, it may be very difficult to carry out the procurement procedure and control the performance of the contract, and once these skills are lost, these are very difficult to repair.

It is known that the service buying process is less standardized and more complex than the buying of products. Because the subject of the purchase is invisible, the service acquiring process is characterised by an increased need for written technical specifications referring to the content of procurement. Graw and Maples (1994) consider that for the same reason, judging the skills and qualities of a service provider or a contractor and taking references are regarded as more important. Also, ensuring a good communication between the provider and the beneficiary is of crucial importance, particularly in the context of managing unforeseen events that may occur in the provision of services.

Related literature

The majority of the specialised studies on the subject refers to the differences between product and service procurement, outsourcing and the use of public procurement as a factor for accelerating the economic recovery during economic crises.

The differences between product and service procurement have been analysed by many specialists in the field. According to Shostack (1977) and Berry (1980), there are four characteristics that make services distinct from products: intangibility, inseparability, perishability and heterogeneity. Berry and Parasuraman (1991), Grönroos (1990) and Normann (1992) claim that:

- in service production there is a high level of staff resources involved;
- there are more difficulties in measuring and specifying the quality and output of services (including many problems with delayed effects);
- consumption and production are happening simultaneously, frequently involving the customer;
- services are not possible to buffer or transport. Also, services are intangible;
- services are mostly performed in multiunit companies, with dispersed locations.

The inseparability is the most important characteristic of a service, because the purchaser is involved in the delivery process. This implies that the purchaser may have a direct impact on the result of the service which is delivered. The inseparability of consumption and production forces the sellers and buyers into intimate contact (Grönroos, 1978). Payne (1995) considers that through interpersonal relationships, long-term customer relationships are built, thereby ensuring customer satisfaction.

In the last period, public organizations have paid increased attention to reducing costs, increasing efficiency, flexibility, basic skills, and outsourcing of nonessential activities.

The definition of outsourcing is services that are contracting-out and were performed in-house, in the past (Thai et al., 2009). Outsourcing is a procurement strategy frequently selected as a way of increasing efficiency and effectiveness (Steane and Walker, 2000). Outsourcing can also have an

effect on employees, with conditions and terms of employment getting worse after outsourcing. The main risks of outsourcing are losing knowledge and in-house expertise (Boston, 1996), reductions in quality and unintentional loss of control (Lei and Hitt, 1995).

In the case of outsourcing, there are approaches in the research literature that refer to both the controversial issue of choosing between providing services in the organization or making-or-buying, as well as of maintaining or reducing staff within the organization.

One of the main problems of contracting-out is considered to be the cost of monitoring. The organisation of the monitoring function can be made in different modes. At one extreme there's a trust on the service beneficiaries (for example garbage collection). Public authorities have different ways to evaluate the delivery of services (for example customer surveys). At the other extreme, there are very strictly organized inspections many times a week (Thai et al., 2009).

Because it is a way to increase efficiency and effectiveness, outsourcing has also been very much applied in the private sector, even more so than in the public sector, because, unlike state organizations, private companies operate in a competitive market economy that influences the prices, quantities and quality of products / services.

Public procurement (especially those of works) may be a factor in accelerating economic recovery. In times of economic crisis the state can invest more in infrastructure (and not only) by allocating additional funds and initiating a larger number of procurement procedures.

An interesting approach is that of Murray (2009), referring to the public procurement strategy as a factor for accelerating the economic recovery during economic crises. In the case of the economic crisis of 2009-2010, the author notes that Britain's local government strategy had changed very little due to the recession, that existing practices have acted against accelerating economic recovery, and that a short-term strategy containing more measures would have been justified. The author considers that a strategy for accelerating the economic recovery must include the following measures:

- the strategy needs to be validated by the parliament;
- the procurement strategy should be synergistically linked with a regional or local economic development strategy. It is very important that a thriving competitive business community to continue to exist;
- the long-term contracts should be put away in favour of short-term multi-sourcing contracts utilizing ‘lots’. In doing so, the exposure to risk is reduced for both suppliers and public authorities;
- during a time of recession, in all contracts should be embedded social clauses, such as combating unemployment;
- the reduction of payment deadlines (Murray, 2009).

Research Methodology

This study is an exploratory study that uses secondary data analysis and forecasting. The study analyzes statistical data on the evolution of the types of public procurement contracts in Romania from 2007 to 2017.

The purpose of the research is to study public investment procurement as a factor for accelerating the economic recovery in Romania in the case of the economic crisis between 2009 and 2010.

The main objectives of the study are to analyze the evolution of the number and value of investment contracts between 2007 and 2017, the consequences of the measures taken by the political factors to increase the funds destined for salaries and pensions to the detriment of investments and to provide an estimate for 2017 of the value of the works contracts using Brown's economic-mathematical model of simple exponential smoothing.

The research questions are the following:

- What was the evolution of the number and value of investment contracts in Romania between 2007 and 2017?
- Have the public procurement in Romania been used to stimulate the economic recovery in the event of the economic crisis between 2009 and 2010?
- The estimation for 2017 of the value of the works contracts using Brown's economic-mathematical model of simple exponential smoothing is confirmed by real data?

In order to examine the evolution of the types of public procurement contracts in Romania throughout the period 2007-2017, the research methodology comprises the next steps:

- examination of the specialized studies in the area of research;
- data gathering;
- data analysis and the elaboration of the research results.

The principal source of information and data utilised in the research was the official reports published by the Romanian National Agency for Public Procurement (ANAP), different statistical indicators for public procurement procedures and some information for the general public in Romania.

The utilisation of the official reports of the Romanian National Agency for Public Procurement presented the next advantages:

- the high accuracy of the information;
- the information comes from the Romanian electronic procurement system;
- the high relevance of these information and data about the national coverage of the Romanian procurement system.

The evolution of the types of public procurement contracts in Romania

The distribution by type of contracts and framework agreements awarded in Romania in the year 2017 is described in Table 1.

Table 1: Distribution by type of contracts and framework agreements awarded in Romania in 2017

No.	Type of contract / framework agreement	Number of contracts / framework agreements awarded	Weight
1	Supply	60,324	80.73%
2	Services	9,643	12.90%
3	Works	4,760	6.37%
Total contracts / framework agreements awarded		**74,727**	**100%**

Source: Romanian National Agency for Public Procurement (ANAP, 2017)

From Figure 1 it can be seen that the highest number of contracts / framework agreements awarded in 2017 was for supply (80.73% share) followed by services (weight 12.90%), the number of works contracts having a weight of only 6.37%.

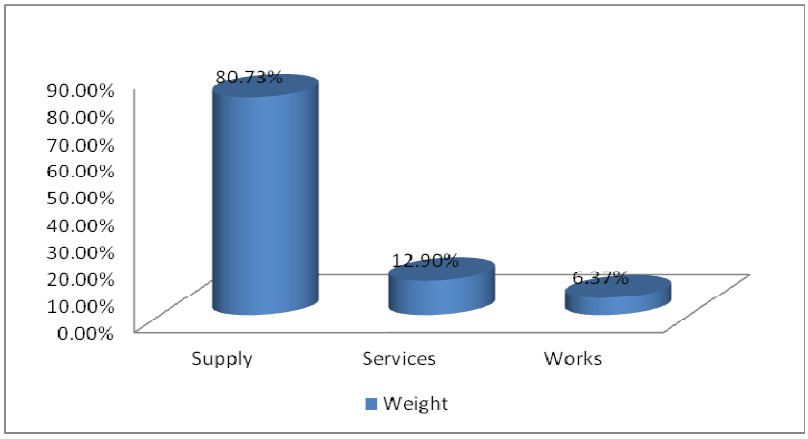

Figure 1: Graphical representation of distribution by types of contracts and framework agreements awarded in Romania in 2017

Source: Based on the data in Table 1

The main statistical indicators for the public procurement carried out in the period 2007-2017 in Romania are presented in Annex 1.

Table 2: Values of contracts awarded between 2007 and 2016

Line no. Annex 1	**1**	**2**	**3**	**5**	**7**
Indicator/ Year	**Value of works contracts (thousand lei)**	**Weight of the value of works contracts out of the total value of the awarded contracts (%)**	**Value of supply contracts (thousand lei)**	**Value of service contracts (thousand lei)**	**Total value of awarded contracts (thousand lei)**
2007	13,085,026	58.59%	5,680,100	3,568,533	22,333,659
2008	24,846,622	46.56%	15,591,811	12,932,023	53,370,456
2009	**25,798,228**	**54.91%**	**10,299,029**	**10,882,883**	**46,980,140**
2010	**22,188,322**	**51.18%**	**11,295,511**	**9,870,914**	**43,354,747**
2011	34,343,766	58.11%	12,987,973	11,772,966	59,104,705
2012	30,020,584	53.87%	13,996,708	11,712,090	55,729,382
2013	29,644,985	54.79%	13,247,906	11,210,527	54,103,418
2014	35,971,725	53.57%	18,636,669	12,542,725	67,151,119
2015	37,058,725	54.00%	21,403,124	10,161,736	68,623,585
2016	17,262,769	38.87%	17,404,320	9,746,296	44,413,385

Source: (ANAP, 2016)

From the analysis of the evolution of the indicators presented in lines 1, 3, 5 and 7 of Annex 1, respectively the values of the works, supply, services contracts and total values of contracts for the period 2007-2017, it can be noticed that in 2009 and 2010 the total values of the contracts awarded amounted to 46,980,140 thousand lei and to 43,354,747 thousand lei compared to 2008 and 2011,

when the values were of 53,370,456 thousand lei, respectively 59,104,705 thousand lei (Table 2 and Figure 2). The weights of the works contract values for the period 2008-2010 varied between 46.56% and 54.91%, while in 2007 and 2011 these were of 58.59% and 58.11%, respectively.

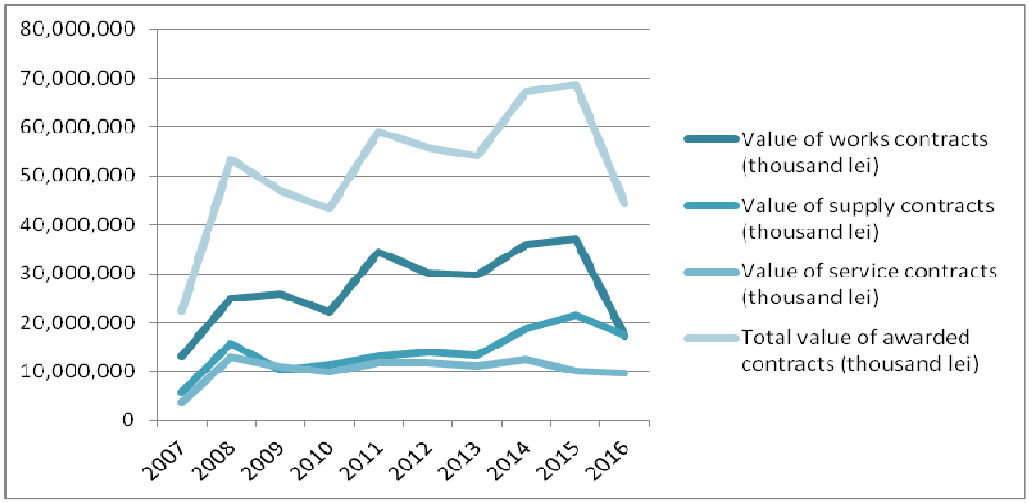

Figure 2: Graphical representation of the evolution of the value of contract awarded between 2007 and 2016

Source: Based on the data in Table 2

Thus, it can be seen that **during the economic crisis of 2009-2010**, **public procurement in Romania has not been used as a factor for accelerating economic recovery**. Consequently, **the conclusions formulated by Murray (2009)** (who determined that in the economic crisis of 2009-2010, the UK local government strategy changed very little due to the recession and that the existing practices have acted against the acceleration of economic recovery) **are also confirmed in the case of Romania.** In this period of economic crisis, the state would have had to allocate additional funds (especially for infrastructure investments) and initiate a larger number of public purchases.

NAO, (2018) uses three criteria to evaluate the value for money of government spending:

- efficiency (spending well) which means the relationship between the output from services or goods and the resources used;
- economy (spending less) which means minimising the cost of resources used (inputs);
- effectiveness (spending wisely) the relationship between the intended and actual results of public spending or outcomes (NAO, 2018).

A general economic principle is: "Buy in times of economic crisis and sell in periods of boom". In the analysed case, namely in terms of public procurement during periods of economic crisis, prices are low and implicitly the efficiency, economy and effectiveness of using the budgetary funds are maximum, namely the best value for money ratio is obtained.

Also, from the analysis of the evolution of indicators presented in lines 1 and 2 of Annex 1, namely the value of works contracts and their weight in the total purchases made, it can be noticed that **due to the measures taken by the political factors regarding the increase of the funds for the salaries and pensions to the detriment of investments, in 2016 the works contracts** (which had as main object investments in infrastructure - highways, roads, bridges, facilities etc.) **decreased to 17,762,769 thousand lei** (from 37,058,725 lei in 2015), **namely from a weight of 54% in 2015 to a weight of 38.87% in 2016**. Unfortunately, these measures continued in the period 2017-2019.

The trend of the work contracts decrease can also be seen from the analysis of the indicators in lines 10 and 11 of Annex 1, respectively the total number of works contracts and its weight in the total number of awarded contracts (Table 3).

Table 3: Total number of works contracts and their weight in the total number of contracts awarded during 2007-2017

Line no. Annex 1	10	11
Indicator/ Year	**Total number of works contracts**	**Weight of the number of works contracts out of the total number of contracts awarded (%)**
2007	5,979	17.47%
2008	19,240	16.23%
2009	13,699	13.20%
2010	10,188	11.58%
2011	8,595	11.48%
2012	6,891	10.41%
2013	5,412	9.73%
2014	4,383	8.21%
2015	5,576	8.72%
2016	3,717	6.67%
2017	4,760	6.37%

Sources and adaptation from: (ANAP, 2016), (ANAP, 2017)

As can be seen in Figure 3, **the weight of the number of works contracts in the total number of awarded contracts decreased steadily between 2007 and 2017,** from 17.47% in 2007 to 6.67% in 2016 respectively 6.37 % in 2017.

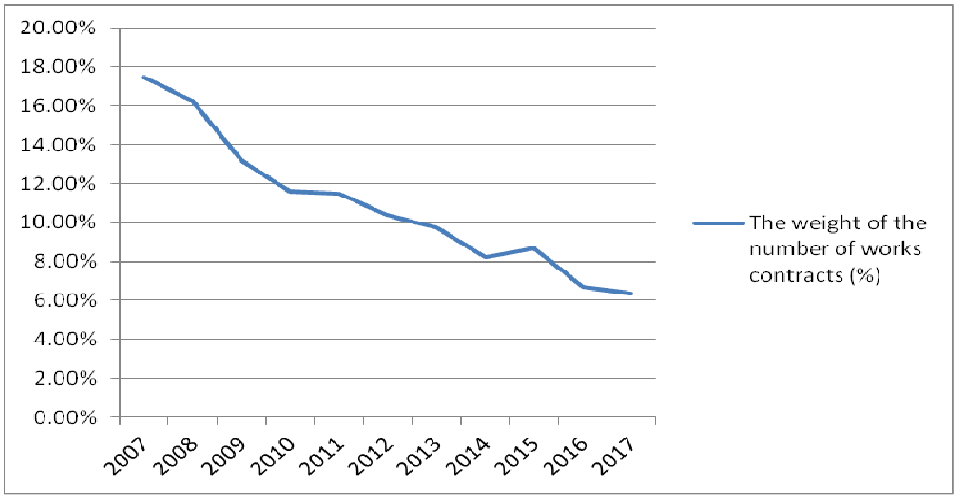

Figure 3: Graphical representation of the evolution of the weight of the number of works contracts in 2007-2017

Source: Based on the data in Table 3

Continuing this trend can lead to dangerous situations, due to the non-assurance of the amounts necessary for the safe operation of the existing infrastructure. The main consequences of reducing investment funds are:

- very crowded traffic on public roads leading to a large number of traffic accidents resulting in significant material damage and loss of lives;
- interruption of the electricity supply of some localities;
- the collapse of some bridges;
- derailment of some trains or subways;
- interruption of water or heat supply to neighbourhoods or even cities.

Estimate of the value of awarded works contracts

In order to highlight the influence of the political factor on investment (works contracts), we estimate for 2017 the value of awarded works contracts (line 1 of Annex 1) and we compare this estimated value to the actual value. The evolution of the value of the works contracts awarded for the period 2007 - 2016 is presented in Table 4.

Table 4: Total value of works contracts awarded during 2007 – 2016

Line no. Annex 1	**1**
Indicator/ Year	**Value of works contracts (thousand lei)**
2007	13,085,026
2008	24,846,622
2009	25,798,228
2010	22,188,322
2011	34,343,766
2012	30,020,584
2013	29,644,985
2014	35,971,725
2015	37,058,725
2016	17,262,769

Source: (ANAP, 2016)

To estimate the total value of contracts in 2018, Brown's economic-mathematical model of simple exponential smoothing will be used.

Brown's model of simple exponential smoothing has the following form:

$$F_t = \propto X_t + (1-\propto)F_{t-1} \quad (1)$$

or $$F_{t+1} = \propto X_t + (1-\propto)F_t \quad (2)$$

where:

X_t = total value of contracts awarded in period t;
F_t = estimated value in the period t-1 for contracts awarded in period t;
F_{t+1} = estimated value in period t for contracts awarded in period t + 1;
α = smoothing constant, $0 \leq \alpha \leq 1$.

For the estimation, the *QM for Windows / Forecasting / Time Series Analysis* software was used.

The estimate for the year 2017 of the value of the works contract awarded for the smoothing constant α = 0.61 (which is optimal *α* in relation to the mean squared error) is presented in Table 5. For α = 0.61 the lowest MSE average squared error is 77,335,630,000,000.

Table 5: Estimate for 2017 of the value of the awarded works contracts for smoothing constant α = 0.61

Forecasting			Exponential smoothing				
Alpha	0.610000014						
Data			**Error Analysis**				
Period	Demand		Forecast	Error	Absolute	Squared	|% Error|
2007	1.31E+07		1.31E+07				
2008	2.48E+07		13085030	1.18E+07	11761590	1.38E+14	0.473368
2009	2.58E+07		20259600	5.54E+06	5538630	3.07E+13	0.21469
2010	2.22E+07		23638164	-1.45E+06	1449844	2.1E+12	0.065343
2011	3.43E+07		22753759	1.16E+07	11590011	1.34E+14	0.337471
2012	3.00E+07		29823666	1.97E+05	196914	3.88E+10	0.006559
2013	2.96E+07		29943784	-2.99E+05	298803.5	8.93E+10	0.010079
2014	3.60E+07		29761513	6.21E+06	6210207	3.86E+13	0.172641
2015	3.71E+07		33549740	3.51E+06	3508980	1.23E+13	0.094687
2016	1.73E+07		35690218	-1.84E+07	18427448	3.4E+14	1.067468
			Total	1.86E+07	58982427	6.96E+14	2.442306
			Average	2.07E+06	6553603	7.73E+13	0.271367
				Bias	MAD	MSE	MAPE
					SE	9971533	
Next period	**24449474.32**						

The graphical representation of the actual data (the value of the awarded works contracts) and the estimation for the year 2017 of the value of the works contracts awarded for the smoothing constant α = 0.61 is presented in Figure 4.

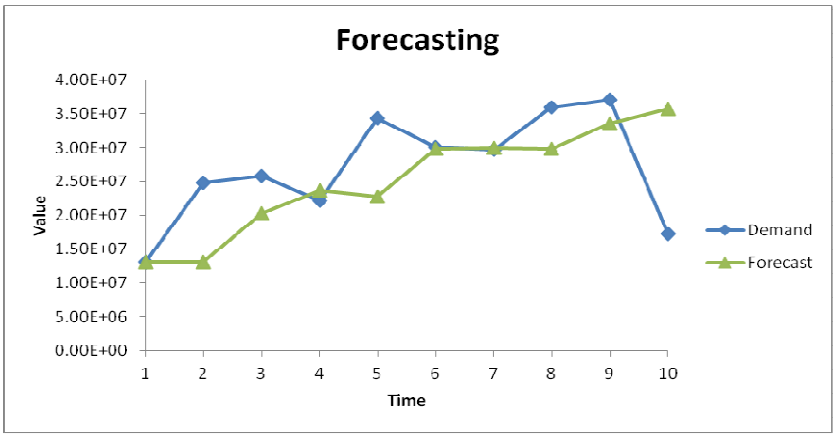

Figure 4: Graphical representation of actual data and estimation for year 2017 of the value of the awarded works contracts

According to the presented economic-mathematical model, the value of the awarded works contracts recommended to be taken into account for 2017 is 24,449,474 thousand lei, because the lowest MSE average squared error is 77,335,630,000,000, this being obtained for $\alpha = 0.61$.

Considering the fact that in 2016 the value of the awarded works contracts amounted to 17,262,769 thousand lei, it follows that the estimated value resulting from the application of the economic-mathematical model for 2017 (24,449,474 thousand lei) is 41.63% higher than the value of the previous year.

In fact, the investment expenditures in Romania in 2017 (economic growth year) were only of 12.1 billion lei, by 30% lower than in 2016, the lowest investment expenditures in the last 12 years (ZF, 2017), which means that for the estimation of the value of the awarded works contracts, Brown's economic-mathematical model of simple exponential smoothing is not confirmed by actual data.

This is due to the measures taken by the political factors in Romania which led to the increase of the budget destined for salaries and pensions and the decrease of the investment budget.

Conclusions

The study notes that in public procurement in Romania the largest weight belongs to the supply contracts, and the smallest share to the works contracts for investments.

The analysis of the evolution of the types of contracts also revealed that, in the case of the economic crisis from 2009 to 2010, public authorities in Romania did not use public procurement to stimulate economic recovery. Measures taken by policy makers have acted against economic recovery, the budget funds for public procurement being very low, which has resulted in the worsening of the effects of the economic crisis.

The study also revealed that in the period 2007-2017, the share of works contracts in the total number of contracts awarded decreased steadily from 17.47% in 2007 to 6.37% in 2017.

In 2016, the Romanian policy makers took a series of measures that led to the increase of the funds for pensions and wages and to the reduction of the funds allocated to the investments, a situation that led to the aging of the existing infrastructure and to the non-assurance of its safe operation.

Also, the tendency to decrease investment expenditures continued in the period 2017 - 2018. The estimate for 2017 of the value of works contracts awarded by the use of Brown's economic-

mathematical model of simple exponential smoothing (the estimated result representing a 41.63% increase as compared to the previous year) was not confirmed by actual data (30% less than in the previous year), this situation being due to the measures taken by the political factors in Romania, which led to the increase of budget expenditures for pensions and wages at the expense of investments.

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Annex 1: The centralizing situation of the statistical indicators for public procurement in Romania during 2007-2017

No.	Indicator/Year	Calculation formula	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	Value of works contracts (thousand lei)	-	13,085,026	24,846,622	25,798,228	22,188,322	34,343,766	30,020,584	29,644,985	35,971,725	37,058,725	17,262,769	-
2	Weight of the value of works contracts out of the total value of the awarded contracts (%)	(1/7) x100	58.59%	46.56%	54.91%	51.18%	58.11%	53.87%	54.79%	53.57%	54.00%	38.87%	-
3	Value of supply contracts (thousand lei)	-	5,680,100	15,591,811	10,299,029	11,295,511	12,987,973	13,996,708	13,247,906	18,636,669	21,403,124	17,404,320	-
4	Weight of the value of supply contracts out of the total value of the awarded contracts (%)	(3/7) x100	25.43%	29.21%	21.92%	26.05%	21.97%	25.12%	24.49%	27.75%	31.19%	39.19%	-
5	Value of service contracts (thousand lei)	-	3,568,533	12,932,023	10,882,883	9,870,914	11,772,966	11,712,090	11,210,527	12,542,725	10,161,736	9,746,296	-
6	Weight of the value of service contracts out of the total value of the awarded contracts (%)	(5/7) x100	15.98%	24.23%	23.16%	22.77%	19.92%	21.02%	20.72%	18.68%	14.81%	21.94%	-
7	Total value of awarded contracts (thousand lei)	1+3+5	22,333,659	53,370,456	46,980,140	43,354,747	59,104,705	55,729,382	54,103,418	67,151,119	68,623,585	44,413,385	57,500,149
8	Total number of awarded contracts	10+12+14	34,232	118,552	103,798	88,007	74,843	66,174	55,615	53,388	63,946	55,735	74,727
9	The average value of the awarded contracts (thousand lei)	7/8	652	450	453	493	790	842	973	1,258	1,073	797	769
10	Total number of works contracts	-	5,979	19,240	13,699	10,188	8,595	6,891	5,412	4,383	5,576	3,717	4,760
11	Weight of the number of works contracts out of the	(10/8) x100	17.47%	16.23%	13.20%	11.58%	11.48%	10.41%	9.73%	8.21%	8.72%	6.67%	6.37%

	total number of the awarded contracts (%)												
12	Total number of supply contracts	-	21,040	77,128	71,607	62,641	53,246	49,412	40,735	41,209	48,889	43,633	60,324
13	Weight of the number of supply contracts out of the total number of the awarded contracts (%)	(12/8) x100	61.46%	65.06%	68.99%	71.18%	71.14%	74.67%	73.24%	77.19%	76.45%	78.29%	80.73%
14	Total number of service contracts	-	7,213	22,184	18,492	15,178	13,002	9,871	9,468	7,796	9,481	8,385	9,643
15	Weight of the number of service contracts out of the total number of the awarded contracts (%)	(14/8) x100	21.07%	18.71%	17.82%	17.25%	17.37%	14.92%	17.02%	14.60%	14.83%	15.04%	12.90%

Sources and adaptation from: (ANAP, 2016), (ANAP, 2017)

Territorial Brand Development and Evaluation (The Case of Ekaterinburg)

Natalia V. GONCHAROVA

Ural Federal University named after the first President of Russia Boris Yeltsin, Ekaterinburg, Russia, n.v.goncharova@urfu.ru

Liudmila V. DAINEKO

Ural Federal University named after the first President of Russia Boris Yeltsin, Ekaterinburg, Russia, l.v.daineko@urfu.ru

Abstract

The article discusses branding of a territory (city or region) as a tool to enhance its competitiveness and stimulate its socio-economic development. We focus on the case of Ekaterinburg (Russia), describe the competitive advantages of this city, and show the need for building a stronger city brand. We also compare the position of Ekaterinburg in various national city rankings. The conclusion is made that rankings that use formalized (objective) indicators are quite effective in the evaluation of a city brand's performance and territorial branding in general.

Keywords: Branding, Brand of a Territory, Region's Brand Image, City Brand.

Introduction

The modern city is not just a socio-economic system but a major force shaping market relations and business communications. A city can help realize the cumulative potential of the surrounding territory and maximize the advantages of the whole region. To help cities acquire and maintain their competitive edge on national and international markets, marketing techniques and instruments can be used.

As cities engage in economic relations with various actors competing for investment, talent and other resources, the authorities increasingly rely on various market mechanisms and methods in their municipal management practices.

A strong brand is a way to promote a city's individual personality and make it recognizable. Brand is an effective tool that can help a city capitalize on its advantages, enhance its marketing potential, attract investors and boost socio-economic development, thus improving the quality of life of its residents.

Literature Review (Research problem)

With the advent of the digital economy, it has become essential to have a viable territorial branding strategy to realize the territory's potential. 'Brand of a territory is a combination of unique qualities and timeless values, reflecting the uniqueness and original consumer-oriented characteristics of this territory and community, which are well-known, publicly recognized and enjoy strong demand among the consumers in this territory' (Vazhenina, 2012). Regional image (Sushnenkova, 2011) is defined as a coherent symbolic representation of a region existing in the public or individual consciousness and resulting either from personal experience or from the impact of the media.

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To evaluate a regional image (Vizgalov, 2011), the following factors are usually considered: structural (location, climate, history); changeable (size of the territory, population, landscape, cultural traditions); and symbolic (symbols, significant events and personalities). Culture is an important element in each of these factors since the image is often aligned with specific cultural symbols and representations, which can become the core of the evolving brand. A strong territorial brand makes the city easily recognizable and distinguishes it from competitors. A brand cannot be realized through external effort alone (Bystrova & Kochetkov, 2017). Only a a living, vibrant brand can attract people, which is why a city brand should be a result of cooperation between brand specialists and urban residents. Involvement of local communities into the process of brand creation enhances the quality and efficiency of applied marketing strategies (Zenker & Petersen, 2010). Territorial branding stimulates social and economic development of regions and cities (Eidelman et al., 2016; Veleshchuk, 2015); rural areas (Moroz et al., 2020); and national parks (Ferrari, 2020), as well as the development of regional tourism (Eidelman & Fakhrutdinova, 2016). In their pursuit of distinctiveness not only do brands of regions and cities compete for recognizability but they can also network and cooperate with other territories (Pasquinelli, 2013). It should be noted that residents' view of their home cities and the views of tourists are not mutually exclusive but should be in agreement, otherwise the city's image and authenticity will suffer (Merrilees et al., 2009).

Research problem

In order to respond to the challenges of globalization, territories have to be able to make the most of their competitive advantages, enhance their economic well-being and the quality of life of their residents. To address this task, it is necessary to reconsider the city (or region) promotion strategies by supplementing them with those based on marketing and branding principles. Our hypothesis is that the performance of a territorial brand can be evaluated by using the data of the rankings based on formalized (objective) indicators. Rankings that rely on unformalized subjective evaluations and those that tend to constantly change their indicators and scale are less suitable for this purpose.

Purpose of the Study

A city's brand is its identity (Vizgalov, 2011). Therefore, the larger is the city, the more positive aspects and resources the brand can reflect. However tempting the idea to show all the positive sides may be, it is better to select just a few to ensure the brand's recognizability. This study aims to gain a deeper understanding of the theoretical and methodological aspects of territorial brand evaluation. Brand evaluation is necessary to identify the territory's own resources that could be used for marketing purposes and the external resources that should be attracted for better results.

Methodology

The study uses general scientific methods and relies on the data of the Federal State Statistics Service (Rosstat), open research data from other studies, and rankings data.

Results

Territorial branding is aimed to ensure a long-term presence of a particular territory in the information space, increase its recognizability, encourage the public’s positive interest in the goods and services produced in this territory, attract investment and strengthen the territory’s appeal as a tourist destination. Promotion of the territory's positive image among external audiences contributes to the creation of long-lasting positive associations this territory evokes.

A strong city brand is bound to have a positive effect on the brands of local businesses and vice versa, if the city's image is negative, local businesses will also suffer. Therefore, entrepreneurs, especially those who own unique local businesses, should be no less interested in the development of the city brand than owners of hotels, restaurants, tourist agencies, transport companies and the local authorities. The key to success is to create a unique and memorable city brand. The brand concept should not contradict the city's identity but, on the contrary, reinforce it. The more fully and more adequately the brand reflects the city's identity, the more appealing it will be for target audiences, both internal and external.

For quite a while, there has been a perceived need to create a proper brand identity for Ekaterinburg. Until December 1990, Ekaterinburg (Sverdlovsk before 1992) had been closed for foreigners. The city was freely accessible to Soviet citizens but foreigners needed to have a special invitation, which means that inbound tourism was out of the question. In the post-Soviet period, however, Ekaterinburg started hosting diverse cultural, sport and political events, which attracted foreign visitors.

On more than one occasion has Ekaterinburg become a venue for high-profile international events, which made the local authorities interested in the creation of a distinctive visual brand identity (among such events were SCO Summit in 2008; BRIC Summit in 2009; German-Russian forum 'Petersburg Dialogue' in 2010, in which participated President Dmitry Medvedev and Chancellor of Germany Angela Merkel; the 31st Russia-EU Summit, involving European and Russian leaders; the 10th Russia-Kazakhstan Interregional Cooperation Forum in 2013, in which participated the presidents of the respective countries; the 6th Forum 'Russia - Azerbaijan: Interregional Dialogue-2015'; the ICPC International Collegiate Programming Contest in 2016; FIFA World Cup in 2018; the Boxing World Cup Final in 2019; the 10th Eurasian Economic Youth Forum 'Russia – Asia – Africa – Latin America: the Economy of Mutual Trust' in 2019; the 2019 Youth Match Racing World Championship). The city also submitted a bid to host the World Expo 2020. In 2023, Ekaterinburg will host the World University Games.

Russian territories, especially capital cities Moscow, St.Petersburg and Kazan (especially after the 2013 Summer Universiade) are now actively developing their own brands.

Many cities are primarily associated with particular architectural objects, known for their artistic, cultural and historical value; these objects may constitute an important part of their cities' brands. More often than not, the role of city symbols is performed by religious buildings, which can take incredibly diverse and innovative architectural forms and may have a rich and contradictory history. Not only do old buildings such as 16th century St.Basil's Cathedral in Moscow, the Church of the Intercession of the Holy Virgin on the Nerl River (built in 1165) and the Church of the Holy Sepulchre in Jerusalem (built in the 4th century) become symbols but also new ones, for example, Hallgrimskirkja in Reykjavik (designed in 1937 and finished in 1975) and the Cathedral of Christ the Saviour in Moscow (rebuilt in 1999). There are many architectural sites all over the world that are essential to city brands. In the beginning, these sites did not always bear any particular symbolic meaning and many acquired such meaning only years later. The Eiffel Tower in Paris, for example, was not conceived of as a city symbol, this famous landmark was originally built to celebrate the 100th anniversary of the French Revolution. Similarly, the Statue of Liberty in New York was a gift of the people of France to the people of the United States to commemorate the centennial of U.S. independence. Other stories like this include that of the Sydney Opera House built in 1973 and Burj Al Arab, built in 1999, and so on.

Territorial branding is a lengthy and complex process which requires considerable administrative and financial resources. It starts from the preliminary evaluation of the already existing city brand, which has evolved naturally, then the brand concept is designed based on the region's characteristics and advantages. After that, this concept is implemented and the brand is promoted. Finally, the performance of the city brand is monitored and evaluated (this can be done with the help of various rankings).

To make a city brand world-famous, it is necessary to formulate a comprehensive strategic plan and to work persistently to improve brand awareness, for example, by conducting unique symbolic events. For instance, Ekaterinburg, known all over Russia for its rock-scene, since 2015 has become a venue for unique festival Ural Music Night (https://uralmusicnight.ru/). The end of the FIFA World Cup in 2018 in Ekaterinburg coincided with the music festival, and the city benefited from this opportunity to show foreign audiences its great potential as a concert venue and a centre of music culture even though it was only for one night. It should be noted that a symbolic event of such a scale can have an enormous emotional impact on the target audience.

It is highly desirable that the city brand concept should emphasize positive aspects of the territory while minimizing negative ones.

In the Soviet period, Sverdlovsk (now Ekaterinburg) was known as an industrial city with smoking factory pipes, soaring crime rates and also as a place where the last Russian tsar and his family were brutally murdered. Thus, to create an effective city brand and make the city attractive, it was necessary first and foremost to overcome the negative brand perceptions and turn them into positive ones.

Currently there is no sightseeing spot, place or event that could be considered as the main symbol of Ekaterinburg. The most famous symbol of the city is Sevastyanov's house, which was chosen as the official architectural symbol of Ekaterinburg for the FIFA World Cup 2018. It was also this building that was selected to represent Ekaterinburg in the large-scale graffiti project in Moscow. In the 2016 public vote held to decide on the symbols and cities that would illustrate the new banknotes, it was Sevastyanov's House and Iset Hotel that got the majority of votes in Ekaterinburg. Sevastyanov's House is located in the historical centre of the city, right next to the dam on the city pond (a favourite walking place among the locals, known as 'Plotinka'). The House traces its history back to 1817. In the late nineteenth century, architect A.I. Paduchev oversaw the reconstruction of the house, originally built in the classical style, and turned it into an outstanding example of the neo-Gothic style, artfully combining Gothic and Barocco elements. Since the early twenty-first century, the House has been the regional Governor's residence.

Iset Hotel is an iconic Constructivist monument, built in the 1930s as a part of the so-called Chekists' Quarter. Originally, it was built as a dormitory-style accommodation for the staff of the Cheka (NKVD) but was later turned into a hotel.

Although the above-described architectural sites are of enormous cultural and historical value, they remain virtually unknown beyond the borders of the region and attract few tourists.

One of the most famous sightseeing spots in Ekaterinburg, the centre of the cult of Tsar-Martyr Nicholas II and his family and a popular destination for Orthodox pilgrims from Russia and other countries is the Cathedral-on-the-Blood (The Church on Blood in Honour of All Saints Resplendent in the Russian Land). It is an active Orthodox cathedral built in 2003 on the site of demolished Ipatiev House, where the Romanov family were kept and executed on the night of 16–17 July 1918. Despite the fact that this place is popular with tourists and is also widely used for religious and other events, it is connected to the tragic death of the royal family and, therefore, triggers strong negative associations. Therefore, in our view, it is not suitable for promoting the territory's image among external audiences. Thus, the question about the place that could become a distinctive symbol of Ekaterinburg still remains open.

There is currently no single methodology for measuring the performance of a territorial brand. In Russia, there are various rankings of cities and regions created by different experts and organizations and using a variety of indicators. Many rankings rely on experts' evaluations and may suffer from flawed sampling. Let us consider the main national rankings and compare Ekaterinburg's position with those of Moscow and St.Petersburg – the two capital cities with the strongest brands in Russia.

The on-line project 'City of Russia' was launched in 2013 (https://город-россии.рф). Its purpose is to support national development and preserve cultural and historical heritage of the Russian state. The best city is chosen by free vote on the project's web-site: visitors to the site may vote every day without prior registration. Table 1 shows the results of the vote in 2012-2019.

Table 1: Ekaterinburg in 'City of Russia' ranking (2012-2019)

Period	Position	Number of votes
2012	49	2,441
2013	37	3,463
2014	14	27,841
2015	41	9,614
2016	49	6,070
2017	48	7,094
2018	37	7,012
2019	35	7,727

In 2019, the leader was Cheboksary while Moscow and St.Petersburg ranked only 24th and 32nd respectively. It should be noted that this ranking is not promoted in publicly accessible sources. We thus believe that it is not very objective and presents a somewhat distorted picture.

Yet another example of a highly subjective, much-hyped ranking is the Quality of Living Ranking of Cities, available on portal Domofond.ru. The best city is chosen by daily voting: residents of Russian cities are asked to evaluate the quality of life in their home cities. The evaluation scale and criteria are changed every year. For example, in 2019, the criteria were safety, cleanliness, environment, public transport, roads and parking spaces, shops and markets, sport and recreation, child-friendliness, neighbours, utility services, the income to cost of life ratio. The cities' performace in these criteria were evaluated on a 10-point scale, ranging from 0 (totally disagree) to 10 (totally agree). Ekaterinburg' position in the ranking in 2017-2019 is shown in Table 2.

Table 2: Ekaterinburg in the Quality of Living Ranking of Cities (2017-2019)

Period	Position	Number of respondents	Average score	Environment	Cleanliness	Housing and utilities	Neighbours	Child-friendliness	Sport and recreation	Shopping	Transport	Safety	Cost of living	Roads/parking space	Noise
2017	71	258,000		174	150	89	149	20	20	79	34	163	9		
2018	47	64,870	7.2	6.5	5.9	5.9	7.4	7.2	6.5	8.5	7.6	6.5	5.1	5.0	6.4
2019	63	90,000	6.4	6.4	6.1	5.5	7.2	7.0	6.5	8.7	7.1	6.5	4.5	4.4	

In 2019, Tyumen was at the top of the ranking with Moscow and St.Petersburg ranking 6th and 26th respectively.

A good example of how a city's or a region's performance can be adequately measured is the Urban Environment Quality Index, calculated by the Ministry of Construction, Housing and Utilities (https://индекс-городов.рф). This ranking was launched in 2018 as a part of the national project 'Housing and Urban Environment'. The Index is based on the evaluation of six types of urban space: residential buildings and surrounding territory; green spaces; social and business facilities and

surrounding territory; social and leisure facilities and surrounding territory, street network; and other public areas. The set of six criteria includes safety, comfort, environment and health, identity and diversity, technological innovation, efficient management. For each type of space there is one key criterion. The resulting evaluation matrix comprises 36 indicators used for desk review based on official statistics, data of GIS-systems and remote zoning of territories. Each city's performance in each indicator is evaluated by using a 0–10 scale. The integral index is calculated as a sum of all scores in all the indicators. The maximum index value is 360 points. The best cities to live are considered to be those that score more than 180. A region's index is calculated as an average of the indices of the cities located in this region. Table 3 shows the results of the Urban Environment Quality Index for Ekaterinburg and Sverdlovsk region in 2018-2019.

Table 3: Ekaterinburg and Sverdlovsk region in the Urban Environment Quality Index (2018-2019)

Period	Ekaterinburg	Sverdlovsk region
2018	191 points	165 points
2019	188 points	172 points

Unsurprisingly, Moscow and St.Petersburg, Russia's most famed cities and its former and present capitals, are at the top of this ranking.

The centre of information communications 'Ranking' in 2015 launched a project 'National Ranking' to study domestic and inbound tourism and compile annual rankings of Russian cities and regions depending on their popularity among tourists (http://russia-rating.ru/). The National Tourism Ranking is based on the following criteria:

- hotel accommodation and infrastructure (the number of hotels in the region, the number of bed places in hotels);
- the role of tourism in the region's economy (number of tourist agencies in the region, persons employed in the tourism industry as a share of the region's population);
- profitability of the tourism and hospitality industries in the region (hotels' revenues, volume of paid services, revenues of catering businesses);
- popularity of the region among Russian tourists staying for more than one day (number of Russian tourists staying at hotels; number of nights spent in hotels);
- popularity of the region among international tourists (number of foreign tourists staying at hotels);
- unique tourist attractions (the number of monuments and sightseeing spots included in the Unified State Register of Objects of Cultural Heritage and UNESCO World Heritage Sites);
- crime rates (offences per 100,000 population);
- interest in the region as a travel destination among Internet users (number of search queries);
- the region's media presence (number of publications in the mass media)

Table 4 illustrates the position of Sverdlovsk region in the National Tourism Ranking. Sverdlovsk region continues a steady climb in the ranking, its scores in the nine key criteria are constantly increasing (the statistical data for evaluation can be easily accessed from the official sources).

Table 4: Sverdlovsk region in the National Tourism Ranking in 2015-2019

Period	Position	Score
2015	-	Less than 50
2016	17	60.9
2017	10	83.5
2018	7	92.2
2019	10	100.2

In 2018, Sverdlovsk region moved to the seventh place in the ranking after hosting matches of the FIFA Football World Cup. Traditionally, Moscow and St.Petersburg occupy the top positions in the ranking: in 2019, Moscow scored 114.7 and ranked first while St.Petersburg came second with the score of 113.7.

Conclusions

The above analysis shows that even though there is a considerable gap between Moscow and St.Petersburg and other Russian cities, Ekaterinburg has a good chance to stand on a par with the leaders and build a strong brand by capitalizing on the key advantages of Sverdlovsk region. Ekaterinburg is a major industrial, economic and business centre of Russia with developed transport, business and hotel infrastructure. It ranks first in the country in terms of the amount of retail floorspace, third in terms of retail turnover, and fourth in terms of population. The city also has resources for tourism development.

Over 50 Orthodox churches and cathedrals make Ekaterinburg an attractive destination for religious tourism and pilgrimage. The most popular sites are the Cathedral-on-the-Blood and Ganina Yama - a complex of seven churches built on the place where the remains of the royal family were buried after the execution. The city has a vibrant cultural life with over 30 museums, 16 professional theatres (including the world-famous private Kolyada-Theatre), concert halls, a circus and a zoo. A number of state-of-the-art sporting venues, including the stadium Ekaterinburg-Arena (Central Stadium), which can accommodate 35 thousand spectators, makes the city suitable for hosting large-scale sport events. With its large exhibition centres ('Ekaterinburg-Expo, Centre of International Trade, 'Ural Exhibitions' Centre), Ekaterinburg provides abundant opportunities for business tourism: every year it hosts over 200 exhibition events, including the international exhibition and forum of industry and innovation INNOPROM. As for active tourism, Sverdlovsk region has 17 ski resorts and over 500 natural sites, which means large opportunities for natural tourism and eco-tourism.

An important thing to remember while building a brand is that in modern digital environment, information, positive and negative alike, spreads very easily. For example, in May 2019, Ekaterinburg became an arena for the confrontation between the authorities and local citizens over the plans to build a cathedral in honour of Saint Catherine. This conflict attracted considerable public attention in Russia. In June 2020, yet again Ekaterinburg turned up in the centre of a scandal surrounding the conflict between dissident priest Schema-Hegumen Sergii and the metropolitan bishop. Being in the centre of such scandalous events means that the city gains negative media publicity, which can be detrimental to its brand. Therefore, all of the key stakeholders (residents, regional authorities, businesses, historians, cultural activists and religious leaders) should participate in the development of the city's branding strategy. For successful promotion of the brand, it is necessary to use positive symbolic and unique events such as the forthcoming celebration of the 300th anniversary of Ekaterinburg and the World University Games (Universiade) in 2023.

Success of Ekaterinburg's branding strategy and the strength of its brand can be further monitored with the help of rankings that use objective indicators.

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Evolution of Terrorist Strategies and Their Impact on European Security

Danuta MIERZWA And Marek TOMASZYCKI

General Tadeusz Kościuszko Military University of Land Forces, WrocLaw , POLAND
Faculty of Management.

Correspondence details: danuta.mierzwa@awl.edu.pl, ORCID 0000-0002-4524-1241

marek.tomaszycki@awl.edu.pl, ORCID 0000-0001-7952-0954

Abstract

The phenomenon of terrorism based on Islamic fundamentalism is one of the biggest problems threatening the modern world. The main research objective of the article was to analyse the new strategy of terrorist attacks and assess their threats to Europe's security. The authors not only pointed out the potential terrorist threats to European countries, but also outlined the ways to combat them. In their view, the fight against terrorism should be supranational. The main research problem of the article is the analysis of terrorist strategies and the assessment of their threats to European security. The number of terrorist attacks has decreased, but their effectiveness in terms of fatalities has increased. Most of the attacks in the examined period were separatist. The total global cost of economic losses due to terrorism was estimated at $14.1 trillion for 2018 or 11.2% of global GDP. Europe is the second-best performing region after Central America and the Caribbean, according to GTI. Only eight European countries have worsened this indicator.

Keywords: Terrorism, Terrorist Tactics and Strategies, Terrorist Threats, State Security, Counterterrorism

Introduction

One of the biggest problems threatening the modern world is the phenomenon of terrorism based on Islamic fundamentalism. In the 21st century, in the era of digitization and global access to the Internet and media, terrorist organizations spread their propaganda with great ease. The ever-expanding democratization has provided an excellent basis for the development of terrorism, often referred to as the 21st-century bubonic plague due to its rapid spread. Using one of the main principles of democracy, the one concerning respect for minority rights, terrorists are recruiting new fighters and encouraging so-called "lone wolves" through social media and the mass media. In the fight against terrorism, civil liberties, despite their many advantages, also have many disadvantages. One notable example in this context is the media, as already mentioned.

Based on the experiences, in 2005, the Council of Europe drew up a document entitled "The Media and Terrorism," recommending that the media did not support terrorists by increasing public fear, because terrorist attacks are about creating as much panic and chaos as possible, and the images and information they present are often exaggerated to gain as much publicity as possible, an Świeca Candle, 2017; Szmidtka, 2016].

According to statistics, the number of terrorist attacks and their victims in Europe has decreased compared to the years 1970-1990, when there were up to 10 attacks a week, mostly by separatist organizations such as the Irish Republican Army (IRA) and left-wing ones such as the Rote Armee Fraktion (RAF) [El Ghamari, 2016; START, 2018b].

Despite the statistical decline in terrorist threats, governments cannot make their vigilance sleep and, therefore, continue to strengthen their cooperation in the international arena by improving their security systems [Tomasiewicz, 2014, p. 126; Wojciechowski, 2009].

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All the outlined above in this synthetic way contribute to creating a problematic situation that should become an object of interest and scientific investigation. The research area formulated in this way is interdisciplinary and includes, among other things, issues and problems remaining in the area of military sciences, humanities, the theory of organization and management, and praxeology.

It should be stressed that this is a dynamic scientific area that is constantly changing and should be systematically researched, analyzed, and improved if necessary. It is not possible to introduce specific solutions and stop there when the area of responsibility is the security and lives of its citizens. Fear often paralyzes people and prevents them from making free and fully informed decisions. A reliable assessment of the threats that may disrupt the current order can effectively predict terrorist attacks [Krzysztoń, 2016, p. 105; Kubiński, 2017, p. 201; Mierzejewski, 2011, p. 7].

The main research problem was the identification and characterization of the new terrorist attack strategy and the assessment of the risks arising from it to Europe's security.

This issue seems to be interesting and important, as it remains in the sphere of deliberations and discussions of the leaders of the world's major powers.

The effectiveness of the research was achieved through the application of selected theoretical and empirical research methodology used in the management, security, and defense sciences. The main research methods included analysis of source documents, scientific observation, induction and deduction, and synthesis. According to J. Sztumski [2020], J. Pieter [1967, p. 317nn] and T. Michalski [2008], these methods are ideal for comparing specific phenomena over time. Their greatest advantage is the possibility to use abstract thinking in them, thanks to which we can apply them in various combinations. Another important determinant was the concept and limitations of the article, as well as material, technical, and organizational conditions. The research process was conducted based on studies of subject literature, legal acts, Internet sources, and military studies. The sources mentioned above were used to draw as much objective information as possible from them.

The Theory and History of Terrorism

There are many definitions of terrorism in the literature. At the very beginning, it is essential to indicate the differences between terrorism and terror. The notion of terror is used primarily about the methods that governments apply to their people. The term terrorism, on the other hand, refers to the use of violence by society against the state authority. Nevertheless, both terms are now used as synonyms [Dietl, Hirschmann, and Tophoven, 2009, p. 27; Department of Homeland Security Strategic Framework for Countering Terrorism and Targeted Violence p. 12-19, Jerrold, 2004 p.22;].

For the purposes of this article, only a few of them will be given. The Global Terrorism Database (GTD) defines a terrorist attack as the threat or actual use of illegal force and violence by a non-state actor to achieve a political, economic, religious, or social goal through fear, coercion, or intimidation [START, 2018a;] Another definition of terrorism, according to the authors the shortest and most concise, comes from the "Dictionary of National Security Terms" [1996, p. 109] and reads: a form of violence consisting of deliberate action to extort or intimidate governments or particular social groups for political, economic, or other purposes.

In turn, the European Union has defined terrorism as acts which, by their very nature and context, can cause serious harm to a country or an international organization when committed with the aim of seriously intimidating a population, or unduly compelling a government or international organization to act or abstain from acting, or severely destabilizing or destroying the fundamental political, constitutional, economic, or social structures of a country or an international organization.

Given the examples, a generalization can be made, and it can be assumed that the characteristic feature of the definitions is that **they intimidate the communities and authorities of states with the intention to achieve specific benefits.**

When speaking of terrorism, it is worthwhile to know its elements and features, which are most commonly found in definitions. It will be helpful in further consideration of the subject. Table 1 shows a comparison of the occurrence of common elements and features of terrorism in the definitions in the analyzed articles made by the team of the Schmidt & Jongman and the team of l. Weinberg, A. Pedahzur, S. Hirsch-Hoefler. The first team analyzed 109 definitions, while the second 73 definitions of terrorism.

Table 1: Frequency of the occurrence of common elements, characteristics of terrorism in definitions (in %).

Element	**A. Schmid (1988)**	**Weinberg et al. (2002)**
1. Violence, force	83,5	71
2. Political nature	65	60
3. Fear, emphasis on terror	51	22
4. Threat	47	41
5. (Psychological) results and (anticipated) reactions	41,5	5,5
6. Diversified victim - target	37,5	25
7. Intentional, planned, systematic, and structured action	32	11
8. Combat methods, strategy, tactics	30,5	31,5
9. Abnormality, conflict with accepted rules, no humanitarian restriction	30	0
10. Extortion, enslavement, submissiveness	28	5,5
11. The publicity aspect, advertising	21,5	18
12. Randomness, impersonality, discrimination	21	0
13. Civilians, non-violent persons - neutral and standing aside as victims	17,5	22
14. Intimidation	17	11
15. Stressing the innocence of the victims	15,5	10
16. A group, movement, organization as perpetrator	14	29
17. Symbolic aspect, demonstrating force to others	13,5	5,5
18. Incalculability, unpredictability, unexpected violence	9	1

19. . Secret, hidden character	9	7
20. Uniqueness, seriality or advertising nature of violence	7	0
21. Criminal (aspect)	6	5,5
22. Demands towards the third parties	4	1

Source: Weinberg, Pedahzur and Hirsch-Hoefler, 2010.

After getting acquainted with the definitions and the most important elements and features contained in them, we will go down in the history of terrorism. A brief historical outline begins with the period after the Second World War, believing that earlier periods, although rich in terrorist experiences, would not significantly contribute to the publication. During that period, terrorist activity was modeled on large quasi-military organizations. Examples include the Irish Republican Army (IRA), which consisted of units of the military division and the legitimate political party Sinn Fein and organizations such as the Women's Movement and Irish Volunteers.

In the 1960s, there was a visible weakening of left-wing terrorism in favor of right-wing and national liberation organizations. Examples of right-wing organizations operating at that time are the French Organisation L'Armee Secrete and the Sicilian national liberation Esercito Volontario per l'Indipendenza Della Sicilia or the Cypriot Ethnic Organosis Kiprijon Agoniston, which fought against the British colonists, and the Tirol Befreiungsausschuss Sudtirol, which was active as a terrorist until 1970 with around 250 terrorist acts.

In the 1970s, left-wing terrorism, which militarized the so-called class struggle, began to dominate. The Italian Red Brigades, which dealt with the kidnappings and murders of their ideological and political opponents, were to the fore [Tomasiewicz, 2014, p. 126; Kraj, 2012]. In the same years, in Germany, the Rote Arme Fraktion (RAF) was active. It pursued its views through bombings, among others at the headquarters of American troops in Europe in 1972, kidnapping and murdering its political opponents, holding hostages, as was the case in Stockholm in 1975 when the organization occupied the German embassy. The RAF also robbed banks to obtain money to finance their activities [Holub, 2016, p. 62].

Today, terrorist groups can be formed under any conditions, from a poor to a highly industrialized European or Asian city. In general, underdeveloped countries and “failed states” are mainly seen as the most attractive places for criminals and terrorists because they carry little risk of interference by state and local authorities. The last decade has seen the most significant increase in terrorist activity in the last fifty years. It can be challenging to know precisely which terrorist groups are most active today and for which quantities of criminal acts they are responsible, as many of them have regional branches operating under different names. According to official statistics, the most active groups during this period include Boko Haram, Al-Shabaab, ISIL (the Islamic State of Iraq and Levant, often referred to as ISIS or DAESH), the Khorasan Chapter of Islamic State, and the Taliban (Figure 1).

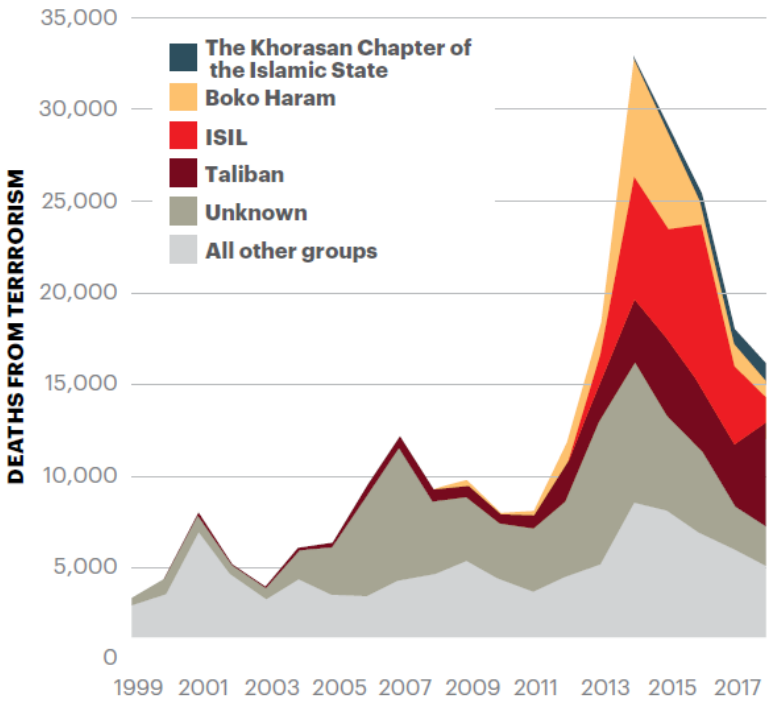

Figure 1: The four most active terrorist groups in 1998-2017 [START, 2019, p. 15].

The Evolution of Terrorist Tactics and Strategies

The methods and types of violence used by terrorists in individual years indicate a slow but constant evolution of terrorist tactics and strategies, including traditional ones such as murders, bombings, arson attacks, taking hostages, kidnapping, sabotages, mystification, and suicide attacks [Adamski, 2007, p. 60].

Newer tactics may include unconventional forms of terrorism, for instance, nuclear terrorism (making a dirty bomb, attacking a nuclear reactor, etc.), high-tech terrorism involving cyber-attacks, environmental terrorism (threatening to destroy the environment), or biological terrorism (using biological weapons) and terrorist attacks aimed at destroying cultural heritage. The evolution of methods and forms of terrorist activity is shown in Table 2.

Table 2: Evolution of methods and forms of terrorist attacks

Methods and forms of terrorist activity	Old	New
Assassinations against passenger aircraft	Taking hostages	To be used in suicide attacks
Assassinations against aircraft in general	Detonation of explosive devices with a timer	Use of MANPADS[1] or detonation of IEDs[2] assembled during flight
Assaults against ships	Taking hostages on passenger ships	Aiming to sink valuable war and white fleet vessels (tankers)
IED attacks	Using wire and time detonators. Use of ready-made explosives, available on the market	Use of remote explosion initiation systems. Use of military and self-made explosives
Armed attacks	Mainly on VIPs, military bases, police headquarters	Mainly hotels, bazaars, religious places of worship, lower level officials, isolated stations, civilians
Attacks against key state infrastructure	None	Coordinated attacks on oil and oil pipelines and power, communication, computer and drinking water distribution networks
Assassination methods	Hit-and-run tactics	Suicide bombings and combined attacks
Purpose of the terrorist action	Carrying out a spectacular attack that will draw the attention of the media and societies	Carrying out an attack that will result in as many victims as possible, which will draw the attention of the media and societies
Planned attacks at the management level of the organisation	Attacks planned against selected sites or a group of sites, without a "wider strategic vision"	Planned strategy of attacks, coordinated in terms of form, place and time

Source: Adamski, 2007, p. 60.

The techniques and tools used during attacks are also evolving. A quantitative list of the main techniques used by terrorists during attacks between 2002 and 2018 is presented in Figure 2.

[1] MANPADS - Man–Portable Air-Defense System.
[2] IED - Improvised Explosive Device.

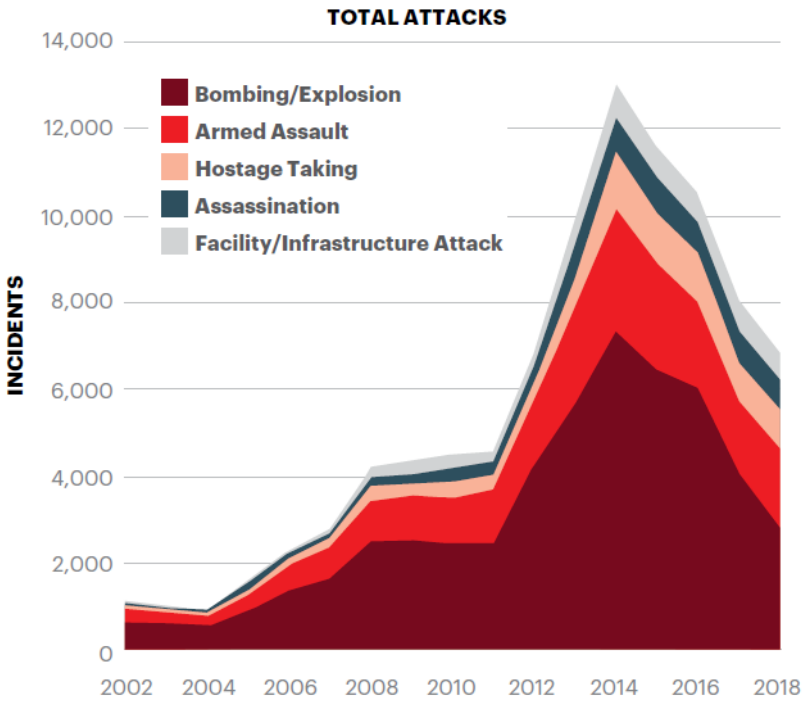

Figure 2: The number of individual techniques used by terrorists in attacks between 2002 and 2018 [START, 2019, p. 36]

When analyzing Table 3, it is easy to see that between 2015 and 2018 there was a reduction in the number of attacks carried out.

Table 3: The number of terrorist attacks carried out in the world between 2015-2018

Year / Category	2015	2016	2017	2018
Number of attacks	11 774	11 072	8584	8093
Number of countries where attacks took place	92	104	100	84

Source: Country Reports on Terrorism, 2019.

Unfortunately, this is an illusory picture of reality, because, at the same time as their number decreased, their efficiency grew, increasing the number of fatalities (Table 4). Only such a comparison, the number of attacks to the number of people killed in them, gives us a real picture of the effects of terrorist activities. It also makes us aware that nowadays it is not the quantity, but the size of the most important effects for terrorist organizations as it gives publicity in the media and ”fame.”

Figure 3 displays the causes of the terrorist attacks between 1970 and 2018.

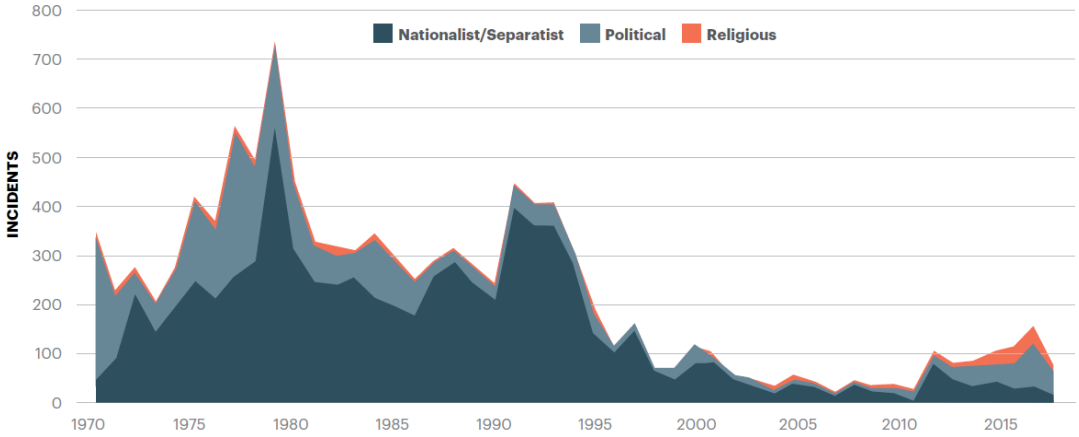

Figure 3: Terrorist attacks in the West by type, 1970-2018. [START, 2019, p. 47]

As can be seen, most of the attacks during the period considered were of a separatist (to a lesser extent political) nature, the number of which started to fall from 2000. From 2010 to 2018 a growth in politically and religiously motivated attacks can be observed.

Table 4: Global human losses due to terrorism in 2015-2018

Year / Category	2015	2016	2017	2018
Killed	28 328	25 621	18 753	32 836
Injured	35 320	33 932	19 461	22 651
Kidnapped	12 189	15 664	8937	3534

Source: Own study based on: Country Reports on Terrorism, 2019.

To continue to be effective, terrorist organizations must not only win on "battlefields" but also gain knowledge and evolve and win people's hearts and minds. If a terrorist group lacks the ability to learn, its effectiveness in achieving its goals will largely be determined by chance. Learning capabilities allows a terrorist group to adapt its actions to ever-changing circumstances through:

- developing, improving and using new weapons or tactics that can enable them to develop their capabilities over time,
- improving their members' skills in using existing weapons or tactics,
- collecting and using intelligence information needed to conduct operations effectively,
- combating measures to counteract their activities and thus enhancing the chances of survival of attempts to destroy the organization,
- preserving developed capabilities, even in case of loss of some members [Piekarski, 2015, p. 244; START GTD, 2018a; UNODC, 2018].

Therefore, the terrorist group‘s learning and change capabilities are a significant determinant of the level of threat it poses, as learning and change are the way organizations can seek solutions to problems that limit their freedom of action and limit their ability to achieve goals.

Each group brings its knowledge and experience, from which others can benefit. Lessons learned from the experience of other rebels and their techniques, tactics, and procedures result in a multiplication of strength.

Threats/Contemporary Terrorism/Today

Terrorist groups and individual terrorists have always used their environment and society to achieve their objectives. The development of civilization has brought more sublime ways of carrying out attacks in the 21st century. The technological development we are witnessing has been used perfectly by terrorist organizations, which has led to a 'new quality' of threats. The changes in terrorist groups' activities have also been greatly influenced by globalization, which has facilitated rapid access to many countries and places. Besides, the development of the information society has helped to increase fear. The Internet is now a tool used in psychological warfare, and one can say that it is a new kind of weapon used by terrorists, but also a new front of the fight.

The most dangerous terrorist groups in the world include Boko Haram, Al-Shabaab, ISIL, Taliban, and Al-Qaeda. Although there are probably cells of only one of them (ISIL) operating in Europe, all terrorist groups are a threat. There is little doubt that they will want or need to act together in the short or long term. That, in turn, will make a united, single-purpose grouping a considerable threat to Europe. Another growing security problem is that of the so-called "lone wolves" mentioned above, who watch terrorists from comfortable homes, assimilate with them, and radicalize themselves. Due to the lack of direct links and contacts with terrorists, they are tough for the services to work out.

The understanding of the term "lone wolves" has also recently acquired a new meaning. At the end of the fighting in Iraq and Syria with the so-called Islamic State (ISIL), strongly supported by Al-Qaeda and volunteers from almost all over the world, an order was probably given to some fighters to withdraw from the fighting and infiltrate countries of the Western World, mainly Europe and the USA. One group's task is to take cover, create a good starting point, and prepare for individual terrorist actions. These actions are to be carried out occasionally, according to the decision of the fighter or by order. Another group is to carry out "work at the base," spreading Jihad, building groups of social dissatisfaction, and creating new structures. Their task is also to recruit volunteers to carry out suicide actions and help in their organization.

In addition, given the social discontent caused by the influx of Muslim immigrants, it is possible to increase the problem of extreme right-wing terrorism[3], as in the case of Breivik or the 2019 attacks on mosques in New Zealand.

Terrorists use many tactics and techniques, mainly in Western countries, among other attacks using buses or trucks to drive passers-by or ram vehicles. That is the simplest and most effective way to carry out attacks. At the same time, such action is tough, and often impossible to predict, because the vehicle is most often conquered immediately before the action. Despite the controlled trade in weapons in Western countries and the increasing difficulty of access to them for law-abiding citizens, attacks with firearms or white weapons still cannot be underestimated. Bomb attacks or the use of chemical or biological weapons are also likely, but on a smaller scale, due to difficult access to components useful for creating such means of destruction and complicated procedures for preparing for action.

In addition to the threats to Europe's security that directly result from terrorist activity, there are several other aspects that can significantly impact the ability to prevent and combat terrorism effectively [CONTEST, 2018; NSS, 2017; National Strategy for Counterterrorism, 2018].

[3] Extreme right-wing (ultra-right) terrorism is based on an ideology combining various admixtures of racism, xenophobia, chauvinism, anti-Semitism, sexism (mainly misogyny), homophobia, anti-liberalism. It is limited to a form of militia (beating with dangerous tools and destroying property). The targets of extreme right-wing terrorist groups are most often immigrants, refugees, people of a different race, LGBT people, as well as people with a different worldview from the extreme right (left-wing, pro-choice, feminist, ecological, liberal, centrist, and moderately right-wing).

Let us look at the situation in Europe after World War II. Until the 1990s, the citizens of the world were seriously afraid only of the aftermath of the Cold War, but also a nuclear war that would ultimately destroy their homes, schools, and places of entertainment and contaminate the earth for hundreds of years. The real problem was the vision of the nuclear apocalypse caused by the two world powers, the United States (USA) and the Soviet Socialist Republics (USSR). Such a perception of the importance of threats distracted attention from terrorism and its importance for security, and at the same time, offered great opportunities for terrorist groups to act. Today we have a similar situation. We are coming closer and closer to a situation like that before 1990. Again, we have more and more tensions between the USA, Europe, and the rest of the so-called Western World and Russia and China. Once again, the specter of a global conflict using nuclear or other weapons of mass destruction is becoming a danger. The question is: *will this push the fight against terrorism into the background?*

Various types of pandemics can also pose a threat to an effective fight against terrorism. Let us pay attention to what happens during a COVID – 19 pandemic. In principle, we do not see another topic or threat is just a pandemic. We should consider it from the point of view of terrorists: *Are they also afraid of a pandemic?, Have they interrupted their preparations for subsequent attacks?* Knowing their determination, they use this time with even higher activity to prepare for the next attacks.

The last problem raised by the authors is the financing of expenditure on the fight against terrorism. It is directly related to the last two threats since the money will also be divided into increased needs resulting from them.

Since the terrorist attacks of 11 September 2001, international support for more effective counterterrorism measures and responses has led to closer international cooperation in counterterrorism matters and a widespread tightening of the approach to prosecuting "terrorists." More money was then allocated, from $76 billion in 2001 to $111 billion in 2014 (Figure 4). It was imperative in the context of the observed increase in exports and globalization of terrorism by groups such as Al-Qaeda and the so-called Islamic State in Syria and Levant (ISIL) [Thomas, 2018]. However, the trend is not showing clear signs of the decline of its scale and popularity.

Looking at the following years, however, we see a significant drop - 38% in spending (Figure 4) from $54 billion in 2017 to $33 billion in 2018.

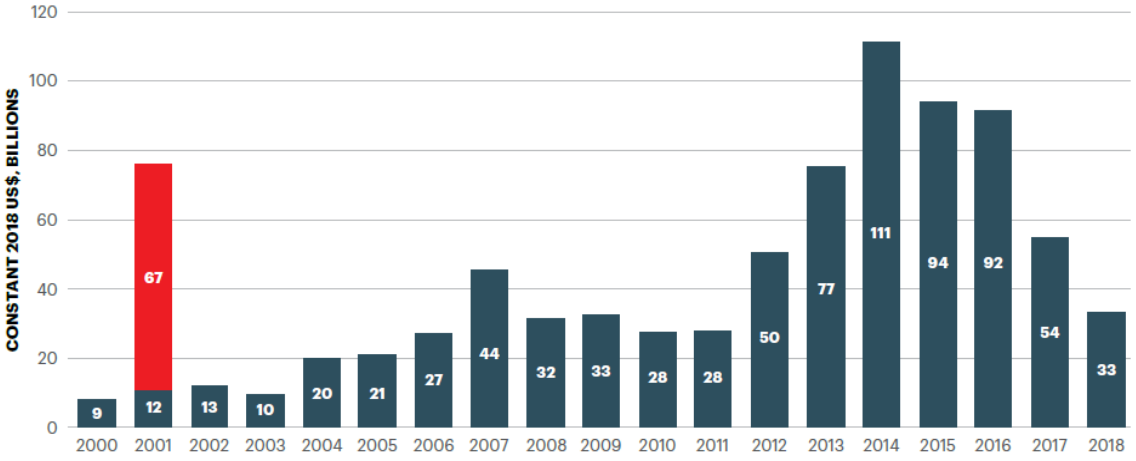

Figure 4: Global costs of counterterrorism spending in 2000-2017 (in billion). [START, 2019, p. 29]

With such a downward trend, there may not be enough money for an effective fight against terrorism. The total amount of global economic losses resulting from terrorist attacks is estimated at $14.1 trillion for 2018, or 11.2% of global GDP [START, 2019, p. 31].

Estimating these costs is very cautious, as they do not take into account the long-term consequences of terrorism resulting from limited tourism and related business, production, and investment activities. The economic impact of terrorism varies in regions, as shown in Table 5. In Europe, the effect of terrorism on economic losses is estimated at 0.6.

Table 5: Economic impact of terrorism by region, $US billions, 2018.

REGION	ECONOMIC IMPACT OF TERRORISM (US$ BILLIONS)	REGIONAL ECONOMIC IMPACT AS PERCENTAGE OF THE GLOBAL TOTAL
sub-Saharan Africa	12.17	37%
Middle East and North Africa	11.9	36%
South Asia	5.87	18%
Asia-Pacific	1.22	4%
Europe	0.6	2%
South America	0.59	2%
North America	0.49	1%
Russia and Eurasia	0.23	0.7%
Central America and the Caribbean	0.12	0.4%

Source: START, 2019, p. 47.

The impact of terrorism on individual European countries has been estimated according to the GTI[4]. Europe recorded an improvement in 25 out of 36 countries in 2018 and is the second best-performing region after Central America and the Caribbean, as shown in Table 6.

[4] It is based on the Global Terrorism Database (GTD), which is the most reliable source of data on terrorism. The GTI has been developed in consultation with the Global Peace Expert Panel on the GTI Index. The GTI assesses each country on a scale from 0 to 10; where 0 means no impact of terrorism and 10 represents the most tangible impact of terrorism. Countries are ranked in descending order with the worst results listed first in the index.

Table 6: Europe GTI score, rank & change in score, 2002-2018.

Country	Overall Score	Regional Rank	Change 2002-2018	Change 2016-2018
Turkey	6.533	16	2.365	-0.503
United Kingdom	5.405	28	1.102	-0.205
France	5.008	36	1.269	-0.467
Germany	4.254	44	1.791	-0.347
Greece	4.167	45	0.748	-0.124
Belgium	3.636	53	3.207	-0.424
Sweden	3.450	56	3.355	-0.486
Spain	3.354	59	-1.645	-0.670
Italy	3.109	63	0.488	0.373
Ireland	2.692	69	2.606	-0.353
Netherlands	2.347	77	0.934	0.387
Kosovo	2.255	79	-1.757	-0.439
Finland	2.026	81	2.026	-0.475
Austria	1.655	84	1.645	-0.197
Bosnia and Herzegovina	1.388	88	-0.378	0.049
Montenegro	0.999	97	0.694	0.961
Denmark	0.957	101	0.957	0.140
Czech Republic	0.866	102	0.637	-0.696
Poland	0.477	106	0.038	-0.242
Lithuania	0.458	108	0.458	0.458
Albania	0.420	110	-0.194	-0.588
Cyprus	0.420	110	0.010	-0.786
Bulgaria	0.372	112	-1.217	0.057
North Macedonia	0.301	115	-3.776	-0.348
Latvia	0.229	117	0.038	-0.229
Switzerland	0.191	118	-0.402	0.057
Hungary	0.181	119	0.152	-0.182
Estonia	0.115	123	0.058	-0.114
Serbia	0.115	123	0.115	-0.114
Norway	0.076	128	0.076	-0.077
Slovakia	0.057	129	-0.096	-0.058
Iceland	0.029	133	0.029	-0.028
Croatia	0.000	138	-1.033	-0.014
Slovenia	0.000	138	0.000	0.000
Portugal	0.000	138	0.000	0.000
Romania	0.000	138	0.000	0.000
	Regional average		**0.397**	**-0.158**

Source: START, 2019, pp. 42-43.

Only eight countries worsened their index, while three countries recorded changes in their score. According to Europol (TE-SAT, European Union Terrorism Situation, and Trend Report), between 2013 and 2015, the number of terrorist attacks, both failed or thwarted, as well as those carried out, has steadily increased within the EU. In 2013, there were a total of 152 attacks, in 2014. - 201, and in 2015. - 211 The above trend changed in 2016 when the number of attacks fell (142). In the past year, they took place in the UK (76), France (23), Italy (17), Spain (10), Greece (6), Germany (5), Belgium (4), and the Netherlands (1). For several years now, the number of injured or victims of terrorist acts has remained at a similar level in the European Union. In 2015, 151 people were killed, and 360 were wounded across the EU, while 142 were killed and 379 wounded in the late year.

Another important aspect is the number of people arrested in European Union countries on charges of terrorism. In 2013 it concerned 535 cases, in 2014 – 774, and in 2015 - 1077. The trend changed in 2016 when there was a slight decrease to 1002 cases. In this context, a particularly worrying trend is the increase in the number of arrests for terrorist activities motivated by Jihadist ideology. In 2012. It was 159 in 2012, 395 in 2014, and 718 in 2016. It should be noted that in the past year about 70% of all detainees for terrorist activities were Islamists, compared to 50% two years earlier. In 2016, the highest number of such cases was registered in France - 429 (a total of 456 people was detained in France for various activities related to terrorism). Spain (69), Belgium (62), the Netherlands (36), Austria (30), Italy (28), Germany (25) were also in the lead. It is worth noting that in 2016 no Islamic arrests took place in the United Kingdom, although it is there that one of the largest Muslim communities in Europe lives, and the local population of radical Islamists is currently estimated at around 20,000. Moreover, as already noted, in 2016, the most significant number of acts of terrorism in the United Kingdom was recorded (but only on separatist grounds). The extent of this phenomenon in individual EU member states is shown in the summary [Wojciechowski, 2017].

To sum up the problem under consideration, it is safe to say that the real threat of terrorism to European countries exists, and the emerging new security picture does not allow us to look optimistically into the future. Therefore, there is nothing left to do but to be prepared for an effective fight against terrorism, especially anti-terrorism [Morell,Michael 2015 ;Jones, 2014;] and counterterrorism (direct combat) [de Sousa, Mirza, and Verdier, 2009; Warner and Matfess, 2017].

The knowledge about terrorist threats should be steadily spread among society, not based on intimidation because it has a negative effect, but building awareness.

What is more, it should be stressed that only joint action by all countries in Europe and its immediate environment can allow these tasks to be performed effectively. The European Union should be the leading organization responsible for legal regulations and the organization and efficient management of the implementation of tasks in practice. It is worth considering building supranational anti-terrorist forces, able to act quickly in separate operational areas.

Conclusion

Summarizing the above considerations, we can formulate some important conclusions for European security:

- There is still a real threat of terrorism to European countries, and the emerging new security environment does not allow us to look optimistically to the future.
- Knowledge about terrorist threats should be constantly spread among the public, not based on intimidation because it has a negative effect, but building awareness.
- Preparation for an effective fight against terrorism, mainly through anti-terrorism (prevention) and counterterrorism (direct combat), should become one of the most important objectives of the European Union countries and Europe.
- The European Union strategy [2005] on combating terrorism sets out four areas of action: protection, prevention, response, and prosecution. The strategy, in line with the opinion of European law experts, has given Member States individual responsibility.
- Only joint action by all countries in Europe and its immediate environment, as well as cooperation with other partners of the broad coalition of states to fight global terrorism, can make it possible to carry out these tasks effectively, and this implies a change in the European Union's (counterterrorism) strategy towards team responsibility (see above).

- The European Union should be the leading organization responsible for legal regulations, as well as for **organizing and efficient direction of task performance in practice**.
- Counterterrorist activities (direct combat) should include the creation of transnational counterterrorist forces, capable of rapid action in separate operational areas, at the disposal of separate regional headquarters (command centers) of the European Union (with the possibility of participation of non-EU countries, voluntarily declaring their intention to take part in the program).
- Attention should be paid to the possibility of using the potential of the EU forces, which has not yet been properly (in principle) used.

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Designing and Implementing of a Prototype Biometric Door

Bogdan BADEA
Petroleum-Gas University of Ploiesti, Romania
gbucur@upg-ploiesti.ro

Gabriela BUCUR
Petroleum-Gas University of Ploiesti, Romania
gbucur@upg-ploiesti.ro

Adrian MOISE
Petroleum-Gas University of Ploiesti, Romania
amoise@upg-ploiesti.ro

Cristina POPESCU
Petroleum-Gas University of Ploiesti, Romania
cristinap@upg-ploiesti.ro

Abstract

Biometric technologies are in a period of rapid development, and the interest of potential users is focused on the advantages and disadvantages that this technology offers, in terms of security, economy and convenience. The purpose of this paper is to show the design results for implementing the biometric control system for a door access. The prototype of the assembly was done with the help of a Creality CR-10 3D printer, through FDM - Melted Filament Modeling Method.

Keywords: Biometric Technology, Security Control Access, 3D Printing

Introduction

The development and improvement of information collection and processing systems have led to the modernization of access systems. Thus, security systems based on biometric technologies are presented as a viable, low-cost alternative to systems based on magnetic cards, barcodes or passwords.

The use of biometrics to identify and authenticate human subjects has begun to offer some unique advantages over traditional methods. Only biometric authentication is based on the identification of a certain intrinsic part of the human being. Systems based on magnetic cards, barcodes or physical keys can be lost, stolen or multiplied. The security offered by biometrics can be assisted by keys, passwords, PIN codes, so that the validation of the access depends on the person who requests it, not on what he knows, or what he has, but on what he is. It should be noted that biometric security resources are based on the person using them, effectively eliminating the risk that was associated with the old technology, while providing a much higher level of security that suits both users and system administrators.

Theoretical Aspects

Biometric Technology

Biometric technologies involve capturing a person's biometric data, transforming it into a biometric pattern (template), storing it in a database, and then verifying that person's identity by comparing the biometric pattern with the individual's appropriate characteristic. These systems ensure rapid identification and have a low failure rate. Obviously, identification with a fingerprint reader is faster than using, for example, an identity card. At the same time, because identification is done through a unique characteristic of the person and by eliminating the human factor, identification is more secure.

A fingerprint or iris scan is much easier to use than a normal password, especially if you want a long one. Most modern smartphones only need a few seconds to recognize a fingerprint, giving the user access. The biggest advantage of biometrics is that a hacker must be physically nearby to find out the

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necessary information. This narrows the circle of suspects if someone finds out only user-known information. Proximity is also a factor that can help catch the perpetrator, which cannot be applied to a hacker from another continent.

In this context, biometric technologies are structured on the following principles or stages of operation (Fig 1):

- capture of information to be analyzed;
- information processing and creation of a data file - signature file;
- stage (verification phase);
- transmission of the results of the comparisons to the decision factor (user).

A fingerprint is the representation of the epidermis of the finger: it consists of a pattern of ridges and grooves interspersed as mentioned by Maltoni et al (2009). Peak discontinuities (eg, terminals or bifurcations) are called characteristic points (minutiae).

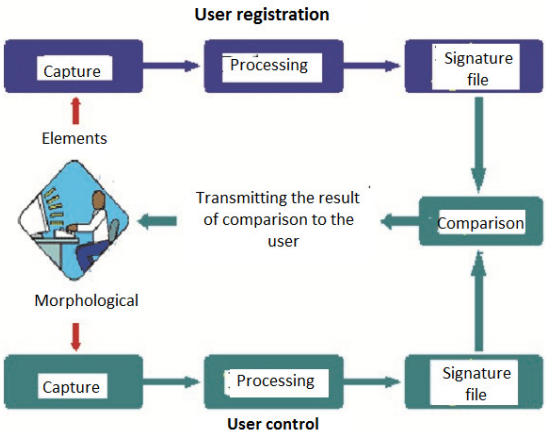

Fig. 1*: Principle structural scheme of biometric technology*

Identification algorithms, based on characteristic points, usually consider each characteristic point as a triplet $m = \{x, y, h\}$ encoding the spatial coordinates and the angle of the ridge. The set of attributes belonging to the characteristic points extracted from a fingerprint is called a template. Fingerprint matching consists of comparing two patterns to determine if the two sets of characteristic dots come from the same finger. Two characteristic points are considered matched if the spatial distance between them is less than the given spatial threshold and their directional difference is less than the given angular threshold. Such thresholds are needed to compensate for the inevitable errors made by characteristic point extraction algorithms and to take into account distortions caused by skin elasticity. Matching the characteristic points in practice can be a difficult task.

In the book by Lee and Gaensslen (2001), there are two important technologies used for fingerprint sensors: optical and capacitive. Optical sensors require a light source that is refracted through a prism. The finger is placed on a glass plate. The source illuminates the fingerprint and the image is captured. Capacitive sensors no longer require the optical device, the fingerprint image is obtained by measuring the voltage created between the skin and the polycarbonate plate of the reader. The capacitive sensors must have a surface similar to that of the finger. They are susceptible to noise, including 50 Hz noise from the user's network, as well as the internal noise of the sensor affects them. Electrostatic discharge, salt from perspiration or dry fingers may interfere with image capture from the sensor. As shown in the book by Ashbaugh (1999), data regarding the relative placement of lines, notches, forks and intersections are stored in a file of the user's database and then compared with the data entered into the computer by this user. Following the instructions, the subject enters a 1-9 digit PIN code by typing. At the signal, the finger is positioned on the reader board and then retracted. A numeric code is created. At the signal, the finger is positioned again, several times, for comparison. The whole operation must take less than 2 minutes. The file size is between 500 and 1500 bits.

Analysis and representation of fingerprints

The papillary impression is a reproduction of the epidermis on the finger, produced when the finger is pressed on a smooth surface. The most obvious structural feature is the pattern of ridges and valleys; In an image of a footprint, the ridges are closed areas and the valleys are open, Fig 2.

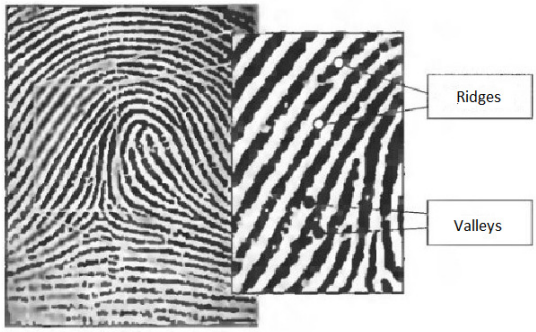

Fig. 2: Ridges and valleys in an image with a fingerprint

In the book by Maltoni et al (2009), fingerprint-specific features are generally described on three levels. The Level 1 feature set can be detected globally and includes singular points (core and delta), papillary structure, ridge orientation field, and ridge frequency.

In addition to the orientation field, the frequency (density) of the papillary ridges can be extracted, which represents the average number of ridges traversing a segment of a certain length centered in the pixel for which the ridge orientation was calculated and oriented orthogonally thereon, Fig. 1.3 (b). In general, the information provided by the orientation field is much more important than that extracted from the density of the ridges.

Analyzed globally, the fingerprint model exposes one or more regions in which there are distinctive shapes (characterized by large curves), as mentioned by Jain et al (2007). These regions (called *singularities* or *singular regions*) can be classified into 3 typologies: *loop*, *delta* and *whorl*, Figure 3 (a).

The loop and whorl define singular nucleus points, associated with the point of maximum curvature of the papillary ridges.

Single regions are generally used to define the fingerprint pattern, on the basis of which fingerprint classification can be performed, in order to simplify fingerprint retrieval and search applications. According to Roddy and Stosz (1997), fingerprint pattern is one of four features that can be extracted globally from the fingerprint image.

The Level 2 feature set is calculated locally and refers to the details in the fingerprint image called minutiae. "Mint" means small detail and in the context of fingerprints refers to the many ways in which papillary ridges can be broken or divided.

The thickness of the papillary ridges, their shape, their curvature as well as the details such as incipient ridges, scars, warts, and the most important pores, form the set of Level 3 features.

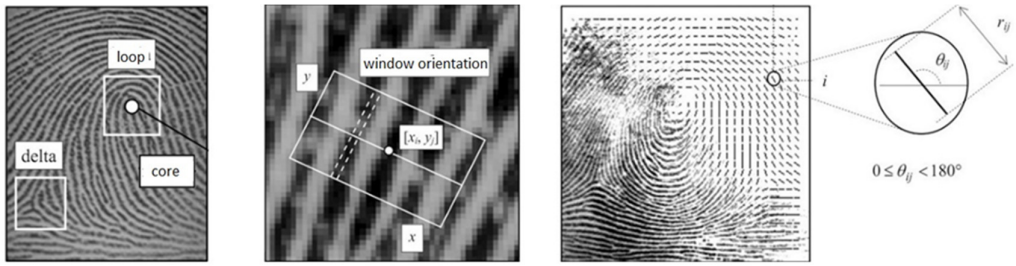

Fig. 3: Level 1 global features: (a) single points, fingerprint pattern, (b) ridge frequency, (c) ridge orientation field.

If the images are acquired at a high resolution (eg 1000Dpi), the sweat pores can be clearly identified, Fig 3 (a). In fact, every ridge on the epidermis (the skin surface) is dotted with sweat pores along its entire length. In a study developed by Stosz and Alyea (1994), it is mentioned that, although the information provided by the pores (number, position, shape) is very distinctive, very few automatic fingerprint matching techniques use these pores because a very high resolution and very good image quality are required.

Modeling the Sliding Door Assembly

The design and realization of the assembly was done with the help of a Creality CR-10 3D printer, through FDM - Melted Filament Modeling Method.

Using this method, a filament of a molten thermoplastic material is extruded through the nozzle at the end of the filament removal system onto the layered surface to make the designed objects.

Each new layer will be deposited on top of another layer and attached to it because the extruded material hardens almost immediately after being removed through the nozzle. FDM printers usually use ABS plastic, PLA, biodegradable polymers, and some more "eccentric" ones even use concrete, chocolate, sugar or other unusual foods.

3D printable models can be created with 3D design software or 3D scanning. Figure 3 shows a model of the designed sliding door. The sketch corresponds to the scale of the real object, all dimensions being measured and designed so as to facilitate the work in the mechanical assembly stage.

Before printing a 3D model from an STL file, it must first be processed by a software, commonly called a "slicer", which converts the model into a sequence of subtitle layers and produces a series of commands. travel on the three axes of travel and information on the deposition of material. These commands form G-Code (in the case of the printer studied in this paper), but the name may differ depending on the printer or software used. There are several such slicer programs including Skeinforge, Slic3r, KISSlicer, Cura, etc.

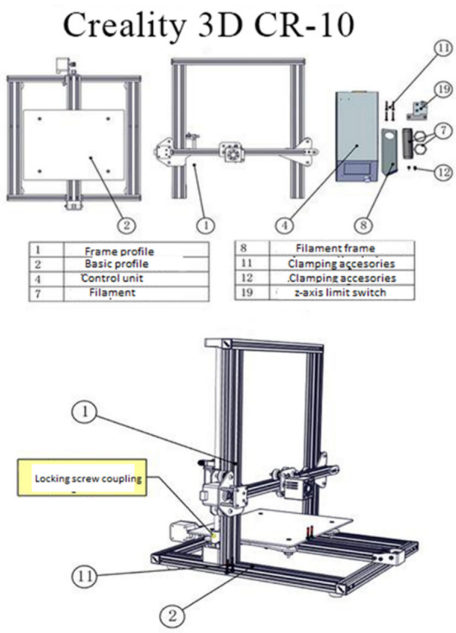

Fig. 4: Creality CR-10 3D printer diagram

The 3D printer follows the instructions in the G-Code to deposit successive layers of material to form the final object. These layers, which correspond to the virtual sections of the CAD model, are automatically joined and glued, thus achieving the final shape.

The main advantage of this technique is the ability to create almost any desired geometric shape. The printer resolution describes the thickness of the deposited material layer, the X-Y resolution in number of dots per inch (dpi) or micrometers (µm). The thickness of a layer is usually around 100 µm, ie 250 dpi, although there are printers that can make layers of tens of µm. From the software, we can change this thickness according to the requirements of the application. The XY resolution is comparable to the resolution of traditional laser printers. The points are about 50 - 100 µm in diameter.

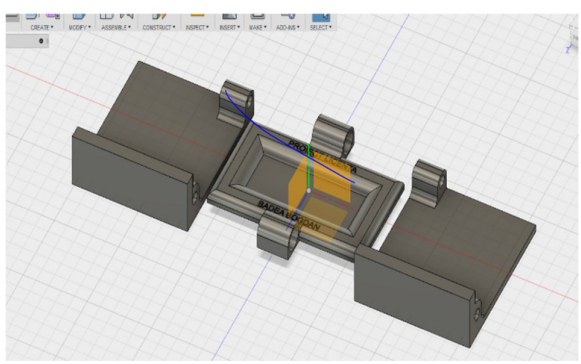

Fig. 5: 3D model designed for the sliding door

The block diagram of the sliding door system

The block diagram consists of CPU (central processing unit - development board with an ATmega328 microcontroller) that executes the program through arithmetic and logic operations, as well as system input / output operations, R305 fingerprint scanner sensor module, 4x3 matrix keyboard, 1602 LCD module, a pulse driver and a bipolar stepper motor. A threaded rod is connected to the motor shaft on which the sliding door runs. There is also a DC power supply (Fig 6).

When powering the system, the LCD displays a message for entering the password code, once the correct code is entered, the CPU allows the fingerprint to be scanned, if the fingerprint is correct the CPU sends the signal to the driver who controls the motor step by step; it opens the sliding door, after the interval of 2000 micro seeds the door closes and the system returns to its original shape.

The motor chosen for this application is NEMA 17 (National Electrical Manufacturers Association), from the category of bipolar stepper motors.

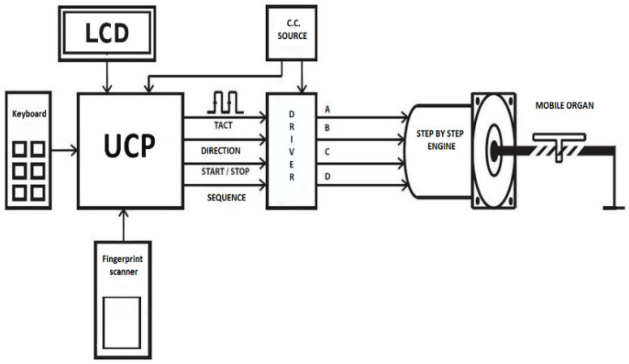

Fig. 6: Block diagram

A bipolar motor has two coils that are permanently fed, the torque obtained having an optimal value compared to the unipolar model where only one of the two coils is fed, thus resulting in a low torque. The bipolar motor has four connecting wires and the unipolar one has six, and is controlled by reversing the current through the two coils, in turn. The NEMA 17 motor, model 103H5208-10U41 has the following main features: 1.8°/step, recommended voltage varying between 12 volts and 24 volts, phase current of 2 amps and torque of 59 Ncm.

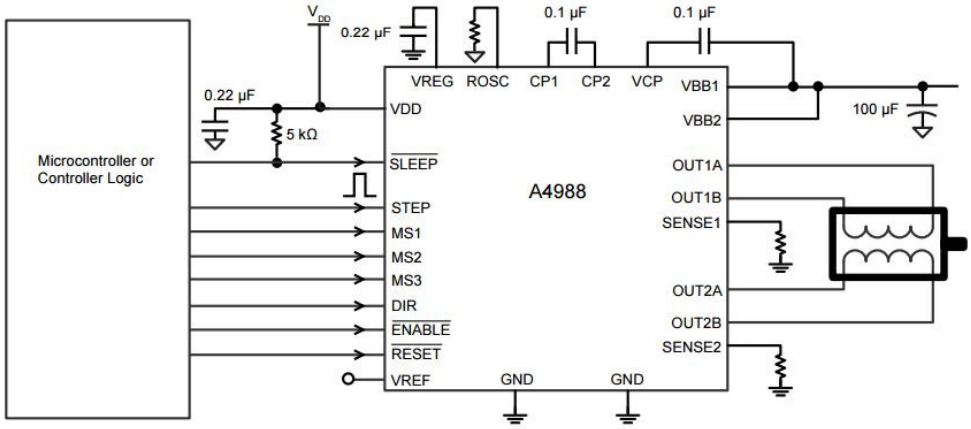

Fig. 7: Driver interconnection scheme

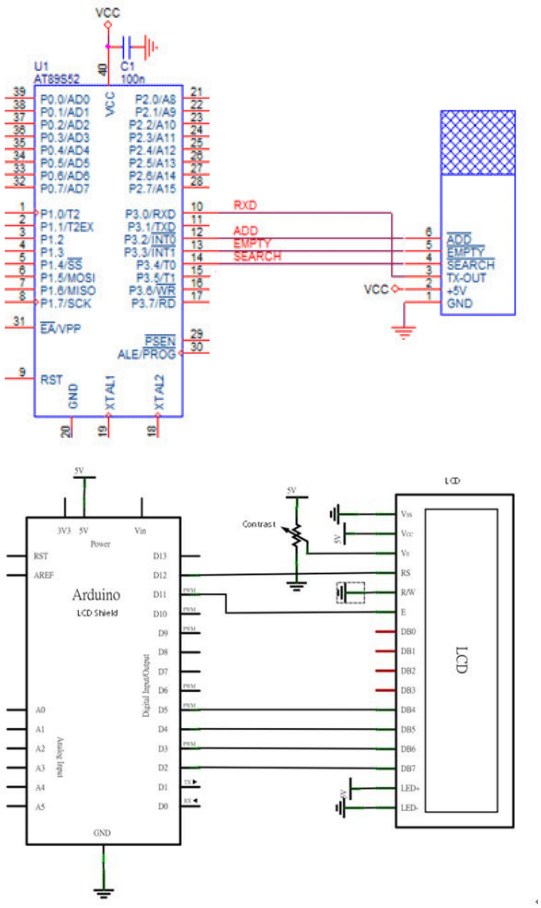

Fig. 8: Interconnection diagram for module R305

The motors perform a complete rotation in a number of 200 steps, to which is added the level of the desired resolution, and multiplying these two values, we will obtain the number of effective steps of a complete rotation.

Hardware drivers are used for motor control. The driver model is A4988 and it was chosen due to its easy-to-use control interface and easy configuration and interconnection. The interconnection diagram with the microcontroller and the stepper motor is shown in Fig 7.

R305 print sensor module with TTL UART interface was used for direct connection to the microcontroller or PC via the MAX232 / USB-Serial adapter (Fig.8). Connect the microprocessor or system with TTL communication and send data packets to take pictures, detect prints, hashes and searches. Up to 162 fingerprints can be stored on the built-in FLASH memory. The supply voltage is in the range of 3.6 - 6.0VDC, while the maximum current is 120mA. LCD 1602 module with blue backlight was used to display the messages, the supply voltage is 3.3 V.

To control the password code, a 4x3 matrix keyboard was used, with 12 buttons (numbers from 0 to 9 and special characters: "*", "#"). Maximum supply voltage 24VDC, maximum current 30 mA, 8 output pins.

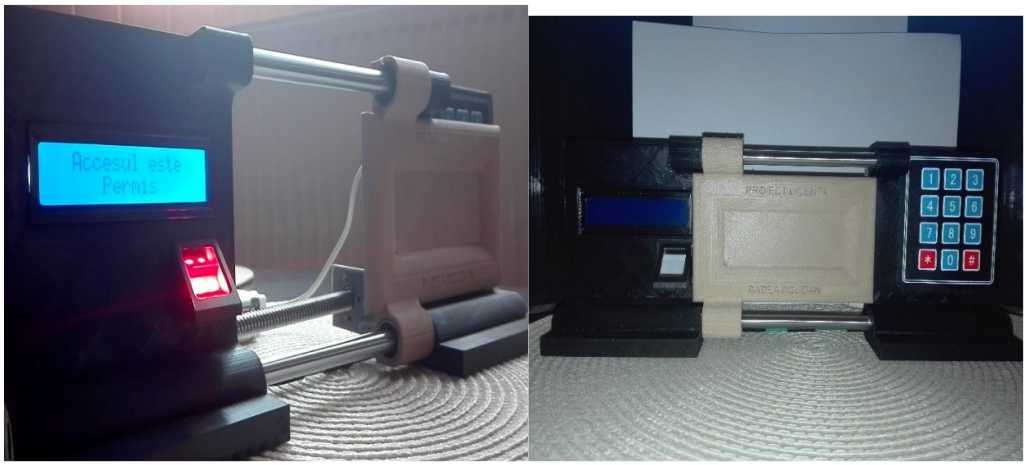

Fig. 9: The prototype door

Programming the microcontroller

The programming of the microcontroller was made in the C ++ programming language, language in which the following source code was elaborated, from which a fragment is presented:

```
... #include <LiquidCrystal.h> //display library
#include <Keypad.h> // keyboard library
#include <Adafruit_Fingerprint.h> //fingerprint lib
#define mySerial Serial
int pozisyon = 0;
const byte ROWS = 4; //4 columns
const byte COLS = 3; //3 rows
bool s= false;
int MotorStep = 9;
int MotorDir = 10;
int MotorEN = 11;
    ...
```

After displaying the message "Enter password" enter the code set in the first part of the code "8989"; if it is entered correctly the message "Password is Correct" is displayed, and the message "Fingerprint Verification" appears; if the code was incorrectly entered, the message displayed is "Password is incorrect."

```
    …
delayMicroseconds(1000);}
      delay(2000);
      for (int i=0; i<2070; i++){
      digitalWrite(MotorDir, LOW);
      digitalWrite(MotorStep, HIGH);
      delayMicroseconds(1000);
      digitalWrite(MotorStep, LOW);
      delayMicroseconds(1000);}
      digitalWrite(MotorEN, HIGH);
  lcd.clear();
  s=false;
  return finger.fingerID;
}
```

Conclusions

Using biometric technology, the employer can check if the employees have complied with the work schedule and, at the same time, if they have fulfilled their duties on time. Also, fingerprint models are very useful in limiting staff access in certain areas, or when using certain machines. Only those specially trained to program a machine will be able to start, adjust or use it, thus avoiding errors that can sometimes have serious consequences on the production line.

One of the first implementations of security biometrics is access to special places of maximum security (bank, laboratories, weapons room), offering access only to persons enrolled in the system. They are effective because it is necessary for the person to be present, a system that is very difficult to break.

Biometrics can also be used in automation, it can help start machines, laptops, equipment or production machines only to authorized persons.

It is easier to access that person's database, which could be introduced at the airport or portable devices connected to the network to help state bodies to more easily find out the identity of certain people, which is necessary for anti-terrorism or wanted persons. The practical way of biometric systems is that it can replace a credit card, driver's license, passport or identity card, once the data is entered into a network.

Last but not least, biometric technology could offer a personalized driving experience: when the car "recognizes" the driver, elements such as car temperature, music, navigation system or seat position could be automatically adjusted based on his preferences.

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The Relevance of Online Communication for Conference Attendees Motivation. Differences between German and Portuguese Participants

Hanna KAZAK

Bachelor of International Business and Communication – ISM University of Management and Economics, Vilnius, Lithuania
Email: kazakay@gmail.com

Ricardo Fontes CORREIA

Associate Professor – Instituto Politécnico de Bragança; UNIAG-Applied Management Research Unit, Campus de Santa Apolónia, 5300-253, Bragança, Portugal
Email: ricardocorreia@ipb.pt

Abstract

The main goal of this paper is to understand whether there are different motivational factors of decision-making processes to attend a conference from people of different nationalities (namely Portuguese and Germans) as well as their social media usage and preferences. After the literature regarding the topic was analysed in order to guide the research, a quantitative empirical research in the form of an online survey of 20 questions was conducted. 53 respondents in Germany and 56 respondents in Portugal were analysed. The findings revealed no significant differences between the 2 markets. The results gained from the empirical research revealed useful to be used as guideline for the development of a social media-marketing plan in Germany for a company responsible for the organization of a big annual event for Product Managers in the Southern part of Europe that collaborated with this study.

Keywords: Online communication, Conference, Attendees Motivation, Marketing.

Introduction

The social media usage in recent years has been increasing dramatically due to the growing number of social networking sites, instant messaging services, online forums and mobile smartphones (Lai & To, 2015). And nowadays, social networks are one of the important components of marketing strategies and campaigns of companies aimed at attracting customers (Nadaraja & Yazdanifard, 2013). But without a correct social media strategy and social media plan, there is no chance to successfully run the companies (Saravanakumar & SuganthaLakshmi, 2012).

The company's existence in social media networks helps build close relationships with customers in various industries around the world (Sashi, 2012) and event management industry is not an exception. The event management industry continues to prosper offering attendees more and more event choices from which they can choose (Global Meetings and Events Forecast, 2019). Due to the industry's rapid growth, it is having difficulty attracting more attendees to events; therefore, developing a reliable and effective system for assessing the factors considered by the participants of the event is in the interest of contribution to the event marketing practice (Yoo & Chon, 2008). Competition between venues and events underlines the need for a better understanding of the attendee's behaviour and their decision-making process (PCMA Survey, 2003, as cited in Severt, Wang, Chen & Breiter, 1987).

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Which factors influence attendees when deciding to attend an event, what are the main reasons for attending the event, what social media channels attendees use and which sort of content is the most attractive, as well as other important questions that are related to the habits of using social networks, must be answered for the successful event planning and communication.

The goal of this research is to explore and understand if there are differences between German and Portuguese attendees' motives for the decision to participate in a conference, their social media usage and preferences and whether it is worth to adjust social media marketing plan for each of these 2 different markets.

This paper is divided in four main sections. The research starts with the literature review and an overview of the main definitions regarding social media and the conference industry. Secondly, we describe and justify the methodology used in this research. Then we introduce the empirical research results and discussion of the research main findings. The paper ends with the limitations of the study and suggestions for further research.

Literature Review

Social Media

The 21st century is experiencing a social media revolution that has already led to enormous changes in how consumers receive and use marketing communications (Williams, Crittenden, Keo & McCarty, 2012). On average, people spend a quarter of their free time on the Internet (Meesad, Sodsee & Unger 2017). But even though social media networks has become one of the main part of our everyday life, the companies are still struggling to understand the customers in their social media and why and how they use it (Whiting & Williams, 2013). For consumers, digital media is now not only a resource for researching the products and services they want to purchase, but also to engage with the companies and other consumers (Garretson, 2008). Therefore, social media should be one of the components of the company's marketing strategies (Nadaraja & Yazdanifard, 2013). And the companies that really understand the online behaviour of their customers have an advantage to engage with them (Woodcock, Green & Starkey, 2011). But before implementing a social media marketing plan, it is essential to clearly define goals and target audience (Preston, 2012). Moreover, McCann and Barlow (2015) emphasized that a company should have a clear strategy and understanding of how and what it will be used for. According Castronovo and Huang (2012) by formulating a social media strategy, a variety of social media tools can be used based on the goals of the strategy and the trends in social media usage among the target market. Defining the right strategy as well as conducting research on the target audience for this strategy are the main components of effective social media development for companies (McCann & Barlow, 2015).

Nowadays, the Internet is considered as the most cost-effective and more efficient way to engage with people (Castronovo & Huang, 2012). Social media facilitates the interaction between buyers and sellers and gives the opportunity to better understand customers (Sashi, 2012). Social media marketing can be used to achieve various goals, including increasing traffic, increasing search engine rankings, or increasing sales of a product or service (Weinberg, 2009). The increase of market share and brand awareness could also be achieved by creating an appropriate social media strategy, which would be less costly than using traditional marketing tools (Rafiee & Sarabdeen, 2013). Even companies with a limited budget can run successful social media marketing campaigns with little or no cash investment (Nadaraja & Yazdanifard, 2013). Moreover, social media platforms give comprehensive opportunities to customize user engagement (Hanna, Rohm & Crittenden, 2011). And Farook and Abeysekera (2016) also emphasized that one advantage of social media is its positive effect on customer online engagement.

Conference Customer Engagement

In recent years with the evolution of the Internet and various social media channels, the concept of customer engagement has increased its importance. Patterson, Yu and De Ruyter (2006) define customer engagement as the level of different "presence" of the customers, such as physical, emotional or cognitive in their relationship with the organization. Farook and Abeysekara (2016) examined that the content of social media posts plays an important role in customer online engagement and noted that the higher the impact of social media marketing, the higher the customer engagement. According to Kilgour, Sasser and Larke (2015), in order to increase the social media engagement, it is important to understand the various user groups and their interaction on social media channels.

People attend conferences for various reasons and their decision depends on their priorities, interests, and tastes and marketers approach should reflect their preferences in building a marketing plan (Preston, 2012). However, Preston also emphasized that different approaches should be used aimed at separate market segments that is why it is important to research and analyse the target market of potential customers.

In order to improve a strategic marketing campaign, it is important to understand people's motivation and their decision-making process for attending various events (Gitelson & Kerstetter, 2000). Potential attendees have different requirements and motivational factors and participate in the conferences for various reasons (Hoyle, 2002).

Multiple motivations are usually the norm for the decision to travel and attend conferences. Rittichainuwat, Beck & Lalopa (2001), divided the conference motivations into 2 groups: the push factors related to human needs which motivate to travel an attend conferences, and the pull factors more related with the conference attractiveness and technical features. They also consider facilitators and inhibitors factors. The facilitators "refer to factors that encourage travel, such as availability of time, money, and good health" and inhibitors, "which are exemplified by the lack of money, time, and good health, discourage conference participation." (Rittichainuwat, Beck & Lalopa 2001, p.47). According to the authors the top five major conference motivations were "Education", "Networking" "Interesting conference programs", "Career enhancement" and "Traveling to desirable place". The top three major conference inhibitors were money, time, and distance. And the top four major conference facilitators were "Covered travel expense from my employer, school", "Affordable conference costs", "Affordable transportation costs", and "Time availability".

Getz, (2007) classify the motivators in 2 large groups: the first one is the 'intrinsic motivators', which are related with escapism that connects the event with a desired leisure pursuit. This escapism "leads people to events for the generic benefits of entertainment and diversion, socializing, learning and doing something new" (p.416). The second group named as "the pull or seeking factors" is related "to those with special interests who want a specific set of benefits offered by the event." (Getz, 2007, p.416) and the professionals who have to attend certain conferences because of their content or unique networking possibilities are mostly included here.

Oppermann and Chung (1997) were the first who developed a conceptual framework for decision-making of participation in conventions. This model represents how different variables influencing the decision-making of potential attendees. Personal or business factors, association or conference factors, location factors, and intervening factors are the four main factors that influence an individual's decision-making process when attending a conference. The figure below represents the conference participation decision-making process.

Personal or business factors. The first factor that any potential attendee takes into account when deciding whether to attend the conference or not is the conference accessibility that includes the conference cost, family concerns, health of attendees and time availability of participants. Moreover, one of the conference attendance motivators that are related to personal and business factors is the desire to learn something new to become a better specialist in the field and professional advancement.

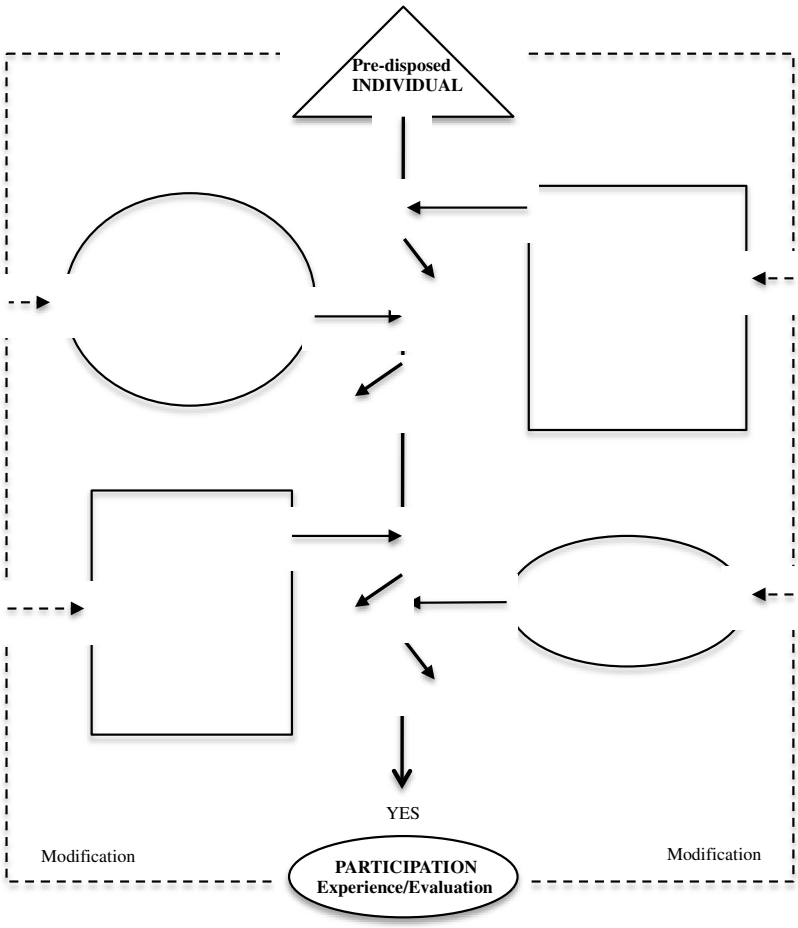

Figure 1: Conference Participation Decision-Making Process. Source: Oppermann & Chon (1997 p.186)

Association or conference factors. This factor is associated with the involvement of a person in the corresponding association: networking and job opportunities, personal interaction with like-minded people and making professional contact play a major part in deciding whether to attend the conference or not.

Location factors. Favourable conference locations nearby the airport or home are important factors considering whether to attend the conference or not. Moreover, the closest location will save time and money and decrease the expenditure cost of attendees. For some people, the climate of the country where the conference is held can also influence decision making to attend the conference.

Intervening factors. Oppermann & Chung (1997) emphasized that conferences should not only compete with each other for attendees but also compete against other related products or services. Other conferences, for example, are taking place in another more attractive location, at different times or with better speakers and programs can be one of the intervening options for potential attendees. It may also refer to a different way of spending the time rather than going to the conference. Such opportunities also include spending time with family, traveling or simply staying at home and watch the conference online.

Research and Data Collection Method

When choosing the research methodology and the way the data is collected, the aim of the research has a high influence. The aim of this research is to better understand the motivation of product managers to attend conferences, and to collect information about social media usage and preferences of product managers to improve consumers' engagement. Moreover, we wanted to understand whether there are different motivational factors of decision-making processes to attend the conference from people of different nationalities (namely Portugal and Germany) as well as their social media usage and preferences.

Considering the goal of the research we follow a non-experimental quantitative research. Due to geographical limitations the quantitative primary research in the form of online survey was chosen to collect the data. The non-probability sampling technique was used throughout the research using a convenience sampling design.

The survey was distributed, with the help of the marketing department of a company responsible for the organization of a big annual event for Product Managers in the Southern part of Europe. The survey, which was constructed in English and had identical questions for both German and Portuguese respondents, was placed on social media channels of Facebook, LinkedIn, Instagram and Twitter, sent in the company newsletters of the 6th and 14th of November 2019, and sent by email to the attendees of the conference organized in 2019 by the company that collaborated with the study.

In total 135 people participated in the survey, however, after the preamble to survey for consent to participate in research and the question of where do respondents live, 26 respondents were eliminated because they didn't meet the requirements for the survey. 109 respondents were selected for further analysis: 53 respondents from Germany and 56 respondents from Portugal.

Both German and Portuguese attendee's online survey consists of 20 questions and was grouped in 4 categories: demographic characteristics, attitude toward the conference, motivational factors and social media usage and content preferences. This survey was designed to better understand the motivation of product managers to attend conferences and the factors that influence decision making to attend professional events.

Results

Decision Making and Attractiveness Factors.

Attitude toward the conference. Two questions were asked in order to analyse the attitude of respondents toward the conferences in terms of how often they attend the conference per year and if there are any other resources besides going to the conference to develop themselves as a product management professionals. Almost all the respondents (46 (87%) from Germany and 51 (91%) from Portugal) indicated that they read blogs, articles, books and other resources that are on topic. 36 (68%) respondents from Germany and 35 (63%) from Portugal mentioned that they attend the conferences. What concerns how many conferences do participants attend, on average, in a year, the majority of respondents 41 (77%) from Germany and 37 (66%) from Portugal attend conferences 1-2 times per year.

Motivational factors. A block of questions in this section was asked to find out what factors influence the respondent when deciding to attend the conference. Respondents were asked to evaluate factors in terms of importance from 1 - not important at all, to 5 - very important. From the Figure 2 below it is clear that the most important factor for both German and Portuguese attendees are prestigious speakers, ease of access and the price of the tickets. Travel expenditures are not too far behind. And the expectations related to a partnership with organizations that protect the environment and famous brand name of the company are the least important for attendees.

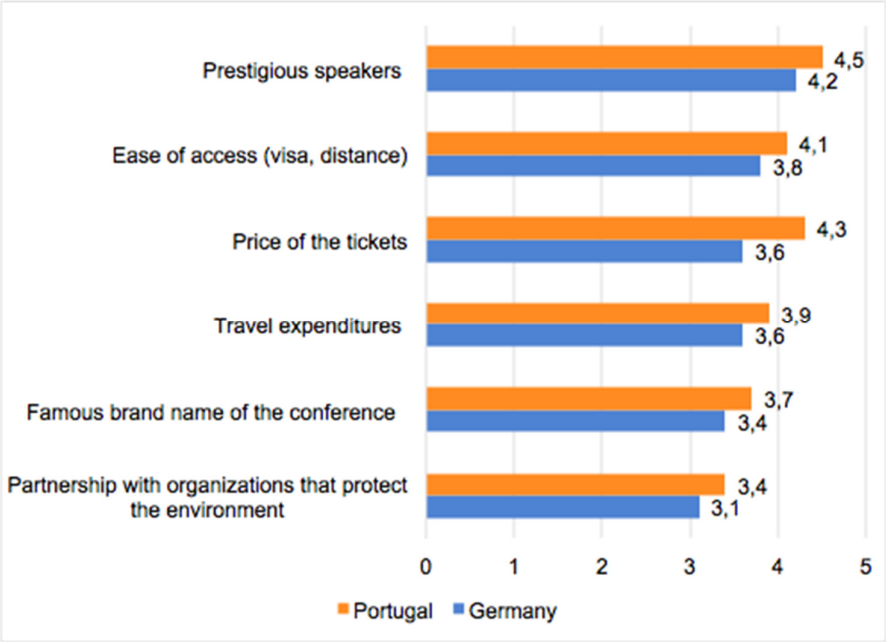

Figure 2: Bar graph. Average evaluation of respondents' factors to attend the conference.

When respondents were asked to evaluate their motivation to attend the conference using the level of measurement in the range from 1 to 5, from the not important at all to very important, the results showed that the most important motivational factors for attendees to get theoretical knowledge and to get inspired (Figure 3).

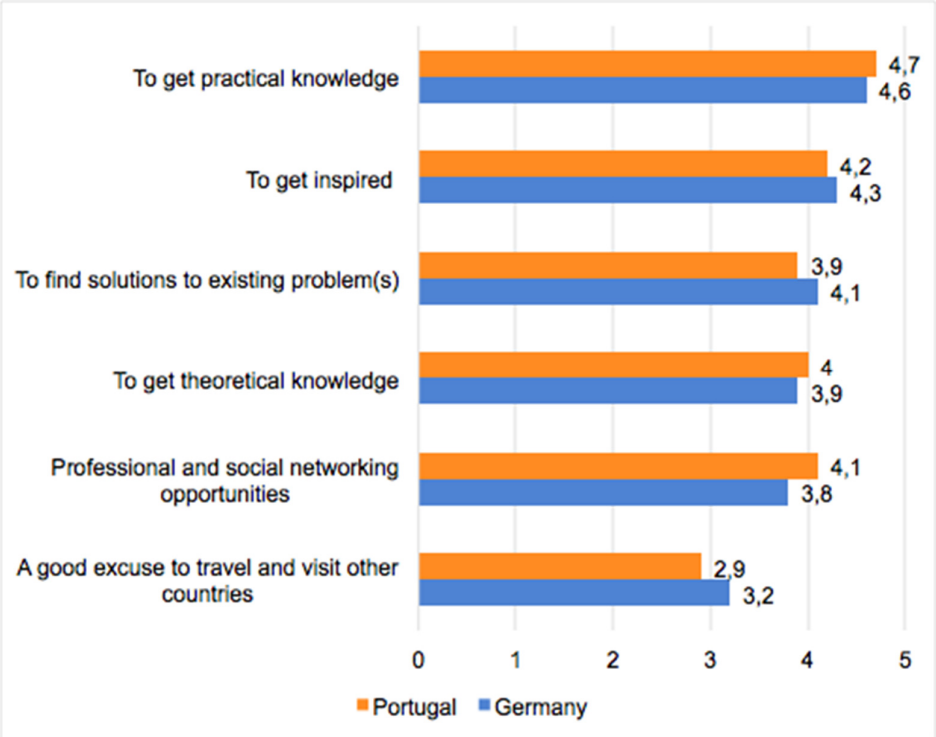

Figure 3: Bar graph. Average evaluation of respondents' motivation to attend the conference.

Respondents were asked where would they first search for the conference if decided to attend the conference. 25 respondents (47%) from German and 32 (57%) from Portuguese attendees mentioned that google search in most cases is the most preferable way of search for the conference. In the second place, 30% of German attendees and 27% of Portuguese attendees prefer to search in social media.

The respondents were asked with whom they attend conferences. Results revealed that 32 respondents (60%) of German attendees prefer to attend the conference with their co-workers while only 18 attendees (32%) form Portugal mentioned that. Portuguese respondents are most likely to attend the conference alone and more than half of the respondents (59%) indicated that.
According to the survey, regardless of the country the majority of respondents 20 (38%) from Germany and 25 respondents (45%) from Portugal pointed that the best alternative to the conference is YouTube videos with speakers' talks. Live streaming of the conference goes after and accounts 26% of German answers and 32% of Portuguese.

Social media usage and content preferences. This part of the survey was moulded to collect information about the social media usage of respondents. Figure 4 below shows that the most popular social media platforms in terms of how often it is used is LinkedIn, Youtube, Instagram and Facebook.

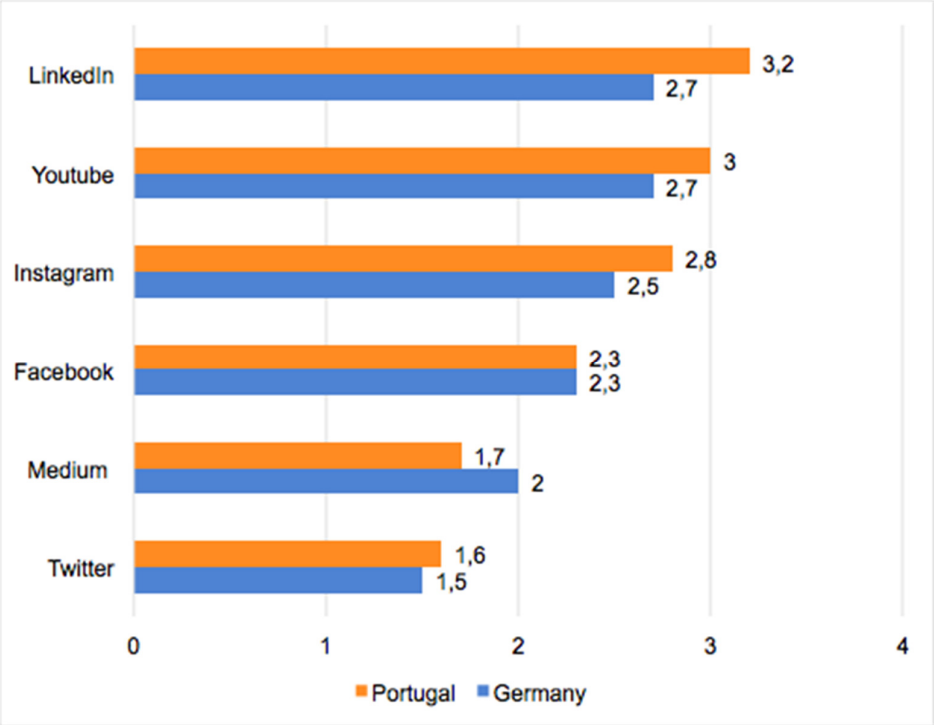

Figure 4: Bar graph. Average evaluation of respondents' usage of different social media platforms.

From the question regarding which part of the day you are the most active on social media the majority of respondents, 34 (64%) from Germany and 27 (48%) from Portugal answered that they are most active in the evening. 13 (25%) of German and 8 (14%) of Portuguese are most active in the morning.

Respondents were asked to indicate their level of agreement with a statement with five-items focused on identifying what is their internal motivation for using social media (Figure 5). The most highly rated answers were "I use social media to connect and keep in touch with friends and family" and "I

use social media to know the latest news ". Social media as a source of relaxation and entertainment is also not far behind. It is meaning that respondent fall under 3 categories of social media users: social interaction, information seeking and entertainment.

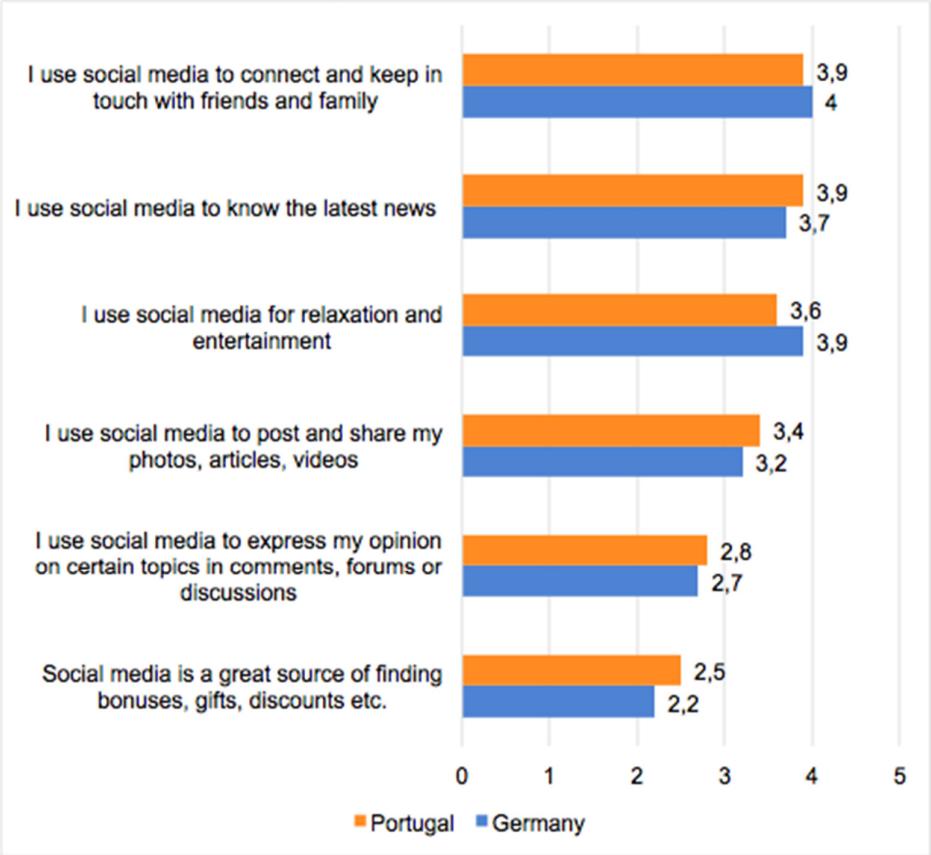

Figure 5: Bar graph. Average evaluation of respondents' purpose of social media usage.

During the survey respondents were asked what types of content do they prefer when learning about companies and their products or services. The figure below (Figure 6) shows that the most frequent answers were long articles, videos and social media posts. However, German respondents value social media posts more than the Portuguese, while they prefer to watch videos.

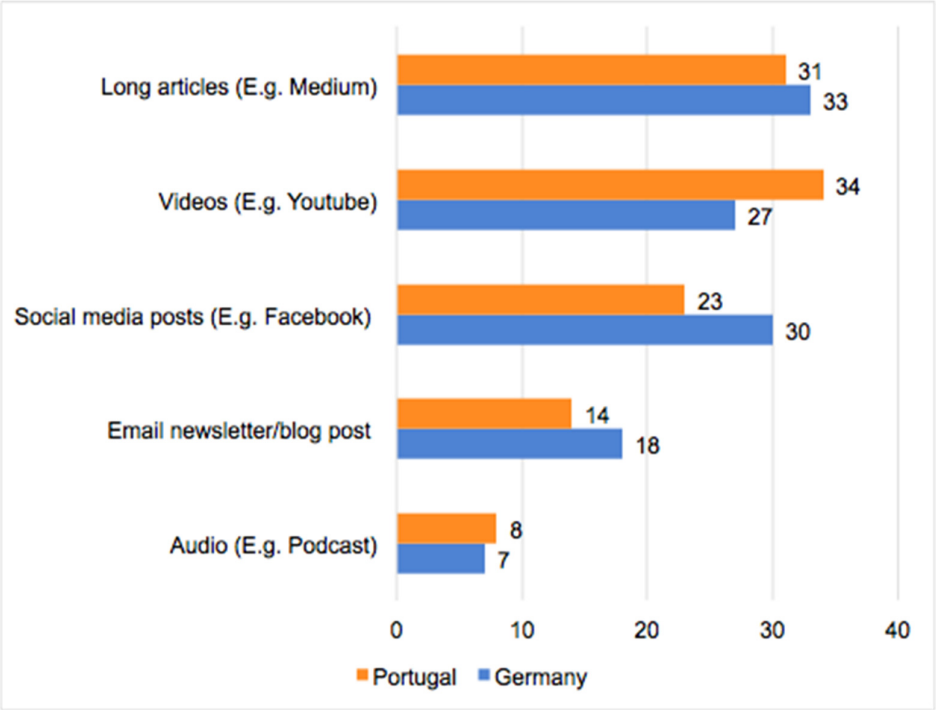

Figure 6: Bar graph. What types of content respondents prefer when learning about companies and their products or services

While conducting the survey participants were asked to evaluate how interesting is each of the following content for them in social media channels (Figure 7). The level of measurement in the range from 1 to 5 was used from strongly disagree to strongly agree. The information about speakers and their talks as well as educational materials about product management are the most interesting content for German and Portuguese respondents. Information about backstage and sales or discounts is not relevant for both respondents groups.

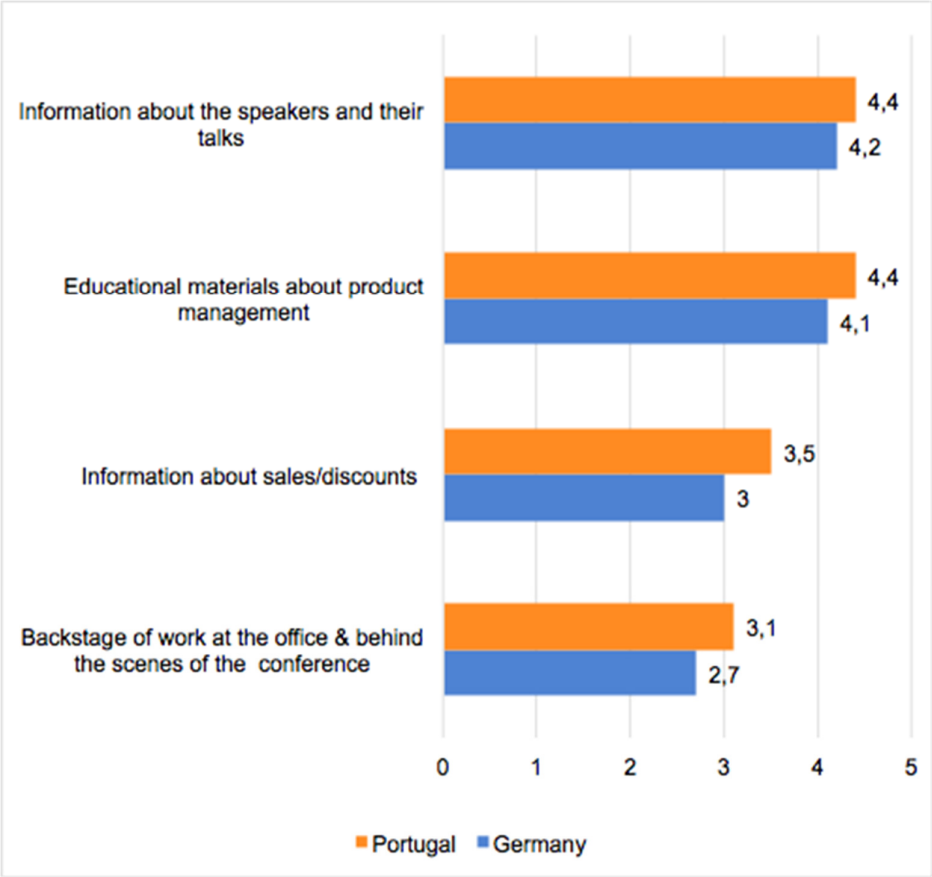

Figure 7: Bar graph. Average evaluation of respondent's interest in the content of social networks.

Conclusions

While analysing the empirical research results there were no significant differences identified between the markets. But still is possible to identify small differences between the German and Portuguese Market. Firstly, German attendees commonly has 0-9 years of work experience, when Portuguese are more likely to attend conferences in the beginning of their career and has 0-3 years of work experience. Secondly, German attendees prefer to attend the conference with their co-workers while Portuguese are most likely to attend the conference alone. Moreover, long articles and social media posts are the most preferable type of content for German market, while Portuguese value more videos.

No other significant differences were identified between markets that assure that adapting social media marketing plan will not result in significant unsuspected issues in different markets. All the results will be used in the further development of managerial decisions of the company that collaborated with this study to improve its social media-marketing plan in Germany.

The study faces some limitations, such as time and geographic restrictions, as well as the fact that the survey was not conducted in the respondents' native language. Due to the research limitations the sample size was not big enough and can lead to bias interpretation of the results.

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Optimization Models for The Shelf Space Allocation Problem with Vertical Position Effects

Kateryna CZERNIACHOWSKA and Marcin HERNES

Wroclaw University of Economics and Business, Komandorska 118/120, 53-345 Wrocław, Poland
{kateryna.czerniachowska, marcin.hernes}@ue.wroc.pl

Abstract

Shelf space allocation is one of the most important processes in retail management. It influences not only this process performance and costs but also the quality of relationships with customers and customers' satisfaction. The shelves on which products are displayed in retail stores are some of the most critical resources in the retail environment. The category management and shelf space allocation decisions are therefore issues very important to the retail industry. The objective of this paper is to develop a practical shelf space allocation models with vertical position effects to compare retailers' profit, considering it as linear and non-linear with space elasticity parameters. A comparison of the developed models is also presented. Results obtained from experimental data sets using the CPLEX solver show a significant difference between these solutions.

Keywords: Merchandising, Planogram, Retailing, Shelf Space Allocation, Solver.

Introduction

Shelf space allocation is one of the most important processes in retail management. The traditional form of sale is still important, despite the rapid growth of e-commerce. Even during the Covid-19 pandemic, customers make shopping in traditional form, especially in the food industry. It influences not only the process performance and costs but also the quality of relationships with customers and customers' satisfaction (Flamand et al., 2018). Moreover, the choice of shelf space allocation approach can have a significant impact on sales forecasting, delivery planning, procurement, financial flows, and other retail processes. Often the retailer can also stimulate the purchases of products even if they are not really in the customer's needs (Frontoni et al., 2017). Therefore, decisions related to shelf space management and allocation are the critical factors influencing retail companies' efficiency. The literature presents a great variety of shelf space allocation problem (SSAP) models with the common goal of maximizing the total profit by deciding on the number of product facings on each shelf, without considering their location on the vertical shelf level or horizontally within the shelves. One of the major drawbacks of the SSAP literature is that shelf space allocation models pay no attention to merchandising rules based on fast moving products and the product price, i.e. they neglect vertical shelf levels for basic and luxury products. The next reasonable limitation we figure out is that the SSAP literature totally omits such allocation features as capping and nesting, which provide the retailer with additional revenue. Capping signifies allocation of a product on the top of another one with the possibility of changing the orientation of the top product to allocate more products. Nesting signifies allocation of a product inside another one as a bucket.

The objective of this paper is to develop a practical SSAP models with vertical position effects to compare retailers' profit considering it as linear and non-linear with space elasticity parameters. Our contribution is related to developing mathematical models consider different vertical levels based on product prices, which makes the planogram visually attractive to customers as well as generating more revenue for the retailers allocating more expensive products on eye-level. To the best of our

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knowledge, such a model has not yet been developed. Therefore, the main contribution of this study is extending the shelf space allocation theory with SSAP models with a linear and non-linear profit function considering vertical position effects with regard to four constraint groups (shelf constraints, product constraints, multi-shelves constraints, and category constraints). We also provide an experiment comparing these two models on various practical problem sizes with the CPLEX solver.The rest of the paper is organized as follows. Section 2 presents an analysis of the related works and Section 3 provides the problem definition. The mathematical models for both problems are presented in Section 4. Numerical results of the computational experiments are given in section 5. Conclusions are drawn in Section 6.

Related Works

Shelf space is one of the most critical resources which attract customers' attention in a retail store. Currently, there is a lot of ongoing research on SSAP. Appropriate shelf management decisions enable customers to easily find, compare, and approach the products sold at the store (Düsterhöft 2020). Flamand et al. (2016) performed experiments to measure the elasticities. The data had been collected from wide retail chains with a high number of stores. Within these series of experiments, only category elasticities were estimated, and shelf space allocation decisions were not considered. The researchers' experiments proved that impulse buying products have higher space elasticities, i.e. increasing the shelf space for them results in increased sales. The major drawbacks of their experimental studies are time, cost, and inefficiency. The reliability of the results is doubtful if the product is presented in multiple places within the store. Moreover, a significant promotion on a similar product, or holiday or seasonal items can totally change the demand for the product being examined. What's more, product elasticity parameters do not remain the same during a long period; they also should be continuously estimated (Dalkilic, 2007). Price, promotion, and assortment variety influenced by the category in the overall retail, own label programs, as well as advertising also affect product demand (Dhar et al., 2001). Commonly, category and shelf space decisions should consider substitution possibilities between similar features. But such substitution effects are difficult to predict, estimate, or obtain from a real store (Bianchi-Aguiar, 2015). Murray et al. (2010) developed a joint optimization SSAP model considering display orientation and product price. They included in their model price cross elasticity, which is much easier to be measured and predicted than cross elasticity. Chen et al. (2014) investigated the product placement problem in designing online product web listing pages, which an issue very close to retail SSAP. They developed an optimization model to determine how to allocate products of the same category over multiple Web pages with the goal of profit maximization. (Karampatsa et al. 2017) states, that shelf space allocation models do not clearly and comprehensively address assortment selection, neglect substitution effects between products, and ignore the stochastic nature of demand.

Problem Definition

With limited shelf space and plenty of regular and new products included in the assortment, the retailer must decide on each product's quantity and selling price and allocate the products as effectively as possible using the available shelf space. Many retailers are now turning to shelf space allocation models to maximize their total profit. Before presenting the mathematical models considered in this paper, we introduce some definitions related to shelf space allocation. Planograms are graphic representations of product allocation on the fixtures or shelves which allow the retailer to define the position of the product on the shelf and its number of facings. The number of facings, which is a very important variable in SSAP, is defined as the quantity of items that can be directly displayed on planogram shelves. Items, which cannot be seen, are not considered in this research. In our research, we define the following variables and parameters. Subscripts mean a variable's indexes, superscripts mean a variable's mnemonics and don't mean indexes or powers.

Parameters and indices: K - total number of categories; G - total number of subcategories; S - total number of shelves; P - total number of products; k - category index, $k = 1,...,K$; g - subcategory index, $g = 1,...,G$; i - shelf index $i = 1,...,S$; j - product index, $j = 1,...,P$.

Parameter of a category $k : m_k$ - minimum category size as percentage of the shelf length.

Parameters of a shelf $i : s_i^l$ - length; s_i^d - depth; s_i^h - height.

Parameters of a product $j : p_j^w$ - width; p_j^d - depth; p_j^h - height; p_j^s - supply limit; p_j^u - unit profit; p_j^k - category; p_j^g - subcategory; p_j^n - nesting height, $p_j^n \le p_j^h$, or $p_j^n = 0$ if a product can't be nested;

$$p_j^{o_1} = \begin{Bmatrix} 1, & \text{if front orientation is available for product } j \\ 0, & \text{otherwise} \end{Bmatrix}$$ - front orientation binary parameter;

$$p_j^{o_2} = \begin{Bmatrix} 1, & \text{if side orientation is available for product } j \\ 0, & \text{otherwise} \end{Bmatrix}$$ - side orientation binary parameter;

p_j^l - cluster; $f_j^{\min}$ - minimum number of facings; $f_j^{\max}$ - maximum number of facings; $c_j^{\max}$ - maximum number of caps per facings group; $n_j^{\max}$ - maximum number of nests of one facing; $s_j^{\min}$ - minimum number of shelves on which the product can be allocated; $s_j^{\max}$ - maximum number of shelves on which the product can be allocated; α_j - scale parameter; β_j - space elasticity.

Decision variables:

$$x_{ij} = \begin{Bmatrix} 1, & \text{if product } j \text{ is placed on the shelf } i \\ 0, & \text{otherwise} \end{Bmatrix}$$

f_{ij} - the number of facings of the product. c_{ij} - the number of caps of the product.

n_{ij} - the number of nests of the product.

$$y_{ij}^{o_1} = \begin{Bmatrix} 1, & \text{if product } j \text{ on the shelf } i \text{ on front orientation} \\ 0, & \text{otherwise} \end{Bmatrix}.$$

$$y_{ij}^{o_2} = \begin{Bmatrix} 1, & \text{if product } j \text{ on the shelf } i \text{ on side orientation} \\ 0, & \text{otherwise} \end{Bmatrix}.$$

The problem can be formulated as follows. On a given planogram, a retailer offers K merchandise categories. The retailer determines P products and assigns them to K categories and G price subcategories. Merchandising rules define how products are placed on shelves by identifying product categories into which products should be grouped and price subcategories assigned to the shelves. The retailer can manage its merchandise categories defining the minimum occupied space by each category on the planogram in order to make it visually attractive, which improves customers' satisfaction. The common practice is that categories are vertical, i.e. products are grouped and arranged inside the category. The customer's basket depends on product prices and various levels of

categories. On the planogram, the price subcategories are horizontal, i.e. the more expensive or the more branded product is, the higher it is placed on eye-level. Obviously, cheaper products can be placed on lower shelves as well as upper ones. In contrast, more expensive products can't be placed on lower shelves. The retailer's profit-maximizing problem is to find the optimal shelf space for each product while defining its quantities.Fig. 1 presents the merchandising rules of allocating products in vertical shape categories (A, B, C) on a planogram. Numeric values signify horizontal level price subcategories. The darker the products on Fig. 1 are, the more expensive in a real store they are, which means that they can't be placed on lower shelves. Unlike cheaper products, marked with light colours, which could be placed on any shelf. The products with medium colours must be placed no lower than the medium shelf. There are two possible product orientations for a product. For the front orientation, the width p_j^w is taken as a line parameter. For the side orientation, where the product is rotated at 90 degrees, its depth p_j^d is taken as a line parameter. Products with similar features, functions, or tastes, according to the store's merchandising rules, are grouped by the retailer into clusters and placed together on the same shelf. This is done to ensure the substitution effect of similar products if one of them is out of stock.

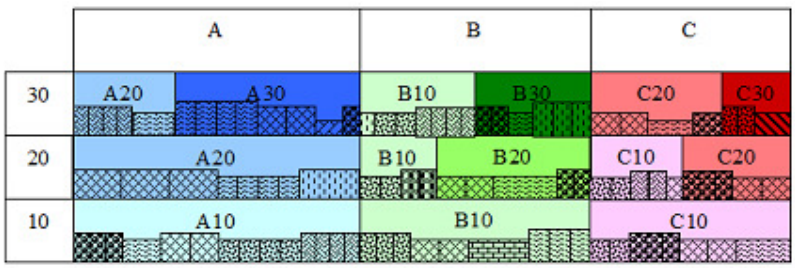

Fig. 1: Allocation of the categories and price subcategories on a planogram

Generally, in scientific research, facings are considered as a product quantity parameter. But in reality, based on the physical parameters of packaging, products can be capped, nested, or neither. Capping occurs when a product is placed on the top of another one in another rotated orientation. Most rectangular boxes, such as boxes containing coffee or sweets, can be capped. Nesting means placing a productinside another one, which concerns products such as bowls or plates. Fig. 2 and Fig. 3 show a method for allocating caps and nests. It could be observed that for front-orientated products the number of facings in one capped group is $\lceil p_j^h / p_j^w \rceil$ (otherwise for side-orientated products this number is $\lceil p_j^h / p_j^d \rceil$). The maximum possible caps in one capped group models the situation if too many cappings are placed above the facings in the row below, the items below may be broken or destroyed, or upper cappings could fall off the shelf. A similar situation occurs with nestings - if too many nested plates are placed inside the lower plate on the shelf, the plate below may become damaged or destroyed, or the upper plates could fall off the shelf. In this research, the total number of product items combines facings, caps, and nests.

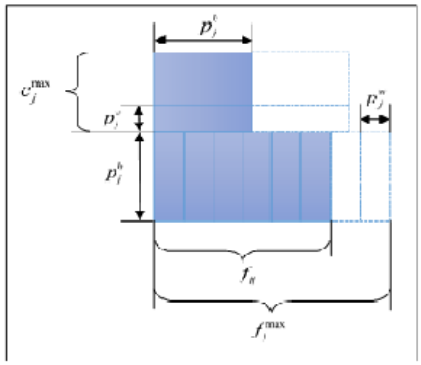

Fig. 2. Caps allocation

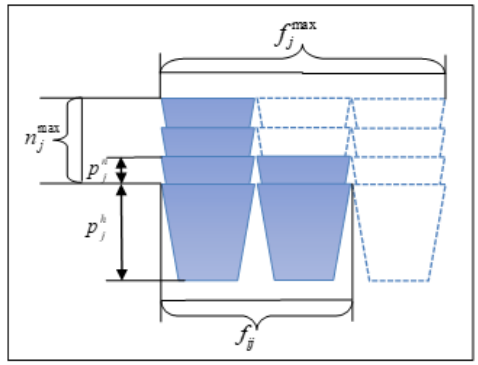

Fig. 3. Nests allocation

In the current research, we investigate one (top) row of facings with cappings or nestings above it. The facings in the vertical dimension are not taken into account. Because of this fact, the shelf height and product supply limit are modelled only for one top row of facings incorporating capping or nesting above. The same situation is with the depth of the products and the depth of the shelf, which are modelled also for the facings' top row. To solve the retail SSAP, the goal is to determine the number of facings f_{ij}, caps c_{ij}, and nests n_{ij} of a product j which is allocated on the shelf i considering 4 classes of constraints: shelf constraints, product constraints, multi-shelves constraints and category constraints, in order to maximize the profit gained by the retailer.

Mathematical Models

With the notation presented above, the SSAP model with a linear objective function that maximizes profit can then be formulated as follows:

$$\max \sum_{j=1}^{P} \sum_{i=1}^{S} x_{ij} p_j^u (f_{ij} + c_{ij} + n_{ij}) \tag{1}$$

The SSAP model with a non-linear profit function can then be formulated as follows:

$$\max \sum_{j=1}^{P} \sum_{i=1}^{S} x_{ij} p_j^u \alpha_j (f_{ij} + c_{ij} + n_{ij})^{\beta_j} \tag{2}$$

In equation (2), the objective function maximizes profit by changing the expected demand for the products that depend on the space occupied by the products. α_j is a scale parameter identified as the base demand for the product or demand for the product with one facing. β_j is a space elasticity parameter.

The constraints used in both models are described below.

Shelf Constraints

shelf width (for all $i = 1,...,S$): $\sum_{j=1}^{P} f_{ij} (y_{ij}^{o_1} p_j^w + y_{ij}^{o_2} p_j^d) \le s_i^l$ (3)

shelf depth (for all $i = 1,...,S$, $j = 1,...,P$): $x_{ij}(y_{ij}^{o_1} p_j^d + y_{ij}^{o_2} p_j^w) \le s_i^d$ (4)

product height including caps' and nests' height (for all $i = 1,...,S$, $j = 1,...,P$):

$$x_{ij}\left(p_j^h + \left\lceil \frac{c_{ij} x_{ij}}{\max\left(\left\lfloor \frac{f_{ij}(y_{ij}^{o_1} p_j^w + y_{ij}^{o_2} p_j^d)}{p_j^h} \right\rfloor, 1\right)} \right\rceil \cdot (y_{ij}^{o_1} p_j^w + y_{ij}^{o_2} p_j^d) + \left\lceil \frac{n_{ij} x_{ij}}{\max(f_{ij}, 1)} \right\rceil \cdot p_j^n\right) \le s_i^h \quad (5)$$

Product Constraints

supply limit (for all $j = 1,...,P$): $\sum_{i=1}^{S} (f_{ij} + c_{ij} + n_{ij}) \le p_j^s$ (6)

minimum and maximum number of facings (for all $j = 1,...,P$):

$$f_j^{\min} \le \sum_{i=1}^{S} f_{ij} \le f_j^{\max} \quad (7)$$

maximum number of caps (for all $i = 1,...,S$, $j = 1,...,P$):

$$c_{ij} \le c_j^{\max} \cdot \left\lfloor \frac{f_{ij}(y_{ij}^{o_1} p_j^w + y_{ij}^{o_2} p_j^d)}{p_j^h} \right\rfloor \quad (8)$$

maximum number of nests (for all $i = 1,...,S$, $j = 1,...,P$): $n_{ij} \le n_j^{\max} f_{ij}$ (9)

Multi-Shelves Constraints

minimum and maximum number of shelves (for all $j = 1,...,P$):

$$s_j^{\min} \le \sum_{i=1}^{S} x_{ij} \le s_j^{\max} \quad (10)$$

side orientation is possible (for all $i = 1,...,S$, $j = 1,...,P$): $y_{ij}^{o_2} \le p_j^{o_2}$ (11)

only one orientation (front or side) is available (for all $i = 1,...,S$, $j = 1,...,P$):

$$\begin{cases} y_{ij}^{o_1} \cdot y_{ij}^{o_2} = 0 \\ y_{ij}^{o_1} + y_{ij}^{o_2} = 1 \end{cases} \quad (12)$$

the same product orientation on all shelves (for all $j = 1,...,P$):

$$\max_{i=1,...,S}(y_{ij}^{o_1}) \ne \max_{i=1,...,S}(y_{ij}^{o_2}) \quad (13)$$

the next shelf only (for all $j = 1,...,P$, $a,b: |a-b| \neq 1 \wedge a < b,\ \ a,b = 1,...,S$):

$$x_{aj} \cdot x_{bj} = 0 \tag{14}$$

the same number of facings on all shelves (for all $i = 1,...,S$, $j = 1,...,P$):

$$f_{ij} \leq \left\lceil \frac{\sum_{i=1}^{S} f_{ij}}{\sum_{i=1}^{S} x_{ij}} \right\rceil \tag{15}$$

the same cluster on the same shelf (for all $i = 1,...,S$, $a,b: p_a^l = p_b^l,\ \ a,b = 1,...,P$):

$$x_{ia} = x_{ib} \tag{16}$$

Category Constraints

the minimum category size if the products of this category are located on the shelf (for all $i = 1,...,S$, $k = 1,...,K$):

$$(\sum_{\substack{j=1,\\ p_j^k=k}}^{P} f_{ij}(y_{ij}^{o_1} p_j^w + y_{ij}^{o_2} p_j^d) \geq \left[s_i^l \cdot m_k \right]) \vee (\sum_{\substack{j=1,\\ p_j^k=k}}^{P} f_{ij} = 0) \tag{17}$$

$[...]$ means rounded value.

the possibility of allocation of the products based on their price subcategory (for all $i = 1,...,S$, $j = 1,...,P$): $x_{ij} \leq \min(\max(s_i^g - p_j^g, 0), 1)$ (18)

Decision Variables

if the product are located on the shelf (for all $i = 1,...,S$, $j = 1,...,P$):

$$x_{ij} \in \{0,1\} \tag{19}$$

the number of facings (for all $i = 1,...,S$, $j = 1,...,P$):

$$f_{ij} = \{f_j^{\min} ... f_j^{\max}\} \tag{20}$$

the number of caps (for all $i = 1,...,S$, $j = 1,...,P$):

$$c_{ij} = \{c_j^{\min} ... c_j^{\max} \cdot \left\lfloor \frac{f_{ij}(y_{ij}^{o_1} p_j^w + y_{ij}^{o_2} p_j^d)}{p_j^h} \right\rfloor\} \tag{21}$$

the number of nests (for all $i = 1,...,S$, $j = 1,...,P$):

$$n_{ij} = \{n_j^{\min} ... n_j^{\max} \cdot f_j^{\max}\} \tag{22}$$

if the product is placed on front orientation (for all $i = 1,...,S$, $j = 1,...,P$):

$$y_{ij}^{o_1} \in \{0,1\} \tag{23}$$

if the product is placed on side orientation (for all $i = 1,...,S$, $j = 1,...,P$):

$$y_{ij}^{o_2} \in \{0,1\} \tag{24}$$

Experimental Studies

Consistently with prior shelf space research, we conducted computation experiments to compare the sensitivity of two different model approaches. We designed an SSAP with linear (1) and non-linear (2) profit functions (LPF, NLPF accordingly). Because of commercial confidentiality, the data for the tests were simulated. We simulated the product profits consistently with the guidelines by Yang (2001) and Bai and Kendall (2005) – randomly, by a normal distribution. The product widths and heights were also brought about by a normal distribution. According to Eisend (2014)**Error! Reference source not found.**, the space elasticity β_j is assumed to vary between $0 \le \beta_j \le 0,35$ The scale parameter α_j depends on the maximum number of facings $f_j^{\max}$. The experimental data model the data from a real retailer's problem. In this research, we generated 75 stores in which different products had to be place in different shelf space locations. In our simulation, 5 product sets of 10, 20, 30, 40, 50 products were used, which we tried to allocate on 3, 4, 5 shelves on planograms with shelf widths of 250 cm, 375 cm, 500 cm, 625 cm, 750 cm. In all tests, the planograms combine shelves of the same widths as it usually arise in a real store. The number of vertical categories is 2 (for 10 and 20 products), 3 (for 30 products), 4 (for 40 products), 5 (for 50 products). The computational experiments were performed in IBM ILOG CPLEX Optimization Studio Version: 12.7.1.0.

The results of the financial performance of both models are reported in Table 1. Minimum, average and maximum values in Table 1 and Table 2 were calculated with the same shelf and products numbers with different shelf widths. The time limit for CPLEX solver was set to 5 minutes.

The columns "LPF is better" show the results when the goal optimization function was linear according to formula (1). Using the received solution values, we calculated the total profit according to formula (2) and compared by how many percent the LPF value is better than the value of NLPF. It is shown that the difference in solutions received by these two functions varies from 0.25% for 5 shelves with 10 products up to 176.84% for 5 shelves with 40 products. The effects of this mean that in a real retail store the difference expressed in dollars between these two approaches is significant. The average value varies from 8.77% for 5 shelves with 10 products up to 102.67% for 5 shelves with 40 products.

The columns "NLPF is better" show the results when the goal optimization function was non-linear according to formula (2). Using the received solution values, we calculated the total profit according to formula (1) and compared by how many percent the NLPF value is better than the value of LPF. It could be observed that the difference in solutions received by these two functions varies from 1.89% for 5 shelves with 30 products up to 63.40% for 5 shelves with 50 products. This also results in a significant difference expressed in dollars (but a little smaller than in the previous scenario). The average value varies from 6.91% for 3 shelves with 30 products up to 42.17% for 5 shelves with 50 products. These results conclude that when LPF is the goal optimization function, the solution

received by NLPF is approximately 2 times worse, otherwise, when NLPF is the goal optimization function, the solution received by LPF is only 1,5 times worse (comparing 102.67% to 42.17%).Table 2 reports the relative profit comparison of the two models when the goal optimization functions were expressed as LPF and NLPF. It is shown that the relative profit ratio of the solution received by these two functions varies from 1,35 for 4 shelves with 50 products up to 4.72 for 4 shelves with 20 products. Interestingly, the results also show that the quality advantage of these two models sometimes differs very slightly, but sometimes it differs approximately 5 times.

Table 1: Comparison of Linear and Non-Linear Profit Functions

Shelves	Products	Categories	LPF is better			NLPF is better		
			Min	Avg	Max	Min	Avg	Max
3	10	2	11.81%	20.35%	27.66%	8.11%	10.89%	12.92%
	20	2	39.05%	65.88%	125.69%	20.38%	28.38%	36.53%
	30	3	20.56%	36.53%	59.70%	2.09%	6.91%	10.22%
	40	4	68.87%	93.70%	122.64%	14.74%	27.17%	40.11%
	50	5	72.42%	100.69%	154.40%	6.34%	23.87%	36.41%
4	10	2	15.62%	21.15%	25.20%	9.56%	19.57%	28.77%
	20	2	44.13%	48.63%	55.84%	16.58%	19.07%	22.89%
	30	3	10.35%	26.76%	65.31%	2.39%	9.60%	23.99%
	40	4	60.36%	96.21%	130.04%	13.77%	31.64%	45.22%
	50	5	40.40%	74.20%	114.06%	8.94%	30.75%	43.50%
5	10	2	0.25%	8.77%	18.10%	8.80%	15.63%	19.00%
	20	2	25.55%	60.82%	100.13%	22.09%	30.59%	59.23%
	30	3	9.74%	23.36%	44.64%	1.89%	8.41%	13.99%
	40	4	56.25%	102.67%	176.84%	13.79%	27.17%	48.04%
	50	5	25.93%	41.47%	53.17%	23.57%	42.17%	63.40%

Table 2: Linear and Non-Linear Profit Ratio Comparison

Shelves	Products	Categories	LPF/NLPF ratio		
			Min	Avg	Max
3	10	2	2.29	3.30	4.08
	20	2	2.64	3.41	4.22
	30	3	1.63	2.56	3,10
	40	4	1.51	2.50	3.06
	50	5	1.63	1.84	2.07
4	10	2	2.17	3.17	4.13
	20	2	3.22	4.14	4.72
	30	3	2.32	2.82	3.37
	40	4	2.16	2.79	3.26
	50	5	1.35	1.80	2.14
5	10	2	2.83	3.58	4.27
	20	2	3.60	3.98	4.47
	30	3	2.30	2.96	3.28
	40	4	2.67	3.10	3.52
	50	5	1.51	1.84	2.32

The results obtained during the experimental phase are shown in Fig. 4 and Fig. 5. The horizontal axes in Fig. 4 and Fig. 5 show the number of shelves, products and shelves width (separated by a dash). For the test instance with 3 shelves with 250 cm and 50 products, there was no solution found because it is impossible to allocate so many products on short shelves without violating other constraints.

Fig. 4 shows that almost in all cases the result attained by the LPF goal function was better than the result of the NLPF goal function on the same data set. But the deviation of the NLPF goal function is much lesser.

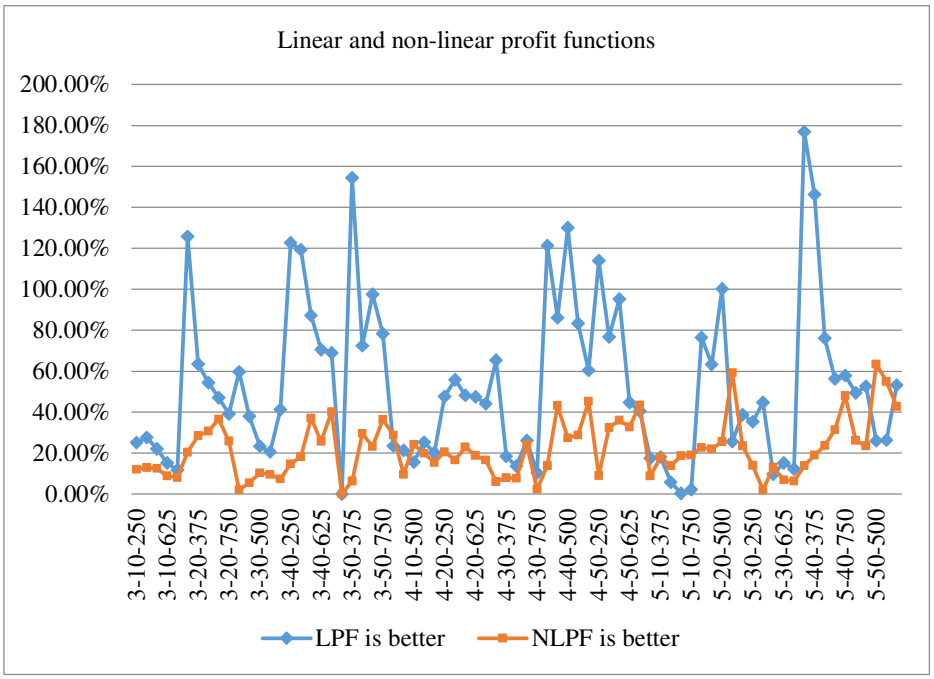

Fig. 4: Comparison of Linear and non-linear profit functions.

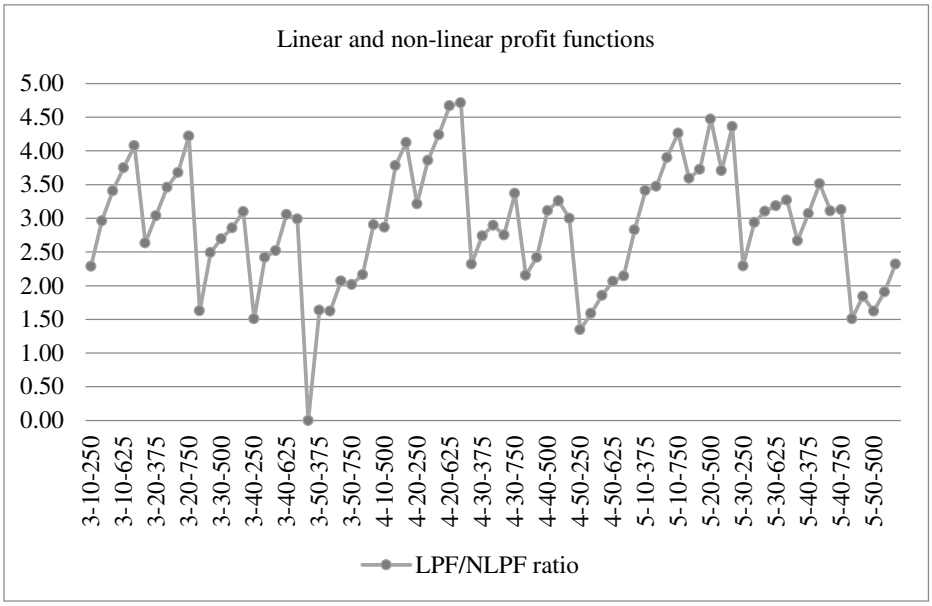

Fig. 5: Comparison of linear to non-linear ratio of profit functions comparison

Conclusions

Shelf space is one of the most critical resources in the retail industry. In this research, we focus on the retailer's total profit maximization models. Interestingly, with the goal optimization function expressed by LPF, the solution received by NLPF is approximately 2 times worse. In contrast, with the goal optimization function expressed by NLPF, the solution received by LPF is only 1,5 times worse. Nevertheless, if the profit is expressed in dollars in a real retail store, there is an enormous difference between these solutions. So, the SSAP model should be planned very carefully and should use the most up-to-date data considering all possible external factors and constraints.

The developed models can be used in practical solutions. It can be directly implemented in the logistics (warehouse) module in retail information systems, developed, for example, in H-structure (Becker and Reinhard, 2007). It should be fully integrated with the marketing module, which processes such data as the assortment and product policies (including goods planning), assortment planning, sales and turn-over planning, as well as product lists.

Some further issues could be investigated in the future. Obviously, both shelf space allocation models can be applied to most retail stores in which products are allocated on planogram shelves. But these models could also be adjusted to other types of planograms such as cubed walls (for shirts, skirts, jeans), pegboards (for socks, hosiery, kitchen accessories), pallets (for big heavy products), chests, and bins. Next, when the profit function is considered to be non-linear, the methods of calculating the scale parameter and the space elasticity parameter for each product must be adjusted more carefully, in a very small time-frame, and must be updated very frequently because of changing seasons, holidays, assortments, the introduction of new products , advertising of corresponding products etc. The more frequently retailers make such changes to store shelf space configurations, the more precise results from models can be received and the more profit can be earned.

Acknowledgment

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Professional Traits of Forensic Investigators in Investigation Process Expedition: Malaysian Evidence

Norziaton ISMAIL KHAN

Universiti Teknologi MARA, Malaysia
Email: norzi153@uitm.edu.my

Anis Asfarina ZULKIFLI

RHB, Risk Department, Malaysia
Email:eynazik@yahoo.com

Abstract

Financial crimes have become dominant in the contemporary business environment. It is one of the most serious crimes endangering the national security and public safety of a country. It is directly associated with legal, social, human rights, political and development issues. This research provides a descriptive analysis of the professional traits of a forensic investigator in the investigation process expedition based on Malaysian evidence. Data for this study is collected through a questionnaire survey. A sample was driven from two enforcement agencies in Malaysia which are National Audit Department (NAD) and Malaysian Anti-Corruption Commission (MACC). Based on the descriptive statistic, Skills of Forensic Investigator question, "Critical thinking: the ability to differentiate between opinion and fact" scored the highest mean of 4.76. It implies that on average, that by having critical thinking skills the forensic investigator has the ability to differentiate between the opinion and facts of the fraudster. Next, Investigative Techniques of Forensic Investigator question, "Interviewing and Interrogation: An investigator needs to understand the subject's intention, effective inquiry, techniques of ethical and legal aspect in obtaining information" scored the highest mean of 4.80. It shows that on average, the respondents agreed that interviewing and interrogation technique will help in understanding the subject matter and thus expedite the investigation process. Lastly, Knowledge of Forensic Investigator question, "Anti-Money Laundering Act 2001: Act enacted dealing with money laundering and anti-terrorism financing" scored the highest mean of 4.77. The respondents agreed that having knowledge of the Anti-Money Laundering Act 2001 will eventually help in the expediting investigation process. As a conclusion, the professional traits of a forensic investigator can aid the government to combat financial crimes. These include skills, investigation technique and knowledge of the forensic investigator. Hence, this research provides insight for the Malaysian government on the importance of forensic investigator professional traits in expediting the investigation process.

Keywords: Expedition, Forensic Accounting Investigation, Investigation Techniques, Professional Traits,

Introduction

Accounting practices of international financial institutions have been moved forward as a result of a series of events involving financial crimes (Romanus, 2014). Monetary abuses and misrepresentation are wonders throughout the world. Activities involving financial crime include misrepresentation, misappropriation, plundering, illegal tax avoidance, negligence outside of trade and oil bunkering. According to the Association of Certified Fraud Examiners (ACFE), there are many forms of fraud or better known as occupational fraud, and it is classified into three types: bribe and corruption, misappropriation of assets and Fraudulent Financial Reporting (Association of Certified Fraud

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Examiners, 2019). Money-related misdeeds are inspired by monetary need caused by eagerness, betting, bonds, business investments, poor speculation or attempts to maintain a lavish way of life (Mukoro, 2013). Detecting fraud and white-collar crime has been part of the conventional accounting function. The internal and external auditors are supposed to uncover fraud through the audit process (Anti-Corruption Network for Eastern Europe and Central Asia, 2011). However, auditors only check for compliance of the company's book towards generally accepted accounting principles, auditing standard and also company policies. Thus, a new group of forensic investigators are needed to detect fraudulent transactions. It is known as forensic investigators. Forensic investigators work in two primary areas, investigative accounting and litigation services. Forensic investigators investigate the operation of an organization and prepare information that may be used in a criminal or civil court case.

Forensic investigators are trained to uncover fraudulent practices which resulted from litigation activities. Forensic investigators utilize a wide understanding of business and management, financial reporting system, accounting and auditing standards, evidence gathering and investigative techniques and litigation process (Bhasin, 2007). They are more proactive towards risk reduction role by performing extended audit procedures, acting as advisors to audit committee and uncover financial fraudulent activity. Hence, forensic investigators are in a growing need for the country in confronting major financial crimes problem (Bhasin M. L., 2013). Malaysia has faced a major problem of financial crime. The lack of a forensic investigator's knowledge and skills has led to a situation in which government and corporate entities trick law enforcement to their advantage in financial crimes (Bhasin, 2017). The issue arises from the fact that a forensic investigator is still new to most businesses as well as to Malaysia's public awareness. According to KPMG (2002), most companies agreed that fraud is a major problem in Malaysia and the negative effect of bribery on the general public and the economy by financial fraud is inevitable (Urien, 2019).

Forensic investigators are trained to look beyond numbers and deal with the business realities of the situation. They play an important role in analysis, interpretation, and presentation of complex financial and business-related issues. They are also familiar with legal concepts and procedure (Bhasin, 2017). There are several activities usually being carried out by forensic investigators which are investigating and analysing financial evidence, the evolvement of computerised application in analysing and presentation of the financial evidence and communicating their findings in the form of a report with exhibit and collections of the report (Bhasin, 2017). These professional capabilities will assist them in legal proceedings, such as testifying in courts as an expert witness in preparing visual aids to support the trial evidence. However, the lack of knowledge, skills and the use of forensic investigations techniques in the battle against money-related corruption could also be a contributing factor (Ocansey, 2017) to delay the process of investigation.

In conclusion, a broad knowledge of forensic investigators is a key to success for the entry-level of forensic investigators (Anyaduba, 2013). This is to assist in the investigation procedure and also expedite the process. A big save in time and cost can be earned when the case investigated can be solved successfully within the dateline. Thus, any fraudulent cases involving financial crime can be solved by immediate action and prevent effectively. Thus, the country can be benefited by this with the existence of forensic investigators as fraudulent activities involving companies' book can be uncovered and traced magnificently. Concerning the above, it is crucial for this research to be conducted since it will provide an understanding of the professional traits of the forensic investigators that enables the expedition of the investigation process.

Literature Review

Investigation Process Expedition

Financial investigation is a procedure that is carried out to investigate and prosecute economic crimes and are allowed to collect evidence in corruption investigations (OECD, 2011). Different methods and strategies used to perform economic or property investigations have been described based on experience in actual cases of financial crime. For example, money movements are tracked using databases and registers (for example, company registers, stock exchange data), disclosure forms (asset

disclosures, public officials and other persons' financial and tax statements) and available wage, income and expenditure information (bills, expenditure reports). It was emphasised that a comprehensive, integrated review of these records is essential in financial investigations (OECD, 2011). Once evidence of corruption was discovered through the study of publicly available information, various examples of wrongdoing are examined. Multidisciplinary teams are created in many countries to investigate and prosecute crimes against corruption. A prosecutor led the team, consisting of prosecutors and investigators, as well as various law enforcement agencies. Every organization can conduct functions during such a group investigation if it has the best experience and different powers. For example, the Service for Investigation of Financial Crimes conducted an analysis of financial and economic records of the political party and related enterprises and seizure of such documents. Experts analysing electronic data gathered key evidence to prove that political party systematically received illegal funding. An investigator would probably not be able to do it on his own (OECD, 2011).

A report on forensic accounting tools available in private audit firms revealed that while audit firms do not have similar powers to law enforcement agencies, they have resources and skills that can be useful in helping to uncover corruption, particularly active corruption. Many forensic accounting tools have been presented, in particular, analysis of open source information (mass media, internet, etc.), analysis of corporate databases, accounting and other company documents (accounting records, agreements, payment orders, bank statements, etc.), interviews with company employees and professional organizations, collection of information within an industry, a procedure to match lifestyle with a predicted income. It has been mentioned that, for example, focused interviews with financial officers can be a good source of information about schemes used to channel this company's money. It has been emphasized that the strength of forensic investigator lies in a combined information analysis (OECD, 2011). It is also important to note that a comprehensive approach or a combination of the investigative methods and approaches mentioned above can help to effectively detect and prosecute financial crimes. It is necessary to use all available investigative techniques and rules, not just specific laws on corruption. It appears that a comprehensive approach is needed to effectively investigate and prosecute corruption, combining a variety of methods from collecting and examining public and non-public documents to monitoring, collaborating with witnesses and others (OECD, 2011). The role of witnesses in co-operating with investigators and prosecutors is also vital to expedite the investigation process.

Skills of Forensic Investigator

The American Institute of Certified Public Accountants (AICPA) recommended that forensic accounting techniques and procedures should be gradually combined in the detection of financial reporting, as forensic investigators and auditors have distinctive training, skills and mentalities (American Institute of Certified Public Accountants, 2004). Forensic investigators must have exceptional expertise in dealing with the issue of economic and financial crimes. It follows logically from these clarifications of forensic investigator techniques and skills that having these uncommon and explicit skills is important in effectively assisting the forensic investigator in speeding up the investigation process. These are the essential skills to be possessed in the investigative phase expedition by a forensic investigator. A forensic investigator should therefore have a conspicuous ability to help expose misleading information. In this way, creative reasoning skills can benefit the forensic investigator immensely (Ramaswamy, 2005). These skills will help them to understand the explanations for the perpetrator's practices, legal and moral issues, and provide assurances and evidence to individuals with little or no accounting knowledge (Ramaswamy, 2005). Forensic investigator abilities in verbal communication are exceptionally critical (Wells, 2007). It will trigger the forensic investigator's achievement in speeding the investigation process. It is certainly consistent with Malaysia's underlying goal of reducing fraud activities. Before the establishment is authorized by law, personal communication skills are included as a favourable position or required forensic investigator skills (Wells, 2007) as it will change them to be an additional alarm and accurate in the expediting investigation process.

According to Crumbley (2006), the forensic investigator should have good information skills learned due to the different number of documents required during the investigation process. Appropriate documentation filtering can allow them to identify success more precisely. The need to track their work

and write interpersonal skills is therefore important as this will allow them to provide an elegantly written document to assist the jury in litigation. Essentially, the investigation process can be expedited with the relevant skills learned by the forensic investigators.

Investigative Technique of Forensic Investigator

To use information technology, the forensic investigator is required to perform informative undertakings because most of the financial violations involve the use of software or virtual assets (Smith, 2005). By using information technology, an investigator can also benefit from data mining, which is characterized by the ability to use factual calculations to recognize patterns in a set of data. Consequently, the investigator may have the option of revealing patterns that may show misleading activities. Nevertheless, the data mining procedure is extremely iterative (Sharma, 2012). In this way, the forensic investigator's integrity in conjunction with the use of information technology is crucial. In addition, the forensic investigator's knowledge and implementation of questioning and interrogation methods is a significant investigative skill (Hoffman, 2005). It further clarifies how criminological investigators adapt and approach the method of interviewing and questioning to collect information. Whether the individual was dishonest or otherwise could be identified by verbal or non-verbal actions. It is necessary to learn the effective ways of the questioner or interviewer in conducting the investigation (Golden, 2006).

Another forensic investigator's investigative technique is surveillance and suspects profiling skills. It is close observation and collection of data concerning someone or potential fraudster (Gray, 2011). This includes collecting significant data for the investigation and creating a suspect profile if there is a suspicion. Surveillance also requires individual identification to collect information from any suspect and determine the attributes of the suspect (Gray, 2011). Information on aptitude test is essential for a forensic investigator to gather information from the subject involved (Gray, 2011) and processed to identify criminal capacity, disposition and objectives. Nonetheless, there is no doubt that skilled and trained professionals with forensic expertise can be a major advantage for corporate-sector and help improve their corporate governance structures (Wells, 2007). According to Alabdullah et., al (2014) researchers considered the rise of forensic accounting to be fundamental to the economic situation of the nation. Forensic investigators need to become capable along these lines and have professional core skills to assist in the expedition of the investigation process. Subsequently, the reliability of surveillance is critical in detecting cases of financial crime in organizations.

Knowledge of Forensic Investigator

Financial knowledge is essential to the detection of financial crimes by a forensic investigator. The two key categories of valuable skills for the forensic investigator are in-depth analysis of financial statements and the ability to conduct the investigation fundamentally. According to Bhasin M.L (2013), these skills assist forensic investigators in the discovery of anomalous examples in bookkeeping data, understanding of misrepresentation plans, including misappropriations of assets, money laundering, bribery and corruption, risk assessment control structure, achieve management, comprehensive knowledge of the financial statements and the ability to analyse them objectively. With the expansion of financial knowledge, it will assist forensic investigators in uncovering and perceiving abnormal patterns in accounting information, an exhaustive understanding of fraud schemes, including but not limited to misappropriations of assets, tax evasion, corruption and also the ability to understand corporate internal control systems (Bhasin M. , 2013). It thus shows that the skills of a forensic investigator are important and positively interacts with financial crime detection.

In a study by Anyaduba (2013) demonstrated that forensic investigators are a group of individuals in the specialized accounting field who use auditing and analytical proficiencies to assist in legal matters arising from current and potential disputes or litigation. It is therefore part of an investigation that is reasonable for the court of law to have a higher level of assurance. At the end of the day, the investigation will consist of a mixture of bookkeeping, examination, and the ability to disclose the reality. This comprises knowledge on generally accepted accounting, accounting and auditing standards to determine losses or profits, assets, damages, the efficacy of internal controls and fraud for

the use of the legal system in criminal and civil litigation (Zysman, 2001). Nonetheless, a legal procedure requires a request for accounting; thus, it provides the highest level of certainty using rational means to achieve a generally accepted connotation (Akintoye, 2008) and to provide the requisite results in the resolution of disputes. It strongly supports the need for forensic investigator legal information in the course of expediting investigation. In summary, a forensic investigator is an expert in a specialized area of accounting that uses accounting, auditing, investigative and legal knowledge to provide evidence of legal-related information.

Research Method

Data Collection

This research uses a survey of the questionnaire. This study approached the forensic investigators of the National Audit Department and the Malaysian Anti-Corruption Commission in Malaysia. The questionnaire survey was distributed by an online survey via a form on Google. A total of 83 survey questionnaires were collected and used based on the Google form's data extraction. The respondents in this study remained anonymous and were not given any financial incentives to encourage voluntary participation in completing the questionnaire. In this study, the survey instrument will include questionnaires that will provide a different component section consisting of Sections A, B, C and D. Section A will cover gender, age and many more in the demographic section. Sections B and C will cover independent variables that focus on forensic investigator's skills and forensic investigator's knowledge respectively. Finally, Section E is the coverage that is the dependent variable in this study on the detection of an investigation process expedition. Respondents in this section will be measured following their years of specific field investigation experience. The questionnaires used in this study were adapted and have been tested and confirmed by the previous researchers in a large-scale study (Ocansey, 2017; Ahmed, 2016).

Findings And Discussion

Demographic Analysis

This section provides descriptive analyses of the demographic characteristics of the respondents consisting of the frequency and the percentage of the nominal questions. Table 1 shows the frequency of respondents based on their gender. The total respondents for this study are 83 forensic investigators. It indicates that 37 or 44.6% of the respondents are male whilst 46 or 55.4% of the respondents are female.

Table 1: Frequency of the Respondents' Gender

	Frequency	Per cent
Male	37	44.6
Female	46	55.4
Total	83	100.0

Table 2 explains the education level of the respondents. The respondents are categorised into 4 groups of their education level which includes Diploma, Bachelor's Degree, Master's Degree and Doctorate. About 49.4% of the respondents hold a Master Degree followed by the respondents with a Bachelor Degree of 28.9%. There are 11 respondents who are Doctorate holders representing 13.3% of the total respondents whilst 7 respondents is a Diploma holder represents only 8.4% of the total respondents.

Table 2: Frequency of the Respondents' Education Level

	Frequency	Per cent
Diploma	7	8.4
Bachelor Degree	24	28.9
Master Degree	41	49.4
Doctorate	11	13.3
Total	83	100.0

Table 3 depicts the frequency of the respondents' years of working experience. Out of 83 respondents, 36.1% has working experience for more than 10 years, 33.7% has a working experience of 6-10 years whilst 28.9% has a working experience of 1-5 years.

Table 3: Frequency of Working Experience by the Respondents

	Frequency	Per cent
1-5 years	24	28.9
6-10 years	28	33.7
More than 10 years	30	36.1
Total	83	100.0

Descriptive Statistics

Table 4 shows the descriptive statistics of the dependent variable namely, the investigation process expedition based on the results of the questionnaire. The highest mean score goes to question number 1, "An investigator needs to understand the subject matters: by studying the case thoroughly: the background and available pieces of evidence of the offender." where the mean score response of the question is 4.80 i.e. greater than 3.00. This finding implies that on average, the respondents agreed to the statement that the investigator needs to have a good understanding of the subject matter in handling cases which eventually will expedite the investigation process. The average standard deviation (SD) of the response is 0.462. This indicates that the respondents' perceptions were close or similar to one another. The lowest mean score goes to question number 6, "Political influence has an impact on the process and reporting of findings." where the mean score response of the question is 4.35 i.e. greater than 3.00. This finding implies that on average, the respondents slightly agreed to the influence of political matters in expediting the investigation process. The average standard deviation (SD) of the response is 1.098 which is higher than 1. This indicates that the respondents' perceptions were a bit far or differed to one another.

Table 4: The Investigation Process Expedition

	Mean	Std. Deviation
(1) An investigator needs to understand the subject matters: by studying the case thoroughly: the background and available pieces of evidence of the offender.	4.80	0.462
(2) An investigator needs to complete procedures within the time frame given.	4.53	0.817
(3) An investigator needs to request an extension of findings most of the time.	4.35	0.930
(4) An investigator needs to handle several cases at one time.	4.35	1.041
(5) An investigator needs to conduct an investigation regardless of high profile or low profile individuals.	4.67	0.646
(6) Political influence has an impact on the process and reporting of findings.	4.35	1.098
(7) Commitment and involvement from other enforcement agencies can speed up the reporting process.	4.70	0.599
(8) Successful audit trails can speed up the reporting process.	4.72	0.570
(9) The ability to get complete documentation in handling cases can speed up the reporting process.	4.78	0.542
(10) Advance information technology systems can speed up the reporting process.	4.72	0.591

Table 5 shows the descriptive statistics of the first independent variable namely, skills of a forensic investigator. Based on the result of the questionnaire the highest mean score goes to question number 1, "Critical thinking: the ability to explain between opinion and fact." where the mean score response of the question is 4.76 i.e. greater than 3.00. This finding implies that on average, the respondents agreed to the statements on the ability to explain between opinion and facts by having critical thinking skills. The average standard deviation (SD) of the response is 0.554 which is lower than 1.00. This indicates that the respondents' perceptions were close or similar to one another. The lowest mean score goes to question number 5, "Unstructured problem solving: the ability to deal and establish statement/opinion on each case independently." where the mean score response of the question is 4.53 i.e. greater than 3.00. This finding implies that on average, the respondents slightly agreed to the statements on the unstructured problem-solving will helps the ability of the forensic investigator to deal and establish statement/opinion on each case independently. The average standard deviation (SD) of the response is 0.738 which is lower than 1.00. This indicates that the respondents' perceptions were close or similar to one another.

Table 5: Skills of Forensic Investigator

	Mean	Std. Deviation
(1) Critical thinking: the ability to explain between opinion and fact.	4.76	0.554
(2) Communication: The ability to effectively communicate in both writing via reports and speech.	4.69	0.603
(3) Analytical Proficiency: the ability to prepare complete documentation.	4.76	0.508
(4) Deductive analysis: the ability to detect red flags during audit findings/investigation.	4.65	0.633
(5) Investigative flexibility: the ability to move away from extended audit procedures and able to conduct a thorough examination.	4.53	0.738
(6) Unstructured problem solving: the ability to deal and establish statement/opinion on each case independently.	4.61	0.659

Table 6 shows the descriptive statistics of the second independent variable namely, Investigative Techniques of Forensic Investigator based on the result of the questionnaire. The highest mean score goes to question number 1, "Interviewing and Interrogation: An investigator needs to understand the subject's intention, effective inquiry, techniques of ethical and legal aspect in obtaining information"

where the mean score responses of this questions are 4.80 i.e. greater than 3.00. This finding implies that on average, the respondents agreed to the statements on the investigative technique where interviewing and interrogation technique will help in understanding the subject matter and thus expedite the investigation process. The average standard deviation (SD) of the response for question 1 is 0.488 which is lower than 1.00. This indicates that the respondents' perceptions were close or similar to one another. The lowest mean score goes to question number 2, "Using Computer-Based Software Tools: An investigator needs to be information technology (IT) literate" where the mean score response of the question is 4.59 i.e. greater than 3.00. This finding implies that on average, the respondents slightly agreed to the statements on the importance of computer-based software usage and being IT literate. The average standard deviation (SD) of the response is 0.716 which is slightly lower than 1.00. This indicates that the respondents' perceptions were close or similar to one another.

Table 6: Investigative Techniques of Forensic Investigator

	Mean	Std. Deviation
(1) Interviewing and Interrogation: An investigator needs to understand the subject's intention, effective inquiry, techniques of ethical and legal aspect in obtaining information.	4.80	0.488
(2) Using Computer-Based Software Tools: An investigator needs to be information technology (IT) literate.	4.59	0.716
(3) Offender Profiling: An investigator should know the technique to identify the offender and also able to link together several individuals/organisations/events.	4.71	0.595
(4) Surveillance: An investigator needs to have a follow-up and a continuous observation over someone or something in obtaining information.	4.69	0.697
(5) Observation and Documentation: An investigator needs to document in written or through observation notes and able to interpret the findings.	4.77	0.477

Table 7 shows the descriptive statistics of the third independent variable namely, knowledge of forensic investigator based on the result of the questionnaire. The highest mean score goes to question number 3, "Anti-Money Laundering Act 2001: Act enacted dealing with money laundering and anti-terrorism financing." where the mean score response of the question is 4.77 i.e. greater than 3.00. This finding implies that on average, the respondents agreed to the statements on knowing the Anti-Money Laundering Act 2001 will eventually help in the expediting investigation process. The average standard deviation (SD) of the response is 0.611 which is lower than 1.00. This indicates that the respondents' perceptions were close or similar to one another. The lowest mean score goes to question number 4, "Financial Accounting and Auditing Knowledge: the ability to understand basic Accounting Principles and International Auditing Standards (IAS)." where the mean score response of the question is 4.64 i.e. greater than 3.00. This finding implies that on average, the respondents agreed to the statements on the requirement know basic Accounting Principles and International Auditing Standard in investigating cases. The average standard deviation (SD) of the response is 0.725 which is lower than 1.00. This indicates that the respondents' perceptions were close or similar to one another.

Table 7: Knowledge of Forensic Investigator

	Mean	**Std. Deviation**
(1) Malaysian Anti-Corruption Commission Act 2009: Act enacted to provide for the establishment of MACC to make better provision for the prevention of corruption.	4.75	0.490
(2) Whistle-blower Protection Act 2010: Act enacted to combat corruption and other wrongdoings, and to protect individuals who whistleblow to the relevant enforcement agencies.	4.71	0.530
(3) Anti-Money Laundering Act 2001: Act enacted dealing with money laundering and anti-terrorism financing.	4.77	0.611
(4) Financial Accounting and Auditing Knowledge: the ability to understand basic Accounting Principles and International Auditing Standards (IAS).	4.64	0.725
(5) Specific Legal Knowledge: the ability to understand basic legal processes and legal issues.	4.67	0.543

Conclusion

Forensic investigation is the utilization of specialized investigative skills in carrying out an inquiry conducted in such a manner that the outcome will have an application to a court of law. Forensic investigation is the examination of evidence regarding an assertion to determine its correspondence to established criteria carried out in a manner suitable to the court. To successfully exercise good investigation expedition, there is a need for internal controls and one aspect of these controls relates to financial oversight. Unfortunately, the number of financial frauds that have been continually perpetrated within the country that raises serious questions as to whether traditional financial controls are working. This study examines the skills of forensic investigators and investigation process expedition. It means that traits such as knowledge, qualification, skills, and experience of the investigator affect the investigation process expedition. However, skills seem to be disputable issues among the traits as it is very subjective. Often, skills and investigation techniques are comprising one trait. Forensic investigator skills represent exceptional skill sets and techniques developed to detect the proof of fraud amongst other specialized knowledge areas of forensic accounting. Besides, investigative techniques of the forensic investigator are also determined in this study. Interview and interrogation are two major technique used to elicit responses from the accused. The evidence can be gathered by practising these two methods that can be used to approve or disprove the act in use in the investigation process. In this technological world, computer forensics and data mining techniques are crucial for investigators to expertise into uncovering technological fraud. Forensic investigators are expected to be the specialist in any accounting and legal field. In this profession, it is very imperative to have a thorough knowledge of accounting system and at least a basic understanding of the legal system. Besides, good knowledge on company's corporate governance policies, laws that regulate this policy and also command a civil and criminal law as well as the legal system and court procedures will assist the investigators to uncover fraudulent financial reporting. Therefore, the skills of forensic investigators, the investigative techniques of forensic investigator have a strong and statistically affect the investigation process expedition while the skills of forensic investigator do not affect the investigation process expedition.

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Formation of Human Potential of The Region in The Conditions of Demographic Crisis (on The Example of Regions of Ukraine)

Kateryna Sehida,
Doctor of Sciences (Geography), Associate Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: kateryna.sehida@karazin.ua

Liudmyla Niemets,
Doctor of Sciences (Geography), Professor, Head of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: soc-econom-region@karazin.ua

Taras Pohrebskyi,
PhD in Geography, Associate Professor of the Department of Economic and Social Geography, Lesya Ukrainka Eastern European National University, Lutsk, Ukraine,
e-mail: pogrebskyi.taras@eenu.edu.ua

Kostiantyn Niemets,
Doctor of Sciences (Geography), Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: konnem1948@gmail.com

Ievgeniia Telebienieva,
PhD in Geography, Associate Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: telebenevaev@gmail.com

Gennadii Golub,
PhD in Geography, Associate Professor of the Department of Economic and Social Geography, Lesya Ukrainka Eastern European National University, Lutsk, Ukraine,
e-mail: golub.gennadiy@eenu.edu.ua

Abstract

A number of global problems and crises that have engulfed the world community, associated with intense globalization, bring to the forefront human quality and overall human potential. As human potential is based on the population, it is timely and relevant to research its formation in a demographic crisis, which is gaining momentum in many regions and countries, affects on the formation of human potential, its ability to withstand crisis challenges, creates a number of socio-economic problems and troubles. Such countries include Ukraine, whose demographic problems, like most post-Soviet countries, are surprisingly acute. This publication embodies an attempt to identify key features of the formation of human potential in the region in a demographic crisis. To achieve this research goal based on the analysis of scientific sources to determine the content of human potential as a component of the integrated potential of the territory, its components, demographic basis; based on the analysis of official statistics using factor analysis to establish the spatial features of demographic processes and structures of regions of Ukraine as factors in the formation of human potential, to consider and compare the main demographic trends of different regions of Ukraine. The authors consider the general features and peculiarities of the content of the concept of human potential from the standpoint of different sciences, substantiate its understanding as a component of the integral potential of the territory; features of formation of human potential of the region in the conditions of demographic crisis are considered. Using factor analysis, the authors analyzed the factors influencing on the formation of human potential in terms of regions of Ukraine. As an

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example, the article analyzes the features of the formation of human potential of two very different and very significant regions of Ukraine: Volynska and Kharkivska oblasts.

Keywords*:* human potential, demographic crisis, socio-economic development, potential, factor analysis, region, Ukraine.

Relevance of the research

XXI century has exacerbated many global problems of the world community. A number of crises and catastrophes have engulfed all countries in the world without exception. In different parts of the world they manifest themselves in different ways. However, all the problems are related to intensive globalization, and therefore the qualities of people and the total human potential come to the fore. In many developed countries, the formation of human potential, its ability to withstand crisis challenges, is affected by a severe demographic crisis, which creates a number of socio-economic problems and troubles. Such countries include Ukraine, whose demographic problems, like most post-Soviet countries, are surprisingly acute. The demographic crisis in Ukraine is systemic, leading to the deterioration of all parameters of the country's development. Among its causes are the change of social life and, first of all, the system of social production, as a result of which the coordinated functioning and development of its components has been disrupted, which also has an impact on the formation of human potential. The demographic crisis is seen as a consequence of this systemic crisis in the most important spheres of society, the emergence and exacerbation of contradictions that affect on demographic processes and cause different socio-spatial models. Since the basis of human potential is the population, it is timely and relevant to research its formation in a demographic crisis. The authors consider the human potential of Ukraine as a component of the integrated potential of the territory, and therefore the analysis is conducted in terms of regions of Ukraine. Among the important tasks of the research are the substantiation of the factors of human potential formation and the analysis of this situation in the regions of Ukraine in particular, and in the state as a whole.

The Review of Previous Research

Studies of certain aspects of the formation, development and realization of human potential and its individual components are widely covered in the scientific literature. In particular, they were discussed at previous IBIMA international conferences. In particular, Veronika Humlerova analyzes the impact of human potential on the economic development of rural settlements on the example of individual territories of the Czech Republic [3], considers the peculiarities of regional development in view of intensification of migration and population change, the impact of human capacity of municipalities on subsidies from EU funds [2]. A number of works are devoted to the assessment of opportunities and transformation of human capital in terms of technological development and informatization of the economy [4].

In this aspect, Michael WENZEL examines the current challenges facing most German companies in view of demographic change in economically developed countries and the digitalization of the economy, identifying areas for the best symbiosis of senior workers' experience and the skills of young professionals [24]. The impact of demographic changes on the labor potential and labor market in Central Europe is considered by Jiri CERNY, studying the population structures in Central Europe and policy measures with a focus on the labor market, identifying potential areas of labor market development in view of structural changes in society [1].

Some aspects of the demographic component of human potential are covered by Andrzej Skibinski, who examines current demographic trends as a source of change in human resource management through the assessment of demographic change in Poland and Slovakia through quantitative and qualitative analysis of Eurostat statistical databases and author's sociological survey on intergenerational cooperation [22], considers the demographic conditions, processes and structures that determine the key internal factor of human potential, its impact on the economic development of the Visegrad Group [23].

In our previous researches, demographic potential has been identified as an object of socio-geographical research, methodology of its assessment [17] as a basis for socio-economic development of the region [7,18], features of its formation in the regions of Ukraine [20], demographic factors of regional development [16] and demographic situation as its indicator are determined [8]. At previous IBIMA conferences we discussed some issues of demographic processes, including migration, their impact on human potential and regional development in the world and in Ukraine [5,6,19,21].

Despite the large number of scientific studies on this issue, the questions remain: What are the components of human potential as a component of the integrated potential of the territory? What demographic processes and structures have the greatest influence on the formation of human potential? How to identify and evaluate their quantitative and qualitative impact? What are the features of the formation of human potential in a depopulated population and exacerbation of the demographic crisis?

Purpose and objectives

This article embodies an attempt to identify key features of the formation of human potential in the region in a demographic crisis. To achieve this research goal based on the analysis of scientific sources to determine the content of human potential as a component of the integrated potential of the territory, its components, demographic basis; based on the analysis of official statistics with the use of factor analysis to establish the spatial features of demographic processes and structures of regions of Ukraine as factors in the formation of human potential, to consider and to compare the main demographic trends of selected regions of Ukraine.

Information base and methods of research

The information base for the analysis of demographic processes and structures underlying the formation of human potential in the regions of Ukraine are official statistics: the 2001 Census of Ukraine [11], the State Statistics Service of Ukraine [14], the Main Department of Statistics in Volyn region [12], the Main Department of Statistics in Kharkiv region [13], analytical reviews, reports, scientific articles, the results of the authors' own research.

In the research were used methods of analysis and synthesis (to determine the content, components and factors of the formation of human potential; for establishment of spatiotemporal features of the formation of human potential in the regions of Ukraine), mathematical-statistical and demographic statistics (to process the official statistics, isolation and calculation of demographic indicators), rationing and linear scaling (to bring the data into normalized form, further processing by factor analysis, comparison of trends in demographic processes and structures of the studied regions of Ukraine), factor analysis (to establish the degree of factors of human potential, to determine their differentiation by the regions of Ukraine), comparison, systematization, generalization and others.

Presenting Main Material

Modern scientific developments of domestic and foreign scientists cover the study of human potential, human capital, human development, labor potential, life potential, demographic potential, reproductive potential, etc. In response to social demand, the development of economic research has led to the isolation of the demographic (human) factor of social development. Specialists in various sciences have studied individual issues of human potential from the standpoint of different sciences, differently interpreting the definition of "human potential", highlighting the most important features for a particular study from the standpoint of different scientific approaches. In general, human potential is a complex socio-economic system, its state is characterized by a set of indicators that complement each other: life potential of the population, investing in the formation and accumulation of human potential, scientific potential of society, employment potential, educational potential, health

potential, cultural potential, etc. Sometimes human potential is identified with demographic potential, considering the population, the share of the working population, age and gender characteristics, the dynamics of population movement, etc. Human potential is characterized by indicators of social development, quality of life, average life expectancy, adult literacy, GDP per capita, it includes opportunities for population reproduction and human development, a set of knowledge, skills, abilities and motivations of a person that have economic value. This potential increases as a result of a kind of investment (birth and upbringing of children, education of people, migration, etc.), considered in the context of the ideology of human potential, quantitative and qualitative potentials of its reproduction is a condition, basis and goal of society and state.

Taken into acount the complexity of socio-geographical research, the demographic potential of the territory is considered as a set of human resources of the territory, as a complex demographic, social, economic, settlement, ethnic, ecological phenomenon that reflects the overall characteristics of interconnected features of society. Accordingly, the blocks for assessing the demographic potential are determined: demographic, economic-demographic, settlement-demographic, socio-demographic, geodemographic, ecological-demographic [18]. Socio-geographical approach allows us to consider human potential as a component of the integrated potential of the territory. In the structure of the integrated potential there are a number of partial potentials, which are associated with the presence of certain types of resources and their groups on the territory. The leading role in the composition of integrated potential belongs to human potential, which includes demographic, labor (the main productive force, as it creates and uses labor, ensures the production of material and spiritual goods, favorable environmental conditions of people; its scale as a producer and consumer is a motivating force for the production of certain volumes of goods and services) and ecistic (scale of development and features of the settlement system of a region, taking into account also the available potential (prerequisites) that can ensure its development in the future). Demographic potential is an important component of human potential, includes all the features, properties and capabilities of the population necessary for the recovery of generations, ie the population with its structure and qualitative characteristics [15].

At the same time, most researchers agree that the basis of the region's human potential is the population and its socio-demographic characteristics; on the one hand, the population of a certain territory in the first approximation allows to determine the potential of the population of a certain territory, on the other - the features of demographic behavior of the population are the result and factor of transformations of human potential. Thus, human potential is, first of all, socio-demographic subsystem, it is self-organizing, has the ability to maintain its integrity and internal structure with significant changes in external conditions. The essence of human potential is manifested through structural indicators, because they represent it as a whole. For the same reason, the most informative is the process of reproduction of human potential and clarifying of the structure and role of its individual components.

According to the State Statistics Service of Ukraine, as of May 1, 2020, the current population was 41 806 223 people. It should be noted that the data of the State Statistics Service of Ukraine are based on information from registration authorities, so they include only those who are officially registered in Ukraine. These representations do not take into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the temporarily occupied territories in Donetska and Luhanska oblasts [14]. At the time of the proclamation of Ukraine's independence, the country had a population of 51.9 million, and in two years to 1993 there was an increase in population (52.2 million), which has never been recorded in the country's history. During this period, the population decreased by more than 10 million people, which indicates a high rate of depopulation and exacerbation of the demographic crisis, the essence of which is systemic and leads not only to rapid population decline, but also to significant deformations of its structure and demographic behavior that ultimately has a significant negative impact on the formation of human potential now and in the future.

Therefore, the formation of human potential is influenced by a number of factors that can be divided into economic, social and demographic. Let's consider which demographic processes have the greatest impact on the formation of human potential in the regions of Ukraine. The analysis of

factors influencing on the formation of human potential in Ukraine was carried out on the basis of factor analysis (the method of principal components with varimax rotation of factors), which allowed to calculate the factor load on each of the indicators. Taking into account the availability of statistical information for the research were selected 17 indicators that reflect the demographic characteristics in terms of regions of Ukraine. The initial data for factor analysis do not contain information about the Autonomous Republic of Crimea, Donetska and Luhanska oblasts, which significantly affected on the results. In order to determine the optimal number of factors, the dispersion of each of the factors was calculated (table 1).

Determining the optimal number of factors, we turn to three criteria:

- according to the criterion of Kettel's "stone rash": on the graph of dispersion (scree plot) there is a place where the decrease of dispersion from left to right is slowed down as much as possible. It is assumed that to the right of this point is only a "factorial rash". The graph of dispersion (Fig. 1) shows four factors;
- by Kaiser's criterion: only factors with a dispersion greater than 1 are selected (in our case four factors);
- by cumulative percentage: as determinants are selected those factors that cover a total of about three quarters of the original information, ie the cumulative percentage should exceed 75% (in our case, three factors).

Table 1: Absolute, relative and cumulative dispersion values of factors of human potential formation of Ukrainian regions

Factor	Dispersion	Percentage of total dispersio, %	Cumulative dispersion	Cumulative percentage, %
1	8,125886	47,79933	8,12589	47,7993
2	4,102946	24,13498	12,22883	71,9343
3	2,021965	11,89391	14,25080	83,8282
4	1,216138	7,15375	15,46693	90,9820
5	0,730383	4,29637	16,19732	95,2783
6	0,414360	2,43741	16,61168	97,7158
7	0,254729	1,49841	16,86641	99,2142
8	0,091616	0,53892	16,95802	99,7531
9	0,027312	0,16066	16,98534	99,9137
10	0,013363	0,07861	16,99870	99,9923
11	0,000880	0,00517	16,99958	99,9975
12	0,000339	0,00200	16,99992	99,9995
13	0,000045	0,00026	16,99996	99,9998
14	0,000037	0,00022	17,00000	100,0000

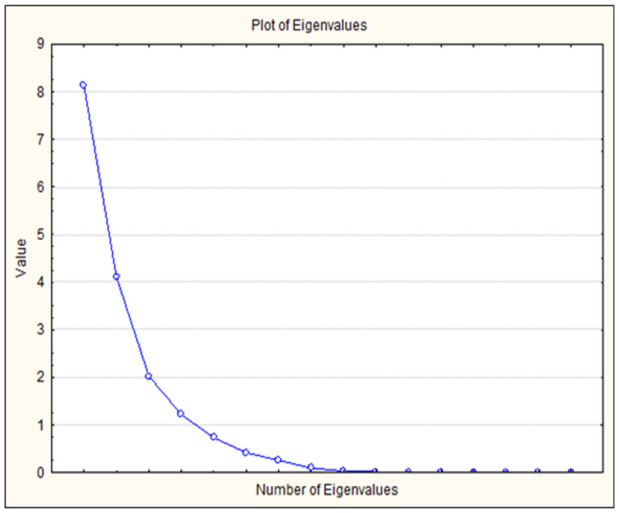

Fig. 1: Graph of dispersion ("stone rash") of factors of human potential formation of Ukraine (built on the results of factor analysis)

Thus, we will assume that the formation of human potential in Ukraine is most influenced by four factors. As a result of varimax rotation of the coordinate axes, a matrix of factor loadings was obtained (Table 2).

Table 2: Factor loadings (Varimax raw), extraction: principal components, marked loadings are > 0,7)

№ and characteristic	Factor loadings			
	factor 1	factor 2	factor 3	factor 4
1 – urbanization rate, %	0,392661	-0,279362	0,125766	0,754757
2 – density, persons / km2	-0,235435	-0,269759	0,071705	0,857745
3 – birth rate, ‰	-0,961112	0,149331	-0,003995	0,194097
4 – mortality rate, ‰	0,888408	0,294525	0,108388	-0,177200
5 – reproductive change, ‰	-0,962501	-0,108390	-0,066430	0,193057
6 – infant mortality rate, ‰	-0,059070	0,262363	-0,454427	-0,301466
7 – demographic pressure (general), ‰	0,054844	0,978339	-0,074900	-0,160366
8 – demographic pressure (0-15), ‰	-0,903133	0,372052	-0,100414	-0,141229
9 – demographic pressure (60+), ‰	0,957457	0,228796	0,056020	0,044533
10 – population aged 0-15, %	-0,931216	0,286408	-0,107281	-0,154934
11 – population aged 15-60, %	-0,053337	-0,977410	0,076497	0,169307
12 – population aged 60+, %	0,973990	0,140055	0,069422	0,060842
13 – migration flow (in), ‰	0,051860	-0,088019	0,975488	0,139160
14 – migration flow (out), ‰	0,264148	0,034274	0,871460	-0,186611
15 – migration balance, ‰	-0,226164	-0,201977	0,719468	0,480081
16 – demographic aging, ‰	0,898163	0,101086	0,023751	0,369979
17 – total population growth, ‰	-0,858058	-0,175707	0,281107	0,369583
Expl. Var	8,073132	2,636142	2,592890	2,164771
Prp. Totl	0,474890	0,155067	0,152523	0,127339

Based on the values of factor loadings, the content of factors influencing on the formation of human potential of Ukraine is established. The factor includes the indicator for which the factor loading is the largest, ie the closest in modulus to one. If the factor loadings of the indicator for each of the 4 factors are less than 0.7 ("threshold" value), this indicator was not included in the analysis because it is statistically insignificant. Taken the share of dispersion, we consider the main first two factors (the 1st factor accounts for 47.8% of the total dispersion of the original data; the 2nd - 24%). Based on the values of factor loadings, it is established that four factors influence on the formation of Ukraine's human potential. Interpretation of the results of factor analysis made it possible to determine the following hypothetical factors: demographic (nine indicators (Table 2)), structural (two indicators), migrational (three indicators), resettlement (two indicators).

According to the results of factor analysis, the values of factors in terms of regions of Ukraine were calculated (Table 3). Factor weights are indicators that assess the contributions of administrative-territorial units to each of the factors. The matrix of factor weights is calculated by multiplying the matrix of the original data by the matrix of factor loadings. They are interpreted as relative estimates of the manifestation of a certain factor in each individual administrative-territorial unit and serve as a basis for their grouping. If the value of the factor weights is about 0, then the impact of this factor corresponds to the impact on the country as a whole, if more (and especially more than 1) – the impact of this factor is significantly greater, and if minus (more than -1) – significantly less than in the country in general.

Table 3: Factor weights of manifestation of factors of human potential formation in the context of regions of Ukraine (factor scores, rotation: Varimax raw, extraction: principal components)

Oblasts	Factors			
	demographic	structural	migrational	resettlement
Vinnytska	0,47060	1,10440	-0,61591	0,12651
Volynska	-1,41121	1,12981	-0,31348	-0,08134
Dnipropetrovska	0,69374	0,31467	-1,01906	0,88317
Zhytomyrska	0,07778	1,33450	1,13449	-0,30287
Zakarpatska	-1,91308	-0,29565	-1,08766	-1,08393
Zaporizka	0,91044	-0,36250	-1,26320	0,69769
Ivano-Frankivska	-0,85173	-0,89459	0,19796	-0,93140
Kyivska	-0,32574	0,50559	2,32608	0,60224
Kirovohradska	0,79017	1,36195	0,45034	0,01034
Lvivska	-0,73072	-1,13011	1,60633	-0,77930
Mykolaivska	0,36441	-0,57094	-0,47671	-0,27982
Odeska	-0,48433	0,26643	0,24178	0,21418
Poltavska	1,00584	-0,31766	0,73389	-0,42504
Rivnenska	-1,89454	1,48112	0,23076	-0,22942
Sumska	1,19737	-1,20931	1,85444	-0,82167
Ternopilska	-0,00875	-0,79410	-0,62421	-0,68275
Kharkivska	0,76421	-2,04458	-0,23472	-0,18018
Khersonska	0,11994	-0,41918	-1,25102	-0,21095
Khmelnytska	0,33601	0,72051	-	-0,01024

			0,38859	
Cherkaska	1,13764	0,44743	-0,75054	-0,05150
Chernivetska	-0,85940	-0,69591	-1,00672	-0,58529
Chernihivska	1,62627	1,23208	-0,09395	0,16452
Kyiv	-1,01493	-1,16396	0,34970	3,95705

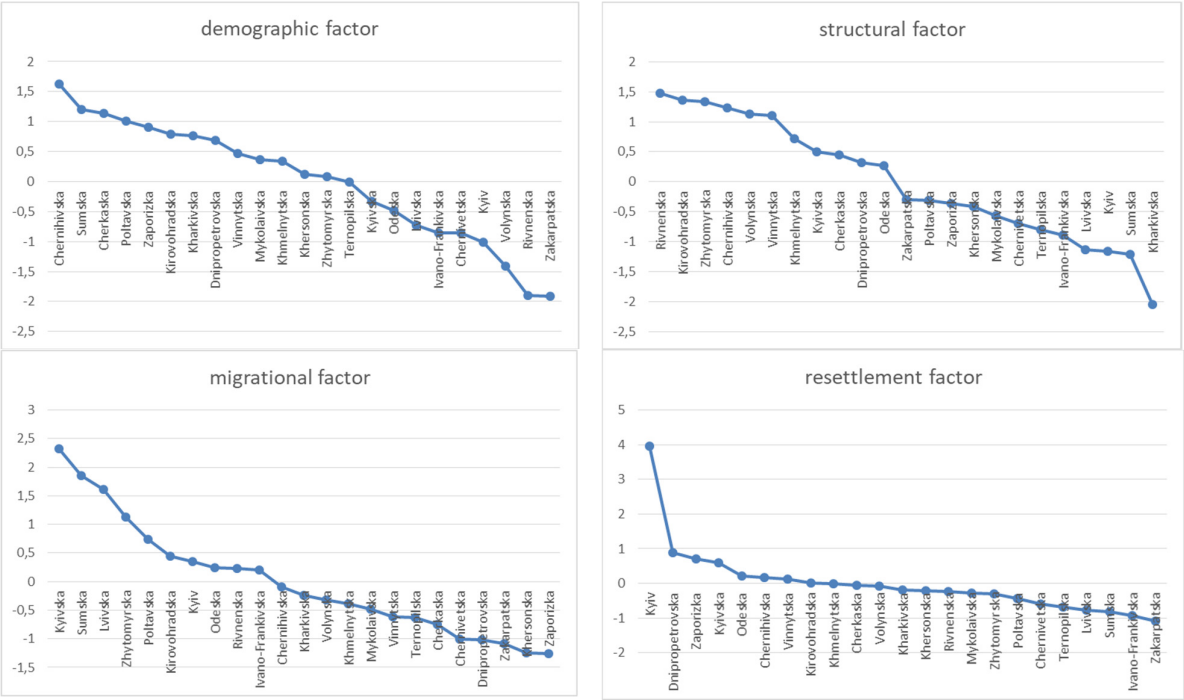

Fig. 2: Distribution of regions of Ukraine by the value of certain factors of human potential formation (built on the results of factor analysis)

The values of the current factors are significantly differentiated on the territory of Ukraine (Fig. 2). Demographic factor acquires the largest and smallest significance in Chernihivska, Sumska, Cherkaska oblasts and Volynska, Rivnenska, and Zakarpatska oblasts respectively. It is explained by the peculiarities of demographic processes, socio-demographic behavior of the population and so on. The migrational factor has a significant differentiation by the regions of Ukraine: it acquires the highest importance in Lvivska, Zhytomyrska, Kyivska, Sumska oblasts; the lowest – in Zakarpatska, Chernivetska, Khersonska, Zaporizka and Dnipropetrovska oblasts. The most effective influence of the structural factor is observed in Volynska, Rivnenska, Zhytomyrska, Vinnytska, Kirovohradska and Chernihivska oblasts, the smallest – in Lvivska, Sumska and Kharkivska oblasts. The resettlement factor is most pronounced in the city of Kyiv and Kyivska, Zaporizka, Dnipropetrovska oblasts, least - in Sumska and a number of western oblasts. Therefore, since the population itself is the basis of human potential, demographic processes and structures have a significant impact on its formation. Lets consider the influence of their individual components on the example of two regions in eastern and western Ukraine: Kharkivska and Volynska oblasts. Their example identifies indicators, characteristics, negative aspects of the demographic crisis, which in general affects on the socio-economic development of the whole state and the phenomena that affect on human potential.

Therefore, the selected for comparison Volynska and Kharkivska oblasts of Ukraine are not only located in geographically different parts of the country, but also have opposite demographic trends, distinguish the maximum diversity of demographic behavior of the population of different regions of Ukraine. We do not aim to compare the quantitative and qualitative composition of the human potential of these regions, we will determine the demographic prerequisites for its formation. For the convenience of analysis, the indicators are normalized to the national value (Fig. 3). Thus, Volynska oblast belongs to those regions of Ukraine where high reproductive activity, as evidenced by a relatively high birth rate (10 ‰ vs. 8 ‰ on average in Ukraine and 6.8 ‰ in Kharkivska oblast). As such a situation has been observed over the last few decades, a significant share of the younger age group in the population structure is traced (21% vs. 16% on average in Ukraine and 14.7% in Kharkivska oblast). Accordingly, the demographic burden of "children" is higher (349 ‰ against 278 ‰ on average in Ukraine and 239 ‰ in Kharkiv oblast). Similarly, the rate of depopulation in the oblast is much lower than in the state as a whole (-2.8 ‰ vs. -6.6 ‰ on average in Ukraine and 8.4 (in Kharkivska oblast). Volyn oblast is also characterized by a low level of population aging (13‰ vs. 17 ‰ on average in Ukraine and Kharkiv oblast). On the other hand, Kharkiv oblast is characterized by high migration attractiveness, a significant positive balance of birth migration (2 ‰ vs. 0.9 ‰ on average in Ukraine and Volyn oblast), and the oblast is characterized by a high level of urbanization (80.7% vs. 69% on average in Ukraine and 52% in Volyn oblast) and population density (86 people / sq.km against 70 people / sq.km on average in Ukraine and 52 people / sq.km in Volyn oblast). Thus, we can note the opposite demographic trends in the researched regions, respectively, the degree of influence of demographic factors on the formation of human potential in Volyn oblast is higher, while in Kharkiv oblast leading socio-economic factors.

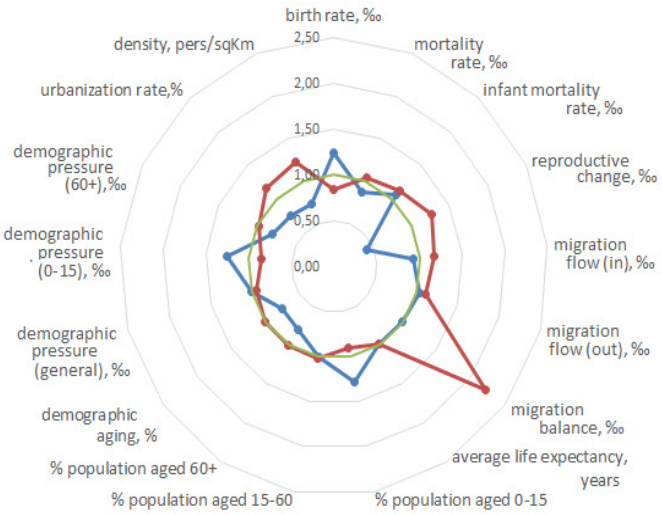

Volynska oblast	Kharkivska oblast	average in UKRAINE	
10,1	6,8	8,1	*birth rate, ‰*
12,9	15,2	14,7	*mortality rate, ‰*
7,5	7,9	7	*infant mortality rate, ‰*
-2,8	-8,4	-6,6	*reproductive change, ‰*
14,2	18,1	15,4	*migration flow (in), ‰*
15,1	16,1	14,5	*migration flow (out), ‰*
0,9	2	0,9	*migration balance, ‰*
71,49	71,4	71,76	*average life expectancy, years*
20,9	14,7	16,3	*% population aged 0-15*
59,8	61,2	59,8	*% population aged 15-60*
19,3	24,1	23,9	*% population aged 60+*
13,02	17,2	17,1	*demographic aging, %*
672	633	671	*demographic pressure (general), ‰*
349	239	278	*demographic pressure (0-15), ‰*
323	394	399	*demographic pressure (60+), ‰*
52,3	80,7	69,2	*urbanization rate,%*
51,8	86	70	*density, pers/sqKm*

Fig. 3: Comparison of demographic indicators of human potential formation in Volynska and Kharkivska oblasts (calculated and built on the basis of [12,13])

Conclusions

The research of human potential development in a demographic crisis is a topical issue today. After all, for many countries of the world, including Ukraine, the demographic problem is painful, and the demographic crisis is exacerbated from year to year. Human potential is a complex socio-economic system based on population; at the same time, human potential is influenced by a number of factors. Our research demonstrates the multifaceted impact of factors on the formation of human potential of the country. Using factor analysis, the article identified the main factors influencing on the formation of human potential in the demographic crisis in Ukraine as a whole, as well as in selected regions. The values of the current factors are significantly differentiated on the territory of Ukraine. For in-

depth analysis, such oblasts of Ukraine as Volynska and Kharkivska were selected, which show different demographic trends and driving levers of influence on the formation of human potential, which are located in geographically different parts of the country and have opposite demographic trends, reflect the maximum diversity of demographic behavior of Ukraine. Volyn oblast is characterized by such influencing factors as high birth rate, low population aging, Kharkiv oblast is characterized by completely opposite influencing factors, namely the migration attractiveness of the region, high level of urbanization and population density. So, summing up, we can say that in the researched regions of Ukraine is observed the opposite demographic trends, respectively, the degree of influence of demographic factors on the formation of human potential in Volyn oblast is higher than in Kharkiv oblast for which socio-economic factors are leading. Recently, the development of human potential is becoming a major and determining factor in economic growth. Numerous researches have convincingly shown that the classification of countries by the level of their economic development is crucially determined by the quality of human potential. Ultimately, such parameters as the pace of scientific and technological progress, the organization and culture of labor, and its productivity also depend on it. The level of development of Ukraine in the future is determined by how effective the process of building the human potential of the country and its regions will be and how effectively this potential will be used in the state. In Ukraine, the priority areas of human potential development are the formation of a social market income system, the formation of a model of continuing education and self-education, providing a qualitatively new level of health care. In further research, the authors plan to use SWOT-analysis to consider in more detail the problems and prospects for the impact on human potential development in the context of the demographic crisis in the regions of Ukraine.

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Migratory Processes In Metropolicies: Advantages And Disadvantages For Metropolitan Regions

Maryna LOHVYNOVA
PhD student of the Department of Human Geography and Regional Studies,
V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: logvinova_mari94@ukr.net

Olha SUPTELO
PhD student of the Department of Human Geography and Regional Studies,
V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: syptelo@gmail.com

Liudmyla NIEMETS
Doctor of Sciences (Geography), Professor, Head of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: soc-econom-region@karazin.ua

Kateryna SEHIDA,
Doctor of Sciences (Geography), Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: kateryna.sehida@karazin.ua

Liudmyla KLIUCHKO
PhD in Geography,
Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: liudmylakliuchko@gmail.com

Ievgeniia TELEBIENIEVA
PhD in Geography, Head of the Educational and Research Laboratory of Regional Human-geographical Studies, Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: telebenevaev@gmail.com

Abstract

Metropolises play an increasing role in the life of the global society, shaping the features of migration processes in certain regions and countries of the world. Ukraine is rapidly developing in this direction, playing a significant role in the geopolitical processes of Europe. The article is devoted to the problem of migration asymmetry of the population associated with the concentration of a significant part of the population of Ukraine in the metropolises. Metropolises and metropolitan regions are the centers of attraction for migrants, concentrating a huge industrial, labor, social, infrastructural and cultural potential. The purpose of the study is the analysis of the main features of migration processes in the metropolitan regions of Ukraine and the detection of the opportunities and threats which they have for the metropolises and the whole country. Based on foreign and native researches, the concept of "metropolis" is analyzed. It has been established that in Ukraine metropolitan functions are performed by Kiev, Kharkiv, Odesa, Dnipro, Lviv. All of them, Kiev is the exception, are monocentric metropolises of the all-Ukrainian level. Kiev is a metropolis of international importance and due to the intensive processes of suburbanization, it acquires the features of polycentricity. The factors of migration attractiveness and types of migrations that prevail in a particular metropolis are revealed. The main indicators of migration are considered: the number

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of arrivals, departures, the balance of migration along metropolises and regions in which they are located. The opportunities and threats of population migration for metropolitan regions are analyzed.

Keywords: metropolis, metropolitan region, internal migration, migration process, migration flow, migration growth, Ukraine.

Introduction

In recent years, the territory of Ukraine has been characterized by intense migration transformations, which form the territorial unevenness of the settlement of the country's area. Large cities – metropolises – become recipients of the largest migration flows while rural areas and the most part of small and medium-sized cities experiences a significant outflow of the working-age population. It increases the depression of these regions and increasingly aggravates the polarization of the socio-economic development of settlements in the center-periphery direction. Migration is becoming one of the main factors of qualitative changes in the structure of the city's population and has a significant impact on the processes of spatial transformations of the urban environment. The fact that the city is a "magnet" of migration flows, entails the uneven socio-economic and demographic development of the country's territory as a whole, tells about the relevance and necessity of this study. In addition, an important aspect of this article is detection of opportunities for the socio-economic development of metropolitan areas due to migration population growth and the threats that metropolitan regions of Ukraine face in a process of population migration.

The purpose of the study is to analyze the main features of migration processes in the metropolitan regions of Ukraine and identify the opportunities and threats that they pose for the metropolises and the country. To achieve the purpose of the study, the team of authors sets the following tasks: to analyze the theoretical foundations of the definition of the concept "metropolis" in the measurement of Ukrainian cities; analyze the migration situation in these cities and identify the factors of their migration attractiveness; to explore the possibilities and threats of migration for the metropolitan regions of Ukraine, taking into account the interdependence of the development of these processes in Europe and the world as a whole.

Research Methodology

The research was carried out using a number of general scientific and specific scientific research methods. Among them: statistical (main indicators of population migration in metropolitan regions); method of analysis and synthesis (for analyzing migration flows from the periphery to metropolitan areas); problem method (for identifying threats of migration flows for metropolitan regions); a graphical method (for visualizing research results in the form of diagrams, graphs, diagrams, etc.) and some others which will be disclosed during the research.

The data of the State Statistics Service of Ukraine *(Derzhavna sluzhba statystyky Ukrainy)*, the State Migration Service of Ukraine *(Derzhavna mihratsiina sluzhba Ukrainy),* the Ministry of Social Policy of Ukraine *(Ministerstvo sotsialnoi polityky Ukrainy)* were used. Analytical reviews and reports, scientific articles and publications of foreign and Ukrainian authors were studied.

Analysis of Major Publications

Population migration, its causes and directions are a complex multidisciplinary industry, which is dealt by representatives of social geography, demography, sociology, public administration, economics, politics and others separately and in cooperation.

So, Jorge Bravo, in the General secretary's report about the work of the 51st session of the Commission according to Population and Development, calls cities as centers of social, economic and political activities and mobilities of people which attract internal and international migrants. At the same time, the author calls that the processes of globalization are the main factor in increasing the flow of migrants to the cities *(Bravo, 2018).*

M. Lerch predicates that many large cities and metropolises of the world are characterized by an increase in the population precisely because of migrants, primarily external ones, which is mainly facilitated by the processes of urbanization, which entail an improvement in living in the cities *(Lerch, 2017)*.

Exploring the characteristics of migration of rural areas and towns, Carle C. Zimmerman identified a certain relationship between the level of socio-cultural development of migrants and the place of their migration *(Zimmerman, 1928)*. So, representatives of the lower strata of the population, if they decide to move, they prefer to migrate to the towns not too far from their former place of residence. At the same time, people with a higher level of education and labor qualifications choose large cities or other countries.

Also it is interesting the research written by Jorge Rodríguez-Vignoli, Francisco Rowe, in which, using a quantitative assessment method, was revealed the influence of internal migration on the structure of the local population in eight large cities in Latin America *(Rodríguez-Vignoli, Rowe, 2018)*. Internal migration tends to reduce the sex ratio of the population under the age of 14, as well as to increase the percentage of young people (aged 15-29) among the local population.

The Study of the Impact of Migrants on Urban Communities in the United States by Franklin J. James, Jeff A. Romine, Peter E. Zwanzig confirms the positive impact of migrants on the socio-economic situation in large cities. Migrants did not reduce employment opportunities in the United States, on the contrary, they strengthened a number of sectors in the economy of large cities, including small business, finance, construction and industry, also they increased exports *(Morar, Dulca, Nagy, 2016)*.

For Ukrainian researchers, the issues of migration and its impact on the development of the territory are also relevant, taking into account the European and global socio-economic space. In the national report "Ukrainian society: the migration dimension" employees of the Institute of Demography and Social Research named M.V. Ptukhy NAN of Ukraine give an comprehensive description about migration processes in the context of the country and separate regions *(Ukrainske suspilstvo..., 2018)* Wherein, the influence of urbanization on the distribution of the main flows of migrants is called one of the main factors, but there is no analysis of this process in the most developed cities of the country (metropolises). And T. Drahunova in her study calls the regional centers as the main centers of attraction of migration flows in the country, and among the most important reasons for migration calls social *(Drahunova, 2011)*.

N. Lykhovid overlooks the features of the influence of cities on migration processes, trying to analyze the main consequences and effects of migration processes in Ukraine *(Lykhovid, 2017)*. Among them she calls the depopulation of some regions of the country, the change in the structure of the population, the loss of an able-bodied highly qualified population and the need to develop and correct the country's migration policy.

L. Niemets, O. Suptelo, M. Lohvynova, L. Kliuchko, I. Telebienieva also tell about the uneven socio-economic development which occurs as a result of the outflow of the population from peripheral areas and the influx into large cities, which become the so-called "poles of growth" *(Niemets, Suptelo, Lohvynova, Kliuchko, Telebienieva, 2020)*.

Thus, despite the available researches about the migration activity of the population in metropolitan areas, there are certain “blank spaces” requiring additional study with an integrated multidisciplinary approach. In our opinion, “blank spaces” are a detailed study of migration processes in each ukrainian metropolis, identification of the factors of attractiveness of migrants and, of course, positive and negative aspects of the impact of migration on Ukrainian metropolises. This study does not seek to fill the existing gaps but it is a certain background to a complex study of these points and provides an incentive for further discussions of many scientists according to this problem.

Presentation of the Main Research Material

Modern migrations are characterized by a significant segment of temporary, rotating movements. Therefore, the number of people who were (worked, studied) in metropolises at a certain period of their life and, thus, got or brought the features of other cultures significantly exceeds the number of people who currently live in non-native regions where *(Malynovska, 2009).*

For O. Denysenko, metropolis (from the Greek. Metropolis – the main city, capital) is a form of territorial organization of society, which develops on the basis of separate cities and is characterized by flexibility and diversification of the structure of their socio-territorial complexes, the activity of innovative movement and high sectoral , inter-sectoral and territorial integration, special properties of the socio-cultural environment (saturation with objects and connections, dynamism, contact, social mobility). It allows them to realize their metropolitan functions *(Dronova, 2014).* The adjacent zone of the most intense influence of the metropolis with the city forms a functional integral metropolitan region *(Denysenko, 2012).*

Following the development of the metropolis a metropolitan area is formed, which differs from the agglomeration that it includes a suburban area, which is closely connected with the central city by labor migrations, independently of whether the settlements of the suburban area merge with the central city or not *(Melnyk, 2013).*

According to the opinion of the staff of the Institute of Demography and Social Research named after M.V. Ptukhy, there were only six cities in Ukraine performed metropolitan functions at the beginning of the new millennium. Today t Kiev is part of the global metropolitan network, Kharkiv, Odesa, Dnipro, Lviv are regional metropolises of the all-ukrainian level. In connection with the hostilities in the East of Ukraine and the occupation of a part of the territory of Donetsk and Lugansk regions, Donetsk has actually lost such functions *(Ukrainske suspilstvo..., 2018).*

According to E. Dronova's opinion, metropolitan functions are concentrated in super-large cities (in cities with one million population). They transform such cities from national into regional and transnational centers performing organizational and managerial, innovative and creative, transport and communication, spiritual, cultural and informational-representative functions *(Dronova, 2014).*

In Ukraine the number of such cities is decreasing, because at the beginning of the 21st century the five cities of Ukraine, in which more than a million people live, left Donetsk. However, according to experts, in 15-20 years the growth of their share in the total population may exceed 25% on the background of a general reduction population and migration flows from peripheral areas. It tells about a significant deformation of the structure in the settlement system in the state and may lead to undesirable consequences.

O. Denysenko notes that such interregional centers as Kiev, Kharkiv, Lviv, Dnipro, Odesa and others acquire metropolitan features – functions which are especially important for social development. Their implementation goes beyond the state and ensures its interaction with the global economic system *(Urbanistychna Ukraina…, 2017).*

Most of the Ukrainian metropolises are monocentric. They have one core (regional center), adjacent cities and rural settlements. They have stable, well-defined economic and social centripetal connections in labor markets, educational institutions, between business entities, as well as in communication relations between companies and local authorities forming migration flows in the corresponding direction (*Ukrainske suspilstvo..., 2018)*. Recently, Kiev metropolis has been acquiring signs of polycentricity, which manifests through the synergistic functional influence of the central cell (the city of Kiev) on the surrounding space with the transfer of growth poles beyond it against the background of the preservation of the defining dominant of the center. In this regard, one can clearly see the re-profiling of the industrial functions of the core, the removal of non-capital sectors of the economy to the peripheral zone and, as a consequence, the redistribution of pendulum migrations in

favor of satellite cities and settlements where high-tech enterprises of the construction, light, food-chemical, perfumery and cosmetic industries operate *(Pokliatskyi, 2009).*

All Ukrainian metropolitan cities are covered with the processes related to residential suburbanization: selective transformation and fragmentation of rural settlements in the nearest suburban area; construction of new cottage townships and transformation of historically formed garden and dacha cooperatives into permanent housing around metropolitan centers; construction of new residential complexes in neighboring settlements with high transport accessibility; "Internal suburbanization" of the cities ("internally" suburbanizedcities' neighborhoods) *(Urbanistychna Ukraina…, 2017).*

As a rule, the increase of the population in metropolitan areas is due to the migration movement of the population outside their borders as a pendulum migrations. In the metropolises we investigated, satellite city mostly perform a residential function, therefore, the main flows of population movement are periodic labor and educational pendulum migrations (Table 1).

Table 1: Characteristics of migrations in the metropolises of Ukraine

Name	Factors of migration attractiveness	Types of migrations
Kiev metropolis	The capital region, the largest city in Ukraine by population, financial, infrastructure, industrial, educational, cultural center of Ukraine; positioning as a Smart city; high standard of living of the population; the most developed labor market, labor needs; high employment in the tertiary sector; the presence of innovative enterprises; favorable investment climate and significant investment attraction; developed transport infrastructure both around the city and with satellite cities; the transfer the industrial enterprises to the peripheral zone and a certain redistribution of pendulum migrations in favor of satellite cities and settlements with industry concentrated industry.	labor, educational, both permanent and pendulum.
Kharkiv metropolis	Developed labor market and growing demands for labor; priority development of the service sector, financial sector, trade; development of high-tech industries, IT industry; a high level of development of science, education (Kharkiv is a student capital of Ukraine); positioning the city as a Smart city; a high level of development of agriculture and the demands for labor in this industry; wide transport intercity and intraregional communication; neighborhood with regions including temporarily occupied territories.	labor, educational, both permanent and pendulum, forced migrations of immigrants from Donetsk and Lugansk regions
Odesa metropolis	High integration of the city and nearby settlements, which promotes the intensity of pendulum migrations; development of the suburban area, where prices for real estate and land are much lower; good transport links between Odesa and satellite cities; good intra-regional communication; an increase in the intensity of migration in the summer due to the opening of the tourist season; seasonality of migrations because of the employment in the agro-industrial complex, tourism, recreation, as well as transport and logistics; development of the secondary and tertiary sectors of the economy.	labor, educational migrations, high intensity of pendulum migrations.
Dnipro metropolis	Favorable transport and geographical location; industrial development and the presence of large industrial enterprises; demand for labor from small businesses; development of the tertiary sector; neighborhood with regions including temporarily occupied territories.	labor, educational, both permanent and pendulum, forced

		migrations of immigrants from Donetsk and Lugansk regions
Lviv metropolis	Lviv is a historically formed center with a powerful concentration of financial and economic, socio-cultural, material and informational capitals; wide transport links of the regional center with the adjacent territory, which creates prerequisites for expanding the geography of pendulum migration; development of cross-border cooperation; powerful IT sector (SoftServe, Intellias, ELEKS, Lohika, GlobalLogic); the development of the fuel and energy and petrochemical, food industry, mechanical engineering; the presence of a large number of institutions of higher education;	labor, educational, both permanent and pendulum, mostly abroad.

(Niemets, Suptelo, Lohvynova, Kliuchko, Telebienieva, 2020;
Niemets, Husieva, Suptelo, Sehida, Kobylin, Kliuchko, 2018;
Niemets, Mezentsev, Morar, Sehida, Husieva, Peresadko, 2018;
Kostrikov, Niemets, Sehida, Niemets, Morar, 2018;
Kostrikov, Sehida, 2016; Ukrainske suspilstvo..., 2018; Malynovska, 2009)

Consider the indicators of migration in the metropolitan regions of Ukraine and metropolitan cities in more detail. Fig. 1 shows that all metropolitan regions and metropolitan cities, except for the Dnipropetrovsk region and the Dnipro, have a positive migration balance. Among the migration flows internal migrations of the population prevail in all, without exception, regions (Fig. 2). The largest flows of migration are concentrated in the capital region – Kiev region and Kiev. In 2019 the population of Kiev region increased by 27.343 people. due to migration growth (because of internal migration of the population), the population in Kiev increased by 17.175 people. In 2019 Dnipropetrovsk region and Dnipro demonstrate a negative balance of migration in the number of 1.426 and 39 people respectively, although internal migrations make for a small migration increase in the regional center.

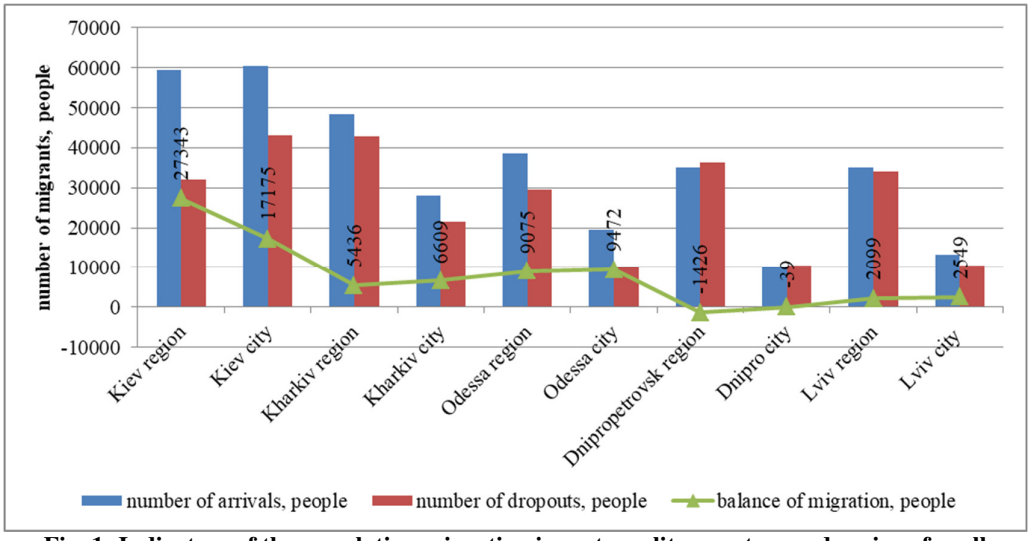

Fig. 1: Indicators of the population migration in metropolitan centers and regions for all migration flows (constructed by the authors according to (Derzhavna sluzhba statystyky Ukrainy)

Today internal migration in Ukraine significantly exceeds international. It does not substantially affect the number and content of the country's population as a whole, but it causes changes in its location, sex and age structure of certain regions, is a consequence and an important factor of regional differences, is directly related to the processes of industrialization and urbanization,

depopulation of the village *(Malynovska, 2009).* The largest flows of intraregional migration (Fig. 2) of the population are directed to the capital – Kiev, which is associated with its metropolitan functions. However, a fairly high migration growth of the population is provided by Odesa, mainly due to seasonal population movements and their employment in tourist and recreational activity and the service sector. It is characterized by a clear seasonality of tourist and health migration, which creates many problems for the city.

In the investigating metropolises there is a positive balance of international migration (Fig. 3), however, Lviv region is characterized by insignificant negative indicators which is connected with the border position of the region, and as a result, labor migration of the population abroad.

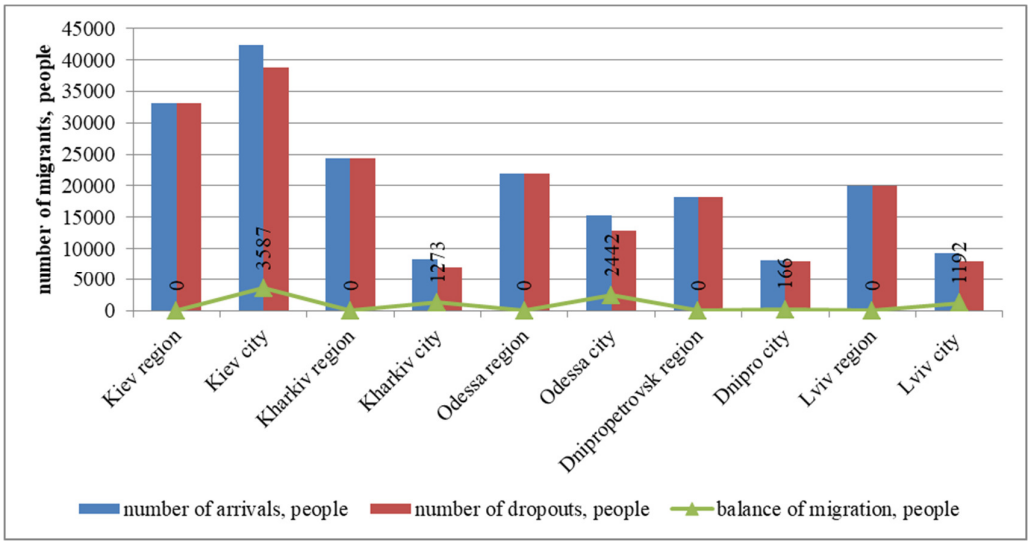

Fig. 2: Indicators of population migration in metropolitan regions by the number of intraregional migrants (constructed by the authors according to (Derzhavna sluzhba statystyky Ukrainy)

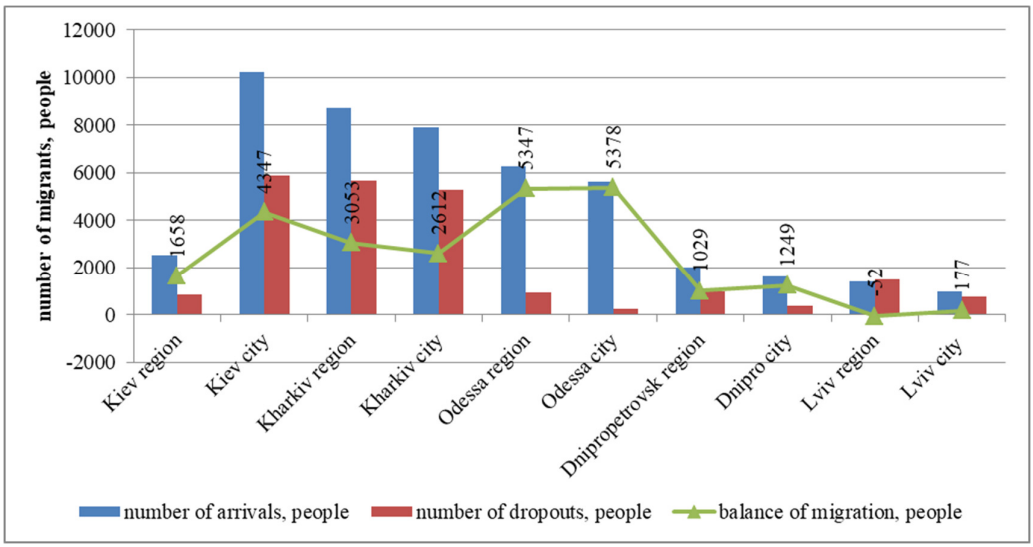

Fig. 3: Indicators of population migration in metropolitan regions by the number of international migrants (constructed by the authors according to (Derzhavna sluzhba statystyky Ukrainy)

The influence of metropolises on the formation of internal migration flows of the population is carried out through the intensification of the processes of economic reproduction of the labor force, the formation of self-regulation and self-maintenance mechanisms of the professional mobility of the economically active population and the growth of opportunities to satisfy its information and communication needs. It is important to expand the range of administrative services which can be obtained on the basis of the best service with minimal bureaucratic barriers, high standards of public and private specialized medical care, and access to educational and cultural infrastructure as well.

Based on the analysis of the factors of the migration attractiveness of territories and statistical information about the rates of migration in metropolitan cities, we can conclude that the main trends of internal migrations connected with the formation and development of metropolises are the high concentration and intensity of pendulum migrations to the satellite cities – metropolis with the purpose of labor, educational, administrative, cultural, informational, recreational and health migration of the population. This is facilitated with the developed intraregional and interregional transport links. In addition, Kiev, Kharkiv, Dnipro metropolises have become a place of migrants' concentration from the temporarily occupied territories of Ukraine – internally displaced people. There is a dependence of the intensity of migration movements of the population to the center-periphery from the peculiarities of the spatial development of metropolises: the farther from the center, the lower business activity and the level of living of the population and accordingly the more incentives to look for work outside the place of residence.

The asymmetry of migration flows in Ukraine from the periphery in favor of the metropolitan areas and their development as centers of attraction for migrants causes a number of socio-economic problems because of the growing imbalance between the number and structure of the permanent and actually existing population. Migrants carry out a significant load on the labor market, increase competition, and influence on the transport, engineering and social infrastructure of metropolises. First of all, such a load arises due to pendulum migrations from satellite cities and suburban areas. On the other hand, internal migration stimulates housing construction, which should improve the quality of life of the population, but in practice it often threatens the social and technological security of settlements because of carrying out with violation of construction requirements and without taking into account real social needs. Often, such settlements haven't got the necessary infrastructure: kindergartens, schools, clinics, physical culture and sports centers, which influence on existing social facilities. Suffering the utility services of metropolitan areas is increasing which are already morally and technically outdated and physically worn out. The migration increase in the population of metropolises causes the growth of the level of technogenic pollution, the growth in expenses for solving transport, housing and communal and other socio-economic problems. Also, in connection with the concentration of the population, the need to branch out the network of infrastructure for processing or burying solid industrial and domestic waste is constantly growing *(Ukrainske suspilstvo..., 2018).*

Beside that the rapid development of metropolises accelerates the dehumanization of certain territories, primarily with a high concentration of towns and small villages. Active migration of young people from rural areas aggravates the depopulation, increases the problems of the countryside, increases its depression and leads to significant socio-economic problems in these territories.

Conclusion

The world processes of globalization and intensive urbanization are the main factors attracting the majority of migrants to the metropolis cities. The level of development of these cities, social infrastructure and urban policy attract migrants both from other regions of the country and from abroad. At the same time, the adaptation of such migrants is much more effective precisely in large cities, the evidence of which can be considered the positive indicators of the migration balance. Metropolitan regions and metropolises are areas of maximum concentration of the population with fitting conditions for their life.

As usual among Ukrainian cities, the most attractive city for migrants is Kiev. With the status of the capital and a favorable socio-economic and transport position, the city attracts about 3.5 thousand internal and 4 thousand international migrants per year. Other metropolitan regions of Ukraine: Kharkiv, Dnipro, Odesa and Lviv regions are less popular than Kiev but in the context of the country they have high positive indicators of the migration balance.

The main threat of the direction of migration flows in Ukraine to the metropolitan areas is the uneven distribution of the population around the country, which causes unevenness and instability of socio-economic development. At the same time, migrants can play as one of the factors in the intensity of the development of these regions, creating competition in the labor market and in production, thereby improving the quality of the final product, increasing its cost.

In the context of this study, an important point is the analysis of the demographic and social structure of migrants, which will help to clarify the reasons of migration and the impact of migrants. Unfortunately, the official statistics services do not have this information, therefore, part of the study of migration flows in Ukraine towards the metropolitan regions and their impact depending on the "quality" of migrants will be made by the authors in the future.

Today, the development of metropolitan cities in Ukraine is taking place in conditions of a significant concentration of migrants due to the high need for concentration of capital. In our opinion, first of all metropolises will continue to attract internal migrants because they have got all necessary conditions for the life and work of the population. Perhaps, in the future, the structure of the formation of flows will change in favor of migrations “city-metropolis” and small volumes of return migration to the countryside and small towns of the country will remain. The last question is especially relevant today because of the sharply deteriorating ecological state of cities and the desire of the population to live in more comfortable and healthy conditions. Further research of the development of metropolises and large cities in modern conditions is also required, including pandemics, which significantly affects the life of the global society. These questions will be further investigated by the authors.

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Migration as a Factor of Urban Space Transformation

Olha SUPTELO
PhD student of the Department of Human Geography and Regional Studies,
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: syptelo@gmail.com

Maryna LOHVYNOVA
PhD student of the Department of Human Geography and Regional Studies,
V. N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: logvinova_mari94@ukr.net

Anatolii KORNUS
PhD (Geography), Associate Professor of the Department of General and Regional Geography, Sumy State Pedagogical University named after A.S. Makarenko, Sumy, Ukraine, e-mail: a_kornus@ukr.net

Liudmyla NIEMETS
Doctor of Sciences (Geography), Professor, Head of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine, e-mail: soc-econom-region@karazin.ua

Ievgeniia TELEBIENIEVA
PhD in Geography, Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: telebenevaev@gmail.com

Iryna SCRYL
PhD in Geography, Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: stkharkov@ukr.net

Abstract

The growth of cities and urban population, the development of urban space as a result of improving the socio-economic standard of living of urban residents, stimulate the attractiveness of cities among migrants. This article presents the results of a study of the impact of different groups of migrants on the urban space of Kharkiv as one of the largest cities in Ukraine. Kharkiv is migratoryly attractive not only for domestic but also for international migrants. It is an indisputable fact that immigrants influence the urban space, bring elements of their own culture and traditions. This study identified the main groups of migrants arriving in Kharkiv and their general characteristics. According to the purpose of migration and the term, the impact on the urban space of the city differs. It was found that short-term migrations of internal migrants do not have a significant impact on the urban space, the reason for which is primarily the affinity of socio-cultural traditions in most regions of Ukraine. Instead, long-term international migration, especially forced migration, encourages immigrants to adapt to new conditions and, in turn, to adapt urban space to their own needs, changing it.

Keywords: migration, urban space, migration processes, segregation, transformations, Kharkiv, Ukraine.

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Introduction

Rapid urban development and urban population growth have become one of the most important factors in the transformation of world society at the beginning of the XXI century. Economic, social and cultural activity of the population became closely connected with the development of the city and urban space. Structural demographic changes directly affect the transformation of urban space. The principles of the "new urbanism" and the global tendencies of anthropocentrism contribute to the creation of a city for people, that is, the maximum consideration of the needs of urban residents in the planning and development of the city and urban space.

The processes of globalization, openness and accessibility of most countries of the world and a number of other factors, including economic, cultural, social, stimulate the intensification of migration flows. Migrants act both as a promising resource and a threat to development for host communities and territories. Therefore, there is a need to assess the impact of migrants on the development of territories and identify threats and prospects that may arise in the process of adaptation of migrants.

The migration movement of the population and the migrants themselves have a significant impact on the development of certain territories, both in Ukraine and for most countries around the world. This applies mainly to the development of large cities. The situation in eastern Ukraine has stimulated an increase in the flow of internal migrants and changes in the direction of international migration *(Ukrainske suspilstvo…, 2018).* Such changes affected primarily the cities closest to the conflict zone, such as Kharkiv, which has traditionally been attractive to certain groups of migrants.

Relevance of Research

In 2019, the total migration increase in Kharkiv amounted to 6609 people, including the migration increase of international migration - 2612 people. In 2019, the city received 58.3% of all migrants in the region, including 90.6% - international migrants *(Mihratsiynyy rukh…).* This indicates the migratory attractiveness of Kharkiv among both domestic and international migrants.

Kharkiv is being transformed on the basis of "new urbanism" and anthropocentrism, being at the stage of transition from the industrial to the post-industrial stage of development, declaring development intentions as a Smart city At the same time, considerable attention is paid to the needs of the population and mutual influence on the transformation of urban space, taking into account the needs of the city and its inhabitants *(Mezencev, Olìjnik, Mezenceva, 2017).*

Although, during the study period, the percentage of migrants in Kharkiv does not exceed 3% of the total population of the city, migrants have a significant impact on its development and transformation of the urban space. This is manifested both in the emergence of new public spaces and in the adaptation of existing ones. After all, a significant proportion of migrants, adapting, move to the category of residents *(Niemets, Suptelo, Lohvynova, Kliuchko, Telebienieva, 2020).*

The purpose of this study is to identify and analyze the impact of migrants on the transformation of public spaces in the city of Kharkiv as one of the largest cities in Ukraine. ***The main objectives*** of the study are: 1) to identify the main groups of migrants who influence the transformation of the urban space of Kharkiv; 2) characteristics of urban spaces created or adapted for the needs of migrants; 3) identification of threats and prospects for the development of the urban space of Kharkiv in the context of the impact of migrant activities on it.

Research Methodology

This article is based on a set of philosophical, general scientific and specific scientific research methods. Main methods: analytical, synthetic, inductive-deductive, problem search (detection of the influence of migrants on the transformation of urban space), retrospective (analysis of migration

flows in different periods due to historical circumstances) statistical (operation of statistical data), graphical (to visualize research results in in the form of graphs, charts, cartographic charts). The use of the method of morphological analysis occupies a significant place in the study. It is morphological analysis, which aims to study the objective world of urban space through field examination and photofixation and its systematization, allows to identify functional qualitative and quantitative changes in the urban environment and draw conclusions about the quality of space organization. As M.V. Ragulina notes, the method of morphological analysis allows to create a spatial "portrait" of the city and to reproduce its essential features as much as possible *(Ragulina, 2012).* According to A. Lefebvre, urban space is a set of representative tangible and intangible images and "texts", the analysis of which gives an idea of the city itself, its spaces and inhabitants *(Lefebvre, 1991).*

Analysis of Previous Research

The city, its inhabitants and their interaction are in the field of research of many sciences. Moreover, special and different approaches have been formed both to the interpretation of the phenomenon of the city and urban space, and to the mechanism of its analysis. The main aspect of this study is to establish the characteristics of the interaction of non-native residents of the city (migrants) with the urban space. The growing role of the city in the life of society in the middle of the twentieth century stimulated the development of the concept of "right to the city". Its founders Andri Lefebvre and David Harvey declared that all city dwellers, without exception, regardless of social status, have the right to participate in decisions about the transformation of urban space, as it belongs primarily to urban dwellers. This concept was formed on the basis of studies of a number of groups of the population not included in the urban society, in particular, the homeless and migrants *(Harvey, 2006; (Lefebvre, 1991).*

At the 51st session of the Committee on Population and Development, Gora Mboup in report "Urbanization and Migration – Two Global Mega Trends:Diversity, Opportunities, and Challenges" states the relationship between urbanization and migration on the development of both society and territory *(Mboup, 2018).* After all, the steady growth in the number of cities and urban residents is largely due to increased mobility of the population in the context of globalizationAt the same time, the influence of migrants does not always have a positive vector, often it is the significant number of people in the city that leads to the deterioration of living conditions of its population (favelas in Rio de Janeiro).

That is why a number of scientists consider one of the most important tasks - the adaptation of migrants in the socio-cultural, economic and political space of the city. Marluci Menezes, Judith Allen, Lia Vasconcelos in the study of the impact of immigrants on public spaces, the main emphasis is on the development and transformation of the cultural landscape of cities *(Menezes, Allen, Vasconcelos, 2009).*

Instead, Valeria Monno and Silvia Serreli state the fact that very often migrants are not included in the urban space and city life. As a result, socio-economic inequality of the population is formed and segregation processes are intensified. As an alternative to this, the authors consider the development of inclusive policies in cities towards vulnerable groups, including migrants *(Monno, Serreli, 2020).*

For Ukraine, migration processes have a significant impact on the development of both the country and individual cities. That is why a number of Ukrainian scientists study the interaction of migrants and migration processes and their characteristics with the city, urban space and local residents. In particular, O. V Senyura names the social aspects of migration among the factors of urban space transformations *(Senyura, 2015).* A.A. Mozhovyy, notes that urban space is the center of conflict formation *(Mozhovyy, 2014).* Agents of the conflict can be both city residents and the urban environment. For cities that are transforming, urban conflicts are very common *(Morar, Dulca, Nagy, 2016; Morar, Nagy, Dulca, Boros, Sehida, 2019).* One of the preconditions for increasing the conflict-generating nature of urban space is significant flows of migrants, which can lead to negative forms of urbanization such as pseudo-urbanization and covert urbanization.

In the context of the socio-political situation in eastern Ukraine, a significant part of research related to migration processes and urban space is aimed at studying the peculiarities of adaptation of internally displaced persons (as one of the groups of migrants) to new urban spaces. Yu. R. Khachaturyan reveals the theoretical context of the adaptation of migrants to urban space on the example of a cohort of children from the group of forced migrants *(Khachaturyan, 2017)*. Given this, it is extremely important to study the transformations of the urban space of large cities in the context of interaction with migrants, in particular one of the Ukrainian cities with a population of millions in Kharkiv.

Presentation of the Main Material

Migration is a continuous process that is the subject of political, social and economic discussions. Managing human flows is one of the most significant challenges for both developed and developing countries. Different reasons and directions of migration create additional problems for governments and local governments, as it is necessary to take into account the motives that motivated people to move. This is especially important for Ukraine, given the rapid decline of rural areas and rural settlements, especially sparsely populated. The problem of migration is becoming even more significant in cities, because it is there that migrants are looking for a better life. At the same time, living in cities allows for greater integration into society. Cities, in addition, provide a decent level of housing, education, medicine, transport, etc. This article is devoted to the peculiarities of the influence of different groups of migrants on the urban space of the post-socialist city at the stage of transformations – Kharkiv *(Niemets, Husieva, Suptelo, Sehida, Kobylin, Kliuchko, 2018).*

One of the largest cities in Ukraine, both in terms of economic development and population, Kharkiv is attractive to both domestic and international migrants due to its border position and high socio-economic development. During the period of independence, Ukraine has been an active participant in international and domestic migration processes and has suffered relevant socio-economic and political consequences:

- Changing the structure of the population: diversification of the ethnic composition of the population;
- Decrease in the working population: labor migration abroad;
- Uneven settlement of the population within the country: the predominance of migration flows in the direction of "periphery - center";
- Intensification of urban processes and socio-economic decline of the village.

In the context of the interaction of urban space and migration processes, the most relevant is the presentation of the impact of immigrants. Moreover, there is no doubt that the representatives of internal migrants easily adapt to urban space and urban lifestyle and subsequently assimilate without having a significant impact on the transformation of urban space. Instead, international migrants, according to differences in culture and traditions, are much more difficult to adapt, less likely to assimilate, but are included in urban society by making changes to the urban space.

The inclusion of individuals in the new conditions of existence in the country has two manifestations: adaptation or isolation with exclusion from society. The analysis of urban space makes it possible to assess the level of adaptability of immigrants. Examples of immigrants' adaptation to new conditions in the urban space are: the emergence of social, cultural and spiritual spaces (educational institutions, cultural centers, religious institutions); economic activity based on authentic traditions of immigrants (traditional productions and outlets); visual transformations of urban spaces (ergonomics traditional for immigrants, architecture, street culture, etc.).

The population migrates due to a number of reasons, which are determined mainly by the duration of this process. In Kharkiv, as an active participant in the migration process, the following main groups of immigrants were formed:

- internal labor migrants, including pendulum migrants from the suburbs;
- internally displaced persons from the conflict zone in eastern Ukraine;
- educational international and domestic migrants;
- refugees and workers from other countries.

Each of the representatives of these groups of migrants, one way or another, has an impact on the transformation of urban space, along with residents of the city, regardless of the duration of mobility. Next, consider the existing changes in urban space that are caused by the activities of each of these groups of migrants.

1. Labor internal migrants, including pendulum migrants from the suburbs: mainly the intensification of pendulum migrations contributes to the development of the transport network in the suburban direction, as well as the "convergence" of the suburbs with the city. As labor migration is generally temporary, such immigrants do not have a significant impact on the transformation of urban space.

2. *Internally displaced persons from the conflict zone in eastern Ukraine:* as of 2019, about 1.4 million IDPs are registered in the country, of which about 130,000 are located in the Kharkiv region, most of whom (66.7%) live in *Kharkiv (Niemets, Husieva, Lohvynova, Kandyba, Kliuchko, 2018).* The main manifestation of the change in the urban space of IDPs was the construction of modular towns for their residence (Fig. 1).

On the one hand, the construction of modular towns has attracted to social functioning mostly abandoned and unpromising areas of urban space, and on the other hand, this kind of neighborhood usually has a negative social effect.

3. *Educational international and internal migrants:* Kharkiv is called the city of students, because a large number of diverse higher education institutions attract a significant number of students, including from abroad. To meet the needs of students, the following transformations were carried out in the urban space: combining the space of study and living of students in a number of universities in the city; emergence of research and educational spaces; formation of auxiliary institutions and institutions of trade and public catering, entertainment around educational institutions.

Fig. 1. Modular town of IDPs in Kharkiv

Fig. 2. «Karazin Student Hall»

Students often continue living in Kharkiv after graduation. At the same time, local students easily adapt and eventually change the urban space alongside the city's residents. Most international students return home, but those who stay, due to their excellent culture and traditions, can significantly influence the transformation of urban space, up to the formation of a kind of urban segregation. Thus, traditionally, in Kharkiv, in the area between the metro stations Botanichny Sad and Oleksiyivska, a kind of campus has been formed, which has a fragmentation of accommodation of Ukrainian and foreign students. Foreign students often stay in the same areas for permanent residence after graduation. Eventually, commercial, entertainment, or social facilities began to appear for some nationalities.

4. ***Refugees and labor migrants from other countries.*** The vast majority of members of this group purposefully migrated to Ukraine during the period of unstable socio-political and economic situation in their countries. Labor migrants mainly come to Ukraine from less developed countries and more of them settle in the capital, large cities and engage in heavy low-paid work *(Niemets, Lohvynova, Sehida, Husieva, Kravchenko, 2019).* Usually, migrant workers are a temporary phenomenon, so they do not have a significant impact on the transformation of urban space. Instead, a group of forced migrants who choose Ukraine as their permanent residence and have a significant impact on both the city's and the city's socio-cultural space are refugees. The largest groups of national minorities in Kharkiv, with the exception of Russians, Belarusians and Jews, who traditionally live here, are Armenians, Azerbaijanis, Tatars, Georgians, Vietnamese, Poles and Koreans. Recalling the history of military and political conflicts in migrant donor countries for Ukraine, it is obvious that the majority of these national minorities are refugees. Having lost their physical connection with their homeland, the refugees are actively influencing the urban space of Kharkiv. They adapt it to their own needs. Thus, a significant number of catering establishments with traditional cuisines for these immigrants arise. (fig. 3)

Restaurant «Georgia»

Cafe "Armenia"

Restaurant «"Rising Dragon"»

Restaurant "First Chaikhana"

Fig. 3: Restaurants of Kharkiv, which were established by national minorities

Over time, representatives of lador migrants, students, refugees from different countries form diasporas, which as a full-fledged community have a social impact on the city and urban space. Religious institutions (Fig. 4), schools, educational and cultural centers are being built.

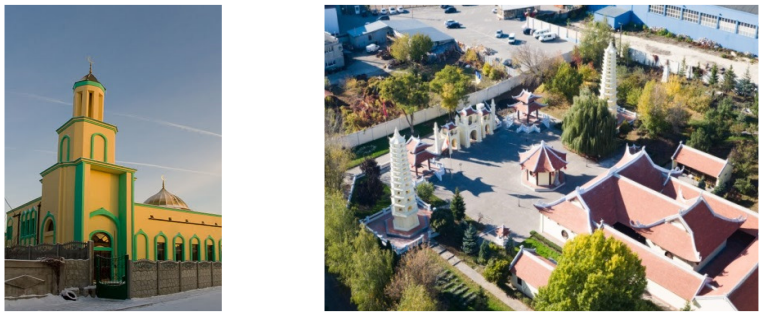

Fig. 4: Religious buildings of Kharkiv of representatives of national minorities

In general, Kharkiv is migratoryly attractive for both domestic and international migrants, as evidenced by migration flows (Fig. 5).

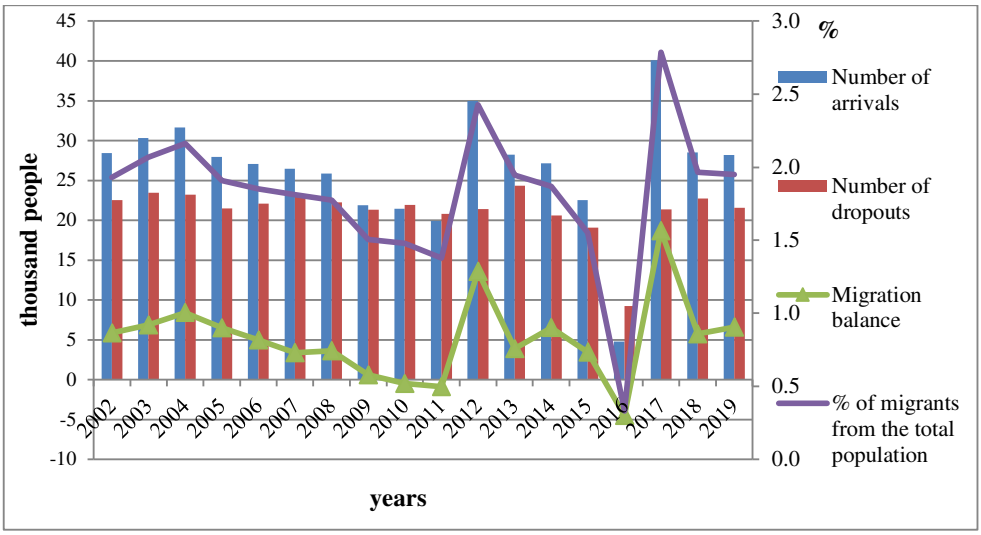

Fig. 5: General migration flows in Kharkiv for the period 2002-2019 (created by the authors according to (Mihratsiynyy rukh…)

Analyzing the urban space, we can conclude that significant transformations for the needs of migrants, which would be disharmonious or would interfere with the daily practices of residents, especially the emergence of urban segregation, were not detected. This can be explained by the loyalty and adaptation of the local population to migrants. This was facilitated by the history of the formation and development of the city and its diverse ethno-national composition, as well as active processes of adaptation of immigrants.

Considering immigrants in terms of prospects for the development of Kharkiv, the following main points should be noted:

- creation of a more diverse socio-cultural segment of the urban space of Kharkiv;
- attracting tourists, including those associated with local diasporas.

The threats to the development of urban space under the influence of migrants include the following:

- the threat of losing the authenticity of the city of its space under the pressure of culture and traditions of migrants;
- the emergence of competition between residents and migrants in various spheres of city life.

The study of the impact of migrants on urban space is a complex multidisciplinary problem. After all, undoubtedly, the influence is mutual. And the main task is to strike a balance between adapting and imposing one's own traditions and culture.

Conclusions

The processes of transformation of urban space are a complex object of study, because the number of agents who influence the urban space is unlimited. One of the most important factors in the transformation of urban space is migration and the migrants themselves.

As an migration-attractive city, Kharkiv needs to control and resolve issues related to migration and migrants at the city policy level. Traditionally, taking into account the history of development and the current state of functioning of Kharkiv, four large groups of migrants have been formed: labor internal migrants; students; IDPs, refugees and international migrant workers. According to the authors, the latter group has the greatest impact on the urban space of Kharkiv, because it is in the city the longest of all and has a significant need to restore the usual living environment. Mainly, the influence of migrants on the urban space of Kharkiv is manifested in the opening of traditional representatives for this group of food and trade, religious and educational institutions.

Migrants can have both positive and negative impacts on the urban environment. By diversifying the urban space and thus attracting tourists and other migrants, they threaten the uniqueness of the urban space. Further research plans a more detailed analysis of the social impact of certain groups of students on the socio-cultural landscape of the city of Kharkiv and their interaction with city residents. The world is changing rapidly, there are many tensions and conflicts in local and global society. But the sustainability of the latter lies in the great diversity of cultures, relationships, different supranational groups, and so on. These issues require comprehensive interdisciplinary research, and therefore will continue to be in the field of view of the authors' research.

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Internal Migration Flows in Ukraine In the Context of Decentralization: Opportunities and Threats

Maryna LOHVYNOVA
PhD student of the Department of Human Geography and Regional Studies,
V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: logvinova_mari94@ukr.net

Olha SUPTELO
PhD student of the Department of Human Geography and Regional Studies,
V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: syptelo@gmail.com

Olesia KORNUS
PhD in Geography, Assistant Professor of the Department of General and Regional Geography,
A.S. Makarenko Sumy state pedagogical University, Sumy, Ukraine,
e-mail: olesiakornus@gmail.com

Liudmyla NIEMETS
Doctor of Sciences (Geography), Professor, Head of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: soc-econom-region@karazin.ua

Kateryna SEHIDA
Doctor of Sciences (Geography), Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: kateryna.sehida@karazin.ua

Kateryna KRAVCHENKO
PhD in Geography, Senior Lecturer of the Department of Human Geography and Regional Studies,
V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: kate4465@gmail.com

Abstract

The article discusses possible options for changing intraregional migration flows in Ukraine, associated with the processes of decentralization – reforms to consolidate and unite settlements (cities, villages, townships) into enlarged territorial units – the so-called ***united territorial communities (UTCs)*** in order to transfer significant powers and budgets from government agencies to local governments. Undoubtedly, the successful implementation of this reform will lead to the emergence of new migration directions and the redistribution of the population within the country. The purpose of this article is to analyze the redistribution of migration flows in Ukraine, caused by the processes of decentralization and to identify the impact of migration flows on the development of united territorial communities. The main directions of migration flows associated with the processes of decentralization, in our opinion, will be the following directions: 1) united territorial communities – large cities; 2) migration to UTCs located near large cities and centers of economic development, as an intermediate point for further migration to cities; 3) territorial movements of the population between several UTCs; 4) territorial movements of the population within the UTC from the peripheral regions to the center of the UTC. The main characteristics of UTCs that operate in the regions of Ukraine are considered – their number, the area occupied by UTCs from the area of the region and the share of the region's population living in UTCs. The Western Ukrainian regions and the Dnieper region, where the implementation of this reform is much ahead of the overall Ukrainian

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pace, are already experiencing new directions of migration flows. The opportunities and threats of population migration for the united territorial communities are analyzed.

Keywords: Internal Migration, Decentralization, Migration Flow, Migration Gain, United Territorial Communities, Ukraine.

Introduction

In terms of volumes, internal migration in Ukraine significantly exceeds international migration. Internal migration does not affect the size and composition of the country's population as a whole, but it causes changes in its distribution in certain regions and communities, and is a consequence and an important factor of regional differences. It is directly related to the processes of industrialization and urbanization, depopulation of the countryside, socio-economic and political transformations, in particular with the processes of decentralization. It is caused in general by the same reasons as international migration, has a similar motivation, that is, the need to improve living and working conditions, therefore it is directed mainly from depressed regions and communities to those that are dynamically developing, usually from peripheral rural areas to large industrial cities or centers of communities. In connection with the processes of decentralization, which are actively implemented in Ukraine, there is a redistribution of migration flows and population in most regions of the country. The emergence of new poorly managed migration flows, the low efficiency of state management and local self-government have complicated the solution of other, no less important for society, problems in the field of education, employment, health care development and modernization of the social protection system. At the same time, migrants make up a significant share of the population of developed cities, and more recently, the centers of united territorial communities, acting as an indicator of socio-economic development, possessing high intellectual, industrial, social, and financial potential. Therefore, it becomes relevant to study new migration flows in Ukraine caused by the processes of decentralization, to identify the threats that migrants pose to the united territorial communities (UTCs) and the opportunities that communities receive due to the human potential of migrants.

The purpose of the study is to analyze the redistribution of migration flows in Ukraine, caused by the processes of decentralization and to identify the impact of migration flows on the development of united territorial communities. The authors set themselves the following main research questions: How have the main directions of migration flows in Ukraine changed in connection with the processes of decentralization? Do migrants influence UTCs? Is it possible the emergence of threats to UTCs in connection with the migration activity of the population?

Research Methodology

This research cannot be performed without using a complex of interdisciplinary approaches and methods. The research relies on both philosophical and general scientific methods and special methods and techniques.

To achieve the goal and search for answers to key research questions, the team of authors used the following methods: analytical (including the method of analysis and synthesis, abstraction), problem-search (to identify the impact of migration on UTCs), systematization (to systematize data on migration flows with the aim of a comprehensive study of their impact on UTCs), classification (to highlight the main migration flows in the context of decentralization), statistical (statistical data for analysis), SWOT analysis (to identify the strengths and weaknesses of migration processes in the context of decentralization, as well as opportunities and threats of their influence for communities), graphic (to visualize research results in the form of graphs, diagrams, schematic images).

The study used data from the State Statistics Service of Ukraine, the Internet portal "Decentralization gives opportunities" (Ofitsiinyi sait portalu "Detsentralizatsiia daie mozhlyvosti"), the Ministry for Communities and Territories Development of Ukraine (Informatsiia pro monitorynh rozvytku silskykh terytorii), which provides reports on monitoring the socio-economic development of UTCs

in each region of Ukraine. Other analytical reviews and reports, scientific articles and publications of foreign and Ukrainian authors were also studied.

Analysis of Previous Studies

Many publications of foreign scientists are devoted to the influence of decentralization processes, since in developed countries this reform has long been completed, and the direction of migration flows that arose in the context of decentralization are almost completely studied. However, there are practically no such publications among Ukrainian scientists.

Studying the impact of decentralization on migration processes, George W. Hammond, Mehmet S. Tosun note that the positive impact depends on the area of the administrative-territorial unit and its economic indicators. Positive migration growth is observed in metropolises, where per capita income and general employment are increasing. On the contrary, peripheral areas experience significant population outflow (Hammond, Tosun, 2009). A supporter of decentralization C. Tiebout noted that in the presence of a large number of territorial units and intensive migration of the population, decentralization creates conditions for the production of public goods, since migrants directly affect the production of public goods and the payment of taxes (Tiebout, 1961).

D. Satterthwaite, C. Tacoli note the uneven socio-economic development of territories as a result of the decentralization process, large enterprises are concentrated in large cities and economic centers, while the periphery remains as a rule rural, which leads to a difference in income between the center and the periphery of the communities and thus generates migration flows in the direction from the periphery to the center of the communities (Satterthwaite, Tacoli, 2003).

M. Klupt, studying the center-peripheral relations in modern Europe, notes that intensive migration, combined with a rapid increase in life expectancy, also pushes the problem of aging in the recipient regions of migrants into the background, but causes aging in the periphery, as well as in depressed regions. Migration flows, increasing the structural and institutional heterogeneity of the European center, do not eliminate the differences between it, the semi-periphery and the periphery, but, on the contrary, contribute to their reproduction. Streams of highly skilled migrants move to the central regions, which concentrate high-tech and knowledge-intensive activities, the semi-periphery absorbs unskilled migrants, and the periphery becomes a source of labor resources for the center and semi-periphery (Klupt, 2015).

Poorly managed flows of migrants to cities and centers of united territorial communities lead to negative consequences for sustainable development – gentrification, which can lead to a sharp rise in housing prices and, consequently, an increase in inequality, which can also seriously hinder sustainable development. The pressure on finances and city budgets to serve a growing number of different population groups with different needs is a serious problem for public administration (Migrants and cities…, 2017).

J. von Braun also talked about increasingly strong links between urban and rural areas due to the migration activity of the population, which is a problem for the sustainable development of territories. This is confirmed by the fact that the poorer (peripheral, agricultural) communities do not benefit as much from decentralization as the wealthier, and in some cases decentralization even aggravates their situation (Braun, 2014).

J. Jütting, C. Kauffmann, I. Mc Donnell, H. Osterrieder, Ni. Pinaud and L. Wegner examined the impact of decentralization on poverty in peripheral regions in 19 countries around the world. They argue that in those countries where the central government does not fulfill its main functions, decentralization can be counterproductive, it can be a powerful tool for reducing poverty in the country as a whole, but it can lead to imbalances in territorial development and population migration within its regions (Jütting, Kauffmann, Mc Donnell and etc., 2004).

R. Bird, E. R. Rodriguez also note the importance of migration in the process of decentralization. In the absence of major economic changes in communities, there is an outflow of the population. Scientists note how migrants can cause external negative effects to the regions they leave, and similar negative effects and costs on the regions to which they are sent (Bird, Rodriguez, 1999).
Staff members Ptoukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine agree with foreign scientists. The national report "Ukrainian Society: the Migration Dimension" (Ukrainske suspilstvo: mihratsiinyi vymir: nats. dopovid, 2018) analyzes the reform of the initial stage of the decentralization reform in Ukraine, as well as analyzes the impact of decentralization on migration flows in the country with an optimistic, pessimistic and realistic version of the implementation of the administrative-territorial reform in Ukraine. The links between the central and peripheral regions of the Kharkiv region, which are manifested, as a rule, in labor and educational migration, were studied by L. Niemets, O. Suptelo, M. Lohvynova, L. Kliuchko, I. Telebienieva. Cities become "points of growth" due to migration attraction, provide ample opportunities for obtaining a higher income, therefore, they attract migrants from peripheral areas, which also confirms the subsequent uneven socio-economic development of regions due to migration losses of the periphery and opportunities due to migrants in cities (Niemets, Suptelo, Lohvynova and etc., 2020).

Since the main consumer of human potential in Ukraine is the capital region, M. Chaikovskyi, A. Kovtun talk about the transformation of Ukraine's regions into the inner periphery. The main mechanism of internal peripheralization, according to the authors, is labor migration from the periphery to the center and industrialized regions, educational migration, which contributes to the loss of peripheral regions of intellectual potential and its greatest concentration in the center, which thereby strengthens its competitive offers relative to other territories (Chaikovskyi, Kovtun, 2019). In the context of these publications, the study of new flows of internal migration in Ukraine associated with the processes of decentralization is an important scientific task, since migration is an important resource for the development of communities, but at the same time it is a threat to the socio-economic prosperity of territories with low migration activity and outflow of the population.

Presentation of The Main Research Material

Decentralization reform is the key reform in Ukraine today. The reform is being carried out through the unification of basic territorial communities (cities, villages, townships) into enlarged territorial units – the so-called united territorial communities (UTCs) with the transfer of significant powers and budgets from state bodies to local governments. The merger takes place on a voluntary basis (up to 2020 inclusive). Among the main goals of decentralization in Ukraine are the prevention migration from rural areas, the fight against poverty, the expansion of employment, ensuring equal opportunities and meeting the needs of the population, improving the quality of life, providing opportunities for personal development and improving the state of social development (Detsentralizatsiia v Ukraini…, 2018). The unevenness of the socio-economic development of urban and rural areas is associated, first of all, with unequal opportunities in financing, which directly affects the socio-demographic processes in the peripheral regions, contributes to the outflow of the working-age population from the periphery to the center, from the village to the city. Decentralization implies that a more equitable balance of budget expenditures, investments in infrastructure, and an increase in funding for programs for the economic development of rural areas should be achieved between urban and rural areas (Detsentralizatsiia: korotko pro holovne, 2019). The introduction of this reform in Ukraine will undoubtedly affect the migration processes within the state.

The formation of UTC is carried out taking into account:

- the ability and capacity of local self-government bodies to solve public issues related to their competence to meet the needs of the population;
- historical, geographic, socio-economic, cultural development of settlements;
- state of infrastructure development;
- financial support of the corresponding administrative-territorial units;
- features of labor migration of the population;

• the availability of services in the relevant areas (Monitorynh protsesu detsentralizatsii vlady, 2020).

As of January 2020, 1,029 united territorial communities have been created in Ukraine, in 980 of which local elections have already taken place. The largest number of communities in Ukraine was created in the West of the country (in Volyn, Zhytomyr, Ternopil, Khmelnytskyi regions), as well as in the Dnieper region (Dnipropetrovsk and Zaporizhia regions). It is planned that after the local elections in October 2020, the sub-regional level will change, in which 130 districts will remain (instead of 490). At the basic level, 1470 UTCs will remain, which include cities, towns and villages (Fig. 1) (Monitorynh protsesu detsentralizatsii vlady, 2020; Ofitsiinyi sait portalu "Detsentralizatsiia daie mozhlyvosti"). Geographically, UTCs occupy more than a third of the territory of Ukraine, where a quarter of its population lives.

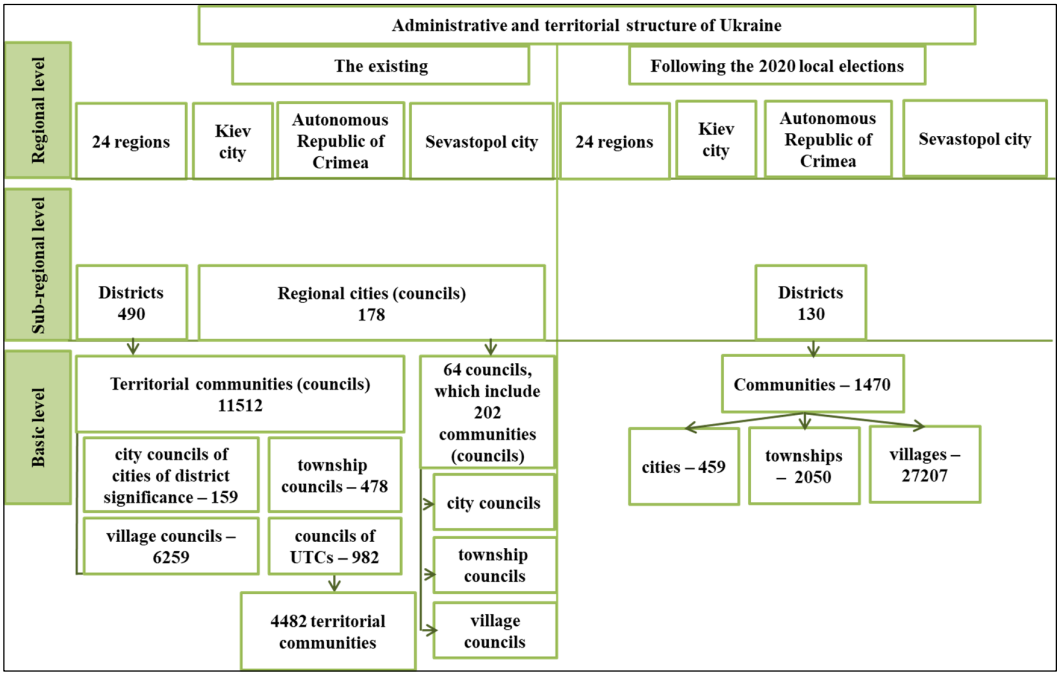

Fig. 1: Current and prospective (after the local elections in 2020) administrative-territorial structure of Ukraine (built by the authors according to (Ofitsiinyi sait portalu "Detsentralizatsiia daie mozhlyvosti")

Changes in the administrative-territorial structure of Ukraine can lead to the formation of new intra-regional migration flows, as well as to the formation of new centers of attraction for migrants. Migration flows in Ukraine in the context of the successful implementation of the administrative-territorial reform can be formed in the following directions (Fig. 2):

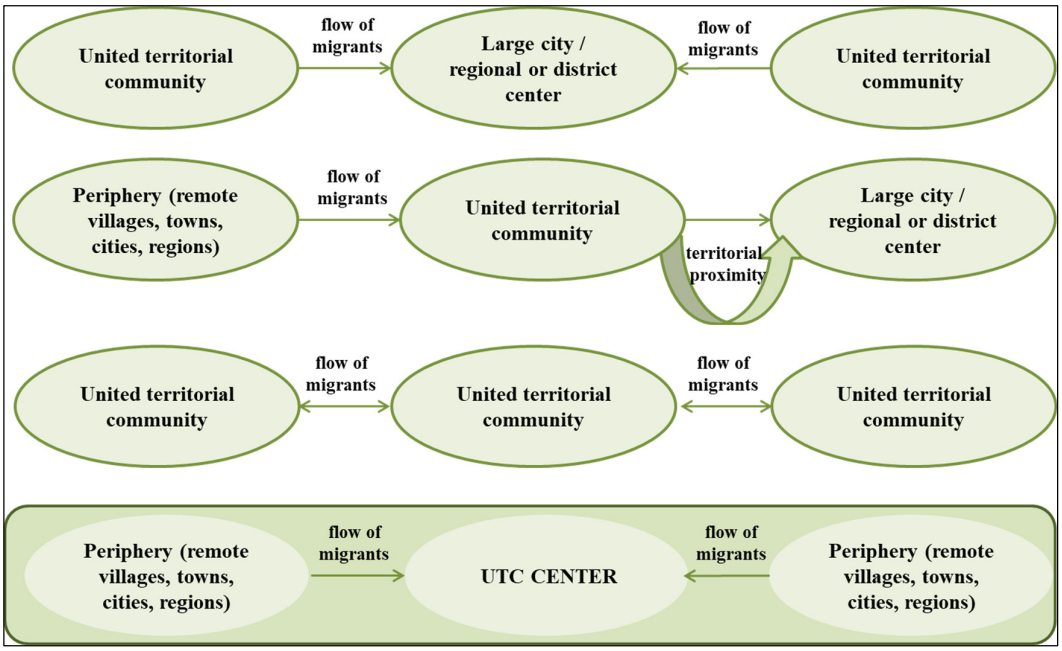

Fig. 2: Directions of migration flows in Ukraine associated with the processes of decentralization (built by the authors according to (Ukrainske suspilstvo: mihratsiinyi vymir: nats. dopovid, 2018; Tilikina, 2019)

Migration direction "united territorial communities – large cities". Large cities, which are centers of concentration of production, investment, intellectual, information, educational and other resources, have long attracted the working-age population, since they give higher chances of employment, increase their own income and provide quality services (Niemets, Suptelo, Lohvynova and etc., 2020). Migration flows in this direction can be either constant or periodic (pendulum).

Migration to UTCs located in close proximity to large cities. Such migration is directly related to the process of suburbanization. The united territorial communities have a more favorable socio-geographical position, good transport accessibility, are considered as a bridge between the city and the periphery, have a higher business activity and a favorable market environment compared to the peripheral zone, developed infrastructure and services. In addition, the high cost of housing in large cities and the ability to search for affordable housing in the nearest UTCs strengthens UTCs ties with large cities, regional administrative centers and centers of socio-economic development due to periodic flows of pendulum migration. As a rule, the positive migration balance of such UTCs is due to the process of reurbanization – a stable population of UTCs, their renewal, including due to urban planning reconstruction.

Territorial displacement between UTCs. Such movements include labor migration, educational migrations from outsider UTCs to better-off UTCs with high labor opportunities; labor migration between UTCs partners; territorial movements between residents of neighboring UTCs, caused by family ties and personal factors. The prospect of this direction of migration flows is due to the need to combine the efforts of neighboring UTCs or UTC-partners to attract investments, build enterprises, arrange infrastructure and social facilities.

Territorial movements within the UTCs in the direction "periphery – UTCs center". Often the administrative and economic center of the UTCs is a powerful focus of concentration of local migration flows. Under the influence of the implementation of financial decentralization (an increase in their own financial revenues of local budgets and the possibility of obtaining additional funds due to the expansion of sources for the formation of a revenue base), communities will have the

opportunity to increase their financial potential for the proper maintenance of infrastructure facilities, communal property institutions, and the provision of public and utility services. This will revive migration contacts between the community's population and activate the migration movement (Ukrainske suspilstvo: mihratsiinyi vymir: nats. dopovid, 2018).

Since the planned UTCs have not yet been fully formed in Ukraine, and also taking into account the experience of European countries, it can be noted that the influence of decentralization processes on intramigration processes in the country will only increase (Milbradt, 2018). Therefore, we can assert that first direction of migration – movement in the direction of "united territorial communities – large cities" will include the most large-scale migration flows. This is due to the fact that it is in the cities where the necessary social infrastructure is concentrated (housing and communal services, educational institutions, medical institutions and recreational facilities, social security institutions, cultural and leisure institutions) and most enterprises. In rural areas all this is absent or underdeveloped. However, in our opinion, the dynamics and directions of the migration movement will largely depend on the difference in the living conditions of the inhabitants of the united territorial communities – more successful UTCs will attract a larger number of migrants due to a higher level of economic development, local budget income, wages, the possibilities of social infrastructure (Niemets, Lohvynova, Sehida and etc., 2019).

Therefore, in the near future, one should expect an increase in the positive balance of migration in communities with high financial solvency, which are distinguished by high indicators of their own income and capital expenditures per capita, with a powerful business sector, developed infrastructure and social sphere, that is, in which the basic prerequisites for the preservation and enhancement of human potential within the territorial community are formed (Mihratsiia yak chynnyk rozvytku v Ukraini).

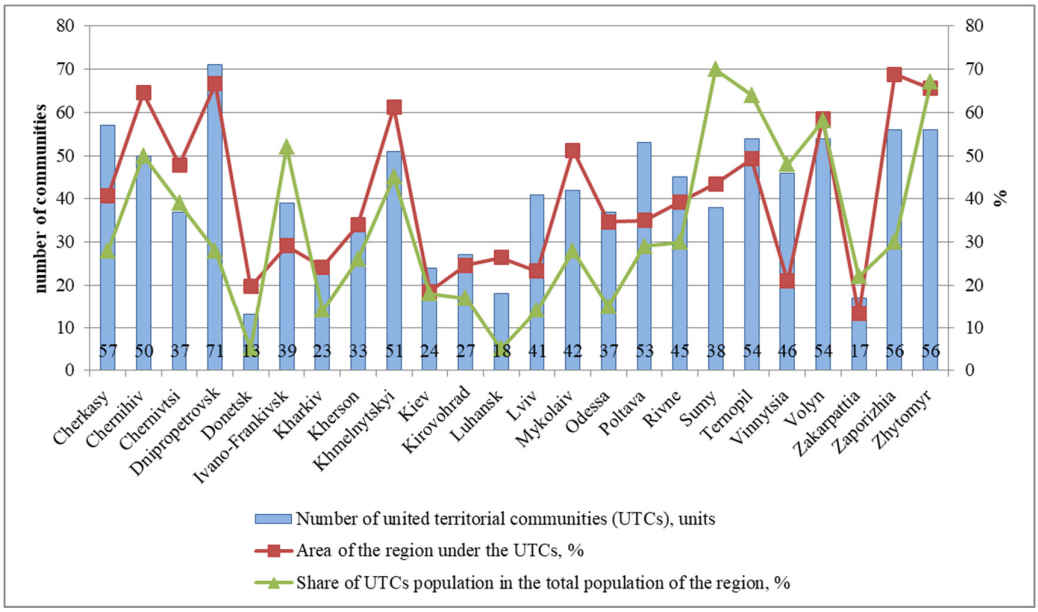

Fig. 3: The main characteristics of UTCs that operate in Ukraine (built by the authors according to (Ofitsiinyi sait portalu "Detsentralizatsiia daie mozhlyvosti")

In the future, the greatest impact of the decentralization process on migration flows will be noticeable in those regions where communities occupy a significant area of the region's territory and also concentrate a significant proportion of the population (Fig. 3). We can assume that large-scale active movements within a community from the center to the periphery and between neighboring communities will be observed in Sumy (where 70% of the region's population lives in the UTCs), Zhytomyr (67%), Ternopil (64%), Volyn (58%), Ivano-Frankivsk (52%), Chernihiv (50%) regions. It should be noted that it is the Zaporizhia and Dnipropetrovsk regions that have the largest area

occupied by UTCs – 66.6% and 68.8%, respectively. However, taking into account the proportion of the population that lives in UTCs (28% and 30%, respectively), it can be assumed that in these regions flows will prevail in the direction of "united territorial communities – large cities" and "migration to UTCs located in close proximity to large cities". he same directions of migration flows will increase in those regions where the center of the region is metropolises – Kiev, Kharkiv, Odessa regions. This is confirmed by the low proportion of the population living in the UTCs (Fig. 3).

Let's analyze the indicators of internal migration within the settlements of the united territorial communities of the regions of Ukraine. Based on fig. 4 we can see the tendency of active migration inflow in the communities of the Luhansk region (55.6% of communities with a positive migration balance), Zakarpattia (50%), Ivano-Frankivsk (47%), Kirovohrad (46.2%), Mykolaiv (41.4 %), Khmelnytskyi (41.2%), Ternopil (41.0%) regions, that is, in those regions where there is no large city that performs the functions of a metropolis of regional significance (Fig. 4) (Ofitsiinyi sait Ministerstva rozvytku hromad ta terytorii Ukrainy). In this case, the centers of attraction for migrants are those communities that have high financial security, good transport accessibility, a wide labor market, developed infrastructure, etc. In those regions where metropolises are present - Kiev, Kharkiv, Odessa, Dnepropetrovsk, Lviv regions, those communities that are in close proximity to the metropolises, are part of their agglomerations and communities that are most developed in the socio-economic aspect will have a positive migration balance. In such regions, metropolises will create an asymmetry of migration flows, attracting to themselves most of the migrants (Korniienko, 2018).

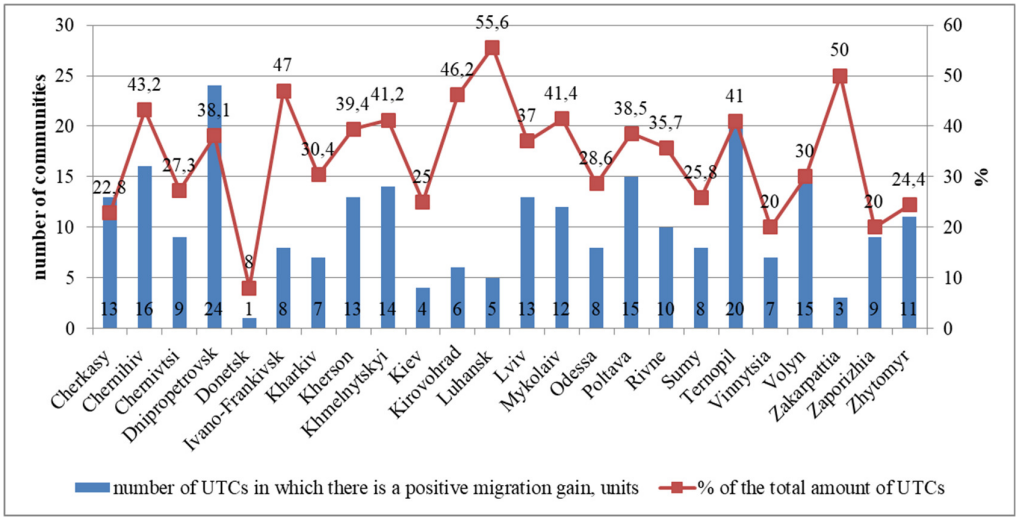

Fig. 4: Indicators of the migration increase in internal migration of the population within the settlements of the UTCs for 2019 (built by the authors according to (Ofitsiinyi sait Ministerstva rozvytku hromad ta terytorii Ukrainy)

The largest population decline due to migration is observed in the communities of the Rivne region (a decrease in 50% of communities), Poltava (41.0%), Chernihiv (40.5%), Dnipropetrovsk (39.7%), Sumy (38.7%), Donetsk (38.0%), Mykolaiv (37.9%), Ivano-Frankivsk (35.9%) regions (Fig. 5). Migration losses are observed in communities with low resource potential, insufficient financial solvency and passivity of civil position. Financially secured UTCs, as a rule, maintain a positive migration balance in the exchange of population with UTCs outsiders (Ofitsiinyi sait Ministerstva rozvytku hromad ta terytorii Ukrainy).

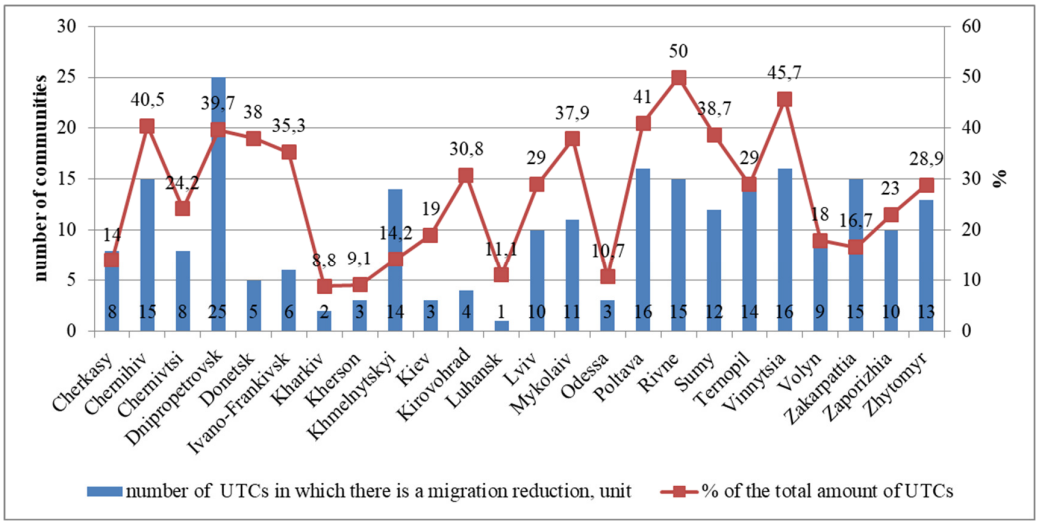

Fig. 5: Indicators of the reduction in internal migration of the population within the localities of the UTCs for 2019 (built by the authors according to (Ofitsiinyi sait Ministerstva rozvytku hromad ta terytorii Ukrainy)

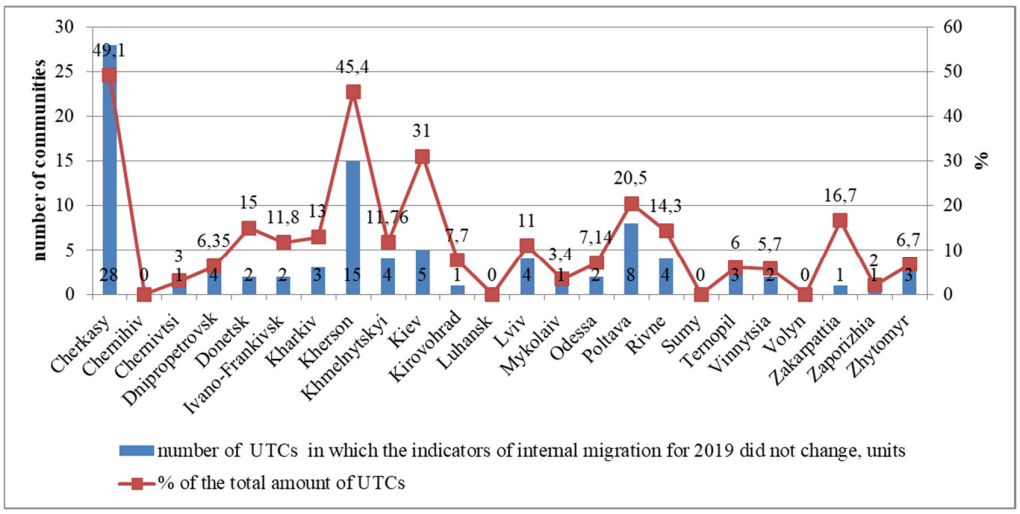

Fig. 6: Communities in which the indicators of internal migration of the population in 2019 did not change compared to the previous year (built by the authors according to (Ofitsiinyi sait Ministerstva rozvytku hromad ta terytorii Ukrainy)

Migration flows in Ukraine associated with decentralization processes can have a positive impact on UTCs, since migrants of working age, as a rule, have a high educational and qualification level. This indicates a significant accumulated human capital, which can act as an important factor in the development of high-tech industries and services with intensive use of knowledge in communities with high migration activity (Lohvynova, 2019). In the socio-economic sphere, migration activity leads to an increase in the number of enterprises and organizations due to a surplus of labor. In addition, thanks to migrants, the least popular vacancies for the local population in the labor market are being filled, which leads to cheaper production of goods, increased requirements for the range and quality of goods and services. Thanks to migrants in communities, the social activity of the population is increasing and the number of social initiatives that the local population actively supports and develops together with the migrants is increasing. At the same time, the activation of migration flows and changes in the structure and composition of the population can have many threats for the further development of the territory (Table 1).

Table 1: Influence of migration flows on united territorial communities (compiled by the authors for (Lohvynova, 2019; Khymynets, Tsimbolynets, 2019; Niemets, Husieva, Pohrebskyi and etc., 2020; Ukrainske suspilstvo: mihratsiinyi vymir: nats. dopovid, 2018)

Opportunities	***Threats***
* increase in the population of UTCs due to the influx of migrants; * development of communities at the expense of migration capital, which saturates the economy of communities; * opening new enterprises, providing jobs for residents of UTCs due to the entrepreneurial activity of migrants; * filling unclaimed vacancies in the labor market, easing tension on labor market, as a consequence of the decrease in the unemployment rate of the UTCs; * the creation of high-tech jobs and the attraction of productive investment (including foreign direct investment); * increasing the professional and qualification level of labor resources due to the intellectual potential of migrants; * promoting the development and diversification of business and the formation of clusters; * development of infrastructure, introduction of energy efficient technologies; * growth of social activity of the population due to new social initiatives; * replenishment of the local budget of the UTCs at the expense of taxes paid by migrants; * development of the consumer market, improving the range and quality of products; * improvement of the state of social infrastructure, construction of new social infrastructure facilities and reconstruction of existing ones; * consolidation of efforts of migrants, society, government, business on the basis of partnership; * improving the image of the community at the local and regional levels.	* a decrease in the population size in UTCs outsiders and communities with low financial activity; * uneven socio-economic development of individual communities, uneven development within the community, depressiveness of the periphery of the community; * deepening of regional identities among the population within the UTCs; * possible conflicts between migrants and the permanent population of UTCs, which leads to an increase in social tension in society, a possible increase in the level of crime; * the load on the housing stock, the need to provide housing for migrants, the rise in prices in the real estate market; * increased depression in rural areas due to the outflow of a part of the highly qualified population; * increasing the load on institutions of preschool, general secondary and higher education, medical institutions; * growing load on social welfare departments, pension fund departments, city employment centers; * increased competition in the labor market; * increasing social inequality; * an increase in the socio-cultural difference (in traditions, values, lifestyle, etc.).

Migration redistribution of the population on the territory of Ukraine can lead to serious threats to the united territorial communities. These threats consist in the increasing demographic burden on the population of the working-age population of the centers of the UTCs, the unevenness and asymmetry of the socio-economic development of the territories of individual UTCs due to competition for capital, including human, production, financial, cultural (Ukrainske suspilstvo: mihratsiinyi vymir: nats. dopovid, 2018). Large migration losses of the population will be experienced by communities with low resource potential, insufficient financial solvency and passive social position of residents. The loss of population due to migration outflow can lead to the loss of the economically active labor force, as a result, to the prevalence of the number of elderly people and depopulation. However, in the communities-recipients of migrants, an influx of population can fill unclaimed vacancies in the labor market, but on the other hand, lead to a shortage of housing, a worsening crime situation, destruction of local cultural and spiritual wealth, transformation of the mental characteristics of the population, lead to conflicts between communities, which poses a direct threat even to the integrity of the country.

Conclusions

The implementation of the decentralization reform in Ukraine should reduce territorial disparities in the socio-economic development of regions. The reform is aimed at increasing the employment of the population by opening new enterprises and organizations, increasing the income and well-being of the population of the united territorial communities, preventing large-scale migration of the population from the countryside and the depressiveness of the Ukrainian countryside. Of course, the unification of settlements into communities affects the direction of migration flows. In our opinion, the main directions of migration flows associated with the processes of decentralization will be the following directions: migration from united territorial communities to large cities, regional and district centers, centers of high socio-economic development; migration to UTCs located near large cities and centers of economic development, as an intermediate point for further migration to cities; territorial displacement of the population between several UTCs, UTCs outsiders to UTCs leaders; territorial movements of the population within the UTCs from the peripheral regions to the center of the UTCs.

To date, the reform of decentralization in Ukraine is at the stage of active implementation, 1029 UTCs have been created out of 1470 planned. In the Western Ukrainian regions and in the Dnieper region, UTCs occupy more than half of the region's area. In regions such as Sumy, Zhytomyr, Ternopil, Volyn, Ivano-Frankivsk, Chernihiv regions, more than half of the region's population lives in UTCs. This may indicate active population movements between UTCs or within one UTC from peripheral areas to the center.

Migration flows can positively influence UTCs. But if communities will have a population less than the minimum permissible norm (5 thousand people), their chances of keeping the population from migrating, and even more so creating a positive migration growth, are very small. Higher financial incomes, the possibility of attracting investments, smart management can lead to the socio-economic well-being of some communities and the presence of socio-economic problems in others. And the migration of the population from outsider communities to community leaders will increase the disproportions in the social and economic development of communities. However, given a developed transport infrastructure, such migrations can be of a pendulum character.

The positive impact of migration flows for communities consists in an increase in the population of the community, its qualitative composition, since, as a rule, migrants are people of working age with high intellectual potential and labor qualifications. Due to the migration capital, it is possible to attract investments, open new enterprises and create new jobs, thereby reducing the unemployment rate in the community, developing infrastructure facilities, etc.

Thus, the prospects for the transformation of internal migration flows in the country as a whole and in its regions depend on the conditions for the implementation of the administrative-territorial reform and the success of decentralization changes in terms of improving the quality of life in territorial communities. Therefore, at the end of the implementation of the decentralization reform in Ukraine, a comprehensive analysis of migration redistribution should be carried out, taking into account the financial and other socio-economic indicators of the UTCs.

Because the reform of decentralization in Ukraine is completely incomplete, 441 UTCs that are still planning to create will obviously be quite problematic. This process requires additional research. In particular, what factors hinder the creation of these UTCs (qualitative characteristics of the population of these territories, income, labor and intellectual potential). The authors intend to further study these problems. After that, it is possible to solve the issues of optimization of intramigration processes, to propose models for their comprehensive improvement in order to ensure the sustainable development of territorial communities

The issues of completing decentralization in Ukraine require special attention and interdisciplinary study. As a result, the schemes of socio-economic zoning of Ukraine should be adjusted. All this will

help to ensure the development of the socio-economic, demographic foundations of Ukraine for enhanced integration into the EU and the world community of developed countries.

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The Influence of The Agreement Ratification Between Ukraine and The European Union on The Labor Migration of Ukrainians

Kostiantyn NIEMETS
University/Organization: V.N. Karazin Kharkiv National University
Address: Square Svobody, 4, room 3-62, Kharkiv, Ukraine, 61022

Kateryna KRAVCHENKO
University/Organization: V.N. Karazin Kharkiv National University
Address: Square Svobody, 4, room 3-62, Kharkiv, Ukraine, 61022

Liudmyla NIEMETS
University/Organization: V.N. Karazin Kharkiv National University
Address: Square Svobody, 4, room 3-62, Kharkiv, Ukraine, 61022

Kateryna SEHIDA
University/Organization: V.N. Karazin Kharkiv National University
Address: Square Svobody, 4, room 3-62, Kharkiv, Ukraine, 61022

Oleksandr NOSYRIEV
University/Organization: National Technical University «Kharkiv Polytechnic Institute»
Address: 2, Kyrpychova str., Kharkiv, Ukraine, 61002

Liudmyla KLIUCHKO
University/Organization: V.N. Karazin Kharkiv National University
Address: Square Svobody, 4, room 3-62, Kharkiv, Ukraine, 61022

Abstract

The modern world of global humanity can be described as traveling and migrating. This extremely complex modern phenomenon has many causes and factors of influence on the one hand, on the other – it affects the lives of most countries. Labor migrations are especially important. Ukraine, which until recently was on the sidelines of these processes, is increasingly participating and influencing their course, in particular, in the context of European integration. The intensification of migration processes creates a number of difficulties for both Ukraine and many EU countries, causes destabilization in the labor market, generating certain socio-demographic changes, etc. A number of documents and programs to resolve this situation in Ukraine are being developed and implemented at the state level. The authors consider the impact of ratification of the agreement with the EU on labor migration flows in Ukraine, analyze the state policy in the field of labor migration regulation, namely - the Strategy of State Migration Policy of Ukraine for the period up to 2025 in this paper.

Keywords: labor migration, illegal migration, migration flows, migration balance, population survey, Strategy of State Migration Policy of Ukraine, ratification of the association agreement.

Substantiation of the Research Problem

Population migration processes are one of the decisive factors influencing the change in the number and structure of the population, the interregional distribution of the population and the labor market.

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Migrations differ in their intensity, vector of movement, duration, which are motivated by certain objective or subjective reasons.

Migration processes in the world in the current realities are acquiring global proportions, moreover, they can often be characterized by territorial disproportion, which is due to the uneven development of countries and regions of the world. The study of the features of the migration movement is relevant for many countries of the world, including for our state, because Ukraine is characterized by intensive international and intraregional migrations. In recent years, there have been significant changes in the economic, political and social life of the country in Ukraine. Migrant donor countries, including Ukraine, have many consequences of external migration, most notably the reduction of labor resources; disqualification of a significant part of migrant workers who work abroad outside the profession, demographic problems, etc.

There are also many functional consequences for these countries: alleviation of the unemployment problem due to the unloading of the labor market, cash inflows from migrants, which stimulate industry, improve economic dynamics, and so on. But at the moment, intensive labor migration not only reduces the supply of labor in the Ukrainian labor market, but also reduces its quality. As a result, for Ukraine, international labor migrations have become a factor in the spread of various kinds of challenges, which necessitates a comprehensive study of migration risks, in particular, in the socio-geographical aspect. Thus, the relevance of the study is determined not only by modern political and economic processes, but also by the need to improve the existing system of regulation of labor migration in Ukraine.

The intensification of cross-border mobility of the population has increased as a result of Ukraine's acquisition of a visa-free regime for travel to the European Union in June 2017. From June 2017 to June 2019, border guards recorded 42.6 million border crossings by Ukrainian citizens, including 9.2 million with biometric passports, including almost 3 million without visas. During the second year of visa-free travel (June 2018 - June 2019), citizens of Ukraine made 2.35 million trips to the EU without a visa, which is in 4.2 times more than during the first year of its validity (June 2017 - June 2018) *(Derzhavna mihratsiina sluzhba Ukrainy)*.

The migration presence of Ukrainians in Europe is growing at the present time. The number of valid residence permits for Ukrainian citizens in the EU has doubled over the past ten years and amounted to about 1.2 million in 2018. The largest number of Ukrainians lived in Poland (442 thousand), Italy (234 thousand), the Czech Republic (132 thousand), Germany (121 thousand) and Spain (92 thousand) *(Predstavnytstvo Mizhnarodnoi orhanizatsii z mihratsii (MOM) v Ukraini)*. The main reason for the labor migration of Ukrainians abroad is the difficulty in finding a decently paid job at home. Over the past five years, the economic factors of migration have intensified politically and socially, which has led to a rapid increase in migration sentiment and an increase in the intensity of migration.

The aim of the work is to identify the impact of the ratification of the agreement with the EU on the flows of labor migration in Ukraine, analysis of state policy in the field of regulation of labor migration, namely the Strategy of the State Migration Policy of Ukraine for the period up to 2025, identification of positive and negative causes of this phenomenon.

Review of Previous Research

Migration processes have long been the subject of scientific research. The basis of scientific understanding of migration was founded by A. Smith. He founded an approach that lobbied for unhindered international labor exchange to promote economic growth and poverty alleviation. One of the priority areas of such processes was the attraction of foreign skilled workers while prohibiting the migration of their citizens. The formulation of the classical theory of migration belongs to E. Ravenstein *(Ravenstein, 1885)*. E. Lee proposed the laws of migration and formulated a system of "attraction-repulsion" of migrants *(Lee, 1966)*.

At the end of the twentieth century. the so-called neoclassical theory of migration was developed, at the origins of which were D. Massey, A. Paloni, J. Durand and others. This approach is based on the migrant's calculation of possible economic gains or losses from the migration process. Such factors include: the cost of the trip itself, the possibility of taking a job, in the case of illegal migration – the risks of deportation. The moral and psychological aspects of migration by neoclassical theory include stress in finding a new job, the difficulty of being in a culturally foreign territory, the loss of stable ties *(Massey, 2002)*. But this theory has also been strongly criticized, particularly in terms of methodological principles.

Until the 60s of the twentieth century, domestic research on this topic was almost absent. The reason for this phenomenon is the unpopularity of this area of research due to the ban on the use of migration statistics, in particular, regarding foreign migrations. Such studies have become widely popular due to the mass labor migrations of the population in order to develop virgin lands. In the political aspect, these processes correlate with the times of "thaw". The main aspects of such studies were the scale (volume) of migration, their orientation and gender and age structure of migrants.

There was an emphasis on the theoretical foundations of migration and the interdependence between the intensification of migration processes and economic and political phenomena in society in the 70's and 80's of the twentieth century. It is at this time that the development of domestic methodological foundations for migration research, attempts to develop and implement migration policy.

The globalization of the scale of migration, in particular – international, took place in the XX – early XXI century, which only increased the interest of scientists in this issue. But it should be noted that the research of that time is fragmentary and rather imperfectly covers such aspects of migration as the problems of adaptation of migrants, the dynamics of their identity, and so on.

According to the K. Brettell and J. Holyfield's research, migration processes are interdisciplinary, so any study performed by the methodological apparatus of one science can not be complex (Brettell, Hollifield, 2015). According to the authors, the sciences that are designed to study migration processes are economics, geography and sociology. At the same time, each science should be responsible for a certain aspect of research, namely:

- sociology – features of adaptation of migrants, their identification and loss and their acquisition of social ties;
- economy – identification of socio-economic factors that were the basis of the migrant's decision to move and the corresponding economic consequences of these decisions;
- geography - identification of the dominant spatial patterns of migration.

However, the common denominator between these areas of research is that they try to specify various aspects of migration and explain their nature.

According to K. Brettell and J. Holyfield, extremely important in the implementation of the model of "attraction - repulsion" is the population density, and in the case of overpopulation is the repulsion factor, sparsely populated factor is the attraction factor. But at the moment the most densely populated, as a rule, are regions with significant economic development, cities, which themselves act as poles of attraction for migrants. This statement also calls into question the case of individual or mass migration. In individual migration, the force of "repulsion" can be economic difficulties and life difficulties: dismissal, death of relatives, divorce, etc. *(Brettell, Hollifield, 2015)*. Attractive factors include favorable living conditions, a significant difference in income and others.

S. Haug's scientific research emphasizes the relevance of interdisciplinary research, which should be based on tangential aspects of scientific theories. She is the author of the theory of rational choice. This theory explains the migration of the population through the behavior of a particular individual *(Haug, 2015)*.

An important role in the study of modern migration processes in Ukraine is played by studies of the Institute of Sociology of the National Academy of Sciences of Ukraine, in particular periodic sociological monitoring, which includes questions about the experience of labor migration, its intention and so on *(Instytut sotsiolohii NAN Ukrainy)*.

In previous studies, the authors considered the migration challenges of the 21st century and Ukraine's experience in resolving them (K. Sehida, N Husieva, L Niemets, O Suptelo, P. Kobylin, L. Kliuchko, 2018), problems and prospects of adaptation of internally displaced persons in Ukraine (Niemets L., Husieva N., Sehida K. Kraynukov O., Lohvinova M., Suptelo O., 2019), the impact of stationary migration on population reproduction, characterized migration mobility and features of the region (Niemets, Husieva, Lohvynova, Kandyba, Kliuchko, 2018), features, factors and consequences of migration processes in the countries of the European Union (Sehida K., Niemets L., Korenkov R., Nosyriev O., Dobrovolskaya N., 2020). Regarding the issue of labor migration, the motivators of labor migration, types of employment of labor migrants abroad and the positive and negative consequences of labor migration in Ukraine were considered (Niemets, Lohvynova, Sehida, Husieva, Kravchenko, 2019).

Research Methodology

In order to obtain representative results of the study of labor migration, we used a set of philosophical, general scientific, specific scientific methods. Sociological methods have played a significant role in the study, in particular, the survey method, its results make it possible to find out the independent opinion of the population about the experience of labor migration or the intention to carry it out. The comparative method was used to compare official data from state statistics and opinion polls. Methods of induction, deduction, analysis and synthesis, systematization and generalization, etc. were used to process the obtained materials. Mathematical-statistical method, method of formalization and ranking were used for processing data sets. To present the results of the study, a graphical method was used (construction of diagrams, Paretto graphs).

This research on migration in Ukraine is characterized on the basis of the number of migrant workers and foreigners working in Ukraine, the migration balance, which characterizes the migration increase (decline) due to migration, the number of migrant workers without regulated status, the volume of remittances of migrant workers.

For a comprehensive statistical study of labor migration processes, we used a systematic approach, that identified causal relationships and factors influencing the formation and scale of labor migration. It is the application of a systematic approach that has led to the development of practically significant conclusions and recommendations for the regulation of labor migration.

Presentation of Research Results

The study and analysis of the general migration situation in Ukraine is complicated by many factors, the main of which are the cancellation of the traditional population census, the lack of necessary data from the temporarily occupied territories, etc. For the last 18 years, internal migration in Ukraine has mainly been about migrations between cities (almost 50% of the total turnover). This trend correlates with the fact that large cities are regional centers of development, centers of service, and therefore they attract migrants. Let's analyze the features of migration growth in Ukraine for the period from 2002-2019 (fig. 1).

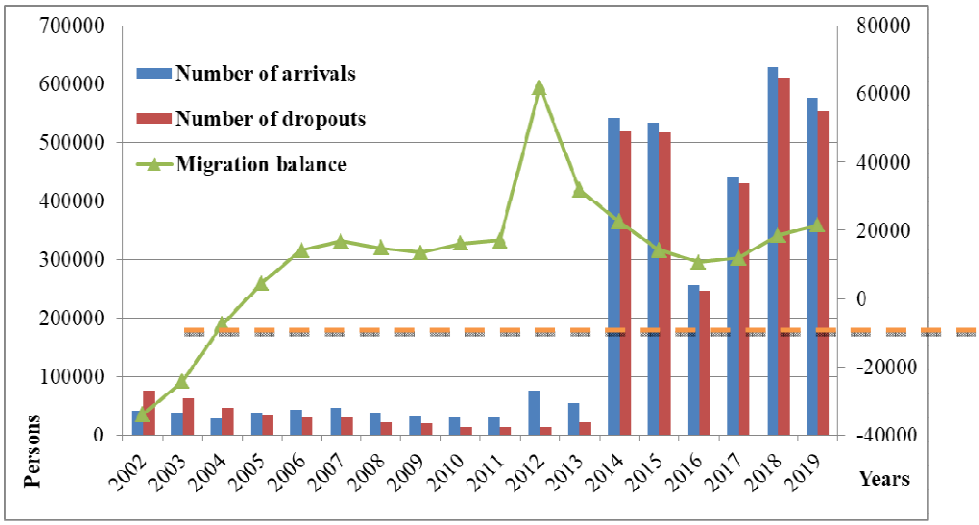

Fig 1. Dynamics of the migration balance in Ukraine (2002-2019)
(developed by the authors based on data Derzhavna sluzhba statystyky Ukrainy)

Analyzing this graph, we can see that the balance of migration was negative in 2002-2004, and further has positive values. The maximum migration increase for the study period is observed in 2012. Then the number of arrivals in Ukraine reached 76,361 thousand people. This was influenced by the European Football Championship "Euro-2012", which took place in Ukraine, in the largest cities: Kyiv, Kharkiv, Donetsk, Lviv. Already in the following years, the increase in migration gradually decreased, but in the future, the number of immigrants exceeded the number of emigrants. Since 2014, both the number of arrivals and departures has increased significantly. The reason for this is political reforms and the economic situation in the country. This process was also strengthened by the 2017 agreement on visa-free travel between Ukraine and the EU. According to the results of 2019, Ukraine has a positive migration balance. But the migratory mood of the population is changing quite rapidly, as evidenced by the results of population surveys (fig. 2).

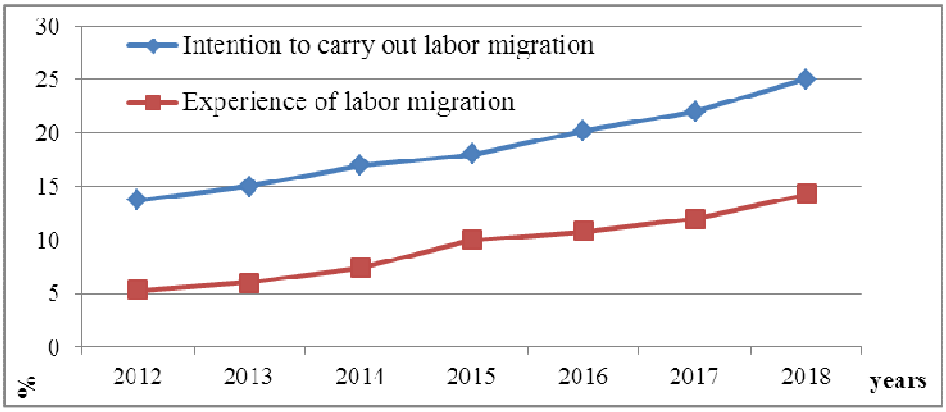

Fig. 2: The results of a survey of Ukrainians regarding intentions of labor migration and experience of labor migration of both personal and family members,% (developed by the authors based on data Instytut sotsiolohii NAN Ukrainy)

According to the results of the annual survey conducted by the Institute of sociology NAS of Ukraine, 13.7% of respondents answered the question "Do you or any of your family members have

experience of temporary work abroad?" positively in 2012, and in 2018 – 25.2%. At the same time, 7.4% expressed their intention to go abroad to work in the near future, and in 2018 – twice as much – 14.3%. Labor migration abroad is quite common in Ukraine, the population has significant experience of labor migration, and the unstable economic and political situation is an important factor in "attracting" labor migration to other countries. Both the number of people who have had experience of labor migration and the number of those wishing to carry it out are growing.

In order to assess the scale and study the characteristics of labor migration of Ukrainians abroad, the State Statistics Service of Ukraine in 2008, 2012 and 2017 conducted large-scale population surveys, which surveyed more than 20 thousand households *(Zovnishnia trudova mihratsiia, 2018).* According to the data obtained, at least once 1.5 million people, or 5.1% of the working population of Ukraine, went abroad to earn money for 2.5 years before the survey or worked abroad at the time of the survey in 2008 – 1.2 million or 3.4% of citizens aged 15–70 years, in 2017 – 1.3 million or 4.5% of the population of the appropriate age (excluding the population of the temporarily occupied territories). Such studies did not take into account migrants who left with the whole family and persons, who carried out pendulum migrations in border areas, so the real number of migrants is much higher. According to many researchers, the number of Ukrainian labor migrants is currently over 3 million (Libanova, 2018).

The countries-poles of attraction of labor migrants for Ukraine are traditionally the neighboring countries: Russia, Poland, the Czech Republic, and also the countries of Southern Europe (Italy, Spain, Portugal). The situation in eastern Ukraine has significantly affected this structure, which has reoriented the migration flow from east to west (EU), the dominant country in terms of the number of migrants is Poland (fig. 3).

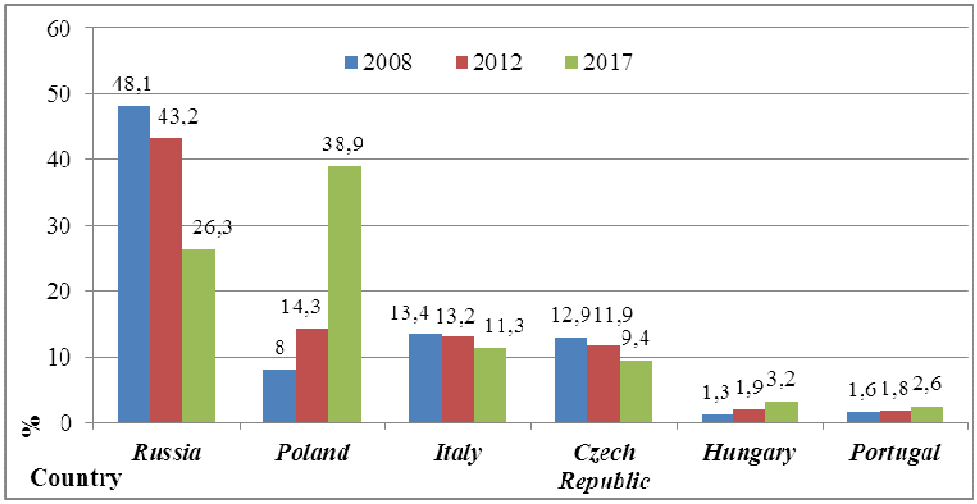

Fig. 3: Dynamics of the percentage of migrant workers by destination countries according to the results of surveys in 2008, 2012 and 2017,%
(developed by the authors based on data Zovnishnia trudova mihratsiia, 2018)

The transformation of Poland into the main destination country for labor migrants from Ukraine was facilitated by the procedure introduced in Poland in 2008, according to which Ukrainians can work for 6 months during a calendar year without a work permit, but only at the request of the employer registered by local local government administrations. Italy has long been ranked high in the ranking of countries attractive to Ukrainian migrant workers, as is the Czech Republic. Hungary is territorially close and attractive to migrant workers in the border areas of western Ukraine. The sixth country in the ranking of the most popular among migrants from Ukraine is Portugal, which has a fairly soft migration policy and is also favorable among migrants. In terms of intra-regional context,

it is important that previously about 70% of migrants from Ukraine to Poland were residents of the western regions, but now this trend has changed enough, and residents of central, southern and eastern regions also take an active part in migration in this direction.

Migrant workers have a high impact on Ukraine's domestic foreign exchange market. According to various estimates, remittances from migrant workers account for about 2–5% of our country's GDP (fig. 4).

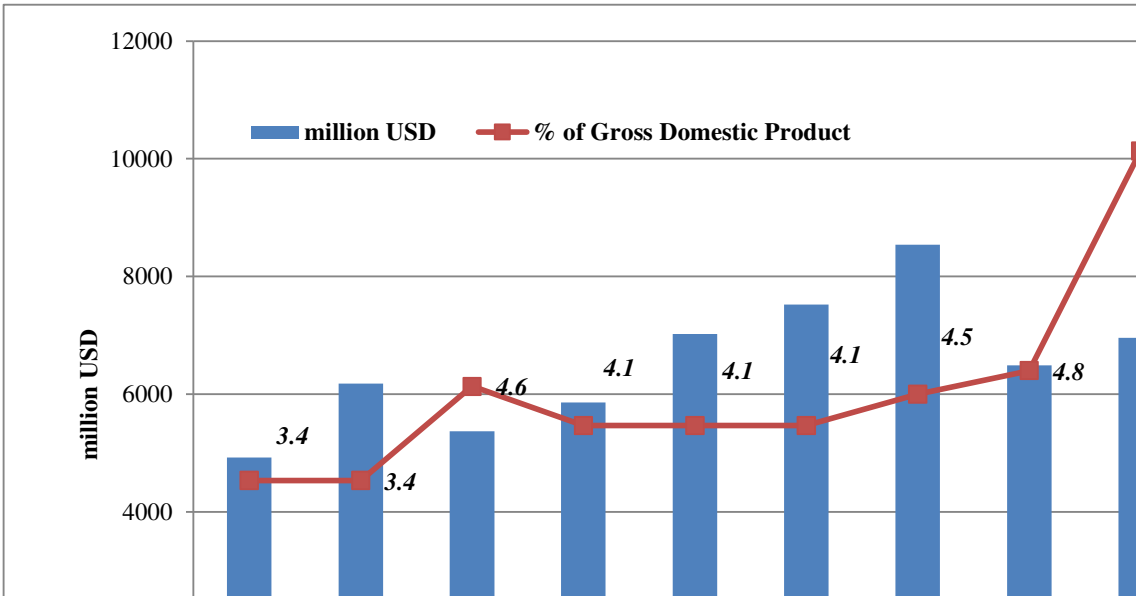

Fig. 4: Dynamics of private money transfers to Ukraine in 2007–2018 (developed by the authors based on data Ministerstvo finansiv Ukrainy)

Based on the volume of private transfers, which is a component for calculating the country's balance of payments, it should be noted that payments have a steady upward trend (except for the crisis of 2008 and 2009, 2014, due to the occupation of Crimea and the start of hostilities in Donbass). As of 2018, the volume of private transfers reached 11.1 billion USD, which was 8.5% of GDP. It is noteworthy that this amount is several times higher than the volume of foreign direct investment in Ukraine. In this aspect, there is a similar structure of countries: until 2014, the main country of origin of transfers was Russia, which received a third of all transfers, and in recent years the share of Russia decreased and in 2018 amounted to less than 10% (1.09 billion USD). In contrast, in 2018, Ukraine received 32.8% of all transfers (3.6 billion USD) from Poland. Transfers from the Czech Republic almost doubled compared to the previous year (7.6% of all transfers, or 846 million USD) *(Predstavnytstvo Mizhnarodnoi orhanizatsii z mihratsii (MOM)*).

The impact of private remittances of migrant workers on Ukraine's economic growth is quite controversial. On the one hand, there may be a reduction in unemployment and accumulation of human and financial capital, which has positive consequences for economic growth, on the other – it causes a distortion in the labor market, which reduces the investment attractiveness of the region and the country.

Ukraine is not only a donor of migrant workers, but also a host country. As of 2018, 16,000 foreign workers are officially employed in Ukraine (fig. 5).

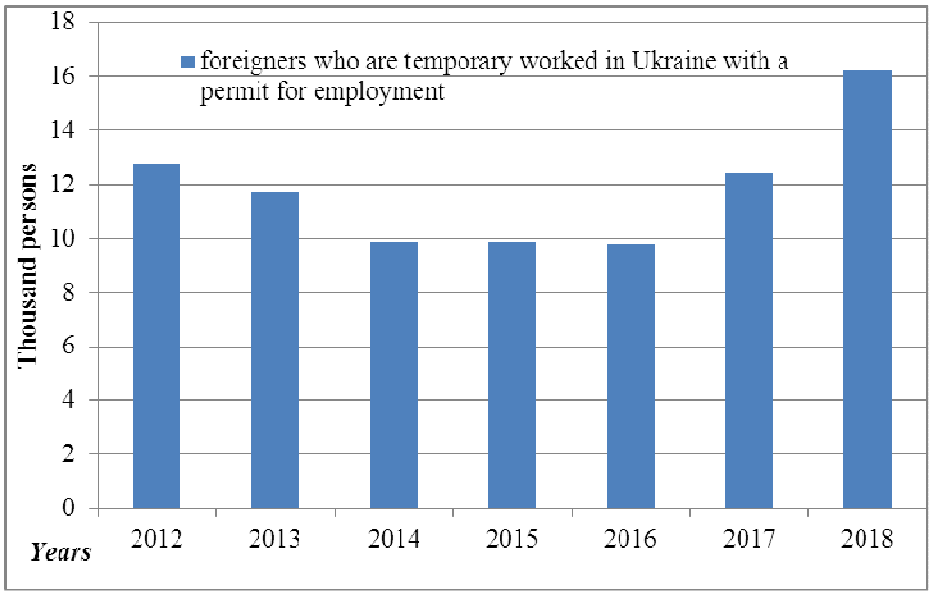

Fig. 5: Dynamics of the number of foreigners who are temporarily worked in Ukraine with a permit for employment, at the end of the year, thousand people (developed by the authors based on data Ministerstvo sotsialnoi polityky Ukrainy)

Labor immigrants are mainly employed in trade and repair, industry, information and telecommunications in Ukraine. The most numerous among them were citizens of Turkey (about 3 thousand people), the Russian Federation (1.6 thousand people), China and Belarus (about 1 thousand people) in 2018 *(Ministerstvo sotsialnoi polityky Ukrainy)*.

Unregulated migration is relevant for Ukraine in two dimensions. Firstly, a certain part of Ukrainian citizens who go abroad to earn money, stay there or engage in paid activities without proper permits and documents.

Secondly, the territory of Ukraine is used for illegal transit to European countries from many countries in Africa, the Middle East and Central Asia. It is worth noting that according to 2018, almost one in four migrant workers worked abroad without any legal status or only a tourist visa (fig. 6).

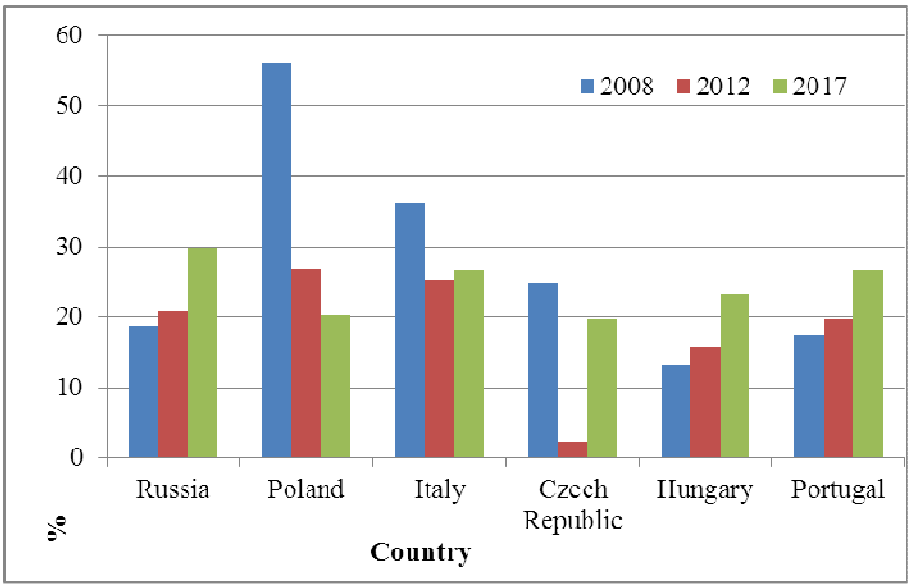

Fig. 6: Dynamics of the percentage of Ukrainian labor migrants, who were abroad without a regulated status (including those who worked with tourist visas) in 2008, 2012, 2017 (developed by the authors based on data Ministerstvo sotsialnoi polityky Ukrainy)

In 2008, the largest number of illegal migrants was registered in Poland, Italy and the Czech Republic, in 2012 their number decreased, the minimum was in the Czech Republic, the maximum - in Poland, Italy and Russia. In 2017, the largest number of illegal migrants was detected in Russia, which is due to the strict policy against Ukrainian labor migrants. A large number of illegal labor migrants are also registered in Portugal and Romania.

The aggravation of the problem is also confirmed by the statistics of European countries on Ukrainian citizens who are violators of the migration legislation of the host countries (fig. 6).

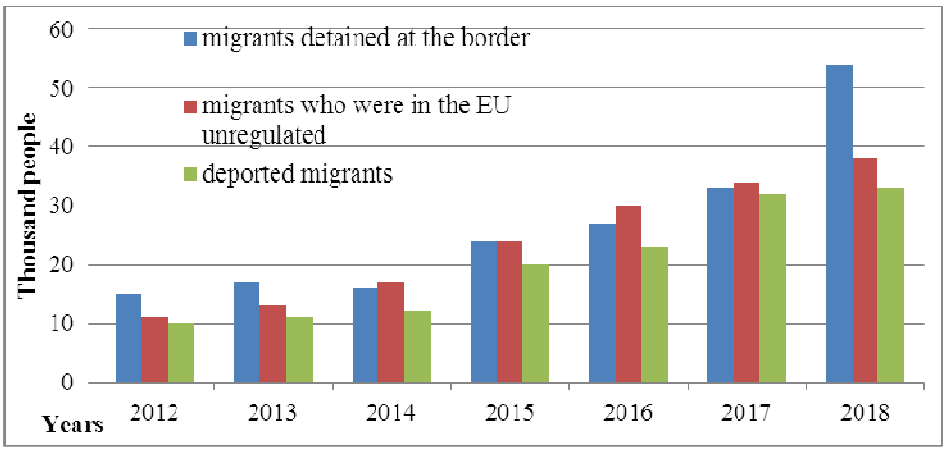

Fig. 7: Dynamics of the number of detected illegal migrants-citizens of Ukraine on the territory of the EU in 2012-2018 (developed by the authors based on data Eurostat: Enforcement of migration legislation)

The graph shows a gradual increase in the number of illegal Ukrainian migrants in the European Union. Since the ratification of the agreement in 2017, the number of illegal migrants from Ukraine in the EU is more than 30 thousand people. In 2018, the number of illegal labor migrants detained at the border increased sharply - 50 thousand people, which indicates the strengthening of border

control. The number of deported labor migrants has also increased significantly. Thus, the ratification of the agreement with the EU has helped to increase not only the flow of legal labor migration, but also its illegal manifestations. The main reasons for illegal migration are the unwillingness to work officially and draw up the necessary documents, political reasons and armed conflicts.

The problem of unregulated migration of foreigners to Ukraine or transit to EU countries remains relevant today. In 2018, 1.1 thousand people were detained while trying to cross the state border illegally, 11.1 thousand migrants with unregulated status were found on the territory of Ukraine, 92% of them were violators of stays (fig. 8).

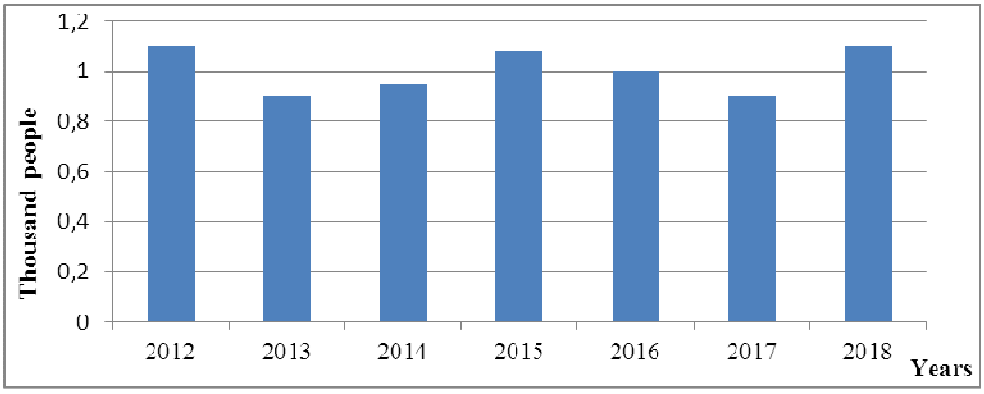

Fig. 8: Dynamics of the number of illegal migrants, detained by the Border Guard Service of Ukraine in 2012-2018 (developed by the authors based on data Derzhavna mihratsiina sluzhba Ukrainy)

The studied indicator has no tendency to increase or decrease, fluctuates during the studied period in the range from 0.8 to 1.1 thousand people. Regarding the countries of citizenship of migrants with unregulated status, identified by the State Migration Service of Ukraine in 2018, it should be noted that most of them were citizens of Russia (1994 persons), Azerbaijan (1918 persons), Uzbekistan, Armenia, Moldova and Georgia (about 1000 persons) *(Derzhavna mihratsiina sluzhba Ukrainy)*.

The obtained results indicate the need to apply mechanisms to regulate labor migration in Ukraine, both for migrants and immigrants. In 2017, the Strategy of the State Migration Policy of Ukraine for the period up to 2025 was developed and implemented, which is focused on 2 stages: 2018-2021, 2022-2025.

The document envisages reducing administrative barriers to the freedom of movement of the population of Ukraine, reconsidering the permitting nature of documents for travel / stay abroad. The task is to promote the reintegration of Ukrainian migrants who return, develop cooperation with the Ukrainian diaspora and encourage the repatriation of representatives of the diaspora. It is the regulation of labor migration that is one of the main objectives of the Strategy *(Stratehiia derzhavnoi mihratsiinoi polityky Ukrainy na period do 2025)*. The objectives of the Strategy, the positive consequences and issues of their implementation in the context of regulating labor migration are considered (table 1).

Table 1: Analysis of the goals of the Strategy of the state migration policy of Ukraine for the period up to 2025 in the context of regulating labor migration (developed by the authors)

№	*The purpose of the Strategy*	*The main tasks*	*Problematic aspects of implementation*
1	*Reduce administrative barriers to the freedom of movement of the population of Ukraine*	Accounting and registration of the population, clear control over the movement of migrants across the border, issuance of chipped identity documents. Use of information systems for the collection and storage of personal data. Use of mobile applications.	The place of residence according to the registration and the actual place of residence often do not coincide. In particular - young people who are quite mobile, and more often rent housing, and are quite active in terms of labor migration). Not 100% coverage of the country by the Internet.
2	*Reduce the negative consequences of emigration from Ukraine and increase its positive impact on the development of the state*	Gradual elimination of economic, social and other factors of public life that lead to emigration, development of alternatives to long-term migration (short-term employment), protection of citizens' rights in Ukraine.	The mismatch between the level of wages abroad and in Ukraine remains a powerful factor in attracting migrant workers, and even after short-term employment, migrants will intend to return to "earnings".
3	*Create the necessary conditions for the return and reintegration of Ukrainian migrants into Ukrainian society*	Providing access for returning Ukrainians to receive social services guaranteed to citizens of Ukraine by law, development of appropriate state and regional programs, providing information and advisory assistance to citizens of Ukraine returning to Ukraine.	The implementation of this goal is possible only under the condition of the economic development of the state, an increase in the level of wages, and the provision of social guarantees, which is a problem, because the issue is the taxation of the wages received by a migrant abroad, which forms this fund.
4	*Promote legal migration to Ukraine, consistent with social policy and economic development of the state*	Establishment of a mechanism for providing quotas for employment of foreigners, which will flexibly respond to the needs of the labor market, encourage the repatriation of members of the diaspora to Ukraine.	As Ukraine is a middle-level country, most labor immigrants are citizens of the same or lower level of development, who are employed in trade or industry.
5	*Ensure the successful integration of foreigners and stateless persons, who are legally in Ukraine, into Ukrainian society*	Increasing the level of cooperation with the environment of immigrants, involvement in the development of programs on integration and immigration, the formation of a culture of interethnic relations in society.	The difference between the traditions of life, religion, mentality of the population, which often leads to conflict situations in society.
6	*Effective use of the visa system and the capacity of diplomatic missions to manage migration*	Using the practice of the European Union, ensuring the rapid processing of visa applications, optimize the list of	Mentality of the population and the presence of experience of illegal labor migration, the availability of such migration

		documents.	across some parts of the state border.
7.	*Carry out border control of persons, adapted to changing migration flows and opportunities of integrated border management*	Automation of border control, control over "problem" areas of the border, creation of national databases of illegal labor migrants.	Long-term implementation of this goal, the presence of a condon with Transnistria, LPR, DPR, which creates problems in the formation of a single database.
8.	*Strengthen control over compliance with migration legislation within the state*	Improving the system of detection of illegal labor migrants within the state.	It is necessary to provide this service with equipment, qualified labor.
9.	*Ensure respect for the human dignity of returnees by encouraging them to return voluntarily*	Return policy should allow potential migrants to understand, that the only way to reap the benefits of immigration is to comply with migration laws.	The need to review the legal, financial and procedural aspects of the process of voluntary return of labor immigrants.
10.	*Introduce an appropriate mechanism and programs for regularization of illegal migrants*	Enabling foreigners, staying in a country in violation of the law, to obtain legal status.	The need to develop an algorithm for legalizing migrants with an emphasis on the benefits, that will motivate legalization.

In general, the Strategy provides for measures to support migrant workers throughout the migration cycle: from the intention and collection of information on employment abroad to return to Ukraine. At the same time, the implementation of certain provisions of the Strategy on migrant workers faces certain difficulties and needs to be refined.

Conclusions

The signing of the Association Agreement with the European Union was a big step forward for Ukraine and redefined our country on the world political and economic arena. External migration processes are quite active in Ukraine during the times of Independence, but the agreement brought them to a new level, finally changing the eastern vector of migration to the western one. In general, the balance of migration in Ukraine is positive, but since 2017 there has been a significant increase in migration flows, which reached a maximum for the study period in 2018. According to opinion polls, in recent years has increased not only the number of migrant workers who want to try themselves as a migrant worker (in 2018 – about 25% of respondents, compared to 14% in 2012). Statistics on the presence of labor migrants from Ukraine show a decrease in the number of labor migrants in Russia, an increase in Poland (almost 40% of migrants in 2018), Italy and the Czech Republic. Over the past 10 years, the volume of private remittances from abroad has also grown significantly, which not only improves the living standards of migrant workers' families, but also accounts for 8.5% of Ukraine's GDP. It is worth noting the large volumes of labor migration of Ukrainians: as of 2018, 16,000 migrants were officially employed, which is a fairly high figure, but it is difficult to compare with the number of emigrants. Unfortunately, illegal migrations are quite common, which are manifested both in European countries where Ukrainians migrate and on the territory of Ukraine.

The scale of labor migration requires new approaches to its regulation, because modern migration policy is not able to significantly affect the solution of labor migration. To this end, the Strategy of the State Migration Policy of Ukraine for the period up to 2025 has been developed and implemented in Ukraine. The analysis of the Strategy proved that it qualitatively differs from the previous documents regulating the migration policy of Ukraine, has clear goals and directions for implementation. The strategy assumes not only legal and economic, but also social aspects of labor

migration: promoting the reintegration of Ukrainian migrants, cooperation with the Ukrainian diaspora and encouraging repatriation, the integration of immigrants into Ukrainian society as a two-way process in which both migrants and the local population participate. But the implementation plan itself is superficial and not detailed, which determines the list of problems of implementation of the Strategy, which need to be addressed, namely: significant differences in wage levels in the EU and Ukraine, which is the dominant attraction of migrant workers abroad, long-term realization of many tasks, mentality of the population, etc. Migration is an extremely common phenomenon in the modern world, which is rapidly evolving and gaining new volumes, is influenced by a wide range of factors. In today's conditions, this topic is gaining new relevance, requires future research.

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Features and Problematic Issues of The Tourism Development in Ukraine Due to The Coronavirus Covid-19 Pandemic

Liudmyla NIEMETS
Doctor of Sciences (Geography), Professor, Head of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: soc-econom-region@karazin.ua

Serhii KOSTRIKOV
Doctor of Sciences (Geography), Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: sergiy.kostrikov@gmail.com

Yurii KANDYBA,
PhD in Geography, Assistant Professor of the Department of Human Geography and Regional Studies, V. N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: kand77@ukr.net

Nataliya DOBROVOLSKAYA
PhD in Geography, Assistant Professor of the Department of Human Geography and Regional Studies, V. N. Karazin Kharkiv National University,
Assistant Professor of the Department of Travel and Hotel Business, Kharkiv Institute of Trade and Economics of the Kyiv National University of Trade and Economics,
Kharkiv, Ukraine,
e-mail: natalie.dobrovolskaya@gmail.com

Pavlo KOBYLIN
PhD in Geography, Head of the Educational Laboratory of Socio-Economic and Informational Technologies, Assistant Professor of the Department of Human Geography and Regional Studies, V.N. Karazin Kharkiv National University, Kharkiv, Ukraine,
e-mail: kobilin333@gmail.com

Hanna KUCHERIAVA
PhD in Geography, Assistant Professor of the Department of History of Ukraine and Tourism, Kyiv National Linguistic University, Kyiv, Ukraine,
e-mail: annakucheryava12@gmail.com

Abstract

The paper focuses on those features of the tourism development in Ukraine, that became dominant ones over the last decade. The problematic issues that the this industry faces in the context of the coronavirus COVID-19 pandemic have been identified, and the ways of their resolving have been proposed. It has been outlined that the domestic tourism is expected to be developed in Ukraine in the post-quarantine period mainly in its structure excursion. educational, health resort, and in active tourism domains.

Keywords: tourism in Ukraine, tourism domains, domestic tourism, foreign tourism, tourist flows, coronavirus COVID-19.

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Statement of the Research Problem

The coronavirus COVID-19 pandemic dramatically affected the life of the Ukrainian society, in general, and the socio-economic development of the country, in particular. Implementation of the quarantine measures and actions literally suspended economic life in the country, what has provided the drastic impact on the development of the service sector of the Ukrainian economy. One of its branches , which is the most noticeable affected by quarantine steps, is the touristic branch of the economy. Development of the latter is primarily associated with the transport operational activity , it assumes mobility of service recipients and provides direct contacts of many people in various regions of the country and all over the world. Therein, the tourism as an economical sector faces new challenges due to seeking for solution in what way to restore the lost positions and develop its new domains and activities.

The purpose of this study is to analyze the situation on the tourist services market and justify the necessity of the new touristic domains and trends development in Ukraine in the coming post-quarantine period. This is highly crucial, because many countries of the world, first of all, the EU, remain closed for Ukrainians. Obviously, if the pandemic events go on in an indefinite period of the future, this process can ultimately ruin the tourism industry.

Review and analysis of Previous Research Materials

Since the coronavirus pandemic has hooked most of the countries all over the world and produced a strong impact on the development of tourism, both domestic and foreign - the study of its development problems is under the close scrutiny of the scientific community, and their solution is one of the priorities for the socio-economic and human policy of many countries.

The preventive pandemic impact measures and anti-crisis programs for the tourism development, taken by the EU countries in the context of the global economic crisis of 2008-2009, are indicative. Thus, the Greek government allocated the contribution to the travel industry in the amount of 200 million euros. The cost for promoting Greece abroad in 2009 was increased by 50% relatively to the 2008 advertising budget. Tourism programs for new types of recreation and extreme sports have been developed (*Maksimova, L., 2011*).

Many countries, which economies are based on the tourism industry, took active steps during this period so that to save and retain this economically important sphere. Thus, the Egyptian government freed the hotel industry from obligations to co-finance the governmental advertising campaign in the international market to facilitate the activities of tourism enterprises during the economic downturn. Fuel and airport taxes were reduced for charter carriers, and additional discounts were introduced for those airlines, which make at least 11 charter flights per month. The total amount of financial assistance to hotels and airlines amounted to $ 1.2 billion. USD. Egyptian overseas advertising campaign focused on the availability of recreation in this country. As a result, Egypt turned out to be one of the few countries to which, according to the results of 2009, the inflow of, e.g.,, Russian tourists only not decreased, but grew by 13% instead *(Yezhednevnaya elektronnaya gazeta...).*

Aviana, Ida Ayu Arintya Dian, & Alversia, Y. (2019) conducted a study of the effectiveness of the media influence on the image of a destination and intentions of tourists to return to the island Bali (Indonesia) after eruption of the Mount Agung and several earthquakes in 2017 - 2018. This study discovered that so-called word-of-mouth (WoM) social media communication and government social media provide the best influence on the image of a tourist destination in the aftermath of a disaster, while. this image broadly influences the intention of tourists to visit the country at least once again.

Global scale problems in the world are being greatly aggravated and also affect the tourism development. According to Kacetl, J., Klimova, B., Kuca, K. (2018), since 2015 France has been the most terrorist-prone country in Europe. From 2014 to 2015, the contribution of tourism to GDP in the country decreased by $ 1.7 billion. USD. By comparison, Italy, where no deaths from terrorism were

reported, expanded its tourism sector during the same period of time by $ 4.9 billion USD. The relevant studies demonstrate that contribution of tourism to GDP is twice as much in countries, where there are no terrorist attacks, compared to the countries, where there were such attacks. According to *Global Terrorism Index, 2019,* other countries that are under a high threat of terrorism in Europe are Belgium, Germany, Spain, Russia, Turkey and the UK. Thus, the Belgian economy suffered a loss of almost 1 billion euros after the terrorist attacks of the Islamic State in Brussels in March 2016. The most affected business areas were hotels, restaurants and tourism.

In 2020 the world was swept by the COVID-19 pandemic. According to the World Tourism Organization (*UNWTO, 2020*), the number of tourists arriving from abroad is expected to drop to 78%, leading to a loss of 1.2 trillion USD of export earnings from the tourism and 120 million direct tourism job losses, that is in 7 times more, than impact of the attacks in the US on September 11, 2001, and the largest decline in history.

Due to the COVID-19 pandemic, countries around the world have developed the most common measures to mitigate the effects of the crisis and accelerate recovery. These measures are named by the World Tourism Organization as follows:

- financial and monetary measures;
- measures to protect jobs and promote learning and skills;
- market research initiatives and public-private partnerships;
- measures and initiatives to restore tourism;
- promotion of domestic tourism (*UNWTO, 2020*)

Financial and Monetary Measures: Germany lowered the VAT rate to support the tourism and hospitality industry. In Turkey, the VAT on domestic flights of the airline was reduced from 18% to 1% for a period of three months. Egypt postponed payment of all fees for tourism and hotel establishments, exempted bazaars and cafes located in archaeological sites from paying rent until tourism resumes safely. Egypt's central bank launched a finance initiative to support tourism, cut the interest rate for loans with a maximum two-year maturity in addition to a six-month grace period. Cyprus has approved a fund to implement tourism support activities in cooperation with airlines and travel operators, as well as activities to increase tourism demand from October 2020 to March 2021.

Australia is assisting the aviation industry with the Aviation Industry Assistance Package, which includes exemptions from several passenger and aviation charges. China approved a special fund to reimburse expenses of travel agencies.

Examples of ***measures to protect jobs and promote learning and skills*** are the following: the government of Bulgaria will help businesses (including hotel, travel and tour operators, restaurants and fast food facilities) by covering insurance payments owed by employers. Workers in Greece whose work contracts are temporarily suspended will receive compensation, while the state will cover their social security and medical contributions. The Ministry of Tourism of Israel developed a comprehensive training program through professional webinars and web courses to preserve and enrich the human capital of the industry (hoteliers, travel agents, tour operators, tour guides and other tourism professionals). Chile is adapting a technical assistance program for businesses that incorporate a strong digital component into business and digital governance processes for tourism entrepreneurs. Egypt issued guidelines for all tourism staff on the steps to follow with respect to self-defense procedures, and provided staff training to raise awareness in the event of emergencies (*UNWTO, 2020*).

Market research and public-private partnership initiatives: the Bureau of the Tourism Sector Committee of France meets regularly to support the sector. Ecuador set up five working committees to revitalize the tourism sector. Thailand set up a project to develop a big data storage system, and surveys are regularly conducted among a number of tourist accommodation agencies in the Seychelles, Albania, Armenia, Estonia and other countries to assess the impact of COVID-19.

Measures and initiatives to restore tourism can be named as follows. Spain created a Certified Safe Tourism System, a guarantee mark and certification for the implementation of the Health Risk Prevention System against COVID-19, and released a series of guidelines to reduce the spread of SARS-COV-2 coronavirus in the tourism sector. Lithuania, Latvia and Estonia have opened their borders to each other's citizens since May 15, creating a tourism bubble in the Baltics. Kenya announced the gradual reopening of tourism facilities and the confirmation of bilateral tourism agreements and free Covid-19 certificates for East African countries. Bahrain is working on a crisis management action plan, including building trust-based coalitions, maintaining positive and ongoing contact with tour operators, focusing on co-marketing with other tourism partners. China conducted a market analysis to predict the share of domestic tourism in total tourism demand *(UNWTO, 2020)*.

Towards the ***promoting domestic tourism***, countries such as Australia, Botswana, China, Egypt, Georgia, Hungary, Iceland, Italy, Kenya, the Republic of Korea, etc. provide vacation vouchers for domestic travel, exempt domestic airlines from service charges, and co-finance small advertising projects in the domestic market (*UNWTO, 2020*).

The tourism development in general and its certain aspects were considered and analyzed in some of our previous papers, while studying characteristic features of pilgrimage tourism in Ukraine (Niemets L., Telebienieva, et al., 2019), trends and features of rural tourism development in Ukraine (Niemets, L., Sehida, K., et al. , 2018b), features of the transition to a polycentric model of the regional development (Niemets, L., Niemets, K., et al., 2019; Niemets, L., Sehida, et al., 2018a) formation and implementation of development strategies of the Ukraine's regions (Niemets, K., Sehida, K., et al., 2018), regional development in general (Niemets, K., Kravchenko K., et al., 2019), post-industrial development of the city of Kharkiv (Niemets L., Suptelo O ., et al., 2019a), industrial heritage as a component of post-industrial development of the city of Kharkiv (Niemets L., Suptelo O., et al., 2019b), brownfields in the city of Kharkiv (Niemets, L., Husieva, N. et al. , 2018), shopping malls as objects of tourist infrastructure (Niemets, LM, et al., 2016).

Research Methods and Techniques

Analysis, mathematical-statistical, graphic methods have been used for this research. By the mathematical-statistical method, the evolution of tourism development in Ukraine from 2011 to 2018 has been analyzed, and a number number of Ukrainian tourists traveling within Ukraine and abroad, as well as foreign tourists served by tour operators and travel agents in Ukraine have been highlighted separately. Using the graphical method, a histogram has been constructed mirroring this evolution (Fig. 1). The study is based on the analysis of statistical stuff on the development of tourism in Ukraine for the period from 2011 to 2019 with the use of expert assessments. The latter allow identifying the trends in the tourism development in Ukraine in the post-quarantine period.

Statement of this Research Content

Let us consider the features of tourism development in Ukraine over the past decade. It should be noted separately, that this industry has been developing in an expedite way in Ukraine during this period. At the same time, domestic tourism has not taken a sufficiently high position in the economy yet.

There were unstable dynamics in a number of tourists served by subjects of tourist activity in Ukraine during 2011 - 2017. From 2011 to 2013 a number of tourists had been increasing rapidly from 1.84 million to 3.45 million, or by 88%. This growth occurred mainly due to those Ukrainians, who traveled abroad. Their number increased twice over the indicated period - from 1.23 million to 2.52 million people. Another reason was foreign tourists, whose number reached its maximum value in 2012 for the studied period (more than 270 thousand people, which is in 2.4 times more than in 2011)which. This phenomenon was associated with holding the European Football Championship "Euro 2012" (*Dobrovolska N.V., Kandiba Yu. I., 2019*) (Fig. 1).

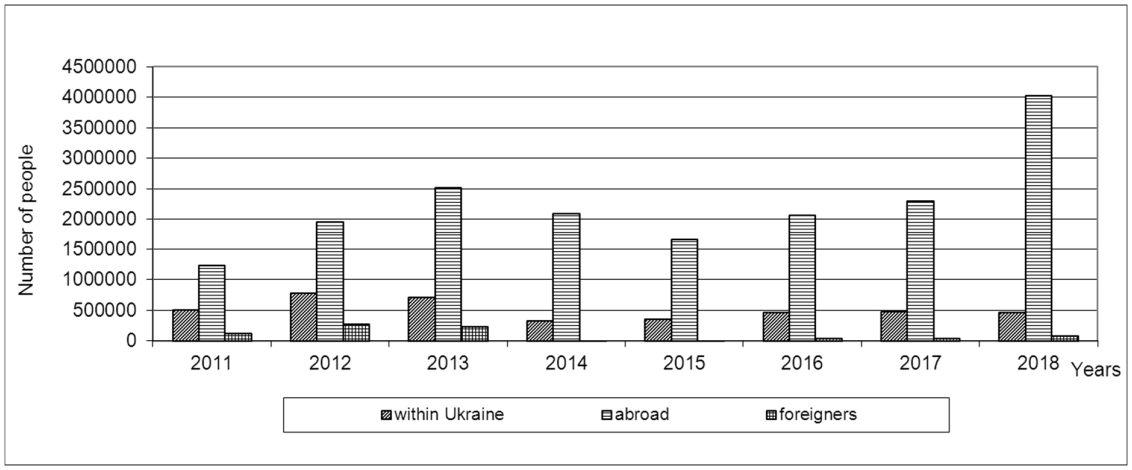

Fig. 1: A number of serviced tourists in Ukraine
(constructed by (Tourism activity in Ukraine in 2013); Tourism activity in Ukraine in 2015); Tourism activity in Ukraine in 2018))

This fact demonstrates that Ukraine already has an impressive potential for the development of not only the foreign tourism, but also the domestic one. It is facilitated by the rather favorable geographical position of our country, its natural and climatic conditions, significant potential of tourist resources of both natural, and anthropogenic origin.

Since 2014, the number of tourists who used the services of tour operators or travel agents has dropped sharply, reaching the lowest level of 2.02 million people in 2015. This happened because of a drop in demand for a domestic tourist product caused both by drastic deterioration of the socio-economic situation in Ukraine, and by decrease of the security level as a result of intensified hostilities in the east of the country.

Since 2016, the evolution of tourist flows has been becoming positive again concerning both Ukrainians traveling within their own country and travelling abroad, as well as the flow of foreign tourists to Ukraine. The lowest tourist activity of domestic tourists within Ukraine is typical for 2014, when tour operators and travel agents served 322 thousand tourists, which is in 2.2 times fewer, than in 2013 and in 1.4 times fewer than in 2018. The smallest number of Ukrainian tourists traveling abroad was observed in 2015 - 1.65 million people only, which is in 1.5 times fewer than in 2013 and almost in 2.5 times fewer than in 2018. In the next three years the number of tourists traveling abroad, served by the subjects of tourist activity in Ukraine, was growing and exceeded 4 million in 2018. This evolution is accounted for the increased interest of Ukrainians in tourist sites in foreign countries, what has happened due to the introduction of a visa-free regime with the EU and with a number of other countries contributed to the activation of the outbound tourist flow from Ukraine. This is undoubtedly because of the insufficiently high level of the tourist infrastructure development in Ukraine itself.

The introduction of quarantine in Ukraine from mid-March 2020 because of the spread of the coronavirus COVID-19 with its consequential morbidity significantly influenced the development of tourist activities in Ukraine. The tourist foreign flows have practically stopped - both Ukrainians abroad and foreign tourists to Ukraine. According to the chairman of the Association of the hospitality industry of Ukraine A. Liev, up to 20% of travel companies in Ukraine may be bankrupted (*Filonenko, O, 2020*). The govermental budget of Ukraine for 2020 provides an amount of 240 million UAH for the tourism development, which is only about 0.02% of the expenditure side of the budget. Because of the coronavirus epidemic, all the funds of the state budget of Ukraine allocated for the development of tourism have been redirected to mitigating measures of the consequences of the epidemic (*Turyzm pislya karantynu, 2020*). Thus, the tourism industry in Ukraine is practically left without state support. Unlike Ukraine, the EU plan to allocate up to375 billion EUR to rebuild the tourism industry after the

coronavirus pandemic. In particular, 255 billion EUR will be allocated to the governments to help the tourism sector of their countries and almost 120 billion EUR - to entrepreneurs and companies that suffered losses, so that to be able to continue their busines (*Sinyutka O., 2020*).

According to the National Institute for Strategic Studies of Ukraine (*Shchodo rozvitku turizmu v Ukraïní…*), the overall losses of the tourism industry in Ukraine are estimated at more than 1.5 billion US dollars. The share of tourism in Ukraine's GDP for the period from 2010 to 2018 amounted to 1.5 - 2% (*Yvtushenko, O.V., Kurinna, A.T., 2018*), which as of 2018 was about 2 billion US dollars per year. On the one hand, the small share of the tourism industry in Ukraine's GDP cannot drastically affect the overall socio-economic state of the country, and on the other hand, the losses of the industry itself in the amount of 1.5 billion US dollars per year can cause irreparable damage to the tourism industry. But since Ukraine is characterized by a relatively high share of domestic tourism in the overall tourism economy, the country has better conditions for preserving the national tourism industry.

The scale of losses to the tourism industry due to quarantine measures varies significantly in different regions of Ukraine. The regions of Western Ukraine are the most affected by the COVID-19 pandemic – Lviv, Ivano-Frankivsk, Chernivtsi, Ternopil regions, in which the number of cases and the increase in morbidity are the highest among the regions of Ukraine – both in absolute indicators and per 100 thousand residents. At the same time, these regions are one of the most attractive for both Ukrainian and foreign tourists, since they have rich natural, historical and cultural tourism resources.

As a result, the greatest blow to the tourism development was dealt precisely to the regions of Western Ukraine. It has a particularly negative effect on the socio-economic development of these areas, since tourism in them is a branch of specialization and it occupies a prominent place in the structure of the regional economy.

In the long term, with the gradual opening of state borders, the international tourism will recover its positions at a slow pace, which is largely due to decrease of the income level of the population of Ukraine due to the quarantine. In a situation like this, experts predict an increase of domestic tourism in Ukraine, which will compensate reduction of international tourist flows associated with the closure of state borders and decrease in the income level of the majority of our citizens. The active development of domestic tourism is also caused by psychological factors - the desire of people to "change the situation" after quarantine and the need for some kind of summer vacation and recovery.

The structure of of the domestic tourism sectors has also changed. The only branch of tourism that did not lose its tourists due to the pandemic is active one (primarily hiking, water and cycling), since tourists travel mainly to remote places from settlements, spend the night in tents or campgrounds, and not always attracted to cafes or restaurants in terms of food. At the same time, the most affected by the coronavirus pandemic are those sectors of tourism that are most associated with the transportation, food and with accommodation of a large number of tourists - excursion and educational tourism, business, religious and educational, entertainment, event activities. The sector of medical and health tourism is also delineated separately, which is traditionally one of the most popular sectors in Ukraine and even in the circumstances of the coronavirus remains at the level of previous years in terms of a number of tourists.

After a period of forced self-isolation, tourists should be expected to be greatly interested in short-term trips around Ukraine, weekend tours with an interesting program, which are affordable and at the same time able to provide a full range of impressions. According to the director of Coral Travel Ukraine T. Prokopenko, popular destinations after the finishing quarantine will be short weekend programs at a low price, family vacations by a sea and medical tourism (*U Derzhturyzmi rozpovily…*, 2020). Undoubtedly, large load on domestic tourism creates a number of difficulties. Many Ukrainians are accustomed to having a rest on the sea, which gives significant health improvement, in particular, to families with children. Therefore, the load on sanatoriums, rest homes of the Black and Azov Seas has sharply increased, which again leads to various negative results. Many beaches of Odessa and the region, as well as the coast of the Azov Sea, are already polluted and closed to tourists. It can cause a number of new diseases and negatively affect the state of the health care in the country.

A set of measures has been proposed to mitigate the negative impact of the COVID-19 coronavirus pandemic on the tourism industry of Ukraine *(Pandemíya COVID-19 ta íť naslídki…)*, (*Shchodo rozvitku turizmu v Ukraíní v…*). The most important, in our opinion, are measures of state support for the tourism industry of an economic nature, in particular: exemption of travel service providers from VAT, income tax and unified social contribution, land tax and tax on non-residential real estate; cancellation of tourist tax payment until the end of 2020; exemption from taxation when paying rent and land use, tenants of state and public property.

Losses of the state and local budgets from the lost tax revenues from travel operators and agents will not be critical due to the insignificant share of tourism in the economy of most regions of Ukraine. At the same time, the industry will receive additional financial opportunities for development during the crisis, which is very important for the regions of Ukraine, in which tourism is an industry of specialization, primarily in the western (Carpathian) and southern (coastal) regions.

Conclusions

Thus, the coronavirus COVID-19 PANDEMIC MADE new challenges to the tourism industry of Ukraine, as in many other countries of the world. Having lost government support, the tourism industry has to reorient to serving mainly “domestic tourists”, which is caused by continued isolation, step-be-step opening of state borders and decline of the purchasing power of a significant part of the native population. Therefore, the main task of the governmental authorities and local self-government is to create conditions for the development of domestic tourism, primarily -its active, "green", sightseeing and educational, and health resort sectors. This task should be resolved at the regional and local scales, using the opened options of the united territorial communities as units of the new administrative-territorial structure of Ukraine.

Further Research Perspectives

Taking into account the very difficult socio-economic situation in Ukraine at for the time being, the problem highlighted in this text needs a comprehensive efficient solution, since the economic well-being of many segments of the people and the whole country would depend on such solution. On the one hand, many relevant issues require thorough, comprehensive, and interdisciplinary investigations. This relates only to economic support for the transport industry, in particular, for air carriers, which are catastrophically bankrupted. Travel companies, tour operators and other representatives of the tourism industry need government support too.

On the other hand, fundamental research is crucially necessary on the development of domestic tourism identifying places for "green", ecological, active, health tourism. Ukraine is rich in the mentioned resources, it is necessary to study it, and develop specific routes, the objects for intensive development of infrastructure, providing economic support from the government.

These problematic issues are in the authors’ attention with respect to further research. Justification of new routes, estimation of the tourist load on these territories, etc., are being expected.

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The Problem of Reproduction in Agriculture

Lyudmila A. ZAPOROZHTSEVA
Voronezh State Agrarian University named after Emperor Peter the Great,
Voronezh, Russian Federation, ludan23@yandex.ru

Yuliya V. TKACHEVA
Voronezh State Agrarian University named after Emperor Peter the Great,
Voronezh, Russian Federation, julchen19@yandex.ru

Victoria B. MALITSKAYA
Plekhanov Russian University of Economics,
Moscow, Russian Federation, vmrussian@yandex.ru

Irina V. KUZNETSOVA
Voronezh State Agrarian University named after Emperor Peter the Great,
Voronezh, Russian Federation, irina197906@mail.ru

Natalia A. GORLOVA
Voronezh State Agrarian University named after Emperor Peter the Great,
Voronezh, Russian Federation, gorlova1@mail.ru

Abstract

The world is now being seriously overhauled, which is seen in economic digitalization and more frequent financial crises growing easily into global financial problems. Reproduction is an urgent matter both for the economic theory and practice, but the approaches towards its understanding have not changed for the last two hundred years. The reproduction process covers distribution and redistribution both on the micro and macro levels. Connection between the development of companies, territories and human capital occurs with the help of reproduction mechanisms. Commercial companies are not only taxation subjects, but also the key agent of distribution and redistribution relations, they form the income of households, take part in investment and social programs, infrastructure development and ensure demand for the products of related industries. Despite the fundamentality of definitions, digitalization promotes development of the balance methods, which undoubtedly covers some aspects of understanding the reproduction category. In modern practice the reproduction category roots in the notion of industry potential, which means that companies' functioning is a horizontal and vertical basis of the reproduction processes. The article deals with the influence of formalization of distribution and redistribution processes on the micro and macro levels on reproduction of agriculture companies' potential.

Keywords: Reproduction, Agriculture, Agricultural Companies, State Support

Introduction

Food provision may soon become one of the most urgent problems. Although part of the population of the planet has long switched to alternative sources of protein from natural sources, the bulk of the population remains committed to the traditional forms of products. This is why agriculture is one of the priority branches of the economy both regionally and globally. Many modern countries link their strategic development with agriculture. Commercial organizations are the basis of modern economy – they are the key to the development of territories, formation of infrastructure and the servicing

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industries, social establishments creating a multiplication effect. Each production job creates up to 8-10 jobs in other economic areas. Although the key agricultural component is land, effective operations require the use of high quality seeds and planting material, highly productive animals, high-quality breeding stock, etc. We believe that lower effectiveness of company operations may trigger the impossibility of reproduction of the aforementioned components and destruction of agriculture potential.

Literature Review

The goal of commercial organizations is profit generation and the longer it happens the better it is for all participants of economic relations. High competition in a market economy and technological development lead to the need of constant investment and company resource upgrade. The economic theory views constant resumption of operations, their continuity as reproduction. Although the key goal is expansion of production meaning higher output, prosaic maintaining of the sales market is important nowadays. If a company fails to fulfill the last condition, the effect of shrinking production appears. The interrelation of reproductive processes helps us conclude that a chain of shrinking manifestations appears in the vertical and horizontal connections. This effect is very clear in agriculture – destruction of reproduction of a large agrarian company ruins sustainable development of rural areas, the impossibility of reproduction of its population, worsening of regional indicators. Besides, we should take into account that the issue of importance of biological resources, whose circulation is specific and requires close attention, appears in this sector together with the need of reproduction of labour, land and investment.

The theoretical basis of reproduction is outlined in many works written by the representatives of foreign and local economic schools. Such researchers as F. Quesnay (1960), K.Marx (1867) and others made the most conspicuous contribution to understanding this issue. The special features of agricultural reproduction, including in agricultural companies, were researched by I.V. Zagaitov (2006), K.S. Ternovykh (2006), etc. The works of other scientists, A.F. Shishkin, O.Yu. Ageyeva, A.N. Mikhailov (2007), outline modern reproductive factors. These studies lead us to the conclusion that modern agricultural reproduction is not only a constantly resuming and repeating process of public production, but also connection of the system of factors and relations in agriculture.

Research Question

The agricultural reproduction problems have specific and common features. A. Smith (1776) invented a classic formula of income generation -- labour, land(rent) and capital. The issues of investment and return on investment appeared along with the appearance of accounting -- a double entry helped determine the presence of assets and their disposal, while effective operations were preconditioned by the sales of all goods and means of consumption. Consequently, continuation of entrepreneurship required replenishment of stock, resources and used production means (equipment) not only in strict quantitative, but also qualitative compliance with the period and time of activity. When deliberating on late production, K. Marx (1867) established relations between the implementation theory, national wealth and crises. As a result, he made conclusions about the continuity and constant resumption of production, the relationship between production and circulation. The reproduction process is realized in connection between reproduction of the social product, production forces and production relations. Technological development changes the ratio of the components – initially human labour was replaced with machines, while now production relations are robotized and “smartized”. The interrelation of production, distribution, exchange and consumption make the existing distribution proportions doubtful. Poor consumption is not so noticeable in industry, but in agriculture it means hunger – demand for food should be backed by money or excessive production is liquidated and destroyed. Replacement of human labour with robots releases a large number of people since conceptually the issue of distribution of the surplus produced by the robots has not been resolved. The pressing problem is falling effective demand for agricultural products and results of their processing. Some states use aquaculture and alternative food in the form of insects, larvae and embryos, but the population of the developed states is not yet ready

to reject massively the classic nutrition scheme and agricultural production. The modern economic trend is wide-scale sanctions, which diminishes the effectiveness of global labour division and questions state security. While considering reproduction, B.N. Dikaryov (2006) suggested augmenting K. Marx' interpretation by a fifth chain – resumption of reproduction as a system of relations of continuous process. They suggest inclusion of fertility and land quality, rural population as the production force and carriers of industrial relations in the relations. We think that inclusion of crop productivity and productivity of animals, aquaculture, as well as technological inventions in the use of biological resources is reasonable.

The special features of agrarian production include its seasonality, production technologies, industrial use of biological capital (table1), which transform into an array of financial factors. Both intensive and extensive efficiency growth of agriculture almost always increases the environmental load on the territory of food production, the anthropogenic impact.

Table 1: The effects of natural and technological factors on the processes of agricultural reproduction

Transformation of natural and technological reproduction factors into financial and economic factors	
Seasonality	Tough deadlines for investment, disinvestment and capital circulation beyond a financial year or exceeding it several times
Production technology	The discrepancy between the calendar, actual and weighted average production and commercial cycles
Special features of biological capital use	Stage-by-stage entry of capital elements into the reproduction process and its sprawl
Natural factors' impact	Unsustainability of financial results and reproduction volumes
	The multiplication effect of risks connected not only with the special features of biological capital use, but also with economic factors, which boost the negative effect of environment

Thus, seasonality of agricultural production means dependence of the time of operations, and, as a consequence, reproduction cycles on technological stages of production processes -- the need in fixed and working capital is spread throughout the year. Production technologies require timely material-intensive, fund-intensive and labor-intensive work within a short time, which means high capital concentration in some periods and its relative idling in the others. For example, harvesting lasts from a few days to several weeks, while machines are on the company's books for a whole year. Their absence can mean a crop loss or the impossibility of processing products. Biological capital in the form of plants and animals has special features of organization and reproduction -- apart from completing the production cycle there is an issue of sources and ways of its regeneration. Besides, scantiness or excess of natural factors (heat, precipitation, temperatures) devalue even highly effective expensive agricultural technologies. G. Lawrence (2017) points to the transformation of food distribution and redistribution models, which also influences agricultural reproduction processes. Production is redistributed, competition between exporters and importers of traditional, modernizing and industrial production systems grows. In its turn, there is transformation of rural territories' economies, says A. Dobeson (2018).

We do not deny the importance of each reproduction system element, but we conclude that a company as its central part is important. Business is a modern development basis for the territories –

analysis of statistics shows that creation of jobs and an increase of their number boost households' income, it is beneficial for the quality of life in such settlements. An agricultural company cannot be isolated from the environment. Consequently, we can conclude that the reproductive processes of a company, industry, a rural area, a state as well as human capital are all connected logically. The system of reproductive relations in a company should be considered as an isolated system (a collection of subsystems, subdivisions, business processes), and simultaneously as an element of a wider and bigger scale category.

Even when price growth for food products can be restricted, we cannot deny the importance of profitability of agricultural companies as a criterion of effectiveness of the aforementioned system of relations. Like we said earlier, provision of expanded production based on primary accumulation is important from an economic point of view. From the financing point of view, profit is the source of growth and development of a company, it concentrates the interests of all participants of social and agrarian relations. In a classic scheme of costs recovery, a company's revenue from the core activity of selling products and services is used to pay indirect taxes, salaries, to cover amortization and tangible costs, taxes attributed to the financial result, to pay dividends and replenish funds.

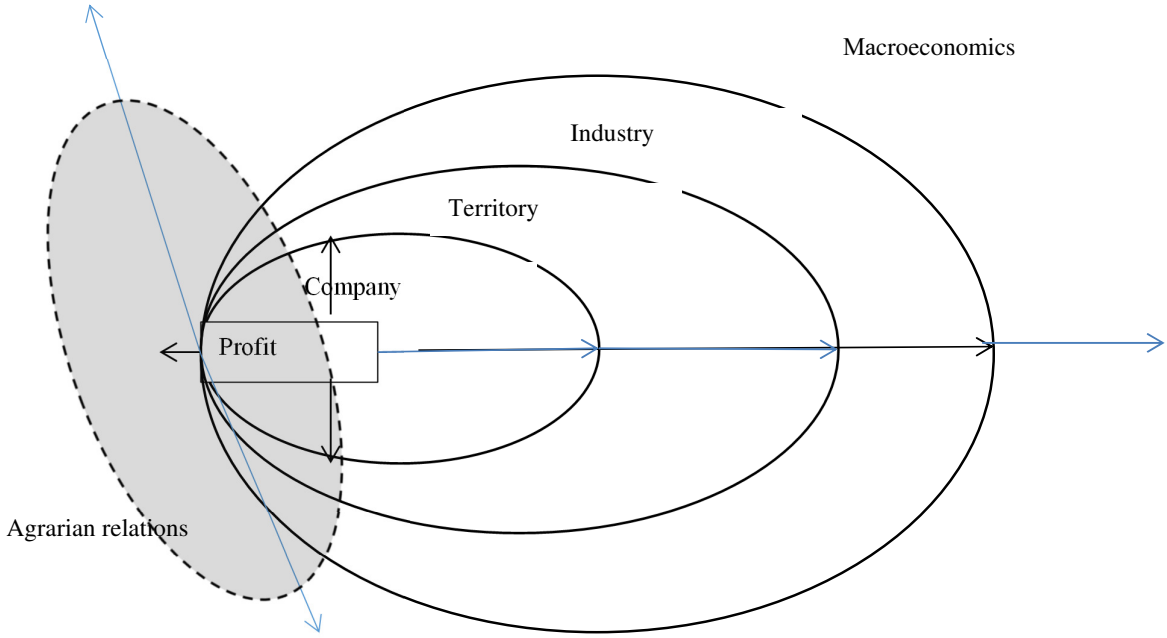

Fig. 1: The scheme of reproduction of an agrarian company in the system of agrarian relations

<table>
<tr><td colspan="9">Revenue from the sales of products, work and services</td></tr>
<tr><td colspan="6">Revenue from sales</td><td colspan="3">Indirect taxes</td></tr>
<tr><td rowspan="4">Tangible costs and amortization</td><td colspan="5">Gross profit</td><td rowspan="4">VAT</td><td rowspan="4">Excises</td><td rowspan="4">Other taxes</td></tr>
<tr><td rowspan="3">Salary and deductions</td><td colspan="3">Profit</td><td rowspan="3">Taxes attributed to the financial result</td></tr>
<tr><td colspan="2">Net profit</td><td rowspan="2">Profit tax</td></tr>
<tr><td>Dividends</td><td>Company funds</td></tr>
</table>

Fig. 2: Scheme of enterprise's cost recovery system

However, when revenue is insufficient, the risk for the owners in the form of dividend nonpayment, spending of commercial funds and shrinking property becomes evident. Companies cut costs to balance profit and costs, but this is not always effective and exacerbates the situation, worsens the

financial state of a company. In agriculture, it also disrupts not only capital reproduction, but also the system of agrarian relations, undermines the possibility of its recovery. The system of balancing the financial results relative to participants of public relations is shown in figure 3.

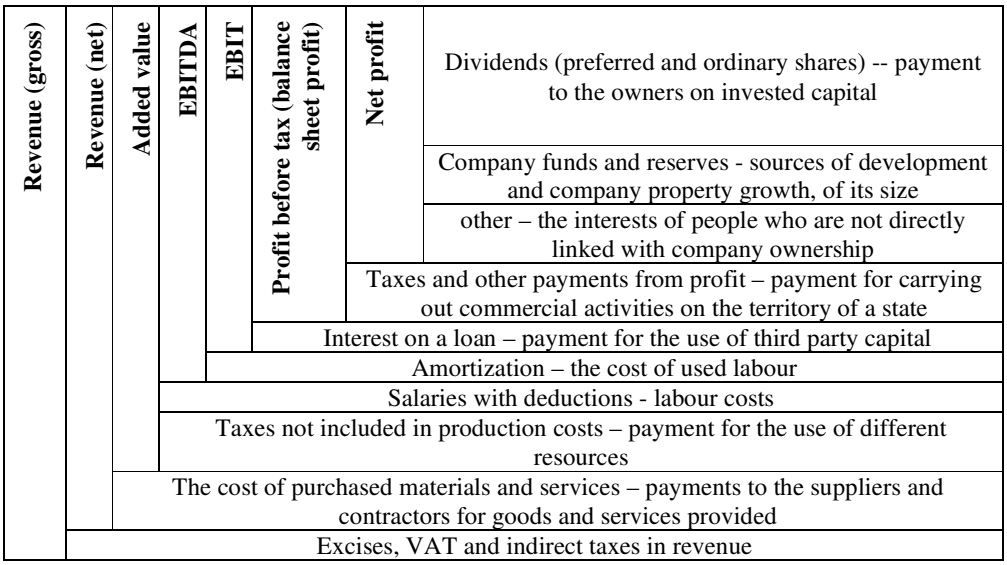

Fig. 3: A system of balancing financial results relative to the participants of public relations

We should note that cost cuts cannot be endless – there is a point where irreparable disruption of relationships occurs. The lack of funds leads to violation of production technologies, falling fertility, the loss of productiveness, yields, labour quality. Such a situation is unacceptable, but possible. We believe that in a market system the possibility of agricultural continuity and reproductivity can be manifested in the influence of macroeconomic regulation on the effectiveness of the sector's operations. State, regional and local support compensates the objective and subjective injustice of distribution processes in agriculture and boosts the effectiveness of the cost compensation system of a company, increase tax collection, expand operations. Subsidiary responsibility of different management levels helps solve the problem of rural areas development and boost the life quality of rural population. Table 2 reflects indicators of agriculture support in central Russia.

Table 2: State and regional support of farmers

Regions	Farm fields, thousand ha	Transfers to agricultural producers from the budget of a Russian Federation subject, mln rbl.	Total state support, mln rbl.	Gross agricultural product, mln rbl.	Tax collection to the budget from agricultur e, mln rbl
Belgorod region	1599.5	1 248	8 246	245147.1	5626442
Bryansk region	1143.3	617	9 811	86639.8	706996
Vladimir region	559.3	115	1 086	29100.9	2824505
Voronezh region	3026	1 710	10 315	200860.2	4013527

Ivanovo region	509	30	401	15094.6	192893
Kaluga region	871.5	624	3 204	41324.9	1959005
Kostroma region	542	46	321	16130.4	219414
Kursk region	1912	427	4 736	130371.0	2310728
Lipetsk region	1533.4	827	5 599	115268.9	2583332
Moscow region	1051.4	1 110	4 354	90623.5	13911404
Oryol region	1553.8	93 643	1 873	67185.8	1002113
Ryazan region	1474.9	411	2 389	51586.8	929298
Smolensk region	1216.2	107	928	23614.1	487878
Tambov region	2104.7	438	3 411	129849.4	Н/Д
Tver region	1356.7	232	1 788	37057.2	495053
Tula region	1451.1	322	1 326	61585.9	2460099
Yaroslavl region	725.4	230	898	32960.0	774095

Since agriculture is a strategically important economic sector, the Russian government has suggested measures of its full internal support. Despite an approved policy of import substitution, it is not always possible to cover the need of agricultural producers in production means as well agricultural goods' consumption at the national level. Practically each country is an importer of some type of food, machines, fertilizers, etc., thanks to population growth and the need of high-tech agricultural production. Consequently, a full reproduction cycle in one state is hardly possible. Since investment in digital infrastructure is mostly private, we can suppose that this tendency is of a strategic nature – a small number of companies can boast competitive advantages of innovations as the key strategic growth factor.

Discussion and Results

The need of theoretical and methodological development of agricultural reproduction is conditioned by the following.

First, an important trend of agriculture development is rising exports, which in future can threaten internal consumption. Low households' income means they are not ready to a price rise for food and agricultural raw materials for its production. Falling state support coupled with damping prices translate into the impossibility of full cost recovery, which means disruptions of reproduction processes. This dilemma requires close and comprehensive strategic assessment.

Second, our research demonstrates the importance of profitable operations of agricultural companies as a nucleus of reproductive relations system. The impossibility of endless balancing of financial results without the loss of quality of agrarian relations and productive potential requires close attention to the problem of state support. Lower state support strengthens objective and subjective contradictions and conflicts in agricultural production.

Third, support of agricultural companies has a multiplying effect both on the agricultural goods production and on the investment process. Higher investment in agriculture, in its turn, leads to expected growth of tax collection to the budgets of different levels.

Fourth, positioning of agriculture as the basis of food security restricts possibilities of the sector in receiving and boosting revenue, cultivates interest to exports of produced goods, which should be accounted for when developing strategic aims, goals and parameters.
The analysis of experts' assessments of Russian agricultural reproduction helped us formulate some recommendations for the development of this system in Russia aiming at solving the current problems.

1. The size of agricultural profit predetermines the possibility of break-even operations, self-sufficiency and self-financing, recovery of capital, productive forces and specific production potential of the sector;
2. At the moment the possibility of revenue growth on the back of production intensification and productivity and yields growth is practically exhausted, which drives us to the conclusion that maintaining profits is connected with tough cost cutting;
3. The possibility of agricultural companies' cost recovery is dwindling constantly, while falling state support exacerbates the negative influence of the factors. Between 2000 and 2018, the total number of agricultural organizations shrank by more than 80%, partially on the back of growth in the number of companies. Each fourth agricultural company is loss-making. In 2000, the highest profit was seen in plant-growing, currently the highest financial result is demonstrated by cattle-breeding. In the last three years, the agriculture products price index on the local market is below 100 % year-on-year, while annual price growth for consumed products ranges from 0.5 to 7.5% and more.
4. People employed in agriculture are most vulnerable as the agricultural processes become more efficient – at the moment employment does not exceed 3 people per 1,000 ha of agricultural land, between 2 and 8% of people are released annually. The absence of alternative employment in rural areas means disruption of reproduction processes of rural and adjacent areas.
This means that revenue is the key financial resource in the process of reproduction. If it is sufficient, contradictions of reproduction of agricultural processes are softened:

a) the employees have good salaries, which helps diminish the unfairness of invested labour and public appraisal of the results;
b) the owners receive expected dividends without hurting financing of the company and participants of reproductive relations;
c) the company participates in social programs and in the development of the territory, where it operates, pays stable taxes without the use of aggressive schemes of their optimization.

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Framework for Return to Work in Malaysia

YUEN Yee Yen, QUEK Meng Quan, Wendy TEOH Ming Yen and SUGANTHI Ramasamy

Faculty of Business, Multimedia University, Malaysia
yyyuen@mmu.edu.my

Abstract

This research is one of the pioneer study in Malaysia, which is conducted to propose a framework to overcome obstacles that limit persons with disabilities (PWDs) to return to work. This study is important to ensure that effective strategies can be drafted to help PWDs to return to work in both public and private sectors. This research is important as assisting PWDs to return to work will not only increasing PWD's income and quality of life, but also assist the employers and nations enhance the productivity and talent retention. This research applies systematic sampling approach to collect 300 questionnaire responses from PWDs who participated the return to work program to have a better understanding on the challenges faced by the PWDs to return to work.

Keywords: Return to Work, Framework, Persons with disabilities (PWDs).

Introduction

According to Department of Statistics Malaysia, 513,519 Malaysians had registered as persons with disabilities (PWDs) in 2019 (Department of Statistics Malaysia, 2019). PWDs make up of approximately 13% of the total population in Malaysia (Department of Statistics Malaysia, 2019). There are many challenges faced by PWDs in Malaysia, particularly, the return to work rate is relatively low and the unemployment rate is critically high (Islam, 2015).

In order to increase the return to work rate of PWDs, Malaysia Government has implemented the Persons with Disabilities Act 2008 (PWDA 2008) to protect the wellbeing of PWDs and assure PWDs being employed with equal basis as other citizens (Wahab & Jaafar, 2018). Malaysia Government has created rehabilitation center for PWDs to perform vocational and academic trainings for increase their return to work abilities (Lee, Abdullah, & See Ching Mey, 2011). Malaysia Government also encourages PWDs to return to work by implementing "One Percent Employment Policy" which target for at least 1% of the total workforce in public sector should be reserved for PWDs (The Sun Daily, 2015).

As of present, Malaysia is far from achieving the government's proposed target of one percent PWD in public workforce, with only 0.7% of PWDs returned to work in both public and private sectors (Loh, 2018). Social exclusion, discriminations such as lack of respect and being marginalized in all aspects of life hinder PWDs to return to work and leads to high unemployment, low income, and poor quality of life (Islam, 2015).

Many PWDs in Malaysia are still facing great challenges in returning to work due to the employers' lack of understanding on their actual needs and requirements and negative attitudes toward rehiring and retaining PWDs after occupational injuries (Narayanan, 2018). PWDs are generally perceived as weak, dependent, and incompetent, which make them far less likely to be hired and retained at workplace (Hwa & Ang, 2017). Currently, there is limited study in Malaysia that specifically focuses in examining key factors that hinder PWDs to return to work. Low return to work rate among PWDs in Malaysia is not well addressed with no holistic research framework on factors affecting return to work intention among PWDs in Malaysia.

This research is important as it aims to propose a holistic framework to overcome obstacles that hinder

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PWDs from return to work. A holistic return to work framework is crucial to enable effective strategies to be drafted to help PWDs to return to work in both public and private sectors. This research is important, as the return to work will not only increasing PWDs income and quality of life, but also assist employers and the nation to retain talented workforce.

Literature Review

Return to Work

PWDs who suffer from minor or severe degree of disability, which may lead to temporary absence from work due to their disability. Low return to work among PWDs is not only considered as the major burden for personal, but also it is also a big hurdle for family, financial, employers, government and economy. Cancelliere et al. (2016) discovered that nearly 600 million PWDs worldwide experienced low return to work. An estimated $28 billion of annual productivity losses was incurred from low return to work among PWDs. Total number of PWDs are increasing from year to year worldwide, lead to escalating challenges to return to work (Cancelliere, et al., 2016).

Since work is considered as an important and indispensable activity in human's life, which fulfils human's basic needs by generating income, provide opportunities for social interaction, and promote mental and physical well-being positively (Patterson, 2018), improving return to work will definitely enhance the life satisfaction and quality of life of PWDs (Patterson, 2018).

In Malaysia, there is a substantial gap between the goal of integrating PWDs into the labor force and their actual levels of return to work.

Emotion Barrier

Emotion barrier can be defined by innate and classically conditioned situations that present challenges to the return to work of PWDs (Izard, 2010). The impact of emotion on action, decision making, thinking, wellbeing, physical and mental health of PWDs has been affirmed by many psychological scientists (Izard, 2010). Functionally discrete emotion as sad, joy, interest, anger, low self-esteem, stress, shame, fear, guilt and anxiety may affect their chances of return to work (Murad, O'Brien, Farnworth, & Chien, 2013).

According to the previous research conducted by Eggert (2010), PWDs used to experience negative emotion such as stress, depression, fear of re-injury, and low self-esteem due to discrimination in the workplace, which may lower their intentions and chances to return to work (Eggert, 2010). Eggert (2010) suggested that PWDs experience emotional problems such as depression, and these emotional problems are significant barriers of return to work. The stronger the emotional barrier, the less likely for the PWDs to return to work. PWDs experience negative emotion such as anger due to the inability to perform daily activities and duties, and fear of being rejected from returning to work (Murad et al., 2013).

Behavior Barrier

Return to work can be determined by individual complex behavior barrier towards return to work. The behavior of the PWDs can be an important determinant of return to work since the ability to control their own actions and reactions are crucial in making decision of whether to return to work or continue absence from work (Yean, Johari, & Sukery, 2015).

Both employees and company stakeholders agree that the PWDs' reactions towards their current situations are important factors affecting return to work. For instance, some PWDs do not want to return to work due to refusing to communicating and interacting with the co-worker and refuse to make a move out of their comfort zone to adapt to the working environment (Ahlstrom, Hagberg, & Dellve, 2013).

Occupational Barrier

Occupational barrier refers to the lack of social support from workplace, which includes strong support from employer, manager, and colleagues and close relationship with employer, manager, and colleagues (Heimlich & Ardoin, 2008). Occupational barrier is one of the focal points in investigating the barriers and facilitators of return to work (Eggert, 2010).

Low or inadequate support from supervisors and colleagues will negatively affect return to work intentions of PWDs. A lack of colleagues' support on assigning modified or adjusted for PWDs is perceived as a main barrier for return to work (Yean, Johari, & Sukery, 2015). On top of that, the employer or manager also plays an important role in providing occupational support for PWDs to return to work. Ahlstrom, Hagberg, and Dellve (2013) proposed a positive association between supportive workplace and return to work intentions. PWDs with adequate occupational rehabilitation and supportive workplace environment are having better work ability and positive intention to return to work compared to those without proper occupational rehabilitation and support. Social support, feeling welcomed by colleagues and leadership support are important factors in influencing the outcomes of return to work (Ahlstrom, Hagberg, & Dellve, 2013; He et al., 2010).

Health Condition Barrier

Health condition barrier of PWDs will affect his or her ability to perform daily job-related tasks and activities (Patterson, 2018). Mental problem, work-disabling pain, and physical impairment will potentially influence the abilities of performing work and daily activity and reduce return to work intentions (Yean, Johari, & Sukery, 2015).

As discovered by Pflaum, McCollister, Strauss, Shavelle and DeVivo (2006), PWDs with spinal cord injury and less severe disability are more likely return to work after occupational injury than those with more severe disability. Physical impairment such as inability to walk would be disabling for construction job, but it is not disabling for office accounting job.

Furthermore, another research conducted by He, Hu, Yu, Gu and Liang (2010) also indicated that PWDs with less serious health conditions are more likely to perceive themselves as having better health status, leading to better return to work outcomes and shorter duration of absence from work.

Family Barrier

Lack of sympathy and caring from closed family members (such as parents, children, siblings and more) negatively affects the return to work decision of PWDs. Family plays an important role in encouraging and persuading employees to return to work (Ahlstrom, Hagberg, & Dellve, 2013).

Close family members have the potential to influence injured employee's decision on return to work through providing personal advice related to the financial status of the family. Family is one of the social interpersonal resources, which could influence the PWD's decision to return to work (Pflaum et al., 2006).

PWDs who are suffered from musculoskeletal injuries and disorder, are highly demotivated. Therefore, encouragement from family is an important motivator for them to return to work (Yean, Johari, & Sukery, 2015).

Methodology

As the objective of this study is to identify the barriers of return to work and develop a framework to enhance the return to work opportunities of PWDs in Malaysia, the sampling frame of this study should be focused on those PWDs who has prior working experience and would like to return to work after

losing their job.

The sample size for this study is 300. In the general calculation of sample size, with the population size of registered PWDs is 513,519, at a confidence level of 95%, the sample size of 300 is appropriate in proprosing a reliable and holistic return to work framework

For this research, 300 PWDs in central region of Malaysia were selected through systematic random sampling method. Structured survey questionnaires were conducted where survey questions were distributed to each and every of the selected PWDs to determine key factors affecting return to work before a framework can be built to guide relevant stakeholders in designing policies to recruit and attract PWDs from returning to work. The questionnaires were sent to 5 disability management expert panel reviews to confirm its face validity before the questionnaires were distributed

Results

Majority of the respondents (42.3%) earn an average monthly income of RM1001-RM2000 before they lose their previous job due to disability. 28.7% of the respondents earn an average monthly income of RM2001-RM3000 and 13.0% of them earn monthly income of RM3001-RM4000 before they lose their previous job due to disability.

Approximately 47.7% of the respondents have been hunting for the opportunity to return to work for more than 1 year. 24.3% of them are currently in the treatment and recovery process and they are keen to return to work as soon as possible.

Majority of the respondents have plans to return to work in future ($\bar{x}$ = 4.06 out of 5.00) and have strong determination to return to work despite various internet external constraints ($\bar{x}$ = 4.04 and 4.03 respectively).

Based on the responses of 300 respondents who suffer from occupational injuries, the following sustainable framework for return to work was developed. Emotion barrier, behavior barrier, occupational barrier, health barrier and family barrier are found have significant impact on return to work of PWDs.

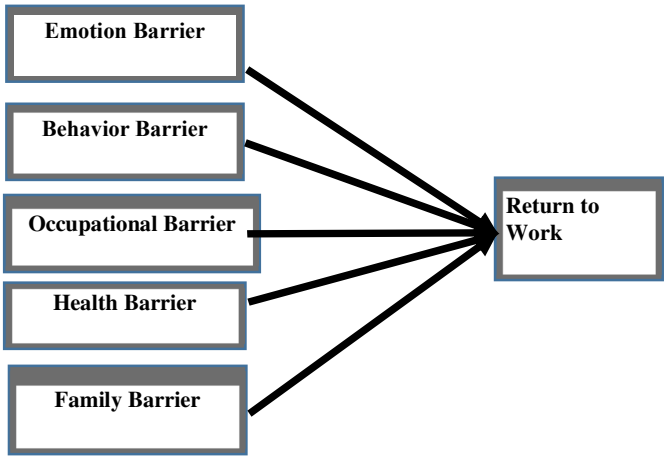

Figure 1: Return to Work Framework

Table 1 indicates the reliability test result for dependent (return to work) and independent variables (emotion barrier, behavior barrier, occupational barrier, health barrier and family barrier) in the proposed framework. The Cronbach's Alpha value for all the variables as shown in Table 1 acceptable

as it is more than the threshold value of 0.7. The result suggest that all the variables in the proposed framework are reliable in predicting return to work of PWDs in Malaysia.

Table 1: Reliability Score

Variables	Reliability
Emotion Barrier	0.866
Behavior Barrier	0.733
Occupational Barrier	0.858
Health Condition Barrier	0.639
Family Barrier	0.847
Return to Work	0.809

The return to work framework developed by this study is the pioneer holistic return to work framework in Malaysia based on the response of sizable 300 PWDs. This research framework is useful for government and private organization in enhancing successful employment of PWDs in public and private sectors. This newly developed framework can be used to enhance the understanding of the needs of PWDs to improve their return to work rate at public and private sectors and improve the quality of life and income of PWDs, which are mostly the low income B40 in Malaysia.

This is an important pioneer study in Malaysia that examine factors affecting return to work among PWDs. The finding has an important implication to Malaysia government as it assists Malaysia government to develop a more suitable job initiative and opportunity to promote higher rate of return to work among PWDs.

Acknowledgement

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Africa's Cybersecurity Posture:

The need for a Regional Cyber Security Capacity Assessment

Olatunji OSUNJI

Doctoral Student
School of Business and Technology Marymount University, Arlington United State.
1000 N Glebe Rd, Arlington, VA 22201
o0o34411@marymount.edu

Abstract

One of the strategies to lead the cause for a secured cyberspace within the private, public or at the national level is to have good visibility into the cybersecurity capacity of entities with the environment. The African Union Convention on Cyber Security and Personal Data Protection is an indication that African leaders has some initiatives to drive cybersecurity within the region, however without fully understanding the national level commitment and distribution of cybersecurity capacity within the region; it will be difficult to transition into a secure continent. Data triangulation of current cybersecurity posture of Africa from previous cybersecurity readiness and maturity assessment, journal articles, reports and websites relevant to cyber security situation in Africa was used to argue that Africa Union Commission does not have holistic visibility into the cyber security capacity posture of its member nations; and that this should be the first step in charting a way forward. The aim of this paper is to raise awareness within the leadership of Africa Union of the need to step up their cybersecurity effort of monitoring and oversight by empowering the newly constituted African Union Cybersecurity Expert Group to perform at full capacity and draw up a plan to perform a region wide cybersecurity capacity assessment. By working jointly with member nations and international community at the forefront of cybersecurity capacity building, the region will be able to build a more secure and resilient structure that will ensure the social-economic transformation that it desires.

Keywords: African Union Cybersecurity Expert Group, Cybersecurity, Cybersecurity Capacity Building, Cybersecurity posture.

Introduction

In the past two decades, the deployment of Information and Communication Technology (ICT) infrastructure in Africa has led to an explosion in the number of people with internet access – most of whom are first time users without a cybersecurity mindset. This experience has been referred to in some quarters as leapfrogging (Schia, 2016) and this internet exposure has created a form of vulnerability in cyberspace. In its 2013 research paper, TrendMicro, a global security firm reported that could become a safe harbor for cybercriminals within 3 years. Schia (2018) reported that developing countries have become safe haven for cyber criminals.

African Union (AU) is the Africa's continental body that's brings together the countries in the region, just like the European Union (EU) or Organization of America States (OAS). One of its aims is to promote peace, security, and stability on the continent [1]– a goal that is now been made complex by the increasing level of cybercrime and cyber-attacks. Effort to maintain peace, stability and security

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can be undermined by lack of visibility into the cybersecurity posture of the region. For that reason, it is essential for AU, to have a holistic understanding of the level of cyber security readiness and capacity of each member state. Not only does AU as a regional body need to lead the cause for a secure environment with cooperation from private, public and international organizations, the responsibility to have a good visibility into the cybersecurity capacity of entities with their domain also rest on it. In a recent publication by United Nations Institute for Disarmament Research (UNIDIR), it was stated that regional organisations are specially positioned to help member nations in developing cybersecurity capabilities (UNIDIR, 2019).

A top down approach to cybersecurity has always proven to be an ideal strategy to adopt. Intergovernmental organizations at the sub-regional level have developed some cyber security frameworks that could help combat cybercrime. Orji (2015) highlights some of such efforts: in 2011, a model Cybercrime Law was adopted by Common Market for Eastern and Southern Africa (COMESA), while the Economic Community of West African States (ECOWAS) adopted a directive on Fighting Cybercrime. The Southern African Development Community (SADC) also adopted a Model Law on Computer Crime and Cybercrime in 2012. Building on these sub-regional efforts, in June 2014, the AU Convention on Cyber Security and Personal Data Protection was adopted by Africa Union Commission (AUC).

Another aim of AU is to establish the necessary conditions which would enable the continent to play its rightful role in the global economy and in international negotiations, it is expected that this should include ensuring that the cyber security posture of the region no longer constitute a weakness within global cyberspace. Worldwide, research has shown that emerging economies are facing threats emanating from attacks on their critical infrastructure (White, 2014).

In addition to the efforts within the region, the international community has developed frameworks that can assist countries worldwide to assess their cybersecuirty standing in terms of readiness, capability or capacities. The International Telecommunication Union's (ITU) cyber readiness program, Global Cyber Security Capacity Centre's Capacity Maturity Model for Nations (CMM) and The Global Forum on Cyber Expertise (GFCE) are a few of these international initiatives. Several AU member states have participated or have been assessed on one or more of these, with the expectation that the result of such assessment would trigger a push to improving the security posture of such a nation. It appears this is coming at a very slow rate- as an example, only few member nations have ratified the AU Convention on Cyber Security and Personal Data Protection. While there are indications that the AU has some initiates to drive cybersecurity within the region, without fully understanding the level and distribution of cybersecurity capacity or incapacity within the region, it will be difficult to transition into a secure continent.

This paper argues that AUC does not have a holistic visibility into the cyber security posture of its member nations and that this should start with a thorough assessment of cyber capacity of member states. It aim to point out that AU needs not only have visibility into the regions cybersecurity capacity posture, but also lead the effort to ensure that member states take ownership of building necessary cybersecurity capacities. Triangulation of secondary data from current state of affairs of the region through the lens of ITU's cyber security readiness, available CMM assessment reports, journal articles, reports and websites relevant to cyber security situation in Africa was used in preparing this paper.

It recommends the taking of ownership of cyber security oversight of member nations of AU by empowering the newly formed African Union Cyber Security Expert Group to perform a cyber security capacity assessment of the region using CMM and also makes a case for AU to have a monitoring role on the regions cybersecurity capacity building effort.

This paper is divided into four sections. The first section which includes this introduction continues with a general background on Africa and AU. The second section will critically examine the cyber security efforts across the region with emphasis on AU's involvement or oversight. The third section examines how AU member states fairs with ITU cyber readiness program and CMM with some

comparison with Organization of American States' (OAS) efforts. This is then followed by recommendations and the conclusion.

An Overview of Africa

Africa is a continent comprising of 55 sovereign countries with a combined population of over 1.2 billion people. The United Nation estimate that Africa will account for more than 50% of the world population growth between now and 2050[2] and it is one of the fastest growing continents in terms of population, economy, global connectivity and digital transformation. The continent is comprised of five sub-regions, namely Central Africa, East Africa, North Africa, Southern Africa and West Africa. Each of these sub-regions has one or more intergovernmental organizations; Arab Maghreb Union (AMU) in North Africa, (excluding Egypt but including Morocco, which is not an AU member); Economic Community of West African States (ECOWAS) in West Africa; The Intergovernmental Authority on Development (IGAD) in Northeast Africa; Economic Community of Central African States (ECCAS) in Central Africa; and SADC in Southern Africa (Moller, 2009). All these sub-regional organizations play an active role in directing the cybersecurity situation of their member states.

At the regional level, the AU is the intergovernmental organization that unites each of these nations. It was officially launched in July 2002 in Durban, South Africa. Out of the 55 states in the regions, only Morocco is not part of AU. Within the last two decades, the continent has been a focus of both the developed nations and international development organizations like the International Monterey Fund (IMF), United Nations (UN) and World Bank (WB). The sustainable development goals of UN and WB's vision 2030 were both directed towards eradicating poverty in developing nations. As of year 2015, Africa had 27 out of the world's 28 poorest countries.[3]

The sustainable development goals of the UN have been underpinned by ICT and this has led to increase internet access and digital transformation across the region. A country's ICT infrastructure is also the foundation underpinning its digital economy. The dividend of digital transformation within the region is evidenced through improve economy, job creation and increase standard of living of the citizenry. In an effort to spread the benefit of digital dividend across the region, AUC led a multi-stakeholder process to develop a Digital Transformation Strategy (DTS) for Africa in 2019 - a vision to harness digital technologies and innovation to transform Africa's economies, societies, and governments to generate new economic growth, job creation, and poverty reduction (AU, 2019). It is expected that member states will adopt, promote and implement the DTS as the common digitalization strategy. This however is coming at a huge price to the global community as the lag between digital transformation and cyber security transformation within the region has continued to turn the region into a vulnerable zone.

Cyber Situation in Africa

The cyber situation in African is complex. On one side is the misuse of knowledge resulting in continual increase of cybercrime rate, with the region facing a cyber-crime cost of about US$3.5 billion a year (Serianu, 2017); on the other is the increasing misuse of power by government to control access to internet within their jurisdiction. Most African economies have become a fertile ground for cybercrime activities and cybercriminal (kshetri, 2019). The advantages that digitization has brought to the people of Africa through ecommerce, social media online education are obvious and this is been embraced eagerly without consideration for good cyber hygiene. Careless cybersecurity practices leads to vulnerable systems - for instance, it was reported that in 2010, 80% of PCs used in Africa were infected with viruses and malware (Gady, 2010). Cybercriminals often use these unprotected computers to launch cyber-attacks against targets all over the world. Some of the other issues identified as been responsible for increasing cyber-attacks in the continent as identified by Kritzinger and Solms (2012) are:

i. Low cybersecurity budgets which can be less than 1% in many organizations.
ii. Viewing cybersecurity as a luxury and not a necessity.

iii. Shortage of skill and awareness among internet users to protect themselves from rapidly evolving cyber-threats.
iv. Weak national legislation and law enforcement.

One of the debates in cyberspace running in parallel with issues around cybercrime is maintaining norms and governance of the internet. While countries like Russia and China are advocating for internet controlled by the state, United States and several western European countries advocate for an internet that is open and free. African nation has remained in a swing condition between these two factions. Several incidents of internet shutdown –either partially or fully, by Africa countries in recent times has continued to raise concern worldwide. Chad, Sudan, Mauritania, Ethiopia, Zimbabwe and Democratic Republic of Congo are a few of the African states that have all or part of their internet shutdown for at least a day within the last few years.

This situation has already prompted several African countries and the AU to begin carrying out initiatives at the national, sub-region and region levels to improve their cyber security posture. These efforts may have been silo across the continent as recent ITU report indicated low incident report rates and information sharing culture within the continent (ITU 2018). Kshetri (2019) stated that a lot of these efforts have been channelled toward improving cyber related regulations. The AU also acknowledge this by issuing a press release supporting that there is still an evident gap among AU member states in mitigate cyber threats.4

The reminder of this section will highlight a few initiatives at the regional level.

The AU Convention on Cyber Security and personal Data protection

AUC, with cooperation from United Nations Economic Commission for Africa drafted the AU Convention on Cyber Security and Personal Data Protection, which was adopted on 27th June 2014 (AU, 2014). This was after a call for review by civil society and academia over concerns relating to privacy rights, freedom of expression, small consultations scope, and the absence of some critical governance mechanisms (Orji, 2012). It is believed that the adoption of this convention will promote cyber stability in within the region.

With several national laws guiding Cybercrime, Privacy and Data Protection, Consumer Protection and Electronic Transaction across African nations, the AU Convention on Cyber Security and Personal Data Protection comes handy in harmonizing these laws. According to AUC, the convention imposes on member state the obligation to establish national legal, policy and institutional governance mechanisms on cyber security. However, Orji (2015), argued that the convention's framework is not sufficient enough for the much needed cooperation among member nations.

In a November 2016 joint report of the AUC and the security firm Symantec, only 11 African countries had specific laws and provisions in place to deal with cybercrime and electronic evidence (Symantec, 2016). Table 1 shows the status of African nations in respect to some cyber related legislations as of January 2020. [5]

Table 1: Status of cyber related legislations in Africa as of January 2020

Legislation	Status- Number of Countries			
	Available	Draft	None	No data
Cybercrime	28	11	15	0
Privacy and Data Protection	23	7	12	12
Consumer Protection	20	6	10	18
Electronic Transactions	32	10	4	8

Even though several of the nations have legislation on cybercrime and data protection as evident in table 1, without the ratification of AU convention by member nations, the synergy of these individual legislation and legal binding of the convention will be impossible. As of February, 2020 only 4 out of the required 15 member nations have ratified the convention (AU, 2020). It appears that AUC need to do more in the area of working with member nation to ratify the convention. It would be beneficial to the continent if AU leadership would take on the responsibility of engaging nations who have no legislation in place with a view of working with them to identify and resolve any challenges they have.

African Union Cyber security Expert Group

The creation of an Africa Cyber Security Collaboration and Coordination Committee was endorsed in January 2018, during the 32nd Ordinary Session of the Executive Council. This gave birth to African Union Cybersecurity Expert Group (AUCSEG) who has been specifically tasked with the following: [6]

i. Advising the African Union Commission (AUC) on cyber security issues and policies;
ii. Proposing solutions to facilitate the ratification and domestication of the Malabo Convention into national laws;
iii. Sharing best practice on how to mitigate current and new threats and on the protection of critical infrastructure and election systems as well ;
iv. Identification of research areas rewuired for policies, guidelines formulation.
v. Identifying ways to support the establishment and development of Computer Security Incident Response Teams (CSIRTs);
vi. Developing ways for close collaboration among AU Member States and stakeholders, on Cybersecurity;
vii. Proposing ways to build capacities and to increase skills in ICTs security and their proper use;
viii. Supporting AU on building African Position within the international process related to Cybersecurity including ways of cooperation with international stakeholders.

It is hoped that this group will channel the way forward for Africa in terms of cybersecurity challenges. If given the necessary resources, it can possibly transition to and be respected like the European Network and Information Security Agency (ENISA) – EU's Agency for Cybersecurity, whose responsibility include guiding and working with EU Members States and relevant stakeholders on ways to improve their cybersecurity capabilities. However, the terms of reference of the group raises some concerns. As an example, members will serves in voluntary capacity and on termed appointment.[7] This may impair the commitment of members, which can slow down progress.

Agenda 2063

With the realization that African needs to repositioning itself to becoming a dominant player in the global arena, leaders of AU started to priorities inclusive social and economic development, continental and regional integration, democratic governance and peace and security. In 2013, a fifty year agenda, tagged AGENDA 2063 was conceived (AU, 2015). According to AU, AGENDA 2063 is "*the continent's strategic framework that aims to deliver on its goal for inclusive and sustainable development and is a concrete manifestation of the pan-African drive for unity, self-determination, freedom, progress and collective prosperity pursued under Pan-Africanism and African Renaissance*" .[8] Among other things, the agenda identifies key Flagship Projects which can boost Africa's economic growth and development and lead to the rapid transformation of the continent. One of the flagship projects is cyber security. It's worth noting that cyber security was not initially included as one of the flagship projects as indicated by initial documents on AGENDA 2063.[9]

This reflects the lack of importance attached to cyber security at that level of AU regional governance. However, the decision to adopt Cyber Security as one of the flagship projects gives a clear indication that Africa leaders have acknowledge that in addition to incorporating development plans brought about by the rapid changes in emerging technologies, there is also need to ensure that

these technologies are used for the benefit of African individuals, institutions or nation states by ensuring data protection and safety online. The Cyber Security project will use the AU Convention on Cyber Security and Personal Data Protection as its bedrock. The first report on the Agenda's effort identified that in the area of cybersecurity, lack of budgetary resources is delaying the implementation of the cybersecurity initiates and that region plans to look more into the area of capacity building (AU, 2020)

International Cooperation

AU is a member of the Global Forum on Cyber Expertise (GFCE), which is a global platform for countries, international organizations and private companies to exchange best practices and expertise on cyber capacity building.[10] Members are encouraged to develop joint initiatives in cyber capacity building within the GFCE. In 2019, the GFCE Annual Meeting was hosted by the AU Commission with a focus to further strengthen the structure for international cooperation on cyber capacity building. This serves as an advantage for Africa and an opportunity for AUC to take up the leadership position by using their involvement in GFCE to ensure that all AU member states' national cyber security capacity status is known and improved on.

A capacity building workshop on cyber strategies, cyber legislation and setting up national Computer Emergency Response Team (CERT) was organized by AUC in collaboration with U.S. Department of State and Internet Society in 2018. The workshop was aimed at providing African experts with the appropriate cyber security knowledge to prepare and adopt national cyber security strategies and cyber legislations as well as the requirements for setting up and managing CERT.[11]

Africa Cyber Security Capacity Status

There have been several indices and frameworks within the international community to assist nations in knowing their cybersecurity posture and where they stand compare to other nations. This section takes a look at Africa's standing through the lens of three of them and the role of AUC in these efforts.

ITU Global Cybersecurity Index (GCI)

ITU's Global Cybersecurity Agenda (GCA) framework was launched in 2007, with the aim of enhancing international cooperation that will foster confidence and security in the information society. It attempts to measure the commitment of nations to building a secure cyber space through five strategic pillars: As stated by ITU, these pillars are represented in table 2.[12]

Table 2 : ITU Global Cybersecurity Agenda strategic pillars

Pillars	Measures
Legal	The existence of legal institutions and frameworks dealing with cyber security and cybercrime.
Technical	The existence of technical institutions and framework dealing with cyber security.
Organizational	The existence of policy coordination institutions and strategies.
Capacity building	The existence of research and development, education and Training programs, certified professionals and public sector agencies fostering capacity building
Cooperation	The existence of partnerships, cooperative frameworks and Information sharing networks.

Data are collected through online survey and used to produce a composite index refer to as The Global Cybersecurity Index (GCI). These five designated areas form the basis of the indicators for GCI because they shape the inherent building blocks of a national cybersecurity culture

According to ITU (2018), the main objectives of GCI include; the type, level and evolution over time of cybersecurity commitment in countries and relative to other countries; progress in cybersecurity commitment of all countries from a global perspective; progress in cybersecurity commitment from a regional perspective; the cybersecurity commitment divide (i.e. the difference between countries in terms of their level of engagement in cybersecurity initiatives). The entire framework solidifies ITU's role in building confidence and security in the use of information and communication technologies.

The GCI report is one of the indexes that provide a ground to compare the cyber culture and readiness of nations. In the 2018 GCI report, of the 44 ITU member states in Africa region, only 31 carried out the survey. Mauritius, Kenya and Egypt were among the top 50 countries globally with high commitment towards securing cyberspace. The report revealed that Africa lags behind other continents as it has more countries with low cybersecurity commitment.

This result is an eye opener for AUC to step in and engage each country in reaffirming their commitment to cybersecurity and developing a good cybersecurity culture, without which the dividend of digitization will be far fetch.

Cybersecurity Capacity Maturity Model for Nations (CMM)

The CMM was developed in 2014 by the Global Cyber Security Capacity Centre (GCSCC) of the University of Oxford. According to GCSCC, it "*facilitates a comprehensive understanding of effective and efficient national cybersecurity capacity and to enable policy makers to define priorities for capacity building and investments*". It is aimed to assist countries asses themself and based on post assessment recommendations; necessary actions are expected to be taken. As of January 2020, it has been deployed in over 80 nations - 22 are African nations.[13] The model benchmarks a country's across five dimensions of cybersecurity capacity: National Cybersecurity Policy and Strategy; Cyber Culture and Society, Cybersecurity Education, Training and Skills; Legal and Regulatory Frameworks; and Standards, Organization and Technologies. Within each dimension, there are factors, aspects, stages of maturity, and indicators of cybersecurity capacity (GCSCC, 2016). Each of these terms is defined as follows:

Factor: These gives a description of what it means to possess cybersecurity capacity. They are elements that contribute to the enhancement of cybersecurity capacity maturity. Most factors are made up of one or more aspects that structure

Aspect: This represents a smaller division of each factor. Each aspect is composed of a series of indicators within 5 stages of maturity.

Indicator: These are the building blocks which gives the specific stage of maturity within a distinct aspect, factor and dimension. In order to elevate a country's cybersecurity capacity maturity, all of the indicators within a particular stage will need to have been fulfilled. The country will either provide evidence of fulfilling the criteria or not.

Stage: Stages define to which degree a country has progressed in relation to a factor/aspect of cybersecurity capacity. There are 5 distinct stages of maturity that serve as a snapshot of existing cybersecurity capacity, from which a country can improve or decline depending on the actions taken (or inaction). These stages are:

a. Start-up: There is no evidence of cybersecurity maturity or it's at its infancy.
b. Formative: Evidence of activity of some of the aspect can be clearly provided, although this may be ad-hoc or poorly defined.

c. Established: Constituent of this aspect is in place, and working, however the allocation of resources toward cybersecurity is not mature.
d. Strategic: Distinction and choices have been in prioritizing aspect of CMM for the countries depending on the national situation
e. Dynamic: This stage indicates that there is clear framework to adjust to prevailing cybersecurity situations with dynamic reallocation of resources when needed.

Out of 54 nations within the region, only 22 had participated in the CMM review process as of January, 2020, 5 of which have their results published and available online. The publishing of report is at the discretion of the nation assessed. However, if AU had been involve in the assessment or initiate its conduct, just like OAS did in partner with Inter-America Development Bank (IDB, 2016), AU would have access to the results and have visibility into the security landscape of the region. OAS, with cooperation IDB, took ownership of the task to conduct CMM assessment of America regions which gave them insight into each countries cyber security posture. In addition, If AUC has visibility into each member state's result; it will give them a clear view of how they can assist member nations and areas to concentrate cyber security building.

The conduct of the Latin America and the Caribbean (LAC) CMM assessment, championed by OAS and IDB allows for same process and methodology throughout the review process. Meanwhile, the 22 African nations completed were reviewed by one or more international development organizations or national body from 6 different organizations - Commonwealth Telecommunications Organization (CTO), GCSCC, German development agency (GIZ), ITU, Norwegian Institute of International Affairs (NUPI) and World Bank (WB). AU was not involved in any of these in any significant capacity and the methodology may have been slightly different from nations to nation because of the number of reviewing bodies.

In addition, it took four years (between 2015 and 2019) to assess less than half of African nations – same assessment was done within a year for all LAC countries (2015-2016). A reassessment of LAC region has been completed and the report of progress made and areas needing attention were made publicly available in a report (IDB, 2020). OAS, with support from IDB took the initiative and ownership of the process and ensured that the cybersecurity status of their member states was known. AU leadership should follow suite and take ownership of this process. Table 3 shows the list of African nations that have been assessed or working towards assessment as of January 2020.

Table 3: African Nations that has been assessed or preparing for CMM assessment

COUNTRY	ASSESSING ORGANISATION	YEAR	REPORT
Malawi	CTO		
Mozambique	CTO		
Rwanda	CTO		
Tanzania	CTO		
Eswatini	CTO/ITU		
Nigeria	GCSCC	2019	
Uganda	GCSCC	2015	Available
Tunisia	GCSCC/GIZ	2019	
Madagascar	GCSCC/ITU	2016	Available
Sierra Leone	GCSCC/ITU	2016	Available
Senegal	GCSCC/NL	2016	Available
Ghana	GCSCC/NUPI/WB	2018	
The Gambia	GCSCC/WB	2018	Available
Botswana	WB	2019	
Burkina Faso	WB	2019	

Cape Verde	WB	2019	
Ivory Coast	WB	2019	
Namibia	WB	2019	
Niger	WB	2019	
Zambia	WB	2017	
Lesotho	WB/GCSCC	2019	
Mauritius	WB/GCSCC	2019	

Recommendation

Africa is diverse in culture, faith, technology development and social economic and political factors; hence it is obvious that there is no same solution fits all in this region. The establishment of AUCSEG is timely and AU should leverage on such committee to gain insight into the region posture by:

1. The committee should transition into an agency like ENISA and participation should not be voluntary nor based on termed appointment. This will ensure more commitment on the part of members or employees of such agency.
2. The agency should be backed up by necessary policies to drive their initiatives. In order for the group to meet its set goals, it is of necessity to start with a baseline of the current cybersecurity landscape of the continent. ITU's cyber readiness index and the Cybersecurity Capability Maturity Model developed by GCSSC are good frameworks to start assessing countries security preparedness. If given the necessary resources, it can become reputable like ENISA.
3. AUCSEG should develop the necessary capability in house to perform these assessments and be able to take ownership by conducting it in all Africa nations. It should take the leading step and collaborate with other developmental organization and institutions like GCSSC, WBG and ITU to drive the implementation of CMM. A current profile should be developed for each country and a target profile determine based on each countries social economic and political situations. The target profile is the higher level of cyber security capacity that individual country would set as goals to attain within a set period of time, bearing in mind that capacity building takes time and involve capital.
4. There should be leadership effort from AU for a coordinated, multi-stakeholder effort to countering cyber threats in the continent and this should complement the silo works that each member nation is doing across the continent.

Conclusion

Amidst several other initiatives, the commitment of AU to fighting cybercrime and maintaining security and peace within the continent have been reaffirmed through adoption of the AU convention on cyber security and personal data protection, prioritizing cybersecurity as one of the pillars of agenda 2063, becoming a member of GFCE and establishing of AUCSEG. However, the issue at hand is beyond coming up with an agenda or convention, without a way to enforce and monitor. You can only monitor what you have visibility into.

AU, through AUCSEG should be centrally engaged with issues of cybersecurity and cybercrime by having a holistic view of the cyber landscape and channelling directions for nations to take. The approach should be to take ownership and build a profile for each country through assessment using the CMM. This effort should be done alongside the countries.

Future work will be to examine the challenges facing capacity building in Africa nations and explore how CMM can be adapted as a tool to achieving Africa's vision - Agenda 2063 and DTS. This work will be based on data and interviews to be conducted within and outside of the continent.

Note

[1] See https://au.int/en/overview#:~:text=The%20African%20Union%20(AU)%20was,to%20build%20on%20its% 20work.

[2] See https://www.un.org/en/sections/issues-depth/population/index.html#:~:text=Africa%3A%20fastest%20growing%20continent,population%20growth%20among%20major%20areas.

[3] See https://www.worldbank.org/en/news/feature/2018/12/21/year-in-review-2018-in-14-charts

[4] See https://au.int/en/pressreleases/20191212/african-union-cybersecurity-expert-group-holds-its-first-inaugural-meeting

[5] See https://unctad.org/en/Pages/DTL/STI_and_ICTs/ICT4D-Legislation/eCom-Data-Protection-Laws.aspx

[6] See iv above

[7] See https://au.int/sites/default/files/announcements/34922-annc-au_cyber_security_expertgroup_tors.pdf

[8] See https://au.int/en/agenda2063/overview

[9] See https://au.int/sites/default/files/documents/33126-doc-01_background_note.pdf

[10] See https://www.thegfce.com/

[11] See https://au.int/en/pressreleases/20180723/workshop-au-member-states-cyber-strategy-cyber-legislation-and-setting-certs

[12] See https://www.itu.int/en/action/cybersecurity/Pages/gca.aspx

[13] See https://gcscc.web.ox.ac.uk/cmm-reviews

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Organizational Culture in Virtual Structures: Mechanisms of Consistent Collaboration

Marcin FLIEGER
Department of Management, General Tadeusz Kościuszko Military University of Land Forces, Poland
E-mail: marcin.flieger@awl.edu.pl

Michał FLIEGER
Department of Law and Administration, Adam Mickiewicz University, Poland
E-mail: m.flieger@wp.pl

Ilhan TARIMER
Department of Technology, Muğla Sıtkı Koçman University, Turkey
E-mail: itarimer@mu.edu.tr

Abstract

This paper investigates the issue of mechanisms which support the increase in efficiency of collaboration in virtual organizations. Conceptual development and positioning of the research aim at providing a generalizable contribution to management practice, at the same time being accessible to practitioners. The authors focused on working out a pattern for creating mechanisms that allow members of virtual structures to adjust to the organizational-culture-conditioned ways other partners operate. The analysis contributed to the consistency concept which stems from the theory of systems. The practical aspect of the study was presented within multiple case studies, on the example of Turkish organizations. Case studies present a template which serves as a tool for practitioners who exploit network relations and virtual structures.

Keywords: Organizational Culture, Virtual Structures, Collaboration Mechanisms, Consistency Concept

Introduction

In the last two decades the organizational environment has undergone substantial transformation and the key role is played by multi-directional co-dependence of business partners (Mayne et al., 2003; Sakai and Kang, 2000). It results in taking a network collaboration approach (Kickert et al., 1997). The theory of network abandoned an atomic approach to explain reality in favour of a holistic perspective. Thus, a network may be perceived as a collection of long-term, formal and informal, direct or indirect relations between two or more units (Håkansson and Snehota, 1989; Newman et al., 2004; Camagni, 1995; Kilduff and Tsai, 2003; Edelenbos and Klijn, 2007).

The network itself becomes a fundament for development of virtual organizations. Nowadays, cross-border virtual teams are perceived as a valuable source for knowledge creation (Toivanen, 2017). However, the integrator of a virtual organization faces the problem of harmonizing collaboration between partners (Flieger, 2017). Undisputedly, one of the crucial factors influencing effective relations between firms which often operate in different parts of the world is an organizational culture (Wu and Ma, 2018; Peretz et al., 2017). The integrator needs to be aware of cultural differences and similarities, and must know how to adjust to them in order to ensure long-term, effective network collaboration (Stocker et al., 2017). Essential becomes the ability to create such a process of cooperation and communication that will be understood by all concerned (Vetrakova and Smerek, 2016). Such knowledge is needed also for workers at lower levels of an organizational hierarchy, since they are the ones who have a direct contact with other knot groups (e.g. suppliers or internal clients).

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According to the consistency concept, an organization needs to harmonize three basic levels of management – strategic, tactic and operational. They create a natural hierarchy in which lower levels are conditioned by higher ones. Understanding of these relations and conditions become especially important in case of inter-organizational networks. Such virtual structures consist of organizations operating in different parts of the globe, which results in different approaches to implementation of mechanisms that are aimed to ensure optimal efficiency. In this context, one of the basic issues are cultural differences.

The analysis presented in the paper provides both theoretical and practical contribution. The authors concentrated on depicting a concise theoretical construct which allowed integration of a consistency concept and organizational culture in network collaboration. It is a new perspective which led to the conceptualization of a pattern of working out consistency mechanisms. This theoretical background serves as a template for practical use by managers. It shows what mechanisms and in what way should be implemented in order to allow members of virtual structures to adjust to the organizational-culture-conditioned ways other partners operate.

Thus, the authors made an attempt to answer the research question: what is the pattern of adjusting to organizational culture in virtual structures in order to ensure consistent collaboration? Identifying this pattern and consistency mechanisms constitutes the main objective of the paper. Understanding of this phenomenon serves as an extremely important contribution to the knowledge concerning proper development of relations between partners in virtual structures and, consequently, an increase in efficiency of the process of creating common value.

Consistency Concept

The theoretical contribution of the study refers to conceptualizing a construct which allows integration of a consistency concept and organizational culture in network collaboration. Consistency concept has its roots in the theory of systems (Churchman, 1971; Bertalanffy, 1969). It has a crucial importance when it comes to organizational harmonization and optimization, which is the essence of consistency. Optimizing an organization by implementing changes requires treating it as one system and looking in different directions, which means detecting possible effects of the changes in various area and dimensions of an organization. Possible effects may appear also in the areas which are very distant from one another (Haken, 1983; Miller and Page, 2007).

In order to make the concept useful for managers, we need to identify key areas that may undergo changes and explain interactions between them. In this way it will be possible to identify how some changes implemented in one area influence other areas. Further, that leads to identification of the process of harmonizing, adjusting and consistency building among different organizational areas. As a consequence, it becomes possible to implement the consistency concept in practice and increase organizational effectiveness.

Consistency Platforms

Theory of systems allows looking at an organization from the perspective of systems, subsystems and metasystems. Thus, systems consist of subsystems, but at the same time systems are the parts of metasystems (Parsons, 1951; Luhmann, 2013). This idea lays at the heart of the consistency concept. It refers to three consistency platforms. Each of them ought to create a consistent system and when this requirement is met, all the elements of each platform are harmonized and consistent (Table 1).

Table 1: General approach for organizations' consistency analysis

Consistency perspective 1	Consistency platform 1	Subsystem 1
		Subsystem n
	Consistency platform n	Subsystem 1
		Subsystem n
Consistency perspective 2	Consistency platform 1	Subsystem 1
		Subsystem n
	Consistency platform n	Subsystem 1
		Subsystem n

Source: own study

The first platform refers to the concepts and methods of management. In both theory and practice of management these two elements logically complement each other. Implementation of one concept triggers off the need to introduce other concepts, so that the first one is complementarily supported. Furthermore, implementation of management concepts creates the need to implement management methods which stem from the concepts in question. Accordingly, platform two consists of two key elements – organizational structure and appropriate style and mechanisms of management – and the third platform refers to human resource management.

Research Approach and Methods

Taking into consideration the objective of the paper and the character of analysed phenomena, the authors adopted methodology of an inter-subjective paradigm, within which they used an idiographic approach which allowed analysing a concrete phenomenon in its context. The research was carried out using the method of a multiple case study (Yin, 2014), following its methodological rigor (Eisenhardt, 1991). The choice of the method is a result of set research objectives and the stage of knowledge development in the investigated research area. Operating of virtual structures still is a relatively new phenomenon. It develops in a very dynamic way and is conditioned by numerous variables. There is a need for a thorough examination which would allow formulating propositions of patterns and development of the phenomenon in question. Therefore, the presented research is interpretative (Eisenhardt and Graebner, 2007) and it leads to in-depth understanding of the phenomenon in some particular context.

During the research the authors worked out a pattern for creating consistency mechanisms. Firstly, they identified organizational culture of Turkish organizations: the levels of language, behavior and infrastructure artefacts, norms, values and cultural traits were examined and their characteristics identified. Such an approach to the research allowed providing results which can become a significant help for organizations which plan to cooperate with foreign partners to adjust to the organizational culture. To make this adjustment effective, the authors worked out the examples of consistency mechanisms, which are presented further in the paper. The mechanisms are based on the organizational culture characteristics collected during the research.

Scrutiny within multiple case study was carried out in two stages: within-case analysis and cross-case analysis. Following the replication logic, case studies constituted a series of independent research which provided data corresponding with the research questions. Outcome of each individual case study was a base for cross-case comparisons with results of other cases. It allowed theoretical generalizations concerning the pattern of identifying collaboration mechanisms.

The paper presents results of 22 case studies. The key criterion of choice was the variety of cases (Flyvbjerg, 2012) – the organizations were chosen in the way which made the research group differential. It included different public organizations, but also private firms from a production and service sector. The companies belonged to different trades and they were of a different size. Such a variety of the research group allowed giving a very realistic perspective on the characteristics of Turkish organizational culture. The access to crucial data constituted additional criterion. It referred

to the possibility of carrying out in-depth interviews with managers and regular workers. Moreover, it ought to be emphasized that it was a very deliberate decision to use a territorial limitation (in this case to the city and province of Muğla). It allowed very precise identification of organizational culture which developed in a particular region. Such an approach corresponds with the needs of organizations which develop collaboration with foreign partners – very often they expect to identify cultural conditions not so much of some country, but rather of a specific region (or regions) in which they operate. It constitutes another strong reason for using a case study method rather than quantitative ones.

Eight of research cases were public organizations and fourteen represented a private sector. Public institutions consisted of university units and health institutions in the city of Muğla. As for the private sector, they were small and medium size entrepreneurships operating in the city of Muğla. Eight of the companies were from a service sector and the rest of them were production companies. The in depth interview was conducted among the total of 78 workers from different levels of organizations' structure, but most of them were lower-level (production) workers. 26 respondents were managers of different levels.

At this point it is crucial to emphasize that the authors did not aim at statistical generalization, but rather understanding, depicting and synthesizing. They made an attempt to understand the reasons and ways of creating strategy and organizational (virtual) structure (Remenyi et al., 2005). They focused not only on repetitive, but also contextual relations between elements of environment. Such an approach allowed capturing experiences of the research group and their interpretation, and complex understanding of the analysed phenomena.

The in-depth interviews were conducted in November and December 2019, supported by a questionnaire which included mostly open questions. The data was coded according to adopted conceptual frames (*a priori* codes) (Miles and Huberman, 2000). Collected answers were grouped, so that it was possible to establish how often a given characteristic was mentioned by the respondents. Then, the crucial artefacts in each group were identified using statistical calculation. For each group the authors calculated the third quartile (Q3). The artefacts which were included in the third quartile constituted the base for working out the consistency mechanisms.

Results and Discussion

Elements of Organizational Culture

The first stage of the research aimed at identifying all elements of organizational culture of Turkish organizations. Each kind of artefacts (language, behavioral, material, norms, values, standards and cultural traits) was analyzed separately and presented in tables 2-6. Each table shows assessment made by members of both public and private organizations.

As presented in table 2, views regarding crucial language artefacts appeared to be very similar. Both groups of respondents stressed importance of verbal communication and face to face contacts. Moreover, there is a clear expectation and openness to exploit new communication technologies. Both kind of organizations prefer using Turkish language, but public organizations also exploit English. In private organizations it is common to use technical language.

Table 2: Language artefacts

Artefacts	Members of public organizations	Members of private organizations
Verbal communication	**32**	**39**
E-mail, Whatsapp and other communicators used	25	18
Traditional phones communication	25	22
Written communication (letters)	17	8
Face to face contacts	**26**	**24**
Body language	9	12
Support and assistance while communicating	9	6
Openness to use/learn new technologies in communication process	**39**	**26**
Confidentiality of communication	13	20
Official way of communicating	20	3
Semi-official and friendly communication	15	18
Meeting presentations	5	2
Bureaucracy in communication process	18	2
Preferring using Turkish language	**31**	**24**
English use	**33**	5
Turkish dialects/slang use	13	14
Office-based, specific language	2	16
Technical language	17	**34**

Source: own study

As for another artefacts, the answers differ substantially. In case of behavioural artefacts, in public organizations dominate official behaviour, bureaucracy and objectives oriented attitude, whereas private organizations stressed rather less official behaviour, team work and task responsibility (table 3). Regarding material artefacts (table 4), representatives of public institutions emphasized importance of rather official dressing and proper interior design. The latter feature was also highlighted by private firms, but it was accompanied by efficient use of technological devices and exploitation of internal communication systems.

Table 3: Behavioural artefacts

Artefacts	Members of public organizations	Members of private organizations
Official behaviour	**28**	17
Semi-official behaviour	10	**39**
Respectful, professional behaviour	17	13
Official manager-employee relations	18	9
Non-official attitude to colleagues	15	**25**
Tolerance to different behaviours	9	8
Strict rules in behaviours	15	18
Helpful behaviours	18	14
Behaviours regulated in organizations	21	13
Bureaucratic	**26**	8
Disciplined	13	18
Positive attitude	**22**	8
Humble and honest attitude	12	6
Behaviours based on task responsibility	16	**25**
Objectives orientation	**27**	19
Team work importance	16	**25**

Source: own study

Table 4: Material artefacts

Artefacts	Members of public organizations	Members of private organizations
Internal communication systems	12	**26**
Grouped and easily reached technical equipment	12	20
Efficient use of technological devices	14	**32**
Semi-official dressing	**22**	24
Official dressing	**38**	2
Dress code implemented	16	22
Work comfort dominates dressing style	17	19
Importance/originality of institutional interior design	**18**	**28**
Care of infrastructure	14	22

Source: own study

Concerning dominating norms, standards and values, in both kinds of scrutinized organizations serious attitude to work and expectation of continuity of relations were picked (table 5). However, in public units also honour and sense of stability is important, whereas private firms underlined some aspects of time management. Finally, in case of cultural traits, public organizations emphasized hard

work, respect, tolerance, information sharing and loyalty to work-place. The latter one was also highlighted by private companies, but it was accompanied by IT orientation, expectation of job satisfaction and financial benefits (table 6).

Table 5: Norms, standards and values

Artefacts	**Members of public organizations**	**Members of private organizations**
Pragmatism	9	12
Time/deadlines respected	13	**26**
In daily routines 'just in time' attitude	12	**25**
Serious attitude to work	**19**	**23**
Importance of ethics	18	20
Team-spirit	16	21
Respect to mission and vision of institution	14	11
Work highly valued by employees	15	18
Love and sincerity	17	10
Hospitality	17	14
Honour	**25**	16
Stability	**19**	14
Continuity of contacts and relations	**26**	**23**

Source: own study

Table 6: Cultural traits

Artefacts	**Members of public organizations**	**Members of private organizations**
Hardworking	**26**	19
Efficiency at work	22	18
Information sharing	**24**	14
IT orientation	13	**23**
Collaboration/ team work	19	14
Job satisfaction	9	**22**
The will to get rich	3	**37**
Loyalty to work-place	**24**	**22**
Loyalty to other employees	11	18
Collaboration in harmony and order	16	13
Respectful and tolerant attitude	**26**	7
Helpful to other workers/partners	16	19
Openness for collaboration with foreigners	15	18

Source: own study

Collaboration Mechanisms for Consistency

Having established the characteristics of organizational culture for Turkish public and private entities, it was possible to work out the mechanisms for consistent cooperation. Below, we present the main characteristics divided according to the organizational culture levels. The analysis was done separately for public and private organizations. Each characteristic corresponds with dedicated mechanisms. What is crucial, the mechanisms created by the authors are just examples - they are supposed to help and encourage managers create their own collaboration mechanisms according to the situation they are in.

Language Consistency

As we can notice in table 7, Turkish public and private organizations are quite similar as for language artefacts and so they require implementing similar consistency mechanisms. It is important to put an emphasis on personal contacts and direct, verbal communication. İt is crucial when starting collaboration with Turkish organizations, but also when the relations develop. Face to face communication is important, so it is necessary to pay regular visits to Turkish partners. İf it is not possible (for instance because of a geographical distance), the Internet tools should be used, so that Turkish partners could see the face of the person they speak to. This way personal, friendly relations develop and the trust between partners is built. Moreover, when employees speak English, they perceive it as an opportunity to practice and develop language skills. Therefore, this aspect of cooperation also should be taken into consideration.

Table 7: Language artefacts characteristic for Turkish public and private organizations and dedicated cooperation mechanisms

	Language artefact for public organizations	**Cooperation mechanisms**
1	Verbal communication	Using phones and other IT communicators allowing direct contacts with Turkish partners; direct negotiating of crucial cooperation terms; verbal confirmation of cooperation terms before formal documents are prepared
2	Face to face contacts	Personal visits in Turkish companies when starting cooperation and then in ongoing contacts; using modern Internet tools allowing face to face conversations; using face to face contacts to strengthen verbal communication; working out friendly relationships based on personal contacts
3	Openness to use/learn new technologies in communication process	Introducing new Internet tools for mutual communication; personal training for Turkish employees concerning the use of new communication tools
4	Preferring using Turkish language	Verbal communication with native translators; written communication in Turkish language;
5	English use	If possible, using English in verbal and written communication (when Turkish employees speak English)
	Language artefacts for private organizations	**Cooperation mechanisms**
1	All the above – see public sector section	As in public sector section
2	Technical language	When the trade requires using Turkish and English technical vocabulary

Source: Own study

Behaviour Consistency

As shown in table 8, regarding behavioural artefacts the mechanisms of cooperation with Turkish public and private organizations are different. Public organizations are more formal, there is a need to follow strict rules and codes, and there is a very little space for informal relations. In a private sector the situation is less formal, it is possible to organize informal meetings outside the company and it is important to pay attention to integration of cooperating partners. İn this case friendly atmosphere helps reaching business objectives.

Table 8: Behaviour artefacts characteristic for Turkish public and private organizations and dedicated cooperation mechanisms

	Behaviour artefact for public organizations	**Cooperation mechanisms**
1	Official behaviour	Organizational code necessary to be followed; formal meetings with managers and workers; formal body language
2	Bureaucratic	Recognizing formal requirements and rules; following formal procedures; making sure all formal requirements are met; preparing to take time when cooperating
3	Positive attitude	Following rules and meeting formal requirements with enthusiasm and patience; being nice and helpful to Turkish workers when following procedures
4	Objectives orientation	Concentrating on meeting requirements and following rules and regulations when cooperating
	Behaviour artefacts for private organizations	**Cooperation mechanisms**
1	Semi-official behaviour	Private meetings outside company; company integration meetings; codes less important to follow
2	Non-official attitude to colleagues	Making friends with Turkish partners allowing informal contacts; creating informal atmosphere in mutual relations; close relations with cooperating workers from different countries
3	Behaviours based on task responsibility	Focusing on objectives to be met; discussing business matters first; paying attention to organizational profits; possible to rely on Turkish partners when reaching objectives
4	Team work importance	Creating teams when cooperating; integrating cooperating workers and companies; various forms of formal and informal integration

Source: Own study

Infrastructure consistency

The research results from table 9 show that there are some substantial differences when we take into consideration material artefacts' importance for public and private organizations. In a public sector it is important to be dressed rather formally, according to a dress code. However, in a private sector material artefacts are mostly connected with the IT systems and devices the companies implement and use on daily basis. Thus, foreign partners need to adjust to the systems, so that the communication process is effective. İn both cases (public and private) the design of office space is important and often it reflects Turkish culture. Thus, other members of an inter-organizational network ought to acknowledge and respect this aspect of relations.

Table 9: Material artefacts characteristic for Turkish public and private organizations and dedicated cooperation mechanisms

	Material artefacts for public organizations	**Cooperation mechanisms**
1	Semi-official dressing	Dressing less officially in routine contacts; less formal way of dressing when meeting the same level co-workers
2	Official dressing	Dressing in an official way when relations are initiated and when official meetings are held; dressing officially when meeting higher level managers
3	Importance/originality of institutional interior design	Respecting originality of interior corresponding with Turkish culture
	Material artefacts for private organizations	**Cooperation mechanisms**
1	Internal communication systems	Effective use of internal communication with the use of IT tools; using electronic documents and signatures; necessity to get familiar with IT applications in communication systems
2	Efficient use of technological devices	Necessary to get familiar with technological devices and adjust to the technological requirements; using new technological solutions during cooperation
3	Importance/originality of institutional interior design	As in public organizations section

Source: Own study

Norms and values consistency

With regard to norms and values, first of all it is necessary to respect workers and the rules they follow in everyday routine. Partners ought to respect Turkish customs and culture, and avoid open criticism. İt is also very important to focus on long-term relations by setting common strategic goals. Generally, it is useful to show that we want to get engaged in the cooperation process seriously and for a long period of time. All the actions which express such intentions may be implemented, which gives foreign managers a possibility to be creative in this process.

Table 10: Norms and values characteristic for Turkish public and private organizations and dedicated cooperation mechanisms

	Dominating norms and values in public sector	**Cooperation mechanisms**
1	Serious attitude to work	Following formal procedures; showing respect and understanding towards procedures and local customs; helping in fulfilling legal requirements; showing respect to the cooperating organizations; avoiding open criticism
2	Honour	Creating win-win solutions; open communication and cooperation process; showing respect to organization, workers and culture; respecting family bonds and relations
3	Stability	Creating clear rules of cooperation; putting emphasis on long term relations; creating friendly atmosphere; giving support to problem solving
4	Continuity of contacts and relations	Long-term orientation of cooperation; creating long-term plans and objectives; mutual exchange of workers; planning and working process in mixed teams
	Dominating norms and values in private sector	**Cooperation mechanisms**
1	Time/deadlines respected	Treating deadlines seriously; trying to do things on time or even

		before deadline; setting realistic deadlines and avoiding crossing them
2	In daily routines 'just in time' attitude	Patience with waiting for output; helping in production process and just-in-time practices; avoiding stressful situations when deadlines have not been crossed yet
3	Serious attitude to work	As in the above section
4	Continuity of contacts and relations	As in the above section

Source: Own study

Cultural Consistency

While cooperating with Turkish partners, it is necessary to pay attention to effective communication systems which will support information transfer between partners. Another findings show that Turkish workers are very loyal to their work places, so it is necessary to show respect to the organizations they work for and to avoid open criticism. Also, Turkish workers are very tolerant, so there is no need for foreign partners to adjust strictly to cultural norms and habits.

İt is also interesting that Turkish organizations are open to the latest technology. Thus, delivering new IT solutions may strengthen cooperation and help build long-term relations. Finally, it is very important to make sure that Turkish partners are financially satisfied. Therefore, business partners should consider implementing different financial bonuses.

Table 11: Cultural traits characteristic for Turkish public and private organizations and dedicated cooperation mechanisms

	Dominating cultural traits in public organizations	**Cooperation mechanisms**
1	Hardworking	Respecting workers duties; offering help with common ventures; being ready for long working hours; spending much time in office with Turkish partners
2	Information sharing	Efficient listening process in contacts with Turkish partners; communicating clear terms, objectives and expectations; sharing information from outside business world; taking an interest and being involved in the process of mutual communication
3	Loyalty to work-place	Respecting the name, nature, tradition and principles of Turkish company; avoiding criticism in an open form; avoiding complaining about own company, rules, managers, procedures; being loyal to Turkish partners, which helps to build up long-term and trustful relations
4	Respectful and tolerant attitude	Being yourself, not trying to copy local behaviour and believes; keeping own originality in look, behaviour and believes; being open in explaining failures and mistakes
	Dominating cultural traits in private organizations	**Cooperation mechanisms**
1	IT orientation	Using various IT tools in cooperation and communication process; offering new tools to be implemented; helping with development of new IT solutions within company
2	Job satisfaction	Taking actions which lead to making Turkish people more satisfied with their job; making friends and creating wide net of relations giving the feeling of family atmosphere; improving local working conditions; financial aspect of satisfaction important (bonuses); rewards system
3	The will to get rich	Putting an emphasis on financial aspect of cooperation; rewards,

		bonuses; life-standard-improving bonuses such as corporate cars, telephones, computers
4	Loyalty to work-place	As in the above section

Source: Own study

Conclusion

Presented analysis allowed more thorough understanding of relational characteristics of virtual structures, which constitute crucial value for the development of network science (Watts, 2004; Hudson, 2004; Moller and Wilson, 1995). The authors made a theoretical contribution of conceptualizing a pattern of adjusting to organizational culture in virtual structures. Furthermore, in order to strengthen the practical contribution of the study, the authors presented a possible use of the template on the example of Turkish organizations. The results show that in Turkey the characteristics of organizational culture differ substantially between private and public units and organizations which collaborate in virtual structures ought to acknowledge this by implementing different mechanisms for each kind of an organization.

Finally, the authors would like to stress that the conceptualized pattern and the process of working out mechanisms ought to serve for integrators in virtual organizations as a general template which shows in what way to increase efficiency of relations in a cultural dimension. Although the analysis was done using the method of a multiple case study, the process is universal and it may be implemented by every unit which develops collaboration within virtual structures.

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Strategies of Raw Material Diversification in Management of Resource Supplies of Oil Extraction Companies

Irina Petrovna BOGOMOLOVA

Voronezh State University of Engineering Technologies, Voronezh, Russia, e-mail: uopioe@yandex.ru

Nataliya Mitrofanovna SHATOHINA

Voronezh State University of Engineering Technologies, Voronezh, Russia, e-mail: 32362@mail.ru

Lyudmila Timofeevna TRINEEVA

Voronezh State University of Engineering Technologies, Voronezh, Russia, e-mail: lapa82@yandex.ru

Sergey Anatolevich LOSKUTOV

Voronezh State University of Engineering Technologies, Voronezh, Russia, e-mail: uopioe@yandex.ru

Irina Evgenievna USTYUGOVA

Voronezh State University of Engineering Technologies, Voronezh, Russia, e-mail: uopioe@yandex.ru
ystugova@yandex.ru

Abstract

The urgency of this research is predetermined by a significant role of the food industry in securing food independence of the Russian Federation, stiffer competition on the local and foreign markets, lower effectiveness of resource use at oil extraction companies. The objective of the research is to adapt the raw material diversification mechanisms to industry specifics of managing raw materials supplies at oil extraction companies to widen the production range without infringing the interests of plant growing companies, which specialize in oil seeds, and vegetable processing companies. Our article dwells on the scientific and methodological basis of raw material diversification of oil extraction companies and trends of raw materials provision of the Russian Federation's oil extraction enterprises, which became the basis of our recommendations to improve company management when implementing a raw material diversification strategy. Insufficient knowledge of organizational and economic issues of raw materials diversification and scientific and practical importance of raw materials diversification in managing food company supplies predetermined the novelty of our research.

Keywords: Raw Material Diversification, Processing Industry, The Agro-Industrial Complex, Efficient Use Of Raw Materials, Raw Materials Supplies.

Introduction

Stiff competition and economic sanctions made the issue of effective raw materials supplies of the Russian food companies urgent, and raw materials diversification can become a good solution.

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The fat and oil industry is the backbone of the processing industry in agriculture, which produces highly valuable foods (vegetable oils, margarines, mayonnaises), high demand goods for the households. Besides, products of the industry are used as raw material in bakery, confectionery, vegetable canning industries as well as in production of detergents, cosmetics and medical goods, paintwork and other types of technical products. Oil raw material wastes (oilseed cakes, extracted meal) are an important raw material component for mixed fodder used in cattle breeding and poultry raising.

A research of the Russian market of oilseed cakes and extracted meal established its significant differences from the trends of the international market. First, Russia mainly grows sunflower as opposed to soy worldwide. Second, the Russian Federation virtually uses no oilseed cakes and extracted meal in production of mixed fodder as a source of protein, like the European Union countries do. However, the Russian oilseed cakes and extracted meal market grows steadily adding more than 50% in the last five years. The key qualitative changes of the market can be attributed to the growing production of soy meal in the Kaliningrad region. Rising internal consumption of oilseed cakes and extracted meal is an undisputable fact conditioned by the development of cattle-breeding and fish farming and a fall of their share in exports from 40% to 25%, although exports of oilseeds remains flat. However, imports structure does not change dominated mainly by the soy meal and sunflower cakes.

Our theoretical and analytical research revealed that raising the efficiency of raw materials use is pivotal for the local economy on the whole and the economy of the fat and oil industry companies in particular. The quality and quantity indicators of the raw materials are essentially the basis for organization of production predetermining the level of production capacities use, duration of the working season, the volume and range of products [1].

Literature Review

Critical assessment of theories of the Russian and foreign scientists on diversification management (table 1) as well as multi-dimensional scientific research of practical expertise and special features of industry operations were the basis for adjustment of scientific and methodological foundation of raw materials diversification at food companies. In particular, we singled out the preconditions of diversification, revealed its advantages and disadvantages, defined the factors and criteria, on which the choice of diversification strategies depend.

Table 1: Classification of the key notions and definitions of diversification by different authors

Author	Definition
1 Diversification as a form of capital concentration	
R.Z. Akberdin A. Ya. Kibanov	One of capital concentration forms to enter the market.
T. Eggertsson	Variety of investment for creation of a stake, which would be stable and sustainable to market fluctuations.
P.P.Sorokin	All associations of interconnected and non-interconnected productions within a company.
2 Diversification as a way to expand the product range	
I.Ansoff	Widening the product range to be carried out by isolated enterprises or their associations.
S.M. Sinelnikov, T.G. Solomonnik	Augmentation of a product range with the goods unrelated to the technology in use, or produced goods or services.
A.A.Anfinogentova	Significant widening of the company's scope and creation of production of a large number of interrelated goods and services of the same type.

3 Diversification as a way to widen company structure	
D.S. Sink	Widening of the product range through simultaneous development of many unrelated productions.
V.S. Balandin, N.S. Yashin, E.A. Bagirov	A risk reduction strategy through diversification of investment between several high-risk assets.
4 Diversification as a way of market share growth	
R.A. Fatkhutdinov	Widening company operations or product range
L.Ye. Basovsky	Monopolies' integration in an industry unrelated to their core operations.
Yu. I. Artemyeva	A merger of monopolies with the industries operationally unrelated or functionally independent from their core operations.
Source: compiled by the authors	

Stable functioning and sustainable development of socially important branches of the food industry, on which state food security depends, largely hangs on their raw materials supplies, of which the key control lever is diversification.

Problem

Given the fact that the industry is socially important and raw material intensive, but can use different types oil seed plants (sunflower, soy, rapeseed, flax, mustard greens, castor bean, etc) special attention should be paid to the raw material supplies to the oil and fat industry. The first three account for about 95% in Russia's sown area. The Volga, South, Central and Siberian federal districts account for the bulk of the area sown with sunflower (44.0%; 23.4%; 17.5% and 9.1% respectively). Soybean crops are mainly concentrated in Russia's Far East (50.5 %), Central (31.0 %) and South (8.2 %) federal districts. Rapeseed resistant to the cold climate is grown in the Siberian (40.4 %), Central (22.6 %), Volga (17.3 %) federal districts. At that, the trends confirm sustainable growth of the area under oil seed plants. Thus, in 2015-2018, the Russian Federation's sunflower crops growth amounted to 117.5 %, while the area occupied by soy and rapeseed grew by 38.2% and 55.1 % respectively. The Siberian federal district led the soy area growth (by 350%). The worst growth of rapeseed area was demonstrated by the Urals federal district (+ 1.5%).

A clear positive area growth trend couples with sustainable growth of the gross oil seed crops in the Russian Federation – the rapeseed crop doubled in 2018 compared with 2016 and sunflower seeds by 16% in the same time bracket. The Urals and Siberian districts are the growth leaders. A breakdown of the gross crop by the key oil seed plants demonstrates sustainable leadership of sunflower (from 67.5% in 2016 to 65.6% in 2018). Soy was second largest in the gross harvest of Russia's oil seed plants (from 34.3% in 2016 to 31.3 % in 2018).

Synthesis of statistical information helped us identify the patterns of oilseed crop yield indicators and a close correlation of their values with the weather and climate conditions, as well as compliance with the requirements of cultivation technologies. In particular, the sunflower yield in the period under consideration averaged 13.3-16.0 hundreds kilograms per hectare with the Central, South and North-Caucasian federal districts being the leaders. The soy yields vary by 250% in 2015-2018, while the average country indicators stood at 12.7 (2015) – 14.1 hundreds kilograms per hectare (2016). Russia's average rapeseed yields demonstrated lesser variety (from 9.9 to 14.7 hundreds kilograms per hectare in 2015 and 2019 respectively, or a little over 50%). The stable yield leaders in the period are the North-West, South and Central federal districts. The Volga district is an outsider.

Table 1: Rapeseed yields in Russia's top-10 regions in 2019 hundreds kilograms per hectare.

Region	Yields, hundreds kilograms per hectare	In % to average 2015-2019 yield
Krasnodar region	17.0	115.6
Altai region	10.4	70.7
Tula region	23.6	160.5
Tatarstan republic	14.9	101.4
Kaliningrad region	31.9	217.0
Omsk region	9.6	65.3
Lipetsk region	22.5	153.1
Novosibirsk region	11.5	78.2
Kemerovo region	14.7	100.0
Ryazan region	20.3	138.1

Despite a low soy and rapeseed yield compared to other states, academicians and practitioners say that growth of the sown area is promising because it helps solve one of the key raw material diversification problems in the production of vegetable oil and oil meal (a highly protein feed with a high content of feed plant proteins) and to cement the Russian Federation's export potential. International demand for oil seed plants and products of their processing is confirmed by the following. In the 2017-2018 season, soy exports amounted to 915,387 tonnes (66.9% of total oil seed exports), rapeseeds to 362,717 tonnes (26.5%), sunflower to 89,638 tonnes (6.6%). The key importing states are China (89.4%), Belarus (6.7%), while Iran, the Republic of Korea, Turkey, Azerbaijan, Kazakhstan and others totally account for 3.9%. Practically the same situation can be seen in rapeseed exports where the key customers are China (35.5%), Belarus (35.1%), Mongolia (22%), Nepal (2,3%), Turkey (1.4%) and Germany (1.4%). Russian sunflower is bought by Belarus (26.2%), Turkey (23,2%), Iran (14.5%), Kazakhstan (8.9%), Ukraine (5.6%), Azerbaijan (5.2%) and some other states.

The product of rapeseed processing is rapeseed oil and rapeseed meal (one of the protein animal feed types, which is close to soy and much richer than traditionally used sunflower, pea and bean meal by its energy value, protein activity and amino acid composition). The key Russian regions using rapeseed meal in production and consumption of mixed fodder include the Voronezh, Moscow, Leningrad, Kursk and Lipetsk regions.

Rapeseed oil is not only the basis for production of many foods, including mayonnaise and margarine. It is used for frying, as a dressing for cold dishes, in cosmetics to produce facial masks and in pharmaceuticals in making unguents and injections. Rapeseed oil is also used to produce fatty esters used in biodiesel fuel and lubricants, in the textile and rubber industries.

Our statistic research demonstrated a stable growing tendency of natural and price indicators of the internal and external markets of vegetable oils. This can be partially explained by growing consumption if oils by the Russians in the wake of their transfer to healthy eating and positive dynamics of the Siberian and Far Eastern markets. Although sunflower oil accounts for the key segment of the market (over 83%), corn oil demonstrates the highest growth.

There are goods from foreign partners on the Russian oil seed market. In the 2017-2018 season, Russia imported 104,400 tonnes of unpacked vegetable oil, mainly rapeseed, sunflower and soy. The key exporters are Belarus (75.3%), Ukraine (20.7%) and Israel (2.7%). Rapeseed oil suppliers are also the Republic of Korea, Finland and Germany. At the same time, there is a declining trend of fat

and oil products imports thanks to acquisitions by large Russian holding companies and the launch of production by leading foreign companies on the territory of the Russian Federation.

Our country tries to maintain the balance of export and import operations on the fat and oil market. In the season under research the country exported 2,784,457 tonnes of oil, including 66.5% of sunflower, 19.8% of soy and 13.7% of rapeseed oil. The key consumers of the three types of Russian vegetable oils are China (16.8%), Egypt (15.4%), Turkey (13.1%), Iran (8.3%), Algeria (6.7%), Norway (5.3%).

Given the quality characteristics of Russian imports, which are often genetically modified raw food materials and food (many experts confirm that some imported margarines, vegetable oil and sauces contain transgenic soy, corn and rapeseed, which is detrimental for the health of Russians), we should point to a high competitive potential of local fat and oil companies on the international markets. Practice confirms that compared to foreign producers they use virtually no genetically modified components and Russian products are no worse than their foreign analogues by many indicators, including ecological safety. At the same time the issue of rising competition is exacerbated not only by the absence of effective policies and mechanisms of state regulation of the Russian market of genetically modified oil and fats products, but also the need of boosting provision with resources underpinned by raw materials diversification of companies taking into account international and consumer requirements.

Discussion and Results

Our research outlined the key preconditions of raw material diversification, which could stimulate the growth of companies, widen their product ranges and help them branch out into non-traditional raw material markets. They are:

First, the macroeconomic trend of shrinking margins in the traditional industries, the effect of the law of uneven economic development of some industries when the market changes, the requirements of scientific progress and economic digitalization.

Second, the key economic advantages and disadvantages outlined by the authors. Positive fallout of the organizational and economic mechanism under research includes the possibility of use of the current materials basis and personnel, rhythmic income generation from operations due to elimination of the negative consequences of seasonality typical of food companies, cementing competitive positions and widening markets thanks to the use of non-traditional raw materials and production of new goods. However, we should point to the limitations of diversification – heavy investment in innovations, long implementation and a high risk of the projects, insufficient knowledge of managers and other personnel.

Third, a research of results of the companies, which diversified successfully made the basis of decomposition of the factors they took into account (condition of the world and Russian economies, competitive positions on the local and foreign markets; economic trends, special features of raw materials supplies and production). Assessment of the diversification results should factor in not only the final financial indicators of the company, but also strategic prospects of its production and sales. Defining strategic alternatives will help the management pick the best type of diversification, which will take into account the possibilities of material, labour and financial resources of the company. However, since food production is material intensive, when choosing a diversification strategy one should pay most attention to provision with raw materials based on stronger cooperation with farmers.

Analysis of expert assessment of Russian problems of raw material diversification led us to the following recommendations for development of the system in Russia with the aim of solving the current problems:

1. A diversification decision should be taken basing on the analysis of various forecasts. Traditionally, according to our research, foreign and local enterprises use three key criteria when working on their diversification strategy – industry attractiveness, costs to enter the industry, additional advantages. At the same time, given industry specifics of food production (uneven development; violation of price parity for raw materials, materials, fuel and energy and other resources; quantity and quality fluctuations of raw material supplies thanks to the seasonal type of operations; a low value of the production capacity utilization factor; low margins, etc.), we believe it reasonable to introduce a new criterion, which will incorporate all the qualitative and quantitative elements of raw materials resources supplies and the efficiency of raw material diversification, which would ensure sustainable development of a company and help stick to the chosen strategy.
2. Raw materials diversification should include analytical and controlling instruments to ensure management aimed at an economic effect of a chosen strategy of rapid business development, reducing the risk of unfavourable environment. After analysis of the current market conditions we recommend:
measures to diversify raw materials and products by switching to seasonal processing of rapeseed, whose crop in Russia rises steadily;
the use of economic and mathematical methods to forecast the key parameters of the local oil seed market (gross crop from the sown area, the highest possible yields with a correction factor of compliance of the sum of active temperatures and the amount of precipitation with normative indicators, as well as raw materials' price trends).
3. Raw materials diversification as an organizational instrument to boost production of food without additional financial costs. Plants often have to suspend their operations due to the absence of the necessary amounts of raw materials until a new harvest appears, which results in a market share loss and deterioration of financial standing of a company on the back of rising semi-fixed costs in total production costs because there is shortage on the sunflower market each year with a simultaneous price rise. At the same time, the companies can boast equipment capable of creating multilines to process different types of oilseeds, creating higher efficiency thanks to processing oil extraction wastes.
4. Managerial solutions to implement a raw material diversification strategy with the use of our algorithm of an economic and mathematical model of raw material diversification in managing oil extracting plants resources, which will result in adjustment of the highest crop and getting the highest possible indicators.

Modelling of a forecast includes the following stages. Initially the periods of information collection should be adjusted. Calculation in each area is done with the start of sowing (individual date for each region). Further, information of the Russian Federation Agriculture Ministry on sowing and the sown area as well as the sum of active temperatures and the volume of precipitation compared with their optimal values for the period -- the weather factors have the heaviest impact on the crop -- should be processed daily. The highest possible gross crop is calculated by multiplying the sown area by the highest yield registered in the region. A potential gross crop iscalculated by introducing coefficients to adjust the maximum calculated by dividing the real and normative factors. The work is finished by comparing the Agriculture Ministry's data on the threshed rapeseed and its gross crop forecast. Our recommendations say the deviation should not exceed 5%.

Thus, our research can be used when developing recommendations to improve the mechanisms of raw material procurement management of oil extraction companies while diversifying its raw materials basis.

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Industrial Heritage as A Brand of The Ural Region in The Context of New Industrialization

Vladimir V. ZAPARIY
Ural Federal University named after the first President of Russia Boris Yeltsin, Ekaterinburg, Russia, vvzap@mail.ru

Ekaterina V. ZAITSEVA
Ural Federal University named after the first President of Russia Boris Yeltsin, Ekaterinburg, Russia, katia_zai@mail.ru

Natalia V. GONCHAROVA
Ural Federal University named after the first President of Russia Boris Yeltsin, Ekaterinburg, Russia, n.v.goncharova@urfu.ru

Abstract

The topic of the article is extremely relevant at the present time, because there is a need to create an economically attractive image of the Ural region. In the article, the authors touch upon an unusual aspect that influences on the development of new industrialization in such an old industrial region as the Urals - the industrial legacy. They put forward a hypothesis, which they argue that brands created on the basis of the industrial heritage of the region can have a significant impact on the development of the Ural region. Through the creation of a special brand on the basis of industrial heritage, it is possible to promote products of the region, develop industrial tourism as one of the competitive products of the region, and gain a competitive advantage in modern economic connections. Arguments and proposals are made for such work by regional authorities and public organizations.

Keywords: Urals, Industrial Heritage, New Industrialization, Image, Brand.

Introduction

The relevance of the research topic is due to the fact that currently the image is becoming an important tool for the economic development of a modern region. Opinion about the territory formed by its residents and tourists among investors has a significant impact on revenue entering to the municipal budget, exports, investment flows and the dynamics of the gross regional product.

Socio-political, cultural, historical, investment attractiveness of the regions does not arise from scratch, but is the result of a formed and updated brand. Each region is represented in the mass consciousness in a manner endowed with unique characteristics. Such representations are a kind of public opinion concentrate.

Ural was originally formed as a region with a number of features that favorably distinguish it from other regions of the country, including industrial ones. This uniqueness of it cannot be used to create an economically attractive image that allows at least partially overcome the growing processes of deindustrialization.

The goal is to consider the industrial heritage of the Ural region and determine the possibilities of using it in order to create and manage the region's brand in the context of new industrialization, which will create opportunities for the development of business, territory (including museums, historical sites or landscapes of historical industrial parks) and industrial tourism.

Within the framework of the institutional and systems approach, the authors used such methods as analysis of materials obtained in the archives; analysis of the works of other researchers, whose articles are devoted to work on imageology, on brand theory, on the theory of new industrialization,

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literature on the industrial heritage of the Urals. The systematic approach made it possible to identify areas of work for the preservation and use of the region's industrial heritage in the context of new industrialization. It is aimed at creating a new industrial basis for the region and does not imply the preservation and use of industrial heritage objects for production and other purposes. Therefore, the conditions for the preservation of the regional industrial heritage are not positive. The authors did not aim to develop a new brand of the territory or its products; historical objects of the region's industrial heritage of the 18th-20th centuries were used for the analysis. This article deals with the development and preservation of regional brands in the form of an industrial heritage as elements of the region's competitiveness and its socio-economic development.

Literature Review

The literature review can be divided into four sections: work on imageology, on brand theory, on the theory of new industrialization, literature on the industrial heritage of the Urals.

Let's consider first of all research on creating the image of the region. For a modern, economically attractive image of the region (Zapariy and Zaitseva, 2017), it is possible to form several territory brands.

In the Urals it is possible to develop and use such a brand as the industrial heritage which was formed as a result of the specific development of the region. Since there are many industrial heritage sites preserved on its territory.

The image of a territory is understood as an aggregate or system of basic (simple) ideas about a certain territory, created, represented and transmitted mainly through the media for specific political, socio-cultural, economic purposes. From the standpoint of image perception by image-making objects, the image of a region is “a relatively stable and reproduced in the mass and / or individual consciousness the totality of people's emotional, rational ideas, beliefs and feelings that arise about the characteristics of the region, are based on all the information received about the region from various sources, as well as personal experience and impressions” ” (Arlashkina and Napalkova, 2014). .

So, the following subjects of image-making are involved in creating the image of a region: the region itself, represented by the authorities, at this level combines the functions of the customer and the performer; media and communications; specialists (political technologists, image makers, press secretaries, etc.); foreign economic and diplomatic services; state and public organizations; sports and cultural organizations and events, the education system, science, personnel policy; separate individuals (immigrants from the region, represented in the central authorities, well-known regional politicians, cultural figures, scientists) (Vasilkonova, 2014).

Among foreign studies of the problem of forming the image of the territory, it is necessary to note the work of N. Clifton (Clifton, 2014), who study the influence of the region’s brand on its image.

The author notes that many products associated with the region can have both positive and negative impact on the brand of the region. It is the regions that can create and maintain their own characteristics in a globalized and standardized world. At the same time, the role of intangible factors in the success of regional images or brands increases.

Within the framework of the brand theory, the economic and marketing approach must be distinguished, it is the dominant direction in the study of the brand phenomenon and is implemented in the framework of the branding theory. This approach is practically oriented. In the theory of branding, there are two directions: brand management and brand building.

Brand management theory examines the principles of brand management as a tool to increase the surplus value and intangible assets of the company. The main provisions of the brand management theory were developed by such Western researchers as D. Aaker, E. Rice, J. Ellwood and P. Temporal. Among Russian researchers, must be mentioned I. Ya. Rozhkov, V.N. Domnin, and E. A. Ruday.

As part of the brand-building theory, the way for the development of the ideological concept of the brand and its attributes - name, logo, packaging, corporate character, etc. is searching, and the problems of creating brand formation techniques in the mass consciousness are being studied. The development of the ideological concept of the brand is devoted to the work of M. Mark and K. Pearson, J.-M. Drew, D. Aaker, as well as M. Vasilyeva and A. Nadein. In the theory of brand building, a brand is interpreted most often as a brand image formed in the mass consciousness (Arkhangelskaya, 2006).

The concept of "new industrialization" is new to domestic science. Its formation began with an article by MSU professor S.S. Gubanov (Gubanov, 2008). The study of the theory of industrialization, including in relation to Russia, was continued by leading Russian scientists (S.D. Bodrunov, S.Yu. Glazyev, R.S. Greenberg, V.V. Ivanter, V.L. Inozemtsev, V. M. Kulkov, E. B. Lenchuk, O. A. Romanova, V. T. Ryazanov, A. S. Sukharev, A. I. Tatarkin (Silin and Animitsa, 2017), (Silin at al., 2017).

The problem of identifying, studying, preserving, rehabilitation and subsequent use of industrial heritage sites is one of the leading themes of foreign scientists (Vargas-Sánchez, 2015). In the Urals, were among the first to raise this problem. V.V.Alekseev, E.V. Logunov, E.A. Kurlaev and others. Nowadays, among historians of the Russian and Ural industrial heritage, historians of Ye.V. Alekseev, V.V. Zapariy, E.S. Lakhtionovu, A.E. Kurlaeva, architects N.S. Solonina, O.A. Shipitsynu et al. (Vargas-Sánchez, 2015).

Thus, the problem of creating and using industrial heritage as a brand of the Ural region in the context of new industrialization has not been well-studied yet. Relying on the results of new studies, regional authorities can develop a completely applicable strategy to overcome the problems of the region.

In recent years, the theory of new industrialization has taken a leading position in economics. It was first formulated by V. Beitman, C. Richter, P. March, S.S. Gubanov, N. Pakhomova and others (Dobos at al., 2012, (Bateman, 2013), (Sharma, 2016), (Marsh, 2012).

In our opinion, this theory most adequately reflects the modern vision of economic development processes taking into account the latest technical and technological trends. Among the processes affecting the new industrialization, there are those that we would like to highlight. In a modern competitive economy in the context of globalization, the most important factor influencing positively on the development of regions there are processes that increase competitiveness (Dvoryadkina at al., 2017).

The distinctive factor that highlighting our region from others is the centuries-old technical and technological history. It is reflected not only in modern scientific and technical achievements of the modern Ural industry, but also in the rich industrial heritage that influences modern scientific and industrial culture. This means that this advantage can and should be used as a competitive one. For this it is necessary to formulate the appropriate brands.

It is through branding of the industrial heritage regional authorities can promote the products of the region, develop industrial tourism as one of the competitive products of the region, and gain a competitive advantage in modern economic ties.

The problem of brands and their impact on improving competitiveness is well studied in the scientific literature and is used in such sciences as management and marketing. Recently, a separate area has been singled out - territorial branding or branding of places, including branding of the city. Among foreign researchers, the names of C. Dinni, T. Moilanen and S. Rainisto et al. (Bivainiene and Tamosiunas, 2017), (Dinnie, 2011), (Green at al., 2018), (Moilanen and Rainisto, 2009) should be mentioned. In Russian science, the study of the theory of branding of places is done by D.V. Vizgalov, M.E. Zykova, V.V. Zyazin, M.M. Smetannikov and others (Vizgalov, 2011), (Zykova, 2010), (Zyazina, 2010).

Practical Relevance, Suggestions and Results of Implementations

Using of branding technologies contributes to the development of investment attractiveness, growth of the region's reputation capital, allows to form loyalty to the region for both internal (permanent residents) and external (immigrants, investors) target audiences.

Attraction of industrial heritage as a brand of the Ural region carries two-sided practical significance. On the one hand, it is an opportunity to raise the level of the industrial region to an even greater degree: the promotion of Russian production and its technical and technological capabilities in order to attract the attention of the state and society to overcome the problem of falling importance of industry in the country's economy, which is becoming uncompetitive in relation to the industry of neighboring countries. On the other hand, the formation of an attractive image of the region through the creation of a voiced brand will accelerate and strengthen the processes of studying, preserving and using monuments of industrial heritage in the Urals (Zapariy and Zaitseva, 2017).

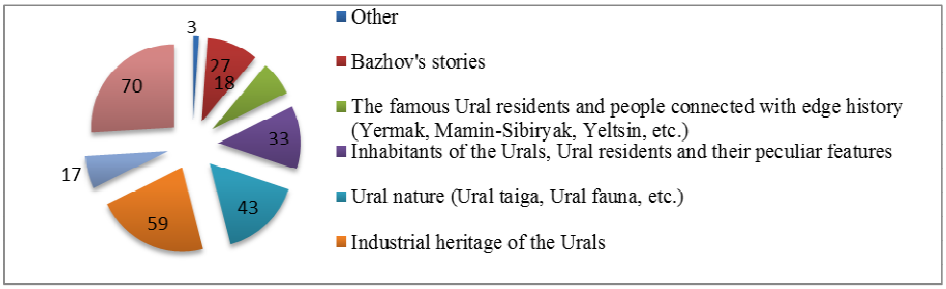

Fig. 1: What do you associate the Ural region first of all with?

In the case of the positive experience of the Urals in creating a working brand that brings economic profit to the region, this example can be used by other regions of Russia.

In terms of achieving the goals of new industrialization in Russia, the formation of a successful image of the leading industrial region of the country will allow to solve the following tasks:

• formation of investment attractiveness of the region for domestic and foreign businesses;

• attracting potential residents (labor force, students, scientists); an obstacle to the outflow of talented youth and skilled labor to other regions and countries (Mihajlov, 2009).

• the formation of the tourist attractiveness of the region and the development of scientific, cultural, entertainment and business tourism; obtaining support from the state budget and ensuring the participation of regional projects in federal programs; attraction of federal orders for enterprises.

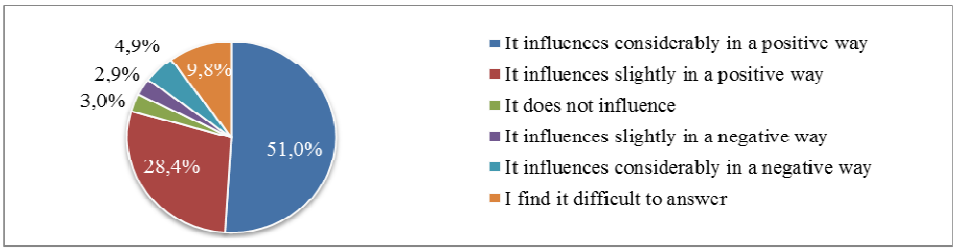

Fig. 2: Does the industrial heritage influence the region image?

One of the ways to preserve the monuments of the industrial heritage can and should be tourism (Timothy, 2016). An example of this we can see in Sweden. Closing the unprofitable steel mills and abandoned mines, the Swedes in many cases tried to keep them in the same form in which they were on the day they stopped. After some time, these objects were specially equipped for visiting and showing to tourists. Now they bring significant income, foster patriotism and respect for the past of

the country. In other countries, we can also observe numerous examples of the restoration, reuse or reprofiling of industrial heritage sites (Niu at al., 2018), (Xie, 2015).

In the Urals, in the Sverdlovsk region, there are objects, monuments of industrial heritage associated with such great personalities as N. D. Demidov, V.N. Tatishchev.

In order to preserve, maintain and develop these monuments, it is necessary to develop and implement a new cultural and educational tourist route to places with industrial heritage .

For example, a multi-day tour of the following cities and towns: Yekaterinburg, Verkhniy Tagil, Nevyansk, Byngi, Nizhny Tagil, Kushva, Ust-Utka.

Over 300 years of its existence, entire industries were created in the Urals, among which the mining industry played a major role. Now the region has preserved a number of industries and individual units, which are very interesting in terms of the industrial history of the past and present.

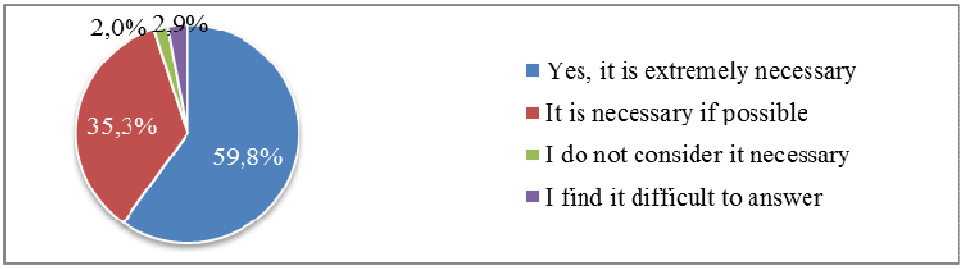

Fig. 3: Do you find necessary a safekeeping of the industrial heritage?

It is naturally surprising that there is no museum complex in the center of the Urals, which would be a museum of the Urals science and technology, covering the main branches of the Urals industry and science. Of course, over the decades of the museum's existence, the Urals have developed their own system of technical museology. So, the issues of preservation, generalization and propaganda of industrial heritage are covered, first of all, by the Sverdlovsk Regional Museum of Local Lore, which has wonderful foundations on the history of technology. Certain exhibitions exist in the Museum of Architecture, the Museum of Radio of A.S. Popov, museum exhibitions of a number of enterprises, universities and organizations.

The main tasks of the museum should be: the manning and preservation of monuments of science and technology of the Ural region, the popularization of scientific and technical knowledge and active educational work. The organization of the technical museum will serve to preserve the monuments of technology, which, due to the introduction of new technologies, modern equipment into production, are subject to dismantling and gradually lost.

The most important part of the national policy of each state and of Russia in particular is the creation of attractive image of the country in the eyes of people from other countries.

Cultural heritage objects now play this important role.

These industrial brands as "the Mining Ural", "Grey-Headed Ural", "Ural mountains – basic edge of power" and others, must become a recognizable brand in the region in the country and in the global stage, and branded the mark of the Ural factories "Siberian sable", if it can be reborn to claim the title of one of the world's oldest trademarks. Due to the fact that there are monuments of industrial heritage, Russia is represented in the eyes of the international community, not only the capital but also the province. Thereby, these centers became the objects of national and international tourism. The total number of visits by tourists (foreigners and Russians) to museums and reserves in the Urals reaches 1.5-1.7 million people annually.

It is important to note that the sector is "small" economy is quite profitable for the regions. In the field of touristic business and Museum service a significant part of the population can and should be

involved. A good example of this is the Museum-reserve Mikhailovskoye in the Pskov region, where in this area involved many hundreds of people.

In this context, it is important to create manifestation of legislative initiatives of local and regional authorities, scientific and public organizations to create a coherent system of record-keeping, research, conservation, rehabilitation and use of monuments of industrial heritage, which are of great interest not only in national but also international scale. And this should not be a distant prospect, because the delay in this case has dangerous ends, because every year we lose a large number of these cultural and material values for future generations, and we should prevent this.

Conclusions

The creation of a sustainable and recognizable brand in the Ural region on the basis of the industrial heritage involves the solution of fundamental tasks: to analyze market situation; development of action plan for brand promotion; the definition of their brand names; create a communication system.

To create an attractive environment for business, both domestic and foreign, on the territory of the region there should be extensively use of Federal laws and adapt these tasks to the regional legislation.

Use quality brand of industrial heritage does not mean that this will be the only brand in the region. On the contrary skilful combination of historical traditions and new tendencies of development looking to the future, augurs a powerful economic development.

According to the foregoing, it is possible to identify a number of areas that will allow for branding of the industrial region on the basis of the industrial heritage. 1. Identification and registration of monuments of industrial heritage. 2. Determination of their further use as museums, historic sites or landscapes of historical industrial parks or their conversion in the other direction. 3. The study of historians and architects of monuments, the creation of the list of architectural and historical descriptions of the objects. 4. A broad advertising campaign in print and on television about the monuments of industrial heritage and the importance of conservation. A series of books and booklets about the industrial heritage of the region. 5. Creating and maintaining a large number of touristic routes in the monuments of the industrial heritage of the region. The use of the monuments themselves and itineraries for educational purposes (schools, vocational and higher educational institutions), as well as in various forms of professional development. 6. Conferences and symposia at national and international level, drawing attention to the objects of industrial heritage. 7. Participation in international organizations working in the field of cultural and industrial heritage (UNESCO and TICCIH). 8. The involvement of the volunteer movement for the development and implementation of tourism products on the monuments of industrial heritage of the region. Besides this also need a broad discussion of problems in scientific and professional circles, the media. Such a discussion will attract public attention to the problem, will contribute to its successful solution in the future.

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The Level of Sustainability of Enterprise's Activity as Assessed by Employees - Comparative Analysis in Poland And India

Teresa KUPCZYK

General Tadeusz Kosciuszko Military University of Land Forces, Wroclaw, Poland,
teresa.kupczyk@awl.edu.pl

Abstract

The article aims to diagnose the sustainability of enterprises' activities in the assessment of employees, and its relations with practices used in the enterprise for sustainable development. It was also decided to establish whether employees would like their companies to operate sustainably. Quantitative and qualitative research was carried out based on a questionnaire survey among 449 employees of enterprises in Poland and India. According to 18%, their enterprises operate sustainably, i.e., reduce the harmfulness of their activities to the natural environment and act for the benefit of employees and other social initiatives. In the opinion of 29% of the respondents, their companies' activity is only sustainable to some extent, and 8% believe that it is not sustainable. The respondents from India assess the sustainability of their enterprises to a much higher degree than those from Poland. It was found using the Spearman's rank correlation coefficient that the higher the employees rate the level of sustainability of their enterprise the more often environmental and social issues are taken into account in the enterprise when making critical decisions, employee volunteering is conducted, thus enabling employees to implement charity projects during work, the enterprise communicates and promotes its dedication to sustainable development, supports employees in striving for a balance between work and personal life, and improves their working conditions. The results of these studies may support the managerial staff responsible for implementing corporate strategic plans related to sustainable development. They will allow for a better understanding of how employees assess the level of sustainability of the company's operations and what activities allow them to increase this assessment.

Keywords: assessment of sustainable development, employee expectations, enterprises, Poland, India.

Introduction

Sustainable development is increasingly embedded in the core business strategy, constituting a growing part of corporate strategic goals (Galbreath, 2009; Harmon & Fairfield, 2014; Dutta, Lawson, Marcinko 2013; Gunasekaran & Spalanzani 2012). Nowadays, enterprises are expected to implement corporate social responsibility at the level of responsible company 4.0, where people and technologies cooperate and the increase of revenues and generated profit are perceived as equally important as attention paid to the environment and stakeholders (Deloitte 2020). Still, international statistics and research result reveal unsatisfactory level of implementation of sustainable development at enterprises in Poland (Kubicka, Kupczyk 2018) and in India (ROS 2019; Bertelsmann Stiftung, 2020). It is worth noting that Sustainable Development Goals to be implemented by 2030 concern not only actions aimed at reduction of enterprises' negative impact on the natural environment. They also focus on promoting full and productive employment, decent work for all people, fairness, and gender equality. From this point of view, it has become an interesting and important area of research to study employees' opinions about enterprises' sustainable development. This issue is scarcely researched, but it's very important, because studies show that sustainable development:

- affects the sense of job satisfaction (Magbool, Amran, Nejati, Jayaraman 2016);
- increases trust in the organisation in its relations with new employees or collaborators (Renwick, Redman, Maguire 2012);

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- affects good employer image (Cherian, Jacob 2012; Raport Employer Branding w Polsce 2017);
- shapes employees' commitment and their loyalty toward the organisation (Cone Communications 2016).
- companies which have CSR strategies are perceived by employees as more innovative and dynamically developing (Edelman 2018).
- gives a possibility of lasting interaction between society, ecosystems and other living systems without impoverishing the key resources" (Marin, Dorobanțu, Codreanu, and Mihaela, 2012).

A vast majority of employees would like their employer enterprises to operate in a sustainable manner (Kubicka 2017; Kubicka, Kupczyk 2018; Cone Communications 2016; Edelman 2018). In this respect they expect their employers:

- to limit the organisations' negative environmental impact (Cone Communications 2016);
- to support social and charitable projects (GlobeScan Radar 2016);
- that superiors should display personalised interest in the situation and development of individual employees (Cone Communications 2016);
- to cease operations which harm customers or employees (Edelman 2018).

International statistics reflect the level of implementation of all 17 Sustainable Development Goals to be achieved by 2030 (Bertelsmann Stiftung, 2020). However, there are no data concerning assessment of the situation by employees, especially in Poland and India - two states that stand out in the world and European Union by high levels of environmental pollution. This is an important, but hardly studied indicator of effectiveness of changes introduced at enterprises in order to support sustainable development.

The objective of this study is to compensate this gap. Therefore, the purpose of the paper is to diagnose the degree of sustainability of corporate operations as seen by employees in Poland and India, as well as its correlation with pro-sustainable development practices applied by their employers. The presented research results supplement knowledge about the degree of sustainability of corporate operations perceived by employees, and also indicate measures that can significantly improve this assessment. Thus, they can expand the research concerning strategic corporate management focused on corporate sustainable development.

Theoretical Background and Research Hypotheses

The degree of sustainability of corporate operations has been studied and analysed from many perspectives, e.g.:

- pro-sustainable development decision-making (Despeisse, Vladimirova, 2014; Miller, Hickson, Wilson 1996; Arvai, Campbell-Arvai, Steel 2012);
- analytical technique to model and assess sustainable development index at enterprises, the importance of innovation for sustainable development, and the link between economic, social and environmental development indicators (Dvořáková and Zborková, 2014, pp. 686-695; Garbie, 2014, pp. 4876-4915; Shao, 2009, pp. 143-146).
- recognition of the interaction between implementation of SDG and decision-making processes (Nilsson et al. 2016b);
- integration of social, economic, and environmental considerations in significant decision making (Gibson 2006);
- human resources management (Bossink 2012; Bombiak, Marciniuk-Kluska 2019; Haugen 2014; Muller-Christ 2011).

Most researchers emphasize that sustainable development is a way of managing that will enable future generations to carry out tasks and live at the same level as today (Klarin, 2018, pp. 68-69; Sterling, 2010; Vare and Scott, 2007; Weidinger, 2014). It is a process which involves human intelligence, decision making efficiency, planning and management skills, power of imagination, entrepreneurship, development and production with environmental safety etc. (Sagar 2018, p. 161). Therefore,

sustainable development depends to a large extent on the human factor, this is why more attention should be paid to this aspect. In particular, it is qualified employees who understand and apply the principles of sustainable development in their work who play an important role in the process of transforming enterprises into sustainable organisations (Cohen, Taylor & Muller-Camen 2012; Muller-Christ 2011; Bossink 2012; Haugen 2014; Epstein & Buhovac 2014; Bombiak & Marciniuk-Kluska 2019).

Based on the literature the following research theses were formulated:

T1. In the employees' opinion, their enterprises' activity is not fully sustainable, which means that they do not sufficiently reduce their harmfulness to the natural environment and do not act in a sufficient degree for the benefit of employees and other social initiatives.

T2. Age, sex, education, nationality, place of residence, position held, the size of the enterprise, the type of its activity, and the length of its functioning on the market do not significantly differentiate employees' opinions on the sustainable operation of enterprises, or whether they would like their enterprises to be more sustainable.

T3. Employees' assessment of the degree of sustainability of their businesses demonstrates significant positive relationships with corporate sustainable development practices such a: taking environmental and social considerations into account when making key decisions, conducting corporate volunteering, enabling employees to carry out charitable projects during their work, communicating and promoting their commitment to sustainable development, supporting employees in striving for a balance between work and personal life, and taking care to improve their working conditions.

Methods

The hypotheses were verified based on data collected in quantitative and qualitative research conducted at the turn of 2018 and 2019 in Poland and India.

The questionnaire, which was developed for this study and its preparation was preceded by preliminary tests, was used as a research technique. The respondents filled in the questionnaire independently and anonymously, previously giving their consent to participate in the research. The conducted research aimed to find answers to the research problems posed, which took the form of the following questions:
1. How do employees assess the level of sustainability of their employing enterprises' the activity?

2. Are there significant differences in this respect as for the criterion of nationality (Poland, India), sex, age, education (higher, lower), place of residence (urban, rural), position, size of the enterprise, and type of its activity (service, production)?

3. Are there significant relationships between employees' assessment of the sustainability of the company's operations and the use of certain sustainable development practices?

The basic terminology was set as part of the conducted research. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). It was assumed that the company's activity is sustainable if the company reduces its activity harmfulness to the natural environment and acts for the benefit of employees and other social initiatives.

The research subject of the study were:

• assessment of the level of sustainability of enterprises' activities in the employees' opinions,
• the relationship between "employee assessment of corporate sustainability" and the company's application of sustainability practices.

The respondents assessed the degree of sustainability of the enterprises' activity using the five-point Likert scale (Gamst, Meyers, Guarino, 2008), where 1 - definitely unsustainable, 2 - rather not sustainable, 3 – hard to say, 4 - sustainable to some extent, 5 - definitely sustainable.

Research procedures were applied in nomothetic terms. They are directed at repetitive phenomena that allow discovering and formulating general laws, and discovering similarities, universal rules and regularities governing the phenomena under study. This allowed the use of statistical methods of inference about the properties of the examined objects. Non-parametric tests were used as a statistically significant discrepancy between the observed distribution of variables and the normal distribution was revealed after the Shapiro-Wilk test ($p < 0.05$). The results of answers given on rank scales depending on grouping variables were analyzed with the Mann-Whitney U test (for two groups, e.g., taking into account gender, education, nationality, place of residence, position held, type of activity) and the Kruskal-Wallis ANOVA test with Bonferroni adjustment (for more than two groups, e.g., taking into account the criterion of the respondents' age, the size of the enterprise, and the length of its operation on the market) (Dunn 1961, 2017). The existence of a trend for subsequent populations was measured with the Jonckheere-Terpstra test for ordered alternatives. The relationships between the variables "assessment of the sustainability of business activities" and the applied practices in the enterprise for sustainable development were analyzed by estimating the Spearman's rank correlation coefficient (Lieberson 1964). The test probability at $p<0.05$ was considered significant, and $p<0.01$ as highly significant. Statistical analyses were performed using the PQStat statistical package, version 1.6.4.122. The research applied the quota sampling, which required resignation from the statistical condition of representativeness of the research [Lohr 1999; Rao 2000]. It was decided to do so not only because of the research objectives, but above all because of the research possibilities. The criteria that significantly differentiate the population regarding the research subject were defined in the quota selection. As a result, the studied population was divided into groups according to the following criteria and their selection was deliberate: nationality (Poland, India), gender, education (secondary, higher), age (under 35, 35-50, over 50), place of residence (urban, rural), position held (a person not holding managerial positions, managerial staff), the size of the enterprise (micro, small and medium-sized, large), type of enterprise activity (production, service).

This approach was chosen because the adopted sample largely corresponded to the structure of the population due to the distinguished features, and moreover, individuals within the group were characterized by greater homogeneity. To determine the percentage share of the selected groups, their actual distribution in the population was used (according to GUS data from 2019). The minimum sample size was established using the G * Power software (Faul, Erdfelder, Lang, Buchner 2007). The minimum sample size was 134 people with the following parameters: Type of Power analysis - A priori: Compute required sample size, given α and power, and effect size (two groups), power 0.90 (0.9007737), α rr prob = 0.05, effect size | p | = 0.6782266, critical t = 1.9862068. The study was conducted on a sample of 499 employees of enterprises, of which 64% were people from Poland and 36% from India. 75% of the respondents are employees who do not perform managerial functions, 25% are managerial staff. 61% were men and 39% women. The structure of the respondents from the educational point of view was as follows. 53% were people with higher education, and 47% with secondary education. The respondents were mostly young people, under 35 (82%). Middle-aged people (35-50 years old) accounted for 13%, and there were 5% over 50 years of age. 77% of the respondents lived in urban and 23% in rural areas. 43% were employed in large, 35% in medium-sized, 17% in small, and 5% in micro-enterprises. Most enterprises (54%) dealt services, and 47% with production. The management staff accounted for 25%.

Results

The respondents were asked to evaluate the sustainability of their companies' activities.

18% of them stated that their enterprises operate in a sustainable manner, i.e., that they reduce the harmfulness of their activities to the natural environment and act for the benefit of employees and other social initiatives. 29% considered that their companies' activities are only to some extent sustainable. According to 18% of the respondents, the activity of their companies is rather unsustainable, and 8%

believe that it is not sustainable. Others concluded that the activities of their companies are neither unsustainable nor sustainable. The arithmetic mean of sustainability of the company's activity in the respondents' assessment on the 1-5 scale was 3.31 (with S. D. = 1.18 and significance level 0.05). Therefore, it is quite low, which may indicate that companies employing the respondents focus too little on reducing the harmfulness of their activities to the natural environment and on activities for employees and other social initiatives. The assessment of corporate sustainability differed in some groups, as shown in Table 1.

Table 1: Employees' assessment of the sustainability of enterprises' activity (according to the arithmetic mean) made on a scale where 1 - definitely unsustainable, 2 - rather not sustainable, 3 – hard to say, 4 - sustainable to some extent, 5 - definitely sustainable (N = 499).

Respondents	Poland		India	
	means	S.D.	means	S.D.
women	2,96	1,07	3,88	1,02
Men	3,01	1,14	3,88	1,14
age below 35 years	2,96	1,12	3,93	1,04
age of 35-50 years	3,09	1,04	3,79	1,05
over 50 years old	3,00	1,35	3,38	1,56
higher education	3,11	1,06	3,90	1,07
secondary education	2,94	1,13	3,57	1,51
persons not holding managerial functions	2,96	1,07	3,91	1,04
management staff	3,15	1,23	3,86	1,13
living in urban areas	3,00	1,14	3,93	1,06
living in rural areas	2,97	1,05	3,53	1,31
employed in large enterprises	3,14	1,01	3,92	1,17
employed in medium-sized enterprises	2,84	1,11	3,82	1,05
employed in small enterprises	3,05	1,21	3,90	0,91
employed in micro-enterprises	2,78	1,24	4,33	1,15

Source: own research results

The following null hypotheses H_{01}- H_{09} were formulated to verify the thesis consisting in the statement that age, sex, education, nationality, place of residence, position held, as well as the size of the enterprise, and the type of its activity do not significantly differentiate employees' opinions on the sustainability of their enterprises:

• H_{01} There are no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities in the groups of Polish and Indian employees.
• H_{02} There are no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities between women and men.
• H_{03} There are no statistically significant differences in the distribution of assessments related to the sustainability of their enterprises' activities in the groups of employees with different education (higher, secondary).
• H_{04} There are no statistically significant differences in the distribution of assessments regarding the sustainability of their enterprises' activities in the groups of employees of various ages (under 35, 35-50, over 50).
• H_{05} There are no statistically significant differences in the distribution of assessments for the sustainability of their enterprises' activities in the groups of employees living in urban and rural areas.

• H_{06} There are no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities in the groups of employees holding various positions (managerial staff, people not holding managerial positions).
• H_{07} There are no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities in the groups of employees employed in service and production enterprises.
• H_{08} There are no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities in the groups of employees employed in enterprises of various sizes (micro, small, medium, large).
• H_{09} There are no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities in the groups of employees employed in service and production enterprises.

It began with the verification of the null hypothesis H1 that there were no statistically significant differences in the distribution of assessments of the sustainability of their enterprises' activities in the groups of Polish and Indian employees using the Mann-Whitney U test. With such a value of statistics Z (8.393979), the null hypothesis that both groups of employees from Poland and India assessed the degree of sustainability of their enterprises' activities similarly had to be rejected (Table 2).

Table 2: Differences in the distribution of Polish and Indian employees' subjective assessments regarding the sustainability of their companies' activities

Grouping variable	**Country:**
Group name	India
The sum of the group ranks	57610,5
Average group rank	320,058333
Group name	Poland
The sum of the group ranks	67139,5
Average group rank	210,468652
Statistics U	16099,5
Statistics U	41320,5
Value p (exact)	0,0001
Statistics Z (with correction for associated ranks)	8,393979
Value p (asymptotic)	<0,000001

Source: own research results

Therefore, we can conclude with 95% probability that Indian employees assess the sustainability of their enterprises' activity to a significantly higher degree than Polish employees (p=0.0001). The above result is puzzling, because according to the global SDG 2020 index characterizing the state of implementation of 17 Sustainable Development Goals 2030, Poland achieved the indicator 78.19 in 2020 (23rd place out of 166 countries), and India 61.92 (117th place) (Bertelsmann Stiftung, 2020). Therefore, since India has achieved much worse results in terms of sustainable development, its optimistic assessment probably resulted from other factors. It could have been influenced by cultural factors since the business culture in India reflects the social order governed by patriarchalism and hierarchy prevailing there. The prevailing situation on the labor market could have been of some importance. In India, in October 2019 (at the time of the research), the unemployment rate was 8.1% (India Center for Monitoring Indian Economy), while in Poland it was 5% and it was the lowest in 30 years (GUS). Thus, the labor market in Poland at that time was the employee's market. Perhaps some of the factors contributing to the Indian employees' assessment of the situation were that they have insufficient knowledge about the negative impact of enterprises' activities on the natural environment.

Perhaps the respondents from India have slightly different expectations / standards regarding the sustainable development of enterprises than those from Poland. Despite the identified differences in the assessment made between employees from India and Poland, it should be emphasized that both groups think that the current activities for sustainable development in their companies are insufficient or simulated. This allows for the conclusion that a significant part of enterprises in Poland and India still do not operate in a sustainable manner.

In the next step, there was verified the null hypothesis H_{02}, which stated that there are no statistically significant differences in the distribution of assessments concerning the sustainability of business activity among women and men. Although the arithmetic mean of women's assessments (2.96) was lower than that men's (3.01), the differences were not statistically significant (Table 3).

Table 3: Differences in the distribution of subjective women's and men's assessments concerning the sustainability of their enterprises' activities

Group name	**Woman**
The sum of the group ranks	48112,5
Average group rank	246,73077
Group name	Man
The sum of the group ranks	76637,5
Average group rank	252,09704
Statistics U	29002,5
Statistics U	30277,5
Value p (exact)	0,676997
Statistics Z (with correction for associated ranks)	0,417321
Value p (asymptotic)	0,676444

Source: own research results

With the statistic Z (0.417321) and p = 0.676997, the null hypothesis H_{02} that women and men assess the same degree of sustainability of their enterprises' activity similarly should be accepted. This result is puzzling as long as it can be assumed that women similarly assess the sustainability of their enterprises, regarding the reduction of harmfulness of their activities to the natural environment, or activities for social initiatives. However, it is difficult to accept, based on current statistical data, that women and men are treated equally in enterprises in Poland and India. It is worth recalling that "Gender equality" is the fifth of the 17 Sustainable Development Goals to be implemented by 2030 (The United Nations 2019). Indeed, it has been recognized that "gender equality" is not only a fundamental human right but an indispensable foundation for a peaceful, prosperous, and enduring world. An analysis of the current data on gender equality according to the Global Gender Gap Report 2020 shows that women are still discriminated and in a more difficult situation on the labor market. In 2020, Poland has achieved the indicator of 0.736 (where 1 means equality between women and men) and was placed 40th out of 152 countries. India, on the other hand, achieved the index of 0.668 and was placed 112th. In the area of Economic Participation and Opportunity, the Global Gender Gap Report 2020 indicator for Poland is even lower and amounted to 0.711 (57th position) and for India 0.354 (149th position) (World Economic Forum 2020). Given the data, the research results indicate that probably some of the surveyed women are not aware of the gender inequalities existing in their companies or do not associate them with sustainable development.

Like above, the H_{03} hypothesis was verified to determine whether education influences the surveyed employees' assessment regarding the sustainability of their enterprises (Table 4).

Table 4: Differences in the distribution of employees' subjective assessments regarding the sustainability of their enterprises' activities with higher and secondary education

Grouping variable	**Education**
Group name	secondary
The sum of the group ranks	48691
Average group rank	208,081197
Group name	higher
The sum of the group ranks	76059
Average group rank	287,015094
Statistics U	21196
Statistics U	40814
Value p (exact)	0,0001
Statistics Z (with correction for associated ranks)	6,282842
Value p (asymptotic)	<0,000001

Source: own research results

With the statistic Z (6.282842) and p = 0.0001, the H_{03} hypothesis had to be rejected.
It turned out that people with higher education assess their enterprises' sustainability significantly higher than those with secondary education.

This may indicate that people with higher education are better treated in their enterprises and that more activities are carried out for them to ensure their decent work, good working conditions, fairness, and equality. Perhaps their higher assessment of the sustainability of their companies' activities results from the fact that they have greater knowledge and expectations in this regard, and as a result, they perceive activities undertaken by companies for sustainable development, including for employees and other social initiatives.

To verify the hypothesis H_{04}, consisting in the statement that there are no statistically significant differences in the distribution of assessments regarding the sustainability of their enterprises' activities in groups of employees of different ages (under 35, 35-50, over 50), the Mann-Whitney U test was performed (Table 5).

Table 5: Differences in the distribution of subjective assessments concerning the sustainability of their companies' activities between employees of different.

Kruskal-Wallis ANOVA		**POST-HOC (Dunn Bonferroni)**	**below 35**	**35-50**	**50 +**
Analyzed variables		Difference for mean ranks			
Multiplicity – not interpreted	0	below 35		12,73	10,2
Multiplicity – no data	0	35-50	12,73		2,53
Significance level	0,05	50 +	10,20	2,53	
Grouping variable	Age	NIR			
Degrees of freedom	2	below 35		44,20	69,08

Statistics H (with correction for associated ranks)	0,56	35-50	44,20		78,57
Value p	0,76	50 +	69,08	78,57	
Jonckheere-Terpstra trend test		Statistics			
Sequence number for [below 35]	1	below 35		0,69	0,35
Sequence number for [50]	2	35-50	0,69		0,08
Sequence number for [50 +]	3	50 +	0,35	0,08	
Statistics L	18659	Value p			
Statistics Z	0,7397	below 35		1	1
Value p one-sided	0,2298	35-50	1		1
Value p two-sided	0,4595	50 +	1	1	

Source: own research results

They turned out to be statistically insignificant (p = 0.2298). It was decided to analyze the existence of a trend for subsequent populations using the Jonckheere-Terpstra test for ordered alternatives (Jonckheere 1954; Terpstra 1952). The p value determined from the test statistics was compared with the significance level. It was suspected that people of different ages differently assess their enterprises' sustainability. Therefore, it was decided to conduct a trend analysis. In the surveyed population, the assessment of the sustainability of their enterprises' activity decreases with the increase of age. Successive age categories were assigned successive natural numbers. The obtained one-sided p value = 0.229756 is greater than the set significance level $\alpha = 0.05$, which indicates no trend. Therefore, the null hypothesis H4 had to be accepted.

To verify the null hypothesis H5, it was checked whether the place of residence was an important factor influencing the employees 'assessment of the sustainability of their enterprises' activities (Table 6).

Table 6: Differences in the distributions of subjective assessments regarding the sustainable operation of their enterprises between employees living in urban and rural areas

Grouping variable	**Place of residence**
Group name	Urban
The sum of the group ranks	99773,5
Average group rank	259,151948
Group name	Rural
The sum of the group ranks	24976,5
Average group rank	219,092105
Statistics U	18421,5
Statistics U	25468,5
Value p (exact)	0,007219
Statistics Z (with correction for associated ranks)	2,682343
Value p (asymptotic)	0,007311

Source: own research results

With the statistic Z (2.682343) and p = 0.007219, the H5 hypothesis had to be rejected.
Thus, it can be concluded with 95% probability, that employees living in urban areas assess the state of sustainability of their enterprises' activity to a significantly higher degree than employees living in rural areas (p = 0.007219).

This may indicate that enterprises in cities care more about sustainable development, i.e., they reduce the harmfulness of their activities to the natural environment and more often act for employees and other social initiatives.

To verify the null hypothesis H_{06}, the Kruskal-Wallis ANOVA test was carried out, which allows to determine the differences between the assessment of the sustainability of enterprises' activities in groups of employees occupying different positions divided into management staff and persons not performing managerial functions (Table 7).

Table 7: Differences in the distribution of assessments regarding the sustainable operation of their enterprises between employees living in urban and rural areas

Grouping variable	**Position**
Degrees of freedom	5
Statistics H (with correction for associated ranks)	7,526421
Value p	0,184339

Source: own research results

Although the management staff assesses the sustainability of their enterprises' activity to a slightly higher degree (arithmetic mean 3.15) than people who do not perform managerial functions (2.96), these differences turned out to be statistically insignificant (p = 0.184339). Therefore, the H6 hypothesis had to be accepted. On the other hand, statistically significant differences were found in the assessment of enterprises' sustainability depending on the size of the enterprise in which the respondent was employed (Table 8).

Table 8: Differences in the assessment of the degree of sustainability of enterprises' activities between people employed in enterprises of various sizes (micro, small, medium and large ones)

Grouping variable	**Size of the enterprise**
Statistics H (with correction for associated ranks)	4,963313
Value p	0,174503
Jonckheere-Terpstra trend test	
Sequence number for [micro, small, medium, large]	1, 2, 3, 4
Statistics L	43948,5
Statistics Z	1,967575
Value p one-sided	0,024558
Value p two-sided	0,049117

Source: own research results

The research results show that large enterprises care for the sustainable development to the greatest extent. People employed in micro-enterprises rated the sustainability of their enterprises significantly lower. The obtained value of p = 0.024558 is lower than the set significance level, which speaks in favor of the occurring trend. Therefore, the size of the enterprise significantly affects the sustainability of its operations. Therefore, the null hypothesis H_{08} had to be rejected.

In the last step, the null hypothesis H_{09} was verified, which stated that there were no statistically significant differences in the distribution of assessments concerning the sustainability of their enterprises' activities in the groups of workers employed in service and production enterprises (Table 9). The differences turned out to be statistically insignificant (p = 0.973445). Therefore, the hypothesis

H_{09} had to be adopted (p = 0.973445), which means that respondents from production and service enterprises assessed the sustainability of their enterprises in a similar way.

Table 9: Differences in the distribution of subjective assessments regarding the sustainability of the enterprises' activities between employees from service and production enterprises

Group name	**Production**
Average group rank	58053
The sum of the group ranks	250,22845
Group name	Services
The sum of the group ranks	66697
Average group rank	249,8015
Statistics U	30919
Statistics U	31025
Value p (exact)	0,973445
Statistics Z (with correction for associated ranks)	0,033647
Value p (asymptotic)	0,973159

Source: own research results

Based on the Spearman's rank correlation coefficient, statistically significant relationships were established between the employees' assessment of the company's sustainability level and their sustainable development practices. Therefore, the employees of the enterprise assess the level of sustainability of the enterprise higher the more often (N = 499):

• environmental and social issues are taken into account when making critical decisions in the enterprise (r = 0.169282, p = 0.000145);
• the enterprise conducts Employee Volunteering enabling employees to carry out charity projects during their work (r = 0.128601, p = 0.004009);
• the company communicates and disseminates its commitment to sustainable development, both among the non-managerial employees and in the environment (r = 0.120204, p = 0.007185);
• the enterprise supports employees in their pursuit of work-life balance (r = 0.103744, p = 0.020454);
• the employer cares about the improvement of working conditions (r = 0.088706, p = 0.04765).

Conclusion and Discussion

According to employees, only some enterprises in Poland and India follow sustainability practices. This is a confirmation of results of other research indicating that implementation of sustainable development principles is difficult for enterprises (Revell, Blackburn, 2005, Drake et al., 2004), and that in key decision-making enterprises consider other criteria than environmental and social issues (Bonn, Fisher, 2011; Gibson 2006; Ehrenfeld, 2000; Nilsson & Persson 2012; Robért, Broman, Basile, 2013; Baldock & Charveriat, 2018). The discussed assessment by employees may suggest that issues of operations sustainability, especially with respect to human resources management are treated in some of the studied enterprises in a selective or partial way or even are ignored. Age, gender, job position and type of business do not significantly differentiate employees' assessment of corporate sustainability. However, the study has confirmed that employees in India, those with university degree, residents of urban areas and employees of big companies assess the condition of sustainability at their employer enterprises significantly higher. This may suggest that at big cities and big enterprises more attention is paid to sustainable development, including sustainable measures for people with university background. The significant correlations between the employees' assessment and pro-sustainable development practices suggest that the assessment was better at enterprises where more attention was

paid to considering environmental and social issues at key corporate decision-making, where corporate volunteering was applied more broadly to allow employees take part in charity project during their working hours, enterprises with improved communication and promotion of pro-sustainable development measures among employees and in the environment, where employees were supported in searching for work-life balance and where more attention was paid to improvement of working conditions. The obtained results may indicate that at some studied enterprises strong leadership was missing, and this is one of the essential factors that determine introduction of sustainable development. This conclusion is consistent with findings of De Gobbi (2011) and Stewart, Gapp (2011). Another cause of this situation may involve management staff's insufficient understanding of values arising from sustainable development and their impact on satisfaction of employees and customers (Hemingway, Maclagan, 2004 and De Gobbi, 2011). Therefore, it seems reasonable to postulate that enterprises should operate in a more sustainable manner, because previous measures taken seem insufficient or purely declarative, especially in employees' opinion.

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Nature Ideas Exchange: Adaptation, Ethics and Tolerance Upbringing of Adolescents from Reform Schools and Detention Homes on Examples of Similarity with The Forest Ecosystem

(1)Karolina MACHACKOVA, corresponding author

(2)Martin POP

(1)Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Kamýcká 129, Praha 6 - Suchdol, 165 00, Czech Republic

(2)Institute of Hospitality Management in Prague, Svídnická 506, Prague, Czech Republic

(1) e-mail: machackovak@fld.czu.cz
cell: 00420 720 554 799
https://orcid.org./0000-0001-9819-5325 https://www.researchgate.net/profile/Karolina_Machackova

(2)e-mail: pop@vsh.cz
cell: 00420 730 612 116

Abstract

This article describes ongoing research with 152 adolescents from six reform schools and detention homes aged 12-16 years with a risky behavioural disorder (drugs, crime, aggression). The aim is to find out whether young people's understanding of moral values will increase, and social adaptation improves through regular workshops in the forest. On the examples of forest fauna and flora (wolves, wild boars, deers, fungi, bees, ants) the principles of mutual coexistence, cooperation, care for others, adaptation and collaborative animal and plant models were demonstrated to the teenagers using forest pedagogy methods. The theoretical framework is based on the nature ideas exchange. Analogy method and Focus interview with off-topic replicas methodologically approach this research.

Keywords: *Serious behavioural disorders. Morality and values. The analogy method. Collaborative models of forest.*

Introduction

Every living organism manifests itself in a relationship with other organisms in the environment, but sometimes the relationships are disrupted by aggression and social maladaptation, which is more serious when it concerns children and adolescents.

Experts at Stanford University led by dr. Nicole Ardoin systematically analyzed 119 peer-reviewed studies published between 1994 and 2013. These studies measured the impact of environmental education and stay in nature on K-12 children and pupils from 33 countries. The studies have clearly shown that environmental education has led to many positive outcomes, from improving academic performance, enhancing critical thinking skills, developing personal growth, and life-building competencies, including self-esteem, increased civic engagement, and positive environmental behaviour (Ardoin, Bowers, Wyman & Holthuis, 2018; Stern, Powell & Ardoin 2008). It follows from the above that staying in nature improves skills and personal competencies.

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Processes and interactions in nature are very similar to proceedings and interactions in human society (Kopčaj, 2007). Ecosystems are not only for nature conservationists and researchers; they have much in common with the community (Salvati &Zitti, 2008). Every day, caring for others, coexistence, cooperation, adaptation, and innovation take place in nature. The constant pressure on assimilation has led to high-level specializations, sophisticated survival strategies and especially collaborative models (Rösler, 1995b). Based on this fact, we hypothesize that ethical behaviour can be well demonstrated in parallels with the living ecosystems of nature. Rösler (1995a) introduces the term "Nature Ideas Exchange": nature offers many analogies applicable to practice, on which the principles of ethics, morality and cooperation can be presented uniquely.

Aim of the Study

As part of the upbringing and reeducational activities of adolescents suffering mental problems with severe risky behaviour (abuse, criminality, truancy, aggression, early sex life), a pedagogical-psychological experiment is performed. The objective of this research is to bring up adolescents from reform schools and detention homes to behave according to the principles of morality, ethics, caring for others and cooperation. The analogy with forest ecosystems has been used for this purpose. This study aims to identify whether the training of ethical behaviour in the form of analogy with the forest ecosystem using forest pedagogy methods (Cornell 1991, 1998, 2012) will improve teenagers' teamwork and social adaptation. The following question guided the study: has adolescents' social competenceincreased? Analogy method and Focus interview methodologically approached this topic.

Method number 1: Pedagogical experiment: “Searching for parallels of natural ecosystem using analogy based on examples of coexistence, adaptation and cooperation of the forest ecosystem.”

Method number 2: Focus discussions with off-topics replicas.

Materials and Methods

Verification must come from confrontation, comparison, real examples, and experiments. Is it an effective training for ethical values if we place adolescents with the severe behavioural disorder into a lecture hall and give them a continuous tutorial on morality? Yes and no: teenagers gain an overview from an interdisciplinary perspective, but due to the chosen (frontal) method of teaching, knowledge acquired in this way may be shallow. Juveniles do not gain enough experience to understand the essence of interrelationships, interdisciplinary links do not develop to a sufficient depth, and attention is declining (Průcha, Walterová, Mareš 2001). Frontal teaching does not develop learning competence (Walberg & Paik, 2000).

Sociological pedagogy and the development of personality through social work and solidarity we can trace in the ideas of E. Durkheim. Emphasis on creative work and the environment is placed by H. Parkhurst, R. Steiner, and C. Freinet, who emphasize the practical application of knowledge, creative work, and the teacher's cooperation with children. By analogy method with a living ecosystem, youthful could gain new perspectives and participate directly in this world to make informed decisions and become change agents.The analogy is crucial for human creativity and the active learning process. It is a relationship between two different things, comparing the unknown to the known (Dvořák, 2007). Analogies help us to find significant parallels between distinct situations (Wilson & Keil, 1999). Hofstadter & Sander (2013) consider analogies as the basis of our thinking. Gentner (2003) claims that people are intelligent because of (1) their extraordinary ability to learn by analogy, (2) mastery of sign systems, and (3) the relationship between the previous two. Analogous reasoning is abstract thinking in everyday life (Smirnova, Zorina, Obosova & Wasserman, 2014). The analogy is also a stylistic means used to support argumentation (Przywara, 2007).

The principles of adaptation, partnerships and cooperation can be explained on forest fauna and flora. A total of 152 adolescents from six reform schools and detention homes aged 12-16 years participated in the pedagogical experiment (n = 152). The maximum group size was eight people.

First, the teacher explained how the individual plants and animals in the forest behave and their specifics. The teacher used in doing so demonstration and experience methods and in nature showed strategic partnerships, cooperation, adaptation, innovation and animal care on the examples of living trees, bees, ants, mushrooms, plants and animals. Teenagers worked in teams, searching for parallels between commonality of the forest ecosystem, and human society through observation, discussion, brainstorming, mind maps, educational games, and experiences using forest pedagogy methods.

Results

Parallels between forest ecosystem and morality, ethics and tolerance in society

The parallels are numbered (1-9); the following text represents the teacher's explanation of the topic, and the arrow → means analogy with society detected by teenagers (Parallel: teacher'sexplanation→ analogy detected).

1. Bee and plant (*Apis mellifera*): the bee is saturated with pollen and guarantees the flower its reproduction → mutually beneficial and altruistic cooperation.
2. Nitrogen fixation: the plant obtains nitrogen and microorganisms are protected in tubers → successful coexistence.
3. Beehive and anthill: division of labour between different castes, some care for protection and safety, others care for larvae, others forage →interconnected and functional system of cooperation and care for others, in which each individual has a role and place, willingness accept their role in the community.
4. Wolf pack, a group of wild boars; deer and roe community: the members of the tribe know each other well, the loss of one member of the group leads the others to look for him. Members share feed and help each other with hunting, caring for cubs and protecting the group → integration into the society of other individuals, caring for others, teamwork, solidarity. The pack or tribe must be cooperative and pull together.
5. Swarm: A flock of animals behaves and moves like one living organism with a certain logic without anyone commanding them → conformity and tolerance of others in the swarm.
6. Ants (*Lasius niger*), termites (*Isoptera*) and aphids (*Aphidoidea*):ants supply the fungi with plant tissue and then these fungi become the primary source of their food. Aphids contribute their organic matter and ants protect them→ if we want to get something, we have to give something ourselves, the principle of exchange.
7. Jay's shout: a warning signal to which other animals also respond → to worry about others.
8. Meadow grasshopper in green grass (*Conocephalus discolour*), and *Syrphus ribesii*: insects blend in colour with their surroundings or mimic the appearance of wasps, bees and bumblebees → if we want to survive, we must confirm the surroundings.
9. The evolutionary theory of Ch. Darwin: change →the advantage is one who cooperates and conforms; not one who is aggressive.

Conclusion (tentative)

We have already obtained challenging empirical data, and our research will continue with ananalysis of communication in the form of focus interview with off-topic replicas. On the examples of forest fauna and flora, adolescents see that values such as cooperation, adaptability, care for others allow them to survive and are completely self-evident in nature.

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Structure of Ukrainian Agricultural Insurance Market in Terms of Sectoral Gradation

Olena PROKOPCHUK
Uman National University of Horticulture, Ukraine, E-mail: olena_prokopchuk@ukr.net

Olena NEPOCHATENKO
Uman National University of Horticulture, Uman, Ukraine, E-mail: nepochatenko1@gmail.com

Mykhaylo MALYOVANYI
Uman National University of Horticulture, Ukraine, E-mail: malyovanyi1980@gmail.com

Svitlana VLASYUK
Uman National University of Horticulture, Ukraine, E-mail: vlasiuks@ukr.net

Nataliia IVANOVA
Uman National University of Horticulture, Ukraine, E-mail: nn_ii@ukr.net

Abstract

The article investigates the internal structure features of the agricultural insurance market, which resulted in III sectors gradation; each of them forms separate structural elements or their totality. It is determined that the authorized body for supervision of insurance activity (State Financial Services Commission) belongs to the sector I of the internal structure of agricultural insurance market; to sector II - structural elements; to sector III - elements of infrastructure. The external environment of the agricultural insurance market is a system of interrelated factors that surround and affect its internal system. This classification makes it possible to describe the structure of the agricultural insurance market as a complex polystructural system having a three-sector internal structure and surrounded by the external environment and to substantiate the feasibility of complex supervision, regulation and development of all its constituent elements. The essence of the concept of "agricultural insurance market" is investigated and the author's definition is presented.

Keywords: Agricultural Insurance Market, Internal Structure, Regulator Of The Agricultural Insurance Market, Structural Elements, Infrastructure Elements.

Introduction

For Ukraine, the agricultural sector has always been one of the priority areas from the standpoint of both foreign economic and domestic economic development, as the immediacy of the manufacturing process management and support of food facility is acute for each country in all periods of development. This statement is crucial not only to ensure the viability and self-sufficiency of the country as a whole and society in particular, but also many different areas of human activity. Given that the agricultural sector in Ukraine is developing dynamically, agricultural insurance, as a tool to ensure the stability of agricultural producers income, should at least partially meet such dynamics.

The development problems of the agricultural insurance market in Ukraine give rise to the situation that all its participants and, above all, farmers, suffer from. As a result, they are deprived of the opportunity to make informed decisions about the choice of insurance companies with which they plan to enter in cooperation (Nesterchuk et al., 2018). As a result, those wishing to obtain agricultural insurance services in Ukraine, despite the steadily improving performance of the agraricultural sector in the national economy, remain extremely short.

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Methodology

For the scientific solution of the goal set out in the article, general scientific methods of scientific cognition and study of economic phenomena were used, in particular the dialectical method of cognition - for the analysis of scientific works of scientists on the domestic and foreign functioning problems of the agricultural insurance market in general, and the study of its structure peculiarities, in particular; the method of empirical research - as part of the assessment of the current state and development of the study object; graphical method - for systematization and visual representation of research results; abstract-logical approach - to summarize the study results and formulate conclusions on this basis.

Analysis of the latest studies and publications

Different aspects of the functioning of such an important tool as agrarian insurance were studied by the number of national scientists and practitioners, among them are Martseniuk-Rozaronova, (2010); Navrotskyi, (2012); Nesterchuk. (2018); Polchanov, (2013) et al. In their research the scientists studied the main development trends of the Ukrainian agricultural insurance market in general and some problematic aspects of its development, generalized historical aspects of its formation and establishing, studied the specific features of insurance legislation, and found out the specific character of the insurance market. Ukrainian scientists researched insurance products and insurance schemes that provide insurance protection of agricultural producers: Nesterchuk, Tsymbalyuk & Rolinskyi (2018); Sinitsina (2011).

Some theoretical and practical aspects of agricultural insurance were profoundly investigated by foreign scientists, among them the following should be mentioned: Adhikari, Belasco & Knight (2010); Assa (2015); Komadel, Pinda & Sakalova (2018).

It is necessary to mention that foreign scientists provide a profound and elaborate analysis of insurance programs, used in the agrarian insurance. This aspect was covered by foreign researchers in the context of classical, parametric and specific insurance schemes.

A great body of scientific literature deals with parametric schemes in the agricultural insurance, that is the index insurance products for agriculture. This aspect is sufficiently and elaborately researched by the following foreign scientists Mußhoff, Hirschauer, Grüner & Pielsticker (2018); Xiao & Yao (2018).

At the same time, the realities of today are such that the structure of the agricultural insurance market is disparate in nature, as it is limited by the classification of structural and partly infrastructural elements, as well as by the supervisory and control bodies and lacks a holistic perception.

In view of this, at this stage, the question of the internal structure peculiarities of the agricultural insurance market requires more and more attention.

Aims

The purpose of the article is to study the features of the internal structure of the agricultural insurance market of Ukraine, in terms of sectoral gradation of the latter in particular.

Results and Discussion

The study of the agricultural insurance market is impossible without an in-depth analysis of its structure, that is, the elements of which it consists and which interact. The agricultural insurance market is a rather complex phenomenon that has its internal structure and external environment.

The interpretation generalization of "agricultural insurance market" concept, with the author's proposal of this definition is reflected in Fig. 1.

AGRICULTURAL INSURANCE MARKET

- the environment in which insurance companies operate and provide services in the agricultural sector of economy
- mechanism for financial resources redistribution of agricultural producers and insurance companies operating in the agricultural sector
- set of structural and infrastructural elements of the agricultural insurance market, which appropriately participate in the implementation of the relevant services
- the sphere of economic relations, where the object of sale is agricultural insurance
- * a complex integrated system covering various structural units and a platform for cross-sectoral interaction of structural elements of the specified market, which are appropriately involved in the production and consumption of relevant services, elements of infrastructure, facilitating the prompt interaction of structural entities (insurance companies and agricultural producers) in their production, purchase and sale and consumption, and the supervisory bodies that oversee the insurance business.

It should be noted that, in contrast to the existing definitions, the proposed one takes into account the interaction not only of structural entities (mainly insurance companies and agricultural producers), but also of other constituent elements of the specified market structure, in particular this concept is considered in the context of balanced and organized cross-sector cooperation and interaction of all key elements of the agricultural insurance market, which are appropriately involved in the production and implementation of the relevant services (Assa, 2015, Komadel, 2018).

Mandatory conditions of the agricultural insurance market functioning are:

- insurance items having a use value;
- insurance protection need;
- possibility to make a decision on participation in the insurance agreement;
- structural and infrastructure entities of the agricultural insurance market that are able to meet mentioned needs or consume them.

Considering the general structure features of the agricultural insurance market, it should be noted that the latter has a complex three-sector internal structure and is surrounded by the external environment. The key sectors that shape its internal structure include: sector I - an authorized insurance supervisor; II - structural elements; III - infrastructure elements. The external environment of the insurance market is a system of interaction between the factors that surround and influence the internal system. It is represented by elements that the insurer can manage (market demand, competition, insurance know-how, insurance market infrastructure) and those that it cannot influence (population, age and sex structure, seasonal migration, consumer purchasing power), but should take into account in their activities.

Let us dwell on each sector of the internal structure of the agricultural insurance market in more detail.

The first sector of the internal structure of the agricultural insurance market

The first sector of the internal structure of the agricultural insurance market is formed by agricultural insurance market regulator which functions are vested in the National Commission, which carries out state regulation in the sphere of financial services markets (National Financial Services Commission).

The mission of the National Financial Services Commission is to create conditions for efficient and transparent functioning of non-banking financial services markets, strengthen systemic stability and improve financial inclusion in these markets, ensure consumer rights protection for non-banking financial services, as well as integrate into the global financial space with no threat to Ukraine's national interests and economic strength.

The second sector of the internal structure of the agricultural insurance market

The structural elements of the agricultural insurance market that form sector II of its internal structure include: insurance companies that perform the functions of developers and insurance/reinsurance providers in this market; agricultural producers - consumers of these insurance services and association of insurers - providers of secondary, ancillary services (Fig. 2).

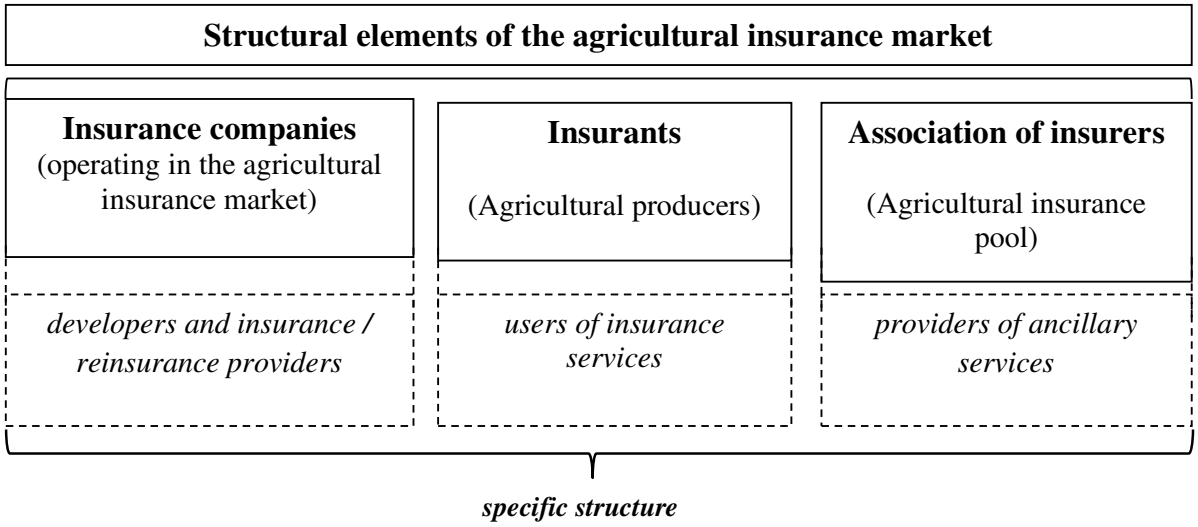

Fig. 2: Structural elements of the agricultural insurance market
[Author's development].

Insurance companies operating in the Ukrainian agricultural insurance market

According to the National Commission for State Regulation of Financial Services Markets, in 2018 63 insurance companies were licensed to conduct insurance activities in the form of voluntary insurance of agricultural products, while only 14 of them actually insured agricultural risks (Fig. 3).

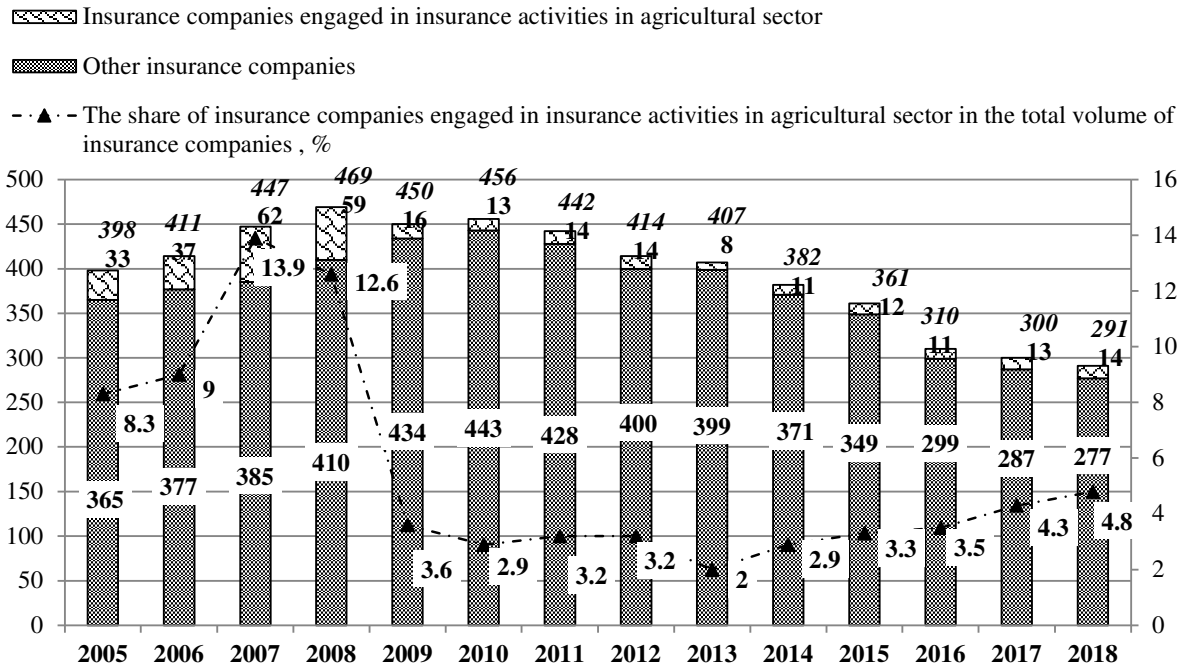

Fig. 3: Number (units) and share (%) of insurance companies in the agricultural insurance market of Ukraine

[Source: calculated and proposed by the authors].

The Ukrainian insurance industry is characterized by a decrease in the number of such structural entities operating in the insurance market as insurance companies. Thus, if in 2008 their number reached a maximum for the study period and amounted to 469 units, in 2018 - reached a minimum - 291 units.

As for insurance companies engaged in insurance activities in agricultural sector, since 2010 their number has been more or less stable, being volatile between11-14 units.

Analyzing the data of Fig., it should be noted that the number of insurance companies operating in the agricultural insurance market is quite small. Thus, their share in 2018 was almost 5% (or 14 units). The average value of the analyzed indicator for the study period was 6% (or about 25 units).

In addition, it should be noted that a certain center of insurance companies has been formed, which are already constantly and fairly stable in the Ukrainian agricultural insurance market (Fig. 4).

Insurance organizations that insured agricultural crops

PAT Strakhova kompania AKHA STRAKHUVANNIA
PAT Ukrainska Aktsionerna Strakhova kompania ASKA
PAT Strakhova kompania BROKBIZNES
TDV Strakhova kompania GARDIAN
PAT UKRAINSKA POZHEZHNO-STRAKHOVA KOMPANIA
PAT Aktsionerna Strakhova kompania INGO Ukraina
PAT Strakhova kompania KRAINA
PAT Strakhova kompania Oranta-Sich
PAT Strakhova kompania PZU UKRAINA
PAT Strakhova hrupa TAS
PAT Ukrainska agrarno-Strakhova kompania
PAT Strakhova kompania Universalna
PAT STRAKHOVA KOMPANIA MEGA-HARANT
PAT Strakhova kompania HARANT-SYSTEMA

Fig. 4: Insurance companies that provided agricultural insurance services in the agricultural insurance market in 2018

[Source: calculated and proposed by the authors].

Agricultural producers who are consumers of insurance services in the Ukrainian agricultural insurance market

Distributive peculiarities of enterprises engaged in agricultural activities by the size of farm land in 2018 are shown in Fig. 5.

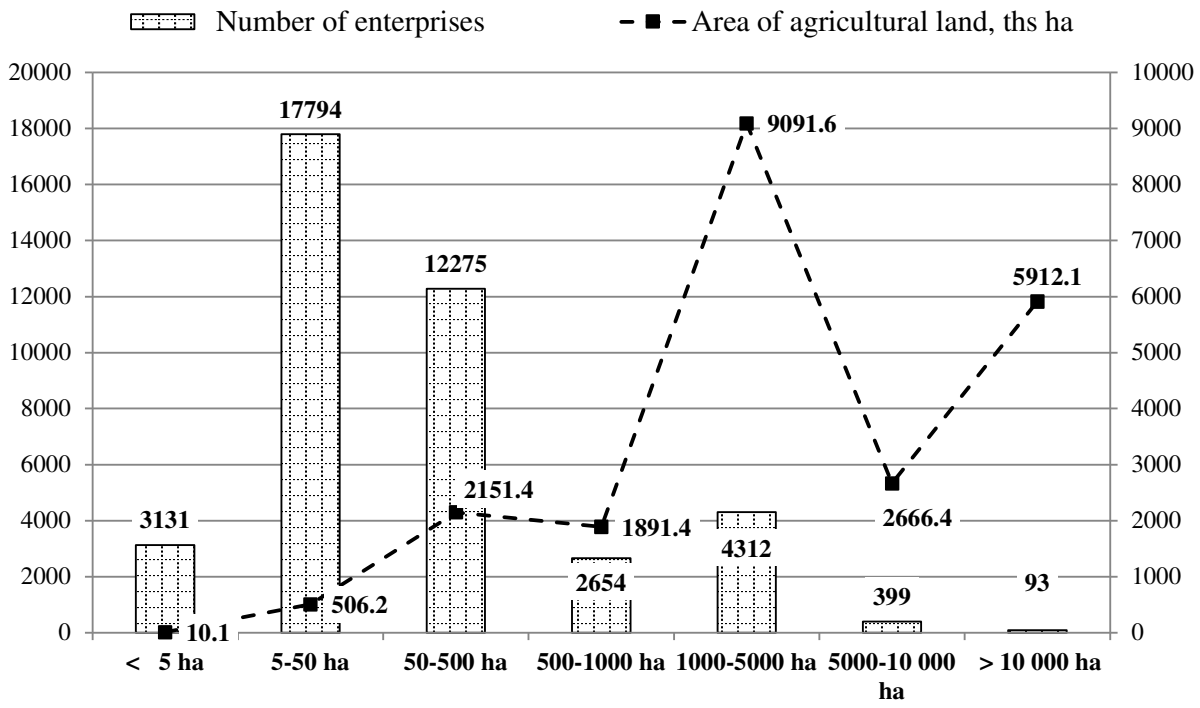

Fig. 5: Distributive peculiarities of enterprises engaged in agricultural activities by size of agricultural land in 2018

[Source: calculated and proposed by the authors].

Analyzing the data of Figs. It should be noted that there are about 166 companies that grow crops on more than 10 thousand hectares of land. And those who cultivate an area of 1000-10 000 hectares, there are almost 5 000. Thus, a little over 10% (13%) of companies control about 80% (77%) of agricultural land in Ukraine.

Instead, 8% of enterprises with up to 5 hectares of land cultivate only 0.05% of all Ukrainian agricultural lands.

The largest number of enterprises – 17 794 units (or 44%) is concentrated in the group of enterprises under the cultivation of which there are from 5 to 50 hectares of land. However, it is only almost 3% (2.5%) of agricultural land in Ukraine. The group of enterprises cultivating from 50-500 ha is quite significant - 12 275 (30%), 11% (2151.4 thousand ha) of all Ukrainian agricultural lands are cultivated.

An association of insurers operating in the agricultural insurance market

The only association of insurers that provide insurance in accordance with the Law of Ukraine "On features of insurance of agricultural products with state support" is the Agrarian Insurance Pool. The participation of insurers in this association is a condition for the implementation of insurance of agricultural products with state support (Fig. 6).

AGRICULTURAL INSURANCE POOL	
General characteristics	non-profit organization that unites insurers of Ukraine on a voluntary basis
Date of foundation	November 07, 2012 (created by four insurance companies)
Main activity	related to the organization and implementation of production risk insurance, storage and circulation of agricultural products (with state support) from agricultural production risks)

was to promote:

improving the quality of agricultural insurance
introduction of general rules of conduct in the market (so that there are no conflicts between insurers and farmers)
introduction of standard insurance products (developed and proposed by the International Finance Corporation (IFC, World Bank Group) Project "Development of Agricultural Insurance in Ukraine", prepared taking into account the world experience and Ukrainian features of agricultural insurance and related to strategically important for Ukraine grain and technical crops)
mediation between the agricultural insurance market and the government (in particular, his task was to revive subsidized insurance)

turned:

to the regulator of financial flows in the field of subsidized agricultural insurance (as soon as the need for this function has disappeared, the need for the pool itself has disappeared - as a result, a situation has arisen in which the pool nominally exists, but in fact does not work).

Fig. 6: General characteristics and functions of the agricultural insurance pool
[Author's development].

Under modern conditions, when the state support of agricultural insurance is purely declarative in nature and does not work in reality, the agricultural insurance pool may be entrusted with the functions of agreeing the rules of the game in the agricultural insurance market, as well as the interests of all its key participants.

The third sector of the internal structure of the agricultural insurance market

The agricultural insurance market of Ukraine in terms of infrastructure elements that form sector III of its internal structure is presented in Fig. 7.

The implementation of insurance services is essential for the formation of proper relationships between insurance companies and customers, which affects the image not only of individual insurers, but of the entire insurance market. At present, insurers pay special attention to the organization and improvement of the insurance products sales system through insurance intermediaries (Adhikari, 2010; Xiao, 2018).

The same situation is typical for the functioning of the agricultural insurance market, in which the intermediaries in the segment of insurance and non insurance types are actively involved in the process of insurance (reinsurance) services sale and their support in the agricultural sector of the economy.

The activity of insurance companies in attracting customers (agricultural producers) to conclude new insurance contracts is called acquisition (acquisition activity of the insurer). Acquisition providers are sales channels for insurance products. It is considered that the acquisition activity of the insurer is normal if the number of new insurance contracts exceeds the number of contracts for which the validity term has expired.

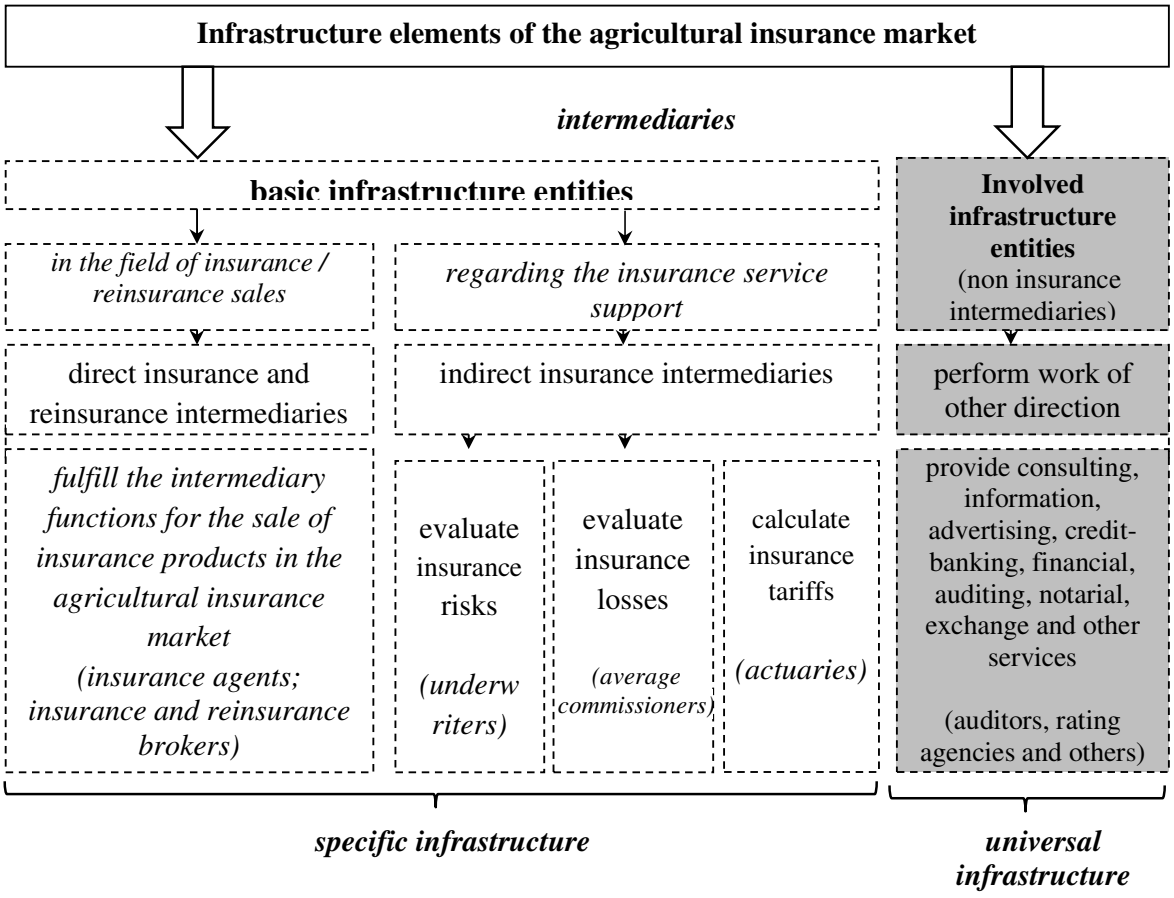

Fig.7. Infrastructure elements of the agricultural insurance market
Source: author's development

The main channels of insurance products sale in the agricultural sector of the economy are shown in Fig. 8.

The channels for insurance products sale are in the agricultural sector of the economy

an office channel for insurance products sale
(agricultural producers independently contact the office of the insurance company - such realization is carried out directly by its staff)

channel sales through insurance intermediaries

(agents and brokers on a commission basis are involved in the sale of insurance products. Their activity increases the efficiency of concluding agricultural insurance contracts)

channels for insurance products sale over the Internet, telephone

Fig .8. The main channels of insurance products sale are in the agricultural sector of the economy
[summarized according to Polchanov (2013); Sinitsina (2011); Vilenchuk (2014)].

At the same time, in Ukraine, the sector of the internal structure of the agricultural insurance market as intermediary or of infrastructure elements is not effectively developed.

Among the insurance intermediaries, operating in the Ukrainian agricultural insurance market, the intermediary services regarding the insurance services support (in particular, insurance risk assessment - underwriters; insurance loss assessment - average commissioners) have been acquired a certain level of development. Instead, insurance services in the domestic agricultural insurance market are mainly provided directly by insurance companies to their consumers - agricultural producers with no direct intermediaries - insurance agents and brokers in this process.

In addition, non-insurance intermediaries operate in the infrastructure of the agricultural insurance market, providing advisory, information, advertising, credit-banking, financial, auditing, notarial, exchange and other services.

Thus, improving the conditions for the development of intermediation in the Ukrainian agricultural market will make it an effective channel for the insurance products sale, which, in its turn, will strengthen the position of insurance companies in both its insurance and its agricultural insurance segment and enhance the culture of agricultural insurance among agricultural producers.

Conclusions

Thus, the study makes it possible to describe the structure of the agricultural insurance market as a complex polystructural system that has a three-sector internal structure (structured in III sectors) and is surrounded by the external environment.

Having investigated the internal structure of the agricultural insurance market, it should be noted that it is divided into III sectors, each of which form separate structural elements or their totality.

Thus, sector I belongs to an authorized body for insurance activity supervision (State Financial Services Commission); to II - structural elements (developers and providers of insurance services - insurance/reinsurance companies providing services in the agricultural sector; users of insurance

services - agricultural producers; providers of ancillary services - association of insurers); to III - infrastructure elements grouped by major infrastructure entities (insurance intermediaries, performing direct intermediary functions - agents and brokers and indirect - assess insurance risks - underwriters and insurance losses - average commissioners) and involved infrastructure entities (no insurance intermediaries) performing other business - auditors, rating agencies, and others). The external environment of the agricultural insurance market is a system of interrelated factors that surround and affect its internal system.

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Level of Regional Development and The Dynamics of Unemployment During The COVID-19 Crisis, Based on Observations of German And Polish Regions

Joanna KUDEŁKO

Professor of Cracow University of Economics, Cracow, Poland
kudelkoj@uek.krakow.pl

Dorota RYNIO

Professor of Wroclaw University of Economics and Business, Wroclaw, Poland
Dorota.Rynio@ue.wroc.pl

Abstract

The main objective of this paper is to provide an evaluation of the impact of the crisis produced by the COVID-19 pandemic upon the dynamics of unemployment increase in regions at different levels of socio-economic development. The examination involved regions of Germany and Poland. The following research methods were used: literature studies, descriptive statistics, the Hellwig's development measure method, and ANOVA one-way analysis of variance. The most significant finding of the study was as follows: at the present stage of the pandemic, the negative economic effects of the crisis are most profound for regions characterized by a higher level of development, compared to those in less advanced regions. The study presents an important contribution to the economic knowledge of crises, supplemented by detailed analyses of global economic trends produced in response to the pandemic threat. The most important limitation of the study is the preliminary character of the empirical observations made – a direct result of the limited availability of formal statistics and the relatively short time window of the present crisis. Future analyses may be supplemented by a wider selection of regions and factors under examination over longer periods, to ensure effective verification of the preliminary findings. The research results may serve to support governmental activities at different levels of administration in the effective planning of regional socio-economic development, including those made in anticipation of various crisis phenomena.

Keywords: Economic crisis, unemployment, regional development, demographics, regional vulnerability, regional resilience

Introduction

In line with the present approach, planning of socio-economic development is determined by many variables; some of these variables may not necessarily be desired, expected, or foreseeable. Changes in global economy proceed in a rapid fashion, and are unparalleled in their effective extent in this highly turbulent environment [Cortwright 2001].

The present economic crisis associated with the global outspread of the SARS-CoV-2 virus has already brought some negative consequences of unparalleled scale to national and regional economies. However, regions respond differently to its pressure, and the tangible effects of the crisis are varied. The extent of negative outcomes is defined by a region's vulnerability to crisis phenomena. Two elements of the concept of regional vulnerability are of particular note here, namely: exposure and resilience. The former determines a region's strength of response to negative external stimuli. Thus, regional economies which are more actively involved in global exchange and more susceptible to

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external influence will naturally be more exposed to this type of risk. [Briguglio et al. 2009]. It seems that consequences of strong exposure are most acutely observed in the earliest stages of a crisis. In the long term, a region's capacity of containing the effects of crises will be described in terms of regional resilience. A broad examination of regional vulnerability to various types of crisis situations (brought about by various determinants) can be found in the ESPON study [Territorial Dynamics 2014], covering the period of 2004-2012. However, crises analysed in the above study had not been in any way related to pandemic conditions, and therefore cannot be directly related to the present scenario. In our context, resilience describes a region's adaptive capacity of absorbing or adjusting to changes, adapting to external stimuli, exploiting challenges and opportunities, and coping with unavoidable consequences (Walker, Salt 2006).

Empirical evidence suggests that high vulnerability, in terms of exposure to crisis phenomena, is observed among the most advanced regions; however, these regions are, at the same time, characterized by high resilience (adaptive capacity to absorb the negative shocks) [Zaucha *et al.*, 2015]. Therefore, it may be assumed that the most advanced regions have borne the greatest load of negative effects in the initial phase of the present COVID-19 crisis [Bailey et al. 2020, pp. 1163-1174].

In the light of the above premises, the main objective of this paper was to evaluate the impact of the present crisis associated with the COVID-19 pandemic upon the dynamics of unemployment increase in regions at different levels of socio-economic development. As we are still at the early stage of the pandemic development where exposure to external effects plays the major role, the study's research hypothesis was formulated as follows: at the present stage of the COVID-19 crisis, its negative effects, evidenced mainly through the increase of unemployment, are more acutely experienced by advanced regions, compared to regions at lower levels of economic development. The research gap identified in this context was the more important taken the relatively narrow timeframe of the global economic duress brought about by the pandemic and its effects.

With regard to formulation of the research expectations, it was assumed that regions at different levels of their socio-economic development would present equally varied dynamics of their unemployment rate increase. Specifically, the authors assumed that the largest dynamics of unemployment rate increase would be observed in more developed regions, and that it would be at its lowest in the least developed regions.

Research was focused on regions of Germany and Poland, with the intention of providing a wider perspective for the analytical evaluation of crisis effects. Statistical analyses were performed using standard functions of MS Excel and the IBM SPSS Statistics suite.

Literature Review

Socio-economic development, in this sense, represents the sum of transformations that affect the operation of societies and economies; a complex and long-lasting process [Parysek 2018, p. 39; Lucas 1998, p. 3-42; Amin 1999, p. 365-378].

Demographic determinants represent one of the most important fundaments of socio-economic development. The main concepts of demographics have evolved over the ages, as emphasized by E. Vilquin [Vilquin 2006, pp. 5-26] in his depiction of the development of demographic ideas and theories from antiquity to the present times, analysed in a variety of aspects: cultural, economic, social, psychological, environmental, and natural. While the authorship of the modern demographic school of thought is commonly attributed to Thomas R. Malthus, his theory is outdated and does not withstand criticism. The 20th century has brought three important theories describing the socio-economic determinants of natural migrations of general population with some support from empirical evidence: the concept of the first and the second demographic transition, the economic theory of populations by Alfred Sauvy (1963), and the reformulated theory of fertility by Gary S. Becker (1981).

Current demographic trends, particularly those in the EU area, may constitute a partial barrier to development. Some of the most characteristic trends in this context include: reduction of fertility, rise

of life expectancy, ageing of societies with members of the demographic boom entering their retirement age, and the problem of double ageing [Szukalski 2006, pp. 6-10].
In this context, it may also be useful to present the notion of crisis, as a natural element of the global economic operation and development. As natural occurrences, crises may affect individual sectors and whole economies, including the global economy. Economic crises have been a natural complement to human activities from the earliest history of economic exchange [Wague 2009, p. 81]. According to G. Gorzelak, crisis is a natural phenomenon of any market economy, manifesting itself in a reasonably regular fashion, by 'oscillating between reasonably recognized parameters of an economic decline' [Gorzelak 2009, p. 7]. An economic crisis represents a 'sudden decrease of economic activity (production, employment, investment)' [www1]. According to K. Zimniewicz, a crisis is a process involving a progression of long-lasting events, which are seen as a hazard or even a barrier to existence [Zimniewicz 1990, pp. 223-224]. In effect, an economic crisis typically fathoms a wealth of other negative effects, such as prolonged recession, slump, turbulence, or economic chaos [Blanchard 2009]. The notion of economic crisis is most often and most directly defined in terms of an economic slump, i.e. an observable decline in economic growth [Dzikowska 2015, p. 735]. The notion is typically used with reference to whole economies, but it may also be adopted on regional and local perspective, or even that of individual enterprises [Marek, Wieczorek-Szymańska 2011, p. 227].

As emphasized by A. Nosek and A. Pietrzak, impetuousness and mounting pressure are the most important properties of economic crises; these may manifest themselves in various segments of the economy and lead to periodic decline of economic activities [Nosek, Pietrzak 2009, p. 83]. Similarly, M. Wague argues that an economic crisis represents a slump in global economy evidenced by decline in investment, credit limitations, bankruptcies, rise of unemployment, disintegration of large parts of the banking sector, decline in international trade [Wague 2009, p. 82]. An economic crisis can also be defined as a cyclical decline in economic growth, as postulated by the classical theory of the economic cycle, where crises mark periods of sudden production decline, leading to general income reduction, and followed by increase in unemployment [Szopa, Zamora 2015, p. 16]. Although it is believed that markets are generally reliable due to their stability, durability and resilience (through self-regulation) [Roubini 2011, p. 22], it may not necessarily mean that modern economies are altogether free from the constraints of the traditional economic (or business) cycle. The theory of cyclic fluctuations has been revisited on numerous occasions [Estey 1959, Kalecki 1980, Keynes 2003], and remains in focus, despite changes in general approach to the typical course and duration of such cyclic phases (L. von Mises) [Estey 1959; Kalecki 1980; Keynes 2020; Ebeling 1996, pp. 25-37].

The present crisis is a combination of demand shock (retail outlets closed for quarantine purposes, consumption decline resulting from work loss and general reduction of income) and supply shock (with many production facilities on quarantine, and various disruptions of supply chain and distribution). There are no econometric models available to help us predict the future consequences of the present crisis. This is evidenced in the wide spectrum of Poland's 2020 GDP forecasts issued in the context of the present COVID19 crisis by various financial institutions: from 3.0% by Moody's, through 1.9% by BOŚ, 1.6% by mBank, 0.9% by Citi Handlowy, IGN's 0%, down to -3.6% according to Morgan Stanley [www2]. This is good evidence of the precipitous uncertainty we're dealing with at the moment.

Crises produce various outcomes depending on their spatial context, and the intensity of such consequences is also widely diversified. Some regions may display evidence of an economic slowdown, others may experience periods of stagnation or recession. Variance in regions' responses to the economic crisis is described by each region's individual vulnerability to the new phenomena. Concepts of evolutionary resilience were analysed in numerous studies [Davoudi 2012; Holling and Gunderson 2002; Walker et al. 2004; Folke et al. 2010], with focus on dynamic correlations between duration, adaptation and structural changes observed in the context of various spatial and temporal dimensions in their strife to reach and maintain the unique state of equilibrium. Scientific disputes on measures of economic susceptibility (vulnerability) to external stimuli in a regional and national dimension were initiated in 1970s [O'Keefe et al. 1976] within the context of natural sciences, and were later expanded to cover the macroeconomic dimension [Tobin, 1980, pp. 31–34; Hamilton 1983; Jones and Leiby 1996]. In Turner et al. [2003] and Birkmann [2006], the concept of vulnerability is adopted in three major spheres: social, economic, and environmental. Vulnerability (susceptibility) is

territorially oriented, and context-related (Cutter et al. 2003); it applies to the future, and it may be analysed in both unidimensional and multidimensional fashion [Turner 2003, p. 207]. The economic resilience is defined by the following dimensions: resistance, recovery, or the region's ability to recuperate, reorientation, rebirth [Martin 2010, pp. 1-32].

With reference to the operationalization of the concept of vulnerability to macroeconomic stimuli postulated by the Austrian Institute for Spatial Planning (Österreichisches Institut für Raumplanung) – OIR (2011), the term is identified as a function of the following: shock exposure, shock sensitivity, and adaptive capacity; with exposure and sensitivity conditioning the region's response to external stimuli [Komornicki 2015, p. 39].

Regional vulnerability to crises is a fundament of the long-term economic operation of regions and a measure of regions' attractiveness for investors. In this context, vulnerability may be analysed in various cross-sections, from microeconomic to global [Markowska, Strahl 2015, p. 2]. Resilience mechanisms in regions determine their ability to continue along the chosen path of development in spite of unfavourable and changing conditions.

In the theoretic approach of new economic geography, reactiveness and sensitivity are perceived as two main elements that determine the economic development of a region [Gawlikowska-Hueckel, Szlachta 2016, p. 26]. Management of reactiveness to external macroeconomic stimuli requires careful determination of the pre-existing heuristics, as emphasized by proponents of the behavioural economics approach [Simon 1957; Kahneman and Tversky 1979].

Materials and Methods

The first stage of this research project involved evaluation of demographic determinants of development in regions under study. This was followed by determination of the pre-crisis level of development for each such territorial unit under examination, based on selected statistical measures of regional socio-economic growth. These formed the fundament for the design of a synthetic measure of regional development, and served to segment the research sample into three groups, namely: developed, average, and underdeveloped regions. A diagnosis of the present effects of the COVID-19 crisis was also performed at this stage of research, using information on regional unemployment rate increase as a reliable index of negative changes in the studied NUTS 2 statistical regions. The final stage of the study involved determination of statistically significant differences (if any) between the previously identified groups of regions, in relation to their reported unemployment rate fluctuations.

For the purpose of providing a broader perspective of research and in anticipation of gaining more insightful results, the analytical evaluations were performed for regions of both Poland and Germany. In effect, the study included all the NUTS 2 recognized regions of Poland and Germany, to a total of 55 territorial units (17 regions of Poland, and 38 regions of Germany).

The study involved the use of the following research methods: literature studies, descriptive statistical analysis, Hellwig's development measure method, and ANOVA one-way analysis of variance.

Based on selected diagnostic properties illustrating various aspects of the socio-economic development, a synthetic measure of regional development was formulated using Hellwig's taxonomic spatial measure of development [Hellwig 1968]. Hellwig's method is a model method, meaning that it adopts an ideal model of an object, i.e. one characterized by the highest (for the stimulating factors) or the lowest values (for the hampering factors). The synthetic measure is construed from measurements of distance between the studied object and the model representation of an ideal object, expressed in standard Euclidean metrics [Młodak 2009, Panek 2009]. The resulting measure takes values in the range of (0;1), with higher values signifying closer proximity to the model. Distance of regions to the ideal model representation was each time calculated from the following formula:

$$d_{i0} = \left(\sum_{j=1}^{m} \left(z_{ij} - z_{oj} \right)^2 \right)^{\frac{1}{2}}$$

where:
zoj – coordinates of the model object, determined from the standardized input variables
zij – coordinates of the standardized input variables
m – number of variables
The value of synthetic measure for each region was calculated from the following formula:

$$d_i = 1 - \frac{d_{i0}}{d_0}$$

where:
$d_0 = \overline{\mathrm{d}_0} + 2s_{(d_0)}$,

$$\overline{\mathrm{d}_0} = \frac{1}{n} \sum_{i=1}^{n} d_{i0}$$

$$s_{(d_0)} = \left(\frac{1}{n} \sum_{i=1}^{n} \left(d_{i0} - \overline{d_0} \right)^2 \right)^{\frac{1}{2}}$$

Based on resulting values of the synthetic measure of development, regions were ranked and segmented into groups describing different levels of socio-economic development (developed, average, underdeveloped).

The next phase involved examination of correlations between the resulting measures of socio-economic development and the available unemployment rate statistics (dynamics of unemployment rate increase in June 2020 compared to June 2019). To confirm the existence of statistically significant differences between groups of regions representing different levels of development and their respective dynamics of unemployment rate increase, a dedicated statistical procedure was used, namely: ANOVA one-way analysis of variance. The objective of this method is to provide information on statistical significance of differences between several averages taken from samples representing many population sets [Bedyńska, Brzezicka 2007]. Thus, the method may be applied to study any potential correlations between unemployment rate increases observed in response to the present crisis and the pre-established levels of socio-economic development in the analysed regions.

A one-way analysis of variance is a generalized test of differences between averages in sets, where comparisons are made between values of intragroup and intergroup variance, resulting in F (Fisher) statistic value, calculated from the following formula:

$$\mathrm{F} = \frac{\mathrm{MS}_{MG}}{MS_{WG}}$$

where:

MS_{MG} – intergroup variance, also referred to as within-group variance
MS_{WG} – intragroup variance, also referred to as between-groups variance.

Analysis of variance allows for effective verification of the research hypothesis on the equality of averages. The zero hypothesis for testing was formulated as follows:
$H_o = M_1 + M_2 + \ldots + M_k$
where k is the number of levels (categories) of x factor (the number of tested groups).

For the identification of statistically significant differences between pairs of averages, a post hoc analysis was conducted, involving comparisons of each average within group against every other average. The study assumed the statistical significance level at a value of $p = 0.05$, representing the probability of an error.

Statistical data used in the study was obtained from official statistical institutions, namely: the Statistical Office of the European Union – Eurostat, the German Bundesagentur für Arbeit, and the Polish Główny Urząd Statystyczny. Statistical analyses were performed using standard formulas of the MS Excel and the IBM SPSS Statistics suite.

Descriptive analyses of the development levels of regions under study was performed for the year 2018 (where no data was available, 2017 values were adopted). On the one hand, this approach was dictated by the availability of statistical data and by the lack of more recent indices. On the other hand, the authors' intention was to study the levels of regional development from before the outburst of the present crisis associated with the COVID-19 pandemic. With regard to the observed increase of unemployment in regions following the outburst of the crisis, the authors employed statistical data for June 2020, i.e. the initial period of the crisis development. These figures were examined against the same period of the previous year, to capture differences associated with the pandemic outburst and its effects.

Results and Discussion

Demographic determinants of regional development in Germany and Poland

The study emphasized the basic demographic determinants of regional development in Germany and Poland, as human resources and the associated economic potential are the most important factors defining the development potential of regional economies.

Table 1: Basic demographic data for regions of Germany and Poland (2018)

NUTS 2 regions	Population	Population density	Crude rate of net migration plus statistical adjustment	Total fertility rate	Life expectancy at birth
German regions					
Average	2178746	467	4,8	1,6	80,9
Coefficient of variance	53,1	170,1	39,3	4,0	1,0
Polish regions					
Average	2233923	147	0,2	1,43	77,7
Coefficient of variance	43,9	80,6	1316,0	6,7	1,1

Source: Eurostat, https://ec.europa.eu/, (accessed 25 July 2020).

The studied regions showed a wide variance in population and in other demographic statistics (Tab.1). The largest population density was observed in large metropolitan areas recognized as separate NUTS 2 units, namely: Berlin, Hamburg and Bremen in Germany, and Warsaw metropolitan area in Poland. In terms of average population density values, German regions scored significantly higher (at 467 persons/1 km^2) compared to those in Poland (an average of 147 persons/1 km^2). At the same time, German regions displayed a much more pronounced intergroup variation of this index, with coefficient at 170%, compared to a decidedly lower level of 80.6% for Poland.

German regions were also found to display higher values for the remaining properties under examination. Their migration balance was in positive figures for each German region, signifying their appeal for those seeking employment or economic refuge. The average migration balance was at 4.8. Total fertility rate was at an average of 1.60 and was marginally higher than that for Poland (1.43). German regions ranked higher in life expectancy, at an average of 80.9 years of age, i.e. by more than three years compared to that for Poland. German regions showed moderate variance of migration balance, and were fairly uniform in terms of fertility and life expectancy figures.

Similarly, Polish regions displayed high cohesion with respect to fertility and life expectancy averages from region to region. And conversely to the German scores, the migration balance for Polish regions showed massive variance (with coefficient at 1316%). The most attractive region was that of Warsaw (with migration balance ratio at 8.0). At the same time, many regions displayed negative migration ratio, with national average at a mere 0.2.

Regional levels of socio-economic development in Germany and Poland

The following economic indices were employed for the evaluation of the pace of socio-economic development processes in regions over the period directly preceding the onslaught of the present crisis:

x_1 - Regional gross domestic product (PPS per inhabitant),
x_2 - Disposable income of private households (PPS per inhabitant),
x_3 - Population density,
x_4 - Tertiary educational attainment, age group 25-64 (%),
x_5 - Unemployment rate (%),
x_6 - Employment in high-tech sectors (% of total employment).

For the purpose of defining the set of variables for examination, the following criteria were adopted: availability of accurate and current data for all regions, the analytical value of each variable, as well as the accessibility of each variable's notion and its universal recognition. Other commonly used criteria of selection were also adopted, including data universality, measurability, accessibility, quality, and interpretability.

The adopted set of diagnostic properties provides information on various aspects of regional socio-economic development, such as: global production volume (x_1), affluence (x_2), region's appeal as a migration destination (x_3), quality of human resource capital (general level of education) (x_4), labour market potential and degree of labour utilization (x_5), development of high-tech sectors (x_6).

Compared to their Polish counterparts, German regions received higher scores in the majority of the analysed properties (Tab.2). Their advantage was the most profound with respect to regional gross domestic product per inhabitant and disposable income of private households per inhabitant, with average values in excess of those for Poland by nearly 80%. Strong advantage was also observed in relation to high-tech sector employment (34 %). At the same time, German regions scored lower with respect to unemployment rate, by an average of 18%. As already mentioned, German regions were characterized by a decidedly higher population density, ranking nearly twice as high as the Polish regions. It must be noted, however, that they also displayed high intergroup variance in this context, as evidenced by the elevated value of the coefficient of variance (at 170%).

Table 2: Level of socio-economic development of German and Polish regions, in relation to selected properties (2018; income data for 2017)

NUTS 2 regions	Regional gross domestic product (PPS per inhabitant)	Tertiary educational attainment, age group 25-64 (%)	Employment in high-tech sectors (% of total employment)	Population density	Unemployment rate (%)	Disposable income of private households (PPS per inhabitant)
German regions						
Average	36379	28,1	3,9	467	3,3	21197
Coefficient of variance	21,6	17,2	38,3	170,1	30,9	7,8
Polish regions						
Average	20294	30,0	2,9	147	4,1	11894
Coefficient of variance	37,9	25,6	69,5	80,6	34,6	15,2

Source: Eurostat, https://ec.europa.eu/, (accessed 25 July 2020).

Polish regions are at an advantage over Germany only in terms of the relative share of high education in general working population (age 25-64). However, this advantage is not too pronounced, with difference slightly in excess of 6%.

Apart from the already noted population density advantage, Germany shows much stronger intraregional cohesion in the other studied aspects. Polish regions, in turn, are far more diversified.

Changes of the unemployment ratio associated with the effects of the COVID-19 crisis in regions of Germany and Poland

All the regions under study displayed evidence of a significant increase of unemployment in response to the present COVID-19 crisis. Such evidence includes high values of unemployment ratio fluctuations observed for June 2020 vs. same month last year (Tab.3). These negative effects were decidedly more pronounced in German regions, with unemployment rate increase by an average of 30.06%. Regional variance in this respect was fairly moderate for Germany, as attested by the coefficient value of 37.9%. The most adverse effects were observed in the regions of: Schwaben (unemployment increase by 52.45%), Tübingen (47.33%), Stuttgart (45.96%), and Freiburg (45.26%). The least adverse effects, in turn, were reported in the regions of: Lüneburg (9.82%), Brandenburg (14.00%), Dresden (14.66%), and Sachsen-Anhalt (15.88%).

It may be worth noting that, prior to the present crisis, the general trend of unemployment was in expressed in negative values. Between June 2017 and June 2018, the number of unemployed decreased by an average of 8.13%. Over the next year (June 2018 – June 2019) the decreasing trend continued, amounting to an average of 1.58% on top of the previous figure. However, at the time the economic fluctuations varied considerably between regions (as attested by the coefficient value of 285.1%). Some regions registered fairly significant increases of unemployment (in relation to the previous year), and were most pronounced in Niederbayern (an increase of 8.26%) and Unterfranken (4.32%).

Polish regions were decidedly less affected by the economic slump, as evidenced by the less pronounced increase of unemployment between June 2019 and June 2020, by an average of 18.16%, i.e. by 11.9 percentage points less than that for German regions. The unemployment effects were most adverse in the regions of: Wielkopolskie (29.77%), Pomorskie (25.08%), Małopolskie (24.35%), and Opolskie (23.97%). The least adverse effects were observed in the regions of: Łódzkie (9.66%), Lubelskie (11.28%), Mazowieckie (11.40%), and Kujawsko-Pomorskie (11.56%).

In the years prior to the outbreak of the COVID-19 crisis, all regions of Poland had shown a steady trend of unemployment decrease. Between June 2017 and June 2018, the number of unemployed was reduced by an average of 16.5%, and by further 9.68% between June 2018 and June 2019. Interregional variance in this respect was fairly low and remained at a moderate level throughout the whole period of analysis.

Table 3: Changes in the number of unemployed in regions of Germany and Poland

NUTS 2 regions	June				Change of unemployment rate for June 2018 compared to June 2017 (in %)	Change of unemployment rate for June 2019 compared to June 2018 (in %)	Change of unemployment rate for June 2020 compared to June 2019 (in %)
	Total No. of unemployed						
	2017	2018	2019	2020			
German regions							
Average	64953	59851	58515	74693	-8,13	-1,58	30,06
Coefficient of variance	72,3	72,9	73,5	70,8	24,5	285,1	37,9
Polish regions							
Average	67744	56935	51594	60381	-16,50	-9,68	18,16
Coefficient of variance	43,6	44,7	45,3	43,1	23,5	32,7	33,1

Source: Bundesagentur für Arbeit, https://statistik.arbeitsagentur.de/ (accessed: 25 July 2020), ***Bank Danych Lokalnych****: GUS, https://bdl.stat.gov.pl/ (accessed: 25 July 2020).*

Level of regional development and vulnerability to the COVID-19 crisis

- Changes in unemployment rate constitute of the best available measures of the effects of the present global crisis associated with the COVID-19 pandemic. Benefits of this measure include the availability and timeliness of unemployment data, and its suitability for the purpose of effective interregional comparisons. Thus, the effects of the present crisis were examined on the basis of a percentage value index representing an increase in the number of formally registered unemployed per the end of June 2020 compared to the same month of the previous year, i.e. 2019.
- Statistical analyses were performed in order to examine any potential correlations between levels of regional development and the regions' responses to the present crisis, as reflected by their respective dynamics of unemployment rate increase over the last year.
- Firstly, a synthetic measure of regional development was formulated for each region, to serve as basis for a ranking and a classification of regions into three groups, based on their effective level of socio-economic development.
- The synthetic measure was each time calculated using Hellwig's method, based on the six diagnostic indices described above. Analytical evaluations were made jointly for all the formally recognized regions of Germany and Poland, and their results are presented in Tab. 4. Based on the results of the above, regions were then grouped into the following categories, using their respective values of the synthetic measure of development. Three groups were defined as follows:
- the most advanced regions, with synthetic measure of development > 0.30;
- regions at an average level of development, with synthetic measure of development in the range of (0.15; 0.30];
- the least developed regions, with synthetic measure of development ≤ 0.15

Table 4: Group classification of German and Polish regions, formulated on the basis of the regions' ranks in synthetic measure of regional development

• NUTS 2 regions	• Country	• Dynamics of unemployment June 2020/June 2019 (in %)	• Synthetic measure of development	• Groups of regions, by level of socio-economic development
• Hamburg	• Germany	• 35,68	• 0,57	• Group 1 – the most advanced regions, with synthetic measure of development > 0.30
• Berlin	• Germany	• 37,18	• 0,56	
• Warszawski stołeczny	• Poland	• 21,97	• 0,50	
• Oberbayern	• Germany	• 49,53	• 0,44	
• Darmstadt	• Germany	• 37,30	• 0,39	
• Bremen	• Germany	• 18,18	• 0,37	
• Stuttgart	• Germany	• 45,96	• 0,35	
• Karlsruhe	• Germany	• 42,95	• 0,34	
• Köln	• Germany	• 22,59	• 0,34	
• Mittelfranken	• Germany	• 35,88	• 0,32	
• Tübingen	• Germany	• 47,33	• 0,32	
• Freiburg	• Germany	• 45,26	• 0,31	
• Düsseldorf	• Germany	• 16,82	• 0,29	• Group 2 – regions at an average level of development, with synthetic measure of development in the range of (0.15; 0.30]
• Rheinhessen-Pfalz	• Germany	• 28,08	• 0,28	
• Dresden	• Germany	• 14,66	• 0,28	
• Leipzig	• Germany	• 25,81	• 0,27	
• Oberpfalz	• Germany	• 42,50	• 0,26	
• Unterfranken	• Germany	• 40,05	• 0,25	
• Braunschweig	• Germany	• 18,89	• 0,25	
Schwaben	Germany	52,45	0,24	
Gießen	Germany	24,56	0,24	
Hannover	Germany	20,55	0,24	
Dolnoslaskie	Poland	19,68	0,23	
Pomorskie	Poland	25,08	0,23	
Trier	Germany	38,60	0,22	
Detmold	Germany	26,59	0,22	
Thüringen	Germany	24,36	0,21	

Koblenz	Germany	35,50	0,21	
Malopolskie	Poland	24,35	0,21	
Saarland	Germany	24,99	0,21	
Oberfranken	Germany	41,38	0,21	
Münster	Germany	20,28	0,21	
Kassel	Germany	29,73	0,21	
Schleswig-Holstein	Germany	25,48	0,20	
Slaskie	Poland	19,85	0,20	
Brandenburg	Germany	14,00	0,20	
Arnsberg	Germany	22,59	0,19	
Chemnitz	Germany	19,94	0,18	
Niederbayern	Germany	41,91	0,18	
Lódzkie	Poland	11,28	0,17	
Lüneburg	Germany	9,82	0,16	
Wielkopolskie	Poland	29,77	0,16	
Weser-Ems	Germany	29,07	0,15	Group 3 – the least developed regions, with synthetic measure of development ≤ 0.15
Mecklenburg-Vorpommern	Germany	20,01	0,14	
Zachodniopomorskie	Poland	21,87	0,14	
Podlaskie	Poland	12,08	0,13	
Lubuskie	Poland	9,66	0,12	
Sachsen-Anhalt	Germany	15,88	0,11	
Kujawsko-Pomorskie	Poland	11,56	0,10	
Opolskie	Poland	23,97	0,10	
Swietokrzyskie	Poland	12,88	0,07	
Lubelskie	Poland	20,62	0,07	
Podkarpackie	Poland	15,36	0,07	
Mazowiecki regionalny	Poland	12,95	0,05	
Warminsko-Mazurskie	Poland	17,32	0,04	

Source: own research, based on reports by: Eurostat, Bundesagentur für Arbeit, and Główny Urząd Statystyczny.

Group 1 included the most advanced regions, for which the synthetic measure of development was found to be in excess of 0.3. Twelve regions were classified here, with leading positions held by large metropolitan areas of: Hamburg, Berlin, Warsaw and Bremen; followed by regions of Oberbayern and Mittelfranken (the German state of Bayern); all regions of the Baden-Württemberg state, i.e.: Stuttgart, Karlsruhe, Tübingen and Freiburg; Darmstadt (the state of Hessen), and Köln (the state of Nordrhein-Westfalen).

Only one Polish region was classified in this group, namely: the metropolitan area of Warsaw, formally identified as a separate NUTS 2 region.

Group 2 was the most populated of the three, with thirty regions at an average level of socio-economic development, for which the synthetic measure of development was found to be in the range of (0.15; 0.30].

Group 3 included the least developed regions, a set of thirteen regions for which the synthetic measure of development was equal or less than 0.15. Polish regions represent a majority of those classified at the lower end of the ranking. Of all the seventeen NUTS 2 regions of Poland, as many as 10 were classified in this group. The least developed regions were those of the eastern part of Poland: Warminsko-Mazurskie, Mazowieckie (region), Podkarpackie, Lubelskie, and Świętokrzyskie. Also, the group of the least developed regions included only three German regions, namely: Sachsen-Anhalt and Mecklenburg-Vorpommern (each with state competences, both are situated in the eastern part of Germany), and Weser-Ems (a region of the Niedersachsen state).

The above classification seems to support the earlier conclusions suggesting a significantly higher level of development in German regions, compared to their Polish counterparts.

In order to test for any statistically significant differences between the three groups or regions representative of different levels of development in terms of their reported dynamics of changes in unemployment ratio, the authors decided to employ the ANOVA one-way analysis of variance (Tab.5). For the dependent variable, an index was adopted representing a percentage increase in the number of officially registered unemployed in June 2020 compared to June 2019 data. In this approach, the dynamics of unemployment rate increase serves to illustrate the magnitude of effects caused by the present COVID-19 crisis.

Table 5: Statistical parameters of the AVOVA analysis for the index – dynamics of unemployment between June 2019-June 2020 (in %) – in groups of regions representative of three levels of development

Specification	Group 1	Group 2	Group 3
Arithmetic mean	36,65	26,26	17,18
Maximum value	49,6	52,5	29,1
Minimum value	18,2	9,7	11,3
Coefficient of variance (in %)	28,9	39,2	32,7
Parameters of property distribution	$Z_{1(12)}$ = 0,214; ni	$Z_{2(30)}$ = 0,154; ni	$Z_{3(13)}$ = 0,162; ni
Levene test results	$F_{LEVENE'A\ (2,52)}$ = 1,647; ni		
Fisher statistics	$F_{(2,52)}$ = 13,127; p < 0,05		

Source: own research, based on reports by: Eurostat, Bundesagentur für Arbeit, and Główny Urząd Statystyczny.

The normality of dependent variable distribution was tested using the Kolmogorov–Smirnov test, yielding the following results for each group: $Z_{1(12)}$ = 0.214; ni; $Z_{2(30)}$ = 0.154; ni; $Z_{3(13)}$ = 0.162; ni. Based on test results, normality of the variable distribution in each group was confirmed. This was followed by verification of the equality of variances for the variable using the Levene's test, yielding the following result: $F_{LEVENE'S\ (2.\ 52)}$ = 1.647; ni (statistically insignificant). The test results attested to statistical insignificance of the test, giving way to an assumption that there are no fundaments for rejecting the hypothesis on the equality of variances in the groups under study. Thus, such equality of variances was assumed to hold true.

Further examinations yielded the following Fisher statistics: $F_{(2.52)}$ = 13.127; $p < 0.05$, suggesting that the result is statistically significant, giving no reason to reject the zero hypothesis (H_0) on the equality of result averages between groups. Hence, it may be assumed that there are statistically significant

differences between the three groups under study in terms of their reported dynamics of unemployment ratio increase.

The last step involved a post hoc analysis using the Bonferroni correction for multiple comparisons in pairs, to ensure that differences between results obtained for each pair of comparable groups are statistically significant.

Conclusions

This study places focus on examination of short-term response to the crisis brought about by the present COVID-19 pandemic. At this initial phase, the most pronounced effects are those of regional exposure. Thus, it was assumed that the most advanced regions, for the fact of being more exposed to crisis phenomena through their stronger global interconnections, will be more adversely affected by negative effects of the first phase of the present crisis. These assumptions were verified on the basis of formal reports of increases in unemployment rates resulting from the present crisis.

Analyses involved regions of Germany and Poland, with evidence to suggest that the former had been more advanced in terms of their socio-economic development compared to the latter. German regions were also characterized by more favourable demographic conditions.

The research hypothesis formulated at the initial stage has been verified. The results of the study seem to confirm that, at the present stage of the COVID-19 crisis, its negative effects epitomized by the increase of unemployment rates, are more acutely experienced by advanced regions, compared to regions characterized by lower levels of socio-economic development.

The effects of the crisis, as manifested in the increased unemployment rates, were most pronounced in Group 1 regions (the most advanced ones). Their reported increase of unemployment between June 2019 and June 2020 was at an average of 36.65%. Regions classified under Group 2 (medium level of development) came decidedly second in this respect, with a significantly lower index value of 26.26%. Unemployment increases were the least pronounced in Group 3 (the least developed regions), and averaged at 17.18% over the same period.

Based on results of statistical one-way analysis of variance between groups of regions representing three different levels of development in terms of their reported unemployment rate increase, it may be concluded that the negative effects of the first phase of the present crisis were decidedly more adverse in the group of the most advanced regions, compared to that of less developed regions, in confirmation of the initial assumptions.

It may be assumed that more advanced regions will also be more resilient to external shocks, defined here as the ability to return to the pre-established path of development after an external shock. This assumption, however, may only be verified at a later stage, and in a long-term perspective.

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The Pricing Policy for Hotel Services in Poland In the Light of Surveys

Aleksandra BANASZKIEWICZ

The Faculty of Economic Sciences and Management
Nicolaus Copernicus University in Toruń
Toruń, Poland
aleksandra.banaszkiewicz@umk.pl

Ewa MAKOWSKA

The Faculty of Economic Sciences and Management
Nicolaus Copernicus University in Toruń
Toruń, Poland
ewa.makowska@umk.pl

Abstract

The main purpose of the article is to present the results of the survey on pricing strategies for hotel services in a selected region of Poland, namely the Kujawsko-Pomorskie and Pomorskie provinces. The survey was carried out twice, with a five-year interval, i.e. in 2014 and 2019. This enabled the comparison of the obtained data. The survey was aimed at verifying the thesis that determining the prices of hotel rooms is made on the basis of certain factors, mainly such as: the wealth of the society and its tourist awareness, the attractiveness of the region, the state of development of both domestic and international tourism, as well as the needs of business in terms of the need for hotel services.

Keywords: The Pricing Policy For Hotel Services, Tourism, Hotel Industry

Introduction

The beginnings of the hotel industry in Poland go back to the beginnings of Polish statehood. The first lodging facility was established by Mieszko Stary in 1187. It was a hospice located in Poznań next to the customs house (Mitura, Koniuszewska, 2006).

Moving to modern times, the 1990s were a breakthrough period for hotel services in Poland. It was then, that the rapid development of the Polish hotel industry of various standards and forms began. Many individual hotels have been built, and hotel chains such as Marriott, Holiday Inn, Louvre and Accor have also expanded. There have been changes in the management of accommodation facilities and in the ownership structure of hotel buildings. The commenced privatization process covered state-owned property. At the same time, all unprofitable or not promising facilities were liquidated. As a result of economic and social changes, an increasing number of medium income citizens took part in shorter or longer trips organized for various purposes. Another important moment for the development of the hotel industry was Poland's accession to the European Union. The hotel services market began to mature and the offer of hotel services was being adapted to the requirements of both Polish and foreign guests. The years 2008 - 2013 brought Poland a 50% increase in the number of hotels. The use of hotel services has also increased. This period in Poland was unanimously called the hotel boom (Milewska, Włodarczyk, 2015).

The main purpose of the article is to present the results of the survey on pricing strategies for hotel services in a selected region of Poland, namely the Kujawsko-Pomorskie and Pomorskie provinces. The survey was carried out twice, with a five-year interval, i.e. in 2014 and 2019. This enabled the comparison of the obtained data. The survey was aimed at verifying the thesis that determining the

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prices of hotel rooms is made on the basis of certain factors, mainly such as: the wealth of the society and its tourist awareness, the attractiveness of the region, the state of development of both domestic and international tourism, as well as the needs of business in terms of the need for hotel services.

Strategies for setting prices for hotel services in the literature on the subject

Determining the price for hotel services is an extremely difficult task for the managers of this type of enterprise. This is primarily related to the specific features of the tourism sector, such as for example high price elasticity of demand for tourist services, a long lead time between pricing decisions and the sale of products, immateriality of services and the inability to store them, relation of fixed costs to variable costs (Bosiacki et al., 2008).

Ultimately, the price for the product must be set against the value delivered to the customer. Both too high and too low a price will lead to lower profits. The selection of a pricing strategy should therefore consist of the following stages (Kotler, 2005): selecting the target of the pricing strategy, determining the size of demand, determining the size of costs, analyzing costs, prices and competitor offers, selecting the pricing method and selecting the final price.

When setting the price of a hotel service, it is also worth paying attention to its characteristic elements. It is a combination of various values provided to the client, both of a tangible and intangible nature. The material elements include such factors as (Jaremen, Panasiuk, 2008): goods purchased by hotel guests (e.g. a meal in a hotel restaurant,), goods without which the service could not be provided (e.g. hotel facility), and goods constituting the material basis for the services provided (e.g. catering equipment). Among the intangible elements of a hotel product, we can distinguish, for example hospitality, an appropriate atmosphere or making reservations.

According to the literature on the subject, pricing for tourist services can be set in various ways. The best known forms of pricing are: the cost method, the demand method and the competitive method (Kotaś, Sojak, 2010).

In the cost method, the price should cover the profitability of the capital employed and the cost of the hotel enterprise. It is less beneficial for customers, but most credible for the company and tax authorities. From the point of view of costs, price calculations should include: the amount and structure of total costs, the amount of fixed and variable costs per service unit, the possibility of using the economies of scale and possible changes in the cost structure (Turkowski, 2003).

The demand method is based on the observation and analysis of the relationships between the demand for a service and its price. In the case of hotel services, the demand is most often flexible in relation to the price. Price elasticity of demand is the intensity of consumer reaction, which is manifested in the scale of changes in the volume of purchases to the change in price. It is necessary to know the size of the demand, the purchasing power and the nature of the segment targeted by the offer (Altkorn, 2002).

The competitive method consists in comparing a certain own pricelist with the competitors' prices for a similar service. Using this method, the hotel should first define which segment is the most important for it, and then it should define which companies are its competitors. (Turkowski, 2003).

It should be noted that basic prices are not final prices in the hotel industry. Their planning, apart from the basic price, also takes into account differentiated prices. In the hotel industry, the following differentiation criteria are most often used (Rapacz, 2007):

- time of making a purchase,
- features of the recipients of the hotel product and the nature of the trip,
- sales volume,
- form of payment,

– distribution channel.

The topic of pricing strategies for hotel services has been discussed many times in the world literature. Particular attention was devoted, among others, to such issues as: the methods of determining the price and factors affecting its level (Saló, Teixidor, Fluvià, Garriga, 2020), the use of selected models to adjust the pricing policy to changing market conditions (Mariello, Dalcastagné, Brunato, 2020; Fadly, Ridwan, Deni Akbar, 2019; Zhuang, Chen, Fu, 2017; Wei, Hoffer, 2009), analysis of selected price determinants (Mandić, Petrić, 2020; Lin, 2017; Raya, 2011), analysis of pricing policy on the example of hotels operating in a given region (Pulina, Santoni, 2019; Vives, Jacob, 2019; Kim, Cho, Kim, Shin, 2014), analysis of pricing policy in the context of high competition (Enz, Canina, Liu , 2008; García, 2013; Dong, Ling, 2015), psychological aspects of pricing (Liu, Denizci Guillet, Xiao, Law, 2014; Ahmad, 2015; Pelegrín-Borondo, Arias-Oliva, 2015).

Methodology of Survey

The conducted survey is part of the stream of regional research focusing on selected issues related to the functioning of the tourism industry in individual provinces in Poland. Regional research on the broadly understood tourism sphere in the Kujawsko-Pomorskie Voivodship entitled "*Directions of development in the field of tourism and their impact on the economy of the Kujawsko-Pomorskie Voivodship*" were conducted, among others, in 2009-2011 by a team of employees of the Nicolaus Copernicus University in Toruń and Kujawsko-Pomeranian Tourist Organization (Anszperger, Radkiewicz, 2011). In the case of the Pomeranian Voivodship, for example, a study was carried out under the name "*National tourism in the Pomeranian Voivodship*", carried out by the team of employees of the Institute of Tourism in Warsaw (Alejziak, 2010). It should be emphasized that the pricing strategy was not the main subject of the above-mentioned studies.

The survey carried out in 2014 and then repeated in 2019 was aimed at collecting data on the basis of which it would be possible to answer the following questions:
- what is the methodology for pricing in the surveyed hotels,
- what external factors, in the opinion of the respondents, influence the price formation,
- what is the impact of competition on shaping prices in the hotel industry,
- how the price is perceived by the customer.

The questionnaire form containing the above questions was sent out electronically for the first time in the fourth quarter of 2014. In response, 60 completed questionnaires were obtained from hotels located in northern Poland, mainly in cities (90%), mostly with 4 (40%) or 3 (35%) stars, and to a lesser extent 5-star (20%) and those with 2 stars (5%). The number of beds in the surveyed establishments ranged from 120 to 378, and in most cases, hotels had single and double rooms. Survey questionnaires were completed by hotel owners, directors or chief accountants.

The responses obtained in 2014 showed that when setting the price, respondents largely rely on the cost strategy, taking into account such factors as: demand for hotel services, customer wealth, hotel location, length of stay, specific season, time and form of payment. In order to verify the obtained results and check whether this is a constant trend, the survey form was sent again in the fourth quarter of 2019. This time, 40 correctly completed questionnaires were obtained. The collected data show that a typical respondent, as before, were hotels operating in northern Poland, 95% located in the city, with a majority of 4 (45%) or 3 (35%) stars, and a minority of 5-star hotels (10%) and those with 2 stars (10%). Most hotels had from 100 to 185 hotel places, mainly single and double rooms. Due to the size of both samples, the obtained survey results are not representative but only informative, aimed at the presentation and analysis of the collected material.

The survey questionnaire included 27 questions assigned to the following areas: general information, pricing methodology, external factors shaping the price, price and competition, price from the customer's perspective. The article presents the respondents' answers to selected questions from the individual, above-mentioned parts of the survey.

Survey Results

The first question asked of the respondents related to the pricing strategy chosen by the hotel. The survey shows that in 2019 the strategy most often chosen by hoteliers when determining room prices was the cost strategy. This answer was indicated by as many as 80% of the respondents. A much smaller proportion (15%) of the respondents chose the demand-driven strategy, and only 5% of them chose the competitive strategy. In relation to the results from 2014, one can notice an increase in interest in the cost strategy by 5% and a similar increase in interest in the demand strategy. On the other hand, the interest in the competitive strategy clearly decreased - from 15% to 5%. The distribution of results is presented in Chart 1.

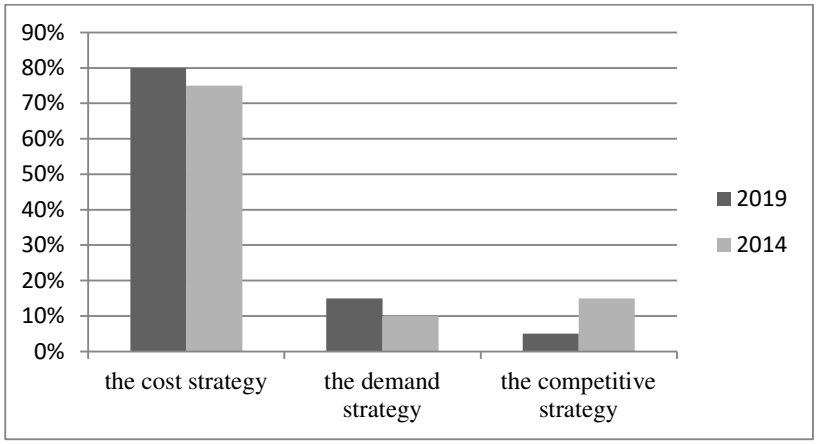

Chart 1. What pricing strategy has your hotel chosen?

Source: Based on the survey results.

Another question was about the purpose of the pricing strategy. In 2019, the vast majority of respondents replied that the goal of their strategy was to increase the number of hotel services sold (85%). The creation or stabilization of the hotel's image was indicated by 10% of the respondents. Only 5% has chosen to increase market share as its target. On the other hand, during the 2014 survey, the answer "increase in hotel services sold" reached the result of 90%, while the remaining two statements were at the level of 5%. The answers indicated by the respondents are presented in Chart 2.

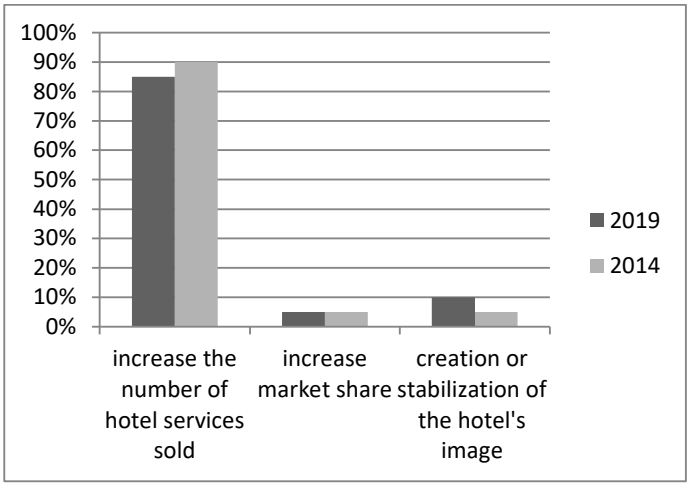

Chart 2. What is the purpose of the pricing strategy?

Source: Based on the survey results.

When asked "How often is the price in your hotel changed", the vast majority of respondents replied "once a year" (75%), but five years earlier this tactic was used by almost all hotels, hence the result of 95%. The obtained results are graphically presented in Chart 3.

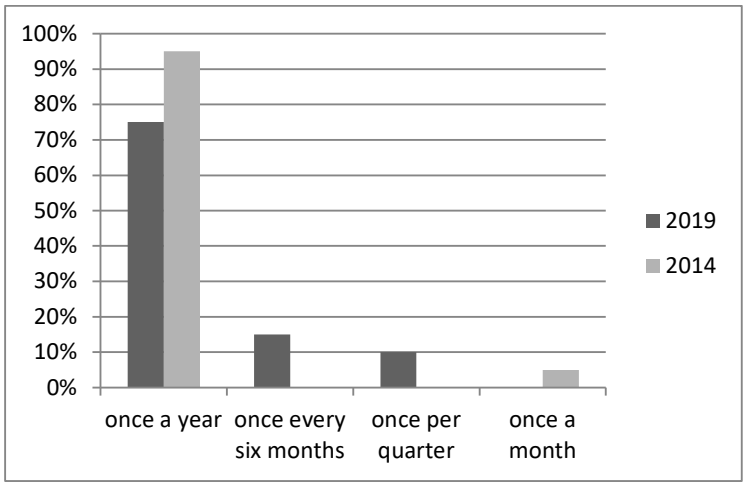

Chart 3. How often the price is changed at your hotel?

Source: Based on the survey results.

The survey shows that in 2019, the offer addressed to companies (75%) was very important for the operation of hotels. However, only 25% of the respondents opted for basic prices. In 2014, the price addressed to business guests was even more important and was indicated by 85% of respondents. In addition, all surveyed entities in the course of both studies confirmed that they applied a price differentiation system depending on the length and date of stay.

Another question addressed to hoteliers concerned the costs that influence pricing. The respondents agreed that the costs of marketing (90%) and personnel costs, e.g. employee remuneration (90%) had the greatest impact on the pricing of their services. Insurance costs (75%), Internet, TV and telephone costs (65%), building maintenance costs (65%) as well as product and material costs (60%), administration and management costs (60%) and depreciation (55%) and hotel interior design costs (55%) have a slightly smaller, although still significant impact on the price. The obtained results were at a similar level during the first and the second survey.

Convergent results in both studies were also obtained by asking a question about internal factors influencing the setting of prices for hotel services. The vast majority of hotels indicated that the factors such as length of stay 80%, seasonality 80%, time and form of payment 75%, an offer tailored to groups 60%, the location of a room in a hotel building 60% as well as also the number of beds in the hotel 60%. Only then are taken into account: place of purchase of services 50%, additional room equipment 35% as well as access to additional services in the hotel 30%, room equipment and design 20%. The image of the hotel - 10%, hotel staff - 10%, and entertainment venues - 10% are much less important. Only 5% of the respondents believe that the factor that influences the price is the availability of parking for guests and the technical condition of the equipment.

The next part of the survey was to find out which of the external factors, according to the respondents, affect the price. The respondents had the following options: location of the hotel, potential of the region, hotel categorization, degree of customer wealth, level of infrastructure, and they could also add another factor which, in their opinion, was the most important. According to a 2019 survey, the most important factor in price planning was the degree of customer availability (40%). The location of the hotel is a slightly less important factor (35%). The categorization of the hotel is also important (20%) and, to a small extent, the potential of the region (5%). In the earlier survey, according to the respondents, the greatest impact when planning the price was the degree of customer wealth, ie 80%. Factors such as the location of the hotel 70% were also important. Next, the categorization of the

hotel was indicated as 35% and the potential of a given region was 5%. The distribution of results is presented in Chart 4.

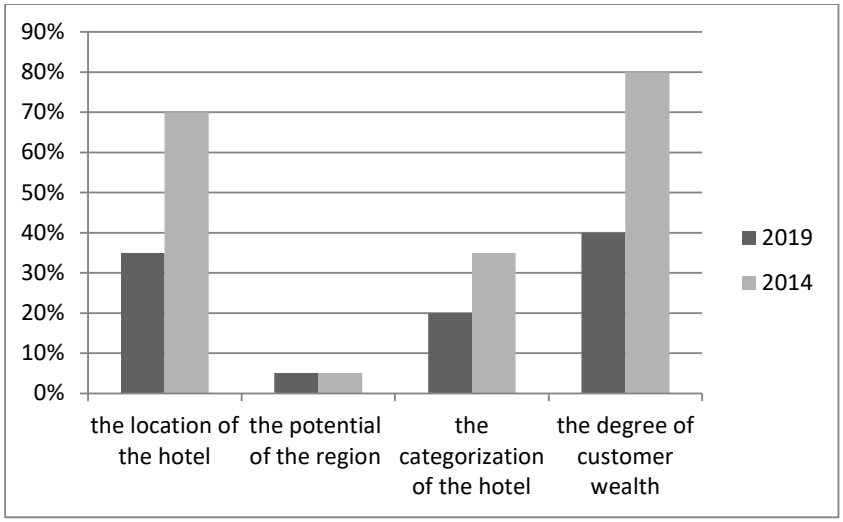

Chart 4. Which factor turned out to be the most important when planning the price?
Source: Based on the survey results.

The next questions in the questionnaire related to the competition. When asked if competition influences the price setting, as many as 85% of the respondents in 2019 answered yes, in 2014, almost all respondents answered yes, i.e. 95%. Taking into account the frequency of competitor analysis, in 2019 60% of respondents conducted a competition analysis every six months, 30% performed it once a quarter, and 5% did it once a year. The same number of hotels conducted a competition analysis once a month. Similar results were obtained in the previous survey. Similar results were also obtained when asked about the assessment of the price level compared to the competition. The vast majority of respondents (90%) admitted that the prices they set are at the same level as those of competing hotels. On the other hand, 10% indicated that their prices are at a higher level than those of their competitors.

When analyzing the prices of hotel services through the prism of customers, a question was asked about the discounts offered. Discounts for regular customers are the most popular among hotels (85% in 2019 and 80% in 2014). Discounts offered to groups (50% in both studies) and season-specific discounts (65% in 2019 and 50% in 2014) are in second place. The answers given by the respondents are presented in Chart 5. The respondents in both surveys agreed in 100% that the location of their hotels has a huge impact on consumers' decisions.

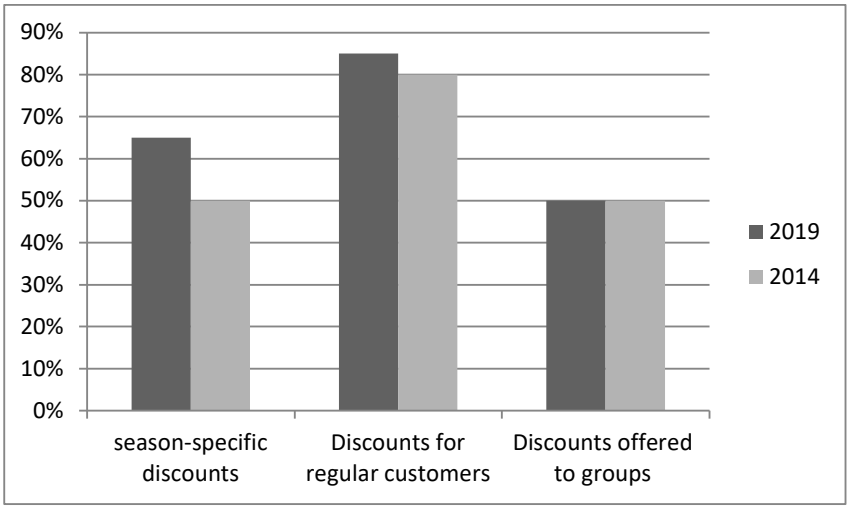

Chart 5. Does your hotel offer discounts?

Source: Based on the survey results.

Discussion

The conducted surveys show that hotel managers in most cases choose a cost strategy when determining room prices. On the other hand, they apply a competitive strategy to a small extent, which seems quite dangerous to them. Hoteliers using this strategy do not pay attention to the quality and difference in the services provided. The cost strategy is the most favorable, it distinguishes both the quality and the differences in the services offered. It pays attention to the fact that the total income covers at least the total costs. Targeting the strategy of increasing the number of hotel services sold proves that hotels care most about selling as many services as possible. This is understandable in light of the growing competition in the hotel industry every year. The problem in the hotel industry is the frequency of price changes, which is very high. Frequent fluctuations in price changes may adversely affect the image of hotels as they lose their credibility. For this reason, most managers adopt the tactic of changing prices in the largest possible time intervals. The frequency of price changes can be influenced by various factors, ranging from changes in costs incurred by the hotel, to local charges, which also increase or decrease. For hotels, the most important type of activity is the offer addressed to companies. The prices offered to enterprises are significantly lower than the basic prices. Discounts range from 10 - 30% and can sometimes be as high as 50%. Such a client usually books almost a complete set of hotel rooms. Each hotel facility will strive for such a consumer, because the corporate market is a very profitable enterprise for them. In the survey conducted, the respondents agreed that their prices are subject to differentiation. This is a very important activity as it allows them to shift some of the demand into dead periods. Price differentiation allows not only to determine the amount of demand for the services provided at a given time, but also has an impact on the maximization of revenues related to the appropriate choice of the price level in relation to the degree of demand. Improperly differentiated prices may cause the hotel to fail to achieve the planned margin and even incur a loss. Most of the respondents replied that the factor which is taken into account in price differentiation is the length of stay of hotel guests. The first night is always the most expensive, because to rent a room, no matter how long the stay is, the costs of cleaning the room, washing bed linen and towels must be included. The longer the stay, the lower the price the hotels can offer. Seasonality is the second important factor. Different prices will be offered during the week and weekends, similar to the season. When determining prices, both fixed costs and variable costs are taken into account. On the basis of the obtained results, it was found that marketing costs, which are related to the specific features of hotel services, have a decisive influence on the setting of prices. They are both an opportunity and a challenge for people who deal with hotel marketing. Their rational reduction may help to set the appropriate price to a level that will satisfy both the hotelier and the client. According to the survey, the most important external factor taken into account in the hospitality industry when planning prices is the degree of customer wealth. Hotels are aware of the role of compe-

tition in their environment. It is also connected with its constant analysis. Most often, hotels analyze the situation in the competitive environment every six months. Hoteliers are aware that their competition is growing year by year. In order to stand out from these competitors, hotels use different prices, additional services, and increase their standard and quality. The prices of hotel services are very similar to the competition. Especially hotels located in cities have a very large number of competitors. In a situation where the offer of the hotel is similar to that of its most serious competitors, it will be forced to keep its prices close to those of its competitors, which will help to keep customers. Only 10% of hotels have prices higher than competition. This may indicate that they have a strong position in the market or offer services that others do not have. When hotel prices are at a similar level, the most important role is played by the location, appearance of the hotel and the additional services it provides. Hotels apply many kinds of discounts. They encourage their regular customers to visit again, the size and type of discounts are adjusted to the seasonality, and they also attract groups through specially adapted discounts. Discounts offered to regular customers allow hotels to build a loyalty program for their frequent visitors. Location is one of the key factors influencing consumers. This is where customers start choosing a hotel. After determining the place, they look for a hotel that meets their requirements. Customers often want the hotel to be in the center, as close to the sea as possible or in another attractive place. In order to make their offer more attractive, hoteliers additionally include breakfast in the room price, provide their guests with swimming pools and saunas, and provide rooms with additional equipment such as a dryer, iron and air conditioning. This type of service can be a decisive factor in consumer choice of a hotel.

Conclusions

The task of hotels is to meet the increasingly complex and unusual needs of their potential guests. The greatest role in this process is played by market observation and responding to new customer requirements. Hotel facilities must be modernized and have a varied offer of additional services. The goal of every hotel is to generate profit. Many factors influence the achievement of the goal. The most important ones include the idea for the formula of the facility, meeting the unsatisfied needs of potential customers and ensuring competitive prices, adequate to the quality of services offered. The literature on the subject indicates the following ways of influencing the quality of hotel services (Witkowski, 2002):

1. market competition between hotels and growing requirements of guests - they force hotel managers to have an appropriate attitude to quality - the market of hotel services is the buyer's market and this fact forces the development, provision and development of guest service standards the most;
2. supervision and control activities carried out by state and local government bodies and specialized institutions - control activities contribute to the maintenance of standards, quality, sanitary condition and safety;
3. activities of the hoteliers' professional self-government - the Polish Hotel Association may influence the quality level of hotel services, e.g. through the recommendation system and organization of industry competitions;
4. legal regulations - they can be treated very broadly and refer to the provisions of construction law, sanitary regulations or environmental protection, while the main way of influencing the level of hotel services by the legislator should be categorization.

The current epidemiological situation poses many challenges for the tourism industry, not only in terms of the quality of its services. Despite the fact that most sectors are trying hard to return to normal operations, there are still industries that, despite the lifting of most of the restrictions, are strongly affected by COVID-19. Reports of an increase in the number of infections or the introduction of global restrictions also cause serious concern to people working in the tourism industry (horecatrends.pl).

A study commissioned by the Polish Tourist Organization shows that in 2020, due to the current situation related to COVID-19, as many as 82% of tourists pay attention to increased hygiene standards during their trip. Therefore, facilities that stand out in this field may gain a competitive ad-

vantage both on the domestic and foreign markets. Therefore, the Polish Tourist Organization, meeting these expectations, created the Industry Team for Self-Certification of Hotels and Accommodation Establishments, the aim of which was to prepare a self-certification program and develop a program of further activities in this area (Polish Tourist Organization).

Attempts to stimulate the tourist activity of consumers in the form of a travel voucher are one of the ideas for solving the current problems of the industry. The effects of the actions currently taken by both the Polish government and the managers of hotel enterprises will be visible in the near future. They will certainly be the subject of further studies by the authors on the scope and nature of changes in the hotel strategy made in connection with COVID-19.

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Statistical Assessment of The Development of Small and Medium-Sized Businesses in The Republic of Kazakhstan

V. ZARUBINA
Rudny Industrial Institute, Rudny, Republic of Kazakhstan
zarubina_v@mail.ru

M. ZARUBIN
Rudny Industrial Institute, Rudny, Republic of Kazakhstan
zarubin_mu@mail.ru

D. KENZHEBEKOVA
Kostanay State University named after A.Baytursinov, Kostanay, Republic of Kazakhstan,
Dina_ken1971@mail.ru

A. KURMANGALIEVA
Kostanay State University named after A.Baytursinov, Kostanay, Republic of Kazakhstan,
bektau@mail.ru

YE. VASSILCHUK
Kostanay State University named after A.Baytursinov, Kostanay, Republic of Kazakhstan,
elenavasilchuk@mail.ru

Abstract

The purpose of this research article is to develop a methodological approach to determining the integral rating of business development in the regions of Kazakhstan on the basis of the proposed indicators, the forecast of business development. **Methodology** – statistical methods were used in the preparation of the article, such as the use of the geometric mean to determine the rating of regions, trend analysis, and the rating method was used as a mathematical model. **The result** *(value)* of this work is to conduct a statistical analysis and substantiate the possibility of using the proposed integral index as a tool for assessing the development of the level of entrepreneurship in the regions.
Conclusions – methods of statistical analysis, namely on the basis of calculating the integral index, are applicable to assess the development of entrepreneurship in the regions of the country, to form a rating based on the geometric mean.

Keywords: Small and Medium-Sized Businesses, Rating, Index, Integral Index, Assessment of Business Development.

Introduction

Small and medium-sized businesses in Kazakhstan accounted for 10.5% of GRP in 2005 and 28.4 % of GRP in 2018 [1]. The development of this sector of the country's economy, built on the formation of a class of entrepreneurs and their support, is one of the key tasks of Kazakhstan. The experience of developed countries demonstrates the need for comprehensive support for the development of small and medium-sized businesses, which makes it possible to ensure a significant level of their contribution to the economy of their countries. Thus, the share of small and medium-sized businesses in the GDP of developed countries is 50-60 % [2]. However, it is impossible to make effective management decisions without feedback and without accurate and effective mechanisms for evaluating the performance of this sector of the economy. In this regard, in our opinion, it is relevant to conduct research to assess the development of entrepreneurship for our state.

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The level of development of entrepreneurship in the regions is different. This can be explained both by a number of objective reasons and by the effectiveness of business support in this region. It is known that the problem of the development of small and medium-sized businesses has been widely studied, however, modern understanding requires additional study of the influence of the actualized factors affecting its development.

Various methods of assessing the development of entrepreneurship are known as tools. For example, statistical analysis of small and medium-sized businesses allows you to determine the factors, trends, and dependencies that affect the state economy, use the forecast of the dynamics of indicators, and choose the best models. However, the use of these methods presents disparate views on different parameters. At the same time, statistical analysis uses methods of integral estimates, which, in our opinion, can be applied to the assessment of business development.

Literature Review

Studies aimed at studying the essence of entrepreneurship, its role in the formation of the state are presented in the works of A. Smith, K. Keynes [3, 4].

Assessment of the effectiveness of modern entrepreneurship is presented in the works of Russian scientists L. A. Kolesnikov, A. Yu. Chepurenko, support of entrepreneurship in the field of strategic planning by E. M. Bukhvald, A. V. Vilensky [5, 6, 7]. The assessment of infrastructural support of small business is considered in the works of L. G. Rudenko, V. M. Karaulov and many others [8, 9].

The development of entrepreneurship in Kazakhstan is considered by domestic scientists - A. Toksanova, G. Ukubasova, A. Asenova and others [10,11]. Various directions of assessing the development of entrepreneurship in Kazakhstan are presented in the works of N. N. Kulbatyrov, A. A. Tulepbekova [12].

A retrospective analysis of the scientific works of classics and contemporaries makes it possible to draw conclusions about the possibility and necessity of conducting research in the field of supporting and managing the development of small and medium-sized businesses, bringing together development assessment factors into a single system. The development of the digital economy and its globalization, the acceleration of decision-making processes and an increase in the number of influencing factors significantly, in our opinion, exacerbate the problem of effective management of business development.

The lack of a comprehensive system for assessing the development of entrepreneurship in the context of the development of the digital economy that takes into account the listed factors has led to scientific research devoted to the statistical assessment of the development of small and medium-sized businesses in the Kazakhstani situation.

Main Part of The Study

An important component in the effective development of Kazakhstan, integration into the world space is the dynamic development of entrepreneurship.

In modern conditions, the assessment of the effectiveness of the development of entrepreneurship in the regions can be performed on the basis of the geometric mean, the use of which becomes possible when assessing entrepreneurship by relative indicators [9]. The authors propose to determine the rating of the development of entrepreneurship in the regions on the basis of statistical indicators - the number of small and medium-sized businesses, including active ones, the output of products by small and medium-sized businesses per 1000 people of the region's population, the output of products per one small and medium-sized business. Such an assessment integrates a number of factors into a single index and can be called an integral index of entrepreneurship development.
The authors of the article, based on [8,13], to calculate the integral index of the development of small and medium-sized businesses, it is proposed to use the following formula:

$$I = \sqrt[4]{I_1 * I_2 * I_3 * I_4}\ , \qquad (1)$$

where I – integral index of the development of small and medium-sized businesses;

I_1 – growth index of small and medium-sized businesses;

I_2 – growth index of active small and medium-sized businesses;

I_3 – index of production output by small and medium-sized businesses per 1000 people of the region's population;

I_4 – growth index in output per one small and medium-sized business entity.

One of the most important indicators of entrepreneurship development is the number of registered, including active small and medium-sized businesses (SMBs). Table 1 shows the growth index of registered SMBs in Kazakhstan for 2017-2018 as a whole in the republic and regions. The analysis used statistical data of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan [1]. A positive dynamics of an increase in the number of entrepreneurs is observed in the country as a whole, the growth over the period under review was 2.4%, the highest growth rate is in the city of Nur-Sultan. A decrease in the number of registered SMBs took place in Almaty, Kostanay, Turkestan, North Kazakhstan, East Kazakhstan regions.

Table 1: Growth index of registered SMBs

Regions	2017	2018	Growth index
The Republic of Kazakhstan	1 540 592	1 577 747	1,024
Akmola	55 836	55 862	1,000
Aktobe	63 120	65 832	1,043
Almaty	142 607	142 103	0,996
Atyrau	55 210	57 135	1,035
West Kazakhstan	48 047	49 646	1,033
Zhambyl	76 878	80 019	1,041
Karaganda	100 710	102 423	1,017
Kostanay	65 237	64 011	0,981
Kyzylorda	49 991	51 078	1,022
Mangystau	56 256	59 784	1,063
Turkestan	213 028	141 082	0,662
Pavlodar	52 132	53 045	1,018
North Kazakhstan	36 656	36 154	0,986
East Kazakhstan	111 162	111 036	0,999
Nur-Sultan city	148 536	162 128	1,092
Almaty city	265 186	274 689	1,036
Note - calculated by the authors based on the source [1]			

The growth index of active SMBs is calculated and presented in Table 2. The share of active SMBs in 2018 was 78.7%, in 2017 - 74.3%. The highest growth rate of active entities in the capital is 1.282, the lowest is in the Turkestan region - 0.737.

In all regions, except for Turkestan (with an index less than 1), there is a positive growth trend in the number of active SMBs, which positively characterizes the development of entrepreneurship in these regions.

Table 2: Growth index of active SMBs

Regions	2017	2018	Growth index
The Republic of Kazakhstan	1 145 994	1 241 328	1,083
Akmola	41 719	44 106	1,057
Aktobe	50 209	54 430	1,084
Almaty	109 877	115 630	1,052
Atyrau	42 897	46 756	1,090
West Kazakhstan	37 111	40 062	1,080
Zhambyl	58 692	63 262	1,078
Karaganda	79 276	84 032	1,060
Kostanay	48 237	51 093	1,059
Kyzylorda	37 450	42 342	1,131
Mangystau	47 015	51 096	1,087
Turkestan	177 411	130 804	0,737
Pavlodar	41 311	43 820	1,061
North Kazakhstan	27 587	28 969	1,050
East Kazakhstan	79 966	87 678	1,096
Nur-Sultan city	97 251	124 685	1,282
Almaty city	169 985	174 509	1,027
Note - calculated by the authors based on the source [1]			

The population density in the regions of Kazakhstan is different, as well as the population size. In this regard, it is interesting to determine the production output by small and medium-sized businesses per one inhabitant of the region. Table 3 shows the output of products by SMBs per 1000 people of the population of the regions for 2017-2018, as well as the index of output. The largest volume of production is in Nur-Sultan, Almaty, as well as in the west – Atyrau, West Kazakhstan, Mangistau regions. The smallest volume of output is in Zhambyl, Kyzylorda, Turkestan regions. Only in the Turkestan region, the growth rate is less than one and amounted to 0.458 for the period under review, which indicates a decrease in the growth in the level of output by entrepreneurs in the region. The growth index in Nur-Sultan is also less than one – 0.955, however, the volume of production per capita is the highest in the country – 4531.14 million tenge / person. in 2018, in other areas, the growth index is more than one, which indicates an increase in the volume of output in monetary terms in the period under review. In general, in the Republic, the production index was 1.124.

Inflation in the Republic of Kazakhstan in 2018 was 5.3% [14]. The growth rate of output is 12.4%, which is 7.1% higher than the inflation rate. This positively characterizes the dynamics of production by SMBs.

It should be noted that in Kazakhstan comprehensive support is provided for the development of entrepreneurship for the activation and formation of its own production of products, the development of the manufacturing sector of the economy. For this purpose, a number of programs have been adopted and are being implemented [16, 17, 18].

Table 3: Index of production output by SMBs per 1000 people of the region's population

Region	2017			2018			The index of production output
	Population size, people	Production output, million tenge	Production output per 1000 people, tenge million / thousand people	Population size, people	Production output, million tenge	Production output per 1000 people, tenge million / thousand people	
Akmola	738 942	653 408	653 408/738,942 =884,25	738587	785 649	785649/738,587 =1063,72	1,203
Aktobe	857 711	757 393	883,04	869603	894 930	1029,12	1,165
Almaty	2 017 277	1 142 516	566,37	2039376	1 367 731	670,66	1,184
Atyrau	620 684	1 647 391	2654,15	633801	2 385 604	3763,96	1,418
West Kazakhstan	646 927	1 448 044	2238,34	652314	1 510 142	2315,05	1,034
Zhambyl	1 117 220	431 073	385,84	1125297	479 542	426,15	1,104
Karaganda	1 380 538	1 031 609	747,25	1378554	1 333 266	967,15	1,294
Kostanay	875 616	764 732	873,36	872736	908 634	1041,13	1,192
Kyzylorda	783 156	325 868	416,10	794165	380 617	479,27	1,152
Mangystau	660 317	784 844	1188,59	678224	943 258	1390,78	1,170
Pavlodar	754 854	745 522	987,64	753804	745 716	989,27	1,002
North Kazakhstan	558 584	490 388	877,91	554519	570 829	1029,41	1,173
Turkestan	1 977 026	1 160 075	586,78	1981747	532 055	268,48	0,458
East Kazakhstan	1 383 745	900 219	650,57	1378504	1 037 218	752,42	1,157
Nur-Sultan city	1 030 577	4 888 936	4743,88	1078362	4 886 210	4531,14	0,955
Almaty city	1 801 993	6 069 107	3368,00	1854556	6 870 957	3704,91	1,100
Total	18 157 337	23 241 125	1279,99	18395660	26 473 049	1439,09	1,124
Note - calculated by the authors based on sources [1], [15]							

Table 4: Index of production output per SMB entity for 2017-2018

Region	2017			2018			The index of output for one entity of SMB
	Release of products by SMB entities, million tenge	Number of SMB entities, units	Product release per SMB entity, million tenge / unit	Release of products by SMB entities, million tenge	Number of SMB entities, units	Product release per SMB entity, million tenge / unit	
The Republic of Kazakhstan	23 241 125	1 540 592	15,09	26 473 049	1 577 747	16,78	1,112
Akmola	653 408	55 836	11,70	785 649	55 862	14,06	1,202
Aktobe	757 393	63 120	12,00	894 930	65 832	13,59	1,133
Almaty	1 142 516	142 607	8,01	1 367 731	142 103	9,62	1,201
Atyrau	1 647 391	55 210	29,84	2 385 604	57 135	41,75	1,399
West Kazakhstan	1 448 044	48 047	30,14	1 510 142	49 646	30,42	1,009
Zhambyl	431 073	76 878	5,61	479 542	80 019	5,99	1,069
Karaganda	1 031 609	100 710	10,24	1 333 266	102 423	13,02	1,271
Kostanay	764 732	65 237	11,72	908 634	64 011	14,19	1,211
Kyzylorda	325 868	49 991	6,52	380 617	51 078	7,45	1,143
Mangystau	784 844	56 256	13,95	943 258	59 784	15,78	1,131
Turkestan	1 160 075	213 028	5,45	532 055	141 082	3,77	0,693
Pavlodar	745 522	52 132	14,30	745 716	53 045	14,06	0,983
North Kazakhstan	490 388	36 656	13,38	570 829	36 154	15,79	1,180
East Kazakhstan	900 219	111 162	8,10	1 037 218	111 036	9,34	1,153
Nur-Sultan city	4 888 936	148 536	32,91	4 886 210	162 128	30,14	0,916
Almaty city	6 069 107	265 186	22,89	6 870 957	274 689	25,01	1,093
Note – calculated by the authors based on the source [1]							

The next indicator in assessing the development of entrepreneurship is the index of product output per SMB entity for 2017-2018 (table 4). The maximum volume of production per one SMB entity in 2018 was observed in Nur-Sultan, West Kazakhstan, Atyrau regions. The smallest volume of production is in Turkestan, Zhambyl, Almaty, East Kazakhstan regions. The range of changes in the volume of production by SMBs in 2018 varies from 41.75 million tenge / unit in Atyrau region, up to 3.77 million tenge / unit in the Turkestan region. The highest index of output per SMB entity for 2017-2018 received in the Atyrau region.

Based on the calculated indices, the integral index of entrepreneurship development in Kazakhstan was determined (Table 5).

Table 5: Integral index of development of small and medium-sized businesses for 2017-2018

Region	**Growth index of SMBs entities**	**Growth index of active SMBs entities**	**Index of production output by SMBs entities per 1000 people in the region**	**Index of production output for one SMB entity**	**Integral index**
The Republic of Kazakhstan	1,024	1,083	1,124	1,112	1,085
Akmola	1,000	1,057	1,203	1,202	1,112
Aktobe	1,043	1,084	1,165	1,133	1,105
Almaty	0,996	1,052	1,184	1,201	1,105
Atyrau	1,035	1,090	1,418	1,399	1,223
West Kazakhstan	1,033	1,080	1,034	1,009	1,039
Zhambyl	1,041	1,078	1,104	1,069	1,073
Karaganda	1,017	1,060	1,294	1,271	1,154
Kostanay	0,981	1,059	1,192	1,211	1,107
Kyzylorda	1,022	1,131	1,152	1,143	1,111
Mangystau	1,063	1,087	1,170	1,131	1,112
Turkestan	0,662	0,737	0,458	0,693	0,627
Pavlodar	1,018	1,061	1,002	0,983	1,015
North Kazakhstan	0,986	1,050	1,173	1,180	1,094
East Kazakhstan	0,999	1,096	1,157	1,153	1,099
Nur-Sultan city	1,092	1,282	0,955	0,916	1,052
Almaty city	1,036	1,027	1,100	1,093	1,063
Note - calculated by the authors based on sources [1], [15]					

According to the integrated development index in Kazakhstan as a whole, we can note the positive dynamics of small and medium-sized businesses.

- the integral index was 1.281. However, the range of changes in the index ranges from 0.204 in the Turkestan region to 1.74 in the Atyrau region. Therefore, in 2017-2018, the progressive development of small and medium-sized businesses can be noted in Atyrau (1,740) and Karaganda regions (1,481) as having the largest and significantly higher than the average for Kazakhstan;

- requiring a more in-depth analysis of the situation in the region, significant correction of mechanisms and/or tools for the development of entrepreneurship in the Turkestan region (0.204).

The distribution of regions by output and the share of active actors in the region is interesting. Table 6 and figure 1 show the distribution of regions according to the proposed criteria.

Table 6: Distribution of regions by production output and share of active entities for 2018

Region	Production output per SMB entity, million tenge	Share of active SMB entity
Akmola	14,06	78,955
Aktobe	13,59	82,680
Almaty	9,62	81,371
Atyrau	*41,75*	*81,834*
West Kazakhstan	*30,42*	*80,695*
Zhambyl	5,99	79,059
Karaganda	13,02	82,044
Kostanay	14,19	79,819
Kyzylorda	7,45	82,897
Mangystau	15,78	85,468
Turkestan	3,77	92,715
Pavlodar	14,06	82,609
North Kazakhstan	15,79	80,127
East Kazakhstan	9,34	78,964
Nur-Sultan city	30,14	76,905
Almaty city	25,01	63,530
Note - calculated by the authors based on the source [1]		

Table 6 and figure 1 demonstrate the dynamic development of entrepreneurship, again in the Atyrau and West Kazakhstan regions.

The effectiveness of entrepreneurship development in Nur-Sultan and Almaty requires additional study. These cities demonstrate a high output per one entity, but the share of active entities is low.

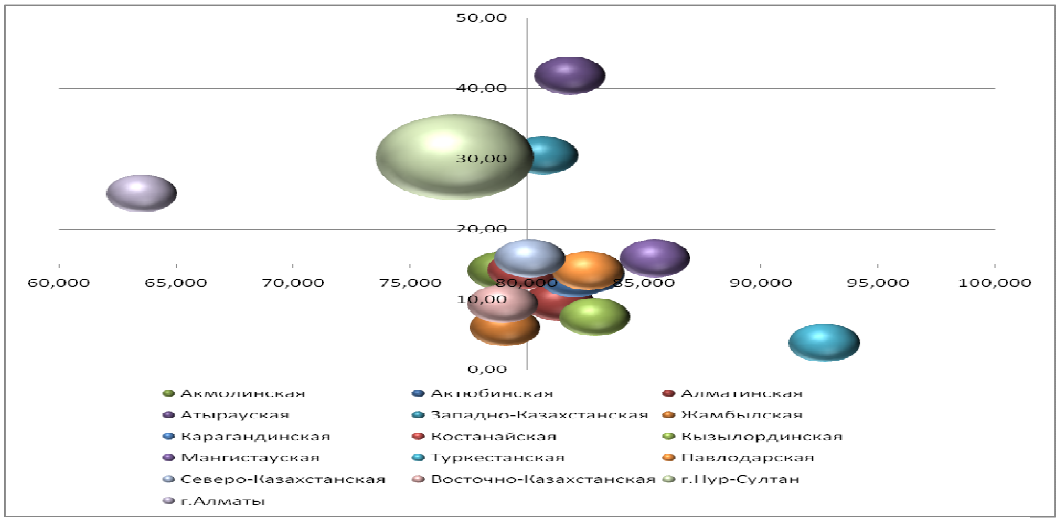

Fig. 1: Distribution of regions by the share of active SMBs entities and product output.
Note: compiled by the authors based on the source [1]

Turkestan region is again an outsider in terms of the share of active SMBs entities and production output. The lowest level of production per SMB entity is in this region.

The range of variation is 0.596 (1.223-0.627). According to the obtained level of the rating of development of small and medium-sized businesses, the regions of Kazakhstan can be conditionally divided into three groups: the first group – dynamically developing regions (lagging behind the leader by no more than 20%), the second group – with an average level of development of SMBs (lagging behind the leader in the range of 20 -80%, the third group – low development of SMBs (lagging behind the leader by more than 80%).

Table 7: Distribution of regions of the Republic of Kazakhstan by the level of development of SMBs

Groups of regions by the level of SMB development	Characteristic	Regions
Group 1 - dynamic development	the gap from the leader is no more than 20%	Atyrau is a leader Akmola, Aktobe, Almaty, Karagandy, Kostanay, Kyzylorda, Mangistau
Group 2 - medium development of SMBs	the gap from the leader in the range of 20-80%,	West Kazakhstan, Zhambyl, Pavlodar, North Kazakhstan, East Kazakhstan, Nur-Sultan city, Almaty city
Group 3 - low development of SMBs	the gap from the leader by more than 80%).	Turkestan

We will calculate the dispersion, standard deviation, coefficient of variation of the obtained rating of SMB entrepreneurship development in the Republic of Kazakhstan.

Table 8: data for calculating dispersion, standard deviation, coefficient of variation

Region	X_i	X_i^2
Akmola	1,112026601	1,2366032
Aktobe	1,105358279	1,2218169
Almaty	1,105165175	1,2213901
Atyrau	1,223158809	1,4961175
West Kazakhstan	1,038783758	1,0790717
Zhambyl	1,072745747	1,1507834
Karaganda	1,153938675	1,3315745
Kostanay	1,106732945	1,2248578
Kyzylorda	1,110548434	1,2333178
Mangystau	1,11187515	1,2362664
Turkestan	0,627171614	0,3933442
Pavlodar	1,015334857	1,0309049
North Kazakhstan	1,094166388	1,1972001
East Kazakhstan	1,099434242	1,2087557
Nur-Sultan city	1,051811438	1,1063073
Almaty city	1,063350189	1,1307136
Total	**17,0916023**	**18,499025**

The dispersion is determined by the following formula:

$$D_e = x^2 - (\bar{x}_e)^2 = \frac{\sum_{i=1}^{n} x_i^2}{n} - \left(\frac{\sum_{i=1}^{n} x_i}{n}\right)^2, \qquad (2)$$

where D_e – dispersion,

n – number of values,

x_i – value of the integral index of the development of SMBs in the region in the Republic of Kazakhstan.

$D_e = (18{,}499025/16) - (17{,}0916023/16)^2 = 0{,}015084103$

In addition to the mean, it is also of interest to identify trends in how the observations are scattered relative to the mean. The standard deviation is the measure of the deviation of the observations from the mean.

The standard deviation is determined by the following formula:

$$\delta = \sqrt{De}, \qquad (3)$$

Standard deviation δ= 0,122817356

The coefficient of variation was:

$$Кв = \frac{\delta}{\bar{x}} = 11{,}497$$

In modern conditions of development, it is necessary to activate small and medium-sized businesses in all regions of the country to ensure a significant increase in the volume of production.

Obtained Results (Conclusions)

There is a sufficient amount of research in the field of small and medium-sized businesses. However, we identified the need to form an integrated assessment of business development based on the proposed indices, which forced us to study this issue more deeply. We have proposed an assessment of the development of entrepreneurship based on statistical indicators, using the geometric mean to determine the rating of regions for the development of entrepreneurship. The integral index is calculated on the basis of private data: the growth index of small and medium-sized businesses entities; growth index of active small and medium-sized businesses entities; index of output by small and medium-sized businesses per 1000 people population of the region; index of output growth per small and medium-sized business entity. The results of calculations show:

- regions with successful business development – Atyrau region;
- regions that require a more detailed analysis of the situation – Nur-Sultan and Almaty cities;
- regions that are outsiders in the development of entrepreneurship that require a radical revision of decisions – Turkestan region.

According to the results of the study, it is proved that the use of an integral indicator not only allows you to reduce a set of indicators to a convenient and visual assessment system, but also to identify hidden, yet undiscovered problem points in the development of entrepreneurship.

Further development of small and medium-sized businesses can be ensured by activating its development in the regions, forming development vectors using digital technologies.

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Exploring the Digital Literacies and Multiple Intelligences of Teachers in Graduate School

Regina E. SITOY
Cebu Technological University, Cebu City, Philippines, regina.sitoy@ctu.edu.ph

Pascal NDINGA
University du Quebec a Montreal, Montreal, Quebec, Canada
ndinga.pascal@uqam.ca

Michel PLAISENT *
University du Quebec a Montreal, Montreal, Quebec, Canada, plaisent.michel@uqam.ca

Bernard PROSPER
University du Quebec a Montreal, Montreal, Quebec, Canada, prosper.bernard@uqam.ca

Emerson D. PETEROS
Cebu Technological University, Cebu City, Philippines, emserson.peteros@ctu.edu.ph

Abstract

Nowadays teaching is closely related to new technologies of information and Covid-19 has been a catalyst to accelerate the transition to magisterial course to distant learning, proving the importance of NTI to education. But curriculum are slow to change and skills with technology are not generalized among teachers and students in pedagogy. One of the reasons may be the fact that there are nine different types of intelligence. This paper reports on an investigation to find if there is a relation between digital literacy and intelligence style. It also studies the relationship between the different components of digital literacy/competency and if there is a there is a significant relationship between the different multiple intelligence types. Results show that the digital literacy/competency level of the respondents is moderate, hence the need to enhance this skill, especially that society is more digitally dependent. Furthermore, the respondents are mostly strong in existential intelligence, with intrapersonal intelligence as their secondary strength. Correlation findings between digital literacy/competency level and multiple intelligences show that intrapersonal intelligence is significantly correlated with safety, content creation, and communication. In addition, musical intelligence is significantly correlated with problem-solving. With these findings, the authors suggest an emphasis be made on enhancing digital literacy or competencies or teachers, especially that education in the 21st century rely largely on technology, allowing the teachers to fully and successfully interact with their students.

Keywords: multiple intelligence, teacher, digital literacy, teaching, information technology

Introduction

The 21st century sees plenty of significant changes in lifestyle, required job skills, and even social behavior as compared to past eras. Technological innovation has played a significant role in this transition. Such innovations allow day-to-day tasks at the tip of one's fingertips to be carried out online – emails, news, banking, shopping, gaming, social media, and more – without physically needing to leave the chair. Therefore, it is crucial that each individual have a wide range of skills and competencies in this rapidly evolving and highly interconnected world, and will need to learn them continuously throughout life (Council of the European Union, 2018; Uerz, Volman, & Kral, 2018; Benali, Kaddouri, & Azzimani, 2018; Van Laar, van Deursen, van Dijk, & de Haan, 2017).

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It is important to recognize, with all this internationalization and globalization, that the skills required to create a functioning community have also developed or have been modified (Schwab, 2016). Human society has experienced various kinds of technological innovations, or industrial revolutions, namely (1) Industry 1.0 with water and steam as the source of power for production, (2) Industry 2.0 with mass manufacturing and assembly lines, (3) Industry 3.0 with electronics and computer technology to mechanize production; and (4) Industry 4.0 with artificial intelligence and more sophisticated technologies (Benešová & Tupa, 2017; Lu, 2017; Schwab, 2016). The key goals of these developments are to improve productivity and quality of life, with Industry 4.0 making better use of internet technology and advanced artificial intelligence (Lu, 2017).

Such emerging innovations have profound effects on people's education, resulting in a professional and highly educated workforce, as skills taught decades earlier vary from what would be expected over the next few years (Benešová, & Tupa, 2017; McKendrick, 2015). Because of these developments, governments have agreed on reference frameworks, especially in the area of learning outcomes, to guide schools to produce learners who are ready to satisfy the needs of society. The value of digital literacy is demonstrated by numerous national and regional initiatives to establish and enforce digital literacy frameworks and strategic plans to promote digital literacy amongst its citizens (Law, Woo, De la Torre, & Wong, 2018).

The Council of the European Union (2018) recommends key competencies for lifelong learning, with the aim that "everyone has the right to quality and inclusive education, training, and lifelong learning to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labor market." The United Nations (UN) set 17 global goals covering various socio-economic issues for all member nations to achieve by the year 2030, and one of these goals focuses on education – "to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UN, 2017). The Association of Southeast Asian Nations (ASEAN) established the ASEAN Qualifications Reference Framework, which is equal to all and gives a universal standard on education criteria, or qualifications, across participating ASEAN Member States (ASEAN.org, 2016). Objectives of this framework include (1) support recognition of qualifications; (2) encourage the development of qualifications frameworks that can facilitate lifelong learning; (3) promote the development of national approaches to validating learning gained outside formal education; (4) promote and encourage education and learner mobility; (5) support worker mobility; (6) improve understanding of qualifications systems; and (7) promote higher quality qualifications systems.

The Philippine educational system has also made a major paradigm change in consonance with these developments. The new K-12 curriculum is on its 2-year mark for its elementary and secondary education, and shift from content-based education to outcomes-based education for its tertiary education. The goal of these changes is to see graduates fully prepared and qualified for the workforce.

As emerging technologies constitute an inextricable part of the young people's everyday lives, some analysts argue that the present generation of learners thinks and learns differently from their predecessors. With the rapid growth of digital technology in recent years, there is no doubt that many young people have gained enormous technical experience, especially in economically developed countries, before they reach the university (Lai & Hong, 2014). Higher education must, therefore, adapt to respond to these differences in learning to accommodate the "more technology-driven, spontaneous, and multi-sensory" learning styles (Prensky, 2001). The growing use of these modern innovations by the present generation has placed tremendous pressure on their educators to understand the importance of digital communication, to discover new ways of thinking and processing the learners' knowledge, and incorporate it into their academic environments (Buragohain, 2019; Krumsvik, 2014).

It is, therefore, the focus of this study to determine the digital literacy of teachers. By now, educators should have realized that being digitally literate, knowing how to incorporate technology into the

curriculum, and being positive about using it in the classroom would have an effect on student learning (Michalakis, Vaitis, & Klonari, 2019).

Theoretical Background/Related Literature and Studies

Digital Literacy/Competence

In recent years, the notion of literacy has shifted. Literacy usually refers to the ability to read and write to communicate and/or get information (Pate & Grote, 2011). Proponents of 21st-century skills have proposed the integration of digital literacy into the curriculum, along with the other skills such as collaboration, creativity, communication to name a few, as these are essential for work and life (Envision, 2017; Campbell & Kresyman, 2015; Hixson, Ravitz, & Whisman, 2012; Voogt & Roblin, 2012). George-Palilonis & Watt (2018) defined digital literacy as the ability or skill to effectively make and share meaning in different types and media, to effectively create, collaborate, and communicate in digital settings, and to understand when and how digital technology can support these tasks. A summary of definitions of digital literacy and competencies taken from some studies are reflected in Table 1.

Table 1: Summary of Definitions of Digital Literacy and Competencies

Author	Definition
Cornell University as cited in Yazon, Ang-Manaig, Buama, & Tesoro (2019)	Ability to find, evaluate, utilize, share, and create content using information technologies and the internet
List, A. (2019)	Necessary competencies or skills that are interrelated with one another for success in the digital environment
Yazon, Ang-Manaig, Buama, & Tesoro (2019)	Includes a wide range of skills that are required to thrive in a growing digital environment
Council of the European Union (2018)	Involves the confident, critical and responsible use of, and engagement with, digital technologies for education, work, and participation in society
George-Palilonis & Watt (2018)	The ability or skill to effectively make and share meaning in different types and media, to effectively create, collaborate, and communicate in digital settings, and to understand when and how digital technology can support these tasks
Law, Woo, De la Torre, & Wong (2018)	The ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies for employment, decent jobs, and entrepreneurship. It includes competencies that are variously referred to as computer literacy, information and communication technology (ICT) literacy, information literacy and media literacy
Uerz, Volman, & Kral (2018)	Refers to the ability to use technology in general and is not specifically related to teaching and learning
Sauro (2017)	Refers to having several skills and competencies in the context of ICT
Yu, Lin, & Liao (2017)	Includes the fundamental ICT operational skills and the capability to use or manipulate complex ICT communication applications
Author	**Definition**
Greene, Yu, & Copeland (2014)	Refers to the cognitive processes that people engage by using computer-based knowledge found in different hypermedia
Ilomäki, Paavola, Lakkala, &	Defines that digital competence consists of technical

Kantosalo (2014)	competence, the ability to use digital technologies in a meaningful way for working, learning and in daily life, the ability to assess digital technologies critically, and the desire to engage and contribute in the digital culture
Meyers, Erickson, & Small (2013)	Includes aspects of cognitive authority, safety and privacy, ethical, and responsible use and reuse of digital media
Chase & Laufenberg (2011)	Offers a range of learning experiences, creativity, and opportunities for expression that were not previously accessible
UNESCO (2011)	For teachers, this refers to the ability to help students become collaborative, creative and problem-solving learners through the use of ICT so they will be effective citizens and members of the workforce
Eshet-Alkalai & Chajut (2009)	The ability to use a wide variety of cognitive and emotional abilities in digital technology
Eshet (2004)	Requires more than just the ability to use software or use a digital device; it involves a wide range of diverse sociological, cognitive, emotional, and motor skills that users need to work successfully in digital settings
Ministry of Education, British Columbia, Canada	The interest, attitude and ability of individuals to use digital technology and communication tools appropriately to access, manage, integrate, analyze and evaluate information, construct new knowledge, and create and communicate with others

The incorporation of these new skills does not replace the conventional curricula on essential reading, writing, mathematical skills, as well as history, science, and others, but will also find instructional strategies and/or create instructional materials that represent the development of these skills or competencies and make learning more meaningful (Geisinger, 2016; Abril, 2013). These skills are more than rote learning as they focus more on experimentation, creativity, use of multimedia imagination, which allows one to be participants and contributors of technology, and not just as consumers (Davidson, 2012; Davidson, 2016). Such critical and needed skills, not just knowledge, should be taught and instilled in the learners – skills that are crucial for success in an ever-changing, digitally dependent society (Schoen & Fusarelli, 2008; Siddiq, Gochyyev, & Wilson, 2017).

Digital literacy has many components. In Soo Jung Moon's and Sang Y. Bai's (2020) study, digital components of Radovanović, Hogan, & Lalić (2015) were the basis for predicting youth civic engagement and the role of social media news attention in South Korea. These components are formal operational skills, information retrieval, and analytical skills, digital communication skills, and creation skills. Voogt and Roblin (2012), in their comparative analysis of 21st-century competencies of various international frameworks, determined that digital literacy includes basic scientific, economic, technological visual and information, multicultural literacies, and global awareness. George-Palilonis & Watt (2018), together with the Professor Garfield Foundation, introduced the digital literacy website to K-5 teachers in Midwest, USA, which emphasizes the 21st-century skills of creativity, critical thinking, collaboration, and communication, along with functional meaning-making, cultural and social understanding, finding and selecting information, and e-safety. The Ministry of Education in British Columbia, Canada elaborates that the characteristics of digital literacy are research and information literacy; critical thinking, problem solving, and decision making; creativity and innovation; digital citizenship; communication and collaboration; and technology operations and concepts. In addition, UNESCO, along with the European Commission, emphasizes the following dimensions of digital literacy: (1) research and information literacy, (2) critical thinking, problem-solving, and decision making, (3) creativity and innovation, (4) digital citizenship, (5) communication and collaboration, and (6) technology operations and concepts (Law, Woo, De la Torre, & Wong, 2018).

H1: There is a significant relationship between the different components of digital literacy/competency.

Multiple Intelligence

The concept, measurement, and development of intelligence have long been debated by many – psychologists and educators to name a few (Sternberg, 2003). It has been a question of nature versus nurture, individual versus group influence, or the classification of the different types of intelligence (Walinga & Stangor, 2014). Intelligence, which was initially regarded as a single entity acquired during birth, has been identified as one of the main factors in the teaching-learning environment and academic achievement (Dolati & Tahriri, 2017; Çeliköz, 2017). In the study of Mujis and Reynolds (2011), the Intelligence Quotient (IQ) Theory states that intelligence is the determining factor for people's ability to learn and achieve academically, which then allows them to assume leadership positions in society. Because of this view, standardized tests are given to measure IQ, which allows educators to have a glimpse of the learners' capacity to achieve (Çeliköz, 2017).

A new paradigm that counter-flowed with this one-standard-for-all intelligence viewpoint was the Theory of Multiple Intelligence (MI) which was discovered by Howard Gardner in 1983. This theory changed the way psychologists, educators, and even parents view the learners (Alhamuddin & Bukhori, 2016). It stresses that intelligence is not just developed logically nor linguistically, but is also developed in other ways (Alhamuddin & Bukhori, 2016). MI consists of different types that are not usually reflected in IQ tests, and that each one is equally important as the other types of intelligence (Gardner, 1993). This theory also notes the fact that each person is smart, but in vary in degrees of strength, which may even change from time to time depending on his/her exposure to different factors (Kennedy-Murray, 2016; Yaghoob & Hossein, 2016). The different intelligence types are logical-mathematical, verbal-linguistic, visual-spatial, bodily-kinesthetic, interpersonal, intrapersonal, musical, naturalistic, and existential (Gardner, 1993; Shearer, 2019; Shi, 2019; Çeliköz, 2017; Dolati & Tahriri, 2017; Kennedy-Murray, 2016; Alhamuddin & Bukhori, 2016; Yaghoob & Hossein, 2016; Walinga & Stangor, 2014).

Since individuals have all nine intelligences, though in varying degrees, and that these intelligences are dynamic – develop through time and various learning experiences, it may be safe to assume that individuals have more than one dominant intelligence and that each of these intelligences are interrelated with each other (Yaghoob & Hossein, 2016). According to Shi (2019), MI has the following characteristics: (1) different – there are nine (9) types of intelligence that vary in each individual; (2) practical – intelligence allows individuals to discover new knowledge, create and be innovative, and are able to solve problems; (3) integrity – all nine intelligences are interrelated and interact with each other; and (4) developmental – strength of each intelligence may change depending on the different learning opportunities, training, or environment. The study of Overchuk and Niemczyk (2009) on the applicability of MI theory in pilot assessment and training shows that the respondents are strong in both intrapersonal and spatial intelligence. In addition, Çeliköz's (2017) study showed that prospective teachers of Yildiz Technical University are dominant in mathematical-logic, verbal, interpersonal, and intrapersonal intelligences.

H2: There is a significant relationship between the different multiple intelligence types.
H3: There is a significant relationship between digital literacy/competency and multiple intelligence types.

Statement of the Problem

This study assessed the perceived digital literacy levels of teachers pursuing their masteral or doctoral degrees and aimed to answer the following questions:

1. As perceived by the respondents, what is their digital literacy levels as to information processing, communication, content creation, safety, and problem-solving?

2. What is the multiple intelligence profile of the respondents?

Methodology

This study used the descriptive-correlational survey method to determine the digital literacy competencies and distribution of multiple intelligences of teachers pursuing graduate studies in the province of Cebu, Philippines. These teachers come from different areas of the region, both in the urban and rural areas, as well as working in either private or public schools.

After permission from the deans of the colleges to conduct the research was granted, hard copies of two (2) questionnaires were distributed to 287 respondents, including a letter of consent to take part in the research. Confidentiality of data was emphasized, including proper storage of answered sheets.

The digital competency survey was adapted from the study of Al Khateeb (2017). The survey was used to measure the respondents' perception of their digital competencies and was based on the European Digital Competencies Framework for Citizens (DigiComp), which was formulated by the European Commission. The study of Law, Woo, De la Torre, and Wong (2018) through UNESCO, also referred to this framework to propose a global framework of reference for digital literacy skills for all. Indicators of the said framework are information processing, communication and collaboration, digital content creation, safety, and problem-solving. Scoring procedure is a 7-point Likert scale wherein competency levels are rated as “expert” at seven (7) and “digital illiterate” at one (1).

The second questionnaire on multiple intelligence was adapted from the study of McClellan and Conti (2008), wherein the authors have developed a reliable and valid instrument to measure the learners’ preferences. There are three (3) groups with nine (9) statements in each group. Statements in each group are ranked where one (1) describes the respondent the most and nine (9) describes the respondent the least. Scores of each statement are tallied according to each intelligence type and sum of each type determines which is the dominant intelligence type of the respondent, as well as the least dominant type.

ANOVA, Cronbach’s Alpha, and principal component analysis were done to treat the data before Pearson r was used to check the relationship of the variables.

Results and Discussion

Profile of the Respondents

Table 2 shows that the average of the respondents is 32 years. GradschoolHub.com (2019) mentioned that the average age of graduate school students is 33 years, with older students taking up doctoral degrees. Most of the respondents of Rungduin and Miranda (2018) in their study on factors on completing graduate degree completion are within the 31-40 years age range. Most of the respondents are pursuing their masters degree, with 95 (33.1%) of the respondents are taking up Early Childhood Education. For the doctoral program, 17 (5.9%) of the respondents are taking up Special Education. The domination of female teachers (241 or 64%) can also be seen in the census taken by UNESCO Institute for Statistics (2018) wherein 91.08% are female teachers in pre-primary education in the Philippines.

Majority of the respondents are teachers (247 or 86.1%) working in the public sector (170 or 59.2%). It is interesting to note that despite knowing that public school teachers have more workload aside from teaching tasks, many still prefer to be part of the government service (David, Albert, & Vizmanos, 2019). This study focused on the data of the teachers.

Table 2: Profile of the Respondents

Demographics		Frequency (n = 287)	Percentage (%)
Age (*Average age: 32*)			
	21 – 30	138	49.7
	31 – 40	89	32.1
	41 – 50	46	16.6
	51 and above	5	1.9
	Missing	9	
Sex			
	Female	241	84
	Male	43	15
	Prefer not to say	3	1
Program and Major			
	Masters	***254***	***88.5***
	Early Childhood Education	95	33.1
	Special Education	77	26.9
	Guidance and Counseling	32	11.0
	Administration and Supervision	23	8.0
	Other	27	7.1
	Doctoral	***33***	**11.5**
	Special Education	17	5.9
	Other	16	5.6
Occupation			
	Teaching	247	86.1
	Non-teaching	40	13.9
Institution Type			
	Public	170	59.2
	Private	88	30.7
	Non-academic or no affiliation	29	10.1

Digital Literacy/Competency Profile

Digital literacy in the 21st century has now become one of the important and fundamental competencies alongside reading, arithmetic, oral skills, and writing (Almås, A.G. & Krumsvik, R., 2007). Therefore, having digitally literate students, along with improving technology tools for blended learning, flipped classroom, online classes, and other innovative teaching strategies, will require teachers to also be digitally literate. Table 3 gives a description of the digital literacy profile of the respondents.

Information processing, communication, and safety indicators scored high on the respondents' profile. Information processing is the ability to know what information is needed, to know how to properly search and recover data, and to verify the source and content of the information, including data management and organization (Law, Woo, De la Torre, & Wong, 2018). Teachers search the internet for various needs such as looking for affordable or free instructional materials, seminars for professional development, research, connecting the classroom to the world, and many more. Furthermore, the communication indicator is the ability to use digital technologies to collaborate, communicate, interact, and share information, among others. When physical presence or face-to-face meetings are not possible, teachers are able to meet with their students and continue lessons using

various media. Lastly, the Safety indicator is being able to protect one's device and one's data privacy, especially that digital transactions and activities are becoming part of daily routine.

Table 3: Digital Literacy/Competency Profile

Indicators	Mean	Verbal Description
Information Processing	5.48	very literate/competent
Communication	5.55	very literate/competent
Content Creation	4.46	moderately literate/competent
Safety	5.53	very literate/competent
Problem Solving	4.71	moderately literate/competent
Overall Profile	**5.14**	**moderately literate/competent**

Legend: 1.00-1.86 digitally illiterate/incompetent, 1.87-2.72 very illiterate/incompetent, 2.73-3.58 mildly illiterate/incompetent, 3.59-4.44 fairly literate/competent, 4.45-5.30 moderately literate/competent, 5.31-6.16 very literate/competent, 6.17-7.00 digital expert

Results show that there is a need to update the digital literacy or competencies. Quality teaching and school leadership are two of the most important factors in increasing student achievement. In order to have quality and effective teachers, professional development to develop and hone their expertise and skills are one of the best practices of an institution (Mizell, 2010). A professional and upgraded teacher would have the confidence and credibility to teach, giving students a more engaging learning environment and experience. He/She is then updated with new teaching strategies that will meet or address the students' learning needs or challenges.

The new generation of students are more tech-savvy than the previous generation, using the internet and other digital resources in most of their daily activities. With the shift to focus on student learning, teaching with technology gives teachers a wide variety of strategies that enhance student outcomes. Teachers who are able teach with technology are, therefore, at an advantage. With the dependency on smart devices and technology, students are able to adapt quickly to technology-rich learning environments such as flipped classroom, blended learning, and online classes. With the rise of the corona virus-19 pandemic worldwide, teachers are forced to use technology to reach students who are not able to physically go to school (Anft, 2020). Teachers who are comfortable and are capable to use technology will find it easy to use any of these methods, while those who are not may find it challenging. Therefore, it is important and advantageous that digital literacy be integrated into the pre-service teachers' curriculum or that professional development on digital literacy be emphasized for teachers to be able to use various digital tools to meet the needs of their learners.

With all of the respondents taking up their masters or doctoral degrees, it is a given that promotion is part of the goal. They will be involved more in educational administration or management than the teachers who have no postgraduate degrees. Digital literacy skills are important in accomplishing administrative functions which are, but not limited to, collation/submission of administrative reports, teacher evaluation reports, budget proposals, research, personnel files and monitoring, plotting of teacher class loads, facilities management, project management, online enrollment procedures and approvals, choosing the appropriate learning management system (LMS), and others (Aduwa-Ogiegbaen & Iyamu, 2005). As administrative procedures are transitioning from manual to digital, it is important that all teaching and non-teaching staff know how to process basic protocols online such as filing of leaves of absence, attendance logs, monthly accomplishment reports, facilities requests and purchases, computation of grades, making digital instructional materials, research, online banking, usage of the appropriate LMS, and many more.

Multiple Intelligence (MI) Profile

The theory of MI gives opportunities for diverse teaching strategies to maximize learning. Since intelligence is dynamic, it believes that a person's intelligence strength or weakness may change over

time through exposure to different factors. Furthermore, a person can be "smart" in more than one area. Table 4 shows the profile of the MI of the respondents, with "A" as the primary strength and "B" as the secondary strength.

Table 4: Multiple Intelligence Profile

Intelligence Type	A	B	Total
Bodily-Kinesthetic	53 (18.5%)	49 (17.1%)	102 (35.6)
Existential	72 (25.1%)	60 (20.9%)	132 (46%)
Interpersonal	40 (13.9%)	53 (18.5%)	93 (32.4%)
Intrapersonal	55 (19.2%)	63 (22.0%)	118 (41.2%)
Logical-Mathematical	46 (16.0%)	33 (11.5%)	79 (27.5%)
Musical	42 (14.6%)	31 (10.8%)	73 (25.4%)
Naturalistic	16 (5.6%)	21 (7.3%)	37 (12.9%)
Verbal	15 (5.2%)	15 (5.2%)	30 (10.4%)
Visual-Spatial	27 (9.4%)	29 (10.1%)	56 (19.5%)

Results show that most respondents are existentialists as the primary strength and intrapersonal as secondary strength. Existentialists have strong intuitions and have a solid belief system that enable them to understand others and, eventually, the world around them (Kelly, 2019). McCoog (2010) stated that existentialists are very introspective, recognizing that in order to understand the world, they need to understand themselves first. Filipinos are innately religious, with emphasis on the question, "Who am I?" as part of the development or of their whole persona (Ramos, 2017). Culturally, the belief in God, who is the reason for existence, is the very nature of Filipinos.

In addition, understanding how life is through their own experiences, most existentialists are also strong in intrapersonal intelligence (McCoog, 2010), as seen in the results of this study. Intrapersonal intelligence, as compared with interpersonal intelligence, is the awareness of one's strengths and weaknesses, and how to use these effectively in life (Parker, 2016).

Correlations Between Digital Literacy and MI

Digital literacy/competency is an important skill, especially in the 21st century teaching-learning environment. It is interesting to know how each MI strength of the respondents affects the way the respondents develop their digital skills.

Table 5 used Pearson r Correlation Coefficient to find out whether there are relationships between the different components of digital literacy/competency at 0.01 level of significance using two-tailed test. All coefficient values showed that there are positive and significant correlations between the paired literacies, namely: information processing and communication ($r = .763$, $p < 0.01$), information processing and content creation ($r = .565$, $p < 0.01$), information processing and safety ($r = .709$, $p < 0.01$), information processing and problem solving ($r = .763$, $p < 0.01$), communication and content creation ($r = .647$, $p < 0.01$), communication and safety ($r = .733$, $p < 0.01$), communication and problem solving ($r = .668$, $p < 0.01$), content creation and safety ($r = .649$, $p < 0.01$), content creation and problem solving ($r = .745$, $p < 0.01$), safety and problem solving ($r = .742$, $p < 0.01$). Therefore, hypothesis is supported.

Table 5: Pearson correlation between the different components of digital literacy/competency (2-tailed)

	Communication	Content Creation	Safety	Problem Solving
Information Processing	r=.763** sig=.000,n=244	r=.565** sig=.000, n=243	r=.709** sig=.000, n=242	r=.614** sig=.000, n=245
Communication		r=.647** sig=.000, n=245	r=.733** sig=.000, n=243	r=.668** sig=.000, n=246
Content Creation			r=.649** sig=.000, n=242	r=.745** sig=.000, n=245
Safety				r=.742** sig=.000, n=245

The above-mentioned components are equally important for one to be able to participate fully in the digital society (mediasmarts.ca, 2019). They are interrelated and as one navigates through the digital platform, each component is actively seen.

Table 6 presents the correlations between the different multiple intelligence types using Pearson Product Moment Correlation Coefficient.

Table 6: Pearson correlation between the different multiple intelligence types (2-tailed)

MI	Existential	Inter-personal	Intra-personal	Logic	Musical	Naturalistic	Verbal	Visual
Bodily Kinesthetic	r=.060 sig=.351, n=243	r=.247** sig=.000, n=243	r=.111 sig=.085, n=243	r=-.035 sig=.586, n=243	r=.038 sig=.556, n=243	r=.222** sig=.000, n=243	r=-.151* sig=.019, n=243	r=-.009 sig=.885, n=243
Existential		r=.245** sig=.000, n=243	r=.462** sig=.000, n=243	r=.118 sig=.067, n=243	r=-.043 sig=.506, n=243	r=-.068 sig=.289, n=243	r=-.105 sig=.101, n=243	r=-.036 sig=.575, n=243
Inter-personal			r=.248** sig=.000, n=243	r=.107 sig=.097, n=243	r=-.012 sig=.858, n=243	r=-.028 sig=.663, n=243	r=.024 sig=.705, n=243	r=-.026 sig=.685, n=243
Intra-personal				r=.272** sig=.000, n=243	r=-.015 sig=.816, n=243	r=-.103 sig=.110, n=243	r=-.041 sig=.525, n=243	r=-.089 sig=.167, n=243
Logic					r=.046 sig=.480, n=243	r=.142* sig=.027, n=243	r=.029 sig=.654, n=243	r=.121 sig=.059, n=243
Musical						r=.020 sig=.752, n=243	r=.110 sig=.088, n=243	r=.035 sig=.590, n=243
Naturalistic							r=.181** sig=.005, n=243	r=.023 sig=.723, n=243
Verbal								r=.250** sig=.000, n=243

The results revealed that some correlations of the paired intelligences were positive while others were negative. Moreover, 10 correlations out of 36 are statistically significant but having weak correlations. The positive and significant correlations were bodily-kinesthetic and interpersonal ($r = .247$, $p < 0.01$), bodily-kinesthetic and naturalistic ($r = .222$, $p < 0.01$), existential and interpersonal ($r = .245$, $p < 0.01$), existential and intrapersonal ($r = .462$, $p < 0.01$), interpersonal and intrapersonal ($r = .248$, $p < 0.01$), intrapersonal and logic ($r = .272$, $p < 0.01$), logic and naturalistic ($r = .142$, $p < 0.05$), naturalistic and verbal ($r = .181$, $p < 0.01$), and verbal and visual ($r = .250$, $p < 0.01$). These correlations, therefore, support the hypothesis. On the other hand, bodily-kinesthetic and verbal ($r = -.151$, $p < 0.05$) had a negative and significant correlation, and therefore do not support the hypothesis.

There are several possible factors that influence the development of an intelligence type, such as environmental conditions or opportunities that foster its development (Ahvan & Pour, 2016; Raissi Ahvan, Zainalipour, Jamri, & Mahmoodi, 2016). A person may have, not just one, but multiple

intelligences due to motivational, cultural, and experiential factors (Luo & Hwang, 2018; Gardner & Hatch, 1989 as cited in Ahvan & Pour, 2016).

Table 7: Analysis of Differences of Literacy and Intelligence Style

	VarInfo Processing	Var Communication	VarContent Creation	VarSafety	VarProblem Solving
MIF BodilyK	F=0.496, sig=0.610	F=0.419, sig=0.658	F=0.334, sig=0.716	F=0.049, sig=0.952	F=1.183, sig=0.308
MIF Existential	F=0.669, sig=0.513	F=1.358, sig=0.259	F=1.514, sig=0.222	F=1.007, sig=0.367	F=0.221, sig=0.802
MIFInter	F=0.646, sig=0.525	F=0.152, sig=0.859	F=1.652, sig=0.194	F=0.560, sig=0.572	F=0.080, sig=0.923
MIFIntra	F=2.120, sig=0.122	F=3.342, sig=0.037	F=3.054, sig=0.049*	F=4.667, sig=0.010**	F=2.414, sig=0.091
MIFLogic	F=0.338, sig=0.713	F=0.619, sig=0.539	F=1.185, sig=0.307	F=1.033, sig=0.357	F=0.223, sig=0.800
MIFMusical	F=1.336, sig=0.264	F=2.542, sig=0.081	F=2.596, sig=0.076	F=1.844, sig=0.160	F=3.946, sig=0.20**
MIF Nature	F=1.136, sig=0.322	F=2.039, sig=0.132	F=0.410, sig=0.664	F=0.498, sig=0.608	F=2.113, sig=0.123
MIFVerbal	F=0.368, sig=0.693	F=0.303, sig=0.739	F=0.729, sig=0.483	F=0.042, sig=0.959	F=0.219, sig=0.804
MIFVisual	F=0.310, sig=0.734	F=1.132, sig=0.324	F=1.915, sig=0.149	F=0.352, sig=0.703	F=0.871, sig=0.420

Table 7 presents the ANOVA test conducted between the codification of preferred intelligence style (A, B or other) and the summary measure of each of the five dimensions of digital literacy. As an example, in the computation of MIFBodilyK, "A" means that it is chosen as the first preferred style, "B" that it is the second preferred style and "C" that it is another choice. The coefficients presented in the table reflect the existence of a difference or not in the digital literacy of respondents given his intelligence style preferences.

As the reader sees, only three (3) statistically significant differences are observed. The Content Creation skill is different for those with "intra," or intrapersonal, intelligence style (F=3.054, sig=.049); similarly, the Safety component is different for those with that type of intelligence (F=4.667, sig=.010). Finally, Problem Solving may be different or those with "musical" as preferred intelligence style. Since there are only three (3) significant relationships, one should exercise caution in the interpretation of these results.

This is also seen in the study of Sherman (2014) wherein findings showed that verbal-linguistic intelligence did not have significant correlation with digital literacy. Most common intelligence with correlations to digital literacy is the intrapersonal intelligence, specifically with the communication, content creation, and safety components. It is not surprising because working in the digital setting is often an individual activity, allowing the person to be aware of his/her own personal thoughts, experiences, and behaviour while online. Musically-inclined individuals often use their right brain and are typically more creative when looking for a solution to a problem (Sholihah, Saefudin, & Priyandoko, 2020).

Discussion

Given the importance of information technology in life and in education of new generations, this study focus was to determine the literacy level of teachers and explore its potential relationship with their dominant style of intelligence. From our respondent's self-estimation, it appears that they report having a competency profile varying from moderately literate / competent (content creation and

problem-solving) to very literate/competent (information processing, communication and safety). As teachers, digital literacy/competency is a necessity especially when doing blended or online teaching.

Our paper proposed three hypotheses: the first one was about the existence of a significant relationship between the five dimensions of the concept of literacy /competency. A Pearson correlation study was made among those, which resulted into high coefficient, ranging from .565 to .763, all with a 2-tails significance of .000. Clearly the literacy/competency is sufficiently captured by the 62 questions of the instrument. The second hypothesis was suggested the existence of a significant relationship between the nine intelligence types.

Results show the "existential" style as the primary intelligence type and "intrapersonal" as the secondary intelligence type. All the components of digital literacy/competency are correlated to one another, as each one is equally important to have a successful and effective digital experience. Significant and positive correlations between MI pairs are found, such as (1) bodily-kinesthetic and interpersonal, (2) bodily-kinesthetic and naturalistic, (3) existential and interpersonal, (4) intrapersonal and logic, (5) logic and naturalistic, (6) naturalistic and verbal, and (7) verbal and visual. The most important relationship is found for existential – intrapersonal intelligence style (r=.462). However, bodily-kinesthetic and verbal had a negative and significant correlation. Only 13 of the 36 correlations were found statistically significant; this may indicate the effect of the hazard, since the coefficients are relatively low, even for those with a significance of .000.

The third hypothesis postulated the existence of a correlation between intelligence type and digital literacy skills. Findings showed that intrapersonal intelligence is significantly correlated with communication, content creation, and safety, while musical intelligence is significantly correlated with problem-solving. Although the results of this study indicate some associations between certain intelligences and digital literacy skills, only 5 out of 45 are significant, with a low coefficient "r", the highest being .177, limiting confidence on the reality of the observed relationship.

Conclusion

This study brings has shown that teachers master many aspects of the main dimension of digital literacy. It has also indicated that intelligence style might not be so important to explain or impact the digital literacy level.

This study suffers from several limits and flaws. It was conducted among a limited number of teachers on a single university in Philippines. It is suggested that a more representative sample of teachers be taken from the country to eliminate the bias due to this convenience selection of respondents. Additionally, the self-assessment of competencies should be compared to objective tests, although the instrument was based on literature review. Further researches are suggested in order to overcome these limitations, namely a more objective measure of literacy could be used to correlate skills with intelligence style.

This study has opened a first step to the understanding of the role (or the impact) of intelligence on digital literacy. Our mixed results suggest that a better understanding is needed of both constructs. The information technology is not a monolithic knowledge and the five dimensions used as surrogate of this construct might not be sufficient to assess it. Also, this study shows that digital literacy might have a different meaning depending on the society in which it is used so further studies may be done to understand the cultural and contextual impact of environment.

Authors suggest also that since the education of the 21th century will largely rely on technology, studies should be conducted to take into account the psychological aspects of dematerialization of the teaching, giving more importance to computers for information transmission (prepared by a technology skilled teacher) and more importance to the teacher for supporting projects, class animation and personal motivation, especially given the growing popularity of flipped classroom. As students' interactions and teacher interactions are expected to be more mediated by technology, authors suggest that studies be conducted in the area of sociology to examine the capacity of teachers

to efficiently manage interactions in the classrooms. The authors are actually planning a replication of their study with Canada, in order to see if economic development and or cultural differences can provide a better understanding.

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How Behaviour of Firms Change Due to Public Interventions: The Concept of Behavioural Additionality Effect

Paulina KUBERA

Poznan University of Technology, Poznań, Poland, Paulina.Kubera@put.poznan.pl

Abstract

Measuring average impacts of public interventions, which is a dominant approach in the evaluation of public programmes has little to offer to inform policy making. For instance, the ultimate goal of innovation policy is about a qualitative change, not the numbers of patents obtained or applied, product or process innovations introduced or employment growth in the supported firms in terms of R&D personnel. Hence, the key concept advanced in this paper is behavioural additionality effect, which takes account of the difference in behaviour of a target population (firms) owing to a public intervention. The article addresses three research questions: How behavioural additionality is conceptualised in extant literature? What are the major obstacles in assessing behavioural additionality effect of public interventions? And how these problems can be overcome? Based on literature review and evaluation practice it can be argued that the term 'behavioural additionality' suffers from conceptual confusion and terminological ambiguity. Two major hindrances can be identified that impede the behavioural additionality research. The first it is the confusion between the potential and actual behaviour. The second is called 'project fallacy' and entails the problem with causal explanation. To remedy these problems – the conceptualisation of behavioural additionality as changes in organisational routines and capabilities are suggested as well as process tracing and contribution analysis that are grounded in generative causality. The article contribution lies in providing a common reference frame for evaluation of behavioural additionality at the firm's level that incorporates the element of persistency of the changes induced, what is vital from the public policy perspective.

Keywords: evaluation, behavioural additionality, organisational behaviour, organisational routines

Introduction

Public programmes are primarily viewed in terms of effects with little attention paid to how those effects are produced. Measuring average impacts of public interventions, which is a dominant approach in the evaluation of public programmes has little to offer to inform policy making: whether the programme can be successfully scaled-up, implemented elsewhere or for other recipients, what to do when a programme does not yield expected effects. Hence, recently more attention is paid to the variation in program effects and mechanisms through which these effects occur (Astbury & Leeuw, 2010). Addressing these kinds of problems means moving beyond the traditional input/output approach and trying to understand what is inside the 'black box' of a policy instrument, inspecting the inner-workings of a public intervention.

The typical output (result) indicators used in the evaluation of innovation policy instruments are: the number of patents obtained or applied, number of product or process innovations introduced, employment growth in the supported firms in terms of R&D personnel, etc. However, are they really the primary goals of innovation public policy? Rather not. Innovation policy, as the term suggests, is a policy, a set of instruments, that affect innovation. Innovation can be defined in a broader or narrower manner, however, a key point is that it implies 'the introduction of new solutions in response to problems, challenges or opportunities that arise in the social and/or economic environment' (Edler & Fagerberg, 2017, p.4) From this perspective, the term is applicable to high-tech and low-tech, to manufacturing and services, to the private as well as the public sector (see, e.g. Osborne & Brown, 2013), and, importantly, denotes a qualitative change.

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The key concept advanced in this paper is behavioural additionality, which takes account of the difference in behaviour of a target population (firms) owing to a public intervention. Producing the outputs is not only a matter of having the right resources of various types (material, human, capital) this is also a matter of their right combination, coordination in time and space. We can reformulated the above mentioned examples of output additionality using behavioural lenses: what organisational routines and capabilities have been built/enhanced due to a public intervention, how a public intervention interacts with strategies and capabilities of firms? It can be argued that behavioural additionality is closely related to output additionality, since it creates prerequisites for improvement of firm's economic performance. However, the focus should not be limited to the problem: how public support modifies manner in which a subsidised project is carried out (the analogy to opening a 'black box' of public interventions.). An important question is also about the persistency of the behavioural changes of firms after the intervention (completion of the subsidised project). Moreover, the concept of behavioural additionality captures a shits in firm's orientation (greener or more social focus) as public innovation policy carries horizontal objectives as well.

The paper is organised into five parts. An introduction accentuates the need for complementing (not substituting) the traditional input/output approach to innovation policy evaluation with behavioural additionality effects. The subsequent part deals with the question of how behavioural additionality is conceptualised in extant literature and suggests a common reference frame for evaluation of behavioural additionality at the firm's level taking into consideration the persistency of policy effects. In the third one – two interrelated lines of inquiry are followed, namely: what are the major obstacles in assessing behavioural additionality effect of public interventions, and how these problems can be overcome. The considerations are based on literature review and evaluation practice. The article ends with concluding remarks and the indication of avenues for further research.

A common reference frame for evaluation of behavioural additionality effect at the firm's level

Behavioural additionality in scholar literature and evaluation practice is defined in many different ways (for the review – see: Gök & Edler 2011; Kubera, 2018).

Table 1: Conceptualisation of behavioural additionality effect

Firm-level one off effects	Firm-level persistent effects	System-level effects
Public support influences the decision to launch a project, to expand its scope and scale, or the pace in which project is implemented. In State aid law these constitute the "incentive effect" of aid, together with a situation when public support affects the decision concerning the location of a project (regional State aid).	Public support influences the firm's behaviour beyond the frames of the supported project, either by inducing changes in the firm's strategic management (e.g. adopting a more strategic approach to R&D), or inducing changes at the operational level (e.g. the application and reporting requirements (greater rigour) are institutionalised into the firm's further activities	Public support influences behavioural changes of other entities (actors of innovation system), who are not the target population (e.g. knowledge spill-overs).

Authors: Polt & Streicher (2005), Falk (2006) Wanzenböck, Scherngell & Fisher (2013).	Authors: Davenport, Grimes & Davies (1998), Hall & Maffioli (2008), Neicu, Teirlinck & Kelchtermans (2016).	Authors: Meuleman & De Maeseneire (2012), Larrea, Aranguren & Karlsen, (2012), Wu (2017).

Source: Own elaboration based on the systematic literature review carried out by the Author (Kubera, 2018).

A separate and a very common conceptualisation of behavioural additionality effect which cannot be neatly categorised to one of the three types mentioned above is collaboration additionality (Breschi et al., 2009; Teirlinck & Spithoven, 2012; Cerulli, Gabriele & Poti, 2016). Its prominent role in innovation processes stems from the fact that cooperation with other firms or institutions creates opportunities to gain complementary resources and skills, and as a consequence, can lead to faster development of innovations, improved market access, cost and risk sharing. Cooperation additionality can be viewed as a firm-level one-off effect, when a beneficiary firm enters into collaboration only to carry out the subsidised project, or a firm-level persistent effect (e.g. due to a public intervention a firm changes the pattern in which it cooperates with others); or system-level effect, in the form of e.g. improved coordination. The effects at a firm level certainly do not exclude those at the system level. Moreover, the problem - how changes occurring at the beneficiary firms (target population of a public intervention) modify behaviours of other actors of innovation system is an interesting line of inquiry deserving further investigation (the knowledge spill-over effects, technology diffusion), which are frequently not captured adequately in evaluation of public programmes in the field of RDI (e.g. Autio, Kanninen & Gustafsson 2008).

It follows that present definitions of behavioural additionality effect suffer from conceptual confusion and terminological ambiguity, impending a proper theoretical understanding and hindering empirical research. In order to introduce a common reference frame for evaluation of behavioural additionality at the firm's level and incorporating the element of persistency of the changes induced (what is vital from the public policy perspective), in this paper behavioural additionality is conceptualised as modification of the beneficiary firm's organisational routines, which are the building blocks of the firm's organisational capabilities; these can be, in turn, linked to the firm's dynamic capabilities and firm strategy.

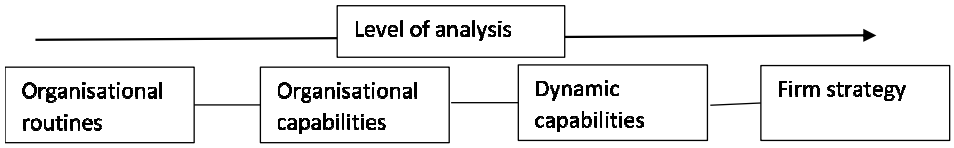

Fig. 1: Focal points in the search for the behavioural additionality effect of public support

Source: Own elaboration.

Research on behavioural additionality effect incorporating the element of persistency can be related to one or more of these focal points. They are organised in a hierarchy, with organisational routines as a basic unit of analysis for organisational behaviour, however, it should be borne in mind that the relations between these constructs are two-directional, thus, a cross-level analysis is advocated (Salvato & Rerup, 2011).

The term 'organisational routines" refer to 'repetitive, recognizable patterns of interdependent actions carried out by multiple actors' (Pentland & Feldman, 2008, p.235). They can be treated as basic components of organisational behaviour and repositories of organisational capabilities. For that reason, they are relevant for capturing and understanding organisational change. Analysing how

organisational routines and capabilities change can help to recognize the pathways and mechanisms by which external factors shape the organisation's behaviour (Becker et al., 2005).

Although all four: organisational routines, organisational capabilities, dynamic capabilities and firm strategy are distinct constructs, they are linked. Organisational capabilities are larger scale units of analysis in comparison to organisational routines. Following Winter (2003, p.991), Felin et al. (2012) define organisational capability as 'a high level routine or collection of routines that together with its implementing input flows, confers upon an organisation's management a set of decision options for producing significant outputs of a particular type (p.1355). Hence, organisational capabilities involve patterned activity which is oriented to relatively specific objectives. They entail deploying resources (inputs), usually in combination, and using organisational processes to produce firm's outputs that matter for organisation's survival and prosperity. While (operational) capabilities enable an organisation to earn a living at present, dynamic capabilities concern change, as they include: a capacity to identify the need or opportunity for change, to respond to such a need or opportunity and implement a course of action. Hence, they extend, modify or create (ordinary) capabilities (Winter, 2003). They are crucial for developing and maintaining a competitive advantage of the firm and thus have a direct link to the firm's strategy.

Problems to overcome in behavioural additionality research – putting puzzles together

There are two major hindrances that impede the behavioural additionality research. The first it is the confusion between the potential and actual behaviour. The second is called 'project fallacy' and denotes 'the failure to distinguish between a single sponsored project and the longer-term business innovation effort to which it is part' (Georghiou & Clarysse 2006, p.10).

Hall and Maffioli (2008) while evaluating the impact of technology development funds in Latin America applied subjective indicators- innovation surveys to detect behavioural additionality defined as a more proactive attitude of beneficiary firms towards innovation activities and a firm's willingness to interact with external sources of knowledge and financing. In a similar vein, Chapman and Hewitt-Dundas (2018) examined effect of public support on senior managers' attitudes to innovation, such as support for innovation, risk tolerance and openness to external knowledge. However, we know that potential means that something might chance to happen or not to happen, or being a little more precise, potential is actualised when conditions are right. (Not to mention the common method variance problem involved in self-reporting techniques). On the other hand, though, it should be admitted that numerous public interventions are about changing (forming) attitudes. First, there is an intervention, which causes the attitude change, which, in turn lead to the behaviour change. It is hard to deny the worth of such studies as they shed some light on the effects of public interventions, but we might have the impression that we have stopped somewhere in the middle , we do not get the full picture of the phenomena under investigation, only a piece of it. Similarly, entering into collaboration, number of collaborating partners used as indicators of behavioural additionality effect (Aschhoff, Fier & Löhlein, 2006) say little and mean only scale and scope aditionality, which can be confused with input/output approach. They create opportunities for spill-over effects, but behavioural change trigger three factors that must be in place simultaneously. Apart from the right conditions (opportunities), there is an emotional factor (motivation) and cognitive factor (knowledge, skills). Public interventions are frequently aimed at only one factor, assuming that the rest are present, what is not always the right approach. It is important for public interventions to yield intended behavioural effects to verify (with a feasible level of confidence) whether these assumptions really hold true.

The recent conceptualisation on organisational routines as generative systems, where the ostensive and performative aspects are distinguished and interlinked, along with artifacts, might be a solution. These three aspects (i.e. ostensive, performative and artifacts) must be in place for a pattern of interdependent actions be identified as a routine. Public policy interventions produce behavioural additionality effect by creating and/or reinforcing one or more of these aspects.

An ostensive part of a routine denotes the abstract aspect of the routine stored in people's mind, an idea, how to act. Performative part is an enactment of the ostensive part in particular time and space. In other words, while the ostensive dimension of a routine is the abstract and generalised understanding of the routine (usually plural, as the understanding of a routine may differ across an organisation), the performative dimension designates a specific action taken by specific people at specific times (Salvato & Rerup, 2011). They are mutually constitutive, with the performances creating and recreating the ostensive aspect and ostensive aspect constraining and enabling the performances (Becker, 2020). A routine does not exist without being enacted, at most we can call it an aspirational or espoused routine.

Artifacts, the third dimension of a routine, can take a variety of different forms, such as written rules, procedures, software and computers or forms of general physical setting (e.g. an outline of an office). They are often used to ensure the reproduction of particular patterns of action. They influence and represent the ostensive and performative dimensions of a routine, however, they cannot be confused with organisational routines as such (Pentland & Feldman, 2008). Standard operating procedures are sometimes used as proxies of routines. While for some questions they may work well, substituting the representations for the routine accentuates the static nature of organisational routines and does not allow to capture their dynamics properly (Feldman, 2016) If we want to get a full picture of behavioural additionality effect of a public intervention we need to break organisational routines (and capabilities) into parts and map their interrelationships.Include figures and tables within the body of your paper.

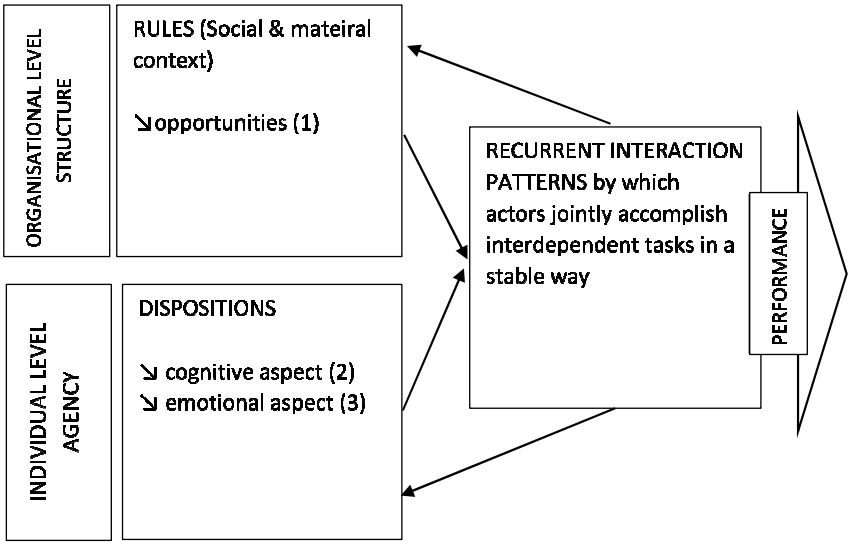

Fig 2. Internal dynamics of a routine

Source: Own elaboration. (1), (2), (3) – drivers of behaviour change

The next identified hindrance impeding the progress in behavioural additionality research lies in the additionality concept as such. While we are evaluating public interventions we want to know what was in fact caused by a given intervention not by some other factors. Hence, the focus is on those changes/effects which have been brought about over and above what would have taken place anyway without the examined intervention. Thus, the root problem entails causal explanation. In many

situations it is difficult to separate the effects, in particular behavioural effects, of a subsidised project from the larger ongoing activity of the beneficiary firm (the so called project fallacy problem).

The prevailing input/output approach in evaluation of public interventions which relies heavily on successionist model of causation is not suitable for behavioural additionality research. This is because of its inability to capture the contextual features properly. In organisational setting our actions are conditioned by history and intent (backward- and forward-looking), and power structure, in this sense they are consequential, however, they are also constitutive for organisational structures and processes (they shape the context). Moreover, the successionist approach is unable to explain the causal connection, i.e. the process leading from cause to effect, what happens in-between cause and effect. Generative causation, by contrast, attaches great importance to this transformation, as it tries to provide fine-grained explanation of the behaviour of specific actors (thinking, decision-making, action) in a given context with specific resources, opportunities and constraints (Befani 2016).

Two approaches are suggested, both of which are grounded in generative causality, to address the problem of 'project fallacy', namely : contribution analysis (CA) and process tracing (PT). However, we need to come to terms that they do not measure an impact of a public intervention in a strict sense, but rather increase our confidence that a public intervention had an influence on a target population. In other words, behaviour change might not be caused solely by an intervention (as in the case of attribution). An intervention is one of many factors which contribute to a given change. At best, we can talk about the 'causal package , in which a given intervention plays a vital role (Mayne, 2012).

CA belongs to theory-based-evaluations, where the starting point is a theory of change, a comprehensive description of a path how a given intervention is expected to bring about the intended changes. It specifies the activities taken within an intervention and subsequent changes, along with assumptions for each causal link that must hold true for the change to occur and the associated risks as well as other influencing factors. In spite of appearances, this path does not need to be linear, but involve many feedback loops that need to be understood. All of these elements of a theory of change are assessed against available empirical evidence. Mayne (2012) developed six key steps in contribution analysis to follow to make the whole approach more systematic.[1]

Moreover, the application of process tracing, its principles and tests, may additionally increase the strength of causal interference made in contribution analysis. PT is a case-based approach to causal inference with a focus on the use of clues within a case (causal-process observations, CPOs) to adjudicate between alternative possible explanations. Miles and Cunningham (2006) write: 'The issue at stake is not just a matter of more or less activity at one point in time. Activities have been reshaped, there has been a learning process in the individuals and organisations concerned" (p.160). Of interest are long-term and persistent effects. On the whole, in recent years one can observe that process and practice approaches to organisational topics have gained momentum, 'de-emphasizing the entity-like features and emphasizing more the continuity of becoming', 'dynamic unfolding' processes. This entails 'refocusing on enactment rather than representation, on process and potentiality rather than likelihood, and on relationality rather than correlation' (Feldman 2016, p.26).

The recent incorporation of the informal Bayesian logic into process –tracing allows for assessing the type and strength of inferences we can make using different forms of empirical evidence. Hence, it is not the quantity of observations that affect strength of evidence (unless they are independent), but the probability of observing a given piece of data. The aim is to design data collection so as to maximise our confidence in the existence of the theorised causal mechanisms. If the probability of a given piece of data before and after empirical research is similar, it means that this evidence is weak. Accordingly: the bigger the difference between the two probabilities, the stronger is the evidence (Befani & Mayne, 2014). In what follows, we should assess each piece of potential evidence in terms of its certainty and uniqueness; i.e. whether we have to find a given piece of evidence for the theory to be valid, and whether there are any plausible alternative explanations for finding it. For example, a 'hoop test' involves making a prediction with high certainty and low uniqueness, in that there are many plausible alternative explanations for finding the evidence. In this case finding the predicted

evidence means little updating of our beliefs, however, not finding this evidence has a disconfirmatory power (Schmitt & Beach, 2015).[2]

Conclusions and avenues for future research

In order to ensure policy learning the traditional input/output approach to evaluation of innovation policy should be complemented with the third type of additionality effect, namely behavioural additionality, which takes account of the difference in behaviour of a target population owing to a public intervention. However, the literature review and evaluation practice reveal that a diverse array of meanings is attached to the term, hindering empirical research and cumulation of knowledge.

Two major hindrances can be identified that impede the behavioural additionality research. The first is the confusion between the potential and actual behaviour, (changing attitudes, our understanding versus changing behaviour, activities undertaken). The second is called 'project fallacy' and entails the problem with causal explanation, as in many situations it is difficult to separate the effects, of a subsidised project from the larger ongoing activity of a beneficiary firm and this pertains in particular to behavioural effects. Moreover, from the policy perspective, of interest are not only one-off behavioural changes but persistent changes which are not confined to the implementation of a subsidised project.

To remedy the first problem the definition of behavioural additionality as changes in organisational routines and capabilities are suggested . The recent conceptualisation of organisational routines as generative systems, where the ostensive (an idea how to act – abstract) and performative (enactment, real) aspects are distinguished and interlinked, along with artifacts, might help to capture the behavioural changes induced by a public intervention. Common frames and units of analysis can bring greater coherence in behavioural additionality research.

Regarding the second problem, given the complexity surrounding the ways in which firms' behaviour is modified (context sensitivity, path dependence, power structure etc.) the only viable manner in which we can deal with the problem of 'project fallacy' is to strengthen our confidence that a given intervention contributed to an intended behaviour change and that the intervention was a vital part of a 'causal package' . Contribution analysis by Mayne (2012) combined with process-tracing and its recent developments consisting of the incorporation of informal Bayesian logic are suitable for this purpose.

Nevertheless, there are still many questions concerning the assessment of behavioural additionality effect that remain unanswered and deserve further attention. I would suggest the following avenues for future research. First, the concern is about the methods/ research approaches suitable for tracking behavioural effects of public interventions. Case study and ethnographic research is particularly relevant for investigating behavioural additionality, as the main research questions they are aimed at are 'how' and 'why' questions, the researcher has little or no control over behavioural events, and the focus of study is a contemporary (as opposed to entirely historical) phenomenon (Yin, 2018). However, the question remains whether can we get beyond the case-study design in the assessment of behavioural aditionality effect and still provide rich insights how firms behave and how the behaviour of firms can be influenced through public policy instruments. Perhaps, modelling approaches could be employed for that purpose to a greater extent. Secondly, behavioural additionality is usually assumed to be positive, that the public intervention will affect the firm's propensity to innovate so that they can perform better and create competitive advantage, or in the worst case – there is no behavioural additionality, meaning that a public intervention has no persistent impact on the firm's behaviour. However, too little attention is paid to the case of negative behavioural additionality. Georghiou and Clarysse (2006) mention about negative behavioural additionality providing the example of a public intervention that encourages firms to take risks which they cannot afford. Public intervention are also associated with adverse behavioural effects when they lead to the wrong direction in terms of technology or the market, or encourage firms to enter into alliances which are unproductive and costly. However, defining negative behavioural additionality remains particularly

challenging. Even when a subsidised project does not yield desired outputs we can still talk about positive behavioural additionality when the knowledge and capabilities gained during its implementation turn out to be valuable in subsequent projects, the firm can capitalize on them in other innovation endeavours. Shepherd et al. (2009) describe it aptly: ' within some failures lie the seeds of subsequent project success' (p.589). It is argued that not only organisations are more likely to learn from failures than from successes, but also that the knowledge derived from failure depreciates more slowly than when derived from success (Rhaiem & Amara, 2019). Hence, the question is – how can we capture properly these instances of behavioural additionality of public interventions, in particular what time frames should be adopted.

[1] Six steps to be taken to produce a credible contribution story: (1) : Set out the cause-effect issue to be addressed; (2) Develop the postulated theory of change and risks to it, including rival explanations; (3) Gather the existing evidence on the theory of change; (4) Assemble and assess the contribution claim, and challenges to it; (5) Seek out additional evidence; (6) Revise and strengthen the contribution story.

[2] The three other tests are: (1) a doubly- decisive test, which combines high uniqueness and high certainty; not finding the evidence downgrades our confidence, while finding it increases our confidence, since there are few plausible alternative explanations for the evidence; (2) a straw-in-the-wind test combines low certainty and low uniqueness which means little updating our beliefs, and (3) a smoking gun test – involves making a theoretically unique prediction but not certain; finding the evidence enables strong confirming inferences, whereas the opposite is not very informative.

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Granting State Aid to Entrepreneurs in The Context of Coronavirus

Paulina KUBERA

Poznan University of Technology, Poznań, Poland
Paulina.Kubera@put.poznan.pl

Abstract

The spread of the coronavirus hit the global economy unexpectedly and with great force. Many so far healthy undertakings had to (and still have to) deal with the looming lack of liquidity. In order to counter the damage inflicted on undertakings and to perverse the continuity of economic activity during and after the coronavirus pandemic, public authorities were forced to launch various types of support measures for entrepreneurs. As the extraordinary times call for greater activity on the part of the state, the question is how freely can EU member states design their interventions and what support measures for entrepreneurs are utilised to deal with the effects of the COVID-19. State activity in the form of providing support for entrepreneurs is discussed as a trade-off between the need to mitigate the disruptive impact of the coronavirus pandemic on the economy and the need to maintain a level playing field for all enterprises in the EU. Considerations are based on literature review, the analysis of relevant legal provisions and guidelines as well as state aid cases related to coronavirus. The article provides a better understanding of the rationale behind the EU state aid control and state aid admissibility in the context of the coronavirus outbreak.

Keywords: State aid, general measures, operating aid, coronavirus

Introduction

The spread of the coronavirus hit the global economy unexpectedly and with great force. In response, countries around the world implemented several containment measures to halt the pandemic, including social distancing measures, travel restrictions and lock downs. These had a stifling effect on economic activities, not only in tourism, entertainment or transport sectors, but in almost all sectors, without even sparing large enterprises. Moreover, uncertainty surrounding the near and distant future led to flight to safety in consumption and had a negative effect on investment plans. Many so far healthy undertakings had to (and still have to) deal with the looming lack of liquidity.

In order to counter the damage inflicted on undertakings and to perverse the continuity of economic activity during and after the coronavirus pandemic, public authorities were forced to launch simultaneously various types of support measures for entrepreneurs.

The article examines how freely can EU member states design their interventions and what support measures for entrepreneurs are utilised to deal with the effects of the COVID-19. The problem is vital for the avoidance of harmful subsidy races among EU member states where those member states that have larger funds at their disposal can outspend neighbours to the detriment of cohesion within the EU. The level playing field in the EU internal market must be preserved. Considerations are based on literature review, the analysis of relevant legal provisions and guidelines as well as state aid cases related to coronavirus.

The remainder of the paper is structured as follows. The first part is devoted to the problem of the differentiation between state aid and general public measures that is crucial in determining the competences of EU member states to implement their own support measures. In the next sections the notion of state aid is further clarified, its admissibility criteria are discussed in the context of

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coronavirus pandemic as well as relevant state aid cases are invoked for illustrative purposes. The article ends with final conclusions.

What is state aid and how does it differ from general public measures

Generally, economic policy falls within the remit of each EU member state. Nevertheless, the process of economic policy coordination at the EU level takes place in either 'soft' as well as 'hard' forms. The former denote moral persuasion and peer pressure through benchmarking and exchange practices, the latter – strict rules to be respected with a sanction mechanism attached to them. The example of 'soft' coordination is the broad economic policy guidelines and employment guidelines, the example of the 'hard' cooperation is the stability and growth pact, a set of rules designed to ensure that member states pursue sound public finance. Currently, these coordination processes, reformed, work in parallel under the 'European Semester'. The European Semester brings together within a single policy co-ordination cycle many EU instruments. The EU institutions set priorities for the EU, review national performance, economic reform and budget plans and issue Country-Specific Recommendations (CSRs).[1] As Verdun and Zeitlin (2018) point out: 'Although the Semester involves no legal transfer of sovereignty from the member states to the EU level, it has given the EU institutions a more visible and authoritative role than ever before in monitoring, scrutinizing and guiding national economic, fiscal and social policies, especially within the euro area' (p.138).

Moreover, member states enjoy discretionary power in reference to the implementation of general public measures. Selectivity is a feature that differentiates state aid form general measures which are applicable to all undertakings in all sectors within the state (Sciskalová & Münster, 2014). Shaping the tax system or social security system are examples of general public measures as long as they do not favour certain undertakings or the production of certain goods. Then they are not contradictory to the EU internal market and any possible distortions of the competition being their result are eliminated through the harmonisation of the law of member states and coordination of economic policies (Schütte, 2006; Kubera 2011). State aid, in turn, implies granting an advantage in a selective way 'over other undertakings that are in a legal and factual situation that is comparable in the light of the objective pursued by the measure'.[2] Being a selective intervention in the market, state aid is under the EU control.[3]

A word of caution must be mentioned here. The very fact that undertakings are treated differently in public policy instruments does not automatically imply the existence of state aid. As a matter of fact, general measures frequently differentiate between recipients of public interventions. When general measures incorporate detailed provisions applicable to certain undertakings only, they still can have their rationale in logic and nature of the system of which they are part.[4] An example are special purpose levies such as environmental taxes which are imposed exactly to discourage some activities or production of some products which are detrimental to the environment. Differentiation between undertakings derives directly from the intrinsic objective of the system (in this case this special-purpose levy). The assessment, however, would be opposite when a given regulation differentiating between undertaking was a part of a corporate income tax system. In this case environmental policy objectives are external policy objectives as criteria applied are unrelated to the reference system (i.e. corporate income tax system) and therefore cannot be relied upon by member states to justify a difference in treatment of undertakings. In this case possible justification could be the progressive nature of income tax and its redistributive purpose. Other legitimate grounds for introducing a differentiation between undertaking in public policy measures may result from inherent mechanisms necessary for the functioning and effectiveness of the system, such as the need to avoid double taxation, to fight fraud or tax evasion. In any case member states should ensure that those measures are proportionate and do not exceed what is necessary to achieve the objective being pursued, (see: Commission Notice on the notion of State aid as referred to in Article 107(1) of the TFUE).

It is also pertinent to stress that material selectivity can also be established de facto. When a state measure which appeared to be applied to undertakings in general way, i.e. its formal criteria are formulated in general and objective term, in reality produces an advantage for certain undertakings or

the production of certain goods, to the exclusion of others, hence, is selective to a certain extent. It can be the case of applying a tax credit only to investments exceeding a certain threshold. Such a measure is de facto reserved for undertakings with significant financial resources.[5] The same holds true for export aid even when the measure is potentially applicable to all domestic undertakings , or measures applied on an experimental basis to certain undertakings (Kociubiński, 2012). Moreover, selectivity can also stem from discretionary power of member states, where fulfilling the eligibility criteria of a given measure does not automatically result in an entitlement to the measure.

To sum up, three main conclusions can be drawn from the above discussion. First, adoption of general public measures which are applied to all undertakings in all sectors within a state falls within the competence of member states. What is under the Union control are selective public measures that can have an impact on competition and trade exchange between member states (i.e. state aid measures). Secondly, general measures frequently involve differentiation between economic actors making the assessment of a given public measure more problematic. In such a case, selectivity of the measure can be established de jure and de facto. The former (de jure) results directly from the legal criteria for granting a measure that is formally reserved only for certain undertakings, e.g. those having a certain size, operating in certain sectors, having certain characteristics or exercising certain functions. However, the assessment of a measure should not stop here as selectivity can be hidden, seemingly neutral and objective criteria for granting a measure can de facto privilege certain undertakings or production of certain goods. Thus, a measure should be considered selective also on the basis of its effects. Thirdly, even when selectivity of a public measure is established it does not automatically mean that this measure constitutes state aid. When there is justification for the selectivity in logic and nature of the system of which they are part, or the selectivity is the result of inherent mechanisms necessary for the functioning and effectiveness of the system (e.g. a corporate tax system), a measure falls outside the state aid rules.

Admissibility criteria for state aid granting in the context of coronavirus

In the previous section the selectivity feature of state aid has been discussed to distinguish state aid from general public measures what is crucial in determining the competences of EU member states to implement their own support measures. However, there are four criteria that must be met cumulatively for a measure to be qualified as state aid. Apart from being selective, these are: the measure must be financed through state resources and be imputable to the state[6] ; it must confer an economic advantage on its recipient (which an undertaking could not get under normal market condition) ; as well as the measure must distort or threaten to distort competition and affect trade between member states [7](Article 107(1) TFUE). It suffices that one of the above-specified criteria is not fulfilled to escape the state aid rules. The rationale for the EU state aid control stems from the fact that it is perceived as a mechanism which underpins the functioning of the internal market and supports economic integration (Kubera, 2020). It is also worth mentioning that state aid control has evolved from 'its initial internal market niche to encompass broader efficiency and fiscal discipline considerations' (Bacon 2017, p.11).

State aid is generally incompatible with the EU internal market and is admissible only on the conditions stipulated in EU law. In order to introduce more clarity and speed up state aid decisions related to coronavirus the Commission has issued Temporary framework for state aid measures to support the economy in the current COVID-19 outbreak. The Temporary Framework indicates six support measures that can be relied upon by member states. However, two of them do not qualify as state aid. These are:

1) measures that apply to all undertakings such as general wage subsidies, suspension of payments of corporate and value added taxes or social contributions that apply to all undertakings. These measures do not constitute state aid since they do not confer a selective advantage;

2) financial support provided directly to consumers, such as for cancelled services or tickets not reimbursed by the operators concerned. These measures do not constitute state aid since they do not confer an advantage on undertakings.

The next group of support measures can be implemented by member states also without the involvement of the European Commission, and this group encompasses:

3) measures designed in line with Block Exemption Regulation.[8] They constitute state aid, however, since they are less likely to lead to undue distortions of competition in the EU internal market due to the limited amount and rules on which aid is granted, do not have to be notified to the Commission.

The remaining three qualify as state aid and will be discussed more in detail in the further sections of the article. These are:

(4) rescue and restructuring aid (Article 107(3)(c) TFEU)

(5) aid to make good the damage caused by exceptional occurrences (Article 107 (2) (b) TFUE)

(6) aid to remedy a serious disturbance in the economy of a member state (Article 107(3)(b) TFUE)

Rescue and restructuring aid (Article 107(3)(c) TFEU)

According to Article 107(3)(c) TFUE, state aid may be granted to facilitate the development of certain economic activities or of certain economic areas, provided that such aid does not adversely affect trading conditions to an extent contrary to the common interest. This group encompasses support measures which are developed to meet acute liquidity needs and to support undertakings that face financial difficulties including those caused and aggravated by the coronavirus outbreak. However, these need to be in line with the strict criteria set out in the Rescue and Restructuring Guidelines[9] , in particular the principle 'one time last time', which means that aid can be granted to undertakings in difficulty in respect of only one restructuring operation. Moreover, it must be shown that the aid is truly in the public interest in a given case, in the sense that saving the undertaking would prevent social hardship or address market failures. The exit of firms and their replacement by others is not only a natural market process but also an important driver of productivity. Therefore, public interventions that interfere with that process is under particular EU scrutiny (Maier-Rigaud & Milde, 2015).

Rescue aid is designed to allow undertakings which face imminent collapse to stay in business for long enough to develop a restructuring plan. It takes the form of liquidity support (loans or guarantees) and has a maximum duration of six months. When further support is needed, restructuring aid can be granted which aims at supporting a firm's restructuring and its return to long-term viability. Member states are free to choose the form that restructuring aid takes as well as it can be granted for a longer period of time, nevertheless the aid must be accompanied by a detailed restructuring plan that meets a number of conditions (the Competition Directorate-General of the European Commission, 2014).

This was the case with a public guarantee on a loan in favour of Romanian airline BlueAir. The measure was divided into two parts and assessed under two different legal basis. In part (EUR 28 million), it was designed to compensate the airline for the damages suffered as a result of the coronavirus outbreak (assessment was carried out on the basis of Article 107(2)(b), which will be discussed in a subsequent section), and partially (EUR 34 million), to provide it with the necessary resources to address part of its urgent and immediate liquidity needs (assessment on the basis of the

Rescue and Restructuring Guidelines). What is important, Blue Air qualified as a company in difficulty[10] before the coronavirus outbreak, i.e. on 31 December 2019. The Rescue and Restructuring Guidelines enable member states to support such undertakings, where the pandemic worsened the situation of a given undertaking that was already poor before the outbreak. The airline was loss making due to the extensive investments it undertook since 2016 to improve its network of routes. The airline had returned to profitability in 2019 and early 2020, however, as other undertakings active in the aviation sector, it suffered significant losses as a result of the coronavirus outbreak and the travel restrictions that Romania and other governments had to impose to limit the spread of the virus. As a result the airlines suffered urgent liquidity needs. The Commission approved the rescue aid since it was limited in time and scope and its contribution to an objective of common interest was satisfactory demonstrated. Romania committed to ensure that, after six months, the public guarantee will be terminated, or BlueAir will either submit a liquidation plan or carry out a through restructuring to become viable in the long-term (subject to the Commission's separate approval) and that aid is necessary to ensure regional connectivity for the significant number of citizens working abroad and for small local businesses that depend on affordable tickets offered by BlueAir on a network of routes it operates, (SA.57026 Romania, COVID-19 – Aid to Blue Air).

Aid to make good the damage caused by exceptional occurrences (Article 107 (2) (b) TFUE)

According to Article 107 (2) (b) TFUE, state aid which is granted to redress the damage caused by natural disasters or other exceptional occurrences is exempted from the general prohibition of state aid. However, for the sake of legal certainty member states can notify such aid to the European Commission, which apart from the classification of the event as a natural disaster or another extraordinary event, takes into account the following when assessing a given aid measure with respect to it being compatible with the requirements stipulated in Article 107 (2) (b) TFUE: (1) proof of a direct relation between the damage and natural disaster or other extraordinary event, (2) proper assessment of damage, and (3) whether any mechanism to avoid excessive compensation has been introduced. It must be emphasised that only aid, which is aimed at the restoration of the condition prior to the natural disaster or other extraordinary event is compatible with internal market.

On the basis of Article 107(2)(b) TFUE member states can provide support for undertakings in sectors that have been particularly hit by the coronavirus pandemic, such as tourism, transport, hospitality or culture, as well as organisers of cancelled events for damages suffered due to and directly caused by the outbreak, e.g. part of the aid granted to previously mentioned BlueAir to compensate the damage directly caused by the coronavirus outbreak and the travel restrictions imposed by public authorities.

Another example is Danish compensation scheme for cancellation of events related to COVID-19. On 6 March 2020 Danish authorities made an official recommendation that all public events with more than 1000 participants as well as those events which were targeted at COVID-19 vulnerable and high risk groups (e.g. elderly) , irrespective of the number of participants, be cancelled, postponed, or substantially modified. The subsequent losses and additional costs suffered by the organisers of such events resulted from the implementation of the recommendation are to be compensated from state budget. The Commission has found a EUR 12 million Danish aid scheme to be in line with EU state aid rules. The Commission considers that the COVID-19 outbreak qualifies as an exceptional occurrence, referred to in Article 107(2)(b) TFUE, as it is an extraordinary, unforeseeable event having a significant economic impact. It clearly distinguishes itself from ordinary events by its character and by its effects on the affected undertakings and the economy in general and thus lays outside of the normal functioning of the market, (Commission decision SA. 56685, Denmark – Compensation scheme for cancellation of events related to COVID-19).

Aid to remedy a serious disturbance in the economy of a member state (Article 107(3)(b) TFUE)

As the above stipulated option (based on Article 107(2)(b) TFUE) is restricted to compensation for damage directly caused by the coronavirus outbreak (e.g. damage suffered by the organisers of cancelled events, damage suffered by an airline caused by travel restrictions), aid addressing more generally the economic downturn from the coronavirus pandemic is assessed on the basis of Article 107(3)(b) TFUE, according to which aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a member state can be considered to be compatible with the internal market. Member states can invoke this ground for support measures granted for a limited period to remedy the liquidity shortage faced by undertakings that were not in difficulty on 31 December 2019 and to ensure that the disruptions caused by the coronavirus outbreak do not undermine their viability, in particular that of small and medium sized enterprises.

The Temporary Framework provides more detailed guidance on admissibility of the aid granted by a member state to remedy a serious disturbance in its economy. According to it, when aid is granted in the form of direct grants, tax and payment advantages, the Commission considers this type of aid to be compatible with the internal market if it meets the following conditions: (1) the total nominal value of such measure does not exceed EUR 800,000 per undertaking, (2) the aid is granted on the basis of a scheme with an estimated budget, (3) the aid is granted no later than 31 December 2020.[11] Secondly, when aid is granted in the form of new public guarantees on individual loans in response to the COVID-19 outbreak, the Commission considers this type of aid be compatible with the internal market if: (1) the guarantee premiums are set at a minimum level, as defined in the Temporary Framework, (2) the guarantee is granted by 31 December 2020 at the latest, (3) for loans with a maturity beyond 31 December, the amount of loans per undertaking does not exceed double the 2019 annual wage bill of the undertaking, or 25% of its total 2019 turnover; (the amount of the loan may be higher in justified cases and for loans with a maturity date until 31 December 2020), (4) the duration of the guarantee is limited to maximum six years and the public guarantee does not exceed: 90% of the loan principal where losses are sustained proportionally and under the same conditions, by the credit institution and the state, or 35% of the loan principal, where losses are first attributed to the state and only then to credit institutions; in both cases the guaranteed amount must decrease proportionally with the size of the loan as it starts to be reimbursed; (5) the guarantee relates to investment and/or working capital loans. Thirdly, aid can also be granted in the form of subsidised interest rates for loans. In that case the reduced interest rates should be at least equal to the base rate (1 year IBOR) plus a credit risk margin as specified in the Temporary Framework. Additional conditions are set where aid in the form of guarantees and loans is channelled through credit institutions or other financial institutions. Moreover, in the context of coronavirus, the Temporary Framework makes public short-term export credit insurance more widely available until 31 December 2020.

A good example is a Danish aid scheme for self-employed. First, the scheme was developed to compensate self-employed undertakings for losses of revenues caused by temporary prohibitions and implementation of recommendations issued by Danish authorities trying to contain the spread of the coronavirus, and as such the aid scheme was assessed on the basis of Article 107(2)(b) TFUE (aid to make good the damage caused by exceptional occurrences). However, along with the progressive re-opening of the Danish economy and partial lifting of prohibitions and recommendations, the aid scheme has been amended as the main purpose of the measure changed from initial compensation scheme to direct grant scheme to mitigate liquidity problems for the undertakings concerned. Therefore, the compatibility assessment of the modified aid scheme was based on Article 107(3)(b) (aid to remedy a serious disturbance in the economy of a member state) and found compatible with the internal market since all the conditions set in the Temporary Framework (and specified above), were met. What is worth mentioning, the rule is that from this type of support measures cannot benefit undertakings that were already in difficulty on 31 December 2019. However, the exemption applies to micro and small enterprises provided that those enterprises, at the moment of granting the

aid, are not subject to collective insolvency procedure under national law and they have not received rescue aid or restructuring aid. Thus, the Danish grant scheme has been made available for those undertakings, (SA.57919 (2020/N) Denmark. COVID-19: limited amounts of aid scheme for self-employed).

Conclusions

State aid has always been thought as the 'second best' option, meaning that member states may resort to state aid only when other less distortive policy measures, such as general and regulatory measures, cannot be applied instead to achieve a given objective. For instance, deferrals of payments of taxes and social security contributions could be a valuable tool to reduce the liquidity constrains of undertakings. When applied generally (i.e. are not restricted to certain undertakings, regions, sectors etc.), they fall outside state aid rules. Member states can also grant compensation for damage suffered due to and directly caused by the coronavirus outbreak for undertakings particularly impacted by the pandemic, such as transport, tourism or hospitality. Operating aid, which now is flowing in a wide stream as a response to the coronavirus crisis, has been repeatedly considered by the European Commission and EU courts as being distortive for competition 'in principle' since it keeps undertakings artificially afloat by covering costs they should cover themselves. Such aid can only be regarded as compatible with the EU internal market when is granted on a temporary basis and is digressive[12] (Nicolaides, 2008).

The current coronavirus crisis seriously affected the economic situations of many so far healthy undertakings and their employees. Against this backdrop, there are no doubts that state aid is necessary to compensate the economic losses inflicted upon undertakings impacted by the pandemic and ensure that sufficient liquidity remains available in the market. Everything indicates that the total amount of state aid granted in response to the coronavirus outbreak, in particular in Western countries, will be at levels exceeding those of all previous crises (Kraus et al., 2020). However, in order to preserve European unity state aid measures should not go beyond what is needed to preserve the continuity of economic activity during and after the outbreak. It can be argued that the Temporary framework for state aid measures to support the economy in the current COVID-19 outbreak does not undermine the fundamental rules of state aid granting. Member states are not free in designing their support measures which constitute state aid. The temporary framework sets limits on state aid, establishes the temporary nature of those instruments and does not lose sight of the aid effectiveness considerations. For instance, undertakings which were already in difficulty by 31 December 2019, i.e. before the crisis, cannot benefit from most of the measures (only to rescue and restructuring aid, however, exemptions apply to micro and small enterprises, see: above). Moreover, the overall amount of temporary state aid measures cannot exceed EUR 800 000 per undertaking, what is important in situations when aid from different sources are cumulated, (different limits apply to the agriculture, fishery and aquaculture sectors). Finally, the Commission has made it imperative that aid cannot be conditioned on the relocation of the beneficiary's activity from one country within the European Economic Area to the member state granting the aid, since such a condition would be particularly harmful for the internal market.

While state aid addressing a lack of liquidity is certainly justified, not all member states are able to support their undertakings at the same level creating the risk of market distortions. In this context, the establishment of the EU-wide fund offering such liquidity interventions may be worth considering (see: Motta & Peitz, 2020). Moreover, as the focus of this article is placed on short-run liquidity support measures that may not be enough, the next step could be to examine what measures states can take to support entrepreneurs in the longer time perspective in their path towards objectives of common interest.

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[1] As the current economic downturn caused by the coronavirus outbreak is becoming a huge strain on the budgets of member states and the debt-to –GDP ratios are rising, the European Commission

launched in February 2020 the public discussion on the EU fiscal rules and economic governance (see: for example: Dullien et al., 2020).

[2] Case C-143/99 Adria-Wien Pipeline GMBH, ECLI:EU:C:2001:598, par.41.

[3] According to the Article 3 of TFUE: 'the establishing of competition rules necessary for the functioning of the internal market' lies within the exclusive competence of EU.

[4] Case C-53/00 Ferring SA and ACOSS, EU:C:2001:627, par. 17.

[5] Joined Cases Ramondin SA and Ramondín Cápsulas SA v Commission, T -92/00 and T-103/00, ECLI:EU:T:2002:61, par. 39

[6] State resources are interpreted widely. They include, for example, EU funds distributed through national operational programmes.

[7] An undertaking itself does not have to be involved in intra-Union trade, it suffices that aid helps to maintain or increase domestic activity, with the result that undertakings from other EU member states have less chance of penetrating the market of the member state concerned.

[8] Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty.

[9] Communication from the Commission: Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty (2014/C 249/01).

[10] The definition of an undertaking in difficulty can be found in Art. 2, para. 18, of Commission Regulation (EU) 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty (General Block Exemption Regulation).

[11] Special rules apply to the agricultural, fisheries and aquacultural sectors and undertakings active in the processing and marketing of agricultural products.

[12] However, certain exemptions apply to aid to remote regions and to offset transport costs.

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Sensory Marketing at the Destination Level: A Conceptual Approach

Ricardo Fontes CORREIA
Associate Professor – Instituto Politécnico de Bragança; UNIAG-Applied Management Research Unit, Campus de Santa Apolónia, 5300-253, Bragança, Portugal email: ricardocorreia@ipb.pt

Ana FRANCO
School of Economics and Management University of Porto, Rua Dr. Roberto Frias, 4200-464, Porto, Portugal email: anamafalda_franco@hotmail.com

Raquel MENESES
Associate Professor - School of Economics and Management University of Porto, Rua Dr. Roberto Frias, 4200-464, Porto, Portugal email: up233177@g.uporto.pt

Abstract

Marketing strategies adopted in many destinations do not take into consideration the potential of the senses to generate memorable experiences. By ignoring a driving force of intangibility, such strategies do not value a major source of differentiation. In fact, in a time where the intangible assumes an essential role, the senses emerge as a key for the differentiation of a particular destination when compared to other alternatives. This article puts in evidence the importance of the sensory marketing at the destination level. We develop a conceptual model where sensory contact points emerge as the central element in the 3 different phases of the tourist experience: a priori to capture the attention and provide (or recall) sensations of the destination, in loco for the generation of a multisensory image of the destination, and a posteriori inspiring a new visit to the destination or it's recommendation to others. The model proves to be particularly useful for practitioners, offering relevant insights for managers and policy makers.

Keywords: Sensory Marketing, Senses, Destination, Tourism, Experiences

Introduction

Marketing applied to regions has become a central activity in regional management as it achieves to generate competitive advantages that originate a differentiation of the destination, valuing the intangible and making it unique (Correia & Brito, 2011). Due to the intensification of competition in tourism and a world market that seeks unique and memorable tourist experiences, destinations and tourist companies should look for more innovative marketing strategies in order to attract more tourists. Tourism can thus be perceived as a consumer experience (Pine & Gilmore, 1998), where the tourist is seen as a consumer (Agapito, Mendes, Valle, & Almeida, 2014; Quan & Wang, 2004).

Marketing strategies of companies producing traditional consumer goods, such as cars, cosmetics and food products, have recognized the importance of the senses for the purchase process, however tourism marketing has neglected the significant role of olfactory, tactile, taste and auditory sensations during consumer experiences (Gretzel & Fesenmaier, 2004). Although tourism studies in the past gave greater importance to the visual dimension of the tourist experience (Urry, 1992), recent studies support the importance of the five senses for the marketing of tourist experiences (Agapito, et al., 2014; Dann & Jacobsen, 2003; Gretzel & Fesenmaier, 2004; 2010; Kastenholz, Carneiro, & Marques, 2012; Pan & Ryan, 2009). However there is not yet a concrete model that allows inserting the five senses roles in the territorial management in a dynamic and interactive way. In this paper, taking advantage of all the existing knowledge about the relevance of the senses to destination touristic

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experience an operational model has been developed that places sensory marketing as a central element in the entire destination management strategy.

The article is structured as follows. Section 2 offers a comprehensive overview of the theoretical background. Firstly, the sensory marketing is contextualized as one of the most relevant elements for consumer experience and offer value. Secondly, it addresses the application of sensory marketing to touristic destinations, highlighting its central role for the touristic experience. Section 3 presents the model developed with the aim of making sensory marketing at the destination level operational. Finally section 4 summarizes the main contributions of the paper and concludes with limitations and suggestions for further research.

Conceptual Background

Sensory Marketing

Human senses have been progressively recognized over time as important factors that influence consumer behaviour, emotions and perceptions (Rupini & Nandagopal, 2015). In the 1950s, major brands began to work on the colours and design (visual marketing) of products and their advertisements, such as the Coca-Cola bottle that reminds consumers the shape of a woman. Then music (audio marketing) started to be introduced in television ads and in sales outlets, and today there is no point of sale without background music. In the 1970s, the first “blind tests” appeared and the brands started to modify the taste of their products in order to adapt them to consumers (taste marketing). In the 90s the scent (olfactory marketing) started to be used to influence the consumer through the creation of artificial scents in the sales points, since 75% of our emotions are generated by the scent. The texture of the products (tactile marketing) also began to be worked on as a way of influencing the consumer, such as the weight of cutlery, the softness of napkins and the comfort of chairs in restaurants. Thus, the role of the senses in the individual perception of the environment attracted the attention of different disciplines, revealing its multidisciplinary nature and importance. Specifically, the evolution in neuroscience, psychology and marketing research has led to interesting results in terms of the role of human senses in consumer behaviour, leading to the emergence of sensory marketing (Krishna, 2011).

According to Krishna (2012, p. 332), sensory marketing is defined as “marketing that engages the consumers' senses and affects their perception, judgment and behavior” and can therefore be used to subconsciously trigger the perception of consumers about abstract notions of the product such as its sophistication, quality, elegance, innovation and modernity.

Sensory marketing begins by understanding consumer perceptions, starting with the stimuli that affect the senses, and reaches consumer responses through the interpretation of those stimuli. Thus, sensory marketing argues that the strategies that aim to create multisensory experiences with products, places, events and communications, influence consumer behaviour (Ditoiu et al., 2014).

The five senses give rise to conscious and unconscious sensory experiences, so sensory marketing can also be defined as the use of stimuli and expressed elements, which consumers perceive through the senses, to create certain environments (Suárez & Gumiel, 2012). The use of sensory stimuli in the creation of environments that appeal to the consumer's senses should not be understood as a form of manipulation, but as a process of improving marketing activities aimed at generating a greater value for the consumer.

According to Trierweiller et al. (2011), sensory marketing aims to tie a brand, product or service in the consumer's mind, generating sensations through the senses in order to create an emotional bond, seducing consumers through messages that stimulate the right hemisphere of emotion, as opposed to the messages that stimulate the left hemisphere of the human brain, responsible for reason (Schmitt, 1999). Sensory marketing aims to capture the attention of the five senses of the customer and thereby

create sensory experiences in order to differentiate brands, motivate and create value in the minds of consumers (Schmitt, 1999).

For Guzel and Dortyol (2016), the visual stimulus is the most focused by researchers and is considered the most powerful of the senses, namely associated with colours and light; the auditory stimulus is considered the easiest and strongest to arouse emotions, feelings and memories in the consumer, namely in the case of music; the olfactory stimulus is considered to be one of the most subconscious, namely in the case of pleasant aromas that make the consumer stay in a place longer, in contrast to unpleasant aromas that keep the consumer away; gustatory stimulation is another sense that strengthens the experience, attracting the consumer's attention, namely in the case of the pleasant taste of food and drinks; the tactile stimulus is considered the least important, but should not be ignored.

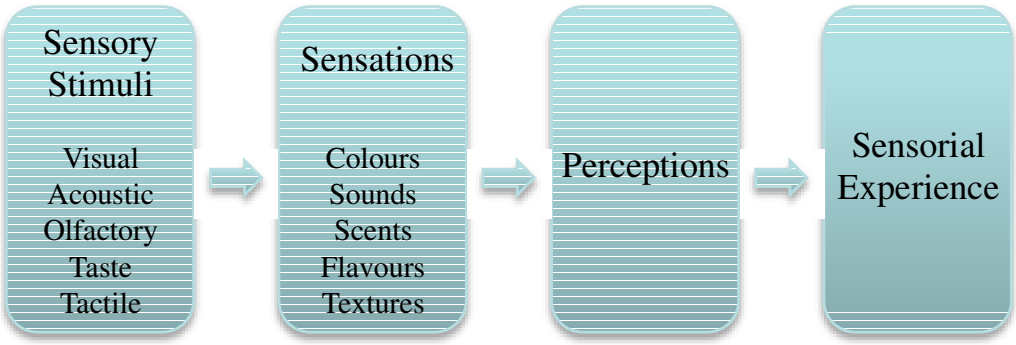

Fig. 1: Sensorial perception process. Source: The authors.

As can be seen in Figure 1, sensory stimuli (visual, acoustic, olfactory, taste and tactile) give rise to sensations (colours, sounds, scent, flavours and textures, respectively), which will be assimilated by the human being through the process of perception (Agapito, et al., 2014). The sensation occurs when the stimulus collides with the cells of a receptor sensory organ, originating the reception of information; perception is awareness or understanding of sensory information / stimulus, transforming it into an experience (Krishna, 2012). Sensory marketing is an application of sensation and perception understanding for the marketing area.

In this context, sensory marketing points to the stimulation of the five senses as essential to encourage consumers' experiences with products and services, influencing their perceptions and, consequently, their preferences and behaviours (Hultén et al., 2009; Krishna, 2011). All the senses play an important role in the consumption experience of individuals (Hultén et al., 2009). According to Hultén (2011), a sensory experience is defined as an individual perception of goods and services or other elements in a service process, as an image that challenges the human mind and senses. And, since the experiences are personal, existing in the mind of the individual who has been involved on an emotional, physical, intellectual or even spiritual level, they can be enacted through the stimulation of human senses, in order to involve consumers emotionally and intellectually in their interaction with products and services (Pine & Gilmore, 1998).

Sensory marketing can be used in a wide range of activities and it has three main characteristics: (1) it focuses on the remarkable and positive experiences that it can offer to the consumer in contrast to the functional attributes and benefits that traditional marketing focuses on; (2) considers consumption to be a holistic experience, where the consumer pays attention to the environment and the experience it provides; (3) takes into account not only the reason but the emotion of the consumer, through which he makes a choice based on feelings and emotions (Schmitt, 1999). In this way, sensory marketing is a complex concept, as it analyses consumers' subconscious, their perceptions, feelings and tastes.

The five senses are, therefore, essential for the consumer to know and understand the environment that surrounds him. In this way, sensory marketing aims to stimulate these senses in order to influence, without the consumer being aware, the consumption experiences and, thus, the consumer's behaviour and decisions.

The Sensory in Tourism

Tourism has evolved more and more in search of sensations and experiences. Tourists seek trips and experiences where all the senses can be involved (Gálvez, Granda, López-Guzmán, & Coronel, 2017). The study of the sensorial dimension of tourist experiences has been recently pointed out, by several authors, as crucial to support marketers to make tourist experiences memorable, since these are considered a source of competitive advantage of destinations and can be stimulated through the five senses (Agapito et al., 2013; Agapito, Pinto, & Mendes, 2017; Agapito, Valle, & Mendes, 2014; Campos, Mendes, do Valle, & Scott, 2016; Gretzel & Fesenmaier, 2004; Gretzel & Fesenmaier, 2010; Pan & Ryan, 2009).

According to Kastenholz (2002), it is the experiences at the destination that give rise to a greater involvement and familiarity, stimulating the recommendation, the repetition of the visit and the choice of similar destinations. According to the same author, there is a positive relationship between a good experience at the destination and the repetition of the visit, resulting in tourist loyalty to the destination. This positive experience has a strong impact not only on the tourist who has enjoyed it, but also on the opinion that will be transmitted by him to family and friends. In this way, each destination should seek to arouse the interest of potential tourists by transmitting and providing positive experiences of the same.

Pan and Ryan (2009) highlight that multisensory tourism is an enriching element, stating that the more interactive the tourist or traveller is with the surrounding environment, the more their senses are stimulated, and the greater value will be attributed to the experience of traveling. Involving all the senses is therefore important because the more sensory an experience is, the more memorable it will become.

The endogenous resources of certain destinations offer multiple sensory stimuli, creating sensory experiences unique to that destination capable of attracting tourists. Therefore, local resources must be used in order to create sensory experiences that attract the attention of tourists (Agapito, et al., 2014).

Tourism products must contain a significant number of sensory contact points with the consumer, involving all the senses for a complete tourist experience. For example, to create a complete visual experience, marketers must permanently consider and analyse the colours used, the brightness, transparency, volume, area used; as for hearing, the analysis should focus on intensity, pitch, timbre and sound vibration to identify new opportunities in order to improve the experience; the smell, characterized by quality, intensity, emotional valence and duration must also be studied and explored. The scent characterizes the places, making it easier to identify and remember them in the tourist's mind (Dann & Jacobsen, 2003; Stancioiu, Teodorescu, Pargaru, Botos, & Anamaria-Cătălina, 2013); taste is mainly addressed in the context of gastronomic tourism (Everett, 2008), with the consumption of local food being an important part of the tourist experience, or even the main motivation of the tourist on his trip (Gálvez et al., 2017), providing a most memorable travel atmosphere (Quan & Wang, 2004).

According to Xiong et al. (2015), the vision can be considered the most immediate, essential and reliable sense to know the destination; hearing on the other hand can arouse emotions in the tourist about the destination; smell is considered an important sense in appreciating the destination and in remembering it; the palate represents the culture of the destination and opportunities for tourists to experience the same, with many researchers arguing that each region should promote its local cuisine as an attraction for tourists (Gálvez et al., 2017); touch can provide proximity to the destination, in

addition to serve as a form of communication between the tourist and the locals in case of difficulty of communicating through the language.

The relative place occupied by each sense in the formation of a tourist experience, can provide a structure for the creation of a sensory marketing strategy allowing the creation of touristic products or services based on sensations susceptible to be "absorbed" by consumers (Stancioiu et al., 2013).
Sensory marketing thus offers an important contribution to tourism marketing, since the senses are responsible for processing the sensory stimuli that, in turn, originate the appearance of tourist experiences (Agapito et al., 2013). This recognition of the experiential nature of tourism and new consumer trends requires marketing approaches that use innovative ways to communicate tourism experiences (Schmitt, 1999).

Xiong et al. (2015) and Son & Pearce (2005) use the term "multisensory image", to describe individual perceptions based on sight, hearing, smell, taste and touch, formed through the interpretation of sensory stimuli of the destination by tourists. These stimuli can be obtained either through the experience of visiting the destination, or by searching for information about it through various means. The touristic experience starts before the destination visit, at the stage of planning the trip and choosing the place to visit, and continues after the tourist returns home, in the form of memories. In this way, marketing can explore the different phases of the tourist experience through sensory appeals to the five senses as a way of capturing the attention of tourists, attracting them to their destination (Agapito, et al., 2014). According to the authors, the multisensory image that tourists have of a destination affects their feelings and emotions, influencing their intentions to visit or revisit the destination. In this way, the multisensory image becomes important in the presentation, strengthening or weakening of a destination (Xiong et al., 2015).

Sensory Marketing Model

So far we have focused on the most strategic elements of sensory marketing. These elements include the stimuli, sensations, perceptions and experiences. All the destinations have resources with the potential to generate sensorial stimuli and memorable experiences. Defining the sensory contact points of the territory that can generate those memorable experiences is a key element in the sensory marketing strategy. However the definition of these elements is only part of a long journey that should include the integration of diverse actions.

The complex features associated with the territories and their resources are very different, so there are no generic recipes of actions to implement in order to develop and enhance their offer. Nevertheless, some essential steps are referred to the operationalization of a sensorial marketing strategy (Figure 2).

The tourist experience goes through three phases: a priori, in loco and a posteriori, during which the perception of the experience can change and influence the future behaviour of the tourist (Agapito et al., 2017). In all of these three phases sensory contact points should be provided to the tourist. These sensory contact points should be consistent, coherent, and aligned with the resources of the destination and the experiences that it wishes to generate.

In the a priori stage, websites and tourist pamphlets can capture the attention of the senses through the use of images, videos and sensory maps, as well as interactive contests. Virtual environments, such as Second Life, are also a way for tourists to experience the destination virtually, appealing to their senses in order to attract them (Neuhofer, Buhalis, & Ladkin, 2012). This phase is decisive as tourists explore, seek inspiration and interact with the destination for the first time. Thus, destination marketers must add multisensory information to their promotional communication, through advertisements and pamphlets with multisensory suggestions or the use of multimedia to present their multisensory images, in order to provide or recall sensations of the destination in the tourist's mind. Travel agencies must also develop a multisensory environment around the destination, through images, music, smells, flavours, food, local products in order to promote the destination and influence tourists in choosing it (Xiong et al., 2015).

The in loco phase is crucial for the delivery of sensory contact points. When well implemented these are going to improve the interactions with the destination, that in turn will foster the stimuli potentiating the arousal of memorable experiences. All the integrated experiences will then generate a multisensory image of the destination (Figure 2). Apart of generating new interactions (and consumption) for the tourist while in the destination, if this multisensory image will be positive exceeding the initial expectation of the tourist it will remain on its memory longer increasing the odds to revisit the destination and recommend it to others.

Marketing can use some techniques to deliver sensory contact points like multisensory routes, sharing experiences in real time through, for example, applications for mobile phones and tablets (Agapito, et al., 2014). Through social networks, such as Facebook, tourists can interact with others in real time, sharing photos and comments about the destination (Neuhofer et al., 2012), while experiencing it sensorially.

In the a posteriori phase, tourists continue to receive sensory stimuli from the destination through stories told to friends and family, sharing experiences on travel blogs or virtual communities (such as TripAdvisor), offering souvenirs, sharing photos with family, friends and on social networks (Agapito, et al., 2014). All these activities remind the tourist of his past tourist experience, thus developing the intention to revisit the destination and his recommendation to friends and family, based on the level of satisfaction of the tourist, which is influenced by the sensory stimuli received in all phases of your tourist experience (Diţoiu, et al., 2014). It can therefore be said that the tourist experiences a destination through the five sensory channels (visual, auditory, olfactory, taste and tactile) during their entire experience (a priori, in loco and a posteriori) (Diţoiu et al., 2014).

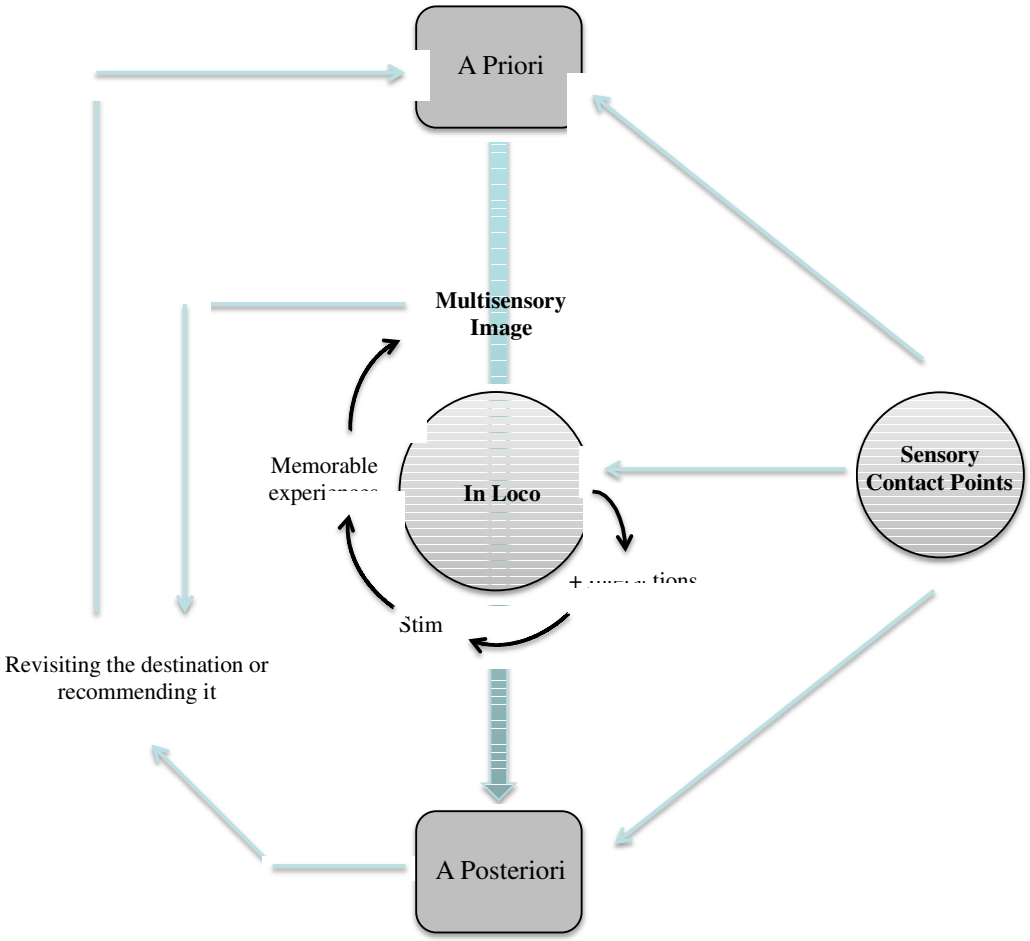

Fig. 2: A Model for the Development of a Sensory Marketing Strategy. Source: The authors.

When sensory information is communicated, it is usually presented in isolation, that is, or smell, taste, touch or sound, and is often simply translated into visual signals (Gretzel & Fesenmaier, 2004). Destinations shouldn't attract only by sight (Dann & Jacobsen, 2003; Pan & Ryan, 2009), but through an integrated perspective of all the senses. The current literature on tourism studies claims a holistic approach to the five senses as a way of understanding their role in global tourist experiences, since previous studies have privileged only the sense of vision (Agapito et al., 2012; Agapito, Valle, et al., 2014; Dann & Jacobsen, 2003; Gretzel & Fesenmaier, 2004; 2010; Kastenholz, Carneiro, & Marques, 2012; Pan & Ryan, 2009). This approach emphasizes the importance of understanding the sensory relationship between tourists and destinations, suggesting that sensory marketing can be used to create, communicate and boost tourist experiences, increasing tourists' satisfaction and, consequently, increasing long-term recall and recommendation through word of mouth. In fact, when sensory marketing strategies are aimed at providing the most positive tourist experiences possible, the tourist ends up revisiting the destination or recommending it. Taking into account the fact that if more than one sensory stimulus affects the consumer at the same time, he will remember the destination more quickly (Dițoiu & Căruntu, 2014). Thus, the more senses are called in an integrated way, the stronger the message will be transmitted.

According to Guzel and Dortyol (2016), tourism specialists should pay special attention to generate memorable tourism experiences for tourists in order to create and maintain a sustainable competitive advantage in the destination. They must discover ways to appeal to the senses of tourists in an

emotional and rational way, creating a relationship between tourism and the multisensory experience. These memorable experiences are built by tourists through individual and subjective evaluation of experiences, such as the collection of pleasant memories during their vacation at the destination (Agapito et al., 2017).

Conclusion

All the destinations are different, as different are their associated resources and the senses they can trigger on the tourists. The destinations should evaluate themselves trough the tourist eyes of and define the multisensory image (or images) that they want to deliver. For that they should identify and deliver sensory contact points in the 3 phases of the tourist experience in a consistent and integrated manner.

In conclusion, the tourist creates his own image of the destination according his own perception that is, through the experimentation of the destination, combining the five sensory dimensions. Thus, it is necessary to create a unique atmosphere at the destination level to generate / stimulate positive associations with the place and, at the same time, eliminate negative ones, providing sensory experiences that can seduce the senses of tourists and offer some memories that can leave a visible mark of the destination, together with the overall memorable experience (Diţoiu & Căruntu, 2014). In this way, determining and promoting the multisensory experiences that tourists find most rewarding and unique in the destination has become an essential marketing strategy to attract a greater number of tourists (Guzel & Dortyol, 2016). On the other hand, less pleasant or negative multisensory experiences in the destination must also be considered in the marketing strategy as aspects to be targeted for improvement (Xiong et al., 2015).

This research should be viewed as an exploratory exercise, translated into a model of analysis of a reality that involving multiple actors revels itself to be very complex. The model now proposed therefore lacks an empirical validation that at first should occur through a qualitative methodology. Another line of future research will be to measure and relate the relation between experiences and the multisensory image of the destination comparing tourist that have been exposed to more sensory contact points to other less exposed. It will also be interesting to be able to quantify and relate the relative importance of each of the senses for the multisensory image as well as the relation between them.

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To What Extent Does Integrated Reporting of Economic Entities' Performance in The European Area Comply with The International Requirements in The Field?

Mariana MAN

Professor Ph.D., Faculty of Sciences, Department of Economic Sciences,
University of Petroșani, Romania
E-mail: man_mariana2006@yahoo.com

Maria-Mădălina BOGEANU-POPA

Ph.D. Student, Doctoral School of Economics, University of Craiova, Romania
E-mail: madalinabogeanu@yahoo.com

Abstract

This paper investigates how the international context regarding the integrated reporting influences the economic entities in the European area. In this context, reference is made to the manner of application and the extent to which the economic entities prepare reports in compliance with the international integrated reporting framework. The hypotheses formulated start from knowing the principles drafted by the International Integrated Reporting Council (IIRC). The research was carried out on a sample consisting of 30 economic entities belonging to one state in Europe and the integrated reporting of which has been studied through the content analysis and scoring method. The results obtained as a result of the research carried out made it possible to validate or invalidate the hypotheses. The application of the IIRC principles proved to be relevant in reflecting the performances of economic entities in the European area. One of the IIRC specific principles that has been noted refers to the credibility of the integrated reports drafted, proving by means of the score obtained that the specified principle best governs the reporting of economic entities in the European area.

Keywords: Integrated Reporting, Conceptual Framework, IIRC Principles, Economic Entity, European Area.

Introduction and Motivation

Globally, the international integrated reporting framework of IIRC is the manner of rapid implementation of adopting the integrated reporting. IIRC was constituted by the interest to internationally adopt the integrated reporting ((KPI, 2018). Organisationally, IIRC presents itself a global coalition consisting of representatives who are members of the council and promotes the interactions with the social and economic environment in order to coordinate and carry out the initiatives and related activities (Caraiani et. al., 2015).

The objectives and concepts underlying the IIRC are based on creating value (in the long, medium and short term), presenting the (social, intellectual, natural, human, manufactured and financial) capital, in other words presenting enough information so it would answer to the needs of interested individuals (Dima and Man 2015). Moreover, highlighting the connection between the sustainable development and economic value is taken into account, meaning to detail the interconnection between elements, highlighting the performance indicators and creating the context required in the reporting process. In this whole process, the transparency of the information provided is promoted (Dima, Popa, and Farcane, 2015).

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The purpose and motivation of this research is to find answers to some questions that arise from the analysis of annual integrated reports published in 2018 by many economic entities in the European area. This research has as reference the framework of the IIRC integrated reporting concept that appeared in December 2013. By the combined use of the two methods, the level of compliance of the reports drafted with the requirements of the integrated reporting principles could be determined. In order to measure the quality level of the reports, it is required to compare them with the requirements imposed by the IIRC international reporting framework IIRC (2013). This model is proposed by authors such as Eccles, Krzus and Ribot (2015).

Literature Review

The conceptual framework of the IIRC is the main support in addressing the financial and non-financial nature, and it defines the integrated reporting as a way of concise communication regarding the strategy, governance, external environment and creation of short, medium and long term value (IIRC, 2013). Through the fact that there is a merging of financial information with the non-financial, the access to information is facilitated for a wide category of users: customers, authorities, community, employees, customers (Deloitte, 2012).

Internationally, the social responsibility practices are encouraged, by which the opportunity to apply the sustainable principles is proven (Caraiani et. al., 2015). Moreover, the economic entities are tempted to expose more management elements and less performance ones, which does not conclude the positive influence or good practices, meaning it does not present utility for that economic entity (Bonila-Priego, Font and Rosario Pacheco-Olivares, 2014). Meeting the requirements of third parties is an aspect that has been achieved through the publication of non-financial information, but these are included into the entity's strategy. Therefore, we can say that it is desired to exceed the responsibility threshold only by simply presenting the social, environmental and economic aspects (García-Sánchez, Rodríguez-Ariza, Frías-Aceituno, 2013).

Regarding the integrated performance reporting, studies have been drafted, which focused on the factors that influence the integrated reporting (Frías-Aceituno, Rodríguez-Ariza and García-Sánchez, 2013) and Hurghiş (2017), as well as studies that represented the compliance degree of integrated reports according to the IIRC, being drafted by Eccles, Krzus and Ribot (2015), Dumitrana et al., (2009), Ruiz-Lozano and Tirado-Valencia (2016). By going through these studies, it was found out that the common point is represented by the IIRC conceptual framework. This conceptual framework provides a good reporting base, establishing the guiding principles and elements required to be addressed in an integrated report (Bratu, 2017).

Studies such as that drafted by Caraiani et. al., (2015) proposes another model and namely the preparation of a list of factors that refer to the content, and these factors are identified in reports. This method aims to increase the degree of objectivity. Followers of the same method are also authors Ruiz-Lozano and Tirado-Valencia (2016) who analysed the extent to which industrial companies meet the principles of integrated reporting, and the results of their research prove that not all entities are at the same level of integrated reporting (Kot, Măcriş, 2015).

The integrated report supports the sustainable development strategy and provides a full set of information in an organised and compact manner (Bonilla-Priego, Font and Pacheco-Olivares, 2014). Moreover, a long-term vision is presented regarding the value creation and the interdependence of the aspects presented in the integrated report is emphasised. Being considered one of the most efficient methods by which existing problems are identified, the integrated reporting entails an efficient allocation of the resources within the economic entity and in this way the reporting quality is significantly improved (Hurghiş, 2017).

According to the IIRC framework, the elaboration of the integrated can have a stand-alone structure, being distinct from other document or may be included in the reports made by the economic entity on a regular basis. The usual practice within the economic entities is to include the integrated report in the financial statements drafted. Seen as a means of

communication, an integrated report is an introduction to the detailed information available generally in electronic form on the entity's web page so that the access to them is easy for as many people as possible.

The definition given to integrated reporting by the international framework of the IIRC is that of a process resulting from an integrated thinking, finalised by a centralised result and transmitted periodically by an economic entity (IIRC, 2013).

Methodology Research

In the research carried out, the *content analysis* and *scoring method* were used. *The content analysis* facilitated the identification and description of objectives in rigorous manner. By this method, the characteristics of the objectives subject to analysis have been identified and counted. The purpose of the content analysis consisted in the initial description of the requirements that should be met, in testing and comparing the content of the reports with the international requirements. An important characteristic of this method refers to formulating the hypotheses regarding the relationships between the concepts analysed. The advantage of using the content analysis refers to the methodical character, more precisely to the objective and quantifiable character. This analysis allows highlighting both the constant elements and those subject to change.

The scoring method is a method based on the discriminating analysis and is often used by those from the economic entity's external environment. The analysis methodology based on scores refers to simultaneously dealing with the multiple characteristics the economic entities have. The method principle is to statistically determine a separation between the economic entities belonging to a group, environment or geographical region. An economic entity's opening towards new horizons of exploitation is the reason why this exploits the opportunities appeared. Affiliation to the European area provides an advantage cultivated in the desire for change. The particularities of each country depend on the national development strategy and on the economic entity's capacity to comply with the highest standards.

In order to achieve an evaluation grid, the *requirements of the IIRC international reporting framework* (2013) have been analysed, and *seven principles of integrated reporting* are highlighted:

- P1 – *Strategic concentration and orientation of the entity towards the future;*
- P2 – *Information connectivity;*
- P3 – *Relationships with third parties;*
- P4 – *Importance and relevance;*
- P5 - *Significance;*
- P6 - *Credibility;*
- P7 – *Comparability and coherence.*

Once the principles are known, in order to carry out this research, two hypotheses have been formulated, which based on the results obtained will be validated or invalidated:

Hypothesis (H_0): *Most of the economic entities in the European area emphasise the credibility and significance of the reports when they draft integrated reports.*
Hypothesis (H_1): *The integrated reports drafted by the economic entities in the European area comply with the requirements of the IIRC International Reporting Framework, depending on the field of activity.*

Following the economic entities' analysis, through the principles pursued, it was possible to identify both the strengths and weaknesses, the opportunities and the risks, and for a fairest assessment, it is useful to give coefficients of importance, in order to determine an average score, as a weighted average, following the calculation formula (1):

$$\bar{I} = (\sum_{x=1}^{n} xi)/\sum x \quad (1)$$

where:
$\bar{I}$= average score;
$x_1, x_2 ... x_n$ = the principles, with the scores obtained;
i= constant coefficient.

The scoring method is a method used mainly by investors or creditors to calculate the risk factor that an economic entity has. The method represents a linear combination of a group of significant indicators (principles), each having a statistical base coefficient. The application of the method involves the achievement of two distinct groups, namely the economic entity that meets the principles of the IIRC reporting framework and the economic entity implementing the principles. Thus, for these groups, a linear combination is determined that allows the differentiation of the two groups, by means of the scoring method Z (2):

$$z = a_1x_1 + a_2x_2 + a_3x_3 + \ldots + a_nx_n \quad (2)$$

where:
z = the score;
x = the elements involved in the analysis;
a = weighting coefficients.

The formula for calculating the average (3) was used in order to establish the average scores, so that the average scores obtained by the economic entities were calculated according to the formula:

$$m = (x_1 + x_2 + ... + x_n)/n \quad (3)$$

where:
m = average;
x_1, x_2 = elements;
n = the maximum number of analysed.

The validation/invalidation of the hypotheses depended on the results obtained based on the methods applied. The data collected were mainly from the category of reports published periodically by the economic entities concerned. The data collection sources have an official character, being processed further. Data collection involved the use of several techniques and establishment of various sources, a process specific also to empirical research. The data presented have been enough for the relevance of the results obtained, materialised through tables, conclusions and discussions.

The Assessment of The Extent to Which the Integrated Reporting Complies with The IIRC Requirements. Case Study for The Economic Entities in The European Area

Adopting the integrated reports internationally in order to reflect the non-financial performance of economic entities had considerable impact on the entities, as it is deemed that these aspects have the greatest interest for third parties (Bogeanu-Popa, Man, 2019).This was the reason why this paper addresses the economic entities at European level.

The research analyses the economic entities in the European area that have drafted and published integrated reports. By consulting the international IR Examples Database and through their own websites of the economic entities, a sample of 30 economic entities was obtained, in the reports of which there are or are not references to the IIRC integrated reporting concept. The sample is represented by a number of 30 economic entities from the European area that have reports published for 2018 (Sustainable Development Knowledge Platform, 2019). The aim was to choose a representative economic entity from the European countries that adhered to the integrated reporting standards. When choosing the sample, the random selection technique was used, provided that the economic entity would provide the public with the online environment informatio. By selecting the sample, it was aimed to cover as many economic sectors as possible, and the entities selected for the research are presented in table 1.

Table 1: List of the selected economic entities in the European area

No.	Country	Name of the economic entity	Economic sector
1	Austria	OMV	Oil and gas
2	Belgium	Louis Delhaize Group	Retail
3	Bulgaria	Bulgargaz	Oil and gas
4	Czech Republic	Skoda	Production
5	Cyprus	Bank of Cyprus	Banking services
6	Croatia	Bonbon	Telecommunications
7	Denmark	Novo Nordisk	Pharmaceutical industry
8	Estonia	Tallinna farmatsiatehas	Pharmaceutical industry
9	Finland	Finnair	Aviation
10	France	Carrefour	Retail
11	Germany	Continental AG	Production
12	Greece	Alpha Bank	Banking services
13	Ireland	Ryanair	Aviation
14	Island	Actavis	Pharmaceutical industry
15	Italy	Enel	Energy and resources
16	Latvia	Latvian airlines	Aviation
17	Lithuania	Air Lithuanian	Aviation
18	Luxembourg	RTL Group	Telecommunications
19	Malta	AirMalta	Aviation
20	Great Britain	BT Group	Telecommunications
21	Norway	Aker Solutions	Oil and gas
22	Holland	KLM Royal Dutch Airlines	Aviation
23	Poland	PKO Bank Polski	Banking services
24	Portugal	Coindu	Production
25	Romania	Banca Transilvania	Banking services
26	Slovakia	Rova	Production
27	Slovenia	Adria Airways	Aviation
28	Spain	Telefonica	Telecommunications
29	Sweden	Electrolux	Production
30	Hungary	OTP Bank Group	Banking services

Source: The projection of authors based on the data taken from the web pages of the economic entities

For the sampled economic entities that have subsidiaries in several countries, the country of origin of that economic entity was taken into account, and in terms of the annual reports drafted, the *consolidated report* drafted by the *parent entity* was taken into account. Based on the constructed sample, Table 2 presents the economic sectors where the researched economic entities operate.

Table 2: The economic sectors where the selected economic entities operate

No.	Economic sector	Number of economic entities	Share
1	Banking services	5	16.66%
2	Oil and gas	3	10%
3	Production	5	16.66%
4	Aviation	7	23.34%
5	Retail	2	6.66%
6	Telecommunications	4	13.34%
7	Pharmaceutical industry	3	10%
8	Energy and resources	1	3.34%
Total		**30**	**100 %**

Source: The projection of authors based on the data taken from the web pages of the economic entities

It is observed that the most representative economic sectors are the *aviation* with a number of 7 economic entities and a percentage of 23.34%, followed by the sectors of *production* and *banking services*, which have a number of 5 economic entities and a percentage of 16.66% each, and the least representative is the sector of *energy* and *resources* with a single economic entity and a percentage of 3.34%.

Taking into account the *principles of integrated reporting* established, the principle ***P7-Comparability and coherence*** is a difficult one to evaluate in an objective manner, given that the research has been done only for 2018, the comparability of reports from one period to another not being possible. As a result, this principle was removed from the analysis. Although this principles can be assessed in terms of comparability of the reports of economic entities from the same sector of activity, the score given would not be complete, and the analysis of this principle would be insignificant for this research.

The *principles* were graded individually starting from 0 to 3. If the report did not provide information on this element, grade 0 was given, and if the report describes the factor very well, the grade obtained was 3. Having said this, *a report may obtain a maximum score of 18*. In order to increase the degree of objectivity, components were created in order to establish which of these are identified in the content of the reports and intermediary scores have also been given. The intermediary scores were summed and rounded up so that there are no decimals, therefore a score was obtained for each principle. *Total scores and average scores were calculated for each economic entity, and average scores for each individual principle.* Table 3 details the scores obtained by the economic entities.

Table 3 : Total score given for the compliance with the principles specific to integrated reporting

Total score/economic entity	17-18	15-16	13-14	11-12	9-10	7-8
Number of economic entities	7	5	6	2	6	4
Percentage	23.33%	16.67%	20 %	6.67 %	20 %	13.33%

Source: Authors' projection

The average score resulting from the analysis of the degree of compliance with the integrated reporting principles is 2.20. Four economic entities are emphasised to have obtained a maximum score, respectively Banca Transilvania (Romania), PKO Bank Polski (Poland), BT Group (Great Britain), OMV (Austria). According to table 3, it is observed how the score was registered in a percentage of 50% from 13-14 points upwards, up to the score of 18 points, therefore it is a high score. For the entities in the second half of the classification, legislative issues may be involved to a greater extent than the entity's internal policy. Although not all economic entities have recorded maximum scores, they made considerable efforts to align with the international standards of integrated reporting. Even if the level of integrating certain economic entities is lower, the desire to

align with the international requirements of that entity must be appreciated and, more than that, the support must be noted that the country of origin of that economic entity provides to be able to implement the European or international regulations on integrated reporting.

The aim of this study aims to give scores objectively, the economic entities presenting the most complete and elaborate set of information in reports are rewarded with maximum scores, while the lower scores are obtained by the economic entities presenting in their reports less information or where the absence of information is noticeable.

Figure 1 shows the average scores for each of the principles; it is observed that there is a difference of 0.63 between the maximum and minimum values, which leads to the conclusion that the integrated reports are compliant with the international reporting framework to a great extent.

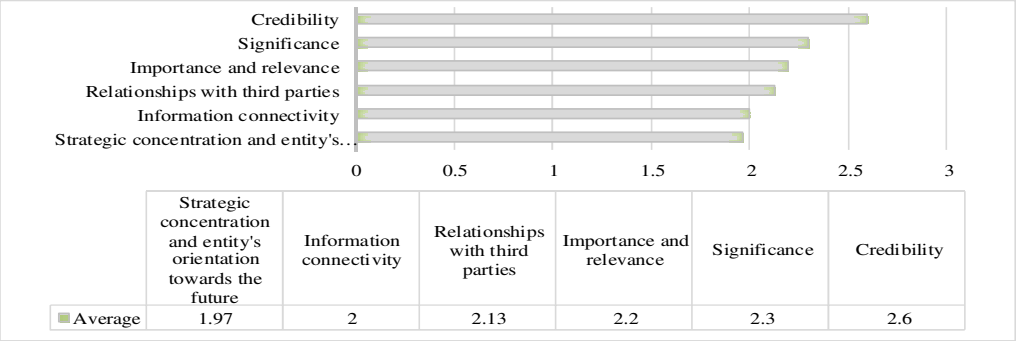

Figure 1: Average scores calculated for the integrated reporting principles
Source: Authors' projection

According to the data obtained from Figure 1, six of the seven principles will be detailed according to the average scores obtained. The analysis of the principles, together with the average scores obtained by the economic entities will be detailed below.

In the case of the principle ***P1- Strategic concentration and orientation of the entity towards the future***, an average score of 1.97 was obtained. This score is one of the lowest scores obtained, because some of the economic entities did not focus to a large extent on the promoting strategy or on the opportunities the entity has in the future of the activity. Table 4 details the situation of the scores obtained by the economic entities in compliance with the IIRC requirements for this objective.

Table 4: Scores specific to the principle P1 – Strategic concentration and orientation of the entity towards the future

Score	Name of the economic entity
Score 0	Bulgargaz; Bank of Cyprus
Score 1	Bonbon; Tallinna farmatsiatehas; Finnair; Coindu; Adria Airways; Electrolux.
Score 2	Louis Delhaize Group; Skoda; Novo Nordisk; Carrefour; Ryanair; Actavis; Enel; Latvian airlines; Air Lithuanian; RTL Group; AirMalta; Aker Solutions; Telefonica.
Score 3	OMV; Continental AG; Alpha Bank; BT Group; KLM Royal Dutch Airlines; PKO Bank Polski; Banca Transilvania; Rova; OTP Bank Group.

Source: Authors' projection

Following the scores obtained, we can say that the entities studied do not elaborate reports fully compliant with the international integrated reporting framework. Even though most entities obtained scores of 2 and 3, scores of 0 and 1 were also recorded. The main problem was that in the available reports, no element was found regarding the *long-term economic entity's strategy*, aspects regarding the *allocation of resources in order to achieve the objectives*, elements related to *capital*, respectively

the effects produced on capitals and, last but not least, aspects regarding the *way in which the entity creates value in the long, medium or short term*.

Regarding the principle ***P2-Information connectivity***, score 2 was obtained, a value close to the previous principle, meaning the idea that the entities did not focus very much on this principle, it can be said that its level is an acceptable one. Table 5 details the scores obtained by the economic entities in order to find out the degree of compliance with the international standards for integrated reporting.

Table 5: Scores specific to the principle – *P2 Information connectivity*

Score	Name of the economic entity
Score 0	Bank of Cyprus; Rova.
Score 1	Louis Delhaize Group; Bulgargaz; Tallinna farmatsiatehas; Finnair; Actavis; Adria Airways; Coindu.
Score 2	Skoda; Bonbon, Continental AG; Ryanair; Enel; Latvian airlines; Air Lithuanian; Aker Solutions; Telefonica; Electrolux
Score 3	OMV; Novo Nordisk; RTL Group; AirMalta; BT Group; KLM Royal Dutch Airlines; PKO Bank Polski; Banca Transilvania; OTP Bank Group; Carrefour; Alpha Bank.

Source: Authors' projection

From the table presented, we can see that most of the economic entities have good scores, meaning of 2 and 3, which proves that they either achieved a connection in terms of the *capitals and business model*, or focused on *qualitative information and qualitative indicators*. The entities that received low scores, between 0 and 1, had problems regarding the non-correlation of the presentation of financial information with the non-financial information or deficiencies in the non-correlation of the resources allocated in the entity's strategy. All these lead to reducing the connectivity effect and affect the process of alignment with the standards imposed by the international reporting framework.

In connection with the principle ***P3-The principle of relationships with third parties***, the entities analysed registered a good score of 2.13. It results that a set of information has been presented on third parties, particularly on the parties interested in the economic entity; all except for one economic entity that scored 0 on this principle, according to Table 6.

Table 6: Scores specific to the principle *P3-Relationships with third parties*

Score	Name of the economic entity
Score 0	Coindu.
Score 1	Tallinna farmatsiatehas; Finnair; Actavis; Adria Airways.
Score 2	Louis Delhaize Group; Bulgargaz; Bank of Ciprus; Bonbon; Alpha Bank; Ryanair; Latvian airlines; Air Lithuanian; AirMalta; Aker Solutions; Rova; Telefonica; Electrolux.
Score 3	OMV; Skoda; Novo Nordisk; Carrefour; Continental AG; RTL Group; BT Group; KLM Royal Dutch Airlines; PKO Bank Polski; Banca Transilvania; OTP Bank Group.

Source: Authors' projection

By means of the P3 principle, the relationships that the entities have with the interested parties were mainly aimed at, but also the extent to which the entity takes into account their opinion and wants to meet their expectations. This is highly important because the group of users of this type of information largely consists of capital providers. Also the international integrated reporting framework encourages the provision of as much information as possible to capital providers, as they are an important category of information users (Soyka, 2013).

Regarding the principle ***P4-Importance and relevance***, the scores obtained by entities are high, the average score being 2.20. The analysis of this principle took into account the identification of significant elements regarding the important aspects in the process of operating the entity's activity. Table 7 details the status of the scores obtained by each individual entity, reflecting the degree of compliance with the international integrated reporting requirements.

Table 7 Scores specific to the principle *P4-Importance and relevance*

Score	Name of the economic entity
Score 1	Tallinna farmatsiatehas; Finnair; Actavis; Coindu; Adria Airways; Electrolux
Score 2	Bulgargaz; Bonbon; Bank of Ciprus; Alpha Bank; Ryanair; Enel; Latvian airlines; Air Lithuanian; RTL Group; Aker Solutions; Rova; Telefonica; OTP Bank Group.
Score 3	OMV; Louis Delhaize Group; Skoda; Novo Nordisk; Carrefour; Continental AG; AirMalta; BT Group; KLM Royal Dutch Airlines; PKO Bank Polski; Banca Transilvania; OTP Bank Group.

Source: Authors' projection

Following the analysis, descriptions of the activity were found in all reports, which led to a score of at least 1, for providing minimal information. However, most economic entities provided significant, relevant and important information regarding their activity. Significant, well-detailed and well-argued matrices of significance were noted in the reports, and this indicates that the aspects on the international integrated reporting policies have been complied with. Moreover, the presentation of the significant risks, of the method to combat the risks or mitigate them is an aspect of major importance in an economic entity. On this topic, authors such as Eccles, Krzus and Ribot (2015) believe that an entity can identify the main risks better than to explain them.

Regarding the principle ***P5- Significance***, it obtained almost the highest average score, meaning 2.3. This score is reflected in the effort made by economic entities to repeat the information presented, and what the entities develop consists of logical and concise information that follows a well-defined and coherent structure. According to Table 8, most entities obtained scores between 2 and 3.

Table 8 : Scores specific to the principle *P5-Significance*

Score	Name of the economic entity
Score 1	Bonbon; Alpha Bank; Telefonica; Air Lithuanian; Rova.
Score 2	Bulgargaz; Novo Nordisk; Tallinna farmatsiatehas; Carrefour; Ryanair; Enel; Latvian airlines; AirMalta; Aker Solutions; Bank of Ciprus; Coindu; Electrolux; Finnair; Actavis; Adria Airways.
Score 3	OMV; Louis Delhaize Group; Skoda; Continental AG; RTL Group; BT Group; KLM Royal Dutch Airlines; PKO Bank Polski; Banca Transilvania; Telefonica; OTP Bank Group.

Source: Authors' projection

The failure to give the maximum score to this principle was due to repetitive information, meaning the presentation of the same information in several sections of the report. Although authors such as Eccles et al (2012) consider that the integrated reports have a narrative character, according to the international reporting frameworks, they must be precise and concise.

The principle ***P6- Credibility*** obtained the highest average score, respectively 2.6. As a result, it can be concluded that the economic entities have presented information where a clear, credible and coherent picture of the annual reports drafted results from, which are also in line with the international reporting framework, with no errors in this process. These data are detailed in Table 9.

Table 9: Scores specific to the principle *P6-Credibility*

Score	Name of the economic entity
Score 1	Rova.
Score 2	Bulgargaz; Louis Delhaize Group; Bank of Ciprus; Bonbon; Finnair; Air Lithuanian; Aker Solutions; Coindu; Adria Airways; Electrolux.
Score 3	OMV; Novo Nordisk; Skoda; Continental AG; Enel; Latvian airlines; RTL Group; BT Group; KLM Royal Dutch Airlines; PKO Bank Polski; Tallinna farmatsiatehas; Carrefour; Alpha Bank; Ryanair;Actavis; AirMalta; Banca Transilvania; Telefonica; OTP Bank Group.

Source: Authors' projection

For more credibility in this regard, part of the economic entities confirmed and validated the information through the audit, which also brought assurance on the accuracy of the information provided (IIRC, 2013). Moreover, external opinions have been formulated regarding the elaborated reports, which is a key element of the international integrated reporting policies (Man, Bogeanu-Popa, 2020).

Discussions and conclusions

The most relevant results of the research were obtained with the help of the entities which registered scores greater or equal to 2. Aspects such as information importance, relevance, significance and credibility are the elements most used by the economic entities through the integrated reports, but the aspects such as future planning, information connectivity or the third party relations are not the be neglected. Due to this, the most parts of the economic entity from the European space respect the IIRC specific principles and guide their activity after them.

Useful recommendations for the interested parties regarding the drafting of the analysis within the entity as well as in the reporting activity would be the permanent improvement of the ways of communication at every existent level. Through permanent access to information, the strategy, the vision and the mission of the entity can reach every IIRC specific principle and can have compatibility and coherence with time accomplishing the last principle of IIRC.

In this paper, the research represents the direct reflection of the reality. Two research methods were used, respectively qualitative and quantitative research. Through the *qualitative research*, we could collect and analyse data not represented by numbers, the former being of exploitation and understanding character. The processes are described without interfering with them and important characteristics of a subject are emphasised. In the qualitative research, description was used to detail and describe the characteristics and to highlight the existing links. Through *quantitative research*, we could collect and process the data and the results of processing the data could be emphasised.

We observe that the economic entities in the European area that have complied exactly with the requirements or those that have come as close as possible to them have recorded high scores for each of the principles analysed. They provided well-structured, logical, detailed reports, which presented the value created and promoted the business model. By comparison, the entities that obtained lower scores need to make additional efforts to draft integrated reports. It can be said that the economic entities in this situation are entities in an early stage of integrated reporting. Having said this, we can establish the validation or invalidation of the hypotheses.

In the case of *hypothesis (H_0),* this *is validated* because most of the companies in the European area emphasise *the credibility and significance of reports*, when they draft integrated reports, which is proven by the highest averages scores obtained. In the case of *significance*, the score of 2.3 was obtained and in the case of *credibility*, the score of 2.6 was obtained. This is reflected in Figure 1. *Average scores for the principles of integrated reporting*, in Table 8. *Scores specific to the principle P5-Significance* and Table 9. *Scores specific to the principle P6-Credibility*.

In the case of hypothesis (H_1), this *is not validated*. The invalidation of this hypothesis is justified by the fact that the economic entities in the European area do not draft *integrated reports in compliance with the requirements of the International Reporting Framework of the IIRC depending on the field of activity*. In this case study, there is a relatively homogeneous distribution of business sectors and the scores obtained by the entities are varied and differ depending on the principles they comply with. This is confirmed by Table 1 *The economic sectors in which the economic entities operate* and reflected in Figure 1 *Average scores for the integrated reporting principles*.
The limits of this research refer to the relatively low number of economic entities, but representative for the European states that have adopted the principles of integrated reporting according to international requirements. The limitation of the study is given by the fact that a report was made for Europe, and not for several continents. Another limitation of this research refers to how the scores are given, because it can be a subjective one and influences the results. In order to overcome the limitations of this case study, the research can be extended to several continents and for a longer period of time, which would allow the possibility of a better comparison, spread over several years. The advantage offered would be to observe the evolution of the reports drafted from one year to another or from the first reference year to the last reference year.

In conclusion, this research refers to integrated reports specific to economic entities in the European area on the compliance with the international principles of integrated reporting (IIRC, 2013). The research sample analysed consisted of 30 economic entities from the European area, being analysed for each integrated reporting. For the research, methods were used by which the extent to which the principles were complied with were aimed at. By means of the study carried out, the general conclusion is that the economic entities in the European area are in different stages of compliance with the requirements imposed by the IIRC.

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The Proposed Architecture for The Integration of Electronic Payment Systems Based on Blockchain Technology Within Social Networks

Ion-Costel-Marius BALTOI
Academy of Economic Studies, Bucharest, Romania
marius.baltoi@ie.ase.ro

Ioan ADASCALITEI
Academy of Economic Studies, Bucharest, Romania
ioan.adascalitei@ie.ase.ro

Abstract

Recent technological developments are increasingly impacting the interaction between people and the way they communicate, distribute information and exchange opinions. Since the advent of social networks, the element of novelty has been represented by communication between people through technology. This paper proposes to analyze the architecture of a social network application that integrates an electronic payment service based on blockchain technology. The working methodology is qualitative and is based both on the study of existing resources and on experience in the field of software development. The purpose of the paper is to analyze the use cases of the solution and to briefly present the architecture of the solution through the modules it integrates.

Keywords : blockchain, electronic payment systems, social networks

Introduction

Recent technological changes pose new challenges for the financial system and generate new opportunities for institutions involved in economic activities. Thus, emerging technologies have the potential to innovate in the financial field and to change the balance in this sector dominated by financial institutions. From the use of artificial intelligence to fraud prevention, machine learning to creating customer profile and learning to behave, investing in new blockchain-based security systems, financial institutions are increasingly incorporating new technological innovations.

At present, blockchain technology is one of the most important topics of discussion both in academia and in the technology industry worldwide. This technology was first introduced in 2008, together with Bitcoin, as a peer-to-peer system for making electronic payments between various actors, individuals or financial institutions. The system based on blockchain technology makes electronic payments without an interaction of a market regulator (central bank, for example) and avoids the problem of duplicate payments (Nakamoto, 2009) (Duplicate payments are a problem specific to digital currencies; thus, doubled expenses can be defined as a transaction in which data from another transaction already sent for network processing are used).

In the e-commerce market, blockchain technology is used to improve efficiency in electronic payments and payment processing; the blockchain can also support the improvement of companies' economic indicators by extending operations across the borders of the home country and facilitating online transactions securely without the intermediation of a third party involved and performing real-time security checks.

Blockchain-based systems are data structures that create a digital register of transactions and transmit them to a distributed network. They use cryptography to allow each participant to manipulate

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information in a secure way without the need for central authority regulation. Also, once a block is registered in the blockchain register, it is difficult to modify or delete.

Blockchain technology allows the verification of financial transactions in a real-time network, without the intervention of an intermediary, compared to traditional electronic payment systems in which the execution of transactions is based on the regulations of a central authority or other intermediary for making payments. The blockchain architecture allows a distributed network of computers in which they interact and reach a consensus without the need for an intermediary.

Currently, the financial field is based on a system of intermediaries (banks or other financial institutions) that facilitates clearing of sums of money to payment processing networks. Eliminating or reducing the number of intermediaries can reduce costs by hundreds of billions of dollars each year, making real-time transactions easier (Anon., 2016).

The paper further presents a section dedicated to previous papers that have researched this topic and captures the useful aspects of this research. Next, is presented the research methodology.

The central part of the paper captures the architectural part of the system proposed for research and implementation. Thus, are presented the main cases of use and architecture of the solution based on its main components: the payment module, the RESTful web service and the social application.

Literature Review

World Bank Group (International Finance Corporation, 2019) defines blockchain technology as "a very interesting technology that can prove to be a radical innovation - similar to technologies such as the steam engine and the Internet that triggered the industrial revolutions." Also, the impact of this technology is manifested in other sectors of activity such as the financial sector, energy, supply chains, public sector, etc. There are also uncertainties about the scalability, interoperability or costs of the transition to the blockchain. Next, the paper presents an analysis of the evolution towards the blockchain starting from a centralized environment (the central core controls the information about transactions and records, and the other actors maintain their own copies), the decentralized environment (intermediaries maintain local records of transactions, and other parties maintain their own copies) and up to the distributed environment (all parties involved manage the same records in each transaction).

In the paper (Avital, et al., 2017), the authors propose for research the concept of "smart money" (in short, smart money is a customizable value exchange tool that relies on computerized protocols to facilitate, verify and impose certain payment conditions; for example, who can use the money, where and for what purpose). The payment customization is a feature of DLT-based infrastructure (distributed ledger technology).

The paper (Yoo, 2017) presents examples of applications of blockchain technology in the financial sector. Electronic blockchain payments will be able to be made through the American startup Ripple and it is expected that this global system will be used in the international currency settlement market and in the foreign exchange market. ABRA (Yoo, 2017) is also working on a payment system through which people can send money to people around the world. In the foreign exchange market, TenX, a company that offers virtual money settlement services in Singapore, works with VISA and MasterCard on a service that allows customers to pay in virtual currency on a regular credit card network.

G. Dolinski in paper (Dolinski, 2018) presents a new model for making payments abroad, a system also based on Ripple technology. Compared to the analyzed model, the new model proposes a smaller number of intermediary actors (each additional intermediary obstructs visibility, creates a potential point of delay or error and adds additional costs for customers). Thus, intermediaries are given up in exchange for connecting to the blockchain network to make more efficient use of global payment processing.

The article (Zhong, et al., 2019) summarizes the results of the development of the FIPS (Flexible Instant Payment System) to improve payment flexibility so that users can make offline payments without doubling expenses. The system is based on a digital signature scheme. Thus, starting from the idea that the blockchain system, smart contract and digital signature have a high level of security, and the FIPS system will be a secure one and will have properties such as flexibility, high security, real-time payments, high efficiency and scalability.

Methodology

This paper is based on qualitative research. In the first phase, a research was carried out at the level of scientific resources at the moment in specialized literature (articles in the field, papers presented at conferences or published in journals, online articles), being extracted the current state of knowledge in the field.

The architecture of the proposed solution

Use cases

In establishing the prototype architecture, an important role is played by clearly establishing the use cases and the way in which the application flow takes place. In this sense, figure 1 shows the analysis of use cases within the prototype proposed for research. In order to use the social network and the payment service, the user will need to log in; if it does not have an account, there is the possibility to create a new one.

Once logged in, the user will be able to use the functions available in the solution prototype for 2 main cases: social interaction (messaging services, image sharing, audio files, location, various links to external sites) or use of available wallet services (transfer money, view account details).

The use of the electronic wallet within the solution implies the fulfillment of some essential conditions: the electronic wallet to be active and to be available in the account. In case of problems using the payment module, the user will be able to consult the help page.

Within the prototype, the money transfer between 2 users will be made based on the unique ids of the user accounts, so we can also benefit from additional checks performed by the social network. During processing, the id will be encrypted so as to ensure increased security and avoid unauthorized attempts to perform transactions.

For the use of the payment module by the user, 3 screens are available, each with a specific functionality: the first screen is dedicated to viewing the account information (balance, account currency) and involves the initialization of transactions by the user); the second screen involves filling in the information needed for a transfer between accounts (recipient user id, amount transferred), and during processing will contain a message with the status of the request. The third screen is dedicated to displaying and changing the information in the payment module.

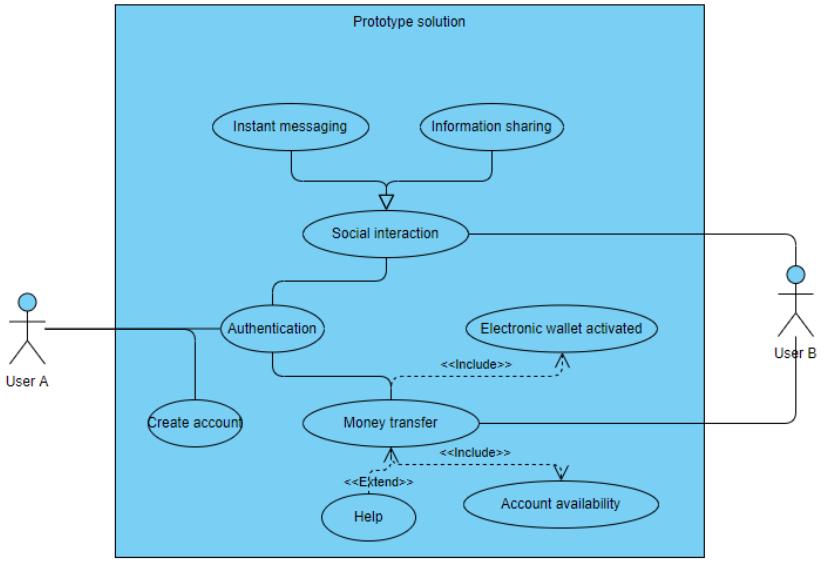

Fig. 1: Prototype use cases

Within the prototype, a special use case refers to the possibility of charging the electronic wallet. This operation can take place through any other electronic means of payment. The use case presented below is customized for charging through a banking application. Thus, after the authentication operation, the operation of uploading the electronic wallet or updating the information can be performed.

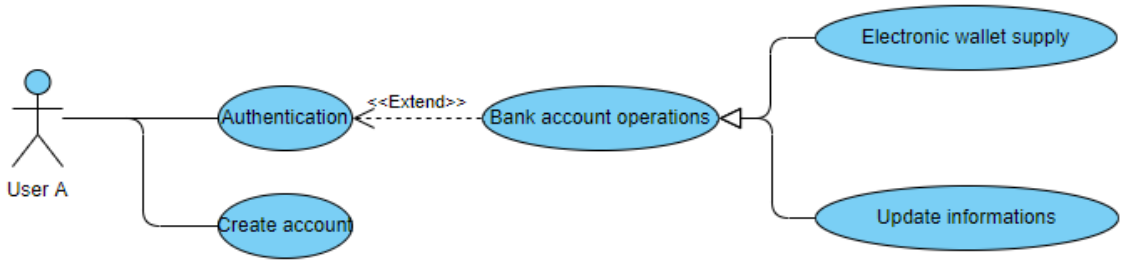

Fig. 2: Electronic wallet charging

The solution proposed for analysis in this research involves the integration of electronic payment services in social networks. Within the solution, we identified 3 main components: the social network, the web service and the payment service, the benefits to be further analyzed.

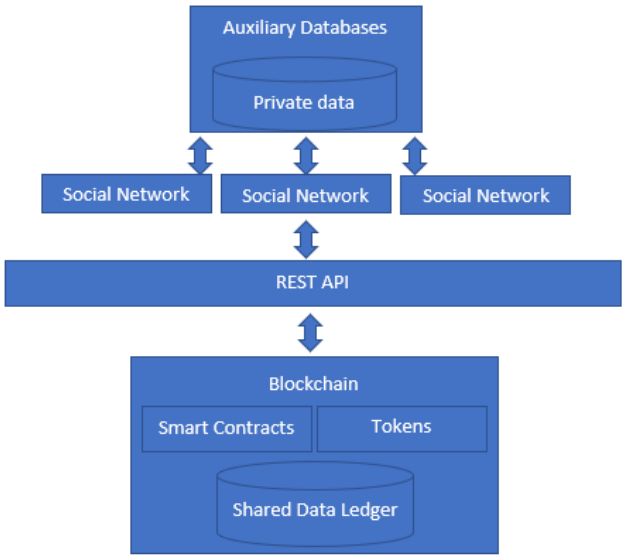

Fig. 3: System components

Figure 3 shows the components of the system and how they interact. Thus, we can highlight:

- social network - within the developed prototype, it is an Android open source solution that allows users to interact and transfer various amounts of money between their accounts, each with a specific unique ID;
- a RESTful web service - allows various operations in order to execute transactions between users, respectively the obtaining of new available balances. Thus, this service has the role of mediating the interaction between the client applications and the payment module;
- the payment module is a solution developed based on blockchain technology and simulates money transfer between users; it can be considered the core of the solution because all user transactions will be executed by it;
- auxiliary databases: have the role of storing various temporary or permanent information (for example, user data).

Payment System

Blockchain innovation depends on the possibility of P2P (distributed) organizes and gives a solid widespread informational index between hubs, regardless of whether they don't have any acquaintance with one another. It likewise gives a common and believed exchange sign in which put away duplicates of changeless and scrambled data are put away on every hub in the system. Truth be told, the idea of blockchain first showed up in October 2008 as a major aspect of the Bitcoin arrangement so as to make P2P systems for cash move, without the intermediation of banks (Voshmgir, 2019).

P2P network is a type of architecture that creates partitions of work within a network. A node within the blockchain network can be called a peer and describes how it works together with the other nodes to perform multiple tasks on the network. The P2P network allows nodes to provide information to another node in the network via the Transmission Control Protocol (TCP), and connections between peers are automatically generated by IP addresses on the same network. (Rahmadika & Rhee, 2018).

P2P networks are the mechanism used in the blockchain system for disseminating information within the system, keeping the whole system decentralized. The main objectives of such a network are to allow network members to synchronize the overview of the system and to update the information of all nodes after any change (Delgado-Segura, et al., 2018). Storing data on a P2P network eliminates

issues that arise from the vulnerability of centralized servers while using different cryptographic methods to secure the network.

Communication between nodes in a P2P network allows them to exchange data without the intermediation of another node in the network; thus, people or institutions that do not know or trust each other, live in different areas or are subject to different legal rules, do not have a legal agreement between them, can interact through technology without intermediaries such as banks, brokerage platforms or other institutions (Voshmgir, 2019).

Blockchain is a mutual, believed, open exchange log that anybody can review, however no client controls. It is a conveyed database that keeps up a developing rundown of exchange information records, cryptographically shielded from alteration and correction (Voshmgir, 2019). The vault is assembled utilizing a Linked List structure (a progression of affixed squares where each square contains a specific number of exchanges that have been approved in the system at a given time and the connection to the past square utilizing a pointer - factors that store data about the area of another variable).

The registry runs on a peer-to-peer (P2P) network. Distributed consensus based on game theory concept, combined with cryptography, allows secure validation of P2P transactions, thus bypassing the need for traditional trusted third parties:

- P2P - each node in the network stores a copy of the entire blockchain (transaction logging is ensured);
- Game theory - each new block is added to the blockchain based on a consensus of validators at a given time;
- Encryption - the network stores all information encrypted in the form of blocks. The first block is called the "genesis block", and the next blocks store the address / hash of the previous block so as to ensure that the blocks are chained.

The hash function is a cryptographic protocol and is created similarly for multiple input values, but it is difficult to find the original value of the input. Whenever an attacker tries to modify a block of data in the blockchain network, each peer detects the attacker's activity. Specifically, the attacker must change the entire data block in the network, which is impossible.

The architecture of blockchain-based systems has a number of key features, among which we can list encryption, immutability, provenance, decentralization, anonymity and transparency (Lastovetska, 2019).

- Encryption - within a blockchain, transactions are validated based on complex calculations and following the application of data encryption algorithms between the parties involved;
- Immutability - blockchain records cannot be modified or deleted;
- Provenance - you can track the origin of each transaction recorded in the blockchain;
- Decentralization - each node in a blockchain has access to the distributed system due to the consensus algorithm that ensures network control;
- Anonymity - each node in a blockchain network has a generated address, not the user's identity. Through this procedure, network anonymity is maintained, especially within a public blockchain;
- Transparency - the blockchain system cannot be corrupted because it requires a huge computing power to completely overwrite the blockchain network.

RESTful web service

REST (Representational State Transfer) is an architectural style for designing network applications and defines a set of constraints that are used to create web services in order to ensure interoperability between computer systems on the Internet. RESTful web services permit mentioning frameworks to get to and control printed portrayals of web assets, utilizing a uniform and predefined set of activities (Wikipedia, 2020).

Web resources were first characterized on the World Wide Web as records or documents distinguished by their URLs. These days, they have a significantly more nonexclusive and theoretical definition that envelops anything, substance or activity that can be recognized, named, tended to, controlled or executed, in any capacity, on the Web. In a RESTful web administration, solicitations to an asset's URI will create a payload reaction designed as XML, JSON, YAML, or another configuration. The reaction may affirm that an adjustment in the status of the asset has been made, and the reaction may give connects to other related assets.

The advent of RESTful web services has brought a number of benefits and novelties for software developers. Thus, the benefits include simplicity in development (RESTful architecture is simpler than SOAP services, and adaptation to new technology is fast), exposure of APIs as HTTP services (services can be accessed by applications running in various environments - web or mobile (Android, iOS, etc.), RESTful offers flexibility in communication (compared to SOAP which only uses XML files for communications, REST also uses other file types). client information is never stored on the server between requests, each request must contain the necessary information, improving scalability and allowing the server to quickly release resources when they are no longer needed (Medium, 2018).

In the literature, good practices in the field have been studied and the results have been presented in multiple researches, for example, the paper (Fielding, 2000) presents the design principles in the REST architecture. It also provides a number of examples of how web services can be used as the core of the solution and how they can communicate with other components.

B. Mulloy in paper (Mulloy, 2012) presents different design principles and good practices for web APIs and brings to the analysis the concept of “pragmatic REST”, a concept that refers to the fact that the usability of the API is more important than following the design and development guidelines. However, non-compliance with good practice guidelines does not mean ignoring fundamental concepts in RESTful services.

The paper (Fielding, et al., 2017) analyzes the architectural style of REST and offers a diverse perspective on it. The authors propose to extend the field of interest to the REST architecture and explore software technologies that can integrate these services. The article also proposes for analysis the applicability of RESTful services within the decentralized software architecture.

Social Network

Within the system proposed for analysis, the social network component is an application that offers instant messaging services, similar to other platforms such as WhatsApp, Facebook Messenger, WeChat, platforms already existing in the market. Features of this application include conversations between users, sharing information, images, audio files, creating user accounts or creating a user profile with personal information.

From a technical point of view, the application is an open source product, developed in the JAVA language and works on the Android platform. The information needed by the application's function is stored in a Firebase database, stored in the cloud. Benefits of cloud-based databases include real-time information processing, low database maintenance costs, disaster data recovery, scalability, or rapid expansion of functionality to meet current needs.

Among the opportunities offered by mobile social networks, the paper (Jabeur, et al., 2013) presents the integration of cloud platforms such as Amazon Web Services, Google App Engine or Salesforce that can be used with mobile applications to create mobile ecosystems where the user experience is enhanced, with cloud technology providing users with a robust, scalable, low-cost infrastructure. maintenance. Also, the mobile cloud is considered a major improvement of the infrastructure by offering advantages such as distributed computing, multi-core processors, service-oriented architectures (SOA) or virtualization services.

In using the services of mobile social networking solutions, the challenge is the high expectations of users who want an experience similar to that offered in the desktop version. In this regard, social networks must have an easy adaptation to various mobile devices on which they operate, with different information processing features or different screen sizes. Social mobile networks must also provide opportunities for integration and standardization so as to ensure good interoperability between various hardware and software solutions (Jabeur, et al., 2013).

Conclusions

Social networks offer multiple possibilities to users; starting from classic functionalities such as social interaction, distribution of information, audio, video materials or location distribution and up to electronic payment services. They can function both as an integral part of the social application, and as external services whose development can be done independently of the social network.

This paper analyzes the 2 main cases of use of the solution, among which is the monetary transfer between 2 electronic wallets, as well as the supply of one wallet at a time. These features could be expanded in the future with other features such as automatic payments, user behavior analysis or estimates of future developments. Also, in this paper were presented the 2 main modules of the application that interact with each other and offer the possibility of money transfer: the social network, the RESTful web service and the payment module. Each component represents an independent module so that any evolutions are treated independently and do not accidentally impact the functionality of the system.

In the future works, we will propose for analysis the development part of a functional prototype that integrates electronic payment services in social networks. Based on this prototype, we will be able to measure the impact that such a solution has on users and how it can work in reality.

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A Competency-Based Approach to The Assessment of Civil Servants' Performance in High-Risk Environments

Elena KOLESNICHENKO
Tambov state university named after G.R. Derzhavin, Tambov, Russia
e-mail: ekolesnichenko@live.ru

Olga RUDAKOVA
Central Russian Institute of Management – Branch of The Russian Presidential Academy of National Economy and Public Administration, Orel, Russia
e-mail: rudakova71@yandex.ru

Irina ZINOVIEVA
Voronezh State University of Forestry and Technologies named after G.F. Morozov, Voronezh, Russia, e-mail: forest.vrn@gmail.com

Safonova NATALIA
Voronezh Branch of the State Marine and River Fleet University
named after Admiral S.O. Makarov (Voronezh), e-mail: vfspguvk@mail.ru

Abstract

The effectiveness of public management depends on the civil service performance. Civil service is one of the types of public service. Since one of its priorities is personnel policy, civil servants deal with the issues related to the social, legal and professional spheres. A civil servant should be competent and qualified for the position he/she holds. In the article, the authors focused on the theoretical and practical aspects of assessing the competencies of civil servants in high-risk environments. The purpose of the study is to develop tools for assessing the competencies required in high-risk environments. The authors used a methodology which consists of seven stages. The researchers made the necessary preparations at the preliminary stage and created a working group of specialists to develop a civil service competency framework. Apart from that a content analysis was carried out and core competencies were determined. According to the group of specialists working in the regional civil service system, civil servants should have analytical thinking skills, communication skills, personal efficiency, leadership and decision-making skills.

Keywords: Personnel Management, Staff Assessment, Civil Servants, Competency Assessment

Introduction

The competency-based approach is fundamental to all HR management activities: it can be used to select personnel, to assess the quality of their work and to build a career and training system. In this regard, almost all countries in the world use a competency-based approach to the personnel selection in the civil service system. Most often, the competency model is used to establish a culture of state bodies, to assess candidates in the process of personnel selection, to assess the working efficiency of public servants, to prepare training and professional development programs and human resources plans, to develop an effective salary system, etc.

According to A.V. Khutorsky and A.V. Yeryomin "competence" includes a set of interrelated personal qualities (knowledge, abilities, skills, work methods) an employee should have in relation to certain objects and processes to work efficiently. To sum up, we can conclude that competence refers to a required level of knowledge, abilities, skills and qualities an individual needs to work in a certain

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area of professional activity, while competency refers to the ability and readiness of a person to independently apply them in professional activity.

In fact, management activity is associated with risk. Researchers define the concept of risk in many ways. In economic theory, risk is associated with unexpected expenses in projected profits due to negative factors affecting the working environment and labor activity.

Most Russian economists define risk as uncertainty about potential losses. Russian dictionaries define the word risk as: "Risk is the possibility of danger, failure". According to a second definition, "Risk is a venture at random". Apart from that risk is defined as unforeseen consequences, or the possibility of expenses. All these definitions imply that risk is associated not with uncertainty but with a potential threat. The fact is that if under certain circumstances negative outcomes are inevitable these situations cannot be called risky. Therefore, a more accurate definition of risk is “Risk is the probability of a negative outcome under the conditions of uncertainty”.

It is vital to assess and predict risks in order to determine an appropriate management concept under the conditions of a changing external environment.

In high risk environments, a person in charge needs to find an alternative way to solve a problem.

Risk management includes the following components (Fig. 1).

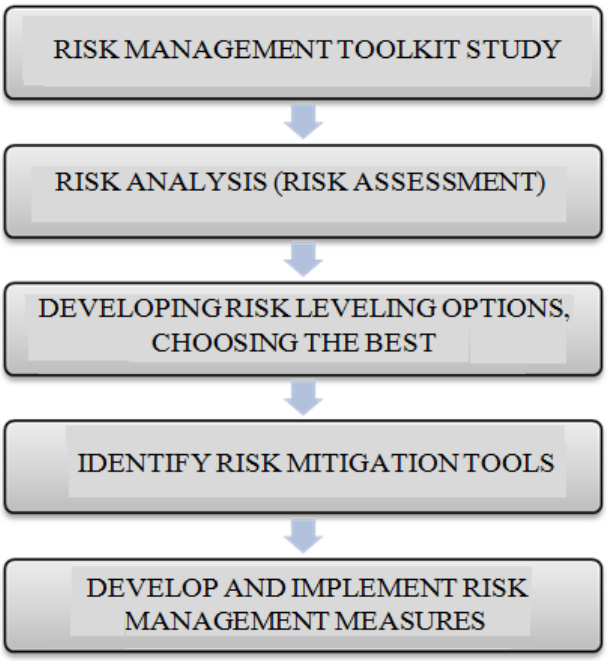

Fig. 1: Components of risk management

The authors of the article proposed two approaches to risk management that can be applied by local governments.

According to a process approach, risk management includes a number of stages:

1) research and policy analysis with a focus on risk management;

2) risk analysis.

It is vital not only to assess the existing risks but also to analyze what brings about these risks. However, it turns out that under the same conditions the outcomes can be different. It is crucial to

form a specific system to mitigate or eliminate risks. The final stage of risk management involves risk prediction and taking measures to compensate for losses.

According to a system approach, the main components of risk management at the regional level are:

- elimination of negative consequences;

- distribution of powers and responsibilities;

- completion of work ahead of schedule;

- data analysis;

- effective interaction;

- balance of income and expenses.

These components should be included in the job description of a civil servant. A competency-based approach which is used to assess a civil servant's performance is based on these requirements.

According to V.V. Verna, a special technology should be used to develop a competency framework. This technology includes a set of specific methods, techniques and tools [5].

E.A. Galiy and her co-authors consider the assessment of competencies as a process of determining the priority qualities a civil servant should have to efficiently perform his/her duties.

A.A. Gorbunova and her co-authors claim that assessment of competencies of a civil servant is a process of evaluation of knowledge, skills and abilities of a civil servant and his/her capability to apply them in practice. Moreover, within this process his/her personal qualities and behavior are analyzed.

N.V. Tsurgan defines "competency assessment technology" as a set of organizational measures and a system of methods and tools which are used to assess the knowledge, skills and abilities of the personnel, and their capability to apply their knowledge, skills and abilities to solve practical problems they have to deal with when performing their professional duties.

Thus, in modern economic conditions and high-risk environments it is advisable to develop a civil service competency framework and introduce a system of assessment of civil servants' competencies.

Methods

In their works many researchers analyze the use of a competency-based approach in the civil service system. As for the methodological basis of this study, the authors applied a system approach to assess the competencies of civil servants. Studying a civil service competency framework, the authors concluded that project activities should be taken into account in the job description of a civil servant.

The authors carried out this research in a comprehensive manner (McClelland, Boyatzis and other authors). The first part of the study is devoted to the assessment of competencies in the context of project management. The authors published the results of this research in their previous works. The second part of the study is based on a general methodology; the competencies of civil servants have to be assessed under the conditions of high-risk environments. To develop the tools for assessing the competencies of a civil servant, the authors conducted the following analyses:

- document analysis. It was required to study instructions and regulations in order to obtain information about the specifics of the work of a civil servant;

- content analysis. Using the method of "brainstorming", the researchers analyzed the information obtained in the process of developing a civil service competency framework. Apart from that, the researchers analyzed the results of the survey (the competencies were ranked by order of importance).

The authors studied the specifics of the activities of the regional administration, the organizational structure of the executive bodies, the staffing table and the functions of structural divisions. The process of developing tools for assessing competencies consisted of several stages.

At the preparatory stage the authors interviewed the leading HR specialists of the civil service department, personnel administrators and award specialists. The goal of the researchers was to develop a civil service competency framework. The researchers identified the employees who deal with the personnel and are involved in the process of developing a competency framework (a leading specialist and a chief specialist of the HR department and a chief consultant). The researchers analyzed the documents required to develop a competency framework of a civil servant. Finally, the authors investigated the regulations for administration and structural divisions (departments), regulations on competitive selection of civil service staff, regulations on the formation and training of a reserve of managerial personnel.

At the second stage, a working group of specialists was formed. It included the specialists from the HR department - a leading specialist, a chief specialist and a chief consultant. The members of the working group were informed about the objectives of the project and expected results. In the course of this stage, the authors also examined the competency framework of the administration - the highest executive body in the region. In the course of the discussion, the brainstorming technique was used: based on their experience all the members of the working group spoke on the problem of the development of a competency framework and came up with their own ideas.

At the third stage, the researchers carried a content analysis of the information and developed a questionnaire on competencies (it included 10 core competencies civil servants should master) (Fig. 2).

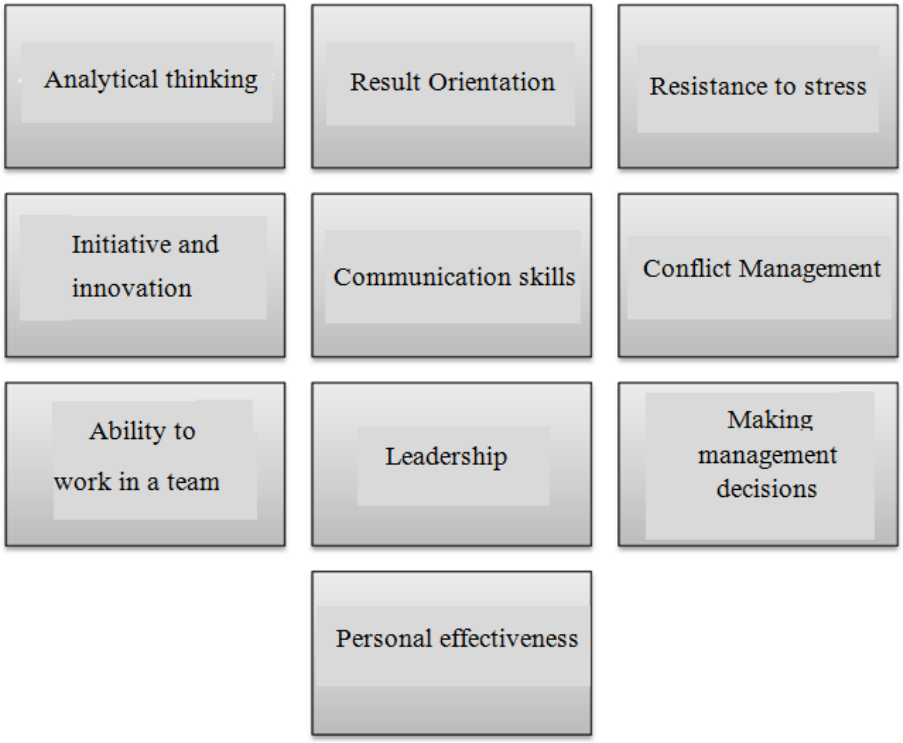

Fig.2: Competencies civil servants should master to work in high-risk environments

The members of the working group were asked to fill in the assessment sheet and rank the importance of the competencies using a 5-point rating scale (Table 1).

Table 1: assessment sheet

№	Competence	Competency characteristics (abilities)	Importance
1	Analytical thinking	Ability to identify priority goals for yourself and analyse possible difficulties in achieving it	
		Ability to analyse problems and draw systematic and logical conclusions	
		Ability to predict developments, anticipate possible problems, develop specific ways to solve them	
2	Result Orientation	Ability to make efforts and remain active to achieve goals and objectives	
		Ability to clearly represent the outcome and strive to achieve it	
		Strive to meet or exceed established standards	
3	Resistance to stress	The ability to control your emotional state, not lose activity and performance when in a stressful situation	
		The ability to work efficiently for a long time, solving monotonous or time-consuming tasks	
		Ability to cope with frustration, failure, and keep moving forward	
4	Initiative and innovation	The desire to propose ideas and solutions aimed at improving performance. Support other initiatives	
		Desire to make additional efforts, go beyond their functional responsibilities to actively influence the improvement of the efficiency of the work process	
		Initiatives and innovations, ability to measure their effectiveness based on objective indicators	
5	Communication skills	The ability to easily build relationships with different people	
		Ability to persuade, argue, defend their ideas	
		Ability to choose the optimal communication style in various business situations	
6	Conflict Management	Ability to prevent conflict situations without compromising one's own interests	
		The ability in interpersonal or group conflict to constructively and productively build tactics of interaction with the opponent, aimed at achieving their own goals without compromising the needs of the other party	
		Ability to competently get out of conflict situations	
7	Ability to work in a team	Ability to work on a common result by creating a common information field	
		Commitment to discharge their responsibilities responsibly, respect other team members and agreements reached among themselves	
		Willingness to assist and support team members in addressing emerging issues	
8	Leadership	The ability to inspire, encourage others to act. Motivation and persuasion without administrative pressure	
		Ability and desire to educate and transfer knowledge to others, develop their subordinates	
		Ability to form a strong team	
9	Making management decisions	Ability to make effective decisions and willingness to take responsibility	
		The desire to achieve the maximum possible result, to make additional efforts for this.	
		Ability to take responsibility for the results of their team, provide professional support and	
10	Personal effectiveness	Focus on the development of professional knowledge and skills, regularly monitor recent changes, current state of affairs in their professional field	
		The desire for self-development, the use of several ways of learning: passing trainings, studying literature	
		Pursuit of excellence and career advancement	

Rank the competencies using a 5-point rating scale (unimportant - 1, highly important - 5).

At the fourth stage, based on a qualitative analysis of the results of the questionnaire, the researchers identified the five key competencies which were ranked as the most important. At the same stage, the researchers and the head of the HR formed a competency framework.

Results and Discussion

Based on the results of the implementation of the third and fourth stages of the study, the authors identified the competencies a civil servant should master in high-risk environments (Table 2).

Table 2: the competencies a civil servant should master in high-risk environments

Competence	Competency characteristics (abilities)	Behavioral indicators
1. Analytical thinking	Ability to assess the current situation and predict risks that are potentially likely to arise	- in solving problems, identifies gaps in information, finds possible sources and formulates precise questions for obtaining it; - determines the relationship of individual parts of the problem, finds the causes of its occurrence; - considers the situation in a broad context, takes into account the influence of the maximum number of factors and the likelihood of risks; - accurately predicts the development of events and assesses how its decisions are reflected in others (people, organizations, regions), including in the long term; - offers solutions aimed at preventing possible problems and taking advantage of future opportunities; - is guided by strategic objectives and determines the most effective ways to achieve them
2. Communication skills	The ability to organize the work of the team, which will ensure the integrated identification and leveling of risks	- communicates with others in a respectful and friendly manner; - establishes and maintains long-term partnerships with other people inside and outside the organization, broadens the range of contacts; - takes into account the needs of other people, develops mutually beneficial solutions, shows willingness to compromise; - consistently and logically state its position in the form and scope necessary for the interlocutor; - shows confidence in communication with different people, knows how to clearly distribute instructions; - arguably explains his point of view to others; - influences and enlists the support of others to promote ideas, solutions, projects.
3. Personal effectiveness	Ability to effectively organize your own work and efficiently allocate efforts to achieve maximum results	- ensures performance of the work within the established time frame; - faced with obstacles, persevere and continue to work until the result is achieved; - offers new ways to improve the performance of duties; - considers ideas and proposals of others to increase the efficiency of performance of official duties and implements them; - switches from one task to another in a short time; - does not reduce the quality of work if it is necessary to perform several tasks
4. Leadership	Ability to manage subordinates, effectively plan, organize and monitor work	- clearly sets and monitors tasks; - distributes tasks among subordinates, taking into account their individual characteristics and current load, performs effective control; - encourages subordinates to learn and develop professionally. - demonstrates confidence in the successful resolution of the problem, inspires others with its actions and enthusiasm for the best performance and achievement of a common goal
5. Making management decisions	Ability to quickly make and implement management decisions	- promptly makes decisions at its level of responsibility, complying with the established decision-making procedure; - decisions are taken in a balanced manner taking into account possible risks; - builds a motivation system based on transparent and understandable indicators; - is responsible for his decisions and actions, as well as for their consequences.

Developing the tools for assessing the competencies civil servants should master in high-risk environments, the authors analyzed the procedures for personnel selection, certification, qualification examinations and probationary period (interviews, questionnaires, group discussions, individual work of the candidate, testing, observation, case solving, 360 degrees Performance Appraisal, Assessment Center).

The researchers came to the conclusion that the method for assessing competencies depends on the goals and objectives of the organization (institution), as well as the contents of the competencies. For example, Table 3 shows the methods for assessing competencies.

Table 3: мethods for assessing some competencies of the personnel

Competence	Valuation methods						
	Interview	Observation	Case / Work	Case Resolution	Panel Discussion	360 Degree	Testing Evaluation Center
1. Analytical thinking	+		+	+	+	+	+
2. Communication skills	+	+	+	+		+	+
3. Personal effectiveness	+		+			+	+
4. Leadership	+	+	+	+		+	+
5. Making management decisions	+		+		+	+	+

To test the proposed tools for assessing the competencies civil servants should master in high-risk environments, the following measures were implemented:

- the levels (indicators) and contents of competency were determined (incompetency, development, experience, skills);

- the optimal assessment method was selected (a competency-based interview);

- an assessment sheet was developed to make it easier for the staff to give answers. The interviewees were asked to indicate which structural unit they worked in and the position they held (Table 4);

Table 4: competency-based Interview Assessment Sheet

№	Competence	Notes and comments	Competency level of candidate from 1 to 4
1	Analytical thinking		
2	Communication skills		
3	Personal effectiveness		
4	Leadership		
5	Making management decisions		

- The schedule and location of the interview were approved. The employees of the regional administration departments were selected (the department of administrative work and contract service; Department of State, Municipal Service and Anti-Corruption; Department of State and Municipal Services, Information Technology, Communications and Document Management; Department of Public Relations and Information Policy; Law department.

A competency-based interview was conducted (it is a type of structured interview which is conducted according to a pre-developed scenario. During a competency-based interview, real situations that a candidate had to face in the past are considered). There were three sets of questions on each competency. If there was a need, additional clarifying questions were asked (Table 5).

Table 5: list of procedures for assessing the competencies civil servants should master to work in high-risk environments (a partial list)

Competence	Competency Levels	Competency Assessment Issues
Making management decisions	**1 - Level of incompetence.** He does not know how to make decisions on his own, is not able to take responsibility for making a decision. Not ready to take the risk. When discussing alternatives, he demonstrates conformism, does not seek to defend his own position. Own actions do not agree with the actions of other people. **2 - Level of development.** Attempts to analyze the situation. In conditions of uncertainty, he prefers not to take risks. When making a decision, it takes into account the opinion of more experienced colleagues. Takes responsibility for the decisions made in case of full confidence in their correctness, in other cases strives to share responsibility among all members of the team. **3 - Level of experience.** Capable of making programmed decisions on its own, for which it has experience in making. Takes risks in exceptional cases. The presence of experience in decision-making uses as an argument in their favor when defending their position before management. Takes responsibility for a specific area of work. **4 - Skill level.** Performs a detailed analysis of the problem situation and the consequences of making a decision. Demonstrates risk preparedness if necessary. Regularly aligns his own actions with those of other people. When defending his own decisions, he is convincing, uses logical and understandable reasoning. Capable of coordinating the efforts of subordinates, demonstrates responsibility, controlling the timing and conditions of work.	Describe the situation in which you were responsible for the management decision you made? Have you been held responsible for the irrational actions of your subordinates? Give a concrete example from your own experience when it was difficult for you to make a decision? How did you come to this decision and what was the result?
Analytical thinking	**1 - Level of incompetence.** Decomposes the problem into a number of simpler tasks or actions without prioritizing them. Forms a set of tasks without establishing the order of their solution. It does not take into account the consequences of its decisions and the nature of their impact on the work. **2 - Level of development.** Establishes a causal relationship between different aspects of the situation. It can classify these elements, classifying them into one of the categories according to the criterion "for" and "against." **3 - Level of experience.** Identifies multiple causal relationships; sees a set of potential causes of the phenomenon, as well as a number of consequences of the action. Analyses the relationships between the components of the problem, foresees possible barriers to solving the problem, predicts the development of the situation. **4 - Skill level.** Carries out comprehensive planning and analysis. Uses a variety of analytical methods and procedures. Generates a number of possible alternatives to solving the problem and compares them according to the value criterion.	What are your personal goals for the coming year? How do you estimate the probability of their achievement? What are the barriers to achieving your goals? Give an example of the ineffective decision you have made? What are the reasons for making the wrong decision? What are the consequences of making the wrong decision? In the event of a similar situation, would you change your own actions in any way? Describe your own experience of successful performance of complex or urgent work in conditions of interference (lack of time, resources, inefficient work of subordinates or team members). What helped you to succeed and solve your problems?

Conclusions

Management activity is constantly associated with risk. Risk can be numerically measured. It is a potential possibility of an unfavorable outcome. It is vital to assess and predict risks in order to determine an appropriate management concept under the conditions of a changing external environment.

The authors of the article proposed two approaches to risk management that can be applied by local governments. According to a process approach, risk management includes a number of stages:

1) research and policy analysis with a focus on risk management;

2) risk analysis.

It is vital not only to assess the existing risks but also to analyze what brings about these risks. It turns out that under the same conditions the outcomes can be different. It is crucial to form a specific system to mitigate or eliminate risks. The final stage of risk management involves risk prediction and taking measures to compensate for losses.

According to a system approach, the main components of risk management at the regional level are:

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- completion of work ahead of schedule;

- data analysis;

- effective interaction;

- balance of income and expenses.

These components should be included in the job description of a civil servant.

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Overview of the Continuous Improvement Methodologies used in Organizations

Nicoleta CHICU
The Bucharest University of Economic Studies, Bucharest, Romania
chicu_nicoleta@yahoo.com

Andrei RADUTU
Bucharest University of Economic Studies, Bucharest, Romania
radutuandrei@yahoo.com

Abstract

Nowadays organizations are facing a tremendous wave of change due to various factors such as globalization, technology development, unstable economic environment and specialized workforce. In this context, managers need a series of instruments for obtaining performance in the organizations they are leading, while at the same time, answering to the external and internal factors of change. In order to be able to harmonize these variables, continuous improvement (KAIZEN™) became a performance approach in the economy and motivated all the organizations to think about innovative ways of developing their activities. In this concern, organizations managed to adapt and evolve as customer demands are changing constantly by using continuous improvement techniques at all the levels of the organization on one hand and by keeping in mind that improving processes is a core value of their business on the other hand. Based on literature review and empirical evidence, the aim of this study is to provide an overview of the most used methodologies in continuous improvement, as well to describe the specific characteristics of a project approach within an organization, in order to develop a management system scheme for continuous improvement projects. The method used for this paper is a qualitative one and the purpose of the study is to contribute to an increased understanding of the benefits of such methods and techniques. The paper could be perceived as an initial step in continuous improvement implementation and thereby as a basis for further research studies.

Keywords: Continuous Improvement, KAIZEN™, Evolution, Performance, Management

Introduction

The sustainable success of an organization is supported by its own ability to meet the needs and expectations of all stakeholders: customers, shareholders, employees, and society in a long-term and in a balanced way. To develop such capabilities, it requires vision and leadership from the management team, but also the application of a coherent set of management tools that involve the entire organization in the continuous improvement of results.

Process analysis and identification of improvement opportunities, along with streamlining these processes, are essential steps that must be followed by all the companies that want to achieve operational performance, efficiency and profit.

Considering the above aspects, two research questions that are connected were designed:

RQ1: Which are the steps that need to be accomplished by a company in order to implement a continuous improvement process and,

RQ2: Which are the most used tools and techniques of CI that can be applied by companies?

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To answer these questions, the authors used the literature as a support. The present paper aims to present an overview of the techniques and tools used in the continuous improvement processes in companies, to define the steps that such a project must contain, as well as the decision matrix through which an improvement initiative qualifies for implementation. Furthermore, the benefits of using continuous improvement techniques will be enumerated and how they can determine a competitive advantage of company in the market.

Literature Review

KAIZEN™ or continuous improvement (CI) or is a well-known way of achieving performance that is focusing on obtaining profit, while reducing costs of an organization or company (Imai, 1986). At the same time, Bessant and Caffyn (1997) is outlining that CI is a wide focused and sustained process that will bring innovation in organizations. Other scholars draw attention to the fact that CI aims to eliminate waste from all the processes and systems of an organization in order to carry out the activity more easily (Bhuiyan and Baghel, 2005). The same authors describe continuous improvement as a never-ending process that occur in every organization and which involves some or all of the company's employees by using specific methods and techniques in order to develop easier ways of working, eliminating waste from the process and leading to innovation.

Until now, KAIZEN™ has been implemented in fields of activity related to production and manufacturing (Gieskes and Broeke, 2000), but also in services (Emiliani, 2004), being considered a key to organizational competitiveness. The results obtained can be underlined in multiple ways by reducing the defect rates, response time, by increasing the delivery commitments, productivity, by involving the customer into product, by improving quality performance, employee commitment and motivation and by reducing costs (Hamid et al., 2018).

Through the CI methods, companies use their skills for achieving better results, build a culture of performance and also a personalized management system. While designing the start of their continuous improvement projects, the organizations are required to have a project plan which include a various information such as: the goal, procedure and process map, the people involved in the project and their function, the documentation needed.

Rus (2008) identifies the steps that a CI process must pursue, being composed of 4 main phases: phase 1: data collection, phase 2: identification and documentation of processes, phase 3: permanent supervision and adaptation and phase 4: process management and improvement. The last phase of the process (phase 4) will be developed in the figure 1, involving the following elements: monitoring the performance of success; determining the needs for improvement; launching and leading actions for improvement; formalization and generalization of savings. In this phase, it is necessary to constantly consider the feedback and the performance matrix, so that the process is carried out correctly. Moreover, it is important to mention that the improvement of a process can take place when it has the following characteristics: it is stable, standardized, has few or no exceptions and its improvement have not affected its performance.

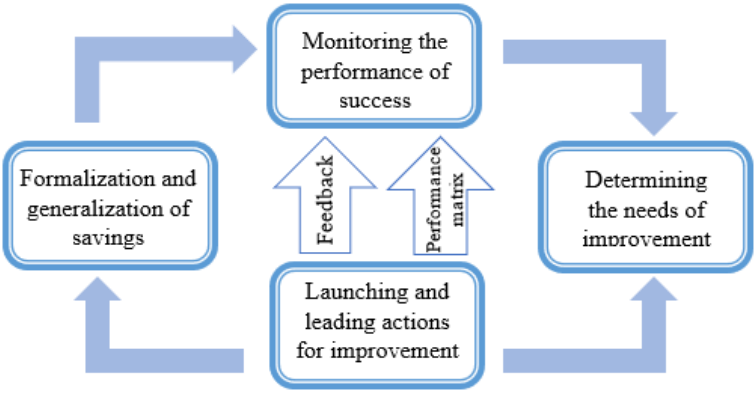

Fig. 1: Generic steps for CI projects. Source: Rus, 2008

The present model was extended by adding the following information (Figure 2) – after determining the needs of improvement, it is necessary to collect the opportunities of improvement. The next step added to the model is the evaluation of the CI idea – solution, estimating the terms and savings, and the type of the project are determined.

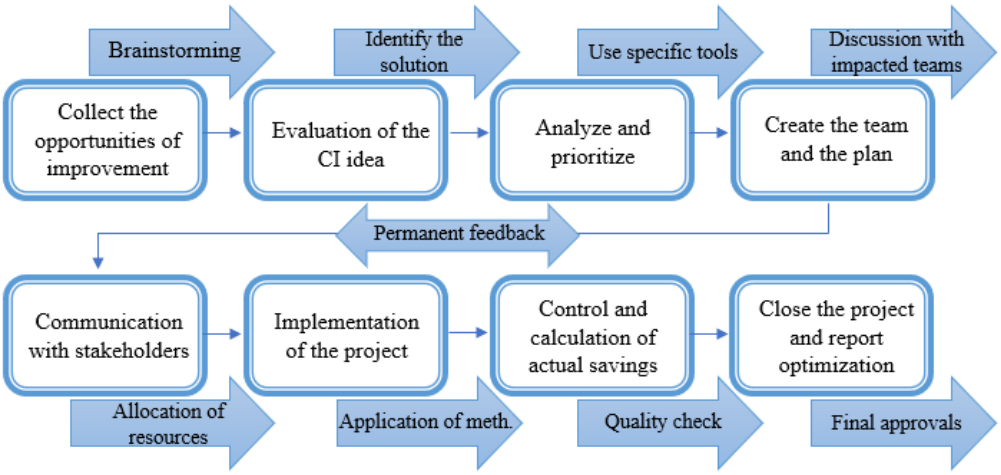

Fig. 2: Generic decision matrix for CI implementation. Source: Rus, 2008

The following step is to analyze and prioritize – use a specific tool for tracking the progress and allocate the necessary resources. Going further, the team and the plan is created – identification of the project manager and project sponsor, assigning a CI coordinator and setting the execution times. Next, communication with stakeholders – discussion with impacted teams, with the process experts and teams are performed. The next step consists in implementation of the project – application of specific KAIZEN™ techniques, coaching, project monitoring and communication with stakeholders. The next phase is about control and calculation of actual savings – financial savings, savings as per volume of work divided by the total number of employees (FTE) and the quality check. The last step consists in closing the project and report the optimization – approvals from the project sponsor and financial analyst, closing the project in the system used for tracking.

Principles and tools of continuous improvement

While the need of a continuous improvement system in companies and organizations is essential, the road for obtaining performance is rather a more challenging way and it not necessarily follows a straight line, as the change process itself.

Most companies and management teams which are deciding to follow this path are encountering a certain problem or constraint, while not being able to identify other ways in which to reach their objectives. There are also few visionary managers, who understand the benefits of continuous improvement methods and techniques on the long term and their impact on their company's performance. They would rather choose to implement them for further developing the organization from top to bottom, while "developing the people for developing the organization" (Imai, 2012).

Therefore, in order for the change ("Kai" in Japanese) for the better ("Zen" in Japanese) to begin, as KAIZEN™ methods and techniques to be applied by everyone, everywhere and every day (Imai, 2012), the companies must be aware of the importance of a series of a series of principles and concepts. These will be further detailed and their application within every workplace, process and organization-wide represents the fundamentals for the continuous improvement implementation of methods and techniques.

"*Quality first"* represents an approach related to both quality as a result, but also a process. While in the first one, the quality of a product or a service could be very well measured, considering the external client requirements, the quality as a process is referring to every activity as a result of internal client-supplier relationships. Basically, it can be stated that the quality as a process implies that within all the actions necessary to build a product or a service, every person involved respects the following rules:

- ✓ "Do not accept a problem" – because in that specific workplace, the person performing the activity is an internal client for the previous activity or process, therefore she has certain requirements for the product or service in question
- ✓ "Do not create a problem" – it will not create any value
- ✓ "Do not pass a problem on" – the next workplace is an internal client and the product or service will have to also respect a series of requirements. Passing it on will involve additional costs and time for fixing it.

By following these rather simple rules, an organization could have a more in-depth focus on the quality, both from the result and process perspectives (Imai, 2012), (Kaizen Institute Romania, 2020).

"Gemba Orientation" is a principle involving the practical application of any continuous improvement method within the real place where the value is added ("Gemba" in Japanese), such as the production floor, in case of a manufacturing company, or the office in case of services company. In fact, the Gemba orientation principle represents the way to act in case any problem appears. The first step consists in establishing a KAIZEN™ Team and objective for that specific situation. Next step is going to Gemba and see for yourself the effects of that situation, not trying to solve it from a conference room, because it is not relevant and efficient. The third step is to verify data from the aspects that could have an influence on that matter. Continuous improvement methodologies recommend checking the causality with five factors: manpower, materials, methods, machinery, environment. Practically, a potential cause related to any of the 5 factors involved is very easy to be seen, simply by observing and collecting data. The fourth step of this principles is represented by the identification of any wastes ("Muda" in Japanese), variability of the process ("Mura" in Japanese) or excess ("Muri" in Japanese) that could be observed in the place the problem appeared. Finally, the fifth step consists in applying KAIZEN™ methods and techniques for taking the necessary measures

to solve the problem and add value for the internal and external client (Imai, 2012), (Kaizen Institute Romania, 2020).

"Waste elimination". Both a principle and a fundamental method of continuous improvement, waste elimination (Muda) creates a high degree of awareness regarding the client's requirements, by splitting the activities that a company has in two categories: value-added and non-value-added ones. As Taiichi Ohno – father of the Toyota Production System, where KAIZEN™ has its origins, stated, "the client is not willing to pay for any activity", the value-added activities are defined as the ones that the clients are willing to pay for and are generically represented by the ones which are transforming the product or service, considering their requirements (Ohno, 2013). All the other ones are non-value added and their costs are assumed by the company. At their turn, the latter could be perceived from two perspectives: activities which are clearly wastes for the company and should eliminated (e.g. waiting time, defects, etc.) and activities which although do not add value, there are necessary for the current process, depending on a series of factors. In time, by in-depth analysis, all activities can be improved, the objective being to have as much value-added as possible, in order to increase the organization's performance (Imai, 2012), (Kaizen Institute Romania, 2020).

"PDCA and SDCA Continuous Improvement cycles". Known also as "Plan – Do – Check – Act" and "Standardize – Do – Check – Act", the two improvement cycles are complementary and can be used by any team at every organization level. While the PDCA improvement cycle has as purpose to make a performance improvement of a process in time, the SDCA improvement cycle aims to eliminate the process variability and standardizing the best, simplest and safest method of operating, while also communicating and performing trainings to the team for everybody to apply it. Although most teams would think that it is essential to start with the improvement actions (using a PDCA cycle), the recommended way of considering to improve a process is actually to standardize the existent practices (by applying a SDCA cycle), in order to reduce variability and have a solid fundament to improve, rather than scattered performances with various root causes and solutions. After the process is standardized, when a team considers that it identified a better way of operating, it should implement a PDCA cycle, followed by a standardization of that specific best practice (SDCA) and the two are following each other without a limit (Imai, 2012), (Kaizen Institute Romania, 2020).

"Process and results" principle consists in the fact that organizations should acknowledge the fact that their performance could be perceived from two perspectives mentioned. Management teams of any level should be aware that every result is the effect of a process, and every process conducts to a result. Therefore, it is not sufficient to control just one of them, but to have an in-depth analysis of both perspectives, for having stable processes and therefore, good results (Imai, 2012), (Kaizen Institute Romania, 2020).

"*Integral system approach*" principle represents an overview of the activities, processes, and objectives perspective. The main benefit of the companies which are implementing continuous improvement methods is the focus on so-called "total system", rather than on "functional approach". In the latter one, activities and objectives are not very well linked between the departments and directions of the company, not following the client-supplier logic, the problem solving not being systematically approached and solved. The total system approach follows a very clear organizational objective in which every department knows exactly the specific activities and KPIs with which they could contribute, the problems are seen as opportunities and solved in multi-disciplinary teams, by involving all the specialized parties involved and more than that, the performance of the organization is always more important than the individual one (Imai, 2012), (Kaizen Institute Romania, 2020).

"*Developing the organization through people development*". This principle also implies an approach which is very common especially in Japan, where the "respect for people" represents still a central value of the country and of Toyota. As the main glance, a management team would be tempted to develop first the organization and after that being oriented to the people. In this concern, it could be stated that any company has to essentially focus on people development, and together with them to develop a performing organization (Imai, 2012), (Kaizen Institute Romania, 2020).

Results approach and performance

Once the awareness regarding the benefits of applying the principles aforementioned has been created within the management teams of the organizations, there are a series of continuous improvement methods that could be implemented, depending on the specifics of the problems encountered.

In order to maximize performance and create a culture of continuous improvement, a company could use various methods and techniques, which can lead also to building its own personalized management system.

Probably some of the most important ones that manages to solve around 80% of the problems of an organization, once they are used organization-wide are the "*Daily KAIZEN*™" ones (Kaizen Institute Romania, 2020). These methods are related to shop floor management and include the following:

- ✓ "*Waste Identification and Elimination (Muda)*": this method manages to make the teams aware of the wastes that they have within their workplaces and processes. There are 7 types of Muda, each of them being easy to observe and quantify: over-production (worst type of Muda because more products than necessary are manufactured or in a shorter time than needed, which leads to other types of Muda); inventory (stock of raw materials, WIP products, etc., or in other words costs that are blocked until the sale); waiting time (for a person or a machinery, which is leading to waiting time alongside the process); motion (people searching for various instruments, information, or who encounter heavy movements for operating the product); transportation (various transportation times and distances within the company and not towards the client); over-processing (more operations than necessary are performed, which involve additional costs or unstable process, which causes variability) and defects (any quality parameter that is not respected leads to additional costs, rework, etc.) (Imai, 2012), (Kaizen Institute Romania, 2020).

- ✓ "*Problem Solving Story*": represents the approach of solving problems in a systematic way. In this concern, every team learns how to identify, understand, search and successfully recognize the root cause, create a specific action plan to eliminate it, while also thinking ahead for preventing the problem to reappear (Imai, 2012), (Kaizen Institute Romania, 2020).

- ✓ "*5S Method*": being represented by 5 logical steps, the method is actually a management tool for optimizing the workplace. Its benefits could be seen in a greater quality, productivity, a better space organization, a more visual approach meant to identify any product, tool or information in a very short time and also in an increased moral and motivation for the team, which has the opportunity to optimally project its workplaces. Also, one of the most important benefits is the trust given by the 5S implementation to every client, partner or employee, due to the standardized and stable process. 5S is also a method which is the fundament for implementing other more complex continuous improvement tools (Imai, 2012), (Kaizen Institute Romania, 2020).

- ✓ "*Standardization*": is represented by the implementation of best, simplest and safest way to perform actions (e.g. operating, quality, communication, etc.). Therefore, standards assure the performance by being the fundament for training, operating and eliminating the variations within the processes (Imai, 2012), (Kaizen Institute Romania, 2020).

- ✓ "*Visual Management*": in accordance with the way people perceive information (over 70% being visual), this continuous improvement technique improves the way in which information, progress, KPIs and so on are communicated on three levels: workplace, process and system (organization). In order to optimally implement it, it is necessary to adapt the information for every level, in correlation with the information needed by the beneficiaries. Another characteristic of this method is that the content should be very easy to read and

understand (e.g. graphics, pictures, tendencies, color codes, etc.) and at the same time to manage the process with the data illustrated (Imai, 2012), (Kaizen Institute Romania, 2020).

- ✓ "*Team Management*": this method adds some best practices for team organization, defining the roles and responsibilities for every team member, what subjects should be communicated and under what specific format, etc. This technique also involves some other elements from the previously mentioned methods, such as a team board where the meetings takes place, standards, visual management aspects, specific to the teams (Imai, 2012), (Kaizen Institute Romania, 2020).

Subsequently, the more complex problems that companies encounter could be solved with some other categories of techniques such as: TFM (Total Flow Management) – a series of techniques studying the sequence of activities, operations and processes that a product or service goes through, from the moment of the raw material is received within the company until the delivery to customer (e.g. Value Stream Design, Levelling, etc.); TPM (Total Productive Maintenance) – methods used for monitoring, improving and operating the company's equipment and machinery, as an indicator of the efficiency and effectiveness (e.g. Planned Maintenance, Autonomous Maintenance); TQM (Total Quality Management) – techniques which ensure a good control of the quality and of the operations through which a product or a service is realized, as well as the measurement of the quality requirements of the internal and external customer, customer complaints analysis, etc. (e.g. Auto-Quality Matrix); TSM (Total Service Management) – continuous improvement methods having as aim to increase sales, marketing, innovation, etc. Of course, in order for the company to be competitive also in the future, it is essential to have a strategic and operational management orientation, by defining its mission, vision for 3 or 5 years, the strategic objectives, as well as specific KPIs for every department and leadership development (Imai, 2012), (Kaizen Institute Romania, 2020).

Conclusions

Coming back to the two research questions stipulated in the beginning of the paper, one could argue that implementation of a continuous improvement project and methodologies is rather a complex process, which requires changing the mentality, attitude, paradigms and habits of the entire organization, starting from the top management until the operators level. The continuous improvement techniques should be implemented after a Gemba evaluation, in which it needs to be established the real needs of the company, with a focus on improving the value-added activities.

As Masaaki Imai (2012), founder of Kaizen Institute stated: "There are three key factors to successfully implement KAIZEN™: Management commitment, Management commitment, Management commitment.", the top management teams should understand their essential role in leading the change towards a culture of performance and guide their teams to obtaining it.

Acknowledgment

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What Do We Know About Virtual and Augmented Reality Applications in Human Resource Management and Development? A Systematic Literature Review

Pedro FERREIRA
CEOS.PP, ISCAP, P.Porto and University Portucalense, Porto
Portugal, pferreira@upt.pt

Viviana MEIRINHOS
CEOS.PP, ISCAP, P.Porto, Porto, Portugal
vivianameirinhos@iscap.ipp.pt

Ana Cláudia RODRIGUES
CEOS.PP, ISCAP, P.Porto, Porto, Portugal
anarodrigues@iscap.ipp.pt

António MARQUES
LabRP - CIR, ESS, P.PORTO, Porto, Portugal
ajmarques@ess.ipp.pt

Abstract

The development and improvement of new technologies are leading companies to re-think their methods, processes, and practices in several areas. In human resources management, this trend is also present. Despite this growing trend of integrating new technologies in human resources management, there is no systematic information on what is being done, how, and with what results.

This paper tries to fill this gap by presenting the results of a systematic literature review about the use of virtual and augmented reality in human resources management and development.

The results show that the use of these technologies is still in a very early stage, requiring more in-depth research, but the results so far are promising, namely in terms of the impact that this technology can produce in some human resources management and development processes. Future paths of research are also pointed out.

Keywords: Virtual Reality, Augmented Reality, Human Resources Management, Systematic Literature Review

Introduction

The current social and economic conjuncture, impacted by growing globalization and technological advances, demands more qualified and competent people. The ability to face constant changes in a market characterized by innovation is one of the most prominent demands. This context has consequences for organizations, especially for Human Resources Management and Development (HRMD), pressured to develop innovative tools and processes capable of guarantee higher levels of productivity and competitiveness (Oliveira and Oliveira, 2011; Stone and Deadrick, 2015).

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The growing movement for integrating new technologies in management processes is well illustrated by what has been called as industry 4.0 (Hecklau et al., 2016; Sivathanu et al., 2018; Shamim et al., 2016). It's well documented the importance of preparing human resources management processes for the integration of new technologies, such as Internet-of-Things, Big Data, and artificial intelligence in order capable of automating HR processes, thus promoting more efficiency.

Despite the growing volume of research on the topic of industry 4.0 with a focus on the role of technologies in management processes, there is still no systematic analysis of literature on specific technologies, such as virtual reality (VR) and augmented reality (AR), and human resources management.

As such, this work aims to contribute to the systematization of what has been studied and researched about the use of VR and AR in the area of HRMD, with a special focus on the potential application and impact of these technologies on HR processes. In detail, this research work aims to accomplish the following goals:

- Organize scientific knowledge already produced about the use of VR and AR in HRMD;
- Understand the potential use and impact of VR and AR in HRMD;
- Understand the process of applying VR and AR in HRMD;
- List the benefits of using VR and AR in HRMD.

To accomplish these goals a systematic literature review was conducted. The option for this method is mainly related to the need to identify, evaluate, select, and systematize the scientific available information about the topic.

VR is a computational technology, generated by one or more multisensory devices, that the user can control, manipulate and explore, interactively and in real-time, allowing the user to have an immersive experience in a different and alternative environment (Aguinis, et al ., 2001; Tori and Kirner, 2006). Through the use of 3D graphics or 360° videos, users experience an authentic computer-generated environment, creating a sense of presence that allows experiences such as walking on the surface of Mars, flying an aircraft, or observing the frescoes in the Sistine Chapel, without actually being there (Aguinis, et al., 2001).

Currently, VR systems have three main characteristics: navigation, interaction, and immersion. These systems allow users to move through three-dimensional computer-generated images, such as a walk through the corridors of a virtual museum, enjoying the exhibitions. But they also allow navigating through the environment, interacting with it, touching, lifting, manipulating, or moving objects (Kirner and Kirner, 2011). VR systems are often, but not always, immersive: immersion refers to the perception that the user is surrounded by the virtual environment, in which the stimuli of the physical environment are blocked through devices, such as the HMD, directing human senses to images, sounds, and objects to create a realistic virtual environment (Aguinis, et al., 2001).

While VR can be defined as a dynamic and reactive system with the virtual environment produced by a computer, transporting the user to a virtual environment (Choi, et al., 2005), AR is achieved when the user, inserted in the real world, interacts with elements registered three-dimensionally (Kivrak, et al., 2013). As such, AR makes use of real and virtual elements, allowing the creation of interaction between the real and the virtual environment.

In recent years, AR has registered a more accentuated growth, since it is used in different contexts, including but not limited to the training of technicians for complex tasks such as equipment repair and maintenance; the visualization of constructive elements or hidden objects; signaling environments or consulting complementary information in real environments; the prospection and graphical visualization of data by estimation in real environments; the consultation of data enabling their interaction and analysis; simulation; conferences with participants in remote meetings; entertainment and games; archeology with the possibility of total reconstruction of the object from the fragment found; teaching with the insertion of complementary or relevant information to the theory taught (Cardoso, Lamounier Jr, Kirner, and Kelner, 2007).

VR and AR are types of technology that offer several benefits to their users: the multisensory characteristics allow the visualization of objects in three dimensions, enhancing the experience of "being there"; this three-dimensional observation allows a better assessment of objects in terms of size, shape, and texture concerning the two-dimensional projection where it's harder to determine those same characteristics (Anthes, et al., 2016; Ausburn and Ausburn, 2014).

This type of technology is also advantageous for simulating dangerous tasks or jobs, avoiding compromising the person's safety, such as training in special rescue operations, training in work at height or with hazardous materials, and training in tasks involving expensive equipment or material; it is also useful to know or manipulate objects and products that do not exist or are hard to find (Bennett, 2009).

Time reduction is seen as another advantage in using this technology. Hou, et al. (2015), who dealt with the use of VR and AR in the industry, guarantee that the decrease in production time is directly related to the increase in companies' profits. Also Baird and Barfield (1999) show that the use of AR positively influenced the time needed to complete equipment assembly tasks when compared with the use of instruction manuals.

The use of VR and AR enables the reduction of errors, for example in the assembly actions done manually by the operators. The reduction of manufacturing errors makes it possible to reduce the time and resources needed to recover defective products and also resources and time spent on the manufacture of irrecoverable products (Hou et al., 2015). In 2017, Doshi, Smith, Thomas, and Bouras carried out a study to assess the possibility of increasing precision in tasks such as welding; the test was carried out in an industrial environment, in the automotive sector, with a significant increase in the precision of spot welding, using AR instead of traditional methods.

In HR, the advantage of using this technology can be useful in several processes: it can promote the company and the job with immersive experiences, allowing to change the way a job interview is conducted, immersing the candidate in different situations so that their behaviors can be observed and assessed (Muhanna, 2015; Van Krevelen and Poelman, 2010). VR also makes it possible to conduct a non-face-to-face interview, allowing the company to save time, reduce travel costs for the candidate (Van Krevelen and Poelman, 2010), as well as presenting the business environment, values , and culture of the company in an interactive way; it can also assist in the training of tacit knowledge among employees; to promote a more complete, simple and practical induction process, with information accessible at any time; and finally, it can promote the company's culture by enabling employees to relate and commit to the organization (Muhanna, 2015).

Bennett (2009) argues that the use of VR or AR makes HRMD processes more efficient, such as training, recruitment and selection, and the integration of employees, as it allows them to save time, material, and human resources management. Aguinis and colleagues (2001) add that the use of this technology can also have advantages over the traditional methods, made of questionnaires or interviews because the realism created by the software allows a realistic simulation of the work environment; the more immersive, interactive, and navigable the selection techniques, the greater the consistency and predictability of the candidate's performance in the job (Bennett, 2009).

On the other hand, there are some disadvantages to the use of virtual and augmented reality. Although nearly residual, Aguinis et al., (2001) and Anthes et al. (2016) refer to some physical problems reported by users after the immersive experiences such as blurred vision, headaches, disorientation, balance problems, drowsiness, excessive sweating, loss of appetite, nausea and vomiting. Despite being increasingly accessible and cheap, this type of technology still has a somewhat high cost. The initial investment in hardware and software and the need for constant updating requires some financial which is not within the reach of all companies (Aguinis, et al., 2001).

Method

The study consisted of a Systematic Literature Review (SLR) intending to identify, critically evaluate, and organize a synthesis of results and scientific evidence of available and relevant studies, related to the use of VR and AR in HRMD. As a previously planned method, SLR aggregates results from primary research using strategies that limit bias or random errors. (Cook, Mulrow, and Haynes, 1997; Kietchenham, 2007).

This method became relevant and popular primarily in Health studies since it allows researchers and practitioners to be up to date with the advancements in scientific knowledge, the direction of their main conclusions, and even future lines of research (Sampaio and Mancini, 2007). The method is used in scientific disciplines other than Health, since it is particularly useful for integrating information from a set of studies carried out separately on a specific issue, pointing out comparisons between coincident or opposite results, as well as identifying areas that do not yet have scientific evidence allowing exploration in future research (Moher, Liberati, Tetzlaff, and Altman, 2009; Sampaio and Mancini, 2007).

The SLR research protocol used in this study was based on the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green, 2011) with a few adaptations as a result of the specificities of the area of this study. The protocol includes six steps: 1) formulation of the research question; 2) definition of objectives for the systematic review; 3) definition of inclusion criteria; 4) research strategy; 5) selection procedure; 6) procedure for data extraction and categorization, which are summarized in the following table:

Table 1: Summary of the SLR protocol

Research Question	How do VR and AR are being used in human resource management processes and practices?	
Goals for the SLR	Organize scientific knowledge already produced about the use of VR and AR in HRM and D Understand the potential use and impact of VR and AR in HRMD Understand the process of applying VR and AR in HRMD List the benefits of using VR and AR in HRMD	
Search strategy	Databases	Web of Science and Scopus
	Keywords	virtual reality AND human resources (and variations with initials) augmented reality AND human resources (and variations with initials)
	Parameters	Full-text; Years (all); Type of output (article or conference paper)
Selection procedure	Based on PRISMA Statement	
Data extraction and categorization	General data of the outputs were registered on an Excel database. Several categories of analysis were also defined and information collected: 1) publication year; 2) geographic location of the first author; 3) authors; 4) keywords; 5) type of study; 6) methods used; 7) impact of the technology; 8) development; 9) implementation; 10) assessment; 11) HR process; 12) resources used	

The selection process (stage 6) used in this study was based on the PRISMA Statement model (Preferred Reporting Items for Systematic Reviews and MetaAnalyses). PRISMA emerged as an evolution of the original QUOROM, to support researchers in improving, organizing, and presenting

meta analyzes, including SLR (Liberaty, et al., 2009). PRISMA consists of a checklist and a four-phase diagram that objectively and accurately materialize SLR (Liberaty, et al., 2009).

The categories used in the analysis can be divided into two groups. The first group reports categories related to the document description, such as publication year, keywords, type of study, and methods. The second group is related to the specific goals focused on the potential use and impact of VR and AR in HRMD.

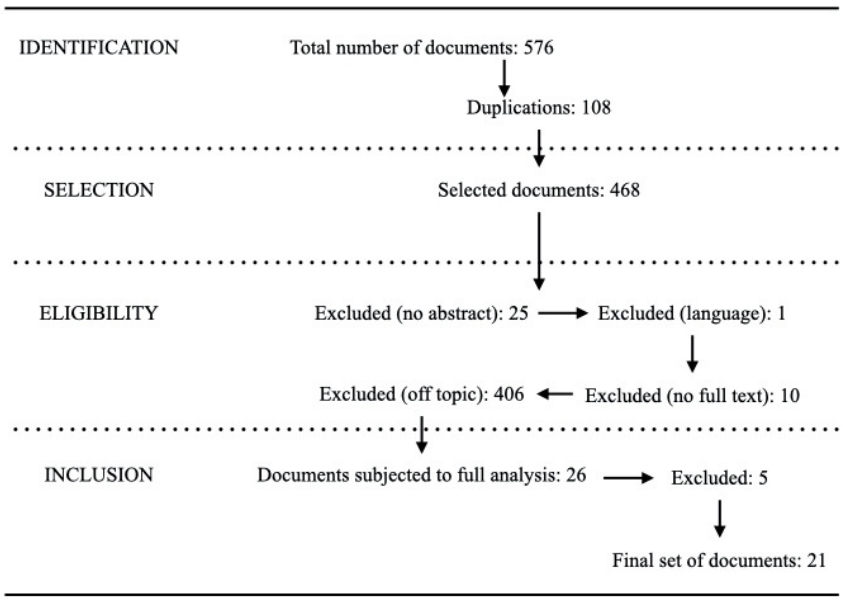

Figure 1: Steps of the selection procedure

Findings

The final set of documents includes 21 research studies. The reduced number of results already reveals that this research topic is still understudied. Since 2007, the year of the first publication, this means that an average of 1.75 studies was published each year. However, when looking at the number of publications per year (figure 2), it is possible to identify a general growing trend, although not very consistent given the small number of publications. The year 2013 seems to mark the relatively steady growth of publications in this area.

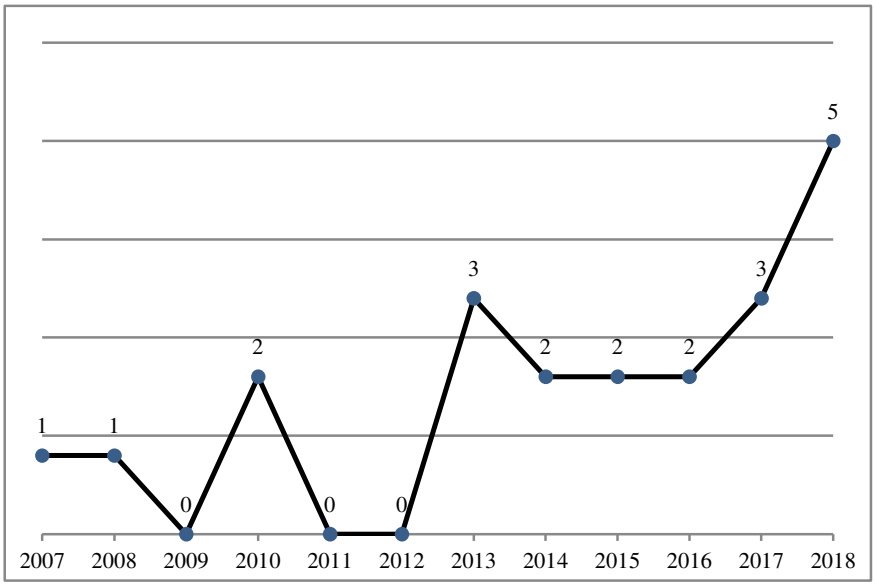

Figure 2: Articles by year of publication

In SLR, keywords used by authors to categorize published research can also offer some clues on what is relevant in a specific research area (table 2). Not surprisingly, the research in this area is dominated by the keywords "virtual reality" (n=9) and "augmented reality (n=5), with some evidence of human resources management related keywords.

Table 2: Frequency of most used keywords

Keyword	n	%
virtual reality	9	7.6
augmented reality	5	4.2
virtual environments	2	1.6
human resources	2	1.6
knowledge management	2	1.6
smart glasses	2	1.6
countainers terminal	2	1.6
production	2	1.6

The geographical distribution of the studies was defined using the first author affiliation. Europe seems to show a greater interest in this area (n=10). However, this data should be taken carefully, since, except for 3 published studies, most research was published by several authors with different affiliations (table 3).

The categories "type of study" and "research methods used" offer an idea of the research approaches more common when studying the use of VR and AR in HRMD (table 3). The research is mainly empirical and qualitative in the approach. Even though mixed methods is a common option. Most studies focus on the application of some kind of solution to a specific context (e.g. 3D simulation as a training tool, VR-based firefighting training, or augmented reality applications in construction project

activities) which help to explain the empirical nature of studies. For the same reason, the preference for the qualitative approach may be anchored on the small scale nature of the context where the application was made.

Table 3: Descriptives of main categories

	n	%
Geo-distribution of documents		
Europe	10	47.6
America	5	23.8
Asia	5	23.8
Africa	1	4.8
Type of study		
Theoretical	6	28.6
Empirical	15	71.4
Type of methods		
Quantitative	2	9.6
Qualitiative	12	57.1
Mixed	7	33.3
Type of technology		
Virtual reality	17	80.9
Augmented reality	3	14.3
Both	1	4.8
Resources used		
Hardware	13	61.9
Software	3	14.3
No mention	5	23.8

Finally, the type of technology and the resources used. Virtual reality is the most common type of technology (n=17). Only one study used both technologies. This might mean that researchers find more potential in the application of virtual reality to HRMD than augmented reality. As to the resources used,

the large majority uses some kind of hardware. This may be explained by the fact that most studies are focused on virtual reality (which most of the times demands the use of some kind of hardware).

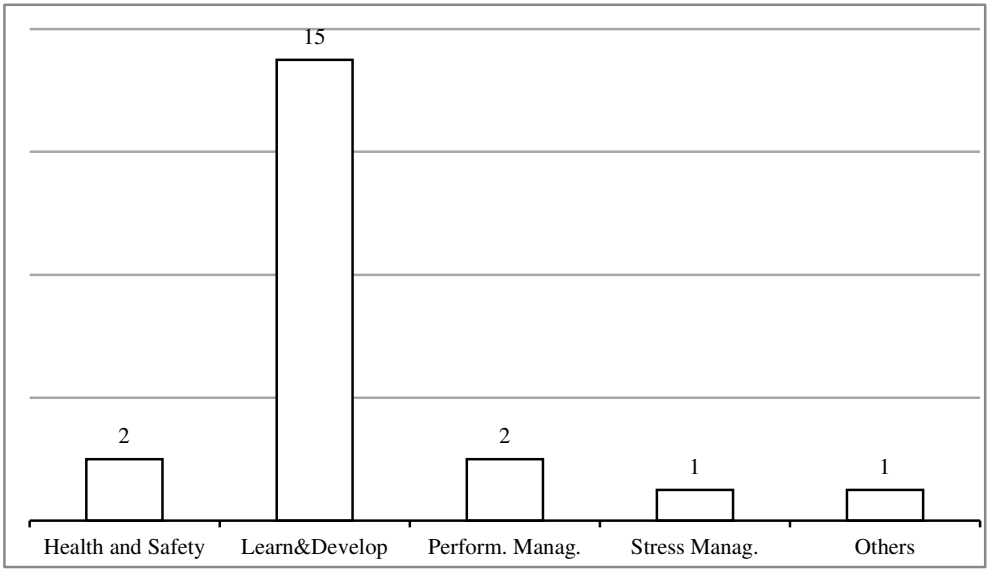

Figure 3: Most mentioned HRMD processes

The second part of the analysis aims to offer information about the focus of the research. Specifically, the HR processes that were involved and the connection of VR and AR with those processes.

Regarding the HR processes that were the focus of the research, "learning and development" is by far the preferred target of the connection between HR processes and VR and AR (figure 3). This preference may be explained by the long tradition of studies in the area of formal education and training (Psotka, 1995), but is also supported in the positive results that simulation, immersion, and virtual worlds have on learning outcomes (Merchant et al.i, 2014). In a lesser extent, other HR areas were also the focus of previous research, such as "health and safety", "stress management" or "performance management".

6The final group of data is related to the conclusions reported by the research. For this study, the information was grouped into four categories: development, implementation, assessment, and impact (table 4). The reason for these categories is related to the goal of this systematic literature review, namely understanding the process of applying VR and AR to HR, its use, and its impact.

Most studies report information about development, implementation, and assessment. Nevertheless, considering that the nature of the topic involves assessing if and how VR and AR can be an efficient solution in several HR processes, the number of studies that show no evidence of development, implementation, or assessment is quite high.

Finally, the large majority of the studies (n=17) offer information about the impact of VR and AR, which is evidence of the relevance of the study, to improve and expand the knowledge produced. Within the studies reporting information on impact, there is a consensus that VR and AR produced a positive impact on the HR process, with just one study reporting a negative impact.

Table 4: Information reported on the connection between HR processes and Virtual & Augmented Reality

Category of Analysis	Category definition	n
Impact	Evidence of the relevance of the study, with the aim of improving and expanding the knowledge produced	Positive n=16
		Negative n=1
		No evidence n=4
Development	Indicates whether the study reports on the detailed presentation of an application or project	Yes n=11
		No evidence n=10
Implementation	Indicates whether the study reports on the actual practice of an application or project	Yes n=13
		No evidencen=8
Assessment	Indicates whether the study reports on the verification of an application or project	Yes n=13
		No evidencen=8

Conclusions

The results of this systematic literature review point to several conclusions, alongside with some suggestions for future research in the field of the use and impact of VR and AR in HRMD. The results show a field of research that can be characterized as (1) under-explored, (2) immature, and (3) inconsistent.

The reduced number of publications (n=21) in the past 12 years with less than 2 publications per year, is a manifest low number when compared with other systematic literature reviews (see as an e.g. Macke and Genari, 2019; Tariq et al., 2016). Thus, the low number of publications reveals an under-explored field of study.

The field can be also characterized as immature. The year 2013 seems to mark the relatively steady growth of publications. This means that the study of VR and AR use and impact on HRMD is quite recent, still in its first steps. Also, the majority of studies are empirical and qualitative. The empirical studies under analysis are more concerned with assessing if the technology serves the purpose of HR processes or not than the development of the theory that supports future studies in the field. The preference for qualitative instead of quantitative studies is the result of the focus on the application of some kind of VR or AR solution to a specific context. However, it also reveals some immaturity in the field since the reduced number of quantitative studies prevents the generalization of results to a larger scale.

Finally, the study of the use and impact of VR and AR in HRMD can also be characterized as inconsistent. The number of publications, although with a relatively growing trend since 2013, is inconsistent with no publications in 2 years in a row (the years of 2011 and 2012. But more importantly, the imbalance between studies that focus on VR and AR technology's impact is quite pronounced.

Although this result is consistent with Tori, Kinner, and Siscoutto (2006), namely the use of VR hardware equipment on HR processes, the fact is that the field of study as a whole grows imbalanced.

The larger number of studies on training and development, alongside the lack of study of several HR processes, is another argument that supports some inconsistency in the field of study. Muhanna (2015) and Van Krevelen and Poelman (2010) described the HR processes where VR and AR can be applied, including recruitment and selection, induction and integration, training, employer branding (promoting the company's brand), organization culture and mission. This study revealed that only four processes were the focus of published research. Training and development stand out, followed by far by health and safety processes, performance management, and stress management.

The number of studies that show no evidence of development, implementation, or assessment is quite high, but the number of studies that report some kind of impact is quite high. We believe that this is a sign of under-exploration and immaturity of the area. The lack of information about development, implementation, or assessment reveals that there is no focus on developing and test new AR and VR solutions, but simply use what already exists and test if it works on the context of HR processes. This argument is further supported by the fact that papers are mainly empirical, looking to report the impact of VR or AR on some kind of HR process.

Tavares (2010) stresses that the search for new methods and strategies for organizations to differentiate themselves are increasingly important in the current job market. The use of VR and AR in HR processes can be considered one of those methods, due to their characteristics of immersion and interactivity. At first sight, the results of the systematic literature review could seem discouraging, showing an uninteresting scenario. However, this scenario offers several clues for future research.

Being an under-explored area, but with a high level of receptivity, particularly among practitioners, the novelty of possible solutions will certainly be welcomed in the scientific as in the practitioner communities. Nevertheless, it is important to offer robust studies, with a high degree of generalization and consistent results. This demands more quantitative studies, using larger samples. Additionally, it may be useful to introduce quasi-experimental studies allowing to compare the results of HR processes with and without the use of VR and AR solutions. This kind of approach will allow us to isolate the variables induced by the characteristics of the technology, and thus a better understanding of the real effectiveness of VR and AR in HR processes.

As seen in the introduction, VR and AR have some distinctive characteristics, offering different potential benefits. As such, it is important to develop a balanced understanding of both types of technologies. Another important research path is the comparative understanding of both technologies as alternative and complementary solutions.

The reduced number of studies reporting development, implementation, and assessment of VR and AR solutions shows one of the most important paths of future research. There is a need for the development of VR and AR solutions adjusted to the reality and constraints of HR processes. Although assessing the impact of existing solutions is crucial and a major contribution, the development of software that can take advantage of VR and AR technologies, without losing sight of the characteristics of HR processes is of utter importance.

Finally, there is much more in HR than learning and development. This is not to say that L and D is not a set of important HRMD processes. But from a holistic, integrated, and balanced perspective it is important to understand how VR and AR can be used in other less obvious areas. This path of research will certainly encourage more disruptive and innovative thinking and solutions, thus furthering knowledge in the effective application of VR and AR in HRMD.

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Impact of Implementation of Destructive concepts in Public Administration

Irina V. MINAKOVA
Southwest State University, Kursk, Russia, irene19752000@mail.ru

Tatyana N. BUKREEVA
Southwest State University, Kursk, Russia, tnbinchina@yandex.ru

Olga I. SOLODUKHINA
Southwest State University, Kursk, Russia, kuznecova_olja@mail.ru

Daniil I. RASPOPIN
Southwest State University, Kursk, Russia, tdime-swsu@mail.ru

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Abstract

The purpose of the study is to generalize and systematize Russian management practice based on false scientific theories. The authors have analyzed such destructive influence processes as orientation of organizational policy towards post-industrialism, inefficiency of monetization of the economy, application of liberal theory, which led to reduction of state regulation of socio-economic processes and excessive openness of the national economy. It was identified that these concepts and ideas were brought to Russian state practice from the outside (in particular, they were recommended by the International Monetary Fund (the IMF). The authors have revealed that introduction of these false concepts weakened Russia's national potential.

Keywords: Management Practice, Post-Industrialism, Monetization Of The Economy, Liberal Theory, State Regulation Of Economy

Introduction

We follow the statement that destructive concepts introduce to the country's intellectual environment false scientific theories, paradigms, strategies that affect its public administration towards weakening defence-important national potentials (Rusrand, 2014). The introduction of a false theory leads to wrong management practices and destructive state policies that can affect country's potentials in negative way.

A destructive state policy in modern Russia can be illustrated by the following examples: orientation towards post-industrialism as the general direction of structural policy; inefficiency of the monetization process, application of liberal theory, which led to reduction of state regulation of socio-economic processes and excessive openness of the national economy. These concepts and ideas were brought to Russian state practice from the outside. In particular, they were recommended by the International Monetary Fund (the IMF).

Research Material and Methods

The purpose of the study is to generalize and systematize Russian management practice based on false scientific theories.

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The theoretical basis of the research was formed by the conceptual provisions related to various aspects of public administration and presented in the works of Gillis M., Perkins D.H., Roemer M., Snodgrass D.R. (1996), Meier G.M. (1992), Ray D. (1998), Hess P., Ross C. (1997), Singer H. (1964), Skarstein R. (1997).

During the research process, there were used the following research methods for studying complex social objects: analysis, synthesis, comparison, analogy.

Research Results

In December 1990, the International Monetary Fund, the World Bank and the Organization for Economic Co-operation and Development prepared a report with the recommendations to the USSR towards taking a course of transition from a planned economy to a market economy (Rambler News, 2019).

According to George W. Bush's speech delivered in 1992

"… the revolution in these new States is a defining moment in history with profound consequences for America's own national interests. The stakes are as high for us now as any that we have faced in this century. And our adversary for 45 years, the one nation that posed a worldwide threat to freedom and peace, is now seeking to join the community of democratic nations … But if this democratic revolution is defeated, it could plunge us into a world more dangerous in some respects than the dark years of the cold war…"

In April 1992, the British Chancellor of the Exchequer and G-7 finance minister Norman Lamont raised the similar idea, 'If we miss this opportunity, then everyone will regret it later. The reform process in Russia must be made irreversible.'

The IMF proclaimed the end of the 'cold war' between East and West and the formation of a 'new partnership'. Russia became a member of the IMF on June 1, 1992. In 1992-1999, the IMF in total directed USD 22 billion to support economic reforms in Russia. The granting of loans was accompanied by the setting of conditions for the liberalization of the Russian economy. It was developed the Washington Consensus, an economic stabilization program and a radical structural reform. The Washington Consensus assumed privatization of public enterprises, introduction of market pricing, liberalization of foreign economic activity (requirements to eliminate export taxes on gas and oil; to abandon mandatory pre-customs examination of exported goods; to reduce import taxes), free convertibility of currencies, liberalization of international capital flows, and removal of currency restrictions, radical land and agricultural reforms. Information transparency became a prerequisite for Russia's admission as a member into the IMF (the IMF was provided with information about the Russian economy, its balance of payments, gold and foreign exchange reserves, etc.) (Smyslov, 2010).

The following foreign advisers played an active role in practical implementation of the economic policy developed by the IMF in Russia: A. Aslund, L. Balcerowicz, M. Dabrowski, J. Sachs., etc. Whenever Russia failed to fulfill the requirements, the IMF blocked the next tranche. The implementation of the Washington Consensus's prescriptions led to disastrous consequences, comparable to the consequences of the revolution and the civil war. The GDP in 1922 relative to 1913 was 57%, and then in 1998 its level was only 60% of the 1991 level. Even during the Great Patriotic War, the economy of the RSFSR grew at an average rate of 4.7% due to the relocation of industry beyond the Urals and the construction of new enterprises. During the Great Depression, the USSR demonstrated fantastic growth rates of 13-14%. In 1998, the production decline amounted to 46% of the 1990 level (Odintsov, 2017).

If starting from 1990 the average GDP growth rates had remained at 3%, the GDP would have reached USD 1625 billion by 2015 (its actual value for this period is USD 1176 billion). Thus, the total loss of GDP (we are talking about underproduction of GDP) is about USD 10.5 billion. I.

Lavrovsky gives a similar estimate of the damage – USD 8-10 billion. It was established about 43,320 enterprises during the Soviet epoch from 1922 to 1984, and about 30,000 were closed at the Yeltsin Era (Odintsov, 2017).

A theory of postindustrial society surfaced in the 1960s under the impact of development of post-industrial spheres of activity (Minakova, 2019). However, despite the emergence of postindustrial theory, in the United States, unlike in Russia, the growth of industrial production continued. The fact is that developed countries have moved their production to the territory of developing countries. This opened up the opportunity to freely use a low-cost labor and resources of developing countries, thus reducing production costs. However, in general, the material production of developed countries, redistributed throughout the world, not only did not decrease, but increased. It is the level of industrial development that largely determines the potential of the economy, the efficiency of using natural, material and labor resources.

It is no coincidence that, according to statistics, the countries with the largest GDP are at the same time the leading industrial powers (Table 1) (Visasam, 2020).

Table 1: Industrial production in 2016-2019

Industrial Production in 2016 (USD, million)		Industrial Production in 2017 (USD, million)		Industrial Production in 2019 (USD, million)	
China	8057	China	8414	China	8414
Taiwan	402	Taiwan	411	Taiwan	411
Hong Kong	30	Hong Kong	30	Hong Kong	30
the EU	4718	the EU	4873	the EU	4873
the USA	3500	the USA	3601	the USA	3601
India	2375	India	2590	India	2590
Japan	1332	Japan	1356	Japan	1356
Russia	1214	Russia	1250	Russia	1250
Indonesia	1176	Indonesia	1221	Indonesia	1221
Germany	1173	Germany	1210	Germany	1210
Saudi Arabia	777	Saudi Arabia	796	Saudi Arabia	796
Brazil	761	Brazil	757	Brazil	733

In terms of industrial production, China is an undisputed leader, its industry accounts for more than 40% of the modern economy. China's share in global ship production is 45%, mobile phones – 71%, footwear – 63%, personal computers – 91%, air conditioners – 80%, energy-saving lamps – 80% (Visasam, 2020). As for Russia, there has been a decline in industrial production. Moreover, in the 1990s some liberal-minded representatives of economy related ministerial offices stated the absence of necessity for industrial policy at all for a market economy. In particular, according to A.B. Chubais, a First Deputy Prime Minister of the Russian government (in his interview to 'Expert' magazine in August 1997), noted that 'we are not rich enough to have an industrial policy' (Viperson, 2003).

As a result, in 1999 Russia's industrial production index in comparison with 1991 decreased by almost two times (by 48%). In 1992-1999, the average decline was about 7% per year (Newsruss, 2000).

Inefficiency of the monetization process

Inefficiency of monetization of the economy has become a consequence of monetary policy of Russia. Material production must be provided with financial support. All other things being equal, the higher the level of monetization, the higher the rate of economic growth (Mirkin, 2011). In the Russian economy, the monetization coefficient is much lower than in developed and dynamically

developing countries (Japan – 1,184.87%, China – 198.04%, France – 91.96%, Germany – 89.06%, Russia – 43.22%) (Kravchenko, 2020).

In Russia, the demonetization of the domestic economy is carried out in order to suppress inflation. However, this statement is true only in relation to monetary inflation, which is impossible in Russia due to not having enough money in circulation. Unlike developed countries, where the money supply is excessive, Russia needs a remonetization of the economy, which would stimulate economic development.

The theory of radical liberalism, promoting reduction of state's share and excessive openness of the economy. To measure state participation in the regulatory processes of socio-economic system, the indicator of government spending as a share of GDP can be used (Fig. 1) (Kravchenko, 2020). At the same time, government spending becomes the main source of investment and stimulation of business activity. It has a special importance during the economic slowdown, when government spending serves as a lever for stimulating development.

In addition, countries with a high government spending as a share of GDP actively provide financial assistance to the social and cultural sector, environmental activities.

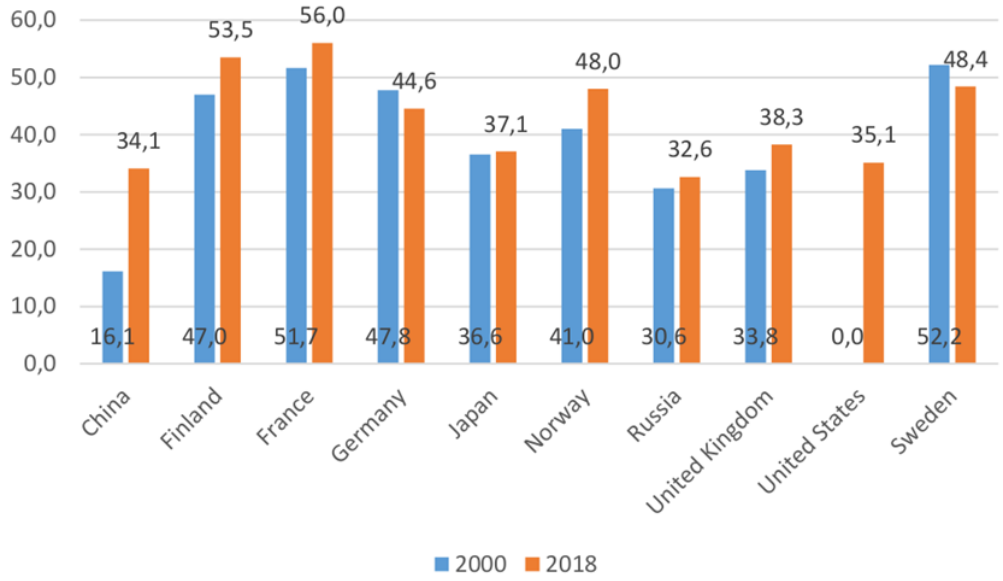

Fig. 1: Government spending as a share of GDP, %

There is a correlation between life expectancy and government spending as a share of GDP.

High life expectancy has been registered in countries with a high government spending on health care, development and implementation of population health programs.

Government spending has a direct impact on the state's human resources: with a share of government spending in GDP of 50-55%, the human development index reaches 0.82, with a share of government spending in GDP of 30-35%, the human development index does not exceed 0.59 (Sulakshin and Kravchenko, 2016). Countries with a high government spending provide their citizens with the best living conditions: standard of living, education, health care, law enforcement, recreation, etc. Given the fact that long-term economic growth and human capital have a strong correlation, cuts in public expenditure are unacceptable.

As for the excessive openness of the economy, it has increased the dependence of the modern Russian economy on exports, determined, first of all, by the sale of oil and gas. So, in 2019, mineral

products accounted for 53% of all Russian exports (Ru-Stat, 2020). Such a pronounced monospecialization of Russian exports leads to dependence on the global situation in the hydrocarbon market.

Conclusion

The results of introduction such wrong management practices as orientation towards post-industrialism, inefficiency of the monetization process, application of liberal theory have led to a significant lag of Russia from the leading countries in terms of GDP. Long before the emergence of neoliberalism as an economic school in 1944, K. Polanyi warned about the possible catastrophic consequences of the dogmas of market fundamentalism

"… to allow the market mechanism to be sole director of the fate of human beings and their natural environment, indeed even of the amount and use of purchasing power, would result in the demolition of society."

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Evolution of Federal Transportation Policy and Finance in the USA in the Twentieth Century

Yulia LEONTYEVA

Ural Federal University, Ekaterinburg, Russian Federation
E-mail: uv.leonteva@mail.ru

Igor MAYBUROV

Ural Federal University, Ekaterinburg, Russian Federation
E-mail: mayburov.home@gmail.com

Abstract

This research, especially on the financial aspects, will be of particular interest in Russia, which, half a century after the USA, has faced the need to develop a rational transport policy, including the choice of adequate fiscal instruments for its implementation. The aim of this article is to trace the history of American twentieth-century transportation policy-making and financing. This study relies on methods of historical research and logical analysis. The general trend that determined the US transport policy in the twentieth century - the primacy of the automobile - remained more or less stable throughout the given period. However, the creation of a trust fund for more efficient and better targeted financing of road construction can definitely be regarded as a positive experience to learn from. Throughout the twentieth century, in their choice of priorities, American policy-makers almost always focused on the car as the dominant mode of travel. The priority goal of the transport policy was to provide traffic congestion relief. Unsurprisingly, this problem was addressed through heavy investment in road space expansion. To summarize the above analysis, we can point out the following three periods: 1920-1960s – Mass automobilization, conditions highly conducive to car use; 1960-1990s – Growing car dependence, suburban sprawl, conditions conducive to car use; 1990s – Development of multi-modal transportation, growing constraints on car use.

Keywords: Transport Policy, Transport Taxes, Trust Fund, Conducive to Car Use.

Introduction

The US was the first to encounter the challenges of mass automobilization, therefore, the development of its transport policy can greatly contribute to our understanding of state management of the transport sphere (Mayburov, 2017). This research, especially on the financial aspects, will be of particular interest in Russia (Mayburov, 2016), which, half a century after the USA, has faced the need to develop a rational transport policy, including the choice of adequate fiscal instruments for its implementation.

The car has become synonymous with American lifestyle and throughout the twentieth century the country's transportation policy was predominantly oriented towards car ownership (Congress, 1994). In short, its main priority was to ensure self-sufficiency of citizens and businesses in fulfilling their transportation needs. This, however, resulted in the population's growing car dependency while mass transit was deemed of secondary importance (Lyle, 1964). In this light, public transport came to be seen as an obligatory social service for low-income and vulnerable categories of citizens, socially useful but able to be kept fully self-sustaining through passenger fare revenues.

To gain a more in-depth understanding of the US transport policy and its fiscal instruments, we need to look at it in historical perspective. Historical analysis will bring to light the factors behind Americans' attachment to private car ownership and the far-reaching implications of this situation.

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The aim of this article is to trace the history of American twentieth-century transportation policy-making and financing.

Our hypothesis is that the system of transport taxes in the USA evolved for a long time as a part of the general transportation policy.

Literature Review

There is a vast body of research on US transport policies. Most of these studies adopt the urbanist perspective on this problem. Those written in the first half of the twentieth century emphasized the advantages of mass automobilization and road expansion, although some of them also brought to light the problems associated with these trends and ways of counteracting their negative effects (Leontyeva, 2016).

The network of interstate highways connected the major metropolitan areas and made the country's territory better suited for automobiles, which soon started to be perceived as the only means of transport. This process also contributed to the deterioration of downtown areas and had a detrimental impact on the human character of the city (Vuchic, 1999).

It should be noted that the above-described negative effects resulted from the simplified approach to transport planning: highway engineers gave priority to cars and failed to recognize the growing significance of public transport in city life during the period of mass automobilization. This approach was based on the famous methodology developed by Wilbur Smith (1961), who helped design and build major parts of the Interstate Highway System. He argued that construction of interstates would guarantee a stable flow of positive effects and would have virtually no negative effects. All the parameters used in planning road infrastructure (number of lanes, capacity of parking lots, etc) were set through simple extrapolation in proportion to the ever-increasing car traffic. Laying bus routes along overhead roads was deemed infeasible because in the general traffic flow the bus could not compete with the car in virtually all of the parameters. According to Wilbur Smith, the only mode of public transport that could compete with the car was the metro or the underground railway system, which was planned and designed separately.

Only in the 1990s did the expert community become aware of the drawbacks of this simplified approach (and others similar to it). Anthony Downs, an expert from Brookings Institution, pointed out that in the USA, most transport experts were more interested in the benefits of further development of high-speed road networks in agglomerations rather than their disadvantages. The main accent in these studies was placed on predicting the growing traffic volume of motor vehicles. Mass transit was considered as rudimentary, as something that should be excluded from the general volume of transport work within the highway construction projects. Unsurprisingly, in this kind of planning, little attention was paid to the relative efficiency of alternative transport modes (Downs, 1992).

Moreover, some studies (Rendell, 1994; Burchell, 1999) pointed out the following repercussions of the policies adapting cities to car travel: downtown areas ceased to attract investment and there was an outflux of more affluent residents to the suburbs. As middle-class urbanites moved to the periphery, they were followed by businesses and trade centres. As a result, the value of the property in city centres fell dramatically. In contrast to wealthy suburbs, downtown areas started drawing poor, vulnerable and marginalized groups, which led to increased crime and disorder and deterioration in the quality of health care and school education (Cisneros, 1993). Consequently, downtown areas lost some of their tourist attraction.

It should be noted that the fiscal policy played an important role in the urban sprawl process. For a long time, owners of single family housing were entitled to a variety of tax credits and reliefs: they could deduct mortgage interest and property tax payments as well as certain other expenses from their federal income tax (Pucher, 1994).

Another group of noteworthy studies deal with the technological initiatives aimed at alleviating the problem of congestions. Since 1990, the US government has been spending massive funds (in total 40 billion dollars over a 20-year period) on the program 'Intelligent Transportation Systems' (ITS). One of the key figures behind ITS research and deployment was D. Gazis (1972). The purpose of this program is to increase the awareness of road traffic participants and improve the efficiency and safety of the whole traffic system with the help of information and communications technologies. Despite the obvious benefits of this program, it still tends to prioritize private vehicles since what it increases the traffic capacity of the road network, which leads to an increase in the total car traffic. At least these are the outcomes of the ITS program described by American researcher Harmut H. Topp (1995). In his critical review, he showed that the solution to major transport problems lies not in the sphere of high technologies as many hope but in the creation of intermodal public transport systems.

Methodology

This study relies on methods of historical research and logical analysis. We studied the evolution of transportation-related taxes in the US, described the key trends in the development of the US transport policy and drew general conclusions about the transformations in the funding of this policy.

In this paper we are not going to look into the specifics of transport financing in individual states but will consider the national trends in the transport policy throughout the twentieth century. Our study is based on the analysis of the relevant research literature and US legislation.

Results

Development of the US federal transportation policy

In the US, the rise of automobile ownership and production started in the 1920s: while in 1920 there were 33 vehicles per 100 households, in 1930, this figure grew to 77. By 1955, there was one vehicle per household. The Report of The Federal Electric Railways Commission compiled by Delos Franklin Wilcox dealt with the reasons behind the crisis in the transportation sector and stated that in the period of mass automobilization in the 1920s and 1930s, authorities on all levels concentrated on creating policies and patterns which favoured car use over other transport modes. The provision of public transportation was at the same time passed to private hands.

After World War II, the US transport policy became even more focused on road construction.

The Highway Trust Fund (HTF) was established in 1956 and served as a source of funding for the National System of Interstate and Defense Highways consisting of a federal grid network of one-way freeways. Although in the beginning the HTF was not supposed to provide financing for public transportation, the situation changed in 1970, after the Urban Mass Transportation Act was adopted. Another significant event happened in 1966, when the first freeway revolts occurred in major urban agglomerations as people became aware of the disastrous effect that the transport policy was having on their local neighborhoods.

Faced with the public protest, the government had to adjust the plans for constructing new highways in cities like San-Francisco, Boston, Philadelphia, and Washington and to make freeways bypass these agglomerations rather than cut through them. Moreover, the federal government recommenced financial support for public transportation projects. In the 1980s, Ronald Reagan cut the public transit budget significantly and all the revenues from the Fund were again allocated or road construction.

A dramatic shift in favour of intermodal surface transportation systems happened in the 1990s (Intermodal Surface Transportation Efficiency Act of 1991 – ISTEA. Public Law 102-240). The HTF provided regular funding for road construction projects on a cumulative total basis while public transportation systems had been starved for funding until the 1990s - these projects received funding only occasionally, in certain time intervals.

It should be noted that as a result of the fundamental change in the sentiments of the American elite in the 1990s, public transport started to be given more consideration. The Intermodal Surface Transportation Efficiency Act of 1991 (Public Law 102-240) and the Transportation Equity Act for the 21st Century adopted in 1998 (Public Law 105-178) were the two key laws, which reflected a serious shift in experts' and public opinion in favour of mass transit and in particular intermodal transport systems (Vuchic, 1999).

Development of Financing Mechanisms for The Transportation Policy

The mechanisms for financing road construction were established by the two related laws adopted in 1956: The Federal-Aid Highway Act and the National Interstate and Defense Highways Act. The Federal-Aid Highway Act authorized the construction of a 66,000 km-long network of interstate and defense highways and, to begin with, allocated 25 billion dollars from the funds of the Ministry of Defense. These funds were directed to the Highway Trust Fund (HTF), established by the second law. The Fund drew on the following key sources of revenue: the federal excise tax on gasoline (since 1993, it has been 18.4 cents per gallon on gasoline (4.86 cents/litre) and 24.4 cents per gallon for diesel fuel (6.45 cents/litres) along with taxes on tires and heavy highway trucks. Highway construction was financed according to the 90:10 federal-aid formula, where 90% came from the HTF and the states contributed only 10% of the total cost of road construction on their territories.

State fuel taxes were not abolished and continued to be used as a source of revenue for respective states. The average fuel tax rate for all American states is 31.04 cents per gallon of gasoline and 31.01 cents per gallon of diesel fuel. By and large, the federal and local fuel taxes turned out to be acceptable for car owners (13 cents per litre) and did not have a significant impact on the car usage decision.

The HTF proved to be a steady and predictable institutional structure, existing for more than a half of a century without any significant change. In 1982, within the HTF, two separate accounts were established – one for funding road construction and other surface transportation projects and the other, 'Mass Transit Account', for supporting public transportation (this account has a fixed source of revenue - 1 cent per gallon from the gas tax).

The system of trust funding of road construction led American car owners to perceive highways as a common good, maintained and developed exclusively at the expense of car owners themselves. This resulted in utter rejection of any other kinds of fiscal instruments which were seen as limiting access to this good.

The Interstate Highway System was declared complete in 1992 (the initial goal was to build the highway network in 10 years). The System comprises 77.5 thousand kilometers of road. With the initial cost of the project being 25 billion dollars, the final cost of the project was estimated as 114 billion (in the prices of 2018, 521 billion dollars). One of the reasons why the construction of interstates became so costly was the faulty (from the modern point of view) design choices made back then as highways cut through central cities instead of bypassing them. As a result, 20% of the network cut directly through the core of virtually every big city, which entailed further costs such as the costs of buying out urban land, construction of interchanges, and having to reconstruct the cities' central parts (the most illustrative in this respect are the examples of Seattle, Hartford and Huston). In many cases these changes were initiated by states and municipalities themselves, which were eager to reconstruct the downtown areas in their cities at the federal expense.

After the main network was officially completed in 1992, the project was continued and plans were made to widen lanes, expand and reconstruct the existing network. Most interstates remain toll-free (car owners pay for the use of the roads by contributing via the gas tax). The exception is a small share of toll roads (about 4.700 thousand km, or only 6% of the total network), which had been built prior to 1956 and were incorporated into the network in the late 1950s.

Parking pricing appeared when the first meter was installed in 1935 and underwent significant transformations throughout its history. It gradually transitioned from subsidized parking (the costs of

parking were covered by the territorial community, employer, seller, etc) to the system of parking fees paid by car owners themselves. Paid on-street parking was first introduced in downtown areas in the 1960s, which decreased the number of car trips to the centre of the city since the number of parking places was considerably lower than the demand for them and the price elasticity of demand was high (it was -0.52 for trips to work and -0.62 for other trips) (Lehner, 2019).

The disproportion between supply and demand led municipal authorities to increase the number of parking spaces. Eventually, municipal authorities in many American cities started to enhance the paid parking capacity of the downtown areas by building comfortable multi-level parking facilities. In the majority of large cities this caused a delayed negative effect as the car traffic to the centre increased. This happened because large parking lots created stable behavioral patterns as people started to associate car trips to the city centre with easy parking.

To sum up, the evolution of the US transport policy went hand in hand with the growth in car ownership although in different periods the transport and infrastructure system was to a greater or lesser extent conducive to the use of private vehicles. To summarize the above analysis, we can point out the following three periods/

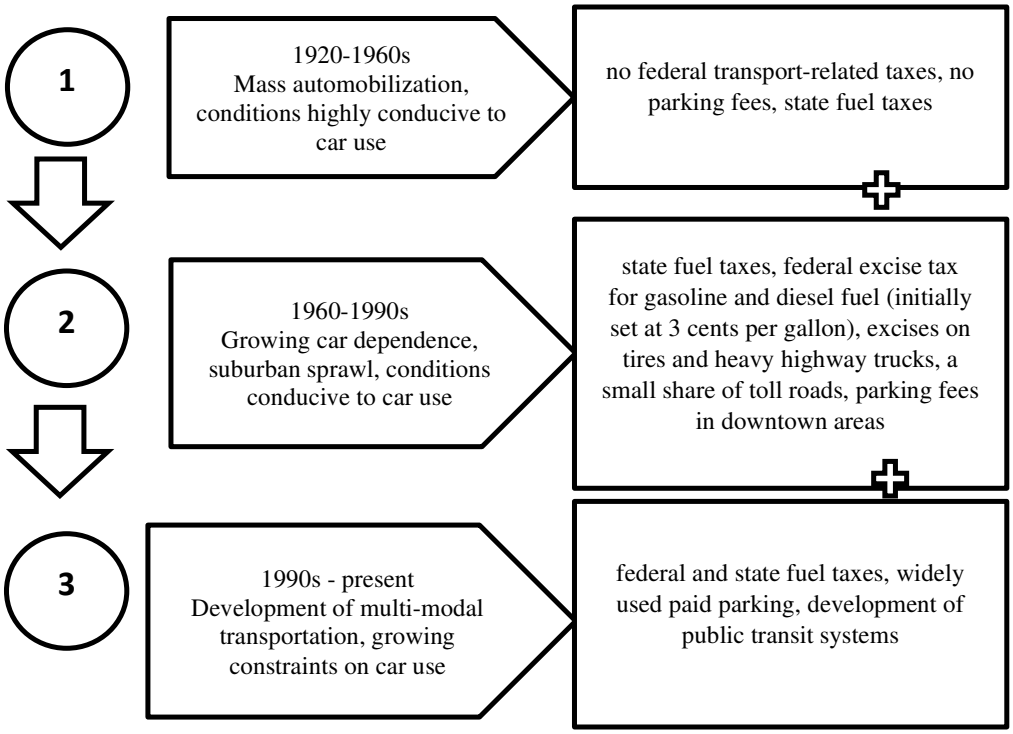

Figure: Development of the transport system and financing in the USA

The general trend that determined the US transport policy in the twentieth century - the primacy of the automobile - remained more or less stable throughout the given period. However, the creation of a trust fund for more efficient and better targeted financing of road construction can definitely be regarded as a positive experience to learn from.

Conclusion

Throughout the twentieth century, in their choice of priorities, American policy-makers almost always focused on the car as the dominant mode of travel. The priority goal of the transport policy was to

provide traffic congestion relief. Unsurprisingly, this problem was addressed through heavy investment in road space expansion. In residential areas with dense housing such expansion inevitably led to changes in the structure of urban land use. Expanding freeways threatened the urban spaces meant for other purposes, primarily, for recreation (boulevards, parks and other green spaces). Downtown areas were drowning in car storage as garages and multi-level parking lots sprouted across the cities, arterial highways sliced through the middle of the cities, accompanied by multi-level junctions and roundabouts. The number of cars grew together with the increasing traffic capacity of the highway network. The construction of urban freeways spurred suburbization as more affluent urbanites fled to the suburbs, which also changed the cities' business and cultural landscape. The relocation of economic, cultural and social activity from the historical centre to the periphery further intensified the processes of suburban low-rise sprawl.

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Consumer Attitudes Towards the Causes of Food Waste in Poland

Urszula SAMOTYJA
Poznań University of Economics and Business, Poznań, Poland
urszula.samotyja@ue.poznan.pl

Magdalena ANKIEL
Poznań University of Economics and Business, Poznań, Poland
magdalena.ankiel@ue.poznan.pl

Abstract

Consumers attitudes toward food waste, which is an emerging challenge around the world, are affected by several factors and mechanisms. Recognizing them is key in order to implement effective preventive actions. The main aim of the study was identification, analysis and evaluation of consumer behavior on the food market in the context of wastage in households in Poland. The research method used was a direct individual questionnaire interview. The surveyed population constituted of consumers purchasing food products (N = 1145). The main cause of food waste (51%) is shopping without proper planning, which causes consumers to buy too many food products that are not consumed by the expiry date. The perception of excessive needs is also pointed out as a significant cause of food waste during shopping (37%). Moreover, consumers say that food waste is favorable when there is so-called 'buying just in case', which also leads to an excessive amount of food in households that is ultimately not consumed (23%). In the opinion of consumers in Poland, buying large packages of products also contributes to throwing away food (due to the unavailability of smaller packages or the economic benefits resulting from large capacity, 22%). The phenomenon of food waste (due to non-consumption) is obvious and acceptable to 11.2% of the Polish consumers. This study was supported by the National Science Centre (Narodowe Centrum Nauki), Poland [grant number 2017/27/B/HS4/00805].

Keywords: Consumer Behavior; Purchase Decisions; Food Waste; Decision making; Consumer attitudes; Sustainability; Malnutrition

Introduction

According to the Goal 12.3 of the Sustainable Development Goals (SDG) halving per capita global food waste at retail and consumer levels by 2030, and reduce food losses along production and supply chains, is an emerging challenge for the forthcoming decade (United Nations, 2015). The reason for this call as well as for other several interventions undertaken is the alarming data about the scale of food wasted around the world (FAO, 2019; Kim et al., 2019; Schanes et al., 2018; Parfitt et al., 2010).

Food waste at consumer level is affected by several factors and mechanisms (Schanes et al., 2018). In comprehensive literature review, Principato (2018) presented 'the household food waste journey' of which every phase including planning, provisioning, storing, preparing, consuming, and disposal is affected by psychological, social, situational, and demographic and socio-economic factors which influence wasteful behaviours. Gaiani et al. (2018) on the basis of a survey performed in Italy identified and described seven consumers' profiles related to food waste behaviour: (1) the conscious-fussy type, who wastes because food doesn't smell or look good; (2) the conscious-forgetful type, who forgets what is in the fridge or on the shelves; (3) the frugal consumer who tends not to consume fruits and vegetables and declares to waste nothing or almost nothing; (4) the exaggerated cook, who overbuys and overcooks, (5) the unskilled cook, (6) the confused type and (7) the exaggerated shopper. The study revealed that food waste is a complex and multi-faceted issue.

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Wansink (2018) specified three distinct stages in which food is wasted by consumers: after purchasing (food was bought and never used), after preparation (food was prepared but never served) and after serving (food was served but never consumed). Consumers' practices and routines play a significant role in the wasting process. According to Bilska et al. (2020), arranging products in a refrigerator or cabinet in such a way so that products with closest expiry date are placed closest to the door is not commonly practiced in Polish households. One quarter of Italian consumers admitted that they make errors at the shopping planning stage. Moreover, 48% and 42% pointed to expiration and spoilage as a cause of food waste; 37% reported that food was in the fridge or cupboard for too long; some of them reported a lack of sensory attractiveness as a reason for discarding food (Gaiani et al., 2018). In the McCarthy and Liu study (2017), 34.4% and 19.9% of respondents discarded food because it has passed the 'use by' and 'best before' dates. According to Lanfranchi et al. (2016), the main reasons for food waste in Italy were leaving food out for too long (23%) and buying or preparing excessive amounts according to the needs (23%). Spoilage or expiration was often pointed out as a result of not consumption of food at the proper time (Bilska et al., 2020; Aitsidou et al., 2019; Lanfranchi et al., 2016; Quested, Ingle and Parry, 2012). Excessive safety concerns, uncertainty about product safety and date labelling or problems with finding or understanding information were also reported (Williams et al., 2020; Wilson et al., 2017).

It was proved that having high intentions to reduce food waste do not go in pair with waste reducing behaviour (Stancu et al., 2016; Visschers et al., 2016). This weak relationship between the intension to reduce food waste and acting upon it was described as the 'attitude-behaviour gap' (Vermeir and Verbeke, 2006). On the other hand, consumers consider throwing away food as improper behaviour which is associated with feeling guilty and uncomfortable (Waitt and Philips, 2016; Graham-Rowe et al., 2014; Radzymińska et al., 2016). It is probably because of this reason that they tend to provide underestimated values when asked to self-assess the extent of food waste in households (Falasconi et al., 2019). In In a study of Gaiani et al. (2018), 90% of respondents reported that they consider food waste a serious issue and would like to be more informed about its consequences, whereas 78% affirmed that they are worried about food waste. Nearly 58% of them would discard smaller amounts of food if they were charged a fee for wasted food, 35% – if they were informed about the monetary value of wasted food, 26% and 20% – if they were informed about the environmental and social impact (respectively). Reynolds et al. (2019) found that the majority of current interventions achieve only a 5–20% reduction in food waste. There is a need to gain more knowledge about the drivers of food waste at the consumer level. Recognising consumer attitudes is necessary in order to implement effective actions and best practices (Caldeira et al., 2019).

The main aim of the study was identification, analysis and evaluation of consumer behavior on the food market in the context of wastage in households in Poland. The specific research objectives concerned the behavior and attitudes of consumers with regard to the problem of food waste in households, in particular:

- identification and assessment of consumer attitudes in Poland towards the causes of the problem of food waste in households;
- identification and analysis of the relationship between consumers' attitudes towards the causes of the problem of food waste and segmentation variables such as gender, education, income level and the number of people in the household;
- analysis of the relationship between consumer attitudes towards the problem of food waste and the frequency of throwing it away in households in Poland.

The results of the study are part of an advanced research project on food waste in households and a continuation of publications in this thematic scope (Ankiel and Samotyja, 2020; Ankiel and Samotyja, *accepted paper*).

Materials and Methods

The empirical research on consumer behavior in the context of food waste was conducted using the face to face interview method in the period from April to May 2019. The research tool was an

interview questionnaire prepared and verified in piloting. The interview questionnaire contained 20 questions divided thematically into sections related to the determinants of consumer purchasing behavior on the food market in Poland, the perception and consumers' understanding of information on shelf life of food, consumer behavior related to food waste in households, as well as the perception of the health risk of food in the context of its waste in households. In addition, the interview questionnaire contained questions allowing for the identification of respondents in terms of demographic, economic and social characteristics (including sex, age, place of residence, material status, education, number of people in the household, and number of children in the household). Nominal and ordinal scales were used in the questionnaire, including the Likert scale, i.e. a bipolar interval scale, used mainly to measure consumer attitudes. The correctness and reliability of the construction of the questionnaire was verified by the Alpha-Cronbach test (the coefficient α oscillated between 0.7 – 0.9).

The research population was consumers declaring the systematic purchase of food products. The selection of the research sample (N = 1145) was carried out by the quota method (selection criteria: sex, age, and place of residence), which met the demand for maintaining the relative representativeness of the research population. In the process of the empirical data analysis, the IBM SPSS Statistics tool was used, which allowed the analysis of the results of the statistical description. The detailed structure of the research sample was presented in Table 1.

Table 1: Structure of the research sample

Variables		Percentage
Gender	female	45.3
	male	54.7
Age	under 19	2.2
	20 - 29	17.3
	30 - 39	20.0
	40 - 49	13.4
	50 - 59	14.8
	60+	32.4
Material status	definitely above the national average	8.2
	above national average	18.1
	national average	35.5
	below national average	24.8
	definitely below the national average	13.4
Place of residence	traditional village	12.3
	village by the city	7.1
	city up to 20.000	5.2
	city 21.000 – 50.000	4.9
	city 51.000 – 100.000	12.4

Variables		Percentage
	city over 100.000	58.1
Number of household members	1	13.5
	2	32.3
	3	22.2
	4	21.3
	5+	10.7
Number of children in the household	0	3.3
	1	54.3
	2	20.8
	3	15.6
	4+	6.0

Source: own research

Results and Discussion

Food waste is a major economic, ethical and social problem affecting the world community, and has been the subject of numerous social campaigns in recent years, especially in the context of malnutrition and hunger. According to the United Nations Food and Agriculture Organization (FAO), more than 820 million people across the globe are suffering from hunger (Fan et al., 2020). In this context, an interesting research problem is the identification of the frequency of food wastage by consumers in Poland and their attitudes towards the problem of wasting food in households (in particular towards the reasons for throwing away food that has not been consumed). The results of the study are presented in Figure 1.

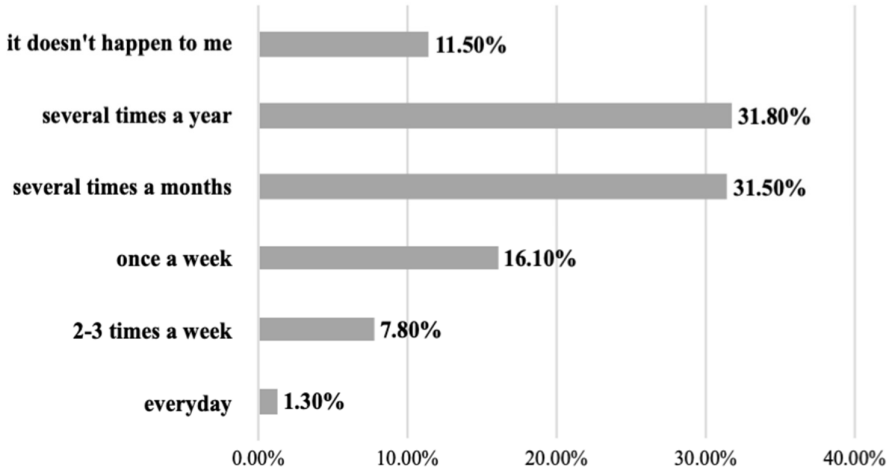

Fig. 1: Frequency of throwing out purchased food in the households

Source: own research

As indicated by the results in Figure 1, the vast majority of consumers surveyed in Poland admit to having thrown out purchased food (88.5%). Only 11.5% of consumers declare that they do not throw out purchased food. A relatively high percentage of the surveyed consumers throw away non-consumed food with high frequency, at least once a week (25.2%, including 1.3% of those who throw food away every day). 31.5% of consumers in Poland waste food several times a month, and 31.8% only a few times a year. Therefore, it can be concluded that the vast majority of consumers Polish households do not consume food by throwing it away, and a quarter of consumers do so very frequently (i.e. at least once a week), which is highly worrying. It can be assumed that consumers who discard food are not able to plan shopping rationally, buy too much food in relation to consumer needs, and also have low awareness of the importance of the food waste problem (Ankiel and Samotyja, 2020). In turn, the reasons for wasting food in households in Poland indicated by the respondents are presented in Table 2.

Table 2: The reasons for wasting food in the opinion of consumers in Poland (%)

Reasons for throwing out food	**Total***	**Women***	**Men***
lack of thought / planning in shopping	51.0	51.1	50.8
we succumb to the illusion of 'excessive needs' when shopping	37.0	37.8	35.8
we buy more just in case	23.3	23.9	22.4
it is normal that some of the purchased products are not used	11.1	10.6	11.6
smaller packages are not available	8.0	7.0	9.3
larger packages seem to be more cost-effective	13.8	13.7	14.0

Source: own research

* values do not add up to 100% due to the possibility of choosing several answer variants

The surveyed consumers in Poland indicate '*lack of thought / planning shopping'* (51.0%) as the main reason for wasting purchased food in households. This means that ½ of consumers in Poland are aware that they do not plan their purchases properly, perhaps they do it under time pressure or impulse (low prices, sales promotions, etc.). The first step to changing habits (in this case leading to excessive, unplanned shopping) is to become aware of the problem, so it can be concluded that a large percentage of consumers are aware of irrational purchasing behavior leading to food waste. The second reason indicated by the respondents for wasting food is '*succumbing to the illusion of excessive needs when shopping'* (37.0%). During shopping (especially in large-format stores, with a self-service form of sales such as hyper, supermarkets or discount stores), buyers are subjected to the influence of various stimuli, such as price reductions, discounts, sensory marketing activities (aromas, colors, light), food products images (or their packaging) that influence their purchasing decisions (often irrational). Impulse buying results in up to 62.0% of supermarket sales and 80.0% of all sales in some categories of consumer products (Luo, 2005). Unplanned shopping increases the chances of impulse buying by 20% (Gaille, 2014). Additionally, research shows that consumers who purchase food under the influence of hunger buy more than they need (de-Magistris and Gracia, 2017). Bushong, King, Camerer, and Rangel (2010) found that the physical presence of an appetite for food items triggered hungry people to be willing to pay more for them. De-Magistris and Gracia (2016) pointed out that hungry participants were willing to pay a higher price premium for products when they predicted being both hungry and satiated in the future. Therefore, a rational approach to

the purchase of food products is particularly important, because – as shown by the results in Table 1 – consumers realize that they are under the delusion of excessive needs, which leads to excessive purchases, which in turn lead to non-consumption of the purchased food, i.e. waste.

Another major cause of food waste is '*buying more food just in case'* (23.3%). Consumers often buy food in bulk (in particular those on the run, under time pressure or consumers who prefer to make larger purchases less frequently); additionally they buy it in case of unexpected circumstances. It turns out, however, that such conduct leads to excessive stocks, failure to consume food within its use-by date and ultimately leads to it being thrown away, and thus wasted. This problem has become extremely common in the time of the global crisis caused by the COVID-19 pandemic. In most countries where COVID-19 cases have started to appear, consumers begin 'panic buying' products, including food products (especially products such as rice, pasta, jarred meals, flour) (Arafat et al., 2020). It can be assumed that if the study were conducted in 2020, the discussed cause of food waste would be indicated by a much larger percentage of the surveyed consumers. '*Buying food in larger packaging, which seems to be most cost-effective',* is another reason indicated by consumers for throwing away purchased food (13.8%). Large food packages (e.g., mayonnaise, ketchup in a 500 ml jar, 2 kg meat, 1 kg cakes) is an increasingly popular shopping option appearing in the portfolio of many food market companies. It should be clearly emphasized that the assumption of large packaging is profitability for consumers – the per 100 g price of a product in large packaging should be lower than the standard size packaging (Coelho do Vale et al., 2008; Ghosh, 2017). Consumers in Poland admit that they do not consume food in large packages in full – only ¼ of consumers declare that they consume the entire product. This is a very alarming phenomenon that leads to food waste (Authors, *accepted paper*).

It is highly disturbing that 11.2% of the surveyed consumers in Poland indicate that '*it is normal that some of the purchased products are not used'*, which means that the phenomenon of food waste (due to non-consumption) is obvious and acceptable to them and taken into account in the purchasing process. Although the percentage of consumers with such views is not high, nevertheless, in light of the malnutrition problem in the world, and also in regards to the implementation of the principles of sustainable development (including minimization of food and packaging waste), this percentage should be minimal. The smallest percentage of consumers in Poland claim that the reason for throwing away the purchased food is due to purchasing it in large packages, but because of an objective reason, namely: *'smaller packages are not available'*. It can be assumed that consumers decide to buy large food packages under the pressure of a strong need (e.g. the product is necessary to prepare a specific dish) and in the absence of a standard or smaller package. Perhaps they are not aware that the remaining food product can be used in a rational way (frozen, given to others) and not thrown away. When analyzing the indicated causes of food wastage depending on gender by consumers in Poland (Table 1), it can be noted that gender does not determine the opinion of consumers – the differences in the percentages of indications are less than 3 percentage points, therefore within the statistical error.

In summary, according to consumers in Poland, the main reason for throwing away, and thus wasting food, is the lack of planning the shopping and – which is related to this – being under the illusion of excessive needs when shopping. Additionally, consumers buy food in bulk, just in case. Thus, it can be concluded that irrational, excessive shopping is the key determinant of food waste by consumers in Poland. The current situation with the COVID-19 pandemic shows that there is no need to stockpile excess food. Unfortunately, from the point of view of both producers and trade intermediaries, striving to maximize the volume of purchases made by consumers is the primary motivator for their actions.

On the other hand, consumers should increase their awareness of the problem of food waste, or more precisely, strive to reduce the throwing away of food they have purchased rather than consumed by sharing food with others, processing or freezing food. Such behavior would reduce the problem of food waste even in the case of excessive shopping. The attitudes of consumers are a big problem, as they a priori recognize that it is normal that some of the purchased food products are not used. The above realizes how important it is to educate consumers, the aim of which would be to make them

aware of the problem of food waste in the world, and thus convince them that the priority should be consuming the purchased food in its entirety, and if that is impossible, implementing the principles of the sharing economy, i.e. giving food to others (friends, family).

In the context of identifying, analyzing and assessing consumer attitudes in Poland towards the causes of food waste, an interesting issue is their analysis in relation to the frequency of discarding non-consumed food. The results are presented in Table 3.

When analyzing the results included in Table 2, it can be noticed that:

- in the segment of consumers who agree that *''lack of thought/planning in shopping'* contributes to food waste in households, 56.6% discard non-consumed food with high frequency (daily, 2-3 times a week, once a week and several times per month) and 43.4% only throw away food a few times a year or not at all;
- in the segment of consumers who agree that *'we succumb to the illusion of 'excessive needs' when shopping'*, which contributes to food waste, 59.0% discard food very frequently, and 41.0% only throw it away a few times a year or not at all;

Table 3: The reasons for wasting food in the opinion of consumers in Poland, and frequency of throwing out food (%)

Reasons for throwing out food	**Frequency of throwing out food**					
	everyday	2-3 times a week	once a week	several times a month	several times a year	it doesn't happen
lack of thought / planning in shopping	1.4	7.7	15.1	32.4	31.2	12.2
	56.6				43.4	
we succumb to the illusion of 'excessive needs' when shopping	1.2	8.5	18.1	31.2	31.3	9.7
	59.0				41.0	
we buy more just in case	1.5	9.2	16.1	34.1	30.7	8.4
	60.9				39.1	
it is normal that some of the purchased products are not used	4.0	7.3	16.9	37.9	29.0	4.9
	66.1				33.9	
smaller packages are not available	0.0	6.8	11.4	30.7	38.6	12.5
	48.9				51.1	
larger packages seem to be more cost-effective	1.3	7.2	18.3	30.7	30.1	12.4
	57.5				42.5	

Source: own research

- among consumers who say that we *'buy more just in case'*, which contributes to food waste in households in Poland, 60.9% discard food frequently, and 39.1% do not throw away food at all or only a few times a year;

- in the consumer segment, according to whom 'it is normal that some of the purchased products are not used', as many as 66.1% of consumers throw away food very often / frequently, and only 33.9% throw it away several times a year or not at all;
- in the group of consumers who agree with the statement that *'smaller packages are not available'* (so they buy larger ones without consuming the whole product), less than half (48.9%) discard food very frequently, and 51.1% don't do it at all or only a few times a year;
- in the segment of consumers who agree that *'larger packages seem to be more cost-effective'* (so we buy them without consuming the entire product), 57.5% throw away food every day, 2-3 times a week, once a week or several times a month, and 42.5% only throw food a few times a year or not at all.

In conclusion, the largest percentage of consumers discarding non-consumed food is in the group that agrees that it is normal that the entire product is not used (66.1%). This is highly disturbing; meaning that this segment of consumers is unaware of the importance of food waste and malnutrition / hunger in the world. This segment requires education in terms of both increasing the awareness of the problem of food waste and changing consumption habits in households. On the other hand, the least often (or not at all) are consumers in the segment agreeing to the opinion that sometimes large packages are bought because smaller ones are not available – as many as 12.5% of consumers in this segment do not throw away food at all, and 38.6% only a few times a year. Interestingly, and at the same time definitely worth following – in the analyzed segment, none of the consumers throw away food every day.

Conclusions and Recommendations

The results of the study on consumer attitudes, opinions and awareness about the causes of food waste in households in Poland allowed us to draw many interesting conclusions, as well as formulate important recommendations. Half of polish consumers are of the opinion that the main cause of food waste is shopping without proper planning, which causes consumers to buy too many food products (in relation to both the types of products and the quantity of individual products) that are not consumed by the expiry date. According to consumers, the perception of excessive needs is also a significant cause of food waste during shopping (especially in self-service stores), which is actually related to the lack of proper shopping planning. Consequently, household consumers possess excessive amounts of food that they do not consume but throw away, generating waste. In addition, consumers say that food waste is favorable when there is so-called 'buying just in case', which also leads to an excessive amount of food in households that is ultimately not consumed. In the opinion of consumers in Poland, buying large packages of products also contributes to throwing away food (due to the unavailability of smaller packages or the economic benefits resulting from large capacity).

When analyzing the views of consumers on the causes of food wastage in households in Poland, the most disturbing fact is that about 11% of respondents admit that it is normal not to use all of the purchased food products, and therefore it is normal to waste this food. While in the case of poorly planned purchases or purchasing larger packages, it can be assumed that the excessive amount of food (which will not be consumed) results from unintended, unplanned, often impulse actions of the consumer. The attitude which assumes that not consuming some of the products is the norm is alarming. In view of the above, it is very important to take actions aimed at individual consumers in Poland, which, on the one hand, would increase their awareness of the problem of food waste, and on the other hand, would affect the purchasing habits (more rational, well-planned purchases) and consumption habits (not throwing away the purchased food – consumption in time / issuing to others).

As far as the causes of food waste are concerned, an interesting conclusion is that education significantly determines the attitudes and opinions of consumers. Consumers with lower education more often agree with the statements that the reason for throwing away food is to buy it in large packages and to buy larger amounts 'just in case'. On the other hand, consumers with the highest level of education agree to a greater extent with the statement that wasting food in Poland results from the lack of planning of purchases and succumbing to the illusion of excessive needs when

shopping. Thus, presumably, the least educated consumers may waste food, despite being guided by economic determinants of purchase (large, more profitable packaging); educated consumers, on the other hand, are not always driven by economic determinants, but they can waste food by making irrational, impulse purchasing decisions. Similar conclusions can be drawn by analyzing the attitudes of consumers towards the problem of food waste and the level of their income. As it turns out, consumers in the poorest households most agree with the statement that large packages appear more affordable (and unfortunately for this reason, non-consumed food is thrown away); in turn, consumers from the richest households support this view the least. Therefore, it can be assumed that the least educated, the poorest consumers waste food without really planning, guided by economic reasons. On the other hand, the most educated, well-off consumers in Poland waste food by making rash purchasing decisions. When analyzing the relationship between the size of a household and consumers' views on the causes of food waste in Poland, no clear, obvious relationships are noticed (only the most numerous households are partially distinguished by clearer attitudes towards the causes of the problem in question). On the other hand, when analyzing the attitudes of consumers towards the causes of food waste in relation to the frequency of throwing it away in households, it can be concluded that the largest percentage of consumers throwing away non-consumed food are those who agree with the statement that it is normal that the entire product is not used. As already stated, the above means that this segment of consumers is not aware of the importance of the problem of food waste in Poland and in the world.

In view of the above conclusions, it is worth formulating a few recommendations for consumers in Poland in the field of food waste. First of all, education is of key importance and should reach the consumer through various available communication channels (television, press, Internet, education in educational institutions, education through play in kindergartens) and make consumers aware of the importance of this problem. Additionally – points of sale should conduct information campaigns with the help of banners, displays, leaflets communicating the proper handling of the product, so as not to let it expire (which will involve the necessity to throw it away). In addition, manufacturers could use food packaging to convey content that increases consumer awareness of food waste. Social media are currently one of the key communication channels, so they should be used as sources of information on both the problem of food waste itself, but also ways of reducing this phenomenon (e.g. making rational purchasing decisions and proper handling of food in households so that the products do not expire, and ultimately are consumed).

The conducted research may be a starting point for further, in-depth research of households in Poland (e.g. ethnographic research), which would show not only consumer declarations, but also actual behaviors contributing to increasing or reducing the problem of food waste in relation to various product categories.

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Long and Short Shelf Life Foods in Consumer Purchasing Decisions – The Case of Poland

Urszula SAMOTYJA
Poznań University of Economics and Business, Poznań, Poland
urszula.samotyja@ue.poznan.pl

Magdalena ANKIEL
Poznań University of Economics and Business, Poznań, Poland
magdalena.ankiel@ue.poznan.pl

Abstract

Identifying consumer behavior related to the consumption of long and short shelf life foods as well as recognizing consumer preferences regarding purchases of food with different shelf life dates is important for effectively tackling the goals of sustainable development. In the article, the authors presented the results of a study on consumer behavior on the food market in Poland, with particular emphasis on preferences in the purchase of perishable and shelf-stable food with long and short shelf life dates. The research method used was a direct individual questionnaire interview; the surveyed population constituted of consumers purchasing food products (N = 1145). The results of the study indicate that in the case of shelf-stable foods, consumers prefer the ones with a long shelf life, and in the case of fresh food, consumers prefer the ones with a short shelf life. Moreover, consumers in Poland are characterized by a positive attitude towards discounted food with a short shelf life, only if they are convinced that they will manage to consume it on time. The research conclusions are a contribution to the discussion on the relationship between consumer preferences in the studied area and their handling of purchased food with short shelf lives in the context of sustainable development and reducing food waste. This study was supported by the National Science Centre (Narodowe Centrum Nauki), Poland [grant number 2017/27/B/HS4/00805].

Keywords: Consumer Behavior; Purchase Decisions; Food Labelling; Shelf life Labelling; 'Use By' Date; 'Best Before' Date; Food Waste

Introduction

Labeling plays an important role in communicating information about food products along the food chain. Food labels contribute to fair competition on the producers market and are one of the essential mediums through which consumers get knowledge about a food product and its properties. Thus, food labeling enables consumers to make informed choices, helps them formulate opinions or shape preferences, and influences consumer behavior (Bryła, 2020; Latiff et al., 2016; Ankiel-Homa, 2012). Most of the information supplied on food packaging is served on a mandatory basis. These include:

a) information about the identity, composition, mass or volume and other characteristics of the food product,
b) nutritionally relevant information – declaration of energy value and content of nutrients,
c) information related to the protection of consumer health and the safe use of a foodstuff, such as information on substances causing allergies or intolerances, alcohol content, special conditions of storage and use, and shelf life dating (Regulation (EU) No. 1169/2011).

It has been shown that information on shelf life is important for the consumer. The declared shelf life is one of the main functional attributes of food products considered at the stage of purchasing

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decisions (Kumar and Kapoor, 2016; Ababio et al., 2012). The fact that the information occurs becomes the basis for building the trust of the buyer towards the product and the producer. The results obtained in the study of Djekic and Smigic (2016) show that the shelf life of products is the most important information on labels for Serbian consumers. The same observation was made in relation to Polish consumers (Olejniczak et al., 2016).

According to art. 2 Regulation of the European Parliament and of the Council No. 1169/2011 of 25 October 2011 on the provision of food information to consumers, food placed on the market should be labeled (with some exceptions) with the 'use by' date or the minimum durability date ('best before'). 'Use by' date generally is applied to fresh, perishable, microbiologically unstable products – consuming the product after its expiry date is associated with a health threat for the consumer (Regulation (EU) No. 1169/2011). In turn, the date of minimum durability indicates the date until which the food product retains its properties, provided that it is properly stored. After exceeding this date, the product does not become dangerous to the health of the consumer. In the case of many food products, exceeding the minimum durability date is only associated with quality losses, e.g. deterioration of the smell or texture, while the product is still safe and edible. Some foods are exempt from the need for shelf life labeling; these include fresh fruit and vegetables, vinegar, sugar, salt, and some alcohols.

Several studies proved that date information influences behavior at the point of purchase and consumption. Based on the label, buyers can select proper food products according to their preferences regarding shelf life. On the one hand, consumers prefer fresh and low-processed products, and on the other hand, they are looking for convenient food which can be stored for a long period of time or used under various conditions (Hertz and Halkier, 2017). Consumer preferences differ in this area (Stranieri et al., 2017). The study of Liem et al. (2016) showed cross-cultural differences in how consumers perceive short and long shelf life milk. Australians preferred the taste of pasteurized milk over the taste of UHT milk. This was in opposition to Chinese participants, who preferred the taste of UHT milk over the taste of pasteurized milk. Contradictory, they had a higher liking for any milk that was labeled 'short shelf life milk'.

It was shown that freshness dating determines consumer attitudes toward food which manifests itself in its acceptance or rejection. Based on freshness dates, consumers gain insight on how much time is left before the product's expiration. They are less willing to pay for perishable foods as they approach the end of their shelf lives and the perceived risk of a loss of freshness increases. It was found that consumers sort foodstuffs according to the remaining shelf life, causing the older product to remain on the shelf (Newsome, 2014; Chung and Li (2013). The results show that short shelf life is one of the main causes of food waste in the retail sector because there are problems with the sale of short-dated products resulting in their expiration (Bilska et al., 2018; McCarthy and Liu, 2016; Garrone et al., 2014).

This data is in line with a previous study conducted in Poland, where it was proved that the most common reason milk and milk products were wasted in retail was due to their exceeded shelf life (78% loss). It was found that the length of shelf life is the factor that most differentiates wasted products (kefir, pasteurized milk, buttermilk, cream, yogurt) from those which have a low waste share (e.g. packaged rennet cheese) (Wrzosek et al., 2014). As consumers are unlikely to purchase perishable foods with a shorter remaining shelf life if the price is the same as of those with a longer remaining shelf life, several strategies were developed (Aschemann-Witzel, 2018). Chung and Li (2013) suggest that food retailers can enhance customer satisfaction by offering an earlier but lower discount, and increasing it as perishable food items approach their expiry date, rather than a higher discount when the expiry date is imminent.

After-purchase freshness information also influences the consumer's value of the product and willingness to either consume or reject. Van Boxstael et al. (2014) noticed that consumers are more willing to reject food at the purchase decision than in a situation when the food had already been paid for. In the study of Altintzoglou et al. (2012) and Østli et al., (2013) freshness dating influenced the acceptability of cod fillet. In the study of Wansink and Wright (2006), dates influenced overall

acceptability, perception of freshness and healthfulness of yogurt. The contextual influence was showed in the study of Samotyja (2015) where freshness dating affected the overall acceptability of potato snacks, perception of crispness and oxidative flavor. These attributes were rated less favorably when the label suggested post-expiration. Rejection of food was reported not only after passing the date of minimum durability date (Williams et al., 2020) but also due to the forthcoming 'use by' and 'best before' dates. The strong effect of the freshness dating on the consumer decision was shown by Alongi et al. (2019). When the expiry date of salad stored was communicated, rejection increased from 12 to 27%. A lack of knowledge and consumer awareness, misunderstanding of the information on the label and excessive health concern were among the reasons cited (Zielińska et al., 2020; Gaiani et al., 2018; Manzocco et al., 2016).

The food market in Poland offers many product categories, which include both fresh products labeled with the 'use by' date and products marked with the minimum durability date (milk, convenience food, fruit, and vegetable products). It can be assumed that consumers do not correctly interpret the way these products are labeled with shelf life dates, which may result in wasting food labeled with the minimum durability date if the date indicated on the packaging is exceeded. Therefore, it seems reasonable to recognize consumer preferences regarding purchases of shelf-stable and perishable food and to identify consumer behavior related to the consumption of these products in terms of food waste. Most of the studies conducted in the past have presented shares of wasted foods regarding food categories but without making a distinction between perishable or shelf-stable ones. In order to design effective food waste prevention strategies, it is also important to recognize the influence of remaining freshness on the willingness to purchase food products with short and long shelf lives.

The main aim of the study was the identification, analysis, and evaluation of consumer behavior on the food market in the context of wastage in households in Poland. The specific research objectives concerned consumer behavior and attitudes regarding food products labeled with different shelf life dates, more precisely:

- analysis and evaluation of the frequency of food purchases by consumers in Poland;
- analysis of consumer preferences in the field of long and short shelf life foods;
- identification of consumer attitudes towards perishable and shelf-stable foods, including products that will soon expire and are therefore discounted.

In this study, long and short shelf life food was considered in two dimensions as presented in Fig. 1.

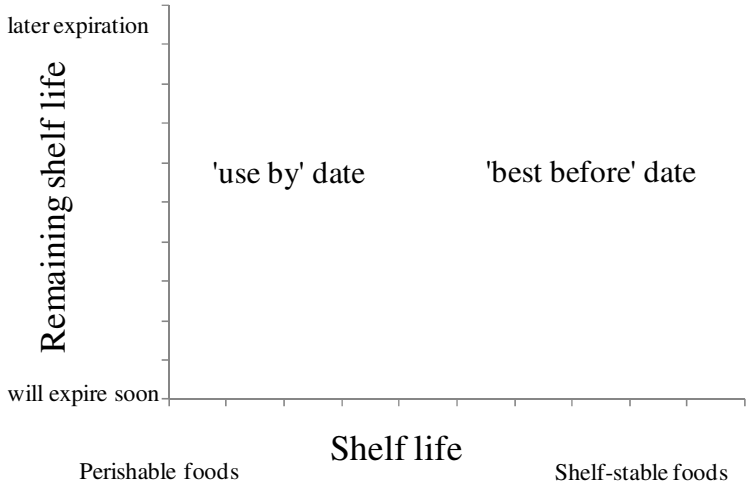

Fig. 1: The concept of long and short shelf life food

Source: own elaboration

According to microbiological stability, food products are represented by perishable and shelf-stable foods; this is reflected in different types of labeling ('use by' and 'best before' dating). Within each date type, there are products that are going to expire soon and others, with longer remaining shelf lives. We examined consumer behavior in the entire area presented in Fig. 1.

Materials and Methods

Empirical research on consumer behavior in the context of food waste was conducted using the face to face interview method in the period from April to May 2019. The research tool was an interview questionnaire prepared and verified in piloting. The interview questionnaire contained 20 questions divided thematically into sections related to the determinants of consumer purchasing behavior on the food market in Poland, the perception and understanding of information on shelf life of food by consumers, consumer behavior related to food waste in households, as well as the perception of the health risk of food in the context of its waste in households. In addition, the interview questionnaire contained questions allowing for the identification of respondents in terms of demographic, economic, and social characteristics (including sex, age, place of residence, material status, education, number of people in the household, number of children in the household).

The research population was consumers declaring the systematic purchase of food products. The selection of the research sample (N = 1145) was carried out by the quota method (selection criteria: sex, age, and place of residence), which met the demand for maintaining the relative representativeness of the research population. In the process of empirical data analysis, the IBM SPSS Statistics tool was used, which allowed for the analysis of the results of the statistical description. The results were presented in the form of structure indicators and position measures (mean, mode and median).

Results and Discussion

Consumer preferences in Poland in terms of shopping for long and short shelf life foods

The frequency of purchasing food products is related - as it can be assumed - not only with the frequency of consumption of these products, but it can also be assumed that it directly influences consumer behavior in terms of reducing / increasing food waste in households. An interesting research issue related to the possible disposal of purchased, not consumed food is the identification of consumer attitudes and preferences regarding the purchase of long and short shelf life foods. As you know, food products can belong to the short or long shelf life categories. In the case of products with a short shelf life, their timely, current, regular consumption is important in order to avoid throwing these products away due to (1) excessive purchases (2) expiry due to lack of consumption. Throwing out fresh food products as a result of not consuming them on time contributes to increasing food waste in households, which is a major ethical, economic and social problem. Therefore, it is important to diagnose consumers' preferences with regard to the purchase of long and short shelf life foods.

The results of the survey on consumer preferences in the above-mentioned scope in total and in terms of gender are presented in Table 1.

Table 1: Consumers' preferences regarding long and short shelf life foods (%)

Product categories	Consumer preferences when purchasing long and short shelf life foods	Overall	Women	Men
grain products	I purchase those with a long shelf life	24.3	26.3	21.7
	I purchase those with a short shelf life	26.2	28.4	23.5
	I purchase those with both a long and short shelf life	31.8	30.9	32.8
	I do not pay attention	16.0	21.2	11.6
	I never purchase	1.7	0.8	2.7
dairy	I purchase those with a long shelf life	24.6	23.6	25.4
	I purchase those with a short shelf life	31.6	28.7	33.9
	I purchase those with both a long and short shelf life	33.0	32.9	33.1
	I do not pay attention	7.9	5.3	11.1
	I never purchase	3.0	2.3	3.7
meat, lunch meat and fish	I purchase those with a long shelf life	21.5	21.8	21.4
	I purchase those with a short shelf life	39.9	42.0	37.0
	I purchase those with both a long and short shelf life	27.5	28.6	26.1
	I do not pay attention	6.8	4.4	9.9
	I never purchase	4.3	3.2	5.6
fruits and vegetables	I purchase those with a long shelf life	12.4	12.1	12.5
	I purchase those with a short shelf life	39.1	41.9	39.1
	I purchase those with both a long and short shelf life	25.8	26.2	25.8
	I do not pay attention	21.1	19.6	23.4
	I never purchase	1.6	0.2	3.3
fats and oils	I purchase those with a long shelf life	34.0	37.8	29.6
	I purchase those with a short shelf life	4.1	4.6	3.8
	I purchase those with both a long and short shelf life	27.0	26.8	26.9
	I do not pay attention	31.0	33.3	28.9
	I never purchase	3.9	6.4	1.9

Product categories	Consumer preferences when purchasing long and short shelf life foods	Overall	Women	Men
sweets	I purchase those with a long shelf life	26.5	28.8	23.6
	I purchase those with a short shelf life	2.4	2.9	1.8
	I purchase those with both a long and short shelf life	22.0	21.5	22.3
	I do not pay attention	40.2	40.0	40.6
	I never purchase	8.9	6.8	11.7
snacks	I purchase those with a long shelf life	22.9	25.5	19.7
	I purchase those with a short shelf life	4.5	5.2	3.7
	I purchase those with both a long and short shelf life	19.1	18.3	19.5
	I do not pay attention	38.9	38.5	39.6
	I never purchase	14.6	12.5	17.5

Source: own research

The results included in Table 1 allow us to draw the following conclusions about consumer preferences in Poland in the field of long and short shelf life foods:

- consumer preferences regarding the purchase of long and short shelf life foods depend on the food category;
- in the identified consumer segments (women/men) there are no clear preferences for the purchase of long and short shelf life foods within the studied categories of food products;
- in the case of grain products, the highest percentage of consumers declare that they buy products with both a short and long shelf life (31.8%), and the percentage of consumers preferring products with a long shelf life and short shelf life is essentially the same (24.3% and 26.2%). Thus, it can be concluded that for grain products there are no clear consumer preferences for the choice and purchase of long or short-life products;
- in the 'dairy products' category, a greater percentage of consumers declare that they prefer to buy products with a shorter shelf life, although the difference is only 7 percentage points (24.6% prefer long shelf life and 31.6% prefer short shelf life). A relatively large percentage of respondents (30%) believe that they buy dairy products with both short and long shelf life, while 7.9% do not pay attention to shelf life;
- when analyzing consumer declarations in relation to meat, lunch meat and fish, it can be noticed that almost 40% prefer fresh products with a short shelf life (which seems obvious considering the way these products are sold in retail outlets, as well as their distribution), although it is surprising a relatively high percentage of consumers who prefer to buy meat, lunch meat and fish with a long shelf life. Perhaps such a high percentage of indications results from the fact that meat in self-service stores is offered partially cultured, preserved and wrapped, and therefore marked with a long shelf life. On the other hand, fish is often sold canned or frozen, and lunch meat are sliced and packaged. 27.5% of the surveyed consumers declare that they buy meat, lunch meat and fish, both with a long and short shelf life;
- fruits and vegetables are a product category where consumers in Poland (both women and men) prefer a short shelf life (39.1%). This is quite obvious considering the features and properties of these products, as well as the way they are displayed and sold (by weight). On the other hand, 12.4% of consumers prefer vegetables and fruit with a long shelf life (as it can be assumed, this

applies to partially processed products, e.g. preserved, dried or frozen fruits and vegetables). A relatively high percentage of respondents declare that they buy these products, both shelf-stable and fresh (25.8%), while as many as 21.1% do not pay attention to shelf life. In light of the law in force in the European Union, fresh fruit and vegetables which have not been peeled, cut, or similarly treated, do not need to have a shelf life label (Regulation (EU) No. 1169/2011);

- on the other hand, fats are products for which consumers in Poland prefer a long shelf life (34.0%). A similar percentage of consumers declares that they do not pay attention to shelf life (34.9%), and only 4.1% prefer short shelf life fats. Most of the fats offered on the Polish market are products with a long shelf life, so the results of the study in this regard are not surprising;
- sweets and snacks are – similarly to fats and oils – food products, where consumers in Poland prefer a long shelf life (sweets – 26.5%, snacks – 22.9%). The percentage of consumers who prefer products with a short shelf life is small (sweets – 2.4%, snacks –4.5%) and probably concerns fresh products (e.g. sweet and salty pastries), which are offered in bakeries, confectioneries and stands in self-service stores. Half of the surveyed consumers do not pay attention to shelf life of sweets and snacks. Taking into consideration such a high percentage, it can be assumed that consumers simply assume a priori that packaged products have a long shelf life, while products (mainly 'by the pound') offered in confectioneries, coffee shops and confectionery stands have a short shelf life.

Consumer attitudes in Poland towards food products with long and short shelf life

Considering the fact that in the case of the analyzed categories of food products, consumer preferences regarding the purchase of long and short shelf life products are varied, it is worth checking what attitudes are represented by consumers towards products with different shelf lives, including discounted products. In other words – it is interesting to analyze the attitudes and beliefs of consumers towards food products with long and short shelf lives because it may contribute to the discussion on linking consumer preferences with their attitude towards e.g. discounted food that will soon expire (Bilska et al., 2020; Aschemann-Witzel, 2018; Chung and Li, 2013). Consumers' attitudes towards statements related to foods with different shelf lives were assessed on the Likert scale. The values on the Likert scale were as follows: a value of 1 meant 'I disagree', a value of 2 ' I mostly disagree', 3 'It is hard to say', a value of 4 'I mostly agree', and a value of 5 'I agree'. The overall results are presented in Table 2 in the form of position measures, i.e. classical and positional measures represented by arithmetic mean, mode, and median. Such an approach will allow for a slightly different look at the obtained attitude ratings using the Likert scale.

Thus, the values of position measures presented in the table 2 show that in the case of the assessed statements 1 and 7, we can unambiguously accept their acceptance by the respondents. We can make a similar conclusion in the case of statements 3 and 5. However, the values of measures (arithmetic mean and median) for statements 2, 4, 6 show that the surveyed consumers do not have clearly defined opinions about their attitudes. Therefore, their actual purchasing routines may vary or depend on the situation at the time of making a decision (purchase necessity, time pressure, lack of product knowledge, etc.).

Table 2: Consumer attitudes towards long and short shelf life foods (average, dominant, median)

Statements about food products with varying shelf lives	$\bar{x}$	M_0	M_e
1. When choosing shelf stable foods (such as rice, jam), I prefer those with a longer shelf life	3.96	4.0	4.0
2. When choosing perishable food products (such as meat, delicatessen products), I prefer those with a longer shelf life	3.12	4.0	3.0
3. I sometimes buy food, where the 'use by' date will expire within a few days	3.49	4.0	4.0

Statements about food products with varying shelf lives	$\bar{x}$	M_0	M_e
4. I buy food, where the 'use by' date will expire within a few days only if the price is discounted	3.16	4.0	3.0
5. I sometimes buy food, where the date of minimum durability ('best before ') will expire within a few days	3.39	4.0	4.0
6. I buy food, where the 'best before' date will expire within a few days only if the price is discounted	3.14	4.0	3.0
7. I buy discounted food that will expire soon only if I know I can use it on time	3.70	4.0	4.0

Source: own research

In order to accurately verify the identified attitudes of consumers in Poland towards food products with a long and short shelf life, an analysis of the total structure indicators, dependent on the gender of consumers (percentages of responses) was additionally carried out. The results are presented in Table 3.

Table 3: Consumer attitudes towards long and short shelf life foods and consumer gender (%)

Statements about food products with varying shelf lives	Grade*	Overall		Women	Men
1. When choosing shelf stable foods (such as rice, jam), I prefer those with a longer shelf life	1	2.4	7.4	3.2	1.4
	2	5.0		4.0	6.3
	3	19.7		17.8	21.9
	4	40.3	73.1	38.4	43.0
	5	32.8		36.5	27.5
2. When choosing perishable food products (such as meat, delicatessen products), I prefer those with a longer shelf life	1	13.5	36.2	15.2	11.3
	2	22.7		25.0	20.5
	3	19.1		16.8	22.3
	4	27.0	44.6	26.5	27.1
	5	17.6		16.5	18.8
3. I sometimes buy food, where the 'use by' date will expire within a few days	1	5.8	19.2	5.3	6.3
	2	13.4		14.1	12.1
	3	18.8		17.6	20.5
	4	50.7	62.1	50.2	51.2
	5	11.4		12.8	10.0
4. I buy food, where the 'use by' date will expire within a few days only if the price is discounted	1	9.3	33.1	8.9	10.0
	2	23.8		24.6	22.3

Statements about food products with varying shelf lives	Grade*	Overall		Women	Men
	3	20.5		18.1	23.6
	4	34.6	46.5	36.5	32.2
	5	11.9		12.0	11.9
5. I sometimes buy food, where the date of minimum durability ('best before') will expire within a few days	1	5.8	22.2	5.0	6.6
	2	16.4		16.5	15.6
	3	20.7		20.4	21.7
	4	47.3	57.1	47.3	47.5
	5	9.8		10.8	8.6
6. I buy food, where the 'best before' date will expire within a few days only if the price is discounted	1	8.7	33.9	8.1	9.8
	2	25.2		26.4	23.4
	3	21.6		20.4	22.9
	4	32.1	44.5	32.5	31.6
	5	12.4		12.6	12.3
7. I buy discounted food whose shelf life will expire soon only if I know that I can use it on time	1	6.5	16.7	5.3	8.0
	2	10.2		10.2	10.2
	3	18.4		16.0	21.1
	4	36.9	64.8	38.0	35.5
	5	27.9		30.5	25.2

**1 – I disagree, 2 – I mostly disagree, 3 – It is hard to say, 4 – I mostly agree, 5 – I agree*
Source: own research

In conclusion, the detailed distribution of responses in the case of assessments according to the Likert scale of the formulated statements are presented in Table 2. In our opinion, they fully confirm the conclusions presented on the basis of the positional measures obtained for each of these statements (Table 3). The confirmation of the above may be the cumulative percentages of responses in the case of the value 4 (I mostly agree) and 5 (I agree) for statements 1 and 7, as well as the cumulative shares for the values 2 (I mostly disagree) and 3 (It is hard to say) in the case of statements 2, 4, 6.

Conclusions and Recommendations

The results of the study on consumer attitudes and preferences in Poland, with regard to perishable and shelf-stable food products with a long and short shelf life (within the categories studied), allows for the formulation of several interesting conclusions, recommendations for food market participants, as well as for setting the directions of further research in the given subject area. When it comes to consumer preferences regarding the shelf life of the food they buy, it turns out that in the case of

grain and dairy products, consumers do not have clear preferences for shelf life – they buy both long and short shelf life products. In turn, in the category of meat, lunch meat and fish, and fruit and vegetables, the vast majority of consumers in Poland prefer products with a short shelf life, which in fact seems obvious considering the way these products are distributed and sold. Fats, sweets and snacks are food products for which consumers in Poland choose mainly those with a long shelf life. In the context of the above, it is worth paying attention to the fact that food products with a long shelf life belong mainly to the category of shelf-stable, marked with the date of minimum durability, therefore exceeding the shelf life in their case does not require the disposal of the product, but should prompt the consumer to process, consume or donate this product to reduce food waste. On the other hand, consumers who prefer products with a short shelf life, which usually belong to the fresh food category, should be aware that these products should be consumed within the shelf life, otherwise they should be disposed of (thrown away), which generates the phenomenon of food waste. In addition, consumers should also be aware that perishable food, after reaching the 'use by' date, should not be consumed due to high health risk. Therefore, an interesting research issue is the connection of consumer preferences in terms of food purchases with different shelf lives in the context of identifying the knowledge and awareness of consumers in relation to food labeling types, understanding the terminology related to food labeling and handling food after expiration. The above will be another subject of research undertaken by the authors. Referring also to the preferences of consumers in Poland in terms of shelf life of food in connection with selected segmentation variables (gender, household size), it can be concluded that gender does not determine consumer preferences, while the size of the household determines them to a limited extent. As already mentioned – in the case of most of the analyzed product categories, consumers from one-person households prefer shelf-stable products to a greatest extent, and consumers from 5+ households mostly do not pay attention to the shelf life of the food they buy (thus preferring neither of the two variants of labeling). The study of consumer attitudes towards shelf-stable and perishable food products with short and long shelf life (which may additionally be overestimated) provided highly interesting conclusions in terms of cognition and application. The analysis of the values of the position measures (mean, mode and median) and the analysis of the structure indicators (the percentage of indications) allows to draw the following conclusions:

- in the case of shelf-stable food, consumers prefer the one with a long shelf life;
- in the case of fresh food, consumers prefer the one with a short shelf life;
- in the category of shelf-stable food with a short shelf life and perishable food with a long shelf life, consumers in Poland do not have specific attitudes and beliefs;
- consumers are not fully convinced about the purchase of perishable and shelf-stable food products, which are discounted due to their short shelf life.

A summary of the analysis of consumer attitudes towards shelf-stable and perishable food with a long and short shelf life is presented in Figure 2.

Most consumers correctly expect a longer shelf life from shelf-stable foods. Previous research has shown that consumer expectations differ in terms of expected durability. Some customers value longer shelf life, are ready to pay more for it, while others have a bad perception of long-life products, fearing their high price, as well as the presence of preservatives (WRAP, 2007). Perishable foods may be associated with freshness and naturality, therefore consumers may prefer more short-term perishable foods. Consumers in Poland are characterized by having a positive attitude towards food with a short shelf life, which is discounted only if they are convinced that they will manage to consume it on time.

The formulated conclusions also provide recommendations for participants of the food market in Poland (mainly sales units and individual consumers).

FOOD PURCHASING PREFERENCES OF CONSUMERS IN POLAND		
PERISHABLE FOODS LONG SHELF LIFE	→	45% CONSUMERS
PERISHABLE FOODS APPROACHING EXPIRATION	→	62% CONSUMERS
PERISHABLE FOODS APPROACHING EXPIRATION AND REDUCED PRICE	→	47% CONSUMERS
SHELF-STABLE FOODS LONG SHELF LIFE	→	73% CONSUMERS
SHELF-STABLE FOODS APPROACHING EXPIRATION	→	57% CONSUMERS
SHELF-STABLE FOODS APPROACHING EXPIRATION AND REDUCED PRICE	→	45% CONSUMERS
APPROACHING EXPIRATION AND REDUCED PRICE + SOON CONSUMPTION	→	65% CONSUMERS

Figure 2: Consumer attitudes and preferences towards perishable and shelf-stable food with long and short shelf life

Source: own study

First of all, consumers should be educated about the specificity of the food category (perishable foods / shelf-stable foods). In particular, it is important that consumers are aware of how to properly deal with perishable / shelf-stable foods during the shelf life and after the expiry date. Due to the fact that consumers are not fully convinced about the purchase of perishable / shelf-stable foods, which are discounted due to the short shelf life, retail distribution channels (mainly large self-service stores) should conduct extensive promotional and educational campaigns to make consumers aware of the legitimacy of buying food with a short shelf life at a discounted price. Consumers should be aware that such action reduces food waste and generates less waste that must be disposed of. Additionally, buying short shelf life food at a promotional price is economically attractive and gives consumers a sense of savings. On the other hand, it is important that the promotional and educational campaign also raises awareness of the issue of differentiating food labeling systems with the use of durability dates, and thus indicates the right ways of dealing with products that will soon expire. In other words, consumers should be aware that perishable foods must be consumed by their 'use by' date and that shelf-stable foods may be consumed after their 'best before' dates) (it is highly unethical and irrational to throw them out). In addition, it is important that retail stores properly display and inform consumers about the possibility of buying food that has been discounted due to the very short remaining shelf life. Promotional information encouraging the purchase of discounted food should be placed next to store shelves with a given product category as well as directly next to the products. It is also effective to separate special promotional zones (e.g. store shelves) or baskets with discounted food, additionally supported by promotional messages encouraging to buy, not waste food. It can be assumed that for many consumers from the economically sensitive segment (e.g. seniors) such purchases may be an attractive product offer, as well as for consumers following the concept of 'zero waste' or the concept of sustainable development.

It should be emphasized that the conducted research and the conclusions drawn from it have limitations related to the adopted research procedure (declarative research) and do not describe the real purchasing behavior of consumers in Poland, but only their declarations regarding purchasing attitudes and preferences. Nevertheless, they provide valuable insights and recommendations, and fill the research gap in the field of consumer preferences as to food shelf life in Poland (the subject research on a representative research sample was not carried out earlier). In addition – as already mentioned – the results and research conclusions contribute to the discussion on the relationship between consumer preferences in the studied area and their handling of purchased food with short shelf life in the context of sustainable development, as well as the issue of reducing food waste.

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Student's Electronic Portfolio as The Basis for The Implementation of a Continuous Educational Trajectory

Anastasiya PESHA
Ural State University of Economics
Yekaterinburg, Russia, myrabota2011@gmail.com

Marina NIKOLAEVA
Ural State Pedagogical University,
Yekaterinburg, 620012, Russia, nikolaeva250381@list.ru

Nelly SHRAMKO
Ural State Pedagogical University,
Yekaterinburg, 620012, Russia, nelvik.ekb@yandex.ru

Abstract

This paper presents an author's critical analysis of the existing electronic portfolios of university students for the availability of opportunities to implement the continuous development of a student and graduate. The authors provide a conceptual basis for further research in the field of student e-portfolio and its elements. This paper reveals approaches to the interpretation of the concept of "portfolio" and its main elements, reflected in scientific research and regulatory documents, and also provides the results of a desk study of approaches to the formation of electronic portfolios of 31 universities in the Russian Federation. The results of the analysis show the state of scientific knowledge about the context of the electronic portfolios use in universities. The authors conclude that it is necessary to study the student's reflective assessment of the stages of the formation and development of a portfolio. In addition, the implementation of the principle of portfolio continuity throughout professional life should become one of the priority tasks of future research. The authors also note the importance of organizing employers' access to portfolios as stakeholders of the educational process in higher education. As a result of the work carried out, the authors presented their vision of the structure of the student's electronic portfolio blocks with its possible integration into the digital competency platform.

Keywords: Higher Education, Student, E-Portfolio, Supra-Professional Skills, Employment.

Introduction

The modern world situation, economic instability, dynamics of technological development and sustainable development trends are reflected in the specialist's labor market. The professional community puts forward more and more serious requirements for job seekers. There are some contradictions between the preparation of students at the university and the requirements that employers impose on them. Confirmation is the foresight projects of the Agency for Strategic Initiatives "Education 2030" and "Competencies 2030", which provoke heated scientific discussions in the country (About the Education 2030 project, 2020; Luksha, 2012).

It should be noted that it is not only the availability of basic vocational education that makes a specialist competitive in the labor market, but also objective evidence of possession of certain skills in the educational and in the future professional sphere. This is about supra-professional skills. Experts point out that the difficulty of finding a job for students and graduates is primarily due to their lack of an adequate level of development of professional and supra-professional skills (Pereira, 2013). The importance of supra-professional competencies / soft-skills of modern graduates for the labor market is emphasized by researchers (Frey & Osborne, 2017; Pesha, 2020). Employers are interested in getting quick and transparent information about the applicant. That is why today the appendix to the resume is

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relevant not only to social networks, but above all to the portfolio of a potential candidate.

Portfolio (English Portfolio - "portfolio"; French porter - to state, formulate, carry and folio - sheet, page) in the dictionary literature is defined as "a portfolio, a folder for important matters or documents" or "a collection of documents, samples of work, photographs that give an idea of the offered opportunities, services of the company or specialist. " Portfolios developed by students were first introduced in the 1960s. Later, researchers define it as a form of monitoring and assessing student achievement, its characteristics, evidence of progress in learning based on results, efforts made, materialized products of educational and cognitive activities, including self-esteem (Golub, Churakova, 2005). Portfolios in different countries of the World are part of the assessment of individual educational results of a student and a tool for broadcasting the achievements of graduates to future employers. Unfortunately, for a number of reasons, Russian universities have limited or no access to student portfolios for employers. These limitations act as an obstacle to the rapid and effective communication of the stakeholders of the educational process. In addition, a university student's portfolio can become an effective basis for the development and implementation of a continuous educational trajectory for a student, graduate and employee of the organization.

The key goal that the authors set themselves is to analyze the existing electronic portfolios of university students for the availability of opportunities to implement the continuous development of a student and graduate. The authors set themselves the task of developing a conceptual basis for further research in the field of a student's e-portfolio, as well as defining its basic elements as part of the future digital competency platform. In this article, the authors reveal approaches to the interpretation of the concept of "portfolio" and its main elements, reflected in scientific research and regulatory documents, and also provides the results of a desk study of approaches to the formation of electronic portfolios of 31 universities in the Russian Federation.

The approaches analysis to defining the essence and elements of students' portfolio

Conventionally, there are three types of portfolios in the scientific literature.

The first type is a paper or printed portfolio (traditional form) - a folder with supporting documents, and for creative professions these are photographs, sketches, drawings, etc. This type of portfolio has limited capabilities.

The second type is an electronic portfolio. It is assumed that all of the above is stored in digital format or recorded on an electronic storage medium.

The third type is web or network portfolio. This is a presentation of the applicant in the Internet space: social networks, personal website, business card website, etc.; assumes maximum availability of information and flexibility of the structure.

The portfolio system in Russian vocational education is no longer new. In Russian pedagogical practice, the portfolio began to be actively used in the late 1990s. New methods have come for the presentation of achievements. In connection with the transition to the Bologna system. In this system the emphasis is on the transparency and comparability of competencies, as well as on increasing the role of students' independent work and their activity. If earlier the portfolio was used by people of creative professions to demonstrate and confirm their professional level, now it is a mandatory attribute in almost any field.

Thus, today the portfolio is a multifunctional tool for external assessment and self-assessment of individual achievements of students, which allows you to consciously and reasonably predict and implement an individual educational route. For example, A.I. Masalskaya, N.G. Gomboeva, M.M. Dubtsova, I. V. Starchakova, N.V. Potekhina defines a portfolio as a form or component of authentic assessment of educational and scientific results in terms of a product created by a student (Gomboeva et al, 2017; Masalskaya, 2014). N.G. Gomboeva et al. (2017) Note that a portfolio as a career planning

technology contains a package of documents in electronic or paper form, which reflects the most significant achievements (personal, professional, social, etc.) of a student or specialist. The cumulative effect of the portfolio contributes to increasing the motivation of students to obtain educational, scientific, creative and sports achievements, which will further increase the competitiveness of the future graduate in the labor market. G.B Golub and O.V. Churakova introduces the concept of “model portfolio function”, which consists in building a model of an individual educational route for each student (Golub, Churakova, 2005).

Abroad, sufficient experience has been accumulated in using the portfolio, there are national and international organizations engaged in the study of electronic portfolio technology (the Euro Portfolio Consortium, based on EIfEL), the International Association for the E-Portfolio (International Coalition for Electronic Portfolio Research, and others) For example, the main goal of the Europortfolio Consortium is to increase the competitiveness of European education, the International Association unites specialists who study the impact of the e-portfolio on various aspects of the educational process and the educational achievements of students (Kravets, 2013, pp. 45-48). Abroad, the most often realized "portfolio of career advancement".

An electronic portfolio in world practice is a part of a promising strategy for the 21st century - e-learning. There is no unequivocal understanding today of the content of an electronic portfolio and the requirements for it. For example, the Instructional Management System Global Learning Consortium (IMSGLC) defines a portfolio as a collection of student personal data representing achievements, goals, experiences, and other personalized information that a student can provide to an educational institution, employers, and others. In this case, the portfolio acts as an “intermediary” between the student, the university and the employer.

A broader understanding of the e-portfolio is given by the European Institute for E-Learning (EIfEL) and defines as “a collection of reliable and diverse data, selected from a large archive, demonstrating the achievements of an individual (or organization) over a certain period of time, selected on the basis of reflective analysis and presented by one or several target audiences, depending on the specific goal pursued by the individual (or organization) ”(Ravet, 2007). It is based on a reflective assessment of the student's achievements, which are demonstrated to the interested party. So S. Ravet (2007) focuses on the reflective learner who develops a portfolio and uses or evaluates their assets in a specific context. However, it should be noted that back in the early 2000s, K. Zeichner & S. Wray urged to move away from the conclusion that the portfolio promotes more reflection, and to start considering the “nature and quality” of this reflection (Zeichner & Wray, 2001).

As M.M. Alajmi, e-Portfolios help students determine the results of their progress and give them a sense of their progress through comments received from faculty, administration or fellow students. This feedback gives students a clear understanding of their weaknesses and how to improve their work (Alajmi, 2019). D. Scully, M. O'Leary, M. Brown argue that study portfolios are suitable for the development and assessment of integrated cross-subject knowledge and general skills / attributes (e.g. critical thinking, creativity, communication, emotional intelligence) rather than focusing solely on disciplinary knowledge in specific subject areas. This is of particular interest in the higher education context, as universities and other parts of the sector face increasing demands to bridge the perceived gap between what students are learning and what is valued by employers (Scully, O'Leary & Brown, 2011).

The claim that today's college students are “digital natives” and therefore adapt easily to e-portfolio software, as argued by S. Bennett, K. Maton & L. Kervin (2008) and P.A. Kirschner & P. DeBruyckere (2017), is erroneous. Students need to be empowered to choose a convenient structure for portfolios, significant artifacts and learning outcomes, and they need personalized support in mastering the software (Bennet et al, 2008; Kirschner & DeBruyckere, 2017).

Bolliger D.U. & Shepherd C.E. in their study of the use of a portfolio in online programs, which involved creating an electronic folder for sharing documents, noted that 85% of students had an increased desire to learn (Bolliger & Shepherd, 2010). Working on the portfolio helped students assess

their own progress. Here it is necessary to note the point of view of D. Scully, M. O'Leary, M. Brown, who believe that high learning outcomes are achieved through competent integration of the content of an electronic portfolio into the educational context (Scully, O'Leary & Brown, 2011).

A. V. Korotun and Nikolaeva M.A. rightly note that "higher educational institutions must comply not only with the requirements of the state, which is undoubtedly reflected in the professional standard, the mission of which is to remove the contradictions between educational standards and the real requirements of the industry", but also they have to meet the labor market requirements (Nikolaeva, Korotun, 2018, P.70).

Today, each university collects information about its students in the format of an electronic portfolio. It is posted in the electronic information and educational environment of the university, but it is available only for internal use by the student himself, teachers and organizers of the educational process. To create an electronic portfolio, web technologies, learning management systems, and cloud computing technologies are used. Most often, in universities, the "Electronic Portfolio" service is developed on the basis of the LMS (Learning Management System) on-line training system, which is available through the student's personal account after preliminary authorization.

A portfolio is not only a modern effective form of self-presentation and self-assessment of the results of a student's educational activities, but also contributes to:

- strengthening of motivation for educational achievements;

- the formation of reflexive skills, the ability to objectively assess the level of their professional competencies;

- gaining experience in communication and business competition;

- development of professional competencies;

- increasing the competitiveness of the future specialist (Panyukova and others, 2013, p.5).

The electronic portfolio is placed in the electronic information and educational environment of the university and is one of its elements. For example, L.A. Ivanova defines an e-portfolio as a web-based resource that reflects the continuous growth of educational, scientific or professional achievements of the owner and is based on hypertext technologies that make it possible to implement links between the components of cross-references (Ivanova et al, 2009, p.69).

The classical structure of the electronic portfolio of a university student consists of the following sections:
- educational activities,
- research and design activities,
- cultural and creative activities,
- social activities,
- sports activities,
- personal and professional development.
Sometimes the portfolio also includes an autobiography, which is filled in by the student in a free narrative form. The autobiography describes the main stages of life, interests, hobbies, characteristics and strengths of the character, the main achievements of the student.

The data of the electronic portfolio can be used for external analysis of the effectiveness and assessment of the quality of educational, research, creative and sports activities of the student, as well as act as a supporting base when submitting documents for the appointment of an increased scholarship, participation in youth competitions, shows, rallies, Olympiads, forums of various level and status.

Results

The local regulatory documents about electronic portfolios of the Russian Federation universities were analyzed with the purpose of our study (n = 31). In particular, the subject of analysis was the "Regulations on the student's electronic portfolio" and "Regulations on the student's portfolio". The results of this analysis lead to several conclusions.

1. The main term "electronic portfolio" by universities is interpreted ambiguously and rather diversely (Table 1). Common is the emphasis on the individual achievement of the learner. Therefore, the portfolio is a kind of vector that sets the direction for professional development and growth. Based on the intermediate and final results of mastering competencies, the student can build his further individual route of personal and professional development

Table 1: Approaches to the interpretation of the concept of "Electronic portfolio"

a set of documents, information, achievements ...	a personal account of a participant in the educational process ...
a package of documents, materials ...	a platform for the implementation of mechanisms of interaction between participants in the educational process ...
a set of electronic copies / documents ...	a way of recording, accumulating and evaluating ...
an individual electronic set of documents ...	an electronic resource ...
a form of self-assessment of performance results ...	an Information resource ...
the element of the Electronic Information and Educational Environment (EIE) ...	an information array ...
the basis for the rating of the university ...	a monitoring tool ...

2. The electronic portfolio of a university student is part of e-learning or an element of the electronic information and educational environment of the university, therefore, this element is integrated into the electronic journal. In an electronic journal, the teacher records the student's current progress. The content of the electronic portfolio includes mandatory control projects. These are abstracts, term papers, final qualification work, as well as all accompanying and supporting documents (reviews, reviews, defense protocols, and others).

3. 70% of universities analyzed by us implement e-portfolio on the Moodle e-learning platform. This allows you to implement the key principles of EIOS dictated by the Federal State Educational Standard of Higher Education 3 ++:

- access to curricula, work programs of disciplines (modules), practices, to publications of electronic library systems and electronic educational resources specified in work programs;

- fixing the course of the educational process, the results of intermediate certification and the results of mastering the main educational program;

- conducting all types of classes, procedures for assessing learning outcomes, the implementation of which is provided with the use of e-learning, distance learning technologies;

- the formation of an electronic portfolio of the student, including the preservation of the student's work, reviews and ratings for these works from any participants in the educational process;

- interaction between participants in the educational process, including synchronous and (or) asynchronous interaction through the Internet.

4. Approximately 70% of the normative documents analyzed by us indicate severe restrictions on access to the electronic portfolio - this is the student himself, the curator, the organizer of the educational process and the head of the educational program. In 10% of the Regulations, the student himself can assign the level of access to the materials of his portfolio. Compliance with the safety of students' personal data is one of the priority tasks of the university.

5. The university decides on the terms of keeping the portfolio. On average, terms range from one year to three years, in rare cases up to five years. However, some Regulations do not specify a time frame at all. The general practice of many universities shows that as soon as students finish their studies, their personal card goes into the archive, and with it the electronic portfolio. After graduation from the university, access to portfolio materials is limited for the student. The information can no longer be changed by the student independently.

The inability to update and manage the portfolio by a university graduate runs counter to the concept of Life Long learning and devalues the entire process and results of portfolio formation over several years.

6. 37% of provisions include obligatory reflection in the portfolio. It should be noted that the formation of a portfolio is carried out through the student's conscious independent activity. Consequently, special attention is paid to self-assessment of intermediate and final results, as well as the results of mastering certain types of activities (educational, research, project, social, etc.). At the same time, the creation of a portfolio is a creative process that allows taking into account the results achieved by students in a variety of activities: educational, research, sports, cultural and mass. The formation of a student's personal portfolio should teach him to regularly plan his professional and personal growth, to achieve the goals of this growth, should prepare him for professional self-promotion. Such self-monitoring should be systematic and regular.

7. The electronic portfolio is based on the principles of scientific and practicality, formalization, optimality, professional ethics and openness, aesthetics, integrity, reliability and thematic completeness of materials. All universities have specialists, curators who are responsible for the quality of filling the portfolio (data verification), reliability and timeliness, and their responsibilities include motivating students to work on a portfolio. At the same time, the main responsibility for placing and filling the portfolio is assigned to the student himself, who must systematically evaluate his own achievements. However, nowhere is it said what consequences or sanctions await a student who maintains a portfolio in bad faith or does not do it at all.

8. One of the goals of creating an electronic portfolio is to promote the choice of a conscious trajectory of individual development and successful employment of a student after graduation, as it can serve as a basis for drawing up a resume or further continuing education. The choice of a conscious trajectory of individual development is possible through a constant self-assessment of one's educational level and potential capabilities, through professional self-improvement and self-development. On the basis of the electronic portfolio, an objective resume is formed and subsequent successful employment. In this regard, a contradiction arises - the university restricts access to third parties to the materials of the graduate's electronic portfolio in accordance with the Federal Law of the Russian Federation of July 27, 2006 No. 152-FZ "On Personal Data". The employer needs to make a formal request to get permission to study the materials, which is very rare. Therefore, there is a break in the link: "Student - Portfolio - University - Graduate - Portfolio - Employer".

The portfolio is a powerful impetus for self-realization of the student's personality, which, according to N.V. Shramko, "is most effectively formed at the university." This desire "is due to the development of subjectivity, the individual's awareness of his place in the macro-environment of social relations in general and the educational environment of the university in particular" (Shramko, 2011, p. 38).

9. Each university independently determines the structure of the student's portfolio. As a result of the analysis, it was revealed that the portfolio loses its original purpose and is transformed into a student's

personal account, in which information is also recorded on the implementation of the curriculum in the field of training, an information about the student's incentives and the level of language and software products.

However, it should be noted that almost 60% of universities lack criteria for evaluating electronic portfolios in their normative documents, and about 25% have vague criteria. For example, the teachers of the Yelabuga Institute of the Kazan Federal University in 2015 make an attempt to reveal the content of the criteria for evaluating an electronic portfolio (Galimullina, 2015, p. 27-28). The authors distinguish the following groups of criteria: technical, ergonomics-design, content, presentation, reflective.

Despite the qualitative study of the content of these criteria, there is still a certain discrepancy between the learning process and the assessment of the portfolio content. We associate this tension with the lack of a common understanding of the content.

At the same time, today the content of an electronic portfolio is one of the most effective forms of self-assessment of the student's performance, which contributes to motivation in educational activities, the development of professional and supra-professional competencies, and an increase in the competitiveness of a future specialist in the labor market.

10. Unfortunately, to date, there is no clear distinction between learning outcomes and results that are presented in the portfolio. Hence, the question arises about the role of outcome evaluation and process evaluation. Wouldn't the demonstration style of learning outcomes assess the process itself be overlooked? A student's portfolio should not displace the learning process. In this regard, it is interesting to note A. Moores & M. Parks, who believe that a formal final assessment of a student's portfolio at the end of the semester can increase their motivation and level of involvement in the portfolio technology itself (Moores & Parks, 2010). At the same time, the researchers note the need for a personalized and holistic assessment of the portfolio, the presence of high-quality feedback. To date, the concept of software shells for personal educational environments (PLE - Personal Learning Environments) is actively developing, however, according to O.M. Karpenko, A.V. Abramova, M.E. Shirokova, V.A. Basov currently there is still no unified approach to what should be and what properties should be endowed with a personal educational environment (Karpenko et al., 2015, pp. 6-7). The desire to personalize education allows you to take into account the psychophysiological characteristics of the student and allows you to build an individual development plan more consciously and competently. Self-assessment of a student's capabilities and educational results is reflected through the maintenance of a continuous portfolio. However, certain "proofs" of the student's self-reflection are needed here. Demonstration of independence in work on a portfolio is the basis for students' understanding of lifelong learning.

The structure of the author's vision of an electronic portfolio within the digital competency platform is shown in Figure 1.

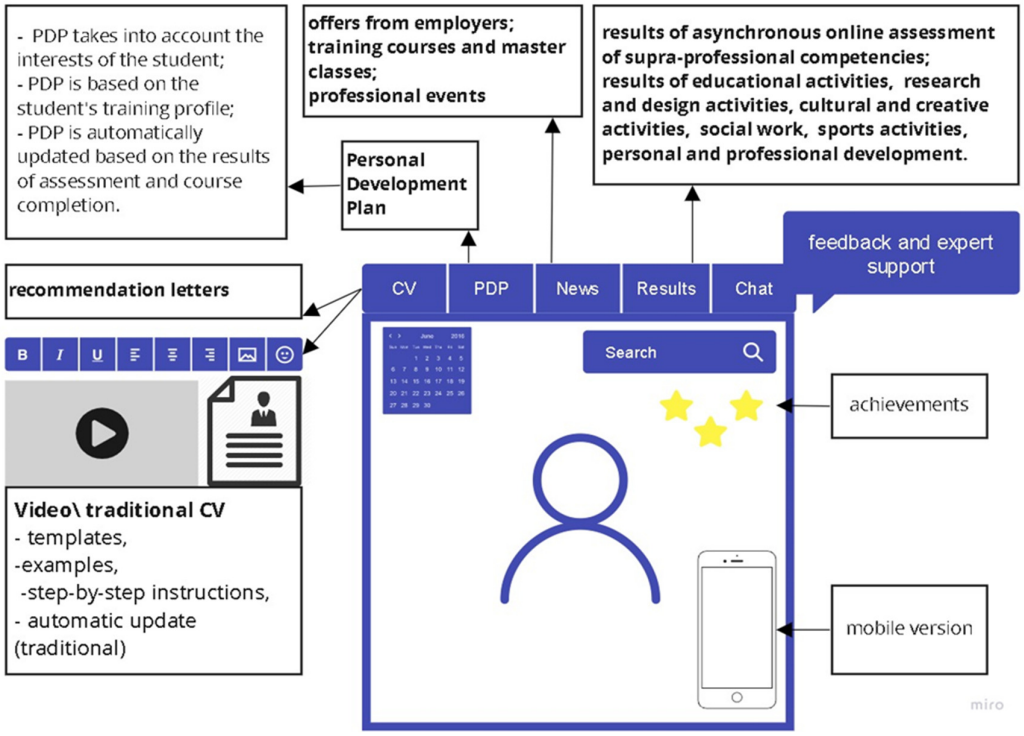

Fig. 1: Student e-portfolio structure concept

Conclusion

Research is needed that will be aimed at studying the student's reflective assessment of the stages of formation and development of a portfolio. The research data should include the learning process itself, which will in parallel correlate with the progress of the student during his studies.

Continuity should be a key characteristic of a portfolio. It needs because we are often faced with the fact that as soon as a student graduates from a university, portfolio management is "cut off". The portfolio is the basis for building a further individual development plan for the student. This basis not only within the walls of the university, but also after graduation. This is confirming the thesis of the continuity of education. In our opinion, the assessment of the portfolio is important not only on the part of the teacher, but also on the part of the future employer. Therefore, there is a need for communication support of the portfolio, for example, through the creation of chat rooms, the integration of social networks, as well as leading job portals.

A special training course (elective / elective course) or a discipline section is needed, where the technical and substantive aspects of creating and filling an electronic portfolio will be considered.

Students should be given autonomy in defining the content of the portfolio. Working on creating a portfolio is associated with maintaining high motivation of students, developing their ability to set goals, plan and organize their educational activities, develop skills of reflection and activities to assess their achievements. At the same time, the student's right to determine access to portfolio materials should not be limited by the LMS of the university.

The electronic portfolio of a university student is a modern tool for assessing educational results, which can be viewed as a response to the challenges of the digital economy. However, the closed nature of the university's IEE does not allow employers to organize interaction with potential candidates during

a student's training. The limited communication opportunities indicate the need for universities to revise the main regulatory provisions for access to an electronic portfolio. Communication between employers and students can be organized without access to students' personal data and an access algorithm can be written on a digital platform.

The expansion of the use of interactive web technologies and social media allows bringing the portfolio to a qualitatively new level through the creation and implementation of the Online competency platform, which will become a new educational philosophy.

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Anarchy Potential Guarantor of International Security in Dynamic Context Generated by the New Hybrid Threats

Mihail PĂDURARU - PhD Candidate

University of Economic Studies Bucharest, Romania
mihail.paduraru@ccirom-tkm.ro

Abstract

The existence of the new Coronavirus "SARS-COV 2" was confirmed in early 2020 and then the rapid spread of the pandemic globally, generated major disruptions in communities, business and last but not least in political systems, putting considerable pressure on the affected countries.
In addition to affecting human health, coronavirus has also had a negative impact on economic, political and security activity with severe consequences worldwide, and its full effect has not yet been determined. In this context, the extent of the spread of the pandemic in most states exacerbates the existing socio-economic problems and dissatisfaction with the leadership, which puts significant pressure on political leaders in all states.The effectiveness of the actions taken by the authorities to combat the pandemic and the economic consequences of the health crisis will significantly influence the course of political regimes and not necessarily in a democratic direction. This paper aims to analyze in a realistic paradigm the implications generated by the existence of an anarchic international system and the inevitability of this state of affairs in the context of the current international situation caused by the pandemic caused by SARS-COV 2 virus. Comparative evaluation and introduction of The "dilemma of democracy" will seek to complement the overall picture of the anarchy.
"It is our suffering that brings us together. It is not love. Love does not obey the mind, and turns to hate when forced. The bond that binds us is beyond choice. We are brothers. We are brothers in what we share. In pain, which each of us must suffer alone, in hunger, in poverty, in hope, we know our brotherhood. We know it, because we have had to learn it. We know that there is no help for us but from one another, that no hand will save us if we do not reach out our hand. And the hand that you reach out is empty, as mine is. You have nothing. You possess nothing. You own nothing. You are free. All you have is what you are, and what you give."
— Ursula K. Le Guin, The Dispossessed

Keywords: Security, International Relations, Anarchy, Democracy, Hybrid Threats.

Introduction

One of the fundamental points of realistic theory is represented by the premise of an international anarchic system. Anarchy must be understood not as a violent and unregulated chaos, but as a form of order with a horizontal, decentralized dispersion.

Anarchy is a competitive environment for states, which has negative connotations from a security perspective. Competition between states also determines their degree of international influence, although we cannot refer to the existence of a proper global hierarchy.

In *Theory of International Politics,* Kenneth WALTZ (1979) argues that there are times in the history of international relations when anarchy seems undesirable, the costs that a hierarchical order would impose, would be much higher and would affect all state actors.

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In the anarchic system described by realistic theory, states have the opportunity to learn to rely on their own strengths and not to depend on an external authority for them to achieve the proposed goals. Thus, we notice that the anarchy postulated in realism is similar to that sustained even by the classical anarchist ideology and not a pejorative interpretation of it, as we can easily find.
The fundamental difference between the anarchy of the realists and that of the anarchists is generated by the degree of pacifism of each.

Classical anarchism suggests the state of anarchy as inherently peaceful (following a violent process of total state destruction) while realism associates the state of anarchy to the nature of pessimistic contractors like Thomas Hobbes (1651) argues in Leviathan, where each actor pursues his own interests and ensures security in every way possible.

Starting from the premises of the realistic theory of international relations, the present paper aims to argue the idea that the very anarchic order at the global level could be a sensitive guarantee of state security.

The Unlikely Extrapolation of Democracy

If in terms of order within a state we can conclude that democracy is the most appropriate regime, at the level of state actors the situation cannot be extrapolated without endangering the balance of power. Democracy require a well-established hierarchical model and necessarily a central figure of authority, an elected leader.

In the case of the international environment, the interests and vulnerabilities of the actors are felt much more acutely and have more dramatic repercussions, on a larger scale, than in the case of the relations between the citizen and the state.

The suppression of anarchy through the emergence of a possible world government would unbalance the fragile balance of power as Kenneth WALTZ (1979) argues in *Theory of International Politics*.

On one hand because control of the hierarchical system would become an end in itself and on the other hand because it would risk the outbreak of a widespread civil war being practically impossible to force all state actors to reach a common denominator regarding the chosen social system.

Democracy is also based on the trust given to the majority, at the level of the international scene this idea can be considered at least uninspired.

States cannot be treated as individuals (although in some situations there is the possibility of behaving as such) precisely because their status is not always permanent, as the consequences of wars prove.
In addition, democracy loses its meaning when it becomes an imposed regime, even with the best of intentions.

At the international level, a democratic and hierarchical regime would suppose the existence of a center that would completely destabilize politics at the global level as its role of administrator would be replaced by that of authority, the struggle for control over it becoming the new goal of the great powers. Centralizing power at the international level is not an appropriate strategy if a balance is to be maintained.

The anarchic system offers the possibility of avoiding this centralization, with the advantages and disadvantages arising from multipolar organization.

In the general contemporary sense, a democratic regime guarantees peace to some extent. Francis Fukuyama quoted in “Structural Realim after the Cold War” by Kenneth WALTZ (2000), argued that "a democratic state has never fought another democratic state". Based on this statement, a legitimate question could be about the vulnerability of democratic processes that can lead (and have done so many times) to completely undemocratic situations - a good example would be the election by democratic

vote of the German National Socialist Party in power in 1933, thus a democratic process reaching by force of events to create the premises for the establishment of a totalitarian regime.
Democracy, in any of its forms, is far from infallible. Advanced and industrialized democratic states do not necessarily tend to be attacked, but this does not rule out involvement in conflicts with undemocratic regimes.

If Kant's Rechtsstaat is the starting point of the idea of modern democracy, whether we refer to it as the rule of law or as a liberal democracy, then we can see that a restrictive definition of the democratic regime will have two possible consequences: it cannot be applied at the national and international level of improbability.

The understanding of democracy at the national level differs from the international one by the chronic lack of homogeneity in the international environment.

There are few cases in which a liberal democratic regime could prepare for war against another and the prevalence of democracy can only guarantee global peace if the causes of aggression are internal to the state, thus ignoring the conflicts of interest in relations between states.

However, relations between states cannot strictly involve the aspect of conflicts of interest, no matter how much this perspective would suit the realistic current.

In the international environment, the presence of a collaboration between states is also necessary, which often takes the form of an interdependence.

The interdependence of states is caused by the orientation of liberal democracies towards profitable peace, giving up the status of militarized power.

This type of economic and peaceful interdependence significantly decreases the situations in which armed conflict can be reached between states, but an overview is needed to indicate the corollary of this premise - an unequal interdependence in which relations become too close, between states with different capabilities and potential, can lead to tensions.

The closer the relationship, the more serious the consequences of interdependence.

In an anarchic order, competition and collaboration are equally expected, both of which can have a beneficial effect on the evolution of states and the cost-benefit ratio in terms of ensuring security at national and international level.

From a realistic point of view, there is no situation in which a factor cannot possibly degenerate into conflict, hence the preference of security studies for this paradigm.

Interdependence acquires different values depending on the political context in which it occurs.

In the contemporary international system, cooperation between states has a completely different impact and a much lower relevance, than in a situation like the Warsaw Pact member states, where dependence on the center (Soviet Union) was mandatory and collaboration between regimes with equal status or comparable status, were inevitable.

In anarchy (and in anarchism), any imposed, obligatory aspect gives rise to situations with potential violence.

Although difficult to accept as such, the desire for freedom often becomes a source of discord to a similar extent to the struggle for power.

States, as actors on the international stage, feel the situations they are forced to accept contrary to their will and identity as abuses and understand to treat them as such, hence most of the imbalances of inter-state dynamics.
We are taught to look reluctantly at totalitarian regimes, necessarily assuming them to be violent. However, if we can accept that (liberal) democracy cannot guarantee global peace, we could also accept that an authoritarian / totalitarian regime will not necessarily be aggressive in relation to other state actors.

The difference between a national regime approach and its application (or applicability) at the international level must be emphasized again.

If at the national level we can face both totalitarian and democratic regimes, but we cannot enjoy the freedom offered by an anarchic system, at the international level neither liberal democracy nor dictatorship works.

An alleged world government, viewed only at the conceptual level, will always lack legitimacy, which will also make it impossible to obtain it democratically.

The extrapolation of the democratic regime to the international environment will tend towards totalitarianism, the interest for maximizing the power of the big actors will cancel any other objective. Anarchy works as long as the Holy Grail of power is buried in no man's land.

Security and Conflict - The Dilemma of Democracy and the Illusion of Freedom

Security status can appear for a moment and can be felt by one state in the short interval between the increase of its military potential and the directly proportional reaction of another. This competition cannot last indefinitely, the war being often the deterrent.

On one hand, the conditions for a peaceful climate are complex and open to debate.

On the other hand, the conditions for the outbreak of war are simple: anything can trigger a conflict if the current interests of the actors involved demand it.

Returning to the Kantian perspective, where the natural state is that of war, the existence of international politics guarantees that at some point violent tensions will arise between states. However, it is hard to believe that the abolition of international relations in order to achieve security through isolation could be a viable solution.

A perfectly balanced behavior of a state would guarantee the absence of a threat from it only insofar as this behavior would be permanent, which is obviously a difficult goal to achieve.

The perspective of the minimal state, a libertarian vision proposed by Robert Nozick (1974) in *Anarchy, State and Utopia*, outlines the role of the central authority as being limited to law enforcement supervision.

In such a vision, the state loses its political role and can no longer influence the international environment to the same extent.

Libertarianism is theoretically close to anarchism, but it cannot yet imagine the total absence of the state.

There is no belief that the minimum state model could work at the international level in order to ensure a climate of security, but to some extent, international cooperation organizations and institutions end up playing a role similar to the minimum state on a smaller scale.

One of the most frequent criticisms of the realistic paradigm is skepticism about the efficiency and honesty of cooperation through international organizations.
From Kenneth Waltz point of view, a theorist of the structural realist current, this skepticism is perfectly justified.
The best example of this is provided by the North Atlantic Treaty Organization (NATO), whose goal theoretically ended with the Cold War. The extension of its existence confirms the principle according to which, an organization once created will always find something to do and will acquire its own identity, difficult to dissolve.

Realism argues that there is a subordination of international organizations to national interests, which leads to a lack of trust in the goals they set for themselves.
In the anarchic dynamics of the international environment, alliances between states can be multipolar, in which case, the participating powers are similar in capacity, bipolar, dividing spheres of influence and unipolar, centered around a single great power.

If military alliances have no purpose other than counteracting the threat that triggered their creation, sometimes finding new threats and imposing defensive behavior may justify turning alliances into security organizations centered around the actor or actors with the most decision-making power.

This state of affairs causes an imbalance of power at the international level which creates the need for counterbalancing which in turn creates the premises for tensions and conflicts.

Institutions can become useful tools for the great powers and have a greater share in changing the international environment than institutional liberalism considers.

Impregnating international institutions with a lush and complicated bureaucratic apparatus seeks to fill a void of legitimacy that the existence of that body feels.

At the same time, the bureaucratization of international institutions indicates the tendency to transform their image into a state-like one, bringing the hierarchy to the forefront to the detriment of the purpose for which they were created.

Again, the anarchic system can help balance the situation. The above-mentioned interdependence of states is a double-edged sword in any system of ordering authority, whether horizontal or vertical. The integration policy supported by the liberal current, highly appreciated in the international environment at the moment, can lead to an undermining of the identity of the states by the rapid propagation of the effects from the international, to the national.

A peaceful and ideal international system is utopian through the very inevitability of contact between states.

Max Stirner, the most ardent supporter of extreme individualistic anarchism, contemplated anarchist utopia in terms of total isolation of the individual, pursuing personal interests in the absence of cooperation with other individuals, concluding that self-preservation transcends all other goals that the individual would could propose.

At the level of interaction between states, isolationism is not really possible, although North Korea seems to be trying to disprove this premise, leaving itself anchored in an unconventional dystopia that determines the international environment to wait for the outcome in a manner proper to democracies.

Liberal democratic regimes in general, cannot refrain from spreading their enthusiasm to environments less conducive to their exuberance, at a time when history marks the emergence of liberal interventionist politics, a kind of forced benevolence under the legitimacy of the common good.

The liberal democratic regime should not, if we conform to its characteristics, engage in wars. Wars are the primitive manifestation of the failure of diplomatic relations and the decline of security and

have no place in the economy of the modern world that has retained the experience gained from two World Wars and one Cold.

Precisely because of this, democracy seems to be imposed on all state actors, of course, in order to ensure a safer international climate and fairplay competition between all state actors in the future.

When democracy needs to be imposed, it actually loses its democratic value. A state should, in a perfectly anarchic international system, be able to choose whether it wants to be a democracy or not.

The need for security of the other state actors, requires them to want a total uniformity on the types of regimes, in order to ensure against the unpredictable and undemocratic reactions of those with different visions.

Worryingly, the anarchy of the international environment is not really anarchic.

The basic principle of anarchy is freedom (also expressed by the refusal to accept a central authority). Freedom is not a viable option in an international system in which every action of a state causes chain reactions.

Modern democracies, although not fighting each other, create alliances to fight with others, repeatedly uniting in the face of threats to strengthen their enclave of democracy and profit-oriented pacifist spirit.

Thus arose the dilemma of modern democracy as a corollary of the security dilemma.

If a liberal democratic regime is also defined by its peaceful behavior, when it engages in a war aimed at imposing democracy where it does not exist, it loses its implicit democratic character.

If it does not, it risks further losing its democratic character by imposing stricter internal security policies to ensure its protection against the threats posed by undemocratic regimes.

Democracy at the national level, in terms of security in an anarchic international system, is the least harmful choice in the long run, but not the least expensive.

In addition, the emergence of the dilemma of democracy demonstrates that it simply cannot exist, it must be constantly maintained because competition for power in the international arena always follows authoritarian impulses.

If wars can be divided into crusades or crimes, those motivated by the uniformity of the democratic character of the international environment could fall into the subcategory of the struggle for security. Uniformity implies a greater degree of predictability and this in turn implies a lower risk from the security point of view.

Relative peace can be maintained in the current climate by corroborating internal and external restrictions, always keeping in mind that a higher power entails the desire to use it, while the lower powers will feel constantly threatened by it.

Even with the prospect of absolutely all states becoming liberal democracies, the anarchic system would continue to be the only one to function because it is unlikely to eliminate all cultural, economic and identity differences in order to achieve a classical democratic order in the international arena.

Conclusions: Criticism and Inevitable Anarchy

The thesis of this paper supports the anarchy as a potential guarantor of international security in an uncertain environment generated by the new hybrid threats - a comparative analysis, in a realistic paradigm.

Classical anarchy suppose absolute freedom, not just the lack of a leading figure. As stated in the previous lines, freedom in an anarchist sense does not exist in the international arena. Paradoxically, the states that can enjoy greater freedom are not the great powers, but the small and seemingly insignificant powers.

The great powers are on constant alert, trying on the one hand to maintain hegemony at the international level and on the other hand to maintain balance at the national level.

Where freedom appears, the feeling of insecurity also inherently arises. The limits of a state's freedom are unclear and their extent can only be tested by taking risks.

In classical anarchism, freedom cannot be combined with the idea of external limitation of the agent's will.

In the anarchy of the international environment, freedom is understood exclusively from the perspective of this type of limitation, the most important variable still being power.

Anarchy in realism is not equivalent to anarchy in anarchism. The anarchy postulated by realism suppose a mutual restriction of freedoms in the dynamics between states, determined both by the balance of power and by changes in polarity.

Anarchy from the perspective of anarchist theory suppose total freedom and implies only strictly necessary cooperation, abolishing the malignant character of politics.

A higher degree of security entails the restriction of freedom, but limited freedom is not a mandatory indicator of security.

The choice to be made between freedom and security perverts the meaning of anarchy, but even so, it remains inevitable due to the lack of an alternative.

During the paper, the reasons why democracy at the international level remains utopian (or dystopian, depending on preferences) were exposed, as well as the premises of a global totalitarian regime were excluded from the very beginning.

The model of the minimal state, laissez-faire, extrapolated to the international environment would probably achieve the same results that cooperation organizations currently achieve.

The tendency of states to form a coalition in the face of a threat, would translate into revolt against a global central authority.

In addition, it should be noted that, the classical anarchy is a pacifist concept by limiting the contact between individuals in the apolitical sphere and by abolishing the idea of power.

More than that, anarchy in the international environment, offers a sensitive guarantee of security precisely through the inevitability of contact between actors (which, as has been stated, implies both competition and interdependence) and through the pressure of history that reminds us all that the price of diplomacy is lower than the price of war.

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Market Efficiency, Accounting Information and Stock Prices

Intan W. OTHMAN
Senior lecturer, Universiti Teknologi MARA, Malaysia
waheedah87@uitm.edu.my

Maslinawati MOHAMAD
Senior lecturer, Universiti Teknologi MARA, Malaysia
masli856@uitm.edu.my

Abstract

Capital market efficiency plays a major role in a country's economic development, as it affects capital formation, resource allocation and the distribution of wealth among market participants. This paper reviews previous studies to provide an understanding of the concepts of capital market efficiency. In addition to explaining the various forms of capital market efficiency, this paper discusses in depth the market efficiency of emerging economies, specifically in Malaysia. Prior studies show that accounting regulations, institutional infrastructure, quality of information disclosure are among factors that determine the extent of market efficiency. The paper further emphasizes that accounting information plays a significant role in determining market efficiency, especially in the Malaysian context which is scarcely explored by prior studies within the milieu of emerging markets.

Keyword: Capital market efficiency, stock price, earnings management, emerging economy, Malaysia.

Introduction

The efficient market hypothesis forms the basis of the modern financial theory, but its application is wide-ranging covering research fields such as economic, finance and accounting. The hypothesis was developed by Eugene Fama in the 1960s to explain the relationship between information and share price in efficient markets (Fama, Fisher, Jensen, & Roll, 1969; Beaver, 1981). The efficient market hypothesis by Fama (1970) suggests that stock prices immediately and accurately reflect all available information about firm's value at any time in an efficient market. According to the efficient market hypothesis, investors are not able to generate a risk-adjusted return in excess of the market portfolio by using selective trading strategies as all relevant information is accurately incorporated into the share price (Ross, Westerfield & Jordan, 2010). Thus, it is not possible to extrapolate future share prices or gain abnormal return in an efficient market through the analysis of past price data, i.e. technical analysis, and that instead share prices follow a "random walk" (Campbell, Hilscher, & Szilagyi., 2011).

Types of Market Efficiency

Capital market efficiency plays a major role in a country's economic development, as it affects capital formation, resource allocation and the distribution of wealth among market participation (Arshad, Rizvi, Ghani, & Duasa, 2016). Fama (1965) categorizes the market efficiency into three different forms, namely the weak form, semi-strong form and strong form of market efficiency.

(i) Weak Form Market Efficiency

The weak form market efficiency suggests that all information embedded in historical stock prices is incorporated into the current share price. In its weak form, the hypothesis claims that returns of the stocks are serially uncorrelated and show a constant mean, i.e. no systematic tendencies (Harrison & Moore, 2012). This suggests that trading rules based on historical price patterns, such as the ones

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used in technical analysis, such as charting, are unable to predict future share prices and to systematically achieve a return in excess of the market portfolio (Jovanovic, Andreadakis, & Schinckus, 2016).
Factors such as inept accounting regulations, weak institutional infrastructure, low quality information disclosure and high information asymmetry generally feature the emerging markets (Al Janabi, Hatemi-J, & Irandoust, 2010). Within this scenario, some emerging capital markets are at best weakly efficient as they do not pass the requirements for higher grade efficiencies (Islam & Khaled, 2005; Rejeb and Boughrara, 2013). A regulatory framework that promotes market participation, ensure high accessibility to reliable and high-quality information and reduces institutional restrictions on securities trading help increase market efficiency (Antoniou, Ergul, & Holmes, 1997) to become at least weak-form efficient. For example, emerging stock markets in countries such as Saudi Arabia and Kuwait (1985-1989), Turkey (1992-1999); Uganda (1994-2012); the Organization of Islamic Conference (OIC) member countries (1998-2012) are found to be weak-form efficient (Butler & Malaikah, 1992; Buguk & Brorsen, 2003; Katusiime, Shamsuddin, & Agbola, 2015; Arshad et al., 2016). The stock markets of these countries are generally characterised by high volatility, low liquidity, high cost of fund, weak governance and legal framework and are found to be weak-form efficient.

(ii) Semi-strong form market efficiency

The semi-strong form of market efficiency suggests that current share prices reflect all past and present public information. The semi-strong form suggests that the market share prices are updated in response to any publicly announced new information. This means that all form of publicly available information such as information included in company reports, trading announcements and the business press will be instantly incorporated into stock prices. If this is correct, then, fundamental analysts which base their research on publicly available information will not able to gain an advantage over the investors (Jovanovic et al., 2016) in certain circumstances.

Both with regard to the weak and the semi-strong form of market efficiency, it is important to note that publicly available information might not necessarily be correct, e.g. due to mistakes, difficulties in predicting developments or opportunistic behaviour by managers. As a consequence, the release of new and updated information by the same or different sources is likely to lead to price adjustments. For example, Defond & Zhang (2014) document that bond prices incorporate most of the bad earnings news in the period leading up to and during earnings announcement. Nonetheless, a portion of the bad news impounded in the bond price reverses in the period following the announcement. This indicates that the market was aware of bad news, e.g. from press coverage of adverse economic or firm-specific developments, but that the firm's announcement revealed that the news was not as anticipated based on the previously available information.

The study by Al Janabi, Hatemi-J & Irandoust (2010) shows that the financial markets in the six Gulf Cooperation Council (GCC) countries; i.e. Qatar, Bahrain, Kuwait, Saudi Arabia, Oman and the United Arab Emirates are informationally efficient in the semi-strong form during the period 2006-2008. The study documents that practices of financial liberalisation, such as waiving barriers to the foreign capital influx and improving prudential policies and regulation, have stimulated growth in the countries' economic development and boosted up the trading activities in their stock markets. Cross-listing of equity securities further facilitated to improve over thin trading problem. This has led to high liquidity within the financial market, thus lowering borrowing costs for those entities having the aspire to raise equity funds. The imposition of high quality and transparency in financial reporting, improvement of corporate governance measures, and enhancing the application of international accounting standards and coherent enforcement of risk management measures may have further enhanced the efficiency of the GCC equity markets.

(iii) Strong Form Market Efficiency

The strong-form market efficiency assumes that all available information – public and private (i.e. insider information) - is reflected in the current market share price. This means that if new information is uncovered, it is immediately reflected in share prices. The random discovery of

information is expected to cause share prices to fluctuate unpredictably (Fama, 1970). This means that in markets with strong form market efficiency, it is impossible to earn or predict extra profit by applying technical trading rules. Even the application of insider information would be of no use since insider information is reflected immediately in the market price so that insiders are not able to make abnormal returns by trading on their information (Jovanovic et al., 2016). Strongly efficient market enables investors to ascertain the risk and return of their investments based on all currently available information, which means that there should not be undervaluation or overvaluation of assets (Jamil et al., 2020).

There are a number of assumptions which are crucial for the existence of a strong-form market efficiency by which the security price will "fully reflect" all available information (Fama, 1970). These conditions include (i) trading of securities at no transaction cost; (ii) information is available to market participants at no cost; and (iii) the implication of current information on current prices and the distribution of future prices of securities are agreed by all market participants. In practice, the assumptions for the existence of frictionless markets with freely available information and perfectly rational investors are unlikely to be ever met. Fortunately, the above three conditions are sufficient, but not necessary, for market efficiency (Fama, 1970). For instance, even with a high transaction cost may mean that prices may still "fully reflect" all available information when the transaction does take place, provided that all available information is taken into account by market participants in the process of price formation.

Capital Market Efficiency in the Emerging Market

Markets in the emerging countries tend to be less efficient compared to the developed ones (Griffin, Kelly, & Nardari, 2010). The nature of an emerging market makes it hardly possible to assume that all relevant information will be reflected in share prices (Samuel, 1981). The main reason for the weak information efficiency is due to poor capital market development resulting in weak regulations and control in the emerging markets (Gupta, 2006). Harrison & Moore (2012) further argue that the state of information inefficient are partially due to emerging markets being typically characterised with having a low level of liquidity and thin trading. Thin trading normally occurs in emerging markets because the opportunities for participating in the market is neither well understood nor well distributed among many investors. Moreover, the ill-informed investors sometimes have access to information that is less reliable. Lack of access towards reliable information arises due to the limited disclosure requirements among public firms (Harrison & Moore, 2012). Factors such as weak property rights protection, complex organisational structure, and regulatory distortions further contribute towards information opacity in the emerging market (Fan, Wei, & Xu, 2011). Changes in the accounting system alone may not improve financial opacity in the market since accounting rules enforcement relies on strong institutions which however are lacking in the emerging market (Ball, Kothari, & Robin, 2000). However, recent studies such as Arshad et al (2016) found that the market efficiency of the Turkish stock exchange has been gradually improving over time due to the informational advantage owned by the foreign investors who generally have high expertise, with local agents who concurrently help intensify their investments (Ciner & Karagozoglu, 2008). This suggests that foreign investors might be able to substitute or complement or add to markets' information efficiency due to them being highly skilled and knowledgeable and their market participation that increases market liquidity.

Excessive government intervention in commerce activities is another common attribute of the emerging markets (Fan, Wei, & Xu, 2011). However, political connection building and bribery become a significant behaviour distortion under the authority of low quality government. Prior studies document that managers and firm owners tend to have a close political connection or bribe bureaucrats who can easily influence the state banks to grant business privileges or loans to the firms (Sapienza, 2004; Charumilind, Kali, & Wiwattanakantang, 2006; Fan, Rui, & Zhao, 2008). Firms within these corrupted emerging countries are more likely to have poor transparency, complex organisational structure, and weak corporate governance. (Leuz & Oberholzer-Gee, 2006; Jiang, Lee, & Yue, 2010). High corruption coupled with weak corporate governance may, in turn, lead to

investment spending inefficiency and thus the instability of the emerging market's financial system (Radelet & Sachs, 1998).
Political and economic instability in the emerging markets may also cause high volatility in the stock market thus affecting the market efficiency negatively. For example, Egypt was generally found to be at the weak-form spectrum of market efficiency during the period 1998-2012 (Arshad et al., 2016). This was mainly due to certain catastrophic events such as the September 11 attacks, the Arab Spring and the global financial crisis causing volatility and high inefficiency within the Egyptian stock market. The stock market was impaired further by the frictions within the local trading process including limited information provision to market participants and limited financial intermediaries.

In general, due to the limited information efficiency within the emerging stock market, private information is often not captured in a company's share price (Fama, 1965). When the market does not have the information that is privately known among the managers, accounting manipulation can be used to influence and indirectly increase firm's share price (Efendi, Srivastava, & Swanson, 2007), which in fact can be misleading to the investors (Berkman, Zou, & Geng, 2009), causing them to lose on their investment. Louis (2004) argues that due to the many alternative ways of earnings manipulation, it would be improbable for the market to tell exactly how much the earnings have been managed. The existing anecdotal evidence such as the famously known case of Enron and WorldCom advocates that even the managerial incentive to deceive the market is evident; the act of earnings management can fool even the most sophisticated investor (Louis, 2004).

The Malaysian Capital Market

The key to an efficient market is the efficiency in resource allocation, i.e. where resources are channelled to their most productive uses (John & Senbet 1998). Prior research has tested and found that well-regulated emerging capital markets are generally semi-strong efficient, though they can also be subject to some weaknesses as possible sources of market inefficiency. Instances such as agency conflicts, imperfect information, and market imperfections such as taxes, weak regulatory enforcement and poor corporate governance structure impede the arbitrage process in the capital market, hence reducing the efficiency in resource allocation which then lead to market imperfections (Andres, Betzer, & Weir, 2007; Al Janabi et al., 2010; Rose & Søpstad, 2015).

The Malaysian capital market is generally well-regulated and highly liquid (Arshad et al., 2016). For instance, the survey by Credit Lyonnais Securities Asia (CLSA, 2006) showed that Malaysia recorded a scale of nine out of ten for instituting the most corporate governance rules and regulations. Furthermore, the national accounting standards in Malaysia comply with the International Accounting Standards whereby the International Financial Reporting Standards was fully adopted in 2012. While this might suggest that the Malaysian stock market has semi-strong form of market efficiency, prior research including Barnes (1986) (1975-1980), Laurence (1986) (1973-1978), Lim, Liew, & Wong (2005) (1990-2002) and Munir & Mansur (2009) (1980-2008) found that in the past the Malaysian capital market was only weak-form efficient. However, reforms of the capital market, corporate governance and accounting regulation in recent years is expected to have improved the information efficiency of the Malaysian stock market.

Malaysia has made a remarkable transition within a short span of 30 years, from a principally agrarian economy to becoming a productive middle-income economy (Randhawa, 2011). The Malaysian capital market is considered well-developed when compared to other East Asian economies (EAU, 2002). Malaysia macroeconomic stability and its business-friendly environment have sustained the inflow of foreign direct investment and contributed to a steady economic growth (Randhawa, 2011). In strengthening the Malaysian capital market, the Capital Market Masterplan (CMP) was implemented in 2004 that include initiatives to implement higher quality governance system, better supervisory and regulatory framework and improved market liberalization (Ibrahim, 2007). This is expected to improve market liquidity, better informational transparency and made Malaysia more integrated into the global economy (Poshakwale, 2020). With the launch of the Malaysia International Islamic Financial Centre (MIFC) in 2006 to promote Malaysia internationally

as a marketplace for Islamic finance, further allows Malaysia to be more integrated into the international financial system (Yusof & Bahlous, 2013).
In accordance with the objective to transform Malaysia into a high-income nation, the Capital Market Plan 2 (CMP2) being made effective in 2011, help to further improve the Malaysian economic growth through promoting capital formation and strengthening information infrastructure, among others. The CMP2 also puts a high emphasis on strengthening the governance system in ensuring that the capital market is well-regulated. This would include enhancing product regulation to manage risk, strengthening corporate governance and improving the regulatory framework according to the changes in the market landscape. In addition, Malaysia also has a sound financial reporting system which is in line with the General Acceptable Accounting Practices (GAAP) (Yeow & Mahzan, 2013). Concurrent with the global development of accounting standard, the Malaysian accounting standards have converged fully with all the International Financial Reporting Standard (IFRS) in the year 2012. The full adoption of the international accounting standards gives a significant contribution towards the Malaysian corporate disclosure practices.

Overall, it is contended that improvement in the Malaysian supervisory and regulatory framework, market liberalisation and betterment in the national accounting standards would contribute to increased market liquidity, better information transparency (and availability), hence higher degree of market efficiency (Qamruzzaman & Wei, 2019). Higher quality of governance system in place may also help ensure a higher standard of conducts are applied by business organisations which assist investors to be more well-informed and thus makes more rational decision making in ensuring that their wealth is maximised.

However, the information efficiency of the Malaysian capital market is still likely to be negatively affected by the poor legal enforcement and investor protection (Hasnan et al., 2013). These flaws arise due to the weak judicial system (which is subservient to the local political system), inadequate prosecutorial resources (Gunasegaram, 2007) and excessive political interference in the Malaysian economy that leads to cronyism (Muniandy & Ali, 2012). All these weaknesses hinder from an effective arbitrage process which then impedes efficient allocation of resources, hence limiting the information efficiency of the Malaysian capital market.

Efficient Market Hypothesis and Accounting Information

Some research assumes that capital markets are informationally efficient and that investors can "see through" any weaknesses in accounting data (Healy & Palepu, 1993). An example given by Stein (1989) is that firm's earnings are used by the stock market to make a forecast of firm value, whereby firm's current higher earnings will be associated with future higher earnings. Based on this view, managers tend to manipulate market signal by discretionarily inflating earnings to increase forecasted firm value. In an efficient market, investors will not be fooled by the manipulation. The well-informed investors will accurately conjecture that a certain amount of earnings is inflated and will regard this as part of stock price prediction.

It has long been documented that the reaction of stock price towards earnings announcement is relatively quick (Patell & Wolfson, 1984). This would mean in an efficient market, investors impound public and private accounting information efficiently and immediately adjust market prices. Nonetheless, it has long been criticized that accounting measures can be subject to managerial distortions due to manipulation e.g. of inventory valuation, depreciation policies, variation in the method of accounts consolidation, treatment of revenue and expenditure items, and outright deceit and fraud (Chakravarthy, 1986). Even if the market efficiency assumptions really holds, Bettis (1983) contends that firm's share price may change according to the information that managers choose to reveal to the investors, hence firm's share price does not essentially reflect its fundamental value. Bettis (1983) argues that the accounting standards only impose minimum information disclosure. Further information, such as product quality and management changes would be available in the process of doing business. Disclosure of such information depends on managerial discretion and if so, often done via public speeches, press releases, public interviews and security analysts briefing. This means that security price in an efficient market partially reflect the information that managers choose to reveal.

The implication intensifies in a market with limited efficiency where private information on managerial accounting malfeasance is not reflected in the company's share price due to information asymmetry. This may lead to the firm's share price being overvalued. For instance, managers might engage in earnings management activities to artificially boost earnings and enhance earnings growth expectations which eventually increases firm value, hence firm's equity overvaluation (Badertscher, 2011). This would result in failure of the capital market to differentiate between profitable corporations and unprofitable corporations (Watts & Zimmerman, 1986) and investors inability to appropriately determine the risk and return of their investments (Gupta & Basu, 2007). In view of this, it would be impossible to rely on the movement in share prices to predict aggressive or fraudulent financial activities in a market with limited efficiency.

Managerial opportunistic behaviour such as aggressive earnings management that precedes forced restatement typically cause volatility in firm's earnings (Dichev & Tang, 2008; Donelson, Jennings, & Mclnnis, 2011; Mayorga & Sidhu, 2012) which then lead to subsequent share price variability (Baginski & Whalen, 2003). Instances of volatile earnings due to opportunistic earnings management include firm's "big bath" and "cookie jar" reserving (Mohd Radzi, Islam, & Ibrahim, 2011; Dechow, Hutton, Kim, & Sloan, 2012). The big bath theory proposes that a firm experiencing from low earnings in any given year may choose to do discretionary write-downs to cut down current period's earnings even further (Jordan & Clark, 2011). The big bath practice makes it easier for managers to report higher profits in future years. This is based on the notion that the managers will not be penalised proportionately more due to boosting of earnings on the already depressed earnings (Jordan & Clark, 2011). On the other hand, "cookie jar" reserve is created by managers as hidden account used to expand earnings in later years when economic events unfold that led to actual losses to be realised (Levitt, 1998). This normally takes place when managers manage earnings slightly downward over a specified period of time to get the flexibility for upward earnings management in the future challenging period (Dechow et al., 2012).

In view of this, market signal via share price variability may then be used as an indication that firms' private information (opportunistic earnings management) is not fully impounded and reflected in share price. This is consistent with Ball (2009) who explains that in a perfectly efficient market, it is unnecessary to have future price reaction arising from a particular information because security price will adjust immediately to all available information. It would be thus unlikely for future price variability to happen in strongly efficient markets. In a different perspective, share price variability within the Malaysian limited efficient market may indicate that private information on manipulative accounting information may not be impounded by the market due to information asymmetry. It, therefore, seems appropriate for this study to utilize share price variability as a factor in predicting the likelihood of forced restatement.

Conclusion

Capital market efficiency plays a major role in a country's economic development, as it affects capital formation, resource allocation and the distribution of wealth among market participation (Arshad, Rizvi, Ghani, & Duasa, 2016). The general perception is that the developed markets are more efficient due to their long-term presence, increased maturity, and technological growth, in comparison to the emerging economy counterparts. The Malaysia capital market, more specifically, is found to have limited information efficiency (Barnes, 1986; Laurence, 1986; Lim, Liew, & Wong, 2005; Munir & Mansur, 2009). Factors such as poor legal enforcement and investor protection (Hasnan et al., 2013) as well as the pervasiveness of cronyism (Muniandy & Ali, 2012) are some possible weaknesses that might have contributed to the Malaysian limited market efficiency. Generally, the limited market efficiency may negatively impact the country's economic development due to inefficient resource allocation and inequality distribution of wealth among market participation (Arshad, Rizvi, Ghani, & Duasa, 2016). The limited information efficiency may cause investors not being able to detect and "see through" weaknesses in accounting data resulting in managers to take advantage and engage in opportunistic earnings management, earnings misstatement or even outright fraud with the purpose of rent extraction.

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Mergers and Acquisitions In Malaysia

Nur Nashreen ZAKARIA,
Universiti Teknologi MARA, Malaysia
nashreen0627@gmail.com

Maslinawati MOHAMAD, PhD.[i]
Universiti Teknologi MARA, Malaysia
masli856@uitm.edu.my

Intan Waheedah OTHMAN, PhD.
Universiti Teknologi MARA, Malaysia
waheedah87@uitm.edu.my

Sutrisno, Ph.D
Universitas Islam Indonesia, Indonesia
sutrisno@uii.ac.id

Abstract

Like other developing countries, Mergers and Acquisitions (M&A) has been emerging successfully in Malaysia. Despite being rich in resources, Malaysia is famous for its multiracial culture among foreign countries[ii]. As a result, there are high opportunities for foreign companies to expand. Malaysian company is said to be looking into M&A if they wanted to firm up their reputation in Malaysia before competing internationally (Kummer, 2012). This paper therefore addresses mergers and acquisitions in Malaysia as well as the main rules and regulations and the joint motive company involved in M&A. We extend our discussion on the motives of M&A in general.

Keywords*:* Mergers and Acquisitions, Malaysia, Regulations, Law, History, Motive

Introduction

Generally, mergers take place when two or more companies merged to become one new company or corporation, whereares an acqusition is when one company takes a controlling ownership interest in another firm. Many literatures described mergers and acquisitions (such, Horne and John, 2004; Gergios, 2011; Khan, 2011; Durga, Rao and Kumar, 2013) in various terms. Horne et al (2004) stated that mergers are legal activities in which two or more organizations merge to become a single company as a legal entity. Gergios (2011) stated that an acquisition may take places when large financial firms bought a small firm, whilst a merger is when two or more companies merged into becoming a single company. The concept of merger is when two or more entities merge and join one or more firms (Khan, 2011). However, according to Duksaite and Tamošiūnienė (2011) the distinction is not that important, since both definitions would have a similar effect, where two separate firms merge into one and these firms support each other.

In the Malaysian context, mergers and acquisitions (M&A) generally refers to the acquisition of shares of a company, consolidation of businesses or takeovers (Sankar and Yen, 2018). With the exponential growth of technologies and the worldwide wave of economic globalisation, M&As have been an effective way for businesses to discover and develop new opportunities. (Zhong, 2016). In other words, M&A is also a common corporate recovery strategy used by companies worldwide. However, according to Mah and Thomazios (2019), in Malaysia there are lack of companies that taking advantage of M&A incentives to boost growth. Aik, Hassan and Mohamad (2015) stated that an increase in the financial performance of target firms compared to the acquired firms is not statistically significant, it is inferred that there was no actual improvement in the financial performance of the merged firms after

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M&A practices. This has been identified by Malik (2019) that the performance of the merged firm is far more different as it is lower than the non-merged firm. According to Andreou, Louca and Panayides (2012), as cited in Rashid and Naeem (2016), firms involved in M&A are for synergistic reasons rather than expecting bonus consumption from the management. Therefore it is crucial for this study to provide an understanding on the key laws and regulations of M&A in Malaysia and the common motives on why companies involve in M&A activities.

This study was carried out as a systematic evaluation of previous literature. The findings of the selected research work have been classified, grouped and summarised in order to discern a meta-analytical view of the work carried out to date. M&A in Malaysia is in unfavourable states and is said to be softened following the Covid-19 pandemic due to business volatility (Zainul, 2020). The laws and regulations were therefore considered and organised in a way that would allow businesses to understand the act, code, rules and guidelines issued by the government. M&A 's motives are varied due to heterogeneous opinions as to why businesses are interested in M&A. They are known as synergy motives, agency motives and hubris motives. This paper summarises some of the key developments in M&A carried out over two decades in empirical studies in Malaysia. Study can help to recognise possible issues and set the agenda for future work.

This paper is organized as follows. Section II is the mergers and acquisitions (M&A) in Malaysia. Section III explains the rules and regulations of mergers and acquisitions in Malaysia. Section IV is the common motive of M&A and Section V is the discussion and conclusions.

Mergers and Acquisitions (M&A) in Malaysia

Malaysia is a country rich in natural resources, highly skilled labour at a relatively low wage scale and strategically positioned in the Asia-Pacific region[1], it is one of the largest concentration countries and economic traders in the South East Asia region, especially the Association of South East Asian Nations (ASEAN) (Tong, 2012).

The growth of the Malaysian companies are not only at the local arena, but also in ASEAN and internationally. This is shown when Malaysia is ranked third in ASEAN 's total trades of USD 466,642.8 million in 2018, while Singapore ranked one and Vietnam ranked two with total trades of USD 782,656.9 million and USD 480,567.6 million respectively. According to Tong (2012), Malaysian companies focuses into M&A before venturing overseas if they were to strengthen their foothold in Malaysia before competing internationally with another large company globally.

M&A began in Malaysia in the 1970s, where oil and rubber plantation companies were largely confined to business (Yusof, Hassan, and Jalil, 2000; Marimuthu, 2008), and the number of M&As continued to emerge with the industrial sector, coupled with a privatisation policy that encouraged many companies to become more competitive in diversifying their businesses (Ripain and Ahmad, 2014). However, the transactions have declined in recent years, as the number of completed M&A deals in Malaysia involving listed firms has decreased from 410 in 2015 to 227 in 2019[2]. According to The Star (2018), despite the slow down, the demand for M&A remained competitive in 2018, growth was led by a spike in high-value outbound sovereign wealth fund (SWF) transactions from Singapore, supported by domestic M&A activities in the area. M&A activities will remain robust into second half of 2020 and in year 2021 as a few companies have publicly made known their intentions to restructure, re-strategise and or deleverage (Shankar, 2020). However, the perception has turned differently because of the latest Covid-19 pandemic. Zainul (2020) recently reported in The Star News that merger and acquisition (M&A) activities are likely to slow down in the short term as market uncertainty contributes to the disparity in valuations.

[1] https://www.worldbank.org/en/country/malaysia/overview
[2] Source: Thomson Reuter Eikon retrieved as at 13 February 2020

The aim of this paper is therefore to provide further understanding on M&A, in particular on the typical legal agreements involved and the key laws and regulations in force in connection with mergers and acquisitions in Malaysia.

Key Laws and Regulations of Mergers and Acquisitions (M&A) in Malaysia

There are two types of companies that are involve in M&A which are the public and private listed companies. Public mergers and acquisitions in Malaysia are mainly regulated by the Capital Markets and Services Act 2007 (CMSA). The Securities Commission (SC) issued the Malaysian Code on Takeovers and Mergers 2016 and implemented in compliance with the CMSA. Malaysian Communications and Multimedia Commission (MCMC) emphasized that private and public mergers and acquisitions are typically regulated by the Companies Act 2016. According to Meng et al (2019), the parties are free to settle on the law regulating documents relating to transactions. However, the legal formalities and procedures for transferring shares, companies or properties will still be subject to Malaysian law.

CMSA (2007) requires the Commission to approve the acquisition or sale of an asset resulting in a significant change in the business direction or strategy of a listed firm, or any related M&A activities listed under the Act. Any failure to comply with the provision, the Commission shall have the right to refuse to accept the proposal.

In addition, there is also a public M&A code, the Malaysia Code for Takeovers and Mergers. This Code includes standards and rules regulating the conduct of all individuals or parties involved in the takeover bid, merger or compulsory acquisition, including the bidder, the offeror, the offeree and their officers and associates. The Commission shall prescribe the Code in compliance with the standards set out and may do whatever is appropriate or fair to provide best impact to the clauses of this Division and of the Code, without limiting the generality of the foregoing.

However, there are other key law and regulations that may be applicable for M&A as stated by Mah et al (2019) as follows:

- Financial Services Act 2013
- Offshore Companies Act 1990 (for Companies incorporated in Labuan)
- Bursa Malaysia Securities Berhad Listing Requirements 2010 (Bursa Listing Requirements)
- The Capital Markets and Services (Fees) Regulations 2012
- Contracts Act 1950
- Foreign Investment Committee Guidelines (administrative)

For both public and private M&A, Malaysian Communications and Multimedia Commission (MCMC) provide guidance and establish a process for assessing M&As that have been voluntarily notified to it, whether public or private M&A. These Guidelines also set out the procedures that the Commission would follow in the implementation of Chapter 2 of Section VI of the 1998 Communications and Multimedia Act (CMA) for mergers and acquisitions. MCMC (2019) defines M&A as capable of capturing a wider spectrum of corporate transactions, relating to any transfer or combination of ownership of two (2) or more businesses or business organisations. Such transactions include consolidation, tendering, asset purchases and acquisitions by management.

Despite the various codes, acts and guidelines provided by the Malaysian Government, there are lack of companies that took advantage of outbound M&A incentives to boost growth by moderating their earnings capacity (Mah et al, 2019). Recently, Zainul (2020) interviewed one of a member firm of Baker McKenzie International, who claimed that the policy and guidelines provided by the regulator should be more transparent in order to boost the M&A activity in Malaysia. He said again that the regulatory authority should improve the approval process and make it more timely and transparent.

This shows that regulators plays a vital role in improvising the numbers of M&A activity in Malaysia. Although there are rules and regulations on the activities but if the responsible players are not performing well, the bottom will inevitably fall. In addition, we will discuss the motive of companies involved in M&A.

Motives of M&A

There are various of motives that have been discussed by researches (Song, Ali and Pillay, 2005; Isa and Lee, 2010; Azevedo, Alves and Santos, 2016; Aggarwal and Garg, 2019). According to Song et al (2005), the reasons for M&A are always ambiguous and present a problem of classification. There is no common justification for a M&A, but rather a variety of reasons that often contradict and complement each other.

A. Synergy Motive

According to Al-Sabri and Nordin (2018), a number of studies have argued that synergy is one of the key motivations of M&A. Synergy typically means that the benefits that will be achieved when two businesses are engaged in M&A are greater than the combined benefits of the original two independent firms. (Tong, 2012). In a simple term, Ripain et al (2014) summarised their synergy as one plus one equal to three. There are three types of synergies, including financial synergies, organisational synergies and managerial synergies (Sudarsanam, 1996; Hitt, Dacin, Levitas, Arregle and Borsa, 2000). It is argued that these synergies can allow the merger of firms to achieve a positive net acquisition or boost performance (Song et al , 2005).

B. Agency motive

Agency motivation can also be referred to as Agency Theory and Empire Building Theory (Song et al , 2005; Tong, 2012; Al-Sabri et al, 2018). In comparison to the synergy motive, the Agency motive suggests that managers focus more on optimising their own income and resources than on maximising shareholder capital (as cited in Al-Sabri et al , 2018). By way of a simple example by Song et al (2005), if managers themselves are not properly diversified, they will diversify the assets of businesses in order to minimise the risk to their available capital, even though diversification provides little to no value to shareholders. The Agency Theory describes the presence of conflicting interests between managers and shareholders, which can induce managers to participate in such practises for their private benefit. These self-interest behaviours can lead to a decline in shareholder wealth.

C. Hubris motive

According to Al-Sabri et al (2018), hubris theory or motivation is another common theory used to describe the motivation of M&A. Hubris motive is also known as hubris theory, hubris hypothesis and process theory. Waal (2013) pointed out that the hybrid hypothesis is sometimes used to describe managerial overconfidence in mergers and acquisitions. The concept behind this hypothesis is that managers overrate their ability to determine future acquisition goals. As a result , the stock market responds adversely and the bidder firm's share price declines. This is similar to Rohra and Chawla (2015) which stressed out that acquisition managers make mistakes in assessing targets and lead to M&A where there are no synergistic benefits and thus overpayments made to the target business.

Discussion and Conclusion

M&A has been successfully emerging in Malaysia similar to other developing countries. Despite being rich in resources, Malaysia is famous among foreign countries with its multiracial culture. As a result, there are high opportunities for foreign companies to expand, as Malaysia has tremendous skilled labour from different races and low-wage ethnicity. In addition, M&A, which is generally owned in Malaysia, was the purchase of company stock, the sale of companies or the acquisition of assets. This type of operation benefits the business from growth, particularly at a low cost of purchase.

Although there are complete rules and regulations for public and private M&A to be followed as guidelines, it is believed that the framework or mechanism must be invented in order to strengthen the movement of M&A activities in Malaysia. Thus, companies planning to get involved in M&A are advised to study the real motive rather than jump into M&A activities and reach a complete failure in the future.

This study limitation is only to provide a great deal of insight and understanding on M&A in Malaysia, the rules and regulations for companies to follow, as well as the common motivation for M&A. Therefore, it is recommended for future research to study on the growth trend of M&A in Malaysia, potential effect of the current rules and regulations on M&A companies, the adoption of codes and guidelines provided by the government among public or private M&A in Malaysia or any further detail investigation is recommended.

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[i] Corresponding Author: Maslinawati MOHAMAD, PhD. Faculty of Accountancy, Aras 1 & 2 Bangunan FPN, Universiti Teknologi MARA, Cawangan Selangor, Kampus Puncak Alam, 42300 Bandar Puncak Alam, Selangor, Malaysia. Email address: masli856@uitm.edu.my. Tel no: +603-32587488 / +6012-8888749.

[ii] Ethnic Malays make up 50 percent of the population, Chinese a further 23 percent, with Indians and indigenous peoples forming the remainder, according to the CIA World Factbook (Webster, 2010).

A Study on Impact of Speed Radar and Red-Light Cameras on Drivers' Behavior in Abu Dhabi City

Khamis Salem ALNABHANI and Nor Hazana ABDULLAH

Faculty of Technology Management and Business, Malesia

Abstract

Traffic law enforcement is a main part of any road safety strategy and the only one that has quick and direct impact in improving driver's behavior. The main objective of this study is to investigate the impact of two new automated enforcement systems in Abu Dhabi (AD) city on drivers' behavior and overall road safety. These systems are speed and red-light enforcement cameras. Two types of data sets are used: crashes and traffic violations data for six years and self-reported questionnaire survey data. Crash data analysis showed that as increasing the number of speed camera devises the number of speed-related crashes decreases. Regarding the red-light camera systems (RLCs), the analysis showed that the number of red-light running crashes was decreased by 47.2% after implementing RLCs. More understanding of the driver's behavior and response towards the enforcement camera systems were investigated from 600 participants in a questionnaire survey. The main findings indicated that significant number of drivers tend to reduce their speed only at the speed camera sites. Drivers always comply with the speed limit when they feel that they under camera detection. Well known locations and visible cameras pushing drivers to such behavior. In addition, drivers who think that they can avoid camera detection and who prefer high speed limit were involved in speed-related crashes more than others. Finally, about 83% of participants believe that speed and red-light cameras have significant impact in improving road safety. The findings of this study are very helpful for road safety authorities in developing effective road safety action plans.

Keywords: Speed Camera; Red-Light Running Camera; Drivers' Behavior; Traffic Enforcement; Self-Reported Questionnaire

Introduction

Based on World Health Organization report (WHO-2015), about 1.24 million people die every year as a result of traffic crashes and more than 90% of road traffic deaths occur in low- and middle-income countries. People aged between 15- and 44-years account for 48% of the global road traffic deaths which made the issue of road safety more dramatic. Currently, significant efforts are being carried out in most countries to improve road safety level and achieve strategic targets of road crash fatality rates such as zero-vision strategies in some European countries.

Emirate of Abu Dhabi (AD), the capital of the United Arab Emirates (UAE), has an increasing population growth rate accompanied by an increasing number of vehicles and, in turn, increasing number of driving licenses. more than 200 different nationalities are living in AD with different cultures and road safety background that put the road safety authorities in a real challenge. Traffic crashes escalated, putting an economic burden on the country. Thus, the main concern of the traffic police is to enforce road users to follow traffic law in order to improve road safety level. The strategic target of Department of Transportation DOT in UAE is to reach 3.0 fatalities per 100,000 inhabitants by 2023. In addition, AD traffic police department has a zero-vision strategy for traffic crash fatalities by 2030. To achieve this target, the traffic police of AD has established two types of traffic enforcement systems; speed and red-light cameras during last eight years. The human error accounted for about 97.2% of the severe crashes in AD during the past years. Thus, improving drivers' behaviors is the core of the road safety strategy of AD traffic police. However, drivers'

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response and the impact of the implemented enforcement cameras on drivers' behavior and overall road safety still need more. therefore, the main objective of this study is to investigate the impact of the speed and red-light camera systems on the driver's behavior and road safety and to understand driver's response and attitude towards these two systems.

Literature Review

Human errors are considered as the lead cause of traffic crashes in the majority of crash reports over the world (Karscasu and Er 2011). Early study, Treat et al. (1979), found that "human errors and deficiencies" were a definite or probable cause in 90-93% of crashes. More updated report by NHTSA's (2008) stated that human error is the critical reason for about 93% of crashes. That findings prove the significant impact of improving drivers' behavior on improving road safety level. Traffic enforcement is the most powerful toll that enforce drivers to follow traffic rules and drive by a safer way. The main purpose of traffic law enforcement is to push/encourage drivers to comply with traffic rules, and it is traditionally underpinned by the principles of deterrence theory that the behavior of human beings can be modified by making them fearful of the consequences of committing illegal acts (Homel, 1988).

Recently, automated traffic enforcement devices are widely used, especially speed and red-light running camera systems. Wilson et al., 2006, reviewed some prior studies that tacked the impact of the speed camera on road safety. The reviewed studies concluded that speed camera leaded a reduction in crashes frequency by a range from 14% to 72% and a reduction in related fatalities by a range from 8% to 46%. Another study reviewed 14 speed camera sites (Pilkington and Kinra 2005) that proved a reduction in crash frequency from 5% to 69% and 12% to 65% in injuries and 17% to 71% in fatalities. In U.K., Gains et al., (2004) estimated a reduction of about 42% in fatalities and serious injuries as a result of the national safety speed camera program. In Europe, OECD 2003 pointed out a 50% reduction in fatalities of road crashes. Another study in U.K., belonging to the Department of Transportation, showed a reduction in speed-related fatalities by 65% at fixed speed camera sites and by 28% at mobile speed camera sites (Gains and Humble 2003).

Regarding the red-light camera systems (RLCs), many studies found that the RLCs reduced the overall number of crashes at signalized intersections (especially right-angle collision type) and related injuries and fatalities (Retting and Kyrychenko (2002); Hallmark et al. (2010); Wong 2014). In addition, Maryland (2001) investigated the impact of RLCs at 25 intersections in Howard County, MD. It was found that the right-angle collisions were reduced by 42% and 32% reduction in rear-end collisions and a reduction of 22% for other types of collisions. In U.K., Hooke, et al. (1996) evaluated the effectiveness of RLC in various sites in England and Wales covering 78 intersections. It was found that the total injuries of crashes at the studied intersections were reduced by 18% in average. Hu et al. (2011) studied many signalized intersections at 99 cities. It was found that RLCs decreased the overall fatal collisions.

Study Approach

The impacts of two automated traffic enforcement systems on the drivers' behavior and road safety are investigated in this study: speed camera and red-light camera systems. These two systems have been installed in the city of Abu Dhabi during the last decade and are still in increasing numbers.

Two approaches were applied to achieve the study objectives. The first approach is comparative statistics of road safety indicators such as number of crashes and number of related fatalities before and after the installation of the enforcement systems. The second approach relied on a self-reported questionnaire for a sample of licensed drivers in AD. The questionnaire survey aims to investigate AD drivers' behavior, response, and perception towards the installed enforcement camera systems. In addition, to know the awareness and education level of drivers regarding road safety aspects.

Data Collection

Two sources of data are employed in this study: 1) traffic crashes and violations data, and 2) interview survey data.

Crash and Traffic Violation Data

First data set is included the severe crash data during last six years from 2012 to 2017 that were extracted from AD traffic police database. A severe crash is the crash that resulted in at least one injury or fatality. The database includes all information about each crash (for example: location, road feature, crash cause, crash type, crash description, vehicle involvements information, etc.), and at-fault drivers' characteristics (such as age, gender, nationality, driving license information, years of driving experience, etc.). In addition, traffic rules violation records of all drivers were extracted from the traffic violation database of AD police, especially speed and red-light running. Traffic violations are classified based on the violation rule type and number of traffic violation points. The database has all information about the offender drivers' characteristics, location of the violation, and type of violation (face to face or through automated systems).

Survey Questionnaire Data

Second source of data was collected by conducting self-reported questionnaire survey. The questionnaire form included 42 questions to examine and understand drivers' behavior, attitude, education and reaction towards the new advanced two enforcement systems in AD. The questionnaire form was prepared in two different languages; Arabic and English. More than one thousand questionnaire forms were handed out among licensed drivers in AD in different public areas (such as governmental authorities, shopping malls, etc.). The sample of drivers is randomly selected taking into consideration the demographic characteristics distribution of licensed drivers in term of drivers gender and age to represent the real situation of drives population in AD. Finally, about 600 reliable and completed forms were selected to be used in the analysis process of this study.

Crash Data Analysis

The study methodology is mainly based on conducting comparisons between the traffic safety indicators in terms of number of crashes, crashes fatalities, and number of traffic rule violations before and after installing the automated enforcement devices (for both speed cameras and red-light cameras).

Impact of Speed Camera Systems on Speed-Related Crashes

Speed is one of the major factors contributing to traffic crash occurrence and severity. Many studies show that any small reduction in speed value can result in a significant reduction in road trauma. It was noticed that speeding violations make up about 81.7% of the total traffic violations record in AD. Statistics shows that male and young drivers being more likely to get involved in speed-related crashes than female and older drivers. Accordingly, road safety strategy that establish in 2011 focused in increasing the number of speed cameras for improving road safety in general and to achieve the strategic target to reach the fatality rate 3.0 fatalities per 100,000 inhabitants by 2023 from 10.7 fatalities per 100,000 inhabitants in 2011. Based on that the total number of the installed speed cameras has been increased from 422 cameras in 2012 to 1,450 cameras in 2017. During these years a significant reduction of speed-related crashes was observed.

Fig.1 illustrates the relationship between the number of the installed speed cameras and the frequency of the speed-related crashes over years. This figure clearly shows that as the number of speed cameras increases, the number of speed-related crashes decreases from 340 crashes in 2012 to 142 crashes in 2017 (i.e., about 58.2% reduction in speed-related crashes).

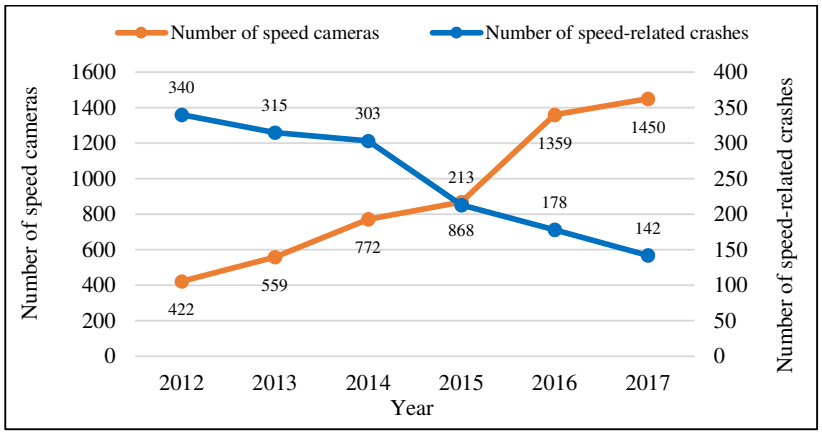

Fig. 1: Number of Speed Cameras Vs Speed-Related Crash Frequency

Fig. 2 shows the relationship between the number of the installed speed-cameras and the number of fatalities that resulted in speed-related crashes. This figure shows a reduction in fatalities of speed crashes from 77 fatalities in 2012 to 46 fatalities in 2017 (i.e., a reduction of 40.3% in fatalities that resulted in speed-related crashes).

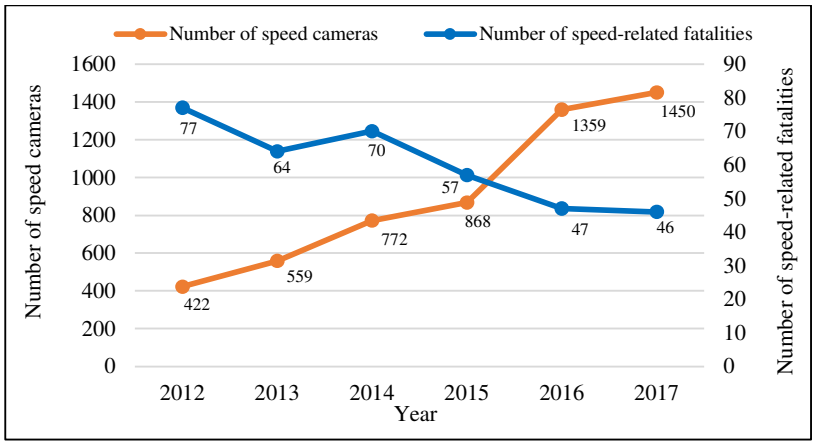

Fig. 2: Number of Speed Cameras Vs Number of Fatalities Resulted in Speed-Related Crash

With increasing the number of speed cameras, the number of speeding violations is increased accordingly. Fig. 3 shows the relationship between the number of fatalities and severe-injuries that resulted in speed crashes in terms of total number of speeding violation records during last six years. The linear trend in this relationship shows the decreasing trend of fatalities and severe injuries as a result of increasing speed enforcement in terms of number of speed violation tickets that have been issued. all of the previous results reveal that increasing speed enforcement by increasing speed cameras led to significant reduction in speed-related crashes and fatalities.

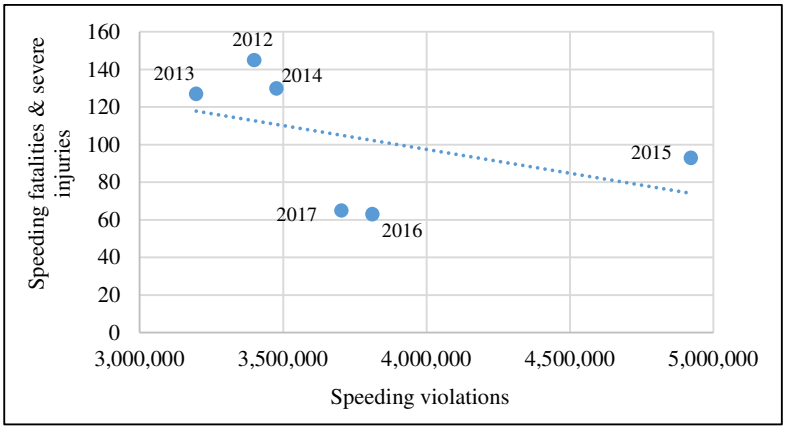

Fig. 3: Speeding Fatalities and Severe Injuries

Impact of Red-Light Camera Systems on Red-Light-Running Crashes

Red-light running is considered one of the most prominent factors in urban crashes at signalized intersections and contributes to a rising rate of fatalities in recent years around the world. Based on the 2014 statistics in AD, about 60% of the total severe crashes at signalized intersections were due to red-light running violations. To decrease these numbers, red-light camera systems (RLCs) have been activated in the fourth quarter of year 2013 at 30 signalized intersections in AD city. To evaluate the impact of RLCs on road safety at intersections where the RLCs were installed, a before and after study was then conducted by investigating crash patterns in the four years before RLCs activation (i.e., from 2010 to 2013) and after the activation of the RLCs (i.e., from 2014 to 2017).

Fig. 4 shows the total number of crashes that occurred due to red-light running drivers at AD intersections from 2010 to 2017. This figure clearly shows a significant reduction in red-light crashes since year 2014 (i.e. after activation of the RLCs) compared to the period before. By aggregating the total crashes of red-light for the four years after and before RLCs, it was found the reduction in red-light related crashes have been reduced by about 47.2%. Furthermore, Fig. 5 shows the number fatalities that resulted in red-light crashes during last eight years. this figure shows a significant reduction of fatalities at intersections that resulted in red-light runners since 2014. By aggregating the total crashes of fatalities due to red-light running crashes during the four years after and before RLCs, it was found the reduction in the fatalities that resulted in red-light crashes have been reduced by about 53.6%.

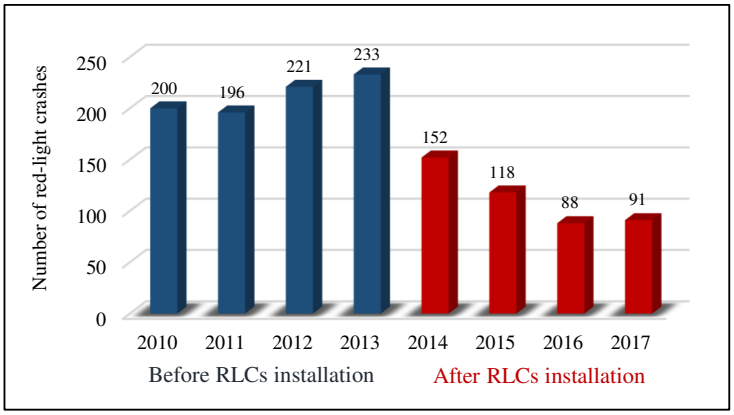

Fig 4. Crashes due to Red-Light Runners

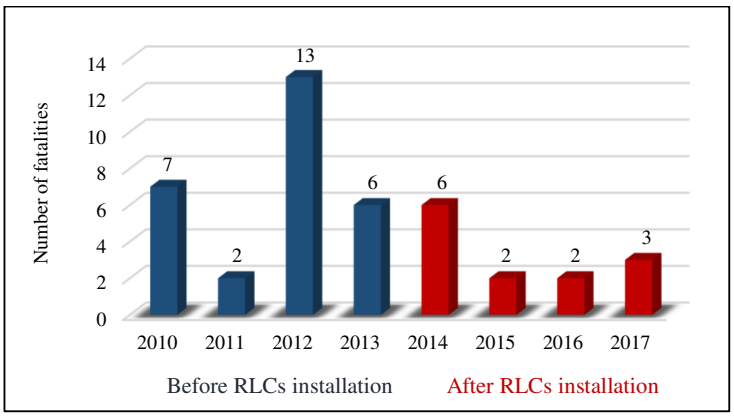

Fig 5. Crash Fatalities due to Red-Light Runners

By analyzing the crashes that occurred at the 30 intersections where the RLCs were installed, it was found that the total number of crashes at these intersections was decreased by a range of 25% to 88% during the four years after RLCs installation compared to the four years before with average reduction in all intersections of 52.5%. In addition, the total crashes that occurred due to red-light was decreased by a range of 11% to 100% with average reduction in red-light crashes of 57.0% at the 30 intersections.

Questionnaire Survey Data Analysis

As mentioned before, about 600 self-reported questionnaire forms are used in the analysis for more understanding the driver's behavior and response to speed and red-light camera systems. The first 5 questions in the survey form was about drivers' characteristics including gender, age, nationality, experience and education level. Fig. 6 shows the percentage of the sample participants of drivers and the licensed drivers' population in AD in terms of gender and age. The Chi-Square test showed that the sample of drivers is significantly represent the drivers' population.

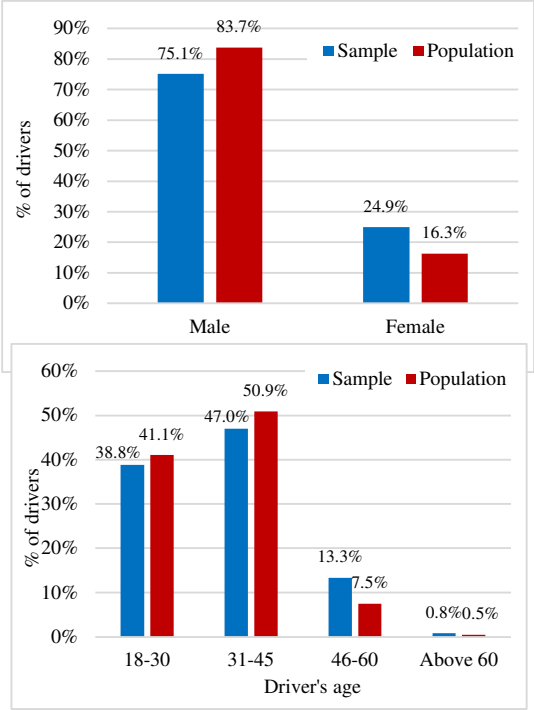

Fig 6. Drivers' Characteristics in the Sample and Population

Due to the limitation of this paper length, Table 1 shows results of some key questions of the survey. It shows that about 16.1% of drivers have more than 5 speeding violations during the last year. About 11.8% of drivers feel no enough speed enforcement and 10.5% reported that they can avoid speed camera detection. About 32.1% of drivers prefer high speed limit values and 11.4% admitted that they intentionally like to violet the speed limit. A significant percentage of drivers (73.2%) reduce their speed when they recognize a speed camera ahead. one third of the drivers directly reduces their speed just when see a speed camera without checking their current speed value. Such a behavior of reducing speed just to see the radar should be investigated given the seriousness of this behavior on traffic safety.

Regarding the location of the cameras, 53.1% of the drivers are familiar with the enforcement camera locations and 61.5% of drivers easily recognize the camera locations. That may interpret their behavior of reducing speed at camera locations. In addition, the percentage of drivers who reduce their speed when they recognize a patrol car stopping on the road side is higher compared to speed cameras. Finally, a significant percentage of drivers (89.6%) admitted that the existence of speed camera systems led them to comply with the speed limits. Most drivers (about 83.0%) believe that automated enforcement camera systems improved road safety level.

The survey data analysis showed that almost three-fourths of the drivers (73.6%) who were involved in speed-related crashes had at least two speeding violation tickets during the last year. This confirms the fact that the majority of the drivers who frequently violate the speed limit are more likely to be involved in speed-related crashes. Furthermore, it was found that male drivers tend to drive much faster, have more repeated speeding violations, and prefer higher speed limit values compared to female drivers. Most drivers tend to violate speed when they feel no enough speeding enforcement on the roads; the respondents who feel there isn't enough traffic monitoring were the most reckless where about 70.4% of them had at least two speeding violations during the last year.

Some alarming results were that 76.7% of participants claimed that they usually exceed the speed limit when they feel no speed camera around, about 88.2% reduce their speed when they approach speed camera locations, and 52% know well the speed camera locations. Moreover, about 78% of drivers got at least one speed violation ticket and 37% of them got more than 4 speed tickets during the last year. It is important to mention that about 33.7% of the respondents feel the existing number of speed limit signs isn't enough, which is a percentage that can't be overlooked since about 75.5% of them had no less than two speeding tickets last year.

Table 1: Participants' Responses to some Questions

Question No.	Variables	Categories	Freq.	Percentage
Q6	How many speed violations tickets did you get during the last year?	- Nothing	129	21.7%
		- One only	95	16.0%
		- 2 ~ 3 violations	152	25.5%
		- 4 ~5 violations	123	20.7%
		- More than 5	96	16.1%
Q8	What are the main reasons that make you exceed the speed limit while driving?	- Low values of the posted speed limits	199	33.2%
		- I feel no enough monitoring and enforcement	71	11.8%
		- I can avoid the radar easily	63	10.5%
		- I was in a rush and try to save time	253	42.2%
		- I enjoy high-speed driving	14	2.3%
Q10	Are the existing speed limit values on external roads satisfactory for you?	- Yes	351	63.1%
		- No, I prefer higher speed limit	180	32.4%
		- No, I prefer lower speed limit	25	4.5%
Q12	Do you prefer removing the existing speed limits?	- Yes	88	15.3%
		- No	488	84.7%
Q13	Do you always comply with speed limit signs?	- Yes	513	88.6%
		- No	66	11.4%
Q14	Do you adjust your speed when you approach the speed camera?	- Yes	429	73.2%
		- No	157	26.8%
Q15	What is the action you take when you watch a speed camera?	- Reduce my speed directly	72	32.9%
		- Look at my current speed to decide whether to reduce my speed or not	127	58.0%
		- Do nothing	20	9.1%
Q16	Are you familiar with the locations of existing speed and red-light cameras on the roads that you frequently use?	- Yes	297	53.1%
		- No	262	46.9%
Q17	Do you easily recognize the	- Yes	347	61.5%

Question No.	Variables	Categories	Freq.	Percentage
	locations of fixed radars when you drive on any road?	- No	217	38.5%
Q19	Is the value of fines for speeding violations deterrent for you?	- Yes	486	83.2%
		- No	98	16.8%
Q23	Are the existences of enforcement cameras leading you to comply with the speed limits?	- Yes	527	89.6%
		- No	61	10.4%
Q24	Have you faced a speed-related crash before?	- Yes	178	30.0%
		- No	416	70.0%

One interesting result was that 15.5% of the participants prefer to have roads with no speed limit. Fig. 7 shows that drivers who prefer removing the speed limits completely had slightly more speeding violations (65.9%) than others (62.9%). However, they had a remarkably higher speed-related crashes involvement (50.0%) versus (26.6%) for those who prefer roads with clear speed limit regulation. These findings prove the importance of defining a speed limit for all roads and the speed limit signs should be visible and clear.

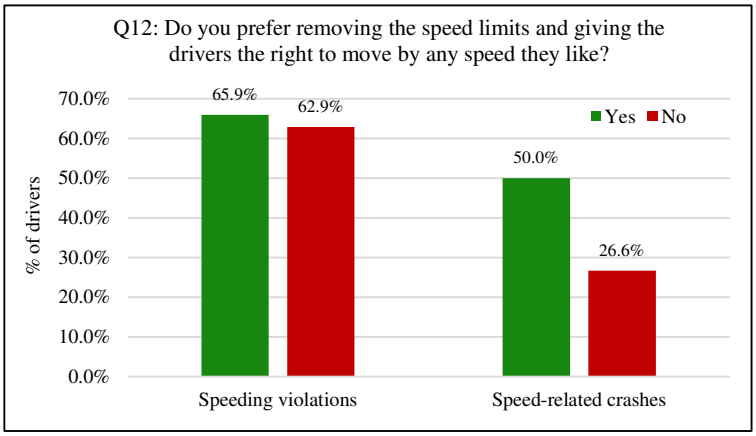

Fig. 7: Speeding Violations and Speed-Related Crashes Regarding Speed Limits Approval

As for the drivers' opinions regarding the efficiency of the automated enforcement camera systems, Fig. 8 points out that a lower percentage (60.9%) of drivers who believe that automated enforcement camera systems improved road safety level got speeding violations compared to those who think enforcement camera systems have no impact on road safety (70.0%). Moreover, almost half of drivers who thought that enforcement camera systems did not improve safety were involved in traffic crashes versus 26.0 % of drivers who thought that enforcement camera systems have a significant impact in improving road safety.

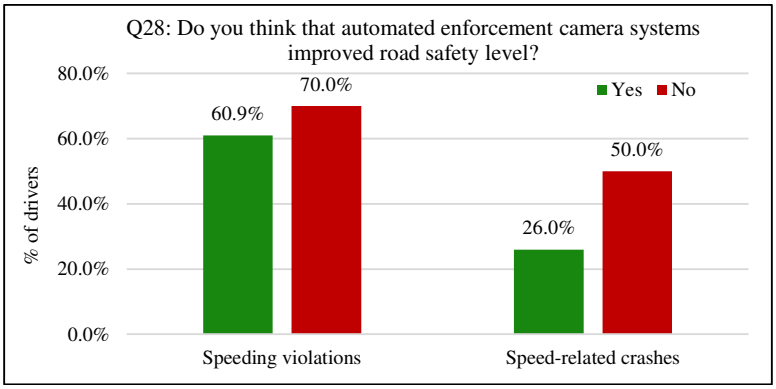

Fig. 8: Impact of Drivers' Opinion towards Enforcement Cameras Efficiency

It was found that the drivers who are unaware about the margin value between posted and enforcement speed limits were involved in speed related crashes more than others. The merging value between the posted speed limit and enforcement speed camera limit is 20 kph in AD. about 45.3% of drivers who thought the merging speed value is more that 20 kph were involved in speed crashes and hove higher speed violations compared to 25.4% of drivers who know the correct value. A positive finding in the survey is a significant number of drivers (about 83% of participants) believe that the recently implemented speed and red-light camera systems actually improved the road safety level in AD.

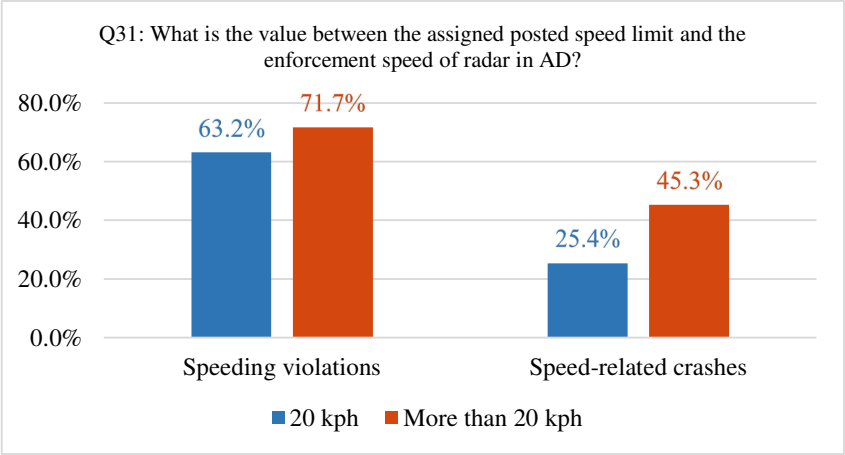

Fig 9. Impact of Drivers' Knowledge on Violations and Speed-Related Crashes

Conclusion and Recommendations

This study investigated the impact of the two automated traffic enforcements systems: speed and red-light camera systems on road safety and driver's behavior in Abu Dhabi city. Two sets of data were used to achieve the study objective; crash and traffic rule violations data during last six years and self-reported questionnaire survey data. About 600 reliable and completed forms were selected to be used in the analysis process of this study.

Crash data analysis showed that the total number of the installed speed cameras has been increased from 422 cameras in 2012 to 1,450 cameras in 2017. As a result, the number of speed-related

crashes decreases from 340 crashes to 142 crashes during the same period (about 58.2% reduction in speed-related crashes). In addition, the resulted in fatalities in the speed-related crashes were decreased from 77 fatalities to 46 fatalities (about 40.3% reduction in fatalities in speed-related crashes). The relationship between speed violation records and crashes showed that by increasing speed violations tickets the speed-related crashes decreasing.

Regarding red-light camera system RLCs, by comparing four years before and four years after RLCs installation, the analysis showed that the total crashes that occurred due to red-light running at all signalized intersections in Ad were reduced by 47.2% and RLCs installation. In addition, the red-light running related crashes were reduced by about 52.5% at the intersections where the red-light cameras were installed and the resulted in fatalities of these crashes were reduced by 57.0%.

The questionnaire survey data analysis showed a lot of information regarding drivers' behavior and response towards enforcement cameras. Male and young drivers tend to drive and violate the speed limit more than female and old drivers. About 53.1% of drivers are familiar with the locations of speed and red-light cameras. The majority of drivers reduce their speed at speed camera sites to avoid camera detection. The analysis proved that drivers who prefer high speed limit and who have more than two speeding violation tickets were involved in speed-related crash more than others. The analysis also showed a weakness in the road safety education for drivers. Drivers who do not know the true margin value between the posted and enforcement speed limits are more likely to be involved in speeding violations and speed-related crashes. Finally, about 83% of participants believe that speed and red-light cameras have significant impact in improving the overall road safety level in AD.

It is expected that the findings of this study will be very helpful for road safety authorities in Ad to improve road safety programs and action plans. in the light of these findings, it is recommended to continue in the installation of speed and red-light cameras due to its positive impact of road safety and driver's behavior. It should be taken into consideration when installing the speed camera to combine between the visible and hidden speed camera sites to reduce the local impact of the visible cameras and feel drivers that they can be detected at any time. In addition, more effort towards increase the drivers' education regarding speeding behavior and general road safety aspects in Ad should be done through awareness campaign especially for young drivers.

Acknowledgment

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Generation Z's Attitude to Eco Food as Determination Factor in Setting Up Eco Restaurants

Denka ZLATEVA
University of Economics – Varna, Bulgaria, zlateva@email.com

Mariya VELEVA
University of Economics – Varna, Bulgaria, maria.veleva@ue-varna.bg

Maciej DEBSKI
University of Social Sciences Warsaw, Poland, mdebski@san.edu.pl

Antoni KOLEK
University of Social Sciences Warsaw, Poland, akolek@san.edu.pl

Abstract

The preferences of customers in the restaurant and hospitality industry strongly depend on national characteristics, fashion and the spread of certain behavioral patterns. Therefore, it is important to reveal how the increase in the popularity of pro-ecologically oriented ideas and healthy food can affect some industries. It is sociological legitimate to select the population of people from Generation Z as a research group that is currently entering the market with new ideas and new needs.

The specific aims of this paper are: (1) to explore the Generation's Z attitude to eco food and green restaurants; (2) to conduct a comparison between representatives of Generation Z in three Middle and Eastern European countries: Poland, Bulgaria and Ukraine, concerning this attitude. The article describes the main characteristics of the Generation Z. This study presents a discussion on the results of empirical research covering the attitude of Generation Z to pro-ecological activities and lifestyle, green food and projection of consumer behavior towards the creation of green-food restaurants.

The contribution of this paper is as follows:

- Comparative analysis was done on the basis of the answers of the representatives of Generation Z from three different post-communists countries, which has not been done till now by other authors;
- Innovative is the idea to outline the relation between Generation Z's attitude to eco-food and the entrepreneurial intentions for setting-up eco-restaurants as own business;
- The current level of pro-ecological consciousness of the representatives of Generation Z in the three countries was revealed.

Keywords: Generation Z, pro-ecological policy, green food, eco restaurant

Introduction

Young people are more and more important segment of the tourist market. The annual value of the tourist market of that group of customers was estimated at 190 billion dollars in 2009 and 286 billion dollars in 2014 (Richards, 2016). The people constituting that segment possess the features crucial in tourism. What distinguishes them are relatively high amount of free time, mobility and curiosity. At the same time, they are eager to learn about new cultures, be close to nature and local communities. These features make the young an important group of customers of the tourist industry not least because they also have at their disposal significant financial measures, which is a result of the financial aid from their parents and the fact that they are not bound by the necessary expenses

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characteristic of older generations. It is also believed that the importance of this group is going to increase fast in near future (Buffa, 2015). At the same time, it is argued that the tourist industry is the industry of the future (Vukic, Kuzmanovic and Stankovic, 2014). Understanding the specifics of consumption of a given market segment, the expectations, and the sources of satisfaction, is crucial for successful sales. Taking into account the growing importance of the group and the increasing number of young people as customers of the tourist industry, the study of their behavior seems fully reasonable.

At the same time, the question of sustainable development is a significant notion in the development of the modern tourist industry (Tzschenke, Kirk and Lynch, 2004), and it has become an important topic of analyses (Berezan, Milar and Raab, 2014). Tourists' interest in sustainable holiday experience has been pointed out as a global trend (Buffa, 2015). Its key aspect is ecology and care for environment, which in many places is endangered by the excessive development of tourism. It is green concept itself is identified as one of the most crucial tasks facing the modern tourist industry (Han, Kim and Kiatkawsin, 2017). It is underlined that the concept and the need to follow its rules are especially noticeable in the hospitality industry (Mousavi, Oskara, Woosnam, 2017). Its dynamic growth inevitably means high impact on the environment (da Rosa and Silva, 2017). It is obvious that the rapid growth of the hotel services and venues is closely related to the growing number of young tourists and the growing demand for culinary services.

Understanding the motives behind purchases and the sources of customers' satisfaction is of key importance for effective sales based on adding value for consumers. That is why it is worthwhile to analyze various groups which determine the demand on the tourist market. One of such groups of ever increasing importance is the group of young people. Their behavior has undergone numerous analyses, but such studies are mainly focused on the Generation Y (Buffa, 2015; Jang, Kim and Bonn, 2011) while the Generation Z remains examined insufficiently studied. Bearing this in mind, it seems only reasonable to analyze their attitude to pro-ecological behaviors among entrepreneurs in the context of using such behaviors in building company's competitive advantage. For the purpose of this research, the following hypotheses are set:

1) The environmental protection is important to generation Z;
2) The eco food is important to generation Z;
3) Generation Z perceives „being green" as competitive advantage, and it makes sense to establish „green restaurants" as part of their green lifestyle.

In order to gain a broader perspective, a comparative analysis is carried out. The analysis includes groups of students coming from three Middle and Eastern European countries: Poland, Bulgaria and Ukraine. It yields yet another fourth question: Can any differences between the representatives of the three nations in question regarding ecology and eco food be observed?

The Generation Z – General Characteristics

In the literature concerning the subject, young people are defined according to different criteria. The authors of this study focused on the people belonging to the so-called Generation Z, assuming that it comprises people born between 1995 and 2010 (Lazanyi and Bilan, 2017; Vallone et al., 2016; Ivanyi and Biro-Szigeti, 2019). Those who are underage have been excluded from the present study as they appear far more difficult to examine (Sauthgate, 2017). This situation results in the insufficient number of analyses, especially those of the empiric character which describe purchasing behaviours of the Generation Z including those regarding tourism (Cini, Leone and Passafaro, 2012). At the same time however, the literature accentuates the need for studies concerning the behaviours of the representatives of different generations (Li, Li and Hudson, 2013).

Some of the analyses point out the fact that the young people from the Generation Z are independent (Desai and Lele, 2017), expect fast access to information and instant answers to their questions (Opris and Cenusa, 2017). This should be seen as an important premise for those employees of organisations who are responsible for communication with the young. What is not surprising is the

high level of using the available online tools for tourism-related consumption, which itself is the subject of numerous researches (Hamed, 2017; Ip, Lee and Law, 2012; Rudez and Vodeb, 2015). This generation is even characterised as more online than offline. Another characteristic feature is their use of smartphones to gain access to the internet (87% of them) when compared to older generations (Ivanyi and Biro-Szegeti, 2019). Not only does it show their need for fast access to information but also the need for various applications used for tourist consumption. The easy use of such applications results in them, being used for finding and booking tourist products on the way to work, at work or during lunch breaks (Wang, Xiang and Fesenmaier, 2014). The young do it also while travelling (Tan et al., 2017), waiting for „last minute" offers or other „limited-time-only" offers.

Hence, the features characteristic of the tourist consumption by the young should not be surprising. According to the literature, they are as follows (Baltescu, 2019):

- Proneness to last-minute decisions;
- Constant search for bargains and options;
- Use of word-of-mouth recommendations while making tourist decisions;
- Ever growing use of low-cost services.

It is worthwhile to consider the young's attitude to ecology. The environment and the need to protect it have been named as one of the main factors determining the growth of the tourist market. Moreover, the significance of this factor is still rising (Dwyer et al., 2009). The literature points at eco-tourism, nature-based tourism, responsible tourism or green tourism (Buffa, 2015). As early as in 2010, over 60% of Europeans voiced their concerns about air pollution and 50% feared the negative impact of food on health (Food-related risks, 2010). It is observed that a lot of people implement often radical changes to their lifestyles in order to limit the impact on the environment (Bostrom and Klintman, 2011; Zalejski and Faszczewska, 2012). Sidali, Huber and Schamel (2017), in turn, present an analysis which reveals different attitudes to the ecological issues depending on the respondents' age. Other sociological factors such as sex, level of education or level of income do not seem to generate any significant differences. Hence, it is worthwhile focusing on specific age groups, including the young ones. Han et al. (2017) present the results showing that young people do care about the environment and are eager to undertake pro-ecological actions. Similarly, in Poland it is the young who are most committed to pro-ecological actions. (Zalejski and Jaszczewska, 2012).

Green Restaurants for Green Consumers

Nowadays consumer behavior is strongly influenced by environmental or "green" values. According to Doszhanov and Ahmad (2015) and Mohd (2013) these values influence their consumers 'needs and attitudes, or in other words, what people buy and what they want to consume in the restaurants. 'Green' consumers are usually defined as consumers who apply consumer practices that are viewed as environmentally-friendly (Connolly and Prothero, 2008).

In the widest sense the 'green customer' is a person who is interested in the environment. According to numerous authors, the occurrence of green consumers is obvious worldwide. For example, in the USA, health-aware people prefer green restaurants, since they offer local, organic and healthy food (Namkung and Jang, 2017). A typical stereotype of the 'green customer' is that they implement green practices at home (Di Pietro et al., 2013), they are mid-high income earners, female (Han et al., 2011) and youths (Baltescu, 2017). This new trend results in a new market with an environmental conscience and new competitive advantages for the companies. In the same time, rising environmental and health concern about the current food production systems has contributed to increasing number of people considering the purchase of ''eco-friendly'' food (Mohd, 2013). Baltescu (2017) surveyed 264 students in Brasov. The results showed that although only 34% were aware of the green restaurant concept, 95% consider themselves as highly environmentally concerned. To young adults, an ecofriendly restaurant attributes are: use of renewable energies, attention to the use of ingredients, avoiding of frying procedures, and the use of organic ingredients (Baltescu, 2017).

Jang et al. (2011) defined a green restaurant as one that implements green practices. According to some authors, green practices that can be widely applied in restaurant businesses include employing energy-and water-efficiency equipment, using locally-grown and organic food, offering healthy menus, forbidding disposable cups and to-go containers, training employees to adopt green practices, recycling and disposing of cooking oil, and reducing pollution (Gázquez-Abad et al., 2015; Schubert et al., 2010).

La Vecchia (2008) points out, that in general, organic, locally and sustainably grown food can be considered as green food. It could be suggested that food-focused green attributes such as organic or locally-grown food ingredients may appeal to customers, especially health-conscious ones, who tend to prioritize their health and form their purchasing decisions based on such principles (Jang, Kim and Bonn, 2011). In their analysis, Hu, Parsa and Self (2010) confirmed that people who care more about their health are more likely to purchase green products.

Kwoka and co-authors (Kwoka, Huang and Hu, 2016) study what really matters to the consumers, why they should prefer a green restaurant. Based on the results of the survey, the authors make the following suggestions: restaurants should highlight what they have achieved in terms of environment-focused green attributes on their websites, advertisements, and other marketing materials. Green restaurants should develop menu items or special events tailored to female consumers, who tend to view green attributes to be more important than males. But according to the findings of the study green restaurants should be very cautious about charging higher prices, since most consumers indicated that they would make only marginal efforts to dine at a green restaurant. Consumer demand for environmentally friendly food has risen quickly over recent decades. Establishment of new environmental regulations has increased individuals' environmental awareness. A study conducted by Harris Interactive shows that 63% of consumers would spend more for organic food or locally grown food.

That's why increasing consumer interest in eco-friendly food caused a number of changes to the restaurant industry. Young people have become a challenging market in the restaurant industry. There are lots of studies concerning Generation Y consumers' behavioral intentions concerning green restaurants (Yoon, Woo and Mark, 2011), but studies for Generation Z are yet insufficient. That's why, in order to successfully market to this generation, restaurateurs need to understand how to satisfy this market segment of consumers.

Methodology

Sample and data collection

The study took place in December 2019 and January 2020 and included a group of students. of Generation Z in three Middle and Eastern European countries: Poland, Bulgaria and Ukraine. The survey addressed to respondents was named "Generation Z's attitude to eco food as determination factor in setting up eco restaurants". Its purpose was to obtain answers enabling the determination of attitudes and values related to organic food and the will to establish organic restaurants.

The research is directed to Generation Z - people born between 1995 and 2010. Having in mind their age, it was considered appropriate to hold it among university students. The survey is addressed to 18-26 years old respondents at University of Social Sciences - Lodz (campus Warsaw, Poland), and University of Economics - Varna, Bulgaria (Bachelor and Master degree students). The respondents were asked voluntarily to fulfill the survey questionnaire and to present them directly to the survey administrators. 600 questionnaires were distributed, as 55 of them were incomplete or invalid. 545 questionnaires were processed.

Questionnaire Development

Questions to be answered by respondents were established in accordance with the social research methodology aimed at limiting the interviewer's influence (Babbie, 2008). The respondents' knowledge of the issue also allowed questions to be predicted about future behavior and motivations (Schwarz, 2007). The survey questionnaire consisted of 15 questions that were directed to 195 Poles, 204 Ukrainians, and 146 Bulgarians.

The questionnaire was created in accordance to the research hypotheses, stated in this paper. It consists of several parts: the first one reveals demographic information like gender, age, and socio-professional groups of respondents; the second part concerns their attitudes towards pro-ecological actions, and behaviors implemented in their everyday life; the third part studies their perceptions of eco-food and green restaurants. Also there is a question concerning the relation between their green life-style and their intention to establish a green restaurant as a start-up or future business.

All the answers were measured using a nominal scale.

Data Analysis

The statistical analysis procedures used in the research are descriptive statistics as well as factor analysis. First, descriptive statistics such as simple frequencies and average values were used. Then analyzes were made detailing socio-demographic characteristics, as well as international comparisons.

The comparative analysis used in the article is an element of the study consisting in listing objects distinguished due to a common factor and observation of other differentiating aspects. The differences in the perception of eco food and eco business revealed as a result of the study have revealed the specifics of perception of this industry in different countries.

Limitations of the study and research methods used

This study included in the research is not free from limitations. First, the populations of young people studied in different countries may be an imperfect representation. Secondly, the respondents' attitudes may change over time and it may be interesting to repeat the test after a year or two. Among the limitations of the study, we can also mention the diverse level of knowledge about eco food and eco business. This means that people who are more aware of healthy attitudes may behave differently.

Results and Discussion

Respondents' Profiles by Gender and Age

According to gender criteria, out of 545 respondents, 361 are female and 184 - male. Among the different nations included in the research, the percentage between male and female respondents is as follows (table 1):

Table 1: Profile of the respondents based on gender

Gender of the respondents	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Female	70%	59%	69%
Male	30%	41%	31%

Source: own research

More women than men took part in the study. The largest percentage of women can be found in the group of Ukrainians (70%) and Bulgarians (69%). In the case of Poland, the proportion was 59% to 41%.

People between 18-26 are considered as Generation Z. In according to this, and the age criteria, 156 of the respondents are 18-20 years old, 248 from them are 21-23 years old, and 141 are 24-26 years old. Table 2 shows the distribution of the respondent groups by age and nationality as follows:

Table 2: Profile of the respondents by age

Age of the respondents	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
18 – 20 years old	54%	23%	1%
21 – 23 years old	38%	51%	48%
24 – 26 years old	5%	26%	51%

Source: own reserach

Respondents by Social Groups

Among the surveyed people social groups related to the status on the labor market and participation in education were distinguished: 156 are students, 4 are working, and the biggest group is of the working students - 385 respondents. Table 3 presents the percentage of people by nationality and socio-professional groups:

Table 3: Profile of the respondents by social groups

Socio-professional groups of respondents	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Student	25%	18%	48%
Working	1%	1%	0%
Working student	74%	81%	52%

Source: own research

Summing up the demographic features of the surveyed populations, it can be said that responses can be classified as the Generation Z, and the conducted research maintains the diversity of the population due to gender, age and socio-occupational group.

Attitudes towards pro-ecological actions, and behaviors implemented in their everyday life

Among the examined issues a question arose regarding the attitude towards pro-ecological actions and products. According to the conducted research, as much as 62% of Bulgarians believe that this is important and always pays attention to the environmental performance of products. In this case, only 22% of Ukrainians surveyed and 12% of Poles surveyed said that they always pay attention to it. This is shown in Table 4:

Table 4: Attitude towards pro-ecological actions and products

Pro-ecological actions	Results by nationality of the respondents		
	Ukrainians	*Poles*	*Bulgarians*
It is important, I always try to act in line with ecology	22%	12%	62%
I try to act according to ecology, but I do not always succeed	64%	67%	38%
I'm indifferent	7%	13%	0%
I follow the rules of ecology only as long as it is in line with my interest	5%	7%	0%
It is a waste of time	2%	1%	0%

Source: own research

The results show that young people, in all three countries, pay attention to the pro-ecological idea but with varying degree of awareness. The fact that all respondents from Bulgaria indicate the first or second answer speaks of a naïve attitude, rather than of strictly following the ecological way of life. The concept of ecological lifestyle is relatively new to the Bulgarian society and is not yet deeply understood by the young people there.

Among the Ukrainians and Poles surveyed, the largest is percentage of the respondents who try to act according to the ecological idea but do not always succeed. For Bulgarians it is approximately one third of the respondents. 13% of Poles and 7% of Ukrainians surveyed are indifferent and 1% of the Poles and 2% of the Ukrainians say that, being pro-ecologically oriented is a waste of time. It is disturbing that more than 8% of all respondents are still not aware of the importance of pro-ecologically oriented lifestyle. On the other hand, they are still young and it could be presumed that in nearest future they may become more ecologically oriented.

The answer "I follow the rules of ecology only as long as it is in line with my interest" was indicated by 7% of Poles and 5% of the Ukrainians. This position reveals the more selfish-oriented values, which is more or less typical for the young people of 21st century.

In order to indicate what the everyday life of respondents related to environmental protection looks like, they were asked what activities and behaviors they perform. Table 5 presents the results based on the result referring to measures: definitely yes - 0, rather yes - 1, rather not - 2, definitely not – 3. According to the respondents' answers, the most frequently implemented action among Ukrainians is to take the empty glass bottles to recycle-collection point; to avoid plastic packaging and to use biodegradable packaging. Among Poles, sorting garbage and switching off lights are the most important things. Also they usually use own shopping bags in order to avoid disposable plastic one. It is well known that they are non-degradable and are considered as one of the biggest environmental threads. In the case of Bulgarians, the most common form of pro-ecological activities is also delivering empty glass bottles to recycle / collection point, to carry own shopping bag, and sorting of garbage.

Table 5: Everyday actions/behaviors implemented in respondents' life

Everyday behavior of respondents	Results by nationality of the respondents		
	Ukrainians	*Poles*	*Bulgarians*
I sort my garbage	1,58	1,14	1,92
I save water cutting down its use	1,52	1,26	2,38
I carry my own shopping bag so that I don't need to buy disposable plastic ones	1,69	1,20	1,66
I use biodegradable bags	1,12	1,31	2,82
I save electricity cutting down its use	1,68	1,36	2,58
I try to buy and eat healthier foods	1,89	1,47	2,66
I pay attention/react to unnecessarily switched-on light	2,42	1,19	2,49
I take empty glass bottles to recycle/collection point	0,52	1,93	1,65
I avoid plastic packagings	0,9	1,65	2,65

Source: own research

The results in Table 5 indicate that for the different nations the same everyday activities have different impact to their ecologically oriented lifestyle. For example, avoiding plastic packaging is measured by 0.9 points for Ukrainians, 1.65 for the Poles, and 2.65 for the Bulgarians. The points for the use of bio-degradable bags vary from 1.12 (for the Ukrainians) to 2.82 (for the Bulgarians). On this base it could be suggested that the reason is still that there is still no generally accepted idea for ecological behavior by all countries.

Perceptions of Green-Food and Green Restaurants

Restaurants, oriented to green practices could establish a new niche for environmentally responsible customers and potentially sustain long-term profits. Such green restaurants could gain advantage over common restaurants on the base of implementing green policy. According to Kassinis and Sotiriou (2003), this could not only attract new customers and form higher satisfaction, but also could lead to increased loyalty and long-term increased sells.

Usually the prices at green restaurants are higher, and according to other researchers (Jang, Kim and Bonn, 2011) it could be a factor for some of the consumers to avoid this type of restaurants, regardless of their green orientation. According to Hannas (2007), even the consumers that are most committed to the green idea do not choose all the time green restaurants.

In our research to the question "Are you willing to pay more for a restaurant, following a pro-ecological policy (green restaurant)?" we received the answers presented in Table 6:

Table 6: Paying more for a restaurant following a pro-ecological policy

Possible answers	Results by nationality of the respondents		
	Ukrainians	*Poles*	*Bulgarians*
Definitely yes	8%	3%	29%
Rather yes	47%	44%	68%
No opinion	18%	28%	1%
Rather not	25%	21%	2%
Definitely not	2%	4%	0%

Source: own research

Almost 2/3s of the respondents (63.4%) are willing to pay more, but only 11.7% of them gave the answer 'Definitely yes", while 51.7% said 'Rather yes". It can be seen that the percentage of those who are firmly ready to pay is approximately low - 11.7%. Similar results are presented by other researchers too (Manaktola and Jauhari, 2007) - they found out that despite of the positive attitude towards green practices, only 15% of the respondents were willing to pay extra for environmental initiatives. Dutta et al. (2008) found out that around half of the respondents are ready to pay up to 3% more than regular menu prices if the restaurant is green, and almost 15% of the respondents would pay as much as 10% more.

On the other hand, almost 20% of the respondents are not willing to pay more even though they realize the advantages of the green idea. If we try to distinguish the national attitude - it can be seen that approximately half of the Ukrainians and Poles would pay more for green food, while for the Bulgarians the percentage is considerably higher (above 90%). Probably it is due to the fact that in Bulgaria, especially out of the capital, there are still not enough green restaurants. So, maybe some of the respondents do not have a real idea about the price differences between green and common restaurants.

In recent years, green food consumption became a global issue and it could be assumed that, as income increases consumers tend to pay more for high-quality food. Food safety and sustainability are two important factors for food quality. That is why green food with less chemical residuals has become more preferable across the world.

In this study, in order to examine whether green food is important for respondents from the generation Z, they were asked if they were willing to pay more for green food. The results are shown in Table 7:

Table 7: Paying more for eco-friendly food

Possible answers	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Definitely yes	10%	7%	37%
Rather yes	59%	53%	60%
Rather not	26%	32%	3%
Definitely not	5%	8%	0%

Source: own research

The vast majority of respondents (73.2%) in general, are willing to pay more, but there are shaped two segments: definitely ready to pay more (16.14%), and consumers, rather willing to pay more (57.06%). The last ones are prevailing in the answers of all the three nations examined.

The results are similar to the ones of other researchers (Xiaohua, Zhifeng and Yinchu, 2014). In their study they conclude that younger people are willing to pay more for green food. A possible explanation for this could be that they have a longer life expectancy and because of this they prefer food of high quality to gain health benefits.

Almost 27% of the answers belong to the group which is not willing to pay more for eco-friendly food. The possible reasons could be: they are not willing to change their willing habits; insufficient financial resources and because of this - re-arraignment of spending priorities; insufficient awareness of green food benefits. Probably, the regional difference between the big and small cities could be also a reason for these results - the green food benefits awareness is more spread in the big cities than in the small ones.

In addition to economic behavior, an attitude towards health-related qualities of food is also of an interest. Despite that generation Z prefers snacks and street food they are also ready to try new kinds

of food. That is why they are open towards to 21st century trend of green food. According to Mc Sweeney (2019) the majority of generation Z is looking for food that fits in with their values - green, sustainable, and the locally produced.

The respondents of our study were asked to answer the question: "Do you pay attention to health-related qualities of the food you consume?". Results are presented in Table 8:

Table 8: Paying attention to health-related qualities of food

Possible answers	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Definitely yes	18%	26%	76%
Rather yes	54%	60%	34%
Rather not	26%	11%	0%
Definitely not	2%	3%	0%

Source: own research

Almost 85% give positive answers (36.5% - definitely yes; 48% rather yes). Nevertheless that all the respondents origin from post-communist countries, the national eating patterns have impact on their attitude towards health-related aspects of food.

Relatively low (1.9%) is the percentage of those who definitely does not pay attention to health benefits of food.

In order to examine which specific characteristics of the food our respondents define as green, we asked: "Which of the following statements are true regarding green food?". The possible answers were: always - 0; sometimes - 1; never - 2; no opinion – 3. The presented results (Table 9) indicate that respondents attach great importance to the healthy aspects of food products. Among the main symptoms of healthy food, the most important were: low calorie, production doesn't harm environment, product has short expiry date, or product doesn't contain preservatives. Result is shown in Table 9.

Table 9: Perceived characteristics of green food

Characteristics of green food	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Is less calloric	1,94	1,46	1,5
Tastes good	2,22	1,33	1,46
Has short expiry date	2,23	1,09	1,11
Its production doesn't harm environment	2,35	1,18	1,02
Is not genetically modified	2,23	1,21	1,01
Is not highly processed	1,89	1,12	1,05
Looks attractive	1,96	1,39	1,46
Is more nutritious	2,15	1,07	1,02
Doesn't contain preservatives	2,2	1,15	1,05

Does not cause allergies	1,98	1,34	1,56
Is very healthy	2,34	1,07	1,03
Has no distinctive feature except high prices	1,54	1,48	1,04

Source: own research

The results presented in the table indicate differences in green food characteristics perception among the respondents, based on their nationality. For Poles, the following features are most often related to green food: it is more nutritious; it is very healthy, while most rarely the following statements are considered true: it is less caloric; it has no distinctive features except high prices.

The Bulgarians consider the answers "it is not genetically modified"; "it is more nutritious"; "its production doesn't harm environment"; "it is very healthy" as most related to the green food. The least related ones are: it does not cause allergies; it is less caloric; tastes good; looks attractive.

Ukrainians differ in their opinion - most often, they associate green food with the statement "it has not distinctive feature except high prices". Next in importance are: "it is not highly processed"; "it is less caloric"; "looks attractive". As least important ones they point out: "its production doesn't harm environment". Comparing the values listed in Table 9, similarities of perceptions of green food for Poles and Bulgarians can be seen, while the opinion of the Ukrainians differs. For example, the statement "it is more nutritious" is among the most important for Poles (1.7) and Bulgarians (1.02), while for Ukrainians it is considered less important (2.15).

According to Schubert, F., et al (2010) the pro-ecological policy of restaurants includes three aspects: environmental, health, and social. The various groups of consumers rank these aspects in a different way while creating the image of pro-ecological restaurant in their minds.

In order to reveal how our respondents estimate the value of restaurants following a pro-ecological policy (or using green-food), a question was included in the survey. Results are presented in Table 10:

Table 10: Value of restaurant following a pro-ecological policy (or using green food)

Possible answers	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Definitely yes	16%	13%	52%
Rather yes	60%	46%	44%
No opinion	17%	29%	3%
Rather not	6%	10%	1%
Definitely not	1%	2%	0%

Source: own research

Almost 75% of all respondents state that they would value higher such restaurants. It is worth to compare these results to the ones, presented in Table 6, where 63.4% are willing to pay more to visit a restaurant following a pro-ecological policy. Obviously, some of the respondents value higher this kind of restaurants, while they are not able to pay more for them.

17.6% do not make difference between pro-ecological and common restaurants. 7.5% do not see the advantages of pro-ecological ones.

As mentioned above, one of the aspects of the pro-ecological policy of the restaurants is the environmental one. The most common practices related to this aspect are: energy and water efficiency equipment; recycling of cooking oil; pollution reducing; forbidding disposable caps, etc.

A question related to this was set in our questionnaire: "Do you think that the establishment of more restaurants following a pro-ecological policy could support the idea for ecologically clean nature?". The results are presented in Table 11:

Table 11: Relation between establishment of restaurants following a pro-ecological policy and ecologically clean nature

Possible answers	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Definitely yes	22%	18%	95%
Rather yes	48%	52%	5%
No opinion	22%	16%	0%
Rather not	7%	12%	0%
Definitely not	1%	2%	0%

Source: own research

Less than 10% give a negative answer, while 78% are confident that implementing these practices can help for cleaner nature. Presented by nations, the results are as follows: 70% of the Poles, 70% of the Ukrainians, and all of the Bulgarians support this idea.

In order to obtain a prognostic knowledge about the tendency and willingness to establish a pro-ecological restaurant as a startup for own business by the respondents, a question whether they would like to establish such a restaurant was asked. The results are presented in Table 12:

Table 12: Intentions for establishing a pro-ecological restaurant as a start-up for own business

Possible answers	**Results by nationality of the respondents**		
	Ukrainians	*Poles*	*Bulgarians*
Definitely yes	18%	9%	60%
Rather yes	43%	18%	39%
No opinion	17%	23%	1%
Rather not	16%	33%	0%
Definitely not	6%	17%	0%

Source: own research

From the table it is obvious that 26.2% of all the respondents answer "definitely yes", as in this quota prevail the answers of the Bulgarians (60% of the Bulgarian respondents). 33% of all answers are "rather yes". In this case prevailing is the quota of the Ukrainians (43% of the Ukrainian respondents). Almost 60% of the young people belonging to Generation Z, included in the survey, have entrepreneurial intentions and would start their own business (answers "definitely yes", and "rather yes"). .

The biggest is the share of the Bulgarians, followed by the Ukrainians, and the Poles. It is difficult to define the exact reason for these results. Nevertheless, it could be suggested that most of the young Bulgarians believe that through establishing their own business they could gain financial independence and self-managed professional development.

26% of the respondents are not interested in establishing their own pro-ecological restaurant, at the same time, 14.8% state that they have no opinion.

Conclusions

The presented research demonstrates that young people, in all three countries, pay attention to the pro-ecological idea, although - with varying degree of awareness. For the young people of the three nations presented in the study, the same everyday activities (sorting garbage, saving water, using bio-degradable bags, avoiding plastic packaging etc.) have different impact to their ecologically oriented lifestyle, but they do apply them.

Most of the respondents from Poland, Ukraine and Bulgaria, are willing to pay more for a restaurant following a pro-ecological policy and they believe that such restaurants could help to protect the environment, because of the pro-ecological practices implemented. Green food consumption becomes trendy for the generation Z and it is not just because it turns out to be a fashion, but also because they pay attention to the health benefits of green food and healthy lifestyle too.

Almost 75% of the respondents estimate higher the value of restaurants following a pro-ecological policy which highlights their ecological consciousness regardless of nationality, and consider it as a competitive advantage. There is a strong bond between their ecological awareness and the level of their intention to establish a pro-ecological restaurant as a start-up. However, a difference could be seen among the representatives of the three countries studied. A large number of respondents representing generation Z believe that such restaurants could help to protect the environment.

The research hypotheses adopted for the purpose of this study have been confirmed by the results and thus - should be considered as correct. The contribution of this paper is spread in few aspects:

- Comparative analysis was done on the basis of the answers of the representatives of Generation Z from three different post-communists countries, which has not been done till now by other authors;

- Innovative is the idea to outline the relation between Generation Z's attitude to eco-food and the entrepreneurial intentions for setting-up eco-restaurants as an own business;

- The current level of pro-ecological consciousness of the representatives of Generation Z in the three countries was revealed.

This study could be considered as a starting point for further analysis related to Generation Z's attitude towards pro-ecological life-style.

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Methods of Assessing the Economic Impact Investing in The Development of Intellectual Resources

Roman E. MOISEEV
Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia, remoiseev@kai.ru

Gaziz F. MINGALEEV
Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia, mingaleevgaziz@mail.ru

Rafik Z. VALIULLIN
Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia, varafi@mail.ru

Mansur F. SAFARGALIEV
Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia, safargaliev@list.ru

Abstract

In modern times, the process of making a decision on whether to invest in education or not is complicated. When a person decides to invest in education and continuing education, his expectations regarding his future income play a significant role in this matter. Since the results of investment in education appear in the form of higher wages, it is possible to conclude if the investment was profitable and efficient. The main practical problem is associated with the lack of scientific tools which determine the relationship between the competencies formed at the training stage and the results that are obtained by the both sides interested in the development of intellectual resources. Along with the transition to the digital economy, significant changes are taking place in the labor market. The demand for professions that are associated with the performance of repetitive formal operations is decreasing. Instead there is a growing demand for specialists who can deftly use digital technologies for the benefit of business, competence profiles are changing; new professions continue to appear, the requirements for staff flexibility and adaptability are increasing as well as the need to obtain supra-professional skills ("soft skills"). In this regard, the purpose of the article is to create a measuring toolkit for assessing the results of investment in the development of intellectual resources. The proposed toolkit allows for a more accurate setting of educational tracks on the basis of technical specifications of employers' enterprises and allows accelerating the process of paying off the investment in the development of intellectual resources. The authors attempted to describe mathematically the relationship between the competencies formed at the training stage and the results achieved by the participants in the development of intellectual resources. A particular feature of the proposed economic and mathematical tools is the ability to quantitatively measure the relationship between competencies and wages. At the same time, the authors note down that this method is developing in the direction of paying attention to the formation of professional competencies and personal qualities in the development of intellectual resources.

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Introduction

In recent years, the development of the digital economy has been driven by large-scale technological, demographic and geopolitical trends.

During this time, the mechanisms of human involvement in economic activity have changed, along with the transition of the economy from one type to another. The era of mass digitalization is no exception, and it also leads to dramatic changes in people's lives.

Labor productivity and competitiveness of companies are growing, jobs are being created. Humanity is now connected by technological devices and each person is given the opportunity to find and buy goods from anywhere in the world. Linguistic, religious and racial borders and barriers are being erased.

So, the electronic economy is no longer limited to the e-commerce business, but affects absolutely all aspects of life. All this is due to the growth of the digital space.

Therefore, first of all, this term refers to an economy based on the use of digital information and communication technologies.

Mostly, it characterizes the field of electronic goods and services. But it also affects production, which uses the latest Internet technologies. These include, for example, "Industry 4.0", "Smart Factory", etc. Human resources serve as the carrier of information and knowledge, which in turn affects the business environment. During this period of digitalization, the importance of control over the technological processes which are associated with the accumulation and use of human capital should be noted.

Thus, the purpose of the article is to create a measuring instrument for assessing the results of investment in the development of intellectual resources.

Literature Review

Although human capital as an economic category appeared for the first time in the 17th century, William Peter was the first who tried to measure it quantitatively. So, by human capital he meant both a person and his useful properties. He believed that it was this factor that contributed to the increase in national wealth more than all the others [1].

Adam Smith proceeded in conducting the research on this topic and wrote ‘A Study on the Nature and Causes of the Wealth of Nations’ (1776). There he noted that in order to achieve productivity growth, it is necessary to improve the skills and abilities of a worker and only afterwards to upgrade and renovate the machines and tools. The cost of it is tantamount for property capital investments and are paid off over the course of a working period. To sum up, education is an investment in a person's ability to earn money in the future. Therefore, it must be accessible to the population [2].

In the modern world, given the growth and infusion of the digital economy, information and knowledge are becoming even more significant factors of production. Now, when the competitiveness of an enterprise is being determined, it is not so much the materials and resources that are assessed as intellectual resources [8].

Therefore, the latter, as well as fixed and circulating assets, are considered the welfare of an enterprise and are a key factor in its development.

Despite the fact that the authors all over the world carried out research on this topic, modern economic science still gives no clear interpretation of the concept of "intellectual resource".
T.A. Stewart is the first to use the term "intellectual capital". He explained this concept as useful knowledge, information and intellectual property assigned to a company and used to produce more valuable property. Intellectual resources are used to form intellectual capital [3].

Statement of the problem

Analysis of the literature [4,7,12,13] has shown that in modern conditions the choice of whether to invest in education or not is becoming more complicated. When a person decides to invest in education and continuing education, his expectations regarding future income play a significant role in this matter. Since the results of investment in education appear in the form of higher wages, it is possible to say whether the investment was profitable and efficient.

The main practical problem is associated with the lack of scientific tools which determine the relationship between the competencies formed at the training stage and the results that are obtained by the both sides interested in the development of intellectual resources.

Theoretical part

Along with the transition to the digital economy, significant changes are taking place in the labor market:

- the demand for professions that are associated with the performance of repetitive formal transactions is decreasing;
- there is a growing demand for specialists who can deftly use digital technologies for the benefit of business;
- competence profiles are changing;
- new professions continue to appear;
- the requirements for flexibility, adaptability and the possession of supra-professional skills (“ soft skills ”) of personnel are increasing [9].

According to UNESCO, an international research showed that the level of income depends on the level of education by 60%. The following trends were distinguished:

- the wages of the people who received better education are higher than those with a worse quality education;
- the more experienced and older the employee is, the higher his salary is;
- the better the education is, the later the marginal revenue is reached.

Therefore, when a person decides to invest in education and continuing education, his expectations about future income play a significant role in this issue [10]. Since the results of investments in education are manifested in the form of higher wages, the high earnings prove that the investments showed themselves as profitable and effective.

In these conditions, the process of making a decision regarding investment in education becomes more complicated. This is due to the lack of scientific tools for determining the relationship between the competencies formed at the training stage and the income received at the stage of labor activity [11].

The development of intellectual resources consists in the constant improvement of human abilities, competence and motivation [15].

The formation of individual resources includes the following stages:

1. Primary socialization. A child gets the basics of world picture, culture, some primitive knowledge, skills and abilities, norms of human interaction. Psychomotor reactions and stability of the nervous system are also formed [14].

2. Basic intellectual. A child goes to school and gets basic knowledge in the field of natural, humanitarian and social sciences [16]. Also, his talents, abilities, creativity, individual needs and interests are identified and formed out.

3. Professional and educational. At this stage, a person gets high education, receives basic professional training and forms intellectual potential. Thanks to theoretical and practical training, the professional competencies of the individual are developed. They are consolidated with advanced training, industrial training and retraining.

4. Accumulation and implementation of intellectual capital. At this stage, a person receives and updates his knowledge in institutions of higher education and postgraduate education, attends various extra trainings, courses and seminars. All this contributes to the development of professional and personal competencies.

The time of using human capital can be extended by investing in health care and social security of citizens [17], as well as in disease prevention, social insurance, leisure and sports. Also, the improvement of living conditions contributes to the improvement of the quality of life, reduction of morbidity, mortality and extension of working capacity.

5. Return and depletion of intellectual capital. This is the final stage at which social, labor and creative activity decreases. The person loses some professional skills and retires. Both the person and the organization reduce the investments in the person's education, but the help and support of the family and the state are required [18].

The realization of intellectual potential at each of these stages changes in scale, subjects of financing and cost characteristics.

So, on one hand, the development of the use of intellectual resources is accelerating thanks to the digital economy. It makes it possible to acquire knowledge without interfering in the work process, e.g. via distance learning, consulting general cultural and professional information resources, free consulting services on educational forums, blogs, Internet reference books, encyclopedias and other resources [19].

However, on the other hand, the person needs a sufficient number of high-quality personnel for full development [20]. Therefore, most enterprises are trying to adapt to new conditions taking into account the values of the new generation and changing the tactics of hiring, retention and remuneration of employees.

All the work of the future is expected to be team work. Employees must interact with each other and complement each other. Instead of narrow specialists there should be a team of people and over time their roles in the team will be changing. The project changes and so do the requirements for the skills of employees.

The most demanded will be the employees who have a whole range of competencies and other qualities that go far beyond the scope of highly specialized training and also those who are versed in several areas at once and can transfer knowledge and technological solutions from one industry to another.

Also it is important to note that any organization has specific strategic goals. In order to achieve them, you need personnel with the appropriate knowledge, skills and abilities. No financial investment can ensure the viability of an organization if it does not have talented and experienced employees.

The company, in turn, uses a remuneration system, motivates employees and focuses their attention on solving certain problems. This system should be valuable to the employee and satisfy his needs.

In practice, there are several main approaches to the development of a remuneration system:

1. based on the assessment of the value of labor (workplace);
2. based on the assessment of labor results;
3. based on the assessment of competencies.

Considering the development of the digital economy and the intellectualization of education, where a person receives not just an education, but a set of certain competencies, the remuneration based on a competence-based approach deserves more attention and meets modern requirements.

In this case, for each position, a list of competencies is formed which includes a full set of characteristics (knowledge, skills, abilities) and behavior indicators necessary for the employee to successfully perform his functions. The value of remuneration of staff will depend on the level of competence required.

In the case when these competencies are designated, the personnel have goals and motivation that orient them towards achieving a significant level of competence in a particular area of activity.

The main advantage of competency-based pay is its developmental component. The introduction of such a system will be more successful in organizations with a sufficiently high level of general education, in a corporate culture, which has great values of self-development and competence.

Some authors proposed to use the model which links the wages of workers of a certain category with their levels of general, professional and general cultural competence.

For the sake of simplicity, we will consider 4 categories:

1 - workers
2 - employees
3 - specialists
4 - leaders.

The model for each category of personnel will be the dependence of workers' wages on the level of competencies required.

Let's introduce the notation:

i - personnel category $(i=\overline{1,4})$

P_{ij} - general professional competencies for the i category of personnel $(i=\overline{1,4};\ j=\overline{1,\ell_i})$

p_{ij} - professional competencies for the i category of personnel $(i=\overline{1,4};\ j=\overline{1,m_i})$

The salary level for each category will be considered as a function of competencies

$$Z_i = f_i(\overrightarrow{P_i}, \overrightarrow{p_i}, \overrightarrow{k_i})$$

Where $\overrightarrow{P_i} = (P_{i1}, P_{i2}, ..., P_{i\ell_i})$

$\overrightarrow{p_i} = (p_{i1}, p_{i2}, ..., p_{im_i})$

$\overrightarrow{k_i} = (k_{i1}, k_{i2}, ..., k_{in_i})$

The type of function can be selected taking into account specific data on the enterprise.

The general requirements for functions are the following: non-decreasing in the interval of changes in its arguments and capable to pass through the origin.

Let us consider a model of the competence of the personnel of an enterprise using the example of an economist (settlement and economic activity) of an enterprise.
For example, in the enterprise an economist y (i = 3) is required to have the following competences:

General professional:

- the ability to analyze data and be able to justify research results (P_{31}) ;
- the ability to collect, analyze and process the required data (P_{32}) ;
- the ability to solve problems connected with professional activity (P_{33}) ;
- the ability to make managerial decisions and the willingness to take responsibility for them (P_{34}).

Professional:

- the ability to analyze the financial and economic activities of the enterprise (p_{31}) ;
- possesses the skills with software reference of the Economic and Financial Statements (p_{32}) ;
- the ability to perform the calculations necessary for drawing up the economic sections of plans, justify them and present the results of work in accordance with the standards adopted in the organization (p_{33}).

General cultural:
- the ability to communicate in oral and written forms in Russian and foreign languages (k_{31}) ;
- to be active and creative regarding the work (k_{32}) ;
- the ability of self-organization and self-education (k_{33}).
For example, consider the linear form of the function:

$$Z_i = \sum_{j=1}^{\ell_i} a_{ij} P_{ij} + \sum_{j=1}^{m_i} b_{ij} p_{ij} + \sum_{j=1}^{n_i} c_{ij} k_{ij}$$

For the sake of convenience while describing the example, let us assume that the competences within one group have the same coefficients, i.e.

$$Z_i = a_i \sum_{j=1}^{\ell_i} P_{ij} + b_i \sum_{j=1}^{m_i} p_{ij} + c_i \sum_{j=1}^{n_i} k_{ij}$$

Where

$i=3,\ \ell_i = 4\ ,\ m_i = 3\ ,\ n_i = 3$

We will introduce a scale of competencies indicating the levels that describe the quality of behavior. The level scale can be different. For example, 4 levels:

0 - competence has not been demonstrated;
1 - the level of basic development;
2 - the level of confident possession of competencies in standard situations;
3 - skilled level.

A university graduate who has mastered the bachelor's program possesses the competencies provided by it.

General professional competences:

– the ability to solve standard problems based on information and bibliographic culture, using information and communication technologies and taking into account the basic requirements of information security;
– the ability to collect, analyze and process the data necessary to solve professional problems;

– the ability to choose tools for processing economic data in accordance with the task, analyze the results of calculations and substantiate the findings;

– the ability to find organizational and managerial solutions in professional activities and the willingness to bear responsibility for them.

Professional competences (settlement and economic activity):

– the ability to collect and analyze the initial data necessary for calculating economic and socio-economic indicators characterizing the activities of economic entities;

– the ability to calculate economic and socio-economic indicators characterizing the activities of economic entities on the basis of standard methods and the current regulatory framework;

– the ability to perform the calculations necessary for drawing up the economic sections of plans, justify them and present the results of work in accordance with the standards adopted in the organization.

General cultural competences:

– the ability to use the foundations of economic knowledge in various fields of activity;

– the ability to communicate in oral and written forms in Russian and foreign languages for solving problems of interpersonal and intercultural interaction.

– the ability to work in a team, being tolerant to social, ethnic, confessional and cultural differences;

– the ability for self-organization and self-education.

Comparison of these competencies with the enterprise competency model shows their only partial correspondence. Assuming that a graduate has a basic level of competencies, we will have:

$P_{3j} = (1, 1, 1, 1)$; $p_{3j} = (1, 0, 1,)$; $k_{3j} = (1, 0, 1)$

Table 1: economic effect of investing in education according to the requirements of federal standards

Period (year)	First . expenses	Cash income	Cash expense	Cash flow	Net cash flow	Net Present Value (NPV)
1	116400	-126637	-243037	-243037		0
2	116400	-126637	-243037	-243037	-486074	-466258
3	116400	-126637	-243037	-243037	-729111	-670875
4	116400	-126637	-243037	-243037	-972148	-858033
5	10000	167040	10000	157040	-815108	-690098
6	10000	208800	10000	198800	-616308	-500515
7	10000	240120	10000	230120	-386188	-300845
8	10000	271440	10000	261440	-124748	-93218
9	10000	292320	10000	282320	157572	112946
10	10000	313200	10000	303200	460772	316812
11	10000	334080	10000	324080	784852	517639
12	10000	375840	10000	365840	1150692	727985
13	10000	417600	10000	407600	1558292	945662
14	10000	469800	10000	459800	2018092	1174768
15	10000	522000	10000	512000	2530092	1412770
Total:						1 628 739

Initial data for the calculation:
tuition fee is 116.4 thousand rubles, annually for 4 years
discount rate = 4.25%
lost wages while studying is equal to the minimum wage
the annual expenses for the acquisition / improvement of competencies are 10 thousand rubles.
the acquisition / improvement of competencies leads to an increase in salary according to the competency model.

With this initial data taken into account, training costs will pay off in the fifth year of operation.

If a university prepares a specialist paying attention to the requirements of the enterprise beforehand, the graduate is already more prepared to work in the enterprise. In this case, all the competencies included in the model can be considered as having a level of confident competence in standard situations for a graduate.

In this case, the starting salary is 40 thousand rubles (table 2).

Table 2: The economic effect of investing in education in accordance with the requirements of federal standards and TK of the employer enterprise

Period (year)	First . expenses	Cash income	Cash expense	Cash flow	Net cash flow	Net Present Value (NPV)
1	116400	-126637	116400	-243037		0
2	116400	-126637	116400	-243037	-486074	-466258
3	116400	-126637	116400	-243037	-729111	-670875
4	116400	-126637	116400	-243037	-972148	-858033
5	10000	417600	10000	407600	-564548	-477966
6	10000	448920	10000	438920	-125628	-102025
7	10000	480240	10000	470240	344612	268457
8	10000	501120	10000	491120	835732	624503
9	10000	522000	10000	512000	1347732	966040
10	10000	542880	10000	532880	1880612	1293048
11	10000	584640	10000	574640	2455252	1619330
12	10000	626400	10000	616400	3071652	1943280
13	10000	668160	10000	658160	3729812	2263467
14	10000	720360	10000	710360	4440172	2584705
15	10000	783000	10000	773000	5213172	2910966
Total:						11898639

In this case, the training costs will pay off in the third year of work. It can be seen that the second model has a significant advantage over the first. A characteristic feature of the proposed model for the development of intellectual resources based on the formation of standard competencies and competencies ordered by employers is the possibility and necessity of enhancing cooperation between educational institutions and employers. This relationship provides an independent request of society, students and employers for quality education.

Results

It should be noted that a more accurate setting of educational tracks based on the technical specifications of employers' enterprises allows accelerating paying off the investment in the development of intellectual resources. In this article, an attempt was made to describe the mathematical relationship between the competencies formed at the training stage and the results that are obtained by the both sides interested in the development of intellectual resources. A characteristic feature of the proposed economic and mathematical tools is the ability to quantitatively measure between competencies and people's salaries. At the same time, the authors note down that this method is developing in the direction of paying attention to the formation of professional competencies and personal qualities in the development of intellectual resources.

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Teamwork as a Moderator of relation between Information System Success and Organizational Performance

Katarzyna TWOREK
Wroclaw University of Science and Technology, Faculty of Computer Science and Management,
Wyb. Wyspianskiego 27, 50-370 Wrocław, Poland, katarzyna.tworek@pwr.edu.pl

Artur KRZYSTEK
Comarch S.A., Finance, Banking and Insurance IT Services,
Prof. M. Życzkowskiego 29a, 38-864 Kraków, Poland, artur.krzystek@comarch.pl

Abstract

The paper is devoted to the analysis of the potential influence of teamwork on Information System(IS) success. The study concentrates on IS success and its influence on organizational performance. It is assumed that teamwork is one of factors potentially influencing that relation. Empirical research is conducted to verify formulated hypotheses based on results obtained from more than 1000 organizations from two business contexts (Poland and Switzerland) in order to determine whether teamwork is a moderator of the relation between IS success and organizational performance.

Keywords: Information System success, organizational performance, teamwork

Introduction

On dynamical and competitive markets the Information Systems are the elements of socio-technical organizations which enables their business activity and would made their competitive advantage (Ives and Learmonth, 1984). They are enough relevant to become the business strategy entity (Wilson, 1989; Bergeron and Crotau, 2001). Implementation and servicing of IS are also a big share in companies' budget and its failure exposure the for the risk often threatening its existence. That means the success of IS is significant to organizational effectiveness and may determine its performance (Delone and McLean, 1992) but this relation was limited to some benefits (Delone and McLean, 2003; Seddon, 1997).

In 1992 Gordon studies it was showed: the 82% of North American companies with over a hundred of employees are organized in a form of work teams. In the middle of 1990s approximately 70% of Fortune 1000 companies involves teams and plans their use of teams in the future (Chen and Barshes, 2000). Teams are the basement building of most organizations (McGrath, 1997) and team effectiveness is the significant factor of organizational performance (Gladstein, 1984; Hackman, 1987; Magpili and Pazos, 2018; Bieńkowska, 2019; Bieńkowska & Ignacek-Kuźnicka, 2019). This is why teamwork become important construct effecting this performance(Salas, Cooke and Rosen, 2008; Delarue et al. 2008). Teamwork as the socio-technical phenomena is studied in context of shared cognition (Salas and Fiore, 2004; Salas, Cooke and Rosen, 2008) and quality of work life (Pearce and Ravlin, 1987; Hackman, 1987; Campion, Papper and Medsker, 1996) and these factors may strengthen relation between IS Success and organizational performance.

So far, many research were conducted according to team effectiveness and organizational impact. In 2008 there were over 130 models explaining team performance (Salas et al. 2007) . Many of them were concentrated on teamwork (Salas, Sims and Burke, 2005). Moreover, there many developments and modifications of IS success models. In 2011 there were over thirty ongoing or finished research in area of IS success model (Müller and Urbach, 2011). Thus, this study does not focus on the statement, that IS success and teamwork influences organizational performance. The main approach of is to verify if teamwork is a moderator of the relation between IS success and performance. If it turned out to be true

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it might mean that the role of teamwork in organizational performance and the IS success is bigger than it is currently understand.

Literature Review and Hypotheses Development

Teamwork in organization

Teamwork as the way of organization structure impacting its performance comes from socio-technical systems theory (Trist, 1981). Researchers assume various approaches to explaining the term 'team'. There is no unambiguous approach to the term itself, as it is interchangeably (seldom without proper explanation of differences) used as: self-managed team or autonomous team (Delarue, et al. 2008; Muller, Procter and Buchanan, 2000; Guzzo and Dickson, 1996) or even group or working unit (Benders and Van Hootgem, 1999). In this article, the term team will be understood as: ' (a) two or more individuals who (b) socially interact (face-to-face or, increasingly, virtually); (c) possess one or more common goals; (d) are brought together to perform organizationally relevant tasks; (e) exhibit interdependencies with respect to workflow, goals, and outcomes; (f) have different roles and responsibilities; and (g) are together embedded in an encompassing organizational system, with boundaries and linkages to the broader system context and task environment' (Kozlowski and Ilgen, 2006).

Teamwork can be defined as the set of specific and inter-correlated knowledge, skills, and attitudes (KSAs) letting the team for effective work in terms of coordination and adaptiveness (Campion and Stevens, 1994;Cannon-Bowers et al. 1995; Sims, Salas and Burke, 2005).

The essence of IS success

Information System (IS) success model (Delone and McLean, 1992) was positively verified by many researchers (Petter and McLean, 2009). User satisfaction is general factor of IS success (Zviran and Erlich, 2003) basing on three dependent variables : IS quality , information quality and service quality (Delone and McLean, 2003).

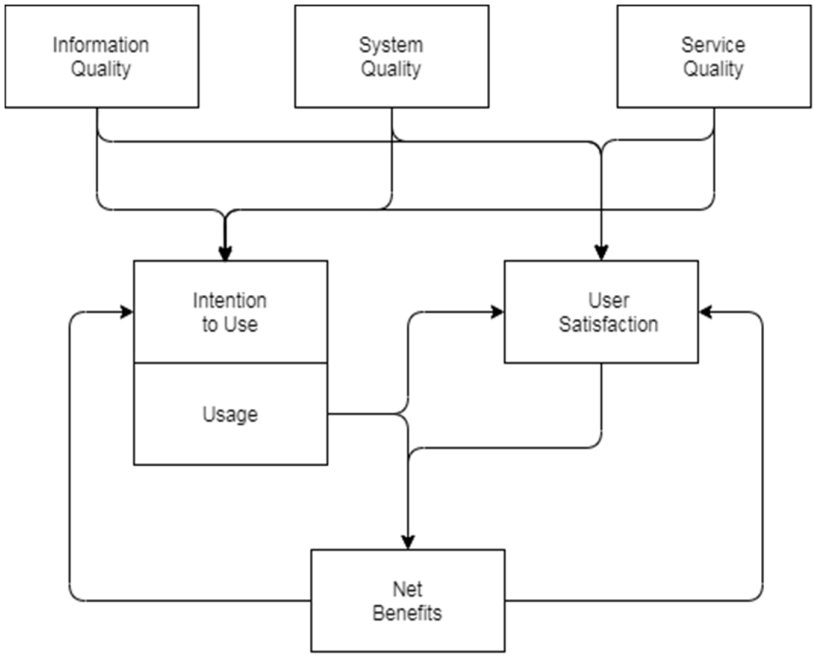

Fig. 1: Delone and McLean IS success model

IS success may be measured by dependent variables in reference to Delone and McLean model, by four items:

- Service Quality : The fulfillment of the given SLA.
- IS intention to use: The willingness of use of IS by employees.
- Quality, Information Quality : The correctness of information received from IS
- Quality, Usefulness : The performance of employees enhanced by the use of IS

In this article IS usage is not taken into consideration because the relation between IS use and IS user satisfaction is not clear enough (Bokhari, 2005) and was replaced by usefulness (Seddon and Kiew, 1996; Seddon, 1997).

Teamwork , IS success and organizational peformance – hypotheses development

In a time perspective, IS success depends on user involvement from the very early stage of system definition (requirements definition), through the development, implementation, ending on IS servicing. User involvement plays key role in IS success, but this role needs further research (Bano and Zowghi, 2015; Alam, 2002). Moreover, teamwork quality (TWQ) is a crucial construct building software teams effectiveness understood as IS quality (Gemuenden and Hoegl, 2001). High TWQ influences high IS quality as the output of teamwork and may lead to IS success. User involvement as the participant of the development teams (Bano, Zowghi and de Riminmi, 2016) leads to better user satisfaction and IS Success. It can be noticed especially in Agile teams involving customers (system users) (Lindsjørn, et al. 2016) and in innovative projects (Gemuenden and Hoegl, 2001). It allows to assume that teamwork improves such IS success factors as user satisfaction and may impact usefulness and IS intention to use at the stages from definition to implementation.

Teamwork is also a basement determinant of service quality in IS (Wattson, Nel and Pitt, 1993). Service quality is the factor of IS user satisfaction and effects on IS success. Doll and Torkzadeh (1988) consider IS user satisfaction in term of system quality and information quality. IS user satisfaction finally impact on IS success and may impact on its usefulness. It leads to the second assumption that at the at the stage of IS servicing teamwork relates positively to IS success.

Basing on these two assumptions: teamwork supports IS success during the development, implementation and servicing phases of IS lifecycle , afore mentioned hypothesis can be formulated:

H1a: There is a positive relation between teamwork and IS success.

Teamwork effectiveness and building high performance teams in relation to organizational performance is still matter of research (Salas and O'Neill, 2017; Jones, 2017; Turner et al. 2020). Influence of a teamwork and TWQ on organizational performance is not well defined, but support of hypothesis about positive impact of teamwork on organizational performance as the standalone variable or with other constructs can be found (Kozlowski and Ilgen 2006; Guzzo and Dickson, 1996; Salas, Sims and Burke, 2005; Magpili and Pazos, 2018).

There are many attempts to team effectiveness basing on input-process-output (I-P-O) McGrath (1984) models (Gladstein, 1984; Pearce and Ravlin, 1987; Hackman, 1987; Yeatts and Hyten, 1998) and its variations. This models are often considered in multi-level approach. Team effectiveness is related to individual, team or organizational level but still there is no consent about the impact of team effectiveness on organizational performance. It is because organizational performance indicators varies the same way the organizations varies and because team performance output structures differs according to differences in models and differences in teamwork effectiveness theories. It brings the idea of research the relation between the teamwork and organizational performance as the way of finding simpler and more general dependence.

Hypothesis below can be formulated on the conceptual framework with independent teamwork and transmission values : attitudinal and behavioral outcomes and structural changes and dependent organizational performance variable was presented by Delarue et al.(2008).

H1b:There is a positive relation between teamwork and organizational performance

More field study research should investigate and incorporate organizational impact measures (Delone and McLean 1992) . Verification of the Delone and McLean model becomes disputable the relation between usage and user satisfaction as well as measurement of usage (Downing, 1998). Also the usage, as the variable in this model, is questionable and it was replaced by usefulness factor (Seddon and Kiew, 1996; Seddon, 1997). The attempt to test the construct of IS success which includes usefulness and excludes usage lets for verification this construct.

After many verifications, Delone and McLean (2003) model don't explains the impact the IS user satisfaction and intention to use on organizational performance. Instead of it, the net benefits variable is introduced. Moreover user satisfaction and use may not be alternative to measuring IS performance directly (Youthas and Yong, 1997). Further investigations of new construct of IS success influencing the organizational performance directly are needed. Usefulness of the IS defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance' (Davis, 1989) lets for researching direct impact of the IS success construct on organizational performance and it makes to legitimate verification of hypothesis below:

H1c:There is a positive relation between IS success and organizational performance.

Individual level is a level the IS success factors impact the organization (Petter and McLean, 2009.). Teamwork supports employee performance on the same level (Manzoor et al. 2011).Team effectiveness output is partially defined in many models by the elements of quality of worklife (QWL) (Pearce and Ravlin, 1987; Hackman, 1987; Campion, Papper and Medsker, 1996). On the other side, QWL satisfaction influences IS success through IS user satisfaction (Garrity and Sanders, 1998). That means the QWL may be factor which make resonate the teamwork and IS success. Additionally, elements of QWL can be transitional mechanism between teamwork and organizational performance (Delarue et al. 2008). This make legitimate question about relation between IS success and organization performance in the context of teamwork moderation variable at the individual level.

Mental models play important role in IS influence on organizational performance, because they are positively influencing on IS learning and IS user performance (Staggers and Norcio, 1993). Shared cognition is the central matter of teamwork (Salas ,Coke and Rosen, 2008). Shared mental models as the shared cognition is linked to teamwork performance (O'Connor, 2004) . It lets for the assumption the shared metal models may improve of IS performance better than individual mental models and teamwork may be a moderator between IS success and organizational performance.

H2: In organizations based on teamwork, the influence of IS success on organizational performance is stronger than in organizations not based on teamwork.

An overview of all formulated hypotheses is presented in Figure 2 and is aligned with the main aim of this article: the verification of teamwork as a moderator of the relation between IS success and organizational performance.

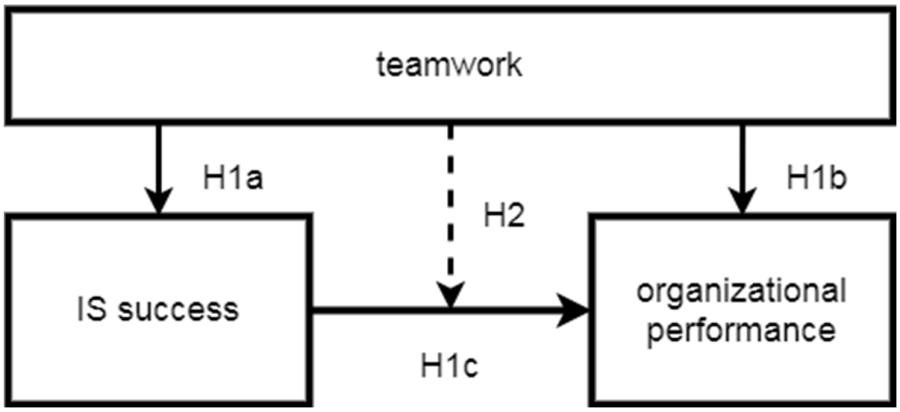

Fig. 2: Teamwork as a moderator of the relation between IS user satisfaction and Organizational Performance

Research Methodology and Results

In order to verify the proposed hypotheses, the empirical research based on a survey method (gathered using CAWI method) was performed.. The main survey was preceded by the pilot survey conducted in late 2018 among the group of 50 managers (acting as competent judges). According to obtained results, the ambiguous questions were rewritten in order to obtain more informed response and it was established that proposed questions are understood by respondents as it was intended by researchers (which is a prerequisite for establishing a questionnaire as a valid measurement method (Czakon, 2019). The main research was conducted in early 2019, among organizations located in Poland and Switzerland, which was the only condition limiting the sample (organizations were surveyed regardless of size, industry or type of business etc.), using CAWI method.

The obtained sample covered 349 organizations operating in Poland and 288 organization operating in Switzerland. The selection of those specific countries was intentional and responses from both countries were treated as one sample to ensure proper distribution over the entire scale of responses. The distribution of the organizations across all sizes was satisfactory and allowed to assume that the obtained sample can be representative for all organizations (see Table 1).

Table 1: Organization sizes and countries

	Time of operations				**Total**
Organization size	**Poland (local organization)**	**Poland (branch of a global organization)**	**Switzerland (local organization)**	**Switzerland (branch of a global organization)**	
Micro (below 10 people)	24	58	40	3	125
Small (11-50 people)	30	68	66	6	170
Medium (51-250 people)	15	86	89	13	203
Large (above 250 people)	12	56	63	8	139
Total	81	268	258	30	637

Source: Bieńkowska et al., 2020

Variables overview

The following variables were used to verify the proposed hypotheses:

IS success was measured based on 4 items covering four areas of IT operations, which are crucial for building its proper support for organization. The scale was based on a 5-point Likert scale (from I strongly disagree, to I strongly agree with a middle point: I have no opinion).

Organizational performance was measured based on Balances Scorecard concept (Kaplan and Norton, 1996), being the framework that allows to draw together multiple measures aimed at financial performance, internal business processes, customer perspectives, and innovation and learning. 10 items were rated on the 5-points' Likert scale (from well below expectations to well above expectations with the middle point: as expected).

Research Results

The first step of the analysis was the correlation analysis between IS success, teamwork and organizational performance. The r-Pearson correlation analysis was used and the results presented in table X show that all correlations are strong and statistically significant. Therefore, those results are a basis for positive verification of hypothesis H1a, H1b and H2 initially confirming that *there is a positive relation between IS success, teamwork and organizational performance*.

Table 2: Correlation analysis between the IT reliability, IS success and organizational performance

	IS success	teamwork
teamwork	r(629)=0,677**, p<0,001	1
Organizational performance	r(629)=0,864**, p<0,001	r(629)=0,706**, p<0,001

Source: own work

The relation between IS success and organizational performance was analyzed in the context of *teamwork* to verify whether teamwork is a statistically significant moderator of the relation, which existence is verified above. Regression analysis with moderator was used to determine that. The results of the analysis are presented in table 3.

The statistical reasoning was based on the linear regression analysis with moderator. In every case, as a first step, new variable – moderator – is introduced. The moderator variable is built as a product of two standardized independent variables. As a second step, 3 regression models are built (the analysis was performed using Process macro for IBM SPSS Statistics). The first model is built as a base model for comparison, only independent variables are added as predictors. The second model is built using independent variables together with the moderator as predictors to verify whether the moderating influence is occurring in sample. To confirm that, the third regression model is built using only one independent and the moderator as predictors.

Table 3: Regression models' statistics.

Model description	R^2	*Delta* R^2	*Moderator coeff.*	*Standard error*	*t Stat*	*P Value*
IS success, teamwork, Moderator *dependent v.: organizational performance*	0,776	0,022	0,037	0,014	2,514	0,012

Source: own work.

The obtained models clearly show that teamwork is a moderator of analyzed relation. The delta R2 and obtained model are statistically significant ($F(3, 629) = 728{,}762$, $p < 0{,}001$). Therefore, obtained results are the basis for positive verification of hypotheses H2 confirming that *teamwork is a moderator for the relation between IS success and organizational performance.*

Discussion

Teamwork has positive impact on organizational performance. Study confirmed previous research and many theoretical models found in literature. Team effectiveness models are complex constructs aimed at explaining the dependence between team characteristics, processes and the output effects of teams in the organization, but in this study direct relation was confirmed on the more general level. This means the teamwork and high TWQ leads to better performance on every organizational level.

Teamwork has also positive impact on IS success. Chance on IS success grows up by building the teams that involves users at the every stage of IS lifecycle. IS success is also complex construct this research confirms the direct relation more generally. Further studies are needed to explain the relation between IS success factors and work team. Especially relation between IS user satisfaction and teamwork requires further investigations.
IS success has no strong positive effect on whole organizational performance. This results were described in previously in literature. Exchange between usage and usefulness factors didn't bring expected expansion the organizational net benefit into organizational performance.

The main focus of this research was to verify whether the effect of IS success on the organizational performance due to IS Success impact is stronger in organizations performance with teamwork and weaker in organizations without teamwork. The obtained results confirm adopted assumptions and underline the role of teamwork as the moderator strengthening the effect. Teamwork improves QWL and lets for building shared mental models which are the basis of IS performance, but it remains the presumption. This study confirms general moderation supportive role of teamwork but further research on QWL and team effectiveness factors and their particular share of supporting between this two constructs are required. Especially metal models and transitive memory requires further research as the factors of teamwork influence (direct or indirect) on performance (Kitaygorodskaya, 2006).

Theoretical studies were performed with additional foundations. The quality is measured only in reference to data quality and usefulness because some studies founds the quality effect on data quality and system usefulness (Bergeron and Raymond, 2008; Hasan et al. 2013). Quality of service was measured by SLA fulfillment (Marciniak 2013; Yoon and Im 2008). This additional foundations don't change the generality of the results but they may be consider as the theoretical limitations.

Conclusions

Currently, teamwork is a basis for many companies and organizations determining their operational performance(Kroupa, 2007). Also, information system becomes the critical factor effecting organizational performance or even shaping business strategy(Bergeron and Crotau, 2001).

The obtained results clearly showed that also in case of IS success, there is a positive, statistically significant correlation between teamwork and SI success also between teamwork and IS success and organizational performance. Moreover, they showed that teamwork is a moderator of the relation between IS success due to organizational performance. Therefore, it confirms that teamwork plays a fundamental role in IS design, implementation and usage and effects IS success leveraging organizational performance.

Performed empirical study is conducted with certain limitations. Only two countries were selected for comparisons, so in future it is worth to consider the verification of formulated hypotheses in organizations operating in other countries. However, the obtained results seems to be a solid first step in the analysis of teamwork and IS lifecycle, establish directions for further research.

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Supporting Entrepreneurship from Public Funds during the Major Economic Disruptions: Polish Evidence

Justyna ZYGMUNT

Opole University of Technology, Opole, Poland
j.zygmunt@po.edu.pl

Abstract

This paper uses a data set for the Polish economy covering the early months of the COVID-19 pandemic (March-August 2020) to examine how the economic downturn has been responded in Poland through establishing "first aid" supporting programs to entrepreneurship. The focus is on the usage of funds that have been granted to Poland within the EU financial framework 2014-2020, and which have been re-directed to answer the urgent needs of enterprises. In particular, this paper addresses the following questions: (i) what were the phases of supporting entrepreneurship in Poland during the COVID-19 economic disruption from funds within EU financial framework 2014-2020, and (ii) what was the nature of that support? The study makes a contribution to the entrepreneurship literature by providing a useful evidence of the approach towards supporting entrepreneurship during a major economic downturn. In particular, this paper finds that policy actions in Poland to support entrepreneurship from the EU funds within financial framework 2014-2020 have been two-tier, with the nationwide tier more likely to support medium enterprises and the regional tier focused primarily on supporting micro and small enterprises. It has been also observed that although the policy actions to respond to the COVID-19 effect on enterprises have been considerable, they remain relatively undifferentiated in terms of sectors and the regional specificity.

Keywords: Entrepreneurship, Economic Disruptions, Public Support, COVID-19, European Union, Poland

Introduction

Entrepreneurship is commonly acknowledged to be pivotal to economic growth (Audretsch and Keilbach, 2008) and has relevant consequences for structural changes (Zygmunt, J., 2020a). However, entrepreneurship tends to be contingent on the business cycle (Davidsson and Gordon, 2016) and notably vulnerable to the major economic disruptions (Cowling et al., 2015). The impact of such disruptions on entrepreneurship is mixed. On the one hand, it is argued that many enterprises are likely to employ a variety of flexible responses and are disposed to apply adaptive behaviour (Smallbone et al., 2012), including pivoting to take advantage of the crisis-induced opportunities (Morgan et al., 2020). On the other hand, economic downturns may entail serious distress for enterprises as they may be substantially constrained, which may lead to dramatic alternation in business dynamics (Naudé, 2020) with significant decrease in new business registration (Klapper and Love, 2011), severe prevention the existing ones from expanding (Paulson and Townsend, 2005), and strong growth in the likelihood of bankruptcy (Kliestik et al., 2018). While the scale of crisis-driven business failures may be huge, conducing to high social and economic costs, a question arises of whether enterprises should be supported from public funds during the major economic disruptions, and if so, what policy actions should be taken to mitigate crisis fallouts.

The issues of supporting entrepreneurship from public sources have attracted growing attention of scholars in recent years, and public grants are increasingly considered to be an important vehicle for enterprises survival and growth (e.g., Pergelova and Angulo-Ruiz, 2014; Dvouletý et al., 2020). However, until recently, only a few studies provide evidence of how public grants may be applied to moderate the blowbacks of the major economic disruptions on enterprises (e.g., Brown et al., 2020;

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Hale et al., 2020), and still little is known about the ways in which entrepreneurship may be fostered during economic crisis. Therefore, the goal of the paper is to address this gap in the literature by examining how the major economic disruptions have been responded in Poland through establishing supporting programs to enterprises from public funds. More specifically, this paper contributes to the literature on entrepreneurship by using the recent COVID-19 downturn as the empirical setting to investigate the ways in which the European Union (EU) funds that have been granted to Poland within the EU financial framework 2014-2020 have been used to support entrepreneurship during the economic downturn.

The rest of the paper is organized as follows. The next section provides the research background. Data and research method are described in the second section. Third section presents the empirical results. Conclusions are provided in the fourth section.

Theoretical background

As claimed by Naudé (2020), entrepreneurship is "reflected in the start-up of new firms and the growth of existing firms, particularly SMEs" (p. 1). Numerous dimensions have been recognised as being significant for entrepreneurship (e.g., Maj, 2017; Zygmunt, A., 2017; Kubiciel-Lodzińska and Solga, 2019; Zygmunt, A., 2020; Zygmunt, J., 2020b), and it is increasingly suggested that the success or failure of entrepreneurial firms may be strongly dependent on the economic adversity (e.g., Lai et al., 2016). Alongside this perspective there is a growing school of thought which indicates that there are differences in how economic disruptions impact small and large firms (e.g., Smallbone et al., 2012). Smaller firms are regarded as more flexible to adapt their behaviour to a recessionary environment (Osiyevskyy et al., 2020), however they are vulnerable to large decline in the demand for goods and services (Cowling et al., 2015). They are more likely to perform worse during crisis conditions due to "liability of smallness" (Aldrich and Auster, 1986) and crisis-induced resource scarcity, as e.g. disconnected supply chains and logistic channels (Morgan et al., 2020), deficient internal financial sources and limited access to external ones (Brown, 2020), which may strongly affect liquidity and day-to-day operations in particular.

There is a broad consensus that the major economic disruptions are inevitable, however their seedbeds, intensity, and duration are tough to predict (e.g., Knudsen, 2019). It is argued that the current COVID-19 pandemic has generated an economic downturn that is likely to exceed the effects of previous ones, even those caused by global financial crisis in 2007-2008 (e.g., Brown et al., 2020; Sułkowski, 2020). This pandemic caused an unprecedented situation with the lockdown of large parts of society and enforced closure of some economy sectors, mostly services, for a certain period. The consequences of the COVID-19 pandemic for the economy have been elusive, with preliminary estimations forecasting a deep global recession, increase in unemployment and in bankruptcies (OECD, 2020). Hence, it is understandable that policy attention in many countries concentrates on mitigating the impact of the COVID-19 downturn through supporting entrepreneurship. As argued by Naudé (2020), such support should be directed to constrain entrepreneurial exits and to mitigate large decrease in consumer demand. In general, it is possible to distinguish two main forms of that support: (1) direct financial (e.g., grants, loans), and (2) non-direct (e.g. advisory services, trainings) (Dvouletý et al., 2020). It seems that whilst many enterprises temporarily diminished or even ceased trading because of the lockdown, particularly direct financial support would be sought-after. In other words, the nature of that particular support – almost immediate to apply and more disposed to yield results at short notice – may be pivotal in determining the "first aid" support to ease liquidity constraints and to hinder the threat of closure.

As the means of support for enterprises are generally government funds and, in the member states of the EU, structural funds. While the EU funds were thus far principally aimed to enable enterprises to enhance their performance and increase their growth (Le Gallo et al., 2011), the recent major economic downturn has caused an unprecedented situation. More specifically, while it is expected that the current COVID-19 recession is going to be highly deep, it seems that mitigating the economic and social blowbacks only from government funds may be highly insufficient. That is a key reason why the European Commission urgently shifted its policy and for an unseen scale re-

directed its funds to respond to COVID-19 economic disruption. In particular, the €81.4 billion SURE instrument has been approved to financially support some of the member states, and in terms of the current EU financial framework 2014-2020 transfers between these funds, their categories and policy objectives have been allowed, with simplified administration and eased procedures of their allocation (European Commission, 2020). However, the extent to which these particular funds have been directed to support entrepreneurship in respective member states during the COVID-19 crisis has been left to distinct decisions and policy actions of each member state. Therefore, while it is argued that government responses to COVID-19 downturn varies significantly (Hale et al., 2020), and given the need for more rapid insights into how entrepreneurship may be supported during major exogenous shocks, this paper is focused on the following research questions: (i) what were the phases of supporting entrepreneurship in Poland during the COVID-19 economic disruption from funds within EU financial framework 2014-2020, and (ii) what was the nature of that support?

Materials and Method

The research approach used in this paper was an analysis and review of relevant policy documents at both the EU and Polish levels. First step was to identify legal acts related to COVID-19 pandemic published by the European Community and by Polish authorities. In next step, those legal acts were selected that relate to supporting entrepreneurship during the COVID-19 downturn in Poland from that funds within the EU financial framework 2014-2020 which have been re-directed to answer the urgent needs of enterprises. Then, while the analysis of these documents led to the identification of additional data sources which may provide extensive data on policy actions, especially in terms of their implementation, further data were sourced from the following official websites of Polish government and non-governmental organisations: the Ministry of Development Funds and Regional Policy, Bank Gospodarstwa Krajowego, Polska Agencja Wspierania Przedsiębiorczości, as well as from the European Commission website and also from European Funds Portal which reports about the usage of the EU funds in Poland. Next, the findings were synthesized and the results of analysing process have been reported.

Research period starts from March 2020 when the COVID-19 lockdown was announced in Poland and finishes at present (August 2020), covering different phases of policy actions.

Findings

The first case of the COVID-19 infection in Poland was registered in early March 2020. With the growing number of infected, starting from 12 March nurseries and kindergartens were closed, and schools and universities started remote teaching. Restrictions were introduced in the operation of shopping centres. Border traffic was closed for non-Polish citizens and two-week quarantine for Poles returning from abroad was mandatory. Physical distance has been introduced as 2.0 metres, and as of 16 April face masks have been required indoors (in public places) and outdoors. From 30 May to onwards (late August 2020) face masks are still obligatory in some indoor areas (e.g., shops, public transport, churches) and from 25 July physical distance has been reduced to 1.5 metre. Border traffic opened at 13 June for the EU citizens without mandatory quarantine.

The stages of the lockdown and its easing in Poland were as follows:

- stage I (24 – 31 March 2020) – first stage of the lockdown – movement restrictions, client limits in shops, large area DIY stores closed Saturdays and trade Sundays, passenger limits in public transport
- stage II (1 – 19 April 2020) – second stage of the lockdown – temporary suspension of some business activities, mostly from the services
- stage III (20 April – 3 May 2020) – first stage of the lockdown easing – more people allowed to do the shopping at the same time, loosening in movement restrictions, outdoor recreation acceptable

- stage IV (4 – 17 May 2020) – second stage of the lockdown easing – hotels and similar accommodation reopened, large area DIY stores reopened Saturdays and trade Sundays, museums, libraries, art galleries reopened, therapeutic rehabilitation reopened
- stage V (18 – 29 May 2020) – third stage of the lockdown easing – beauty and hair salons reopened, all shops in shopping centres reopened, eating out allowed, sport events allowed in open space for up to 50 people without the spectators, loosen passenger limits in public transport
- stage VI (30 May – 24 July) – fourth stage of the lockdown easing – solariums and massage parlours reopened, cinemas and theatres reopened, sport events allowed indoors, ease in restrictions on the number of people in shops, restaurants, etc.
- stage VII (25 July – 7 August 2020) – fifth stage of the lockdown easing – increased numbers of spectators allowed on sport events, as well as on swimming pools, conferences, trade shows, exhibitions (up to 50% of places), removal of restrictions on taking alternate seats during indoor entertainment events and in the amphitheatres
- stage VIII (8 August 2020 – onwards) – the zone lockdown – reversion to some restrictions of limited number of people in shops, restaurants and cafes, entertainment events, limits in public transport in areas with a growing number of COVID-19 cases. Such areas have been divided into "red" and "yellow" ones with more strict restrictions comparing to the other areas (gov.pl, 2020).

Following the lockdown, policy actions have been taken to mitigate the impact of the COVID-19 crisis. A Polish aid scheme has been developed promptly, and early April it has been approved by the European Commission (European Commission, 2020). Particular attention has been given to supporting entrepreneurship. Business population in Poland is dominated by micro, small and medium companies – almost 99% of Polish enterprises fall into these classes, with the predominance of micro companies (96%), and the 58% of total workforce. Hence, their survival and adoption to the COVID-19 crisis environment seem to have a great consequence for social and economic conditions in Poland.

As a part of that support, the following direct financial vehicles have been launched by now: liquidity loans, working capital subsidies, exemption from paying social security contributions and health insurance, compensation for the loss of turnover from business activity, covering of remuneration costs for employees with relevant social security contributions, etc. (gov.pl., 2020). These support vehicles have been backed from the government funds, as well as from the re-allocation of funds that Poland has at disposal within the EU financial framework 2014-2020. Also, Poland has been granted late August €11.2 billion financial support from the EU under the SURE instrument in the form of loans on favourable terms to respond self-employment drop in particular (European Commission, 2020).

Within the EU financial framework 2014-2020 Poland has been granted €82.5 billion and 81.1% of this amount has been already allocated to the end of 2019 (gov.pl., 2020). With the acceptance of the European Commission some of remaining funds, notably from the European Regional Development Fund and the European Social Fund, have been mobilised to address the effects of COVID-19 downturn (European Commission, 2020). The analysis of the relevant policy documents provides evidence of the two-tier approach towards supporting entrepreneurship in the research period. More specifically, nationwide and regional tiers have been identified, as it has been observed that enterprises' location matter in securing support. Given the nature of supporting entrepreneurship across each tier, it has been recognised that it has been mainly similar, with liquidity loans and working capital subsidies as the major vehicles. That finding indicates that when it is estimated that the economic shock is going to be extremely steep, the main focus of policy actions, regardless of the range (nationwide, regional), is primarily on business survival objectives, most notably to ease liquidity constraints. This observation supports the view that as financial distress may strongly affect entrepreneurship (Cowling et al, 2015) short-term policy actions directed to "injecting liquidity" (Brown, 2020, p. 11) to the enterprises are recommended.

Table 1 presents the summary of support means directed to the enterprises at the nationwide tier,

which have been backed from the re-allocation of funds that Poland has at disposal within the EU financial framework 2014-2020.

Table 1: The vehicles of support entrepreneurship from the re-allocation of funds that Poland has at disposal within the EU financial framework 2014-2020 – a nationwide tier

Liquidity loans for micro, small and medium enterprises from any sector
The amount of support for enterprise the possibility to take several loans for a total amount up to PLN 15 million (approx. €3.40 million) *Support conditions* (a) the amount of total support should not exceed: (i) 25% of the enterprise's total turnover in 2019, or (ii) double value of the annual wages, including the costs of employee benefits in 2019 or in the last year for which data are available, and (b) enterprise faces financial difficulties or is at risk of it due to the COVID-19 pandemic and before 31 December 2019 was not in financial difficulties *Support details* payback period up to 6 years, interest rate 0%, no commissions and fees, grace period up to 6 months
Working capital subsidies for medium enterprises from any sector
The amount of support for enterprise determined as the product of special coefficient related to enterprise's workforce and the number of months for which support is applied (up to three months) – max amount is PLN 0.42 million (approx. €0.09 million) when enterprise employs 249 people and applies for three months support *Support conditions* (a) enterprise faces financial difficulties at the day of being supported as a result of the COVID-19 pandemic, or (b) enterprise faced at least 30% decrease in turnover in any month after 1 February 2020 in relation to the previous month or the same month in previous year *Support details* non-repayable, except when enterprise discontinues business activity in period for which support is granted

Source: Own elaboration based on data sourced from BGK, 2020; PARP, 2020; European Funds Portal, 2020.

At the nationwide tier, funds re-allocated within EU financial framework 2014-2020, have been used in Poland, in early months of the COVID-19 economic shock, to provide liquidity loans and working capital subsidies for enterprises nationwide. Interestingly, the analysis shows that this support has been company-size oriented. More specifically, at this tier liquidity loans have been offered to micro, small and medium enterprises that have been affected by the COVID-19 economic disruption, while only medium enterprises have been eligible to apply for working capital subsidies. It has been also observed, that although some sectors have been particularly influenced in Poland by the lockdown commence, any sector has not been privileged with targeted means at the national tier, and the rules for securing support remained the same for any enterprises.

Second tier represents all regions in Poland which implement their regional operational programmes. These programmes have been approved by the European Commission in regions' action plans aimed to achieve the Cohesion Policy goals on their territories by the use of the EU funds. Consequently, supporting entrepreneurship at the regional tier is highly location dependent. It means that the vehicles supporting entrepreneurship may differ regionally in terms of their nature, value, and rules for securing them, and are directed only to enterprises from a particular region. The analysis indicates

that there has been a considerable policy activity at the regional tier in responding to COVID-19 crisis and supporting entrepreneurship by the re-allocation of funds that Poland has at disposal within the EU financial framework 2014-2020. While it is beyond the ambition of that paper to discuss in details the regional differences in the amount and conditions of support directed to enterprises, it should be emphasised that the nature of that support remains relatively undifferentiated among regions. In particular, the analysis provides evidence that in each region liquidity loans for micro, small and medium enterprises have been channelled, and complementary to the nationwide tier, working capital subsidies have been directed only to micro and small enterprises. However, it should be emphasised that support for enterprises at that tier has been wider compared to the nationwide in terms of its nature. More specifically, with only two types of the support vehicles at the nationwide tier (liquidity loans and working capital subsidies), co-financing of remuneration costs from funds within EU financial framework 2014-2020 has been offered as the vehicle to support enterprises at the regional tier. Some regions have also have channelled further support in the form of e.g., investment microloans or loans to help changing the business model. Moreover, as compared to the nationwide tier, predominantly any preferences have not been given in terms of sectors. Only three regions have taken a different approach and directed their working capital subsidies to the enterprises from these sectors that have been strongly affected by the lockdown commence (e.g., tourism and related services, accommodation, gastronomy).

While the COVID-19 downturn has caused liquidity shortages in many enterprises, the immediacy of providing support seems essential to prevent massive bankruptcies. The analysis provides evidence that support for entrepreneurship from the re-allocation of funds that Poland has at disposal within the EU financial framework 2014-2020 has been available in different phases. Specifically, at the nationwide tier first phase of supporting entrepreneurship started early May 2020, that is during stage IV of the lockdown and its easing in Poland, when first liquidity loans for micro, small and medium enterprises have been accessible. At first PLN 0.4 billion (approx. €0.09 billion) have been channelled, however due to great demand the amount of support has been raised in three waves up to total PLN 2.15 billion (approx. €0.48 billion) at the end of August. More than 1,000 enterprises have been already granted with the process still pending (end of August 2020). That was followed by the second phase starting early June, that is during stage VI of the lockdown and its easing in Poland, when working capital subsidies for medium enterprises have been accessible at the nationwide tier. That particular support has been channelled in the seven waves (to 11 August 2020), with the number of supported enterprises ranging from 88 to 872 in respective waves. In total, PLN 2.5 billion (approx. €0.56 billion) have been channelled for working capital subsidies to 42% of all medium enterprises in Poland. A slightly different picture emerges from the analysis of the regional tier when various means of supporting entrepreneurship from funds within the EU financial framework 2014-2020 have been available disparately depending on the regions policy actions, but not earlier than middle of July, that is stage VI of the lockdown and its easing in Poland.

Conclusions

This paper has looked at the how public funds may be applied to moderate the blowbacks of the major economic disruptions on entrepreneurship. Using a data set for the Polish economy covering the early months of the COVID-19 disruptions (March-August 2020), this paper offers some exploratory insights into how that downturn has been responded in Poland through establishing “first aid” supporting programs to entrepreneurship from the re-allocation of funds within the EU financial framework 2014-2020. The findings provide evidence that, while the COVID-19 downturn is still ongoing, the two-tier approach towards supporting entrepreneurship from these funds has been adopted as of now: nationwide and regional. It has been also observed that the nature of that support is generally liquidity loans and working capital subsidies. Such support’s nature seems appropriate given the stage of the crisis and the necessity of policy actions to respond to enterprises’ urgent need to alleviate liquidity constrains and to ensure continuity of employment. Various phases of supporting entrepreneurship have been identified, with support at the nationwide tier available more promptly than at the regional tier. The findings provide empirical support to the ongoing research discussion on relevant policy actions related to supporting entrepreneurship during the major economic disruptions.

Several policy insights can be drawn from the findings of this paper. While foregoing support is predominantly provided to any sector, enterprises from these sectors that have been profoundly affected by the lockdown commence may need to be especially targeted when constructing policy actions. Similarly, there may be crucial to ensure the necessary support for these enterprises that are considered to be of regional significant. Support should also not only provide "first aid" to enterprises but also be focused on the long term objectives, as e.g. fostering high growth enterprises and increasing innovation.

Some limitations of the paper should be acknowledged. First, although the paper covers some policy actions that have been directed to date to support entrepreneurship since the COVID-19 lockdown in Poland, there is not sufficient knowledge about the ways the pandemic would proceed and how it may affect entrepreneurship *in spe*. Further research should therefore focus on examining which vehicles may be adequate to support entrepreneurship during the COVID-19 pandemic changing dynamics and economic downturns arising from that. Second, while this paper illustrates how some public funds may be used to support entrepreneurship under the environmental volatility, such as during the major economic disruptions, the outcomes of this support are not regarded in this paper. This is because not much time has elapsed since the analysed support has been directed to enterprises. While it takes time until the effects of supporting policy become visible in empirical data, another possible avenue for research is to evaluate wherever policy responses were appropriate both for individual enterprise and economy.

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Business Environment Institutions in Rural, Urban-Rural and Urban Municipalities in Poland As Subjects Supporting Development of Entrepreneurship

Agnieszka ŻOŁĄDKIEWICZ-KUZIOŁA

Nicolaus Copernicus University in Torun, Torun, Poland
a_zoladkiewicz@umk.pl

Abstract

The present article strives to provide answers to the following research queries: (1) Within Polish municipalities, are there disproportions regarding the number and type of business environment institutions functioning on their territories? (2) Is there any, and if yes, what type of support is granted to business environment institutions by municipality? The article presents the results of the author's survey study which was conducted from September to December 2018. The research tool used was a survey questionnaire in electronic form which was sent directly via email to all 2478 municipalities in Poland. In the research, the division into rural, urban-rural and urban municipalities was taken into consideration. The results have shown that there are significant disproportions in the number of business environment institutions functioning in municipalities in Poland. The smallest saturation with business environment institutions was reported in rural municipalities whereas the largest in urban municipalities. Among researched institutions, the largest group in the case of rural and urban-rural municipalities were information centres while in the case of urban municipalities investor service centres. Rural municipalities provide support to business environment institutions mainly in the form of advisory service, urban-rural municipalities provide access to premises and urban municipalities offer financial support.

Keywords: Entrepreneurship, Business Environment Institutions, Support of Entrepreneurship, Municipalities.

Introduction

Entrepreneurship is perceived as the engine of economic growth (Acs, Szerb, 2007, p. 112; Farayibi, 2015). Foremostly the development of enterprises from SME sector, play an important role in the state's economy: they create new workplaces, boost production of goods and services as well as increase the income of citizens, the budget of local government units and the state. Moreover, they have a positive impact on the development of infrastructure, improve the quality of natural environment, but also the knowledge, qualifications and new skills of the society (Żołądkiewicz, 2016, p. 357; Żołądkiewicz, 2019, p. 118; see more Keskin, Senturk, Sungur, Kiris, 2010; Kruja, 2013; Hu, 2010).

The development of SME is determined by numerous varied internal factors connected with the entrepreneur and specific character of the enterprise as well as external factors associated with the environment of the enterprise (Kamińska, 2011, p. 53). Enterprises from SME sector when handling difficulties require mainly operational and strategic support from the so-called business environment institutions (BEI) (Filipiak, Ruszała, 2009, p. 75). Such institutions are also referred to as institutions supporting entrepreneurs, back office institutions, institutions supporting business, institutions from business environment (Dorożyński, Urbaniak, 2012, pp. 202-203), or market environment institutions (Lizińska, Marks-Bielska, Serocka, 2014, p. 68), support infrastructure (Lisowska, 2016, p. 87), non-commercial business environment (Fabińska, 2013, p. 72).

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As Krajewski, Śliwa (2004) observe, development of enterprises, including those from SME sector, is conditioned by the number and type of business environment institutions located in the closest neighbourhood, such as municipality which forms a basic unit of local government. Hunt (2015, p. 5) in the work on the role of business environment institutions is close to assume that 'the more, the better'. Even though business environment institutions provide support to entrepreneurs, they also need support from other subjects so that they can exist and function in a particular area. Therefore, it is crucial to verify the number and type of business environment institutions functioning in a particular area, but also the level and form of support granted to them by the local government.

The article strives to provide answers to the following research queries: (1) Within Polish municipalities, are there disproportions regarding the number and type of specific business environment institutions functioning on their territory (business incubator, local development agency, loan guarantee fund, loan fund, entrepreneurship support association, information centre, investor service centre, technology park, industrial park)? (2) Is there any, and if yes, what type of support is granted to business environment institutions by the municipality?

Theoretical Framework

In literature on the subject one may find various definitions of business environment institutions. For instance, the European Commission defines business environment institutions (BEI) as subjects offering services supporting entrepreneurship, i.e. ‘services, originating in a public policy initiative, that aim to assist enterprises or entrepreneurs to successfully develop their business activity and to respond effectively to the challenges of their business, social and physical environment' (Commission of the European Communities, 2001, p. 7).

In the Regulation of the Minister of Regional Development of 20 May 2009 on granting support for boosting the potential of business environment institutions within the scope of regional operational programmes, such institutions are defined as 'a micro-entrepreneur, a small or medium entrepreneur, but also other type of entrepreneur, regardless of their legal form, who does not operate for profit or allocates profits for statutory goals and conducts activity which is aimed at creating beneficial conditions for development of entrepreneurship'.

In Burdecka's opinion, business environment institutions are 'non-profit institutions which do not operate for profit or allocate profit for statutory goals specified in the statute or similar document, and operate on the territory of Poland'. Subjects owning material, technological basis, human resources and competences necessary to offer services for SME sector' (Burdecka, 2004, p. 5).

On the other hand, for Dorożyński, business environment institutions are 'subjects which offer various forms of services which support operation of business activity. This support may be granted against payment or free of charge to people who conclude business activity or already functioning enterprises in order to stimulate their development' (Dorożyński, 2013, p. 137).

Concluding, taking into consideration all presented definitions one may state that the notion of business environment institution includes almost all types of subjects which are directly or indirectly linked to the creation and functioning of enterprises.

These institutions have impact on the investment attractiveness of the region as well as its level of competitiveness. Moreover, they also contribute to the development of high tech industry, regional economy's innovativeness and help to shape a knowledge-based economy (Dominiak, 2013, p. 44). They also play a significant role in the development of entrepreneurship, particularly SME sector, by offering information, advisory, technical, coaching, organizational, legal and financial support (Dominiak, 2016, pp. 100-101, Lisowska, 2016, p. 86). Additionally, they offer assistance in networking with foreign counterparties (Glabiszewski, Grego-Planer, Liczmańska-Kopcewicz, 2018, p. 580). Support is directed to those who initiate business activity as well to those who already operate an enterprise (Mempel-Śnieżyk, 2014, p. 53).

Business environment institutions can be divided in many ways. For instance, with regard to the type of undertaken actions, target group of recipients or necessary competences of the staff, business environment institutions may be classified into three basic categories (Bąkowski, Mażewska, 2014, p. 8; Matusiak, 2011, p. 182):

- centres of entrepreneurship (e.g. business incubator, training and advisory centre): their role is to promote and incubate entrepreneurship, direct support services to mainly small enterprises, activate the development of peripheral regions or those affected by structural crisis,
- innovation centres (e.g. technological park, technology transfer centre, academic business incubator): their role is broad promotion and incubation of innovative entrepreneurship, technology transfer and providing pro-innovative services, activation of academic entrepreneurship and cooperation of science with business,
- para-banking financial institutions (e.g. business angels networks, seed capital): their role is to reduce financial discrimination of newly created and small enterprises without credit history, provide financial services adjusted to the specifics of new business ventures.

The most complex catalogue of business environment institutions functioning in Poland compiled for work purposes by the Polish Agency for Enterprise Development encompasses such institutions as (Domańska, 2019, p. 32-22):

- central administration units with their reporting units, including foremostly the Polish Agency for Enterprise Development,
- local government units,
- regional development agencies,
- research and development units, including centres of excellence and centres of advanced technologies,
- employer associations,
- trade chambers and associations,
- training-advisory or consulting institutions,
- higher education units,
- institutions supporting entrepreneurship, including employment agencies, business incubators, industrial parks, foundations and associations realizing programmes supporting entrepreneurship,
- financial institutions, such as banks, Bank Gospodarstwa Krajowego, investment funds, loan funds, business angels networks, venture capital funds,
- subjects listed in the Database of Development Services, compiled by the Polish Agency for Enterprise Development.

In further part, the focus is on only 9 business environment institutions, i.e. business incubator, local development agency, loan guarantee fund, loan fund, entrepreneurship support association, information centre, investor service centre, technological park and industrial park.

Business incubators are organized economic units which encompass a broad group of isolated and real estate based centres. They are targeted at assisting newly created and small/medium enterprises, foremostly by facilitating sufficient venue area for business activity, creating a positive atmosphere for undertaking business activity and realizing innovative ventures, but also support in the form of legal, financial, patent, organizational, technological services as well as assistance in acquiring funds (Sosnowska, Poznańska, Łobejko, Brdulak, Chinowska, 2003, p. 53; see more Salem, 2014).

Local development agencies are institutions the operation of which is aimed at counselling and organization of trainings for SME enterprises, but also local and regional government units or non-governmental organisations. They also play the role of an intermediary between the public authorities and the business. Very frequently they conduct other business environment institutions (Krajewski, Śliwa, 2004, p. 93-94).

Loan guarantee funds and loan funds are para-banking institutions. The role of loan guarantee funds is to provide guarantees for mainly small and developing enterprises which do not have a sufficient credit history or collateral required by the bank (Mażewska, 2011, p. 85). The scope of activity of loan guarantee funds includes support for entrepreneurs while preparing loan applications as well as popularization of knowledge regarding the acquisition of EU funds (Kogut-Jaworska, 2008, p. 111). On the other hand, loan funds grant capital support by providing loans mainly for micro and small enterprises. Financial support is directed also to the unemployed who initiate business activity (Szydłowski, Wojtowicz, 2019, p. 75).

Another type of business environment institution taken into account in the research is entrepreneurship support association. Their main goal is popularization of the idea of entrepreneurship and self-employment, active cooperation with local government administration as well as private and non-governmental organizations (Mempel-Śnieżyk, 2014, p. 56).

Municipal information centres function in a complex way. Their services are directed mainly to the unemployed, students and graduates of upper-secondary schools, employers and those who wish to start their own business. Their activity concentrates on assisting job search, compiling recruitment documents, informing of available courses and trainings, counselling with respect to labour law and networking employers with job seekers (Zespół ds. Współpracy Regionalnej, 2015). Investor service centres are units which usually function within the structure of big city administration, their purpose is mainly promotional activity and offering services to new investors, both Polish and foreign (Grycuk, Russel, 2014, p. 69).

Technological parks are sets of isolated venues with technical infrastructure which were created in order to facilitate exchange of knowledge and technology between scientific units and enterprises. Industrial parks, in turn, encompass industrial areas equipped with proper infrastructure aimed at entrepreneurs who wish to operate a business activity in them (Grycuk, Russel, 2014, pp. 69-70; see more Hunjet, Ivetić, Kozina, 2018).

Research Methodology

So as to realize the research goal, in the article one presents the results of author's survey study which was conducted in the period from September to December 2018. Research tool used is a survey questionnaire in electronic form which was sent directly via e-mail to all 2478 municipalities in Poland. In the study the division of municipalities into rural (1548 units), urban-rural (628 units) and urban (302 units) was taken into consideration. During realization of the study research data was obtained from 394 rural municipalities, 188 urban-rural and 114 urban municipalities. Rural municipality is the area without a town in its area, it has only villages. Urban-rural municipality contains both rural urban areas. Urban municipality is contained within the administrative boundaries of a city. Moreover, urban municipality may also be a city with county rights (Kozłowski, Zadworny, 2016). In the conducted study the queries regarding business environment institutions concerned selected nine types of institutions, i.e. business incubator, local development agency, loan guarantee fund, loan fund, entrepreneurship support association, information centre, investor service centre, technological park and industrial park.

Research Result

The major aim of the conducted study was to indicate which business environment institutions listed in the survey questionnaire function in their municipalities, and also which institutions are planned to be established in the nearest future.

In rural municipalities, business environment institutions are rare (see Fig 1). Despite that, the largest share are information centres which conduct their activity in 21 rural municipalities; that constitutes only 5% of all studied rural municipalities. Next are investor service centres which function in 17 rural municipalities, local development agencies (14 rural municipalities), loan funds (13 rural municipalities), entrepreneurship support associations (12 rural municipalities), loan guarantee funds

(11 rural municipalities) and business incubators (10 rural municipalities). The smallest group are industrial parks which were indicated by 3 rural municipalities and technological parks functioning in one rural municipality. Also, a small percentage of rural municipalities plan to establish business environment institutions in their area in the nearest future. Only 6 rural municipalities declared to create a business incubator, 4 rural municipalities declared an information centre, 3 rural municipalities an entrepreneurship support association, investor service centre and industrial park and finally, 2 rural municipalities plan a technological park.

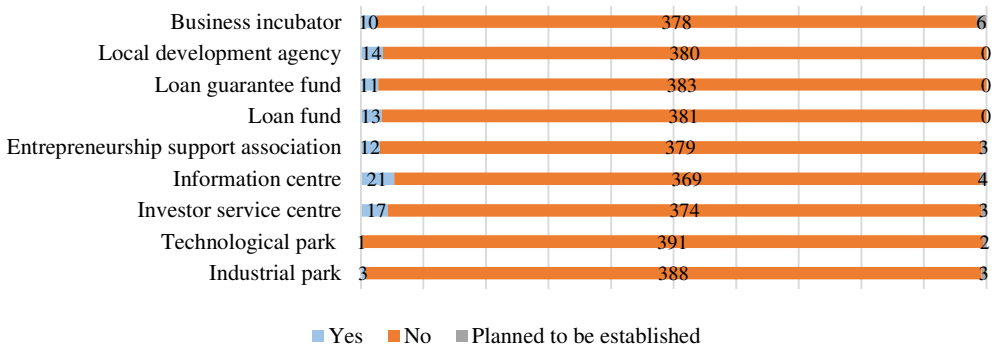

Fig. 1: Business environment institutions functioning on the territory of rural municipalities
Source: own compilation based on the author's research results (n=394).

Similarly to rural municipalities, urban-rural municipalities pointed most frequently information centre among business environment institutions functioning on their territories (see Fig 2). Nonetheless, such choice was characteristic of only 11% urban-rural municipalities. The smallest group were industrial parks (6 urban-rural municipalities) and technological parks (4 urban-rural municipalities). Also, as in rural municipalities, the authorities of urban-rural municipalities declared to create a business incubator (5 urban-rural municipalities), information centre (4 urban-rural municipalities), investor service centre (2 urban-rural municipalities), entrepreneurship support association (1 urban-rural municipality) and industrial park (1 urban-rural municipality). Yet, in the nearest future urban-rural municipalities do not plan to create a technological park, loan fund, loan guarantee fund or local development agency.

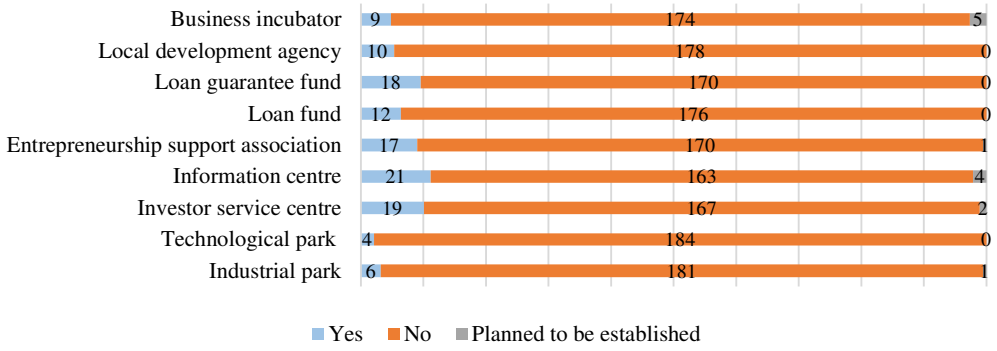

Fig. 2: Business environment institutions functioning on the territory of urban-rural municipalities
Source: own compilation based on the author's research results (n=188).

In the case of urban municipalities, the situation of municipalities with selected business environment institutions functioning on their territory is definitely better in comparison to rural or urban-rural municipalities (see Fig 3). The most frequently pointed by urban municipalities were investor service centres. These institutions operate in as many as 52 municipalities, which constitutes nearly 46% of all

urban municipalities which replied to the query. The second most frequent indication was a business incubator (38 urban municipalities), then information centre (37 urban municipalities), loan fund (36 urban municipalities), local development agency (35 urban municipalities), loan guarantee fund (34 urban municipalities) and entrepreneurship support association (31 urban municipalities). Similarly to rural and urban-rural municipalities, the smallest group of institutions indicated by urban municipalities was industrial park (29 urban municipalities) and technological park (24 urban municipalities). Only 2 urban municipalities declared to create a business incubator and another two information centre, whereas one municipality declared an entrepreneurship support association and another one investor service centre.

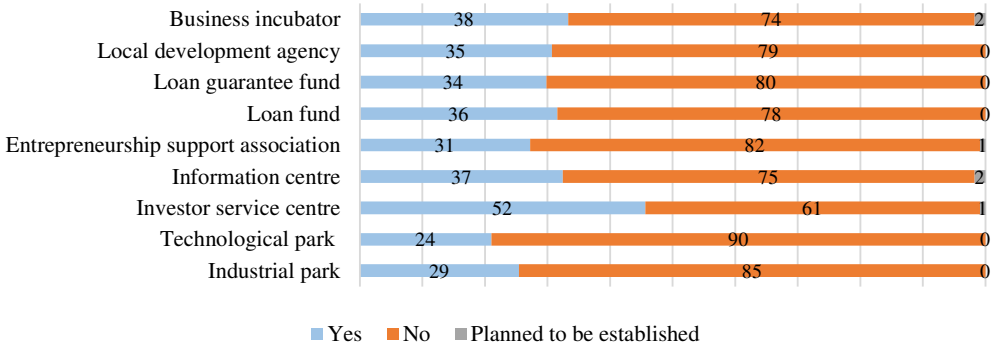

Fig. 3: Business environment institutions functioning on the territory of urban municipalities
Source: own compilation based on the author's research results (n=114).

Having analysed the replies to queries regarding the functioning of business environment institutions provided by municipality authorities, one may evaluate the degree of saturation with specific subjects (see Table 1). It may be observed that mostly rural municipalities (84.77%) are deprived of business environment institutions. Second are urban-rural municipalities (70.74%). As for urban municipalities, only 32.46% of them do not have a functioning business environment institution on their territory. Among rural municipalities with functioning business environment institutions, the majority are those with only one such subject. Moreover, there are no rural municipalities with 7, 8 or 9 functioning business environment institutions. A similar result can be observed in the case of urban-rural municipalities. Nonetheless, the case is different for urban municipalities as one may indicate local government units where as much as 9 business environment institutions function on their territory.

Table 1: The number of business environment institutions functioning on the territory of municipalities

The number of business environment institutions	Type of municipality					
	rural		urban-rural		urban	
	number	share	number	share	number	share
0	334	84.77	133	70.74	37	32.46
1	36	9.14	25	13.30	14	12.28
2	13	3.30	12	6.38	12	10.53
3	7	1.78	10	5.32	11	9.65
4	2	0.51	4	2.13	7	6.14
5	1	0.25	3	1.60	10	8.77
6	1	0.25	1	0.53	8	7.02
7	0	0.00	0	0.00	7	6.14
8	0	0.00	0	0.00	2	1.75
9	0	0.00	0	0.00	6	5.26

Source: own compilation based on the author's research results (n=696).

In further part of the study, the subjects were to evaluate their scope and type of support (facilitating access to premises, financial support, advisory services) provided to specific business environment institutions.

In general it may be stated that rural, urban-rural as well as urban municipalities demonstrate great commitment to creation and functioning of business environment institutions (see Table 2, 3, and 4). Almost in all cases, the percentage of subjects declaring support exceeded 60%. Rural municipalities provided a lot of support for information centre in the form of advisory services whereas the smallest support was offered to industrial park, where only one municipality declared advisory services. Urban-rural as well as urban municipalities declared most support for investor service centres in the form of facilitating access to premises. In the case of urban municipalities, the smallest support was provided to technological park. In turn, among urban-rural municipalities the smallest support was provided to loan fund. Moreover, among rural municipalities support in the form of advisory service seems to dominate among all indicated business environment institutions. Urban-rural municipalities declare support mainly in the form of facilitating access to premises whereas urban municipalities offer financial support.

Table 2: The scope of support for creation and development of business environment institutions offered by rural municipality authorities

Specification	Yes, including	Providing access to premises	Financial support	Advisory services	No	N/A
Business incubator	8	2	2	6	2	384
Local development agency	9	4	1	4	5	380
Loan guarantee fund	8	4	1	3	3	383
Loan fund	8	4	1	3	5	381
Entrepreneurship support association	10	6	2	7	2	382
Information centre	20	10	3	16	1	373
Investor service centre	14	6	3	11	3	377
Technological park	1	1	0	0	0	393
Industrial park	1	0	0	1	2	391

Source: own compilation based on the author's research results (n=394).

Table 3: The scope of support for creation and development of business environment institutions offered by urban-rural municipality authorities

Specification	Yes, including	Providing access to premises	Financial support	Advisory services	No	N/A
Business incubator	6	5	0	2	3	179
Local development agency	6	4	3	5	4	178
Loan guarantee fund	15	3	13	3	3	170
Loan fund	8	2	4	3	4	176
Entrepreneurship support association	13	7	4	5	4	171
Information centre	17	12	3	10	4	167
Investor service centre	18	13	7	12	1	169
Technological park	2	0	0	2	2	184
Industrial park	5	2	1	3	1	182

Source: own compilation based on the author's research results (n=188).

Table 4: The scope of support for creation and development of business environment institutions offered by urban municipality authorities

Specification	Yes, including	Providing access to premises	Financial support	Advisory services	No	N/A
Business incubator	32	27	16	12	6	76
Local development agency	21	6	14	9	14	79
Loan guarantee fund	18	4	13	4	16	80
Loan fund	16	3	10	6	20	78
Entrepreneurship support association	25	15	13	15	6	83
Information centre	29	20	9	19	8	77
Investor service centre	48	35	21	33	4	62
Technological park	20	11	13	9	4	90
Industrial park	21	11	13	9	8	85

Source: own compilation based on the author's research results (n=114).

Conclusions

The study has shown that the distribution of business environment institutions (BEI) in municipalities in Poland is uneven. One may observe significant spatial disproportions between rural, urban-rural and urban municipalities. Among others, Ładysz (2020, p. 109) aptly notes that significant disproportions in the number of functioning business environment institutions affect the attractiveness of particular areas for entrepreneurs planning to start their business. Additionally, in the case of municipalities with the lowest number of business environment institutions, their development opportunities also decrease.

The lowest saturation with BEI was reported within the area of rural areas. 84.77% of studied rural municipalities do not have a functioning business environment institution within their territory. In addition, among rural municipalities with functioning business environment institutions, the majority are those with only one such subject. Such situation is highly unfavourable. The results of numerous studies (e.g. see Bieńkowska-Gołasa, 2015, p. 9-10) indicate that the level of entrepreneurship in rural municipalities in Poland is lower when compared to urban-rural and urban municipalities. Consequently, a small number of business environment institutions in rural municipalities may have a negative impact on the development of entrepreneurship in those areas.

On the other hand, urban municipalities have the largest number of functioning business environment institutions. These are mainly investor service centres. Only 32.46% of urban municipalities do not have any active business environment institutions. Moreover, unlike rural or urban-rural municipalities, among urban units one may list areas where as many as 7, 8 or even 9 business environment institutions function. Among all studied institutions, the largest group in the case of rural and urban-rural municipalities are information centres whereas in the case of urban municipalities investor service centres.

The number of business environment institutions may result from the commitment of local authorities into their creation and functioning. Also, the results of the study show that urban, urban-rural and rural municipalities provide support to business environment institutions in the form of facilitating access to premises, financial support and advisory services. Nonetheless, certain discrepancies may be observed. Rural municipalities provide support mainly in the form of advisory services, urban-rural in the form of facilitating access to premises while urban municipalities offer financial support. Thus, in order to improve the situation regarding the number of business environment institutions, rural municipalities, in the fashion of urban municipalities, ought to engage in financial support of such institutions.

Due to the role of particular business environment institutions in entrepreneurship development, changes in the policy of supporting entrepreneurship are necessary. There is a need to a.o. systematize the rules regarding location of business environment institutions which would reduce the disproportion

in the number of such institutions. The research conducted by DEG's has shown that improvement of business environment is significant not only for enterprises, but also for the whole society (Skibbe, 2018).

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Spatial Policy Tools. The Space as a Public Good

Pawel MICKIEWICZ
Faculty of Economics, West Pomeranian University of Technology in Szczecin, Poland,
pawel.mickiewicz@zut.edu.pl

Maciej NOWAK
Faculty of Economics, West Pomeranian University of Technology in Szczecin, Poland,
maciej.nowak@zut.edu.pl

Bartosz MICKIEWICZ
Faculty of Economics, West Pomeranian University of Technology in Szczecin, Poland,
bartosz.mickiewicz@zut.edu.pl

Abstract

This paper defines the roles of spatial policy tools protecting the space understood as a public good. Space protection in this approach must be implemented through specific spatial policy tools. The paper verifies the real scope of such protection. An attempt was made to translate approaches and dilemmas regarding public goods into conditions related to the spatial management system.

Keywords: Public Goods, Space, Spatial Order, Planning and Spatial Development.

Introduction

Issues related to the protection of spatial order and proposing the optimal spatial management system can be undertaken from various perspectives. The perspective of institutional economics undoubtedly remains one of them. In the context of current problems occurring in the spatial management system, it is worth developing the approach to space as a public good. The aim of the paper is to indicate functions that spatial policy tools at local level should fulfill while protecting the space understood as a public good

Space management and malfunction of public authorities

A specific feature of the public good is that its unit can satisfy more than one consumer. Furthermore, an additional consumer does not reduce the amount of public good available to others. Thus, individual consumption of a good by one person does not exclude individual consumption of this good by others (Samuelson 1954, Samuelson 1958). A. Kargol-Wasiluk links the occurrence of public goods with the occurrence of collective needs. Examples include national defense, public safety, sanitary protection, street lighting, and the use of public roads. A. Surdej distinguishes between competitive goods in consumption (private goods and goods for shared use) and non-competitive goods in consumption (club goods and pure public goods). Excluding from consumption is a separate element (private and club goods are excluded). The author indicates that the criteria of consumption non-competitiveness and non-exclusion from consumption are met by small number of goods - pure public goods (Surdej 2006). According to W. Gaczek, all goods, except private goods, can be roughly treated as public goods. It is the authorities (central, regional, local), who determine how much public funds will be allocated to public goods [Gaczek 2003]. Thus, the authorities shape these goods. This approach can be largely agreed, especially in the context of special treatment of public goods themselves; first of all, due to the fact that in practice there are no public goods that fully meet all textbook attributes assigned to them. It should also be noted that, according to E. Ostrom, with every institutional solution aimed at regulating access to goods that are jointly owned in

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a way that achieves multiple purposes, this requires prior answers, among others, to the following questions:

- how is the issue of multidimensional links between different levels of action to be solved?
- how is the unforeseen accident to be resolved?
- how will the rules set out over time change in response to ongoing internal and external changes (Ostrom 2012, Ostrom 2005)?

R. Stiglitz points out that one of the most important public goods is the quality of state management. The model-managed state has the characteristics of public goods in this approach. (Stiglitz 2004). The above principle can also be applied to issues related to spatial planning. The initial assumption would be that the external effect is the quality of space management and: guaranteeing such solutions that will sufficiently protect spatial order and related environmental and natural conditions. Therefore, public interests related to spatial management are inseparably connected with the category of public goods. They are understood as all products of human activity of every citizen's interest, to which access on equal terms is guaranteed by public authorities of all levels in accordance with their real competences and possibilities of the economy (Markowski, Drzazga 2015). In other words, it can be stated that public goods are:

- space shaped according to the spatial order,
- access to environmental and natural values of space,
- clarity regarding the rights of individual entities in the field of spatial development,
- related opportunity to the implementation of projects important from the perspective of individual investors (Nowak, 2017).

Functions of spatial policy tools

As part of these considerations, reference was made to two key spatial policy tools at the local level, i.e. studies of spatial development conditions and directions, as well as local spatial development plans. The analysis should, however, be started from the basic framework, possibilities and limitations of local spatial policy. W. Gaczek, among features of the active way of conducting spatial policy mentions, among others:

- emphasis on implementing the agreed spatial policy objectives,
- taking preventive actions that do not allow restrictions on the development of the commune,
- taking active measures to combine various external sources of financing in the implementation of spatial development programs (Gaczek 2003).

Among the main problems, T. Markowski includes:

- introducing optional local planning,
- basing the issuing of location decisions on pathological and corruption-generating principles,
- strengthening the traditional approach to spatial planning at supra-communal levels,
- orientation of local governments only towards internal matters and excessive intergovernmental competition (Markowski 2011).

There is no doubt, therefore, that there is a serious gap between the goals and expectations of spatial policy and real possibilities. This should also be taken into account when assessing the function of the study and local plans (Bąkowski, 2018, Śleszyński, Stępniak, Mazurek 2018, Zawadzka 2017) . The assumption of creating the current spatial management system was that the study of conditions and directions of spatial development is to constitute a basic spatial document in the commune. J.M. Chmielewski emphasizes that the study by means of specific principles can define the future desired spatial structure without falling within the impassable framework for freedom of planning local (Chmielewski 2010). In accordance with the assumptions underlying the spatial management system in Poland, a key document at the local level should be local spatial development plans (Mickiewicz, Nowak 2019, Nowak 2015, Kowalewski 2019, Izdebski et al 2018). M. Feltynowski even indicates

that the adoption of local plans significantly determines the effectiveness of spatial policy in the commune (Feltynowski 2009). Their most important role can be reduced to the following elements:
- determination of land use,
- delimiting the areas for various purposes,
- defining a building ban for specific plots,
- defining the rules related to environmental and nature protection.

The scale of the problem is illustrated by results of the research. As part of the author's previous publication, spatial policy in 299 communes (from voivodeships throughout Poland) was analyzed, including the use of spatial policy tools.

Table 1: Application of spatial policy tools in selected communes

Area of communes covered by local plans (%)	Number of communes meeting the criteria related to the area covered by the plans	Percentage share of communes in which building conditions are not denied at all - in a given group
0	26	57,6
0,1-20	117	25,6
20 – 50	25	24
More than 50	121	39,7

Source: own study based on (Nowak, 2017)

In Table 1, attention was paid to the planning coverage of communes and issuing decisions on building conditions dependent on that coverage (a tool replacing the local spatial development plan in the absence of it in a given area). In the whole country, slightly more than 30% of the area is covered by local spatial development plans. The results contained in Table 1 show that the area of communes covered by local plans is varied and very often depends on random circumstances from the perspective of the main spatial policy framework. It is rare that the local plan covers a space recognized as e.g. the most important public good in a given commune (from this perspective). Rather, local plans cover areas designated for specific buildings – thus, it is primarily about meeting the individual needs of individual space users. A broader tendency to order the space can be found only in the communes covered by local plans in the scope exceeding 50%.

Conclusion

Repairing the indicated problems should be as follows:
- creating a broader system basis for adopting the local spatial development plans (or their equivalents), while consistently maintaining, for example, tendency analysis related to the protection of space values that can be associated with recognizing them as public goods,
- integrating development planning, also (or rather above all) in the spatial dimension - in addition to achieving other goals, this will allow for a broader view of space in the context of public goods.

Specific actions taken by communal authorities and space users have a dimension directly related to the economic context. Failure in considering this context will lead to significant losses in the long term. This is fully inscribed in the context of the problems undertaken, among others, in publications by E. Ostrom. And it is her proposed focus on the analysis of issues related to public goods that finds full application in the spatial management system.

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Reactions to Employee Work Monitoring Systems: Preliminary Considerations and Pilot Study

Alicja BALCERAK

Wrocław University of Science and Technology, Faculty of Computer Science and Management, Wrocław, Poland, ORCID: 0000-0002-4507-0497, alicja.balcerak@pwr.edu.pl

Jacek WOZNIAK

University of Economics and Human Sciences, Warsaw, Poland, ORCID: 0000-0003-4610-2822, j.wozniak@vizja.pl

Abstract

The goal of the study was twofold: (i) To verify the effect of 3 variables – self-evaluation of performance, evaluation of direct superiors and evaluation of organization – on acceptance of smart work monitoring systems, and (ii) To distinguish predictors that increase readiness to have such monitoring systems installed, in exchange for a small monthly salary bonus for the monitored employees. A questionnaire study was conducted in Poland, on a group of 130 respondents, of which 55 were immigrants from post-Soviet Union countries. Low levels of each of these three variables were found to significantly decrease acceptance of smart work monitoring systems. A logistic multivariate regression analysis showed that – of the five potential predictors studied – only desire for promotion within the organization (a measure of attitude towards the organization) and evaluation of direct supervisor were significant.

Keywords: acceptance of electronic monitoring systems, work monitoring system, monitoring, privacy calculus decision model

Introduction

Monitoring work performance and its outcomes is a standard managerial activity. Its origins reach back to pre-industrial times and over-the-shoulder observation of employees by supervisors (Thiel, MacDougall, & Bagdasarov 2019). Developments in telecommunications technology have led to a proliferation of the means of carrying out monitoring activities, and the creation of new tools and innovations in performing and analyzing these observations has caused a sudden spike of practical and research interest in the topic of work monitoring (Ravid et al. 2020; White et al. 2020).

Recent solutions in this area involve the Internet of Things, or the capacity to transmit information between various objects at any moment, anywhere, and in any way (Lu, Papagiannidis, & Alamanos 2018). The Internet of Things carries with it, among others, the ability to gather current data about the events around a given item or person, at practically no expense. As a consequence of this ability, electronic performance monitoring tools (and the so-called smart work monitoring systems) are being developed and used to gather, process, preliminarily analyze, and report monitoring data, which then serve as the basis for (mostly automatic) decision-making. However, although new ways of monitoring emerge, there is currently a dearth of scientific data about their reception by employees. Moreover, their improper use can lead to substantial losses (Ravid et al. 2020).

The goal of the current study was twofold: to measure how acceptance of a simple kind of smart work monitoring system is influenced by three factors related to the context of its implementation: an individual characteristic of the monitored employee (self-assessment of own performance) and their subjective, context-dependent self-reports of attitudes towards their supervisor and towards their organization. Additionally, an attempt was made to distinguish the predictors of increasing this

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acceptance by offering the employees a small financial bonus for their consent to being monitored. A recent review of the literature on individual differences influencing the reactions to electronic performance monitoring highlights the need for further studies combining individual differences with the characteristics of monitoring and the workplace context (White, Ravid & Behrend 2020: 58). Our study took such a direction.

The article is organized in the following way: The first part describes monitoring, and presents factors that influence its perception by employees. Part 2 introduces the premises of the study and the research hypotheses. Part 3 discusses the results, conclusions and further research needs.

Monitoring and Employee Attitudes

For the purposes of the current study, we defined monitoring as „the observation, examination, and/or recording of employee work-related behaviours, with and without technological assistance" (Stanton 2000: 87; Thiel, MacDougall & Bagdasarov 2019: 20). Such a definition distinguishes monitoring from the ways of utilizing monitoring data, particularly for performance assessment, the ways of communicating this assessment to the employees, as well as the resulting corrective behaviors. This definition focuses on work performance behaviors rather than strictly on performance outcomes. Thus, the definition does not specify the type and frequency of observations, allowing for observations that a given employee is both aware and unaware of.

Defined this way, monitoring also includes a range of behaviors only distantly related to work, such as, for example, observing employees' physical activity during their free time, as this activity indirectly influences employee health, which, in turn, influences attendance and retention. This definition of monitoring thus does not involve issues related to the rights and permissions of the monitoring institution, the privacy risks, nor the ways of implementing these solutions legally and acceptably for the employees. Although in modern organizations monitoring refers chiefly to security and performance, in the current study we focused rather on monitoring behavior, placing us within an older, Taylorian rather than Druckerian, tradition of thinking about work management (Woźniak 2020).

Monitoring can be realized through various techniques of data gathering which are separate from the ways and techniques of analysis used for reporting. Traditional monitoring, for example, CCTV recordings or observation cards filled out by observers, were mostly used for creating very simple reports consisting of counting the number of observed occurrences of a given event. The second area has recently begun incorporating not only simple reports based on frequencies and graphs showing the occurrence of the appropriate behavior types, but also analyses created via artificial intelligence and machine learning methods, mostly used for Big Data analyses. On the one hand, this results from the large volume of data obtained from behavior observations via the Internet of Things. On the other hand, this is due to the character of this data, which is no longer unform and directly related to work performance, but increasingly often serve as potential sources of varied indices, often of weak prognostic validity and reliability. For example, webcam feeds, eye tracker monitors, and keystroke trackers provide a constant stream of observations which – as any kind of Big Data, that is, data which is heterogenous with respect to type and reliability, extensive, and potentially with high value (Lee 2017) – require extensive analyses in order to yield managerially useful information. However, implementing new technological solutions which replace traditional, human-supervised monitoring with artificial intelligence analyses of the gathered data can also become a new, separate source of employee concerns.

The current interest in monitoring is related to new technologies which not only allowed for the expansion of monitoring beyond those business sectors which traditionally used it since the 1980s such as call centers, but also lowered the costs of data gathering. The best example is the constant data gathering via CCTV cameras, which have become a well-understood possibility, analogous to the (more difficult to imagine) possibility of monitoring via the Internet of Things. Thus, although smart monitoring usually refers to monitoring systems based on the Internet of Things (Princi &

Krämer 2019), that is, in the simplest cases, systems using the RIFT technology for data gathering (Lu et al. 2018), we define smart monitoring systems for the purposes of the current study as those methods of data gathering, storage, processing, preliminary analysis, and reporting which utilize ICT capabilities. Research shows that specific solutions in the sphere of the aim, invasiveness, temporality, and transparence of electronic monitoring systems influence their reception by the monitored individuals (Ravid et al, 2020). Attempts to explain the reactions of specific individuals to specific types of system usually refer to the privacy calculus decision, that is, the estimation of costs and benefits, particularly the costs, related to a partial loss of privacy due to such monitoring (Princi & Krämer 2019; Bhave et al 2020).

However, as has already been underscored by Stanton (2000), the characteristics of the monitoring system are only one of the factors influencing its perception, as it can also be analyzed similarly to the perception of any new procedure within an organization. Stanton pointed towards an array of workplace-related contextual factors which determine this perception – from the consequences of monitoring and the arguments used to justify its implementation to the specific conditions of a given position (such as employment security, workload, and the ability to control it). Stanton also noted that different reactions to the same (technologically and organizationally) monitoring system should be expected based on employee individual differences, both psychological and demographic, such as trust in the supervisors or in the organization as a whole (Stanton 2000: 89). This served as the starting point of the current study.

Developments in monitoring technology which took place at the beginning of the 21st century and the new wave of interest in electronic performance monitoring systems has resulted in a recent publication of several literature reviews (Ball 2010; Das 2019; Ravid et al 2020). However, they are based on data from studies on electronic monitoring systems, that is, systems employing humans for data analysis and interpretation, carried out chiefly in call centers in English-speaking countries. The current study, carried out in a different social context (opinions of employees of various business branches in eastern Europe, also about the beginning of smart monitoring systems) is complementary to the aforementioned analyses. Additionally, it represents a step towards a better understanding of Stanton's analytic model, which has yielded inconclusive empirical results.

Assumptions of the Research and Hypotheses

The goal of the current study was twofold: to measure how acceptance of a simple kind of a smart work monitoring system is influenced by three factors related to the context of its implementation: an individual characteristic of the monitored employee (self-assessment of own performance) and their subjective, context-dependent self-reports of attitude towards their direct supervisor and towards their organization. Additionally, an attempt was made to distinguish the predictors of increasing this acceptance by offering the employees a small financial bonus for consenting to being monitored.

The research hypotheses were formulated on the basis of the model of interdependence of the respondents' reactions to monitoring systems and their attitudes towards the organization and their direct supervisors, proposed by Stanton (2000). We assumed that a positive relationship with the direct supervisor (operationalized here as rating one's supervisor as better than average) and a positive attitude towards the organization (operationalized here as a desire for promotion in the organization) as well as low fear of performance evaluation (operationalized here as a high self-assessment of own performance) will facilitate – ceteris paribus – a positive attitude towards smart work monitoring systems.

Research carried out thus far on electronic monitoring systems has yielded disparate results concerning the simultaneous and independent influence of the three factors distinguished in Stanton's model.

Some research confirmed that trust in the organization is a moderator of the influence of the attitude towards the monitoring system on the effects of its implementation, measured by changes in attitudes,

retention behaviors (Alder, Noel & Ambrose 2006), or ratings of systems using the Internet of Things (Princi & Krämer, 2019).

Trust in the supervisor – as opposed to trust in the organization, and thus in contrast to Stanton's model which highlighted the importance of both those factors – was revealed to have no effect on the reaction to monitoring. This has been interpreted as an effect of treating monitoring as an organizational procedure rather than a line manager's choice (Alder et al 2008: 493). On the other hand, another study showed that trust in the manager moderated the relationship between assessments of fairness of electronic performance monitoring system use and its consequences for workplace attitudes and performance (McNall & Roch 2009).

We expected high self-assessments of own performance quality to facilitate greater readiness to accept performance monitoring on the basis of results from experimental studies showing that self-efficacy is related to positive effects of electronic performance monitoring systems implementation (Laird, Bailey & Hester 2017). Literature reviews concerning electronic monitoring systems do not indicate that trust in the quality of one's performance has been directly studied as a factor in acceptance of monitoring.

The following hypotheses were posed:

H1. The higher the self-assessment of own performance, the higher the acceptance of smart work monitoring systems.

H2. The more positive the attitude towards one's supervisor, the higher the acceptance of smart work monitoring systems.

H3. The more positive the attitude towards the organization (measured as a desire for promotion in the organization), the higher the acceptance of smart work monitoring systems.

A second goal of the study was to verify some predictors affecting the consent for being monitor by smart work monitoring systems in exchange for a small salary bonus. The predictors taken into account in the current study were: acceptance of smart work monitoring systems, gender, and nationality (immigrant status).

The following hypothesis was put forward:

H4: Readiness to consent to the implementation of smart work monitoring systems in exchange for a small salary bonus will be facilitated by the positive self-assessment of own performance, supervisor's evaluation, desire for promotion in the organization, immigrant status, and male gender.

Thus, we indirectly refer to the results of Princi & Krämer (2019) who showed that the individual privacy calculus can be an explanatory model for the level of acceptance for performance monitoring systems basing on the Internet of Things. In that study, costs were measured with a scale of privacy threats related to a given type of monitoring. On the basis of this model, it can be assumed that individuals with a more positive attitude towards monitoring would rate the costs of being monitored as lower. Alternatively, they could rate the subjective value of the salary bonus granted in exchange for being monitored as higher. For this reason, the direction of our hypothesis on immigrant status is based on a premise that the subjective value of money would be greater for immigrant employees than for native Polish employees as there is wide disparity between wages in Poland and in the immigrants' country of origin.

Taking into account gender as a predictor was based on the study by Ball, Daniel, and Stride (2012) who showed that women are more concerned about maintaining privacy in their work environments. This means that they value their privacy more, which should result in expectations of a higher

financial bonus to balance the costs of monitoring in their subjective cost/benefit analyses. In case of a predetermined amount of compensation for monitoring, women will thus be less likely to consent to it, as they will judge privacy loss as more significant.

Method

Participants

The sample consisted of 130 currently employed subjects, over 50% of respondents had higher education, and 32% were still studying. 43% of respondents were younger than 25. We would like to thank Mr. M. Yakovlenko, a Ukrainian engineer working in Poland in a large energy company, for sharing data obtained for the needs of his MA thesis, written under the supervision of one of the authors. The data for the study was collected using the "snowball" method. Hence, most of the respondents worked as technicians in technology companies.

Measures

Acceptance of a smart work monitoring system was measured by the question: "Assess whether you accept supervision of your work with the use of ICT software which observes and registers the behavior of the working person", assess on a 7-point Likert-type scale.

Readiness to consent to the implementation of smart work monitoring systems in exchange for a small salary bonus was measured by a question: "Would you consent to your employer using any observation tools of his choice to collect information about what you do during the working day, in return for an additional monthly bonus of 100 PLN?" [c. 25 $]. Participants responded on a 7-point Likert-type scale. As frequencies on low levels were small, the variable was recoded as binary: 1. Agreement, 2 – Disagreement.

Self-evaluation of own performance was measured by the statement *"Assess your work effectiveness"* on a 5-point Likert-type scale. As nobody assessed their performance negatively, only 3 levels of the variable were used: Average, Rather higher than average, Higher than average.

Evaluation of supervisor was measured by the statement: "Assess your supervisor (boss)", on a 5-point Likert-type scale. (1 – Lower than average; 2 – Rather lower than average 3 – Average; 4 – Rather higher than average, 5 – Higher than average). As frequencies on low levels were small, the variable was recoded to 3 levels: Average or lower, Rather higher than average, Higher than average.

Desire for promotion in the organization was measured by a direct question, with responses on a 7-point Likert-type scale. As frequencies on level 1, 2 and 3 were small, the variable was recoded to 3 levels one: Not present or weak, Present, Strong.

A detailed description of smart monitoring systems preceded the questionnaire. IBM SPSS Statistic software (v.25) was used to conduct all statistical analyses. Statistical significance was set for a 0.05 level.

Results

Hypotheses 1-3

As the *Acceptance of smart work monitoring* systems did not pass tests of normality (Shapiro-Wilk statistic = 0.843; $p<0.001$), hypotheses 1-3 were tested with Kruskal-Wallis-test followed up by pairwise comparisons with the Bonferroni corrections for multiple tests. The results are summarized in tables 1, 2 and 3 below.

Table 1: Comparisons of acceptance of smart work monitoring systems across three levels of Self-evaluation of performance – results of Kruskal-Wallis test

Null hypothesis	Ranks			Kruskal-Wallis test		
	Self-evaluation of performance	N	Mean Rank	H	df	Sig.
The distribution of Acceptance of smart work monitoring systems is the same across categories of Self-evaluation of performance. (Rejected)	Average	39	46.81	17.41	2	0.000
	Rather higher than average	57	68.53[A]			
	Higher than average	34	81.87[A]			

Notes: Ranks with the same superscripts are not significantly different at p<0.05. The Bonferroni correction for multiple comparisons was applied.

Table 2: Comparisons of acceptance of smart work monitoring systems across three levels of Supervisor's evaluation – results of Kruskal-Wallis test

Null hypothesis	Ranks			Kruskal-Wallis test		
	Supervisor's evaluation	N	Mean Rank	H	df	Sig.
The distribution of Acceptance of smart work monitoring systems is the same across categories of Supervisor's evaluation. (Rejected)	Average or lower	45	45.77	20.25	2	0.000
	Rather higher than average	56	74.74[A]			
	Higher than average	29	78.28[A]			

Notes: Ranks with the same superscripts are not significantly different at p<0.05. The Bonferroni correction for multiple comparisons was applied.

Table 3: Comparisons of acceptance of smart work monitoring systems across three levels of Desire for promotion in the organization – results of Kruskal-Wallis test

Null hypothesis	Ranks			Kruskal-Wallis test		
	Desire for promotion	N	Mean Rank	H	df	Sig.
The distribution of Acceptance of smart work monitoring systems in the same across categories of Desire for promotion. (Rejected)	Not present or weak	38	43.33	19.76	2	0.000
	Present	58	74.72[A]			
	Strong	34	74.56[A]			

Notes: Ranks with the same superscripts are not significantly different at p<0.05. The Bonferroni correction for multiple comparisons was applied.

As we can see, Acceptance of smart work monitoring systems is significantly lower on groups with the lowest levels of *Self-evaluation*, *Supervisor's evaluation* and *Desire for promotion*. Differences among higher levels are however insignificant. Hypotheses 1-3 may therefore be taken to be partially supported.

Hypothesis 4

For the verification of H.4., only data from respondents who gave a definite answer to the question: "Would you consent to your employer using any observation tools of his choice to collect information about what you do during the working day, in return for an additional monthly bonus of 100 PLN?" was used. Eliminating the "don't know" response reduced the sample to 112 people. Descriptions of the variables and their significant correlations are shown in Table 4.

In order to find the significant variables that influence the *Readiness to consent to the implementation of smart work monitoring systems in exchange for a small salary bonus*, a backward stepwise binary logistic multivariate regression analysis was performed. The model was specified as follows: dependent variable: FB_cat; predictors: Nationality, Gender, Desire for promotion, Supervisor's evaluation, Self-evaluation. The elimination threshold was set at $p > 0.1$.

Table 4: Descriptions and significant correlations of variables used in logistic regression analysis

Variable (short name)	Description	Mean (SD)	Correlations significant at the 0.05 level
FB_cat	Readiness to consent to the implementation of smart work monitoring systems in exchange for a small salary bonus 1 – Agreement (n=76); 0 – Disagreement (n=36)	0.68 (0.47)	Desire for promotion (0.32) Supervisor's evaluation (0.28) Self-evaluation (0.24)
Nationality	Nationality 1 – Immigrant (n=47); 0 – Pole (n=65)	0.42 (0.50)	Desire for promotion (0.19) Supervisor's evaluation (0.21)
Gender	Gender 1 – Male (n=45); 0 – Female (n=67)	0.40 (0.49)	Desire for promotion (0.22) Supervisor's evaluation (0.21) Self-evaluation (0.26)
Desire for promotion	Desire for promotion 1 - Not present or weak (n=31); 2 – Present (n=52), Strong (n=29)	1.98 (0.73)	FB_cat (0.32) Nationality(0.19) Gender (0.22) Supervisor's evaluation (0.39) Self-evaluation (0.52)
Supervisor's evaluation	Supervisor's evaluation 1 - Average or lower (n=36); 2 – Rather higher than average (n=49), Higher than average (n=27)	1.92 (0.75)	FB_cat (0.28) Nationality (0.21) Gender (0.21) Desire for promotion (0.39) Self-evaluation (0.48)
Self-evaluation of performance	Self-evaluation of performance 3 - Average (n=31); 4 – Rather higher than average (n=49), 5 - Higher than average (n=32)	4.01 (0.75)	FB_cat (0.24) Gender (0.26) Desire for promotion (0.52) Supervisor's evaluation (0.48)

The iteration for the logistic regression analysis terminated at step 4 leaving two parameters in the model i.e. *Desire for promotion* and *Supervisor's evaluation* (Table 5). The Hosmer-Lemeshow test revealed good fit with a value of 8.34 ($p = 0.304$).

Table 5: Logistic regression test results

Variables in the Equation							
		β	Standard error	Wald	df	Sig.	Exp(β)
Step 4	Desire for promotion in the organization	0.814	0.330	6.069	1	0.014	2.256
	Supervisor's evaluation	0.627	0.328	3.661	1	0.056	1.873
	Constant	-1.937	0.738	6.898	1	0.009	0.144

The values of Exp(β) indicate that as *Desire for promotion in the organization* and *Supervisor's evaluation* increase, the odds of the *Readiness to consent to the implementation of smart work monitoring systems in exchange for a small salary* bonus increase.

Nagelkerke R2 value is 0.186, which means that *Desire for promotion in the organization* and *Supervisor's evaluation* explain only 18.6% of the dependent variable's variability, and consequently that there are other factors influencing *Readiness to consent to the implementation of smart work monitoring systems in exchange for a small salary bonus*.

Discussion of Result and Conclusions

The first aim of the study was to ascertain the way that positive assessment of own work performance, of direct supervisors, and of own organization (measured by the desire for promotion) affects the acceptance of smart work monitoring systems. The verification of H1-H3 showed statistically significant differences in acceptance between people who rate each of these three variables as low, or higher. This constitutes a partial confirmation of Stanton's arguments, translated into a different type of monitoring, that both individual differences as well as attitude towards the organization and the direct supervisor influence the acceptance of smart work monitoring systems. The lack of statistical significance for the medium and high levels of acceptance might suggests that from a certain level upward, positive attitudes towards the organization and the direct supervisor, as well as a positive assessment of own performance do not additionally influence the acceptance of new organizational procedures.

Such an interpretation, which requires further studies, disproves the validity of using the privacy calculus decision model for explaining the acceptance of smart work monitoring systems, provided we assume a strong monotony of the dependence of subjective value of the potential losses on the increase in the risk of privacy threat in the sphere of workplace behaviors. This suggests that low levels of trust facilitate high estimations of privacy threat, whereas trust levels above a certain threshold (on three separate dimensions) do not decrease the estimation of privacy threat. Such threshold effects of attitude-related factors are not atypical, especially for factors which are hygienic in Herzberg's sense.

The second aim of the study was to verify which of the considered factors facilitate consent for being monitored by smart work monitoring systems in exchange for a small salary bonus. An analysis of predictors (H4) showed that from among the five included factors, only the desire for promotion in the organization and evaluation of the direct supervisor were statistically significant, explaining 18.6% of the dependent variable's variance. This relatively low amount of explained variance should not be surprising as it should be expected that the factors related to trusting the direct supervisor and the organization are not the only factors influencing the decision to consent to being monitored in exchange for a small financial remuneration.

However, it is notable that the remaining factors were not included in the model, which suggests the necessity for further research on the actual determinants of the decision to consent to being monitored in exchange for a small salary bonus. From the perspective of the privacy calculus model, a salary bonus lowers an individual's subjectively perceived costs of accepting a given solution. This was the basis of H4 in the current study. The fact that not every predictor was revealed as statistically significant suggests that, in the situation of consenting to such a procedure in exchange for money, other factors change the value of protecting one's privacy (or the subjective value of money), on which H4 was founded. Studies on the consequences of including extrinsic rewards in situations where a decision was intrinsically motivated have yielded examples in which small financial bonuses lowered the readiness to accept certain solutions which would be negative for the individual, for example, locating a uranium waste landfill near one's place of residence (Woźniak 2012). Further research is needed to establish the factors, as well as their interactions, that would facilitate such a change in the context of consent for smart work monitoring systems.

The current study had a preliminary character, which does not allow for drawing practical conclusions about the predictors of "buying acceptance" for smart work monitoring systems. More than 80% of the dependent variable's variance remained unexplained. Rather, the current results should be treated as an argument showing the limitations of the privacy calculus model as the basis for explaining the process of giving consent for smart work monitoring systems, especially in light of large individual variability in attitudes towards privacy protection revealed by prior studies showing that only around 55% of participants can be considered "privacy pragmatists" ready to negotiate equivalents for giving away their own privacy (Bhave et al 2020: 142). However, the confirmation of the factors in Stanton's model has practical use, since it suggests that, when considering the implementation of smart work monitoring systems, the supervisors' activities should first focus on increasing their employees' trust and a sense of that their performance is appreciated.

It must be noted that the current study was carried out on an incidental sample gathered via snowball sampling, which resulted in a greater than average proportion of participants with technical education and – potentially – varied attitudes towards ICT-based solutions. Second, the study involved questionnaire responses, which can be treated as indices of real decisions only to a limited extent. In this sense, the current results should be treated as preliminary, stimulating further research. In particular, further studies should focus on the issues of the threshold effects of the three factors in Stanton's model, which, in the current exploratory study, were measured with a single self-report question each. However, each of the attitudes in Stanton's model has a multifaceted character and further studies, even if questionnaire-based, should employ a more detailed operationalization. This should be the case especially with regard to operationalizing the attitude towards the organization: The current study measured it as the desire for promotion, which, however, is only an indirect index of a positive emotional attitude.

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Development of Theory and Practice of The Knowledge Management System as A Component of The Digital Economy

Olga V. RUZAKOVA

Ural State University of Economics, Ekaterinburg, Russian Federation
rov@usue.ru

Abstract

This article considers the development of the theory and practice of knowledge management as a component of the digital economy. The relevance of the article is due essentially to the powerful development of the digital economy and its impact on all areas of the state's economy. The purpose of the study is to develop theoretical provisions on the strategy, organization, and economics of the knowledge management system as a component of the enterprise management system as a whole. The strategy of the knowledge management system and methods of its formation are determined. The structure of the knowledge management system has been developed with the definition of three main outlines and their description. This structure can be used in practical work on modeling the components of the system. The technological and methodological components of the organization of the knowledge management system are determined. In the course of the research, the author determined the economy, including the budget and the formation of the system's profit, and also considered the method of multi-tier cost accounting for the functions of ABC (Activity Based Costing) and its practical application. The work uses some methods of system analysis (structuring, classification, modeling, analogy, and graphic methods).

Keywords: Knowledge Management System, Organization of Knowledge Management, Strategy of Knowledge Management, Knowledge Economy, Business-Process.

Introduction

The modern economy is often defined as a knowledge economy. This term refers to an economy that creates, disseminates, and uses knowledge to ensure its growth and competitiveness. Knowledge is something that many businesses increasingly produce, sell and acquire, and this drives the development of advanced knowledge and the most effective use of it. In this regard, at present in the theory and practice of enterprise management, the direction "Knowledge Management" has become widespread (Abdikeev and Kiselev, 2011).

At present, according to many experts, the company's intangible assets - the secrets of production, ideas, technologies and other know-how - all that make up its knowledge become the main competitive advantage. In the world's leading companies, the share of intangible assets reaches 30-80% of the value of assets (Marinicheva, 2008). The quality of knowledge at the enterprise directly affects the effectiveness of the following processes: the adoption of managerial decisions in strategic, tactical and operational management; innovation activity; continuous professional development of employees; providing partners with access to counseling and training; use of internal knowledge of the company's business processes and the accumulated knowledge of consulting companies; control and workflow of the company.

Neither resource planning of production, nor general quality management TQM (Total Quality Management) nor reengineering of business processes BPR (Business Process Reingeneering) will not be able to provide a large company with relevant market positions and development in the future. Obviously, knowledge management (Knowledge Management) today is a requirement of time. The

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knowledge market is gradually beginning to play a major role, outstripping the development of the market of material goods (Ruzakova, 2010).

Gartner Group defines knowledge management as an area of activity that provides an integrated approach to the collection, organization, access and use of the organization's information resources, which include databases, information and documents describing rules and procedures, and explicit and implicit knowledge in heads of employees of organizations (Labotsky ,2006).

The most progressive, according to the author, is the view of the collective of Russian authors under the direction of B.Z. Milner on the management of knowledge at the enterprise as "a way of thinking, a system of views and principles that focus on the development of intellectual resources and innovation activity" (Milner, 2003).

To expose the content of the modeling of knowledge management systems, the analysis objects proposed by Ronald Maier (Maier, 2007), which include the strategy, organization, technology and economy of the knowledge management system, were taken as a basis. In turn, these four aspects touch upon a wide range of issues: the rationale for a competitive positioning strategy for the company's activities, the structure of the information model of the knowledge management system, the description of the device for system design technology, the rationale for choosing a methodology for modeling business processes, the methodology for static and dynamic modeling of business processes, formalization of the component methodology of the organization of knowledge management systems, formalization of the solution of the problem of configurations a comparative analysis of problem domain modeling, a description of the syntactic (object) level of the knowledge management system, a description of the semantic (conceptual) level of the knowledge management system, a description of the pragmatic level (application level) of the knowledge management system, the business process modeling toolkit of the management system knowledge, the method of cost analysis of the organization of business processes, the methodology of multi-level accounting of costs by function (ABC - Activity Based Costing), dynamic an Liz performance of business processes.

Knowledge Management System Strategy

When analyzing and organizing the four components of the knowledge management system, it should be noted that knowledge management in the enterprise has its own structure, which, according to one of the first researchers in this field, K. Viga consists of three interrelated levels of management: business, management, practical actions (Dresvyannikov, 2006), presented in Table 1.

Table 1: Knowledge management structure

Level of knowledge management	Practical exercise of each level			
Business level	Planning a corporate strategy to best manage knowledge	Planning, creating, and implementing new products based on better knowledge	Business reorientation for the creation, deployment, and operation of knowledge assets	Creation of joint ventures and attraction of outsourcing projects0
Management level	Creation of knowledge, its acquisition, preservation, transfers, and use	Monitoring knowledge management and linkage practical functions	Policy of knowledge management and actions	Identify actions and resources associated with relevant knowledge
Level of practical actions	Analysis of certain and available	Formation of human resources through education	Support of projects and other research	Combining knowledge with expert networks

Level of knowledge management	**Practical exercise of each level**			
	knowledge	and training	programs	and consultations
	Creation of knowledge accounting system	Maintenance of educational programs	Creation and deployment of soft applications	Applying knowledge to working objects

Knowledge management strategies are aimed at creating a new value realized in products, people and processes through the rational formation and use of knowledge in organizations. The main goal of these strategies is to increase the efficiency of using all available resources of the organization, introduce innovations, improve customer service, and reduce losses from unused intellectual assets (Gaponenko and Orlova, 2008).

The knowledge management system strategy includes a description of the goals, objectives and factors that influence the strategy. Among the many methods for forming a strategy, one can single out the following:

- Rationale for the competitive strategy for positioning activities.
- Methods of identification of business processes.
- Heuristic method of strategic planning based on the SWOT - analysis method.

The rationale for a competitive strategy for positioning activities is based on the analysis of the "AND-OR" graph of the tree (Fig. 1). We will consider the formation of the method " Rationale for the competitive strategy for positioning activities" in two directions:

- life cycle of the system.
- characteristics of the organization's potential.

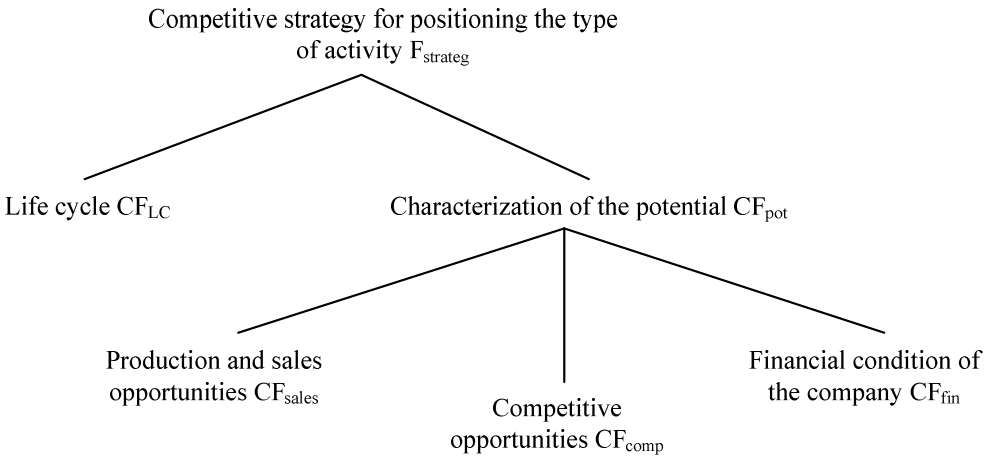

Fig. 1: Graph "AND-OR" analysis of the competitive positioning strategy of the company's activity

The characteristics of the first direction are presented in Table 2. "System life cycle" in detail. The second direction can be defined as: production and marketing capabilities of the enterprise, competitive opportunities and the financial condition of the enterprise. Financial condition can be presented through indicators of assessments of liquidity and assessments of financial stability.

Table 2: Life Cycle

Characteristic	Life Cycle Stage			
	Launching on the market	**Growth**	**Maturity**	**Decline**
Definition	Weak competition, consumers - new lovers, sales growth rate - weak	Constantly growing competition, consumers - a mass market, the rate of sales growth - fast-growing	Big competition, consumers - a mass market, the rate of sales growth - slowly growing	Decreasing competition, consumers lagging behind, growth rate of sales falling
Strategic efforts	Expansion of the market	Penetration deep into the market	Defending the market share	Minimization of costs
Competitive strategies	Focusing on the target segment	Leadership over costs. Focusing on costs	Wide differentiation. Optimal costs	Focusing on costs. Focusing on differentiation
Profit	Negligible	Maximum	Falling	Low or zero
Price	High	Somewhat lower	Lowest	Increasing
Product	Main option	Advanced version	Differentiated variant	Increased profitability

Organization of a knowledge Management System

The organization of a knowledge management system is a structure of knowledge management, a description of methodology and technology. The structure of knowledge management can be divided into three main contours: the synthetic (object) level, the semantic level (ontology), the pragmatic level (the level of applications). In turn, each of these levels consists of a number of components. For example, the synthetic level includes different knowledge bases, and the semantic level includes a hierarchy of relations of concepts. The pragmatic level of the management structure contains applications that are the result of the work of the two above levels (Fig. 2).

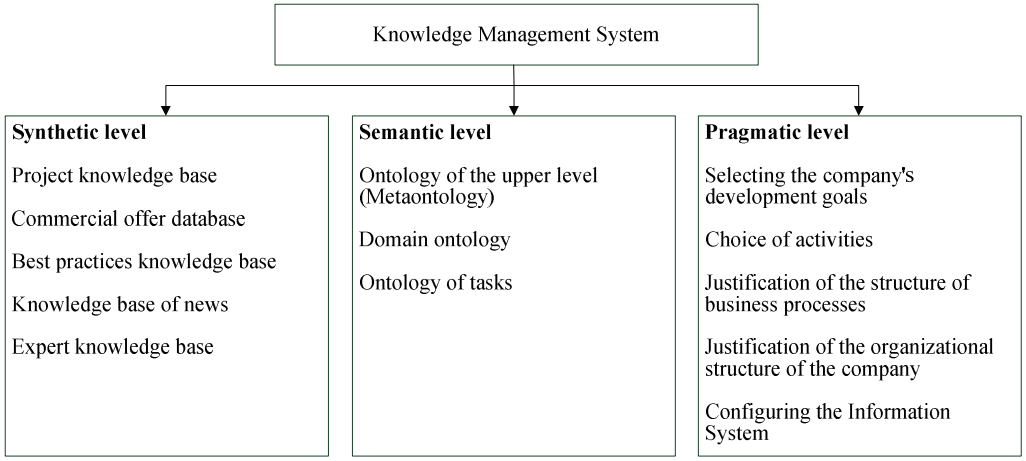

Fig. 2: Structure of knowledge management systems

Synthetic level (object) is responsible for storing in the specially developed categories of indexed knowledge. The semantic level (ontology) contains the ontology of the upper level (metaontology),

the ontology of the domain and the ontology of the problems. He defines the conceptual model of knowledge. The pragmatic level (applications) is the choice of the company's development goals, the choice of activities and the rationale for the structure of business processes. At this level, the goals and objectives of the issues under consideration are formed for the knowledge management system.

The syntactic (object) level

It presumes the storage of annotated categories of sources of knowledge annotated with a specially developed system and their indexing (Telnov, 2004, p.105). Each base of this level can include, for example, the knowledge base of best practice, the following sections:

- performance metrics.
- methods of organizing business processes.
- precedents.
- reference materials.

Semantic (conceptual) level

The definition of a conceptual model of the structure of knowledge common to all sources of knowledge, that is, the development of ontology.

The structure of ontology knowledge should show the paradigmatic relations of concepts (synonymy, homonymy, polysemy) and syntagmatic relations of concepts (axioms, logical rules).

Pragmatic level (application layer)

At the application level (pragmatic level), each task is addressed in the following areas:

- Formulation of the problem.
- Selection of relevant sources of knowledge.
- Understanding the selected material.
- The solution of the problem.
- Verification of the feasibility of the solution of the problem.
- Decision making and monitoring of its implementation.

It should be noted that all levels of the knowledge management system are of fundamental importance for its construction and functioning. However, it is necessary to especially highlight the semantic level, which provides the possibility of interpreting user requests to the knowledge management system through the use of ontology, which in turn determines the set of concepts of the domain and relations between them.

Metaknowledge systematizing and creating provides an opportunity of using individual parts of ontology as construction material for constructing new ontologies or extension of existing ones. Regardless of kind of business metaontology may be unified. Its purpose is to describe general concepts: essence, object, subject, function, feature, event etc. It is necessary to have control under syntactic constructions, which are used at the next level — ontology of subject area (Telnov, 2013).

The semantic level of the knowledge management system (ontology) provides a number of significant advantages of a virtual organization in the field of electronic retail financial services, namely: an accurate understanding of the knowledge of the situation and the client through the recognition of implicit knowledge; as close as possible to the vocabulary and understanding of the client's financial situation and the corresponding commercial offers; the possibility of gaining additional knowledge by the knowledge management system in the process of solving specific problems through a dialogue with the user.

The methodology and technology of the organization of the knowledge management system includes:

- Apparatus for the design of systems.
- Justification of the choice of methodology for modeling business processes.
- Component technology for organizing business processes using a knowledge management system.
- Methods of static and dynamic modeling of business processes.
- Formalization of the component methodology of the organization of the knowledge management system.
- Formalization of the structure of ontology.
- Formalization of the solution of the task of configuring the company's business processes.

The formalization of the component methodology of the organization of a knowledge management system can be based on the definition of the "S" system given by Yu. F. Telnov, which is a generalization of definitions by L. Fon Bertalafi, V.N. Volkova, F.I. Temnikova, A.I. Uemova, Yu.I. Chernyak and others (Telnov, 2004, p.123) in the form of a tuple:

$$S = \{G, E, En, T, F, R, Z\},$$

where S is the system; G - a set of goals for the functioning of the system, determining the purpose of the functioning of the system, which are measured using reachability criteria; E - a set of elements of the system as entities that are converted using functions (created, consumed, used, saved); En is the set of elements of the external environment as entities of the system environment that influence the performance of system functions; T is the set of periods of time characterizing the frequency of reproduction cycles of the elements of the system; F - a set of functions (types of activities, processes, operations) that carry out the transformation of the elements of the system; R is the set of relations of the system components that determine the constant interrelations and dynamic interactions of the system components; Z is the set of regularities (strategies, methods) of the functioning of the system, determining the structure of the system and its relationship with the external environment.

Considering knowledge management as a process, according to Newman and Conrad, knowledge management consists of four main processes: the creation, storage, transfer and use of knowledge (Milner, Rumyantseva, Smirnova and Blinnikova, 2006, p.91). However, this process can be expanded, namely, to include collection, storage and accumulation, processing, transfer and use of knowledge. For example, the process of storage and accumulation includes methods of spiral-like knowledge building and software such as Data Warehouse, Data Mart, OLPT systems. The processing process is based on the methods of artificial intelligence, the method of justifying a competitive strategy for positioning activities, the method of analyzing critical success factors, the method of searching for the optimal supply of products and services, and uses the Business Intelligent software: OLAP, Data Mining. (Ruzakova and Zvyagintsev, 2015). Note that semantic networks, according to experts, are the most common way of representing knowledge in the space of possible states, and their use in the formalization of knowledge occurred earlier than other methods.

Economics of Knowledge Management System

The economy includes a description of the budget and profit generation of the knowledge management system, and includes:

- methodology of cost analysis of business process organization (break-even point analysis method).
- The methodology of multi-tier cost accounting for the functions of ABC (Activity Based Costing).
- method of dynamic analysis of business process performance.

The method of cost analysis of the model (Medynsky and Ildemenov, 1999), based on the analysis of the breakeven point, allows to determine the break-even sales volume, the critical level of the implementation price and fixed costs, as well as the appropriateness of management decisions on

technology and product line change. Also, it involves multi-tier accounting of costs, i.e. the cost of a product or service in terms of the value of the functions performed, rather than the traditional cost elements.

The method of multi-tier cost accounting for the functions of ABC (Activiti Based Costing) includes a description of the costs by functions proposed by Yu. F. Telnov (Telnov, .2004. p.188): determination of total costs for performing functions by business units, assigning costs to value objects in terms of the functions used (Fig. 3).

It should be noted that this technique requires a precise definition of all the functions used in the chain of basic and auxiliary business processes.

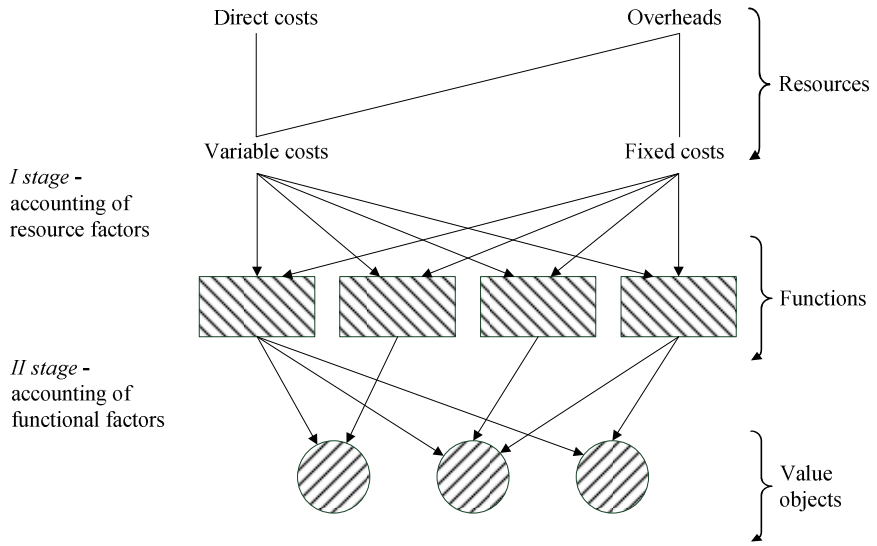

Fig. 3: Two-stage cost accounting by functions

It should be noted that when carrying out a cost analysis of business processes in a retail banking, it is necessary to take into account that various operations and services represent a very definite value for clients. A well-known reorganizer of banks Paul H. Allen believes that "bank managers need to get away from the practice of pricing based on costs and a benchmark against competitors. This approach should give way to the natural method for retail business - the determination of prices based on the subjective value of the service for the consumer" (Allen, 2002).

Conclusion

The description of the main components of the knowledge management system allows us to conclude that the construction of a knowledge management system is a complex process, requiring the formalization of implicit knowledge, the dynamic analysis of multidimensional business models, but at the same time necessary for building up the competence of the company, and hence its future development. Managing knowledge, the organization seeks to create and consolidate its competitive advantages.

In the near future, one can reach the creation of knowledge bases, in which the best examples of the use of modern management technologies in state enterprises and institutions, as well as consulting companies, are concentrated.

A broad range of tasks which are solved by systems and based on knowledge allows to make a conclusion of possibility to make management decisions using the publication data of such systems on the level of experts' conclusions.Knowledge management process can be extended around information processing, storage and collecting the methods of artificial intelligence, methods of searching the optimal offer of products and services etc.

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Challenges of The Digital Economy: Assessing the Level of Competence of Technical Universities Graduates Based on Pedagogical Testing

Lyudmila I. MIRONOVA

Ural Federal University after name the first President of Russia
B.N. Yeltsin, Yekaterinburg, Russian Federation
mirmila@mail.ru

Olga V. RUZAKOVA

Ural State University of Economics, Yekaterinburg, Russian Federation
rov@usue.ru

Report

According to the Federal state educational standard of higher education in the learning process of students the competence-based approach should be implemented. It means that it is necessary to be able to determine the level of formation of students' competence in different subject domain. The purpose of the article is to describe the methods of levels determination of students' competences formation as a result of the development of the discipline, allowing them to assess, using a level approach (low, medium, base, high). The competence of the student of concrete subject domain is understood as his theoretical knowledge and abilities in the studied subject domain and practical experience of their application. The main stages of the proposed methodology: the input diagnostic test before studying the course, the final pedagogical testing after the course, the defense of the project which is independently executed by the student. The criteria of Kruskal-Wallis and Bartlett were used for an assessment of the results homogeneity of pedagogical testing, and the criterion of Pearson's Chi-squared was used for the level evaluation of students' experience in project developing. The algorithm of application of the methodology is presented in specific numerical data. The technique can be used during studying disciplines, which are ending by independent development of students' projects, such as: term paper, final qualification work, a thesis project, master's dissertation, etc.

Keywords: Digitalization of The Economy, Engineering Training, Statistical Processing of The Results of Pedagogical Testing, The Level of Competence Formation.

Introduction

In accordance with the Federal State Educational Standard of higher education, a competency-based approach must be implemented when preparing students. At the same time, in the context of the transition to the digital economy, new requirements are imposed on graduates, according to which the graduate must possess, in addition to key professional competencies, called hard skills, a certain set of non-specialized, career-relevant supra-professional skills that are responsible for successful participation in the work process, high productivity and are not related to a specific subject area, called soft skills.

According to modern research in the field of professional training, the professional competence of a student in a specific subject area is understood as his theoretical knowledge and skills in the subject area under study and practical experience in their application. This means that it is necessary to be able to determine the level of competence of students in a particular subject area.

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Thus, the *problem of research* is determined by the current state of engineering training of students, which requires the implementation of a competence approach, and insufficient development of methods for determining the levels of formation of professional competence of students.
This fact determines the *relevance of the article*, which consists in the fact that there is an objective need to develop a methodology for determining the level of formation competence of students in the field of engineering training.

The main idea of the publication is to expand the understanding of the possibility of evaluating the levels of formation of professional competence of students using the results of pedagogical testing and their subsequent statistical processing.

The purpose of the research is to develop a method for determining the levels of formation of professional competence of students. *The purpose of the publication* follows from the purpose of the research and is to develop a methodology for determining the levels of competence formation of students as a result of mastering engineering training disciplines based on statistical processing of the results of pedagogical testing.

Object of research: the process of engineering training of students in modern universities. *The subject of the research* is to determine the levels of students ' competence formation in the field of engineering training based on statistical processing of the results of pedagogical testing.

Literature Review

The researches of Bolotov V. A. (2003), Bordovskaya N. V. (2002), Zeer E. F. (2007), Zimnyaya I. A. (2006), Pak N. I. (2006) and others is devoted to the theory of competence approach. The implementation of the competence approach is based on a level approach to the empirical assessment of the formation of a student's competence in the field of engineering training. The level approach to the estimation of empirical values has been known for a long time, and its use in pedagogical measurements is based on the works of Bloom B. (1956), Bespalko V. P. (1969) and others. Questions related to the application of this approach to the experimental assessment of professional competencies are reflected in the research of Serdyukov V. I. (2007), Kozlov O. A. (2017), Starichenko B. E. (2004) and others. Based on their research, the formation of knowledge and skills is evaluated in the framework of a taxonomic approach, which involves identifying the levels of formation of a student's competence in the field of engineering training. At the same time, the professional competence of a student in the field of engineering training will be understood as a set of theoretical knowledge and skills and the availability of practical experience related to the development of engineering projects.

The analysis of Federal state educational standards of higher education has shown that the competence approach requires the search for new methods for determining the levels of formation of students ' competence in a particular area. One of them is pedagogical testing. According to research on the levels of learning material assimilation of Bloom B. (1956), Bespalko V. P. (1969), to assess the competence of students, it is advisable to use a level approach that assumes the presence of four levels: reproductive (low), adaptive (medium), heuristic (basic) and creative (high).

At the reproductive (low) level, the student distinguishes, recognizes objects of knowledge when re-perceiving previously studied material, performs actions with them, but "with a hint", copies educational information. At the adaptive (medium) level, the student independently reproduces and applies information in the previously considered typical situations. At the heuristic (basic) level, the student uses the acquired knowledge and skills in atypical situations, gets new knowledge by acting on a pattern. At the creative (high) level, the student acts in unexpected situations and creates new algorithms, rules, actions, that is, subjectively new information.

The analysis of scientific publications has shown that in accordance with the competence approach in education (Zimnyaya I. A., 2006), which involves the identification of theoretical and practical aspects of the educational process based on the formation of a set of knowledge, skills and experience

of various activities, the student should be able to demonstrate their skills in practice. Then you can evaluate the level of competence achieved by students in a particular field on the basis of a separate assessment of their knowledge and skills in the field of theoretical foundations of the discipline studied by means of pedagogical testing (Dakhin A. N., 2009) and the levels of experience in applying this knowledge and skills in solving practical problems (for example, when defending an independently completed project).

Method

As part of the method for determining the level of students ' competence in a particular subject area, we will consider the theoretical training of students in one of the engineering disciplines, which ends with the defense of a project completed by the student independently. You can evaluate the level of initial knowledge for the development of a new subject area based on the results of the input diagnostic test. The content of the input diagnostic test is determined by the subjects of those disciplines, the development of which is necessary for the formation of competence in a new subject area.

Since the article will consider a specific calculation method, for the convenience of further calculations, we will assume that the input diagnostic test contains 50 main questions on the courses passed by students, determined by the training curriculum. The results of a test task are traditionally evaluated on a dichotomous scale: 1-the answer is correct, 0-the answer is incorrect. Thus, the maximum possible score for all correctly answered questions in the input diagnostic test is equal to the number of test questions (in our case, 50 points). According to research of Bespalko V. P. (1969), allocate the level of initial knowledge and skills of students in the field of studied disciplines required for the development of a new course: from 70% to 100% of the maximum number of points received for a diagnostic test (35 to 50 points), and a low level, insufficient for the development of a new course with scores less than 70% of the maximum (0 to 34 points).

You can evaluate the level of theoretical knowledge and skills in a particular engineering discipline based on the results of the final pedagogical testing. The volume of the final test should include a number of questions that fully cover all the learning material studied by students. Let's assume that the final test for the engineering discipline studied by students contains 60 test tasks that fully cover all modules of the engineering discipline and are adequate for its thematic planning. The result of each test task is also evaluated on a dichotomous measurement scale (Zimnyaya I. A., 2006). In our example, the sum of possible values of dichotomous variables obtained by students based on the results of the final test will be measured on a 60-point scale, which can be divided into four non-intersecting intervals: [1; 15], [16; 30], [31; 45], [46; 60], each of them corresponds to a low, medium, basic and high level of theoretical material assimilation, respectively.

To assess the level of formation of experience in implementing methods of activity in a particular engineering discipline, you can use the results of a student's defense of an independently completed project. The student project also scores on a dichotomous scale. The presence of relevant experience is assessed with 1 point, the lack of experience-0 points. To evaluate the results of the project, you need to develop a table that is divided into four intervals: [0; 2], [3; 4], [5; 6], [7; 8], corresponding to low, medium, basic and high levels of formation of experience in applying the acquired knowledge and skills in a specific engineering field. This table will be used by members of the Commission who evaluate the result of project protection. The content of the assessment table is determined by the specifics of the subject area and requires serious preparatory work of the subject teacher, who needs to describe in detail all the practical requirements for the student project that meet each level of formation of student experience.

The described method is divided into 3 stages. At the 1st stage, we form groups of participants who will determine the level of competence formation. Then the input diagnostic testing is performed. At the 2nd stage, the theoretical development of the engineering discipline is carried out, which ends with the final testing and defense of the project completed by the student independently. At the 3rd stage, statistical processing of the results of the method is performed.

As part of statistical processing of research results, the following steps must be performed:
3.1. Check the homogeneity of the sample with the results of the input diagnostic testing.
3.2. Check the homogeneity of the sample with the results of the final pedagogical testing after mastering the theoretical course of engineering discipline.
3.3. Check the homogeneity of the sample with the results of student project protection.

The Results of Research and Discussion

Stage 1. As an example, the level of competence of students will be checked during 4 academic years, one academic group per year (group 1-21 students, group 2-23 students, group 3-29 students, group 4-25 students).

The results of the input diagnostic test for the studied disciplines are presented in tables 1-4.

Table 1: Results of group 1 students performing the input diagnostic test

№ student's	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Sum of points	50	48	47	47	46	45	44	44	43	42	41
№ student's	12	13	14	15	16	17	18	19	20	21	
Sum of points	41	40	40	39	39	38	37	37	36	35	

Table 2: Results of group 2 students performing the input diagnostic test

№ student's	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Sum of points	50	50	47	47	46	46	45	44	44	43	42	40
№ student's	13	14	15	16	17	18	19	20	21	22	23	
Sum of points	40	39	39	39	38	38	37	37	37	36	35	

Table 3: Results of group 3 students performing the input diagnostic test

№ student's	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Sum of points	50	50	50	49	48	47	46	46	46	45	44	44	44	42	41
№ student's	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Sum of points	41	41	40	40	39	39	39	38	38	38	38	37	37	37	

Table 4: Results of group 4 students performing the input diagnostic test

№ student's	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Sum of points	50	50	50	50	48	48	48	47	45	43	43	43	42
№ student's	14	15	16	17	18	19	20	21	22	23	24	25	
Sum of points	42	41	41	41	40	40	40	40	39	38	38	37	

Let's perform consecutive steps of statistical processing of the results of pedagogical testing.

Checking for homogeneity of samples containing the results of input diagnostic testing

Since the conclusion about the level of competence in the field of engineering training will be made on the basis of combining four groups into one, first of all, it is necessary to check the homogeneity of four groups of students based on the results of the input diagnostic testing.

We show that the samples containing the results of input diagnostic testing are homogeneous. To do this, we use the Kruskal-Wallis criterion (Levin D. M., Stefan D. et al., 2004).
Statistics of the Kruskal-Wallis test for testing the H_0 hypothesis that there is no shift in the position parameters of the compared samples have the form:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} n_i \left(\overline{R}_i - \frac{N+1}{2} \right)^2,$$

where $\overline{R}_i = \frac{1}{n_i} \cdot R_i;\ R_i = \sum_{j=1}^{N} R_{ij}$, N is the volume of the combined sample, i is the sample number, and n_i is the volume of the i – th sample.

The use of Kruskal-Wallis statistics requires combining the four samples under consideration, presented in tables 1, 2, 3, 4, into one, sorting its elements in ascending order and assigning them ranks.
Algorithm for applying Kruskal–Wallis statistics:
Step 1. Write down the attribute values for each of the studied groups.
Step 2. Arrange the overall selection in ascending order.
Step 3. Calculate the sum of R_j ranks of each sample with volume n_i.
Step 4. Calculate the H_{calc} statistics.
Step 5. Find $H_{tabl} = \chi 2\ (\alpha, k\text{-}1)$ for $k \leq 4$ and $nj \leq 5$ using a special table for small k and n_j.
Step 6. The H_0 Hypothesis is accepted if the $H_{calc} \leq H_{tabl}$.
If $n_j > 5$, an approximation of the Kruskal–Wallis statistics is required.
If there are groups of repeated ranks, then modified statistics must be calculated.
Let's perform all the steps listed in the algorithm sequentially, using the data presented in tables 1, 2, 3, and 4.

Step 1, 2. Rank together all the x_{ij} scores (i-sample number). The result of this step is shown in table 5.

Table 5: Combined sample of input diagnostic test results

Score	35	35	36	36	37	37	37	37	37	37	37	37	38	38
Rank	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Score	38	38	38	38	38	38	38	38	39	39	39	39	39	39
Rank	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Score	39	39	39	40	40	40	40	40	40	40	40	40	40	41
Rank	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Score	41	41	41	41	41	41	41	42	42	42	42	42	43	43
Rank	43	44	45	46	47	48	49	50	51	52	53	54	55	56
Score	43	43	43	44	44	44	44	44	44	44	45	45	45	45
Rank	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Score	46	46	46	46	46	46	47	47	47	47	47	47	48	48
Rank	71	72	73	74	75	76	77	78	79	80	81	82	83	84
Score	48	48	48	49	50	50	50	50	50	50	50	50	50	50
Rank	85	86	87	88	89	90	91	92	93	94	95	96	97	98

Step 3. From the table 5 let's make table 6, in which R_{ij} is the rank of the j-th score in the i-th sample. Matching scores are averaged.

Table 6: Values of sample points and their rank

I	X_{ij}	R_{ij}	I	X_{ij}	R_{ij}	I	X_{ij}	R_{ij}	I	X_{ij}	R_{ij}
1	35	1,5	2	39	27	2	42	52	3	46	73,5
2	35	1,5	2	39	27	3	42	52	1	47	79,3
1	36	3,5	3	39	27	4	42	52	1	47	79,3
2	36	3,5	3	39	27	4	42	52	2	47	79,3
1	37	8,5	3	39	27	1	43	57	2	47	79,3
1	37	8,5	4	39	27	2	43	57	3	47	79,3
2	37	8,5	1	40	36,5	4	43	57	4	47	79,3
2	37	8,5	1	40	36,5	4	43	57	1	48	85
2	37	8,5	2	40	36,5	4	43	57	3	48	85
3	37	8,5	2	40	36,5	1	44	63	4	48	85
3	37	8,5	3	40	36,5	1	44	63	4	48	85
4	37	8,5	3	40	36,5	2	44	63	4	48	85
1	38	17,5	4	40	36,5	2	44	63	3	49	88
2	38	17,5	4	40	36,5	3	44	63	1	50	93,5
2	38	17,5	4	40	36,5	3	44	63	2	50	93,5
3	38	17,5	4	40	36,5	3	44	63	2	50	93,5
3	38	17,5	1	41	45,5	1	45	68,5	3	50	93,5
3	38	17,5	1	41	45,5	2	45	68,5	3	50	93,5
3	38	17,5	3	41	45,5	3	45	68,5	3	50	93,5
3	38	17,5	3	41	45,5	4	45	68,5	4	50	93,5
4	38	17,5	3	41	45,5	1	46	73,5	4	50	93,5
4	38	17,5	4	41	45,5	2	46	73,5	4	50	93,5
1	39	27	4	41	45,5	2	46	73,5	4	50	93,5
1	39	27	4	41	45,5	3	46	73,5			
2	39	27	1	42	52	3	46	73,5			

According to table 6 we calculate R_i и $\overline{R}_i$:

$$R_1 = \sum_{j=1}^{98} R_{1j}$$

R_{1j}=1,5+3,5+8,5+8,5+17,5+27+27+36,5+36,5+45,5+45,5+52+57+63+63+68,5+
+73,5+79,5+79,5+85+93,5=972

$$\overline{R}_1 = \frac{972}{21} = 46,28$$

$$R_2 = \sum_{j=1}^{98} R_{2j}$$

R_{2j}=1,5+3,5+8,5+8,5+8,5+17,5+17,5+27+27+27+36,5+36,5+52+57+63+63+68,5+
+73,5+73,5+79,3+79,3+93,5+93,5=1016

$$\overline{R}_2 = \frac{1016}{23} = 44,17$$

$$R_3 = \sum_{j=1}^{98} R_{3j}$$

R_{3j}=8,5+8,5+17,5+17,5+17,5+17,5+17,5+17,5+27+27+27+36,5+36,5+45,5+45,5+45,5+
+52+63+63+63+68,5+73,5+73,5+73,5+79,3+85+88+93,5+93,5+93,5=1458

$$\overline{R}_3 = \frac{1458}{29} = 50,27$$

$$R_4 = \sum_{j=1}^{98} R_{4j}$$

R_{4j}=8,5+17,5+17,5+27+36,5+36,5+36,5+36,5+45,5+45,5+45,5+52+52+57+57+
+57+68,5+79,3+85+85+85+50+50+50+50=1405

$$\overline{R}_4 = \frac{1405}{25} = 56,2$$

Step 4. Substitute the found value $\overline{R}_i$ in an expression for calculating Kruskal-Wallis statistics:

$$H_{calc.} = \frac{12}{98 \cdot 99} \cdot (21(46,28 - 49,5)^2 + 23(44,17 - 49,5)^2 +$$

$$+29(50,27 - 49,5)^2 + 25(56,2 - 49,5)^2) =$$

$$= 0,0012 \cdot (217,77 + 653,2 + 17,11 + 1122,5) = 0,0012 \cdot 2010,58 = 2,41$$

In the case of the use of statistics Kruskal–Wallis test, if $n_i \geq 5$ (in our case $n_1 = 21$; $n_2 = 23$; $n_3 = 29$; $n_4 = 25$), an approximation is required.

The approximation of the Kruskal–Wallis statistics is defined as follows (Levin D. M., Stefan D. et al., 2004):

$$M = \frac{N^3 - \sum_{i=1}^{k} n_i^3}{N \cdot (N+1)}$$

$$\nu_1 = (k-1)\frac{(k-1)(M-k+1) - V}{\frac{1}{2}MV}$$

$$\nu_2 = \frac{(M-k+1)}{k-1}\nu_1$$

$$V = 2(k-1) - \frac{2\left[3k^2 - 6k + N\left(2k^2 - 6k + 1\right)\right]}{5N(N+1)} - \frac{6}{5}\sum_{i=1}^{k}\frac{1}{n_i}$$

Then statistics $F = \frac{H(M-k+1)}{(k-1)(M-H)}$ will have an F-distribution with ν1 and ν2 degrees of freedom.

Compute an approximation of the Kruskal–Wallis test:

$$M = \frac{98^3 - (21^3 + 23^3 + 29^3 + 25^3)}{98 \cdot 99} = \frac{879750}{9702} \approx 91$$

$$V = 2 \cdot 3 - \frac{2 \cdot (3 \cdot 4 - 6 \cdot 4 + 98 \cdot (2 \cdot 4 - 6 \cdot 4 + 1))}{5 \cdot 98 \cdot 99} - \frac{6}{5}\left(\frac{1}{21} + \frac{1}{23} + \frac{1}{29} + \frac{1}{25}\right) =$$

$$= 6 - \frac{1616}{48510} - 0,199 \approx 6$$

$$\nu_1 = 3 \cdot 2 \cdot \frac{(3 \cdot 88 - 6)}{91 \cdot 6} = 2,8$$

$$\nu_2 = \frac{88}{3} \cdot 2,8 = 82$$

$$F_{calc.} = \frac{2,41 \cdot 88}{3 \cdot 93,41} = 0,756 \cdot$$

Given that in the calculations q=15 groups with matching ranks (t_1 =2; t_2 =2; t_3 =8; t_4 =10; t_5 =9; t_6 =10; t_7 =8; t_8 =5; t_9 =5; t_{10} =7; t_{11} =4; t_{12} =6; t_{13} =6; t_{14} =5; t_{15} =10), find the modified Kruskal–Wallis statistics using the formula:

$$H^*_{calc.} = H\left[1 - \left(\sum_{j=1}^{q} \frac{T_j}{N^3 - N}\right)\right]^{-1}$$

where $T_j = t_{j3} - t_j$; t_j is the size of the j-th group of identical ranks, q is the number of groups of identical ranks. For $n_i \geq 20$ (this is our case), the approximation of the distribution of statistics by the H χ^2 – distribution with f = k-1 degrees of freedom is valid, i.e. the null hypothesis is rejected, if H* ≥ $\chi^2_{\alpha(k-1)}$.

Calculate the modified statistics H*.

$$H^*_{calc.} = 0,756 \cdot (1 - E)^{-1}, \text{ где } E = \sum_{j=1}^{q} \frac{T_j}{N^3 - N} = \sum_{j=1}^{15} \frac{T_j}{N^3 - N},$$

$T_1 = t_1^3 - t_1 = 8-2=6$; $T_2 = t_2^3 - t_2 = 8-2=6$; $T_3 = t_3^3 - t_3 = 512-8=504$;
$T_4 = t_4^3 - t_4 = 1000-10=990$; $T_5 = t_5^3 - t_5 = 9^3 - 9=720$; $T_6 = t_6^3 - t_6 = 10^3 -10=990$;
$T_7 = t_7^3 - t_7 = 8^3 - 8=504$; $T_8 = t_8^3 - t_8 = 5^3 - 5=120$; $T_9 = t_9^3 - t_9 = 5^3 - 5=120$;
$T_{10} = t_{10}^3 - t_{10} = 7^3 -7=336$; $T_{11} = t_{11}^3 - t_{11} = 4^3 - 4=60$; $T_{12} = t_{12}^3 - t_{12} = 6^3 - 6=210$;
$T_{13} = t_{13}^3 - t_{13} = 6^3 - 6=210$; $T_{14} = t_{14}^3 - t_{14} = 5^3 - 5=120$; $T_{15} = t_{15}^3 - t_{15} = 10^3 -10=990$.

$$E = \frac{1}{941094}(6 + 6 + 504 + 990 + 720 + 990 + 504 + 120 +$$
$$+120 + 336 + 60 + 210 + 210 + 120 + 990) = 6,2 \cdot 10^{-3}$$

$$H^*_{calc.} = 0,756 \cdot \left(1 - 6,2 \cdot 10^{-3}\right)^{-1} = \frac{0,756}{0,9938} = 0,76 \cdot$$

Step 5. Tabular value χ^2 for the significance level α=0,05 with the number of freedom degrees k-1=3 is 7,82.

Step 6. If $H^*_{calc.} < \chi^2_{tabl.}$ (0,76 <0,82), then the null hypothesis about the absence of shift in the studied samples is accepted as plausible, which means that the samples with the results of the input diagnostic test are homogeneous.

Next, we show that the set of sample variances containing the results of input diagnostic testing will also be uniform. To do this, we use the Bartlett criterion to compare several sample variances with different volumes (Mironova L.I., 1997). Table 7 shows the variances of the original samples.

Table 7: Values of variances of initial samples of results input of diagnostic testing

Number Samples I	Length Samples N	Variance Selections D_i
1	21	D_1 = 18,13
2	23	D_2 = 20,58
3	29	D_3 = 18,89
4	25	D_4 = 18,32

We introduce the notation:

$$N^* = \left(\sum_{i=1}^{k} n_i\right) - k$$

$$D = \frac{\sum_{i=1}^{k}(n_i - 1)D_i}{N^*}$$

$$V = 2{,}3026 \cdot \left(N^* \cdot \lg D - \sum_{i=1}^{k}(n_i - 1) \cdot \lg D_i \right)$$

$$C = 1 + \frac{1}{3 \cdot (k-1)} \cdot \left(\sum_{i=1}^{k} \frac{1}{n_i - 1} - \frac{1}{N^*} \right)$$

The calculated value of the Bartlet criterion is determined by the formula B_{calc} = V/C.

Calculate N* = 98-4 = 94

$$D = \frac{20 \cdot 18{,}13 + 22 \cdot 20{,}58 + 28 \cdot 18{,}89 + 24 \cdot 18{,}32}{94} = 18{,}98$$

V=2,3026·(94·lg(18,98)-20·lg(18,14)+22·lg(20,58)+28·lg(18,89)+24·lg(18,32)))=0,107

$$C = 1 + \frac{1}{3 \cdot 3}\left(\left(\frac{1}{20} - \frac{1}{94} \right) + \left(\frac{1}{22} - \frac{1}{94} \right) + \left(\frac{1}{28} - \frac{1}{94} \right) + \left(\frac{1}{24} - \frac{1}{94} \right) \right) = 1{,}014$$

B_{calc} = 0,107/1,014 = 0,105

We compare the calculated value of the Bartlett criterion with the critical value taken from the distribution table χ^2 in accordance with the significance level α=0,05 and the number of degrees of freedom ν = k-1. As mentioned above, the table value of χ^2 for the significance level α=0,05 with the number of freedom degrees k-1=3 is 7,82.

Since the calculated value of the Bartlett test is less than the table value (0,105<7,82), the hypothesis being tested that the variances of samples with the results of input diagnostic testing are uniform can be taken as plausible at the significance level α=0,05 and the number of freedom degrees k = 3.

Thus, the verification of the homogeneity of the initial samples with the results of the input diagnostic testing using both the Kruskal–Wallis criterion and the Bartlett criterion gave identical results, which allowed us to accept the hypothesis of the homogeneity of the initial samples as plausible at the significance level α = 0,05 and the number of freedom degrees k =3.

Checking for homogeneity of samples containing the results of final pedagogical testing after mastering the theoretical course of engineering discipline.

At this stage of statistical processing, it is advisable to use the Pearson consent criterion χ^2. The Pearson agreement criterion χ^2 is used to compare distributions of objects of several aggregates based on the state of a certain property based on measurements on the scale of names of this property in several independent samples from the considered population (Serdyukov V. I., 2007, Starichenko B. E., 2004). The essence of the method is to check the degree of discrepancy between the observed and expected frequencies – the greater the discrepancy, the greater the value of χ^2.

The following is an algorithm for applying the Pearson consent criterion χ^2:

Step 1. Formulate the null statistical hypothesis H_0.

Step 2. Set the level of significance of the hypothesis, which is that the probability of making an error of the first kind, that is, to accept the hypothesis H_0 as plausible, while it is not. In pedagogical research, as a rule, the significance level is chosen 0,05. Then, if the null statistical hypothesis is rejected, the probability of making an error of the first kind is 5%, and the probability of making a correct conclusion is 95%.

Step 3. Determine the number of freedom degrees.

Step 4. Calculate the value of the χ^2 criterion using the formula:

$$\chi^2_{calc.} = n \cdot \left(\sum_{i=1}^{k} \sum_{j=1}^{l} \frac{n_{ij}^2}{n_i \cdot n_j} - 1 \right),$$

where n is the total sample size (in our example n=98);
k – the number of levels of formation of knowledge and skills based on the results of the final test k=4;
l – number of groups (l = 4);
i – group number (i = 1,2,3,4);
j – level number (j = 1,2,3,4).
n_i – the number of students who have reached the i-th level of knowledge and skills formation;
n_j – the number of students who have reached the j-th level of knowledge and skills formation;
n_{ij} – the number of students of the i-th group who have reached the j-th level of knowledge and skills formation.

Step 5. The calculated value of the criterion is compared with its table value.

Step 6. Formulate a conclusion that if the calculated value of the criterion χ^2 is less than the table value, then the null statistical hypothesis is accepted as plausible. Otherwise, it is rejected and an alternative hypothesis is accepted.

Based on the fact that the described method is used on students who successfully coped with the input diagnostic test, a null statistical hypothesis H_0* is put forward that all four groups are homogeneous according to the results of the final pedagogical testing for the studied course of engineering discipline, which is checked by the Pearson agreement criterion χ^2 at the significance level $\alpha = 0{,}05$.

Based on the results of the final pedagogical testing, we make table 8 for calculating the criterion χ^2.

Table 8: Results of final pedagogical testing of 1, 2, 3 and 4 students groups in engineering discipline

The results of the final of pedagogical testing					
Level in points	**Group 1**	**Group 2**	**Group 3**	**Group 4**	**Total by level**
Low 1÷ 15	3	2	2	1	8
Medium 16÷ 30	4	3	4	3	14
Basic 31÷ 45	6	8	10	9	33
High 46÷60	8	10	13	12	43
Total students	21	23	29	25	98

According to table 8 we calculate the value of the criterion χ^2:

$$\chi^2_{calc.} = 98 \cdot \left(\frac{3^2}{21 \cdot 8} + \frac{2^2}{23 \cdot 8} + \frac{2^2}{29 \cdot 8} + \frac{1^2}{25 \cdot 8} + \frac{4^2}{21 \cdot 14} + \frac{3^2}{23 \cdot 14} + \right.$$
$$+ \frac{4^2}{29 \cdot 14} + \frac{3^2}{25 \cdot 14} + \frac{6^2}{21 \cdot 33} + \frac{8^2}{23 \cdot 33} + \frac{10^2}{29 \cdot 33} + \frac{9^2}{25 \cdot 33} +$$
$$\left. + \frac{8^2}{21 \cdot 43} + \frac{10^2}{23 \cdot 43} + \frac{13^2}{29 \cdot 43} + \frac{12^2}{25 \cdot 43} - 1 \right) = 3{,}53$$

Let's calculate number of freedom degrees (NFD) for table 8. It is known that the number of freedom degrees for the matrix consisting of m rows and n columns and equal (m – 1) (n – 1) -1, then NFD= 3*3 -1 = 8. The table value of χ^2 with 8 degrees of freedom at a significance level of 0,05 is 15,5.

The calculated value of Pearson's χ^2 is 3,53. the Table value of the criterion for NFD = 8 is $\chi^2_{0,95}$ = 15,5. Since the calculated value of the criterion χ^2 is less than the table value, the hypothesis H_0* can be accepted as plausible and combine data from four samples based on the results of the final

pedagogical testing into one. Analysis of the total sample data allows you to determine how many students have mastered the engineering discipline at the high, basic, medium and low levels.

Checking for homogeneity of samples containing the result of the students projects protection

Table 9 shows the results of student projects protection in groups 1,2, 3, and 4.

Table 9: Results of student project protection in groups 1, 2, 3 and 4

The result of the protection projects						
Level		**Group 1**	**Group 2**	**Group 3**	**Group 4**	**Total**
[0,2] low	0	0	1	1	1	3
	2	1	1	2	1	5
[3,4] medium	3	1	2	2	2	7
	4	2	4	3	1	10
[5,6] basic	5	6	5	5	5	21
	6	7	6	6	5	24
[7,8] high	7	2	2	7	6	17
	8	2	2	3	4	11
Total students		21	23	29	25	98

Based on the results of testing the statistical hypothesis H_0*, a null statistical hypothesis H_0** is put forward that according to the results of project protection, the four experimental groups are homogeneous. To check its plausibility, we calculate the criterion statistics χ^2 based on the project protection results shown in table 9. Since each level of experience assessment represents an interval, to improve the accuracy of calculating the Pearson criterion, we will allocate sublevels within each interval corresponding to the lower and upper bounds of the interval, so we have 8 levels of experience in project development. The project protection results matrix consists of 8 rows and 4 columns. Then the number of freedom degrees for this case will be NFD = 7*3-1 = 20.

$$\chi^2 = 98 \cdot \left(\frac{1^2}{21\cdot 5} + \frac{1^2}{21\cdot 7} + \frac{2^2}{21\cdot 10} + \frac{6^2}{21\cdot 21} + \frac{7^2}{21\cdot 24} + \frac{2^2}{21\cdot 17} + \frac{2^2}{21\cdot 11} + \right.$$
$$+ \frac{1^2}{23\cdot 3} + \frac{1^2}{23\cdot 5} + \frac{2^2}{23\cdot 7} + \frac{4^2}{23\cdot 10} + \frac{5^2}{23\cdot 21} + \frac{6^2}{23\cdot 24} + \frac{2^2}{23\cdot 17} +$$
$$+ \frac{2^2}{23\cdot 11} + \frac{1^2}{29\cdot 3} + \frac{2^2}{29\cdot 5} + \frac{2^2}{29\cdot 7} + \frac{3^2}{29\cdot 10} + \frac{5^2}{29\cdot 21} + \frac{6^2}{29\cdot 24} +$$
$$+ \frac{7^2}{29\cdot 17} + \frac{3^2}{29\cdot 11} + \frac{1^2}{25\cdot 3} + \frac{1^2}{25\cdot 5} + \frac{2^2}{25\cdot 7} + \frac{1^2}{25\cdot 10} + \frac{5^2}{25\cdot 21} +$$
$$\left. + \frac{5^2}{25\cdot 24} + \frac{6^2}{25\cdot 17} + \frac{4^2}{25\cdot 11} - 1\right) = 9,2$$

The calculated value of the Pearson criterion is 9.2. the Table value of the criterion for NFD = 20 is equal to $\chi^2_{0,95}$ = 31,41. The calculated value of the Pearson criterion is less than the table value, which makes it possible to accept the H_0** hypothesis as plausible and combine data from four samples based on project protection results into one. Analysis of the combined sample allows you to determine the number of students who defended projects at the high, basic, medium and low levels.

Then, based on the results of testing the null statistical hypotheses H_0* and H_0**, combined named sample of students from four experimental groups is compiled, including data on the results of their final pedagogical testing on the theoretical course and the protection of student projects. The analysis of the named sample allows us to determine the number of students who have achieved high, basic,

medium and low levels of competence in the field of engineering course development as a result of training.

Conclusion

The article considers a method that allows you to determine the number of students who have a certain level of competence in the development of engineering discipline, which involves the formation of theoretical knowledge and skills and the ability to demonstrate them in practice during the preparation and protection of an independently completed project. The method is based on the application of a level approach to the empirical assessment of competence formation in the field of engineering disciplines development. It is shown that evaluation of the level of formation competence of the student in studying an engineering discipline consists of two private empirical estimates: an empirical assessment of student theoretical knowledge and skills in the field of engineering disciplines and empirical assessment of a student's experience of independent project development and protection.

In the framework of statistical data processing, the Kruskal – Wallis rank criterion was used to prove the homogeneity of samples to determine the equality of the medians of the compared samples, the Bartlett criterion to compare the variances of several samples with different volumes, and the Pearson agreement criterion.

Analysis of the levels of competence formation of students after studying a particular engineering discipline will allow, in the case of insufficiently satisfactory results, to make corrective pedagogical actions, thereby improving the quality of engineering training of students.

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Soybean Production - Actual Statement and 2020-2024 Forecast in Romania

Agatha POPESCU

University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania
E-mail address: agatha_popescu@yahoo.com

Abstract

The paper analyzed the dynamics of soybean cultivated area, production and yield in Romania in the period 2010 -2019 and established the estimates of sown area and seeds output for the 2020-2024 horizon. Both the soybean cultivated surface and production registered a high development in the last decade, so that in 2019, in Romania, 158,149 ha were harvested from which there were obtained 415,942 tons of seeds, meaning 2.8 times more than in 2010. Yield had a slight increase of only 12% and accounted for 2,630 kg/ha in 2019, which proved that surface extend had a more important influence on production growth than yield. The decision to chose the quadratic trend model having the formula $Y = 581.53\ x^2 + 6{,}834{,}4\ x + 51{,}174$ for the cultivated area and $Y = 3{,}841.7\ x^2 - 2{,}863{,}9\ x + 122{,}867$ for production for setting up the estimates for the next five years was taken based on the results obtained for R^2, $\bar{R}^2$, RMSE, MAE, and MAPE criteria which offered a higher accuracy. In 2024, it is expected that Romania to produce 844,291 tons soybean seeds from 284,534 ha cultivated with this crop. Farmers are interested to increase the cultivated areas and production, as a response to the subsidies offered by the EU according to its new Green CAP policy reform regulations and Danube Soya Program aiming to grow protein output from certified non GMO crops like soybean.

Keywords: soybean production, trends, growth models, forecast, Romania

Introduction

Soybean is an important oilseeds crop for its many uses as food, feed, raw material for processing industry, a high value plant in crop rotation, and a valuable resource for achieving bio-fuels, reducing pollution and preserving environment as mentioned by Bilteanu and Birnaure (1989) and Popescu Agatha (2012a).

In the EU-28, soybean is not so much produced, as long as imports are cheaper, but during the last years the need of protein crops certified as non GMO has determined the EU to sustain farmers to extend production within a new CAP policy focused on Green Reform started since 2013 (European Parliament, 2013, Regulation No.1307/2013) and the establishment of the Danube Soya Program (Austrian Development Agency, 2020).

Romania is ranked the 6th in the EU for its production after France, Germany, Poland, and Czech Republic (EU, Crop Market Observatory, 2018). Soybean finds good conditions in Romania to express its production potential among the oil-seeds crops, coming on the 3rd position after sunflower and rape as affirmed by Popescu Agatha (2010, and 2012b), Surca (2018), and Popescu and Dinu (2020).

The areas suitable for soybean cropping are: the South and South Eastern Romania (Zone I), West (Zone II), the Sub-Carpathian area (Zone III), East Moldova and North West (Zone IV) and small areas in North East and the Central part (Zone V) (Popescu Agatha, 2018a, and 2018b).

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The increased demand on the domestic and foreign market is also a reason to intensify the cultivation of soybean on larger surfaces and carry out a higher production, for reducing imports and stimulating exports as attested by Preda (2017) and Popescu Agatha et al. (2019).

"Growth models" such as: linear, quadratic, logarithmic, cubic, exponential, power etc are largely used for analyzing and forecasting as described by Pindyck and Ribinfeld (199l0, Karim et al. (2010), Habib et al. (2013) and Nazir et al. (2016).

Researchers are interested to carefully select the best fitted models which are going to be used to estimate the future levels of a variable. For this purpose, different models should be tested, compared and selected depending on the measure in which they assure the highest precision of the actual image of the growth scenario in a time series.

The selection criteria for a growth model could show: (a) either the highest prediction precision judged by means of coefficient of determination (R^2) and adjusted R square ($\bar{R}^2$), taking into consideration that, the higher the R^2 and $\bar{R}^2$, the higher the prediction accuracy; (b) or the lowest deviations and errors in estimating mean, judged by means of Root Mean Squared Errors (RMSE), Mean Absolute Deviation (MAD), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), Akaike Information Criterion (AIC), Bayesian Information (BIC) etc; (c) or a mix of these criteria as affirmed by Pindyck and Ribinfeld (199l), Karim et al. (2010), Habib et al. (2013) and Nazir et al. (2016).

In this context, the purpose of the paper was to identify the best fitted model to design soybean production forecast in the next five years in Romania taking into account the analysis of the dynamics in the 2010-2019 decade.

The paper is structured as follows: *Introduction,* which briefly presents the results regarding the importance of soybean in the EU and Romania, justifying why it is needed to increase production and the main diagnosis tools which could be used to comparatively test various trend models in order to chose the best one which assure the highest accuracy of the prediction. *Materials and methods* present the sources of data, the trend models selected for soybean production forecast, and the criteria chosen to test them. *Results and Discussions* provide the obtained results, comments and interpretations, and *Conclusions* present the main ideas resulting from this research work.

Materials and Methods

Data collection

The data used in this study refer to soybean production carried out in Romania in the period 2010-2019, the empirical data being provided by the National Institute of Statistics.

The studied indicators were: (i)cultivated area with soybean, (ii)soybean seeds production and (iii) production.

Methodological aspects have been:
Dynamics analysis based on the formula of Fixed basis Index: $I_{FB(\%)} = (Y_n/Y_1)100$, where: Y_n is the value of the variable in the year n and Y_1, the value of the variable in the year 1.
Average annual growth based on the formula: $\overline{\Delta y} = (y_n - y_1)/(n - 1)$.
Trend models, as follows: (a) linear fit model, having the formula: $Y = bx + a + e_i$, and (b) quadratic fit model, with the formula: $Y = ax^2 + bx + c + e_i$.

The criteria used for testing the accuracy of the trend models have been: R^2, $\bar{R}^2$, RMSE, MAE, and MAPE.

The results were tabled and graphically illustrated, being accompanied by comments. The conclusions pointed out the main aspects regarding the future of soybean production in Romania according to the best fitted forecasting model.

Results and Discussions

Present situation regarding soybean crop performance

Soybean cultivated area has almost tripled its size in 2019 compared to 2010. If ten years ago, in Romania there were cropped only 63,948 ha with soybean, in 2019, the surface sown with this crop reached 158,149 ha, meaning an average annual growth of 10,466.7 ha (Table 1, Fig. 1 and 2).

Table 1: Dynamics of soybean cultivated area, production and yield, Romania, 2010-2019

	Cultivated area (ha)	Production (Tons)	Yield (kg/ha)
2010	63,948	149,940	2,345
2011	72,056	142,636	1,980
2012	79,793	104,330	1,308
2013	67,672	149,931	2,216
2014	79,910	202,892	2,539
2015	128,156	262,061	2,045
2016	127,266	263,380	2,070
2017	165,143	393,495	2,383
2018	169,422	465,609	2,748
2019	158,149	415,942	2,630
2019/2010%	293.15	277.40	112.15
Average annual growth, $\overline{\Delta y}$	10,466.7	29,555.7	31.6

Source: Own calculation based on the data from National Institute of Statistics, 2020.

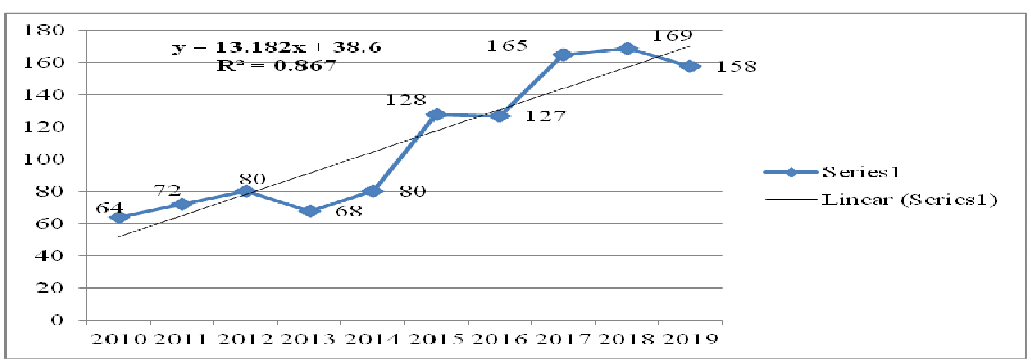

Fig.1: Dynamics of soybean cultivated area based on linear trend model, 2010-2019, Romania (thousand ha)

Source: Own design based on the data from National Institute of Statistics, 2020.

From a statistical point of view, spreading the data on the graph, two trend line models were considered suitable for reflecting the evolution of the cultivated area with soybean: the linear one and the quadratic one. However, analyzing R square value, we may easily notice that in case of the linear model $R^2 = 0.867$ while in case of the quadratic model $R^2 = 0.8769$, therefore a little higher, meaning that the last trend line model assures a higher precision in estimating the tendency of soybean cultivated surface in the studied interval (Fig. 1 and 2).

The increase of the cultivated area with soybean was determined by higher and higher interest of the farmers for this crop, stimulated by the subsidies per surface unit coming from the EU and also from the Romanian Government for producing more seeds rich in protein from crops certified as non GMO, and by the higher acquisition price compared to the one for other crops.

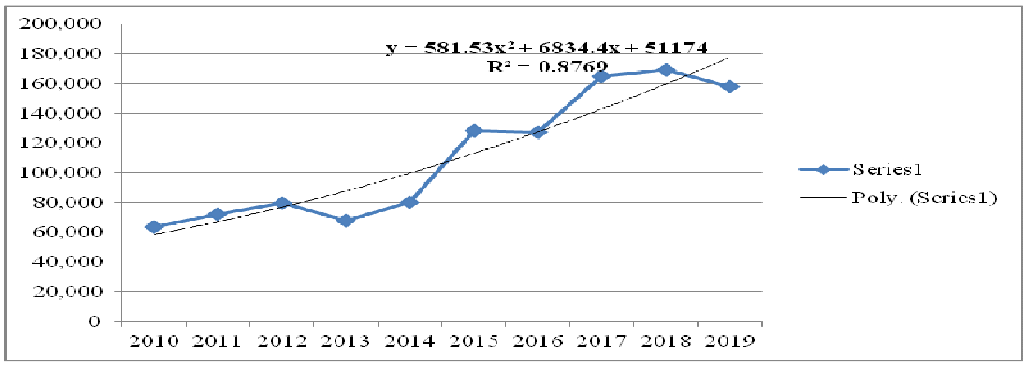

Fig.2: Dynamics of soybean cultivated area based on quadratic trend model, 2010-2019, Romania (ha)

Source: Own design based on the data from National Institute of Statistics, 2020.

The EU market has a high requirement of protein, and soybean is the crop whose seeds have the highest content in protein. Due to the difficulties in assuring the import of non-GMO soybean meal from America, the EU-28 decided to reduce the imported amounts by 50% and to start producing soybean in the member states till 2025, as a first stage, and then to continue to develop soybean production only in the community for assuring the independence of food security.

The European Protein Independence Plan encourages farmers to extend the soybean cultivated area and use modern technologies to grow seeds production, as long as soybean proved to be highly efficient crop (Paybou, F., 2018). The price difference between the non-GM and GM soybeans (and derivatives) is high and looks to widen significantly in the coming years (Brookes, G. et al, 2005).

For the cultivated area with soybean, Romania comes on the 2nd position in the EU-28, after Italy, and being followed by France, Croatia and Hungary. About 14% of the EU-28 cultivated area with soybean is in Romania (Eurostat, 2018).

In Romania, the share of soybean in the cultivated area with oil plants increased from 4.5% in 2010 to 8.8% in 2019. The largest percentages were achieved in the last years, reflecting the increased importance of soybean among the oil seeds crops (Popescu Agatha, 2018b).
At present, soybean is cultivated in the following regions and zones of favorability: Oltenia, Muntenia, Dobrogea and South of Moldova regions (Zone I), Banat region (Zone II), West Moldova, North Muntenia and North Oltenia in the the Sub-Carpathian area (Zone III), East Moldova and North West Crisana (Zone IV) and small areas in North East Moldova and the Central part of Transilvania (Zone V) (Fig. 3).

Fig.3: The regions and zones of favorability where soybean is cultivated in Romania

Soybean seeds production

As a result of the extend of the sown area with soybean in Romania, seeds production increased 2.77 times in the analyzed interval from 149,940 tons in 2010 to 415,942 tons in 2019, meaning an average annual growth rate of 29,555.7 tons (Table 1).

The trend models suitable to characterize the dynamics of soybean production are again the linear and quadratic models as presented in Fig. 4 and 5.

The quadratic model offers a higher accuracy in estimating the trend of soybean production as long as $R^2 = 0.9075$, a little higher than $R^2 = 0.8547$ in case of the linear model.

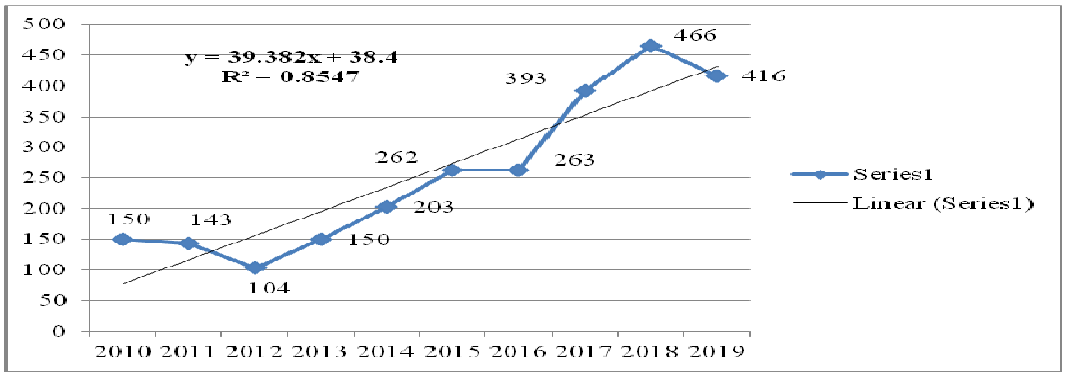

Fig. 4: Dynamics of soybean production based on linear trend model (Thousand tons)
Source: Own design based on the data from National Institute of Statistics.

Soybean production increased because of the implementation of modern technologies, based mainly on the use of the new high breeding value hybrids offered by various companies to farmers. Along the soybean chain to the final product: soybean meal, the importance of the crushing factories in seeds processing increased and their capacity was correlated with the seeds supply.

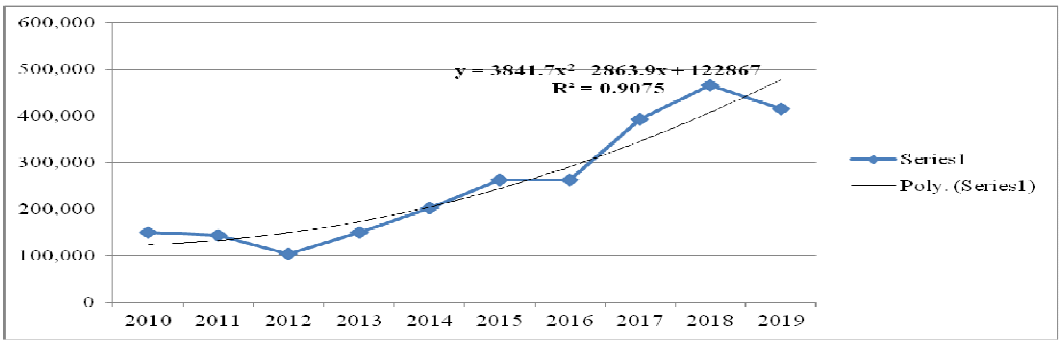

Fig. 5: Dynamics of soybean production based on quadratic trend model (tons)
Source: Own design based on the data from National Institute of Statistics.

From the total oils seeds production achieved in 2019 by Romania, which accounted for 4,792 thousand tons, soybean production of 416 thousand tons represent only 8.6%, but more than 6.3% in 2010 as mentioned by Popescu Agatha (2020).

Romania is among the most important soybean seeds producers in the EU-28, being ranked the 6th for its production after France, Germany, Poland, and Czech Republic (EU, Crop Market Observatory, 2018; EU, Oilseeds and protein crops, area and yield, 2020).

However, the demand of crude protein for feed market is much higher in the EU. The feed market absorbs about 93% of crude protein production and the main sources of oilseeds meals are: rapeseed, sunflower seeds and soy beans; pulses: beans, peas, lentils and lupines. As the internal production of the EU is much smaller than the requirements, about 75% of protein supply is assured by imports, especially from the USA, Brazil and Argentina. Soybean is on the top position among the imported amounts of oilseeds (USDA GAIN Report, 2018).

Soybean Yield

In comparison with the high increase in the cultivated surface and production, in Romania, soybean yield registered just a slight growth of only 12.15% in the last ten years, from 2,345 kg/ha in 2010 to 2,630 kg/ha in 2019 (Table 1).

Average production is still at a low level in Romania, because of the deficiencies in choosing the best varieties with high production potential and adapted to the local conditions of soil and climate, in assuring the proper farm inputs and in managing the modern technologies, aspects with which many farmers, especially owning smaller farms, are facing.

Another reason why soybean yield did not increase too much in Romania is linked to climate change, especially in terms of high temperatures and long periods of drought in the years 2012, 2015 and 2016 as mentioned Popescu Agatha (2018a).

Romania's position in the EU-28 for soybean cultivated area, production and yield

According to Eurostat crops statistics, 2018, and Chancellor (2018), regarding the situation of soybean crop performance in the EU-28 main producing countries in the period 2008-2017, Romania came on the 2nd position after Italy for the cultivated area in 2008 with 49.9 thousand ha, representing 18.3% of the EU-28 cultivated area, while in 2016, Romania was ranked also the 2nd after Italy, for 126.7 thousand ha.

For soybean seeds production, in 2008, Romania came on the 3rd position after Italy and Croatia for 90.6 thousand tons, and in 2016, the country was also ranked the 3rd after Italy and France for 261.9 thousand tons.

But, for soybean yield, Romania was 1,816 kg/ha in 2008, a level which situated the country on the 6th position after Italy, Croatia, Austria, France, Hungary, and in 2016, the country was ranked also on the 6th position for 2,067 kg/ha soybean seeds after Italy, Croatia, Austria, Hungary and France.

However, the figures reflected the development of the soybean sector in Romania's agriculture in 2016 versus 2008 in the as long as the cultivated area increased 5.2 times, seeds production 2.9 times and yield +13.8% (Table 2).

Table 2: Romania's position among the EU-28 top soybean producing countries in 2016 versus 2008

	2008			2016			2016/2008%		
	Area (Thou. ha)	Production (Thou. tons)	Yield (kg/ha)	Area (Thou. ha)	Production (Thou. tons)	Yield (kg/ha)	Area (Thou. ha)	Production (Thou. tons)	Yield (kg/ha)
EU-28	273.0	764.2	2,799	817.1	2,490	3,047	299.3	325.7	108.8
Italy	107.8	346.2	3,211	288.1	1,081.3	3,753	267.2	312.3	116.8
France	21.8	63.1	2,894	125.1	293.7	2,348	573.8	465.4	81.1
Romania	49.9	90.6	1,816	126.7	261.9	2,067	524.8	289.1	113.8
Croatia	35.8	107.6	3,005	76.0	239.0	3,145	667.6	222.1	104.7
Hungary	29.0	74.1	2,555	61.3	181.3	2,958	211.3	244.7	115.8
Austria	18.4	54.1	2,940	49.8	152.6	3,064	270.6	282.1	104.2

Source: Own calculation based on the data from Eurostat, Crops Statistics, and Chancellor, 2018.

Descriptive statistics reflects that in the last ten years, in Romania, the average sown area with soybean was 111,151.5 ± 43,043.40 ha, with a variation coefficient of 38.72%, showing a high deviation of the variable in the chronological series from the mean as the values are heterogeneous and the mean is not representative.

The average soybean production in the 2010-2019 interval accounted for 255,021.6 ± 128,961.18 tons, with a high coefficient of variation (CV = 50.56%) reflecting the heterogeneous data and the lack of representativeness of the mean.

The soybean yield registered an average level of 2,226.4 ± 412.70 kg/ha and the variation coefficient was, CV = 18.53%, reflecting a relative homogeneous series of data and that the mean could be accepted as representative (Table 3).

Table 3: Descriptive statistics for the studied indicators

	Mean	St. Dev.	Coeff. of variation (%)
Cultivated area (ha)	111,151.5	43,043.40	38.72
Production (Tons)	255,021.6	128,961.18	50.56
Yield (kg/ha)	2,226.4	412.70	18.53

Source: Own calculation based on the data from National Institute of Statistics.

Future Production Scenario

Based on the results obtained by processing the primary, there were established two mathematical growth models which are suitable to reflect the dynamics of the soybean cultivated area and production as follows:

For the cultivated area:

(a)Linear trend model, whose determined formula is $Y = 13{,}231.2\ x + 38{,}379.8$
(b)Quadratic trend model, whose obtained formula is $Y = 581.53\ x^2 + 6{,}834{,}4\ x + 51{,}174$

For soybean seeds production:

(a)Linear trend model, whose determined formula is $Y = 39{,}394.96\ x + 38{,}349.26$ and
(b)Quadratic trend model, whose obtained formula is $Y = 3{,}841.7\ x^2 - 2{,}863{,}9\ x + 122{,}867$.
The resulted values for the selection criteria used to chose the best fitted forecasting model are presented in Table 4.

Table 4: Selection criteria for testing the trend models

	Criteria				
	R^2	$\bar{R}^2$	RMSE	MAE	MAPE
Linear fit	0.867	0.851	14,939.08	12,906.76	0.01358
Quadratic fit	0.8769	0.8615	14,329.01	11.976.22	0.01168
Results for soybean production					
Linear fit	0.854	0.836	46,520.83	42,078.7	21.65
Quadratic fit	0.907	0.895	37,553.88	32,449.5	14.23

Source: Own results.

Comparing the results for the two fit models, one may easily notice the differences for each criterion.

Both in case of the cultivated area with soybean and production, R^2 and $\bar{R}^2$ have higher values in case of the quadratic model versus the linear one. Therefore, from this point of view, the better fitness model is the quadratic one, as long as R square for tells us that 87.69% of the cultivated area and 90.7% of production depends on the time variation and the remaining on other factors.

RMSE, MAE and MAPE have registered lower levels in case of the quadratic model compared to the linear one: $RMSE_Q < RMSE_L$, $MAE_Q < MAE_L$, and $MAPE_Q < MAPE_L$.

This means that the quadratic model is better than the linear fit yielding smaller forecasting deviations and errors both in case of the cultivated area and soybean output.

Having in mind a clear picture of the results of the use of the diagnosis tools, one may recognize that the best fitted model for forecasting soybean production in Romania for 2020-2024 horizon is the quadratic trend model.

The forecast of soybean cultivated area and production is presented in Table 5.

Table 5: Soybean production forecast for 2020-2024 horizon (tons)

	2020	2021	2022	2023	2024
Soybean cultivated area	196,718	216,927	238,300	260,836	284,534
Soybean production	556,210	641,705	734,884	835,746	944,291

Source: Own results.

In 2024, it is expected that soybean sown area with soybean to reach 284,534 ha and seeds production 944,291 tons. This means that the cultivated area will be by 80% higher and production by 127% higher than in 2019.

Conclusions

Both the soybean cultivated area and production proved a high dynamics during the period 2010-2019. The results attested a high growth rate in soybean production and a strong increasing trend in the last decade (+177.4%), so that, in 2019, soybean output accounted for 415,942 tons.

The production growth was influenced in a higher proportion by the increased cultivated surface and in a smaller proportion by yield due to many technological factors and climate change.

For forecasting soybean cultivated area and seeds production with a high precision in Romania in the period 2020-2024, two models have been tested: the linear model and the quadratic one.

Taking into consideration the results for the criteria R^2, $\bar{R}^2$, RMSE, MAE, and MAPE, it was drawn the decision that the quadratic model assures a higher accuracy in forecasting soybean sown surface and output for the next five years.

Based on this, it was estimated that in 2024, Romania is expected to produce 944,291 tons soybean seeds from a cultivated surface of 284,534 ha, meaning an average production estimated at 3,318 kg/ha by 26% more than in the year 2019.
The extend of the cultivated area with soybean and the growth of seeds production have led to the increase of the value of the agricultural output and the farmers' income and, also, created new opportunities for oilseeds exports on the EU market.

The use of the diagnosis tools named growth determinist models in selecting the best fitted model to set up the future level of a variable is compulsory as researchers to be sure that their results are accurate and conclusions are pertinent. They have to pay attention to the forecast period, having in mind that the longer the forecast horizon, the higher the forecast error. Therefore, a short-term scenario is more recommended than a long-run forecast.

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Contribution of Agriculture to Romania's Gross Domestic Product

Agatha POPESCU

University of Agricultural Sciences and Veterinary Medicine, Bucharest, Romania
E-mail address: agatha_popescu@yahoo.com

Abstract

The paper analyzed Romania's GDP and GDP produced in agriculture in the period 2008-2019 pointing out the changes by resources and in the territory, and also in agriculture by micro regions. Descriptive statistics, and trend regression functions, correlation and determination coefficients were used to process the data. In 2019, Romania achieved Euro 222 Billion GDP, almost double than in 2008. Trade, transportation, tourism, Industry, and Public services have the highest contribution to GDP. More than 50% of GDP is achieved by three regions: Bucharest- Ilfov, North West and South Muntenia. Agriculture carried out Euro 11.08 Billion GDP in 2019, by 55% more than in 2008 and contributes by 5% to GDP. Agriculture GDP has a more balanced growth in the territory. The dynamics from the last decade and the positive connection between GDP in agriculture and Romania's GDP ($r = 0.731$), $R^2 = 0.534$, and the regression model, $Y = 19.820 x + 29.423$, reflects that agriculture will continue to be an important sector of the economy in the future. If in case of GDP per capita Romania accounts for 69% of the EU-27 average (Euro 31,000), and occupying the 24th position, for GDP created in agriculture, Romania is ranked the 5th in the EU after France, Italy, Spain, and Germany. It is expected that in the future Romania's economic growth to continue and GDP produced in agriculture to increase much more.

Keywords: agriculture, Gross Domestic Product, trends, Romania.

Introduction

Agriculture is an important sector of the economy as it supplies primary agricultural products, most of them essential to nourish the population and also to assure the raw materials for processing industry.

Agriculture is the main activity in the rural areas where over 50% of Romania's population is living (Popescu, 2013, Popescu and Condei, 2015, and Popescu et al., 2018). It offers jobs, but also has an indirect impact in other sectors such as: food processing and machinery industry, transportation, trade etc along the agricultural products chain.

Agriculture is an opportunity for rural population for business development in order to assure farmers' income and the living standard for their families, and also plays an important role in landscapes and biodiversity preservation and environment protection.

Romania's has a high agricultural production potential and performance, coming on the eight position in the EU-28 for the value of agricultural output which in 2018 accounted for Euro 18.6 Billion, representing 10.51% of the EU-28 agricultural output. Other EU countries have a higher contribution such as: France (43.6%), Italy (32.2%), Germany (30%), Spain (29.5%), United Kingdom (16.8%), the Netherlands (15.5%) and Poland (14.1%) (Eurostat, 2020).

In order to characterize the dimension of the economy of a country, the contribution of various sectors to the economy, and to compare the economic development of different countries, the most commonly used indicator is Gross Domestic Product (GDP).

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GDP is "equal to the sum of gross value added (GVA) achieved in production, plus taxes on products and minus subsidies on products. GVA is given by the difference between output and intermediate consumption"(Eurostat, Glossary GDP, 2020).

An increase in GDP reflects that the economy is performing well, having a good impact on jobs availability, salaries increase and consumers' spending on goods and services.

GDP has various types, but two of them, real GDP which is an inflation-corrected indicator and nominal GDP at current prices (with inflation). For this reason, nominal GDP is higher than real GDP and for calculating real GDP, nominal GDP is divided to a deflator.

GDP is usually analyzed in its dynamics for various intervals of chronological series of data provided by the official statistical institutions, the approach being made either regarding GDP as a whole at the country level, as well as by its resources and uses, and also in the territory by regions of development (Russu, 2014, Popescu and David, 2015 and 2017, Sfetcu, 2016, Popescu, 2017b, 2018a).

Specific econometrics models and methods are commonly used to analyze GDP dynamics and its factors of influence (Anghelache and Anghel, 2017).

The analysis of GDP of a country involves many approaches referring to: (a) the main production factors which participate to the creation and growth of GDP as macroeconomic indicator: fixed, human and financial capital (Popescu, 2011, Burgen et al., 2012, Popescu and David, 2015) and (b) the uses of GDP for consumption, gross capital formation, stock variation and net export (Bobinaite et al, 2011, Anghel et al., 2018).

Romania's GDP accounted for Euro 180 Billion GDP in the year 2017, meaning Euro 9.232 per inhabitant (current prices). (Amariei, 2016, European Commission, 2018).

The main resources contributing to GDP in Romania are: services (32%), industry (23%), trade (18%), financial transactions (Popescu and David, 2017). Also, in Romania, GDP is much more influenced by final consumption than export and gross fixed capital (Popescu, 2018a).

In the territory of Romania, the discrepancies regarding the contribution of the eight micro regions of development to GDP reflect a divergent trend and an unbalanced economic growth (Popescu, 2017b). Having in mind that GDP is the key indicator reflecting the health of the economy, in this study it was approached both GDP produced in agriculture and GDP at the country level, in order to evaluate the contribution of agriculture in the economy of Romania.

GDP in agriculture results from "the difference between the value of agricultural output and the value of the expenses spent to assure goods and services inputs which are required to sustain production process and, finally, all these are adjusted for taxes and subsidies on products" (Eurostat, 2020).

In Romania, GDP created in agriculture is deeply influenced by agriculture peculiarities connected to: farm structure where subsistence farming is dominant, small farm size, low technical endowment and investments, labour force aging and low education level (Popescu, 2015a and 2015 b), the climate change impact on agricultural technologies, low productivity and high risk caused by meteorological phenomena (Popescu, 2015c, Popescu, 2016a and 2016b), and product quality (Popescu, 2018b, Popescu, 2019a and 2019b).

Due to this, Romania produces only Euro cents 0.21 added value per kg of raw materials consumed in agriculture compared to Euro 1.58 added value - the average in the EU-28 which shows that GVA produced in Romania is seven times smaller than in the EU (Boghean and State, 2013, Enache, 2014, Novotna and Volek, 2016, Popescu et al., 2016).

Agro-food export plays an important role in increasing GDP, but Romania's agro-food trade balance is still a negative one, despite that the general trend in imports is a declining one (Popescu, 2017a and 2017c).

In this context, the purpose of the paper was to analyze both the evolution of Romania's GDP by its resources at the national level and in the territory, and also GDP created in agriculture at the country level and in the micro regions of development in the period 2008-2019, in order to evaluate in what measure agriculture, forestry and fishing contributed to the economic growth.

The paper is structured as follows: *Introduction,* which briefly presents the results regarding the importance of agriculture in the economy and its contribution to GDP as well as the main results in studying GDP in relation to its resources and uses and determinant factors. *Materials and methods* present the data sources, and the main methodological aspects used to process them. *Results and Discussions* provide the obtained results, comments and interpretations, and *Conclusions* present the main ideas resulting from this research work.

This section should follow keywords. This section should provide background of the study and highlight research motivation.

Materials and Methods

Data collection

The data used in this study refer to GDP both at the national level and in agriculture, forestry and fishing in Romania in the period 2008-2017 were taken from the data base of the National Institute of Statistics.

The studied indicators were:

(i)Romania GDP in its dynamics as whole and by economic activities contributing to its achievement, and also its territorial distribution by micro-regions of development;
(ii) GDP created in agriculture, forestry and fishing its dynamics and also its territorial distribution by micro-regions;
(iii)The relationship between Romania's GDP and GDP created in agriculture, forestry and fishing in terms of correlation coefficient and dependence quantified by a regression model.

Methodological aspects have been:

Dynamics analysis was carried out using the Fixed basis Index: $I_{FB(\%)} = (Y_n/Y_1)100$, where: Y_n is the value of the variable in the year n and Y_1, the value of the variable in the year 1.
Average annual growth was calculated using the formula: $\overline{\Delta y} = (y_n - y_1)/(n - 1)$.
Trend models were used to characterize the general tendency in the evolution of GDP both at the national level and in agriculture, forestry and fishing. For this purpose, it was used the quadratic model having the formula: $Y = ax^2 + bx + c$.
Descriptive statistics involved the calculation of mean, standard deviation, kurtosis, skewness, minimum and maximum values, coefficient of variation.
The correlation coefficient was calculated using the well known Bravais-Pearson's formula.
The determination coefficient, R^2 was used to establish the measure in which the variation of the dependent variable, Romania's GDP is caused by the variation of the independent variable, GDP created in agriculture, forestry and fishing.
Linear regression model having the formula: $Y = bx + a$ was used to calculate and interpret the dependence relationship between the two types of GDP.
The results were tabled and also illustrated in a few graphics, which were accompanied by comments. The conclusions emphasized the main ideas resulting from this research work.

Results and Discussions

Romania's Gross Domestic Product (GDP) increased by 95.22% from Lei 539.8 Billion (Euro 146.6) in 2008 to Lei 1,053.8 Billion in 2019 (Euro 222 Billion), the average annual growth in the studied interval 2008-2019 being Lei 46.7 Billion (Euro 10.65 Billion). These figures reflect that Romania's economy is developing well having a continuous ascending trend (Fig .1).

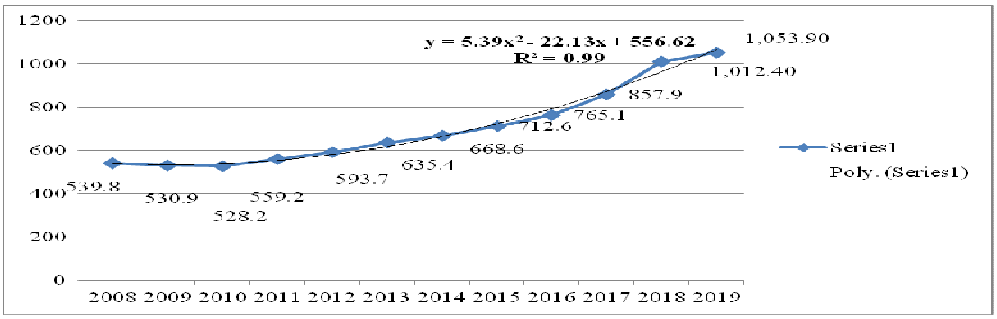

Fig. 1: Romania's GDP dynamics, 2008-2019 (Lei Billion)

Source: Own design based on the data from National Institute of Statistics, 2020

The GDP growth was determined by the contribution of all the economic activities in various volumes and proportions. According to the empirical data available at present, in 2017, the highest contribution to GDP was given by Trade, transport, hotels and restaurants which produced Lei 158 Billion GDP, Industry came on the 2nd position with Lei 137.6 Billion, Public administration and defense, education, health and social assistance occupied the 3rd position with Lei 105.7 Billion. In the decreasing order other economic activities came as follows: Real estate transactions with Lei 68.8 Billion, Professional, scientific, technical and administration activities with Lei 64.6 Billion, Information and communication with Lei 46.9 Billion, Constructions with Lei 44.2 Billion, Agriculture, Forestry and Fishing with Lei 37 Billion, and Cultural activities with Lei 26.6 Billion. Compared to the year 2008, in 2017 it was noticed that almost all the economic activities increased their contribution to GDP, except the field of Buildings (Table 1).

Table 1: Romania's GDP by activities in 2017 versus 2008

	Activity	GDP by activity (Lei Billion)		2017/ 2008 %	Share of the activity in GDP (%)	
		2008	2017		2008	2017
	Romania's GDP	**539.8**	**857.9**	**158.9**	**100.0**	**100.0**
1	Agriculture, forestry, fishing	34.0	37.0	108.7	6.3	4.3
2	Industry	137.2	137.6	100.3	25.4	16.0
3	Constructions	61.3	44.2	72.0	11.3	5.1
4	Trade, transport, hotels and restaurants	97.3	158.0	162.4	18.0	18.4
5	Communications and information	23.4	46.9	200.4	4.3	5.5
6	Financial transactions and insurance	11.3	21.0	185.9	2.1	2.4
7	Real estate transactions	35.8	68.8	192.1	6.6	8.0
8	Professional, scientific, technical and administration	21.6	64.6	298.7	4.0	7.5
9	Public administration, defense, education, health, social assistance	50.2	105.7	210.4	9.3	12.3
10	Cultural activities	12.0	26.6	221.9	2.2	3.1
11	Gross Value Added	484.2	776.6	160.3	87.9	90.5
12	Tax per products	57.6	81.2	141.0	10.6	9.5

13	Rights on imports (Customs tax)	0.9	2.6	266.6	0.2	0.3
14	Subsidies per product	-3.0	-2.6	85.3	0.5	0.3

Source: Own calculation based on the data from National Institute of Statistics, 2020.

The highest growth rate in the analyzed interval was registered by Professional, scientific, technical and administration sector (+198.7%), Cultural activities (+121.9%), Public administration and defense, education, health, and social assistance (+110.4), Communication and information (+100.4%), Real estate transactions (+92.1%), Financial transactions and insurance (+85.9%), Trade, transport, hotels and restaurants (+62.4%),
GDP produced in Agriculture, forestry and fishing increased by 8.9%, while in the field of industry the growth rate was the lowest one, just 0.3%.

An important aspect which has to be mentioned is that Gross Value Added created in the economy increased by 60.3% from Lei 484.2 Billion in 2008 to Lei 776.6 Billion in 2017 (Table 1).

The structure of GDP by activity in the economy in 2017 reflects that the highest share in GDP belongs to: Trade, transport, hotels and restaurant (18.4%), Industry (16%), Public administration and defense, education, health and social assistance (12.3%) and the lowest shares to Agriculture, forestry and fishing (4.3%), Cultural activities (3.1%) and Financial transactions and insurance (2.4%).

Also, we may notice that in 2008 compared to 2017, the percentage contribution to GDP declined in case of the following activities: in Agriculture, forestry and fishing from 6.3% to 4.3%, in Industry from 25.4% to 16%, and in Constructions from 11.3% to 5.1%, and raised in case of all the other activities (Table 1).

The increase of GDP in Romania was the result of the economic efforts and performance achieved by the eight micro-regions of development in the studied period.

Over 50% of GDP is created in three micro regions: Bucharest-Ilfov, North West and South Muntenia. In 2017, the highest GDP accounting for Lei 233 Billion was carried out by Bucharest-Ilfov, their contribution being by +64.4% higher than in the year 2008. On the 2nd position came North West micro region which produced Lei 104.9 Billion GDP, by 70.2% more than in 2008, and on the 3rd position was South Muntenia micro-region with Lei 101 Billion., a level which was by 49.6% higher than in 2008. The other micro-regions registered a lower GDP, but enough to sustain the economic growth at the national level.

Compared to 2008, the contribution to GDP increased in all the eight micro-regions at least by 50%, the highest increase being +70.2% in North West and the lowest one accounting for +49.6% was registered in South Muntenia. The percentage contribution to Romania's GDP by micro-region, in the descending order was the following one in 2017: Bucharest-Ilfov 27.1%, North West 12.2%, South Muntenia 11.8% Center 11.35%, North East 10.45%, South East 10.25%, West 9.5% and South West Oltenia 7.5% (Table 2).

Table 2: The contribution of the eight micro-regions to GDP in the year 2017 versus 2008

	GDP by micro-region (Lei Billion)		**2017/2008 %**	**Share of micro-region in GDP (%)**	
GDP Romania	**538.9**	**857.8**	**158.9**	**100.0**	**100.0**
North West	61.6	104.9	170.2	11.4	12.2
Center	60.0	97.0	161.6	11.1	11.3
North East	57.2	88.9	155.4	10.6	10.4
South East	56.3	88.0	156.3	10.4	10.2
Bucharest - Ilfov	141.7	233.0	164.4	26.2	27.1

South Muntenia	67.5	101.0	149.6	12.5	11.8
South West Oltenia	42.0	64.0	152.3	7.8	7.5
West	53.5	81.0	151.4	10.0	9.5

Source: Own calculation based on the data from National Institute of Statistics, 2020.

Gross Domestic Product in Romania compared to other EU countries

In the period 2009-2019, the EU-27 registered an average annual GDP growth rate of 1.6%. Romania achieved 3.1%, coming on the 7th position among the countries which had a higher economic growth rate than the EU average, it is about: Ireland (6%), Malta (5.7%), Estonia (3.7%), Poland (3.6%), Lithuania (3.5%), and Luxemburg (3.1%).

In 2019, the EU-27 GDP in PPS terms accounted for Euro 13,922 Billion, of which 60.7% was achieved by Germany, France, Italy and Spain which are the largest economies.

Considering PPS GDP in EU-28 = 1, in 2019, Romania recorded 2.48, being ranked the 7th after Hungary (205.03), Czechia (18.19), Sweden (12.78), Denmark (9.74), Croatia (4.79), and Poland (2.55) (Eurostat, PPP GDP, 2020).

Regarding GDP at current prices per inhabitant, reflecting the living standard of the population, the EU-27 average in the year 2019 was Euro 31,100. Considering it equal to 100, Romania came on the 24th position for 69% of the EU average GDP/capita, being followed by Greece (68%), Croatia (65%) and Bulgaria (53%), situated on the last positions. It is worth to mention that in the period 2009-2019, Romania moved from the 26th position to this 24th position as a consequence of the economic development. (Eurostat, 2020, National accounts and GDP).

Gross Domestic Product created in Agriculture, forestry and fishing had also a high dynamics in the interval 2008-2019, registering 154.89 % growth rate. In 2019, this economic sector produced Lei 52.6 Billion GDP (Euro 11.08 Billion) compared to Lei 34 Billion (Euro 9.23 Billion) in 2008, meaning an average annual growth of Lei 1,697.6 Million (Euro 387.43 Million) (Fig. 2).

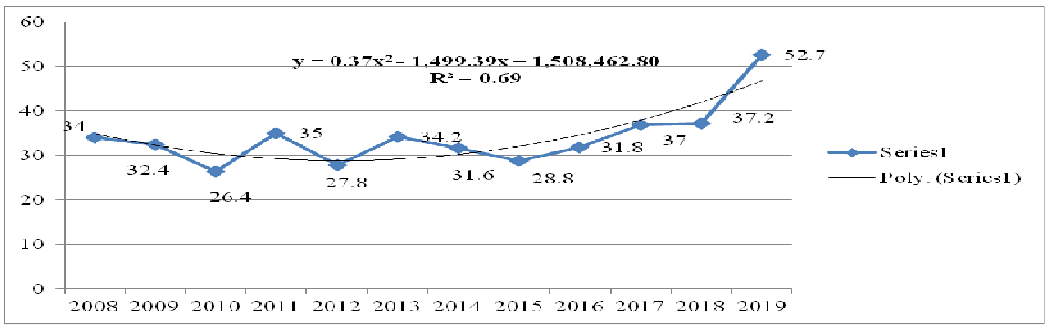

Fig. 2:Romania's GDP dynamics in agriculture, forestry and fishing, 2008-2019 (Lei Billion)
Source: Own design based on the data from National Institute of Statistics, 2020.

As a result, the share of GDP created in Agriculture in Romania's GDP decreased from 6.3% in 2008 to 5% in 2019, but in the years 2012, 2014-2018, the percentage was even smaller, the lowest level being 3.66% in 2018, a year when agriculture output was deeply affected by climate change in terms of extreme phenomena (frozen periods at the end of winter early, huge rainfalls in spring, long and severe droughts in summer etc (Fig. 3).

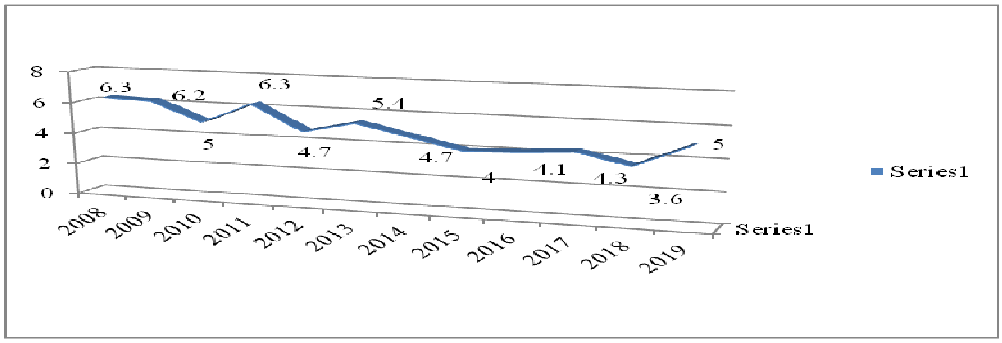

Fig. 3: Share of GDP in agriculture, forestry and fishing in Romania's GDP, 2008-2019 (%)
Source: Own calculation and design based on the data from National Institute of Statistics, 2020.

The contribution of the micro regions to GDP created in agriculture, forestry and fishing is shown in Table 3. The micro-regions which are able to produce the highest GDP in the field of agriculture, forestry and fishing are: South Muntenia, which in 2017 achieved Lei 6.9 Billion, South East with Lei 6.7 Billion and North East with Lei 5.9 Billion.

The lowest GDP accounting for Lei 1.1 Billion was produced by Bucharest-Ilfov, where other economic activities are much better developed like industry, constructions, communications and information, financial transactions, real estate transactions etc.

The weight of the micro-regions in GDP produced in agriculture, forestry and fishing by region, in the decreasing order, was the following one in the year 2017: South Muntenia 18.5%, South East 18.1%, North East 15.9%, South West Oltenia 12.2%, North West 11.2%, Center 10.7%, West 10.5% and Bucharest-Ilfov 2.9%.

GDP achieved in agriculture, forestry and fishing increased in almost all the micro regions in the studied period 2008-2017, except North West and Central part, where in 2017 it was smaller than in 2008 by 6.9% and, respectively by 2.5%.

The highest growth was noticed in Bucharest-Ilfov region (+175%), South West Oltenia (+15.3%), South East (+13.5%), West (+11.4%) and South Muntenia (+11.2%), which are the regions which have the highest potential for agriculture, and the lowest growth was +3.5% recorded on North East (Table 3).

Table 3: The contribution of micro-regions to GDP created in agriculture, forestry and fishing (AFF), Romania, in the year 2017 versus 2008

	GDP in AFF by micro-region (Lei Billion)		2017/2008 %	Share of micro-region in GDP in AFF (%)	
GDP in AFF Romania	**34.0**	**37.0**	**108.8**	**100.0**	**100.0**
North West	4.4	4.1	93.1	13.0	11.2
Center	4.0	3.9	87.5	11.7	10.7
North East	5.7	5.9	103.5	16.8	15.9
South East	5.9	6.7	113.5	17.3	18.1
Bucharest - Ilfov	0.4	1.1	275.0	1.1	2.9
South Muntenia	6.2	6.9	111.2	18.2	18.5
South West Oltenia	3.9	4.5	115.3	11.3	12.2
West	3.5	3.9	111.4	10.6	10.5

Source: Own calculation based on the data from National Institute of Statistics, 2020.

Comparison between GDP created in Romania's agriculture to the one in other EU countries

Agriculture contributes to GDP by 5% in Romania and by 5.1% in Bulgaria, which reflects that this sector is of a high importance in the economy of these countries.

Also, the share of agriculture in GDP is enough high in Greece (4.1%), Hungary (3.9%), Latvia (3.9%), and Slovakia (3.8%).

In the largest economies in the EU, the share of agriculture in GDP is much smaller: Germany 0.7%, France 1.7%, Italy 2.1% and Spain 2.6%, which reflects that other sector such as services and industry have a higher contribution to the economic development.
However, taking into account the absolute values of GDP carried in agriculture, the top EU countries are: France, Italy, Spain, Germany, Romania, Poland, Netherlands, Greece, Hungary and Czechia. These ten countries produced PPS GDP Euro 209.97 Billion in agriculture, representing 76,22 % of the EU-27 GDP.

Therefore, Romania comes on the 5th position for PPS GDP Euro 20.95 Billion, representing about 8% of the GDP created in agriculture of the EU-27 in 2019. This confirm the fact that Romania has a powerful agriculture, a high potential to produce more and better, and to sustain economic development of the country (Table 4).

Table 4: EU-27 top 10 countries for GDP produced in agriculture in 2019

	PPS GDP (Euro billion)	PPS GDP in agriculture (Euro billion)	Share of agriculture in PPS GDP (%)
EU-27	**13,922**	**275.49**	**1.97**
France	2,214	37,63	1.7
Italy	1,785	37,49	2.1
Spain	1,331	34.6	2.6
Germany	3,121	21.85	0.7
Romania	419	20.95	5.0
Poland	251	20.88	2,4
Netherlands	693	11.09	1.6
Greece	225	9.22	4.1
Hungary	222	8.66	3.9
Czechia	304	7.60	2.5
Total Top 10	10,565	209.97	

Source: Own calculation based on Eurostat data, 2020, National accounts and GDP.

Comparing the increase of Romania's GDP with the growth of GDP created in agriculture, forestry and fishing by micro region, we may notice that at the country level GDP has a higher dynamics due to the large variety of activities, whose results do not depend on climate change.
Work in agriculture is deeply influenced by meteorological factors which could favor or not favor production in the vegetal and also in the animal sector, also the activity is running mainly in small farms of lower productivity, characterized by not sufficient endowment, modern technologies used just in a small percentage of agricultural holdings, high price for farm inputs and low acquisition price of agricultural products, most of farmers are over 60 years old, and only about 20% have a high training level in farm management.

At the national level, GDP increased by 58.9%, as a result of the growth of over 50% in each micro region, the highest growth being +70.4% in North West while the lowest one was +50% in South Muntenia.

In agriculture, the highest increase of GDP (+184.2%) was registered in Bucharest-Ilfov micro-region, but this aspect is less important as long as the value of GDP in agriculture is the smallest one. The lowest growth of GDP in agriculture was 2.4% achieved in North East. Also, in North West and Center, GDP in agriculture decreased by -6.4% and, respectively, by -0.9%.

However, it deserves to appreciate that in South West Oltenia, South East and South Muntenia, GDP produced in agriculture increased in the analyzed interval by +17.25, +13.4% and, respectively, +10.5% (Table 5).

Table 5: Comparison concerning the increase of GDP in Romania and of GDP in agriculture, forestry and fishing in the year 2017 versus 2008 by micro-region (%)

	GDP Romania	GDP in agriculture, forestry and fishing
At national level	**+58.9**	**+8.8**
North West	+70.4	-6.4
Center	+81.6	-0.9
North East	+55.3	+2.4
South East	+56.4	+13.4
Bucharest -Ilfov	+64.4	+184.2
South Muntenia	+50.0	+10.5
South West Oltenia	+52.6	+17.2
West	+51.4	+9.8

Source: Own calculation based on the data from National Institute of Statistics, 2020.

Descriptive statistics in terms of mean, standard deviation, kurtosis, skewness, minimum. maximum, and coefficient of variation for Romania's GDP and for GDP created in agriculture, forestry and fishing is shown in Table 6.

Table 6: Descriptive statistics for Romania's GDP and GDP created in agriculture, forestry and fishing

	Mean	St. Dev.	Kurtosis	Skewness	Min	Max	Var. coef.
Romania's GDP	704.8	183.8	-0.22	0.97	528.2	1,053.9	26.07
GDP in agriculture	34.0	6.78	5.36	1.93	26.4	52.7	19.90

Source: Own calculation based on the data from National Institute of Statistics, 2020.

The value of the variation coefficient is higher than 20% in case of Romania's GDP reflecting that the data in the chronological series 2008-2019 are relatively heterogeneous and the mean is not representative, while in case of the value of the coefficient of variation for GDP created in agriculture, forestry and fishing ranged between 10% and 20% reflecting a relatively homogeneous series of data and that the mean is representative (Table 6).

The dependence of Romania's GDP on GDP created in agriculture, forestry and fishing was studied by means of regression analysis, from which it resulted the following regression equation: $Y = 19.820 x + 29.423$, where: Y = Romanian's GDP, the dependent variable, and X = GDP created in agriculture, forestry and fishing, the independent variable.

The regression model reflects that if GDP created in agriculture, forestry and fishing will increase by one unit, GDP created in the whole economy will grow by 49.243 units.

The availability of the regression model is confirmed by F-stat = 11.484, whose value is higher than the F tabled value and also by the low risk degree, Sign. F = 0.0068.

The limits of the confidence interval, Lower 95% and Upper 95% have been the following ones for the parameters a and b of the regression model: - 422.4363 < a < 481.2840 and 6.7943 < b < 32.8467 (Table 7).

Table 7: The estimated regression model

Regression statistics						
Multiple R	0.7312					
R square	0.5347					
Adjusted R square	0.4882					
Standard error	131.54					
Observations	12					
ANOVA						
	df	SS	MS	F	Sign. F	
Regression	1	198902.6	198902.6	11.4942	0.00688	
Residual	10	173045.6	17304.56			
TOTAL	11	371948.2				
	Coefficients	St. Error	t Stat	*P*- value	Lower 95%	Upper 95%
Intercept	20.4238	202.7971	0.1450	0.8875	-422.4362	481.2840
x- variable 1	19.8205	5.8462	3.3903	0.00688	6.7943	32.8467

Source: Own results.

The value of the coefficient of determination, $R^2 = 0.534$, shows that only 53.4% of the variation of Romania's GDP depends on the variation of GDP created in agriculture, forestry and fishing, and the remaining depends on GDP created in other sectors. The fact that the correlation coefficient between Romania's GDP and GDP formed in the agricultural sector is r = 0.731 shows that between these two indicators it is a strong and positive relationship.

The predicted value of Romania's GDP, the value of the prediction error (residuals) and the standardized value of error are shown in Table 8.

Taking into account the points cloud in the graphical illustration of the relationship between X- the independent variable, that is GDP produced in agriculture, forestry and fishing and the residuals, we may conclude that the regression model is well chosen, because there is no correlation between the independent variable X and residuals, which reflect the value of the prediction error, in other words, the difference between the observed value and predicted value of Romania's GDP (Y) (Fig.4).

Table 8: Residual output

Observation	***Predicted Y***	***Residuals***	***Standard Residuals***
1	703.3217938	-163.5217938	-1.30374199
2	671.6089502	-140.7089502	-1.121857598
3	552.6857867	-24.48578666	-0.195222591
4	723.142321	-163.942321	-1.30709481
5	580.4345248	13.26547519	0.105764233
6	707.2858992	-71.88589924	-0.573138682
7	655.7525284	12.84747162	0.102431534
8	600.2550521	112.3449479	0.895714404
9	659.7166338	105.3833662	0.840210448
10	762.7833756	95.11662445	0.7583548

11	766.747481	245.652519	1.958561587
12	1073.965653	-20.06565344	-0.159981335

Source: Own results.

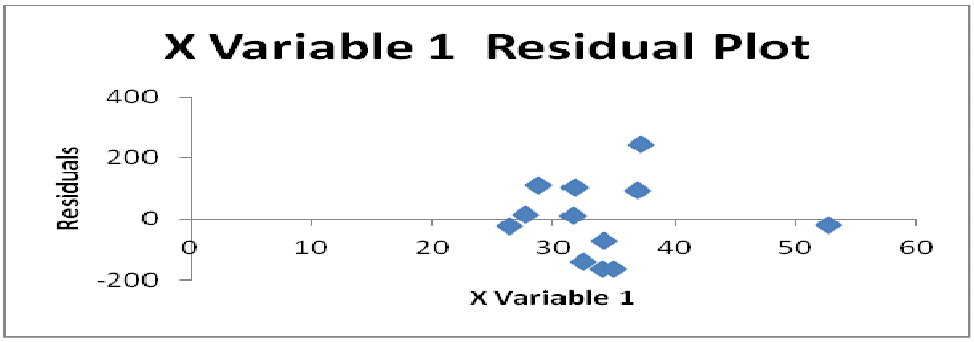

Fig. 4: GDP produced in agriculture, forestry and fishing versus the value of prediction error
Source: Own results.

Conclusions

Romania's GDP followed a high ascending trend in the period 2008-2019 increasing by 95% and accounting for Lei 1,53.8 Billion (Euro 222 Billion) in 2019. This reflects the efforts made by all the sectors for the development of the economy. It is expected that in the future the economic growth to have the same ascending trend.

Taking into account the evolution in the last decade of trade, transportation, hotels and restaurants, industry, and public administration and defense, education, health and social assistance, in general services, it is expected that these economic activities will continue to develop and increase their contributing to GDP.

Bucharest- Ilfov, North West and South Muntenia regions will continue to produce over 50% of Romania's GDP and to keep their position of leaders in pushing upward of the economic growth.

GDP produced in Agriculture accounted for Lei 52.6 Billion GDP in 2019 compared to Lei 34 Billion in 2008, meaning + 55%. The decline to 5% agriculture share in Romania's GDP in 2019 is explained by the high growth rate of GDP in other fields.

Agriculture has a more balanced development in the territory as reflected by the contribution of the regions of development to GDP: South Muntenia (18.5%), South East (18.1%), North East (15.9%), South West Oltenia (12.2%), North West (11.2%), Center (10.7%), West (10.5%), except Bucharest-Ilfov which has the smaller contribution (2.9%).

The smaller GDP in Romania's agriculture compared to other economic sectors is caused by the reduced gross value added due created in this sector, determined by the specific features: the dominance of the small sized-farms, relatively low technical endowment, low productivity, farmers' aging and their low training level, high price for farm inputs and low acquisition price of agricultural products, and also by the fact that agricultural production is deeply influenced by climate factors which during the last decade have produced distortions in agricultural output affecting the agriculture contribution to the economic development and farmers' income.

Despite of these aspects, agriculture remain an important economic sector contributing to the economic growth, as proved by the correlation coefficient ($r = 0.731$) existing between GDP formed in agriculture and GDP at the country level and $R^2 = 0.534$, which shows that 53.4% of the variation of Romania's GDP depends on the variation in GDP in agriculture. The regression model, Y = 19.820

x + 29.423 proved that if GDP created in agriculture, forestry and fishing will increase by one unit, GDP created in the whole economy will grow by 49.243 units.

In the coming future, it is expected as Romania to produce more GDP in agriculture and to keep its 5th position among the major contributors to the development of the EU agriculture.

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The Significance of "Smart Specialisation" For the Regional Innovativeness Growth

Magdalena KOGUT-JAWORSKA, PhD

University of Szczecin, Poland
magdalena.kogut-jaworska@usz.edu.pl

Elżbieta OCIEPA-KICIŃSKA, PhD Ing.

University of Szczecin, Poland
elzbieta.ociepa-kicinska@usz.edu.pl

Abstract

This article analyses the significance of smart specialisations in enhancing the innovative policy paradigm in the regions. Smart specialisations by definition should play a major role in stimulating innovativeness at the regional level, in particular with regard to enhancing the region's potential, its resources, key competences and competitive advantages while identifying the priority criteria. Thus, the concept should ensure a bigger growth of the regions attractiveness and their faster development. Smart specialisation is an approach implemented under the EU's Cohesion Policy, also in Poland. Smart specialisation in Polish regions is also known as an approach that combines the industrial, educational and innovative policies in order to identify and concentrate a limited number of priority areas for the economy. It is assumed that clearly identified smart specialisations in combination with appropriate management of public financial resources contribute to economic growth and improvement of the economic situation in Polish regions. The aim of this article is to present and characterise the assumptions for smart specialisations, and also to explore the process of intelligent specialisation and its role in the growth of innovativeness in Polish regions. First, the article presents the assumptions for introducing smart specialisation and characterises the smart specialisations identified by the individual regions in Poland. Next, the research assumptions are presented along with the results of the regional benchmarking based on the synthetic measure of development and on the analysis based on indicators for strategic horizontal objectives, describing the level of innovativeness and R&D advancement.

Keywords: Smart Specialisation, Regional Policy, EU Financial Policy, Innovation, Economic Development

Introduction

The concept of smart specialisation constitutes an overall (complex) approach to the issue of specialisation in the area of science, technology and economy in the European Union. The basic assumption of the smart specialisation concept is enhancing the innovativeness and competitiveness of regions via utilisation of their best assets and developing the most promising specialisation areas from the point of view of achieving competitive advantages on an international scale.

Pursuant to the assumptions of the smart specialisation strategies, each region has specific resources which, incorporated into global processes, become the key success factors. Taking into consideration the endogenous capabilities of the region, its resources, key competences and competitive advantages in the course of identifying the priority areas is to ensure a bigger growth of the regions' competitiveness and their faster growth.

Regional smart specialisations are a new instrument for regional growth, via which the European Union encourages the regions to develop the areas that have the greatest development potential. This

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is because the regional specialisations are to reflect the specificity, uniqueness and economic originality of each region. Consequently, the smart specialisations are to lead to creating areas and niches that enable durable and dynamic growth, preventing any duplicated investments, at the same time fostering the inter-regional growth.

Pursuant to the assumptions of the Cohesion Policy, in the years 2014–2020 the smart specialisation concept should be particularly important in the process of regional growth. On that basis, each of the voivodeships in Poland developed a regional innovation strategy containing the smart specialisation identified within the given area.

The aim of this article is to present and characterise the assumptions for smart specialisations, and also to explore the process of intelligent specialisation and its role in the growth of innovativeness in Polish regions. The main outcome of the analysis is presenting new research assumptions and the results of the regional benchmarking based on a synthetic measure of development and the analysis based on indicators for strategic horizontal objectives.

The article describes the role of smart specialisations and indicates their progress as well as the effects of their implementation in Polish regions. For the purposes of the analyses, a literature review was also completed, which included the analysis of major European and national documents, to show the conditions and constraints related to introduction of the smart specialisation concept to the regional policy. The pragmatic part concerns a short description of smart specialisations identified by the individual regions in Poland, and empirical identification and evaluation of progress in implementing the concept. The added value is outlining the effects of the innovative policy based on smart specialisation, and positioning of the Polish regions within a ranking based on the synthetic measure of development.

Conceptualisation of the idea of "smart specialisation" – background for the conducted research study

According to D. Foray, smart specialisation is "an entrepreneurial process of identifying the areas of science and technology, from among the specialisations, from which the given region may avail itself" (Foray, 2009). According to P. David, D. Foray and B. Hall, in turn, "a smart specialisation is both a concept inscribed in the innovation strategy and a tool applied for developing and building the current and future standing of the region or country in a knowledge-based economy" (Foray, David, Hall 2011). Smart specialisation holds an important place in the innovation and industry policy (Foray, 2016), as this concept is aimed at promoting an effective and efficient use of public investments in research, innovations and technological development. The idea is a determinant for prioritisation of allocating the public resources connected with innovations which are sensitive to the regional context.

The concept of smart specialisation offers a number of benefits in terms of designing a policy to stimulate innovations, while taking into account the diverse, evolutionary nature of regional economies. Smart specialisation may therefore be perceived as a result of the needed convergence between a regional development policy and an innovativeness policy (McCann, 2015). Even though the concept is nothing new in the EU's cohesion policy [i], its assumptions refer to the theories known for years in the area of economic thought, particularly with regard to regional growth, as e.g. the theory of: economic base, core product, industrial district, territorial production systems, cluster, "learning" region, or new economic geography. Smart specialisations have become a new philosophy for developing the innovation policy in the European Union, therefore they have been the object of numerous analyses and expert opinions as well as they have been referred to in the EU policy papers[ii]. The studies emphasise the congruity of the idea with the EU policy and indicate practical recommendations in the area of developing a regional policy focused on creating smart specialisations.

The concept of developing smart specialisations is an attempt to improve effectiveness of the innovation processes, particularly in the context of the public sector expenditure (Pessoa, 2014, pp. 5-8). The underlying assumption is that regions should not and cannot develop their activities simultaneously in all areas. They should be selective and choose the domains where they have the best developed resources, and should focus their scientific, research and innovative activities within their scope (McCann, Ortega Argiles, 2011).

Regional strategies of research and innovations for smart specialisation are in turn integrated and defined at the grass roots level economic transformation programmes, based on (Nowakowska, 2011):

- utilising the strengths and competitive advantages of a given region and its potential to achieve excellence, while taking into account any differences in economic capacities of individual regions in relation to innovations,
- full engagement of stakeholders and joint identification of the most promising areas of specialisation, as well as weaknesses that hinder introduction of innovations in any given region,
- focusing the public support in the area of the pursued policy and investments on key regional priorities which are manifested in trends, challenges and needs in the area of knowledge-based development, including any ICT-related activities,
- application of tools to encourage innovativeness and experimenting, to stimulate investments of private entities in research and development; to foster technological and practical innovations; to create a synergy effect,
- relying on evidence-based data and indicators as well as on a reliable system of monitoring and evaluation.

The difference between the smart specialisation concepts and the traditional concepts of innovation management is the process which can be defined as entrepreneurial discovery – an interactive process where the forces having an impact on the market and the private sector search for information about new, potential fields of activity, and governmental organisations assess the potential impact of any given areas on development of the region, and support the areas which have the greatest potential to achieve a competitive advantage in that respect (Wolniak, Hąbek, 2016). It should be noted that on the one hand the concept of smart specialisations requires a number of necessary conditions for its implementation, and on the other hand it is possible to identify many constraints affecting the policy as such, which was based on the concept. The major constraints are classified in the table below (Table 1).

Table 1: Conditions and constraints for a regional development policy based on implementing smart specialisations

Conditions	Constraints
– changing the traditional attitudes taken by the public to what is unknown, and stimulating pro-innovative behaviours, which includes elimination of stereotypes, fostering trust towards new solutions and stimulating social attitudes of being open to innovations – ensuring efficiency of the education system and the ability to adjust the education services to the market	– favouring the regions that are already developed, at the cost of underfinancing others, which would be in contradiction to the main principle of the EU's territorial cohesion – concentration of cutting-edge technologies development in the best developed regions, with concurrent marginalisation of less developed regions, which results in increased

needs, and adequate response to the social and economic situation in the region – stimulating pro-innovation attitudes among entrepreneurs, which includes encouraging them to implement innovations, especially those worked out in cooperation with the research & development sector – implementation of innovative ideas on the market via taking up activities aimed at reducing the level of risk involved in implementation of innovations – supporting research & development activities in research units and in enterprises, which is based on solid rules and legal regulations. This will make it possible for any engaged entities to prepare strategic planning of their actions in medium- and long-term time horizon. – ensuring effectiveness of allocating any means for research & development activities. This is to be fostered via supporting any R&D works aimed at introducing innovative ideas into the market. – increasing the number and quality of innovative ideas implementations, particularly those prepared on the basis of R&D works, while ensuring appropriate competences of any institutions engaged in the processes, as well as transparency of the intellectual property protection regulations – support for application of innovation and ICT technologies used in serving the public – ensuring access to the financial instruments that support innovation measures in various phases of development, including the latest solutions known worldwide in that respect – supporting the international cooperation and internationalisation of enterprises in order to enhance the competitive position and to increase the significance in international and global value chains – supporting the cooperation between the science and economy sectors via legal regulations encouraging the process participants to intensify their	polarisation – difficulties in anticipating which technologies in a long run will be developing at the fastest rate, which is due to the extremely fast progress of science – individual regions achieving the same or similar results in terms of priority rankings – too many regions select a few most popular technologies, predominantly ICT, nano- and biotechnologies, – the risk connected with wrong choices, resulting from excessive support provided to solutions that finally prove to be inefficient – constraints resulting from the unpredictable and complex nature of innovation, connected with application of technological solutions and results of research done in various areas, being applied in many fields which were not anticipated by innovators (e.g. pervasive IT technologies, new materials, nano- and biotechnologies) – a risk that the works in the region may be relatively easily dominated by traditional interest groups, which are more interested in retaining the *status quo* rather than restructuring the economy via innovations – reliance on single industries, which is particularly hazardous in case of regions and cities with a low level of development, with a small overall economic potential – attempts to create, on a top-down basis, clusters that constitute development policy instruments that may turn out to be a trap, both from the point of view of the chances for success and long-term effects, with regard to the types of activity that cannot rely on any traditions – ignoring the demand side represented by innovators, users and consumer interest groups, as well as any intermediaries with a knowledge-based and simultaneously market-focused perspective, i.e. settling for a traditional triple helix managerial model, assuming interactions between the academic world, public authorities and entrepreneurs,

activities, especially with regard to investments made by the enterprise in the area of innovation – developing the service offer of the institutions that support implementation of innovations and technology transfer, and ensuring easy access to their services	without the forth group of stakeholders representing a vast range of innovation users, as per the model described as a quadruple helix

Source: own study based on *M. Słodowa-Hełpa, 2013: Inteligentne specjalizacje polskich… Regionalna Strategia Rozwoju Inteligentnych Specjalizacji Województwa Zachodniopomorskiego 2020+ RIS3 WZ,* Zasady polityki innowacyjnego rozwoju … 2016 r 51.

Smart specialisation is based on a conviction that no country or region may be a leader in all areas of research and innovativeness, but each of them has its specific potential which makes it possible for them to attain a competitive advantage only in some specified areas. According to the European Commission, in a knowledge-based economy each region has its own role to play, on a condition that it is able to determine its competitive advantages, potential and ambition to achieve excellence in specific market sectors or niches

Innovative potential in smart specialisation strategies in Polish regions

Analysing the innovative potential in Poland, it is possible to distinguish a number of social, economic and spatial factors which affect the level of innovativeness. This is because the innovation processes on the one hand are heavily determined by the society wealth level and human capital resources, which is often manifested by open attitudes to innovative products. On the other hand, innovation development depends on the economy's technological capacity – understood in a broad sense as a level of technological advancement of industry and service sectors, the academic sphere that introduces innovations to the economy.

The processes of choosing smart specialisations in Polish regions were similar. Identification of the specialisation was mainly based on statistical data, predominantly on the level of GDP generated by a given sector, employment level and personnel with a given education profile. Another important element covered the comparative analyses performed in order to show the potential of key industries. Similarly, in each region, social consultations were carried out among the public, entrepreneurs, business environment institutions, and non-governmental organisations.

It should be noted that different levels of detail apply to smart specialisations in any individual regions, which made the comparison very problematic. In accordance with the comparative study methodology, in the course of distinguishing the specialisations, they were standardised according to industries, where specialisations were assigned to industry groups and then sectors made up of those groups. The categorising was aimed at determining in which direction the given industry is developing, on the basis of its more exhaustive description in the strategy document.

The study accounted for the significance level of a given industry in the smart specialisation strategy of a given region as a whole. Unfortunately, the level of detail for each voivodeship as well as the number of specified specialisations were not covered by uniform rules. The table below presents smart specialisations broken down into sectors and industries (see Table 2).

Table 2: Regional smart specialisations of Polish regions

Voivodeship	Smart specialisations
Dolnośląskie	Chemical and pharmaceutical industries Spatial mobility High quality foods Natural and recycled materials Manufacturing of machines and equipment, materials processing ICT
Kujawsko-Pomorskie	Safe foods Processing, fertilisers and packaging Medicine, medical services and health tourism Automotive industry, transport devices and industrial automation Tools, injection moulding, plastic products Information processing, multimedia, programming ICT services
Lubelskie	Bioeconomy Medicine and health Low-carbon power engineering IT and automatic control
Lubuskie	Green economy Health and life quality in the region Innovative (modern) traditional industry Business cooperation
Łódzkie	Modern textile and fashion industry (including design) Advanced building materials Medicine, pharmaceuticals, cosmetics Power engineering, including renewable energy sources Innovative agriculture and food processing Information technology and telecommunications
Małopolskie	Life sciences Sustainable energy ICT Chemicals Production of metals and products from metal and mineral non-metallic resources Electrical and mechanical engineering Creative and leisure industries
Mazowieckie	Safe foods Smart management systems Modern business services High quality of life
Opolskie	Chemical (sustainable) technologies Sustainable construction and wood-processing technologies Metal and mechanical engineering technologies Power engineering technologies (including RSE, improving the energy efficiency) Agricultural and food processing technologies, healthy food
Podkarpackie	Aviation and astronautics High quality of life ICT
Podlaskie	Agricultural and food sector

	Medical services sector Ecoinnovation sector Mechanical engineering
Pomorskie	Off-shore and port logistics technologies Interactive technologies in an information saturated society Eco-effective technologies in production, transmission, distribution and consumption of energy and fuels and in construction industry Medical technologies within the scope of civilisation diseases and ageing
Śląskie	Power engineering Medicine ICT Emerging industries Green economy
Świętokrzyskie	Resource-saving construction industry Metal and foundry industry Modern agriculture and food processing Health and pro-health tourism ICT Exhibition and trade fair business Sustainable energy development
Warmińsko-Mazurskie	Water economy High quality foods Wood and furniture
Wielkopolskie	Bioresources and food for conscious consumers Interiors of the future Industry of tomorrow Specialised logistic processes ICT-based development Modern medical technologies
Zachodniopomorskie	Bioeconomy (based on the region's natural resources and its economic and R&D potential) Maritime activities and logistics (including maritime technology – the industry which is nested in the region, but which must respond to current challenges) Metal and mechanical engineering industry (there are more and more companies operating in this sector in the region, there are more and more industrial parks, an additional advantage is the precious experience connected with the shipyard industry) Services of the future (the fast-growing ICT, IT KPO and creative industries) Tourism and health (making use of natural resources and cultural heritage)

Source: Own study based on the regional strategies of the 16 voivodeships in Poland.

The analysis of the indicated smart specialisations in the Polish regions has shown that the most popular specialisations – ICT and multimedia – were chosen by the voivodeships: Dolnośląskie and Wielkopolskie. Medicine and health tourism is supported as part of the regional policy in: Dolnośląskie, Lubuskie and Zachodniopomorskie. Smart specialisations within the scope of healthy food were indicated in the voivodeships: Dolnośląskie, Lubuskie and Opolskie. Bioeconomy is, in turn, promoted in Dolnośląskie, Lubuskie, and Zachodniopomorskie. Opolskie has focused its regional policy on power engineering, including renewable energy sources. Mechanical engineering and metal industry is another popular specialisation promoted in: Dolnośląskie, Lubuskie, Opolskie,

and Zachodniopomorskie. Business services are supported as part of the innovation policy in Zachodniopomorskie. Also, logistics and water engineering are valued in Zachodniopomorskie. Dolnośląskie, in turn, relies on chemical and mining industries.

Research assumptions

As part of carrying out the assumptions indicated in the article, the study was divided into two stages. During the first stage, the regions were benchmarked on the basis of the methodology found in the document: Regional benchmarking in the smart specialisation process: Identification of reference regions based on structural similarity (Navarro i in., 2014), according to which the key measures of the regional development level may be broken down into five[iii] groups:

1) geo-demography,

2) HHRR education level,

3) technological specialisation,

4) sectoral structure,

5) firm size.

Each of the groups contains from one to ten identified variables that describe a given feature (Table 3). The input data used in the calculations were derived from the Local Data Bank of the Central Statistical Office (Bank Danych Lokalnych, 2020) and pertain to the years 2008, 2013 and 2018. This selection of data made it possible to compare the levels of regional development before introduction and after the implementation of smart specialisations, and to compare the latest available data.

Table 3: The variables used in the study along with the weights assigned to them

Dimensions	Elements	Weight	Subtotal weight	Measure
1. Geo-demography	Population structure	0,2	0,05	Total Population
			0,05	Population >= 65
			0,05	Population <15
	Urbanisation		0,05	Pop. in urban and comm. areas
2. HHRR educ. Level	HHRR educational level	0,2	0,20	Pop. with upper secondary and tertiary ed.
3. Technological specialization	Technological distribution (patents)	0,2	0,05	Patents granted by the Polish Patent Office - total
			0,05	Patents granted by the Polish Patent Office - per 100,000 residents
	R&D		0,05	Share of persons employed in R&D in the economically active population
			0,05	Internal expenditure on R&D
4. Sectoral structure	Economy's sectoral distribution	0,2	0,02	Agriculture, forestry and fishing (A)
			0,02	Industry (except const.) (B-E)
			0,02	Construction (F)
			0,02	Wholesale and retail trade, transport etc. (G-I)
			0,02	Information and communication (J)
			0,02	Financial and insurance activities (K)
			0,02	Real estate activities (L)
			0,02	Professional, scientific and technical activities (M-N)
			0,02	Public administration (O-Q)
			0,02	Arts, entertainment and recreation (R-U)
5. Firm size	Firm size	0,2	0,20	Average firm size

Source: own work.

The diagnostic variables used in the study are expressed in different units of measurement, which made any direct comparison impossible. In order to make them comparable and additive, they were transformed by means of the zero unitarisation method based on the span between the maximum and minimum values of the feature in question. Obtained values of the variables are positive and fall within the range from 0 to 1, where "1" stands for the most beneficial, and "0" for the least beneficial value of the examined variable. It was assumed that when a high value of the diagnostic variable for a given phenomenon is associated with beneficial growth, the feature is considered Larger-the-better (LTB), whereas in a situation where a low value of the variable is beneficial for the phenomenon in question, it is deemed Smaller-the-better (STB). The standardisation was carried out with the use of the following formulas (Ziemiańczyk 2010):

LTB:

$$Z_{ij} = \frac{x_{ij} - min\, x_{ij}}{max\, x_{ij} - min\, x_{ij}},$$

STB:

$$Z_{ij} = \frac{max\, x_{ij} - x_{ij}}{max\, x_{ij} - min\, x_{ij}},$$

where:

Z_{ij} – diagnostic variable, falling within the range from 0 to 1,

x_{ij} – the feature value for a given region,

min x_{ij} – the lowest value of the feature among the examined regions,

max x_{ij} – the highest value of the feature among the examined regions.

Pursuant to one of the proposals of the authors of the methodology developed jointly by Orkestra – Basque Institute of Competitiveness and the S3 Platform (Navarro i in., 2014, s. 20), each of the indicated five groups of measures was assigned the same weight equal to 0.2, whereas the individual variables within the groups were assigned the partial weights of equal value in such a way so that their sum amounted to 0.2. Yhis approach is consistent with consistent with, inter alia, Grabiński (Grabiński, 1992), Sokołowski (Sokołowski, 1985), Klóska et al. (Klóska i in., 2020). The next step was calculation of the relative synthetic measure of development, expressed by the formula:

$$SMD_i = \sum_{j=1}^{k} \alpha_j z_{ij},$$

where:

W_i – relative coefficient of development,

k – quantity of variables considered in the study,

α_j – weight of the jth variable,

z_{ij} – values of the statistical features x_{ij} considered in the study, standardised by means of the zero unitarisation method.

It was assumed that a higher value of the aggregate formula is associated with a higher level of development. Thus, by means of the linear ordering method, the ranking of regions was obtained.

The basis for the second part of the research study was the five indicators selected for the strategic horizontal aims based on the analysis of the evaluation methods adopted by the regions (e.g. (Szmyt i in., 2016, s. 66)):

1) internal expenditure on R&D, relation to GDP (current prices),

2) PhD students per 10,000 population,

3) university graduates per 10,000 population,

4) people employed in R&D per 10,000 population,

5) expenditure on innovative activities in 2017 in industrial enterprises.

As for the first four indicators, its change over time was analysed, the fifth indicator was available only for 2017, however, in view of its great significance, it could not be ignored. At the last stage, the ranking of regions was presented on the basis of the most recent data – only the data for 2018 and 2017 were processed by means of the linear ordering method.

Results of own research

The analysis of the values of the synthetic measure of development made it possible to distinguish four groups of regions (Figure 1):

- the ranking leader – Mazowieckie voivodeship,
- three regions which, in different configurations, in each period took positions that ranged from the second to the fourth place (Śląskie, Małopolskie and Wielkopolskie),
- five regions which alternately took the last places in the ranking (Lubuskie, Opolskie, Świętokrzyskie, Zachodniopomorskie and Podlaskie),
- the remaining seven regions which were placed in the middle of the ranking.

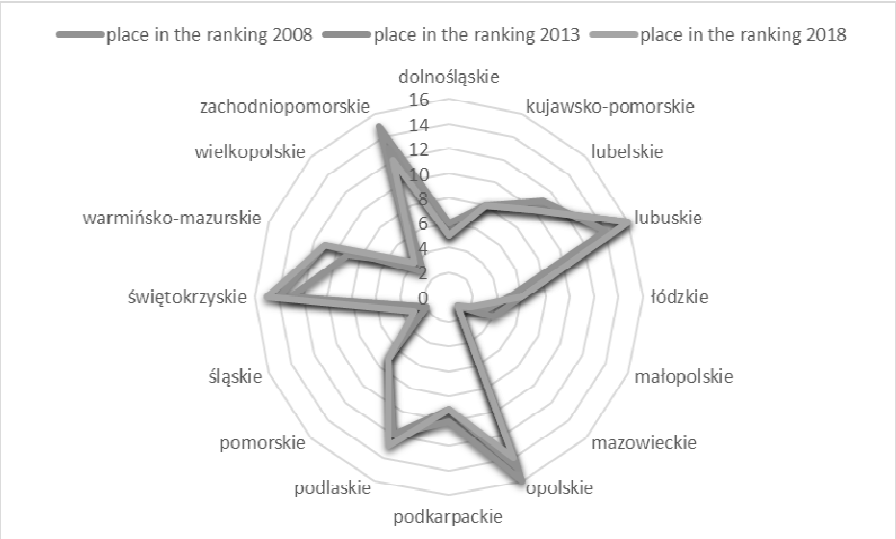

Fig 1. Synthetic measure of development in Polish regions for 2008, 2013, 2018
Source: own work.

At the same time, over the 11 years covered by the analysis, the value of the synthetic measure of development calculated for the individual regions did not change much. The span computed for the values for 2008 and 2018 ranged from 0 to 0.1. The detailed values of the synthetic measure of development calculated for the individual voivodeships for the years 2008, 2013, 2018 are presented in Table 4.

Table 4: Synthetic measure of development in Polish regions for 2008, 2013, 2018

region	Synthetic measure of development		
	2008	2013	2018
mazowieckie	0,88	0,84	0,87
śląskie	0,65	0,60	0,63
małopolskie	0,60	0,59	0,64
wielkopolskie	0,60	0,60	0,62
dolnośląskie	0,53	0,55	0,49
łódzkie	0,54	0,46	0,45
pomorskie	0,45	0,45	0,45
kujawsko-pomorskie	0,43	0,42	0,41
podkarpackie	0,37	0,39	0,39
lubelskie	0,36	0,35	0,38
warmińsko-mazurskie	0,38	0,34	0,31
podlaskie	0,29	0,28	0,26
zachodniopomorskie	0,26	0,26	0,26
świętokrzyskie	0,27	0,24	0,22
opolskie	0,21	0,21	0,22
lubuskie	0,27	0,18	0,17

Source: own work.

Graphs 2 – 5 present the change in value over time with regard to: internal expenditure on R&D, PhD students per 10,000 population, university graduates per 10,000 population and the employed in R&D per 10,000 inhabitants, whereas Table 5 provides information about expenditure on innovative activities in industrial enterprises in 2017.

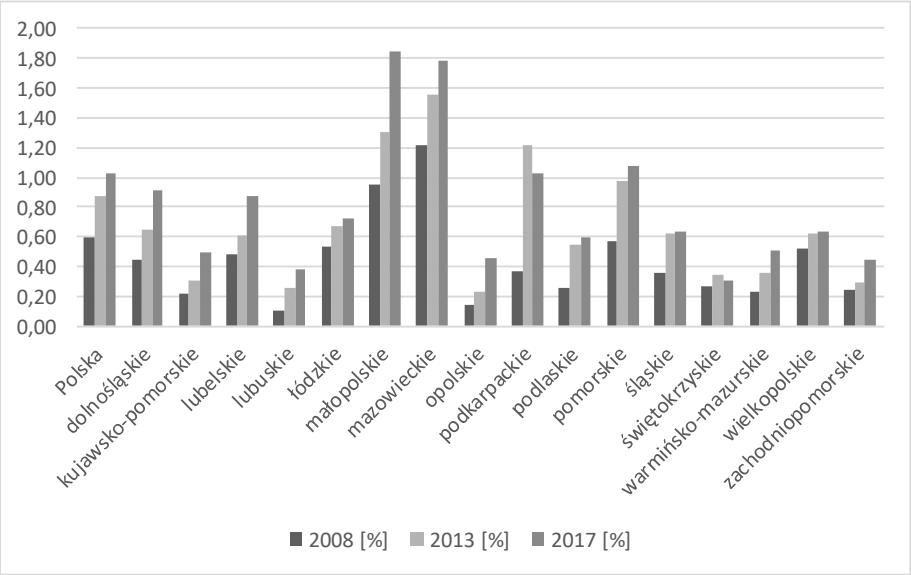

Fig. 2. Internal expenditure on R&D, relation to GDP (current prices)
Source: own work.

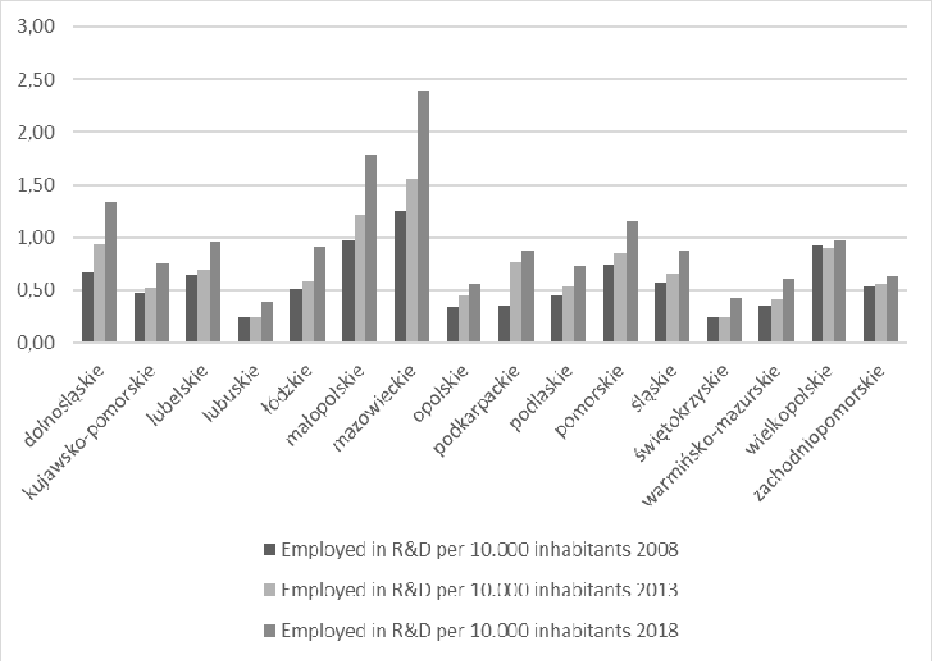

Fig. 3. Employed in R&D per 10,000 population
Source: own work.

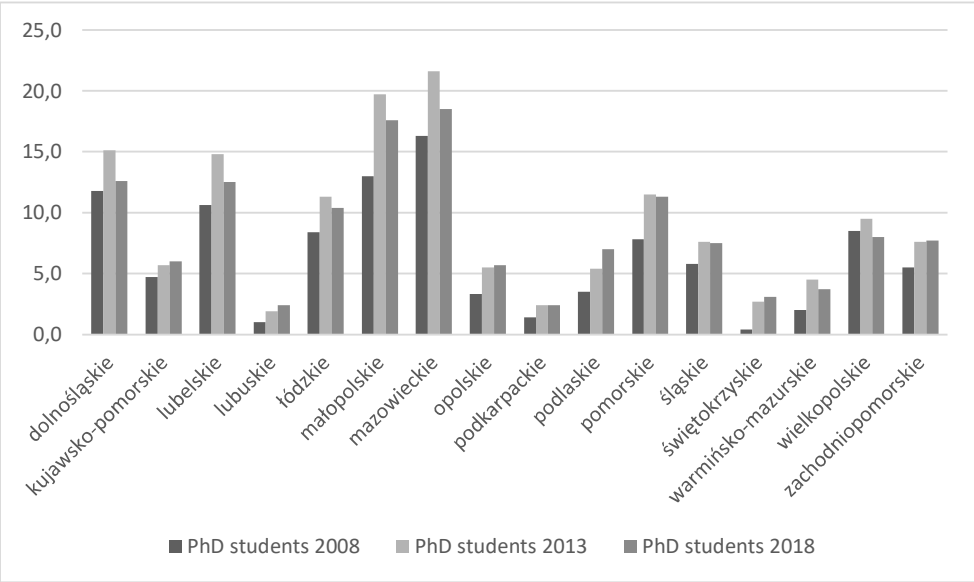

Fig. 4. PhD students per 10.000 population
Source: own work.

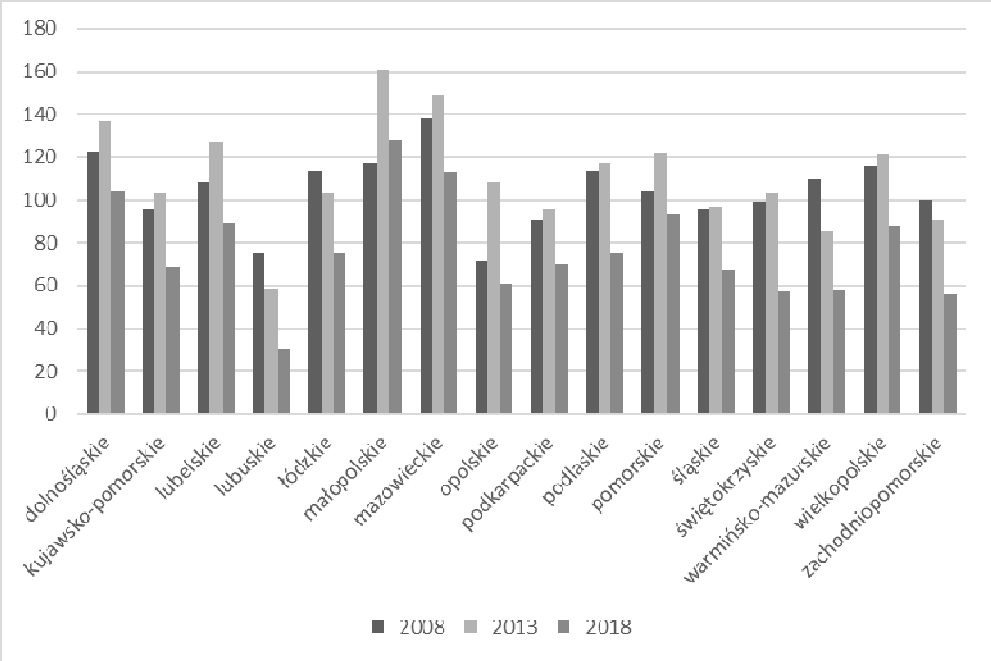

Fig. 5. University graduates per 10,000 population
Source: own work.

Table 5: Expenditure on innovative activities in industrial enterprises in 2017

region	Share of enterprises		
	grand total	innovation active	which incurred expenditures
dolnośląskie	100,0	20,4	15,2
kujawsko-pomorskie	100,0	18,6	12,7
lubelskie	100,0	23,2	13,8
lubuskie	100,0	15,8	12,0
łódzkie	100,0	17,3	12,2
małopolskie	100,0	23,5	17,3
mazowieckie	100,0	21,4	15,3
opolskie	100,0	23,1	17,5
podkarpackie	100,0	21,2	15,9
podlaskie	100,0	18,6	13,2
pomorskie	100,0	20,2	15,1
śląskie	100,0	20,8	15,0
świętokrzyskie	100,0	20,8	15,8
warmińsko-mazurskie	100,0	16,0	11,2
wielkopolskie	100,0	19,4	15,1
zachodniopomorskie	100,0	20,9	14,4

Source: own work.

The analysis of the values of strategic horizontal objectives has shown that the Małopolskie and Mazowieckie voivodeships are characterised by the highest values of internal expenditure on R&D, PhD students per 10,000 population and university graduates per 10,000 population. The Małopolskie voivodeship also shows the highest level of expenditure on innovative activities in industrial enterprises. At the same time, it may be surprising to note the low ratio of the employed in R&D per 10,000 population in these voivodeships (8th and 9th place in the ranking). In this category, the Dolnośląskie region is the leader. It should also be noted that the Śląskie voivodeship which managed to attain the second/third highest value of the synthetic measure of development, is placed in the bottom half of the ranking in Graphs 2 – 5 and in Table 5. The Lubuskie voivodeship, in turn, takes the last position in categories such as: internal expenditure on R&D, university graduates per 10,000 population, and expenditure on innovative activities in industrial enterprises in 2017.

Summary and conclusions

To conclude the deliberations regarding the significance of smart specialisations in enhancing the paradigm of the innovative policy in the regions, it should be stressed that in Poland only in the few regions the level of structural conditions which are relevant for innovation-driven development and the strategic horizontal objectives are consistent (e.g. Małopolskie, Lubuskie). We should also note the rising level of all strategic horizontal objectives: internal expenditure on R&D, PhD students, university graduates, the employed in R&D, expenditure on innovative activities in industrial enterprises in 2017, which may confirm the increasing role of innovativeness, consistent with the smart specialisation assumptions presented in the theoretical part.

When comparing the effects of the analysis performed with the branch specialisations selected based on the strategies of smart specialisations for particular Polish regions, it needs to be said the leading branches are those which focus on development of innovative companies production and service, and ensure proper ways of cooperation between the production sector and the research potential. In case of Mazowieckie and Małopolskie regions, they are the branches of the ICT, energy, electronics, advanced services for business, as well as the branches which improve living standard of the population. In case of Dolny Śląsk (Lower Silesia), the specialisations are mainly concentrated around the modern, industry-based economy. For some regions, e.g. Podkarpackie, the path of development is obvious and the smart specialisations follow the traditional, historically conditioned branches, however, for some other regions, the identification of the specialisations seems to be difficult to perform and to compare with other regions (especially where modern branches of economy became the choice). Broad assessment has to be applied in order to conclude which particular branches are the key factors for success in implementation of innovative processes. In conclusions, it needs to be added that the level of specify of the identified specialisation areas is diverse in particular regions of Poland. Similar conclusions can be drown regarding the number of branches or sector found within the process of smart specialisation defining, for every region features a different number of endogenous advantages sectors and branches which decide about development of innovations in a given region.

Summing up, it should also be pointed out that regional smart specialisations are a new instrument of regional development in Poland, and that currently the country is still paving the way to create areas and niches to enable sustainable and dynamic development of regions. Taking into account the current implementation stage of smart specialisations, we can also assert that constraints for a regional development policy based on implementing smart specialisations, which are presented in the article, in view of the results of the completed analyses of the synthetic measure of development based on the indicators for strategic horizontal objectives, will be gradually becoming less important, whereas the benefits resulting from introducing the smart specialisation concept will be increasing and will be more visible in terms of development of innovativeness in Polish regions.

An interesting issue in that regard may be a detailed evaluation of the smart specialisation implementation process in the individual regions, and even though it is not consistent with the assumptions of this study, it may constitute an interesting point of reference for further studies on effects of implementation of the smart specialisation concept in Poland.

Acknowledgment

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[i] The concept was worked out in connection with the implementation of the Europa 2020 strategy by an expert group headed by Janez Potočnik, European Commissioner for Science and Research Knowledge, whose deputy was Prof. D. Foray. The outcome of the works carried out by the Group was the report: Knowledge for Growth. European Issues and Policy Challenges (European Commission, 2008).

[ii] The following studies are particularly important for understanding and implementing the concept (Nowakowska, 2011): Regional Policy Contributing to Smart Growth in Europe 2020 – this document describes the role of the regional policy in implementing the Europe 2020 Strategy in the area of smart growth, in particular with regard to implementing the "Innovation Union" flagship project (COM 2010, p. 553), Connecting Smart and Sustainable Growth through Smart Specialisation – this document specifies the ways to connect smart specialisations with sustainable economic growth (European Commission 2012), Guide to Research and Innovation Strategies for Smart Specialisation RIS 3, which shows the ways of designing smart specialisations and instruments of implementation (Foray et al. 2012).

[iii] The source methodology also includes 2 more groups of measures, i.e. openness (trade openness), measured as total exports (% GDP) and institutions & values determined by multilevel government, social and institutional capital (quality of institutions, feeling of safety of walking alone in the local area after dark, most people can be trusted or you can't be too careful) and entrepreneurial / innovative attitudes, which in the case of analysing the regions being part of one country do not seem relevant. Moreover, for some of them the values are not updated, and as a result the Benchmarking Regional Structure tool is based on e.g. the outcomes of a study pertaining to a given feature, which was conducted back in 2008.

Stakeholders Training Strategy as a Key Factor of Project Costs Estimation

Katarzyna CZAINSKA

General Tadeusz Kościuszko Military Uniersity of Land Forces, Faculty of Management, Wroclaw, Poland, katarzyna.czainska@awl.edu.pl

Kazimierz KOWALSKI

General Tadeusz Kościuszko Military Uniersity of Land Forces, Faculty of Management, Wroclaw, Poland, kazimierz.kowalski@awl.edu.pl

Abstract

The authors of this article took up the subject of an incorrectly planned training strategy in projects and the consequences of this phenomenon in economic and organizational practice. As the research objective, they adopted indicating the critical role of training planning in project management. Based on literature research, case studies, and direct interviews with representatives of the military, IT, banking, logistics, and financial and development/construction industries, carried out in 2018-2020, they proposed the original method ("STOP costs"). The method of multidimensional analysis, which is a combination of well-known techniques and management tools (i.e., Stakeholders Mapping, Training Needs Analysis, Objects maintenance and Goals Management, Project Life Cycle), can be used to eliminate the problem of underestimating the training costs in project management and minimizing the negative consequences of the lack of appropriate training in all phases of the project.

Keywords: Trainings, Development, Project Management.

Introduction

Project management is a field that has been explored for many years by theoreticians and practitioners, who represent not only management science. However, it turns out that it is still possible to identify research and management gaps in this field (i.e., related to the planning and implementation of projects in social or economic life).

The authors of the article paid particular attention to the overly routine and even disrespectful approach to the issue of training in projects, which in turn leads to real threats related to their implementation and functioning of the project subject in the post-project phase. The thoughtless duplication of cost items related to training in the budgeting of subsequent projects was considered routine, while it is disrespectful to reduce or omit these costs knowingly, for example, to increase the attractiveness of a commercial offer or convince the management board that it is appropriate to undertake design work. Therefore, the article aims to present the critical role of training planning in project management.

Moreover, an additional goal is to present the proprietary method of multidimensional analysis of the sources of identification of training costs in the project, given the working name "STOP costs." In the first phase of works, the following research problems were formulated: 1 / underestimating the training costs related to a given project may adversely affect all project dimensions, i.e., budget, implementation time, and requirements; in particular, it is related to the risk of exceeding the project budget, generating considerable costs in the post-implementation / exploitation phase, failure to implement the project, untimely implementation of the project, lack of improvements/results expected in connection with the project implementation; 2 / the underestimation of training costs in

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projects results from a narrow perception of the subject of training, target group, methods and forms of training, lack of synchronization of training activities with the project life cycle.

Therefore, a research question was asked: how to avoid the problem of underestimating the costs of training in project management? Empirical research was preceded by literature studies (in-depth desk research); then, case studies of military projects were carried out. The obtained results were additionally confronted with the experts' statements (i.e., project managers and members of project teams) from the IT, banking, logistics, financial, and development/construction sectors. The research was conducted in the years 2018-2020. The preliminary analytical work results allowed for the following hypothesis: there is a possibility of eliminating the problem of underestimating the costs of training in project management by using the multidimensional analysis of "STOP costs." The hypothesis will be verified in the course of further research aimed at determining the effectiveness of the tools as mentioned above in business practice.

Theoretical Framework

One of the paradigms of modern management is building a company's competitive advantage based on strategic management of employees' competencies (Moczydłowska, 2018; Skrzypek, 2016). Moreover, it has been stated that employee development carried out by an appropriate training program is one of the main foundations of sustainable human capital management, i.e., the leading idea of modern organizations (Kuźniarska, 2018). In the 2018 study, Nogalski and Niewiadomski confirmed that the main factors lowering the "excellence" of a company include, among others, inadequate employee training system; despite the understanding of the idea and the need for training in enterprises by top management and executive employees, the number of training courses is significantly reduced. The main reasons for such a situation included the lack of time for participation in training (mainly caused by numerous professional duties) and the lack of funds allocated for this purpose (Nogalski, Niewiadomski, 2018).

The above conclusions were also formulated about such an extensive management field as project management (Clark, 2010; Lee-Kelley, L., Blackman, D., 2012). Unfortunately, the observation made by Ramazani and Jergeas still holds true that *the expenses devoted to training, certifications, and project methodologies are enormous; however, the failure rate is still high, and the gaps between expected and actual results are still there* (Ramazani, Jergeas, 2015).

When searching for the causes of the existing situation, it was decided to adopt a process approach and analyze the various phases of the project life cycle regarding the mismatch between the demand and the supply of knowledge. As research in the field of project management did not lead to a single and widely accepted model of the course of project implementation, due to the subject of this article, the model developed by Trocki was adopted as the starting one because it takes the aspect of stakeholder participation in individual phases of the project life cycle into account (Figure 1).

Besides, that model is universal enough to correspond to traditional and the newest project management methods (e.g., agile, scrum). On the other hand, the assumption of analyzing the problem from the point of view of stakeholders is consistent with the strategic approach, where the organization's environment (including the project's environment) is understood as a unique and dynamic configuration of diverse groups of stakeholders. To properly recognize the problems of an organization, it is first necessary to identify key players, i.e., stakeholders. Project stakeholders are the direct participants and affected people of the projects (Guide, 2001), but not only the project members (i.e. owner, consultant, contractor, suppliers), but also those from the project environment (i.e. customers, government, local community, public media etc.) (Institute, 1987). Moreover, stakeholder analysis has been conducted in different branches to help researchers to study on various project related problems from perspectives of stakeholder influence, stakeholder concerns, stakeholder expectations, and public participation. Xue, J., Shen, G.Q. and Yang, R.J., et al. (2020) presented the results of bibliometric research in which they showed that the identification of

stakeholders is a key process of project management; stakeholder identification should be carried out differently, depending on the industry/branch and project characteristics.

When examining the issues of training in projects, Globerson and Korman (2001) pointed to the necessity of two approaches to planning and implementing training, namely standardized and just-in-time training (JIT-T). Standardized type of training concerns general, shared, and repeatable topics for many projects. JIT-Ts should be tailored to the project specifics and compatible (in terms of time and subject) with the problem they concern and, above all, carried out for stakeholders who need the knowledge.

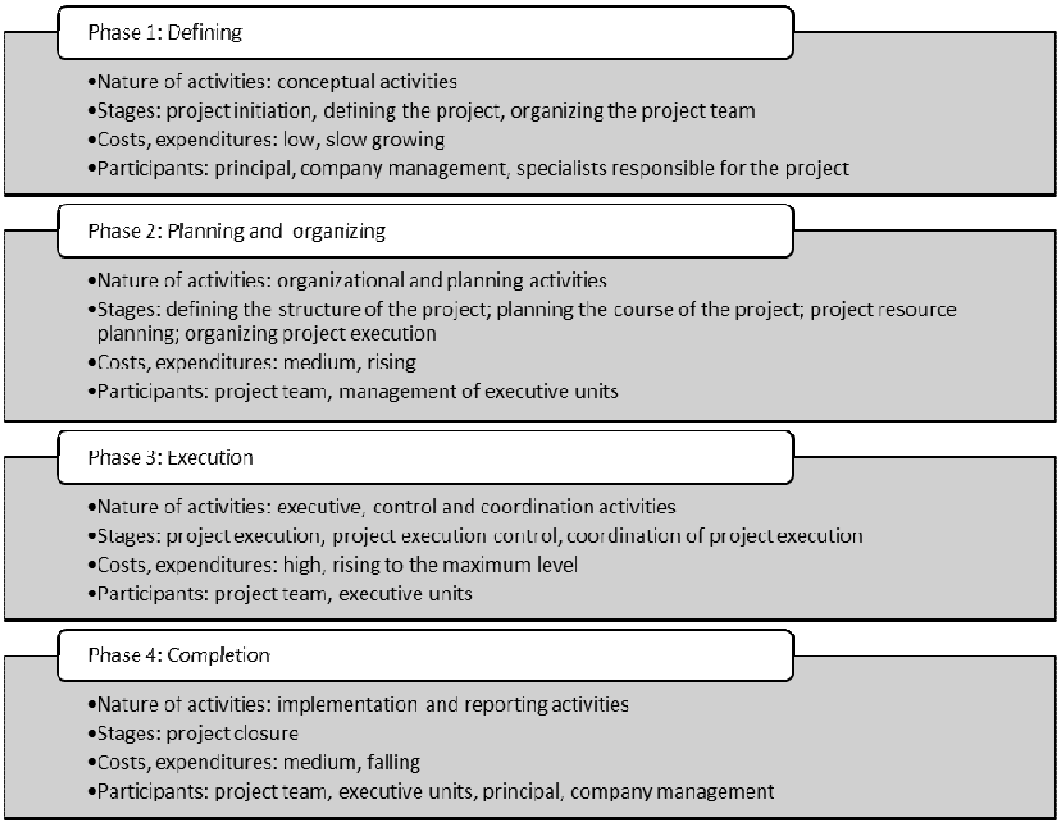

Fig. 1: Project life cycle model

Source: based on Trocki, Grucza, Ogonek, 2003, pp.32

An essential issue in project management, at every stage, is the identification of competency and training needs (Tam, Moura, Oliveira et al. 2020; Wiewiora, Chang, and Smidt 2020). The competency needs analysis is of long-term importance and is performed to: 1/ identify specific areas for improvement; 2/ obtain support from the management staff to conduct efficient training and development activities; 3/ determine the costs and benefits of training and development programs; 4/ establish the necessary data resource useful for the evaluation of development programs in the future (Juchnowicz, 2016, pp. 275-276).

The analysis of training needs is a set of activities that define the target group of training participants, its subject, scope, and forms (Serafin, 2011). However, the training need might be ongoing (regarding the currently performed tasks), adaptive (allowing for additional tasks), and developmental (related to the anticipated changes in the scope of work in the future) (Jasiński, 2005). Thus, further dimensions arise that should be considered in the design training strategy.

Therefore, a vital aspect of identifying training needs will also be the inclusion of object maintenance in the post-project phases, i.e., operation and withdrawal. Such analysis is crucial in any case when the project object/result is to be used for a certain period after the project ends, especially when the end-users are people who are not the project team members. Thus, one can notice the consistency of the design process and analyses of stakeholders and training needs. Therefore, the training strategy is aimed at reducing the costs arising in the individual phases of the project related to non-performance or improper implementation of this project.

Methodology and Research Process

The decision to undertake research was made after identifying a significant problem in economic practice, consisting in diminishing the importance of training in projects. The research work took three years (2018-2020) and is still being continued. The research process was organized according to generally accepted principles and consisted of the following phases: formulation and development of research assumptions (questions, scientific problems, hypothesis); literature review (in-depth desk research); selection of research methods and tools; selection of respondents; qualitative and empirical research; data analysis; inference; development of the "STOP costs" tool.

Table 1: Specification of the analyzed projects

Industry	Goal of the project	Research method	Respondent (-s)	Period of the study
Military	the acquisition of military equipment	case study	Project team members	2020
IT, banking, logistics, financial	transition	face-to-face interviews	Project managers	2018
Information Technology	software	face-to-face interviews	Project managers	2020
			Project teams members	2020
Construction	residential and industrial construction	Computer-Assisted Web Interview (CAWI)	managers and board members of construction companies listed on the Warsaw Stock Exchange	2019
		face-to-face interviews	CEO of the construction company	2018
		Focus Group Interview (FGI)	CEO's of the construction company	2018

Source: own study

The tool testing stage and the transfer of knowledge to economic and organizational practice remain to be implemented.

The Impact of Training on Project Implementation - A Case Study

The implementation of projects aimed at the acquisition of military equipment (SpW - equipment specially designed or adapted for military needs and intended to be used as a weapon, ammunition, or war measures) is one of the most expensive and time-consuming projects in the military sector. It should be mentioned that the projects aimed at acquiring SpW are not only the purchase of new SpW but also the modernization (modification) of the already used SpW, or the implementation of development works. Their importance for the Armed Forces is demonstrated, among other things, by the functioning of the Defense Acquisition University, a higher education institution educating

personnel (both civil and military) in the field of procurement and services for the United States Department of Defense.

Training of stakeholders in military projects related to the acquisition, operation, and disposal of military equipment is carried out its life cycle including the phases of identification, analysis and concept, implementation, operation, and withdrawal (Decision No. 141 / MON, 2017; Decision No. 161 / MON, 2018). In the Armed Forces of the Republic of Poland, the training of personnel involved in the acquisition of firearms, as part of standardized training, includes post-graduate studies "Management in the military equipment acquisition" and a specialist course "acquiring military equipment".

The training personnel, in the above-mentioned manner, is recommended by the key stakeholder in the system for obtaining SpW, namely the Department of Defense Policy of the Ministry of National Defense (powers - civilian employees) and by the Human Resources Department of the Ministry of National Defense (powers - soldiers). It happens that the second of the afore-mentioned institutions sends to the course not always according to the needs for projects but taking account of the individual development needs of the staff - further career).

As part of the above-mentioned of training, the staff acquires general, common, and repeatable knowledge for the implementation of many projects in the field of the system of acquiring, operating, and withdrawing SpW of the Armed Forces of the Republic of Poland, the life cycle of SpW, project management in the organization, team management, arms cost accounting, the armaments market and defense technologies, logistic systems and processes, the system of obtaining the foreign assets in NATO and the EU, the quality management system in accordance with the AQAP requirements in the process of acquiring foreign resources, Prince 2 Foundation. Each member of the project acquiring SpW should be a graduate of the above-mentioned courses. The reality indicates a 50% implementation rate for this postulate.

The main stakeholders of the military equipment acquisition subsystem (identification, analytical-conceptual and implementation phase) are the Minister of National Defense, the Secretary of State in the Ministry of National Defense responsible for technical modernization, the Chief of the General Staff of the Polish Armed Forces, the Director of the Armament Policy Department, Organizers of Functional Systems, the Chief of the Armament Inspectorate, the Chief of Inspectorate for the Armed Forces Support, SpW Chief executives (a unit or an organizational unit of the Ministry of National Defense, as well as an internal unit responsible for defining the directions of the SpW development in the Armed Forces of the Republic of Poland, as well as organizing the implementation process and determining the operation, including combat use, and specific withdrawal processes), central logistic authorities (COL - a unit or organizational unit of the Ministry of National Defense, and their internal unit, responsible for organizing operation processes and training technical specialists for specific types of SpW), the Director of the Military Center for Standardization, Quality, and Codification, and the Heads of District Military Representations.

The above-mentioned stakeholders decide on sending participants of SpW acquisition projects to the standardized and JIT-T pieces of training. SpW Chief xecutives (user training) and COL (operator training) play a special role in the needs of JIT-T.

The cost structure of acquiring SpW includes the costs of the logistics package and the training package. As part of the logistics package, technical personnel's training is provided. However, as part of the training package, user training is most often carried out. Training costs most often include expenditures on training users and operators, trainers, stands, simulators, and IT systems. Competency and training needs, and training costs, are strictly dedicated to individual projects.

As part of the acquisition of the high-mobility medium-capacity vehicle Jelcz 442.32 (950 items), the training of technical personnel (at the instructor level) was carried out in plants producing key vehicle components (including MTU - engine, Axeltech - drive axles, ZF - gearbox, transfer case, steering

gear, WABCO - brake system). Five people who participated in the above-mentioned trainings received the qualifications of certified instructors (currently there are two remaining in the service, who can train other instructors).

The training of mechanics in the field of construction and operation of vehicles in the number of 2 mechanics for each 40 vehicles delivered is carried out comprehensively once a year; it lasts for 4 days at the Logistics Training Center and 5 days at Jelcz Sp. z o.o. On the other hand, user training (8 hours at the manufacturer's) is carried out as part of each delivery / transfer of the vehicle with 1 person (driver) for each vehicle. Drivers, most often users of the Star 266, report postulates to extend this training due to the much greater design and technological complexity of the vehicle.

The Impact of Training on The Implementation of Projects - Results of Direct Interviews

Face-to-face interviews took place in the years 2018-2020. The long period of research resulted from the fact that the interviews were conducted separately in various industries and were always one of several segments (threads) of complex research related to human capital management.

In October and November 2018, the Association of Business Services Leaders (ABSL) made it possible to conduct a study, which covered six managers of transition projects from the IT, banking, logistics, and financial sectors. Projects of transition in business are seen as projects related to the establishment of Business Process Outsourcing Centres (BPO), Shared Services Centres (SSC), IT Centres or Research and Development Centres (R&D).

The respondents pointed out that the key factor of the success of the transition is the training tailored to the individual phases of the project and the entities involved. The training topics included issues of employees' resistance to changes, negotiations, conflict resolution, building commitment and trust, counteracting professional burnout, and multicultural management. Training courses for employees (both on the part of the acquired entity and the acquiring entity) regarding the essence of the transition and the consequences of its implementation, i.e., direct impact on employees and the way they perform their work, were also significant. Training in the so-called hard competencies related to the subject of the transition, i.e., legal, financial, organizational, and IT matters, etc. was essential as well. Competency gaps were noticed mainly on the side of transition managers, who were expected to acquire soft and subject hard competencies, as well as hard skills related to project management.

Based on the analyzed investments an expert in the development (construction) industry indicated the relationship between the training system and the project implementation effectiveness. In the enterprise he runs, all employees are systematically trained every four months in the field of quality standards operating in the organization. Such a system counteracts potential defects on the construction site, and also contributed to the reduction of the number of complaints by 70% and made it possible to reduce the staff of the warranty service. According to the respondent, the main beneficiaries of trainings should be site managers. However, the scope of training must include both soft skills (especially organizational and negotiation skills) and traditional technical training in strictly construction knowledge and skills. In practice, both types of training are often delivered together as complementary or as a result.

Eight board members of development companies, who participated in the focus study organized in 2018, formulated similar conclusions (Rostkowski, Kawecki, 2018). Managers of real estate development companies decided that the trainings constitute a strong element of the employee motivation system. Unfortunately, the 2019 quantitative study on a group of 96 site managers and 24 board members of 18 development companies listed on the Warsaw Stock Exchange proved that in practice 22% of companies do not train employees, which translates into an increase in the number of defects reported by customers (Kawecki, 2019).

The IT industry seems to be the best experienced and trained industry in project management. Nonetheless, also there the respondents (project managers) indicated shortcomings. First of all, the trend of managing projects using new methods, e.g., scrum, turned out to be a trap. The threat results from the inept use of these methods, and above all, team members' lack of knowledge about them. The project manager is often the only person who knows the assumptions of the method; unfortunately, it happens that even he/she has no experience in this field. Therefore, a problem begins when the team members do not understand the style of work. What is worse, the methods of cooperation are also not understood by external entities (e.g., employees of the client or subcontractors).

The new project management methodology is also related to the IT system for project implementation monitoring. The respondents (members of project teams) indicated that in the crowd of work, employees forget about training in the use of these systems, they do not explain the rules of document circulation (especially creating and archiving project documentation) and the related rules in the field of internal (in the project team) and external (with entities outside the team) communication.

The respondents (both project managers and team members) pointed to a gap related to a very important element of the project, which is the valuation of individual works (tickets); employees at various stages of the project are asked for this quote. Although the valuation affects the price offered to the contractor, it is often performed under time pressure and by an employee who does not know the rules that should be followed when estimating labor costs. Employees who evaluate tasks (tickets) under the agile methodology have a similar problem.

From the point of view of employees, the neglected competency gap is the ongoing updating of specialist substantive knowledge, for example, resources are not foreseen for a) renewing employee certificates or acquiring new ones, b) participation in industry conferences, c) subscription to magazines, reports, and industry channels, etc. A substantial neglect in the project life cycle is narrowing down the thematic training of end-users or limiting the preparation of manuals (instructions) to those available in paper and/or electronic form. Unfortunately, it also happens that a help desk is appointed; however, due to staff shortages or cost reduction, the people employed there are not specialists but also use instructions.

Multidimensional Analysis of "STOP Costs"

The training strategy is classified as functional; hence it should be related to the general strategy of the enterprise. In addition, it was assumed that, in accordance with the applicable rules and best strategic management practices, the training strategy should contain goals and directions that will become the basis for creating operational plans specifying such elements as the subject of the training, defining the target group (training entities), time and place of training, forms, methods and tools, training assessment indicators, and evaluation of training outcomes.

However, any work on the strategy should be preceded by a strategic analysis, and in the case of a training strategy, an analysis of competency gaps and training needs (existing and potential). When designing a tool for multidimensional analysis of potential competency gaps, the authors used a combination of methods and tools known in management sciences, namely **S**takeholders Mapping, **T**raining needs analysis, **O**bjects maintenance, and **P**roject Life Cycle. The working name of the tool "STOP" was created using the first letters of the above-mentioned elements. Since the tool is designed to reduce and/or eliminate costs in projects, the above-mentioned the name "costs" was added.

The tool takes the form of a matrix (Table 2), which is the basis for a detailed analysis of the needs of its individual cells (fields of intersection of matrix dimensions). The procedure of using the tool consists of twelve stages, referring to indication of: project phases, stakeholders, competency gaps, training needs, groups of topics, agendas, syllabuses, cost estimation, division of responsibility,

training activity, monitoring, training evaluation, training efficiency evaluation. The first and at the same time key step is the specification of the project phases, i.e., adjusting the number and naming of phases to the specificity of the project. One can leave the names presented in the formula (Table 2) but due to the fact that individual industries may use a different language, appropriate verification is recommended for better communication in the project team and the project environment. It is crucial to include the pre and post-project phases in the project life cycle. The level of detail is left to the tool users. The second stage of the procedure is listing the stakeholders of the project; in the initial phase of creating the list it should not be assumed that all the indicated persons are to be trained. A heuristic approach resulting in a suitably complete list of entities is recommended.

The third step is to analyze the competency gap in individual cells of the matrix. Each cell of the matrix is tested. A cell can be assigned a value equal to 0, which means that: a) a given stakeholder does not participate in the indicated phase of the project; b) no competency gap was identified. The fourth step is to decide which gaps are to be closed by supplementing or updating knowledge, i.e., training needs are identified. To avoid duplication of training for several stakeholders, in the fifth step the needs is rationalized by grouping them in terms of thematic and time. The training is then introduced into the overall project schedule to keep it in sync with other project tasks. Simultaneously, work can already be carried out on the development of syllabuses, which mainly define the subject of training, group size, methods, techniques, and forms of training.

The requirements specified in the syllabuses should form the basis of the training valuation. It is also recommended to separate funds for JIT-T. An essential stage in creating a training strategy (especially in the case of projects realized with entities or for external entities) is to specify who is responsible for organizing individual training, and most importantly, who will bear the cost, while maintaining the requirements specified in the syllabuses. An indicated person(s) who is a member of the project should monitor the quality and timeliness of training organization. Monitoring is to be carried out during the project duration, not after its completion. Organizational monitoring should be supplemented by efficiency monitoring, i.e., checking whether training participants acquire competencies and, more importantly, perform the tasks entrusted to them in the project.

Table 2: The exemplary matrix of training needs diagnosis of including project key stakeholders

Phase of a project / Stakeholder	Analysis 1	Performance 2	Implementation 3	Exploitation 4	Withdrawal 5
DM - Decision makers	DM_1	DM_2	DM_3	DM_4	DM_5
PM - Project manager	PM_1	PM_2	PM_3	PM_4	PM_5
PTM - Project team members	PTM_1	PTM_2	PTM_3	PTM_4	PTM_5
PCS - Project control staff	PCS_1	PCS_2	PCS_3	PCS_4	PCS_5
C - Coach / mentor	C_1	C_2	C_3	C_4	C_5
SFU - Support of final users	SFU_1	SFU_2	SFU_3	SFU_4	SFU_5
MS - Maintenance staff	MS_1	MS_2	MS_3	MS_4	MS_5
FU - Final users	FU_1	FU_2	FU_3	FU_4	FU_5

Source: own study

Conclusion

The presented research results indicate the relationship between the training of project stakeholders and the effectiveness of the project implementation. The need for training and acquiring competencies should be determined and implemented in accordance with the phases of the project life cycle. Training should be provided to all stakeholders, not only project managers, to ensure a holistic approach to the project, which may, for example, eliminate the reduction of project implementation costs by reducing the cost of training needs (frequent practice in acquiring SpW). The tool determining the competency and training needs of the project stakeholders should be programmed in accordance with the suggested steps in the procedure for using the "STOP costs" tool. The "STOP costs" tool should be implemented collectively, with the participation of PM and selected team members, including external companies. As part of the project task fulfillment, it is necessary to create conditions for knowledge sharing, knowledge transfer, and creating teams of internal trainers or mentors.

In order to continue the research work related to determining the effectiveness of the above tool in economic practice, the following hypothesis was formulated: it is possible to eliminate the problem of underestimating the costs of training in project management through the use of multi-dimensional "STOP costs" analysis. The hypothesis will be verified in the course of further quantitative research.

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Methodological Aspects of Innovative Activity Management in Network Production Systems

Mansur F. SAFARGALIEV

Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
safargaliev@list.ru

Gaziz F. MINGALEEV

Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
mingaleevgaziz@mail.ru

Albert L. BIKMULLIN

Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
airt@bk.ru

Alexander P. SNEGURENKO

Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
alex2306kai@mail.ru

Abstract

The article develops methodological aspects of managing innovative activities in networked production systems, including: identifying the challenges of transforming the infocommunication nature of managing modern production systems in the digital economy; the conceptual apparatus of the innovation management system in networked production systems has been expanded; a comparative analysis of project management in non-network and network production systems is carried out, as well as the distinctive features of the categories "production and trading networks" and "network production systems" are shown; revealed the features of material and technical support in traditional and network production systems; the characteristics of the prospects of networkization of the production system of an industrial holding are given on the example of enterprises of the radio-electronic industry.

Keywords: Network, Production System, Digital Economy, Ecosystem, Infrastructure, Freedom, Competition.

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Introduction

The digital economy is qualitatively changing the nature of interfirm relations, as well as the model of relations between producers and consumers. Modern companies strive to create smart production systems that operate on the principles of a networked economy. At the same time, the global market is considered as consumers and suppliers of resources. The network becomes an ecosystem for the formation of consumer values, which creates conditions for a plurality of goal-setting systems. This leads to a shift in emphasis from the competition of innovative products to the network competition of innovative management models [1]; the need to operate with very large data; a radical acceleration of the change of technological orders; the emergence of new consumption patterns; desire to have a high level of personal freedom.

The need to take into account the plurality of goal-setting systems leads to a contradiction of traditional models of innovation management with modern market demands for the ways of organizing human interaction and the need to create fundamentally new organizational structures that allow working in conditions of multi-parameter and multifunctionality of interaction between innovation participants.

The purpose of the article is to develop methodological aspects of innovation management in networked production systems in the context of digitalization of production management processes and the development of new consumption patterns.

Objectives of the article:

1. Identify and characterize the challenges of transformation of the infocommunication nature of the management of modern production systems in the digital economy.
2. To expand the conceptual apparatus of the innovation management system in networked production systems.
3. Conduct a comparative analysis of project management in non-network and network production systems, as well as show the distinctive features of the categories "production and retail networks" and "network production systems".
4. Identify the features of logistics in traditional and networked production systems.
5. To characterize the prospects for the networkization of the production system of an industrial holding.

Research Part

Modern production is characterized by extremely heightened competition, the expansion of markets far beyond the borders of one state or even a continent, significant volatility in demand and heterogeneity. The effective use of the heterogeneous market and resource advantages of individual industries and their digital management as an interconnected production system in geographically distributed production centers, united by a single network, is becoming an imperative today for most large manufacturers of goods and services. Applying the concepts of manufacturing networks in practice allows you to structure globally dispersed operations and combine them into a single structure that ensures the creation of customer value. This leads to the transformation of the infocommunication nature of modern industries and, as a consequence, the development of networked production systems. The network is understood as scattered production with matrix connections, where individual production centers influence each other, and therefore cannot be controlled in isolation [3]. All these complex multifactorial processes increase competition in the markets, expand the boundaries of competition to a global scale and present manufacturers with modern challenges, ignoring which can lead to partial or complete loss of market share in which the company can operate with confidence at the moment.

According to the author, the most significant challenges of transformation of the infocommunication nature of the organization and management of modern industries are the following [2]:

1. Development and active use of smart grids and control systems, which, at the global level, transform the conditions for the implementation of economic activities by business entities.
2. Formation of a new technological order in the global system of industrial relations, based on the widespread use of automation and intellectualization of production facilities, including: big data; internet of things; 3D printing; printed electronics; quantum computing; distributed ledgers (blockchain); autonomous robots, etc.
3. Creation of new methods and technologies for organizing production, based on additive technologies, involving a fundamentally different principle of shaping based on layer-by-layer production. This approach allows you to create an unlimited number of variants and types of products and ensure a level of zero waste in production.
4. Development and widespread use of artificial intelligence in production processes, which changes the usual perception of human functions in almost all areas of his activity.
5. Digitalization of production leads to the blurring of the boundaries between Bio, Social & digital reality, which is expressed in the rapid development of Internet of Things (IoT) technologies, which radically transforms the nature of production and economic relations.

In this regard, in the modern world, the competition of goods and services is inferior to the competition of production ecosystems. In other words, production systems today and in the future must be able to create new meanings for completely different categories of consumers. Manufactures become personalized and at the same time their technologies and formats of interaction with consumers are unified.

The format of the relationship between producers and consumers, aimed at the continuous formation of new consumer meanings through the interactive involvement of resources of the internal and external environment in this process, in the author's opinion, can be provided by network production systems that are more focused on collecting and analyzing information about consumers, the formation of personal commercial offers for various categories of clients, and also have the technical capabilities to effectively organize mass creativity, including consumers in the creative process.

The use of the intelligence of society can be considered as a significant reserve for increasing the efficiency and flexibility of the functioning of networked production systems. At the same time, the intelligence of the network society depends on the social intelligence of the network participants, as well as on the level of development of the ecosystem of open network production. The definitions of the expansive differences of the proposed terms characterizing networked production systems are presented in Table 1.

Table 1: definition of expansive differences of the proposed terms characterizing networked production systems

Term	Definition
1	2
Network effect	Results jointly created by network participants for each other when using network products or services, which ensures changes in the levels and degrees of their network freedom
Network freedom of participants	Freedom of participants in networked production systems in choosing the parameters of interaction with each other in the network with the ability to determine and accept the associated risks and obligations
Number of degrees of network freedom	The minimum number of independent variable parameters required for a complete description of the state and movement of the network subject
Social intelligence of network participants	Abilities of a participant in a networked production system, which determine the success of network and off-network interaction with other participants, including systems of the external environment.
Intelligence of a networked society	The collective intelligence of the network, allowing to find the most effective solutions to the problems of networked production systems.
Network culture	The activity of network subjects in various manifestations, including all forms

	of self-realization and self-development, the accumulation of social intelligence and their integration into the intelligence of the network society.
Network space	Part of the global information space within the communication boundaries of networked production systems.
Network Infrastructure	A subsystem of the network economy that provides general necessary and equally accessible conditions for the functioning of networked production systems.
Ecosystem of networked innovation	An open production network communication material-field environment that has the properties of self-organization, self-regulation and self-development, which allows you to create competitive value propositions for market participants.

The networkization of production systems is based on the formation of the intelligence of a networked society, which ensures the implementation of the key values of participants in networked production systems in the freedom of self-development and self-realization. The rate of development of social intelligence of participants in a network depends on the ecosystem of networked productions, which generate fields that attract or repel the networked society. Thus, social intelligence is a substance, and the ecosystem of networked productions is a field, which together form a material-field force aimed at creating the intelligence of a networked society.

The development of production technologies is aimed at the active involvement and use of the intelligence of the network society in production systems, the integration of which occurs, including through the collection, storage and processing of big data (Big Data technology). Large companies actively use big data to form and implement their business strategies, as well as at the level of making standard operational decisions. This fact is confirmed by studies of Russian and foreign analytical centers. So, according to the statistical analytical collection "Indicators of the Digital Economy: 2019", which is published by the HSE Research University at the end of each year with the participation of Rosstat and the Ministry of Communications. In addition, according to the results of the activities of the Cornell Research University Consortium, INSEAD - the School of Technological Bidness and the World Organization for Intellectual Property Management, the volume of the global big data market in 2018 was already estimated at 38 billion US dollars, and by 2025 this figure will reach 132 billion. US dollars. At the same time, the global volume of digital data will amount to 175 zettabytes by 2025. By comparison, the global digital data volume in 2018 was 33 zettabytes. According to the above-mentioned analytical center, the drivers of the world big data market are the growth of information transfer speed and an increase in the capacity of information storage facilities; reduction in data storage costs; lowering barriers when using cloud services for data processing; increased interest in educational tracks on big data theory and, as a result, an increase in the number of specialists in this area; a radical increase in the amount of available data, including unstructured data; a sharp increase in the number of objects of the Internet of things. The speed of change in the global manufacturing field forces manufacturers to constantly use new knowledge, including those based on big data analytics, in order to maintain their presence in the markets and develop new directions.

The key competence of managers in a network production system is the ability to organize the mass creativity of interested, neutral and disinterested people, whose purposeful mental activity forms the intelligence of society.

As a rule, a project-based approach to managing the development of an organization's innovations is implemented in networked production systems [4]. A characteristic feature of project management of innovation activities in networked production systems is peer-to-peer simultaneous interaction on the principle of "many-to-many", establishing links on a short-term basis without the cost of maintaining them, high speed of information dissemination, availability of a large number of resources, the ability to share costs between participants, flexibility and stability of the production system, constant communication with the consumer, a sharp reduction in the number of management links, a decrease in the cost of promoting innovative products, the presence of a higher probability of interaction, a sharp decrease in barriers to interaction, including psychological (Table 2).

Table 2: Comparative characteristics of project management in offline and networked production systems

Comparison criteria	Off-grid production system	Networked production system
Number of potential participants in innovative projects	Determined by the classic controllability rate, usually up to 10 participants	Directly proportional to the square of the number of network nodes according to the law of network economy
The likelihood of implementation of innovative projects	It is determined by the product of a limited number of centers of activity by their level of their innovative activity	It is determined by the product of the expanded number of activity centers by their level of their innovative network activity
Number of initiated innovative projects	Determined by a variety of interests, intellectual experience and social intelligence of individual participants in the system	Determined by a variety of interests, intellectual experience and intelligence of the network society
Quality of initiated innovative projects	Limited by the financial capabilities of the initiator of the innovation and his ideas about quality	Increased by pooling financial resources of network participants, quality is determined by general requirements
Probability of creating market value in demand	Depends on the level of predictive abilities of the participants of individual participants in the system	Increases proportionally with the growth in the number of network participants
Company risk level	Increases sharply if the demand of the target group changes	Decreases sharply depending on network scale
Asset utilization rate within the framework of innovation implementation	Work under uneven load conditions with peak voltages and sharp drops	Load balancing occurs due to the network resource and the connection of other network participants
Distribution of risks in the implementation of innovations	Weak uneven distribution with concentration of risks in separate elements of the system	The concentration of risks in individual elements of the network production system is excluded
The number of assets used in innovative projects	Determined by the capabilities of a limited number of participants in innovative activities	Increases dramatically due to the expansion of the volume of resources involved in innovation activities
The nature of interaction in the field of innovation	Multi-rank interaction with a strict delineation of rights and powers in decision-making	Peer-to-peer interaction with the differentiation of rights and powers in decision-making based on chaos management methods.

The highlighted properties of networked production systems create conditions for the formation of flexible organizational structures with such characteristics as: a large number of participants; heterogeneity of participants; the goal-setting systems of the participants are not always consistent with each other, they may contradict each other; difficultly predictable activity of participants in time and in network space; the object of management is a whole group of homogeneous or heterogeneous processes; many decision-making centers that affect many directly unrelated processes at once; a high degree of interconnectedness and interdependence of decisions from each other.

Networked forms of innovative project management provide some competitive advantages for manufacturers who want to obtain additional production effects through the use of network resources. The Internet is becoming a limitless platform and field for implementing innovations in the digital

economy; competition is shifting to the sphere of digital competencies for managing innovative technologies.

At the same time, the concepts of production and trading networks and network production systems should also be separated. Manufacturing and distribution networks are sprawling and geographically standardized manufacturing systems. The emergence of networked production systems is associated with a qualitative change in production and economic relations on the basis of: high liberalization of participants and consumers; a decrease in the role of administrative management, replaced by artificial intelligence; transformation of the notions that production is the totality and concentration of the production capacities of a company and its personnel located in certain territorial areas into the idea that the information space on the Internet can be a platform for placement and effective functioning, which can connect isolated and independent subjects who have objects and / or means of labor in the ownership or on other conditions, as well as having the necessary competencies to perform specific production tasks on a temporary basis. Comparative characteristics of the categories production and trading networks and network production systems are presented in Table 2.

Table 3: comparative characteristics of the categories "production and trading networks" and "network production systems"

Characterizing feature	Production and retail chains	Networked production systems
State of the art	Have received rapid development in the past few decades in connection with	They are actively developing in areas, the effectiveness of which significantly depends on information technology
Development potential	The development potential of production and retail chains has been largely exploited, the development is aimed at intellectualizing production management	There is significant potential for the development of networked production systems, due to the development of the digital economy
Distinctive feature of the network	Active use of informatization of production processes to improve manageability	Active use of artificial intelligence for automatic network management
The nature of network management	Organization and optimization of production processes in the network based on the collection and analysis of information in the form of big data	Creation of conditions for the development of the network as a self-adjusting and self-governing system, where big data is a necessary condition for the operation of artificial intelligence
Degree of freedom of participants	The network participants work in a hierarchical system under conditions of fairly strict administrative control	Network members have a high degree of limited freedom, restrictions on entry and exit of their network and the schedule of working in the network are reduced

Business digitalization leads to acceleration of production processes with a significant simplification of the availability of information [5]. The formation and development of network production involves the formation of a new economic entity that provides a platform for interaction between network participants in order to form and distribute network values. It is difficult to imagine a modern company that has achieved high results in production and economic activity, as a result of the hard work of many employees who work to create corporate success, whose plans do not include the development and expansion of the market presence and increase in market capitalization. As a rule, such companies are building strategies for the development of their representative offices in the form of network formations. So, the most active distribution of network forms of production and economic relations were in the areas of trade, as well as various services, including banking. According to the author, there are reasons to believe that real production spheres are prepared for networkization,

which allows predicting the spread of network technologies and models of network business development. This is largely due to the rapid development of automated company management tools, the possibility of switching to 3D printing of material objects, the use of a large amount of data when the company operates in the markets, the modernization of the company management model, the creation of unique materials, etc.

The high degree of openness of the networked production system provides access for a large number of suppliers, performers and consumers to the network. In this regard, the restrictions on the use of certain types of resources existing in traditional production systems can be lifted provided effective and creative methods of their involvement in the network. The network model of the organization of production requires a wide variety and availability of various types of resources, including information, financial, labor, intellectual and others. This is a distinctive feature of network production, which provides them with a competitive advantage compared to offline production and leads to increased efficiency of resource use.

Continuity of production requires timely supply of resources of the required quality and in the right quantity for various consumers [6]. In traditional production systems, continuity is achieved by diversifying suppliers. For this, a long-term contractual relationship is established. At the same time, a high probability of deliveries is ensured as a result of acquiring a certain experience of interaction with suppliers. To increase the likelihood of supply and guarantee of sale, interaction with an unlimited number of suppliers, performers and buyers is carried out. At the same time, the probability of obtaining the required amount of resources from a separate supplier, performing work by a separate performer or making purchases to individual buyers can be quite low. However, the overall probability increases due to the fact that the number of subjects in the network is much wider than in the out-of-network form of organization of production. Features of the characteristics of logistics in traditional and networked production systems are presented in Table 4.

Table 4: features of logistics in traditional and networked production systems

Specifications	Traditional production system	Networked production system
Link types	One with many	Many with many
Interchangeability of resources	Limited interchangeability for certain types of resources	Polyresource - mandatory interchangeability of a wide range of resources
Diversification of suppliers	Increases the likelihood of supplying resources	Provides a high probability of supply of resources due to networkization of suppliers
Sales diversification	Increases the likelihood of product sales	Provides a high likelihood of product sales due to networked buyers
Interchangeability of products	Interchangeability at the whole product level	Interchangeability at the level of product parts

The hallmark of logistics in networked production systems is the sophisticated type of fast many-to-many links that require high speed transitions from one resource to another, as well as providing a wide product line for shoppers with dynamic customer requirements. This makes it possible to increase the reliability of interaction and the stability of material and technical support and the speed of updating technologies in the network production system through the use of organizational resources of the external environment, ahead of setting higher standards of interaction, as well as increasing the mobility of production.

One of the striking examples of the formation and development of its own network production system is the innovative activity of Russian enterprises of the radio-electronic industry, which are united by the vertically integrated company Joint Stock Company "Concern of Radio-Electronic Technologies" (hereinafter referred to as the concern). The concern includes more than 70 Russian industrial enterprises engaged in the development and production of radio-electronic products for both military

and civil purposes. Today, the enterprises that are part of the concern supply their products to various countries of the world, the total number of export destinations is more than 30 countries.

The digital economy opens up new opportunities for the group to collaborate in the field of innovation with other enterprises of various sizes and scales of activity. In this regard, the chain is considered by the concern as a factor in maintaining the existing market share and developing new segments. Based on competencies in the current segments of its presence, the Concern will enter the most important segments for the state and implement additional market opportunities based on network development and integration of its production systems.

Analysis of the dynamics of the development of the Russian radio-electronic industry showed that the concern is switching to a network organizational structure for managing production systems, which involves two directions of networkization of production:

1. Network as a more perfect control structure, featuring increased flexibility, stability and robustness;
2. Network as a new form of accelerated collaborative creation of new values that meet modern market trends.

The first direction allows to increase the flexibility and stability of the company management system. A characteristic feature of networked organizational structures for managing production systems is a high degree of adaptability of production subsystems to changes in the internal and external environment of the company. The network organizational structure of management may not enter into a rigid contradiction with the existing hierarchical management structure, but harmoniously fit into the practice of managing production processes due to the fact that network forms of interaction do not require constant expenditures of resources to maintain communication channels.

The second direction of networkization of the processes of creating and managing innovations in production systems provides, in the author's opinion, the possibility of solving the problem of single-product and narrow specialization of production systems of the Russian radio-electronic industry, as well as reducing the dependence on direct budget financing within the framework of the state defense order.

In this regard, the concern forms a network-centric business model based on a set of such parameters of production and economic activity according to the C4ISR principle, which assumes the effective organization of digital management of the production system, control, communication, collection and computer processing of information, surveillance and intelligence. Networkization is manifested in the fact that today conditions are being formed for the implementation of joint activities of enterprises of the radio-electronic industry with companies operating in various industries and types of economic activity.

Conclusion

The main conclusions of the research presented in the article are as follows:

1. The most common critical challenges of transformation of the infocommunication nature of management of modern production systems have been identified: active use of smart grids and control systems; the formation of a new technological order in the global system of economic relations; creation of new methods and technologies for organizing economic systems; development and widespread use of artificial intelligence; digitalization of production, which leads to blurring the boundaries between Bio, Social & digital reality. It has been established that the key competence of managers in a network production system is the ability to organize the mass creativity of interested, neutral and disinterested people, whose purposeful mental activity forms the intelligence of society. The maximum manifestation of the intelligence of society is possible in the conditions of liberalization of network relations in which the manifestation of the talents and abilities of network participants is organized in a tolerant network environment. It has been established that the

networkization of production systems, including on the basis of co-branding projects with leading world corporations, makes it possible to strengthen the role of domestic companies in the international division of labor in the implementation of projects for computer engineering of production.

2. The definitions of the broad differences of the proposed terms characterizing the network production systems are given, including: network effect; network freedom of participants; the number of degrees of network freedom; social intelligence of network participants; the intelligence of the network society; network culture; space of a networked production system; network production system infrastructure; ecosystem of networked innovation. It has been proven that networked production systems provide a wider range of opportunities for creating a qualitatively different production ecosystem aimed at maximizing the involvement of participants in the process of creating new values, including those that are exclusively characteristic only for networked forms of cooperation - networked values.

3. The characteristic features of the project management of innovative activities in non-network and network production systems have been identified by such characteristics as: the number of potential participants in innovative projects; the likelihood of implementing innovative projects; the number of innovative projects initiated; the quality of initiated innovative projects; the likelihood of creating a demanded market value; the level of company risks; the degree of asset utilization in the framework of the implementation of innovations; distribution of risks in the implementation of innovations; the number of assets used in innovative projects; the nature of interaction in the field of innovation. For networked production systems, a characteristic feature is highlighted - the presence of active open digital platforms for automatic or semi-automatic production control in the network.

4. The features of resource management of innovation activity in networked production systems operating on the principle of "many with many" are revealed. It has been established that network interaction can improve the reliability of interaction and the sustainability of organizational and resource support for innovation in networked production systems, increase the rate of technology update through the use of organizational resources of the external environment, ahead of setting higher standards of interaction, as well as increasing the mobility of production.

5. Using the example of the Russian radio-electronic industry, the advantage of network cooperation in such areas as: transport, health, safety, etc. is shown. For this, the integration of enterprises of the radio-electronic industry takes place on the basis of a network organizational structure of management, which involves two directions of network of production: the network as a more perfect structure control, characterized by increased flexibility, stability and robustness; network as a new form of accelerated collaborative creation of new values that meet modern market trends.

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Conceptual Aspects of Innovation Management in Offline and Networked Production Systems

Mansur F. SAFARGALIEV

Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
safargaliev@list.ru

Gaziz F. MINGALEEV

Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
mingaleevgaziz@mail.ru

Ruslan F. GARIFULLIN

Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
deeltaar@mail.ru

Bulat R. GAREEV

Associate Professor at the federal State Budgetary Educational Institution of Higher Education «Kazan National Research Technical University named after A.N. Tupolev–KAI» (KNRTU–KAI, FSBEI HE «KNRTU–KAI»), department of economics and management at the enterprise, Kazan, Russia,
b.r.gareev@mail.ru

Abstract

The digital economy makes new demands on the models of company management, demands from them fundamentally new approaches to innovation, including in the field of innovative entrepreneurship. Among the important prerequisites for the network transformation of the innovative activity of modern production systems in the digital environment, the author attributed the following: the emergence of new technological structures; the emergence of new models of innovation management based on the development of organizational and communication mechanisms; expanding the availability of resources in the digital environment and increasing the economic freedom of participants in innovative activities.

Keywords: Network, Production System, Digital Economy, Ecosystem, Infrastructure.

Introduction

The network production system involves the formation of an ecosystem of generation and resource support for innovation in the network. The critical element of the ecosystem is the following

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functionality: methodological and instrumental support for innovation; high-quality examination of projects; involvement in the network of people and resources necessary for specific projects; organization of effective interaction of subjects of innovation. The quality of the ecosystem is essential to ensure the efficiency and continuity of the networked production system and innovation within its framework. Among the important functions are the following: formation of a personnel reserve of innovative activities in networked production systems; the formation of a social lift for participants in innovative activities in the network; ensuring flexibility of motivation of participants in innovativeactivities based on identifying and supporting the talents of each; the ability to localize resources within the framework of the implementation of individual stages of projects in terms of time and volume; navigation of personnel and resource support for innovation in networked production systems.

According to the author, the key characteristics of networked production systems are the following parameters for organizing innovation in a networked format:

1. The number of potential participants in innovative projects.
2. The likelihood of implementing innovative projects.
3. The number of innovative projects initiated.
4. The quality of initiated innovative projects.
5. The likelihood of creating a market value in demand.
6. The level of company risks.
7. The degree of asset utilization as part of the implementation of innovations.
8. Distribution of risks in the implementation of innovations.
9. The number of assets used in innovative projects.
10. The nature of interaction in the field of innovation.

Research part

One of the most important distinguishing characteristics of network innovation in production systems is the number of participants involved in network innovation and the number of potential participants who can be involved in it. The principal position of the author is that there is much more opportunity in the network to involve human capital in network innovation, which makes it possible to increase the likelihood and efficiency of using the intelligence of the network society for the purpose of innovative development of the company. Outside the network production system, the number of participants is determined by the classical norms of controllability; completely different laws work for the network. So, according to Metcalfe's law, the number of potential participants in innovative activity in a network production system is proportional to the square of the number of nodes in the network. Increasing the efficiency of innovation in the digital economy, according to the author, is associated with an increase in the number of network participants, as well as the creation of a system for motivating network participants to innovative activities. The formation of competitive advantages of production systems in the digital economy is directly related to the use of technologies for integrating the social intelligence of participants in innovative activities in the network and the maximum realization of the intelligence of the network society for the qualitative growth of the parameters of innovation.

Another important parameter of innovation in the network in production systems is the likelihood of initiation and implementation of innovative projects aimed at increasing the innovative activity of production systems. In the author's understanding, in non-network production systems, the probability of initiating and implementing innovative projects is determined by the product of a limited number of activity centers by their level of their innovative activity. At the same time, the probability of initiation and implementation of innovative projects in networked production systems is determined by the product of the expanded number of activity centers by their level of their innovative network activity. The author relies on modern studies of network formations, which made it possible to identify one of the most important characteristics of innovation in networked production systems, which is that the active use of network resources can create a fundamental opportunity for initiating innovative projects, improve the quality of solutions in the field of innovation, and accelerate implementation processes. innovative projects through the use of digital management technologies.

Increasing the likelihood of generating innovative projects by enhancing the innovative activity of network participants creates additional opportunities for the growth of the number of innovations. The number of ideas that can form the basis of innovation determines the innovative activity of production systems. At the same time, it is not at all necessary that all these ideas end with the implementation of production and other innovations. In some companies, on the contrary, as a measure of the effectiveness of innovation, they use such criteria as: the number of their own ideas that did not stand up to criticism; the amount of working time used to implement the employees' own ideas, etc. The increase in innovative ideas creates the basis for creating a database of directions for innovative development. The use of scientific approaches to the analysis of information, such as addition, product, division, difference, hybridization and others, allows you to create an unlimited number of innovative projects, as well as create conditions for the implementation of human capital in the production system. The involvement of artificial intelligence resources increases the speed and ability to make informed management decisions in the implementation of the innovation strategy. The author's approach is based on the assumption that in non-networked production systems, the number of initiated innovative projects is determined by the diversity of interests, intellectual experience and social intelligence of individual participants in the system. At the same time, the number of initiated innovative projects in networked production systems is determined by the variety of interests, intellectual experience and intelligence of the networked society.

An important element of innovation in networked production systems is the quality of initiated innovation projects. In the author's vision, the network format of innovation activity allows using the intelligence resource of the network society to improve the quality of the company's innovative activity. At the same time, the basis of a networked society can be completely diverse network participants, including people involved and not directly involved in the networked production system.

The stages of quality assurance initiated by innovative projects in networked production systems are shown in fig. 1.

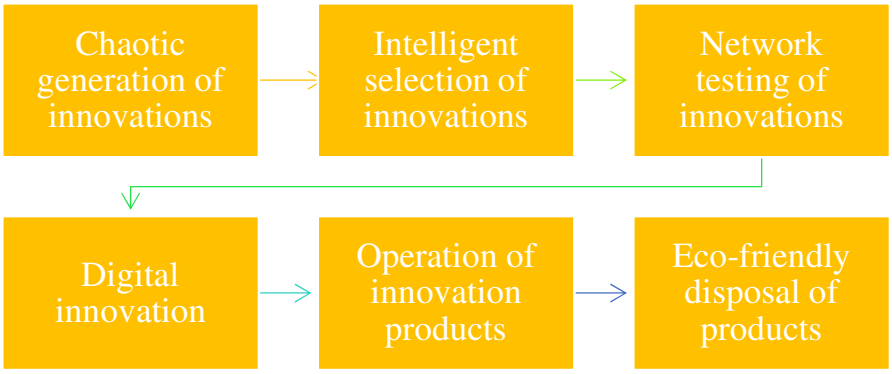

Fig. 1: Stages of quality assurance initiated by innovative projects in networked production systems

The quality of ideas and the ecosystem for the realization of the intelligence of a networked society form the basis of the innovation activity of the networked production system and characterize the innovative potential of the networked production system. Ensuring the quality of initiated innovative projects requires the formation of a system consisting of the following stages: chaotic generation of innovative projects; intellectual selection of innovations; network testing of innovations, digital implementation of innovations in production and economic activities; operation of products of innovative activity, including on the principles of a joint economy; eco-efficient utilization of innovations in networked production systems.

To ensure quality, initiated projects in networked production systems is the stage of generating innovative ideas. A characteristic feature of this stage, according to the author, should be the removal of restrictions on the creative activity of participants in the innovation process. Formation of a base of innovative ideas, which can later be formulated as innovative projects, should be carried out in a controlled chaos. Thus, a significant increase in the number and quality of innovative projects can be achieved. To improve the quality of testing innovative projects, scientific institutions also acquire special importance as subjects of their own opinion regarding networked production systems and their innovative activities.
At the second stage, innovative projects are selected. As a rule, most of the generated projects at this stage do not stand up to constructive criticism. However, the ideas underlying innovative proposals can work to improve the quality of projects that have been selected. Information technology can make the selection process intelligent by using the resources of artificial intelligence.

At the next - third stage, network testing of innovative projects takes place, with the maximum involvement of the social intelligence of network participants. The production system creates conditions for accelerated and semi-automatic testing of innovations. Innovation activities in a networked production system can take place in research teams that can migrate across the network. The research team becomes an independent subject of innovation, which becomes more mobile in the network. Competition of innovative projects in the network is ensured on the basis of openness and increased availability of information. This significantly improves the quality of testing innovative projects and innovative products. The quality of testing can be improved by allowing network innovators to test the outcome of innovation in different roles. At the same time, in the networked production system, according to the author, there should be a reasonable structure of participants performing appropriate functions in innovation. Thus, the following classification of the roles of participants in innovative activities in the network is proposed : generators of innovative projects; critical analysts of innovative projects in the network; realists who carry out a balanced and comprehensive assessment of projects. At the same time, testing projects should involve evaluating projects based on a set of criteria. An excessive desire to evaluate projects solely on commercial criteria can cut off important projects that have significant potential for strategic development of the network production system.

The most important stage in ensuring the quality of network and innovation activities is the implementation of innovative projects. The network form of innovation makes it possible to increase the flexibility of the networked production system due to the fact that during the implementation of projects the set of project quality parameters can be adjusted, and the implementation can take place in conditions of unclear goals and results. At the same time, a high proportion of projects implemented in the network production system can be used as one of the criteria for the effectiveness of innovation in the network production system. In addition, an important element of ensuring the quality of innovation in the network production system are such parameters as: the quality of selected innovative projects; quality of elaboration of innovations; the quality of project management systems in the network, the quality of project implementation in the network, and others. Scaling up the implementation of projects can be carried out through the active use of digital technologies, which provide significant advantages to the production system. Digital is becoming a key element in ensuring the quality of networked innovation in companies.

The exploitation of products of innovation, including those created in networked production systems, is also an element of ensuring the quality of innovation in the network. The system for collecting information on the course of operation of products of networked innovation is of particular importance . The main characteristics of quality assurance of network innovation are the quality level of collection, storage and analysis of big data on the course of operation of innovation products. The information obtained during the registration of events related to the operation of the products of innovation is used to improve the quality of innovation in the future.

The environmental friendliness and efficiency of disposal of products created or created within the framework of innovative projects determines the quality of the organization of innovation activities within the network of production systems. Modern business, in our opinion, cannot but take into

account the ecological component of the created products, which is a characteristic of its social responsibility. In the author's vision, the utilization of the results of innovative activities should be without costs or with their minimum amount. The decision to dispose of products created as a result of innovative activities should be made as soon as possible. The ideal end result of such a system for recycling spent or ineffective elements of the ecosystem of innovation in networked production systems is an independent, if possible, forced exit of obsolete products and technologies from the system.

The author's approach is based on the proposition that in non-networked production systems, the quality of initiated innovative projects is limited by the financial capabilities of the initiator of the innovation and his ideas about quality. At the same time, in networked production systems, the quality of initiated innovative projects can be significantly increased by pooling the financial resources of network participants, the quality is determined by general requirements.

The network production system makes it possible to implement the concept of a joint economy to a greater extent, which ensures a higher degree of utilization of the company's assets that are involved in innovation. Joint investment in innovation, joint exploitation of resources in the field of the company's innovation and rational distribution of the effects of innovation, provides a significant increase in the efficiency of asset use and a significant increase in the return on equity of individual participants in network and innovation activities. In off-grid production systems, work is carried out under uneven load conditions with peak voltages and sharp drops. At the same time, load balancing occurs in networked production systems due to the network resource and the connection of other network participants.

The joint economy in the field of network innovation, in our opinion, makes it possible to reduce the overall project risks, and most importantly, to reduce the risks of individual participants in innovative activities. Reduction of risks for individual participants is ensured by reducing the volume of initial investment per participant, a higher level of utilization of labor resources and resource efficiency, as well as due to the increased flexibility of the network production system in the organization of the company's innovative activities. In non-networked production systems, there is an uneven distribution with a concentration of risks in individual elements of the system. At the same time, in networked production systems, the concentration of risks in individual elements of the networked production system is excluded.

The network provides, in the author's opinion, an expanded involvement of resources in the company's innovative activities. In this regard, fundamentally new opportunities appear for project participants and new horizons for specific projects open up. Such opportunities appear due to the wider involvement of resources in the company's innovative activities, including through such tools as crowdfunding , crowdsourcing , sharing costs , volunteering and volunteering, and others. In non-networked production systems, the number of assets used in innovation projects is determined by the capabilities of a limited number of innovation participants. At the same time, in networked production systems, the number of assets used in innovative projects increases sharply due to the expansion of the volume of resources involved in innovative activities.

A characteristic feature of innovation in networked production systems, according to the author, is the possibility of constructing a model of interaction between participants of innovation activity, possessing th th possibility of providing increased freedom of members of the network. Off-grid production systems have a relatively rigid structure for managing processes in the implementation of projects, including innovative ones. In non-networked production systems, as a rule, the multi-rank principle of communication is used. Under the authority of the author, the rigidity and hierarchy of the organizational structure of innovation management reduce the speed of processes in the implementation of innovative projects. The peer-to-peer communication model implemented in the network allows to increase the speed of generation, selection, testing and implementation of innovative projects. In non-networked production systems, the nature of interaction in the field of innovation involves multi-rank interaction with a strict delineation of rights and powers in decision-making. At the same time, in networked production systems, the nature of interaction in the field of innovation involves peer- to -

peer interaction with the differentiation of rights and powers in decision-making based on chaos management methods.

Comparative characteristics of project management in non-network and networked production systems are presented in Table 4.

Table 4: comparative characteristics of project management of innovative activities in non-network and network production systems

Comparison criteria	Non-network production system	Networked production system
Number of potential participants in innovative projects	Determined by the classic controllability rate, usually up to 10 participants	Directly proportional to the square of the number of network nodes according to Metcalfe's law
The likelihood of implementation of innovative projects	It is determined by the product of a limited number of centers of activity by their level of their innovative activity	It is determined by the product of the expanded number of activity centers by their level of their innovative network activity
Number of initiated innovative projects	Determined by a variety of interests, intellectual experience and social intelligence of individual participants in the system	Determined by a variety of interests, intellectual experience and intelligence of the network society
Quality of initiated innovative projects	Limited by the financial capabilities of the initiator of the innovation and his ideas about quality	Increased by pooling financial resources of network participants, quality is determined by general requirements
Probability of creating market value in demand	Depends on the level of predictive abilities of the participants of individual participants in the system	Increases proportionally with the growth in the number of network participants
Company risk level	Decreases sharply depending on network scale	Decreases sharply depending on network scale
Asset utilization rate within the framework of innovation implementation	Work under uneven load conditions with peak voltages and sharp drops	Load balancing occurs due to the network resource and the connection of other network participants
Distribution of risks in the implementation of innovations	Weak uneven distribution with concentration of risks in separate elements of the system	The concentration of risks in individual elements of the network production system is excluded
The number of assets used in innovative projects	Determined by the capabilities of a limited number of participants in innovative activities	Increases dramatically due to the expansion of the volume of resources involved in innovation activities
The nature of interaction in the field of innovation	Multi-rank interaction with a strict delineation of rights and powers in decision-making	Peer-to-peer interaction with the differentiation of rights and powers in decision-making based on chaos management methods

Thus: the characteristic features of project management of innovative activity in non-network and network production systems have been revealed by such characteristics as: the number of potential

participants in innovative projects; the likelihood of implementing innovative projects; the number of innovative projects initiated; the quality of initiated innovative projects; the likelihood of creating a demanded market value; the level of company risks; the degree of asset utilization in the framework of the implementation of innovations; distribution of risks in the implementation of innovations; the number of assets used in innovative projects; the nature of interaction in the field of innovation.
The following features can be attributed to the characteristic features of project management of innovative activity in non-network production systems : the number of potential participants in innovative projects is determined by the classical norm of manageability, as a rule, up to 10 participants; the probability of implementation of innovative projects is determined by the product of a limited number of centers of activity by their level of their innovative activity; the number of initiated innovative projects is determined by the variety of interests, intellectual experience and social intelligence of individual participants in the system; the quality of initiated innovative projects is limited by the financial capabilities of the initiator of the innovation and his ideas about quality; the probability of creating a demanded market value depends on the level of predictive abilities of the participants of individual participants in the system; the level of company risks decreases sharply depending on the scale of the network; the degree of asset utilization within the framework of the implementation of innovations; work under conditions of uneven load with peak voltages and sharp drops; distribution of risks in the implementation of innovations weak uneven distribution with a concentration of risks in individual elements of the system; the number of assets used in innovation projects is determined by the capabilities of a limited number of innovation participants; the nature of interaction in the field of innovation involves multi-rank interaction with a strict delineation of rights and powers in decision-making.

The following features can be attributed to the characteristic features of project management of innovative activity in non-network production systems: the number of potential participants in innovative projects is directly proportional to the square of the number of network nodes according to Metcalfe's law; the probability of implementation of innovative projects is determined by the product of the expanded number of activity centers by their level of their innovative network activity; the number of initiated innovative projects is determined by the variety of interests, intellectual experience and intelligence of the network society; the quality of initiated innovative projects is increased by pooling the financial resources of the network participants, the quality is determined by general requirements; the likelihood of creating a demanded market value increases proportionally with an increase in the number of network participants; the level of company risks decreases sharply depending on the scale of the network; the degree of asset loading within the framework of the implementation of innovations, load balancing occurs due to the network resource and the connection of other network participants; distribution of risks in the implementation of innovations, the concentration of risks in individual elements of the network production system is excluded; the number of assets used in innovative projects increases sharply due to the expansion of the volume of resources involved in innovative activities; the nature of interaction in the field of innovation involves peer- to -peer interaction with the differentiation of rights and powers in decision-making based on chaos management methods.

Conclusion

It has been established that the network forms of organizing innovation activities are non-alternative in the digital economy, due to the shift of competition between companies in the sphere of rivalry between management models and the desire of manufacturers to form and distribute network effects.

Formation of the systemic foundations of project management of innovation in networked production systems requires the development of scientific tools that allow identifying and measuring the parameters of interaction between innovation participants in the network, as well as creating conditions for the effective implementation of innovative projects in networked production systems. It should be noted the importance and possibility of ensuring a higher level of quality of innovation in networked production systems through, for example, the implementation of the proposed stages of ensuring the quality of project management of innovation. Thus, an increased level of quality of innovation in the network in production systems is ensured, in the author's opinion, can be ensured through the possibility

of using an expanded composition of participants in the testing process and innovations implemented within production systems. In this case, an open system of testing innovations in the network is assumed, which allows using the intelligence of the network society in the organization of innovative activities. Improving the accuracy of assessing the results of innovative activities provides, according to the author, to target the development of innovative products and predict the demand for them.

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Online Education in Developing Countries: A Comparative Analysis of the Development of the Sector in Russia, China and Brazil

Arthur A. MAKSAEV

Krasnodar cooperative Institute (branch) of Russian University of cooperation, Krasnodar, Russian Federation, https://orcid.org/0000-0002-6417-8807, krasnodar@ruc.su

Nurmagomed S. SURAKATOV

Dagestan State Technical University, Makhachkala, Russian Federation, https://orcid.org/0000-0003-3423-9135, sur71@yandex.ru

Tatyana G. SOBOLEVSKAYA

Tax College, Moscow, Russian Federation, https://orcid.org/0000-0001-7792-2861, taina_leb@yahoo.com

Sofia L. LEBEDEVA

Russian University of transport, Moscow, Russian Federation, https://orcid.org/0000-0002-0541-5171, 4s.lebedeva@gmail.com

Evgeniya K.KARPUNINA

Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation, https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru
corresponding author

Abstract

The purpose of the study is to analyze the conditions for the development of the online education sector as the basis of the digital economy in rapidly developing countries (Russia, China, Brazil), as well as to assess its current state and growth prospects. The authors identified the advantages of online education in comparison with traditional education forms, also revealed the specifics of the development of online education in Russia, China and Brazil. The authors determined that China is the leader in the field of online education among the countries studied, and it is ahead of the world's leading countries in the development of certain segments of the online education sector. Russia shows a steady growth of online educational platforms and online higher education programs, however, the country faces a number of problems in terms of institutional, technical, personnel and methodological support. Brazil is characterized by rapid growth of online education in the higher education system (due to the removal of institutional restrictions and affordability), the share of students enrolled in online programs has reached almost 30% of the total number of students, while the number of applicants is also increasing. It is concluded that the development of online education in developing countries can be a tool for forming the intellectual basis of the digital economy.

Keywords: online education, developing countries, digital economy, human resources, e-education, MOOCs, educational platforms.

Introduction

Rapidly developing countries such as Russia, China, and Brazil (a leading part of the BRICS Association) are now seen as likely leaders in digital development on a global scale. Their potential is

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quite high, and the level of development of information and communication infrastructure contributes to the effective dissemination and processing of information (Antipova and Rodionova, 2016). And given the slowdown in economic growth in most of the world's mature economies, experts predict a redistribution of the global landscape in the near future (United Nations, 2019b).

Education is fundamental to the digital economy development. Intensive generation and use of digital technologies is possible if there is a reliable basis in the form of a competitive education system, high-quality educational services that ensure the formation of specialists required for the digital economy, as well as the expansion of educational opportunities. However, such parameters of the education system are not available in every country.

However, in the context of digitalization, the development of the online education sector can probably become a real tool for increasing the educational and intellectual potential of developing countries. At the very least, the rapid growth of this sector (according to Statista (2020b), the global online education market will amount to 243 billion US dollars in 2022), the confidence and support of teachers and students around the world (more than 60% of teachers around the world support digital education models, and 92 % of students around the world are interested in personal support and information support for the degree process), as well as the large investments of companies in online educational services (in 2015 alone, more than $ 2.2 billion was invested in the development of more than 300 companies) emphasize the importance of online education in the processes of increasing the educational and intellectual potential of countries, as well as the level of their digital development (Education International, 2020).

Therefore, the analysis of the demand for online educational services, the current state of this sector, as well as the problems and prospects for its growth in rapidly developing countries require special research attention.

Methodology

The purpose of the study is to analyze the conditions for the development of the online education sector as the basis of the digital economy in rapidly developing countries (Russia, China and Brazil), assess its current state and growth prospects.

Research objectives:

1) identify the advantages of online education in comparison with traditional forms of education;
2) reveal the conditions for the development of online education in rapidly developing countries;
3) determine the current state of the online education sector in Russia, China and Brazil;
4) assess the prospects for the development of the online education sector as the basis of the digital economy and the possibility of overcoming existing growth constraints.

The topic of online education development is revealed in the research of Yuan and Powell (2013), Bauder (2012), Keegan (2013), Kentnor (2015), Vishneva (2019), Mozhaeva (2013).

Approaches to assessing the ICT infrastructure and technical equipment of educational institutions are presented in the works of Van Deursen and Van Dijk (2014), Vega et al. (2019).

The specifics of the use of modern digital technologies in the educational environment in different countries are presented in the publications Luckin et al. (2016), Rizzotto (2017); Greenspan (2015), Blaschke and Hase (2015).

The object of the study is a set of online education programs implemented in developing countries such as Russia, China, and Brazil.

In this study, online education is understood as the organization of educational activities at all levels of education using information technologies (computer-based learning technologies, interactive

multimedia, web-based learning, online learning), as well as technical means, including telecommunications networks that provide the necessary information through communication channels, interaction between students and teachers, who may be located in the same educational institution, or in different cities and countries. Methods of online education make significant changes in the generally accepted approaches to the educational process, as well as determine the removal of restrictions and increase the availability of education (Bolkunov, 2016).

Research methods: theoretical analysis method, comparative analysis method, economic analysis method, system approach.

Results

1) What are the advantages of online education over traditional education? Why can it be considered as a tool to increase the country's educational potential and create a basis for digital development?

First, online education allows to personalize the educational process and provide adaptive learning (in contrast to traditional educational institutions) (Kalyuzhny, 2017). This is possible thanks to the selection of suitable content and its adaptation to the abilities of each person.
Second, online education uses more interactive technologies and advanced media tools (tablets, screens, etc.), as well as augmented and virtual reality technologies.
Third, the cost of online education is lower than the cost of traditional education, which makes it more accessible to a larger population (Uvarov and Frumin, 2019).
Fourth, online education allows you to overcome geographical boundaries and meet the educational needs of different groups of the population, regardless of country or race.
These advantages have provided a rapid growth of the Learning Management System (LMS) market since 2012 (when the boom of educational startups in the world began), by 2019 the market size reached 198 billion US dollars (Vishneva, 2019), by 2022 it is projected to grow to 243 billion US dollars.

Today, 77% of American companies use online education resources to train staff, which provides them with an increase in revenue of up to 26% and a reduction in costs of up to 70%. According to the results of international surveys, the use of online learning technologies is supported by more than 65% of teachers (65% of them use open educational resources in the learning process, 37% - MOOCs, 63% - learning technologies based on competencies) (Statista, 2015a).

The demand for online training courses from students is also high: according to 2015 data, 49% of students surveyed worldwide have completed at least one online training course in the past year (Statista, 2015b). 63% of the surveyed US University students note an increase in the effectiveness of learning through the use of online learning technologies, 53% say they have increased confidence in their knowledge of the material, and 34% confirm an improvement in their ability to cope with non-academic tasks (Statista, 2016). Thus, these facts confirm the advantages of online education.
2) Let’s reveal the conditions for the development of online education in Russia, China, and Brazil.
Opportunities for online education are primarily determined by the development of digital infrastructure, i.e. free access to the Internet, the availability of technical means for access, as well as the speed of data transfer and the affordability of connecting both organizations providing educational services and the population receiving them (table 1).

Table 1: The state of digital infrastructure in Russia, China, and Brazil as a basic condition for online education

Country	Fixed broadband connections per 100 people	Active mobile broadband connections per 100 people	Average data transfer rate, MB / s	Cost of fixed and mobile broadband connection, $US PPP	Percentage of Internet users from all citizens	Percentage of households with a computer
Some rapidly developing countries						
Russia	21,4	80,8	11,8	10,1	76,0	74,4
China	28,0	83,6	7,6	16,1	54,3	55,0
Brazil	13,7	90,2	6,8	29,9	67,5	46,3
Developed countries						
USA	33,7	133,1	18,2	66,1	94,9	89,2
Euro-28	33,8	81,5	12,5	32,5	92,1	83,2

Source: compiled by the authors based on OECD (2018), ITU (2018).

The table shows that in some positions Russia, China and Brazil are not inferior to European countries with mature economies and the United States. For example, the level of mobile broadband connection usage in the countries studied is very close to the average European level. The number of households equipped with computers in Russia is high (74.4%), approaching the level of European countries (83.2).

The average data transfer rate in Russia is 11.8 MB/s, which is comparable to the European average of 12.5 MB / s. China has a high value of "fixed broadband connections per 100 people" - 28.0 (in Europe-33.8, in the US-33.7). However, Russia and Brazil have a significant lag in such indicators as the level of fixed broadband connections, the share of Internet users from all citizens, which, to a greater extent, determine the opportunities for online education.

The analysis of composite indices of human development in the studied countries shows the existing need to improve the General level of education and literacy of the population (table 2).

Table 2: Composite indices of human development in Russia, China, and Brazil

Country	Average duration of training, in years	Skilled labour	Education index adjusted for inequalities	Human Development Index
Some rapidly developing countries				
Russia	12,0	96,4	0,807	0824
China	7,9	71,4	0,573	0,758
Brazil	7,9	64,1	0,525	0,761
Developed countries				
USA	13,4	96,4	0,849	0,920
Euro-28	11,7	90,72	0,879	0,890

Source: compiled by the authors based on United Nations (2019a)

These tables show that China and Brazil are clearly lagging behind developed countries in terms of education, average training duration, labor force qualifications, and human development index. In contrast to Russia, whose indicators are almost comparable to the average European level.

According to the United Nations (2019), countries with higher broadband access and higher levels of human development tend to have advantages in higher education and increase their leadership in these areas over time.

Thus, first of all, in China and Brazil, and second-in Russia, there is a need to increase the level of education of the population, which makes it necessary to develop the online education sector.

3) Let's analyze the state of the online education sector in Russia, China, and Brazil.

Online education sector in Russia

In terms of the online education development, Russia lagged significantly behind developed countries until 2014. For example, in the United States in 2012, there were 277 online universities, while in Russia there were only 2 (Makhmudov, 2016).

By 2014, there were more than 50 major projects in Russia that attracted tens of thousands of listeners, and the population's interest in self-education was reflected in the growth of this market segment by 70% in the period 2013-2014 (Mozhaeva, 2013). Most of the population during this period used the potential of online education to learn a foreign language, prepare for the unified state exam, and develop programming skills on a paid basis (Andreev, 2014).

Since 2015, the opportunities for online education, regardless of the requirements for the basic level of education in Russia, have expanded due to the implementation of the open education project at the country's leading universities (MSU, HSE, SPBU, MISIS, etc.) on a free basis (Npoed, 2020).

In addition, the free educational project “Universarium” has created a network of inter-university platforms for pre-professional training and targeted specialized training (Universarium, 2020).

An online learning platform “Uniweb” together with leading universities in the country, develops online educational products for the distribution of high-quality business education in Russian, both on a paid and free basis (Univeb, 2020).

The “Lectorium” project, which has more than 105,000 students, cooperates with the Ministry of education and science of the Russian Federation, leading universities and schools in Russia and Europe, as well as professional associations and companies (Lektorium, 2020).

Since 2016, the growth of online education programs (e-learning) and learning based on distance educational technologies has begun in Russian universities (table 3).

Table 3: Number of programs using e-learning and distance learning technologies in the total number of higher education programs (bachelor's degree, specialty, master's degree)

Educational programs of higher education	2016	2019
The total number of educational programs of higher education, units	41112	46496
Number of educational programs using e-learning, units	8441	12133
The number of educational programs using distance learning technologies units	4090	6485

Source: compiled by the authors according to the Ministry of education and science of the Russian Federation (2020)

In the period 2016-2019, the total number of programs implemented using e-learning increased by 30%, while the number of programs implemented using distance learning technologies increased by 37%. Accordingly, the number of students enrolled in online higher education programs has increased (table 4).

Table 4: Number of students enrolled in online higher education programs in Russia in 2019

Name of educational programs	Number of students-total, people	Number of students enrolled in e-learning programs	Including using exclusively e-learning	Number of students enrolled in programs using distance learning technologies	Including the use of exclusively distance learning technologies
Bachelor's degree programs	2814179	610114	14026	396312	35236
Specialist's degree programs	753393	112129	576	59702	685
Master's degree programs	531673	117632	2641	78423	4098

Source: compiled by the authors according to the Ministry of education and science of the Russian Federation (2020)

However, Russia is characterized by the problem of staffing online higher education due to the reduction of the teaching staff of Russian universities by 26.1% in the period 2013-2018, as well as the low level of digital competence formation among teachers and the lack of material incentives for improving competencies.

However, online educational programs are implemented not only at the higher education level. They also take place in the sphere of preschool and school education. For example, an increasing number of students use the "Ya-klass" simulator for schoolchildren, platforms for preparing for the unified state exam, as well as projects in the field of human cognitive improvement (HCI). However, this market segment is not sufficiently developed.

Online education sector in China

The online education sector in China is one of the fastest growing. In 2018 179 million people participated in online educational programs, and the sector grew by 63% compared to 2015 (International Education News, 2019). This was due to the growth of public financial investments in educational technologies at all levels (growth dynamics since 2011), the implementation of the plan to modernize the education system, as well as attracting investment from interested companies (Solovyov, 2019).

The development of the online education sector provides revenue growth (in 2018 - 251.76 billion yuan, or 25.7% of the sector's growth), as well as increasing the level of acceptance of online education among users and improving the online learning experience.

In China, there is a segmentation of the online education market: the primary and secondary online education sector (including homework and English language training on the platforms of companies such as 17ZuoYe, Vipkid, etc.); the test-oriented sector (preparation for tests, civil service exams and international exams TOEFL, IELTS, for example, on the platforms of Koolearn, GEDU); the vocational education and training sector (for example, from the companies FenBi, huatuEducation).

The fastest-growing segment in 2018 was the primary and secondary online education sector, by 2022, it is expected to grow further (to 27.7%), against the background of a reduction in the segment

of higher online education from 61.8% in 2012 to approximately 40.8% in 2022 (IResearch Global Group, 2019). According to iResearch estimates, the adult population is the main consumer of online education services, which is due to the stable dynamics of the development of the professional online education sector (table 5).

Table 5: Structural dynamics of the online education sector in China, 2012-2018

The sector of online education	2012	2013	2014	2015	2016	2017	2018
Primary and secondary online education sector	9,0	10,1	11,6	11,6	12,6	14,9	17,6
Higher online education sector	61,8	61,0	59,6	60,2	60,9	57,3	53,3
Vocational online education sector	25,7	25,5	25,3	24,3	22,6	23,7	24,8

Source: compiled by the authors according to IResearch Global Group (2019)

It should be noted that China has a problem of staffing online education, which is successfully solved by attracting teachers and specialists from all over the world.

The online education sector in China is demonstrating its investment attractiveness. In 2018, more than 50% of the total capital of venture EdTech companies around the world was invested in Chinese startups (Solovyov, 2019). In 2013, the volume of investment in the Chinese education industry was only 54 million US dollars, by 2018 this figure has increased to 2573 million US dollars (Deloitte, 2019).

In addition, in 2018, experts note a characteristic trend for China – the rapid development of 97 “unicorn” companies in the online education sector. According to CB Insights, in February 2019, the six largest EdTech “unicorns” were of Chinese origin (17zuoye has more than 60 million users; Vipkid serves 200,000 paid students from 32 countries; DaDaABC English language learning system; world leader in educational solutions STEAM Makeblock; o2o educational service Changing Edu) (Solovyov, 2019).

The rapid development of the online education sector in China is also due to cultural factors and the social values that are being implemented, which are the basis of the emerging digital economy.

Online education sector in Brazil

Brazil is showing growth in the information and communication technology sector, including through ICT collaboration with developed countries (Perminov, 2019). In 2016, there were 9820 registered IT companies in Brazil focused on software development, service delivery, and commercialization of third-party products. The total number of employees in the IT sector, according to the Brazilian Association of computer technology and telecommunications companies (BRASCOM), is 1 million 500 thousand people, of which 600 thousand people work directly in IT companies, and 900 thousand-on the side of customers from commercial and government structures (Igate, 2016).

However, the country has a high level of illiteracy - 9.7% in 2010 (Saraiva, 2011). Thus, the number of young people with higher education in 2009 was 14.4%, while in other Latin American countries this figure is much higher: in Argentina- 40%, Venezuela- 26%, Bolivia-20.6%, Chile-20.6% (Perminov, 2019). At the same time, inequality in obtaining higher education remained due to the high cost of education: only 5.6% of young people had a monthly income that allows them to get higher education(the minimum wage in Brazil as of January 1, 2017 is 937 reais, which is equal to US $ 300. The minimum wage was $ 282 in 2016 and $ 253 in 2015).

Only 28% of 345 thousand university teachers have a doctorate, 38% have a master's degree, 34% of teachers work without a degree, and only 78% of 2 million teachers have a higher pedagogical education (Popova, 2018). The main reason for this situation is the lack of resources invested in education.

Therefore, the development of the online education sector in Brazil is one of the most pressing issues. Currently, the Brazilian Government is trying to stimulate the country's innovative development, select and train qualified workers, strengthen the research base and create a modern scientific and technical infrastructure.

Currently, total spending on education in Brazil is about 6% of GDP, which is higher than in Argentina (5.3%), Colombia (4.7%), Chile (4.8%), Mexico (5.3%) and the United States (5.4%) (Wenr, 2019).

Starting in 2003, the Brazilian Ministry of education launched a program to modernize public schools under the “ProInfo” project: providing public secondary schools in Brazil with computer equipment, communications, and free software. As part of the project, 95.24% of the entire fleet of school computers was updated, two thousand schools are connected to the Internet, have a network infrastructure and use digital learning technologies. In 2009, the number of laboratories and educational institutions equipped with Linux systems was 53,000. They provide Internet access to 52 million students, as well as opportunities to use projectors, central processors, and group content in the educational process.

There are more than 2,000 universities in Brazil, 78.5% of which are private. Many of them successfully implement online learning programs, including for international students. According to a 2019 survey, almost half of Brazilian Internet users said they had completed an online course: about 52 percent completed a free course, and 24 percent successfully completed a bachelor's degree program via the Internet (Statista, 2020a).

The growing demand for education and the increasing use of the Internet to deliver educational content are driving the development of online education in Brazil. Since 1996, universities have been allowed to supplement existing full-time programs with bachelor's and master's programs implemented online and remotely.

In 2018, about a million students were enrolled in technology education programs, almost half of them using online learning technologies. In general, in the period from 2007-2018, the number of students enrolled in online education in technology-related programs increased by 586 percent (Wenr, 2019).

In 2018, 24 percent of all undergraduate students were enrolled in online education, 92 percent of them in private universities. In 2018, the number of available places for online education exceeded the number of available places in traditional teacher training programs for the first time.

In the near future, even more growth in online education is expected: private institutions are allowed to set up 250 online learning centers per year in several locations, and online learning programs are subject to the same accreditation standards as traditional programs. In this way, online learning contributes to increasing the opportunities for people in rural and remote areas to access higher education.

Brazil is one of the countries (including Chile, Colombia, Argentina, Mexico, Norway, Turkey) that do not have the resources to create and maintain national educational platforms and use the capabilities of leading platforms where universities publish MOOCs in the national language. Thus, the country uses MOOCs in the educational process of its universities, without investing financial resources in the creation of a national platform (Semenova et al., 2018).

Currently, Brazil is implementing the SP Stars program, which selects startups whose representatives participate in training sessions and receive online advice from expert mentors representing large high-tech companies. An example of such a startup is the private business school in Sao Paulo, which offers free online courses to teach Brazilians professional development through entrepreneurial value. To date, about 70,000 students have completed online courses and almost 2,000 have paid for a six-month program.

Conclusions

Thus, the analysis allows the authors to identify China as a clear leader in online education among rapidly developing countries. The level of development of the online education sector in China, as well as its growth prospects, will undoubtedly provide a reliable intellectual foundation for the digital economy development.

Online education is a relatively new phenomenon for the Russian reality, which faces a number of development problems in terms of institutional, technical, personnel and methodological support. So, the main problems of online education development in Russia are: lack of criteria and general standards for the quality of electronic content and educational materials, problems with copyright protection and institutionalization of online education as one of the legally established forms of education, lack of financial resources to support the processes of creating web resources, filling them and storing data, as well as staffing problems (Lapchick, 2014; Bolkunov, 2016).

The general problems of the development of the education system in Brazil do not allow the authors to talk about segmentation of the online education sector yet. The use of digital technologies helps to optimize the educational process in school education, but the segment of online education for primary school children in Brazil is poorly developed. However, the rapid growth of online education is typical for the higher education level (due to the removal of institutional restrictions and affordability), where the share of students enrolled in online programs has reached almost 30% of the total number of students, while the number of applicants is also increasing. Thus, the analysis confirms the authors ' assumption that the development of online education in developing countries can contribute to the formation of the educational and intellectual potential of their digital economy and provide long-term advantages in digital development.

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Personal Brands in The Networked World

Wioleta KUCHARSKA

Gdansk University of Technology, Gdańsk, POLAND
wioleta.kucharska@pg.edu.pl

Abstract

This conceptual paper is focused on the theoretical considerations concerning the role of personal brands in the process of value creation in a network economy. Based on the literature review, the author points to the growing, dynamic and awareness of the importance of personal brands, and draws attention to the fact that the key resources of the modern economy, such as knowledge (especially tacit), skills (professional & social), relations, are inherent to humans. So, individuals aware of their assets consciously shape their personal brands and participate in the process of value creation by entering into alliances concerning cooperation and integration of their key resources with entities and other prosumers. These alliances ensure the maximization of mutual benefits. As a result, we can observe how personal brands of human assets are dynamically moving from their place at the sidelines to the center of the modern economy.

Keywords: Personal Brand, Value Creation, Networked Economy.

Introduction

The "network economy" based on knowledge has significantly contributed to economic growth in recent years (Malik, Ali and Khalid, 2014, pp. 32–48). According to the World Bank estimates (Hamilton et al., 2005, pp. 61-70), intangible capital constitutes approximately 78% of the world's wealth. In developing countries, intangible capital accounts for 59% of assets, while in OECD countries it is approximately 80%. Intangible assets are the basis of the "new economy" (De, 2014, pp. 25-42; Crouzet and Eberly, 2018), and therefore brands significantly affect the condition of enterprises (Barwise, 1993; Bawise et al. 1989, 1990), and in the case of global brands - economies (Kucharska, et al., 2018). This contribution can be defined and considered in direct financial terms, but also in indirect and non-monetary terms, e.g., through the contribution to the improvement of the quality of life. The idea of the so-called meaningful brands (Hollis, 2013) is the concept of creating brands that gain a strong financial position through a significant contribution to the quality of life of their consumers. This contribution can and should be considered as the involvement of brands in pro-social activities within the meaning of the philosophy of corporate social responsibility (CSR), undertaken both by global and local enterprises, (Kowalczyk and Kucharska, 2020). But also, by strong personal brands that influence their social circles shaping attitudes. In the case of public figures and celebrities, the opportunities for social impact can be truly profound. In a networked economy, not only enterprises but also individuals are value producers. This is a kind of network economy phenomenon which has never been observed before. Knowledge workers, i.e. key producers of intangible assets, have transformed the importance of the role of an employee in relation to a corporation and its environment. Figures such as Bill Gates, Mark Zuckerberg, Richard Branson, and Steve Jobs perfectly showcase the importance of individuals and their personal brands in a networked economy. Importantly, virtual social media have created a communication channel that enables promoting every personal brand regardless of its position in the real world. Consciously, every user of a network automatically functions as a personal brand and his or her media presence is nothing more than a broadly defined branding. Naturally, social media do not determine how people function as brands, they are only a (or the) global communication channel available "for everyone". Social media are both 'only a' and 'the' global communication channel, 'only a' communication channel because the opportunities (e.g. their reach and tools) do not determine the ability of individuals to effectively create their own brand, but they are also 'the' global communication channel because the opportunities offered by such a wide reach and tools for measuring that reach and the

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power to foster involvement in the posted content capture the imagination and build awareness of the importance of the communication activities undertaken by given individuals within the network, thus creating space for new activities and proposals for "new value bundles". Therefore, the knowledge of a person, namely the knowledge worker, the ability to create intangible assets, which are key in the modern economy, and also because of the fact that in the network economy every person, and, in particular, the user of the social network, regardless of whether he or she wants it or not, and whether he or she is aware of branding processes or not, has a personal brand; and, therefore, it is necessary to include personal brands in the considerations on the influence of brands on the creation of value in the network economy.

In the recent decade, the network economy has changed and continues to change in a special way the models of value creation through brands. Social media and specifically online brand communities (Kucharska, 2019b) significantly contribute to e.g., the new business models. Personal brands are an important part of this process alongside corporate brands on a global and local level. It is therefore important to explore the role of personal brands in the value creation process in the network economy. This conceptual paper aims to do this and identify key research areas worth to be more in-depth examined.

Value Creation in the Networked World

The concept of value in the perspective of the network economy is quite dynamic. The dynamics of the business and social environment leads to continued redefining of this concept. The network is both an infrastructure and a modern form of market process coordination. New infrastructure and resources not only generate new methods of value creation, but also a new perspective on how it is perceived and defined. In the network economy, the internet is a key business infrastructure, while in line with the S-DLogic resources are both tangible and intangible bundles of benefits in the form of skills and knowledge, as well as relations, among others. S-DLogic, service-dominant logic (Vargo, Lush, 2004) is the idea that all providers on the market are service providers. A service in this context is the use of a given resource to generate benefits. Resources are owned by both consumers and producers. Therefore, in line with this idea, producers provide a resource-production service that is used for generation of bundles of value. As a consequence of this approach, the generated benefit is a special form of experiencing meanings which becomes a value determinant in this context. The beneficiary's perspective is crucial for the assessment and measurement of value. In this context, every "bundle of benefits" is a "value proposition" that is subject to constant evaluation in the process of integration with the potential beneficiary, which gives it its current meaning. This meaning is an indicator of value. The meaning transfer affects the concept of value. This transfer is based on existing relations.

Regarding the R-A theory proposed by Hunt and Madhavaram (2014), the relation itself is also a resource, so it is a kind of value proposition. The weight of this resource in the process of networked value creation has significance. Therefore, the key competence in the context of networked value creation is the configuration of an effective system of networking which is capable of integrating the resources available within the network, i.e. co-creation and meaning transfer. Relationship networking, supported by modern communication technologies, is a transfer infrastructure. According to the idea of S-DLogic, it is only the interaction and integration of resources, including relations, in a configured network that gives value to a given bundle. The relationship capital (Perechuda, 2007) becomes a significant intangible asset of an enterprise. The network economy forces building relationship capital beyond the transactional level to configure an effective value network. In this context, the value becomes more important, if understood not only as a simple function of money (financial benefits) but also as a function of relations and integration (social benefits).

in line with the idea of prosumerism, the network economy is based on the cooperation of individual creators based on a value network instead of a hierarchical structure; it also promotes a symmetrical exchange of benefits between co-creators (Powell, 2003). Individual value creators, understood as

sources of intellectual capital, can independently of corporate hierarchies, for instance, distribute the generated value in a selected, existing network, or they can configure a network themselves. As a source of value in the network economy, the intellectual capital is generated outside any hierarchies.

Considering the above, it can be concluded that value in the network economy is created through the co-creation and cooperation of members of a consciously configured value network. The more conscious and careful the configuration of the network, the greater its value generation efficiency. An organization can create value both within the internal and external network, similarly generated values can be dedicated to the external or internal network of beneficiaries. Common to all these cases is the overriding need to generate value for the shareholders of enterprises in the long term, through the ongoing generation of value dedicated to specific beneficiaries under the adopted business model. According to the aforementioned idea of S-DLogic (Vargo et al., 2008), both suppliers and recipients of values are not only parties to the transaction, but they are also integrators of resources available within the network (tangible and intangible in the form of specific competencies or knowledge , for instance). Each innovation as a "bundle of potential benefits" is, in this context, a "value proposition" that is subject to continuous evaluation in the process of interaction and integration with the potential beneficiary. Therefore, the perspective of the beneficiary is essential for proper assessment and measurement of the value (Vargo et al., 2008). An interesting research thread concerning the definition and creation of value in the network economy is the prosumer perspective, i.e. a conscious consumer oriented towards his or her own personal brand.

Personal Brands

The research aim considered in this paper is centred upon determining the role of personal brands in the process of value creation in the network economy. Based on the definitions proposed by Shepherd (2005) and Khedher (2014), personal branding is a planned process in which conscious prosumers try to promote themselves (Kucharska and Mikolajczak, 2018). The concept of personal brand was first introduced by Peters (1997). In the initial stage of formulating this concept, the idea of self-marketing appeared to concern mainly celebrities, politicians and business leaders (Schawbel, 2009; Shepherd, 2005; Nolan, 2015). Over time, it has proved to be of value for other groups as well, such as broadly understood managers (Evans and Hempstead, 2017; Kang, 2013), scientists, university lecturers (Gander, 2014; Kozinets, 2017), footballers (Kucharska et al., 2020), knowledge workers (Mládková et al., 2015; Kucharska, 2019a), librarians (Ahmad et al., 2016) and students who are in the early stages of their careers (Lee and Cavanaugh, 2016; Merdin, 2011). The rapid development of social media has significantly contributed to the increasing importance of the competencies of building a personal brand among the so-called "average" social media users, regardless of profession or age (Labrecque et al., 2011; Schawbel, 2009). Dutta (2010) suggested that under present conditions all people should become specialists in their own branding and consciously protect their reputation and personal network. Kucharska and Dąbrowski (2016) pointed to personal brand building as a strong motivation for sharing knowledge. Knowledge workers want to be seen as experts; they can gain such a reputation by sharing their knowledge, so indirectly, by building their own brand they can also significantly influence the creation of value of enterprises or economies. Similarly, artists and footballers develop specific sectors of the economy related to their activities by building their own personal brands (Kucharska et al., 2020). The indicated publications fill a research gap concerning the importance of personal brands in the value creation process in the network economy. Specifically, they point to the impact of personal brands on the performance of individuals and businesses, as well as the economic sectors they represent.

An important element in considering the contribution of personal brands to value creation in the network economy is the context in which the online brand community operates. Social media are an important communication channel. In 2019, 72.4% of the world's online population had access to social networks, compared to 69.6% in 2016 (Statista, 2020). This denotes a rapid development of this communication channel open to "all". This increase justifies the continually growing interest of scientists and practitioners in virtual communities' power of integrating people. Virtual communities, and especially online brand communities, are a special type of consumer communities defined as specialised, geographically unrelated human relations that are part of a structured set of social

relations between brand enthusiasts (Muniz and O'Guinn, 2001). The relations between members of virtual communities and brands, as well as the resulting community identification, are continually evolving and therefore are an exciting object of research (e.g., Zaglia, 2013; Wolter et al., 2016; Tuškaej et al., 2013, 2018; Manchanda et al., 2015, Coelho et al., 2018; Pedeliento et al., 2020). The key issues requiring exploration, in the context of creating value with the participation of the brand community, are mechanisms regarding the identification of consumers with the particular brand online and their influence on loyalty to this brand, and the mechanisms shaping relationships between consumers who join the same online brand community (Millán and Diaz, 2014). It is therefore important that research on online brand communities explains one of the most important motivations for joining online communities, supporting the thesis that consumers associated with a group are less radical in rejecting brands than those independent of a social group (Escalas and Bettman, 2005). In fact, brand enthusiasts simultaneously perceive social identity together with the brand community and its environment (Zaglia, 2013). In addition to social networking with community members and brands, previous research has shown that another important motivation for using social media is the self-presentation of network members (Seidman, 2013; Teichmann et al., 2015). In support of this claim, the findings of Orehek and Human (2017) suggest that social media platforms can be a useful outlet for self-expression, which is a form of self-affirmation, as originally defined by Ashfort and Mael (1989). The mechanisms of these relations are crucial in determining the intensity with which consumers identify themselves with a given brand (Millán and Diaz, 2014). Therefore, it is important to understand how these two dimensions affect the creation of value in social networks, to understand the motives that lead consumers to join online brand communities. Kucharska (2019b), and Confente and Kucharska (2020) indicated that the users' personal brands are an important part of the social media value creation process. These publications empirically verify both the motives and effects of user identification with online brand communities. Specifically, the authors have proven that users make use of commercial brands online to create their own personal brands, and this is, according to Ajzen's theory of "planned behaviour" (1991, 2002), the key motive for identifying a personal brand with a commercial brand online. The importance of this finding is all the more significant because it leads to a deeper understanding of the brand-consumer relationship in the social network, which is vital for optimising business models developed in this environment.

The new trend in the design of value circulation in the economy favours the development of the so-called sustainable models, which make it possible to create, analyse, manage, provide and communicate propositions of the value generated by enterprises to customers and other stakeholders by using the social capital of customers and other stakeholders so that the model is fed, in a way, by the involvement of all parties potentially interested in it, i.e. customers and other stakeholders of a given value network (Neumeyer and Santos, 2018; Piyathasanan et al., 2015; Schaltegger et al., 2016). The idea of a sustainable business model involving all value stakeholders perfectly reflects the concept of "sharing economy"1 and "wisdom of the crowd", (Heinrichs, 2013) where value is both shared and co-created (Heinrichs, 2013). Sharing economy offers consumers the opportunity to "avoid waste" or at least delay it by exchanging, swapping, giving away, hiring, trading, lending, and sharing goods" (Piscicelli et al., 2015, p. 21). Therefore, with these trends in mind, enterprises are interested in establishing and maintaining close relationships with customers in virtual reality (Phillips, 2015). The concept of online brand communities provides favourable opportunities in this respect. There is little research on the identification factors concerning social media users and online brand communities for developing business models. Digitalisation offers new paths for business development. Social media are significantly changing social communication standards, becoming an important part of the new business system. Kucharska (2019b) proved that commercial brands can effectively create value in the social network if they consider in their models the need to create a user's personal brand in relation to their reference groups.

Moreover, Moulard et al. (2014, 2015, 2016, 2020) and Kucharska et al. (2018b, 2020) noted that the authenticity of the personal brand is one of the key factors influencing the ability to create value by the particular personal brand. Therefore, the personal brand authenticity factor should be also included in the theoretical model of personal brands contribution to value creation in the network economy.

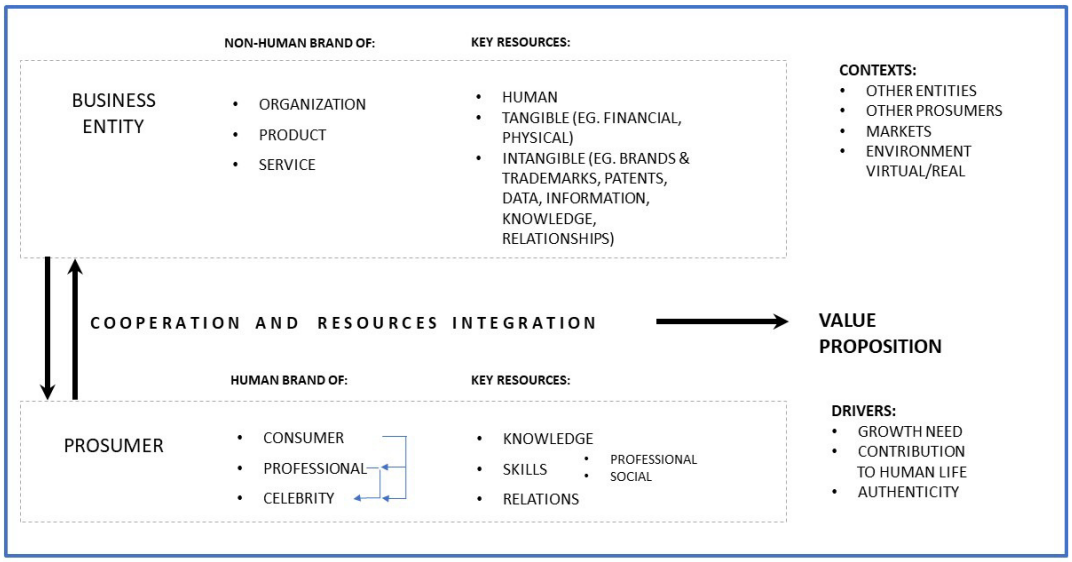

Fig. 1: Theoretical framework

Further Research

The most promising directions for further research relate to the personal brands' contribution to value creation. Also, personal brand equity studies are needed, especially in the context of such drivers as personal brand growth (how to measure it?), contribution to human life by such personal resources as knowledge, relations, and skills - professional and social. How to operationalize it to measure it? Moreover, authenticity (true-to-ideal, true-to-fact, and true-to-self, following Moulard et al. 2020). Personal brands are a significant phenomenon worth to be more-in depth investigated.

Summary

The above considerations lead to the formulation of an initial theoretical framework (Figure 1) aimed at determining the role of personal brands in the process of value creation in the network economy. Personal brands of prosumers (e.g., consumers, professionals, or celebrities) as well as brands linked to businesses (e.g., a product, service, or organization), based on available resources, and through cooperation and integration of resources with other prosumers or businesses, generates a value proposition. This proposed value is then evaluated in each business context by its potential beneficiary. The key drivers (important factors in value evaluation) include perceived authenticity, perceived contribution to everyday life and the constant need for growth and development. All these elements together are significant in terms of the value creation process. Personal brands play a special and important role because their awareness and significance are rapidly growing. Moreover, key resources such as knowledge (especially tacit knowledge), skills (professional & social), and relations, which are inherently linked to given individuals, so individuals who are aware of their strengths consciously shape their personal brands and consciously participate in the process of value creation by entering into alliances concerning cooperation and integration of resources with businesses and other prosumers who ensure maximization of mutual benefits. As a result, we can

observe how personal brands of human assets are dynamically moving from their place at the sidelines to the center of the modern economy.

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Energy Poverty in The Polish Village – Experts' Survey Report

Arkadiusz PIWOWAR

Wroclaw University of Economics and Business, Wrocław, Poland
arkadiusz.piwowar@ue.wroc.pl

Abstract

Poland faces serious challenges related to the provision of clean and affordable energy to its citizens, in addition, energy poverty is a significant problem, which most often affects the inhabitants of rural areas. In this paper, based on the analysis of primary data obtained through a survey of experts (agricultural advisors), the scope and causes of the phenomenon under study were identified. According to the research, almost half of the respondents assessed that energy poverty is a serious problem in rural areas in Poland. The research shows that the most important factor causing this problem is the cost of purchasing energy (the amount of energy price, distribution costs and taxes affecting the price). In experts' opinion, the problem of energy poverty is insufficiently emphasized in the media, in public and scientific discussions/debates.

Keywords: Energy Poverty; Rural Energy; Poland.

Introduction

The issue of energy poverty has been the subject of scientific considerations since the 1980s. Energy poverty has a multifaceted nature and in general it is the phenomenon of the inability of households to meet basic energy needs in their place of residence (i.e. an appropriate standard of heat and the possibility of supplying other types of energy to adequately meet the basic needs of household members) (González-Eguino 2015). The multifaceted nature of the studied phenomenon covers many economic, infrastructural, social equality, education and health problems (Bouzarovski and Petrova 2015; Middlemiss et al. 2019; Sareen et al. 2020). The issues related to energy poverty are an important element shaping the broadly understood quality of life (Maxim et al. 2016; Thomson et al. 2017; Zhang et al. 2019). The literature on the subject also emphasizes the existence of the so-called hidden energy poverty at the household level (Karpinska and Śmiech 2020). Due to material deprivation, problems related to technical infrastructure, etc., particular interest in the phenomenon of energy poverty occurs in the context of inhabitants of rural areas (Pereira et al. 2010; Kaygusuz 2011). The relatively high risk of exclusion covers farmers, retirees and pensioners living in the countryside.

In Poland, despite many positive socio-economic changes that have taken place in the last 30 years, the significant reduction of energy poverty remains a challenge in the field of social policy (Świerszcz and Grenda 2018; Chojnacka 2020; Sokołowski et al. 2020). Relatively low incomes, high and growing energy costs and low energy efficiency of buildings are the main causes of energy poverty in Poland. An additional problem with energy poverty is air pollution, which is mainly caused by heating homes with coal and other solid fuels (Rogus et al. 2019; Piwowar and Dzikuć 2019; Woźniak et al. 2020). The energy sector and energy policy in Poland must face fundamental changes in the near future related to climate change, security of supply and energy poverty (Ehrenhalt 2018; Kryk 2019; Piwowar and Dzikuć 2020). The problem of energy poverty within the countries of Central and Eastern Europe (CEE) does not only concern Poland (Kyprianou et al. 2019; Thomson et al. 2019; Teschner et al. 2020). The phenomenon of energy poverty in this area is not marginal, but it is often underestimated and treated superficially (Lenz and Grgurev 2017; Neacsa et al. 2020).

In Poland, the problems of energy poverty are mainly dealt with by independent research institutes, mainly the Institute for Structural Research (IBS) and the Institute for Sustainable Development (Szpor and Lis 2016; Rutkowski et al. 2018). The data from 2018 shows that this problem affects

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approx. 10 percent of households in Poland (3.35 million people). The reports of the Institute for Structural Research show that in 2016, 12.2% of the Polish population suffered from energy poverty. Therefore, this is a real problem, more and more often discussed, but still not sufficiently recognized, especially in relation to households of farmers. To date, there is no detailed research at the microeconomic level in the literature on the subject, which would attempt to characterize the energy poverty of this group of households. However, the results of previous studies of the general level of energy poverty indicate that in Poland this problem mainly affects inhabitants of rural areas. The available IBS reports show that every fifth person living in the countryside is struggling with energy problems. This is related to economic reasons (lower incomes of population in the countryside compared to city dwellers), and also to the fact that the villagers live in single-family houses, often of large square metrage and low energy efficiency. In addition, many people living in rural areas have no access to the heating and gas networks.

The issue of energy poverty is one of the most important challenges of contemporary economic and social policy in Poland (Piwowar 2020). However, the problem of energy poverty in the context of rural areas has not been of particular scientific interest so far. The necessity to carry out the research covering this area has been signalled in many studies (Świerszcz et al. 2019; Piwowar and Dzikuć 2020). The aim of this study was to find out the position of people specialized in a particular field (agriculture) regarding the problem of energy poverty in rural areas in Poland, including in particular the scope and causes of the studied phenomenon.

Material and Research Methods

This article uses the results of own research carried out as part of a research project financed by the National Science Centre in Poland. The project included three-stage empirical research based on original questionnaires:

- quantitative surveys of farmer's households (size of the test sample – 480 farmers' households, surveys representative in the scale of Poland);
- qualitative research (size of the test sample – 60 farmers' households, surveys among the holdings from the first stage);
- qualitative expert's studies (size of the test sample size – min. 30 experts).

The primary data was obtained by means of a survey research conducted by direct interview with the use of a questionnaire. The questionnaire contained a total of 22 questions, of which 7 demographics and 15 substantive questions. The demographics questions were aimed at assessing and verifying the experts, including their education, experience and knowledge regarding the research problem. The substantive questions concerned opinions, declarations and assessments of various aspects related to the phenomenon of energy poverty. Responses were made on nominal or ordinal scales (usually 5-point). Some of the questions were open-ended, in which experts were asked to write down their opinions on a particular topic. Selected results from this study are presented in this paper.

This study was based on a survey conducted among 31 experts (agricultural advisors), including at least four experts dealing with low-emission agriculture in each of the six Macroregions in Poland. Due to the nature of the research, the time range of analyses was related to 2018-2025. The structure of the respondents was dominated by women (19 people), and 24 people had higher education related to agriculture (agronomy, animal husbandry, agricultural technology). Taking into account professional experience, it is worth emphasizing that 20 respondents could boast over 20 years of professional experience in the field of agriculture and rural areas.

The research technique and the method of sampling (random selection within all macro-regions in Poland) ensured in-depth analysis of the issue under study, taking into account the spatial diversity of

rural areas in Poland. Agricultural advisers who were experts in the studied subject matter know very well the behaviour and actions of farmers. Employees of the centres support farmers with their advice, respond to the information needs of agricultural communities and the main priorities of rural and agricultural development.

Results and Discussion

The research has undertaken, among others, the problem of the occurrence of energy poverty in Poland. The respondents were asked for their opinion on the existence of the problem of energy poverty in three areas: in Poland in general, in rural areas in Poland and in farmers' households (Fig. 1).

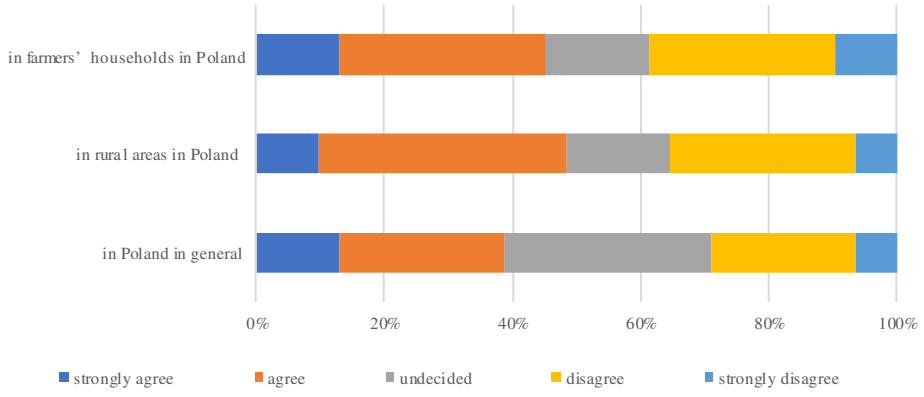

Fig. 1: The respondents' declarations on the problem of energy poverty in Poland

Source: own study based on questionnaire surveys (N=31)

As the analyses show, positive answers ("definitely yes" and "rather yes") were most often related to rural areas in Poland (48.4% of the answers in total). Slightly less, according to the respondents, this problem occurs among farmers' households (45.2% in total). According to 38.7% of respondents, this problem occurs throughout the country.

It is worth emphasizing that a similar percentage of positive answers was recorded when asked about the problem of energy poverty in rural areas, which the respondent represented and/or knows its conditions in terms of agriculture. 15 positive answers were given, 16 people answered "no".

The respondents were also asked about the main causes of energy poverty in rural areas in Poland (Fig. 2). The respondents were asked to rank the factors according to the degree of importance, assigning them numbers from 1 to 5, where 1 is the most important factor and 5 the least important.

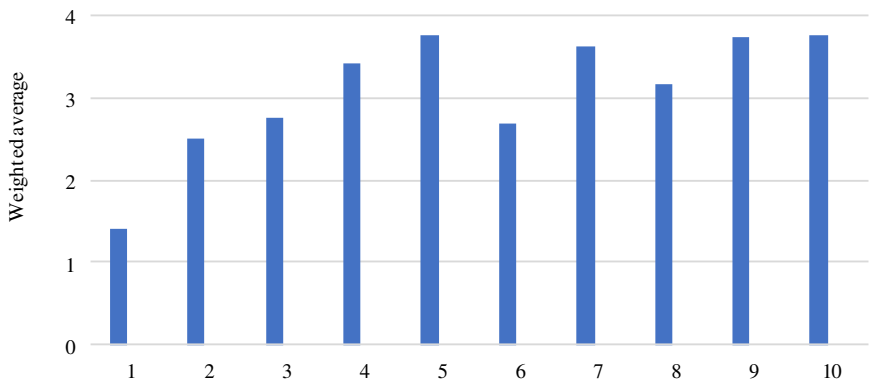

1	The amount of energy prices, distribution costs and taxes affecting the price
2	Technical condition of residential buildings
3	Technical condition of livestock buildings
4	The usable floor area of a dwelling
5	Family
6	Increasing dependence on electricity related to, among others, the growing number of electrical appliances
7	Low energy class of devices consuming electricity in household equipment
8	Low energy class of devices consuming electricity on farm equipment
9	No actions (activities) in households for energy saving
10	No actions (activities) on farms for energy saving

Fig. 2: Respondents' declarations on the main causes of energy poverty in rural areas in Poland

Source: own study based on questionnaire surveys (N=31)

According to the respondents, the most important factor is "the amount of energy prices, distribution costs and taxes affecting the price" (weighted average was 1.41). The technical condition of residential buildings (weighted average was 2.5) and livestock buildings (weighted average was 2.76) were also classified as important causes of energy poverty in rural areas in Poland. Moreover, the respondents pointed to the increasing dependence on electricity related to, among others, the growing number of electrical devices (this factor was the third most important factor in the opinion of the respondents, the weighted average in this case was 2.68).

The respondents were also asked whether the issues related to energy poverty in rural areas in Poland were sufficiently emphasized in various forms of communication and discussions. The results of this part of the analysis are presented in Tab. 1.

Table 1: Experts' declarations on the sufficient emphasis on the topic of energy poverty in rural areas in selected media

Specification	**Definitely yes**	**Rather yes**	**Hard to tell**	**Rather not**	**Definitely not**
	[%]				
Legal regulations	0	19	26	42	13
Scientific publications	3	29	19	39	10
Popular science papers	6	16	23	42	13
Training programs for farmers	10	29	6	45	10
Discussions, public debates	3	23	16	48	10

Source: own study based on questionnaire surveys (N=31)

In almost all of the above-mentioned media, the respondents agreed that in public discourse, scientific and popular science works, etc., the studied phenomenon is not emphasized enough. Experts marked the most positive answers ("definitely yes" and "rather yes") during training courses for farmers (39% of answers in total).

Summary

The study was based on the analysis of data using the direct interview method among experts working in agricultural advisory centres. This approach attempts to explore and describe the scope and causes of energy poverty in rural areas in Poland. One of the first conclusions that can be drawn from the analysis of the information obtained from the survey is the fact that almost half of the respondents considered the problem of poverty in rural areas in Poland as existing (9.7% answered "definitely yes"; 28.7% answered "yes"). The percentage of positive answers was definitely higher than to the question about the overall occurrence of this problem in Poland. According to experts, the biggest problem of maintaining an adequate heat standard and supplying other types of energy to adequately satisfy basic needs occurs in rural areas.

On the basis of the conducted interviews, the main reason for this phenomenon can be distinguished – the amount of energy prices, distribution costs and taxes affecting the price. Moreover, three other factors turned out to be important: the technical condition of residential buildings; increasing dependence on electricity related to, among others, the growing number of electrical appliances and the condition of livestock buildings. According to the respondents, considerably less importance was attributed to factors such as: the size of the family; no action (activity) in households/farms for energy saving; usable floor space of a dwelling; low energy class of electricity consuming devices for household/agricultural equipment.

Summarizing expert opinions on the subject matter under study, it is worth emphasizing that, according to experts, these issues should be subject to a wider public debate. Conducting a deeper public debate and better shaping the social policy are undoubtedly challenges in the studied subject matter. Furthermore, the expected increase in prices of CO_2 emission allowances, the COVID-19 pandemic and the related economic crisis may aggravate the problem of energy poverty in Poland, which will require additional programs and funds to support people (families) affected by energy exclusion.

Acknowledgment

This study was conducted and financed in the framework of the research project "Socio-economic, environmental and technical determinants of the energy poverty in rural areas in Poland", granted by the National Science Centre in Poland, program OPUS, grant No. 2018/31/B/HS4/00048.

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Contribution to the Implementation of Unmanned Traffic Management System (UTM) Using Distributed Fuzzy Control

Augustin SEMENESCU [1], Marius MINEA [2], Ilona Mădălina COSTEA [3], Ionut CHIVA[4]

[1] Department Engineering and Management for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; augustin.semenescu@upb.ro
[2] Department Telematics and Electronics for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; marius.minea@upb.ro
[3] Department Telematics and Electronics for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; ilona.costea@upb.ro
[4] Department Telematics and Electronics for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; cosmin377@gmail.com

Correspondence: augustin.semenescu@upb.ro

Abstract

The purpose of this article is to provide a compliance monitoring solution in an unmanned aerial traffic management system (UTM), using fuzzy logic. Fuzzy logic, which is based on the theory of fuzzy sets, allows the linguistic description of the laws of command, operation and control of a system. In working with complex and nonlinear systems it can often be observed that with the increase of their complexity a diminution of the significance of the details in the description of the global behavior of the systems is observed. A detailed description of the behavior of a system is often not only unnecessary, but even counterproductive. One of the consistent arguments for approaching by the methods of sets and vague logics the description of the laws of command and operation of systems is that of the ease of use of linguistic expressions, of the use of words. Finally, we will propose a TMU architecture for the control of the trajectories of unmanned aircraft vehicles (UAS).

Keywords: Unmanned Aircraft Vehicle, System Traffic Management, Fuzzy Logic, Trajectory Monitoring

Introduction

In recent years, the use of drones / unmanned aircraft system (UAS) has increased significantly in all directions - commercial and personal applications, with millions of aircraft registered in Europe and the United States alone. Predictions show a steady increase, with FAA estimates suggesting that the number of unmanned aircraft registered could double by 2025 [1]. This rapid increase in the traffic of unmanned aircraft used more and more frequently in the commercial area due to the COVID-19 pandemic, brings new challenges. As airspace capacity is limited [2] and increasing the level of use of unmanaged air traffic can lead to insecurity and potential critical situations. For these reasons, it has become necessary to develop unmanned aerial traffic management system (UTM) architectures in order to ensure the maximization of the use of airspace, but also the safety of Critical Infrastructures [3].

The principles that currently apply to radio-electronic (radar) research can also be applied to UTM. Actions of detection, interception, analysis of communications and electromagnetic radiation and especially the ability to determine the trajectories of drones evolving at high speeds in an uncontrolled environment, measurements can often be severely disturbed and unable to provide relevant data to UTM systems. . The use of classical methods, based on Boolean logic, which are not able to operate with imprecise notions, can provide erroneous data, which can jeopardize the success of detection

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actions. Therefore, it is necessary to use methods that allow great flexibility in describing input variables, that exceed the limitations imposed by Boolean logic and that allow logical reasoning with multivalent logic variables capable of taking any value in the range [0,1].

Fuzzy logic, which is based on the theory of fuzzy sets, allows the linguistic description of the laws of command, operation and control of a system. In working with complex and nonlinear systems it can often be observed that with the increase of their complexity a diminution of the significance of the details in the description of the global behavior of the systems is observed. A detailed description of the behavior of a system is often not only unnecessary, but even counterproductive. One of the consistent arguments for approaching by the methods of sets and vague logics the description of the laws of command and operation of systems is that of the ease of use of linguistic expressions, of the use of words.

Although such an approach may seem inappropriate, it often proves to be superior and much less laborious than a rigorous mathematical approach. The main argument in favor of fuzzy set theory, which is a generalization of classical set theory, is to excel in operating with vague, vague notions.

In classical set theory, a clear distinction is made between the notion of belonging and the notion of non-belonging of an object to a given set. Thus, there is no partial membership in a set and no means of expressing such a situation. For example, a tree may belong to a set called the "biosphere," while a rock may not belong to that set. We will continue to call such sets crisp sets. The theory of vague sets highlights the fact that there are extremely few rigid sets. For example, defining a rigid set called the "biosphere" may have difficulty including the notion of "coral," which is often considered a lifeless limestone. The fuzzy approach to such a problem is not an exception, by eliminating the paradoxes that may arise from the dichotomy of strict membership or non-belonging to a certain set. Fuzzy logic admits the partial belonging of an object to a set; thus, the gradual transition between total membership in a given set and total non-membership in the same set is allowed. Partial membership in a certain set simultaneously implies partial non-membership in that set.

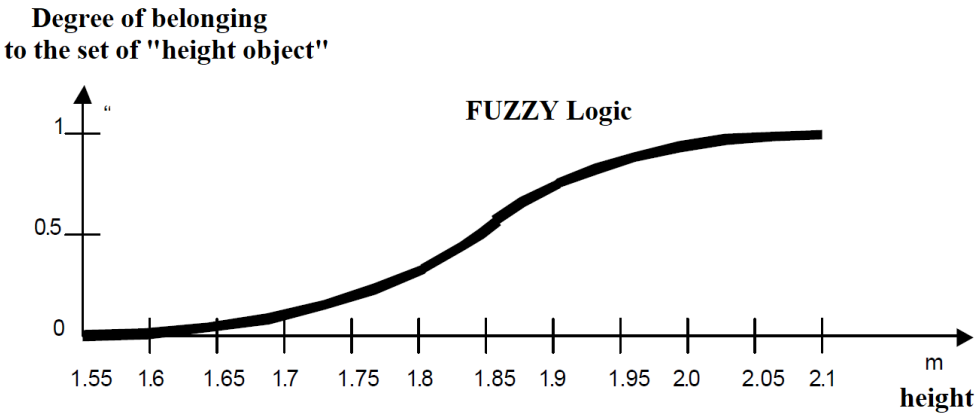

Figure 1: Representation Fuzzy logic that allows partial membership in the defined set, being characterized by the gradual transition from "low" to "high".

The generalization characteristic of the classical set theory is given by the fact that the fuzzy set theory allows both total membership and total non-membership (of course, not simultaneously). It is obvious that we can use fuzzy logic to implement rigid systems (determined by rigid sets), but the benefit of such an approach would be negligible. The force of fuzzy systems is manifested in transition situations, in the areas of partial belonging of an element to a certain set. Traditional logic recognizes only complete membership and complete non-membership and requires that an assertion be either true or false. Fuzzy logic allows the existence of partial truth or falsehood. Figure 1 illustrates the difference.

Given the premise that the transition from false to true must be gradual and that an assertion can be both partially true and partially false, a different way of approaching command and control issues must be constructed. We agree, in principle, that the world around us cannot be perceived only in "white" and "black." In fact, in most cases, the surrounding world presents itself in a multitude of shades of "gray", which, however, in practice, we assimilate with two values: "white" and "black". Fuzzy logic not only accepts shades of "gray", but also provides us with powerful tools to operate with these shades in a proper way.

Proposed Solution

Following the collaboration between the departments of Engineering and Management for Transports and the Department of Telematics and Electronics for Transports, the Faculty of Transports within University “Politehnica” of Bucharest (UPB), resulted a UTM system, based on distributed fuzzy logic control.

Currently, drone detection systems are in full development, using acoustic fingerprint [4], [5], [6], radar detection [7], [8], radio communication detection [9] and video detection [10], [11], [12]. For drone trajectory management systems, GPS detection can be used, as well as anonymous detection of communications used by the drone on Wi-Fi, by detecting the MAC address specific to each drone [13], [14].

Rapidly growing interest in the development of intelligent systems a led to the multiplication of sensor types, which ensures an increasingly rich perception of the surrounding reality, allowing the description and solving some of the most varied problems. Use of new types of sensors and actuator leads to better quality, productivity, and safety of processes. The general trend is a rapid increase in the number of measurements and actions in controlling complex processes. Therefore, processing power it must also grow. Developing a processor that perform all measurements, make all decisions, and perform all actions control is no longer a realistic approach. Thus, data collection and control of actions must be both logically and spatially distributed. This one solution raises new problems in sharing information or finding solutions cooperation. The distribution of components should, as far as possible, ensure decentralization of computing capabilities without substantially reducing reliability global system. In particular, communication between components should limited; otherwise the performance could decrease dramatically. The use of communication buses ensures the endowment of intelligent components with the possibility of digital communications, which can be considered as a first level of intelligence. In addition, smart components must be able to to process locally the data addressed to them. This second level of intelligence is needed to reduce the exchange of information as long as smart tools produce increasingly complex data. This one the approach should reduce the flow of data between various components and in at the same time, it should ensure a uniform and homogeneous treatment of the data that they come from various sources. Thus, distributed tools must be able to perform complex functions, but they must also communicate and communicate. work with other equipment. These capabilities are called interoperability and collaboration between systems. To achieve the concepts described above, access to means is necessary which allow the integration of intelligence at lower levels. Due to the ability to represents gradual information in a way familiar to human thinking, fuzzy logic is a powerful tool for integrating intelligence. In particular, the way the connection between linguistic terms and numerical quantities allows implementation of high-level functions, such as data fusion and processes of complex decision.

Most implementations of *distributed fuzzy systems* are based on interacting distributed components that have a fuzzy and rules base which communicates with other components by numerical values. The most classic solution for coding a fuzzy system is the use of a high-level language. Another solution is to use dedicated hardware such as fuzzy processors. None of the solutions provide an easy way to implement the systems fuzzy: the first because it does not have methods for distributing applications in many processors, and the second because the hardware solutions require enough long time for development.

The problem is to define distributable fuzzy components, such as fuzzy sensors or fuzzy inference components that are connected to a bus communication. Depending on the configuration, a fuzzy component implements one or several combinations of fuzzy processes, known as real-fuzzy transformation (TRF), inference and fuzzy-real transformation (TFR).

Theoretical Aspects on Fuzzy Components

Tracking of targets represents the forecast of the possible trajectories of the target as a function of its previous positions. The prediction accuracy depends on how much precisely the previous and current positions of the object were measured. Unfortunately, due to parasitic echoes generated on the radio locator screen, the limitations of algorithms related to processing the signals coming from different sensors, the position of the targets can be determined with approximation. The values measured can enhance multiple variable features and may be constrained by different initial conditions depending on the flight angle and on the position of the target towards the radar.

Research presented in articles [15] and [16] on the use of fuzzy logic to track the trajectory of a target has had a major impact on research and academia. The stability of the fuzzy controller plays an important role and has been thoroughly investigated.

In [16] we presented the mathematical algorithms for tracking the trajectory using fuzzy logic, below we will present only the results obtained by demonstrating the superiority of fuzzy logic over the Kalman filter. In the first situation (figure 2), a target accelerates rapidly and executes rapid turns. As it can be observed, the Kalman filter performs several erroneous actions in series, which increases the displacement between the current position and the predicted one by accumulating the errors from one scan to another. This low rate of response to unexpected changes in the dynamic of flight is due to the time required by the Extend Kalman estimator's response (usually during a few scans). For the target executing a 360° turn over six scans, a delay of two scans may represent a 120° angular deviation. Thus, the tendency of the Kalman system to overestimate the next position of the target is not surprising, thus resulting in loss of the target.

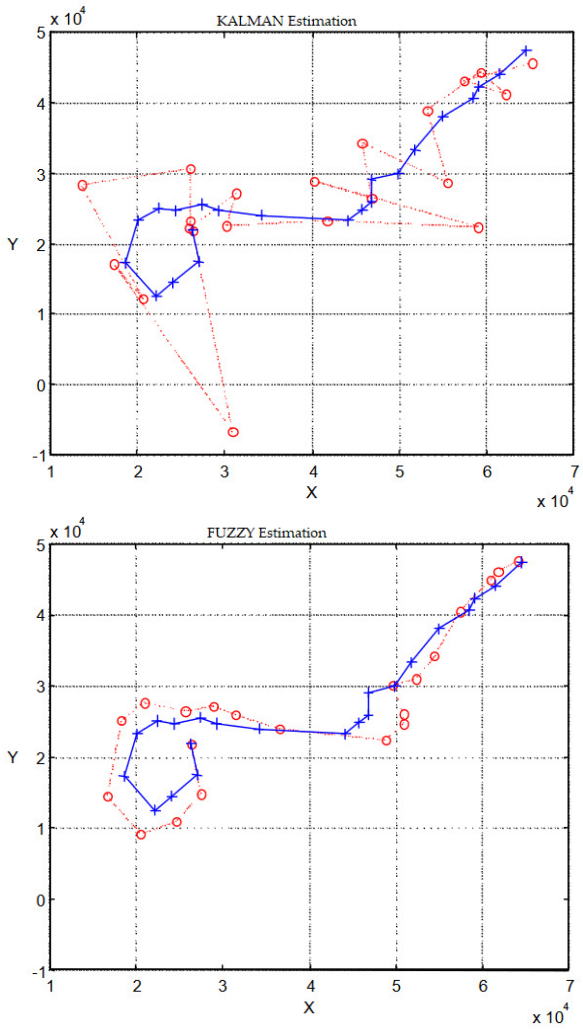

Figure 2: Kalman filter estimation (red – real target position, blue – estimated target position) left image and Fuzzy filter estimation (red – real target position, blue – estimated target position) right image.

Figure 3 show the performances of the two systems in another situation. A target is being tracked on an approximate linear trajectory with constant speed. There are no significant losses of the target. It can be noticed that the predictions of the Kalman system are placed on a curve in a zig-zag pattern. The system is thus dependent of noise, even if the noise level is minimum.

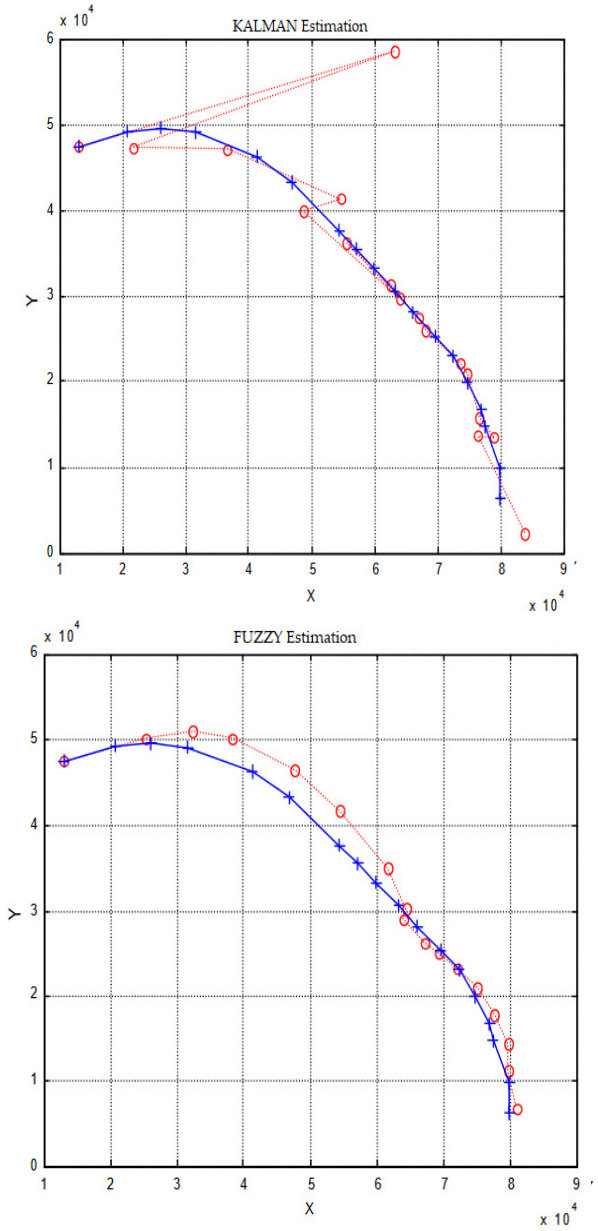

Figure 3: Kalman filter estimation (red – real target position, blue – estimated target position) left image and Fuzzy filter estimation (red – real target position, blue – estimated target position) right image.

Application with Fuzzy Sensors Distributed for Measurement Distance

Using the results presented above [15], [16], in this article we propose a new algorithm for estimating the trajectory using *distributed fuzzy control*.

The problem is to obtain a symbolic description of the position of an object, based on two distance measuring sensors, c1 and c2, as in figure 4. The goal is to characterize the object detected by its position and orientation toward a direction through via two fuzzy subsets. The sets of linguistic terms

are respectively {close, quite_close, quite_far, far} and {left, front, right}. To obtain the distances d1 and d2, two intelligent sensors with ultrasound. Each smart sensor is equipped with two transducers the same resonant frequency. The detection principle is based on modulation linear of the transmitter. The receiver transducer receives a signal modulated in frequency. The difference between the transmitted frequency and the received one, marked with a face, is proportional to distance. This difference is obtained after multiplication the two signals and the application of a filter goes down. To obtain the distance, the frequency must be obtained fa. For this, a measurement was implemented of the signal period using microprocessors.

Smart sensors can be turned into fuzzy sensors by simply applying FACCT language, without the use of additional hardware. Every The fuzzy distance sensor describes its measurement as a fuzzy subset over lexical set {close, medium, far}. A third cell is used to perform the aggregation of the two distances, which leads to obtaining a virtual sensor for obstacle detection. The aggregation is performed by two different sets of rules (see figure 5), one being associated with the position, and the other orientation. The configuration of fuzzy cells is described in figure 6. For fuzzy cells 1 and 2 no specificity issues. They are based on the same text files FACCT configuration. Each cell first performs the fuzzy symbolic transformation of the measurements. The resulting fuzzy subsets are transmitted cell 3, whose I2C address is 96.

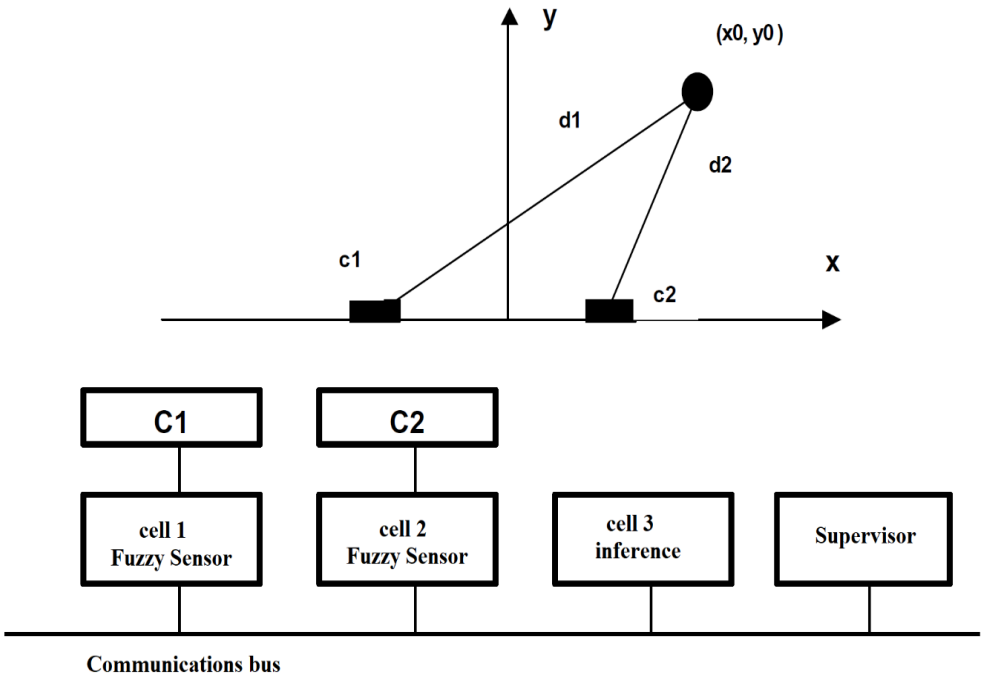

Figure 4: Description of the position of an object, based on two distance measuring sensors.

THE BASIS OF RULES FOR POSITION

	POSITION	CLOSE	MEDIUM	FAR
d2	CLOSE	CLOSE	QUITE_CLOSE	QUITE_FAR
	MEDIUM	QUITE_CLOSE	QUITE_FAR	FAR
	FAR	QUITE_FAR	FAR	FAR

THE BASIS OF RULES FOR GUIDANCE

		d1		
	ORIENTATION	CLOSE	MEDIUM	FAR
d2	CLOSE	FRONT	RIGHT	RIGHT
	MEDIUM	LEFT	FRONT	RIGHT
	FAR	LEFT	LEFT	FRONT

Figure 5: The aggregation is performed by two different sets of rules.

For example, suppose d1 = 90 m and d2 = 230 m. By definition to the linguistic variable distance in figure 5, their respective fusions are:

j2 (d1) = {0.3 / Close, 0.7 / Medium, 0 / Far}
and
j2 (d2) = {0 / Close, 0.2 / Medium, 0.8 / Far}

The proposed operators give for h and i:

h = {086 / Left, 0.14 / Front, 0 / Right}
i = {0 / Close, 0.06 / Quite_close, 0.38 / Quite_far, 0.56 / Far}

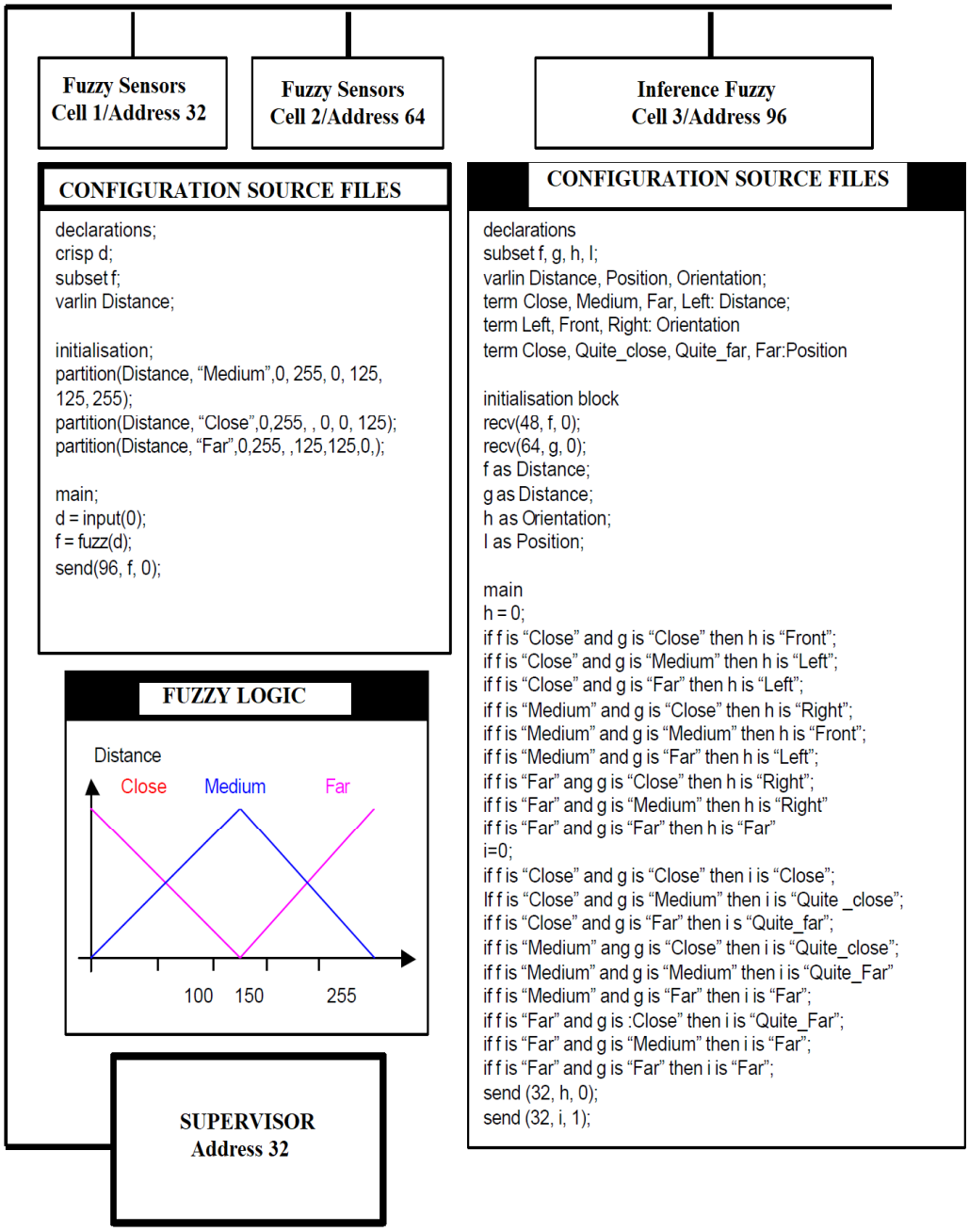

Figures 6: Configuration of fuzzy cells system.
As in the previous example, these results illustrate only the functionality offered by fuzzy cells.

Conclusion

After explaining the concept of distributed intelligent control, the concept of fuzzy components and their definition in terms of hardware and software was presented. The simple way to implement fuzzy cell-based systems has been described. The configuration of the cells in the network is done by a specific language, called FACCT. FACCT files can be compiled by fuzzy cells using a resident

compiler. The cells are implemented on the structure of an INTEL C100 microcontroller. The advantages of using a network of fuzzy components do not consist only in those offered by distributed systems. It is found that fuzzy cells are easy to configure, but at the same time provide high-level functions, such as fusion and decision-making processes. The network also allows the addition of components to increase system performance. The added components do not necessarily have to be fuzzy components, because the network supports several types of data. There is also the possibility to create virtual components, where cell 3 can represent a virtual position sensor.

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Strategic Decision Support - Integrated System for Support and Management of Crisis Interventions

Augustin SEMENESCU, Marius MINEA, Ilona Mădălina COSTEA and Ionut CHIVA

[1] Department Engineering and Management for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; augustin.semenescu@upb.ro
[2] Department Telematics and Electronics for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; marius.minea@upb.ro
[3] Department Telematics and Electronics for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; ilona.costea@upb.ro
[4] Department Telematics and Electronics for Transports, University "Politehnica" of Bucharest, 060042 Bucharest, Romania; cosmin377@gmail.com
Correspondence: augustin.semenescu@upb.ro

Abstract

The general objective of the project, presented in this article, is to create a hardware and software platform to provide support in substantiating decisions and coordinating activities in crisis situations. Thus, the main objective is to make a prototype module for "agent-based modeling and simulation of pedestrian crowds in panic situations", to which will be added modules for "Detection of the escape route from a scene using Deep Learning and Voronoi networks" and "remote monitoring system of the physiological parameters of the intervention teams". To achieve this support system for making strategic decisions, we propose the implementation of a complex hardware and software architecture of C5ISR type (command and control, communications, computers, cyber, intelligence, surveillance and reconnaissance).

Keywords: strategic decision systems, panic situation, pedestrian crowds' model, Voronoi cell.

Introduction

In the study of the design process of strategic decision support systems, the notion of system is essential. A system is a set of interdependent elements (components) between which a dynamic interaction is established, based on predetermined rules, to achieve a certain goal [1]. According to systems theory, any military body is a system. Depending on how detailed the analysis is, a system has nine features [2], [3].

Each system accepts several inputs, processes the information provided by them and sends the results to the outputs and from here, in the environment in which the system evolves. The limits of the system separate it from the environment in which it manifests itself. Through the interfaces a system communicates with the environment. A system exists only in the environment that contains it and will interact with it through the data and information received.

A system is made up of components. These, also called subsystems between which various relationships are established, can consist of indivisible component elements or groups of aggregate elements. The design of the subsystems is very important because, if the system as a whole no longer functions properly, its "repair" should be possible by simply replacing the subsystem that caused the failure. System limitations refer to the constraints imposed by its parameters (eg storage capacity or speed) according to which the system must operate in order to achieve the purpose for which it was achieved.

There are some important notions regarding the study of the system. Decomposition is very useful when trying to understand how a complex system works. It will be broken down into simpler

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subsystems, the structure of which can be analyzed and understood in turn, without taking into account interference between subsystems [4]. Modularity derives directly from decomposition and facilitates the process of troubleshooting the system. Coupling refers to the fact that the systems are interdependent although they should be as independent as possible. Thus, the failure of a subsystem would lead to the chain damage of all subsystems and, ultimately, the malfunction of the main system. If independence is ensured, only the defective component can be replaced, making the troubleshooting and repair process much shorter. Cohesion is the extent to which a subsystem can perform a single function [5].

The information system is based, as the name implies, mainly on information. It comprises all the internal and external information used within the organization as well as the data on which it was obtained, the procedures and techniques for obtaining information (starting from the primary data) and disseminating the information, as well as the staff involved in collecting, transmitting , data storage and processing. The information system refers not only to the way in which the tools provided by T&C are used but also to the way in which people interact with technology in an institution. In the military field, the information system ensures the connection between the decisional and the operational system. An information system can be represented as in figure 1:

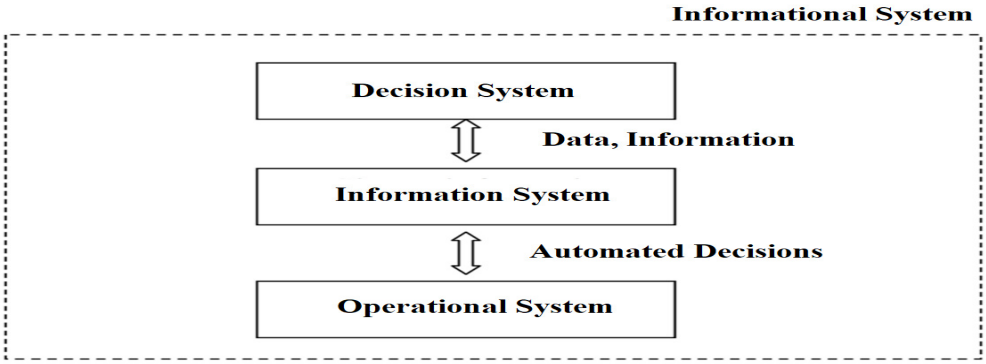

Figure 1: The relationship between computer system and information system.

The functions of an information system are the following:

• to collect information from the operational and decision-making systems as well as the information coming from the external environment.
• to memorize this information as well as information resulting from its processing.
• to ensure the access to the memory in order to communicate the stored information.
• process information at the request of the operating system and the management system.

The notion of computer system is related to the computerization of the organization's activity, therefore to the use of hardware equipment and software products for organizing and managing information [6]. The use of computers in the information system (IS) of an organization leads to the definition of the Automated Information System (AIS) component - which includes only the work done with the help of computers. From this point of view, the SI - SIA relationship can be represented as in figure 2.

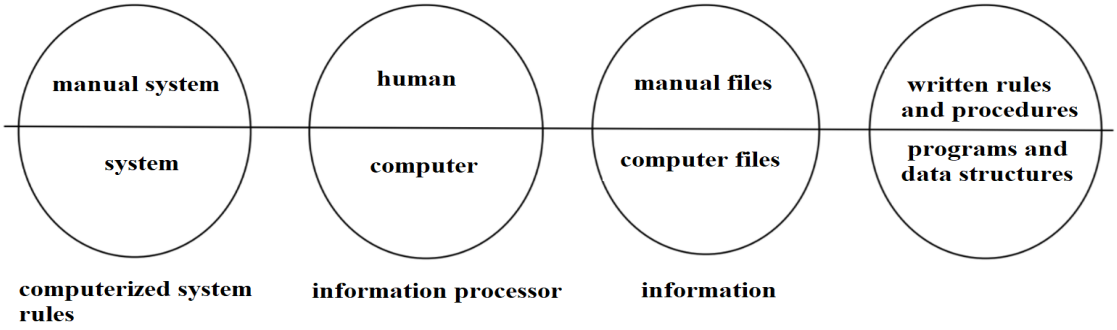

Figure 2: SI - SIA relationship.

An information system is an integrated user-computer system that provides information to support operational and management activities in an organization, using hardware and software, manual procedures, a database, and mathematical models for analysis, planning, control and decision making [7]. The main objective pursued by the introduction of an information system is to ensure the management with real and timely information, necessary for the substantiation and operative elaboration of decisions. The elaboration of the information systems imposes the modeling of the information system of the organization with the help of a formalism through which the reality within the information system can be represented as suggestively and faithfully as possible. For organizations of low complexity, computerization can mean the realization of a single computer application also referred to as a computer system [8]. Complex computer systems can be broken down into subsystems, which in turn can be broken down into applications for certain categories of users, which in turn can consist of one or more programs written in various programming languages as shown in Figure 3.

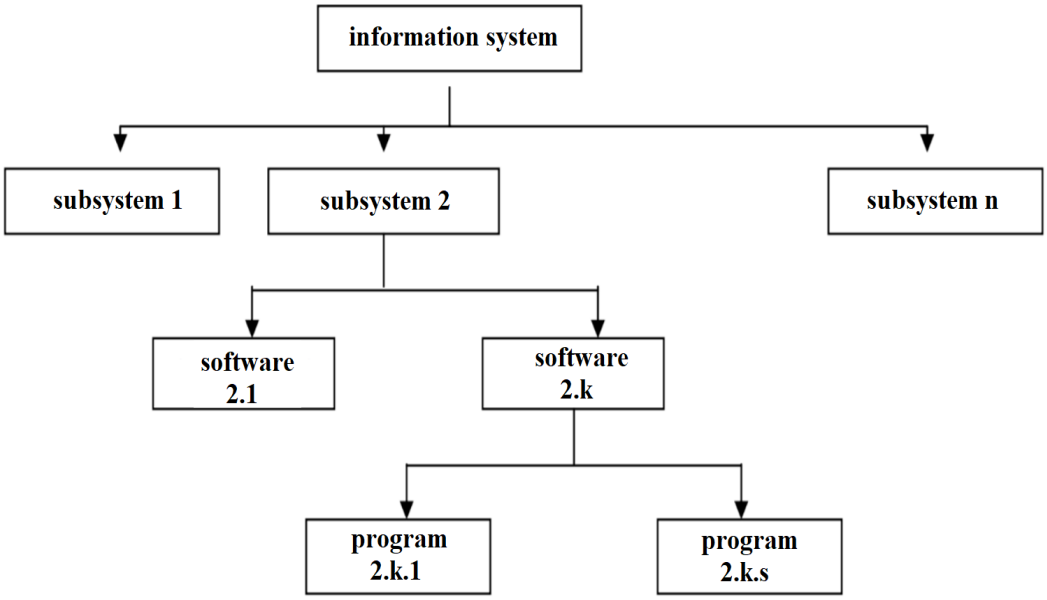

Figure 3: Computer system, subsystems, applications, programs.

Computer systems, subsystems and applications are called computer products and software products. A computer product consists of programs that access the database and the necessary documentation for the use and maintenance of the programs. These are based on methodologies and require the completion of stages starting with the specification of requirements and ending with their implementation,

operation, and maintenance [9]. The military information system is a structured set of functionally intercorrelated elements to automate the process of obtaining information and to substantiate decisions [10]. The information system is included in the scope of the information system if within the information system there will be a series of activities that cannot be automated.

Proposed Solution

Agent-based modeling and simulation of pedestrian crowds in panic situations
Motivation

The increasing occurrence of moments of panic during mass events motivated the study of the impact of panic on crowd dynamics and the simulation of pedestrian flows in panic situations. The lack of understanding of moments of panic continues to cause hundreds of casualties each year, not to mention methodological studies of panic behavior capable of predicting crowd dynamics [11]. Under these conditions, there are thousands of casualties and twice as many accidents caused by the crowd around the world, despite efforts to control the crowd and many security forces. Pedestrian crowd dynamics are generally predictable in high-density crowds, where pedestrians cannot move freely, self-propelled interactions develop between pedestrians. Although each pedestrian has personal preferences, the dynamics of the movement can be shaped as a social force of the crowd. The corresponding forces can be controlled for each individual and represent a different variety of behaviors that can be associated with panic situations [12], such as avoiding danger, crowding, and pushing[13]. In this software development, we use an agent-based model for pedestrian behavior in panic situations to predict collective human behavior in a dynamic crowd situation. The proposed simulations are a practical way to reduce fatalities and minimize evacuation time in panic situations. Moreover, we introduce a push behavior module, which will lead to an almost real pattern of crowd dynamics.

Theory and Approach

The proposed model will be presented as an extension of the work done by Helbing. The model proposed by Helbing is for a person who is part of a crowd and lives in a virtual world. This individual, who will henceforth be called the agent, is the element that will incorporate the intelligence of the system. Therefore, this approach is based on the collective behavior of individual intelligent agents, from whose interactions a group behavior and a dynamic of agents' self-organization will emerge.

Model proposed on agents

The microsimulation model proposed by Helbing, uses a mixture of physical and socio-psychological forces to simulate the dynamics of the crowd. Our goal will be to introduce (1) a panic parameter that affects agent behaviors, (2) a mechanism for spreading panic in crowds, and (3) auxiliary states for modeling push / push behaviors that do not belong to the Helbing model, being the contribution of the authors of the article [14], [15].

The novelty equation consists in planning two parts given by:

$$m_i \frac{dV_i(t)}{dt} = m_i \frac{V_i^o - V_i(t)}{\tau_i} + f_i$$

(1)

$$u_i(t) = m_i \frac{e_i(t)}{\tau_i}$$

(2)

where u_i(t) is the output of the control and m_i and τ_i are the mass and the constant agent, respectively. The interaction forces are given by:

$$f_i = \sum_{j(\neq i)} f_{ij} + \sum_w f_{iw}$$

(3)

where $e_i(t) = V_i0(t) - V_i(t)$ represents the error between the desired speed $V_i0(t)$ and the actual speed, $V_i(t)$. From eq. (2), we can see that the Helbing planning equation is the proportional representation of control.

Push / Push Pattern

The pushing or pushing behavior is one in which an agent tries to force a path through a crowd. This will require changing the modeling of the planning equation. To allow an agent to push, the planning part must overcome the interaction forces. To achieve this effect, we add an integrator to the planning part, resulting in a new acceleration equation that can be represented as a proportional integral control, this being represented in figure 4.

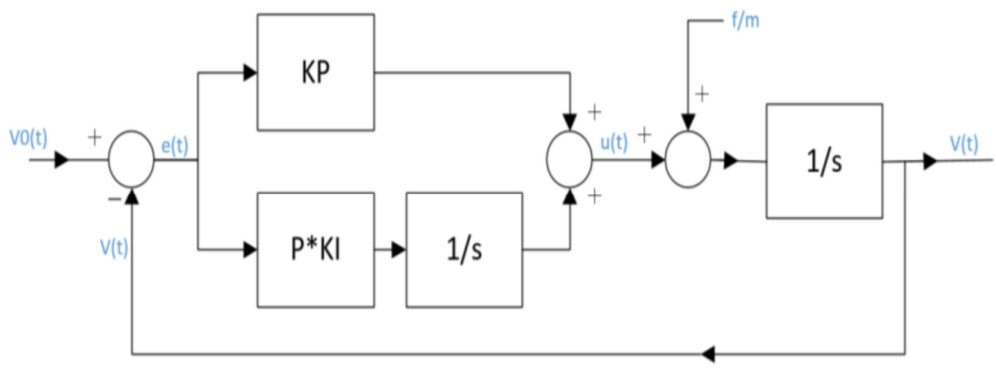

Figure 4: Speed control represented by the proportional values of the integrator.

In this context the equations are:

$$\frac{dV_i(t)}{dt} = u_i(t) + \frac{1}{m_i} f_i$$

(4)

$$u_i(t) = k_{pi} e_i(t) + f(P_i) k_{Ii} \int_0^t e_i(t) dt$$

(5)

$$f_i = \sum_{j(\neq i)} f_{ij} + \sum_w f_{iw}$$

(6)

$$e_i(t) = V_i^0(t) - V_i(t)$$

(7)

$$V_i^0(t) = \left(f(P_i) V_{i\,max} + (1 - f(P_i)) \left|V_i^0(0)\right|\right) \overrightarrow{V_i^0(t)}$$

(8)

where V_{max} is a scalar that represents the maximum speed that an agent can reach and $|V_i^0(0)|$ represents the initial speed (before panic) or the speed of the agent in relaxed situations. Moreover, $V_i^0(t)$ is a normal vector that represents the desired direction of the agent. The panic parameter $P_i \in [0,1]$ is also entered. The integrator is only active if $f(P_i)$ is nonzero. The increase of $f(P_i)$ increases the desire to push and cross the crowd. The function $f(P_i)$ has an exponential increase, mapping the panic parameter to a value ranging from zero to one, for example the appropriate function:

$$f(P_i) = \frac{1 - \exp(-P_i)}{1 - \exp(-1)}$$

(9)

The parameters kP_i & kIi, are integrative constants. The constants of proportionality and integration will determine the strength of the agent. In other words, they represent how fast an agent changes its status, the higher the constant, the faster the change. However, the interaction forces will be kept unchanged as described in the Helbing model. The repulsive forces will be active only if the agent j

was in the area surrounding the agent i, where the area of proximity for the force f_{ij} is defined by a circle centered at the position of the agent i with radius. In addition, there is a field of view, defined by a circle centered at the position of the agent i with radius rvi and used to activate fiw in a similar way.

Panic Behavior

"Herd" behavior is an essential reason for modeling panic behavior, in which individuals transfer their behavior to other agents. This leads to the spread of panic among other agents. In other words, the panic of individuals tends to cause social contagion, which leads to life-threatening blockage and overload. Each agent has P_i as a panic parameter, the value ranging from zero to one. The initial value of the panic parameter is always zero but increases due to sources of panic (fear) in the environment or could be acquired from the environment. In terms of dissemination, we use a model of consensus dynamics or dissemination with external input. Our model depends on the number of agents in the surrounding area and their level of panic [16]. The surrounding area is defined by a circle centered at the position of the agent with radius r_{si}. Panic behavior will also depend on the relative distances between agents. An agent will be more affected by agents who are at shorter distances. These factors result in the model:

$$P_i = c_i\left(z_i P_i + \sum_{j \in r_{si}} P_j w_j\right) + (1 - c_i) Q_i \tag{10}$$

$$\sum_{j \in r_{si}} P_j w_j + z_i = 1;\ w_j = \frac{(1 - z_i)/d_{ij}}{\sum_{k \in r_{si}} 1/d_{ik}} \tag{11}$$

where c_i is a constant, which is used to weigh the environmental effect of the influence of social behavior. Similarly, w_j is a constant used to weigh the influence of panic caused by agents in the area surrounding the agent. The constant z_i represents the personal confidence in the agent's own judgment on the generated situation.

For agents, the permissible values of control output $u\ t$) are limited. A level of saturation is used so that $|u(t)| < S_{ai}$. Panic sets in if the agent is stuck in the crowd and tries to open a path for himself, resulting in accumulation on terms of integration. This behavior is called windup. In other words, this occurs when the controller output can no longer affect the controlled variable (saturation), which leads to the accumulation of a significant error during this time in terms of integration. When the error $e(t)$ tends to zero, the control output $u(t)$ of the P_I is equal to the integration terms. To solve the problem, an anti-panic technique was used, involving stopping the integrator for periods of time until the response falls within an acceptable range. In our model, the integrator will be stopped if the control output $u(t)$ saturates, (shown in figure 5), reaches the pushing limit of the agent.

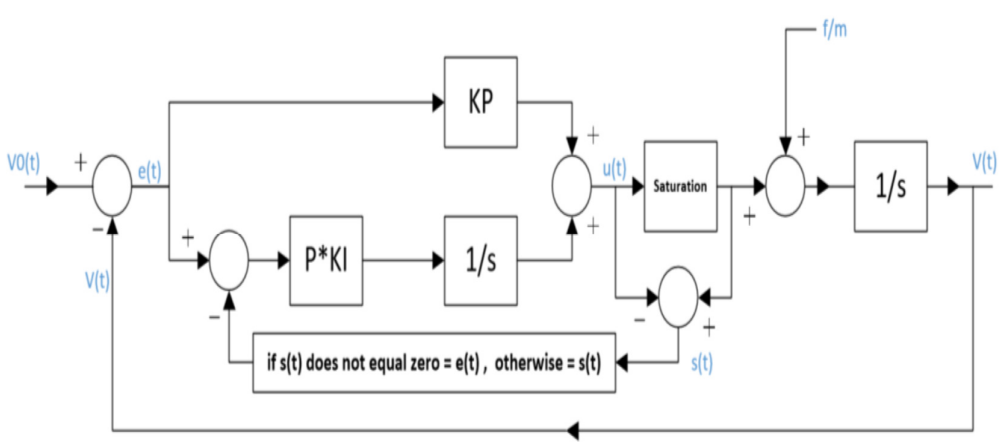

Figure 5: Control of the pushing speed of the agent when the panic is installed.

Detection of the escape route from a scene using Deep Learning and Voronoi networks

Motivation

Recently, Deep Neural Networks have been used to generate cutting-edge results in many subfields of the imaging industry. This category of algorithms can be used to extract a significant amount of information from many types of images or visual aids. Our activity focuses on training a neural network that accurately detects roads, analyzing images from an event. In the mapping industry, it is crucial to have detailed and accurate maps in order to be able to build accurate and quality travel route (evacuation) applications. The first step in achieving this goal is to detect all roads in a given area. Recent advances in aerial imaging technology make it possible for drones / satellites to provide high-resolution images that can be easily distinguished by anyone on the road. The goal is to build an intelligent system that, once it receives an aerial image, can accurately extract road topology. In technical terms, we need to generate a prediction for each pixel of the source image, namely the probability that that pixel is part of a path. Academic research calls this problem Semantic Segmentation because the image must be segmented into objects of interest. In the end, once the pixels are labeled according to the road, building the road network for later use becomes a relatively easy problem.

Theory and Approach

We briefly present as a first result a geometric solution to detect communities on graphs, based on Voronoi diagrams. This method is usually used to partition metric spaces into regions (Voronoi cells) around selected points (generating points), as illustrated in Figure 6 (black-red cell map representation). Each point in space belongs to the nearest generating point. We apply this solution in the case of graphs, where all the connections have a positive length and the distance between two nodes is equal to the shortest route between them, see figure 6 (green line) [17].

To introduce the clustering method, we first present the Voronoi partitioning method in 2D Euclidean space. Consider a set of points in a 2D plane, distributed to form local groups. We calculate the local density of the points inside the territories and select the generating points of the Voronoi cells inside their territory with radius r, as seen in figure 6 (the representation of the black-red cell map).

Each point in the plane is assigned to a Voronoi cell with the nearest generating point. As a result, the points are divided into groups by Voronoi cells [18]. To apply the previous theory to networks, we need to transform the graph into a metric space. First, we calculate a value of the distance between each two nodes, which is the length of the shortest route between them. The length of any route is equal to the sum of the lengths of the connections along the route, where we defined the length of the connection as the inverse of the grouping coefficient of the connections.

Once we have defined the distance, the next step is to determine the generating points. During the calculations we used a Voronoi generator point selection method based on the relative local density of the nodes. The best strategy for Voronoi partitioning, however, is to increase the r value and examine the quality of the clustering, for example by modularizing the cluster.

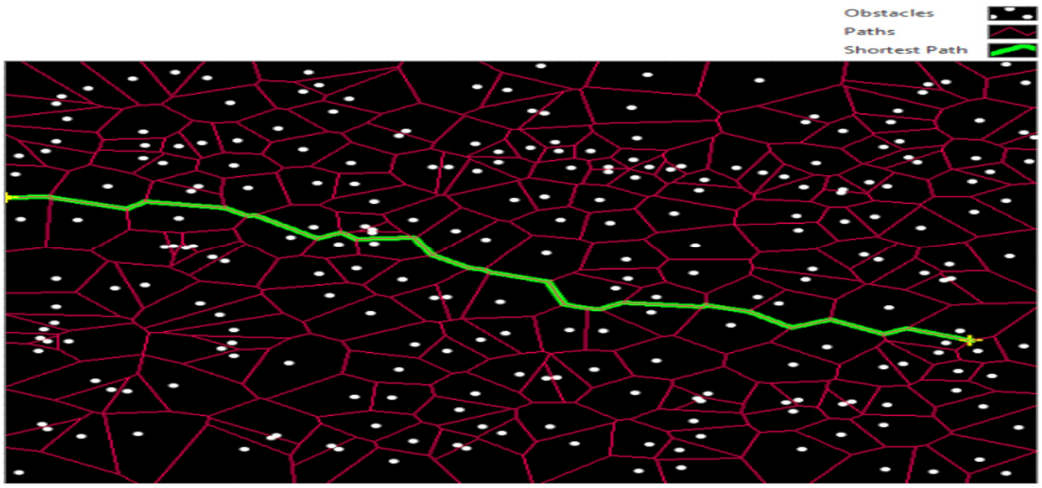

Figure 6: Automatic determination of the escape route (green line) from the event scene (background cell map) using Deep Learning and the Voronoi algorithm.

We tested our methods on real-world benchmarks and networks. We used benchmarking algorithms with a wide variety of settings of different parameters. I generated 100 graphs with different parameters. These graphs were partitioned by increasing the r values and the quality functions for our partitioning and for the communities predefined on the graph were monitored. For comparison we used the modularity function and the result of mutual information between our clusters [19].

When the method reached the maximum value of modularity, the values obtained from the mutual information were close to 1 (for the optimal value of r), indicating that the method successfully identified the original communities on benchmarks. However, it is noted that in some cases the structure of the communities is not very clear, since there are a lot of small groups.

Unlike benchmarks, in the case of real-world networks the grouping is more complicated. In this case we do not know the optimal structures of the communities, and the success of our method can be judged only by comparison with other methods already accepted [20]. We tested our algorithm on several real-world networks, with different structure and origin, and we compared the results with the results of five other algorithms used on a scale

range. We obtained that our method works well for relatively small values of the parameter r, and only if we have a pronounced mixing between communities, we do not find the right clusters.

Conclusion

Strategic decision support systems are integrated systems of policies, procedures, organizational structures, personnel, equipment, facility, and communications designed to support the exercise of the command and control process in all phases (states) of missions in the tactical field [21].

The strategic decision support system will ensure the transmission of information between the organizational structures (entities participating in the action) and the technical means of processing in the space related to the tactical field, beyond the visible and invisible horizon. The fundamental role of the technical decision support system is to ensure, in a timely manner, with maximum security, decisive and relevant information at the relevant levels to enable tactical forces to use it in achieving their objectives at all stages of the action. tactical. The missions that will be carried out by the strategic decision support system are:

1. Supporting command and control processes across the spectrum of tactical actions (providing decision-makers with the means to exercise authority and command of subordinate forces and those received in support to carry out the mission).
2. Support for planning, decision-making and rapid response in dynamically evolving tactical environments (rapid transition from offensive to defensive actions requires commanders to make frequent changes in conceptions and action plans).
3. Support for increasing the mobility of intervention teams and adapting them to different environments for carrying out specific actions.
4. Ensuring the exchange of information within the joint tactical actions, with the support of other participating entities.

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Covid19 Impact on Information Channels Choosing Preference During The Self-Study of Teachers in The Gender Context

Radim ŠTĚPÁNEK
University of Ostrava-Faculty of Education, Ostrava, Czech Republic
radim.stepanek@osu.cz

Veronika ŠVRČINOVÁ
University of Ostrava-Faculty of Education, Ostrava, Czech Republic
veronika.svrcinova@osu.cz

Svatopluk SLOVÁK
University of Ostrava-Faculty of Education, Ostrava, Czech Republic
svatopluk.slovak@osu.cz

Pavel DOSTÁL
University of Ostrava-Faculty of Education, Ostrava, Czech Republic
pavel.dostal@osu.cz

Abstract

This article is focused on the analysis of information channels choosing preference during the self-study of teachers in the gender context for the decisive period from March to June 2020. Schools were closed worldwide in this period with the emphasis on communication with pupils via electronic platforms on the internet. Teachers were assimilated to completely new roles, within one week they had to adapt to this arisen situation and change the education in the sense of realised digital competence. The goal of the article is to find the scale of preferred information channels during the self-study of teachers and to compare the difference in preparations at men and women teachers in the three-month period mentioned above. We also wanted to know how the preference was changing according to the extent of the school residence where the online lessons were realised.

Keywords: COVID19, distant education, evaluation of teachers, pedagogy, self-study preference of teachers.

Introduction

The Czech Republic is the cradle of the tradition of education of the broadest levels of population. We file 94 % of people with higher secondary education in the age group of 25 – 64 years. As it can be seen in Figure 1, there are 150 thousand teachers (more precisely 150 592 in the period of January – February 2019) working in the level of pre-school, elementary and high schools in the Czech school system. According to [1] there is one quarter of men from this ground in the working process (more precisely 25,39 % in the period of January – February 2019). This situation is very imbalanced in pre-school education. Only a half percent of teachers are men (more precisely 0,68 % in the period of January to February 2019). Every tenth teacher is a man at secondary schools (more precisely 11,09 % men work at secondary schools in the period of January – February 2019). The older students study at schools, the more men work in the teaching staff. Nearly a third of men teachers work at lower-secondary schools (more precisely 31,90 % in the period of January – February 2019). High schools and colleges are already gender-balanced half on half (more precisely 49,94 % men teachers work here in the period of January – February 2019).

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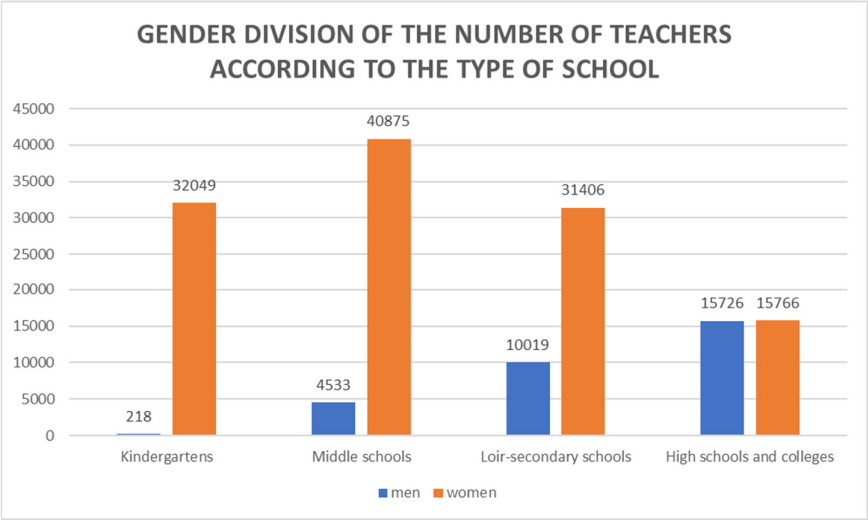

Fig. 1: Gender division of the number of teachers according to the type of school (Source: Own processing)

The state of ratio between female and male teachers in the Czech Republic is not rare at all on the global scale which illustrates Figure 2. In the theory of gender roles according to [2] there must also exist mechanisms of ways of behaviour in the question of preparations on work and self-study that are also expected from a person based on the gender. They blend with gender stereotypes and also participate on their creation. They can vary even in terms of one generation unlike the gender concept, that changes slowly. According to [3], [4], [5] the research points to the fact that the number of women in science, technology, mathematics and engineering (STEM) degrees are lower than the number of men. In addition, it has negative implication for closing gender gap earning because the STEM fields pay more than humanities and social fields, where women are majority Some authors consider the field of study choice as a relevant factor in the gender pay gap determination among graduates.

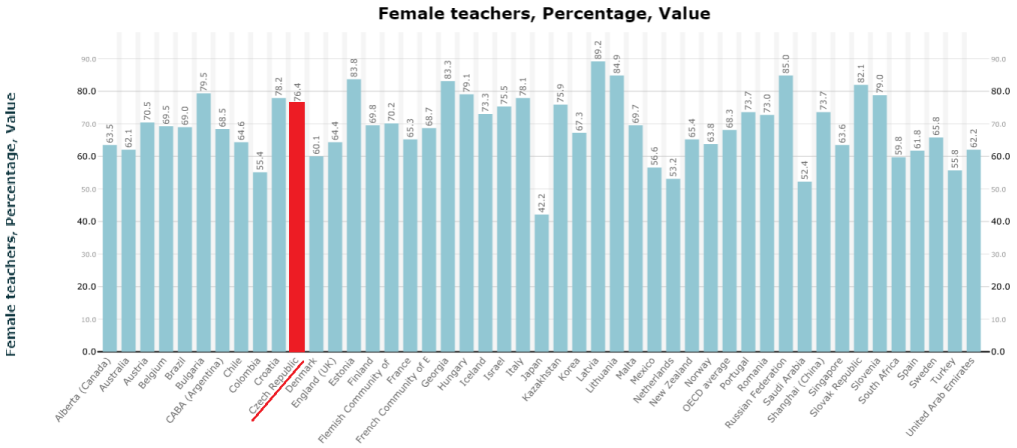

Fig. 2: Comparison of the gender balance in the pedagogical sphere between the Czech Republic and other countries [6]

The duty of further education when teachers renew, solidify and complete their qualification during their teaching activities is set by a school law that defines:

Forms of further education in the Czech Republic. Further education is realised:

- institutionally at universities

- institutionally in the facilities of further education of teachers (next marked in text and graphs as **FET**)
- **via self-study** [7]

There are 12 workdays set aside a year for self-study with varied selection of programmes and focuses for every teacher. This extent of time off corresponds to the time before breaking out of the COVID19 pandemic. During the distant education teachers had very little time for self-study of necessary technical competence. They also had limited resources when the state of emergency was declared. This period is often called the "big jump" period in the Czech Republic. Even conservative and elder teachers were forced to learn to work with new modern technologies as implements of their teaching communication with students and parents.

Methodology

The nationwide research to acquire necessary data was realised from March to June 2020 via the quantitative method of data collection with the participation of 211 experienced teachers (see Table 1). The whole research on the topic COVID19 in the school system for period mentioned above contained 42 questions and the recovery rate was 24 %. We choose the data relating to the objective of the contribution to this conference from the measured data.
The main objective of the research survey was to find the changes in preference in the question of self-study at female and male teacher before and after breaking out of the COVID19 pandemic.

The research question is: Which offered and used technologies and method do teachers see as great during the COVID19 pandemic, which were neglected and unused on the contrary?
We are going to reach the objective specified above via solving further particular problem marked **A**.

Problem A: Are there changes in preference of acquiring new knowledge and education trends in the area of using computers and multimedia in teaching before and after closing schools.
H1: The part of active self-study with a predominance of online publications, webinars, educational videos on YouTube etc. increased of one third among teachers in the period of COVID19 pandemic.
H2: There are differences in preference of using resources for self-study and teaching between male and female teachers.
H3: There is not a significant difference in preference of using resources for self-study and teaching between teachers from municipal and village schools.
The summary of the structure of the research sample is evident from following Table 1.

Table 1: demographic characteristics

Variables	Frequency	Percent		Variables	Frequency	Percent
Gender				**Age Groups**		
Male	34	15		18-29	11	5
Female	187	85		30-39	40	18
Magnitude of municipality where the school is				40-49	86	39
A municipality up to 2 thousand people	28	13		50-59	74	33
Small town 2001-10 000	74	33		60+	10	5
Middle 10 001-100 000	60	27		**Type of school**		
Big above 100 thousand	39	18		Elementary (1-5. grade)	97	44
Prague	20	9		Elementary (6-9. grade)	59	27
Teaching practice length (in years)				Elementary - special	4	2
0-2	14	6		Children's home with a school	1	0
3-5	16	7		A grammar school	12	5
5-10	33	15		Technical secondary school	31	14
10-15	29	13		Vocational school	5	2
15+	129	58		Another type of school	12	5
Education						
Complete University	218	98				
High school	3	2				

As visible in Table 1 shown below: Demographic characteristics, nearly 60 % respondents are teachers with experience of more than 15 years, only 6 % of the statistical unit can be considered as "beginning teachers".

Results

Problem A results: H1: The part of active self-study with a predominance of online publications, webinars, educational videos on YouTube etc. increased of one third among teachers in the period of COVID19 pandemic.

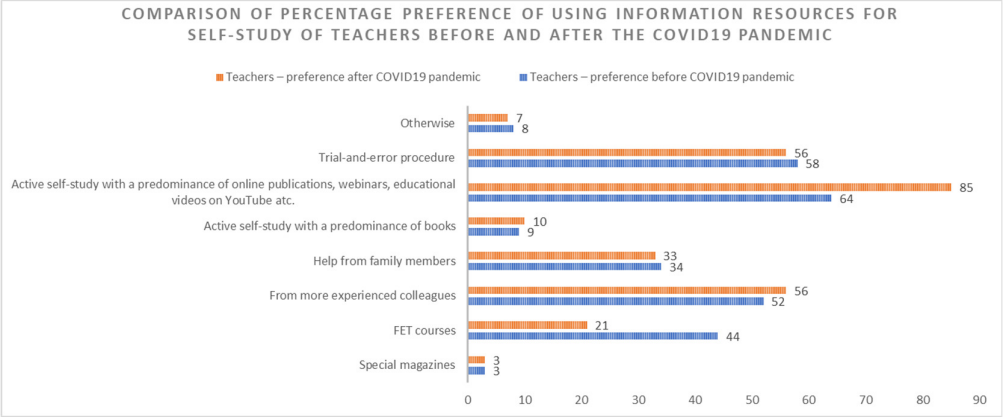

Fig. 3: Comparison of percentage preference of using information resources for self-study of teachers before and after the COVID19 pandemic (Source: Own processing)

Hypothesis H1 confirmed: 64 % respondents used covered opportunity of active study with a predominance of online publications, webinars and educational videos before breaking out of COVID19. During the online education it was 85 % which is a significant increase of 33,33 %. Preference in other areas like "trial-and-error" method, help from more experienced colleagues or family members remained the same. Organized accredited courses of FET recorded great fall of 23 %.

H2: There are differences in preference of using resources for self-study and teaching between male and female teachers.

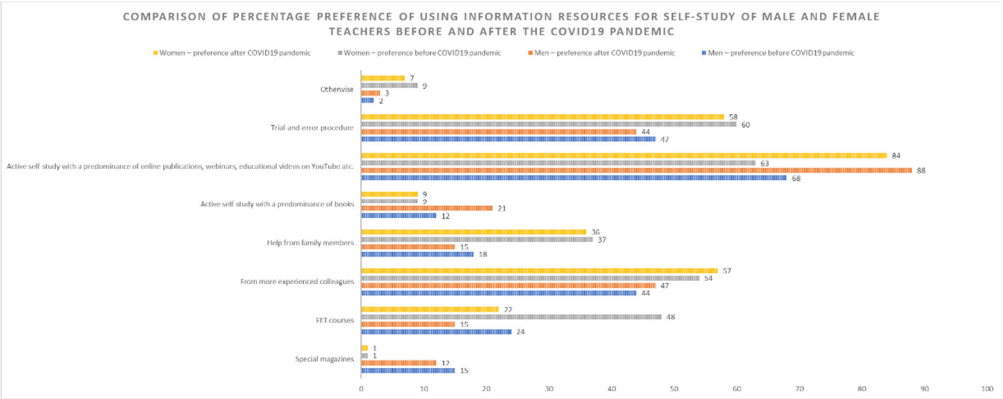

Fig. 4: Comparison of percentage preference of using information resources for self-study of male and female teachers before and after the COVID19 pandemic (Source: Own processing)

Hypothesis H2 confirmed: Respondents answering these questions could use more answers to cover the area of their preferential interest of self-study more complexly. Male teachers use reading of special magazines more for their professional development in the area of new knowledge, educational trends, using computers and multimedia in lessons. We can see further differences in popularity of books for self-study. Male teachers started using the more during the period of COVID19 pandemic, it means it nearly doubled from 12 % to 21 %, on the contrary women stagnated on 9 %. Female teachers were more looking for support and advice in their families in this area. Female teachers used about three times more the "trial-and-error" method than male teachers.

H3: There is not a significant difference in preference of using resources for self-study and teaching between teachers from municipal and village schools.

The term "village" is obviously interpreted a little different in every country. In the Czech Republic we consider it a village when it is a township that has less than 2000 inhabitants.

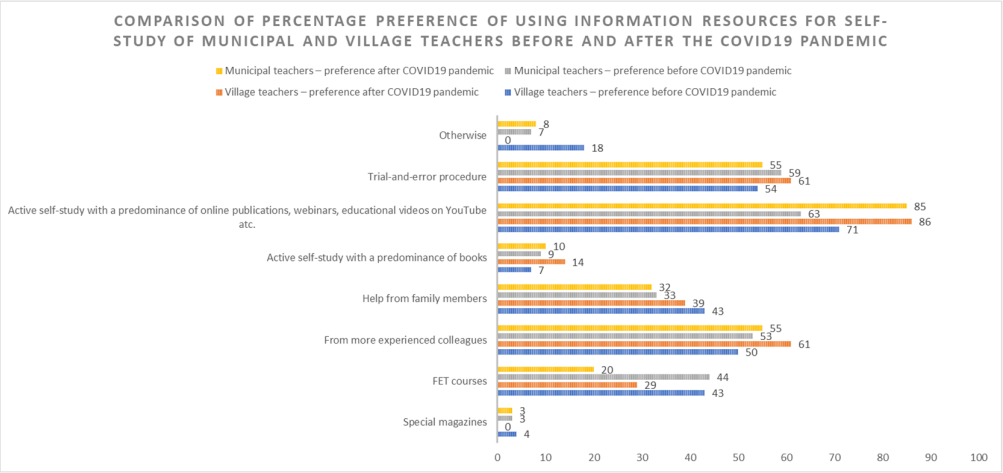

Fig. 5: Comparison of percentage preference of using information resources for self-study of municipal and village teachers before and after the COVID19 pandemic (Source: Own processing)

Hypothesis H3 confirmed: We found that Czech village teachers have also great connectivity in terms of so many discussed differences between "villages" and "cities". The size of the facility (and particular absence of associated services) does not influence the way of preparation of teachers and their preference of choosing among particular types of self-study.

Conclusions

The continuity of education is one of the most important criteria of successful education. The transformation from contact education to online platform was realised successfully in the Czech Republic thanks to the change of preference of active self-study of teachers who were forced to change their usual forms and methods of teaching and upgrade their digital competence rapidly. The analysis of comparison of resource selection during self-study of teachers is also interesting according to gender and size of facilities. The results show that there are significant changes in preference of acquiring new knowledge and education trends in the area of using computers and multimedia in teaching before and after closing schools. The part of active self-study with a predominance of webinars, online publications, educational videos on YouTube etc. increased of one third among teachers in the period of COVID19 pandemic. Male teachers used to read special magazines and books more for their professional development in the area of new knowledge, educational trends, using computers and multimedia in lessons. Female teachers were more looking for support and advice in their families in

this area. Female teachers used about three times more the "trial-and-error" method than male teachers. Research shows here that active predominance of self-study using online publications and webinars creates the same conditions for education of teachers thanks to good connectivity in villages and it eliminates their preceding disadvantages related to the absence (or little variety) of available educational services in their surroundings. The closure of educational institutions due to preventive measures against the spread of COVID-19 has affected the education, well-being, and functioning of all parties involved in educational systems in the world.

The closure of educational institutions due to preventive measures against the spread of COVID-19 has affected the education, well-being, and functioning of all parties involved and benefiting from educational systems in the world.

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Competencies of Managers in Industry 4.0 In the Perception of The Senior Management Staff – Results of The Qualitative Research

Joanna M. MOCZYDLOWSKA

Bialystok University of Technology, Białystok, Poland
joanna@moczydlowska.pl

Karol KOWALEWSKI

The University of Finance and Management in Bialystok, Białystok, Poland
karol.kowalewski@wsfiz.edu.pl

Abstract

The aim of the article is to systematize knowledge of key managerial competencies in enterprises 4.0 as well as to learn about opinions on this subject expressed by the management staff from the enterprise sector. The first part of this paper presents considerations about managerial competencies. Next, the origin and essence of the concept Industry 4.0" were described. The aim of the empirical part is to solve the following research problem: what is the opinion of the senior management of large and medium-sized business entities about managerial competencies important in the context of changes resulting from the development of Industry 4.0? The article contains the results of research carried out using the desk research method and focus group interview (FGI). The empirical material allows for the conclusion that requirements for the competencies of the senior management are very high. Their broad, interdisciplinary knowledge of new technologies and the business opportunities that emerge from using them, must go hand in hand with communication skills and sensitivity to the needs of others. Impersonal analytical and strategic thinking must be supported by flexibility and creativity, commitment in building relationships (often virtual) and bold leadership in a dispersed team. Creating ambitious, bold visions of the enterprise development must be based on independence, mental resilience and self-discipline, but also on openness to various points of view. Due to the limitation of research to Polish managers, we treat their results as preliminary and requiring continuation.

Keywords: competencies, industry 4.0, senior management staff.

Introduction

Economy 4.0 – as it was in cases of the earlier industrial revolutions – constitutes the result of rapid technological changes coupled with changes in the social order, customs and behaviours of people. The main 'pillars' of Industry 4.0 include: the industrial internet of things, cloud-based production, smart factories, cyber-physical systems and social product development. The development of an industry based on digitization and new technologies generates challenges that can only be met by companies that are directed by managers equipped with competencies adequate to these challenges. Therefore, the study of key competencies in Industry 4.0 does not only have a cognitive dimension but also a utilitarian one because at the country level it allows for reorientation of the educational policy and at the organizational level it directs the selection of personnel and the policy of professional development of employees (Stock & Seliger, 2016; Sulich & Zema, 2020; Niemczyk et al., 2019).

The aim of the article is to systematize knowledge of key managerial competencies in enterprises 4.0 as well as to learn about opinions on this subject expressed by the management staff from the

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enterprise sector. The article contains the results of research carried out using the desk research method and focus group interview (FGI). The interview was conducted among high-level managers (executive level) from selected industrial enterprises operating in Poland. These are the pilot studies whose results will be used to create tools for further, in-depth quantitative research.

Executive (managerial) competencies

For years, competencies were (and in many cases still are) equated with a formal right of a person to make decisions and take a position on the matter on behalf of the organization. The quality, effectiveness and efficiency of professional work were rather considered in the context of qualifications. Qualifications were mainly determined on the basis of formal education, knowledge and skills. Currently, it is assumed that the term *qualifications* has a narrower range and refers primarily to the results of formal education; replacing the term *qualifications* with the term *competencies* aims at reflecting changes taking place on the labour market, whereby in the process of performing work, routine manual work is replaced with activities definitely more intellectual (Assante et al., 2019, Moczydłowska 2009). It is also a manifestation of appreciating the importance of employees' abilities and talents as an element of their professional competencies.

T. Oleksyn (2006) is a supporter of a broad definition of competencies. While defining competencies, he lists a set of the following elements that create them:

- internal motivation,
- talents and predispositions,
- knowledge,
- education,
- experience and practical skills,
- health and physical condition,
- other psychophysical features important in work processes,
- attitudes and behaviours expected in the workplace,
- formal powers to act.

Competencies are additionally divided into universal competencies of the entire organization, universal competencies of managers and universal competencies of all employees. The universal competencies of the front line management include:

- ability to shape and effectively implement the mission, vision and strategy of the organization;
- ability to achieve the intended goals;
- knowledge and skills allowing for professional performance of all management functions;
- effective, rational and ethical management of all resources (human, financial, material) of the organization, skilful time and information management;
- competencies in the area of public relations and representing the organization in the external environment (Oleksyn 2006, pp. 25-30).

With regard to management staff, a distinction is also made between hard and soft competencies (Savanevičienė, Stukaitė, Šilingienė 2008, pp. 81-89). The first relate to knowledge and skills of the practical application of methods, techniques and tools useful in management, including mathematical, statistical, operational research, etc. Whereas soft competencies are mainly related to social and personal competencies, e.g. features of the management style, leadership or empathy (Ng, Kee 2018, pp. 252-257).

Researchers dealing with the issue of competencies determining the effectiveness of the manager's work often analyze them in three dimensions: attitude, managerial skills and knowledge (Dziekoński 2016, pp. 86-87; Kiełtyka 2018, p. 9). Each of them includes specific competencies, among which the dominant importance have:

- in the area of 'attitude': emotional intelligence, creativity, ability to show trust, consistency in action, ability to build authority, honesty, authenticity of behaviour, openness to diversity of

other people's attitudes, ability to deal with stress, establishing contacts easily, ability to work in a team, managerial awareness and courage;

- in the area of 'managerial skills': ability to make decisions under time pressure, responsibility, analytical thinking, ability to assess the effects of actions, ability to formulate goals, ability to organize the work of subordinates, ability to communicate effectively, ability to motivate team members, providing assistance in problem-solving, goal orientation, conflict-solving skills, negotiation skills;
- in the area of 'knowledge': extensive knowledge of determinants of effective management, including economics, psychology and sociology of organizations.

It will not be an overuse to say that managerial competencies are the most important among all resources of any organization. The quality of management is the result of the competencies of the management staff and motivation to use these competencies in practice. Without managers' professionalism it is impossible to create competency resources of an organization, diagnose these resources and transform them into a source of effective action. Moreover, the relationship between the competencies of the managerial staff and the professional competencies of employees should also be highlighted here (Sadowska-Snarska, 2014). Skills of managers, especially in the area of professional use of the human resource management tools, determine access to necessary competencies of individual employees. While making personnel decisions, managers are responsible for the quality of competency resources brought into the organization by its employees. By shaping and implementing incentive systems, managers are responsible for transforming employees' competencies into the desired and measurable results of their work. Therefore, it can be safely assumed that achieving management goals is impossible without a high level of managerial competencies of people performing managerial functions. These competencies are always assessed in a certain context, determined, on the one hand, by the framework of the organizational culture (Szydło 2018), and on the other hand, by the broad context of the global economy. Over the past few years, this broad management context has been dominated by changes known as Industry 4.0 (Economy 4.0).

Industry 4.0 – the origin and essence of the concept

Industry 4.0 is an indistinct and ambiguous concept. In the literature, it is referred to as an idea, concept, new corporate philosophy, industrial revolution, the result of this revolution, a new way of production, a new entrepreneurial paradigm, a new era of entrepreneurship and even as a 'specific label' used to describe the results of a research project financed by the German government (Białoń et al. 2018, pp. 84-85). The substitute term 'Economy 4.0' has also been adopted in Poland, where it has become a key element of the so-called Strategy for Responsible Development (Strategia ..., 2017) adopted by the Ministry of Economic Development. The authors assume that the term Industry 4.0 is a specific mental abbreviation used to describe a new way of manufacturing goods and services based on modern technologies and artificial intelligence, integrating the sphere of information and matter. At the same time, it should be clearly emphasized that due to the specificity of production systems in various branches of industry, the term Industry 4.0 cannot, as a rule, be generalized (Lasi et al. 2014, pp. 239-242).

The concept of Industry 4.0 was born as a result of the fourth industrial revolution (see Figure 1). The term 'industrial revolution' is attributed to A. Toynbee (after: Olender-Skorek 2017, p. 38), who identified the first of them in the beginning of 1760. Since then, four industrial revolutions have been described in economic sciences. Their common denominator was the introduction and publicity of an invention, which radically changed the production process and had an influence on the hitherto view about the structure of enterprises, work organization, used resources and efficiency. The 'key' words determining the understanding of the first three industrial revolutions are steam engine, electricity and computer (Mayer-Schönberger, Cukier 2013, p. 36). In the twenty-first century, changes in industry are advancing from electronic and information industrialization to next generation manufacturing systems (NGMS), also known as the intelligent ones (Drath, Horch 2014, pp. 56-58). They became the basis of the fourth industrial revolution known as Industry 4.0.

The genesis of Industry 4.0 is influenced by the cyclical nature of economic development and the emergence of crisis periods, in which appears an increased need to take risk and seek new technological solutions to ensure an increase in productivity of enterprises. The results expected

today are no longer achieved by economic activity performed by using methods characteristic of the paradigm of Industry 3.0 (i.e. electronic and information industrialization) from the second half of the twentieth century (Łapuńka, Marek-Kołodziej 2017, pp. 23-26).

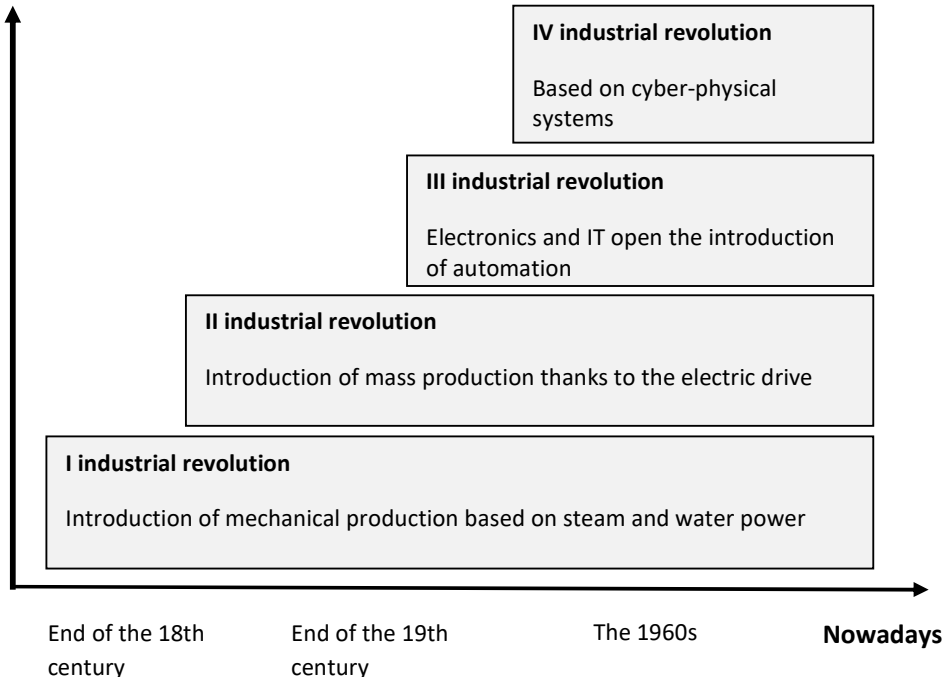

Fig. 1: Industrial revolutions

It is assumed that the idea of Industry 4.0 is based on the vision of smart factories built of intelligent cyber-physical systems that are characterized by autonomy and have the properties of self-configuration, self-control and repair (Faller, Feldmüller 2015, pp. 88-91; Nosalska, Mazurek 2018, pp. 1000–1003). Germany is the birthplace of Industry 4.0 (Kagermann 2015, pp. 23–45). In 2011, in Germany, it was assumed that increasing global competitiveness by increasing the quality of products and reducing production costs would be only possible thanks to new production systems. These systems consist of an information system and autonomous numerically controlled machines using elements of artificial intelligence (Hermann et al. 2015, pp. 124-130; Lu 2017, pp. 6-10). A new technological generation in the area of production is heading towards designing manufacturing systems that integrate the information processing with the matter processing. This direction can be called 'digitization of the matter,' and its assumptions turn the smart factories controlled by CPS (Cyber-Physical Systems) into a reality in the Internet of Things environment. Probably for this reason, the terms Industrial Internet or Digital Factory are used alternatively to illustrate the changes described here under the name of Industry 4.0. The key process of the fourth generation can also be described as datafication, defined as the growing process of creating digital representations of subsequent areas of the real world and drawing value from the information obtained in this manner (Mayer-Schönberger, Cukier 2013, p. 36). Datafication also affects the way of functioning individuals in society since people have an access to an increasing amount of data that they can use to make life, professional and consumer decisions better suited to their preferences.

As mentioned before, the main goal of revolution 4.0 is to increase global competitiveness by increasing product quality and reducing production costs. A goal formulated in this way can hardly be considered innovative, but what is clearly new are the ways of achieving this goal. It is served by solutions in the area of smart factories and smart services, which increasingly will offer customers greater flexibility in operations and more efficient allocation of resources, paving the way for agile manufacturing and scalable logistics solutions. In the industry referred to as 4.0, computer networks

are integrated with the unified skills and real-time information exchange (Goliński 2013, pp. 37-43). Online process control makes it necessary to build an appropriate interface between humans, machines and technological devices, and as a result, defining their mutual interdependence. The Industry 4.0 concept describes the growing digitization of the entire value chain and resulting from this connection of people, objects and systems through real-time data exchange (Spath et al. 2013, p. 221).

Industry 4.0 is composed of three main parts. The first is IoT - Internet of Things and Cyber-Physical System. The second element of Industry 4.0 is associated with the progressive handling of a large amount of data and advanced analyzes (Ashton 2009, pp. 98-101). And the third part constitutes the appropriate communication infrastructure. Industry 4.0 is based on previously unknown combinations of technology, industry and digitization (Glas, Kleemann 2016, pp. 57-62). Moreover, the enterprise's system is not only a production system including machines and manufacturing devices, robots or industrial manipulators, but also a further environment, in the form of logistics systems, resources and customer service. All these elements, in accordance with the concept of Industry 4.0, should be highly integrated and connected, programmable, reconfigured, managed and flexible (Qina et al. 2016, p. 128). This leads to an increased demand for innovation in the area of new materials and technologies, innovative production processes as well as new business models. Therefore, it is no exaggeration to say that the new way of enterprise functioning, referred to as 4.0, has become a source of enormous, unprecedented challenges in the area of management, including new expectations regarding the competency resources of employees (Roszczyk-Kowalska 2018, p. 55). The analysis of the literature (Śledziewska, Włochy 2020, p. 171) shows that in enterprises 4.0 the following are of the key importance:

- Technological competencies that allow for a conscious and efficient interaction with technology in private and professional life. This group includes STEM (Science, Technology, Engineering, Mathematics) competencies, as well as advanced digital competencies in the area of programming and operating advanced IT systems. However, less advanced competencies, consisting in understanding the principles of functioning of machines and systems and controlling them by the use of intuitive interfaces, are becoming more important.
- Emotional competencies that allow for dealing with changes and uncertainty; these competencies facilitate teamwork and taking responsibility.
- Cognitive competencies including critical thinking, solving complex problems or creativity.

Competencies of a manager and challenges of Industry 4.0

In enterprise4.0, the management staff face the necessity to deal with complexity of data, complexity of problems and complexity of economic relationships between people, organizations, countries, and even cultures as well as between the entire human population and environmental conditions. Perhaps for this reason, cognitive competencies are indicated as the key competencies of managers of the Industry 4.0 Era. As Białoń and Werner (2017, p. 88) write, cognitive competencies are primarily composed of cognitive competencies in a narrow sense, i.e. ability to sensually perceive the world, use language, and thus also categorize sensory perception, ability to think, especially think creatively, and remember. In addition, cognitive competencies also include imagination or feeling emotions that do not belong to the traditionally understood cognitive competencies. The common product of these two groups is, for example, the ability to think with the help of metaphors and heuristics, extremely important especially in creative problem solving (Gigerenzer 2008).

One of the basic features of a manager in enterprise 4.0 is the awareness of benefits and risks of the idea of Industry 4.0 (Gudanowska et al. 2018, pp. 65-74). A manager who knows what his company is fighting for while implementing this concept will understand what he and his team must strive for and at what goals to direct the employees and the development of their competencies. And it is the word *development* that is of key importance in building a smart organization for a new era (Borowiecki 2016, pp. 9-16). Interdisciplinary and multidimensional development generate advanced competencies of employees who successfully combine technical skills with interpersonal skills (Jamka 2019).

Completely new technologies will require new technical skills. Examples include: integration of cyber-physical systems, advanced production management systems, advanced robotization, complex production data analysis systems, application of artificial intelligence algorithms in the production space (Schmidt et al. 2015, pp. 16-27). In an enterprise operating on the basis of cyber-physical systems, competencies related to ensuring cyber security move to the forefront. The success of modern projects also depends on good contact between employees at various levels of the organization and representing various specializations.

It should be emphasized here that the most modern technologies will not replace effective communication between team members and managers (Kinkel et al. 2017, pp. 323-330). This means that the ability to present complex technical problems in a simple and understandable way for representatives of other specialties assumes growing importance within the communicative competencies. Competencies such as flexibility of action, openness to changes and a positive attitude to the diversity of tasks as well as the ability to manage the time effectively and resistance to stress will still be highly valued. Managers cannot cope with the challenges of enterprise 4.0 without the ability to lead the project team, who will also operate differently than before. More and more often, remote communication with people from other cities, and even countries, with a different cultural background and speaking a different language will be at stake. Therefore, another key competency of the 4.0 era manager is intelligence and cultural sensitivity.

	professional	personal
conceptual	**cognitive**	**meta-competencies**
operational	**functional**	**social**

Fig. 2: Competency matrix

The authors, adopting the American definition of competency as a set of characteristics of a given person "which consists of elements characteristic for this person, such as: motivation, personality traits, skills, self-esteem related to functioning in a group and the knowledge that this person has acquired and uses"(Boyatzis 1980), propose that competencies of a manager in enterprise 4.0 should be presented in the form of a matrix (see Figure 2) covering both the dimension of personal competencies (manager as a person) and strictly professional competencies (manager as a task performer).

Based on the epistemological analysis, the authors of the article propose to assume that the key competencies of a manager in enterprise 4.0 are:

1. In the group of cognitive competencies: highly developed abstract and analytical thinking, highly developed spatial imagination, creativity, fluent thinking.
2. In the group of functional competencies: change management, project and process management at a high level of complexity, knowledge of modern technologies and their application, conflict management, commitment management.
3. In the group of social competencies: above-average ability to cooperate in a team characterized by a variety of competencies as well as generational and cultural diversity, managing relationships with all stakeholders of the organization, high level of mental maturity manifested by resistance to stress and emotional intelligence, authentic leadership.
4. In the group of meta-competencies: high self-awareness, managerial courage, openness, visionary approach to the enterprise's activity. Focus on continuous personal development.

Methodology and Results of The Research

The aim of the empirical part is to solve the following research problem: what is the opinion of the senior management of large and medium-sized business entities about managerial competencies important in the context of changes resulting from the development of Industry 4.0? In order to answer this question, the technique of focus group interview (FGI) was used. It is a research technique based on interviewing a group of people with similar experiences important in the context of the research subject. According to this methodology, the group of respondents is selected according to criteria such as age, gender or other important characteristics, for example, seniority in a managerial position (Barbour 2011). The group interview, the results of which are included in this publication, is based on the mechanism of introspection. The authors are aware that this method is perceived as the subjective one. Despite criticism from social science methodologists, introspective research basically constitutes the basis of all studies, and the use of their results in diagnosing the views of managers is based on the well-documented in the literature statement that an employee is the best source of information about the specificity of the organizational role and its determinants (Woźniak 2006, p. 706). Ten representatives of the senior management (6 men and 4 women) participated in FGI. The average time of their seniority in a managerial position was 11 years. At the time of research, all of them were performing a function of a director or board member. The discussion was moderated by the co-author of the article. The moderation was based on the experimental convention, according to which the moderator does not invite participants to take part in the discussion by calling individual participants to answer, but addresses the group as a whole (Lisek-Michalska, Lipiec, Olczyk 2012, pp. 207-211). The authors took care of the correct group dynamics assuming that it should have the following properties:

- an appropriate level of activity of individual participants – not too high to avoid monopolization of the discussion by individuals and not too low to prevent loss of information due to their withdrawal,
- domination of the subject – group relationship over the subject – moderator relationship, so as not to lose the character of a focus group interview in favour of individual interviews,
- the initiative of participants to engage in polemics with other participants or the initiative consisting in supporting the opinions of interlocutors with additional arguments,
- free expression of felt emotions,
- friendly attitude of participants taking part in the meeting towards other respondents, encouraging them to take part in the discussion.

The respondents' statements were recorded with their consent. The content analysis constituted the basis for drawing conclusions. The analysis of the message content is understood as "taking it apart into simpler elements (units of analysis) or distinguishing its features, properties and elements and then classifying them according to the adopted system of categories" (Worek 2001, p. 34). After B. Worek (2001, p. 36), it was assumed that the correct content analysis should have the following features: it should take into account only syntactic and semantic elements of the message, has to be objective and systematic, which means that a partial, biased analysis is unacceptable, in which only those content elements are selected that confirm the researcher's thesis.

Competencies mentioned by the managers were categorized (see Table 1), assuming the group division criterion presented in the theoretical part of this chapter. Additionally, a group of personal competencies was distinguished, which was not taken into account in the presented earlier typology of Delamare Le Deist and Winterton (2005, p. 40), and importance of which was emphasized by the participants of the research. The measurement of the amount of time the managers devoted to discuss individual groups of competencies shows that they talked about the importance of cognitive competencies for the longest time (approx. 30% of the time devoted to discussion), social competencies (also approx. 30% of the time), then functional competencies (20%), personal competencies (15%) and meta-competencies (5%).

Table 1: Groups of key managerial competencies in industry 4.0

Cognitive competencies	highly specialized professional knowledge, knowledge and understanding of the applications of new technologies, analytical and strategic thinking, openness to innovations, above-average creativity, flexible thinking	30%
Functional competencies	change management, project and process management, knowledge sharing, relationship management, customer orientation	20%
Social competencies	above-average ability to cooperate in a team, including a dispersed team, communicativeness, building a 'team spirit,' trust in colleagues	30%
Personal competencies	self-management, independence in thinking and acting, self-discipline, ability to work under pressure, work-life balance	15%
Meta-competencies	managerial courage, willingness to learn throughout life, life wisdom, ethical sensitivity.	5%

In the opinion of the managers, representatives of their profession in the era of Industry 4.0 must be very open to innovations and constant change. It requires constant learning and great flexibility as well as a kind of managerial courage. An example of such an approach is the statement: "In the chemical industry, which I represent, changes occur so quickly, product and organizational innovations are continuous, therefore only a person who is able to accept this pace or even stimulate it can effectively manage it. It must be a very creative, mentally strong and brave visionary."

According to the managers participating in the research, the senior management in enterprises 4.0 must have a very high level of interdisciplinary knowledge that goes far beyond the canons of traditional management. Basing your business on the latest technologies requires mastering the concepts used by their creators and understanding the possibilities offered by innovative solutions. According to the respondents, the role of a manager in the digital world of enterprise 4.0 is not to replace IT specialists and programmers, but to act as a link between experts in new technologies and those who will use them. As one of the manager noticed: "The most sought profession of the future will not be a programmer, but a person who will be able to understand it and precisely combine business and IT. This gap must be filled by managers of the new times." The multitude of managerial challenges in Industry 4.0 requires even greater analytical thinking skills, because paradoxically, despite the support of artificial intelligence, the amount and pace of data and information processed by managers is growing. During the group interview, the importance of strategic thinking was also commonly emphasized. According to one of the chairwomen, "despite the fact that in our daily work we focus on short-term results that guarantee our financial liquidity, we must not lose sight of the distant future and have a number of different scenarios of operation, depending on the dynamically occurring changes. A manager of the new times must be a strategist who plays in many fields at the same time."

In the course of the research, the importance of a specific managerial wisdom consisting in the ability to use the knowledge of colleagues has been highlighted. As one of the managers stated: "The worst that can affect us is an excess of ambition and a naive belief that we know everything better. Changes occur so fast, that even while still learning, we will not know everything. While managing enterprise 4.0, I must have an open mind and a lot of trust in my engineers, specialists and technicians."

According to the respondents, in enterprises 4.0 the value of social competencies will increase even more, including communication skills, team work, and ability to build authentic relationships. The following statement is an example: "The high mobility of employees, their dispersion, even on a global scale, means that the ability to communicate takes on a new dimension. It is not only communicating in different languages, on different cultural foundations, but most of all communicating remotely using various specialized languages. In addition, a link in the communication chain is more and more often the carrier of artificial intelligence. Therefore, it is no longer human-human communication, but human-robot-human communication. Managers have to

learn this and teach this in their organizations. The matter is further complicated by the fact that we will not get to know many of our close associates personally." Moreover, new challenges have been underlined that are associated with the fact that in the management process it is necessary to build a sense of commitment and employee-specialist bonds not so much with a specific employer, but with a 'flowing' project team. For that reason, an important managerial competency constitutes leadership understood as building a 'team spirit' and uniting very diverse employees towards a common idea.

The respondents also noted the ontological dimension of management in the era of Industry 4.0. A symbol of this discussion thread is the following statement: "Perhaps the most important competency of a manager is the healthy distance and criticism. You have to remember what is the point of the whole thing and for who it is to serve. There is always a risk that we may 'choke' on the possibilities offered by new technologies and forget that anyway the most important thing is the human being: the human being our employee, the human being our client." Another interesting statement is expressed in this trend: "Perhaps we will face a sad image of a business deprived of almost entirely authentic interpersonal relations." In this context, the specific humanistic sensitivity of a manager who must skilfully balance between the opportunities offered by new technologies and the needs of employees who often respond to these technologies with fear and a sense of progressive exclusion grows to the rank of an important competency.

In spite of the fact that during the focus group interview only 15% of the time was spent on expressing statements about personal competencies of a manager, the importance of such skills as working under time pressure, responsibility and taking care of your mental and physical well-being was strongly underlined. However, as pointed out by one of the participants of the research, "new technologies are also some kind of trap, which we also experience while managing our companies. We are available anytime, anywhere, and when a business partner forgets the time difference, we conduct teleconferences at three in the morning, neglecting our right to rest".

Summary

Implementation of the concept of Industry 4.0 causes far-reaching changes in the existing rules governing productivity and competitiveness. Enterprises must remove barriers between information and physical structures, which means the need for interdisciplinary thinking and putting into practice both technical and social competencies. Industry 4.0 requires modification of thinking about cooperation and changes organizational roles, forcing both the reorganization of process management and redefinition of the role of a manager.

The research shows that representatives of this professional group are aware of the challenges associated with management in enterprise 4.0 and competencies that enable them to cope with these challenges. They realize that the effectiveness of management, and thus the effectiveness of their work, requires the use of very diverse competencies. While analyzing the research results, the authors divided them into: cognitive, functional, social, personal and meta-competencies. The empirical material allows for the conclusion that requirements for the competencies of the senior management are very high. Their broad, interdisciplinary knowledge of new technologies and the business opportunities that emerge from using them, must go hand in hand with communication skills and sensitivity to the needs of others. Impersonal analytical and strategic thinking must be supported by flexibility and creativity, commitment in building relationships (often virtual) and bold leadership in a dispersed team. Creating ambitious, bold visions of the enterprise development must be based on independence, mental resilience and self-discipline, but also on openness to various points of view.

The results of the qualitative research presented in this article can be used as a basis for formulating hypotheses for further quantitative research. In addition, they can become the basis for constructing postgraduate managerial programs aimed at shaping and developing competencies important for people fulfilling the organizational role or preparing to fulfil it.

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Dialogue with Civil Society as a New Quality of Socio-Economic Processes Management

Yury VASYUTIN
Doctor of Historical Sciences, Professor, Department of Political Sciences and Public Policy,
Russian Presidential Academy of National Economy and Public Administration;
Academician of the Academy of Political Sciences
y.s.vasutin@yandex.ru

Olga RUDAKOVA
Doctor of Economic Sciences, Professor at the Department of Economics and Management,
Orel State Institute of Culture
rudakova71@yandex.ru

Nadezhda STEBLETSOVA
Candidate of Political Sciences, Associate Professor at the Department of Economics and Management, Orel State Institute of Culture
stebl_n@mail.ru

Alexandr ESIPOV
Candidate of Pedagogical Sciences, Associate Professor at the Department of Library and Information Activities, Orel State Institute of Culture
ari-all@ya.ru

Abstract

The relevance of the research is determined by the Address of the President of the Russian Federation Vladimir Putin to the Federal Assembly in 2020, which forms profound and large-scale strategic changes in the constitutional, state and public construction for many years. The aim of the research is to provide an analysis of further improvement of the reformation and democratization of Russian society, which involves increasing the importance of civil society in a qualitatively new state and municipal management of socio-economic processes in the country, including processes in the socio-cultural sphere. The authors focus on the difficult conditions of the international situation, the consequences of coronavirus pandemic, with regard to which state and public institutions need to solve large-scale problems of socio-economic development without delay. It requires a new quality of state governance in accordance with direct dialogue with citizens.

Keywords: Address of the President of the Russian Federation, constitutional reforms, state governance, civil society, public oversight, socio-cultural sphere of society.

Relevance and Statement of the Problem

The most important feature of the Address of the President of the Russian Federation Vladimir Putin (2020) to the Federal Assembly of the Russian Federation in 2020 is the emphasis on the dialectical unity of the development of the processes of state and constitutional construction. It is in this harmony that many people see the future of the country. In this regard, the President of the Russian Federation delivered the Address to the Federal Assembly of the Russian Federation, saying that it is necessary to discuss "... state structure and domestic policy, which are defined by the Fundamental Law of our country – the Constitution of the Russian Federation. I keep getting these questions all the time …» (Presidential Address to the Federal Assembly, 2020).

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It is well known that the adoption of the Constitution, more than a quarter of a century ago, was certainly a historic event because it stated, on the one hand, the change of political, socio-economic, ideological foundations of life of the country, and on the other hand, the birth of a new statehood, parliamentarism, Russian society, Federal, regional and local authorities, including the Presidency of the Russian Federation and the Constitutional Court, which had no parallel in the whole history of Russian society.

Extent of the Problem Elaboration

Over these years, the theoretical and methodological provisions of constitutional construction and the historical experience of its implementation in Russian society have been widely discussed by academic community. A number of articles, books, textbooks, monographs by such authors as A.N. Zuikov (Zuikov, 2008), V.A. Degtev (Degtev, 2005), A.N. Kokotov (Kokotov, 2010.) and V.D. Zorkin (Zorkin, 2018), N.A. Mikhalev (Mikhalev, 2010), Yu.I. Skuratov (Skuratov, 2007), M.A. Chekryga (Chekryga, 2010) were published.

Statements by the country's leading figures on this topic appeared in the media immediately before the constitutional anniversary of the new Russia. President Vladimir Putin addressed the theme of the anniversary of the Constitution of the Russian Federation repeatedly and emphasized the historical significance of the event. Federation Council Speaker Valentina Matviyenko gave an interview to Rossiyskaya Gazeta (Mislivskaya and Sadchikov, 2018), former Prime Minister Dmitry Medvedev published the article “25 Years of the Constitution of the Russian Federation: Balance between Freedom and Responsibility” in the journal “Zackon” (Medvedev, 2018), and the President of the Constitutional Court of the Russian Federation published the article “Letter and Spirit of the Constitution of the Russian Federation” in the Russian government newspaper (Zorkin, 2018).

State authorities and mass media drew public attention to the provisions of the Constitution of the Russian Federation as many citizens were not familiar with its content and history of adoption. Representatives of government bodies and citizens began to perceive the Russian Constitution in a new way, analyzing the processes in the country from a socio-political point of view, they were aware that our new Constitution is still imperfect. President of the Constitutional Court of the Russian Federation Valery Zorkin (2018) emphasized the fact that there are some shortcomings in the adopted laws, however they are quite correctable by certain alterations and further adjustment of the provisions of the Constitution of the Russian Federation to social and legal realities (Zorkin, 2018).

It is known that in accordance with Articles 83, 90, and 115 of the Constitution of the Russian Federation and existing legislation, the President of the Russian Federation has broad powers of presidential control in a diverse constitutional process. These powers are diverse, complex, dynamic and generally involve a high level of responsibility of the parties.

The event – the adoption of a new Constitution – takes place in a large country, in a difficult historical situation, therefore the President needs to have special political and legal powers and mechanisms that can be used to organize the functional activities of a modern law-based state. At the same time, the President exercises presidential control not only at the Federal level, but also at the regional and even municipal level, and the most important mechanism for such control is the Federal districts headed by representatives of the President of the Russian Federation. There are also representatives of the President of the Russian Federation in the Russian regions – the Chief Federal Inspector and his staff and the reception offices of the President of the Russian Federation; they maintain constant contact with the citizens.

In our opinion, academic community warmly and gratefully notes the fact that the historically specific experience of presidential control in our country – an integral part of the constitutional process of reforming and democratizing Russian society – has taken place during the execution of the duties of the President of the Russian Federation by Vladimir Putin. It is known that in March 2000, by all-Russian vote, Vladimir Putin was elected President of the Russian Federation, replacing Boris

Yeltsin, the first President of the Russian Federation, who, due to the prevailing objective and subjective circumstances, prematurely retired.

Vladimir Putin became the Head of State and guarantor of the Constitution of the Russian Federation at an exceptionally difficult time for the new Russia. At the cost of enormous efforts, relying on various branches of government, socio-political potential, and various social categories of the population, the President was able to implement a number of serious reforms in the country, including those that contribute to the democratization of Russian society, the unity of the people, and Russia's defense capability. It was V.V. Putin (2020) who managed to increase the role of the new Russia at the international level.

Thus, the Russian President, as the Head of State and guarantor of the Constitution, considering the established constitutional requirements, takes measures on protection of the Russian and shows initiative for its improvement. The President of the Russian Federation in his Address to the Federal Assembly and the people emphasized the need to introduce certain changes to the country's main law that will directly guarantee the priority of the Constitution of Russia (Presidential Address to the Federal Assembly, 2020).

The Address of the President of the Russian Federation to the Federal Assembly contains also the idea about the need to increase the place and role of civil society in the solution of large-scale socio-economic and technological challenges that require new quality of state governance, government's work, all levels of government, direct dialogue with citizens: "Our society is clearly calling for change. People want development, and they strive to move forward in their careers and knowledge, in achieving prosperity, and they are ready to assume responsibility for specific work. Quite often, they have better knowledge of what, how and when should be changed where they live and work, that is, in cities, districts, villages and all across the nation." (Presidential Address to the Federal Assembly, 2020). This change must be the result of "direct dialogue" with citizens and "they must be actively involved in this process" (Presidential Address to the Federal Assembly, 2020).

Research Results

Problems of political participation in state and municipal governance and public oversight carried out by civil society institutions, representatives of multi-party organizations, trade unions, public councils and associations require different ways of solution, as well as consideration of public opinion.

Some people believe that participation in public administration and control is hindered by paternalistic attitudes of a significant part of citizens, their dependency and a certain lack of self-confidence, which negatively affects the growth of their civic activity. This is also the fault of the media, which often do not contribute to improving the competence of citizens, especially at the regional and local levels (Molodov, 2015). Others note "the low involvement of a big part of population and civil society institutions in the form of real non-profit organizations in the implementation of public control. This is largely due to the low level of legal awareness, legal culture of citizens, and low level of trust in civil society institutions…" (Ibragimova, 2017). There is also an opinion that "the legal understanding of the subject of public control is higher than the level of knowledge of an ordinary citizen, which creates a barrier to the participation of ordinary citizens in the analyzed group of legal relations, and neither citizens nor public associations are yet fixed among the subjects entitled to carry out measures to implement public oversight in the law on public control" (Collection of Legislation of the Russian Federation, 2018).

The complexity of public control is determined by high significance and inaccessibility of certain authorities and management in society due to the closed nature of these institutions, while the implementation of public oversight requires the accessibility of their activities. A new concept of openness of executive authorities has recently started working: "expanding the opportunities for civil society participation in the development and expertise of decisions taken by executive authorities" (Vasilyeva, 2014). The emergence of "open government" and other measures of information

openness contributes to it, however, apparently, by inertia, there is a steady distrust of citizens to public organizations due to their lack of professionalism and social activity.

We think that the practical significance of the essence of public oversight is now understood ambiguously, however at the moment there is no alternative to it, and this movement continues to occupy an important place in the reformation and democratization of Russian society, and therefore in solving the most important tasks set in the Address of the President of the Russian Federation. Moreover, in accordance with the Address of the President of the Russian Federation, the role of civil society in the process of transformation is strengthening significantly, and there is a closer interaction of public control bodies with state and municipal authorities and other organizations and departments.

Much has been said and written about the concepts and definitions of public oversight, however we must keep in mind that there is a need to preserve and develop this movement (and we observe it at meetings of the President of the Russian Federation with residents of Moscow, St. Petersburg, Smolensk, Kirov, Ivanovo region, etc.). There is a need to have feedback from public, socially active citizens, and public institutions that, in accordance with existing norms, participate in the formation and development of Russian society, influencing the solution of current problems the state and the society are facing.

There are many other definitions of public oversight in the press. In general, this institution is a set of means and techniques by which society guarantees that the behavior of its members, individual public associations and social groups, will contribute to ensuring the legality of state and municipal governance, in accordance with the established norms (Semenova, 2011).

To improve the effectiveness of public control in modern conditions, civil society institutions should pay attention to the provisions of the new Constitution of the Russian Federation adopted on December 12, 1993, which became the starting point of legal public oversight at the stage of formation of reformation and democratization of Russian society. Part 1 of Article 45 and the legal relationship of Articles 2, 17, 18 refers to the need for public oversight over the activities of authorities and their representatives (Constitution of the Russian Federation, 2008). Article 4 of the Decree of the President of the Russian Federation No.601 “On the main Directions of Improving the System of Government Administration” (Official Internet Resources of the President of Russia, 2012), adopted on 7 May 2012, emphasizes that “activities of subjects of public control carried out in the course of monitoring the activities of state authorities, local self-government bodies, state and municipal organizations that exercise certain public powers in accordance with Federal laws, as well as for the purpose of public verification, analysis and public evaluation of regulations issued by them and decisions taken” (Official Internet Resources of the President of Russia, 2012).

The country's first Federal law No.212 of July 21, 2014 “On Fundamentals of Public Control in the Russian Federation” strengthens legal and regulatory framework for public oversight significantly (Collection of Legislation of the Russian Federation, 2018), it also uses the term “public control” for the first time. Attention is again focused on the need for participation of civil society institutions in the implementation of public control, and various forms and methods of this participation are defined, they are “aimed at ensuring the balance of integrity and effectiveness of the reformation, ensuring a positive effect of the ongoing state reforms” (Yarovaya, 2019).

In his Address to the Federal Assembly, the President of the Russian Federation encouraged civil society institutions to participate in state and municipal management and public oversight more actively, in particular in the implementation of demographic policy (Presidential Address to the Federal Assembly, 2020); in the implementation of the national project Russia – Land of Opportunity; in the sphere of the healthcare: “to monitor the provision of equipment, construction and repair of rural paramedic centres (Presidential Address to the Federal Assembly, 2020); in the development of education, creative work, implementation of social and cultural projects. The President emphasized the importance of “every creative initiative of our citizens, public associations, non-profit organizations, as well as their willingness to contribute to national development” (Presidential Address to the Federal Assembly, 2020); traditions of mutual assistance and respect for

older generations, the volunteer movement that unites schoolchildren, university students, and people of different generations and ages; the President encouraged to focus on the economic and social growth of our regions and interests of people, which "is possible only with the active participation of society, our citizens and, of course, ... all branches and levels of government" (Presidential Address to the Federal Assembly, 2020); to participate in improving the political system of society "... considering the maturity of our main political organizations and parties as well as the reputation of civil society, I believe these proposals are justified" (Presidential Address to the Federal Assembly, 2020).

About 100,000 civil society representatives are seeking to participate in the preparation and conduct of the upcoming vote on constitutional amendments. In the conditions of a critical situation – coronavirus infection (global pandemic) – institutions such as professional associations of doctors, nursing staff, social workers, business organizations, the media, the volunteer movement resolutely came to the aid of the country to protect our people, primarily children and older people, at the call of the government. Other representatives of civil society also provide irreplaceable support in this nationwide battle: parties, trade unions and other socio-political communities, professional and socio-cultural associations, numerous local formations.

The Russian President's initiatives to strengthen the country's defense capability and state security include, on the one hand, the creation of the main military and political directorate in the structure of the military department and the development of socio-political education of the personnel of Armed Forces, and, on the other hand, the interaction of the public with the leadership of the Armed Forces structures in solving this most important task.

Today, there are public formations under various branches of the Armed Forces. For teenagers there are clubs for young friends of pilots, tankmen, sailors, border guards, and cosmonauts. Military-technical centers, clubs and clubs work for military and pre-military age youth. At higher and secondary educational institutions there are search teams on the places of military battles of the Great Patriotic War. Representatives of the older generation of labor collectives, socio-cultural sphere are members of public councils under various defense agencies, law enforcement agencies and military-patriotic associations. As President of the Russian Federation Vladimir Putin emphasizes, this approach helps to strengthen the unity of these bodies and all categories of the population, makes their work more transparent and highly accountable to society» (Presidential Address to the Federal Assembly, 2020).

Some of these important issues of improving the civil society and developing its institutions in state and municipal management and public control are considered as part of possible amendments to the Constitution of the Russian Federation. The President emphasized that "public associations, parties, regions, the legal community, and Russian citizens will express their ideas. The broadest public discussion is needed." (Presidential Address to the Federal Assembly, 2020).

The issue of amendments to the Constitution of the Russian Federation was considered at the meeting with the working group chaired by Vladimir Putin. Distinguished representatives of the cultural community M. Petrovsky (2020), A. Kalyagin (2020), D. Matsuev (2020) proposed an amendment to the Constitution in the sphere of our national culture as the symbol of the nation is the DNA of the nation. Our national culture is famous in the world for such names as L. Tolstoy (1918-1986), F. Dostoevsky (1821-1881), P. Tchaikovsky (1840-1893), R. Shchedrin (1932), A. Solzhenitsyn (1918-2008), K. Malevich (1879-1935), V. Kandinsky (1866-1944), K. Stanislavsky (1863-1938), R. Gamzatov (1923-2003), F. Iskander (1929-2016), Yu. Temirkanov (1938), V. Gergiev (1953), D. Likhachev (1906-1999), D. Granin (1919-2017). This is an outstanding image of Russia, and it must be protected, therefore we propose an amendment to the Constitution of the Russian Federation that states that our national culture is supported and protected by law. Vladimir Putin approved this proposal and stressed that it is culture that makes us a multi-ethnic Russian people and shows our identity.

Proposals and Conclusions

As a result, the Law of the Russian Federation “On Amendments to the Constitution of the Russian Federation" in Article 68 states that “the culture of the Russian Federation is a unique heritage of the multi-ethnic people. Culture is supported and protected by the state” (Meeting of Vladimir Putin with the working group on drafting proposals for amendments to the Constitution, 2020) and Article 69 emphasizes that “the state protects cultural identity of all peoples and ethnic communities of the Russian Federation, guarantees the preservation of ethno-cultural and linguistic diversity”. Article 3 contains an important addition that “the Russian Federation supports compatriots abroad in preserving the all-Russian cultural identity” (Meeting of Vladimir Putin with the working group on drafting proposals for amendments to the Constitution, 2020).

Along with other proposals, the Commission's meeting in February 2020 adopted a proposal of members of the working group to define the place and role of civil society in the Constitution of the Russian Federation in the following words: “the State fully contributes to the development of civil society”. Following the discussion, Russian President approved the introduction of this provision in the new Constitution of the Russian Federation, and in the law of the Russian Federation on the amendment to the Constitution in Article 113 was written for the first time that the Government “Implements measures to support civil society institutions, including non-profit organizations and ensures their participation in the development and implementation of public policy” (Law of the Russian Federation on amendments to the Constitution of the Russian Federation, 2020). These measures also involve the volunteer movement and business.

Public institutions, as well as other state and municipal organizations, participated with interest in drafting their proposals for constitutional amendments. At the beginning of February, more than 220 proposals had been submitted, and by the end of the month, more than 900 amendments were under consideration by the working group. Russian President Vladimir Putin has repeatedly met with the working group to draft proposals for amendments to the Constitution of the Russian Federation. At the first meeting in February, Russian President Vladimir Putin emphasized that in working on proposals for amendments to the Constitution of the Russian Federation, “It is extremely important here to double-check every word, every letter, and every comma. But at the same time, we should not omit what was created with great effort of our people and enshrined in the current Constitution; we should not lose anything but, on the contrary, we must meet today’s challenges (Meeting of Vladimir Putin with the working group on drafting proposals for amendments to the Constitution, 2020). In the context of a democratic approach to the entire socio-political campaign, representatives of the non-systemic opposition, usually activists of individual parties, public organizations and movements, including those associated with liberal Western ideas and its aggressive ideology, also proposed their amendments to the Constitution of the Russian Federation. Even in these conditions, some of them partially support the proposed changes, and there are those who oppose some provisions of the Constitution and any amendments, however, in our opinion, it will not have a significant impact on positive people's movement because many people in Russia have long been aware that with all positive attitude to the Constitution of 1993, adopted in the difficult conditions of the initial stage of formation and development of Russian society, it does not fully corresponds with the essence of sovereignty and interests of the broad masses of the Russian population.

In this regard, we would like to draw attention to some aspects of the relationship between civil society institutions and other organizations and agencies. As for the attitude towards some aggressive pro-Western organizations, our attitude towards them as organizations of foreign agents is unequivocally negative. The proposed amendments to the Constitution of the Russian Federation offer a number of preventive measures concerning their representatives and their actions. Our attitude to other civil society institutions is another matter. We are not always attentive and caring in our daily life to public organizations. Unfortunately, there are still many regional and municipal government representatives, managers, business structures, entrepreneurs who sometimes, due to their busy life, underestimation of the place and role of civil society institutions in the socio-political process of municipal and regional organizations, sometimes show bureaucracy and indifference, do not pay due attention to their own numerous and quite diverse organizations and associations of civil society,

ranging from teenagers to veterans. As a result, there is often various signals of misunderstanding, critical assessments of their activities, and complaints to higher authorities as feedback, proving that civil society and its institutions, as well as regional representatives of state power and management, are an integral part of the socio-political system of Russian society. These organizations and agencies now need to think about the constitutional assessment of civil society and its institutions because for the first time in our history one of the amendments to the Constitution of the Russian Federation states the need to help civil society institutions, promote them and support them.

In our opinion, state and other organizations and departments should pay attention, first of all, to the huge creative potential of their civil society institutions, without which no problem can be solved in our society at any level – industrial, social, health, socio-cultural sphere, and especially public administration. However, to do this, it is necessary to strive for constant cooperation and interaction – to respect their status and not seek to manage these institutions themselves, avoid bureaucracy, and find the right methods of interaction, as Vladimir Putin, who heads various public councils, commissions and working groups under the President of the Russian Federation, demonstrates daily. He finds time to communicate with representatives of Federal, regional, and municipal civil society institutions. These meetings have become traditional and are a kind of effective feedback channel with citizens: "Most of all I trust the sentiments of average people as through their judgments, interest and sincerity, you can see the problems of millions of citizens" (Interview with Vladimir Putin, 2020).

Thus, the Address of the President of the Russian Federation to the Federal Assembly with a call to start solving large-scale socio-political, socio-economic problems in practice was, at the same time, an address to Russia's people. It aroused an unprecedented interest and desire of many citizens to be involved in improving the constitutional process and state building in the country. A new mechanism of state governance is emerging, which takes into account direct dialogue with citizens, strengthening the balance between the society and the state. This scientific-based approach in the Address of the President of the Russian Federation determines the viability of a democratic state designed to respond to modern socio-political, socio-economic and cultural challenges and threats in these difficult conditions of our life.

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Current Practices on Government Innovation towards Human Capital Development for Achieving UAE Vision 2021

Zayed Hussain Salih ALHEMAIRY

Universiti Tun Hussein Onn Malaysia (UTHM)
zayed.saleh@gmail.com

Wan Fauziah Wan YUSOFF

Universiti Tun Hussein Onn Malaysia (UTHM)
fauziahy@uthm.edu.my

Abstract

In any organization, the performance of HC plays an integral role in organization success. Although human capital competencies vary widely, but they are crucial part in the workplace. The development of human capital is one of the pillars of success in most industries. Innovation is one of the elements that have transformed the business in recent decades. UAE has arisen as a country with a resilient awareness and encouraging approach towards innovation. The vision of UAE government is to become one of the most initiative governments by the year 2021. Therefore, this study is designed to analyze the current innovation practices by the government towards human capital development as well as innovation management and examined the direct relationships between these variables. To achieve this goal, quantitative methods were applied after the survey in The Ministry of Community Development (MOCD). The total number of population equal to 1230 individuals. Those individuals represent the staff working in MOCD. The outcome of this study revealed significant relationships between all variables. This research makes the following contributes: first, a valid factor structure for innovation and human capital development was formulated; second, measurement of the influence of these variables in public organizations was validated.

Keywords: Innovation Practices (IP), Human Capital Development (HCD), Innovation Management (IM), Human Capital (HC).

Introduction

Innovation is one of the elements that have transformed the business in recent decades. The concept of innovation has enabled both developing and developed countries to bring together extensive transformations among which some have been successful while other remained unsuccessful. If an innovation fails in the public division, it will have an impact on the citizens. Therefore, effective innovation in the public division is virtually indistinguishable, while a noticeable failure can put an end to brilliant career (Bain and Kleinknecht, 2016). It provides context in which companies, individuals and governments operate indicating the ability of a nation to attract innovative ideas and investments (Bason, 2010).

UAE seeks of developing environments which would enable and promote innovation through development of adequate regulatory framework, giving broad enabling services, improving technological infrastructure and warranting availability of incentives and investments. The key for success in innovative endeavors is the creation of right environment for innovation (UAE National Innovation Strategy, 2015). Human capital (hereafter referred as HC) forms the base of innovation as evident from the increasing concern of governments and companies over the world in recognition and promotion of innovative individuals and groups (OECD, 2014). Thus, the government of UAE, focuses

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upon development of individuals who have high spirits of innovation. It aspires empowering nation for driving innovation through development of innovative people and their capabilities in technology, science, mathematics and engineering while equipping them with skills of 21st century (UAE National Innovation Strategy, 2015).

The question arises how to stimulate innovations has been extensively addressed in the strategic management field many studies in the past. However, the role of human capital in innovative development has not yet been explored fully. Scholars are still unable to provide a framework explaining how human capital development (hereafter referred as HCD) is linked to innovation management (Alsufyev, 2013). That is why the goal of the current study is to overview the literature body regarding the human resource development in order to differentiate it from human resource management and provide synthesis of diverse theories explaining the impact of innovation practices on HCD.

The aim of study

Many studies in the past have covered the topic of innovation and HCD. However, the question arises how to stimulate innovations from various perspectives towards HCD. The literature review shows that the role of IP to develop the workforce has not yet been explored broadly. While in UAE there are limited studies discussed the role of IM in public sector, this study aims to fill this theoretical gap and explain how IP and IM could enhance the skills of individuals. Scholars are still unable to provide a framework explaining how human resource development could be influenced by IP and management (Alsufyev, 2013). Despite there are lots of studies revealing that the development of HC will enhance innovation performance. But there are lack of empirical evidences on the contrary impact of innovation towards HC in many industries. That is why the objective of the current study is to overview the literature body regarding the human resource development in connection with innovation in order to differentiate it from previous research projects on this topic and provide synthesis of diverse theories explaining the impact of innovation on individual development. This study is designed to analyze current practices of government innovation in UAE towards HCD. The research problem is that there is no empirical evidence showing that a link between innovations practices (hereafter referred as IP) and HCD as well as the mediation role of innovation management in this model. Therefore, the research hypotheses were developed to determine the relationship between IP and HCD, and IP with innovation management (hereafter referred as IM), and finally between IM and IP in UAE. To achieve this goal, quantitative methods were applied to examine innovation practice in the Ministry of Community Development (MOCD). The total number of population equal to 1230 individuals. Those individuals represent the staff working in MOCD.

The concept of Innovation

Innovation refers to the successful implementation of a novel idea on the market and workplace (Steiber and Alänge, 2014). The advantages of this definition includes implicitly which emphasizes the difference between creativity and invention on one hand, from product development and implementation on another hand. It gives an aim and push to organizations by suggesting that creativity is not important without follow-through. The importance of this definition, is to move beyond classical boundaries of innovation idea generation and patenting (Benaim, 2015).

Simsit et al. (2014) stated that innovation is the continuous process through which productive resources are developed and utilized to produce higher quality with lower cost products than had previously been available. In the same context, Ilori et al. (2017) defined innovation as new knowledge incorporated in process, product, and service. The author also categorizes innovations according to technological development, marketing activities and organizational characteristics. Based on definitions mentioned above, innovation begins with sequential processes includes the recognition of a problem or discovery a novelty idea, then extends over the problem-solving and the creation of productive ability to the introduction of the creative product and service on the marketplace.

Previous studies showed that innovation have developed from the earliest times to today. For instance, from the 18th century there was some development in the innovation though not very much involvement

was done. It included the development of tractors, car engines and new machines. In the 19th century, the innovation improved to a more improved involvement including the application of the technology in innovation (Brown and Osborne, 2013). While in the 20th century the concept of innovation has continued to improve in all sectors including the development of the telephones, typewriters, power plants, manufacturing and many other industries. In the 21st century the concept of innovation has experienced a rapid advancement due to the advancement in information technology. For example, the development of super computers, smart phones and artificial intelligent (Baden-Fuller and Haefliger, 2013). The 21st century have really improved the communication industry in a way that innovation have aided communication effectiveness inside organizations. Innovation has grown prolifically over the past few decades, this has led to a great need for scholars to do a lot of research and try to come up with solid information on the same.

Innovation does not occur spontaneously. This is certainly true because in the case of the intensive competition in the global environment, the organizational authority is required to coordinate, facilitate, and decide to be innovative. Innovation depends on effective cross-functional orchestration. The purpose of this orchestration requires to organize the teams and dividing up responsibilities, roles, and powers to be part of the innovation challenge. Consequently, the organization must have a suitable organizational structure with explicit orientations and commitment to innovation (Nagano et al., 2014).

Innovation in UAE

UAE has arisen as a country with a resilient awareness and encouraging approach towards innovation. The UAE Government has exhibited a determination and holds the funds to capitalize the infrastructure, employment opportunities and HC to foster growth and innovation (Schilirò, 2015). Significant business has already been supported by the substantial investments that includes the oil and gas industry, semiconductor, green technology, aerospace and ICT in accordance with its approach towards becoming a prominent economy based on knowledge (Schilirò, 2015). UAE has arisen as a country with a resilient awareness and encouraging approach towards innovation. The UAE Government has exhibited a determination and holds the funds to capitalize the infrastructure, employment opportunities and HC to foster growth and innovation (Inkinen et al., 2015).
The vision of UAE government is to become one of the most initiative governments by the year 2021. In UAE, significant developments have been made by considering innovation as an important element for the growth and development in the country. The National Innovation Strategy (NIS) seeks taking innovation within UAE to great heights, where innovation culture will be implanted amongst companies, individuals and the government. Primarily it directs attention upon identified priority sector which will be driving innovation in future. Framework of national innovation strategy is structured around these key pillars:

i. Innovation Champions.
ii. Innovation-Enabling Environment.
iii. Innovation priority Service.

Moreover, the government of UAE has set out innovation strategies so as to reach the targeted position. There are three strategies set out for this namely creation of an enabling environment, innovation champions and by having innovation priority sectors. An enabling environment means setting out conditions that promote innovation. The government has formed innovation frameworks, improved on technology infrastructure and investment and incentives. All those companies trying to increase and focus more on innovation the government is setting out supporting measures to make sure their innovation reach a higher level without much financial constraints and by avoiding other challenges. But if an innovation fails in the public division, it will have an impact on all the citizens. Effective innovation in the public division is virtually indistinguishable, while a noticeable failure can put an end to an up to then brilliant career (Bain and Kleinknecht, 2016). Thus, NIS not only drives top international and national business towards investment in research and development but also aspires to building innovation and scientific research centers, sponsor innovative nationals, adopt advanced technologies, and launch award of national corporate (UAE National Innovation Strategy, 2015). NIS target innovative companies from all over the world and promote the reputation and role of UAE as

global center to test innovations across identified sectors of innovation. NIS appeals for improvement of specialized zones for specific sectors in line with Media, Industry, Renewable Energy, Internet and other specialized zones present within country (UAE National Innovation Strategy, 2015).

Innovation Practices

The concept of Innovation Practice (IP) is defined from the various perspectives in the literature. IP is defined as the representation of a process, usually an activity of developing a new service or a product, new process in technology, new organization, or improvement of the existing service or product (Deakins and Freel, 2009). Innovation has been appraised and considered to be necessary for individuals and organizations (Mehmet, 2016). Ideas are the raw materials for innovation, and they can have vital influence on the success or failure of IM (Fontana and Musa, 2017).

IP is the combination of overall organizational achievements as a result of renewal and improvement efforts done considering various aspects of firm innovativeness, i.e. processes, products, organizational structure, etc. Therefore, IP is a composite construct (Hagedoorn and Cloodt, 2003) based on various performance indicators pertaining, for instance, to the new patents, new product announcements, new projects, new processes and new organizational arrangements. Adams et al. (2006) observed that measurement of IP does not appear to take place routinely within management practice in organizations.

Martín-de et al. (2012) classified innovation by different categories, such as product, process, organizational, and marketing innovation. The measurement of innovation is regarded as a structured process rather than a hope-based strategy. It is evident that, innovation has traditionally focused on products and processes, and then it has attracted attention in other fields such as marketing and even organizational level. The new area of business will provide significant gains regarding innovation; however, the combination of product, process and distribution hasn't reflected the sufficient potential for organizational innovation (Doğan, 2017). Therefore, at the present, several types of innovations including the incremental product, radical product, incremental process, radical process, administrative innovation have been extensively studied (Kim et al. 2012). While this study is focused on four types of innovation (Product, process, marketing and organizational innovation). Marketing innovation is defined as implementing new marketing method that involve significant changes in the packaging, design, placement and product promotion and pricing strategy (OECD, 2005). While, Organizational innovation is defined as introduction of new practices of doing business, workplace organizing methods, decision making system and new ways of managing external relations (Polder et al., 2010).

Innovation Management

In order for innovation to take place, it depends on a complicated set of interactions between various elements of organization. Innovation require to establishing comprehensive system which are able to support innovation in a systemic way. The implementing of this system requires individuals should be dynamic and divisions interacting with each other, and emphasis to making decisions across organizational levels, which engage individuals in innovation activity, as well as improve the quality of the organization's relationship with the external environment (Nagano et al., 2014).

A large and growing body of literature has investigated the relationship between innovation and management, which is extensively seen as the heart of a competitive in contemporary economy. The literature includes evidence that successful competitive is dependent heavily upon capacity of an organization's management of the innovation process, also proposes factors that relate to effective management of the innovation process (Adams et al., 2006).

The review of literature shows that IM it is a multidimensional model explaining how innovation is influenced by human capital, culture, and strategy. To grasp innovation opportunities, all these dimensions must be managed. Organizations relying on innovation should be open to intelligent and creative ideas and should design a mechanism that begins with supporting human sources. In this context, innovative initiatives and the competitiveness of organizations will growth rapidly. Consequently, a managerial structure should be designed in a way to supports innovative tendencies.

Moreover, working conditions should be regulated accordingly to foster innovation strategy (Nagano et al., 2014).

According to Serpell and Alvarez (2014) these factors is useful for organization's management to improve their performance in innovation context as well enhance the competitiveness by helping the organizations in several industries to focus on best tools to manage innovation. Moreover, Serpell and Alvarez (2014) developed a measurement model of IM. These factors have emerged through identification of the best factors that can be used to measure IM found in literature. However, the focus in this study on three cultural and human capital factors as well as the strategy of innovation. According to Alex (2016) innovation culture characterized as an intangible source that contributes to increased levels of innovation through searching and acceptance of the diversity of opinions and provides a new horizon of thinking and a way of acting that supports innovation ideas, accepting the mistakes in order to growth, encouraging risk taking propensity, rewarding the success, flexibility of the management about work time and in problem solving, motivating the communication and acknowledgement of the work and of the team spirit. While strategic innovation usually involves a major adaptive change in the company's business model or the adoption of a new business model. They can sometimes be driven by innovations that occur within the organization, such as strategic change, product and process innovations or by innovations and external challenges. External strategic changes such as mergers are the most common manifestations of strategic innovations. In addition, strategic innovations focused internally generally involve structural reshaping (Doğan, 2017).

Human Capital Development

In any organization, the performance of HC plays an integral role in organization success. Although HC competencies vary widely, but they are crucial part in the workplace. For this reason, critical development has to be taken place to develop the performance of workforce. Several actions could be taken for achieving HCD such as training that equip HC them better skills for the job, also employment of individuals those who are qualified for the job (Martin et al., 2013).

The development of HC is one of the pillars of success in most industries. Islam, et al. (2011) made use of board statistics of 87 nations during the period from 1970 to 2004 to examine whether the involvement of HC in growth of productivity is reliant upon the structure of HC and the proximity to technological front. This research concluded that the impact of the growth augmentation by skillful HC rises as high and middle-income nations move closer to the technological innovation. Lengnick-Hall, et al. (2011) suggested that training, education and other proficient initiatives taken towards the enhancement of the levels of expertise, capabilities, values, knowledge and social assets of the workforce would result into employee satisfaction and improved performance and leading towards the enhancement in organizational. Many countries in the globe have put great emphases on the HCD in order to boost the economic progress by dedicating required time and efforts (Hanushek, 2013). Therefore, to step into the global arena of innovation, HCD is considered as one of the major solutions. Specifically, it is imperative for administrations to invest obligatory resources in HCD as it has a tendency to influence organizational performance (Marimuthu et al., 2009).

It is evident that HCD is a progressive approach that every organization need. When an organization is in its initial stages, it is always hard to have solidified on the best approach for that specific company and as such to form a concrete system requires better training and a good time for better outcome to be gained. Every organization has its own specific strategies for improvement and equipping better its staffs for a progressive development in this sector.

Martin et al. (2013) argued that HCD is a significance plan to foster innovative inside the organization. In particular, the organizations play an important role in refining the level of HC by explicit techniques that may include arranging formal training to enhance employee's proficiencies. This indicates that particularly in evolving economies, organizations could boost their innovative productivity by providing employees with the prospect to improve themselves.

According to Nankervis, et al. (2010), there have been a number of efforts being made in order to identify the path that leads to origin of the HCD. However, all these efforts have been specifically

limited to a specific era of the time and based on the experiences obtain by a certain region or the country. Starting with a very modest start as 'people's management' during the 1700s, HCD has transformed to turn out to be a necessary educational arena as well as exhibited an imperative operation in the administration of organizations (Rotich, 2015). While Baron (2007) suggested that investment in the human resource is the most valuable of all capitals. Therefore, it would be difficult to implement any innovation strategy without human capital having good level of skills and knowledge. In this regard, the development of human capital is necessary step before applying various innovation practices (Yashar and Maryam, 2016).

Human capital in UAE

Emiratis focusing on public sector jobs are largely determined by cultural and social traditions. It has been reported (Forstenlechner, 2010) that HC in public sector in UAE are not working like others in the private sector. In addition, it has been said that Emiratis see themselves as a middle class in the society of the UAE, and will not consider the possibility of filling jobs in the private sector that are believed to be less than their jobs in the public sector (Maurice 2005), or not seen as offering career development prospects (Nadir, 2013).

Today's age has no choice but a greater investment in human capital. To ensure this, countries are in search of innovation plans where such investment can be initiated. The huge flow of HCD such as training, exchange of talents, and attracting the talent is the main practice of UAE these days. Such cordial situations will equip UAE nationals with high exposure, flourish business at rapid pace and will become a central hub in this part of world (Nadir, 2013). The model of HCD comprises on two levels. First is individual level which will explain the parameters required for individual branding? This will justify the importance of branding at individual level and also put some reasons of UAE national's approach to adopt such sub parameters at individual level. Second is the model is about country level which means UAE approach to coordinate with other countries (Nadir, 2013).

However, elements of HC theory can be helpful in helping explain UAE employment patterns and the limited effectiveness of Emiratization so far. For example, from the perspective of new classical theories such as the theory of HC, a large number of foreign workers in a country's workforce can be interpreted as a result of the differences between countries in the supply and demand for work in assessing work in the UAE from a HC perspective money, it can be seen that Emirati citizens are in low demand because they have low levels of qualifications that employers do not need while their foreign counterparts are in high demand because they have the required qualifications that employers believe they will serve them well (Omar, 2012). Based on these evidences, this study concludes that Emirates human capital need acquiring certain skills, whereas innovation practices are strong determinants to HCD of Emirates workforce.

Previous studies revealed that the heavy dependence on large numbers of foreign migrants over time has distorted education and skills requirements in the labor market. For a long time, most of the high and low skills jobs in the UAE, and almost all of the jobs in the free market sector, were filled by expatriates, and there was little incentive for citizens to develop the expertise or skills needed for these jobs (Al Mutawa, 2007). This fact shows the importance of development plans to HC in public sector in UAE. Accordingly, this study surveyed the Emirates staff in MOCD in order to point out how innovation contributes to HCD in public sector organizations.

In the UAE, the concept of human resource management can be very important in contributing to understanding how to foster economic growth and competitiveness at the national level through appropriate investment in higher education and education. Vocational training that specifically targets the needs of employers and the economy in general (Ndubisi et al., 2015). This relates particularly to the context of the current Emiratization policy in the UAE, where the focus shifts somewhat from applying quotas to employing citizens to developing a local workforce equipped to meet the needs of employers in the private sector.

Innovation and human capital development

HC is supposed to be an important factor for innovation and economic development. However, the long-run impact of HC on current innovation trends and economic development is still a black box (Claude and Ralph, 2019). However, HC is a set of skills, knowledge, capabilities and attributes embodied in people, it is crucial to absorb and organize knowledge and to innovation (Helena et al., 2019).

A research conducted by Alawamleh et al. (2019) investigated the relationship between innovation and HC investment showed how the implementation of them leads to significant economic development. The findings of their study identified three main pillars required to support economic development and achieve a competitive advantage using the country's HC: (1) Habitation, (2) Opportunity, and (3) Entrepreneurship. The relevance of the questions dealing with the HC formation and functioning individualities in the innovative development conditions is provided by the fact that highly developed post-industrial economy, manufacturing and service sector cannot do without highly educated and skilled workers, that makes dependable the efficiency and competitiveness at the company level and the whole national economy (Snezhana et al., 2016). In other words, modern technology and all of its rapid changes is entirely driven by innovations originating in the human brain. Human cognition is intangible, yet it determines the creations of humans and the ways in which we perceive and interpret the world.

It is evident that skills development is one of factors of HC that is connected to innovation. In any organization when only skilled individuals are considered for the job its means that innovation will be higher. With HCD can work in given departments effectively and yield more results than the uneducated ones. Based on these arguments and the findings of previous studies, the following hypothesis will be examined in the empirical part of this study.

Hypothesis 1: Innovation practices has a significant effect on human capital development.

The creation of innovative ideas and technologies is considered uniquely human, and it is fundamental to advances in all sectors and aspects of human life (Marlin-Bennett, 2004). However, most organizations fail to utilize their human capabilities to the optimum extent, because they are focused on task-based execution approaches (e.g., the operation of equipment) rather than developing and deploying the resource of HC to foster innovation. Nevertheless, large organizations have long been alerted to the advantages of making the management of people their number one priority (Tan, 2014). Another aspect of HC investment views it as a sustainable, continually improved resource that delivers an innovative output leading to economic development through innovation and creativity (Alawamleh et al., 2019). HCD interventions can positively contribute to organization's innovation activities. HCD is also found to positively influence employee engagement, leadership, manager's motivation to learn, the promotion of a learning culture, and social capital development all of which are positively associated with innovation (Sheehan et al., 2014). Building on the findings of these previous studies, this research seeks to find connections and build relationships between IP and management with HCD and to find empirical evidences in which the implementation of these concepts leads to skilled HC in public organization in UAE.

It is evident that to formulate an effective IM through better strategy and innovation culture, an organization must understand that IP plays a huge role in how products or process are created (Mohammad, 2018). IM is a series of plans linked to IP used by an organization to achieve advancements in technology or services, usually by investing money in research and development activities. Based on these arguments and the findings from previous studies, the following hypothesis will be examined in the empirical part of this study.

Hypothesis 2: Innovation practices has a significant effect on innovation management.

In the same context De Rassenfosse et al. (2014) found a positive relation between HCD and innovation management. They concluded that the role of IM of organizations such as offering formal training and helping individuals to be innovated workforce. HCD involve at every stage of innovation journey: gestation, development, and implementation. However, there is still no model explaining the relationship between HCD and innovations (Alsufyev and Zavyalova, 2013). Foster (2006) proposed

some theoretical contribution to the exploration of the HCD-innovation phenomenon by providing suggestions on the role of HCD in innovation journey based on the model of the innovation process developed by Van de Ven et al. (1999). While Huasheng et al. (2018) claimed that without creative ideas from employees, there will be no innovation in the organizations. Moreover, he suggests that first organizations create ideas, secondly develop these ideas and finally implement them (Huasheng, et al., 2018).

The conceptualization in Figure 2 shows the relationship between HC and innovation at various. Based on these arguments and the findings from previous studies, the following hypothesis will be examined in the empirical part of this study.

Hypothesis 3: Innovation management has a significant effect on human capital development.

Results and Discussions

The analysis of hypotheses is based on various analysis methods including descriptive, correlations, factor analysis and regression. SEM analysis is used to validate the conceptual model which is an emerging statistical tool that is gaining popularity in the social sciences. In this chapter, the study examined the relationships between IP, IM, and HCD. To justify the direct relationships between variables the Critical Ration (C.R) is applied to validate each hypothesis as well as significance level of regression coefficients. C.R is formed by dividing an estimate by its standard error. The following two criteria are used to validate the hypotheses of this study. The C.R $\geq$ 1.96 or $\leq$ -1.96 for a regression weight. Then a hypothesis is true, otherwise the hypothesis should be rejected (Garson, 2005; Chen et al., 2010; Hair et al, 2010). The justification of each hypothesis is indicated in Table 1 shows that all values of C.R $\geq$1.96 and ranging between lowest value = 3.052 (IP-HCD) and highest value = 6.033 (IP-IM).Moreover, the level of significance $\leq$ 0.05 for all relationships indicated in Table 1. From this result it is concluded that IP (independent variable) influences two variables namely: IM (mediator variable), and HCD (dependent variable) in direct relationships. While IP affect HCD directly and indirectly through IM. In summary, the SEM analysis shows that Hypothesis 1, Hypothesis 2, and Hypothesis 3 are validated to be true and not rejected. In other words, there are significant and positive correlations (direct effects) between the three variables.

Table 1: Hypothesis Justification

Hypothesis	Hypothesis Statement	C.R	Result	Sig.
Hypothesis 1	Innovation practices has a significant effect on human capital development	3.052	Validated	0.002
Hypothesis 2	Innovation practices has a significant effect on innovation management	6.033	Validated	0.000
Hypothesis 3	Innovation management has a significant effect on human capital development.	4.157	Validated	0.000

Conclusions

The review of literature reveals that a good organization resource can be an essential factor in an organization's success. The deployment of unique skills of human resources is a major success of competitive advantage. Besides good and beneficial organization resources, another factor that may contributes to better development and high degree of success is innovation practices. Like any organization in the public sector, government institutions must foster innovation in the workforce and enhance innovated thinking among individuals to align with the sources of challenges, as innovation practices continue to evolve in parallel with the tremendous advancement of technology. The outcome of this study revealed that all hypotheses are validated within established criteria based on SEM methods also support the theory developed in this study. Moreover, the empirical evidences of this study revealed that all direct relationships between innovation practices, innovation management, and human capital development are significant. This research makes the following contributes: first, a valid factor structure for innovation and human capital development was formulated; second, measurement of the influence of these variables in public organizations was validated.

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Modelling the Antecedents of Social Media Entrepreneurial Engagement in Malaysia: An Application of Socio-Cognitive Theory

Adedapo Oluwaseyi OJO

Faculty of Management, Multimedia University, Cyberjaya, Malaysia
ojo.adedapo@mmu.edu.my

Mazni ALIAS

Faculty of Management, Multimedia University, Cyberjaya, Malaysia
mazni.alais@mmu.edu.my

Abstract

Recent advancement in digital technologies has re-shaped the nature of entrepreneurship. The social media, for example, offers a platform for multiple actors to engage in entrepreneurial activities beyond their immediate environment. Therefore, the integration of technology in entrepreneurial activities has created huge potential for socio-economic outputs. The present study draws on the social cognitive theory to propose a model explaining the cognitive and social factors influencing individuals' engagement in entrepreneurial activities on the social media platform. The proposed model will be tested with data to be collected from youth within the Klang Valley area of Malaysia.

Keywords: Digital Entrepreneurship, Social Media Engagement, Socio-Cognitive Theory.

Introduction

Entrepreneurship plays a significant role in the economic development of nations through the innovativeness of people in harnessing diverse resources for economic activities (Bruton, Ahlstrom, & Obloj, 2008). An entrepreneur is "someone who specialises in taking responsibility for and making judgmental decisions that affect the location, form, and the use of goods, resources or institutions" (Hebert and Link, 1989). Successful entrepreneurial engagement depends on innovation as a dynamic process of adapting to changes and uncertainties in the market. Through carefully crafted policy and intervention, the government plays a central role in minimising uncertainty and transactional costs, yet entrepreneurial agency is essential to harnessing the potential opportunities. The tension between human agency and institution is well articulated in the paradox of embedded agency (Seo and Creed, 2002). The institution could create an enabling environment for several actors to engage in diverse activities, but the respective outcomes are dependent on how individuals make use of the available platform. This has become more evident in the modern economy where people have leveraged the internet and social media network for different outcomes.

The increasing accessibility to digital technologies like internet smartphones, tablets, computers and the associated products and platforms like Facebook, Instagram, Snapchat and Youtube has created a new trend in entrepreneurial activities (A. O. Ojo et al., 2019). Given the universality and collaborative platform of these technologies, the main assumptions of entrepreneurship uncertainty have been reversed. For example, entrepreneurial processes and outcomes have become less bounded, while the locus of the entrepreneurial agency has moved beyond the individual to include several actors. The multiple possible combinations of technology and entrepreneurship have resulted in a diversity of phenomena with different characteristics and socio-economic impact. In Malaysia, for example, a range of public and private initiatives have been taken to enable the younger generations to harness their awareness and capability in digital technologies for entrepreneurial purposes. The #mydigitalmarker programme was introduced by the Malaysian Digital Economy Corporation (MDEC) and the Education Ministry in attempt to expose the youths to the business opportunities available via the digital technologies platform (NST, 2018). Nevertheless, a recent world bank report

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suggested that Malaysia should invest more in promoting digital entrepreneurship among the youth to spur economic growth and job creation (Worldbank, 2018).

Although there is a lack of generally acceptable definition of digital entrepreneurship, its significance in transforming the business landscape through the innovative use of digital technologies has been widely acknowledged (Nambisan, 2016). As Nambisan (2016) note, further to its impact in extending the boundaries of entrepreneurship, digital technology has also altered the underlying role of individuals in entrepreneurship. Digital entrepreneurship has facilitated interaction among multiple actors, thereby the context of individuals' engagement has become more central in the pursuit of entrepreneurial initiatives. Hence, the need to situate individual within the context of their engagement with digital technology has become imperative (Fichman et al., 2014).

Previous studies on youth entrepreneurship Malaysia has examined the adoption of ICT among younger entrepreneurs (Zaremohzzabieh et al., 2016), students' readiness for the implementation of entrepreneurship education (Othman et al., 2012) and perception of agro-based entrepreneurs on the application of mobile phone in agro-business (Shaffril et al., 2009; Ojo, 2017). However, the issue of youth engagement in digital entrepreneurship has been overlooked.

The main purpose of this study is to investigate how the cognitive and contextual factors shape the engagement of Malaysian youths in entrepreneurial activities on social media. The social cognitive theory (SCT) offers the appropriate theoretical basis for situating the individuals within their context of engagement (Pincus, 2004). Specifically, individuals' behaviour are shaped by their attributes and their interaction with the social environment. Therefore SCT is relevant in explaining the reasons why individuals adopt certain behaviour (Bandura, 1986). In line with this, we posit that youth's engagement in entrepreneurial behaviour on social media is associated with differences in their cognitive state and social interaction.

Theoretical Background

Social cognitive theory (SCT) is a meta-theory, which has been employed across discipline to explain the dynamics of human behaviour (Kock, 2004). Studies have validated its relevance in the adoption of technological innovation (Compeau & Higgins, 1999; Ratten & Ratten, 2007), e-government application (Loo et al., 2009; Rana & Dwivedi, 2015), social media (Khang et al., 2014), internet banking (Boateng et al., 2016) as well as internet use and gratification (LaRose & Eastin, 2004; Ojo and Raman, 2017)). The SCT posits that individual behaviour is shaped by expectation, as well as personal and external factors. These factors are expressed in terms of the triadic reciprocal interaction among individual's attributes (i.e., abilities, knowledge and skills), external environment and actual behaviour (Bandura, 1989; Benight & Bandura, 2004). Such interaction is facilitated through human agency, wherein the individual exhibits the power of choice over outcome and leverage on awareness to continually regulate her behaviour in tandem with the desired outcome (Bandura, 2001). This regulatory influence is enacted through the belief in one's capability to choose and control actions. Beliefs depend on the evaluation of one's cognitive ability, motivation and the availability of the resources to complete the task (Wood & Bandura, 1989).

SCT associates human behaviour with the concepts of reinforcement and observation, which are evident through the cognitive processing of human interaction. Individuals learn to do something by observing and imitating those who are already involved in such activities. Unlike in the Western context, where individuals exhibit a preference for personal identities and individual achievements, group commitment has proven to be salient to individual perception in the Eastern context (Hosfstede, 1980). Social identity theory suggests that individuals who are strongly attached to their group identity are likely to develop the social identity. This facilitates the alignment between their identity and the group norm, thereby enabling them to easily accept the intentions and behaviours of their group members (Chatzisarantis et al., 2009; Jiang et al., 2016).

Hypotheses Development

Drawing insight from the above, we posit that engagement in entrepreneurial activities on social media network is the outcome of choice made by the individuals. In line with this reasoning, individuals are expected to engage differently based on their beliefs as well as the perception of others behaviour. The link between social identity and individual perception is rightly emphasized in the SCT. Individual's learning process is enabled through the social context when one's behaviour is modelled by observing and interacting with other members of the group. Therefore, individual action could be shaped by the perception of the behaviour of those within one's social group (Bandura, 2001). In the following sections, we discuss the significance of personal beliefs in terms of self-efficacy and outcome expectations and the implications of social identity on such beliefs and behaviour.

Self-efficacy

Self-efficacy is the personal belief in the ability to attain a certain level of performance or desired outcome in situation that affect one's life (Bandura, 1997). It is strongly associated with individual engagement and the differences in outcome when people with a comparable level of skills are engaged in a certain activity (Shane et al., 2003). As a salient factor of individual differences, self-efficacy reveals how belief in one's ability could account for behavioural difference. When faced with similar challenges, the former perceive opportunities for action, while the latter perceives obstacles and risks, thereby justifying the lack of action. Self-efficacy could make people feel more competent to overcome perceived obstacles and achieve expected positive outcomes. Therefore, people high in self-efficacy are likely to persist when faced with challenges and uncertainty. Self-efficacy is relevant in differentiating the choice made by individuals in their engagement in entrepreneurial activities. Individual who perceives him or herself as being capable of using social media for entrepreneurial activity is more likely to demonstrate such behaviour by choosing to adopt the platform for entrepreneurial purposes.

H1. Self-efficacy positively influences the intention to engage in social media for entrepreneurial purposes.

Outcome Expectations

Lent et al. (1994) demonstrated the relevance of SCT in student's choice of an entrepreneurial career. The study suggests the interaction between students perceived self-efficacy and outcome expectations. Specifically, individuals who have confidence in their abilities to perform certain tasks would have a favourable expectation about the outcome (Bandura, 2001). Such expectation is a reflection of one's beliefs about the consequences of a particular choice of action. Therefore, outcome expectations are the behavioural incentives, which determine engagement in a given task. When the entrepreneur perceives the social media network to be useful for attaining certain desirable outcome, he/she will develop the intention to engage in the activity.

H2. Outcome expectations positively influence the intention to engage in social media for

Social Identity

Social identity suggests that an individual's awareness of his or her membership in a group and the extent of emotional attachment to such group shapes their sense of social identity (Jiang et al., 2016). This does not only influence personal identity but also one's perception and behaviour (Haslam et al., 2009). By identifying with a particular group, an individual's behaviour will be such that conforms to other members of the group. In other words, individual's will behave according to their in-group members, but different from their out-group members. Such behaviour evolves through interaction with other members of a similar group. Through social interaction with others, individuals express their attachment to various groups, and they develop their own identity to conform to the group's

image and reputation (Baker & White, 2010; Jiang et al., 2016). Therefore, people who are members of groups that promoting products on social media are likely to develop the intention to engage in entrepreneurial activities on social media network.

H3. Membership of commerce-oriented group on social media positively influences the intention to engage in social media for entrepreneurial purposes.

Entrepreneurial Capability

Entrepreneurial behaviour entails how an individual perceives innovative activity according to his/her level of autonomy and competitive aggressiveness. An important determinant of such is personal capability, which reflects the extent of an individual's innovativeness, proactive and risk-taking behaviour. Given that social media network is an innovative technology, which is characterised by some level of complexity and uncertainty, thereby individuals with high entrepreneurial capability are more likely to engage in the network for entrepreneurial purpose.

H4. Entrepreneurial capability positively influence the intention to engage in social media for entrepreneurial purposes.

Contextual Factors

Individual's engagement in entrepreneurial activities can be shaped through the contextual factors of the business and societal environments. Studies have confirmed the significant impact of educational background, perceived support and role model on individuals' decision to engage in entrepreneurial activities (Cooper and Park, 2008; Tran and Korflesch, 2016). Therefore, these contextual factors are also proposed as potential determinants of intention to engage in entrepreneurial activities on social media.

H5. Contextual factors (perceived support, educational background and role model) will positively influence the intention to engage in social media for entrepreneurial purposes.

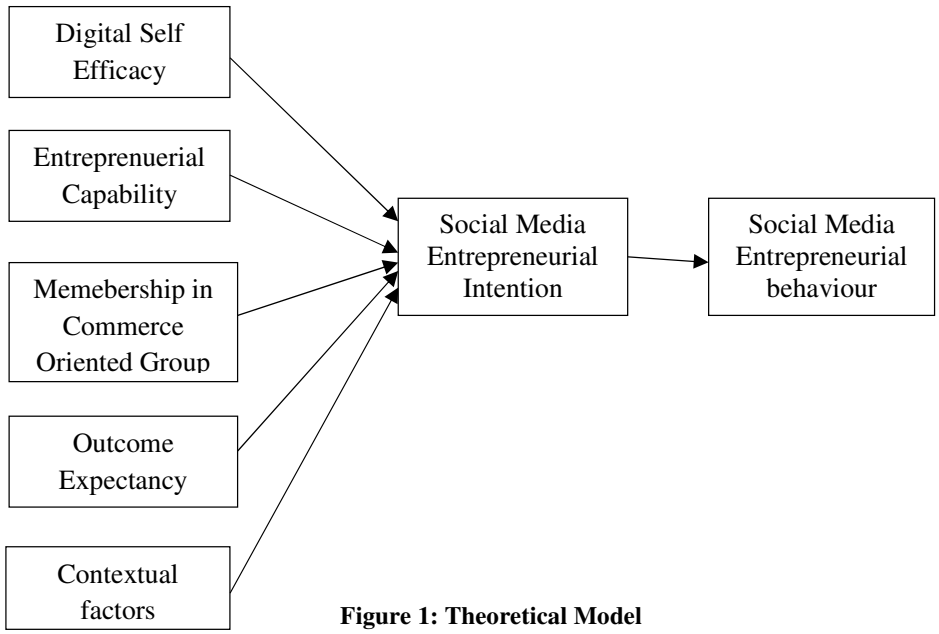

Figure 1: Theoretical Model

Proposed Methodology

This proposed study will employ a survey method in the collection of data to test the hypothesised relationships. The data will be collected from individuals across the Klang Valley area. This is the most prosperous, developed and urbanised metropolitan area in Malaysia, thereby the youth populations are expected to be more exposed to digital technology (Ojo et al., 2019). Based on the recently passed bill in the Malaysian parliament, a youth is someone between the ages of 15 to 30 years (Zainuddin and Kaur, 2019). Therefore, the respondents for this study will be from the above age groups. The questionnaire will be self-administered following the intercept survey technique. This technique is relatively easy to implement and most appropriate for enhancing the response rate for respondents from diverse backgrounds (Boateng et al., 2016; Ojo et al., 2019). In implementing the intercept technique, two research assistants will be recruited and instructed to randomly administer the questionnaires to respondents in public places like train stations, malls, etc. The collected data will be analysed using the partial least square structural equation modelling method to test the hypothesised relationships.

Discussion

This study contributes to the entrepreneurship literature by drawing on the SCT to propose a conceptual model explaining the social and cognitive factors of youth engagement in entrepreneurial activities through the social media platform. In essence, the present study situates individuals within the context of their engagement in entrepreneurial activities. Beyond the personal attributes, we proposed the social and contextual factors that could shape personal intention and behaviour towards digital entrepreneurial activities. As a result, our study addresses the need for further research on the implications of social and situational factors on human behaviour towards digital technologies (Fichman et al., 2014).

The expected findings from this study will contribute to the national initiatives on encouraging digital entrepreneurship among youths, thereby offering insights on policy development for job creation and economic growth. The findings will also contribute towards enhancing the quality of life of youths in Malaysia by identifying the factors that are essential to cultivating digital entrepreneurial mindset.

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Analysis of Key Audit Matters in DAX 30 and WIG 20 Audit Reports

Grzegorz WARZOCHA
PhD, Wroclaw University of Economics, Wroclaw, Poland,
grzegorz.warzocha@ue.wroc.pl

Kamil BUJAK
M.Sc. in Management, Finance & Computer Sciences,
kamil.bujak@avanta-audit.pl

Abstract

This research is a continuation from the earlier work of its authors on the requirements to identify and report key audit matters (further also referred to as "Key Audit Matters" or "KAM") in auditors' reports and its objective is to update, summarize and present the results of the work performed in respect of the key audit matters determined and communicated in the independent auditors' reports issued in conjunction with the audit of the 2017-2019 annual financial statements of DAX 30 and WIG 20 constituent companies. Research activities focused on reading of the reporting requirements in respect of key audit matters relating to audits of historical financial information as defined in the International Standards on Auditing (ISA) and examination of the auditors' reports issued in conjunction with the audit of the 2017-2019 annual financial statements of the DAX 30 and WIG 20 constituent companies listed on the Frankfurt Stock Exchange (Germany) and Warsaw Stock Exchange (Poland).

The main objective of the research was to confirm how the number and the nature of the Key Audit Matters for DAX 30 and WIG 20 constituent companies varied in the period covered by the research. For the purpose of the research it was tentatively assumed that both (1) the number and (2) the nature of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of DAX 30 constituent companies for the financial years 2017-2019 would vary. It was further assumed that both (3) the number and (4) the nature of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of WIG 20 constituent companies for the financial years 2017-2019 would also vary.

Keywords: Audit, Risk, Auditor's Report, Key Audit Matters.

Introduction

In accordance with the International Standards on Auditing the purpose of an audit is to enhance the degree of confidence of intended users in the financial statements. This is achieved by the expression of an opinion by the auditor on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 3).

The financial statements subject to audit are those of the entity, prepared by management of the entity with oversight from those charged with governance (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 4).

In conducting an audit of financial statements, the overall objectives of the auditor are:

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(a) to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, thereby enabling the auditor to express an opinion on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework; and
(b) to report on the financial statements, and communicate as required by the ISAs, in accordance with the auditor's findings (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 11).

Risk Assessment

In accordance with the International Standards on Auditing the auditor is also required to identify and assess the risks of material misstatement, whether due to fraud or error, at the financial statement and assertion levels (ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*, paragraph 3).

As part of the risk assessment, the auditor shall also determine whether any of the risks identified are, in the auditor's judgment, a significant risk (ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*, paragraph 27). The auditor shall treat those assessed risks of material misstatement due to fraud as significant risks (ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*, paragraph 27).

When identifying and assessing the risks of material misstatement due to fraud, the auditor shall, based on a presumption that there are risks of fraud in revenue recognition, evaluate which types of revenue, revenue transactions or assertions give rise to such risks (ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*, paragraph 26).

Areas of higher assessed risk of material misstatement, or significant risks identified in accordance with ISA 315 shall be taken by auditor into account in order to determine, from the matters communicated with those charged with governance, those matters that required significant auditor attention in performing the audit (ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report,* paragraph 9).

Determination and Communication of the Key Audit Matters

The auditor shall determine which of the matters determined in accordance with paragraph 9 of ISA 701 were of most significance in the audit of the financial statements of the current period and therefore are the key audit matters (ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report,* paragraph 10).

In accordance with paragraph 10 of ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report* the auditor shall describe each key audit matter, using an appropriate subheading, in a separate section of the auditor's report under the heading "Key Audit Matters," unless the circumstances described in further paragraphs apply.

The purpose and the methods of the research

The purpose of the research was to examine how (1) the number and (2) the nature of Key Audit Matters determined and communicated in conjunction with the audit of the annual financial statements of DAX 30 constituent companies and how (3) the number and (4) the nature of Key Audit Matters determined and communicated in conjunction with the audit of the annual financial statements of WIG 20 constituent companies for the financial years 2017-2019 varied.

It was tentatively assumed that the number (hypothesis 1) and the nature (hypothesis 2) of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of DAX 30 constituent companies for 2017-2019 would vary.

It was further assumed that the number (hypothesis 3) and the nature (hypothesis 4) of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of WIG 20 constituent companies for the financial years 2017-2019 would vary.

The research focused primarily on the examination of the auditors' reports issued and filed in 2018-2020 in conjunction with the 2017-2019 annual audits of the financial statements filed by the DAX 30 constituent companies listed on the Frankfurt Stock Exchange (Germany) and examination of the auditors' reports issued and filed in 2018-2020 in conjunction with the 2017-2019 annual audits of the financial statements filed by the WIG 20 constituent companies listed on the Warsaw Stock Exchange (Poland).

To present the results of the research work Key Audit Matters were split in the following categories:

ACC – for KAM relating to accounting policies of the entity
ACQ – for KAM relating to mergers and acquisitions
IMP – for KAM relating to impairment
IFRS – for KAM relating to application of the IFRS and changes thereto
VAL – for KAM relating to valuation
PRO – for KAM relating to provisions
REC – for KAM relating to assets recoverability
REV – for KAM relating to revenue recognition
T&L – for KAM relating to tax & legal matters
OTH – for KAM relating to other issues

Given the empirical nature of the research, priority was given to the reading of the relevant International Standards on Auditing and analysis of the selected auditor's reports. Consequently, the study concentrates less on other theoretical aspects, references to professional literature or other publications.

Results of the Research Performed

Table 1 and Table 2 attached below summarizes the results of the research performed.

Table 1: Number and nature of Key Audit Matters (DAX 30 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
ADS 2019	0	0	1	1	0	0	0	0	0	0	**2**
ADS 2018	0	0	0	1	0	0	1	0	0	0	**2**
ADS 2017	0	0	0	1	1	0	0	0	1	0	**3**
ALV 2019	0	0	0	0	2	0	0	0	0	0	**2**
ALV 2018	0	0	0	0	3	0	0	0	0	0	**3**
ALV 2017	0	0	1	0	3	0	0	0	0	0	**4**
BAS 2019	3	0	0	1	0	0	1	0	0	0	**5**
BAS 2018	1	1	0	0	0	0	1	0	0	0	**3**
BAS 2017	1	0	0	0	0	1	2	0	0	0	**4**
BAYN 2019	0	0	0	0	0	0	1	1	1	1	**4**
BAYN 2018	1	1	0	0	0	1	1	1	1	0	**6**
BAYN 2017	1	1	1	0	0	0	0	1	1	0	**5**
BEI 2019	0	0	0	0	0	0	0	1	2	0	**3**
BEI 2018	0	0	0	0	0	0	0	1	2	0	**3**
BEI 2017	0	0	0	0	0	0	0	1	2	0	**3**
BMW 2019	0	0	0	0	5	0	0	0	0	0	**5**
BMW 2018	0	0	0	0	3	0	0	0	0	0	**3**
BMW 2017	0	0	0	0	4	0	0	0	0	0	**4**
CON 2019	0	0	0	0	1	0	2	0	0	0	**3**
CON 2018	0	0	0	1	1	0	1	0	0	0	**3**
CON 2017	0	0	0	0	0	0	1	0	0	0	**1**
1COV 2019	0	0	0	0	0	0	1	0	0	0	**1**
1COV 2018	0	0	0	0	0	0	1	0	0	0	**1**
1COV 2017	1	0	0	0	0	2	1	0	0	0	**4**
DAI 2019	1	0	2	0	1	0	0	0	0	0	**4**
DAI 2018	1	0	2	0	1	0	0	0	0	0	**4**
DAI 2017	1	0	0	0	1	0	0	0	0	0	**2**
DBK 2019	0	0	1	0	1	0	0	0	1	1	**4**
DBK 2018	0	0	0	1	1	0	0	0	1	1	**4**
DBK 2017	0	0	1	0	1	0	0	0	2	1	**5**
DB1 2019	0	0	2	0	1	0	0	0	0	0	**3**
DB1 2018	0	0	2	0	1	0	0	0	0	0	**3**
DB1 2017	0	0	2	0	0	1	0	0	0	0	**3**
LHA 2019	1	0	0	1	0	1	1	1	0	0	**5**
LHA 2018	2	0	0	0	0	1	0	1	0	0	**4**
LHA 2017	1	0	0	0	0	1	0	1	0	0	**3**
DPW 2019	0	0	0	0	0	1	1	0	0	0	**2**
DPW 2018	0	0	0	1	0	1	1	0	0	0	**3**
DPW 2017	1	0	0	0	0	0	0	1	1	0	**3**
DTE 2019	0	0	0	1	0	0	1	1	0	0	**3**
DTE 2018	0	0	0	1	0	0	1	0	0	0	**2**
DTE 2017	1	0	1	0	0	0	1	1	0	0	**4**
EOAN 2019	0	1	0	0	0	0	1	0	0	0	**2**
EOAN 2018	0	1	0	0	0	1	1	0	0	0	**3**
EOAN 2017	0	1	0	0	0	1	1	0	0	1	**4**
FRE 2019	0	0	1	0	0	0	1	0	1	0	**3**
FRE 2018	1	0	1	0	1	0	0	0	0	0	**3**
FRE 2017	0	1	1	0	0	1	0	0	0	0	**3**

Source: Annual Reports of 2017-2019 DAX 30 constituent companies

Table 1 (continued)

Table 2: Number and nature of Key Audit Matters (DAX 30 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
FME 2019	0	0	0	0	1	0	1	0	0	0	**2**
FME 2018	0	1	0	0	1	0	1	0	0	0	**3**
FME 2017	0	0	1	0	0	2	0	0	0	0	**3**
HEI 2019	0	0	1	0	2	0	0	0	0	0	**3**
HEI 2018	0	0	1	0	1	0	0	0	1	0	**3**
HEI 2017	0	1	1	0	0	1	0	0	1	0	**4**
HEN3 2019	0	0	0	1	0	0	1	0	0	0	**2**
HEN3 2018	0	0	0	0	0	0	1	0	0	1	**2**
HEN3 2017	1	1	0	0	0	0	1	0	0	0	**3**
IFX 2019	0	1	1	0	0	0	0	0	0	0	**2**
IFX 2018	0	1	0	0	0	0	1	0	0	0	**2**
IFX 2017	0	0	1	0	0	0	1	0	1	0	**3**
LIN 2019	0	0	1	0	0	0	0	1	0	0	**2**
LIN 2018	0	0	0	0	0	0	2	0	0	0	**2**
LIN 2017	0	0	0	0	0	0	1	1	1	0	**3**
MRK 2019	0	0	0	0	0	1	0	0	0	0	**1**
MRK 2018	0	0	1	0	1	0	0	0	1	0	**3**
MRK 2017	0	0	1	0	2	0	0	0	1	0	**4**
MUV2 2019	0	0	0	0	3	0	0	0	0	0	**3**
MUV2 2018	0	0	0	0	3	0	0	0	0	0	**3**
MUV2 2017	0	0	0	0	3	0	0	0	0	0	**3**
RWE 2019	1	1	1	0	0	0	1	0	0	0	**4**
RWE 2018	1	0	0	0	1	0	1	0	0	0	**3**
RWE 2017	0	0	0	1	0	1	1	0	1	0	**4**
SAP 2019	1	0	0	0	0	0	1	1	1	0	**4**
SAP 2018	0	1	0	0	1	0	1	1	0	0	**4**
SAP 2017	0	0	0	0	1	0	1	1	0	0	**3**
SIE 2019	1	0	0	0	0	1	0	1	1	0	**4**
SIE 2018	0	0	0	0	0	1	0	1	1	0	**3**
SIE 2017	0	1	0	0	0	1	0	1	1	0	**4**
MTX 2019	0	0	0	0	1	0	1	1	0	0	**3**
TKA 2018	0	0	0	0	0	0	2	0	1	0	**3**
TKA 2017	0	1	0	0	0	1	1	0	1	0	**4**
VOW3 2019	1	0	0	0	0	1	2	0	0	0	**4**
VOW3 2018	2	0	0	0	1	0	2	0	0	0	**5**
VOW3 2017	2	0	1	0	0	1	1	0	0	0	**5**
VNA 2019	0	0	1	0	2	0	0	0	0	0	**3**
VNA 2018	0	0	1	0	2	0	0	0	0	0	**3**
VNA 2017	0	1	1	0	1	0	0	0	0	0	**3**
WDI 2019	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
WDI 2018	1	1	0	0	3	0	0	0	0	0	**5**
WDI 2017	0	1	0	0	2	0	1	0	0	0	**4**
Total for 2019	**9**	**3**	**12**	**5**	**20**	**5**	**17**	**8**	**7**	**2**	**88**
Total for 2018	**10**	**7**	**8**	**5**	**25**	**5**	**19**	**5**	**8**	**2**	**94**
Total for 2017	**10**	**9**	**13**	**2**	**19**	**14**	**14**	**8**	**14**	**2**	**105**

Source: Annual Reports of 2017-2019 DAX 30 constituent companies

Table 2: Number and nature of Key Audit Matters (WIG 20 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
ALR 2019	0	0	1	0	0	0	0	0	1	0	**2**
ALR 2018	0	0	1	1	0	0	0	0	1	0	**3**
ALR 2017	0	0	0	0	0	1	0	1	0	0	**2**
CCC 2019	1	3	0	0	2	0	0	0	0	0	**6**
CCC 2018	1	2	0	1	1	0	0	0	0	0	**5**
CCC 2017	0	0	0	0	1	0	0	0	0	0	**1**
CDR 2019	1	0	0	0	0	0	0	1	0	0	**2**
CDR 2018	1	0	0	0	0	0	0	1	0	0	**2**
CDR 2017	1	0	0	0	0	0	0	1	0	0	**2**
CPS 2019	0	0	1	1	0	0	0	1	1	0	**4**
CPS 2018	0	0	1	0	0	0	0	1	2	1	**5**
CPS 2017	0	0	1	0	0	0	0	1	1	0	**3**
DNP 2019	0	0	0	0	0	0	0	1	1	0	**2**
ENG 2018	1	0	1	0	0	0	0	1	2	0	**5**
ENG 2017	0	0	1	0	0	0	0	1	0	0	**2**
PLY 2019	0	0	0	0	1	0	0	0	0	0	**1**
EUR 2018	1	1	1	0	0	0	0	1	1	0	**5**
EUR 2017	0	0	0	0	0	0	0	1	0	0	**1**
JSW 2019	0	0	1	1	1	0	0	0	0	0	**3**
JSW 2018	0	0	2	0	1	0	0	0	0	0	**3**
JSW 2017	0	0	1	0	0	1	0	1	0	0	**3**
KGH 2019	1	0	0	1	1	0	1	1	0	0	**5**
KGH 2018	0	0	1	0	0	0	0	1	0	0	**2**
KGH 2017	0	0	1	0	0	0	0	1	0	0	**2**
LTS 2019	0	0	1	1	1	0	0	0	0	0	**3**
LTS 2018	0	0	1	0	1	0	0	0	0	0	**2**
LTS 2017	0	0	1	0	0	1	0	0	0	0	**2**
LPP 2019	1	0	1	1	0	0	0	0	1	1	**5**
LPP 2018	1	0	1	0	0	0	0	0	0	1	**3**
LPP 2017	1	0	1	0	0	0	0	0	0	0	**2**
MBK 2019	0	0	1	0	0	1	0	0	0	0	**2**
MBK 2018	0	1	1	0	0	1	1	0	0	1	**5**
MBK 2017	0	0	1	0	0	0	0	0	1	0	**2**
OPL 2019	0	0	1	1	0	0	1	1	0	0	**4**
OPL 2018	0	0	1	1	0	0	1	1	0	0	**4**
OPL 2017	0	0	0	0	0	0	0	1	1	0	**2**
PKO 2019	0	0	2	0	0	0	0	0	1	0	**3**
PKO 2018	0	0	2	1	0	0	0	0	0	0	**3**
PKO 2017	0	0	0	0	0	1	0	1	0	0	**2**
PGE 2019	0	0	0	0	0	0	1	0	0	0	**1**
PGE 2018	0	0	1	0	0	0	0	0	0	0	**1**
PGE 2017	0	0	1	0	0	1	0	1	0	0	**3**
PGN 2019	0	0	2	0	0	0	0	0	0	0	**2**
PGN 2018	0	0	2	0	0	0	0	0	0	0	**2**
PGN 2017	0	0	2	0	0	0	0	0	0	0	**2**
PKN 2019	0	0	0	1	0	0	1	0	0	0	**2**
PKN 2018	0	0	0	1	0	1	1	0	0	0	**3**
PKN 2017	0	0	0	0	0	1	1	0	0	0	**2**

Source: Annual Reports of 2017-2019 WIG 20 constituent companies

Table 2 (continued)

Table 2: Number and nature of Key Audit Matters (WIG 20 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
PEO 2019	0	0	1	0	0	0	0	0	1	0	**2**
PEO 2018	0	0	1	1	0	0	0	0	0	0	**2**
PEO 2017	0	0	1	0	0	0	0	0	0	0	**1**
PZU 2019	0	0	2	0	0	2	0	0	1	0	**5**
PZU 2018	0	0	2	1	1	1	0	0	1	0	**6**
PZU 2017	0	0	1	0	2	0	0	1	0	0	**4**
SPL 2019	0	0	0	0	2	1	0	0	0	0	**3**
SPL 2018	0	1	1	0	0	0	0	0	0	0	**2**
BZW 2017	0	0	1	0	0	0	0	0	0	0	**1**
TPE 2019	0	1	1	1	0	0	0	0	2	0	**5**
TPE 2018	0	0	1	0	0	0	0	0	1	0	**2**
TPE 2017	0	0	1	0	0	0	0	0	1	0	**2**
Total 2019	**4**	**4**	**15**	**8**	**8**	**4**	**4**	**5**	**9**	**1**	**62**
Total 2018	**5**	**5**	**21**	**7**	**4**	**3**	**3**	**6**	**8**	**3**	**65**
Total 2017	**2**	**0**	**14**	**0**	**3**	**6**	**1**	**11**	**4**	**0**	**41**

Source: Annual Reports of 2017-2019 WIG 20 constituent companies

Evaluation of Results

All posed hypotheses (hypothesis 1, hypothesis 2, hypothesis 3 and hypothesis 4) were tested positively in the conducted research. This is however to note that:

For hypothesis 1 (the number of the KAM for DAX 30 constituent companies) the number of KAM did not vary significantly from year to year in the period of the research (105 KAM in 2017, 94 KAM in 2018 and 88 in 2019).

For hypothesis 2 (the nature of the KAM for DAX 30 constituent companies) the nature of KAM did vary for most of KAM and periods and did not vary for other KAM and periods.

For hypothesis 3 (the number of the KAM for WIG 20 constituent companies) the number of KAM did vary significantly from year to year in 2017 and 2018 and did not vary significantly in 2018 and 2019 (41 KAM in 2017, 65 KAM in 2018 and 62 in 2019).

For hypothesis 4 (the nature of the KAM for WIG 20 constituent companies) the nature of KAM did vary to different extent for the various KAM and research period.

Conclusions and definition of further possible research areas

Based on the results of the research the authors of this paper decided to continue their work on KAM determined and communicated in annual audit reports for DAX 30 and WIG 20 and to perform comparative study for other Stock Exchange constituent companies such us but not limited to CAC 40 or FTSE 100.

In addition to the above the authors of this paper plan to perform more detailed analysis of KAM and response to risk.

References

- 2017-2019 auditors' reports of the DAX 30 constituent companies
- ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*,
- ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*
- ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*,
- ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report*

Analysis of Key Audit Matters in CAC 40 and WIG 20 Audit Reports

Grzegorz WARZOCHA

PhD, Wroclaw University of Economics, Wroclaw, Poland,
grzegorz.warzocha@ue.wroc.pl

Kamil BUJAK

M.Sc. in Management, Finance & Computer Sciences,
kamil.bujak@avanta-audit.pl

Abstract

This research is a continuation from the earlier work of its authors on the requirements to identify and report key audit matters (further also referred to as "Key Audit Matters" or "KAM") in auditors' reports and its objective is to update, summarize and present the results of the work performed in respect of the key audit matters determined and communicated in the independent auditors' reports issued in conjunction with the audit of the 2017-2019 annual financial statements of CAC 40 and WIG 20 constituent companies. Research activities focused on reading of the reporting requirements in respect of key audit matters relating to audits of historical financial information as defined in the International Standards on Auditing (ISA) and examination of the auditors' reports issued in conjunction with the audit of the 2017-2019 annual financial statements of the CAC 40and WIG 20 constituent companies listed on the Paris Stock Exchange (France) and Warsaw Stock Exchange (Poland). The main objective of the research was to confirm how the number and the nature of the Key Audit Matters for CAC 40 and WIG 20 constituent companies varied in the period covered by the research. For the purpose of the research it was tentatively assumed that both (1) the number and (2) the nature of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for the financial years 2017-2019 would vary. It was further assumed that both (3) the number and (4) the nature of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of WIG 20 constituent companies for the financial years 2017-2019 would also vary.

Keywords: Audit, Risk, Auditor's Report, Key Audit Matters.

Introduction

In accordance with the International Standards on Auditing the purpose of an audit is to enhance the degree of confidence of intended users in the financial statements. This is achieved by the expression of an opinion by the auditor on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 3).

The financial statements subject to audit are those of the entity, prepared by management of the entity with oversight from those charged with governance (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 4).

In conducting an audit of financial statements, the overall objectives of the auditor are:

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(a) to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, thereby enabling the auditor to express an opinion on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework; and
(b) to report on the financial statements, and communicate as required by the ISAs, in accordance with the auditor's findings (ISA 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, paragraph 11).

Risk Assessment

In accordance with the International Standards on Auditing the auditor is also required to identify and assess the risks of material misstatement, whether due to fraud or error, at the financial statement and assertion levels (ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*, paragraph 3).

As part of the risk assessment, the auditor shall also determine whether any of the risks identified are, in the auditor's judgment, a significant risk (ISA 315 (Revised), *Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment*, paragraph 27). The auditor shall treat those assessed risks of material misstatement due to fraud as significant risks (ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*, paragraph 27).

When identifying and assessing the risks of material misstatement due to fraud, the auditor shall, based on a presumption that there are risks of fraud in revenue recognition, evaluate which types of revenue, revenue transactions or assertions give rise to such risks (ISA 240, *The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements*, paragraph 26).

Areas of higher assessed risk of material misstatement, or significant risks identified in accordance with ISA 315 shall be taken by auditor into account in order to determine, from the matters communicated with those charged with governance, those matters that required significant auditor attention in performing the audit (ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report,* paragraph 9).

Determination and Communication of the Key Audit Matters

The auditor shall determine which of the matters determined in accordance with paragraph 9 of ISA 701 were of most significance in the audit of the financial statements of the current period and therefore are the key audit matters (ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report,* paragraph 10).

In accordance with paragraph 10 of ISA 701, *Communicating Key Audit Matters in the Independent Auditor's Report* the auditor shall describe each key audit matter, using an appropriate subheading, in a separate section of the auditor's report under the heading "Key Audit Matters," unless the circumstances described in further paragraphs apply.

The purpose and the methods of the research

The purpose of the research was to examine how (1) the number and (2) the nature of Key Audit Matters determined and communicated in conjunction with the audit of the annual financial statements of CAC 40 constituent companies and how (3) the number and (4) the nature of Key Audit Matters determined and communicated in conjunction with the audit of the annual financial statements of WIG 20 constituent companies for the financial years 2017-2019 varied.

It was tentatively assumed that the number (hypothesis 1) and the nature (hypothesis 2) of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of CAC 40 constituent companies for 2017-2019 would vary.

It was further assumed that the number (hypothesis 3) and the nature (hypothesis 4) of Key Audit Matters identified and reported in conjunction with the audit of the annual financial statements of WIG 20 constituent companies for the financial years 2017-2019 would vary.

The research focused primarily on the examination of the auditors' reports issued and filed in 2018-2020 in conjunction with the 2017-2019 annual audits of the financial statements filed by the CAC 40 constituent companies listed on the Paris Stock Exchange (France) and examination of the auditors' reports issued and filed in 2018-2020 in conjunction with the 2017-2019 annual audits of the financial statements filed by the WIG 20 constituent companies listed on the Warsaw Stock Exchange (Poland).

To present the results of the research work Key Audit Matters were split in the following categories:

ACC – for KAM relating to accounting policies of the entity
ACQ – for KAM relating to mergers and acquisitions
IMP – for KAM relating to impairment
IFRS – for KAM relating to application of the IFRS and changes thereto
VAL – for KAM relating to valuation
PRO – for KAM relating to provisions
REC – for KAM relating to assets recoverability
REV – for KAM relating to revenue recognition
T&L – for KAM relating to tax & legal matters
OTH – for KAM relating to other issues

Given the empirical nature of the research, priority was given to the reading of the relevant International Standards on Auditing and analysis of the selected auditor's reports. Consequently, the study concentrates less on other theoretical aspects, references to professional literature or other publications.

Results of the research performed

Table 1 and Table 2 attached below summarize the results of the research performed.

Table 1: Number and nature of Key Audit Matters (CAC 40 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
AC.PA 2019	0	0	1	1	1	0	0	0	0	0	3
AC.PA 2018	1	0	0	1	1	0	0	0	0	0	3
AC.PA 2017	1	0	0	0	1	0	0	0	0	0	2
AI.PA 2019	0	0	1	0	0	0	1	1	0	0	3
AI.PA 2018	0	0	1	0	0	0	1	1	0	0	3
AI.PA 2017	0	0	1	0	0	0	1	1	0	0	3
AIR.PA 2019	0	0	0	0	1	0	1	2	2	0	6
AIR.PA 2018	0	1	0	2	0	1	1	0	1	0	6
AIR.PA 2017	1	0	0	1	2	0	0	0	1	0	5
MT.AS 2019	0	0	0	0	2	0	0	0	0	0	2
MT.AS 2018	0	1	1	0	0	1	0	0	1	0	4
MT.AS 2017	0	0	1	0	1	1	0	0	1	0	4
ATO.PA 2019	0	1	0	0	3	0	0	1	0	0	5
ATO.PA 2018	1	0	0	0	2	0	0	1	1	0	5
ATO.PA 2017	0	1	0	0	3	0	0	0	0	0	4
CS.PA 2019	0	0	0	0	3	0	0	0	0	0	3
CS.PA 2018	0	1	0	0	2	0	1	0	0	0	4
CS.PA 2017	0	0	0	0	2	0	2	0	0	0	4
BNP.PA 2019	1	1	0	0	0	1	0	1	0	0	4
BNP.PA 2018	0	0	1	0	2	0	0	0	1	1	5
BNP.PA 2017	0	0	1	0	2	0	0	0	1	1	5
EN.PA 2019	1	0	0	0	1	1	0	0	0	0	3
EN.PA 2018	1	1	0	0	1	1	0	0	0	0	4
EN.PA 2017	1	0	0	0	1	1	0	0	0	0	3
CAP.PA 2019	0	0	0	0	1	0	0	0	0	0	1
CAP.PA 2018	0	0	0	0	1	1	1	1	1	0	5
CAP.PA 2017	0	0	0	0	1	1	1	1	1	0	5
CA.PA 2019	0	0	0	1	1	1	0	0	0	0	3
CA.PA 2018	0	0	0	0	1	1	0	0	0	0	2
CA.PA 2017	0	0	0	0	1	0	0	0	0	0	1
ACA.PA 2019	1	0	0	0	2	0	0	0	1	1	5
ACA.PA 2018	0	0	1	1	1	0	1	0	0	0	4
ACA.PA 2017	1	0	1	0	1	0	1	0	0	0	4
BN.PA 2019	0	0	0	0	1	0	0	1	1	0	3
BN.PA 2018	0	0	1	0	0	1	0	1	0	0	3
BN.PA 2017	0	1	1	0	0	1	0	1	0	0	4
DSY.PA 2019	0	0	1	0	0	0	0	0	1	0	2
DSY.PA 2018	0	0	1	0	0	0	0	1	1	0	3
SOLB.PA 2017	0	1	1	1	0	1	0	0	1	0	5
ENGI.PA 2019	0	0	0	0	2	0	1	1	0	0	4
ENGI.PA 2018	0	0	0	0	1	2	0	0	0	0	3
ENGI.PA 2017	0	0	0	0	0	0	0	1	0	1	2
EL.PA 2019	1	0	1	1	0	0	0	1	0	0	4
EL.PA 2018	1	0	1	1	0	0	0	1	0	0	4
EL.PA 2017	0	1	1	0	0	0	0	0	0	0	2
RMS.PA 2019	1	0	0	1	1	0	0	0	1	0	4
RMS.PA 2018	0	0	0	0	1	0	0	0	0	0	1
LHN.PA 2017	0	0	2	0	0	0	0	0	2	0	4
KER.PA 2019	0	0	1	1	1	0	0	0	1	0	4
KER.PA 2018	0	0	1	1	1	0	0	0	1	0	4
KER.PA 2017	0	0	1	0	2	0	0	0	1	0	4
OR.PA 2019	0	0	0	0	2	0	0	1	0	0	3
OR.PA 2018	0	0	0	0	2	0	0	1	0	0	3
OR.PA 2017	0	0	0	0	2	0	0	1	0	0	3
LR.PA 2019	0	0	0	0	0	0	1	0	0	0	1
LR.PA 2018	0	0	0	0	1	0	0	0	0	0	1
LR.PA 2017	0	1	0	0	1	0	0	0	0	0	2
MC.PA 2019	0	0	0	1	2	1	0	0	0	0	4
MC.PA 2018	0	0	0	0	3	1	0	0	0	0	4
MC.PA 2017	0	1	0	0	2	1	0	0	0	0	4
ML.PA 2019	0	1	1	0	0	1	0	0	1	0	4
ML.PA 2018	0	0	2	0	0	0	0	0	0	0	2
ML.PA 2017	0	0	1	0	1	0	0	0	0	0	2

Source: Annual Reports of 2017-2019 CAC 40 constituent companies

Table 1 (continued)

Table 2: Number and nature of Key Audit Matters (CAC 40 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
ORA.PA 2019	0	0	0	1	1	1	0	1	1	0	5
ORA.PA 2018	0	0	0	0	1	1	0	1	1	0	4
ORA.PA 2017	0	0	0	0	1	1	0	1	1	0	4
RI.PA 2019	0	0	0	0	1	1	1	0	1	0	4
RI.PA 2018	0	0	0	0	2	0	1	0	1	0	4
RI.PA 2017	0	0	0	0	2	0	1	0	1	0	4
UG.PA 2019	0	0	0	0	2	0	2	0	0	0	4
UG.PA 2018	0	0	0	0	2	0	2	0	0	0	4
UG.PA 2017	0	1	0	0	1	0	1	0	0	0	3
PUB.PA 2019	0	0	0	0	1	0	0	0	0	0	1
PUB.PA 2018	0	0	0	1	1	1	0	1	0	0	4
PUB.PA 2017	0	0	0	0	1	0	0	0	0	0	1
RNO.PA 2019	0	1	0	0	1	0	2	0	0	0	4
RNO.PA 2018	0	1	0	1	1	0	1	0	0	0	4
RNO.PA 2017	0	2	0	0	1	0	1	0	0	0	4
SAF.PA 2019	0	0	1	0	1	1	0	1	0	0	4
SAF.PA 2018	0	1	1	0	1	1	0	1	0	0	5
SAF.PA 2017	0	0	1	0	1	1	0	1	0	0	4
SGO.PA 2019	0	0	0	1	3	0	0	0	0	0	4
SGO.PA 2018	0	1	0	0	2	0	0	0	0	0	3
SGO.PA 2017	0	1	0	0	2	0	0	0	0	0	3
SAN.PA 2019	0	0	0	0	1	1	0	1	1	0	4
SAN.PA 2018	0	0	0	0	1	0	0	0	0	0	1
SAN.PA 2017	0	0	0	0	1	0	0	0	0	0	1
SU.PA 2019	0	0	0	0	2	1	1	0	0	0	4
SU.PA 2018	0	0	0	0	2	1	1	0	0	0	4
SU.PA 2017	0	0	0	0	2	1	1	0	0	0	4
GLE.PA 2019	0	0	0	1	1	1	1	0	0	1	5
GLE.PA 2018	0	0	1	0	2	0	1	0	0	1	5
GLE.PA 2017	0	0	1	0	2	0	1	0	0	1	5
SW.PA 2019	0	0	0	0	2	1	0	0	1	1	5
SW.PA 2018	0	0	0	0	1	0	1	0	1	1	4
SW.PA 2017	0	0	1	0	1	0	1	0	1	1	5
STM.PA 2019	0	0	0	0	1	0	1	1	0	0	3
STM.PA 2018	0	0	0	0	1	0	0	1	1	0	3
STM.PA 2017	0	0	0	0	2	0	0	1	1	0	4
FTI.PA 2019	0	0	0	0	2	0	0	1	0	0	3
FTI.PA 2018	0	0	2	0	0	0	0	1	0	0	3
FTI.PA 2017	0	1	1	0	0	0	0	1	0	0	3
FP.PA 2019	0	0	1	0	0	0	0	0	0	1	2
FP.PA 2018	0	1	1	0	0	1	0	0	0	0	3
FP.PA 2017	0	0	1	0	0	1	0	0	0	0	2
URW.AS 2019	1	1	0	0	1	0	0	0	0	0	3
URW.AS 2018	1	1	0	0	1	0	0	0	0	0	3
URW.AS 2017	1	0	0	0	1	0	0	0	0	0	2
HO.PA 2019	0	1	0	0	1	0	0	1	0	0	3
FR.PA 2018	1	0	1	0	0	1	0	0	0	0	3
FR.PA 2017	1	0	1	0	0	1	0	0	0	0	3
VIE.PA 2019	0	0	1	1	0	0	1	0	1	0	4
VIE.PA 2018	0	0	2	0	0	0	0	0	2	0	4
VIE.PA 2017	0	0	1	0	1	1	0	0	1	0	4
DG.PA 2019	0	1	0	0	0	1	1	0	1	0	4
DG.PA 2018	0	0	0	0	1	2	0	0	0	0	3
DG.PA 2017	0	0	0	0	1	2	0	0	0	0	3
VIV.PA 2019	0	0	0	0	2	0	0	0	1	0	3
VIV.PA 2018	0	0	0	0	2	0	0	0	1	0	3
VIV.PA 2017	0	0	0	1	3	0	0	0	1	0	5
Total 2019	**6**	**7**	**9**	**10**	**47**	**13**	**14**	**15**	**15**	**4**	**140**
Total 2018	**6**	**9**	**18**	**8**	**41**	**17**	**12**	**12**	**14**	**3**	**140**
Total 2017	**6**	**11**	**18**	**3**	**46**	**14**	**11**	**9**	**14**	**4**	**136**

Source: Annual Reports of 2017-2019 CAC 40 constituent companies

Table 2: Number and nature of Key Audit Matters (WIG 20 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
ALR 2019	0	0	1	0	0	0	0	0	1	0	**2**
ALR 2018	0	0	1	1	0	0	0	0	1	0	**3**
ALR 2017	0	0	0	0	0	1	0	1	0	0	**2**
CCC 2019	1	3	0	0	2	0	0	0	0	0	**6**
CCC 2018	1	2	0	1	1	0	0	0	0	0	**5**
CCC 2017	0	0	0	0	1	0	0	0	0	0	**1**
CDR 2019	1	0	0	0	0	0	0	1	0	0	**2**
CDR 2018	1	0	0	0	0	0	0	1	0	0	**2**
CDR 2017	1	0	0	0	0	0	0	1	0	0	**2**
CPS 2019	0	0	1	1	0	0	0	1	1	0	**4**
CPS 2018	0	0	1	0	0	0	0	1	2	1	**5**
CPS 2017	0	0	1	0	0	0	0	1	1	0	**3**
DNP 2019	0	0	0	0	0	0	0	1	1	0	**2**
ENG 2018	1	0	1	0	0	0	0	1	2	0	**5**
ENG 2017	0	0	1	0	0	0	0	1	0	0	**2**
PLY 2019	0	0	0	0	1	0	0	0	0	0	**1**
EUR 2018	1	1	1	0	0	0	0	1	1	0	**5**
EUR 2017	0	0	0	0	0	0	0	1	0	0	**1**
JSW 2019	0	0	1	1	1	0	0	0	0	0	**3**
JSW 2018	0	0	2	0	1	0	0	0	0	0	**3**
JSW 2017	0	0	1	0	0	1	0	1	0	0	**3**
KGH 2019	1	0	0	1	1	0	1	1	0	0	**5**
KGH 2018	0	0	1	0	0	0	0	1	0	0	**2**
KGH 2017	0	0	1	0	0	0	0	1	0	0	**2**
LTS 2019	0	0	1	1	1	0	0	0	0	0	**3**
LTS 2018	0	0	1	0	1	0	0	0	0	0	**2**
LTS 2017	0	0	1	0	0	1	0	0	0	0	**2**
LPP 2019	1	0	1	1	0	0	0	0	1	1	**5**
LPP 2018	1	0	1	0	0	0	0	0	0	1	**3**
LPP 2017	1	0	1	0	0	0	0	0	0	0	**2**
MBK 2019	0	0	1	0	0	1	0	0	0	0	**2**
MBK 2018	0	1	1	0	0	1	1	0	0	1	**5**
MBK 2017	0	0	1	0	0	0	0	0	1	0	**2**
OPL 2019	0	0	1	1	0	0	1	1	0	0	**4**
OPL 2018	0	0	1	1	0	0	1	1	0	0	**4**
OPL 2017	0	0	0	0	0	0	0	1	1	0	**2**
PKO 2019	0	0	2	0	0	0	0	0	1	0	**3**
PKO 2018	0	0	2	1	0	0	0	0	0	0	**3**
PKO 2017	0	0	0	0	0	1	0	1	0	0	**2**
PGE 2019	0	0	0	0	0	0	1	0	0	0	**1**
PGE 2018	0	0	1	0	0	0	0	0	0	0	**1**
PGE 2017	0	0	1	0	0	1	0	1	0	0	**3**
PGN 2019	0	0	2	0	0	0	0	0	0	0	**2**
PGN 2018	0	0	2	0	0	0	0	0	0	0	**2**
PGN 2017	0	0	2	0	0	0	0	0	0	0	**2**
PKN 2019	0	0	0	1	0	0	1	0	0	0	**2**
PKN 2018	0	0	0	1	0	1	1	0	0	0	**3**
PKN 2017	0	0	0	0	0	1	1	0	0	0	**2**

Source: Annual Reports of 2017-2019 WIG 20 constituent companies

Table 2 (continued)

Table 2: Number and nature of Key Audit Matters (WIG 20 constituent companies 2017-2019)

KAM reported / Entity and year	ACC	ACQ	IMP	IFRS	VAL	PRO	REC	REV	T&L	OTH	Total
PEO 2019	0	0	1	0	0	0	0	0	1	0	**2**
PEO 2018	0	0	1	1	0	0	0	0	0	0	**2**
PEO 2017	0	0	1	0	0	0	0	0	0	0	**1**
PZU 2019	0	0	2	0	0	2	0	0	1	0	**5**
PZU 2018	0	0	2	1	1	1	0	0	1	0	**6**
PZU 2017	0	0	1	0	2	0	0	1	0	0	**4**
SPL 2019	0	0	0	0	2	1	0	0	0	0	**3**
SPL 2018	0	1	1	0	0	0	0	0	0	0	**2**
BZW 2017	0	0	1	0	0	0	0	0	0	0	**1**
TPE 2019	0	1	1	1	0	0	0	0	2	0	**5**
TPE 2018	0	0	1	0	0	0	0	0	1	0	**2**
TPE 2017	0	0	1	0	0	0	0	0	1	0	**2**
Total 2019	**4**	**4**	**15**	**8**	**8**	**4**	**4**	**5**	**9**	**1**	**62**
Total 2018	**5**	**5**	**21**	**7**	**4**	**3**	**3**	**6**	**8**	**3**	**65**
Total 2017	**2**	**0**	**14**	**0**	**3**	**6**	**1**	**11**	**4**	**0**	**41**

Source: Annual Reports of 2017-2019 WIG 20 constituent companies

Evaluation of Results

In general, all posed hypotheses (hypothesis 1, hypothesis 2, hypothesis 3 and hypothesis 4) were tested positively in the conducted research. This is however to note that:

For hypothesis 1 (the number of the KAM for CAC 40 constituent companies) the number of KAM did marginally vary from 2017 to 2018 and it did not vary in 2018 and 2019 (136 KAM in 2017, 140 KAM in 2018 and 140 in 2019).

For hypothesis 2 (the nature of the KAM for CAC 40 constituent companies) the nature of KAM did vary for most of KAM and periods, but in general they did not vary significantly.

For hypothesis 3 (the number of the KAM for WIG 20 constituent companies) the number of KAM did vary significantly from year to year in 2017 and 2018 and did not vary significantly in 2018 and 2019 (41 KAM in 2017, 65 KAM in 2018 and 62 in 2019).

For hypothesis 4 (the nature of the KAM for WIG 20 constituent companies) the nature of KAM did vary to different extent for the various KAM and research period.

Conclusions and definition of Further Possible Research Areas

Based on the results of the research the authors of this paper decided to continue their work on KAM determined and communicated in annual audit reports for CAC 40 and WIG 20 and to perform comparative study for other Stock Exchange constituent companies such us but not limited to DAX 30 or FTSE 100.

In addition to the above the authors of this paper plan to perform more detailed analysis of KAM and response to risk.

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- ISA 240, The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements
- ISA 315 (Revised), Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and Its Environment,
- ISA 701, Communicating Key Audit Matters in the Independent Auditor's Report

Satisfaction with The Work Among Tutors of Russian Higher Educational Organizations

Nelly ORLOVA
The Russian Presidential Academy of National Economy and Public Administration,
Tver branch, Tver, Russia, director@tver.ranepa.ru

Olga RUDAKOVA
The Russian Presidential Academy of National Economy and Public Administration,
Tver branch, Tver, Russia, rudakova71@yandex.ru

Artem TUFYAKOV
Tver State Technical University, Tver, Russia, kagarak@mail.ru

Abstract

The involved staff is satisfied with the working conditions in the organization, loyal to its goals and values, and ready to take action to improve its business and organizational performance. The involvement of employees in the activities of any organization contributes to the high productivity of their work, which can have a positive effect on overall performance. The study of staff satisfaction, loyalty and involvement in higher educational institutions' process is of particular interest. In these organizations, the role of involvement is especially great, as it lets employees identify with the educational institution, as well as form both standards for their behavior and a sense of responsibility for their implementation. The aim of the study is to analyze the level of satisfaction with the work among educators of Russian higher educational institutions. The paper assesses tutors' involvement in comparison with other professions; the article gives analysis concerning the degree of satisfaction with the work of Russian teachers, their willingness to move to another job, preferences for wages.
The results of the study indicate a relatively high level of Russian educators' satisfaction with their work, which was proved by more than half of those teachers who were surveyed. There is a steady decline in the number of those who are ready to change jobs or stop working altogether. The share of such employees decreased from 33% in 2006 to 20% in 2017. Teachers' requirements for the level of salaries are also growing, which can stimulate their transition to another job with poor characteristics, compared to work at a university.

Keywords: Staff Satisfaction, Staff Loyalty, Staff Involvement, Human Capital, Staff Productivity, Commitment to The Profession.

Relevance and Problem Statement

World experience demonstrates that human capital is the key to the economic success of both national economies and individual organizations. Nowadays, it is evident that a highly qualified specialist in his or her field is the most important asset of any organization. However, the effectiveness of his or her work is influenced by many factors that depend both on the organization and on the employee himself/herself. Staff involvement, which is understood as a physical, emotional and intellectual state that motivates better performance of work, acts out as one of them. The involvement of employees in the activities of the organization contributes to the high productivity of their work, which can have a positive effect on overall performance.

The relevance of the problem of tutors' satisfaction with their work is increasing in the context of modern socio-cultural challenges to higher education, which require, among other things, the formation of a new type of relationship among the participants of the educational process. On the one hand, the

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higher education system's institutions must fulfill their main purpose - to participate in the formation of students' human capital. On the other hand, higher educational institutions are rapidly turning into entrepreneurial structures which are forced to increase their efficiency and competitiveness, and it seems possible only if all scientific and pedagogical employees work effectively, and that demands their involvement.

The degree of the Problem Elaboration

The category of staff involvement attracted close scientific attention at the end of the 20th century and continues to hold it today. The first studies devoted to the problem of involvement were carried out by W. Ouchi (1981), R. Pascale and A. Athos (1981). The named authors, relying on the Japanese model of work, believed that the commitment of employees to the values of any organization favorably affects the level of their involvement, which acts out as the best way of motivation. One of the most fundamental works devoted to the mentioned problems was prepared by W. Kahn (1990). The scientist was one of the first who used the term "involvement" in scientific circulation. He interpreted involvement in terms of physical, intellectual and emotional properties and qualities of employees, which in any case can be reflected in the organization's activities. The works of such foreign scientists as T. Peters and N. Austin, M. Armstrong and A. Saks, F. Frank, R. Finnegan and C. Taylor are devoted to the study of staff involvement, as well as its essence and methodological tools to manage it. Involvement as a model of behavior for employees and their managers, in which the latter, demonstrating their leadership qualities, treat the former as equals, was studied in the works by T. Peters and N. Austin (1985). Considering theoretical and extensive practical experience, M. Armstrong (2006) proved that an employee, who is involved and who is participating in the process of the organization's activities forms an interest in the enterprise's success, which is undoubtedly acts out as an important condition for the organization's development. A. Saks (2006) researched employees' engagement, using the theory of social exchange (SET). He believed that such involvement is determined by those resources which any given organization represents, and it will be maintained until the rules of social exchange are violated (for example, the organization's management abandons the promised level of employee's support). F. Frank, R. Finnegan and C. Taylor (2004) interpreted staff engagement from the economic point of view, i.e. as the amount of effort which employees put into doing their job. They noted that the main reason for increasing involvement in any organization is the pursuit of additional profit.

It should be noted that the category of staff involvement is rarely mentioned in the Russian scientific literature, when it comes to study the labor relations' system. In the national scientific practice, the category of job satisfaction is widely used. The most in-depth studies of job satisfaction (staff involvement) were carried out in Russia by N. Alexandrova, M. Magura, M. Kurbatova and some others. In most cases, scientists have researched diagnostic tools and the ways to increase employee engagement. N. Alexandrova (2016) considers staff involvement as a result of increased satisfaction. Russian economists M. Magura and M. Kurbatova (2007) believe that it is the organizational commitment that combines such three components in its structure as identification (awareness of the organization's goals as one's own), involvement (the desire to contribute to the achievement of the organization's goals) and loyalty (emotional commitment to the organization). Interpretations of the involvement (engagement) category, which are given by V. Maslova (2012), T. Solomanidinova (2014), Yu. Melikhov (2014), are quite the same. The significant part of Russian specialists understand staff involvement as a motivation of a person to work, which is the result of internal incentive elements (needs, interests, value orientations), on the one hand, and environmental factors (external incentives that induce activity), on the other hand.

Research Results

According to the research by Gallup Institute, levels of engagement around the world can vary considering the type of job. Knowledge-based personnel, such as managers and specialists in various fields are more inclined to go about their jobs than those who are playing more routine roles, such as clerical or production workers. As it follows from the data in Figure 1, managers have the highest level

of involvement, which is about 28%. A high level of involvement characterizes the activities of specialists (doctors, lawyers, teachers, etc.), which is about 27%. The involvement level of the latter is more than double that of, for example, production and office personnel. This discrepancy is due to differences in workplace conditions that can affect engagement: the ability to speak up, expand your skills, and use a unique combination of them. For example, employees in the manufacturing or service sectors are not able to make significant changes to the working process, because their day is structured. In comparison, those employees who perform professional or managerial tasks can improve their work or their workplace more easily.

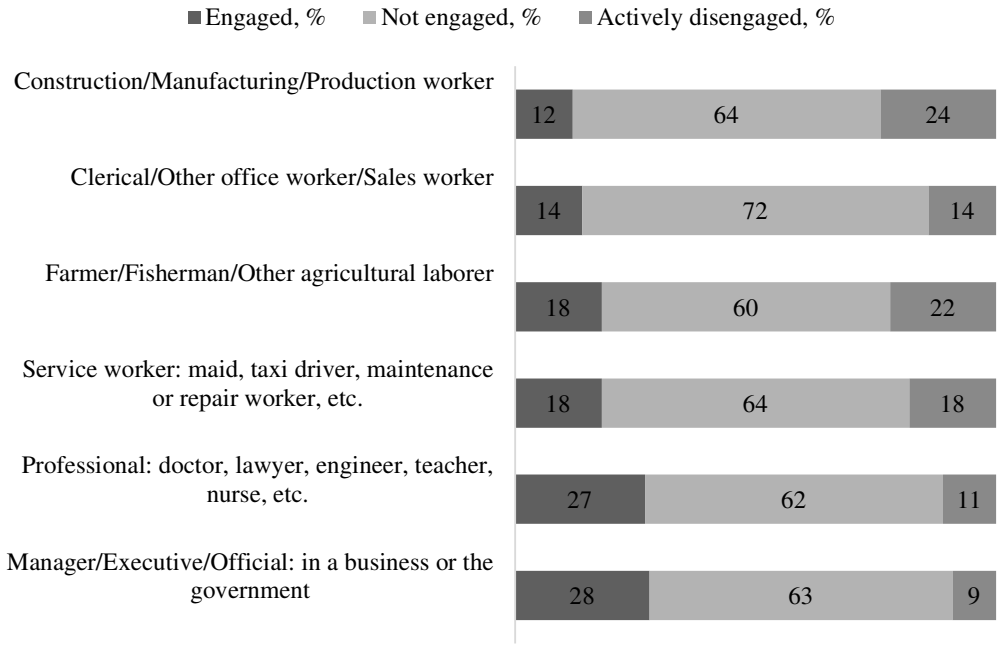

Figure 1: Staff involvement structure in some kinds of professions around the globe in 2017 (State of the Global Workplace, 2018)

The study of staff involvement in higher educational institutions is of particular interest. Emergences of a large number of higher educational institutions, their rapid transformation into entrepreneurial structures and, as a result, the growing competition between them determine the urgency of internal sources of their activities' efficiency. One of these sources is the involvement of tutors of higher educational institutions. In these organizations, the role of engagement is especially great, because it lets employees identify with the educational institution as well as form both standards of conduct and a sense of responsibility for their implementation.

The study of the tutor's attitude to his or her profession is dictated, on the one hand, by some professional standard requirements, and on the other hand, by motivation processes in the professional sphere. Engagement lets an employee "to realize commitment to the profession, to accept professional goals and values, to master the basic requirements of the profession to a person, to build a path of his or her professional development, etc." (Kalashnikov and Minyurova, 2017). Another variant of the work attitude can be the formation of professional marginalism, which manifests itself in the rejection of organizational values, the loss of a sense of commitment to the profession, the rejection of the socially acceptable professional morality for the given profession. The professional staff marginalism in some socially significant professions (educators, doctors, civil servants) is especially dangerous. In this regard, the study of the phenomenon considering the engagement of higher educational institutions' teachers is relevant and socially urgent.

Higher educational institution's staff involvement ensures the efficiency of its functioning and also fulfills its main purpose to contribute to the formation of the students' human capital. It is obvious that fulfillment of the indicators' array, by which the performance of higher educational institutions is monitored, can be difficult to provide without real engagement of scientific and pedagogical workers who supply both generation of new ideas and their practical implementation (Monitoring 2019, 2019). In this regard, the task of higher educational institutions is not only to search for eminent researchers and attract them to work, but also to support those who are already committed to the educational organization and profession, as well as to create a favorable environment for their initiatives' implementation. It should be noted that the involvement of scientific and pedagogical workers has a direct impact on the students' achievements and their attitude to the educational process. The involved tutors are dominated by values aimed at professional development, success and achievements. One of the results of tutors' activity is students' achievements. The specifics of teachers' professional activities allow them to have a significant impact on a wide segment of the society and the human capital's size.

Staff involvement, understood as a physical, emotional and intellectual state that motivates employees to work better, is one of them. Based on the increase in the of personnel's productivity, this engagement can be represented by an appropriate diagram (Fig. 2). Satisfaction means that an employee is satisfied with some or all of the working conditions in the organization and he or she intends to continue working there. Loyalty means that an employee accepts the working conditions in the organization, shares its goals and values. The staff involved is satisfied with the working conditions in the organization, loyal to its goals and values, and ready to take action to improve business and organizational performance.

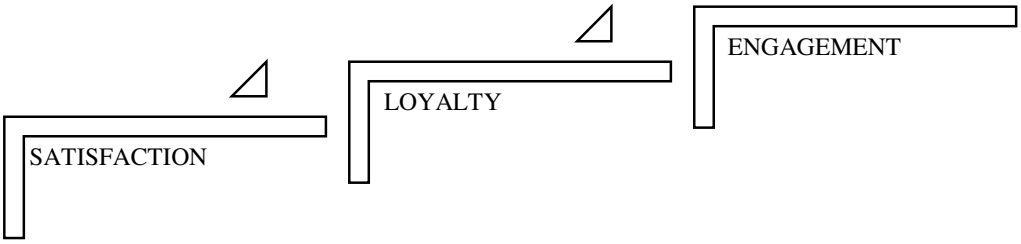

Figure 2: The process of forming staff involvement

Research results indicate a high level of educators' satisfaction with their work (Philinkova, 2015). Tutors are most satisfied with such aspects of their work as pedagogical communication, teaching a favorite subject, and interaction with students. According to a 2017 study by the Higher School of Economics, 53.7% of tutors expressed satisfaction with their work. The highest level of satisfaction was demonstrated by educators of private Russian universities - 79.3%; the lowest level of job satisfaction was shown by employees of ordinary universities - 50.1% (Fig. 3). It should be noted that the level of satisfaction which exceeds the average university level, was recorded by HSE experts among tutors of Russian creative universities - 60.0%.

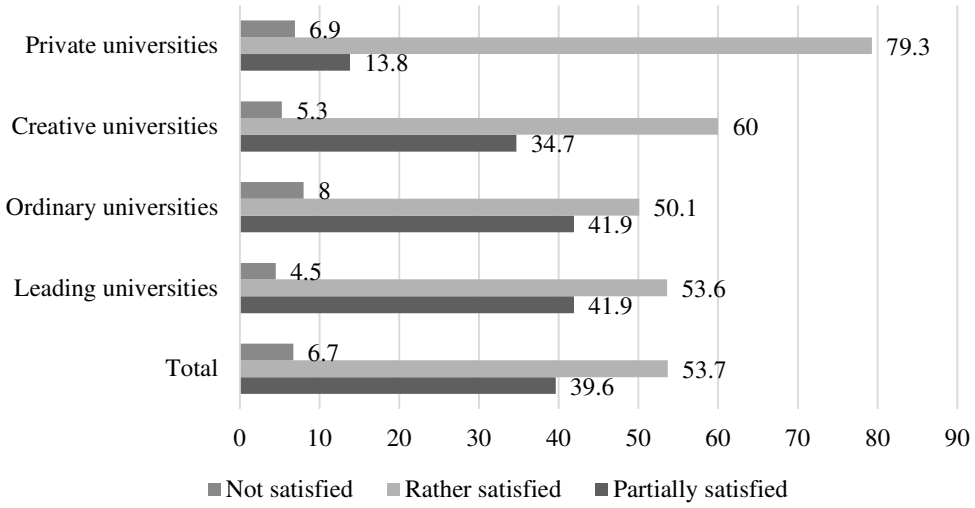

Figure 3: The level of tutors' satisfaction with the work considering the type of universities in 2017, % of the total number of educators who answered (Changes in strategies, motivations and economic behavior of students and tutors of Russian universities, 2019)

To our mind, it is important to consider job satisfaction among employees of higher educational institutions as a factor of their readiness to change jobs, since the problem of labor mobility of tutors has long ceased to be a problem of a specific educational institution, but has become a problem of state importance. The desire to change jobs should be seen as indirect evidence of dissatisfaction with it. According to the HSE, the share of full-time higher education's staff who is ready to change jobs or stop working altogether decreased from 33% in 2006 to 19% in 2014, in 2016-2018 it stabilized at the level of 20% (Fig. 4). Experts explain the attractiveness of academic employment, on the one hand, by its stability in the educational field, and by the growth of wages in this sector of the economy, on the other hand.

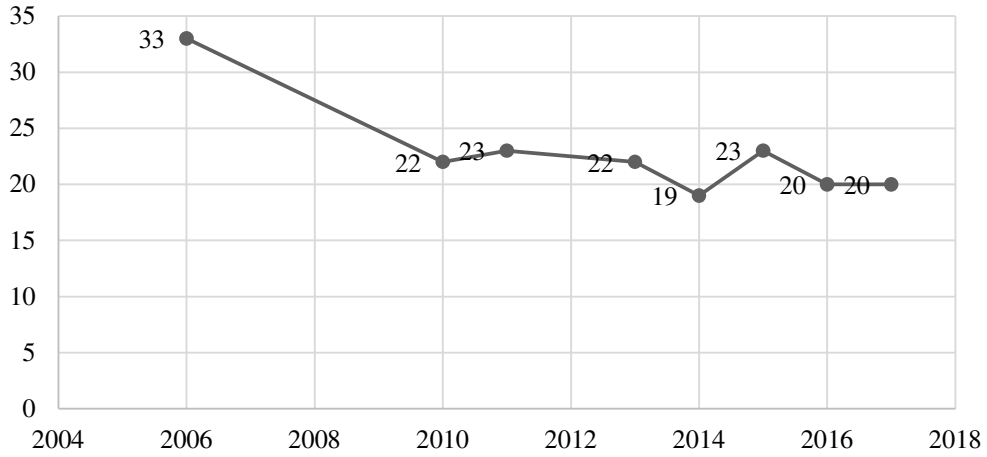

Figure 4: Willingness of tutors to move from work in the university to some other job or stop working altogether in 2006-2017, % of the total number of educators who answered (Changes in strategies, motivations and economic behavior of students and tutors of Russian universities, 2019)

Dissatisfaction with the work among tutors of higher educational institutions is associated with their willingness to look for a new job. At the same time, one group of educators understands the job change as a transition to another educational organization, and the other group considers it as a departure from the profession. It should be noted that there is a large proportion of those tutors who have not decided yet. If in 2010 they did not know, what kind of work 18.8% of tutors willing to change jobs, wanted to take, then in 2014 there was 15.2% of them, and in 2017 - 27% (Fig. 5). The share of tutors who understand a job change as a transition to another university is steadily growing: in 2010 it was 15.7%, in 2014 - 21.1%, in 2017 - 23.0%. This fact should, to our mind, be considered as evidence of the teaching profession attractiveness. However, a large proportion of educators are ready to leave the profession. Moreover, in 2010 and 2014, most of them sought to work in state institutions - 15.3% and 18.6%, respectively. According to the results of the 2017 study, only 6% of scientific and pedagogical workers gave preference to this field of activity. Non-teaching work in the private sector attracted 11.8% of tutors in 2010, 9.7% in 2014, and 10.0% in 2017.

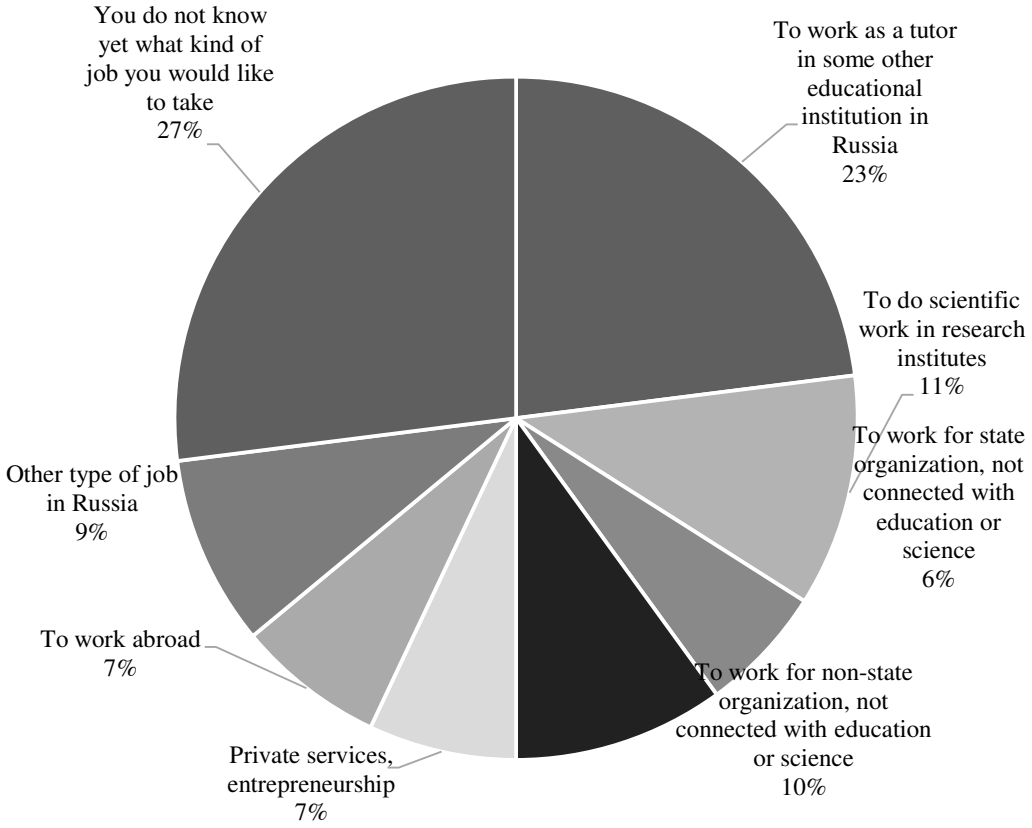

Figure 5: Tutors' preference for a new job in case of leaving the university in 2017, % of the number among full-time university tutors wishing to change jobs (Changes in strategies, motivations and economic behavior of students and tutors of Russian universities, 2019)

A huge argument when choosing a profession and willing to stay in it is a salary. Undoubtedly, it is not the only, but a quite important factor which influences the dynamics of the number of educators. As the HSE study shows, the requirements of tutors considering the level of salaries are growing, which can stimulate them to move to another job (less attractive in comparison with the current). If in 2006 46.1 thousand rubles were enough for a teacher to move to a new place of work, in 2014 the sum was 101.9 thousand rubles, and in 2017 it was 108.0 thousand rubles (Average monthly nominal accrued wages of employees for a full range of organizations as a whole in the country of the Russian Federation in 1991-2019, 2019). As Figure 6 shows, a tutor working for a leading university can move to another

place of work, if his or her future salary is more than 136.0 thousand rubles. The employees' wishes of creative and ordinary Russian universities are significantly less - 82.0 thousand rubles and 90.0 thousand rubles.

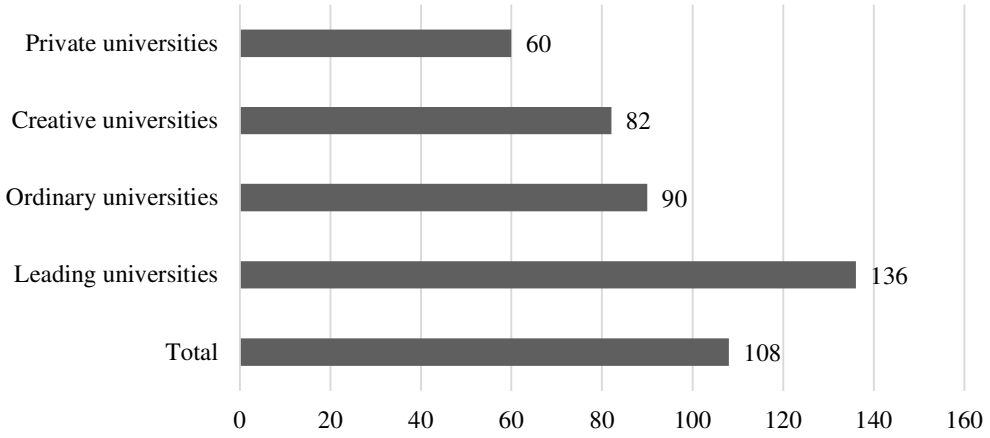

Figure 6: What is the minimum wage level you agree to move to another job with a higher salary level than yours now, if it is uncreative, monotonous work with a tight schedule, not related to physical labor, does not require high qualifications and retraining? (2017)? (Changes in strategies, motivations and economic behavior of students and tutors of Russian universities, 2019)

Conclusions and Offers

Research and development of technologies for staff involvement has become a global trend for the management community over the past twenty years. Recently, not only economic effects of its growth have been calculated, but the main factors influencing employees' engagement have also been identified. The latest experience of foreign management proves that an efficient and high-performance labor level can be achieved in those organizations whose employees are satisfied with their working conditions, who are loyal to the goals and values of the organization and who are ready to take action in order to improve their business and organizational performance. The results of the study indicate a relatively high level of Russian tutors' satisfaction with their work, which was proved by more than half of those teachers who were surveyed. There is a steady decline in the number of educators who are ready to change jobs or stop working altogether. The share of such employees decreased from 33% in 2006 to 20% in 2017. Educators' requirements for the level of salaries are also growing, which can stimulate their transition to another job with unattractive characteristics, compared to work at a university.

Research and development of technologies for staff involvement in organizations have become a global trend for the management community over the past twenty years. In our opinion, increase in the job satisfaction among scientific and pedagogical workers should be facilitated by a number of factors, such as increase in the status of an educator and the prestige of the teaching profession; strengthening measures of tutors' social protection and resource provision of their professional activities; solving issues of their material incentives; development of corporate culture of higher educational institutions; formation of stable labor collectives, etc.

It is difficult to ensure fulfillment of all those indicators, which define the effectiveness of higher educational institutions' activities, if there is no real involvement of scientific and pedagogical workers, who provide both generation of new ideas and their practical implementation. The ongoing modernization of Russian education lets create any model, aimed at the development of educators' professional potential.

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Features of Russian Corporate Culture

Olga RUDAKOVA
Orel State Institute of Culture, Russian Federation, rudakova71@yandex.ru

Yury VASYUTIN
Russian Presidential Academy of National Economy and Public Administration,
Russian Federation, y.s.vasutin@yandex.ru

Tatyana TISHCHENKOVA
Orel State Institute of Culture, Russian Federation, TishenkovaTatyana@yandex.ru

Nelly ORLOVA
The Russian Presidential Academy of National Economy and Public Administration, Tver Branch,
Russian Federation, director@tver.ranepa.ru

Abstract

As international cooperation has increased, problems related to the peculiarities of cross-cultural interaction are of importance. Significant differences between countries determine the relevance of studying the institute of corporate culture in Russia as an economic and socio-cultural phenomenon. According to domestic experts, the prerequisites for the formation of the institute of corporate culture in Russia emerged in the mid-1980s. Russian corporate culture is still being formed. Its rapid growth in our country is largely due to globalization and the desire of domestic corporations to become a part of the world economy. Russian researchers note that the formation of corporate culture in the country was influenced by and contains features of pre-revolutionary (pre-Soviet) corporate culture; the corporate culture of the Soviet period and contemporary foreign corporate culture. The research is aimed at analyzing the factors responsible for emergence of Russian corporate culture, identifying the stages of its development and defying its characteristics.

Keywords: Russian Corporate Culture, Soviet Corporate Culture, Pre-Revolutionary Corporate Culture, "Soft" Corporate Culture, "Hard" Corporate Culture, Leadership, Power.

Relevance and Statement of the Problem

Increased competition, larger amounts of information, the speed of its acquisition, as well as the rise in the role of human capital determine the importance of internal sources of efficiency of an organization. Corporate culture should be considered as one of such sources as it affects a company's operations and contributes to its ultimate success. A well-developed corporate culture encourages a rapid development of any organization. A poor corporate culture, on the contrary, can lead to crisis phenomena in companies, which can stem from a lack of necessary adjustments to the changing conditions of their internal and external environment (Annaev, 200).

Globalization processes have led to a growing interconnection and interdependence of countries. Today, countries are unlikely to remain unaffected by global economy. The increase in international cooperation (the emerging and functioning of multinational corporations that employ citizens of different states, international projects, etc.) has emphasized issues related to the peculiarities of cross-cultural interaction. There are significant corporate culture distinctions in countries.

Corporate culture in Russia cannot be considered finally-formed. Today, it is experiencing a rapid growth. Russian companies establish their own unique models of corporate culture, which differ from Western and Eastern ones, based on traditional relationships, the experience of Soviet period and demands of market economy. Current social processes emphasize the importance of studying the institute of corporate culture in Russia as an economic and socio-cultural phenomenon. Moreover, the

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issue is of particular relevance taking into consideration the development of businesses in the context of globalization and mutual influence of national and business cultures.

Degree of the Problem Elaboration

Theoretical and empirical development of the problem of corporate culture has been developed in the works of both foreign and Russian scientists. There are a significant number of monographs, scientific articles, textbooks devoted to various aspects of corporate culture. Abroad, the process of understanding the role of corporate culture in the development of an organization began in the 1930s. For instance, M. Sherif (1936) in 1936 used the concept of social norm; K. Lewin, R. Lippitt and R. White (1939) used the idea of climate in the organization in 1939. According to E. Mayo (1933), along with organizational and economic factors, employees' behavior is influenced by other non-material factors. C. Barnard (1938) discussed organizational morality, considering it as an asset for integrating cooperative and individual components of an organization. H. Simon (1964) defined the concept of organizational goal. The research into corporate culture was continued in the 1950s. M. Dalton (1966) studied the process of natural emergence of cultures and subcultures. D. Hampton (1987) and H. Trice (1984) published works on companies' traditions, rites and rituals. Large-scale research of corporate culture began in the 1980s, when it was considered as a factor of business efficiency (W. Ouchi (1981), T. Peters and R. Waterman (1982)). K. Sholts (1995) considered corporate culture as a regulatory axiological system. Significant contribution to the study of corporate culture management problems was made by G. Hofstede (1984) and E. Schein (1988).

In Russian science culture was studied by A. Gastev (1924) within the framework of the concept of scientific organization of labor in the 1920s. According to Gastev, employees' relationships require certain "cultural conventionality" that contributes to a friendly internal environment. A. Alekseev (1990), S. Belanovsky (1988), and V. Olshansky (1968) wrote about the «culture of production and labor» and «quality of working life». Researchers studied the influence of factors such as ideology, psychological climate and leadership on labor efficiency. Russian scientists began to consider the concept of corporate culture in the early 1990s. The research of this phenomenon was implemented in the works of O. Vihansky, M. Ivanov, L. Kartashova, A. Naumov, A. Prigozhin, V. Spivak, V. Tomilov, D. Shusterman, V. Shcherbina. O. Vihansky and A. Naumov (2003) define organizational culture as a set of important assumptions that are accepted by members of an organization and expressed in the values declared by this organization, which sets guidelines for employees' behavior. According to A. Prigozhin (1995), a company's efficiency is determined by the ability to combine personal needs of employees and ways to meet them within the company through a corporate culture that was specially established and embedded in the minds of employees. L. Kartashova (2001) et al. distinguish two ways to establish corporate culture: spontaneous, when corporate culture is established under the influence of unmanageable factors and processes, and scientific, which is based on scientific methods and models of its formation. V. Tomilov (2009) considers corporate culture as a mindset that determines the internal life of an organization. M. Ivanov and D. Shusterman (2004) describe corporate culture as a variety of external manifestations that significantly affect the behavior of employees. V. Spivak (2001) argues that the approach to corporate culture based on the models of developed countries is irrelevant in the Russian reality and proposes to consider domestic approaches that had developed in the Soviet period. Y. Semenov (2004), E. Scriptunova and E. Svircova (2001), T. Solomanidina (2003), V. Yadov (1987) and others ontinued the study of corporate culture.

Research Results

In Russia the transition from planned to market economy was accompanied by significant institutional changes affecting both the structure of production and the structure of socio-economic relations. It was quickly realized that successful functioning of market economy requires not only an economic and organizational basis, but also the acquisition of a new culture. At that time the key problem of the Russian economy was and continues to be the improvement of general culture of socio-economic management through the formation of corporate culture. However, a comprehensive approach to the formation of corporate culture among Russian managers was just beginning to emerge at that time.

According to domestic experts, the prerequisites for the formation of the institute of corporate culture in Russia emerged in the mid-1980s, when domestic technologies of corporate events were developed. From this moment to the present day, they distinguish several stages in the development of Russian corporate culture (Fig. 1). It becomes clear that the vector of the development of Russian corporate culture corresponds to the vector of the socio-economic development of the country. Both Russian corporate culture and Russian economic model were formed under the influence of foreign experience and domestic practice. Thus, we can talk about the formation of a special model of relationships in Russian companies.

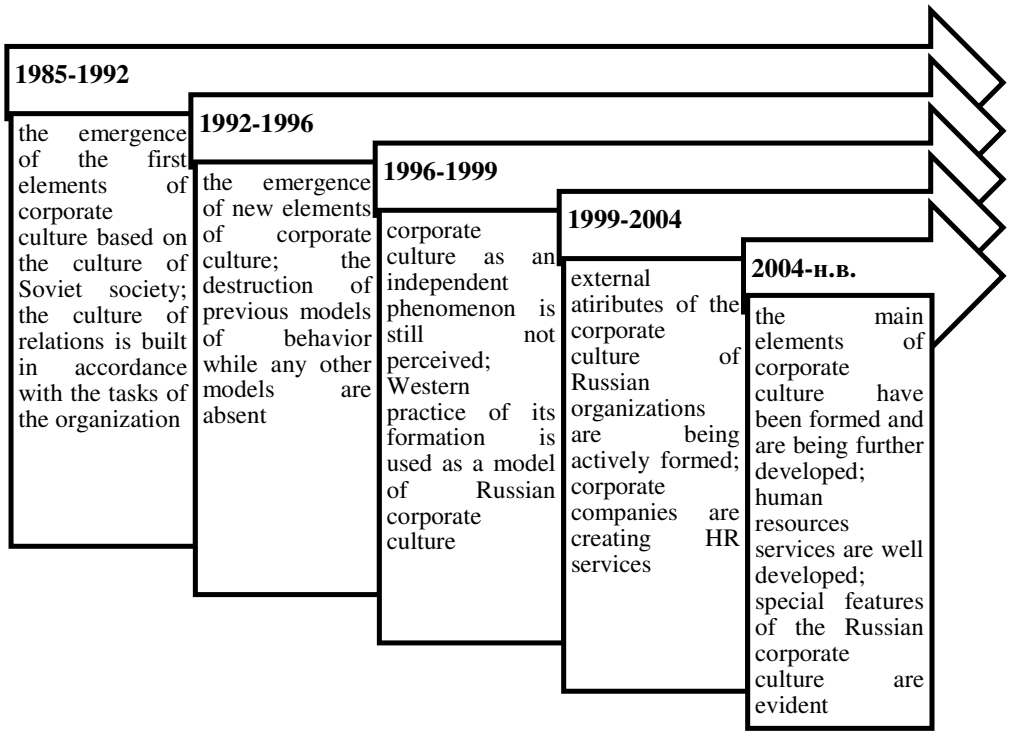

Figure 1: Stages in the development of Russian corporate culture (Govriakova, Vaganova, Vechkanova, 2015)

Russian researchers note that the formation of corporate culture in the country was influenced by and contains features of pre-revolutionary (pre-Soviet) corporate culture, the corporate culture of the Soviet period and modern foreign corporate culture (Sverdlikova, 2017). According to the study conducted in 2005-2006 by the marketing communications Agency Nextep Promotion and the PR Principle communication management Agency, it was found that during this period the main influence on the formation of the corporate culture of Russian organizations exerted foreign experience (55.8%). In many respects, the specifics of the Russian corporate culture were determined by the specifics of market relations that had developed in the country (32.6%). The traditions of Soviet corporate culture were in the third place in terms of impact (23.3%), however they did not lose their relevance. It should be noted that in Soviet times, our country had a rather distinctive corporate culture, which was based not only on the idea of working for the benefit of the state, but also on the idea of personal contribution to the formation of humane social relations and the promotion of socialist ideology in other countries. Unfortunately, the traditions of Russian business of the pre-Soviet era are hardly taken into account in the formation of modern corporate culture. And the business world of pre-revolutionary Russia had a lot of experience in building strong corporate culture and socially responsible business (Korobkova, 2015). Main factors that determined the formation of the Russian corporate culture is shown in the figure 2.

Figure 2: Major factors that have determined the formation of Russian corporate culture (Pervakova, 2012)

The Russian corporate culture is still being formed. Its rapid growth in our country is largely due to globalization and the desire of domestic corporations to become part of the world economy. According to Russian entrepreneurs, foreign business partners and consumers will consider them to be reliable partners if they have a healthy corporate culture in their companies. It should be noted that export-oriented companies and companies with foreign participation pay much more attention to corporate culture than other Russian organizations.

Today, there exist three models of corporate culture in Russia. The first model of corporate culture is characterized by the focus of top management on monitoring the employees' behavior. It is assumed that managing the employee behavior can increase their productivity and reduce risks. This model of corporate culture prescribes specific norms for each labor process. The weakening of monitoring the activities of staff entails the awakening of their true values and beliefs. The second model of corporate culture is based on a directive behavioral approach. The human resources management is based on the values of the organization formed by the owners and management of the company at the individual and collective level of employees. The third model of Russian corporate culture assumes that changes in the elements of the working environment determine changes in the system of values and behavior of personnel. The elements of the work environment that can transform the corporate culture of the organization include the transformation of office space, changing organizational principles, improving the motivational system etc.

Despite the recognition of the obvious role of corporate culture in the activities of modern organizations, the leadership of Russian companies does not always recognize this phenomenon and cultivate it. According to domestic management, the main reasons for this state of affairs are the lack of time and energy, as well as the lack of tools and good practices. The most disturbing reasons for the lack of desire to develop corporate culture are the reluctance to invest in the development of the organization and to make long term plans.

According to the study conducted by Oliver Wyman, a leading international company in the field of management consulting, in 2019, the management of Russian companies is aware of the importance of corporate culture in solving strategic tasks: 7.4 points out of 10 possible (Fig. 3). However, the attention paid by senior management of Russian companies to the development of corporate culture is relatively low: 6.4 points out of 10 possible.

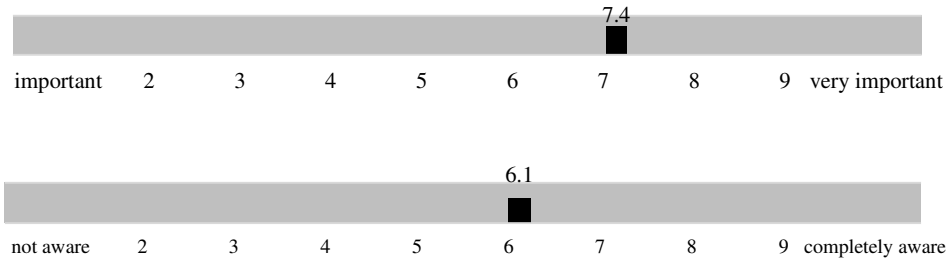

Figure 3: Russian management on the importance of corporate culture and its cultivation in the organizationи (Corporate culture in Russia

Most Russian companies are currently working on the formation and development of corporate culture in one form or another. In this regard, it is important to understand what factors make domestic entrepreneurs pay attention to the corporate culture, what goals they want to achieve with it. There are main factors and backdrop factors that make Russian companies pay attention to their corporate culture (Fig. 4). The main factors are the main reason for the formation, development and transformation of corporate culture in the organization and they come from the strategy of its development. The role of backdrop factors is also quite large; however these factors are usually due to law, traditions, stereotypes, etc.

MAIN FACTORS	BACKDROP FACTORS
• Attracting and retaining promising staff. • Promotion of client-centricity. • Formation of the company's image. • Compliance with the new working conditions.	• The embodiment of the business founder's philosophy. • Ensuring work discipline, striving for cost optimization. • Focus on commercial success. • Fraud prevention and anti-corruption.

Figure 4: Main and backdrop factors that make Russian companies pay attention to their corporate culture (Corporate culture in Russia, 2019)

According to Oliver Wyman experts, the leadership model is one of the specific features of the Russian corporate culture. The image of the Russian leader differs significantly from the Western model. The Russian leader must combine authoritarianism with progressiveness. Employees of Russian organizations believe that authoritarianism is a mandatory trait of a leader. Authoritarianism is permissible even at the expense of fairness and consistency. However, a true Russian leader should combine authoritarianism with patronage and paternalism. The elder employees prefer a strong leader of the organization. It should be noted that the authoritarian leader looks less attractive only to young employees. They are more focused on such features of the leader as knowledge, experience, creativity, and communication skills, which is much closer to the world's common leadership model. Experts from Oliver Wyman stated that the ideal leader should combine traditional Russian authoritarianism with the role of a progressive public figure. In other words, the leader is expected to combine incompatible things consistently.

Russian researchers in the field of corporate culture agree that the “red” corporate culture is predominant in Russia. Experts of the Russian consulting company ECOPSY note that the culture of strength in domestic organizations is manifested both in its “negative” voluntary” type, and in the positive type, when it is a culture of feat” (Rosin, 2018). This type of corporate culture is justified in extreme conditions; however it is absolutely ineffective “in the age of digitalization, increasing the

speed of decision-making and the transition from competition by the quality of the product to competition by the quality of teams" (Zaitsev, 2020). This type of corporate culture is widespread in traditional industries and regions, and it is much less common in such industries as telecommunications, advertising, and IT.

The concept of spiral dynamics was proposed by management consultants D. Beck and K. Kovan (2006). According to this concept, people, collectives, organizations and entire countries go through typical stages in their development, when the higher ones resemble the lower ones from an evolutionary point of view, which makes it possible to speak of spiral movement. The spiral dynamics model is a color spiral, where each color represents a different value. The company's development is based on its corporate culture, which is understood as a certain set of values and priorities. The red corporate culture or culture of power is when the main value is power, and power acts as an engine.

Another distinctive feature of Russian corporate culture, according to the research by Oliver Wyman, is that the initiative in the Russian management system at all levels always comes from the management. The management of Russian companies does not encourage initiative on the part of ordinary employees. The Western willingness of management to give subordinates more freedom in their activities and initiate innovations is not applied in Russia.

It should be noted that the "red" corporate culture for business management always uses a hierarchical management model, a significant disadvantage of which is the low initiative of the staff. The value of any initiative under this management model is considered primarily in terms of policy (the interests of the leader), and not the effectiveness of the business. The "social contract" that has developed in the Russian corporate culture is as follows: management does not expect initiative from employees, and they, in turn, do not go beyond the official regulations.

According to Oliver Wyman experts, the low level of communication in Russian companies is also a distinctive feature of the Russian corporate culture. Vertical and horizontal communication channels are present in any organization. Vertical channels are responsible for transmitting the management information and feedback. Horizontal channels are used for communication between employees and structural divisions of the same level.

As we have already noted, the "red" corporate culture for business management always uses a hierarchical management model, the disadvantages of which include lack of communication with insubordination. According to the study by Oliver Wyman the level of development of vertical and horizontal communications in Russian companies is relatively low. The problem with vertical communications is the inability of the Russian leadership to convey management information to subordinates and get feedback from them. Each next level of managers acts as a filter. According to experts, Russian managers deliberately do not share information with colleagues and subordinates. As a result the top management of the organization receives significantly distorted information about the real state of affairs. The free movement of information requires trust, openness, and priority for corporate interests. In Russian companies, there is a "deliberate restriction of access to valuable information, its retention in order to increase competitiveness and significance of self in the organization", which is a big disadvantage of the Russian management model (Corporate culture in Russia, 2019). As shown in figure 5, employees of Russian organizations rated the communication process at 3.8 points out of 10, which is the lowest indicator in the entire study of corporate culture in the country.

Figure 5: Russian managers on the effectiveness of the communication process in the organization (Corporate culture in Russia, 2019)

Corporate culture is a collective phenomenon. This is particularly evident in the Russian corporate culture. Collectivism is a national trait. The collective spirit is formally embodied in ceremonial procedures (for example, a large number of corporate events). Russian employees show a greater propensity for teamwork than European employees. As shown in figure 6, relations between employees of Russian organizations are closer to trust (7.5 points out of 10) than to circumspection. It should be noted that this is the highest indicator according to the results of a study conducted by Oliver Wyman.

In general, experts from Oliver Wyman noted the growing awareness of the importance of corporate culture in Russian organizations. The previous disregard for corporate culture gives way to a willingness to form and develop it. In the modern world organizational changes are impossible without relying on corporate culture.

Figure 6: Russian managers on employee relationships (Corporate culture in Russia, 2019)

In early 2019, Superjob, an IT company that has been developing technology for recruitment and job search for more than 20 years, conducted its research on the corporate culture of Russian organizations. The organization's experts studied the types of corporate culture that are most common in domestic companies, and studied the commitment of professional groups to these types.

Different types of corporate cultures were divided into two main types – “soft” and “hard”. The “soft” type of corporate culture is characterized by honesty in relation to staff, suppliers, consumers and competitors; the model of behavior in the organization is determined by support, mutual assistance, and trust. The “hard” type of corporate culture is based on achieving goals by any means; the behavior model is based on competition, aggression, and power.

The survey by Superjob illustrated that 64% of respondents claimed that they work in organizations with a “soft” type of corporate culture; 16% – described the type of corporate culture of the company in which they work as “hard”; 20% – found it difficult to determine the type of corporate culture (Fig. 7).

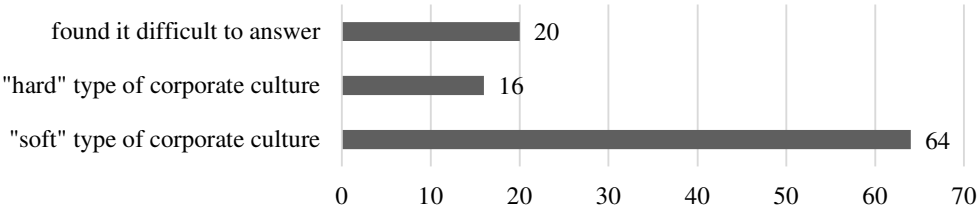

Figure 7: What type of corporate culture characterizes your company?
(Aggressive type of corporate culture is preferred by directors and sales managers, 2019)

The survey by Superjob illustrated that the majority of respondents would like to work in organizations with a “soft” type of corporate culture – 83%; a “hard” type of corporate culture would suit 5% of respondents; 12% had difficulty with their preferences (Fig. 8). It should be noted that 89% of women and 76% of men prefer a «soft» corporate culture. A “hard” type of corporate culture attracts only 2% of women and 8% of men. Eighty eight percent of respondents with an income of less than 29.9 thousand rubles prefer a “soft” type of corporate culture, while a «hard» type is acceptable for only 3%. As the income of the respondents increases to 80.0 thousand rubles, we see a tendency that the number of employees who prefer a “soft” type of corporate culture decreases to 78% and the number of supporters of a “hard” type increases to 7%.

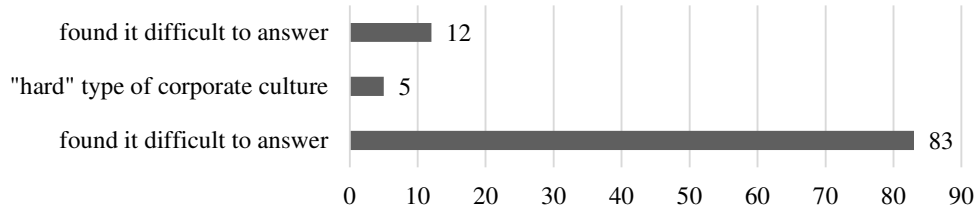

Figure 8: What type of corporate culture would You like to work with? (Aggressive type of corporate culture is preferred by directors and sales managers, 2019)

Of interest is the distribution of preferences for types of corporate culture among the 23 most popular professional groups. The "soft" type of corporate culture is preferred by architects, designers, and economists (more than 90% of all respondents). Sales managers and directors (more than 10% of all respondents) would prefer to work in companies with a "hard" corporate culture. Based on the conducted sociological research, Superjob experts claim that the "hard" type of corporate culture is preferred where there are more male employees (Aggressive type of corporate culture is preferred by directors and sales managers, 2019). The percentage of women who are supporters of this type of corporate culture is small for all professional groups. For example, among sales managers, 12% of men and only 3% of women are supporters of an aggressive corporate culture.

Conclusions and Proposals

The formation of corporate culture in modern Russia occurs against the backdrop of incomplete market transformations in the country and the ideas of social patronage that have persisted since Soviet period. However, we argue that foreign experience has a growing influence on the formation of the corporate culture of Russian organizations. This experience is of importance as market relations in Russia are relatively young.

The combination of both Western and Eastern features in the Russian national character explains paradoxical and contradictory nature of Russian corporate culture. In our opinion, its specific nature is determined by the dramatic history of the Russian state, the vast territory of the country and its multi-ethnic society.

The paper identifies a number of characteristics of corporate culture in Russia. First, specific features of Russian corporate culture are largely determined by the leadership model.

In Russia, the predominant corporate culture is a "red" corporate culture or culture of power that relies on a strong leader. Second, initiative in the Russian management system at all levels always comes from management, initiative of employees is not encouraged. Initiative is a quality that allows an individual to act creatively. It manifests itself consciously and intentionally and requires effort. Moreover, it manifests itself only if an individual is interested in changing the existing situation. And only the leader is responsible for creating the environment necessary for the initiative of the staff. Third, Russian corporate culture is also characterized by a low level of communication. At the same time, the efficiency of vertical communications is extremely low. Relations between employees of Russian organizations are characterized by a high degree of trust. In Russian companies, informal relationships between employees often dominate formal ones. Consequently, relationships in the organization are built in accordance with unwritten rules. Documents regulating the activities of employees are declarative in nature.

Because there are certain factors, such as unfavorable socio-economic situation in the country, spiritual crisis, high unemployment, insufficient financial incentives etc., the question of establishing a Russian model of corporate culture remains open. It should be expected that in the context of globalization the traditional Eastern model of Russian corporate culture will acquire features of Western capitalist business culture.

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La Capacité Technologique Et La performance Des Entreprises: Le Rôle Médiateur De La Capacité Marketing Et Dela Transformation Digitale

Feriel GHARBI
Researcher in marketing
E-mail: ferielgharbi2@gmail.com

Afef BEN YOUSSEF *
Assistant Professor at the Higher Institute of Technological Studies of Communications of Tunis (TUNISIA). Researcher at GEneneral Mangement Studies (GEMAS)
E-mail: afefbenyoussef@yahoo.fr

Imed ZAIEM
Professor at Faculty of Economic Sciences and Management of Nabeul.
Researcher at GEneneral Mangement Studies (GEMAS)
E-mail: imedzaiem20@gmail.com

**Corresponding author*

Abstract

Objectif : L'objectif de cet article scientifique est de comprendre l'impact de la capacité technologique sur la performance des entreprises dans un contexte de transformation digitale. Cette recherche repose essentiellement sur deux courants de recherche : Le premier fait référence à la théorie du management par les ressources permettant d'étudier l'impact des nouvelles technologies sur la performance des entreprises. Le deuxième, fait référenceà la théorie psychosociale et étudie le comportement des organisations et leur attitude face aux technologies de l'information. **Conception/Méthodologie/Approche :** Suivant une perspective hypothético-déductive, ce travail repose sur deux parties. Une partie théorique rédigée pour passer en revue les travaux antérieurs portant sur les variables du modèle conceptuel. Une partie empirique, développée pour présenter la méthodologie et les résultats des données recueillies via un questionnaire. L'étude empirique a été réalisée auprès d'un échantillon de 90 entreprises tunisiennes. Nous avons étudié la purification des échelles de mesure relative aux différents concepts en utilisant des analyses en composantes principales ACP à l'aide du logiciel SPSS 23 et effectuer une analyse confirmatoire avec l'approche PLS. Enfin, nous avons testé les hypothèses de notre recherche, expliqué les résultats obtenus et déduit un ensemble d'implications managériales qui intéressent notre sujet. **Résultat :** Les résultats ont montré que la capacité technologique à un effet positif sur la capacité marketing contrairement à la transformation digitale des entreprises qui n'a pas d'effet direct sur leurs performances sur le marché. De plus, l'étude a permis de vérifier que ces deux dernières variables ont un effet médiateur entre la capacité technologique et la performance sur le marché. **Implications Managériales :** D'une part, l'influence positive de la capacité technologique sur la capacité marketing montre que les nouvelles technologies aident les entreprises à améliorer leur performance et atteindre leur objectif commercial. D'autre part, nous pouvons constater à travers notre revue de la littérature que la transformation digitale n'est pas une mise à niveau logicielle ou un projet d'amélioration de la chaîne d'approvisionnement. C'est un choc numérique planifié pour ce qui pourrait être un système raisonnablement fonctionnel. Andriole (2017). De ce fait, avoir un site internet, une page facebook, nommer un community manager ou même un directeur du digital en entreprise ne suffit pas pour dire qu'une entreprise est digitale. En plus, nous pouvons également constater que la transformation digitale touche la culture même de l'entreprisepuisqu'elle met en évidence l'apportdes IT sur la structure organisationnelle, les routines, la circulation de l'information en entreprise. Li et al. (2017)

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Originalité/Valeur : Dans certaines recherches plusieurs auteurs ont montré que les nouvelles technologies et capacités numériques continuent de dominer notre paysage économique, et que les organisations font face aujourd'hui à une surveillance accrue sur la façon dont la transformation numérique peut fournir le mécanisme d'innovation et de performance de l'entreprise. En effet, dans cette perspective, les auteurs ont montré que la capacité technologique est extrêmement utile pour les entreprises afin de connaitre une plus grande valeur commerciale au moyen d'une meilleure rentabilité, d'une meilleure productivité, d'une réduction des coûts d'exploitation, un avantage concurrentiel et d'autres mesures de performance des entreprises. Mais, des preuves pratiques indiquent qu'il est en même temps difficile et couteux d'intégrer la capacité technologique dans une infrastructure non IT. C'est autour de ces divergences que nous avons formulé notre problématique de recherche. En effet, nous cherchons à savoir :
Dans quelle mesure la capacité technologique influence-t-elle la performance sur le marché en considérant les effets médiateurs de la capacité marketing et de la transformation digitale de l'entreprise ?

Mots clés : Capacité technologique, transformation digitale, capacité marketing, performance, technologie de l'information (IT), management par les ressources (RBV).

Introduction

Massivement utilisées de nos jours, les nouvelles technologies ne cessent d'impressionner tout le monde grâce à leurs innovations aussi fréquentes et facilitant le quotidien. De facto, le changement est inévitable. Les organisations, les particuliers et leurs relations mutuelles changent. Plus que jamais, la primauté est accordée par ces deux parties aux technologies. Volle (2014) utilise le terme « iconomie » pour décrire la résonance avec cet accord technologique et sociétale actuel. Pour lui, l'«iconomie » est la société dont l'économie, les institutions et les modes de vie s'appuient sur la synergie de lamicroélectronique, du logiciel et de l'Internet. En effet, une prise de conscience des gains d'opportunités des technologies digitales se manifeste constamment, particulièrement par les organisations.

Etant un système ouvert sur son environnement, l'entreprise est supposée s'adapter aux changements fréquents du contexte dans lequel elle opère. En effet, depuis quelques décennies, les technologies d'Internet, puis le mobile et ainsi le digital ont complètement bouleversé tous les marchés. Quel que soit le secteur, les outils digitaux qui facilitent le partage de données et d'informations sont aujourd'hui au cœur des activités des entreprises. Cloud, intranet, plateformes et messageries collaboratives, solutions d'aide à la prise de décision, de relation clientèle, ERP, CRM et tant d'autres outils sont disponibles à tous managers et marketeurs. Ainsi, pour trouver des solutions pour les clients, de construire de nouveaux avantages concurrentiels, il est important d'envisager le digital non plus comme une forme d'équipement technologique mais comme une stratégie qui fait la différence. Toutefois, la diversité des opportunités du digital laisse place aux réflexions relatives aux choix et aux utilisations efficaces des solutions technologiques afin de créer de la valeur. Dans ce sens, pour Fayon et Tarter (2014), la performance d'une entreprise dépend de sa maturité digitale. Plus précisément, la réussitedépend de sa stratégie digitale clairement identifiée et de sa capacité à piloter les chantiers digitaux avec agilité et en concordance avec les marchés sur lesquels elle est implantée.
Tout en restant dans la logique du marketing digital qui se base sur les effets des nouvelles technologies, sur le comportement des consommateurs et utilisateurs de produits, notre recherche s'intéresse à étudier l'impact de la capacité technologique sur la performance sur le marché en considérant l'effet des deux variables médiatrices à savoir la capacité marketing et la transformation digitale des entreprises.

Une Revue De La Littérature Sur La Capacité Technologique

La capacité technologique décrit la capacité d'une entreprise à réunir et à déployer des ressources IT en combinaison avec les ressources d'autres entreprises (Bharadwaj, 2000). Certains chercheurs ont

soutenu que la capacité technologique est plus qu'une simple capacité qu'une entreprise possède, mais plutôt un ensemble complexe de technologie de l'information en relation avec les ressources, les compétences et les connaissances connexes qui permettent aux entreprises de coordonner les activités et d'autres ressources afin de produire les résultatssouhaités (Stoel et Muhanna, 2009).

Les entreprises ayant la capacité de planifier et d'intégrer leurs ressources en IT peuvent mieux saisir de l'information sur les clients, partager des connaissances et améliorer les processus opérationnels (Karimi et al., 2001 ; Mithas et al., 2011). Pour obtenir un bon rendement venant des ressources en technologie de l'information, les entreprises doivent créer une capacité technologique à l'échelle de l'entreprise en combinant l'infrastructure de l'IT, les compétences humaines en IT et les biens incorporels appuyés par les IT avec des ressources spécifiques a d'autres entreprises (Bharadwaj, 2000 ; Wade et Hulland, 2004). Jusqu'à maintenant, l'incidence de la capacité des technologies de l'information sur le rendement des entreprises a reçu beaucoup d'attention positive, et des études laissent entendre que les entreprises ayant une capacité technologique élevée ont tendance à surpasser leurs concurrents. (Bharadwaj, 2000 ;Mithas et coll., 2011). Dans le but de concilier l'évolution de la capacité technologique et son incidence, certaines études ont soutenu que l'avantage concurrentiel découlant de la capacité technologique dépend du fait que les entreprises tirent ou non pleinement parti de leur capacité technologique existante. (Bhatt et Grover, 2005 ; Rai et Tang 2010 ; Chen et al., 2014). Dans un environnement commercial de plus en plus digital, la capacité technologique est devenue un mécanisme important grâce auquel les entreprises peuvent créer des liens numériquesomniprésents entre les activités et les entités de la chaîne de valeur. La gestion stratégique et la littérature sur les SI indiquent que la capacité technologique est une variable latente comportant trois dimensions, à savoir la « capacité de l'infrastructure de l'TI », la « capacité de l'entreprise en IT » et la « position proactive de l'IT » (Lu et Ramamurthy, 2011). La capacité de l'infrastructure de TI désigne l'architecture, les services de gestion des données et les plateformes d'applications d'une entreprise. Cette capacité permet à une entreprise de construire un système de communication et d'intégration robuste à l'intérieur et au-delà des frontières organisationnelles. La capacité des activités en technologie de l'information est une mesure de la capacité d'une entreprise à envisager et à utiliser des ressources IT pour atteindre ses buts et ses objectifs opérationnels. L'approche proactive en matière de IT renvoie à la capacité d'une entreprise de chercher activement et constamment des façons novatrices d'utiliser les ressources IT pour cerner et créer de nouvelles idées et opportunités (Fichman, 2004).

La perspective adoptée dans la plupart des études est qu'une entreprise ayant une capacité technologique élevée devrait démontrer une capacité accrue dans chacune des trois dimensions.

Des recherches sur les systèmes d'informations continuent de remettre en question l'incidence directe de la capacité des IT sur le rendement des entreprises (Carr, 2003 ; Chen et al., 2014). Par exemple, Mithas et al. (2011) ont constaté que la capacité des technologies de l'information contribuait au rendement de l'entreprise en améliorant d'autres capacités de l'entreprise, comme la capacité de gestion de la clientèle, la capacité de gestion des processus et la capacité de gestion du rendement. En effet, les capacités informatiques permettent aux entreprises de créer un créneau de marché et de différencier leurs offres de produits dans un contexte commercial de plus en plus concurrentiel (Tan et Teo, 2000). De même, Bharadwaj (2000) a analysé le rendement des entreprises à l'aide d'une matrice de rendement fondée sur les profits et les coûts et a constaté que les entreprises ayant une capacité technologique élevée ont tendance à surpasser leurs concurrents. Ainsi, les entreprises ayant une capacité technologique plus élevée sont plus en mesure de mobiliser, de déployer et d'exploiter les ressources en IT avec d'autres ressources existantes pour obtenir un meilleur rendement.
Hypothèse 1 : La capacité technologique influence positivement la transformation digitale.

Une Revue De La Littérature Sur La Capacité Marketing

La capacité marketing a été schématisée dans la littérature en fonction de la capacité d'une entreprise à se servir des ressources disponibles pour effectuer des tâches de marketing de manière à obtenir les résultatsespérés (Morgan, Katsikeas et Vorhies, 2012). Par ailleurs, la littératuresuggère que les

capacités marketing sont particulièrementprécieuses, inimitable et non substituable permettant de créer un avantage concurrentiel durable et améliorer la performance de l'entreprise.
Selon Vorhies et Morgan (2005) la capacité marketing désigne la pratique, la routine et le mode de travail d'une entreprise qui utilise ses ressources pour répondre aux besoins du marché et renvoie également à des processus intégratifsconçus pour reconnaître, recueillir et appliquer les connaissances et les compétencesafin d'ajouter de la valeur dans le domaine du marketing (Su et al., 2009). En effet, la capacité marketing agit comme un moteur de connexion capable de gérer un portefeuille équilibré d'offres de marché, présenter des promotions intelligentes, faciliter une gamme appropriée de prix et exposer les produits au bon moment et au bon endroit. Ces efforts de marketing soigneusement configurés et déployés peuvent transformer le sens culturel organisationnel du marché en satisfaction de la clientèle, en croissance des parts de marché et en rentabilité.

Selon (Canine et Zou, 2009) les capacités marketing se composent de trois grands groupes : La capacité externe, comme la détection du marché et le collage des canaux, la capacité interne comme la logistique intégrée et le développement technologique et les capacités qui couvrent les deux approches, comme les nouvelles capacités de développement de produits et d'exécutiondes commandes des clients. Avec la demande continue du marché, le développement rapide des technologies de l'information raccourcit le cycle de vie de produit, cependant les chercheurs en marketing ont commencé à se concentrer sur la perspective dynamique pour examiner des capacités marketing.

En outre, la capacité marketing désigne le processus d'intégration par lequel une entreprise recueille et utilise ses connaissances et ses compétences pour gérer ses ressources internes et s'adapter à l'environnement externe (Su, Tsang et Peng, 2008 ; Teece, Pisano et Shuen, 1997). Aujourd'hui plusieurs entreprises intègrent des technologies numériques comme les médias sociaux, big data, l'analytique, le cloud et les technologies mobiles pour stimuler le changement. Grace à la capacité technologique et les technologies de l'information il est devenu donc possible d'accéder à l'information et faire face à la concurrence.

Étant donné que le marketing comprend l'établissement de relations avec les clients, les technologies de l'information et les capacités du marketing jouent un rôlecomplémentaire. Par exemple, la fonction marketing est chargée de communiquer sur les produits et services de l'entreprise afin de générer la demande des clients. La fonction informatique permet la fonction marketing en fournissant des informations sur les modèles de demande, les préférences des clients via la CRM, et peut utiliser l'analyse pour identifier les besoins latents.

Ainsi, les ressources associées aux capacités informatiques et de marketing peuvent avoir un effet d'interaction (Constantin et Lusch, 1994). Par conséquent, cela peut être la preuve de l'utilisation stratégiqueet de la combinaison inimitable de ressources que la RBV suggére conduire à un avantage concurrentiel (Barney 1991). Dans le contexte marketing, ERP conserve des informations sur l'ensemble des processus opérationnels d'une entreprise en intégrant plusieurs fonctions de gestion : solution de gestion des commandes, solution de gestion des stocks, solution de gestion de la paie et de la comptabilité, solution de gestion e-commerce, solution de gestion de commerce BtoB ou BtoC. Ces informations pourraient être avantageusement utiliséesultérieurement par l'entreprise pour mieux servir les clients et mieux servir l'activité marketing de l'entreprise.

Conformément à la RBV, le fait de tirer parti des capacités des entreprises en technologie de l'information peut permettre de tirer pleinement parti des capacités de marketing. Vickery et al. (2003) soutiennent que les systèmes d'information intégrés permettent à tous les services fonctionnels (la fabrication, les achats, le marketing, la R-D, etc.) de l'entreprise d'accéder à l'information et de la transmettre.

Hypothèse 2 : La capacité technologique influence positivement la capacité marketing des entreprises.

L'apport De La Transformation Digital En Entreprise

Selon Westerman et al, (2014) Les technologies numériques telles que analytics, big data, cloud, les médias sociaux, les plateformes mobiles et les solutions intelligentes sont des innovations remodelant les modèles d'affaires de conduite et réinvestissantla façon dont les organisations sont en cours d'exécution des opérations commerciales. Selon Libert et al. (2016) la transformation digitale se réfère à des changements et des transformations qui sont entraînés et construit sur la base de technologies numériques. Tandis que les organisations transforment et évoluent constamment en réponse à l'évolution du paysage des affaires, la transformation digitale représente les changements construits sur la base des technologies numériques, marquant le début des changements uniques dans les opérations commerciales, processus d'affaires et la création de valeur. Libert et al. (2016) ont fait la distinction entre mise à niveau digital, qui est l'utilisation des technologies numériques pour accroître l'efficacité des processus d'affaires d'une entreprise, et la transformation digitale, qui se produit lorsque les technologies numériques sont utilisées pour changer radicalement l'ensemble des opérations commerciales, la création de valeur et dans certains cas de nouvelles offres de produits numériques.

Grâce à la transformation digitale, les organisations sont en mesure d'intégrer les technologies numériques dans de nombreux aspects de leurs opérations et sont également en mesure d'engager les clients avec des innovations digitales émergentes (Aral et Weill, 2007).

Par ailleurs, À mesure que la transformation numérique augmente, les entreprises sont en mesure d'améliorerleurs offresgrâce à une plus grande personnalisation, à une plus grande satisfaction de la clientèle et à une réduction des coûts de vente (Mithas et coll, 2005;Brynjolfsson et Hitt, 2000). Des étudesantérieures sur les implications des technologies numériquessuggèrent que la numérisation influence positivement le rendement des entreprises. Les entreprises qui utilisent des processus opérationnels plus numériques obtiennent de meilleurs résultatsgrâce à leurs capacités en IT (Brynjolfsson et Yang, 1997).

Hypothèse 3 : La transformations digitale influence positivement la performance de l'entreprise

La Capacité Marketing Et La Performance De l'entreprise

De nombreuses études ont examiné les effets des capacités sur la performance, et de nombreuses études ont examiné les effets d'une capacité individuelle sur le rendement de l'entreprise. Toutefois, les gestionnaires doivent connaitre les effets de diverses capacités sur le rendement lorsqu'ils tentent d'affecter des ressources pour gérer l'ensemble des capacités pertinentes à la performance sur lemarché. Outre les capacités traditionnelles de gestion de la distribution, de gestion des produits, de gestion des prix et de gestion de la promotion, les gestionnaires doivent également tenir compte des capacités de leur entreprise en matière de collecte d'information ou de gestion de la recherche et de planification générale du marketing.

- **Capacité de distribution :**

C'est la capacité de maintenir derelations solides avec les membres des différents canaux de distribution. Cela peut aider à surmonter les problèmes typiques qui se posentquotidiennement dans le monde des affaires, les modifications apportées aux processus de distribution et les intrusions périodiques des concurrents. La gestion des relations de distribution repose principalement sur le développement et le maintien de la confiance que les partenaires de la relation distribuent équitablement les avantages et travaillent à la viabilité mutuelle (Samaha et al., 2011). Conformément au cadre des capacités dynamiques, la capacité des membres du canal de travailler ensemble pendant qu'ils s'adaptent aux changements dans l'environnement peut aider à maintenir les niveaux de rendement (Teece et al., 1997). Le fait d'être confiant que la flexibilité se traduira par des rendements

équitables peut aider à maintenir des partenariats et à améliorer les performances des canaux de distribution (Yu et al., 2013).

- **Capacité de développement de nouveaux produits :**

Il s 'agit d'élargir la perspective de l'orientation du marché. Han et al. (1998), ontconstaté que le développement de nouveaux produits génère une meilleure performance. Cette relation peut être le résultat d'un monopole temporaire détenu par l'entreprises la plus innovante (Schumpeter, 1942), ou tout simplement que le nouveau produit fonctionnellement surpasse les autres produits sur le marché (O'Cass et Sok, 2012). De nombreuses étudesréalisées ont ensuite étudié le lien entre l'innovation et la performance, en constatant la relation positive dans l'industrie des machines alimentaires (Bigliardi, 2013), dans l'industrie pharmaceutique (Sorescu et al., 2003), ainsi que dans de vastes contextes d'industries de haute technologie (Wuyts et al., 2004) et des industries de basse technologie plus courantes (Noble et al., 2002).

- **Capacité de tarification :**

Pour certaines entreprises, la capacité de négocier avec les distributeurs, les détaillants ou les clients commerciaux en ce qui concerne les contrats relationnels à long terme offrent la meilleure performance. Pour les autres entreprises, la capacité de prévoir la santé économique d'un marché offre les meilleurs résultats. Toutefois, le fait de pouvoir établir le prix des produits pour signaler la qualité, le prestige et la disponibilité par rapport aux concurrents donnera généralement les meilleurs résultats (Flatten et al., 2015). Cette capacité de comprendre la discrimination par les prix et la façon dont le marché réagira aux signaux et aux changements de prix est presque un art psychologique autant qu'il est comptable. On s'attend à ce que les entreprises dont les gestionnaires sont capables de comprendre les prix obtiennent de meilleurs résultats que celles qui sont plus performantes en finance ou en comptabilité.

- **Capacité de promotion :**

La capacité de promotion comprend toutes les communications entre une entreprise et ses marchés. Les recherches récentes dans ce domaine se concentrent sur la coordination et la cohérence des messages utilisant toutes les sources médiatiques de la télévision traditionnelle, de la radio et de la presse écrite jusqu'aux médias sociaux. Cette ligne de recherche suggère qu'une plus grande intégration de la capacité de communication en marketing améliorera l'efficacité de la promotion, le rendement de la marque sur le marché et le rendement financier (Luxton et al., 2015). L'uniformité qui accompagne la capacité augmente également la performance des nouveaux produits (Chen, 2011). En outre, une communication marketing plus efficace a permis d'accroître les performances globales de l'organisation (Jerman et Završnik, 2012).

- **Capacité de recherche en marketing :**

Narver et Slater (1990) soulignent l'importance de recueillir et de diffuser des informations sur le marché et sur les concurrents de l'entreprise. Des milliers d'études ont examiné la relation entre l'orientation du marché et la performance des entreprises, en tenant compte des principaux effets, des effets médiés et des effets conditionnels dans de nombreux contextes différents.

- **Capacité de gestion du marketing :**

Dans le monde de l'entreprise, les cours des actions changeront à mesure que les capacités de gestion de l'entreprise s'amélioreront ou se détérioreront avec l'ajout ou la perte de gestionnaires clés. Au-

delà des gestionnaires individuels, la documentation sur la prise de décisions de groupe laisse entendre que la diversité de la gestion améliorera la prise de décisions parce que la diversité apporte une variété de points de vue, tient compte d'autres options et permet d'établir des critères d'évaluation. Dans la documentation sur la gestion, la diversité des sexes a été associée à une meilleure performance financière (Opstrup et Villadsen,2015).

En outre, le plus grand capital intellectuel qui provient de la diversité des antécédents scolaires, de la diversité de l'industrie et de la diversité de l'expérience internationale au sein des équipes de gestion est étroitement lié à l'augmentation de la performance de l'entreprise (Díaz- Fernández et al., 2015). Même la diversité fonctionnelle au sein des équipes de gestion peut améliorer la performance (Cannella et coll., 2008). La raison d'être de la diversité et de l'inclusion de points de vue multiples est semblable à celle des équipes sportives qui ont des joueurs compétents à des postes précis. Chaque joueur peut éduquer l'équipe pour comprendre la perspective des joueurs de l'équipe du concurrent de la même position, et peut apporter la force spécifique de cette position à l'équipe de la maison. Les équipes, qu'elles soient sportives ou de gestion, avec les joueurs les plus compétents à chaque poste, seront probablement les meilleures dans la compétition.

Chacune des capacités de marketing se rapporte positivement à la performance du marché qui à son tour conduit à la performance financière.

Hypothèse 4 : Les capacités marketing, y compris la distribution, la recherche en marketing, le produit, la promotion, la gestion du marketing et les prix influencent positivement la performance sur le marché de l'entreprise.

Modèle Conceptuel

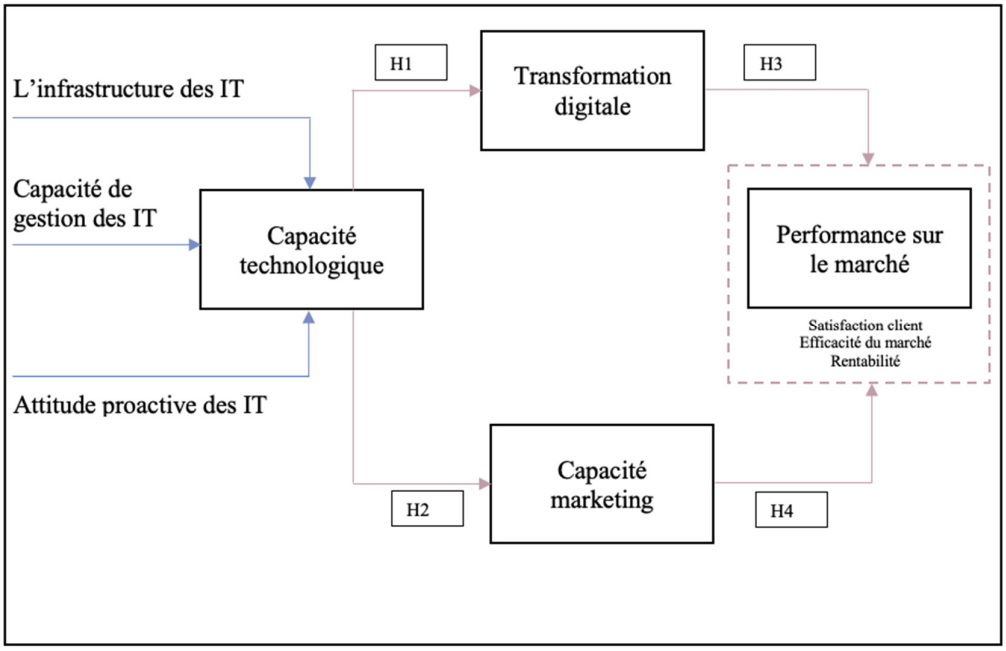

Figure 1 : La significativité des relations

Méthodologie

Cette recherche s'inscrit dans une perspective positiviste. Nous partons par un a priori théorique afin de vérifier des relations qui relient les différentes variables traitées.

Afin de répondre à notre problématique principale de recherche, nous avons suivi une démarchehypothético-déductive. Nous avons construit notre cadre conceptuel et proposer des hypothèses de recherche à partir des travaux de recherche passés.

Justification des échelles de mesures

Concept	Auteur	Source
Transformation digitale	Aral et Weill 2007	**IT Capability and Digital Transformation**
Capacité marketing	Morgan et al. 2009;Vorhies and Morgan 2005	**Big Data Resources,** [redacted] **Marketing Capabilities, andFirm Performance.**
Capacité technologique	**IT Business spanning** (Bharadwaj et al.1998 Mata et al. 1995)	**IT Capability and Digital Transformation**
Performance sur le marché	**IT Proactive stance** (Lu et Ramamurthy 2011 ; Weill et al. 2002)Morgan et al. 2009	**Big Data Resources,** [redacted] **Marketing Capabilities, andFirm Performance.**

Échantillon

Dans notre recherche, nous ne disposons pas une liste exhaustive des entreprises. Ainsi que notre recherche ne se limitera pas sur une régionprécise ou un groupe de personne précis, mais il inclut toutes les entreprises situées en Tunisie tout domaine confondu.

Le choix d'une méthode d'échantillonnagedépend de l'objectif de la recherche. Pour notre enquête, un échantillon non probabiliste est convenable.

Dans la branche de l'échantillonnage non probabiliste, nous avons choisi l'échantillonnage de convenance, comme son nom l'indique, il consiste à interroger la première personne rencontrée qui accepte de répondre et qui est capable de fournir des informations sur le sujet à étudier. Dans notre cas nous avons collecter les repenses auprès de 90 dirigeants d'entreprises située en Tunisie.

Étude Empirique

La partie empirique de notre recherche vise à présenter et discuter l'opérationnalisation empirique de notre modèle conceptuel qui a été testé sur un échantillon de 90 entreprises qui sont ou qui visent à

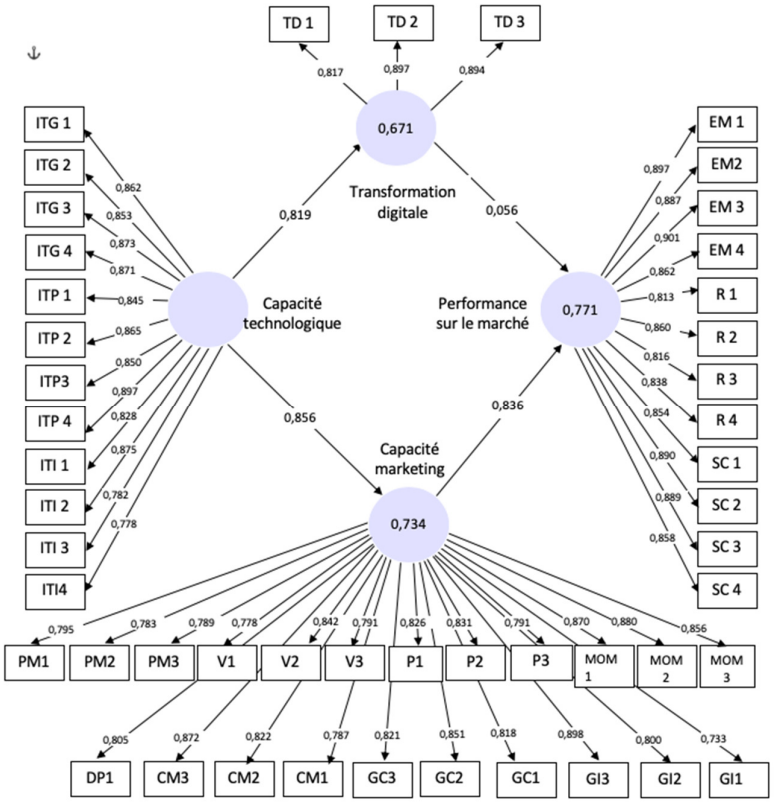

Figure 2 : Intensité des relations sur PLS

poursuivre une démarche de transformation digitale.

Pour ce faire, nous avons étudié la purification des échelles de mesure à travers l'usage de la méthode des équations structurelles, pour cela nous avons utilisé l'analyse en composante principale (ACP) via SPSS 23.

Enfin nous avons étudié la vérification des hypothèses de recherche, la validité des relations entre les différentes variables, et l'interprétation des résultats obtenus.

Après avoir utilisé la méthode PLS pour étudier l'intensité des relations entre les différentes variables,

Nous avons constaté que toutes les hypothèses de notre recherche sont validées sauf l'hypothèses 3 qui représente que la transformation digitale influence positivement la performance sur le marché et ce dû à plusieurs raisons :

- Selon Dubelaar et al (2005) les PME Africaine sont confrontées à de nombreux obstacles relatifs à leur développement, notamment en ce qui concerne la sécurité de l'information, en raison du manque de ressources humaines qualifiées. Partant de cette idée nous déduisons que dans un contexte de transformation digitale ce qui compte vraiment n'est pas seulement l'utilisation des ressources numériques, chaque entreprise qui vise à adopter une démarche de transformation digitale doit mobiliser des investissements dans les personnes, les processus et les technologies afin d'améliorer sa performance (Dehning et al., 2003). L'intégration des employés qui ne sont pas adaptés aux nouvelles technologies et ne maîtrisent pas les nouvelles tendances digitales, peuvent nuire à l'organisation et nuire à sa performance.

- Par ailleurs, la transformation digitale peut ne pas avoir un effet direct sur la performance de l'entreprise, mais, certes elle présente un effet stratégique permettant à l'entreprise d'être un Leader sur le marché. Avec l'utilisation des nouvelles tendances tel que big data, business intelligence, l'intelligence artificielle l'entreprise pourra mieux analyser la demande et mieux satisfaire sa clientèle.

- En outre, dans ce troisième argument qui explique la relation non significative entre la transformation digitale et la performance sur le marché nous mettons l'accent sur le concept de la maturité digitale des entreprises en Tunisie. Pour mieux expliquer cette idée nous allons présenter le constat de Cap Gemini (2013) sur la maturité des entreprises en matière de digital

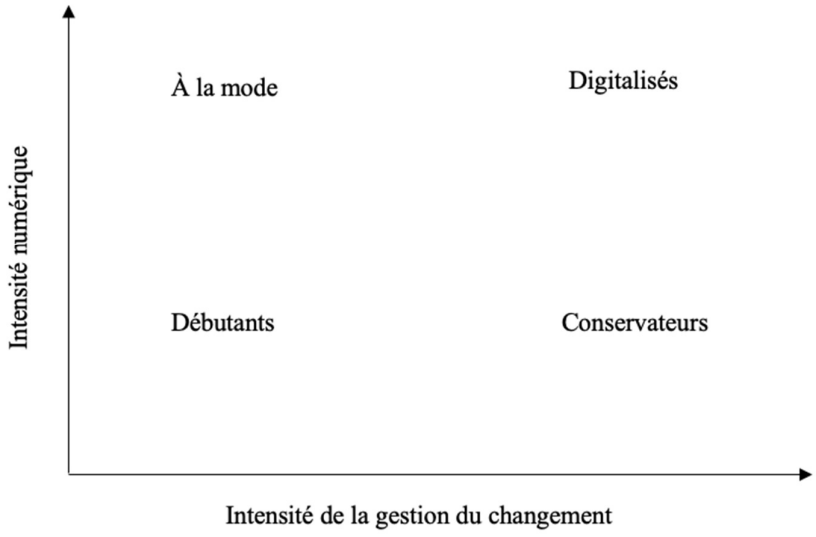

Figure 3 : Cap Gemini (2013) : La maturité digitale

- En Tunisie, nous sommes encore dans la phase « débutants » non seulement sur l'axe des outils mais aussi sur l'axe des personnes. Ce qui explique la non validité de l'hypothèse 3 de notre recherche.

CONSTATIONS

L'analyse des données recueillies à travers l'étude quantitative a révélé plusieurs résultatsintéressants.

Premièrement, nous avons constaté la forte corrélation entre les variables du modèle conceptuel et l'intensité de l'effet de la capacité technologique sur la transformation digitale et la capacité marketing des entreprises et l'effet de cette dernière sur la performance sur le marché contrairement à la faible corrélation entre la transformation digitale et la performance sur le marché de l'entreprise.

Deuxièmement, nous avons pu étudier la significativité des relations et nous avons constaté à travers l'analyse multi groupe que seule la variable exportation est significative.

Pour résumer, ce présent travail de recherche présente certaines contributions sur le plan théorique et managérial.

- Apports théoriques

Sur le plan théorique, notre travail a permis un meilleur approfondissement du concept de lacapacité technologique. Nous avons pu confirmer l'influence positive de la capacité technologique sur la transformation digitale et sur la capacité marketing des entreprises. Nous avons égalementdégagé l'influence positive de la capacité marketing sur la performance des entreprises sur le marché. Enfin, nous avons constaté la non validité de l'hypothèse H3 en Tunisie, c'est-à-dire que la transformation digitale n'a pas un effet direct sur la performance sur le marché.

- Apports manageriaux

Tout d'abord, il faut savoir que la transformation digitale n'a pas un effet immédiat, elle vise plutôt le long terme. C'est un concept complexe qui nécessite toute une architecture IT adéquate afin d'améliorer le rendement des entreprises. Outre que son impact sur la performance sur le marché, la transformation digitale et l'utilisation de nouvelles technologies numériques, comme les médias sociaux, les appareils mobiles, les outils d'analyse ou les dispositifs intégrés, peuvent aussi apporter des améliorations importantes aux activités, comme l'amélioration de l'expérience client, la rationalisation des opérations ou la création de nouveaux modèles d'affaires.

En outre, les investissements en IT peuvent êtreconsidérer comme un avantage concurrentiel incontournable pour l'entreprise. Les entreprises ayant la capacité de planifier et d'intégrer leurs ressources en IT peuvent mieux saisir de l'information sur les clients, partager des connaissances et améliorer les processus opérationnels. Par conséquent, les entreprises dotées de ressources, de connaissances et de compétences en IT sont plus susceptibles d'évoluer et d'améliorer leur performance.

Par ailleurs, le marketing digital, rassemble à toutes les pratiques marketing employées sur les supports et les canaux digitaux. Les nombreuses disciplines du marketing digital ont pour principaux objectifs de développer la relation client. Tout cela a pour but d'améliorer la notoriété de son entreprise et améliorer sa performance sur le marché. Par ailleurs, le marketing digital permet la création d'une communauté, notamment sur les réseaux sociaux, qui est totalement acquise pour sa marque. Dans d'autres contextes, il est possible de se servir de cette influence pour déclencher un

besoin chez les clients potentiels. Pour améliorer ses chances d'atteindre ses objectifs, l'idéal est de mettre en place une stratégie qui a recours à de nombreux canaux numériques. Pour se faire, plusieurs sont les méthodesappropriées, notamment le SEO, Search Engine Optimization ou optimisation pour les moteurs de recherche, SMO l'acronyme de Social Media Optimization ou Optimisation pour les Médias Sociaux qui désigne l'intégralité des techniques et actions ayant pour but de développer la notoriété de l'entreprise sur les médias sociaux. Ainsi que, le web analyse ou web analytics qui se base sur l'analyse de comportement de son audience sur son site web, dans le but de déceler les points à améliorer ou à modifier. Tout cela, son oublier l'apport des canaux traditionnels et l'impact de ces derniers sur la performance de l'entreprise.

Limites De La Recherche Et Voies De Recherches Futures

Notre recherche a des répercussions sur le volet stratégique des entreprises. Plus précisément, ce travail de recherche sera d'une importance pratique pour les gestionnaires et les cadres qui luttent pour développer et intégrer les technologies numériques à leurs processus opérationnels. Cette étuderévèle que la capacité des IT est d'une part un moteur de la transformation numérique et d'autre part une source de performance. Cette étude comble le vide et révèle que la création d'une transformation digitale grâce aux capacités existantes peut stimuler la performance sur le marché. De plus, cette étude souligne la nécessité d'être conscient de l'empreinte numérique en entreprise.

Bien que cette étude apporte un certain nombre de contributions, comme toutes les autres études de recherche, elle a aussi des limites. L'étude a utilisé un petit nombre de variables qui peuvent avoir une incidence sur la performance sur le marché. Bien que la capacité technologique joue un rôle essentiel sur le rendement des entreprises, d'autres facteurs, comme les ressources, peuvent influer sur la façon dont ces entreprises utilisent et appliquent les technologies numériques. Des études futures complètes peuvent être nécessaires,il est important de ne pas limiter la transformation digitale contexte organisationnel tout en négligeant le contexte social dans lequel le système est utilisé.

Enfin, le concept de la capacité technologique dans cette étude a été expliquer sans prendre en considération la phase de maturité digitale de l'entreprise. Ce qui peut faire l'objet d'une recherche future.

Conclusion

La transformation digitale devient un sujet de prédilection pour les entreprises du monde entier (Von Leipzig et coll. 2017). On s'attend à ce que les entreprises qui ne sont pas en mesure de s'adapter au monde numérique soient sans aucun doute victimes du « darwinisme numérique », où les titulaires peuvent disparaître et seules les entreprises les plus adaptables, sensibles aux tendances technologiques, survivra pour rester sur le paysage concurrentiel (Schwartz 2001). En Tunisie, l'histoire des progrès technologiques des entreprises a été entachée de tentatives infructueuses qui se concentrent uniquement sur les technologies sans tenir compte des grands domaines de décisionstratégique. À l'heure actuelle, il existe de nombreux exemples d'organisations incapables de suivre le rythme de la nouvelle èrenumérique et les gestionnaires manquent encore de clarté sur les considérationsstratégiques dans leurs efforts de transformation numérique (Hess et al. 2016 ; Matt et al. 2014).

De ce fait, il est généralement admis que l'utilisation des capacités technologiques peut avoir un impact positif sur la performance sur le marché si l'entreprise prépare au préalable une bonne infrastructure IT qui regroupe les biens physiques constitués des technologies de l'informatique, l'infrastructure humaine qui comprend les routines, les expériences, les compétences, les engagements, les valeurs et les normes appliquées par la main-d'œuvre de l'organisation dans la prestation des produits et services (Henderson and Venkatraman , 1993; Byrd and Turner, 2000) et les biens intangibles appuyés par les IT qui comprennent la gestion des connaissances, l'orientation

des utilisateurs et la synergie entre les intervenants comme le gouvernement, les citoyens et les fournisseurs (Bharadwaj, 2000; Bakry, 2004; Grant, 2010)

Aujourd'hui nous entendons beaucoup discuter la transformation digitale. En réalité, La stratégie de transformation digitale est d'une part un plan directeur qui aide les entreprises à gérer les transformations découlant de l'intégration des technologies numériques, ainsi que dans leurs opérationsaprès une transformation (Matt et al. 2005).

D'autre part, La transformation numérique consiste à tirer parti des technologies numériques pour apporter des améliorations importantes aux activités, comme l'amélioration de l'expérience client ou la création de nouveaux modèles d'affaires. (Piccinini et al. 2015).

Par ailleurs, la transformation numérique englobe la numérisation des processus axée sur l'efficacité et l'innovation numériqueaxée sur l'amélioration des produits physiques existants grâce aux capacitésnumériques (Bekkhus 2016).

Enfin, la transformation numérique est la transformation profonde et accélérée des activités, des processus, des compétences, et des modèles pour tirer pleinement parti des changements et des possibilitésdécoulant des technologies numériques et de leur impact dans l'ensemble de la société de façonstratégique et prioritaire (Berghaus and Back 2016).

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ANNEXE

Concept	Auteur	Source
Transformation digitale	Aral et Weill 2007	IT Capability and Digital Transformation
Capacité marketing	Morgan et al. 2009 ; Vorhies and Morgan 2005	Big Data Resources, Marketing Capabilities, andFirm Performance.
Capacité technologique	IT infrastructure (Bharadwaj et al. 1998 Ross et al. 1996 Weill et al. 2002) IT Business spanning (Bharadwaj et al.1998 Mata et al. 1995) IT Proactive stance (Lu et Ramamurthy 2011 ; Weill et al. 2002)	IT Capability and Digital Transformation
Performance sur le Marché	Morgan et al. 2009	Big Data Resources, Marketing Capabilities, andFirm Performance.

Lagged Dividend And Dividend Payout: Interacting Effect of Institutional Investors

Nur Izni ZURNI* and Norashikin ISMAIL**

* Philip Capital Management Sdn Bhd. Kuala Lumpur, Malaysia
iznizurni@gmail.com

** Faculty of Accountancy, Universiti Teknologi Mara Cawangan Selangor, Kampus PuncakAlam, Selangor Darul Ehsan, Malaysia
shikin673@uitm.edu.my)

***coressponding author*

Abstract

While shareholder activism is most prevalent in United States, Asian region too is witnessing the rise in the activism count – driven prominently by the proliferation of global institutional investors stakes in Asian companies which support activist investors. However, since institutional investors all across the globe are much more dispersed and diversified than individual investors, hence, domestic institutional investors too could be as impactful as their foreign peers in steering targets' corporate governance agenda towards the direction that they considered ideal. Yet, despite deemed to be highly capable to force corporate governance change, the influence of institutional investors on their investees' corporate governance agenda may not be as cut and dry as it appears. Moved by this premise, this study proposes models for empirical investigations into the relationship between companies' lagged dividend payout level and their current dividend payout level. The study further proposes that the institutional shareholding would weaken the relationship between companies lagged dividend payout level and their current ones.

Keywords: Lagged Dividend, Shareholder Activism, Corporate Governance, Institutional Shareholdings

Introduction

Shareholder activism is exploding and as PwC (2018) claimed, their tactics and strategies are changing. In his writing, Breitinger (2017) shared that the activism could brutally damage the targeted companies since they may be forced to take an instant triggering positive share-price action, which potentially impair the wider organization. Though shareholder activism may be prevalent now than they were in the past, but, really, as stressed by Breitinger (2017) and Wolf (2017), shareholder activism is nothing fresh – it has existed ever since shareholders have had voting rights in the companies where they hold shares. However, Breitinger (2017) explained that the circumstances were different back then - shareholding was more concentrated and exclusive, and oftentimes, the shareholders would only exert influence behind closed doors.

Basically, according to PwC (2018), what draws shareholders' activists' interest in their targeted companies is the desire to steer the company towards the direction that they perceived right. For instance, the activists may shock awake their sleepy investors, management teams before they dive too far into deep sleep, which would be detrimental to the corporate life (PwC, 2018). In some other cases, the likes of Borges & Othman (2015) and Teng (2016) pointed out, shareholder activists may provoke their target(s) when, in their eyes, the interests of the corporate participants – particularly minority shareholders - have been deprived or taken lightly.

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While shareholders activisms are greatly linked with the United States, Summerfield (2018) emphasized that the statistics reported by JP Morgan (2018) demonstrate that activism is now gaining traction in other jurisdictions too. With reference to the report, there were 106 activist campaigns took place in Asia in 2017 – versus 94 carried out in 2016 and way far back in 2011, only 10 shareholder campaigns held. In Malaysia, as Ashrafi & Muhammad (2013) mentioned, particularly after the financial crisis back in the year 1997-98 of whereby the corporate governance mechanism was restructured, the brand-new structure has activated institutional shareholders' play in the market to uplift corporate governance system, intentionally. What is, as reported in Malaysian Reserve (2017), the urge from Minority Shareholders Watchdog Group – otherwise known as MSWG - to adopt the principles of non-compulsory Malaysian Code for Institutional Investors 2014 should somehow develop the interest of the institutional investors to exert their influences on corporate governance matters.

Typically, the setting of dividend level is typically referenced to the existing payout trend. However, this may be implicit to some. For instance, as reported in The Edge Malaysia (2017), there are companies that poorly regard - some even completely denied – the shareholders' dividend rights even with institutional shareholders around, in spite being in net cash positions, had been able to embrace various financial commitments and still have excess of funds. While institutional shareholders are claimed to be hugely capable to drive corporate governance change, which includes matter pertaining to dividend decision, yet, their influences on the dividend payout decision may not be as cut and dry as it appears. This is likely to be true especially when there is historic dividend payout level – let alone if there is already a deep-rooted and solid dividend payout trend in place. This gives rise to the research into this matter – the effect that institutional shareholding has on the relationship between lagged dividend payout level and the current ones. To reach the focal objective, there are two gatekeepers that need to be passed; to determine whether lagged dividend has relationship with current dividend and whether institutional ownership has any relationship with the dividend payout level.

The remaining parts of the paper are organised as follows: section 2.0 provides the literature review and thus covers relevant accounting theory underpinning the study, and other variables hypothesize to influence dividend payout. Section 3.0 gives the proposed empirical method of the paper which the sample source of data; model specification and the proposed estimation method. Section 4.0 presents the conclusion of the paper.

Literature Review

Agency Cost Theory

Developed by Jensen & Meckling (1976), this theory suggests that, since there is a separation of ownership and control, hence, both parties to the relationship – the shareholders (principal) and managers (agent) – are likely to defend their own interests. Their interests, according to Raviv & Harris (2010) and Shaftoe (2018), may be – oftentimes are – inconsistent. Depending on the magnitude of the disagreement between their interests, it is no surprise that while some companies may only face trivial conflicts, yet, as brought up by Raviv & Harris (2010) and Matsusaka (2017) in their pieces, there are shareholders and managers who are in a hostile corporate war.

Jensen & Meckling (1976) laid out several provokes to principal-agency battles. For instance, matters pertaining to the retention of earnings and cash accessible by the managers, which also agreed by some other recent scholars such as Chung, Firth, & Kim (2005) and Rahman (2008). It is worth to recall that, as described by Jensen & Meckling (1976), the incompatibility of both parties' interests aggravates the controversy around shareholders-managers' relationship. Hence, in aligning the interests so that companies can break free from agency crisis – if that is even possible – some of the control alternatives available includes dividend distribution as shared by Parikh (2007) and Picker (2018). Point taken from by Lo, Wu, & Kweh (2017) study suggested that institutional shareholders are competent agency-relationship's regulators and therefore, should be able to press agency cost as low as practically feasible

Signaling Theory

Signalling theory, Miller & Modigliani (1961) comes to presence primarily due to asymmetric information between managers and stakeholders, specifically outside stakeholders. Considering that dividend is one of the information transporters, hence, companies would send dividend off to the market Benveniste & Spindt (1989), Stoughton & Zechner (1998) and Aggarwal & Dahiya (2000). While the underlying message behind the issuance and non-issuance of dividends is abstract, nonetheless, Lacerda & Santa-Clara (2010) suggested it is tough to neglect the predictive power of dividend.

A consistent payout level of dividend is likely to circulate meaningful information about companies' performances. It is, therefore, fairly easy to comprehend why investors find dividend-paying companies with an uptrend payout record more eye-catching than the ones with descending payout movement. (Marquit,2011) Bhargava & Chen (2012) and Brito, Pereira, & Vareda (2016) suggested while many corporate information is kept confidential, however, the constructive ones like dividend payment, are better off to be dispensed to the market.

Besides that, this theory also proposed that another credible mechanism to transmit information to the market is by having institutional investors. Ajina, Lakhal, & Soughne (2015) in their France-based research revealed that the proportion of institutional investors has a positive and significant effect on stock-market liquidity. That is, institutional investors also are credible information transmitter, just like a dividend. It is widely testified that institutional investors play huge role in transmitting information, to the degree that, Ahmad & Jusoh (2014) stated that the existence of institutional investors or large shareholders mutes the necessity to hire other tools to trumpet companies' impressive performance.

Dividend Payout Level

Among well-known types of dividend policy is a residual payout ratio, which, as Harvey (2012) described as an approach of where the dividends are paid out of earnings left over. Especially when companies are not hugely profitable and/or are seeking to establish themselves, this is likely to be an ideal approach to a dividend payment. Generally, though many income-seeking shareholders tend to fall for companies that have high dividend payout ratios' records, however, Bergmann (2016) and Kennon (2017) punctured that popular idea with their argument – high dividend payers may over-glorify their financial footing. High payout ratios are rarely sustainable and it should warn the investors that on the horizon, there could be a disappointing dividend

Lagged Dividend Payout Level

Baker, Farrelly & Edelman (1985) and Goldberg (2016) held that, commonly, dividend stability dominates managers' dividend concerns as opposed to the simple dollar figure of dividends. While it may be irrelevant for some dividend-paying companies, Plaehn (2017) argued that in most cases, trimmed dividend payout, particularly the drastic ones, typically rings weakness. According to Aivazian, Booth, & Cleary (2003) and Klein (2014), in all rationality, companies would aim to project a rock solid image – which is the polar opposite of being weak. So, in plotting an ideal trend of payout ratio based on the premise of stability, Chemmanur, Hu, & Liu (2010) and Imran (2011) were in the opinion that, historical dividend payout level(s) is(are) ideal piece(s) of building block(s) to begin with.

Institutional Shareholding

Lang & McNichols (1997) and Venkat (2014) suggested that the term 'institutional ownership" signifies the ownership stake in a company that is held by institutional investors. These institutional investors, according to OECD (2017), are major collectors of savings and suppliers of funds to the financial markets. Institutional investors are loaded with a great deal of power, typically relative to individual investors. And for that, their presence, even in isolation of the shareholding, has granted them with what Mueller (2003) defined as "power without property". Hirschman (1970) stated that these investors can exercise control over their investees and lessen the management's moral hazard

through "exit and voice" behavior. Gillian & Starks (2000) described "Exit and voice" expression, as institutional investors' exertion of control over their investor's business decisions, which can stretch from the threat to sell off their shares (exit) to the active use of their voting rights (voice) in the shareholders' meeting.

Profitability

Profitability is one of the golden keys that unlock the access to a firm's overall health status (Maverick, 2016). When we look at profitability in isolation of other influential factors to the dividend payment decision, profit-rich businesses, have a financial advantage to spoil their investors.

In relation to dividend payout, Lintner (1956) and Boyte-White (2018) agreed that companies' profitability has long been regarded as the primary measure of the company's capacity to pay dividends. According to Biery (2014), companies that bagged large net margin, especially those that outperformed the broader market, are said to have a comfortable margin of financial safety.

Solvency

Solvency as defined by Bragg (2018), is a state of financial soundness which is influential to an entity's ability to clear their financial load as they fall due. One of the prevalent measurements of a company's financial leverage is debt-to-capital ratio. Speaking about debt, Nash (2016) and Tellefsen (2017) remarked that there is a popular myth about debt - it is narrowly considered 'evil' and would effortlessly take away its dependents' life. However, debt-financing can be beneficial, particularly when a company manages to subscribe to low-interest long-term loan. The running into insolvency does not flatly lie on debt - it lies in debt-capital structure. Normally, when a company carries a high debt relative to its entire capital base, they are said to be highly leveraged , and such structured, warned Garcia (2018) and Lawrence (2016), can be detrimental.

When companies acquire fund via external debt, Bergmann (2016), Cerini and Associates (2017) and Kisava (2017) raised that, by that time, new and fixed financial liability would be created since debt covenant binds debtors to their lenders. Logically, since the dividend is taken out of a company's wealth, hence, according to Abor & Fiador (2010), there is a chance that the collateral base which supplies the lenders with the confidence to lay the asked money in the hands of their borrowers, would collapse.

The Relationship between Lagged Dividend on Dividend Payout Level

The majority of former scholars conclude that current dividend payout models their seniors (Miller & Modigliani, (1961); Baker, Farrelly, & Edelman, (1985); Pruitt & Gitman, (1991); Naceur, Goaied, & Belanes, 2006). Yet, to replicate similar prediction can be inaccurate for multiple factors. First, these studies were conducted external to Malaysia territory thus there could be geopolitical factors that have sufficient weight to influence corporate decision, dividend distribution decision included. There is a strong mutual statement made by Aivazian, Booth, & Cleary (2003) and Klein (2014) on corporate image and dividend decision. According to them, in all rationality and under normal circumstances, companies would want to be known for their solid corporate reputation. To be able to serve the intended strong image, clear, rational and consistent dividend history is one of the corporate tricks that companies can dish out to the marketplace. So, in plotting an ideal trend of payout ratio with the ambition to accomplish such image, as cited by Chemmanur, Hu, & Liu (2010) and Imran (2011), past year's dividend payout ratio is an ideal piece of building block to begin with.

The Relationship between Institutional Shareholding on Dividend Payout Level

Institutional investors, as resourceful investors, at least compared to individual investors, advantage of economies of scale in information-gathering and analysis. Therefore, in the presence of

institutional owners, the corporation is less likely to use dividends as a means of reducing agency costs. In the case of where institutional investors hold a sizable amount of share – especially the holding size that grant them a scream rather than merely a whisper, it is sensible to predict that, when the size of institutional ownership expands, the level of dividend payout reduces.

The interactive Effect of Institutional Shareholding on the Relationship between Companies' Lagged Dividend and Dividend Payout Level

Institutional shareholders holding is projected to weaken the relationship between companies' current dividend payout level and their pasts'. One of the narratives that go into the prediction is that the presence of institutional shareholders, especially with sizable stake, can ease agency hiccups which activated by ownership-management split-up.

While it may be argued that institutional shareholders – especially ones that put forward huge investment size in their investee could perform active monitoring, and as a result, their investee would gain better financial returns, the argument is flawed primarily because financial benefit is not a promising outcome when institutional shareholders take active charge of monitoring roles.

Research Methods and Sample Selection

The STUDY adopts positivist research paradigm using a hypothetical deductive methodology through testing a set of hypotheses. The data is analysed using univariate and multivariate analysis involving ordinary least squares (OLS) regression with the estimation of equation as follows:

$$PAYOUT_{i,t} = B_0 + \beta_1 LAGGED_{i,(t-1)} + \beta_2 INS_OWN + \beta_3 ROFIT_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots (1)$$

The first model, it intends to provide answers to the question of whether to lag the dividend payout level and institutional ownership have any relationship with the current dividend payout level.

The second model to unearth the interacting effect that institutional ownership could have had on the relationship between lagged dividend payout level and the current LEVEL.

$$PAYOUT_{i,t} = B_0 + \beta_1 LAGGED_{i,(t-1)} + \beta_2 INS_OWN_{i,t} + \beta_3 LAGGED_{i,(t-1)} * INS_OWN_{i,t} + \beta_4 PROFIT_{i,t} + \beta_5 LEVERAGE_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The subscripts *i* and *t* denote firms and year, respectively. Payout denotes dividend in the current year. Dividend measured as total dividends paid over the number of shares outstanding, and expressed as ringgit Malaysia (RM) per shareholding. LAGGED denotes dividend payout in the previous period. INS_OWN_i denotes institutional ownership measured as percentage of shares owned by institutional shareholders that are listed on "Top 30 Shareholding List". PROFIT is measured as Net margin and calculated as net profit over sales while leverage is calculated as total debt over total equity.

Data and Sample Companies

The model tests the research hypothesis were estimated using a sample of companies listed on the main market of Bursa Malaysia that have made cash dividend payment in the year of study and in the prior year during the investigation year 2016 and 2017. The sample companies comprises of all industry sectors except finance, real estate investment and trusts (REITS), hotels, infrastructure project companies (IPC), mining and closed funds. The second criterion for inclusion in the final sample is that the company was continuously listed during the last five year period. The requirement that companies were continuously listed ameliorates the impact of Initial Public Offering (IPO) effects on the sample. Thirdly, international evidence supports the hypothesis that in the first year after listing, IPO companies manage earnings to meet the prospectus forecasts (Teoh, Welch & Wong, 1998). In particular, Ismail and Weetman (2008) document that Malaysian IPOs, in the first year of listing manage earnings in the direction of the forecast, so that the forecast error falls within

the limit tolerated by the regulations. Ismail et al. (2013) also provide evidence that IPO companies, managed earning to meet last year dividend payment. Therefore, newly listed companies were excluded from the sample. The model will be tested using multiple regression analysis.

Conclusion

The study proposes research models of the likely effect of lagged dividend and dividend payout level. The study further proposes that there is an interacting effect of institutional shareholders on the relationship between lagged dividend and dividend payout level.

The study hypothesize the institutional investors and their shareholding size have no influence over dividend payout level. It is assumed that the dividend-paying corporations that operate within a Bursa Malaysia regulatory environment leaves no space for their institutional investors To exert any force on matter pertaining dividend payout policy. While there are many explanations that drive to such assumption, yet the noticeable one could have been, while institutional investors' stake in their investees can be regarded as a valid signaling tool, but that fact does not replace, let alone take away, the credibility of dividend to signal corporate performance to the marketplace. Well, while dividend payout level may not necessarily give a correct reflection of the payers' financial being at all time, however, one the simplest ways for companies to communicate their financial well-being and shareholder value is by saying "the dividend cheQUE is in the mail and it is at par or even superior than we issued last year." Dividends may not be a perfect signaling tool, however, the prior studies suggests that, most dividend payers believe that building a resilient and durable payout trend could send a clear, powerful message about future prospects and performance.

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Green Finance Post-Pandemic Restructuring: Mini-Overview and Approaches to Modeling Links

Igor K. KLIOUTCHNIKOV
Doctor of Economic Sciences, Professor, Research Director of the International Banking Institute, St.-Petersburg, Russia; e-mail: igorkl@list.ru

Oleg. I. KLIUCHNIKOV
PhD, Assist. Prof., International Banking Institute, Russia; e-mail: okey003@mail.ru

Olga A. MOLCHANOVA
Doctor of Economic Sciences, Professor, Saint Petersburg State University of Economics, Russia; e-mail: oamolchanova@list.ru

Abstract

Green finance is an important area of tackling environmental threats, especially those associated with climate change. The Covid-19 outbreak has drawn additional attention to green finance as an economic mechanism for creating healthy living environments. The article examines the impact of COVID-19 on the financial industry, the involvement of green finance in the economic recovery after the pandemic, towards taking into account the Paris Agreement to reduce greenhouse gas emissions and improve sustainability. The authors put forward a provision on the presence of causal links between two concepts: "green" finance and "green" economy. The article substantiates the position that the global pandemic will have a long-term impact on the attitudes of investors, governments, and the public towards financing measures to protect the environment and prevent climate change.
The three-agent model proposed in the article makes it possible to analyze the behavior of green finance participants. By simulating their behavior, the mechanism of adaptation of both the system and agents to internal and external pressure is analyzed in order to preserve their functionality and increase the performance and efficiency of green financing.

Keywords*:* Green Finance, Green Bonds, Pandemic, Climate Change, Three-Agent Model.

Introduction

The outbreak of COVID-19 has demonstrated that society is not ready to respond quickly to global threats to both the environment in general and health in particular, and the economy (Guerriero et al, 2020). As uncertainties increase about protecting populations from disease and preventing climate change, it is important to make our society more resilient to both COVID-19 and long-term environmental challenges. This can be done by focusing on green finance - increasing its effectiveness and strengthening its position in post-pandemic economic recovery, which will bring significant benefits, both short-term and long-term, and increase societal resilience to shocks over time. The World Health Organization (WHO, 2019) ranks climate change as the biggest global health threat in the twenty-first century. Predicting future risks from climate change is not easy. An equally difficult task is to determine the response of the financial system to these risks, including insurance, as well as private and public financing of projects that contribute to their mitigation.

The suspension of habitual norms of life and activities during Covid-19 changed the way of life had a profound impact on the environment and attitudes towards health care. The pandemic has exacerbated many problems in the economy, increased risks, and increased uncertainties. Every week, the global economy loses $ 200-250 billion from the pandemic (COVID-19, 2020). When all attention is focused on the fight against the virus, climate problems and the risks associated with climate change are formally somewhat relegated to the background (Wyns, 2020). Against this background, there is a need to rethink attitudes towards green finance in order to clarify its place in economic development and track the ongoing transformation in green finance. These days, the

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pandemic appears to be new opportunities for green finance and a green economy. Green growth, driven by green finance, could be a long-term megatrend winner rather than a niche zone.

A green focus in post-pandemic economic recovery will increase the resilience of society to pandemics and other emergencies, including climate change (OECD, 2020). Back in April 2020, at the initiative of the OECD General Secretariat, a document was prepared to discuss the post-pandemic economic recovery based on investments in improving the environment. The authors of the document propose "to increase resilience to pandemics with the help of environmental factors, which is a key component of measures to stimulate economic recovery, which are currently being developed by governments" (Cox and Piccolo, 2020). The transition to a green economy is necessary to achieve the goals set out in the Paris Agreement. During the transition, a system of regulation and measurement of investments is being created, the size of which is estimated at tens of trillions of dollars. All this requires a clear classification of green finance and the establishment of causal relationships, which will allow the transition to parameterization and assessment, comparisons, and targeted transformations of finance and the economy in a green direction.

Measuring the quality and depth of penetration of green finance into global markets, establishing causal relationships in this process, and determining the impact of investments on the preservation of the environment is a major challenge. The fact is that there are significant national and regional differences in their accounting and regulation. This problem can be fundamentally solved by standardizing green financial products and services, which makes it possible to move to their quantitative measurement, accumulation of statistical series, and their comparison between countries. In addition, in this way, you can move to the formation of proposals aimed at meeting the target demand of investors and preparing products for specialized markets (for example, green bond exchanges and markets where hydrocarbon emissions quotas are traded). This problem has attracted the attention of the UN and other international organizations. He has underpinned a number of initiatives, including the UNEP Positive Climate Change Initiative (UNEPFI, 2017), the UNEP Financial Centers Initiative for Sustainable Development (UNEP, 2017), the KIC climate finance initiatives, I4CE and PwC and UN PRI (2017-2018), as well as initiatives to create an environment for sustainable stock exchanges (UNPRI / UNCTAD 2009).

The article puts forward and develops the following provisions: (i) there are the following links (a) between climate change, pandemic, and green finance; (b) between the concepts of “green” financial and “green” economy: “green” finance is a mechanism for the formation (reasons) of a “green” economy (consequence); (ii) a narrow focus on coping with a post-pandemic recession can have adverse environmental and health consequences, as long-term effects cannot always be considered in the pursuit of short-term results; (iii) the effect of green finance can be greatly enhanced by changes in lifestyles, the behavior of people and companies, legislative initiatives and government decisions aimed at protecting the health and the environment. The aforementioned provisions are viewed from the point of view of at least two competing discourses, according to which, during the post-pandemic economic recovery, the New Green Deal (Schroeder, 2019; Cobb, 2019), which gained international circulation in 2018-9, will undermine the economy (Walden, 2020) or increase its resilience. According to the first statement, investments in environmental projects will be reduced, and according to the second statement, “climate” investments will help restore and restructure the economy towards increasing its resilience. Also, in the article, to analyze the relationship between the main participants in financing environmental projects and analyze their behavior, simulations are carried out using a three-agent model.

Literature and Framework

Much of the economic literature on the optimal financial response to climate change focus on the trade-off between direct costs and the potential uncertainties of long-term benefits of carbon investments (Giglio et al, 2015). At the same time, the discount rate and its parameters play a central role in this discussion, since even small changes in discount rates can dramatically change the present value of investments in the long term. Thus, in the long term, make investments in carbon reduction attractive or unattractive. In this regard, financing was considered in terms of solving two problems:

(i) climate change in the right direction (Mahsin et al, 2020; Campiglio, 2016), (ii) adaptation of economic systems (Birindelli et al, 2020; Kahn et al, 2019) and, above all, production and households to climate change (Pham and Huynh, 2020; Jones et al, 2020)

No less popular are futurological studies of a green future and the role of green finance in building it (Clapp, 2018). In this regard, there are various reviews and analysis of various aspects of green bonds: debt obligations associated with financing projects that claim environmental benefits (Anh, 2020; Jones et al, 2020; Banga, 2019). The role of finance in climate change mitigation is also widely explored (Painter, 2019; Kahn et al, 2019). There is a fairly large body of literature and research on the involvement of the green and environmental sectors in sustainable and socially responsible finance (Boubaker, et al, 2018; Alahbali and Nobanee, 2020; OECD, 2019). There are also studies on the link between green finance and the green economy (Klioutchnikov et al, 2018).

Policymakers, practitioners, and academics are just beginning to study the impact of COVID-19 on the financial industry, as well as its involvement in post-pandemic economic recovery (More, 2020). Overall, the link between climate change and the current pandemic (Sengupta, 2020) from a green finance perspective is a new topic.

Conceptual Approaches

Numerous organizations and institutions have developed their definitions of "green" finance. The G20 defines this concept as “financing investments that provide environmental benefits in the broader context of environmentally sustainable development” (G20, 2016). The OECD considers the term “stand-alone,” derived from a broader investment theme, or closely related to other investment approaches such as socially responsible investing (SRI); environmental, social, and government (ESG) investment, sustainable, long-term investment or similar concepts ” (Inderst et al, 2012). In general, the G20 and OECD represent “green” finance as a process aimed at achieving certain goals.

In 2016, the Committee on the Environment, together with the UN financial services, proposed to standardize the main definitions and concepts of “green finance” under the theme “Sustainable Financial System” (UNEP, 2016a). At the same time, the approaches to these concepts were analyzed, which operated in a number of intergovernmental organizations and countries. Approaches to this concept and its constituent parts of exchanges that trade in green bonds, banks that provide green loans, statistical bodies of a number of countries, investment companies, and others were also taken into account. As a result, schemes were developed for entering the green finance system of various clusters, as well as areas of its responsibility and actions - environment, social sphere, economy, and government. As a result, the following general approaches have been proposed for the following terms:

- “Climate finance” - within the framework of the UN Framework Convention on Climate Change, the concept is reduced to local, national, or transnational financing, which can be obtained from public, private and alternative sources. This concept serves both to denote solutions to the problems of reducing emissions, and to adapt countries to the adverse effects of climate change.

- “Green finance” is a broader concept than climate finance as it also includes other environmental goals and risks. It is used to characterize the greening processes of various investment projects (UNEP, 2016a). At present, a kind of consensus has been reached on the inclusion of health issues and the fight against the COVID-19 pandemic in this topic.

- “Green Banking” - describes the process of banks' participation in “green finance” (UNEP, 2016b). As part of this process, the role of central banks in supporting green finance has been identified (UNEP, 2017a).

The refinement of these concepts resulted in a roadmap for the formation of a sustainable financial system, which began to determine the main parameters and processes of stabilization of the financial system towards its “greening” (UNEP, 2017b). In October 2017, at the annual meeting of the World

Bank and the International Finance Corporation, together with Bloomberg, a mechanism for greening the financial system was considered and proposed, which included digital green finance (UNEP, 2018). Currently, a wide variety of information is generated, collected, transmitted, processed, stored, and used in digital form. Naturally, this process affected such areas as the environment and finance, which became the basis for the transition to digital "green" finance. The digital form of "green" finance has further contributed to the cross-border transformation of the "green" economy and is largely combined in the overall process of digitization of all assets of our time - from natural assets to knowledge and human capital, within which the digitalization of the environment among and the digitalization of management and recovery mechanisms it, including the digitization of green finance. Thus, green finance entered the digital sphere and gained significant development in it in a short period. It is associated with both digitized traditional financial services in green packaging and the use of blockchain technologies.

In 2018, the European Bank for Reconstruction and Development established that green finance covers the financing and risk management of projects in a clean economy, energy efficiency, energy conservation, rational use of water resources, waste recycling, green infrastructure, informatics, education, etc. social industries, as well as green building construction, green R&D (EBRD, 2018). Besides, it was suggested to define the level of zoning in 'brown' projects. Thus, the area of responsibility of green finance in society was expanded.

The International Finance Corporation has developed a methodology for defining green finance for bonds, loans, and investments (IFC, 2017). She approached the concept from the standpoint of project tasks (micro and macro data of the project, its result), location (borrower and investor, location of the project and its operator - legal registration and actual location), and supply and demand (including estimates and changes in economic indicators). This methodology allows you to cover the entire spectrum of financial activities and move from the bottom up. To this end, green is first determined at the project level, based on the intended use of the investment in the real economy, by applying estimates for the corresponding green share in the project. Then they move on to assessing the company as a whole, and then the numbers are aggregated at the industry and country level. These results can be compared with the need for green financing to identify problems and green points of action.

When calculating the Global Green Finance Index (GGFI, 2018), this concept refers to any financial instrument or activity in the financial services industry, including insurance, stocks, bonds, trading in commodities and derivatives, as well as analytical or risk management tools that lead to positive changes the environment and society in the long term, that is, create conditions for sustainability. This practice formed the basis for the development of the GGFI index (2018).

The most basic criterion for the "greenness" of a company, product, process, or project is the ability or contribution to reducing its greenhouse gas emissions. The past two decades have seen a surge in new financial instruments such as green bonds, and environmental markets such as carbon and forest markets or markets for water services and resources. In addition, there has been progressed in analytical methods and a shift to big data, which has fueled the development of green mechanisms in finance and economics and has drawn increased attention to these topics.

A differentiated approach to green finance in mature economies and emerging markets is often accepted. The latter is characterized by a concentration of green finance not only in areas such as clean energy, low-carbon transport, and energy-efficient buildings but also on financial support for industrial restructuring, including towards energy efficiency and environmental pollution control (Shultz, 2020). Probably, the post-pandemic economic recovery will also be associated with the widespread restructuring of industry in the above directions.

The GGFI classifies green finance as any financial instrument or activity in the financial services sector, including insurance, stocks, bonds, commodities and derivatives trading, analytical instruments, or risk management instruments, resulting in positive changes for the environment and society in the long term. The main criterion for the "greenness" of a company or project is that it

helps to reduce greenhouse gas emissions. Over the past two decades, the rise of new financial instruments such as green bonds, and environmental markets such as carbon, forestry, or water services, along with advances in analytical methods, has drawn increased attention to green finance.

The term "green" finance is quite significant in international policy debates, such as recent meetings at the World Economic Forum. For example, green finance is no longer seen as a limited activity but is a profitable and promising sector of financial markets that serve society and raise the status of financial centers within which the main financial processes unfold. The transition to a green economy is taking place within the framework of the goals set out in the Paris Agreement. It is backed by a global investment strategy valued at tens of trillions of dollars.

There are many definitions of green finance and opinions on how to move towards green investment, but they can be summarized as an approach to financial systems that mobilize finance for clean and sustainable growth.

A group of specialists from the International Banking Institute (St. Petersburg, Russia) at the 2019 seminar on green finance (Klyuchnikov, 2019) identifies three main options or approaches to green finance - narrow, medium and broader senses. In a narrow sense, green finance is limited to financial solutions to climate and environmental problems, and in the medium one, to the creation of environmentally friendly technological processes, products, and energy. In a broader sense, the concept borders on sustainable financing, which is necessary to ensure sustainable economic growth. Each option has its own set of both market and non-market activities, which can be classified into two groups: (i) supporting and stimulating the use of finance in the green direction, (ii) controlling and limiting investments in dirty technologies and production.

In the course of the current pandemic, under the influence of digitization and cross-border activities, changes in both the content and the organizational structure and management of green finance have accelerated. In general, the process of their management can be defined as a set of formal and informal rules and norms, following which people interact in the financial sphere for the effective accumulation, direction, and use of financial resources to solve various nature management tasks and prevent climatic and other natural threats. Modern societies adhere to a basic set of rules and regulations defined by national interests. Nation-states have physical boundaries; while the problems of natural resources users often have trans boundary dimensions and are not limited to national borders. The modern pandemic, on the one hand, has blocked states in solving internal problems of fighting the virus, maintaining infrastructure and the environment, and on the other hand, it has drawn attention to the trans boundary nature of epidemiological and climate threats and the need for joint actions to address these problems.

To summarize, green finance is usually classified as loans and investments aimed at improving the environment and preventing climate threats through a wide range of actions to solve social problems. From this point of view, they have many macroeconomic effects, and different lending and investment procedures, directions, and forms of organization may have different macroeconomic goals and properties. First, green finance often has a huge impact not only on a specific industry or region but also on global processes. The localization of capital investment is often associated with extraterritorial consequences. Consequently, green finance, even when solving local problems, does not have regional jurisdiction, since in most cases it has a broader and often global impact on the economy, that is, it has mega-economic and mega-social consequences and usually leads to the formation of a green economy in worldwide. In this case, their purpose - utility, value, and result - go beyond certain cost characteristics of the immediate effect. Understanding how value is created and accumulated in a green economy through green finance requires a new approach to defining the categories of cost, value, price, and utility. A new approach can only be formulated as a result of an interdisciplinary search and solution to this problem by combining many disciplines - from computer science, finance, and behavioral economics to management, psychology, political science, and even epidemiology.

The concepts of ‘sustainability’ and ‘green finance’ have both concrete and amorphous features. Both concepts cover many different practices that relate to natural, social and political-economic phenomena. In everyday life, stability is quite understandable. This concept is widely used to define the state of physical phenomena or natural ecosystems. The latter is often considered in connection with the desire to prevent them from destruction and the need to preserve them for posterity. As for green finance, most economists continue to consider them in narrow terms as a financial subsystem, the dynamics of which unfolds in the environmental direction of financing, that is, corresponding to the solution of problems of preserving the environment, primarily the prevention of climate change, processes, tools, and goals. However, an alternative approach to green finance can be offered. In this case, green finance includes a variety of subsystems - from economic to non-economic. The central link of the economic system in green finance is the relevant elements of the financial system that are associated with solving environmental problems. As for non-economic subsystems, they include political, social, and cultural phenomena and institutions that are necessary for the future survival of a person. Moreover, green finance (i) becomes an integral part of capital accumulation and the creation of a sustainable system of capital accumulation, (ii) ensures the stability of financial markets and the stability of the entire economy, and also (iii) acts as a financial mechanism for the life support of humanity and the preservation of the Earth's ecosystem.

Linking Climate Change to the Pandemic and Green Finance

The dominant schools viewed the environment (especially the climate) and finance as independent systems. As soon as the modern pandemic began to unfold, the shortcomings of this approach were immediately revealed. It turned out that the environment is directly related to finance. It's not just a shift towards social distancing during the COVID-19 pandemic that has impacted financial institutions' interactions with customers and fueled the rapid development of digital services. Important changes in financial liquidity were outlined and financial assistance programs were deployed, and the financial system began to prepare for post-pandemic economic recovery.

Traditionally, financial markets have been presented as an efficient system for allocating resources. They have been widely modeled and studied using general equilibrium models, game theories, in which agents behave rationally and maximize value. In this case, prices are determined using, for example, the Black-Scholes-Merton formula. In essence, it all boiled down to a linear approach. At the same time, optimization of the predictability of results was carried out under the strict control of two operators: the state and the market. However, first, during the 2008 crisis, the financial system showed its vulnerability. Internal misadventures turned out to be much stronger in their influence on the depth of shocks than external ones. Over the past twelve years, trends have emerged that may indicate new threats to the system, and this is not only a monstrous increase in debt and asymmetries but, above all, a gap in the balance between finance and the real sector. At the same time, the contradictions associated with the gap in the ratio between financial and natural capital are highlighted.

Another important circumstance is that the coronavirus pandemic could lead to a deeper understanding of the connections that bind people around the world. Well-equipped health systems are essential to protect people from health security threats, including climate change. Climate change has already paved the way for the spread of some infectious diseases. The current pandemic has shown that predicting future risks is not easy, but climate change is strongly affecting several areas that play a prominent role in when, where, and how pathogens appear. In this regard, changes in temperature and precipitation are of key importance. To limit the risk of infectious diseases, it is necessary to significantly reduce greenhouse gas emissions and limit global warming to 1.5 degrees. That is, to implement the Paris Agreement by increasing green financing for economic development.

In the baseline scenario of post-pandemic development, proposed by the experts of the World Economic Forum, the key condition for normalization of activities is an investment in the long-term development of human health and the environment towards building a green economy (IMF, 2020). Green finance acts as a tool for creating measures to preserve the environment and increase the resilience of the economy. In the new conditions, green financing will provide epidemiological

measures to protect people, which is extremely important for the effective reproduction of human capital. A green focus for economic recovery after a pandemic will increase the resilience of societies to pandemics and other emergencies, including climate change (Cox and Piccoli, 2020). In April 2020, at the initiative of the OECD General Secretariat, a document was prepared that discusses economic recovery after the pandemic based on investments in improving the environment (OECD, 2020).

Climate and environmental change, as well as the pandemic, have focused on leading players that can affect the future of society. Among them, finance, which determines future development, holds the palm. However, COVID-19 pandemic could be the biggest challenge for financial institutions. On the one hand, their involvement in economic recovery could potentially weaken the focus on climate bonds and environmental issues, but on the other hand, the pursuit of sustainable finance and investment in health and environmental improvements could also help raise awareness of green finance. These two tendencies will act simultaneously and in each case, the priority will be on the side of one or the other. As the economic impact spreads, green finance faces some big challenges. Their solution is associated with the choice of specific steps that are aimed at changing the position now, as well as associated with possible calibration for the future. In particular, the channels for raising capital are changing. There is growing interest in increasing their openness, despite the decrease in liquidity and the reduction in supply.

Post-pandemic financial institutions will contribute to unique solutions to finance environmental transformation. Already, various workarounds are being developed to eliminate bottlenecks, in particular, related to late payments, cancellation of fees, and the transfer of any investment decisions and changes in their directions.

Due to the pandemic, there have been several changes in cleantech funding:

1) The importance of the processes of monitoring financial flows has increased. The changes were associated with an increase in the impact on profit of changes in financing terms and balances on bank accounts, which was influenced by both lower interest rates and increased delays in debt and interest payments, changes in the conditions for raising capital, methods and priorities of working with clients as during pandemic and with subsequent recovery.

2) Investors' interest in financial products that have ESG criteria is growing.

3) There has been a change in the yield and liquidity of green bonds, as well as the demand for them. In the course of significant price fluctuations, demand was redistributed, attention to some green bonds declined, while others increased.

4) With a general increase in risk and uncertainty in the financial sector, green bonds and green loans tend to become more stable and therefore more attractive financial products.

5) The disruption of supply chains in all spheres of the economy caused a reorientation of attention and financial investments in this area. In particular, there have been changes in the financing chains for climate investments.

6) Information asymmetries have increased and information priorities have changed, leading to a change in the way financial institutions deal with climate information.

7) With the overall increase in business value, the flexibility of producers of environmental goods and services, as well as mechanisms for lending and investing in production chains, increases.

8) Under the influence of changes in the production and supply chains, an increase in inventories was required, which affected the structural changes in the cost of environmental products. There has been a revision of investment strategies and pricing of environmental investment projects, also related to a change in attitudes towards health and the environment as a result of cheaper money.

The coronavirus pandemic is contributing to a deeper understanding of the links that link society, the economy, and the environment. Well-equipped health systems are essential to protect people from threats to health security, including climate change. A stable financial system can financially withstand threats to the environment and human health.

Social interaction, as well as interaction with nature, can be considered as part of the human ecological environment. The growing popularity of investment strategies that incorporate ESG (Environmental, Social, and Governance) criteria is one of the main investment trends. More and more investors want their money to be invested sustainably or with positive effects, both socially and environmentally, and not harm the environment. Actions that can generate economic growth and prevent a new pandemic outbreak: (i) investing in public health, an early response to outbreaks and testing materials, and (ii) combating illegal wildlife trade Financial support for their implementation fits well with green financing". Besides, mitigation measures are intended to work in the same direction. For example, preventing deforestation (a major cause of climate change) can help (i) halt biodiversity loss and (ii) slow down animal migration, which also carries the risk of spreading infectious diseases.

Three-agent model of behavior in the green bond market

Green finance is complex systems exhibiting a wide range of non-trivial emerging phenomena, including extreme shocks, short and long-term memory, dynamics, and multifractality. Collective behavior in systems can be modeled using a variety of approaches, including complex dynamic models, agent-based models, or graph theory. One of the most important and complex tasks is to describe the collective behavior of interacting edges, the corresponding information flows between them, and also to determine the role of nodes in these interactions. This study proposes a three-agent model in which the nodes are (i) the issuer of the green investment project, (ii) the investor or underwriter, and (iii) the regulator. The model of behavior is considered on the example of issuing, placing, and regulating green bonds - innovative financial instruments (Bange, 2019).

Green bonds represent one of the most visible innovations in sustainable finance over the past decade. Their growing market reflects the growing interest of the financial sector in climate risks. There is no universal definition of green bonds, although there is growing consensus as to what they are for The Green Bond is defined as a fixed-income financial instrument to raise capital to finance or refinance related green projects (OECD 2017; ICMA 2017). Green bond issuance surged from $ 1 billion in 2007 to $ 259 billion. In 2019, with cumulative output for all years (since inception in 2007) $ 754 billion (Almeida, 2020).

In the Russian Federation, the green bond market is in its infancy. The first bonds were issued in 2018, and as of July 2020, there were only five issues. In 2016-18, a number of steps were taken at the government level to create a market for green debt instruments: the creation of a regulatory framework; determination of the principles of information disclosure by issuers; development of a procedure for opening and approving green bonds; compiling a list of areas in which green bonds can operate; creation of a commission that marks bonds and controls the sending by the issuer of funds received for the implementation of the declared project.

The Moscow Exchange has become the center for the issuance and placement of Russian green bonds (except the Russian Railways issued green bonds on the Irish Exchange) (Annual Report, 2020). It supports the development of the concept of sustainable development in Russia and in April 2019 joined the global initiative Sustainable Stock Exchanges (SSE). In 2019, the Sustainable Development Sector was created at the Moscow Exchange to finance projects in the field of ecology, environmental protection, and socially significant initiatives (Tuteeva, 2020). Within the sector, there are five issues of green bonds with a total issue volume of 7.55 billion rubles and 500 million euros (Table 1). In 2020, the exchange plans to expand the range of structural and green bonds, including the appearance of social bonds in the Sustainable Development Sector.

Table 1: Green bonds of Russian issuers (issues March 2017 - July 2020)

Issuer	Industry	Volume of issue	Placement year	Placement
JSC "Commercial real estate FPK" Garant-Invest	Commercial real estate, green technologies	RUB 500 million	2017	Moscow Exchange
LLC “Resource-saving” KhMAO	Housing and communal services, waste management	RUB 1.1 billion	2018	Moscow Exchange
PJSC CB “Center-Invest”	Renewable energy sources, environmentally friendly transport	RUB 250 million	2019	Moscow Exchange
JSC "Russian Railways"	Railway transport infrastructure	EUR 500 million	2019	Irish Exchange
JSC “OFO Rusol 1” (organizer of the placement Sovcombank)	Green energy, solar power plants	RUB 4.7 billion, RUB 900 million, RUB 100 million	2019	Moscow Exchange

The main purpose of the modeling is: (i) to show the main interactions of the three main participants; (ii) trace the flow of information between the three main participants in the issuance and placement of green bonds; (iii) consider the behavior of the participants. Entropy transfer can measure the movement of information; a model-free measure that determines the amount of information transferred from the source time series to the target time series. It can successfully describe complex systems with nonlinear interactions. The strongest flows are in the sectors associated with climate bonds (for example, the stock markets). On the other hand, outside the exchanges, much weaker information flows are demonstrated. This is because exchanges generate a significant transmission of information about marginal events, which becomes much more important in the transferred entropy picture (Korbel et al, 2019).

There are at least three major market participants involved in the issuance of green bonds (Figure 1), including:

1) The issuer or developer of the project who creates a "green" project. In the project document, the issuer describes the expected positive impact of its project on the environment. To avoid overestimating or underestimating such impacts, the project is audited in terms of its impact on the environment and compliance with the greenness criteria,
2) A regulator. The role of the regulator is to conduct a quantitative and qualitative assessment of the project:
a. Use of proceeds: Before issuance, the legal document must state how the proceeds of the bond will be used.
b. A technical assessment of the specific risks and opportunities associated with the project, as well as the creditworthiness of the green bond issuer.
c. Monitoring, Reporting and Transparency Requirements: Several reports are regularly published to monitor both the project and the use of proceeds to ensure that proceeds from green bonds are distributed in accordance with the Green Bond Principles, and
3) Underwriter. Green bond underwriter provides capital to the issuer for a specified period at a fixed or variable interest rate.
The tripartite process of issuing green bonds can entail significant transaction costs - which is one of the barriers to the development of green bonds.

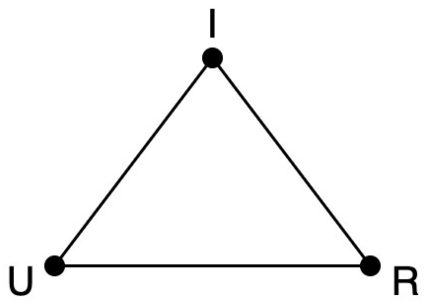

Figure 1: Three-agent-based model

The logic behind the three-agent model is as follows:

- The issuer (I) prepares an issue prospectus that meets certain criteria for "greenness", which is controlled by R.
- A project that meets these criteria goes to the Investor (U).
- The investor, by placing bonds on the stock exchange, mobilizes the necessary capital, and transfers it to the issuer.
- In turn, the issuer makes coupon payments and pays the capital base to the underwriter.

The regulator moderates the process - it affects both the issuer and the underwriter.
In the model, each agent has a certain set of properties. By simulating real-world phenomena, the behavior of each agent can be studied.
The three-agent model that studies the behavior of decentralized agents is based on three main ideas:
- The objective orientation of information objects from the point of view of their controllability;
- The emergence and learning ability of agents;
- Classification of solvable problems according to their complexity by reducing them to a set of simpler problems with efficient algorithms for solving.

It is assumed that the regulator mediates the interaction between the issuer and the investor. The search for a mechanism for the regulator's influence on the issuer and the investor can be reduced to discovering cause-and-effect relationships in a complex context (Anderson and Scott, 2012) or by opening a “black box” (Bathaee, 2018). By simulating the actions of agents, the effectiveness of the interactions is tested. For this, a number of hypotheses are put forward.

A hypothesis can be defined as a logically implied relationship between two or more variables, expressed in the form of a testable statement. Communication is offered using rigorous logical reasoning. These logical relationships can be part of the theoretical framework for research. Let's consider some of the hypotheses: 1) the issuer of the network is interested in the investment (variable); 2) the level of interest in investments is related to the level of their solution to environmental problems; 3) the level of solving environmental problems is related to the level of the investment effect; 4) if the effect decreases, then the demand for investment falls; 5) if the effect grows, then the demand for investment increases. These are verifiable proposals. Moreover, the first hypothesis contains only one variable. And this hypothesis is rather abstract. The second and third hypotheses have two variables that are related to each other, but the nature of their relationships is not determined (there is no directional relationship). In the fourth and fifth hypotheses, in addition to the relationship between the two variables, directions are set (in the fourth - negative, and the fifth - positive). Regulators can test these hypotheses: market (exchanges) and government (special commissions, as well as by checking compliance with ESG criteria).

The evaluation of the participation of the parties in a triangle can be carried out from the graph theory. Directional graphs can be used to model information flows of financial intermediaries with clients. For this, the links between the nodes are given the necessary orientation. In graph theory, the Tutte-Berge formula (Berge, 1962) characterizes the size of the maximum match in a graph. It can be

used to determine the smallest distance between the vertices. Usually, the formula is used when organizing traffic - finding the best routes (Bondy and Merty, 2010). However, it is quite suitable for understanding the processes that determine (i) the issuer's interest in investments, with appropriate environmental regulation, and (ii) the investors' interest in financing projects with their corresponding efficiency. Thus, issuers strive to maximize the effect. This principle follows from the laws of entropy of information. Like gas molecules, agents interact with each other. Collective interactions can influence individual behavior.

The three-agent model makes it possible to establish certain rules for the behavior of agents located in time and space and located in networks. Moreover, the behavior of agents can be "tied" to a certain time and place. This approach allows you to focus not on the stable state of the system, but on how the system and agents adapt to internal and external pressure to maintain their functionality, which is extremely important in the face of changing requirements for protecting the environment and people from climatic and pandemic threats.

Conclusions

There is a strong likelihood that changes in the behavior of people, companies, governments, and investors as a result of the pandemic will have a significant impact on the state of green finance. The article substantiates the position that the way out of the economic crisis caused by the pandemic will be based on ESG criteria, the main link of which will be green financing.

There is a fairly wide range of assessments of financial mechanisms for overcoming the crisis caused by the pandemic and directions for financing economic recovery (Rathi, 2020). However, the prevailing opinion is that the way out of the economic crisis caused by the pandemic will be based on a further increase in the importance of sustainable financing with the transition to new norms that take into account the real threat to humanity, in particular, from natural disasters, primarily related to climate change (Krurowska, 2020), possible pandemics and other natural disasters.

Green finance is designed to address the challenges of economic recovery in ways that help not only reduce the risks and vulnerabilities of the economy and society to unwanted external influences, but also reduce emissions that cause climate change and increase uncertainties, and mitigate the negative impact of future pandemics.

The three-agent-based model proposed by the authors makes it possible to analyze the behavior of agents in the process of green financing. By simulating the various participants in the green finance system, a mechanism is considered for adapting both the system and the agents to internal and external pressures to maintain their functionality and increase the productivity and efficiency of green finance.

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Developing the Design Assumptions of Robotic Process Automation Maturity Model

Andrzej SOBCZAK

Warsaw School of Economics, Warsaw, Poland
sobczak@sgh.waw.pl

Abstract

As weight of robotic process automation (RPA) increases, enterprises that implemented this approach should periodically perform a review and assessment of solutions applied – organizational and technological ones – and business benefits obtained. It should be conducted in systematized manner and include multiple factors. In particular, it should cover degree to which approach applied is aligned with organization's strategic goals, how efficiently activities related to robotic process automation are performed on operational level (during software robot development and maintenance), or finally – what the personnel's skill level and knowledge of robotic process automation is. If areas where improvements to the approach are necessary are identified, required improvement measures should be defined and implemented. Maturity models concept can be used to ensure systematized, complete approach to the review and assessment of approach to robotic process automation. Objectives of this article include: (G1) presenting key concepts of maturity models, (G2) analyzing existing approaches of robotic process automation maturity model for organizations, and (G3) defining the design assumptions of the proprietary robotic process automation maturity model, taking into account the imperfections and shortcomings of the existing approaches in this respect.

Keywords: Maturity Model, Robotic Process Automation, RPA, Robotic Process Automation Maturity Model

Introduction

For several years now, companies all over the world have been implementing digital transformation projects involving the "use of new digital technologies (…), in order to enable major business improvements like enhancing customer experience, streamlining operations or creating new business models" (Fitzgerald and others, 2013). The digital technologies are the foundations of the transformation projects implemented. In accordance with analytics companies' estimates robotic process automation (RPA) tools are currently the fastest growing group of digital transformation technologies on the IT market. According to Gartner the sales of solutions and services in this area rose 63.1% in 2019, as compared to 2018, coming in at USD 1.3 billion (Gartner, 2019). According to Forrester's analysts the value of RPA licenses and services sold is to reach USD 2.9 billion by 2021 (Clair and others, 2017). While according to Fortune Business Insight analytics company, the value of the RPA market is to reach USD 6.8 billion by the end of 2026.

Enterprises that use robotic process automation should periodically, in a systematic manner, conduct reviews of their approach in this area and business benefits obtained. The reviews should cover, among others, the degree to which the approach applied is aligned with the organization's strategic goals (both in the business, as well as the IT domain), how efficiently activities related to robotic process automation are carried out on the operational level (both during software robot development, as well as during their maintenance), or finally, what the enterprise personnel's level of skills with respect to robotic process automation is. This will allow for identifying areas in which it is necessary to improve the approach applied and it will be the starting point for defining improvement measures.

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The topics discussed in the article fall within the thematic scope of the theoretical considerations and empirical research conducted as part of several sub-disciplines of the management science (Bełez et al., 2019), in particular:

- Change management (sub-discipline: Strategic management) - robotic process automation is considered in the article as a specific type of an organizational change that should be managed appropriately;
- Organization's maturity (sub-discipline: Process and project management) - the article presents the characteristics of issues related to the robotic process automation maturity of an enterprise, which is one of the aspects of an organization's maturity;
- Management in the robotic process automation environment (sub-discipline: Production, services and technology management) – the management context in the robotic process automation environment is the main theme of the discussion presented in the article.

The goals of this article include: (G1) presenting key concepts of maturity models, (G2) analyzing existing approaches of robotic process automation maturity model for organizations, and (G3) defining the design assumptions of the proprietary robotic process automation maturity model, taking into account the imperfections and shortcomings of the existing approaches in this respect.

A diverse set of research tools was applied to achieve each of the paper's objectives. They included, accordingly: literature review, partly structured expert interviews and creative thinking techniques.

Based on the above presented objectives of the article the following structure of the paper was adopted. Section two presents two interpretations of the "robotic process automation" concept. Section three includes the key concepts of maturity models. Section four presents the existing robotic process automation maturity model for enterprises. Section five presents the set of the design assumptions of the proprietary robotic process automation maturity model. Section six presents the summary of the thus-far considerations and potential directions of further research are outlined – in particular related to the set of the proprietary model's design assumptions.

Robotic process automation and software robot concept

Currently the "robotic process automation" concept is viewed in two different ways in the subject matter literature – narrow and broad.

According to the narrow view, RPA is a class of information technology tools, a part of a broader group of information technology solutions used to robotically automate business processes (this group also includes BPMS – Business Process Management Systems, Workflows platforms, API (Application Programming Interface) management tools and also LowCode/NoCode tools[i]).

RPA class tools enable developing software robots, most often using graphical wizards or by recording actions performed by a human operator, definitely less often by directly writing a robot code. Researchers dealing with robotic process automation have identified a number of distinguishing features of software robots developed using RPA tools (Aguirre and Rodriguez, 2017), (Anagoste, 2018), (Asatiani and Penttinen, 2016), (Lacity and Willcocks, 2017), (Moffitt and others, 2018), (Stople and others, 2017), (Suri and others, 2017), (van der Aalst and others, 2018), (Willcocks and Lacity, 2016):

- they are used to automate selected sub-processes that make up the given process or even groups of actions logically extracted out of such a process, definitely less often to automate end-to-end processes;
- they are, first and foremost, used with respect to operational processes and business support processes, they are implemented less often in the direct customer service area (Chatbots, Voicebots or Taskbots are typically used in the latter case);
- they automate sub-processes or large scale (mass) operations (performed multiple times within the assumed time unit – e.g. within a month or a year), most often by faithfully reproducing actions carried out by an operator thus far;

- their use does not entail the need to optimize or reengineer the processes that are being robotically automated (although it is recommended);
- they operate based on the preset algorithm, but more and more often are enriched with certain elements of artificial intelligence, and, as a result, they are able to make more complex decisions (in particular, they are able to learn based on the data provided – both structured, as well as unstructured) (Lacity and Willcocks, 2018, 26);
- they perform operations directly on a graphical user interface of IT systems – the same way as a human-operator does it (although some RPA tools allow for performing operations directly on the robotically automated applications' database layer);
- they do not require creating of dedicated APIs (Application Programming Interface) to exchange data between applications;
- they use business logic that constitutes an integral part of the applications that a software robot will be working with, which eliminates the problem of reproducing such logic within the robot itself;
- they do not require a change to the code of the applications that a robot is interworking with, and therefore no knowledge of the internal structure of the individual applications is required, which is very important in case of legacy systems.

In the broader view of the concept, "robotic process automation" can be regarded as a particular type of an organizational and technological change the inherent part of which is the deployment of specific software (including cognitive software), ultimately leading to the formation of a hybrid workforce (Fersht and others, 2019), (Lacity and Willcocks, 2018), (Willcocks and others, 2020). Such a workforce is understood as a coherent ecosystem of software robots, as well as human resources with specific skills and competences, performing specific business processes and processing specific data.

The latter, broader understanding of the robotic process automation concept has been assumed for the purpose of this article. The adoption of such an understanding of robotic process automation leads to the viewing of actions related thereto not only from the technology point of view but also from the organizational and cultural perspective.

Such an approach positions robotic process automation not in the domain of tools to be used for ad-hoc organizational efficiency improvements, but among approaches that would allow for implementing digital innovations in an enterprise (Willcocks and others, 2020, 28).

Key Concepts of the Maturity Model

In the paper (Kohlegger and others, 2009) maturity model is defined as a model that "represents phases of increasing quantitative or qualitative capability changes of a maturing element in order to assess its advances with respect to defined focus areas. The focus area determines which indicators for maturity can be used to assess a maturing element". On the other hand, in the article (Becker and others, 2009, 213) it is indicated that "a maturity model consists of a sequence of maturity levels for a class of objects. It represents an anticipated, desired, or typical evolution path of these objects shaped as discrete stages. Typically, these objects are organizations or processes. The bottom stage stands for an initial state that can be, for instance, characterized by an organization having little capabilities in the domain under consideration. In contrast, the highest stage represents a conception of total maturity".

It is noteworthy – at least based on the number of existing maturity models – that they have won broad recognition both among representatives of academic community, as well as practitioners. Their use is supported by simplicity and ease of applying the concept, use of coherent terminology, ease of understanding the results obtained and ability to undertake specific actions based thereupon (Lasrado and others, 2015).

At the same time, it should be emphasized that this simplicity also constitutes one of the main criticisms raised by the critics of such an approach. They are of the opinion that complexity and volatility of organizations are so high that referring to a closed list of issues (topics) (and such one always occurs in case of this type of approach) makes it impossible to take into account the specifics of the given organization (Mettler, 2011, 82).

Analysis of the current robotic process automation maturity models

The subject literature research completed did not unearth any scientific articles in the reviewed magazines published in Polish or English that would present a proprietary, comprehensive robotic process automation maturity models. The starting point for the literature research was an analysis – conducted in August of 2020 – of the publications stored in databases 1) Web of Science (WoS) Core Collection, 2) SCPUS. The focus was on English language publications – articles in the reviewed publications and books. No reports / analyses prepared by consulting companies were taken into account at this stage. The phrases:

- ”Robotic Process Automation” and “Maturity Model”,
- ”RPA” and “Maturity Model”,
- “Software Robots” and “Maturity Model”

were searched for accordingly. The searches were conducted on titles, abstracts and keywords. A similar procedure was applied in case of each database and each phrase: an appropriate keyword was entered into the database search engine to obtain a basic list of documents. Each of these documents was initially analyzed and a classification was made to group the materials into: a) contents totally irrelevant with respect to the issues (topics) discussed in the article, b) generic content, c) documents overlapping the contents found in other databases, d) relevant documents, taken into account in the more detailed analysis. As a result of the completed review of the literature related to robotic process automation and maturity model no items containing references to this topic were identified.

In the final stage, the analysis of books on robotic process automation topics was conducted. Based on the criteria of relevance to the issues (topics) covered in the article, the currency of the content presented and the methodology apparatus used, the decision was taken to include 4 items related to robotic process automation in the literature research. As part of the second stage of the literature research – the items selected as part of the first stage were subjected to a more detailed analysis with regard to maturity model references contained therein. No items containing references to the proprietary take on this topic were identified. In the paper (Willcocks and others, 2017) there is a reference to ”The Enterprise RPA Maturity Model” developed for the company Blue Prism – however it presents robotic process automation stages, and not directly its maturity assessment mechanism. The author is aware of the limitations of the adopted research procedure that in its current form cannot be called a systematic literature review (Uman, 2011).

However, such approaches developed by consulting companies are available. Among them the following ones are worth highlighting:

- HfS Research Maturity Model for RPA,
- Forrester Robotics Quotient Model,
- Mindtree’s Automation Maturity Model,
- Federal RPA Community of Practice Maturity Model

”RPA Maturity Model of Coforce” was excluded from the analysis as, despite the name suggesting that it was applicable to the robotic process automation maturity assessment, after it had been studied, it turned out to be an approach presenting a sequence of activities aimed at deploying RPA tools in an organization. A similar situation occurred in case of ”The Enterprise RPA Maturity Model”, which was prepared for the needs of the company Blue Prism.

Each of the above four models is discussed below.

HfS Research Maturity Model for RPA

HfS Research model was developed in 2014 (Sutherland, 2014). It can be considered to be the market’s first approach to the robotic process automation maturity assessment. Its main specific feature is a focus on the robotic process automation maturity assessment from the perspective of Business Process Outsourcing (BPO) centers. It is visible in the approach to the structure of its building blocks: maturity levels and dimensions of such maturity assessment.

HfS Research model distinguishes three maturity levels (Sutherland, 2014):

- Initialization – a BPO organization at this maturity level is approaching RPA deployment as a kind of an experiment (aiming to grasp some understanding of this technology) that can be implemented within the existing contract with the customers;
- Industrialization – a BPO organization at this maturity level is approaching RPA tools deployment as one of the possible ways to perform some contracts with the customers, however RPA is still not regarded as a key activity;
- Institutionalization – a BPO organization at this maturity level is approaching RPA deployment as a source of building a competitive advantage on the market, which in practice means that it is making sizeable investments in IT processes and tools.

HfS Research listed the following model maturity assessment dimensions (Sutherland, 2014):

1. Main goal of RPA deployment – a BPO organization indicates the goal of RPA deployment. On the initialization level the goal is to replace actions performed by a human-operator with a software robot, on the industrialization level – to enhance cognitive capabilities of an employee-specialist, and on the institutionalization level – to introduce cognitive tools.
2. RPA program business owner – a BPO organization indicates a person responsible on the strategic level for works carried out in the RPA area. On the initialization level it is usually a customer service team manager, on the industrialization level – a global process owner, and on the institutionalization level – BPO's Vice President for operations.
3. RPA deployment vision – a BPO organization indicates what the robot implementation model is. On the initialization level these are usually robots that are not coordinated with one another, on the industrialization level – robots accessible from a central location, and on the institutionalization level – robots operating under a service model.
4. RPA technology vision – a BPO organization indicates what the technology context of using RPA tools is. On the initialization level it is usually remote access, via terminals, on the industrialization level – robot integration with customer applications, and on the institutionalization level – an integrated robot platform.
5. RPA competence ownership – a BPO organization indicates who the subject matter owner of RPA deployment works is. On the initialization level these are usually independent business analysts, on the industrialization level – process experts team, and on the institutionalization level – RPA Center of Excellence.
6. Source of financing – a BPO organization indicates what the RPA deployment works' source of financing is. On the initialization level these are usually customers' funds, on the industrialization level – customers' and BPO's funds, and on the institutionalization level – BPO's own funds.
7. Approach to robotic process automation – a BPO organization indicates what its approach to robotic process automation is. On the initialization level robotic process automation is not preceded by the alteration of the processes, on the industrialization level robotically automated processes are analyzed and, based on that, improvement measures are undertaken, and on the institutionalization level robotically automated processes are comprehensively altered.
8. Customer context during robotic process automation – a BPO organization outlines rules of cooperation with customers during robotic process automation. On the initialization level robotic process automation is visible from the customer's perspective, on the industrialization level a BPO organization starts a discussion on robotic process automation, and on the institutionalization level a BPO organization, jointly with the customer, agrees on the robotic process automation roadmap.
9. Analysis of the data collected owing to the RPA tools – a BPO organization indicates how it is using the data available thanks to the use of the RPA tools (in particular all kinds of logs). On the initialization level data is used to generate ad-hoc reports, on the industrialization level a BPO organization uses the data collected to systematically generate reports, and on the institutionalization level a BPO organization develops, based on such data, a dashboard that is continuously updated.
10. Long term RPA development vision – a BPO organization indicates how it perceives robotic process automation. On the initialization level robotic process automation is perceived as an ad-hoc solution that can be replaced with a different approach, on the industrialization level a BPO organization perceives robotic process automation as a tool that provides business flexibility, and

on the institutionalization level a BPO organization wants, thanks to robotic process automation, to achieve the ability to dynamically adapt to technology and business changes.

The proposed model should be regarded as a comprehensive approach, although narrowed down to BPO type organizations. It should be noted, however, that this model is not equipped with assessment questions, which leaves a lot of room for interpretation by the unit employing such a solution.

Forrester Robotics Quotient Model

Forrester developed ”Forrester RQ (Robotics Quotient) Model” in 2018, and offered its updated version, named 2.0, in 2019 (Gownder, 2019).

The core part of the model is the RQ (Robotics Quotient) concept, which is defined as a measure of: ”ability of individuals and organizations to adapt to, collaborate with, trust, and generate business results from automated entities, including software like RPA, AI, physical robotics, and related systems” (Gownder, 2019).

This model does not introduce maturity levels (as is the case with other models). Forrester model assumes that the higher the RQ value, the more mature the organization is in terms of robotic automation of its operations.

The authors of the model assume that assessment will take the form of a self-assessment and take into account the thus-far achievements of the organization with respect to automation/robotic automation. This model proposes that leaders coming from the following areas should take part in the assessment: IT, operations, business and HR. Additionally, it is recommended that assessment is periodically repeated – usually every 6-12 months.

The current version of the Forrester model includes three assessment areas (people, leadership, organization), to which 15 high level assessment topics (items) are assigned. Having completed the organization’s assessment using such topics the result obtained should be referenced to the fourth area – trust (Gownder, 2019).

”People” area includes the following assessment topics (items) (Gownder, 2019):

- “Nontechnical employees can easily adapt to new tools, processes, and/or values at work”.
- “Nontechnical employees communicate well with each other about technologies we use at work”.
- “Nontechnical employees know when to question the results of an automated technology”.
- “Nontechnical employees can easily work with machines to jointly solve problems”.

“Leadership” area includes the following assessment topics (items) (Gownder, 2019):

- “Leader can easily apply technological implementations from one unit of the business to another”.
- “Company has clearly articulated how different automation technologies can help us reengineer our current business processes”.
- “Leaders have proven to be effective at process and operational realignment when needed”.
- “Leaders communicate honestly and empathetically with employees”.

”Organization” area includes the following assessment topics (items) (Gownder, 2019):

- “Someone at my company could complete analysis for the automation process”.
- “We have the right technology experts needed for the automation technologies that we’re interested in”.
- “My company encourages alignment and collaboration between different parts of the business”.
- “My career path in the world of automation is clear to me”.
- “We have established a structured training curriculum for working with automation technologies”.
- “We are measuring how automation technologies improve the experience of our customers”.

- "We have identified and implemented KPIs related to automation technologies".

Having responded to the above assessment topics (items) the organization must assess how the results obtained are impacting the choice of automation technology – in the context of trust to such technology. The authors of the Forrester model are noting such aspects of the technology choice as the level of the organization's acceptance versus the degree of non-deterministic / non-transparent character of its operations (this is of particular importance with respect to technologies that utilize artificial intelligence mechanisms – a solution that includes elements thereof can be very efficient, but the results obtained can be hard to explain / audit) (Gownder, 2019).

The model presented features an interesting approach that goes beyond robotic process automation (in particular it can be applied to assess the maturity of the manufacturing process robotic automation implemented using industrial (physical) robots). Unfortunately, this model is the most restricted one (in terms of licensing) among all the models presented in this article. Forrester charges interested companies licensing fees for the use of the detailed list of assessment questions and IT tools that support the assessment process.

Mindtree's Automation Maturity Model

The model developed by Mindtree utilizes the concept of an organization's five maturity levels – from "Ad hoc" level to "Adaptive" level (Kumar, 2016). The structure of such levels is very precisely defined. It is composed of:

- a general description of the level,
- benefits for the organization that are achievable once the organization has reached the given maturity level,
- roles that initiate actions related to the organization's transition to the given maturity level,
- consequences of the organization finding itself on the given maturity level from the human resources management perspective.

Each maturity level is described in general below (Kumar, 2016).

Level 1 (Ad hoc) – the level on which automation related activities are undertaken within the organization, but they are not planned or coordinated in any way. Such activities are conducted by various teams – depending on the needs and there is no formal budget allocated thereto. Automation is usually implemented using scripts, tools that a team has already had or solutions available under the open source license. On this level of maturity automation is initiated by persons that are motivated to improve their work efficiency. On this level of maturity an increase of the organization's / department's work efficiency by not more than 5% can be expected. On this level of maturity automation does not have any impact on the level or structure of employment.

Level 2 (Opportunistic) – the level on which the goal of automation related activities is to solve a specific business problem – i.e. they are reactive. Automation is usually implemented using RPA class tools. The organization starts discussions on selecting a tool and allocating budget to automation related works. On this level of maturity automation is initiated by the leader of the area in which a problem occurs. On this level of maturity an increase of the organization's / department's work efficiency (productivity) by 5 to 10% can be expected. On this level of maturity transfers (reassignments) of personnel between departments may take place as a result of automation.

Level 3 (Systematic) – the level on which automation related activities are managed within the organization in a comprehensive manner, through a portfolio of initiatives and they are actively pursued (places where automation can be implemented are sought out). Automation is implemented using RPA class tools and based on the agile approach (Scrum/DevOps). Automation is initiated by dedicated experts who understand the specifics of the process based approach and are familiar with automation technologies. On this level of maturity an increase of the organization's / department's work efficiency by 10 to 20% can be expected. On this level of maturity transfers (reassignments) of personnel between departments take place or layoffs are made as a result of automation.

Level 4 (Institutionalized) – the level on which automation related activities are becoming a part of every initiative undertaken by the organization. The organization has a formulated automation strategy in place. Automation is implemented with the use of classic RPA tools, cognitive automation tools (using machine learning and natural language processing), chatbots and voicebots. Automation is initiated at the enterprise's strategic objectives levels. On this level of maturity an increase of the organization's work efficiency by 20 to 30% can be expected. On this level of maturity material transfers (reassignments) of personnel between departments take place or significant layoffs are made as a result of automation.

Level 5 Adaptive) – the level on which robotic process automation solutions adapt to changing business needs (it is possible thanks to a broad combination of automation tools with machine learning techniques and natural language processing). In particular, the solutions built are self-healing and self-scaling. Automation is the foundation of the company's operations – becoming a major part of the business strategy. On this level of maturity an increase of the organization's work efficiency by more than 30% can be expected. A comprehensive alteration of the company's organizational structure and employment take place as a result of automation.

The model presented features an interesting approach that goes beyond robotic process automation, as it refers, on one hand, to simple automation using scripts and macros, and on the other hand – to cognitive automation. Unfortunately, this model does not take a structured form and is not equipped with assessment questions, which leaves a lot of room for interpretation by the unit employing such a solution.

Based on the above analysis of the existing maturity models it can be stated that there is a research gap that involves a lack of the commonly available, open (accessible without fees) and developed with methodological diligence approach that would allow for conducting a robotic process automation maturity assessment in a systematic manner.

Federal RPA Community of Practice Maturity Model

Federal Community of Practice dealing with robotic process automation is a collaborative body designed to rapidly accelerate the adoption of RPA technology across the US federal government agencies. The community consists of representatives from more than 50 federal agencies, with more than 750 members. The community pursues a bifurcated mission. First, the organization is charged with discussing and designing solutions to help individual agencies overcome the technical, management, and operational challenges that arise in deploying robotic process automation. This portion of the group's mission includes such initiatives as designing common federal solutions for credentialing, privacy, and security with respect to robotic process automation, and designing common management metrics to gauge federal government wide impact of robotic process automation. The second element of the community's mission is to provide knowledge sharing and mentoring to organizations looking to launch an RPA tools implementation program or to evolve their current approach to RPA.

The Federal RPA Community of Practice Maturity Model introduces four maturity levels described below (Federal RPA Community of Practice, 2020).

Level 1. Organizations at this level are at the start-up stage of implementing an RPA program. Pilot bots development process is usually underway or less than 5 bots are used in the production environment. The annualized bot capacity created is less than 5k hours. The organization has established a formal process related to the RPA tools deployment.

Level 2. Organizations at this level are developing an RPA tools implementation program. Between 5 and 20 bots are used in the production environment at such organizations. Their annualized capacity is estimated to stand at 5-50k hours. The organization has formally defined security, privacy, as well as RPA tools deployment program policies. The organization's program management, reporting, and robotically automated process improvement capabilities are being developed.

Level 3. Organizations at this level are already experiencing visible impacts of the RPA tools implementation program. More than 20 bots are used in the production environment at such

organizations. Their annualized capacity is estimated to stand at 50-100k hours. The organization has developed formal IT security and privacy policies with respect to robotically automated processes. The organization has strong RPA program management and process improvement capabilities. RPA tools have been deployed across multiple functional areas of the organization. The foundations for further scaling up have been built.

Level 4. An organization is experiencing significant impacts of the RPA tools implementation program. 5-10 bots are deployed every month. Their annualized capacity is estimated to stand at more than 100k hours. RPA Center of Excellence, that coordinates work for various business units, has been established. The organizations are expanding their RPA tools by adding intelligent automation capabilities. Dedicated personnel (FTEs) responsible for the RPA tools deployment program management and business process reengineering is in place. Workforce redeployment, capacity planning, and reskilling are required due to the robotic process automation achieved.

The model presented is characterized by a highly comprehensive approach to assessing the robotic process automation maturity of an organization. The weakness of the model is the fact that it is targeted to the specifics of the US government's federal agencies. As a result, any attempts to use it in relation to enterprises require a number of adjustments to be made.

Based on the analysis of the existing maturity models carried out in this section, it can be concluded that there is a research gap involving the lack of a commonly available, open (available free of charge), and developed with a methodological regime, approach that would allow for a systematic assessment of the robotic process automation maturity. Therefore, undertaking research work in this area is justified.

Developing the design assumptions of the proprietary robotic process automation maturity model of an enterprise

In order to maintain the methodological regime the author, planning to work on developing the proprietary robotic process automation maturity model of an enterprise (Robotic Process Automation Maturity Model), decided to use the procedure presented in (Becker and others, 2009, 218). It is composed of a series of the following steps: 1) Initiation, 2) Problem definition, 3) Comparison of existing maturity models, 4) Determination of development strategy, 5) Iterative model development, 6) Conception of transfer and evaluation, 7) Implementation of transfer media, 8) Evaluation, 9) Introduction of amendments to the model. Items 1-3 of that procedure are presented in the earlier sections of the article, while developing of the model's design assumptions is a part of implementing item 4 of the procedure.

When defining the set of the design assumptions of the proprietary robotic process automation maturity model of an enterprise, the author completed an analysis of the existing maturity models with respect to process management, software development and robotic process automation.

Additionally, the author conducted semi-structured expert interviews with persons dealing professionally with robotic process automation. In 2018-2019 the author conducted an analysis of 18 projects completed in Poland, related to the implementation of RPA tools in medium and large companies representing diverse industries (banking, insurance, telecommunications, financial services, BPO (Business Process Outsourcing) and SSC (Shared Service Center), e-commerce, traditional retail). However, the author is aware of the fact that an 18-interview sample is limited in size. The reason for such a limited size was still a low penetration of robotic process automation. The analysis was based on semi-structured interviews conducted with persons in charge of robotic process automation deployments (middle level management personnel) or supervising such implementations (higher level management personnel). The criterion for selecting respondents was having completed at least one pilot RPA tool implementation. The information obtained during such interviews was also used as a contribution to developing the proprietary model's assumptions.

The design assumptions of the proprietary model of assessing robotic process automation maturity of an enterprise developed by the author are provided below:

1. Model must allow for objectively assessing the actual robotic process automation maturity level for an organization which implies the need to precisely define assessment questions and have them cover the broadest possible scope of issues (topics) related to robotic automation;
2. Model can be used at a company of any size that finds itself on any robotic process automation maturity level. This leads to the preparation of a set of questions that is as content rich as possible;
3. Model can be used at a company of any size and any industry at which robotic process automation is taking place. This implies developing a model in such a way that it does not reference company size or industry specifics (e.g. in terms of terminology used);
4. Model must be as simple as possible and inexpensive to use, which implies that assessment will be performed by an organization's in-house team, with potential methodological support from an external consultant;
5. Model is not connected to any specific robotic process automation vendor/tool, which implies that the model does not reference any detailed technology issues (topics).
6. While viewing robotic process automation as a specific type of an organizational change, the model must take into account not only technical aspects, but the strategic, organizational, cultural and competency related ones as well.
7. Due to the diverse range of issues that need to be taken into account, the model must have a multidimensional and hierarchical structure.
8. Each issue presented in the model must be mapped in the form of a control question with a specific number of possible answers.
9. The use of the model should enable the determination of a) overall robotic process automation maturity of the enterprise; b) maturity of the enterprise with respect to the particular dimensions of the model - e.g. in terms of the strategic or organizational aspects of robotic process automation.
10. The maturity model should be adaptable to the specifics of the given enterprise, while it is assumed that there will be a certain fixed (invariable) part of the model and a part that the enterprise will be able to modify on its own.

Summary and directions of further research

Trend analyses indicate that in the overwhelming majority of industries there is no turning back – advanced robotic process automation is inevitable. This is why it is so important to make managers and decision makers realize how profound the changes brought about by robotic process automation at their organizations will be.

Activities related to increasing an organization's maturity with respect to robotic process automation entail the need to incur specific expenditures – both financial outlays, as well as organizational measures. This is why it is so important to be able to precisely point out areas where such activities are justified. This is possible thanks to completing an assessment of the current maturity of the organization's robotic process automation.

In the first part of the article the author lays out three objectives of this paper. In the third part of the article an attempt is made to accomplish the first objective: key concepts of maturity models are discussed. In the fourth part of the paper the current approaches to assessing robotic process automation maturity are discussed, thus achieving the second objective of the article. The set of the design assumptions of the proprietary robotic process automation maturity model is discussed in the subsequent part of the article. This way the third objective of the article is accomplished.

Therefore, the author is planning to continue his research in this area. In particular, the author is planning to undertake the task of developing the proprietary robotic process automation maturity model based on the design assumptions developed and presented in the article. The model, to be developed by the author, will be made available free of charge – including the detailed description (along with the complete list of assessment questions) and the IT tool supporting its application. Any organization will be able to apply the model for its internal needs, and also adapt it to the extent required thereby.

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[i] The author proposes the following definition of LowCode/NoCode tools – it is a class of software used to develop applications that requires a relatively small amount of code developed or no coding at all, as the majority of the work is carried out using pre-defined components, merging them (using visual wizards) and setting their parameters.

Digital Readiness of Russian Regions

Naira P. BYCHKOVA
Kuban State Technological University, Krasnodar, Russian Federation,
https://orcid.org/0000-0002-3984-3959, nbichkova97@gmail.com

Zulay K. TAVBULATOVA
Chechen state University, Grozny, Russian Federation,
https://orcid.org/0000-0001-9598-9461, eva_didi@inbox.ru

Natalya V. RUZHANSKAYA
The Komi Republican Academy of State Service and Administration, Syktyvkar, Russian Federation,
https://orcid.org/0000-0003-3236-1620, natasharug@mail.ru

Ruslan M. TAMOV
Belgorod State National Research University, Belgorod, Russian Federation,
https://orcid.org/0000-0001-6777-1596, tamov.apex@yandex.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation,
https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru

corresponding author

Abstract

The purpose of the study is to analyze the processes of digitalization at the regional level and determine the level of readiness of Russian regions for intensive digital development. The authors conducted a comparative analysis of Russian regions in terms of access of households and organizations to digital infrastructure, their use of digital technologies for personal and professional purposes, digital literacy, as well as investment in ICT development and R&D. The authors used the Portulance Institute methodology to determine the network readiness index of Russian regions. The available data from the Russian statistical database were grouped into subgroups - technology, people, governance, and impact. Calculations of the network readiness index for 80 regions of Russia were made by authors. The results allowed to conclude that 32 regions of Russian Federation have high network readiness indicators. The proposed tools for assessing the network readiness of regions can be used as a criterion for differentiating digital development policies at both the state and regional levels.

Keywords: Digital Economy, Region, Russia, Digital Readiness, Network Readiness Index, Digital Infrastructure

Introduction

The process of formation of the digital economy is significantly differentiated in terms of countries and regions of the world. The reason for differentiation is the different level of digital infrastructure formation and access to the use of ICTs.

Today, the availability of the Internet, as well as the possibility of using digital technologies to solve personal and professional problems, determine the level and quality of the population life (Molchan et al., 2019). Regions that are remote from digital infrastructure are deprived of opportunities for progressive development, and their populations cannot be included in the processes of global communications.

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This, in turn, constrains economic and social activity, limits the human potential realization for the benefit of social progress, provokes imbalances in the regional economy of Russia, violating its integrity, as well as causes problems of socio-economic lagging at the international level.

The Russian Federation is currently lagging far behind the world's leading countries in terms of digital development. The share of the digital economy in Russia's GDP is about 4%, which is 1.5-3 times lower than in the United States, China, and the European Union (Ushakova and Uskov, 2019). If we look at international comparisons, we can see that in the international ranking of countries in terms of ICT development, Russia ranks only 45th in the world (Tadvisor, 2020), according to the E-Government Development Index in 2018, Russia ranked 32nd (United Nations, 2020), in the Digital Competitiveness Index, the country is ranked only 40th out of 63 countries (IMD, 2019).

It is likely that this lag in Russia is determined by the scale of its territory, significant regional development differentiation, as well as gaps in state policy in terms of digitalization, which define the digital unpreparedness of certain territories for the penetration of digital technologies and inclusion in the digital space (Portulance Institute, 2019).

Thus, there is a need to analyze the processes of digitalization at the regional level and determine the readiness of Russian regions for intensive digital development.

Methodology

The starting point of the study is the network readiness assessment methodology developed by the Portulance Institute (2019). In accordance with this methodology, the network readiness index is calculated based on four groups of indicators: Technology (access, content, and future technologies), People (individuals, businesses, and governments and their readiness for digital transformation), Governance (credibility, regulation and inclusion), and Impact (impact of digitalization on the economy, quality of life, and contribution to the achievement of sustainable development goals). Indicators of international statistics allow to calculate and compare countries in terms of this index. However, the lack of initial statistical information about Russian regions does not allow using the indicators included in the index. In this regard, the authors made adjustments to the methodology taking into account the Russian specifics.

The system of indicators reflecting the network readiness of regions, adapted to the Russian specifics, is presented in table 1.

Table 1: A system of indicators for assessing the network readiness of regions

Group of indicators	Network readiness Index indicator	Similar indicator for Russian regions
Technology		
Access	1.1.1 Mobile tariffs	-
	1.1.2 Handset prices	-
	1.1.3 Internet access	-
	1.1.4 4G mobile network coverage	-
	1.1.5 Fixed-broadband subscriptions	Percentage of households with broadband Internet access, % (Gks, 2019a)
		Organizations with broadband Internet access, % of the total number (Gks, 2019a)

	1.1.6 International Internet bandwidth	-
	1.1.7 Internet access in schools	-
Content	1.2.1 Digital participation and content creation	-
	1.2.2 Mobile app development	-
	1.2.3 Intellectual property receipts	-
Future Technologies	1.3.1 Availability of latest technologies	Advanced manufacturing technologies used (Gks, 2019b)
	1.3.2 Company investment in emerging technology	-
	1.3.3 Government procurement of advanced technology products	-
	1.3.4 ICT PCT patent applications	-
	1.3.5 Computer software spending	Capital expenditures on information, computer and telecommunications equipment (weighted relative to the population of the region) (Gks, 2019b)
	1.3.6 Robot density	-
People		
Individuals	2.1.1 Internet users	Users of the Internet among households, % of total households (Gks, 2019a)
	2.1.2 Active mobile-broadband subscriptions	-
	2.1.3 Use of virtual social networks	The percentage of households making purchases online, % of total households (Gks, 2019c)
	2.1.4 Tertiary enrollment	Education index (Analytical center under the government of the Russian Federation, 2019)
	2.1.5 Adult literacy rate	Literacy, % (Analytical center under the government of the Russian Federation, 2019)
	2.1.6 ICT skills 2nd sub-pillar: Businesses	-
Businesses	2.2.1 Firms with websites	Organizations with a website, % of the total number of organizations Sabelnikova et al., 2018)
	2.2.2 Internet shopping	-
	2.2.3 Professionals	Online staff training, % of the total number of organizations (Sabelnikova et al., 2018)
	2.2.4 Technicians and associate professionals	Using special software tools in organizations (Gks, 2019d)
	2.2.5 Extent of staff training	-

	2.2.6 R&D expenditure by businesses	-
Governments	2.3.1 Government online services	Percentage of households receiving public services online, % of the total number of households (Sabelnikova et al., 2018)
	2.3.2 Publication and use of open data	-
	2.3.3 ICT use and government efficiency	-
	2.3.4 R&D expenditure by governments and higher education	Internal R&D costs (weighted relative to the region's population) (Gks, 2019b)
Governance		
Trust	3.1.1 Rule of law	-
	3.1.2 Software piracy rate	-
	3.1.3 Secure Internet servers	
	3.1.4 Cybersecurity	Percentage of the population who used information security tools, % of the total population of the region (Gks, 2019d)
	3.1.5 Online trust and safety	-
Regulation	3.2.1 Regulatory quality	-
	3.2.2 Ease of doing business	-
	3.2.3 Legal framework's adaptability to digital business models	-
	3.2.4 E-commerce legislation	-
	3.2.5 Social safety net protection	-
	3.2.6 ICT regulatory environment	-
Inclusion	3.3.1 E-participation	-
	3.3.2 Socioeconomic gap in use of digital payments	-
	3.3.3 Availability of local online content	-
	3.3.4 Gender gap in Internet use	-
	3.3.5 Rural gap in use of digital payments	-
Impact		
Economy	4.1.1 Medium and high-tech industry	Share of high-tech and knowledge-intensive industries in the gross regional product (Gks, 2020)
	4.1.2 High-tech exports	-
	4.1.3 PCT patent applications	-

	4.1.4 Labor productivity per employee	The index of labor productivity (Gks, 2020)
Quality of Life	4.2.1 Happiness	-
	4.2.2 Freedom to make life choices	-
	4.2.3 Income inequality	-
	4.2.4 Healthy life expectancy at birth	Healthy life expectancy at birth (Analytical center under the government of the Russian Federation, 2019)
SDG Contribution	4.3.1 Access to basic services	-
	4.3.2 Pollution	Organizations that have implemented innovations that improve environmental safety in the production of goods, works, and services (Gks, 2019d)
	4.3.3 Road safety	-
	4.3.4 Reading proficiency in schools	-
	4.3.5 Math proficiency in schools	-
	4.3.6 Use of clean fuels and technology	-

After the selection of indicators are examined to excessive deviations that may interfere with the objectivity of ratings. Deviations with an absolute asymmetry value greater than 2 and exceeding 3.5 are excluded from calculations (Groeneveld and Meeden, 1984).

The authors use the normalization method to achieve comparability of indicators:

$$x_i = \frac{xi}{xmax} \quad (1)$$

The authors perform a sequential aggregation of points based on the calculation of the arithmetic mean for each indicator that makes up the overall network readiness index. The ideal value of the network readiness index is 1.0.

The information base of the research consists of statistical data of Federal service of state statistics of Russia, Analytical center under the Government of the Russian Federation, Higher school of Economics, Organizations for economic cooperation and development (OECD), McKinsey Global Institute.

Literature Review

The versatility of the process of digital economy formation in their research showed Atkinson et al. (2009), Varian et al. (2002), Gillett et al. (2006), who based on empirical data studied the impact of digital technologies and the Internet on socio-economic processes in the United States, United Kingdom, France, and Germany. Frey and Osborne (2013), Brynjolfsson and McAfee (2014) paid attention to the study of the processes of labor market transformation under the influence of automation, as well as pointed to the trend of reducing the average and low-skilled labor force as a result of capital substitution.

Katz (2012, 2017) identified three waves of digitalization, as well as the corresponding types of technologies being implemented, he systematized the economic and social benefits and disadvantages of digital development. Among the obvious benefits of digitization, the author has identified increasing

productivity as a result of implementing more efficient ICT technologies in business processes, optimizing supply chain, reducing overall costs. Katz attributed the disadvantages of the digital economy to the negative economic impact of disrupting the Internet as a result of natural disasters, cybercrime, technological failures or politically motivated disconnections, as well as the degradation of human relations as a result of intensive digital consumption.

Martin (2005), Hagerstrand (1966), Novak and Hoffmann (2000), Wilhelm and Thierer (2000), Greenstein and Prince (2006), Elohov and Alexandrova (2019), and Shvetsov (2014) studied the specifics of digital economy development in the regional context. For example, Elohov and Alexandrova (2019) conclude that achieving uniform digital development in the regions contributes to balancing their resource capabilities and overcoming the digital lag of the country as a whole.

Results

Analysis of indicators of digital readiness of Russian regions.

The basic condition for the development of the digital economy is the formation of digital infrastructure. In this aspect, the availability of devices and access to the Internet for households, and businesses are important.

The ability of households to access a computer and enjoy the benefits of the Internet varies significantly in different regions of Russia. Availability of computers and alternative access via TVs or mobile phones, as well as access to the Internet can be attributed to the basic indicators of the readiness.

According to a sample survey of the population on the use of ICT by the Federal state statistics service of the Russian Federation, five regions with the highest and lowest indicators of personal computer use in households can be identified (Fig. 1).

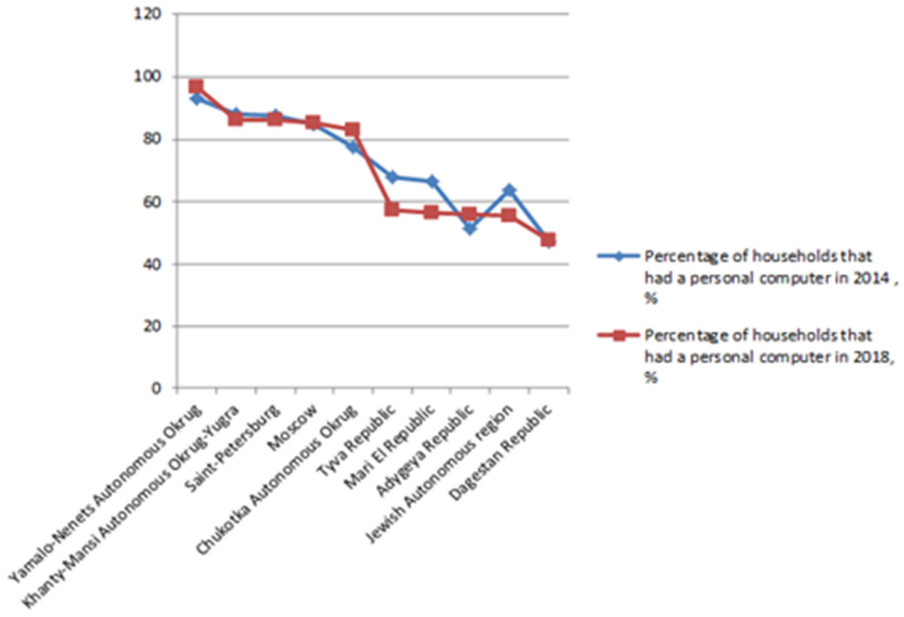

Fig. 1: Top-5 regions of Russia with the highest and lowest indicator of personal computer usage in households in 2014 and 2018 (as a percentage of the total number of households in the corresponding subject of the Russian Federation) (compiled by the authors according to Gks (2019d)

According to the data, the gap between the regions of the Russian Federation in the use of personal computers by households in 2014 was 1.96 and increased by 2018 to 2.02 times.

However, in 2019, only 39.7% of households in urban areas and 27.7% in rural areas used a desktop computer to access the Internet. 42.4% of households used mobile computers (laptops), 23.3% - tablet computers, 66% - other mobile devices (mobile phones or smartphones, e-book readers, etc.), 12.6% - TVs with a special device (smart TV) (Gks, 2020).

The situation with access to the Internet for households is as follows (Fig. 2).

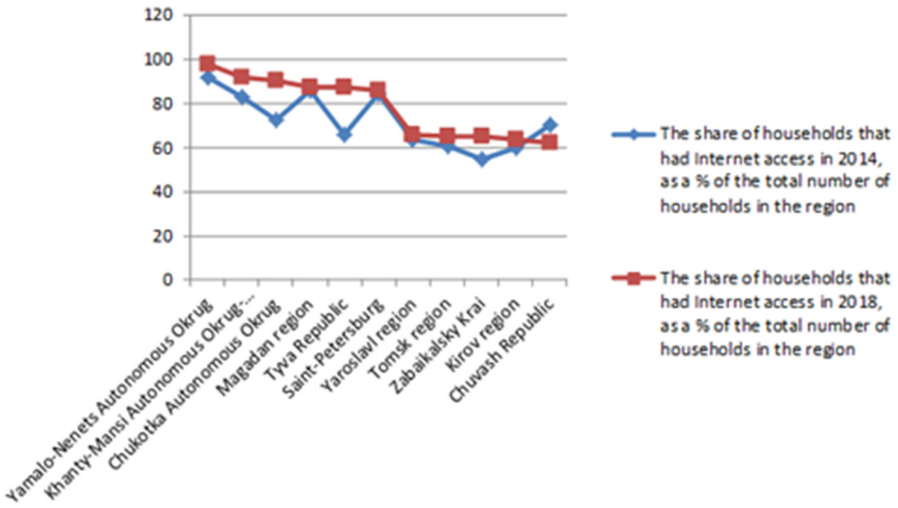

Fig. 2: Top-5 regions of Russia with the highest and lowest indicator of household access to the Internet in 2014 and 2018 (as a percentage of the total number of households in the corresponding subject of the Russian Federation) (compiled by the authors according to Gks (2019d)

The data shows that the gap in household Internet access increased from 1.3 times in 2014 to 1.6 times in 2018.

The regions of the Russian Federation with the highest rates of broadband Internet access in 2018 are: Yamalo-Nenets Autonomous Okrug (96.3%), Khanty-Mansi Autonomous Okrug – Yugra (88.9%), the Tyva Republic (87.4%), Saint Petersburg (84.7%), and the Altai Republic (84.4%). Chechen Republic (50.2%), Khakassia Republic (54.5%), Dagestan Republic (58.8%), Chukotka Autonomous Okrug (59.1%), Republic of Sakha (Yakutia) (62%) have the lowest indicators (Gks, 2019b). Thus, in terms of broadband access of households to the Internet, the gap between the regions of the Russian Federation is 1.9 times in 2018 (3.3 times in 2014).

Moscow in 2018 was the leader in the number of connected mobile subscriber devices per 1000 people (2890.9 units), while the Adygea Republic closed the list of lagging regions with a value of 1030.4 units.

Experts emphasize that the digital divide between households depends on income and education (OECD, 2001). As the level of education increases, the likelihood of access to ICT grows. The size and type of household, age, gender, racial and linguistic origin, and location (urban/rural) also affect access to and use of the network.

Digital literacy of the population also determines the level of Internet use and overcoming the virus infection problem. The significant differentiation across the regions of the Russian Federation indicates that the population is unprepared for new threats to the digital economy (Karpunina et al., 2020). Thus,

in 2017 in the Altai Republic, the percentage of the total population aged 15-74 years who used the Internet over the past 12 months and faced the problem of virus infection was 27.4%, while in the Tambov region, the value of this indicator reached 2.2%. The gap between regions for this indicator is 12.5 times.

Currently, there is significant progress in the spread of broadband Internet access in the Russian Federation, but there is still a clear gap between regions in terms of Internet usage in organizations-1.6 times in 2018 (Fig. 3). At the same time, the size of this gap has decreased by 2.2 times since 2010, which indicates that the regions of the Russian Federation are aligned in the use of broadband access by organizations.

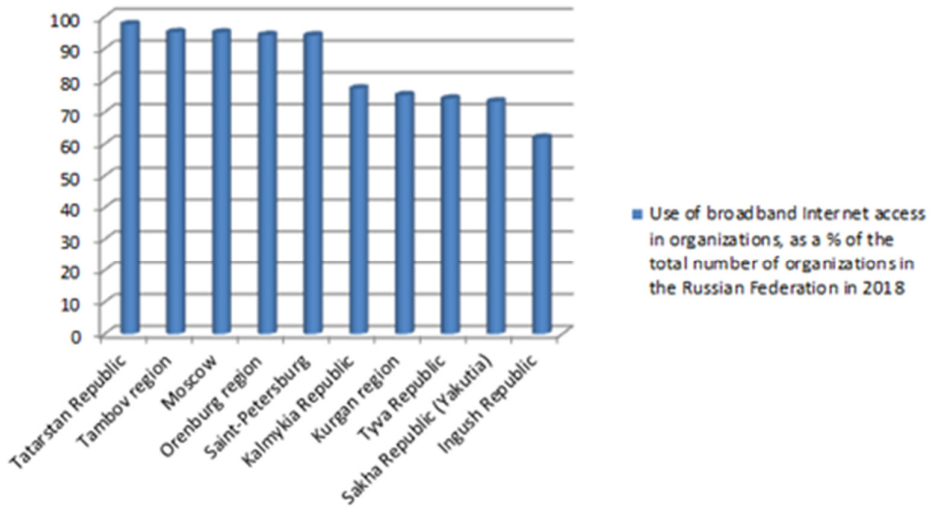

Fig. 3: Top-5 regions of Russia with the highest and lowest indicator of organizations that used broadband Internet access, as a % of the total number of organizations in the corresponding subject of the Russian Federation in 2018 (compiled by the authors according to Gks (2019d))

The gap between organizations using ICT technologies in different regions of the Russian Federation is as deep as the gap between households (Fig. 4).

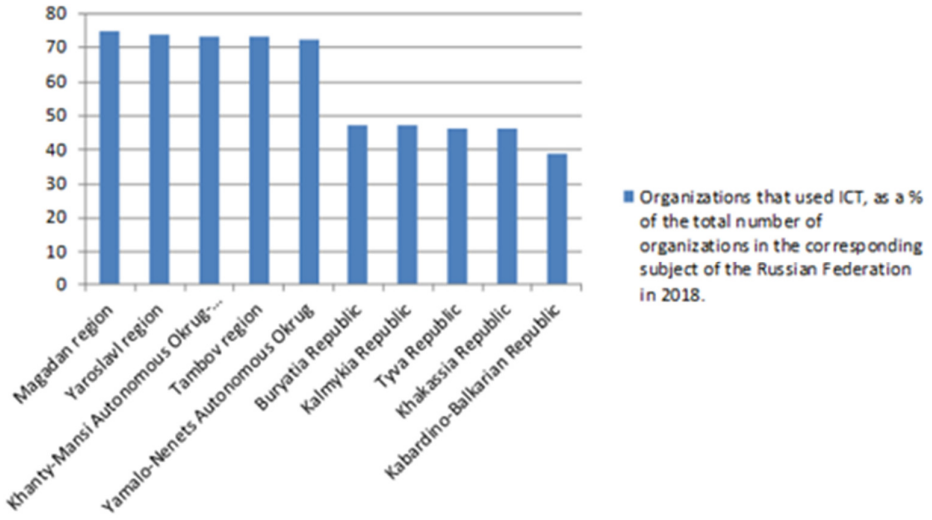

Fig. 4: Top-5 regions of Russia with the highest and lowest indicator of organizations that used ICT, as a % of the total number of organizations in the corresponding subject of the Russian Federation in 2018 (compiled by the authors according to Gks (2019d))

The gap between organizations using information and communication technologies in different regions of the Russian Federation in 2018 is 1.9 times.

In terms of the use of electronic document management in organizations, the gap in 2018 was 2.4 times (the leader is the Ingush Republic (97% of the total number of organizations), and the Chechen Republic had the lowest indicator (40.7%).

One of the indicators for assessing the level of digitalization of the country is the "development of online public services". Without access to the Internet, it is impossible to use either electronic public services or smart cities. In Russia as a whole, the value of the indicator "public receipt of state and municipal services in electronic form" (in % of the population aged 15-72 who received state and municipal services) increased from 35.2% in 2014 to 74.8% in 2018. However, there are still quite a lot of problems, especially in the lagging regions of the Russian Federation with the introduction of modern cellular standards.

Only a third of cellular base stations support the modern mobile Internet standard-4G and LTE (Skolkovo, 2019). In this segment of the digital economy, there is also a significant gap between regions (2.5 times): the Yamalo-Nenets Autonomous Okrug has the highest rate of receiving state and municipal services in electronic form (95.3%), while the Chukotka Autonomous Okrug has the lowest rate (38.6%) (Abdrahmanova et al., 2019). For example, the second position among the regions that are actively implementing digitalization tools at the administrative level is occupied by the Khanty-Mansi Autonomous Okrug (Yugra). More than 1.2 million people are registered on the unified portal of state and municipal services in this region, which is 98% of Yugra residents over 14 years of age. With the help of the mobile app "public Services of Yugra", information about educational and health services is available to residents of the region. In 2018, citizens were able to get 3.7 million services using the app (Invest Foresigth, 2019).

The analysis allows to draw a conclusion about the presence of significant differentiation among regions of Russia on all levels – from the population to the government. On selected indicators of access to ICT and use the Internet for professional activities and for personal purposes, the positive dynamics of reducing the gap. This may be due to the implementation of the national program "Digital economy of the Russian Federation" (2017), as well as numerous regional programs and strategic documents that affect the intensity of the use of digital technologies.

There are also significant differences in the processes of ICT investment and the costs of research and development, which are carried out by both the state and business structures.

As a rule, large regions with a strong scientific and technological base-Moscow, Saint Petersburg, and the Moscow region – have the largest amounts of investment in ICT development. However, according to the indicator "capital expenditures on information and computer equipment", the Nizhny Novgorod region and Chelyabinsk region are close to the leading regions (Gks, 2019d). The situation is similar with domestic R&D expenditures. The Nizhny Novgorod region (24000,6 rubles/per capita), the Tomsk region (15159,7 rubles/per capita), and the Kurgan region (14481,4 rubles /per capita) are close to the capital region (27815 rubles/per capita) (Gks, 2019d).

Calculation of the network readiness index of Russian regions

The initial indicators and calculation of the network readiness index of Russian regions are presented in table 2. The authors excluded Moscow, Saint Petersburg, and the Moscow region from further analysis due to significant asymmetry. Thus, normalization of indicators and calculation of the network readiness index was carried out for each of the 80 regions of the Russian Federation using Microsoft Excel tools.

Table 2: Initial indicators and calculation of the network readiness index of Russian regions

Region	Percentage of households with broadband Internet access	Organizations with broadband Internet access	Advanced manufacturing technologies used	Capital expenditures on information, computer and telecommunications equipment	Users of the Internet among households	The percentage of households making purchases online	Education index	Literacy	Organizations with a website	Online staff training	Using special software tools in organization	Percentage of households receiving public services online	Internal R&D costs	Percentage of the population who used information security tools	Share of high-tech and knowledge-intensive industries in the gross regional product	The index of labor productivity	Healthy life expectancy at birth	Organizations that have implemented innovations that improve environmental safety	The network readiness indexof the region
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Belgorod region	68,9	91,2	2536	0,26	79	41,1	0,95	99,7	53,7	42,9	91	69,2	1387,6	74,5	11,10	102,80	72,9	60	0,6702
Bryansk region	64,3	87,8	2064	0,00	77,8	21,4	0,937	99,6	45,8	34,1	89,2	54,4	1158,3	73,8	20,70	104,70	70,9	75	0,6405
Vladimir region	66,1	92,7	7640	0,73	79,2	28,3	0,939	99,7	50,7	40,6	88,5	70	3663,3	80,6	28,80	101,00	70,3	70	0,7122
Voronezh region	73,7	88,6	2795	1,03	80,6	16,7	0,949	99,6	52,2	40,4	92	67,6	3459,2	70,9	18,10	102,60	72,1	63,6	0,6623
Ivanovo region	63,7	87,1	1161	0,50	84,5	33,1	0,938	99,7	51	44,6	89,7	64,8	679,3	71,7	21,50	102,60	70,8	57	0,6606
Kaluga region	70,3	87,3	4639	20,4	76,5	16,2	0,938	99,7	49,7	44,6	88,8	66,6	7065,4	76,3	34,40	102,80	71,2	92,3	0,7298
Kostroma region	67,6	80,9	1560	0,00	78,4	26,7	0,935	99,6	42,6	42,9	85,5	37	252,7	81,2	17,10	101,40	70,9	50	0,6157

Kursk region	76,8	78,5	1454	0,45	83,2	32,1	0,97	99,8	43,6	37	81,2	62,6	2483,3	84,3	18,30	104,20	70,9	100	0,6762
Lipetsk region	73,2	94,6	2921	2,19	85	24,5	0,936	99,6	46,1	48,8	91,2	71,8	445,8	95,4	11,70	101,90	71,6	75	0,6845
Orel region	65,7	84,6	1574	0,00	71,7	22,1	0,963	99,7	43,2	36,5	85,9	43,3	825,7	83	17,40	102,50	70,7	100	0,6396
Ryazan region	65,2	87,7	1923	0,45	72,9	14,4	0,949	99,8	46,6	37,4	89,4	54,5	1763,9	75,9	22,80	102,80	71,9	80	0,6448
Smolensk region	71,8	88,6	1863	11,6	80,2	26,9	0,937	99,7	53,9	33,8	90	75,2	1829,1	86,5	21,90	106,20	70	100	0,7035
Tambov region	74,5	95,2	2060	0,39	81,7	23,5	0,941	99,7	64,9	40,1	91,5	63,9	906,5	92,1	17,20	104,10	72,1	100	0,7019
Tver region	65	83,8	4170	12,9	82,4	23,4	0,943	99,7	43,5	36,8	84,3	40	3431,5	78,8	21,00	104,10	69,2	60	0,6489
Tula region	81,1	85,6	4539	0,54	85,8	30,1	0,937	99,7	48,2	38,5	85,7	75	4516,6	80,1	35,30	104,00	70,6	75	0,7234
Yaroslavl region	63,3	90,1	3132	6,51	79,4	24,7	0,956	99,8	55,1	46,3	89,7	69,2	4126,9	83,4	26,50	102,90	71,2	76,9	0,7063
Karelia Republic	74,6	88,6	707	0,65	82,6	32,4	0,942	99,6	53,4	45,2	87,3	41,1	1768,6	74,2	16,60	102,20	69,8	75	0,6555
Komi Republic	77,3	88,3	1156	6,02	81,1	31,7	0,947	99,7	43,8	44,2	86,8	49,3	2432,5	83,3	12,00	100,00	69,5	80	0,6591
Arkhangelsk region	69,7	83,9	1168	4,55	79,4	31	0,939	99,6	43,5	43	86,9	65,5	1415,5	85,5	26,10	105,40	70,8	100	0,6939
Vologda region	69,3	86,1	3167	1,71	79,8	24,9	0,937	99,6	50	45,5	85,9	60,9	547,1	84,4	16,70	104,40	70,2	100	0,6811
Kaliningrad region	70,5	88,5	930	11,5	82,4	27,9	0,93	99,8	48,8	41,6	86,2	65,8	1218,6	80	23,00	103,10	71,9	100	0,6929
Leningrad region	73,2	93,9	2762	10,4	81,9	30,8	0,86	99,7	58,6	45,5	91,1	57,4	4021,1	81,1	15,20	105,70	71,1	100	0,7068
Murmansk region	82,4	87,4	1375	4,28	88,9	41,7	0,907	99,6	50	43,8	86	45,6	3477,3	93	16,90	101,80	70,9	75	0,6888
Novgorod region	63,4	85	2134	9,17	75,5	26,3	0,941	99,6	46,9	49	89,9	48,3	3385	81,8	28,30	100,80	69,2	75	0,6795
Pskov region	65	87,8	1994	1,11	78,8	26,1	0,927	99,6	45,3	40,5	89,5	39	358,7	79,4	19,40	100,00	69,3	69	0,6347
Adygea Republic	76,2	89,1	443	0,66	77,7	8,1	0,912	99,6	52,1	39	80,5	69,4	551,6	75,3	15,60	104,20	72,6	100	0,6489
Kalmykia Republic	62,1	77,5	134	0,00	85,8	22,2	0,934	99,4	35,2	32,6	76,3	61,5	283,1	46	13,10	103,20	73,4	69	0,5862

Crimea Republic	81,4	87,8	108	0,68	84,5	18	0,929	99,8	46,6	39,2	86,8	41,4	786,1	89,1	23,50	105,30	70,7	50	0,6378
Krasnodar region	63	87,8	7375	1,49	84,3	28,5	0,938	99,8	45,3	37	83,5	66,6	1119,5	75	14,30	100,20	72,8	90,9	0,6785
Astrakhan region	80,8	88,5	669	0,49	82,6	26,5	0,942	99,3	47,5	42,6	88,6	58,9	507,9	70,9	12,80	106,60	72,2	100	0,6652
Volgograd region	76	78,8	2519	1,44	82	25,9	0,928	99,7	39,8	33,9	82,5	70,4	1414,7	81,5	18,90	98,80	72,5	100	0,6672
Rostov region	78,1	88,5	3872	9,56	85	37,8	0,946	99,7	45,2	38,1	88,5	66,1	3079,7	80,5	20,90	104,50	72,2	81,8	0,7067
Sevastopol	79,2	90,1	540	49,2	86,5	39	0,938	99,9	38,1	28,8	87,9	51,7	1864,6	72,4	24,30	95,00	71,6	56	0,6785
Dagestan Republic	58,8	62	572	0,87	82,2	13,1	0,852	99,2	31,5	15,3	53,6	38,3	390,8	53,4	12,10	98,00	77,2	100	0,5349
Ingush Republic	78,1	93	38	0,00	78,5	14,2	0,837	98,1	73,8	41,8	98,9	64,5	206,8	81,3	22,10	99,10	80,8	100	0,6935
Kabardino-Balkar Republic	66,7	79,6	283	0,00	84,9	17,6	0,882	99,4	42	26,7	72,6	67,7	821	80	18,90	99,70	75,1	100	0,6305
Karachay-Cherkess Republic	69	84,7	176	0,00	79,4	20	0,884	99,3	49,8	35,3	85,5	61,3	1107,3	61,9	18,20	95,70	74,7	100	0,6381
Karachay-Cherkess Republic	83,6	83,6	176	0,00	88,8	24,6	0,921	99,6	45,4	32	79,6	46,5	483,6	83,2	18,90	95,90	75,1	50	0,6227
Chechen Republic	50,2	85,1	210	0,00	69,3	7,5	0,888	98,2	52,3	12,4	49,6	54	190,8	48,5	22,20	102,00	74,2	100	0,5630
Stavropol region	68,6	91,1	1981	0,50	85,1	18,1	0,903	99,5	56,1	46,6	91,1	66,2	747,8	71	23,80	100,50	73,4	100	0,6890
Bashkortostan Republic	77,9	88,8	8614	13,2	84,5	23	0,935	99,7	53,6	41,8	88,9	78,1	2688,2	69,6	23,60	104,60	71	80	0,7274
Mari El Republic	65,9	81,8	971	2,06	83,4	21,3	0,941	99,6	41,9	40	84,1	63,9	361,2	77,5	24,00	104,00	70,8	68	0,6458
Mordovia Republic	65,2	89,6	2595	0,00	74,9	21,9	0,936	99,5	36,5	28,9	86,9	71,9	1259,1	83	22,40	102,30	72,3	87,5	0,6555

Tatarstan Republic	80,2	97,7	8304	19,1	92,8	36,8	0,954	99,7	49,3	43,2	92,3	81,4	4562,2	83,7	19,80	101,20	73,6	88,9	0,7689
Udmurtia Republic	69,1	87	6642	18,9	78,6	27	0,96	99,6	48,6	37,5	87,1	64	1554,7	86,9	26,20	103,00	70,9	66,7	0,7038
Chuvash Republic	62,3	91,3	3527	6,70	72,7	30,2	0,944	99,6	64,1	42	87,1	60	1768,6	86,4	31,20	104,30	71,5	66,7	0,7025
Perm region	67,4	90	13690	22,41	78,2	25,2	0,946	99,6	42,5	39,3	88,6	48,4	5530,1	80,1	29,60	103,20	69,7	90,5	0,7441
Kirov region	64	87,9	2835	1,26	75,5	25,7	0,958	99,6	39,4	37,1	87	55,4	1665,9	97,4	27,90	103,30	71,1	83,3	0,6759
Nizhny Novgorod region	72,4	93	8639	78,69	78,7	34,8	0,945	99,7	53,4	47,2	90,1	63,4	24000,6	78,4	31,30	101,60	70,8	84	0,8446
Orenburg region	74,9	94,3	1265	1,58	81,7	24,2	0,938	99,6	53,4	40,6	91,1	63,8	482,9	82,1	11,80	102,70	70,6	88,9	0,6682
Penza region	71,4	84,5	2002	9,79	80,2	24,7	0,931	99,6	53,4	41,8	85,4	66,3	3880,9	69,7	22,50	104,60	72,5	100	0,6942
Samara region	79,8	78,4	8037	15,14	87,1	25,5	0,959	99,5	37,1	36,6	78,9	54,9	4410,9	87	23,90	100,80	71,1	83,3	0,7028
Saratov region	72,4	79,5	7734	0,53	81,2	19,5	0,938	99,6	37,1	34,3	80,6	65,3	1836,9	79	23,70	102,50	72,1	28,6	0,6432
Ulyanovsk region	70,4	83,5	2081	23,75	72,6	9,8	0,94	99,5	43,1	39,6	84,9	56	9767,4	68	34,00	101,60	71	87,5	0,6900
Kurgan region	64,1	75,4	1584	0,36	75,8	23,6	0,949	99,5	37,2	33,9	88,7	43,2	14481,4	75,5	24,40	104,20	69,4	100	0,6692
Sverdlovsk region	72,5	88,6	13102	6,37	80,3	30,4	0,965	99,6	51,6	46	88,6	47,2	6963,2	86,5	24,80	103,30	70	73,1	0,7425
Tyumen region	84,1	85,4	1929	21,08	89,7	46,1	0,981	99,7	46	47,9	86,9	74	8953,2	85,1	20,50	108,00	71	100	0,7622
Khanty-Mansi Autonomous Okrug-Yugra	88,9	86,7	2602	15,63	92,2	44,6	0,916	99,9	48,3	50,5	88,2	71,2	1988,6	90,4	6,40	100,30	73,5	100	0,7271
Yamalo-Nenets Autonomous Okrug	96,3	83,8	5178	1,29	97,1	65	0,897	99,7	45,3	49,1	83,4	86,1	510,2	88,9	3,80	115,20	72,1	98	0,7505
Chelyabinsk region	74,2	86,6	7584	53,28	82,6	27,3	0,952	99,7	49,7	43,9	87,7	60,7	6169,5	83,5	20,60	100,50	70,5	90,9	0,7542

Altai Republic	84,4	86	224	0,46	80,9	60,1	0,947	99,4	46,4	43,8	90,5	56,4	452,1	91,1	19,30	105,10	70,1	100	0,7137
Buryatia Republic	68,6	68,2	538	5,19	83,9	26,5	0,947	99,5	30,6	27,3	68,7	45,4	847,4	74,8	26,50	103,80	69,6	100	0,6239
Tyva Republic	87,4	74,3	69	3,09	85,2	22,8	0,944	99,5	36,6	31,1	76,2	78,8	944,4	60	26,80	103,50	64,2	100	0,6545
Khakassia Republic	54,5	82	643	0,74	81,7	16,9	0,928	99,7	46,8	40,9	81,5	64	197,4	75,1	16,20	104,50	69,3	100	0,6375
Altai region	69,4	84,6	2598	0,56	79,9	27	0,938	99,5	36,5	37,3	89,6	68,3	782,3	73,6	19,30	101,30	70,7	63,6	0,6447
Zabaikalsky region	62,3	83,7	1347	0,00	76,6	17,2	0,922	99,5	34,5	38,4	90,8	37,8	396,8	69,9	15,50	100,70	68,3	66,7	0,5941
Krasnoyarsk region	66,8	85,6	4275	6,92	82,3	26,1	0,944	99,6	42,6	40	84	80,4	7875,8	76,9	14,40	103,20	70	94,1	0,6959
Irkutsk region	69,9	79,9	3001	2,92	79,5	21,3	0,955	99,5	44,5	39,5	80	54,5	1980,4	80,2	17,00	103,60	68,2	88,9	0,6514
Kemerovo region	66,4	84	3963	0,79	79,5	21,7	0,933	99,7	47	41,9	85,3	45,7	567,7	78,7	15,60	102,90	68,7	100	0,6548
Novosibirsk region	74,5	80,3	3563	24,27	81,4	26,2	0,97	99,7	40,5	32,5	84,2	51,9	8501,9	96,7	22,70	103,90	71,2	83,3	0,7014
Omsk region	74	86,9	3194	0,51	80	25,2	0,975	99,5	36,6	33,7	81,6	62,2	2984,1	75,8	19,00	100,70	70,8	55,6	0,6407
Tomsk region	63,7	80,09	1922	26,65	82	26,1	0,978	99,7	43,7	41,8	80,3	51,7	15159,7	79	21,00	99,60	71,7	25	0,6687
Sakha Republic (Yakutia)	62	73,4	892	10,44	85,8	31,2	0,936	99,6	37,6	34,5	81,4	46,2	3006,2	60	11,70	102,90	70,8	60	0,6047
Kamchatka region	78,5	85,3	720	3,81	82,3	43,8	0,928	99,9	52,9	47,5	88,8	54,3	4460,3	77	18,60	108,60	68,7	89	0,7003
Primorsky region	73,9	88,7	1285	3,31	83,5	28,9	0,944	99,8	42	39,4	84,1	64,8	4217,7	63,9	16,70	101,20	69,7	80	0,6582
Khabarovsk region	79,7	89,4	3006	3,18	82,1	28,8	0,949	99,8	53,6	46,5	87,8	49,5	1774,4	78,4	17,90	101,10	69,1	100	0,6914
Amur region	71,5	79,3	638	0,50	83,4	18,4	0,933	99,7	35,8	37,1	85,2	67,1	721,7	77,2	12,90	101,70	68,3	100	0,6354
Magadan region	75,8	84,1	434	4,26	86,4	30,6	0,96	99,8	41,9	42,9	84,8	37,8	5794,3	58,4	13,60	105,30	69	100	0,6527
Sakhalin region	71,8	87,1	618	0,20	77,6	30,9	0,93	99,7	51,7	49,7	85,3	57,2	2320,4	69,8	11,10	108,40	68,7	89	0,6602

Jewish Autonomous Okrug	65,6	83	98	0,00	77	24,2	0,908	99,5	37,5	34,5	88,1	36,4	606,3	79,3	16,10	102,60	65,9	90	0,6114
Chukotka Autonomous Okrug	59,1	89,6	142	0,00	91,7	31,8	0,917	99,7	47,1	55	82,5	19,2	680	76,8	13,40	104,50	64,4	98	0,6401

The range of variation is 0.3097, the average is 0.6821. The coefficient of oscillation of 45.4. Maximum values of the networked readiness index are: Nizhny Novgorod region (0.8447), Tatarstan Republic (0.7689), Tyumen region (0.7623). The minimum value for the Dagestan Republic is 0.5349.

The group of regions with high values of the network readiness index includes: Vladimir region, Kaluga region, Smolensk region, Tambov region, Tula region, Yaroslavl region, Arkhangelsk region, Kaliningrad region, Leningrad region, Murmansk region, Rostov region, Ingush Republic, Stavropol region, Bashkortostan Republic, Udmurtia Republic, Chuvash Republic, Perm region, Penza region, Samara region, Ulyanovsk region, Sverdlovsk region, Khanty-Mansi Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Altai Republic, Chelyabinsk region, Krasnoyarsk region, Novosibirsk region, Kamchatka region, Khabarovsk region. These regions have network availability index values in the range of 0.69-0.84. Other regions lag behind in the network readiness index (0.53-0.69).

Conclusions

The authors analyzed the processes of digitalization at the regional level and determined the readiness of Russian regions for intensive digital development. The analysis allowed the authors to conclude that there is a significant differentiation between the regions of Russia at the level of population, households, organizations in terms of access and use of digital technologies, the level of digital literacy, as well as the amount of costs for financing the introduction of ICT and R&D. The authors used the Portulance Institute methodology to determine the network readiness index of Russian regions. The indicators for calculating the index were adapted to the existing Russian statistical database and grouped into subgroups (technology, people, governance, impact). The results of calculating the network readiness index allowed the authors to conclude that 32 regions of Russia out of 80 analyzed have high indicators of network readiness. Indicators of ICT investment and R&D expenditures are crucial in determining the network readiness index. Those regions where the value of these expenditures is significant have large index values. The proposed tools for assessing the network readiness of regions can be used as a mechanism for differentiating digital development policies at both the state and regional levels.

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The Role of Cost Accounting in Environmental Cost Measurement and Control in A Small Enterprise – A Case Study

Grzegorz BUCIOR
University of Gdansk, Faculty of Management, Department of Accounting, ul. Armii Krajowej 101, 81-824 Sopot, Poland, grzegorz.bucior@ug.edu.pl

Arleta SZADZIEWSKA
University of Gdansk, Faculty of Management, Department of Accounting, ul. Armii Krajowej 101, 81-824 Sopot, Poland, arleta.szadziewska@ug.edu.pl

Abstract

The studies conducted so far in Poland indicate not only the low environmental awareness of SMEs, but also incorrect reporting of their impact on the natural environment. Due to the fact that SMEs constitute majority of the companies operating on the market, however, their negative impact on the natural environment is significant. For this reason, these units should have access to complete information (both in terms of quantity and value) regarding their impact on the natural environment and the results of the protective measures taken in this regard. Taking this into account, the aim of the article is to present the possibility of using cost accounting to provide information on the environmental costs arising in a small manufacturing enterprise. The literature review and the overview of the legal regulations as well as the case study carried out contribute to extension of knowledge on the role of cost accounting as a tool allowing provision of reliable information on environment exploitation and regarding the assessment of the company's impact on the quality of the environment and the compliance with the principles of environmental protection.

Keywords: Cost Accounting, Environmental Cost, Small Enterprise, Impact on The Natural Environment.

Introduction

Enterprises are viewed as the main generators of the ecological threats. For this reason, while conducting a business activity, companies cannot afford to ignore the environmental protection rules. This necessitates access to relevant and credible information (Szadziewska, 2013) that would allow:

- assessment and control of the impact of economic activity on the natural environment,
- functioning in accordance with the applicable environmental regulations,
- rational management of the natural capital resources,
- reducing the risk of ecological catastrophes,
- implementation of new technological solutions and innovations into production processes and reduction of the negative impact on the natural environment.

An important role in delivering the above-mentioned environmental information is played by the cost accounts recorded by businesses. As part of the information system, it should constitute an important tool in obtaining relevant and credible information, enabling economic entities to undertake activities aimed at prevention, reduction and repair of the damage done to the natural environment. In particular, cost accounting (CA) is meant to:

1) identify, measure, record and analyse the costs related to exploitation of and the changes to the environment;
2) determine the tax burdens on the exploitation of the resources and the use of values of the natural environment;

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3) provide information enabling assessment and control of the rationality of the conducted business activity, from the perspective of its impact on the natural environment.

In highly developed countries, the use of CA as a source of environmental information has been the subject of many scientific studies since the end of the 20th century (Wendisch, Heupel, 2005; Hörisch, 2015; Shasi et al., 2018; Caldera et al., 2018; Yadav et al., 2018). In Poland, so far, little research in this area has been conducted (Stępień, 2005; Majchrzak, 2006; Szadziewska, 2013). What is more, most of the projects implemented concerned the methods used for measurement of the environmental impact large enterprises exert as well as inclusion of such information in external reporting. By contrast, the studies conducted so far overlook or present little information on the role of CA as a measurement system and a source of information on the environmental costs (EC) in micro and small enterprises. Due to the significant number of these entities, however, in most market economies, their economic activity contributes to the environmental burden caused by pollutants. For this reason, these entities should have access to information on their impact on the natural environment, including information on the resulting EC. Lack of access to this type of data prevents compliance with the applicable environmental regulations. Taking this into account, the aim of the article is to present the use of the CA system as a tool for measuring EC in the small manufacturing enterprise under examination. Based on literature overview, a review of the legal regulations and the case study, the following research questions have been formulated:

1. What EC are identified and recorded in the CA system of a small manufacturing enterprise?
2. Is the small manufacturing enterprise able to prepare valid environmental reporting (ER) based on the environmental information provided by the CA system?

We believe our article extends the knowledge on the possibilities of using CA to obtain reliable information on EC in small businesses. The case study presented also allows identification of the actions that can be taken by every small entity to record, group and control the costs of natural resource exploitation and pollution removal as well as the cost of the protective measures undertaken. However, the main limitation of our article is the inability to apply our conclusions to other companies. For this reason, a need exists for further research, to determine how SMEs obtain the information they need to develop ER.

SMEs and the impact of their economic activity on the natural environment

In the EU countries, SMEs (Small and medium-sized enterprises) are perceived as the source of economic growth and the driving force behind the development of European economy. It is indicated that SMEs play a key role in the creation of new jobs, production capacity improvement, reduction of poverty, and the increase of a given economy's competitiveness (Sokołowska, 2013, p. 83; Shashi et al., 2018, p. 3679). According to the Annual Report on European SMEs 2018/2019, non-financial SMEs were responsible for generating 54.5% of GDP and employed 61.4% of the total workforce. In Poland, the companies classified within this group constitute the majority. In 2018, their share in the structure of all enterprises was 99.8%. These entities comprise micro, small and medium-sized companies. This division is presented in Table 1, in accordance with the legal regulations regarding statistical data collection and the tax system in force in Poland.

Table 1: Definition of SMEs

Enterprise Category	Employees	Turnover	Balance sheet total
Micro SME	0 to < 10	< € 2 million	< € 2 million
Small SME	10 to < 50	< €10 million	< €10 million
Medium-sized SME	50 to < 250	< €50 million	< €43 million

Source: Developed based on the Act on the Law of Entrepreneurs of 6 March 2018

It needs to be noted that the classification presented in Table 1 takes into account quantitative criteria. In order to classify an entity within a specific category, it must meet two conditions, in at least one of the last two financial years, i.e. the number of employees and the value of the sales revenues or the value of the balance sheet total. The division indicated is in line with the EU Commission Recommendation of 6 May 2003. It has been in force since the 1st of January 2005, in relation to all the measures, policies and programs in the EU. This classification was introduced to Polish legal regulations on January 1st, 2005. What is more, changes were made in the accounting regulations, as to include the concept of micro and small entities. The same criterion regarding the number of employees was adopted in the regulation. There are differences, however, in the thresholds adopted for the value of the sales revenues and the value of the balance sheet total. As such, when conducting research, usually the number of employees is used for enterprise classification.

In Poland, non-financial SMEs play a significant role in the building of the Polish economy. Their share in the national GDP in 2017 was 49.1%. In these companies, however, the problems associated with natural environment exploitation and protection are not always noticed. This has been indicated in the research carried out in 2008 by the Environmental Partnership Foundation, which indictaed that 68% of the companies surveyed believed that their activity had low impact on the natural environment (Zbaraszewski, 2010, p. 527). Similar research results were obtained in 2014 by Kubicka and Kupczyk (2016), as part of a project titled "Green company - the key to enterprise competitiveness". 52% of the micro and small companies surveyed (i.e. 26 entities) believed that they exerted no negative impact on the natural environment, while 48% admitted to minimal environmental impact of their business activity. What is more, the research carried out by Osiński et al. (2017) in 2014-2015 indicates not only the low ecological awareness on the part of the SMEs surveyed, but also incorrect reporting of their impact on the natural environment. Such situation in particular occurs in micro and small enterprises, which delay implementation of the obligations resulting from environmental regulations or treat them as insignificant and fail to comply with them at all (see: Osiński et al., 2017, p. 105).

It needs to be noted that the economic activity conducted by entities has direct impact on the natural environment, causing its quality to deteriorate. This state of affairs has been affected not only by the large enterprises operating on the market, but also by the SMEs. As stated by Osiński et al. (2017, p. 97) in unit terms, the impact of a micro or small entity may be minor, but due to the cumulative effect, the total amount of the pollution generated by all companies in this group is of significant importance for the condition of the environment. This results from the fact that these units constitute the vast majority of enterprises in Poland. For this reason, it is important that these entities have access to information on the environmental aspects of their functioning that are associated with their negative impact on the natural environment. Such information includes data on the following in particular:

- water consumption,
- particulate emissions and greenhouse gas emissions,
- solid and liquid waste produced (including hazardous waste),
- the wastewater generated,
- recycling and recovery of waste.

The above-mentioned information groups facilitate SME enterprises in fulfilment of their reporting obligations resulting from environmental regulations. They additionally constitute the basis for assessment of their impact on the natural environment and for undertaking the measures to protect it.

SMES' Environmental Costs in The Light of The Legal Regulations Applicable in Poland

At present, in Poland, enterprises are required to conduct their business activity in accordance with the principles of sustainable development, i.e. in a manner that maintains the quality of the natural environment for the present and the future generations. Such a state of affairs primarily has been influenced by an expansion of the existing legal regulations involving implementation of:

- a country's environmental policy that assumes undertaking activities to reduce the pressure on the natural environment;

- the priorities included in the Strategy for Energy Security and Environment – a perspective until 2020;
- the priorities adopted by the European Union related to implementation of sustainable development, contained.

A list of selected entrepreneurial obligations resulting from the introduced legal regulations is presented in table 3.

Table 3: Selected entrepreneurial obligations resulting from the legal regulations

Entrepreneurial reporting obligations	Legal regulations
Information about the impact of enterprises on the natural environment and the protective measures undertaken in this regard – reports submitted to relevant governmental and local bodies, such as: – a collective summary of the information on the scope of the exploitation of the environment and regarding the amount of the fees due; – a report on the used up electrical and electronic equipment; – statistical reports (the Polish formats, so called: OS-1, OS-3, OS-4, OS-5, M-06, attachment to F-03, SP and SG-01 questionnaire OŚ-29/k); – packaging reports (the Polish formats, so called: OPAK1, OPAK2, OPAK3, OŚ-OP1); – a summary of the data on the types and the quantities of waste, its management as well as regarding the installations and the equipment used to recover or dispose of such waste; – a collective summary of the data on sewage waste; – an annual report on the greenhouse gas emission.	– The Act of 27 April 2001 on the protection of the environment – The Act of 27 April 2001 on waste – The Act of 18 July 2001, Water Law – The Act of 29 July 2005 on waste electrical and electronic equipment – The Act 29 June 1995 on public statistics, – The Act of 11 May 2001 on packaging and packaging waste – The Act of 11 May 2001 on the obligations of entrepreneurs in the field of management of some waste as well as on the product and the deposit fees – The Act of 27 April 2001 on waste – The Act of 22 December 2004 on the trade of greenhouse gases and other substance emission allowances
Ensuring public access to the information on the environment and its protection.	– The Act of 3 October 2008 on provision of information on the environment and its protection, on public participation in environmental protection as well as on assessment of the impact on the environment – Constitution of the Republic of Poland of 2 April 1997 – The Act of 27 April 2001, the Environmental Protection Law
Obligation of large units to disclose non-financial information, including environmental information presented in a non-financial report or in a separate report containing non-financial information.	– Directive 2014/95/EU – The Accounting Act, with the changes introduced in 2017 by the Act of 15.12.2016

Source: Own elaboration on the basis of the current legal regulations

The information contained in Table 3 indicates that in their annual reports SMEs do not have to present any information on the impact of their activity on the natural environment nor on the protective measures taken in this area. This is in line with Directive 2014/95/EU, which assumes that individual Member States should not impose any additional administrative burdens on small and medium-sized enterprises. Nevertheless, entities in this group are obliged to prepare reports on environment exploitation, on the assessment of their impact on environment quality, and on their compliance with the principles of environmental protection. Therefore, in order to meet the requirements in this area, they should have access to information on the EC incurred in the course of running business, including the costs associated with:

- acquisition of permits and authorizations for the release of substances or energy into the environment, if the environment exploitation exceeds the scope of general use;
- the fees incurred for environment exploitation;
- recycling and achievement of an appropriate level of waste recovery;
- incurrence of administrative penalties;
- the measures taken to protect the natural environment.

The structure of SMEs' environmental costs is presented in Table 4

Table 4: The structure of SMEs' environmental costs

Internal EC (environmental protection costs)	Internalized external EC
1. Outlays on projects in the field of environmental protection	1. Environmental fees for: a) emission of gases and particulate matter into the air, b) discharge of sewage into waters or into the ground, c) abstraction of groundwater and surface waters, inland waters and internal sea waters; d) waste storage; e) acquisition of permits for the emission of particulate matter and gases into the air, water permits, etc.
2. Current costs of environmental protection incurred for prevention, reduction, neutralization or elimination of pollution and repair of the damage resulting from the company's day-to-day operations	2. Product charges for packaging, batteries, storage batteries, lubricating oils, charges for electrical and electronic equipment, or for vehicle recycling.
3. The costs of environmental reserves, e.g. land reclamation, purchase of CO_2 emissions	3. The cost of additional fees and penalties for non-compliance with applicable regulations and for environmental degradation.

Source: Developed based on Szadziewska, 2013, pp. 337-361.

In addition to the EC associated with air protection, sewage management and water protection as well as waste and packaging management, which are indicated in Table 4, enterprises may incur costs associated with development of their pro-ecological image. These costs include, in particular, the cost of environmental management system implementation and maintenance or the cost of reporting the socially responsible activities undertaken by companies in order to reduce their negative impact on the environment. It should be added, however, that measurement of EC is not an easy matter. This results

from the complex nature of this category, consisting of a large number of elements. Identification and valuation of these costs is not an easy task. Currently, the solutions used in SME CA do not allow discrete classification nor recording and accounting of the EC arising in these companies.

Cost accounting as a source of information on EC in a small manufacturing enterprise - Empirical Study

Compliance with the principles of environmental protection in business operations applies not only to large enterprises, but also to micro and small ones. These units are obliged to submit, to the relevant state-government and local-government bodies, reports on their impact on the natural environment and the protective measures taken in this respect. Nevertheless, as indicated by the research carried out by Osiński et al. (2017, p. 98), majority of the SMEs surveyed (i.e. 63.6%) did not comply with the obligation to report the amount of gas and particulate matter emissions to the National Center for Emissions management (KOBiZE). Proper waste management was also problematic, in particular with regard to the hazardous waste that ended up in municipal landfills. What is more, the results obtained also indicated that EC, in most of the entities surveyed, have been undervalued. This did not result from the entrepreneurs' reluctance to incur these costs, but from the lack of awareness of the need to incur such costs (Grudzień et al., 2015, p. 306). For this reason, a need exists to establish the role of CA as a source of information on the EC arising in a small manufacturing enterprise.

Research Questions and Methodology

Analysis of the publications presenting the results of research on environmental cost accounting (ECA) in SMEs allows a conclusion that a research gap exists concerning the functioning of ECA in Polish small and medium-sized enterprises. Assuming that the issues addressed in the work deserve researchers' interest, the approach prevalent in the literature should be adopted, according to which qualitative research is recommended when the object, the subject or the phenomenon examined has not been covered by research or when only a few of such studies have been conducted (Creswell 2009). It is all the more justified, as a belief functions in the literature that the existing research on accounting relies overly on quantitative survey methods, which may distort the correct image of the reality under examination (Bogt, Van Helden 2012). Case studies based on observation may be the answer. This call conforms to the general interest in qualitative research in the field of accounting, for better understanding of individual accounting practices aggregated into group behaviors (Hall 2016; Ryan et. al. 2002).

For these reasons, the qualitative research strategy was selected for the study. According to Creswell (2009), in a qualitative study, researchers formulate and seek answers to research questions, as opposed to hypotheses. Taking the above and the importance of the available, previously cited studies into account, as well as bearing in mind the purpose of the work, the Authors formulated the following research questions:

RQ1: What EC are identified and recorded in the CA system of a small manufacturing enterprise?
RQ2: Is the small manufacturing enterprise able to prepare valid ER based on the environmental information provided by the CA system?

Qualitative research requires multiple sources of data and data triangulation, to increase the credibility of the study, whereas any finding or conclusion drawn from the case study may be more convincing and accurate, if it is based on several different sources of information (Yin, 2014). The case study method was selected as the research approach in this study. Selection of the case was related to participant observation on the part of one of the Authors of this work.

The primary source of evidence was the audited entity's documentation. The following documents were analyzed, with regard to the criteria described further:

1. the entity's corporate documents, including: the partnership agreement, copy of the register of entrepreneurs of the National Court Register, copy of the data from the National Official Register of Business Entities REGON;
2. the accounting policy, understood as a document defining the accounting principles and the internal regulations shaping the entity's economy;

3. annual financial statements;
4. environmental reports.

The second source of evidence entailed participatory observation, since one of the Authors participated in activities related to ECA implementation and co-created the ER system in the entity surveyed. The observation was intended to verify how the procedures and the methods implemented as part of CA and ER are carried out.

The Research Procedure

The case studied was assessed according to the criteria defined with consideration of the available publications on the functioning of ECA in enterprises (Wendisch and Heupel 2005, Dyduch 2016, Ferens 2016).

The case assessment criteria have been divided into 3 groups associated with the main areas of analysis, that is:

C1 - the manner in which the entity operates,
C2 – ECA,
C3 – ER.

The first group of criteria refers to the organizational and the functional aspects of the entity surveyed and consists of the following sub-criteria:

C1.1 – the formal aspects of running a business,
C1.2 – the subject of activity,
C1.3 – the principles of economic records,
C1.4 – the CA principles.

Assessment of these criteria was focused on the issues that are significant from the perspective of the research question verification process, which mainly concerned accounting and CA issues.
Within the C2 group, the following criteria have been defined:

C2.1 – measurement and recording of the quantity and the quality of the water collected;
C2.2 – measurement and recording of the amount and the type of the gases or the particulate matter introduced into the air;
C2.3 – measurement and recording of the amount and the type of the liquid and solid waste released into water or soil;
C2.4 – measurement and recording of the amount and the type of the liquid and solid waste stored independently;
C2.5 – measurement and recording of the amount and the type of the liquid and solid waste designated for disposal or treatment;
C2.6 – data records containing information on environment exploitation and the amount of the fees due;
C2.7 – valuation and recording of the fees payable for environment exploitation;
C2.8 – recognition of the environment-related costs, in accordance with function-related taxonomy:

- the cost of environment exploitation,
- prevention costs,
- the cost of pollution reduction,
- restitution costs,
- the cost of environmental management system.

The criteria in this group can be treated as features of ECA, while the assessment made according to these criteria was focused on verifying whether CA exhibited these features after the implementation process and whether CA exhibited these features during the study. As such, owing to these criteria, it was possible to verify RQ1.

Group C3, related to ER, mainly consisted of sub-criteria representing various types of environmental reports produced by SMEs. These criteria, supplemented with criteria related to the method of report development, were intended to help verify RQ2. The criteria structure was as follows:

C3.1 – organization of ER;
C3.2 – the ER process;
C3.3 – the information base for ER;
C3.4 – summary of information regarding environment exploitation and the amount of the fees due;
C3.5 – report on packaged products, on packaging and packaging waste management;
C3.6 – the VOC (Volatile Organic Compound) balance – a report on the compliance with the emission standards for greenhouse gasses and other substances released into the air by entities exploiting the environment;
C3.7 – data summary on the types and the amounts of waste, the methods of waste management and the installations and devices used for recovery and disposal of waste;
C3.8 – report on the weight of manufactured, imported, exported packaging;
C3.9 – report on the amount of the product fee due.

Case Study Findings

The results obtained via the case study analysis, based on the criteria mentioned previously, are as follows:

C1.1 - the enterprise is a legal person, a limited liability company established under the Polish law. The company's share capital was provided by private entities. The company is classified as a small enterprise, as per the criteria specified in the Accounting Act. The average annual number of job positions in the company is 36, 7 of which are administration and accounting positions. The balance sheet total for 2019 was approximately PLN 8 million, while the sales revenues were approximately PLN 12 million.

C1.2 - the company conducts business activity entailing the processing of waterfowl feathers, resulting in the production of down and feathers that are used as filling in the textile industry – quilt, pillow and clothing filling. For this reason, the company has been classified within the manufacturing industry, with the business activity code of the Polish classification PKD 13, 92, Z, i.e. PRODUCTION OF FINISHED TEXTILE PRODUCTS. The production process with the greatest impact on the environment is the feather washing, as it requires consumption of large amounts of water. Other processes, such as sorting and dedusting, show lower environmental impact.

C1.3 - the company keeps accounting books in accordance with the Polish Accounting Act.

C1.4 - the company's cost account is characterized by the following features:

- records of the cost of basic production activity are kept based on the types of activity;
- the type-based system of costs is consistent with the range of costs in a comparative profit and loss account;
- product calculation is carried out in accordance with the division method;
- the types of activity costs, in addition to the standard overheads, include the accounts used in product calculation - direct costs, indirect production costs and purchase costs.

C2.1 - the company measures its water consumption for production purposes and separately for non-production purposes. An internal record of this consumption is kept for control and resource management purposes.
C2.2 - the company does not measure its gas or particulate matter emission into the air. In the company's opinion, such a measurement is not justified, due to the low level of emission.
C2.3 – the company does not measure the amount, nor the type, of the liquid and solid waste discharged into water or soil, since none of its waste is treated in such way.
C2.4 – the company does not measure, nor record, the amount and the type of the liquid and solid waste stored on its own, due to the small amount. Work is currently underway to implement independent

treatment of solid waste. Successful implementation of such a process will result in the necessity to keep such records.
C2.5 – the company measures the level of both the liquid waste (post-production water) and the solid waste. An internal record of the amount of waste is kept for control and management purposes. Liquid waste (sewage) is discharged into the municipal sewage system. Solid waste is transferred to entities authorized to dispose it.
C2.6 –the company has been recording information on environment exploitation and the amount of the fees due. Appropriate registers are kept for this purpose.
C2.7 – the entity measures and records the fees due for environment exploitation. The accounting policy incorporates development of an information subsystem for environmental accounting, through the following:

- definition of the current set of environmental reports that the entity should prepare; this list constitutes part of the document development and circulation regulations, as an attachment to the accounting policy,
- formulation of the scope of the ER obligations assigned to specific positions in the administration and accounting department; description of these obligations is included in the accounting policy, in the part defining the personnel structure of the administration and accounting department,
- indication of the allocation rules for selected EC; this information is included in the accounting policy, in the section describing the principles for calculation of the costs of manufacturing.

C2.8 – recognition of EC, based on the systematics of a given function within the entity surveyed, entails the following:

a) the cost of environment exploitation - recognized separately, via analytics especially-developed within the cost group, divided by the type of activity; this applies to the following costs:
charges for electricity consumption, the costs of water acquisition and treatment, consumption of materials for environmental protection purposes, the energy consumption associated with waste product disposal, waste treatment services, solid waste collection and disposal services, sewage services,
b) prevention costs – not specifically included, fall within the scope of indirect production costs (depreciation of the fixed assets involved in pollution prevention, pollution monitoring costs) or overhead costs (resource efficiency training),
c) pollution reduction costs - currently they are not recognized separately, because the entity has been including these costs within the costs of environment exploitation, due to their low level; since the company is working on development of its own water treatment and recycling installation and a solid waste composting installation, the need for separate recognition of these costs will emerge in the future,
d) restitution costs - none,
e) the cost of the environmental management system – none.

C3.1 – ER organization has been defined in the accounting policy and is applied in accordance with the procedures established,
C3.2 – the ER process, verified for the period covered by the study (2019), should be considered correct, which in turn results in fulfillment of the reporting obligations,
C3.3 – the ER information base has been defined in the accounting policy, as presented in the criteria C2.7 and C2.8; it should be noted that it was used during the period considered,
C3.4 – the information on environment exploitation and the amount of the fees payable was compiled in a timely and complete manner,
C3.5 – the report on the products in packaging, the packaging and the packaging waste management was prepared in a timely and complete manner,
C3.6 – not applicable,

C3.7 – the list of data on the types and the amounts of waste, the methods of waste management and the installations and devices for recovery and disposal of waste was not created on the basis of the entity's assessment that there was no such obligation,
C3.8 – not applicable,
C3.9 – the report on the amount of the product fee due was prepared in a timely and complete manner.

Discussion

The case study shows that the entity has not developed any special subsystem of ECA. This conclusion is not surprising, as most studies on ECA in SMEs show that such entities rarely develop a separate system for recognition of EC (for example: Grudzień et al., 2015; Osiński et al., 2017, Burrit 2004). Meanwhile, it has been acknowledged that proper direction for CA development entails implementation of special procedures and methods for valuation and recognition of EC (Letmathe, Doost, 2000). ECA is a CA system oriented at proper allocation. It is based on a systematic cause and effect analysis. It allows linkage of the production costs associated with emission, removal and disposal of waste and sewage with the factors that cause these costs. In traditional CA systems, which the Authors have dealt with in this study, these costs are treated as other indirect costs and are allocated to the cost carriers, without any clear relation. This results in the inability to properly identify and control EC, as there is no appropriate cost allocation to cost centers. Proper allocation of EC to their centers can help reduce these costs (Ansari et al. 1997).

Referring to the case study, it should be recognized that separation of an EC account in the entity examined would significantly contribute to the improvement of the entire CA system. The condition for this entails implementation of procedures, in accordance with an appropriate pattern. An example of the structure of such a system is shown in Figure 1.

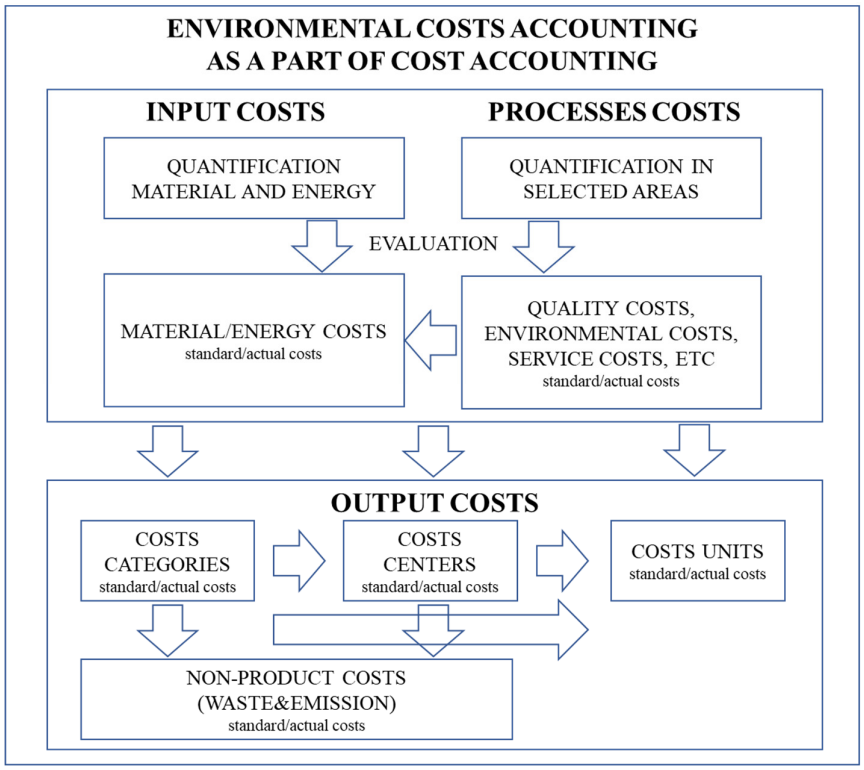

Figure 1: Conceptual structure of cost accounting in an SME.

Source: Based on: Letmathe, Doost, 2000; Jasch, Savage, 2008, Szadziewska, 2013.

The account presented valuates the outlays, the processes and the products, in accordance with their actual costs. This procedure creates a decision-oriented information base for the environmental management system and for the planning, control and supervision of material and energy cost flows.

As a result, integration of environmental aspects into all areas of planning occurs. Apart from that, relevant environmental data improves the understanding of business processes. This is particularly important in the face of the steadily growing importance of EC for enterprise operation. Knowledge of the real costs of environment exploitation is a necessary condition for the change, often necessary, in the way of doing business, including a change in the unit's attitude towards environmental protection.

To achieve this, modification of the existing CA is needed. It should be emphasized that the entity surveyed has the potential for such a change, but it depends on adequate determination on the part of the management staff. Such determination will only emerge when the benefits of additional information outweigh the costs of making the change.
Construction of an environmental cost account, in accordance with the concept proposed, assumes:

- valuation and recording of material and energy costs, along with the related EC - for this purpose, it is necessary to identify and properly describe the significant costs of environment exploitation or the costs of the impact on the environment;

- it is crucial to identify which material and energy costs have significant environmental impact;

- the relevant material and energy costs to be increased by EC can be determined with the real (actual) or standard cost model;

- to calculate EC, it is necessary to register the consumption of materials and energy, in terms of quantity and value;

- by linking the relevant material cost streams with the related EC, the actual cost of material and energy consumption is obtained.

The case study leads to a conclusion that in the entity examined it would be relatively easy to modify the CA applied, as to fit the form of the concept presented. This is evidenced by a fairly extensive set of procedures and methods used by the entity to handle the EC associated with environmentally harmful production. A subjective but clear conclusion from the study is the observation that the entity stopped halfway in the CA modification for the needs of handling the environment-related areas of accounting.

Our research contributes to the extension of knowledge on the role CA in a small manufacturing enterprise plays in the acquisition of environmental information. However, there is a need for future research in this area.

Conclusion

The study confirmed that the CA maintained in a small enterprise does not provide full record nor control of the EC. These results are consistent with previous studies carried out in Poland (Grudzień et al., 2015; Osiński et al., 2017).

Although the entity fulfills the minimum obligations in terms of both the record keeping and the ER, it should be recognized that the lack of an environmental cost subsystem, within the structure of the cost account used, generates a significant risk in this area.

The lack of cost account solutions applied in the field of classification and environmental cost recording (quantitative and valuable), hinders correct fulfillment of the environmental obligations imposed on SMEs by the legal regulations. In particular, it may refer to the requirement of conducting business in accordance with the principles of sustainable development (e.g. taking actions aimed at reducing the negative impact of business activity on the natural environment).

When answering RQ1, it should be stated that only the EC that are significant for the level of the product manufacturing cost valuation are isolated and recognized. The costs that are less important from this perspective, on the other hand, are ignored and fall within the scope of normal operating costs. This can be considered a system dysfunction, since the costs not currently recognized as product manufacturing costs can also be of significant importance in terms of control and management. This state of affairs can be improved by modifying the cost account in accordance with the concept presented in the previous part of the work.

When answering RQ2, it should be noted that based on the environmental information provided by the CA system, the company surveyed is able to prepare ER to the minimum extent required by law. There is no doubt that the CA modification recommended would have positive impact on the ER process - by potentially extending the scope of the data reported. More importantly, CA modification would allow development of internal environmental reports and ER for management purposes. Currently, such reporting does not exist in the entity surveyed, whereas the use of internal reporting could significantly support management processes (Petcharat, 2012).

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Analysis of The Causes and Circumstances of Accidents in The Company Management Using the Ishikawa Diagram and The Quality Valuation Method on The Example of The Particular Accident

Stanislaw BRZEZINSKI

University of Economics and Human Sciences in Warsaw, Warsaw, Poland
stanislaw_brzezinski@wp.pl

Abstract

An employer is responsible for the health and safety at work. By means of various methods and management techniques, he tries to make the work environment not only efficient, but also safe. Occasionally, however, work accidents do occur in the work environment. The role of an employer is to investigate the causes and circumstances of their occurrence. The preparation of an accident protocol should not end the accident procedure. It is in the employer's interest to perform an in-depth analysis of the incident in order to find out the organizational or managerial causes of the accident. In this paper, the Ishikawa diagram and the method of quality evaluation were used to analyze the causes and technical circumstances of accidents in enterprise management.

Keywords: Health and Safety Management, Accidents at Work, Ishikawa Diagram, Quality Evaluation Method.

Introduction

Each organization strives to perform in the best possible way through the available methods and techniques. Quality improvement in the organization of work or the production process can take place through the implementation of appropriate standardization mechanisms. Rational action by improving quality and safety does not have to be the motto of large organizations or enterprises. More and more often, the example of large enterprises is followed by small ones and they implement quality methods and mechanisms. It is important that the owner and employees are aware of the purpose of implementing management methods. The implemented solutions are defined as principles, methods, instruments or tools. However, it should be emphasized that any action related to quality can be determined as management improvement (Woźny, 2016).

The aspect of occupational health and safety is of significant importance for the improvement of management. Each improper operation of a human or machine may determine the impediment, downtime or stoppage of the production process. Therefore, organizations and enterprises more and more often pay attention to the quality of solutions in terms of the safety of the work environment. The resulting failure of a machine or a device can be rectified by repair or replacement. It should be pointed out that such an action may significantly affect the condition of the enterprise. The issue of employee safety is also important. In the case of accidents, significant perturbations in the functioning of the company or organization may also occur (Miller, 2011).

It should be pointed out that an employer has more obligations towards an accident than in the event of a machine or a device failure. The employer is obliged to carry out an accident procedure within 14 calendar days, which is concluded with an accident protocol. The essence of the actions of the post-accident commission is to establish the causes and circumstances of the incident, which is why the speed of the procedure and proper analysis are of key importance (Woźny, 2015). An important aspect of post-accident activities is to find out the real causes and implement appropriate solutions that will protect employees from given incidents in the future. When analyzing events, various

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qualitative solutions can be used, including the Ishikawa method and Quality Assessment as a method of managing safety and its impact on the occurrence of accidents (Hamrol, Mantura, 2005).
In the presented research paper author decided that the Ishikawa diagram and the method of quality evaluation will be used to analyze the causes and technical circumstances of accidents in enterprise management.

Quality-Based Management

Quality-based management is aimed at collecting and processing data related to events and processes that take place in the management system or the organization's environment. This procedure allows managers to make the right decision regarding the implementation of tasks or organization of the work of the employee team. From the human resource management point of view, management is based on the elements of planning, organizing, motivating and controlling. This process may take place through appropriate quality-based management mechanisms.

Management is not only about managing. It can also be understood as the relation of the company and its resources to the problems that arise during the company's operation (Skowron-Grabowska, Nowakowska-Grunt, 2017). The speed of reaction to a problem or its prediction may prove the quality of management. The use of management methods increases the probability of achieving goals. The use of methods is related to the implementation of deliberate, repeatable and based on scientific experience activities that present real benefits (Saja, Szajt, 2017).

An application of various management instruments based on data collection and processing allow a relatively quick presentation of the results of the activities carried out. The analysis and interpretation of the obtained data allows quick reactions to the occurrence of inconsistencies.

Management instruments can be adapted to the requirements and expectations of the organization, and therefore can be used in various areas of processes. It should be pointed out that individual management instruments can be implemented not only in terms of the production process or service provision (Kleszcz, Ulewicz, Nowakowska-Grunt, 2013). Many management instruments can be implemented in various areas of the organization's operation, including occupational health and safety management (Sęp, Pacana, 2001; Nowakowska-Grunt, 2008).

An example of an instrument that can be implemented in business management is the Ishikawa Cause and Effect Diagram. It allows a detailed analysis of the causes and irregularities in the implementation of an action, process, etc. The structure of the diagram enables the identification and connection of problems with individual categories. Generally, creating an Ishikawa diagram is done through teamwork using the brainstorming technique.

The categories in the root cause analysis using the Ishikawa diagram are divided into:

- Methods,
- Machinery,
- Materials
- Man,
- Management.

When identifying the sources of the problem in individual categories, one should prioritize them, from the most important to the less important ones. Such action will allow presenting the main and secondary causes of the problem (Pacana, Czerwińska, Siwiec, 2018).

In the case of the post-accident procedure, it is possible to indicate in which areas of activity, the company has problems related to safety. The analysis allows improving the process of documenting an accident event itself and to reduce information noise (communication errors) between units participating in the procedure (Woźny, Saja, Dobosz, 2018).

Accident at work – a case study for a warehouse

An accident at work is a sudden event made by an external cause, resulting in an injury or death, occurring in connection with work:

1. during or in connection with the performance by the employee of ordinary activities or orders of his superiors;
2. during or in connection with the performance of activities by the employee for the employer, even without instructions;
3. while the employee is at the disposal of the employer on the way between the employer's seat and the place of performance of the obligation resulting from the employment relationship.

It is the employer's responsibility to appoint an accident team to analyze the causes and circumstances of the incident. It should be pointed out that the actions taken by the team are not aimed so much at determining the causes and circumstances of the event, but at presenting the consequences for the employee and the employer in relation to the event. Such action allows implementing corrective and preventive measures in order to exclude or significantly reduce the probability of a similar accident event in the future (Woźny, 2017).

The subject of the analysis is an accident of an employee working as a warehouse keeper in a high-bay warehouse. The accident team investigated the circumstances of the accident event. As a result of the inspection of the scene and explanations of the injured person and the witness, the commission found that on the day of the incident, the injured person started working at 3 p.m. in the company's warehouse. Around 21.45 while performing official duties related to completing orders for tires, there was an accident at work. The injured employee, working as a warehouse worker, climbed the baskets to the 2nd level while completing the tires to the specification, using the basket arm and the herringbone tires to remove the tires. When leaving the basket along the same path, he slipped and fell to his left side. A witness of the event heard a noise and saw the victim lying on the floor. The witness gave him first aid, notified his superior and called an ambulance.

The explanations of the injured person and the inspection of the scene show that the employee voluntarily climbed onto the basket with tires and then fell off it. He did not comply with the health and safety instructions for loading and unloading and storing tires in force in the company and did not comply with the general health and safety rules provided during initial and periodic training. The knowledge in the above-mentioned scope was confirmed by signatures under the statement on the employee's familiarization with the occupational risk and other instructions. Additionally, before the commencement of each shift, the warehouse manager or shift manager informs employees in which sections they will perform their work activities and what is the course of work and appropriate proceedings.

An analysis of the causes of accidents at work with the use of Ishikawa diagram

When analyzing the causes of accidents at work, attention should be paid to all the factors that may cause it. The determining factors indicated in the Ishikawa diagram are also helpful. In the incident analyzed, several important factors that caused the accident are indicated. It often happens that employees at a given workplace do not know the safety rules and procedures sufficiently. This problem is closely related to the "management" factor. Lack of proper supervision and communication noise on the employee-foreman/manager/employer line may cause the employee to act inconsistently with the adopted safety rules.

Another important element determining an accident at work is the inadequate technical condition of machines and devices, or their incorrect calibration, or use contrary to their intended use and OHS instructions. This state of affairs occurs primarily due to the lack of awareness of the employees

themselves and the lack of supervision over the process. Employers often delay the inspection or repair of machines and devices, as this may generate costs. Nevertheless, this situation is extremely dangerous for the workers themselves. It is also worth paying attention to the awareness of the employees themselves. The employer should make employees understand that they should report all kinds of defects and problems themselves. Probably the fear of material liability means that employees rarely report irregularities.

Employees who use a given material or semi-finished product do not fully know its specification and do not comply with the personal protective equipment assigned to a given material. The main reason for not following the guidelines is the time they have to spend putting on the PPE. It is worth emphasizing that haste and routine are the most common causes of accidents at work.

An employer is obliged to take care of current medical examinations and health and safety training. Disregard for OSH training by employers is a common situation. It is noteworthy that frequent trainings make employees aware of the dangers that occur in the work environment. During the training, the health and safety inspector has an opportunity to discuss in detail the accidents that have occurred in the workplace. Very often, employers also do not pay attention to other parameters that affect the quality and efficiency of an employee's work. An example is the analysis of the norm of overload of the musculoskeletal system or the employee's energy expenditure. While employers pay attention to the weight of a given material, etc., which means that they use appropriate devices, e.g. pallet trucks, electric pallet trucks or industrial trucks, but they rarely pay attention to the dimensions of materials, products, etc. It happens that an employee moves materials in accordance with the standard (up to 30 kg for permanent work), however, the dimensions of the material often cause other overloads and problems with motor coordination.

An employer, in accordance with the applicable regulations, is to ensure safety and a hygienic working environment. A number of activities that must be performed are included in many safety regulations and standards. Therefore, it is important that the employer takes care of the appropriate health and safety service that will perform all activities and will constantly monitor them. Properly functioning health and safety services in cooperation with foremen/ managers and the employees themselves are able to properly care for the work environment. It is important for the employer to support the activities of health and safety services and to approve their activities for safety, creating an increasingly higher safety culture of the company (Woźny, Woźny, 2017).

Table 1: Factors determining an accident at work in a warehouse - Ishikawa diagram

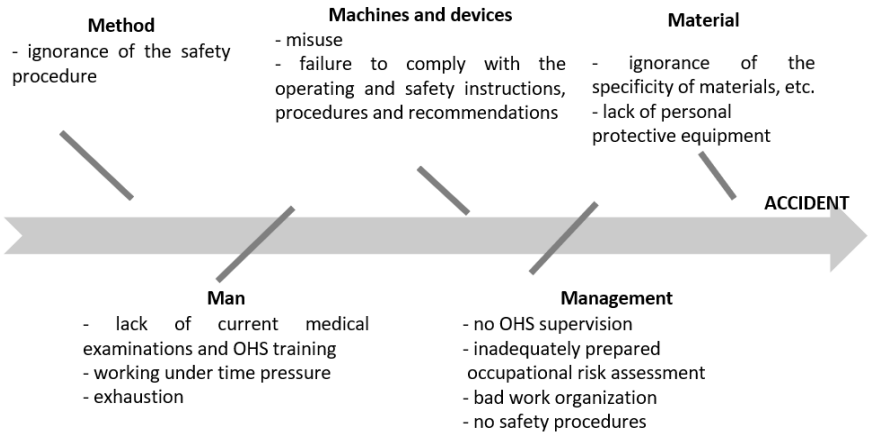

(Author's own research).

An analysis of causes of accidents at work with the use of the quality valuation method

The analysis of the individual factors determining an accident at work in a warehouse makes it possible to enumerate the most important elements that need to be corrected in order to prevent the analyzed accident event in the future. The incident analysis carried out by the Accident Committee and the Ishikawa Diagram show various determining factors. However, it is worth paying attention to the most important factors that can be quickly implemented. It should be pointed out that in every organization (even the one in which all procedures and processes comply with the applicable health and safety regulations), there may be a human factor that has a significant impact on the occurrence of accidents.

Initially, quality assessment was a method of assessing the quality of products, but it can be used as a method of solving decision problems. From the definition of quality itself, one can derive a simple indicator which is the quotient of a set of parameters and requirements, or going a bit further.

Q = Quality = Facts/Expectations

If Q is less than one, one can talk about an insufficient level of quality, i.e. sub-quality. When Q is greater than 1, one deals with excess quality, i.e. exceeding customer expectations, and thus with additional unjustified costs. The Q = 1 level means that customer requirements are fully met, i.e., full quality.

The practical use of such a formula is impossible as both the facts and expectations are usually expressed by many parameters. By applying some modification of the above equation, single features can be investigated (mfiles.pl)

An assessment of the employer's actions to prevent a hazardous event in the work environment, which result in accidents at work as well as breakdowns and events dangerous to general safety and ecological safety. The characteristics of the work environment important for its safety:

- Machines and devices in working order and checked,
- Appropriate health and safety training of employees,
- Providing adequate quality of personal protective equipment,
- Safety procedures,
- Appropriate organization of work,
- Communication between employees and between employees and the employer.

Table 2: Taxation method

State determination	Relative state	Assessment
Very good	0.9	The highest
Favourable	0.7	High
Average	0.5	Average
Unfavourable	0.3	Low
Vary unfavourable	0.1	The lowest

(Author's own research)

Table 3: Assigning relative states for each of the features for the safety of the work environment

No.	Feature's name	State definition according to the taxation method and/or the alternative method	Relative state (quality factor from 0.1 to 0.9 and/or from 0.0 to 0.8)	Our subjective assessment (q_i)
1	Machines and devices in working order and checked	Regular checks (once a year)	0.9	**0.5**
		Irregular checks (once every 2-3 years)	0.5	
		No checks	0.1	
2	Appropriate occupational health and safety training of employees	Very good	0.9	**0.7**
		Good	0.7	
		Average	0.5	
		Poor	0.3	
		Very poor	0.1	
3	Ensuring the appropriate quality of personal protective equipment	The best quality measures	0.9	**0.1**
		Average quality measures	0.5	
		Poor quality measures	0.1	
4	Safety procedures	Exist	0.9	**0.5**
		Partially exist	0.5	
		Don't exist	0.1	
5	Appropriate work organization	Very good	0.9	**0.3**
		Good	0.7	
		Average	0.5	
		Poor	0.3	
		Very poor	0.1	
6	Communication between employees and between employees and the employer	Exists	0.5	**0.3**
		Partially exists	0.3	
		Doesn't exist	0.1	

(Author's own research).

The method consists in formulating the criteria of importance, and then establishing the strength of the relationship between the features and the criteria against which the analysis of the importance of individual features is carried out. Among the 10 universal criteria the following are included:

- B - safety,
- C - novelty,
- K - cost,
- L - benefit,
- N - reliability,
- P - appearance,
- S - effectiveness,
- T - accuracy,
- U - usability,
- W - defectiveness.

The strength of the relationship between the feature and the criterion is marked with points in the table. The sum of the points determines the localization number (LL) - the criterion with the highest number of points is given to LL = 10, the next 9, etc. (mfiles.pl).

- 0 Has no connection,
- 1 Minor relationship
- 2 Small relationship
- 3 Perceived relationship
- 4 Clear relationship
- 5 Very large relationship (mfiles.pl)

Table 4: Assignment of locational numbers (Author's own research)

No.	Feature's name	Importance criteria symbols (in alphabetical order)									
		B	**C**	**K**	**L**	**N**	**P**	**S**	**T**	**U**	**W**
1	Machines and devices in working order and checked	5	4	5	5	5	3	5	4	5	5
2	Appropriate occupational health and safety training of employees	5	2	0	3	3	1	3	3	0	0
3	Ensuring the appropriate quality of personal protective equipment	4	2	4	4	5	1	2	5	5	5
4	Safety procedures	5	2	1	3	4	0	2	2	4	2
5	Appropriate work organization	3	2	3	3	3	0	4	2	2	2
6	Communication between employees and between employees and the employer	2	0	0	2	5	0	5	0	3	0
	Total no. of points	**24**	**12**	**13**	**20**	**25**	**5**	**21**	**16**	**19**	**14**
	Location numbers (ranking)	**9**	**2**	**3**	**7**	**10**	**1**	**8**	**5**	**6**	**4**

$$k_i = \frac{\textit{value of the sum of products for a given feature}}{\textit{the smallest value of the sum of the products}}$$

$$Q_i = \frac{\sum k_i \cdot q_i}{\sum k_i}$$

where:
k_i – importance level

q_i –quality factor for a given feature

Q_i= 0,62

$R_i = k_i (q_{max} - q_i)$ lub $R_i = k_i q_{max} - k_i q_i$

where:
q_{max} - is the maximum value of the relative state that could be assigned to the feature (in our example, i.e. 0.9).

q_i - relative states (our subjective opinion) (mfiles.pl).

Table 5: Product calculation for individual features

No.	Feature's name	Symbols of validity criteria by location number													
		Grades of importance criteria										Sum of products	k_i	q_i	$k_i q_i$
		N	B	S	L	U	T	W	K	C	P				
1	Machines and devices in working order and checked	50	45	40	35	30	20	20	15	8	3	266	1.9	0.5	0.95
2	Appropriate occupational health and safety training of employees	30	45	24	21	0	15	0	0	4	1	140	1.0	0.7	0.70
3	Ensuring the appropriate quality of personal protective equipment	50	36	16	28	30	25	20	12	4	1	222	1.6	0.1	0.16
4	Safety procedures	40	36	16	21	24	10	8	3	4	0	162	1.2	0.5	2.31
5	Appropriate work organization	30	27	32	21	12	10	8	9	4	0	153	1.1	0.3	0.33
6	Communication between employees and between employees and the employer	50	18	40	14	18	0	0	0	0	0	140	1.0	0.3	0.30
	Total:												7.7		4.75

(Author's own research)

Table 6: „R"calculations

No.	Feature's name	k_i	q_{max}	q_i	$(q_{max} - q_i)$	R_i
1	Machines and devices in working order and checked	1.9	0.9	0.5	0.4	**0.76**
2	Appropriate occupational health and safety training of employees	1.0	0.9	0.7	0.2	**0.2**
3	Ensuring the appropriate quality of personal	1.6	0.9	0.1	0.8	**1.28**

	protective equipment					
4	Safety procedures	1.2	0.9	0.5	0.4	**0.48**
5	Appropriate work organization	1.1	0.9	0.3	0.6	**0.66**
6	Communication between employees and between employees and the employer	1.0	0.9	0.3	0.6	**0.6**

(Author's own research)

The analyzes show that the most important aspects proving the safety of the work environment are:

- Ensuring the appropriate quality of personal protective equipment (1.28)
- Machines and devices in working order and checked (0.76).

It should be pointed out that in the analyzed accident event, personal protective equipment as well as machines and devices had no effect on the accident.

It is important that as a result of the analyzes, the three indicated features obtained the lowest result, i.e. it should be interpreted that the greatest anomalies may occur in the case of:

- Appropriate occupational health and safety training of employees (0.2)
- Safety procedures (0.48)
- Communication between employees and between employees and the employer (0.6).

Shaping safe working conditions is the responsibility of every employer. On the basis of applicable law, the work environment is organized in such a way as to ensure the safety of employees. However, regardless of the methods and means used by the employer, there may be a number of organizational problems that will determine accident events.

In the analyzed incident, which was classified as an accident due to the employee's fault, since he knowingly entered the warehouse rack to remove the tire. This behavior was inconsistent with the applicable safety rules. When constructing corrective and preventive actions for similar events, it is worth analyzing the causes of its occurrence in detail. The analyzes carried out according to the Ishikawa diagram and quality evaluation indicated that better actions should be taken in employee training, safety procedures, or communication between supervisors and employees.

The incident occurred contrary to the applicable procedures, despite the fact that the employee, with his own signature, stated that he had been acquainted with them. He was also trained in health and safety and had a job instruction. Such behavior of the employee proves that, in spite of the use of appropriate safeguards, there is no awareness of the potential threats among employees that may arise as a result of non-compliance with the procedures.

Conclusions

Employers are obliged to take care of proper working conditions by means of the most available methods. Through appropriate procedures and management methods, they not only strive for quality and efficiency of work, but also want the work environment to be safe.

In order to achieve safe working conditions, apart from the methods and procedures, it is important to properly train and make employees aware of why the safety aspect is so important. The analysis of the accident event clearly indicated that the company lacked a factor building the awareness of safe work in a warehouse.

The analysis of the incident and the analysis according to the Ishikawa diagram, as well as the method of quality evaluation showed that the company had appropriate methods and procedures to manage occupational health and safety. In this case, the human factor failed by acting independently

against applicable regulations. Such behavior is unacceptable in the work environment as it indicates employee's low level of safety awareness.

The main corrective and preventive measure for similar events is to build appropriate mechanisms to make employees aware of the consequences of acting in a way inconsistent with the adopted procedures. The training part should be extended with regard to the issues related to accidents. Showing the causes and circumstances of events and their consequences may increase the level of awareness among employees and draws attention to safety issues in the work environment.

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The InsurTech/FinTech And the Services Marketing Nexus: A Theoretical Framework

Abdelmo'ti Suleiman Abdelmo'ti Abu Rub[a]
asaburub@imamu.edu.sa
College of Economics and Administrative Sciences, Al Imam Muhammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia

Mohamed Nejib Ouertani[b]
mnouertani@imamu.edu.sa
College of Economics and Administrative Sciences, Al Imam Muhammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia
Faculty of Economic Sciences and Management, Sfax, Tunisia

Abstract

Financial technology is the product of technological advances on the financial side of the global economy. It has created a new and emerging form of finance in emerging companies that has posed a challenge to conventional banks. On the other hand, a fierce competitor may reduce its investment opportunities if it does not adjust the pace of the world. This technology contributes to a number of features that are reflected in the financial investors and the beneficiaries of financial services. The development of this type of technology may require a special incubator environment and legislative regulations. This technology also has an impact on conventional and Islamic insurance companies, especially on the quality of the products offered to the insured, particularly with regard to the cost of these products.

Keywords: Financial technology (FinTech), insurance technology (InsurTech), Takaful technology (TakTech), e-Marketing, GCC region.

Introduction

The IT and technology industry is witnessing spectacular developments and rapid changes that require a digital transformation in our lifestyles and business styles. With these developments growing at this stage, the insurance sector remains one of the most important economic and financial sectors that are affected by and interact with the ongoing changes in the digital industry.

There is no doubt that the parties to the insurance relationship all benefit from the development of technology in the insurance business, especially companies and document holders in addition to national economies. Digital transformation, for example, contributes to the creation of new sources of revenue and profits. This is due to the importance of insurance in the business system and the vitality of its role in the economic and social renaissance. Furthermore, helps to provide innovative services to customers in innovative ways to meet their needs and requirements, and helps in creating new jobs.

Digital transformation also makes the insurance markets more innovative and their future more prosperous, supporting the growth of the national economy and enhancing its competitiveness globally. Based on these facts, insurance companies are required to invest in digital data and services in keeping with the knowledge economy and in line with the needs of customers and the market.

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Relevant organizations should make significant efforts in the digital transformation of their services, which are mostly smart, in order to promote growth and development of the insurance sector. As is necessary and without a doubt and no hesitation starting in the legal and technical and financial regulation of the market. In order to improve the performance of the insurance industry towards new and more advanced horizons, increase its contribution to GDP, enhance the domestic market competitiveness and catch up with IT, and apply everything new and modern in this regard, which will be reflected positively on this vital sector.

In this context, the main aim of this study is to understand the impact of technology and information technology on the quality of the services of the insurance sector, especially the Islamic Takaful one in order to establish a theoretical framework in this context. The study also aims to know the reality of insurance companies from InsurTech, as well as the extent to which insurance companies respond to technological developments and provide services in line with the development Technology and meet the needs and desires of customers, in order to achieve competitive advantage in a sector undergoing major technological changes.

Literature Review

Tan Choom Yan and al (2018) surveyed the main paper dealing with insurance technology and its potential from the perspective of enablement for financial and insurance services. The authors pointed out that digital revolution in the insurance sector had insufficiently changed during the last years. They also conclude that recent innovation in China's digital finance space has shown that emerging entities will impact the industry. They stated that the new statistical tools i.e., big data and Blockchain, will effect the service provided by the insurance sector.

Loannis (2018) examined the effect of the development of FinTech. He also offered various perspectives to help understand the implications of FinTech for the broader financial ecosystem. Based on the most recent research in this area, the author examined the implications of FinTech for financial institutions and regulation, particularly in the global banking and regulatory sector. The author has also attempted to link research conducted by practitioners and academic research.

Anjan (2020) reviewed the theoretical and empirical literature on fintech and its interaction with banking. The author highlighted the most known definition of fintech, surveyed some statistics and stylized facts. The review is organized around four main research questions. The paper summarizes our knowledge on these questions and concludes with questions for future research.

Tianxiang (2020) studied the impact of Fintech on the capability of banks to provide credit to customers, namely small and medium Chines companies over the period 2011-2018. The author concludes that fintech effectively helps the credit supply operation to small and medium enterprises. Also, the author studied whether the effect of fintech varies according to bank size. The author concludes, however, fintech played impact more significantly the increase in credit for small banks compared large ones. Accordingly, the author proposes to use fintech instead of developing several small banks.

Emmanuel et al (2020) examined the relationships between artificial intelligence, digital marketing and financial services in relation to vulnerable customers. Specifically, the authors studied artificial intelligence and its impact on transforming digital marketing practices. They concluded that there is little scientific work on artificial intelligence deployments that intensify the problems of financially vulnerable customers since they have limited access to financial systems, services or technologies. Therefore, the authors proposed the challenges faced by companies who want to integrate artificial intelligence into the digital marketing of their financial services. The authors conclude, therefore, that companies cannot always effectively use technology to target their customers. They also noted that understanding the ethical implications, data challenges as well as modeling is necessary for successful deployment of AI.

Noureddine and Hemrit (2020) investigated the effect the technological innovations and communication, i.e., the internet use, on the demand for life and non-life insurance using a panel of OECD countries over the period 2007-2017, using many panel data models. The authors showed that internet use affect

positively non-life insurance activities. But, they stated that there is no impact of internet use in the case of life insurance.

Financial technology, Fintech: an overview

Raison d'être

Fintech refers to an industry made up of companies that harness technology to serve the payment sector, and financial technology firms are generally emerging companies challenging traditional companies that are less dependent on software.

The National Digital Research Center in Dublin defines the Fintech as an innovation in financial services. More specifically, Fintech companies often use technology to compete with existing financial systems.

The emergence

The first opportunity for the emergence of Fintech was in 2008 (Alt and al (2018)), after the global financial crisis, subsequent bank bailouts and banking corruption scandals that marked a turning point in the banking sector. Industry experts and consumers began skeptical about the future of traditional banking. That only 26% around the world have high confidence in banking institutions.

Traditional banks have started to fall in front of Fintech. Four of the largest banks in the United States and Britain have cut their workforce by 350,000 over the past seven years.

Why does the world turn to financial technology?

Financial technology offers solutions as well as the development of bank-controlled financial instruments such as remittances, business credit cards and other operations, creating attractive alternatives and easy-to-use digital destinations.

The $ 1 billion TransferWise, launched in 2011, succeeded in reducing the value of the money transfer process, away from traditional banks and conversion methods.

Investment in Fintech

Global investments in the financial technology sector have increased significantly, from $ 928 million in 2008 to $ 4 billion in 2013, and then grew to $ 20 billion by 2015.
Investments are expected to reach $ 46 billion by 2020, thanks to technological advances and innovative financial products. Venture capital firms account for 24% of total investments, private equity firms 15%, venture investors 12%, and other investors 49% .
(http://www.banksnews.ps/news/5c8769446aa26760a57437cf)

Potential revolution in the GCC region

Despite the spread of Fintech worldwide, it is still in the slow growth of the Gulf region. The use of online banking, credit cards and alternative payment systems, such as CashU and OneCard, However, studies show that 85% of consumers in the Middle East still prefer to pay on delivery.

Group financing is one of the areas in which Fintech has begun to demonstrate its potential in the region. Although it does not replace traditional sources of finance such as banks, private equity and venture capital, collective financing has provided another option for the region facing a liquidity crisis as oil prices fall Silatech has joined forces with Qatar Charity to launch a collective funding platform to fund young Arab entrepreneurs.

In Kuwait, startups launched mobile applications to stimulate digital payment, such as "Agar" to pay real estate rents, and "May Bill" to pay bills via mobile.
In Jordan, the GreenLet online lending platform was launched where users can get the loan within 15 minutes, and the algorithm is based on assessing the creditworthiness of the user.
Jordan's Sharia-compliant lending platform, Liwa, was established in 2013 and had a $ 500,000 financing round last year from Dash Ventures, Jordan Union Bank and MENA Venture Investments.
It also recently secured a $ 2.3 million financing round from the venture capital fund Badia Impact, which belongs to the Global Fund for Projects group "Silicon Brady".
According to the 2016 Digital Payport report, e-payments are expected to increase in the Arab region to $ 69 billion a year by 2020.

The region is witnessing a growth of 23% in digital payments, driven by an annual growth of 40% in the Saudi market and 24% in UAE.
The UAE continues to lead e-commerce across the region, with 71 per cent of the population in electronic shoppers. Jordan is at the end of the list, with Internet penetration at 50 per cent of the population.

According to the World Bank, the cost of remittances to expatriates amounts to 7.7% worldwide of total remittances, and India is losing $ 5 billion a year in bank transfer costs as it has the highest rate of remittances from the Gulf region and around the world.
This financial technology will impact more on banking companies, financial services and insurance sectors, as demand will be driven by legislation and regulations that are still slow in their age in the region.

UAE experience

Financial technology has attracted large amounts of investment and interest from the public and private sectors in global financial centers. Banks seek to maintain their competitiveness amid increasing competition from new entrants, and governments aim to position themselves as centers of innovation.
The Arab world has a significant impact on the development of this industry, and the UAE in particular is no exception, having expressed its determination to develop the country through the National Innovation Strategy, a national initiative aimed at creating an ecosystem dedicated to innovation.
Financial technology is set to play a key role in the UAE's ambition to become a technology hub. The Abu Dhabi International Market last year launched the Regulatory Lab (RegLab), the first sandbox technology and framework in the Middle East and North Africa aimed at encouraging technology startups and providing regulatory assistance and advice.

The role of financial technology in innovation and technology in the UAE is not limited to Abu Dhabi alone. The Dubai Financial Services Authority (DFSA) has also contributed to the development of financial technology regulations and laws.

The new class of financial services license allows financial technology companies to develop and test their innovative concept within six to 12 months from within the DIFC without being subject to all regulatory requirements normally applied to regulated companies.
In the last few years, the UAE has come a long way in attracting the talents of local and international financial technology from around the world.

The launch of Fintech Hive in January by the Dubai International Financial Center (DIFC) was a major development in the region's renewable financial technology sector, welcoming the first technology-based accelerator. In 2018, Fintech Hayef at the Dubai International Financial Center (DIFC), the region's first-ever financial technology accelerator established by the Dubai International Financial Center (DIFC), has expanded its program to include insurance, Islamic finance and regulatory technology services. But along with emerging financial technology companies, banks and financial institutions have also attracted financial innovation.

For example, NBAD was the first bank in the Middle East to go directly on blockchain[1] for real-time cross-border payments by leveraging the Ripple network. Another example is Abu Dhabi Islamic Bank, which has partnered with Fedor to launch the region's first digital bank.

There are already some success stories now in the UAE in terms of financial technology where incubators, enterprise and program development institutions, and innovation centers support the creation and growth of local entrepreneurs and attract global talent. Batas believes and supports UAE initiatives to make the country and the Arab region a strategic hub for financial technology in the near future.

The 2018 version of the program builds on the success of the accelerator in its launch last year in partnership with Accenture, the global provider of professional technology services. The program continues to bridge the gap between technology innovators and mega financial institutions while providing a platform capable of enabling the development of innovations that are in line with Dubai 2021 and the growth strategy of the DIFC 2024.

The program will be hosted by Abu Dhabi First Bank, Arab Bank and Noor Bank as financial partners, as well as a number of former partners such as Abu Dhabi Islamic Bank, Citigroup, Emirates Islamic Bank, Emirates NBD, HSBC, Mashreqbank, Standard Chartered and Visa. Partners from financial institutions will prepare, collaborate and participate in emerging projects through a 12-week mentoring program.

Fintech Hayef will also be part of the Dubai International Financial Center (DIFC) as a strategic partner. The Dubai Islamic Economic Development Center will seek to target emerging companies operating in the Islamic finance sector, which is an important pillar for this region.

On the other hand, the Fintec Hayef program at the Dubai International Financial Center (DIFC) is collaborating with Accenture's Fintec Innovation Labs to enhance the status of the accelerator among the world's leading financial centers.

Insurance Technology (InsurTech)

InsurTech is a subset of financial technology, it is the equivalent of FinTechs in the banking world. Which is related to using technology to simplify and improve the efficiency of the insurance industry.

In 2017, consulting with giant Capgemini and the non-profit industry body Efma, found that traditional insurers face increasing competitive pressure due to the emergence of a number of emerging insurance companies.

InsurTech: the next revolution

The InsurTech, which concerns the insurance sector, is today one of the main sources of growth. Like FinTech, the InsurTech sector is driven by the growing number of data produced and circulating around the world: Internet browsing, smartphone applications, tracking purchasing behavior, personal data, etc. Moreover, it is estimated that 50% of the data will be collected by connected objects in 2020 (Saha and al (2017)).

The collection of this data can be very useful for both insurers and policyholders as it will help to better anticipate risks and claims. Subsequently, the analysis of this data will lead to a greater personalization of the insurance offers, tailor-made according to the profile of each insured. Finally, the digitization of services and contracts will lead to greater automation of the processing of claims and compensation. The live analysis of these will in return to better anticipate the risks and claims, etc.

Blockchain Is a distributed database that has the ability to manage an ever-growing list of named records (blocks). Each block contains a timestamp and a link to the previous cluster. A series of blocks is designed to preserve and prevent data from being stored, meaning that when you store information in the cluster, you can not later modify that information (wikipedia).

The applications developed under the InsurTech are as varied as they are varied. Here are some examples of benefits that we can soon benefit from:

• We compare and subscribe anywhere and anytime! For example, you will be able to receive an estimate of insurance quotes following the real-time sending of photos of your apartment or the license plate of your vehicle.
• We spare on the best media, chosen for us! By informing your profile and your investment objectives, an algorithm may for example be able to select for you the best investment materials.
• Insurer knows better customers! By collecting certain data (driving, physical activity, shopping, etc.), your insurer will be able to send you the most appropriate protection formulas and prevention messages.
• In case of disaster, my file is processed faster! By declaring your claim online, compensation can be unlocked automatically, through the magic of "Smart contracts". Advances that will also lead to the automation of claims management as well as the detection of fraud.

Can we will be better protected by InsurTech?

Services created by InsurTech start-ups promise three major benefits for users
• More customization - Real-time analysis of data, but also updating your situation will change your premiums and guarantees according to your needs. You will be able to receive in real time insurance offers related to your purchases, your activities or your location.
• More transparency - You instantly know the impact of each claim on your insurance profile and receive a bonus for virtuous behavior.
• More proximity - You use mobile communication channels, such as instant messaging, video calling, or sending photos via a dedicated application.

The Islamic insurance takaful technology: TakTech

Investment in insurance technology helps insurance process, reduce costs and improve the service provided to customers either through the establishment of a technological system or contracting with companies that provide technological service to provide technical support, knowing that Takaful technology TakTech (proposed for the first time by the researcher), represent the technology behind the creation, distribution and management of insurance business using technology consists of two components: Takaful insurance and Technology, a term inspired from FINTECH and INSURTECH. Like INSURTECH, which has become one of the most widely used terms today in many conferences, event and insurance professionals ... TakTech is expected to revolutionize insurance operations and its Islamic management.

Technology-based Takaful companies (TakTech) have made the process of purchasing insurance policies easier, from individual insurance to corporate insurance. As the technological insurance has made it easier for customers to search for and to compare the appropriate type of insurance through the Internet, applications and social media and there is no need to visit the company to complete the insurance process or to report a claim or an accident. TakaTech will play an important role in all the steps of the insurance process and will also contribute to the development of policies and services provided to customers. The applications used by customers, the car monitors and the physical tracking tools that can be worn have facilitated understanding customer, understanding his needs and finding advantages suits his lifestyle. Furthermore, Takaful companies use technology to provide technology-backed services and involve more interaction with customers, the success of TakaTech is expected to make underwriting, pricing risk assessment, claims settlement and asset management more efficient for insurer

Thus, the chain value is the series through which the products pass in order. At each step, the product acquires additional value, beginning with the product design (policy) followed by marketing, subscription and pricing, claims settlement and customer service. TakTech can impact the insurance industry, especially the methods of obtaining data and their analysis, which helps the process of designing the policy in a way that suits the needs of the customer. Use technology to reach the target customers faster, through social media. The technology also provides new data and sophisticated analysis which helps to better know and understand risks and how to reduce them and use those data to determine the fair price. With regard to

claims settlement, technology contributes to the ease of reporting in the case of an accident and accelerates the claims settlement adjustment process. Finally, customer service is done electronically through social platforms on the Internet and mobile to facilitate communication between the customer and the company and save time and effort.

e-Marketing of insurance Takaful service

Internet marketing, known as digital marketing (e-marketing) or web marketing, includes all methods and practices related to the world of Internet marketing: Internet communication, and improve electronic commerce.

There are several sites that promote the marketing of electronic and provide several services for marketing, for example, there is a website dedicated to this matter, namely, electronic marketing in order to promote the advertiser or the goods, relying on marketing and promotion without papers such as the newspaper, but rely on the Internet, mobile and other digital devices that keep abreast of technological development. Today, all the world uses technology and development in the daily life of the individual, as the process of purchasing, distribution, shopping, display of demand and production is developed by electronic methods no longer as it was before. For the traditional process they were expensive and take a long time.

e- Marketing techniques allow the development of customer relationship to an unprecedented level: continuous interaction is now available. Although it has received some resistance from some customers considering this type of marketing intrusive. However, the use of voluntary reporting techniques, among users, especially those who frequented the business site. It also uses e-marketing to get customers in order to maximize the benefit of selling on a site and winning customer loyalty.

Furthermore, it is possible to acquire this commodity and obtain it in a short time so that any marketer can promote its goods and sell, exceeding consequently the territorial limits to enter the universality, which guarantees at least more popular for that product or service. In short, e- marketing has made it possible to obtain a product or service without regarding time or place. e-Marketing helps open the way for everyone to market their goods or experiences without distinguishing between a giant enterprise with a huge capital and an ordinary person or small company with limited resources.

Marketing mechanisms and methods are characterized by low cost and ease of implementation compared to the traditional marketing mechanisms and the possibility of adapting the costs of designing the store and advertising for free or in accordance with the budget according, while it seems difficult to apply such mechanisms to the traditional business. Using the software techniques associated with the e-marketing environment and advertising campaigns in this digital environment, it is simply possible to evaluate and measure the success of any advertising campaign and to identify the strengths and weaknesses. The geographical distribution of the target segments of these campaigns and other targets can also be directed or determined, which seems difficult to achieve when using traditional means.

Advantages of e-marketing of insurance policies

1. Insurance companies have become popular, thanks to e-marketing, using modern technologies in the areas of service design rather than traditional design methods, as there are many software ready and detailed for such insurance services.
2. Producing and providing computer-based insurance services through internet networks.
3. Obtain immediate information on the level of insurance services in the insurance market and marketing quotas through advanced communication networks.
4. Preparing studies for the market, customers and purchasing behavior.
5. E-marketing techniques contribute to the identification of after-sale services for the insurance product.

The nexus between TachTech and the quality of services provided

These start-ups are intended to trigger a disruption in insurance services by incorporating technological developments to improve and simplify the offer by making it cheaper.

All operations are done digitally from product creation to price setting through claims management and marketing operations. TakTech build traditional products or tailor-made products by creating dedicated products for certain companies such as, for example, car dealers.

This branch requires a variety of skills because the products are complex to build and the technological issues must be well understood. But it's a gigantic market!

To understand the sphere of development of this sector, here are some innovations that are in progress:

1. The dematerialization of insurance contracts
2. Subscription and rapid management of contracts online
3. Claims management online
4. Customization of offers and automation of processes via artificial intelligence
5. The individualization of customer relationship management
6. Cost reduction
7. The rise of customer satisfaction and the excellence of the user experience
8. Exploitation of big data
9. The use of connected objects technologies in homes and research on autonomous cars Insurtech has therefore upset the insurance industry with its agility and technological innovation capacity, as FinTechs do in the banking world.

Conclusion

It is clear that financial technology or what is known as FinTech is a financial revolution that swept the economic arena and that was necessary to facilitate transactions to reach the largest segment of the insurance customers in its traditional and Islamic form due to several considerations. With the rapid advancement of ICT, and artificial intelligence, this new momentum has to be matched by financial technology, which has created a new structure for the insurance industry through emerging companies that are active in its context, requiring a customized environment and technological sophistication on the one hand and Along with the laws that regulate the work in various sectors and provide a safety aspect on the other hand.

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Adaptation of Polish Legal Acts Regarding Accounting to International Standards

Ewa W. BABUSKA

Cracow University of Economics, Cracow, Poland
babuskae@uek.krakow.pl

Abstract

The purpose of the article is to present the changes in the Polish Act on Accounting related to the changes that have taken place in Poland economy over the past thirty years, during the transition from socialist to capitalist. The main part is preceded by a brief outline of accounting. The novelty of the article is to trace the evolution of Polish accounting regulations in the period of political and economic transformation in terms of their adjustment to EU and IAS / IFRS solution. The research method consists in a reviewing of legal regulations: national, European and international, as the related literature does not synthetically and comprehensively reflect all changes introduced to the Polish Accounting Act during the period. The article is an attempt to fill this gap, i.e. the lack of synthetic and comprehensive studies on this subject in the literature. The Author verifies the research hypothesis by checking what changes and when were introduced to the Polish Accounting Act in accordance with the amendments to EU directives as well as to international accounting and financial reporting standards. It has been shown that changes to the Act were introduced regularly and adequately to region and international laws, which is why the Act was frequently amended and adapted to new regulations on an ongoing basis and the hypothesis has been positively verified.

Keywords: Regulations of Accounting and Financial Reporting, European Union Directives, International Standards, The Polish Act on Accounting.

JEL classification: M41, K20, K29

Introduction

The present accounting in the global dimension is treated as the language of business, which accounts for its international standardization and harmonization despite the existing and applied domestic systems and their unique solutions (Surdykowska, 1999; Jaruga ed., 2002). Basic principles, rules, canons, norms, assumptions, standards on which accounting rests have been shaped over centuries of its historical development which has not been completed. The purpose of the article is to present the changes in the Polish Act on Accounting in connection with the transformations that have taken place in the Polish economy over the past thirty years, during the transition from socialism to capitalism.

The main section is preceded by a brief outline of accounting. The novelty of the paper lies in tracing the evolution in the Polish accounting laws during the system and economic transformation, adjusting them to the EU and IAS/IFRS solutions. The research method consists in a reviewing the legal regulations: national, European and international, as the related literature on the subject does not synthetically and comprehensively reflect all changes introduced to the Polish Accounting Act during the period. The article is an attempt to fill this gap, i.e. the lack of synthetic and comprehensive studies on this subject in the literature. The Author verifies the research hypothesis by checking what changes and when were introduced to the Polish Accounting Act in accordance with the amendments to EU and IAS / IFRS laws. It was shown that changes to the Act were introduced regularly and adequately to region and international laws. It was frequently amended and adapted to new regulations on an ongoing basis, and the hypothesis was positively verified.

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The Historical Outline of Accounting

The Polish economy in 1945-1989 was a centrally-steered economy, with social (state) ownership, deprived of private ownership. The socialized economy was in opposition to the capitalist economy and it was modeled on the soviet economy, in close connection with it and with other economies of Eastern and Central Europe, where the socialist system and the model of the so-called "planned" economy was imposed. Poland has "always" used the continental (German) model of accounting, preferring the valuation of assets and liabilities according to their historical cost. It was only in 1994, when the Act on Accounting was passed, that Poland started to implement the solutions of the Anglo-Saxon model and international standards. It must be remembered that in the history of searching for generally accepted principles of accounting in the USA there was a significant change and the major focus was shifted to searching conceptual assumptions as the theoretical foundation for standards that have become their major part. "Concept Assumptions" as FASB document (Financial Accounting Standards Board) was called the "constitution", on which standards were to rely, while the choice of vocabulary emphasized the political essence of standards. "Concept Assumptions", however, were not referred to financial accounting, but to financial reporting. These assumptions, contrary to expectations, did not become a generator in the process of developing standards, but their significance gradually decreased and they became only a source of concepts, preserving their political characteristics (Hendriksen and van Breda 2002, pp.138-148).

At some point the establishment of accounting norms was the subject of the state intervention. In the European area this occurred directly in the legal form, in the English and American area – stakeholders ordered directly the creation of professional standards. The European mode relied on political will, while the American one requires participation of all interested parties and legitimization that is broader than political will. That is why at the beginning of the 1970s the USA became home to the first board in the world (FASB) which represented interests of economic entities more fully and whose task was to establish financial accounting standards. It was also forced to solve the problem of its own legitimization on the intellectual platform and needed theory that would justify the content of standards and the way of establishing them. However, since accounting has never had a generally accepted scientific theory, the Board formulated it independently in the shape of a concept framework of financial accounting in the mid-1960s. It was then that the main focus shifted from measuring income to generating information for stakeholders, who needed it to take economic decisions. This direction is still developing along with the process of globalizing world economies.

In Polish one can read "The Concept Assumptions of Financial Accounting" formulated by IASB (International Accounting Standards Board) with its registered seat in London, which establishes financial accounting and reporting standards. Both Boards originate from English and American areas. Financial statements and corresponding measurement, structure and communication patterns, that is financial reporting standards, are the major products of the current stage of development of accounting (Nowak, 2010, pp. 15-20). The recent study of The Routledge Companion (2015 ed. by S. Jones), devoted to the theory of financial accounting, draws attention to the fact that this theory finds many applications in the accounting practice of many entities and also has political implications. The authors of the new standards rely extensively on theoretical assumptions of accounting, and the regulatory bodies in corporations behave in a similar way when establishing regulations and evaluating existing accounting solutions in practice. The theory of accounting deals with formulating and analyzing rules on which the accounting practices rely and supporting them. In the USA these are Generally Accepted Accounting Principles – GAAP (Delaney et al, 2003).

Changes in Accounting and Financial Reporting Regulations in Poland Adjusting Them to European And International Solutions

Financial reporting is an integral part of accounting, since a financial report is the final product of accounting. Accounting and financial reporting are subject to continuous changes as they try to adjust to the developing global economy as well as regional and national economies. The growing flow of goods, services, capital and people attributed to the progressing process of globalization – in the

1990s brought about a change in the purpose of companies activities and contributed to the increased demand for new information, necessary for management and investment purposes. Since then the top priority has been seen not in increasing short-term profits, but in increasing the value of the company in the long term, whereas financial and non-financial data included mainly in financial reports are used when making strategic decisions and checking their implementation, as well as when managing risk in an enterprise. They are also used by other stakeholders, primarily investors, when choosing an optimal way of allocating capital in selected investment ventures.

The accounting of highly developed countries has been largely harmonized on the basis of international accounting standards [IAS – issued until 2001 by International Accounting Standards Committee (IASC)] and international standards of financial reporting [ISFR – issued Since 2001 by International Accounting Standards Board (IASB) with its headquarters In London]. Standardization and harmonization of accounting and financial reporting resulted from the necessity to standardize various solutions found in accounting theory, practice and policy in particular countries and from the need to develop and implement international patterns of conduct in accounting, as well as in order to make financial reports in global economies comparable (Olchowicz, Tłaczała, 2015, p. 13). These standards are not strictly provisions of law, but they are reflected in legal regulations of particular countries referring to the accounting and the financial reporting used there. In 80. years of XX age the harmonization of financial reports has been greatly affected by the directives of the European Union. These were: Directive IV from 25th July 1978 on principles of making, publishing and auditing annual financial reports, Directive VII from 13th July 1983 on principles of making, publishing and auditing consolidated financial reports, and Directive VIII from 10th April 1984 on professional qualifications of persons authorized to audit annual financial reports and requirements to be met by auditing companies in order to be able to audit annual financial reports. However, since Directives IV and VII, in spite of numerous modifications, did not help to achieve the desired state of comparability and transparency of financial reports, the European Commission implemented a new directive on accounting, aimed at decreasing administrative burden, mainly of small companies, and improving clarity (transparency) of financial reports. It is Directive of the European Parliament and of the Council of 26th June 2013 on the annual financial statements, consolidated financial statements and related reports of certain undertakings. The Directive amended the Directive of the European parliament and of the Council 2006/43/EC and repealed the Directives of the Council 78/660/EEC and 83/349/EEC (OJ of EU 29.06.2013, item L182/19). In 2002 the European Parliament adopted Regulation No 1606/2002 on the application of international accounting standards in the European Union. The regulation included the order to use IAS/IFRS in making consolidated financial reports for issuers of securities allowed for public trade since 2005. Since January 2005 banks and capital groups operating in the EU, including those operating in Poland, are obliged to make annual financial reports in accordance with the IAS/ISFR. It should be emphasized that accounting in Europe, as in other regions of the world, has been shaped by various social, economic and political factors for centuries. These factors have marked significant differences deeply rooted in the practice of making financial reports. These factors include: various legal and tax systems, different perception of goals of financial reporting and various sources of financing economic activity (Bonham et al, 2006, p. 66).

Accounting in Poland, as mentioned, was based on the continental model and was subject to various legal regulations which covered all its issues, namely bookkeeping, cost accounting and financial reporting. As the Polish state underwent constitutional transformation, accounting was governed by new acts of law in order to adjust it to the free market economy conditions and the information needs of both external and internal users. The first of them was the regulation of the Minister of Finance from 15th January 1991 on principles of accounting, which normalized the accounting records and the new financial reporting, whereas in other issues (including mostly cost accounting) it referred interested parties to the principles developed by the accounting science and to accounting practice and customs (Regulation of the Minister of Finance, Journal of Laws No 10, item 35, § 3 point 6).

The key legal act, however, has been the Act on Accounting of 29th September 1994 (Journal of Laws No 121, item 591). The act was passed when the legal order of the IV Directive of the Council of 25th July 1978 on annual reports (78/660/EEC) was implemented into the Polish law. The Act includes provisions concerning financial accounting and financial reporting (Article 4 section 3). The issue of

costs, that is managerial accounting (in German-speaking countries known as controlling), however, was neglected and the provision on applying principles of the accounting science and its practice and customs in matters not regulated by the Act was not repeated, i.e. § 3 point 6 of the above-mentioned regulation of the Minister of Finance. According to Sobańska and Walińska (2018, p. 155), this created „regulation and terminology confusion in the subject literature and in accounting practice".

The act which regulated accounting and financial reporting while ignoring managerial accounting was called "inadequate to the subject scope" (Sobańska, 2012, p. 179). The Act on Accounting (AA) has been amended many times in order to adjust it to social, economic and legal changes and to the EU and IAS regulations. The harmonization of the Polish accounting law with the EU directives started 12 years before Poland's accession to the EU. From the very beginning the Act combined provisions of the IV and VII Directives, while the European Commission did so only in 2013 (Dadacz 2018, p. 5-8). The Act also immediately introduced some solutions from the Anglo-Saxon accounting model. The first significant amendment was introduced in the Act of 9th November 2000 and brought expended definitions, simplified inventory, changes to report templates and adjustment of accounting principles to the requirement of computer bookkeeping (Gnich, 2002, p. 14). Detailed provisions of all changes to the Act on Accounting are presented in Table 1 below.

Table 1: Amendments to the Polish Act on Accounting, presented chronologically

No	Legal act	The goal of the amendment and the introduced changes
1	The Act of 9th November 2000 on Amending the Act on Accounting, Journal of Laws No 113, item 1186 (valid since 1st January 2002, but Article 1 point 42 entered into force on 1 January 2001 and applied to financial statements for the financial year beginning in 2000).	The aim of this amendment was to adapt the Polish Act on Accounting to regulations valid in the EU and the IAS. Some missing provisions were supplemented, concerning, e.g. mergers and takeovers of companies, capital investments, financial leasing, long-term contracts of services, deferred tax; some concepts not used in Polish practice were defined, such as consolidation of financial reports of units in a capital group; the concept of "reporting period" was extended; smaller units were exempted from audit and consolidation thresholds were increased (revenues, balance sheet sum, employment) for small and medium size capital groups; in matters not covered by the Act it was allowed to use national accounting standards (NAS) and if there was a lack of them, IAS. This was the so-called major amendment of the Polish Act on Accounting.
2	The Act of 27th August 2004 on Amending the Act on Accounting Journal of Laws No 213, item 2155 (valid since 1st January 2005).	The amendment was connected with Poland's accession to the EU and the adjustment to the Regulation 1606/2002/EC of the European Parliament and of the Council of 19th July 2002 on the use of IAS. The issuers of securities allowed in one of the regulated markets of the EEA (European Economic Area) and the banks were obliged to make consolidated financial reports in accordance with the IAS starting from 2005. These changes were to allow comparison of data from financial reports of particular units on a global scale as they were made in accordance with the IAS.
3	The Act of 18th March 2008 on Amending the Act on Accounting Journal of Laws No 63 item 393 (valid since 1st January 2009).	The amendment was to implement in the Polish Act the provisions of Directive 2006/46/EC amending directives IV and VII on annual and consolidated financial reports. It defined, inter alia, responsibility of company organs for preparation and publication of financial reports and reports on company activities; it standardized the valuation and inventory of investment in real estate; it specified specific situations when opening and closing books, for example bankruptcy with a possibility of making a settlement, division by separation; the method of combining shares when merging companies was limited only to companies which were under joint control; it regulated the issue of commercial bookkeeping in connection with the growing outsourcing of accounting services. It was then that the wording of the provision on exchange rate differences was changed and the limit of turnover from which it was necessary to run accounting books was increased from EUR 800 000 to EUR 1 200 000.
4	The Act of 11th July 2014 on Amending the Act on Accounting, Journal of Laws item 1100 (valid	The amendment of the Act in 2014 and 2015 was connected with the implementation of the directive of the European Parliament and of the Council 2013/34/EU of 26th June 2013, replacing directives IV and VII on annual financial reports, consolidated and related reports of some entities.

5	since 5th September 2014; The Act of 23rd July 2015 on Amending the Act on Accounting and Some Other Acts, Journal of Laws item 1333 (valid since 23rd September 2015).	The changes were combined with the introduction of some simplifications in financial reporting of micro units in 2014 ("small amendment") and small units in 2015 ("big amendment"). Two annexes were added to the Act, annex No 4 and No 5, which included scopes of information indicated in financial reports of such units. By introducing some simplifications, the law makers took into account the greater susceptibility of smaller entities to economic fluctuations and administrative burden. Amendments to the Act allowed the use of simplifications by a wider group of entities, whereas the amendment from 2015 allowed non-governmental organizations to run a simplified register of revenues and costs in place of accounting books.
6	The Act of 9th May 2014 on Facilitating Access to Some Regulated Professions, Journal of Laws item 768 (valid since 10th August 2014).	This amendment to the Act repealed the provisions limiting the commercial running of accounting books and since it came into force, such services could be performed by anyone with full capacity to conduct legal activities, with clean criminal record for some specific crimes and possessing an insurance policy against third party liability. The Minister of Finance thus stopped issuing certificates of an accountant which were necessary in order to offer commercial bookkeeping. Market mechanisms that increase competition and economic freedom should verify access to these services.
7	The Act of 15th December 2016 on Amending the Act on Accounting, Journal of Laws from 2017, item 61 (valid since 26th January 2017).	This amendment widened the thematic scope of the Act by implementing the directive of the European Parliament and of the Council 2014/95/EU of 22nd October 2014 on the duty to reveal non-financial information in reports on activities of the biggest entities of public interest. This mainly concerns stock exchange security issuers and large financial institutions, if they employ over 500 staff on average in a year and if they have PLN 85 million of the balance sheet sum or PLN 170 million of annual net revenue from sales of goods/ products. These units are obliged to submit "a declaration on non-financial information" concerning social and staff matters, natural environment, respect for human rights and fight with corruption. On top of it, large stock exchange companies must reveal in their reports information on the applied policy of diversity towards persons who are members of company organs, giving their age, sex, geographical origin, education and professional experience. The inclusion of new reporting obligations due to CSR is to ensure coherence and comparability of such information revealed by European companies and large capital groups and to facilitate winning investors, strategic partners and clients. This amendment also referred to financial reports of non-governmental units for which a separate, simplified scope of reporting information was developed, included in Annex No 6 to the Act on Accounting. It reflected the specificity of the activities of public benefit organizations and specific nature of their revenues and costs.
8 9	The Act of 9th November 2017 on Amending Some Acts in order to Improve the Legal Surroundings for Innovative Activities, Journal of Laws item 2201 (valid since 1st January 2018) The Act of 15th December 2017 on Amending the Act on Tax on Goods and Services and Some Other Acts, Journal of Laws from 2018, item 62 (valid since 1st July 2018);	The uniform text of the Act on Accounting of 30th January 2018, Journal of Laws item 395 (this act is now expired) reflects changes introduced by the quoted here acts and changes resulting from provisions published before 26th January 2018. Using Article 3 of the Act of 9th November 2017, in Annex 1 to the Act on Accounting, in section "Additional information and explanations", in section 2 after point 10 point 11 was added, with the following wording: "information on costs connected with research and development work, which have not been classified according to Article 33 section 2 to intangible and legal assets". Using Article 2 of the Act of 15th December 2017, in Annex 1 to the Act on Accounting, in section "Additional information and explanations", in section 1 after point 17 point 18 was added, with the following wording: "money means collected on VAT account, which is specified in: a) article 62a section 1 of the Act of 29th August 1997 – The Banking Law (Journal of Laws from 2017, items 1876, 2361 and 2491, and from 2018, item 62), b) article 3b section 1 of the Act of 9th November 2009 on Cooperative Savings and Loans Institutions (Journal of Laws from 2017, items 2065, 2486 and 2491, and from 2018, item 62)". Thus additional information and explanations were expanded by adding to them further required points.
10	The Act of 26th January 2018 on Amending the Act on National Court Register and Some Other	The uniform text of the Act on Accounting from 17th January 2019, Journal of Laws 2019, item 351, reflects amendments introduced by the quoted acts and changes resulting from provisions announced before 16th January 2019. The change resulting from the amendment to National Court Register was

11 12 13 14 15	Acts, Journal of Laws item 398 and 650 (valid since 15th March 2018); The Act of 6th March 2018 – Provisions introducing the Act Enterprise Law and Other Acts Concerning Economic Activity, Journal of Laws, item 650 (came into force 30 days after its announcement); The Act of 5th July 2018 on Succession Management of an Individual person's Enterprise, Journal of Laws item 1629 (came into force 3 months after its announcement); The Act of 9th November 2018 on Country Housewives Clubs, Journal of Laws item 2212 (came into force on the day following announcement); The Act of 9th November 2018 on Amending Some Acts in order to Make Simplifications for Entrepreneurs in Tax and Economic Law, Journal of Laws item 2244 (came into force on 1st January 2019, with exceptions); The Act of 6th December 2018 on National register of Debtors, Journal of Laws from 2019, item 55 (comes into force on 1st December 2020, with exceptions).	related to the obligation to make unit and consolidated financial reports and report on activity in an electronic form. Units covered by the register of enterprises of NCR were obliged to electronically make reports following the logical structure and format given in Public Information Bulletin on the website of the Ministry of Finance and were exempted from the obligation to submit them to the Tax Office. This change is aimed at improving the security of economic activities and improve insight into the whole information and documentation held by the NCR. On the other hand, amendments resulting from the act on simplifications for entrepreneurs in tax and economic law, known as the so-called Package for Small and Medium-Sized Enterprises, concerned: -raising revenue thresholds (from PLN 17 million to PLN 25.5 million and the balance sheet sum (from PLN 34 million to PLN 51 million), that is to the highest values determined in the directive 2013/34/EU for small entities, whose number thus grew by 3 thousand, that is by over 7%, this is specified in article 3 section 1 c and 1 d of the AA; -increasing the number of micro entities which make financial reports, mostly simplified ones, these entities include individuals, civil partnerships of individuals and enterprises inherited, general partnerships of individuals, partnerships, if their net revenues from sale of goods, products and financial operations amounted to, in Polish currency, at least EURO 2 000 000 and not more than EURO 3 000 000 for the previous financial year, these changes are specified in article 3 point 1a and 1b of the AA; - abolishing the requirement to store the confirmed financial reports for an unlimited period of time and limiting this period to 5 years, as specified in article 74 point 1 of AA; - extending the group of entities which are entitled to use the tax definition of financial leasing, that is to classify leasing contracts in a simplified way, following the rules specified in tax provisions, as stipulated in article 3 point 6 AA; - resigning from determining deferred tax, article 137 point 10 AA; - not valuing assets and liabilities by a micro entity according to their fair value and correcting the purchasing price, article 28 AA; - small entities do not have to apply provisions on financial instruments (regulation of the Minister of Finance on specific principles of acknowledging, ways of valuation, scope of disclosing and way of presenting financial instruments), article 28b, point 1 in connection with article 81 point 2, sub-point 4 AA; - using simplified principles of calculating costs of manufacturing the product – article 28 point 4a AA; Moreover, in micro and small enterprises which are not covered by the directive on accounting, and in non-governmental organizations, changes referred to: - using tax rules of appreciation of tangible and intangible assets, article 32 point 7 AA; - resignation from creating risk reserves, faced losses and effects of other events and resignation from write-offs updating the value of assets, article 7 points 2a and 2b AA; - resignation from creating accruals for future payments to employees, including retirement pension payments, article 39 point 6 AA.

Source: own elaboration on the basis of acts listed in table 1 and Dadacz, 2018, p. 5-8, as well as on the basis of the Accounting Act (consolidated text of 2019, items 351, 1495, 1571, 1655, 1680, of 2020, item 568).

Olchowicz and Tłaczała (2015, pp. 20-21) mentioned that, the Polish accounting regulations were linked to the content included in IAS and IFRS by introducing the principles and standards to the Act on Accounting. This content was usually simplified to easy the workload and to facilitate its accomplishment. At the same time an important provision was included in the Act, namely that in matters not regulated by the provisions of this act and provided they apply the rules (policies) of accounting, entities can use national accounting standards issued by the Accounting Standards Committee. If there is no relevant domestic standard, entities can use IAS / IFRS, excluding those units for which these standards are the law. So far the following national standards have been issued: 1) cash flow account, 2) income tax, 3) unfinished construction services, 4) loss in value of assets, 5)

leasing, rent, lease, 6) reserves, passive cost accruals, provisional liabilities, 7) change of rules (policies) of accounting, estimate values, rectifying errors, events following the balance sheet day – approach and presentation, 8) developer activities, 9) report on activities. National accounting standards are to facilitate the application of accounting regulations by entities, by specifying them and providing interpretations helpful in practical implementation of provisions.

Those entities operating in Poland for which standards are the law obligatorily use all standards, without any exceptions, along with interpretations issued for them, while other entities use only those regulations which were included in the Act on Accounting. IAS / IFRS are the leading accounting patterns of accounting, adjusted to economic transformations in the world, whereas domestic laws are usually traditional. However, the Polish Act on Accounting has been changing rapidly, incorporating immediately right solutions proposed in consecutive standards.

Conclusions

In conclusion, in the period of 25 years which passed since the passing of the first text of the Polish Act on Accounting, many significant amendments have been introduced to it. All these changes resulted from the need to adjust the Polish Act of Accounting to the global and European tendencies in accounting, elevated as "the language of business": in international economic relations. These tendencies reflect the processes of standardizing this language on a global scale and harmonizing and standardizing financial reports as the basic carrier of financial information. Every change in newly-implemented solutions in theory, practice and policy of accounting exerts some influence on financial reporting of entities, constituting the final product and an integral part of accounting. Referring to the purpose of the article, it can be stated that a detailed study of frequent changes to the Polish Accounting Act over the last 30 years of the political and economic transformation in Poland shows that the act is being gradually and immediately adapted to the IAS / IFRS international standards and directives of the European Union. It can also be hoped that the article filled the gap in the literature on the subject in terms of a synthetic and comprehensive presentation of the changes introduced in the Polish Accounting Act in order to adjust it to the EU Directives and the MRS / IFRS standards. The research hypothesis as to whether the changes to the Polish Accounting Act are implemented frequently, regularly and adequately to the changes introduced in EU directives and in international accounting and financial reporting standards has been positively verified. That explains why Poland belongs to a group of countries which update their national provisions on accounting in accordance with arrangements and norms promoted and adopted in the world. Thanks to the updates, the Polish Act on Accounting includes modern trends in decisions concerning accounting and does not lag behind the world solutions in this field. On the other hand, this act reflects the specificity of the Polish economy and its further development prospects. The implemented provisions are deeply analyzed by numerous Polish theoreticians and practitioners in order to ensure their best adjustment to the reality of the economic life in Poland.

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Managing Changes when Adding Technology in Financial Sector

Elena MIRCEA

The Bucharest University of Economic Studies, Bucharest, Romania
elenamircea94@gmail.com

Abstract

In a changing world, resources tend to be insufficient and managing them could come with hard challenges for a company. Constant adaptation and evolvement define the basis for a successful business, but behind it comes a strong infrastructure that ensures the operativity. This year turned out to be a major test for humanity and for the economy. Regardless of the business and domain of interests, everyone had to exceed the boundaries and find innovative ways of making business. Increased competition makes businesses recalculate their economic indicators and invest in productive work and efficiency, thinking about overall performance of the company, by using integrated systems. The aim of this paper is to present the change management process for information systems, by analyzing techniques that enhance specific principles and practices, among several implications in business. Strategic implementation of technology in the financial sector can save a business, but the required changes are not easily accepted. Mindsets and old ways of working need to be changed and adapted to the new strategies. This year demonstrates to us that only spontaneous people and flexible processes lead to successful businesses.

Keywords: information systems, change management, agile, business performance

Introduction

The predecessor of information systems is considered to be Hollerith's tabulating machine. Since 1890 when Herman Hollerith developed the tabulating machine, offering a major step to automatization, information systems have known different stages (Zwass, 2011). An information system is an integrating set of hardware and software components designed for collecting, storing, analysing and processing data. Around 1960 was the time when a new domain appeared on the market, "Management Information System" (MIS) describing how information technology, management, finance and accounting can mix together, obtaining an innovative system that can define the success of a company. Only in the late '70s worldwide companies were able to utilize the power of those systems, when some IS software versions for personal computers were released (Hirschheim & Klein, 2012).

In over 60 years of existence, information systems had a spectacular evolution, creating a new domain, different from both information technology and business, but combining knowledge from several fields. The main components come from IT (computer hardware, software and telecommunications and databases) and from the financial sector (principles, practices and procedures). Business relies on this integrated set of components for collecting, storing and processing data in order to carry out specific operations, customer support and remain competitive on the market. IT development has been occurring under Moore's law, the power of the computer devices has been doubling every 18-24 months (Gregersen, 2011), so in order to stay on the market every company needs to measure the organizational performance and the impact of any change done in the environment.

The literature (Zwass, 2011) presents three types of information system, grouped in a pyramidal structure: operational systems – the base of the structure, support of knowledge work – the middle layer and the management support – top layer. Transactional Processing Systems support the processes through which products are designed, produced and sold, using large integrated systems as ERP, CRM and SCM. Knowledge work stands for manipulating abstract content and theories through

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professional support systems, collaboration systems and knowledge management systems. Top managers use specific systems as decision support systems or executive information systems, systems that rely on TPS for operations.

Managing Changes for Increasing Organizational Performance

It is widely accepted that the appearance of information systems came as a response to the need of automatization and standardization of all the already existing business processes and practices. Financial success depends on how thoroughly people inside the organization embrace the change, so creating a new organization design, new processes and implementing new technologies may never be seen as an improvement if managers do not bring individuals along.

IT Service Management is the concept that describes the principles and practices used by an organization to maximize business value, using the information technology. Accomplishing international, national and industrial standards, ITSM describes IT as the key concept in developing a reliable business. Besides being a standard, ITSM became a culture, a mindset who guides managers in achieving the desired outcome. Forbes Insights published in collaboration with BCM an analysis done over the state of ITSM presenting also the most used frameworks and processes (Forbes Insights & BMC, 2017):

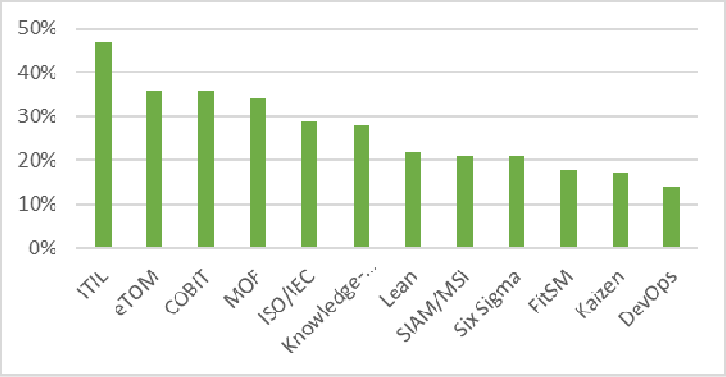

Figure 1: ITSM Frameworks Popularity (adaptation after (Forbes Insights & BMC, 2017))

The top key performance indicator to measure ITSM effectiveness is Information Technology Infrastructure Library, with over 47% of the market, it is a best practice framework that "*gives guidance on the provision of quality IT services and the processes, functions and other capabilities needed to support them"* (AXELOS, 2011). ITIL processes are organized around five service lifecycle stages (Lindros, 2017):

- Service Strategy – mapping the IT model over the organizational structure, establishing processes for monitoring,
- Service Design – continuous improvement for IT processes and services to best fit organization needs,
- Service Transition – defines and mitigates the risk through change management process,
- Service Operation – daily support for functional operations,
- Continual Service Improvement – KPIs evolution, problems and optimization proposals.

In the 90's, COBIT was designed as a set of IT control objectives and later ISACA founded the idea of IT management and information governance. By helping managers to align business goals with IT practices, COBIT is establishing the link between information systems, business and information technology. Through its five components, COBIT framework offers metrics that measure the achievement while identifying new business responsibilities and ways of accomplishing them using IT processes and minimizing risk (Simplilearn, 2020). The process description acts as a reference model, but also as a common language and by controlling the objectives, the auditors have a clear list of requirements that have to be checked (Information System Audit and Control Association, 2019).

ITIL comes at the same level with COBIT, without excluding the other one. While COBIT explains what should be done, ITIL offers solutions for how to do IT governance in a correct way.

Having the same popularity as COBIT, Business Process Framework (eTOM) delivers a widely agreed and adopted service-oriented architecture especially for telecommunications and entertainment industry. The conceptual level of eTOM has three major areas, reflecting the main focuses within enterprises (tmforum, 2020):

- Strategy, Infrastructure and Product covering planning and lifecycle management;
- Operations presented as the core of day to day operational management;
- Enterprise Management describing corporate or business support management.

The framework can be utilized as a common language between companies, departments or teams when discussing process issues, defining process flow to model and standardize interactions and to define requirements for the IT systems that would be supporting the process flows.

Business Process Framework can be linked with ITIL practices, being described as complementary frameworks that support each other on the official forum (tmforum, 2020).

Change management includes the processes, tools and techniques used to achieve desired outcomes from a business perspective, but focusing also on helping people adopt and utilize the change in day-to-day work. The notion defines a process, but also a competency and everything is driven by a change manager who ensures that every change is documented, tested and understood by the application users.

This paper focuses on understanding the impact of changes in daily business by following a repeatable cycle and using a set of tools that increase organizational effectiveness and measure the performance of the companies. Hiatt and Creasey established in (Hiatt & Creasey, 2003) the 5 tenets of change:

- *We change for a reason;*
- *Organizational change requires individual change;*
- *Organizational outcomes are the collective result of individual change;*
- *Change management is an enabling framework for managing the people side of change;*
- *We apply change management to realize the benefits and desired outcomes of change.*

On Prosci's blog, each tenet is argued with real life examples (Creasey, 2019). For only 26% of the organizations the reason for the change is clear, but the biggest concern is raised by the fact that individuals don't understand that their mindset and the way they currently do their work have to

change completely. 91% of the webinar participants organized by Prosci answered that those crucial individual changes were not defined in their organization (Creasey, 2019). Planning a change on Monday and the go-live on Tuesday is not change management, people need time to understand and adapt their work.

Managing a business can be really challenging, using a wrong configured information system and bringing the agility required by this pandemic situation, without understanding it can turn a successful company into a failure overnight. Business models have to be taken into account and according to the Japanese learning method, SHU-HA-RI (IBM Agile Explorer, 2018), you have to know the stage of your business before implementing any major change. SHU (follow) is the first phase, in which a new business arises and is recommended to understand and respect the previous business examples, following the good practices and learning from other companies mistakes. HA (break) is the intermediate stage in which some more adjustments can be done to the standard processes. RI (transcend) final stage, with a mature and experienced management, adaptability to changes based on trust and communication.

When it comes to technology, the future is marked by Cloud Computing and cloud applications. Many companies are already there and invested in this new technology that brings IT closer to the users. Cloud Computing defines on-demand availability of computer system resources without direct user involvement. Based on the service models classification (SaaS, PaaS and IaaS), evolved the paradigm "Everything as a Service" (XaaS) presenting the new market trends, when the customer pays only for the ordered services; a service for which no maintenance and personal involvement is needed.

In 2012, "Journal of Information Systems" published an article, mentioning about "Information System as a Service" (Hilman, 2012), an era in which companies use a product and manage only its interface, but all the infrastructure, databases and firewall rules are maintained by different providers. Today, the future of the outsourcing companies could be under pressure taking into consideration the pandemic situation, if the main companies are not getting enough business, they would not be able to pay for the outsourcing services. The IT outsourcing companies have adapted quickly, offering constant support even from home offices, but all their income is based on the primary companies and their ability to sustain business during tough times.

An agile company is characterized by the ability to recognize disruptive factors and to respond quickly in a changing and turbulent environment. Agility measurement is the time between the appearance of an opportunity and its capitalization, the shorter the time, the more agile is the company. Big companies such as Oracle, SAP, Microsoft relied on Cloud Computing, offering all their services as packages that can be accessed over the internet. The customer has all the advantages of an integrated system, without knowing the infrastructure behind it.

Patrick Lencioni described in (Lencioni, 2002) the five dysfunctions of a team, by disposing them in a pyramidal form. By analyzing the dynamic inside of a group and gathering the common mistakes, he concluded that at the base of the pyramid can be found the lack of trust, followed by fear of conflict, lack of commitment, avoidance of responsibilities and in the end the team has no result. All those human reactions and feelings make the acceptance of the change even more difficult and at this level constant work and involvement from the management part is needed.

Strategic Implementation of IS in Business

According to Forbes, 84% of companies fail at digital transformation because they do not spend enough time analyzing and changing people's behaviors, culture and the way in which the decisions are taken: "One of the most basic impediment to moving forward on the road to digital transformation is whether or not enough people within the organization are aware of the challenges." (Rogers, 2016).

A good business example when analyzing digital transformation is “Starbucks”, a company that managed to overcome the financial crisis from 2008 by implementing a powerful information system (Thomas, 2014). The worldwide coffee chain suffered important financial losses during the crisis and in order to stay on the market and remain competitive, they had to rethink the whole business strategy together with all their processes. As part of the new strategies, some products had to be retired from the market and for others, price reductions were inevitable. But the biggest question is what to retire, how do you know what exceeds the average budget of a regular consumer and what is affordable? In order to make the best decision in a short period of time, large volumes of data, gathered from all the stores had to be analyzed. This was the time when the management team decided they needed help, extracting relevant data from all the information they had was impossible without a transactional processing system. Today’s success confirms the decision from the past, in 2008 the company was present in 49 countries, owning 17000 cafes (Starbucks Corporation, 2008) and later reaching 31256 locations in 2019, being on the market in 78 countries (Starbucks Corporation, 2019). The case represents an example of an agile management prepared to assume important decisions even when financial indicators would say that it is not the proper time for a costly investment. A good change management determined the rapid adaptation to the new customer requirements.

Over the last 20 years many companies decided to implement an information system as the benefits are hard to ignore. It was observed that an IS can help companies to save money, increase competitiveness and improve performance. After implementing an IS, FedEx moved 3.4 million packages daily inside the United States and UPS over 15 million all over the world (Thomas, 2014). Increasing organizational performance through information technology is a common practice and many companies are choosing to implement an Enterprise Resource Planning system, which contains integrated modules for finance and accounting, human resources, production planning, sales and distributions, material management and marketing. This integrated program runs one database that is accessible for all business units inside a company and is commonly structured to three tier application architecture: database layer, application server and client presentation layer.

An ERP goal is serving the core business processes, by combining as many functions as possible, enabling communication between different departments and simplifying the process flow. However, the success rate of the implementation is very low and could become worse when an organization manages to obtain the IS benefits and the effects do not last for a long period of time (Ming-Tien Tsai, et al., 2011). Changes and variations of the environment can affect the efficiency of the systems if the ERP is not able to adapt to the modifications. Robbins-Gioia published in 2002 a survey result, made on a hundred enterprises, discovering that 46% of those companies were unable to maintain the competitive advantages provided by an ERP for a long period of time (Ming-Tien Tsai, et al., 2011). Also, the Conference Board conducted a survey revealing that 40% of ERP projects fail in one year after go-live (Ming-Tien Tsai, et al., 2011).

Information systems agility consists in the ability to adapt in real time to the new challenges that can appear in the business environment and to embrace changes without any major impact for organizations. A double approach of agile information system benefits is presented in table 1.

Table 1: IS Benefits – Double Approach

Domain	Benefit
Business	Standard processes and practices
	Increase in efficiency of data processing
	IS capacities aligned with the business needs
	Innovation in technical solutions
	Minimizing the risk when implementing changes
	Business processes can change in real time
	Financial benefits, increase in sales value
	Maintenance cost reduction
	Faster development of products/services
Information Technology	Minimizing the time when implementing changes
	Faster recovery in case of outages and downtimes
	Data validity improvement
	Rapid development of new functionalities
	Standardization to internationl standards
	Adaptation for system upgrades
	Rapid response to security threats

Some difficulties can be mentioned when talking about agility and changes, on the top of the list sits people's reluctance to change, lack of trust in new methods and in others, as human interaction is the key, good communication and strong collaboration is needed, also involvement of all company's departments in the scheduled changes that affects the system is essential to ensure success of that change.

A series of assumptions have to be defined from phase one of the change implementation: openness, communication and collaboration, acceptance of the changes and of the new technologies, willingness to help the others in defining and understating a certain process.

George Polya defines in (Polya, 1945) the four principles of solving problems (table 2), later adopted in all the fields and more important in business when it comes to link it with information technology. Those four concepts could be adapted when implementing and managing an organizational change. Similarities can be found between Polya's heuristic and agile principles, work and learn based on repetition: listen, iterate, learn and correct; leading to successful implementations while people understand the necessity of the change and manage to learn how to work with the new functionalities.

Table 2: Polya's Heuristic for Solving Problems

Principle	Approach
Understand the problem	The managers cannot solve the problem simply because they don't understand it. Without having all the information, it is not possible to find a proper solution.
Devise a plan	Choose the appropriate strategy and this may include use a predefined model, draw schemas, look for a pattern.
Carry out the plan	Persist with the chosen plan and only after not seeing the desired results you can chose another model
Look back	Learn from the past mistakes, reflect on what worked ok and what could be improved.

Even the agile rituals, the four well-known regular meetings, are based on the same heuristic:

- Sprint Planning – understanding the existing problems and bottlenecks,
- Daily Stand-up – planning and deciding the daily strategy in order to continue the work,
- Sprint Review – following the chosen solution and presenting the sprint result,
- Retrospective – lessons learned, reflect over the last sprint and decide what improvements can be done.

Conclusions

In conclusion, with a relative short history, information systems managed to influence both finance and information technology markets, by creating a link between business and IT. Managers must understand the necessity of focusing on data flow and collaboration between different departments, mapping processes and practices and less on creating a powerful system only from a technical perspective.

The Internet era opened a new world full of opportunities and a good change management helps organizations and to become even more competitive in an unstable environment, by adapting their business strategies to the market requirements. Every company should follow the trend when it comes to technology solutions that improve the business overall, but the involved changes have to be thorough analyzed. Cloud Computing is the technology on which the biggest IT service providers relied on during the past few years and it seems to be the future of an appropriate system management.

Technology can help solving the existing problems, can bring financial benefits and can improve organizational performance, but is a common effort that has to be done by all the involved parties in adapting and evolving to the new processes and practices imposed by an information system.

In the end of the study some limitations have to be mentioned, as the paper focuses more on change management general principle and practices and less on offering a well-defined methodology and "how to" steps. Every company has to find what best fits depending on their needs and must consider the "best practices" as a starting point. The IS implementation or changing effects have to be analyzed by every organization and decide which factors might affect the overall performance.

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Transportation Policy Financing in Europe

Igor MAYBUROV

Ural Federal University, Ekaterinburg, Russia
E-mail: mayburov.home@gmail.com

Yulia LEONTYEVA

Ural Federal University, Ekaterinburg, Russian Federation
E-mail: uv.leonteva@mail.ru

Abstract

Analysis of the choices that European states made regarding their transportation policies brings us some important insights. A major achievement of these policies was the creation of a comfortable environment for living and tourism. The aim of this article is to study the trends in the development of transportation policies and financing in Western European countries in the second half of the twentieth century. Our research hypothesis is that the system of transport taxes and charges in Western Europe evolved for a long time and was largely determined by the priorities in these countries' transportation policies. This study relies on methods of historical research and logical analysis. We analyzed transport policies in Western Europe in historical perspective starting from the 1950s. The article discusses the fiscal processes for the implementation of transport policy in the countries of the European Union: Increasing fiscal significance of road charges and taxes, Growing importance of parking pricing, Use of fuel and road taxes as revenue-raising mechanisms. European experience provides important lessons to learn from in terms of transport policy instruments, which can be used to regulate the demand for personal vehicles and public transport. European countries have managed to develop effective strategies for reducing car dependency and increasing the flexibility and scope of their public transport offers.

Keywords: Transport Policy, Financing, Road Charges, Road Taxes, Parking Pricing.

Introduction

Analysis of the choices that European states made regarding their transportation policies brings us some important insights, especially when we compare these choices with the relevant US experience (Pucher, 1995). A major achievement of these policies was the creation of a comfortable environment for living and tourism. European cities evolved around medieval quarters built primarily for pedestrian use as the streets were planned to be just wide enough to allow for the passage of a horse-drawn carriage. From the very beginning, these cities were highly attractive for tourists. The processes of mass automilization, however, posed new challenges to the development of European cities. The questions arose as to how urban areas should be reconstructed and whether priority treatment should be given to cars or pedestrians (Leontyeva, 2019).

This urbanist dilemma may best be illustrated by the case of post-war Germany. Most German cities were heavily damaged by the bombings in WWII and in the rise of the post-war urban redevelopment could have been planned to accommodate increased car traffic in the central areas. For example, the inner city zones could have been rebuilt to incorporate multi-level highways and extensive parking facilities, like in Chicago, Detroit, Los Angeles or other American cities. However, this did not happen. The committee of urban experts that considered the alternative solutions to the post-war reconstruction of German cities discussed this option and rejected it (Hollatz, 1965), deciding instead to fully recreate the old city look.

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The Europeans have chosen to preserve their historic inner cities and this experience is important for other countries, which faced similar challenges of mass automobilization, although much later. In the context of Russia, where mass automobilization started only two decades ago (Leontyeva, 2016), it is particularly relevant to investigate European transportation policies and financing, especially in historical perspective. Such analysis will provide us with a better understanding of successful strategies of creating a comfortable and safe pedestrian-friendly environment.

The aim of this article is to study the trends in the development of transportation policies and financing in Western European countries in the second half of the twentieth century.

Our research hypothesis is that the system of transport taxes and charges in Western Europe evolved for a long time and was largely determined by the priorities in these countries' transportation policies.

Literature Review

A vast body of research is devoted to the role of taxes in the implementation of European transportation policies: increased road charges have proven to be quite effective in discouraging the use of personal vehicles (De Borger, 2007; Söllner, 2018) as this instrument significantly contributes to the cost of a car trip and thus leads individual drivers to compare the car with other modes of transport in such key parameters as the cost and time of a trip, levels of comfort and safety. The cost of a trip is particularly important and it is this parameter that is targeted by policy-makers most often for regulation of people's travel behaviour.

Viewed from the theoretical perspective, people’s choices of travel modes for their work-related daily trips can be explained with the help of a standard hypothesis of expenditure minimization (Dafermos, 1969).

The generalized cost of a trip comprises two components:
first, the direct monetary costs, that is, the costs estimated by comparing the cost of a car travel (fuel, road tolls and parking fees) with the cost of using mass transit modes (Mayburov, 2017);
and second, indirect non-monetary costs, that is, the costs estimated by comparing the car travel time with the time spent by travelling by public transport.

The generalized cost of a trip is calculated by multiplying the time spent traveling by unit costs (these measurement units are determined by individuals themselves) and then by adding up the direct and indirect costs.

There is evidence that individuals tend to focus primarily on their direct expenditures rather than indirect non-monetary costs when calculating the generalized cost of a planned trip. They also tend to ignore the external costs of travel, that is, the costs of this choice for the local community such as the societal or environmental impacts, the noise, and so on (Jackson, 2008). Therefore, the purpose of road charges should be to increase the generalized cost of travel in the eyes of individual citizens and thus raise the individual marginal costs of car travel to the level of the marginal social costs (Bel, 2016).

It should be noted that European countries have accumulated considerable expertise on parking pricing and its effects on people’s travel behavior. For example, A.R. Kuppam et al. surveyed commuters' behavioural responses to different parking pricing scenarios and found that about 35% of the car owners are likely to reconsider their choice of the mode of travel if they have to pay for parking 1-3 dollars in outer neighbourhoods or 3-8 dollars in the city centre (Kuppam, 1998). In case of a fourfold proportional increase in parking tariffs, the percentage of people choosing not to go to an outer location by car rises progressively - by over 5.5 times, while the percentage of those who decide against car use when travelling to the centre grows in proportion to the tariff increase - by 4 times.

Methodology

This study relies on methods of historical research and logical analysis. We analyzed transport policies in Western Europe in historical perspective starting from the 1950s. Based on the results of our analysis, we made some logical generalizations concerning the development of transport policies and their financing in Western European countries.

For the sake of brevity, we won't go into the specifics of transport financing in individual regions and will focus only on general European trends. Our study relies on the analysis of the relevant research literature and EU legislation.

Results

Development of European Transportation Policies

The first wave of mass automobilization swept across Western Europe in the 1950s. In Eastern Europe, this trend started a decade later - in the 1960s. Almost all European cities with historic quarters and narrow streets proved to be unready for this surge in the number of motor vehicles, which soon led to chronic traffic problems and bottlenecks, shortages of parking spaces and so on. These, in turn, caused urban sprawl and the movement of households and businesses out of the city centers.

Within several decades, European communities managed to develop clear-cut policies to regulate car demand and increase the provision of public transport services. Phil Goodwin points out the following result of this policy: until it was introduced, the annual increase in the volume of public transport services in the majority of European cities had not exceeded 3-5% and these growth rates had remained virtually unchanged for 30 years. After the introduction of the transport policies aimed at reducing car use in the 1980s, the demand for mass transit rose by 100% in just 5 years (Goodwin, 1998). The main fiscal processes associated with this policy are shown in the table below.

Table: Financing of transport policies in the EU

№	Process	Description
1	Increasing fiscal significance of road charges and taxes	Various fiscal instruments (charges and tolls) are used to increase the cost of car ownership to the level of marginal social costs
2	Growing importance of parking pricing	There is a growing diversity of parking pricing strategies, involving all types of parking spaces; (differentiated) parking tariffs are used; a dynamic approach to parking pricing (demand-dependent tariffs) in central zones is applied to discourage long-term parking
3	Use of fuel and road taxes as revenue-raising mechanisms	The revenue from fuel excise duties and road taxes levied on car owners goes in equal proportion to the funds for road construction and public infrastructure development.

Increasing Fiscal Significance of Road Charges and Taxes

An increase in the cost of car use and ownership is usually economically justified, although this strategy may be difficult to put into practice since it may cause considerable resentment amongst the public. As a result, there is a variety of practices and strategies in EU countries although the general trend remains more or less the same: there has been a steady increase in the fiscal significance of road charges and taxes.

Let us look at the key fiscal instruments applied in the majority of EU countries. Such countries as Norway, the Netherlands and Denmark make the most active use of fiscal instruments to regulate the traffic volume and car use behaviour.

1) *High costs of car ownership (registration fee, taxes on car ownership).* These charges affect people's decision to purchase a car. To a greater or lesser degree, fiscal instruments are used in almost all EU countries. In Norway, Denmark and the Netherlands, however, transport taxes and charges are traditionally the highest: for instance, the amount of the registration tax may be comparable to the cost of a car itself. These charges signal to the households that car purchase and ownership can be very expensive, thus prompting them to become more rational and prudent in their choices concerning the number of cars they need if at all.

2) *High fuel taxes.* In countries with high fuel taxes, these instruments perform a triple function: first, the fiscal function, as they provide revenue for the funds to maintain public roads and develop public transport; second, the regulatory function, as the fuel prices contribute to the direct costs of a planned trip and, therefore, affect people's decisions of the mode of transport; 3) the environmental function, as high excise duties substantially add up to the cost of fuel and encourage people to switch to lighter, lower-emitting cars with less powerful engines. This instrument is widely used in all EU countries, with the highest fuel excise duties found in Germany and the Netherlands - in some periods fuel excise duties in these countries accounted for up to 45 % of the end price of petrol (Derycke, 1998).

3) *Toll roads.* Tolls add to the direct cost of a planned car trip but at the same time reduce the indirect non-monetary costs by cutting the travel time. Thus, toll roads increase the variety of choice for individual travelers. There is sufficient research evidence of the efficacy of these tools for reducing car use (Schweitzer, 2008; O'Mahony, 2000; Litman, 2012). B. Ubbels and E. Verhoef, for example, show that road pricing measures in the Netherlands not only help reduce the car traffic by 6-15% but also lead to a decrease in the number of car trips and encourage the use of non-motor vehicles (Ubbels, 2006).

4) *Vignettes.* Vignette is a charge of a fixed amount paid in advance for unlimited road use in a certain country within a specific time period (year, month, 10 days). This instrument is widely used in Switzerland, Austria, the Czech Republic, Bulgaria and Hungary. What distinguishes it from other fiscal tools is that the administrative costs of operating vignette systems are quite low. Moreover, it provides a stable and reliable source of revenue for the road fund. Remarkably, this instrument does not affect people's decisions regarding vehicle ownership and usage since the amount of the vignette fee does not depend on how intensively the road will be used by the driver.

5) *Congestion pricing* (a fee or tax charged on car and motor vehicles for entering a restricted area). This instrument has been a subject of active debates in Europe and has garnered considerable attention from policy-makers. Congestion pricing measures have been most widely used in Norway since 1990: this measure is currently implemented in eight Norwegian cities (Oslo, Bergen, Haugesund, Kristiansund, Namsos, Stavanger, Tønsberg, and Trondheim) with road toll tariffs varying between 1 and 4 euro for vehicles weighing not more than 3.5 t and with double fees in peak hours. In other European countries, this instrument is in use in ten cities, including London (2003), Stockholm (2006), Milan (2007), and Göteborg (2013).

Parking Pricing

Since the 1950s, this instrument has been actively used to regulate travel behavior as drivers were encouraged to park in specific locations and required to pay for the time they occupied the parking spot. In general, there was a steady increase in parking capacity until the mid-1970s. In this period, multi-level parking facilities were built in city centres and popular areas in outer neighbourhoods. Since the 1970s, however, the extensive growth in surface parking spaces has almost stopped and parking capacity started to be increased primarily by building underground garages. Differentiated parking fees started to be applied to signal to the drivers that car trips to the city centre are seen as undesirable behaviour.

Moreover, since the 1970s, in many European cities, the parking supply in the city centre has been restricted: first this policy was adopted in Hamburg and then in London. The authorities also took a radical step banning the construction of new parking facilities and changing the requirements for capital construction projects. The restrictions included setting the maximum allowable number of parking spaces (previously it had been required that the projects should specify only the minimum number).

As a result, in several decades, European cities have accumulated considerable experience of parking space management and the use of pricing to regulate parking supply and demand. The most productive approach to parking pricing can be described as non-stationary or dynamic, when on-street tariffs are set depending on the actual demand. If the parking space is fully occupied, it means that a higher tariff may be applied - the price will continue to rise until there are about 15-20% of unoccupied spaces in peak periods.

Use of Fuel and Road Taxes as Revenue-Raising Mechanisms

In Europe, fuel and road taxes levied on car owners provide the revenue that is then allocated in equal proportion to the funds for road construction and public transport development.

Quite illustrative in this respect is the example of Germany, which adopted a program for development of urban public transport in 1967. The program covered a period of thirty years and stipulated the use of fuel excise duties as a source of revenue. The revenue from excise duties was accumulated in the special fund to be later allocated in equal proportion to transport infrastructure projects of German cities. Thanks to this program, in almost all German cities, by 1990-2000, public transport systems had been modernized and the infrastructure for non-motorised travel was created.

France is another example of how public transport can be provided with a long-term source of funding with the help of a special purpose local tax. In France, the *versement transport* (or VT for short) - an urban regional payroll tax - was introduced in 1973 to modernize public transport in cities with over 300 residents. Since 1999, this tax has been applied in larger cities with over 10,000 residents. The VT is levied on companies with the staff of more than 11 employees and is paid at the rate of 11.5% of the total gross salaries of all employees. In recent decades, the VT has covered up to 40% of the operating expenses of public transport operators (Vigrass, 2005).

Conclusion

The European transportation policies, aimed at creating a comfortable environment for living and tourism, have generally received substantial public support and ensured a number of positive long-term effects: environmental, transport, recreation, social, and economic. These effects resulted from the development of modern public transport systems and mass transition towards zero-emission mobility.

European experience provides important lessons to learn from in terms of transport policy instruments, which can be used to regulate the demand for personal vehicles and public transport. European countries have managed to develop effective strategies for reducing car dependency and increasing the flexibility and scope of their public transport offers.

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Systematic Literature Review on Business Intelligence for Decision-Making in Customer Affiliation

Eduardo Jesusi-Venturo
Universidad Autónoma del Perú, Lima, Perú, eduard_jv89@outlook.com

Miguel Flores-Sare
Universidad Autónoma del Perú, Lima, Perú, miguelangelfloressare@gmail.com

Javier GAMBOA-CRUZADO
Universidad Señor de Sipán S.A.C., Lima, Perú, jgamboa65@hotmail.com

José HERRERA SALAZAR
Universidad Norbert Wiener, Lima, Perú, joseluis.herrera@uwiener.edu.pe

Johny PRETELL CRUZADO
Universidad Autónoma del Perú, Lima, Perú, johnypretell@hotmail.com

Carlos GUILLERMO PAUCAR
Universidad Nacional de San Antonio Abad del Cusco, Cusco, Perú, guillermo.paucar@unsaac.edu.pe

Abstract

In an increasingly competitive world, information plays a key role in organizations for strategic decisions that may ensure success of the company, managers are aware of the importance of controlling this information and using it to achieve better results in their decision-making processes. To this end, this study is conducted to determine the benefits and effectiveness of implementing business intelligence in the decision-making process of companies worldwide. This study includes a comprehensive analysis of 108 articles published between 2015 and 2020 and extracted from various highly important academic sources. During this 5-year period, there have been advances and new trends in the field of business intelligence, and these served as the basis for this study. The results of this study demonstrate the various benefits of business intelligence in companies and its extensive application in different areas, such as the banking sector, with the aim of providing competitive advantages.

Keywords: Business Intelligence, Systematic Literature Review, Data Warehouse, Decision-Making.

Introduction

Decision-making processes in an organization depend on the available information, which is generated and collected by the company itself; the managers are in charge of making decisions. As Jain and Sharma (2017) say this process becomes imprecise when there is a lack of information, thereby resulting in expenses, delays, downtime, risks, etc. Gonzales et al. (2015) mention that few companies implement business intelligence (BI) tools in their processes; some companies in the banking sector do not have BI solutions for their decision-making processes regarding the affiliation of clients worldwide. The difficulties encountered by these companies are delays in the generation of reports, high percentage of risk in the decision-making process, low percentage of reliability in the generated reports, and low levels of satisfaction from the managers in charge of making decisions. These problems would be mitigated if these companies had a BI solution.

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Various studies have been conducted to evaluate and demonstrate the effectiveness of BI in decision-making. However, we must understand what BI means. BI provides a set of tools that support business analysis, and their implementation helps improve the performance of organizations. According to Tangsripairoj and Natseevatana (2018) the purpose of this technology is to collect, store, and analyze the generated data. In their research Khatibi et al. (2017) indicate that this is achieved by applying a process involving extraction, transformation, and load (ETL), followed by online analytical processing (OLAP); data mining techniques can also be applied. Rivera and Shanks (2015) state that the results are finally shown in dashboards in a dynamic and interactive manner to facilitate the visual display of information to those responsible for making decisions. Successful decision-making is highly dependent on the quality of information; therefore, it is crucial that the aforementioned processes are performed correctly. This ensures the delivery of information that is true, accurate and, understandable.

The objective of performing a systematic literature review (SLR) is to determine the benefits and effectiveness of the application of BI in improving the decision-making processes in companies worldwide. The remainder of this paper is organized as follows. Section II shows background and related work, section III presents the methodology used for the review of the literature. Section IV details the results of the SLR, section V shows the discussion of results. Section VI provides the conclusions and scope of future research.

Background and Related Works

In recent years, several investigations on BI and its effectiveness in organizations have been conducted. To improve productivity and generate competitive advantage, several researchers designed and implemented various BI proposals. This helped overcome the flaws in information management and achieve the strategic objectives of companies.

BI can be implemented in many areas, as demonstrated in various studies. Authors Neyoy et al. (2017) proposed a BI solution for a small–medium-sized enterprise in the food industry, whose goal was to achieve a competitive advantage over its rivals. For this purpose, a data warehouse was designed using the Ralph Kimball methodology. This process was initiated by defining the business requirements, followed by the creation of a data warehouse using the information regarding the sales made by the restaurant. An OLAP cube was then developed to show the information through dashboards created in QlikView to allow restaurant managers to make better strategic decisions based on the sales information.

Tangsripairoj and Natseevatana (2018) designed a BI tool to provide useful information to executives of the Office of the National Broadcasting and Telecommunications Commission in Thailand, with the aim of improving the effectiveness of strategic and operational decisions regarding a radio license management process. This tool was based on data generated by the frequency management system and the automated spectrum management system; these data were processed, analyzed, and displayed in a dynamic and interactive form on a dashboard to ease the task of decision-making for the executives in charge.

Therefore, it is important for companies to make better use of their information through better management and use of the tools offered by BI. As indicated by the analyses of previous research, there are numerous benefits of BI, and they will help determine the success of companies in an increasingly competitive and demanding world. The purpose of this study is to highlight all the work that has been done on the use of BI in various companies that make their decisions based on their own information.

Methodology

a. Systematic Literature Review

An SLR was used in this study. This research method is characterized by an exhaustive review of articles on a given subject, which is BI in this case. These documents are then evaluated, analyzed, and synthesized to arrive at a rational deduction of the information related to BI.

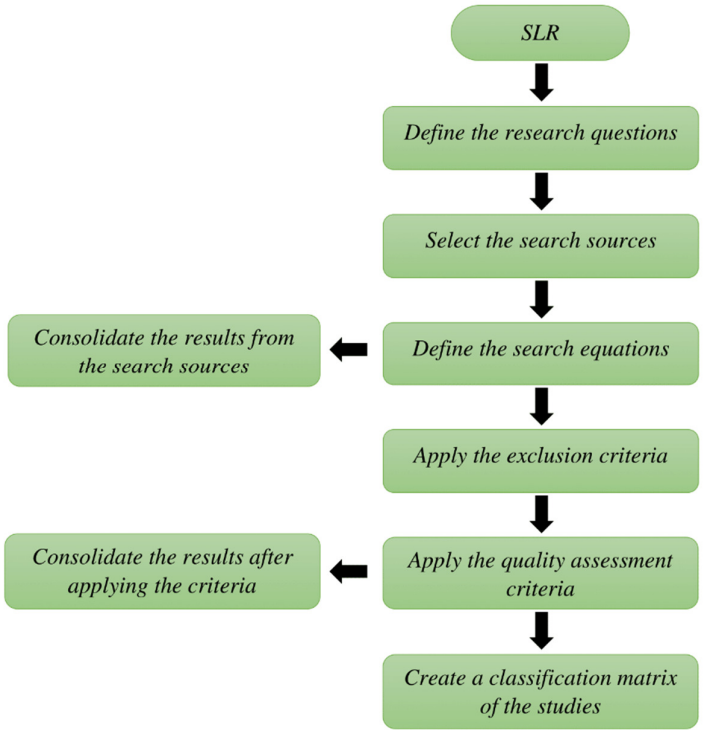

Fig. 1: Flowchart of SLR

b. Research Questions

Table 1 lists the research questions that are answered through the analysis of the articles selected in this study regarding BI for decision-making.

Table 1: Research questions

Research Question	Motivation
RQ1: How effective is BI in decision-making?	Determining the effectiveness of BI in decision-making.
RQ2: In what areas has BI been applied?	Determining the areas in which BI has been applied.
RQ3: What are the quality and security standards for the development of BI?	Defining the quality and security standards for the development of BI.
RQ4: What types of tools or techniques support the improvement of BI?	Delimiting the tools or techniques that support the improvement of BI.

c. Search Sources

Ten of the most popular academic databases were used to select the scientific articles for analysis.

- Scopus
- IEEE Xplore
- Springer Link
- Google Scholar
- Science Direct
- Dialnet
- DOAJ
- Taylor & Francis Online
- Microsoft Academic
- EBSCOhost

d. Search Equations

Various academic search engines have a defined search structure with which articles regarding a given topic can be precisely obtained. For this purpose, the following equations were defined.

Table 2: Search equations

Source	Search Equations
Scopus	ALL ("Business Intelligence") AND ALL ("Data Warehouse") AND ALL ("Desicion Making") OR ("Methodology")
IEEE Xplore	((("All Metadata":Business Intelligence) AND "All Metadata":Decision making) OR "All Metadata":Ralph Kimball)
Springer Link	"Business-Intelligence" AND "Decision-Making" AND (Methodology OR Method OR Model)
Google Scholar	"Business-Intelligence" AND "Data-Warehouse" AND "Decision-Making" AND (Methodology OR Method)
Science Direct	("Business Intelligence" AND "Decision Making") AND ("Data Warehouse" OR "Kimball")
Dialnet	("Business Intelligence"-"Ralph Kimball") AND ("Decision Making" OR "Data Warehouse")
DOAJ	"Business Intelligence": "AND", "Decision Making"
Taylor & Francis	[All: Business Intelligence] AND [All: Data Warehouse] AND [All: Decision Making]
Microsoft Academic	"Business Intelligence" AND "Decision Making"
EBSCOhost	((Business Intelligence) AND (Decision Making) OR (Ralph Kimball)) AND (Methodology)

e. Consolidated Number of Results According to Source

After applying the search equations, a significant number of scientific articles, which are depicted in Fig. 2, were selected from each source:

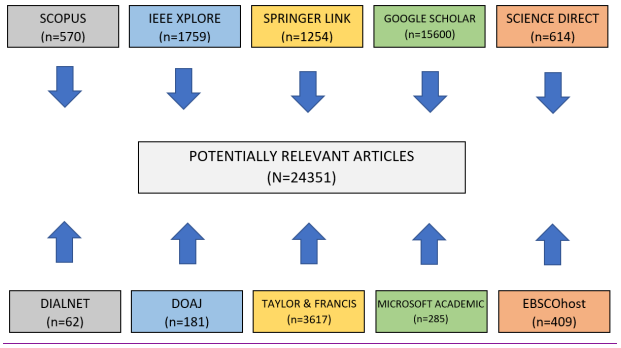

Fig 2. Consolidated matrix of the number of results

f. Exclusion Criteria

Table 3 lists the exclusion criteria for selecting the most suitable articles and discarding the remaining.

Table 3: Exclusion criteria

No.	Exclusion Criteria	Does it comply?
EC1	The articles are not less than 5 years old OR	✔
EC2	The articles are not written in English OR	✔
EC3	The articles do not present a methodology in the research OR	✔
EC4	The articles do not propose a BI solution OR	✔
EC5	The articles do not contain any keywords related to the research OR	✔
EC6	The articles have not been cited by other authors OR	
EC7	The authors of the articles have not worked with the sample unit OR	
EC8	The articles have not addressed all the questions OR	
EC9	The articles do not present correct measurements of the indicators.	

g. Consolidated Number of Results after Applying Criteria

Fig. 3 shows the number of articles excluded according to each exclusion criterion, leaving a final total of 108 articles.

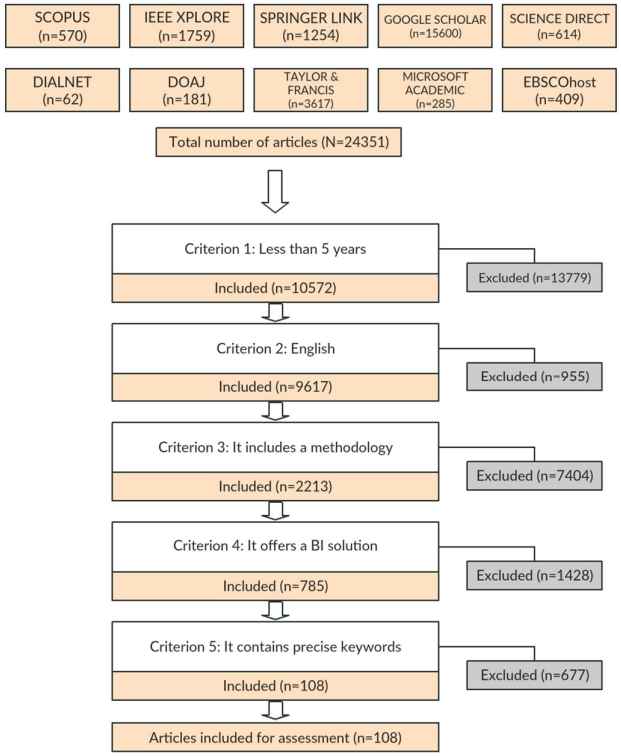

Fig. 3: Consolidated graph of results after applying exclusion criteria

h. Criteria for Evaluating the Quality of the Studies

In addition to the exclusion criteria, six quality criteria were formulated to assess the selected scientific articles.

Table 4: Quality criteria

No.	Quality Assessment Criteria	Does it comply?
QA1	Does the article have a well-organized and well-described structure?	✔
QA2	Is the article relevant to our research?	✔
QA3	Are the references of good quality?	✔
QA4	Is the purpose of the research clearly explained in the article?	✔
QA5	Are the research findings clearly explained in the article?	✔
QA6	Does the article describe the limitations or validity of the results?	✔

All the 108 selected articles fully complied with the quality criteria. This ensured that they would provide the necessary information for the development of this study.

i. Mendeley Reports of the Classified Studies

Mendeley was used to store and generate reports of the 108 articles selected for this study.

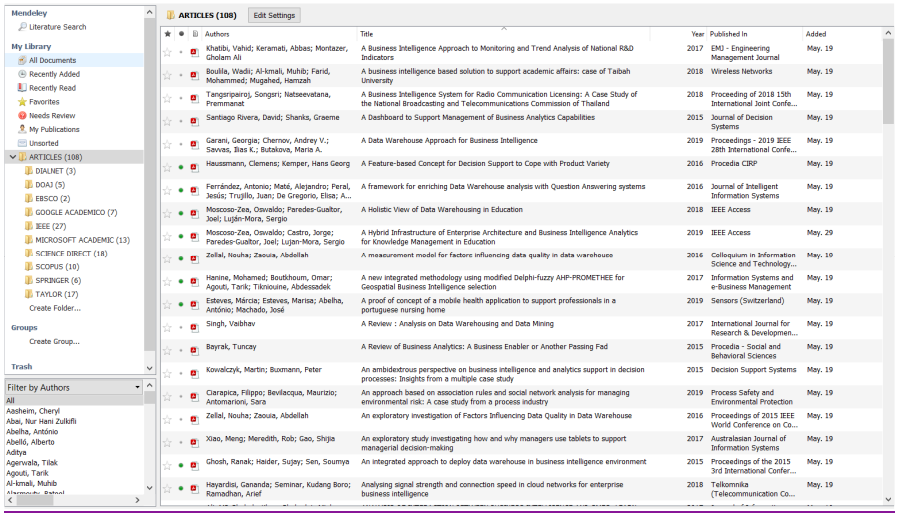

Fig. 4: Mendeley report

Results

The questions posed in this study were answered after the SLR of the 108 selected studies was completed.

RQ1: How effective is BI in decision-making?

The effectiveness of BI in decision-making can be determined by reviewing the benefits of its implementation in the various scientific studies analyzed in this work. Many authors claimed that BI is the best solution to problems related to information in organizations; BI with its diverse tools can benefit decision-making in the following ways:

- Creation of strategic edge;
- Improvement in data quality;
- Time reductions;
- Reduction in operating costs.

The authors Wieder and Ossimitz (2015) established that BI must be a priority for executives who use information technologies to improve the quality of their decisions. To demonstrate this, they conducted an extensive analysis of the effectiveness of BI in decision-making and surveys involving senior managers in Australia. Their studies provide clear and concise evidence on the effectiveness of BI in management decision-making.

Zellal and Zaouia (2016) investigated the factors that influence the quality of information when designing a data warehouse, which is a fundamental tool of BI. The determined factors include a misunderstanding of business requirements, the selection of unsuitable tools that do not fit the company, not having a development methodology (such as the Ralph Kimball methodology), and failures in the

ETL process. These authors also indicate the methods and quality standards that must be applied to correct these errors and improve the quality of data in any BI project aimed at optimal decision-making. In his research work Tanphet and Wanchai (2018) implemented BI using the Ralph Kimball methodology at CAT Telecom in Thailand, to prepare a maintenance plan for their equipment, such that repairs could be performed in advance. A strategic advantage was generated by reducing operational costs and saving planning time, owing to the correct decision-making of the company managers, who used the BI solution proposed by the authors.

Table 5 lists the benefits of BI in decision-making, when implemented in a company, as mentioned in the selected articles.

Table 5: Benefits mentioned in the articles

Benefits	Qty.	%
Cost Reduction	13	11
Data Quality	55	46
Strategic Edge	39	33
Time Reduction	12	10

RQ2: In what areas has BI been applied?

After analyzing the various scientific articles selected in this study, it was found that BI has been applied in various areas. It is sufficient for a company or institution to generate its own information, as this can be used by BI tools, regardless of the type of source.

In his paper Combita et al. (2020) designed a BI government framework for the Universidad de la Costa to strengthen organizational culture, data management, data analysis, and institution management. This solution allowed for effective controls that guaranteed the success of the university's BI projects. According to the authors, this tool can be replicated in any public or private university that wants to ensure its strategic objectives.

The authors Kao et al. (2016) applied a BI solution named Hospital Business Intelligence System in a clinic in Taiwan; this approach aimed to improve decision-making in hospitals by facilitating medical management indicators. The developed tool managed to maximize the value of the clinic and improve administrative management. Furthermore, the use of BI is increasing in various fields, and more organizations are beginning to understand that their best asset is information and BI can provide the tools to exploit such information to the maximum possible extent.

Table 6 presents all the areas where BI has been implemented, which were determined based on the analyzed studies.

Table 6: Areas where BI has been implemented

Areas	Qty.	%
Bank	14	10
Enterprise	54	38
Hospital or Medic	15	10
Industry	36	25
Telecommunication	7	5
University	17	12

As shown in the table, BI is most widely used in enterprises, which represent 38% of the total areas, and telecommunication accounts for only 5%.

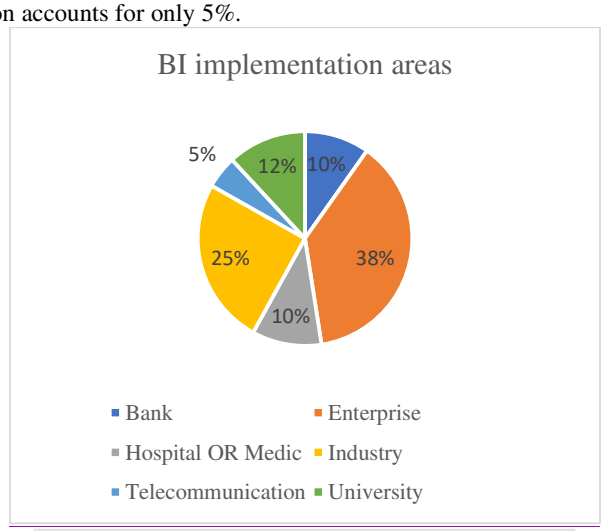

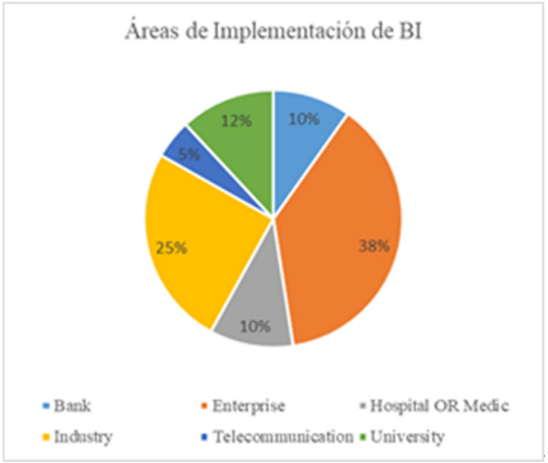

Fig. 5: Implementation areas according to percentage

Among the total number of articles referring to any area where BI has been implemented, it was found that 38% refers to enterprises in general, 25% refers to industries, followed by 12% to universities and 10% to both medical sectors and banks.

RQ3: What are the quality and security standards for the development of BI?

The efficiency of a BI solution depends on factors such as the quality of the solution, for which development standards have been defined. Various authors, including Zella and Zaouia (2016), studied the factors that influence data quality when developing a data warehouse; ISO 25012 (2008) is a factor that enables quality control of data. This prevents information deficiencies such as bad analysis of business requirements, incorrect key performance indicators, wrong measurements, poorly debugged data, poor ETL processes, poor choice of development tools, and inexperience of the team in charge of data warehouse development.

According to Brichni et al. (2017) the ISO standard criteria that help data meet quality standards are accuracy, ability to learn, ease of use, operability, maintenance, portability, and accessibility. Another factor to take into account is information security; data is the asset of a company, and the use of encryption algorithms should be considered to protect the information when developing a data warehouse, while striving to not impair the performance and scalability of the BI project. According to Chandra and Gupta (2018) For the purpose of information security, Bi should be developed with a focus on three aspects: confidentiality, availability, and integrity of data.

Table 7 and Fig. 6 help reinforce this response by providing consolidated insight into the quality and security standards found in the 108 studies reviewed.

Table 7: Quality and security standards for the development of BI

Standards	Qty.	%
Data Security	20	27
Quality Guidelines	8	11
Quality of Development	45	62

Both the table and the figure show that the most widely used standard in BI is quality of development, which represents 62% of all the standards and is the most important in majority of the studies; quality guidelines represent 11% and used the least when compared with all other standards.

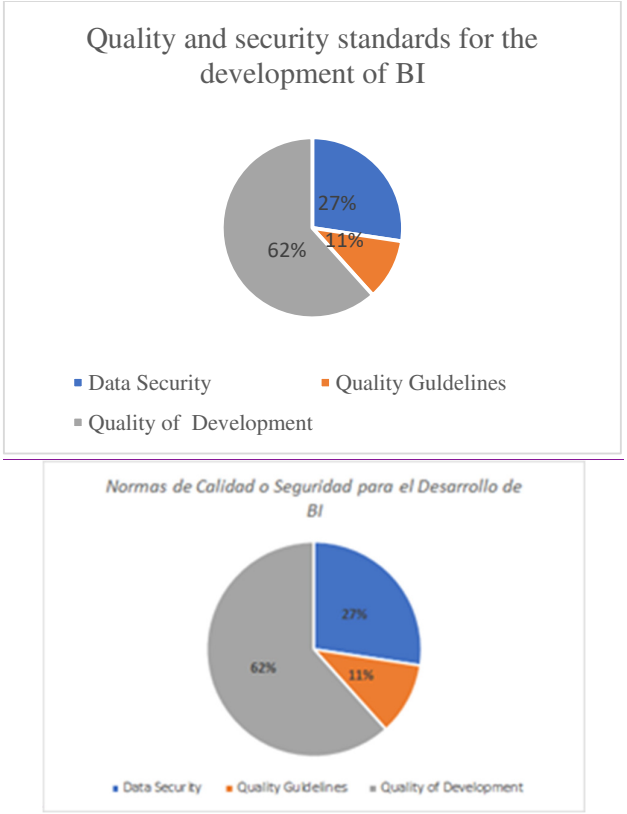

Fig. 6: Quality and security standards for the development of BI according to percentage

RQ4: What types of tools or techniques support the improvement of BI?

The authors cited in this study used several tools and techniques to improve their BI solutions; the most widely used ones in the 108 studies were as follows.

- Dashboard
- Data Warehouse
- QlikView
- Pentaho
- Power BI
- Data Mining
- Big Data
- Data Analytics
- Cloud Computing

One of the most important tools that help in decision-making is dashboard; Rivera and Shanks (2015) reported that this is a monitoring tool that aims to provide decision makers with information that is relevant, consolidated, and easy to access, as the information is presented visually with the help of graphics, tables, colors, and notations. The author Șerbănescu (2017) conducted a study on the QlikView tool and the way in which it supports improved decision-making. This tool provides ease of implementation and improved workflow compared with OLAP, lower investment costs than those of other BI solutions, fast response owing to its powerful processing algorithm, and enormous flexibility as it does not require a database.

BI also relies on techniques such as data mining or big data to make its results more effective. In his research work Singh (2017) mentioned that data mining serves as a decision-making support system alongside BI because of its ability to extract and analyze data from large datasets. Balachandran and Prasad (2017) indicated that big data has been used in BI projects when the volume of data is considerably large for data warehouses.

Table 8 lists all the tools or techniques that were used by the authors of the analyzed studies:

Table 8: Tools or techniques that increase the effectiveness of BI

Tools	Qty.	%
Big Data	49	15
Cloud Computing	14	4
Dashboard	34	10
Data Analytics	54	16
Data Mining	56	17
Data Warehouse	72	21
Pentaho	9	3
Power BI	44	13
QlikView	5	1

Discussion

As the results of the questions posed in this study are obtained, the results are discussed. The effectiveness of BI was determined based on the benefits reported by the authors of the reviewed studies;

these were mentioned as achievements in their BI projects. Furthermore, because of the effectiveness of BI, the authors used it in various areas where the use of information does not satisfy the desires of the users. The results of this study demonstrate the importance of following a development methodology that ensures the quality and security standards of a project. It is important to know what types of BI tools or techniques should be used, depending on the business needs, as all tools or techniques are not ideal for a given scenario. The results also show that the data require a special treatment to ensure that BI provides true and reliable information, because flawed BI projects would lead to financial and operational losses for the organizations.

Evidence from this study suggests that BI is a good choice when there are flaws in an organization's decision-making. The decision of selecting the best method to implement in a company is left to the discretion of the professionals as they have to consider the existing development methodologies, tools and techniques that support it, and quality and security standards. All of these aspects require a proper analysis and knowledge of the company in which the BI solution is to be implemented. This study is consistent with the one conducted by Sangupamba et al. (2015) because of the manner in which the SLR was used to determine the interest of the researchers regarding BI and analyze all the studies that can resolve the various questions posed, thereby producing a wide range of results.

Conclusions and Future Research

In this study, an SLR was used in which studies from 2015 to 2020 were analyzed. With the help of 10 academic search engines, search equations that initially provided 24351 articles were formulated and a series of exclusion and quality criteria were applied to finally yield 108 articles. This SLR successfully answered the questions posed in this study, and the findings allowed the identification of the manners in which BI can be implemented to improve decision-making in organizations. Several benefits were determined, including strategic advantages, data quality improvement, time reduction, and reduction of operating costs, thereby demonstrating the effectiveness of BI. Education, medical, and banking sectors are some of the areas in which BI is being implemented more frequently owing to the amount of data they generate, manage, and benefit from. This study also showed that it is convenient to follow development standards for BI solutions. Factors that ensure quality and security in BI were also determined. For this purpose, a development methodology must also be followed; Kimball and Inmon's methodologies were found to be the most widely used. Moreover, it was shown that BI relies on various techniques and tools such as dashboard, data warehouse, data mining, and big data software that help improve the effectiveness. Finally, the articles that support the results of this study pertain to the most active authors on the subject and the most important search sources.

This study has some limitations such as the fact that it was completed using articles found over a period of 5 years, thus placing a restriction on time. New methodologies, tools, and techniques may create new BI paradigms, and these will require further investigation. For future studies, it is recommended that articles published within a period of 3 years be used to obtain the most recent trends in BI. This can provide researchers with new concepts and contribute to the development of BI.

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Motivations for Customer Engagement Due to Consumer Innovativeness

Paweł BARTKOWIAK
Poznań University of Economics and Business, Poznań, Poland
pawel.bartkowiak@ue.poznan.pl

Szymon MICHALAK
Poznań University of Economics and Business, Poznań, Poland
szymon.michalak@ue.poznan.pl

Abstract

The main goal of the paper is to identify the differences in customer engagement motivation due to the level of consumer innovativeness and advance knowledge regarding motives of consumer engagement. The research part of the paper presents the characteristics of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration, identification of statistically significant differences between these segments regarding motivational factors, definition of criteria for segmentation of the research population in terms of customer engagement motivation and the relationship between those segments and segments based on innovative predispositions. The study was conducted by means of direct interviews using an interview questionnaire, on a sample of 795 inhabitants of the Poznań agglomeration and its results indicate that material motivation for engagement in value co-creation is far more important than intangible motivation.

Keywords: consumer innovativeness, customer engagement (CE), consumer behaviour, value co-creation, motivation, consumer segmentation

Introduction

Most product innovations introduced to the market are not accepted by customers. To prevent this, companies increasingly engage their stakeholders, primarily customers, in value co-creation. For a long time now, customers are no longer just passive recipients of a company offer, but participate in its co-creation or are even the initiators of its creation. Customer engagement (CE) can take many different forms and is not limited to interactions between the client and the company. The development of information technologies, including social media in particular, enhances the ability of consumers to influence each other's behaviour. Gaining and maintaining a competitive advantage through consumer engagement requires understanding the reasons why customers participate in those types of behaviour.

This paper is a continuation of the previous paper, the aim of which was to identify the relationship between consumer innovativeness and customer engagement. For the purposes of that paper a segmentation of consumers based on their innovative predispositions was performed (Bartkowiak and Michalak, 2020b). The purpose of this paper is to determine the extent to which the drivers of consumer engagement differ across the four previously identified consumer segments and which of these factors are the most important.

Motivations for consumer engagement behaviour

We discussed the different views on the concept of consumer innovativeness and its importance when it comes to innovation adoption in our previous paper. We would like to point out that consumer innovativeness is a personality trait, however the new product adoption is depended (among other factors) on a product category. Moreover, the results of our study confirmed the hypothesis of the existence of a clear relationship between consumer innovativeness and customer engagement (Bartkowiak and Michalak, 2020b).

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For a long time the management of consumer relationships has been a top priority for companies all over the world, with increasing interest of non-transactional behaviour (Verhoef, Reinartz and Krafft, 2010). With the emergence of digital era and increasingly networked society, engaging customers has become a strategic imperative for marketers (Rasool, Shah and Ul Islam, 2020). Despite the fact, that scholars (e.g. McEwen, 2004; Patterson, Yu and de Ruyter, 2006; Bowden, 2009; Van Doorn et al., 2010; Brodie et at., 2011; Hollebeek, 2011; Vivek, Beatty and Morgan, 2012; Jaakkola and Alexander, 2014; Harmeling et al., 2017; Pansari and Kumar, 2017) and practitioners have been paying attention to the concept of consumer engagement for many years, there is a lack of unanimity in defining the term in question. The differences in views are also visible regarding the scope of consumer engagement behaviour. For some authors it covers all consumer behaviours towards the company (Kumar et al. 2010) and for other researchers only those behaviours that go beyond the transaction (Van Doorn et al. 2010). Consumer engagement can take various forms e.g.: engaging in cocreation activities for new product development, word-of-mouth (WOM), helping other customers, blogging, recommendations, writing reviews, complaints or engaging in legal action (Van Doorn et al., 2010; Bijmolt et at., 2010). In our view, consumer engagement can be both transactional and non-transactional (Kumar and Reinartz, 2016), positive or negative (Van Doorn et al., 2010) behaviour, can be initiated by both customers (current and potential) and companies (Vivek, Beatty and Morgan, 2012), both in the real world and in a virtual environment (Brodie et al., 2013) and plays a central role in the process of value co-creation (Piligrimiene, Dovaliene and Virvilaite, 2015).

Over more than a decade, many studies were conducted to better understand the motivations for consumer engagement behaviour in e.g.: co-creation process (Martínez-Cañas et al., 2016), co-creation innovation activities (Roberts, Hughes and Kertbo, 2013), co-creation in the new product development (NPD) process (Hoyer et al., 2010), co-production (Etgar, 2007), co-creation of professional and generic services (Neghina et al., 2017), co-creation of brand identity (Kennedy and Guzmán, 2016), virtual co-creation / online co-creation activities (Füller, 2010; Constantinides et al., 2015), co-creation communities / online co-innovation communities (Nambisan and Baron,2009 ; Zhang, Kandampully and Bilgihan, 2015; Fernandes and Remelhe, 2016; Ind, Iglesias and Schultz, 2013; Ind, Coates and Lerman, 2019; Claffey and Brady, 2017), electronic word of mouth (e-WOM) (Strutton, Taylor and Thompson, 2011; Hussain et al., 2018; Cui et al., 2014; Belarmino and Koh, 2018, Sohaib et al., 2018; Vilnai-Yavetz and Levina, 2018), brand-related activities in social media (Kim and Drumwright, 2016; Azar et al., 2016; Osei-Frimpong, 2019; Enginkaya and Yılmaz, 2014) and others. It should be emphasized that motivations differ across various forms of consumer engagement (Roberts, Hughes and Kertbo, 2013). Consumers could engage in co-creation projects because of their intrinsic motives (e.g. fun, kinship, altruism), internalized extrinsic motives (e.g., learning, reputation, and own use) or/and purely extrinsic motives (e.g. payment and career prospects) (Füller, 2010). Furthermore, most consumers are motivated by a combination of intrinsic and extrinsic motivation (Fernandes and Remelhe, 2016).

Hoyer et al. (2010) classified motivators of cocreation into financial, social, technical, and psychological factors. Etgar (2007) grouped drivers that encourage consumers to engage in co-production into: economic, psychological and social drives. Kennedy and Guzmán (2016) identified five main factors of consumer motivation for engaging in co-creation of brand identity: social (peer pressure, popularity, trend and social status), fun (entertainment and excitement), brand identification (similar values and social responsibility), communication appeal (appeal, advertising) and brand commitment (brand loyalty and brand recognition). (Füller, 2010) divided motives for engaging in co-creation projects into several categories: intrinsic playful task, curiosity, altruism – community support, making friends, self-efficacy, information seeking, skill development, recognition-visibility, personal need-dissatisfaction and compensation-monetary rewards. Constantinides et al., (2015) categorized customer motives for participating in online co-creation activities into: learning benefits, social integrative benefits, personal integrative benefits and hedonic benefits. Claffey and Brady (2017) identified five motivational drivers of consumer engagement related to hedonic, utilitarian, social integrative, personal integrative needs and personal self-enhancement needs. Zhang, Kandampully and Bilgihan (2015) proposed three major motivations for customer engagement in online co-innovation communities: brand equity, sense of community and monetary incentive. Fernandes and Remelhe (2016) research on customers' motivations as drivers of engagement in collaborative innovation has

shown that financial motives were far less important than intrinsic motives, knowledge motives and social motives. Nambisan and Baron (2009) distinguish four categories of benefits from participation in virtual customer environments: learning benefits (the most important ones), social integrative benefits (the least important ones), personal integrative benefits, and hedonic benefits. A study conducted by Vilnai-Yavetz and Levina, (2018) has shown that altruism (an intrinsic motive) for social sharing e-business content was more frequently reported than financial incentives and recognition from other SNS users (extrinsic motives). Osei-Frimpong (2019) conducted research regarding consumer motivations in online social brand engagement participation and divided the motivational factors into 5 categories: autonomy-oriented (intrinsic) motivation, integrated regulation, identified regulation, introjected regulation and external regulation. Enginkaya and Yılmaz (2014) identified five distinct motivation factors of consumer engagement with brands through social media: brand affiliation, conversation, entertainment, investigation and opportunity seeking, which turned out to be the highest motivation of consumers to interact with brands over social media. Whereas Azar et al. (2016) proposed five main consumer motivations to interact with brands through social media (Facebook): social influence, search for information, entertainment, trust and reward. Their research indicate that the two most important ones were the motivation to search for information and reward motivation. The analysis of the literature showed that the results of studies conducted by other authors are ambiguous and vary depending on the form of customer engagement. On the one hand, financial (material) motives turned out to be very important in the context of interactions with brands via social media, but on the other hand, they turned out to be least significant when it comes to e.g. engagement in collaborative innovation or social sharing e-business content.

As it has been shown, research on the motivation of consumer engagement has a wide subject scope. Based on an integrative literature review Martínez-Cañas et al., 2016 categorized consumers' motives for participating in co-creation processes into eight categories: (1) financial rewards, (2) career advancement, (3) acquiring social capital, personal relationships, and identity construction, (4) access for social standing and renown, (5) self-esteem, self-efficacy, and self-expression, (6) learning, (7) hedonic motivations, (8) altruistic desire to contribute. The variables used in the research carried out for the purposes of this paper covered all of those categories.

Research Design

The analysis is based on the results of empirical research conducted in the first half of 2019 among the inhabitants of the Poznań agglomeration – the direct interview technique (face to face interviews) was used. The areas of empirical research included: respondents – inhabitants of the Poznań agglomeration, subject – evaluation of innovativeness and customer engagement, spatial – the Poznań agglomeration, and temporary – the first half of 2019. In the process of selecting the sample for the study, a quota selection was used, in which it is assumed that the study is representative if the sample structure is consistent with the structure of the studied population. The comparison of the structure of the research sample and the general population is presented below (table 1).

Table 1: Comparison of the studied population and the research sample

		RESEARCH POPULATION				RESEARCH SAMPLE			
		inhabitants		Structure		respondents		structure	
	age	female	male	female	male	female	male	female	male
cities of the Poznań agglomeration	<29	11274	11457	1.4%	1.4%	11	9	1.4%	1.1%
	30-49	20741	20000	2.5%	2.4%	22	21	2.8%	2.6%
	50+	30335	22454	3.7%	2.8%	29	23	3.7%	2.9%
villages of the Poznań agglomeration	<29	17773	17855	2.2%	2.2%	17	17	2.2%	2.1%
	30-49	34952	34168	4.3%	4.2%	34	30	4.2%	3.8%
	50+	39383	31441	4.8%	3.8%	37	28	4.6%	3.5%

the city of Poznań	<29	50665	48309	6.2%	5.9%	56	48	7.0%	6.0%
	30-49	80009	77352	9.7%	9.5%	79	76	10.0%	9.6%
	50+	162023	108809	19.8%	13.3%	157	101	19.8%	12.8%
		447155	**371845**	**Sum**	**100.0%**	**442**	**353**	**Sum**	**100.0%**
		Sum	**819000**			**Sum**	**795**		

Source: Based on Statistics Poland and own study.

The size of the research sample was 795 observations (N = 795). The set of quota selection criteria includes: gender, age and place of residence of the respondents. In the process of analysing the results of empirical research, the IBM SPSS Statistics tool was used, which allowed the analysis of the statistical description, correlation analysis and the analysis of variance. Additionally, it should be emphasized that the presentation of the obtained results is a continuation of previous publications that allowed for identification of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration (Bartkowiak and Michalak, 2020b) and components of motivation related to customer engagement (Bartkowiak and Michalak, 2020a).

In the case of innovative predispositions four segments were identified:[1]

1. the hybrid segment (SI1) in which the combination of pro-innovative, orthodox and conservative predispositions is high,
2. the pro-innovation segment (SI2) in which the pro-innovative predisposition is high,
3. the orthodox and conservative segment (SI3) in which the orthodox and conservative predisposition is high,
4. the neutral segment (SI4) in which the combination of pro-innovative, orthodox and conservative predispositions is low.

The table below shows the characteristics of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration (table 2).

Table 2: Characteristics of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration

Segments characteristics (%)		**SI1**		**SI2**		**SI3**		**SI4**		**Total**	
		↕	↔	↕	↔	↕	↔	↕	↔	↕	↔
Gender	Female	45.4	10.0	51.6	28.7	62.6	47.3	52.5	14.0	55.6	100.0
	Male	54.6	15.0	48.4	33.7	37.4	35.4	47.5	15.9	44.4	100.0
	Total	100.0	12.2	100.0	30.9	100.0	42.0.	100.0	14.8	100.0	100.0
Age	<29	27.8	16.8	34.1	52.2	8.1	16.8	19.5	14.3	20.3	100.0
	30-49	35.1	13.0	47.6	44.7	21.9	27.9	32.2	14.5	33.0	100.0
	50+	37.1	9.7	18.3	12.1	70.1	62.9	48.3	15.3	46.8	100.0
	Total	100.0	12.2	100.0	30.9	100.0	42.0	100.0	14.8	100.0	100.0
Education	Primary + vocational school	16.5	10.2	10.1	15.3	27.6	58.6	21.7	15.9	20.1	100.0
	Secondary school	56.7	17.5	40.9	30.8	37.5	39.7	33.0	12.1	40.3	100.0
	High school	26.8	8.4	48.9	37.4	34.8	37.4	45.2	16.8	39.6	100.0
	Total	100.0	12.4	100.0	30.3	100.0	42.6	100.0	14.7	100.0	100.0
Material status	Below national average	19.6	13.6	11.7	20.0	24.4	57.1	11.3	9.3	17.9	100.0
	National average	34.0	11.3	30.0	24.7	41.2	46.2	45.2	17.8	37.4	100.0
	Above national average	46.4	12.9	58.3	40.2	34.5	32.5	43.5	14.4	44.6	100.0

	Total	100.0	12.4	100.0	30.8	100.0	42.1	100.0	14.7	100.0	100.0

Legend:
SI1 – **hybrid segment**–pro-innovative (+), orthodox and conservative (+) predisposition
SI2 – **pro-innovation segment**–pro-innovation (+), orthodox and conservative (-) predisposition
SI3 – **orthodox and conservative segment**–pro-innovative (-), orthodox and conservative (+) predisposition
SI4 – **neutral segment**–pro-innovative (-), orthodox and conservative (-) predisposition

Source: Own research.

The analysis of the results by gender shows that most women belong to the orthodox and conservative segment (47.3%). On the other hand, in the case of men, the most numerous segments are: the pro-innovation (33.7%) and the orthodox and conservative (35.4%). On the other hand, the analysis of the results in terms of age shows that most respondents aged <29 (52.2%) and 30-49 (44.7%) belong to the pro-innovative segment, while the oldest (50+) respondents are mainly representatives of the orthodox and conservative segment (62.9 %). In the case of primary, vocational (58.6%) and secondary (39.7%) education, the orthodox and conservative segment is the most numerous, while people with higher education are most often belonging to the pro-innovative (37.4%) or orthodox and conservative (37.4%) segments. The last factor differentiating the respondents' affiliation to the identified segments is their material status. People who assessed their material status below (57.1%) or at national average level (46.2%) most often belong to the orthodox and conservative segment, while people with material status above the national average most often belong to the pro-innovative segment (40.2%).

Based on the results of the literature research and the characteristics of the distinguished segments (age, education level, level of affluence), we put forward two research hypotheses:

H1. The intangible motivation for participation in customer engagement is higher in the group of consumers with a higher level of innovativeness.

H2. Material motivation for participation in customer engagement is higher in the group of consumers with a lower level of innovativeness.

Results

The next step in the research procedure was the comparison of average values of motivational factors of the segments based on innovative predispositions of the inhabitants of the Poznań agglomeration (table 3).

Table 3: Comparison of average values of motivational factors of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration

Motivational factors	Total average	segment SI1 | SI2 | SI3 | SI4	ANOVA
1. financial benefits	4.11	$4.11^1 < 4.31^2 > 4.01^1 \approx 3.95^1$	4.876**
2. discounts, freebies, product samples	4.09	$4.00^1 < 4.26^2 > 4.02^1 \approx 4.01^1$	3.435*
3. gaining experience - developing one's competences	3.20	$3.69^2 \approx 3.59^2 > 2.84^1 \approx 3.01^1$	23.393***
4. satisfaction, recognition, self-esteem	3.21	$3.48^2 \approx 3.41^2 > 2.99^1 \approx 3.16^1$	7.620***
5. new business and (or) private relationships and contacts	3.19	$3.46^3 \approx 3.71^3 > 2.76^1 < 3.06^2$	27.600***
6. identifying with the company, being part of the organization	2.69	$3.22^3 > 2.93^2 > 2.44^1 \approx 2.46^1$	17.024***
7. the prospect of permanent cooperation with the company	2.93	$3.36^2 \approx 3.38^2 > 2.54^1 \approx 2.74^1$	27.707***
8. career opportunity	3.02	$3.52^2 \approx 3.46^2 > 2.63^1 \approx 2.78^1$	26.090***
9. impact on the development or modernization of the company's offer	2.82	$3.24^2 \approx 3.22^2 > 2.50^1 \approx 2.51^1$	24.024***
10. participation in the promotion of the company's offer	2.70	$3.19^2 \approx 3.09^2 > 2.40^1 \approx 2.28^1$	27.972***
11. adjusting the company's product to one's own needs	3.30	$3.44^2 \approx 3.61^2 > 3.11^1 \approx 3.09^1$	10.571***

12. access to market news, product testing	3.21	$3.46^2 < 3.84^3 > 2.82^1 \approx 2.80^1$	43.168***
13. altruistic participation	2.30	$2.92^2 > 2.18^1 \approx 2.24^1 \approx 2.19^1$	10.321***
SI: 1–hybrid, 2–pro-innovation, 3–orthodox and conservative, 4–neutral segment Test post hoc – S-N-K Student-Newman-Keuls Significance levels (p values): ***p≤0.001, **p≤0.01, *p≤0.05			

Source: Own research.

The analysis of the results presented in the table 3 allows for the identification of several regularities. First, the importance of material benefit motivators is highest in the pro-innovation segment and overall. Secondly, the importance of intangible benefits motivators is most often highest in two segments: the hybrid segment and the pro-innovation segment. Third, the importance of the motivators related to altruistic participation in customer engagement is the highest in the hybrid segment. The orthodox and conservative segment is the least motivated to participate in customer engagement. The motivation of the respondents from the neutral segment is also low, except for the fifth variable related to new business or private relationships and contacts.

In terms of motivational components of the inhabitants of the Poznań agglomeration the results of exploratory factor analysis (EFA) allowed for the identification of two components (Bartkowiak and Michalak, 2020a). The first component is related to material motivation – it consists of variables 1.financial benefits and 2.discounts, freebies, product samples. The second component is related to intangible motivation – it consisted of variables 3.gaining experience, 4.satisfaction, recognition, self-esteem, 5.new business and (or) private relationships and contacts, 6.identifying with the company, 7.the prospect of permanent cooperation with the company, 8.career opportunity, 9.impact on the development or modernization of the company's offer, 10.participation in the promotion of the company's offer, 11.adjusting the company's product to one's own needs and 12.access to market news, product testing.

The comparison of average values of motivational components of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration (table 4).

Table 4: Comparison of average values of motivational components of segments based on innovative predispositions of the inhabitants of the Poznań agglomeration

Motivational components – Exploratory Factor Analysis results	Total average	segment SI1 | SI2 | SI3 | SI4	ANOVA
Component 1 – material motivation	4.10	$4.06^1 < 4.29^2 > 4.02^1 \approx 3.98^1$	4.979**
Component 2 – intangible motivation	3.03	$3.41^2 \approx 3.42^2 > 2.71^1 \approx 2.79^1$	36.110***
SI: 1–hybrid, 2–pro-innovation, 3–orthodox and conservative, 4–neutral segment Test post hoc – S-N-K Student-Newman-Keuls Significance levels (p values): ***p≤0.001, **p≤0.01, *p≤0.05			

Source: Own research.

The obtained results clearly show that the importance of material motivation is the highest in the pro-innovation segment. It does not support H2 which stated that material motivation for participation in customer engagement is higher in the group of consumers with a lower level of innovativeness. On the other hand, the importance of intangible motivation is high at the same time in the pro-innovation and hybrid segments. It supports H1 which stated that intangible motivation for participation in customer engagement is higher in the group of consumers with a higher level of innovativeness. The respondents' motivation to participate in customer engagement is the lowest in the orthodox and conservative or neutral segments.

In order to deepen the obtained results the criteria for segmentation of the respondents due to their customer engagement motivation were defined. Due to the range of the used measuring scale <1.5>, it was assumed that respondents representing a given type of motivation (material or intangible) are qualified entities for which the value of a given component is greater than 3.00 ($Comp_{(n)}>3.00$). Otherwise, when the value of this component is less than or equal to 3.00 ($Comp_{(n)}\leq 3.00$), the

respondents are not treated as representatives of the extracted type of motivation. Based on the results of the exploratory factor analysis and the assumptions made, the population of respondents was divided into four segments (table 5).

Table 5: Criteria for segmentation of the inhabitants of the Poznań agglomeration based on customer engagement motivation

Components	Component value	Segments			
		SM1	SM2	SM3	SM4
M1. material motivation	+ (Comp1 > 3.00) – (Comp1 ≤ 3.00)	+	+	–	–
M2. intangible motivation	+ (Comp2 > 3.00) – (Comp2 ≤ 3.00)	+	–	+	–
	Sum N=100%	48.7%	35.5%	4.2%	11.6%

Legend:
SM1 – **holistic motivated segment** – material (+), intangible (+) motivation
SM2 – **material motivated segment** – material (+), intangible (–) motivation
SM3 – **intangible motivated segment** – material (–), intangible (+) motivation
SM4 – **unmotivated segment** – material (–), intangible (–) motivation

Source: Own research.

In the identified segments, there is a different intensity of material and intangible motivation. In the case of the holistic motivated segment (which turned out to be the largest one) both the material and intangible motivation are high. In case of the material motivated segment (the second largest) the material motivation variables are high, in case of the intangible motivated segment other variables are high, in turn of the unmotivated segments the values of all variables are rather low. It should be noted that almost 90% of respondents manifests a high degree of motivation (material or intangible) for consumer engagement.

Identification of the segments based on innovative predispositions and based on customer engagement motivation allows to determine the dependencies between them. First, the correlation relationships between the identified segments were verified. For this purpose, the V-Cramer correlation was used, and the obtained result (V = 0.218***) confirms the existence of a statistically significant relationship. The characteristics of segments based on customer engagement motivation according to segments based on innovative predispositions (table 6).

Table 6: Characteristics of segments based on customer engagement motivation according to segments based on innovative predispositions

Customer engagement motivation (%)	Innovative predisposition								Total	
	SI1		SI2		SI3		SI4			
	↕	↔	↕	↔	↕	↔	↕	↔	↕	↔
SM1	67.0	16.9	68.7	43.9	33.2	28.8	35.1	10.4	48.7	100.0
SM2	15.5	5.3	20.7	18.1	49.1	58.4	44.7	18.1	35.5	100.0
SM3	8.2	24.2	4.5	33.3	2.4	24.2	5.3	18.2	4.2	100.0
SM4	9.3	9.8	6.1	16.3	15.3	55.4	14.9	18.5	11.6	100.0
Total	100.0	12.3	100.0	31.1	100.0	42.2	100.0	14.4	100.0	100.0

Legend:
SI: 1–**hybrid**, 2–**pro-innovation**, 3–**orthodox and conservative**, 4–**neutral segment**
SM: 1–**holistic motivated**, 2–**material motivated**, 3–**intangible motivated**, 4–**unmotivated segment**

Source: Own research.

The analysis of the results from the perspective of segments based on customer engagement motivation allows to indicate which segments based on innovative predisposition are most often represented among them. Accordingly:

- in the case of the holistic motivated segment (SM1), the most numerous group is the pro-innovation segment (SI2 – 43.9%), and then the orthodox and conservative segment (SI3 – 28.8%),
- in the case of the material motivated segment (SM2), the largest is the orthodox and conservative segment (SI3 – 58.4%), and then the pro-innovation (SI2 – 18.1%) or neutral segment (18.1%),
- in the case of the intangible motivated segment (SM3), the biggest is the pro-innovation segment (SI2 – 33.3%), and then the hybrid (SI1 – 24.2%) or orthodox and conservative segment (SI3 – 24.2%),
- in the case of the unmotivated segment (SM4), the most popular is the orthodox and conservative segment (SI3 – 55.4%).

A similar analysis can be made from the perspective of innovative predisposition segments. Accordingly:

- in the case of the hybrid segment (SI1), the most popular is the holistic segment (SM1 – 67.0%), the other segments are relatively small,
- in the case of the pro-innovation segment (SI2), the most often is the holistic segment (68.7%), the share of other segments is small,
- in the case of the orthodox and conservative segment (SI3), the most common is the material motivated segment (SM2 – 44.7%), and then the holistic segment (SM1 – 35.1%),
- in the case of the neutral segment (SI4), the greatest is the the material motivated segment (SM2 – 49.1%), and then the holistic segment (SM1 – 33.2%).

Conclusions

The aim of the paper is to identify the differences in customer engagement motivation due to the level of consumer innovativeness. The obtained results allow to indicate the characteristics the most pro-innovative consumers (included in the pro-innovation segment) – these are people up to 50 years old, with secondary or higher education, whose material status is above the national average. The most motivating factors for participation in CE are definitely material factors. The results of the conducted research allowed for the verification of the hypotheses. Hypothesis 1 was confirmed, while the results

did not support H2. The research shown that almost 90% of respondents manifests a high degree of motivation (material or intangible) for consumer engagement.

Practical Implications

The market success of an organization, understood as successfully introducing new products to the market, cannot take the form of a traditional, one-sided organizational process, but must take into account the requirements of various stakeholders, primarily consumers. The obtained results may be useful for companies that want to engage consumers to a greater extent in the value co-creation process and thus increase the chance of acceptance of the introduced product innovations. The results of the segmentation allow for matching appropriate motivational instruments to different groups of consumers. This is important as the results show a potentially high level of customer interest in engaging in value co-creation.

Limitations and Future Research

The study was not national in nature; hence its results can only be referred to inhabitants of the Poznań agglomeration. In the next stages of research, an interesting idea seems to be to examine the main barriers in engaging in value co-creation among the general population of Poland, as well as residents of other countries and comparing results internationally.

Endnotes

[1]The identified predispositions based on the results of exploratory factor analysis (EFA) (Bartkowiak and Michalak, 2020a):

1) component 1 – pro-innovation predisposition (variables: 1.seeking information and testing new products immediately; 3.taking risks associated with new products; 5.passive opinions on new products for the environment; 7.verifying new products earlier compared to the environment; 9.attitude of the leader of product innovation verification; 10.testing new products; 11.quick adaptation of new products; 12.active opinions on new products in the environment; 14.interest in technological innovations; 15.adaptation of market novelties; 16.searching for new market solutions; 18.broadening knowledge about new products; 21.seeking and collecting information about new products; 22.encouraging the environment to use new products; 23.regularly purchasing new products),

2) component 2 – orthodox and conservative predisposition (variables: 2.use of new products after verification by the environment; 4.expecting support from the environment in using new products; 6.use of tested products; 8.leaving verification of new products to the environment; 13.occurrence of barriers related to the use of new products; 17.use of proven market solutions; 19.distrust of new products; 20.late acceptance of product innovations).

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Utilization of The Border Guard of the Republic of Poland Preventing Covid-19 Spread

prof. dr hab. Bernard WIŚNIEWSKI

WSB University in Dąbrowa Górnicza, Dąbrowa Górnicza, Poland
bfwiśniewski@o2.pl

Abstract

In polish conditions, many formations are actively involved in preventing the spread of COVID-19, among which the Border Guard holds an important position. This formation struggles daily with numerous problems that call for theoretical support. Today, the greatest threats posed to the said formation are: terrorism, proliferation of weapons of mass destruction, organized international crime, uncontrolled migrations, economic crises, calamities of religious and ethnic origin, natural and ecological disasters, technical mishaps and failures, and pandemics which is of crucial important today. The problem situation outlined above was the basis for conducting research set to assess the effectiveness of the Border Guard in preventing the expansion of COVID-19. During the research, the method of source material analysis, synthesis, comparison, generalization, inference and abstraction have been used. The research resulted in a conclusion that the Border Guard is a kind of first state barrier to the spread of COVID-19. Due to the above, this formation, for the sake of its effectiveness, keeps improving the law regarding its functioning and organizational solutions resulting from mentioned regulations. The research also allowed to identify the causes, conditions and effects of the application of legal solutions, and defined recommendations for improving the use of Border formation in preventing the spread of COVID-19 in the future. simultaneously, these conclusions are general enough so that they may be used in both Polish conditions or other very similar.

Keywords: Threat, Security, Border Guard, Law, Management, Epidemic, COVID-19.

Introduction

Extraordinary threats are the most common phenomenon that endangers human life and health [1]. One of them may be infectious diseases [2].

The first two decades of the 21st century are the period of the emergence of new epidemics caused by human infectious diseases. In December 2019, the SARS-CoV-2 corona-virus, was identified for the first time in Wuhan, China. It bears responsibility for the ongoing epidemic of respiratory system infections causing COVID-19 disease.

Many state institutions got involved in minimizing the effects of the above introduced epidemic in the affected areas . Due to their properties and potential, the institutional circle should also include formations intended for the protection of the state border [3] and border traffic control [More: 4]. According to their purpose and tasks, their capability is built and maintained [5]. The main determinants of said potential are numbers and competences. Both determinants leave mark on the preparation of these formations to operate in conditions of extraordinary threats [More: 6].

The protection of the state border [7] is a multifaceted undertaking [8], requiring the organization of a complex administrative, political and sanitary enterprise, with varying degrees of rigors, endeavored by each sovereign state [9] aimed at prevention of illegal crossings of the state border [10] and unauthorized transport of certain goods [11], the introduction of which into the territory of

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Poland is prohibited [12] and prevention of the penetration of infectious diseases across the border [13].

Methodology

The main goal of the research was to augment knowledge about the effectiveness of the usage of the Polish Border Guard in preventing the spread of COVID-19, which is consistent with the assumptions of scientific research [14]. On the other hand, the specific objectives were:

- diagnosis of the currently used organizational and legal solutions regarding the operation of the Border Guard in a pandemic;
- definition of assumptions for the improvement of the use of this formation in conditions of idiosyncratic threats, based on the analysis and assessment of its functioning until present.

A system approach and a functional approach were used in the research. The first, hence the use of the Border Guard was analyzed in the context of activities executed by the components of one entity, interconnected within the state security system [15]. The second, due to the fact that the use of this formation was considered by defining its relations with institutions which perform similar functions under the law.

The theoretical methods have been used in the research [16], which in turn allowed to present the results of the scrutiny based mainly on the analysis of the legal provisions in force until the presence of COVID-19 in Poland was registered and those legal acts that were introduced extempore after this fact. They were also supplemented with analyzes of information relating to the effectiveness of the Border Guard's undertakings in preventing the escalation of COVID-19 and scientific literature. The investigation used conclusions from the scientific literature and the author's research conducted in 2005-2020.

Purpose of the Border Guard

A state is an organization governed by the law [more: 17]. Citizens and all components of the state are obliged to comply with this law [18]. This obligation is supervised by a specially appointed apparatus of state authority and administration. This property of the nation is connected with the necessity for its citizens to abide by the binding legal rules and with the possibility of enforcing the compliance with those regulations [19]. Pursuant to the provisions of the constitution of April 2, 1997, the Republic of Poland is a democratic state ruled by law, which is the common good of all citizens [20]. It should also be added that all activities of public authorities and administration [21] and state institutions [22] must result from the provisions of law and may not venture beyond them [23]. Failure to do so may lead to consequences that violate the level of safety expected and accepted by the society [24].

Guaranteeing security [More: 25] is the basic condition for the spiritual and material development of the entire group organized into the state and of human individuals living in that state [26; 27]. This task is affiliated to many state institutions. One of them is obviously the Border Guard [28], which is an unwavering, armed and uniformed formation supervised by the minister responsible for internal affairs, operating in all states and conditions of the nation's functioning [29].

The Minister of Interior and Administration oversees the protection of the state border [30] on land and at sea and is also accountable for border traffic control [31]. The Air Force [32] and the Navy of the Republic of Poland [33], with which the Border Guard cooperates closely, participate respectively in the protection of the state border at sea and in the air space [34].

The issues of border protection are determined by the wellspring of universally binding law, including international agreements with neighboring countries and agreements concluded between

the minister of internal affairs and the minister of national defense, between the Border Guard and other state institutions, and additional legal acts [35].

The track of the state border on land and in Polish internal waters is pronounced with border marks.

The state border at sea is 12 nautical miles from the baseline [36].
The state border is set at [37]:

- land sections and in places where the state border crosses standing waters or flowing waters that pass to the other shore - along a straight line running from one mark to the other;
- rivers, creeks, streams and non-navigable channels - along the center line of the riverbed;
- navigable rivers - along the center line of the fairway or the midway of the mainstream.

In order to protect the state border, a border strip and a border zone have been established. The border road strip is an area 15 meters wide, counting inland - from the state border line or from the shore of border waters or the sea shore. Contrarily, the border zone covers the entire area of municipalities adjacent to the state border. If the width of the border zone does not reach 15 km in that manner, it also includes neighboring communes where the area lies - in whole or in part - at a distance of 15 km from the state border [38].

Road, rail and river border crossing points [39] and the types of traffic allowed at these passage points are laid down in international agreements [40]. In contrast, sea and air border junctions are established by ordinance of the Council of Ministers.

The authorities obliged to maintain the border crossing points on a permanent basis in a condition that allows for effective border, customs, sanitary, veterinary [41], phytosanitary, chemical and radiometric control are the appropriate territorial competent voivodes in relation to rail, road, air and sea border passages, as well as river crossings border and overnight stopping points on border rivers.

Border protection on land and sea as well as border traffic control in Poland was entrusted to the Border Guard. It is responsible, inter alia, for recognition and detection of crimes and border offenses, prevention and prosecution of their perpetrators, to the extent specified by relevant laws. However, the legislator did not specify the catalog of crimes being the subject of this formation's interest. Nevertheless, on the basis of certain provisions of the Act on the Border Guard, it can be stated that the area of its interests are crimes and offenses directly related to border traffic of persons or goods [42]. Therefore, it is assumed that border crime includes three main categories of misconducts: broadly understood illegal migration [43], smuggling of goods and forgery of documents authorizing the crossing of the state border [44].

However, the material scope defined by this method did not exclude the possibility of prosecuting other crimes and offenses by the Border Guard.

Since the establishment of the Border Guard, the capacity of its tasks has been systematically broadened to include police powers related to combating widely understood border crime [45]. It should be acclaimed that with Poland's accession to the European Union, the Border Guard was fully prepared to undertake tasks related to the protection of some of the external borders of the European Union and ready for cooperation with EU / Schengen border formations [46].

The activities launched by the Border Guard in the field of combating border crime are both a provisional control and systematic operational-reconnaissance and investigative activities. An important element supporting the struggle against border crime is the intensified border control implemented by Border Guard officers with the use of modern technical equipment, including the institution of refusal of entry into the territory of the Republic of Poland to foreigners posing a potential threat.

The question of national border protection and border traffic control is nowadays widely discussed in the mass media and scientific studies, which demonstrates its vital role in both the security system of the Republic of Poland [47] and in international security. The dynamically altering level of challenges and threats [48] affecting the security of state borders requires actions appropriate to the situation [49], the effectiveness of which depends directly on the level of the applicable operating procedures of all state structures and knowledge - twain on the practical and theoretical side [50].

On the one hand, the actual level of perils of terrorism [More: 51], border crime, organized crime, natural disasters [52] or technical failures [53], and currently, epidemics, on the other hand, the perception of security of citizens, chiefly those living in border zones - drive to take all possible steps in search new organizational solutions.

Rules for organizing actions

The diagnosis of organizational procedures in force in the Border Guard shows that they are uniform and flexible enough, allowing the methods used to enable the Guards to effectively carry out tasks entrusted to them by law, while exploiting all its possibilities [54].

Depending on the nature of the tasks performed, three levels of management were distinguished in the Border Guard [55; 56; 57], namely:

- III level of command (basic intervention level) - management at this level means managing of the forces currently in service, supervised by the operational duty officer of the organizational unit and includes activities undertaken by officers of the Border Guard post, carried out directly in the area of responsibility;
- II management level - the tactical level, organized in order to coordinate [More: 58] activities of the intervention level forces and assigned reinforcement unit at the disposal of a given organizational body. Activities under Level II are implemented up to the level of the Border Guard unit headquarters;
- I level of management - strategic level, understood as force management as well as coordination and control of actions [59], in the case when the incident covers the area of more than one organizational unit of the Border Guard (or there is a high probability of such a threat), as well as during actions protracted in time, in the conditions of the growing need to strengthen assets and resources and to supplement the logistics facilities. Such a large operation is carried out by the designated headquarters of the Border Guard unit or the Border Guard Headquarters.

Management at level III (intervention) is conducted by the commander of the border guard organizational unit.

The following individuals are entitled to manage the activities of the Border Guard at the 2nd level: the commanding officer of the Border Guard post, territorially competent for the area of the event, or the commanding officer of the Border Guard unit (his deputy), as well as an officer appointed by the commander of the branch or the chief commander of the Border Guard. The operation of the Border Guard at the 2nd level of command is an organized effort carried out by the unit's own forces up to the level of the Border Guard division.

In turn, the management of activities at level I is done at the level of a branch headquarters or the Border Guard Headquarters. The following persons are entitled to lead the activities of the Border Guard on the 1st level: the commanding officer of the Border Guard (his deputy), the commanding officer of the Border Guard unit (his deputy), and an officer appointed by the above-mentioned operators.

In order to effectively implement the scope of tasks concerning border protection, the Border Guard has a set of powers. The most important of them include the possibility [37]:

- to utilize the help of persons who are not officers of the Border Guard;
- conduct operational control;

- use of documents that prevent the determination of identification of a Border Guard officer and the means that the officer might use to perform his official tasks;
- use of information about the person, including personal data obtained by authorized bodies, services and state institutions as a result of operational and reconnaissance activities or operational control.

Additional tasks of the Border Guard in COVID 19 conditions

The factors influencing the effectiveness of the responses of state institutions were, and are, first of all, unpredictable and dynamic ever-changing particular threats menacing the security of the state. Today, such a global threat is the spread of the SARS-CoV-2 coronavirus that causes the COVID-19 disease.

Due to the increase in the level of the aforementioned threat, on March 2, 2020, the Parliament of the Republic of Poland adopted the Act on special solutions related to the prevention, counteraction and combating of COVID-19, other infectious diseases and the crisis situations caused by them [60], as amended by the Act of March 31, 2020 The Act defined the principles and procedures for preventing and combating infection with the SARS-CoV-2 virus and the expansion of an infectious disease in humans triggered by this virus, additionally the tasks of public administration bodies in the field of aversion and withstanding an infection or an infectious disease [61].

Consequently, on March 13, 2020, the Minister of Health of the Republic of Poland issued a regulation on the announcement of the state of epidemic hazard in connection with the spread of the SARS-CoV-2 coronavirus and the increase in the incidence throughout the territory of the Republic of Poland, commencing on March 14, 2020 until the revocation [62]. The introduction of an epidemic emergency was aimed at lessening the spread of the coronavirus and limiting the increase of infection rates. The decision [for more information: 63] meant the introduction of numerous restrictions [64] concerning, among others, the freedom of movement.

As intended, the Border Guard was among the institutions responsible for the enforcement of restrictions [65] on mobility. It was culpable for changing the applicable rules of state border protection. By the Regulation of the Minister of the Interior and Administration of March 13, 2020 [66], border control of persons crossing the state border constituting the internal border was temporarily reintroduced in the period from March 15, 2020 to March 24, 2020. It has been assumed that the scope of the inspection will be adjusted to the degree of threat to public order or state security in connection with the occurrence of a serious danger to public health caused by the SARS-CoV-2 coronavirus, leading to the COVID-19 disease. Temporary border control has been reintroduced for persons crossing the state border constituting the internal border at the state border with the European Union countries neighboring Poland also at seaports and airports within the internal border. Due to the development of the pandemic peril, the regulation of the Minister of the Interior and Administration of March 13, 2020 was twice amended [67; 68].

The tasks entrusted to the Border Guard were carried out effectively. On daily basis about 670 officers of this formation on average, were involved in the undertakings concerning the reintroduced border control. At the internal border, as part of the temporarily reintroduced border control in the direction of entry to Poland, a total of 2,481,848 people were inspected, including the border sections with: the Federal Republic of Germany - 1,969,845, the Czech Republic - 385,415, the Slovak Republic - 14,217, the Republic of Lithuania - 34 623 and in sea ports - 55 026 and air ports - 22 722 [69].

Lessons for the future

Nowadays an increasingly popular belief is that such universal values as: freedom, equality, truth, good, human rights, justice and democracy are not sufficiently appreciated in real social reality. To

the contrary, the attention of public opinion is absorbed by such issues as: spreading violence, increasing number of aggressive behaviors, brutalization of life and mass illness [70].

The conducted research shows that in order to ensure the effectiveness of the Border Guard, a number of legal [71] and organizational solutions are being introduced, relating, inter alia, the management of this formation [72].

A characteristic feature of the pointed solutions is cooperation [73]. Research also indicates that the proper organization of Border Guard activities is one of the basic conditions for limiting the spread of COVID-19.

Effective prevention of the spread of COVID-19 requires the improvement in the operation of many state institutions, including the Border Guard. It ought to include the development of ever more effective rules and methods of potent and comprehensive counteraction against extraordinary threats in general.

As predicted in terms of the development of the pandemic, the world is facing yet another wave of escalating infections.

The conveyed research indicates that the number of tasks assigned to the Border Guard will not change. However, the need to involve an increasing number of officers of this formation will be very likely. At the same time, the possibilities of the Border Guard in this regard may diminish. Officers of said formation will be exposed to infections not only because of their service. This will likely result in a reduction of the tally of officers assigned to direct border surveillance and border traffic control activities. It would therefore be necessary to introduce countermeasures [74] in the form of:

- full assurance of officers' needs concerning means of protection against infection;
- constant examination of officers [75] in accordance with the rules applicable in health care facilities;
- simplification of information flow [More: 76] and documentation of the results of work;
- the possibility of immediate replacement of damaged equipment as well as individual and team equipment;
- gathering and maintaining stocks;
- creation of reserves on the basis of officers serving in education centers and in the administrative division;
- increase in cooperation with citizens in border regions;
- strengthening cooperation with non-governmental organizations whose scope of activities is similar to the nature of the tasks of the Border Guard;
- increase in cooperation [77] with the police [78] and the army [More: 79; 80];
- continuous professional development in the field of education for safety [81], including health protection.

In the event of failures in the implementation of measures to prevent crisis situations [82], including the spread of COVID-19, one should also take into account the necessity to introduce a state of emergency [83; 84] throughout the country, which, in accordance with the applicable legal order, will allow to use the reserves accumulated for situations of special hazards and increase the headcount of the Border Guard.

Conclusions

One of the features of the Border Guard operations is the need to rationalize. It is also imperative that rationalization involves learning, which is not a simple matter. "The learning system must adapt its organizational structure to the environment, and in fact to the changes taking place. It is necessary to develop new variables for action, as only they will allow to maintain effectiveness. It is also essential to acquire knowledge not only from own experience. New solutions and ideas ought to be hunted for, then the knowledge should be put into practice and a common vision of the future has to be created,

moreover as a result, new ideas shall be tested [85]. Their consequence is to be education, which is an important part of preventive activities, aimed mainly at pro-health and environmental learning, and one of the basic ways of teaching safety thus coping with difficult situations [86].

Bearing in mind the aforementioned considerations, it can also be stated that the previously brought forward rationalization [more broadly: 87] included, includes and should continue including institutions responsible for state security. One of them is the Border Guard, being the first barrier to COVID-19.

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Internal Crisis as A Security Challenge for A Nation State

dr hab. Andrzej CZUPRYŃSKI

WSB University in Dąbrowa Górnicza, ul. Cieplaka 1c, 41-300 Dąbrowa Górnicza, Poland
andrzej.czuprynski@icloud.com

Abstract

The occurrence of internal hazards in each country constitutes an integral part of the natural, biological, social and political conditions of each security entity. In the process of counteracting crisis threats, it is reasonable to take control of their symptoms and jurisdiction over their evolution in such a way as to minimize the negative effects, and thus prevent their escalation into a full-blown crisis. It is reasonable to assume that a calamity is characterized by:

- unpredictability as to the duration and path of the development of perils causing the crisis;
- the mass scale of dangers in a large area causing the crisis;
- long-term and continuous negative impact on the social, economic and cultural life of citizens;
- failure of public institutions aimed at securing the functioning of the society.

Keywords: Crisis, Crisis Management, Security.

Introduction

Crisis is a concept which describes natural, biological, social [7, pp. 13-21], political [8, pp. 125-136] and economic phenomena that seriously threaten the existence of specific beings. In all areas of knowledge, semantic interpretations of the word and concept of crisis in various languages and in assorted problem approaches can be perceived, which shall provide the observer, participant or decision-maker with sufficient insight enabling to organize measures to reduce or counter the symptoms of threats that may cause a crisis [49, p. 10; 21, p. 43; 32, pp. 36-38; 45, pp. 156-173; 34, pp. 83-89; 38, pp. 28-45]. There is also an over-exposure to the concept of crisis, which in social reality is sometimes unverifiable, as long as the cumulative real menace does not escalate. Approaching the symptoms of emergency threats with great responsibility, we may take actions that will largely neutralize their negative effects and might not even be noticed by the society, except for their investigators. Contrarily, by disregarding the symptoms of threats and certain hazards, or by executing amiss decision-making choices, we can lead to crises or leave those unaffected by the process of their own evolution, we take the risk that they might escalate into a crisis or remain at the level of stabilized perils. In the first case, by taking actions based on overly defeatist forecasts, we can use up available resources and expose ourselves to the accusation of mismanagement, and in the second case, by disregarding the symptoms of dangers, we may in the near future cause substantially greater losses and exhaust far more resources in order to tackle and rebuild damage induced by the threat than actual preventive measures might.

Research Assumptions

Taking into account the adopted expectations, it would be reasonable to explain the conditions causing threats which in turn may develop into a crisis. Hence the research problem - what kind of situations are conducive to the development of internal security crises in the state? The problems contained in the question indicate the need to clarify, first of all, two issues, exactly the phenomena and the notion of crisis factors causing deadlock threats in the country and explaining when exactly are we dealing with a catastrophe. Way too often, the concept of crisis is emphasized for each threat, and yet not every menace causes emergency, but only their accumulation in the specific

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environmental conditions of the security entity. Thus, the account of conditions adequate to the concept of crisis and crisis-generating factors that might trigger it were adopted as the cognitive objective.

In the adopted research process, the qualitative research strategy was used, assuming that "(...) the field of qualitative research is defined primarily by a series of tensions, contradictions and fluctuations (...)" [10, p. 5] focusing on explaining the essence of the problem by identifying the specific conditions of the symptoms of the crisis-causing phenomenon and the conditions of the trouble Critical thinking on the problem and the research subject have been used, assuming that:

- one shall strive to critically perceive descriptions of facts, processes and phenomena contained in the literature on the subject;
- use comparisons of similar problems, facts, phenomena, objects and conclusions obtained from aforementioned in the research process;
- to make a multifaceted and deep analysis of data contained in the literature on the subject;
- to analyze and compare cases of deviations from commonly perceived norms [42, pp. 257-273; 41, pp. 29-51; 16, pp. 21-42; 44, pp. 1-20; 11, pp. 19-56; 39, pp. 8-46].

During the investigation process, the content of selected literature on the subject was researched using, the method consisting in the coherent application of reasoning operations (analysis, synthesis, comparison, abstraction, generalization, inference) and the strategies of reductive, taxonomic, heuristic and constructive thinking [35, pp. 325-343; 6, pp. 81-98].

The crisis and its presumptions

The Polish legal system does not define the crisis term [52; 53; 54; 55; 56; 57; 58], and a crisis situation and a state of disaster emergency, indicating that this is a process that should be constantly monitored and in the event of actual hazards, one of the three extraordinary states might be introduced (martial law, state of emergency, state of natural disaster) specified in the Constitution and made more precise in subject acts in question. Despite defining the conditions for initiation of extraordinary measures, the acts determined by perils are left free to interpretation by decision-makers, even in situations where most of the restrictions resulting from legal conditions are applied, e.g. the state of natural disaster in the first half of 2020 in Poland. Similar examples of arbitrary rejection of legal conditions concerning the introduction of states of emergency in justified cases are noticed in many countries and can be observed in connection with the current epidemiological risk.

In the Polish judiciary system, the legislator refers to a crisis situation, threats which require special operating procedures to be applied, but does not specify whether or not a particular event or series of events is or is not considered a crisis for the state. Such a general approach to the problems conditioning the crisis is controversial and allows for freedom of interpretation, usually stemming from political premises, and not actual threats. From a semantic point of view, a crisis is defined as a situation unfavorable to someone or something, that indicates the need to apply radical solutions to the existing situations, e.g. in the case of: the breakdown of the state development processes, the instability of the value system and social apathy, the collapse or serious violation of the political system in the state and the process of exercising power itself, as well as many other events that help predict the escalation of the threat.

The crisis arouses negative, pessimistic emotions because it is associated with fear, an uncertain and dangerous situation and is related to the process of hazards [9, p. 54; 20, pp. 81-92; 26, pp. 199-209; 19, pp. 239-256; 13, pp. 283-296; 4, pp. 344-352]. A calamity does not always have to bring up a feeling of fear, the threat of loss of certain values, but it always arouses a feeling of uncertainty as to which direction it might escalate provided we are unable to control it. "Threats and uncertainty have always belonged to the conditions of human existence, previously in some sense to an even greater extent than today (...)" [2, p. 15], that was related to the poor capability to forecast perils and the organizational and material possibilities to oppose the negative effects. It shall nevertheless be emphasized that in the past, their scope was usually more finite, due to the nature of the threat and the

limitations of space, time, communication, exchange of goods and thoughts, and the current epidemiological, ecological and climate risks concern almost all inhabitants of the Earth.

The definition of the crisis [43, p. 61] emphasizes its sources and negative effects, but at the same time excludes the possibility of application of extraordinary measures in order to de-escalate. A plight is the result of unidentified or neglected symptoms of threats, and then of actual dangers, resulting in a difficult situation, which in fact requires specific actions and material measures taken. A threat is a situation in which unfavorable conditions or unfavorable factors disturb the accepted order and disorder the functioning of the subject or object of security, introducing chaos in the place of harmony [51, p. 21]. Hence, it is concluded that it is vital to use extraordinary measures for a rapid down-scaling of the crisis, which means a return to the acceptable level of menaces. Threats may be initiated by random or non-random causes having a negative impact on the functioning of the security entity or may cause adverse changes in the environment, accumulating unresolved significant problems in a short period of time what significantly violates subject's security system [15, p. 76]. On the one hand, a threat is a mental state caused by the subjective perception of phenomena assessed as unfavorable or dangerous, and on the other hand, there may be objective factors causing states of justified fear of losing deeply cherished values [9, pp. 54-66]. Thus, it is very important to use objective criteria in the assessment of hazards, the perception of which is justified according to Daniel Frei as:

- a state of insecurity that takes place when the actual threat is correctly perceived;
- state of obsession, in which a low threat is perceived as serious;
- state of false security resulting from underestimation of threats and disregard of them;
- proper security condition, where the threat is low and its perception is correct [17, pp. 17-21].

The conclusions from the study of the literature regarding the subject indicate that the crisis is caused by threats, or rather by their accumulation in turn a threat of high destructive power occurring in a short time. We deal with a crisis when there is a certain breach of the balance between threat and actual security [25, pp. 24-29; 46, pp. 33-45]. In many cases, the plight is seen as the culmination of hazards [22, p. 283; 12, pp. 81-86; 23, p. 15; 48, pp. 70-76; 31, pp. 16-17], which can be interpreted as a short-term phenomenon, because the culmination state means that after reaching a critical point as a result of the undertaken actions , the stabilization and spontaneous or forced decline occurs. Therefore, we can conclude that in some situations the crisis manager may seek to escalate it, because after having reaching the peak, hazards will decrease or weak elements of the organizational procedures will come to light, so they can be repaired or replaced by those with better properties [50, p. 63-71].

Generalizations and conclusions from the analysis of the crisis indicate that its essence is a precarious situation that endangers people and property in a given area or there is a significant limitation of the functioning or the activity of public administration bodies due to discrepancies in the resources and powers necessary to implement in relation to the existing risk. A crisis is a process that is predictable, but difficult to neutralize, if we do not possess appropriate operating procedures and measures that detect early and afterwards remove a given situation so as to minimize possible damage.

The sources of the crisis origin may be a consequence of the mutual overlapping of many hazards, which may in turn lead to the creation of a new type of threat with greater negative consequences for the subject and the object of security than a single risk. If we put forward the thesis that the crisis is the result of a process, a combination of various menaces that are identifiable, possible to diagnose and forecast, we can also conclude that the emergency can be identified, diagnosed and forecast on the basis of the dangers that cause it, which gives us the possibility of taking preventive actions in in order to avert its occurrence [36, pp. 54-55]. Therefore, countermeasures should be undertaken at the stage of the incidence of symptoms of threats in order to halt their escalation and ultimately the emergence of a catastrophe. However, for fear of prematurely directing actions and resources to the symptoms of threats, decision-makers consciously or unconsciously allow them to take shape, and if

they fail to take preventive measures against actual hazards, consequently lead to the outbreak of a crisis, which does not have to be only a climax, and may also last as long as purposeful and effective counteractions will be taken with the intention of reduction of the negative effects and rebuild the damage. An example of such action is the storage of dangerous explosives in Beirut since 2014, which ultimately, as a result of various combinations of events, led to their explosion on August 4, 2020. It should be emphasized that any actions undertaken towards the identified crises are considered delayed and much require more expenditure than early preventive actions against symptoms of threats would, and even in the consecutive stage against actual hazards.

A crisis is not a singular event, but a process of intertwining perils occurring at the same time and area, which constitute a threat to the subject or object of security they concern and its environment. The emergency is perceived as a phenomenon that is characterized by a high level of threat that increases in a short period of time and happens as a surprise to the security entity [21, p. 39; 14, pp. 9-17]. A deadlock is not a sudden phenomenon bearing no sign of escalation. In internal relations in the state as well as in the international arena and in other spheres of social life, there are many indications of the impending danger, but we are not always able to interpret them accordingly or for other reasons we ignore them (disregard), because frequently it is difficult to register the context in real time for one or some other event in a random chain of cause and effect [30, p. 110]. This seems to be a kind of excuse for procrastination in action - requiring situations. Many countries, in view of the information about the expanding epidemiological threat, overlooked it as soon as in December 2019, assuming that the problem may not affect them on such a drastic scale. Thus, the decision maker does not make a decision to act hoping that the symptoms of a threat or actual peril might not cause a crisis. The decision maker does not make decisions on the basis of risk anticipation, because he or she usually does not utilize scientific tools for determination [47, pp. 118-152]. Therefore, decision-making attitude is not confirmed by the foreseen risk over which one intends to take control, but the subjective perception of hazard expressed with the hope that the scale will eventually automatically decrease. Risk means anticipating threats, crisis and its consequences and is always a future event with a certain probability of occurrence [3, pp. 22-23]. "Risk is a certain figure of reflection because it considers the benefits and harms and allows you to decide today about the future" [3, p. 37].

Perception of the crisis as a natural, biological, social, political and economic phenomenon provides us with numerous interpretations. In general, within the literature on the subject, among other things, it is indicated that the crisis:

- is seen as an obstacle in the achievement of important goals that cannot be eliminated by usual means;
- prevents the control of threats by a security entity due to self-limitation;
- causes disorganization of social life, both in the individual and collective dimensions;
- is seen as an event that exceeds the ability to manage it by using normal procedures and measures;
- causes emotional, cognitive and behavioral disturbances;
- it is expressed in a subjective reaction to the present difficult circumstances or events;
- creates challenges, opportunities and threats constituting the basis for changes;
- requires innovative operating procedures and resources for its effective administration;
- forces decisions making based on incomplete data;
- causes a high risk of success in neutralizing its negative effects.

Overbearing that we do not treat the dilemma as a phase of organizational management, one should expect that extraordinary measures ought to be applied in order to neutralize the negative effects, and therefore the diagnostic assumptions that despite the threat of breaking or significant weakening social ties, disrupting the functioning of public institutions, it is still justified to apply the measures resulting from the introduction of one of the states of emergency [43, p. 61] is not particularly convincing. Latter would mean that we are not dealing with a crisis, but with a threat and the decision-maker manages towards an acceptable level of hazard. Thence, without negating the features of the crisis described in the literature, but in order to distinguish threat from crisis, we can assume

that the occurrence of internal risks is an integral part of the natural, biological, social and political conditions of each security entity.

The inevitability of threats and crises can be mitigated by an appropriate system of genesis, diagnosis, forecasting and monitoring of the symptoms. In the process of counteracting the dangers of catastrophes, it is reasonable to take control of the manifestations of threats and control their evolution in such a way as to minimize their negative effects, and therefore prevent their development into an accumulation of real perils and a crisis. It is reasonable to assume that a crisis is characterized by:

- unpredictability as to the duration and direction of the development of elements causing the crisis;
- the mass scale of perils in a large area causing the trouble;
- long-term and continuous negative impact on the socioeconomic and cultural life of citizens;
- causing unpredictable losses, the dimension of which results in an increase in expenditure aimed at returning to normal;
- failure of public institutions securing the proper functioning of the society.

The adopted premises for perception of the essence of the crisis distinguish it from threats, the accumulation of which in specific circumstances may cause a crunch, but not every danger should be interpreted as a crisis. The accumulation of hazards may cause a situation if:

- the early detection and diagnosis does not take place in due time;
- no preventive actions or measures are taken;
- no measures are taken to minimize the negative effects;
- are not be monitored after the de-escalation phase to ensure that they do not revive.

Crisis Inducing Factors

In the period dating from the conclusion of the Cold War to 2015, 124 armed conflicts of varying intensity erupted in the world [1, pp. 395-467], which in turn had an impact on the level of security of primarily the parties to the conflict and countries in their immediate vicinity, and indirectly also on safety in the region and in the world as a whole. Armed clashes are still there in the political reality of many countries, but at present a greater danger is caused by socio - civilization hazards which, due to the strongly developed globalization processes, trigger challenges, opportunities and threats for humanity without deliberately targeting specific entities [33, p. 284- 318; 3, pp. 230-268; 29, pp. 17-25; 40, pp. 172-211]. Social and civilization perils are a side effect of development processes and it could be argued that man is the perpetrator of intentional and unintentional dangers and crises as an entity managing all spheres of social life, but at the same time is also a victim of their negative outcomes.

Safety management is achieved in four stages (Fig. 1):

- prevention (monitoring the symptoms of threats and taking ongoing actions to eliminate or neutralize);
- preparation (planning activities and gathering resources to eliminate crises);
- reacting (using prepared procedures and resources assembled for this purpose);
- reconstruction (restoration of destroyed or damaged systems, objects, relations at a level which does not allow for similar hazards and losses in comparable situations).

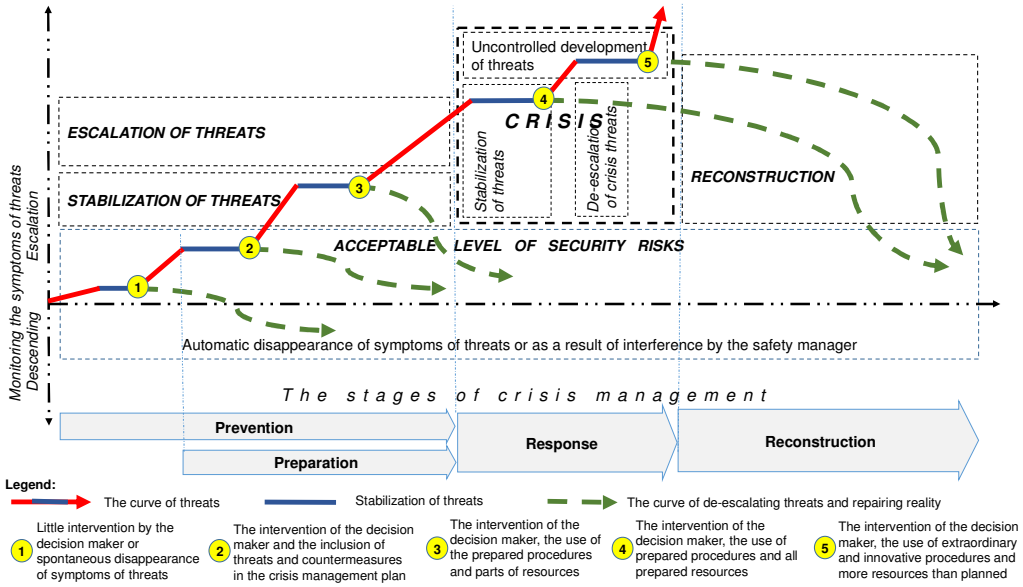

Fig. 1: Crisis and security management

Source: own study.

In the event of an incorrect diagnosis of the symptoms of dangers and failure to implement appropriate measures, might lead to such an escalation of threats in the prevention phase, which then accumulates into a crisis. A non-monitored crisis may cause irreversible changes in a specific security system [24, p. 15]. Therefore, in the area of broadly understood safety, we use the concept of a crisis situation where there are challenges, opportunities, threats, situations and actions leading to the restoration of a disturbed level of security. Crisis situations are understood as all circumstances leading the security entity to the necessity of making decisions concerning the situation that has occurred. On the other hand, the impasse is the apogee of the symptoms of perils and actual threats that have not been eliminated or neutralized. In a crisis situation, the time and scale of menace play a dominant role. The escalation of threats in a short time determines the actions taken under time pressure, which may as well mean that we take ad hoc actions, not the optimal ones. Such an action results from the failure to identify and diagnose the symptoms of threats, which, the moment they accumulate, escalate into real hazards and may develop into a full-blown crisis.

An emergency situation and a crisis do not always have to be pejorative in meaning. Crisis situations arise not only in the aspect of threats, but above all in the facet of changes. Identifying and acting on the causes of deadlocks is the main task of all state services responsible for security [27, pp. 8-20]. Differently, all actions taken on identified crises are overdue reactions. Crisis situations are determined by the boundary between accepted and unacceptable risks. A defined level of threat always occurs, but it cannot be delineated as a permanent state of crisis. Hence, it is required to exemplify the social acceptance level of perils [21, p. 44]. We will talk about a crisis situation if the level of accepted threat escalates beyond its limits and creates hazards that are unacceptable in the light of international and national law and in the public awareness.

From the very beginning of its existence, humanity had to deal with problematic situations and various crises. International security concerns not only political and military issues, but also financial, energy, economic, ecological, demographic, information and many others [37, p. 15]. They are triggered by: random events, deliberate actions, personal failures and failures of international and national institutions.

We live in an uncertain environment where, apart from positive values, there are also negative ones, causing a state of imbalance and even exclusion [3; 2]. All crises cannot be predicted, and therefore we are not able plan countermeasures against the unforeseen ones. We may however reduce the

symptoms influencing the crisis and minimize the effects. From here the need to identify the critical factors. An emergency is a special phenomenon that occurs within general, sometimes prolonged, processes of change. It is an immanent part of our life, it concerns us all, it is desirable even, because as a result of the crisis we may diagnose all the weaknesses of security management, but for this reason only we ought not to cause it.

The sources of the crisis should be attributed to human activity because man is the direct or indirect perpetrator of taking certain dicey actions or in critical situations responsible for not taking any, or worse taking, wrong actions.

In the literature on the subject, there are crises:

- physiological and psychological related to the functioning of the subject of action;
- social, the source of which is the communal environment of human functioning;
- ecological, threatening and violating the balance in nature;
- economic, based on the functioning shape of the economy;
- political and political-military, which in fact have the same cause, but the level of resources involved in their neutralization or liquidation varies [5, pp. 123-138].

Crisis is a phenomenon that accumulates numerous threats and is rarely homogeneous, therefore it seems reasonable to perceive crises in a heterogeneous perspective. Generalizing the above assumptions, it is purposeful to look for the origins of crises and emergency situations in the conditions:

- political and military, where political contradictions create tense situations leading in extreme form to a military crisis in international or internal relations;
- economic and social, where the disturbance of market mechanisms may result in a set of threats not only to the economic but also to the social sphere;
- social-behavioral, where failure to meet basic human needs causes violent social reactions;
- civilization and ecological, where the processes of controlling nature by humans cause, unintended side effects (disturbance of the balance in nature) causing ecological perils;
- physical-geographic, in which the morphological conditions of the universe or reckless human activity lead to threats [9, p. 66].

Regardless of the nature of the crisis, its key participant will always be a human being who is the subject of action and the object at which the negative effects of the crisis are directed.

Ending

Crisis is identified among many areas of practical and scientific activity and, for the most part, it refers to threats and challenges (much less often to opportunities) for political systems, territorial integrity, economic stability, life and health of people, goods and the environment [18, p. 11]. Classic emergency situations and troubles are characterized by: a violent course of the process, the suddenness of the resulting conflict, the immediate development of events, high social importance of cases, social tension, contradictions of interests, spontaneity of behavior, aggression towards the other party to the conflict, as well as being stretched in time and often remain hidden for a period of time [28, pp. 41-42]. A crisis is a component of an emergency situation, however, hazards do not always escalate into a full scale crisis, because with proper safety management, symptoms of threats and actual perils as a result of their generation, diagnosis, forecasting and monitoring are neutralized or eliminated at an early stage of their development [47]. Overusing the term crisis to describe all difficult situations resulted in its devaluation. By the term crisis, we should describe situations that cannot be dealt with by standard procedures and accumulated resources. A crisis combining many threats is a challenge for security since it requires the use of non-standard operating procedures and the implementation of extraordinary measures to inhibit the development, and then to neutralize its destructive nature also rebuild the damage caused to a certain level that immunizes the security environment against similar dangers. A crisis occurs when the prepared procedures and resources are

inadequate to the existing threats, and the entity managing the crisis does not have the possibility of their elimination or neutralization at the social level accepted. The world is in crisis because it does not have certain procedures (free development of infections or their maximum reduction) and measures (vaccines) that can neutralize the pandemic to a socially acceptable level that would be viewed as a crisis situation, not a crisis.

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Re-examining Monetary Policy Effects and Sectoral Real Sector in Nigeria

Ebenezer O. OLADIMEJI

Department of Economics and Development Studies, Covenant University, Ota, Nigeria
Tel: +2348133438299
Email: ebonyseyai@yahoo.com

Ebenezer BOWALE

Department of Economics and Development Studies, Covenant University, Ota, Nigeria

Henry OKODUA

Department of Economics and Development Studies, Covenant University, Ota, Nigeria

Abstract

The debate about overreliance on oil and its non-sustainability to resolve major economic problems in Nigeria has shifted more attention to the real sector of the Nigerian economy. Over a few years ago, the government and the monetary authority have refocused their economic and policy decisions to include the growth of the sector. In achieving this, the government has, among its policy approaches, used the monetary policy instrument to improve the sector and addressed some of the problems that have bedeviled the sector over the past years. This study reexamined the channel through which monetary policy affects each sector of the real economy, using the structural vector autoregression (SVAR). Seasonally adjusted quarterly data between the period of 2008Q1 and 2018Q4 were used for the study. The results revealed that credit and asset price channels are the most dominant monetary policy transmission channels to the sectoral real sector. However, the intervening role of credit risk in the effectiveness of monetary policy to the real sector was established, as it reordered the percentage response of sectoral outputs to shocks from the variables that represent channels of monetary policy transmission to the real sector. This study, therefore, recommends that the monetary authority should always consider credit risk, while taking real sector targeted policy decisions in order to predictably forecast the expected results of its policy actions; so as to improve real sector performance.

Keywords: Real Sector, Monetary Policy, Credit Risk, Structural Vector Autoregression (SVAR)

Introduction

In the modern-day discussions on sustainable economic development, the real sector is among the sectors that have been considered as major drivers of economic performance (Adeusi and Aluko, 2015). In the past few years in Nigeria, there has been a deliberate effort by the governments, where they have focused more on the sector, to complement and save the country from frequent economic shock from oil. The Nigerian economy has over the years been tied to her crude oil. This resulted in neglect of the real sector that was the pride of the nation and major source of foreign exchange before and after independence, until the discovery of oil. Monetary and fiscal policies have always been the major tools used by the governments across the globe, including Nigeria, to improve economic performance, and studies have been carried out to assess their effects on the economy (Oboh, 2017; Ajayi and Aluko, 2017 and Adegoriola, 2018). The Nigerian government, through the monetary authority, has embarked on a series of policy actions, which are targeted at reviving the sector. Among these is the transmission of credit to the real sector, by influencing the banking system, through appropriate monetary policy instruments. This has not yielded the expected result, if the recent circulars of the Central Bank of Nigeria (CBN) to the deposit money banks are anything to go by (CBN Circular July 03, 2019; CBN Circular July 10, 2019). In July 2019, the CBN increased the minimum loan to deposit ratio of the

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deposit money banks from 58.5 percent to 60 percent to mandate them to increase lending to the real sector. This came with a penalty of additional cash reserve requirement of 50 percent of the lending shortfall of the target loan to deposit ratio, for banks that fail to comply with the directives. Another circular was published by the same CBN in September 2019, where it further increased the minimum loan to deposit ratio from 60 percent to 65 percent, with a stiffer sanction for non-compliance by the deposit money banks. In the statement of the CBN, the move is to facilitate greater investment in the real sector. Evidence from all of this is that the banking system sometimes limits their credit to the real sector. One of such reasons for this is the failure of the real sector investors to meet up with their loan repayment obligations, which is called credit risk or default risk in the literature (De Guimarães and Feijó, 2011; Ahiawodzi and Sackey 2013; Doriana, 2015). **This study will reexamine this process of monetary policy effects on each subsector of the real sector**; considering the intervening role of credit risk in the relationship between monetary policy and the real sector. The remaining part of this paper is organized into section two to section six. Section two focuses on the review of relevant literature; section three showcases the methodology and data used for the study, while section four details the results and discussions. In sections five and six, the conclusion and recommendation for policy implications are respectively presented.

Literature Review

Ayodeji and Oluwole (2018) used Johansen co-integration and vector error correction mechanism to examine the impact of monetary policy on the economy in Nigeria. The gross domestic product, broad money supply, interest rate, liquidity rate, and exchange rate were used as explanatory variables in the model. As revealed by the study, the exchange rate and money supply had a positive but fairly insignificant impact on the economy. Further findings showed a long-run relationship between monetary policy and the economy. The liquidity ratio was included in the model to determine output growth. However, the cash reserve ratio would have been a better variable. Liquidity ratio is the ratio of deposit that banks must hold in high liquid assets; cash reserve ratio is the ratio of deposit that must be kept with the central bank, which thereby determines the capacity of banks to lend to the productive sector.

With multiple regression analysis, Ekwe, Ogbonnaya and Omodero (2017) assessed the impact of monetary policy on the Nigerian economy. Their model contained gross domestic product, credit to private sector and money supply. They found that the monetary policy had no significant impacts on the economy, and discovered that that the broad money supply had not been adequately regulated. It was further established that the bank lending rate to the private sectors was so high that it adversely affected the Nigerian economy. However, Ekwe et al., (2017) used money supply and credit to private sector as the only monetary variable to explain the Nigerian economy; this was represented by GDP. The model specification may suffer error of omitted variables, as the model is more of a closed one. Nigeria is an open economy with the rest of the world, so interest rate and exchange rate are key variables that influence the output in Nigeria.

Elem-Uche, Omekara, Okereke and Madu (2019), using the variables that reveal different types of monetary policy transmission channels, employed vector error correction model to forecast real output in Nigeria. According to the co-integration result, the monetary policy variable cointegrated with its channels of transmission, while credit channel, exchange rate and money supply channel accounted for the variations in real output in the short run. In the long-run, real output values adjusted speedily to the changes in the money supply, credit channel, interest rate and exchange rate channel. Taking some variables into account, the authors noted that the success and growth of the real sector depend on the efficacy of the monetary policy to forecast its policy outcome. They concluded that the influence of monetary policy channels is significant to stabilize Nigeria's economy

Abuka, Alinda, Minoiu, Peydro and Presbitero (2019) studied the monetary policy and bank lending in developing countries. According to the authors, a statement of weak or nonexistent bank lending channel in developing countries has existed for a long time, and they tried to revisit it, using Uganda as a case study. Their results showed that monetary policy contraction caused a reduction in bank credit supply to firms and affected economic activity, and the concluded that monetary policy can be an effective macroeconomic tool in developing countries. However, using only one country's result to generalize the experience of all the developing nations is doubtful. More data from more than one

developing countries should have been included in the model for a balanced and more inclusive research outcomes.

CBN (2014) studied the effect of monetary policy on the Nigerian real economy at a disaggregated level with SVAR econometric technique. Using a quarterly data from the period of 1993Q1 to 2012Q4 to show how the outputs from the various subsectors respond to unanticipated monetary policy shocks, the study's result showed evidence of heterogeneous response of sectoral output to contractionary monetary policy shock. As further revealed by the forecast error variance decomposition, the most important variable that explains the variation in sectoral is money supply, which represents the credit channel. The variations in sectoral real output is not significantly explained by monetary policy rate and exchange rate.

Patrick and Akanbi (2017) used Zambia as a case study to assessed the relative importance of the channels of monetary policy transmission in a developing country. Using vector autoregressive econometric method to estimate the variables in the model, the authors found the exchange rate and credit channels to be effective monetary policy transmission channels. Further findings showed that interest rate channel was weak and asset price channel was not important. However, broad money supply was among the variables in the model specification on page 155, but what was eventually used by the authors in their analysis on page 157 and 159 was a narrow money supply. Broad money supply is a better representation of the stock of money in circulation. Patrick and Akanbi (2017) replaced it with narrow money supply without justification. This may have biased the results.

Herradi and Leroy (2019) used twelve advanced economies which included Australia, Canada, Germany, France, Italy, Denmark, Japan. United Kingdom, Sweden, Netherlands, Norway, United States, and Netherlands to assess the implication of monetary policy from a long-run perspective. Using local projections and a panel vector autoregressive method, they considered consumer price index, real gross domestic product, stock prices, national income, and nominal short term interest rate. According to the results, the expansionary monetary policy strongly increased the share of national income held by these countries, but contractionary monetary policy behaved in the opposite direction. This effect of monetary policy was caused by higher asset prices. However, few of the monetary policy transmission channels were considered; only variables that captured exchange rate, interest rate, and asset price channels were captured in their model. For instance, credit channel was not accounted for and no justification was given for this. Even if previous studies had established a weak credit channel in these countries, the authors should have mentioned it.

Ahiawodzi and Sackey (2013) conducted a study on the reasons for the credit rationing behavior of DMBs to the private sector, even when interest rates were liberalized to ensure credit allocation. According to the study, banks consider other factors in determining how they allocate their funds to borrowers. One of such variable is credit risk, which increases borrowers' rate of default, including the real sector investors. They concluded by recommending an active role by the government in the financial sector, while banks should also strengthen their loan monitoring system. This will help to control the rate of default, as against their traditional method of credit rationing. De Guimarães and Feijó (2011) confirmed in their study that the macroeconomic environment contributes significantly to banks' credit risk.

Methodology and Data

A Structural Vector Autoregressive (SVAR) econometric approach is used for this study. All the quarterly data, which were mainly sourced from CBN statistical bulletin, were adjusted for seasonal variations, using Census X-13. These are sectoral real output data on agriculture, manufacturing, construction, trade, and services and respectively represented as $y_{t\,Agriculture}$, $y_{t\,Manufacturing}$, $y_{t\,Construction}$, $y_{t\,Trade}$, $y_{t\,Services}$. Other variables in the model are interest rate (r), monetary policy rate (mpr), exchange rate (ner), maximum lending rate (mlr), asset price (Pa), broad money supply (m2), and credit to real sector (crs). Tests of stability, unit root and autocorrelation were also conducted.

Model Specification and Identification

The structure of the economy is represented by the structural form in equation (1).

$$\Lambda x_t = \varphi + \sum_{j=1}^{p} \omega_j x_{t-j} + \Psi e_t \quad (1)$$

Λ is the coefficient matrix of vector of endogenous macroeconomic variable x_t. φ is the vector of constants. Ψ is the contemporaneous response of the variables to the shocks. ω_j is the coefficient matrix of the vector of lagged values of endogenous variables, where $\omega_j = 1,..., p$. x_t is a vector of macroeconomic variables. e_t is a vector of serially uncorrelated structural shocks with zero mean and diagonal variance co-variance matrix that is time invariant, represented as $\mathrm{E}\left[\varepsilon_t \varepsilon_t^{'}\right] = \Omega$; where $e_t \sim iid\ N_n(0,\Omega)$. This means the random variables are independent, identically distributed with the same distributions, but may be contemporaneously correlated. The structural equation is represented below in its implicit form:

$$mpr_t = f\begin{pmatrix} r_t, ner_t, p_{a_t}, mlr_t, cr_t, crs_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix} \quad (2)$$

$$r_t = f\begin{pmatrix} mpr_t, ner_t, p_{a_t}, mlr_t, cr_t, crs_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix} \quad (3)$$

$$ner_t = f\begin{pmatrix} mpr_t, r_t, p_{a_t}, mlr_t, cr_t, crs_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix} \quad (4)$$

$$p_{at} = f\begin{pmatrix} mpr_t, r_t, ner_t, mlr_t, cr_t, crs_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix} \quad (5)$$

$$mlr_t = f\begin{pmatrix} mpr_t, r_t, ner_t, p_{at}, cr_t, crs_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix} \quad (6)$$

$$cr_t = f\begin{pmatrix} mpr_t, r_t, ner_t, p_{at}, mlr_t, crs_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix}$$

(7)

$$crs_t = f\begin{pmatrix} mpr_t, r_t, ner_t, p_{at}, mlr_t, cr_t, m2_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix}$$

(8)

$$m2_t = f\begin{pmatrix} mpr_t, r_t, ner_t, p_{at}, mlr_t, cr_t, crs_t, y_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix}$$

(9)

$$y_t = f\begin{pmatrix} mpr_t, r_t, ner_t, p_{at}, mlr_t, cr_t, crs_t, m2_t, mpr_{t-j}, r_{t-j}, ner_{t-j}, p_{a_{t-j}}, \\ mlr_{t-j}, cr_{t-j}, crs_{t-j}, m2_{t-j}, y_{t-j} \end{pmatrix}$$

(10)

y_t is the aggregate real sector. At the sectoral level, y_t is respectively replaced by $y_{t\,Agriculture}$, $y_{t\,Manufacturing}$, $y_{t\,Construction}$, $y_{t\,Trade}$ and $y_{t\,Services}$. In the equations, each endogenous variable is a function of all other endogenous variables and lag values of all the endogenous variables in the model. By the explicit form, the equations are represented below:

$$mpr_t = \varphi_{10} - r_t - ner_t - p_{a_t} - mlr_t - cr_t - crs_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{11} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{12} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{13} ner_{t-j} + \sum_{t-j}^{p} \varphi_{14} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{15} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{16} cr_{t-j} + \sum_{t-j}^{p} \varphi_{17} crs_{t-j} + \sum_{t-j}^{p} \varphi_{18} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{19} y_{t-j} + e_t^{mpr_t}$$

(11)

$$r_t = \varphi_{20} - mpr_t - ner_t - p_{a_t} - mlr_t - cr_t - crs_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{21} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{22} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{23} ner_{t-j} + \sum_{t-j}^{p} \varphi_{24} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{25} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{26} cr_{t-j} + \sum_{t-j}^{p} \varphi_{27} crs_{t-j} + \sum_{t-j}^{p} \varphi_{28} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{29} y_{t-j} + e_t^{r_t}$$

(12)

$$ner_t = \varphi_{30} - mpr_t - r_t - p_{a_t} - mlr_t - cr_t - crs_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{31} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{32} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{33} ner_{t-j} + \sum_{t-j}^{p} \varphi_{34} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{35} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{36} cr_{t-j} + \sum_{t-j}^{p} \varphi_{37} crs_{t-j} + \sum_{t-j}^{p} \varphi_{38} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{39} y_{t-j} + e_t^{ner_t}$$

(13)

$$p_{a_t} = \varphi_{40} - mpr_t - r_t - ner_t - mlr_t - cr_t - crs_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{41} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{42} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{43} ner_{t-j} + \sum_{t-j}^{p} \varphi_{44} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{45} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{46} cr_{t-j} + \sum_{t-j}^{p} \varphi_{47} crs_{t-j} + \sum_{t-j}^{p} \varphi_{48} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{49} y_{t-j} + e_t^{p_{at}}$$

(14)

$$mlr_t = \varphi_{50} - mpr_t - r_t - ner_t - p_{at} - cr_t - crs_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{51} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{52} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{53} ner_{t-j} + \sum_{t-j}^{p} \varphi_{54} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{55} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{56} cr_{t-j} + \sum_{t-j}^{p} \varphi_{57} crs_{t-j} + \sum_{t-j}^{p} \varphi_{58} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{59} y_{t-j} + e_t^{mlr_t}$$

(15)

$$cr_t = \varphi_{60} - mpr_t - r_t - ner_t - p_{at} - mlr_t - crs_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{61} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{62} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{63} ner_{t-j} + \sum_{t-j}^{p} \varphi_{64} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{65} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{66} cr_{t-j} + \sum_{t-j}^{p} \varphi_{67} crs_{t-j} + \sum_{t-j}^{p} \varphi_{68} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{69} y_{t-j} + e_t^{cr_t}$$

(16)

$$crs_t = \varphi_{70} - mpr_t - r_t - ner_t - p_{at} - mlr_t - cr_t - m2_t - y_t + \sum_{t-j}^{p} \varphi_{71} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{72} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{73} ner_{t-j} + \sum_{t-j}^{p} \varphi_{74} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{75} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{76} cr_{t-j} + \sum_{t-j}^{p} \varphi_{77} crs_{t-j} + \sum_{t-j}^{p} \varphi_{78} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{79} y_{t-j} + e_t^{crs_t} \tag{17}$$

$$m2_t = \varphi_{80} - mpr_t - r_t - ner_t - p_{at} - mlr_t - cr_t - crs_t - y_t + \sum_{t-j}^{p} \varphi_{81} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{82} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{83} ner_{t-j} + \sum_{t-j}^{p} \varphi_{84} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{85} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{86} cr_{t-j} + \sum_{t-j}^{p} \varphi_{87} crs_{t-j} + \sum_{t-j}^{p} \varphi_{88} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{89} y_{t-j} + e_t^{m2_t} \tag{18}$$

$$y_t = \varphi_{90} - mpr_t - r_t - ner_t - p_{at} - mlr_t - cr_t - crs_t - m2_t + \sum_{t-j}^{p} \varphi_{91} mpr_{t-j} + \sum_{t-j}^{p} \varphi_{92} r_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{93} ner_{t-j} + \sum_{t-j}^{p} \varphi_{94} p_{a_{t-j}} + \sum_{t-j}^{p} \varphi_{95} mlr_{t-j} + \sum_{t-j}^{p} \varphi_{96} cr_{t-j} + \sum_{t-j}^{p} \varphi_{97} crs_{t-j} + \sum_{t-j}^{p} \varphi_{98} m2_{t-j}$$
$$+ \sum_{t-j}^{p} \varphi_{99} y_{t-j} + e_t^{y_t} \tag{19}$$

The structural shocks $e_t^{mpr_t}, e_t^{r_t}, e_t^{ner_t}, e_t^{p_{at}}, e_t^{mlr_t}, e_t^{cr_t}, e_t^{crs_t}, e_t^{m2_t}, e_t^{y_t}$ are independent, identically distributed; the variance co-variance matrix is constant over time and are serially uncorrelated with zero mean as shown in equation (20).

$$\begin{pmatrix} e_t^{mpr_t} \\ e_t^{r_t} \\ e_t^{ner_t} \\ e_t^{p_{at}} \\ e_t^{mlr_t} \\ e_t^{cr_t} \\ e_t^{crs_t} \\ e_t^{m2_t} \\ e_t^{y_t} \end{pmatrix} iid \left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2_{mpr_t} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \sigma^2_{r_t} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \sigma^2_{ner_t} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \sigma^2_{p_{at}} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \sigma^2_{mlr_t} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \sigma^2_{cr_t} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \sigma^2_{crs_t} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \sigma^2_{m2_t} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \sigma^2_{y_t} \end{pmatrix} \right) \tag{20}$$

Representing equations (11) to (19) in matrix form, all the endogenous variables in each equation are expressed in terms of lag values of other endogenous variables:

$$\begin{pmatrix} 1 & c_{12} & c_{13} & c_{14} & c_{15} & c_{16} & c_{17} & c_{18} & c_{19} \\ c_{21} & 1 & c_{23} & c_{24} & c_{25} & c_{26} & c_{27} & c_{28} & c_{29} \\ c_{31} & c_{32} & 1 & c_{34} & c_{35} & c_{36} & c_{37} & c_{38} & c_{39} \\ c_{41} & c_{42} & c_{43} & 1 & c_{45} & c_{46} & c_{47} & c_{48} & c_{49} \\ c_{51} & c_{52} & c_{53} & c_{54} & 1 & c_{56} & c_{57} & c_{58} & c_{59} \\ c_{61} & c_{62} & c_{63} & c_{64} & c_{65} & 1 & c_{67} & c_{68} & c_{69} \\ c_{71} & c_{72} & c_{73} & c_{74} & c_{75} & c_{76} & 1 & c_{78} & c_{79} \\ c_{81} & c_{82} & c_{83} & c_{84} & c_{85} & c_{86} & c_{87} & 1 & c_{89} \\ c_{91} & c_{92} & c_{93} & c_{94} & c_{95} & c_{96} & c_{97} & c_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_t \end{pmatrix} = \begin{pmatrix} \varphi_{10} \\ \varphi_{20} \\ \varphi_{30} \\ \varphi_{40} \\ \varphi_{50} \\ \varphi_{60} \\ \varphi_{70} \\ \varphi_{80} \\ \varphi_{90} \end{pmatrix} + \begin{pmatrix} \omega_{11} & \omega_{12} & \omega_{13} & \omega_{14} & \omega_{15} & \omega_{16} & \omega_{17} & \omega_{18} & \omega_{19} \\ \omega_{21} & \omega_{22} & \omega_{23} & \omega_{24} & \omega_{25} & \omega_{26} & \omega_{27} & \omega_{28} & \omega_{29} \\ \omega_{31} & \omega_{32} & \omega_{33} & \omega_{34} & \omega_{35} & \omega_{36} & \omega_{37} & \omega_{38} & \omega_{39} \\ \omega_{41} & \omega_{42} & \omega_{43} & \omega_{44} & \omega_{45} & \omega_{46} & \omega_{47} & \omega_{48} & \omega_{49} \\ \omega_{51} & \omega_{52} & \omega_{53} & \omega_{54} & \omega_{55} & \omega_{56} & \omega_{57} & \omega_{58} & \omega_{59} \\ \omega_{61} & \omega_{62} & \omega_{63} & \omega_{64} & \omega_{65} & \omega_{66} & \omega_{67} & \omega_{68} & \omega_{69} \\ \omega_{71} & \omega_{72} & \omega_{73} & \omega_{74} & \omega_{75} & \omega_{76} & \omega_{77} & \omega_{78} & \omega_{79} \\ \omega_{81} & \omega_{82} & \omega_{83} & \omega_{84} & \omega_{85} & \omega_{86} & \omega_{87} & \omega_{88} & \omega_{89} \\ \omega_{91} & \omega_{92} & \omega_{93} & \omega_{94} & \omega_{95} & \omega_{96} & \omega_{97} & \omega_{98} & \omega_{99} \end{pmatrix} *$$

$$\begin{pmatrix} mpr_{t-j} \\ r_{t-j} \\ ner_{t-j} \\ p_{at-j} \\ mlr_{t-j} \\ cr_{t-j} \\ crs_{t-j} \\ m2_{t-j} \\ y_{t-j} \end{pmatrix} + \begin{pmatrix} e_t^{mpr_t} \\ e_t^{r_t} \\ e_t^{ner_t} \\ e_t^{p_{at}} \\ e_t^{mlr_t} \\ e_t^{cr_t} \\ e_t^{crs_t} \\ e_t^{m2_t} \\ e_t^{y_t} \end{pmatrix} \quad (21)$$

The structural form equations above cannot be estimated with OLS. This is the major problem with structural equations because the regressors are correlated with the error term and this violates an important assumption of OLS; as a result, no reliable estimates can be arrived at (Claudia and Massimiliano 2014). This problem can however be solved if equation (1) is considered in its reduced form VAR, by pre-multiplying the structural equation by the inverse of the coefficient matrix of the vector of the endogenous macroeconomic variables x_t .

$\Lambda^{-1}\Lambda x_t = \Lambda^{-1}\varphi + \sum_{j=1}^{p}\Lambda^{-1}\omega_j x_{t-j} + \Lambda^{-1}\Psi e_t$; This can further be simplified as $x_t = \Lambda^{-1}\varphi + \sum_{j=1}^{p}\Lambda^{-1}\omega_j x_{t-j} + \Lambda^{-1}\Psi e_t$; Hence $x_t = d + \sum_{j=1}^{p} D_j x_{t-j} + \varepsilon_t$. Where $d = \Lambda^{-1}\varphi$; $D_j = \Lambda^{-1}\omega_j$; $\varepsilon_t = \Lambda^{-1}\Psi e_t$; $For \quad j = 1,...,p$

$\Sigma_\varepsilon = \mathrm{E}\left(\varepsilon_t \varepsilon_t^{'}\right) = \Lambda^{-1}\Psi \mathrm{E}\left(e_t e_t^{'}\right)\Lambda^{-1'}\Psi^{'} = \Lambda^{-1}\Psi\Psi^{-1}\Omega\Lambda^{-1'} = \Lambda^{-1}\Omega\Lambda^{-1^{'}}$; $\Psi\Psi^{-1} = 1$;

$\Sigma_\varepsilon = \Lambda^{-1}\Omega\Lambda^{-1^{'}}$; $\varepsilon_t \sim iid \ N_n\left(0, \Sigma_\varepsilon\right)$

The reduced form VAR of equation (21) now becomes:

$$\begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_t \end{pmatrix} = \begin{pmatrix} d_{10} \\ d_{20} \\ d_{30} \\ d_{40} \\ d_{50} \\ d_{60} \\ d_{70} \\ d_{80} \\ d_{90} \end{pmatrix} + \begin{pmatrix} D_{11} & D_{12} & D_{13} & D_{14} & D_{15} & D_{16} & D_{17} & D_{18} & D_{19} \\ D_{21} & D_{22} & D_{23} & D_{24} & D_{25} & D_{26} & D_{27} & D_{28} & D_{29} \\ D_{31} & D_{32} & D_{33} & D_{34} & D_{35} & D_{36} & D_{37} & D_{38} & D_{39} \\ D_{41} & D_{42} & D_{43} & D_{44} & D_{45} & D_{46} & D_{47} & D_{48} & D_{49} \\ D_{51} & D_{52} & D_{53} & D_{54} & D_{55} & D_{56} & D_{57} & D_{58} & D_{59} \\ D_{61} & D_{62} & D_{63} & D_{64} & D_{65} & D_{66} & D_{67} & D_{68} & D_{69} \\ D_{71} & D_{72} & D_{73} & D_{74} & D_{75} & D_{76} & D_{77} & D_{78} & D_{79} \\ D_{81} & D_{82} & D_{83} & D_{84} & D_{85} & D_{86} & D_{87} & D_{88} & D_{89} \\ D_{91} & D_{92} & D_{93} & D_{94} & D_{95} & D_{96} & D_{97} & D_{98} & D_{99} \end{pmatrix} * \begin{pmatrix} mpr_{t-j} \\ r_{t-j} \\ ner_{t-j} \\ p_{at-j} \\ mlr_{t-j} \\ cr_{t-j} \\ crs_{t-j} \\ m2_{t-j} \\ y_{t-j} \end{pmatrix} + \begin{pmatrix} \varepsilon_t^{mpr_t} \\ \varepsilon_t^{r_t} \\ \varepsilon_t^{ner_t} \\ \varepsilon_t^{p_{at}} \\ \varepsilon_t^{mlr_t} \\ \varepsilon_t^{cr_t} \\ \varepsilon_t^{crs_t} \\ \varepsilon_t^{m2_t} \\ \varepsilon_t^{y_t} \end{pmatrix}$$

(22)

$\varepsilon_t^{mpr_t}, \varepsilon_t^{r_t}, \varepsilon_t^{ner_t}, \varepsilon_t^{p_{at}}, \varepsilon_t^{mlr_t}, \varepsilon_t^{cr_t}, \varepsilon_t^{crs_t}, \varepsilon_t^{m2_t}, \varepsilon_t^{y_t}$ are the reduced-form VAR error terms and are also serially uncorrelated with zero mean and independent, identically distributed; the variance co-variance matrix constant over time.

$$\begin{pmatrix} \varepsilon_t^{mpr_t} \\ \varepsilon_t^{r_t} \\ \varepsilon_t^{ner_t} \\ \varepsilon_t^{p_{at}} \\ \varepsilon_t^{mlr_t} \\ \varepsilon_t^{cr_t} \\ \varepsilon_t^{crs_t} \\ \varepsilon_t^{m2_t} \\ \varepsilon_t^{y_t} \end{pmatrix} iid \left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2_{mpr_t} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \sigma^2_{r_t} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \sigma^2_{ner_t} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \sigma^2_{p_{at}} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \sigma^2_{mlr_t} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \sigma^2_{cr_t} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \sigma^2_{crs_t} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \sigma^2_{m2_t} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \sigma^2_{y_t} \end{pmatrix} \right)$$

(24)

However, the structure of the economy cannot be explained by the reduced-form VAR, and as such reduced-form error terms ε_t cannot be interpreted as structural shocks. Hence, it becomes impossible to uniquely determine the parameters $\varphi, \Lambda, \omega_1, ..., \omega_p, \Omega$ from $d, D_1, ..., D_p, \sum_\varepsilon$. The shocks must be correctly identified before the estimated SVAR can be used to generate impulse response functions that explain the time-dynamic effects of the monetary shocks on the sectoral real outputs. One of the solutions to this identification problem, in literature, is by zero short-run restrictions, equally known as Cholesky identification, recursive identification. According to Cooley and LeRoy (1985), the recursive identification procedure is arbitrary and it cannot be interpreted as a structural model since different variable ordering yields different structural parameters. A non-recursive restriction on the contemporaneous interactions among the variables in the model was introduced in the works of Blanchard and Watson (1986) Bernanke (1986) and Sims (1986), where identification allows for a theory based-restrictions which represent a meaningful relationship between the variables and the structural shocks. As long as the identification conditions are met, the restrictions may not be a

triangular form or recursive. If Ω is normalized as an identity matrix in which $\Omega = \mathrm{I}_k$, $\sum_\varepsilon$ becomes $\sum_\varepsilon = \Lambda^{-1}\Lambda^{-1'}$, which is symmetric and represents a system of $K(K+1)/2$ independent equations. The system in this instance can then be solved for the unknown parameters Λ^{-1}, in as much as the number of unknown parameters in Λ^{-1} is not more than the number of independent equations in $\sum_\varepsilon = \Lambda^{-1}\Lambda^{-1'}$. This will require the imposition of additional restrictions on selected elements of Λ^{-1} by making them equal to zero. The restriction is $K(K-1)/2$ zero parameters in matrix Λ. Λ is the coefficient matrix of the vector of endogenous variables in the model. A theoretical fact is used to identify the model below.

$$\begin{pmatrix} c_{12} & 0 & 0 & 0 & 0 & c_{17} & 0 & 0 \\ 1 & c_{23} & 0 & 0 & 0 & 0 & 0 & c_{29} \\ c_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & c_{59} \\ 0 & 0 & 0 & c_{65} & 1 & 0 & 0 & 0 \\ c_{72} & 0 & 0 & c_{75} & c_{76} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & c_{89} \\ c_{92} & c_{93} & c_{94} & c_{95} & c_{96} & c_{97} & c_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_{t\,Agriculture} \end{pmatrix}$$

$$\Lambda x_t = \begin{pmatrix} 1 & c_{12} & 0 & 0 & 0 & 0 & c_{17} & 0 & 0 \\ c_{21} & 1 & c_{23} & 0 & 0 & 0 & 0 & 0 & c_{29} \\ 0 & c_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & c_{59} \\ 0 & 0 & 0 & 0 & c_{65} & 1 & 0 & 0 & 0 \\ 0 & c_{72} & 0 & 0 & c_{75} & c_{76} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & c_{89} \\ c_{91} & c_{92} & c_{93} & c_{94} & c_{95} & c_{96} & c_{97} & c_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_{t\,Manufacturing} \end{pmatrix}$$

$$\begin{pmatrix} c_{12} & 0 & 0 & 0 & 0 & c_{17} & 0 & 0 \\ 1 & c_{23} & 0 & 0 & 0 & 0 & 0 & c_{29} \\ c_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & c_{59} \\ 0 & 0 & 0 & c_{65} & 1 & 0 & 0 & 0 \\ c_{72} & 0 & 0 & c_{75} & c_{76} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & c_{89} \\ c_{92} & c_{93} & c_{94} & c_{95} & c_{96} & c_{97} & c_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_{t\,Construction} \end{pmatrix}$$

$$\Lambda x_t = \begin{pmatrix} 1 & c_{12} & 0 & 0 & 0 & 0 & c_{17} & 0 & 0 \\ c_{21} & 1 & c_{23} & 0 & 0 & 0 & 0 & 0 & c_{29} \\ 0 & c_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & c_{59} \\ 0 & 0 & 0 & 0 & c_{65} & 1 & 0 & 0 & 0 \\ 0 & c_{72} & 0 & 0 & c_{75} & c_{76} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & c_{89} \\ c_{91} & c_{92} & c_{93} & c_{94} & c_{95} & c_{96} & c_{97} & c_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_{t\,Trade} \end{pmatrix}$$

$$\begin{pmatrix} c_{12} & 0 & 0 & 0 & 0 & c_{17} & 0 & 0 \\ 1 & c_{23} & 0 & 0 & 0 & 0 & 0 & c_{29} \\ c_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & c_{59} \\ 0 & 0 & 0 & c_{65} & 1 & 0 & 0 & 0 \\ c_{72} & 0 & 0 & c_{75} & c_{76} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & c_{89} \\ c_{92} & c_{93} & c_{94} & c_{95} & c_{96} & c_{97} & c_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ ner_t \\ p_{at} \\ mlr_t \\ cr_t \\ crs_t \\ m2_t \\ y_{t\,Services} \end{pmatrix}$$

c_{12} represents the contemporaneous response of monetary policy rate to shocks from interest rate. This is theoretically and empirically valid as the monetary authority will adjust the monetary policy rate based on the activities in the banking system and changes in interest rate. c_{17} represents the contemporaneous response of monetary policy rate to shocks from credit to real sector. The bank lending rate and short term interest rate are affected by changes in monetary policy rate; this affects credit to sectoral real sector. So, the indirect effect of the official interest rate on credit to the sectoral real sector by the banking system can be traced. c_{21} represents the contemporaneous response of interest rate to shocks from monetary policy rate. In theory, changes to official interest rate lead to changes in the market interest rate. c_{23} represents the contemporaneous response of interest rate to shocks from exchange rate. A fall in exchange rate will cause assets denominated in local currency to suffer exchange rate risk, making foreign investors demand for higher interest rate in investing in domestic assets. c_{29} represents the contemporaneous response of interest rate to shocks from sectoral real outputs. An increase in real output requires more money to purchase goods and services. This makes owners of real and financial assets offer them for sale thereby bringing down prices of these assets. This however leads to an increase in interest rate. c_{32} represents the contemporaneous response of exchange rate to shocks from interest rate. As domestic interest rate decreases, returns on domestic assets also decrease compared to foreign assets, leading to high capital outflows and depreciation of the domestic currency, which affects the exchange rate. c_{59} represents the contemporaneous response of maximum lending rate to sectoral real output. Perceived risky productive investors are one of the categories of banks' customers. The maximum lending rate is the rate at which credit is advanced to this category of customers for investment purposes, which ultimately leads to an increase in real output. c_{72} represents the contemporaneous response of credit to real sector to interest rate. When market interest rate declines, investment and credit to real sector are expected to increase. c_{75} represents the contemporaneous response of credit to real sector to shocks from maximum lending rate. Among other things, lending rate determines the quantity of credit banks give to their customers. c_{76} represents contemporaneous response of credit to real sector to shocks from credit risk. A high risk of default brings about higher non-performing loans, which makes banks to lower credit to sectoral real sector. c_{89} represents the contemporaneous response of broad money supply to sectoral real output. As real output increases, all things being equal, more money will be needed medium of exchanging it. c_{91} represents the contemporaneous response of sectoral real output to shocks from monetary policy rate. Real output responds to changes in monetary policy rate, through short term interest rates and other monetary policy channels. c_{92} represents the contemporaneous response of sectoral real output to shocks from interest rate. This follows is-lm framework, where changes in interest rate will affect sectoral real output through investment. c_{93} represents the contemporaneous response of sectoral real output to shocks from exchange rate. This follows exchange rate channel of monetary policy impulses. c_{94} represents the contemporaneous response of sectoral real output to shocks from asset price. When stock prices fall, the value of financial wealth decreases which leads to a reduction in consumption and sectoral real output. c_{95} represents the contemporaneous response of sectoral real output to shocks from maximum lending rate. As banks lend to each subsector of the real sector, more investments are made, leading to an increase in real output. c_{97} represents the contemporaneous response of real output to shocks from credit to real sector. Through investment, a rise in credit to real sector will increase output. c_{98} represents the contemporaneous response of sectoral real output to broad money supply. An increase in broad money supply will shift the LM curve to the right, while a decrease in broad money supply will shift the LM curve to the left. In all this, sectoral real output is affected.

Results and Discussions

Diagnostic Test

Philip Perron Unit Root Test

Table 4A: Summary of Unit Root Test

		Level			*1st Difference*	
Variables	**Observed Values**	**Critical Values**	**Remark**	**Observed Values**	**Critical Values**	**Remark**
lmpr_d11	-1.22240	-2.9314	Non Stationary	-3.73633	-2.93316	Stationary
lir_d11	-2.21950	-2.9314	Non Stationary	-5.63109	-2.93316	Stationary
lner_d11	-0.485020	-2.931404	Non Stationary	-5.744341	-2.933158	Stationary
lPe_d11	-3.05610	-2.9314	Stationary	-4.26058	-2.93316	Stationary
lmlr_d11	-2.050623	-2.9314	Non Stationary	-3.274569	-2.933158	Stationary
lcr_d11	-2.049962	-2.9314	Non Stationary	-6.8011	-2.933158	Stationary
lrsc_d11	-3.109756	-2.93316	Stationary	-7.981767	-2.935001	Stationary
lcrs_d11	-2.708386	-2.931404	Non Stationary	-4.123297	-2.933158	Stationary
lm2_d11	-3.435938	-2.931404	Stationary	-8.338663	-2.933158	Stationary
lxt_d11	-2.358127	-2.931404	Non Stationary	-6.173393	-2.933158	Stationary
lxtAgriculture_d11	-2.321881	-2.931404	Non Stationary	-6.266563	-2.933158	Stationary
lxtManufacturing_d11	-2.733602	-2.931404	Non Stationary	-6.958154	-2.933158	Stationary
lxtConstruction_d11	-2.218326	-2.931404	Non Stationary	-6.053167	-2.933158	Stationary
lxtServices_d11	-2.194604	-2.931404	Non Stationary	-8.017515	-2.933158	Stationary
lxtTrade_d11	-2.289955	-2.931404	Non Stationary	-5.874362	-2.933158	Stationary

The stationarity test was conducted, using Phillips Perron unit root tests. At first difference, all the variables were stationary as detailed in table 4.A.

Lag Selection Criteria

Akaike information criterion (AIC), Final Prediction Error (FPE) Hannan-Quinn information criterion (HQ) and Schwartz information criterion (SC) information criteria were used to determine the lag length. The choice of the optimum lag length used for this study is the lag which most criteria consider to be the optimum. This is indicated with an asterisk (*) in figure 4A.

VAR Lag Order Selection Criteria						
Endogenous variables: DLOG(MPR_D11) DLOG(R_D11) DLOG(NER_D11) LOG(PA_D11) DLOG(MLR_D11) DLOG(CR_D11) DLOG(CRS_D11) DLOG(M2_D11) DLOG(XTAGRICULTURE_D11)						
Exogenous variables: C						
Date: 08/27/20 Time: 14:07						
Sample: 2008Q1 2018Q4						
Included observations: 40						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	352.0441	NA	2.88e-19	-17.15220	-16.77221*	-17.01481
1	448.5355	144.7371	1.46e-19	-17.92678	-14.12680	-16.55282
2	563.1941	120.3915*	5.20e-20	-19.60971	-12.38975	-16.99920
3	710.0049	88.08648	1.86e-20*	-22.90025*	-12.26030	-19.05318*

Figure 4A: Lag Selection Criteria

Stability and Normality Test

The reduced form VARs are stable as detailed in figure 4B; all the roots have modulus less than one and lie inside the unit circle. The normality test results in table 4B satisfies the normality condition, as the probability value corresponding to the Jarque-Bera statistics is more than 5%; meaning that residuals are multivariate normal.

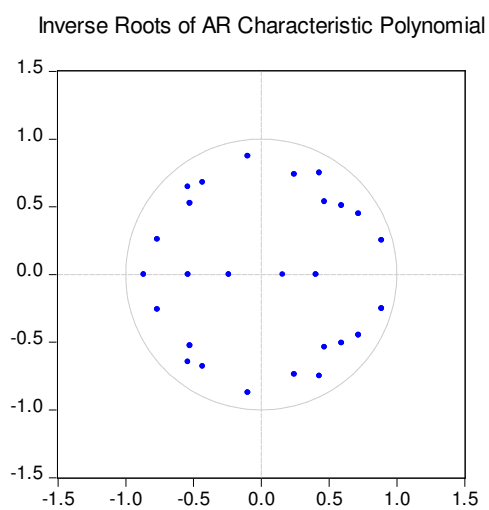

Figure 4B - Stability Condition Table

Table 4B - Normality Test

Summary of Normality Test Result

Component	Jarque-Bera	df	Prob.
1	1.118162	2	0.5717
2	2.189708	2	0.3346
3	0.251558	2	0.8818
4	13.11685	2	0.0014
5	1.249456	2	0.5354
6	2.014708	2	0.3652
7	4.916579	2	0.0856
8	0.365119	2	0.8331
9	0.194590	2	0.9073

Discussion of Results

Summary of SVAR Estimate of Contemporaneous Response Among Variables

Agriculture

Table 4C: Summary of Agriculture SVAR Result

mpr_t	r_t	ner_t	P_{at}	mlr_t	cr_t	crs_t	$m2_t$	$x_{t\,Agriculture}$	
1	0.807814 (0.1972)	0	0	0	0	-25.53942 (0.0000)**	0	0	mpr_t
8.667396 (0.0013)**	1	-21.74130 (0.0000)**	0	0	0	0	0	-1.378334 (0.0009)**	r_t
0	3.824141 (0.0000)**	1	0	0	0	0	0	0	ner_t
0	0	0	1	0	0	0	0	0	P_{at}
0	0	0	0	1	0	0	0	2.414670 (0.0000)**	mlr_t
0	0	0	0	50.47728 (0.0000)**	1	0	0	0	cr_t
0	2.236880 (0.0073)**	0	0	-4.602658 (0.6508)	-10.41415 (0.0000)**	1	0	0	crs_t
0	0	0	0	0	0	0	1	0.020702 (0.9568)	$m2_t$
18.63747 (0.0000)**	-1.246036 (0.2559)	3.483920 (0.5144)	3.897115 (0.1606)	-60.64771 (0.0000)**	0.078765 (0.9693)	22.52068 (0.0001)**	3.03625 (0.6409)	1	$x_{t\,Agriculture}$

Note: ** indicates significant at 5% level, while * indicates significant at 10%
Source: Author's computation using Eviews 10

Table 4C is the SVAR result estimates of agricultural sector, including the intervening role of credit risk. It reveals the contemporaneous response of each variable to shocks from other variables in the system. For instance, the estimate of contemporaneous response of credit to real sector to shocks from credit risk is -10.41415; which indicates a reduction in credit/funds to the real sector during the period of high credit risk.

Manufacturing

Table 4D : Summary of Manufacturing SVAR Result

mpr_t	r_t	ner_t	P_{at}	mlr_t	cr_t	crs_t	$m2_t$	$x_{t\,Manufacturing}$	
1	0.775307 (0.2134)	0	0	0	0	-22.24474 (0.0000)**	0	0	mpr_t
-12.45672 (0.0000)**	1	25.81521 (0.0000)**	0	0	0	0	0	1.745872 (0.0000)**	r_t
0	3.876809 (0.0000)**	1	0	0	0	0	0	0	ner_t
0	0	0	1	0	0	0	0	0	P_{at}

0	0	0	0	1	0	0	0	1.916532 (0.0000)**	mlr_t
0	0	0	0	53.51817 (0.0000)**	1	0	0	0	cr_t
0	2.620936 (0.0027)**	0	0	-12.16249 (0.2763)	-11.67059 (0.0000)**	1	0	0	crs_t
0	0	0	0	0	0	0	1	0.022539 (0.9407)	$m2_t$
-30.10578 (0.0000)**	-0.983827 (0.4513)	1.527279 (0.6764)	-3.46359 (0.0992)*	133.6996 (0.0000)**	-3.743595 (0.0920)*	-20.90326 (0.0001)**	21.80962 (0.0018)**	1	$x_{t\,Manufacturing}$

Note: ** indicates significant at 5% level, while * indicates significant at 10%
Source: Author's computation using Eviews 10

Table 4D is the SVAR result estimates of manufacturing sector, including the intervening role of credit risk. It shows the contemporaneous response of each variable to shocks from other variables in the system. The estimate of contemporaneous response of credit to real sector to shocks from credit risk is -11.67059; which suggests a reduction in credit/funds to the real sector during the period of high credit risk.

Construction

Table 4E : Summary of Construction SVAR Result

mpr_t	r_t	ner_t	P_{at}	mlr_t	cr_t	crs_t	$m2_t$	$x_{t\,Construction}$	
1	0.761145 (0.2246)	0	0	0	0	-26.1694 (0.0000)	0	0	mpr_t
10.18958 (0.0003)**	1	-22.6245 (0.0000)**	0	0	0	0	0	-1.148720 (0.0002)**	r_t
0	3.837006 (0.0000)**	1	0	0	0	0	0	0	ner_t
0	0	0	1	0	0	0	0	0	P_{at}
0	0	0	0	1	0	0	0	1.817059 (0.0000)**	mlr_t
0	0	0	0	50.97136 (0.0000)**	1	0	0	0	cr_t
0	2.239285 (0.0070)**	0	0	-2.803873 (0.7835)	-10.50587 (0.0000)**	1	0	0	crs_t
0	0	0	0	0	0	0	1	0.013567 (0.9624)	$m2_t$
16.66220 (0.0000)**	-0.800971 (0.4585)	4.881293 (0.4039)	4.826338 (0.1011)	-59.43080 (0.0000)**	-0.900672 (0.6632)	19.79595 (0.0004)**	4.259970 (0.5058)	1	$x_{t\,Construction}$

Note: ** indicates significant at 5% level, while * indicates significant at 10%
Source: Author's computation using Eviews 10

Table 4E is the SVAR result estimates of construction sector, including the intervening role of credit risk. The contemporaneous response of each variable to shocks from other variables in the system is summarized in the table. Among these is the estimate of contemporaneous response of credit to real sector to shocks from credit risk, which is -10.50587. This indicates that credit to construction sector is reduced, during the period of high credit risk.

Services

Table 4F: Summary of Services SVAR Result

mpr_t	r_t	ner_t	P_{at}	mlr_t	cr_t	crs_t	$m2_t$	$x_{t\,Services}$	
1	0.917968 (0.1449)	0	0	0	0	-26.44036 (0.0000)**	0	0	mpr_t
7.106868 (0.0208)**	1	-23.23992 (0.0000)**	0	0	0	0	0	-1.320489 (0.0001)**	r_t
0	3.830269 (0.0000)**	1	0	0	0	0	0	0	ner_t
0	0	0	1	0	0	0	0	0	P_{at}
0	0	0	0	1	0	0	0	1.853437 (0.0000)**	mlr_t
0	0	0	0	50.75424 (0.0000)**	1	0	0	0	cr_t
0	2.733136 (0.0013)**	0	0	-7.691333 (0.4525)	-11.76111 (0.0000)**	1	0	0	crs_t
0	0	0	0	0	0	0	1	0.016881 (0.9541)	$m2_t$
22.24043 (0.0000)**	-0.460217 (0.7056)	-6.530321 (0.2769)	9.756428 (0.0002)**	-54.70014 (0.0001)**	-3.04040 (0.2515)	19.58511 (0.0011)**	12.88914 (0.0746)*	1	$x_{t\,Services}$

Note: ** indicates significant at 5% level, while * indicates significant at 10%
Source: Author's computation using Eviews 10

The credit to the service sector, as revealed in table 4F, is also affected by high credit risk. This is evidenced by estimate of the contemporaneous response of credit to real sector to shocks from credit risk, which is -11.76111.

Trade

Table 4G: Summary of Trade SVAR Result

mpr_t	r_t	ner_t	P_{at}	mlr_t	cr_t	crs_t	$m2_t$	x_{tTrade}	
1	0.761656 (0.2239)	0	0	0	0	-26.39257 (0.0000)**	0	0	mpr_t
9.085958 (0.0006)**	1	-22.31715 (0.0000)**	0	0	0	0	0	-1.311654 (0.0007)**	r_t
0	3.831586 (0.0000)**	1	0	0	0	0	0	0	ner_t
0	0	0	1	0	0	0	0	0	P_{at}

0	0	0	0	1	0	0	0	2.223972 (0.0000)**	mlr_t
0	0	0	0	50.92264 (0.0000)**	1	0	0	0	cr_t
0	2.415104 (0.0040)**	0	0	-6.076414 (0.5525)	-10.72500 (0.0000)**	1	0	0	crs_t
0	0	0	0	0	0	0	1	0.017603 (0.9602)	$m2_t$
17.81040 (0.0000)**	-1.305675 (0.2468)	5.194265 (0.3427)	3.694689 (0.1718)	-57.42246 (0.0000)**	0.003862 (0.9985)	22.60778 (0.0001)**	2.693273 (0.6648)	1	x_{tTrade}

Note: ** indicates significant at 5% level, while * indicates significant at 10%
Source: Author's computation using Eviews 10

Table 4G is the SVAR result estimates of trade sector. With the intervening role of credit risk, the credit to the sector from the banking system is reduced. This further explains the estimate of -10.72500, which is significant at 5%.

Forecast Error Variance Decomposition

Agriculture

Table 4H : Variance Decomposition of Agricultural Output with intervening role of Credit Risk

Variance Decomposition of DLOG(XTAGRICULTURE_D11): Period	S.E.	mpr Shock1	r Shock2	ner Shock3	P_{at} Shock4	mlr Shock5	cr Shock6	crs Shock7	m2 Shock8	XtAgriculture Shock9
1	0.414234	8.27E-07	2.39E-07	0.000126	4.83E-07	99.95949	0.040014	0.000369	2.93E-07	3.18E-08
2	2.571412	0.236076	0.225899	0.003408	94.25380	2.657708	0.009971	0.309417	2.079425	0.224297
3	3.428155	0.968383	0.233606	0.286517	53.43521	1.787862	0.448448	0.176929	42.14681	0.516237
4	3.624916	0.867775	0.213871	0.273724	51.05862	1.851112	0.732843	0.160247	44.36396	0.477853
5	4.214148	0.662515	0.246428	0.237280	53.46791	1.403418	0.542335	0.196787	42.88194	0.361388
6	4.260932	0.648219	0.291015	0.435975	52.41585	1.580179	1.223422	0.227001	42.82480	0.353542
7	4.825133	0.507325	0.231062	0.366782	41.23090	1.234602	0.956099	0.178177	55.01934	0.275713
8	5.028670	0.467461	0.212841	0.368732	38.67211	1.142707	0.882283	0.186558	57.81338	0.253929
9	5.075561	0.462342	0.208959	0.473374	38.83538	1.121757	0.892576	0.183236	57.56612	0.256259
10	5.145285	0.450566	0.203367	0.490105	40.32483	1.093639	0.881034	0.181362	56.11214	0.262958
Average		0.527066	0.206704	0.293602	46.36946	11.383247	0.6609025	0.180083	40.08079	0.298217

Factorization: Structural

Table 4H shows the variation in agricultural output as a result of shocks from other variables in the system. With the intervening role of credit risk, the contributions of shocks from the interest rate, exchange rate, asset price, and money supply are respectively 0.20%, 0.29%, 46.36% and 40.08%.

Table 4Ha : Variance Decomposition of Agricultural Output without intervening role of Credit Risk

Variance Decomposition of DLOG(XTAGRICULTURE_D11):		mpr	r	ner	P_{at}	mlr	crs	m2	XtAgriculture
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8
1	0.396084	4.76E-05	1.48E-05	0.011666	7.34E-06	99.96122	0.027022	8.45E-06	1.11E-05
2	3.022165	0.292404	0.269692	0.011975	68.51626	1.718712	0.038259	29.05621	0.096487
3	3.226604	1.013560	0.634864	0.059425	60.78241	1.688947	0.308650	35.11222	0.399925
4	3.612766	0.889956	0.510264	0.107780	47.30751	1.368227	0.409279	49.06453	0.342459
5	4.068184	0.724676	0.449021	0.115376	50.25024	1.094645	0.345020	46.72781	0.293215
6	4.197416	0.684569	0.450304	0.108676	49.45172	1.176228	0.698696	47.15191	0.277896
7	4.832588	0.517487	0.339731	0.108366	37.30675	0.887726	0.531176	60.09874	0.210022
8	4.840401	0.515865	0.340902	0.119338	37.19003	0.884890	0.532136	60.20686	0.209987
9	4.911091	0.501569	0.331227	0.132485	36.22279	0.861589	0.520401	61.22499	0.204947
10	4.985484	0.488019	0.321843	0.134401	38.04875	0.837297	0.505055	59.46348	0.201154
Average		0.562815	0.364786	0.090949	42.50765	11.04795	0.391569	44.81068	0.223610

Factorization: Structural

In table 4Ha, it is evidently seen that shocks from the interest rate, exchange rate, asset price, and money supply caused variations in agricultural output. These variations are respectively 0.36%, 0.09%, 42.50% and 44.81%.

Manufacturing

Table 4I :Variance Decomposition of Manufacturing Output with intervening role of Credit Risk

Variance Decomposition of DLOG(XTMANUFACTURING_D11): Period	S.E.	mpr Shock1	r Shock2	ner Shock3	P_{at} Shock4	mlr Shock5	cr Shock6	crs Shock7	m2 Shock8	XtManufacturing Shock9
1	0.521891	7.85E-07	2.04E-07	0.000131	2.98E-07	99.96313	0.036459	0.000269	1.18E-05	2.48E-08
2	4.624366	0.036855	0.001611	0.021301	41.87582	1.273595	0.005009	0.015822	56.70047	0.069516
3	7.601565	0.178733	0.015357	0.279055	15.64460	0.642356	0.322400	0.042026	82.77850	0.096974
4	8.525395	0.143905	0.025083	0.221919	42.93533	0.609994	0.317372	0.045993	55.62215	0.078250
5	9.275999	0.123723	0.034000	0.216919	40.01933	0.515294	0.319982	0.046061	58.65537	0.069327
6	9.405383	0.121120	0.040036	0.211214	30.23606	0.519217	0.367698	0.060470	68.37398	0.070205
7	10.45406	0.106214	0.046852	0.238097	26.66869	0.425972	0.298189	0.075800	72.08111	0.059074
8	11.08523	0.095295	0.042706	0.212257	25.79065	0.378845	0.266656	0.067682	73.09281	0.053095
9	11.19894	0.093376	0.042601	0.222711	26.72786	0.371247	0.262963	0.074455	72.15269	0.052096
10	11.30362	0.091690	0.042628	0.233473	26.46654	0.364822	0.266411	0.077039	72.40331	0.054085
Average		0.099091	0.029087	0.185708	27.63649	10.50645	0.246314	0.050562	61.18604	0.060262

Factorization: Structural

In table 4I, the respective contributions of shocks to interest rate, exchange rate, asset price and money supply, to the changes in manufacturing output are 0.02%, 0.18%, 27.63% and 61.18%. This is with the intervening role of credit risk

Table 4Ia : Variance Decomposition of Manufacturing Output without intervening role of Credit Risk

Variance Decomposition of DLOG(XTMANUFACTURING_D11): Period	S.E.	mpr Shock1	r Shock2	ner Shock3	P_{at} Shock4	mlr Shock5	crs Shock6	m2 Shock7	XtManufacturing Shock8
1	0.476312	6.88E-05	1.33E-05	0.013625	1.63E-05	99.96149	0.024681	0.000100	9.71E-06
2	3.093763	0.126861	0.107156	0.003712	94.51662	2.371434	0.080173	2.564129	0.229918
3	4.448170	0.574618	0.092534	0.021231	36.61190	1.368378	0.401164	60.52117	0.409014
4	7.155861	0.223007	0.060032	0.024242	19.01148	0.580611	0.184279	79.75682	0.159534
5	8.246059	0.172872	0.050414	0.021562	21.62869	0.438856	0.187719	77.37367	0.126219
6	8.314269	0.176327	0.049721	0.042776	11.29960	0.434870	0.226147	87.63813	0.132428
7	9.182479	0.153093	0.041259	0.060750	17.58179	0.358971	0.185957	81.50368	0.114496
8	9.473405	0.146553	0.038873	0.057686	17.08197	0.343358	0.177535	82.04642	0.107604
9	9.520865	0.145456	0.039016	0.059714	17.89224	0.345314	0.179688	81.23149	0.107081
10	9.527642	0.148394	0.039484	0.064661	17.87908	0.344943	0.179438	81.23300	0.111001
Average		0.186725	0.05185	0.036996	25.35034	10.65482	0.182678	63.38686	0.149730

Factorization: Structural

Table 4Ia contains the percentage variation to manufacturing output as a result of shocks to variables such as interest rate, exchange rate, asset price, and money supply. The contributions to variations in manufacturing output are 0.05%, 0.03%, 25.35% and 63.38%.

Construction

Table 4J -Variance Decomposition of Construction Output with intervening role of Credit Risk

Variance Decomposition of DLOG(XT CONSTRUCTION_D11):		mpr	r	ner	P_{at}	mlr	cr	crs	m2	XtConstruction
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8	Shock9
1	0.550470	7.75E-07	1.92E-07	0.000120	1.08E-06	99.96054	0.038980	0.000352	8.41E-07	4.64E-08
2	3.288498	0.122460	0.310248	0.001469	95.42775	2.902223	0.028974	0.437538	0.626631	0.142710
3	5.073596	0.466013	0.240684	0.174135	61.77898	1.350619	0.236877	0.186313	35.30588	0.260500
4	5.193193	0.448739	0.231605	0.186813	51.92348	1.506332	0.560459	0.186359	44.66944	0.286779
5	5.926495	0.359885	0.250136	0.177306	41.52013	1.191446	0.430798	0.188521	55.65585	0.225928
6	5.998622	0.351478	0.299999	0.385372	41.42308	1.379157	1.096159	0.213194	54.62798	0.223577
7	6.642121	0.286678	0.247423	0.349510	44.10572	1.124993	0.894557	0.173889	52.63477	0.182462
8	6.774947	0.276592	0.237874	0.367650	43.15164	1.085713	0.860341	0.182772	53.66171	0.175709
9	6.830935	0.272951	0.234586	0.487515	42.94796	1.069613	0.885728	0.181517	53.74209	0.178049
10	6.907021	0.266981	0.229451	0.506251	43.98869	1.051609	0.875335	0.180623	52.71955	0.181510
Average		0.285178	0.228201	0.263614	46.62674	11.26222	0.590821	0.193108	40.36439	0.185722

Factorization: Structural

In table 4J, the variation to construction output with the intervening role of credit risk is shown. According to the result, about 0.22% variation in construction output is due to shocks from the interest rate. Shocks to exchange rate accounts for 0.26% variation in the output; shocks to asset price accounts for 46.62% variation in the output, while shocks to money supply accounts for 40.36% variation in construction output.

Table 4Ja -Variance Decomposition of Construction Output without intervening role of Credit Risk

Variance Decomposition of DLOG(XTCONSTRUCTION_D11): Period	S.E.	mpr Shock1	r Shock2	ner Shock3	P_{at} Shock4	mlr Shock5	crs Shock6	m2 Shock7	XtConstruction Shock8
1	0.538245	4.77E-05	8.46E-06	0.011129	5.62E-05	99.96261	0.026067	6.98E-05	1.37E-05
2	3.965667	0.193635	0.238450	0.028733	82.82686	1.847890	0.083925	14.74271	0.037798
3	4.698929	0.534731	0.488347	0.080810	58.99393	1.417714	0.185232	38.13100	0.168241
4	4.927114	0.573440	0.444165	0.121645	53.83627	1.307493	0.338177	43.18958	0.189228
5	5.707411	0.444871	0.355638	0.124417	42.96235	0.989890	0.273301	54.68656	0.162973
6	5.878808	0.426865	0.373795	0.118332	43.64425	1.064369	0.588157	53.63062	0.153612
7	6.669492	0.331692	0.290471	0.110793	33.91174	0.828893	0.457428	63.94938	0.119597
8	6.671598	0.331484	0.291671	0.122766	33.89108	0.828478	0.458015	63.95698	0.119522
9	6.753433	0.323518	0.284764	0.135807	33.10310	0.811621	0.448845	64.77568	0.116667
10	6.822557	0.319653	0.279313	0.141901	34.42950	0.795268	0.439814	63.47924	0.115306
Average		0.347994	0.304662	0.099633	41.75991	10.98542	0.329896	46.05418	0.118296

Factorization: Structural

Without the intervening role of credit risk as revealed in table 4Ja, shocks to the interest rate is responsible for 0.30% variation in construction output. Shocks to exchange rate, asset price and money supply respectively account for about 0.09%, 41.75%, and 46.05 variation in construction output.

Services

Table 4K - Variance Decomposition of Services Output with intervening role of Credit Risk

Variance Decomposition of DLOG(XTSERVICES_D11): Period	S.E.	mpr Shock1	r Shock2	ner Shock3	P_{at} Shock4	mlr Shock5	cr Shock6	crs Shock7	m2 Shock8	XtServices Shock9
1	0.539672	5.61E-07	3.16E-07	0.000147	2.03E-06	99.95967	0.039885	0.000287	3.54E-06	2.13E-08
2	5.356478	0.092312	0.057554	0.005903	58.2503	1.182468	0.000690	0.161596	40.14126	0.107916
3	10.29285	0.186617	0.033367	0.074830	31.09101	0.327086	0.180302	0.052169	67.94138	0.113241
4	10.32438	0.185501	0.052437	0.074758	31.03623	0.331674	0.187847	0.052742	67.96558	0.113239
5	10.45144	0.181463	0.087796	0.099091	32.33851	0.324368	0.186456	0.062884	66.60892	0.110513
6	10.48435	0.180867	0.105498	0.227286	32.32897	0.358843	0.387945	0.070629	66.22999	0.109977
7	10.89121	0.170436	0.102955	0.211689	30.75330	0.342647	0.370132	0.071280	67.87516	0.102397

8	11.08786	0.165206	0.099765	0.240142	30.13620	0.330602	0.361962	0.074236	68.49301	0.098885
9	11.11572	0.165001	0.099269	0.309496	30.41920	0.331522	0.376422	0.074030	68.12434	0.100718
10	11.18468	0.163035	0.098133	0.351232	30.26293	0.343598	0.381657	0.078411	68.21395	0.107053
Average		0.149044	0.073677	0.159457	30.66167	10.38325	0.247330	0.069826	58.15936	0.096394

Factorization: Structural

The result from table 4K reveals the percentage variation in services real output to shocks from the interest rate, exchange rate, asset price, and money supply; which are 0.07%, 0.15%, 30.66, and 58.15%.

Table 4Ka :Variance Decomposition of Services Output without intervening role of Credit Risk

Variance Decomposition of DLOG(XTSERVICES_D11): Period	S.E.	mpr Shock1	r Shock2	ner Shock3	P_{at} Shock4	mlr Shock5	crs Shock6	m2 Shock7	XtServices Shock8
1	0.536895	3.25E-05	1.24E-05	0.011951	0.000141	99.96021	0.027120	0.000525	1.24E-05
2	5.110014	0.116541	0.185040	0.003633	51.32144	1.203458	0.009208	47.10664	0.054044
3	7.470209	0.266057	0.303002	0.013955	24.85758	0.576131	0.210594	73.66036	0.112318
4	7.509223	0.287906	0.323537	0.046787	25.14837	0.576626	0.227918	73.26612	0.122734
5	7.632149	0.281127	0.354428	0.095585	25.21357	0.560616	0.229980	73.13597	0.128717
6	7.695602	0.276518	0.374925	0.117809	25.46270	0.605966	0.405133	72.62416	0.132784
7	8.535631	0.225026	0.311929	0.096607	20.80832	0.492574	0.334837	77.62273	0.107983
8	8.545148	0.224525	0.311237	0.111650	20.89473	0.497810	0.345053	77.50654	0.108448
9	8.593255	0.222243	0.309556	0.132886	20.67763	0.495183	0.353867	77.70131	0.107321
10	8.667662	0.218632	0.308379	0.152661	21.05042	0.489553	0.352052	77.31952	0.108788
Average		0.211861	0.278205	0.078352	23.54349	10.54581	0.249576	64.99439	0.098315

Factorization: Structural

Table 4Ka reveals the contributions of shocks to interest rate, exchange rate, asset price, and money supply to the percentage variation in services real output, without the intervening role of credit risk. These variations are respectively 0.27%, 0.07%, 23.54% and 64.99%.

Trade

Table 4L: Variance Decomposition of Trade Output with intervening role of Credit Risk

Variance Decomposition of DLOG(XTTRADE_D11):		mpr	r	ner	P_{at}	mlr	cr	crs	m2	XtTrade
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8	Shock9
1	0.449752	7.55E-07	2.28E-07	0.000136	5.18E-07	99.96001	0.039509	0.000343	2.75E-07	3.79E-08
2	2.779049	0.162744	0.320438	0.028290	92.84985	2.661659	0.066739	0.342830	3.397769	0.169683
3	3.808638	0.739472	0.344337	0.295589	49.85203	1.604093	0.443938	0.183213	46.14643	0.390895
4	3.971258	0.691570	0.319899	0.275953	48.53565	1.625294	0.649582	0.168679	47.34921	0.384165
5	4.442105	0.576546	0.338919	0.260940	49.79195	1.338551	0.519422	0.207301	46.65473	0.311638
6	4.543776	0.551033	0.369626	0.464723	48.48815	1.446439	1.213702	0.218751	46.94958	0.297997
7	5.209245	0.420975	0.283793	0.389232	37.06904	1.100532	0.923492	0.166437	59.41977	0.226730
8	5.339192	0.401234	0.270383	0.414151	35.77427	1.051118	0.879984	0.175447	60.81756	0.215846
9	5.410553	0.392429	0.263298	0.534363	35.21273	1.024130	0.888736	0.171595	61.29615	0.216575
10	5.497450	0.380128	0.255041	0.546700	36.93104	0.994723	0.866824	0.169517	59.63675	0.219275
Average		0.431613	0.276573	0.321008	43.45047	11.28065	0.649193	0.180411	43.16679	0.243280

Factorization: Structural

The trade variance decomposition result with the intervening role of credit risk is detailed in table 4L. While trade output variation of 0.27% is caused by shocks to interest rate, other variations of 0.32%, 43.45%, and 43.16% are as a result of shocks to exchange rate, asset price, and money supply.

Table 4La: Variance Decomposition of Trade Output without intervening role of Credit Risk

Variance Decomposition of DLOG(XTTRADE_D11):		mpr	r	ner	P_{at}	mlr	crs	m2	XtTrade
Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8
1	0.431934	3.83E-05	1.16E-05	0.011131	0.000287	99.96052	0.026394	0.001603	1.73E-05
2	2.813509	0.245760	0.345732	0.011205	65.03689	2.381201	0.244994	31.67140	0.062826
3	3.088205	0.926871	0.795591	0.010140	64.06704	2.516032	0.341157	31.00272	0.340447
4	3.142931	1.072088	0.770965	0.089138	61.55331	2.434853	0.462528	33.22050	0.396619
5	3.242871	1.068645	0.797786	0.096042	48.34576	2.399952	0.467597	46.39252	0.431700
6	3.672544	0.839364	0.662623	0.083216	37.72752	2.093454	0.945642	57.30572	0.342462
7	4.434605	0.577189	0.454455	0.089889	30.61617	1.444142	0.648853	65.93433	0.234971
8	4.435661	0.577004	0.455887	0.118403	30.60658	1.443610	0.651280	65.91132	0.235917

9	4.543527	0.550066	0.434578	0.138214	28.42705	1.380534	0.624378	68.21992	0.225259
10	4.674799	0.522425	0.410653	0.140961	37.05186	1.306094	0.590100	59.76226	0.215648
Average		0.637945	0.512828	0.078834	40.34325	11.73604	0.500292	45.94223	0.248587

Factorization: Structural

In table 4La, the variations of trade real output as a result of shocks to interest rate, exchange rate, asset price, and money supply are respectively 0.51, 0.07%, 40.34%, and 45.94%.

As shown in the sectoral SVAR result estimates in tables 4C, 4D, 4E, 4F and 4G, the interaction among the variables in the model follows the theoretical justifications that underscore the identification process. Most of the estimates are statistically significant at 5% level, including the contemporaneous response of credit to real sector to shocks to credit risk. With the role of credit risk in the relationship between monetary policy and the real sector, it is expected that in the period of high credit risk, less credit will be channelled or transmitted from the banking system to the real sector. This will eventually lead to a reduced impact on the real sector, as the effectiveness of the transmission chain is reduced by the intervening role of the credit risk. This is exactly the case, as shown in tables 4.H, 4.I, 4.J, 4.K and 4.L. These tables detail the channels through which the sectoral real outputs are affected or impacted, as a result of monetary policy actions of the CBN, with consideration for credit risk. When compared with the results in tables 4.Ha, 4.Ia, 4.Ja, 4.Ka and 4.La, it is evident that without the intervening role of credit risk, more money flows to the real sector through the money supply, which represents the credit channel, because money supply increases majorly as banks creates more money through credit/deposit expansion.

For instance, without the intervening role of credit risk, about an average of 42.50% and 44.81% variation or changes to agricultural output are respectively from asset price and credit channels. With the intervening role of credit risk, the monetary policy effects on the agricultural output, through the credit channel, is reduced to 40.08%; which means that during the period of high credit risk, the monetary policy effects on agricultural subsector is majorly through the asset price channel (46.36%). For the manufacturing subsector, the monetary policy effect is majorly through the credit channel, both with and without the intervening role of credit risk. However, the effect is greater without the intervening role of credit risk (63.38%) than when the intervening role of credit risk is considered (61.18%). For the construction subsector, the effects of monetary policy during the period of high credit risk is majorly through asset price channel (46.62%), while the monetary policy effect on the subsector is majorly through the credit channel, without the intervening role of credit risk (46.05%). A similar evidence is established in the trade subsector, where about and average of 43.45% changes to trade output is through the asset price channel in a period of high credit risk and 45.94% variation in the said subsector is through the credit channel, without the intervening role of credit risk. However, the credit channel in the services subsector is the major channel, both with and without the intervening role of credit risk; but the effect is lesser during the period of high credit risk. Further findings revealed that the interest and exchange rate channels are very weak in transmitting monetary policy effects to all the subsectors, as the changes to the sectoral real outputs are insignificant.

Comparing this study's results with the result of the study carried out by the Central Bank of Nigeria (CBN, 2014), the following analysis can be arrived at: The CBN established that (a) There is an evidence of heterogeneous response of sectoral output to contractionary monetary policy shock. (b) As revealed by the forecast error variance decomposition, the most important variable that explains the variation in the subsectors is money supply, which represents the credit channel. (c) The variations in

sectoral real output is not significantly explained by monetary policy rate and exchange rate. This above analysis is similar to the findings of this study, without the intervening role of credit risk. The monetary policy, interest, and exchange rates' contributions to the variations in sectoral outputs is insignificant. The variation to real output is majorly explained by money supply (which represents the credit channel) and asset price variables. However, the result is different, with the intervening role of credit risk. The asset price channel is the most effective in the agricultural, construction, and trade subsectors, during the period of high credit risk; while the effect of credit channel is reduced, in the manufacturing and services subsectors, with the intervening role of credit risk. This is one of the major contributions of this study.

Conclusion

The real sector in Nigeria has been given some level of attention in the past few years. This is a deliberate action to improve the sector and reduce overdependence on oil. This policy action includes influencing the banking system to channel more funds to the sector, through the use of monetary policy instruments. This study reexamined the sectoral effects of this process, using SVAR econometric technique with seasonally adjusted quarterly data spanning from 2008Q1 to 2018Q4. The results showed that monetary policy significantly impacts on the sectoral real sector. The credit and asset price channels are the two major channels of transmitting monetary policy effects to the agricultural, manufacturing, construction, services and trade subsectors. However, in the period of high credit risk, the credit channel transmits lesser monetary policy effects to the real sector than the asset price channel.

Recommendation

Evidence from the research findings revealed that all the subsectors of the real sector respond differently to the monetary policy actions of the Central Bank of Nigeria. Therefore, this study recommends that the monetary authority should always consider each subsector separately, by disaggregating the policy objectives to achieve the desired goals.

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Promoting a Heritage Sports Tourism Place Strengthens Loyalty to Tourist Destination: The Case of Ancient Olympia in Greece

Christos C. FRANGOS

President of the Greek Research Institute for the study of Quantitative, Social, Biomedical and Economic Issues, Professor, Ph.D. (London School of Economics), Athens, Greece,
christos.frangos@gmail.com

Pericles DIMITROPOULOS

Teacher in Greek Higher Secondary Education, Economist, Athens, Greece
topnews@otenet.gr

Konstantinos C. FRAGKOS

Medical Doctor, Ph.D., University College Hospital NHS Foundation Trust, London, U.K.,
C.C.Frangos@gmail.com

Athina SOTIROPOULOU

University of Patras, Department of Economics, Patras, Greece
sotiropoulou.s.a@gmail.com

Ele PASHALI

University of Ioannina, Ioannina, Greece
ele.pasxali@gmail.com

Christina LITSI

University of West Attika, Athens, Greece
afro_litsi2@hotmail.com

Abstract

The ancient Olympia is the birthplace of Olympic Games which have started on 776B.C. in Greece. Ancient Olympia was, also, a place for the worship of Zeus, the Head of the 12 Gods in ancient Greece .Relevant research includes the papers of The Temple of Zeus was the largest and most important building at Olympia and was one of the largest Doric temples in Greece. The statue of Zeus within the temple was made by Pheidias (who had worked on the Parthenon and its statue of Athena) and was a solid gold and ivory representation of Zeus seated on a throne. It was regarded as one of the Seven Wonders of the Ancient World. Every four years the modern Olympic games are taking place in a city around the World and in the place of ancient Olympia in Greece the lightning ceremony is taking place for the lightning of the Olympic flame. Although the Ancient Olympia is a world-famous heritage sports place, few attempts have been made to market this place as an important tourist destination and to increase the loyalty of tourists visiting it. In this paper we attempt to describe the ruins of ancient Olympia, the buildings, the stadium and the history of the Olympic games. We define and we review critically an alternative kind of tourism, the heritage sports tourism. We find some weaknesses in the accessibility of ancient Olympia as a tourist destination. Finally, we suggest some improvements in the image of the tourist destination of ancient Olympia employing the immense power of Social Media and some ways of improving the accessibility to this important place of Greece.

Keywords: Ancient Olympia, Loyalty, Satisfaction, Promotion of tourist destination

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Introduction and Literature Review

The Olympic Games started at ancient Olympia, which is a place on the North West of Peloponesse in Southern Greece. The Olympics are an important part of world history, (Callebat,1998). There is an extensive research about the world-famous event, which is taking place every four years, the Olympic Games. The reader can look at the papers of Barringer (2005); Pleket (2004); Crowther (1996); Lee (1998); Gibson, Attle and Yannakis (1998d); Crowther (2010); Tersini (1987); Randall (2011); Gibson (1998a,1998c); and Vitouladiti and Katsari (2014).

In the 10th century B.C., Olympia became the top place for the worship of Zeus. Because of the religious and sports importance of ancient Olympia, this place has one of the highest concentrations of masterpieces from the ancient Greek world. In addition to temples, there are the ruins of all the stadiums built for the Olympics, which were held in Olympia every four years beginning in 776 B.C. The Temple of Zeus was the largest and most important building at Olympia and was one of the largest Doric temples in Greece. The statue of Zeus within the temple was created by Pheidias (who had worked on the Parthenon and its statue of Athena) and was a solid gold and ivory representation of Zeus seated on a throne. It was regarded as one of the Seven Wonders of the Ancient World (Price, 2002; Brida et al, 2016).

The archaeological site of Ancient Olympia attracts thousands of visitors in southern Greece every year, as this popular destination encompasses not only extraordinary natural scenery, but also a cultural treasure – it is the cradle of the Olympic Games.

Description of places of sports, worship and Archaeological Museums in ancient Olympia

Ancient Olympia was a place of worship of Zeus, the father and head of the 12 Gods of the ancient Greeks. Consequently, the largest temple at the center of the Olympia sanctuary is dedicated to Zeus. The pediments of the temple of Zeus depict the race between Pelops and Oinomaos (East pediment) and the dynamic composition of the Centaurs abducting Deidameia on the West. Presently the statues are beautifully reconstructed inside the nearby Olympia museum alongside the metopes of the temple of Zeus, in one large room, (Gardiner, 1926; Wikipedia,2004 Summer Olympics).

The museum exhibits some of the best ancient Greek art and artifacts one would find anywhere. In terms of content, it's one of the top five archaeological museums in Greece. There one can see masterpieces like the famous Hermes of Praxiteles statue.

The stadium of ancient Olympia was the position where the Olympic Games were taking place continuously since 776 B.C. In the middle of the long sides you will see the stone stands where the Hellanodikes (literally "the judges of the Hellenes") stood. The date of the first Olympic games (776 B.C.) is the first accurate chronology of historical Greece since the names of the victors were faithfully recorded and the ancient Greeks measured time back to the centuries by referring to the different Olympic games.

The games had an important meaning for the ancient Greeks, the meaning of peace, freedom and togetherness. During the Games the Greeks were leaving aside their traditional differences, and even were ceasing open hostilities in war time in order to compete in the Olympics.

In ancient Olympia there is the archaic temple of the goddess Hera which was built on 590 B.C. Next to the temple of Zeus is the workshop of Pheidias, where the great sculptor crafted the gigantic chryselephantine statue of Zeus.

The divine precinct in ancient Olympia is packed with history and importance. There are structures used by the priests (Theokoleon), the administration (Bouleuterion), state (Prytaneion), and

accommodation (Leonidaion and Roman hostel) buildings. There are also residences for distinguished guests (Nero's House) and all the sports structures used for the preparation and celebration of the Olympic Games: the stadium and the hippodrome to the east, and the thermal baths, the palaestra and the gymnasium to the south and west.

The Olympic Games in the ancient age

The ancient Greeks have invented the Olympic Games. They started in ancient Olympia on 776 B.C. and they were held in a quadrennial rhythm, without interruption for about 1200 years. The program of the ancient Olympic games was small, compared with the program of the modern ones: running events (over several distances), the pentathlon, and the so-called "heavy" events: wrestling, boxing and pankration. Various equestrian events (with and without chariots) completed the program. This program was discussed with the athletes, their social background and ideology: Although the prize in ancient Olympic Games was a wreath of olive leaves- a forerunner of our modern gold medal, there was no amateurism in Greek athletes, because they were happily participated in highly rewarding money games before and after the Olympics (Pleket, 2004).

The beginning of modern Olympic Games

The concept of Olympic honor was the most important legacy left to modernity. In the ancient age, athletes agreed to a three-month sacred truce and came together from all the Greek cities of the Mediterranean world to compete. This practice demonstrates the most important ideals of Greek humanism: peaceful and loyal competition among free and equal men (Gibson, 1998a; Crowther, 2010; Mandell, 1976; Pierre de Coubertin et al, 2000; Pierre de Coubertin, 1994; Reid, 2006; Young, 1999; Wikipedia, 2004 Olympic Games).

The revival of the Olympic Games in 1896, through the efforts of Pierre de Coubertin, illustrates the lasting nature of the ideals of peace, justice and progress-the most fragile attributes of human heritage. During the ancient Olympic Games, the values of fair competition and sacred truce were established and reman today, among humanity's highest goals. Consequently, the visitor or sports tourist to ancient Olympia can feel the same spiritual and ideological force that drove athletes thousands of years ago.

Fourteen nations and 241, all male, athletes took part in the games of Summer 1896. Participants were all European, or living in Europe, with the exception of the United States team. Winners were given a silver medal, while runners-up received a copper medal. Retroactively, the IOC has converted these to gold and silver, and awarded bronze medals to third placed athletes. Ten of the 14 participating nations earned medals. The United States won the most gold medals, 11, host nation Greece won the most medals overall, 46. The highlight for the Greeks was the marathon victory by their compatriot Spyridon Louis (Randall, 2011; The 1896 Olympic Games, Wikipedia).

The 2004 Summer Olympics, and commonly known as Athens 2004, was a premier international multi-sport event held in Athens, Greece, from 13 to 29 August 2004 with the motto Welcome Home.

The Games saw 10,625 athletes compete, some 600 more than expected, accompanied by 5,501 team officials from 201 countries. Having previously hosted the Olympics in 1896, Athens became one of only four cities to have hosted the Summer Olympic Games on two separate occasions at the time (together with Paris, London and Los Angeles).

The 2004 Olympics were generally deemed to be a success, with the rising standard of competition amongst nations across the world. The final medal tally was led by the United States, followed by China and Russia with the host Greece at 15th place. Several World and Olympic records were broken during these Games,(The 2004 Olympic Games, Wikipedia).

The relationship between Sport and Culture

The concept of civilization, for the ancient Greeks, was meaning the harmonious combination of the following: sports, fine arts and education. In the ancient world the Greek civilization was unique in giving to sports such a prominent position as to determine the humanistic roots of a society (Halloway, 2001; Hinch and Hingham, 2001). For Greeks in the ancient times, the purpose of civilization was to influence all human activities and to promote moral , artistic and spiritual development. In this way harmony between the body and the spirit was achieved. The philosopher Plato was also a great athlete (Middleton and Hawkins, 1998; Middleton, 1992). Plato won victories in wrestling at Delphi, Nemea and Isthmia (Gardiner, 1926; Young, 1999). It is evident that the combination of body exercise and education were the great pillars of ancient pedagogical system (Gibson, 1998b; 1998c).

The founder of the modern Olympic Games, Pierre de Coubertin has accepted the notion that 'an ideal education that, like the Greeks, integrated training for the mind and training for the body' (Mandell, 1976).

The period of the beginning of the modern Olympic Games (1880 to 1900) was characterized by the interest in reviving classical Greek civilization, rapid industrialization and new technological achievements facilitating transportations and communications. Consequently, Pierre de Coubertin, and the society of the late 19th century have adopted the notion' a sound mind in a sound body' (Pierre de Coubertin et al, 2000; Pierre de Coubertin, 1994).

The Athens Games of 2004 promoted the ancient heritage of Olympic Games as their main message and tried to create a link between modernity and antiquity, aiming to emphasize on the ancient values for sport, togetherness and culture. The Logo of the Olympic games of 2004 was the catchword: 'Welcome Home'. This theme gave to the Olympic Games their specific frame of reference.

In modern times, the connection between sports and culture serves a more materialistic purpose. Organizers and marketers of sports events have the justifiable opinion, that they can increase the attention paid to the events by the audiences by incorporating cultural and non-sport events. Cultural activities contribute to sport events by identifying different segments of audiences, like tourists, television viewers, and, consequently, forming a strong relationship with sports events, resulting to the increase of people who are interesting in the sports events and, at the same time, contributing to the economic development of the cities where the sports events are taking place.

Sport Tourism

The classical tourism is the tourism which is expressed with the three (s): Sea, sun and sand. Apart from the classical tourism there exist the alternative form of sport tourism, (Ross, 2001; Gibson, 1998a; Goodall, 1988; Goodall, 1991).

In this section the following definitions of different kinds of sport tourism will be given:

Definition 1: Sport Tourism is the tendency of travelling to engage in or view sport-related activities. It is generally recognized that there are three types of sport tourism: Sport Event Tourism, Active Sport Tourism, and Nostalgia Sport Tourism.

Definition 2: Sport event tourism includes visiting hallmark events such as the Olympic Games and the World Cup Soccer Championships. In fact, both the World Cup in 1994 and the Olympic Games held in Athens in 2004 were actively promoted as a tourist attraction.

Definition 3 : Active sport tourism involves the individuals travelling to participate in sporting events. These participatory events can take on a wide variety of forms in a wide variety of sports. Golf, kayaking, tennis, fishing, snow-mobiling and surfing are just a few examples of the sports that people travel to participate in.

Definition 4: Nostalgia sport tourism or heritage sport tourism involves the individuals travelling to famous sport-related attractions such as the stadium in ancient Olympia or the Panathinaiko stadium in Athens, Greece. Also, Nostalgia sport tourism involves the visits to sports museums like the Archaeological Museum in ancient Olympia.

Loyalty toward tourism destination and relationship with tourist satisfaction and destination image

Regarding marketing research, customer loyalty has been defined in several ways (Jacoby & Kyner, 1973). The first definition of loyalty is with respect to attitudes of customers. Customers' beliefs about the value received lead to their overall attitude toward a product or service, such as the intention to repurchase. The second defines loyalty as behavioral tendencies, including continued patronage and act of recommendation (Hughes, 1991; Sönmez & Graefe, 1998). An alternative conceptualization is the integration of the two views, which defines customer loyalty as the relationship between relative attitude and repeat patronage (Dick & Basu, 1994; Oliver, 1999). Tourist loyalty has been defined as an extension of customer loyalty in tourism setting (Backman & Crompton, 1991); (Baloglu, 2001), that is, if destination experience is considered as a product, tourists may choose to revisit or recommend it to friends and relatives (Yoon & Uysal, 2005). Specifically, tourist loyalty has been conceptualized in one of the following approaches: attitudinal loyalty, behavioral loyalty and composite loyalty (Jacoby and Chestnut,1978). Attitudinal loyalty refers to tourists' psychological tendency such as intention to revisit a destination or recommend to other potential tourists. The composite approach of loyalty suggests the integration of both attitude and behavior (Backman & Crompton, 1991; Iwaskaki & Havitz, 1998); that is, tourists who demonstrate behavioral loyalty toward particular destinations tend to have a positive attitude toward those destinations. At operational level, revisit intention and recommendations to others are the most commonly used measures for tourist loyalty (Alcañiz et al., 2009; Horng et al., 2012; Hung &Petrick, 2012; Oppermann, 2000).

Repeat visitors represent a invaluable market segment for many tourism destinations. They tend to stay longer at a destination (Oppermann, 1998), spread positive word of mouth (Oppermann, 2000; Shoemaker & Lewis, 1999), and participate in consumptive activities more intensively (Lehto, O'Leary & Morrison, 2004). Repeat visitors are also cost-effective as they incur a much lower marketing costs than first-time visitors (Shoemaker & Lewis, 1999; Zabkar, Brencic and Dmitrovic, 2010; Frangos et al. 2014; Zhang, 2012; Zhang and Wang, 2011; Zhang, Fu, Cai and Lu, 2014).

Destination image plays an important role in tourists' decision-making and subsequent travel behavior (e.g. Baloglu & McCleary,1999); consequently, they have been examined extensively in the tourism literature (Pike, 2002). Kim and Richardson (2003) define destination image as follows: A totality of impressions, beliefs, ideas, expectations, and feelings accumulated toward a place over time (Zhang et al, 2014; Backman and Crompton, 1991; Baloglou and McCleary, 1999; Baloglu, 2000; 2001).

Undoubtedly, satisfaction is one of the most relevant variables when analyzing tourist behavior, as it influences the choice of destination, the consumption of products and services, and the decision to return, For this reason, tourist's satisfaction has been a priority subject of research in recent years Tourist satisfaction is defined as follows , according to tourists have previous expectations before receiving the service which they compare with the perceived outcome of the service (Alcañiz, García, & Blas, 2009). Another approach is the equity theory, which reveals that tourist satisfaction can be analyzed as a relationship between the sacrifices and rewards he expects in terms of time, cost or effort and value received Swan (Dick and Basu, 1994; Chi, 2012).

The relationship between tourism and the economic development of a country

The development of tourism leads to the economic development of a country.

During the last twenty years there was already interest in the relationship between the tourism activity and the growth on national income and/or national production although the theoretical ground of such relationship was not explicitly defined. Several researchers investigate the Tourism-Led Growth Hypothesis (TLGH), hence offering a theoretical and empirical link between inbound tourism and economic growth.

The 'new growth theory' teaches that exports have a relevant contribution to economic growth through two main channels: by improving efficiency in the allocation of the factors of production and expanding their volume. The increase in efficiency is obtained by several sources: expanding external and internal competition, developing positive externalities for other sectors by promoting the diffusion of technical knowledge and skills and facilitating the exploitation of economies of scale and scope in the export sector (Mayo and Jarvis, 1981; Mazanec, 1989; Mazanec and Zins, 1994; McKercher, 1995; McWilliams and Crompton,1997; Meidan,1995; Millington and Cleverdon, 1999; Moutinho, 1987; Murphy and Pritchard,1997).

Exports also enhance economic growth by increasing the level of investment. International tourism is regarded as a non-standard type of export, since it implies a source of receipts and consumption in situ. Given the difficulties in measuring tourism activity, the economic literature tends to focus on primary and manufactured product exports, hence neglecting this economic sector.

Analogous to the Exports-led Growth Hypothesis (ELGH), the TLGH analyses the possible temporal relationship between tourism and economic growth, both in the short and long run. The question is whether tourism activity leads to economic growth or, alternatively, economic expansion drives tourism growth, or indeed a bi-directional relationship exists between the two variables. International tourism is regarded as a non-standard type of export, since it implies a source of receipts and consumption in situ. Empirically, this hypothesis has commonly been tested via the so-called Granger no-causality test.

The proliferation of empirical studies, testing whether economic growth is tourism driven, is such that the TLGH is nowadays considered as a key area of research within tourism economics (Brida et al, 2013) review the existing literature on the validity of the hypothesis that Tourism development leads to Economic Growth. Several researchers have written extensive reviews on examining the validity of 'Tourism-led Growth Hypothesis (TLGH). Tourism may stimulate other economic industries by direct and indirect effects. An increase in tourism expenditure may lead to additional activity in related industries, and the overall variation connected with it will be greater than the initial injection in spending (Tian-Cole and Crompton, 2003; Tian-Cole et al, 2002).

If this effect is activated, one of the best ways to enhance economic benefits is to integrate tourism into the national economy by establishing strong linkages between tourism and other economic sectors such as agriculture, fisheries, manufacturing, construction and other service industries.

If the tourism sector makes use of products and services produced within the local economy, it will strengthen these other sectors and provide additional income. In economics, this process is known as the ***multiplier effect*** of the tourism sector on the overall economy which is empirically calculated either through the Tourism Satellite Account or through computable general equilibrium models, which use input–output tables.

One can mention as an economic cause of the relationship of tourism and the economic growth of a country, the rapid expansion of national GDP that encourage even further international tourism. The improvement in the process of globalization tends to enhance trade amongst countries, hence facilitating exports. In a global economy, there is an increasing international ownership and franchising of many hotel and restaurant chains that have become big players across the word. (Andriotis, 2002).

The growing importance of tourism for the economic development of a Region in European Union

Tourism plays an important role in the EU because of its economic and employment potential, as well as its social and environmental implications. Tourism statistics are not only used to monitor the EU's tourism policies but also its regional and sustainable development policies (Eurostat, Statistics Explained, 2018).

In 2015, one in ten enterprises in the European non-financial business economy belonged to the tourism industries. These 2.4 million enterprises employed an estimated 12.7 million persons. Enterprises in industries with tourism related activities accounted for 9.2 % of the persons employed in the whole non-financial business economy and 21.5 % of persons employed in the services sector. The tourism industries' shares in total turnover and value added at factor cost were relatively lower, with the tourism industries accounting for 3.8 % of the turnover and 5.7 % of the value added of the non-financial business economy (Eurostat, Statistics Explained, 2018).

The Management and Marketing Research Regarding A Destination

Destinations are amalgams of tourism products, offering an integrated experience to consumers. Traditionally, destinations are regarded as well-defined geographical areas, such as a country, an island or a town (Weaver and Lawton, 2011; Yuksel, Bramwell and Yuksel, 1999; Wicks and Schuett, 1993; Andriotis, 2002; Baker and Crompton, 2000; Buhalis, 1998; 1999a). Destination is defined as "the focus of facilities and services designed to meet the needs of the tourists". A plethora of destinations comprise a core of the following components which are characterized as the six (A) (Buhalis, 1998; Jamal & Getz, 1996; Yuksel et al, 1999; Palmer & Bejou, 1995; Ekinci et al, 2013; Krippendorf, 1987):

1. Attractions (natural, man-made, artificial, purpose built, heritage, special events)
2. Accessibility (entire transportation system comprising of routes, terminals and vehicles)
3. Amenities (accommodation and catering facilities, retailing, other tourist services)
4. Available packages (pre-arranged packages by intermediaries and principals)
5. Activities (all activities available at the destination and what consumers will do during their visit)
6. Ancillary services (services used by tourists such as banks, telecommunications, post, newsagents, hospitals, etc.)

Special organizations, called Destination Management Organizations (DMOs) are accountable for the planning and marketing of the destinations of tourist interest and they have the power and resources to undertake action towards achieving the strategic objectives of marketing and management of the regions of interest for tourist development.

The specific objectives for marketing of the destinations are the following (Goodall, 1988; 1991; Kent, 1991; Mansfeld, 1995; Mayo & Jarvis, 1981; Sirakya, McLellan & Uysal, 1996; Mazanec, 1989; Mazanec & Zins, 1994; Moutinho, 1987; Ryan, 1997; Woodside & Lysonski, 1989; Goodall and Ashworth, 1988; Gunn, 1994; Law, 1992):

1. Enhance the long-term prosperity of local people
2. Delight visitors by maximizing their satisfaction
3. Maximize profitability of local enterprises and maximize multiplier effects

4. Optimize tourism impacts by ensuring a sustainable balance between economic benefits and socio-cultural and environmental costs

The contribution of marketing research to destination marketing is very substantial and it includes the following areas (Lee, Graefe and Burns, 2004; Levitt, 1983):

1. Identification of the main attributes anticipated by each market Segment.

2. Design and attributes required for tourism products and services
3. Evaluation and development of destination image (Letho et al, 2004; Kim and Richardson, 2003; Kent, 1991; Manning, 2011; March, 1994).
4. Segmentation of market and development of corresponding marketing mixings.
5. Opening new markets and reducing dependency on existing ones
6. Evaluation of the elasticity of demand for each market segment
7. Reduction of seasonality by matching market segments (Sirakaya et al, 1996; Sonmez and Graefe, 1998; Swarbrooke and Horner, 1999).
8. Examination of reasons deterring people (suppressed demand) from visiting destinations
9. Assessment of compatibility with other target markets
10. Examination of alternative distribution channels
11. Assessment of tourism impacts to the destination and selecting the right segments
12. Evaluation of marketing effectiveness and selection of media for Promotion (Jamal and Getz, 1996; Jenner and Smith, 1993; Iwasaki and Havitz, 1998; Jacoby and Kyner, 1973; Jacoby and Chestnut, 1978).

The promotion channels of the destination include television, radio, social media, public relations and a mixture of cultural and sporting events which take place in the broader region where the destination is (Woodside, 1990; McWilliams & Crompton, 1997; Worboys, Lockwood and de Lacy, 2005; Shoemaker and Lewis, 1999).

Suggestions for continuous improvement of Marketing Research and Management of the famous sport and cultural destination of ancient Olympia

Marketing research is a dynamic process and should continue after a first visit to the tourist destination of interest. In particular, marketing Research in ancient Olympia should organize sample surveys during and after visitations to enable the local authorities of ancient Olympia to identify weaknesses and concentrate their corrective action (Dieudonne, 2012; Echtner and Ritchie, 1991; Hede, 2006; Hedges and Olkin, 1985; Hockings et al, 2004; Horng et al, 2012; Hughes, 1991; Hung and Petrick, 2011; 2012; Ioannides and Debbage,1988; Kotler, Bowen and Makens, 2006; Towner and Newton, 1996; Tribe, 1997; Woodside and Lysonski, 1989; Frangos et al, 2014).

Data is often collected by frontier controls, airports and transport authorities, national statistics offices, local councils, tax offices as well as principals such as hotels, travel agencies, etc. The effectiveness of marketing research in destinations will depend on the ability of Destination Management Organizations (DMOs) to co-ordinate the research activities undertaken by the entire range of local authorities and organizations. It is therefore very important to co-ordinate all these surveys and data in order to produce meaningful inferences to inform and guide tourism policy and marketing strategies (March, 1994; Fan, Zheng ,Yao and Mu, 2009).

Museums, culture places and events and top nature and sports activities in ancient Olympia

It is necessary to identify the museums, Culture, festivals and Top Nature and Sports in ancient Olympia and the surrounding cities and ports in order to use them in Marketing Research and Management as attractions of tourists and as sources of economic development of the Western part of Peloponnesse, Greece, where ancient Olympia is located.

In ancient Olympia there exist the following tourist attractions:

Top 10 Museums and Sites

1. Olympia Archaeological Site
2. Archaeological Museum of Olympia
3. History of the (ancient) Olympic Games Museum
4. Museum of the Modern Olympic Games

5. Pier de Coubertin's Monument
6. Temple of Apollo Epikourios
7. Temple of Aphrodite
8. Ancient Ilida
9. Chlemoutsi medieval Castle
10. Nestor's Palace

Top 10 Culture and Festivals

1. Ancient Olympia Festival
2. Olympia International Film Festival for Children & Young People
3. Alfios river Eco-festival
4. Andritsena traditional village
5. Monastery of Sepetou
6. Ancient Ilida Festival
7. Chlemoutsi Castle Music Festival
8. The Andravida horse show
9. Local feasts (panigiria)
10. Monastery of Kremasti

Top Nature and Sports

1. Alfios River
2. Activities in Olympia valley
3. Kato Samiko Beach
4. Kaiafas Thermal Spa
5. Lagoon of Kotychi&Strofilia Forest
6. Nedas' Waterfalls

What can be done to promote tourism in ancient Olympia?

First of all, a good Marketing Research of a cultural heritage place such as ancient Olympia includes the involvement of Social Media. We suggest the following:

1. The creation of a Video with ancient Olympia which will be uploaded in YOUTUBE.

2. Marketing through INSTAGRAM TRAVEL INFLUENCERS. Today, there are people who maintain blogs in Instagram with hundreds of thousands of followers. These people, along with journalists and media executives can be invited to ancient Olympia to see the Museums ,the nature resorts and to participate in cultural events. On their return back ,they will write and upload pictures of ancient Olympia. In this way the sanctuary of ancient Olympia will be known to many cultural tourists who will like to visit this place (Gibson and Yiannakis, 1992; 1994a; Gibson,1994b; Buhalis, 1998; 1999a; Buhalis and Cooper, 1998; Gibson,1998a; Gartner, 1996; Parasuraman, 1985; Parasuraman et al, 1988).

3. Creation of WEB SITES marketing ancient Olympia, in CHINESSE OR IN RUSSIAN language. Today, many tourists to Greece are coming from China and Russia. Naturally, many of these tourists will be impressed and influenced if they can read a Web page in their own language. They will explore ancient Olympia and the famous statues in the Museums reading the Web page in their own Language! This fact will be a strong incentive to visit Greece and ancient Olympia, in particular. Extensive research has been carried out on this subject (Willig, 1985; Woodside, 1990; Woodside and Lysonski, 1989; Ahamefule, 2012; Phillips, 2003; Pigram, 1996).

4. In the port of Katakolon which is near Olympia, the National Tourism Organization should organize an annual yacht racing competition with European television coverage which should attract many tourists who could be encouraged to visit ancient Olympia. In this way, a cultural event which is a visit to ancient Olympia could be marketed together with a sports event which is the yacht racing competition resulting in the arrival of many cultural and sports events tourists (Pearce, 1982; 1989).

5. In Olympia, which is a town near ancient Olympia, the Ministry of Education and various Greek Universities and scientific associations should organize annual scientific Conferences with medical, historical, Archaeological or pure scientific thematic areas (Ritchie, 1986; Rivera and Croes, 2010; Ryan, 1991a; Shen, 2012).

6. The Greek Government and in particular, the Ministry of transport should build an airport in the town of Olympia. In this way, Charter flights with tourists from all over the world should land in Olympia and the nearby ancient Olympia (Poon, 1989; 1993; Porter, 1980; 1985).

Conclusion

A review has been carried out of the research which has been concentrated in ancient Olympia, Olympic Games, the relationship between sport and culture and the attractions of it as a tourist destination. It should be noted that the future of ancient Olympia as a cultural ,ecological and sports destination cannot be assured without broadscale, ongoing societal support and central government financial assistance. The tendency of twinning of ancient Olympia with other cities of the world should be adopted in order to generate a worldwide interest and the subsequent flow of tourists. The education of the people responsible for receiving the tourists should be more systematic and, combined with the Greek value of "filoxenia" (being a helpful and enthusiastic host), should produce the desired results in a reasonable time.

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Predictive Factors of Unemployment and Real Gross National Product per Capita in EU-27: Level of Education, Performance in Program for International Student Assessment (PISA), Parents' education, Youth migration and Financial Crisis

Christos C. FRANGOS

President of the Greek Research Institute for the study of Quantitative, Social, Biomedical and Economic Issues, Professor, Ph.D. (London School of Economics), Athens, Greece, christos.frangos@gmail.com

Konstantinos C. FRAGKOS

Medical Doctor, Ph.D., University College Hospital NHS Foundation Trust, London, U.K., C.C.Frangos@gmail.com

Panagiotis PLAKUDAKIS

Bank of Greece, A.E.
e-mail:pplakudakis@bankofgreece.gr

Abuzar Yousef Ali AHMED

Assistant Professor at Jeddah University, Statistics Department, Jeddah, Saudi Arabia Kingdom, abuzarjeha@gmail.com

Abstract

In this paper we investigate the association between the level of education and the quality of learning outcomes which are achieved by students and the Unemployment rate expressed by the Real Gross Domestic Product per capita, in the European Union (EU), during the years 2003 to 2018. Using the Report of the Organization of Economic Cooperation and Development (OECD), 2010: The High Cost of Low Educational Performance, we present Educational Performance and Schooling as the key drivers for increasing the Real Gross Domestic Product per capita, because the result is the rise in the supply of well-paid skilled workers who form the backbone personnel and innovative force of many enterprises. We derive two Linear Statistical Models with independent variables the level of education of the population and the educational performance of students and dependent variable the Real Gross Domestic Product per capita, for the countries of European Union. The employment opportunities of young people with special educational needs are emphasized and the efficiency of the educational systems across the Member-States of EU is examined in the light of the Report of the Program for International Student Assessment (PISA), Organization of Economic Cooperation and Development, 2018. Finally, a set of policies is suggested to the Educational Planners of European Countries for the maintenance of Economic growth using Educational tools, school reforms and increasing the ratio of teacher-student.

Keywords: Real Gross National Product per capita, special education, European Union, Program for International Student Assessment.

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Introduction and Review of Existing Research

The relationship of the level of education and unemployment rate

The impact of education on unemployment is very important. A country which has an efficient education system can provide the labor market with skilled workers who will be absorbed by employers because of their qualifications, especially, if they have skills in digital Technologies and Communication. Riddell and Song (2011), support the opinion that "graduating from high school increases the probability of re-employment by around 40 percentage points(p.p)". During the economic crisis of 2007 to 2019, governments have increased their higher education investments in order to provide skilled workers to the labor market and to reduce the unemployment rates, according to Marjanovic and Mihajlovic (2014).There must be ties between the courses offered in High Schools and Universities and the specific needs of the labor market in a country (Vytautas Snieska et al., 2015) in order to increase the opportunities for graduates to be employed.

According to Numez and Livanos (2010), the demand for specific skills in different jobs and the capacity of the education system to provide the workers with the skills in demand, leads to a successful transition of graduates from the Educational Institutions to the labor market. The market stratification is strong in the Northern European Countries and this is the reason for the smaller risk of unemployment in Northern European countries rather than in the Southern European ones.

According to Eurostat, Unemployment Statistics (2015), Slovakia recorded in 2018 the biggest gap in the unemployment rate between persons with high level of education (2.8 %) and low level of education (27.6 %).

Research on the Unemployment rate by level of education in European Union Countries (EU-28)

According to Eurostat, Employment Statistics (2019), unemployment rates tend to be higher for persons with low levels of educational attainment rather than persons having a tertiary level of educational attainment. This characteristic was noted in all of the EU Member States in all years from 2002 (except in Luxembourg in 2003).

At EU-28 level, the unemployment rate of persons having a low level of education has increased from 10.1 % in 2002 to 12.5 % in 2018, while it decreased for those having a tertiary level of educational attainment from 4.3 % to 3.9 %. While the average unemployment rate in the EU-28, in 2018, for people aged between 25 and 64 having attained at most a lower secondary education was 12.5 %, the corresponding rate for those that had obtained a tertiary education qualification was much lower at 3.9 %. The gap in unemployment rates between those who had attained a tertiary level of education and those who had attained at most a lower secondary education had widened from 2002 to 2018 in EU-28 from 5.8 p.p. to 8.6 p.p.

Among the EU Member States, the gap was particularly pronounced in 2018 in Slovakia (24.8 percentage points (p.p), Lithuania (16.4 p.p.) and Latvia (13.3 p.p.), while the gap was the narrowest in Cyprus and Portugal (both 2.2 p.p.). In Turkey in 2016, 2017 and 2018, the unemployment rate of persons with a tertiary level of education was slightly higher than the unemployment rate of persons with a low level of education (Figures 1 and 2).

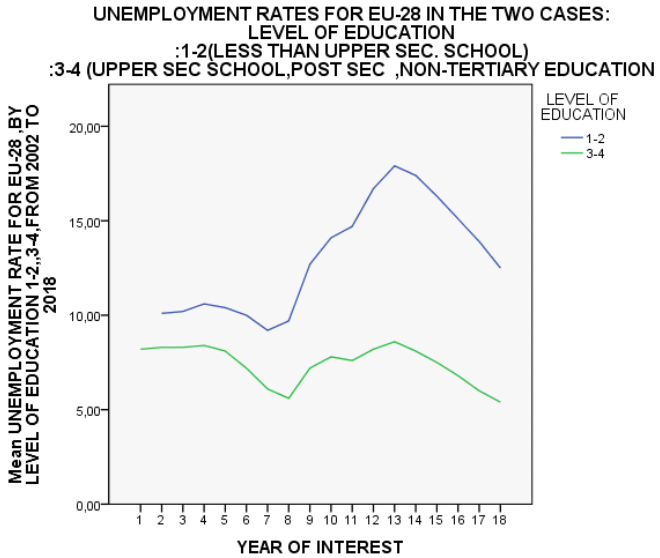

Fig. 1: Unemployment rate by level of education, EU-28, 2002-2018. The line with higher y-axis values corresponds to the level 1-2. The x-axis scale corresponds to years 2001 to 2018. Source of data: Eurostat (2019), Employment Statistics.

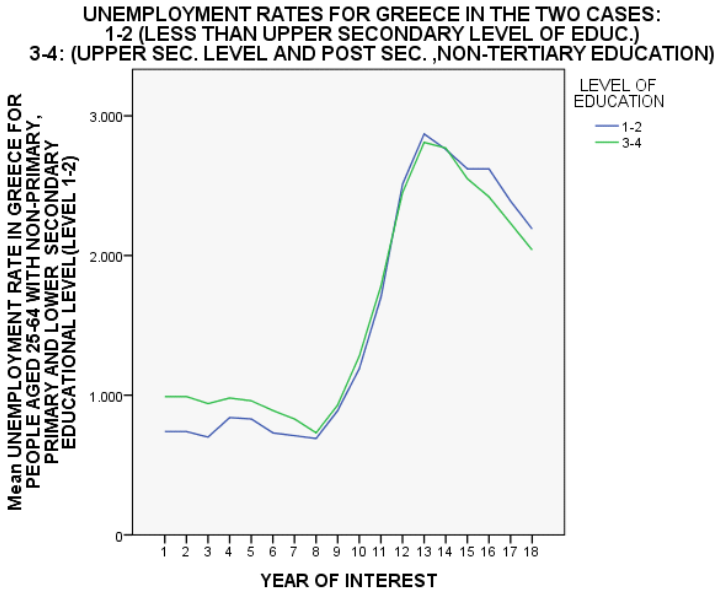

Fig. 2: Unemployment rate by level of education in Greece, 2002-201. In Greece, there is no much difference in unemployment rate between people with 1-2 and 3-4 level of education. Source of data: Eurostat (2019), Employment Statistics.

Long-term unemployment is one of the main concerns of policy-makers. Apart from its financial and social effects on personal life, long-term unemployment negatively affects social cohesion and, ultimately, may hinder economic growth. Figure 3 shows the breakdown of the unemployed by unemployment duration. At EU-28 level, a bit more than half (57.0 %) of those unemployed have been

unemployed for less than one year. However, this average hides large differences between countries. More than 81 % of the unemployed in Sweden were in this group, followed by Denmark (78.9 %), Finland (78.2 %) and Luxembourg (75.3 %), meaning that it goes relatively fast to find a new job for the unemployed in those countries. Greece is on the other end of the scale, with 29.7 %, followed by Slovakia (38.2 %), Bulgaria (41.6 %) and Italy (41.9 %). In Greece in 2018 more than half of the unemployed persons were looking for a job for more than 2 years, followed by 44.1 % in Slovakia and 37.3 % in Bulgaria.

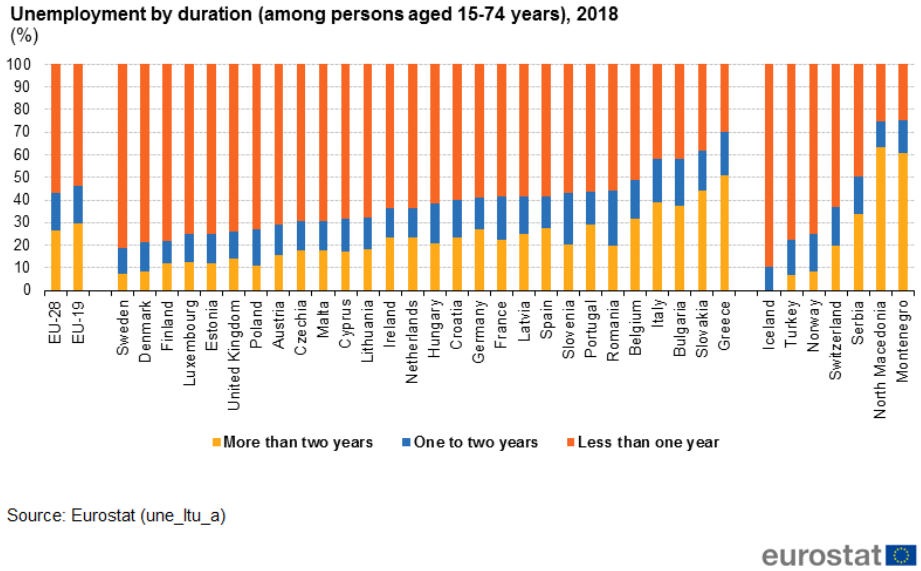

Fig. 3: Unemployment by duration, 2018 (%). Source: Eurostat (2019), Employment Statistics (appsso.eurostat.ec.europa.eu/uni/show.do?dataset=une_ltu_a)

The segmentation of the Labor force of EU-28 in 2018 by employment status

The following figure 4 (Infographic) shows the numbers (in thousand persons) of people who were active and inactive with respect to their employment, and their corresponding subdivisions, in 2018, across the EU-28 countries (source: Eurostat (2019), Employment statistics). Figure 4 includes as inactive persons with respect to their employment, the students in their last year of studies. The figure shows that more women than men are inactive or working as part-time workers and that the total of the inactive persons in EU-28 were 133766000.

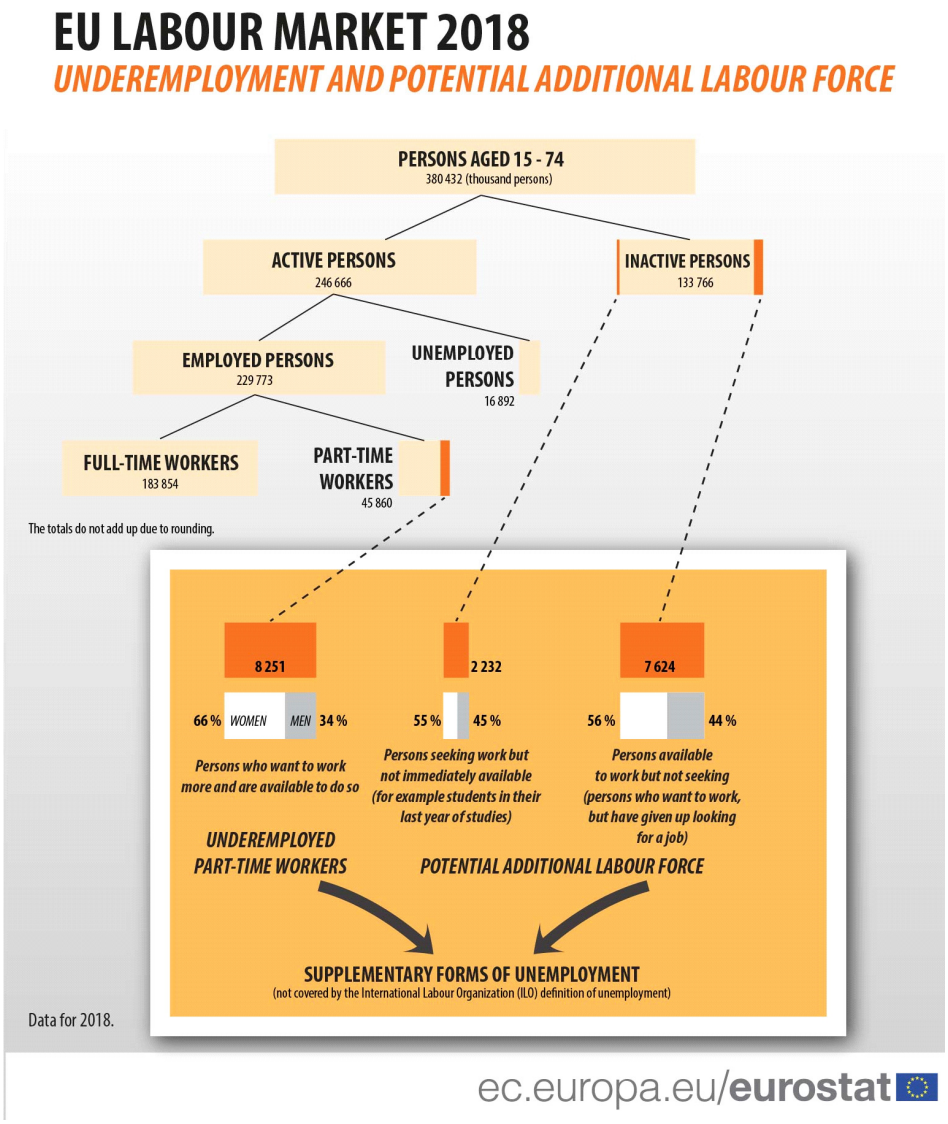

Fig. 4: The EU labor market

The effect of emigration to the employment prospects for higher education population

Migration of labor force abroad is another important variable influencing the development of unemployment rate. When a country is under development or economically struggling, then, the people with higher education or the people with prolonged periods of unemployment emigrate to the countries of EU or to the United States or Canada. On the other hand, there are countries in EU-28 where the number of unemployed people in the "source" country and the number of people emigrating and working abroad in other "host" countries have a negative association.

One of these countries is Slovakia. According to Vojtovich (2013) and Pryymachenko et al. (2013), there is a negative correlation between the numbers unemployed people in Slovakia during the period 2000 to 2008 and the people emigrating from the country and working legally abroad (without counting

the illegal emigrants to Austria and the other countries of Central and eastern Europe. The following Table 1 is provided by Vojtovich (2013) (Figure 5).

Table 1: Numbers of Unemployed people and residing in Slovakia and number of working people and residing abroad

Year	Unemployed (thousand)	Working abroad (thousand)
2000	506,5	49,3
2001	533,6	64,1
2002	504,1	78,4
2003	452,2	69,3
2004	383,1	103,6
2005	333,8	125,4
2006	273,4	158,1
2007	239,9	177,3
2008	248,6	206,4

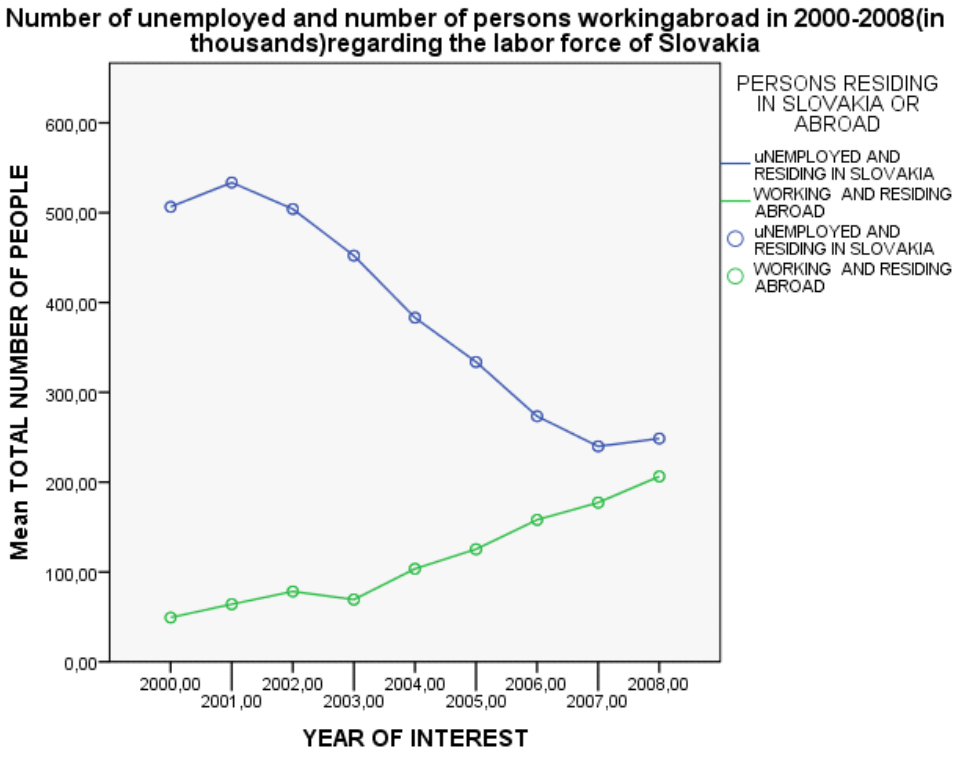

Fig. 5: Labor force in Slovakia during 2001 to 2008

The correlation coefficient between the variables:

Number of people unemployed and residing in Slovakia and

Number of people working and residing abroad

is -0,955 and it is statistically significant at the level 0,005. It is observed that as the number of people unemployed and residing in Poland is reduced, at the same time the number of Polish people working abroad is increased.

According to the following Figure 6, from Eurostat, Survey on Employment and immigration, 2014/2008 (LFS AHM2014/2008), the following are concluded:

In 2014, the unemployment rates of the EU population aged 25–54 ranged from 17.2 % in the case of 'first-generation immigrants' with 'non-EU origins' to 7.6 % for 'second-generation immigrants' with 'EU origins' (see Figure 6). Unemployment rates were higher among both groups with 'non-EU origins' while the immigrants with 'EU origins' and the 'native-born with native background' presented unemployment rates below 10 %.

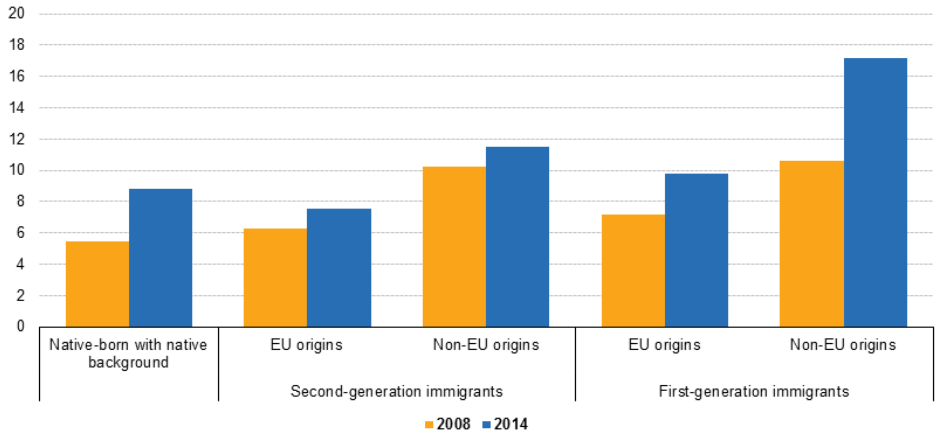

Note: population aged 25–54.
(¹) Origin of first-generation immigrants: country of birth; origin of second-generation immigrants: country of birth of parents.
(²) 2014: estimates do not include Denmark, Ireland or the Netherlands and include estimates for Germany by citizenship.
Source: Eurostat, EU LFS AHM2014/2008

Fig. 6: Causes of immigration among citizens of EU Countries

According to Rakauskienė and Ranceva (2014), the main causes of youth migration are: unemployment, poverty, poor quality of life, problems related to education and difficult political situation. The following adverse effects of emigration are usually cited: depletion of the country's human capital assets, resulting in lower productivity; loss of return on investment in education; smaller tax base; larger inequality in the donor country. It is rather obvious that if country loses its skilled, educated and demanded workforce this could retard its development.

The benefits from the brain drain or brain waste are the following: a. Outmigration has reduced the excess supply of labor and lowered unemployment. b. Outmigration has increased the wages of stayers, especially for socio-economic groups that have become relatively scarce. c. There are potential benefits from return migrants with enhanced human capital. d. Labor migrants send cash to their home economies (Zaiceva, 2014).

European Union states like the UK, Ireland and Sweden were three countries that opened their labor markets for the A8 (Latvia, Lithuania, Estonia, Poland, Hungary, Slovakia and Slovenia, Czech Republic) countries. This consequently resulted in considerable relocation of Latvian labor migrants, particularly to the UK and Ireland. According to Kahanec et al. (2009) almost 70% of the immigrants from the A8 have been absorbed by the UK and Ireland since 2003.

Statistical procedures to prove the relationship between Level of Education, performance in the Program for International Student Assessment (PISA) and Real Gross National Product per capita

Research Methodology

Summarizing the findings of the existing research on the causes of unemployment, one could define as follows the factors which generate unemployment in a country: Inadequate education, parents' unemployment, parent's lack of education, the structure of the educational system, skills mismatch, the financial crisis, the Gross Domestic Product of a country and social problems.

Adequate schooling of the citizens of a country leads to dynamic economic growth of the country. It is obvious that learning does not end with school and an assessment of schooling outcomes such as the Program for International Student Assessment (PISA) cannot reflect the skills which individuals acquire subsequently in their lives. However, evidence from longitudinal surveys in Australia, Canada and Denmark shows that performance in PISA is a strong and consistent predictor for subsequent educational experiences (OECD, 2010).

In this paper ,we shall investigate, with the help of linear statistical models, the relationship of Real Gross Domestic Product (GDP) per capita with the level of education of the citizens of the EU-28 (28 Countries of European Union), in 2018, which has the following three subcategories:

Level of Education:

- Level 0-2 : Less than Primary School, Primary and Lower Secondary Education
- Level 3-4: Upper Secondary Education,Post Secondary Education, Non-Tertiary Education
- Level 5-8: Tertiary Education, Undergraduate Tertiary Education, first stage of postgraduate Education, Second stage of Postgraduate educat., Doctoral Level.

Theories of the influence of Education on Economic Growth

The theoretical base of this approach comes from the "endogenous growth" literature that has developed over the time interval of 1990 to 2000. In this research, a variety of researchers (importantly Lucas (1988), Romer (1990) and Aghion and Howitt (1998)) stress the role of education in increasing the innovative capacity of the economy through developing new ideas and new technologies. This is called endogenous growth model because technological change is determined by economic forces within the model. The theories of technological diffusion such as Nelson and Phelps (1966), Welch (1970), and Benhabib and Spiegel (2005) stress that education and continuous schooling may facilitate the transmission of knowledge needed to implement new technologies.

Construction of a Linear Statistical Model to express the relationship between Real Gross Domestic Product per capita , Educational attainment and quality of learning (PISA Results)

Motivated from the above theories, we suggest the following linear Statistical Model which relates Real Gross Domestic Product (GDP) per capita for each Country of European Union and the performance of its students at the PISA competition for a specific year (t) and we consider the case :

t=2018:

$$\ln(\text{Real GDP per capita})_i = \alpha_0 + \alpha_1 \ln(\text{SCHOOL ATN}_{0\text{-}2})_i + \alpha_2 \ln(\text{SCHOOL ATN}_{3\text{-}4})_i + \alpha_3 \ln(\text{SCHOOL ATN}_{5\text{-}8})_i + \alpha_4 \ln(\text{PISA PERC})_i + \varepsilon_i \qquad (1)$$

where

$\ln(\text{SCHOOL ATN}_{0\text{-}2})_i$ is the logarithm with base (e) of the percentage of school attainment at level 0-2 in country (i) of the European Union on 2018,

$\ln(\text{SCHOOL ATN}_{3\text{-}4})_i$ is the logarithm with base (e) of the percentage of school attainment at level 3-4 in country (i) of the European Union on 2018,

$\ln(\text{SCHOOL ATN}_{5\text{-}8})_i$ is the logarithm with base (e) of the percentage of school attainment at level 5-8 in country (i) of the European Union on 2018,

$\ln(\text{PISA PERC})_i$ is the logarithm with base (e) of the number of points which the students belonging to country (i) have collected at the PISA international competition on 2015,

ε_i is a random error with mean (0) and variance (σ^2),

$\{\alpha_0, \alpha_1, \alpha_2, \alpha_3)$ are unknown coefficients to be estimated by Least Squares method.

ln(Real GDP per capita) is the logarithm with base (e) of the Real Gross Domestic Product per capita for country (i) on 2018. We present the following definition of Real GDP per capita:

Definition. Real GDP per capita is a measurement of the total economic output of a country divided by the number of people and adjusted for inflation. It is used to compare the standard of living between countries and over time (EUROSTAT, 2019).

The data used for model (1), are presented in the following Table 2:

Table 2: Data for Model (1)

COUNTRY	LN(REAL GDP PER CAPITA, 18)	LN(LEVEL $ED_{0\text{-}2}$, 18)	LN(LEVEL $ED_{3\text{-}4}$, 18)	LN(LEVEL $ED_{5\text{-}8}$, 18)	LN(PISA, 15)
BELGIUM	10,47	2,97	3,82	3,56	
BULGARIA	8,78	2,87	3,65	3,39	6,22
CZECHIA	9,78	2,82	3,98	3,39	6,10
DENMARK	10,77	1,67	4,23	3,27	6,20
GERMANY	10,49	2,73	3,71	3,75	6,23
ESTONIA	9,62	2,59	4,04	3,40	6,23
IRELAND	10,97	2,39	3,85	3,74	
GREECE	9,79	2,54	3,59	3,93	6,22
SPAIN	10,12	3,03	3,80	3,55	6,12
FRANCE	10,37	3,58	3,16	3,71	6,20
CROATIA		2,82	3,74	3,72	6,20
ITALY	10,19	2,40	4,11	3,33	6,16
CYPRUS	10,06	3,54	3,79	3,06	6,18
LATVIA	9,42	2,63	3,62	3,88	6,07
LITHUANIA	9,50	2,33	3,97	3,60	6,19
LUXEMBURG	11,30	1,77	3,88	3,82	6,16
HUNGARY	9,43	2,92	3,49	3,88	6,18
MALTA	9,98	2,62	4,08	3,31	6,17
NETHERLANDS	10,63	3,69	3,37	3,44	
AUSTRIA	10,54	2,86	3,72	3,73	6,23

COUNTRY	LN(REAL GDP PER CAPITA, 18)	LN(LEVEL ED_{0-2}, 18)	LN(LEVEL ED_{3-4}, 18)	LN(LEVEL ED_{5-8}, 18)	LN(PISA, 15)
POLAND	9,43	2,55	3,94	3,60	6,20
PORTUGAL	9,79	1,82	4,06	3,59	6,22
ROMANIA	9,07	3,76	3,35	3,35	6,22
SLOVENIA	9,91	3,00	4,09	3,01	
SLOVAKIA	9,66	2,17	4,01	3,59	6,24
FINLAND	10,51	1,99	4,18	3,31	6,13
SWEDEN	10,69	2,21	3,80	3,83	6,27
UNITED KINGDOM	10,39	2,56	3,71	3,84	6,20
ICELAND	10,59	2,86	3,60	3,83	6,23
NORWAY	11,15	2,98	3,49	3,86	6,16

We use the Statistical Package for the Social Sciences, SPSS (Version 21), Pallant (2013) on data presenting the variables of model (1) and we find the following results:

Table 3: Results for model (1), year 2018

Statistic	Std Error	p-value
R=0,72		
R^2=0,53		
F=5,87 ,DF1=4,DF2=21		0,002
Coeff. Of y-intercept=-30,98	15,06	0,05
Coefficiect of *ln(PERC0-2, 2018)=0,50*	0.41	0,23
Coefficiect of ln(PERC3-4, 2018)=0,35	0,95	0,72
Coefficiect of ln(PERC5-8, 2018)=0,1,49	0,68	0,04
Coefficiect of ln(PISA, 2015)=5,34	2,02	0,01

From Table 3 we conclude the following:

There is a statistically significant relationship between the dependent variable ln(REAL GDP for 2018) and the independent variables ln(percentage of people in Educational level 0-2), ln(percentage of people in Educational level 3-4), ln(percentage of people in Educational level 5-8), ln(PISA results for 2015), because R^2=0,528 and F=5,874, df1=1, df2=24, p-value=0,002.

The variables : ln(percentage of people in Educational level 5-8), p-value=0,040, and, ln(PISA results for 2015), p-value=0,015, are statistically significant.

Construction of a Linear Statistical Model to express the relationship between the Real Gross Domestic Product per capita and the results of the Program for International Student Assessment (PISA)

The newly developed theory of economic growth of the decade of 1980 to 1990 emphasizes the importance of education and innovation, (elements of human capital) in long-term economic growth. In contrast to this, the theory of market value, shows that many studies have highlighted the influence of intangible assets such as research and development, patents, intellectual capital on the market value of companies and also on their development, leading ultimately to economic growth. There are many research publications which have revealed that one of the most important factors of economic growth is human capital (Aghion and Howitt (1998), Lucas(1988), Mankiw et al. (1992), Romer (1990a; 1990b)).

In this context it is important to emphasize the quality of learning outcomes achieved by students and the ranking of the countries of the organization of economic cooperation and Development with respect to the assessment of their 15 year old students in three main areas of knowledge, Mathematics, Science and Reading comprehension.

The Program for International student Assessment (PISA) has been launched by OECD and it is a examination in Mathematics, Science and Reading of 15 -year old students coming from all the countries of OECD. This exam was held on 2000, 2003, 2006, 2009, 2012, 2015 and 2018. The results of 2018 will be published on December 2019.

According to the report by Hanushek and Woessmann (2010), there is a strong relationship between cognitive skills – as measured by PISA and other international Programs-to economic growth. The relationship indicates that relatively small improvements in the skills of a nation's labor force can have very large influence on future well-being. Moreover, the benefits, put in terms of Real Gross Domestic Product (GDP), far outstrip the value of the short-run business-cycle management. This is not to say that efforts should not be directed at reducing the bad effects of economic recession, but it is to say that the long-run issues should not be neglected.

In the context of the above theoretical basis, we assume for each of the years: t(1)=2012, t(2)=2009 and t(3)= 2003, the following model for the countries of European Union:

$$\ln(\text{Real GDP per Capita})_i = \alpha_0 + \alpha_1 \ln(\text{PISA PERC})_i + \varepsilon_i \qquad (2)$$

where

$\ln(\text{PISAPERC})_i$ is the logarithm with base (e) of the number of points which the students belonging to country (i) have taken at the PISA international competition on year t(j), j = 1, 2, 3.

ε_i is a random error with mean (0) and variance (σ^2)

$\{\alpha_0, \alpha_1)$ are unknown coefficients to be estimated by Least Squares method,

$\ln(\text{Real GDP per capita})_i$ is the logarithm with base (e) of the Real Gross Domestic Product per capita for country (i) on year t(j), j = 1, 2, 3 .

The following table presents the data used in model (2):

Table 4: Data for Model (2)

COUNTRY	LNGDP12	LNPISA12	LNGDP09	LNPISA09	LNGDP03	LNPISA03
BELGIUM	10,43	6,23	8,10	6,23	10,34	6,21
BULGARIA	8,58	6,00	8,52	6,06	8,19	
CZECHIA	9,62	6,23	9,59	6,17	9,41	6,20
DENMARK	10,70	6,21	10,67	6,20	10,66	6,19
GERMANY	10,41	6,23	10,33	6,21	10,28	6,18
ESTONIA	9,43	6,24	9,29	6,22	9,15	
IRELAND	10,51	6,21	10,50	6,21	10,50	6,19
GREECE	9,79		9,98	6,18	9,90	6,11
SPAIN	10,00	6,17	10,05	6,18	10,03	6,15
FRANCE	10,35	6,24	10,32	6,21	10,29	6,20
CROATIA	9,24	6,14	9,27	6,17	9,15	

ITALY	10,17	6,23	10,19	6,19	10,23	6,11
CYPRUS	9,99	6,10	10,06		9,98	
LATVIA	9,18		9,06	6,18	8,79	6,15
LITHUANIA	9,24		9,07	6,15	8,81	
LUXEMBURG	11,25		11,25	6,16	11,21	6,15
HUNGARY	9,21	6,13	9,19	6,20	9,10	6,14
MALTA	9,71		9,65		9,57	
NETHERLANDS	10,41	6,24	10,55	6,23	10,47	6,21
AUSTRIA	10,50	6,23	10,46	6,15	10,39	6,19
POLAND	9,21	6,18	9,12	6,21	8,84	6,16
PORTUGAL	9,69	6,20	9,72	6,19	9,70	6,13
ROMANIA	8,78		8,76	6,05	8,39	
SLOVENIA	9,76	6,17	9,78	6,18	9,64	
SLOVAKIA	9,48	6,18	9,38	6,17	9,09	6,16
FINLAND	10,46	6,26	10,43	6,28	10,38	6,21
SWEDEN	10,60	6,20	10,54	6,21	10,48	6,19
UNITED KINGDOM	10,31	6,25	10,28	6,20	10,27	
ICELAND	10,41		10,42	6,21	10,29	6,20
NORWAY	11,11	6,22	11,11	6,22	11,06	6,17

The results for model (2) for each of the years 2003,2009 and 2012 are presented in the following table:

Table 5. Results for year 2003, Model (2)

Statistic	p-value	Std Error
R=0,347		
R^2=0,120		
F=5,98 , DF1=1, DF2=19	0,123	
Y-INTERCEPT=-36,34	0,22	28,79
COEFF, OF LNPISA3 = 7,52	0,12	4,66

Table 6. Results for year 2009, Model (2)

Statistic	p-value	Std Error
R=0,41		
R^2=0,17		
F= 5,34, DF1=1, DF2=26		
Y-INTERCEPT=-33,23	0,086	18,63
COEFF, OF LNPISA9=6,96	0,029	3,01

Table 7. Results for year 2012, Model (2)

Statistic	p-value	Std Error
R=0,65		
R^2=0,43		
F= 16,16, DF1=1, DF2=21	0,001	
Y-INTERCEPT=-32,10	0,006	10,47
COEFF, OF LNPISA12=6,79	0,001	1,69

From the above table we conclude for years 2012 and 2009, the variables ln(PISA12) and ln(PISA09) are statistically significant. For years 2012 and 2009 the Statistics F and R are statistically significant meaning that there is a relationship between ln(GDP12) and ln(PISA12) and also between ln(GDP09) and ln(PISA09).

The performance of Greek 15-year-old students in the International Competitions of PISA and the ranking of Greece in PISA ,between the countries of European Union.

From the tables which present the performances of the Students of European Countries, we conclude the following:

a. The rank of Greece was 21st (the last one) out of 21 European countries which have participated in the PISA competition of 2003.The score of Greece was 449 whereas the score of Finland which was the top performer was 500.
b. The rank of Greece was 18th out of 28 European countries which have participated in the PISA competition of 2009.The score of Greece was 483 whereas the score of Finland which was the top performer was 536.
c. The rank of Greece was 25th out of 28 European countries which have participated in the PISA competition of 2015.The score of Greece was 455 whereas the score of Finland which was the top performer was 531.
d. In all PISA international competitions of 2003,2012 and 2015,the score of Greek students ,in the three subjects-Mathematics, Science and Reading- was below the Mean Score of all the European countries which have participated in the PISA competition.
e. The solution to these disappointing results lies in the process of changing the curriculum of schools and educational institutions and establishing the Schools-Models in Greece which will have the best curriculums, the best ratio of teacher -student and, finally ,the best students. According to the report of by E.A. Hanushek and L. Woessmann (2010), applying reforms in schools is a difficult task and the results in terms of student achievement are relatively modest and fruitful ,in the long-run .

At the same time, the results from countries achieving high and impressive learning outcomes in PISA-like Finland in Europe, Canada in North America or Japan and Korea in East Asia-or from those that have seen rapid improvements in the quality of schooling (like Poland) underline that doing better is possible.

Concluding Remarks

From the above research we conclude the following:

a. There is a close relationship between the economic growth of a country expressed in terms of its Real Gross Domestic Product per capita and the level of education of its citizens as well as the quality of learning outcomes which are achieved by its students in successive PISA competitions.
b. The Southern Europe countries, especially Greece and Cyprus, need to reform their educational systems in order for their students to perform better in International competitions, such as PIZA, but ,also, because ,the reform of educational systems will produce better “human capital” which is necessary for innovating the economic systems of these countries. Therefore, particularly important tasks are the following: promoting training and retraining to enhance obsolete skills, in all countries, especially, in Greece and Cyprus.
c. It is important that the policy makers, particularly the educational planners , pay attention to the participation of 4-year old children to programs of pre-school education, as well as, to the participation of disadvantaged children or children with learning and behavioral difficulties to programs of inclusive education for all.
d. Attention must be paid from the educational planners to the sports education for all the citizens of the European countries. The sports education will make possible the maintenance of a healthy population and a dynamic economy.
e. Moreover, since labor shortages are likely to be filled by immigrant labor, accommodating immigration policies is important.

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A Main Barriers to Improve the Effectiveness of Execution of IT Projects Intended for the Polish Public Administration

Stefan ROZMUS

Institute of Computer and Information Systems, Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, stefan_rozmus@wat.edu.pl

Abstract

A diagnosis of the condition of key Polish IT projects, subsided by the European Union structural funds, implemented to the benefit of public administration during the period 2004-2015 has shown that practically all large projects have ended up with more or less spectacular failures. The planned corrective actions are included in the document National Integrated Informatisation Programme. Now the next and third evaluation of this document shows that the corrective measures taken are still unsatisfactory. The aim of this article is to assess the reasons for this and to identify main barriers to the success of the programme. The presented paper is based on the analysis of the literature on the subject and the author's experience gained during participation in several large IT projects for public administration.

Keywords: project, system, public administration, informatisation.

Introduction

Achieving the success of an IT project was, and still is, a big problem. The results of studies carried out over the last few decades show that a significant number of IT projects have not been successful. The world-famous organisation The Standish Group International, which has been involved in researching the properties of IT projects and software development methodologies since 1985, published a report as early as 1994, which showed that only 16% of the projects could be considered as successful (TheSGI, 2014). Despite the constant development of methodologies, both for project management and software development, the situation remains unsatisfactory in this respect. This is confirmed by reports from successive studies (TheSGI, 2016; TheSGI, 2019). Over the period 1996-2019, the share of projects completed successfully oscillated around 30%. It should be noted that the attempt to improve this condition of affairs by implementing a new definition of success in 2011 has failed. According to the new definition, the success of a project means that it has been carried out according to the schedule, did not exceed the planned budget and the result of the project was considered satisfactory (*on time, on budget with a satisfactory result*). The adopted definition of success is based on project parameters slightly different from the classical design triangle (Atkinson, 1999). The *quality* parameter was replaced by the *satisfactory result* parameter (time parameter and budget parameter remained). This seemingly small change allows for a flexible elaboration of definition of success for a specific project, with the possibility to take into account e.g. customer satisfaction, benefits for the organisation, benefits for interested parties, etc.

The same applies to IT projects for the Polish public administration, which is one of the largest recipients of dedicated IT systems in Poland. According to data from the Central Statistical Office, in 2013 the number of implemented systems alone, which are sources of data for public statistical surveys, exceeded five hundred, and several dozen more were under implementation (GUS, 2013). Does this mean that each of these projects, which ended with the implementation of a manufactured product or a service, was successful? Yes, if we assume that the mere fact of implementation, taken as a satisfactory result, means the success of the project. However, when considering the success of a project in the scope of maintaining the values of the planned project parameters (scope, time, budget, quality) within the accepted tolerances, it turns out that in relation to many of these projects it is difficult to speak of

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its success. However, in this context, referring to only one of the parameters, time, can we call the implementation, in the Pension Office of the Ministry of the Interior Affairs, of the pension system EMERYT with a delay of over ten years (MSWiA, 2014), the success of the project? As in the case of the CEPiK system, which was implemented several years after the planned deadline (CEPiK, 2003). It is also difficult to talk about the success of the project, within which the ŻRÓDŁO application enabling the processing of data collected in the State Registers System, was developed. Since the migration of data from local systems to the database of this system began with the implementation of the ŹRÓDŁO application (1 March 2015), immediately after its implementation, the waiting time for issuing e.g. a copy of a birth certificate has increased from the previous few hours to over three months (NIK, 2016).

These are examples of three projects only where the planned value of at least one of the project parameters has not been met. Nevertheless, these are not exceptional cases. As mentioned in the report summarising the condition of implementation and results of the largest Polish IT projects co-financed from the European Union structural funds in the years 2004 - 2015, practically all large IT projects implemented with the subsidies of EU funds ended in more or less spectacular failures (Nowakowski, 2015; Nowakowski and Klinger, 2015). The implementation of corrective actions was to be ensured by the National Integrated Informatisation Programme (PZIP) (MAiC, 2014) and its subsequent evaluations. Unfortunately, the diagnosis of the condition of informatisation of the State, presented in successive evaluations of the PZIP (MC, 2016b; MC, 2019), shows a number of negative features, some of which have invariably been repeated.

The aim of this article is to assess the reasons for this and to identify main barriers to the success of the programme. The presented paper is based on the analysis of the literature on the subject and the author's experience gained during participation in several large IT projects for public administration. Although some of the original Internet sources are no longer available, however the author has copies of these materials downloaded from the Internet, on the date of access.

The National Integrated Informatisation Programme and the effects of its implementation to date

The National Integrated Informatisation Programme is a strategic document describing the activities of the government aimed at providing citizens with electronic public services of high quality. The aim of the programme is to create a coherent, logical and efficient information system of the State, which such system provides e-services at national and European level in a quality- and cost-efficient manner. Starting from a diagnosis of the condition of informatisation as for today, the programme shows the objectives to be achieved and ways to achieve them, as well as a proposal for measures to monitor the effectiveness of achievement of results.

The diagnosis showed that the informatisation of a number of public administration processes has been underway, and several cross-sectoral IT projects have provided solutions, which are used by many users on a national scale. The services provided, available online, cover a number of key areas, including administrative matters (in particular, citizens' affairs), the labour market, health care (which is currently bearing fruit in the face of COVID-19), justice and the judiciary, running business enterprises, settlement of taxes due to the State and access to statistical data for citizens. Nevertheless, a number of problems, which affect the management of projects and the effects of implementation of IT systems by the administration, have also been identified. One of the main problems was insufficient preparation of the administration for the implementation of the projects, which manifested itself in the weakness of the project approach to the implementation of the tasks, i.e. subject-matter and organisational preparation of the teams responsible for the execution of the projects, and ultimately - due to the lack of a coherent concept of functioning and maintenance of the systems already produced. Among the other problems, the most important ones were identified to be:

- lack of proper coordination of projects’,
- deficiencies in the system for monitoring the progress of project implementation,

- problems in providing financing for the maintenance of the services made available, resulting in the suspension of the project execution or failure to use its effects,
- delays in legislative work causing delays in the execution of projects and the inability to use the implemented solutions in practice,
- problems with the application of public procurement law resulting in delays in the projects' executions.

The analysis of the diagnosed condition resulted in the conclusion that in order to ensure effective implementation of the objectives defined within the PZIP, it becomes necessary to define uniform management standards, common to public administration, which will be applied in the informatisation process. These standards are grouped into three areas:

- the area for management of portfolio, programmes and projects,
- area of the application software development,
- the area of management of implemented IT services.

The diagnosis of the condition of the State informatisation presented in the next evaluation of the PZIP (MC, 2016b) showed that the condition of the State informatisation, found in the evaluated period of activities from 2014, and therefore the effects of the implementation of the PZIP in its previous evaluation, is characterised by a number of negative features. With regard to running IT projects for public administration, this condition can be described as follows:

- the management of IT resources is dispersed and decentralised and therefore uncoordinated,
- lack of sufficient competences on the part of the administration in procurement, designing, building and maintaining IT systems causes delays in implementation, poor quality and may result in unjustified costs for the State. This concerns cooperation with both external and internal suppliers,
- lack of uniform standards and guidelines for the development, maintenance and implementation of ICT projects and lack of cyclical control mechanisms,
- lack of governmental (group ones, common for part of the administration) rules for running IT projects and lack of a leader responsible for coordinating these works.

In the next, planned as the last one, evaluation of the PZIP (MC, 2019), the actions undertaken within the PZIP were assessed as directionally correct. However, their effects have not yet been assessed , as most of the actions were taken late or were executed too fragmented, and some projects are still in the preparatory phase. It has been pointed out that due to the persistence of the problems identified previously and the insufficient effectiveness of the actions undertaken so far, it is justified to continue the directions of works undertaken within the current programme. The approach itself seems appropriate, in particular in view of the continuing (after five years of execution of the PZIP) negative features in the area of IT projects for public administration, such as:

- dispersed and uncoordinated management of IT resources,
- a growing gap in the market for the availability of IT specialists, which is an important element hindering the development of the domestic IT sector,
- insufficient competences of public administration in the area of ordering, designing, building IT systems and their maintenance, related, among others, to the low competitiveness of public administration as an employer for IT specialists.

However, without denying the rightness of the chosen directions of improvement, one may fear that the final assessment of the results of the execution of the National Integrated Informatisation Programme by the Council of Ministers, planned for 2024, will not be fully satisfactory. For, without knowing the assessment of the effects of the measures taken to date, it cannot be assumed that they are appropriate. For the same reason, there is no basis for properly estimating the time needed to achieve the planned final effects of the programme. In this situation, it may be helpful to analyse in detail

projects already completed, in terms of the conditions for their implementation and the achievement of the planned parameters. In addition, it is worth looking at how the public administration body responsible for these projects evaluated their implementation.

The execution of the projects within the priority axis No 7 of the Innovative Economy Operational Programme – case study

Within the priority axis No 7 of the Innovative Economy Operational Programme (IEOP), 40 contracts/agreements for subsidies were signed (together with the system project). The total value of co-financed projects under the priority axis No 7 is PLN 3,820 million. By December 31, 2015, 36 projects (including the system project) for the total value of subsidies of PLN 2,670 million, were completed (MC, 2016a). The analysis of the course of execution of selected projects, compared to the life cycle of an IT project for public administration, brings, in the author's opinion, a number of information allowing for a more detailed diagnosis of the causes of problems included in the PZIP. In comparison with the results of this analysis, the evaluation of project execution, issued by the Ministry of Digitalisation at the time of closing the priority axis No 7 of the IEOP, seems particularly interesting.

Life cycle of an IT system for public administration

The life cycle of an IT system for public administration results from the published recommendations of the Head of the Public Procurement Office, concerning the award of public procurements for IT systems and the supply of computer sets (UZP, 2011). According to them, an entity subject to Public Procurement Law, when constructing a procurement for an IT system, should take into account the system life cycle including the following phases:

- Conceptual phase - it concerns all activities related to the identification of needs, review of available solutions, assessment of their feasibility at the contracting authority (a public administration entity).
- Contractor selection phase - includes activities aimed at selecting a contractor for a specified system, culminated with signing up a contract with the contractor.
- Execution and acceptance phase - includes the execution of the contract with the contractor completed with the acceptance of the ordered/procured system and putting it into current operation.
- Operation phase and further development phase - the system built is used by the contracting authority and administered by the relevant employees of the contracting authority or by a contractor selected for this purpose.

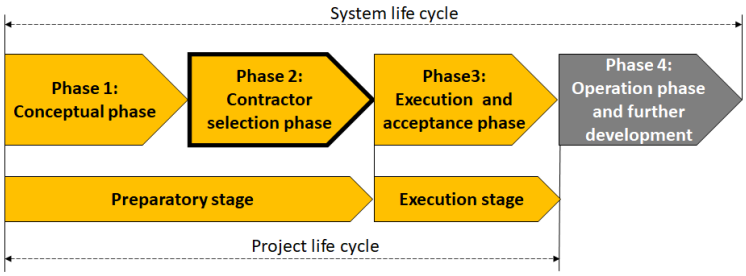

Fig. 1: Project life cycle as part of the IT system life cycle for public administration

The first three phases make the life cycle of the project (Fig. **1**), within which the system is developed. It can be noticed that the success of a project depends to a large extent on the contracting authority. For it is the contracting authority, as part of the preparatory stage (phase 1 and phase 2), that is laying the foundations for the future execution of the system (phase 3). It is important for the contracting authority

to treat the project as a whole, for which he is responsible. It would seem that this is natural. Nevertheless, there are known cases of the use of the tempting possibility of assigning a responsibility for the implementation of the whole project to the system's contractor, although the real presence of the contractor in the project dates back to the beginning of phase 3. In order to better expose this issue, in the author's opinion, it is reasonable to use a case study covering the execution of projects under the e-Cło (eng. *e-Duty*) programme (in one of these projects the author acted as the project manager). Although it is only a group of a dozen or so projects, however the negative results of the report mentioned above (Nowakowski, 2015) allow, to a certain extent, for a generalisation of the considerations, also covering the remaining projects from the period 2004-2015, which, after all, are carried out on the basis of the same rules as those of the e-Cło programme. They were based on the same binding legal provisions.

Programme e-Cło - plans and execution

The aim of the e-Cło programme was to build an electronic environment for the Polish customs administration to provide electronic public services related to the collection of receivables by the customs administration, trade in goods and ensuring the security of international trade. The e-Cło programme included 20 interrelated projects (e-Cło, 2012).

The projects of the e-Cło programme were managed in accordance with the PRINCE2 methodology applicable to projects executed and implemented for public administration. Each project had two management stages (Pękala, 2012) (Fig 1). Stage I, preparatory stage, included actions on the part of the contracting authority, from the preparation of the project to the selection of an external contractor in the tender procedure. Stage II, implementation, is the development by the contractor of an external IT system and other products specified in the procurement, to which he was contractually obliged. This would seem to be a typical project management process with an external/outsourced contractor. The moment of signing up the contract (item U) is tantamount to ordering a group of tasks to be performed by the project manager to the manager of the contractor team. The problem is that the contract and its enclosures do not in any way meet the conditions imposed on the input element of the process, *accepting a group of tasks to be performed*. As a basic principle, before a task force is assigned to a team, the project leader and the team leader should agree on what is to be provided, the reporting requirements, what restrictions apply, what procedures are to be followed and whether the requirements of the task force are justified and whether can be met (Axelos, 2009).

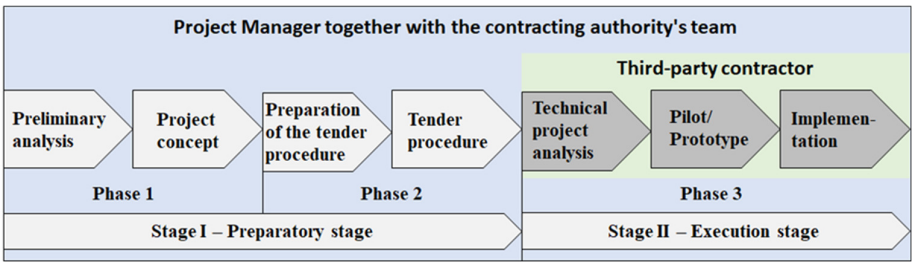

Fig. 2: Management stages of e-Cło projects compared to the current project life cycle

Ignoring the fact that at the time of signing the agreement, a second project appears (Rozmus, 2014), which also needs to be initiated, results in unnecessary chaos at the outset. On the one hand, the contracting authority requires a number of management documents to be prepared, while on the other hand, work on the contractor's side starts from the technical design phase, which does not include the preparation of management documentation. If the required management documentation consists of several dozen documents, including descriptions of the products to be produced, the contracting authority should anticipate and ensure adequate time for their implementation in a framework schedule.

There are also a number of reservations about the framework schedules. First of all, the contracting

authority did not allow for the possibility of postponing the planned project completion date if the planned contract deadline is exceeded. This resulted in bizarre situations where the contract for one of the projects was signed in December and the system, developed within this project, was to be ready for pilot implementation at the end of January next year.

Moreover, the deadlines given for reaching the milestones were often unrealistic. This was mainly due to the imposed deadlines for the production of certain products, the manufacture of which was conditioned by the manufacture of other products. For example, in the technical design phase of the ZEFIR2 system there is, among others, the item *Developing a tests' plan* (IC-Kraków, 2011a). The document specifies that the test plan should contain, inter alia, the scope of the tests, the place where test is conducted, a detailed test schedule, a list of test scenarios.

It would not be surprising if it were not for the fact that the complete document was to be produced at the same time as the requirements specification (and thus even before the system was designed). It is not difficult to notice that the scope of the document defined in this way is, by definition, impossible to achieve under these conditions. Only acceptance tests can (and should) be specified.

Table 1: Scheduled timeframe for the execution of projects within the e-Cło programme

Project	Commencement date	Scheduled completion date	Scheduled timeframe for the execution [months]			Total scheduled timeframe for the project [months]
			Phase 1	Phase 2	Phase 3	
HERMES2	April 2009	March 2014	**26**	15	19	60
Help Desk	January 2010	September 2013	**16**	**17**	12	45
ZISAR	February 2010	December 2013	**21**	13	13	47
MCA	February 2010	December 2013	**31**	**8**	7	46
ZEFIR2	April 2010	March 2014	11	**19**	18	48
SZPROT	July 2010	March 2014	**20**	9	16	45
PDR PL/UE	July 2010	September 2013	**16**	12	13	41
AIS	November 2010	March 2014	**18**	7	16	41
SZPADA	April 2011	December 2013	7	5	**21**	33
AES	July 2011	March 2014	9	8	16	33
ARIADNA2	August 2011	December 2013	8	4	**17**	29
NCTS2	October 2011	May 2014	3	11	**18**	32
OSOZ2	October 2011	December 2013	6	8	13	27
ECIP/SEAP PL	October 2011	December 2013	6	6	**15**	27
ISZTAR4	October 2011	December 2013	6	8	13	27

It is also worth analysing the planned execution times of e-Cło projects (due to lack of data, not all projects were included) in relation to individual project phases (Table 1). Out of 15 projects:

- only in 4 projects the time to execute phase 3 is longer than the total time to execute phases 1 and 2,

- in 7 projects the time to execute phase 1 is longer than the time to execute phase 3,
- in 3 projects the time to execute phase 2 is longer than the time to execute phase 3.

It is not difficult to notice that the proportions of the estimated lead times of the various phases of the projects clearly indicate that only those phases, for which the contracting authority is responsible, are taken care of, and that responsibility for their implementation cannot be transferred to someone else. With the predetermined timeframe of the projects, the average share of the estimated time of the preparatory stage in the estimated duration of the whole project was 60.93%, with the maximum share as high as 84.78%. The share was less than 40% in just one project only.

Although potential contractors made comments on the Terms of Reference (IC-Kraków, 2012), but the comments did not bring any effect. And the end result (MF, 2015; MF, 2016a, 2016b; IC-Kraków, 2016), as you might have guessed, has definitely missed the plan (Fig 3).

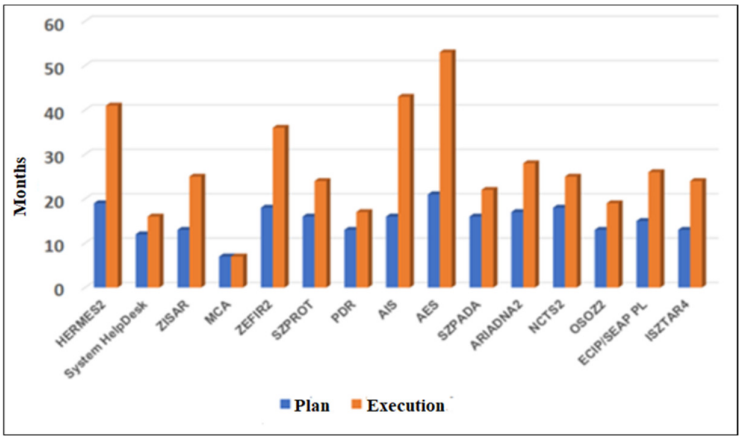

Fig 3. Delays in the completion of e-Cło projects in relation to the plan

Apart from one, the projects under consideration were delayed. The average delay by the external contractor (*Phase3*) was about 71% of the planned time and the maximum was as much as 169%. Among the delayed projects, projects with a delay of more than 50% of the planned time (8 projects) prevailed, half of which were projects with a delay of more than 100% (Fig 4).

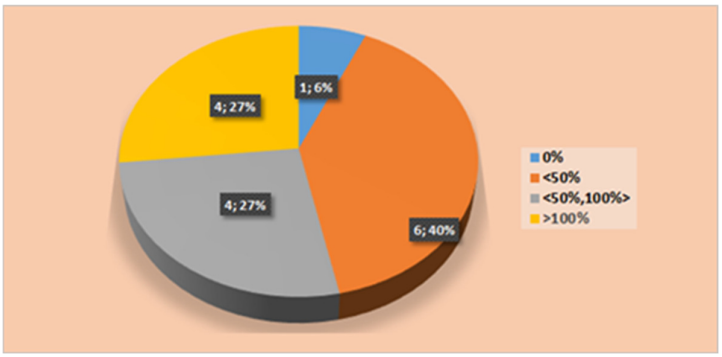

Fig 4. Number and percentage of projects in the e-Cło programme by groups of delays

Evaluation of the execution of the projects of the priority axis No 7 of the Innovative Economy Operational Programme by the Ministry of Digitalisation

In the presented case study I have pointed out a number of anomalies and deficiencies, which have led to the planned time of *Phase3* execution being exceeded, thus to exceeding the planned project execution date. Due to the lack of complete data, it was not possible to analyse how the real costs of the projects were forming in relation to the planned budgets of these projects. Nevertheless, such an assessment was made by the Ministry of Digitalisation. The information on the closure of the priority axis No 7 of the IEOP (MC, 2016a) shows that none of the 40 projects (including the e-Cło programme) has brought losses, and for a significant part of them (32 projects) savings were even noted. This concerns both completed and uncompleted projects (4 projects). Thus, with the total value:

- of all projects, amounting to PLN 4,206,708,281.57, savings of PLN 249,921,915.69 were achieved, which represents 5.94% of the total value,
- of projects completed, amounting to PLN 2.878.945.048,48, savings of PLN 35.975.474,59 were achieved, which represents 1.25% of the total value,
- of projects uncompleted, amounting to PLN 1.327.763.233,09, savings of PLN 213.946.441,10 were achieved, which represents 16.11% of the total value.

Table 2: Savings made on uncompleted projects

The name of the project	The total value of the project [PLN]	The sum of money saved [PLN]	% of money saved in the value of the project
The IT Project, the System for the Protection of the Country against Emergency Threats (SPCET)	297,132,212.02	5,570,062.97	1.87%
Project pl.ID	294,026,962.00	15,372,714.46	5.23%
The Project, the Electronic Platform for Collecting, Analysing and Sharing Digital Resources on Medical Incidents (P1)	712,640,000.00	192,528,076.25	27.02%
The Project, Building the e-service platform of the Office of Electronic Communications	23,964,059.07	475,587.42	1.98%

Taking into account the above, it should be concluded that the situation in the area of financial management of projects for public administration is very good. This is because, despite significant delays in projects in relation to their planned completion dates, none of the projects exceeded their planned budget. What's more, in case of most of the projects, savings were made, with the greatest savings being made by uncompleted projects (Table 1). Is it therefore *a priori* assumed that delays will not affect the cost of the project? Of course, such an assumption is not to be found in any of the project documents. But it is hard to avoid the impression that this was the idea (probably by the consultants) who were drawing up the timetables for each phase (Table 2). The execution time periods for the phases without the participation of an external contractor (*Phase1* and *Phase2*) have been designed to minimise the risk of delay of any of them. Moreover, contracts with external contractors are fixed price contracts, regardless of changes in the scope of the project, including those resulting from changes in legal regulations (IC-Kraków, 2011b). Therefore, the cost of *Phase3* should not affect the total cost of the project, as long as the contracting authority does not exceed its planned costs for *Phase3*. If the change of scope generates additional costs, they will be borne solely by the contractor. And this was probably the case with the execution of projects within the priority axis No 7 of the (IEOP). This is

clear from the assessment presented, although there is no certainty that all those involved in the projects on the part of the contracting authority were paid only from the project budgets, for the entire duration of the projects. Delays in projects can also mean the loss of benefits (and therefore losses), which was not taken into account at all.

Summary

The case study presented clearly shows a number of discrepancies in the preparation and implementation of IT projects for public administration. The main ones are:

- to strive to provide the contracting authority with maximum security, in terms of maintaining project parameters, during the phase, for which he bears sole responsibility,
- seeking to transfer all responsibility for maintaining the parameters of the project to an external contractor during the phase, in which he is involved,
- manipulating the PRINCE2 methodology processes in order to transfer part of the work to an external contractor, which in the management approach adopted (Fig.3) should be carried out by the contracting authority,
- too much confidence in consultants making subject-matter errors in the formulation of the scope of work to be performed, including in framework schedules, resulting in the need to negotiate, anyway necessary changes, immediately after the contract is signed by an external/outsourced contractor,
- ignoring the fact that some of the requirements elaborated by the contracting authority will be outdated at the time of signing up the contract with the external/outsourced contractor, while satisfying itself that the contract price includes any changes in scope, including changes made during the system's production period,
- provisions of the public procurement law, unfavourable to the life cycle of the project, including rigid procedures for drawing up contracts with an external contractor.

If, despite this fact, the final evaluation of the projects executed this way, issued by the institution responsible for their execution, was positive (because an appropriate criterion was adopted), it is no wonder that the same problems still exist in the current evaluation of the PZIP. And, according to the author, this is not mainly due to the lack of IT competences of the persons involved in the projects on the part of the contracting authority (although it is clear that, in relation to administrative staff as a whole, they can constitute a significant barrier (Rozmus, 2017). The most serious barrier to the success of the PZIP, is rather the attitude of the contracting authority, which, with the approval of the responsible authority, is characterised by avoiding co-responsibility for projects. This is facilitated by the lack of established objective criteria for evaluating the execution of IT projects for public administration.

To conclude, without changing the contracting authority's approach to the projects, little will change in the next period of the PZIP. It is to be hoped that such a change will be achieved through further actions by the Centre for Administrative Competence (MC, 2016b), which is responsible, among other things, for verifying all central projects and for providing subject-matter support of the coordination of projects' implementations and executions.

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Employee Trust in The Employer and Its Relation with Company Action for Sustainable Development - A Comparative Analysis of Employees' Opinions In Poland And India

Teresa KUPCZYK

General Tadeusz Kosciuszko Military University of Land Forces, Wroclaw, Poland,
teresa.kupczyk@awl.edu.pl

Joanna KUBICKA

The International University of Logistics and Transport in Wroclaw, Wroclaw, Poland,
joamama@gmail.com

Abstract

Employee trust in employers has become a key value nowadays, particularly in the context of shortages on the labor market and the growing importance of people and their impact on enterprises' success. Therefore, the article aims to identify, analyze, and diagnose employees' sense of trust towards the employer and its significant relation with enterprises' action for sustainable development. Quantitative and qualitative research was carried out based on a questionnaire survey among 449 employees of enterprises in Poland and India to verify the theses and hypotheses. The average level of trust of the surveyed employees towards the employer was found. Polish respondents have significantly lower confidence in the employer than employees from India. It was proved that the more sustainable development activities the enterprises introduce, the higher the trust employees have in the employers. Such activities comprise taking environmental and social issues into account when making key decisions, conducting employee volunteering, enabling employees to carry out charity projects during work, communicating and promoting dedication to sustainable development, both among employees and in the environment, supporting employees in striving for a balance between work and personal life, taking care to improve their working conditions, organizing the training on sustainable development and implementing good practices in this area in the company, and enabling employees to initiate and implement changes in the enterprise from the bottom up. The research findings may support the managerial staff responsible for human resource management. Besides, they may prove useful for implementing strategic plans related to sustainable development and social responsibility. They will allow for a better understanding of the existing relationships between employees' sense of trust in the employer and enterprises' sustainable development.

Keywords: employee trust in the employer, sustainable development of enterprises, Poland, India.

Introduction

The Sustainable Development Goals to be achieved by 2030 include, in addition to environmental protection, tasks related to promoting prosperity and equity, full and productive employment, decent work for all, lifelong learning, and achieving gender equality. They are mainly included in Target 8 (SDG8 - Decent Work and Economic Growth) and Target 5 (SDG5 - Gender Equality). Their implementation has a key impact on the trust of employees and their functioning in the professional sphere. Trust is a very complex construct, with multiple levels, bases, and determinants (Rousseau et al., 1998). It has been defined in terms of a personality trait (e.g., the propensity to trust) (Rotter, 1967), but also has been defined as a behavior (e.g., trusting behavior) (Mayer et al., 1995). Regardless of the

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differences in definition (Rotter, 1967), researchers have highlighted the importance and role of trust. Employee trust brings many benefits. Thanks to it, effective operation, cooperation, and success of the organization are possible (Torres, Bligh, 2012). It is associated with commitment (Dirks, Ferrin, 2002; Lapierre, 2007; Mayer, Gavin, 2005), employees' creativity (Madjar, Ortiz-Walters, 2009; Tam, Lin, 2009), low intention to leave the job (Ferres, Connell, Travaglione, 2004), job satisfaction (Dirks & Ferrin, 2002; Tam, Lin, 2009), and building good relationships (Mayer, Bobko, Davis, Gavin, 2011; Rotter, 1980). It should be remembered that "as trust in general and therefore also between employees and employers differs across countries, not least because of country-specific traditions and socioeconomic and cultural differences" (Clegg, 1976; Crouch, 1993; Delhey and Newton, 2005; Ferner and Hyman, 1998; Fox, 1974; Möllering et al., 2004; Uslaner, 2002). In an organization, trust can take many forms, from trust between organizations (Gulati, 1995; Moorman, Zaltman, & Deshpande, 1992), trust between associates/members of the organization (Dirks & Ferrin, 2002; Johnson-George, Swap, 1982), trust in the relations between subordinates and superiors (Torres, Bligh, 2012), through the employee's trust in the organization (Caldwell, 2004; McCauley, & Kuhnert, 1992). The latter type of trust has become the subject of various empirical research. However, it has rarely been considered from the point of view of its impact on the Sustainable Development of Enterprises. As it turns out, it increases, e.g., the level of trust in the organization in relations with new employees or cooperators (Renwick, Redman, Maguire 2012). Although this issue is significant, it has been poorly understood. The employees in clear majority would like the companies that employ them to operate in a sustainable manner (Kubicka 2017; Kubicka, Kupczyk 2018; GlobeScan Radar 2016; Cone Communications 2016; Sustainable Brands 2016; Edelman 2018). In this regard, they expect their employers to:

- provide them with good working conditions and fair and equitable remuneration (GlobeScan Radar 2016];
- limit the organization's negative impact on the environment (GlobeScan Radar 2016; Cone Communications 2016);
- support charity and social projects (GlobeScan Radar 2016);
- reduce activities that threaten basic human rights (GlobeScan Radar 2016);
- show individual interest in the fate and situation of individual employees (Cone Communications 2016);
- stop carrying out activities that harm customers or employees (Edelman 2018).

Therefore, it is crucial to recognize how the implementation of the afore-mentioned employees' expectations related to the sustainable development of enterprises affects their trust in the employer. It is worth noting that enterprises still have difficulties in meeting the requirements of sustainable development (Revell, Blackburn, 2005, Drake et al., 2004; Bertelsmann Stiftung, 2020), and they use criteria other than environmental and social issues when making critical decisions (Bonn, Fisher, 2011; Gibson 2006; Ehrenfeld, 2000; Nilsson and Persson 2012; Robért, Broman, Basile, 2013; Baldock & Charveriat, 2018). International statistics and research results indicate an unsatisfactory state of implementation of sustainable development in enterprises, mainly in Poland and India (ROS 2019; Kubicka, Kupczyk 2018; Bertelsmann Stiftung, 2020). According to the global SDG 2020 index, which characterizes the implementation of 17 Sustainable Development Goals 2030, Poland achieved an indicator of 78.1 (23rd place out of 166 countries), and India 61.9 (117th place) (Bertelsmann Stiftung, 2020). Therefore, the article aims to identify, analyze, and diagnose the level of employee confidence in the employer in Poland and India and its relationship with the enterprises' activities for sustainable development.

Theoretical background and research hypotheses

Over the last dozen years, increasingly many researchers have been exploring issues of trust (Li, 2011). It is especially important to study levels of employees' trust in their employers and factors that affect it. Despite employers' expectations, the level of trust of some employees is still low. Close to one in six respondents globally have "very little" or "no trust" in their current employer (EYGM Limited 2016). Although the Trust Index has increased by 1 percentage point compared to last year and it reached 54 points globally, it is still quite low. The results of Edelman Trust Barometer 2020 indicate that none of the four major social institutions: government, business, non-governmental organisations

and media is trusted, although the highest level of trust was recorded in the case of business (58%, increase of 1 percentage points). Strikingly, more than a half of the respondents (56%) believe that capitalism brings more bad than good consequences (Edelman Trust Barometer 2020). The level of employees' trust is correlated with the generation the employees represent. Generation Y has the lowest level of trust, the highest level was observed in the oldest generation, i.e. Baby boomers. The youngest generation, Z, displayed significantly lower level of trust than baby boomers and only slightly higher than the Y generation (EYGM Limited 2016, p. 5). Thus, younger generations are characterized by a lower level of trust in their employers. Cultural conditions affect employee trust. It turns out that India has one of the highest values of Trust Index (79 points) (Edelman Trust Barometer 2020). According to employees in India, the main factors that affect employees' trust in their employers include:

- Having a strong senior leadership team,
- Providing job security (the employer doesn't terminate a large number of employees or terminate employees too frequently),
- Providing opportunities to learn and advance in my career,
- Delivering on promises,
- Communicating openly / transparently (EYGM Limited 2016, pp. 24).

Poles display a lower level of trust than employees in India. Trust in employers is declared by 68% of Poles, 12 percentage points more than two years ago, when 56% of Polish participants of the survey were trustful of their employers (Edelman Trust Barometer 2018).
It should be added that trust reflects conviction that the company is fair, ethical and competent (Caldwell, Clapham 2003). These requirements conform to the framework of modern organisations operating in a sustainable manner. Enterprises are expected to implement corporate social responsibility at the level of responsible company 4.0, where increasing revenues and generating profit are perceived as equally important as attention paid to the environment and stakeholders (Deloitte 2020). In line with this trend, organisations must therefore do more than pursue their official mission or implement social programs, they need to learn to act wisely and ethically, and to focus on people (Deloitte 2019). Importantly, the tensions that led to the rise of responsible company 4.0 are reflected in problems affecting work, the environment and communities around the world. This is why in 2020 HR departments will have to enhance their operations in this area, getting more involved in efforts to liquidate differences due to gender, race or similar factors (Russellbedford 2020). Especially, since it is beneficial. Among companies operating according to the responsible business 4.0 model, 74% recorded greater increase in operations in 2019 than in 2018, as estimated by revenues (Deloitte 2019). Compared with people at low-trust companies, people at high-trust companies report: 74% less stress, 106% more energy at work, 50% higher productivity, 13% fewer sick days, 76% more engagement, 29% more satisfaction with their lives, 40% less burnout (Zak 2017). For example, it has been calculated that improved gender equality in the European Union until 2050 could lead to increase of the EU's GDP per capita by 6.1 to 9.6%, representing 1.95 to 3.15 trillion euro (EIGE 2017).
Many factors can lead to loss of employee trust. International studies have identified the ten most important ones:

- Employee compensation is not fair,
- Does not provide employees with equal opportunity for pay and promotion,
- Lack of strong senior leadership,
- Too much employee turnover (voluntary and/or involuntary),
- Does not foster a collaborative work environment,
- Does not provide opportunities for employees to learn and grow,
- No opportunity for managing my work-life responsibilities,
- Leadership pay (e.g., CEO) is disproportionate to the company's financial performance,
- Does not operate in an ethical manner,
- Lack of strong financial performance (EYGM Limited 2016, pp. 6).

The top factors influencing “a great deal of trust” in employers are:

- delivering on promises,
- providing job security,
- providing fair compensation and good benefits,

- communicating openly/transparently,
- providing equal opportunity for pay and promotion for all people regardless of differences,
- operating ethically,
- providing opportunities to learn and advance in my career,
- having a strong senior leadership team,
- encouraging management of my work-life responsibilities by offering flexibility in when and where I work,
- strong financial performance,
- working for a company that has a diverse environment (EYGM Limited 2016, pp. 9).

The analysis of scientific literature and employees' expectations (GlobeScan Radar 2016; Cone Communications 2016; Edelman 2018) showed that enterprises actions for sustainable development may affect employees' trust in their employers.

The following auxiliary theses were formulated:

H1. The level of trust of contemporary employees in the employer is not high.

H2. Nationality, age, sex, education, place of residence, position held, the size of the enterprise, the type of its activity, and the length of its functioning on the market do not significantly differentiate employees' trust in the employer.

H3. The level of employee trust in the employer shows significant positive relations with the enterprises' activities for sustainable development, e.g., such as: taking environmental and social issues into account when making critical decisions, conducting employee volunteering, enabling employees to carry out charitable projects during work, communicating and disseminating their dedication for sustainable development, supporting employees in striving for a balance between work and personal life, and improving their working conditions.

Methods

To verify the main thesis and auxiliary theses formulated above, the following research methods were applied: the method of analysis and criticism of the literature, the method of a diagnostic survey using the questionnaire technique, and statistical methods. Quantitative and qualitative research was carried out at the turn of 2018 and 2019 in Poland and India based on a survey questionnaire. The conducted empirical exploration on a sample of 499 employees in Poland and India was aimed at finding answers to the research problems posed, which took the form of the following questions:

1. What is the employees' sense of trust in the employer?
2. Are there significant differences in the sense of trust in the employer from the point of view of the criterion of nationality (Poland, India), gender, age, education (higher, lower), place of residence (urban, rural), position, size of the enterprise, and type of its activity (service, production)?
3. What are the relationships between the employees trust in the employer and the activities of enterprises targeted at sustainable development?

The research results presented in this study are the greater part of the research carried out by an international team from Poland and India, which included the authors of the study. The survey questionnaire was developed for the purpose of this study. It was preceded by pilot studies. The respondents gave their consent to participate in the research in advance, and were asked to complete the questionnaire anonymously. In this study, the following terminological findings were made. Sustainable development is one that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). From a business perspective, sustainability was defined as a "business approach that seeks to create long-term value for stakeholders by embracing the opportunities and managing risks associated with economic, environmental, and social developments" (Galbreath, 2009). More specifically, business sustainability relates to "integrating the economic, environmental, and social dimensions of

organizational performance" (Harmon & Fairfield, 2014; Fagerlind, Stefanicki, Feldmann & Korhonen, 2019).
Trust in this research referred to the intra-organizational relations between employees and the employer and management; therefore, employees' trust in the employer was limited to aspects related to sustainable development, including, for example, full and productive employment, decent work, meaningful and prestigious, fair remuneration, good working conditions, flexible forms of employment, strong leadership, good communication, lifelong learning, gender equality and non-discrimination, ethical activities, achieving good financial results, as well as environmental protection and social responsibility.

The level of employees' trust in the employer was assessed by the respondents using a five-point Likert scale (Gamst, Meyers, Guarino, 2008), where 1- no trust, 2 - little trust, 3 - medium trust, 4 - high trust, 5 - very high trust. The Mann-Whitney U test was used to compare the responses between particular groups, e.g., employees from Poland and India, women and men, etc. The results of the dependent variable (trust in the employer) were ranked from the smallest to the largest in the studied groups, and then the groups were compared with each other. There were used research procedures, which are applied in a nomothetic approach allowing for the discovery and formulation of general laws, detection of similarities, universal rules and regularities governing the studied phenomena. That enabled the use of statistical methods of inference about the properties of the examined objects. Based on the Shapiro-Wilk test result ($p < 0.05$), a statistically significant discrepancy between the observed distribution of variables and the normal distribution was observed. It required the use of non-parametric tests. The results of the responses on rank scales depending on the grouping variables were analyzed:

• The Mann-Whitney U test (for two groups, e.g., regarding nationality, gender, education, place of residence, position held, type of business)
• The ANOVA Kruskal-Wallis test with the Bonferroni correction, Dunn (Dunn 1961, 2017), for more than two groups, e.g., taking into account the criterion of the respondents' age, the size of the enterprise, the length of its operation on the market.
• The Jonckheere-Terpstra test for ordered alternatives to establish the existence of a trend for subsequent populations.
• Spearman's coefficient of rank correlation (Lieberson 1964) to establish the relationship between the variables "employee confidence in the employer" and "actions for sustainable development used in the enterprise". The test probability was considered significant at the level of $p < 0.05$, and the highly significant at the level of $p < 0.01$. Statistical analyzes were performed using the PQStat statistical package, version 1.6.4.122.

Research sample and its selection

The survey was conducted on a sample of 499 employees of enterprises. There were 64% people from Poland and 36% from India; 61% were men and 39% women. The respondents are mostly young people, under 35 (82%), 13% were middle-aged people (35-50 years old), and 5% were people over 50. Most of the respondents (53%) are employees with higher education, and 47% with secondary education. As for performed functions, the structure of the respondents was as follows: one fourth was the management of various levels, the rest of the respondents were people who did not perform managerial functions. The vast majority (77%) lived in urban areas, and 23% in rural areas. The respondents were mainly employees of large enterprises (43%). 35% were employed in medium-sized enterprises, 17% in small and 5% in micro-enterprises. 54% of enterprises employing the respondents were involved in services and 47% in production. There was used quota sampling, which defined criteria that significantly differentiated the population according to the subject of the study (Lohr 1999; Rao 2000). That approach was chosen because the adopted sample largely corresponded to the structure of the population due to the distinguished features, and moreover, individuals within the group were characterized by greater homogeneity. However, it required resignation from the statistical condition of the research being representative. To determine the percentage share of the selected groups, their actual distribution in the population was used (according to GUS data from 2019). As a result, the studied population was divided into groups according to the following criteria and their selection was deliberate:

- nationality (Poland, India),
- gender (female, male),
- education (secondary, higher),
- age (under 35, 35-50, over 50),
- place of residence (urban, rural),
- position held (a person not holding managerial positions, managerial staff),
- the size of the enterprise (micro, small and medium-sized, large),
- type of enterprise activity (production, service).

G * Power software (Faul, Erdfelder, Lang, Buchner 2007) was used to calculate the minimum sample size. The following assumptions and parameters were adopted for the calculations:
• test family: t test;
• type of power analysis: a priori compute required sample size –given α, power, and effect size;
• input parameters: Tail (s): two; effect size | p | = 0.3; α rr prob = 0.05; power (1- β err prob) = 0.95.
The minimum sample size was 134 people with output parameters: non-centrality parameter δ = 3.6404323; critical t = 1.9862068; Actual power = 0.9509217.

Results

The surveyed employees were asked to assess their sense of trust in the employer. 12% considered it very large and 31% as large. 32% stated their trust level was medium. It seems worrying that as many as 8% do not trust their employer completely, and 16.5% only slightly trust them. The arithmetic mean of the assessment of the respondents' trust towards the employer on a scale of 1-5 was 3.23 (with the standard deviation 1.113701 and the significance level 0.05). The following null hypotheses H01-H06 were formulated to verify the thesis consisting in the statement that nationality, age, sex, education, place of residence, position held, as well as the size of the enterprise, and the type of its activity do not significantly differentiate employees' sense of trust in the employer:

- H01 There are no statistically significant differences in the sense of trust of employees in the employer between employees from Poland and India.
- H02 There are no statistically significant differences in the sense of trust of employees towards the employer between women and men.
- H03 There are no statistically significant differences in the trust of employees towards the employer in groups with different education (university, secondary).
- H04 There are no statistically significant differences in the sense of trust of employees towards the employer in the groups living in urban and rural areas.
- H05 There are no statistically significant differences in the sense of trust of employees towards the employer in the groups employed in service and production enterprises.
- H06 There are no statistically significant differences in the sense of trust of employees towards the employer in the groups employed in enterprises of various sizes (micro, small, medium, large).

It began with the verification of the null hypothesis H01 that there were no statistically significant differences in the employees' sense of trust in the employer between employees from Poland and India. Based on the Mann-Whitney U test, significant differences were found in the assessment of trust in the employer between people from Poland and India (value p (exact) = 0.0001, and value p (asymptotic) = <0.000001). The sense of trust in the employer in Poland is significantly lower than in India (Table 1).

Table 1: Differences in the sense of trust in the employer between the respondents from Poland and India (grades were made on a scale of 1-5, 1- no trust, 2 - little trust, 3 - medium trust, 4 - high trust, 5 - very high trust) (Poland N = 319, India N = 170)

Group name	**India**
The sum of the group ranks	57171,5
Average group rank	319,39386
Group median	4
Group name	Poland
The sum of the group ranks	67079,5
Average group rank	210,28056
Group median	3
Statistics a U	16039,5
Statistics U	41061,5
Value p (exact)	0,0001
Statistics Z (with correction for associated ranks)	8,417461
Value p (asymptotic)	<0,000001
Value p (exact)	0,0001

Source: own research results

The dependence of the respondents' sense of trust on their nationality is presented graphically in a box plot Min - Q1 (lower quartile) - Me (median) - Q3 (upper quartile) - Max (Fig. 1). The variable on the vertical axis is the employee's sense of trust in the employer.

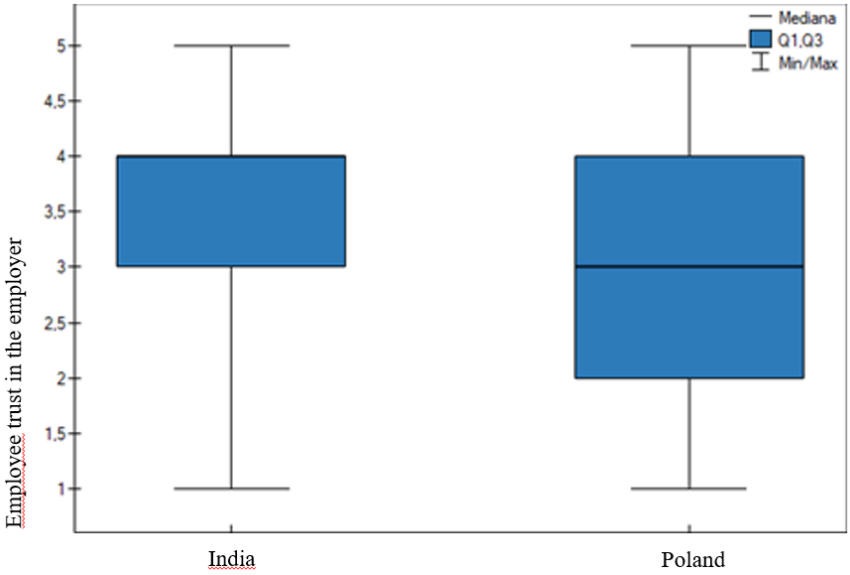

Fig. 1. The relationship between the employees' sense of trust in the employer and the country of origin (Poland, India) based on the Mann-Whitney U test. Min - Q1 (lower quartile) -Me (median) - Q3 (upper quartile) - Max.

Source: own research results

Thus, we can say with 95% probability that Indian employees have a significantly higher sense of trust in the employer than Polish employees (p = 0.0001). Hence, the null H1 hypothesis of no significant differences had to be rejected. The remaining H2-H7 null hypotheses were verified analogously. Based on the Mann-Whitney U test, significant differences were indicated in the sense of trust in the employer between people with higher and secondary education. People with higher education have significantly greater trust in the employer (Table 2).

Table 2: Differences between the sense of trust in the employer between people with higher and secondary education (grades were made on a scale of 1-5, 1- no trust, 2 - little trust, 3 - medium trust, 4 - high trust, 5 - very high trust) (people with lower education N = 234, people with higher education N = 264)

Group name	people with secondary education
The sum of the group ranks	48691
Average group rank	208,081197
Group median	3
Group name	people with higher education
The sum of the group ranks	76059
Average group rank	287,015094
Group median	4
Statistics U	21196
Statistics U	40814
Value p (exact)	0,0001
Statistics Z (with correction for associated ranks)	6,282842
Value p (asymptotic)	<0,000001

Source: own research results

The relationship between the sense of trust in the employer and education is presented graphically in a box plot (Fig. 2).

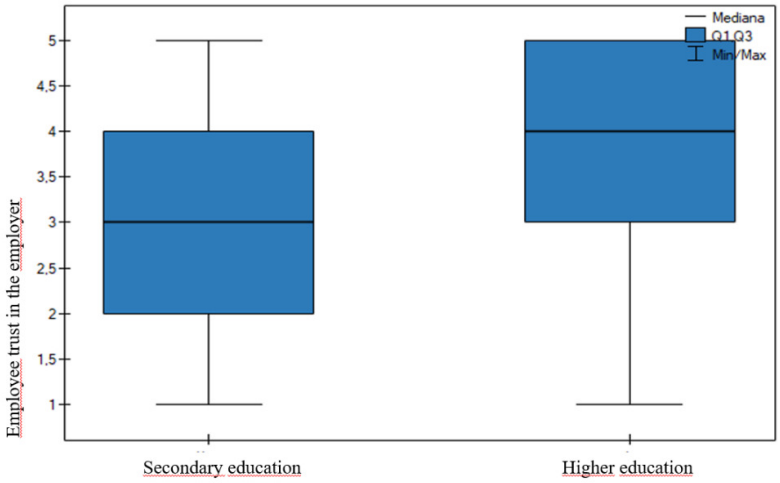

Fig. 2. The relationship between the employees' sense of trust in the employer and education based on the Mann-Whitney U test. Min - Q1 (lower quartile) -Me (median) - Q3 (upper quartile) - Max.

Source: own research results

With the Z statistic (6.282842) and p <0.0001, the H02 hypothesis had to be rejected. Based on the Mann-Whitney U test, no significant differences were found in the sense of trust in the employer between women and men (p-value (asymptotic) = 0.875058). Similarly, no significant differences were found in the sense of trust of the respondents from production and service enterprises (p = 0.657021), as well as in different sizes (one-sided p value = 0.494936, two-sided p value = 0.989873). The assessment of the sense of trust in the employer of people living in urban centers turned out to be slightly higher than those living in rural centers. However, these differences turned out to be statistically insignificant (p = 0.119458). The Spearman's coefficient of rank correlation was calculated to verify the thesis of T3 consisting in the statement that the level of employees' trust in the employer shows significant positive relations with the activities of enterprises for sustainable development, such as taking environmental and social issues into account when making critical decisions, conducting employee volunteering, enabling employees to implement on-the-job charity projects, communicating and spreading commitment to sustainable development, supporting employees in their work-life balance, and improving their working conditions. Statistically significant monotonic dependencies were found between the employee trust in the employer and numerous activities for sustainable development. They allow the following conclusion. Employees have greater trust in the employer if:

- the company they work for is more sustainable (r = 0.104238, p = 0.020109);
- the company increasingly often communicates and disseminates its commitment to sustainable development, both among employees and in the environment (r = 0.091636, p = 0.040943);
- they see more benefits after introducing sustainable changes in the enterprise (r = 0.417734, p = <0.000001);
- they have received more training on sustainable development and more good practice for sustainable development has been implemented in the company (r = 0.188649, p = 0.000023);
- the employer acts to keep the employee in good health and condition (r = 0.483125; p = <0.000001);
- supervisors are more interested in obtaining information from employees about their work to make corrections and improvements to the process (r = 0.467868, p = <0.000001);
- they receive higher additional remuneration (financial and non-financial) for the implementation of activities improving the functioning of the enterprise (r = 0.431436, p = <0.000001);
- their superiors and / or the company provide them with greater support and assistance in introducing changes in the organization (r = 0.415062, p = <0.000001);
- their working conditions improve more often (r = 0.177575, p = 0.000068);
- have a greater possibility of bottom-up, independent initiation and implementation of changes in the enterprise (r = 0.164296, p = 0.000235);
- environmental and social issues are taken into account more often when making key decisions in the enterprise (r = 0.149534, p = 0.000816);
- the enterprise more often supports employees in their pursuit of work-life balance (r = 0.147692, p = 0.000947);
- less frequently during the recruitment process, someone checks the candidates' approach to environmental protection (r = -0.145676, p = 0.001127);
- teams developing and implementing changes in the organization are diverse and represent a wide group of stakeholders, i.e., employees, customers, suppliers, local community (r = 0.12739, p = 0.004409);
- the enterprise conducts employee volunteering more often, enabling employees to carry out charity projects during their work (r = 0.119606, p = 0.00754).

Conclusion and Discussion

Our study provided evidence that:

1. The trust among the surveyed employees is at an average level. One in three declared high trust in their employer, while one in four declared slight trust or none. This is a confirmation of previous study results which showed that a significant part of employees in the world (one in six) declared "very low trust" or "no trust" in their employer (EYGM Limited 2016). It is worth noting that among the respondents this proportion is higher (one in four). It may suggest that among employees from Poland and India there are more people who trust their employers to a small degree or do not trust at all.

2. Respondent employees from India declared significantly higher sense of trust to their employers than employees from Poland. The above results confirm those obtained in other studies (Edelman Trust Barometer 2020). In India sustainable development indicators achieve lower levels than in Poland (Bertelsmann Stiftung, 2020), yet the level of employees' trust in their employer is higher in India. So, it may be affected by other factors, e.g. by local culture.
3. Respondents of higher education declared significantly higher trust in their employers than people with secondary-level education. This may reflect their better treatment at enterprises and application of more sustainable development-related solutions for them.
4. No significant differences were recorded in trust in employer between women and men, enterprises specialising in production or services, different sizes of enterprises or between respondents living in cities and countryside. Thus, it seems reasonable to conclude that gender, education, place of residence, size of the enterprise, type of business do not differentiate the sense of employees' trust in their employer significantly.
5. The employees' trust in their employers grows when the employer companies are more sustainable, communicate and spread their commitment to sustainable development more frequently, consider environmental and social issues in key decision-making, offer higher remunerations, organise more relevant training and implement more good practices in this area, ensure good working conditions, maintaining employees' health and form, support their work/life balance, enable implementation of charity projects at work, as well as bottom-up initiatives of changes at the enterprise.
6. Companies' actions for sustainable development increase employees' trust in their employer.

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Development of Military Logistics in The Discipline Of Science and Quality Management

Tomasz JAŁOWIEC

War Studies University, Faculty of Management and Command, Warsaw, Poland
t.jalowiec@akademia.mil.pl

Abstract

Development of military logistics theory is one of the key factors in improving the functioning of the armed forces. The experience of the Armed Forces of the Republic of Poland (AF RP) so far shows unequivocally that conducting modern and planned military operations places particular demands on entities responsible for their security and logistical support. Logistics issues are an important point of reference in scientific research conducted in the military environment, whose priority is to seek optimal solutions. The complexity of modern logistic processes requires, among other things, a multidimensional approach to solving problems which are the subject of studies of modern military logistics.
The aim of the article is to identify, evaluate and attempt to indicate the directions of development of military logistics in the field of social sciences. within the integrated scientific discipline – management and quality sciences.

Keywords*:* Development, Multidimensionality, Logistics, Management, Quality, Armed Forces

Introduction

The development of any science requires constant efforts aimed at verifying the existing theory and searching for new, previously unknown mechanisms of approaching problems solved on the basis of theory and practice. One of the guiding principles of science development was formulated by Niels Bohr (1885-1962) with reference to physics, but it is applicable to all sciences. It is a principle of correspondence, according to which a new theory replacing the existing one in a given field is its generalisation, as well as modification and deepening at the same time. This situation also applies in its entirety to logistics, including its particular variety of military logistics, which is characterized by a variety of directions, forms, concepts, and methods of management and acquired logistical potential. They are a necessary response to the dynamically changing internal and external conditions of functioning and development of the armed forces. The multidimensional nature of the problems that need to be "measured" in military logistics today requires an interdisciplinary approach, in which the leading role is played by problems solved in the area of management and quality science, a new discipline functioning in the Polish classification of sciences since 2018. Combining management science (in the field of economic sciences) and commodity science (in the field of quality and product management), management science and quality science are very closely related to the area of interest of modern military logistics.

On the basis of own research carried out and conclusions and postulates submitted by experts dealing with modern military logistics, the aim of the work was to identify and evaluate and indicate the directions of military logistics in the field of social sciences. within the integrated scientific discipline of management and quality sciences. The aim of the work was subordinated to the structure of the article which includes two main parts. The first one, theoretical one, is devoted to the identification of the so-called "problem fields" of contemporary military logistics, and the second one indicates, on the basis of empirical research, the dilemmas of development of military logistics in the area of integrated scientific discipline, i.e. management and quality sciences.

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Problem areas of modern military logistics

The development of logistical concepts is the result of a combination of so-called shaping forces. Most often these are forces of a macroeconomic nature: economic, political, social, technical and other. Functioning in such a conglomerate of forces implies a serious difficulty in distinguishing the influence of a particular force only on logistics. It can be pointed out that there are different forces that shape changes in logistics. Existing forces that cause desirable changes in logistics may, in the long run, favour the development of logistics (driving forces) or counteract it (inhibiting forces). If the balance of driving and inhibiting forces indicates a predominance of the former, then the development of logistics in the area can be observed. Driving and braking forces are different in nature, they interact with different forces and in different ways: the nature of these forces is variable over time; the degree of complexity of these forces is very different: some have direct consequences, but their impact may be small, while others exert indirect consequences on logistics, but their impact may be significant; there are still new forces emerging whose impact may be difficult to determine at any given time (Rokita, 2005, p. 335). These forces influence both the choice and the degree of achievement of the goal (in the form of ensuring accessibility), the principles of logistics (of economy, profitability and effectiveness) and priorities (like profit, quality of life and safety), as well as the degree of freedom for logistics (Twaróg, 2016, p. 548). The existing relationships between the driving and inhibiting forces, purpose, principles and priorities of logistics, as well as the scope of logistics activities, are shown in Figure 1.

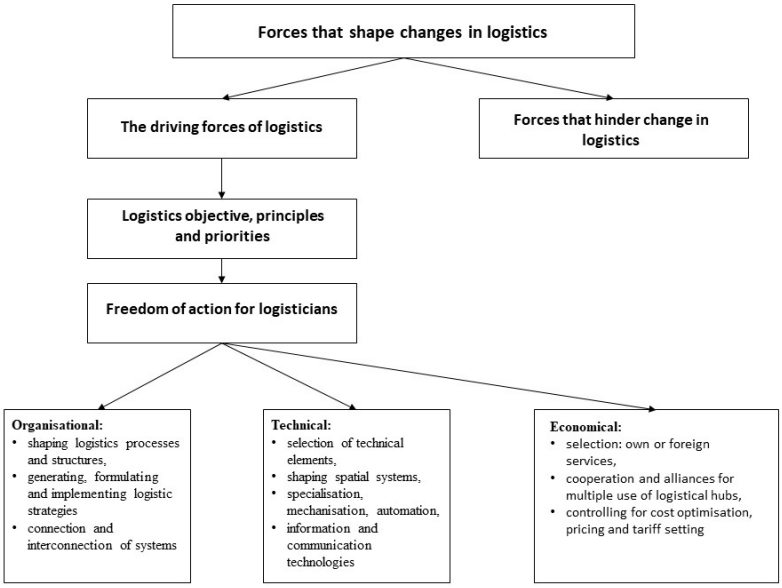

Fig. 1: Forces that shape changes in logistics

Referring directly to military logistics in the process of forecasting its development, special attention needs to be paid to the provisions in such documents as: *Priority Research Directions in the Ministry of National Defence for 2017-2026"* and *the Strategic Defence Review.* The former was introduced by the decision of the Minister of National Defence of 26 June 2019, while the latter is a result of the works by the Ministry of National Defence team launched in mid-2016 and completed in 2017. Detailed analysis of the provisions under the document *Priority Research Directions in the Ministry of National Defence for 2017-2026* and their confrontation with the views presented in the source literature make it possible to indicate that it is justified to conduct scientific research and development works in the area of military logistics focusing on two main aspects: operational and technical. **The operational aspect** refers to obtaining answers as to what capabilities should characterise the logistic system and determining capabilities which should remain the responsibility of the combat support subunits of the

Polish Armed Forces. According to the opinions presented, it is necessary to make optimal use of the technical and material resources available and to determine the capabilities necessary for acquisition. **The technical aspect** is in turn connected with carrying out research aimed at obtaining tools enabling to ensure the implementation of an effective logistic security that would permit the full use of the operational capabilities of the Polish Armed Forces. It includes technologies in the scope of: use of armaments and military equipment, delivering and storing supplies, technical reconnaissance and evacuation, service, maintenance and repair of armaments and military equipment, new technologies in the scope of: integrated information technologies enabling to obtain LCOP - Logistic Common Operation Picture (Decision, 2019, p. 46).

The broad problem areas of interest in military logistics, as an area of great importance from the perspective of the proper implementation of tasks currently faced by the armed forces in all states of country functioning, i.e.: peace, crisis and war, are constantly expanding. Particularly important in this respect is the fact that, according to the assumptions presented in the "Methodology for planning and programming the development of the Polish Armed Forces in 2013-2022", scientific research financed from the state budget constitute an element of the process of achieving operational capabilities by the Polish Armed Forces. They include primarily such capabilities as: ability to command, ability to conduct reconnaissance, ability to fire, ability to support operations and to transfer and maintain mobility, ability to survive and protect troops, including the ability to secure the medical battlefield, ability to support the non-military system in situations of non-military threats (Decision, 2019, p. 46). Moreover, as the experience to date and the provisions in doctrinal documents indicate, the strategic and operational, legal, standardisation and functional conditions resulting from the multinational character of contemporary military operations and the conclusions from participation in missions and operations abroad determine the qualitative changes in the logistics system of the armed forces.

In the light of the above, it should be noted that modern military logistics should not only harness the latest achievements of science and technology, especially in the field of applied research and development works, but also make widespread use of the achievements of management and quality sciences for the improvement of applied solutions and, consequently, work out optimal solutions. Nowadays, it seems justified to state that the area of special exploration of military logistics is the theory and practice aimed at optimising the management of organic and acquired logistic resources with a particular aim to improve the effectiveness of applied solutions. Therefore, the overriding objective of scientific research undertaken in the area of military logistics within the framework of the discipline of management and quality science appears to be a precise definition of challenges and expectations in relation to all elements of the logistics system, as a necessary condition for proper management of the logistics potential used in all states of country functioning for the benefit of military units and institutions. The pursuit of a holistic approach to solving logistical problems has resulted in the past from – and is nowadays related to – the need to constantly seek optimal solutions in logistic activity. Optimisation, which is in essence the choice of the best solution from the perspective of a given criterion, is the primary task of logistics in both its theoretical and practical dimensions. It translates into its specific tasks, which include above all (Skowronek, Sarjusz-Wolski, 2008, p. 20-21): improving the management of material goods flow processes and, consequently, ensuring full satisfaction of the material needs of participants in logistics processes; subordinating logistics activities to the requirements of the recipient (customer) servicing; increasing the efficiency of flow, which in the civil sector is expressed primarily in the pursuit of reducing flow costs and, to the broadest possible extent, logistics costs. In the military environment, the approach to maximising efficiency takes on a slightly different character, as in many cases its economic plane (cost-effectiveness) takes the back seat, giving way to its other dimensions (Jałowiec, 2013; 2017).

To sum up, it is worthwhile to pay particular attention to the multidimensional nature of modern military logistics once more. Current and forecasted conditions of the functioning of the armed forces, and consequently their logistics systems, result in an ever wider area of interest of specialists involved in the theory and practice of improving military logistics processes. It is always worth remembering that the development of military logistics is inextricably linked to the constant search for and discovery of newer and newer connection forming in the complex reality of the functioning of military logistics processes taking place both in the national and multinational dimension.

Dilemmas of Military Logistics Development Within the Discipline of Management and Quality Science – Empirical Research

The relevance and complexity of the area under consideration in the article and the attempt to solve the assumed research problem brought in the necessity to carry out empirical qualitative research of the analysed phenomenon. The basis of scientific research in this area was the method of diagnostic survey, carried out using the technique of expert interview. Due to the limitations introduced, the research tool was developed in the form of an interview sheet and included three detailed questions addressed to a group of four experts with at least a PhD degree and over 20 years of experience in the area of security and logistical support provided for the army. In addition, in order to obtain a cross-sectional character of the material, the research was extended to include two recognised specialists in the civilian environment, representing directly the area of management sciences (classified before 2018 as belonging to the area of economic sciences). This approach made it possible to obtain a general material, which is the basis for detailed and general conclusions. They were based primarily on a comparative listing of the views presented, which were often partially different.

The relevant studies, preceded by a pilot, started in March and were completed in May 2020. The developed research tool – the interview sheet included three questions in total:

1. To what extent do you think that the area of interest in military logistics coincides with the subject of management and quality sciences cognition?
2. What do you think should be the priority for the further development of military logistics within the field of management and quality science?
3. What actions should, in your opinion, be a priority in the further development of military logistics in the field of management and quality science?

The scope of the questions was aimed at getting to know the detailed opinions of the surveyed experts on the dilemmas of the development of military logistics within the field of management and quality science.

Answering the first question, the experts agreed that the area of interest of military logistics is very much in line with the subject of management and quality sciences cognition. The respondents indicated that regardless of cyclical modifications of formal classifications of sciences in Poland, logistics, including military logistics is an important element of the management process. They pointed out in particular that it is impossible to consider the problems of contemporary military logistics without referring them to the resources of an organisation, among which people are the most important. In the presented views, the dominant position was that the destiny of any organization, including the hierarchical one, i.e. the armed forces, is to systematize (organize) the activities of its participants in such a way as to enable it carry out its mission, achieve the expected results and perform its tasks with maximum efficiency with the optimal use of its own or acquired resources. In the case of the first question, when comparing the answers of experts representing the military environment with the civil sector, different opinions in the examined area are obvious. All experts noticed a clear convergence of the area of interest of military logistics with the subject of management and quality sciences cognition, emphasising at the same time that modern conditions require looking for and implementing solutions resulting from interdisciplinary approach. Interesting in this respect is the opinion of one of the experts that currently logistics perceived as a scientific field of expertise shows the strongest links with two fields, i.e. social sciences and engineering and technical sciences. Within the field of social sciences, this applies most to the following disciplines: economics and finance, socio-economic geography and spatial management, security science, management and quality science. Within the field of engineering and technical sciences, however, such disciplines as: civil engineering and transport, automation, electronics and electrotechnology, and technical informatics and telecommunications should be indicated. Moreover, another specialist pointed out that logistics is a field of knowledge (a significant group of logisticians adds the adjective "practical"), and as such it is subject to development using the research instruments borrowed from other scientific disciplines. In the light of the above, it should be noted that it is significant that logistics has not developed its own research instruments – it mainly uses the scientific output of the other, previously formed disciplines of management science, although it

applies methods from outside this area more and more frequently. It is dominated by methods borrowed and adapted, mainly from economic cybernetics, accounting, operational research, computer science and systems theory. Nevertheless, logistics also uses its own specific rules and procedures. In view of the above, it should be noted that the links between logistics, including military logistics and management sciences, are now widely spoken of among specialists and, as it seems, even this view has fewer and fewer opponents.

The second question of the interview sheet referred to an indication of what, according to the experts, is the greatest opportunity for the development of military logistics within the field of management and quality science. In the obtained research material two main streams of the presented views can be seen. The first one indicates that such an opportunity should be seen in the combination of the achievements of military logistics to date with the much greater achievements of the management sciences. Such an approach pointed to the important role and importance of disseminating the rich publishing output of management sciences in the environment of logistics professionals conducting research on optimisation of military logistics processes. The experts pointed to the key importance of using the assumptions of the benchmarking concept (learning from the best, from someone else's mistakes, etc.) to "practice" military logistics within the management and quality sciences. The second group of answers indicated that, most of all, such an opportunity should be seen in the joint conducting of interdisciplinary research by representatives of the environment directly related to military logistics in cooperation with scientists carrying out research on management in the civil environment. When we compare the obtained research material, we can also see that the experts are convinced that the allocation of logistics within the management and quality sciences should in the near future bring measurable effects to the theory and practice of military logistics. An integrated, interdisciplinary and multidimensional approach to the problems of securing and supporting military logistics is a prerequisite for improving the efficiency of military logistics processes.

The answers to the third question contained in the interview sheet clearly indicate that experts see real opportunities for the development of military logistics within the field of management and quality science. Among the priority actions in this respect, the following were predominantly indicated:

- the need to identify the paradigms of military logistics in the light of the paradigms of modern management, especially with regard to defence resources management;
- the need to closely correlate the research conducted in the military sector referring to the management of processes taking place within the framework of securing and logistic support for the military with logistic innovations functioning on the national and international market of logistic services;
- the possibility of developing procedures to combine the efforts of research teams conducting research in civil and military logistics;
- ensuring interdisciplinarity of the research carried out through the widespread inclusion of representatives of other scientific fields and disciplines in research teams;
- establishing close cooperation with foreign, military and civil scientific centres conducting research in the field of development of military-civil logistic cooperation;
- the need to carry out innovative research works in the area of security and logistic support of the military integrating research in social sciences and engineering and technology.

When summarising this part of the research it can be pointed out that the priority in the further development of military logistics in the field of management and quality science has been recognised, first of all, as the necessity of adapting an interdisciplinary approach in the process of cognition of scientific military logistics. As the results obtained show, one of the key ways of developing military logistics is to closely correlate the achievements of military logistics practised within the framework of military sciences, defence and security sciences with the toolbox of management and quality sciences.

Summary

The results obtained in the research process give rise to the following general

Conclusions

1. A significant number of problems considered from the theoretical perspective within the sphere of military security and logistical support of the military are closely linked to the area of interest of the field of management and quality science.
2. Further development of military logistics requires an interdisciplinary approach to the problems to be solved, where social sciences and engineering together with technical sciences should lead the way.
3. Military logistics, especially in peacetime, shares many features with logistics relating to the civilian sphere. Combining the achievements of both types of logistics can bring measurable benefits for both the military environment and free market operators.
4. The main direction of research conducted in the field of military logistics within the discipline of management and quality science is to seek optimal solutions to improve the management of military supply chains in order to fully meet the needs reported by soldiers, units and military institutions.

In conclusion, it should be emphasised that military logistics as a source of cognition of complex phenomena and processes taking place within the framework of securing and logistic support of troops requires ordering and linking the formulated individual views with other theories. Conducting research in the field of military logistics within the framework of the discipline of management and quality science gives new possibilities to achieve that objective, while at the same time determining further problem areas, the cognition and ordering of which is necessary for its further, dynamic development.

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Formal, Legal, and Infrastructural Aspects of Competing – Survey Results from The Polish Road Freight Sector

Malgorzata KEDZIOR-LASKOWSKA

University of Warmia and Mazury in Olsztyn, Olsztyn, Poland
Malgorzata.kedzior@uwm.edu.pl

Abstract

Polish road carriers constitute an essential part of the European transport market. They are responsible for approximately 10% of the cargo transport volume, also effectively competing with foreign carriers. The Polish road transport sector is characterised by a relatively high interference of the state (direct and indirect). This article attempts to assess the impact of formal, legal, and infrastructural determinants on the competitiveness of Polish road carriers. The research survey was conducted twice, in 2013 and 2019, which allowed for the comparative analysis and determination of the directions of changes. The sphere of regulations was described by 8 factors of legal and formal nature and infrastructural conditions. These factors were subjected to the respondents' evaluation. The statistical analysis employed measures of location and variation. The changes in the influence of the studied determinants were established with the Mann–Whitney U test. The research results prove the increased importance of formal, legal, and infrastructural factors in shaping the competitiveness of road carriers. Furthermore, they show a greater heterogeneity in a group of micro-enterprises than in a group of enterprises employing more than 9 persons.

Keywords: Transport, Competitiveness, Poland, Freight.

Introduction

The international scale of business activity underlies the development of competition on transport markets. Globalisation and integration affect the dynamics of changes and conditions of enterprise operation, while the EU transport policy requires respecting international agreements dedicated to transport activity (see Cieślik et al. 2019; Cheba and Szopik-Depczyńska 2017; Kiseľáková et al. 2019).Transport is one of the most important sectors of the global economy (OECD/ITF 2009; Ślusarczyk 2010). Determinants of the sustainable development, also these perceived in the regional context (Charalampidis et al. 2019; Song and Geenhuizen 2015; Pawlak 2020), make the transport play a special role in shaping the economic and social governance. The multi-faceted development of transport, including formal and legal standards dedicated to this sector, is also essential to the functioning of other sectors of the economy (Bollard and Pickford 1998). Therefore, transport's importance in the economic development creates circumstances for interference in the market.

The consequences of Poland's accession to the EU include, among others, a change of legal and formal determinants under which the market and road transport enterprises operate. The purpose of these regulations is to liberalise operating rules and harmonise the competition conditions of road carriers. Poland's accession into the EU structures changed the rules of, among others, accessing the profession of a carrier and driver, drivers' working time, social aspects, fees, and taxes accompanying this business, or emission standards. On the other hand, financial resources were launched, a significant part of which was earmarked for the modernisation and development of road infrastructure (Melecký 2018). In accordance with the transport policy, actions undertaken in this aspect positively affect the safety of road traffic and minimisation (close to zero) of fatalities (Directive 2008/96/EC).

Poland's geopolitical situation and competitive freight rates determined a substantial participation of the Polish carriers in the EU structure of cargo transport. It has not changed for a couple of years. The Polish carriers are deemed one of the major competitors with approximately 10% of the total cargo transported, compared to Germany answering to the greatest number of transport needs in the EU and

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transporting over 20% of the total cargos in 2018 (counted in the number of transported tons). In Poland, transport services are one of the key elements of the generic structure of services. Transport is responsible for almost 1/3 value of the Polish export services to the EU markets, and this share is continuously growing (Szypulewska-Porczyńska and Suska 2020; Jędrzejczak-Gas and Wyrwa 2020).

It should be noted that the road cargo transport sector is fragmented, with a characteristic oversupply of services and consumer market. The EUROSTAT data indicate that in most EU member states, this sector is predominated by micro-entrepreneurs employing up to 5 persons (e.g., 95% in Spain, 87% in Italy, 69% in Austria, 96% in Poland, and 93% in Slovakia). This significant fragmentation has also been noticed by the European Commission (European Commission 2014). Moreover, Laufs and Schwens (2014) point out to the fact that these are usually enterprises poor in human and financial resources.

The liberalisation of the service market in road cargo transport has strengthened competition processes (Poliak et al. 2019). Access to geographically remote markets has contributed to the development of international road transport, including enterprises from the Polish sector. Considering the above, it seems important to determine the impact of formal, legal, and infrastructural determinants of competitiveness of Polish road carriers. This study aimed to determine the impact of these determinants on the competitiveness of road transport enterprises. These determinants were described by 8 factors that are relevant, directly or indirectly, to road carriers' competitiveness. These factors have been subjected to the respondents' assessment. The research survey has been conducted in two independent samples (in 2013 and 2019). The results of the statistical analysis proved, among others, that respondents' answers were influenced by time (research year).

Literature Review

The conditions of service provision at the European road freight transport market were established in the middle of the 19th century. These rules and conditions were stipulated in agreements and conventions. One of the most important conventions pertaining to road transport is the CMR Convention (the Convention on the Contract for the International Carriage of Goods by Road), which standardised conditions of cargo transport, in particular in cross-border trade in goods, and allowed eliminating unnecessary bureaucracy and improving transport processes (Defossez 2013).

Fuel prices, drivers' working time, technical measurements of vehicles, fees for using roads, or emission standards are regulated at the national and the Community level. In the last few years, the major subject of interest was transport decarbonisation (see Jonek-Kowalska 2019). The goals of the transport policy mainly focus on reducing gas emission and congestion at transport routes. This goal may be achieved by service substitution (transfer of demand to more ecological forms of transport) and the development of competences and skills of motor vehicle drivers (Monios 2019; Wheeler and Gilmour 1974). Nevertheless, the actions undertaken so far have failed to modify the branched structure of transport.

Undoubtedly, intervention in the market should be substantively justified (MacGregor Pelikánová 2019; MacGregor Pelikánová 2017). From the macroeconomic perspective, the economic and transport policies cannot facilitate the appearance of barriers for new entrants, including the foreign ones. From the microeconomic perspective, service export represents one of the possibilities for developing competitiveness potential (Smallbone et al. 1998; Thrassou and Vrontis 2008).

A significant element of the interference into the transport market is identifying the needs being one of the cornerstones in determining the economic growth (Eberts 2000). It is assumed that transport regulations are based on three pillars: economy, safety, and environment (Slack t al. 2020). From this article's perspective, the economic aspects (infrastructure, competitiveness) and safety aspects (safety of transport processes) are of particular importance. They influence the efficiency and effectiveness

of road carriers' activity and are directly reflected in an increased safety and punctuality of deliveries that underlie the competitiveness of high-quality services.

Fig. 1: Transport regulations

Undoubtedly, market regulation is indispensable in limiting market failures, including negative external effects of transport (Begazo et al. 2018). On the other hand, formal and legal regulations can curb the competitiveness processes and lead to an increase in the costs of transport and goods (Lebogang 2014; Lacey 1990), particularly if they limit the access to the market (introduction of permits, licenses, certificates) and affect service prices. Excessive regulations (e.g., these in the Polish motor vehicle sector) (Burnewicz 2005) may determine the competitiveness of transport enterprises in the country and abroad as well as the efficiency and effectiveness of the business. Furthermore, the results of Kidoro's research (2003) confirm that, i.a., regulated prices contribute to the deteriorating quality of services and competing conditions (for instance, in public transport). On the other hand, liberalisation of the market contributes to the development of qualitative forms of competing and to a decrease of costs and prices (Yind and Keeler 1991), also in the low-income countries (Wheat et al. 2019).

Events at the road traffic effectively limit transport activity. They contribute to problems with keeping determined delivery deadlines and safety of shipments, thus lowering the carrier's competitiveness. Furthermore, the vibrant development of individual motorisation (faster growth in the number of vehicles than in the society's incomes) (Estache and de Rus 2000) significantly affects the average vehicle speed. Research conducted by OECD/ITF (2015) showed a positive correlation between economic development and road traffic safety. An increasing number of vehicles (individual and commercial ones) increases the likelihood of accidents. Stanton and Salmon (2009) indicated a human mistake to be the most frequent cause of road accidents. What is equally important, is that the infrastructure constitutes a significant element of road transport, particularly in the low-income countries (Promoting open… 2018).

The safety of road traffic largely depends on the qualifications and skills of vehicle drivers. The International Road Union (IRU 2020) has undertaken actions aimed at safety improvement, including e.g., developing a safety culture, modernising and constructing additional safe parking lots for heavy-load vehicles, or launching complex trainings in the scope of safety. The last ones seem to notably support transport processes. The safety can also be increased by the legal criteria of preliminary qualification and periodic trainings that determine drivers' skills, knowledge, and competences (Łacny 2009), thereby supporting the competitiveness of road carriers.

The intervention of the state seems indispensable to improve the rules of transport activity. It should facilitate the elimination of pathological phenomena at the national and international levels. The EU transport policy indicates directions of the state's impact and transport market development. Nevertheless, each country has its own internal regulations. National transport policies should not compete with each other, protect internal markets, and resident carriers (De Borger and Proost 2012).

Research Background and Methodology

The competition for contracts in road cargo transport is determined by service characteristics. The significant ones among the non-price related characteristics include safety, delivery time, timeliness/scheduling, flexibility, and promptness of deliveries (Rudel 2005; Coyle et al. 2005; Meidute-Kavaliauskiene et al. 2017; Kędzior-Laskowska 2020). One of the areas of road carriers' operation is determined by legal and formal regulations as well as infrastructural conditions of service provision, which can directly or indirectly influence the implementation of transport postulates. They include:

- access to the profession of a carrier,
- access to the profession of a driver,
- periodic trainings of drivers,
- quality of road infrastructure,
- technical condition of roads,
- safety of road traffic,
- protection in transport processes (of drivers, vehicles, and cargos),
- international agreements and conventions.

These factors were selected based on relevant literature (e.g. Łacny 2009; Rydzkowski and Wojewódzka-Król 2009; Marciniak-Neider and Neider 2006) and preliminary interviews with mangers of road transport enterprises. They were subjected to respondents' evaluation in a six-point scale (1 – factor completely unimportant to the shaping of competition, 6 – factor highly important to the shaping of competition), whereby those scored at ≥ 4 were considered as having an impact.

The research survey was conducted twice, in 2013 and 2019. In 2013, 134 respondents participated in the survey, and statistical material was collected based on interviews (personal and via telephone) with the use of a questionnaire. This method of collecting data was costly and time consuming. In 2019, the survey was conducted using an electronic questionnaire created in Google Form (the questionnaire was not publicly available). In total, 73 properly filled forms were obtained. In both (independent) research samples the respondents were chosen randomly on a basis of the Polish classification of activities. In both samples questionnaires were addressed to owners, managers, and persons responsible for transport. The respondents represented entities registered in one of Poland's voivodships (Warmińsko-Mazurskie), operating on the international markets, and representing the sector of small and medium enterprises. Microenterprises prevailed in both samples (70% in 2013 and 56% in 2019). In those two samples there were no enterprises with employment over 25 persons. W województwie warmińsko-mazurskim w ok 2% przedsiębiorstw zatrudnienie było większe niż 50 osób. In the structure of road transport enterprises in the Warmińsko-Mazurskie voivodship, 2% of enterprises employed 10-49 people and 0.12% (24 entities) were characterized by higher employment (in 2013 and 2019). Worthy of notice is that the structure of the respondents was similar to the structure of enterprises in Poland and in many EU countries.

This survey aimed to determine the influence (importance) of formal and legal conditions on the competitiveness of road carriers. Secondly, it attempted to identify changes in the perception of dependencies between these determinants and competitiveness (based on the results of surveys conducted in 2013 and 2019). Finally, the structure of employment was considered in the analysis to establish whether enterprise size affected the research results.

Research Results

In the respondents' opinions from 2013, the legal, formal, and infrastructural determinants did not affect changes in the competitiveness of road carriers (average score of the factors < 4). In contrast, an increase in the importance of these determinants (based on average score) could be observed in the 2019 survey. The majority of the assessed factors were considered important from the perspective of competitiveness. Respective results are presented in Fig. 2.

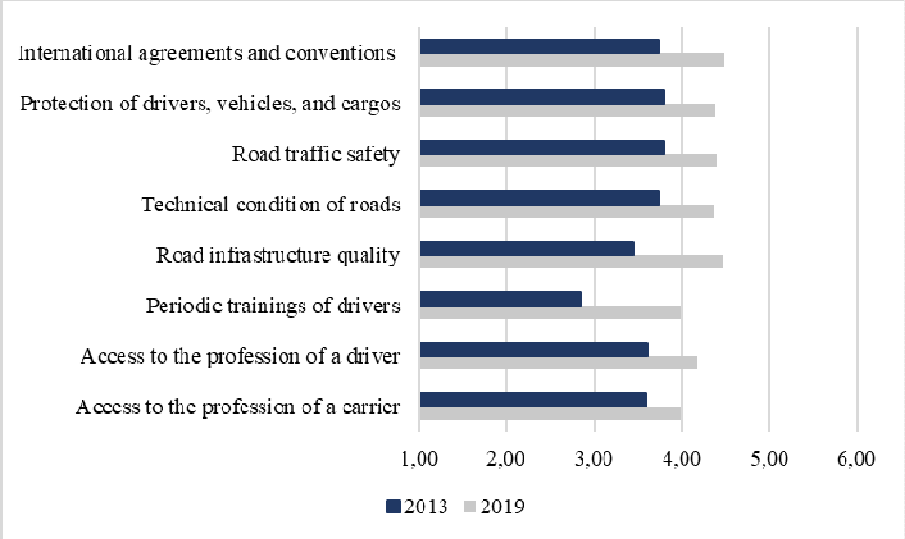

Fig. 2: Average scores of competitiveness factor

Descriptive statistics provided information regarding the absence of homogeneity of research samples (Tab. 1). In 2013, the respondents' opinions regarding the importance of competitiveness factors were divided, as confirmed by a relatively high value of the range or variation coefficient. Particularly large differences and divided opinions can be observed in regarding the factors associated with infrastructure, i.e., road infrastructure quality and technical condition of roads (V=51 and R=5 as well as V=47 and R=4, respectively). Factors with the highest scores were associated with widely understood safety. Road traffic safety ($\bar{x}$=3.81) and the protection of drivers, vehicles, and cargos ($\bar{x}$=3.81) directly determine the efficiency of processes, including competitiveness compared to other entities providing transport services. Worthy of notice is that, in the respondents' opinion, none of the factors was relevant to their competitiveness.

Table 1: Descriptive statistics

Variable	Year of the research*	Valid N	Average ($\bar{x}$)	Median (Me)	Mode	Mode size	Minimum	Maximum	Range (R)	Standard deviation	Coefficient of variation (V) (in %)
Access to the profession of a carrier	2013	134	3.60	4	4	44	1	6	5	1.286830	36
	2019	76	3.99	4	4	23	1	6	5	1.252699	32
Access to the profession of a driver	2013	134	3.61	4	4	74	1	5	4	0.900380	25
	2019	76	4.18	4	4	23	2	6	4	1.032022	26
Periodic trainings of drivers	2013	134	2.84	3	2	58	1	5	4	1.063361	37
	2019	76	3.99	4	5	20	1	6	5	1.438490	36
Road infrastructure quality	2013	134	3.45	3	2	54	1	6	5	1.745315	51
	2019	76	4.47	5	5	28	2	6	4	1.281082	25
Technical condition of roads	2013	134	3.73	3	2	56	2	6	4	1.756467	47
	2019	76	4.37	5	6	21	2	6	4	1.379481	27
Road traffic safety	2013	134	3.81	4	3	38	2	6	4	1.389962	36
	2019	76	4.40	4	4	25	2	6	4	1.139441	28
Protection of drivers, vehicles and cargos	2013	134	3.81	4	3	30	1	6	5	1.563097	41
	2019	76	4.38	5	5	28	2	6	4	1.125835	22
International agreements and conventions	2013	134	3.73	4	3	44	1	6	5	1.245528	33
	2019	76	4.48	5	5	25	1	6	5	1.131734	23

**2013 and 2019 – 95% confidence interval for average*

A non-parametric Mann-Whitney test was used in further statistical analysis to verify hypotheses regarding the insignificance of differences in perceiving the competitiveness shaping factors. The null hypothesis (H_0) was adopted, claiming about no effect of the research year on the assessment of competitiveness factors, that was confronted with an alternative hypothesis (H_1) assuming the effect of the research year on the assessment of these factors, with the adopted significance level of α=0.05. Respective results are presented in Tab. 2. In the case of all factors shaping the competitiveness of road carriers, H_0 had to be rejected and H_1 had to be assumed.

Table 2: The results of the Mann-Whitney U test

Tested value[a]	Mann–Whitney U test	W Wilcoxon	Z	Asymptotic significance (bilateral)
Access to the profession of a carrier	4067.000	13112.000	-2.068	.039
Access to the profession of a driver	3423.000	12468.000	-3.843	.000
Periodic trainings of drivers	2608.000	11653.000	-5.709	.000
Road infrastructure quality	3306.000	12351.000	-3.959	.000
Technical condition of roads	3804.000	12849.000	-2.730	.006
Road traffic safety	3639.000	12684.000	-3.108	.002
Protection of drivers, vehicles and cargos	3852.000	12897.000	-2.574	.010
International agreements and conventions	3228.000	12273.000	-4.153	.000

a. Grouping variable: research year

The significance of differences between the scores of competitiveness shaping factors in particular years of the research was also analysed considering the employment size at respondents' enterprises. The results were expected to allow establishing statistically significant differences in the opinions of respondents from particular groups of enterprises. Respective results are presented in Tab. 3 and Tab. 4. The research year influenced the perception of factors affecting competitiveness in a group of enterprises employing more than 9 persons. The null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was adopted. Three factors were scored significantly higher: access to the profession of a carrier, periodic trainings of drivers, and road traffic safety. In respondents' opinion, the importance of the remaining factors has not changed (no significant differences in average scores). In a group of enterprises employing less than 10 persons (micro-enterprises), the research year had no statistically significant effect on the assessed importance of the access to the profession of a carrier and road traffic safety in shaping the competitiveness of road carriers (H_0 had to be adopted). In contrast, the importance of the remaining factors was observed to increase (H_0 had to be rejected and H_1 had to be adopted). The research year analysis showed that enterprises employing more than 9 persons were characterised by greater homogeneity in the perception of factors compared to a group of the smaller enterprises.

Table 3: The results of the Mann-Whitney U test in a group of enterprises employing more than 9 persons

Tested value[a]	Mann–Whitney U test	W Wilcoxon	Z	Asymptotic significance (bilateral)
Access to the profession of a carrier	358.000	709.000	-2.316	.021
Access to the profession of a driver	424.000	775.000	-1.507	.132
Periodic trainings of drivers	358.000	709.000	-2.300	.021
Road infrastructure quality	449.000	800.000	-1.108	.268
Technical condition of roads	437.000	788.000	-1.272	.203
Road traffic safety	306.000	657.000	-3.003	.003
Protection of drivers, vehicles and cargos	483.000	834.000	-.665	.506
International agreements and conventions	475.000	826.000	-.770	.441

a. Grouping variable: research year

Table 4: The results of the Mann-Whitney U test in a group of enterprises employing less than 10 persons

Tested value[a]	Mann–Whitney U test	W Wilcoxon	Z	Asymptotic significance (bilateral)
Access to the profession of a carrier	1525.000	7411.000	-1.047	.295
Access to the profession of a driver	1162.000	7048.000	-3.040	.002
Periodic trainings of drivers	735.000	6621.000	-5.106	.000
Road infrastructure quality	1063.000	6949.000	-3.415	.001
Technical condition of roads	1286.000	7172.000	-2.280	.023
Road traffic safety	1389.000	7275.000	-1.718	.086
Protection of drivers, vehicles and cargos	1256.000	7142.000	-2.389	.017
International agreements and conventions	952.000	6838.000	-3.976	.000

a. Grouping variable: research year

Conclusions and Discussion

According to the respondents, there was a change in the importance of formal, legal, and infrastructural determinants in shaping competitiveness. They were found irrelevant in 2013, but the research conducted 6 years later demonstrated that regulatory and infrastructure spheres did affect the competitiveness of road carriers. What was the reason behind the change in the entrepreneurs' perception? A likely (and unverified) reason could be the changes proposed in the Community's regulations. They pertain to the functioning of markets and transport enterprises and are described as a "New Mobility Package". The IRU (2019) points out to problems arising from changes related to, i.a., social conditions, the necessity of ensuring hotel conditions in weekly rest of the drivers, and the necessity of providing minimum wages binding in the country in which the transport takes place (except for transit transport). In particular, the last factor will contribute to diminished competitiveness of the Polish carriers and those from Central and Eastern Europe countries. The increased business activity costs will contribute to the increase of prices, being one of the major instruments in competing for contracts in international markets (Poliak et al. 2019; Transport przyszłości 2019; Lazauskas et al. 2012). It seems interesting to continue the research in this respect.

Including the structure of enterprises in the analysis provided important information. In the enterprises employing 1-9 persons, the competitiveness shaping factors were scored significantly higher than in the enterprises employing 10-25 persons. Large fragmentation of services supply suggests lower resourcefulness of entrepreneurs (Laufs and Schwens 2014). Poor human and material resources can constitute a barrier in adjusting to the varying operating conditions, in particular, if these changes are driven by new legal frames of providing services in foreign markets. Greater homogeneity of answers could be observed in the group of enterprises employing more than 9 persons (subject to the fact that micro-enterprises and enterprises employing 10-25 persons constituted heterogeneous samples). A hypothesis assuming that the employment size could affect the homogeneity of the sample seems interesting. Its verification could extend knowledge in the research field of the road carriers competitiveness with consideration given to the regulatory sphere.

The analysis of quality shaping factors demonstrated a significant increase in the importance of the road infrastructure quality in shaping the competitiveness of road carriers. The development of road transport infrastructure in Poland, attempts to limit congestion, and attempts to create safe parking lots in Poland and the EU countries, significantly affect the competitiveness of carriers. This quality is identified with the safety and promptness of deliveries, the implementation of which requires high-quality infrastructure.

Study limitations

The research sample structure was similar to the structure of road carriers in Poland and in many EU countries, but limiting the survey to one voivodship in Poland did not allow for data generalisation. However, reaching similar results in a representative sample could not be excluded. It is worth noticing that the research into the market supply of services is sparse compared to the research focused on the demand in the scope of competitiveness.

The survey results provide an impetus for the continuation of the research and extension thereof by larger entities (with employment rate exceeding 25 persons). As indicated by the research results, the size of the employment can affect perception of the importance of formal and legal conditions to the road carriers' competitiveness.

The survey results provide a platform for further deliberations on the importance of regulatory and infrastructure spheres in the operation of road carriers. The research needs to be continued considering the implementation of the Mobility Package (since August 2020) and formal and legal changes associated with promoting sustainable transport development.

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Interdisciplinarity and Multidimensional of Entrepreneurship: Review of The Main Definitions

Anna KOMARNICKA

Faculty of Management, UTP University of Science and Technology in Bydgoszcz, Poland,
e-mail: anna.komarnicka@utp.edu.pl

Pawel MICKIEWICZ

Faculty of Economics, West Pomeranian University of Technology in Szczecin, Poland,
pawel.mickiewicz@zut.edu.pl

Bartosz MICKIEWICZ

Faculty of Economics, West Pomeranian University of Technology in Szczecin, Poland,
bartosz.mickiewicz@zut.edu.pl

Abstract

Entrepreneurship is an ambiguous concept, and has been described differently over the centuries, both in scientific terms and in practice. There are many definitions, concepts of entrepreneurship in the literature, but there is not a consensus regarding their essence. The article presents a review of selected approaches to entrepreneurship. In addition, the aim of the paper is to seek to answer the question: what is entrepreneurship in practice and what does it do? How is the concept of entrepreneurship defined in the literature? Is it possible to discuss the paradigm of entrepreneurship, considering entrepreneurship as an interdisciplinary science?

Keywords: entrepreneurship, entrepreneurial concepts, multidimensionality, entrepreneurial paradigm

Introduction

The multidimensionality and dynamism of the phenomenon of entrepreneurship makes it a complex issue, a subject of interest for many scientific disciplines, and it is difficult to find a consensus over the meaning of this term. (Siuta-Stolarska, Siuta-Brodzińska 2011). Analysing the issue of entrepreneurship, it can be concluded that it is something natural in today's economic life, because, as M. Bratnicki emphasises, it can be said that '(…) we are entering an era where entrepreneurship is not so much a king as a dictator of economic life'. (Bratnicki 2002). In the theory and practice of many scientific fields, the concept of entrepreneurship is encountered. The multiple of definitions of entrepreneurship and their constant development, determines the need to systematically classify them (Matusiak 2006). However, without this it is difficult to interpret and expose the complexity of the problem. The article is an attempt to answer the question: what is entrepreneurship in practice and what does it do? How is the concept of entrepreneurship defined in the literature? It is also worth considering: is it possible to talk about an entrepreneurial paradigm, meaning entrepreneurship as an interdisciplinary science?

Entrepreneurship as A Science

Entrepreneurship is a discipline of knowledge combining economics and management science. However, until now, it has been difficult to determine its scientific status. According to sceptics, entrepreneurship has not yet developed all the structures characteristic of a separate science, therefore, entrepreneurship is rather complementary to other sciences, mainly economics and management.

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Difficulties in fulfilling criteria appropriate for science are related to the fact that entrepreneurship is interdisciplinary in nature (Zajdel 2015) (Kurczewska 2013). Moreover, entrepreneurship, as opposed to other sciences, has not developed uniform, clearly specified definitions, theoretical concepts and ideas, research rules, unified principles and an independent methodology (Kurczewska 2013). Therefore, the use of terminology, concepts and theories established by other sciences may indicate a flaw or weakness, due to the problem of disproportionality - interdisciplinary research is difficult to be compared. In entrepreneurship, that aspires to be a science, paradigms should be distinguished, but this is not that easy, because the concept of a paradigm is understood in different ways, secondly, interdisciplinarity is in contradiction to paradigm, and thirdly, in social sciences, paradigms are controversial (Kurczewska 2013).

On the other hand, entrepreneurship can be regarded as a paradigm serving to show and understand human behaviour, hence do not look for entrepreneurial paradigms, but treat entrepreneurship as a paradigm in social sciences. P. Davidsson argues that entrepreneurship as a science should deductively test theories taken from sociology, economics, management sciences, but it should also ask new questions, building theories based on an inductive approach (Katz, Shepherd 2003). As K. Kuciński emphasises, along with the complexity of social process conditions, the research fields of separate sciences intermingle. In this way, the multidimensional and wide development of entrepreneurship, enhances it with new content, new approaches, which is a sign of scientific progress (Kuciński 2010). Moreover, there are also views that entrepreneurship as a young science has the right to 'experiment' in the area of applied methodology, and that its openness to 'experiments' encourages development. Furthermore, it is worth stressing that entrepreneurship studies a social phenomenon that is not completely addressed by any other field of science. This is a strong point to acknowledge the autonomy of entrepreneurship as a science. Despite being fragmented, it tries to understand the progress of a one, specific and complete process, which has until now been only randomly studied by other sciences (Kurczewska 2013).

In conclusion, entrepreneurship makes use of the achievements of many sciences and other fields, although its results contribute to the development and enrichment of the areas from which it initially benefited. Therefore, we can talk about the feedback.

The evolution of entrepreneurship

Originally, entrepreneurship began to appear in economic sciences as a function of the market. It was also defined as: risk-taking [Cantillon, Say], activity [Austrian school] and innovation [Schumpeter]. The evolution of entrepreneurship as a field of science and the increased interest in behavioural and entrepreneurial management sciences have caused increased focus on entrepreneurial characteristics and the concept of entrepreneurship as a process (Corbetta, Huse, Ravasi 2004). In the period 1850-1870 in economic sciences - entrepreneurship was defined as a function of the market and the entrepreneur has the ability to identify profit opportunities. Between 1890-1920 in economic sciences - entrepreneurship continued to be understood as a function of the market and the entrepreneur as the creator of instability and creative destruction. In turn, in the years 1950-1970 in behavioural sciences - the entrepreneur was defined as an entity with certain attributes. However, since 1985 in the management sciences -entrepreneurship is considered to be a process (Kurczewska 2013).

The modern, multidimensional concept of entrepreneurship has the following eight dimensions (Siuta-Stolarska, Siuta-Brodzińska 2011):

- the economic dimension (efficiency criteria),
- subjective (entrepreneur),
- process (implemented process),
- educational (education),
- institutional (organisation),
- psychological (psychological factors of entrepreneurship),
- personal (personal characteristics affecting entrepreneurial activities),
- cultural (values, cultural norms).

Nowadays, entrepreneurship is considered as the fourth traditional factor of production, besides the land, labour and capital. In 1924 A. Marshall recognised entrepreneurship as the fourth factor of production, in addition to the classic economy, which had been known before - capital, labour and land (and other natural resources). It has had not only an economic significance, but also an ethical and political meaning (Oleksyn 2012). However, considering entrepreneurship as a factor of production means that entrepreneurship binds together and mobilises capital, labour and natural resources; without entrepreneurship they would be useless (Oleksyn 2012). (Figure 1.).

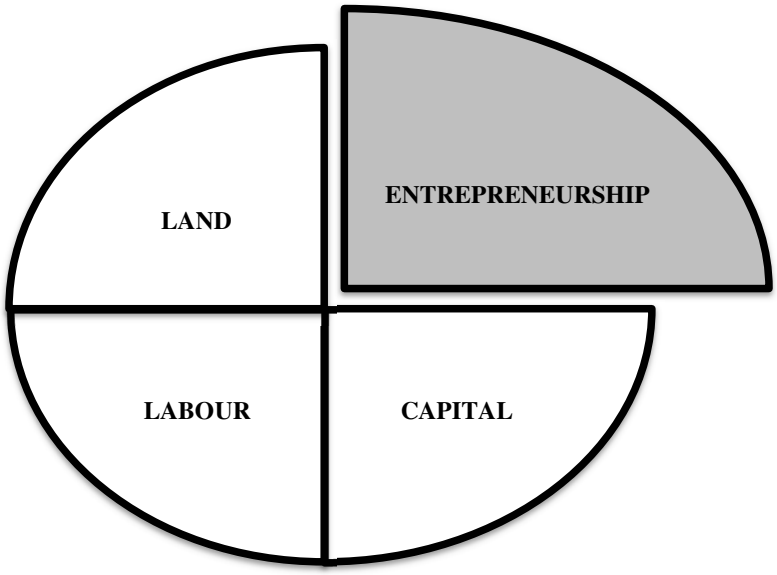

Figure 1: The modern approach to entrepreneurship - effects of production factors
Source: own work based on (Oleksyn, 2012)

The concept and definition of entrepreneurship

The concept of entrepreneurship does not have a single, coherent definition. Entrepreneurship is defined according to different criteria and covers many dimensions. Table. 1 presents different ways of defining the phenomenon of entrepreneurship described by researchers and scientists representing a variety of scientific disciplines.

Table 1: Review of the definition and concept of entrepreneurship

AUTHOR	DEFINITION OF ENTREPRENEURSHIP
M. Bratnicki	Entrepreneurship is manifested in the action of an entrepreneur who gains riches and, at the same time, increases the rate of change in the economy through the use of his talent and, often, luck.
R. Griffin	Entrepreneurship is the process of arranging and running a business and taking the risks involved.
K. Kaczmarzyk	Entrepreneurship means creating something new, which is unprecedented, it is about making changes and taking action by the entrepreneur.
R. Kao	Entrepreneurship is the process of creating something new in order to generate added value for society.
T. Kotarbiński	Entrepreneurship is a certain set of people's behaviours that aims to achieve the intended goal through the implementation of projects.

AUTHOR	DEFINITION OF ENTREPRENEURSHIP
T. Kraśnicka	Entrepreneurship is understood as the process of creating richness, setting up a company, creating innovations, making changes, creating new workplaces, creating new values, the growth of companies (as well as economic growth), and taking advantage of opportunities.
D. Kuratko	Entrepreneurship is a dynamic process of creating added value. This value is created by people who accept the risk of financial, time and/or career related to adding value to a product or service.
J. Machaczka	Entrepreneurship is all the activities related to the setting up of a new business.
J. Macieja	Entrepreneurship is a great method of creating and building something new, basically from nothing, that is to say, it is the ability to use ideas and resources that are invisible to others.
T. Pszczółkowski	Entrepreneurship means to set goals or tasks for ourselves and others on a personal initiative and to make sure that they are implemented efficiently (especially successfully).
S. Shane **S. Venkataraman**	Entrepreneurship is a dynamic process of transforming new knowledge into products and services.
J. Siekierski	Entrepreneurship is the ability to be active individually or as a team in a specific area.
M. Strużycki	Entrepreneurship is not a field of ideological action, but a well understood interest for each entrepreneurial individual and enterprise.
J. Targalski	Entrepreneurship is the process of setting up and running a business.
A. Wiatrak	Entrepreneurship can be considered as an attitude or as a process for the development of current activities or for the setting up of new business undertakings, based on observation, the search for market opportunities, as well as management strategies and leadership in its implementation.
A. Żur	Entrepreneurship is the resourcefulness of life.

Source: own work based on (Bieniok 2012, Glinka, Gudkova 2011, Kraśnicka 2002, Łochnicka 2016, Lisowska, Rogala 2011, Ropęga 2016, Piecuch 2010, Zajdel 2015)

Conclusions

On the basis of an analysis of the various ways of defining the phenomenon of entrepreneurship expressed by representatives of many scientific disciplines, it should be concluded that a uniform, comprehensive, commonly accepted by individual institutions and researchers definition of entrepreneurship has not yet been developed. However, the difficulties in defining the notion of entrepreneurship should not hinder further attempts at it. In addition, it would be difficult to clearly define the paradigm of entrepreneurship, and, assuming that different paradigms coexist, to determine the level of mutual communication and understanding between the paradigms. It should be concluded that a wide discussion on the scientific nature of entrepreneurship, the presence of paradigms in entrepreneurship and interdisciplinary approaches are undoubtedly contributing to its development.

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A Method of Assessing the Feasibility of Realization Enterprise Project Portfolios

Stefan ROZMUS

Institute of Computer and Information Systems, Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, stefan_rozmus@wat.edu.pl

Abstract

The need for simultaneous implementation of many projects in modern enterprises forces a change in the approach to project management. The operational attitude focused on managing individual projects is replaced by a strategic approach focused on managing project portfolios. The purpose of the article is to propose a method to improve the process of building the enterprise project portfolio strategy, which is understood as a set of projects that bring the highest benefits together within the accepted risk tolerance limits. The first part of the article explains the essence of the project portfolio and the project portfolio management process, with particular emphasis on the stage of portfolio components assessment. The second part of the article describes the proposed method for automatically generating project portfolios, which can be realized with a set of available resources. This part presents a model of permissible sharing of resources between projects, a method for assessing feasibility of the project portfolio, and a method that minimizes the number of project portfolios required to assess the feasibility of all established enterprise projects. The proposed method can be used both when switching the enterprise to project portfolio management and when designating a new project portfolio during the implementation of the currently selected one (acquiring new projects or loss of resources). The whole is complemented by elements of the sample application of the proposed method together with graphic illustrations.

Keywords: Project, Project Portfolio, Resources, Graph, Boolean Function.

Introduction

The requirement of simultaneous implementation of multiple projects in modern companies necessitates a change in the approach to project management. The operational approach, aimed at managing individual projects, is being replaced by a strategic approach, aimed at managing project portfolios. Companies generally have established strategies and business objectives. Individual organizational units can submit and implement various projects to achieve these business objectives. Consequently, this leads to competition for access to usually limited company resources. Therefore, company management should implement project portfolio management to ensure that it is able to select and approve projects that are not only in line with the company's business strategies and objectives, but as a portfolio they guarantee an optimal return on possible project investments.

(PMI, 2017) defines project portfolio as a set of projects, programmes, ancillary portfolios and operations managed as a group, in order to achieve the strategic objectives of an organization. Project portfolio management, on the other hand, is the (Thiry, 2007) process of analyzing and allocating the organization's resources between projects and programs in order to achieve the organization's objectives and maximize value for its stakeholders. It should be noted that the base unit of project portfolios (as well as programmes) is a project. Therefore, further considerations, without losing their generality, can be reduced to the case where the project portfolio is simply a set of projects. The projects within the portfolio are quantifiable, which means that they can e.g. be identified, categorized, evaluated, prioritized and authorized. From the point of view of realizability of such a project portfolio with limited resources for which individual projects compete, it is irrelevant whether the projects within the portfolio are related or unrelated, are independent or interdependent and have related or unrelated

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business objectives. What is important, however, is that a given portfolio project cannot be implemented unless it is possible to allocate the resources required to implement this project.

The selection of the best project portfolio with regard to the criteria adopted by a given company takes place as part of the project portfolio management process. The project portfolio management process can be divided into stages. Although the names and scope of the various stages of this process, as perceived by various authors (Brzozowski, 2014; Levine, 2005; Bible and Bivins, 2011), differ, the following tasks can be distinguished in each of them, significant from the point of view of assessing the realizability of the project portfolio, with limited resources available for their implementation. These are:

- identification of potential projects within the portfolio,
- allocation of resources to projects,
- pre-selection of project portfolios, i.e. selection according to the criterion of their realizability with the allocated resources.

Identifying and submitting projects to the portfolio is an activity closely linked to the strategic planning process. Projects should be submitted for the portfolio as a consequence of carried-out analyses (both of the environment and the inner workings of the organization) and conceptual activities (Sońta-Drączkowska, 2012). Regardless of the project identification methods employed (e.g. strategic analysis methods, heuristic methods), the result of this task is the creation of a list of currently implemented and potential portfolio projects. Then, each project from such list should be assigned the resources necessary for its implementation. Assignment of a resource to a project is understood here as a declaration of actual allocation of the resource to said project in case it is accepted for implementation. It should be noted here that the projects on the list that are currently being implemented have already been assigned resources. The resource requirements of individual projects are determined for each of them individually, according to the adopted project management methodology, of which the most commonly used are PRINCE2 (Axelos, 2018) and PMBOK® Guide (PMI,2013).

From the point of view of assessing the realizability of the project portfolio, the resources for the implementation of the portfolio's projects (e.g. personnel, technical or financial resources) can be divided, generally, into two groups, i.e. shared resources and resources that cannot be shared. A shared resource is a resource that can be simultaneously allocated to more than one portfolio project. A characteristic feature of a shared resource is a certain total value of the resource, e.g. number of people, number of processors, amount of money. Assignment of a shared resource involves assigning a portion of the resource to the project by providing a value that is a fraction of the total value of the shared resource (which does not exclude the possibility of providing a total value of the resource). Although a shared resource can be assigned to various projects, only these subsets of projects for which the sum of shares in the value of the resource does not exceed its total value are considered realizable (with regard to the resource). A resource that cannot be shared is a resource that can be allocated to only one project within a portfolio. Similarly, as in the case of shared resources, it can be assigned to various portfolio projects. Nevertheless, after approving the portfolio of projects to be implemented, only one project can be included in this portfolio with such a resource assigned to it.

Moving on to the selection of potential project portfolios based on projects from the list of identified projects, it is quite obvious that the number of possible project portfolios for the J-item list of identified projects is $2^J - 1$. This means that the number of potential project portfolios can be very large. From among these potential project portfolios, only one portfolio can be selected for implementation, the one considered the best in terms of the criteria adopted. Nevertheless, each of the potential projects should be considered. Note that only the project portfolio in which each of the projects in the portfolio has been allocated all required resources can be selected for implementation. Therefore, it will be rational to make a pre-selection of potential project portfolios based on such a criterion of the realizability of the portfolio. This will allow to limit the number of portfolios to be considered at subsequent stages of project portfolio creation.

An interesting perspective on the process of creating a project portfolio is presented in (Cabała, 2018), where the selection of portfolios based on the criterion of the possibility to allocate resources was preceded by the generation of all possible potential portfolios for a set of identified projects. The method of portfolio pre-selection presented in this paper does not require generating a full set of portfolios and at the same time reduces to a minimum the number of portfolios that need to be reviewed in order to determine the set of all potential project portfolios meeting the criterion of their realizability. The proposed method assumes that available resources belong to the group of resources that cannot be shared.

Model of possible execution of project portfolios

Let:

$$\mathbb{PR} = \{pr_1, \dots, pr_j, \dots, pr_J\} \tag{1}$$

be a set of all projects under examination which are to be taken into consideration while making a project portfolio,

$$\mathbb{Z} = \{z_1, \dots, z_n, \dots, z_N\} \tag{2}$$

be a set of resources which may be utilized in the execution of the respective projects (from $\mathbb{PR}$ set), whereas let

$$\mathbb{ZG} = \{zg_1, \dots, zg_s, \dots, zg_S\} \tag{3}$$

be a set of groups of resources viz. a set of all those subsets of resources ($zg_s \in \mathbb{ZG}$) which the designer deemed as indispensable for executing the assigned projects. In the general case, so determined subsets are not disjoint. Therefore, if we assume that each resource z_n may be simultaneously assigned for the execution of only one project, then, after selecting any group of resources whose element is z_n, for the execution of a given project, no other group of resources whose element is z_n may be used any longer for the execution of any other project.

It is convenient to illustrate the relation between the projects and possible groups of resources to guarantee their disjunctive execution by means of a graph:

$$\mathbf{GT} = \langle \mathbb{XT}, \mathbb{UT}, PT \rangle \tag{4}$$

where: $\mathbb{XT}$ – a set of graph vertices, $\mathbb{XT} = \mathbb{PR} \cup \mathbb{ZG}$; $\mathbb{UT}$ – a set of graph branches, $\mathbb{UT} = \overrightarrow{\mathbb{UT}} \cup \widetilde{\mathbb{UT}}$ whereby $\overrightarrow{\mathbb{UT}} \subset \mathbb{PR} \times \mathbb{ZG}$, $\widetilde{\mathbb{UT}} \subset \mathbb{ZG} \times \mathbb{ZG}$; PT – a three-segment relationship which satisfies the following conditions:

$$\begin{aligned} &a)\ \forall u \in \mathbb{UT}\ \exists x, y \in \mathbb{XT}: \langle x, y, u \rangle \in PT \\ &b)\ \forall u \in \mathbb{UT}\ \forall x, y, z, v \in \mathbb{XT}: \\ &\quad \{[\langle x, y, u \rangle \in PT \wedge \langle v, z, u \rangle \in PT] \Rightarrow [(x = v) \wedge (y = z) \vee (x = z) \wedge (y = v)]\} \end{aligned} \tag{5}$$

From now on, graph **GT** will be referred to as the graph of opportunities to execute project portfolios. The edge connecting the two groups of resources means that in those both groups there is at least one common element (but it is not a group of identical resources). Absence of an edge between the groups means separation of those groups. Such an exemplary graph is shown in Fig 1., where:

- upon determination of the project portfolio, four projects are taken into consideration, viz. a set of projects $\mathbb{PR} = \{pr_1, pr_2, pr_3, pr_4\}$,

- the set of resources which may be utilized for the execution of each of those four projects contains twelve different resources, $\mathbb{Z} = \{z_1, z_2, z_3, z_4, z_5, z_6, z_7, z_8, z_9, z_{10}, z_{11}, z_{12}\}$, without being able to share them.

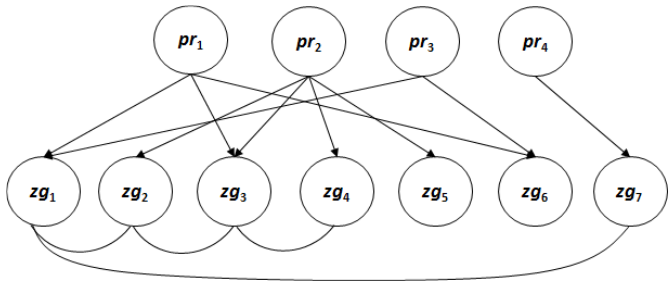

Fig 1. A graph of opportunities to execute project portfolios

- upon examination of possible alternative sets of resources indispensable for the execution of each of the projects under examination, it was ascertained that a prerequisite for their execution is the assignment to each of them of one of the following subsets of the set of resources:
  - pr_1: $\{z_2, z_5, z_7\} \mid \{z_1, z_3, z_8\} \mid \{z_9, z_{10}\}$,
  - pr_2: $\{z_1, z_2, z_8\} \mid \{z_1, z_3, z_8\} \mid \{z_3, z_4\}$,
  - pr_3: $\{z_6\}$,
  - pr_4: $\{z_7, z_{11}, z_{12}\}$,
- eventually, a seven element set of groups of resources has been obtained $\mathbb{ZG} = \{zg_1, zg_2, zg_3, zg_4, zg_5, zg_6, zg_7\}$, gdzie: $zg_1 = \{z_2, z_5, z_7\}$, $zg_2 = \{z_1, z_2, z_8\}$, $zg_3 = \{z_1, z_3, z_8\}$, $zg_4 = \{z_3, z_4\}$, $zg_5 = \{z_6\}$, $zg_6 = \{z_9, z_{10}\}$, $zg_7 = \{z_7, z_{11}, z_{12}\}$.

Graph **GT** will be used for ascertaining whether a given subset of project set $\mathbb{PR}$ (viz. the indicated project portfolio can be executed for a determined set of resources and principles of their disjunctive sharing, viz. for a determined $\mathbb{ZG}$ set.

Identification of the feasibility function for the project portfolio

Each subset of project sets PR can be unequivocally determined by a binary (Boolean) vector

$$\mathbf{L} = \langle \mathrm{l}_1, \dots, \mathrm{l}_j, \dots, \mathrm{l}_J \rangle \tag{6}$$

whose component $\mathrm{l}_j = 1$ means that project numbered j is an element of the project subset under examination $\mathrm{l}_j = 0$ – that it is not an element of that subset.

Let $\mathbb{L}$ stand for a set of all vectors **L** (6). For an established set of resources $\mathbb{ZG}$ (3), for each $\mathbf{L} \in \mathbb{L}$ one may evaluate the feasibility of a project subset determined by vector **L**. By assuming that the value 1 stands for a possible execution of the given project subset, while 0 – stands for its lack, it should be ascertained there will exist a certain binary (Boolean) function $g(\mathbf{L})$ defined as follows:

$$g: \mathbb{L} \to \{0,1\}$$
$$g(\mathbf{L}) = \begin{cases} 1 & when\ a\ subset\ of\ projects\ determined\ by\ vector\ \mathbf{L} \\ & can\ be\ feasibility \\ 0 & otherwise \end{cases} \tag{7}$$

It can be concluded from the essence of function g (7) that it is an increasing, monotonic function. Thus, if there exists a possibility of executing a project subset determined by a certain vector **L**, it is also feasible to execute each subset of such a set. Moreover, be stressed that function g is a coherent

function. Therefore, function g can be unambiguously determined by a set of its maximum vectors. It should be clearly stressed that the method of determination of maximum vectors, described hereinafter, is actually something different from the determination of maximum vectors of a known function, defined, for example with an appropriate Boolean formula (Rudell, 1989; Courdert, 1994; Łuba, 2005).

In order to find the maximum vectors of function g one can successfully apply the method of identification of a non-decreasing binary monotonic function which boils down to finding its minimum vectors (Rozmus and Kozina, 2020) after adequate modification of that method. For this purpose, let us introduce some designations and dependences. Let $B = \{0,1\}$ stand for a set of Boolean values (respectively, false and true), let $\mathbb{L}$ continue to stand for a set of all J dimensional Boolean vectors $\mathbf{L}$ determining the project subsets (from set$\mathbb{PR}$) and let relation $\preccurlyeq \subset B \times B$ be a relation

$$\preccurlyeq = \{\langle 0,0\rangle, \langle 0,1\rangle, \langle 1,1\rangle\} \tag{8}$$

and let relation $\prec \subset \mathbb{L} \times \mathbb{L}$ be a relation defined as follows:

$$\forall \mathbf{L}', \mathbf{L}'' \in \mathbb{L}: [\mathbf{L}' \prec \mathbf{L}''] \Leftrightarrow [\forall 1 \leq s \leq I: l'_s \preccurlyeq l''_s] \tag{9}$$

where $\mathbf{L}' = \langle \mathrm{l}'_1, \dots, \mathrm{l}'_j, \dots, \mathrm{l}'_J \rangle$, $\mathbf{L}'' = \langle \mathrm{l}''_1, \dots, \mathrm{l}''_j, \dots, \mathrm{l}''_J \rangle$. Vector $\mathbf{L}'$ is referred to as a predecessor of vector $\mathbf{L}''$, and vector $\mathbf{L}''$- a successor of vector $\mathbf{L}'$. Interval $[\mathbf{L}', \mathbf{L}'']$, defined in space $\mathbb{L}$, is the set of those $\mathbf{L}$ vectors which are simultaneously successors of vector $\mathbf{L}'$ and predecessors of vector $\mathbf{L}''$. At this point be stressed that $\mathbf{L}' \prec \mathbf{L}'$, and also $\mathbf{L}'' \prec \mathbf{L}''$. Let the function be referred to as φ, and also a monotonic, non-decreasing Boolean function then and only then when for each ordered vector pair $\mathbf{L}', \mathbf{L}'' \in \mathbb{L}$ the following implication is true:

$$[\mathbf{L}' \prec \mathbf{L}''] \Rightarrow [\varphi(\mathbf{L}')] \leq \varphi[\mathbf{L}''] \tag{10}$$

As a minimum vector of function φ will be defined each such a vector $\mathbf{L} \in \mathbb{L}$, that $\varphi(\mathbf{L}) = 1$, and for all predecessors of such a vector, different from L, the value of function φ is equal to 0. If the set of minimum vectors is designated as $\mathbb{L}_{min}$, then, the formal description of function φ is as follows:

$$[\mathbf{L} \in \mathbb{L}_{min}] \Leftrightarrow \left[(\varphi(\mathbf{L}) = 1) \wedge \left\{\forall \mathbf{L}_p \in \mathbb{L}: \left[\left(\mathbf{L}_p \prec \mathbf{L}\right) \wedge \left(\mathbf{L}_p \neq \mathbf{L}\right)\right] \Rightarrow \left(\varphi\left(\mathbf{L}_p\right) = 0\right)\right\}\right] \tag{11}$$

Let vectors $\mathbf{a}, \mathbf{b} \in \mathbb{L}$, $\mathbf{a} = \langle \mathrm{a}_1, \dots, \mathrm{a}_j, \dots, \mathrm{a}_J \rangle$, $\mathbf{b} = \langle \mathrm{b}_1, \dots, \mathrm{b}_j, \dots, \mathrm{b}_J \rangle$ stand, respectively, for the lower and upper end of any interval defined in space $\mathbb{L}$, and let vectors $\mathbf{1}, \mathbf{0} \in \mathbb{L}$, $\mathbf{1} = \langle 1_1, \dots, 1_j, \dots, 1_J \rangle$, $\mathbf{0} = \langle 0_1, \dots, 0_j, \dots, 0_J \rangle$ stand, respectively, for a vector representing a full set of $\mathbb{PR}$ projects, and a vector standing for an empty set. Each interval $[\mathbf{a}, \mathbf{b}]$ in space $\mathbb{L}$ can be unambiguously defined by an appropriate characteristic function Π (Karpiński and Korczak, 1993; Korzan, 1986), assuming the value 1 (true) for vectors $\mathbf{L}$ ($\mathbf{L} \in \mathbb{L}$) belonging to that interval, and the value 0 (false), for vectors from outside that interval. A formula describing such a function may be put down as follows:

$$\Pi_{\mathrm{a,b}}^{(J)}(\mathbf{L}) = \begin{cases} 1, \ gdy\ \mathbf{a} = \mathbf{0} \ \wedge \ \mathbf{b} = \mathbf{1} \\ \prod_{j \epsilon \mathbb{D}_1} l_j \prod_{j \epsilon \mathbb{D}_0} \tilde{l}_j, \ gdy\ \mathbf{a} \neq \mathbf{0} \ \vee \ \mathbf{b} \neq \mathbf{1} \end{cases} \tag{12}$$

where: l_j – Boolean variables (components of vector of Boolean variables $\mathbf{L}$), $\mathrm{a}_j, \mathrm{b}_j$ – Boolean constants (components of vectors $\mathbf{a}$ and $\mathbf{b}$), $\mathbb{D}_1 = \{j \epsilon \mathbb{D}: \mathrm{a}_j = \mathrm{b}_j = 1\}$, $\mathbb{D}_0 = \{j \epsilon \mathbb{D}: \mathrm{a}_j = \mathrm{b}_j = 0\}$, $\mathbb{D} = (\mathbb{D}_1 \cup \mathbb{D}_0) \subset \{1, \dots, j, \dots, J\}$. By making use of the characteristic function of interval (12), it can be ascertained whether a given vector belongs to the interval or not. Be noticed that the set of vectors for which a non-decreasing Boolean function assumes the value of 1 is covered by (non-disjoint) intervals whose lower ends are minimum vectors of that function, and the upper end of each of those intervals is vector $\mathbf{1}$ (in this case, its number of components is J). From now on, those intervals will be referred to as intervals generated by minimum vectors. Starting from any vector, for which function φ assumes the value 1 and examining the predecessors of that vector, we will always reach a minimum vector of

this function. It means that upon identification of function φ , the examination of space $\mathbb{L}$ may be performed sequentially by eliminating entire intervals in which function φ assumes the value 1.

The entire space of vectors $\mathbb{L}$, defined with interval $[\mathbf{a}, \mathbf{b}]$, can be divided dychotomically into two intervals - $[\mathbf{0}, \mathbf{b_1}]$ and $[\mathbf{a_1}, \mathbf{1}]$, where $\mathbf{b_1} = \langle 1_1, \dots, 1_j, \dots, 0_J \rangle$; instead, $\mathbf{a_1} = \langle 0_1, \dots, 0_j, \dots, 1_J \rangle$. Dividing similarly each interval obtained in subsequent stages, after *J*-1 steps we will arrive at a binary tree (Banachowski and Kreczmar, 1989; Wirth, 1985), whose vertices are intervals having a form $[\mathbf{a}_k, \mathbf{b}_k]^n$ where: *k* stands for the number of the step (binary tree level), $k = \overline{0, J-1}$; *n* stands for the interval number for k-th level, $n = \overline{1, 2^k}$. A general rule governing the determination of intervals for the k-th binary tree level - basing upon each interval obtained on k-1th level ($[\mathbf{a}_{k-1}, \mathbf{b}_{k-1}]$), at $k > 0$ - is as follows:

- in vector $\mathbf{b}_{k-1}$, we insert the value of component 0 into position numbered *k*, obtaining vector $\mathbf{b}_k$ (upper end of the first interval),
- in vector $\mathbf{a}_{k-1}$ we insert the value of component 1 into position numbered *k* obtaining vector $\mathbf{a}_k$ (lower end of the second interval),
- by substituting the upper end of interval $[\mathbf{a}_{k-1}, \mathbf{b}_{k-1}]$ with the defined vector $\mathbf{b}_k$, we obtain the first interval $[\mathbf{a}_k, \mathbf{b}_k]'$ whereby $\mathbf{a}_k = \mathbf{a}_{k-1}$,
- by substituting the lower end of interval $[\mathbf{a}_{k-1}, \mathbf{b}_{k-1}]$ with the defined vector $\mathbf{a}_k$,we obtain the second interval $[\mathbf{a}_k, \mathbf{b}_k]''$ whereby $\mathbf{b}_k = \mathbf{b}_{k-1}$.

The binary tree made in line with the rule said for a four dimensional space of vectors **L** is presented Fig 2.

Fig. 2: An exemplary binary tree made in line with rule aforesaid

Determination of minimum vectors of function φ boils down to looking for such vectors in the intervals of so constructed a binary tree. By making use of the properties of a non-decreasing Boolean monotonic function (10) and the characteristic function of interval (12), it can be stated that:

$$[(\mathbf{a} \prec \mathbf{b}) \wedge \varphi(\mathbf{b}) = 0] \Rightarrow [\forall \mathbf{L} \in [\mathbf{a}, \mathbf{b}]: \varphi(\mathbf{L}) = 0] \qquad (13)$$

$$[(\mathbf{a} \prec \mathbf{b}) \wedge \varphi(\mathbf{a}) = 1] \Rightarrow [\forall \mathbf{L} \in [\mathbf{a}, \mathbf{b}]: \varphi(\mathbf{L}) = 1] \qquad (14)$$

A conclusion resulting from the aforesaid is that for identification of function φ it is not necessary to examine all the defined intervals. However, when the value of function φ is equal to 0 for the upper end, there is no need of analyzing that interval. This corresponds to the removal of all subspace of vectors from the analysis (the sub-tree whose vertex is interval $[\mathbf{a}, \mathbf{b}]$). Similarly, removed is the subspace of vectors if for the lower end of interval φ is equal to 1. Therefore, we can minimize the number of indispensable queries leading towards identification of function φ. For searching the binary tree discussed in this paper, the so-called *pre-order* strategy has been intentionally applied (Wirth, 1985). As it can be noticed, each vector belonging to the right-side sub-tree of any vertex of that tree has at least one predecessor in the left-side sub-tree of that vertex. Hence, the adopted searching strategy enables working out of an effective algorithm to guarantee that:

- any vector once examined, will not be re-examined,
- the examination will not cover either the successors of the vectors at which function φ assumes the value 1 or the predecessors of the vectors for which function φ assumes the value 0,
- none of vectors $\mathbf{L} \epsilon \mathbb{L}$ will be left over.

As aforementioned, after a slight modification, the method for identifying function φ will be used for identifying function g, which boils down to the determination of its maximum vectors. For this purpose, we will introduce some designations and dependences. A negated vector of vector L (6) will be vector

$$\tilde{\mathbf{L}} = \langle \tilde{\mathrm{I}}_1, \dots, \tilde{\mathrm{I}}_j, \dots, \tilde{\mathrm{I}}_J \rangle \qquad (15)$$

where sign ~ stands for Boolean negation. The veracity of the following dependences can be proved:

1. For each vector pair $\mathbf{L}_i, \mathbf{L}_j \in \mathbb{L}$, is valid the dependence $[\mathbf{L}_i \prec \mathbf{L}_j] \Leftrightarrow [\tilde{\mathbf{L}}_i \prec \tilde{\mathbf{L}}_j]$.
2. Let Boolean function $g: \mathbb{L} \to \{0,1\}$ be a non–growing monotonic function. Then, function $g': \mathbb{L} \to \{0,1\}$, whose values are defined by the equality $g'(\mathbf{L}) = g(\tilde{\mathbf{L}})$ is a non- decreasing monotonic function.
3. Let g be a a non-growing Boolean monotonic function, and function g' be defined with the equality $g'(\mathbf{L}) = g(\tilde{\mathbf{L}})$ and this, in line with theorem 2 - a non-decreasing Boolean monotonic function. Then, the negated minimum vectors of the non-decreasing Boolean monotonic function g' are maximum vectors of the non-growing Boolean monotonic function g.

Therefore, basing upon dependences 2 and 3, and by using the method for defining minimum vectors of function φ we can determine the maximum vectors for each function $g(\mathbf{L})$ under examination as follows:

a. The vector defined in a successive step is negated.
b. Based on **GT** graph, the possibility of feasibility a subset of projects described by this negated vector is checked. If this is possible, function g assumes the value 1; otherwise, function g assumes the value 0.
c. Operations a, b are repeated for all vectors subsequently defined.
d. All minimum vectors obtained are negated, which is tantamount to obtaining a set of maximum vectors of function g.

Fig 3(a) shows a sequence of project portfolio feasibility queries and responses for the **GT** graph example described earlier (see Fig1). Subsequent vectors were generated in accordance with the already mentioned method of determining minimum function φ vectors, while the value of function φ for each of these vectors was determined (after negating this vector) in accordance with the method described in the next chapter. Function φ identified in the example and function g determined on the basis of minimum vectors of the former function have been illustrated (Fig 3(b), 3(c), respectively), each in a four-dimensional binary space (Korzan, 1978). The vertices of the cube for which the value of the function is equal 1 has been presented in color. In addition, the minimum (function φ) and maximum (function g) vectors were encircled.

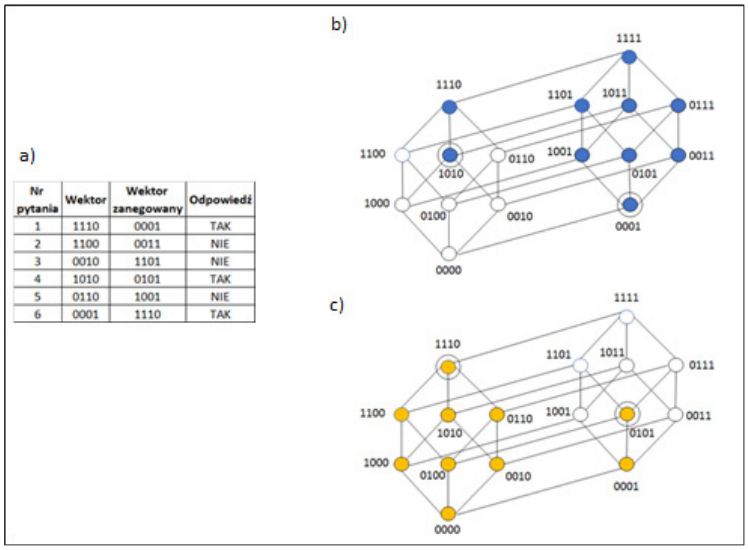

Nr pytania	Wektor	Wektor zanegowany	Odpowiedź
1	1110	0001	TAK
2	1100	0011	NIE
3	0010	1101	NIE
4	1010	0101	TAK
5	0110	1001	NIE
6	0001	1110	TAK

Fig. 3: Example of determining the maximum vectors of function g: sequence of project portfolio feasibility queries (a), graphic representation of the identified function φ (b), graphic representation of the defined function g (c)

Method for determining the values of the function of project portfolio feasibility

Let $\mathbb{PR}_{\mathbf{L}}$ stand for the set of projects described with this vector $\mathbf{L}$, $\mathbb{PR}_{\mathbf{L}} \subset \mathbb{PR}$. If now we should remove all vertices not belonging to subset $\mathbb{PR}_{\mathbf{L}}$ from graph **GT**, then we will obtain graph $\mathrm{GT}^{\mathbf{L}}$ (sub-graph of graph **GT**) which will define the feasibility of the set of projects described with vector **L**. Determination of values of function $g(\mathbf{L})$ boils down to checking whether in graph $\mathrm{GT}^{\mathbf{L}}$ there exists an association of the graph of cardinality $|\mathbb{PR}_{\mathbf{L}}|$ such that each branch of that graph association is an arc; instead, each two vertices belonging to set $\mathbb{ZG}$ (3) are not adjacent to each other in graph $\mathrm{GT}^{\mathbf{L}}$. Thus, if the association number of graph $\mathrm{GT}^{\mathbf{L}}$ is equal to $|\mathbb{PR}_{\mathbf{L}}|$, then $g(\mathbf{L}) = 1$. Otherwise, $g(\mathbf{L}) = 0$.

Due to the imposed constraints (resulting from the interpretation of graph $\mathrm{GT}^{\mathbf{L}}$ branches), none of the generally known algorithms for determining the maximum cardinality graph matchings (Korzan, 1980) can be used directly in relation to graph $\mathrm{GT}^{\mathbf{L}}$. Therefore, in graph $\mathrm{GT}^{\mathbf{L}}$, let us consider subgraph ZG containing only the vertices from set $\mathbb{ZG}$. For this subgraph ZG, all its maximum internally stable subsets are determined. Based on the assumption proved in (Korzan, 1980) that "a subset of vertices $\mathbb{X}'$ in graph $G = \langle \mathbb{X}, \mathbb{U}, \mathrm{P} \rangle$ is an internally stable set only if the subset $\mathbb{X} \backslash \mathbb{X}'$ forms the base of this graph", the problem of determining the maximum internally stable sets of subgraph ZG can be reduced to determining its minimum bases.

Let $n = |\mathrm{ZG}|$ represent the cardinality of the set of vertices of sub-graph ZG, $m = |\widetilde{\mathbb{UT}}|$ be the cardinality of the set of branches of sub-graph ZG and $\mathbf{A} = [a_{ij}]_{n \times m}$ be the binary incidence matrix of this sub-graph. If by **zg** we define a binary (Boolean) characteristic vector describing a subset of set $\mathbb{ZG}$, then the condition for this vector **zg** to define the base of the ZG subset takes the form:

$$\prod_{j=1}^{m} \sum_{i=1}^{n} (a_{ij} \wedge zg_i) = 1 \qquad (16)$$

where zg_i is a component of vector **zg** and the symbols of the product and the sum indicate the conjunction and the alternative respectively. The expression to the left of the equality sign (16) defines function

$$f_b(\mathbf{zg}) = \prod_{j=1}^{m} \sum_{i=1}^{n} \left(a_{ij} \wedge zg_i\right) \tag{17}$$

explicitly designating all bases of graph ZG. If $f_b(\mathbf{zg}) = 1$ then the subset of vertices defined by vector **zg** is the base of graph ZG, otherwise it is not the base of this graph. It can be seen that function f_b is a monotone non-increasing Boolean function, the minimum vectors of which will determine the sets of vertices forming the minimum bases of subgraph ZG. To determine the minimum vectors of this function, the method of identification of φ function could be used as well, where for each vector **zg**, determined in the next step of the algorithm, the value of the function (17) for this vector **zg** is calculated. Fig 4 illustrates subgraph ZG and its designated minimum bases for the example graph **GT** in question (see Fig 1).

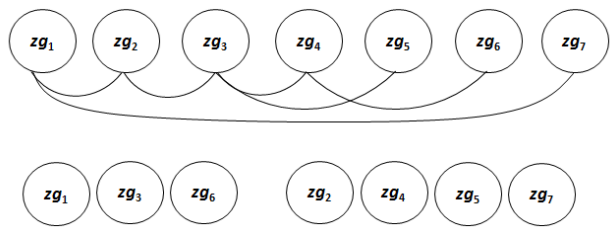

Fig. 4: Example of graph ZG and its minimum bases

On the basis of such obtained minimum vectors, maximum internally stable subsets of sub-graph ZG are determined. For each of these subsets a graph is created, in which the set of vertices is the sum of sets: $\mathbb{PR}_{\mathbf{L}}$ and this maximum internally stable subset. Fig 5 illustrates an example of such graphs for the last vector generated according to the method presented in the previous chapter (see Fig 3(a)).

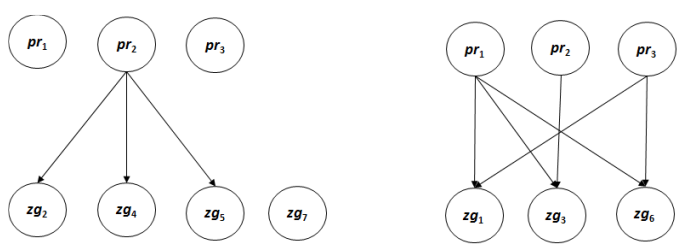

Fig. 5: Graphs created for each of the example internally stable sets and set $\mathbb{PR}_{\mathbf{L}}$ for $\mathbf{L} = \langle \mathbf{1}, \mathbf{1}, \mathbf{1}, \mathbf{0} \rangle$

For each of the graphs created in this way (these will be bipartite graphs), it is possible to determine the maximum cardinality matching, using one of the known algorithms. It can be seen that in order to determine the value of function g, it is not necessary to determine matchings for all these subgraphs, as long as for any of them a matching of a graph with cardinality of $|\mathbb{PR}_{\mathbf{L}}|$ exists. In the case of the discussed subgraphs, for determining the maximum cardinality matching of any of these sub-graphs it is convenient to use an algorithm bearing the historical name of maximum independent loops search algorithm (Korzan, 1980). This will determine the value of function $g(\mathbf{L})$.

Conclusions

The paper presents a method for assessing the realizability of project portfolios with specific limited company resources, necessary for implementation of projects included in individual portfolios. The presented proposal is based on the following assumptions, resulting from the practice of project portfolio management:

- during the implementation of the defined project portfolio, it may be necessary to build a new portfolio (submission of a new project, canceling a project already in implementation due to loss of allocated resources or outdated business rationale, acquisition of new resources),
- creation of a new portfolio requires considering the possibilities of allocation of resources to projects from the identified set of projects, with the set of resources including both the resources currently available and the resources allocated to projects in the current portfolio,
- company's resources are limited,
- it is not worth considering project portfolios that will not be realizable due to lack of required resources.

Considering the above, a model of realizable project portfolios has been developed, taking into account, on the one hand, the possible assignment of resources for the implementation of projects and, on the other hand, the possibility of their disjunctive use in the project portfolio. Given that if the resources allocated make a given project portfolio realizable, each portfolio, which is a subset of the projects of that portfolio, can also be implemented, a method for identifying the binary function of the project portfolio's realizability is proposed (7). The identification of this function comes down to the determination of its maximum vectors, which unambiguously determine all the portfolios that can be implemented with the defined set of resources and their allocation to the portfolio projects.

The proposed method reduces the number of portfolios requiring consideration to the necessary minimum and may be used, after implementation, in various systems supporting project portfolio management. This refers to a functionality covering the broadly understood distribution of resources, allowing users to allocate company resources “as needed” (El Hannach, Marghoubi, El Akkaoui, and Dahchour, 2019). This functionality enables management and distribution of financial, inventory, technical and human resources.

The developed method applies to cases where resources cannot be shared between projects. This is the only limitation of the presented method. Extension of this method to groups of shared resources is the subject of further research by the author.

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Measuring Intellectual Capital in Malaysian Non-Profit Organisation

Siti Zafirah Haiza ABU BAKAR

School of Accounting & Business Management, FTMS College, Persiaran Semarak Api, Cyber 4, Cyberjaya, Selangor, Malaysia
email:zafirah@ftms.edu.my

Amrizah KAMALUDDIN*

Faculty of Accountancy,
Universiti Teknologi MARA Selangor, Puncak Alam, Selangor, Malaysia
email: amrizah@uitm.edu.my
*corresponding author

Abstract

Non- Profit Organisation (NPO) is the third sector after the public and private sectors that aims to provide welfare services. The NPO has received an increasing demand for services from the society and community. NPOs are highly depending on the skills and knowledge that are attached to their volunteers and employees. The lack of focus on profit maximization of NPOs and the shift from the non-profit environment to commercialization, pose new challenges to their management. Researchers argued that most of NPO failure is due to ineffective strategy, however these can be solved by using intellectual capital (IC) as their strategic tool. Previous studies in IC has largely researched on profit organisation leaving the issue of IC and NPO being inadequately explored. Each NPO inherits different characteristics such as different missions, different targets of community, different nature of services and the different ways delivery services. Thus, this study examines measurement of IC from the perspectives of NPO in Malaysia. Questionnaire survey was applied and sixty-seven representatives of NPO in Malaysia participated in this study. Factor analysis was used to identify the themes of IC best suited the NPO. The analyses resulted in twenty-eight indicators which were further classified into three themes representing the IC. Descriptive statistics were applied to identify the best indicators of IC from Malaysian NPOs perspective. Among the new finding is that IC indicators in NPOs are slightly different from those in the profit organisations.

Keywords: intellectual capital, Non-Profit Organisation, organisational capital, human capital, relational capital.

Introduction

The main objective of Non- Profit Organisation (NPO) is to fulfill the society demand rather than making money (Benevene et al., 2017). NPOs support citizens' participation in community life through several different kinds of organizations: some more informal (such as associations and volunteering groups), others more formal or public (such as charities and foundations) (Buonomo et. al, 2020). Recently, IC have emerged as significant for nonprofit organisations. Kong (2007) suggested that NPOs can apply the IC approach due to two main reasons. First, NPOs are facing performance challenges and therefore, they need to have a managerial tool in the same manner as the profit-making organisations. Secondly, NPOs apply more IC elements as compared to the profit-making organisations. However, there are limited number of studies that have examined IC among NPOs (Joia,

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2000). There is a need to examine the potential of IC approach in NPOs and how this approach is applied in the NPOs (Sillanpää et al., 2010).

IC was originally developed to study the contribution of intangible resources in profit-making organisations (Roos et al., 2001). However, intangible resources are also crucial in NPOs although their primary goal is not to make profit. NPOs raise their revenues through various sources such as fundraising, membership fees, funds from the government among others (Lyons, 2001). They depend on their employees' and volunteers' skills, knowledge and experience to achieve their goals (Hudson, 1999). Therefore, NPOs believe that they also need to invest in their employees and volunteers to improve their competencies.

The reformation of the public sector has somewhat pressured the NPOs to compete among themselves of which, could be destructive as they are competing for resources rather than collaborating to solve community problems. Despite the advantages of the IC approach, failing to account for IC in an organisation may lead to misallocation of IC resources. Misallocating intangible resources may cause poor informed decision and consequently, lead to poor strategic planning processes, insufficient trainings and developments, high employees' turnover, less experience top management and incapable to transform data into information (Kong, 2012).

Problem Statement

To date, the NPOs have adopted the IC approach similar to the profit-making organisations (Guthrie, 2001). Reddy et al. (2012) believed that NPOs do need to compete among themselves in order to obtain and sustain community's support and confidence. They also need to secure government grants or contracts. NPO highly depend on the skills and knowledge that attached to their volunteers and employees thus it is importance to invest in improving their competencies. Incorporating IC approach in NPOs seem to be more challenging since the definitions, models, constructs and assumptions of IC are mainly for profit-making organisations (Mesa, 2010). It is even more challenging in understanding the application of the IC approach in NPOs due to their diversity of services and nature (Kong, 2010b). Each NPO inherits different characteristics such as different missions, different targets of community, different nature of services and the different ways delivery services (Ferulano, 2016).

In terms of valuing IC components, it is difficult to decide the best method to value IC components since there are more than fifty IC measurement methods (Ferulano, 2016). Andriessen (2004) has identified ten IC measurement methods that can be used to value IC components. Most organisations reported and valued their IC components without applying a particular method (Dumay, 2009). If they could properly understand how to identify and value their IC components, then their performance can be further improved since IC provides meaningful information for the managers in decision-making process and contributes in building a better organisational strategy (Kong, 2010a). Based on a study done by Sillanpää et al. (2010), they found that there is a potential in applying the IC approach in a NPO that caters for the elderly. They argued that this is possible despite the limited evidences on using the IC approach in a NPO context since there are a variety of knowledge, widespread, non-formalised and unstable assets. In fact, if the NPOs can understand and strategically manage their IC components, then they can make innovation in knowledge creation and bring new values to their organisations (Benevene et al., 2017). The IC is a new form of capital for the NPOs which can be utilised effectively and efficiently provided they understand the components of IC components in their organisations (Kong, 2010a).

Thus, the current study aims to identify the indicators that represents IC (Human Capital, Organisational Capital, and Relational Capital) from perspective of Malaysian NPOs.

Literature Review

Intellectual Capital

Karp (2003) defined IC as "a sum of everything that everybody knows about company that could give competitive advantage". There are three components of IC namely, human capital (HC), organisational capital (OC) and relational capital (RC). Organisation members are required to assess their core competencies, the areas that they can achieve or already achieved in order for them to understand the IC components embedded in their organisation. The embedded IC refers to the wealth of ideas and innovation abilities in determining the future of the organisation (Sharabati et al., 2010). Studies have also shown that IC is usually used in profit-making organisations, thus continuous IC developments are introduced in the profit-making organisations. However, (Benevene et al., 2010) noted that the intangible assets in NPOs should be emphasized more since their primary goal is to improve the wellbeing of their beneficiaries and not to perform financial success.

Intellectual Capital Components

HC is related to human skills, motivation and employees' experience. HC can be increased by hiring employees that possess high skills generated from the external market. Several studies have shown HC management is much more complex in a NPO rather than in profit-making or public organisations (Benevene et al., 2010). HC brings various elements of resources to an organisation including tacit knowledge, competencies, valuable skills, innovation and talents (Kong, 2010a). In NPOs, there are various stakeholders with different expectations, thus managers need to treat the elements of HC efficiently so that they can satisfy and be responsive to their stakeholders (Bontis & Serenko, 2009).

OC comprises of organisation process, patents, databases and management system. In order for HC to function, the organisation must have supportive infrastructure known as organisational capital (OC). In leveraging organisation capability, OC such as systems and organisational philosophy is required in an organization. Learning and knowledge enacted in an organisation on day to day activities is referred to as OC (Kong, 2012). OC assists an organisation to achieve overall organisation performance and supports employees in achieving optimum intellectual performance through organisational structure and mechanism. Even though the organisation hires employees with high skill level, the overall IC would be not able to function if the organisational system and procedures are weak and fail to support HC (Bontis, 1998).

On the other hand, RC relates to relationship networks that the organisation is able to form (Kianto et al., 2014). The RC comprises of knowledge on marketing channels and relationship with customers. To become a leader in the competitive sector, an organisation must be able to understand what goods and services that the customers desire (Bontis, 1998). There are an increasing number of collaborative arrangements among the NPOs with the organisations from different sectors, thus highlighting the importance for the NPOs to effectively manage their external relations (Balser & McClusky, 2005). If the NPOs fail to properly manage their external stakeholders, then there is a high tendency that they would lose their valuable external resources such as fund and volunteers.

Kong and Prior (2008); Buonomo et al. (2020) asserts that the three IC dimensions propose a potential opportunity for competitive advantage, as long as they are interrelated and satisfy organizational, donor, and user needs. A strategic IC management would offer an adequate control over the knowledge flows within and outside the NPO which would lead to better strategic decisions and creation of values in the organization.

Research Methodology

Population and Sample

According to official web page for NPO, there are 60,484 registered NPOs in Malaysia in 2017. There are 12 categories of NPO in Malaysia namely welfare, social, trade, professional, human right, security, culture and art, politics, recreation, mutual benefit, and religion. This study focuses on welfare category in Wilayah Persekutuan Kuala Lumpur, a federal territory in Malaysia. The number of NPO under welfare category in Wilayah Persekutuan Kuala Lumpur is 2,723. Thus, according to Sekaran and Bougie (2010), the appropriate sample size for this study is larger than 30 and not more than 500. This study applied a simple random sampling technique. Thus, it is sufficient to obtain 350 sample size of NPOs under the selected welfare category.

Data Collection

Three hundred and fifty questionnaires were distributed to managers or the NPOs' representatives that possessed comprehensive knowledge about the organisations. The questionnaire adapted Bontis (1998) with few modifications. The questionnaire was distributed through email and some were delivered by hand. Out of 350 questionnaires distributed, only 67 questionnaires were returned which represented a response rate of 19%.

The survey instruments

The managers or representatives were required to give the opinion about IC in their NPO using 5 point Likert scale ranging from "1" for strongly disagree and "5" for strongly agree. It is appropriate to use perceptual measurement in measuring IC in NPO. Perceptual measurement method is usually applied in examining the organisational factors which contribute to organisation performance (Kannan and Aulbur, 2004).

Results and Discussion

Factor Analysis

The data was analysed using Factor Analysis. Factor analysis, which is data reduction method, is applied to reduce a large number of variables to a smaller set of factors. Factor analysis was used to group the IC in the NPOs into three components namely, HC, OC and RC. Only the items with coefficient of above 0.40 were accepted. Further consideration was used when using factor analysis, being Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. KMO is used to measure sampling adequacy and the value must be greater than 0.50. As per Table 1, the value for KMO is 0.729 which indicates sampling adequacy. Bartlett's Test of Sphericity is significant when $p < 0.05$.

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
	Approx. Chi-Square	df	Sig.
.729	1478.730	496	.000

The result for total variance explained is shown in Table 2. Factor 1 explains 37.599% of total variance, Factor 2 explains 8.225% of total variance and Factor 3 explains 6.553%. Thus, the total cumulative

variance explained is 52.377%, an indication that 52.377% of IC can be explained by the three components of IC.

Table 2: Total Variance Explained

Factors	Initial Eigenvalues		
	Total	% of variance	Cumulative %
1	12.032	37.599	37.599
2	2.632	8.225	45.824
3	2.097	6.553	52.377

Table 3 displays the results for factor loading. The items in the questionnaire with coefficient above 0.40 are considered significant in this study. There are 28 out of 32 items that produced factor loading above 0.40. As depicted in Table 4, the items that were loaded under the HC category are "the organisation recruitment program is comprehensive", "we are dedicated to hiring the best candidates available", "employees are excited to voice opinions in group discussions", "organisation employees consistently perform at their best the employees are satisfied with the organisation", "we focus on our customers or beneficiaries wants" and "needs by continually make effort to make them satisfied, organisation employees learn from others" and etc. Under the second category which is RC, the items which were classified under this category are "the organisation is able to get the most out of its employees", "the employees work closely with each other" and "the organisation shared with the employees' feedback from beneficiaries". Under the third category which is OC, items that were included are "the organisation develops more new ideas and products than any other organisation in the social network", "the employees are widely considered as the best within the social network", "the employees of organisation are considered creative and bright", "the longevity of the relationships we have with our customers or beneficiaries admired by others in the social network", "our customers or beneficiaries are loyal to our organisation more so than to any other in the social network", "the time it takes to complete one whole transaction or activities has been decreasing over the past few years and etc.

Table 3: Rotated Component Matrix[a]

	Component		
	1	2	3
The organisation develops more new ideas and products than any other organisation in the social network.	.774		
The employees are widely considered as the best within the social network.	.774		
The employees of organisation are considered creative and bright.	.711		
The longevity of the relationships we have with our customers or beneficiaries admired by others in the social network.	.708		
Our customers or beneficiaries are loyal to our organisation, more so than to any other in the social network.	.703		
The time it takes to complete one whole transaction/ activities has been decreasing over the past few years.	.652		
The systems and procedures of the organisation support innovation.	.624		
We continually meet with our customers or our beneficiaries to find out what they want from us.	.583		
The organisation gets the most out of its employees when they cooperate with each other in team tasks.	.530		
The organisation supports the development of new ideas	.522		
The organisation consistently comes up with great new ideas.	.443		
The organisation recruitment program is comprehensive, we are dedicated to hiring the best candidates available.		.729	
Employees are excited to voice opinions in group discussions.		.712	
Organisation employees consistently perform at their best.		.687	
The employees are satisfied with the organisation.		.675	
We focus on our customers or beneficiaries wants and needs by continually make effort to make them satisfied.		.669	

Table 3: Rotated Component Matrix[a] (continued)	Component		
	1	2	3
Organisation employees learn from others.		.658	
A poll of our customers/beneficiaries would indicate that they are generally satisfied with our services.		.598	
We feel confident that our customers/ beneficiaries will continue to use our services.		.579	
Organisation employees generally give it their all which makes this organisation different from the others in the social network.		.567	
The competence of organisation employees as a whole is equal to the most ideal level we could ever hope to achieve.		.552	
The organisation's culture and atmosphere is supportive		.545	
The organisation supports the employees by constantly upgrading their skills whenever each of them feels it is necessary.		.525	
Our data systems make it easy to access relevant information.		.510	
We have greatly reduced the time it takes to resolve a customer's/ beneficiaries problem		.417	
The organisation able to get the most out of its employees.			.755
The employees work closely with each other.			.716
The organisation shared with the employees' feedback from beneficiaries'			.677

Table 4: Intellectual Capital Components (HC, RC and OC)	
Category	Items
Human Capital (HC)	The organisation recruitment program is comprehensive, we are dedicated to hiring the best candidates available.
	Employees are excited to voice opinions in group discussions.
	Organisation employees consistently perform at their best.
	The employees are satisfied with the organisation.
	We focus on our customers or beneficiaries wants and needs by continually make effort to make them satisfied.
	Organisation employees learn from others.
	A poll of our customers/beneficiaries would indicate that they are generally satisfied with our services.
	We feel confident that our customers/ beneficiaries will continue to use our services.
	Organisation employees generally give it their all which makes this organisation different from the others in the social network.
	The competence of organisation employees as a whole is equal to the most ideal level we could ever hope to achieve.
	The organisation's culture and atmosphere is supportive
	The organisation supports the employees by constantly upgrading their skills whenever each of them feels it is necessary.
	Our data systems make it easy to access relevant information.

Table 4: Intellectual Capital Components (continued)	
Category	Items
	We have greatly reduced the time it takes to resolve a customer's/ beneficiaries problem
Relational Capital (RC)	The organisation able to get the most out of its employees.
	The employees work closely with each other.
	The organisation shared with the employees' feedback from beneficiaries'
Organizational Capital (OC)	The organisation develops more new ideas and products than any other organisation in the social network.
	The employees are widely considered as the best within the social network.
	The employees of organisation are considered creative and bright.
	The longevity of the relationships we have with our customers or beneficiaries admired by others in the social network.
	Our customers or beneficiaries are loyal to our organisation, more so than to any other in the social network.
	The time it takes to complete one whole transaction/ activities has been decreasing over the past few years.
	The systems and procedures of the organisation support innovation.
	We continually meet with our customers or our beneficiaries to find out what they want from us.
	The organisation gets the most out of its employees when they cooperate with each other in team tasks.
	The organisation supports the development of new ideas
	The organisation consistently comes up with great new ideas.

Descriptive Analysis

Human Capital

There are 14 items of HC listed in the questionnaire. The respondents were asked on the agreement towards HC in their NPOs based on a 5-point Likert scale, ranging from '1' as strongly disagree to '5' as strongly agree. According to the descriptive statistics in Table 5, the indicator "we feel confident that our customers/ beneficiaries will continue to use our services" achieves the highest mean value which is 4.12. This result is inconsistent with Bontis (1998) and Sharabati et al. (2010) that found this item is under RC. The item for HC with the highest mean value is the best indicator to represent HC in NPOs. There are 8 items of HC indicators with high mean value which is above 4.00. Majority of the variables of HC have recorded mean value above 3.00. This indicates that the level of respondents' agreement towards HC items are between 3.00 to 4.00.

Table 5: Mean and standard deviation of Human Capital		
	Mean	Std. Deviation
We feel confident that our customers/ beneficiaries will continue to use our services.	4.12	.729
Organisation employees consistently perform at their best.	4.10	.819
The organisation's culture and atmosphere is supportive	4.09	.866
The employees are satisfied with the organisation.	4.06	.814
We focus on our customers or beneficiaries wants and needs by continually make effort to make them satisfied.	4.06	.886
Organisation employees generally give it their all which makes this organisation different from the others in the social network.	4.01	.826
The competence of organisation employees as a whole is equal to the most ideal level we could ever hope to achieve.	4.00	.739
Organisation employees learn from others.	4.00	.888
Employees are excited to voice opinions in group discussions.	3.99	.913
A poll of our customers/beneficiaries would indicate that they are generally satisfied with our services.	3.96	.684
The organisation supports the employees by constantly upgrading their skills whenever each of them feels it is necessary.	3.81	.957
The organisation recruitment program is comprehensive, we are dedicated to hiring the best candidates available.	3.60	.871
Our data systems make it easy to access relevant information.	3.46	.804
We have greatly reduced the time it takes to resolve a customer's/ beneficiary's problem	3.43	.701

Relational Capital

There are 3 items of RC listed in the questionnaire. Table 6 indicates the mean value and standard deviation for RC. The result shows that the NPOs were "able to get the most out of their employees" which recorded the highest mean value of 3.58. This indicates that this item is the most suitable indicator to represent RC in NPOs. Most of the respondents agree that their employees always performed their best and the employees strived to give their full effort to ensure the organisations' activities and routines go well. "The organisation shared with the employees' feedback from beneficiaries" is the next reliable indicator to represent RC in NPOs. This reflects that information on beneficiaries' feedback is crucial in order for the NPOs to enhance their performance. When the customers' feedbacks were disseminated throughout the NPOs, it became easier for the employees to develop strategies and activities that offer satisfaction to their beneficiaries.

Table 6: Mean and standard deviation of Relational capital

	Mean	Std. Deviation
The organisation able to get the most out of its employees.	3.58	1.061
The organisation shared with the employees' feedback from beneficiaries'	3.54	1.035
The employees work closely with each other.	3.33	1.260

Organisational Capital

There are 11 items of OC listed in the questionnaire. Table 7 shows the mean value and standard deviation for OC. Two OC items have same mean value comprising 'the organisation gets the most out of its employees when they cooperate with each other in team tasks" and "the organisation supports the development of new ideas". The mean value for both items is 4.03. The results imply that NPOs achieve their best and perform well when the employees cooperate with each other and build a healthy team task. They need to continuously produce new ideas and be innovative in order to attract more customers and donors.

All the OC items have recorded mean value above 3.00 which is above the average scale. This indicates that most of the respondents agreed that their organization possesses good organisational capital. Since the items under OC are above average rate, it can be assumed that the 11 items represent OC in NPOs.

Table 7: Mean and Standard Deviation of Organisational Capital

	Mean	Std. Deviation
The organisation gets the most out of its employees when they cooperate with each other in team tasks.	4.03	.852
The organisation supports the development of new ideas	4.03	.758
The employees of organisation are considered creative and bright.	4.00	.759
The organisation consistently comes up with great new ideas.	3.96	.843
The systems and procedures of the organisation support innovation.	3.94	.919
We continually meet with our customers or our beneficiaries to find out what they want from us.	3.93	.822
The longevity of the relationships we have with our customers or beneficiaries admired by others in the social network.	3.84	.931
The employees are widely considered as the best within the social network.	3.73	.898
Our customers or beneficiaries are loyal to our organisation, more so than to any other in the social network.	3.73	.963
The organisation develops more new ideas and products than any other organisation in the social network.	3.69	.925
The time it takes to complete one whole transaction/ activities has been decreasing over the past few years.	3.69	.957

Conclusion

The current study contributes to the identification of the suitable indicators for IC components in Malaysian NPOs under welfare category. This study found that IC elements in this study fall under different IC components as compared to the original IC components developed by (Bontis, 1998). This implies that the indicators of IC in NPOs are different from those in the profit organisations. IC perspective in the non-profit organisation differs from the industry's viewpoint.

In view of the importance of IC in assisting NPOs to achieve a competitive edge in the current complex environment, the current study contributes to the organisation and management research on the role of intangible assets in value creation and organisation process. It sheds light on the consideration of knowledge and IC in the NPOs operations. It also highlights the importance of realizing and investing in IC as a solution for all NPOs in general (Laallam et.al, 2020),

Future study can focus on examining IC in other categories of NPO such as social, recreation, mutual benefit, culture and art, trade, professional, human right, security and religion. IC indicators could be different due to the different nature of organisation, mission and objective of the NPOs. A qualitative approach can be applied in order to develop the measurement of intellectual capital.

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Economic and Mathematical Modeling of a Comprehensive Assessment of the Mortgage Potential of the Regions in the Russian Federation

Tatyana S. KOROSTELEVA
Samara National Research University, Samara, Russian Federation,
korosteleva75@mail.ru

Vladimir Y. TSELIN
Samara National Research University, Samara, Russian Federation,
vtzelin@mail.ru

Abstract

The article focuses on the current topic of evaluating the regional mortgage inequality. Based on an analysis of Russian and foreign resources it is clear that currently two aspects remain poorly studied in this area despite a large amount of research on the development of mortgage lending. First of all, it is about the problem of regional inequality in the mortgage lending progress, and then, the issues of measuring the capacity of mortgage markets. Thereby, the purpose of the article is to develop a comprehensive assessment of the mortgage development potential of regional systems of mortgage housing lending in the context of socio-economic inequality in the regions of the Russian Federation. To achieve this goal, the article solves four objectives. First, it is the development of a methodology for assessing the mortgage potential of the regions of the Russian Federation. Secondly, based on the formation and processing of initial data, the selection of the main factors and modeling of a complex criterion for assessing the Russian Federation regions mortgage potential. Third, the practical implementation of the proposed methodology based on a comprehensive assessment of the mortgage potential of all 85 Russian regions. Fourth, the development of management decisions to increase the mortgage potential of regions with low ratings (level C). These areas, together with the proposed approaches to their practical implementation, can serve as the basis for a model of state support for regional mortgage markets.

Keywords: Economic and Mathematical Modeling, Mortgage Potential, Region, Comprehensive Assessment

Introduction

Mortgage loan is one of the biggest innovations in real estate and the financial sector (Dong, 2015). A developed mortgage market contributes to the growth of the economy due to the prosperous real estate development, more efficient allocation of resources, stimulating the development of housing construction and related industries, creating additional workplaces. Mortgages are one of the main mechanisms for improving the housing conditions of the population.

In this regard, the very topic of sustainable development of mortgage is very relevant in both Russian and foreign financial and economic resources. Scientists around the world are discussing a wide range of problems related to the efficient functioning of national mortgage and housing markets, as well as the impact of these segments on the stability of the banking systems of individual states and the world economy generally. For example, a significant part of modern scientific research, in particular the works of Grodecka-Messi (2019), Lyapina et al. (2020), Ge (2014), Cho and Kim (2012), is devoted to studying the effect of investments in mortgage markets on financial stability. Another part of modern research, for example Zhihua (2020), Kharabara (2017), Korosteleva (2013), is focused on the specific problems to specific territories of the development of mortgage lending.

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These problems are especially urgent for developing countries, characterized by underdeveloped mortgage instruments in the territories of their states.

However, despite the relatively large amount of research on the topic of mortgage lending development, two aspects remain insufficiently explored in this area. Firstly, this is the problem of regional inequality in the development of mortgage lending, and secondly, the issues of measuring the "depth" of mortgage markets.

Thus, the main studies in these areas are often focused on identifying the specifics of the development of housing markets and mortgage lending in their territories (for example, Davydovich et al., 2019), assessing the impact of this specificity on the state of the housing problem in the whole country (for example, Guzikova, 2017), an analysis of the prospects for the development of this financial and credit instrument (for example, Shkurkin, 2017) in specific (subjects). At the same time, the task of measuring the "depth" of this development in the conditions of socio-economic inequality of their subjects is not set.

In turn, a number of authors study the problem of measuring the depth of mortgage markets in a country context (for example, Kutlukaya and Erol, 2016). Some authors base their models on one or two factors, studying their influence on the resulting variable, which characterizes, from their point of view, the level of development of mortgage lending in the country. For example, a study by Josphat (2013) assesses the effect of interest rates on mortgage financing, Kaplan (1996) measures mortgage activity by two parameters, comparing a variable that measures the percentage of rejected loan applications with a variable that measures the number of loans per 1000 housing units.

Other authors base their models on one or several clusters of factors, for example, Mogaka et al. (2015) analyze the influence of macroeconomic variables (such as the average annual inflation rate, average annual (GDP) growth rate, average annual exchange rate, and the percentage of people employed in the informal sector and others) on the growth of the mortgage market in Kenya. Ghosh (2016) considers banking and economic conditions as regional economic determinants that influence the development of mortgage lending. Kieti and K'Akumu (2018) explains the availability of mortgage lending in several clusters of factors related to the socio-economic factors of households, characteristics of ownership, characteristics of loans and the macroeconomic environment.

In this study, the authors link regional development topics with an assessment of the level of development of local mortgage markets. The problem of regional inequality of mortgage markets is one of the most interesting and relevant in countries with special territorial differentiation, for example, the USA, Canada, England, Spain, Greece, China, Russia and others. However, only a small part of scientific works is currently devoted to its solution, which include, in particular, the Patatouka (2014) study, which identifies imbalances in the development of housing and mortgage markets in the regions of Greece, simplifies their assessment, the Aranaz and Marquez (2013) study, where the authors compare the features of retrospective development and assess regional differences in the Spanish mortgage market using the sheaf methodology, papers by Grezina (2011), Ivashkov (2011), where the authors, using cluster or factor analysis (or both) assess the mortgage potential of Russian regions.

Therefore, this study is aimed at filling the gap in this field of knowledge, and aims to develop a comprehensive criterion for assessing the development potential of residential mortgage in the context of socio-economic inequality in the regions of the Russian Federation.

Materials and Methods

Data

For analysis and assessment of regional mortgage inequality, as well as modeling a comprehensive criterion for assessing the development potential of regional mortgage lending systems, panel data of state statistics (Rosstat and the Central Bank of the Russian Federation) was used.

In this study, the authors propose the option of moving from particular criteria for assessing regional mortgage potential to a comprehensive indicator. It's based on 23 primary indicators, divided into 4 functional blocks. In particular, the following were identified: a block of economic indicators (5 indicators), a block of housing indicators (5 indicators), a block of socio-demographic indicators (2 indicators) and a block of indicators for assessing the current development of the mortgage market (11 indicators) (Tselin and Korosteleva, 2020). To increase the reliability of the study, data sets were generated for 85 constituent entities of the Russian Federation, including the Republic of Crimea and the city of Sevastopol, during 2014-2018. Note that in this case the source data for the first, most of the second and half of the third blocks of indicators are based on the annual statistical compilation of the Federal State Statistics Service of the Russian Federation "Regions of Russia. Socio-economic indicators. 2019. " The initial data for the fourth block is mainly based on the annual statistical compilation of the Central Bank of the Russian Federation "Some information on the residential mortgage in Russia. No. 5, 2013-2017", as well as the official website of the Central Bank of the Russian Federation (for indicators of 2018). An insignificant part (3 of 23 indicators) was formed on the basis of studies by the Institute for Urban Economics (housing affordability coefficient), the Information and Analytical Portal "All about the mortgage" (the number of existing social mortgage programs), and the "RIA Rating" Rating Agency (share of families who are able to buy a home with a mortgage).

Methodology

To determine the level of the mortgage potential of the region, a methodology was applied based on statistical factor analysis, the principal components analysis.

Principal component analysis is one of the most commonly used methods of reducing the dimension of the initial set of indicators, implemented in most well-known application software set, for example, Statistica, SPSS and others. Of greatest practical interest is the use of the method for classifying objects, when, based on the analysis of the factor loadings, it is possible to divide the primary variables into groups according to the degree of their influence on the main factors (Orlov, 2016).

The methodology for determining the level of mortgage potential in the region includes the following steps:

1. The formation of an array of source data and the formation of a matrix of standardized values.
2. Definition of the main components.
3. The selection and implementation of the rotation procedure.
4. The formation of a model for assessing the mortgage potential of the region and the rationale for the analysis of the structure associated with the main components of the primary indicators.
5. Formation of a matrix for assessing the mortgage potential of the region.
6. Determining the class of the mortgage situation in the region based on the matrix for assessing the mortgage potential of the region.

The ***first stage*** involves the formation of a matrix of source data for indicators that are presented in the Data section.

$$X = \begin{bmatrix} X_{11}, X_{12}, \ldots, X_{1p} \\ X_{21}, X_{22}, \ldots, X_{2p} \\ \cdot, \cdot, \ldots, \cdot \\ X_{n1}, X_{n2}, \ldots, X_{np} \end{bmatrix}, \quad (1)$$

where X_{ij} represents the value of the j-th variable for the i-th region;

i – index number of the region $i = \overline{1 \ldots n}$;

j – index number of the variable $j = \overline{1 \ldots p}$;;

n – number of regions;

p – number of original variables.

Thus, for the purposes of the study, 5 matrices corresponding to 2014-2018 researches were formed. The standardization of the values of the initial variables consists in eliminating the mean values $\bar{x}_i$ from them and dividing the obtained residues by the mean square value σ_i, $i = \overline{1 \ldots n}$.

$$x_{ij} = \frac{(x_{ij} - \bar{x}_i)}{\sigma_i}, \quad (2)$$

At the ***second stage***, the method of principal components determines an ordered set of principal factors. This allows to convert the set of multicollinear vectors of the source data into another reduced complex - orthogonal variables. Thus, the source variables are combined into principal components.

The orthogonal variables Z_j $(j = \overline{1 \ldots k})$ are represented by a combination of the original variables x_{ij} $(i = \overline{1 \ldots n})$.

$$Zj = \Sigma A_{ji} \cdot x_{ij}, \quad (3)$$

where A_{ji} — weight of the j-th component in the content of the i-th variable;

Z_j — principal components.

Replacing the real, normalized variables x_i with a smaller number of variables Z_j, ensures the reduction of the initial variables and a decrease in the multicollinearity effect of many factors.

The total multiple dispersion explained by the main components should be at least 70%.

To fulfill this requirement, at the ***third stage***, the rotation procedure of the axes of the main components is performed. The highest values of the group dispersion fraction were obtained using the varimax method.

The varimax method is based on maximizing variances of variable pressure for each factor, which leads to an increase in large and a decrease in small values of factor loads and facilitates the understanding and interpretation of factors. When interpreting a factor, those initial variables are taken into account that have maximum loads on it in absolute value (Zhgun, 2013).

The criterion for a satisfactory solution is usually to obtain an understandable (interpreted) load matrix, and, accordingly, the possibility of a clear meaningful interpretation of the resulting factors.

The selected factors (principal components) are based on the projected model for assessing the mortgage potential of the region at the ***fourth stage*** of the proposed methodology.

A model for assessing the mortgage potential of a region can formally be represented by the following formula:

$$k_i = \varphi\ (F1_i\ ;\ F2_i\ ;\ F3_i), \quad (4)$$

where k_i –a comprehensive indicator of the level of development of mortgage lending system of the i-th region;

$F1_i$ – the value of the first factor (the first principal component);

$F2_i$ – the value of the second factor (the second principal component);
$F3_i$ – the value of the third factor (the third principal component);
i – region number (Tselin and Korosteleva, 2020).

At the ***fifth stage*** of the methodology, a discrete scale is constructed for each of the selected factors, which involves the allocation of three levels of values of the obtained components:

- level A (high value);
- level B (average value);
- level C (low value).

The result of the implementation of the fifth stage is at least a three-dimensional matrix for assessing the mortgage potential of the region, including 27 possible combinations of coordinates in the space of alternatives.

The resulting matrix is a visual tool for assessing the current mortgage potential of the region for regional authorities, as well as a strategic tool for choosing the "desired" position when setting goals to increase mortgage activity in its own territory. The definition of the class of the mortgage situation in the region on the basis of the matrix for assessing the mortgage potential of the region is carried out at the ***sixth stage*** of the proposed methodology.

Results

We apply the described methodology to obtain a comprehensive assessment of the mortgage potential of the Russian regions. To do this, use the Statistica application package. Table 1 presents the results obtained, namely, the matrix of factor loads, which are the correlation coefficients of the initial variables and the first selected factor for 2014-2018. Moreover, the criterion for the formation of the structure of the factor is the strength of the connection between it and the original variables, interpreted as "high" or "very high".

Table 1: The values of factor loads for the <u>first</u> factor for 2014-2018

Variable	2014	2015	2016	2017	2018
Var 1	0,088	0,134	0,093	0,102	0,209
Var 2	0,385	0,432	0,365	0,397	0,491
Var 3	**0,812**	**0,859**	**0,840**	**0,925**	**0,890**
Var 4	0,212	0,267	0,252	0,257	0,434
Var 5	0,349	0,334	0,324	0,397	0,554
Var 6	-0,142	-0,184	-0,191	-0,090	-0,005
Var 7	-0,055	-0,065	-0,121	0,046	0,078
Var 8	-0,046	-0,039	-0,098	0,061	0,150
Var 9	0,357	0,438	0,419	0,569	0,650
Var 10	n.a.	n.a.	0,105	-0,035	-0,291
Var 11	n.a.	n.a.	n.a.	n.a.	-0,120
Var 12	-0,095	-0,071	-0,094	-0,084	-0,049
Var 13	**0,792**	**0,868**	**0,796**	**0,942**	**0,967**
Var 14	0,494	0,632	0,570	**0,775**	**0,811**
Var 15	-0,026	0,100	0,107	-0,076	-0,166
Var 16	**0,773**	**0,855**	**0,811**	**0,923**	**0,952**
Var 17	**0,974**	**0,964**	**0,966**	**0,915**	**0,884**
Var 18	**0,967**	**0,964**	**0,961**	**0,915**	**0,857**
Var 19	**0,966**	**0,950**	**0,949**	**0,886**	**0,841**
Var 20	**0,954**	**0,935**	**0,944**	**0,776**	**0,856**
Var 21	**0,914**	**0,940**	**0,949**	**0,952**	**0,950**

Var 22	**0,854**	**0,872**	**0,911**	**0,933**	**0,980**
Var 23	n.a.	-0,176	n.a.	-0,135	0,211
Eigenvalue (Expl.var)	9,733	9,614	9,47	9,45	9,52
The share of the explained variance (Prp.totl)	0,487	0,458	0,451	0,43	0,488

Source: authors' own calculations using the Statistica software package

Note that the entire five-year period of the study of Factor 1 was formed by almost the same composition of the initial variables. At the same time, the following primary indicators showed a high and very high relationship between it and the entire set of source variables:

- Var 3 - the number of economically active population, thousand people;
- Var 13 - the volume of issued mortgage housing loans according to the Central Bank of the Russian Federation (in rubles and foreign currency), thousand rubles;
- Var 14 (for 2017-2018) - the number of issued mortgage housing loans according to the Central Bank of the Russian Federation (in rubles and foreign currency), pcs.;
- Var16 - total debt on housing mortgage loans according to the Central Bank of the Russian Federation (in rubles and foreign currency), thousand rubles;
- Var17 - the number of credit organizations issuing mortgage housing loans, pcs.;
- Var18 - the number of credit organizations attracting refinancing in the secondary market of mortgage lending, pcs.;
- Var19 - refinancing of mortgage housing loans with the sale of a pool of mortgage housing loans (rights of claim for HMLs) without the formation of an additional financial instrument, million rubles;
- Var20 - refinancing of mortgage housing loans with the sale of a pool of mortgage housing loans (rights of claim for HMLs) with a further issue of mortgage-backed securities, million rubles;
- Var21 - the amount of overdue debts on HMLs, million rubles;
- Var22 - the volume of prematurely repaid mortgage housing loans in the reporting period, million rubles.

The obtained results also throughout the entire period of the study demonstrate a rather high proportion of the explained variance for the first factor - from 0.43 (for 2017) to 0.488 (for 2018).

Analyzing the structure of Factor 2 (Table 2), it can be noted that a stable composition of its primary indicators has been observed for the past four years, namely from 2015 to 2018.

Table 2: The values of factor loads for the <u>second</u> factor for 2014-2018

Variable	2014	2015	2016	2017	2018
Var 1	0,151	**0,910**	**0,891**	**0,873**	**0,750**
Var 2	0,169	**0,830**	**0,839**	**0,815**	**0,750**
Var 3	0,472	-0,018	0,026	0,004	-0,301
Var 4	0,070	**0,924**	**0,927**	**0,922**	**0,834**
Var 5	0,479	0,469	0,557	0,637	0,482
Var 6	0,447	-0,106	-0,126	-0,015	0,128
Var 7	**0,821**	-0,002	-0,004	-0,025	-0,207
Var 8	**0,837**	0,169	0,131	0,111	-0,093
Var 9	**0,745**	0,015	0,040	0,064	-0,140
Var 10	n.a.	n.a.	**-0,707**	**-0,768**	**-0,728**
Var 11	n.a.	n.a.	n.a.	n.a.	-0,268
Var 12	-0,404	0,122	0,178	0,142	0,136
Var 13	0,505	0,156	0,165	0,174	-0,138
Var 14	0,671	0,027	0,049	0,114	-0,159

Var 15	-0,097	-0,267	-0,388	0,197	0,038
Var 16	0,487	0,202	0,221	0,208	-0,100
Var 17	-0,052	0,085	0,111	0,073	-0,169
Var 18	-0,020	0,056	0,086	0,045	-0,172
Var 19	-0,072	0,082	0,108	0,068	-0,158
Var 20	-0,139	0,114	0,113	0,048	-0,144
Var 21	0,240	0,081	0,127	0,099	-0,163
Var 22	0,348	0,332	0,178	0,171	-0,121
Var 23	n.a.	**0,897**	n.a.	0,922	**0,882**
Eigenvalue (Expl.var)	3,053	3,193	3,13	3,76	3,85
The share of the explained variance (Prp.totl)	0,153	0,152	0,149	0,171	0,144

Source: authors' own calculations using the Statistica software package

Its composition in the specified time period is formed by such primary indicators as:

- Var1 - GRP per capita, rubles;
- Var2 - average per capita cash income of the population, rubles;
- Var4- average per capita nominal accrued wages of employees of organizations, rubles;
- Var10 - housing affordability coefficient;
- Var23 - the proportion of families who are available to purchase a home with a mortgage,%.

The minimum share of the explained variance for Factor 2 is 0.144 (for 2018), the maximum is 0.171 (for 2017).

As for the structure of the third factor, here the composition of its primary variables is less stable, however, during 2015-2018 two indicators are clearly distinguished in its design (Table 3), namely:

- Var7 - commissioning of residential buildings per 1000 population, sq. m. total area;
- Var8 - commissioning of apartments per 1000 population, units.

Table 3: The values of factor loads for the third factor for 2014-2018

Variable	2014	2015	2016	2017	2018
Var 1	**0,919**	0,089	0,012	-0,011	-0,056
Var 2	**0,810**	0,098	0,104	-0,007	-0,061
Var 3	0,058	0,396	0,430	0,180	0,097
Var 4	**0,912**	-0,011	-0,021	-0,111	-0,169
Var 5	0,375	0,344	0,280	0,102	-0,031
Var 6	-0,313	0,407	0,454	0,662	0,693
Var 7	0,014	**0,792**	**0,731**	**0,787**	**0,728**
Var 8	0,233	**0,833**	**0,810**	**0,806**	**0,792**
Var 9	0,147	**0,701**	**0,741**	0,471	0,504
Var 10	n.a.	n.a.	-0,132	-0,107	-0,286
Var 11	n.a.	n.a.	n.a.	n.a.	-0,042
Var 12	0,347	-0,353	-0,325	-0,434	-0,361
Var 13	0,282	0,435	0,524	0,214	0,124
Var 14	0,201	0,647	**0,703**	0,384	0,346
Var 15	-0,175	0,126	0,347	-0,547	-0,450
Var 16	0,329	0,422	0,494	0,224	0,153

Var 17	0,102	-0,105	-0,083	-0,230	-0,328
Var 18	0,090	-0,052	-0,068	-0,225	-0,346
Var 19	0,094	-0,156	-0,146	-0,267	-0,377
Var 20	0,091	-0,175	-0,153	-0,198	-0,368
Var 21	0,091	0,166	0,180	0,036	-0,044
Var 22	0,323	0,187	0,306	0,160	0,036
Var 23	n.a.	-0,010	n.a.	0,055	0,208
Eigenvalue (Expl.var)	2,254	2,951	2,898	2,9	3,06
The share of the explained variance (Prp.totl)	0,113	0,134	0,138	0,132	0,115

Source: authors' own calculations using the Statistica software package

The proportion explained by Factor 3 of the variance is from 0.113 (for 2014) to 0.138 (for 2016).

In general, the obtained results prove a stable composition of the initial variables in the structure of the identified factors for almost the entire period of the study. An exception is the structure of the second and third factors for 2014, however, an analysis of the results shows that the second and third factors in 2014 simply changed ranks in terms of the share of the explained group variance of the source variables, preserving the structure. This can be explained by the lack of data on some indicators for 2012, for example, the share of families who are available to purchase housing through mortgages. In turn, the correlation coefficient of this variable with the second factor according to the results of data processing for subsequent periods always has a significant level of statistical dependence in the range from 0.897 (2013) to 0.922 (2015).

The total percentage of the variance explained by the selected factors is calculated in table 4. For all five years of the study, the multiple variance is higher than 70% and ranges from 73.3 (2017) to 75.3 (2014) percent.

Table 4: Percentage of variance explained

Years/Factor	Factor 1	Factor 2	Factor 3	Total percentage of variance explained
2014	48,7	15,3	11,3	75,3
2015	45,8	15,2	13,4	74,4
2016	45,1	14,9	13,8	73,8
2017	43,0	17,1	13,2	73,3
2018	48,8	14,4	11,5	74,7

Source: authors' own calculations using the Statistica software package

An analysis of the composition of primary variables in the structure of the principal components of the factors selected on the basis of the method allows us to give them the following meaningful interpretation (Fig. 1):

- F1 - an indicator of the effectiveness of the functioning of the regional mortgage market;
- F2 - an indicator of the availability of mortgage lending in the region;
- F3 - an indicator of business activity in the field of housing.

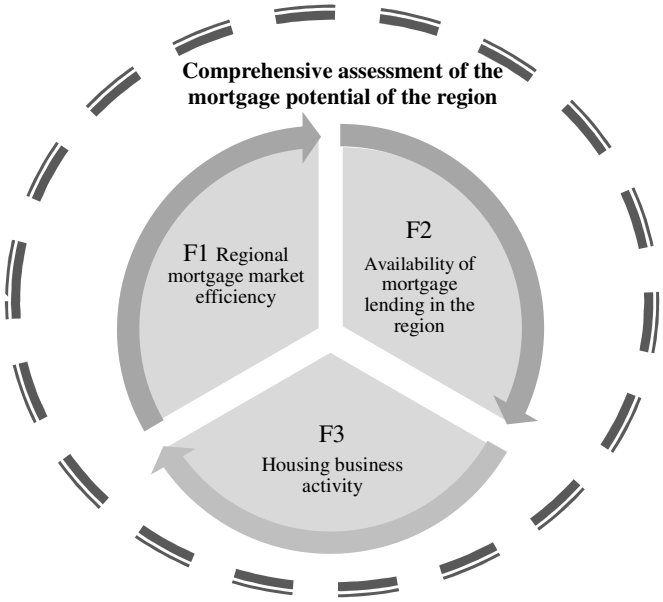

Fig. 1: Meaningful interpretation of the obtained factors

Source: authors' own elaboration

According to the developed methodology for assessing the mortgage potential of regions, at the next stage of the study, a scaling procedure is carried out by levels A, B, C based on the quantile approach. Its application made it possible to divide each of the obtained series of the differential indicator values (F1-F3), including a differential assessment for 85 regions, into three equal groups, where level A forms the first percentile, level B forms the second percentile, and level C forms the third percentile of Russian regions. In turn, the results were tested on the economic indicators of 85 Russian subjects at the last stage of the study. The detailed results of a comprehensive assessment of the mortgage potential of Russian regions for 2018 presented in Table 5. Based on the testing of the proposed methodology, a matrix for assessing the mortgage potential of the entire set of the Russian Federation regions was obtained, including 27 possible combinations of estimates of the differential indicator. Each of the selected cells lists the ordinal numbers of the regions that received one or another rating.

Table 5: Results of a comprehensive assessment of the mortgage potential of the regions of the Russian Federation

№ combinations k_i	**Regions**	***Rating values k_i***		
		Fl	**F2**	**F3**
1	c10; c25; c29; c61; c62; c69	A	A	A
2	c49; c59; c70; c71	A	A	B
3	c18	A	A	C
4	c4; c46; c54; c55; c58	A	B	A
5	c34; c47; c52; c73	A	B	B
6	c77	A	B	C
7	c32; c43; c72; c77	A	C	A
8	c35; c42; c51	A	C	B
9	c36; c67	A	C	C
10	c23	B	A	A

11	c20; c22; c74; c75	B	A	B
12	c78	B	A	C
13	c1; c6; c8; c12; c17; c24; c56	B	B	A
14	c3; c15; c16	B	B	B
15	c57; c68	B	B	C
16	c2; c44; c53	B	C	A
17	c45; c48; c50	B	C	B
18	c5; c38; c84	B	C	C
19	c27	C	A	A
20	c19; c81	C	A	B
21	c21; c26; c60; c64; c66; c76; c79; c80; c83	C	A	C
22	c9; c13	C	B	A
23	c7; c11; c33	C	B	B
24	c82	C	B	C
25	c14	C	C	A
26	c28; c30	C	C	B
27	c31; c37; c39; c40; c41; c63; c65	C	C	C

Note: «c» is the ordinal number of the subject of the Russian Federation adopted by the authors, for example, c1 – Belgorod region; c2– Bryansk region;…..; c18 – Moscow; …..; c85 – Sevastopol.

Source: authors' own calculations

The results of assessing the mortgage potential of Russian regions are clearly shown in Figure 2.

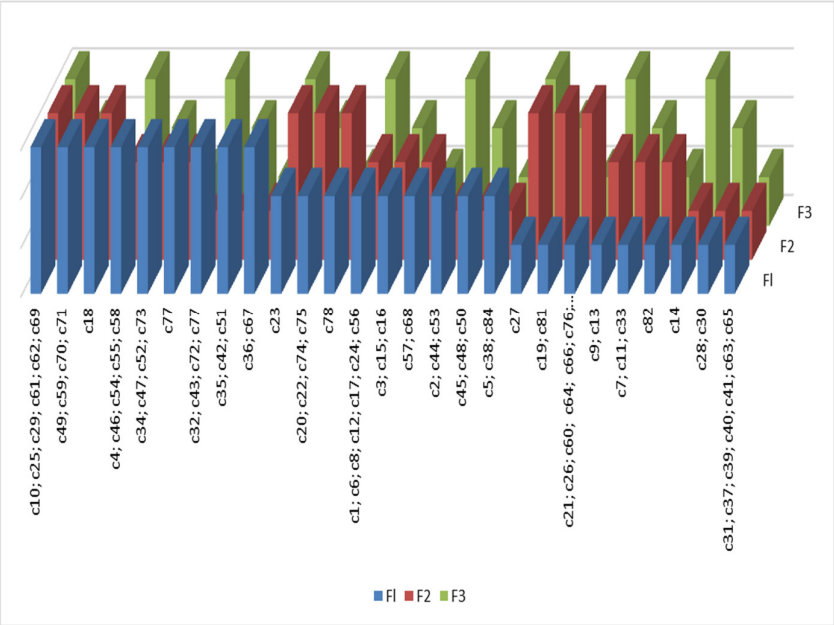

Fig. 2: Illustration of the results of assessments of the mortgage potential of the regions of the Russian Federation

Source: authors' own elaboration

Discussion

The methodology for assessing the mortgage potential of regions developed by the authors has the following advantages:

1. Obtaining a quantitative assessment of the mortgage potential of each of 85 Russian entities and its meaningful interpretation.
2. Possibility of comparing the imbalances in regional mortgage development.
3. Elaboration of management decisions aimed at the implementation of such a "course" of development, which will not only align the mortgage inequality in Russian regions but also increase the level of mortgage development in the country as a whole.

The last point is the most important advantage of the developed approach over existing analogues. In addition, the administrative decisions obtained on the basis of the model for assessing the mortgage potential of the regions can form the basis of the program of state support for mortgage lending in the regions of the Russian Federation.

Thus, as part of the implementation of state support measures for Russian regions, subsidized mechanisms for financing mortgages can be applied to all regions that received low marks (level C) for one or more components of the differential indicator. At the same time, state aid should have a strictly targeted nature, it should be provided on the basis of such instruments as subventions and subsidies. Within the framework of the projected system, in the current economic conditions for the regions of level "C", the following management solutions can be proposed to increase the mortgage potential:

I. For the first component of the differential indicator (F1) - the efficiency of the regional mortgage market:

1. Subventions to federal (DOM.RF) and regional mortgage operators for funding credit institutions that carry out mortgage lending activities on the territory of regions, through the organization of mortgage loan buyout. Such a redemption can be carried out through cession, as well as the purchase and sale of mortgages. This mechanism will allow credit institutions to carry out the procedure for refinancing mortgage loans in the most simplified and quick manner, which in this case will be carried out without the formation of an additional financial instrument, to be specific the organization of the mortgage securities issue. As a result, banks and other financial and credit organizations will receive an almost unlimited resource for issuing "cheap" loans in the territory of the region and that will inevitably lead to an increase in the key primary components for the first factor: the volume of mortgage loans issued in rubles and pieces, as well as the total volume debt on mortgage loans.

2. State subsidies for operating expenses for issuing mortgage loans. These costs include the fixed costs of the credit institution such as rental costs, office maintenance, staff salaries, social security contributions, equipment depreciation, etc. Covering part of operating expenses at the expense of the state source of financing will allow credit institutions to reduce interest rates on mortgage loans without lowering the rate of return. The economic effect of the implementation of such a measure is obvious - stimulating the demand for mortgage lending will lead to the growth of the regional housing and mortgage market.

II. To increase the second component of the differential indicator, specifically the availability of mortgage lending for housing in the region, it is advisable to develop a regional program of targeted assistance to socially significant segments of the population in need of better housing conditions. Such a regional subsidy should be provided to cover part of the monthly mortgage debt service payment. At the same time, the competence to determine the degree of need and the choice of categories of socially significant strata of the population who are entitled to such a subsidy will belong exclusively to the regional authorities. Note that such a measure will allow, first of all, state employees, such as doctors, young scientists, teachers, etc. compensate for their "lost cash income"

and increase their mortgage opportunities. As a result, the share of families with the possibility of obtaining a mortgage loan will grow in the region.

III. An increase in the quantitative assessment of the third component of the differential indicator, namely business activity in the field of housing construction, is possible through the implementation of such measures of state support in the regions as:

1. The development of project financing, including the use of the interest rate subsidy mechanism for the developer. Such a measure can be implemented on the territory of regions with high construction costs due to the remoteness from logistics centers, high utilities, and social burden, as well as the load on parking spaces, etc., which ultimately increases the cost per square meter of housing being built. Using the mechanism of subsidizing the interest rate for the developer in this context will reduce the selling price per square meter. In turn, an increase in the population's effective demand for construction projects will ultimately ensure the growth of housing commissioned in the region (Eremenko and Gareev, 2019).

2. Preparation of construction sites and technical conditions at the expense of the state with their further implementation to the developer. Such a measure will allow the state to shift all the costs associated with the supply of communications and facilities, as well as the resettlement of citizens, often from dilapidated housing located in the territory of the proposed development of the region with low construction activity. In the proposed model, the state, for example, represented by the Housing and Mortgage Fund or the regional Ministry of Construction, prepares a construction site using its own financial resources with its further implementation at a “fair” price to the developer, including through the auction mechanism. The practical implementation of such a measure will remove the extra burden from construction companies, thereby reducing the cost per square meter of housing for the region's population. In addition, the participation of the state in the organization and preparation of sites for the development of residential neighborhoods will make it possible to transfer the issues of citizens resettlement from dilapidated housing located in the built-up areas to a civilized channel, as well as to solve the problem of infill development, which has become urgent today in the most regions of the Russian Federation.

Note that if a region received several low scores for the differential indicator components, assistance should be provided to improve each component. At the same time, according to the results of the financial period, it is possible to redistribute aid between the components of the differential indicator. In this regard, it is necessary to constantly monitor the results of the growth policy of the mortgage market in the regions.

It should also be noted that in order to increase the effectiveness of measures to support the mortgage market, financial resources can be provided to the regions on the terms of co-financing of regional mortgage programs. The co-financing scheme will make it possible to fully involve regional authorities in the process of continuous work aimed at achieving the effectiveness of the mortgage mechanisms being implemented. In this setting, the model of state support for mortgage markets, projected on the basis of the developed differential indicator, will also acquire stimulating character.

Conclusions

Based on the study, the following results were obtained:

1. A methodology for assessing the mortgage potential of regional markets has been developed. Using the method of principal components is proposed as a basic method for the formation of a comprehensive indicator for assessing the mortgage potential of a region.

2. Based on the Statistica application package, five data arrays were processed for 85 regions of the Russian Federation for 2014-2018. A three-factor model is obtained, the structure of each of the main components of the factors identified by the method is substantiated, their meaningful interpretation is given.

3. The results of the assessment of 85 regions mortgage potential in the Russian Federation were obtained, the disproportions of their mortgage development were quantitatively and qualitatively assessed.

4. Recommendations are given for increasing the mortgage potential of regions with low ratings (level C). These areas, together with the proposed approaches to their practical implementation, can serve as the basis for a model of state support for regional mortgage markets.

In general, the proposed approach will make it possible not only to assess the "depth" of regional mortgage markets based on the calculation and subsequent assessment of a complex indicator characterizing the level of the region's mortgage potential, but also to methodologically substantiate options for management decisions aimed at the growth of mortgage lending both within individual regions and in the whole country.

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An Exploratory Study on the Awareness, Compliance, Practices, and Effectiveness of Risk Governance Guideline: Evidence from Banking Industry in Malaysia

Rusni HASSAN

IIUM Institute of Islamic Banking and Finance (IIiBF),
International Islamic University Malaysia,
Gombak, Malaysia
hrusni@gmail.com

Syed Ahmed SALMAN

Faculty of Business and Accountancy, Lincoln University College,
Petaling Jaya, Malaysia
salmaniium@gmail.com

Abstract

Risk is the main cause of uncertainty in any banking industry. Thus, banks increasingly focus on identifying risks and managing them before they even affect the investor. The ability to manage risk will help banks make confident decisions that impact the future of the business. Their knowledge of the risks they are facing will give them various options on how to deal with potential problems. Risk management is the process of identifying possible risks, problems, or disasters before they happen. This allows bankers to set up procedures to avoid the risk, minimize its impact, or at the very least help cope with its impact. A bank should make a realistic evaluation of the true level of risk and plan accordingly. The banking industry is one of the riskiest industries. Many countries and international organizations have come out with rules and regulations regarding risk management. In the case of Malaysia, risk governance guideline was introduced on 1st of March 2013 and has been effective since then. However, the banks are given additional time to bring the existing practices and policies in line with the principles provided in risk governance guidelines. There might be a possibility that some of the banks might delay complying immediately due to the flexibility in the time given by the governing body. Furthermore, to the extent of our knowledge, no research has been conducted on risk governance practices of banks in Malaysia. Thus, it is necessary to find out the awareness, compliance, practices, and effectiveness of risk governance guidelines in the banking industry of Malaysia.

Keywords: Risk, Shari'ah Governance, Banks and Malaysia

Introduction

Risk is the possibility of an adverse effect on any organization by preventing it from achieving organizational objectives (Htay et al., 2014; Salman, 2018). Risk management consists of the activities and actions taken by the organization starting from risk identification until risk communication to the top management as well as the risk managers (Salman, 2015). Managing risk requires careful consideration of the key concepts of minimizing loss, maximizing opportunity, and preparing for uncertainty (Commonwealth of Australia, 2008). The 2007/2008 global financial crisis has underscored the inability of financial institutions to protect themselves from exposures of threats from risk (Bank for International Settlements, 2009; Htay & Salman 2015).

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According to Dermine (2003), there are at least 15 risks that the banking system is exposed to and can be divided into four major groups of risks. The first group of risks is credit risk, which is defined by Dermine as the non-payment on time by the borrower or potential losses from credit. Under this group are retail and corporate credit risk, counterparty risk, settlement risk, environmental risk, and country risk. The second group is the market risk group, which is defined as the loss or decline in return because of the adverse movement of the market. The market risk group includes interest rate risk, foreign exchange risk, equities, and commodities. The third group is liquidity risk, which is according to Dermine, a shortage of cash from many factors such as the bank's deposit loss and an unexpected bank run. Lastly, the final group is operational risk, which is "risk of inadequate or failed internal processes, people and systems" (Dermine, 2003). This group of risks includes execution risk, model risk, fraud, legal risk, and regulatory risk (Dermine, 2003).

In addition to the above four main categories risk, this research will also focus on transparency risk, Shari'ah non-compliance risk, displaced commercial risk, equity investment risk, and rate of return risk. Since the risk can cause the whole banking industry collapsed and consequently, it will affect badly to the country's economy as a whole, many countries and organizations have introduced the guidelines and frameworks regarding risk management of banks. In Malaysia, BNM has introduced a risk governance guideline in March 2013. Thus, this research will focus on the effectiveness of the above-said guideline.

This proposal is presented in six sections. The second section discusses the research questions. The third section outlines the research objectives. The fourth section provides the relevant literature to this research. The fifth section discusses the research methodology and the last section concludes.

Research Questions

1. Are the banks aware to comply with risk governance guidelines issued by BNM?
2. To what extent, do the banks comply with the risk governance guideline?
3. What are the current risk governance practices by the banks?
4. Is there any significant difference between Islamic banks and conventional banks in terms of awareness, compliance, practices, and effectiveness of risk governance guidelines?

Research Objectives

1. To examine the awareness of risk governance by the banks in Malaysia
2. To investigate to what extent the banks comply with the risk governance guideline in Malaysia
3. To find out the current risk governance practices by the banks in Malaysia
4. To analyze whether there is any significant difference between Islamic banks and conventional banks in terms of awareness, compliance, practices, and effectiveness of risk governance guidelines.

Literature Review

Risk management is the main task of the board of directors. The board as the highest author needs to provide the risk management strategy which molds the whole risk management environment of the banks. For this research, we plan to focus on risk governance practices on nine types of risks, namely, market risk, operational risk, liquidity risk, credit risk, transparency risk, Shari'ah non-compliance risk, displaced commercial risk, equity investment risk and rate of return risk. These risks are discussed in the following paragraphs.

Market Risk

Market risk is a risk that arises due to the fluctuation in the market prices of shares, bonds and Sukuk, and any other money market instruments. Normally, the banks are holding the portfolio of these assets

with the expectation of getting a higher and good return. However, holding these assets might cause loss or incur a lower return than what has been expected. Thus, the banks should be very careful in choosing the assets and the investment decision should be done after all the relevant observations and tests have been done (Reserve Bank of Australia Bulletin, 1996; IFSB, 2005). This risk can be faced by both Islamic and conventional banks.

Operational Risk

Operational risk refers to the inefficiency and ineffectiveness of banks' operations due to internal management failure (Htay & Salman, 2014). It can be caused due to inadequate information technology systems and human resource management. This risk can cause a substantial amount of loss to the banks. Therefore, banks need to monitor their personnel very closely so that this risk will not arise (IFSB, 2005; Htay & Salman, 2013). This risk can be faced by both Islamic and conventional banks.

Liquidity Risk

Liquidity risk is a risk when the banks have a shortage of liquid money to pay back to the depositors and any other relevant parties. The main cause of this problem is due to the inadequate asset-liability of the banks (Htay & Salman, 2014). Normally, the liabilities of the banks, for instance, deposits are mostly short-term in nature while the assets of the banks such as loans and Islamic financing are long-term in nature. Besides, the depositors in the general deposit accounts or current accounts can withdraw their deposits any time and consequently, it creates the liquidity risk to the banks. This type of risk can be minimized if the banks strictly monitor and estimate the cash inflows and outflows of assets and liabilities (IFSB, 2005; IFSB. No 12; BNM, 2012). This risk can be faced by both Islamic and conventional banks.

Credit Risk

Credit risk usually refers to the defaults or delays in either payment or delivery of goods. In the case of conventional banks, this risk incurs especially when the customers delay or default in payments (Htay & Salman, 2014). For the Islamic banks, this risk can be caused by two main factors, first is due to delay or default in payments by the customers and the second is when the suppliers delay in delivering the goods or do not meet the specification required by the customers in producing the product. An inefficient and inadequate management information system is also another risk driver because if there is any discrepancy between the actual and predetermined times, the system should alert the credit risk manager, otherwise, it is not easy for the person in charge to detect the cases manually (IFSB, 2005; BNM, 2009; Varotto, 2011). This risk can be faced by both Islamic and conventional banks.

Transparency Risk

Transparency risk is the risk for the market participants when the Islamic banks do not disclose all the material information. Transparent disclosure is necessary for the market participants to make investment decisions. According to the market discipline, only if the information is available, the market participants will be able to predict and know the performance of the banks and then will be able to discipline the management (IFSB No.4). Transparency risk is a generic risk as it also exists in all financial institutions irrespective of Islamic banks or conventional banks. This risk can be faced by both Islamic and conventional banks.

Shari'ah Non-Compliance Risk

Muslim scholars have proposed Islamic banking due to the non-Shari'ah compliant nature of conventional banking activities. The later banking system is based on the interest which is one of the prohibited elements from the Islamic perspective. Shari'ah compliance is the backbone and paramount to Islamic banking business operations. Shari'ah non-compliance risk in Islamic banks is a failure to comply with Shari'ah in performing banking business activities and operations. Shari'ah compliance is unique and considered as the fundamental element of Islamic Banking and Finance. If any failure to

comply with it will adversely affect the reputation of the Islamic banks and the confidence of the market participants including the depositors and investors. Therefore, the Islamic banks need to ensure that this unique risk, non-Shari'ah compliant is monitored and manage properly; otherwise, there will be no difference between Islamic banks and conventional banks (IFSB No.5, BNM, 2012). This risk can be exposed to Islamic banks only.

Displaced Commercial Risk

The displaced commercial risk is the risk when the depositors withdraw unexpectedly due to the dissatisfaction with the Islamic banks. The unsatisfactory performance of the Islamic banks from the depositors' point of view is mainly due to a lower rate of return. When the banks are not able to pay the profit rate what has been expected by the investors, there is a tendency that the depositors will withdraw their deposits. The expected rate of the investors is influenced by the market rate which is offered by the conventional banks. One of the ways to control the displaced commercial risk by reserving some portion of the profits in the reserved accounts, namely profit equalization reserve and rate of return reserve. The practice of reserving some portion of the profit is to smooth the rate of return paid to the depositors by paying the profit rate which is equivalent to market rate when the banks are not making profit during the bad economy period (IFSB, 2005; Toumi & Viviani, 2013). This risk can be exposed to Islamic banks only.

Equity Investment Risk

The equity investment risk can be defined as the risk faced by the Islamic banks when entering to the partnership agreement with the customers. This risk is associated with Mudarabah or Musharakah partnership contracts. In these types of partnerships, the banks are sharing the risk with the partners, and profit and loss will be shared between the customers and banks. The risk can be due to the underperformed business and impairment of capital. In the case of misfortune, normally, the banks will forgo their profit portion to ensure that they can pay the profit rate which is equivalent to the market rate. Therefore, it can be summed that equity investment risk faced by the Islamic banks results in a lower rate of return to the banks, impairment of banks' investment and finally it will lead to the displaced commercial risk if the banks are not able to pay the expected rate by the market participants (IFSB, 2005). This risk can be exposed to Islamic banks only.

Rate of Return Risk

The rate of return risk is faced by Islamic banks when there is fluctuation in the market rate. This risk is associated with asset-liability management. Normally, the banks' assets are long-term in nature and liabilities are short-term in nature. The changes in the market rate will affect the depositors' expected rate of return from the Islamic banks. Although the expected return is high from the liability side, the long-term asset side is not that easy to generate the income for the Islamic banks as quickly as the liability side. Thus, there will be a mismatch between the rate paid to the liability side and earned from the asset side. This risk will cause other risks, i.e. displaced commercial risk (IFSB, 2005; add more reference). This risk can be exposed to Islamic banks only.

After discussing the major types of risks faced by the banks, the following paragraph will present briefly on the risk governance guideline.

This policy document on Risk Governance sets out a framework of principles on risk governance to guide the board and senior management in performing their risk oversight function. This policy applies to all institutions licensed under the Banking and Financial Institutions Act 1989 (BAFIA), Islamic Banking Act 1983 (IBA), Insurance Act 1996 (IA), Takaful Act 1984 (TA), and Development Financial Institutions Act 2002 (DFIA), hereinafter referred to as financial institutions. There are 10 principles regarding board practices, and they are as follows:

Principle 1: The board must ensure that the financial institution's corporate objectives are supported by a sound risk strategy and an effective risk management framework that is appropriate to the nature, scale, and complexity of its activities.

Principle 2: The board must provide effective oversight of senior management's actions to ensure consistency with the risk strategy and policies approved by the board, including the risk appetite framework.

Principle 3: Senior management is responsible for ensuring that the day-to-day management of the financial institution's activities is consistent with the risk strategy, including the risk appetite, and policies approved by the board.

Principle 4: The risk management framework must enable the identification, measurement, and continuous monitoring of all relevant and material risks on a group- and firm-wide basis, supported by robust management information systems that facilitate the timely and reliable reporting of risks and the integration of information across the institution. The sophistication of the financial institution's risk management framework must keep pace with any changes in the institution's risk profile (including its business growth and complexity) and the external risk environment.

Principle 5: Risk management must be well-integrated throughout the organization and embedded into the culture and business operations of the institution.

Principle 6: Financial institutions must establish an independent senior risk executive role (chief risk officer or its equivalent) with distinct responsibility for the risk management function and the institution's risk management framework across the entire organization. The executive must have sufficient stature, authority, and seniority within the organization to meaningfully participate in and be able to influence decisions that affect the financial institution's exposures to risk.

Principle 7: Financial institutions must establish and maintain an effective risk management function with sufficient authority, stature, independence, resources, and access to the board.

Principle 8: Effective implementation of the risk management framework must be reinforced with an effective compliance function and subjected to an independent internal audit review.

Principle 9: Financial institutions must have appropriate mechanisms in place for communicating risks across the organization and for reporting risk developments to the board and senior management.

Principle 10: Executive remuneration must be aligned with prudent risk-taking and appropriately adjusted for risks. The board must actively oversee the institution's remuneration structure and its implementation and must monitor and review the remuneration structure to ensure that it operates as intended.

Regarding corporate structure, this policy lays down three principles and they are as follows:

Principle 11: The board and senior management must be aware of and understand the financial institution's operational and organizational structure and the risks it poses and be satisfied that it is not overly complex or opaque such that it hampers effective risk management by the financial institution.

Principle 12: Where a financial institution operates through special-purpose structures, its board and senior management must understand the purpose, structure, and unique risks of these operations. Appropriate measures must be undertaken to mitigate the risks identified.

Principle 13: The board and management of subsidiary financial institutions will be held responsible for effective risk management processes at the subsidiary level and must have appropriate influence in the design and implementation of risk management in the subsidiary. Conversely, the board and management of a parent financial institution with local and overseas operations is responsible for the risk management of the group and must exercise oversight over its subsidiaries with appropriate processes established to monitor the subsidiaries' compliance to the group's risk management policies.

The next section presents the research methodology that will be used to conduct this research.

Research Methodology

Data

Both primary and secondary data will be used in this study. Primary data will be collected by questionnaires and interviews. Secondary data will be gathered from books, journals, articles, and internet resources related to risk governance.

Sample

The questionnaire will be distributed to all the Islamic and conventional banks in Malaysia. Interviews will be conducted to the risk managers from the Islamic as well as the conventional banks in Malaysia.

Statistical Method

Descriptive statistics, t-test, and Mann-Witney U-test will be used to analyze the questionnaire and content analysis will be used for interviews.

Limitation, Significance, and Contribution of the Study

The limitation of this study is the findings of this research are based on the primary data, i.e. the questionnaire and interviews. It is because the risk governance is effective from March 2013 and it is still very new. Also, the banks are still given a flexible time to comply with it completely. Thus, we believe that for time being, the primary data is the most suitable data to investigate the current risk governance practices of banks in Malaysia.

So far, to the extent of our knowledge, no research has been conducted on the risk governance practices of banks in Malaysia, the findings will be value-added to the current literature. It is believed that the results will be the interests of investors, industrial players, policymakers, Shari'ah advisors, depositors, and the general public.

The findings will provide hints to the investors about the risk management of the banking industry in Malaysia and hence, the investors will be able to make the informed investment decision. The industrial players will be able to estimate to what extent his bank complies with risk governance guidelines compared to the whole industry benchmark. The findings of this research will make the policymakers understand the current compliant status and the policymakers will be able to incorporate this awareness in making future rules and regulations. The Shari'ah advisors are mainly responsible for the Shari'ah compliance of the Islamic banks and thus, these findings will provide the signal to the Shari'ah non-compliance risk exposure management of the Islamic banking industry. The contractual relationship between the depositors and Islamic banks are different from the relationship between the depositors and conventional banks. Thus, the risk exposures of depositors of Islamic banks and conventional banks are different and hence, the depositors will be able to compare and evaluate the effective risk governance practices of these two different groups of banks. The findings will contribute to the knowledge of the general public as well.

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A Brief Overview of Islamic Syndicated Financing

Aida Noraini MANAP

Ph.D. Candidate at IIUM Institute of Islamic Banking and Finance (II*i*BF),
International Islamic University Malaysia
Gombak, Malaysia
aidanoraini@outlook.com

Rusni HASSAN

IIUM Institute of Islamic Banking and Finance (II*i*BF),
International Islamic University Malaysia,
Gombak, Malaysia
hrusni@gmail.com

Abstract

The growth of the Islamic banking and finance industry has developed a demand for innovative and more complex Islamic financing products to serve the needs of various banking customers, especially among corporate consumers, ranging between mid-corporate to large corporate firms. A mid-corporate and large corporate firm are defined by a minimum annual turnover of USD25 million and USD250 million, respectively. Corporate clients are important to commercial banks because they provide immense profit opportunities through their various financial needs. Islamic Syndicated Financing (ISF) has been increasing in demand among corporate customers. ISF is a financing technique involving joint participation by a group of Islamic financial institutions (Islamic banks) to allocate funds to consumers. ISF is typically recommended by the banks to cater to specific needs of corporate firms. ISF standard transaction includes a team of Islamic banks that produces the same set of documents while providing funding to a corporate client. The transaction could also extend under the same financing package to a group of clients. The structure of ISF was built based upon Islamic principles derived from several sources, primarily the Quran and the Sunnah. The academic research on the ISF topic is insufficient, such that even the factors driving its usage and market development have remained unexplained and yet to be empirically explored and tested. Much of the research on the development of syndicated bank financing is focused on the SL market in the U.S and European countries. There has yet to be a study documenting the development of the Islamic alternative to SL, which is ISF, even in an Islamic finance pioneer country such as Malaysia. Islamic Syndicated Financing has been plagued by several challenges since its inception and one of the main challenges has been the understanding and the permissibility of Islamic Syndicated Financing. Therefore, the objective of this paper is to understand the functionality of Islamic Syndicated Financing.

Keywords: Islamic Syndicated Financing, Academic Research & Permissibility.

Introduction

According to (Islamic Finance News [IFN], 2016;2017;2018), the number of ISF deals obtained by corporate firms has increased between 2016 and 2018. A total of 30 deals worth USD19.96 billion were signed in 2017 compared to 28 deals amounting to USD9.38 billion in 2016. In 2017, Malaysia had the highest market share totaled 50 percent, followed by the Kingdom of Saudi Arabia (KSA) with a 23 percent market share. By 2018, the growth of global ISF issuance had further risen by 11.42 percent to USD22.4 billion, which accounted for 0.60 percent (2017: 0.32 percent) of total debt syndication issuance worldwide. In 2018, global participation in ISF issuance is dominated by the GCC banks of

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the KSA, UAE, Bahrain, Kuwait, and Oman; collectively they have arranged and participated in a total 68.3 percent or twenty-eight (28) out of forty-one (41) new issues in 2018 and hence recorded a positive year-on-year growth of 11.42 percent. This steady growth is expected to be uninterrupted, driven by the SDGs opportunities and steady economic growth of unbanked Muslim countries including the *Shariah*-compliant corporate firms (United Nations Development Programme [UNDP], 2018).

Despite the positive outlook coupled with the rising performance of the international ISF market, Malaysia's participation in ISF has dwindled over the years, both globally and locally. Malaysia has since slipped off the league of ISF global market leaders in tandem with the declining ISF activities within the Malaysian banks, after experiencing rapid ISF growth of more than 800 percent between 2006 and 2017 (Bank Negeri Malaysia [BNM], 2019). Based on the in-country performance over the past decade of the total syndicated loan volume in Malaysia, ISF accounted for less than 15 percent except for 2015 where ISF recorded 22 percent of the volume contribution due to the sudden influx of one-off large issuances as large corporations rushed to enjoy stamp duty exemption through ISF. Noticeably, the stamp duty discounts had been introduced by the Malaysian government since 2010 in incentivizing large corporations to source their funding through ISF. However, the take-up rate was discouraging, not until a year before its cessation.
In the subsequent year, the ISF share of issuance plunged as low as 2 percent following the expiry of the stamp duty exemption. In 2017, the ISF market contribution improved to 13 percent yet the bulk of the banking syndication deal issued by the corporate customers was dominated by the syndicated loan instead of ISF (CIMB, 2017). In 2018, a total of 10 percent growth in ISF issuance was recorded (BNM, 2019). The minuscule contribution of the ISF market was purportedly attributed to various challenges faced by the market (CIMB, 2017; Khaleq & et al, 2016).

ISF has been plagued by several challenges since its inception, which made it difficult for it to obtain mainstream acceptance, resulting in it having to still navigate through the ever-changing landscape. The pricing capacity of Islamic banks has been affected by the liquidity constraint, and it is becoming the biggest challenge so far. Moreover, ISF involves a series of transactional lags because of the procedures involved between the client and the facility agent which together act as a deterrent for clients looking for a less time-consuming and structurally simpler solution (IFN, 2018). These contemporary challenges which emerge from the underdeveloped ISF market indicate the presence of high information asymmetry problems in many areas which have yet to be studied, also, academic research on ISF topic is insufficient, such that even the factors driving its usage and market development have remained unexplained and yet to be empirically explored and tested (Godlewski & Weill, 2012; Hutan, 2009).

On the contrary, the conventional alternative of ISF, SL has been extensively studied by the academic researchers since 1990s (Simons, 1993; Dennis & Mullineaux, 2000; Jones, W. Lang, & Nigro, 2005; Wild, 2004; Altunbas, 2004, 2010; Godlewski, 2008, 2010, 2014; Champagne & Coggins, 2012; Rarasati, 2014; Howcroft, Kara, & Marques, 2014; Neuhann, 2016; Donker, Ng, & Shao, 2018; Botsch & Vanasco, 2019).

Islamic Syndicated Financing has been remained disturbed by various difficulties since its beginning, amongst them, the perception and the permissibility of Islamic Syndicated Financing are the central challenges. Consequently, the purpose of the research is to understand the functionality of Islamic Syndicated Financing.

Islamic Syndicated Financing (ISF)

As defined by AAOIFI (2015), ISF is a method that requires the involvement of a group of Islamic banks to make available funds to a single corporate client. Conceptually, the functions of ISF are comparable to a conventional syndicated loan. ISF also takes similar commercial considerations as a syndicated loan except that there are some material differences between the two (2) transactions that must be considered (Khaleq et al., 2016).

Similar to other Islamic banking transactions, the structure of ISF is founded on Islamic codes and law that stemmed from the Quran and the Sunnah (together referred to as the Shariah). Islamic finance structures and techniques have been developed following Shariah principles, and, fundamentally, these codes must be strictly followed when assessing the appropriateness of a proposed loan framework or product. In particular, proceeds raised through ISF must be channeled towards investment activities that are acceptable in Shariah. It should not be completely or partly targeted towards projects that are restricted by Shariah restriction or cause riba (AAOIFI, 2017).

As concluded by Ali and Sarkar (1995), the Islamic banking system is based on these Shariah principles: (i) it should ensure the prohibition of riba (interests); (ii) the prohibition of gharar (uncertainty, risks, speculation) must be abided; (iii) it should only involve halal activities (permitted by Islam); and (iv) the system must practice justice (founded on the ethics and aims of the religion). Therefore, the same principles also apply to the ISF instrument (Khaleq et al., 2016; Visser 2013).

Technically, from the perspective of both the customers and the participating financiers, ISF provides similar protections as syndicated loan which include:

(i) allowing the bank to mitigate their exposure by sharing the customer's credit risk; and
(ii) giving the bank an avenue to participate in more transactions than they may have otherwise and thereby diversify their loan portfolios because they are only taking a portion of each loan transaction.

The main distinguishing feature differentiating ISF from that of conventional syndicated loans is the philosophical underpinning of these transactions. These incidentally make ISF appealing to the customers. In conventional loan syndications, commercial and legal considerations are generally the only issues that determine the terms and forms of these transactions and the rights of the parties. On the contrary, in ISF, (i) parties to the transaction have to observe Shariah principles including ruling out riba, gharar and matter; (ii) products and services that are haram cannot be invested in including the manufacture or sale of tobacco products, alcohol or pork or involved in gambling or pornographic activities or services; and (iii) require the approval of Shariah Supervisory Committees.

According to Godlewski and Weill (2012), although the funders in the financial transactions are not permitted to impose riba (interests), it does not mean that all modes of returns are prohibited. In its place, the revenue or interests can be substituted by the profit-sharing as well as the sharing of loss. In terms of gharar (contractual uncertainty or speculation), it is firmly forbidden based on the fact that in Islamic banking transactions, it is the requirement that the signed contract must be clearly described, specific, and unambiguous to avoid the possibility of one party being exploited by the other.

Another salient feature of ISF is that the profits cannot be defined as interest. Therefore, Shariah cannot guarantee as stipulate the investors' profit. The Shariah compliance of syndicated must strictly observe Islamic financing modes (Hutan, 2009). Besides, the majority of Islamic finance scholars are of the view that when the lead arranger looks to syndicate the debt, it must sell down the debt at par and not at a discount or a premium. Usually, the lead bank in conventional banking will sell the debt further at a discount or a premium rate to other banks. Nevertheless, an administration or management fee can be allocated to the lead arranger for managing the syndication process (Iqbal, 2007).

Notwithstanding, Islamic banks are as interested in protecting their investments and making a return as their conventional counterparts. While an ISF transaction must abide by the conditions outlined in Syariah, it must also make financial sense. As a result, any structure that is ultimately adopted must give the lenders the same rights, benefits, and protections as they would have in conventional syndicated lending. This is especially important in transactions involving conventional lenders or the Islamic windows of conventional banks who may not be as aware or sensitive to Shariah principles.

Permissibility of Islamic Syndicated Financing

According to AAOIFI (2015), the permissibility of ISF is derived from the contract of Musharakah (equity financing). Musharakah is coined from the Arabic root verb shirkah meaning to conjointly take

part in. It symbolizes the joining of two parties in the business. Musharakah is the core of Islamic financing philosophy, where both the risk and return are shared between the investors and entrepreneurs. Musharakah is a business undertaking that draws capital from all individuals in society and is used to fund business ideas.

Despite several shirkah (partnership) found in Islamic law, Shirkah Al 'Inan is most relevant to the partnership between banks and financial institutions. There is a consensus of the jurists that shirkah is the favored mode based on trade and leasing apart from being a legitimate contract in Islam. The term "Musharakah" was initially presented by contemporary Shariah scholars as joint commercial efforts (Taqi Usmani, 1998).

Sharikah Al 'Inan is referring to a partnership between two parties or more whereby each partner underwrites a portion of the money required and giving each contributor the right to have a claim of the assets of the partnership, on the condition that both the profit and loss are shouldered according to their initial contribution to the capital. It is also known as a limited investment partnership where the partners have equal equity but unequal rights to profit, unequal equity with equal rights to profit or unequal equity and unequal rights to profit (Zuhairah & Hartinie, 2018).

Shirkah Al 'Inan does not comprehend mutual surety, instead, it comprehends mutual agency. As a result of mutual agency, the individual partner in the partnership is free from liability for what is owed by any of the other partners as their liability is not joint. Nevertheless, their liability to a third party may be several. It should also be noted that the liability for accountabilities from the partnership affairs is jointly shared. This rule includes all the transactions involving the firm within the limit of what the partners are allowed to engage (Zuhairah & Hartinie, 2018).

Similarly, ISF also adopts the same design through which it enters into a collaborative relationship for funding specific project where more than two parties who are interested to finance. The syndicate banks will share the profit based on the agreement. ISF is the agreement by several banks to participate in a joint investment transaction using one of the instruments of investment with one party leading the investment.

Besides, as implied by the concept of Shirkah Al 'Inan, the syndicate partners need not have equal responsibility in managing the investment. As a result, their profit share may not be equal as indicated very early in the partnership agreement to steer clear of gharar. Similarly, the partners' share of losses would also be determined according to their capital contributions. According to Jaquir Iqbal (2009), the partners will play the role of agents in the syndicate, instead of sureties for the other partners.

Conclusion

ISF is a financing technique involving joint participation by a group of Islamic financial institutions (Islamic banks) to allocate funds to consumers (AAOIFI, 2015). Usually, a bank will be appointed as the lead arranging bank, while for a larger deal that requires extensive funding, a few lead arrangers could be appointed. ISF is typically recommended by the banks to specific needs of corporate firms. ISF standard transaction includes a team of Islamic banks that produces the same set of documents while providing funding to a corporate client. The transaction also could extend under the same financing package to a group of clients. The structure of ISF was built based upon Islamic principles derived from several sources, primarily the Quran and the Sunnah (together referred to as the Shari'ah). By Shari'ah permissibility, ISF is derived from the contract of Musharakah. Musharakah is derived from the Arabic root verb Shirkah which means to jointly participate or Shirkah Al Inan which refers to the business partnership between banks and financial institutions (AAOIFI, 2015; Taqi Usmani, 1998). By application, ISF can be structured using various Shariah-compliant modes. The structure that is adopted depends on the purpose of the financing, assets that will be used to repay the loans, nature of the customer's business, amount of flexibility the parties require, and financier's view of the Shariah-compliant nature of the transaction (Hassan, 2014). Besides, ISF can also be packaged together with conventional SL tranche (AAOIFI, 2015). Project financing, separate conventional and Islamic facilities are considered as large ticket transactions. Those activities are linked through the same term's

agreement but with separate facility agents and cash flow streams. ISF can be split further according to the client's needs to incorporate multiple-funded and non- funded facilities for multiple purposes facilities. The transaction structure also determines shares of the financiers under these respective facilities.

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On the Experience of Applying the Anagogical Approach to The Formation of Specialists' Information Competence

Larisa Yu. OVSYANITSKAYA[1]
International Institute of Design and Service, Department of Mathematics and Computer Science; Financial University under the Government of the Russian Federation, Ural branch, Department of Mathematics and Computer Science, Chelyabinsk City, Russian Federation, larovs@rambler.ru

Alexey D. OVSYANITSKIY
South Ural State University (National research university), Department of System Programming, Chelyabinsk City, Russian Federation, ovalex123@gmail.com

Elena A. KONYAEVA
South-Ural State Humanitarian Pedagogical University, Departments of the Training of Teachers of Vocational Education and Subject Methods, Chelyabinsk City, Russian Federation, elen-konyaev@yandex.ru

Liliya M. BAZAVLUTSKAYA
South-Ural State Humanitarian Pedagogical University, Departments of Economics, Management and Law, Chelyabinsk City, Russian Federation, lilibaz@mail.ru

Natalya Yu. KORNEEVA
South-Ural State Humanitarian Pedagogical University, Departments of the Training of Teachers of Vocational Education and Subject Methods, Chelyabinsk City, Russian Federation, korneevanyu@cspu.ru

Lyudmila A. KOSTRYUKOVA
South-Ural State Humanitarian Pedagogical University, Departments of Economics, Management and Law, Chelyabinsk City, Russian Federation, lacosta9353@mail.ru

Larisa N. PAVLOVA
South-Ural State Humanitarian Pedagogical University, Departments of the Training of Teachers of Vocational Education and Subject Methods, Chelyabinsk City, Russian Federation, pavlovalnppi@mail.ru

Olga N. SHVARTSKOP
South-Ural State Humanitarian Pedagogical University, Department of Road Transport, Information Technologies and Methods of Teaching Technical Disciplines, Chelyabinsk City, Russian Federation, lelik877_87@mail.ru

[1] Corresponding author

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Abstract

The formation of information competence of specialists in any industry is one of the main factors in the process of digital transformation of society. Continuous postgraduate education of people occurs in adulthood. The paper presents the authors' experience related to teaching information technologies based on a scientifically grounded andragogical methodological approach, taking into account the age of the students, social and professional experience. The concept of 'vitagenic' experience is discussed. It has been proven that the transition of life experience into vitagenic experience is possible only if life experience has social and value significance and helps to construct the future, taking into account past mistakes and achievements. Learning information technology for adults on the basis of vitagenic experience contributes to the formation of not only the technical aspects of the issue of mastering digital technology, but also a value, analytical and responsible attitude to information.

Keywords: andragogic approach, continuing education, information competence, vitagenic experience.

Introduction. The features of the adult student

We present our experience in applying the andragogical approach in postgraduate professional training of health professionals In this article.

The rapid growth and qualitative changes in data processing technologies determine the relevance of the issue of the formation of information competence of specialists in the framework of lifelong education.

The formation of information competence occurs in adulthood. Therefore, we have chosen the andragogical approach as the general scientific basis of our research.

Interesting works on the application of the androgogical approach in the context of the digital transformation of society (González and Montoyab, 2019; Bîrsanu, 2020) and the development of elearning (Tomos and Clark, 2018) can be noted. The work introduces the concept of "androgogical competence of a teacher" (Lebedeva, 2017).

The object of andragogy is the process of adult learning. The subject of andragogy research is the patterns of activity of adult learners and educators in the organization and implementation of the learning process. Considering all of the above, andragogy is defined as the science of adult learning, which substantiates the activities of adult learners and educators in organizing the learning process, which forms its subject.

The specificity of the andragogical foundations of education is determined, first of all, by the social and psycho-physiological characteristics of an adult learner: economic independence, life experience, a level of self-awareness sufficient for responsible self-governing behavior.

There are a large number of definitions of an adult, but in general, researchers agree that this is a person performing socially significant productive roles (citizen, employee, family member), possessing physiological, psychological, social, moral maturity, relative economic independence, life experience, and a level of self-awareness sufficient for responsible self-directed behavior (Zmeyev, 2019).

The age, in the case of advanced training of medical personnel, will vary from 25 years (the age of obtaining higher medical education) until the end of professional activity. The literature usually indicates the age of 65 years, however, with the increase in the duration of active life in recent years, the age limit is shifting towards an increase in age.

S.I. Zmeev pointed out five fundamental characteristics that distinguish an adult from a non-adult learner: 1) realizes himself as an increasingly independent, self-governing person; 2) accumulates a larger stock of life (everyday, professional, social) experience, which becomes an important source of training for himself and his colleagues; 3) readiness for learning (motivation) is determined by his desire to solve his

vital problems and achieve specific goals with the help of learning activities; 4) strives for the urgent implementation of the knowledge, skills, abilities and qualities acquired; 5) educational activity is largely due to temporal, spatial, professional, everyday, social factors (conditions).

Опыт применения андрагогического подхода в обучении специалистов здравоохранения

The application of andragogical methods in the training of healthcare professionals is discussed in (Cox and Gunderman, 2017)

Our further research will be based on the principles of andragogy formulated by S.I. Zmeev, and taking into account the specific features associated with the organizational, professional and psychological aspects of the process of forming information competence of managers and specialists of the healthcare system Based on the identified prerequisites, we will determine further algorithms for organizing and implementing the learning process.

1. The student has a leading role in the learning process.

This statement is true in the sense that a healthcare professional is a highly qualified professional who knows how and is accustomed to learning. Even before the start of training, he has clearly defined requirements for training organizers and teachers. In the event that they do not meet expectations, participants in professional development cycles are rarely passive about the current situation, not attending classes or doing their own thing while in the classroom. On the contrary, a mature awareness of the need to acquire knowledge promotes operational contact with course leaders and resolving the issue.

With age, some of the physiological functions of the human body associated with the learning process are somewhat weakened: vision and hearing decrease, memory, speed and flexibility of thinking deteriorate, and the speed of reaction slows down (Lorge, I., 1952).

These negative phenomena are partially compensated by other factors that contribute to learning: life experience, thoroughness, rationality of inference, and a tendency to analyze. But in almost all cases, adults lose to young ones in speed, in the speed of mastering the material, and in performing educational tasks.

Advanced training groups are always of different ages, and the difference can reach forty or more years. Therefore, preliminary preparation is necessary in terms of such a preparation of training programs, educational material and training computer programs, so that, if necessary, there is an opportunity both to slowly familiarize with them and to reflect on the lessons.

The leading role of trainees in planning and building the educational process is not so obvious. Nevertheless, the organizers of training or the leadership of the department need to be prepared to address questions about the competence of teaching staff. It is competence, that is, the successful performance of actions within certain competencies - within the framework of teaching information technology in medicine. The teacher may be an excellent specialist in their field, but this field will be too far from the needs of medicine. For example, the study of the theoretical foundations of computer science or the features of the functioning of software and hardware medical diagnostic complexes that are not used in connection with the modernization of healthcare and their replacement with more advanced devices, with a time limit for studying computer science of 8-16 hours, is clearly not constructive. The application of the junior approach, the essence of which will be described below, is intended to exclude such situations as much as possible.

2. An adult learner strives for self-realization, for independence, for self-government and is aware of himself as such.

A health care specialist or head of health care in advanced training courses feels like an independent, independent person. Students are trained in groups formed according to professional principles: a group of heads of health authorities and institutions, a group of deputy chief physicians for clinical and expert work and doctors responsible for examining disability, specialists of medical and preventive institutions for working with personnel, doctors of organizational and methodological departments, statisticians, clinical residents. In some cycles, several people may be trained from one health care institution.

Health care professionals are people who train and take part in meetings, consultations or conferences every day. Therefore, training is perceived not as a new type of occupation, but as a continuation of the usual professional activity, in the process of which they strive for self-realization and independence.

In the process of practical work on the above cycles, the author and his colleagues in the department faced the problem of the students' reaction to the results of the intermediate and final assessment of knowledge. If positive grades in the academic sense (“excellent” and “good”) were perceived adequately, then the grade “satisfactory” caused irritation and misunderstanding, and not a constructive desire to improve the level of knowledge. This was due to the fact that for the chief physician, the prospect of submitting a document with satisfactory grades in computer science to the personnel department did not cause positive emotions. As a result, it was decided to switch to the "passfail" system or to indicate the absolute number of points scored when passing a test or solving an educational problem.

M.Sh. Knowles wrote: ‘Nothing makes an adult feel like a child to the same extent as the very fact of being judged by another adult. It is an extreme expression of his dependence and disrespect for him’(Knowles, 1980).

3. An adult learner has life (everyday, social, professional) experience that can be used as an important source of learning.

In the late 90s. XX century A.S. Belkin put forward the idea of vitagenic education (Belkin, 1999) or education based on the actualization (demand) of the individual's life experience, his intellectual and psychological potential.

We are in solidarity with the author with his proposal to separate the concepts of "life experience" and "life experience". According to A.S. Belkin, a person has the experience of life - information related only to his awareness of certain aspects of life and activity, but not having sufficient value for him, and life (vitagenic) experience is information that has become the property of the individual, deposited in reserves long-term memory, which is in a state of constant readiness for actualization (demand) in adequate situations. The transition of life experience into vitagenic experience is possible only if life experience has social and value significance and helps to construct the future, taking into account past mistakes and achievements.

Adult education based on vitagenic experience is presented as an andragogic theory of vitagenic education, which has generalized features: actualization and attraction as a source of the entire spectrum of personal and universal human experience in its everyday, vital, vitagenic components; understanding education as a process of attracting and constructively transforming vitagenic experience into a new quality; recognition of the intrinsic value of the vitagenic experience of an adult as the basis for his further self-education, professional and personal self-development.

Adaptation of A.S. Belkin and N.O. Verbitskaya to the construction of a methodology for the formation of information competence of specialists and managers of the health care system contributes to the formation of not the technical aspects of the issue of owning digital technology, but a value, analytical and responsible attitude to information.

The program of classes on information technology at the cycles of professional development of health organizers necessarily includes the topics: "Information security", "The impact of digital technology on

the human body", "Legal aspects of the use of computer programs" and others. We have developed a technology for conducting classes in such a way that all the issues under consideration are presented from the point of view of:

- social significance;
- contained examples of life situations associated with overcoming difficulties, both objective and subjective;
- returned trainees to their personal experience in solving this issue (both successful and unsuccessful, contributing to the awareness and understanding of the reasons for their own failures).

After studying the topic, we presented a constructive optimistic prospect of solving the problem in the case of following the knowledge gained and mastered technologies. Since the consideration of issues was organized in such a way that it touched upon the problems of each person personally, then (according to the results of surveys conducted at the Department of Public Health and Health after each cycle of advanced training), the listeners noted the emerging feeling of self-confidence, the desire to carry out active transformations, related to the implementation and competent and safe use of digital equipment and technologies.

The model of information competence of a healthcare professional that we are developing partially takes into account the ideas expressed in this theory. Competence does not arise at once, but is a complex, indivisible structure that unites and integrates learning indicators, psychological and physiological personality traits, potential abilities, motivation and value attitudes of a person, manifested in the process of professional activity.

Our main task in building a model of information competence is to show its multidimensionality and versatility, to identify factors and connections that to a greater extent affect the achieved result.

For example, if a person in everyday life quite often uses digital household appliances intuitively, without reading instructions or recommendations, then such a habit can be transferred to the professional sphere, which is unacceptable. In this case, medical equipment or software will be used superficially, without using functions hidden from the first glance. However, if the specialist is professional and responsible, then such a transfer of the action pattern will not happen.

The model of information competence of a healthcare specialist we are creating, together with modern means of data mining, allows, based on the forecast of possible scenarios for the development of actions, to identify factors that to a greater extent affect the level of information competence. Therefore, if you design a lesson taking into account the ideas of the holographic approach and the concept of vitagenic information, then you can take timely measures and correct the gaps in the knowledge, skills or skills of the student.

4. An adult learns to solve an important life problem and achieve a specific goal (contextual learning).

Completing professional development courses for healthcare professionals is a must. After graduation, in accordance with the order of the Ministry of Health and Social Development of Russia "On the approval of qualification requirements for specialists with higher and postgraduate medical and pharmaceutical education in health care", once every five years, health care professionals need to undergo advanced training cycles. If a specialist doctor moves to another position, for example, related to the organization of health care, then there is a need for an extraordinary passage of training corresponding to the qualification requirements (general or thematic improvement or professional retraining).

Thus, on the one hand, the motivation for learning is due to administrative requirements. On the other hand, according to surveys of 108 students conducted at the Department of Public Health and Health Care of the Ural State Medical Academy of Additional Education, 98% of respondents agreed with the correctness and necessity of these requirements. The survey also showed that 94% of medical organizers

of health care who are trained at the department come with prepared questions related to specific situations in their professional activities, and are confident that they will receive an answer or advice in solving a question or problem.

Accordingly, the training course is focused on solving specific problems and requires the obligatory allocation of time for the lesson to answer the questions of interest, and the active activity and personal interest of the students provide high motivation and, therefore, the effectiveness of the learning process.

5. An adult learner counts on the immediate application of the skills, knowledge and qualities acquired in the course of training.

In the field of application of information technologies in the health sector, this statement became true in the late 10s. XXI century. due to the fact that the healthcare modernization program has practically solved the problem of equipping medical and preventive institutions with digital technology to solve medical, diagnostic and organizational problems.

The exchange of views, carried out after the completion of the study of each topic, showed that some problems that previously seemed insignificant and related, for example, information security issues (organizational issues related to the receipt, storage and destruction of electronic keys, generation and storage of passwords, distribution of access rights and much other) and the peculiarities of the impact of digital technology on the physiological and psychological health of people, require an urgent solution.

In the case when the application of the acquired knowledge is potentially impossible, the adult's interest in learning disappears. This once again forces us to carefully think over the content of the material and present only those theoretical knowledge that can either be implemented in medical practice or relate to the preservation of personal information and people's health.

6. The learning activity of an adult learner is largely determined by temporal, spatial, everyday, professional, social factors that either limit or contribute to the learning process.

There are a number of factors that directly affect the learning process, but which the teacher (or andragogue) cannot influence: each student learns against the background of personal and professional situations; the need, duration and main content of training in the cycles of professional development of health care professionals are strictly determined by law.

However, there is a factor that can significantly improve the microclimate of the group. The listeners of the group come from different settlements of the Russian Federation and, as a rule, do not know each other. After passing the official registration, classes begin. The duration of the cycles varies from one to two weeks to three months, therefore, with a group size of 15-20 people, in short-term courses, students do not have time to get to know each other and feel more constrained and passive than in a familiar environment.

Long-term observations have shown that if, on the first day after or before the classes, an informal meeting of the listeners is organized (acquaintance with tea drinking) and one of the first classes is to arrange an out-of-the-box visit for informational purposes of the basic medical institution, the microclimate of the group changes to a positive one. side. Students come to classes in a familiar audience, communicate with familiar people who have a similar social and professional level, take interest and consult with each other in solving professional problems. In this case, the classes really take place in the form of a joint activity of the teacher and students.

7. The learning process of an adult learner is organized in the form of a joint activity of a learner and a teacher at all stages.

The survey showed that all medical organizers of health care who are trained at the department come to receive an answer or advice in resolving an issue related to their own professional activities. Questions or problems related to various aspects of the introduction of information technologies, from technical to organizational, arose among all students, regardless of their place of work - a large federal medical center or a village center. Analysis of the problem together with the entire group of students made it possible not only to find the best solution, but also to identify the teacher's needs in a given period of time and to adjust the content of the next lesson in this group and the entire cycle of lessons in the next group.

Such a technology of conducting classes is possible only when teaching qualified adults.

Let's add two factors that need to be taken into account when conducting classes related to the study of information technology in the cycles of postgraduate professional development of health professionals.

- Features of the specialty of the doctor.

Doctors are highly qualified specialists who know how to study and learn all their lives. People who have received medical education do not accept a single fact without its argumentation and proof and tend to critically compare their experience with the proposed educational material. Therefore, teaching any discipline in a medical classroom must be clear, logical and evidence-based.

Every day, healthcare professionals take part in meetings, consultations, conferences. People in this specialty are characterized by the ability to communicate, and the main characteristic of communication is a respectful attitude towards colleagues and their opinions. According to our observation, holding mini-conferences with short (3-5 minutes) messages from listeners on the experience and problems of introducing information technologies in medical institutions and the subsequent joint analysis of facts and opinions make the lesson more productive and diverse.

- Attitude towards information technology.

Computer science is not a specialized subject for physicians, therefore, unlike professional courses, it is not associated with the need for in-depth study. The need for knowledge of information technology appears later, when a doctor is faced with practical problems that have to be solved independently.

Both in everyday life and in medicine, many believe that they have sufficient experience and knowledge to work with any device without reading the instructions. But all software in medicine is created by professionals and is aimed at professionals. Intuitive work with medical and diagnostic equipment, even with a general correct policy, will always be superficial, without using functions that are not externally visible (Ovsyanitskaya, 2015).

Medical equipment designed to perform the same tasks, but from different manufacturers, always has a different interface. In order to switch from work from one high-tech equipment to another, you either need to undergo specialized training, or have a high level of information competence, which allows you to transfer skills and abilities to work with one device to another, taking into account all the specific features. Moreover, it is necessary to approach this responsibly (after carefully reading the documentation) and consciously (without neglecting safety requirements, since many medical and diagnostic devices can affect the environment, causing an excess of the permissible parameters of electric, magnetic fields, X-rays, ultrasonic frequencies, etc. .).

In our opinion, conscious safe work with medical software and hardware-software complexes is the main indicator of a high level of information competence of a healthcare specialist.

A full-fledged teaching of the topic of information security is possible only within the framework of andragogy. In order to realize the importance, relevance, significance of the issue, you need to have life and professional experience, foresight and understanding of real responsibility when working with virtual data.

Currently, the change not only in software, but even generations of information technology is taking place very quickly. Therefore, periodic professional development, the formation of information competence of employees in the field of information security through participation in seminars, conferences, through self-preparation, is the main factor contributing to the fact that the above points will be carried out consciously, competently and will really protect personal and professional confidential information from illegal distribution and theft.

Results

1. The introduction of modern information technologies in medicine is becoming one of the priority areas for the development of the industry. One of the main factors in the successful development of health informatization is the formation of information competence of doctors based on scientifically based methodological approaches, taking into account the characteristics of the subject, age and professional characteristics.
2. The presence of life, everyday, social and professional experience, the desire for independence and self-government, high motivation for learning, as well as the specificity of the medical audience, due to the fact that doctors have a high professional and social status and know how to study, study and take part in meetings , councils, conferences every day, lead to the impossibility of training healthcare professionals in information technology based on standard methods focused on university education and require the use of andragogical foundations for the use of specific technological techniques and teaching methods.
3. The study of information technologies of adults on the basis of vitagenic experience contributes to the formation of not only the technical aspects of the issue of mastering digital technologies, but also a value, analytical and responsible attitude to information.

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Formation of Multivariate Models of Macroeconomic Indicators of Society Development

Viktor D. OREKHOV
University "Synergy", Moscow, Russia
vorehov@yandex.ru

Olga S. PRICHINA
Russian State Social University, Moscow, Russia
olgaprichina@mail.ru

Vladimir P. GORSHENIN
Scientific and Production Association named after S.A. Lavochkin, Khimki, Moscow region, Russia,
gorsheninvp@laspce.ru

Sergei V. ALIUKOV
South Ural State University, Chelyabinsk, Russia
alysergey@gmail.com (Corresponding author)

Elena S. SCHENNIKOVA
Financial University under the Government of the Russian Federation, Moscow, Russia,
esshchennikova@fa.ru

Abstract

The work carried out the development of a generalized algorithm for the comparative analysis of indicators of the results of socio-economic development based on multivariate models of macroeconomic indicators of the development of society. The study of the 16-factor complex of global indices, which includes five indicators of results, made it possible to identify its systemic characteristics and main interrelationships. It is shown that the Human Development Index and Social Progress Index have a dominant influence on various performance indicators. In addition to the high level of influence on other indicators of results (0.3–0.7 total influence), they have a cooperative effect on other indicators within the framework of complex predictors. The GDP per capita indicator is interconnected within the framework of complex predictors, mainly with the World Happiness Index.

Keywords: Human Capital, Happiness Index, Social Progress Index, Human Development Index, GDP per capita, forecasting, optimization, regression analysis

Introduction

For a long time, the main indicator of the state of the economy was considered the Gross Domestic Product - GDP, proposed in the 30s of the 20th century by the American economist Simon Kuznets. The ratio of the GDP to the population (GDP per capita) is interpreted as an indicator of the well-being of the population. In 1954, purchasing power parity exchange rates - PPP - were first published. This approach became widespread after 1978, when a worldwide database of PPP exchange rates was created.

In connection with the growth of the well-being of the population, material prosperity ceased to correspond to the role of the ideal of social development. This has led to increased criticism of GDP as a universal measure of country performance. At the same time, the developers of the 2011 system of national accounts noted that "the GDP indicator was never intended to measure well-being" (Peter van de Ven, 2014).

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In 1990, a group of economists led by Pakistani Mahbub ul-Haq developed the Human Development Index (UNDP, 2018), which is published annually by the United Nations Development Program (UNDP). An essential advantage of the Human Development Index (HDI) is that it is based on two indicators of a natural type (life expectancy and the number of years of education), and the third ensures the inheritance of the relationship with GDP per capita at PPP. Its simplicity is, however, both an advantage and a disadvantage, since it takes limited account of the characteristics of the socio-economic development of countries.

The concept of the economy of happiness has been proposed as a fundamentally different approach to assessing the results of social development (Easterlin, 1974; Veenhoven, 1991; Argyle, 2003; Layard, 2011). This concept received support at the 65th UN session in 2011. At the same time, the resolution "Happiness: A Holistic Approach to Development" was approved. One such approach is implemented as the World Happiness Index (Helliwell at al., 2019). Among the disadvantages of this index, it can be noted that highly intangible indicators such as the feeling of positive or negative emotions make a significant contribution to it. It is characteristic that the dependence of the World Happiness Index (WHI) on a number of predictors is bimodal, and at a certain stage of the development of society, a decrease in the level of happiness may occur with an increase in well-being. This led to a lengthy debate among economists about the Easterlin paradox, which is that GDP growth only within certain limits leads to an increase in the level of happiness (Easterlin, 1974; Diener, 2013).

Since the share of human capital (Schultz, 1962; Becker, 1962) in the national wealth of countries began to grow rapidly since the end of the 20th century, and, according to some estimates, it reaches 80% in developed and large developing countries (Koritsky, 2013; Korchagin, 2005; Suvorov et al; 2014), then human capital (HC) actually also begins to play the role of an indicator of social development (Prichina, 2019). The difficulty lies in the fact that different methods for assessing human capital do not give fully consistent results. For example, the two human capital indices developed by the World Economic Forum (WEF, 2019) and the World Bank Group (World Bank Group, 2019) are based on significantly different indicators.

Finally, under the leadership of M. Porter, the Social Progress Index was developed in 2013 (Porter, 2015; Stern, 2018), the first version of which was released in 2014. The index is formed on the basis of 54 indicators, structured in three areas: basic needs of people, the basics of well-being and opportunities, and for each area 4 groups of indicators were formed, 3-5 in a group. It is fundamentally important that among the indicators used there are no those that characterize the economy and business, which makes it possible to establish the relationship between the economy and the social characteristics of society.

The presence of a wide range of indicators of the development of society, the active improvement of their design, makes the question of the relationship between these indicators urgent.

The aim of the work is to develop a method for comparative analysis of indicators of the results of socio-economic development based on multivariate models of macroeconomic indicators of the development of society.

To solve this problem, in this work, a statistical analysis of the dependence of various indicators on a complex of 15 global indices, including those that can also serve as the resulting indicators, is carried out.

Research Methodology

The methodological foundations of this work are systematic and statistical analysis. As indicators of the results of the socio-economic development of countries, the indices presented in Table 1 are used.

Table 1: indicators of the results of socio-economic development

i	Abbre-viation	Full name	Indicators
1.	GDP/C	GDP per capita at PPP	Gross domestic product at purchasing power parity в долл. США 2018 года, по данным World Bank
2.	HDI	Human Developmen Index	Life expectancy, length of study, log GNI at PPP (UNDP, 2018)
3.	IHC	Index of Human Capital	A comprehensive indicator of human capital, formed from indices: Global Human Capital and Human Capital Index
4.	WHI	World Happiness Index	Life expectancy forecast, freedom to choose a life path, support from other people and social, low corruption, positive or negative emotions, people (Helliwell, 2019)
5.	SPI	The Social Progress Index	- food and low mortality from disease, sanitation and water, housing and electricity, personal safety; - coverage by secondary education, communication and access to information, healthy life and ecology; - rights and freedoms, tolerance for minorities, access to higher education (Porter, 2015; Stern, 2018)

The research program is as follows. Using five indicators of countries' development results, on the basis of a statistical analysis of the database on global indices (factors) shown in Table 2, form a series of complex predictors that provide the minimum regression error with the corresponding performance indicators. The weights of the indices in these predictors presumably reflect the level of influence of these indices on the corresponding development results. Comparison of these indices and their coefficients in various predictors will be used to identify the systemic characteristics of mutual influence, both performance indicators and the complex of global indices used.

Table 2: indices used as factors

i	Abbre-viation	Full name
1.	IEF	Index of Economic Freedom (Miller, 2019)
2.	EDB	Ease of Doing Business Ranking, (Doing Business, 2020)
3.	WGI	Worldwide Governance Indicators (Kaufmann, 2010)
4.	GCI	Global Competitiveness Index, (Schwab, 2019)
5.	MYS	Mean Years of Schooling (UNDP, 2018)
6.	GHC	Global Human Capital (WEF, 2019)
7.	HCI	Human Capital Index (World Bank Group, 2019)
8.	RDE	R&D Expenditure (Knoema, 2017)
9.	LPI	The Legatum Prosperity Index (Legatum, 2019)
10.	CPI	Corruption Perception Index (Transparency, 2020)
11.	LEI	Life Expectancy Index (UNDP, 2018)
12.	KIG	KOF Index of Globalization (Savina, 2019)

It should be noted that the indicators presented in Table 1 were also used as factors on which other indicators of results depend. In addition, the number of indices shown in Table 2 includes those that are not formally global indices, for example, Mean Years of Schooling, but are important from the

point of view of the completeness of this system of indices. For ease of comparison with other arguments, the MYS index is normalized to the average duration of tertiary education (16 years). The value of R&D Expenditure is given in terms of GDP, Life Expectancy Index in years.

The work used data for 72 countries, for which data were available for all indices. A number of fuel producing countries (Qatar, Kuwait, Saudi Arabia) that deviate significantly from the general trends in GDP / C were not included in the sample under study. All countries were ranked according to the value of GDP at PPP and the largest samples were formed, differing in the number of countries: G72, G48, G24, G12, G6. For each of these samples, regression dependencies, coefficients of determination (R^2), and regression error ($\Delta R^2 = 1 - R^2$) were determined. In addition, the mean value of the regression error ($\Delta R^2_m = 1 - R^2_m$) was determined for five samples (G6 – G72). Optimization of predictors was carried out by minimizing ΔR^2_m .

To track the regular nature of the interdependence of performance indicators on a multidimensional complex of factors, at the first stage of the study, for each performance indicator, the dependence of the indicator on single and optimal paired predictors was studied. Paired predictors were formed by a linear composition of indices according to formula (1).

$$P_2 = k\, In_1 + (1 - k) In_2 \qquad (1)$$

Here In_1 and In_2 are the values of two indices for a particular country, k is the contribution coefficient of the first index (1> k> 0), P_2 is the value of the paired index. Complex predictors were formed similarly to paired ones, which included the maximum appropriate number of indices, according to formula (2), where $\Sigma ki = 1$.

$$P_C = \sum k_i\, In_i \qquad (2)$$

The search for the coefficients ki when optimizing complex predictors was carried out by varying them, defining a regression model and estimating the value of ΔR^2_m . Further, the optimal values of ki were determined by the gradient descent method with cyclic change of variables.

Optimizing predictors for GDP / C

First of all, the dependence of GDP per capita at PPP on various global indices was investigated. At the first stage, the values of the regression error ΔR^2_m of the dependence of GDP / C on the single indices presented in Table 1 were calculated. The lowest regression error was demonstrated by the Human Development Index, for which $\Delta R^2_m = 5.5\%$ with a trend as a power of number. The dependence of GDP / C on the Human Developmen Index for the G24 is shown in Fig. 1. Trends in the form of a power of a number and an exponent (dotted line) are close to each other in the considered range of the argument.

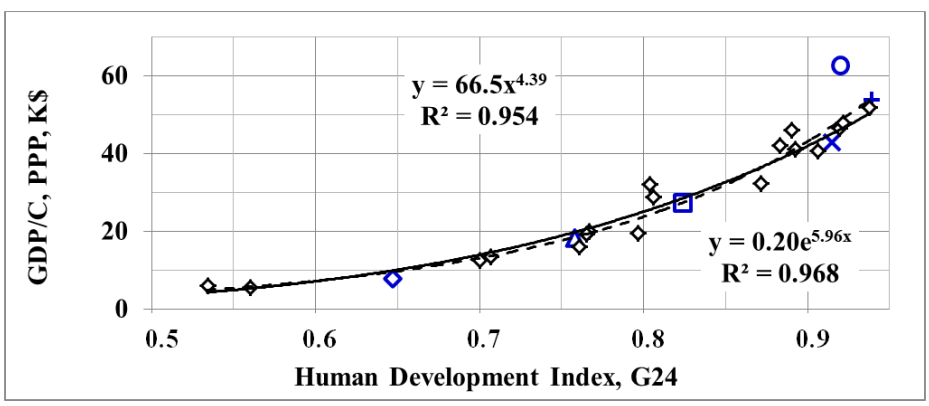

Fig. 1: Dependencies of GDP / C on Human Development Index, G24

It should be noted that the Human Development Index, as one of the three main components, includes gross national income (GNI), which is quite close in size to GDP. Therefore, the correctness of including HDI in the GDP / C predictor complex is somewhat questionable. In this regard, special attention was paid to GDP / C predictors that do not include HDI. Those that provide the smallest ΔR^2_m are shown in Table 3.

Table 3: indexes-predictors of GDP / C with the smallest ΔR^2_m,%.

	G6	G12	G24	G48	G72	mid
LPI	18.2	15.9	16.6	19.5	17.3	17.5
HCI	16.6	11.5	8.9	28.3	22.0	17.4
MYS	8.5	11.7	13.6	29.2	23.4	17.3
SPI	12.4	13.3	9.1	22.8	19.1	15.3
HDI	2.2	2.2	4.6	11.4	7.0	**5.5**

Next, we considered paired predictors formed according to formula (1). HDI and SPI were used as the first of the pairs of indices, which showed the best individual results. The optimal paired predictors of GDP / C are presented in Table 4. The left half of the table shows the values of ΔR^2 for various samples and ΔR^2_m (column - mid), and the right - the values of the coefficients ki of the contribution of the indices to the predictors.

Table 4: regression error of paired GDP / C predictors,%

	G6	G12	G24	G48	G72	mid	IEF	EDB	MYS	GHC	HCI	WHI	SPI	HDI
HDI +IEF	1.7	2.8	3.1	8.5	5.3	4.3	0.20							0.80
HDI +EDB	1.4	2.3	4.3	9.8	6.4	4.8		0.20						0.80
HDI +WHI	1.5	2.8	3.6	10.0	6.2	4.8						0.15		0.85
MYS+SPI	6.7	5.8	6.6	18.2	13.1	10.1			0.40				0.60	
GHC+SPI	4.5	4.1	7.4	19.1	14.9	10.0				0.42			0.58	
HCI+SPI	7.5	6.2	6.4	16.9	13.7	10.1					0.35		0.65	

It can be seen that the predictors that include HDI are characterized by approximately half the values of ΔR^2_m than those with SPI, and the smallest ΔR^2_m = 4.3% is provided by the predictor P = 0.8HDI + 0.2IEF. Among paired predictors that do not contain HDI, the minimum ΔR^2_m = 10% for the predictor P = 0.42GCI + 0.58SPI. Note that the optimal paired predictors, including SPI, contain as the second index those that individually provide low ΔR^2_m. The predictors containing IHD, as the second component, include indices with low individual ΔR^2_m.

At the third stage of the study, complex predictors were identified, which include three indices and an arbitrary number of them, and this was done, both with the inclusion of the Human Development Index, and without it. The found optimal predictors are presented in Table 4 (ERD and CPI indices with a weight of ~ 0.01 are not shown in Table 5).

Table 5: error of regression of complex predictors of GDP / C,%

	G6	G12	G24	G48	G72	mid	IEF	EDB	GCI	MYS	GHC	HCI	WHI	LPI	SPI	KIG	HDI
Pc_1	1.3	2.6	2.9	8.4	5.2	4.1	0.15						0.1				0.75
Pc_2	1.0	2.1	3.1	8.1	5.2	3.9	0.1	0.1					0.1				0.7
Pc_3	4.3	7.1	7.9	16.0	11.3	9.3				0.2			0.25		0.55		
Pc_4	2.4	2.6	5.8	13.1	9.6	6.7	0.03	0.06	0.2	0.12	0.08	0.15	0.15	0.04	0.26	0.07	

Complex predictors including HDI, as in the case of simpler predictors, are characterized by approximately half the regression error, about 4%. Since HDI individually has a very low regression error (ΔR^2_m = 5.5%), adding other indices to it does not contribute to a significant decrease in ΔR^2_m. Therefore, the optimal complex predictor Pc_2, including HDI, contains only 4 components and is marginally superior (ΔR^2_m = 3.9%) compared to the predictor of three Pc_1 indices.

Predictors that include SPI benefit significantly from adding other indexes. The optimal complex predictor Pc_4 includes 12 components and has ΔR^2_m = 6.7%. The SPI index (ki = 0.26) makes the largest contribution to this predictor, which is consistent with the results of studies of ΔR^2_m for individual and paired predictors. Also, the contributions of HCI (ki = 0.15) and GHC (ki = 0.08) are quite high. Overall, the group of human capital indexes (HCI, GHC, MYS) contributes the most to the composite optimal predictor of GDP / C - 0.35. The contribution of the World Happiness Index is also quite large (0.15). The dependence of GDP / C on the Pc_2 predictor for the G24 sample is shown in Fig. 2.

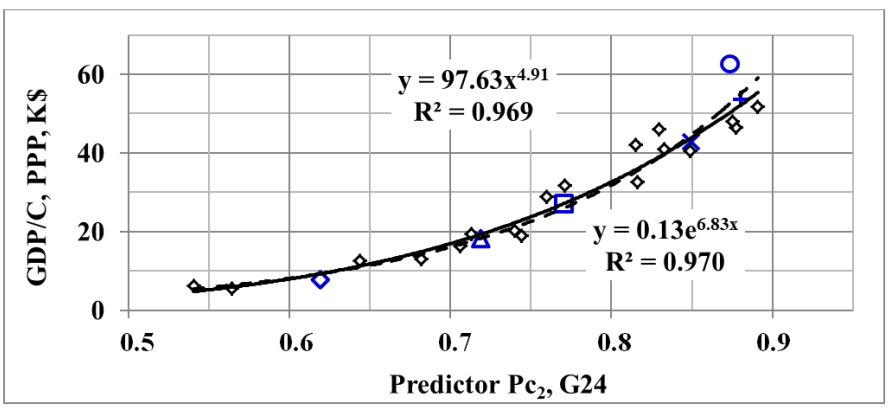

Fig. 2: Dependences of GDP / C on the predictor Pc_2, G24

In Fig. 1, 2 sample points G6 are marked with special symbols from left to right: India, China, Russia, Japan, USA, Germany. It can be seen that all points except for the USA (circle) lie very close to the trend. This means that there is a natural relationship between GDP / C and the found optimal predictor, and the countries under consideration, including Russia, have GDP / C close to this relationship.

Optimization of predictors for Human Development Index

Let us consider the possibilities of forecasting the Human Development Index using the global indices presented in Table 2. Table 6 shows the indices, when used as predictors for HDI, the minimum regression error ΔR^2_m is provided for various samples with a trend in the form of a second degree polynomial.

Table 6: indexes-predictors of HDI with small ΔR^2_m,%

	G6	G12	G24	G48	G72	mid
LPI	12.8	12.7	16	13.2	11.7	13.3
MYS	6.5	9.9	10.7	18.7	16.0	12.4
HCI	10.3	8.8	4.8	14.1	12.8	10.2
SPI	0.6	9.0	5.6	12.5	11.1	7.8
GDP/C	0.2	1.7	5.0	10.3	9.8	5.4

It can be seen that the best individual predictor in this sense is GDP / C with ΔR^2_m = 5.4%, and this value is close to the GDP / C regression error depending on HDI. Some of the difference is due to the fact that these two relationships have different trends. Social Progress Index ranks second in terms of ΔR^2_m = 7.8%. Table 7 presents paired, triple, and complex predictors that provide low regression biases for HDI.

Table 7: complex HDI predictors with small ΔR^2_m,%

	G6	G12	G24	G48	G72	mid	MYS	HCI	SPI	LEI	GDP/C
MYS+SPI	1.28	2.41	3.69	7.31	6.19	4.18	0.4		0.6		
MYS+GDP/C	1.50	2.31	4.21	5.85	5.30	3.83	0.35				0.65
HCI+SPI	2.53	2.56	2.43	4.45	5.58	3.51		0.45	0.55		
HCI+GDP/C	1.51	2.14	2.41	5.27	5.22	3.31		0.4			0.6
SPI+GDP/C	0.31	1.74	2.49	6.52	5.44	3.30			0.4		0.6
MYS+SPI+GDP/C	1.63	1.65	2.77	4.74	4.01	2.96	0.35		0.35		0.3
MYS+LEI+GDP/C	0.95	1.36	1.45	2.81	2.80	1.87	0.33			0.33	0.34
HCI+SPI+GDP/C	0.39	0.82	1.45	2.28	3.43	1.67		0.35	0.4		0.25
Pc_5	0.20	0.55	1.13	1.87	2.32	1.21	0.2	0.2	0.3	0.1	0.2

The first column of the table contains abbreviations of the indexes that make up the predictor, and the last five columns show the proportion of these indexes in complex predictors. Among paired predictors, the smallest average regression error ΔR^2_m = 3.3% is provided by the combination SPI + GDP / C with an SPI share of 0.4, which is consistent with the low individual values of ΔR^2_m for these indices.

Adding the third index to the predictor (HCI + SPI + GDP / C) allows to reduce the regression error by half, to 1.67%. An even more complex predictor Pc3, which includes five indices (MYS + HCI + SPI + LEI + GDP / C), provides a very low level of regression error – 1.2%.

It is interesting that among the paired predictors there are those that do not contain GDP / C and MYS and have a fairly low regression error of ~ 3.5%. This allows HDI to be predicted without having these values included in the HDI definition.

The dependence of the Human Development Index on the optimal complex predictor Pc_3 for the G48 sample is shown in Fig. 3. It can be seen that all points, including G6, are very close to the trend line (polynomial of the second degree - P2).

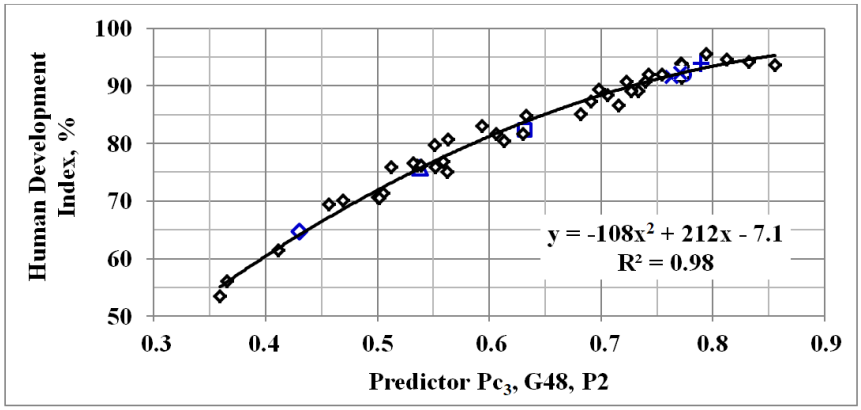

Fig. 3. Dependencies of HDI on the optimal complex predictor

Optimization of predictors for the World Happiness Index

Similarly to the previous indicators, we will consider the multi-factor models of the World Happiness Index. Table 8 shows the indices, when used as predictors for WHI, the minimum regression error ΔR^2_m is provided for various samples. In this case, we used a trend in the form of a polynomial of the fifth degree (for G6 – the third).

Table 8: indexes-predictors of WHI with minimum ΔR^2_m,%

	G6	G12	G24	G48	G72	mid
MYS	4.2	27.3	41.1	39.2	47.5	31.8
HDI	7.4	22.6	34.6	27.5	30.7	24.5
GDP/C	4.8	18.9	35.5	29.5	28.4	23.4
LPI	13.5	26.8	25.3	22.5	25.3	22.7
SPI	12.0	14.7	20.3	26.1	32.3	21.1

It can be seen that the regression error for the WHI is much larger than for the GDP / C and Human Development Index. Comparison of tables 4, 6 and 8 shows that the indices providing the minimum ΔR^2_m for the three indicators of the results of society development are represented by the same group of indices: GDP / C, HDI, SPI, MYS, HCI, LPI.

Table 9: regression error of optimal predictors WHI, %

	G6	G12	G24	G48	G72	mid	IEF	WGI	GDP/C	LPI	SPI	LEI	KIG
IEF+SPI	12.1	19.5	15.6	21.1	28.6	19.4	0.15				0.85		
WGI+SPI	11.4	13.5	15.3	22.1	29.2	18.3		0.15			0.85		
WGI+ GDP/C	3.24	7.88	17.9	27.1	28.4	16.9		0.4	0.6				
LPI+ SPI	12.3	8.7	15.6	21	26.7	16.9				0.45	0.55		
SPI+ GDP/C	0.67	10.6	17.7	20.2	28.1	15.5			0.35		0.65		
IEF+SPI+ GDP/C	0.84	11.7	15	18.1	27.1	14.6	0.15		0.3		0.55		
WGI+SPI+ GDP/C	0.08	5.09	12.7	19.5	28	13.1		0.15	0.37		0.48		
Pc_6	0.29	6.45	11.4	17.3	26.6	12.4	0.14	0.13	0.25		0.45	0.01	0.02

Table 9 shows paired, triple, and more complex optimal complex WHI predictors. The Social Progress Index makes the largest contribution to all types of World Happiness Index complex predictors, with its contribution to the complex predictor Pc_6 being 0.45 compared to 0.26 for the complex Pc_4 predictor for GDP / C and 0.3 for the HDI predictor (Pc_5). This is a consequence of the proximity of these indices in terms of characteristics of the results of socio-economic development. GDP / C has the second largest share (0.23), which indicates that material well-being makes a relatively small contribution to the happiness of the population.

The indices characterizing human capital, as well as the Human Development Index, in the WHI predictors that provide the minimum regression error are not presented. This is a very important phenomenon, which indicates that an increase in educational level and an improvement in health does not make the population happier, at least in the considered World Happiness Index model. At the same time, human capital has a very significant impact on the GDP / C value. Instead of HC factors, the WHI is significantly influenced by the Index of Economic Freedom (0.14) and Worldwide Governance Indicators (0.13).

Characteristically, the trend for WHI is bimodal, as can be seen from Fig. 4, which shows the dependence of the World Happiness Index on the optimal complex predictor Pc_6 and the trend in the form of a polynomial of the 5th degree (P5).

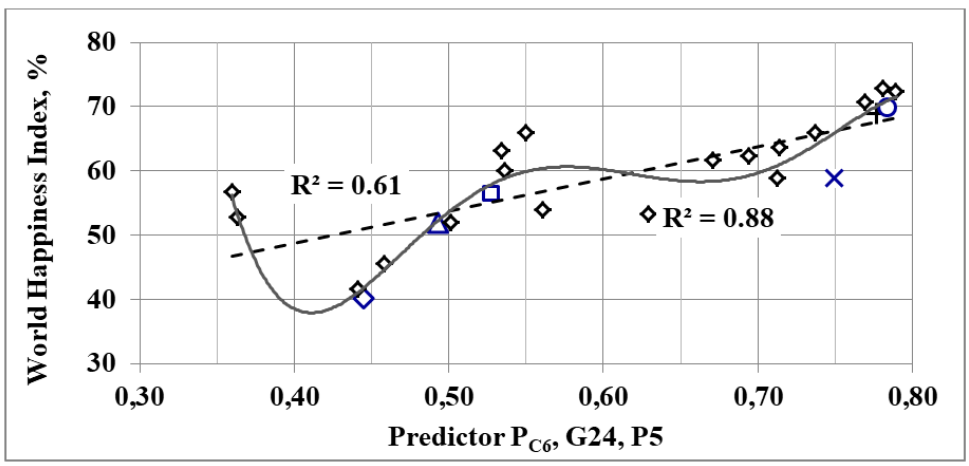

Fig. 4. Dependence of WHI on the optimal predictor P_{C6}, G24

In Fig. 4 large icons represent the countries in the G6 sample from left to right: India, China, Russia, Japan, Germany, and the United States. It can be seen that most of the corresponding points are close to the trend line, which corresponds to a low regression error $\Delta R^2 = 0.3$ for the G6 sample. Also, they are all in uptrend parts.

Discussion

This paper continues a series of studies that examine the multifactorial system of global indices and their relationship with the results of socio-economic activity. In these works, the number of involved indices was constantly increasing and it happened more than once that the new index had a very significant impact on the system of interconnections. Among the latter of such indices are the Social Progress Index and Human Developmen Index and, as it turned out, they are the most important in this system. At the same time, the Human Developmen Index was taken into account from the very beginning, since it includes an analogue of GDP per Capita and therefore its use for forecasting GDP / C is not entirely correct. However, in connection with the involvement in the study of other indicators of development results, the Human Developmen Index was introduced into the system of

the studied indices and it turned out that it is key. This forces us to pay attention to the possibility of the presence of other global indices that can play a significant role in this predictive system.

Among such indicators, an important role can be played by the indicator of natural resources; however, at present, such a correctly formed index is not known to the authors. The existing private components of such an index are rather controversial. For example, the most valuable natural resource in Russia is considered to be forest resources, the value of which is estimated at $ 29 trillion. However, in reality, these resources cannot be used, in particular, due to the lack of appropriate transport opportunities. The cost of arable land in different countries differs tenfold, and these prices are very unstable, as well as the prices for energy carriers. Nevertheless, the relevance of the development of a natural resource value index is very significant from the point of view of the development of investment forecasts.

Conclusion

The studies carried out allow us to draw the following conclusions:

1. A method of statistical analysis of indicators of the results of socio-economic development of countries has been developed and successfully tested, which makes it possible to identify the system characteristics of a complex of 16 global indices, including five indicators of the results of socio-economic development (GDP / C, HDI, WHI, IHC, SPI).

2. Comparison of the interdependencies of the system shows that the Human Developmen Index and Social Progress Index have the greatest impact on the performance indicators. Their influence on other indicators of results is the greatest and amounts to 0.3–0.7 of the total influence and have a cooperative effect on other indicators within the framework of complex predictors. In third place in terms of influence is GDP per Capita.

3. The developed complex optimal predictors for various performance indicators provide a low level of average regression error, which is: for GDP per Capita - 3.9%, Human Developmen Index - 1.2%, World Happiness Index - 12.4%, Index of Human Capital - 5%, Social Progress Index - 5.2% (for the average of five samples, including 6, 12, 24, 48 and 72 countries, ranked by GDP). For a sample of 24 largest economies, the corresponding values of the regression error are: 3.1%, 1.1%, 6.5%, 2.3%, 3.2%, which is significantly less than for the predictors from individual indices.

Acknowledgments

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Syariah-Compliant Legal Framework for Franchising: A Malaysian Legal Perspective

Hua Siong WONG*

School of Law
College of Law, Government and International Studies,
Universiti Utara Malaysia (UUM), Malaysia.

Email: *wonghuasiong@yahoo.com

Abstract

Since the enforcement of the Franchise Act 1998, Malaysia has been promoting the Franchise Industry extensively via the government bodies by providing financial assistance to the would be Franchisors and Franchisees. Some people in the Franchise Industry commented that the Act was said to be more pro Franchisee rather than pro Franchisor as some salient terms and conditions in the Act are stricter on the Franchisors. Others commented otherwise. This is where we will look in depth of the Act as Islam does not allow oppression in dealings. Nevertheless, with a few amendments recently made by the Domestic Trade, Co-operatives and Consumerism Ministry have in a way try to balance the interests of both parties concerned. This paper will look into whether the terms and conditions in the Franchise Act deviates from the Syariah principles and if yes, this paper will look into some proposals on how to make the Franchise Business and Industry Syariah friendly and thus making it competitive in the Islamic Finance Industry. The objective of this study is to ascertain the importance of amending the Franchise Act to be in Syariah compliance as in some circumstances the Franchisors and Franchisees are Muslims and to ensure no element of *usury* and *gharar* exist. Meanwhile, the author would like to evaluate the operation of the Franchise Industry in Malaysia as not to be in contradiction with Syariah principles. This will not only by looking at the Franchise Agreement but also the Franchisor's Standard Operating Procedures and Operation Manuals. The research methodology requires gathering relevant data from both primary and secondary sources. Quran, Hadis, reports, statistics, specified journals and online articles help in order to analyze the material and arrive at a more complete understanding and historical reconstruction of the importance amending the Franchise Act and subsequently the Franchise Agreement to be Syariah compliance. This is qualitative study that involves a systematic study of philosophical and academic views though literatures. Therefore, this study is not an empirical study but rather a library study from various primary data sources such as Quran, Hadis, franchising agreement and secondary data sources namely articles and journals from online database. The study found that challenges faced by local entrepreneurs in franchise industry in Malaysia include the issues of prohibition against the same business, financial concern and monopoly by the franchisor. As such, it is suggested that the need for unique legal framework for Islamic franchising business in Malaysia in order to protect the local entrepreneurs, especially Muslim entrepreneurs in franchise industry.

Keywords: Franchising law, Syariah legal framework, Syariah compliant business, Malaysia.

Introduction

Since the enforcement of the Franchise Act 1998 ("the Act"), Malaysia has been promoting the franchise industry extensively via the government bodies by providing financial assistance to the would be franchisors and franchisees. Some people in the franchise industry commented that the Act was said to be more pro franchisee rather than pro franchisor as some salient terms and conditions in the Act are stricter on the franchisors. Others commented otherwise. This is where we will look in depth of the Act as Islam does not allow oppression in dealings.

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Nevertheless, with a few amendments recently made by the Domestic Trade, Co-operatives and Consumerism Ministry of Malaysia have in a way try to balance the interests of both parties concerned. This paper will look into whether the terms and conditions in the Franchise Act deviates from the Syariah principles and if yes, this paper will look into some proposals on how to make the franchise business and industry Syariah friendly and thus making it competitive in the industry, including Islamic finance industry.

Methodology

This is qualitative study that involves a systematic study of philosophical and academic views though literatures. Therefore, this study is not an empirical study but rather a library study from various primary data sources such as Quran, Hadis, franchising agreement and secondary data sources namely articles and journals from online database.

The research methodology requires gathering relevant data from both primary and secondary sources. Quran, Hadis, reports, statistics, specified journals and online articles help in order to analyze the material and arrive at a more complete understanding and historical reconstruction of the importance amending the Franchise Act and subsequently the Franchise Agreement to be Syariah compliance.

The research methodology requires gathering relevant data from both primary and secondary sources, that includes looking into the Act and Regulations, such as:-

1. Franchise Act 1998 (Act 590) and Regulations (hereinafter referred to as 'the FA 1998')
2. Franchise Operation Manual
3. Franchise & Licensing Agreement
4. Contracts Act 1950
5. Publications of books, journals and articles by academicians and also the players in the industry with regards to the Franchise Business
6. Newspaper cuttings on the topic of Franchise
7. Competition Act 2010

Reports, statistics, specified journals and online articles help in order to analyze the material and arrive at a more complete understanding and historical reconstruction of the importance amending the Franchise Act and subsequently the Franchise Agreement to be Syariah compliance.

Literature Review

The relationship between franchisor and franchisee is contractual in nature and a mutually beneficial business arrangement (Bradach, 1998). The franchise contract requires the franchisor to guide the franchisee in operating the business operation and system including operating hour, menu, providing training, financial obligations, etc. and to create a framework for their relationship. In order to achieve objectives, both franchisor and franchisee need to be interdependent and to cooperate with each other.

Franchising is also classified as a form of strategic alliance from the business perspective (Mclntyre & Huszagh, 1995; Hoy & Stanworth, 2003), because the formal franchise contract listed out the rights and obligations of both parties. It is submitted that the franchisor-franchisee relationship is very complex that requires the complex delineation and integration of individual roles for both franchisor and franchisee (Kaufman & Dant, 1998). This complexity in franchising partnership can potentially lead to hazards for the franchisor (Davies et al., 2011) and conflicts between franchisors and franchisee regarding priorities, timing and revenue stream (Garg & Rasheed, 2006). This situation arose due to dissimilarities between franchisor and franchisee in handling the franchise business. For example, a franchisee had taken legal action against Burger King (franchisor) over the $1 double cheeseburger promotion (Heher, 2009). In this case, the

restaurant owners contended that the offer, which was launched in October 2009, forces them to sell the product at a loss. As a result, the franchisees may have their contract terminated due to non-compliance by the franchisor. The franchisees stand to lose their investments. Thus, Khan (1999) argued that mutual understanding between franchisor-franchisee plays important role to ensure the success of the relationship in franchise business.

Apart from relationship between franchisor and franchisee, the earlier studies have not been much focus on legal issues relating to franchising whereas they were more focused on marketability, product offering, and the issues of dispute resolution and insolvency recently (Oseni, 2012; Oseni & Hassan, 2011). Further thereto, currently most of the Muslim-majority countries namely Gulf Cooperation Council (GCC) region and Association of Southeast Asian Nations (ASEAN) which practising franchise laws are not based on the Islamic law but either based on civil law or common law (Oseni, 2016). Thus, it is indeed a need to come up with a Syariah compliance legal framework that will regulate Islamic franchising industry which will benefit the local Muslim entrepreneurs (Oseni, 2013).

An excerpt from the Malaysian Franchise Act 1998:

> "Franchise is defined in Section 4 of the Malaysian Franchise 1998 as:
> "Franchise" means a contract or an agreement, either expressed or implied, whether oral or written, between two or more persons by which—
>
> (a) the franchisor grants to the franchisee the right to operate a business according to the franchise system as determined by the franchisor during a term to be determined by the franchisor;
>
> (b) the franchisor grants to the franchisee the right to use a mark, or a trade secret, or any confidential information or intellectual property, owned by the franchisor or relating to the franchisor, and includes a situation where the franchisor, who is the registered user of, or is licensed by another person to use, any intellectual property, grants such right that he possesses to permit the franchisee to use the intellectual property;
>
> (c) the franchisor possesses the right to administer continuous control during the franchise term over the franchisee's business operations in accordance with the franchise system; and
>
> (d) in return for the grant of rights, the franchisee may be required to pay a fee or other form of consideration.

After an amendment to the Franchise Act 2012, the requirement for the franchisor to provide operations assistance to the franchisee such as providing materials and services, training, marketing and business or technical assistance has been removed from the definition. Another limb of the definition, which previously stated that the franchisee had to operate the business separately from the franchisor and the relationship could not be a partnership, service contract or agency, has been subsumed into another part of the Franchise Act.

Under the Malaysian Contracts Act 1950, Section 10 of the Act states what agreements are contracts:

> 10. (1) All agreements are contracts if they are made by the free consent of parties competent to contract, for a lawful consideration and with a lawful object, and are not hereby expressly declared to be void.
>
> In common law, a contract (or informally known as an agreement in some jurisdictions) is an agreement having a lawful object entered into voluntarily by two or more parties, each of whom intends to create one or more legal obligations between them. The elements of a contract are "offer" and "acceptance" by "competent persons" having legal capacity who

exchange "consideration" to create "mutuality of obligation."”

Contract in Malaysian Contracts Act 1950 in summary states that elements such as offer, acceptance, consideration and intention to create legal relationship forms a contract. It has the similarities in a typical buying and selling (Aqad) in Islam. The differences will come into the issue of interest (usury).

In Malaysia, every contract shall be governed under this Contracts Act as to ensure that the contract made is not null and void.

In reference to franchise, it is still under the Contracts Act 1950 only it has another specific Act which governs the franchise industry on its own. The basic elements of forming a contract will still fall under the Contracts Act 1950 as a contract will consists terms and conditions agreed by parties entering without having malice and ambiguity and thus defeats the formation of contract. The Franchise Act will focus solely on the formation of Franchise and the relationships between the Franchisor and the Franchisee.

In Islam, contract or Aqad is al-bai’ (jual beli) from the language aspect it means that exchanging one asset/thing/property/cash to another. From the Syaraq perspective, Al Bai has many meanings which has been given by the Ulamaks.

According to Hanafi, buying and selling is the exchange of one’s property with another property according to some specific ways or exchanging something which he likes with some other things which he likes with some other beneficial ways by making an offer or proposition.

According to Syafie, buying and selling is the exchange of a property to another property, whereby both can be handled with an offer and acceptance which is allowed by Syaraq. Al-Bai’ too is a contract of exchanging properties which gives one the ownership and the benefits forever and not for the reason of Qurban.(to be near to Allah SWT) (Mughni al-muhtaj, jld.3, hlm.2).

The buying and selling concept has been promulgated in the Quran, Hadith and consensus of the ulamaks (ijmak). There are more than ten types of transactions in Islam which can happen in a different form and method. Some of the transactions are listed below:

Bai’ al-sil’ah bi al-naqd (بيع السلعة بالنقد)
Bai’ al-muqayadhah (بيع المقايضة)
Bai’ al-salam (بيع السلم)
Bai’ al-sharf (بيع الصرف)
Bai’ al-murabahah (بيع المرابحة)
Bai’ al-wadhiah (بيع الوضيعة)
Bai’ al-tauliah (بيع التولية)
Bai’ al-urbun (بيع العربون)
Bai’ al-talji’ah (بيع التلجئة)

In Malaysia, the industry of franchise is regulated and governed by the Franchise Act 1998. All businesses involve in franchising must first and foremost register their franchise business with the Registrar of Franchise as required under Section 7 of the Act. Prior to registration of the said franchise, the potential franchisors must ensure that its brand and logo has been registered for its trademark. There are documentations that need to be submitted for this registration process under Section 7. Some of the documents that need to be submitted is the Franchise Agreement. We will look into the Franchise Agreement as to highlight the clauses that are not Syariah compliance.

In a standard Franchise Agreement as to follow the requirements under section 17 of the Act, it lists down the terms and conditions that must be incorporated in a Franchise Agreement.

1) A Franchise Agreement must be in writing.

2) A Franchise Agreement must contain but not limited to:-
a) the name and description of the product and business under the franchise;
b) the territorial rights granted to the Franchisee;
c) the franchise fee, promotion fee, royalty or any related type of payment which may be imposed on the Franchisee, if any;
d) the obligations of the Franchisor;
e) the obligations of the Franchisee;
f) the Franchisee's rights to use the mark or any other intellectual property pending the registration or after the registration or after the registration of the franchise;
g) the conditions under which the franchisee may assign;
h) a statement on the cooling off period as provided in subsection (4);
i) a description pertaining to the mark or any other intellectual property owned or related to the franchisor which is used in the franchise;
j) if the agreement is related to a master franchisee, the franchisor's identity and the rights obtained by the master franchisee from the franchisor;
k) the type and particulars of assistance provided by the franchisor;
l) the duration of the franchise and the terms of renewal; and
m) the effect of termination or expiration of the franchise agreement."

Above are some of the salient terms and conditions that need to be incorporated in the Franchise Agreement, however there are clauses that should be in as to protect the franchise industry such as Section 26 of the Act talks about confidential information and

Section 27 of the same Act states on prohibition against similar business. We shall look into the sections mentioned above in the Act that may not be Syariah compliance and what is drafted in a standard Franchise Agreement currently in used.

Section 17(2)(c) refers to the franchise fee, promotion fee, royalty or any related type of payment which may be imposed on the franchisee, if any; this clause will also include the penalty clause in the event the franchisee is late in paying any fee as stated below

Late Payment Charges

"In the event that any sums due to the Franchisor are not paid by the Franchisee on the due date/s as specified by the Franchisor or the terms of this Agreement, such sums shall bear late payment charges calculated on a daily basis at a rate of one point five per centum (1.5%) per month in respect thereof from the due date up to the date of full settlement".

In Malaysia Order 42 r 12 of Court Rules 2012:

12. Subject to rule 12A, except when it has been otherwise agreed between the parties, every judgement debt shall carry interest at such rate as the Chief Justice may from time to time determine or at such other rate not exceeding the rate aforesaid as the Court determines, such interest to be calculated from the date of judgement until the judgment is satisfied."

This clause must be read with Order 42 r.12A of Court Rules 2012 which states:

12(A) "Every judgement debt arising from financial transactions in accordance with Syariah shall carry a late payment charge calculated from the date of judgement until the judgement debt is fully satisfied at the rate provided under Order 42, rule 12and subject to the following conditions:;

a) the judgement creditor shall only be entitled to ta'widh as a result of late payment;

b) the amount of late payment charge shall not exceed the outstanding principal amount; and

c) if the amount of ta'widh is less than the amount of late payment charge, the balance shall be channelled to any charitable organisations as determined by the Syariah Advisory Council."

2) "For the purpose of this rule:-

(a) "Syariah Advisory Council" means the Syariah Advisory Council established under the Central Bank of Malaysia Act 2009 (Act 701) and the Capital Markets and Services Act 2007 (Act 671) and;

(b) Ta'widh means compensation for actual loss and shall be calculated at the rate determined by the Shariah Advisory Council."

To summarise the effects of the above law:

a) "Every judgment debt arising from an Islamic Financial transaction carries a late payment charge at a rate determined by the Chief Justice, say 4% per annum.

b) The judgment debt refers to the outstanding principal amount. The outstanding principal amount is the balance due subject to ibra, where applicable and does not include late payment charge prior to the date of judgment and other costs.

c) The late payment charge is arrived at by multiplying the outstanding principal amount by the number of days of the delay from the date of judgment until the date of full satisfaction at 4% per annum. That will give the amount of the late payment charge, say RM10,000-00. This amount must not be more than the outstanding principle amount otherwise it would be limited to that amount.

d) Ta'widh is arrived at by multiplying the outstanding principal amount by the "daily overnight Islamic Interbank rate" on the date of judgement calculated monthly on daily rest basis for the period of the delay. That will give the amount of Ta'widh, say RM6,000-00.

The difference between late payment charge and the ta'widh is the gharamah which is to be channeled to charitable institutions, for example RM10,000-00- RMRM6,000-00= RM4,000-00. In this example the RM4,000-00 is to be channeled to charitable institutions.

Prior to enforcement of Court Rules 2012, which is the merging of Subordinate Court Rules and High Court Rules 1980, there was no Order 42 r 12(A) in the previous High Court Rules 1980. With the introduction of Order 42 r 12(A), the lawyers can advise their franchised clients to draft the Franchise Agreement according to the new rule above.

Rather than just highlighting this issue with regards to Islamic transactions which involves Gharamah and Ta'widh in the Court Rules 2012 and its interpretation of Order 42 Rule 12(A), this should also be included in the Franchise Act 1998 as to make it known and clearer especially to the Muslim Franchisors and Franchisees. The Franchise Agreement should be amended with regards to the clause of late payment above as to have certainty that whatever late payment incurred is not riba and it is called as late payment charge rather than interest.

There should be a monitoring body as to monitor the funds which are channeled into the charitable institutions and again this should be highlighted in the Franchise Act 1998 rather than just mentioning it in the Court Rules 2012.

The second controversial term in the Franchise Agreement will be the Liquidated Assessment Damages ("LAD") as below:

"*The Master Franchisee acknowledges that, because of the substantial value and importance to the Franchisor of the Franchise described in clause 2.1, the Marks described in clause 11, the Intellectual Property described in clause 12, the Confidential Information described in clause 14 and Continuity of the Business described in clause 18(f), any breach of clauses 2.1, 11, 12, 14 and 18(f) will injure the goodwill of the Business and the Franchisor or the Franchisor's Affiliates. The Parties agree that, at the time of execution of this Agreement, damages for such breaches are difficult to estimate.*
Accordingly, the Parties agree that if the Master Franchisee, the Owners, the Key Operator, the Master Franchisee's directors, officers or employees fails to use its best efforts to prevent or stop such breaches and the breach results in material damage to the Franchisor and/or the Franchisor's Affiliates, the Master Franchisee will pay to the Franchisor, in addition to any right or remedy the Franchisor may have whether at law, liquidated damages of a one-time fee of an amount equal to 4 times of the Master Franchise Fee preceding the breach. The Master Franchisor will not be required to prove the occurrence or quantum of losses arising from the breach of the Master Franchisee."

This clause will certainly have riba (usury) in it as it is additional relief that the Master Franchisor has apart from those remedies it has in law. This clause is used as a deterrent to the Franchisees as not to breach the salient terms in the Franchise Agreement. The Franchisee has no right to say anything on this as this is the term imposed by the Franchisor in the Agreement and it is allowed in the Act. There is no specific LAD formula and it is totally the discretion of the Franchisors to impose whatever amount they wish.

The third controversial term in Franchise Agreement with regards to Restriction of Trade. Is this Clause Syariah friendly? What is this clause all about? Section 27 of the Franchise Act 1998 states:

Section 27 - Prohibition Against Similar Business

(1) "A franchisee shall give a written guarantee to a franchisor that the franchisee and his employees shall not carry on any other business similar to the franchised business operated by the franchisee during the franchise term and for two years after the expiration or earlier termination of the franchise agreement.

(2) The Franchisee and his employees shall comply with the terms of the written guarantee given under subsection (1).

3) A person who fails to comply with subsection (1) or (2) commits an offence."

Section 39 of the Act states the General Penalty clause:
(1) "A person who commits an offence under this Act for which no penalty is expressly provided shall, on conviction, be liable-
a) for the first offence, to a fine of not less than five thousand ringgit and not more than fifty thousand ringgit; and

b) for a second or subsequent offence, to a fine of not less than ten thousand ringgit or to imprisonment for a term not exceeding five years or to both."

Upon sentencing a franchisor for a first offence, the court may-
a) "declare the franchise agreement between the Franchisor and the Franchisee to be null and void;

b) order that the Franchisor refunds any form of payment which he has obtained from any franchisee; or

c) prohibit the Franchisor from making any new franchise agreement or appointing any new franchisee."

Whereas section 40 states the offences made by the body corporate:

"If an offence against any provision of this Act has been committed by a body corporate, any person who at the time of the commission of the offence was a director, manager, secretary or other similar officer of the body corporate or was purporting to act in any such capacity, or was in any manner or to any extent responsible for the management of any of the affairs of such body corporate, or was assisting in such management, shall be deemed to have committed that offence unless, having regard to the nature of his functions in that capacity and to all circumstances, he proves—

(a) that the offence was committed without his knowledge, consent or connivance; and

(b) that he had taken all reasonable precautions and had exercised due diligence to prevent the commission of the offence."

Allah's Command about Justice

"*O you who believe! Stand out firmly for justice, as witnesses to Allah, even though it be against yourselves, or your parents, or your kin, be he rich or poor, Allah is a Better Protector to both (than you). So follow not the lusts (of your hearts), lest you avoid justice; and if you distort your witness or refuse to give it, verily, Allah is Ever Well-Acquainted with what you do*. [Surah An-Nisa (4:135)]"

In Islam, even the highest official, the Caliph, is subject to the same rules of justice as all humanity. There is a famous incident in which Ali Ibn Abu Talib lost a court case to a Christian because he lacked evidence, even though Ali was the Caliph at the time.

Sha'bi reported: Ali ibn Abu Talib found a Christian man with his armor. He decided to take up the matter legally, so he brought the dispute to the judge, Shuraih. Ali said, "This is my armor and I have not sold it nor given it away." Shuraih said to the Christian, "What do you say about what the leader of the believers has said?" The Christian replied, "It is my armor, but I do not consider the leader of the believers to be a liar." Shuraih turned to Ali and said, "O leader of the believers, do you have proof?" Ali laughed and said, "Shuraih is correct. I do not have proof." So Shuraih ruled in favor of the Christian. The Christian took the armor and began to walk away but then he returned. The Christian said:
"*As for me, I testify that this is the judgment of the Prophets. The leader of the believers himself takes me to his judge and the judge rules against him! I testify that there is no God except Allah, and I testify that Muhammad is the Messenger of Allah. By Allah, the armor isyours, O leader of the believers. I followed the army when you were on your way to the Battle of Siffin and the armor fell from your equipment*."

Ali said:

If you have accepted Islam, then the armor is for you."

The clause was in there in the first place as the fear on the Franchisor that all the franchisees and its employees after learning about the system will open up another similar business and be in competition with the Franchisor who may have spent time, effort and millions of dollars in developing the research and development building up the system.

It would be highly recommended if the prohibition against the employees of the Franchisees to be taken out as not to cause them harm in their livelihood as unlike the Franchisee who may have other skills to depend on too.

The fourth controversial issue in Islamising franchise is that in franchises selling liquors by Muslim operators/franchisees for example the franchise of running 7-11 convenience stores. The franchise is in Malaysia with the main Franchisor is from Japan. They operated in Malaysia by appointing one Master Franchisee who has the authority in the Master Franchise Agreement to open up unit Franchises in Malaysia. As to date, the Franchise Act 1998 is silent on all products in franchise shall have halal certification unless the franchises which involves the business of Food & Beverages from very beginning is a non halal restaurant, café and etc.

Eventhough in practice any food and beverages franchises that wishes to operate its franchise in Malaysia, it is encourageable and advisable for them to make it halal compliance as majority population in Malaysia is Muslims. In business point of view, they may lose a lot of money if they do not make their food and beverage business a halal thing. They may restrict themselves to the larger Malay market.

This is the time when Franchise Act 1998 should be amended with the inclusion of the Syariah compliance terms and conditions with regards to obtaining halal certification for all franchise businesses in Malaysia whether its homegrown franchise or abroad. For this paper we had interviewed En Ahmad Faizal, the General Manager of Malaysian Franchise Association who affirmed that now all the franchise business in Malaysia not necessarily must have the Halal certification.

It can either be included in the Franchise Act or regulation to state a requirement that due to the sensitivity of the majority Muslim population in Malaysia, all franchised businesses operating in Malaysia whether homegrown or overseas must acquire the Halal Certification first unless the franchised food business is non-halal food and beverages in the very beginning due to the demand of the non-Muslims in Malaysia.

However in view of our discussion in Franchise in Islamic Finance, below is the excerpt from Global Islamic Finance Magazine with regards to the big business opportunity in franchising Halal products and services.

> "The Halal brand of food chains and restaurants around the world has been increasingly establishing opportunities for franchising through Islamic finance.

Many Halal restaurant franchises have been set up with funding from Islamic banks around the world, paving the way for the use of Shariah compliant instruments in dealing with the lucrative business opportunities developed by the Halal brand. Al Islami has made significant progress in advancing the franchising of the Halal brand and has plans to expand to the UK and France.

Al Islami first entered the European market in 2007 through a deal with UK food distributor 3663 First for Foodservice. The joint venture supplies meat products to the food industry, predominantly in the UK and France. Saleh Abdullah Lootah said "We'll be launching in the UK and France shortly; either the end of 2010, or early 2011. We'll be offering the chain as a franchise… I think the French deal will be closing very soon." Mohamed El-Fatatry, founder of integrated marketing agency, Muxlim, says the Muslim consumer is predicted to account for 30% of the world's population by 2025. "Halal food brands need to learn from Islamic banks," says El Fatatry. "These banks are taking Halal mainstream by highlighting that Islamic banking is no different from mainstream banking, apart from having new ethical values." There will be further scope for many investors to tap into unique and innovative Halal branding for franchising through Islamic finance."

The fifth non Syariah friendly term in the Franchise Agreement will be the 'Monopoly by Franchisors'. This is silent in the Act. It depends on the franchisors to dictate as who is the supplier of the products and equipment that the franchisee must use. This is where most of the Franchisors will try to gain more profit for themselves by manufacturing, producing and supplying the products

and equipment to the Franchisees at higher cost price.

In 2010, Malaysia has enacted Competition Act as to promote the economic development by promoting and protecting the process of competition, thereby protecting the interests of the customers.

> "Malaysian Competition Commission (Mycc) has laid down specific guidelines for Franchise Agreements:
>
> 1. Mycc will assess the Franchise Agreements on the extent to which the agreement significantly forecloses competition in the relevant market. For most franchises, the relevant market will be wider than the franchise products and so unlikely to lead to any foreclosure to the market.
>
> 2. Franchise Agreements normally include the license of intellectual property rights in relation to trade marks, signs and know how for the sale of goods and services. Franchise agreements usually contain a number of vertical restraints including exclusive distribution and non-compete clause.
>
> 3. Vertical price fixing is likely to be more anti-competitive than the non-price vertical arrangements. Vertical non-price restrictions maybe anti-competitive because they foreclose part of the market to the competitors.
>
> 4. In determining whether a vertical agreement significantly prevents, restricts or distorts competition, regard will be given to the market power of the enterprise imposing the vertical restrictions, the justification claimed for the restriction and the extent to which a market in the vertical relationship may be foreclosed.
>
> 5. Anti-competitive non-price vertical agreements may not be considered to have a significant anti-competitive effect if the market share of both the seller and buyer is less than 25% of their relevant market."

Eventhough there is now a Competition Act 2010 as to monitor competition in pricing, this Act should also be looked into as whether it is Syariah compliance and whether all the guidelines proposed by Mycc is in accordance with the Syariah principles as below are some of the verses in the Holy Quran which Allah has stated that for us to be just in life and in trade dealings.

Surah Al Ma'idah (5), Verse 9, says

> "*O you who believe! Stand out firmly for God, as witnesses to fair dealing, and let not the hatred of others to you make you swerve to wrong and depart from justice. Be just; that is next to piety; and fear God. For God is well acquainted with all that ye do*."
>
> Al Quran, As shu`araa' (26), Verse 181-184, Prophet Shu`aib tells his people:
>
> "*Give just measure, and cause no loss (to others by fraud). And weigh with scales true and upright. And withhold not things justly due to men, nor do evil in the land, working mischief. And fear Him Who created you and (Who created) the generations before (you).*"

It is important that any franchise adheres to Shariah principles, which are governed by the Shariah regulatory body of the country. There are many opportunities worldwide for franchise businesses in the areas of Takaful, Sukuk, infrastructural development, Islamic banking and the very popular Halal brand sector, which runs chains of Halal foods under Islamic finance instruments. Major Islamic financial hubs, such as those found in the Middle East, Asia and Europe, are tapping into Islamic franchising opportunities around the world and collaborating on a united front in order to drive the Islamic financial industry forward. Every investor or entrepreneur wishing to start up a

franchise must adhere to the principles of Shariah."

Findings/Results

There are few legal issues in the franchise industry which are arguably not Syariah-compliant.

(i) Prohibition Against Similar Business

Section 27 of the FA 1998 states on prohibition against similar business. Section 27(1) of the FA 1998 states a franchisee shall give a written guarantee to a franchisor that the franchisee and his employees shall not carry on any other business similar to the franchised business operated by the franchisee during the franchise term and for two years after the expiration or earlier termination of the franchise agreement. In this provision, the franchisee is not allowed to conduct similar business within two years after the expiration of the franchise agreement. This section may not pass the fair-trade test of Islamic commercial law. The issue is whether this clause Syariah friendly and fair to entrepreneurs in franchise industry, especially Muslim? Section 27(3) of the FA 1998 states a person who fails to comply this section shall commit an offence. The issue of prohibition against similar trade is non Syariah friendly in the sense that it restricts the livelihood not only the franchisee but its employees too. There have been cases whereby the employees of the franchisee are also forced to sign the non-disclosure and non-competition letter or agreement for not to disclose the trade secret to the third parties and will not compete with the current employers in the similar business. However, in Islamic law, there are authorities in the Quran and Hadith with regards to being fair and just in the trade dealings.

Allah's command about justice in surah An-Nisa (4) verse 135:

> "*O you who believe! Stand out firmly for justice, as witnesses to Allah, even though it be against yourselves, or your parents, or your kin, be he rich or poor, Allah is a Better Protector to both (than you). So follow not the lusts (of your hearts), lest you avoid justice; and if you distort your witness or refuse to give it, verily, Allah is Ever Well-Acquainted with what you do*."

Furthermore, Al Quran Surah An-Nisa (4), verse 29, says:

> "*O ye who believe! Eat not up your property among yourselves in vanities: But let there be amongst you Traffic and trade by mutual good-will: Nor kill (or destroy) yourselves: for verily Allah hath been to you Most Merciful*!"

Al Quran Surah Al-Baqarah (2), verse 188 also says:

> "*And do not eat up your property among yourselves for vanities, nor use it as bait for the judges, with intent that ye may eat up wrongfully and knowingly a little of (other) people's property*."

The prohibition against same business clause was in there in the first place as the fear on the franchisors that all the franchisees and its employees after learning about the system will open up another similar business and be in competition with the franchisor who may have spent time, effort and millions of dollars in developing the research and development building up the system. This situation is unfair to the franchisors as they have spent so much capitals in investment of this business, skills and times in training the franchisees to set up this business. Although this clause is to protect the franchisors but the livelihood of the franchisees and its employees should not be neglected.

The FA 1998 has clearly stated the rules of prohibition against same business by the franchisees. In any event, Islam looks important to livelihood of human being. In Holy Quran Surah Az-Zukhruf (43), verse 32, says:

> "*Is it they who would portion out the Mercy of thy Lord? It is We Who portion out between them their livelihood in the life of this world: and We raise some of them above others in ranks, so that some may command work from others. But the Mercy of thy Lord is better than the (wealth) which they amass*."

On a hadith narrated by Abu Huhairah RA, the Prophet said, "When a man dies, his acts come to an end, but three, recurring charity, or knowledge (by which people) benefit, or a pious son, who prays for him (for the deceased) (HR. Muslim number 1631)." From this narration, it shows that as a human being, the hands of giving is better than the hands of receiving (charity of the finger). Imam Nawawi in explaining this hadith states: the scholars say, the meaning of this hadith is that the practice of the deceased will be cut off from the cause of death and will also be renewed for the merit of the reward except for these three practices. All the knowledge from the franchisor may be considered as giving from Allah and it can be rewarded by Allah.

(ii) Financial Aspect in Franchising Business

The author found that another issue is with regards to the financial aspect in franchising business for example the term of Liquidated Assessment Damages ('LAD') in the franchising agreement. Section 18(2) of the FA 1998 explains the requirement of franchise agreement including but not limited to the issues of payment of fees, rights to use the trademark, obligations of the parties, duration of the agreement and etc. Failure to comply with this subsection (2) shall render a franchise agreement null and void. Accordingly, the parties agree that if the master franchisee, the owners, the key operator, the master franchisee's directors, officers or employees fails to use its best effort to prevent or stop such breaches and the breach results in material damage to the franchisor and/or the franchisor's affiliates, the master franchisee will pay to the franchisor, in addition to any right or remedy the franchisor may have whether at law, liquidated damages of a one-time fee of an amount equal to four times of the master franchise fee preceding the breach (Adam, 2010). As a result, the issue of unfair and inequality of bargaining power will arise as the master franchisee has to follow all the instructions from the franchisor resulting franchisee has no right to bargain if there is a breach of the franchising agreement.

In Islamic law of contract, the parties should not state an amount of damages in the event of a breach of a fundamental term in the said contract (Hassan, Kayed, & Oseni, 2013). The parties cannot predetermine amount which is unquantifiable as this could amount to issue gharar (uncertainty) which is prohibited in Islamic law of transactions. Furthermore, if the parties predetermine the LAD, there will certainly have riba (usury) in it as it is additional relief that the master franchisor has apart from those remedies it has in law. This clause is used as a deterrent to the franchisee as not to breach the salient terms in the franchise agreement. As such, the franchise agreement should also be amended with regards to this issue (Mohamad, 2012; Zakaria, 2013). However, the franchisee has no right to bargain on this as this is the term imposed by the franchisor in the agreement and it is allowed in the FA 1998. Unfortunately, there is no specific LAD formula and it is totally the discretion of the franchisor to impose whatever amount the franchisor wish.

In the Holy Quran Allah has stated regarding fairness among the human beings and doing of good to kith and kin. He forbids injustice, unfairness and inequality.

Al Quran Surah Al Nahl (16), verse 90, says:

> "*Allah commands justice, the doing of good, and liberality to kith and kin, and He forbids all shameful deeds, and injustice and rebellion: He instructs you, that ye may receive admonition*."

> Al Quran Surah Al Nisa (4), verse 135, says:

> "*O ye who believe! stand out firmly for justice, as witnesses to Allah, even as against*

yourselves, or your parents, or your kin, and whether it be (against) rich or poor: for Allah can best protect both. Follow not the lusts (of your hearts), lest ye swerve, and if ye distort (justice) or decline to do justice, verily Allah is well- acquainted with all that ye do."

Al Quran Surah Al Maidah (5), verse 8, says:

"*O ye who believe! stand out firmly for Allah, as witnesses to fair dealing, and let not the hatred of others to you make you swerve to wrong and depart from justice. Be just: that is next to piety: and fear Allah. For Allah is well-acquainted with all that ye do*."

Al Quran Surah Al A'raf (7), verse 181, says:

"*Of those We have created are people who direct (others) with truth. And dispense justice therewith*."

Thus, the issue of LAD in franchise business needs to deal with carefully. The Holy Quran teaches the mankind to be fair and justice in dealing the business. As such, the LAD clause may not be suitable to exist in the franchise agreement.

(iii) Monopoly Of The Business

The next challenge to the Muslim entrepreneurs in franchise industry will be the monopoly by franchisors. Although this issue is silent in the FA 1998, it is actually the consequence from the section 27 of the FA 1998, namely prohibition against similar business. It means there is only one player for the same business in the market and this sole player will monopoly the business in the market. The franchisors can dictate as who is the supplier of the raw materials and equipment that the franchisee must be used. This is where most of the franchisors will try to gain more profit for themselves by manufacturing, producing and supplying the raw materials and equipment to the franchisees at higher cost price. This is against the concept of 'economics of scale' in franchise business. When the franchisor buys the raw materials in bulk, the price so be lower. Thus, the franchisor should not charged higher price to the franchisee.

In 2010, Malaysia has enacted Competition Act 2010 (Act 712) (hereinafter referred to as "CA 2010") as to promote the economic development by promoting and protecting the process of competition, thereby protecting the interests of the customers. Although there is now a CA 2010 as to monitor competition in pricing, CA 2010 should also be looked into as whether it is Syariah compliance and whether all the guidelines proposed by Malaysian Competition Commission ('MyCC') is in accordance with the Syariah principles.

There are some of the verses in the Holy Quran which Allah has stated regarding to be just in life and in trade dealings.

Al Quran Surah Al Ma'idah (5), verse 8, says

"*O you who believe! Stand out firmly for God, as witnesses to fair dealing… Be just; that is next to piety; and fear God. For God is well acquainted with all that ye do*."

Al Quran, As Shu`araa' (26), verses 181to184, Prophet Shu`aib tells his people:

"*Give just measure, and cause no loss (to others by fraud). And weigh with scales true and upright. And withhold not things justly due to men, nor do evil in the land, working mischief. And fear Him Who created you and (Who created) the generations before (you)*."

Monopoly in a business could be derived from the greediness of people and resulting to cause unfair in trade dealings. Market monopoly or iḥtikār is prohibited in Islamic law as

this would cause unfair in trade dealings as there is only one party who controls all the businesses in the market (al-Douri, 2000). In the Holy Quran which Allah has stated that for us to be fair and not greedy, especially in trade dealing. Islam does not encourage iḥtikār as stated in Al Quran Surah Fajr (89), verse 20:

"*And you love wealth with immense love*."

Al Quran Surah Al-Aadiyaat (100), verses 6 to 8, says:

"*Truly man is, to his Lord, ungrateful; And to that (fact) he bears witness (by his deeds); And violent is he in his love of wealth*."

Al Quran Surah Al-Humazah (104), verse 2, says:

"*Who pileth up wealth and layeth it by …*"

Islamic law seeks protection to all parties, including both franchisors and franchisees. However, when the term of restriction becomes unreasonable until one party monopolies the business which caused the unfair dealings, the Islamic legal concept of sū isti'māl al-ḥaq shall apply to prevent a party to exercise the right which will have adverse effect on others' right (Oseni, 2016). Thus, it is suggested that reasonable restrain which are fair to both franchisors and franchisees should be adopted pursuant to the Islamic teaching.

Recommendations

In Malaysia, the only Act which governs the Franchise Industry will be the Franchise Act 1998 and Regulations. There are certain clauses like restriction of trade which is not found in the Contracts Act 1950 but only found in the Franchise Act 1998 & Regulations. This part in the Franchise Act 1998 & Regulations where it says it is too restrictive that it protects the Franchisor more compare to the Franchisee and with the implementation of Syariah compliance clauses would thus be able to make the Franchise Act 1998 & Regulations a fair and just Act for both the Franchisors and the Franchisees. It is thus the intention of this paper to harmonise these two laws and to ensure that complications and issues will not arise in near future.

Many Halal restaurant franchises have been set up with funding from Islamic banks around the world, paving the way for the use of Shariah compliant instruments in dealing with the lucrative business opportunities developed by the Halal brand. Al Islami has made significant progress in advancing the franchising of the Halal brand and has plans to expand to the UK and France.

It can either be included in the Franchise Act or regulation to state a requirement that due to the sensitivity of the majority Muslim population in Malaysia, all franchised businesses operating in Malaysia whether homegrown or overseas must acquire the Halal Certification first unless the franchised food business is non halal food and beverages in the very beginning due to the demand of the non muslims in Malaysia.

Recommendations:

1. The relevant sections in the Franchise Act & Regulations 1998 should be amended and more Syariah compliance.
2. Making Malaysia as a vast known international franchise halal hub.
3 Encouraging and promoting Foreign Franchises to customise their products and services to be in Syariah compliance as to cater the needs of the Muslim population.
4. To create awareness and educate the non-Muslim franchisors and franchisees on the benefits of converting the franchise system to be in Syariah mode.

The Contracts Act does not interfere with any Syariah transactions in Malaysia as Order 42 Rule 12A of Court Rules 2012 has safeguard any judgment debts for Syariah matters and as such the Franchise Agreement needs to be amended according to such.

Malaysia has vast opportunities in expanding its franchise industry however there are some sections in the existing Franchise Act 1998 which are not Syariah compliance. However before one starts the franchise business on a Syariah platform, the key ingredients below must be fulfilled by the Islamic franchisors and franchisees beforehand:

1) Prohibition of Riba (interest) and uncertainty
2) Profit sharing/ Risk sharing
3) Prohibition of forbidden assets
4) Existence of underlying assets

Once we have acquainted ourselves with the Shariah principles necessary in building up our franchise, then we can look into the various fully fledged Islamic financial opportunities for franchises around the world.

Conclusions

Franchise is still one of the vehicle which can spearhead the fastest economic growth in the country. Malaysia at present is as one of the key players in Islamic Finance Industry should look in depth how the Franchise Industry in Malaysia can be Syariah compliance and to attract foreign investors in especially by offering Syariah compliance franchise products and not just in the banking and finance sectors.

The FA 1998 is a valuable Act to regulate and develop the franchise industry in Malaysia to greater heights. It provides for monitoring and quality control over a potential franchise business before it is offered to potential franchisees. Moreover, certain rights and protections to both franchisors and franchisees are offered in the FA1998. Franchise industry is still one of the vehicles which can spearhead the fastest economic growth in the country.

The presence of a successful Muslim entrepreneurs, especially in franchise industry can be a role model in the economic success of the Muslims. Thus, the relevant sections in the FA and Regulations 1998 should be amended and becoming more Syariah compliance. It would be highly recommended if the prohibition against the employees of the franchisees to be taken out as not to cause them harm in their livelihood as unlike the franchisee who may have other skills to depend on too. However, these employees shall not take advantage on this issue.

One of the forms that is considered appropriate for practice in this Islamic-based franchise is to apply ‘akad hibah’ from franchisor to franchisee (Naiimi et al., 2018). Previously this ‘akad hibah’ is only applied in Islamic finance and Islamic property management. Akad hibah in a franchise business can occur when a franchisor alters the format and its complete franchise business system together with the business system to the franchisee without any financial rewards as it does in the conventional franchise system today.

Thus, the Government of Malaysia and the respective ministry namely Ministry of Domestic Trade and Consumer Affairs have to create awareness and educate the non-Muslim franchisors and franchisees on the benefits of converting the franchise system to be in Syariah mode.

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Analysis of The International Research and Development Market: Main Trends in The Development of Participants ' Interactions

Liliia MATRAEVA
Russian State Social University, Moscow, Russia
lilia.matraeva@gmail.com

Ekaterina VASIUTINA
Russian State Social University, Moscow, Russia
esvas@mail.ru

Nataliya KOROLKOVA
Russian State Social University, Moscow, Russia
korolkovana@lariums.com

Abstract

The article analyzes the research and development market operating in various countries of the world. The analysis revealed three basic models for the development of interaction between market participants, features of their modifications, and formed recommendations for the Russian system. Also shows main trends of international market research, based on key indicators, clustering of countries was also carried out, with a description of their specific profiles.

Keywords: international research market, scientific clusters, scientific collaboration, trends in the development of the research and development market.

Introduction

The main condition for competition between participants in international innovation projects is the speed of innovation creation and the growth of the variety of goods produced, and the scale and volume of output are fading into the background. Therefore, project participants create alliances, combining their competencies and resources with other manufacturers, suppliers, business partners and direct competitors, in order to create innovations aimed at improving the productivity of all network participants, which could not be created by participants alone in the time dictated by the market (Vasilenko, 2016; Chen 2019). Such a development strategy is also true for scientific communities, where the current rate of formation of current research trends is so high, and the lag between the development and production of intelligent products is increasingly reduced, which automatically implies the need to form scientific alliances that allow rapid accumulation of resources and the realization of the benefits of complementarity.

Horizontal network alliances can use network platforms and interactive communication technologies, as well as use new principles of cooperation, which include organizational openness (free entry of participants), information openness (interaction of participants in the network in full access to information), the principle of online cooperation on equal terms for all participants, global partnerships, etc. All of the above reflects new mechanisms of competition and profit-making (Ferguson 2007; Inshakov 2009).

We can say that a scientific project is developed according to different business models, which show different degrees of efficiency and are applied depending on the set of incoming conditions of cooperation. At the moment, the following models of cooperation in the innovation sphere are being implemented in practice:

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1. the "Capsule" model is a collaboration in the field of various scientific research, which are of a single nature. In other words, research alliances are constantly emerging on the international research market, which are temporary in nature and are tailored to the solution of a specific applied problem. Achieving the goal automatically stops interaction, and participants of the research project will look for new contractors (partners), provided that new research tasks are updated.

2. Rollover model – i.e. reproduction of a new research project under identical conditions relative to the previous project. Due to the rapid development of technologies and the economy, participants in the international research market prefer to reduce the transaction costs of finding contractors, especially in the field of new knowledge and high technologies. Working out the channels and conditions of interaction in an experimental way, leaving the developed schemes, business models and partners.

The advantages and disadvantages of the rollover model include:

"+"implementation costs are significantly lower, since the technologies and resources involved in the production of the old project are used;

"+"low transaction costs of "searching for information", "entering into a contract", etc.;

"- "it is possible to reproduce "errors", accompanied by an increase in transaction costs."»;

"- "reduced competition between members of the Alliance.

3. Cluster model, i.e. formation of clusters based on collaborative relationships between participants of scientific projects.

Innovative scientific clusters are defined as the concentration of activities on a certain territory of one or several related industries that have a synergistic effect of all their elements and are expressed in increasing their competitiveness (Delgado 2015; Smorodinskaya 2017). In this form of interaction, the main mechanisms of competitiveness are the creation of new chains, relevant innovative projects, non-standard business ideas, management decisions, informal exchange of knowledge, information, and creative ideas typical of high-tech industries.

The characteristics of the cluster organization of scientific research allow us to classify clusters as a collaborative type of network. Cluster organization of interaction is based on a complex of technologies and formats of communicative management, which provides an Advisory nature of communication and replaces the traditional type of interaction between stakeholders with an adhocratic one, typical for collaborative networks, providing an atmosphere of mutual trust and a mechanism for informal knowledge exchange specific to innovation clusters (Korobkina, 2017; Hamari 2016; Qinchang 2019).

The basis of this model, which ensures the generation and effective implementation of scientific projects in the cluster, is created by collaborative network interaction and meaningful communication, covering a wide network of independent agents of various profiles (industry, functional and institutional) – members of the cluster (i.e. those who directly launch and lead projects).

The composition and roles of participants may vary depending on the development of the country and the stage of the cluster life cycle, but in all cases there are institutions for collaboration that coordinate the activities of participants through network platforms (Schuh 2014; Thomson 2016).

A key feature of the cluster model is the functional interrelatedness of participants and their geographic proximity, the advantage of which is the ability to use the resources that are present on this territory, which was originally the Central idea of clusters, and subsequently received a priority factor of economic proximity (effects estimate adjusted for the opportunity cost of participants) (Smorodinskaya 2015; Jia 2017; MacGregor 2012).

When analyzing the key characteristics of such interactions and communications, we can draw the following conclusions:

First, the collaboration based on the principles of the spiral, leads to a reduction of all types of costs in research and development, due to the strengthening of various agglomeration effects, and by reducing the level of uncertainty in a continuous exchange of information.

Secondly, for the implementation of joint research projects, the participants of the innovation cluster combine their assets, knowledge and competencies in various interrelated combinations, which allows them to increase productivity by expanding the variety of products and services created. The result of the joint project is a joint innovative production model, the sustainability of which is achieved by the harmonized development of the three sectors.

Third, the same collaborations take the cluster's network connections beyond its borders (through outsourcing, creating new firms, and knowledge flows). this leads to the emergence of technology transfer on the one hand, and to the emergence of new network clusters on the other.

Based on the described models, the analysis of the main trends in research and development of production of intelligent products on the international market was carried out.

Methodology

The critical analysis showed that the most representative is the comparison of the effectiveness of scientific research in the countries of the G20 grouping, which includes 19 countries with the most developed economies located on different continents. The EU is also a member of the G20. Together, according to the world Bank, these countries represent more than 80% of the world's GDP and 65% of the world's population (World Bank, 2018). According to the OECD, these countries together spend 90% of the funds allocated to R & D in the world, and employ 87% of researchers (OECD, 2015).

Conventionally, the indicators characterizing the efficiency of research can be divided into 2 groups in accordance with the directions of the analysis : a resource (material, financial and human resources) and indicators of scientific knowledge production (number of publications or number of patents, as well as derivatives of these parameters). According to the G20 annual research performance assessment report, the country's scientific profile includes the following key statistics:

- number of researchers per 1,000 people;
- gross domestic expenditure on R & D (PPP in US $ billion) (GERD) relative to GDP;
- number of patents in relation to business sector investment in R & d (BERD);
- normalized average citation by category (Category Normalized Citation Impact). This indicator is increasingly used instead of (or mandatory) addition to the indicator "number of papers per researcher", because it also reflects the demand for publications by the scientific community, which is a kind of indicator of the quality of these works.

Conditionally, the first two indicators are aimed at evaluating the resources directed by a particular country to the production of scientific knowledge, and the last two characterize the effectiveness of "output" or the increment of new knowledge in the field of applied and fundamental research.

In the future, based on the analysis of the presented indicators, the multi-dimensional classification tool (k-means) is used to identify groupings of countries in the international research and development market with specific profiles.

Results

A comparative analysis of the selected indicators showed the following distribution by country:

I. number of researchers per 1,000 people

Unfortunately, there are no data available for this indicator for the following countries: Australia, Brazil, Canada, India, Indonesia, Saudi Arabia and the United States. If you build a rating without regard to these countries, Russia will occupy 8th place: 1,000 people in Russia have a 2.49

researcher (Fig. 1). Leaders for this indicator is South Korea and the UK where the number of researchers ha1 000 people more than 3 times higher than the Russian value.

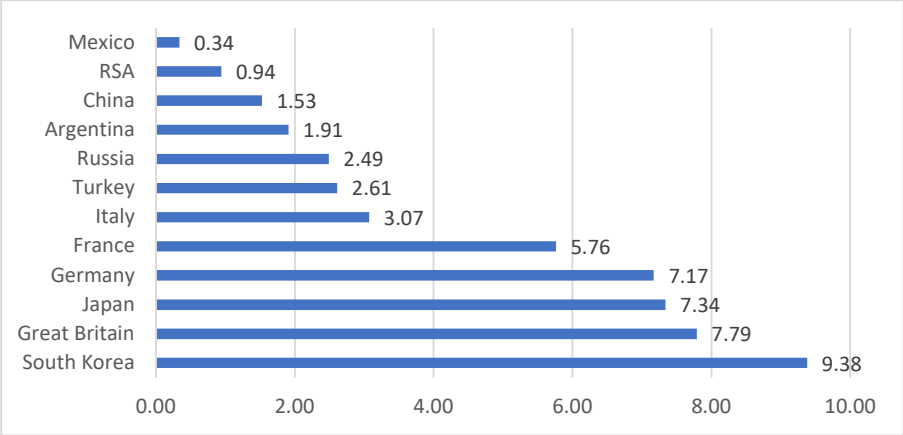

Figure 1: number of researchers per 1,000 people

Gross domestic expenditure on R & d (PPP in us $ billion) (GERD) relative to GDP

Brazil, India, Indonesia and Saudi Arabia are not included in the rating for this indicator due to lack of data. Gross domestic expenditure on R & D in Russia is 1.11% of GDP (11th place). The undisputed leader in this indicator is South Korea: gross domestic expenditure on R & D in relation to GDP for this country is 4.55 %, followed by Japan -3.2% and Germany – 2.2% (Fig. 2).

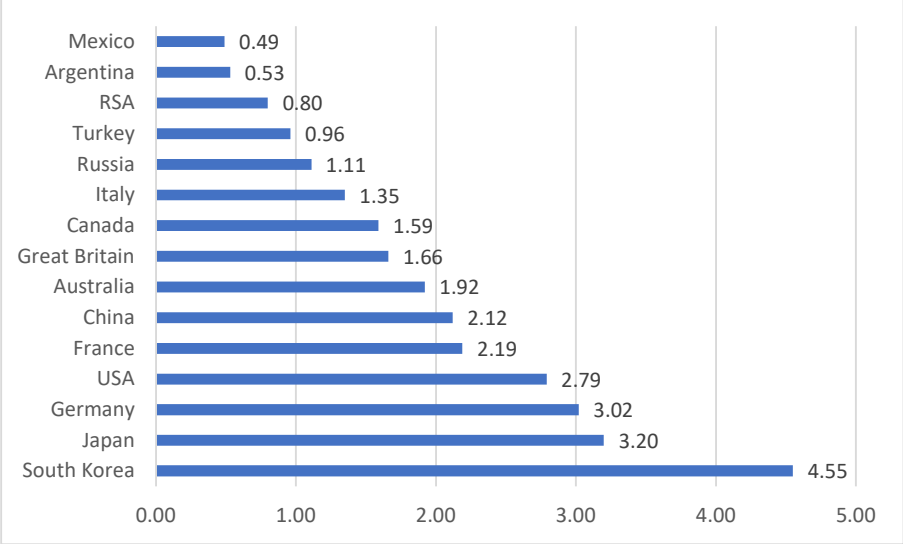

Figure 2: Gross domestic expenditure on R & d (GERD) relative to GDP,%

The most striking indicator that characterizes the level of scientific research implementation is the indicator that reflects the number of patents per billion dollars of investment. In international statistics, it is calculated as the ratio of the number of patents in relation to the investment of the business sector in R & d (PPP in billions of us dollars).

Despite the fact that South Korea was the leader in previous indicators, it is inferior to Japan and China in terms of patent implementation, where $ 1 billion of R & D investments account for 3,421 and 3,394 patents,

respectively. For Russia, this figure is more than 3 times less and is 1103. Brazil, India, Indonesia, and Saudi Arabia are not included in this rating.

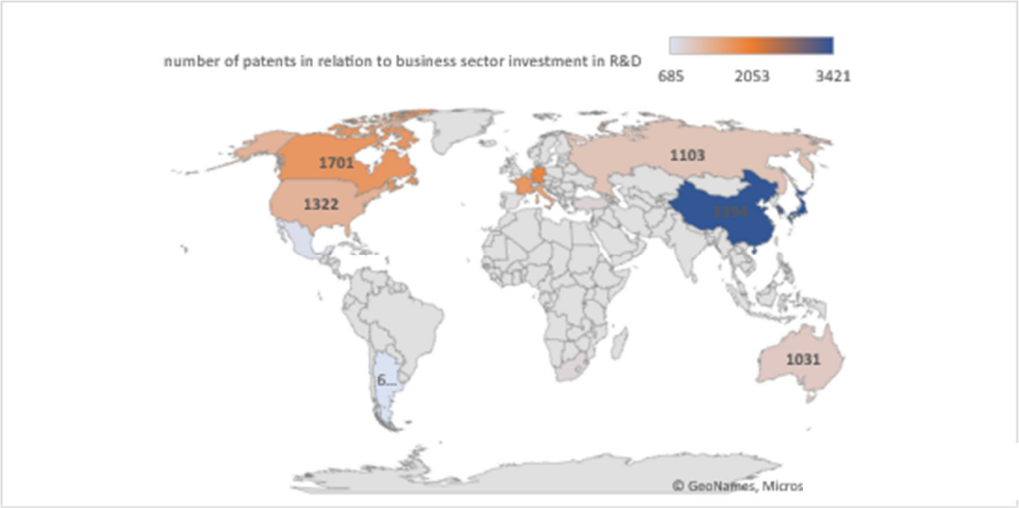

Figure 3: number of patents per billion dollars of R & d investment by G20 countries in 2019

Normalized average citation by category

The normalized average citation by category (CNCI) of a particular publication is calculated by dividing the actual number of citations by the expected citation of publications of the same type, year of publication, and scientific topic. CNCI is an important and objective performance indicator that does not depend on the age of publication, scientific field, or type of document. It allows you to compare scientific organizations of different scales and specializations. If the CNCI value is equal to one, it means that it corresponds to the world average, a value greater than one is higher than average, and less than one is lower than average.

As can be seen from the data shown in Figure 4, the highest values of this indicator are the United Kingdom (1.41), Australia (1.38), Canada (1.31) and the United States (1.31). Russia ranks last in this indicator – 0.59. This means that the normalized average citation for the category in the Russian Federation is almost 2 times lower than the global average. Additional data provided in the Report shows that this indicator has been increasing recently, but its growth is facilitated by international cooperation. Among the works taken into account when calculating this indicator, 38% were performed by international teams. Nevertheless, the share of the most cited publications (10 % of the most cited works) the share of Russian authors is very low and amounts to 4.2% (this is the lowest value among the G20 countries). For comparison: in the UK, this figure is 14.5%, Canada-12.8%, Germany -12.6%, China -10%.

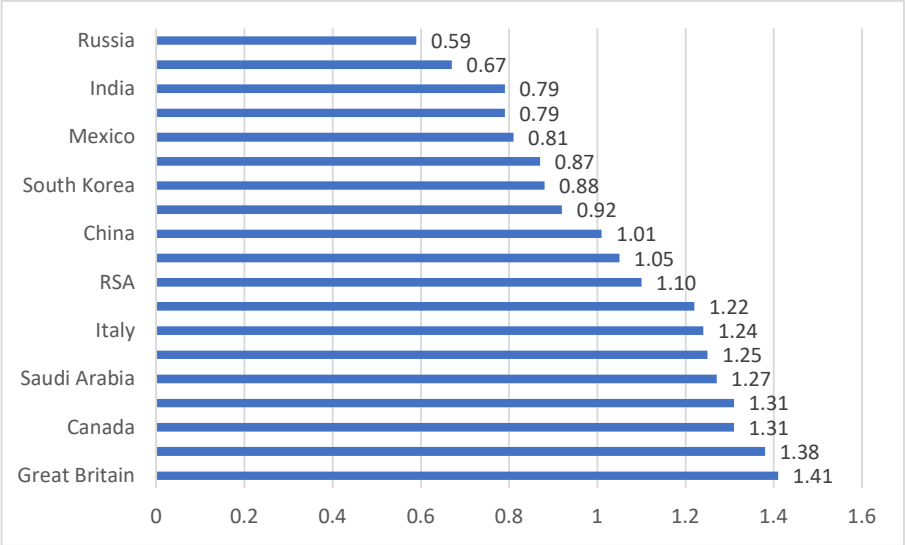

Figure 4: Normalized average citation by category (CNCI) for G20 countries in 2019

Using the multi-dimensional classification (k-means) tool, the analyzed countries can be divided into 4 groups. India, Indonesia, Saudi Arabia, Australia and Brazil were excluded from the classification due to the lack of data for 2 of the 4 indicators analyzed.

Table 1-End cluster centers

Indicators	Cluster			
	1	2	3	4
Gross domestic R & d expenditure (GERD) relative to GDP, %	2,11	0,70	1,75	3,29
Number of patents in relation to business sector investment in R & D (BENZ) (number of patents per billion dollars of investment)	1734,43	798,95	1315,47	3316,97
CNCI	1,30	0,88	1,05	0,92
Number of researchers per 1,000 people	5,18	1,45	1,85	6,08

Source: compiled by the authors.

The first cluster included 4 countries: Great Britain, Canada, France, and Germany. A striking feature of this cluster is the highest CNCI values, which are 1.3 times higher than the global average, as well as a high share of investment in science (on average, 2.11 of GDP for the group). This group is also characterized by a fairly high number of researchers per 1000 people. The number of patents in relation to business sector investment in R & d is not the highest, but is just above the median level. In these countries, great importance is given to basic science, with a very high proportion of researchers present in the 10% of the most cited publications. Conditionally, this group can be described as countries with a high level of resources directed to the scientific sphere, a high level of return in basic science, and an above-average level of return in applied science.

The second cluster consists of 4 countries: Argentina, Mexico, RSA, and Turkey. This group is characterized by a low level of R & D resources, both financial and human. Their gross domestic expenditure on R & D (GERD) in relation to GDP does not exceed 1%. The average number of researchers per 1,000 people in the group is 1.45, which is also the lowest value among the analyzed clusters. The return on research in these countries is also one of the lowest. Nevertheless, Argentina and RSA have become actively involved in international cooperation, which has contributed to an

increase in the share of their publications in the top 10% of the most cited. However, they have a fairly bright industry specialization. Argentina in the social Sciences and Humanities, and RSA in medicine and health. At the same time, Turkey remains quite closed in terms of international scientific cooperation compared to the countries of its group.

The third cluster includes Russia, Italy, and the United States. These countries are primarily united by the average level of return on applied science: the number of patents in relation to the investment of the business sector in R & D for this group is 1315.47. However, the US has a fairly large R & D expenditure relative to GDP-2.79%, while Russia has only 1.11%. The share of US international cooperation in science is quite low. In Italy, the situation with regard to international scientific cooperation is completely different: 55% of publications are the results of international research. In Russia, this indicator is at the level of 38% and, as mentioned above, significantly affects the citation index.

The fourth cluster consists of China, Japan, and South Korea. These are the countries with the highest resource expenditures on research: gross domestic expenditure on R & D in relation to GDP is on average 3.29% for this group. These countries also have the largest number of researchers per 1,000 people. At the same time, the impact in the framework of basic science is quite low (the group value of the citation index is below the average level). The exception is China, where this figure has reached the G20 average, and 10% of the works are among the 10% most cited publications in the world.

Comparing the obtained cluster profiles with the interaction models described earlier, it was found that the total share of organizations that participated in joint research and development projects in the total number of organizations that implement technological innovations is decreasing and is close to the level of 2005 (Fig. 5). At the same time, it is interesting to consider collaborative relationships in the innovation sphere by type of economic activity (Table 2).

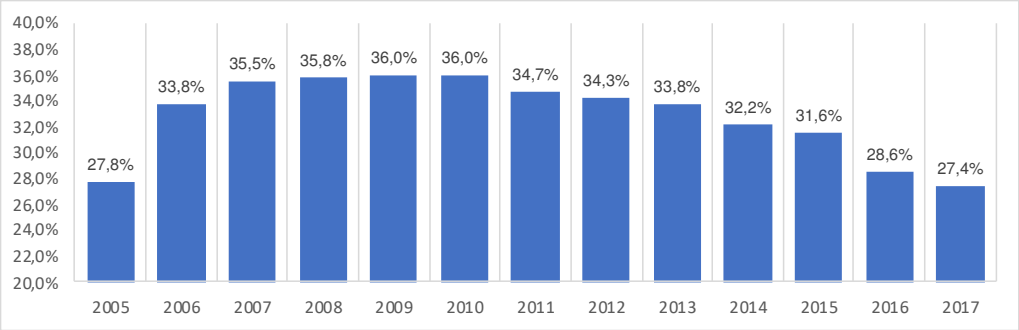

Figure 5: Share of organizations that participated in joint research and development projects in the total number of organizations that implement technological innovations, 2005-2017

A source: Indicators of innovative activities, 2019.

Table 2: Organizations that participated in joint research and development projects, by type of economic activity

Economic activity	Share of organizations that participated in joint research and development projects, %		
	In total number of organizations	*among the organizations, who carried out technological innovations*	*among the organizations, who didn't perform technological innovations*
Industrial production	3,3	27,4	0,7
Extraction of minerals	2,8	33,0	1,2
Coal mining	4,6	**75,0**	3,2
Manufacturing activity	4,9	29,5	1,0
High-technology	**15,4**	**40,8**	**3,5**
Production of medicines and materials, used for medical purposes	**12,1**	25,5	**5,9**
Production of computers, electronic and optical products	**16,1**	**44,3**	3,0
Medium-tech high-level	8,5	35,0	1,9
Manufacture of other vehicles and equipment	10,0	**53,1**	2,1
Medium-tech low-level	4,3	36,3	0,7
Production of coke and petroleum products	11,3	**45,9**	0,8
The production of metallurgical	12,1	**59,8**	1,4
Low-tech	1,4	9,3	0,5
Service sector	3,8	37,7	1,6
Activities in the field of telecommunications	1,8	13,1	0,4
Activities in the field of information technology	1,6	24,1	0,5
Consulting on the following issues management	0,6	6,8	0,5
Research and development	**27,6**	**61,1**	**14,3**
Agricultural industry	0,4	7,9	0,1
Construction	0,4	–	0,4

A source: Compiled by authors based on Indicators of innovative activities, 2019.

The table shows that the greatest potential for implementing scientific collaborations is in the research and development sector, which is represented by research and educational centers and higher education institutions.

In this regard, it is necessary to pay attention to the distribution of organizations that participated in joint projects by the types of partners in the research and development segment. In the segment we are interested in, universities are in third place after research organizations and consumers of goods, works and services. In this regard, they can potentially identify opportunities from the external environment.

At the same time, cooperation within individual ("capsule") projects is fundamental, which accounts for 69.2% of technological partnerships in the implementation of research and development organizations among higher education organizations.

At the same time, universities are almost not considered as one of the main sources of information for technological innovations, either in industrial production or in the service sector. Scientific organizations of academic or industry profiles, as well as professional associations (associations) are not included among the main ones. Preference is given to internal sources, consumer opinion, and Internet sources.

Conclusions

Thus, the analysis of the international research and development market allowed us to identify the following main trends in the development and interaction of participants:

- the most promising model of interaction between participants in research and innovation is the cluster model based on collaborative relationships, but since 2010 its use in world practice has tended to decrease. Currently, the "capsule" model of interaction dominates, which accounts for about 70% of partnerships.
- groups of countries allocated to clusters show specific profiles that differ primarily in the volume of investment and return on investment in science. Russia is part of the third cluster, which is characterized by an average level of return on applied science, but the amount of R & d expenditures in the group varies significantly. Although this indicator is the lowest in the group, Russia also actively participates in scientific alliances and collaborations, which significantly affects the citation index and allows it to stay in the group along with the United States and Italy.
- the greatest potential for implementing scientific collaborations is in the research and development sector, which is represented by research and educational centers and higher education institutions. In the international market of research and development, universities are currently undervalued from the position of sources of information for innovative developments. They are also poorly engaged in forming professional communities, which could expand the possibility of expert evaluation of various innovative projects.

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Legal Regulation Concepts of Economic Security in Russia and in the USA: Comparative Analysis

Galina S. Belyaeva

Doctor of Law, Belgorod State University, 85 Pobedy Street, Belgorod, 308015, Russia.
E-mail: belyaeva_g@bsu.edu.ru

Andrey S. Mamin

Professor of law Belgorod State University, 85 Pobedy Street, Belgorod, 308015, Russia.
E-mail: mamin_andrei@mail.ru

Irina Kapustina

Professor of the Department of real estate expertise and management, Belgorod state technological University named after V. G. Shukhov 46 Kostyukova street, Belgorod, 308012, Russian Federation.
E-mail: i-kapustina@mail.ru

Abstract

The paper deals with the analysis of issues regarding the legal regulation concepts of economic security in Russia and the USA. It is noted that economic security as an object of scientific knowledge and legal regulation is extremely complex due to the fact that that the situation in this area is constantly changing under the influence of institutional changes, aimed at modernizing socio-economic institutions, as well as public administration activity in the field of the economy, civil society development, the national economy sustainable functioning, overcoming technological and industrial backlogs as well as various external and internal threats to the protection of economic rights, freedoms and legitimate interests of the individual, society and state. The paper presents the results of a comparative analysis of the features of legal regulation and ensuring economic security in Russia and the USA with the prospect of using the positive experience of these countries in solving problematic issues that arise in this area.

Keywords: Legal Regulation, Economy, National Security, Economic Security, Concept, The Russian Federation, The USA.

Introduction

Before proceeding to the study of the issues reflected in the paper's title, it should be noted that issues of legal regulation and economic security are always of scientific, theoretical and purely practical interest. However, economic security as an object of scientific knowledge and legal regulation is extremely complex because the situation in this area is constantly changing under the influence of institutional changes, aimed at modernizing socio-economic institutions, performing public administration in the field of the economy, developing civil society, sustainable functioning of the national economy, overcoming technological and industrial backlogs, as well as various external and internal threats to the protection of economic rights, freedoms and legitimate interests of the individual, society and state [1; 2; 3].

Furthermore, economic security is achieved by a combination of specific forms and methods of public administration, which constitute a special mechanism for the legal ensuring of economic security led by a state. In modern conditions, the basic functions of the modern state continue to be

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adjusted in order to create special conditions for the development of economic rights and freedoms of economic entities, and to determine strategic guidelines for economic development, including the context of the global technological and industrial crisis.

In the United States, economic security issues in the context of national security are on a par with democracy and human rights and are the main attribute of liberal legal consciousness. It originates in the English Bill of Rights of 1689, where security is identified with the world unity, public order and the state welfare [4], and in the Declaration of Independence of the United States of 1776, which states that the ensuring public security and happiness is the main task of the state [5].

In contrast to the North American legal tradition, Russia did not have its own concept of national security (this is precisely about national security, which includes the triad - personal, public and state security - Auth.) until the 90s of the last century. Moreover, at the end of the twentieth century, there was actually a reception of the North American and Western European model of designating combined personal and public security as "national," since the concept of "state security" was previously used in the legal system and political practice of Soviet Russia.

In this article, we will not touch the issues of the acceptability of designating security as "national" in the Russian political and legal tradition. We note just the fact that in the United States the formula for identifying the nation and the state is widespread: any person with an American passport is a citizen here, regardless of his/her original history, ethnic culture, ancestral traditions.

Considering the above mentioned, the current task is to make a comparative analysis of the features of legal regulation and ensuring economic security in Russia and the USA with the prospect of using the positive experience of these countries in solving problematic issues arising in this area. Accordingly, within the framework of this article, it would be useful to identify the features of these two legal systems and to identify certain debating and problematic aspects and prospects for solving them.

Methodology

The methodology of the study is based on the application of various general scientific techniques and scientific knowledge methods (analysis, synthesis, deduction, induction, systemic-structural, formal-logical approaches), as well as private scientific methods - historical-legal, formal-legal and comparative-legal.

Discussion and Results

It should be noted that, despite the available evidence of experience in the legal regulation of economic relations and ensuring economic security in the Russian (and Soviet - Auth.) history, it should still be recognized that the emergence of the first conceptual studies on economic security precisely as a certain way of understanding, interpreting any phenomena, the main point of view, the guiding idea, etc., occurs during the Great Depression and is associated with the implementation of the "New Deal" by F. D. Roosevelt. In order to protect the US economic system and the need for state regulation of the economy, in 1934 President Roosevelt created the Federal Committee on Economic Security and its Advisory Council [6].

However, it was premature to speak about the creation of an economic security independent concept, since the Committee's competence included the security of individuals in the context of unemployment control and their labour rights protection. Moreover, the term "economic security" is now used in a number of English-speaking countries in its original meaning, as the protection of individuals and households from a sharp deterioration in the financial situation. Moreover, most of the studies in this area are aimed not at developing a general concept of economic security legal support, but at purely narrowly modernization applied aspects of existing state economic programs [7].

The next step towards the of economic security legal support in the United States was the National Defense Education Act (NDEA) of 1958 [8], aimed, inter alia, at regulating the economic security of the state.

Further, largely under the influence of the confrontation of two superpowers - the USA and the USSR, the USA, with the help of geopolitics and diplomacy institutions, begins to implement policies in the field of ensuring national economic security aimed at disruption of the rival's competitive position. It is at this time that the problem of ensuring national security in the United States is getting a complex scientific character - the doctrine of North American national security is being formed, and it can be defined as "an intellectual product, a systematized set of ideas, values, principles, concepts, which considers modern current and predicted management trends to protect the interests of individual, society and state" [9].

A number of American scientists pay their attention to the importance of the economic component of national security (in the context of our study - economic security). Thus, D. Nanto, analyzing in his work the mutual influence of global politics and national economy and security, concludes that "the economy can't be separated from the processes of ensuring national security, its main role is to provide society with the necessary amount of resources to guarantee the security of citizens, reduce the unemployment rate, create conditions of economic security at all levels" [10].

In turn, his colleague B. Buzan, studying the essence of economic security, writes that this is "a state of the economy which ensures high and steady growth in indicators of the economic well-being of public relations entities. The researcher believes that the stable functioning of the domestic market is determined by the positive influence of external factors. The negative impact of the factors is leveled with the help of insurance reserves and reserve funds of economic entities, that allows to keep the market in stable condition [11].

Foreign scientists also address the impact of globalization on the state and transformation of the definition of economic security, taking into account the risks caused by the variability of economic processes under the influence of the new environment [12]. So, according to M. Kahler, the main role in the mechanism of ensuring economic security should belong to the state [13], and the concepts of the United States and Russia do not differ in this position.

Certain attention is paid to the problems of socio-economic inequality of territories (regions) in particular countries. For example, S. Lessmann basing on the analysis of a group data system on the economic inequality of various world powers (56 countries and 835 regions) over the period of 1980 - 2009 made a conclusion about negative impact of the regions' inequality and the progressive threats to their economic security [14].

If we talk about the institutional framework for ensuring economic security (including cyber security) in the United States, then it is quite efficient and effective. Thus, the Federal Bureau of Investigation has the National Security Agency with all the necessary resources to obtain the necessary information about the controlled facility, process it and take appropriate measures to eliminate threats to national economic security.

The latest version of the US National Security Strategy (NSS) issued on December 18, 2017 [15] is also devoted to the matters of economic security through a prism of existing and potential challenges to the security of the country, as well as ways of counteractions against existing threats. Its main idea is expressed in the words of the President of the United States, who presented the Strategy. He declared that the primary duty of the state to the citizens is to serve their interests, ensure their security, uphold their rights and advance their values [16].

A significant place in the US National Security Strategy of 2017 is taken by issues of promoting American prosperity - maintaining a strong economy that protects the American people, preserves their way of life and advances American power. It also says about the need for leadership in the field of research, technology and innovation, America's energy superiority.[15]

Turning to domestic scientific and practical experience in the field of ensuring economic security, it should be noted that at the doctrinal level the conceptual apparatus, issues of economic security state management and the effectiveness of the mechanism of its legal support were considered in more detail in our country (compared with North American tradition).

The discussions in the area under consideration started in the late 80s - early 90s of the 20th century against the background of negative trends in the national economy, hyperinflation and the resulting decrease in the standard of living of the Russian population.
One of the first definitions of economic security, essentially the introduction of this concept into scientific paradigm, was proposed by V. A. Legasov in 1987 [17].

The first official document that fixed the basis for the economic security legal support of the Russian Federation was the National Economic Security Strategy of the Russian Federation, approved by the Executive Order No. 608 signed by the President of the Russian Federation on April 29, 1996, which includes the description of external and internal threats to the economic security of the Russian Federation as a combination of conditions and factors that threaten the vital economic interests of the individual, society and the state; determination and monitoring of factors that undermine the sustainability of the state's socio-economic system for the short and medium term (three to five years); determination of criteria and parameters characterizing national interests in the field of economy and meeting the economic security requirements of the Russian Federation, etc. [18]. This document was aimed at ensuring the economy development which would make it possible to create acceptable conditions for the life and development of the individual, the socio-economic and military-political stability of the society and the preservation of the state integrity, counter the influence of internal and external threats.

Currently, the main document aimed to counter economic security challenges and threats, prevent crisis situations in the raw materials, production, science, technology and financial sectors, and maintain people's leaving standards is the Russian Federation Economic Security Strategy until 2030 [19], which is the basis for shaping and implementing state economic security policy at the federal, regional, municipal and sectoral levels.
The current the Russian Federation Economic Security Strategy until 2030 contains an updated definition of the economic security concept, a significantly adjusted system of indicators for its assessment.

Conclusions

Basing on the study of the concepts of economic security legal regulation in the United States and the Russian Federation, the following conclusions can be drawn.

First, the problems of economic security, including the theoretical development of its concept and practical legal support to create an appropriate mechanism, are urgent for both the United States and Russia. The main attention is paid to the preserving state sovereignty and sustainable economic development.

Second, there are different approaches to the definition of "economic security"; the North American legal tradition is characterized by a "narrow" approach to understanding this category.

Third, both states are characterized by the "programmatic" type of economic security legal regulation, that is, the consolidation of the main indicators for determining its effectiveness and ensuring it in doctrinal, strategic documents.

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A Cybernetic Model of Improving the Information Security System by Applying Good Practices

Maciej KIEDROWICZ

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, maciej.kiedrowicz@wat.edu.pl

Jerzy STANIK

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Abstract

The article describes a cybernetic model of improving the information security system (ISS) in an organization as a complex security system, whose functioning has been illustrated on the basis of a certain steering/control system with a loop feedback. The cybernetic model of improving the information security system assumes that its organizational structure consists of the elements that minimize both internal and external threats - defense mechanisms, which also include good practices. The authors outlined a concept of applying good practices that concern various issues of improvement the information security system. In accordance with the assumptions of the control theory, the model may be divided into a controlled system and controller.

Keywords: cybernetic model, good practices, improvement of security system

Introduction

The improvement of the information security system (ISS) in the organization means continued implementation of new organizational and technical solutions. It is an advanced process for creating and using models, methods and tools, which should be properly applied to not only increase the degree of efficiency of the ISS, but also to allow the achievement of better and acceptable levels of information security in the organization. More detailed issues related to cyber-security are discussed in Stanik and Protasowicki (2020).

The security management methods should be based on good and reliable patterns, whose numerous examples may be found in the best specialist publications worldwide. Such publications and other available sources, especially on-line, include many formal and informal models related to the information security in organizations. However, such models do not refer only to the selected security elements of the information security systems (ISS), but may be generally divided into:

1. models controlling access to the information, e.g. lattice model, Bell–LaPadula Model (BLP), Biba Model,
2. models protecting the information in databases, e.g. Wood's model, Seaview model,
3. models of theoretical limitations of the information protection systems, e.g. Graham-Denning model, HRU security model (Harrison, Ruzzo, Ullman model) – see Pfleeger (1997) and Stokłosa et al (2001),
4. models of the ICT security system – in a research study by Kowalczyk (2011),
5. models measuring information security performance – e.g. in research of Hoffmann et al (2020) and Protasowicki (2020):
   a) oriented at the loss of the information security attributes,
   b) oriented at the change of the values of security attributes,

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6. models based on the potential of the risk system and security system – see Ficoń (2011),
7. security models based on the quality assessment criteria for the functioning of the security system,
8. information security models based on the practices and principles of the risk-based approach – see Hoffmann et al (2020).

The models mainly used for risk identification and estimation prevail in the group of the above-mentioned types of models. Furthermore, such models are primarily used at the stage of establishment and implementation of ISS. Only several publications include a proposal to implement the models referring to the phases of exploitation, monitoring, maintenance and improvement of information security, using the elements of good practices and selected methods for data collection to obtain the information necessary for the purposes of risk analysis and assessment.

Therefore, one of the objectives of this article is to convince the Reader that efficient information security in the organization must also include good practices implemented at all stages of the ISS life cycle, in particular at the stage of development and improvement of ISS.

The subsequent part of the article includes a description of two cybernetic models of improving information security, which meet the requirements of a simple cybernetic system and automatic control system with positive feedback loop. When building the feedback loop model, the dynamic factors that constitute good practices have been taken into account, even though the model could be also developed using other factors, for example, security efficiency potential or probability of using vulnerability of the system.

Good practices in the ISS improvement

For the purposes hereof, it is assumed that the term "good practices" should refer to all solutions and methods of operation exceeding the commonly applied solutions based on typical standards, norms and tools. When appropriately described, they may constitute a pattern and point of reference for the development and implementation of similar solutions in different areas of operations of the organization.

In the article, it is also assumed that "good practices" mean the most efficient manner of implementing: a process, method, methodology, procedure, pattern, technique or tool, for example, methods using as few resources as possible, for example, security measures, bringing extraordinary results, establishing an example for other solutions that may be used to provide information security, while observing standards of ethical conduct.

The ISS improvement is the process that consists in the changing of a complex object, having positive impact in terms of a specific criterion or set of criteria. In other words, the process means that the object should change its status, which is considered less efficient, to the status that is more desired, better and more powerful from the point of view of a specific criterion or set of criteria.

Some issues related to the increased risk of achieving the required/acceptable level of security of the organization's information resources may be at threat can potentially trigger changes in the ISS. In such case, the improvement of the information processing processes is reactive. However, in practice, the organizations also undertake certain improvement activities, which are proactive.

Therefore, Sienkiewicz (1994) mentioned, by improving the ISS, it is possible to apply a systemic approach or system analysis method. It should be mentioned that the improvement of processes is not an easy task and not always brings the expected results. Rummler and Brache (2000) outline typical mistakes made when improving systems or processes, such as:

- the process of improvement of the security systems or information processing systems is not related to the strategy of the organization in terms of security,

- an idealistic approach to the introduction of new processes, without considering the existing limitations and without any reflection on how such an approach may affect the whole organization,
- the organization focuses more on re-designing the processes than on implementing changes,
- the lack of preparation of the measurement and assessment system and other tools necessary for continuous improvement of the ISS.

The prerequisite for appropriate application of good practices in terms of the ISS improvement should be knowledge of the facts or principles that constitute the foundation for information security management and the methodology of security engineering.

A description of the information security system allowing the construction of a cybernetic model

It is very difficult to find in the literature on the security methodology or engineering a definition or explanation of the information security system (ISS). On the other hand, the information security management system (ISMS) is often described. According to standards of PN-EN ISO/IEC 27001 (2017), the information security management system (ISMS) is a part of the entire management system, based on an approach as resulting from the business risk, referring to the establishment, implementation, use, monitoring, maintenance and improvement of security. The ISMS refers to the organizational structure, policies, responsibilities, planned activities, processes, resources and procedures. The security requirements, business goals and needs, executed processes as well as the size and structure of an organizational unit have impact on the process of planning and implementing the ISMS.

In light of the above definition, the basic rule of researching information security in the organization is the systemic principle of mutual correlations and main conditions. Therefore, it may be assumed that the information security system (ISS) is a complex object designed for a specific purpose, i.e. to ensure the required level of information security in the organization. The acceptable level of security may be reached by appropriate control of the performance characteristics of the ISS. Furthermore, the level of information security in the organization may be increased by the development and improvement of the ISS.

For the purpose of this article, the short name “ISS” means a deliberate action system aimed at ensuring the highest possible level of information security in the organization. The process of building information security consists in the elimination of any risk categories that may occur within the ISS organization (internal risks) and its environment (external risks). Through appropriate organizational or technical actions/decisions, it is possible to control, assess and measure the risk of information resources processed in the ISS and the status of information security (Fig.1).

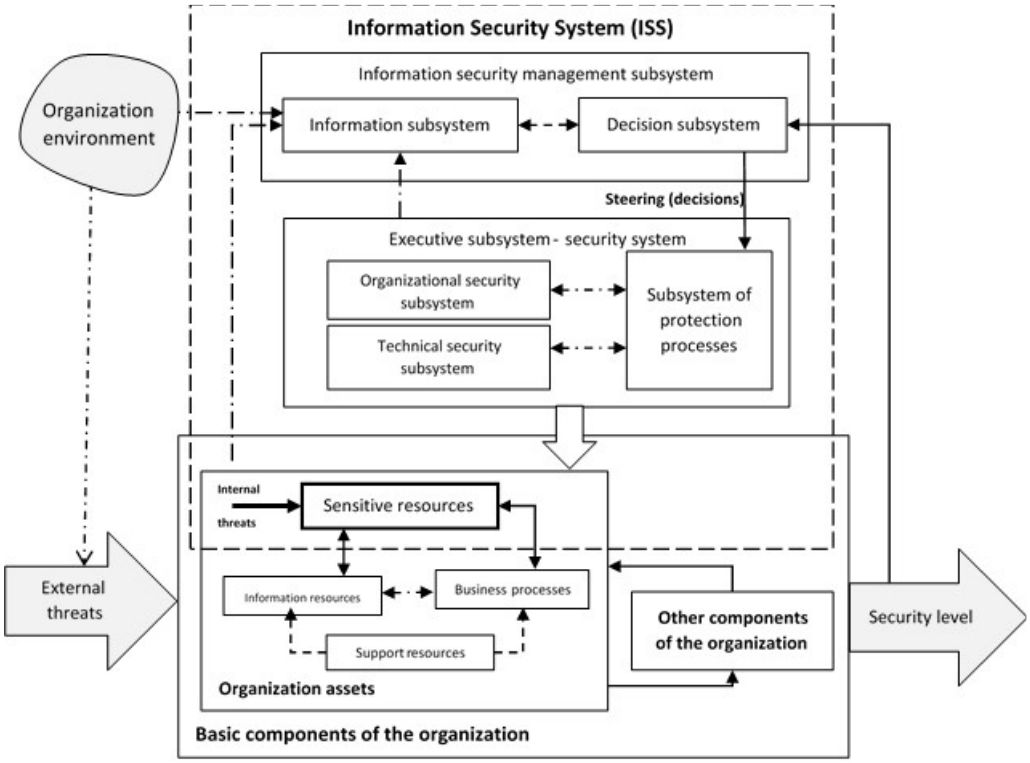

Fig.1: Illustration of the information security system in the organization.

Therefore, the so defined ISS may be compared to a certain system controlling the level of information security on the basis of the assumed sets of security criteria, e.g.:

- infringement of laws and/or regulations, decreased business performance, damaged reputation/negative impact on reputation, national and international law,
- discontinued provision of services, loss of funds/assets, loss of clients,
- financial, technical, environmental and time constraints.

With the above in mind, the information security system (ISS) is expressed by the following formula:

$$ISS = \langle E, R \subseteq E \times E, C, V \rangle, \tag{1}$$

where:

E – a set of objects (active and/or passive) of the ISS,
R – a set of relations defined by the Cartesian product $E \times E$,
C – a set of constant factors determining appropriate functioning of the ISS,
V – a set of variable factors controlling the functioning of the ISS.
The set of objects E is very broad and varied, thus, there are many different systems of classification and division. The entirety of ISS objects may be divided according to the following criteria:

$$E = \{E_i^u;\ u = \overline{1,U}, i = \overline{1,I}\}, \tag{2}$$

where :
U – a set of numbers of the distinguished types of ISS objects, e.g.: a set of information resources (u = 1), a set of business processes (u = 2), a set of support resources (u = 3), a set of security measures (u = 4), a set of vulnerability indicators (u = 5), etc.;
E_i^1 – a data-like information resource (i = 1), a information-based information resource (i = 2), a knowledge-based information resource (i = 3);
E_i^2 – the processes whose loss or deterioration makes it impossible to complete the mission of the organization (i = 1), the processes including confidential processes or using the technology subject to

intellectual property rights (i = 2), the processes that may have significant impact on the completion of the mission of the organization, if modified (i = 3), the processes that are essential for the organization to ensure compliance with the requirements stipulated in contracts, laws or regulations (i = 4);
E_i^3 – support resources, which very often in practice are "carriers" of basic resources, such as a process or an information resource; e.g. a set of resources of the type hardware (u = 1), a set of resources of the type of software (u = 2), a set of resources of the type of personnel (u = 3), a set of resources of the type of organizational structure, etc.,
E_i^4 – organizational protection (i =1), technical protection (i = 2), program protection (i = 3).
The set of relations R can be decomposed as follows:

$$R = R^W \cup R^O \tag{3}$$

where:

R^W – a set of relationships between elements of the ISS, ensuring its specific operation,
R^O – a set of relations between elements of the ISS and elements constituting its environment.
The set of constant factors $C = \{c\}$ often identified with the concept of the ISS infrastructure or structure represents its static nature and refers to a group of factors, which include four basic categories of factors:

$$C = \{c_1, c_2, c_3, c_4\}, \tag{4}$$

where:

c_1 – natural factors,
c_2 – technical factors,
c_3 – geographic factors,
c_4 – social factors.
The set of variable factors $V = \{v_j, j = 1, J\}$ represents the ISS dynamics, hence, they are referred to as the operational factors. The variable factors β include, among other things:

$$V = \{v_j, j = 1,5\}, \tag{5}$$

where:

v_1 – the dynamics of development of the ISMS security subsystem;
v_2 – technical and technological advancement;
v_3 – the scope and maturity of security documentation in the organization;
v_4 – the maturity level of the ISMS organizational structure;
v_5– the scope and maturity of the application of good practices in the field of security engineering.
The operational factors $v_i \in V$ have direct (dynamic) impact on the security level of sensitive resources in the organization, the scope and degree of information security, safety and efficiency of the entire ISS.

ISS cybernetic model as a simple cybernetic system

The cybernetic model providing grounds for detailed block models of actual objects and allowing the analysis of changes in the system is shown in Fig.2.

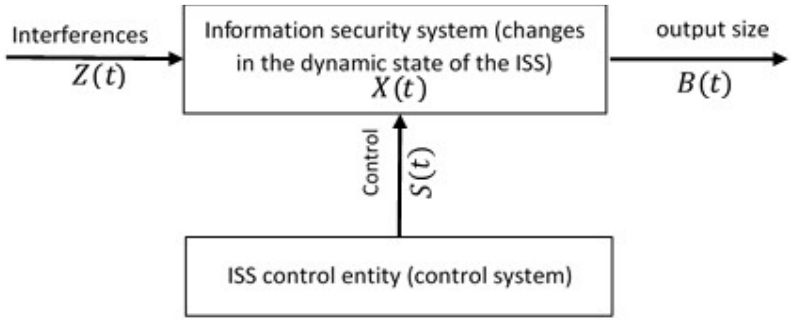

Fig.2: Cybernetic model of the object/system.

On the basis of the cybernetic model (Fig.2), the following simplified relations may be derived:

$$\boldsymbol{G(t)} : \boldsymbol{Z(t)} \times \boldsymbol{S(t)} \longrightarrow \boldsymbol{X(t)} \tag{6.1}$$
$$\boldsymbol{\Phi(t)} : \boldsymbol{Z(t)} \times \boldsymbol{S(t)} \longrightarrow \boldsymbol{B(t)} \tag{6.2}$$
$$\boldsymbol{F(t)} : \boldsymbol{X(t)} \times \boldsymbol{S(t)} \longrightarrow \boldsymbol{B(t)}. \tag{6.3}$$

Relation (6.1) represents the general notation of the “input - status” of cybernetic model whereas relations (6.2) and (6.3) represent general notations of the "input - output” model and “status - output” model.

The physical quantities in the cybernetic model, which characterize input, status and output are described through certain variables, which are usually in the form of the linear independent time functions. The argument of function t ∈ T represents short time axis in T time frame. For the purpose of empirical and - sometimes - theoretical studies (e.g. research of models of automatic control models), the variables are divided into three sets, namely:

1) input variables: $\boldsymbol{z_1(t)}$, $\boldsymbol{z_2(t)}$, ..., $\boldsymbol{z_N(t)}$ – representing different ways of forcing input of the system model ensuring its functioning;
2) internal variables: $\boldsymbol{x(t)}$, $\boldsymbol{x_2(t)}$, ..., $\boldsymbol{x_i(t)}$ – helping to describe the analyzed statuses or attributes of the system;
3) output variables: $\boldsymbol{b_1(t)}$, $\boldsymbol{b_2(t)}$, ..., $\boldsymbol{b_N(t)}$ – describing the functioning of the model output.

The cause and effect relationship between the input and output included in the cybernetic model may be presented as:

$$\boldsymbol{G(t)}[\,\boldsymbol{z(t)}, \boldsymbol{s(t)}] = \boldsymbol{x(t)} \tag{7.1}$$
$$\boldsymbol{\Phi(t)}[\,\boldsymbol{z(t)}, \boldsymbol{s(t)}] = \boldsymbol{b(t)} \tag{7.2}$$
$$\boldsymbol{F(t)}[\boldsymbol{x(t)}, \boldsymbol{s(t)}] = \boldsymbol{b(t)}. \tag{7.3}$$

Relations (7.1), (7.2) and (7.3) represent different types of the cybernetic model. Each of them may form grounds for the creation of the physical and mathematical model of the analyzed system. Relation (5) defines the dependency relationship between input and output and constitutes a typical task which consists in the examination of the “black box”, whereas relation (8) shows a general form of the diagnostic task: Due to the cause and effect relationship between input and output, for the purposes of mathematical modeling, hence, also for the purposes of identification and simulation of the systems, the size of the status and output of the cybernetic model are treated as one category. In such case, the statuses and output constitute the reaction of the system to the forced input; the reaction is sometimes generally referred to as the status.

With the above in mind, in terms of cybernetics, the information security system in the organization may be presented as a classic controllable system with input, output and certain control mechanisms (procedures, directives). The input stream is in the form of the risk vector (***Q***), which is converted in the ISS into the security vector (***SV***) that constitutes the output stream. The cybernetic “black box” is

the information security system that transforms the risk vector ($\boldsymbol{Q}$) into the security vector ($\boldsymbol{SV}$), which may be symbolically noted as the following function:

$$\boldsymbol{SV} = \boldsymbol{ISS}(\boldsymbol{Q}) \text{ or } \boldsymbol{ISS}: \boldsymbol{Q} \longrightarrow \mathbf{SV}\,, \tag{8}$$

where:

ISS – security function (information security system);
Q – risk vector of information security;
SV – security vector of the information security management system;
whereas:

$$Q = \langle Q_n\,, n = \overline{1,N}\rangle, SV = \langle SV_n\,, n = \overline{1,N}\rangle. \tag{9}$$

It must be stressed that the entire ISS information security in the organization is a complex open system, practically non-controllable, thus, it may only theoretically be the subject of research and formal deliberations. To ensure appropriate control of the ISMS, it is essential to know the Q input vectors and SV output vectors as well as their analytical correlations, which raises significant research problems, especially in practical terms. Therefore, the very attempt to identify such problems constitutes progress and a starting point for further theoretical work. The components of the risk vector Z are divided according to different criteria of risks. The traditional threats to information security Z are divided into five categories:

$$Q = \langle Q_n\,, n = \overline{1,5}\rangle$$

where:

Q_1– a subset of information risks;
Q_2 – a subset of natural risks;
Q_3 – a subset of technical risks;
Q_4 – a subset of social risks;
Q_5 – a subset of cyber risks.

The above-mentioned risk categories $Q_n \subset$ Q are further divided into detailed types $Q_{i,n} \in Q_n$, which describe the specificity of a given category. For instance, the information risks (Fig.3) Q_1 may be divided into: $Q_1 = \{q_1^j,\ j = 1,J\}$.

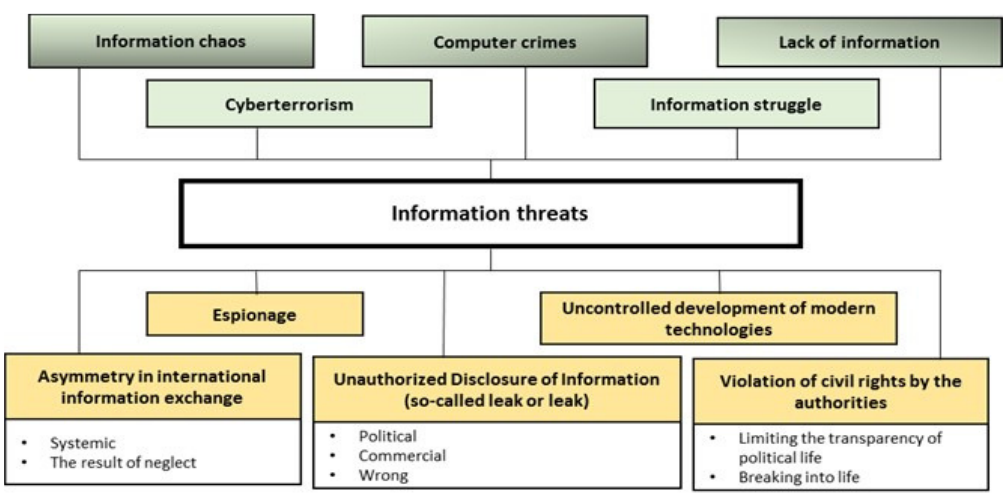

Fig.3: Classification and division of information risks.

The specific security categories$SV_n \subset$ SV, SV= $\langle SV_n\,, n = \overline{1,7}\rangle$ are assigned to the distinguished risk categories $Q_n \subset$ Q

where:

SV_1 – information security;
SV_2 – personal security;
SV_3 – technical security;
SV_4 – business security;
SV_5 – physical security;
SV_3 – ecological security;
SV_6 – social security.

To achieve an appropriate level of security SV, it is crucial to eliminate (or decrease to the minimum) the effects of the specified risks Q, which is symbolically noted as:

$$\mathrm{SV} = \langle SV_n, ; n = 1, N\rangle \longrightarrow max \iff \mathrm{Q} = \langle Q_n, ; n = 1, N\rangle \longrightarrow min. \quad (10)$$

The transformation of risk vector $\boldsymbol{Q}$ into security vector $\boldsymbol{SV}$ is made through the ISMS function (system), i.e.:

$$\boldsymbol{Q} \xrightarrow{\boldsymbol{ISMS}} \boldsymbol{SV}$$

Graphic illustration of equation (10) is shown in Fig 4.

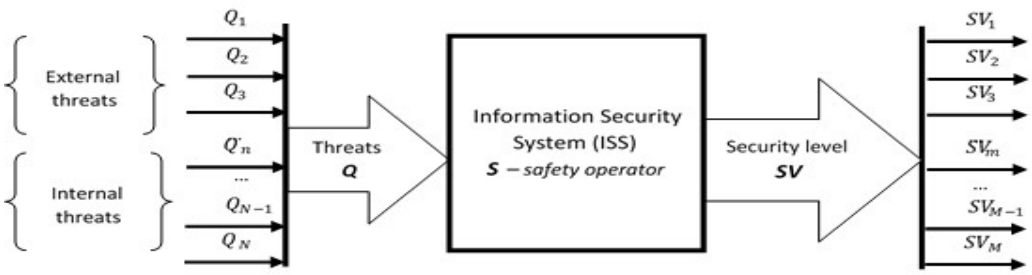

Fig. 4: Information security management system as a simple cybernetic system.

The steering (control) function of the ISS is formally illustrated using information security operator S. By including the concept of "operator S", the formula (10) is noted as the product:

$$\boldsymbol{SV} = \boldsymbol{S} \times \boldsymbol{Q} \quad (11)$$

where: **S** – a symbol of security operator.

The conventionally applied operator S in formula (11) transforms input status **Q** into output status **SV** and the transformation is made according to the procedure included in operator **S**. In the case of such an advanced system, as the ISS, it is extremely difficult to define the nature of operator **S**, since, among other things, it is random and functions in a very complex and dynamic security environment including, for example, political, social, economic, technological and cybernetic security, etc. According to formula (11), the input status, i.e. the expected information security level (**SV**) depends on the risk level (**Q**) and functional structure of the **ISS**, i.e. the action procedures applied thereby. Formula (11) may be expressed in a secret form as the following function:

$$\mathbf{SV} = \mathrm{g}\ (\mathbf{Q}, \mathbf{S}), \quad (12)$$

where:

g (**Q, S**) – the secret function of two variables Q and S;
Q – the ISS risk vector;
S – the security operator (the action operator of the information security system)

In the traditional theory of control, the number $S = {}^{SV}/_{Q}$ is referred to as the capacity limit or transmittance of the system, and it is usually an abstract number. In the case of the analyzed ISS, the actual form of the transformation operator (**S**) is an expression of efficiency and effectiveness of the operations of the entire ISS and implies significant consequences for the information security level. Theoretically, depending on the value (technology) of operator **S**, it is possible to examine three cases of its impact on the input information security vector (**SV**):

$$\mathbf{S > 1 \Rightarrow SV} \nearrow \text{ – acceptable (security) level;} \quad (13.1)$$
$$\mathbf{S = 1 \Rightarrow SV} \longrightarrow \text{ – tolerable level;} \quad (13.2)$$
$$\mathbf{S < 1 \Rightarrow SV} \searrow \text{ – non-tolerable level.} \quad (13.3)$$

In the closed reference system, where transformation S meets condition S > 1, the input vector (SV) may theoretically increase only at the expense of the output vector (Q), which implies the following correlation:

$$\mathbf{(S > 1 \Rightarrow SV > Q) \Rightarrow (SV \rightarrow max \wedge Q \rightarrow min).} \quad (14)$$

In practical experience in the area of the security engineering, formula (14) may be interpreted in the following manner: Thanks to appropriately advanced technologies in the field of security engineering **S ≡ ISS**, the information security (SV) increases and the risks posed by vector Q decrease. It is the best strategy for the ISS development and improvement, as it leads to the achievement of the main goal, which means that the sensitive resources in the organization are guaranteed the required or desirable/acceptable level of security (Fig.1).

ISS cybernetic model as an automatic control system

The cybernetic model providing grounds for detailed control models of actual objects (with feedback loop) and allowing the analysis of changes in the system is shown in Fig.5.

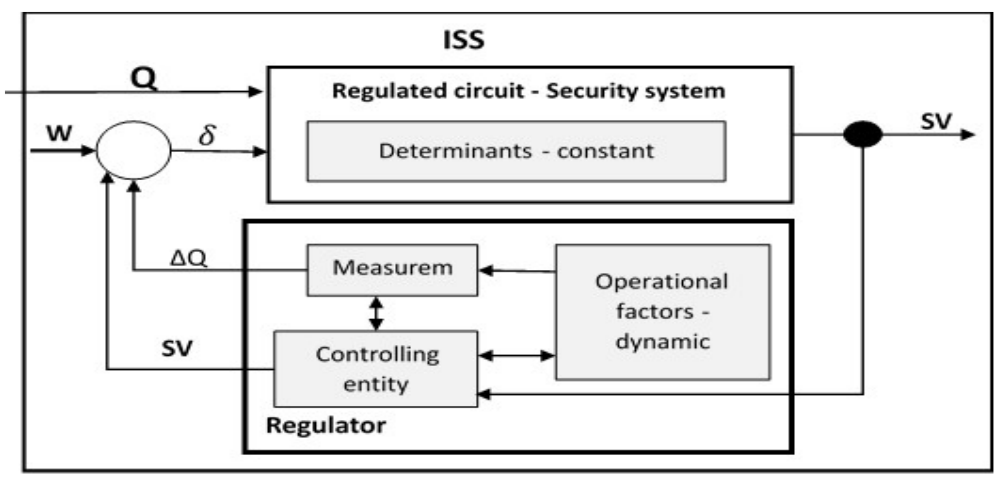

Fig. 5: ISS cybernetic model as an automatic control system.

The information security system (ISS) model, with transmittance **S**, described in the chapter *Cybernetic model as a simple cybernetic system*, has only represented the so-called infrastructure of business processes, which, in accordance with formula (4), mainly refers to the so-called constant determinants. For the purposes of the study, it was assumed that the determinants represent criteria or principles of the information processing processes in the form of a specific fixed platform used for protecting assets processed thereby.

Currently, the additional system (Controller – R) is added to the scheme (model) presented in figure 4 allowing to include *dynamic factors* characterizing the variability of the selected ISS structures and

rules for implementing the information processing processes. By including such factors, it is possible to dynamically control the process of vector transformation Q → S, depending on the relationship between the input status and output status (Fig.5).

The ISS system output (SV) is compared to the set W value, which represents the specificity of the requirements of the information security policy, and the difference between their values, called a deviation or adjustment $\boldsymbol{\Delta Q}$ is subject to the controller's input. Therefore, the controller has the information about the present steering error and may change the SV input value or ΔQ object of control so that the deviation is decreased $\boldsymbol{\delta}$ to zero. As a result, the input value of the system is constantly maintained at a level as close to the requested value as possible.

In the above-described extended ISS cybernetic model, the attached control system R illustrates the activity of the so-called operational factors $v_j \in V$, which reflect current dynamics of the ISS and a possibility of the system's deliberate adjustment.

Controller R, which symbolizes the impact of the operational factors$v_j \in V$, transforms some part of the **SV** input stream into an adjustment $\boldsymbol{\Delta Q}$, adjusting the security level **SV** according to the required level of security (**W**). If we assume that the transformation in controller R is proportional, then the adjustment made by such controller at the input of the controlled system is:

$$\boldsymbol{\Delta Q = R \times SV,} \tag{15}$$

where:

$\boldsymbol{\Delta Q}$ – the adjustment made in the ISS;
R – the transmittance of the controller connected with operational factors;
SV – an output information security vector.
By making adjustment $\boldsymbol{\Delta Q}$, the output status of the whole controlled ISMS may be eventually noted as:

$$\boldsymbol{SV = S\,(Q + \Delta Q) = S(Q + R \times SV) = S \times Q + S \times R \times SV,} \tag{16}$$

where:
$\boldsymbol{S}$ – the transmittance of the controlled system identified with the impact of external factors $c_n \in C$, hence, after simple transformations, the following formula is obtained:

$$\boldsymbol{SV = \frac{S}{1 - S\,R}\,Q.} \tag{17}$$

Formula (17) is the simple formula for the theory of controls, showing a correlation between the output status – in this case, the information security level (**SV**) – and the input status – i.e. the risk level related to information security (**Q**), after considering adjustment $\boldsymbol{\Delta Q}$, which controller $\boldsymbol{R}$ makes in the entire ISS. According to formula (17), if there was no controller R (**R = 0**), the capacity of the entire control system would be **S**. By including controller $\boldsymbol{R}$, the right part of $SV = S\,Q$ should be multiplied by the product characterizing the operations of controller R:

$$\boldsymbol{\frac{1}{1 - S\,R}} \tag{18}$$

and finally, the following formula would be obtained:

$$\boldsymbol{SV = \frac{1}{1 - S\,R} S\,Q.} \tag{19}$$

On the basis of formula (19), it is determined that the first factor defines the operations of controller R, whereas the second one - the controlled system S. Factor (18) shows the activity of feedback loop in the control system, therefore, it is called the feedback loop operator. By way of analogy, in formula (12), equation (19) may be noted in the form of the following secret function:

$$\mathbf{SV} = g\,(\mathbf{S, R, Q}), \tag{20}$$

where: g (**S, R, Q**) – secret function of three variables S, R and Z.

By interpreting adjustment $\boldsymbol{\Delta Q}$ on the basis of security engineering, it must be noticed that in accordance with formula (5), it is a complex functional of such functions ($g_i(t)$) as:

$$\boldsymbol{\Delta Q = G(g_i(t)\ \ i = 1,5\ ),} \tag{21}$$

where:

$g_i(t)$– the current potential of the ISMS (the potential of organizational and technical security measures);
$g_2(t)$ – the current level of vulnerability of the ISMS to cyber attacks;
$g_3(t)$– the current level of maturity of security documentation;
$g_4(t)$– the current level of use of such elements as "good practices";
$g_5(t)$– the current level of security culture in the organization.

What is important in formula (21) is the fact that all internal functions $g_i(t)$ are variable time functions t. It means that adjustment $\boldsymbol{\Delta Q}$ developed by controller R is in the form of a dynamic parameter characterizing current aspects of control and improvement of the ISS, current scope of application of good practices and current level of security culture in the organization. The present level of such variables has direct impact on the status and value of assessment of the current security level of the ISS (SV), hence, the value of the potential system risks (Q).

On the basis of formula (19), it is possible to determine the input status (***Q***) to obtain the required results at the output $SV = \boldsymbol{\delta}$ with given values $S \parallel R$. To that end, in formula (19), the $SV = \boldsymbol{\delta}$ is used and the input vector (**Q**) set.

$$\boldsymbol{Q = \delta \Leftrightarrow Q = \frac{1 - S\,R}{S}\delta = \ \ Q^{*},} \tag{22}$$

where: $\boldsymbol{Q^{*}}$– the expected level of the vector of information security risks.

However, if the input vector has already been set and assumed the value of e.g. $\tilde{Q}$, it is possible to determine the capacity of controller R, necessary to obtain the required level of output vector $SV = \boldsymbol{\delta}$:

$$\boldsymbol{SV = \delta \Leftrightarrow R = \frac{\delta - S\,\tilde{Q}}{S\,\delta} = \ \ R^{*},} \tag{23}$$

where: R* – the desirable value of transmittance of controller R.

By introducing controller R to the ISS, the SV output status may be controlled on an ongoing basis depending on the Q input status. As a result, it is possible to shape the characteristics, parameters and attributes of the ISS in a flexible manner and at such a level that guarantees the maintenance of the input status at a required information security level ***SV= W***.

On the basis of formulas (22) and (23), to ensure the desired level of security ***SV= W***, it is possible to control either the risk vector Q = $\tilde{Q}$ (22) or the mechanism of controller operations R = R* (23). The direct control of risk vector Q is a truly complex process that requires a lot of effort on the part of the entire ISS spread over a longer period of time. It is much easier to shape the level of information security (*SV*) through controller R by selecting appropriate parameters or structures of its functioning. In the categories of security engineering, it means appropriate increase of the ISS security level by introducing proper infrastructure of the security system - the number of security measures and links between them or good practices understood as additional dynamic operational factors $v_i \in V$.

If the interpretation of the system responsible for shaping operational factors $v_j \in V$ has been assigned to controller R: $V = \{v_j, j = 1, J\}$ = f ($v_j, j = 1, J$), then, in compliance with the above assumptions, using such elements as "good practices, it is essential to control the development of the security system ($v_1 \in V$), ISS level of vulnerability to cyber attacks ($v_2 \in V$), level of maturity of security documentation ($v_3 \in V$), efficiency of good practices in the area of security engineering ($v_4 \in V$) and the level of information security culture ($v_5 \in V$). Certainly, the selection of good practices (operational factors) may be freely changed and, depending on the needs, new categories of

factors/good practices, most adequate in a given security environment, may be added. Another issue is the choice of the function formula (19), its validity and usefulness in the discussed control model with feedback loop.

Summary

In practice, there is no model/pattern for the ISS improvement that would be based on the elements of good practices. It is in line with the equifinality principle, according to which there might be many different ways of reaching a given final state in an open system, such as the ISS – see Morgan (2013). Being aware of certain limitations related to the introduction of the ISS improvement models, methods and manners, which bring positive, extraordinary results, the authors decided it was justified to use them.

Particularly in the present situation, when modern organizations are under increasing pressure to quickly and efficiently improve their competence, also in the field of security. Of course, the point is not to copy other solutions without a second thought, but to skillfully and appropriately adapt good practices to the reality and capabilities of the ISS or the organization. Furthermore, it should be also remembered that the very identification of good practices is merely the starting point. Their conditions must be determined and adapted to the conditions of a given security entity, all the while bearing in mind the fact that such good practices will not instantly become the source of success. The industrial application of at least the so-called "mini-practices" becomes indispensable.

The presented method for modeling the information security system (ISS) using the theory of control is a new approach, based on reliable theoretical foundations. Therefore, there are real grounds to engage in a broader thinking about the use of the cybernetic systems with feedback loop while analyzing such complex issues of the information security engineering as, for example, the building of information security according to the norms adopted in the international affairs practice or ISMS improvement based on the elements of good practices.

The article outlines only a concept for using the theory of automatic control to establish the risk functions in the information security system. This extremely complex system belongs to a group of large systems, with a high level of complexity and multi-criteria formulas of operation. The implementation of the theory of control requires the establishment of adequate mathematical or cybernetic models describing the ISS in terms of cybernetic categories of the control systems. The main issue is to define the input and output vectors using open functions of many variables or appropriate functionals.

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Management of Changes in Automotive Life Cycle

Florin STINGA
University POLITEHNICA Bucharest, Romania
florin.stinga20@gmail.com

Irina SEVERIN
University POLITEHNICA Bucharest, Romania
irina.severin@upb.ro

Elena LASCU
University POLITEHNICA Bucharest, Romania
elena_lascu91@yahoo.com

Ioana Alina MITRACHE
University POLITEHNICA Bucharest, Romania
mitrache_ioana@yahoo.com

Bogdan DUMITRU
University POLITEHNICA Bucharest, Romania
bogdan_dmt@yahoo.com

Abstract

This article summarizes the changes flow during the vehicle's life cycle phase and presents an analysis of the changes' implementation ratio. In the automotive industry, harsh competition, the need for optimization of costs and continuous improvement leads manufacturers to improve their products to remain competitive in the marketplace continually. Following the data collection through the 3-year analysis regarding the modifications on the series vehicles, the article presents the stages of implementing the modifications on the vehicles in the production phase and their distribution depending on the nature of these changes. The permanent evolution to continually modify vehicle's parts, even during the production phase, appears necessary. This research presents the main stages of implementing the changes in the series vehicles, the types of changes, the sources of these changes, and the people involved in process. The series changes require special attention considering the implementation costs significantly exceeding the project phase's costs. Essential factors, such as fast implementation time, analysis and rapid solution identification, costs of modifying equipment, and the entire implementation management, but also the resources involved in this process, should be monitored. Considering the importance of these changes on series vehicles, the article summaries the stages of implementation of these changes and details the main areas of intervention.

Keywords: Process Management, Continuous Improvement, Process-Based Guidance.

Introduction

According to [1] automobile industry has experienced a continuous industrial transformation due to the competition in this field of activity, and car manufacturers have paid more attention to the production process by continuously streamlining its product by ensuring integrity, design, fuel efficiency, emission control carbon and the development of various types of efficient engines. The automobile industry is one of the most importantly adding value industries in the international trade market by developing economies and research [2]. Lately, the car market competition is increasing, the demands of the consumers have increased, and the manufacturers have to adapt to their requirements continuously [3]. Managing changes in the automotive field involve identifying opportunities for improvement through various means and requiring several resources to extract the

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necessary information. Continuous vehicle improvement is essential to meet customer requirements, but it is necessary to remain relevant and succeed in maintaining market position in some cases. In the automotive industry, the extent to which a vehicle is improved is linked to internal and external factors. Several factors have influenced car development in recent decades, for example, customer requirements for increased power, space, and comfort, environmental issues such as noise reduction, exhaust emissions, and fuel consumption, economically oriented influences such as production, fuel consumption, durability, service and not lastly, vehicle safety measures[4][5].

Some of the factors listed above are customer-oriented, and many of them are influenced by government legislation. For example, vehicle and passenger safety regulations emerged in the 1960s and were strengthened in the decades or regulations on carbon emissions proposed by governments, which led to the evolution of technologies and standardization of emissions throughout the automotive field [1].

The management of changes during the production phase of the product life cycle in the automotive field is a complex process through which several stages are completed, and many people are involved in participating in the successful implementation. Considering that the vehicle is a complex product, there are many modifications from different sources in the production phase, being necessary to implement the modifications starting from the identification of the need for modification, going until its realization. Some changes are made to correct certain defects of parts, called quality changes, other changes are made to save financial resources, time or material resources, called economic changes, and others are improvement changes, made after benchmarking analysis of direct competitors [6].

According to [7], 77% of changes are due to internal reasons, while 23% are external reasons. An essential aspect to consider, in addition to the costs and people involved in the process of series changes, is the spread of changes that lead to the involvement of various perimeters of the vehicle related to the change, and the spread changes generate 32.4% of all changes. Therefore, the changes during the production phase of the product life cycle have an essential impact on the costs, time, and human resources involved.

Depending on their nature, these changes can bring benefits to the business: (1) when product evolutions are implemented or (2) economic changes that save money or represent a financial effort for the manufacturer by correcting defects when defects are identified. This research aimed to describe the implementation process and analyze the changes during the production phase of the product life cycle made over three years and finally to offer the picture of changes sequences and ratio.

Types of changes on series vehicles

The need for change is due to several factors and may arise from different directions. In production, the changes implemented on vehicles are of significant importance because they end up being applied following relevant analysis for the car manufacturer or for customers.

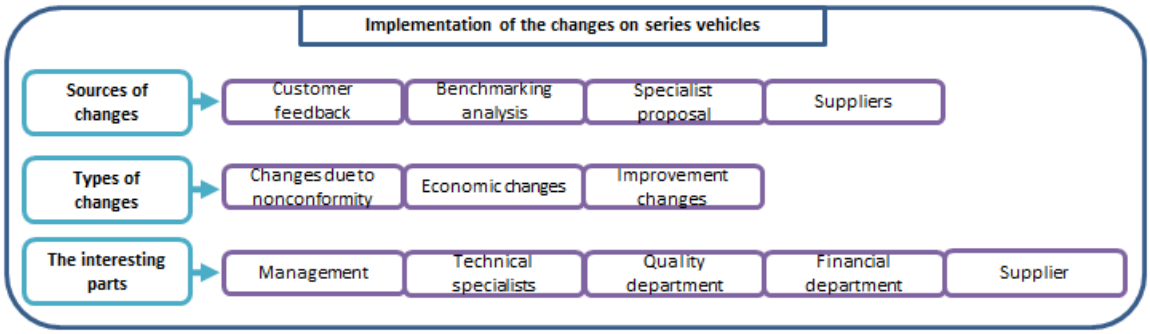

Fig. 1: Implementation of the changes on series vehicles

In the production phase, a series of checks are required when the vehicle leaves the factory. Following the verifications, a series of modifications are identified and proposed for the improvement resulting from the non-conformities resolution.

According to [8], flexibility is considered a competitive advantage, and it is essential for manufacturers to permanently develop their products to be relevant in the market and market their vehicles. For this purpose, benchmarking tests and analysis are performed to adjust their products [9]. Thus, the levels of equipment, design, product quality, and price are studied according to the market's relevant products. Therefore, following analysis, a series of measures are identified to adjust the products to the market requirements and align them with the best competitors.

This type of analysis can lead to product improvement or adjustment, depending on its market strategy. The profitability seen by the manufacturing costs, the used materials, the components manufacturing place, the suppliers are significant for the car manufacturer, so for these reasons, several changes have resulted.

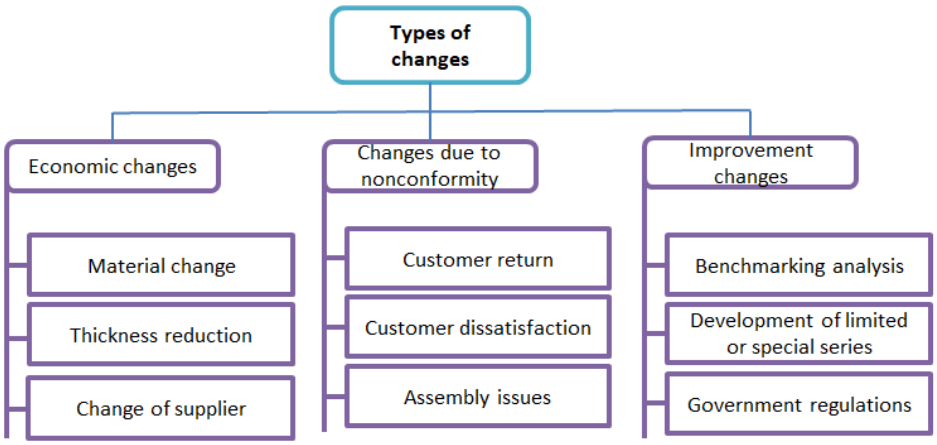

Fig. 2: Types of changes

Economic changes

The decision to implement a change aimed at reducing vehicle manufacturing costs comes from large-scale analysis of the manufacturing process, consumer perception, competitive analysis, and the overall effects on the whole process. These changes are reflected in the quality of the products, quality of used materials, thickness and finishing of parts, and the level of vehicle equipment. Thus, through these types of changes, we find a reduction in the thickness of materials, change type of material, changes regarding the finishes of the parts, or the elimination of specific options or their replacement with cheaper ones, such as manual mirrors instead of automatic mirrors, equipping the vehicle with the air conditioning on a single area or even eliminating it.

The decision for economic changes such as reducing the material or replacing it with lower quality, removing a part, or an option from the vehicle depends on the target market and customer's needs. The changes applied to the vehicle insofar as they do not affect the vehicle's functionality, and the customer's perception correlated with the target market segment.

Quality changes

Quality is one of the main concerns of car manufacturers. Quality expectations must be met and require constant control of all processes, from product design and development to sales and service. Quality management is essential for manufacturing, and continuous improvement of products is imperative for customer satisfaction [10][11].

Customer Return

According to [12], auto repair services have an essential role in solving problems during and after the vehicles are under warranty. Thus, they began to develop their technical expertise to provide services with high profitability. For car manufacturers, the customer's return with the vehicle in service is an opportunity to improve the vehicles in the manufacturing process. The manufacturer analyzes the reasons and non-conformities for vehicles, and following these analyses, improvement measures are proposed for future vehicles to be manufactured.

Customer dissatisfaction

The level of satisfaction is continuously measured and analyzed, and for this, the car manufacturer collects, measures, and acts by the degree of customer satisfaction. For this process, market research is done, and questionnaires are collected from customers. Customer involvement [13] through data collected from market analyses and questionnaires collected from customers is fundamental input data regarding quality improvement decisions or adapting the vehicle to customer preferences.

Mounting problems

The plant's assembly line is another vital source from which opportunities for improvement are identified following inspections [14] and remedied before they reach the customer. These types of changes are dealt with directly by the suppliers responsible for their manufacture.

Product Developments Changes

Competitiveness in the automotive field is growing and leads to product developments in this domain of activity. This competitiveness is translated by the producers' preoccupation with developing new products and improving the existing ones [15]. This competition starts with the design of vehicles [3][16], the applied technologies, and their continuous development [17], but also from the optimization of manufacturing processes [18].

Interchangeability and standardization of components [19] are processes on which car manufacturers rely and help them develop new models and optimize their processes quickly. Competitiveness in the automotive sector leading to product and process evolutions [20] is mainly due to the optimization of processes and costs, the variety of models, and the coverage of market sectors

Development of limited / special series

The evolution is given by the products manufactured in limited series, which involve developing particular components and involving changes in the manufacture of series vehicles. These vehicles are manufactured to satisfy a specific market sector that the car manufacturer intends to open. These products enter the market with individual specifications compared to the standard ones and often lead to innovation in the automotive field.

Government Regulations

Legislation on automotive regulations has begun to tighten, which is reflected in the number of developments on out-of-production vehicles. These regulations require legislation to reduce and control carbon emissions [21] the implementation of passenger and pedestrian safety systems [22, 23], legislation on certifications for new models, global harmonized testing of light vehicles (WLTP, Worldwide Harmonized Light Vehicle Test Procedure) [24].

Changes from suppliers

The suppliers could propose these changes on vehicles, and they can discover an opportunity for improvement for a part or propose a change for reducing the costs or time of manufacturing the product.

Stages of implementing changes

According to [25], in case of a change, regardless of the nature of the change, the organization must define, verify compliance with the requirements and validate the implementations before implementation.

Proposal of the changes

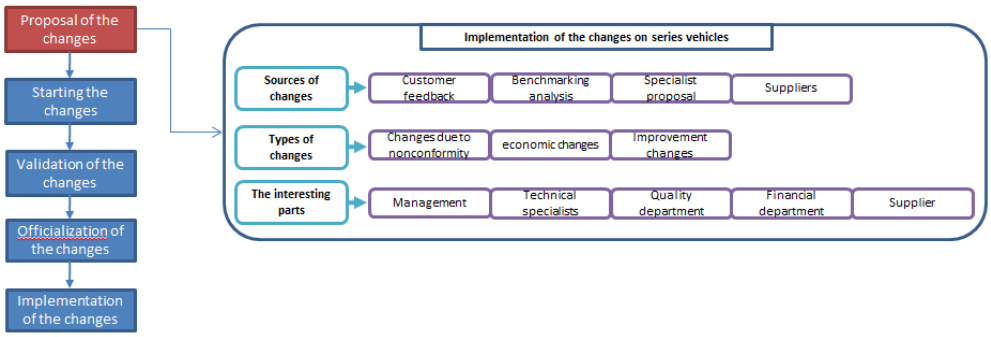

Fig 3. Proposal of the changes

As seen in fig 3, the proposed change stage involves analyzing the sources from which the manufacturer collects information and processes it to continuously improve and optimize the manufacturing process, costs, and time. In order to identify these opportunities, the interested parties are engaged in the process, starting from the clients, suppliers, the management, climbing up to the people engaged in the implementation of the changes.

Starting the changes

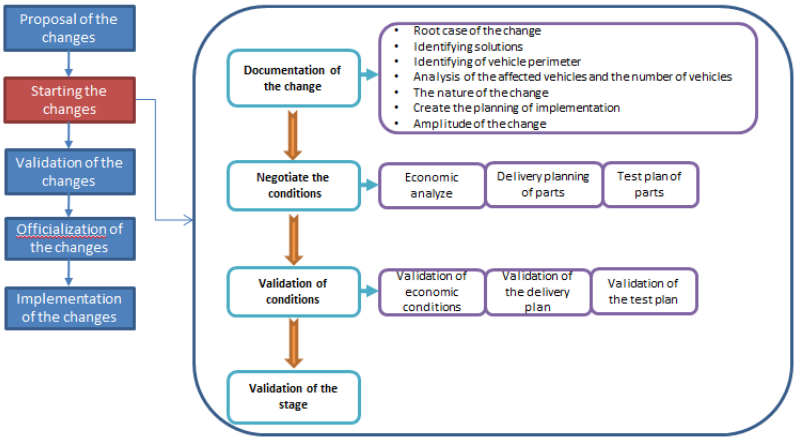

Fig 4. Starting the changes

The change involves documenting it, starting with analyzing the causes that lead to the problem and identifying the solutions. The analysis includes data about the perimeter where the problem or the opportunity for improvement is, the vehicle type, and the number of units. Based on the information, a plan is made, implementation of the parts' modification and delivery, negotiated, and established with the supplier to have a vision on manufacturing implementation. An essential aspect of this process is the economic analysis negotiated with the supplier responsible for making changes to the part and delivery.

Validation of the changes

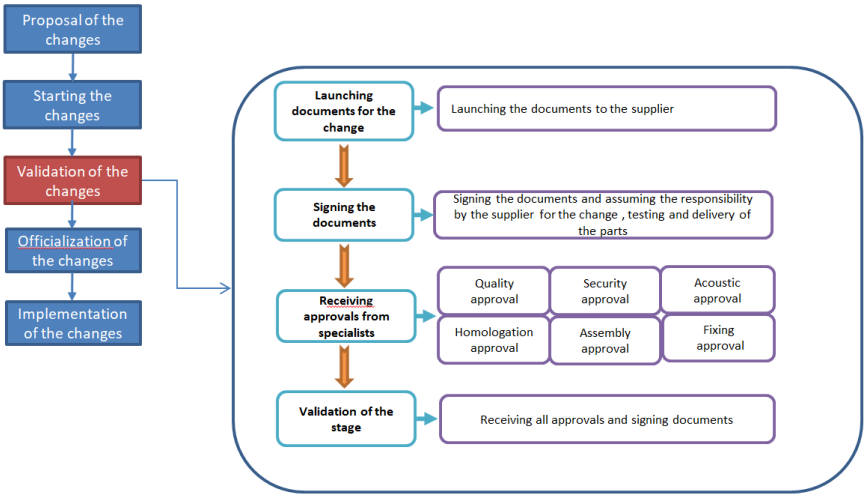

Fig. 5:Validation of the changes

In the validation stage, the documents underlying the change are launched, and the approvals are received from the specialists. The documents are signed by the supplier and the car manufacturer's representatives, representing the agreement of the two parties regarding the technical, economic, and planning part.

Officialization of the changes

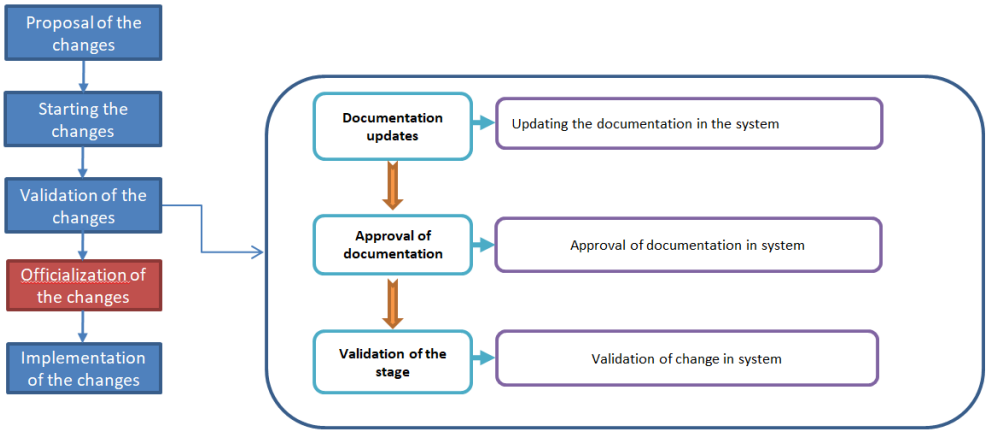

Fig 6.Officialization of the changes

Any change made to a vehicle component must be based on recordings, such as changing the 3D and 2D model of the part, updating cost information, and planning. All these are made in the car manufacturer's systems, as well as of the supplier, and will be validated.

Implementation of the changes

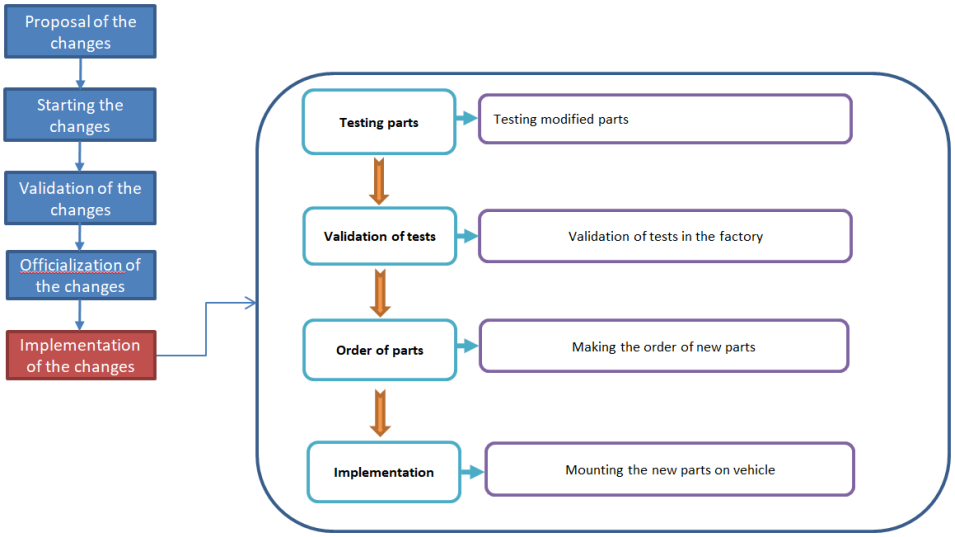

Fig 7.Implementation of the changes

The last stage of making a change on a vehicle implementation and involves testing after the manufacture of new parts. Following the validation of the tests, the parts are ordered, and the parts delivery schedule is observed.

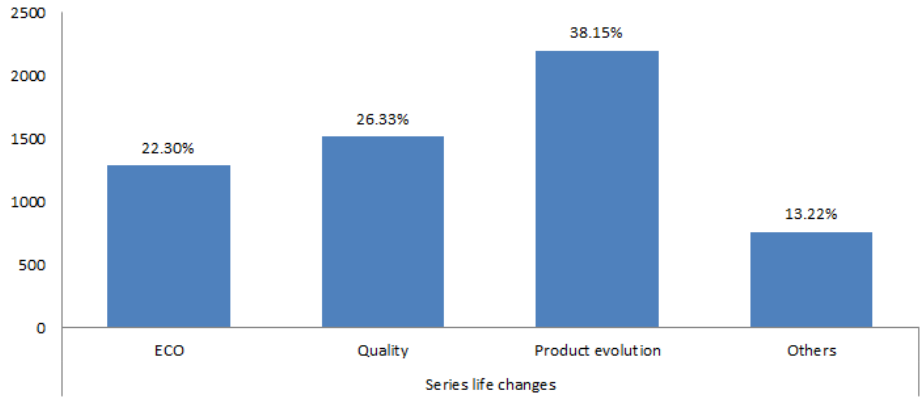

Fig. 8 : Changes on series vehicles

Following the data collection during the three years on series changes and taking into account the large volume of vehicles' changes, the article summarized the main stages of implementing the changes on series life vehicles.

Following the research, based on the data collected in the three years, analyzing 5770 changes, fig 8 shows the share of changes for series vehicles. From the data presented, a percentage of 38.15% of changes represent car manufacturers' concern for the continuous evolution of products with the market evolution and maintaining a competitive advantage through continuous improvement.

This type of change involves implementation costs but which are recovered by maintaining a competitive advantage. The quality changes with a percentage of 26.33% show the manufacturer's care for delivering vehicles without defects, following customer expectations. These changes involve increasing the production costs borne by the manufacturer by correcting the issues on the vehicles.

Another significant type of change is represented by the economic changes with a percentage of 22.30%, through which financial resources are saved and support the manufacturer to adjust its manufacturing costs. A percentage of 13.22% are included other changes than those presented above.

Conclusion

The vehicles' manufacturing process is very complex and requires several stages, but the involvement of several parties in the process to achieve the objectives, too. Most of the time, the manufacturing process's result does not entirely follow the objectives and the initial planning. All of this is due to the complexity of the manufacturing process and the product. As described above, after leaving the production line, the vehicle undergoes various modifications, some of an economic nature, others for the improvement of individual parts or assemblies, or modifications for the alignment at the level of direct competitors on the market. These interventions require rigorous planning of the vehicles' interventions in the manufacturing stage to optimize the costs, the time, and the continuous improvement of the quality of the vehicle to maintain at the level of the market competition.

From the studies so far in the automotive field, we can see that 77% of changes are due to internal reasons in the production phase of vehicles, while 23% are due to external reasons. The high percentage of vehicle changes in the production phase may be due to several factors, as we see most are due to internal reasons, we deduce that preparing the vehicle for the production phase requires improvements and more rigorous analysis.

At the same time, we must keep in mind that the vehicle is a complex product that requires a manufacturing process with many people involved in, many parts suppliers, and most of the time, numerous identified problems in the series production phase. The percentage of 38.15% improvement demonstrates the high level of competition in this field, in which car manufacturers seek to continuously improve vehicles compared to direct competitors and maintain their competitive advantage.

The percentage of 26.33% of quality changes can represent the project phase's mistakes or the need for more rigorous management in this stage to avoid the risks in the production phase. The economic changes, with a percentage of 22.30%, represent how the car manufacturer saves money or other resources, time, human or material resources; 13.22% are necessary changes in the process and are seen as administrative changes for the entire manufacturing process' proper functioning. Following the collection of data over the three years on series changes and considering the large volume of vehicle changes, the article summarized the main steps of implementing the changes in series vehicles by strengthening the image of their effective implementation.

Acknowledgement

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The Identification of Spatial Dependence in The Development Level of Selected Stock Exchanges in The Period Of 2004–2018

Elzbieta SZULC

Nicolaus Copernicus University in Torun, Poland
eszulc@umk.pl

Abstract

The paper concerns the level of development of selected stock exchanges in the context of spatial dependence. The dependence is considered in geographical space on the one hand and economic space on the other. A taxonomic measure of development was constructed to determine the level of development of the stock exchanges. The synthetic measure was calculated on the basis of seven diagnostic variables that were considered as important determinants of the level. The spatial dependence was identified with the use of the join-count test. The main question is whether the objects analyzed, within framework of each separated class as well as between them are grouped based on the existing spatial dependence in the physical sense or create groups featuring similar economic development. The research includes 45 largest trading floors analyzed in the period of 2004–2018. The data used in the analysis was derived from the World Federation of Exchanges (www.worldexchanges.org). Based on the research we have found that both geographic closeness and the similarity of market capitalization as relation to GDP are important factors in the relationships between the level of development of stock markets.

Keywords: stock exchange, spatial dependence, physical and economic distance, join-count test.

Introduction

The question of spatial dependence among world stock exchanges is gaining importance in the context of contemporary processes of globalization and integration of financial markets. The analysis of this issue is possible thanks to appropriate tools offered by spatial econometrics. Applying spatial econometrics makes it possible to evaluate the level of stock exchange development related to the location of markets analyzed and distance between them.

The spatial perspective of the stock markets functioning was considered by a number of studies. Some of the earlier papers, such as e.g.: Erb, Harvey and Viskanta (1994); Longin and Solnik (1995; 2001); Karolyi and Stulz (1996), focused on correlations between stock market returns. Slightly later, the first research on the issue of risk spillover across markets appeared (e.g. Bekaert, Harvey and Ng (2005); Asgharian and Bengtsson (2006); Asgharian and Nossman (2011); Osińska, Fałdziński and Zdanowski (2012)).

There was also an interest in the channels through which stock markets are related to each other. Spatial tools and methods have been used more and more (e.g.: Arnold, Stahlberg and Wied (2013); Weng and Gong (2016); Kisla and Önder (2018); Zhang et al. (2020). In particular, the problem of choosing physical distance vs. economic distance to analyze dependencies between stock markets, was discussed (see e.g.: Eckel et al. (2011); Suchecka and Łaszkiewicz (2011); Fernández-Avilés, Montero and Orlov (2012); Asgharian, Hess and Liu (2013).

The subject of the investigation contains the selected stock exchanges characterized in terms of their level of development. The study includes 45 largest trading floors analyzed in the period of 2004–2018. The specification of the exchanges with the symbols and assignment to the relevant country is presented in Table 1.

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Table1: Specification of the stock exchanges considered

Full name	Symbol	Location	Full name	Symbol	Location
B3 – Brasil Bolsa Balcão	B3	Brazil	LSE Group London Stock Exchange	LSE	Great Britain
Bermuda Stock Exchange	BSX	Bermuda	Luxembourg Stock Exchange	LuxSE	Luxembourg
Bolsa de Comercio de Santiago	BCS	Chile	Malta Stock Exchange	MSE	Malta
Bolsa de Valores de Colombia	BVC	Colombia	National Stock Exchange of India	NSE	India
Bolsa de Valores de Lima	BVL	Peru	Oslo Bors	OSLE	Norway
Bolsa Mexicana de Valores	BMV	Mexico	Philippine Stock Exchange	PSE	Philippines
Bolsay Mercados Argentinos	BYMA	Argentina	Shanghai Stock Exchange	SSE	China
Nasdaq – US	NASDAQ	United States	Shenzhen Stock Exchange	SZSE	China
NYSE	NYSE	United States	Singapore Exchange	SGX	Singapore
ASX Australian Securities Exchange	ASX	Australia	SIX Swiss Exchange	SIX	Switzerland
Athens Stock Exchange	ASE	Greece	Taiwan Stock Exchange	TWSE	China
BME Spanish Exchanges	BME	Spain	Tehran Stock Exchange	TehSE	Iran
Borsa Istanbul	BIST	Turkey	The Egyptian Exchange	EGX	Egypt
Bursa Malaysia	KLSE	Malaysia	The Stock Exchange of Thailand	SET	Thailand
CEESG - Vienna	CEESG	Austria	Warsaw Stock Exchange	WSE	Poland
Colombo Stock Exchange	CoSE	Sri Lanka	Deutsche Boerse AG	DBOEF	Germany
Cyprus Stock Exchange	CySE	Cyprus	Euronext Amsterdam	AEX	Holland
Hong Kong Exchanges and Clearing	HKEX	China	Euronext Brussels	BruSE	Belgium
Indonesia Stock Exchange	IDX	Indonesia	Euronext Dublin	DuSE	Ireland
Japan Exchange Group Osaka	OSE	Japan	Euronext Lisbon	LiSE	Portugal
Japan Exchange Group Tokyo	TSE	Japan	Euronext Paris	PaSE	France
Korea Exchange	KRX	South Korea	Tel-Aviv Stock Exchange	TASE	Israel
Ljubljana Stock Exchange	LJSE	Portugal	Japan Exchange Group*	OGSE	Japan

Note: The stock exchange signed by * was established as a result of consolidation of Japan Exchange Group Osaka and Japan Exchange Group Tokyo.

The level of stock exchange development was defined by a synthetic measure based on seven diagnostic variables, i.e.: X1 – the stock market capitalization, X2 – the number of companies listed on the stock exchange, X3 – the total value of share trading, X4 – the share of five per cent of domestic companies with the highest capitalization in the total stock market capitalization, X5 – the five per cent share of domestic companies with the highest value of share trading in the total turnover, X6 – GDP per capita, X7 – the ratio of market capitalization to GDP.

The theory and empirical analyses were taken into account when selecting the diagnostic variables (see e.g.: Pagano (1993); Demirgüç-Kunt and Levine (1996); Levine and Zervos (1996); Garcia and Liu (1999); Beck, Demirgüç-Kunt and Levine (2003); Seetanah and Ramessur (2008)). It was recognized that the specified variables are important determinants of the development of stock exchanges.

The range of information provided by the World Federation of Exchanges (www.worldexchanges.org), whence we get the data, played a significant role for the spatial and time scope of the investigation.

Methodology

In the investigation there was used the aggregate characteristic of the stock exchange in the form of a taxonomic measure of development. This indicator is understood as a synthetic normalized formula expressed by (Szulc et al., 2014, pp. 129–130; Szulc and Wleklińska, 2015, p. 9):

$$q_i' = 1 - \frac{q_i}{\bar{q} + 2S_q}, \tag{1}$$

where: q_i denotes the synthetic variable determining the level of development of the *i*-th exchange in relation to a development standard, $\bar{q}$ is the average value of the synthetic variable and S_q stands for the standard deviation of the variable.

In this approach the values of the synthetic variable q_i are calculated according to the formula:

$$q_i = \sqrt{\sum_{j=1}^{m} \left(z_{ij} - z_{0j}\right)^2}, \tag{2}$$

where: z_{ij} denotes the value of *j*-th diagnostic variable for *i*-th exchange standardized to 0–1, z_{0j} denotes the value of *j*-th diagnostic variable for the standard of development standardized to 0–1. Thus, q_i means a distance between *i*-th exchange and the development standard.

Based on the values of the taxonomic measure of development, the analyzed exchanges were divided into groups, as follows:

Group 1: $q' > M_e + Q$;
Group 2: $M_e + Q \geq q' > M_e$;
Group 3: $M_e \geq q' > M_e - Q$;
Group 4: $q' \leq M_e - Q$,

where: M_e denotes second quartile (median) and Q means quarter deviation in the distribution of the synthetic measure.

In order to investigate the spatial dependence among the stock exchanges analyzed the join-count statistics were used. The idea underlying the test was borne out of the need to study the dependence between the qualitative variables. The data on such variables may be classified into two or more nominal level categories, which are often marked with different colors. It is then possible to count the numbers of adjacent pairs whose categories are the same, or the numbers whose categories are different. In the case of positive dependence the number of joins of the same category will tend to be 'large' and there will tend to be relatively few joins where categories are different. In the case of negative dependence the opposite will apply (Haining, 2005, p. 79).

The join-count test for categorical data is based on counting the number of adjacencies of particular colors. The basis is a two-color layout – Black-White (BW). Suppose black indicates the presence of the phenomenon or its high level, and the sites where the event of interest does not occur are marked in white. The join-count statistics determine the frequencies of joins: Black-Black (BB), Black-White (BW), White-White (WW). If there is a tendency for similar values to be found together, then the

number of joins where adjacent colorings are the same (BB or WW) will be 'large', the number of joins where adjacent colorings are different (BW) will be 'small' relative to the counts for a random map pattern. This means the positive spatial autocorrelation. In the case of negative spatial autocorrelation where the tendency is for dissimilar values to be found together BB and WW join counts will be 'small' and the BW join count will be 'large' relative to the counts for a random map pattern (Haining, 2005, p. 242). More about the test, see e.g.: Dacey (1968); Cliff and Ord (1973; 1981); Schabenberger and Gotway (2005).

The test can be generalized to more than two colors and for general definitions of adjacency in terms of the distance measure and connectivity matrices. In this study, the proximity between stock exchanges was determined using two approaches. The first uses a matrix of connections with weights established on the basis of the physical distance between the centers of the countries where the stock exchanges are located. The second consists in the consideration of the economic distance in the connectivity matrix. This approach for determining the weights $w_{ij,t}$ consisted in the determination of the economic distance between pairs of stock exchanges according to the following formula:

$$d_{ij,t} = \left| \frac{capital_{it}}{GDP_{it}} - \frac{capital_{jt}}{GDP_{jt}} \right|, \tag{3}$$

where: $\frac{capital_{it}}{GDP_{it}}, \frac{capital_{jt}}{GDP_{jt}}$ – market capitalization as relation to GDP in country *i* and *j* respectively, in the period *t*. Subsequently, the components $d_{ij,t}$ were inverted and entered into the connectivity matrix **W**.

The test in question examines the autocorrelation within as well as between groups, i.e. the test for same-colour joins and the multi-join-count test for same-colour and different colour joins (Bivand et al., 2008, p. 261).

In our investigation the join-count test, as a test applying for qualitative variables, will be used to identify the spatial dependence for four variants of the synthetic variable measuring development of the stock exchange (taxonomic development measure – TDM). The application of join-count tests should allow to verify the preliminary conclusions based on the visual presentation of shaping the values of the TDM.

Results of the Empirical Analysis

Stock Exchange Classification

A taxonomic analysis of the level of development of the exchanges under consideration leads to the conclusion that in all years covered by the study, the American stock exchange NYSE takes the first position in terms of TDM value. The highest capitalization value with a relatively large, though not the largest, number of listed companies, strengthened this stock exchange's leadership position. However, it can be noticed that the value of taxonomic development measure in 2009 fell below and remained at this level until 2015. In the next three years of the analysis this value increased.

The dominance of the United States on the analyzed global market was also emphasized by the fact that in most years of the period considered, the Nasdaq exchange came second. An exception are the years in which the Tokyo TSE Stock Exchange came second in the rankings, i.e. 2005, 2006 and 2013. It can also be noticed that with each successive year, more and more Asian stock exchanges are strengthening at the expense of European and American markets.

Facing the growing interdependences between the world's capital markets and the impact of modern financial products and services on the functioning of market as a whole as well as individual assets, the perception of the global financial market had to change. Development distance between stock exchanges located in America, with the United States at the fore, so far considered the main financial center of the world economy, and Asian stock exchanges with dynamically developing emerging economies, such as China or India, began to decrease.

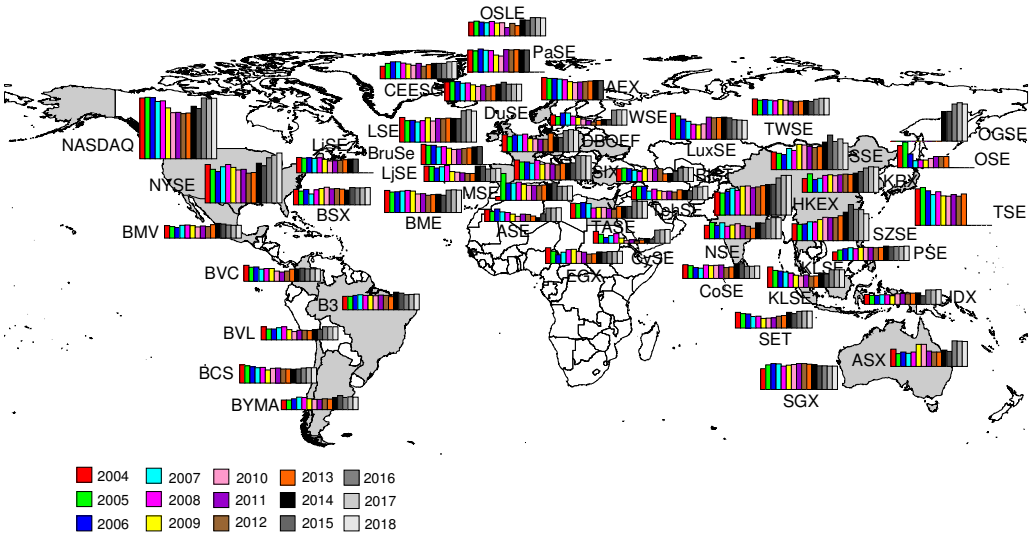

Figure 1: Bar charts of TMD for the investigated stock exchanges in the years 2004–2018.

Figure 1 shows the locations of the studied exchanges on the world map and bar charts of TDM values in the years 2004–2018. This presentation allows us to observe dynamics of changes in the development of the analyzed markets in the arrangement of their location. It can be noted that some Asian trading floors did not see any decline in the value of the taxonomic measure of development after outbreak of the 2007 financial crisis. In the worst case scenario, these exchanges reacted by slowing down or stagnating the pace of growth. This situation can be observed, for example, in the case of the ASX, KRX, SZSE and HKEX exchanges.

There is no doubt that the crisis of 2007 worsened the condition of the American stock exchanges, but it also had a stimulating effect on the process of catching up with the distance between emerging and well-developed exchanges. Especially, in the period of 2016–2018, many European exchanges saw a marked increase in the synthetic measure of development, for example, LSE, SIX, DBOE, TASE and OSLE.

In the conducted study, the analyzed exchanges were divided into groups according to the TDM value. The results of the classification of exchanges considered into groups are presented in Table 2.

In each year of the analyzed period, there are two American trading floors (NYSE, NASDAQ) in the group of the most developed exchanges. Until 2013 inclusive, this group was also co-created by the Tokyo Stock Exchange (TSE). After the consolidation of TSE and the Osaka Stock Exchange (OSE) in 2014, the Japan Exchange Group Tokyo (OGSE) belonged to this group. In most years, they are among the markets representing this group exchanges the once based in Hong Kong and Singapore, i.e. HKEX and SGX respectively.

Table 2: Division of the exchanges into groups by values of the taxonomic measure in 2004–2018.

Year	Group 1	Group 2	Group 3	Group 4
2004	NYSE, NASDAQ, TSE	LuxSE, LSE, HKEX, AEX, OSE, PaSE, BME, SGX, KLSE, BruSE, SIX, DuSE, BCS	SSE,ASX, DBOEF, SZSE, BVC, TWSE, SET, EGX, LiSE, BSX, LJSE, KRX, CoSE, OSLE, B3, NSE, BVL, TehSE, BIST, CEESG, BMV, CySE, ASE, WSE, IDX, BYMA	PSE, MSE
2005	NYSE, NASDAQ, TSE, MSE	OSE, SGX, LuxSE, HKEX, AEX, LSE, PaSE, BME, BruSE, DuSE, KRX, SIX	BCS, KLSE, SSE, SZSE, NSE, SEESG, LJSE, LiSE, TASE, DBOEF, TWSE, OSLE, SET, BVC, BSX, B3, BIST,TehSE, CoSE, ASX, EGX, BMV, BVL, PSE, ASE, BYMA, CySE, IDX	WSE
2006	NYSE, NASDAQ, TSE, SGX	HKEX, PaSE, LSE, AEX, BME, LuxSE, DuSE, BruSE, SIX, MSE	CEESG, SZSE, DBOEF, BCD, KLSE, TASE, BSX, TWSE, LiSE, SSE, ASX, B3, BVC, SET, OSE, OSLE, NSE, LJSE, TehSE, BIST, KRX, ASE, WSE, PSE, CoSE, BVL, BMV, BYMA, IDX, EGX	CySE
2007	NYSE, NASDAQ, TSE, SGX, HKEX	PaSE, BME, SSE, AEX, LSE, SZSE, LuxSE, DuSE, BruSE, MSE, CEESG	SIX, DBOEF, NSE, KLSE, BCS, B3, TWSE, TASE, LJSE, LiSE, KRX, ASX, OSLE, BMV, PSE, BYMA, WSE, BVL, BVC, SET, EGX, BIST, BSX, CoSE, ASE, IDX, TehSE	CySE, OSE
2008	NYSE, NASDAQ, TSE	HKEX, SGX, BME, PaSE, LSE, AEX, SSE, SIX, SZSE, MSE, DuSE, BruSE, DBOEF, KRX	LJSE, BCS, CEESG, LiSE, BSX, LuxSE, B3, OSLE, ASX, KLSE, TWSE, EGX, CoSE, BMV, BVL, BVC, NSE, BYMA, SET, PSE, TehSE, TASE, BIST, CySE, IDX, ASE, WSE	OSE
2009	NYSE, NASDAQ, TSE, HKEX, SSE	LSE, SGX, ASX, BME, SZSE, AEX, KRX, PaSE, BSX, BruSE	DuSE, MSE, SIX, TWSE, CEESG, B3, LuxSE, NSE, EGX, LiSE, BCS, DBOEF, BVC, OSLE, PSE, BIST, CoSE, BMV, KLSE	BYMA, TASE, BVL, LJSE, SET, TehSE, IDX WSE, OSE, ASE, CySE
2010	NYSE, NASDAQ, TSE, HKEX, SSE, SGX	SZSE, ASX, LSE, BME, BSX, AEX, SIX, KRX, PaSE	NSE, LuxSE, BruSE, BCS, MSE, DuSE, TWSE, B3, CEESG, OSLE, PSE, CoSE, BIST, DBOEF, LiSE, EGX, BMV, KLSE	TASE, IDX, BYMA, BVC, SET, OSE, LJSE, BVL, TehSE WSE, ASE CySE
2011	NYSE, NASDAQ, TSE, HKEX, SGX	LSE, SSE, SZSE,PaSE, LuxSE, BME, AEX, KRX, BSX, DuSE, SIX	BruSE, ASX, BCS, CEESG, B3, MSE, TWSE, CoSE, NSE, PSE, BIST, KLSE, DBOEF, LiSE, BMV, EGX, OSE, IDX, BYMA, SET	TASE, BVL, BVC, TehSE, LJSE, OSLE ASE, WSE, CySE
2012	NYSE, NASDAQ, TSE, HKEX, SGX, LSE, SZSE	SSE, PaSE, LuxSE, KRX, AEX, BME, BSX, BruSE	SIX, DuSE, MSE, B3, ASX, BCS, TWSE, PSE, BIST, LiSE, CEESG, NSE, OSLE, DBOEF, BMV, SET, OSE, KLSE, CoSE, BYMA, IDX, BVC, BVL, EGX	TASE, LJSE TehSE, WSE, ASE, CySE
2013	NYSE, NASDAQ, TSE, HKEX, SGX, LSE, SZSE	SSE, PaSE, LuxSE, AEX, DBOEF, KRX, BME, BruSE	BSX, DuSE, MSE, ASX, BCS, CEESG, TWSE, BMV, B3, LiSE, PSE, SET, BVC, TASE, KLSE, CoSE, OSE, IDX, NSE, BYMA, OSLE	TehSE, EGX, BVL BIST, ASE, WSE, CYSE
2014	NYSE, NASDAQ, HKEX, OGSE, SZSE, SSE	SGX, LSE, PaSE, LuxSE, AEX, KRX, BME, B3, BruSE	DuSE, MSE, SIX, ASX, NSE, OSLE, SET, CEESG, LJSE, BSX, CoSE, BMV, DBOEF, KLSE, TWSE, PSE, LiSE, BCS, BVC	BYMA, TASE, IDX, EGX, GVL, TeHSE BIST, WSE, CYSE, ASE

2015	NYSE, NASDAQ, SZSE, SSE, HKEX, OGSE	SGX, LSE, PaSE, LuxSE, KRX, AEX, DuSE, BruSE	MSE, BSX, BME, B3, SIC, NSE, OSLE, CEESG, LJSE, ASX, CoSE, SET, BMV, BCS, BYMA, DBOEF, LiSE, PSE, KLSE, BVC, TWSE	TASE, EGX, BVL, BIST, TehSE IDX, ASE, WSE, CySE
2016	NYSE, NASDAQ, HKEX, OGSE, SZSE, LSE	SSE, ASX, SIX, KRX, SGX, BME, DBOEF	NSE, LUuxSE, OSLE, KLSE, TASE, BSX, SET, DuSE, TWSE, CEESG, BCS, B3, WSE, IDX, PSE, MSE, BIST, ASE, CySE, BMV, BVL, TehSE, LJSE, BYMA, BVC,CoSE, EGX	-
2017	NYSE, NASDAQ, HKEX, OGSE, SZSE, LSE	SSE, KRX, ASX, SIX, SGX, BME, DBOEF, NSE	LuxSE, OSLE, KLSE, BSX, TASE, CEESG, SET, DuSE, TWSE, BCS, B3, WSE, IDX, PSE, BIST, MSE, ASE, CySE, BVL, BMV, BYMA, LJSE, TehSE, BVC, CoSE, EGX	-
2018	NYSE, NASDAQ, HKEX, OGSE	LSE, SZSE, SSE, KRX, ASX, SIX, SGX, BME, NSE, DBOEF	LuxSE, OSLE, KLSE, CEESG, BSX, TASE, SET, BuSE, TWSE, B3, BCS, WSE, IDX, MSE, PSE, CySE, BIST, ASE, BVL, TehSE, BMV, LJSE, BVC, CoSE, BYMA, EGX	-

Note: The groups are numbered from most to least developed.

About 10 trading floors were classified on average in the period considered into the second group, which according to the synthetic measure includes well-developed exchanges. In all years, except 2015, BME belonged to this group. While, until 2015 inclusive, this group was co-created by AEX and PaSE. KRX on the other hand, belonged to it invariably from 2008.

In each year of the adopted 15-year time horizon, the third group is clearly the most numerous group. It includes many of the so-called emerging stock markets. This provides their high development potential. The stock exchanges classified in the third group are characterized by a moderate level of development and their composition has changed slightly in individual years.

The fourth group, represented by trading floors with the lowest development level, usually included European markets located in countries such as Greece, Cyprus, Turkey and Malta, as well as Asian markets, located in the Philippines and Iran, among others.

In the period of 2009–2015, the size of this group increased, which can be explained by the deteriorating economic condition of the countries where the analyzed markets are located, due to the effects of the subprime crisis 2007–2009.

Spatial dependence among the stock markets

Regarding the division of exchanges into groups (see Table 2), the study of spatial autocorrelation was carried out. The use of the join-count statistics allowed for the evaluation of the autocorrelation both within groups and between them.

The motivation for this study was the conviction that the spatial dependence among stock markets can reveal itself in the perspective of the level of development of the exchanges under consideration. The spatial autocorrelation may occur to varying degrees and of different significance depending on this level.

The study was conducted in two variants. In the first variant, a connectivity matrix based on the geographical distance was used to measure the autocorrelation. In the second variant, the connectivity matrix was built on the basis of the difference module between capitalization indices of the analyzed markets. Selected results of the join-count test application are presented in the Tables 3–6. Only the results showing a significant autocorrelation were included.

In the first variant of the analysis, a significant autocorrelation was found only within the second group in 2009 and 2010 as well as within the fourth group in 2011–2015 (see Table 3). It means that in the period of 2009–2010 the well-developed stock exchanges clustered while in the period of 2011–2015 this applies to exchanges with the lowest level of development.

Table 3: Join-count test results within groups for the matrix W based on the geographical distance.

Year	Group	Join-count statistic	p-value	Year	Group	Join-count statistic	p-value
2009	II	1.219	0.003	2013	IV	0.984	0.003
2010	II	1.915	0.000	2014	IV	1.560	0.000
2011	IV	1.068	0.043	2015	IV	1.422	0.000
2012	IV	0.610	0.002	–			

Table 4: Join-count test results between groups for the matrix W based on the geographical distance.

Year	Groups	Join-count statistic	z-value	Year	Groups	Join-count statistic	z-value
2007	I : II	3.419	2.718	2013	I : II	3.072	2.136
					II : III	2.211	-2.032
					III : IV	2.306	-1.659
2008	I : II	3.526	3.446	2014	I : IV	1.965	-3.022
2010	I : IV	2.567	-1.638	2015	I : IV	1.993	-2.676
					III : IV	2.129	-2.143
2011	I : IV	2.248	-1.633	2016	I : III	4.839	-1.694
	II : III	2.396	-1.804				

For example, Figures 2 and 3 show a graphic illustration of the results obtained for 2010 and 2015, respectively.

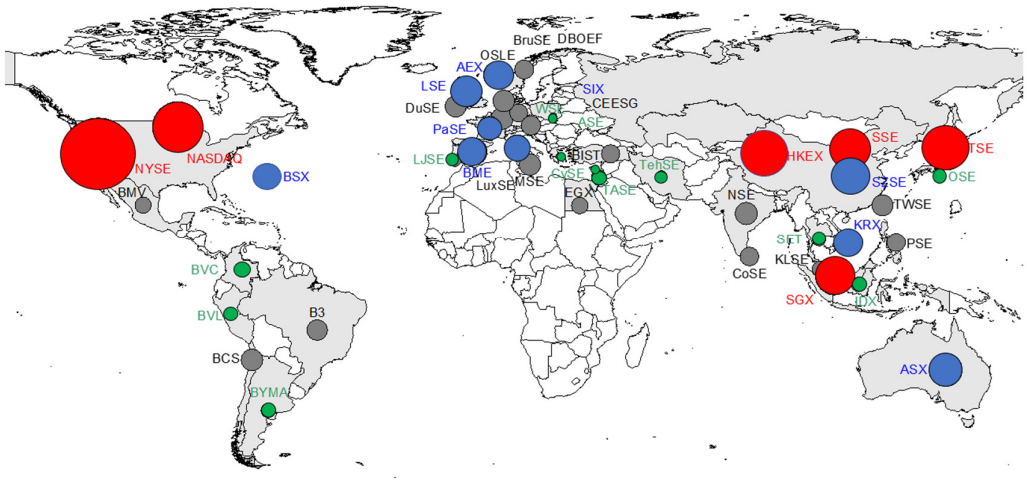

Figure 2: The taxonomic measure of stock exchanges' development in 2010.

Note: The surface of the wheel signals the value of the synthetic variable. The symbols of stock exchanges have different colors depending on the group they belong to. The red color refers to group I. Groups II, III and IV are marked with the following colors: blue, grey and green, respectively.

In Figure 2 it can be seen that most of the exchanges from the second group are located in close proximity. On the other hand, the exchanges from groups I and IV are rather not adjacent to each other.

In turn, in Figure 3 we can see some concentration of exchanges from group IV confirmed by the join-count test, while from group II not confirmed by the test. The underdeveloped exchanges (group IV) are rather not adjacent to the exchanges from groups I and III (see the results of the join-count test for the year 2015 in Table 4).

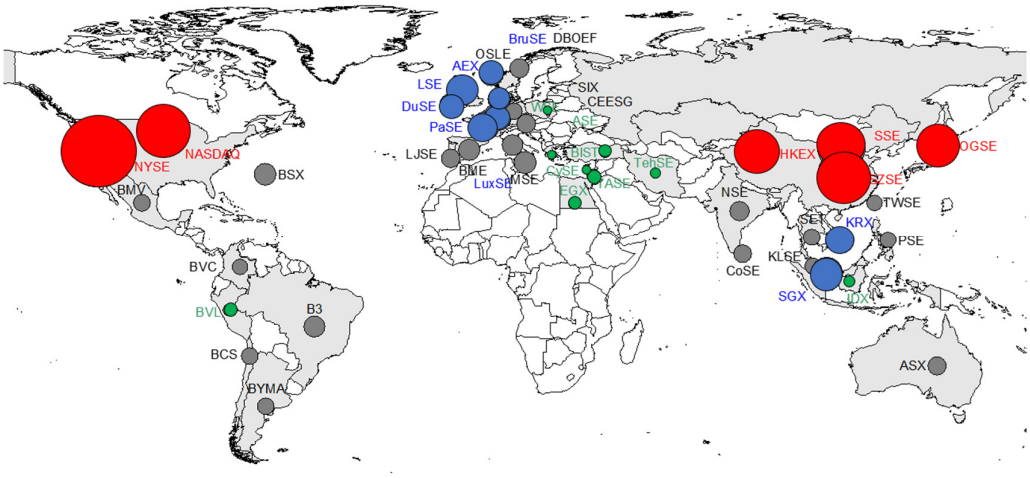

Figure 3: The taxonomic measure of stock exchanges' development in 2015.
Note: Explanations, as above.

It is interesting to study the spatial dependence between groups as well. In this case, statistically significant autocorrelation means more frequent or less frequent associations of objects from different groups relative to random map pattern.

A positive autocorrelation between groups I and II was found in 2007, 2008 and 2013. A negative relationships between groups I and IV were identified in 2010, 2011, 2014 and 2015 as well as between groups II and III in 2011 and 2013, and between III and IV in 2013 and 2015. Negative autocorrelation means that adjacent objects are characterized by a different levels of development. Thus, for example in 2010 and 2015, very well developed exchanges were not neighbors with the poorly developed ones. It is worth noting that in 2016, the negative dependence also applies to very well developed and underdeveloped exchanges. Because this year, none of the analyzed exchanges was qualified to the fourth group, we are talking about the relationships between groups I and III.

In the second variant of the analysis, the exchanges under consideration are characterized by a similar capitalization ratio within groups IV or III, depending on the year of the study (see Table 5). Only in 2016, this 'clustering' also applies to group II.

The study also found a positive autocorrelation between groups III and IV. In turn, the exchanges from groups I and IV as well as I and III, are not similar in terms of the capitalization ratio (see Table 6).

Table 5: Join-count test results within groups for the matrix W based on the economic distance.

Year	Group	Join-count statistic	p-value	Year	Group	Join-count statistic	p-value
2009	IV	2.239	0.003	2015	IV	1.479	0.012
2010	III	2.159	0.005	2016	II	1.337	0.001
					III	6.661	0.000
2011	IV	1.412	0.026	2017	III	6.002	0.020

Table 6: Join-count test results between groups for the matrix W based on the economic distance.

Year	Groups	Join-count statistic	z-value	Year	Groups	Join-count statistic	z-value
2004	I : III	3.229	-3.121	2013	I : IV	1.539	-1.973
	III : IV	3.880	3.225		III : IV	3.907	2.257
2005	III : IV	3.637	2.332	2014	I : IV	1.836	-2.048
					III : IV	4.204	3.032
2006	I : III	2.257	-2.663	2015	I : IV	1.735	-2.012
2007	I : III	2.518	-1.949	2016	I : III	2.451	-2.261
	III : IV	3.876	1.885		II : III	2,454	-3,173
2008	I : II	1.794	-1.653	2017	I : III	4.790	-2.516
2011	I : IV	1.658	-1.905	–			

Conclusions

The study has shown that there are spatial dependencies among stock markets under consideration. Their strength and scope vary depending on the level of stock exchange development as well as the year covered by the analysis. Overall, the dependencies are greater between less developed exchanges (classified into the third or fourth group) and they tend to increase somewhat in and after the financial crisis. This is in line with the opinion of many economists, that the strength of interdependences between financial markets increases in times of economic downturn and decreases in times of prosperity.

Geographical proximity plays an important role in the co-functioning of these markets. The financial distance between the markets is also important, such as the one measured by the capitalization ratio which was used in this study. Identifying the spatial dependence among stock markets, we provide some premise for specifying the spatial econometric models of financial phenomena.

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Retrenchment in Malaysia – Interpreting the Rules

Nehaluddin AHMAD

MA, LL.B., LL.M. (Lucknow University, India), LL.M. (Strathclyde University, UK), LL.D. (Meerut University, India).
Professor, Faculty of Law, Sultan Sharif Ali Islamic University (UNISSA), Brunei Darussalam
Email: ahmadnehal@yahoo.com

Nasrullah Ghaleb ATSHAN

MBA (Human Resources)
Assistant Lecturer, College of Information Technology, University of Al-qadisiyah ,Iraq
Email: nasrullah.ghalib@qu.edu.iq

Gary LILIENTHAL

LL.B. (Sydney University, Australia), Grad. Dip. Legal Pract. (College of Law, Sydney, Australia), M.Psychoanalytic Studies (Deakin University, Australia), Ph.D., (Curtin University, Australia).
Professor of Law, Carrington Rand, Kowloon, Hong Kong, SAR.
Email: carrington.rand@icloud.com

Abstract

The Malaysian Employers' Federation (MEF) has attempted to paint the minimum wage as being more beneficial to foreign than local employees, suggesting a lack of coherence in employers' use of their managerial prerogatives, and blaming retrenchments on the minimum wage. The objective of this article is to analyze critically the laws, procedures, and the principles of retrenchment in Malaysia. The research question is whether employers are terminating workers in Malaysia, actually after having made poor or unsustainable business decisions, but apparently under the specious guise of a claimed unfettered prerogative of retrenchment. Argument tries to show that employers exercising mere prerogative claims necessarily leads to capricious termination decisions, and that redundancies must instead be grounded entirely in law. The configuration of the rules suggests the state recognised the likelihood of underlying employer unreasonableness, *mala fides* and capricious departures from the LIFO requirement. Companies may, in actuality, retrench workers purely to solve errors in their management structure.

Keywords: Managerial Prerogatives; Retrenchment in Malaysia; Capricious Termination Decisions; Employer Unreasonableness; *Mala Fides*; Capriciousness; LIFO Requirement.

Introduction

The Malaysian Employers' Federation (MEF) has attempted to paint the minimum wage as being more beneficial to foreign than local employees. The MEF executive director estimated that a planned increase in the minimum wage would add RM2.5 billion annually to foreign remittances to these workers' home countries. He argued this would impact the strength of the ringgit, adding that employers were forced to depend on the more expensive foreign workers, because of a shortage in local manpower, noting that journalists in media companies had recently been retrenched due to newly mandated minimum wage rules. This suggested a lack of coherence in employers' use of their managerial prerogatives, in seeking foreign workers where locals declined to work for them, and blaming retrenchments on the minimum wage, where employers had failed to adapt to new

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technological and market conditions (Malhotra, 1973). Therefore, the objective of the present study is to analyse critically the laws, procedures, and the principles of retrenchment in Malaysia.

Retrenchment infers a reduction or curtailment of cost or expenses (McCashin, 2019). It is a cutting of expenses, or spending, in response to economic difficulties. However, it does spell out the basic idea of retrenchment, that is, a step that must be taken to reduce business expenses. The Ministry of Human Resources, Malaysia, has defined the word in the ambit of labour law, including closure situations. It states that retrenchment arises from "several factors such as closure of business, restructuring, reduction in production, mergers, technological changes, take-over, economic downturn and others", the causes of redundancy arising from factors such as global economic slowdowns (Muniapan, 2015), declining profits (Muniapan, 2006), change in the nature of work (Parasuraman, 2004), or change in contractual terms of service (Todd & Peetz, 2001). Thus, employers maintain a prerogative to reorganize or execute other kinds of cost-savings (Mohamed & Baig, 2012). The reader might ask how the employer balances these prerogative issues against its mandate to run the business in the interests of the investors by adapting adroitly and quickly to market fluctuations.

Managers describe managerial prerogatives, broadly, as the manager's claim to a right to manage. These so-called prerogatives are said to be entirely discretionary, (Storey, 1983, p. 65) apparently on the basis of managers' high levels of skill. Due to the necessarily bureaucratic and hierarchical nature of managerial prerogatives, management appears in practice to ignore how a prerogative claim might be circumscribed heavily by the administrative law, the industrial relations law and by the general law. This may represent a serious disengagement with both the private and public law.

In the light of these issues, the question arises as to whether employers are terminating workers in Malaysia, actually after having made poor or unsustainable business decisions, but apparently under the specious guise of a claimed unfettered prerogative of retrenchment. Argument tries to show that employers exercising mere prerogative claims necessarily leads to capricious termination decisions, and that redundancies must instead be grounded entirely in law.

The research paradigm is legal analysis, and the research methodology is therefore library research. The article is structured in the logical order of major sections on (a) Principles of Retrenchment, (b) Explaining Retrenchment, (c) The Malaysian Laws of Retrenchment, and, (d) Procedure for Retrenchment.

The configuration of the various Malaysian rules suggests the state had recognised the likelihood of underlying employer unreasonableness, *mala fides* and capricious departures from the LIFO requirement. Companies may, in actuality, retrench workers purely to solve errors in their management structure.

Principles of Retrenchment

Though retrenchment is an exercise of a managerial prerogative, and there is no legal provision that can prohibit any company from cutting their workforce. However, there are certain salient points within employment related regulations that set conditions when conducting any retrenchment exercise. For instance, Section 60N of the Employment Act 1955 clearly states that if there is a situation arises for staff reduction, then the company must retrench their foreign workers first. The Termination and Lay Off Regulations 1980 under Regulations 5(1) indicates that if an employee is not provided a minimum of 12 days' work continuously or pay 12 days' wages in 4 weeks shall be deemed that he/she has been "laid off". Regulation 6 further states that employers are obligated to pay lay off benefits based on the following conditions: (a) 1 – 2 years of service - 10 days' wages for each year of service; (b) More than 2 years – 5 years - 15 days' wages for each year of service; and, (c) More than 5 years - 20 days' wages for each year of service

The Industrial Relations Act 1967 on the other hand provides an avenue for employees who may feel that the retrenchment is conducted in a *mala fide* manner or without valid reasons or as a window dressing with the intention to hire foreign workers. Section 20(3) provides an opportunity for the retrenched employee to file case for 'unfair dismissal' and claim for reinstatement. For employees who

are not covered by the Employment Act 1955, they can file their case and seek any possible remedy if they are not paid any lay off benefits. There are some cases of which the Industrial Relations Court has instructed employers to pay retrenchment benefits.

Explaining Retrenchment

Economic crises bring about layoffs, hiring freezes, and temporary or permanent closures of business divisions. Institutions such as the United States Army, Hewlett Packard, Schlumberger, Microsoft, JP Morgan Chase & Co., or Procter and Gamble, among many others, announced massive layoffs in 2015 (Fortune et al, 2015). Likewise, out of the 1208 executives interviewed by Bain & Company's 14th Management Tools & Trends survey, 61% resorted to downsizing as a management tool (Bain et al, 2013). This suggests that, in times of economic difficulties, the most prevalent strategy for managing human resources is downsizing (Cascio, 2002; Chadwick, et al, 2004; Luan et al, 2013; Trevor et al, 2008; Tsai et al, 2008; Zatzick et al, 2009), to ensure company performance (Luan, 2013) and an attempt to survive and compete in the global economy (Bhattacharyya, 2005).

The Industrial Court has handed down an abundance of awards involving retrenchment. All its awards observe the principle that the reorganization of business is a function within the power and prerogative of the management and no arbitrator should intervene with a *bona fide* exercise of that power. It is not up to the courts to dictate to the management the number of workers it should have. The argument that the company was merely profiting from downsizing had not been accepted either, as it was not necessary to show loss in order to justify retrenchment. The Court, while recognizing the right, rather than prerogative, of the employer to determine the size of his workforce, has however consistently maintained that it must be convinced that the exercise of that power was carried out without any semblance of victimization or unfairness. For example, in *Wha Hay Mooi v Acterna Malaysia Sdn Bhd* ([2010] 2 LNS 0002 (Award No. 2 of 2010)) ([2010] 2 LNS 0002), Khadijah Mahmud, Chairman of the Industrial Court stated:

> The company has the right to reorganize its business for reason of better economy or better management and to retrench any personnel found to be redundant. When the company reorganizes its business operation, the company is entitled to economize its operations including reducing labour court. It is the company's right and privilege to structure its operation in the manner that best fits its requirements. The court finds that the reorganization of the company was a bona fide need and as such the court has no reason to interfere with the company's prerogative ([2010] 2 LNS 0002).

Due to retrenchment, job security may be at stake, which can be a distressing experience inflicting severe economic hardship on affected workers (Mohamed & Baig, 2012). This leads to a worker's shattered life, as he or she is deprived of his major source of income (Benach, 2014), leaving him financially and psychologically distressed. A retrenched worker would face difficulty in finding another job with similar status, and the labor market would be flooded with other job seekers possessing very similar job skills and work experience. Thus, many retrenched workers would not be able to change from one job to another with complete ease.

The effect of job loss would become more apparent if the worker had been in service for a long time and if his job involved only specific skills, which might be of little use to potential new employers (Maslach, 2001). Workers who are unable to use their skills in their new employment, are likely to experience psychological adjustments (Giger, 2011). Coping with these problems, in turn, can create an enormous amount of physical and mental stress, which may contribute to further social and psychological disorders (Giger, 2011). This could lead to dissatisfaction with life and general psychological depression, which increases with continued unemployment (Bester, 2018).

The stability of employment is generally dependent on the economic situation of the country. Although Malaysia is a developing country, it is not spared the impact of globalisation. Over the last three decades the Malaysian economy has experienced tremendous economic development, but with the nation's main commodities prices, such as for rubber, tin, palm oil, among others, falling sharply (Afroz, 2003).

In Malaysia, for example, in 1986 the price of major export commodities, such as rubber, tin and palm oil fell sharply (Afroz, 2003). In consequence of this, the Malaysian economy started undergoing an economic decline, with jobs becoming increasingly scarce. Several large companies, previously considered to be stable, underwent retrenchments. The later economic recession in 1997 was the worst Malaysia had ever experienced. It emanated principally from a financial crisis and stock market collapse, with a massive reversal of foreign capital flow, which had in turn dramatically affected the economy of the country (Thavalingam, 2009).

The September 11 incident in 2001, in the United States of America, had worsened conditions for the Malaysian business community. Being an export-orientated economy and one of the leading exporters of semiconductors and air-conditioners, Malaysia suffered the effects of the drop in exports to major buyer countries such as the United States.

Two years later, the coalition forces' war on Iraq, led by the United States, and an outbreak of severe acute respiratory syndrome (SARS), also adversely affected the Malaysian economy (Thavalingam, 2009). This resulted in slump in business that led many of the biggest corporations into trouble, because of their severely reduced profits. They suffered big losses, some even having to restructure or reorganize their businesses through take-overs and mergers. The worst affected suffered business closures. This caused a rise in unemployment, owing to retrenchments in many sectors of the economy. Newcomers to the labour market found it even more difficult to get jobs. The hardest hit sectors were mostly in manufacturing, commerce, transport, communication, finance and other business services (Aminuddin, 1999). However, the retrenchment of workers on grounds of redundancy is a difficult area of labor law as it has to do with the industrial relations. It raises concerns about economic efficiency, industrial autonomy and social justice (Ramayah, 2004). Also, if the employer carried on business during times of difficulty, it might lead to a situation where both the employer and the workers would be at risk of losing their livelihoods. Therefore, in terminating the employment of some workers, thereby saving both the business and the employment of the remaining employees, it is necessary to restructure the organization (Ariffin, 1997).

In Malaysia, the existing provisions on retrenchment are scattered through regulations, codes, Ministry guidelines and decided cases. Retrenchment of workers cannot be done solely using the labor law, as the courts cannot intervene with the management's decisions of how many employees a company should have and how many should be retrenched (Mohamed & Baig, 2012). As the employer is entitled to organize his business in the manner he considers best, so long as the managerial power is exercised bona-fide, the decision is immune from examination even by the industrial court. However, the industrial court is empowered, and indeed duty-bound, to examine the facts and circumstances of the cases to determine whether retrenchment was procedurally fair (Mohamed & Baig, 2012). Although the code may not be legally binding, the Industrial Court encourages compliance with the Code. Should there be any blatant disregard to the Code, the Industrial Court may conclude that the retrenchment exercise was carried out mala fide and for other collateral purposes. For example In *Kurnipulan Jetson Bhd v Tai Ai Ling* ([2000] 3 ILR 377), the termination of an employee was apparently justified on the ground that the claimant's position was redundant. The Industrial Court observed that the evidence before the Court suggested that the company was financially stable and the fact that one of its subsidiaries was facing financial problems cannot be adopted as an excuse to justify the retrenchment of the employee employed by the parent company. The Court then ruled that there was a breach of the Code of Conduct for Industrial Harmony when the company had failed to consult her or give her early notice of a possible situation of retrenchment and found that she was victimized ([2010] 2 LNS 0002)

Normally, redundancy will lead to the retrenchment of workers. Retrenchment must be carried out according to the prescribed procedures. Unless it is done in line with the requirements of labour law and court practices, the retrenched employees may invoke s 20 of the Industrial Act 1967 and bring an action against the employer for wrongful dismissal. In determining whether the employer has made the right decision in exercising retrenchment, the court will normally look into two main factors as described in the case of *Radio & General Trading Sdn Bhd v Pui Cheng Teck & Ors* ([1990] 2 ILR 242) that is: first, did redundancy situation arise leading to retrenchment; and second, if there is a redundancy situation, whether the retrenchment is done in conformity with the accepted standards of procedure. According to labour law, retrenchment is considered justified if it fulfils these four criteria:

it must be bona fide; it must comply with the collective agreement; it must comply with the statute; and, it must observe the "last in first out" ('LIFO') principle (Award 243 of 1990).

Also, In Malaysia, the Employment (Termination and Lay-off Benefits) Regulations 1980 (the 1980 Regulations), enacted pursuant to s 60J of the Employment Act 1955, provide legislative protection to employees for involuntary termination of employment. The above Regulations are applicable only to certain categories of employees covered by the Employment Act 1955, as specified in the Schedule to the said Act. Workers who do not come within the purview of the Act may have their legal rights protected in a collective agreement, and in the absence of any specific provision in individual contracts of employment, will not be entitled to any termination benefits in the event of retrenchment. For example, in the case of *Harris Solid State (M) Sdn Bhd and Ors v Bruno Gentil Pereira & Ors [1996] 3 AMR 3546; [1996] 4 CLJ 747*, the court held that, where the termination of the claimants was started to be on operational grounds, and the claimants were all union members, it was actuated by victimization and unfair labor practice.

Retrenchment of workers on grounds of redundancy is a difficult situation as it involves employees who have done no wrong. They are, in most cases, to be regarded as competent and loyal workers to be dismissed due to economic needs. Therefore, the procedure involved in making an employee redundant should be carried out properly and the employee must have been justifiably dismissed. To avoid a claim of unjustified dismissal, an employer must be able to prove that the redundancy was genuine and that it followed a fair procedure in implementing the redundancy. For example, in case of *Gabungan Persahaan Minyak Lengkap Sdn V Heng Mee Oo (1990) 2ILR 33* Radio & General Trading Sdn Bhd v Pui Cheng Teck & Ors, where the claimant was made redundant but the job with the same duties and functions remained, retrenchment was held to be not genuine. Therefore, termination of an employment contract must flow from justifiable grounds of redundancy and this includes grounds of redundancy, which must be bona fide and untainted by unfair labour practice. An employer's unilateral declaration of redundancy must be justified on the basis of genuine commercial reasons and the decision to dismiss must be done in good faith and carried out with fairness (Mohamed & Baig, 2012).

Third, as for provision of termination benefits, the term 'termination', in industrial law, refers to the termination of the employment relationship. The employer may terminate the contract when retrenching the employee. In Malaysia, the Employment (Termination and Lay-off Benefits) Regulations 1980, ('the 1980 Regulations'), provide legislative protection to employees for involuntary termination of employment. The above Regulations are applicable only to certain categories of "employees" under First Schedule of the Employment Act 1955. This Act only applies to manual laborers, meaning those whose wages are RM 2000 or below. Workers who do not come within the Act may have their legal rights protected in a collective agreement, as concluded by the employer and the workers' trade union. However, those not governed by a collective agreement, and in the absence of any other specific provision in individual contracts of employment, will not be entitled to any termination benefits, in the event of retrenchment (Mohamed & Baig, 2012). Also, when a redundancy situation has caused a worker's retrenchment, the affected worker must receive retrenchment benefits based on the length of his or her service with thes former employer. The aim of these benefits is to help the employee cope with the difficulties of job loss and to act as a reward for loyalty and service to the company. Therefore, there is a need to critically examine the formulations for compensation of these employees.

The Malaysian Laws of Retrenchment

In Malaysia, the laws of redundancy are embodied in statutes. The Employment Act 1955 and Employment (Amendment) Act 1998 requires the employer to give adequate prior notice of retrenchment. S. 12(3)(c) states that the minimum statutory notice to an employee shall be as per s. 12(2), providing it shall not be less than the following:

a) four weeks' notice if the employee has been employed for less than two years

b) six weeks' notice if the employee has been employed for two years or more but less than five years;

c) eight weeks' notice if the employee has been employed for five years or more.

The employer may also make a payment, in lieu of prior notice, which must be equivalent to the notice given. In default of this requirement, the employer may be liable for prosecution under s 99A of the Employment Act, which carries a maximum fine of RM 10,000.

According to the First Schedule of this Act, a person is an employee under the Act if his or her wages are less than or equal to RM1,500 per month, or is a member of an excluded categories. Otherwise, the situation is governed by the employer applying all the terms and conditions stated in their contract of service.

The Act also entitles employees to certain retrenchment benefits, based on their employment terms and conditions, unless the collective agreement is silent on retrenchment notice and benefits, so that the provisions of the Act should prevail. Section 60J provides that the Ministry can order the employer to pay termination, lay-off or retirement benefits. Regulation 3(1) of the Employment Regulations (Retrenchment and Lay-Off Benefits) 1980 provides that the employee should be compensated, whenever terminated or retrenched, and his or her employment was not less than twelve months. There are categories of employee who may be exempted from receipt of this payment. They are as follows.

a) whose service under the contract of employment is less than twelve months

b) whose contract of service has been terminated by reason other than retrenchment or lay-off, for example due to retirement, misconduct or voluntary termination by the employee

c) if the employee 's contract of service has been renewed, or if he is re-engaged by the same employer under a new contract of service has been renewed, or if he is re-engagement by the same employer under a new contract of service on terms and conditions which are not less favourable than the previous contract, and the renewal or takes effect immediately upon the expiry of the previous contract of service

d) If within seven days from the date of expiry of the termination notice, the employer has offered to re new or to re-engage the employee under the new contract of service on terms and conditions which are not less favourable than the previous contract, and the renewal or re-engagement takes effect on or before the termination date and the employee has refused to accept the offer without any reasonable excuse.

Regulation 6 states further that the number of days of wages entitlement, for each year of employment is as follows:

(a) 10 days between one and two years' service

(b) 15 days between two and five years

(c) 20 days f the employee has served for more than five years

The Act has also laid down guidelines for selecting types of employees to be retrenched. According to s 60N of the Employment Act 1955 (Amendments 1998), when exercising retrenchment, the employer shall not terminate the services of the local workers unless he has first terminated the services all foreign employees working in a similar capacity to the local employees.

Procedure for Retrenchment

In retrenching the employee due to reorganizing or redundancy, the employer has to follow The Code of Conduct for Industrial Harmony 1975 where Clause 20-24 of the Code emphasizes redundancy and retrenchment. The Code, in the document on “Areas for co-operation and agreed industrial relations practices” provided under Clause 7, stipulates the guidelines for employers in the event of redundancy and retrenchment. When redundancy is imminent, the Code recommends that the employer should take steps to minimise reduction of workforce by adopting the following measures:

- Limitation on recruitment;
- Restriction of overtime work;
- Restriction in number of shifts or days worked in a week;
- Reduction in the number of hours of work;
- Re-training and/or transfer to other departments/work.

The code also recommends that prior consultation should be made with the employees and the trade union before steps are taken to reduce the workforce, i.e. if retrenchment becomes necessary, the employer should adopt the following measures:

- Provide early warnings to the workers concerned;
- Implement schemes for voluntary separation and retirement including payment of redundancy and retirement benefits;
- Retire employees who are beyond their normal retirement age;
- Spread termination of employment over a longer period;
- Ensure that no announcement on retrenchment is made before the workers and their representatives or trade union have been informed.

The code also encourages the employer to select employees to be retrenched in accordance with some objective criteria. Such criteria should be worked out in advance with the employees' representative or trade union, as appropriate.

Although the code may not be legally binding, the industrial court encourages compliance with the code, the industrial court may conclude that the retrenchment exercise was carried out mala fide and for other co-lateral purposes.

Also, he should follow the process the certain procedures that has been provided by the Employment Act 1955 and Court of Industrial Relation IRA Act 1967. Besides the Code the employer has to follow the principles of LIFO as a basis to select the employee(s) to be retrenched. However, for foreign workers, the principle of although senior, must go first (FWFO) rule is applied. The LIFO principle states that:

> All things being equal, the employee with the least number of years' service should be the first employee to be identified to be retrenched (*Radio & General Trading Sdn Bhd v Pui Cheng Teck, Gan Sek Teng, Foo Say Tuan & Goh Tok Eng* ([1990] 2 ILR 242).

It ensures that the senior employee is rewarded for his loyalty and lengthy service. The junior who is retrenched, although will suffer some hardship as a result of the loss of employment, will find it less difficult to secure or retain for another job when compared with a senior member of the workforce (Parasuraman, 2004). It is fair not only on the employees but also on the employer. Retrenchment in accordance with the LIFO principle will be less costly to the employer, in terms of retrenchment benefits that are payable (Chen, 2007). For example,

An early exposition of this principle may be found in *Sharikat Eastern Smelting Bhd v Kesatuan Kebangsaan Pekerja-pekerja Perusahaan Logam Sa Malaya* (Award No 16 of 1968) wherein the Industrial Court made the following observation in respect of this principle:

> It is well-established and accepted in industrial law that in effecting retrenchment, an employer should comply with the industrial principle of last come first go unless, there are some valid reasons for departure. This means that the employer is not entirely denied the

> freedom to depart from that principle but that he can only do so for sufficient and valid reason.

The principle of LIFO is to avert the discrimination of employees in retrenchment exercises. The principle of LIFO accords with the principle of equality and unlawful discrimination guaranteed by Art 8 of the Federal Constitution, which precludes persons in a similar situation from being treated differently. LIFO operates on the premise that management should retrench the latest recruit in a particular category.

Firex Sdn Bhd v Cik Ng Shoo Waa ([1990] 1 ILR 226) provides a clear illustration of the principle of LIFO. The Court held, inter alia, as follows:

> When an employer claims to have dismissed a workman in accordance with seniority, i.e.' last come, first go, he must show that he made the choice from among workers doing like work. If the evidence shows otherwise, the dismissal may be regarded as not being made bona fide.

The limitations of the LIFO principle were elaborated by the industrial Court in *Association Pan Malayisa Cement Sdn Bhd v Keatuan Pakerja-pekerja* Perusahaan *Simen (M) Perak* ([1986] 2 ILR 1612), which adopted the principle laid down by the Supreme Court *in Indian Cable Co Ltd v Its Workmen* (1962 (1) LLJ 409). In the *Associated Pan Malaysia Cement Case* ([1986] 2 ILR 1612) the learned Chairman observed that "the LIFO principle is subject to two limitations; Firstly, it operates only within the establishment in which the retrenchment to be carried out. Secondly, rule applies only to the category to which the retrenched the workers belong. According to the Chairman:

> The "establishment" should be construed in its original sense, which means "the place at which the workmen are employed, and it is of essence of the concept of an industrial establishment that it is local in its set-up.

LIFO requires the employer to select the more junior employee in the category of employment for retrenchment. Category refers to a particular description of work and is distinguishable from a grade or scale within the employment structure. Category essentially means similar or like work; while a grade is generally closely linked to the salary structure (Malhotra, 1973).

Malhotra in *The Law of Industrial Disputes* provides a distinction between grade and category:

> The doctrine of last come first go' has to be borne in mind only with respect to different categories of workmen working in an industrial establishment and not to the whole industrial establishment (Malhotra, 1973). There is, however, a clear distinction between a class or category and a grade. The class or category is a group in which posts of particular description are included and the grade has reference exclusively to scales of pay. The word 'category' is therefore, not synonymous with grade. Category means a class or trade such as turner, motor mechanic, electrician, etc. But for this safeguard, very absurd and anomalous situations giving rise to a spate of industrial disputes would arrive (Malhotra, 1973).

An illustration of the distinction between category and grade is also found in *Guoman Port Dickson v Ahmad Akmal Mohd Yunos* ([2001] 1 ILR 875). In this case, an assistant beverage manager was retrenched. He claimed that there was a breach of LIFO as he was more senior in service to another Chinese restaurant manager who joined the hotel after him. The Industrial Court ruled that there was no breach of the LIFO principle as the Chinese restaurant manager was employed as full manager, which was a position higher and more senior in rank (or grade) as compared to the position of assistant beverage manager. Similarly, in case of *Dr HC Huang Consultancy Engineers Sdn Bhd v Lim Choon Ntia* ([2000] 2 ILR 330), there was no breach of LIFO as the employees who were retained were employed as draughtsman and clerks, which were of a different category from the claimant, who was employed as an engineer.

If there was failure to comply with the LIFO principle, the retrenchment is *prima facie* invalid and the dismissal would be without just cause or excuse, unless the employer is able to show reasonable and cogent excuse for departing from the principle. The Industrial Court would then have the power to order reinstatement of the employee to his former position together with the necessary monetary compensation.

Where there is only one employee in a particular category, LIFO would not be applicable. This is because there would be no basis for a comparison to be made when there is only one position to be discharged. This can be seen in case of *Behn Meyer & Co (M) Sdn Bhd v Puan Jariah bte Baharum & Anor* ([1994] 1 ILR 165), where the Industrial Court held that the LlFO principle could not apply to the claimant as she was the only employee in the category of executive in the insurance department in the company (Thavarajah & Low p. 30).

Thavarajah & Low (2009) stated that the following must be borne in mind when applying the LIFO principle.

> 1. The employer is merely required to examine the length of service in the category and not the entire length of employment in the organization.
>
> 2. The application of the LIFO principle is limited to within the establishment in which the retrenchment is to be made and the category to which the redundant employees belong. (Thavarajah & Low, 2009, p. 50).

In the 1986 case of *Associated Pan Malaysia Cements Sdn Bhd v Kesatuan Pekerja-Pekerja Perusahaan Simen(M) Perak* ([1986] 2 ILR 1612), the company retrenched 21 of its employees in an economic downturn, which had caused excess production capacity and low consumption of the company's cement product. The company selected for retrenchment 21 of its most junior lorry drivers, however 12 of those drivers were more senior to some lorry attendants. The company then offered the 12 drivers alternative employment as lorry attendants. Eleven of them accepted this offer. Therefore, 11 lorry attendants with less service were retrenched in favour of the lorry drivers. The union claimed a violation of the LIFO principle, arguing that the company did not take into consideration its employees at another location. The Industrial Court held that it would be impractical to consider the employees at the other location, because the two works were entirely separate operations. It also ruled as reasonable that the company viewed the lorry drivers and lorry attendants as one unit (Malhotra, 1973).

Malhotra (1973) viewed the above case such that the company had the inherent right to select how the workmen would be retrenched so long as its decision is not capricious, without reason or is *mala fide* or actuated by victimization or unfair labor practice. The selection must not be unfair between or among comparable employees, for such reasons related to trade union activities or against an agreed procedure with the trade union or against customary practice, such as the principle of "LIFO".

A starting point of the court’s inquiry would be to examine the corporate history to the company, and its affiliation with its related companies. One should also enquire whether the companies operated their business alike, whether the terms and conditions of employment were generally consistent with each other, whether an employee was transferable within the group companies and whether the composition of the board of directors of the respective companies was substantially similar (Chen 2007).

The employer must produce documentary evidence to satisfy the Industrial Court that it had cogent reasons for departing from the rule. Attendance records, performance appraisals, the quantum of annual increments or bonuses or the lack of the same, in addition to warning letters, minutes of counselling sessions, etc., are some of the evidence. In the absence of any such documentary evidence, it is unlikely that the Court would endorse the departure from the LIFO principle. The Court would be reluctant to rely on subjective or purely oral evidence. There are few circumstances on which LIFO principles may be departed. The circumstances are per Article 22(b) of the Code of Conduct of Industrial Harmony, which stipulates selecting employees in accordance with objective criteria, as had been worked out in

advance with the employee's representative or trade union, including: efficiency; ability and qualifications; length of service and status; age; family matters; national public policies.

In the 1991 Malaysian case of *Malaysia Shipyard & Engineering Sdn Bhd D Mukhtiar Singh & 16 Ors* [1991] 1 ILR 626, the Industrial Court expressly endorsed an independent selection criterion adopted by the company, instead of the LIFO principle. The company applied selection criteria using a point system that weighed age, performance, medical, and disciplinary records of the employees in the organisation. The Industrial Court held that the onus of proof was on the employer to show these selection criteria were fair. The employer was also expected to act reasonably in determining the issues.

Conclusion

The research question was whether employers were terminating workers in Malaysia, actually after having made poor or unsustainable business decisions, but apparently under the specious guise of a claimed unfettered prerogative of retrenchment. Argument tried to show that employers exercising mere prerogative claims necessarily led to capricious termination decisions, and that redundancies must instead be grounded entirely in law.

There is no Malaysian legal provision that can prohibit any company from cutting their workforce, suggesting the possibility of employer capriciousness. There are only regulatory fetters on retrenchment procedures. Employees feeling that the retrenchment was *mala fide* or without valid reasons could file cases for 'unfair dismissal' and further claims for reinstatement.

The principle that the reorganization of business is a function within the power and prerogative of the management and no arbitrator should intervene with a *bona fide* exercise of that power, suggests that it is not based in law, but solely in some measure of an employer's bona fides. The employee argument that the company was merely profiting from downsizing had not been accepted by the courts. This is because it is unnecessary for the company to show loss in order to justify retrenchment. This shatters the employer argument that retrenchments are solely for economic reasons beyond their control.

Thus, retrenchment must be carried out according to the prescribed procedures. The Code of Conduct for Industrial Harmony 1975 may not be legally binding, but the industrial court encourages compliance with the code. When employers do not comply with it, it is open to the industrial court to conclude that the retrenchment was *mala fide* or for other unstated collateral purposes. The employer is therefore also constrained into producing documentary evidence to satisfy the Industrial Court that it had cogent reasons for departing from the LIFO rules for retrenchment. Overall, employers are expected to act reasonably in determining the issues prior to retrenchment.

The configuration of the rules suggests the state had recognised the likelihood of underlying employer unreasonableness, *mala fides* and capricious departures from the LIFO requirements. Companies may, in actuality, retrench workers purely to solve errors in their management structure.

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Irritability and Anger in COVID -19 Related Tweets: Its Psychological Content and Dynamic (Introduction to Research of Black Swan Event Impact on Stock Market)

Tomasz KRUSZEWSKI

Nicolaus Copernicus University in Torun, Faculty of Philosophy and Social Sciences, tomkrus@umk.pl, Poland

Joanna MICHALAK

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, joanna.michalak@umk.pl, Poland

Abstract

The aim of this paper is to explore the COVID-19 hashtag data from March 2020 Twitter posts. We conduct emotional profiling of anger. We use bigram analysis and the analysis of the tweets volume dynamics. We treat COVID-19 as a black swan for the stock market in which we enter the behavior of Twitter users around the selected hashtag. Presented exploratory data analysis suggests that anger comes during periods of increased Twitter activity. Thus, we argue that it can influence the decision-making process of an individual.

Keywords: social media, Ekman's model of emotions, stock market, COVID-19

Introduction

Since March 2020, many works related to COVID-19 has been created (Kufel, 2020; Lyu et al, 2020). In the field of social sciences, they are related to mental health, behavioural economics, or sociology. They introduce data mining methods to process large body of textual data from social media. Twitter was chosen as the narrative space because it represents a fertile field for user opinions, expert views and news (Xue et al, 2020). In the time of lockdown social media replaced real communication and increase the intensity of the discussion. New cyber landscape of pandemic has formed. For example, English tweets related to COVID-19 hashtag reach over 600,000 in March compared to the S&P500 hashtag in previous years (around 250,000 tweets). This represents a significant percentage of world's (public) discussion. Twitter become a mirror of emotions and social mood. We can treat it as a representative sample for pandemic case studies.

Social media data are multidimensional. They capture trends on a global and local scale (Ahmed et al, 2020), presents the opinion of writers and influence the emotional state of readers. Information varies in quality, from official news to disinformation – especially during a pandemic a community is susceptible to conspiratorial thinking (Sharma et al, 2020). Scientists considering about the role of feelings in creating and spreading information as well as related them social groups in social networks (Pastor-Escuredo, 2020). As shown in next section, papers from area of data science and behavioural economy tends to detect and predict patterns in pandemic but not asking why pattern exists. Explanatory theory is complementary for these researches and must be carry also. During the time of uncertainty, the emotional processes that taking place in virtual community even more influence decision-making processes and feelings of individual. The susceptibility of an individual is strengthened by higher role of emotions than rationality in thinking. In such processes, social media is one way to calm down after posting your thoughts (Ahmed et al, 2020). From the other side emotions and sentiment are driven forces for dynamics of information and can affect some real indicators – especially stock market when information is conductive to spread of emotions such as fear or angry.

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Summary up, big social dataset has some psychologically meaning and attributes by which we can insight on human behavior and behavioural changes (Michalak & Samek, 2020).

With this, we present a pilot study on the mining patterns of psychological categories of human behavior during a pandemic based on big social data. The aim of this paper is to explore the COVID-19 hashtag data from March 2020 Twitter posts and present emotional profiling with an example of anger. Anger is an emotion that should naturally arise during events like a pandemic.

Emotions

According to Plato, we are driven by two opposing forces. One of them is calm and predictable, the other is wild and unpredictable. Due to its unpredictability, the second is dangerous. Since the time of Plato, many philosophical and later scientific works on the nature of emotions has been written. Nowadays, although the biological mechanism of emotions is known we still are not able to fully control or correct them. Thus, due to the evaluative nature of emotions, they significantly influence behavior and decision-making process. Emotions cause somatic responses, behaviors and thoughts (simplifying) according to the direction of emotions, positive (pleasant) valance or negative (unpleasant) valence. For example, fear activates the sympathetic nervous system, a component of the autonomic nervous system responsible for mobilizing the body (Pocock & Richards, 2006). Consequently, increased levels of cortisol and epinephrine accelerate the heart rate, breathing, stomach tightness, increased muscle tension, etc., which we read as stress and act within the fight-or-flight response. Decisions are not directed by an analytical and balanced thinking but result from the stimuli that appeared seconds ago, thus they are biased by high error. Summarizing, emotional processes are psychological processes which are the source of emotions and guide cognition, behavior and determine the importance of objects, events, information as well as other peoples. This is one of many ways for understanding emotions, as there is no consensus which way is right. Depending on the cognitive orientation, emotions are identified with feelings while others separate them. In effect they introduce such terms as mood, affect, sentiment. With the increase in the resources of big social data, the discussion on terminology went beyond the framework of psychology. In NLP there is the concept off sentiment analysis. Over time, emotions recognition, emotion processing or emotion analysis was added.

The global experience of 2020 COVID-19 pandemic provide us to observe people's attitudes in case of new stimuli, previously not observed. First, the scale of the epidemic is unprecedented. Second, the socio-economic changes that have occurred since previous similar events are one of the factors determining the incomparability. Third, real-time communication (social media) influences certain phenomena such as disinformation, affective contagion or drives the dynamics of information. The presented factor are additional stimuli that affect the emotional states. Situation of COVID-19 caused many different emotions and feelings among individual, as well as social mood.

Among all emotions, in research, the value of anger and irritability caused by reports on COVID-19 has become particularly important. These reactions are strong enough to determine the decision-making process of individual as well as group. We use the commonly Ekman's model of emotions. Paul Ekman came to important conclusion that facial expression of certain emotions is the same in representatives of different cultures and different times. This universality of facial expressions made him recognize that the emotions that cause it are typical for homo sapiens, regardless of the phenotype developed by the individual. Ekman originally pointed out that these universal emotions are wrath, grossness, scaredness, joy, loneliness and shock. Then he expanded the list of basic emotions (positive or negative) by these that are not necessarily encoded in facial muscles. It consists of amusement, contempt, contentment, embarrassment, excitement, guilt, pride in achievement, relief, satisfaction, sensory pleasure and shame (Ekman, 1999). The listed emotional states arise in the limbic system (or paleomammalin cortex) which, is short, organizes the organism's vegetative processes related to its survival, and therefore regardless of will and consciousness. Action patterns are aimed at regaining a sense of control, concentrating energy, realizing from suffering, suppressing other emotions (Alia-Klein, 2020). It seems to that anger, scaredness, loneliness and shock can arise during pandemic and can be amplified by information from social media.

The underlying cause of irritability is fear and other stressors. It can be assumed that although irritability is not controlled, it can be easily predicted by knowing the factors that cause it. Complications in emotional profiling begin when irritability has a long duration. Then we use the term anger, the components of which are more complex. The components include thoughts and behaviors, the content of which is determined by socio-cultural factors. Phenotypes are created based on educational environments; models presented to an adolescent shaping their own patterns. For irritability, the range of potential human attitudes can be included in catalogue, but reactions caused by anger contain a huge number of variables. Also, there is a difficulty in precisely determining the duration of irritability as well as anger and ambiguity, when the reaction is still uncontrolled by the individual (irritability), and when it is potentially controlled (anger). Hence, in this article both irritability and anger are treated the same, although the authors are aware of the controversial nature of this connection. There are at least two aspects to the discussion. The first is the terminological aspect: since anger is processed by thoughts and is controlled, it is a feeling rather than an emotion. Irritability, on the other hand, occurs only in the extra-voluntary space. Secondly, understanding both responses at the level of neuroscience: irritability and anger arise in other areas of the brain (Toohey & DiGiuseppe, 2017). Activation of anger involves cortical structures, e.g. frontal lobe of the brain. Of course, both reactions are related to the activation of the sympathetic nervous system.

Methods

The state of art is in initial phase, the activities are aimed at getting to know the feelings that appears in the network and the nature of messages. The description is mainly statistical in nature. Part of the works focuses on the semantic layer (Fetzer et al, 2020) when others on network layer and the effectiveness of communication network (Stella et al, 2020). This affect the set of used methods and the metadata that describes the tweets. A review of the literature indicates that many topics covered in presented tweets are characterized by following groups: (1) restrictions and their effects, (2) mental and economic consequences of lockdown, (3) reopening. As indicated, there are many aspects and social issues that peoples raise in tweets therefore each of the categories is examined with sub-topics (for example: travel possibilities, symptoms). Relevant messages are filter by Twitter API with various keyword sets: *corona*, *wuhan*, *#coronavirus*, *#covidoutbrake*. A significant number of studies focus on the development of coronavirus dataset (general dataset, domain-dependent set, question set or language set). Methods including topic models and topic distribution over time, sentiment analysis and sentiment distribution, network analysis. Thus, analysis tends to explanatory analysis with most common words, descriptive statistics of tweets (sub) volumes, n-gram representation and visualization. Latent topics are covered with LDA algorithm. In order to know trends in discussion and its dynamics by percentage shifts in topics/clusters. Sentiment analysis is carried out by using the lexicon-based approach (NRC Emotion Lexicon, LIWC), as there is no domain-specific learning set with good quality.

Our goal focused on findings anger in the dataset and describe it by its dynamics and the semantic layer. Based on literature review, an exploratory data analysis was adopted. The 1st step is the process of data cleaning and normalization. Natural language is characterized by a high degree of redundancy so dimensionality reduction to relevant feature set is first step taken in sentiment analysis. Big social data are noisier due to: (1) Twitter characters (RT, @, #, URLs and emoticons), (2) informal nature of communication and (3) multilingual content. Adequate sub-steps have been taken to manage these problem groups, including: Twitter filtering with English restriction, removing numbers, removing Twitter characteristic, dealing with negation and contractions, lemmatization. The 2nd step is sentiment analysis based on lexicon approach. A two-step procedure was carried out for sentiment analysis process. For first stage VADER dictionary from NLTK module was used. VADER provides positive and negative scores. Second, for a set of negative valance messages NRC lexicon has been used. The NRC Emotion Lexicon is a list of English words and their associations with eight basic emotions (anger, fear, anticipation, trust, surprise, sadness, joy, and disgust) and two sentiments (negative and positive). The annotations were manually done by crowdsourcing (Mohammad). Tweets due to limitation are problematic set for sentiment analysis. With the disadvantages of the dictionary approach, the two-step procedure was intended to ensure lowest possible of errors. For anger set,

visualization was performed, the fraction was calculated, and a representation of bigrams was presented.

Results

Data Description

Data was collected for the period of March 2020 as the month in which most of the restrictions were introduced. By hashtag *#covid-19* we collected 555, 958 tweets (in English) marked with date and ID. Aggregated data with daily time window are presented in figure one. As shown, we are interested in two periods. First, March as whole month. Second, from 31 March to 1 April – when a significant outlier in dataset is observed. After aggregation to the one-minute window in the outlier period some variability can be seen (Figure 2) in the series. Thus, the topics discussed were intensively commented, with emphasis on jumps (in plus and in minus). This imply strong social emotions. Figure 3 presents top bi-grams extracted for period of March in negative-valanced tweets. By bigram we represent the general issues covered in tweets. Figure 4. presents the dynamic of anger emotion in tweets in the period of outlier. Due to disadvantages of the dictionary approach (no information about the structure of sentence, lack of domain dependent word list) scores are divided for 4 groups. Groups 1-2 represents tweets for which results oscillated between different emotions (like fear and anger or joy and anger). Groups 3-4 are most representatives. Figure 6 presents percentage of total tweets by minutes for 2-4 scores. Score 1 has been omitted for the clarity of the visualization. It accounts for 30-40 percent of the total in minute-window.

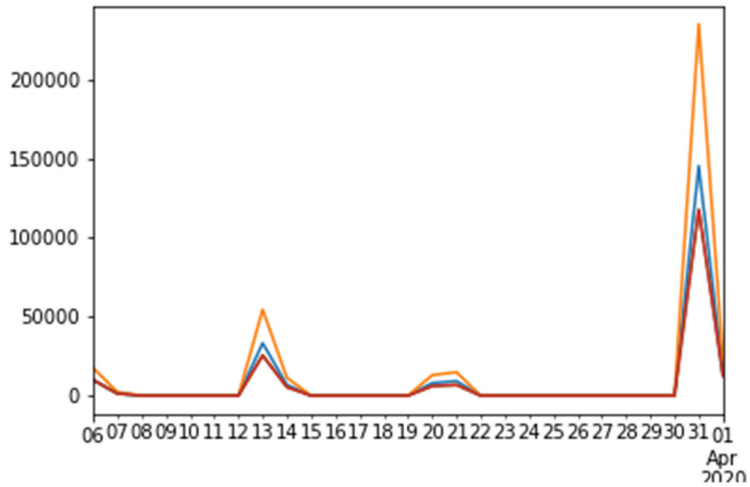

Fig. 1: All daily tweets divided for: 'positive- red', 'negative – blue', 'all – orange' category for March 2020 (calculated using the lexicon-based approach by Vader in NLTK module).

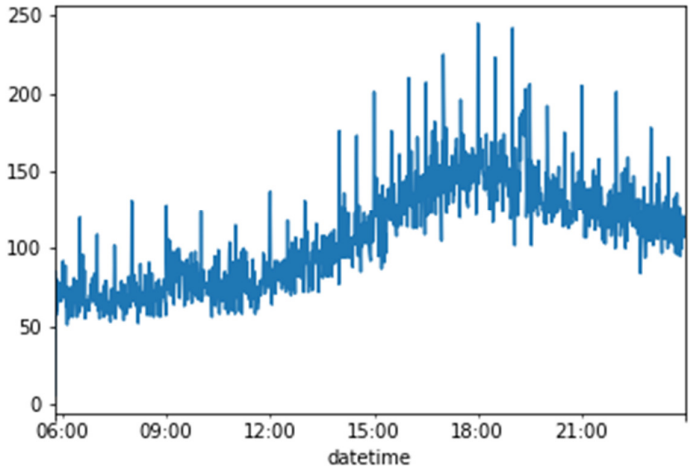

Fig. 2: Tweets aggregated to the one-minute time window for March 31th.

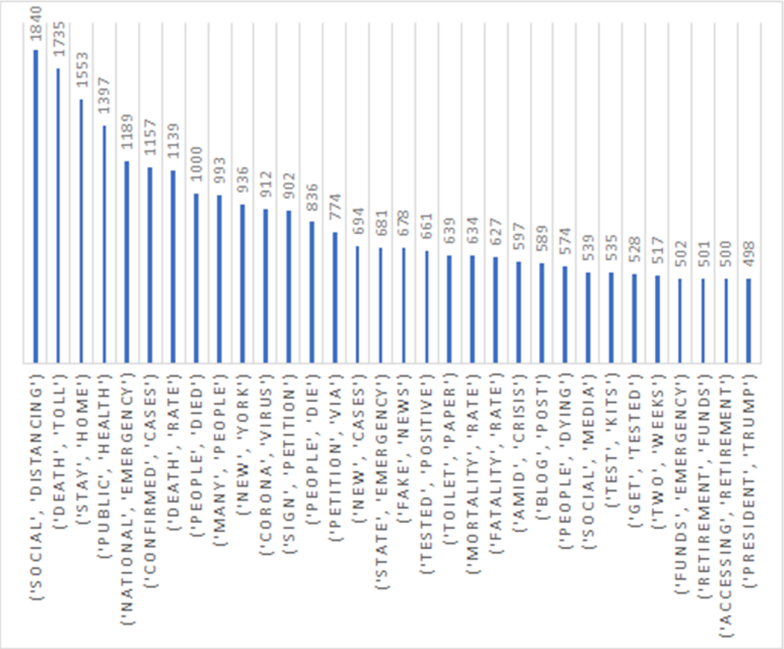

Fig. 3: Top bigrams in March 2020.

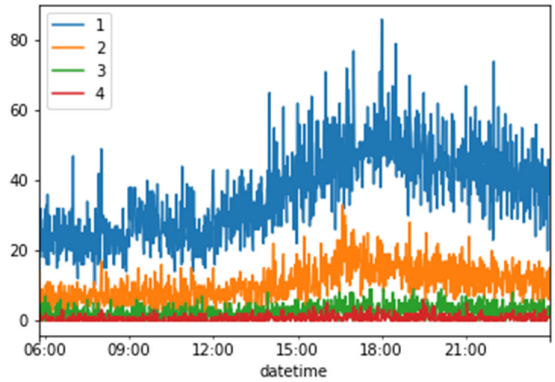

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Fig. 4: The volume of tweets related to anger emotion (identified by NRC-Lexicon) for March 31th

Fig 4 and Fig 5 show the dynamics of the tweets for the outlier on March 31st. On the basis of the ratings obtained from the NRC dictionary, 4 levels of anger were distinguished. Blue line or anger 1 are messages that on the basis of the score were classified as anger, but also classified under other emotions, such as fear or joy. The scoring was unclear. The red line or anger 4 indicates messages for which the function assigned a grade only in the anger class.

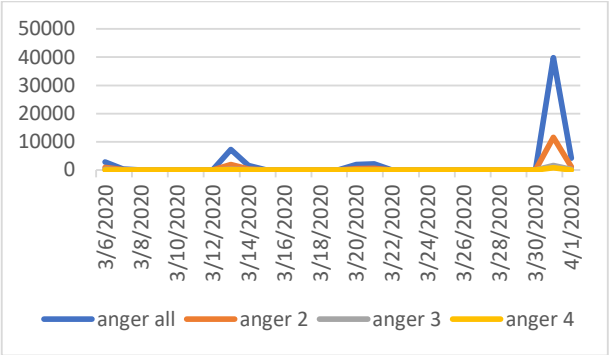

Fig. 5: The volume of tweets related to anger emotion (identified by NRC-Lexicon) in March

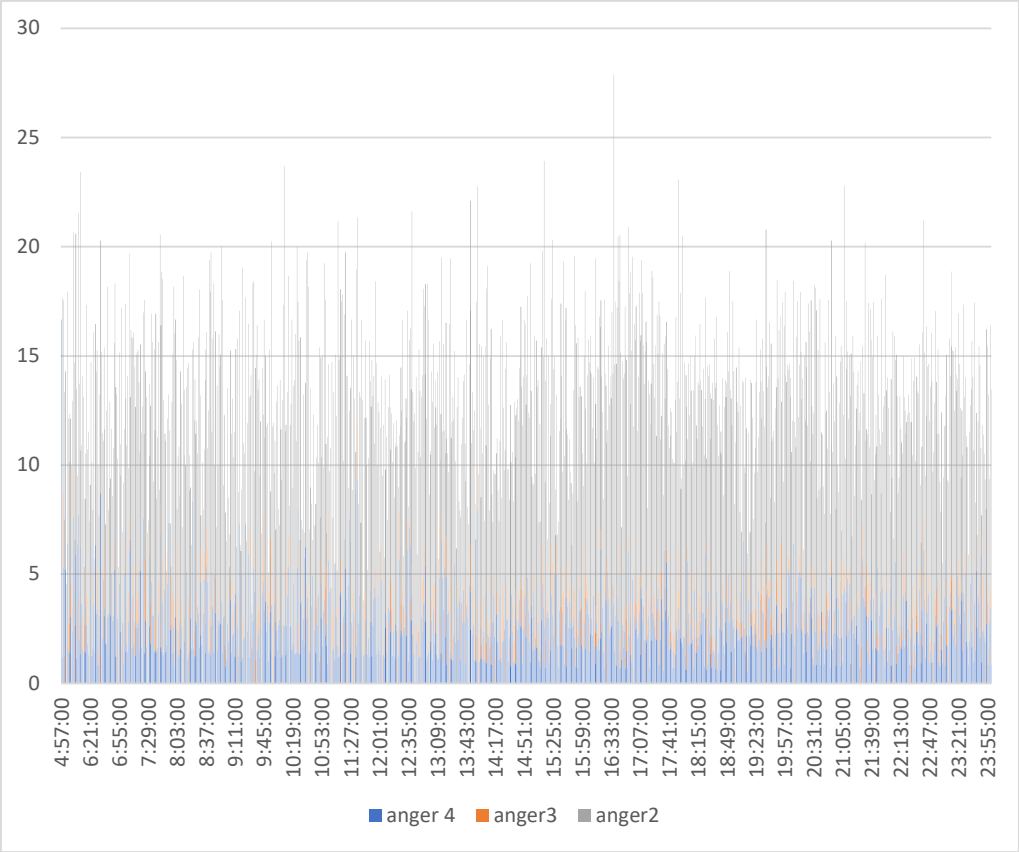

Fig. 6: Percentage of tweets for 2-4 anger scores in total sum of tweets for March 31th

Fig 1-6 show the dynamics and semantic layer of public emotion of anger. For March 31, the average number of tweets sent per minute is 108 with standard deviation = 33,5 and coefficient of variability = 31%. N for anger 1 score = 39 799 with min-max(2;86), n for anger 2 score = 11541 with min-max(1;33), n for 3 score with min-max(2;65) and n for anger 4 score = 806 with min-max(0;6) score. Fig 1 we conclude that the discussion regarding COVID-19 is intense. Fig 2 indicates that the daily dynamics of tweets may have a biological rhythm. Anger plays a significant role in world conversation, especially during outlier periods (Fig 5). However, Fig 6 indicates that the number of messages with the highest score obtained from the NRC dictionary is small.

Discussion

Ahmed et al (2020) showed that fear was the dominant emotion in March after lockdown. However, Kumar et al (2020) points out that anger and fear play a key role in network. Pandemic is related with stress and trauma and effects of which will be visible in long run. British Psychological Society [www1] suggest that some can be affected by stress, anger and confusion after lockdown. Additionally, these emotions are related with lack of contacts, lack of reliable information or loss of finance. So, we observe here multiple stress factors and other negative valance emotions factors. The presented conclusions show us the users which are flooded in information negatively affecting them. Our study is limited to one-month window and emotion of anger; hence the representatives of the data sample is questionable. Since we focused on psychological profiling of anger, we extracted some insights for future research. As Kumar et al (2020) and BPS we can emphases the occurrence of anger during first stage of pandemic. Throughout March, 3 periods corresponding to outliers can be identifies (visual assessment). By mining of anger in these set we conclude that periods of outliers are only in which anger is detected (Fig 5). We argue that these outliers are reactions for WHO and governments decisions. The first outlier arrives on March 13th, two days after the WHO declared a pandemic, on the

day of the suspension of arrivals from Europe in the US, in the time that Europe becomes the epicentre of the coronavirus pandemic. Second outlier comes after the US president introduced his social distance recommendations. From March 31 to April 1, it is difficult to clearly identify a global decision causing a sudden jump in data. In-depth analysis of bigrams in March 31th points that they are similar to those explored for whole month (Figure 3); 'death tool': 1046, 'stay home': 355, 'death rate': 351, 'social distancing': 302. It is possible that the intensity of the discussion since March 31 has increased significantly for most periods, the study will be further developed. Feeling of angry is related to top bigrams, which seems to be related with group of official news from news agencies, WHO or governments, like social distance, death, new case. In summary, social emotions revolve around current events. Research shows similar results (Stella et al, 2020; Lucas et al, 2020; Samuel et al, 2020). Based on Fig. 2 we can assume that intraday data cyclicality may be caused by biological rhythm. According to Sharma et al (2020) we also confirm that references to 'fake news' are a significant part of Twitter discussion. Bigram 'toilet paper' refers to changes in the structure of the basket of goods. Especially visible in the first period of pandemic. These are caused by changes in Maslow's pyramid of needs (Suh et al, 2020). These concern not only the structure of products but also their quantity. Suh et al (2020) makes a conclusion that pandemic affects all category of needs: psychological, socioeconomic and physiological.

Most people report mild to moderate anger anywhere, from several times a day to several times a week. We argue that a large number of tweets in which words may indicate anger can exacerbate this tendency. Also, the dynamics of the social network can increase the affective contagion process. Lerner, Gonzalez, Small, and Fischhoff (2003) identified anger as the emotion most commonly experienced by U.S. citizens in response to the 9/11 terrorist attacks. Which proves that anger naturally occurs in extreme situations. When the emotion of anger arises, it can influence people's perceptions, shape their decisions, and guide their behavior, while they remain angry, regardless of whether the decisions are related or not. to the source of their anger. Thus, anger is likely to be a frequently used judgment cue, especially at the implicit level. So-called short route of information transfer makes these decisions impulsive and biological at the same time. Anger last longer than irritability and is backed by thinking. An individual may search for information's about the source of the treat and (caused by them) correct his own attitude. Moreover, while irritability mechanism will rather incline people to withdraw from activity, anger may lead to its pre-formulation, to the search for alternative forms of activities, for example investors may concentrate on searching alternative investor strategies. Third, once activated, anger can colour people's perceptions, form their decisions, and guide their behavior while they remain angry, regardless of whether the decisions at hand are related to the source of their anger. In the aftermath of the September 11th attacks, experimentally inducing anger not only influenced U.S. citizens' risk perceptions about terror-related events (e.g., being attacked) but also their perceptions about routine events (such as getting the flu) and their policy preferences concerning matters of life and death (Lerner et al, 2003).

Economic perspective for future research

The individual's behaviours are at the core of the interest of many scientists given that those behaviours are critical to understand sudden changes of many economic indicators. Some of their thoughts and emotions can develop expectations and attitudes that influence future economic decisions. Investor sentiment is one of crucial determinants of stock market dynamics. Early works confirms the relationship between events and changes in the stock market. Emotions, herding behaviour can lead to deviations in price from their fundamental values. Herding behavior and emotion is a particularly interesting direction of analysis during the pandemic periods, when investors can share similar emotions and be susceptible to large-scale financial panic. Rehan et al (2020) study if short term stress can move stock market indicators, including volatility. Study reveals that there is increase in volatility in stock market after first death case of COVID-19 in country level. Anxiety which occurs during pandemic affect trust in financial markets. In many papers google search is treated as proxy for anxiety. However, they do not interpret why such set of information is considered for building a proxy variable for psychological attributes. Day et al (2020) investigate impact of COVID-19 cases and deaths, local spread and Google Search on the US stock market. They suggest that those indicators have impact on abnormal stock process and exhibit cause relation on price volatility. The spread of the new coronavirus

has significantly affected economic activity on a global scale by set of restrictions and reduction of economic activity (production, services and trade). Yarovaya et al (2020) argue that lockdown and quarantine cause long-term consequences that are still hard to estimate.

Some of the reactions can be written into the concept of Taleb's black swan theory. Taleb (2007) introduced the concept of black swan and cognitive biases around black swan events. Black swan is an event that meet the following 3 attributes: (1) Event is an outlier because it lies beyond the realm of regular expectations and there are no indications that it may occur. (2) Black swan has an extreme impact on the social and economic space. (3) After the phenomenon occurs, we try to explain the phenomenon to make it predictable. Yarovaya et al (2020) treat COVID-19 as black swan, but their analysis does not include emotions. According to Yarovaya et al (2020) because of 1-3 black swan makes precise prediction challenging for existing risk models. Still, research into the pandemic as black swan is low. Stock markets typically react of a lot set of events, but pandemic is a case of non-financial event. Some studies investigate natural diseases (and see them as black swans), hurricanes and earthquake as well as Ebola and SARS cases on financial markets, but none of them had that large scale. Albulescu (2020) argues that reduction of COVID-19 effects (in medium to long term) should start with understanding the demand side of market. The COVID effect for consumers is showing up in reduction of incomes, job insecurity, weak economic stability and affect their economic moods. He emphasizes the harmful effect of low economic sentiment. Through the prism of anger, we have indicated how public information influence economic anxiety. It generates additional stress, fear and angry, causes panic which lead to uncertainty. As a result, for example, may increases volatility in stock market (Albulescu, 2020). McKisney (www2, 2020) argue that economic sentiment affects expectations and forecasts. Depending these can change day by day according to information flow. Two types of information affect the demand side. First, the number of officially published news about COVID-19, infection and death cases as well as new restrictions, ad its already described in works. This part of information set affects the emotional state. Creating initial attitude towards pandemic. The second set is about big social data. a flood of data in which an individual move significantly affects his condition and activities. Uncontrolled, it can create a collective mood in which individuals react together under the influence of emotions

Conclusions

Based on big social data, we have indicated that anger is activated during periods of increased activity in social media and its related to the typical news (death cases, social distance, fake news, new cases). We treat pandemic as a black swan case for stock market. A description of the mechanisms of emotions was carried out along with their in-depth understanding to help in the interpretation of the impact of emotions from Ekman's model on the stock market. We used anger as an example, as shown in early works like Bollen et al (2011), Ekman's model is widely used in analysis but without in-deep interpretation. We are trying to fill this gap by interdisciplinary research. Upcoming months will be full of analysis of peoples aroused by the danger of COVID-19. Our analysis concerns the exceedingly early stage of global pandemic. Currently, after several months, we are dealing with second wave of COVID-19. People in a situation of long-term treat have a natural tendency to adapt. Thus, the impact of COVID-19 on economic dynamics will also be different. Over time, they get used to the harsh environment, and consequently the biological response (irritability) weakness, giving the way to anger and other responses. We show the psychological mechanism of anger during the early stage of pandemic with explanation of its biological basis.

The presented study is a pilot study. The study showed emotional profiling for feelings of anger during the COVID-19 pandemic. In the future, the study will be conducted for the period from January to May 2020, taking into account pandemic decisions made by authorities for selected countries. The authors will also perform emotional profiling for all emotions in the Ekman model. The study is important in explaining the volatility of financial markets during a pandemic. Big social data has great potential. They make it possible to collect data on an unprecedented scale, with appropriate granularity. The analysis of emotions allows you to know their dynamics with semantic layer.

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Formation of the Accumulative System of Compulsory State Pension Insurance in Ukraine

Mykhailo KUZHELIEV
Doctor of Economics, Professor, Director of Educational and Scientific Institute of Finance and Banking, University of the State Fiscal Service of Ukraine, Irpin, Ukraine
m-kristo@ukr.net

Valerii PAVLIUK
PhD in Public Administration, Co-founder of the NGO "Association of Social Innovations and Scientific Communications", Kyiv, Ukraine
pavliukvaleri@gmail.com

Vita FEDYNA
Senior Lecturer at the Department of Financial Markets, University of the State Fiscal Service of Ukraine, Irpin, Ukraine
vikulja.f@gmail.com

Alina NECHYPORENKO
PhD in Economics, Associate Professor of Department of Finance named after L. L. Tarangul, University of the State Fiscal Service of Ukraine, Irpin, Ukraine
an.0412@ukr.net

Abstract

Purpose: This article is dedicated to the formation of a pension system based on fundamentally new accumulative principles. Each state applies its own model of accumulative system. The future of senior citizens, which, in the conditions of demographic distortion, makes up a significant percentage of the population, depends on how balanced its construction is. **Methodology**: The following research methods and techniques were applied during the study: evaluation and data processing, statistical method, study of economic processes, determination of patterns and trends in their development, identification of areas of further improvement of these processes. **Conclusions**: Assessment of the parameters of the introduction of the accumulative component of pension insurance allowed to determine the advantages and disadvantages of the chosen model in Ukraine. Special attention should be paid to the factors, that will affect the efficiency of the system: the architecture of the system; macroeconomic situation; the state of the domestic stock market; level of administrative costs; problem of securing the money savings of citizens. **Implications**: The accumulative system is vulnerable to economic and financial risks, which requires special care in developing the conceptual framework for its implementation and paces additional responsibility on the government for the consequences of such steps.

Keywords: Pension Reform, Accumulative Pension System, Legislative Proposal, Pension Treasury, Investment Potential.

Introduction

The world experience of the evolution of the pension system shows that the main source of provision for the elderly has long been a solidary pension system based on distributive principles. However, negative demographic trends, economic and social changes in society have raised questions about the efficiency and financial capacity of national pension systems and have been the impetus for pension reform in almost all countries. The main task of such reform was the transition from a solidary pension system (social protection) to a multilevel one, with an emphasis on cumulative financing principles.

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Ukraine was not an exception. The concept of pension reform, enshrined in the Laws of Ukraine of 09.07.2003 “On Compulsory State Pension Insurance” № 1058 IV and “On Non-State Pension Provision” № 1057-IV, provided for the change of the traditional one-tier system of state pension insurance to three-tier, in which solidarity system is supplemented by two cumulative levels. Though the pension reform started in 2004, the configuration of the multi-level pension system in Ukraine has not been implemented. Therefore, the problem of finding an effective model of the accumulative component in the domestic pension system becomes extremely relevant.

The need for a scientific search for a mechanism to protect against the global problem of population aging has attracted considerable attention from Western and domestic economists to study the experience of reforming pension systems. Scientific papers on the theory, methodology, and organization of funded pension systems often analyze the impact of pension assets on the economic development of the state and social welfare. Particularly, the works of A. Borch-Sapan, F. Coke, J. Winter, V. Roik, R Holtzman, R. Goldsmith, R. McKinnon. Problems of formation of the accumulative component were considered in the works of A. Fedorenko, O. Koval, V. Rudyk, G. McTaggart.

The reform of pension systems, including the funded component, has been the subject of much theoretical and empirical research initiated by the World Bank, the European Union, the Organization for Economic Co-operation and Development, the International Organization for Pensions (IOPS), the International Labor Organization (ILO), and the United States. International Development (USAID), etc.

Analysis of scientific publications and recent research shows that the study of the problem of introducing a mandatory funded pension system in Ukraine is insufficient. The problem of a comprehensive study in which the funded pension system would be a separate object of study is ignored by domestic economics.

Therefore, the purpose of this paper is to analyze the domestic bill on the introduction of the accumulative system of compulsory state pension insurance in terms of proposed approaches to the mechanism of its introduction, identifying the advantages and disadvantages of the proposed model and factors influencing its efficiency.

Conceptual principles of introduction of the accumulative system of obligatory state pension insurance

Accumulative pension systems have a special place in the configuration of the pension system. Since the distribution (solidarity) component does not have financial stability in the context of an aging population, it is the system based on the cumulative principle of financing that has become a mechanism of protection against demographic distortions for most countries.

In the systems of this group, pension contributions are accumulated in the individual pension accounts of the participants, and together with the investment income received from the investment of pension savings, create a personal fund, which in the future becomes a source of pension payments.

As a result, the introduction of the accumulative level in the pension system allows:
- to increase the total amount of pension benefits;
- to strengthen social justice due to the direct dependence of the size of the pension on the labor contribution (insurance record) of the person;
- to inherit pension savings from the relatives of the insured person;
- balance the demographic and economic risks inherent in the distributive and accumulative components of the pension system, respectively;
- to create a powerful domestic source of investment resources for the growth of the national economy.

Nowadays, legal framework that governs functioning of the accumulative pension system (the second tier) in the national pension model is the Law "On Compulsory State Pension Insurance" and the Law "On Measures to Legislate Pension Reform." However, even though the concept of the accumulative

component of the compulsory state pension insurance was declared 16 years ago, it has not actually been implemented on practice yet.

The main reasons for postponing the introduction of the second accumulative level include the following: (1) non-compliance with the conditions set out in the Final Provisions (first edition) of the Law of Ukraine "On Compulsory State Pension Insurance" (The Law of Ukraine, 2003) (balanced budget of the Pension Fund; GDP growth by 2% during the last two years; funding provision from the state budget for the lost part of insurance funds in the solidarity system due to the transfer of insurance contributions to the Accumulative Fund; adoption of legislation on the accumulative pension insurance system); (2) lack of political will; and (3) vector change from structural to parametric in pension reform.

We believe, that further postponement of the introduction of the accumulative system of compulsory state pension insurance may lead to an imbalance in the current pension system and, consequently, to the deterioration of the financial and social conditions of the elderly population.

As practice shows, according to the UN, Ukraine is among the 15 countries with the fastest declining population. Low birth rates, high mortality (especially among the working-age population), and migration rates will reduce the population by 28% by 2050, while the share of people over 60 will increase to 32% (United Nations, 2020). Along with the increase in the share of the elderly, pension expenditures will also increase. The actual budget deficit of the Pension Fund for the period 2014-2019 increased from UAH 15.652 billion. to UAH 183.419 billion, which is 4.6% of GDP (State price (online calculator), 2020). The average amount of the assigned pension payment as of January 1, 2020, was UAH 3,082.98; 69% of pensioners receive pension benefits for UAH 1501-3000 (The Pension Fund of Ukraine, 2020). For 20 years, the non-state pension system has not become a significant addition to the joint pension system both in terms of the level of coverage of the population with voluntary pension programs (7% of employees) and the number of pension benefits.

In our opinion, a comprehensive pension reform, a key element of which should be a mandatory funded pension system (subject to a balanced approach to the choice of its model and implementation strategy), can address both decent pensions and economic growth through the accumulation of large long-term national financial resource.

One of the main conditions for the start of operation of the second level of the pension system is the adoption of a separate law that will regulate the introduction of the accumulative system of compulsory state pension insurance in Ukraine. During the period 2006-2019, several bills on the introduction of the second tier of the pension system were submitted to the Verkhovna Rada, most of the provisions of which contain the same approaches to determining the mechanism for introducing the accumulative component, as well as regulating relations in this area. In our opinion, the legislators did not get a single look at the type of organizational model of the system, the administrative body, the number of pension contributions, determining the number of participants, the need for state guarantees of savings.

The research conducted by the authors (Kuzheliev, 2015; Kuzheliev, Fedyna, 2017) provides an opportunity to indicate the stages of evolution of the legislative path of development of models of the accumulative pension insurance system (Fig. 1).

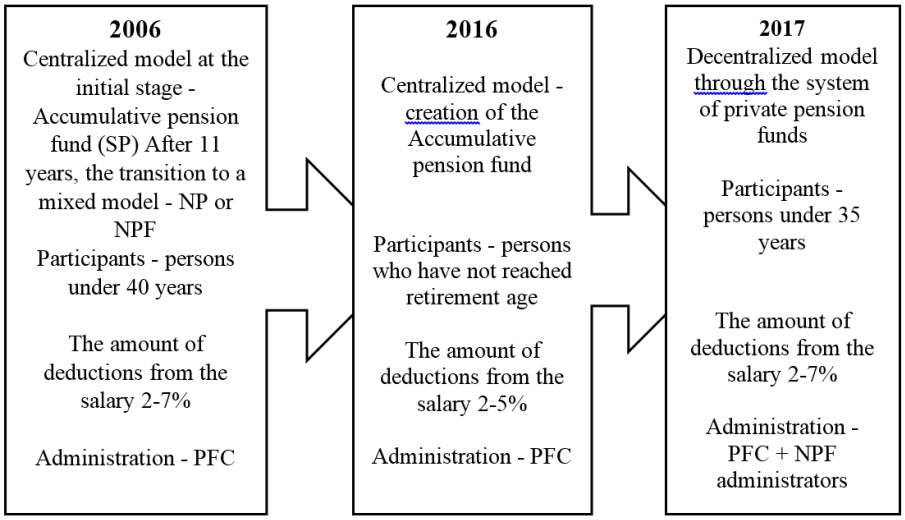

Fig.1: Stages of the evolution of models of functioning of the accumulative system of compulsory state pension insurance

Source: built by the authors based on materials Kuzheliev & Fedyna, 2017.

On December 7, 2019, the Verkhovna Rada registered the draft Law № 2683 "On Compulsory Accumulative Pension Provision", which testified to the emergence of a new financial institution in the country - the Pension Treasury and a change in the ideology of the pension system. From now on, the pension insurance system has its mechanisms for the accumulation and distribution of funds and, most importantly, has involved other social partners - employers and workers - in financial participation in addressing pension issues.

Draft Law №2683 proposes the creation of a centralized system of accumulative pensions, which should be based on four key entities: The State Tax Service of Ukraine, The Pension Fund of Ukraine, The Central Administrator, and The Pension Treasury with the further assignment of certain functions (Fig. 2).

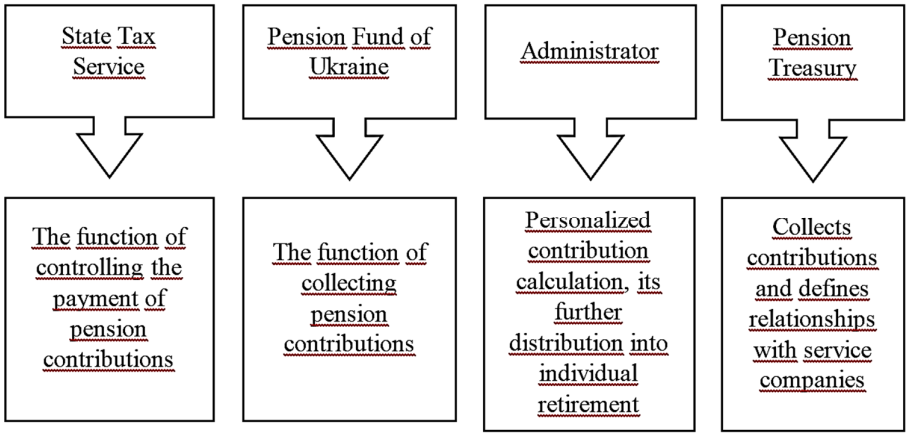

Fig. 2: Functions of key subjects of the accumulative system of compulsory state pension insurance

Source: built by the authors on the basis Draft Law of Ukraine "On Compulsory Pension Insurance", 2019.

According to Article 1. ROM "On mandatory funded pension provision" funded system of mandatory state pension insurance "is based on the principles of accumulation of funds <<…>> in the Pension Treasury or authorized private pension funds and financing the costs of pension payments on the terms of provided by this Law" (Draft Law of Ukraine" On Compulsory Pension Insurance", 2020).

The accumulative component of the pension system is a specific product. On the one hand, it (namely the subsystem - mandatory state-funded pension insurance) can be defined as an integral part of social insurance, and on the other - private pension funds are subjects of the financial services market, which prompted to take as a basis for building the second level of the pension system combined model. The basic parameters of the mandatory accumulative level of the pension system are shown in Table 1.

Factors influencing the efficiency of the functioning of the accumulative component of the pension system

The introduction of a funded system of compulsory state pension insurance is a complex and socially acute process that requires a balanced approach to the choice of implementation strategy and tools. International experience shows that the mandatory funded pension system should be (Mandatory funded pension systems (level 2). International experience: lessons for Ukraine, 2020; OECD Pensions Outlook 2012):

- cheap (centralized administration of pension accounts and low operating costs);
- downtime (reasonable restriction of investment choice, passive investment in index funds and life cycle funds);
- reliable (adequate financial regulation aimed at protecting participants).

Table 1: Analysis of the model of the accumulative component of the system of compulsory state pension insurance

Criterion	The main provisions of the draft Law №2683 "On Compulsory Accumulative Pension Provision"
Type of organizational model	combined - Pension treasury or authorized private pension funds
Subjects	Pension Treasury; Central Administrator; Pension fund; authorized asset management companies; authorized custodians; authorized administrators; authorized private pension funds; authorized insurance companies; payment representatives; system participants; audit firms that audit the financial statements of the Pension Treasury, the Central Administrator, and authorized entities.
Participants	participation is mandatory for all employees before reaching retirement age
Voluntary participation	provided
Acceptance of risks	participant - independent choice of the type of pension portfolio of the Pension Treasury with a simultaneous selection of an authorized asset management company

The number of costs for services	1. The annual maximum amount of expenses for the payment of services of service entities, which are reimbursed from the pension funds of the participants, may not exceed 0.5 percent of the net value of such assets; 2. The annual maximum amount of expenses for the services of the Council and the Administrative Office, the payment of the cost of liability insurance may not exceed 0.1 percent of the net value of such assets
The amount of deduction rates	payment on a parity basis of employees and employers, respectively, in the ratios - (1% + 2%); (2% + 3%); (3% + 4%), (4% + 5%) at the employee's choice
Administration	Central administrator
Executive authority	Administrative office designed for organizational and technical support of the activities of the Board of the Pension Treasury and the Pension Treasury
State guarantees of savings	Missing - The Pension Treasury, the Pension Fund, the Central Administrator, the authorized non-state pension fund are prohibited from assuring or guaranteeing the growth of income of system participants (paragraph 6 of Article 4, paragraph 5 of Article 24, paragraph 6 of Article 34, paragraph 4 of Article 57 of the ROM)
Types of pension products	one-time pension payment; accelerated payments; program payments; lifelong pension.
State regulatory and supervisory body	National Commission on Securities and Stock Market
The need for primary funding	62789250,75 UAH

Source: compiled by the authors on the basis Draft Law of Ukraine "On Compulsory Compulsory Pension Insurance", 2019.

All this considered, the following points should be taken into account:

- system construction architecture;
- macroeconomic situation;
- the state of the domestic stock market;
- level of administrative costs;
- system of guaranteeing the preservation of pension funds.

System architecture. The structure of the proposed mandatory funded pension system should be simple and clear to system members.

Appearance on the pension market of a new financial institution of the Pension Treasury, which will be managed by two structures at once - the Central Administrator (administration of participants' accounts) and the Pension Treasury Board (case management and control), as well as the Administrative Office for organizational and technical support of the Pension Council Treasury and Pension Treasury - complicate the understanding and perception of the participants of the mechanism of the system.

In our opinion, it is more expedient to entrust the functions of the Central Administrator to the Pension Fund, which already carries out personalized accounting of information in the system of compulsory state pension insurance, has a well-established mechanism of the administrative system for quick registration of all insured persons, provides control over insurance premiums.

Macroeconomic situation. Accumulative systems function well in ascending economic cycles and vice versa - in descending ones are completely inefficient. This is due to the investment component of funded pension systems. To be profitable in downward economic cycles, the investment must outpace the market, which is extremely difficult, if possible at all. Conversely, in ascending cycles, non-fatal

miscalculations in asset management, although reducing the efficiency of investment, still leave it profitable (Koval, 2012; Hinz and Holzmann, 2005).

Considering the abovementioned, we believe that the fulfillment of the requirement of the economic growth of the country remains relevant for the creation of appropriate conditions for the introduction of the savings system.

The state of the domestic stock market. Analysis of world practice shows that the funded pension system can have a powerful impact on the socio-economic situation in the country. According to A. Borch-Sapan, F. Koke, J. Winter, the favorable effect of pension reform is the fact that it entails more intensive economic growth by increasing the rate of accumulation and efficiency of the securities market (Borsch-Supan, Koke, & Winter, 2005).

The development of the financial market and the efficiency of the funded pension system are interdependent: the growth of pension savings stimulates the development of the financial market, the developed financial market through an expanded set of financial instruments of proper quality, and sufficient market capacity - increases pension capital.

It should be noted that experts have some concerns about the ability of the domestic financial market to absorb the assets of the savings system. The low capacity of the domestic stock market is confirmed by the structure and volume of trades on the Ukrainian Stock Exchange, wherein 2019 agreements on purchase and sale of securities were concluded for only UAH 3,840 million. (The Ukrainian Stock Exchange, 2020).

According to our calculations (Table 2), if the funded pension system is introduced according to the planned date in 2023, the amount of financial income from the payment of minimum insurance premiums to it in the first year will be 4155.646 million UAH. (the amount of the consolidated contribution is 3%).

Table 2: Investment potential of the accumulative system of compulsory state pension insurance

Year	Number of participants, persons	On average monthly salary, UAH	Remuneration fund, UAH million	The annual amount of the consolidated contribution (rate 1% + 2%), UAH million	The annual amount of the consolidated contribution (rate 4% + 5%), UAH million
2023	22547,34	12496,97	128998,41	4155,646	12752,631
2024	22078,84	13372,56	141042,14	4426,618	13475,210
2025	21610,34	14248,15	153085,87	4687,077	14155,731
2026	21141,84	15123,74	165129,61	4937,019	14794,187
2027	20673,33	15999,33	177173,34	5176,445	15390,581

S*ource: calculated by the authors based on data of the State Statistics Service of Ukraine*

The dependence of the amount of pension savings on the size of the deduction rate is shown in Fig.3

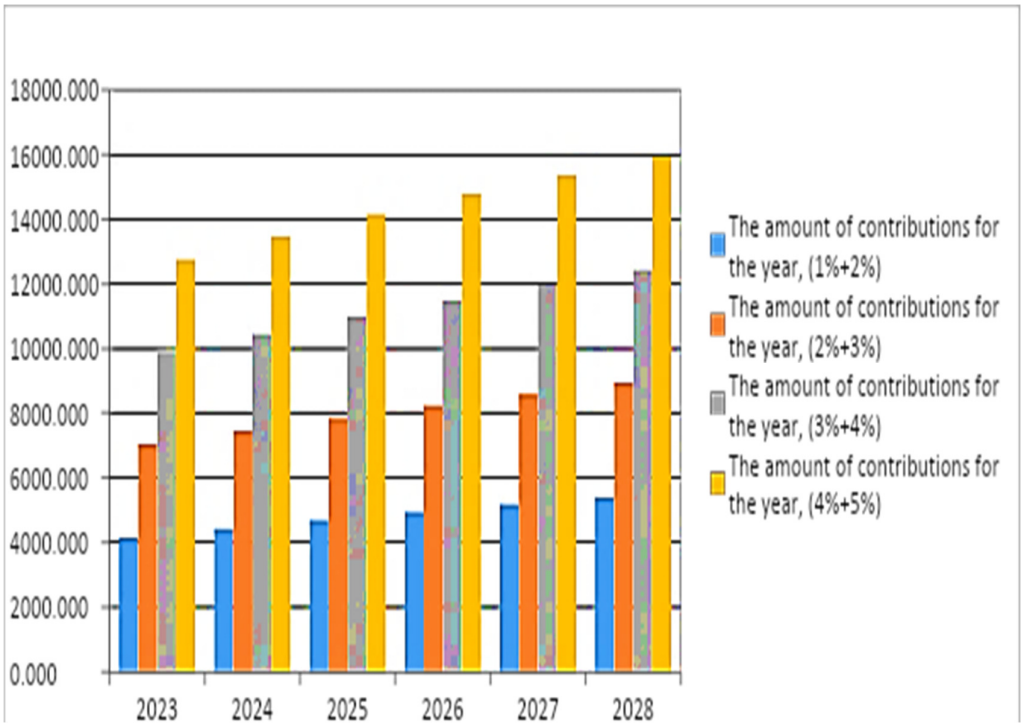

Fig. 3: Financial potential of the accumulative pension insurance system depending on the size of the deduction rate, UAH mln.

Source: calculated by the authors based on data of the State Statistics Service of Ukraine

In our opinion, it is necessary to pay special attention to the problem of declining asset value, which other countries faced during the financial crisis (the phenomenon of "investment trap").

This is a phenomenon in which people who retire after the crisis receive lower pension benefits than "pre-crisis" retirees, although they have similar and sometimes higher participation rates in the system-seniority and pension contributions. Given this fact, it is necessary to provide mechanisms that would differentiate the riskiness of pension assets for different age groups of participants in the savings system.

The level of administrative costs. According to international practice (Hirose, 2011; Orenstein, 2013), high administrative costs (commissions for services of administration, investment, and storage of pension funds) reduce the future amount of pension benefits. The total increase in commissions from 1 to 2% of the average annual value of pension assets reduces the size of future pensions by an average of 20-25%.

Because retirement benefits are delayed, losses due to a failed investment or large administrative costs may not be immediately apparent.

Pension guarantee system. The existence of a mechanism for the protection of pension savings and state guarantees is one of the key points in the introduction of the accumulative system of compulsory state pension insurance.

Given that the system is mandatory for participation, initiated by the state, the mechanism and conditions of introduction are enshrined in law, the state in the person of the government is responsible for macroeconomic indicators of development, the state must be the ultimate guarantor of from their depreciation (Kuzheliev, Fedyna, 2018).

In the context of the problem under consideration, we consider it expedient to create a Fund for Guaranteeing the Preservation of Pension Savings (by analogy with the Fund for Guaranteeing Deposits of Individuals).

Analysis of the bill "On mandatory funded pension provision" for key parameters allowed to determine the advantages and disadvantages of the proposed model of the funded system of mandatory state pension insurance (Table 3).

Haste in the adoption of the Bill, ignoring the problematic issues may discredit the very idea of funded pension insurance and lead to a further imbalance of the current pension system and the deterioration of the financial and socio-economic condition of the state.

During the global crisis of 2008, the weaknesses of second-tier systems became quite apparent and many countries had to deal with rising current government spending on the minimum and social pensions by reducing funded pension contributions or abolishing second-tier systems altogether and transferring accumulated pension assets. to the state pension system (USAID Financial Sector Transformation Project, 2018; Ortiz (ed.), 2018).

Another aspect that revealed the weakness of the funded pension system was gender. The system does not take into account the de facto unequal employment situation of certain social groups of workers, especially women. As their length of service is shorter, their incomes are lower than those of men, and the amount of insurance premiums they will pay to the savings fund is lower, the amount of pension savings will also be lower. According to experts, in 20-30 years the pension of women will be 20-30% of the pension of men (Fultz & Steinhilber, 2003; Kozlovskyi (ed.), 2018; Fedyna, 2017).

Table 3: Advantages and disadvantages of the model of the accumulative system of compulsory state pension insurance

Advantages	Disadvantages
Payment of contributions on an equal basis with employees and employers	Mandatory participation of all categories of working people until they reach retirement age without the possibility to leave the system for citizens who have 5 years or less to retire
A diverse choice of pension products (one-time pension payment; accelerated payments; program payments; lifetime pension)	Inability or unwillingness of citizens to choose appropriate investment strategies due to low financial literacy
Limitation of administrative costs	High costs associated with the implementation of the storage system
Strict restrictions on authorized capital	Scattering and duplication of functions among the main actors of the system
Centralized administration	Taxation of accumulative pensions
Existence of a liability insurance system for members of the Board of the Pension Treasury	Lack of state guarantees for the preservation of pension savings

and members of the board of an authorized private pension fund to third parties	Lack of gender mainstreaming
	Lack of a clear mechanism for accrual and payment of contributions
	Existence of one regulatory and supervisory body in the system - the National Commission on Securities and Stock Market
	Payment of the cost of liability insurance of members of the Board of the Pension Treasury and members of the Board of the authorized private pension fund at the expense of pension assets of system participants

Source: compiled by the authors based on data of Draft Law of Ukraine "On Compulsory Pension Insurance"

The funded pension system can help solve demographic problems in the long run and improve the adequacy of pension benefits, but only if it is properly built, properly managed, and regulated.

Conclusions

The current configuration of Ukraine's pension system is not optimal and necessitates the search for an alternative source of pension benefits, which can fully become its accumulative element. The accumulative pension insurance system allows to reduce the financial burden on state pension funds, create a long-term powerful source of financial resources, strengthen social protection, improve the living standards of the elderly. The increased vulnerability of the savings system necessitates special diligence in developing the conceptual framework for its implementation and places additional responsibility on the government for the consequences of such steps. Particular attention should be paid to those factors that will affect the efficiency of the system: the architecture of the system; macroeconomic situation; the state of the domestic stock market; a level of administrative costs; the problem of reliable preservation of citizens' savings.

Analysis of the model of the accumulative system of compulsory state pension insurance, proposed in the Draft Law "On Compulsory Accumulative Pension Provision", revealed both its strengths and those aspects of the provisions that need to be finalized:

- high additional costs associated with the introduction of the storage system;
- scattering and duplication of functions among the main actors of the system;
- the expediency of taxation of accumulative pensions;
- lack of state guarantees for the preservation of pension savings;
- lack of consideration of gender aspects;
- the presence of one body of regulation and supervision of the system - the National Commission on Securities and Stock Market;
- lack of a clear mechanism for accrual and payment of contributions;
- payment of the cost of liability insurance of members of the Board of the Pension Treasury and members of the board of the authorized private pension fund at the expense of pension assets of system participants.

Instead, the accumulative system of compulsory state pension insurance will be able to fulfill its dual purpose - to become a social stabilizer in the state through a source of additional pensions and provide the state with a unique national source of long-term financial resources.

Areas of further research will be the development of a mechanism for effective regulation and supervision of the subjects of the accumulative system of compulsory state pension insurance.

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Impact of Revitalisation on The Tourist Attractiveness of the City

Anna GARDZINSKA

University of Szczecin, Institute of Spatial Management and Socio-Economic Geography, Szczecin, Poland, anna.gardzinska@usz.edu.pl

Agnieszka SAWINSKA

University of Szczecin, Institute of Spatial Management and Socio-Economic Geography, Szczecin, Poland, agnieszka.sawinska@usz.edu.pl

Abstract

Revitalisation contributes to the social and economic development of degraded urban areas. Moreover, the issue of revitalisation is addressed in terms of competition between cities over potential tourists. The revitalisation of urban areas improves the image of the area, ensures free use of the renewed rest and recreation zones by residents and tourists and contributes to the increase of tourist attractiveness. The area attractive for tourists in which revitalisation activities are undertaken is the city of Szczecin. The main aim of the article is to evaluate the process of revitalisation in Szczecin by the inhabitants of the city and to indicate its impact on tourist attractiveness. The diagnostic survey method was used to assess the impact. The survey was conducted using the CAWI technique among the members of social networking services associating the residents of Szczecin. The obtained results enabled the determination whether the city's residents notice the changes taking place in the city as a result of revitalisation activities and how they assess these changes as well as their impact on the tourist attractiveness of Szczecin.

Keywords: Revitalisation, Tourist Attractiveness, Tourism, City.

Introduction

Revitalisation is a complex process aimed at introducing spatial, technical, social and economic changes in degraded areas of the city. Moreover, this process contributes to the social and economic development of urban areas by increasing the income, employment rates of the residents and the value of property. As a result, numerous Polish cities consider revitalisation as an opportunity for growth and overcoming the crisis of the most damaged and neglected city districts.

The revitalisation additionally contributes to the increase of the tourist attractiveness of the city and an increase in the number of tourists. Historic urban areas, connected with the local community and its heritage, are usually revitalised. Revitalised spaces attract tourists because they are usually characterised by culturally rich spatial planning or a modern urban structure.

The revitalisation process takes place in many European cities, including Szczecin. The city centre has been distinguished as a unique area of revitalisation which, despite intensive utilisation, needs a surge in popularity and restoration of socio-economic value, monuments and the solution of current social problems.

The main aim of the article is to evaluate the process of revitalisation in Szczecin and to indicate its impact on tourist attractiveness. The results of the survey conducted among the residents of Szczecin indicate that the planned and implemented revitalisation process is only partially effective both socially and in terms of tourism.

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Revitalisation and the tourist attractiveness of the city

The concept of revitalisation has already been defined very broadly in foreign and Polish literature. This is due to the complexity of the issues related to the transformation of degraded areas and the large variation in the interpretation of this process. Revitalisation is a concept used by geographers, sociologists, spatial planners, architects, urban planners as well as economists.

The source literature provides numerous definitions which describe revitalisation as the renewal of the urban area. According to the definition offered by S. Kaczmarek (2001, p.16), revitalisation is a sequence of planned activities aimed at economic recovery and a change in the spatial and functional structure of degraded areas of the city. Urban areas may be revitalised for various purposes, e.g. industrial, military, and transportation. Therefore, revitalisation may be understood as overall activities targeted at changes in the functioning of territorial units, especially in cities, of a social, organisational, ecological, planning and economic nature (Noworól, 2010, p.199). A similar opinion is expressed by many other researchers dealing with this issue, including Thomas, Bromley (2000, p. 1403-1429), Rofe (2004, p. 193-205), Markowski, Stawasz eds. (2007, p. 92), Czyżewska (2009, p.45-74), Lorens (2010), Webb, Webber (2017, p. 48-57).

Urban revitalisation is perceived as a coordinated process, jointly run by local authorities, local community and other participants under development policy, which is aimed at counteracting degradation of urban space and crisis phenomena, as well as stimulating development and qualitative changes, by increasing social and economic activity, improving living environment and protection of the national heritage, while maintaining the principles of sustainable development (Jarczewski (ed.), 2009). Revitalisation of an urban area may concern: degraded downtowns and multifunctional pre-war urban developed areas, post-industrial, railroad and post-military areas, blocks of flats (including especially blocks of flats constructed using large panel system-building technology), as well as the city landscape with particular emphasis on the public space system, including urban greenery.

The subject of revitalisation is also raised in terms of the competitiveness between cities over potential tourists. Revitalisation of urban areas improves the image of the area, ensures free use of the renovated leisure and recreation zones for residents and tourists, as well as contributes to the increase of tourist attractiveness.

As many authors emphasize, tourist attractiveness is a complex concept which is difficult to assess clearly. This is due to the fact that tourist attractiveness is determined by, on the one hand, objectively existing natural or socio-cultural conditions, and on the other, by their subjective perception by tourists. Tourist attractiveness should be understood as the properties of an area or an inhabited place resulting from a set of natural or non-natural features that arouse interest and attract tourists. tourist attractiveness may be universal or relative. Universal attractiveness is used when the area is attractive to the general public, whereas its relative nature concerns specific forms of tourism, e.g. attractiveness – usefulness for cycle or nautical tourism, etc. (Kurek, (ed.), 2007).

According to Gołembski, tourist attractiveness consists of tourist values, the condition of the natural environment, effects of its protection and transport accessibility of the area (Gołembski, (ed.), 2002). In the source literature, many authors emphasise that tourist attractiveness is a subjective concept, as a given area is assessed through the prism of own experience, beliefs and values (see e.g. Potocka, 2009, Nowacki, 2012, Nowacki, Kruczek, 2020).

Tourist attractiveness concerns diverse spatial units: regions, inhabited places and also cities. tourist attractiveness of a city consists of a complex system of elements as well as internal and external conditions (see Fig. 1).

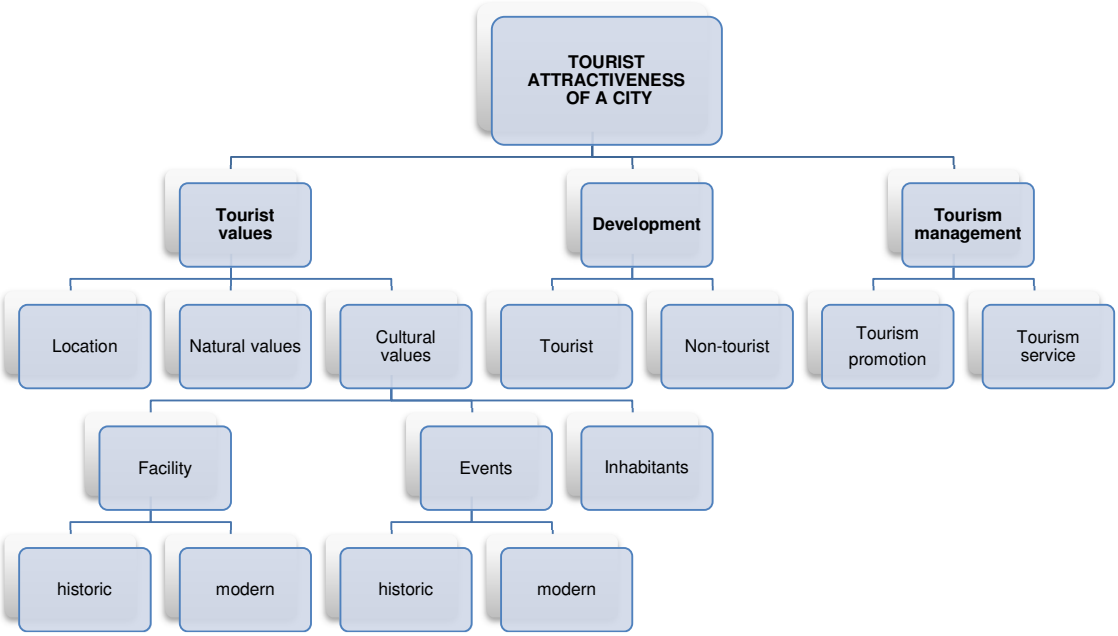

Fig. 1: The factors of tourist attractiveness of a city

Source: A. Kowalczyk, 2005, Nowe formy turystyki miejskiej, Prace i Studia Geograficzne, Tom 35, Wydział Geografii i Studiów Regionalnych, Uniwersytet Warszawski, Warszawa, p. 159.

The main element of the city's tourist attractiveness is its tourist resources. Their quality determines the attractiveness of the area to the greatest extent, which additionally depends on the infrastructure and services, ensuring the satisfaction of the needs of the tourist, interesting leisure activities and transport accessibility in the area. In terms of functionality, the recreational, sightseeing and specialist resources may be indicated. Recreational resources are such complexes of natural environment elements which ensure the best possible regeneration as well as physical and mental well-being. These include a set of essential features, which need to be present to ensure conditions conducive to recreation, and a set of beneficial features which increase the recreational value of the area. The essential features include: climatic and weather conditions, silence, high level of forestation, the presence of aesthetic qualities of the landscape. Beneficial features include: special qualities of the landscape, conditions for active recreation, favourable bioclimatic conditions and medicinal qualities (curative waters, curative gases). Sightseeing resources include material objects or expressions of spiritual culture which the tourists are interested in seeing. Specialist resources allow the performance of various forms of recreation and qualified tourism.

At present, it is assumed that an important element influencing the tourist attractiveness of the city is manner of tourist traffic organisation and especially the promotion and service of tourists. Hughes (2003) believes that the “4 A” components, often mentioned by authors analysing the attractiveness of tourism (attractions, amenities, accommodation, access), should be supplement by another element – “atmosphere” (after: Kowalczyk, 2005).

According to Seweryn (2002), the tourist attractiveness of the area is a collection of those features, phenomena and objects which attract with a certain uniqueness and uncommonness, and at the same time allow the achievement of the purpose of the trip and satisfaction of the needs related to travel and staying in a given area. This definition of tourist attractiveness emphasises its elements which in the best possible way meet the primary need that has led to defining the purpose of the trip (tourist resources) and elements satisfying secondary needs result from the change of the place of stay (adequately developed transport, accommodation, food and complementary infrastructure).

Characteristics of the research area

Szczecin is the capital of Zachodniopomorskie province (see Fig. 2) and one of the most attractive cities for tourists in Poland. It is located in Western Pomerania, in the Pobrzeże Szczecińskie macro-region, comprising 11 mesoregions, 4 of which are part of the city: The Lower Oder Valley, Goleniowska Plain, Szczecin Hills and Beech Hills. The city has a large area (over 300 sq km) and a diverse natural environment, in which water and green areas dominate (25% and 20% respectively).

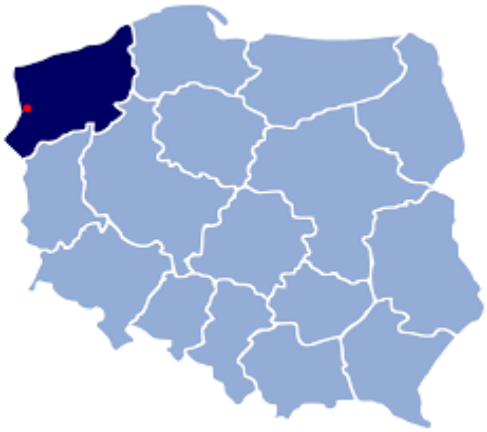

Fig. 2: Location of Szczecin on the map of Poland
Source: http://mapa.livecity.pl/miasto/Szczecin,0977976/10.10.2019

The unique location of the city at the mouth of the Oder River flowing into Dąbie Lake and the Szczecinski Lagoon, in a relatively short distance from the Baltic Coast and Berlin, contributes to its high tourist attractiveness. A major attraction of Szczecin, distinguishing it from other cities in the country, are the landscape values of the surrounding area: hills and large complexes of forests and landscape parks surrounding the city, the flat area of Międzyodrze with arms of the Oder River, numerous city parks with unique tree stands, monuments of material culture, museums, port areas, interesting spatial layout of the city and its buildings. The main element determining the structure and functions of Szczecin is its location in the estuarial area of the Oder River, which divides the city into three main parts: The left bank (city centre, recreation areas), the right bank (housing estates, recreation areas), and the Międzyodrze (industrial, storage and transport functions).

According to GUS [Central Statistical Office] data, in 2018 in Szczecin there were 55 accommodation facilities with 7,357 beds, of which 5,054 (69%) are year-round facilities (https://bdl.stat.gov.pl/BDL/dane/15.11.2019). The accommodation rate per 1,000 inhabitants is fairly high and amounts to 18.24. In 2018, approx. 925,383 tourists visited Szczecin, of which 350,321 (38%) were foreign tourists. The largest number of foreign tourists was from Germany. In comparison with the whole Zachodniopomorskie province, in 2018, approx. 20% of tourists used the Szczecin accommodation facilities.

Revitalisation Activities Undertaken in the City

Revitalisation activities are one of the tasks of local authorities aimed at improving the state of development and living conditions in crisis areas. Each city needs individual plans and methods to implement revitalisation activities depending on the economic or social situation. In order to enable the self-governments of communes [*gminas*] to carry out these tasks, a number of initiatives have been taken at the central level to organise the revitalisation issues. The adoption of the Act on revitalisation in 2015, which introduced statutory tools for the effective implementation of remedial processes, should be considered a crucial step. One such tool is local revitalisation programmes developed at the commune level.

The Local Revitalisation Programme for the City of Szczecin for the years 2017-2023 is in force in Szczecin. The Programme was adopted by resolution No. XXXVII/1098/18 of the Szczecin City Council of 30 January 2018. The document assesses the general situation in the city and provides a diagnosis of the social, economic, environmental, spatial, functional and technical areas. Using multidimensional ratio analysis, the most degraded areas of the city were identified and the areas on which revitalisation activities will be carried out were categorised. In respect of the designated areas, an in-depth examination of the revitalisation area was carried out, and a revitalisation plan was prepared, i.e. a set of objectives, courses of action, as well as targeted revitalisation projects and undertakings.

The proposed area of revitalisation in Szczecin comprises three adjacent housing estates located in the city centre: Centrum, Śródmieście-Zachód and Turzyn – consequently, single area of revitalisation within the administrative boundaries of these estates was designated. The main problems identified in the revitalisation area include (Local Revitalisation Programme for the City of Szczecin 2017 - 2023):

- unemployment and economic marginalisation of residents;
- population ageing and the outflow of residents outside the area of revitalisation;
- loss of economic function;
- deficiency of green and recreational areas;
- poor technical condition of residential buildings, low standard of apartments.

The list of main revitalisation projects specified in the Local Revitalisation Programme for the City of Szczecin includes, inter alia, renovations of tenement houses, construction of community centres, construction of day care centres as well as facilities promoting entrepreneurship and culture. The total value of projects planned for implementation in 2017-2023 is approx. PLN 257 million.

Test Methodology

The aim of the study, which has become the basis for this publication, was to determine how the objectives provided for in the Local Revitalisation Programme for the City of Szczecin are compatible with the residents' needs and whether, in the opinion of the residents, the implemented tasks increase the tourist attractiveness of the city. To this end, the diagnostic survey method was used. The survey was conducted in July and August 2019 using the CAWI technique among the members of social networking services associating the residents of Szczecin. 85 people agreed to participate in the survey[1]. The research tool was a questionnaire designed by the authors for the purpose of the study.

The following research questions were formulated:

[1] With small research samples, it is necessary to interpret the results with caution and refrain from generalisation. Nevertheless, such a sample provides a view on the presented phenomenon and contributes to further in-depth research in this area.

1. What has changed in Szczecin in recent years and which housing estates are undergoing the greatest changes?
2. How do citizens evaluate the activities carried out in the city?
3. What actions contribute to the increase of tourist attractiveness of Szczecin?
4. What should change in the city?

Structure indicators were used to obtain answers to the formulated questions. To recognise the significance of the relationship between the variables the correlation coefficient C – corrected Pearson correlation coefficient – was adopted.

Study Results

Among 85 respondents there were 58 women (62.8%) and 27 men (31.8%). The clear prevalence of women among the respondents may have been determined by factors, such as greater willingness to participate in this type of research or greater activity on social networking sites. The age structure of respondents is dominated by people in the 35-44 age range (Fig. 3). Almost every fourth respondent is in the 25-34 age group (23.5%), more than 25% of respondents are in the 45-64 age group. People under the age of 25 constituted only approximately 5% of the respondents. The fact of conducting the survey on-line and the interest in its subject matter certainly had some influence on such age distribution.

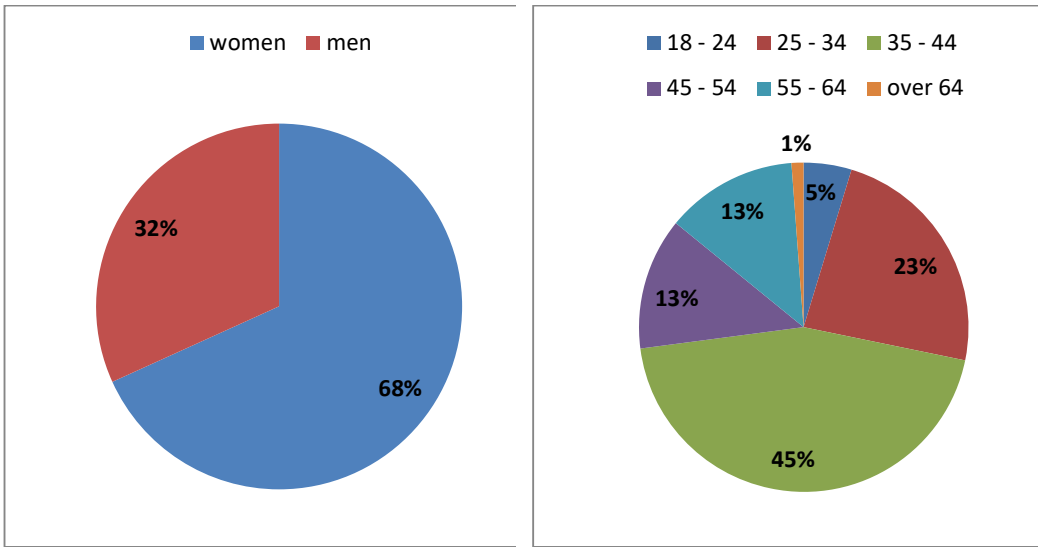

Fig. 3: Gender and age structure of respondents

Source: own work based on surveys

Almost 86% of the respondents are university graduates, only 13% completed secondary education. Approximately 45% of respondents live in the Prawobrzeze district, while every fourth respondent lives in the Srodmiescie or Szczecin-Zachod district. Only 10 respondents come from the northern part of the city.

At the beginning, it was examined whether the respondents noticed the changes occurring in the city and areas of these changes were identified (Fig. 4). All the respondents notice the changes occurring in Szczecin, and the main changes mentioned in the survey included: the management of unused areas (65%), followed by the development of outdoor recreation areas (56%) and renovation of tenement houses (45%).

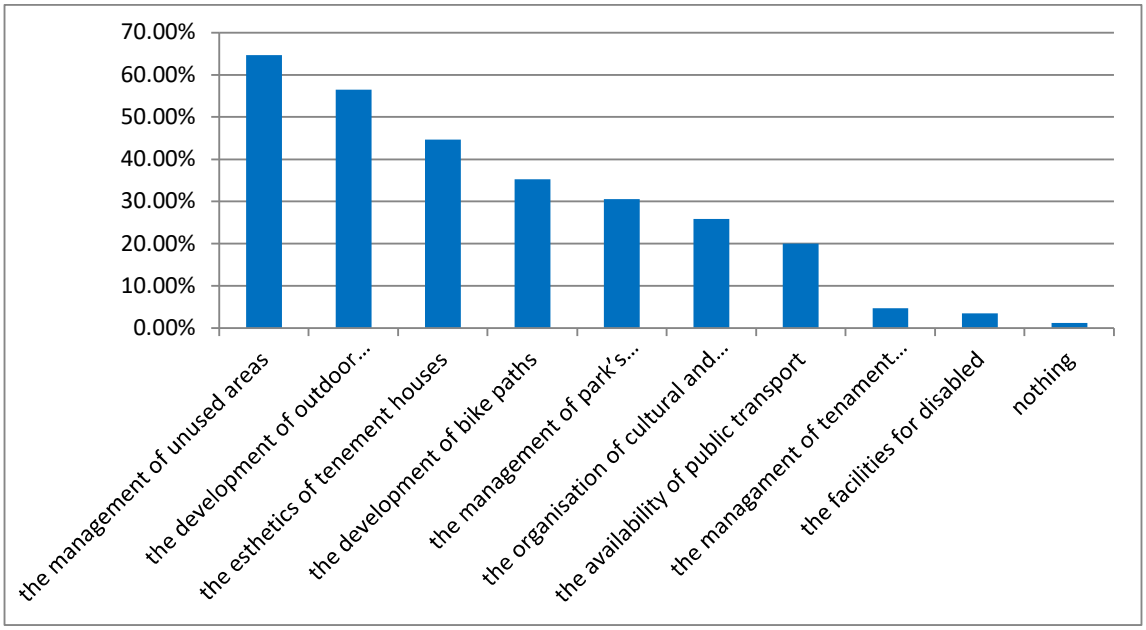

Fig. 4: Identification of changes occurring in the city as a result of revitalisation

Source: own work based on surveys

Moreover, the inhabitants indicated that there are more bicycle paths in the city (35.3% of the respondents), as well as the infrastructure in parks, i.e. benches, shelters and lighting, has improved (30.6%). In this respect, however, it should be indicated that the respondents are not able to indicate whether the above changes are the result of revitalisation activities or, for example, the implementation of EU projects.

The respondents who indicated that the aesthetics of the tenement houses in Szczecin has improved significantly in recent years, also much more frequently positively assessed that the greatest changes are taking place in the Podjuchy district (table 1).

Table 1: Selected statistics depicting the relationship between the changes occurring in individual districts of Szczecin

FEATURE 1	FEATURE 2 - districts of Szczecin			
	Podjuchy	**Słoneczne**	**Załom-Kasztanowe**	**Majowe**
Aesthetics/appearance of tenements	C-Pearson_kor 0.29608 p-value 0.048382	-	-	-
Use of tenement houses for commercial purposes	C-Pearson_kor 0.4937 p-value 0.000593	C-Pearson_kor 0.29457 p-value 0.049597	C-Pearson_kor 0.44562 p-value 0.002205	-
Availability of transport	-	-	-	C-Pearson_kor 0.38877 p-value 0.008389

Source: own work

The respondents who indicated that tenement houses in the city are being utilised as commercial premises believe that the most significant changes are taking place in the following districts: Podjuchy, Sloneczne and Zalom-Kasztanowe. On the other hand, people who notice the improvement of transport accessibility believe that significant changes are taking place in Szczecin, in the Majowe housing estate.

Next, the respondents were requested to evaluate particular activities conducted in the city (Fig. 5).

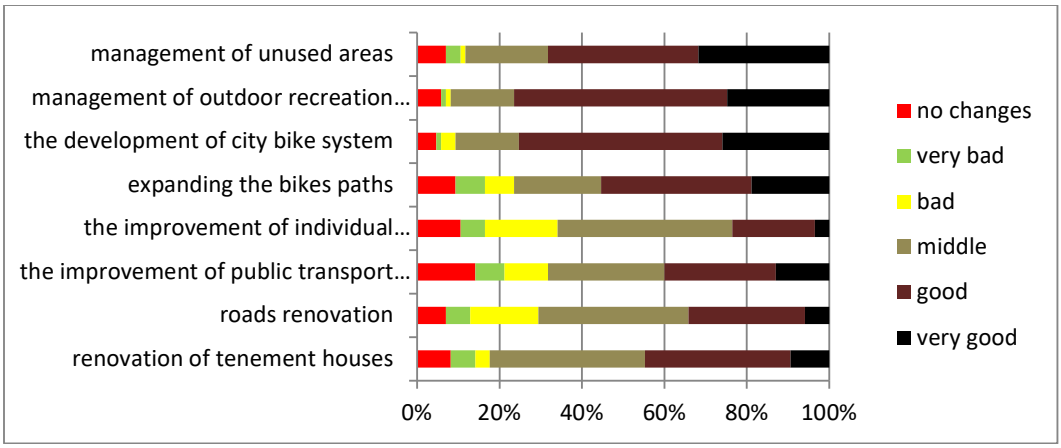

Fig. 5: The evaluation of individual activities

Source: own work based on surveys

The respondents do not notice any changes in the improvement of the public transport system (bus, tram). The system of individual transport and the renovation of roads in the city were assessed negatively. The development of outdoor recreation areas was assessed as good, while the management of unused areas as very good.

According to the respondents, revitalisation activities mainly improve the image of the city (Fig. 6). This answer was given by almost 86% of respondents. More than half of the surveyed inhabitants (55.3%) associates revitalisation with greater opportunities for spending free time. Moreover, every third respondent noticed an increase in the number of tourists in the city and an improvement in housing conditions. The assessment of changes occurring in the city is not related statistically in a significant extent to any other feature of the survey.

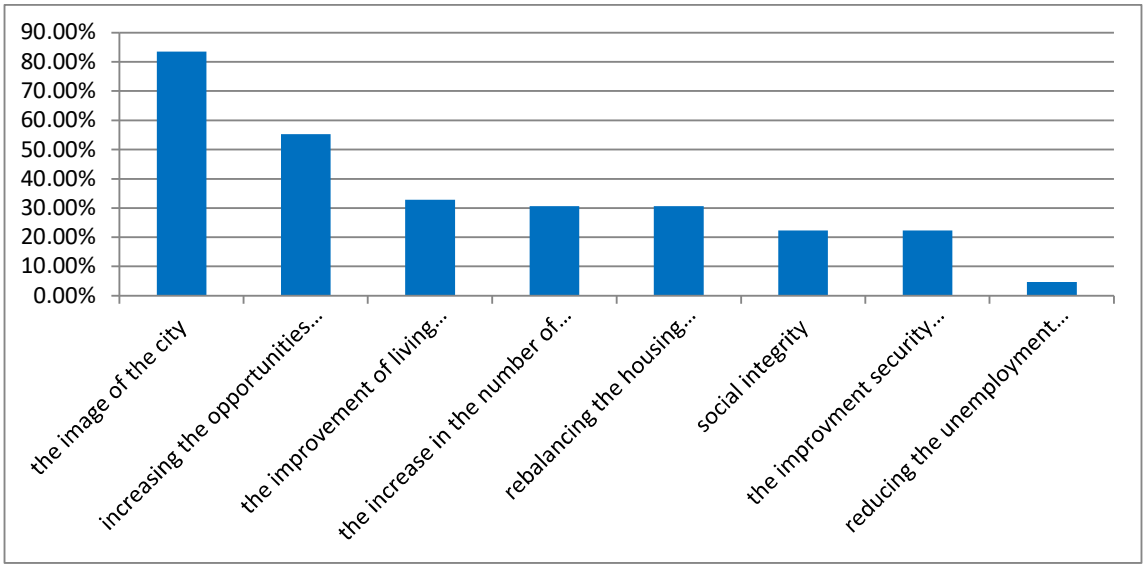

Fig. 6: Areas affected by revitalisation

Source: own work based on surveys

Among the elements which directly enhance tourist attractiveness, resulting from the revitalisation activities carried out in the city, the respondents indicated the management of previously unused areas and the renovation of tenements. The living conditions in the city have been to the greatest extent improved on account of the improvement of the public transport system and the renovation of roads.

The respondents were also requested to suggest changes which should be introduced in the city of Szczecin and which would increase the city's tourist attractiveness and thus the number of tourists (Fig. 7).

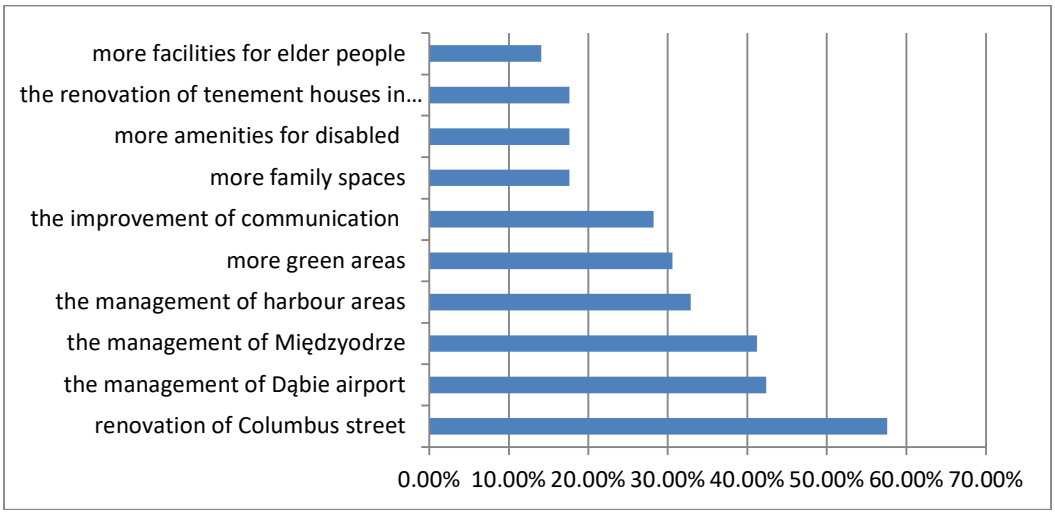

Fig. 7: Suggestions of changes

Source: own work based on surveys

According to the respondents, the revitalization of Kolumba Street would increase tourist attractiveness of the city the most. It is one of the major transport routes connecting the northern and southern housing estates of Szczecin. The area of Kolumba Street is degraded in respect of social, infrastructural and functional aspects. The area has the potential to offer very good housing conditions as well as diverse cultural and recreational services. The respondents who pointed this out were additionally much more likely to assess positively the changes occurring in the city centre, and to indicate the need to develop the Miedzyodrze district, improve transport routes and increase the number of zones for families with children (Table 2).

Table 2: Selected statistics indicating the relationship between the proposed changes that should take place in Szczecin

FEATURE 1	FEATURE 2 – Renovation of Kolumba Street	
	C-Pearson_kor	p-value
Changes taking place in the Centre	0.32603	0.02894
Development of Międzyodrze	0.32138	0.031443
Improvement of transport routes	0.35041	0.018377
More zones for families with children	0.31408	0.035725

Source: own work

Among their own suggestions of changes that should take place in the city, the respondents indicated the construction of the Dąbie ring road and a second swimming pool in Prawobrzeże, further expansion of bicycle paths and connection of new paths with the existing ones, solving the problem of insufficient number of parking spaces in the city, renovation of tenement houses in Stołczyn (Szczecin district) and renovation of road surfaces.

Conclusions

Revitalisation has become a tool for many communes to renew degraded areas in the city. The revitalisation measures are to serve the residents directly, however, indirectly, through their influence on the tourist attractiveness of the city, they contribute to the development of tourism and increase the number of tourists. Renovation of neglected areas or giving them new functions, renovation of tenement houses (often located in the city centre) improves the aesthetics of the landscape and thus diversifies the tourist and recreational offer of the city.

Revitalisation activities carried out in Szczecin result from the assumptions of the Local Revitalisation Programme for Szczecin for the years 2017-2023. The revitalisation area was identified on the basis of multidimensional ratio analysis.

The survey conducted among the residents of Szczecin was aimed at determining whether the residents of Szczecin notice the changes taking place in the city and whether revitalisation affects the tourist attractiveness. The presented results clearly demonstrate that revitalisation is particularly valuable and significant for the development of the city. According to the respondents, this process contributes to the increase in the tourist and recreational attractiveness of Szczecin, but also affects the spatial development of the area.

On the one hand, the selection of the area to be revitalised in the city seems justified and homogeneous, supported by the values of individual indicators, while on the other hand, the city's residents notice the need to revitalise areas in the city other than those indicated in the Local Revitalisation Programme for the City of Szczecin. These include unused and undeveloped areas. The respondents indicated mainly Kolumba Street, the Międzyodrze area, as well as the airport located in the Szczecin-Dąbie district.

In the case of Kolumba Street, the tender procedure for reconstruction is to be announced in the autumn of 2020, while the tender procedure for the first project, carried out as part of the

modernisation of the road to the port of Szczecin and reconstruction of roads in Międzyodrze, was announced in early December this year.

The research may constitute a basis for more detailed analysis, the aim of which will be to examine the residents' awareness of the revitalisation activities carried out in the city and their impact on tourist attractiveness.

Acknowledgement

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The Comparative Method in Legal Research of The Cryptoasset Market

Larisa V. SANNIKOVA

The Institute of state and law of the Russian Academy of Sciences, Moscow, Russia,
7718609@mail.ru

Julia S. KHARITONOVA

The Department of Business Law, Faculty of Law, Lomonosov Moscow State University, Moscow, Russia
sovet2009@rambler.ru

Abstract

The article explains the use of the comparative method to the research the cryptoasset market. The question of the purpose of using this method in legal research remains debatable. Despite the differences in comparative approaches, most scientists agree to define comparative legal research's main practical goals: legal transplantation and harmonization of legislation. In many states, legislators and legal experts are faced with the need to solve global problems related to the regulation of crypto-assets, which requires rethinking the use of the comparative method. To date, no country in the world can claim that it has formed the optimal legal regulation of crypto assets, with breakthrough potential. Analysis of the legislation on the blockchain and crypto-assets in Malta, Liechtenstein, and Russia shows significant conceptual differences. That indicates, first of all, that at the moment, there is no standard approach and understanding of the legal essence of crypto assets, which provides a possibility to form a complete and consistent regulation of this area. At the same time, significant harmonization was achieved by States united in solving the most critical supplementary task such as the fight against money laundering. The article concludes that the study of legal phenomena that are essentially cross-border at the current stage should take into account the legal regulation that is being formed both within the legislation of the most technologically advanced countries and in the international economic space. For this, it is necessary to use the method of comparative legal research.

Introduction

There has always been a space for the comparative method among the wide range of methods studying legal phenomena that jurisprudence usually uses. This method became very significant at the beginning of the last century when comparative legal research in the private law field became more dynamic. The needs of trade practice determined the trends of unification and harmonization of national legislation. As a result, comparative research has started to develop in quality. In modern civil science, the comparative method is considered one of the most common cognition methods.

However, it should be admitted that selecting this method for legal research is primarily because of socio-political reasons. For example, in Eastern European countries during the Soviet period, comparative research was not approved and was admitted mostly as an exception. Interest in comparative studies increased sharply in the late XX- early XXI centuries since some social and legal changes took place in these countries. In particular, the sudden switching from the socialistic economic system to the market economy also required other legal instruments that legal experts were looking to borrow from the leading developed countries' legal systems. European scientists' particular interest in the comparative method is primarily due to the integration processes taking place within the EU.

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In the last decade, the comparative method's relevance has increased due to the processes of globalization (Watt, 2006, pp. 579-607). Furthermore, even though at the moment, there is an apparent crisis of the globalism model, the world market continues to develop and requires some new universal legal mechanisms. With the discovery of end-to-end digital technologies, the modern economy's cross-border nature has become even more vital: «Decentralized and autonomous technology as well as the structure of blockchain, absolute independence from any state institutions and governing bodies, reveal hidden challenges for the government and international institutions» (Broy, 2018, p. 19). Under these conditions, the value of comparative research increases significantly.

Main approaches to comparative law

Quite a large number of studies in legal literature are devoted to the comparative method. At the beginning of the twentieth century, some European scientists proposed to consider comparative law, not as a research method, but as an independent legal science – comparative law (Schmitthoff, 1939, pp. 94-110). In their view, a comparison of legal systems would explain «the reasons underlying the origin, development, and vanishing of legal institutions» (Kamba, 1974, pp. 485-519). However, this approach was not widely supported, and the view of comparative law dominates modern legal science as a research method.

Thus, many researchers believe that comparative studies can exist only in the form of the method of cognition of legal reality used by all legal sciences (Gutteridge, 1974). From G. James and A. Taylor von Mehren (2006), the comparative method as an element of the methodology involves an appeal to the foreign experience of civil law regulation of a particular area of public relations. Simultaneously, scientists allow the comparison to be carried out within the framework of domestic legislation.

Simultaneously, the question of the purpose of using this method in legal research remains debatable. We cannot disagree with those researchers who emphasize that the goal of comparative law cannot only be to gain knowledge about another legal system or its individual institutions (Peris, 2016). Although this is the doctrinal comparison most often found in research. Along with it, other comparative approaches, in particular, functional and cultural-legal approaches, have become widespread and theoretically justified.

The ideologues of the functional comparative approach were K. Zweigert and H. Katz (1998). They assumed that the legal order in different countries faces the same problems, which are solved with different legal institutions' help. However, these institutions perform the same function and can act as an object of comparison. They selected four functions of comparative law that are of particular practical significance: the results of comparative legal research as a material for legislation, as a tool for interpreting legislation, the importance of comparative law for legal education, and its role in the unification of law (Zweigert and Ketz, 1998, p. 29).

The so-called cultural approach proponents, who advocate comparing legal cultures, have a fundamentally different position. In their opinion, the legal order is the normative aspirations of a particular society with its unique way of life and priorities (Jung, 2017, pp. 1-17). Interestingly, representatives of this approach argue differently about the need to study legal cultures. Some consider this a necessary condition for preserving the diversity of legal cultures: «in our approach to legal institutions, we must also recognize the individual and collective achievements of all human attempts to create order, provided that they have created values, and we must value and try to preserve them as such» (Varga, 2012). On the contrary, others believe that studying different countries' legal culture will help smooth out cultural differences and contribute to the significant development of international economic law legislation (Picker , 2013, pp. 21-48).

The position of the outstanding French comparativist Rene David seems to be more balanced. On the one hand, he argued that «legal science by its very nature is cross-border», on the other hand, he stressed that «the science of law has developed independently within different legal systems» (David and Zhoffre-Spinozi, 1990, p. 11, 17).

The critical approach, which is based on the idea of competition between legal systems, also deserves attention (Monateri, 2012). As rightly noted in the literature, «harmony can be achieved not only through «integrative» comparative legal research but also through «contrasting» comparative legal research» (Örücü, 1999). This approach allows us to take into account not only the positive but also the negative experience of other countries in the field of law-making and law enforcement.

From this point of view, the discussion about the greater cost-effectiveness of common law compared to codified civil law, which developed after the publication of the World Bank report «business Development in 2004: understanding regulation», is of interest. This point in the report was based on the fact that codified law regulates economic relations more strictly, which leads to more significant inefficiency of public institutions, longer delays and higher costs, more unemployed people, corruption, lower productivity, and investment attractiveness, but not the high quality of private or public goods. However, the conclusions of the World Bank have suffered from severe critics of the French comparativists. Although they acknowledged that «economic rivalry now affects all legal systems around the world», they pointed to the need to take into account «the paradigmatic values of the legal system» (Fauvarque-Cosson and Kerhuel, 2009, pp. 811-829).

Thus, the variety of approaches to the comparative method of legal research indicates not only its extreme demand but also its lack of development. Simultaneously, this method's scope of application has long gone beyond the limits of comparative law itself and has extended to all legal disciplines. Therefore, legal experts should carefully justify the use of the comparative method in their research.

Despite the differences in comparative approaches, most scientists agree to define comparative legal research's main practical goals: legal transplantation and harmonization of legislation.

The study of various legal systems is necessary for a contemporary researcher better to understand the legal essence of the object under study. Comparing different countries' legal regulation approaches of the legal phenomenon under study allows us to identify their advantages and disadvantages to form an optimal legal regulation model. However, the goal of improving legal regulation should not be replaced by another one, namely, the search for a better law.

As a rule, this replacement is allowed by lawyers from countries with transition or developing economies; they often insist on the reception of individual legal institutions that have been successfully established in the leading developed countries. In this regard, the statement of M. L. Peris (2016), that «law is deeply rooted in its historical, social, cultural and economic context, and there is no such thing as a «better law» deserves support». The search for «a better law» involves attempts to transplant a particular legal institution into the national legal system.

The article by P. Legrand (1997, pp. 111-124), where he strongly opposed legal transplantation, received a great response. Of course, there are many examples in history proving successful legal transplantation, so the cultural approach supporters rightly quote (Watson, 2000), but likely a much larger number of unsuccessful attempts are not mentioned. It seems that a complete rejection of legal transplantation is impossible, but abuse of this method is unlikely to lead to the desired result.

In addition, this way is sometimes not only unjustified but also inapplicable. For example, Russian scholars primarily focus on improving national legislation by borrowing appropriate foreign legal models and institutions. However, to date, no state has a universal recipe in the field of legal regulation of the cryptoasset market.

The unification and harmonization of legislation are recognized as an equally crucial practical goal. In 1900, at the International Congress of comparative law, it was proposed to develop a universal legal regulation through a comparative analysis of national legal systems. Despite this idea's attractiveness, it has not received any significant practical implementation, even in the context of globalization.

Nevertheless, it is difficult to deny that the processes of harmonization of legislation are intensive, especially in the sphere of legal regulation of the world economy. As foreign researchers rightly point out, private law is the optimal area for comparative legal research, since it is less susceptible to political influence. That is why private law can be considered a promising area for harmonizing legislation, which involves the rejection of national characteristics to create a single legal regulation, includes the convergence of legal positions, taking into account existing national legal traditions and features in contrast to unification. The validity of this approach is confirmed by the European Union's experience, which did not create a Single code of private law, despite numerous proposals from scientists, but preferred a mechanism for implementing EU directives in the national legislation of EU Member States.

Applying the comparative method to develop legal regulation of the cryptoassets market

In many states, legislators and legal experts are faced with the need to solve global problems related to the regulation of crypto-assets, which requires rethinking the use of the comparative method. Even though more than a decade has passed since the first cryptocurrency appeared, no country in the world has formed a comprehensive regulation of crypto assets. There are objective reasons for this. First, the cross-border nature of crypto assets does not allow for adequate legal regulation exclusively at the national level. Secondly, there are concerns that the regulatory impact may negatively affect the development of distributed ledger technology in the country, particularly blockchain.

To date, no country in the world can claim that it has formed the optimal legal regulation of crypto assets, with breakthrough potential. In these circumstances, the pattern for borrowing is essentially absent. Some countries, such as Malta and Liechtenstein, have taken the way of creating special laws, but it is not yet clear if they are efficient.

The innovative legal regulation model is based on forming a legal framework for crypto assets by adopting special laws that exclusively regulate relations bounded to crypto assets. Malta was the first decided to do this by passing three interrelated laws:

- The Malta Digital Innovation Authority Act (MDIA);
- The Innovative Technology Arrangement and Services Act (ITAS);
- Virtual Financial Assets Act.

The Malta digital innovation authority act establishes the Malta digital innovation center to certify the distributed ledger technology (DLT) platform. The Innovative Technology Arrangement and Services Act regulates the registration procedures for crypto exchanges and other crypto markets. The Virtual Financial Assets Act defines the legal regime of DLT assets, including ICO procedures.

DLT assets include a virtual token, a virtual financial asset; electronic money; or a financial instrument.

A virtual token means a digital record which usefulness, value, or applicability is limited solely to the purchase of goods or services, either on the DLT platform on which it was issued or within a limited DLT network. Based on a virtual token definition, we can conclude that we are describing a utilitarian token.

Virtual financial assets are defined as digital records used as an exchange and accounting unit, or a way to accumulate value. This definition does not apply to electronic money, financial instruments, and virtual tokens due to its direct order.

The Malta financial services authority (MFSA) has developed a unique financial instrument test to determine whether the virtual financial assets Act's provisions apply to the DLT asset being tested. Whether it is indicated that the DLT asset is a VFA, then the ICO will require licensing and compliance with other procedures provided for by the Act.

Thus, Malta's legislation provides comprehensive regulation of relations related to the creation and circulation of crypto assets.

This way was also chosen by another European state – Liechtenstein. The law on tokens and secure technology service providers (Gesetz über Token und VT- Dienstleister - TVTG) came into force on January 1, 2020. Unlike in Malta, the Liechtenstein legislator did not identify a specific technology, using the concept of «secure technologies» (VT). However, it is clear from the text of the law that it is a distributed registry technology. In this regard, this law is often referred to as the Liechtenstein blockchain Law.

The TVTG law defines a token «as a piece of information in the VT system that may represent a person's claim or membership rights, ownership rights, or other absolute or relative rights and is linked to one or more VT identifiers» (VT ID is the public key in the blockchain). This definition is based on the concept of the token Container Model (TCM). A token as a container can contain the right to a real asset (shares, bonds, gold, real estate, exchange-traded goods, etc.). If the token is not secured, it is an «empty container» that exists as a digital code, such as bitcoin. Utility tokens within this concept contain the right to use the software (Software Usage Right). Thus, the token is a new legal construct in Liechtenstein law and acts as a tool for the digital representation of law (right).

Russia has also taken the way of creating special legislation in the field of crypto assets. In 2019-2020 a number of laws were adopted, which should provide comprehensive regulation of the blockchain industry, according to the legislator:

- The Federal law No. 34-FZ of 18.03.2019 «On amendments to parts one, two and the article 1124 of part three of the Civil code of the Russian Federation»;
- The Federal law No. 259-FZ of 31.07.2020 «On digital financial assets, digital currency and amendments to certain legislative acts of the Russian Federation» (hereinafter-the DFA Law);
- The Federal law No. 259-FZ of 02.08.2019 (as amended on 20.07.2020) «On attracting investments using investment platforms and on amendments to certain legislative acts of the Russian Federation» (hereinafter - the law on investment platforms);
- The Federal law No. 258-FZ of 31.07.2020 "On experimental legal regimes in the field of digital innovations in the Russian Federation."

Digital rights were included in the list of civil rights objects, stipulated in clause 1 of article 128 of the Civil code of the Russian Federation, as a type of property rights.

The concept of digital rights is described in the article 141.1 of the Civil code of the Russian Federation, so «digital rights are recognized as obligation rights and other rights named in this capacity in the law, their content and conditions are determined following the rules of the information system that meets the criteria established by law».

It should be noted that the category of «digital rights» was not used in the literature before it was enshrined in the law. A Russian legislator introduced this term without any theoretical justification. Complaints are primarily caused by the term «цифровые права» («digital rights»), which is entirely borrowed from the English term «digital rights». In English-language legal literature, «digital rights» refers to the set of human rights to use a computer, access the Internet, publish content in a digital environment, process it, transmit it, and other rights of Internet users (see, for example: Marcus, 2015; Goggin et al., 2017). Moreover, the term «digital rights» is used in the term «Digital rights management», used to refer to any system that controls access to copyrighted material using technological means. However, the Russian term «digital rights» is used in a completely different meaning. It seems that the aim of the Russian legislator to form a new terminology does not contribute to the harmonization of Russian legislation in the field of the digital economy. Moreover, this can negatively affect the investment attractiveness of the Russian digital asset market.

Under Russian law, digital financial assets have become a different type of digital rights recognized as digital rights:

1) monetary claims;
2) ability to exercise rights under equity securities;
3) rights to participate in the capital of a non-public joint-stock company;
4) the right to demand the transfer of equity securities.

In addition to digital financial assets, article 1 of the DFA Law defines a digital currency. It is noteworthy that it is purely technocratic: «a set of electronic data (digital code or designation) contained in an information system». Perhaps this definition should emphasize the restriction of digital currency circulation in the Russian legal order.

It seems that the legal concept of «digital financial assets» is used to refer to security tokens. According to clause 2 of article 2 and clause 1 of article 3 of the DFA Law, a decision on digital financial assets must contain information about the type and scope of rights to be certified. The law also provides the possibility of generating hybrid tokens when issued digital financial assets certify several rights types.

Analysis of the legislation on the blockchain and crypto-assets in Malta, Liechtenstein, and Russia shows significant conceptual differences. That indicates, first of all, that at the moment, there is no standard approach and understanding of the legal essence of crypto assets, which provides a possibility to form a complete and consistent regulation of this area.

On the other hand, significant harmonization was achieved by States united in solving the most critical supplementary task such as the fight against money laundering. Regulation in this area has a distinct cross-border character due to the FATF's intergovernmental organization (Financial Action Task Force, FATF). The report «Virtual currencies. Key definitions and potential AML/CFT risks» were issued. Based on it in 2015, the FATF has developed a guide for applying a risk-based approach to virtual currencies, which focuses on the risks that arise when exchanging virtual currencies for fiat. In 2018. amendments to this Guide and Recommendations 15 were adopted, extending their scope to all «virtual assets,» not just cryptocurrency. Besides, it has introduced the definition of «provider of services in virtual assets». In general, the FATF recognized the risks of money laundering and terrorist financing not only in transactions involving the exchange of virtual currencies for Fiat money but also in transactions involving the exchange of various crypto assets among themselves.

The 2019 FATF memorandum to Recommendations 15 detailed the requirements for regulation, supervision, and monitoring of virtual asset service providers. The providers' activities are subject to mandatory licensing or registered in the jurisdiction they are created to apply AML/CFT legislation to them. Besides, they are obliged to pass on information about clients to each other when they make money transfers between exchanges. However, this requires providers to follow the «know your customer» (KYC) principle, which contradicts crypto assets' pseudo-anonymity.

The 2019 guidelines for applying a risk-based approach to virtual assets and service providers in the field of virtual assets explicitly state that the supervision and control of providers' activities should be carried out by the competent state authorities (national financial regulators), and not by self-regulatory organizations.

Although the FATF recommendations are not binding, the FATF member countries strive to ensure that they are implemented in their national legislation within the next 12 months. The FAFT strictly monitors countries' compliance with the adopted recommendations. So, in its report on the United States of March 30, 2020, the FATF pointed out that there are «minor shortcomings» and «technical gaps» related to virtual assets that may allow unscrupulous participants in the crypto market to evade compliance with AML / CFT requirements.

Thus, countering crypto assets to launder illegal income and finance terrorism is mainly carried out by establishing licensing requirements for crypto exchanges and monitoring the transfer of crypto assets.

Following the way of taking into account the FATF recommendations, the European Union has established its rules on the turnover of crypto-assets (Directive (EU) 2018/843 of the European Parliament and of the Council of May 30, 2018, amending Directive (EU) 2015/849 on the prevention of the use of the financial system for money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU -MLD5). In this Act, Crypto assets are defined more narrowly than in the FATF acts. So, virtual currencies mean «a digital representation of value that is not issued or secured by a Central Bank or government authority, is not necessarily linked to a legally established currency, and does not have the legal status of currency or money, but is accepted by individuals or legal entities as a medium of exchange that can be transferred, stored, and sold electronically». Accordingly, not all types of crypto assets are subject to the legal regulation of anti-fraud legislation.

Following the MLD5, the legislation of the AML/CFT applies to «obligated persons». They include providers that provide exchange services between cryptocurrency and Fiat money and providers who keep wallets. The obligated persons do not include those providers that provide services for exchanging crypto assets among themselves, although some may be subject to regulation as wallets' keepers.

The MLD5 rules were to be implemented in the EU Member States' national legislation before January 10, 2020. Thus, the implementation of the MLD5 recommendations in German legislation, on the one hand, creates additional barriers and costs for companies working with crypto assets, and on the other hand, allows banks that have received the appropriate licenses to conduct operations with crypto assets.

It should be noted that national AML/CFT legislation, although developing in one direction, also has certain specifics. Therefore, we cannot talk about forming a single legal framework for the crypto market, which is cross-border, which creates both threats to States associated with illegal activities using crypto assets and legal uncertainties for participants in the crypto market. Against this background, calls for the creation of global standards seem entirely justified.

The study of AML/CFT rules in the European Union and the world allows us to see how the comparative research method allows us to generalize different jurisdictions' rules. The most common issues for different States are being solved, although the crypto-assets' approach may vary significantly. We see that the goals of legal transplantation and harmonization of legislation of different States can be achieved by combining approaches and principles of legal policy for different territories and observing pluralism of opinion to avoid borrowing non-obvious and risky legal solutions before their implementation and verification by time.

Conclusion

It seems that in the context of the global economy and the Internet, the study of legal phenomena that are essentially cross-border at the current stage should take into account the legal regulation that is being formed both within the legislation of the most technologically advanced countries and in the international economic space. That will allow harmonizing national legislation initially, facilitating the country's integration into the world market. We believe that this is the fundamental ability of the comparative method of legal research to develop the legal system of an individual state and at the same time enrich general legal approaches to improve the legal environment, so in our example, it is related to digital markets that do not have a domicile.

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The Effects of the Operation of Individual Pension Accounts in Poland in the Voluntary Pension Insurance System, Taking into Consideration the Tax Preferences Applied

Zbigniew OFIARSKI

University of Szczecin, Szczecin, Poland
zbigniew.ofiarski@usz.edu.pl

Abstract

In the study, the development of voluntary pension insurance in Poland in the form of individual pension accounts was examined and assessed, using the legal-dogmatic and statistical approaches. The accounts are run by authorised financial institutions on the basis of agreements concluded with natural persons. It has been shown that the quantitative growth rate of new pension accounts and the growth of the value of assets accumulated on these accounts are gradually decreasing. The intended purpose of the research was successfully achieved, which was to show that individual pension accounts, as a pension product potentially available to every citizen, actually arouse the interest of a relatively small group of people with above-average income who have relatively extensive knowledge of the pension insurance market. Moreover, it was determined that state action is necessary to strengthen the tax preferences encouraging more people to voluntarily accumulate savings for pension purposes. The state should also become more involved in the processes of educating the society about the principles of the pension insurance system and about the market risks associated with investments in the financial market.

Keywords: Financial Institutions, Pension Insurance, Tax Preferences, Financial Market.

Introduction

The demographic structure of inhabitants and the related inefficiency of universal (compulsory) pension insurance is currently a problem in all modern countries (Carone et al., 2016; Natali, Stamati, 2013; Schneider, 2009; Hughes, Stewart, 2004). The amounts of obligatory insurance premiums paid do not guarantee a sufficiently high pension benefit for the insured person. In Poland, this phenomenon is of particular importance, because the effect of lowering the age limit entitling to pension, as well as the increasing life expectancy, is the constant growth in the number of people receiving these benefits. The resources of people of working age who contribute to the compulsory pension insurance system are diminishing, while the number of people of retirement age (professionally inactive) is growing. The intergenerational pay-as-you-go system no longer provides adequate pension security for contributors.

The system of compulsory pension insurance, supported by subsidies from the state budget, now fails to fulfil its basic functions. As a result, the index reflecting the ratio of the amount of pension to the last remuneration from employment of a previously economically active person is decreasing. Despite the nominal increase in the amounts of pension benefits, as well as their indexation, their real value is falling, which is mainly due to inflation and the increase in prices for basic goods and services.

These phenomena have been recognised in Poland for almost 25 years by various environments (government administration, independent experts, social organisations and scientists). In fact, the dominant view is that a system of voluntary pension insurance needs to be developed, which should, to a significant extent, complement the pension benefits financed from the compulsory system. One of the forms of voluntary pension insurance in Poland are individual pension accounts introduced in 2004. A characteristic phenomenon is the strong interference of the state in the way these accounts

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function, hence the voluntariness feature is significantly disturbed, especially from the point of view of people who would like to accumulate more money in this form.

Voluntary pension insurance is an instrument that is frequently used in modern countries, e.g. in the Czech Republic, the Netherlands (mainly in the form of company and sectoral pension funds), Germany, Switzerland and Slovakia (primarily individual pension plans), Great Britain (private pension plans). The differences, however, involve the use of certain forms of such insurance, the scope of state interference, and incentives to encourage citizens to choose to accumulate funds for additional pension, as well as protection of the accumulated capital against market risk. The forms of voluntary pension insurance, detailed solutions applied in this area, the problem of market risk and protecting accumulated capital against it are issues frequently analysed in Polish literature (Brenk, Wnuk, 2017; Ciura, 2008; Dopierała, 2016; Dopierała, 2018; Herbich, 2010; Jedynak, 2016; Koćwin, 2017). There also have been attempts to assess the effectiveness of partial reforms implemented in this area (Matyjaszczyk, 2016; Pacud, 2012; Ratajczak-Tuchołka, 2013).

Research conducted in Poland also concerns the barriers to the development of voluntary pension insurance, including the lack of a proper system for educating the society about the need to accumulate funds for additional pension (Ostrowska-Dankiewicz, Pieńkowska-Kamieniecka, 2013), limited resources of savings in households (Kwiatkowska, 2016; Leśna-Wierszołowicz, 2017; Rutecka, 2014), unequal treatment in terms of taxation of various forms of voluntary saving for pension purposes (Leszczyłowska, 2016), low effectiveness of the tax preferences applied (Rusinowicz, 2011; Rutecka, 2015). The effects of the functioning of voluntary forms of pension insurance in other countries, compared to the results achieved in Poland, indicate, above all, the need to strengthen various incentives of material interest to more effectively influence decisions made by citizens. In particular, these should be tax exemptions applied at the fund-raising stage and lower tax rates on generated income used after the fund-raising period.

The purpose of this study is to present the quantitative and qualitative effects of the functioning of individual pension accounts (IKEs) in 2012-2019. The choice of this period is not accidental. Its starting point is related to the subsiding of the effects of the 2008-2011 financial crisis, while the end point is connected with the expected deep economic and financial crisis caused by the COVID-19 pandemic. The analysis of the effects of the functioning of IKEs concerns the period of relative stabilisation, which, by definition, should favour making rational decisions regarding long-term capital investments.

The study analyses and assesses the applicable legal regulations in the context of the quantitative and qualitative effects of IKEs based on official statistical data obtained from reports of the Polish Financial Supervision Authority, which is the state authority that supervises the activities of financial institutions authorised to run IKEs in Poland on the basis of agreements concluded voluntarily with citizens. The empirical analysis identified positive and negative phenomena resulting from the functioning of IKEs. In particular, attention was paid to the relatively low popularity of this form of voluntary fund-raising for additional pension, as well as the waning dynamics of the quantitative and qualitative growth in IKEs and financial assets accumulated on them.

Defining the rules of maintaining IKEs in the act gives them the value of a legal institution with universal features, the specification of which takes place in agreements concluded by authorised financial institutions with their clients. It was assumed that IKE is a product of the financial market potentially available to every citizen interested in increasing their pension in the future. There are also social and economic problems accumulating in the legal institution of IKEs. Therefore, analysis and assessment of the effects of the functioning of IKEs require the use of the legal-dogmatic approach (with regard to the basic elements of the legal structure of IKEs) and the statistical approach (to enable the presentation of the quantitative and qualitative structure of IKEs and identification of trends in their development).

It was shown that throughout the analysed period, IKEs fulfilled only a complementary role in relation to the basic pension benefit paid from the resources of public pension funds that make up the

obligatory pension insurance segment. Under the functioning IKEs, the possibilities of making payments up to the statutory annual limits are not even fully used. This is conditioned by the limited free financial resources at the disposal of households, as well as the lack of strong incentives to accumulate savings along with the appropriate resignation from some current expenses of a consumption nature. Therefore, the summary proposes to strengthen the stimulating function of tax preferences, which, however, requires legislative action by the state authorities.

The originality of this study consists in submitting a proposal to strengthen tax instruments in creating greater social activity in the sphere of planning one's income after reaching retirement age. It was further proposed that the state should undertake educational activities to raise the level of knowledge and social awareness regarding pension insurance in the cause and effect aspect. Only such a comprehensive approach creates conditions for solving problems of strategic importance for the state and household finances.

Legal Structure of Individual Pension Accounts - Selected Aspects

The legal structure of IKEs is determined by regulations of a subjective and objective nature. The first group includes the regulations specifying the parties to an IKE agreement, and the latter - the regulations regarding the types of IKEs, annual payment limits, and effects connected with payments from or liquidation of an IKE before becoming entitled to pension payments. The person accumulating funds on an IKE may be a natural person who is an adult without additional restrictions, or a minor who is 16 years of age but only if in a given calendar year they receive income from work performed under an employment contract (Ofiarski, 2020, p. 46). The person accumulating funds on an IKE may be either a natural person residing in Poland or a person residing abroad. The condition of having Polish citizenship or citizenship of another European Union Member State has not been introduced in relation to natural persons saving on IKEs.

A party to an IKE agreement may also be a person who inherits from the person saving on the IKE, or a person indicated in the instruction in the event of death, which the saver may submit to the financial institution operating their IKE. In the latter case, the person purchasing funds accumulated on an IKE cannot continue saving on this IKE. The funds acquired in this manner are payable to the entitled person. If that person has not yet had an IKE, they may conclude a new IKE agreement with a financial institution of their choice. Acquisition by inheritance of funds accumulated on an IKE is exempt from taxation with inheritance and donation tax.

A natural person may only have one IKE; however, it is possible to change the financial institution operating the IKE even multiple times. At the time of concluding an IKE agreement or changing their financial institution, the saver must submit a written statement, under pain of criminal liability for submitting a false statement, that it is their only IKE. Violation of this prohibition is also associated with an additional sanction in the form of high taxation of income from each IKE (income tax is then determined using the 75% rate). In this respect, the saver is equated to a person hiding their income from taxation, i.e. a person committing a tax offence.

The types of IKEs, the way they are operated and the market risk related to the accumulated capital are connected primarily with the category of the financial institution to operate the IKE. The following entities are authorised to operate IKEs: an investment fund, an entity conducting brokerage activities, an insurance company, a bank, and a voluntary pension fund. Taking into account the categories of these financial institutions, five types of IKEs can be distinguished. Individual financial institutions offer different financial services, which consist in maintaining a separate: entry in the register of participants (investment fund), securities account (entity conducting brokerage activities), account in an insurance capital fund (insurance company), bank account (bank), bank account in a voluntary pension fund. Each person saving for pension purposes independently chooses the financial institution in which they wish to keep an IKE.

Accumulating funds is associated with the most risk in a securities account or in an investment fund, and the least - in a bank. Completion of an IKE investment and the use of the generated income is

often distant in time and, especially when choosing capital investing forms associated with more risk (investment funds, financial instruments purchased through a brokerage house), the final result of the investment is uncertain. The risk of even a partial loss of deposited funds in the event of an improperly pursued investment policy by a financial institution should be taken into consideration.

Development of IKEs in 2012-2019

Both economic and social factors determine the quantitative and qualitative development of IKEs. The tendency to collect funds for additional pension depends mainly on the amount of financial resources, the structure of current household expenses, incentives for material support in connection with collecting funds for pension purposes (tax reliefs and exemptions), education level, awareness of the need for adequate financial security after the end of professional activity period. In addition, the development of IKEs may be determined by specific preferences applied to financial institutions where IKEs are offered. In Poland, these mainly include: lower requirements for calculating minimum reserves in banks (Wajda, 2010, pp. 27-28), guaranteeing solvency in the event of bankruptcy of a financial institution, properly exercised state supervision over the activities of financial institutions accumulating funds for pension purposes (Sowiński, 2019, pp. 206-2010), and simplified procedures to prevent the use of financial institutions for the purposes of money laundering or terrorist financing (Ochman, 2016, pp. 329-330). All these solutions have a positive impact on the growth of public trust in financial institutions (Ofiarski, 2017, p. 23).

It should be emphasized that the lowest fees for keeping IRA accounts are charged by banks, and only if the agreement is terminated by month 12 from the agreement date. Relatively high fees are charged by brokerage houses and insurance companies for fund management services (from 1% to 2% on transactions made). In general, financial institutions charge the following fees: processing fees (for processing transactions made by the account holder), cash deposit fees (for funding accounts), depreciation fees (for purchasing participation units), conversion fees (for changing the investment fund). The amount of fees is usually proportionate to the transaction value and is not dictated by the inflation rate.

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The index illustrating the real interest in saving on IKEs, the wealth of savers and the use of the possibility of collecting as much funds as possible is the proportion between the annual limit of payments and the average amount of payments to IKEs, shaping in individual years. This is shown in the table below.

Table 1: The amounts of the average payment to IKEs in relation to the annual limit of payments

Year	Annual deposit limit (in the Polish currency)	Average payment to IKE (in the Polish currency)	Average payment in relation to annual limit (%)
2012	10 578	2 600	24,58
2013	11 139	3 100	27,83
2014	11 238	3 400	30,25
2015	11 877	3 500	29,47
2016	12 165	3 700	30,42
2017	12 789	3 900	30,49
2018	13 329	4 200	31,51
2019	14 295	4 600	32,18

Source: Calculated on the basis of numerical information on IKEs from 2012-2019 provided by the Financial Supervisory Commission, www.knf.gov.pl

In order for readers outside Poland to better understand the qualitative relations presented in the tables below, information on the exchange rates of the Euro to the Polish currency is included. In individual years (as at December 31, according to the exchange rate table of the National Bank of Poland), the average exchange rate of EUR 1 to the Polish currency was as follows: PLN 4.08 (in 2012), PLN 4.15 (in 2013), PLN 4.26 (in 2014), PLN 4.26 (in 2015), PLN 4.42 (in 2016), PLN 4.17 (in 2017), PLN 4.30 (in 2018), PLN 4.26 (in 2019). The maximum annual limit of payments to IKEs in the analysed period was 300% of the forecast average monthly salary in the national economy for a given year, as specified in the Budget Act. A characteristic phenomenon is the increase in the annual limit of payments to IKEs, determined by the increase in the average monthly salary. However, this has no significant impact on the increase in the average payment to IKEs. The average payment to IKEs in the following years did not exceed 1/3 of the annual limit of payments set by the legislator. In addition, many savers have inactive IKEs, i.e. ones where no payments are made for several years after their opening. This is due to the low level of affluence of households in Poland and their high burden of current expenses, taxes and compulsory social security contributions, as well as repayments of high instalments of loans taken mainly for housing purposes. In the analysed period, there was a strong increase in household indebtedness.

The structure of IKEs should be examined with consideration of the categories of financial institutions authorised to operate them as well as the amounts collected on particular types of IKEs. It can also be analysed according to the age of IKE holders.

Table 2: Number of IKE accounts managed by financial institutions in 2012-2019 (in pcs.)

Financial institution category	2012	2013	2014	2015	2016	2017	2018	2019
Insurance companies	557595	562289	573515	573092	571111	568518	562476	462171
Investment funds	188102	182807	174515	205494	236278	275796	316966	355031
Banks	47037	49370	51625	52371	64031	71922	78288	88460
Brokerage houses	20079	21712	22884	25220	27615	30418	32584	39030
Voluntary pension	479	1473	1946	2548	3580	4922	5307	6075
Total	**813292**	**817651**	**824485**	**858725**	**902615**	**951576**	**995651**	**950767**

Source: Official information from 2012-2019 collected by the Financial Supervisory Commission, www.knf.gov.pl

The largest number of IKEs in the analysed period was operated by insurance companies and even the slight decrease in the number of IKEs operated by insurance companies since 2015 did not deprive them of their dominant position on the voluntary pension insurance market. Insurance companies are particularly active in the sale of the offered products, including through brokers and agents, therefore they attract more people interested in pension insurance than other financial institutions (Dopierała, 2017, p. 26). Moreover, IKEs maintained by insurance companies are assessed by many clients as relatively safe for the protection of accumulated capital against inflation. The decrease in the number of IKEs maintained by insurance companies since 2015 was mainly due to savers transferring their accounts to investment funds, who, taking greater investment risk, expected higher profits from accumulated capital. The lowest share in the number of IKEs maintained are voluntary pension funds, but they only obtained the authorisation to operate IKEs in 2012. The number of IKEs maintained in banks, which by the end of 2019 operated almost twice as many IKEs as they did in 2012, has been systematically growing. The 2019 decrease in the total number of IKEs by 44,884 compared to 2018 was mainly due to the acquisition of entitlement by the oldest savers, who made a one-off payment of the accumulated funds together with the generated income.

The level of awareness and the needs of planning financial security for the period after ending one's activity on the labour market may be reflected in the age of people saving on IKEs. The possibility of using the income generated from the accumulated capital without incurring the obligation to pay income tax appears only after the saver reaches 60 years of age. Before this point, it is possible to use this income if the saver acquires pension rights, reaches 55 years of age and meets one of the following conditions: he/she at least made payments to the IKE in any 5 calendar years or made more than half of the payments no later than 5 years before the date of submission of their request for withdrawal of funds. The table below presents the age structure of IKE savers.

Table 3: Number of IKE holders in 2012-2019 by their age structure

Savers' age	2012	2013	2014	2015	2016	2017	2018	2019
Up to 30 years old	53010	41536	32477	28491	27668	30064	32590	36204
31-40 years old	199945	193195	188220	181625	175419	169498	160921	141832
41-50 years old	197082	199948	205666	216412	227126	240683	253102	242380
51-60 years old	238892	240283	238918	242674	249349	255859	263217	245932
Over 60 years old	124363	142689	159204	189523	223053	255472	285821	284419
Total	**813292**	**817651**	**824485**	**858725**	**902615**	**951576**	**995651**	**950767**

Source: Official numerical information on the IKE market from 2012-2019 collected by the Financial Supervisory Commission, www.knf.gov.pl

In the analysed period, people in the 51-60 age group dominated among IKE savers until 2017. Their share in the total number of savers in the following years was almost 30%. Since 2016, the share of IKE savers of the over 60 age group significantly increased, and in the last two years of the analysed period they became the dominant group. The smallest number of people saving on IKEs was among the youngest people, i.e. the age group of up to 30 years, and their number at the end of the period decreased by 16,806 people compared to 2012. Among relatively young people, the need for retirement security is treated as a very distant future. However, this is not due to recklessness. In this age group, the dominant position is held by other needs, such as expenses for housing purposes, purchase of furniture and household appliances, purchase of cars, expenses related to raising and educating children. Saving for pension purposes is also strongly dependent on education and

profession as well as earned income. More determination to save is observed among the wealthier people who expect that they will live longer than others (Olejnik, 2016, pp. 165-166).

The development of IKEs is also determined by the overall value of assets accumulated on IKEs in particular types of financial institutions. This is presented in the table below.

Table 4:Value of assets accumulated on IKEs in 2012-2019 (in PLN)

Year	Total on IKEs	Insurance companies	Investment funds	Brokerage houses	Banks	Voluntary pension funds
2012	3530313000	1397176000	1128873000	524254000	477896000	2114000
2013	4271150000	1618173000	1337534000	676461000	627587000	11395000
2014	5030537000	1903628000	1513289000	790231000	804440000	18949000
2015	5644982000	2060309000	1695828000	902974000	960453000	25418000
2016	6655497000	2283011000	1995158000	1075628000	1266112000	35588000
2017	7961329000	2591891000	2446957000	1285103000	1581246000	56132000
2018	8691153000	2582688000	2724667000	1434683000	1886458000	62657000
2019	10167365000	2738852000	3266396000	1784709000	2296661000	80747000

Source: official numerical information on IKEs from 2012-2019 provided by the Financial Supervisory Commission, www.knf.gov.pl

As at 31 December 2004, PLN 168.5 million was accumulated on IKEs. In 2019, after 16 years of the functioning of IKEs, the total amount of assets exceeded PLN 10 billion, which is a 60-fold increase. However, this is not a significant amount compared to the deposits accumulated in banks at the end of 2019, which amounted to almost PLN 894 billion. At the end of 2019, the largest amount of funds was accumulated on IKEs operated by investment funds (over PLN 3.2 billion), but the highest growth dynamics was recorded in voluntary pension funds (from slightly exceeding PLN 2 million in 2012 to over PLN 80 million, which was a forty-fold increase in assets). Assets on IKEs operated by banks have been systematically growing, as this is generally recognised as the safest form of collecting funds for pension purposes. A negative phenomenon is the low active account ratio, which has been maintaining for many years, ranging from 30% to 34%. This means that only one third of the IKE system participants make payments to their IKEs in a given year.

Table 5: Growth rate of the overall value of funds in Individual Retirecement Accounts (IRA) and the number of accounts kept over the years 2012-2019

Year	Total funds in IRA (in PLN)	Year-on-year growth rate of the value of funds in IRA account (in %)	The number of IRA accounts run by financial institutions (in single accounts)	Year-on-year growth (decline) rate in the number of IRA (in %)
2012	3530313000	100,00	813292	100,00
2013	4271150000	120,99	817651	100,54
2014	5030537000	117,78	824485	100,84
2015	5644982000	112,21	858725	104,15
2016	6655497000	117,90	902615	105,11
2017	7961329000	119,62	951576	105,42
2018	8691153000	109,17	995651	104,63
2019	10167365000	116,99	950767	95,49

Source: Growth rate indicators were calculated based on official statistics on IRA accounts for the 2012-2019 period drawn up by the Polish Financial Supervision Authority.

The growth in the value of assets in IRA accounts was varied throughout the study period, which was mainly due to the changing rate of returns on investment in given financial instruments and partial withdrawals of funds by savers. The growth in the number of new IRA agreements was very low, and the situation got even worse in 2019 when several thousands of people closed their accounts, thereby giving up the plan to have an additional retirement savings option.

The general public interest in saving on IKEs is also low, as only 6.1% of the working age population are IKE holders. This is the result of a number of objective and subjective factors. The first group of factors includes, above all, the low level of wealth in the society, high burden of various public levies on salaries or other income of natural persons, low interest rates offered by financial institutions, constantly rising costs of running a household (rising prices of energy, food, services, rents for the use of residential premises), inflation, increase in debt due to loans taken, risk of losing a job. The subjective factors include the lack of interest in one's own future in the long-term perspective, low level of financial knowledge and the lack of willingness to educate in this area, as well as an illusory perception of security resulting from the functioning of the compulsory social insurance system.

Conclusions

As a result of the conducted research, including the analysis of the quantitative and qualitative effects of the functioning of IKEs, it was found that the possibilities of their dynamic development while maintaining the current incentives used by the state have been exhausted. Gradually, IKEs are becoming a form of accumulation of funds for additional pension by a relatively small group of people with above-average income and well-educated about the phenomena concerning the financial market. The tax privilege in the form of the exemption of IKE income from income tax, which may be used only when the funds are withdrawn after acquiring pension rights, where the basic condition is the age of 60, does not stimulate the dynamic development of IKEs. The positive effects of this tax privilege may be noticeable for the IKE saver only after many years. From this perspective, it is difficult to assess the purchasing power of financial resources in such a distant future and what needs can be satisfied with them. Therefore, the decision to start accumulating funds on an IKE is postponed to later years. The effect is that agreements for maintaining an IKE are more and more often concluded by middle-aged people, at least 40 years of age.

The main reasons for the declining interest in voluntary fund-raising for additional pension were identified. Most of them are objective, and the most important ones are: low level of wealth, high household running costs, inflation and rising prices for basic goods and services, high taxes and other public levies, growing debt due to loans and credits and the need to allocate a large part of the current income to pay loan instalments. The subjective reasons include primarily the reluctance to learn about the mechanisms of the compulsory and voluntary pension systems and the related financial risk, as well as focusing on current problems while neglecting plans for the period after the end of professional activity. The lack of knowledge about the amount of pension from the compulsory system means that the insured are not able to determine the desired level of income after acquiring the right to pension (Cichowicz, Rutecka-Góra, 2017, pp. 94-96). There is also a noticeable decline in social trust in the state caused by frequent changes within the pension system (Dybał, 2019, p. 110).

Therefore, the postulate to introduce an instrument with a much stronger stimulus effect is justified. This could involve an exemption from taxation of expenses of a natural person at the time of making a payment to an IKE (Szumlicz, 2009, pp. 37-38). The tax exemption could consist in deducting part or even all of the saver's expenses in the form of payments to an IKE from the tax base or reducing the amount of the calculated income tax by the respective part of contributions to IKE. The ongoing use of such a tax privilege would be more noticeable for the taxpayer, thus its stimulating effect towards the intention of systematic and long-term savings on an IKE would be strengthened. The right to a tax relief should, however, be conditional on systematic saving by making payments to the IKE every year, and not only occasionally every few years. Increasing the scale of tax preferences for people saving for pension purposes should be correlated with the state's real possibilities of financing them. Tax preferences applied in this area should be a derivative from the state's fiscal policy. Often, more important than the size of tax preferences is their structure (Jedynak, 2016, pp. 16-17).

The conducted research also shows that it is necessary to strengthen educational activities regarding the need to collect funds under voluntary pension systems. An important role in this respect is played not only by financial intermediaries and financial institutions offering pension products, but also by the mass media. However, these are short-term actions, while in the long term, continuous education of the society in this area is necessary. In Poland, despite the fact that the economy based on market mechanisms has been operating for 30 years, the activities of making independent decisions on saving for future retirement have not yet become popular. Taking the reported postulates into account may contribute to the improvement of the attractiveness of saving on IKEs and the interest of a larger group of natural persons in this pension product. Each action increasing the attractiveness of IKEs, stimulated with tax reliefs, will cause a temporary decline in budget revenues. However, it is necessary to undertake this effort due to the growing problems related to maintaining balance in the obligatory state pension insurance system. In Poland, failure to adequately promote voluntary fund-raising systems for pension purposes will in future lead to even greater budgetary expenditure necessary to guarantee the payment of pensions from the state system. It cannot be ruled out that a more dynamic development of individual voluntary forms of collecting savings for pension purposes may take place when the society becomes convinced that benefits from the state pension system will be insufficient to ensure an adequate standard of living during the retirement period.

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Ethical Leadership in the Czech Armed Forces

Zdeněk MIKULKA

University of Defence, Brno, Czech Republic
zdenek.mikulka@unob.cz

Jolana FEDORKOVA

University of Defence, Czech Republic
jolana.fedorkova@unob.cz

Ivana NEKVAPILOVA

University of Defence, Czech Republic
ivana.nekvapilova@unob.cz

Abstract

Organizations and institutions, including security, must consider whether their development and future direction are in line with accepted, ethically acceptable principles (Brown and Trevino, 2006). This also applies to the state security institution Army of the Czech Republic (hereinafter referred to as CAF). According to the authors of this text, it is possible to further develop the CAF in accordance with the ethical principles that are binding on it, by applying ethical leadership to its leadership and management system. The text, which has the character of a descriptive study, in its first part deals with the theoretical foundations of ethical leadership and on their basis, generates the concept of functional ethical leadership. In the second part of the text, the authors apply this concept to CAF conditions. The main method of acquiring knowledge was the content analysis of the results of already performed research and the subsequent synthesis of acquired knowledge. This descriptive study confirmed that the application and development of ethical leadership in CAF are possible. At the same time, it sets out the conditions that need to be met in this context: sufficient time, the right setting of educational and development processes, the adoption of ethical standards and norms at the tactical, operational, and strategic levels, and the emphasis on ethically responsible behavior and actions of military leaders.

Keywords: Ethical Leadership, Moral, Value, Behavior.

Introduction

There have been a number of highly debated scandals and frauds all over the world in recent decades (Enron and Satyam, Sanlu Milk, WorldCom, Lehman Brothers, BNDES Brazilian Development Bank, and many more). These scandals have forced institutions and large corporations to seek redress for their ethical violations and to be aware of their social responsibility and the need for ethical behavior (Ahmad and Gao 2018; Tu and Lu 2016). In this context, a number of studies devoted to ethical leadership began to appear in the specialized literature.

The article was written by Treviño, Hartman, and Brown entitled "Moral Person and Moral Manager: How Executives Develop a Reputation for Ethical Leadership" from 2000 (Treviño et al. 2000) is an important example, which summarizes the results of exploratory research and identifies factors leading to the creation of functional ethical leadership and positive and negative impacts on the organization and its members. This key research was followed by other researches.

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These surveys have provided the following findings:

- Respect, sincerity, and honesty play an important role in successful negotiations (Duggan 2018).
- Creating an atmosphere of cooperation is a prerequisite for building management confidence in employees (Salas-Vallina and Fernandez 2017).
- There is a positive relationship between specific leadership styles and the perception of working conditions of followers - subordinates (Bower 2003).
- The leader and the way of leadership significantly influence the level of, the positive inspiration of subordinates (Malhotra et al. 2007) and the development of visions of the organization (Salas-Vallina et al. 2018; Mistry and Hule 2015).
- Inspiring and motivating elements of ethical leadership are respect and good behavior towards the followers of the leader (Salas-Vallina et al. 2018; Riivari and Lämsä 2014; Walumbwa et al. 2017).
- Leaders and leadership developing the psychosocial dimension of the work environment have a very positive impact on the level of the physical working condition of their followers (Gilbreath and Benson 2004; Salas-Vallina et al. 2018).
- Inspirational ethical leaders have followers (Salas-Vallina et al. 2018; Baas et al. 2008) who can be expected to have a higher degree of close rapport with the organization (Sosik 2006) and co-creation of a better working atmosphere (Murnieks et al. 2016).
- Unethical leaders destroy the reputation of the organization and discourage employees, (Brown and Mitchell, 2010).

According to Brown, Treviño, and Harrison, ethical leadership can be defined as **"the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making"** (Brown et al. 2005, p. 120). The development of ethical leadership based on this definition has yielded the finding confirmed by the research that the theoretical background (knowledge), personal value orientation (attitudes), and the moral and prosocial reasoning, decision-making, and actions of the leader (skills), i.e. **moral competency** (Mikulka et al. 2017), are the key to fulfilling the prerequisites of ethical leadership. An objective assessment of its level means to identify the values that the ethical leader emphasizes, assess the extent, to which his actions are in line with these values and whether his prosocial actions contribute to the positive development and direction of individuals and the whole team (military units, civil organizations). An essential part of the development of moral competency is, therefore, ethical education and leadership (Mikulka and Fedorková 2019). For a military organization made up of mostly specialized military professionals with the prospect of facing an asymmetric war conflict and hybrid threats in the future, the importance of value-based leadership continues to grow. In the second part of this study, the authors, therefore, aimed at the issue of the already mentioned ethical approach to human resource management, the possibilities of its implementation and use in the military environment, specifically in the Czech Armed Forces (hereinafter referred to as CAF).

The text was created as part of the project entitled "Development of social competencies of the military leader", which is implemented by the Department of Leadership, the Faculty of Military Leadership of the University of Defence, the Czech Republic. It answers the basic question: How can the principles of ethical leadership be successfully applied in the specific environment of a national security institution such as the CAF? The text has the characteristics of a descriptive study. The main method for obtaining knowledge was the content analysis of documents, texts, research reports of the research implemented, and the subsequent synthesis of the acquired knowledge.

The theoretical basis of ethical leadership

Ethical leadership did not become more prominent until the year 2000. For the first time, the issues of ethical leadership and the topic of ethics in leadership, in general, were primarily interpreted in 1996 (Northouse 2013, p. 423). Prior to 2000, theories of authentic (charismatic), spiritual and transformational leadership were secondarily concerned with the ethics of leadership (Brown et al. 2005, pp. 117–134).

The theory of ethical leadership itself was significantly developed until after the year 2000. The basic topic was the definition of an ethical leader as opposed to a transformational, spiritual, and authentic (charismatic) leader. Authors Brown and Treviño (2006a, pp. 599–616) state that ethical leadership is linked to authentic (charismatic), spiritual, and transformational leadership by perceiving the leader as a role model, a personality with high ethical and moral standards. Research in this area confirms that the leaders who behave ethically and have high moral standards are perceived as transformational leaders (Brown and Treviño 2006b; Treviño et al. 2000; Weaver et al. 2005). At the same time, however, Brown and Treviño (2006a) emphasize that ethical leadership also has common elements with transactional leadership: normatively clear rules and the requirement for the responsibility of followers for their observance, performance appraisal, and a functional system of rewards and punishments. Ethical leadership thus partially uses both approaches; however, it cannot be unambiguously identified with either (Mikulka et al. 2018).

A questionable element of ethical leadership is the normatively (ethically) correct behavior of the leader and his followers, linked, in a broader context, with situational and culturally conditioned factors. This is due to the fact that "normatively (ethically) correct behavior" is often professionally, situationally, or culturally conditioned, and in different environments and social contexts, its standards may be perceived and set differently (Brown et al. 2005, p. 120). For an objective definition of the term "ethical leadership," it is, therefore, important to identify the content of the role of the ethical leader and demonstrate the connection between the fulfillment of this role and his success. Based on the results of research aimed at finding out the connection between the leader's actions and his honesty, integrity, credibility, and efficiency (Den Hartog et al. 1999; Kirkpatrick and Locke 1996; Posner and Kouzes 1993; Posner and Schmidt 1992; McAllister 1995; Dirks and Ferrin, 2002), Treviño et al. (2000, 2003) implemented the research, the objective of which was to understand what was meant by the term "ethical leadership". The research revealed a number of connections between the personal characteristics of leaders and the quality of their leadership. Treviño et al. (2000, 2003) characterized this fact as *a moral person dimension of ethical leadership* based on personality traits, character, and the altruistic motivation of the leader.

However, research has also shown another important aspect of ethical leadership, which Treviño et al. (2000, 2003) identified as a *dimension of the moral manager*. This dimension represents a proactive effort of the leader to ethically influence subordinates - followers and lead them to an ethical responsibility for their own decisions and actions. Subsequent research using the Ethical Leadership Scale (ELS) tool developed by Brown, Treviño, and Harrison to measure the level of ethical leadership (Brown et al. 2005) has demonstrated and confirmed the following:

- Ethical leaders are characterized as honest, caring, and principled individuals.
- Ethical leaders communicate with their followers about ethics.
- Ethical leaders set clear ethical norms and standards and with the help of rewards and punishments, they demand their observance.
- Ethical leaders are proactive role models for ethical behavior.

In reaction to these findings, Northouse (2007), in his research, suggested and confirmed five major personality traits of an ethical leader that enable normatively (ethically) correct behavior:

- Fair dealing.
- Fair and impartial decision-making.
- Respect for colleagues and subordinates.
- Service to others in the first place.
- The need to build a community.

The research has also shown positive and negative links between personality traits and prerequisites for ethical leadership (Brown and Treviño 2006, p. 602; Hřebíčková et al. 2002, pp. 7-8). *A positive link* was demonstrated between the prerequisites for ethical leadership and personality traits of friendliness (the tendency to trust others; honest and direct conduct; generosity; consideration and helping others; prioritizing cooperation over competition; humility; solicitude; compassion; tendency

to fondness) and conscientiousness (the tendency to be ready and able to solve tasks effectively; the art of organizing everything well; proceed methodically; follow rules; propensity for reliability; the tendency to assign and complete demanding tasks; the ability to be motivated to complete a task and to resist disruptive influences and the ability to think things over in advance). A *negative link* was demonstrated between the ethical prerequisites for leadership and neuroticism (the tendency to worry and fear of how everything will turn out; feeling of anger and bitterness; feeling of sadness and despair; feeling of embarrassment, shame and misgivings; the tendency to succumb to the temptation of food, alcohol, cigarettes, drugs, shopping, etc.; the tendency to be engulfed by extraordinary events or stressful situations and the tendency to act in a panic).

The concept of functional ethical leadership

The analyses of the knowledge and research findings allow the creation of a basic concept of functional ethical leadership. This concept is based on six basic principles:

Fig1. Concept of ethical leadership

The commentary on individual principles of the concept of functional ethical leadership:

1. Values and ideals are a positive part of the practice of ethical leadership.

According to Moorhouse (2002), ethical values should include faithfulness, honesty, integrity, probity, respect, an open mind, responsibility, and courage. According to Karaköse (2007), honesty and integrity are the most beneficial qualities of leaders from the perspective of their followers. Honesty is defined as the quality of justice, openness, and truthfulness towards others, while integrity emphasizes the morally sound attitudes of man.

2. The value responsibilities of the leader and the orientation to others are a prerequisite for functional ethical leadership.

Being ethical involves thinking about good working conditions for others and understanding the consequences of one's own attitudes, decisions, and actions. Ethical leaders in this sense are those who think about the drawbacks and benefits of their attitudes and decisions and their long-term consequences (Mihelic et al. 2010). Ethical leadership positively transforms the leader's decisions made for the benefit of followers and the organization (Brown et al. 2005).

3. Ethical responsibility orientation has a positive impact on the development of the organization.

Ethical leaders are those who act and behave in accordance with norms and standards and who support and develop interpersonal, two-way communication (Brown et al. 2005). Many studies aimed at ethical leadership have confirmed that good leadership was related to the focus on the ethical level of decisions made (Treviño 1986; Treviño and Weaver 1996; Jones and Ryan 1998, Toor and Ofori 2009; Butterfield et al. 2000).

4. **The level of two-way communication has a positive impact on the development of the organization.**

Karaköse (2007) described the importance of the ethical level of communication for organizations. He emphasized that the ethical level of communication of leaders had to be recognized according to the way they discuss with followers. Effective ethical assertive communication is a basic prerequisite for functional ethical leadership (Karaköse 2007).

5. **Ethical leadership is appropriately connected and combined with other approaches in the field of leadership.**

There are three styles of leadership, namely transformational, spiritual, and authentic, that are interconnected and overlap with ethical leadership (Burns 1978; Kanungo and Mendonca 1996; Avolio et al. 2004; Brown and Treviño 2006a; Fry 2003; Reave 2005; Reddy 2016).

6. **Ethical leadership is beneficial due to the outputs that it creates and influences in the organization:**

- Ethical leaders create a two-way communication tool in their followers, an awareness of responsibility for their own behavior and performance and motivation to follow (Brown and Treviño, 2006).
- If leaders create a healthy value system in an organization, they can win their followers' trust and loyalty (Tasneem 2015).
- Ethical leaders motivate their followers to create positive behaviors for the benefit of the organization.
- Ethical leadership strengthens trust between the organization's management and employees.
- Through ethical leadership, responsible leadership can influence the results of the organization (Haque et al. 2019; Doh et al. 2011; Doh and Quigley 2014).

Ethical leadership in the environment of the Czech Armed Forces

Building an ethically high-quality military environment places demands not only on soldiers - individuals but also on military leaders. It requires military leaders at all levels to purposefully build and develop Warrior Ethos, to reinforce value-based manifestations of professional behavior and to dampen unwanted ones (Mikulka et al. 2018). This chapter is, therefore, devoted to the specificity of the military environment and the application of ethical leadership in the conditions of the CAF.

Military environment and its specifics

The military environment can be characterized as a system of elements that, in mutual interaction, enable ensuring state defense. This system can be divided into the inner and outer parts. The external elements may include, in particular, the security policy of the state, financial, recruitment, logistical, and technological resources. The development of external elements of the military environment is interconnected with the development of information and communication technologies, with the requirements for the operational capabilities of the armed forces and with the operational capabilities of potential adversaries. The further development of the external elements of the military environment is greatly influenced by the globalization of military and security organizations, as well as the activities of nationalist, extremist, and religious radical organizations and limiting the influence of national governments (Pokorný et al. 2013).

The internal elements of the military environment may include sets of activities related primarily to the management of human resources, information, and material inputs and outputs. In the military environment conditions, it is primarily an operational task, the command, and control process and the system management dealing with the structure and armament of the enemy and friendly troops, the operational environment, the conduct of military operations, and the management of information and material outputs. The internal elements also include selected secondary activities, which encompass, e.g. the processes for creating organizational structures and logistical support (Pokorný et al. 2013).

The military environment is very specific and at the same time very complex. In the area of internal elements, the specifics of the military environment are manifested *mainly in the area of human resource management - HRM* (Pokorný et al. 2013):

- The basic purpose of HRM in the military environment is to ensure the security and defense of the state, its inhabitants, and territorial sovereignty.
- The military environment creates conditions for activities, the legitimate aim of which is, to injure or kill a person and to destroy the results of human labor.
- Certain processes taking place in the military environment may result in death or trauma with lasting psychological, physical, social, and economic consequences for winners and losers.
- The military environment generates the risks in the form of traumas, lasting changes in thinking and acting, and consequently changes in relationships.
- The military environment leads to creating strong, intense, and personal ties based on shared experience in dealing with limits and extreme situations.
- In the military environment, it is important to work with a change, transformation, and the burden associated with it, such as coping with and realizing the change and the burden associated with it (Ullrich et al, 2018a). The level of the psychophysical fitness is the basis for efficient handling of changes by an individual or for an effective solution of tasks (Ullrich et al. 2018b).
- The military environment often replaces the individual's close social environment (family) in the performance of professional activities that are associated with the separation (foreign missions).
- The military environment places increased demands on moral, ethical, character, and value aspects (Warrior Ethos), free and social aspects (relationships), on competencies for performing specific military activities (conduct of battle), on the acceptance of specific attitudes and customs (military traditions, customs, and ceremonies);
- The military environment requires adequate mental condition with the required levels of cognitive abilities, specific qualities of thinking and acting, work with change and stress, appropriate psychophysical condition, vitality (Štikar et al. 2003, pp. 282 - 284; Hroník 2002, p. 80) and job-involvement.
- The military environment requires a combination of expertise (expert specialization) with polyfunctionality and loyalty.

Applying ethical leadership to the environment of the Czech Armed Forces

The natures of current operations of military and non-military character, and especially the requirement for the functional team cooperation of many individual specialists demand a change to HRM. It is necessary to take advantage of leadership. This requires shaping the personality of the current commander as a leader, who at the same time retains the skills of a manager at all levels of command: tactical, operational, and strategic (Ministry of Defence of the Czech Republic 2019).

Military leadership, in the broadest sense of the word, means a process of social influence leading to the achievement of common goals (Kaiser et al. 2012, pp. 119-135; Spendlove 2007, pp. 407-417; Yukl 2012. pp. 66-85). It represents a way of working with followers - subordinates in a certain type of hierarchically arranged organization, in a specific professional environment. The essence of military leadership is, therefore, social interaction, the relationship between the person who leads (leader) and those who are led (followers). This relationship arises voluntarily.

In order to be a successful ethical leader, a commander must have several basic skills:

- To be able to trust his subordinates.
- To be able to respect his subordinates.
- To be capable of self-reflection and to receive or provide feedback (the two-way communication principle).

Therefore, among the required qualities of a commander - ethical leader, there are mainly *exemplarity, honesty, integrity, empathy, impartiality, determination, loyalty, courage, and patience.*

The commander does not become an ethical leader at the moment of taking office. He must prove this competency together with other professional and social competencies for management, which are expected of him, in relation to subordinates. These competencies are "teachable" only in part, their performance is not possible without personal prerequisites (abilities) and opportunities for their implementation and improvement. The required level of competencies and personal prerequisites (abilities) is differentiated according to the level of command, at which the commander is located (Nekvapilová 2018, pp. 26 - 30).

At the level of tactical (direct) leadership (team, workplace, swarm, platoon, company, battery, and their equivalents), it is direct ethical leadership ("face to face"). Ethical leaders work with a lower level of risk and uncertainty and with less complexity. They focus on coordinating the efforts of the unit (team), providing a clear and concise intent on how to perform tasks, and setting performance requirements. They are expected to manifest a personal example and the role of a moral model and to have a professional skill, initiative, and appropriate organizational skills. They strengthen their position on the basis of formal authority, which rests upon the achieved rank, function, and position in the unit and at the same time on the basis of informal authority, which rests mainly upon character, personal qualities, attitudes, relationship to subordinates and professional experience.

Commanders and ethical leaders at the level of organizational leadership (battalion, division, squadron, wing, regiment, brigade, base, force headquarters, and their equivalents) influence hundreds to thousands of people by their decision-making. To do this, they use and manage their own work team (staff), which is able to obtain, sort, and evaluate the required information and thus to prepare the conditions for decision-making. They are an important element in the military hierarchy since they transform strategic concepts into the form of operational or tactical plans, build functional teams, and define tasks for the level of tactical leadership. They take advantage of indirect leadership through subordinate levels of tactical leadership. They determine the level of organizational culture, Warrior Ethos, and overall climate in the organizational unit. Their priority is to support subordinate commanders and leaders. Within their organizational unit, they set rules of conduct and behavior, priorities, create medium-term visions and development concepts, solve complexly structured problems and work with a higher degree of uncertainty and possible unpredictable consequences and effects of their decisions. They emphasize the control of subordinates (personal and delegated) and the fulfillment of adopted priorities.

The level of strategic leadership (the General Staff headed by the General as the highest leader at the strategic level) is the highest in the hierarchical structure of the army and determines the goals and tasks at the operational level. At the strategic level, the military ethical leader identifies trends, opportunities, and threats and creates strategic visions of a long-term reach. He is responsible for growing the competence of the organization; he shapes and influences it by establishing its organizational structure, allocating human, material, and financial resources, and creating concepts for preparing commanders, staffs, and units for their future roles. He works with a high degree of uncertainty and risk and deals with complex problems that affect but are also affected by political influences and events outside the military organization (outside the CAF). A military "strategic" ethical leader, in the viewpoint of his personal prerequisites (abilities), represents a balanced combination of a thinker, a successful fighter, and an expert in the geopolitical situation, who can pass on his thoughts and opinions to the wider community.

In the context of these requirements, it is apparent that attention must be paid to the development of professional and social leadership competencies in the entire training system of military professionals at all levels. In practice, this means that the issues of leadership and specifically ethical leadership must be part of departmental tertiary education, career courses as well as professional courses. Leadership and specifically ethical leadership is for the ACR and the entire Ministry of Defence not only a method of building units as teams but also a tool that enables the formation of the ACR and especially its individual components as a progressive moral-value organization (Senge 2007).

Conclusion

In the current conditions, which are characterized by instability and a large number of risk factors, finding an effective leadership style and directing the organization (institution) is very important. One of the possibilities offered is ethical leadership, which - is applied to the life of the organization in a functional way - can make it internally stabilized and dynamically and successfully developing. The key is the personality of the ethical leader himself, who here plays the role of a model that teaches lessons of practical applied ethics and hands over values for an honest personal and professional life.

The research has proven that values and ideals, honesty and integrity, people-orientation, decision-making responsibility, and two-way communication are important characteristics of ethical leaders that have a positive impact on the whole process of ethical leadership. Trust between the ethical leader and his followers are a crucial bond as it builds a positive perception of ethical leaders and motivation to follow them. At the same time, the research has shown that followers' trust in ethical leaders helps to develop their own organization and strengthen their sense of organizational identification.

Every organization, including the military ones, must, from time to time, deal with the dilemma of how to continue to develop, where to head for and whether this development will be in accordance with ethically acceptable principles (Brown and Trevino, 2006). At the same time, developing ethical leadership is a lengthy process that requires sufficient time, resources, and the right setting of educational and development processes to enable students to develop into ethical and value-based leaders. At the same time, this study has demonstrated that the adoption of ethical norms and standards, ethically responsible behavior and actions, and functional ethical leadership significantly contribute to the functionality and effectiveness of an organization (Brown and Trevino, 2006).

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The Importance of the Intellectual Capital-Based Model of Islamic Microfinance in India

Rusni HASSAN

Institute of Islamic Banking and Finance (II*i*BF), International
Islamic University Malaysia (IIUM),
Gombak, Malaysia
hrusni@gmail.com

Syed Ahmed SALMAN

Faculty of Business and Accountancy, Lincoln University College,
Petaling Jaya, Malaysia
salmaniium@gmail.com

Adnan YUSOFF

Universiti Tenaga Nasional, Centre for Islamic Studies
and Civilization, Kajang, Malaysia
adnan@uniten.edu.my

Abstract

Microfinance has existed in the history of India for over a century and proves to be one of the most significant tools towards poverty alleviation. The Indian microfinance institutions (MFI's) have attained an outreach of over 30 million clients. A large portion of the population is still not catered making India a favorite market for Microfinance programs. The Sachar Committee Report stated that out of India's poor the deeply impoverished is the Muslim population who also suffer from huge illiteracy, a high drop-out rate, depleting asset base, below-average work participation, and lack of stable and secure employment. Traditional microfinance has not been able to solve the poverty alleviation problem of the Muslims who stay away from conventional microfinance due to religious reasons. Also, the Interest-free microfinance has not been of much use due to its limited availability and scope of operation. The number of customers of IMFIs has quadrupled in recent years but still has only managed to reach one million Muslims compared with 650 million Muslims who are below the average poverty line. However, Intellectual capital based Islamic microfinance seems to be a way out because it does not only deliver the microcredit to the destitute but also provides technical and professional support. Moreover, it eases the securing of finance by making use of social collateral instead of a physical one. This study investigates the importance of the intellectual capital-based model of Islamic microfinance in India. The study will concentrate mainly on social capital, human capital, and spiritual capital. It is hoped that the study will be significant to Muslim communities as the conventional microfinance products have just worked on the surface and have not been able to address the needs of Muslim clients.

Keywords: Islamic Microfinance, Intellectual capital, Social capital, Human capital & Spiritual capital

Introduction

Islamic microfinance plays a dynamic role in the social and economic upliftment of poor borrowers as well as their society (Khandker, 2005). The presence of Islamic microfinance institutions (IMFIs)

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addresses the financial and consumption needs of poor entrepreneurs. However, to the extent of researchers' knowledge, it has not been able to discourse some of the issues of Islamic communities like job creation, illiteracy, and non-availability of physical collateral in India. A dire need for an advanced Islamic microfinance model that targets all these issues is the requirement of the time. Therefore, this research focuses on the importance of the intellectual capital-based model of Islamic microfinance in India. Four important facts make this research valuable.

The first valuable fact, Islamic microfinance service providers in India focus on providing only the financial capital to the borrowers. However, it is established by a lot of studies that providing a candidate with financial capital alone is not enough for their overall development (Hadisumarto and Ismail (2010). It needs to be balanced with other elements of intellectual capital like human capital (providing training and skills) and spiritual capital (religious classes and Islamic study circles).

Secondly, the borrowers in India cannot secure a loan due to the absence of physical collateral. This gap is bridged by social capital by the formation of groups that can secure finance using a peer guarantee mechanism as a replacement for security (i.e. collateral). The incentive that microfinance service providers have in lending to these groups is the 'social collateral' which ensures higher repayment rates and is safer than lending to individuals (Besley and Coate, 1995).

The third fact is that the Islamic microfinance in India has not been able to tackle the menace of unemployment in India. Indian job market paints a sorry picture as far as job creations, shortly, are concerned. Only 33% of Muslims find employment despite higher qualifications (Census, 2011). The intellectual capital-based Islamic microfinance model focuses on human capital which in turn arrests the unemployment.

Finally, interest-free microfinance models all over India cater to just a small section of society (El-Komi and Croson, 2013). Also, self-help groups and other cooperative and credit societies cater to women candidates in selected Indian states. On the other hand, the intellectual capital-based Islamic microfinance model will operate with a wider focus which includes not just the economic capital but social capital, human capital, and spiritual capital.

Intellectual Capital

Stewart (1997), while defining Intellectual capital said that it has been reflected upon by a lot of people, defined by a few, comprehended by even fewer, but no one has come forward to properly appreciate it. Scholars have not yet reached a consensus on the definition or even the shape of intellectual capital. However, Tovstiga and Tulugurova, (2009); Bontis, (2002); Stewart, (1997); Edvinsson and Sullivan, (1996); Lynn, (1998), agree that it consists of human capital, relational capital, and structural capital. Intellectual Model (CIC, 2002) further divides the relational capital into business capital and social capital. It can thus be conferred that social capital is a component of intellectual capital. Nahapiet and Ghoshal (1996); Koening (1998); Prusak (1998), in their works have assumed the social capital to be founded on specific values which gives rise to indicators as ethics, confidence, honesty, loyalty, responsibility, sincerity, solidarity, compromise and transparency. The already existing framework of intellectual capital was extended by Ismail (2005), who added spiritual capital to it as a fourth construct. A person's religious outlooks along with the moral principles constitute the spiritual capital of a person.

Sofian et al. (2008), describe intellectual capital as the synergy resulted from an individual's dominion over professional know-how and experience, expertise and skill, goal relationships, and technological aptitude, that affects the performance of an organization positively.

Reed (2000), carried out a study on the company's performance and the effect of intellectual capital on it. It was found that Intellectual capital is a strong predictor of a companies' performance in the banking industry. A study on financial performance by Riahi-Belkaoui (2003), found a positive association between the intellectual capital of multi-national companies in the United States of America and the performance. The performance of an organization was suggested to be significantly dependent on the variable of spiritual capital by Ismail (2005) who studied the bearing of intellectual capital on

performance. Enough of empirical evidence is available to affirm the application of the asset of intellectual capital as an agent to improve the profitability of a firm.

Lack of Intellectual Capital in Islamic Microfinance

Islamic microfinance is the microfinance services that operate according to the principles of Shari'ah. The Islamic Microfinance Institutions (IMFIs) operate as per Shari'ah or Islamic law providing financing to the poor as per the pre-requisite contract. The last three decades saw the Islamic financial services industry developing considerably. However, the Islamic microfinance services were left behind (Obaidullah and Khan, 2008). Rahman and Rahim (2007), identify it as the biggest challenge to the Islamic Microfinance that it has not yet come out of the shadow of conventional microfinance and is repeatedly accused of being drafted on the same lines. Islamic Microfinance needs to exhaust all the possibilities of financing as per the Islamic financial instruments. Obaidullah and Khan (2008) recognize challenges and suggest rectifications at various levels of implementation of microfinance, which are the micro, and macro levels. Among the other, the one which concerns us is the Meso level initiatives which include "provision of education and training, better coordination and networking, technical assistance through Awqaf and Zakah Funds".

The past researches have established a significant association between the organizational performances and intellectual capital (IC) irrespective of the industrial sector (Bontis et al., 2000). Hashim et al. (2015), confirms the same highly significant relationship between the IC and the microfinance institutions. Yet IC components do not work in isolation. Firms that employ all the components of IC are better equipped to compete as compared to the firms that employ only one. (Amrizah and Rashidah, 2013).

Human Capital

The world is rapidly shifting to a knowledge-based economy. In such a scenario, a country is dependent on the human capital of extraordinary superiority to become a developed nation and maintain that status. This makes human capital the most valuable asset in an organization, a few notches more than other capitals or equipment (Hashim, Osman, and Alhabshi, 2015). Khan, Farooq, and Hussain (2010) reaffirm this statement and consider human capital the most prized asset or a liability to the firm. An exit path out of poverty and the holistic development is via the Human capital and natural capital route (Hassan, 2014).

Spiritual Capital

Tripp (1999), is of the view that mere technical help cannot make an impact in the life of poor people as long as it is not combined with spiritual commitment. The combination of customer capital, social capital, technological capital, and spiritual capital along with practical support proves more effective in improving organizational performance (Hashim et al., 2015).

Obaidullah (2008), claimed that capacity building can be influenced by statistically significant contributions of spiritual capital, technical assistance, and managerial assistance. There is a positive impact on macro and microeconomic variables from an Islamic economic Institution that is borne out of spiritual capital (Yusuf, 2011).

Social capital

Social capital plays a crucial role in facilitating adoption and overcoming constraints of lack of financial, human, and natural capital. The empirical evidence indicates that Islamic Microfinance programs that built social capital can indeed make a significant contribution to poverty alleviation (Hassan, 2014). The social capital variables play a very important role in the economy to increase business productivity and efficiency (Ma'ruf and Restiawati, 2016). Gomez and Santor (2001), found

that social capital is more likely to enhance the economic performance of entrepreneurs through social interactions and network resources.

Selected Literature on the Importance of Intellectual Capital Based Microfinance

Ma'ruf and Restiawati (2016), analyze the social capital in Islamic Microfinance based on three inseparable and dependent factors viz a viz trust, social networks, and norms. The study is conducted as a case study of Baitul Maal Waa Tamwil (BMT). Researchers found the 'trust' variable to have the highest value when compared to the other two factors of 'norms' and 'social networks. They inferred that since trust forms the basis of the establishment of a social network it has such wide applicability in BMTs. 'Social network' establishes good cooperation between BMT and members it also helps to circumvent information asymmetries. Among the 'Norms', 'Islamic value', religion value and proximity of the location directs the BMT members towards common goals.

Antoh, Mensah, and Edusah (2015), empirically studies Sinapi Aba Trust (SAT) microfinance services in Ghana to find out how it affects the development of human capital (beneficiaries) and reduce poverty. The study finds that SAT education programs and beneficiaries' efforts enable beneficiaries to expand their human capital assets enhancing outlook regarding the non-financial aspect of poverty reduction. The programs of SAT are focused on awareness creation and sensitization to inform the beneficiaries about topical issues that prove to be fruitful for the development of beneficiaries and their households. The study revealed that there is a positive relationship between microfinance and human capital theories as the services enabled beneficiaries to improve their knowledge, skill development, and health resulting in overall human capital development.

Lybbert (2008), explored the Role of Spiritual Capital in Poverty Traps and Microfinance. The study recognizes the difficulty in observing and defining spiritual endowments, It explores the meaning and merit of spiritual capital in the context of the Perpetual Education Fund (PEF), which is established by The Church of Jesus Christ of Latter-Day Saints to provide low-interest loans for occupational training to young LDS members in Central and South America, Asia, and Africa to help them escape the perpetual poverty. The study uses The Galor and Zeira (1993) poverty trap model to discusses if the development of spiritual capital might affect poverty differently. Fogel (2000) had explicitly identified fifteen spiritual resources that constitute spiritual capital, including a sense of purpose, a vision of opportunity, a strong family ethic, an ethic of benevolence, a work ethic, discipline, a thirst for knowledge, and self-esteem. The authors explore spirituality and sociality as capital assets and find that by enhancing relationships and adding meaning and depth to one's self-worth, spiritual capital magnifies both human and social capital

Conclusion

Goel (n.d), Chakrabarty (2015), Basargekar (2010), and Jose and Chacko (2017), have presented a snapshot of the current economic and microfinance scenario in India. It reveals that Islamic microfinance that is based on intellectual capital is completely missing from the Indian economic scenario. Therefore, this study looks into the importance of the intellectual capital-based model of Islamic microfinance in India. The study concentrates mainly on social capital, human capital, and spiritual capital. Muslims in India have stayed at the bottom of the pyramid despite traditional and Islamic microfinance operations in India. An advanced model of microfinance is the need of the hour that focuses not only on providing the economic capital but intellectual capital as well. Intellectual Capital includes human capital, social capital, and spiritual capital. The intellectual capital-based model uses a three-pronged strategy to address the problems of the Indian poor that takes into consideration not just financial but human and spiritual capital as well. The added-up benefits ensure the social and economic upliftment, job creation, and building of Ukhuwah (brotherhood) among the Muslim ummah.

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Monitoring Solution For A Set of Computer Applications of E-Business Type

Alexandru COCIORVA

Academy of Economic Studies – Doctoral School of Economic Informatics, Bucharest, Romania,

E-mail: cociorvaalexandru@yahoo.co.uk

Abstract

In the context of today's information society is necesary to implement some modalities for monitoring the e-business solutions. Online business environment, being in a continuous development, needs robust applications, from a technical point of view and of the business criteria. Creating applications that can monitor e-business solutions is more necessary as the number and type of transactions or processes grow exponentially. This paper presents a simple but effective monitoring model for a set of computer applications. The implementation and configuration of such a model can significantly improve the monitoring process for incidents that occur in applications.

Keywords: Monitoring, Model, Implementation, Configuration.

Introduction

One of the premises for the development of e-business applications is monitoring, this notion coming with its technical specifications as well as with the related business requirements. Today, it is increasingly necessary to take into account the administrative aspect of resources in the economy, which is also transposed in the online business environment. Thus, different types of applications have emerged as a natural need to monitor and manage resources, in a constantly growing, online environment. With the development of technology, the possibilities of developing such monitoring applications have increased and adapted to the extremely complex framework of today's information society. The main feature of a monitoring application is to capture incidents that may occur at the level of e-business solution, both technically and procedurally.

In the context of complex applications or application systems, the development of a monitoring solution can be a technical challenge, due to the multiple implications at the business level, but also due to the organization of information. The relationship of an application or set of IT applications with a monitoring solution can be a two-way one, so that an efficient, complex monitoring model can lead to the capture of technical problems and solve them, which would inevitably contribute to the improvement of the application or set of applications. Once improved, other technical problems may appear, much more subtle, which require an update or development and the monitoring solution to meet the new technical challenges. Thus, the initiation of a biunivocal process cycle is observed. This development cycle can continue until the maximum performance level of the application is reached and no further improvements are needed or at the stage when the available technological capacity is reached. There may also be various technological barriers for closing the cycle.

In order to create a monitoring application is necessary to take into account: what is an information system, systems theory, as well as the empirical framework (making measurements and comparisons). The proposed solution must take into account the specifics of the application to be monitored as well as its connections or integrations with other systems, secondary applications. Furthermore, elements configurations represent a main key that must be taken into consideration when designing the solution, in relationship with the metrics that must be estimated and calculated. Thus, it is necessary to make an evaluation of the metrics involved: CPU, disk space, page load rate, server validity, URL, application

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preview, as well as other application-specific elements. The way the application is monitored depends, to a large extent, on the business requirements, but, regardless of its complexity, some basic criteria must be considered in any model of monitoring solution. This aspect includes: the validity of the server on which the application resides, the validity of the application URL, the space on the server. In addition to these basic criteria, the following components necessary for running the application can be monitored as a proactive method of assessing system status: IIS application pools status, web server overview, SQL Server status, database connection or services necessary for the operation of other components (email, reporting tools, preview, objects inserted in the page or even integrations with APIs, etc.).

The model of the monitoring solution that I will present in the next pages, contains mainly the following elements: server status check, URL verification, host status, application preview, as well as information about the applications themselves. The model can also include the following functions: ping, traceroute for detailed checks. The highlighted elements that I will come up with in this monitoring model refer to: services check, applications preview directly on the monitoring solution page as well as the way the alerts are displayed. Also helpful is the inclusion of specifications for the monitored applications, as well as related links, directly in the monitoring solution. A significant contribution can be made, in this framework of the development of monitoring solutions, with the involvement of a monitoring platform that captures various metrics of project efficiency as it is developed. Thus, what is presented in this paper is a start for the realization of a complex monitoring solution. There may be the problem of creating a monitoring solution that provides indicators of project performance which is, in turn, the development of a simple or complex, integrated monitoring system for an application or a set of e-business applications. Highlighting performance metrics through dedicated monitoring solutions for software development projects is a necessity in the context of the current information society. Thus, metrics are of paramount importance in all disciplines involving engineering activity and especially in the development of software that implies critical systems, as mentioned in a research study by García-Valls et al (2019) [1].

As a premise for the development of monitoring applications in various contexts, there may be the problem of intervention or involvement of a monitoring mechanism that extracts data from the activity of each application in a set of e-business applications or portfolio under development in order to provide an overview of the project activity. Thus, it is necessary to implement a data warehouse technique. The use of such a procedure can be the premise for the development of an integrated information system, which would provide valuable business intelligence information, also mentioned in a paper by Muñoza et al (2015) [2]. In order to create a monitoring system for a set of applications, is necessary to consider two parts: the initial phase, the analysis of elements involved in the development of the set of applications and then the reporting phase, in which necessary metrics can be defined, needed to provide the most comprehensive and relevant reports possible, as mentioned by Eric Bouwers (2019) [3]. Here are specified descriptive elements of the monitoring process not only from finished product point of view, of the activity of the applications that have become operational, but also during those applications' creation or development phase.

The aspects described are applicable in the broad sense of monitoring systems, but the solution proposed in this paper is a starting point, a way of representing the concept of monitoring system applied to an application or a set of e-business applications. The quality of the monitoring system created depends largely on the input data provided by applications, their complexity and quality, as well as the ways of achieving the flow of information, which is most often characterized by biunivocity, constituting the premises of an integrated computing system.

Current stage in the development of monitoring applications

Monitoring solutions for e-business applications or application systems have developed a lot in the last 20 years. Today, there is the problem of their implementation in cloud environments, being a helpful element in the progressive development of IoT solutions. Most current monitoring solutions focus on the following parameters: server status, CPU, memory, network activity, URL accessibility, hostname, page load speed, integration validity, as stated by Michael Churchman (2018) [4].

In the cloud area, increasingly used for e-business solutions, service providers give monitoring solutions for both the performance of the infrastructure and the platform itself, through dedicated APIs. Today, the trend of these monitoring solutions is to implement many components related to the market, to everything that can capture the online market. Thus, monitoring tools are no longer simple utilities that we use to highlight some indicators and produce some reports, they must provide directions for business development, involving elements of Business Intelligence. The challenge is to be able to capture the widest possible range of activities and to present most relevant information to decision makers, in the context of Big Data, due to the increasing complexity of e-business solutions, in an increasingly visible way. The tendency, in creating monitoring solutions, is to have a holistic approach and to achieve a framework, as suitable as possible, for integrations, especially those used in the cloud environment. In principle, monitoring solutions in the area of cloud applications are not yet sufficiently developed to cope with the increasing number of elements and functionalities, although the trend is to improve existing algorithms, as the resources monitoring is increasingly efficient. The framework of cloud migrated solutions can create the premises for compact, efficient monitoring solutions, with all elements at their disposal to make an analysis of the resource distribution as close as possible to the standards imposed by Big Data, IoT and 5G. Thus, hardware resources that were 10-15 years ago purchased and managed through very large investments, are now accessible within a platform, through APIs, on demand, by hourly payment, as stated in the article „Cloud applications monitoring: An industrial study", by Tamburri et al (2020) [5].

Taking into consideration that some of the first monitoring systems were made using RTU (Remote Terminal Units) and communication systems like LAN lines, the inclusion of complex cloud monitoring systems represents a major improvement that significantly increased process supervision and helped the technological development from the last years, large scale productivity indicators in different domains being such a consequence. Remote monitoring grew to be more complex as the technology developed rapidly in 1990s, with an enhancement of network technology, as stated in the article „Past is Present: The History of Remote Monitoring" (2014) [6]. In first studies of monitoring systems, as in industrial machine monitoring, architectures were primarily focused on fault detection and diagnosis (as stated in an article from Journal of Manufacturing Systems, 2020) [7]. The same can be applied for early monitoring systems for applications, as basic metrics regarding server and URL status were primarily monitored. Nowadays monitoring systems can comply with complex busines demands, not only making supervision reactive operations but also correcting (in some cases) through dedicated tool integrations different defects and resolving incidents up to a certain level. This aspect creates the premises for the introduction and development of IPCC framework, with accent on incidents and changes affecting the monitored systems. Currently, this segment is mostly developing in the cloud systems monitoring area, especially for the IoT demands. Thus, business cases represent the main guiding element when constructing a dedicated monitoring solution.

First generation monitoring tools were focused on watching the infrastructure (taking into consideration the following aspects: server uptime, server load, network equipment and storage) and generated simple descriptive logs dumped into text files [8]. Since the information society grew and complex data started to come into picture, the second generation of monitoring tools developed and highlighted the following aspects more oriented to the gathering of information: error agregation; APM (Application Performance Monitoring), website monitoring, transaction monitoring and also specific application predefined metrics [8]. Nowadays, we conduct our activities/ operations supervised by the third generation of monitoring tools where contextual intelligence is introduced [8]. The previously mentioned ideas are adapted using an article entitled „The evolution of the world of app monitoring" (2014) [8]. This generation of monitoring applications introduce new metrics related to frequency of process/ system interruptions, localization of the incident and root cause analysis. These points request a bigger involvment of software developers into the application support side, making possible the introduction of devops engineers, having also the qualification of monitoring specific business case elements. This aspect would imply that devops engineers could not only operate and monitor on the platforms but also take corrective actions like modifying the code in order to improve the processes based on the results of the monitored indicators/ metrics. As cloud solutions are developing rapidly in the last years, a devops engineer with application monitoring skills would be suitable for answering

different complex business demands. Also, system/ platform architects could take into account the measurable aspects when designing complex cloud solutions.

For important and impacting business, the APM field becomes increasingly important since resources have a bigger demand for monitoring. Without this aspect, lack of performance monitoring can lead to costly downtime affecting budgets, operations and infrastructure, as well as affecting employees in their daily activities, as stated in an article entitled „The rise of Application Performance Monitoring" (2017) [9]. The same article highlights the fact that with the adoption of Service-Oriented architecture, Cloud, Hybrid IT and Big Data, applications are now more distributed then ever, hundreds upon thousands being managed by third party services [9]. Around year 2009, modern APM tools emerged aiming distributed systems running in virtualized, cloud environments. Today, we have lots of APM solutions that can cope with complex applications and business, major vendors including tools by: New Relic, Dynatrace, App Dynamics (now owned by CISCO) [9]. Another important, enhanced and extensively used monitoring tool is Nagios, suitable for many IT solutions.

In recent years, the development of IoT and connected devices created the premises for huge data transfers; bilions of users or devices get connected to applications on the internet, resulting in trilions of gigabytes of data being generated and processed in cloud datacenters (Taherizadeh et al, 2018) [10]. This large data volume conducts to inefficient utilization of communication band-width and computing resources [10]. All the resource capacity and specific algorithms, computational intelligence, reside in the cloud-centric datacenters, data analytics for current cloud solutions like: Amazon AWS IoT and Google Cloud Dataflow [10]. This aspect still represents an open research platform and in order to solve it, modern cloud frameworks have been introduced (edge, fog and osmotic) aimed at increasing capabilities and responsibilities/ administration of resources using new data transfer protocols to improve the interaction with datacenter-based services [10].

Descriptive elements related to the creation and implementation of the model

The monitoring application model consists of the following elements: status check (server, URL, hostname, service), application preview, informational pages and application access links, validation of disk space status reporting automation.

The application is created in PHP, with dedicated functions for monitoring, and uses elements such as: JavaScript, CSS Bootstrap, iFrame. It can be installed on any type of machine, using Apache web server, either as a stand-alone service or within a tool such as XAMPP, WAMP / LAMP, as a development platform that includes utilities such as: PHP, MySQL, phpMyAdmin, Maria DB. For various changes to code as well as to database it is necessary to install one of the development platforms mentioned above (XAMPP, WAMP / LAMP). PHP is required to perform development and testing, with the help of the related configuration files, MySQL is required for the functionality of the database, also with the help of the related configuration files, and phpMyAdmin is the utility through which the database can be managed and administered.

In the proposed model, the server status is checked by the predefined *chkServer* function, using hostname and port as input parameters. Basically, the function checks server status through the connection port (port 22 for a Linux / Unix machine; ports 80, 8080 for a Windows machine). To display alerts related to the status of the verified server (valid server or inaccessible server), two gif images are used, through which, on the page, the green color for the traffic light appears (if the server is accessible), respectively the red color (if the server is down). The function performing this check can only be used when the server connection ports are open. The structure of this function is presented below:

```php
<?php
// check if a server is up by connecting to a port
function chkServer($host, $port)
{
    $hostip = @gethostbyname($host); // resloves IP from Hostname returns hostname on failure

    if ($hostip == $host) // if the IP is not resloved
    {
        echo "Server is down or does not exist";
    }
    else
    {
        if (!$x = @fsockopen($hostip, $port, $errno, $errstr, 5)) // attempt to connect
        {
            //echo "Server is down";
            echo '<img src="2.gif" title="Server is down">';
        }
        else
        {
           // echo "Server is up";
            echo '<img src="1.PNG" title="Server is up">';
            if ($x)
            {
                @fclose($x); //close connection
            }
        }
    }
}
?>

<?php
```

Fig. 1 : Function for verification of server status

Verification of validity status of the URL is performed by the predefined PHP function *isDomainAvailible*, which uses full web page address of the monitored application:

```php
<?php
    if (isDomainAvailible('URL_pagina_web'))
    {
        echo '<a href="URL_pagina_web" target="_blank"><img src="1.PNG" title="Status of web page: OK!"></a>';
    }
    else
    {
        echo '<a href="URL_pagina_web" target="_blank"><img src="2.gif" title="Status of web page: NOT OK! - Check server!"></a>';
    }
?>
```

Fig. 2 : Function for verification of URL status

Checking the status of the hostname or machine name is done using the predefined PHP function *fsockopen*:

```php
<?php
$host = 'denumire_maşină';
if($socket =@ fsockopen($host, 80, $errno, $errstr, 30)) {
echo '<img src="1.PNG" title="Status of host: OK! - Check: denumire_maşină">';
fclose($socket);
} else {
echo '<img src="2.gif" title="Status of host: NOT OK! - Check: denumire_maşină">';
}
?>
```

Fig. 3 : Function for verification of hostname

Checking the status of services is done through PHP functions built to use the entries defined in services.msc or the output generated by a separate script, made in VBScript, which checks the functionality of the web server and associated elements (IIS web server, application pool workers, or

associated services), SQL Server in SQL Server Configuration Management, or an associated tool (SQL Server, Reporting Services, SQL Server Agent, etc.).

The checks presented so far appear in a single PHP page, in the following form:

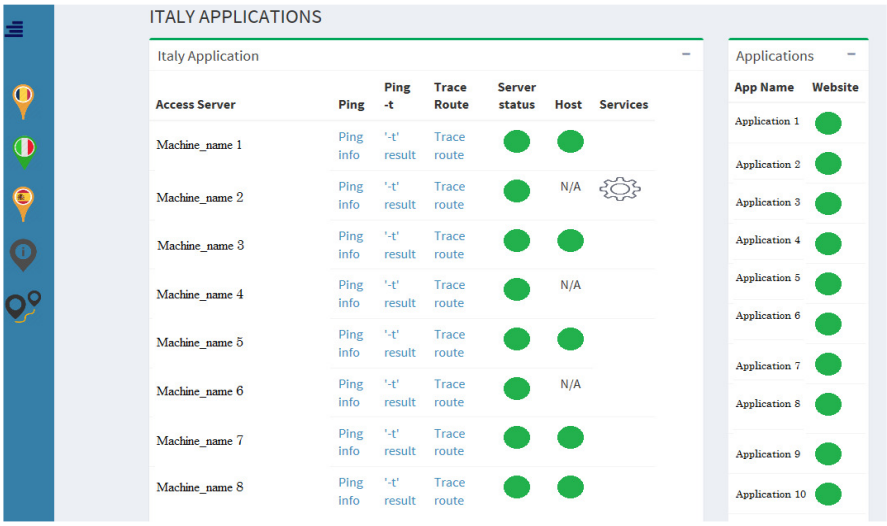

Fig. 4 : Example of fully functional set of applications monitored with the proposed solution

Above image represents the framework of monitoring functionalities for: server, host, services and related applications, according to the presented data. In this case, all servers, applications, hosts and services are valid and functional. For accuracy of the real-time verification of server situation, a convenient refresh rate is established for the applications, through a dedicated html tag, added on each page that provides information regarding the monitoring, in the head section:

```
<head>
  <meta http-equiv="refresh" content="30">
</head>
```

In the following image, one or more services are not functional; in this situation, given that the server on which these services are located is accessible, a thorough check is required directly on the machine to find the cause and resolve the incident affecting the application, in a timely manner:

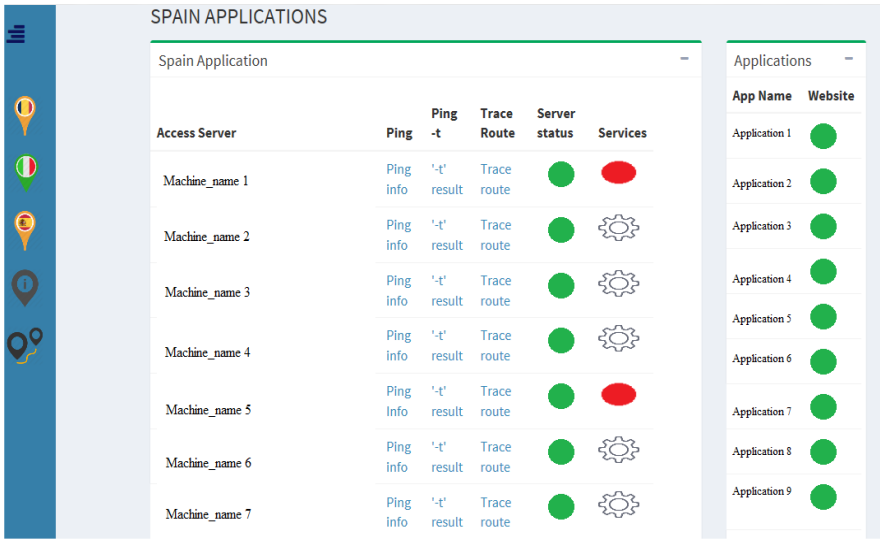

Fig. 5 : Example of a set of applications affected by an incident, monitored by the proposed solution

A preview of the applications directly in a dedicated section within the web page of the monitoring solution model, is done through the html iframe tag. This tag allows you to enter the URL as a parameter along with the size settings, in the following form: *<iframe src = "URL-page-monitored" width = "x" height = "y"> </iframe>*

This tag will be included in a slide show made in JavaScript, with the specification that each slide represents the first page (login page) related to the application to be monitored, which is an indicator of the validity of the application and the possibility of connection. Thus, it is possible to monitor, in real time, all the login pages related to the applications, in a single frame.

Information pages and application access links are included in separate sections within the monitoring solution, facilitating access to infrastructure and related information in the event of a system outage, with the entire dataset in the same frame. The pages were created using the following technologies: HTML, CSS Bootstrap, JavaScript.

Server space situation will be monitored through VBScript automation. The script will automatically send the situation through email via an SMTP server. Then, through another script, the presented situation can be displayed directly on a dedicated page within the monitoring solution. This operation can be performed via an API. For functionality, the script must be placed on one of the Windows/ Linux servers that is being monitored, and then a task must be created in the Task Scheduler/ Crontab for it to run according to certain conditions, the time required for reporting. In order to perform the task, it must be taken into account that the user under which it runs is a system user/ root. Ping and trace route functions are provided through scripts made in Batch, through calls to the cmd ping and trace route commands.

For the monitoring solution to work, associated package containing the scripts must be copied on the machine to be monitored, in the localhost root subdirectory in XAMPP or WAMP / LAMP directory (as appropriate), after the XAMPP / WAMP (LAMP utility, in the case of a Linux operating system) has been installed on the machine.

After these operations take place, the necessary configurations are made, possibly for the development and appearance of errors / notifications in the pages, in the dedicated php.ini and php.conf files. Create the database or import (as appropriate) into phpMyAdmin, then establish the connection ports to the

database. Connection verification can be done by accessing a page in the browser that contains database queries; if the data appears on the page, then the connection is possible.

The scientific purpose of the presented model is to collect, as much as possible, specific metrics data from different sets of applications in order to realize a simple but effective and easily customizable monitoring solution, that can be later enhanced based on technological capabilities of different integrations, as per busines case. Therefore, the solution represents a starting point (as simple platform or simple communication element/ middleware) for the further development of more complex solutions, that can be integrated with systems at a large scale. The solution is also adaptable, being configurable on multiple servers that represent monitoring stations, assuring live performance and status monitoring, in sync, with relevant results.

Along with the hostname monitoring we should also monitor services on TCP ports, since the application's URL could actually be referencing a Windows or Linux service. This operation can be easily done with the help of Windows Process Monitor (in Windows OS) or netstat command (on a Linux machine) which also have the posibility of saving the logs in order to be later analyzed. The analysis includes the investigation of opened and occupied ports in relationship with the processes that are related to a service. Although, most likely, if a process is down (for example Tomcat process, Apache) the hostname cannot be accessed and URL will not be available in the browser, there could be situations in which, due to browser cache memory, the session of the application will remain opened but after making an operation like page refresh or access a GUI element from the page (eg. button, link), the unavailability message of the service will appear. Therefore, this is the reason why is necessary to include a page refresh meta tag with a propper/ suitable refresh rate when developing the monitoring solution, in order to have a realistic status of the monitored applications/ services. Also, it is important to mention that, a high refresh rate could overload the pages and make the GUI elements (alerts, message notifications) inaccessible; on the other hand a low refresh rate could affect the relevance of the monitor page. For enhancing the presented PHP solution, a useful integration could be PHP Server Monitor, which has a series of relevant features like: monitor services and websites; email, SMS notifications; view history graphs of uptime and latency, logs of connection errors, outgoing emails and text messages; easy cronjob implementation to automatically check the servers.

Experimental method used for testing the model

The following activities and operations are performed to test the model of the monitoring solution:

1. Verifications for the accessibility of all targeted ports (21, 22, 80, 8080) both locally and on a server, in order to ensure the connection with the servers through dedicated PHP functions.
2. Development of the application involves successive tests of connection with the servers, by choosing convenient ports, so as to reach a valid port for each type of server. This test is required to perform the server status check functionality.
3. Election of a set of PHP functions through which the basic checks can be performed: server status, hostname status, URL validity.
4. Election of both functional and non-functional applications in the test environment to test: URL status, hostname, services.
5. The creation of script variants that allow the verification of the presented elements and the choice of optimal solutions.
6. Movement of the package of the developed solution on different machines to check the accessibility both on a server and on the stations of the system operators / engineers.
7. Adding / modifying parameters in the configuration files (php.ini, php.conf) to test the response of the monitoring solution and verify the results on different machines.
8. Establish successive refresh rate values to verify how long it takes to update and accurately reflect changes in status for infrastructure and applications.
9. Develop and test, in DEV environment or directly in UAT, specific functions (preferably PHP of Java) for the calculation of IPCC measurements like incident and change requests reports. This test can be done for verifying multiple integrations with different platforms

or access/ connections with the database where IPCC reports are stored. If the functions have the desired result then GUI element can be developed in CSS, Javascript as alert in the main monitoring page.

10. Test the solution on multiple SSL, TLS versions environments in order to see how the pages and functionalities are affected when enabling/ disabling different security protocols. This test is recommanded also for setting the propper security configurations of the monitoring solution.

This set of tests is performed to find the optimal way to implement and configure the monitoring solution.

Benefits of using the model

The benefits of using proposed monitoring solution model are the following:

1. Portability of the solution on local station or on a server with operating systems: Windows, Linux, Solaris.
2. Monitoring solution users do not need access credentials, which facilitates the monitoring operation.
3. The solution is intuitive and, as such, easy to use by any user, without the need for training or instruction manual.
4. Pages with information about infrastructure, applications are a plus and can be a real help when an incident occurs and you need quick access to certain data.
5. The html tag iframe structures, together with the implementation of a JavaScript slideshow, create the necessary framework, in a single page, for viewing the accessibility status of the login pages related to the monitored applications, as well as performing checks directly into the applications.
6. Costs of the solution will be reduced, due to the lack of integrations or special technical specifications.
7. Through the implemented ping and trace route functions, an immediate check can be made, at the moment of occurrence of some incidents that affect the validity and accessibility of the machine.
8. The presented monitoring solution is usable for all applications developed using server-side technologies.
9. Integration with other PHP monitoring tools can be easily made, for IPCC processes monitoring. Also, different metrics could be calculated and designed into specific pages, in the main monitoring tool framework based on the information provided from multiple sources, since the PHP technology allows the usage of multiple functions in order to create complex connections.

The disadvantages of using proposed monitoring solution model are as follows:

1. Lack of monitoring for some components related to operations in the database: degree of loading, number of transactions, etc.
2. The lack of complex integrations, with other components cannot make the model usable, by it's default status, at a high level for complex solutions, offering only the results of some basic verifications.
3. The solution, by it's default settings, cannot provide data on complex metrics, cannot create reports as well as graphs of activities.
4. In some situations, the solution could be difficult to adapt (configure and upgrade), due to possible incompatibilities between newer PHP versions and Apache/ MySQL components from XAMPP/ LAMP. The PHP upgrade could be required if old versions of XAMPP/LAMP are installed, since they represent security risks.
5. Although the solution has a major degree of customization, when facing very complex monitoring demands, integrations with other technologies could lead to a redesign of the architecture.

6. If too many applications are included in the monitoring tool, as monitored elements with alerts, without enhancements (PHP redirections and possible inclusions of iframes), the PHP pages could have difficult loading.
7. The solution does not have (by default) the necessary characteristics for the monitoring of specific cloud environments parameters.

Conclusions

The conclusions that can be drawn from the study regarding the possibility of implementing a monitoring solution with basic functions are the following:

1. Developing a model with basic functions for a monitoring solution can help a wide range of applications and can be the premise for developing the existing solution or other adjacent solutions with a higher degree of impact.
2. The model of the presented monitoring solution uses predefined php functions and can represent the basis for creating useful integrations for different applications developed in other programming languages. Solutions from other programming languages can also be added within the created PHP framework.
3. Ensuring basic functions for checking the IT system is vital for detecting incidents in a timely manner as well as for carrying out proactive activities.
4. The use of several technologies (PHP, HTML, CSS, Javascript, Batch Scripting, VBScript) in creating the monitoring solution is the premise of developing other scripts and integrations that can complete the verification framework.
5. The lack of integrations with vendor solutions (in this case APIs) for monitoring solution functionalities creates the premise of a cost-free model that can be widely used for basic checks.
6. The presented model can be easily configurable and, as such, implemented on various infrastructures.
7. Making the connection between the PHP functions and the results offered by other scripts / automations (Batch scripting, VB Script) creates a variant of a monitoring solution in which different integrations can be done, practically, easily, without making the call to highly complex solutions and scripts. This aspect facilitates the realization of functions, with a higher degree of complexity, for monitoring, without the involvement of costs by making connections with various vendors.
8. The model of a simple monitoring solution is suitable for detecting incidents of a general nature, of systematic damage to applications, but it is not suitable for detecting aspects of subtlety such as: CPU load, memory, I / O for host servers. After integrating with the results of other scripts (PowerShell, Batch scripting, VB Script) this aspect can be improved, but it will not have the characteristic of a complex, high-performance and flexible solution at the same time, necessary for complex applications with different integrations, API type, for example.
9. The model can integrate different PHP platforms in order to calculate relevant IPCC metrics like: incident affection measurement, changes in the system (through change requests), as a share in the total, as per specific process or as share in total set of activities registered in the system. These elements can be related to the presented server functionality features (through the development of the functions presented above) or new ones integrated through other incorporated PHP functions, as well as other technologies improvements/ enhancements, like Java.
10. The described model (with all it's functions and integrations) represents my contribution in the monitoring solutions field, especially through the posibility of customization and portability. Extensions of the existent solution can be done not only through dedicated or predefined PHP functions but also through: Java, .NET/ ASP .NET, VBScript, SQL insertions directly into the platform or in connection with other communicating platforms.
11. Other aspect of personal contribution in the field of monitoring solutions for a set of e-business applications is represented by the holistic approach in a dedicated simple but effective monitoring solution which encapsulates the following: dedicated iframe pages for login

verification purposes (combining javascript slideshow and iframe tag in order to see multiple login pages into the same frameset, a single page, with a user friendly approach); dedicated PHP functions for verifications of basic elements (server, URL, hostname); predefined functions which calculate (in relationship with other platforms or directly through database queries) relevant IPCC metrics for the system (especially incidents and change requests). All the presented features have been tested, as per indications and guidelines from the section „Experimental method used for testing the model".

12. In terms of personal contribution, I also include the development of a relatively simple monitoring tool with the help of IPCC framework (Incident, Problem, Change, Configuration). In this case, the monitoring solution could act as a primary platform (into which different alerts and notifications must be included through the contribution of different specific functions) or as a relational or communicating platform which establishes the relationship between two other systems or platforms with the scope of resources/ processes monitoring. As per below representations, the monitoring solution could be applied for multiple sets of applicatons (with bidirectional dependencies) as well as a middleware component, serving the communication between other main/ principal systems/ platforms.

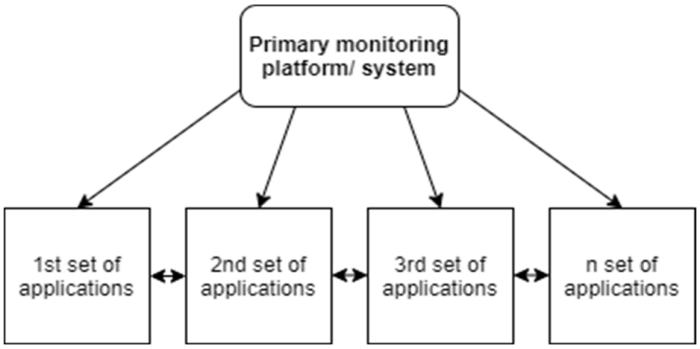

Fig. 6: Primary monitoring platform/ system for multiple sets of applications

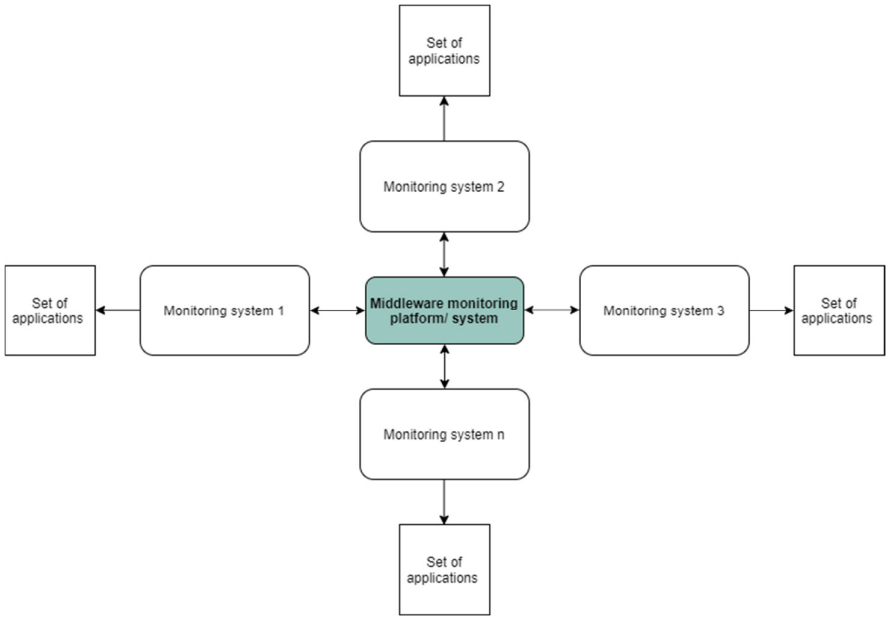

Fig. 7 : Middleware monitoring platform/ system as communication element between other monitoring systems

13. Above representations take into consideration the following aspects of personal contribution: IPCC framework for elements monitoring management; extension of current solution capabilities, depending on the involved general system and business case (features/ functions can be created with the help of the following technologies: VBScript, Batch scripting, PowerShell, PHP, as extensions of the initial simple monitoring solution); communication element that, as monitoring solution, receives information from one system and sends it as output that will be interpreted as input by other major monitoring systems. In this process data transformation might be possible with the help of ETL (Extract, Transform, Load) processes implementations.
14. It is important to take into consideration that, in the presented models, different perturbation factors can occur like: technological barriers, inconsistent data, transient process failures, technical configurations of the involved elements/ systems. All these factors can be eliminated through a control and fix mechanism which can be implemented as a separate application or as an enhancement into the current monitoring solution/ system. Therefore, we have a cybernetic system which can be adjusted through the specific control and adjustement component while the input data is transformed into output, valid information which will be used by other systems. The control and fix mechanism can be created through enhanced PHP functions with SQL, VB Scripts, Batch scripting, without involving the creation of APIs or other complex solutions.
15. With the presented monitoring solution, characterized by portability, IT operators and engineers can efficiently visualize both basic and performance metrics of the infrastructure in a few application pages or tabs. Also, the use case of the platform can be easily extended with other PHP integrations and platforms. These aspects would solve problems like: high costs with vendor applications, multiple inefficient integrations, lack of portability due to complex configuration parameters and even redundant data.

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The Development of Telemedicine in The Context of Revolution 4.0 And the COVID-19 Pandemic on The Example of Poland[1]

Maria PLONKA

Cracow University of Economics, Cracow, Poland
plonkam@uek.krakow.pl

Jolanta STANIENDA

Cracow University of Economics, Cracow, Poland
stanienj@uek.krakow.pl

Abstract

The aim of the article is to present the development, key solutions, benefits and costs of telemedicine in Poland. It shows how the development of new technologies resulting from the fourth industrial revolution (REV 4.0) and the coronavirus pandemic, accelerated the development of telemedicine. The lockdown conditions imposed by the pandemic and the introduction of social isolation in the name of patient and physician safety, froze traditional medical visits and services, shifting the medical market to a remote mode of operations, expanding the provision of telemedicine services. To diagnose the level of telemedicine development, literature studies and original primary research were conducted on the example of one of the primary healthcare clinics in Krakow, Poland. The research presents the challenges posed by Revolution 4.0 and the COVID-19 pandemic for the healthcare sector as well as the benefits and costs of new ways of delivering medical services. The conducted analyzes have provided arguments confirming the thesis that the COVID-19 pandemic has stimulated the use of telemedicine tools in practice. The presented research results and recommendations may be used to build social awareness regarding the need to expand digital competences.

Keywords: telemedicine, e-health, effectiveness of the healthcare system, REV 4.0, COVID-19
JEL: I10, I11, I18

Introduction

There is no turning back from the digital transformation of the healthcare system associated with the fourth industrial revolution. Supporting or replacing traditional healthcare services with the possibility of providing medical services at a distance may be a way to slow down the growth rate of healthcare costs without compromising efficiency (Ruzik-Sierdzińska, Sierdziński, 2018, 51). In the current reality, there is an exceptionally rapid progress in telemedicine, with new, unique technologies appearing, and existing ones being continuously improved. Devices and applications for remote diagnostics and monitoring of the patient's health, equipped with artificial intelligence, are beginning to be treated not as a technological curiosities, but as valuable supplements to medical consultations and improvement of the quality of health services.

Telemedicine and its importance on the health services market

In the absence of an unambiguous definition of telemedicine[2], various definitions are commonly used, as shown in Table 1.

[1] This project has been financed by the Ministry of Science and Higher Education within the "Regional Initiative of Excellence" Programme for 2019-2022. Project no.: 021/RID/2018/19. Total project budget: PLN 11 897 131,40. https://rev4.uek.krakow.pl/
[2] A pioneer in the field of telemedicine was NASA, which monitored the vital functions of astronauts.

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Table 1: Selected definitions of telemedicine

Definition of telemedicine	Author
Telemedicine is the provision of medical services by specialists where distance is a key factor, using communication technologies to exchange information relevant to diagnosis, treatment, prophylaxis, tests, consultations or medical knowledge in order to improve the patient's health (WHO, 1997, 1998).	World Health Organization (WHO)
Telemedicine is a form of exchange of medical information between two parties using telecommunications tools, the purpose of which is to improve the patient's health.	American Telemedicine Association (ATA)
Telemedicine is the provision of health services using ICT in a situation where the health professional and the patient (or two health professionals) are in two different locations. The European Commission also refers to the concept of telemedicine services which "involve the transmission of medical data and information (as text, image, audio or other form) necessary for preventive measures, diagnosis, treatment and monitoring of the patient's health (Komisja Wspólnot Europejskich, 2008, 3).	European Commission of the EU
The medical activity consists of providing health services through teleinformation systems or communication systems (Dz. U. 2020, poz. 295, 567).	The Council of Ministers of the Republic of Poland

Source: development based on: (Olszanowski, Gierek, Skrzypek, 2016, 7).

The definitions presented in Table 1 allow to distinguish a common element for the concept of telemedicine, which is the use of data transmission with the use of ICT technologies to improve the patient's health. The term telemedicine is very broad in terms of content, so it is worth presenting in detail the issues it deals with (Olszanowski, Gierek, Skrzypek, 2016):

- Telecare - care for chronically ill patients, including those with functional limitations. This type of telemedical activity consists of measuring the patient's vital parameters by various sensors, e.g. pulse, blood pressure, saturation, ECG, KTG. The measurements are sent to the monitoring center, where they are processed and initially interpreted by specialized software. If necessary, the results will be sent to the doctor (many experts and practitioners believe that telecare is not included in the field of telemedicine, due to the fact that no medical data is processed as part of this service)[3] (Jarczewski, 2020).
- Telediagnostics - a description of the examination made on the basis of medical multimedia data (digital, text, image, audio data) and sent via telecommunication networks (e.g. telephone) or ICT networks (e.g. Internet) as saved data files.
- Teleconsultation - an opportunity to conduct an online conversation with a high-class specialist.
- Telelearning - most often carried out through internet telemedicine platforms supporting medical workers and patients. This category also includes various types of information bases for obtaining and exchanging information on treatments.

[3] According to A. Jarczewski, telecare is an additional care service that uses modern technologies. Its aim is to increase the safety of elderly, disabled, sick and others who stay alone in their homes. Telecare is a care system tool that allows many people to function better, regain a sense of security and independence. The main factor in the care of this system is a special "SOS" button, which is built into a landline or portable telephone. It allows, in health or life-threatening situations, to connect to the alarm center and call for help adequate to the situation. The possibility of using the "SOS" button is also a greater sense of security.

- Teletreatments, teleoperations - a type of procedure, operation performed with a remote-controlled surgical robot. This is the most technologically advanced type of telemedicine service. It combines elements of surgery, telecommunications, IT and robotics.

The presented division proves that telemedicine should not be perceived as a separate, new branch of medicine, but as an integral part of the healthcare system, enabling a fuller use of resources, including human resources, with the use of appropriate technologies for providing health services (Czarnucha, Grabowski, Najbuk, Kołtowski, 2015).

The telemedicine market shows great potential, taking into account the multitude of applications of its solutions in all branches of modern medicine. When analyzing the classification of telemedicine services according to the method of medical data transmission (communication), the following models can be presented (Research and Markets, 2020):

- real-time data transfer - the patient and the entity performing medical activities communicate via video-conference "live" (most often used in telepsychiatry, telecardiology, teleconsultation),
- storage and transmission (store & forward) - digital data in the form of photos, videos, audio files are acquired and stored on the patient's computer, mobile device or in the cloud and sent via a secured link.
- remote monitoring - the patient is monitored by a system that collects data from monitoring devices and transmits them to an external headquarters, from where healthcare workers supervise his health (most often used in the case of chronic diseases such as diabetes, asthma or heart disease).

The Report (Research and Markets, 2020) shows that the global telemedicine market will reach USD 25.4 billion by 2020, and as much as USD 55.6 billion by 2025. Figure 1 shows the share of individual regions of the world in the global telemedicine market in 2018-2025 in USD. The largest share of North America and Europe in this market is due to the development of technology, civilizational diseases (lifestyle diseases), the size of the geriatric population and the need to reduce healthcare spending. This market is projected to grow rapidly in Asia Pacific due to chronic disease and overcrowding in hospitals (Research and Markets, 2020).

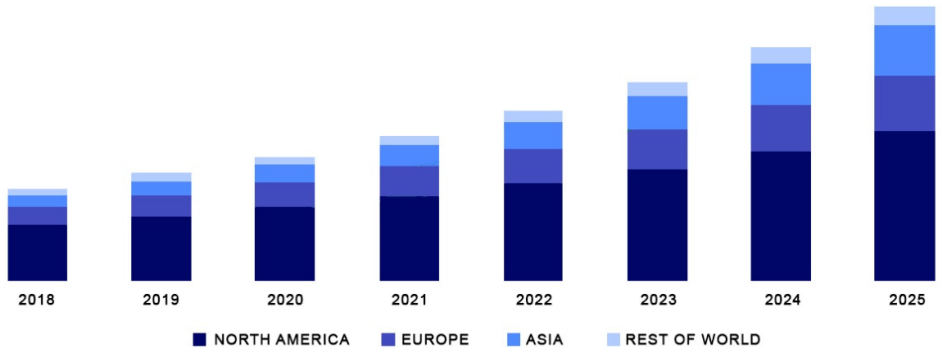

Figure 1: Share in the global telemedicne market by world regions in the period 2018-2025 (in USD billions). In 2020, spending on the global telemedicine market is 25.4 billion USD, while it is forecast to reach 55.6 billion USD in 2025.

Source: development based on (Research and Markets, 2020)

The telemedicine service sector will grow as a result of demographic changes, including an aging population that will increasingly require medical care, a shortage of doctors, and rapidly rising healthcare costs, while research has confirmed that telemedicine can deliver medical care with greater cost-effectiveness (Research and Markets, 2020). This is particularly important as the cost of healthcare in developed countries is expected to soon account for the largest share of all social protection expenditures (Ruzik-Sierdzińska, Sierdziński, 2018, 50).

Telemedicine may be an opportunity to reduce costs for the Polish healthcare system, which has been one of the least effective in Europe for many years. In the overall ranking of healthcare systems, Poland was placed 32nd out of 35 European countries (Björnberg, Phang, 2018, 26) (Table 2).

Table 2: Basic data on healthcare in European countries and related effectiveness in 2018

No	European OECD countries	1. Expenses on healthcare per capita in EUR	2. Expenses on healthcare as a percentage share of GDP in %	3. EHCI Index	4. Effecti-veness 3:1	5. Effecti-veness 3:2
1.	Switzerland	5 799	12,30	893	15,4	72,60
2.	Netherlands	3 885	10,10	883	22,7	87,43
3.	Norway	4 653	10,40	857	18,4	82,40
4.	Denmark	3 831	10,20	855	22,3	83,82
5.	Belgium	3 493	10,00	849	24,3	84,90
6.	Finland	3 013	9,20	839	27,8	91,20
7.	Luxembourg	4 713	6,10	809	17,2	132,62
8.	Sweden	4 019	10,90	800	19,9	73,39
9.	Austria	3 945	10,30	799	20,3	77,57
10	Iceland	3 309	8,50	797	24,1	93,76
11	France	3 572	11,50	796	22,3	69,22
12	Germany	4 160	11,30	785	18,9	69,47
13	Portugal	2 066	9,00	754	36,5	83,78
14	Czech Republic	1 873	7,10	731	39,0	102,96
15	Estonia	1 551	6,70	729	47,0	108,81

16	United Kingdom	3 045	9,60	728	23,9	75,83
17	Slovakia	1 625	7,10	722	44,4	101,69
18	Serbia	987	9,4	699	70,8	74,36
19	Spain	2 446	8,80	698	28,5	79,32
20	Italy	2 551	8,90	687	26,9	77,19
21	Slovenia	2 023	8,00	678	33,5	84,75
22	Ireland	3 930	7,10	669	17,0	94,23
23	Montenegro	728	5,9	668	91,8	113,22
24	Croatia	1367	7,5	644	47,1	85,87
25	Macedonia	638	6,1	638	100,0	104,59
26	Cyprus	1772	6,8	635	35,8	93,38
27	Malta	2568	8,9	631	24,6	70,90
28	Lithuania	1 463	6,30	622	42,5	98,73
29	Greece	1 678	8,40	615	36,7	73,21
30	Latvia	1 252	6,30	605	48,3	96,03
31	Bulgaria	1234	8,4	591	47,9	70,36
32	**Poland**	**1 409**	**6,70**	**585**	**41,5**	**87,31**
33	Hungary	1 473	7,20	565	38,4	78,47
34	Romania	983	5,2	549	55,8	105,58
35	Albania	583	6,8	544	93,3	80,00
	Source and Report page number:	H&G p. 133	H&G p. 135	EHCI p. 26	Own study	Own study

Source: H&G (2018), Health at a Glance: Europe 2018, State of Health in the EU Cycle, The OECD Report, pp. 133-135, EHCI (2019), Euro Health Consumer Index 2018, Health Consumer Powerhouse Ltd., p. 26. Płonka M., 2019, p. 866-867.

The presented data on the financial efficiency of the healthcare system (HCS)[4] in the form of the EHCI[5] index for European countries in 2018, show that the relationship between healthcare expenditure and the position of a given country in the EHCI index are high, but the EHCI is more influenced by spending on HCS per capita[6]. At the same time, it should be noted that European countries have public-private healthcare systems. The dominance of a public system over the private one in Poland means that redistributive allocation mechanisms, supplemented with market allocation mechanisms, dominate the healthcare market. Under these conditions, the distribution of publicly available medical services is largely politically regulated (the basket of guaranteed health services, the list of reimbursed drugs and treatments), and thus non-transparent and blocking universal access to medical services (Płonka, 2017, 321-329, Płonka, 2019, 37-47, Płonka, 2019, 864-870).

Telemedicine gained additional importance during the COVID-19 pandemic, which forced patients to use this form and thus accelerated the pace of its development. The social isolation resulting from the pandemic confirmed that in many cases teleconsultation is sufficient without the need to visit a doctor in person. IBISWorld analysts monitoring the impact of the global COVID-19 pandemic on the US telemedicine market in real time concluded that the impact of the pandemic on the telemedicine market is large because (Research and Markets, 2020):

- a society isolated at home, avoids interaction with others;
- public health institutions encourage people to use telemedicine services whenever possible;
- hospitals and other healthcare providers are finding ways to use telemedicine technology to visit quarantined patients.

New tools in the e-health project on the market for medical services in the economy 4.0

The fourth industrial revolution (REV 4.0)[7] aims to unite material and digital resources and differs from previous technological revolutions in that - by integrating existing technologies - simultaneously in production processes it blurs the boundaries between the physical, digital and biological spheres (Schwab, 2018, 11-12). The most important solutions driving the development of Industry 4.0 include the Internet of Things (IoT), machine learning, artificial intelligence, and augmented and virtual reality (AR and VR) (Deloitte, 2018). Information and communication technologies introduce new possibilities for the provision of medical services. The digital transformation of healthcare that supports direct treatment methods through remote medical services may be a way to slow down the growth rate of healthcare costs without sacrificing efficiency (Ruzik-Sierdzińska, Sierdziński, 2018, 51). In medical services, technology is progressing especially rapidly. New, unique technologies are appearing, while many of the existing ones are being improved.

[4] It is understood as an expenditure-effect relationship in which the expenditure is expenditure on healthcare per capita or as a share of GDP, and the effect is the level of healthcare measured by the EHCI (Euro Health Consumer Index) value included in the H&G (Health at a Glance) report.

[5] synthetic index, the maximum value of which is 1000 points, taking into account the following factors: patient rights and information (max. 125 points), accessibility, waiting times for treatment (max. 225 points), outcomes (max. 300 points), range and reach of services provided (125 points max), prevention (125 points max), pharmaceuticals (100 points max).

[6] The Pearson correlation coefficient between expenditure on HCS per capita and the EHCI index is 0.827, and between expenditure on HCS as a share of GDP and the EHCI index - 0.719.

[7] The concept of the fourth industrial revolution (originally Industry 4.0) was created at the Hanover Fair in 2011 to indicate how the organization of global value chains will be revolutionized. The concept of REV 4.0 was discussed at the Economic Forum in Davos, and its essence was presented in 2016 by Klaus Schwab in the book: The Fourth Industrial Revolution. K. Schwab is the founder and president of the World Economic Forum in Davos.

In the subject literature, the terms telemedicine and e-health are used interchangeably, but in Poland (Dz.U. 2019, poz. 1590) the term e-health[8] (GUS, 2020) is most often used to describe digital changes in healthcare. According to the European Commission, "e-health is the application of information and communication technology tools and services to healthcare". The latest e-health solutions in Poland concern the following projects (Jankowski, Klimczak-Wieczorek, Kloc, Matuszewski, Rozum, 2016, 6):

- P1 - Electronic Platform for Collection, Analysis and Sharing of Digital Resources on Medical Events;
- P2 - Platform for Online Access for Enterprises of Digital Medical Register Services and Resources;
- P3 - Improving the quality of management in healthcare by disseminating knowledge about ICT (e-health projects of the Ministry of Health);
- P4 – Domain-specific teleinformation systems of the healthcare information system - completed in 2016.

It is especially worth paying attention to the innovative tools of the P1 platform (table 3), which significantly facilitated and accelerated contact between patient and doctor, namely: e-prescription, e-referral, e-sick leave, e-advice, individual patient account, electronic medical records

Table 3: Key e-health tools used in Poland

Tool name	Expiry date
E-prescription	From January 1, 2020, a statutory obligation
E-referral	From 1 January 2021 statutory obligation. The e-referral pilot ran from October 2018 to September 30, 2019 (Ministerstwa Zdrowia i NFZ)
E-sick leave	From December 1, 2018, a statutory obligation
E-visit	There is no statutory obligation
Internet Patient Account available via free application of the Ministry of Health (Ministerstwa Zdrowia i NFZ)	
Electronic medical records	There is no binding date set. As of January 1, 2019, it was planned to introduce the obligation of electronic medical documentation.

Source: own study based on the sources provided in the table and (Telemedyczna Grupa Robocza, 2018, 59-61)

The lockdown conditions imposed by the pandemic froze traditional medical visits and services, forcing a new reality and exposing Poland's technological mismatch in the field of telemedicine and

[8] E-health is an effective, economical and safe use of information and telecommunications technologies to support all activities related to health protection, including the provision of health services, systems for observing health-related fields, health education, development of professional literature and knowledge, scientific research, definition of the Polish Central Statistical Office.

remote healthcare services, which have been developing in Western Europe for years (Torchała, 2020). In 2018, Poland was ranked 31st in Europe in the following categories: 24-hour telephone access to health information with the possibility of interaction and availability of electronic prescriptions, and 25th in the category of access to the online visit booking system (Björnberg, Phang, 2018, 52-75). In this respect, the private market was faster than the public health system.

Social isolation also confirmed that in many health situations a teleconsultation is sufficient, without the need to visit the doctor in person. The more so as Polish law and principles of professional ethics allow for the provision of telemedicine services, which are considered to be an equvialent health service, provided on the same terms as personal consultation in the office, the only difference is mediation (Telemedyczna Grupa Robocza, 2020). Since the end of March 2020, the interest of Poles in healthcare e-services that can be used without leaving home and thus minimize the risk of infection with the virus, has definitely increased. The growing role of telemedicine is confirmed by a study for the Biostat Research and Development Center, which shows that as many as 72% of Poles consider remote assistance in the form of teleconsultation to be the safest form of contact with a doctor (BioStat, 2020). An exemplification of the observed trends was presented on the data from one of the clinics in Krakow (Table 4) and concerned the number of consultations provided on-site and as teleconsultations.

Table 4: Number of consultations provided at the point of service and remote at the primary healthcare clinic in Krakow between February and July 2020

Types of consultations	**Number of consultations provided (in persons)**					
	February 2020	March 2020	April 2020	May 2020	June 2020	July 2020
In-clinic consultations	1 950	2 257	1 494	1987	1511	1434
Teleconsultation	0	3	163	228	600	737

Source: own study based on data provided by the primary healthcare clinic in Krakow (N = 5,800 patients).

The data in Table 4 show a sharp increase in the number of teleconsultations since April 2020 caused by the COVID-19 pandemic. There is a noticeable steady increase in remote consultations, the number of which in July compared to April 2020 increased almost fivefold. They are a great help for people who need to obtain medical advice, discuss test results, have another prescription issued for medications that are constantly taken or receive a medical leave certificate for work purposes. In July 2020, almost 13% of clinic patients benefited from teleconsulting, while 24.7% of patients used on-site, in-clinic advice. In February 2020 (before the outbreak of the coronavirus), 33.6% of patients benefited from in-clinic consultations, and no teleconsultations were provided.

Benefits and costs of using e-health tools

Health and health safety of the society are paramount values, therefore the so-far "fledgling" telemedicine market in Poland has been dynamized by the state of higher necessity brought about by COVID-19. On the Polish market, this type of services has been available for several years, and the National Health Fund reimburses certain forms of telemedicine, primarily those related to monitoring of elderly and patients with cardiological problems (Persona, 2020). Experts estimated that the implementation of e-health tools in an optimistic variant may take about two years. However, the coronavirus pandemic has greatly accelerated this process (Polityka Zdrowotna, 2020). This resulted in a partial release of healthcare providers from excess bureaucracy by removing unnecessary

procedures and formalities, allowing, inter alia, use of telephone consultations (Gałązka-Sobotka, 2020).

At the same time, the pandemic increased social awareness of the need for skills necessary to use new technologies, which give access to specialized medical assistance. However, it is worth knowing, which methods of treatment - given the funds allocated to health protection - give a more beneficial effect in the form of better health of the population (Ruzik-Sierdzińska, Sierdziński, 2018, 50). Table 5 shows the benefits and costs of using e-health tools.

Table 5: Benefits and costs of using e-health tools

Benefits	Costs / difficulties
• reducing the number of traditional visits • reducing "queues" to doctors • shorter visit time • improving the quality of patients' health • lower travel costs for an appointment • more efficient use of the time of qualified medical personnel • improving the quality and comfort of doctors' work, • creating a database for medical, economic and social sciences • lower treatment costs • preventing areas with shortages of specialists from being excluded from diagnostics • reducing the time needed to complete medical documentation	• system implementation costs • hardware and software purchase costs, • costs of training medical personnel, • costs of collecting and storing databases • digital exclusion of the 60+ generation • lack of trust in modern technologies

Source: own study based on individual interviews with the management of healthcare facilities in Poland.

One of the greatest advantages of telemedicine is accessibility, which is extremely important in the case of a shortage of specialists in specific fields. This prevents long waiting times for an appointment and the limited availability of doctors in small towns, especially those distant from larger agglomerations. When contacted via the Internet, the physician can admit more patients, minimize visit delays, and contact patients who would have difficulty arriving at the office, for example due to distance or mobility problems (Persona 2020). Therefore, it can be concluded that telemedicine solutions prevent the exclusion of disadvantaged areas from medical diagnostics. Telemedicine solutions save time and assure speed of contact with a doctor, especially in emergency cases requiring a quick response. It is a convenient and easy way for the patient to contact a doctor.

In addition to many benefits, telemedicine can be perceived through the prism of costs and challenges, especially for the elderly, who are the largest group of recipients of medical services. For them, the biggest barrier to using e-tools is digital exclusion and lack of trust in modern technologies. Simultaneously, there is a mental barrier due to the lack of physical, personal contact between the patient and the doctor, which is the reason that medical care is seen as dehumanized.

The Gartner report "e-health for a healthier Europe" lists the use of e-health tools as one of the most effective means of reducing costs and rationalizing expenditures on healthcare in European Union countries (Olszanowski, Gierek, Skrzypek, 2016, 25). According to the Regulation of the Chairman of the Polish National Health Fund (Dzienniki resortowe NFZ.2019.177), the financing of primary care

physician services according to the capitalization rate[9] adjusted using the coefficient appropriate to the age group of the recipient increases significantly from the age of 66 and the coefficient amounts to 2.7 (it is PLN 461.7), and from the age of 75 the coefficient is 3.1 (PLN 530.1). This means that the cost of providing medical services is the highest for age groups of 66 and above.

Conclusion

Civilizational (lifestyle) diseases, aging of society and growing needs in the field of long-term care, in the conditions of limited budgetary resources, imply growing supply and demand mismatches, which must be minimized within the framework of systemic solutions. Telemedicine is a future-oriented field of healthcare, the development of which is a natural consequence of changes – the Fourth Industrial Revolution (REV 4.0) and the COVID-19 pandemic. It enables the provision of medical services at a distance using modern information technologies, allowing for remote communication between the doctor and patient, and monitoring of physiological parameters. This field has even greater potential, since it enables the use of commonly used 3D printers for direct medical assistance (a prototype of a respirator has been created in Poland, which can save the lives of many people in crisis situations). 3D printers can also be used in pharmacology (in 2015, the first tablets approved by the US Food and Drug Administration were "printed") (Persona 2020).

The presented results of research from the primary care facility clinic in Krakow, Poland, allow us to confirm the thesis that the COVID-19 pandemic has stimulated the use of these solutions in practice (number of teleconsultations). At the same time, the presentation of the benefits and costs of using e-tools proves the advantage of the former. The use of telemedicine solutions ensures more effective patient care and greater than before support for doctors in the process of diagnosis and treatment by non-medical personnel.

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[9] The capitalization rate (for the fourth quarter of 2020 is PLN 171) includes the amount intended to cover the costs of diagnostic tests performed by a physician in the process of providing services under the contract, Regulation No. 177/2019 / DSOZ of the President of the National Health Fund of 30 December 2019. on the conditions for the conclusion and implementation of contracts for the provision of healthcare services in the field of primary healthcare, Departmental Journals of the National Health Fund.2019.177, §9.

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Determinación De Factores Para Emprender En El Adulto Mayor: Un Relato De Vida 2017-2020

Carlos GALLEGUILLOS
Departamento de Industria y Negocios, Universidad de Atacama, Copiapó, Chile,
carlos.galleguillos@uda.cl

José SILVA
Departamento de Ingeniería Comercial, Universidad de Atacama, Copiapó, Chile
jose.silva@uda.cl

Rubén HURTADO
Departamento de Administración, Universidad de Atacama, Copiapó, Chile
ruben.hurtado@uda.cl

Abstract

El presente artículo tiene como objetivo contribuir al conocimiento en el área del emprendimiento, específicamente a los factores para emprender en personas de la tercera edad. Esta investigación es de carácter cualitativo, con fundamento filosófico interpretativista, bajo la técnica relato de vida. Los resultados tienden a estar en línea con investigaciones anteriores del área del emprendimiento, no obstante, el principal hallazgo de la investigación corresponde a la relación entre la espiritualidad y la fe como elementos que reducen la aversión al riesgo en los emprendedores. La originalidad de este trabajo se basa en la incipiente investigación del tema a nivel nacional.

Palabras clave: Emprendimiento adulto mayor, Relato de Vida.

Introducción

Según la OMS (2017), en la mayoría de los países, la población de edad mayor de 60 años está considerablemente aumentando y las personas esperan vivir hasta los setenta años o más, edad definida como un adulto mayor y contemplada para cualquier efecto legal en Chile.

Cid et al (2012) proyectan que la población con más de 65 años pasará de un 10% hasta un 15% aproximadamente en 2025, y a más de 20% hacia el año 2050.

Se estima que acciones emprendedoras en la tercera edad, podría generar beneficios bidireccionales, favoreciendo el aumento de bienestar en su conjunto. Kibler et al (2015), concluye que existe posibles beneficios sociales como la reducción de costos para el bienestar, superación del desempleo entre personas mayores y un despliegue productivo de trabajadores de más edad (Weber y Schaper, 2004; Botham y Graves, 2009).

A pesar de lo anterior, existe la presunción que trabajadores de más edad son a menudo juzgados como más caros y menos capaces de manejar un cambio tecnológico rápido, en contraste de los más jóvenes (Duval, 2003, Loretto y White, 2006), provocando discriminación dentro de las organizaciones (Platman, 2003; Weber y Schaper, 2004).

En consecuencia, conforme a la evidencia se han realizado pocos estudios a nivel nacional e internacional sobre las características que podrían mantener el emprendimiento de adultos mayores (Levesque y Minniti, 2006; Kibler et al, 2015). Luego, el objetivo de este estudio se realiza para llenar los vacíos detectados, a partir de los siguientes objetivos:

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- Identificar los determinantes que afectan la intención empresarial en las personas de edad mayor en el corto plazo.
- Verificar la relación entre los determinantes y la intención empresarial en las personas de edad mayor en el largo plazo.

Breve Revisión De La Literatura

La revisión de la literatura se realizó en seis bases de datos, obteniendo una cantidad de trece artículos de investigación. Los *key word* utilizados son: "*entrepreneur older worker", "older entrepreneur", "elderly entrepreneurship" y "third age entrepreneurs".*

Los resultados encontrados son homologables a los definidos por Oelckers (2015), quien destaca perspectivas complementadas por quienes suscriben este estudio, detallados en la tabla 1.

Tabla 1: Revisión adaptada de Oelckers (2015)

	Variable	**Autores**
(1)	Ambiente cultural y contexto.	Weber y Schaper, 2004; Kautonen et al, 2009.
(2)	Acceso financiero, ahorros y patrimonio.	Hart et al, 2004; Kibler et al, 2011.
(3)	Capital humano (experiencias)	Singh y DeNoble, 2003; Weber y Schaper, 2004.
(4)	Capital social (contactos)	Baucus y Human, 1994; Singh y DeNoble, 2003; Kautonen, 2012.
(5)	Carrera laboral.	Baucus y Human, 1994; Weber y Schaper, 2004; Botham y Graves, 2009; Kautonen et al, 2010.
(6)	Emprendimiento femenino.	Kautonen, 2008a; Kautonen, 2012.
(7)	Innovación.	Botham y Graves, 2009; Colovic y Lamotte, 2013.
(8)	Bajas pensiones.	Webster et al, 2005; Wainwright y Kibler, 2014; Kibler et al, 2015.
(9)	Políticas públicas.	Kautonen, 2012; Halabisky 2012.
(10)	Barreras.	Singh y DeNoble, 2003; Levesque y Minniti, 2006; Kautonen et al, 2011; Kibler et al, 2011; Kibler et al, 2015; Kautonen et al, 2013.
(10.a)	Discriminación.	Platman, 2003; Weber y Schaper, 2004.
(11)	Motivaciones.	Weber y Schaper, 2004; Kautonen y Luoto, 2008b; Kibler et al, 2015; Kautonen et al, 2013.
(11a)	Autoempleo.	Singh y DeNoble, 2003; Karoly y Zissimopoulos, 2004; Wainwright y Kibler, 2014.
(11b)	Desempleo.	Webster et al, 2005.
(11c)	Horarios flexibles	Karoly y Zissimopoulos, 2004; Zissimopoulos y Karoly, 2007.
(11d)	Autonomía e independencia	Bond et al, 2005; Walker y Webster, 2007.
(11e)	Oportunidades de aprendizaje y desarrollo	Bond et al, 2005.

La literatura existente muestra que la experiencia laboral previa de los jubilados, modifica la naturaleza de los procesos empresariales utilizados para entrar a los negocios (Baucus y Human, 1994). Además, se sugiere que los adultos mayores poseen una predisposición a emprender que depende de la carrera laboral realizada y la experiencia adquirida (Weber y Schaper, 2004). Esto confirmado por Kutonen et al (2013).

Otras características de emprendedores de la tercera edad según Botham y Graves (2009) son el ingreso razonable o una reserva financiera acumulada, experiencia laboral previa en puestos de trabajo con conocimiento en gestión, ventas y marketing o como profesional, están mejor educados que el individuo promedio de la tercera edad.

Por otra parte, estudios evidencian que la proporción de adultos mayores que están comenzando un negocio es la mitad en comparación a los jóvenes (Hart et al, 2004; Kautonen, 2008a), pero que la tasa de sobrevivencia en el largo plazo de un negocio fundado por emprendedores de la tercera edad es mayor en comparación a su contraparte joven (Kautonen y Luoto, 2008b). No obstante, personas mayores están menos dispuestas a participar en actividades empresariales debido a problemas de salud o asignación de tiempo de preferencias (Singh y DeNoble, 2003, Levesque y Minniti, 2006).

Rotefoss y Kolvereid (2005) encontró que mientras las competencias empresariales aumentan con la edad, las intenciones empresariales disminuyen. Estas intenciones son influenciadas por el grado de dificultad en la puesta en marcha de un negocio, por falta de dinero y ayuda o salud (Tornikoski y Kautonen, 2009; Kautonen et al, 2008c).

Metodología

El diseño de investigación tiene un carácter cualitativo con un sustento filosófico inspirado en el interpretativismo, enfoque de investigación que ofrece una visión rica respecto a la naturaleza de las experiencias del individuo.

La técnica metodológica ha sido el relato de vida, dando espacio a partir de la propia voz para la interpretación sobre el propio estilo de vida y así, articular y explicar quién es el entrevistado (Bruner, 2001).

Para la recopilación de datos se realizó una entrevista semiestructurada centrada en examinar aspectos sugeridos por la revisión de la literatura, motivaciones para convertirse en emprendedor, formas de aprendizaje y desarrollo del capital humano y social, fuentes de financiamiento, innovación y barreras para emprender. Las entrevistas fueron transcritas y codificadas utilizando una adaptación de la teoría fundamentada. El entrevistado fue informado sobre la naturaleza del estudio y su contribución al conocimiento.

Instrumento

La pregunta de investigación corresponde a: ¿Cual es (son) el factor (es) por la cual un adulto mayor opte a emprender dada su edad? A partir de lo anterior, diferentes preguntas giran en torno a aspectos, tales como: de la experiencia, los riesgos y desafíos. Para esto, se usó un conjunto de preguntas de distintos autores que se citan en la entrevista, más las inquietudes de los autores de este estudio.

En este contexto, también se escuchó la voz de dos de los hijos y la de su esposa, quienes han experimentado dicho proceso.

La entrevista tiene un sistema de codificación de respuestas a partir de la grabación y toma de apuntes, inspirado en (Watson, 1994), quien afirma que los investigadores en el ámbito de la gestión seleccionan y modelan sus hallazgos, pero no inventan lo que dicen los entrevistados, el proceso consistió en la lectura y relectura de los datos, los cuales se organizaron una serie de nodos o categorías.

Procedimiento

Se realizaron tres entrevistas en el año 2017 y una entrevista en el año 2020. Esta fue desarrollada operativamente en el hogar del emprendedor.

Desarrollo

La siguiente sección refleja la interpretación que hace el investigador respecto al relato de Ramón Osvaldo Peña Montecinos, quien comenzó a trabajar a los 9 años, en un almacén como vendedor donde trabajaba en las vacaciones por entretención. El segundo trabajo fue en una fábrica de tizas a la edad de 15 años y a los 18 años consiguió un trabajo en una papelera de la comuna de Puente Alto.

En el año 1974 empezó a estudiar Ingeniería en Minas finalizando sus estudios en 1978. En 1986 comenzó a trabajar en Mina el Teniente. En 1990 se fue a trabajar a una empresa en Los Andes y adquirió mayor experiencia laboral, trabajando por 20 años en la ENAMI.

Tuvo logros personales importantes como encontrar a la mujer ideal (Hilda) para su persona, casándose en 1985. Tuvo su primera hija (Karla) en 1987, el segundo (Ignacio) fue en 1990, el tercero (Pablo) en 1991 y su última hija (Rosario) en 1997.

Esta narración se lleva a cabo geográficamente en la III Región de Atacama, Chile. Lugar, donde la principal actividad económica es la minería, donde el período 2014-2016 estuvo marcado por una baja sistemática del precio del cobre, provocando en muchas empresas desvinculaciones por ajustes en los costos.

A. Primera parte, 2017

Sobre el camino al cambio de la vida laboral.

El entrevistado tiene un estilo narrativo bastante discreto y preciso.

¿Qué hizo antes de convertirse en un emprendedor? (Small, 2012).

Trabajé durante 20 años en la Empresa Nacional de Minería [silencio] y antes en empresas contratistas que prestaban servicio a mineras.

¿Qué tan interesado estaba usted antes convertirse en un emprendedor? (Kautonen et al, 2011).

Nunca pensé en convertirme en emprendedor… como trabajaba, no había necesidad, el sueldo que yo tenía alcanzaba para todo, estaban las comodidades [silencio] aunque mis hijos, de mucho antes querían que yo emprendiera, cuando yo aún estaba trabajando [silencio] había pensado en hacer algo después que me jubilara.

¿Después que jubilara?

Sí, porque la plata que uno recibe con la pensión es poca [silencio] pero nunca había pensado en tener un negocio.

Cuénteme sobre ¿cuándo se hizo emprendedor y qué evento catalizó la situación? (Small, 2012).

Ehhh todo esto nace después de haber salido de la empresa [silencio] por una necesidad de ver que no había "ingresos" por no estar trabajando, había que invertir en algo la plata que recibí, el dinero que había era para poder sustentarse.

¿Cómo es eso de no estar trabajando?

Dejé de trabajar por decisión del gerente [silencio] era un problema, yo creo, que la gente que estaba arriba quería ingresar gente de su confianza.

En este tiempo ¿Cuánto se ha preparado para ser emprendedor?, ya sea en términos de tiempo y contenido.

Nunca me he preparado para hacer emprendedor [silencio], sólo la experiencia de mi antiguo trabajo [silencio] yo siempre fui más de ejecutar que de dirigir [silencio] dentro de la ejecución claro uno dirige, la gente que trabajan con uno.

Dada sus circunstancias profesionales y laborales de Ramón, tiene una fuerte tendencia a los aspectos técnicos y operativos de proceso. Se evidencian incipientes rasgos previos de gestión, como lo es el manejo de personas.

B. Segunda parte, 2017

La conversación avanza y se percibe más confianza y soltura en la conversación.

Sobre la empresa en acción.

¿Cómo ha sido el proceso de transición de pasar de empleado dependiente a emprendedor?

Gracias a Dios, no ha sido complicado [silencio] la ayuda de la familia, el apoyo [silencio] como se dice todos tiramos el carro para que sea más fácil.

Me puede hablar sobre el negocio que empezó. ¿Estaba en un contexto que había trabajado?

No, siempre trabajé en la minería.

¿Cómo dio con la idea?

Bueno, yo quería una bencinera… pero un día que fui a comprar un repuesto del auto iba pasando por "Acquabella" y Dios me iluminó y que tenía que ir por la parte del agua [silencio] y por eso me empecé a preocupar del tema.

La espiritualidad en el lugar de trabajo puede ayudar a comprender mejor por qué los individuos muestran diferentes actitudes. La espiritualidad en el lugar de trabajo es una necesidad humana (Hart y Brady, 2005) y las organizaciones no deberían ignorarlo (Afsar y Rehman, 2015).

¿Cómo llevó a la acción la idea de negocio que identifico?

Ehhh, [silencio], fuera de las conversaciones y la aceptación de que este proyecto por el lado de la familia, bueno, ehhh empecé a buscar, buscar [silencio trata de recordar] más menos un mes buscando que planta comprar, como funcionaban, cuáles eran los procesos… hasta que se compró la planta.

¿Con que recursos financió la inversión?

Con la plata que recibí de la empresa cuando salí.

¿Pensó en otra alternativa para invertir ese dinero que recibió?

Ehhh, a ver, si, en algún tipo de depósito… pero no quise porque no es continuo lo que entrega y muy poco.

¿Cómo lo ha hecho para gestionar el negocio?

Ehhh en conversaciones y la ayuda de mis hijos… mi esposa, tratamos de hacer cosas innovadoras para llegar atraer más clientes, ehhh usando la tecnología, esto lo de las redes sociales, es

decir hay que hacer cosas comunicacionales haciendo cosas que puedan ir a la gente, la idea es que las ventas aumenten, pero estas cosas la tienen que llevar acabo mis hijos… cosa que las ventas crezcan.

¿Qué funciones y roles cumple en la empresa?

De todo casi, [risas], porque hasta que no se afirme la empresa, hay que hacer de todo [silencio] Pero va a llegar un momento en que me tengo que hacer un lado para dejarlo en manos de los hijos.

¿Me puede contar como es un día cualquiera en su trabajo?

Ehhh, bueno me baño, se empieza a cargar el vehículo para ir a repartir a los negocios, en algunos sectores de la ciudad, ehhh restaurant algunos locales hasta que quede agua. Bueno, ehhh a la vuelta a casa lavar los bidones, secar y seguir procesando [silencio] La idea es sacar el mejor bidón. Eso es más o menos el training del día.

¿Todos los días son iguales?

No todos los días son iguales, pero en general todas las mañana se vende [silencio] porque hay que ir a entregar o llaman por teléfono, entonces hay que ir a repartir [silencio] y en la tarde se procesa ehhh hasta una hora prudente para no meterle bulla a los vecinos.

¿Cuáles han sido las principales dificultades para convertirse en un emprendedor? (Kautonen et al, 2011).

Dificultades [silencio], en la parte emocional [silencio], los miedos yo creo.

¿Miedos a qué?

A la competencia, aaaah que el cliente no esté a gusto, miedo a que ehhh baje las ventas, miedo a no cumplir con lo que uno al final se propone en cuanto a lo que pueda dar este negocio a las necesidades y gastos que se producen en la familia y la empresa en sí.

¿Y respectos a las dificultades emocionales?

Ehhh, bueno he dormido tranquilamente [risas], no ehhh bueno en el día a día uno se angustia… por las ventas, por llegar luego con el bidón al cliente [silencio], por las contingencias a última hora [silencio] hay empresa que quiere 100 bidones de un día para otro o de una mañana para la tarde.

¿Qué espera ud. de la empresa?

El haber iniciado esta empresa nunca fue con el fin de ser yo el beneficiado, sino que todos [silencio] toda la familia y la familia son los hijos que van llegando también [silencio] Mis hijos, los nietos [silencio] todo va a depender si los hijos se entusiasman con el negocio y lo trabajan.

Al escuchar a Ramón, existe la sensación de estar con un padre que tiene un fuerte vínculo familiar, está plenamente arraigado el modelo masculino de sostén de familia.

¿Cómo es su red de contacto?

Ehhh no tengo [silencio] sólo la familia [silencio] contacto de mis hijos, mi esposa… eso.

C. Tercera Parte, 2017

Sobre los futuros, miedos y desafíos.

¿Cómo ve la empresa en los próximos cinco años?

Mas automatizada… con más volumen de producción.
Pero para eso necesitará recursos. ¿Me puede contar si conoce alguna organización o instrumento público en el cual se pueda apoyar?

Ehhh [silencio] hay una que entrega plata pero no sé si me puede entregar a mí por la inversión que he hecho [silencio] desconozco un poco sobre eso.

Y respecto a la gestión de la empresa, ¿Cómo la ve en los próximos años?

[Silencio], ehhh en la medida que se vayan integrando el que está más arriba le vaya enseñando al de más abajo, que haya comunicación, respeto…

¿Cuánto tiempo pretende vivir como empresario?. ¿Qué hará que se retiren? (Krueger et al, 2000).

Ehhh, yo pienso que un tiempo más, hasta cuando estemos en condiciones de sustentarnos [silencio] para después dejar a alguien de la familia a cargo [silencio] Yo creo que Pablito o Ignacio deberían ser la cabeza del negocio y yo dedicarme a pensar.

¿A pensar? ¿En qué?

Bueno, el emprendimiento debería crecer o sea ampliar el rubro [silencio] como por ejemplo la fabricación de hielo [silencio] a lo mejor tener agua gasificada [silencio] es decir, agrandar el negocio del agua. Ehhhh bueno el crecer implica contratar personal, pero la idea es que siga dando frutos para el conjunto de la familia.

¿Qué piensa hacer después que deje el emprendimiento?

Descansar [risas]

Desde el punto de vista del compromiso y la intención de trabajar autónomamente (Kerr y Armstrong, 2011) establecieron un nivel de asociación significativa respecto a las necesidades de satisfacción personal, los cuales se ven reflejado al cierre de la entrevista.

¿Cuáles son las lecciones más importantes que usted ha aprendido en el camino? (Small, 2012).

Hay que hacer un sacrificio, comprometerse, esforzarse más para poder para cumplir con esa meta [silencio] que a la edad que uno tiene se puede [silencio] no tiene por qué echarse uno a morir.

Finalmente, ¿Está satisfecho con lo que ha logrado hasta el momento?

Si, gracias a Dios.

D. Entrevista 2020

En el año 2020, se contacta con el emprendedor con el objetivo de detectar las razones por las cuales el cree que la empresa a la fecha aún sigue sobreviviendo y como esto ha impactado en su calidad de vida.

Para que el lector interprete la respuesta debe recordar dos hechos que marcaron la agenda nacional en el último tiempo, el estallido social del 18 de octubre del 2019 y la pandemia desde marzo 2020.

Para ello, se abre la conversación con las dos últimas preguntas realizadas en 2017.

¿Cuánto tiempo pretende vivir como empresario? Y aún su empresa sobrevive, me puede explicar que pasó? .

Bueno, el negocio fue creciendo, se agregó la venta de nuevos formatos de agua, la fabricación de hielo [silencio tratando de recordar] y otros productos que complementan la recarga del bidón, por ejemplo: los dispensadores manuales y eléctricos.

¿Cómo lo logró?

Bueno, con la ayuda de mis hijos y por supuesto la inspiración y guía de Dios.

Ahora, respóndame lo siguiente ¿Cómo ha estado su salud física en los últimos años?

Bueno, esto es agotador [silencio], físicamente con dolores en la espalda, [silencio, mueve la mano hacia la espalda] porque el trabajo de cargar y transportar el agua es pesado.

Y en términos ¿emocionales?, le gustó la idea de ser emprendedor.

Ehhhh, [silencio] sí, aunque siento que a veces uno tiene más responsabilidades.

¿A qué se refiere?

Hay que tener el dinero para pagar los proveedores, Ehhh tener una buena calidad del agua para que los clientes no reclamen, [silencio] las deudas.

¿Qué hará que se retire del negocio?

Bueno, mi salud, ehhh esto agota.

¿El negocio seguirá?

[Piensa en silencio], Ehhh no lo sé, Dios sabrá qué pasará, si lo vendo o unos de mis hijos se queda a cargo.

Discusión

Un tema importante de discusión son las características personales del emprendedor. Respecto a la edad, los resultados reafirman lo encontrado por Hart et al (2004), quienes concluyeron que los adultos mayores son mucho menos probables respecto a las personas más jóvenes a tomar medidas para actuar de manera emprendedora (Lévesque et al, 2006; Kautonen, 2008a).

Así mismo, corroborar lo indicado por Bond et al (2005) cuando indica que los hombres mayores (en un 80 por ciento) tienen más probabilidades que las mujeres mayores (62 por ciento) estar casados o vivir con una pareja, lo que proporciona una fuente importante de apoyo.

El perfil de Ramón se ajusta a lo encontrado por Botham y Graves (2009) sobre algunas características de emprendedores de edad mayor, como lo son: una reserva financiera acumulada, experiencia laboral previa en puestos de trabajo con mejores características profesionales que el individuo promedio de la tercera edad.

A partir del relato se tiene que Ramón toma la decisión de emprender producto de su desvinculación inesperada de la empresa donde trabajó por 20 años y a la incertidumbre que esto conlleva en el contexto familiar. Lo anterior, reforzado por Webster et al (2005) y Cahill et al (2006).

Además, confirmar que el emprendimiento de la tercera edad tiene un particular interés de complementar las bajas pensiones (Wainwright y Kibler, 2014; Small, 2012).

Loretto y White (2006) sugieren un fenómeno generacional, donde la noción del modelo masculino de sostén de familia está plenamente arraigada y afecta las expectativas de ampliar la vida laboral tanto para hombres como para mujeres.

El entrevistado no reconoce discriminación por la edad, en contraste a investigaciones que hacen hincapié en cómo empresarios de más edad encuentran difícil encajar en una cultura de empresa dominante, que tiende a enmarcar el emprendimiento como una actividad para individuos más jóvenes (Kautonen et al, 2011; Mallet y Wapshott, 2015).

Finalmente, el principal hallazgo de la investigación corresponde a la relación entre la espiritualidad y la fe como elementos que reducen la aversión al riesgo en los emprendedores. Esto es ratificado en la entrevista a Ramón y su círculo familiar, esposa e hijos. Estos últimos, señalan que sus temores y aprensiones del proyecto son mitigados por su inquebrantable fe en Dios el cual es evidenciado en las entrevistas del 2017 y 2020.

Un segundo hallazgo interesante es el hecho que la literatura previa no hace alusión al nivel de profundidad de tipo de emprendimiento de trabajo, es decir puede existir una gran idea de negocio, pero con alto contenido de carga laboral medido en términos psíquicos y físicos. Esto es interesante comprender pues puede acelerar un deterioro de la calidad de vida y la retirada del emprendedor mayor de su negocio.

Un tercer hallazgo, es haber comprobado que la acción emprendedora involucrada en la creación, movilización y comercialización de los recursos, hacen que el emprendedor pueda percibir un alto grado de autonomía, valorización propia y expectativas, cuyas implicancias se puede apreciar en tres niveles, esto es a nivel individual, respecto a su función en la sociedad inmediata, en este caso su familia y la del entorno como agente de movilidad económica.

Limitaciones Y Futuras Líneas De Investigación

La principal limitación se encuentra dada la naturaleza de la técnica ocupada como lo es el relato de vida. Esta investigación se encuentra abierta a una amplia gama de diferentes interpretaciones.

Respecto a las futuras líneas de investigación, en primer término, si bien, esta investigación se realizó a una persona y dos integrantes del círculo familiar, se recomienda complementar la investigación con dos o más adulto mayores, con el objetivo de disminuir el grado de subjetividad de las observaciones.

En segundo término, Weber y Schaper (2004) sostienen que los empresarios de mayor edad son predominantemente masculinos. Sería interesante contrastar que sucede con el género femenino.

En tercer término, sería interesante comprender como opera la fe dentro de los emprendedores adultos y como esta puede estar en marcada dentro un sistema de creencia global. Esto es interesante debido a que los países de Latinoamérica no poseen modelos de transcendencia espiritual en comparación con los países del Medio Oriente.

Por último, se sabe que en el envejecimiento la persona atraviesa cambios psicológicos y sociales importantes que pueden hacer que la dinámica cotidiana del adulto se altere (Alvarado et al, 2017), por tanto, los resultados sugieren indagar, si el adulto mayor podría presentar un estado de bienestar mayor en la medida que incursiones en acciones emprendedoras, cuando están sujeta al nivel de riesgo (financiero y operativo), tipo (producto o servicio) y nivel de trabajo (estructura organización) del negocio.

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Factores Que Determinan La Intención De Adoptar El Aprendizaje Electrónico En El Sistema Educativo Superior Como Consecuencia De La Pandemia. Una Aproximación Desde La Teoría Del Comportamiento Planificado TPB

Carlos GALLEGUILLOS

Departamento de Industria y Negocios, Universidad de Atacama, Copiapó, Chile,
carlos.galleguillos@uda.cl

José SILVA

Departamento de Ingeniería Comercial, Universidad de Atacama, Copiapó, Chile
jose.silva@uda.cl

Rubén HURTADO

Departamento de Administración, Universidad de Atacama, Copiapó, Chile
ruben.hurtado@uda.cl

Abstract

La presente investigación tiene como objetivo determinar la intención que puedan adoptar estudiantes de educación superior en el aprendizaje electrónico dentro del contexto de la pandemia COVID19, desde la teoría del comportamiento planificado. Las hipótesis planteadas fueron estructuradas de acuerdo a las dimensiones de actitud, normas subjetivas y el control de comportamiento percibido, modelado estadísticamente a través de ecuaciones estructurales. Se ha encuestado a 266 estudiantes de una universidad pública y acreditada de Chile. Los resultados obtenidos han confirmado parcialmente las hipótesis planteadas debido a que sólo actitud y el control del comportamiento percibido han arrojado influencia hacia la intención de adoptar el aprendizaje electrónico. Los hallazgos deben ser comprendidos de acuerdo a las limitaciones del estudio. Finalmente, se presentan las implicancias y las futuras líneas de investigación.

Palabras clave: Aprendizaje electrónico, Teoría del Comportamiento Planificado, Educación Superior, Pandemia.

Introducción

La pandemia mundial de COVID-19 que ha afectado a la mayoría de las partes del mundo con altas tasas de contagio y mortalidad, ha alterado el quehacer natural de los países (Hadi et al, 2020). Las medidas de control impuestas por las naciones han impactado todos los sectores de la población mediante el congelamiento de sus actividades en forma parcial o total (Seetharaman, 2020), acelerando el cambio y la incorporación de las vías digitales para mantener la comunicación entre los individuos (WFE, 2020).

El sector de educación tales como escuelas, colegios y universidades, no se encuentra apartada a estas acciones. En todo el mundo hay millones de estudiantes afectados por el cierre de las instalaciones de las universidades debido a la pandemia (Chavarría et al, 2020). Así, algunas instituciones han suspendido las clases de tipo tradicionales como medida preventiva para proteger a los estudiantes y profesores, las cuales han sido reemplazadas por plataformas virtuales, no sólo a nivel nacional sino también internacional (Lechner et al, 2020).

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Esto, trasuntó en el uso creciente de la tecnología de la información en la educación superior, pasando rápidamente desde materiales en papel con soporte presencial a materiales electrónicos de soporte en línea, lo que genera una incertidumbre respecto a las consecuencias para la experiencia de aprendizaje de los estudiantes (Ebner et al, 2020). Por esta razón, se hace necesario y factible evaluar el impacto de las innovaciones tecnológicas en cada aspecto del currículum.

Esta adopción asume que el alumno debiera encontrarse en condiciones psicopedagógicas adecuadas para enfrentar los desafíos pedagógicos tradicionales de un semestre académico. Por lo tanto, en el contexto del sistema de aprendizaje electrónico, la aceptación del aprendizaje electrónico por parte de los estudiantes se considera uno de los principales criterios para el éxito del sistema de aprendizaje electrónico (Almaiah et al, 2020).

A pesar que existe un cuerpo importante de investigaciones sobre la relación entre el COVID y los procesos de aprendizajes virtuales, curiosamente, poco se ha indagado del nivel de adopción percibida respecto al proceso de enseñanza y aprendizaje virtual en la educación de la administración, negocio y gestión, ocupando la teoría del comportamiento planificado, en adelante TPB (Ajzen, 1991).

El modelo TPB identifica creencias específicas que pueden influir en la intención de aprender y como consecuencia con su comportamiento futuro del alumno el cual se ve reflejado en su rendimiento. Comprender los factores que influyen en la intención de adoptar el aprendizaje electrónico en tiempo de pandemia ayudará a crear un entorno predictivo que permita establecer estrategias favorables para una mayor adopción, así como ayuda para diseñar, planificar y organizar acciones para promover su aceptación.

En consecuencia, el propósito de esta investigación es establecer los factores que determinan la intención de adoptar el aprendizaje electrónico en el sistema educativo superior como consecuencia de la pandemia.

Breve Revisión De La Literatura

Pandemia COVID19 y el proceso académico

La pandemia se ha intensificado en Latinoamérica en el primer semestre del 2020, traducido en términos de contagios y muertos, amenazando el bienestar general de los seres humanos, afectando a todos los ámbitos de la sociedad. En específico, esta investigación ahonda a la educación superior universitaria. Los actores involucrados como estudiantes, académicos, investigadores, personal de administración no sólo han estado ajenos a dificultades en el quehacer cotidiano ya sea en su docencia, investigación, vinculación y procesos de gestión administrativo, sino también a las necesidades de satisfacer simultáneamente las demandas de estudiantes, padres, y organizaciones vinculadas a la entidad universitaria.

En efecto, los estudiantes universitarios, en un semestre académico normal, son sometidos a cargas psicológicas que se pueden traducir en inseguridades, ansiedad, stress, producto de procesos académicos tradicionales como son los exámenes, trabajos, laboratorios, trabajos de titulación, entre otros. Con la pandemia, probablemente muchos estudiantes deberán adicionar a dichas cargas, la ansiedad de retrasar su egreso y prácticas laborales, pérdida de fuente laboral parcial, disconformidad respecto al proceso, resistencia al cambio, entre otros.

Esta generación de estudiantes universitarios enfrenta un desafío sin precedentes a raíz del brote de COVID-19 como lo es la adopción de un nuevo proceso de enseñanza y aprendizaje denominado aprendizaje electrónico. Esta adopción asume que el alumno se encuentra en condiciones psicológicas adecuadas para enfrentar los desafíos pedagógicos tradicionales de un semestre académico. Sin embargo, esta emergencia de salud pública genera incertidumbre, caos y temor con amplias consecuencias psicológicas clínicas y sociales (Holmes et al, 2020).

En condiciones normales del entorno, el proceso de enseñanza y aprendizaje ha presentado desafíos para los investigadores. En este sentido, no ha sido menor pasar de una educación presencial a una virtual. Existe una amplia investigación sobre educación e-learning, existiendo preocupación con respecto al énfasis percibido en lo pragmático más que en lo teórico (Randall et al, 2010).

Algunos investigadores expresan preocupaciones de que los estudiantes en entornos virtuales tienden a sentirse más confundidos, aislados y frustrados, y como resultado su efectividad de aprendizaje y la satisfacción puede reducirse (Zaborova y Markova, 2016). Sin embargo, otros hallazgos indican que los estudiantes tienden a asociarse fuertemente a la interacción social efectiva con el disfrute del aprendizaje en línea y la efectividad del aprendizaje en línea (Damary et al, 2017). Estos resultados contradictorios demuestran que la efectividad del aprendizaje es un concepto complejo, con múltiples dimensiones y debe evaluarse con múltiples medidas (Markova et al, 2017).

Dado lo anterior, suponemos razonablemente que la efectividad del proceso de enseñanza y aprendizaje está dado por el grado de percepción que tiene el estudiante, el cual incluye sus creencias y aprensiones previas, las cuales podrían predecir el comportamiento frente al proceso tecnológico global presente en la entrega del contenido académico.

En este sentido, determinar los factores que influyen en la intención de adoptar el aprendizaje electrónico ofrece una gran oportunidad de indagación puesto que hoy enfrentamos una variable contextual sin precedentes.

Por tanto, es necesario presentar una teoría que pueda incorporar las características involucrada en el comportamiento con elementos predictores de naturaleza tecnológica. En este sentido, la teoría del comportamiento planificado, TPB, podría ofrecer una guía para comprender el fenómeno en estudio.

Teoría del comportamiento planificado

La TPB es una teoría que explora las actitudes, normas subjetivas y el control del comportamiento percibido (PBC), basado en la estructura de creencia del individuo.

Actitudes

Respecto con las creencias actitudinales de Ajzen (1991), se considera pertinente considerar la ventaja relativa, complejidad y compatibilidad, como variables relacionadas con las decisiones de adopción tecnológica. Esto basado en la estructura de Taylor y Todd (1995).

La ventaja relativa (Rogers, 1983) o utilidad percibida Davis (1989) se refiere al grado en que una innovación proporciona beneficios que reemplazan a los de su precursor y puede incorporar factores tales como beneficios económicos, mejora de la imagen, conveniencia y satisfacción.

La complejidad de (Rogers, 1983) o facilidad de uso (Davis, 1989) representa el grado en que se percibe que una innovación es difícil de entender, aprender u operar.

La compatibilidad (Rogers, 1983) es el grado en que la innovación encaja con los valores existentes del adoptante potencial, las experiencias anteriores y las necesidades actuales.

Normas subjetivas

La norma subjetiva de Ajzen (1991) se encuentra relacionada con la posible divergencia de opinión entre los grupos referentes diferentes desde el punto de vista del uso de la tecnología de información. Por ejemplo, para esta investigación se propone compañeros (otros estudiantes), superiores (profesores) e institución.

Control del comportamiento percibido.

Por último, el control del comportamiento percibido de Ajzen (1991), se refiere a la autoeficacia individual. Desde la perspectiva de la adopción tecnológica según aduce Taylor y Todd (1995) se puede ocupar las limitaciones de recursos externos y las condiciones facilitadoras de recursos y tecnológicas.

Así, desde las proposiciones establecidas en la revisión de la literatura se pueden construir las siguientes hipótesis:

H1: La actitud del alumno influye hacia la intención de adoptar el aprendizaje electrónico.
H2: La norma subjetiva del alumno influye hacia la intención de adoptar el aprendizaje electrónico.
H3: El PBC del alumno influye hacia la intención de adoptar el aprendizaje electrónico.

Luego, el modelo hipotetizado es el que presenta la figura 1.

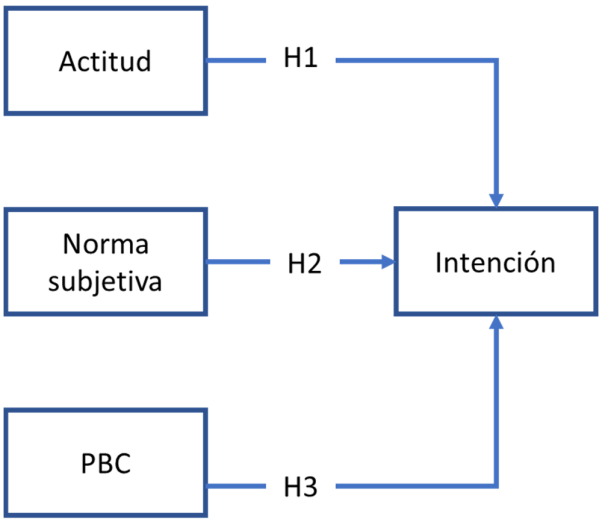

Figura 1: Modelo Hipotetizado

Metodología

Tipo de metodología

La preferencia epistemológica de esta investigación corresponde al modelo hipotético-deductivo.

Tipo de diseño

La investigación presenta un tipo de diseño no experimental, de cohorte transversal, con cuestionario auto-reportado y de unidad de análisis a los estudiantes de pregrado de jornada diurna en una universidad estatal acreditada de Chile.

Población y muestra

La población está conformada por estudiantes de educación superior de una Universidad perteneciente al CRUCH, acreditada, del norte de Chile. Se utilizó una muestra probabilística estratificada por tipo de Facultad con un n = 266 estudiantes.

Procedimiento

El período de toma de muestra fue entre la primera y tercera semana de julio del 2020. La figura 1 presenta las preguntas de la encuesta que fue enviada a través de e-mail a los estudiantes. Esta debió ser completada a través de la plataforma Google Forms.

Las preguntas de la encuesta se adaptaron según la fundamentación de Taylor y Todd (1995). El cuestionario tiene 12 preguntas en las cuales los estudiantes debieron seleccionar una preferencia por pregunta. Esta se detalla en la tabla 1. Para esto, se ha utilizado la escala Likert, donde la puntuación = 1, corresponde a la afirmación "completamente en desacuerdo" y la puntuación = 7, corresponde a la afirmación "completamente de acuerdo".

Tabla 1: Cuestionario a estudiantes de educación superior

ID	Dimensión	Afirmaciones	Fuente
P1	Actitudes	Estoy consciente que el medio tecnológico de aprendizaje ha sido beneficioso para mí.	Adaptación de Taylor y Todd (1995).
P2		Las herramientas utilizadas (moodle, meet, zoom, classroom, entre otras) por la Universidad como medio tecnológico de aprendizaje ha sido compatible con mi forma de trabajar/estudiar/aprender.	
P3		Ha sido fácil aprender a utilizar (moodle, meet, zoom, classroom, entre otras) el medio tecnológico de aprendizaje.	
P4	Normas Subjetivas	Uso el medio tecnológico de aprendizaje por la influencia que ejercen mis compañeros de curso porque ellos consideran que es favorable para mi aprendizaje.	
P5		Uso el medio tecnológico de aprendizaje porque mis profesores creen que es favorable y tiene ventaja para mi aprendizaje.	
P6		Uso el medio tecnológico de aprendizaje porque la institución considera que el medio tiene ventajas para mi aprendizaje.	
P7	PBC	He invertido más tiempo (más del que tradicionalmente ocupo en el proceso tradicional de enseñanza), para aprender a través del medio tecnológico de aprendizaje.	
P8		El costo monetario ha sido alto en imprimir (guías de trabajo, clases, etc) producto del medio tecnológico de aprendizaje.	
P9		Ha sido importante para mí poder contar con un computador cuando lo necesite para acceder al medio tecnológico de aprendizaje.	
P10	Intención	El próximo semestre (espero/quiero/tengo la intención) de participar activamente el medio tecnológico de aprendizaje propuesto por la universidad.	
P11		El próximo semestre (espero/quiero/tengo la intención) de complementar las acciones propuesta por el medio tecnológico de aprendizaje propuesto por la universidad.	
P12		El próximo semestre (espero/quiero/tengo la intención) de promover mejoras al medio tecnológico de aprendizaje propuesto por la universidad.	

Modelo Conceptual

El modelo conceptual propuesto contiene los factores que determinan la intención de adoptar el aprendizaje electrónico en el sistema educativo superior como consecuencia de la pandemia desde la teoría del comportamiento planificado. Así, la variable endógena queda determinada por (η_1 = intención) y las exógenas por (ξ_1 = actitud), (ξ_2 = norma subjetiva) y (ξ_3 = percepción de control de comportamiento).

Además, entre las variables observadas de carácter exógenas se encuentran (□□□= utilidad percibida), (□□□= compatibilidad), (□□□= facilidad de uso), (□□□= compañeros), (□□□= profesores), (□□□= institución), (□□□= autoeficacia), (□□□= condiciones de facilitación tecnológica), (□□□= condiciones de facilitación de recurso). Por último, se tiene que las relaciones entre las variables independientes y dependientes las cuales están determinadas por □□□ (Actitud-Intención), γ_2 (Norma subjetiva-Intención), γ_3 (Percepción de control de comportamiento - Intención).

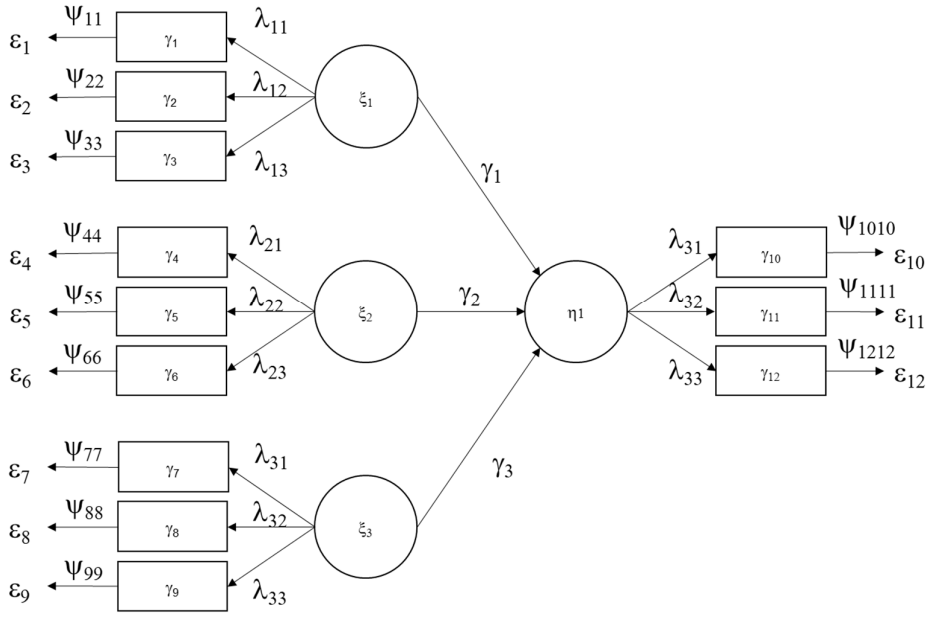

Figura 2: Modelo de ecuación estructural general hipotético

Luego, si la matriz de varianza / covarianza estimada por el modelo, no es significativamente diferente de la matriz de covarianza de datos observados, S, entonces se tiene que el modelo se ajusta a los datos bien, y se acepta la hipótesis nula es decir el modelo apoya la plausibilidad de relaciones postuladas entre las variables, de lo contrario, el modelo no se ajusta a los datos, y la hipótesis nula debe rechazarse (Wang y Wang, 2019).

Resultados

Estadística Descriptiva

La tabla 2 presenta un resumen de las principales estadísticas descriptivas de la muestra. Se indica que un 57,14% corresponde al género femenino y un 42,86% al masculino. Si se considera la Facultad de procedencia, se ilustra lo siguiente: 8,27% pertenece a la Facultad de Ciencias Jurídicas y Sociales, 13,90% a la Facultad de Ciencias de la Salud, 1,50% a Medicina, 12,40% a Humanidades y Educación, 45,86% a Ciencias de la Ingeniería, 13,53% a la Facultad Tecnológica y 4,54% a la Sede

de Vallenar. Así mismo, se expresa en la tabla 3 los resultados de género por nivel y la tabla 4 que muestra los resultados descriptivos de cada Facultad por nivel.

Tabla 2: Resultados descriptivos de la muestra por Facultad

Facultad	Femenino	Masculino	Total
Cs. Jurídicas y Sociales	16	6	22
Cs. de la Salud	30	7	37
Medicina	1	3	4
Humanidades y Educación	21	11	33
Cs. de la Ingeniería	62	60	122
Tecnológica	15	21	36
Sede Vallenar	7	6	13
Total	152	114	266

Tabla 3: Resultados descriptivos de género por nivel

Género	1°Año	2°Año	3°Año	4°Año	5°Año	6°Año	Total
Femenino	42	43	27	28	9	3	152
Masculino	32	35	16	13	11	7	114
Total	74	78	43	41	20	10	266

Tabla 4: Resultados descriptivos de cada Facultad por nivel

Facultad	1°Año	2°Año	3°Año	4°Año	5°Año	6°Año	Total
Cs. Jurídicas y Sociales	8	9	1	4	0	0	22
Cs. de la Salud	9	8	9	10	1	0	37
Medicina	3	0	1	0	0	0	4
Humanidades y Educación	7	5	5	11	4	0	32
Cs. de la Ingeniería	29	34	19	15	15	10	122
Tecnológica	10	17	8	1	0	0	36
Sede Vallenar	8	5	0	0	0	0	13
Total	74	78	43	41	20	10	266

La tabla 5 presenta un resumen de los resultados descriptivos de la encuesta en cada una de las preguntas asociadas a los constructos evaluados. Se ilustra que en general, los estudiantes tienen una evaluación moderadamente alta en todos los ítems que miden la actitud (A), las normas subjetivas (NS) y el control del comportamiento percibido (PBC) con respecto al aprendizaje electrónico como consecuencia de la pandemia. Se destaca el hecho que la pregunta 3 (A) tiene un promedio mayor a 5. Por otro lado, la pregunta 4 (NS) tiene una valoración menor a 3.

Tabla 5: Resultados descriptivos encuesta

Variable	Obs	Mean	SD	Mín	Máx	Carga Factorial	Conbrach Alpha
P1	266	4,003	1,896	1	7	0,6907	0,8331
P2	266	3,661	2,077	1	7	0,8156	
P3	266	3,981	1,956	1	7	0,7613	
P4	266	2,849	1,711	1	7	0,4329	0,8176
P5	266	3,650	1,871	1	7	0,5633	

P6	266	3,924	2,035	1	7	0,5191	
P7	266	5,428	1,864	1	7	-0,2717	0,3716
P8	266	5,086	2,064	1	7	-0,2164	
P9	266	6,511	1,032	1	7	0,2083	

Además, la tabla 5 informa sobre las cargas factoriales que explica el 60% de la varianza total de los datos. Así mismo, se determina la validez del instrumento mediante el Alfa de Cronbach. Ésta, indica valores mayores o iguales a 0,8176 corroborando la confiabilidad del constructo en la muestra de investigación (a excepción de las preguntas 7, 8 y 9, con un valor de Alpha Cronbach de 0,3716).

Modelo de ecuaciones estructurales

El modelo de ecuaciones estructurales probó las hipótesis en el marco de investigación mediante análisis de regresión. La figura 3 muestra los caminos, coeficientes y varianzas explicadas para el modelo.

Así, el camino desde la actitud hacia la intención fue significativo (b = ,96, z = 6,39, p > 0,05), apoyando H1. Luego, la relación entre desde la norma subjetiva hacia la intención no fue significativo (b = ,18, z = 1,55, p < 0,05), no apoyando H2. Por último, la relación ente el PBC y la intención presentó un efecto positivo (b = ,4, z = 2,10, p > 0.05), apoyando H3.

Luego, se reportan los parámetros del modelo de ecuaciones estructurales ajustado, a saber, $\chi 2$ (Chi cuadrado), CFI (Comparative fit index), TLI (Tucker-Lewis index), AIC (Akaike´s information criterion), BIC (Bayesian information criterion), RMSEA (Root mean scuared error of approximation), SRMR (Standardized root mean squared residual) y CD (Coefficient of determination). Se calculó el ajuste del modelo propuesto. Los resultados del ensayo del modelo indicaron un ajuste aceptable: $\chi 2$ (48, N = 266) = 80,590, CFI = 0.976, TLI = 0,967, AIC = 11.684, BIC = 11.834, RMSEA = 0.051 [90% IC: 0.003 / 0.069], SRMR = 0,049 y CD =0,994.

Por último, se presenta en la figura 3 el *path* modelo de ecuaciones estructurales en el que se aprecia que el camino más fuerte para llegar a la intención es la actitud, el cual es seguido por el PBC.

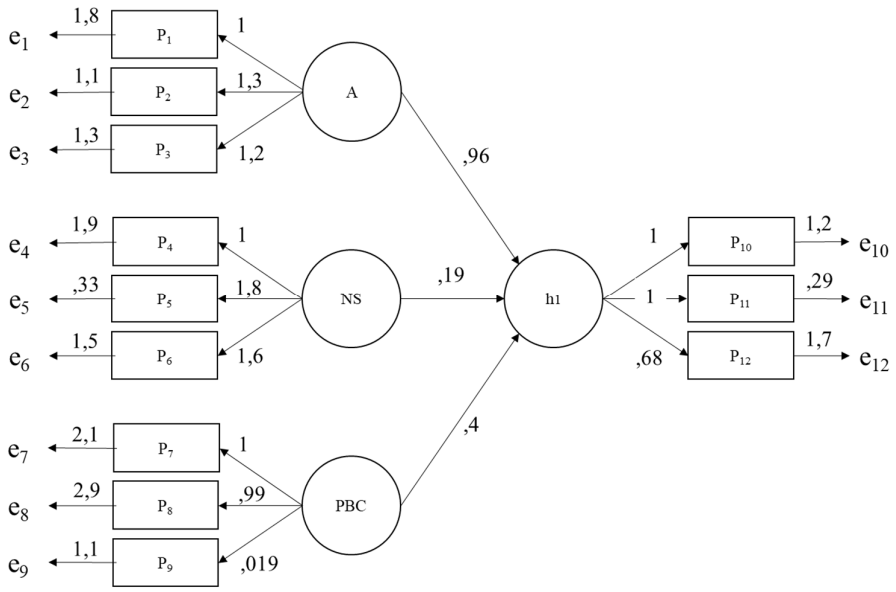

Figura 3: Modelo Conceptual Aplicado

Así, la figura 3 muestra gráficamente los resultados del modelo de ecuación estructural para la muestra de estudiantes de pregrado. Se verifican las relaciones existentes entre las variables latentes y las observables. En ella se evidencian 12 variables observadas, así también 78 elementos conocidos en la matriz de covarianza (12 x [12+1])/2 = 78) y 66 grados de libertad (78 - 12 = 66).

Discusión

Se logra determinar los factores que influyen en la intención de adoptar el aprendizaje electrónico en el sistema educativo superior como consecuencia de la pandemia. Los resultados del modelo de adopción de aprendizaje electrónico propuesto sugieren que los estudiantes pueden ser capaces de adoptar la tecnología como aprendizaje electrónico total. Esto es similar a los resultados presentados por Chu y Chen (2016).

Los hallazgos apoyan parcialmente la TPB, esto es que sólo dos variables independientes, la actitud y la PBC, explican la influencia hacia la intención de adoptar el aprendizaje electrónico. Además, permite sugerir que el camino más fuerte hacia la intención es la actitud seguido de la PBC. Estos resultados son consistentes respecto a los valores de referencia de Liaw (2008).

En el caso de la norma subjetiva, ésta presenta cifras no significativas. Esto ha sido frecuente en investigaciones de carácter indirectos de los autores, probablemente se deba a que esta generación, los nacidos en el año 2000 y que hoy se encuentran en la universidad, sean poco influenciables por el entorno social. No obstante, este hallazgo es inconsistente con la investigación de Valencia et al (2016).

El modelo de ecuaciones estructurales presenta un ajuste adecuado según los criterios informados por Schumacker y Lomax (2004), esto quiere decir que la especificación hipotética previa determina relaciones apropiadas entre las variables. No obstante, el modelo fue modificado a través de las covarianzas de las variables independientes, el cual es aceptado por la literatura previa (Azjen, 1991).

Los hallazgos encontrados permiten demostrar una aparente preferencia sobre la educación no presencial. Esto quiere decir, que al parecer no existe una brecha desde la perspectiva de las competencias y uso de las plataformas digitales de los estudiantes.

Desde la perspectiva de las implicancias prácticas, la pandemia ha requerido, en un futuro cercano, que las universidades identifiquen y busquen reemplazos digitales para ejecutar sus actividades académicas con mínimo contacto físico y de forma segura.

Así mismo, los resultados permiten proyectar la importancia de la capacidad de gestión y liderazgo de los directivos superiores universitarios para mitigar el impacto de la pandemia y a su vez, para promover nuevos proyectos que habiliten el desarrollo de un proceso de aprendizaje no vulnerable que enfrente cualquier tipo de desafío futuro. Por ejemplo, la promoción de un campus virtual, inclusivo, seguro y accesible.

Respecto con las limitaciones del trabajo, se tiene las de orden teórico. En este caso se tiene que en la literatura existen numerosos estudios que utilizan distintos modelos para evaluar la adopción de e-learning en estudiantes, como por ejemplo el TAM de Davis (1989) y la teoría despuesta del comportamiento planificado de Taylor y Todd (1995).

Las limitaciones de orden metodológico reflejan que en este caso, los datos obtenidos son de cohorte transversal lo que inhabilita la predicción. La muestra es de carácter regional, es decir sólo una universidad a lo largo del territorio nacional. El formulario es de auto-reporte, así mismo el instrumento no realiza preguntas sobre el comportamiento, pues los estudiantes aún se encontraban en período lectivo. Esto último, es interesante puesto que la evidencia previa sugieren un efecto significativo de la intención sobre el comportamiento (Pedersen y Nysveen, 2002; Lee, 2006).

Así también no queda claro, la brecha en las competencias, acceso y uso de los académicos en el contexto de pandemia. Esto es relevante pues son parte importante del proceso de enseñanza y aprendizaje que involucra al estudiante, por lo cual debieran ser parte de la discusión.

Por consiguiente, algunas líneas de investigación futuras son profundizar sobre los factores que determinan la brecha de adopción de la tecnología entre los académicos de las universidades y su impacto en los estudiantes. Además, de dar respuestas a las limitaciones teóricas y metodológicas presentes en esta investigación. Esto podría significar en ampliar la muestra y determinar el impacto en el aprendizaje final de los estudiantes post pandemia.

Conclusiones

Como conclusión relevante, se establece que los factores como la actitud y PBC determinan la intención de adoptar el aprendizaje electrónico en el sistema educativo superior como consecuencia de la pandemia, donde la actitud tiene la magnitud más alta para llegar a la intención.

La teoría del comportamiento planificado es parcialmente verificada, esto debido a que la norma subjetiva no presenta niveles de significancia estadística aceptable.

El modelo de ecuaciones estructurales ajustado presenta valores aceptables.

La investigación presenta limitaciones en cuanto a su diseño metodológico por lo cual se sugiere contrastar en futuras investigaciones.

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Energy, Entropy, Exergy (3E) Analysis of a Micro-Cogeneration Unit Using an Alpha Type Stirling Engine

Cătălina DOBRE
University Politehnica of Bucharest, Department of Thermotechnics, Engines, Thermal and Refrigerating Equipment's, 060042, Bucharest, Romania. E-mail: catalina.dobre@upb.ro

Mihaela CONSTANTIN*
University Politehnica of Bucharest, Department of Thermotechnics, Engines, Thermal and Refrigerating Equipment's, 060042, Bucharest, Romania. E-mail: i.mihaelaconstantin@gmail.com

Daniel TABAN
University Politehnica of Bucharest, Department of Thermotechnics, Engines, Thermal and Refrigerating Equipment's, 060042, Bucharest, Romania. E-mail: tabandaniel@yahoo.com

Maria DRAGOMIR
University Politehnica of Bucharest, Faculty of Biotechnical Systems Engineering, 060042, Bucharest, Romania. E-mail: maria_prunau@yahoo.com

Abstract

In this paper, exergy analysis is used to evaluate the performance of a micro-cogeneration unit using an alpha type Stirling engine. Exergetic efficiency is calculated for the whole system according to the second law of thermodynamics. Exergy analysis of each sub-system leads to the choice of the optimum physical parameters for minimum local exergy destruction ratios.Power generation, thermal efficiency and exergetic efficiency are used as successive objective functions. The best distribution of heat exchanger area is found by the optimization of each objective function. Energy, entropy and exergy balance are used for a control volume, assuming a steady-state operation of the engine, in order to deduce the overall irreversibility of the heat exchangers. Energetic, entropic and exergetic analyses are also presented for the whole system, taking into account the limiting physical constraints such as the maximum pressure and volume of the Stirling engine, imperfect heat exchangers, limited heat capacity of the source and the sink (temperature variation of each external fluid during heat transfer) and imperfect internal heat restitution in the regenerator. Hence, an endo- and exo-irreversible Stirling engine cycle is considered and optimized according to several performance criteria: energetic and exergetic. Functional diagrams are proposed in order to show internal and external irreversibility's (destroyed exergy flow and entropy flow generation) and to represent graphically entropy and exergy balance. The models developed in this work allow us to optimize the engine operation according to four criteria: maximum power, maximum thermal efficiency and maximum exergetic efficiency.

Keywords: Micro-Cogeneration, Exergy, Exergetic Efficiency, Stirling Engine.

Introduction

In the current energy economy context many studies focus on renewable energies use and evaluation of lost energies. Therefore, the Stirling engine draws attention of the researchers for its many advantages: strong potential of energy conversion, environmental-friendliness, quietness and great adaptability to any type of heat source.

The study of the Stirling engine presents great complexity due to the oscillatory character of the working fluid evolutions. Stirling engines present many features which are recommended for the micro-cogeneration applications. They have a remarkable energetic efficiency, a noiseless operation and require maintenance at long intervals, having a long lifetime and a great adaptability to any type

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of heat source. However, Stirling engines require efficient cooling in order to operate correctly. This last characteristic was explored by the studied micro-cogeneration unit, and the engine can provide simultaneously heat water and electricity. Cold water, which is the cooling liquid for the engine, is heated in the cooling process of the engine and used afterwards by the central heat system of the house. Theoretical thermodynamic models and predictions of the performances of Stirling engines have already been proposed in the literature with various assumptions. There are three modeling levels of Stirling engines. The ideal analysis in Grosu, L., Rochelle, P., Martaj, N., (2012) (of the first order) predicts the ideal theoretical performances of an engine with a nil or unlimited convective heat transfer coefficient. The uncoupled analysis in Hosseinzade, H., Sayyaadi, H., (2015) (of the second order) takes the results of the ideal analysis and corrects them, taking into account a certain number of finite coefficients and losses in the engine (Hosseinzade, H., Sayyaadi, H., Babaelahi, M., (2015)). The coupled analysis (of the third order) is based on a fine discretization of the engine in various control volumes, taking into account all the main losses. In this paper, an advanced first order model is presented in Petrescu, S., et al., (2012). Power generation, thermal efficiency, entropy generation and exergetic efficiency are used as successive objective functions.

Finite Speed Thermodynamics (FST) (Petrescu, S., et al., (2003)) and Finite Physical Dimensions Thermodynamics (FPDT) (Rochelle, P., Grosu, L., (2011)) are two 0-D analytical methods usually used to simulate and to optimize the Stirling engine operation with limited time calculation.

The Direct Method (Petrescu, S., et al., (2002)) from Finite Speed Thermodynamics has been used in order to study classical Stirling engines in Grosu, L., Dobre, C., Petrescu, S., (2015), solar Stirling engines in Petrescu, S., et al., (2010), Stirling refrigeration and Stirling heat pumps in Grosu, L., et al., (2012), Otto cycle in Petrescu, S., et al., (2008), Diesel cycle in Petrescu, S., et al., (2009), Carnot cycle in Petrescu, S., et al., (2012) and Otto–Stirling hybrid cycle in McGovern, J., et al., (2010). For 12 of the most performing Stirling engines (working in 16 regimes of operation), for 4 (the most performing) solar Stirling engines and for a refrigeration Stirling machine (Petre, C., (2007)), the authors have validated the developed schemes of computation based on the Direct Method.

If in the FST method, the main parameter of the model is the working gas speed which is considered as a finite parameter, in the FPDT method, physical dimensions are considered as finite such as heat transfer area and working piston speed, which are more appropriate for an engineer point of view. Petrescu, S., et al., (2015) have proposed a possible view to unify the FST method and FPDT method.

Mathematical Model

In the present study the Stirling engine performances are analyzed by introducing external irreversibility's of heat transfer with finite temperature difference. In addition, calculation takes into account internal irreversibility's due to the incomplete regeneration of heat in the regenerator, which are related and determined function of the finite speed of the process cycle (piston speed or engine speed).

In this way, the detailed analysis of the processes with finite speed in the regenerator, coupled with the First Law of Thermodynamic carry out to an analytical expression for the regenerative losses' coefficient, X.

The Stirling engine cycle is studied here, assuming limited heat exchanger areas, finite heat transfer coefficients and a defined rotation frequency, which induces speed-dependent fluid flows and time-dependent processes.

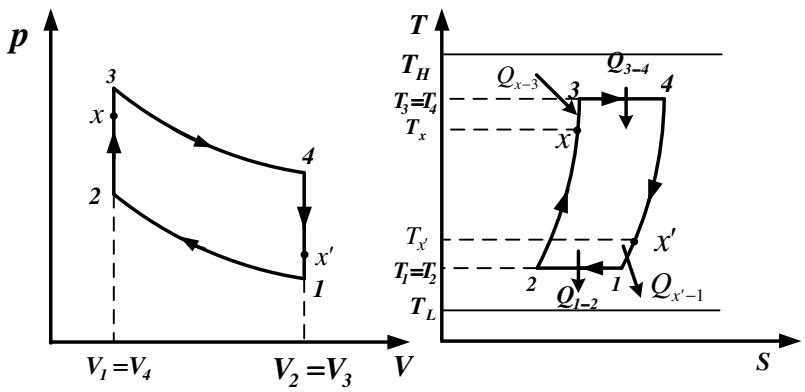

Fig 1: p-V and T-S diagram of an endo- and exoirreversible Stirling cycle

Assumptions:

- The temperature differences between the external fluid and the working gas (ideally isothermal) along processes 3-4 and processes 1-2 are constants;
- Temperature variation of each external fluid during heat transfer (limited heat capacity);
- Imperfect heat exchangers, with respective η_h and η_l effectiveness but assumed to be perfectly insulated ($\eta_h = \eta_l = 1$);
- Imperfect internal heat restitution in the regenerator with a regenerator efficiency <1;
- The working gas is an ideal gas.

In the following expressions of the model, energies and powers are considered as positive and index "g" is used throughout for the working gas. The model assumptions related to the processes, heat flows and temperatures pointed out on Fig. 1. This model is applied to a Stirling engine used for domestic micro-cogeneration, presented on fig 2. The used engine is an alpha type Stirling engine with four double effect pistons. The complex geometry of the heat exchangers was determined by optical measurements. In a previous work (Grosu, L., Dobre, C., Petrescu, S., (2015)) authors have compared results of three thermodynamic models: Direct Method from Finite Speed Thermodynamics (FST), isothermal model (Schmidt) and adiabatic model (Finkelstein) and have confronted them to experiment.

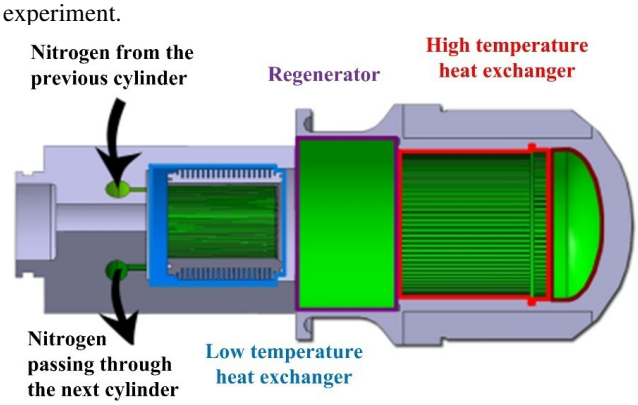

Fig. 2: General scheme of the engine and section of three heat exchangers around a piston.

Engine Energy Analysis

The difference between the efficiency of a real engine and that of an idealized Stirling cycle operating between the same temperature limits is due principally to the heat transfer losses that occur in the regenerative processes.

The analyzed Stirling engine regenerator is composed of several vertical meshes (Fig. 3). The relationships validated for 12 Stirling engines in Petrescu, S., et al., (2012), with horizontally meshes at the regenerator, are based on a formula for the pressure losses depending of the piston speed, deducted by Petrescu, S., et al., (2010), from an Organ's graphic (Organ, AJ., (1992)). This graphic is based on hundreds of experiments for the gas flow through the horizontally meshes. In Grosu, L., Dobre, C., Petrescu, S., (2015), the authors established equivalence assumptions of the two types of regenerator, from the point of view of fluid flow through the regenerator, as well as the analysis of the adjustment parameters, the calculation of the regenerator mass, its heat exchanger surface, and the equivalent number of meshes.

The coefficient of regenerative losses, X, introduced by Feidt, M, (1996), is the term that includes all of the losses due to the incomplete heat transfer in the regenerator. An analysis to calculate these losses has been made by Petrescu et al. (2012). This coefficient clearly depend on a large number of parameters and variables: piston speed w_p, cylinder dimensions (diameter D_C and length L), properties of the solid porous material in the regenerator (density ρ_r, specific heat c_r), dimensions of the screens (d, b, N), gas properties (density ρ_g, specific heat c_p, γ, r) and the range of operating conditions ($\varepsilon = V_{\max}/V_{\min}$, $\tau = \frac{T_h}{T_l}$, T_m, p_m).

The other values involved in the above relations are evaluated, taking into account the average values of gas pressure and temperature in the cycle.

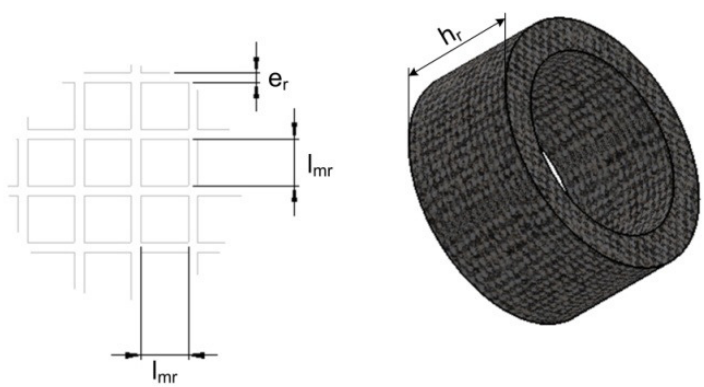

Fig. 3: The regenerator scheme

where:

h_r- is the height of regenerator;
l_{mr}- is the width of one mesh screen;
e_r- is the thickness of a metal wire from the mesh.
Based on Feidt, M, (1996), an equation for *X* that includes the effect of these parameters has been evaluated in Petrescu, S., et al., (2012) using First Law and Heat Transfer Laws. This analysis of these losses produced differential equations that were then integrated. The integration of the equations was based on either a lumped system analysis from Petrescu, S., et al., (2012), which gives

relatively unfavorable results, X_1, or on a linear distribution of the temperature in the regenerator matrix and gas, which gives relatively favorable results, X_2. The resulting expression for X is:

$$X = X_1 + (1-y)X_2 \quad (1)$$

where:

$$X_1 = \frac{1+2M+e^{-B}}{2(1+M)}, \qquad X_2 = \frac{M+e^{-B}}{1+M}, \qquad M = \frac{m_g c_{v,g}}{m_r c_r} \qquad \text{and} \qquad B = (1+M)\frac{hA_R}{m_g c_{v,g}}\frac{S}{w_p}$$

The value of y has been determined from experimental data of 12 of the most performing operating Stirling engines in Petrescu, S., et al., (2012). Setting $y = 0.72$, provided the best fit between analytical results and experimental ones, so this value is used as an adjusting coefficient in the theoretical analysis. Organ, AJ., (1992) makes a remarkable analysis of the different methods for treatment of the details of Stirling engines. Petrescu, S., et al., (2012) obtained from Organ's graphic in Organ, AJ., (1992) (based on hundreds of experiments for the gas flow through the horizontally meshes) the expression of the convective heat transfer coefficient in a porous medium h which depends on a large number of parameters and variables: Prandtl number (Pr) of the gas passing through the regenerator screens, regenerator dimensions (diameter D_{ech}) properties of the material in the regenerator (specific heat at constant pressure $c_p(T_m)$, specific constant r), dimensions of the screens (d, b), gas properties (kinematics viscosity at constant temperature $\nu(T_m)$, and the range of operating conditions (T_m, p_m).

The convection coefficient h is computed as:

$$h = \frac{0.395\left(\frac{4p_m}{rT_l}\right)w_g^{0.424}c_p(T_m)\nu(T_m)^{0.576}}{(1+\tau)\left[1-\frac{\pi}{4\left(\frac{e_r}{l_{mr}}+1\right)}\right]D_{ech}^{0.576}\,\mathrm{Pr}^{2/3}} \quad (2)$$

where the gas speed in the regenerator w_g is computed with:

$$w_g = \frac{A_p w_p}{A_R} \quad (3)$$

By expressing all these parameters as a function of the piston speed w_p, the engine rotational speed n is introduced in the model:

$$w_p = \frac{2nS}{60} \quad (4)$$

The values for the heat exchangers volumes (hot, cold and regenerator volume) and also the dead compression volume and the dead expansion volume are obtained from the experimental measurements, and used to calculate the V_{max} and V_{min} for the cycle.
The minimum pressure of the engine is calculated taking into account the characteristics data of the engine.

$$p_{\min} = \frac{m_g r T_l}{V_{\max}} \quad (5)$$

In addition,

$$m_g = \frac{p_{\max} V_{\min}}{r T_h} \quad (6)$$

In the regenerator, the temperature difference between hot and cold flows is assumed to be constant at each point of the device (Fig. 4).

As regeneration is assumed to be imperfect, the gas temperature history remains the same but the storage/clearance is incomplete and a part of regeneration heat must be continuously compensated by

a supplement of heat $\dot{Q}_{p.R}$ provided by the hot source for each cycle (Grosu, L., Rochelle, P., Martaj, N., (2012)).

$$\dot{Q}_{p.R} = (1-\eta_R)\dot{Q}_{R_T} \tag{7}$$

where $\dot{Q}_{R_T} = \dot{m}_g c_v (T_h - T_l)$ and $\eta_R = 1 - X$.

The heat flow rate on the regenerator, the hot-end and the cold-end heat exchangers can be expressed as follows:

$$\dot{Q}_R = h_R A_R (T_{x'} - T_l) = \dot{m}_g c_v \eta_R (T_h - T_l) = \dot{m}_g c_v (T_h - T_{x'}) \tag{8}$$

$$\dot{Q}_h = h_h A_h \Delta T_{\log}^h = \eta_h \dot{m}_H c_p (T_H^{in} - T_h) = \dot{m}_H c_p (T_H^{in} - T_H^{out}) \tag{9}$$

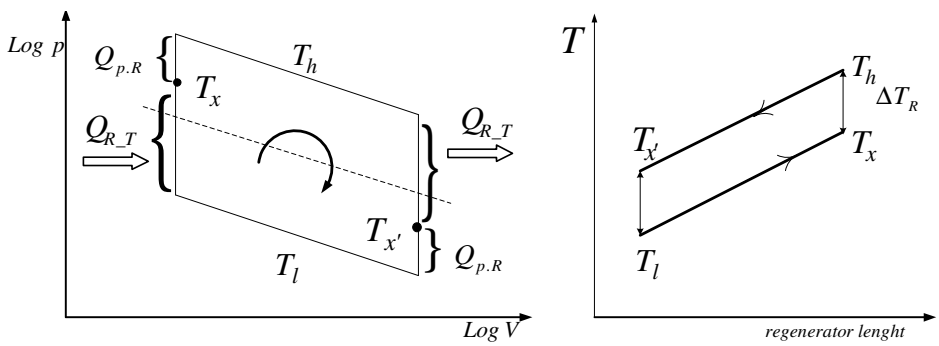

Fig 4. Temperature differences in the regenerator

where $\Delta T_{\log}^h = \dfrac{T_H^{in} - T_H^{out}}{\ln \dfrac{T_H^{in} - T_h}{T_H^{out} - T_h}}$ is the mean logarithmic temperature on the hot-end heat exchanger

and $\eta_h = \dfrac{T_H^{in} - T_H^{out}}{T_H^{in} - T_h}$ - the hot-end heat exchanger effectiveness.

$$\dot{Q}_l = h_l A_l \Delta T_{\log}^l = \eta_l \dot{m}_L c_p (T_l - T_L^{in}) = \dot{m}_L c_p (T_L^{out} - T_L^{in})$$

where:

$\Delta T_{\log}^l = \dfrac{T_L^{out} - T_L^{in}}{\ln \dfrac{T_l - T_L^{in}}{T_l - T_L^{out}}}$ is the mean logarithmic temperature on the cold-end heat exchanger and

$\eta_l = \dfrac{T_L^{out} - T_L^{in}}{T_l - T_L^{in}}$ - is the cold- end heat exchanger effectiveness.

The overall heat flows delivered by the hot source and respectively received by the heat sink are:

$$\dot{Q}_h = \dot{Q}_{3-4} + \dot{Q}_{p.R} = \dot{m}_g r T_h \left[\ln \varepsilon + \frac{X}{(\gamma - 1)} \left(1 - \frac{T_l}{T_h} \right) \right] \tag{10}$$

$$\dot{Q}_l = \dot{Q}_{1-2} + \dot{Q}_{p.R} = \dot{m}_g r T_l \ln \varepsilon + X \dot{m}_g c_v (T_h - T_l) \tag{11}$$

The energy balance of the cycle leads to the calculation of the engine power:

$$\dot{W} = \dot{Q}_h - \dot{Q}_l = \dot{m}_g r (T_h - T_l) \ln \varepsilon = n \frac{p_{\max} V_{\max}}{\varepsilon} \left(1 - \frac{T_l}{T_h} \right) \ln \varepsilon \tag{12}$$

with: $\dot{m}_g = m_g \cdot n$ and $\varepsilon = \frac{V_{\max}}{V_{\min}}$.

Thus, the thermal efficiency depends on the parameter X:

$$\eta_{th} = \frac{\left(1 - \frac{T_l}{T_h}\right)\ln\varepsilon}{\ln\varepsilon + \left(\frac{X}{\gamma - 1}\right)\left(1 - \frac{T_l}{T_h}\right)} \tag{13}$$

Engine Entropy Analysis

The different entropy flows associated to the heat transfer on the heat source and heat sink, as well as the internal entropy generation is presented on a entropy flow diagram (Fig. 5).

The entropy balance leads to the expression of the internal entropy generation due to the irreversibility in the regenerator.

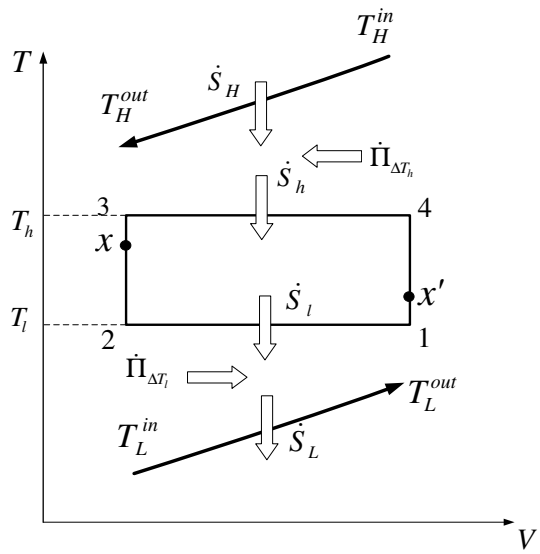

Fig 5. *T-V* diagram of the Stirling engine.

$$\dot{S}_l - \dot{S}_h = \dot{\Pi}_{\Delta T_R} \tag{14}$$

This expression may also be obtained by the entropy balance in the regenerator:

$$\dot{\Pi}_{\Delta T_R} = \dot{S}_{2-x} - \dot{S}_{4-x'} \tag{15}$$

The entropy flow received by the working gas in the hot-end heat exchanger is the entropy flow delivered by the source added to the entropy generation flow due to the temperature between the two fluids.

$$\dot{S}_h = \dot{S}_H + \dot{\Pi}_{\Delta T_h} \tag{16}$$

In the cold heat exchanger, as well, the entropy delivered by the working gas is:

$$\dot{S}_l = \dot{S}_L - \dot{\Pi}_{\Delta T_l} \tag{17}$$

Thus, the engine overall energy balance takes external and internal irreversibilities into account:

$$\dot{S}_L - \dot{S}_H = \dot{\Pi}_{\Delta T_l} + \dot{\Pi}_{\Delta T_H} + \dot{\Pi}_{\Delta T_R} \tag{18}$$

1.3. Engine exergy analysis

The exergy flows associated to the heat exchanged by the working gas with the hot source Q_h and the cold sink Q_l are shown in the fig. 6, at different temperatures: T_h and T_H^m for the source and T_l and T_L^m for the sink, respectively.

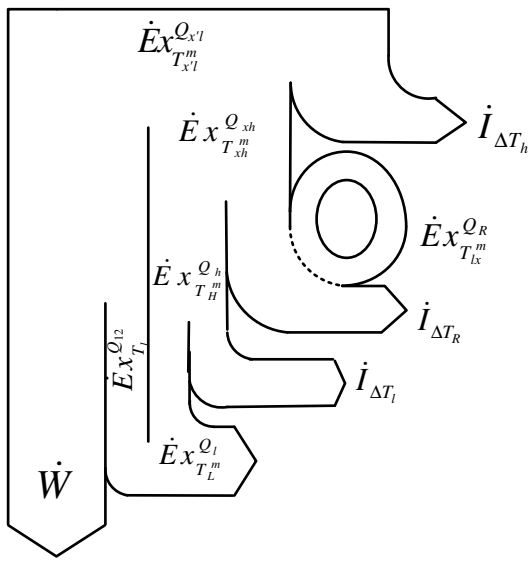

Fig 6. Stirling energy flow diagram

The irreversibilities due to the heat transfer under finite temperature differences, lead to the exergy losses: $\dot{I}_{\Delta T_h}$, $\dot{I}_{\Delta T_l}$ and $\dot{I}_{\Delta T_R}$.

The overall engine exergy balance is:

$$\dot{I}_l = \left|\dot{E}x^{Q_l}_{T_l}\right| - \left|\dot{E}x^{Q_L}_{T^m_L}\right| = \dot{E}x_l^{lost} \tag{19}$$

$$\dot{E}x^{Q_l}_{T^m_L} + \dot{E}x^{Q_h}_{T^m_H} + \dot{W} - T_0\dot{\Pi}_{\Delta T_R} - T_0\dot{\Pi}_{\Delta T_l} - T_0\dot{\Pi}_{\Delta T_h} = 0 \tag{20}$$

or:

$$\dot{E}x^{Q_{34}}_{T_h} + \dot{E}x^{Q_{12}}_{T_l} + \dot{E}x^{Q_{xh}}_{T^m_{xh}} + \dot{E}x^{Q_{x'l}}_{T^m_{x'l}} + \dot{W} - T_0\dot{\Pi}_{\Delta T_R} = 0 \tag{21}$$

with:

$\dot{E}x^{Q_{xh}}_{T^m_{xh}} = \left(1 - \frac{T_0}{T^m_{xh}}\right)\dot{Q}_{xh}$; $\dot{E}x^{Q_{x'l}}_{T^m_{x'l}} = \left(1 - \frac{T_0}{T^m_{x'l}}\right)\dot{Q}_{x'l}$; $\dot{E}x^{Q_{12}}_{T_l} = \left(1 - \frac{T_0}{T_l}\right)\dot{Q}_{12}$; $\dot{E}x^{Q_{34}}_{T_h} = \left(1 - \frac{T_0}{T_h}\right)\dot{Q}_{34}$ and $\dot{\Pi}_{\Delta T_R} = \left|\dot{E}x^{Q_R}_{T^m_{hx'}}\right| - \left|\dot{E}x^{Q_R}_{T^m_{lx}}\right|$.

It results:

$$\dot{E}x^{Q_{34}}_{T_h} + \dot{E}x^{Q_{12}}_{T_l} + \dot{W} = 0 \tag{22}$$

Hence, the exergetic efficiency is:

$$\eta_{ex} = \frac{\dot{W}}{\dot{E}x^{Q_h}_{T^m_H}} = \frac{\dot{E}x^{Q_{34}}_{T_h} - \dot{E}x^{Q_{12}}_{T_l}}{\dot{E}x^{Q_h}_{T^m_H}} \tag{23}$$

Results and Discussion

Geometrical dimensions calculated in Grosu, L., Dobre, C., Petrescu, S., (2015) were used to supply the mathematical model. The simulation results are compared with experimental one published in De

Paepe, et al., (2006). External Stirling parameters are measured: electrical power, external water temperature, water mass flow rate and combustion heat flow rate. T_k and T_l are not measured on this bench test as their values were chosen according to a previous simulation model (Clucas, DM., Raine, JK., (1994)).

Table 1: Geometrical and functional engine parameters

p_{max}[bar]	$V_{max}\cdot 10^4$ [m^3]	$V_{min}\cdot 10^4$ [m^3]
30	2.07	1.45
A_h[m^2]	A_l [m^2]	A_R [m^2]
$21112.37\cdot 10^{-6}$	$1590.43\cdot 10^{-4}$	0.00119

For the optimisation the parameters established are: p_{max}, V_{max}, T_H^{in} , T_L^{in} ,ε, η_h, η_l, X; the independent variable A_h,A_l, n; the dependent variables: T_h, T_l.

Table 2: Central parameters

T_H^{in} [K]	T_L^{in} [K]	$\eta_h = \eta_l$
2000	313	0.8

An equality constraint is imposed on the total heat exchanger area: $A_T = A_h + A_l$.

From fig. 7-9, the existence of optimal values of the area ratio for engine is obvious. With the parameters used for this application, the equipartition of heat exchanger areas is near optimal for the three chosen criteria, especially concerning power and thermal efficiency.

The engine rotation frequency has a noticeable influence on power, which increases with frequency, and a slight influence on thermal and exergetic efficiencies, which decrease with an increase in speed. For the improvement of the proposed analytical model, one also has to consider, among other things, the aerodynamic and mechanical losses in the energy and exergy balances - losses which reduce power and efficiency.

This figure highlights and justifies the choice of the engine constructer referring on engine speed n=25 rot/s. The chosen option is a compromise in terms of power and mechanical efficiency values. It can be observed that, in order to have a greater mechanical efficiency at the expense of the power supplied. The higher rotational speed is, the higher mechanical power is (fig. 7), but the Stirling engine efficiency decrease (fig. 8).

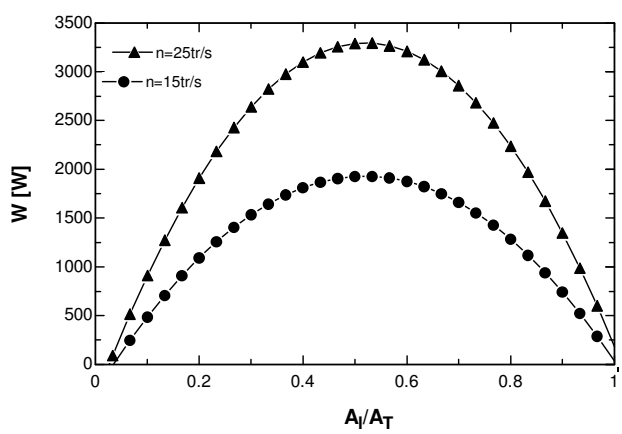

Fig. 7: Engine power versus cold-end heat-exchanger area ratio and engine frequency

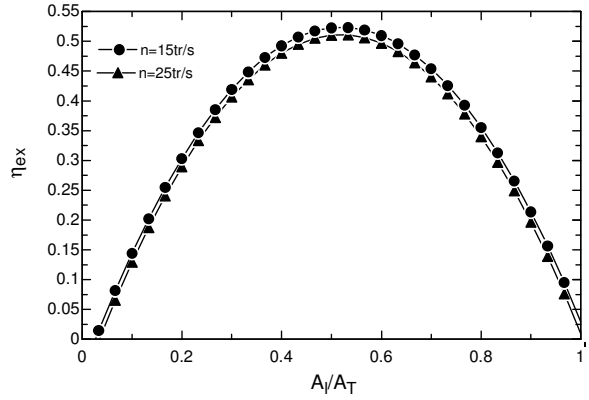

Fig. 8: Engine exergetic efficiency versus cold-end heat exchanger ratio and engine frequency

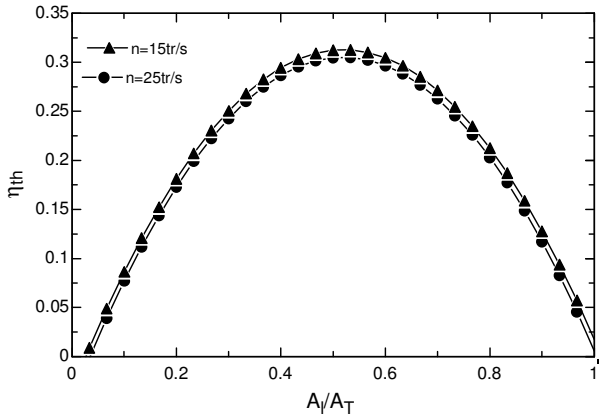

Fig 9. Engine thermal efficiency versus cold-end heat exchanger ratio and engine frequency

If it is necessary for other application for more power, at a smaller value for the Stirling efficiency or less power at a higher value of efficiency, the corresponding optimal speed can be chosen. Thus, for example, it will result from the graph that at a speed engine frequency of 25 tr/s (equivalent of of 2 m/s) would get the maximum power but the value for the efficiency would not be lowered too much.

Taking into account that in this application, the heat from the cold source of the Stirling engine is recovered and used for cogeneration, the decrease of the Stirling engine efficiency would be balanced by the increase of the cogeneration efficiency, and global efficiency is practically constant.Analyzing the results from the graphs, we can propose another design construction for the studied Stirling machine, which can achieve a maximum mechanical power corresponding to a lower efficiency.
This proposal involves resizing the studied engine (the dimensions of the pistons and/or the engine speed) and optimizing the design for the heat exchanger areas.

Conclusions

In a more efficient energy management context, an optimization of an exo- and endo-irreversible Stirling engine with imperfect regeneration is presented for three criteria: power, thermal efficiency and exergetic efficiency with fixed parameters, such as maximum cycle pressure and volume, compression ratio and with a constraint of constant heat transfer total area of heat exchangers. The assumptions related to the heat reservoirs and the regenerator is classical and typical of a study within

Finite Dimension Thermodynamics: limited heat transfer areas, finite speed of thermodynamic process development and heat transfer cc efficient linked to engine speed.

The results showed the influence of the finite heat transfer area on the engine operation optimization. With the imposed parameter values, the optimal heat exchanger area partition is approximately given by a near equality between the cold and hot transfer areas with, in some cases, a slight superiority of the cold transfer area.

Pressure drop losses are major cause of reducing the Stirling engine efficiency; due to this fact we are studying the optimum transient state operation, as an extension of these analyses, taking into account the friction losses, to get a more realistic model.

Nomenclature

A	Heat exchange area [m^2]
c	Specific heat of working fluid [J/kgK]
ek	Specific kinetic energy [J/kg]
ep	Specific potential energy [J/kg]
ex	Specific exergy [J/kg]
E	Energy [J]
$\dot{E}x_T^Q$	Exergy flow of heat Q at temperature T [W]
$\dot{I}$	Irreversibility [W]
h	Convective heat transfer coefficient [W/m^{2}K]
$\dot{m}$	Mass flow rate [kg/s]
n	rotational speed [rot/s]
p	Pressure [Pa]
Q	Heat [J]
$\dot{Q}$	Heat transfer rate [W]
r	Specific working gas constant [J/kgK]
s	Specific entropy [J/kgK]
$\dot{S}$	Entropy flow rate [W/K]
S	Entropy [J/K]
t	Time [s]
T	Temperature [K]
V	Volume [m^3]
$\dot{W}$	Power [W]

Subscripts

g	Gas
L	Cold sink
H	Hot source
in	Inlet
max	Maximum
min	Minimum
out	Outlet
l	Cold
h	Hot
p	Piston
R	Regenerator
th	Thermal
T	Total
0	Reference state

Symbols

γ	Adiabatic exponent [-]
ε	Compression ratio [-]
η	Heat transfer percentage [-]
$\dot{\Pi}$	Entropy generation rate [W/K]

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The Method of Averaged Quality Traits in The Management of The Quality of Marketing Information

Joanna MAJCHRZAK

Poznan University of Technology, Poznan, Poland
joanna.majchrzak@put.poznan.pl

Abstract

The paper considers the problem of studying and assessing the quality of the company's marketing information. The main objective of the research is to adjust and apply the method of quantifying quality, i.e., the method of averaged quality traits, to compute the indicator of marketing information quality. In the research into the quality of marketing information, a selective model of information processing was adopted. Referring to the basics of marketing management, i.e., the marketing mix model and the structure of marketing relationships, the distinguishing features of marketing information are presented. Selected concepts of information quality were considered and the quality of marketing information was determined. The essence of the applied method of quantifying quality and the essence of calculating and interpreting the value of the quality indicator, *J*, was explained. The concept of using the averaged quality traits method in assessing the quality of marketing information was developed. The quality of marketing information is assessed by the value of individual states of features belonging to marketing information. The developed method was used in the study and it evaluates the quality of marketing information of industrial enterprises. The results show the effectiveness of the method in terms of calculating the value of the marketing information quality indicator and the classification of information into individual quality classes. The obtained results are important at the stage of planning the quality of marketing information, i.e., studying, analyzing and designing qualitative changes in managing the quality of marketing information.

Keywords: Quality Management, Qualitology, Information Quality, Marketing.

Introduction

In specialist literature, various approaches to the concept of information are noted (Stefanowicz, 2004). The term information is used as the original concept, without giving any definition or interpretation. In particular, this approach underlies the theory of information developed by Claud Shannon (Shannon, 1948), which does not specify the meaning of the term information, but merely deals with defining its quantity. The term is defined by adopting certain principles tailored to the needs of a given research field, generally referring to other well-known concepts. This term is described (interpreted) by its features, properties, functions. In the most general terms, the information is understood as a basic element of our mental activity. Information flows to us from the physical reality that surrounds us, and their quantity increases with the process of our deeper recognition of this reality. In this sense, information is considered as part of binding processes, with different types of relationships being involved. For example, it may relate to human relationships with other people, with nature, and relationships between various elements that create dynamic structures (Kowalczyk, 1981). In the study of information, two different perspectives can be distinguished, such as, infological perspective and datalogical perspective. The infological perspective, proposed by two Swedish specialists, is related to the person who created or received the information (Sundgren, 1973; Langefors, 1980). In the datalogical perspective information is assumed to be independent of the recipient's mind. This work, to model the marketing information quality, adopts an infological approach. Here, it is assumed that the observer, *U*, deals with some fragment of reality, *R*, which in consequence causes that in his mind a specific mapping (reflection, content, description) of this fragment arises, the so-called infological model of *R* reality in *U*'s

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consciousness. This model is created as a result of the received description of R reality subjected to analysis, interpretation and evaluation based on *U*'s current knowledge and experience, his the so-called frame of reference (Stefanowicz, 2004). The condition for obtaining information is the existence of an observable physical phenomenon or some associations. Occurrence of a certain variety in this phenomenon enabling choice (making specific decisions or drawing a conclusion). The existence of an observer representing some system of intentional action, who makes observations, makes decisions due to the usefulness of certain observation in achieving the objectives of the system. The value of these decisions depends on the degree to which they affect the system's approach to its target state, i.e., achieving the goal (Kowalczyk, 1981, pp.9-11). Studies and practice in the field of information quality management most often adopt the axiological, evaluated approach to information quality referring to usability of information as the criterion of its value, according to Juran's definition of quality which is "fitness for use" (Bizer and Cyganiak, 2009). Substantial amount of research (Michnik and Lo, 2009; Chen and Tseng, 2011; Raghunathan, 1999; Shankaranarayanan and Yu Cai, 2006; Majchrzak, Goliński, Mantura, 2019; Majchrzak et el., 2019) in the field of information quality management, refer to the information quality model used in the method of assessment and information quality improvement, AIMQ (Wang, 1998; Lee et al., 2002). In this paper the information quality is defined by four features, such as (Nowicki, 1979): (1) Completeness, i.e., the information is complete (according to the criterion of the purpose for which we collect information), (2) Trueness, i.e., information is true (free from errors consisting in missing or distorting important features), (3) Timeliness, i.e., information is fast (received at a time that is shorter than the change in the state of the object it concerns), (4) Relevancy, i.e., information reaches the appropriate recipient in the company. In the following chapters, the specificity of marketing information is discussed. The qualitative essence of the method of averaged quality traits is presented and the sequence of actions in this method leading to the calculation of the value of the marketing information quality indicator. The research takes into account the quality of marketing information shaped as part of company relations, such as: relations with the supply market, relations with the sales market, relations in the competition system, relations with the government system, relations with the education system, as well as relations with the research system, between the company and research institutions.

The concept of marketing information

Analyzing the information situation, which is determined by the creation, transmission or receipt of information, depending on the purpose, one can refer to communication theory. In this work, in order to analyze and assess the quality of marketing information, reference is made to the selection model (Westley and MacLean, 1957). In this model, it is assumed that reality, *R*, consists of elements, *X*, understood as any object (or event) that has characteristics capable of being transmitted in some abstracted form. From the standpoint of the observer, *B*, the world consists of a confusion of *X*s. It is assumed that B maps a specific set of *X*s as a means of orienting itself in its environment and as a means of securing problem solutions and need satisfactions. Observer, *B*, has learned that in order to maximize satisfactions and solve security problems he must, first, orient toward *X*s selectively, second, does not orient toward *X* alone, but tends, in the presence of another observer *A*. Observer, *B*, based on own observations and information obtained to Observer *A*, in his own immediate sensory field, is capable of acting upon information thus transmitted to him and must do so if he is to maintain an adequate orientation to his immediate environment. If, *A*s and *X*s relevant to such orientation lying outside his immediate reach, there is need for another role, which is call *C*. Element *C*, understood as the "gatekeeper" (Lewin, 1951) or the "encoder" (White, 1950) is conceived of as one who can select, transform (into some form of symbol containing meanings shared with B) the abstractions of object *X* appropriate, to *B*'s need satisfactions or problem solutions. And, transmit such symbols by means of some channel or medium to *B* (see Figure 1).

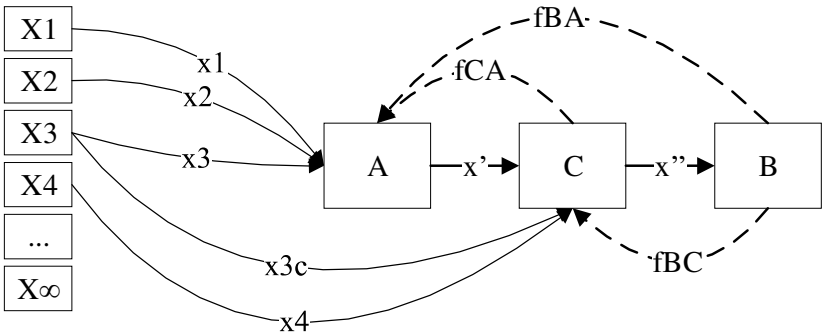

Here, *X*1, *X*2, …, *X*∞ - elements of reality, *R*, understood as any object that has characteristics capable of being transmitted; *A*, *B* – observers; *C* – observer (the role of the "gatekeeper"); *xi* – piece of information, *f*- feedback information.

Fig. 1: The selective model of information processing (Source: own study based on Westley and MacLean, 1957)

Marketing information is treated as a distinctive piece of information, considering the objective criterion to extract varieties of information corresponding to the specificity of the *X* objects they map. And, the subject criterion, where the main factor is the type of observers, *A*, *B*, and *C*, involved in creating, transmitting, or receiving information.

At the initial stage of the development of the scientific foundations of marketing, a functional approach dominated, among others (Shaw, 1915; Weld, 1917). In subsequent concepts, the aspects of market activity of enterprises in relation to various classes of products, the so-called commodity approach to marketing (Copeland, 1923; Breyer, 1931), or in relation to geographical factors of the market environment, the so-called geography-related approach (Reilly, 1931) were examined. The geography-related approach initiated the idea of market segmentation and matching marketing functions to specific market segments (Chamberlin, 1933). The concept of so-called marketing mix and the idea of mapping marketing as a set of elements, was first introduced by Borden (1964), who defined 12 marketing components. The marketing mix model has been developed in numerous studies, shaping various models of marketing composition (see Goi, 2009). In subject literature and practice of marketing activities, the most often referred to is the marketing mix model proposed by McCarthy (1964), the so-called four Ps of marketing: product, price, promotion, and place. Referring to the objective criterion for determining marketing information, it is assumed that this is a kind of information that maps individual elements of the marketing mix.

Adopting the basics of system thinking in marketing was an important stage in the development of marketing. Defining the concept of marketing system was initiated by the so-called direction of system thinking in marketing considerations (system-oriented approaches; Fisk and Dixon, 1967). The basics of system thinking are visible in contemporary developing marketing concepts. Studying and shaping the relation-ships between organizational units of an enterprise and organizational units of surrounding entities is the subject of consideration, among others, of networks of relationships approach (Grönroos, 1982), interaction, network approach, relationship marketing concept (Gummesson, 1987; Parasuraman et al., 1991; Christopher et al., 1991; Payne and Frow, 2017). Modeling of the integrated system of marketing elements, including in particular elements of marketing communication, is the subject of consideration of the concept of integrated marketing communication, IMC (among others Duncan and Moriarty, 1998; Schultz and Schultz, 1998; Kitchen et al., 2008). Referring to the criterion of subjective determination of marketing information, it is assumed that this is a kind of information that is created, transmitted, or received by entities in the structure of marketing relations. Evert Gummesson (1994), one of the creators of the concept of relationship marketing, specifies thirty types of relationships in the structure of marketing

relationships, e.g., the relationship between the supplier and the customer, the interaction between the customer and front line personnel, the relationship between internal and external customers, relationships via full-time marketers and part-time marketers, the quality providing a relationship between production and marketing, the relationship to the customer's customer.

In this studies it is proposed to apply the marketing mix model proposed by McCarthy (1964) as the objective criterion for marketing information classification (here, $X1$ stands for product, $X2$ stands for price, $X3$ stands for promotion, $X4$ stands for place). In the subject criterion, the collection of thirty types of relationships in the structure of marketing relationships is applied (Gummesson, 1994).

The essence of the averaged quality traits method

The method of averaged quality traits was developed by Romuald Kolman (Kolman, 1973, 2009). The essence of the method consists in calculating the average quality indicator from the value of the so-called quality traits that represent averaged states of the quality criteria classified to individual meaning groups resulting from the most important aspects of considering quality. The method makes it possible to evaluate the quality of items, i.e., quantification of the quality. The issues of quantitative (numerical) quality assessment, or the "science of measuring" quality, are developed within the qualimetry. Qualimetry, recognized as an independent scientific discipline, was initiated by G.G. Azgaldov (Azgaldov, 1968) and is still being developed today, in particular by Russian scientists (Azgaldov and Kostin, 2011; Azgaldov, Kostin and Padilla Omiste, 2015). In qualimetry, it is assumed that the category of quality can fulfill a general, significant and universal cognitive function in relation to any object. Qualimetry, treated as a scientific discipline, has interrelationships with other disciplines, distinguishing (Azgaldov, 1982): (1) a set of sciences that are used in the quantitative study of quality (e.g. metrology, experimental psychology, and applied mathematics), (2) sciences which themselves use data obtained as a result of quality study (including efficiency theory, operations research, and axiology). In Polish literature, the concept of developing an interdisciplinary field of knowledge, qualitology, dealing with all issues related to quality is still being developed (Kolman, 1973; Kolman, 2009; Mantura, 2010; Borys, 1980; Borys, 1984; Skrzypek, 1995). The current achievements of qualitology provide the basis for the use of the quality category in solving not only axiological problems related to the category of the value of objects, but also in resolving epistemological questions leading to cognition and shaping models of reality. The general course of action when applying the qualitative method of averaged quality traits can be attributed to (Kolman, 1973, p. 111-138):

1. Selection of criteria out of the relevant requirements and conditions.
2. Selection and segregation of criteria into semantic groups represented by individual quality traits.
3. Quantification of the states of criteria by their reduction in the areas of variability and transformation to a uniform scale of states.
4. Calculations of nominal discriminants as mean of transformed criteria states.
5. Calculations of the quality indicator as the average of the nominal indicators.

The most general form of the formula for calculating the quality indicator, J, according to the method of averaged quality traits is as follows:

$$J = \frac{1}{z}(\alpha A^a + \beta B^b + \gamma C^c + \delta D^d + \varepsilon E^e).$$

Where,

z – number of quality traits taken into account,
$\alpha, \beta, \gamma, \delta, \varepsilon$ - correction coefficients regulating the intensity of the mutual interaction of the nominal discriminants,
A, B, C, D, E – nominal discriminants,
a, b, c, d, e – power exponents taking into account the specificity of the influence of individual nominal discriminants on the quality indicator.

The individual nominal discriminants are calculated as arithmetic means of the criteria discriminants using the formula:

$$X = \frac{1}{n}\sum_{i=1}^{n} W_{iX}^{piX}.$$

Where,

X – A (or B, C, D, E) – nominal discriminants,
n – number of criteria considered in a given semantic group,
W_{iX} – a criterion discriminant with the current number i in the X semantic group,
p_{iX} – the exponent taking into account the specificity of the influence of the W_{iX} criterion discriminant on the nominal discriminant X (most frequently $pi = 1$).
The value of the criterion discriminant for features with the nature of values (i.e. the value favorable for large values from the range of the feature variability) is calculated using the formula for transforming states and calculating the criteria discriminants (Kolman, 2009):

$$W_w = \frac{k_{wz} - k_{wi}}{k_{wa} - k_{wi}}.$$

Where,

W_w – criterion discriminant,
k_{wz} – measured value of the item,
k_{wa} – the greatest value of the item,
k_{wi} – the lowest value of the item.
The quality indicator J should take values from 0 to 1.

Table 1: Classes of the universal interpretative scale of the evaluated states of object's quality.

Class of the quality	Representative value	Basic quality degrees	Name of classes of quality
0	0.95	Set of acceptable states of quality	excellent
1	0.85		exceptional
2	0.75		beneficial
Boundary of normality $N = 0.7$			
3	0.65	Set of unacceptable states of quality	convenient
4	0.55		moderate
5	0.45		average
6	0.35		inconvenient
7	0.25		not beneficial
8	0.15		critical
9	0.05		bad

Source: Kolman, 2009, Majchrzak, Goliński and Mantura, 2019.

The values of the quality indicator are interpreted according to the adopted interpretation pattern, the so-called universal scale of relative states developed. This scale is 0 to 1 scale (in terms of value), universal (in use) and is based on a set of uniformly interpreted (in terms of naming) relative states (Kolman, 2009, p. 64). The set of quality classes with the values of the quality indicator assigned to each of the quality classes is presented in Table 1.

For the cases, relatively frequent in practice, when correction coefficients $\alpha = \beta = \gamma = \delta = \varepsilon = 1$ and exponents $a = b = c = d = e = 1$, the formula for calculating the quality indicator, J, takes a simplified form (Kolman, 2009):

$$J = \frac{1}{z}(A + B + C + D + E).$$

Therefore, in the method of averaged quality traits, it is assumed that the quality is the arithmetic mean of the nominal discriminants, the values of which can be regulated in substantively justified cases with the use of power exponents, and the mutual proportions between the traits - with the use of correction coefficients (importance coefficient, i.e. the so-called wag) (Kolman, 1973).

Marketing information quality assessment

In this study, the method of averaged quality traits was used to assess the state of quality of marketing information shaped as a result of the marketing communication processes of industrial enterprises. The scope of the research refers to the presentation of individual stages of the assessment of the quality of marketing information obtained by organizational units of industrial enterprises in the processes of marketing communication with organizational units of market environment entities. Organizational units of industrial enterprises assess the quality of the acquired marketing information on the basis of its usefulness in the decision-making processes of the company's management. There are six types of marketing communication processes, such as:

- the process of marketing communication with the customer's organizational unit,
- the process of marketing communication with the supplier's organizational unit,
- the process of marketing communication with the competitor's organizational unit,
- the process of marketing communication with an organizational unit of local authority,
- the process of marketing communication with an organizational unit of the education system,
- the process of marketing communication with an organizational unit of a research organization.

As a result of the use of the averaged quality traits method, the current state of the quality of marketing information is recognized as a result of the processes of marketing communication of an industrial enterprise with market environment entities. The correctness of the quality of marketing information is assessed using the universal scale of relative states and assuming the value of the normality limit at the level of N = 0.7 (see Table 1. In the first stage of research activities, the selection of the research sample is adopted, e.g. (1) the research subject is an organizational unit of an industrial enterprise that maintains market relations with the environment entities, such as the customer, supplier, competitor, local authority, education system, research and science system, (2) the research subject is an organizational unit of an industrial enterprise that makes decisions in the area of enterprise marketing activities. The second stage of preparation for the research is to formulate a set of questions leading to the assessment of the marketing information quality. When determining the quality of marketing information, reference was made to the information quality model used in the study of enterprise management information systems (Nowicki, 1979, p. 21). The rationale for choosing this model was, firstly, a synthetic approach to the quality of information, which is important when examining the quality of marketing information as part of research relating to various aspects of industrial enterprises' operations. Secondly, the selected model is suitable for assessing the quality of information in management processes, thus it is possible to assess the usefulness of the quality of marketing information in marketing decision-making processes. The quality of marketing information is defined by a set of four qualities of value, such as:

- the truthfulness of the information, which consists in the compliance of the information with the item it relates to,
- the completeness of the information, which relates to the necessary variety of information obtained, which leads to a full knowledge of the subject it concerns,
- the timeliness of the information, which refers to the time of information circulation, the speed of obtaining information,
- the addressability of the information that relates the information to its recipient; it is assumed that the recipient can use the information only if he understands it.

Using the above features of the value of information, research questions are formulated, leading to the assessment of their condition. An example question leading to the determination of the quality of marketing information shaped in the processes of marketing communication with the company's customers is presented below:

- Is the information you obtain from your clients useful in decision-making processes?

When answering the above question, the respondents define the state of the four features of the value of marketing information:

- Is the information true?
- Is the information complete?
- Is the information fast?
- Does the information reach the right recipient?

The condition of individual value features belonging to marketing information is determined using the basic quality scale. It was created by dividing the entire area of variation into ten different parts, designating successive decimal fractions of perfection. Number 1 denotes the state of perfection, and the number 0 - the state of imperfection, simultaneously assuming the uniformity of the distribution of fractional intermediate values (Kolaman, 2009, Kolman, 1973). Particular features pertaining to marketing information are treated as nominal discriminants.

$$X = \frac{1}{n}\sum_{i=1}^{n} W_{iX} .$$

Where,

$X = A, B, C, D$ – nominal discriminants, where A - refers to the assessment of the status of the marketing information feature, such as completeness, B - refers to the assessment of the status of the marketing information feature, i.e. truthfulness, C - refers to the assessment of the status of marketing information feature, such as timeliness, D - refers to assessments of the status of the marketing information feature, such as relevancy; $n = 4$, W_{iX} – the criterion discriminant with the current number i in the semantic group X, i= 1, 2, ..., m; m- number of enterprises participating in the assessment of the quality of marketing information.

In the research on the assessment of the quality of marketing information, it is assumed that the value of the correction coefficients and power exponents equals 1. When calculating the value of the quality indicator, J, a simplified form of the formula used in the averaged quality traits method is applied. Determining the number of quality classes (see Table 1) on the basis of the calculated value of the quality indicator, the following formula is used (Kolman, 2009):

$$K = 10 - (10J + u).$$

Where,

K – quality class number,
J – quality indicator in the form of a decimal fraction,
u - decimal fraction supplementing the product of $10J$ to the nearest integer up, u=0, when the product of $10J$ is an integer and u=1 when J=0.

As a result of the above operations, the value of the marketing information quality indicator and the number of marketing information quality status class of participating enterprises are calculated. The status of the quality of marketing information is considered correct if the value of the marketing information quality indicator is greater than the specified boundary of normality (N= 0.7) and is classified as 0 (excellent quality status), 1 (distinguishing quality status) or 2 (favorable quality status) of the quality class.

Conclusion and Outlook

The complexity of business management problems, including the marketing management function, is a premise for considering the problem of marketing information quality management. This paper presents the concept of applying the qualitative method of averaged quality traits at the stage of research, assessment and analysis of the quality of marketing information in a given group of enterprises. The research adopted an infological perspective on information, i.e., it is assumed that information is related to the person who created or received the information. The types of entities in the structure of marketing relations are defined according to the collection of thirty types of relationships in the structure of marketing relationships (Gummesson, 1994). The selected models of information quality were considered and the marketing information quality was reflected as the set of features which belonging to information, such as, completeness, trueness, timeliness, and relevancy. The information situation, i.e., the one which is determined by the creation, transmission or receipt of information, was defined with the reference to the communication theory. The selective model of information processing (Westley and MacLean, 1957) is applied. It is assumed that companies' market reality consists of elements characterized by the marketing mix model proposed by McCarthy (1964). The information about the specified elements of marketing mix has characteristics capable of being transmitted in some abstracted form. In order to study and evaluate the quality of marketing information, reference was made to the basics of qualitology and the method of averaged quality traits was used. This method makes it possible to calculate the value of the marketing information quality indicator and to classify it into one of ten quality classes. The presented concept of applying the method of averaging quality traits in the study and assessing the quality of marketing information was used in the study of the quality of marketing information of Polish industrial enterprises (n=89, Majchrzak, 2017). The obtained results constituted a premise to indicate the need to improve the quality management methods of marketing communication processes and to improve the quality of marketing information of organizational units of industrial enterprises.

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Code of Good Practice Regarding Business Continuity of The Production Company

Maciej KIEDROWICZ

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, maciej.kiedrowicz@wat.edu.pl

Jerzy STANIK

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Kazimierz WORWA

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, kazimierz.worwa@wat.edu.pl

Abstract

The article outlines the characteristics of the code of good practice that may be used to ensure business continuity of the production company. The elements of the code, understood as the rules of procedure, good practices or recommendations have been divided into six areas representing all stages of the lifecycle of the Business Continuity Management System (BCMS). The specification of the professional practices for each area is based on several main assumptions: each production process or its activity should be performed with integrity and due care, the processes or tasks should be executed considering the goals and needs of all stakeholders of the process or tasks, using knowledge, methods and tools based on evidence that confirms their reliability or efficiency and guarantees competence and professional application.

Keywords: Production Company, Business Continuity, Code of Good Practice.

Introduction

Under the conditions of increased competition in the market, the issue of building good, solid and mutually respectful relationship between the production company and its stakeholders becomes particularly important. The tool that allows to achieve this goal is the code of good practice [9]. Even though it is of a declaratory nature, it constitutes an important platform laying down significant principles, which the company should follow when dealing with different groups of interested parties. Business Continuity Management (BCM) is the prerequisite for the successful operation of the production company. BCM concept refers to all areas of activity, as every event concerning the operations of the production company may have negative impact on its business.

Business Continuity Management of the production company should not be treated as a narrow discipline practiced by professionals only, but rather as a wide range of activities including risk management, crisis management, security management and recovery of IT systems and data lost after disaster. It is part of the corporate governance, which constitutes a set of good practices providing guidelines for designing production processes and services to improve the company's resilience to potential interruption of the production process and the risk of losses – see Rut and Kulińska (2011). Furthermore, business continuity must form a part of the company's culture, its corporate governance and processes, and must have production process owners assigned thereto.

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The set of good practices in the field of crisis management and emergency plans constitutes the grounds for efficient business continuity management. In 2006, British Standard 25999-1: 2006 – Business Continuity Management was created to include present knowledge of business continuity. Its international equivalent was ISO 22301:2012 – Societal security, Business continuity management Requirements. According to the above-mentioned standard, the Business Continuity Management System:

- is the norm for business continuity management, including the set of good practices in this area, and
- constitutes a documented response of the company to critical events, such as fire, flood, pandemics, technical failure or adverse change of laws.

What is more, other legal standards also govern the rules of procedure aimed at maintaining business continuity – by Zawiła-Niedźwiecki (2008). They include, among other things, the so-called "soft" tools, such as codes of good practice. Such codes do not include any statutory or legally imposed norms, but the principles established by entrepreneurs or their associations (i.e. self-regulatory systems). Their implementation should, among other things, improve the transparency of the company's operations and hence strengthen its brand and relationships with third parties. The manner of using the code of good practice changes and evolves together with the company.

The main objective of this article is to present a model set of good practices and recommendations, i.e. the code of good practice, in the area of business continuity management in the production company.

Production company and its basic components

The production company is a legally and economically separate business (operating for its own account), which produces material goods to obtain financial gains by satisfying the needs of consumers – by Dendera-Gruszka (2017). Its objective is to achieve a high level of productivity and development, with low own costs.

The operations of the production company depend on the production process, during which the employees produce goods using various machines, devices and tools. It is the entirety of activities aimed at creating the finished product with specific economic value.

When analyzing the internal structure of the production company, it may be observed that it is clearly well-organized, which means that its organizational units, departments and divisions are interrelated through business, hierarchical and managerial links. What is more, the following three fundamental zones may be distinguished – see Ficoń (2008):

- provision – transport of purchased materials from warehouses of the supplier to warehouses of the company,
- production – efficient movement of raw materials, materials, semi-products during the entire production process,
- distribution – transport of finished goods from distribution warehouses to destination warehouses. Figure 1 shows correlations and tasks of the above-mentioned sub-systems.

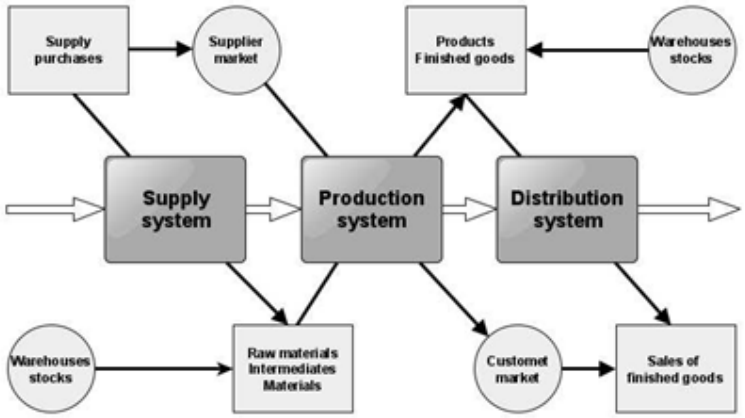

Figure 1: Correlations and tasks of individual systems in the production company. On the basis of Ficoń (2008).

According to Figure 1, the production system in the company is a relatively separate arrangement, which means that it lacks direct links with the market environment. However, the relations include the supply provision system and demand-based distribution system. In the research work of Fertsch (2011), production is one of the main and most important activities of the production system, as it creates new economic values. From the technical and organizational point of view, it allows to adapt and change the object of work into a product, using the means of works and human labor. What is more, the production system also includes the process of maintenance, repair and refurbishment of machines as well as technical infrastructure and means of internal and external transport – see Łunarski (2010). Figure 2 shows the correlations inside the production system.

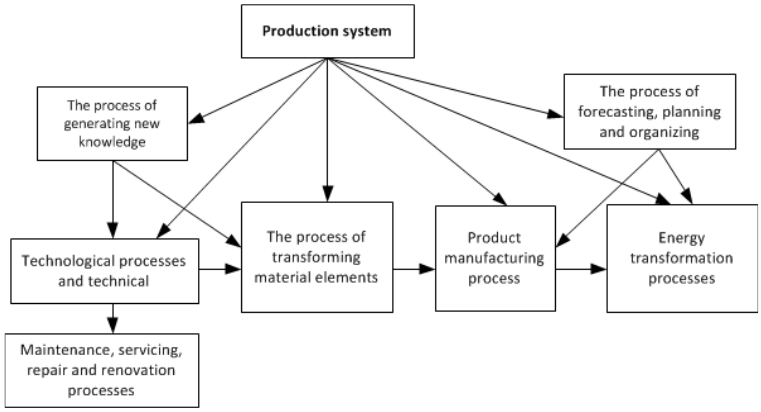

Figure 2: Production system – correlations. On the basis of Dendera-Gruszka 2017.

Internal and external conditions have impact on the management of the production system. Both internal and external environment of the company is exposed to risk and its adverse effects on business continuity. Since the situation is volatile and uncertain, the companies have to show flexibility in order to take quick actions and decisions.

Figure 3 presents the production company model, including the risk impact on its operations.

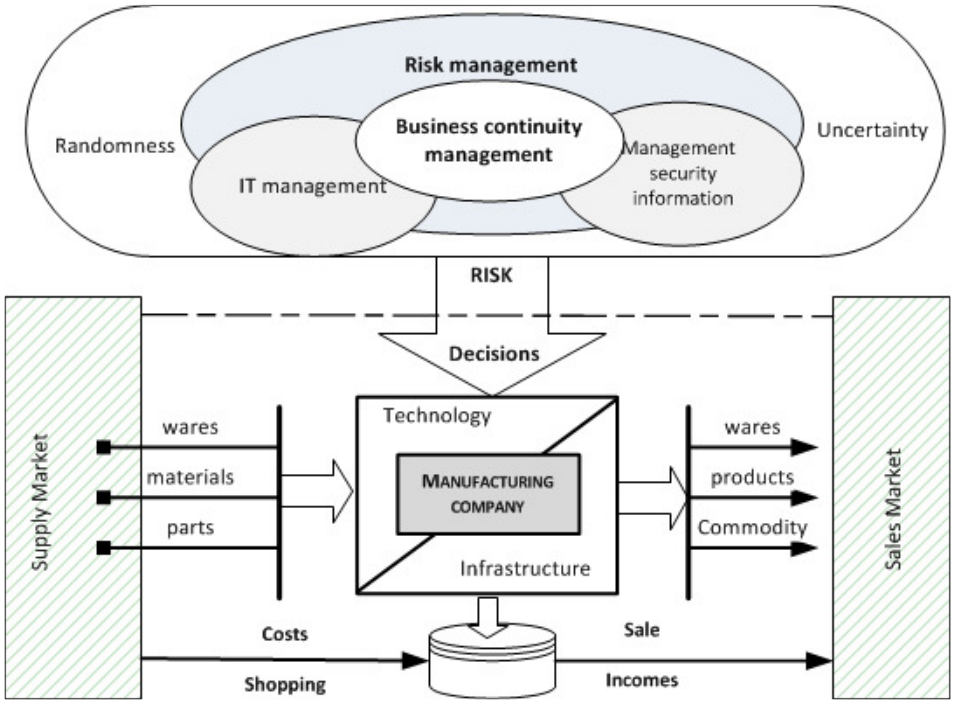

Figure 3: Operations strategy of the production company in the context of risk management and business continuity

The risk of the production system does not refer to situations strictly connected with the technological processes or work safety – see Kulik (2003). The overall factors affecting business continuity management of the production company also have impact on the production system. The production system is the most important element of the production companies, which not only adds values but also allows the company to exist. Therefore, the production system is very sensitive to all risk factors having impact on the organization. The majority of such risk factors are predictable, hence, it is possible to avoid hazardous or unexpected situations. Another group of risk factors affects the company and its production system in a long-lasting manner. The inability to solve the problem successfully may be irreparable for the company.

The purpose of maintaining business continuity of the production company is appropriate management so as to protect the production processes against unplanned interruptions and to facilitate flexible introduction of changes in accordance with the expectations and needs of clients.

Business continuity of the production company

When implementing the BCM system in the company, it must be remembered that its environments includes not only clients, contractors and competitors, but also state bodies and public administration, which may have significant impact on the company.

The British Business Continuity Institute defines the Business Continuity Management as: “a holistic management process that identifies potential threats to an organization and the impacts to business operations those threats, if realized, might cause, and which provides a framework for building organizational resilience with the capability for an effective response that safeguards the interests of its key stakeholders, reputation, brand and value-creating activities” – see Business Continuity Institute (2007).

Figure 4: Holistic process of Business Continuity Management Source: The BCI "Good Practice Guidelines" – base on Business Continuity Institute (2007)

The Business Continuity Management System in the production company is one of the components of the whole management system, thus, should be compatible with other services such as: Information Security Management (ISM), Quality Management System (QMS), IT Services Management (ITSM) [Figure 5]. The purpose of the Business Continuity Management System is to establish, implement and then use, monitor, maintain and constantly improve the functioning of the most important processes in the company (BCM), including guarantee of the information security (ISM) and quality (QMS).

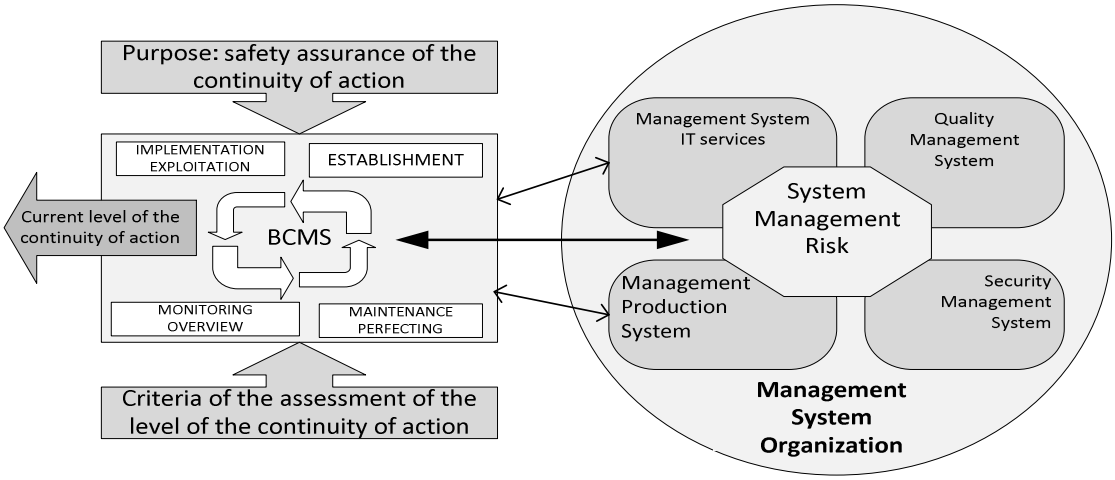

Figure 5: Illustration of relations between the BCMS and other systems in the production company

All operations of the Business Continuity Management System in the production company are included in the so-called Plan-Do-Check-Act PDCA) - Table 1.

Table 1: PDCA

Stage of cycle	Description – the scope of activities to ensure business continuity of the production company
Plan - P	The planning stage of the management system includes the collection of basic information on the company and its production processes, taking inventory of resources and security technologies applied, performance of a two-stage risk analysis, including the analysis of impact of incidents on the production process (Business Impact Analysis) and detailed analysis of threats and vulnerability in terms of continuity of critical processes and information security, preparation of the required system documents (e.g. business continuity policy, business continuity strategy and declaration on the use of security measures, system plans and procedures).
Do - D	The stage of the management system implementation includes the implementation of incident management mechanisms, implementation of security measures, including careful development and use of the Business Continuity Plans, training of personnel in business continuity, implementation of the risk mitigation methods selected as part of the business continuity management strategy, establishment of the operational system management, creation of internal and external communication channels.
Check - C	The stage includes the monitoring and review of the management system, together with the analysis of data in the system, internal audits, review of the system operations by senior management, planning of system improvements.
Act - A	The stage refers to the maintenance and improvement of the security/continuity management system, which includes corrective and preventive measures as well as other system improvements in the form of update of current procedures, BCP plans and risks analyses in accordance with the evolving business processes that describe the organization and changes in the legal and business environment.

The Business Continuity Management Program is the continuous improvement process aimed at developing and maintaining action plans at an appropriate level in case of a potential crisis, which may cause the interruption of the most important production processes in the company. The entire Program is composed of six main parts: incorporation of the BCM into the culture of the organization, management of the Business Continuity Plan, understanding of the organization, establishment of the Survival Strategy, development and implementation of the Business Continuity Plan, Testing, maintenance and audit (Figure 6).

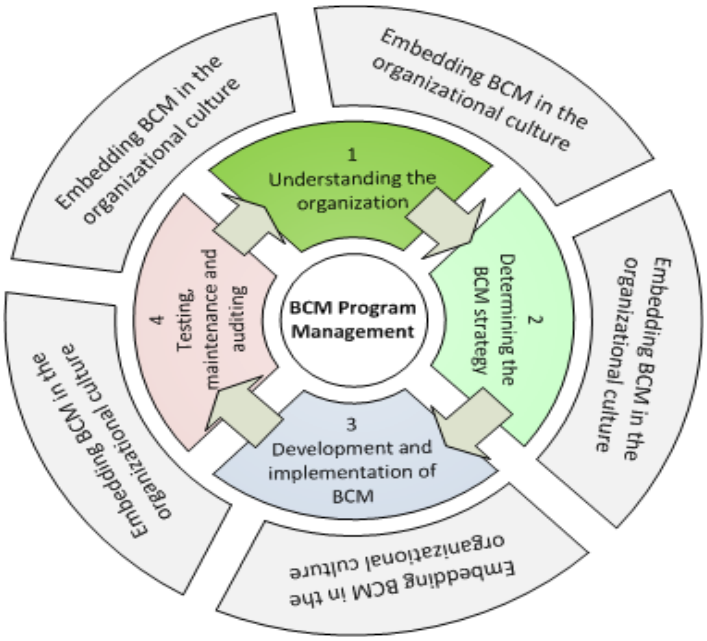

Figure 6: Lifecycle of the Business Continuity Management Program (BCMP)
– based on BS 25999, Part 1

In the production company that is well-developed in terms of its organization, the Business Continuity Management process covers all employees, workplaces, ICT systems, information, technical systems, providers of utilities, shareholders. Sudden interruption of the IT or ICT system may interrupt the continuity of the production process or the functioning of the entire company.

Project of the code of good practice for the production company

The code of good practice is a set of principles of conduct, in particular professional standards for entrepreneurs who agree to follow them with respect to one or more market practices. The codes of good practice may be established by members of a given industry and hence become applicable to such members only. The internal bodies of the organization, which determined such standards, are responsible for checking if they are complied with.

The objective of the code of good practice is to promote the highest standards of operations of the industrial companies in the market. The code of good practice, with respect to Business Continuity Management, includes the most important principles of conduct and professional practices that may be used in the entire lifecycle of the Business Continuity Management System (Fig. 3). The professional practice are based on the following assumptions:

- the knowledge as well as applied methods and tools are mainly based on proofs of their correctness or efficiency, and the guarantee of their reliable and professional application,
- the processes or tasks are performed with regard to the goals and needs of all stakeholders in the process or tasks,
- each process or task is performed with integrity and due care.

The code of good practice to ensure continuity of the production company is illustrated in Table 2 and includes a set of examples of rules of conduct, good practices and recommendations that may be implemented.

The code of good practice has been divided into six areas referring to particular stages in the lifecycle of the Business Continuity Management System – see Good Practice Guidelines (2002):

1. incorporation of the BCM into the culture of the organization,
2. understanding of the organization (process modeling, BIA and RA),
3. establishment of the Survival Strategy,
4. management of the Business Continuity Program,
5. methods of response, testing, maintenance and audit
6. development and implementation of the Business Continuity Management Program,

Table 2: The code of good practice

Stage	Principles of conduct, good practices, recommendations
Incorporation of the BCM into the culture of the organization,	1. If the production company wants to conduct its activities safely and ensure business continuity, it should implement the BCMS as the basis for its operations. 2. Regardless of the size, business profile, industry, region, the Business Continuity Management System should be implemented, enhanced and developed not only in the perception of the managers, but also all employees of the company. 3. The production company should analyze and assess the impact of the disruptions on the Business Continuity Management System, financial goals as well as environmental, quality and OHS aspects with respect to the following: – impact on damages or losses, premises, technologies or information – effects of infringement of statutory or regulatory duties – damage to reputation - financial instability – deteriorated quality of the product or service - environmental damage. The above-mentioned events should be documented. 4. It is important that all personnel in the production company understood the correlations in the company, both inside and outside, potential consequences of disruptions, actions that need to be undertaken in case of a crisis, and reasons of such disruptions. 5. The production company should ensure appropriate communication in the business continuity process, since: the clients, partners, media are awaiting such information, which is of key importance, 6. the production company should prepare crisis communication plans in the form of a set of potential communication channels to communicate with the stakeholders. 7. The production company should appropriately secure such communication with the stakeholder so that no important facts are disclosed, which could have negative effect on the business activity. Furthermore, it is recommended to develop emergency rules of communication inside and outside the production company.

Understanding of the production company	1. The understanding of the production company in the context of its business continuity must be based on specific objectives of the company and knowledge of all key aspects of its functioning with respect to the company's resources and processes, inputs and outputs, processing, production processes as well as additional and management resources. 2. To describe its operations, the production company should use the process-based approach, establish a model of the company processes [Figure 2] and distinguish those processes that are of key importance in terms of the production activities (BIA). 3. The production company should prepare the analyses of potential risks and preventive actions and, on the basis thereof, prepare documents to record such risks, undertaken preventive actions and their effects on the company's business activity. To that end, the production companies should: – assess at the time of occurrence of the aforesaid potential effects whether the business activity could be disrupted, – determine maximum acceptable time of interruption of any type of activity, by specifying: – maximum time after the disruption, during which the activity must be resumed, – minimum level, at which the activity must be performed to restore such level, – time period, during which the levels of activity must be restored.

Establishment of the BCM strategy	1. The production company should ensure that all its employees/subject of work knew and understood – depending on their position - the business continuity strategy in the company; in case of a crisis, they will have to act according to the plans, procedures and instructions, which will be much easier if they know the areas presented in Figure 3. 2. By establishing the Business Continuity Management strategy, the production company should: - include appropriate means for reducing the likelihood of the risk or its effects, - include specific measures mitigating or increasing the company's resilience to risks and disruptions, - define means to ensure the continuity of critical activity during and after the disaster, - include the activities that have not been classified as critical. 3. The production company should consider as accurately as possible every strategy scenario in terms of the resources used, paying special attention to the following: - maximum acceptable time of interruption during the occurrence of risks and disruptions, - costs of implementation and execution of the strategy, - consequences of failure to undertake preventive actions. 4. The production company should each time reduce the likelihood of the occurrence of the same disruption causing interruption in business activity.
Management of the Business Continuity Program	1. The Business Continuity Management Program should be implemented in stages, for example: a) assign responsibility; persons involved in the implementation of the Business Continuity Management Program should be fully competent and responsible for the part of the implementation process entrusted thereto, b) development of the implementation methodology including design, creation and execution of the program. The company should provide all stakeholders with the information on the implemented system, organize necessary training for the implementing personnel and ultimately for all other employees, in stages. c) maintain continuity of the implementation process and constant improvement of the management system. The management of the Business Continuity Management System should be aimed at continuous analysis of the operating system, including the analysis of risks and threats, prevention and mitigation of threats, organization of training, exercises and audits, implementation of updates, administration and monitoring of system continuity. 2. To protect the company, its Management Board and executives should prepare the BCM documentation, which will include, for example: - BCM policy with the described declaration and tasks - analysis of impact on the business activity of the company - analysis of risks and threats - prevention strategy - awareness raising programs - training programs - planning of incident management - business continuity plans - economic recovery plans - schedules of exercises and reports - maintenance and outsourcing contracts

Methods of response, testing, maintenance and audit	1. As part of the developed plan of implementation of the Business Continuity Management System, the company should determine clear and comprehensible structure of response to incidents by preparing detailed action plans for particular units of the production company. 2. Each time a disruption, threat or accident occurs, the company should be able to quickly and easily appoint the team responsible for: - confirming the nature and scope of the incident, - taking control over the situation, - limiting and preventing the spread of the event, - communicating with the stakeholders. The same team should react to the event, report and inform on the preventive steps undertaken and, if necessary, refer the crisis management to a higher level of management or inform the Incident Management Team (IMT) or Crisis Management Team (CMT). 3. The planning process should include the development of the Incident Management Plan (IMP) and Business Continuity Plan (BCP). 4. The IMP constitutes grounds for all areas of the BCM, thus, it should be flexible, easy to read, comprehensible and include all essential elements.

	5. The company is obliged to fully support the IMP in terms of providing the funds for the development and training courses, attaching significance, monitoring. The IMP should contain lists of tasks and control lists of actions for the purpose of Business Continuity Management. 6. The documentation must be supplemented with clear and comprehensible rules of notification, which should be constantly updated. Both the managing staff and personnel involved in the BCM activities should have easy and unlimited access to plans and documents. 7. The IMP activities must ensure security, be based on the BIA results, be structured in such a manner so as to provide strategic and tactical options of actions, and prevent loss of continuity of critical business. In case of the disruption or risk, the report on the event must be drafted - the company should have templates of the standard documents to be used for such purposes. 8. Therefore, it is obligatory to re-conduct the risk analysis and document which part of the present analysis was too simplistic and which corrective measures should be implemented. If the disruption or risk threaten escalation outside the organization or the escalation has already happened, the company should to undertake appropriate steps planned for such a situation and contact external rescue services to prevent further escalation. The above-described circumstances may require official announcement to the public via media. 9. The Business Continuity Plan (BCP) is another element of Business Continuity Management (BCM) allowing the company to recover and maintain its business in case of the disruption and to restore it to the original state. 10. The system of the business continuity plans is activated to support key and supplementary actions (i.e. critical action path) required to achieve the company's goals. It may be used in whole or in part, where the disruption or risk occurred. 11. The business continuity planning should reflect the structure of activities and tasks and provide, on the basis of the control list, the information on all actions that need to be undertaken in case of the disruption or other event. 12. For the purpose of the business continuity management planning, the company must determine its resources for the time of implementation of the preventive measures and maintenance of business continuity. 13. The company must appoint an authorized person responsible for crisis management and give them all powers necessary to manage the company in case of an emergency. 14. The emergency plans must be tested in practice. Various types of tests are developed, for example, 1. notification test – verification if the plan is complete; 2. paper test – verification of the roles assumed by the participants; the test may be in the form of a game; 3. operational test – complete test. 15. The business continuity plans are created on the assumption that the plans are tested and the test results contribute to the improvement of test scenarios and plan modification. 16. It should be remembered that it is very difficult to run tests in production environments, hence, their number is limited to the minimum. 17. The times and measurements of the following must be duly recorded: RTO, RPO, MTPD. The adopted values should not result only from paper analyses, even if based on knowledge and experience, or simulations, but from actual tests showing how the whole procedure goes, where the bottlenecks are and where potential problems may occur. Here come to the aid all sorts of IT solutions, which are not only used to create backup copies or protect data from loss, but also to ensure recovery after the incident or disruption of business continuity. What is the most important is not the back-up copy of data, but a possibility of quick recovery of business.
Deve lopm ent	1. The implementation of the Business Continuity Management System in the company is a turning point marking its transition from theoretical to practical actions, i.e. the time when the company should maximally involve its funds and

	resources to efficiently and quickly implement the Business Continuity Management System. 2. At this stage, the company should have all its critical actions defined, risks connected therewith assessed, strategies for reducing the likelihood of disruptions or threats and strategies for maintaining business continuity and recovery established. 3. Before physically launching the Business Continuity Management System, the company must have a plan for the implementation of such system and its components, with the clearly stipulated goal and scope. 4. Each plan should refer to the effects of its actions in an explicit and comprehensible manner, while maintaining consistency with other plans, especially those that are of key importance for the entire implementation process. 5. The action plans should include clearly defined methods for obtaining and accessing such plans, documents and procedures necessary for their implementation, and the roles and responsibilities of persons implementing the system. 6. The company should describe the personnel structure of persons and teams responsible for the implementation of the system, assign their roles, duties and responsibilities. 7. The company should also develop emergency recovery plans, methods for mobilizing teams, schedules of meetings and execution of tasks and other methods of control and audits at each level of the company's hierarchy. 8. The business continuity planning should allow to answer the questions on how preventive measures are implemented, who is responsible for the response to the event at all levels of the organization, which procedures should be launched, which persons should be informed and consulted before implementing the preventive measures, which decisions have been made, how the evacuation is to be managed and location of the meeting point.

Summary

In today's urbanized, automated and computerized world, the risks are increasing in volume and affect the functioning of whole societies, institutions and production companies. We are often unaware of the how our life depends on efficient operations of the production, power, banking or IT systems and how often they are interrelated. To ensure the continuity of such systems requires a lot of effort from both the companies and public administration.

The code of good practice governs standards and rules of behavior, including good practices used by all subjects of work in the production company as part of their business activity, in particular when working with clients, recipients, IT service providers and other partners.

The codes of good practice are not implemented in the form of legal documents. They are treated as the "manuals of good behavior". Their significance is due to the fact that the production companies in a given market make declarations concerning the use of such practices, which are required by certain industries.

Numerous opinions and analysis of the examined production companies show that, from the point of view of the "good practice" principle, the concept of good practices has not been favorably adopted by many of such enterprises. In compliance with the assumptions underlying the concept of good practices, all members of the provision and sales market should benefit from raising the standards. However, for many of them, such an initiative is unclear, thus, they treat it merely as one of the many tools in the company or capricious idea of the management. Generally speaking, the reason for this is mainly low awareness of the significance of the "good practice" principle. Furthermore, it may not be guaranteed that the efforts undertaken in the field of good practices will be appreciated by the stakeholders.

As indicated by numerous opinions and analyses of production entities, the areas of further research and development of Codes of Good Practice should be focused on:

1. Application of the policy of open access to databases or repositories of codes of good practice based on the following principles:
   - openness - free open access (free and open access) or *libre* open access (free and open access),
   - parallel paths - access to codes of good practice should be provided by publishing them in open peer-reviewed journals and specialist books and placing their content in electronic repositories
   - quick access - descriptions of good practices contained in individual codes should be made available as soon as possible from the date of their publication, preferably immediately.
2. Development of effective procedures for identifying good practice taking into account the following criteria:
   - formal criteria (e.g. in available databases or repositories we are looking for all good practices concerning our problem, we are looking for good practices concerning our problem, tested in other organizations operating in similar areas).
   - substantive criteria (e.g. we are interested in good practices that are applicable in our conditions, and therefore realistic, consistent with the principles of sustainable development, based on local human and material resources, and innovative.
3. Treating good practice as an activity that:
   - brings concrete positive results,
   - contains a certain potential for innovation,
   - it is durable and repeatable, it can be used in similar conditions elsewhere.
4. Treating the code of good practice as a key source of information used to improve business standards and as a good tool for improving the quality of human capital; teaches how you can enrich your knowledge using the experience of others.
5. Promoting/propagating the Code of Good Practice not only as a set of regulations and guidelines, but also as a determinant that inspires Investors who, not limiting themselves to strict rules, will take an active part in the process of improving the existing codes of good practice.
6. Avoidance of creating overly laconic codes, containing too few explanations that do not help to understand the functioning of entire societies, institutions and production companies.

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Multifaceted Risk Model for Measurement of Sustainability of The Production Processes

Maciej KIEDROWICZ
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, maciej.kiedrowicz@wat.edu.pl

Jerzy STANIK
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Kazimierz WORWA
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, kazimierz.worwa@wat.edu.pl

Abstract

The authors of the article focused on the issue of measurement and assessment of sustainability of the production processes. The analyses of the durability potential of the production processes require many different areas of factors and conditions to be taken into consideration. The research task refers to a possibility of implementing or using a multifaceted risk model in the assessment of sustainability of the production process, which is understood as one of the fundamental characteristics of reliability and safety of operations of the actual production systems. The event in the form of an external or internal risk or formal destruction phenomenon constitutes a basic concept in the modeling of management of sustainability of the production process. Each event is connected with the descriptive information, i.e. the information describing a given event in the situational context. The iterative approach was used to build the mathematical model, analyze its potential practical applications and search for the manner of illustrating such potential applications. The testing method was in the form of the intuitive method, allowing to use expert experience in the analyses of possibilities of benefiting from the sustainability of objects and adapting exploitation processes thereto.

Keywords: Production Process, Sustainability Potential, Risk Model.

Introduction

New challenges faced by the production companies (high competitiveness, complexity of manufacturing process or production processes) require changes in the modeling of the sustainability potential - the utilization of workforce is affected by the destruction processes resulting from the environment, exploitation and services. Furthermore, to address such challenges, some innovative methods of data collection, ordering, analysis and processing are needed. What is most important here is responsiveness to changes of internal (fluctuations in service quality) and external conditions (changes in consumer expectations, environmental norms, etc.) – by Downarowicz (2007). The above also includes world trend to improvement of competitiveness by increasing the sustainability potential. It is important for the owner/user of the production process (and better to understand in an intuitive manner than the concept of sustainability) to know how much of the potential workforce does their object have so that they may be used during exploitation to achieve a certain goal. Additionally, it is also crucial to know how much of the sustainability potential is used while storing products, waiting to start another task or rendering other services. The utilization of workforce of the object/process, its lifetime or sustainability potential cause (at the beginning - in a non-explicit manner) deterioration of the parameters of the object/process necessary to implement the process supporting the work of the object.

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With the development of the theory of reliability (Idziaszek et al (2008)), theory of keeping objects in motion (Benner et al (2003), theory of exploitation (Banham et al (2015), Borup et al (2004), Borkowski (2009), Fender et al (2010), Herterich et al (2014)) and theory of recovery, the concept of the sustainability potential has been used more often to describe the operating life of inherent object resources object (Gapp et al (2008), Kiedrowicz et al (2018)), sustainability resources (Borup et al (2004) and Fender et al (2010)), exploitation resources (Borkowski et al (2009)), work resources (Dwiliński (2009)), production potential (Dwiliński (2009)), sustainability potential (Gabryelewicz et al (2014), Gupta et al (2006)). This, in turn, generates the demand for modern methods/models allowing to measure the sustainability potential of the resources held (material, human, financial, information, management) by using a set of potential or actual disruption/risk factors that have adverse effect on such resources. Every risk is assessed according to several criteria, where each criterion describes the probability and/or effects of such risk. The result of risk assessment z_k (= 1, 2 … , N) according to k_i criterion (= 1, 2, … ,) is the risk component r_i (z_k) (= 1, 2, … , M), which reflects one or more risk attributes from set X_i (= 1, 2, … , M) [Figure 1]. The initial discussion of the issue by the authors is in Fuqing et al (2017).

On the basis of own expert knowledge, results of the literature analysis and intuitive method, it was established that to analyze the sustainability potential indicator, based on the risk components and vulnerability of the production processes, it would be reasonable to divide the production resources of the process/system/organization into inherent (related to technical, technological, reliability and sustainability potential of objects) and non-inherent production resources (mainly based on human decisions, such as work organization, exploitation strategies, pro-quality activities, diagnostic activities and selection of environmental conditions, i.e. existing human, training, cultural potential, etc.).

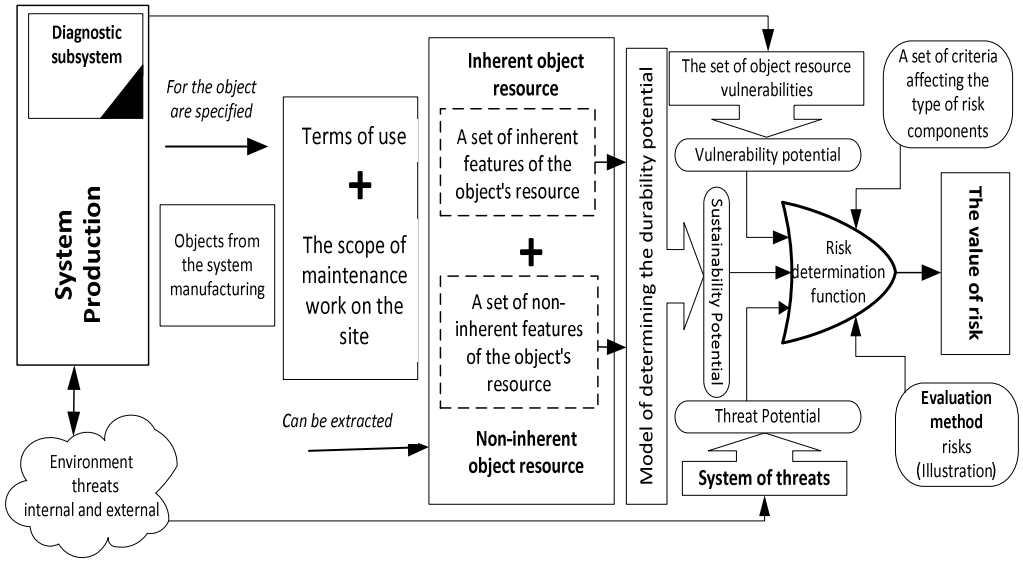

Figure 1: Illustration of relations between inherent work resources of the object and non-inherent service resources assigned thereto, which are generated by the process of using such object (including its lifetime and durability potential), and illustration of the location of the proposed risk model.

There is a number of publications devoted to the measurement of sustainability potential and describing the lifetime indicators in case of assessment of the production processes discussed in study Gebryelewicz et al (2014). Many studies also focus on the methods for improving lifetime (e.g. Herterich et al (2014)) and tackle the issues related to the monitoring of efficiency of use of a given production system, which, however, do not constitute such a general indicator as the sustainability potential. This is the origin of the idea to combine all risk factors concerning the production system means (De Nicolo et al (2011), Gebryelewicz et al (2014)), including their division into inherent and

non-inherent resources (see Dwiliński (2006)), which are necessary to achieve the production or service goal in the form of a number that may be interpreted in different ways, e.g. as a loss, effect, remaining risk, etc.
Neither international nor national literature does mention any mathematical model for measurement of sustainability of the production process, which would be adequate for such a spectrum of risk factors, characteristics describing such risks and vulnerability of the resources. It is only mentioned (in the aforesaid publications) that the appropriate selection of such model determines its effect.
The method proposed in the article, which replaces traditional measurements, is consistent with the theory describing a multifaceted approach, based on the generalized risk model used to assess the sustainability of the production process objects.

Method of assessment of sustainability of the production processes using the generalized/multifaceted risk model

Production process and description of its elements for the purpose of measurement of sustainability potential of the production processes

If something exists, it has certain features. The production process may be characterized by a set of attributes, which are shaped at particular stages of the lifecycle of the production system. A feature is a separate property of each material object (concrete) or piece of work (abstract). Therefore, the characteristics of the object of the production process refer to its structural, technological and exploitation properties/attributes, which may be defined (or preferably measured) and shaped during its operation. Such characteristics mainly result from the fact that the object of the production process should meet certain requirements established at the stage of formalization of assumptions. For the purposes hereof, the following definition of the production system was adopted – see Askarany (2007): "The production system is an intentionally designed and organized material, energetic and informational arrangement used by a person to create specific products, goods and services for the purpose of meeting the needs of consumers" [Figure 2].

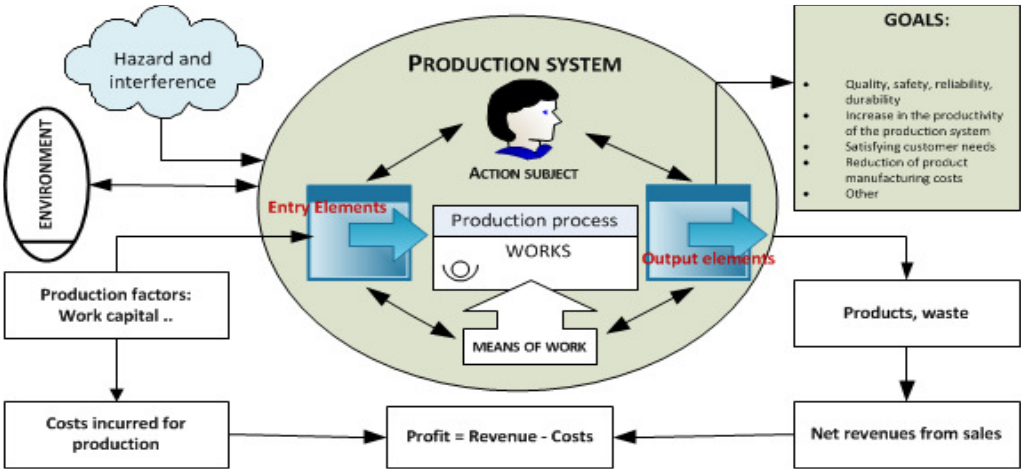

Figure 2: Illustration of basic objects of the production system and their relations.

According to PN-EN ISO 9000:2006 (currently PN-EN ISO 9000:2015-10), the concept of inherence is defined as the "... degree to which a set of inherent characteristics fulfills requirements". On this basis, the authors suggested using the aforesaid concept to describe a set (C) of characteristics of the object work resources, which, in light of the above-mentioned definition, are referred to as quality/reliability/sustainability of the object being an element of the production system/process. The inherent resources are composed of all elements that result from Y^{io} the set of inherent factors present

in the production process. One of the examples may be the sustainability potential of the object (P_t) described by sustainability of inherent object resources) (T^{io}). The maximum value of the object's sustainability (T^{io}_{max}) with respect to inherent resources limits its production capacity (as well as technological, structural, service capabilities and the possibility to execute other tasks, such as removal of natural disasters, etc.). The above may also include the general ability to manufacture both material and service products (e.g. transport products). However, the sustainability (level of use of inherent resources) (hence, (T^{io}_{max}) is strongly affected is strongly affected by the types and volumes of non-inherent resources (Dhillon (2006)), which may be described on the basis of operating life/sustainability with respect to non-inherent resources of the object (T^{nio}) – resulting from the attributes assigned thereto derived from the object management system. The method and quality of use (T^{nio}) are mainly described (according to the authors) by non-inherent factors (Y^{nio}) assigned and dependent on the so-called human factor, thus, they were called non-inherent resources of the object. It is difficult and sometimes even impossible to specify/distinguish (T^{io}) and (T^{nio}) in the operating time of the production/service product described herein as (P_t) in dependency relationship (1)). It is much easier to define Y^{io} and Y^{nio} as well as assess their impact on P_t. The result are the sets of ((C^{io}), (C^{nio}) attributes of the object work resources, both inherent and non-inherent, which are called the working potential of the object – P_t and described by dependency (1),

$$P_t = f\left((T^{io}), (T^{nio})\right); \quad P_t = g\left((C^{io}), (C^{nio})\right) \tag{1}$$

where:

C^{io} - the set of attributes, which may be used to describe the numerical indicator T^{io} (T^{io}_{max}),
C^{nio} - the set of attributes, which may be used to describe the numerical indicator T^{nio} (T^{nio}_{max}).

Mathematical model to measure sustainability of the production process

The following abbreviations are introduced [Figure3]:

- $\boldsymbol{C^{io}}$ - the set of inherent features used to describe the sustainability potential of the production process
- $\boldsymbol{C^{nio}}$ - the set of non-inherent features used to describe the sustainability potential of the production process
- **PO** - the set of vulnerability values, characteristics of weaknesses of the objects in the production process as regards their sustainability
- $\boldsymbol{Z}$ **-** the set of potential (hypothetical) or real (actual) risks, which constitutes a potential spectrum of external risks, external security, reliability and sustainability of the system production process
- **K** **-** the set of criteria for risk assessment
- **Ω** - the set of values $\mathbf{s} = \boldsymbol{\omega_{l,k}}$ used in the loss assessment process with respect to the set of **K** criteria
- $\boldsymbol{A}$ - the set of validity of the criteria from the set **K.**

The value of the sustainability potential in the production system and the risk of its loss is determined on the basis of the set of objects from the set of risks, including the limitations illustrated in Figure 3.

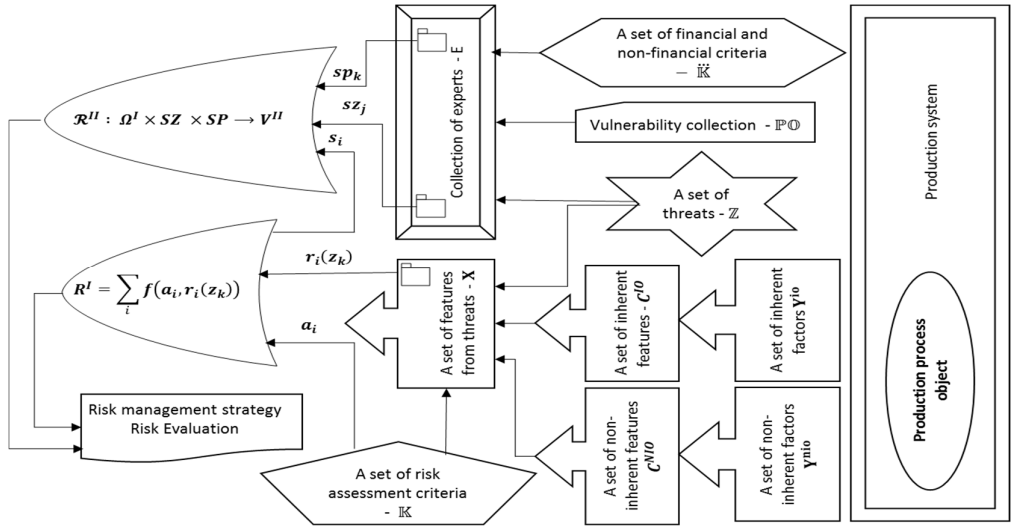

Figure 3: The illustration of the relations between the set of objects in the production system and other sets of: attributes, factors, risks, vulnerability included in the method for assessing the sustainability potential risk.

While assuming that the following transformations are known (see Idziaszek et al (2008)):

1) for the set of inherent and non-inherent characteristics describing the object from the production system in the context of sustainability potential

$$\Gamma : 2^{C^{IO}} \times 2^{C^{NIO}} \longrightarrow \mathrm{P};\ \gamma\left(C_i^{IO}, C_j^{NIO}\right) = p_{i,j} \in P_t; \tag{2}$$

2) for the set of criteria characterizing particular risk components

$$\Psi : 2^X \times 2^{PO} \longrightarrow \mathrm{K};\ \psi(X_i, PO_i) = k_i \in K \tag{3}$$

3) for the set of risks

$$\Phi : 2^K \longrightarrow \mathrm{Z};\ \phi(K_i) = z_k \in Z \tag{4}$$

It is possible to set a general risk measure expressed as dependency (5), illustrated in figure (Figure 3), used to measure the risk of loss of sustainability/production process:

I. Variant one (I):

$$\boldsymbol{\mathcal{R}^I} : \boldsymbol{Z} \longrightarrow \boldsymbol{V^I} \subset \mathbb{R};\ \mathbf{r}^{\boldsymbol{I}}(\boldsymbol{z_k}) = \mathbf{s} = \boldsymbol{\omega_{m,n}};\ \boldsymbol{\omega_{mn}} \in \boldsymbol{\Omega^I} \tag{5}$$

$$\boldsymbol{R}(\boldsymbol{z_k}) = \boldsymbol{f}\left(\boldsymbol{a_i}, \boldsymbol{r_i}(\boldsymbol{z_k})\right);\ \mathrm{k} = 1,2,\dots,\mathrm{N};\ \mathrm{i} = 1,2,\dots,\mathrm{M}. \tag{6}$$

$$\boldsymbol{R^I} = \textstyle\sum_i \boldsymbol{f}\left(\boldsymbol{a_i}, \boldsymbol{r_i}(\boldsymbol{z_k})\right), \tag{7}$$

where:

$\boldsymbol{r_i}(\boldsymbol{z_k})$ - the risk component for the kth risk from the point of view of the *i*-th criterion
$\boldsymbol{a_i}$ - validity of the kth criterion; $\boldsymbol{a_i} \in A$,
N - the number of the set of risks
M - the number of the set of criteria

II. Variant two (II):

$$\boldsymbol{\mathcal{R}^{II}} : \boldsymbol{\Omega^I} \times \boldsymbol{SZ} \times \boldsymbol{SP} \longrightarrow \boldsymbol{V^{II}} \subset \mathbb{R};\ \mathbf{r}^{\boldsymbol{II}}(\boldsymbol{s_i}, \boldsymbol{sz_j}, \boldsymbol{sp_k}) = \mathbf{s} = \boldsymbol{\omega_{ijk}};\ \boldsymbol{\omega_{ijk}} \in \boldsymbol{\Omega^{II}}. \tag{8}$$

where:

$\boldsymbol{\Omega^{II}}$ - the set of values reflecting the level of losses in the sustainability potential, based on the knowledge of the function: $P_t = f\left((T^{io}), (T^{nio})\right)$, $P_t = g\left((C^{io}), (C^{nio})\right)$ or the set of values, reflecting easy use of objects of the production process by the Z risk system with respect to the selected sets of K criteria,

$\boldsymbol{SZ}$ - the set of risks from set Z valuated by experts,

$\boldsymbol{SP}$ - the set of vulnerability from set PO valuated by experts,
$\boldsymbol{V^{II}}$ - the set of risk values.

The values s_i, sz_j, sp_k and the risk value are determined by the expert-mathematical method classified as heuristic methods. This method uses expert opinions. The method of determining individual values s_i, sz_j, sp_k and risk values using the mathematical method and its illustration are described in section 2 this article.

To make further considerations real and offer an insight into the sustainability measurement of the production process, the following assumptions are made:

I. The set of potential risks will be initially divided into three categories: natural risks, technical risks and social risks. The individual categories are then divided into the subcategories, classes and types. The static set of potential risks is transformed into the dynamic categories (kinematic) of real risks having direct impact on the security of a given production system/process, using the function of the system risk (Idziaszek et al (2014)), which is usually defined in the literature as the impact of uncertainty on the objectives or, in a more descriptive manner, as a random attribute of the decision-making process.

II. The set of criteria for risk assessment **K** = { k_i : (= 1,2, …)} may be decomposed into the following subsets:
   1) according to the role specified in the generally accepted definition of risk:
$$\boldsymbol{K_r} = \boldsymbol{K_r^M} \cup \boldsymbol{K_r^S}, \tag{9}$$
   where:

   $\boldsymbol{K^M}$ - the criteria describing the possibility of risk materialization
   $\boldsymbol{K^K}$ - the criteria describing the consequences of risk materialization
   2) according to the representative factors causing change of the sustainability potential (sustainability) of the production object/process/system:
$$\boldsymbol{K_t} = \boldsymbol{K_t^D} \cup \boldsymbol{K_t^{UZ}} \cup \boldsymbol{K_t^J} \cup \boldsymbol{K_t^{ZZ}}, \tag{10}$$

where:

a. $\boldsymbol{K_t^D}$ – the set of criteria describing changes in the properties of the production process, determining the change of its sustainability/workforce based on diagnostic parameters (Pd), e.g.:
   i. the criterion for change of parameters in the process of changing the workforce - $k_{zzp} \in \boldsymbol{K_t^D}$:
   ii. the criterion for change of parameters in the process of changing the usability - $k_{zu} \in \boldsymbol{K_t^D}$:
   iii. the criterion for change of parameters in the process of changing the workload - $k_{zo} \in \boldsymbol{K_t^D}$:
   iv. the criterion for change of parameters in the process of services - $k_{zob} \in \boldsymbol{K_t^D}$:
b. $\boldsymbol{K_t^{UZ}}$ - the set of criteria describing the change of task-based usability of the object:
   i. Change of work efficiency– $k_{ep} \in \boldsymbol{K_t^{UZ}}$.
   ii. Change of work parameters - $k_{pp} \in \boldsymbol{K_t^{UZ}}$,
   iii. Change of residual sustainability - $k_{tr} \in \boldsymbol{K_t^{UZ}}$,
   iv. Change of reliability - $k_{zz} \in \boldsymbol{K_t^{UZ}}$;
c. $\boldsymbol{K_t^J}$ – the set of criteria describing service change of the object:
   i. service quality - $k_{jo} \in \boldsymbol{K_t^J}$,
   ii. type of exploitation strategy - $k_{se} \in \boldsymbol{K_t^J}$,
   iii. materials used - $k_{sm} \in \boldsymbol{K_t^J}$,
   iv. service procedures used - $k_{po} \in \boldsymbol{K_t^J}$,
d. $\boldsymbol{K_t^{ZZ}}$ - the criteria for reduction the workforce of the object (consumption:

i. total sustainability - $k_{tc} \in \boldsymbol{K}_t^{ZZ}$:
ii. maximum object sustainability - $k_{tm} \in \boldsymbol{K}_t^{ZZ}$.

Bearing in mind the nature of impact of one or several criteria on other criteria from the $\boldsymbol{K}$ set and quantification scheme of the risk components, the set of risk criteria $\mathbf{K} = \{ k_i : (= 1,2, \ldots)\}$ may be decomposed into the following subsets:

$$\mathbf{K} = \mathbf{K}^T \cup \mathbf{K}^W, \tag{11}$$

where:

$\mathbf{K}^T$ - table criteria,
$\boldsymbol{K}^W$ - risk enhancers.

The table criteria, shown in the form of tables, may refer to any element from the $\mathbf{K}^T$. set. The table criteria are also called quantification schemes of the risk component for the selected criterion. They directly describe the effects of risk materialization. The quantification scheme of the risk component for a given criterion, i.e. "consequences of risk materialization", organized in the form of a table, is presented as an example in Table 1.

Table 1: Quantification scheme of the risk component for the criterion "consequences of risk materialization"

[j]	Level [$\omega_{1,j}$]	Description
1	Low/green [value – 1]	**Incident**, i.e. every event other than an accident or serious accident, having impact on the sustainability, reliability or security of the production system.
2	Medium/yellow [value – 3]	**Accident/damage**, i.e. unwanted or unintentional sudden event or sequence of events having serious impact on the sustainability, reliability or security of the production system
3	High/red [value – 5]	**Serious accident/failure**, i.e. an accident resulting from a collision or failure, causing substantial damage to the objects of the production system or environment, and other similar accident having the same effects and obvious impact on the sustainability, reliability or security of the production system.

The authors of the article assumed that the risk components resulting from some criteria are in the form of coefficients affecting the risk value resulting from other criteria. A similar concept was put forward in study Marais et al (2012). Furthermore, it is assumed that:

- risk enhancers are characterized by natural numbers w ($w \in \mathbb{N}$), such as the number of technical features or number of diagnostic services in 24 hours.
- the maximum permissible value of characteristics is known and designated as w_{MAX}.

The impact of such enhancer on the general risk measure is defined by its coefficient, determining the set of measured risk levels according to a given criterion:

$$\Omega_w = \{1 + \alpha \cdot \frac{0}{w_{MAX}}, 1 + \alpha \cdot \frac{1}{w_{MAX}}, , \ldots ,1 + \alpha \cdot \frac{w_{MAX}}{w_{MAX}}, \}, \tag{12}$$

where:

Ω_w - the set of measured risk levels,
A - risk enhancer coefficient,
w_{MAX} - the highest permitted value of characteristics.

In such case, the level of the risk component is defined using the following formula:

$$r_w = 1 + \cdot \frac{w}{w_{MAX}}, \tag{13}$$

where:

r_w - the level of the risk component according to the risk enhancer,
w - the value of the analyzed characteristics,

α - risk enhancer coefficient,
w_{MAX} - the highest permitted value of characteristics.
Due to the nature of the risk enhancers, it is assumed that their validity is always 1.

Illustration of the examples

Illustration of the example for variant I

To present the assumptions of the developed risk model, seven examples of criteria referring to both the possibility of risk materialization and its effects have been used in this article. The model consists of four types of segments divided according to the representative processes that have impact on the change of workforce of the object. The chart of such criteria for risk assessment are shown in Figure 4.

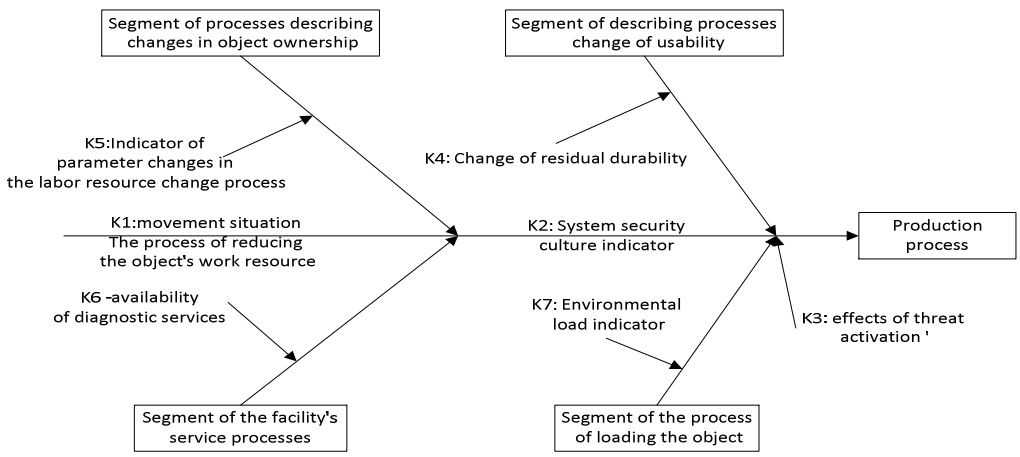

Figure 4: Chart of risk analysis criteria used in the proposed risk model

Due to editing requirements of the article, subsequent chapters do not include any discussion of the quantification schemes for risk components for K4-K7 criteria.

K1 criterion called "movement situation" allows to include the load of the analyzed production process. The value of the risk component according to the said criterion is defined by the following formula:

$$r_w = 1 + \cdot \frac{w}{w_{MAX}}, \tag{14}$$

where:

r_w - the level of the risk component according to the risk enhancer,
w - the value of the analyzed characteristics, e.g. daily usage of total sustainability - Tc
α - risk enhancer coefficient,
w_{MAX} - the highest permitted value of characteristics, e.g. maximum object sustainability - Tm

The above-mentioned criterion is in the form of the risk enhancer.
Another criterion, i.e. K2 "culture security ratio", is aimed at reflecting the general level of security of the production system. The most adequate means for describing the general security level of the production system is one of the ratios from the set of *Common Safety Targets* (CST) expressed as the following formula:

$$OPB = \frac{fatalities\ and\ weighted\ seriously\ injured\ (FWSI)}{number\ of\ man-hours}, \tag{15}$$

The group of the so-called *weighted serious injuries* includes persons, who spent more than 24h in hospital due to an accident. The OPB ratio is calculated for the subsequent calendar years and compared to the *National Reference Value*. The proposed quantification scheme of the risk component for K2 criterion is shown in Table 2.

Table 2: Quantification scheme of risk component for K2 criterion "culture security ratio" (explanation in the text)

j	Level	Description
1	Green	OPB≤0,5·NRV
2	Yellow	0,5·NRV<OPB≤NRV
3	Red	OPB>NRV

The values of the risk components according to the following four criteria are calculated separately for each of the segments. The quantification scheme of risk component for K3 criterion called "effects of risk materialization" is shown in Table 1 of this article.

The K1-K7 criteria (Figure 4) applied herein may be classified in two groups reflecting their functions in the widely accepted definition of risk:

- the criteria describing the possibility of risk materialization: K1 "movement situation" and K3 "effects of risk materialization" and K5 "change of parameters in the process of changing the workforce"
- the criteria describing the consequences of risk materialization: K1 "movement situation", K2 "effects of risk materialization", K4 "change of residual sustainability", K6 "availability of diagnostic services".

On the basis of the presented quantification, it is evident that K1 criterion "movement situation" may belong to two groups at the same time. The criterion describes a possibility of risk materialization – the quicker the objects of the production process lose their sustainability potential, the more probable becomes the loss of continuity of the production system.

The sets of measured risk levels for the adopted risk assessment criteria are as follows:

$$\Omega_1 = \{\ 1 + 0{,}1 \cdot \frac{1}{T_m},\ 1 + 0{,}1 \cdot \frac{2}{T_m},\ \ldots,\ 1 + 01 \cdot \frac{T_c}{T_m}\ \}, \tag{16}$$

for K1 risk enhancer called "movement situation" and $\Omega_i = \{1,2,3\}$; i = 2,3,4,5,6 for other table criteria. It is usually assumed that the criteria referring to the effects of risk materialization should have twice as high impact on the final risk value. Therefore, the following set of validity measures of the analysis criteria have been proposed: ={1,1,3,3,3}. Eventually, the risk may be assessed in accordance with the following formula:

$$R(z_k) = a_1 \cdot r_1(\textstyle\sum_{i=2}^{7} a_i \cdot r_i). \tag{17}$$

The obtained results must be then compared with the threshold values of the risk levels, which should facilitate to make appropriate decisions concerning the maintenance of the production process.

Table 3: Risk valuation scheme

Risk measure value	Risk category
$R(z_k) \leq V^{ra}$	Acceptable risk, V^{ra} – value of acceptable risk
$V^{ra} < R(z_k) \leq V^{rt}$	Tolerable risk V^{rt} – level of tolerable risk
$R(z_k) > V^{rt}$	Non-acceptable risk

Illustration of the example for variant II

As mentioned in section 1.2. the risk value for option II is determined based on the formula (18):

$$\mathcal{R}^{II} : \Omega^{I} \times SZ \times SP \longrightarrow V^{II} \subset \mathbb{R};\ \mathbf{r}^{II}(s_i, sz_j, sp_k) = \mathbf{s} = \omega_{ijk};\ \omega_{ijk} \in \Omega^{II}. \tag{18}$$

The values s_i, sz_j, sp_k and the risk value are determined by the expert-mathematical method classified as heuristic methods. This method uses expert opinions. The results of applying the mathematical expert method are illustrated in Figure 5.

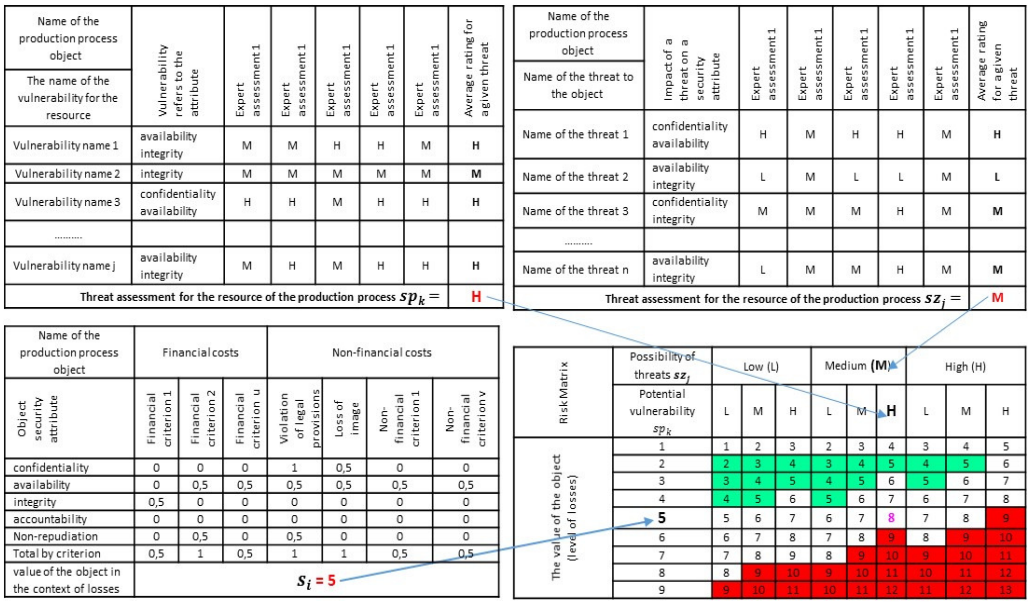

Name of the production process object / The name of the vulnerability for the resource	Vulnerability refers to the attribute	Expert assessment 1	Expert assessment 1	Expert assessment 1	Expert assessment 1	Expert assessment 1	Average rating for agiven threat
Vulnerability name 1	availability integrity	M	M	H	H	M	**H**
Vulnerability name 2	integrity	M	M	M	M	M	**M**
Vulnerability name 3	confidentiality availability	H	H	M	H	H	**H**
.....							
Vulnerability name j	availability integrity	M	H	M	H	H	**H**
Threat assessment for the resource of the production process $sp_k =$							H

Name of the production process object / Name of the threat to the object	Impact of a threat on a security attribute	Expert assessment 1	Expert assessment 1	Expert assessment 1	Expert assessment 1	Expert assessment 1	Average rating for agiven threat
Name of the threat 1	confidentiality availability	H	M	H	H	M	**H**
Name of the threat 2	availability integrity	L	M	L	L	M	**L**
Name of the threat 3	confidentiality integrity	M	M	M	H	M	**M**
.....							
Name of the threat n	availability integrity	L	M	M	H	M	**M**
Threat assessment for the resource of the production process $sz_j =$							M

Name of the production process object	Financial costs			Non-financial costs			
Object security attribute	Financial criterion 1	Financial criterion 2	Financial criterion u	Violation of legal provisions	Loss of image	Non-financial criterion 1	Non-financial criterion v
confidentiality	0	0	0	1	0,5	0	0
availability	0	0,5	0,5	0,5	0,5	0,5	0,5
integrity	0,5	0	0	0	0	0	0
accountability	0	0	0	0	0	0	0
Non-repudiation	0	0,5	0	0,5	0	0	0
Total by criterion	0,5	1	0,5	1	1	0,5	0,5
value of the object in the context of losses	$s_i = 5$						

Risk Matrix	Possibility of threats sz_j	Low (L)			Medium (M)			High (H)		
	Potential vulnerability sp_k	L	M	H	L	M	H	L	M	H
The value of the object (level of losses)	1	1	2	3	2	3	4	3	4	5
	2	2	3	4	3	4	5	4	5	6
	3	3	4	5	4	5	6	5	6	7
	4	4	5	6	5	6	7	6	7	8
	5	5	6	7	6	7	8	7	8	9
	6	6	7	8	7	8	9	8	9	10
	7	7	8	9	8	9	10	9	10	11
	8	8	9	10	9	10	11	10	11	12
	9	9	10	11	10	11	12	11	12	13

Figure 5: Illustration of the method for setting risk values and $s_i \in \Omega^{I}, sz_j \in SZ, sp_k \in SP$ values.

Summary

In summary, it may be stated that the above-described method seems correct and appropriate and allows to analyze the lifetime of the object of the production system due to the nature of changes of the diagnostic parameters or sustainability potential. The presented calculation model for variant 1 and illustration of the method for setting risk values for variant 2 could make it possible to verify the developed model and highlight the application values of the discussed method. The method may be useful in further studies on streamlining both the production processes and production system. Furthermore, due to its universal character, the described method may successfully be used to define residual sustainability of any technical object, whose technical condition is determined on the basis of the analysis of diagnostic parameters, including the sustainability potential. The method outlined in this article may be further improved and extended to cover other cases of accumulation of random changes in the production environment and its surrounding. It also seems that the aforesaid method may be used to assess security, reliability and continuity of the production processes.

This article constitutes the first step for developing the method for assessing sustainability of the production process, which will support managers in their daily work. While considering the lack of objectivity in the opinion of experts, the limited access to essential data and many other well-known methods or models for assessment of usability, reliability or sustainability of the production processes, the authors believe that such an area of research still requires further studies allowing to establish a

comprehensive approach to the measurement and assessment of sustainability of the production processes or systems.

The studies and measurement of sustainability are becoming more and more significant not only as the grounds for improving production processes, but also as one of the possibilities of obtaining reliable information necessary to interpret and forecast events or create scientific theories. Therefore, a theory may be treated as a certain doctrine, encouraging to take specific practical actions on the basis thereof.

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CSR Expenditure Pattern of Indian Corporates-A Case Study of Bharat Petroleum Corporation LTD-KOCHI Refinery

Veena M
Department of Commerce and Management,
Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham University,
Kochi, India
Email Id: veenaamohan2017@gmail.com

Dr. N Ajithkumar
Department of Commerce and Management
Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham University,
Kochi, India
Email Id: najithkumar3000@gmail.com

Abstract

Adherence to legislation of section 135 by India has witnessed a huge increment in the course of the last five years. Organizations on a growing rate comply with a major part of the regulations as determined in the Companies Act,2013 concerning Corporate Social Responsibility. India's pattern on CSR consumption obviously demonstrates their enthusiasm to contribute towards nation building. This study intents to examine the pattern of current CSR expenditure by a giant Indian corporate and on the basis of this pattern anticipate its future spending through regression analysis. The paper culminates on the note that inclusion of compulsion in the CSR Act has achieved a significant increment in the CSR spending by Indian Companies, which shows Indian corporate's readiness to add to stakeholder prosperity.

Keywords*:* Corporate Social Responsibility, CSR Expenditure, Regression Analysis, Time Series Data.

Introduction

Every business organization has an obligation to consider the stake of buyers, suppliers, investors, society and environmental contemplations in all dimensions of their activities. This commitment is termed as Corporate Social Responsibility (CSR). In the words of Mahatma Gandhi," a businessman has to act only as a trustee of the society for whatever he has gained from the society. At the end of the day all the resources belong to the general public". Society offers to organizations the power to claim and use land and assets of the environment. In the fullness of time all of the resources belong to the general public. Srivastava AK et al (2017) mentioned that according to the most recent change in the Indian Companies act 2013 specifying the social obligation of corporate called Corporate Social Responsibility, it's required that organizations with a turnover of Rs. 1000 crore or net profit of Rs 5 crore or more, devote 2% of their average net profits for the previous consecutive 3 financial years towards Corporate Social Responsibility. In India the business concerns have been extremely circumspect and rational in conducting socially responsible initiatives and inculcating them into the core of their business.

Over these years, since its inception, it has been conspicuously developed inchmeal in the background of Indian corporate sector since businesses have perceived and accepted the fact that other than scaling heights in business, it is additionally imperative to build mutually dependable and congenial connections with the society on the whole. Organizations these days have distinct departments and committees that formulate well-defined goals, procedures, and strategies for their socially inclined projects and develop discrete financial plans to achieve those.

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More often than not, such initiatives rely on utmost characterized social convictions as well as painstakingly aligned with the concerns' business space. The most appropriate CSR plans guarantee that while business concerns follow enactments, their ventures likewise regard the development and prelation of the less fortunate segments of the society and the nature. CSR ought to be having a long-lasting impact comprising of organizational affairs that can be carried out without adversely influencing their business objectives. The basic target of CSR activities of businesses at present is to elevate the companies' functional imprint in the minds of general public and stakeholders. CSR approaches, strategies and endeavors are in effect extensively adopted by a tremendous number of organizations all throughout their core activities and decisions.

Bharat Petroleum Corporation Ltd (BPCL), Fortune 500 organization, with an aggregate equity of US$ 5.1 billion, is a major entity in the oil division in the nation. It has processing plants at Mumbai, Kochi, Numaligarh and Bina. BPCL obtained authority over Kochi Refineries Limited (KR) by purchasing the state's stake in March 2001.As a result of the merger, the organization was renamed as BPCL-Kochi Refinery (Bharat Petroleum Corporation Ltd (BPCL)-Company History,2019). This processing plant is perceived as a standout amongst other refineries in India with worldwide degrees of greatness. Subsequently, this processing plant is one of the most appreciated, respected and profitable organization with Maharatna status setting a footprint for others to follow.

Need and Significance of the study

Since the enforcement of compulsory CSR spending in 2014, CSR expenditure by business concerns of India has expanded astoundingly. In 2018, organizations disbursed 47 percent higher when contrasted with the sum in 2014-15, contributing US$1 billion to CSR activities, as indicated by a review. Listed organizations in India spent more than INR 100 billion (US$1.4 billion) in different projects extending from education related projects, skill improvement, social government assistance, medical services, to nature protection, while the contribution to Prime Minister 's Fund alone witnessed an expansion of 139 percent in CSR commitment over the recent one year. Considering the recent alterations to CSR legislations, industrial studies and research gauges CSR adherence to rise and extend up to 98% by the year 2019-2020 (Shira, D ,2020). Bharat Petroleum Corporation Limited is a significant organization in India focused on society's welfare through its Corporate Social Responsibility activities the nation over. Being a leading company, BPCL perceive their duty considering the society and have been operating faithfully for the advancement of weaker sections of the society for quite a long time. Therefore, it is imperative to analyze the trend of CSR spending by this giant corporate based on which the current and maturing organizations in India can figure out the CSR spending by this top organization other than their future turnover and benefits and can in like manner plan their CSR procedures also.

Objective of the study

The intention of this paper is to look over the trend of CSR spending of BPCL towards CSR initiatives post the time of deliberate spending which is from financial year 2014-2020 (i.e. after the execution of CSR Act 2014) and depending on the outcomes, assess whether inclusion of such an amendment in the Companies Act 2013 was significant or not and also to identify the trend of CSR expenditure by BPCL in Kerala. Moreover, the study also intends to predict the CSR expenditure for the coming financial years 2021 and 2022.

Hypothesis

Based on the objective of the study the following hypothesis was formulated:
H_0: There is no significant linear trend on the amount spent in CSR activities by BPCL.

Methodology

In order to analyze the trend of CSR expenditure by BPCL-KR for the period 2014-20, secondary data has been used to assess the amount spent on CSR activities by BPCL in Kerala. The aggregate

figure invested by BPCL-KR from 2014 to 2020 (post the implementation of CSR Act) has been taken by clubbing the amount spent in each CSR activity to arrive at a consolidated figure. The secondary data has been retrieved from the BPCL'S CSR reports published in their website. This study is a time series analysis where time is taken as the Independent Variable and the amount spent in CSR activities each year is the Dependent Variable. ANOVA was used to test the formulated hypothesis and to analyze the results regression analysis was used.

Scope of the study

The study is aimed to predict the CSR amount that will be spent by BPCL in the future for the period 2021 to 2022. From this trend the future turnover of BPCL can be predicted by the company itself as well as by other companies. Besides it aids the company to forecast its future worth, control the cash flow accordingly and take informed as well as prompt business decisions. Added to this the competing firms can plan their moves against the company.

Results and Discussion

Now it is imperative to examine the model fit of the amount spent in CSR activities by BPCL for the period 2014-2020. Based on the data, F test was done, F -value is 29.68. P value is .0028 which is lower than the normally accepted level of significance (5%). Consequently, the null hypothesis is rejected which means, there is significant linear trend on the amount spent in CSR activities by BPCL. This implies the model is fit for prediction, based on which the r^2 (regression) value was examined and, in this study, it is 85.6%. This implies that, with the support of period, the amount spent for CSR activities by BPCL can be predicted as to the extent of 85.6%. The correlation value is 92.5%.

Table 1: Regression Analysis

	r^2	0.856	n	7	
	r	0.925	k	1	
	Std. Error	48030448.4	Dep. Var.	**Amount spent in Rupees (in Crores)**	
ANOVA table					
Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	68,47,15,74,70,39,94,900.	1	68,47,15,74,70,39,94,900.0	29.68	.0028*
Residual	11,53,46,19,90,41,23,700.0	5	2,30,69,23,98,08,24,740.0	Result	
Total	80,00,61,94,60,81,18,600.0	6		Significant	

Table 2: Regression output

variables	*coefficients*	*std. error*	*t (df=5)*	*p-value*
Intercept	-99,63,82,21,780.4286			
t	4,94,51,121.1429	90,76,901.5734	5.448	.0028

Based on the regression output the OLS equation is formulated as follows:

*Amount spent in CSR activities= -99,63,82,21,780.4286 + (period * 4,94,51,121.1429)*

Table 3: Predicted Values for amount spent in CSR in Rupees (in crores)

			95% Confidence Intervals	
t	**Amount spent in Rupees (in Crores)**	**Predicted**	**lower**	**upper**
2,014	1,11,25,000.0	-4,36,63,798.7	-12,77,91,832.1	4,04,64,234.6
2,015	1,40,84,000.0	57,87,322.4	-6,02,08,136.6	7,17,82,781.4
2,016	1,98,30,210.0	5,52,38,443.6	30,64,452.1	10,74,12,435.0
2,017	3,98,34,209.0	10,46,89,564.7	5,80,23,728.1	15,13,55,401.3
2,018	13,21,53,000.0	15,41,40,685.9	10,19,66,694.4	20,63,14,677.3
2,019	21,35,50,000.0	20,35,91,807.0	13,75,96,348.0	26,95,87,266.0
2,020	30,22,50,534.0	25,30,42,928.1	16,89,14,894.8	33,71,70,961.5
2,021		30,24,94,049.3	19,81,46,066.4	40,68,42,032.2
2,022		35,19,45,170.4	22,62,93,559.9	47,75,96,780.9

The above table explains about the consolidated amount spent by BPCL-KR each year based on which prediction for the years 2021 and 2022 is done. If the trend continues like this, the amount spent will be Rs.30,24,94,049.3 and in 2022 it will be Rs.35,19,45,170.4.

The above details are depicted in the chart below. The chart shows a rising linear trend from the year 2014 to 2020.

Chart 1

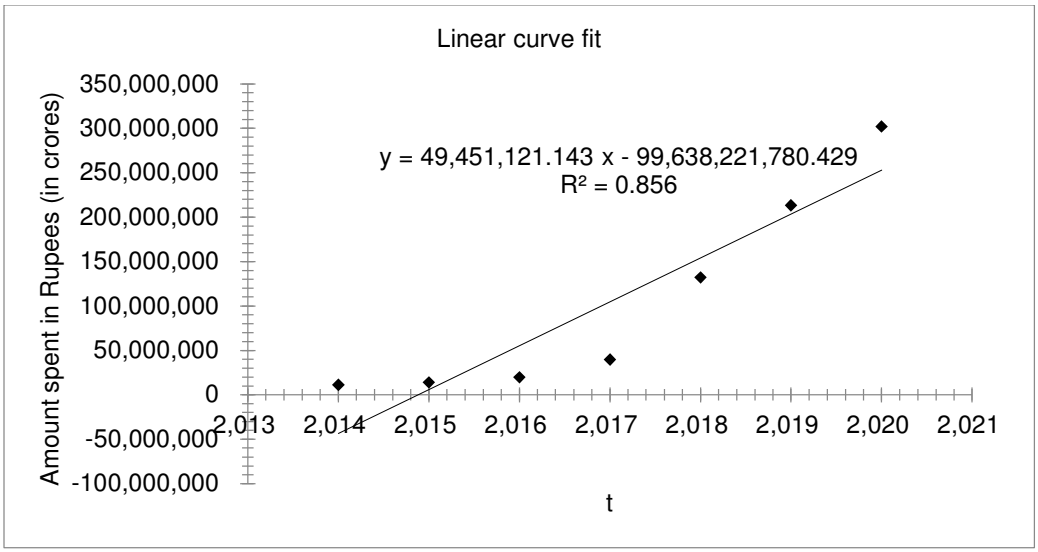

Chart 1: Trend of CSR expenditure

Conclusion

It can be culminated from the study that after the insertion of CSR legislation, the company in this study has shown a rising trend in the CSR expenditure till date and further it could be predicted that the company would continue to contribute immensely to the society's welfare .Overall the study supports other continuing and new companies to plan their firm's strategies to face cutthroat competition. Besides companies can decide on their CSR strategies as well. The Act indicates a tremendous progress in the CSR expenditure by the Indian companies which is threefold since 2014-15 according to many industrial researches. Therefore, it can be undoubtedly concluded that mandatory CSR legislation in India has accelerated the CSR expenditure of corporate sector. This indeed specifies India's willingness to add to the wellbeing of its stake groups specially the community in its proximity, which in a way brings about improved brand review among the stakeholders.

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Hexacopter Model Development Using Advanced Simulation Procedures

Mihai Alin STAMATE
Department of Robots and Manufacturing Systems,
Politehnica University of Bucharest, Romania, stamyhay@yahoo.com

Adrian Florin NICOLESCU
Department of Robots and Manufacturing Systems,
Politehnica University of Bucharest, Romania, afnicolescu@yahoo.com

Cristina PUPĂZĂ
Department of Robots and Manufacturing Systems,
University Politehnica of Bucharest, Romania, cristina.pupaza@upb.ro

Abstract

During the last decades enormous efforts and development attempts have been made regarding the research and expansion of the Unmanned Aerial Vehicles due to their outstanding usefulness in a wide range of applications. Hexacopters have a stable flight behavior at high wind speeds and high load capacity. However, the most common problems arise when it leaves the nominal conditions (hover flight) or tries to perform aggressive maneuvers. The lack of horizontal force control makes it almost impossible to preside over the position independently from the vehicle's attitude, limiting the possible control solutions. This is the reason why Computational Fluid Dynamics (CFD) combined with structural analysis regarding propellers behavior during hovering can help the designer to gather valuable information which, combined with different flight regimes, may contribute to appropriate control solutions. This work is focused on a practical combination of Computer Aided Engineering techniques that enforce traditional design of hexacopters. The aerodynamics of an improved hexacopter model is employed to demonstrate the efficiency of the new design strategy in product development. A study comprising three scenarios with different horizontal wind speeds is presened and remarks regarding the modeling and simulation procedures are included. The novelty of the work consists in the innovative solution of CFD parameter extraction to emerge data for the control system, as well as for the verification of the stability and maneuverability of the hexacopter.

Keywords: hexacopter, high-speed wind, CFD, horizontal airflow.

Introduction

The hexacopter model presented in this paper has six rotors, each of them consisting of a brushless DC motor and a 2-blade fixed-pitch propeller. The propeller disk planes are all mounted within a plane which is parallel to the ground. In this case the changes in drone's attitude are accomplished by varying each of the rotors speeds, in order to create six different thrust forces, thus lift forces, and rotation torques around the rotation center axis, respectively. The hexacopter can perform hover flight, short vertical take-off and landing (SVTOL) as well as roll, pitch and yaw movements, respectively. From another perspective, the improved hexacopter model is an unstable dynamical six-degree of freedom system consisting of three-dimensional translation and rotational movements. The vertical translation motion is obtained by modifying all six rotor speeds simultaneously, thus altering the magnitude of the six vertical thrust forces. Therefore, the hexacopter has highly nonlinear multivariable dynamics, coupled and underactuated, since it has six degrees of freedom and only four actuators (throttle, roll, pitch and yaw), thus making it impossible to operate without a feedback controller action.

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Design and development of heavy lift hexacopter for high payload has recently been analyzed to assure flight in stable attitude (Suprapto et. al, 2017). Assessment was focused on the frame displacement and stress analysis to assure the expected payload. Lei and Cheng (2019) recently reported CFD experimental and simulation investigation of a small dimension UAV model at light breeze wind influences. The study is comprehensive, but the geometry of the prototype, as well as the flow regimes proved to be below common UAV applications. The downwash flow fields at different hovering heights were simulated and analyzed by Zeng et al (2018) for plant protection. Even though the study is compelling, the accomplishments are very particular for the agricultural science and engineering. An interesting approach based on surface morphing technologies for aircraft blade structures was completed in an original Computer Aided approach (Rusu et al, 2018). Although numerous studies were undertaken on hexacopters from different perspectives, CFD analysis for this type of hexacopters was stated mainly by software development companies, in order to prove the solvers capabilities, because it is still considered a tough modeling and simulation problem, not been appropriate for common design purposes. The reduction of the computational model, tuning the size of the mesh with the computational resources and the choice of suitable computational models is considered difficult to be achieved. In the case of six rotors, the propellers rotating domains are so close to each other that the narrow space induces even more modeling issues.

The novelty of the research consists in the combination of the CFD approach with the structural evaluation to provide useful knowledge for the hexacopter developer in order to achieve stable hovering flight. The effect of the wind interference amongst rotors was also investigated. This work is structured as follows: after a brief introduction, aerodynamic issues related to Hex-rotor UAV are discussed with respect to Computer Aided Engineering (CAE) procedures. Then the model preparation and remarks about the computational strategy are introduced in detail in the next section. Numerical simulation scenarios with two different horizontal airflow inlets and results discussion are included in the fourth section and concluding remarks, as well as future development of the work are described in the last section.

The structure of a hexacopter UAV

A hexacopter UAV is a Short Vertical Take-off and Landing (SVTOL) multirotor device, equipped with six rotors, each one consisting of a brushless DC motor and a two-blade fixed-pitch propeller, mounted on top of the motor. Fig. 1 illustrates the improved hexacopter, developed and employed within this approach. All rotors are located on a plane which is parallel to the ground surface. They are arranged in a circle around the main body axis of the aircraft, spaced at 120 degrees apart, with legs attached to the body to allow a safe and steady landing.

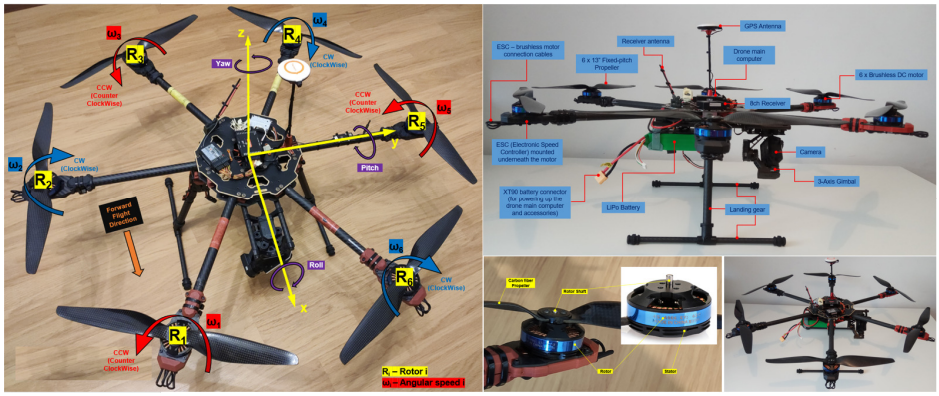

Fig. 1: Hexacopter developed and used in CFD study

Compared to a quadcopter, which is one of the most common used types of multirotor drone due to its characteristics: fast, highly maneuverable, relatively cheap and easy to build - the hexacopter brings several important advantages:

- first, two additional motors mean 30% additional power, which results in an increased lift force and thrust force respectively, thus offering the possibility of carrying much heavier payloads. Also, the increased thrust force makes the hexacopter reach faster speeds than the quadcopter. The two extra rotors also allow the hexacopter to fly at higher altitudes;
- due to its 6-rotor system, it provides a more stable flight and can be reliably controlled even at high wind speeds;
- the most important and critical feature of a hexacopter is its robustness and therefore a lower chance of crashing. The 6-rotor system not only provides a more stable flight and more powerful, but it also is an important safety feature. Thus, in case of a motor or propeller failure, a hexacopter can still be controlled and maintained in flight along the path, with the remaining 5 rotors. The flight controller can use the remaining five rotors to balance each other out and preserve a stable flight long enough until the operator can land the drone safely.

Hexacopter Design Approach

The proposed approach consists of three main stages: a geometry modeling and defeaturing step followed by the CFD computation in order to calculate the thrust force on each propeller and to evaluate the displacements on the mechanical structure of the hexacopter. The last stage is a novel fluid-structure interaction strategy to evaluate the effect of the air turbulences on the hovering of the hexacopter.

The improved UAV model was designed in SolidWorks, defeatured and imported in the preprocessing system - CAD & Geometry defeaturing stage (Fig.2). The rotors are arranged within a radius of 350 mm as illustrated in the detail. Then the propellers faces were mapped and the topology was edited and checked for mesh reliability. The flow domains were built with respect to the mesh motion approach that express the rotation of the air around each propeller, where a particularly fine mesh was generated - CFD Simulation step. Inflation layers were built around propeller faces and the size of the elements was decreased to avoid continuity issues during computation. Due to the relative proximity of the six rotors and the rotating meshes, contact regions overlapping were carefully avoided. The last stage consists in a Structural dynamics simulation that enables the designer to emphasize the effect of the flow turbulences on the mechanical structure and to retrieve suitable data for the stability and maneuverability of the hexacopter.

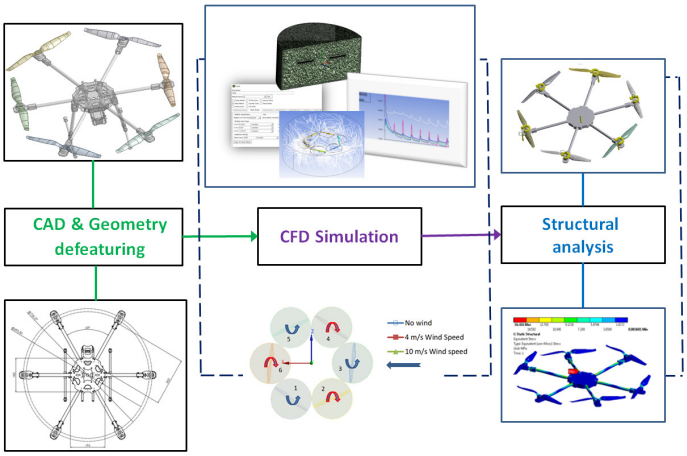

Fig. 2: Novel design approach for the improved hexacopter development

Simulation scenarios and results discussion

The previously described CAE project was completed for three simulation scenarios with respect to the wind speed on the horizontal direction: no wind, wind speed of 4 m/s and 10 m/s respectively. The angular velocity of the rotors had the maximum value of 6500 rpm. The velocities contour in the central vertical plane for wind velocities of 0 and 10 m/s correspondingly are illustrated in Fig. 3. Wind influence on the turbulent flow of the propellers that appear in this plane section can be observed and the dissipation of the central turbulence is noticeable. The turbulences are diverted by the side wind.

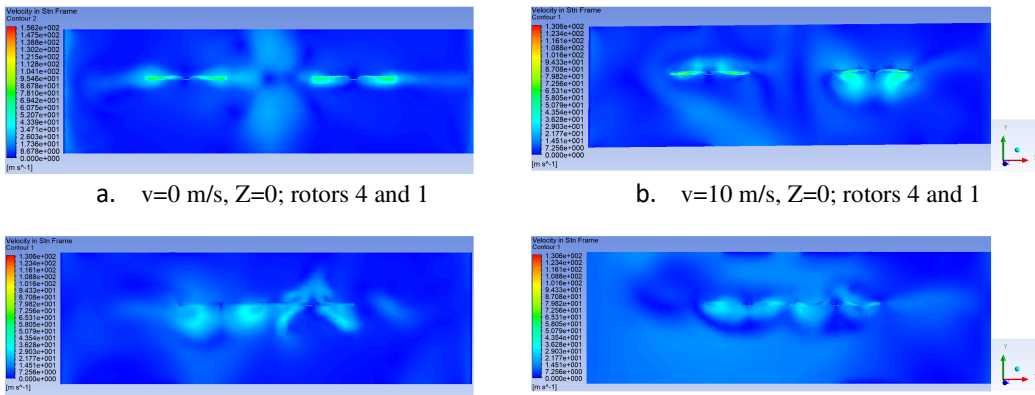

a. v=0 m/s, Z=0; rotors 4 and 1

b. v=10 m/s, Z=0; rotors 4 and 1

c. v=10 m/s, Z=-0.349m; rotors 5 and 6

d. v=10 m/s, Z=0.349m; rotors 3 and 2

Fig. 3: Pressure distribution in the rotors vertical plane

The response thrust force values of the six blades were between 0 and 9 N in absolute values as reccomended. The lift forces were exported to a dynamic analysis and the spatial orientation of the hexacopter structure according to air pressure caused by the interfered turbulences, rotational velocity of the six rotors and the acceleration of the hexacopter was evaluated. Finally, a static analysis was performed and the maximum displacement of the rotors at different simulation times was processed. Fig. 4 illustrates the deformed structure of the hexacopter superposed with the undeformed one, in the YZ plane. The directional deformation at 0.25s proves a low maximum value of 0.5 mm and assures the hovering stability.

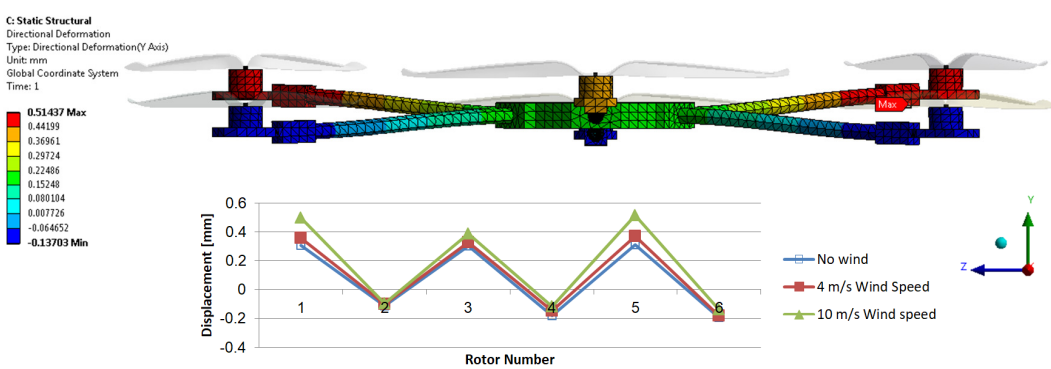

Fig. 4: Directional deformation of the mechanical structure after 0.25 s hovering

Conclusion

CFD simulation is essential for the aerodynamic stability, assurance of low power consumption, a stable flight behavior at high wind speeds, as well as a high payload capacity and drone autonomy, which are mandatory requirements when launching a new powerful hexacopter in order to meet the customer's requirements. The work presents a novel approach for modeling and simulation of an increased performance UAV system, considering the maximum rotational velocity of the rotors and the influence of two high wind scenarios acting in the horizontal plane. The pressure distribution and the thrust forces were exported in a structural analysis of the propellers to emphasize the influence of the CFD response parameters on the stability and maneuverability of the hexacopter. Future work will extend the aerodynamic flow conditions to different wind regimes and action angles. A wide-ranging research on flow regime optimization is now in progress. The forward flight speed of the hexacopter should also be considered in a realistic simulation approach and the rotational velocity of the propellers will be tuned with experimental data.

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Problems and Ways to Improve the Technology of Remote Release of Goods

Irina A. GOKINAEVA
the North-Western Institute of Management of the Russian Presidential Academy of National economy and Public administration, St. Petersburg, Russia, gokinaeva-ia@ranepa.ru

Daria A. KIRILLOVA
the North-Western Institute of Management of the Russian Presidential Academy of National economy and Public administration, St. Petersburg, Russia, kirillova-da@ranepa.ru

Natalya A. DENISOVA
the North-Western Institute of Management of the Russian Presidential Academy of National economy and Public administration, St. Petersburg, Russia, denisova-naa@ranepa.ru

Elena G. USTYUGOVA
the North-Western Institute of Management of the Russian Presidential Academy of National economy and Public administration, St. Petersburg, Russia, ustyugova-eg@ranepa.ru

Svetlana N. BORISOVA
the North-Western Institute of Management of the Russian Presidential Academy of National economy and Public administration, St. Petersburg, Russia, borisova-sn@ranepa.ru

Abstract

The relevance of this research is because the introduction of innovative customs technologies allows you to speed up and simplify customs operations, increase the efficiency of customs control and ensure the formation of a new «artificial intelligence», quickly reconfigurable, «smart» electronic customs. The article deals with the customs technology of remote release of goods used by the customs authorities of the Russian Federation. In this paper, the authors identified the main problems of using customs technology for remote release of goods by customs authorities and gave recommendations for its improvement.

Keywords: Customs Technology for Remote Release of Goods, Electronic Customs, Electronic Declaration Centers, Customs Control.

Introduction

The world of information technology is transforming all spheres of society, influencing on characteristics of the implementation of state functions and ways of exercising state power.

One of the strategic directions for the development of the customs service of the Russian Federation is to improve customs regulation. Now, this is not possible without the introduction of customs information technologies.

The purpose of introducing customs information technologies is to speed up and simplify customs operations, improve the efficiency of customs control, and reduce the time and financial costs associated with foreign economic activity.

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One of the most promising and actively used customs information technologies is the technology of remote release of goods, aimed at optimizing the actions of customs authorities to speed up customs operations without losing the quality of customs control.

At the moment, the Russian Federation is undergoing a restructuring of customs authorities – customs authorities are being formed that specialize in electronic Declaration of goods, using the technology of remote release of goods, such as electronic Declaration centers, on the basis of which electronic customs are being formed. The technology of remote release of goods is one of the resources to the formation and improvement of e-customs, so the analysis practices, identifying problems of application of this technology is necessary for maximum automation and simplification of customs processes – hence the relevance of the chosen topic.

The purpose of the study is to develop proposals for solving the problems of using the technology of remote release of goods by electronic Declaration centers by the customs authorities of the Russian Federation.

Problems arising from the application of technology of remote release of goods

In order to create favorable conditions for foreign economic activity and increase the competitiveness of the economy, customs authorities are taking measures to improve customs administration and introduce new promising technologies, such as: electronic Declaration technology, remote release of goods, automatic Declaration technology for goods, automatic release of goods, electronic Declaration technology for customs transit procedures, pre-notification technology, etc.

Remote release technology is based on the use of remote release in electronic Declaration centers. They are essentially a specialized customs body whose competence is limited exclusively to performing customs operations in respect of goods declared in electronic form, including using the Internet. The work of e-customs centers is based on the use of remote release-customs Declaration technology, in which the Declaration of goods is submitted to the internal customs authority and the actual control is carried out at the border customs. With the help of remote release technology, participants in foreign economic activity can submit a Declaration for goods in electronic form to the electronic Declaration center, and in this case the cargo, that is actually located at the border can be released into free circulation.

Due to the increase in the concentration of the Declaration array in the centers of electronic Declaration and the active spread of the use of remote release technology, a number of problems arise when using this technology, namely:

– problems of the process of remote product release technology;
– problems of interaction of electronic Declaration centers with external customs authorities and functional departments.

More than 8 years have passed since the introduction of remote release technology, customs infrastructure and new customs information technologies have been actively implemented, but the legislative framework has not changed since its adoption-which leads to the irrelevance and inconsistency of the regulatory process with the actively changing reality.

Thus, the problem of the process of remote release of goods technology is related to the non-relevance and lack of information of reconciliation by an external customs authority.

The report on reconciliation results requires the division of information by product, but the information in the transit Declaration about the product batch can be presented with generalized and mixed information: the name of the product batch, product code, total gross weight, total cost. Thus, when comparing information about a multi-item batch, the report is not informative and the comparison time may take a long time, almost not fitting into the specified time – which also affects the quality of the reconciliation.

In identifying obvious non-compliances, details of the transit Declaration and the goods Declaration at customs on the possibility of issuing instructions to customs inspection (customs inspection) that would have a positive impact on the quality of verification.
If automatic registration of the goods Declaration and the automatic release of goods manually verification of the data external customs authority produces, and verify the completion of the customs procedure of customs transit is not provided, that is, the release of goods may be effected before the completion of the customs procedure of customs transit, and therefore, when applying for the temporary storage of the notification on release of goods which entails the issuance of goods from the warehouse of temporary storage without completing the customs procedure of customs transit.

Thus, the reconciliation process is a problematic issue and requires attention, review of relevance and new regulations for its implementation.

The problems of the remote release technology process also include software flaws in the form of duplicates of the goods Declaration. Duplicates of the goods Declaration appear when the declarant submits several goods declarations for the same consignment, which leads to double work of customs authorities and even double automatic release of goods.

The technology of remote release of goods implies active cooperation and interaction of external customs authorities, internal customs authorities with functional departments of customs authorities both in the framework of customs operations, and in conducting customs control before and after the release of goods.

If the technology of remote release of goods has been used for more than 8 years, the interaction system is still not fully debugged and is accompanied by a number of problematic issues.

There are difficulties in interacting with external customs authorities located in a different time zone. On the territory of Russia there are 11 time zones, if the region of the internal customs marked the whole of Russia, respectively for 8-and 12-hour work shift period of time of active interaction of the short – term of customs Declaration and release of goods increased, accordingly, there are temporary workers costs like customs authorities and business.

Despite the active development and promotion of electronic document management in the customs authorities, electronic Declaration centers still maintain paper document management with functional customs departments within the framework of customs control forms and measures.

One of the shortcomings of the bundles functionality is that the external customs authority does not have the ability to notify the internal customs authority about the extension of the deadline for completing the customs procedure of customs transit in connection with the actual control in accordance with measures to minimize the risk profile. The deadline for comparing information is 3 hours, and the extension of the completion of the customs procedure of customs transit is possible up to 10 working days, which leads to violation of many deadlines (the deadline for reconciliation, registration of an electronic Declaration for goods, etc.).

Thus, at the moment, when using the technology of remote release of goods, there are a number of problematic issues that can be grouped as shortcomings of the technological process and shortcomings in the interaction of customs authorities when using this technology and conducting customs control. The solution of the identified problems is necessary for further improvement of the technology of remote release of goods.

Recommendations for solving the identified problems of using remote product release technology

The first group of problems includes the shortcomings of the technological process of remote release of goods.

To solve the problem of reconciliation and generate a report on its results, the following is proposed:

– unification of information required for reconciliation in accordance with the structure of the goods Declaration and transit Declaration;
– development of a new report form on reconciliation results, taking into account the opinion of an expert group of external customs officials on this issue;
– review of the relevance of «manual» reconciliation and consideration of the possibility of implementing an algorithm for automatic reconciliation of the Declaration of goods and transit Declaration, other information and documents-use of the reconciliation algorithm used for automatic registration of the Declaration of goods and automatic release of goods.

In order to prevent the delivery of goods from temporary storage without completing the customs procedure of customs transit, when applying automatic registration of the Declaration for goods and automatic release of goods, several measures must be taken, for example, changes in legislation – the regulation of the use of technology of remote release only after the completion of the customs procedure of customs transit, as well as the introduction of a software tool validates the completion of the customs procedure of customs transit in the form of auto completion message transit.

As part of the functioning of the software used by declarants, it is necessary to consider a measure to identify duplicates, for example:

– software of the customs authority-automatic comparison of several columns of the array of the Declaration for goods from this declarant and notification of the customs inspector about finding identical declarations;
– declarant's software-when creating an identical Declaration for goods – notification of possible submission of a duplicate Declaration.

In addition, when eliminating the possibility of submitting duplicate declarations, one of the problems identified in the interaction of external and internal customs authorities when using remote release of goods technology is solved: the presence of several requests for placing goods in a temporary storage warehouse.

To minimize time costs and improve interaction between customs authorities in different time zones, it is proposed to transfer internal customs authorities to 24-hour work, which will increase the speed of customs operations and reduce the burden on customs inspectors in the morning.

For the development of electronic document management and full transition to it, it is necessary to create new systems:

– providing access to functional departments to electronic versions of the goods Declaration with a set of documents;
– creation and development of platforms using the blockchain system for obtaining documents and information of participants in foreign economic activity for customs purposes.

In General, the solution of the identified problems is necessary for the most convenient and efficient work of customs authorities, as well as for expanding the potential of remote release of goods technology as the main base for accepting the entire Declaration array.

Improving the technology of remote release of goods

One of the ways to improve the technology of remote release of goods can be the use of foreign experience. As noted earlier, the technology of remote release of goods is a complex technology that operates with the help of many resources.

Since the technology of remote release of goods is the basis of the new customs system-electronic customs, this technology must contain digital, electronic resources. When considering the foreign

experience of using electronic Declaration technologies, the most interesting information is about the use of the Internet platform «NTP» by the Singapore customs service since 2018.
The government of Singapore for foreign trade participants, including those from abroad, created this platform. The essence of this Internet resource and its difference from the «single window» was briefly described by the Minister of Finance of Singapore Heng Swii kit: «NTP is a transformational platform that will take us from the traditional national single window, which gives trading companies a universal interface for all regulated transactions related to trade, to a universal interface that will allow it to interact with all business partners, stakeholders and regulators». To organize the interaction of all participants on this Internet resource, the blockchain system is used.

The blockchain is a digital storage of data-documents that are digital records combined in a «chain» of cryptographically and chronologically related «blocks».

Using complex mathematical algorithms, the «block» is linked to the previous one, meaning that new «blocks» are added only at the very end of the «chain». Next, computers on the same network perform encryption, and after receiving the same result, a unique digital signature is assigned to the «block». After updating the registry and creating a new «block», the data cannot be changed, that is, it is impossible to fake it. If you try to change the original documents, they will get a new digital signature, which will indicate a discrepancy in the system.

In other words, the blockchain will allow both external customs authorities and internal customs authorities to conduct customs control without requesting information and documents from participants in foreign economic activity, which minimizes the possibility of submitting forged documents, which, for example, is very important in verifying the certificate of origin of goods. Using this system when using remote product release technology will allow you to:

- be sure of the authenticity of the submitted documents (permits, transport, transaction, etc.);
- establish communication between all participants of foreign economic activity and their business partners;
- full transition to paperless operation;
- prevention of financial crimes;
- quickly get the necessary information and documents.

Thus, the creation of a new blockchain platform for interaction between participants in foreign economic activity and their business partners, following the example of the government and the customs service of Singapore, will help to improve the technology of remote release of goods and solve problems such as paper document circulation and document forgery.

The new system can also be integrated into the actively used «personal account of a foreign trade participant».

In order to extend the use of remote goods release technology in the customs territory of the Eurasian economic Union, attention should be paid to the experience of the European Union member States in the General legal regulation of centralized clearance and work on the harmonization of electronic Declaration systems for interaction between customs services.

Conclusion

The study identified the main problems associated with remote release technology.

We have developed possible recommendations for improving the remote product release technology:

- development of a new report form on reconciliation results and an algorithm for automatic reconciliation of information;

– changing the legal framework for applying the technology of remote release of goods only after the completion of the customs procedure of customs transit – implementation of the algorithm for checking the fact of completion of transit in software;

– automation of the process of finding duplicates of the goods Declaration;

– carrying out analytical work to identify the necessary «links» for the interaction of the external customs authority, the internal customs authority and the functional departments of customs;

– transfer of internal customs authorities to a 24-hour working day;

– providing functional departments with access to electronic product declarations and electronic documents and information;

– development of an Internet platform based on the blockchain system for interaction of all interested and involved persons in foreign economic activity and for fast and effective customs control when using remote release of goods technology.

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On the Experience of Using Vitagenic Learning in Teaching Information Security in Higher Education

Larisa Yu. OVSYANITSKAYA

Financial University under the Government of the Russian Federation, Ural branch, Department of Mathematics and Computer Science, International Institute of Design and Service, Department of Mathematics and Computer Science, Chelyabinsk City, Russian Federation, larovs@rambler.ru

Yulia V. LYSENKO

Financial University under the Government of the Russian Federation, Ural branch, Department of Economics, Finance and Management, South-Ural State Humanitarian Pedagogical University, Department of Economics, Management and Law, Chelyabinsk City, Russian Federation, lysenkoyulia@mail.ru

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Abstract

At present, almost all state, professional and personal information of a person is displayed and stored in digital format. It has been shown that the loss or disclosure of this information can lead to serious reputational or financial losses. Attention is paid to the issues of the influence of a new phenomenon in society - a passive and active digital footprint of a person on his safety. The article shows that training in information security is not limited to the traditional study of technical and organizational aspects of the issue. It is proved that when teaching this subject in higher education, it is necessary to attract the vitagenic experience of students, which contributes to the awareness of the need to comply with information security rules. The paper presents the pedagogical approaches and methods used by the authors, teachers of higher educational institutions, to achieve this goal. Shown are specific examples of practical training with students based on vitagenic learning and using the described technologies.
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Keywords*:* Vitagenic Learning, Information Competence, Bachelors.

Introduction. Information security training features

Currently, all household, social and professional activities of people are subject to digital transformation. According to statistics, the number of users of the portal of Public Services is already more than 75% of the population of Russia and continues to grow (Audience and statistics of the portal of public services, 2020). More than 2/3 of the country's population entrusted all their personal data to the electronic system. Other portals: banking systems, numerous personal accounts in online stores, educational, entertainment sites and others, in total, may have even greater coverage.

As you know, to ensure security and confidentiality, software and hardware systems are used, which are based on mathematical algorithms that have the highest degree of resistance to hacking. But not a single algorithm can resist the human factor, which is expressed in illiterate actions or, on the contrary, inaction, when implementing the procedure for entering and working with electronic resources, using standard

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passwords of the same type, refusing to install antivirus software, noncompliance with organizational and legal norms during work with electronic signature keys.

Compromise of personal data can now threaten not only temporary and reputational, but also financial losses.

These actions are caused by three reasons: lack of knowledge about the consequences of their actions, careless and irresponsible approach to the situation, ignoring danger, acting according to a single template and naivety and excessive trustfulness and frankness with virtual interlocutors.

The next factor, which was not very important a few years ago, but is gaining special importance now, is the digital footprint. The term has synonyms: (digital fingerprint, digital shadow, cyber shadow). A digital footprint is information about a user that remains on the Internet after browsing sites (Shamsutdinova, 2020; Buchanan, 2016). The trail will be passive if the user only views the pages, and

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active if he leaves comments, conducts correspondence, leaves "likes". Taken together, the analysis of a person's Internet activity creates his virtual image, which is actively used by Internet marketers. The term appeared: doxing (search for open and confidential information about a person without his knowledge).

On the one hand, receiving targeted advertising in reasonable amounts is beneficial to users and commercial organizations, leads to an improvement in the quality of customer service, on the other hand, the situation is much deeper and more serious.

The interaction of social and technical sciences promotes the research and development of automated methods for extracting and analyzing digital footprints to predict a person's personality traits. These forecasts can be used for a variety of purposes, including tailoring online services to improve user experience (Azucar, Marengo and Settanni, 2018).

The user's virtual image can be represented by a kind of system of filters (Shamsutdinova, 2020), which track, analyze and rank goods, places, friends according to the degree of importance for the user. An informational "microclimate" is gradually created around a person. His personal virtual space on social networks is likely to include the products and services recommended to him, friends who share his opinion and interests. A large number of such friends can gradually influence a person's worldview and motives, contributing to the purchase of goods or services (Sjöberg M. et al, 2016).

According to research (Boudlaie, Nargesian and Keshavarz, 2019), employers are increasingly recognizing that information available on social networking sites influences recruitment decisions, including recruitment, training, promotions and firing (Brown and Vaughn, 2011). Moreover, 70% of recruiting managers surveyed rejected candidates due to their unreliable online reputation (McGrath, 2012).

In our opinion, information security issues receive very little attention in the process of secondary, higher and additional professional training.

Let us analyze how the basics of information security are taught in higher education. A special subject is provided only for areas of training related to computer networks or programming. In other areas of training, the basics of information security are considered one topic in the subjects "Informatics" or "Information technology in professional activities", which is given several academic hours.

The technology and pedagogical approaches to teaching are most often standard: lecture and practical tasks, familiarization with the theoretical aspects of the issue, problem solving.

However, such traditional methods are absolutely inadequate to realizing the vital importance of the issue. After listening to the lecture and solving the problem, the student may be aware of the existing regulations, organizational and legal norms and technical measures, but he will not realize the rigor of their implementation, because he does not understand that the risks that the teacher is talking about are not virtual, but directly concern him, his friends and relatives. He will not waste his personal time and money on information security.

Therefore, we have developed a technology for teaching information security students based on their vitagenic experience.

The Vitagenic Experience of Man. Literature review

Any student has a domestic, social or professional life experience that should be used as a useful and important source of learning.

In the late 90s. last century A.S. Belkin proposed a vitagenic approach to learning (Belkin, 1999). This approach is based on the actualization or demand of a person's life experience, his intellectual, psychological, moral potential.

A.S. Belkin shared the experience of life and life (vitagenic) experience. Life experience can be understood as all the information received by a person during his conscious life. It can be everyday information, facts heard or read in the media or heard from friends or acquaintances, and are not of sufficient value for him. Under life or vitagenic experience, one can represent information that is already the property of the individual, is stored in long-term memory, and is in a state of readiness for use. It is important and relevant to a person.

At the same time, the transition of life experience into life or vitagenous experience is carried out only when it turned out that life experience has social or value significance, it is necessary to solve a problem that has arisen, or allows you to predict and design the future by analyzing your own mistakes or achievements (Belkin and Verbitskaya, 2007.

Analyzing our own pedagogical experience (Ovsyanitskaya, 2015), works (Belkin and Svinina, 2007; Krivenko, 2009; Bicheva and, Kitov, 2015), we understand that it is the vitagenic approach to teaching information security to students of higher education that will allow developing a technology for conducting classes in such in such a way that all studied topics:

- considered and discussed from the point of view of the personal safety of the student, his relatives or friends;
- could confirm the social significance of a particular issue and the scale of the problem raised not declaratively, but based on the results of a scientific experiment that was initiated and conducted by the student;
- based on situations that occurred in real life of students, their friends or relatives;
- demanded the involvement of life (vitagenic) experience in solving this problem. At the same time, a student's vitagenic experience can be not only successful, but also negative. It is this attraction of negative vitagenic experience that is reflected in the proverb ‘learn from mistakes’.

Approaches in adult education based on vitagenic experience is considered as an andragogic theory of vitagenic education (Khodjaev, 2019; Isyanov, 2020), which has the following characteristic features: actualization and use as a source of the entire spectrum of personal and universal human experience in everyday, life, vitagenic components; awareness of education as a process of using and transforming vitagenic experience into a new quality; awareness of the intrinsic value of an adult's vitagenic experience as the basis for his future continuous self-education, development as a professional and personality (Cox and Gunderman, 2017; González and Montoya, 2019; Tomos and Clark, 2018).

Below we present an adaptation of A.S. Belkin and N.O. Verbitskaya to create a methodology for the formation of students' competence in the field of information security, that is, to contribute to the formation not only of the technical aspects of the issue of compliance with the rules and regulations and the competent use of software and hardware tools, but a conscious, valuable, analytical attitude to this issue.

Pedagogical methods and technologies required to implement the vitagenic approach for teaching information security students

To solve the set task, we analyzed the pedagogical approaches, methods and principles on the basis of which the developed teaching technology will be. We have chosen the following approaches and methods.

Holographic (multidimensional) approach.

As you know, a holographic image is an image that allows a person to observe an object from different angles, from different sides. The principle of a physical phenomenon formed the basis of a holographic or, it is also called, a multidimensional approach to education.

In the work (Belkin, 2000), the author argues that in order for a person to master understanding, and not to have a list of knowledge, he needs a holographic portrait of the phenomenon, and this is possible only if there are different interpretations of the question. The holographic or multidimensional approach involves the use of various technologies, methods, techniques, forms and means that allow one to represent the studied object in all its dimensions and manifestations, from a different angle of view (Belkin and Vozzhenikova, 2004).

An example of the application of the holographic approach.

Topic of the lesson: ‘Spam’.

Spam is the mass mailing of advertising correspondence, mainly emails or messages, to people who have not expressed a desire to receive it. Most often, spam contains advertisements for products or services.

Some people do not pay attention to spam, to others it seems to be: an annoying factor, an action that carries a danger through possible malicious inclusions, a phenomenon that takes away expensive employees' time, the work of fraudsters. However, there are also those who receive money from spam: advertisers, advertising agencies, spam providers and senders. Some recipients find useful information in spam because spam becomes targeted. The legal interpretation of this phenomenon is also quite complex.

Such a different view of one phenomenon requires consideration of it from the point of view of all participants in the process, from customers of spam to executors and recipients.

During the lesson, a holographic approach is used, which allows you to evaluate one phenomenon from different positions and develop your own judgment. During the business game, students imagine themselves in different roles, study this controversial phenomenon from different angles.

The result of the lesson is the understanding that:

- behind every case of malware or spam, there is a financially interested person who finances the project. Creating viruses and sending spam is not an annoying factor, but a well-organized business;
- understanding the need to install modern licensed software to protect against malware;
- skills and abilities to perform elementary actions that prevent viruses from entering the computer.

Topic of the lesson: ‘Information protection by transforming it. The main directions of using cryptographic methods’.

In the classroom, we simulate the process of electronic document flow: students create electronic encryption keys, exchange self-encrypted and / or signed e-mail messages, work out patterns of behavior of bona fide participants in the document flow, imitate the actions of intruders trying to replace the text or authorship of a document and using social engineering methods to access passwords. Learn about common social engineering techniques.

Familiarization with the psychological aspects and basic patterns of social engineering - methods and techniques of deceiving people, leading to the fact that they themselves provide passwords or other information that helps attackers to breach the security of the system, as well as considering objects of study from different, opposite sides allows:

- to realize the almost absolute reliability of algorithms and procedures for electronic document management for the protection of transmitted information, but, at the same time, the possibility of compromising information if users violate elementary rules.
- to form a competent attitude to the generation, use, storage and destruction of electronic signature keys, excluding human factor interference in information security algorithms.

Heuristic learning (Greek Heurisko - looking for, finding, opening).

The purpose of heuristic teaching is the student's search and awareness of his own meaning, goals and content of phenomena and processes, the constant discovery of new, often unexpected, aspects and aspects of the studied subject.

An example of using heuristic learning.

Topic of the lesson: ‘Rules for choosing passwords. Calculation of entropy and password bit space’.

In the lesson, we first calculate the entropy and bit space of passwords and substantiate, on the basis of the data obtained, the required number and variants of symbols for various information systems, and conduct brainstorming sessions that allow us to create our own mnemonic rules for the ability to remember a password that is cryptographically resistant to attempts to crack a password.

Result:

- the formed skill of recognizing the attack of malefactors aimed at users of the information system in order to master the information about passwords.
- the ability to calculate the required number and variants of the symbols used in the generated password, depending on the purpose of the information system.

3. The principle of interactivity and facilitation. These principles are based on the interaction between the participants in the educational process, the teacher and students, students among themselves using modern means of communication. When facilitating learning, the teacher takes a position not "above", but "together" with the trainees, he forms the ability to draw conclusions, find new facets of problems in the situation under consideration (Tatarenkova and Kibets, 2015).

The purpose of using this principle is to create a comfortable learning environment that helps students feel their success and intellectual consistency. The learning process involves discussions and dialogues leading to the joint solution of personally significant problems for each student.

Topic of the lesson: “Identification, authentication, authorization of users. Mutable attacks and mutable defense. "

In the lesson, specific examples are analyzed, ranging from fabulous ("Sesame, open up", to modern ones - the information system of the university, ATM, Internet store, bank information system, and the identification of the identifier, authenticator, owner, authentication mechanism, access control mechanism. make and substantiate proposals on the required and sufficient number and types of authenticators in each case (password, smart card, e-token, biometric data).

The result of the lesson is knowledge about modern threats and the skill of recognizing malicious attacks aimed at users of the information system.

4. Participant observation is a research method that allows you to conduct research in everyday life circumstances and study the problem "from the inside", to find out the reasons for the internal motivation of people who have performed certain correct or erroneous operations with information through their activities.

Starting from the first lesson, we initiate students' own scientific research related to information security. The beginning of the research is the interviews conducted by them with relatives, acquaintances, friends about various aspects of information security, about the observance of security measures at the enterprises in which they work. Seeing a real, not a hypothetical theoretical situation, and having received information not from virtual, but real respondents, students:

- see the real and current situation in the field of information security;
- are convinced of the truth or falsity of their assumptions;
- can make scientifically and practically based proposals to reduce the risk of threats of various kinds;
- analyze existing threats from your own home computer, perform operations to minimize risks.

The result of the lesson is the awareness of the possibility of obtaining real damage if the simplest rules of information security are not followed. Students offer specific ways to counter the identified threats and form recommendations for the leaders of the hypothetical considered organizations that will maximize the reduction of information security threats. For example, the rules for delimiting user access to the resources of the information system, conducting periodic training of personnel, organizing security and access to the system, organizing accounting, storing, using and destroying documents and media, organizing explicit and hidden control over the work of users, creating physical obstacles to ways of penetration of violators, etc.

5. Authentic assessment - assessment of the formation of students' abilities and skills to protect information by placing them in a situation as close as possible to real everyday or professional life.Topic of the lesson: “Identification, authentication, authorization of users. Features of processing, storage and transfer of personal data ”.

After studying theoretical material, students imitate the roles of the operator and owner of personal data. Scenarios of actions in the case of personal and remote communication of participants, the use of well-known information systems with the storage of information about personal data in the "cloud" located in Russia and abroad are being worked out. Existing threats from your own smartphone or home computer are analyzed, measures are developed to minimize risks.

Result: awareness of the possibility of real damage if the simplest rules of information security are not followed. Ability and skills to minimize risks on a smartphone and home computer. Understanding that the home computer also contains information, discrediting which can lead to financial and temporary losses.

Students who are interested in this topic continue to study it in more depth. The topic becomes the basis for future articles for the conference.

Results

The use of vitagenic training, based on the analysis of the many years of experience of the authors of teaching information security in universities, made it possible to achieve:

- to consider all the studied topics and tasks from the point of view of the student's personal safety, relying not only on theoretical knowledge, but to a greater extent on the students' experience. The result is a deep understanding and realization that the slightest violation of the simplest rules of information security can lead to real financial or reputational damage;
- the teacher to observe from the sidelines the course of the discussion, thoughts and intervene at the moment when it is necessary to transfer the discussion to a new channel or, on the contrary, having heard an interesting proposal, not to let it get lost, but to develop the conversation in this direction;
- teach students to identify and eliminate obvious internal and external causes of various types of threats and eliminate the causes of their occurrence, as well as to acquire the skill of recognizing an attack by malefactors aimed at users of information systems in order to master information about passwords;
- to make it clear that behind every case of malware or spam there is a financially stakeholder who finances this project.

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The Importance of Honey Plants In Sustainable Agriculture Management

Constanta Laura AUGUSTIN (ZUGRAVU)
"Dunărea de Jos" University of Galaţi, Romania
zugravulaura@yahoo.com

Maria Magdalena TUREK RAHOVEANU
"Dunărea de Jos" University of Galaţi, Romania
mturek2003@yahoo.com

Loredana DIMA
"Dunărea de Jos" University of Galaţi, Romania
dim_lore@yahoo.com

Ionica SOARE
"Dunărea de Jos" University of Galaţi, Romania
soareionica@gmail.com

Gheorghe Adrian ZUGRAVU
"Dunărea de Jos" University of Galaţi, Romania
zugravuadrian@yahoo.com

Abstract

The aims of this paper are to analysis potential of honey plants for an intensive beekeeping. This research on biological diversity has shown that pollination is a primary service within the ecosystem that is threatened worldwide. By harnessing the potential of honey plants, in this way, more productive intensive beekeeping systems can be developed that offer the benefit of sustainable ecosystems. The place of honey bees in terms of pollination of agricultural crops should be left to the wild bees that can be introduced through specific measures within agro-ecosystems and can do the pollination of agricultural crops much better than honey bees.

Keywords*:* intensive beekeeping, honey plants

INTRODUCTION

Honey production and honey consumption in the member countries of the European Union (EU) are indicators based on which the EU is considered the second largest producer of bee products in the world and a major player in the bee products market. According to EUROSTAT data, EU honey bee production was around 250 000 tonnes in 2018, accounting for 13.3% of world production. The European production of honey bees, according to statistics, covers only 60% of the annual needs of European consumers. The consumption of honey at European level, according to EUROSTAT, represents about 20-25% of the world consumption of honey, representing an average consumption of 0.70 kilograms per person per year. The EU is thus one of the largest importers of bee honey, with annual honey bee imports ranging from 120 000 to 150 000 tonnes. The main suppliers of honey bees are China, with 63 900 tonnes (43% of total EU imports), Argentina, with 22 300 tonnes, Mexico, with 21200 tonnes, and Ukraine, with 8 900 tonnes of honey. At the same time, the lower price of bee products from China is a determining factor leading to a decrease in honey bee exports from EU Member States.

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Amid the shrinking populations of wild bees, modern agriculture has become almost dependent, we could say, on honey bees to meet the needs of pollination services. There are over 20,000 species of bees worldwide, and 750 of them are found in Central Europe. Some of the wild bee species are considered general pollinators because they can pollinate a diverse range of flowers, while others are described as specialized and dependent on certain plant species in terms of their survival, as noted by (Lowenstein et. al, 2015). That said, not all bees prefer the same plant species. Nature specializes in diversity, so that certain species of plants must be compatible with the species of bees that perform pollination. The efficiency of pollination activity is particularly important for the optimal yields that can be obtained in agricultural crops. Thus, for the production of strawberries, a combination of wild bees and honey bees is recommended to obtain quality fruits. Analyzing the state of research regarding the pollination crisis, it becomes clear that the diversity of wild bee species is considered essential for the sustainable production of agricultural crops. Honey bees have long been considered the most important in crop pollination, but there is a growing body of scientific evidence that indicates that wild honey bees contribute substantially to agricultural crop pollination services, much more than previously thought (Lowenstein et. al, 2014). Thus, in a reference study on the problem of pollination that analyzed different production systems in plant cultivation, it was found that even though honey bees deposit a large amount of pollen, they make it quite inefficient (Koh et. al, 2016). Wild pollinators, represented mainly by wild bees, have had remarkable results in pollination efficiency in agricultural crops and have also been able to increase fruit production at least twice as compared to honey bees. Moreover, flowers pollinated by wild pollinators have also produced results in terms of fruit production. Thus, we can say that honey bees that are generally considered as a substitute for wild pollinators, not only do not maximize pollination results but also fail to fully replace the contributions of wild insect pollinators in terms of pollination for the whole range. of agricultural crops and on all types of agricultural land. Research presented by Groff et. al (2016) confirmed that these pollinator communities represented by wild bees offer the best pollination services, better adapted to agricultural crops and wild plants than honey bees. Moreover, research has shown that the yields of pollinated agricultural crops are more unstable when in that region we have a pollinating community that consists of fewer species. Thus, in order to increase the yields of agricultural crops through successful pollination, different populations of wild bee species are therefore essential. The activity of pollination of agricultural crops by bees generates a significant increase in crop yields.

Impact of Cultivation Method

The bees need access to a semi-natural habitat for survival, to ensure nesting sites and also to provide them with pollen feed and nectar from wild flowers. Thus, natural and semi-natural habitats are needed to support bees. The presence of high quality natural and semi-natural habitats on farms and in agricultural landscapes such as: strips of honey plants interspersed in agricultural crops, wooded areas, living hedges and the edges of grassy fields are essential for the survival of wild bees.

The mint crops of the species Lophantus Anisatus, offer the advantage of a perennial crop with a vegetation period of 9 months per year of which 6 months is flowering. Scientific studies have shown that the areas in which the share of semi-natural habitat in farms and in the agricultural landscape has increased have favored increasing diversity and populations of wild bees. In contrast to semi-natural habitats, industrially managed intensive agricultural fields, which are typically cultivated with large-scale monocultures, which offer only a small semi-natural habitat, have the lowest biodiversity and the smallest populations of wild bees.

The landscapes of industrial intensive agriculture do not support the populations of wild bees and also the pollination services they offer. Organic farming has shown that agriculture without synthetic chemical pesticides and biological pest control is viable. Organic farming does not use synthetic chemical pesticides and measures are being used to increase the biological control of pests. These measures include encouraging natural enemies, such as birds, certain cockroaches, spiders and parasitoids, which are means of biocontrol of pests in agricultural crops. Some scientific studies have shown that natural enemies can suppress harmful insects from crops, thus providing a biological means of controlling natural pests. Scientific research has also shown that the diversity and abundance of natural enemies are enhanced in organic farms (Barratt et. al, 2018).

Agricultural landscapes that have greater heterogeneity and diversity, which are represented by small outgrowths of the semi-natural habitat, support a greater number of natural enemies and thus have the greatest potential for pest biocontrol. The simplified agricultural landscapes that are typical of intensive industrial agriculture do not favor the biodiversity of the natural enemies of the pests of agricultural crops. The use of synthetic chemical pesticides also affects these species which can be used for the biocontrol of pests. Functional agro-biodiversity is a concept that refers to those elements of the biodiversity of land or agricultural landscapes, which provide ecosystem services and which support sustainable agricultural production. Successful implementation of agro-biodiversity has also included measures to develop mixtures of wild flower seeds that are sown alongside or within agricultural crops to provide pollen and floral nectar resources for bees. These seed mixtures have also been developed to enhance the biodiversity of natural enemies and which are used for pest control. The key factors known as the main causes for the decline of bee populations are as follows:

• intensification of land use due to industrial production methods that led to habitat loss;
• the use of toxic pesticides for bees and the use of herbicides on the edges of agricultural lands that destroy the wild flowers that the bees feed on;
• pathogens, diseases and parasites;
• the effects of climate change.

Results And Discussions

The intensification of agricultural land use, urbanization and intensification of agriculture were thus the main causes that led to the destruction and fragmentation of natural habitats. These destroyed habitats refer to the loss of live fences, shrubs, old fields, natural grasslands, field edges and forests. With the loss of this natural and semi-natural habitat, there was a decrease in the diversity of wild plants. Loss of these habitats and loss of wild flower diversity have resulted in loss of nesting habitat and bee feed resources. Research shows that habitat loss can cause both a reduction in wildlife diversity of bees and biodiversity of natural enemies (Morin et. al, 2009). Intensive agriculture has also led to a shift from traditional hay meadows, flower-rich habitats that represent a very important food resource for wild bees, for silage production. To the loss of habitats, agricultural practices represented by soil processing, irrigation and elimination of woody vegetation, which destroy the nesting sites of wild bees (Holmes et. al, 2015).

Rapeseed crops can provide an alternative source of food for some species of wild bees, which can effectively exploit crop flowers. This food source cannot be used by all species. The integration of intensive beekeeping with aquaponics offers an efficient production model, which attaches great importance to wild bees in pollinating agricultural crops. The agricultural crops offer food resources for a limited period only during the summer season for several weeks. This surplus of food is thus a limited resource for wild bees and honey that need pollen and nectar resources throughout the feeding season. The acclimatization and introduction into the culture of the Asian mint species Lophantus Anisatus, thus offers a permanent source of food for bees from the beginning of spring to the time of frost. Different species of wild bees are active at different times, so floral resources are needed from early spring to late summer to provide adequate feeding for all species of bees (Hanula et. al, 2016). The widespread overuse of synthetic pesticides is a common practice in today's intensive farming systems. Many wildflowers, nesting areas for pollinators and the living environment of bees, are thus contaminated with harmful chemicals. These insecticides, herbicides and fungicides that are used in intensive agricultural technologies come into contact with bees through pollen, nectar, air, water and soil. These pesticides are toxic to bees, generating short-term chronic effects that weaken and eventually kill bee populations. Landscape analyzes on the living environment of wild bees and butterflies show that the biodiversity of these species appears to be reduced as a result of the application of these intensive pest control measures using pesticides. The widespread application of herbicide on cultivated agricultural fields and around these agricultural lands has drastically reduced diversity and weeds and also the abundance of wild flowers. This weed control technology limits pollen and nectar and therefore the availability of food resources for bees (Usman et. al, 2019). Another factor that resulted in the reduction of bee populations was the invasive external parasitic mite, varroa (Becher et. al, 2013). This parasite poses a serious threat to honey bee colonies globally. Viruses and pathogens are threats that further affect bee colonies (Gulson et. al, 2015). The ability of

bees to withstand these threats from diseases and parasites is influenced by a number of factors, in particular a nutritionally balanced diet and the exposure of these bee populations to the effects of toxic chemicals (Wilfert et. al, 2016). Some pesticides mainly affect honey bees, so they are more exposed to parasitic infections and infestations (Bommarco et. al, 2013).

Many of the effects of climate change, such as temperature rise, changes in precipitation patterns and extreme weather events, have had a negative impact on pollinator populations. Climate change has greatly affected the relationship between pollinators and their main food sources, ie flowering plants, by changing flowering periods and patterns. The pollination of crops by wild bees and honey bees is absolutely essential for ensuring global food security. Bees pollination of wildflowers is particularly important for maintaining the balance of wild plant ecosystems. The demand for pollinators is increasing and this could lead to a limitation of pollination in the near future. This is also due to the fact that the phenomenon of declining pollinator populations is being recorded. In addition, it is known that a variety of wild bees is essential to provide adequate pollination services for agricultural crops and wildflowers.

Granting a central role in the pollination of agricultural crops of honey bees is a high risk factor, given that this species may become vulnerable. I believe that this species should be used in intensive beekeeping that can be integrated into aquaponics systems, rationalizing transhumanity and thus limiting the spread of varroa virus within bee populations. In this way, more productive intensive beekeeping systems can be developed that offer the benefit of sustainable ecosystems. The place of honey bees in terms of pollination of agricultural crops should be left to the wild bees that can be introduced through specific measures within the agro-ecosystems and can do the pollination of agricultural crops much better than honey bees.

Research on biological diversity has shown that pollination is a primary service within the ecosystem that is threatened worldwide. Recent studies have shown that pollination services are increasingly limited. Thus in the UK rape research has shown that insect pollination has been drastically limited in recent times (Vanbergen et. al, 2014).

Limiting pollination services has disastrous implications both for the yield that can be obtained in the crop and for the quality of the seeds. This phenomenon is particularly worrying because there is a growing dependency on pollination services of agricultural crops. Research has shown that rapeseed is highly pollinated by wild bee species. For this reason, it is necessary that the land around agricultural crops be managed in such a way as to increase the number of pollinators (Chandler et. al, 2019). This conclusion was also presented by the results of a separate study on rape farms in northern Canada (Carreck, 2013). In these studies it was found that the land cultivated with rapeseed near the remaining uncultivated areas benefited from the advantage of a rich and diverse community of wild bees and, consequently, they obtained an increase in yields per hectare on the basis of pollination services obtained free of charge. from natural sources (FAO, 2016). Research has shown that farmers could maximize their yields and profits per hectare through these practices to leave 30% of their farms uncultivated (Blaauw and Isaacs, 2014), (Dicks et. al, 2015). In this way, the pollination services offered free of charge by the populations of pollinators that grow on these areas that are not cultivated and which can ensure the increase in yields per hectare can benefit (Bailes et. al, 2015), (Carvell et al, 2016). We analyzed the effects of stimulation of pollination in the pepper culture by introducing in the immediate vicinity of the experimental batches a strip of bushes, flowers specific to autumn. These flowers offer the advantage of attracting insect wild pollinators which thus offers pollination services for late autumn crops. The lots of peppers that were intensely pollinated by these insects have registered yields almost 5 times higher than the elbows that were not pollinated.

Bees do not usually fly when the temperature is below 10°C. There may be flights even if the temperature is around 12-14°C if the day is warm and sunny. The flight in good conditions starts at 16 °C, and at 19°C it reaches a high level. In adverse weather conditions, bees can only fly about 150 meters from the hive. Wild bees are better adapted to the specific autumn weather conditions and can be successfully used to pollinate autumn crops.

The late autumn periods have several windows in which the temperatures rise, are favorable conditions for the flight of bees, but the food resources were destroyed the first episodes of frost. The culture of broccoli for seed provides important food resources for wild bees during these late autumn periods. This crop is very resistant to low temperatures and has inflorescences to freezing.

Organic farming promotes these practices to leave larger areas of semi-natural habitats on farms. These practices favor an increase in the biodiversity of wild bees. Pollination can thus be more effective in organic farms against the background of increasing biodiversity and populations of wild bees and other pollinating insects (Baldock et. al, 2015).

A study conducted in Sweden on the efficiency of pollination in organic farms, analyzed the results of pollination in strawberry crops, analyzing comparatively the results obtained in organic and respective farms (Andersson et al., 2012). Strawberries have been visited by a wide range of pollinating insects on organic farms. The study thus showed that the yields obtained from the pollination of strawberries were significantly improved in the strawberry crop, with 45% in organic farms compared with 17% in conventional farms. This research has demonstrated the high efficiency of much higher pollination in organic farms that can increase both the quantity and the quality of agricultural production.

The intensification of agriculture has usually led to homogeneous landscapes, represented by cereal fields. This led to the loss of uncultivated habitats on farms that supported pollinating insect populations. Uncultivated habitats are represented by live fences, ditches, forests and field margins. At the same time, there were large amplitude losses regarding semi-natural pastures as a result of their transformation into arable land and coniferous plantations. This loss and degradation of semi-natural habitat in agricultural holdings, destroys nesting and wintering sites and is one of the main causes of species decline in cultivated landscapes. Wild bees place their nests in perennial habitats to ensure their reproductive functions. Thus, semi-natural habitats within the farm are essential for the survival of wild bees in the agricultural landscape. In Europe, there is a particular concern about the sustainability and sustainability of intensive agricultural practices.

Organic farming is a model of a production system that encourages sustainable management of all farm-level habitats, in order to support biodiversity. The proportion of semi-natural habitat in organic farms is higher than in conventional farms. Biodiversity is considered to be higher in organic farms compared to conventional farms. The management of organic farming can ensure a greater wealth of pollinator species and at the same time an abundance of wild plants on arable land, invertebrate species, birds and mammals.

Within the organic farms, integrated management techniques based on biocontrol can be applied. Thus the techniques promoted by organic farming have increased the biodiversity of natural enemies represented by cockroaches and spiders that as predators reduce harmful insects.

Agricultural policy measures that support organic farming models contribute to supporting biodiversity in the agricultural landscape. This finding is frequently encountered in scientific studies that have shown the positive effect of organic farming on pollinating insects. It has thus been demonstrated that in organic farms there is greater diversity and at the same time greater coverage of insect-pollinated plants compared to intensive farms.

Organic farming benefits the diversity and numbers of wild bee populations. The integration of intensive beekeeping into aquaponics systems represents an ecologically intensive production model that thus offers more flowers for wild bee feed.

On agricultural land intensively exploited in industrial agriculture models, the diversity of flowers was much lower due to the use of herbicides. Chemical herbicides reduce the diversity of flowering plants and thus reduce the nectar and pollen resources available to bees. Flower strips grown on cereal farmland provide sufficient food resources for wild bees nested in these strips of honeycomb flowers grown in the field, alongside cereals. Analyzing the effect of landscapes, it was found that a

larger area of ecological arable land increased the number of species of wild bees in the strips of honeycomb flowers grown next to these cereal crops.

Scientific research on the impact generated on the richness of the biodiversity by the wild flowers from the organic and intensive pastures managed within the dairy cows farms. Moreover, the introduction of honey flowers in organic pastures offers the advantage of increasing milk quality. It has also been found that land occupied with organic grassland contains a greater number of pollinating insect species than intensively managed grassland.

Organic farms and agri-environment measures of the common agricultural policy encourage the introduction into legumes of leguminous crops, plants that provide generous food resources for wild bees during the late autumn period. Ecological management in agriculture represents a sustainable model of promoting biodiversity within the farm, with adverse effects in terms of supporting wild bee populations.

In order to ensure efficient pollination of agricultural crops, pollinating insects, especially wild bees, need to ensure feeding and nesting requirements to be placed within the same isolation. The wild bees return to the fixed places of the nests, so that the close proximity of the nesting and feeding habitats, from the agricultural lands, are essential for the pollination of the crops.

Agri-environment schemes are an important component of the EU's common agricultural policies, in which direct payments are granted to farmers who adopt sustainable ecological agricultural practices regarding the conservation and restoration of natural habitats. Also the forested areas of the agricultural landscape are important habitats for bees and at the same time for pollination services provided by wild bees.

One way to do this is to plant long-flowering honeycomb species such as Asian mint, Lophantus Anisatus. Asian mint stripes on the edges of arable land or interspersed between crops can provide important floral resources for bees that can last throughout the season if the right flower species are selected. These strips of Asian mint provide food for a wide range of bee species. The flowers of this species of mint offer the advantage that they bloom throughout the season, thus providing nectar and pollen sources for bees.

CONCLUSIONS

The monoculture and the lack of diversity of wild flowers within the agricultural lands, limit the feeding possibilities that the bees have on the agricultural lands. Bees may suffer from a lack of food resources as agriculture becomes more and more intense.
Organic farming promotes these practices to leave larger areas of semi-natural habitats on farms. These practices favor an increase in the biodiversity of wild bees.

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The Policy Measures Impact on EU Beekeeping

Gheorghe Adrian ZUGRAVU
"Dunărea de Jos" University of Galaţi, Romania
zugravuadrian@yahoo.com

Constanta Laura AUGUSTIN (ZUGRAVU)
"Dunărea de Jos" University of Galaţi, Romania, zugravulaura@yahoo.com

Maria Magdalena TUREK RAHOVEANU
"Dunărea de Jos" University of Galaţi, Romania, mturek2003@yahoo.com

Loredana DIMA
"Dunărea de Jos" University of Galaţi, Romania, dim_lore@yahoo.com

Ciprian Petrisor PLENOVICI
"Dunărea de Jos" University of Galaţi, Romania
ciprianplenovici@yahoo.com

Abstract

The aims of this paper are to analysis impact of potential of EU policy measures for beekeeping. The agricultural policy measures related to technical assistance in beekeeping have decisively contributed to the increase of productivity and quality. The result of applying these measures to the beekeeping sector was an essential contribution to stabilizing honey production in the EU, which was achieved by increasing productivity and quality.

Keywords*:* Beekeeping, Agricultural Policy

INTRODUCTION

The main agricultural policy measures had as their main objective really to support the production of honey at current levels, despite the increase in the cost of production costs and the value of competitive honey imports from third countries. All these measures were aimed at combating the effects and in the main threats caused by diseases and pests.

The technical assistance was mainly through professional training measures, allowing the dissemination of technical information with novelty character among all beekeepers and facilitating the purchase of the latest equipment that offers efficient solutions for honey production and for obtaining other bee products.

Analyzing the impact on production caused by measures that support the fight against the varroa parasite, a virus that is a major threat and which requires high costs, the European Commission considers that the effect of these measures has been very positive. Although positive results have been obtained in some EU Member States, the adoption of measures has been limited (Vanbergen et. al, 2014). These deficiencies found in the fight against varicose veins were due to the fact that the procedures required to obtain the assistance needed to combat varicose veins were considered difficult by the beekeepers (Wilfert et. al, 2016). One of the most effective measures proved to be the one that supports the rationalization of transhumance (Becher et. al, 2013). This measure has been highly appreciated in the case studies conducted in Greece and Spain (Blaauw and Isaacs, 2014). I believe that the extension of this measure can be applied in intensive beekeeping systems integrated within an aquaponic system. These superintensive production systems thus offer the opportunity to

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increase productivity and reduce the level of transhumance, while also providing support in controlling the spread of the varroa mite. The economic efficiency of this measure is obtained through the integration of several branches of production both horizontally and vertically within the same production capacity, without introducing additional factors of production (Anderson et. al, 2012), (Baldock et. al, 2015). By developing intensive and integrated beekeeping systems, it is thus possible to apply this measure of streamlining of transhumance and for beekeepers with small bee herds who can achieve a considerable increase in beekeeping income against the background of its location within integrated aquaponics systems. Through this measure of integration of beekeeping in aquaponics systems the measure of transhumance reduction is transformed from a compensatory measure of production losses, to a measure of productivity growth and of stimulating sustainable economic development with positive effects on environmental resources and which thus offers the possibility of biodiversity conservation. The pollination of agricultural crops should be based primarily on the herds of wild bees that should be protected and reintroduced within the agro-ecosystems through specific measures (Bailes et. al, 2015), (Barratt et. al, 2018).

When the bee hive repopulation measure was applied, those beekeepers who received general support recorded a positive effect on production. The repopulation of agricultural land with wild bees specialized in pollination of crops would also generate positive effects for all other branches of agricultural production. The associations and the individual beekeepers who were consulted in the evaluation of the effects of the policy measures applied within the beekeeping sector at European level, unanimously expressed their firm conviction regarding the potential importance of the applied research measure on honey production (Ollerton et. al, 2014), (Orford et. al, 2016).

MATERIAL AND METHOD

In general, the measures aimed at promoting honey obtained in the EU have not had a substantial expected impact on the composition of national and international honey marketing channels. For example, almost all of the honey produced in Germany has been sold locally through direct sales channels, while about 50% of the honey produced in Spain is still sold through wholesaler-specific channels. Analyzing the effects of the measure to support the modernization of specialized laboratories that carry out the analyzes, the physical and chemical properties of honey, we can say that this has contributed to improving the quality of honey and thus facilitated the development of the market by marketing certified quality products. The promotion of native honey bees is supported by the actions that are also carried out within the national programs. These measures have led to an increase in awareness and training of consumers' preferences regarding the quality of honey produced locally. Thus, new types of honey and the availability of local consumers to pay a higher price for quality products have appeared. This consumer behavior was also encountered in Germany and Hungary, against the backdrop of the introduction of the quality certification label. The development of a European digital market, through blockchain technology, for quality beekeeping products can thus offer the support of the native beekeepers, for the superior use of quality products and at the same time an incentive for increasing the quality of bee products.

In principle, in order to support EU domestic production, the measures of the common agricultural policy could have helped stimulate honey exports. Analyzing these changes in consumer perception and behavior we can say that, the direct substitution between these various types of honey produced in the EU and the imported honey from China seems to have been quite limited on the European market. The factors that determine the formation of domestic and global demand are very complex, which is why it is difficult to accurately assess the level of growth of the commercial effect as well as the positive effect of honey production, determined by the bee measures.

However, when analyzing the effect of bee measures, it seems that some effects considered positive on local trade in bee products, targeted by the measures aimed at promoting quality, have occurred. The quality of honey and all bee products is a major factor in maintaining the level of competitiveness. The cost of production, the quality and the associated services are essential attributes of the competitiveness, for the fulfillment of this wish, several beekeeping measures can be applied. The rationalization of bee transhumance represents a measure that directly contributes to the

reduction of production costs, but also indirectly by reducing the losses of bee herds, determined by the impact of the varroa virus, but also as a result of the quite high cost reductions with the treatments. This rationalization measure applied by integrating beekeeping into aquaponics systems thus offers the opportunity to maintain competitiveness through the sale price of bee products. The integration of beekeeping with aquaponics offers the opportunity to increase the production by intensifying and at the same time by increasing the duration of the production cycle at the level of the entire calendar year. In addition, the fixed costs are thus reduced by integrating several production branches within the same production capacity. We refer here to beekeeping, aquaculture, aromatic plants, volatile oils and the obtaining of biomass with a very high calorific power, determined by the concentration of oils in the vegetable debris. The integration of beekeeping offers the opportunity to obtain different assortments of honey in high quality ecological conditions. The quality of bee products is a very important strategy in terms of competitiveness. The general maintenance of high levels of quality in EU honey production was an important factor contributing to a (positive) gap between the average export price of honey and the average import price. A third important element of competitiveness, by price and quality, is the services associated with bee products at the time of sale. Here we refer to the specific measures to support apitherapy, a field with huge potential in the field of social and health services. If apitherapy is well known in terms of the positive, valuable effects in the health field, social apitherapy refers to the social integration of vulnerable and marginalized people by engaging within these integrated intensive beekeeping platforms within aquaponics systems. The success of social apitherapy comes against the backdrop of the interaction of vulnerable people with bees, which are a near-perfect example of social behavior.

It seems that the beekeeping measures applied to the growth of bees, had a moderate positive effect on the keeping and marketing of live bees. The level of trade in live bees remained largely local and limited. Most beekeepers usually grow their own queens, and their own swarms to repopulate their hives and cover their losses during winter and other causes.

The use in the competitiveness analyzes of such average prices, there can be nothing more than an indicator, and this, because the origin and type of the assortment of honey, as well as the channel through which the sales are made, the market structure and the local market in the country, are factors that influence the price level of honey.

Market analyzes based on case studies, interviews and surveys represent marketing research on the bee products market, based on which it was found that the factors that determine the market conditions are also the main engine that generates the producer price trend.

In terms of comparing the level of competitiveness between European beekeepers and their competitors elsewhere, we can say that EU beekeepers face relatively high production costs. These measures of intensification of beekeeping by integrating within aquaponics systems offer the possibility of reducing production costs by increasing the duration of the production cycle by almost 4 times and by reducing fixed production costs that are thus distributed over at least 7 distinct production branches: beekeeping, aquaculture, aromatic plants, volatile oils and vegetable biomass with high calorific power that can be used for pellet production, social apitherapy services, education and health services. Interestingly, this integration of the various production branches also offers the advantage of reducing the costs associated with the production activities indirectly. Integration actually solves the problems associated with or generated by each of these activities if it were developed independently and not within an integrated system. Thus we can give as an example aquaculture that requires a high consumption of water and generates organic residues. The integration of aquaculture with the intensive cultivation of aromatic plants comes with the advantage of eliminating the quantities of organic residues generated by the non-consumed food and the excrement of the fish by exploiting these nutrients at the level of the roots of the aromatic plants, which thus reduce the water consumption level and at the same time do not need any input regarding nutrients. Aromatic plants are obtained without additional input from production factors, both in terms of nutrients and the land surfaces needed in classical crops, irrigation and herbicide or pesticide treatments. Chemical treatments cannot be applied in any form as a result of direct interaction with

fish. Thus, high quality organic products can be obtained under controlled conditions in various production branches.

The EU's relatively limited exports of honey are at higher prices than imports. Analyzing comparative, we can say that, on average, a kilogram of honey imported into the EU in 2016 costs 2.23 euros, while a kilogram of honey exported to non-EU countries costs 5.69 euros. This situation is also observed in terms of comparative analysis of prices for honey import and export and for the period 2017-2018.

RESULTS AND DISCUSSIONS

Analyzing the structure of production costs, we noticed that, in recent years, there has been a strong increase in production costs for beekeepers. This was determined by an increase in bee mortality rates of over 30-50%. The increase in the mortality rate thus led to an increase in the cost of honey production, in some cases even five times. This increase in the cost of production was accompanied by the increase in fuel costs, which also affects the cost of transhumance. It was found that in the countries affected by the drought period, the beekeepers had to increase the duration of transhumance periods, thus being able to cover much greater distances, in order to provide the necessary food for the bees in sufficient quantities. In addition to all these cost increases, there was also an increase in the cost of treatments against varroosis and also an increase in the costs related to supplements needed for the feeding of bees (sugar, corn molasses) (Usman et. al, 2019). The measures proposed in this doctoral thesis, for the integration and intensification of beekeeping, eliminate all these problems related to the increase of the production costs due to the climatic, biological (varroa), and economic factors (referring here to the transport costs, supplements) (Schulp and Verburg, 2014). All of these price increases have substantially affected the incomes of beekeepers and farmers, because the substantially higher production costs have not been offset by the corresponding increase in sales prices. An intensive approach to sustainable organic production is also found in the work (Bommarco, 2013). The strategy of developing the agriculture branches through the intensive ecological approach is also found in the works of Professor Regenstein, (2011).

These measures to support beekeeping by raising bees have had a limited impact on production costs, which have increased in several ways. Although these policy measures have supported the use of medicines for combating varroa virus and the repopulation of beehives, the most economically efficient measure is the rationalization of transhumance, which thus offers economic benefits to beekeepers who obtain a substantial increase in income against intensification and diversification. production.

Supporting transport costs is a measure that has been applied in countries such as Spain or Greece, where we find widespread transhumance. Also through the beekeeping policy measures, support was offered for investment in beekeeping, in order to support honey production. At the same time, the measures of beekeeping policy also took into account the sector of processing bee products. In this respect, the support provided was aimed at supporting the extraction, processing and conditioning of honey more efficiently. Apicultural policy measures also included support for investments in specialized equipment for handling and moving hives (eg trailers, pallets, loading equipment, cranes). In many European countries, beekeeping measures have also been incorporated into national beekeeping development programs. These measures and national programs for the development of beekeeping have also encouraged the diversification of the sources of income of beekeepers. These measures also increase the potential of exploiting other bee products, and the development of specific market segments, such as the market for milkweed products (Senapathi, 2017).

Within the apicultural policies we find also the applied research measure, which made it possible to finance the qualitative and quantitative evaluation of the honey components, as well as the study of propolis. The demand for these types of specific products exceeds the supply, however it is found that beekeepers are not sufficiently aware of the value of the full potential of these niche markets specific to bee products (Sharp et. al, 2016).

With the main aim of production stability, the measures to support the beekeeping sector have decisively contributed to price stability. The success of these measures in terms of price stability is due to the fact that 60% of EU consumption is represented by the output obtained on the domestic market. However, the structure of the European honey market is the only factor influencing prices. In all the studies carried out on the factors that influence the price of honey on the European market, it was not possible to find in the evaluation a general relation between the measures of beekeeping and prices (Scheper et. al, 2013). The global conditions on the honey market and the supply structure of the national markets of EU member countries are largely responsible for the favorable effects generated by the beekeeping policy measures on honey production and prices. The benchmark product that sets the price evolution of all bee products on the world market is standard honey. However, the supportive beekeeping measures have generated an influence on the prices on the local markets for those specific types of honey that are more expensive and of high quality that are marketed on the organic products markets.

By analyzing the structure of the costs of administration of the bees we can have a perspective on the saving possibilities. The cost of buying the queen represents a total production cost of 11%. Sugar has a large share in the production cost structure (17% of the total). The work of the operator in beekeeping has the highest weight in the structure of the production cost (37% of the total) and therefore must be analyzed very carefully in terms of cost reduction (USDA, 2017).

The concept of intensive beekeeping of bee colonies is a viable and sustainable model when considering strategies to reduce production costs. Profitability is essential for the sustainability of the beekeeping sector. Like other agricultural producers, beekeepers can produce fruit and fish. In the case of the diversification of the production branches, various factors can affect the production of beekeeping. Exposure to chemicals, losses in plant diversity, adverse climatic conditions or deterioration of natural bees' habitats, hive capacity are factors that contribute to health problems and determine mortality rates. Not only colony losses affect the economic viability of beekeeping, but the threat and food production. The integration of beekeeping with the agricultural production branches can be realized within an aquaponic system that integrates within an ecological production system the apicultural production with the production of fruits and vegetables, fish and honey aromatic plants.

As for the market, global competitors with lower production costs and cheaper prices pose a threat to the market share of EU producers. The European Commission has highlighted the risks posed by the practices of counterfeiting sugar as well as non-compliance with EU standards and norms.

Agricultural policy measures have an impact on beekeeping, either directly or indirectly. Indirectly, these can contribute to improving the impact of agricultural practices on the environment and on bees. An example of this is represented by the measures aimed at maintaining permanent pastures. As far as direct support measures for farmers are concerned, bee products are part of the EU agricultural markets.

Through these measures of agricultural policy in beekeeping, funds are provided to finance support actions in the field of bee health, hive management, technical assistance, analysis and research on the monitoring of the market and the quality of bee products. This direct support covers up to 50% of the total expenses. In order to substantiate these support measures, EU Member States are developing national beekeeping programs for a period of three years in cooperation with beekeeping organizations. Each Member State has such a program in place. The total amount of 216 million euro was allocated to the EU member countries during the period 2017-2019. The EU has developed a mechanism to promote bee products, based on co-financing through a budget of over 100 million euro per year. Honey is a product that is included in several promotional campaigns both inside and outside the EU. Thus, over 30 types of honey products produced in the EU received quality labels for the product with protected designation of origin (PDO) or protected geographical indication (PGI). These measures to promote local products are tools that can contribute to the development of local markets and increase the value of local products.

CONCLUSIONS

The concept of intensive beekeeping of bee colonies is a viable and sustainable model when considering strategies to reduce production costs. Profitability is essential for the sustainability of the beekeeping sector. Like other agricultural producers, beekeepers can produce fruit and fish. In the case of the diversification of the branches of production, various factors can affect the production of beekeeping. Exposure to chemicals, losses in plant diversity, adverse climatic conditions or deterioration of natural bees' habitats, hive capacity are factors that contribute to health problems and determine mortality rates. Not only colony losses affect the economic viability of beekeeping, but the threat and food production. The integration of beekeeping with the agricultural production branches can be realized within an aquaponic system that integrates within an ecological production system the apicultural production with the production of fruits and vegetables, fish and honey aromatic plants.

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Earnings in eSports – The case of StarCraft II players

Ioana-Ruxandra LIE

PhD, Economics Department, Faculty of Entrepreneurship, Business Engineering and Management, University POLITEHNICA of Bucharest, Bucharest, Romania
ruxandra.lie@gmail.com

Beatrice LEUȘTEAN

PhD, Economics Department, Faculty of Entrepreneurship, Business Engineering and Management, University "Politehnica" of Bucharest, Bucharest, Romania
leusteanbeatrice@yahoo.com

Andreea Maria Gabriela MILITARU

PhD Student, Faculty of Entrepreneurship, Business Engineering and Management, University "Politehnica" of Bucharest, Bucharest, Romania,
andreemilitaru@gmail.com

Abstract

Even if their history can be tracked down to 40 years ago, from a scientific point of view, Esports can be considered as a new area of research. Until now, most of the literature on eSports focuses on the psychological and conceptual dimensions of this domain, and on legal concerns. The purpose of this article is to discuss the different sources of earnings in eSports and to analyze the earnings of a certain group of stakeholders, professional players of StarCraft II. We focus on the earnings and performance of the first 96 best players in the world and we find great variance in their earnings, according to performance. We conclude that if you are not top of the top, maybe should have a plan B as a career and source of income.

Key words: Esports, Starcraft II, Professional Players' Earnings, Descriptive Statistics, Correlation

JEL Classification codes: C00, Z20, Z21, Z22

Introduction

Esports are quite a new domain, both in sports and in scientific research, even if now they have 40 years of history. One of the signs proving their novelty is the fact that researchers haven't been able to decide yet what is the correct spelling – eSports or e-Sports or Esports or esports; for now, these and probably, many others, coexist. The good news is that regarding definition, researchers seem to agree more, and, in short, we can say that "eSports can be defined as organized competitive gaming" (Gawrysiak et al., 2020). The significance of this new study domain comes from the increasing popularity of video games and eSports tournaments, the increasing earnings for different stakeholders in this field and increasing importance of online activities that became especially obvious since the beginning of the SARS Cov 2 pandemic.

The debate regarding the classification of eSport (can they be considered sports or not?) plus the psychological motivation and consequences of playing video games (in a professional way or as amateurs) are the focus for most of the research in this field. Also, some studies analyze earnings in eSports especially as a consequence of in game microtransactions and loot boxes. These were also the focus of some scientific

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studies because of legal aspects, as some countries consider this type of activities gambling, and others don't (Zendle et al., 2020; King, Delfabbro, 2020; King et al., 2019).

Our paper aims to start filling a gap in this area of research, by focusing on the gains received by professional players in eSports. The case study presented in this paper concerns StarCraft II professional players, as this game has some of the most popular tournaments (Gawrysiak et al., 2020). After analyzing the descriptive statistics of earnings in StarCraft II and correlating them with the players' performance we find that there is a moderate correlation between performance and gains, and also that only top players can make a living out of professionally playing the game.

The second part of our paper presents the main findings in research regarding eSports, while the next one shows the scientific methods used and the source of data. In the fourth part we present the results of our findings, and in the last section we conclude, and we offer our ideas for further investigation.

The World of Esports

As mentioned before, one thing researchers seem to agree on is the definition of eSports; though it is expressed in different ways, the idea is same and it says that "eSports are organized video game competitions that serve as a non-traditional model of sport that has established itself as a commercialized entertainment enterprise" (Gawrysiak et al., 2020). A more plastic description is offered by Martoncik (2015), who says that "eSports represents a kind of a merge between electronic games, sports, business, and media".

The first eSports event took place in 1980 – Atari's Space Invaders Championship – and since then, their number has been increasing, as well as their recognition, their live attendance, their audiences and their prize pool, with the DOTA Tournament from 2016 having the highest prize pool until now – more than 20 million dollars (Gawrysiak et al., 2020; Duersch et al., 2020; Funk, 2018; Hallmann, Giel, 2018). In their 40 years history, eSports has developed in a real industry, acquiring an economic dimension: venues built in order to accommodate more and more spectators, tickets sold out, increasing prize pools, online streaming and in game transactions (Gawrysiak et al., 2020; Hallmann, Giel, 2018).

As a consequence of this rapid development, major companies all over the world have become sponsors of eSports events and eSports teams, helping to sustain and expand the industry: Microsoft, Samsung, Red Bull, Intel, Coca - Cola, Comcast, Xfinity, Mountain Dew, T Mobile, Mobil 1, Audi, Airbus, Korean Air (Funk et al., 2018, Meola, 2018).

It is true that the prize pools and the industry itself grew with the help of advertising and sponsorship, but what makes eSports attractive for stakeholders in this domains is the viewer loyalty and the opportunity of reaching online the influential cohort of 12 to 34 years old via streaming platforms and social media (Gawrysiak et al., 2020; Sjöblom et al., 2019). One of the most popular platforms used is Twich, which added to television and Youtube valuable characteristics like real time human interaction between streamers, viewers and even players (Hilvert – Bruce et al., 2018).

Before going analyzing the social implications and monetization aspects regarding eSports, it is worth mentioning that a great part of scientific research on electronic sports is devoted to the debate on the concept itself: can they be considered sports, or not?

Arguments in favor of the first hypothesis are: professional player require physical skills like high precision, motor coordination, agility (Duersch, 2020; Abanazir, 2019; Funk et al., 2018) – which complies with one of the characteristics of sports, physicality –, they need to train regularly, most of the times they belong to a team, they think of strategies and they have to apply them perfectly, there are uniforms, there are coaches, managers and agents, there are deals, transfers and transfer fees (Martoncik, 2015; Funk et al., 2018). We even find in eSports the other side, the bad side of sports, like match fixing, doping, gender and race related

scandals (Funk et al., 2018). Moreover, as it happens for all the traditional sports, eSports players can now receive athlete scholarships and they can belong to college or university teams (Gawrysiak et al., 2020; Funk et al., 2018). And last, but not least, the status that eSports hold now is emphasized by the inclusion of an eSports medal event in the 2022 Asian Games that will take place in China (Gawrysiak et al., 2020; Hallmann, Giel, 2018).

On the other hand, those who do not agree with including eSports in the same category as traditional sports claim that the essence of sports is its athletic dimension, that lacks in the case of electronic sports, and that there is a non-human component that has a considerable effect on the outcome of the game (Mora-Cantallops, Sicilia, 2019; Funk et al., 2018). Unlike traditional sports, the electronic ones have a great dependence on the producers of the games, who offer the software needed in order to compete (Funk et al., 2018).

Another significant part of the studies regarding electronic games deal with their psychological dimension and look for the motivation behind playing and the social interactions that take place online. These studies are not necessarily concentrated on professional players. In short, the researchers found that the main reasons for playing electronic games were sociability, fun and performance, as these games satisfy needs like belonging – to a community or a team –, or the need for being in control, having power as team leader etc. (Martoncik, 2015). Psychological discussion can emphasize another similarity between traditional athletes and eSports athletes: both types of athletes are exposed to great levels of stress and psychological strains when taking part in competitions (Hallmann, Giel, 2018).

It is also interesting to mention some aspects regarding the labor market and the jobs connected to eSports. Of course, the first job one thinks about is the professional player. At the beginning, players only gained from the prizes they obtained (if they obtained them); if they were part of a team, it was customary for the team to cover travel expenses for the events they were taking part in (Connors, 2012). Nowadays, many organizations pay salaries to their players, but the lowest of them are only a few hundred dollars a month, while the highest reach several thousand dollars a month (Connors, 2012). One serious disadvantage for those employed in this domain is the fact that employment can be precarious, as precarious as the player's success (Funk et al. 2018). As a consequence, or maybe, because of this, researchers that studied the industry reached the conclusion that in eSports most professional players are young, they have short carriers and are always in danger to be surpassed by even younger and sometimes more skilled challengers (Funk et al. 2018).

Other jobs related to eSports are in the marketing area, in event planning, or as a streamer or broadcaster on Twich and other similar platforms (Nguyen, 2017). Of course that the recent health crisis has affected those employed in physical event planning, as popular eSports leagues were cancelled, rescheduled or moved online (Nicola, 2020) and those involved in building bigger and bigger venues, while streamers and broadcasters were less affected or even see an increase in their activity, as isolation and lock-downs all over the world increased the number of online game players but also the number of viewers.

This paper will analyze the incomes of only one category from all these stakeholders, the professional players, with a focus on StarCraft II athletes.

Methodology

The data used in analyzing incomes of professional StarCraft II players comes from the site www.alligulac.com, which is dedicated to data, statistics and predictions about this game; the rankings used in the study is the one available on the 22nd of July of 2020. From 2653 players that have been playing the game since its 2010 release in a professional manner, we have selected the first 96, as we consider they are the most representative for the game. The number selected is not random, tournaments in StarCraft II are organized starting with 64 or 32 competitors; we have added another 32, reaching 96, as they have the chance to challenge the others and maybe obtain a place in the tournaments.

In order to analyze data, we have used instruments offered by descriptive statistics, and in assessing the correlation between performance and earnings, we used Spearman's rank correlation coefficient.

Results

StarCraft II is a multiplayer real-time strategy game that in professional tournaments is played in one to one matches (usually best of 3, best of 5 or best of 7 games). It was released in 2010 by Blizzard Entertainment.

As mentioned before, this analysis focuses on the professional StarCraft II players' earnings. We discussed before that tournament winnings and salaries received from teams are the sources of income for a professional player. Besides that, Connors (2012) presents other sources of income: streaming – at first streaming platforms were used in order to communicate with their fans, but after they started offering partnerships that included some ad revenue, players began using streaming as o source of income; coaching – a professional player can charge between $25 and $300 an hour for teaching others how to play (Connors, 2012); casting – explaining the game to the audience of an event.

Unfortunately, there is no data available for the other sources of income, so this analysis will only take into consideration winnings obtained in tournaments. We have chosen the first 96 players on a performance basis, as we consider them the most representative; because some of the players from the earnings ranking are no longer in top 96 players in the world, we excluded them from the list, and we adjusted the others' positions accordingly.

The first step in our analysis was to compute the indicators used in descriptive statistics. We analyzed total earnings during each players career. We have computed the descriptive statistics for four sets of data: earnings for all 93 players (I), earnings of the first 32 (II), earnings of the next 32 (III), and earnings of the last 29 players (IV). Table 1 shows the results obtained.

Table1: Earnings in StarCraft II – descriptive statistics

	Earnings (I)	***Earnings (II)***	***Earnings (III)***	***Earnings (IV)***
Mean	167246.5806	352935	86426.25	51530.1
Standard Error	21836.1989	44964.06	16203.73	11791.98
Median	79720	262714	65862	25199
Mode	#N/A	#N/A	#N/A	#N/A
Standard Deviation	210580.6762	254355.1	91662.15	63501.77
Sample Variance	44344221175	6.47E+10	8.4E+09	4.03E+09
Kurtosis	2.462182434	-0.89116	2.995357	2.921119
Skewness	1.774609236	0.590266	1.756589	1.830085
Range	843884	806410	374947	252372
Minimum	1211	38685	1894	1211
Maximum	845095	845095	376841	253583
Sum	15553932	11293919	2765640	1494373
Count	93	32	32	29

Source: authors' calculations based on data from www.alligulac.com

For the same four categories, we have generated the boxplots, in order to better see the differences between them. They are presented in Figure 1.

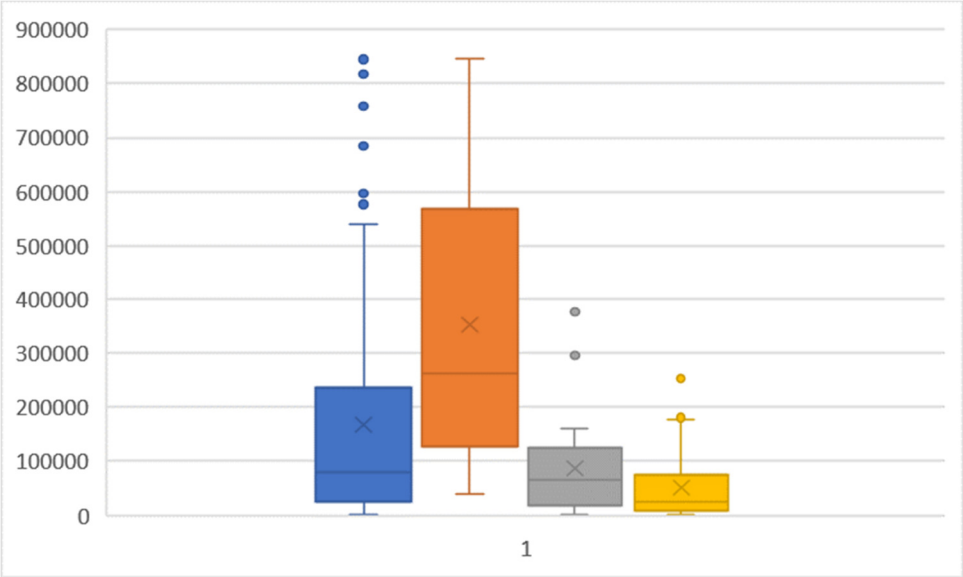

Figure 1: Boxplots for the four earnings categories

Source: authors' calculations based on data from www.alligulac.com

In Figure 1 blue is dataset I, orange, dataset II, grey, dataset III, and yellow, dataset IV.

Correlating data from Table 1 and Figure 1, we find that except players from rank 33 to 64, the other datasets are not homogeneous and there is great variance in values, which means the average income computed is not representative; in this case, median values offer a better image of what happens in each group. The highest standard deviation is registered in the dataset with all 93 players and it gets lower as we split them into 3 categories and as we go lower in the ranking.

We can also notice that most outliers appear when we consider all 93 players in the same set (I). From the three categories of ranks (II, III, and IV), as expected, the first 32 best players of the world have a median value of earning almost 4 times higher than the next group, and over 10 times higher than the last 29 players. As in many other sports, there is a great difference between the top athletes and the others. It can also be observed that the interquartile range is greater in the case of top 32, than in the other two cases, which means that there is more variability in the top of the ranking; moreover, the greater difference between the top 32 is shown by the taller boxplot, comparatively with the other 2 groups. Also, the first 50% of the first 32 players have greater variation in income compared to the others in the same dataset.

The idea that needs to be extracted from here is that if you are not among the very few at the top, living only from tournament winnings is not a good idea, especially because the data present here shows total winnings, in 5 to 9 years of professional career. It is also worth mentioning that out of 2653 players whose winnings are listed on www.alligulac.com, only 27% have earned in their careers at least one thousand dollars from tournament winnings. As a consequence, players on the lower part of the ranking have to make an important decision: to continue playing in a professional manner and hope for significant improvement of their position and income or pursue another career. In this case, analyzing carefully the opportunity costs is vital for the decision (Golescu et al., 2010) and can probably influence the entire life of the professional StarCraft II player.

After this first look on the earnings of players from different positions of the ranking, we wanted to see if there is a connection between performance and total earnings. In order to see that, we have computed Spearman's rank correlation coefficient and we obtained a value of 0.685. As expected, there is a positive correlation between position in the performance ranking and earnings rankings, the relationship is moderate.

This means that earnings in eSports depend not only on performance, but also on the wise choice of tournaments to participate in. Also, as we considered total earnings during a player's career, and the performance ranking is constantly changing, the duration of one's activity can also influence on the total gains. Even if we consider this a limitation of our study, that will be addressed in future research, we believe that the overall result will not change significantly.

Conclusions

ESports are a new area of research and until now there was little research on this topic, even if the number of scientific studies in now increasing (Lokhman et al., 2018). Most of the literature on eSports focuses on the psychological and conceptual dimensions of this domain, for example on the inclusion of eSports between sports, and on legal concerns. With our article we aim to discuss the different sources of earnings in eSports and to analyze the earnings of a certain group of stakeholders, professional players of StarCraft II, focusing on the earnings and performance of the first 96 best players in the world.

One of our conclusions is that unless you are an exceptional player, earnings from playing StarCraft II cannot be sufficient to make a living, and as a professional player under 32nd position in the world's ranking, you should also have a plan B for your career and future earnings. We also find that there is a medium correlation between performance and earnings. Our further research will focus on a deeper analysis of StarCraft players' income, if data regarding their salaries and publicity earnings are available, and also on the income other categories involved in professional eSports, like casters, as their profession offers the opportunity of more steady earnings and for a longer period of time.

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Slowbalisation – Evidence of a Slowdown in Internationalisation

Pawel FOLFAS

SGH Warsaw School of Economics, Warsaw, Poland
E-mail: pfolfa@sgh.waw.pl

Anna ODROBINA

Cracow University of Economics, Cracow, Poland
E-mail: odrobina@uek.krakow.pl

Abstract

In recent years, the term 'slowbalisation' has appeared in the economic literature, meaning changes in the global economy slowing down the process of the internationalisation of economic activity. These changes are characterised by a marked slowdown and even a regression of international economic relations. The article attempts to scrutinize the symptoms and characteristics of a new stage of globalisation. Based on analyses of international trade in goods, services, FDI and international production, it demonstrates that there are grounds for 'slowbalisation', especially in the context of observed geopolitical activities, with trade war being the most important of them, and technological progress focussed on digitisation, automation and artificial intelligence.

Keywords: internationalisation, globalisation, international trade, global value chains (GVCs).

Introduction

The process of globalisation has been of key importance to the world economy since the mid-1980s. Ongoing globalisation, a dynamic phenomenon, brought about continuous growth and spectacular development of international economic links, reflected in a rising volume of international trade; a marked acceleration of foreign direct investment (FDI); globalising financial markets; the internationalisation of production and the development of global value chains (GVCs); impressive technological development, especially in the area of information and communication technology (ICT); the intensification of international migration and other economic linkages. Globalisation seemed to keep gaining momentum incessantly as networks of global economic relationships had reached a critical mass that would further intensify their development and the creation of new links. It was also obvious that occurring crisis developments temporarily slowed down or even reversed international economic linkages; afterwards, however, as crises receded, those economic links would return to the path of buoyant growth, mainly in international trade and FDI.

In January 2019, The Economist (2019a) announced that globalisation had entered a new stage – a path of sluggishness – and referred to the new era of globalisation as 'slowbalisation'. As the turning point in globalisation, The Economist indicated the financial crisis of 2008–2009, having caused cross-border investment, trade, bank loans and value chains to shrink or stagnate relative to global GDP. The Economist contributed to the debate on the process of globalisation and its changes (as mentioned also by Felbermayr (2020)). At the same time, as an opinion-forming magazine, it adds inspiration for scholars (including us) to investigate the nature of 'slowbalisation' (we are aware that The Economist is a popular science magazine rather than a scientific source. However, as it is internationally renowned, we decided to cite it in a scientific article).

This article aims to scrutinize the symptoms and characteristics of 'slowbalisation'. The paper is composed of two parts. Part one focusses on a review of the existing literature on globalisation slowdown, taking account of prior considerations of semi-globalisation and deglobalisation. Part two comprises the authors' studies intended to identify ad describe the symptoms and characteristics of

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'slowbalisation'. The research covers relative indicators, concerning the share of trade and inward FDI in global GDP and those related to production internationalisation and GVCs in the long term. The research hypothesis adopted is that the transformations observed in international economic linkages provide grounds for claiming the emergence of a new stage of globalisation: 'slowbalisation'.

Semi-Globalisation, Deglobalisation and 'Slowbalisation'

As early as more than a decade ago, disruptions (a slowdown) in the globalisation process were addressed in the literature, although in a slightly different context (see e.g. Ghemawat 2003; Nuti 2003; Ferguson 2005; Zorska 2007, p. 33). In the early 21st century, after international flows declined between 2001 and 2003, it was noted that globalisation was only continuous integration of economic activities rather than a specific state of the world economy. Consequently, just as any process, globalisation could slow down, stop or even become reversed. Various authors wrote that statements about a globally integrated economy were significantly exaggerated. The integration levels of particular markets in goods, services and production factors were on the increase, but they remained differentiated and far from the highest potential values.. It resulted from the existence of various obstacles to the free movement of goods, services and production factors. Such partial possibilities of integrating cross-border activities, limited by those barriers, were then referred to as incomplete globalisation or semi-globalisation.

One symptom of semi-globalisation is the alternate occurrence of periods of buoyant growth and of stagnation or declining world trade and FDI flows relative to global GDP. Such fluctuations reflect the fact that there are periods of slowdown in globalisation processes, e.g. during a slump or an economic crisis. Those are characterised by particularly steep decreases in flows of services and production factors.

In the early 21st century, an idea of deglobalisation was added to the notion of semi-globalisation. An extremely pessimistic and controversial concept of deglobalisation was presented by Bello (2006), who identified globalisation with trade, business and profits given priority over equality, equity, the environment, solidarity and social well-being. Therefore, his vision of deglobalisation included a postulate for taking revolutionary actions such as depriving WTO of its mandate to further trade liberalisation or re-orientation national policies from exports to only local production However, globalisation has always been a process based on the principles of the market mechanism; therefore, the reverse process would presumably be caused by the world economic processes as well.

After the intensity of international flows dropped in 2001–2003, the following few years saw a marked increase in the value of international trade and in international flows of production factors, which contributed to the mitigation of opinions that globalisation had slowed down or even become reversed. The situation changed with the onset of the world economic crisis and the post-crisis economic stagnation. Whereas the distinct fall in the share of international trade in goods and services in world GDP in 2009 against 2008 and significant falls in international capital flows relative to global GDP in 2008–2009 as compared to 2007 were attributable to the global economic crisis, the lower proportions of world trade in goods and of FDI in global GDP in the past few years in comparison with 2010–2012 (i.e. the period of recovering international flows after the crisis) were not. As a result, the question has arisen whether we are facing the beginning of a new stage in the development of the world economy, characterised by a (short- or long-term) slowdown in globalisation ('slowbalisation'), or even the reversal of the phenomenon (deglobalisation).

Since then, opinions have been expressed that the changes caused by the 2008–2009 crisis triggered permanent evolution of world trade in goods and services, having resulted in deglobalisation as the next stage of the evolution of the world economy (WTO 2013; Postelnicu, Dinu and Dabija 2015). Questions have also been asked about the limits of globalisation (see e.g. Miśkiewicz and Ausloos 2010).

The present-day deglobalisation related to the collapse of world trade is compared to the 1930s crisis (Campbell et al. 2009; van Bergeijk 2017), but with indications of a much more dramatic and faster

fall in both exports and imports as a result of the 2008–2009 crisis (van Bergeijk 2017, pp. 10–12). Various authors have identified the occurrence of deglobalisation with the consequences of the economic and financial crisis but also with armed conflicts or natural disasters (Postelnicu, Dinu and Dabija 2015). According to James (2017), present-day deglobalisation is a response to the costs and losses arising from the previous acceleration of globalisation. It gave rise to increased protectionism and aggressive trade policies of the USA or Brexit on the international agenda (Martin 2018; The Economist 2019a; 2019c).

It is indicated that the key condition for the currently observed deglobalisation is the effect of production fragmentation and the functioning of value chains (van Bergeijk 2017; Baldwin and Evenett 2009; WTO 2009; James 2017).Trade in manufactured goods depends on the international division of labour, including the organisation of production in value chains, increasingly frequently regarded as the reason for the spilling over of crises and drastic trade shocks.

Studies of deglobalisation basically rely on three major groups of measures: the dynamics of world trade in goods and services at the global and regional levels, inward and outward FDI and portfolio investment. However, a more comprehensive picture of the phenomenon requires further analyses, such as investigations of changes in technology transfers, trade barriers, restrictions related to the movement of labour, incentives to purchase local goods or agricultural production subsidies, often introduced during a crisis, although those should not be identified solely with economic crises (Postelnicu, Dinu and Dabija 2015, p. 5).

According to the article mentioned in the introduction and published by The Economist (2019a), having initiated the debate on the emergence of a new stage of globalisation, or 'slowbalisation', its recognised symptoms include the stagnation and shrinking of world trade, cross-border investment, bank loans and supply chains as the conditions of the so-called 'golden age of globalisation' of 1990–2010 (declining costs of the transport of goods, of communication, tariff reductions and the liberalisation of the financial system) ceased to fuel globalisation. Other causes arose that triggered a permanent slowdown in the process, e.g. a decelerated fall in transport costs, increased competition for transnational corporations (TNCs) from local competitors, a greater role played by services, rising self-sufficiency of Chinese production. In addition, The Economist referred to the US trade war, indicating an increase in the average tariff in the US to a level unheard-of for 40 years (3.4%). The influence of geopolitics is much broader in scope, e.g. changes in the US tax system aimed at the repatriation of capital and China's changed policy towards foreign firms. Increased protectionism is considered to have slowed down globalisation, although it is only the most evident cause; other changes in geopolitics, such as Brexit, challenges of multilateral agreements, the US policy regarding additional tariffs (The Economist 2019a; 2019c), restrictions on Huawei (The Economist 2019e) or extended powers of the Committee on Foreign Investment in the United States (Marantz 2019). Furthermore, certain industries will be particularly affected by the slowdown: telecommunications, semi-conductors, the automotive industry, capital goods, IT hardware and the Internet giants, as sectors sensitive to the protection of the national and economic security interests of their home countries and simultaneously using globally located value chains, which may mean that they must be ready to take costly steps to ensure compliance with those interests of their home countries. At the same time, such a situation may favour regional firms, e.g. the Chinese web industry, small and medium-sized web enterprises in the US that do not rely on access to the foreign geopolitical markets of their rivals (Marantz 2019).

It must be noted that The Economist repeatedly addressed the issue of 'slowbalisation' in 2019, indicating its various symptoms. It raised the problem of the functioning of GVCs (The Economist 2019b), identified as the cause of 'slowbalisation' since ca. 60% of world trade was performed between corporations, having developed internationally their value chains due to tax battles and trade wars. China, involved in the trade war, tends to be at the end of various chains; therefore, the US enormous imports from China also include components produced in other countries, also in the US. But the gains from participation in GVCs for the Chinese economy are much slimmer than the value of exports would suggest. In addition, other countries engaged in value chains have already been adversely affected by the growing role of China in GVCs (The Economist 2019e).

Furthermore, transnational corporations, previously excessively expanding their GVCs (The Economist 2019d; Stapleton 2019), causing ICT-based hyper-globalisation (Baldwin 2016), have become exposed to increasing risks resulting from the complexity and non-transparency of the production process. Therefore, they have been making deep and simplification-oriented changes in their value chains to increase velocity and efficiency (The Economist 2019c, 2019d; Coe and Yeung 2019). The reconfiguration of global operations of corporations towards the shortening and relocation of supply chains has also been shaped by geopolitics, especially between the US and China (The Economist 2019e).

Those distinctly changing conditions have been causing 'slowbalisation' that will involve deeper links within regional blocs (see also Meng et al. 2019), enhanced regional integration but also new challenges such as pressure between regional trade models and the global financial system or labour market problems resulting from the automation of production.

It must be added that the issue of 'slowbalisation' has been raised in various studies and reports of international organisations and institutions. According to the recommendations from the OECD and the WTO (2019), developing countries should adopt export diversification strategies and create regional cooperation frameworks within developing countries to mitigate the effects of the downturn in trade in goods. The UNCTAD (2018; 2019) has given particular attention to analyses of GVCs, indicating a steep fall in the growth rate of participation in GVCs in advanced economies and developing countries. In its predictions for 2020, PWC (2020) expects the continuation of the slowdown trend in the integration of the world economy in trade, financial flows and other aspects. It also points out that corporations should build various scenarios for complicated and complex supply chains. It attributes the development of trade in services to the fact that those have not been affected by the trade war, whereas the US and the UK remain the world's major exporters of services. McKinsey Global Institute (2019) indicated a deep transformation of globalisation. Recommendations for development in 'slowbalisation' conditions have also been prepared for individual regions (Toussaint et al. 2019).

The Symptoms and Characteristics Of 'Slowbalisation'

As already indicated, globalisation – as a dynamic phenomenon – has been repeatedly subject to deceleration and deglobalisation in crises. To identify the symptoms of 'slowbalisation', it seems necessary to take a closer look at long-term trends in world trade and FDI as well as in the internationalisation of production processes, considered to be the most important measures of globalisation. To illustrate those economic linkages against the backdrop of the global economic situation, the analysis covers relative indicators expressed as a share of global GDP in the long term (Fig. 1).

As regards exports of goods, over five decades, their share in global GDP increased from 9.3% in 1970 to 22.8% in 2018 but with evident periods of stagnation (or even decreases): 1974–1978, 1982–1987, 1991–1993, 2009, 2011–2017. All those periods, except for the last one, are unambiguously attributable to crisis developments in the world economy. There was also a marked rise in world exports relative to GDP from 1992 to 2008, to a record high of 25.4%. It is worth pointing out that world trade in goods grew more quickly than global GDP even during the Asian financial crisis (1997) or the dot-com bubble crisis (2001). Despite a fast recovery in world exports after the collapse in 2009, from 2011 the share of exports of goods in GDP showed a slight decline, although there was a minor rise in 2018 (by 0.73%). But exports markedly stagnated as in 2011 the respective proportion was 24.9% of global GDP and dropped to 22.0% in 2017.

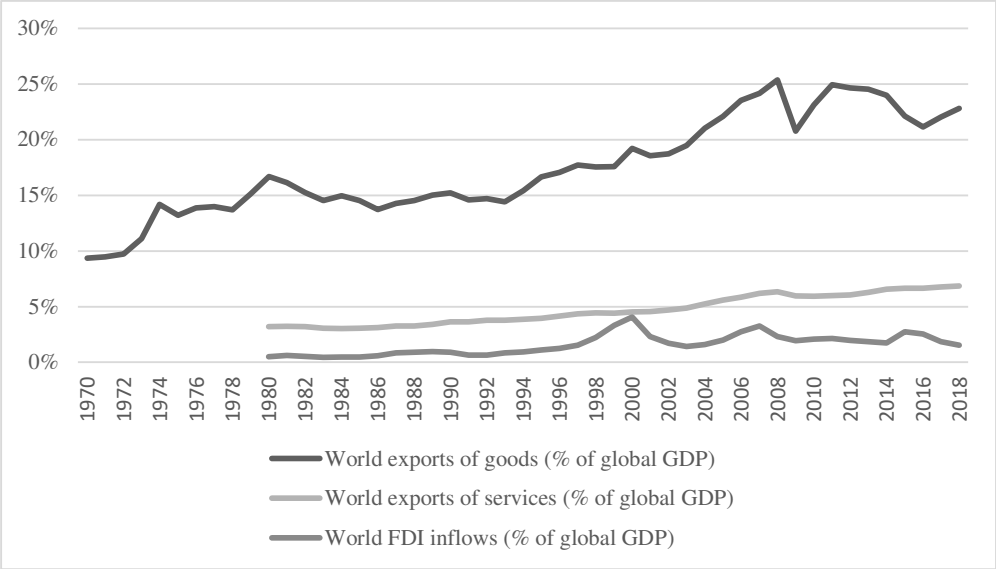

Fig. 1: Trends in world exports of goods, services and FDI (as a percentage of global GDP)
Source: calculated by the authors based on UNCTAD databases (2020b).

World exports of services showed an upward trend, from 3.2% in 1980 to 6.9% in 2018, a record-high share of trade in services in GDP. Furthermore, in that case, decreases in the share in global GDP were relatively insignificant. Even 2009–2010 saw a fall by less than 0.4% against 2008, whereas in 2013 the share of trade in services in GDP exceeded the 2008 figure. Therefore, it is possible to conclude that exports of services steadily rose faster than global GDP. In this case, it is hardly possible to indicate a slowdown since data reflect a steady increase in the share of trade in services in global GDP. It is a surprising trend because trade in services was previously claimed to be even more vulnerable in crisis periods. However, trade in services showed not only a relatively less abrupt decline during the global financial crisis but also a gradual increase from 2011, in contrast to trade in goods. Therefore, it seems that trade in services could become the driver of present-day globalisation in the context of the growing role of digital technologies and trade in intangibles. There has been a very buoyant rise in international payments for intangible goods – in 2010–2016, the growth rate was 60% (UNCTAD 2019, p. 15–16). As indicated by Braga (2019), trade in services has been gaining in importance in the world economy for the following reasons: (1) in conditions of the current production structure, demand for higher-level services, such as R&D, human resource management, marketing, sales; (2) increased demand from consumers for support services, training, software; (3) the role of ICT in effective management and information flow. Digital corporations have also been growing markedly in the global economy; in 2019, seven out of the top ten firms by market capitalisation were digital companies (Apple, Microsoft, Amazon, Alphabet, Facebook, Alibaba and Tencent Holdings). E-commerce is on the rise as well (Braga 2019).

By nature, FDI is characterised by significant volatility and susceptibility to crisis developments. In the 1980s, its share in global GDP rose slowly from ca. 0.5% to ca. 1%, whereas the highest growth rates were noted in 1996–2000, to 4.1% of world GDP, a record high. The subsequent collapse and slow recovery allowed to reach 3.3% in 2007; afterwards, FDI relative to GDP declined until 2014. FDI inflows bounced back in 2015 (2.73%) and then again showed a downward trend of the share of global GDP: in 2018, it was a mere 1.5% (the lowest level from 2004).

Whereas inward FDI in developing countries was stable in the last years, 2017 saw a dramatic fall in FDI inflows to advanced economies (by 37%), accompanied by a decline by nearly 30% in cross-border mergers and acquisitions, and the trend was observed in all sectors (UNCTAD 2018, pp. XI–XII). In 2018, inward FDI dropped further, although the value of merger and acquisition deals showed an increase (UNCTAD 2019, p. 3).

An analysis of long-term global capital flows (UNCTAD 2018, p. 11) indicates that fast-growing debt instruments in the form of bank loans were the driving force before the outbreak of the financial crisis, but the situation changed in 2008. First and foremost, there was a marked decline in capital flows (in 2007, their share in GDP was 21.4%, whereas in 2017 – merely 6.9%); in particular, bank lending shrank dramatically and did not recover (accounting for 2% of global GDP in 2017). At the same time, FDI can be identified as the most stable component of global capital flows in 2002–2017.

To recapitulate the above analyses, it can be pointed out that in the 2010s exports of goods grew at a much lower rate than global GDP, as reflected in the generally falling share of GDP (except for 2018), inward FDI relative to world GDP dropped as well, whereas there was an increase in the share of trade in services in global GDP.

In addition to world trade and FDI, a major role in globalisation is played by the processes of production internationalisation, related to production fragmentation and the functioning of GVCs. Those processes intensified from the 1990s, as *signum temporis* of the accelerating globalisation of 1990–2010. Imports of intermediate goods and services, reflecting international trade in parts, components, semi-finished products, seem to be an appropriate measure for analysing the present trends in the internationalisation of production (Fig. 2). Whether analyses concern data on world imports or global GDP, in 2008 both measures showed the highest values (64.6% of world imports and 20.5% of global GDP respectively). Those indicators dropped due to the global crisis in 2009 and then clearly recovered until 2011; however, afterwards, they showed a minor but steady decline. In 2015, imports of intermediate goods and services represented 61.0% of total world imports (the lowest share in the period covered), whereas the proportion of imports of intermediate goods and services in global GDP reached 17.6%, i.e. below the 2005 level. Therefore, marked stagnation was observed in the internationalisation of production.

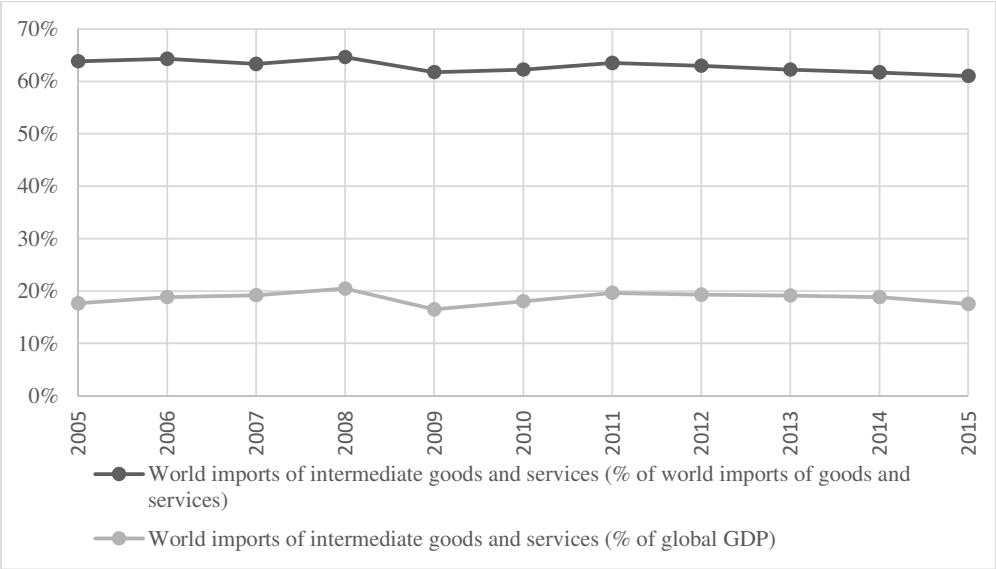

Fig. 2: World imports of intermediate goods and services

Source: calculated by the authors based on OECD data (2020).

International production developed in absolute terms: in 2018, the sales and value added of foreign affiliates of corporations rose by 3% and 8%, respectively, on the previous year. But the increase was related to the upward trend of digitisation and intangible activities (UNCTAD 2019, p. 18). The assets of and employment by foreign affiliates showed a rise, but there was a fall in the rate of return on inward FDI – in 2016–2018, it remained at 6.8%, whereas it had been 8.6% in 2005–2007. A similar trend was observed for the rate of return on outward FDI: 6.1% to 6.4% in 2015–2018 against 9.6% in 2005–2007 (UNCTAD 2019, p. 18).

The above is also confirmed by a falling share of foreign value added in total exports of goods and services (Fig. 3). As regards the world economy as a whole, before 2008 there was an upward trend reflecting the development of GVCs; after the 2009 collapse as a result of the crisis, a rise was observed until 2011, followed by a steady decline – the 2016 figure was 14.3% (the lowest value in the period under examination). Similar trends were noted by the world's two largest economies. The US, where the crisis drove down the share of foreign value added to 9.4% (2009), noted higher rates of decrease than the whole world economy from 2011, to a mere 9% in 2016. It is also worth pointing out that as early as the period preceding the global financial crisis US exports were characterised by a declining share of foreign value added. In the case of China, the country to use foreign value added at 26.3% of exports of goods and services in 2005, the 2016 figure was as low as 16.7%. Those trends clearly show that GVCs are in recession. It is also corroborated by statistics collected by the UNCTAD (2020, p. 123), indicating a steady fall in the share of foreign value added in exports (approx. 32% in 2011 against ca. 29% in 2015–2019).

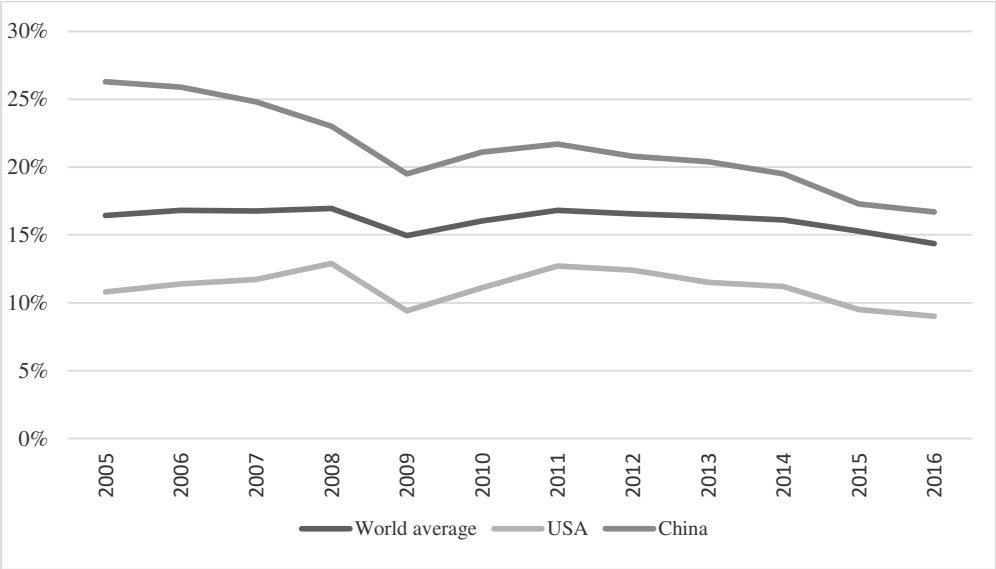

Fig. 3: Share of foreign value added in exports of goods and services
Source: prepared by the authors based on the OECD database (2020).

Such a clear downward trend of the share of foreign value added in total exports suggests that export-oriented production increasingly relies on domestic value added replacing imported value added. It indicates an ongoing process of transformations towards shrinking GVCs. Undoubtedly, it is a major change showing the nature of the new phenomenon, marked by the gradual disintegration of GVCs resulting from changes in strategies adopted by transnational corporations.

It is worth mentioning that some of the reasons behind the transformations in GVCs are considered to be robotisation, automation and artificial intelligence, decreasing trends for production offshoring to developing countries and introducing revolutionary changes in the GVCs structure (Stapleton 2019). As a consequence, the opposite of offshoring (reshoring) can already be observed: the relocation of production back to the home markets (de Backer et al. 2016; Stapleton 2019, pp. 11–12). It seems to explain the evident process of shrinking GVCs, indicated by the data presented in Fig. 2 and 3.

Global value chains and world trade have also been affected by the development of artificial intelligence; for example, the use of AI for machine translation into foreign languages in electronic commerce facilitates its rapid growth; in logistics, AI allows to cut commercial expenses and to optimise supply chains (Stapleton 2019, p. 15); it also reduces communication costs and changes business organisation (Puaschunder 2019).

Conclusion

To recapitulate the above considerations, it is possible to confirm the adopted hypothesis that at present we are facing a new stage of the globalisation process, reflected in the development of essential international economic linkages. It has been demonstrated that international trade, FDI as well as the internationalisation of production and the functioning of GVCs are in stagnation or even in regression. Although a slowdown or decreases have been observed in the case of the previous foundations of globalisation, such as trade in goods, FDI and GVCs, robust growth has been noted in other linkages, previously underdeveloped, e.g. trade in services or intangibles. The development of the world economy observed since 2011 seems to provide grounds for rejecting statements of the sole occurrence of deglobalisation.

Those changes have very complex and multifaceted causes, economic, geopolitical and technological, and their impact on the shape of the world economy is firm and strong. Taking into account those new and significant conditions of globalisation and the already noted changes in international economic linkages, it is possible to conclude that there are clear grounds for recognising the onset of a new stage of globalisation: 'slowbalisation'. Moreover, one may believe that the shape of this stage of globalisation will keep evolving in material aspects.

Therefore, it remains open to question whether 'slowbalisation' is the most appropriate term to refer to the new stage of globalisation; perhaps, as the phenomenon develops, a more adequate name for the new era of globalisation will be coined. However, it is a secondary issue.

It is certainly necessary to conduct broader and in-depth analyses of the ongoing changes and to seek patterns in the new stage of globalisation to fully describe its new nature and development directions and, perhaps, to redefine its foundations as well.

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The Factors Affecting Evolution of Cooperative Innovation Network on Platform: Based on the Prospect Theory

Yang LIU
School of Management, Shanghai University
Shanghai, China 200444

Yanju XU
School of Management, Shanghai University, Shanghai, China 200444

Abstract

To explore evolutionary mechanism of cooperative innovation network on platform which collects users' needs, this paper divides the technical ability of cooperators into the ability of identifying and implementing users' needs. And based on the prospect theory, evolutionary game is adopted to analyze the cooperative behavior of finite rational participants. According to the topological structure of the cooperative network on platform built by core enterprise, this paper uses MATLAB to simulate on the BA scale-free network. It is found that the sensitivity degree of marginal diminishing of perceived gains or losses as well as the coefficient of loss avoidance affect the frequency of cooperation negatively. And there is optimal value of strengths to increase the gains of cooperative innovation and achieve win-win cooperation. It is difficult for the participants with high weaknesses to cooperate with others steadily.

Keywords: Cooperative innovation network on platform; Ability oriented to users' needs; Evolutionary games; BA scale-free network; Prospect theory

Introduction

As more and more platforms emerge to collect users' needs(Achtner, Nanda et al. 2018, Ben Arfi and Hikkerova 2019), platform provider and platform participants cooperate with each other to realize users' expected needs and exciting needs(Kano and Takahashi 1979) which need enterprises identify users' requirement accurately, design and implement it successfully. Collaborators cooperate based on their strengths. Then platform-dependent innovation ecosystem emerges, such as Haier and Xiaomi innovation ecosystem in China.

Platform link collaborators(Sedera, Lokuge et al. 2016, Sun and Wei 2019) and heterogeneous resources to create the value (Eckhardt, Ciuchta et al. 2018). And the factors affecting performance include not only technology but also the factors influencing the cooperative behavior of participants. Because the order and time of cooperative decision is different and participants are all finitely rational, there is a dynamic game of sharing innovation resources and sharing risks among participants of innovation. And complementarity of technical resources, the ability of independent innovation, risk appetite, risk aversion and loss avoidance of participants all can influence the participants' expectation of earnings and experience of co-creating value.

Evolutionary game is an effective analysis method combining the game behavior of finite rational individuals and dynamic evolution. The game process will be affected by structure of network(Nowak and May 1992) and the network structure will also evolve due to the dynamic process of game(Zimmermann, Eguiluz et al. 2004). Because of the existence of core members, platform provider, the cooperative network is scale-free. BA scale-free network is the best topological structure of cooperation(Zhang, Aziz-Alaoui et al. 2014). So, this paper distinguishes the abilities of participants

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oriented to users' needs with ability to identify and implement needs, builds the games model of participants in platform innovation ecosystem with the prospect theory and stimulates on the BA scale-free network.

Theoretical Basis

Ability to Identify and Implement needs

As the Fig 1 shows(Deng and Sun 2009), '1'is the needs which is recognized by users, '7' is the objective demand reflected by users' behavioral information indirectly but not actually recognized by users themselves. The two are effective information of users' needs. And due to the existence of noisy information, as '5' and '6' in Fig 1, enterprises need the ability to identify effectively users' needs and transform it into professional demand of product functional. This ability is called 'ability to identify needs'. In order to complete the new product, enterprise also has 'ability to implement needs'.

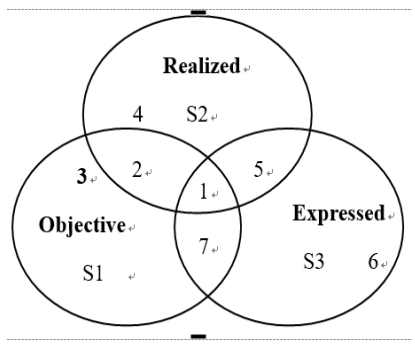

Fig. 1: Description of users' needs

Prospect Theory

The Prospect Theory holds that individuals make decisions according to perceived value in the face of uncertain gains or losses (Xu and Xu 2015), and also points that individuals are more sensitive to the perceived losses, meaning that perceived gains are less than actual gains and perceived losses are greater than actual losses(Levy 1996).

Research Method

Basic Assumptions

There are the two game players, participant i and participant j, which are enterprises or research institutions. And they are finitely rational individuals who seek the better returns and strategies by repeated games. According to prospect theory, the perceived value v of uncertain income or loss is composed of value function $v(q)$ and weight function $w(p)$. $w(p_s)$ is the function of p_s , represents the objective probability of event s. $w(0)=0$ and $w(1)=1$ are given. $\Delta q_s = q_s - q_0$ is the deviation between the actual return obtained by the players and the reference point after the event s. And assume that $q_0 = 0$.

$$v = \sum_s v(\Delta q_s) w(p_s) \tag{1}$$

$$v(q)=\begin{cases} q^{\varepsilon} & q\geq 0 \\ -\kappa(-q)^{\varepsilon} & q<0 \end{cases} \tag{2}$$

$\varepsilon\in[0,1]$ is sensitivity degree of marginal diminishing of perceived gains or losses. The player is risk neutrality when $\varepsilon=1$. κ is the coefficient of loss avoidance, and player is sensitive to losses than gains when $\kappa>1$.

There are two strategies, either cooperate or betray halfway. No matter which strategy players choose, they all aim to maximize their own interests.

The cooperation is built on the basis of complementing each other's strengths and sharing resource. There is technology spillover and the absolute benefit of cooperative innovation is determined by the ability of identify and implement users' needs of collaborators. While the absolute benefit of independent innovation is affected by participants' own ability of identify and implement users' requirement.

Notation

According to the prospect theory, there is no deviation between the perceived value and the actual utility of the definite losses or gains. δ is punishment for default, which mainly related to the breach clauses signed between participants and the ruler of platform. And the cost of cooperative innovation, $\lambda_a h\pi,(a=i,j)$, is certain when player choose to cooperate. And $h\pi$ is the total cost of cooperation and $\lambda_a,(a=i,j)$ is the coefficient of cooperative cost paid by player i or player j.

$\alpha_a,\beta_a\in[0,1],(a=i,j)$ represents the ability of identify and implement users' needs of player i and player j respectively.

If the possibility of collaborative innovation successfully is p_1, the perceived gains of player i is $w(p_1)(l_i\pi)^{\varepsilon_i}+w(1-p_1)*0=w(p_1)(l_i\pi)^{\varepsilon_i}$, and $\pi=(\max(\alpha_i,\alpha_j)*\max(\beta_i,\beta_j)*\sigma)^m$ is the actual benefits of cooperative innovation, m represents the elasticity coefficient of cooperative innovation, and σ is the conversion rate of ability and return.

If the possibility of the thing that player i or player j innovates successfully by itself is p_2 or p_3 .For example, the perceived gains of player i is $w(p_2)\pi_i^{\varepsilon_i}+w(1-p_2)*0=w(p_2)\pi_i^{\varepsilon_i}$, among the formula, ε_i is the coefficients of player i's risk appetite, and π_i is the actual gains of successful innovation by player i independently.

$$\pi_i=\begin{cases} \alpha_i\beta_i\sigma & \alpha_i,\beta_i>0 \\ \beta_i\sigma & \alpha_i=0 \\ \alpha_i\sigma & \beta_i=0 \end{cases} \tag{3}$$

If the possibility of the thing that player i or player j absorbs from the other one is p_4 or p_5 , $w(p_4)\theta_{ij}^{\varepsilon_i}+w(1-p_4)*0=w(p_4)\theta_{ij}^{\varepsilon_i}$ and θ_{ij} are the perceived and actual technology spillover benefit absorbed by player i from player j, and the follower is also the actual technology spillover loss from j to i. And $w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})+w(1-p_5)*0=w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})$ is perceived technology spillover losses. κ is the coefficient of loss avoidance of player i. All same for player j.

Game Model and Equilibrium Analysis

The matrix of perceptive income of the two players is shown as Table 1.

Table 1: Matrix of perceptive income

Player j **Player i**	**cooperate(y)**	**betray(1-y)**
cooperate (x)	$A_i = w(p_1)(l_i\pi)^{\varepsilon_i} + w(p_4)\theta_{ij}^{\varepsilon_i} - \lambda_i h\pi + w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})$ $A_j = w(p_1)[(1-l_i)\pi]^{\varepsilon_j} + w(p_5)\theta_{ji}^{\varepsilon_j} - \lambda_j h\pi + w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j})$	$B_i = \delta - \lambda_i h\pi + w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})$ $B_j = w(p_3)\pi_j^{\varepsilon_j} + w(p_5)\theta_{ji}^{\varepsilon_j} - \delta$
betray (1-x)	$C_i = w(p_2)\pi_i^{\varepsilon_i} + w(p_4)\theta_{ij}^{\varepsilon_i} - \delta$ $C_j = \delta - \lambda_j h\pi + w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j})$	$D_i = 0 \quad D_j = 0$

Suppose that player i chooses to cooperate with probability x and chooses to betray with probability 1-x. And suppose that play-j chooses to cooperate with probability y and chooses to betray with probability 1-y.

According to Table 1, the expected revenue of player i choosing to cooperate or betray are U_{i1} and U_{i2}, and the average of the expected revenue is $\overline{U_i}$.

$$U_{i1} = y[w(p_1)(l_i\pi)^{\varepsilon_i} + w(p_4)\theta_{ij}^{\varepsilon_i}] - \lambda_i h\pi + w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i}) + \delta - y\delta \tag{4}$$

$$U_{i2} = y[w(p_2)\pi_i^{\varepsilon_i} + w(p_4)\theta_{ij}^{\varepsilon_j}] - y\delta \tag{5}$$

$$\overline{U_i} = xU_{i1} + (1-x)U_{i2} \tag{6}$$

Similarly, the expected revenue of player j choosing to cooperate or betray are U_{j1} and U_{j2}, and the average of the expected revenue is $\overline{U_j}$.

$$U_{j1} = x\{w(p_1)[(1-l_i)\pi]^{\varepsilon_j} + w(p_5)\theta_{ji}^{\varepsilon_j}\} - \lambda_j h\pi + w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j}) + \delta - x\delta \tag{7}$$

$$U_{j2} = x[w(p_3)\pi_j^{\varepsilon_j} + w(p_5)\theta_{ji}^{\varepsilon_j}] - x\delta \tag{8}$$

$$\overline{U_j} = yU_{j1} + (1-y)U_{j2} \tag{9}$$

Over time, the player continuously adjusts its strategy by learning and imitating. The dynamic process can be expressed by replicator dynamic equations:

$$\frac{\mathrm{dx}}{dt} = x(1-x)\{y[w(p_1)(l_i\pi)^{\varepsilon_i} - w(p_2)\pi_i^{\varepsilon_i}] - \lambda_i h\pi + w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i}) + \delta\} \tag{10}$$

$$\frac{\mathrm{dy}}{dt} = y(1-y)\{x[w(p_1)(\pi - l_i\pi)^{\varepsilon_j} - w(p_3)\pi_j^{\varepsilon_j}] - \lambda_j h\pi + w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j}) + \delta\} \tag{11}$$

Let $\frac{dx}{dt}=0,\frac{dy}{dt}=0$, the five equilibrium points, (0,0), (0,1), (1,0) and (1,1) $(x^*,y^*)=(\frac{\lambda_j h\pi-w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j})-\delta}{w(p_1)(\pi-l_i\pi)^{\varepsilon_j}-w(p_3)\pi_j^{\varepsilon_j}},\frac{\lambda_i h\pi-w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})-\delta}{w(p_1)(l_i\pi)^{\varepsilon_i}-w(p_2)\pi_i^{\varepsilon_i}})$ are obtained. And the Jacobian matrix can be written to judge the stability of these five points, as formula (12) shows.

$$J=\begin{bmatrix}(1-2x)\{y[w(p_1)(l_i\pi)^{\varepsilon_i}-w(p_2)\pi_i^{\varepsilon_i}]-\lambda_i h\pi+w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})+\delta\} & x(1-x)[w(p_1)(l_i\pi)^{\varepsilon_i}-w(p_2)\pi_i^{\varepsilon_i}] \\ y(1-y)[w(p_1)(\pi-l_i\pi)^{\varepsilon_j}-w(p_3)\pi_j^{\varepsilon_j}] & (1-2y)\{x[w(p_1)(\pi-l_i\pi)^{\varepsilon_j}-w(p_3)\pi_j^{\varepsilon_j}]-\lambda_j h\pi+w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j})+\delta\}\end{bmatrix} \tag{12}$$

The stability of the equilibrium points is determined based on the value of the DetJ and TrJ of Jacobian matrix. Since $TrJ|_{(x^*,y^*)}=0$ constant holds, (x^*,y^*) is an equilibrium point but is not always a stable point. Let $V_i=w(p_1)(l_i\pi)^{\varepsilon_i}-w(p_2)\pi_i^{\varepsilon_i}$, $V_j=w(p_1)(\pi-l_i\pi)^{\varepsilon_j}-w(p_3)\pi_j^{\varepsilon_j}$, $U_i=-\lambda_i h\pi+w(p_5)(-\kappa_i\theta_{ji}^{\varepsilon_i})$, $U_j=-\lambda_j h\pi+w(p_4)(-\kappa_j\theta_{ij}^{\varepsilon_j})$. The stability of four equilibrium points, (0,0), (0,1), (1,0), (1,1), is analyzed and four cases are got as shown in Table 2 and Table 3. And Fig 2 shows the evolutionary phase diagram of case 4.

Table 2: Stability of the equilibrium points in case 1 and case 2

Equilibrium Points	$\delta>-U_a,V_a>0;(a=i,j)$			$\delta>-U_a,\delta+V_a<-U_a;(a=i,j)$		
	DetJ	**TrJ**	**Stability**	**DetJ**	**TrJ**	**Stability**
A(0,0)	+	+	Unstable point	+	+	Unstable point
B(0,1)	-	Uncertain	Saddle point	+	-	ESS
C(1,0)	-	Uncertain	Saddle point	+	-	ESS
D(1,1)	+	-	ESS	+	+	Unstable point

Table 3: Stability of the equilibrium points in case 3 and case 4

Equilibrium Points	$\delta<-U_a,\delta+V_a<-U_a;(a=i,j)$			$\delta<-U_a,\delta+V_a>-U_a(a=i,j)$		
	DetJ	**TrJ**	**Stability**	**DetJ**	**TrJ**	**Stability**
A(0,0)	+	-	ESS	+	-	ESS
B(0,1)	-	Uncertain	Saddle point	+	+	Unstable point
C(1,0)	-	Uncertain	Saddle point	+	+	Unstable point
D(1,1)	+	+	Unstable point	+	-	ESS

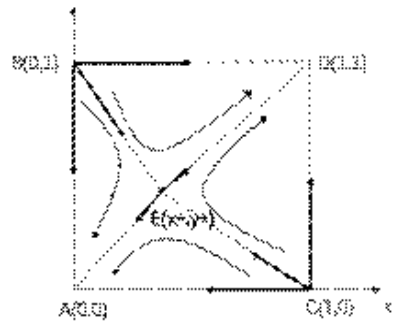

Fig 2. Evolutionary phase diagram of case 4

Simulation on BA Scale–free Network

Simulation Steps

Step 1: Each node was linked with four neighborhoods. And then this paper build different scale of BA scale-free networks based on the mechanism of growth and preference.

Step 2: Each node selects the strategy randomly at the initial moment.

Step 3: The evolutionary rule of the network is related to the mechanism of old nodes to disconnect and reconnect. After each one game, the cooperator i breaks the connection with the defector j who has the greatest benefit(Zimmermann, Eguiluz et al. 2004, Santos, Pacheco et al. 2006). According to the mechanism of compensation, i will select a new player which does not have a cooperative relationship with i from the neighbor of j, and the other party acknowledges the partnership unconditionally(Santos, Pacheco et al. 2006).

Step 4: The rules of updating strategy is Paired Comparison. Player i randomly selects one player j to compare their benefit and imitate player j's strategy with a certain probability W, if the benefit of player j is greater than the benefit of player i. Otherwise, player i will keep strategy.

$$W(i \to j) = \frac{1}{1+e^{-(R_j - R_i)/n}} \tag{13}$$

The n is the uncertain factors such as noise in the environment, which is usually set as 0.1. R_i and R_j represent the sum of the gains obtained by player i and player j in the process of game with all neighbors respectively.

Step 5: Repeat steps 2, 3 and 4 until that a certain number of games steps is reached or stable state of evolution is reached. After experiments and referring to previous studies, this paper sets the number of game steps as 50 steps.

According to the above steps, this paper simulates with MATLAB and measures the evolutionary result with the cooperative frequency which is the number of participants adopting the cooperative strategy divided by the total number of resource providers. In order to avoid the experiment error, tests were repeated for 50 times and the average of the results was taken as the final result for each group of different parameters.

Simulative Results and Discussion

By consulting existing studies(Zhao and Zhao 2016, Li, Cao et al. 2020) and relevant experts in the field of management science and complex network, this paper fix some parameters to analyze the factor influencing the evolutionary behavior in case 4.

$$\alpha_i = 0.2, \beta_i = 1, \alpha_j = 1, \beta_j = 0.2, w(p_4) = w(p_5) = 1, \lambda_i = \lambda_j = 0.5, h = 0.4, \sigma = 10, m = 1.5, \delta = 5, \theta_{ij} = \theta_{ji} = 4$$

Sensitivity Analysis of ε and κ

(Tversky and Kahneman 1992) found that it can represent the general behavioral preferences of any decision maker when $\varepsilon = 0.88$ and $\kappa = 2.25$.

To analyze the sensitivity of ε and κ, set $\varepsilon = 0.2, 0.5, 0.88, 1$ and $\kappa = 0.25, 1.25, 2.25, 3.25$. And $\varepsilon = 0.88$ or $\kappa = 2.25$ when this paper does not analyze the indicator.

1) The sensitivity of ε: As the Fig 3 shows, the evolution of players' behavior is sensitive to ε very much. The smaller ε is, the easier the frequence of cooperation in the game system evolves to 1. And as long as the ε of one player is 0.2, the game system will evolve to (cooperate, cooperate). The smaller ε is, the faster the system evolves. On the contrary, expected that the ε of opponent player is 0.2, as long as the ε of one player is 0.88 or 1, the game system cannot evolve to (cooperate, cooperate) and the frequence of cooperation will decrease compared with the initial status. The higher ε is, the faster the system evolves.

2)The sensitivity of κ: As the Figure 4 shows, the evolution of players' behavior is sensitive to κ too. The smaller κ is, the easier the frequence of cooperation in the game system evolves to 1. And as long as the κ of one player is 0.25, the game system would evolve to (cooperate, cooperate). The smaller κ is, the faster the system evolves. And expected that the κ of opponent player is 0.25, as long as the κ of one player is 2.25 or 3.25, the game system cannot evolve to (cooperate, cooperate) and the frequence of cooperation will decrease compared with the initial status. The higher κ, the faster the system evolves.

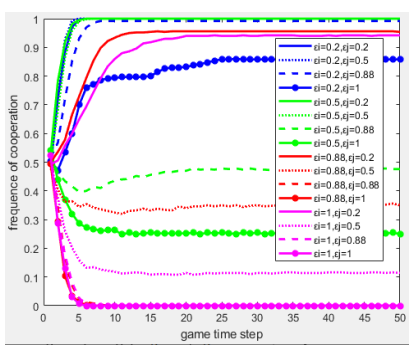

Fig 3. The sensitivity of ε.

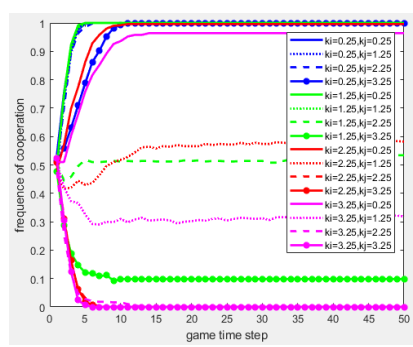

Fig 4. The sensitivity of κ.

The Influence of Ability of Players

1) The influence of strengths α_j or β_i: It is known that the complementary ability influence the gains of cooperation. However, as the Fig 5 shows, as long as the strengths of one player is weak ($\alpha_j = 0.2$ or $\beta_i = 0.2$), the frequence of cooperation in the game system can to evolve to 1. On the contrary, expected that the strengths of opponent player is 0.2, as long as the strengths of one player is strong especially ($\alpha_j = 1$ or $\beta_i = 1$), the game system cannot evolve to (cooperate, cooperate). It indicates that stable cooperation are more likely obtained between the strong and the weak or

between the weak in the game system. Because that the weak can get much more gains by cooperating with others compared with innovating independently and they have no ability to betray halfway. The reason why stable cooperation cannot be formed between the strong is that the strong have a high perceived return on independent innovation. It is especially possible for the strong to betray halfway to get speculative gains and avoid technological spillover losses brought by cooperative innovation.

2) The influence of weaknesses α_i or β_j : As the Fig 6 shows, the evolution of players' behavior is sensitive to participants' weaknesses too. And different from the impact of strengths, as long as the weaknesses of one player is especially high ($\alpha_i = 1$ or $\beta_j = 1$) , the game system would not evolve to (cooperate, cooperate). The higher weaknesses are, the faster the frequence of cooperation in the game system evolves to 0.

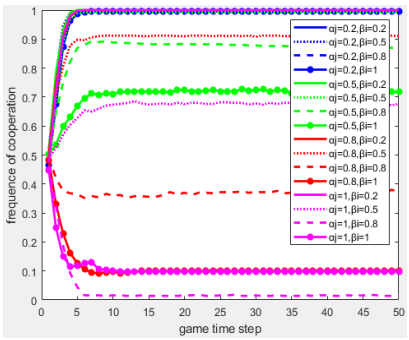

Fig 5. The sensitivity of strengths α_j, β_i .

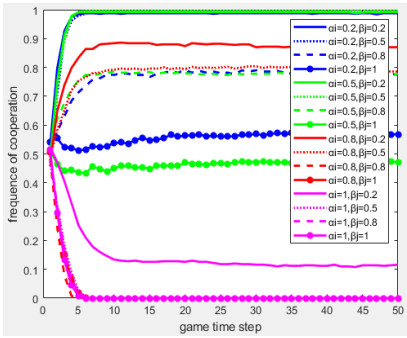

Fig 6. The sensitivity of strengths α_i, β_j .

Conclusion

The research object of this paper is the cooperative innovation network based on the platform collecting users' needs and cooperating depends on the strengths of participants. The research method is evolutionary game on complex network, the theory used includes the evolutionary game theory and the prospect theory. The main purpose of research is to analyze the factors influencing the evolution of the cooperative innovation. According to the simulative results, the following conclusions are obtained:

1) According to Prospect Theory, individuals' perception of gain or loss is diminishing marginal. And it is found that the effect of the sensitivity degree of marginal diminishing of perceived gains or losses on the frequency of cooperation is negative. The less sensitive participants are to diminishing marginal returns, the smaller the perceived value of marginal decline returns, and the more likely they are to build stable cooperative relationships with other participants.

2) The coefficient of loss avoidance affects the cooperative frequency negatively. The prospect theory holds that most individuals are more sensitive to loss than gain. Actually, the less sensitive participants are to loss, the smaller the perceived loss of cooperation, and the more likely the game system evolve to (cooperate, cooperate).

3) To meet users' needs, participants join in the platform ecosystem cooperate with the another one who complement its ability to identify or implement users' needs. Although, the strengths of cooperators affect the gains of cooperation, there is the optimal strengths to ensure the benefits of cooperation and achieve win-win cooperation. It is less likely for the game system evolve to (cooperate, cooperate) between the strong.

4) The weaknesses affect the evolution of the game system negatively by influencing the participants' perceptive value of independent innovation. And as long as the weaknesses of one player is especially high, the win-win cooperation would not be achieved.

In sum, participants, who participate in the platform collecting users' needs and cooperate depends on the strengths of participants, should investigate and measure the one's sensitivity to marginal gains or losses and risk preference in advance before choosing the cooperators.

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Information and Energy in Radiocommunication

Pawel BIENKOWSKI

Wroclaw University of Science and Technology
Telecommunications and Teleinformatics Department, Wroclaw, Poland
pawel.bienkowski@pwr.edu.pl

Abstract

Information is an essential element of human life. The means of communicating information has evolved over the centuries - people have striven to transmit more and more information. With the transmission of information is related to energy consumption and one of the goals has always been to minimize the energy required. For this purpose, a number of methods are used – eg. eliminating redundant information without loss of information content, but also decides to limit some information content in a manner to avoid any damage transmitted information - eg. reducing image resolution. Information transmission methods are also optimized in terms of channel capacity and transmission energy efficiency. All these activities allow to send more information faster and with less and less energy consumption.

Keywords: Information Technology, Modulation, Compression, Radiocommunication Systems, Electromagnetic Environment, 5G.

Introduction

The main task of telecommunication is to transmit information from the sender to the recipient. Usually, information is sent in the form of a message and the entire procedure is based on a typical scheme:

information → information preparation → sending message → receiving message → retrieving information from message.

This universal scheme is a subject of various modifications depending on the type of information and the way it is transmitted, but in each case, it is possible to distinguish individual stages and always note that a specific amount of energy is required to achieve them. It has always been tried to minimize the energy needed to transmit information, and this also applies to telecommunication, and in particular radiocommunication. The paper presents examples of the use of various techniques to optimize the amount of messages and energy necessary to transmit information in various telecommunication systems.

Information in Telecommunication

As mentioned in the introduction, information is usually provided in the form of a message - and it must be remembered that not every message can carry information, and at the same time - the amount of information in one message can be very different. In the "digitized" world, the smallest unit of information is a bit, so information content of a message can be determined in bits/message, which already gives the first estimates of the information density in various messages - of course, the main aim is to fit as many bits as possible in a given message. The number of messages sent in time is limited - it is limited by the so-called channel bandwidth (Cisco, 2017). If the limitation concerns the number of bits that can be transferred, there is nothing else but to rationally manage these bits and maximize the amount of information content in the available number of bits. It is directly connected to the compression, and the coding of information supporting it. Compression can be lossless and lossy. In the case of lossless compression, the source information can be reproduced at the recipient's end in the same form as before compression. Examples of lossless compression can be found in compression of digital files - the popular "ZIP" or "RAR". It consists in "clever" processing of information in such a way as to arrange the information as well as possible - for example, instead of sending a long string of

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zeros, one can send information about the number of consecutive zeros or ones. It is also worth noting that the currently used file formats have in many cases built-in mechanisms of such compression - an example of this is MS Word's save formats - doc and docx. It can be observed by saving the same large text file in both formats and then "zip them up". The second direction used in lossless compression is concerning the elimination of redundant information. The analog color TV signal is a good example from telecommunication. To maintain compatibility with "black and white" television, it was necessary to send the Y luminance signal – which consists information about the brightness of the image. It was sent together with information about the chrominance of the three RGB colors. There is a clear redundancy here - luminance information is also transmitted in the full chrominance signal. What was done? The chrominance signal was converted into the so-called differential signals - R-Y and B-Y, i.e. the difference between the signal representing the red color R and the luminance signal Y. The same was done with the low color B. But the green color G was omitted - why? In short - subtracting the R and B colors from the luminance will leave what belongs to the G color – so why send it additionally? Hence, it was noticed for example in (ITU-R M.2320, 2014) that the chrominance signals can be reduced without losing the quality of the received image - and this is where the field for lossy compression begins. It consists of eliminating from the source information those elements, which - very generally speaking - are not necessary for the correct interpretation of the information by the recipient as example we can refer to (International Standard ISO/IEC 11172, 1993). Of course, the information received in this way will not be identical to the source information - but it will be useful for the recipient. Lossy compression is used in particular for information that is interpreted by our senses - sound, image, but also the written word. In the implementation of lossy compression, certain features of our senses are used and these senses are somewhat cheated. The aforementioned chrominance may be once again used as an example. The sense of sight is much more sensitive to brightness than to color - so information about the color can be impoverished - it can be sent, for example, with "lower resolution". There are other examples, e.g. image details are "masked" by dominant planes, especially bright - glare, or inability to notice details when the object is moving rapidly. It is a similar situation in case of sound - with appropriate algorithms, the number of bits intended to transmit the same - in fact almost the same – information can be significantly reduced what was described in many papers:(Berg J., Bustad Ch., Jonsson L., Mossberg L., Nyberg D. 2013), (Gafer A.Y., Elsadig S., Varun J. 2012). Music and a CD can be used as an example - 1MB of data on CD corresponds to about 7 seconds of music. The same music in good quality MP3 format will take only about 80kB - so it is compressed 13 times. The possibilities of various compression levels are used, for example, in digital radio. Table 1 shows the typical bit rates used in the two standards DAB (Digital Audio Broadcasting).

Table 1: Required bitrate for various radio programs1) in DAB and DAB+ standard

Type of program:	**DAB**	**DAB+**
Stereo sound (high quality music)	192kb/s	80kb/s
Stereo sound (good quality music)	128kb/s	64kb/s
Stereo sound (standard quality music)	112kb/s	48kb/s
Mono sound (good quality music)	96kb/s	48kb/s
Mono sound (music/voice services)	64kb/s	32kb/s
Mono sound (announcements: weather, traffic)	48kb/s	24kb/s

Therefore, depending on the needs and the type of transmitted information, the differences in bitrate can reach up to 400% within one system. Additionally, thanks to the use of more efficient methods of encoding and compression, the newer DAB + standard is practically two times more efficient than its predecessor DAB. Same is true about images. One photo of 1024x768 pixels in uncompressed version - the so-called RAW - with 8-bit sampling of each RGB color it will have approx. 2.4MB. When it is in jpg compression, it will have only several dozen kilobytes.

The following conclusion may be drawn - when we want to send a lot of information quickly - we must try to optimize this information to make sure that redundant elements are not included. It calls for the

need to "censor" this information, depriving it of "unnecessary" elements. At the same time, it must not be forgotten that such preparation of information takes time and energy. Time is an important factor as the speed of the compression process is of great importance when transferring “live” information.

Transmission of Information

In telecommunication systems, the information should be prepared for optimal transmission over the transmission channel. This is achieved by broadly understood modulation. From the point of view of current considerations, its primary role is to make the best use of the available resources - the transmission channel - to send as much information as possible. In the case of digital modulation, the smallest "quantum" of transmission is a single modulation symbol. And here comes another optimization plane - the so-called valence modulation. The simplest modulation allows to send only one bit in one symbol - e.g. modulation OOK (*carrier On-Off-Keying*) or BPSK (*Binary Phase Shift Keying*) or BFSK (*Binary Frequency Shift Keying*). Commonly used multi-value modulations allow sending 2 (np. QPSK - *Quadrature Phase Shift Keying*) to 8 bits – e.g. 256QAM (*Quadrature Amplitude Modulation*). Moreover - the use of appropriate modulation formulas and transmission standards allows for optimal use of the channel band. As a rule, optimization consists in obtaining the possibly uniform spectral density. This is achieved, inter alia, by the use of broadband techniques - e.g. WCDMA (*Wideband Code Division Multiple Access*) used in the UMTS mobile phone standard (*Universal Mobile Telecommunications System*) or an increasingly more often used technique called OFDM (*Orthogonal Frequency-Division Multiplexing*) – e.g. on digital television and terrestrial radio (DVBT and DAB) or LTE system (*Long Term Evolution)* superseding UMTS in mobile phone technologies (3GPP TR 38.913 V15.0.0. 2018), (ITU-R M.2083 2015) and (Spectrum used for LTE 2017). By optimally using the transmission bandwidth, the best possible channel capacity is obtained, and selecting the appropriate modulation additionally improves the energy balance of the system. In detail i

Information Energy

It takes a certain amount of energy to send each piece of information. Depending on the type of transmission channel and the used modulation, sending one bit will require different energy. Overall, it can be said that different modulations have different energy efficiency η_E, which can be described as the ratio of the energy used directly to transmit information E_i to the total energy emitted by the system E_t. – formula (1):

$$\eta_E = \frac{E_i}{E_t} \cdot 100\% \tag{1}$$

It should also be remembered that for the correct reception of information by the receiver, it is necessary to supply the input with a signal of appropriate energy. However, this is not a sufficient condition - the appropriate ratio of the useful signal to the interfering signals must also be maintained (SNR - *signal to noise ratio or CNIR - carrier-to-noise-and-interference ratio*). Moreover, the ratio required for the proper operation of the system usually increases with the modulation valency (i.e. the more efficient the modulation, the higher the signal to noise ratio required). This issue is particularly important in radiocommunication. This is one of the reasons why it may happen that in one place, despite the high level of the Wi-Fi signal, we have a very slow transmission - because there are other networks in the area and our signal-to-noise ratio is small, and elsewhere even though there is a weak signal - the transmission is much better because there is an "electromagnetic void" in the vicinity.

And the last piece of the puzzle - energy efficiency – concerns the part of the energy emitted by the transmitter can be used by the receiver. There are two aspects here - energy losses, e.g. by attenuation of the transmission path (e.g. cable or optical fiber or attenuation of the microwave signal by rain) and signal scattering - the problem of all radio transmissions, but also e.g. optical transmissions in free space. It results from sending information "over the air" - by an area much larger than needed for signal reception by the receiver. This is illustrated quite well by the example of a mobile telephony base station. Let us analyze the following situation. Let us assume a typical sector of base stations - with an antenna half power angle equal to 60° in azimuth and 12° with 2° tilt in the elevation. Let us assume

that the range is limited by the area determined by the signal decrease by half in azimuth and elevation. The radius of such a cell will be about 400 m with a width of about 90º in azimuth. The area of a cell defined in this way can be estimated at approx. p = 120 000 m^2. To simplify the analysis, let us assume that the energy needed to transmit at any point in the cell is constant and is described by the power density at the receiving point S_1=1 mW/m^2. Since the energy is transmitted through the antenna to the entire sector - that is, the required radiated power described by EIRP (*Equivalent Isotropical Radiated Power*) is equal to $EIRP_1$ = 120 W for one connection. If there are 100 users in a cell – EIRP os the station is $EIRP_{100}$=12 000 W, and the power density at any point in the cell is S_{100}=100 mW/m^2. If it was possible to send this energy exactly to the area of e.g. 1 m^2 to the place where the receiver stands - the necessary EIRP power would be only 1 mW, and apart from the "channel" from the transmitter to the receiver with an area of 1 m^2 electromagnetic fields from this system would not exist at all. Of course, this is an ideal situation. However, let's consider another case, that the analyzed cell, without changing the other parameters, was divided into 4 smaller ones - each with the same area. In each of the new sectors, the required power density remains S_{1n}=1 mW/m^2, so nothing changes. However, if there is only one user in the area of the old cell, the electromagnetic energy must be emitted only to one of the new sectors, the area of which will be p_n=30 000 m^2, so the needed EIRP = 30 W and although the power density in the sector where the user is currently present is the same as for a single large cell, no electromagnetic energy is emitted to the other three new sectors. If there will be 100 users, evenly distributed in four new sectors - S_{25}=25 mW/m^2 should be ensured in each sector, so $EIRP_{25n}$=25·30 000 = 750 000 mW = 750 W, and as an effect it will be 3000 W in all sectors – which gives a 4-fold reduction in energy emitted to the environment and a 4-fold reduction in power density in places where users are present. Of course - if all users are gathered together in one small cell - the power density in that cell will be the same as in the large cell before the split - but ¾ of the old cell will not emit electromagnetic energy at all. Therefore, ¼ of previously emitted energy is sufficient. Hence, a significant improvement in the energy efficiency of the system is achieved, while acting pro-ecologically - reducing the emission of electromagnetic energy to the environment. To sum up, in the first approximation - the n-fold reduction in the cell surface allows for an n-fold reduction in the energy necessary to ensure transmission, and thus the n-fold increase in the "energy efficiency" of the system. In a real system, the effect will be even greater, because the energy necessary to transmit at the edge of the cell is at least several times greater than in its center, and thus the energy emitted by the base station to the entire cell will also be several times greater.

Conclusions

Information is energy - sending any information requires a certain amount of energy and the task of engineers is to optimize these systems in order to send information with as little energy as possible and using available resources as optimally as possible. That is because not only energy is important here - but also the possibility of sending as much information as possible in the shortest possible time. It should be emphasized that we are dealing here with a synergy of the amount of information and energy - but in real conditions, increasing the energy will not always bring about the expected increase in the amount of information that can be sent - because we must remember about the *carrier-to-noise-and-interference ratio*. It is certainly worth to direct efforts towards the optimal use of the emitted energy - especially in radiocommunication - and this is what the 5G technology with a large number of small cells and antenna systems allows for. Of course, it should be taken into account that the beginnings of the implementation of this technology will be based on the expansion of the already existing base stations - as was the case with the introduction of next generations of mobile telephony, but this is not the direction that can ensure obtaining optimal system parameters as described in (Okumura Y. 2014), (ITU-R M.2376 2013), (Rangan S, Rappaport S, Erkip E 2014) and (Wu T, Rappaport S, Collins C 2015). Only the construction of a large number of small base stations with relatively low power each will allow for high network capacity with a reasonable energy balance. The only concern may be based on the economic aspect - building a large number of small base stations may turn out to be much more expensive than extending the existing ones

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A System of Material Incentives for Research Scientists in An Organization

Elena KOLESNICHENKO
Tambov state university named after G.R. Derzhavin, Tambov, Russia
e-mail: ekolesnichenko@live.ru

Tatiyana TRUFANOVA
Tambov state university named after G.R. Derzhavin, Tambov, Russia
e-mail: tta777hr@mail.ru

Valentina SUKHOVA
filial-branch of State University of Sea and River Fleet named by Admiral S.O.Makarov
e-mail: vfspguvk@mail.ru

Olga PECHERSKAYA
Voronezh State University of Forestry and Technologies named after G.F. Morozov
e-mail: olga-pecherskaya@mail.ru

Abstract

Each organization strives to achieve market leadership. To be competitive, organizations need to use human resources efficiently. In the current conditions, it is crucial to stimulate employees to increase labor productivity and improve the quality of work and services. Organizations need to focus on the practical sphere of management and scientific interests and to develop a system of incentives to motivate research scientists. TAnalyzing this problem and the conditions in Russia and abroad, the authors came to the conclusion that the personnel incentive system needs to be improved to motivate the research scientists. Since the technological progress brings about better working conditions, staffs need to improve their professional qualifications. However, there are even more problems in the sphere of personnel management. In most organizations, especially in non-profit organizations, managers do not aspire to find the ways to motivate their research staff. The authors made a number of theoretical conclusions and proposed the ways to develop a system of material incentives for research scientists, which can be a basis for further research in the field of personnel management of organizations. As for the practical significance of the research, the authors gave some useful recommendations to personnel managers of all kinds of research organizations.

Keywords: personnel management, staff incentives, scientific staff, incentive system

Introduction

Motivation and incentives play the most important role in management because the goals of the organization can be achieved only in case its employees work as a team. The task of a competent leader is not only to encourage the staff to work efficiently and to take into account the interests of the employees, but also to make the personnel feel satisfied with the results of their work. Following a number of recommendations, employees try to work creatively. Currently, in the scientific and educational literature the terms "motivation" and "stimulation" are defined in different ways, which means that both concepts are complex and multifaceted and need to be studied thoroughly. The authors analyzed different approaches to the definitions of these terms and made a conclusion that motivation depends on our needs and views on life. M.D. Ivanova and N.S. Zalutskaya use different approaches to defining the concept of "motivation". M.D. Ivanova believes that motivation depends only on the internal, physiological and psychological sides of the personnel. Whereas N.S. Zalutskaya

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claims that this process depends not only on the internal side but also on the external forces of motivation: the knowledge, emotions and experience. A.K. Suetov notes that the process of motivation can affect not only an individual, but also a team of employees who have common motives and goals at work.

Thus, the authors of the article concluded that such methods of labor management as motivation and incentives are interrelated concepts that complement each other.

he purpose of the article is to prove theoretically the necessity of the development of the incentive system within an organization.

Methods

The research is based on the scientific works that deal with the problem of stimulating and motivating research scientists in an organization. To collect and study theoretical and empirical material, the authors applied the method of analysis, the method of synthesis, methods of cognition and classification, methods of comparison and generalization. Statistical analysis methods were used to determine the criteria for assessing the performance of employees. As for the regulatory framework, the authors studied the following legal acts: Labor Code of the Russian Federation; Federal Law of the Russian Federation "On Personal Data"; Federal Law "On Information, Information Technologies and Information Protection"; Federal Law "On Science and State Scientific and Technical Policy". As for the resource base of the work, the authors studied various kinds of materials (articles, calculations etc.); publications from the e-library; publicly available financial reports of the company.

As for the methodological basis of the research, a number of scientific approaches were used. According to the systemic approach, stimulation is a set of interrelated elements. According to the process approach, stimulation is defined as a number of sequentially performed operations (there is an algorithm for the formation of incentive payments). The authors applied an integrated approach to study the methods of stimulating employees and the ways to assess labour efficiency. The research methodology has two stages.

At the first stage, the authors studied the job description of research scientists. At the second stage, the incentive system was analyzed.

Job description of research scientists.

According to the Federal Law "On Science and State Scientific and Technical Policy", a research scientist (a researcher) is "an employee who has the necessary qualifications and is professionally engaged in scientific and (or) scientific and technical activities."

Research scientists work in research organizations, institutions of higher education, training organizations delivering vocational education programs and other scientific institutions. Researchers can do their work individually and in a team.

Research scientists can hold the following positions:

– a junior research assistant focuses on specific objectives of the study (carries out observations and experiments, makes measurements, etc.). Under the supervision of the principal investigator, a junior research assistant analyzes the work of other researchers dealing with the problem under study and improves his/her qualifications;

– a principal investigator conducts scientific research within specific project sections, makes observations, etc. A principal investigator is involved in the development of the research plan and its practical implementation. He/she arranges an educational process in universities and scientific institutions (develops and delivers special courses, supervises students who write course papers or work on diploma projects, etc.);

– a senior researcher independently conducts research and works on challenging projects, he/she is in charge of various groups of employees he/she sets goals for. A senior researcher develops and implements personnel training programs. He/she is also involved in the development of the research

plan and its practical implementation. He/she arranges an educational process in universities and scientific institutions (develops and delivers special courses, supervises students who write course papers or work on diploma projects, etc.);

– a leading research scientist supervises a group of researchers who perform their work in accordance with the regulations. He/she is directly involved in research (develops theoretical and practical methods and substantiates his/her proposals, organizes and coordinates the work of the employees and comes up with the ideas where the science projects can be implemented). A leading research scientist develops and implements personnel training programs and conducts training courses for specialists taking part in the educational and scientific process in universities and scientific institutions;

– a chief researcher mainly supervises subordinate staff conducting scientific research. Apart from that, he/she is also involved in the development of the research plan and its practical implementation (defines the research direction, selects methods, techniques and tools, coordinates the work of research workers, analyzes the work of domestic and foreign researchers dealing with the problem under study, comes up with the ideas where the theoretical and practical findings can be implemented, and participates in the work of research scientists). A chief researcher develops and implements personnel training programs and conducts training courses for specialists taking part in the educational and scientific process in universities and various scientific institutions.

Taking into account the job description of research workers, the authors of the article made a conclusion that researchers can get a financial reward in accordance with their publication activity and applied developments.

The performance results should be differentiated.

A researcher can work independently or in a team. However, the incentive payment does not depend on the number of participants working on the project.

Taking into account the job description of research scientists, the authors of the article proposed an incentive scheme.

Specifics of the incentive system

Before considering the specifics of the incentive system, the authors of the article analyzed the concept of system and specifics of its elements. They took into consideration the general theory of systems proposed by L. Bertalanffy, I.V. Blauberg, A.A. Bogdanov, S.V. Leontyev, M.A. Parkhomchuk, S.A. Starykh and other researchers.

Then the authors analyzed the specifics of the concept of system and its components.

A system is a collection of related elements which are linked together to achieve a specific goal. An element is the smallest indivisible object which has specific properties. A system consists of such elements as a subject, a goal, objectives, principles, mechanism (techniques and tools), and an object. The goal defines the principles, objectives of the development and application of the mechanism. Objectives are a set of interrelated benchmarks that specify the goal. The subject influences the object of the system through the mechanism techniques and tools. An object is process or a phenomenon which is under the influence of the mechanism techniques and tools. A mechanism is a means of achieving the goal. It determines the way the subject influences the object.

Techniques are a system of operations and procedures carried out by the subjects of management in a certain sequence. A set of tools is used to perform these procedures. Alongside with the applied mechanism and techniques, tools are used to solve a particular task.

After examining the concept of system, the authors analyzed the specifics of the incentive system. An incentive system is a set of related elements and measures motivating employees. These elements and measures are linked together to achieve a specific goal.

The incentive system is a collection of elements linked together to stimulate research scientists to work more efficiently, which will improve the profitability of the organization. To understand how an incentive system works, the authors analyzed the specifics of its elements and their interrelation (Fig. 1).

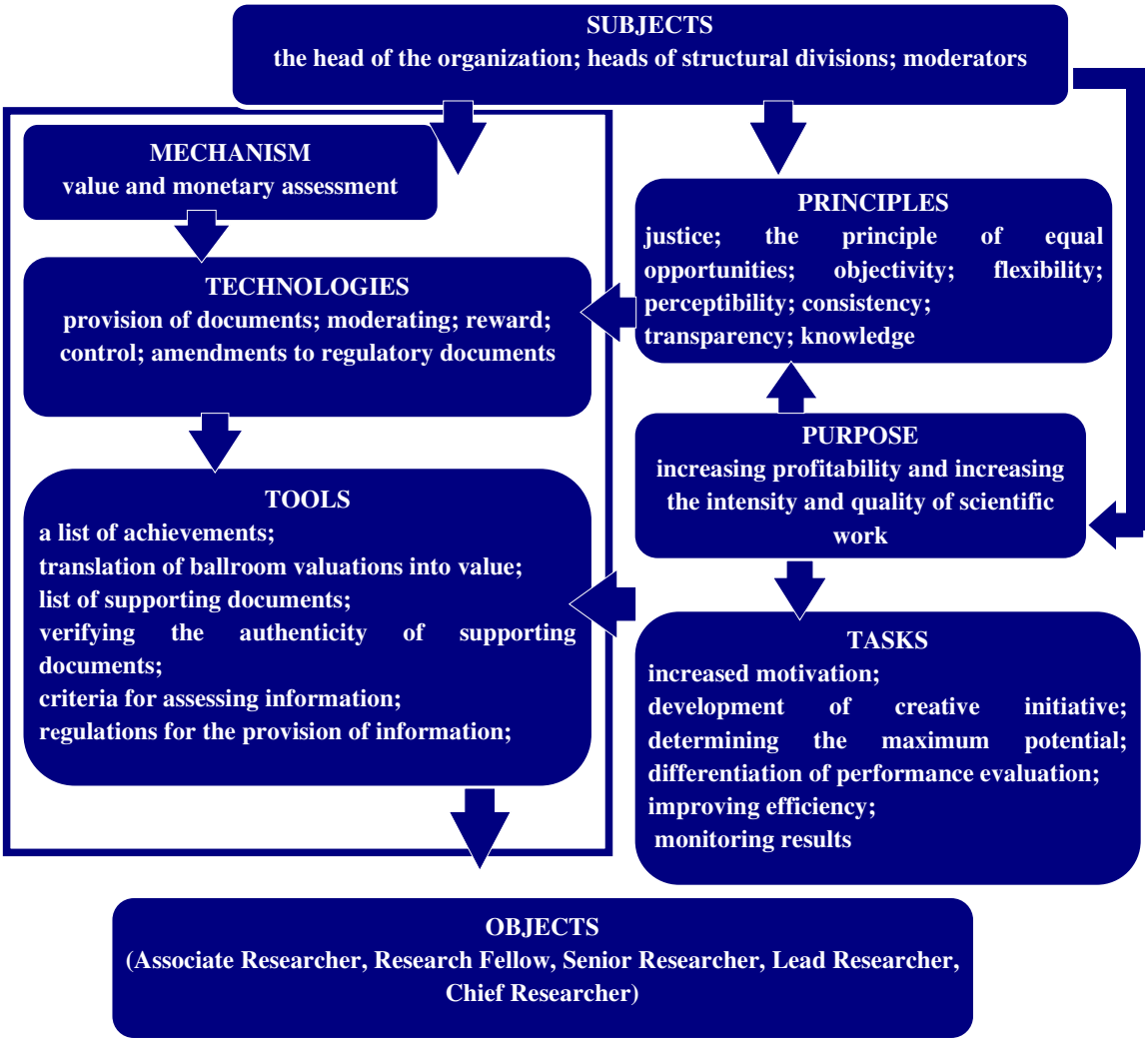

Fig. 1: Incentive system for researchers

Results and Discussion

The system includes subject-object relations, where the head of the organization, heads of structural divisions and moderators are the subject. In the system of material incentives, research scientists are the object.

The goal of the incentive system is to stimulate research scientists to work more efficiently, which will improve the profitability of the organization.

- the objectives are: to increase motivation, to develop creative initiative, to determine the maximum potential, to introduce differential assessment practice, to improve working efficiency and to monitor results;

- the basic principles of the incentive system are:

• fairness (researchers are rewarded in accordance with the rating and the merit pay depends on the quality and quantity of work);

• equal opportunities (all employees have equal opportunities and can be engaged in all activities). This means that every researcher can work in a team and be rewarded for any achievement, regardless of his/her position, qualifications, salary, gender, age, ethnicity and other distinctive characteristics);

• objectivity (the employee performance is objectively assessed);

• flexibility (the present Regulations on incentives for research scientists can be changed at any stage of the development of the organization);

• perceptibility (the incentive system is effective and stimulates researchers to improve working efficiency);

• consistency (the criteria of the performance assessment system do not contradict the goals and results of the organization);

• transparency (the incentive system is transparent, clear and verifiable);

• awareness (all research scientists are informed in a timely manner);

- the mechanism is considered as an integral part of the incentive system influencing the objects. In this incentive system, the assessment practice is introduced; specific techniques and tools are used to reward researchers in accordance with their performance and rating;

- the techniques in the incentive system are: document submission, moderation, incentive payments, control, amendments to regulatory documents;

- the criteria of the performance assessment and bonus accruals are clear. Research scientists are aware of the achievement rewards and the way incentive pay is calculated;

- the tools include: a list of achievements, verification of the authenticity of supporting documents, reward in accordance with the rating, control of activities, a list of supporting documents, regulations for the provision of information, criteria for evaluating information and achievement monitoring.

The incentive system can be introduced in any type of organization.

To implement an incentive system, it is crucial to draw up a local normative act "Regulations on incentives for research scientists of the organization". It should include the following sections:

1. General Provisions

2. The general procedure for a staff incentive program in the organization

3. The procedure for supporting documents submission

4. The procedure for moderating the achievements

5. The procedure for calculating incentive payments

6. The procedure for appealing

7. The procedure for bonus accruals

8. The procedure for introduction of changes

The incentive system should be introduced in accordance with the "Regulations on incentives for research scientists of the organization". The regulations should include such sections as: the procedure for bonus accruals; the procedure for supporting documents submission; the procedure for moderating the achievements and others.

Each employee receives an incentive pay in accordance with their performance and rating.

According to the "Regulations on incentives for research scientists of the organization", the size of an incentive pay depends on the scientific achievements of the employees (Table 1).

Table 1: Performance indicators in the incentive plan

APPLICATION DEVELOPMENT					
Indicator for which incentive payments are accrued	Sum of points for scientific result				
	Categories of researchers				
	Associate Researcher	Research Fellow	Senior Researcher	Lead Researcher	Chief Researcher
1. For permanent employees and teams					
1.1 For scientific ideas and developments					
Pilot Development Phase	0,3	0,35	0,4	0,45	0,5
Implementation phase	0,8	0,85	0,9	0,95	1
Confirmed (patented) technology (product)	1,3	1,35	1,4	1,45	1,5
Product to be implemented in mass production	1,8	1,85	1,9	1,95	2
2. For temporarily engaged employees and teams					
2.1 For scientific ideas and developments					
Pilot Development Phase	0,05	0,1	0,15	0,2	0,25
Implementation phase	0,1	0,15	0,2	0,25	0,3
Confirmed (patented) technology (product)	0,15	0,2	0,25	0,3	0,35
Product to be implemented in mass production	0,2	0,25	0,3	0,35	0,4
PUBLICATION ACTIVITY					
1. Publications					
1.1. Publishing in publications indexed in the Web of Science database					
Category 1 (Q1)	0,8	0,85	0,9	0,95	1
Category 2 (Q2)	0,25	0,3	0,35	0,4	0,45
Category 3 (Q3)	0,2	0,25	0,3	0,35	0,4
Category 4 (Q4)	0,15	0,2	0,25	0,3	0,35
without category	0,1	0,15	0,2	0,25	0,3
1.2. Publishing in publications indexed in the Scopus					
Category 1 (Q1)	0,8	0,85	0,9	0,95	1
Category 2 (Q2)	0,25	0,3	0,35	0,4	0,45
Category 3 (Q3)	0,2	0,25	0,3	0,35	0,4
Category 4 (Q4)	0,15	0,2	0,25	0,3	0,35
without category	0,1	0,15	0,2	0,25	0,3
1.3. Article in the peer-reviewed journal	0,15	0,2	0,25	0,3	0,35
1.4. Publication of a monograph (peer-reviewed, with ISBM assignment)	0,3	0,35	0,4	0,45	0,5
2. Grant Application					
up to 100,000 rubles.	0,1	0,15	0,2	0,25	0,3
up to 1,000,000 rubles	0,15	0,2	0,25	0,3	0,35
up to 10,000,000 rubles	0,2	0,25	0,3	0,35	0,4
more than 10,000,000 rubles	0,7	0,75	0,8	0,85	0,9
3. Educational activities					

Speeches at international conferences (foreign)	0,1	0,1	0,1	0,1	0,1
Speeches at international conferences (in Russia)	0,05	0,05	0,05	0,05	0,05

There are two basic indicators: publication activity (all types of research articles, grant proposals, educational activity) and applied developments (scientific ideas and developments permanent and temporary employees work on).

The system of performance assessment is based on the specifics of the research activity and goals set by the organization.

The size of incentive payments directly depends on the requirements and values of the organization and working efficiency and it may vary in accordance with the goals.

Based on the process approach to the implementation of an incentive system, the authors developed an algorithm for the formation of merit awards given to the research staff of the organization. It regulates the activities of a researcher, moderator and heads of departments. The diagram is shown in Figure 2.

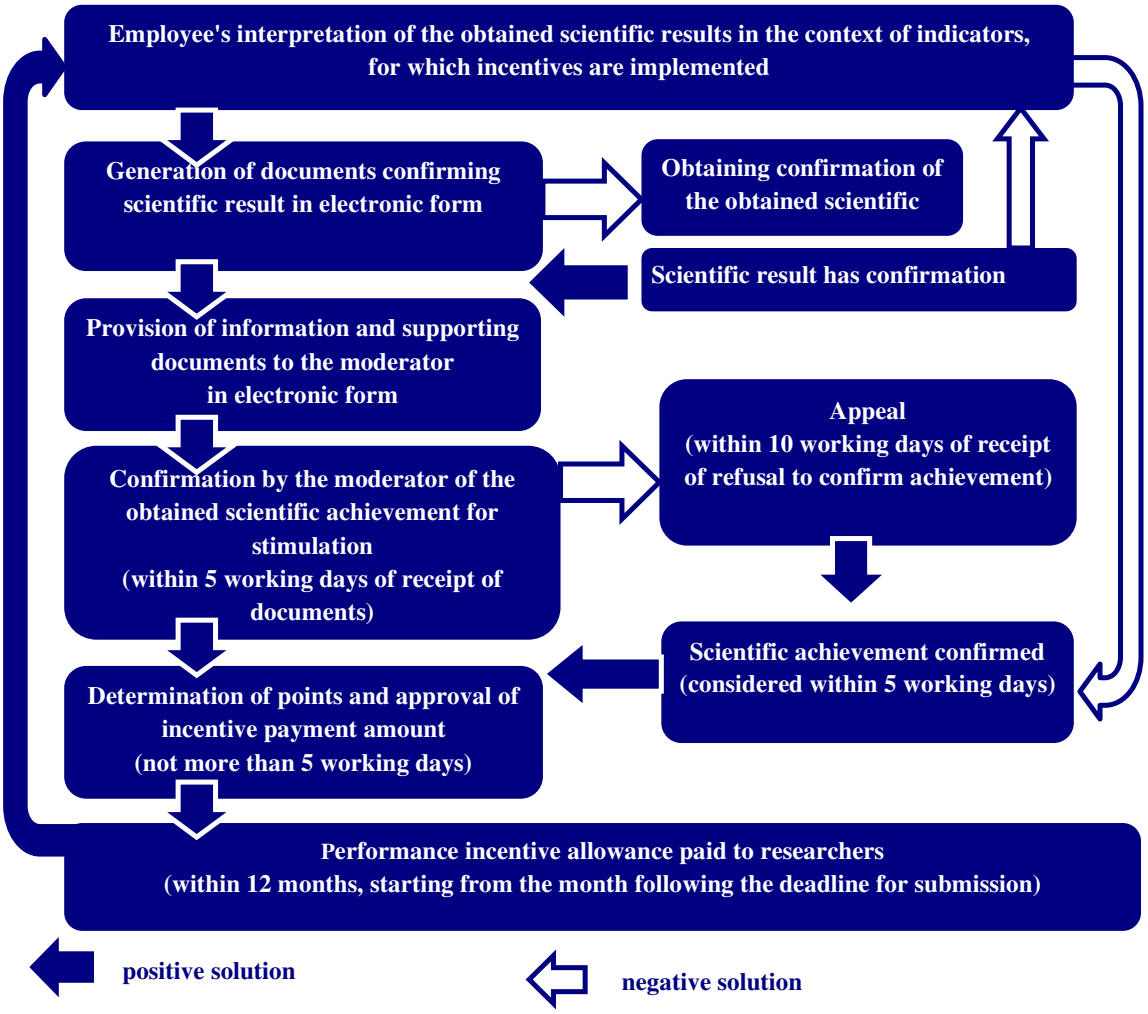

Fig.2: Algorithm for the formation of incentive payments

The algorithm for the formation of incentive payments falls into 6 stages. In some cases, a procedure for appealing has to be performed.
In accordance with its financial capabilities each organization determines the maximum possible score.
The authors analyzed the rating system of a specific organization.
Company data:
- the total number of employees - 2,200 people;
- 880 researchers;
- salary fund of the company - 2.996.000.000 rubles;
- incentive payments - 40% of the salary fund;
- the maximum possible score - 10[1] per year (an average level of work intensity).

Let's make calculations:
1) the total amount of incentive payments per year:
(percentage of the salary fund minus mandatory deductions - 38%) 40% of (2.996.000.000 - 1.138.480.000) = 743.008.000 rubles;
2) the incentive payments per year for research workers:
743.008.000 / 2200 x 880 = 297.203.200 rubles;
3) if the maximum possible score is achieved (10 per year), the cost of one point:
297.203.200 / 880/12/10 ≈ 3000 rubles per month.

There are some recommendations on how to make an incentive system more effective and to increase working efficiency:
- incentive payments should be substantial;
- the employee performance should be objectively assessed;
- all the assessment criteria should be transparent, clear and verifiable;
- all employees should be promptly informed of the changes made;
- performance assessment should be carried out in accordance with the job description of the employees;
- it is necessary to constantly monitor the process of bonus accruals;
- disputable situations should be dealt with in accordance with the Regulations on incentives.

Conclusions

An incentive system is a collection of related elements and measures motivating employees. These elements and measures are linked together to achieve a specific goal.

The authors of the article justified the need to introduce an incentive system for research scientists and examined the elements of the system (subject, goal, objectives, principles, mechanism, object, techniques, and tools) and their interconnection.

The system includes subject-object relations, where the head of the organization, heads of structural divisions and moderators are the subject. In the system of material incentives research scientists are the object. The goal of the incentive system is to stimulate research scientists to work more efficiently, which will improve the profitability of the organization. The objectives are: to increase motivation, to develop creative initiative, to determine the maximum potential, to introduce differential assessment practice, to improve working efficiency and to monitor results. The basic principles of the incentive system are: fairness, equal opportunities, objectivity, flexibility, perceptibility, consistency, transparency and awareness. The mechanism is considered as an integral part of the incentive system influencing the objects. In the incentive system, the assessment practice is introduced; specific techniques and tools are used to reward researchers in accordance with their performance and rating. The techniques in the incentive system are: document submission, moderation, incentive payments, control, and amendments to regulatory documents. The tools include: a list of achievements, verification of the authenticity of supporting documents, reward in

[1] The rating of a chief researcher.

accordance with the rating, control of activities, a list of supporting documents, regulations for the provision of information, criteria for evaluating information and achievement monitoring.
The authors of the article gave a number of recommendations on how to make an incentive system more effective and to increase working efficiency:
- incentive payments should be substantial;
- the employee performance should be objectively assessed;
- all the assessment criteria should be transparent, clear and verifiable;
- all employees should be promptly informed of the changes made;
- performance assessment should be carried out in accordance with the job description of the employees;
- it is necessary to constantly monitor the process of bonus accruals.

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Sustaining Economic Development:

A Post Amnesty Therapy on Peace-Building in the Niger Delta

Godwin EGBE, Frederick AHMADU, David IMHONOPI and Ikechukwu ANUKWU

Department of Sociology, Covenant University Ota, Nigeria.
Correspondents should be addressed to egbegodwin01@gmail.com

Abstract

The Niger Delta is the focal point of attraction in Nigeria because of crude oil, which forms a bulk of the country's export earnings. In spite of this, the inhabitants are faced with terrible conditions such as; polluted air and water, destruction of aquatic life, land infertility, unemployment, low life expectancy and lack of basic social amenities. These forced the youths into arms struggle. The Federal government instituted amnesty program for militants in the area, in which they were trained, paid stipends and rehabilitated. Unfortunately this was not sustained, as some corrupt politicians hijacked the process for their selfish interest. This paper focused on the challenges of Niger Delta people after the ex-agitators embraced amnesty and the return of crisis in the area. The paper employed the use of primary and secondary data, quantitative research method were used with simple random sampling techniques, 381 copies of questionnaire were administered to respondents in selected Oil producing communities in Rivers State Nigeria. The data obtained from the field were coded and run on SPSS software such that they were presented with the aid of frequency tables and research questions were answered based on this. Findings show that the Niger Delta is not getting better even with the efforts and structures put in place. The recommendations made includes; the need for synergy between transnational companies and host communities, implementation of corporate social responsibilities, increased employment and vocational training for youths, these will reduce social unrest and enhance the standard of living.

Keywords*:* Pollution, Militants, Oil Companies, Niger Delta

Introduction

The economy of countries around the world always thrive when there is an atmosphere of complete peace, notwithstanding the Nigerian State has witnessed different forms of sectional uprising that has affected her growth and development. Some of which were political, religious and ethnic motivated. The Niger Delta regions in Nigeria have been researched on by other scholars and academics, especially on key issues such as resource control, host community marginalization and exploitation. However a lot of research has not ventured into the area of amnesty programme offered to youths from the oil producing region.

According to the Nigerian Bureau of statistics (2016), Crude oil constitutes about 97% of the foreign exchange earnings of Nigeria and it is gotten from the Niger Delta. In line with this Okafor (2017), explained that despite, the high presence of transnational companies and crude oil production in the Niger Delta there are still traces of high level poverty, unemployment, high rate of infant and maternal mortality, lack of basic social amenities, air, land and water pollution.

Egharevba (2016) Poverty is a multidimensional problem embedded in a complex and interconnected political, economic, cultural and ecological system. In consonance with this, Osabohien et al. (2019) opined that social security is being offered Programs boosted productivity by 3 per cent for households. The authors inferred that the West African Governments should effectively provide social incentives such as healthcare and individuals' grants, as theses will reduce poverty and inequality for residents in rural areas.

Iruonagbe (2011), Opines that the situation in the Niger Delta region is a paradox, that is; huge and abundance existing side by side with perpetual poverty, slack and underdevelopment.

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The increasing unrest and crisis in the Niger Delta area is as a result of over 5 decades of continuous oppression and marginalization. Several persons have fought towards the liberation of the region from the time of Isaac Adaka Boro, who declared the republic of Niger Delta on the 23rd of February 1966 and was subdued by the federal forces after 12 days. Kenule Beeson "Ken" Saro Wiwa an environmentalist was hung alongside other Ogoni activist on the 10th of November 1995 (Osadolor, 2011).

According to Tambari (2012), there have been numerous agitation for resource control and better revenue sharing formula for oil producing states, emanating from leaders of different "Militant groups" such as Asari, who was the head of Niger Delta people's volunteer force (NDPVF), Ateke, who was leader of the Niger Delta Vigilante (NDV), others include: Tompolo, Soboma, Ebipodei, Ndigbara, Tubotamuno, Togo, Ebikabowei and Okah with a host of other groups that have violently expressed their grievances against the ill treatment experienced in the region.

According to Chibuike (2011), the Federal Government of Nigeria upon the review of the crisis in the Niger Delta region provided the "Amnesty Programme" as a medium towards ensuring lasting peace and collective progress within oil producing communities and Niger Delta at large. The militants were given sixty days (from August 4th to October 4th 2009) to turn in their armed weapons and embrace peace so as to be trained in different vocations and universities both in Nigeria and abroad, the leaders of these groups were awarded pipeline surveillance contract to help secure oil facilities in the Niger Delta from being vandalized.

The programme was to ensure peace and reconciliation among the warring youths, the government and transnational companies working in the area, in order to enhance oil production and the eventual revenue increase that will be reinvested towards undertaking the plague of backwardness in the Niger Delta region.

The granting of amnesty to ex-militants initially reduced the series of violence and invariably enhanced oil production in the region. It helped to reduce attacks on pipelines and increased oil production from Seven hundred thousand (700,000) barrels daily within the space of 2007 and middle of 2009, to about 2.4 million and 2.6 million towards the end 2009, (Dudu, 2016).

Furthermore the Amnesty programme was accompanied by peace in the Niger Delta, this transcended into reduced vandalism of oil pipelines, reduction in hostage taking of foreign expatriates, increased human capital development for the ex-agitators, provision of employment opportunities and the development of infrastructural facilities within the region, (Agbonifo, 2009).

In line with this Badmus (2014), opined that the Amnesty program included a transformational setting engrossed with the acquisition of vocational skills that helped to change the ex-militants. The youths that were enrolled into the programme were trained within and outside the country boarders while a handful of others have already been trained. According to Joseph (2010), peace building is systematic procedure of forming frameworks that eliminates the root of wars in a country and proffer change to states that may be faced with the challenges of war. Therefore the need to build an instrument that supports the resolution of conflict that is strengthen and has capacity to withstand any opposing force without soliciting for support or bowing to external pressure. In line with this Peace-building is an act that expedites the formation of a robust atmosphere of peace with the aim of preventing the reoccurrence of chaos thereby tackling the origin and impact of violence by building a structure that embraces the interest of all parties involved.

International Organizations such as the United Nations (UN), European Union (EU), African Union (AU), North Atlantic Treaty Organization (NATO) and Economic Community of West African States (ECOWAS) are interested in building world peace across global and regional ties, they are anti any event that will be a threat to world peace especially wars, violence and crisis, Peace-building strategy is used to cement the foundation for the beginning of peace in a state that has been ransacked by war, countries like Rwanda used this strategy after the genocide of 1994, the Nigerian Government employed Peace-building after the Nigerian civil war that lasted for over 30 months (1967-1970), the process tries to unite the warring factions with the aim of building the collapsed societal structure (Obong, 2010).

No doubt amnesty is one of the programmes that have seen the break of light in Nigeria, because of the successes it recorded towards dousing the tensions in the Niger Delta region. This was clearly indicated with over eight hundred and thirty four (834) youths enrolled in about a hundred (100) higher institutions within and outside the country. In consonance with this, during the 2013 academic session, about four hundred and fifty nine (459) ex-agitators were on fully funded scholarships in some universities in Nigeria, while two thousand four hundred (2,400), were sent to

different training centres to acquire different vocational skills. This was necessary for their reintegration (Folami, 2014).

Ofili (2014), opined that structure of the amnesty programme was supposed to be a win-win for the Nigerian Government, the ex-agitators and the transnational companies in the Niger Delta. The ceasefire was to bring complete peace into the area and birth development of human capital and infrastructures but the major player which is the government did not consolidate on the gains of the amnesty programme towards Peace-building and ensuring sustainable development in the region, rather it was interested in increasing oil production and government revenue, which affected the entire process and the sword of violence struck again in the region.

Statement of the Problem

According to Fynas (2013), there is no community, people or state that appreciates vehemence and restiveness. The relative peace experienced by the oil producing communities in the Niger Delta was truncated when their cry over the continuous environmental pollution and marginalization fell on deaf ears. This pushed the youths back into violent struggle due to lack of basic social amenities and infrastructure which showcases a developed society like; good drinkable water, power supply, proper health and medical care, standard and solidified roads and employment opportunities are nonexistence within the region.

Although the Amnesty programme in the Niger Delta recorded a significant level of peace and development, however this was not sustainable, as the youths whom were trained and later reintegrated into the society were not given starter packages after the programme, their monthly stipends were not paid and they were not absorbed by the transnational companies operating in the area, (Ogannah, 2009).

The walls of peace witnessed in the Niger Delta collapsed drastically by the uprising of another militant group called the Niger Delta Avenger (NDA) in 2015, this was due to the fact that there was no proper plan to manage the welfare and wellbeing of the ex-agitators after they have completed their training programme, this affected the security architecture within the region, as their sole aim was to completely destroy all the pipe lines and other oil facilities within the region.

The post-amnesty era has proven to be another nasty phase that is plugged into enriching the elite system without any iota of development for majority of the masses domicile in the oil endowed vicinity. Notwithstanding, life threatening situations centred around alienation of people, poverty, corrupt practices, exploitation, huge unemployment, non empowerment of women and youths are still glaring and visible in enslaving the progress of the Niger Delta. The continuous crisis in the Niger Delta between the ex-agitators from the oil producing communities and the government as well as the Transnational Companies has affected all the parties involved, this is because, there is a slowdown in the operations of the Transnational Companies, this has further affected their level of productivity as well as income. The government revenue has dropped due to the unrest in the area and the oil producing communities are faced with continuous molestation by Federal Government who has resorted into constantly sending military troops to the area to combat the youths in order to restore peace to the entire region (Ogege, 2011).

Objectives of the Study and Research Questions

The study seeks to examine the extent to which amnesty Programme has engendered peace in the Niger Delta. It also seeks to assess whether the amnesty programme has led to sustainable economic development in the Niger Delta. It would also analyse the measures taken to ensure Peace-building in the Niger Delta.

On the basics of these objectives the research questions eminent to this study will be answered accordingly:

A. Has the amnesty programme stimulated peace in the Niger Delta?
B. Did the amnesty programme produce sustainable economic development?
C. What actions can be adopted to guarantee Peace-building in the Niger Delta?

Theoretical Framework

The followings theories will be used to further demonstrate its scientific underpinnings and relationship to the main point of the study, they are the: Relative Deprivation theory and Social Exchange theory.

Relative deprivation in retrospect can be traced to the ancient Greece, when prominent personalities like Aristotle enunciated the fact that sudden change in the societal order originates from unfairness and disparity among the people.
Sam Stouffer and some of his colleagues were the first to associate themselves with the tenets of the theory, especially in their work on "The American Soldier" in 1949. Subsequently W.G Runciman gave a formal appraisal of the theory in 1966; the theory was further linked to Criminology in 1980 by Stack John.

Relative deprivation theory is essential in the explanation of the dictates of this study, situating the theory to the study underpins the agitation in the Niger Delta. Which was born out of the quest towards ensuring the people have a good life. Irrespective of the vast resources present in their area; they have been deprived, marginalized and exploited such that they don't have access to the dividends of being an oil producing community. This has surfaced into unemployment, high rate of poverty and environmental decadence in the region, which can be explained as hunger in the midst of plenty.

Moreover there have been scholarships, contracts opportunities to members of oil producing communities, but to an extent this has been made available to the house holds of the elite in the region, such as political office holders and traditional rulers while the entire masses are perpetually neglected.

Notwithstanding this theory explains social ills within the Niger Delta, predicaments of oil producing communities but its assertions are one sided, that is it focuses on the economy of the people alone, but generally it fits into the study by explaining the situation in the region. The shortcomings of this theory made it possible for the use of Social Exchange theory to further explain the study.

The Social Exchange theory was brought to limelight by the work of George Homan, a well-known Sociologist in 1958, he focused on "Social behaviour as Exchange". Homan gave a broad view of social exchange as give-and-take relationship that exists within the confinement of a society and it's determined by the interaction between actors. Notable scholars like Richard Emerson and Peter Blau gave a scientific attestation to the theory within the social science field of Sociology. Exchange can take place between two or more persons, sometimes it serves as an avenue for settling conflict among people, nation and sets, by this it paves way for a win-win situation.

Homans (1958) made a summary of the social exchange theory into three basic schemes: success, stimulus, and deprivation–satiation.

i. Success: This occurs when an individual is rewarded for his action, he tends to reiterate same gesture.
ii. Stimulus: When an act leads to a reward, people are more likely to be engaged in such actions again.
iii. Deprivation-satiation: This occurs when a person has received a particular reward several times; the more diminishing an individual's interest will be towards such rewards.

This theory captures the amnesty deal that was entered by the Nigerian Government and the ex-agitators from the Niger Delta, there was an exchange which culminated into the armed youths laying down their weapons and embracing peace. Where they were trained in different vocations and programme. This was to ensure the end of hostilities, destruction of oil installations and pipe line vandalism, the government made huge proceeds from oil production due to the relative peace that was recorded. This reiterates the theoretical narrative of cost, resources and rewards, therefore accepting to shift grounds and end hostilities were a huge cost. The government willingness to forgo all the criminal acts committed by the ex-agitators and putting up a programme to train them was another cost. It involved resources; the reward was peace, increased oil production and good life for the youths. The oil producing communities in return benefited from this act, because normalcy and stability reappeared.

Research Design and Methodology

This study employed the use of exploratory and survey design; exploratory design was adopted because the study tends to unknot key issues in the post-amnesty era, in which less concern has been given while survey design was used because of geographical area of the study and the need to gather data from the location. The data produced in this study were gathered from a mixture of primary and secondary sources.

The sample size was determined with use W.G Cochran sample size formula, third edition (1977).

S = Z2 x P x (1- P) / M2
S = Sample Size for Infinite Population
Z = Z score
P = Population Proportion which is Fifty percent (50%) = 0.5
M = Margin of error is Five percent (5%) which is = 0.05
S = (Z score) 2 x P x (1- P) / (Margin of error) 2
S = (1.96)2 x 0.5 (1 – 0.5) / (0.05)2
S = 3.8416 x 0.25 / 0.0025
S = 384.16 (Sample size for infinite population)

The population of Bodo was 1109, Nonwa was 987, Okochiri was 863 and Onne was 1305.

1109 + 987 + 863 + 1305 =4266
Therefore, the total population in the study area was 4266
Taking 384.16 as sample size for infinite population
Adjusted Sample = (S)/1 + [(S - 1)/ Population
= 384.16/1 + [(384.16 – 1)/4266
= 384.16/1.008981
= 380.74, Approximately 381
Therefore the sample size for the study was 381.
The distribution showed that; 98 copies of questionnaire were administered in Bodo Community, 85 in Nonwa, 79 in Okochiri and 119 copies in Onne.

A total of 381 copies of questionnaire were administered to respondents in the study area; however 375 were collected and found suitable for the study.

Response rate = Number of received questionnaire/ Number of Administered x 100
= 375/381 x 100
= 98.4 %
Therefore the response rate for the study was 98.4%

A pre-test was adopted to show the level of reliability of the research instruments before it was administered to respondents on the field, a total of 40 copies of questionnaire were issued at 4 selected oil-producing communities across four Local Government Areas in Rivers state. The confirmation of this was done with the aid of cronbach' alpha which indicated 89% level of reliability based on the yielded coefficient of 0.89. The questionnaire was designed in a likert scale and the variables were all divided into different segments that generated the required responses to the research questions of the study. Judicious and systematic processes were employed to scrutinize the validity of data collection instruments, the questionnaire was examined along-side the key informant interview questions and focus group discussion guide with the aim of ensuring that the qualitative data instruments corroborates with that of the quantitative.

The data were obtained, through issuing copies of questionnaire to respondents in which they provided demographic details of themselves and answered the various sections of questions that were draw from the research questions of this study.

Results

The data obtained were analyzed in frequencies and percentages, through the Statistical Package for Social Sciences (SPSS). 381 Copies of questionnaire were administered, 375 copies were accepted while 6 copies of the questionnaire were rejected.

Respondents' awareness of reduction in pipeline vandalism was the first inquiry of the questionnaire. Table 1 below shows the results obtained through the questionnaire.

Table 1: The socio-demographic characteristics of respondents:

	Frequency	Percentage
Sex of Respondents		
Male	263	70.1
Female	112	29.9
Total	375	100
Age of Respondents	**Frequency**	**Percentage**
16-25	211	56.3
26-35	77	20.5
36-45	48	12.8
46-55	39	10.4
Total	375	100
Marital Status of Respondents	**Frequency**	**Percentage**
Single	200	53.3
Married	88	23.5
Divorced	30	8.0
Widowed	24	6.4
Separated	33	8.8
Total	375	100
Respondents' Religion	**Frequency**	**Percentage**
Christianity	225	60
Islam	72	19.2
African Tradition Religion	52	13.9
Others	26	6.9
Total	375	100
Educational Background	**Frequency**	**Percentage**
Non-Formal	50	13.3
Primary	89	23.7
Secondary	200	53.3
Tertiary	36	9.6
Total	375	100
Occupation of Respondents	**Frequency**	**Percentage**
Business	36	9.6
Civil Servant	41	10.9
Factory worker	63	16.8
Farmer	161	42.9

Number of Children	**Frequency**	**Percentage**
0-3	214	57.1
4-6	73	19.5
7-10	62	16.5
11and above	26	6.9
Total	375	100

Unemployed	74	19.7
Total	375	100
Respondent's State of Origin	**Frequency**	**Percentage**
Rivers	134	35.7
Bayelsa	37	9.9
Akwaibom	76	20.3
Cross-River	36	9.6
Abia	27	7.2
Imo	13	3.5
Delta	13	3.5
Edo	26	6.9
Ondo	13	3.5
Total	375	100

Distribution According to Sex

This table shows the distribution of respondents according to their sex. It is evident that 70.1% of the respondents were males while 29.9% of the respondents were females, this means that majority of the youths that are involved in several agitations in the oil-producing communities in the Niger Delta were majorly males, although there might be some females involved but their numbers were usually few compared to the male counterparts.

Distribution According to Age

This shows that 56.3% of the respondents were within the age range of 16-25, while 20.5% of the respondents were within the age range of 26-35, 12.8% of the respondents were within the age of 36-45 and 10.4% were within the age range of 46-55 years.

Distribution According to Marital Status

This indicates that 53.3% of the respondents were single, 23.5% were married, 8% of the respondents were divorced, 6.4% were widowed and 8.8% of the respondents were separated.

Distribution According to Number of Children

The number of children of the respondents represented in the table explains that 57.1% of the respondents have 0-3 children, 19.5% have 4-6 children, 16.5% of the respondents have 7-10 children and 6.9% of the respondents have 11 and above number of children.

Distribution According to Religion

The distribution of respondents' religion was illustrated in the table, it shows that 60% of the respondents were Christians, 19.2% of the respondents were Muslims, 13.9% respondents practiced African Traditional Religion while 6.9% of the respondents settled for other religion.

Distribution According to Education

The result reveals that 13.3% of the respondents had non-formal education, 23.7% of the respondents had primary education, 53.3% of the respondents had secondary education and 9.6% of the respondents had graduated from tertiary institutions. This shows that the level of education in the Niger Delta is relatively low, based on the data obtained from the field.

Distribution According to Occupation

This indicates that 9.6% of the respondents were into business, 10.9% of the respondents were civil servants, 16.8% of the respondents were factory workers, 42.9% were farmers, while 19.7% of the respondents were unemployed. This means that majority of the respondents in the study area were farmers and the rate of unemployment was high.

Distribution According to State of Origin

This shows that 35.7% of the respondents were from Rivers state, 9.9% of the respondents were indigenes of Bayelsa state, 20.3% of the respondents were from AkwaIbom, 9.6% were from Cross-Rivers, 7.2% were from Abia, 3.5% were from Imo, 3.5% of the respondents were from Delta, while 6.9% were from Edo and 3.5% were from Ondo state.

Table 2: Reduction in pipeline vandalism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	17	4.5	4.5	4.5
	Agree	23	6.1	6.1	10.7
	Disagree	232	61.9	61.9	72.5
	Strongly Disagree	103	27.5	27.5	100.0
	Total	375	100.0	100.0	

This shows that 4.5% of the respondents strongly agreed that pipeline vandalism has reduced in their community, 6.1% of the respondents agreed, 61.9% disagreed while 27.5% of the respondents strongly disagreed that the level of pipeline vandalism in their community has reduced.

Table 3: Decreased rate of kidnapping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	19	5.1	5.1	5.1
	Agree	52	13.9	13.9	18.9
	Disagree	196	52.3	52.3	71.2
	Strongly Disagree	108	28.8	28.8	100.0
	Total	375	100.0	100.0	

This reveals that 5.1% of the respondents strongly agreed that the rate of kidnapping in their community has reduced, 13.9% of the respondents agreed, 52.3% of the respondents disagreed while 28.8% of the respondents strongly disagreed. This means that kidnapping has not reduced in the oil producing communities; moreover it is on the increase.

Table 4: Reduced activities of cultists

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	32	8.5	8.5	8.5
	Agree	53	14.1	14.1	22.7
	Disagree	228	60.8	60.8	83.5
	Strongly Disagree	62	16.5	16.5	100.0
	Total	375	100.0	100.0	

The result shows that 8.5% of the respondents strongly agreed that the activities of cultists has reduced in their community since the amnesty programme was conducted, 14.1% agreed while 60.8% of the respondents disagreed and 16.5% of the respondents strongly disagreed. This illustrates that the activities of cultists in oil producing communities in the Niger Delta has not decreased.

Table 5: Youth Empowerment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	18	4.8	4.8	4.8
	Agree	24	6.4	6.4	11.2
	Disagree	209	55.7	55.7	66.9
	Strongly Disagree	124	33.1	33.1	100.0
	Total	375	100.0	100.0	

This illustrates the distribution of respondents based on youth empowerment, 4.8% of the respondents strongly agreed that there have been youth empowerment programmes in their community, 6.4% of the respondents agreed, 55.7% of the respondents disagreed that the youths in their community have been empowered and 33.1% strongly disagreed that there have not been any form of youth empowerment in their community.

Table 6: Reduced Unemployment among youths

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	25	6.7	6.7	6.7
	Agree	17	4.5	4.5	11.2
	Disagree	214	57.1	57.1	68.3
	Strongly Disagree	119	31.7	31.7	100.0
	Total	375	100.0	100.0	

This shows that 6.7% of the respondents strongly agreed that unemployment has reduced among youths in their community, 4.5% agreed, 57.1% disagreed and 31.7% of the respondents strongly disagreed. This means that youth unemployment in the area is on the increase, since the amnesty programme was conducted.

Table 7: Level of poverty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	13	3.5	3.5	3.5
	Agree	24	6.4	6.4	9.9
	Disagree	191	50.9	50.9	60.8
	Strongly Disagree	147	39.2	39.2	100.0
	Total	375	100.0	100.0	

This illustrates that 3.5% of the respondents strongly agreed that there is low level of poverty in their community, 6.4% agreed, 50.9% disagreed, while 39.2% strongly disagreed. This means that poverty is much pronounced in the oil producing communities in the Niger Delta.

Table 8: Youth training and education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	20	5.3	5.3	5.3
	Agree	34	9.1	9.1	14.4
	Disagree	225	60.0	60.0	74.4
	Strongly Disagree	96	25.6	25.6	100.0
	Total	375	100.0	100.0	

This reveals that 5.3% of the respondents strongly agreed that some youths have been trained in different vocations while others have been offered scholarships to study in reputable Nigerian Universities and abroad. While 9.1% agreed, 60% disagreed and 25.6% strongly disagreed. This indicates that although the amnesty programme led to the training of some youths but a bulk of the youths in the Niger Delta; who were ex-agitators were not trained.

Table 9: Social amenities in oil producing communities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	29	7.7	7.7	7.7
	Agree	21	5.6	5.6	13.3
	Disagree	264	70.4	70.4	83.7
	Strongly Disagree	61	16.3	16.3	100.0
	Total	375	100.0	100.0	

The distribution of respondents according to the presence of social amenities in oil producing communities reveals that while 7.7% strongly agreed, 5.6% agreed, 70.4% disagreed and 16.3% strongly disagreed. This means that there are less social amenities in the oil producing communities.

Table 10: Increased living condition of oil producing communities after the amnesty programme

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	14	3.7	3.7	3.7
	Agree	31	8.3	8.3	12.0
	Disagree	209	55.7	55.7	67.7
	Strongly Disagree	121	32.3	32.3	100.0
	Total	375	100.0	100.0	

This shows that 3.7% of the respondents strongly agreed that there have been increase in the living condition of oil producing communities after the amnesty programme, 8.3% agreed, 55.7% disagreed, 32.3% strongly disagreed.

Table 11: The Development of Human Capital among youths

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	31	8.3	8.3	8.3
	Agree	44	11.7	11.7	20.0
	Disagree	219	58.4	58.4	78.4
	Strongly Disagree	81	21.6	21.6	100.0
	Total	375	100.0	100.0	

This shows a visual representation of the respondents' view in relation to the development of human capital among youths, while 8.3% strongly agreed, 11.7% agreed, 58.4% disagreed and 21.6% strongly disagreed. This means that there was no development of human capital among youths from the oil producing communities after the amnesty programme was conducted.

Table 12: Actions taken to secure the future generation of oil producing communities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	33	8.8	8.8	8.8
	Agree	46	12.3	12.3	21.1
	Disagree	180	48.0	48.0	69.1
	Strongly Disagree	116	30.9	30.9	100.0
	Total	375	100.0	100.0	

This shows that 8.8% of the respondents strongly agreed that there have been actions taken to secure the future generation of oil producing communities, 12.3% agreed, 48% disagreed, while 30.9% of the respondents strongly

disagreed. This reveals that no actions were taken to secure the future of oil producing communities in the Niger Delta

Table 13: Clean up of oil spillage site in oil producing communities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	13	3.5	3.5	3.5
	Agree	13	3.5	3.5	6.9
	Disagree	249	66.4	66.4	73.3
	Strongly Disagree	100	26.7	26.7	100.0
	Total	375	100.0	100.0	

The chromatic representation of the respondents based on the clean up of oil spillage site in the oil producing communities, 3.5% of the respondents strongly agreed that there have been clean up of the oil spillage site, 3.5% agreed, 66.4% disagreed and 26.7% strongly disagreed.

Table 14: The collaboration of Government and Transnational Companies to resolve crisis in oil producing communities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	20	5.3	5.3	5.3
	Agree	17	4.5	4.5	9.9
	Disagree	234	62.4	62.4	72.3
	Strongly Disagree	104	27.7	27.7	100.0
	Total	375	100.0	100.0	

The result shows that 5.3% of the respondents strongly agreed that the government collaborates with transnational companies to resolve crisis in oil producing communities, 4.5% agreed, while 62.4% disagreed, 27.7% strongly disagreed. This reveals that the government does not collaborate with transnational companies on crisis resolution in the Niger Delta.

Discussion of Findings

This section gave a holistic explanation of the research questions of this study alongside important issues identified from literature.

RESEARCH QUESTION 1: Has the amnesty programme stimulated peace in the Niger Delta?

This research question was clearly explained by the survey carried out on the field, which indicated comparatively the positions of respondents in table 2, 3 and 4. It was discovered in the study that the amnesty programme to an extent brought about peace but this peace was truncated midway into the programme. Because activities of cultist, kidnapping and pipe line vandalism has been on the increase even after amnesty was given to ex-agitators from the Niger Delta. This indicated that the level of peace in the Niger Delta region has nose-dived due to the mismanagement of the amnesty programme. It was also discovered in the study that the political gladiators from the Niger Delta region hijacked the process, the pipeline surveillance contract that was given to the different militant leaders was cancelled by the President Muhammadu Buhari's administration which triggered another fierce form of unrest in the Niger Delta Region.

RESEARCH QUESTION 2: Did the amnesty programme produce sustainable economic development?

Responses to this question are shown in table 5, 6, 7 and 8 respectively, the respondents explained that the amnesty programme has not birthed sustainable economic development, as poverty is on the increase in the region in spite

of the rich natural endowment it possesses. The ex-agitators who were trained during the amnesty programme where abandoned in the process of the training, some were stranded overseas. The amnesty programme did not contribute to the empowerment of the youths in the oil producing communities, as the programme was ill funded and abandoned by the government. The stipends that the youths were paid was also suspended. It was also discovered from the study that unemployment has been on the increase in the Niger Delta region, some of the youths that were sponsored abroad for their education were not absorbed by the transnational companies operating in the region.

RESEARCH QUESTION 3: What actions can be adopted to guarantee Peace-Building in the Niger Delta?

Tables 9, 10, 11, 12, 13 and 14 gave a detailed explanation to this question in the study. It was discovered that for adequate peace to be restored in the oil producing Communities in the Niger Delta there is an urgent need for Social amenities as the area is faced with infrastructural decay, there is also a need to improve the living condition of the people. It was discovered that, areas which have been affected by oil spillage requires clean up, because the environmental pollution in the Niger Delta region is severe. The study also explained that the collaboration between the government and transnational companies towards changing the narrative in the oil producing communities in the Niger Delta is non-existence. Therefore, the study identified that if viable efforts are put in place by these actors positively there will be records of traceable peace in the Niger Delta region.

Conclusion

The Niger Delta people experience the highest form of exploitation and marginalization not because they are a minority ethnic nationality in Nigeria, but as a result of the selfish and self-centred nature of Nigerian political leaders who have turned the region into a poisonous zone filled with high level of environmental pollution and degradation, such as air pollution, water pollution (surface and underground), the lands are destroyed due to oil spillage, life expectancy is very low as a result of the inhalation of toxic gas emitted by the transnational companies operating in the area. Furthermore corporate social responsibilities such as the provision of basic social amenities are totally absent living the people to witness high rate of poverty, unemployment and high level of illiteracy, the youth felt the only language the government understands is violence and decided to take up arms and fight the government and the transnational oil companies which led to the government granting them amnesty that was seen as a breath of fresh air in the region that will lead to relative peace. However this acclaimed peace did not last long as it was truncated by selfish politicians and government officials who hijacked the amnesty programme and turned it to their own personal source of income, the youths where no longer paid stipends, those who were trained overseas returned frustrated without having any job, the pipeline surveillance contract given to ex agitators were withdrawn, this forced the youths to go back to their former ways of arm struggle but this time very fierce in nature, with the main aim of crippling the Nigerian economy and the destruction of oil installation facilities.

More so this paper sees economic development as an avenue through which sustainable peace can be built and normalcy restored to the Niger Delta people, because when the living condition of the people have been enhanced, there by leading to the reduction of poverty and unemployment with a proper reassurance of a secured future, the warring youths will desist from their acts.

Recommendations

These following recommendations have been identified as the strength that this paper projects for the sustenance of peace and development in the Niger Delta:

1. The people of Niger Delta should be given good life; that is they should be able to enjoy the dividends of being an oil producing area especially when the entire Nigerian economy is built on the resource from the region.
2. There should be proper consultation to foster peace between the militant youths, elders, traditional rulers of oil producing communities and the transnational companies.
3. The transnational companies operating in the area should have development plans that will touch the lives of the people directly through corporate social responsibilities such as the provision of basic social amenities, good roads, scholarships, employments and skill acquisition programme.
4. The government and transnational oil companies should not sponsor factional leadership in the oil producing communities; this will reduce the level of tension and social unrest in the area.

5. The government should avoid the use of combatants to attack the militants in the area, with the sole aim of subduing them, this will only result in more casualties rather a better pragmatic approach of mediation should be used.
6. The government should regulate the activities of the transnational companies such that issues like gas flaring, pollution should be taken care of and where there is possibly an oil spillage a clean should be done to avoid environmental degradation and health hazards on the residents and people of the Niger Delta.

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Analysis of The Influence Factors of Mergers and Acquisitions

Irina CHIRIAC

"Alexandru Ioan Cuza" University, Institute of Interdisciplinary Research,
Social Sciences and Humanities Research Department, Iasi, Romania
irinaochiriac@yahoo.com

Abstract

Many successful businesses face a certain amount of time in their history with a decrease in performance. Increasing competition due to globalization or technological progress, high capital costs and other factors are leading more and more companies to go through difficult times. The analysis of the difficulties faced by companies as well as the means of preventing and overcoming the difficult situation is very important due to the economic consequences of the deterioration of the performance. This chain reaction can cause disruption to an industry or the economy. The aim of the paper is the analysis of the way in which economic factors influence the evolution of mergers at European union level. The analysis performed for the period of 2015-2019 has underlined that the distribution and the evolution of mergers is influenced by the following macroeconomic factors: economic growth, the stock market index, the opening degree of economy, the reference interest of the central bank and inflation. In order to test if the macroeconomic factors influence the number of mergers, the multiple regression, with the help of the statistical software SPSS 20, was used.

Keywords: M&A, economic growth, the stock market index, the opening degree of economy, the reference interest of the central bank, inflation.

Introduction

Mergers are a big and very important part of the corporate finance world. Every day there are M&A operations arranged which bring different companies together to form larger ones. consists of two groups – cross-border merger and acquisitions and domestic merger and acquisitions.

Three main reasons for firms to undergo an M&A process: synergies, diversification and the benefits from imperfect capital markets across countries. Historically, domestic mergers has always dominated the whole M&A activities due to language and culture barriers, government interventions, legal restrictions. However, as the global economy is becoming more connected and integrated, cross-border mergers are increasing in importance. Authors Martynova and Renneborg (2008) investigated the macroeconomic determinants of CM&A using a worldwide sample deals. Mentioning researchers claimed that most of the growth in foreign direct investment over the past two decades has been made via cross-border mergers. Current research on investigating M&A activities mainly focuses on developed countries at microeconomic level.

Other authors as Broaddus, Mueller and Burkhard (1998) mentioned in their research that scientific studies on macroeconomic determinants of mergers operations is relatively scarce, and with a focus on developing countries is even scarcer. The economic, political and social context can influence the evolution of the number of mergers. In the following we will analyze the impact of the macroeconomic factors on the mergers.

More specifically, we will study the link between distribution and the evolution of mergers and a number of macroeconomic factors, among which we note: economic growth, the stock market index, the degree of openness of the economy, the central bank's reference interest and inflation, and the ultimate goal is to identify through a statistical regression model which factor has the greatest influence on the number of companies that have merged. General hypothesis is: The evolution of the number of mergers is influenced by the macroeconomic factors.

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Literature review and Hypothesis Development

Despite the large number of studies investigating the activities of M & A, most focus on microeconomic developed country markets. This study is also relevant in that it investigates the impact of macroeconomic factors on M&A volumes on a sample of European data from 2015-2019.

The need to analyze the connection between the evolution of mergers and acquisitions and macroeconomic factors.

Although numerous studies have had different results in relation to the influence of macroeconomic factors on the activity of mergers and acquisitions, the topic has remained attractive due to a peculiar feature of the merger activity, namely that mergers take place in waves (Shleife, Vishny, 2003).

One of the more noticeable limitations in these studies is that the data sets are outdated, especially lacking financial information from after the financial crisis of 2007 –2008. Based on this gap in existing studies, I plan, in my paper, to update the dataset with more recent figures while focusing on five specific macroeconomic factors, namely GDP, the stock market index, the opening degree of economy, the reference interest of the central bank and inflation.

Substantiation of Hypotheses

Starting from the aim of our research, we considered the following hypotheses:

Hypothesis 1 (H1).

There exists a considerable link between the number of M&As and GDP growth.

The authors Hyytinen and Pajarinen (2002) used to analyze the influence of the macroeconomic factors on the activity of mergers, the following variables: the economic growth and the reference rate of the central bank. An index of high economic growth shows that in a developed economy, there are more companies and more mergers. Companies are more willing to get involvedin Merger and Acquisition deals when the economy is booming, and less willing to get involved inthose deals when the economy is depressed, according to Xiaoxuan (2016). Most research focuses on how M&A business affects companies and consumers. There is more research on how GDP will trigger mergers and acquisitions. Kummer (2006) studied M&A transactions in the South American pharmaceutical industry and found that "the number of M&A transactions is correlated with the development and size of an economy measured in terms of GDP". Doytch, Cakan, Upadhyaya (2011) studied M&A sales in different sectors and how those transactions in different sectors affect the growth of the economy. Their study showed that cross-border M&A slows down the domestic economy (Doytch, Cakan, Upadhyaya, 2011). Moreover, Doytch (2012) studied the correlation of M&A supply and economic growth in OECD countries, found that the M&A services sector has a positive effect on service growth. As we can see from the literature review, even if there is some research on the relationship between M&A supply and economic growth, there is little research that uses the total real value of M&A transactions in Europe in relation to GDP.

Hypothesis 2 (H1).

There is a direct link between the stock index and mergers.

Merger waves appear in times of economic boom when, there is a rapid growth of the economy and thus the stock index increases (Mueller, Burkhard, 1998). These can affect mergers and acquisitions for at least two reasons: first, an increased stock index helps companies finance their acquisitions. In this case, the acquiring company does not have to invest the profit or increase the debts to finance the acquisition. Another reason is related to liquidity. So these factors increase the purchasing power of a company (Hyytinen, Pajarinen, 2002). The waves of mergers coincide with changes in the economic and technological environment. The most important force that led to the consolidation of banks in 1990 was the development of communications and data processing technology. The cost saved by using new technologies has increased with the growth of the company Broaddus, 1998). Nelson investigated the link between the stock index, field of activity and the number of mergers (Martynova, M., Renneborg, 2008). By using simple regression, they established that there is a positive and significant link between the analyzed variables. Nelson failed to establish a link between the field of activity of the companies involved and their merger activity. Authors Clarke and Ioannidis (1996) investigated the link between mergers and the stock market index. For this they considered both the number of mergers and their value. Clarke and Ioannidis used Granger's analysis mergers in the UK. The result of the study was that the stock market index influences both the

value and the number of mergers. The same results were obtained by researchers Sharma, Mathur and Cernat-Gruci (1989). Other studies have led to different results from those mentioned above. Thus, Geroski (1984) did not find a significant link between the merger activity and the macroeconomic factors. Author Guerard (1989) concludes that there is no connection between the field of activity and the activity of mergers in the United States.

Hypothesis 3 (H1).

The central bank's interest rate influences the mergers activity.

The relationship between interest rates and M & As is a widely researched topic. Researcher Marsh (1982) finds a significant and negative effect on interest rates and the evolution of mergers: firms borrow less when the interest rate is high and then prefer to merge. In addition, Taggart (1977) also finds a significant effect of the interest rate on mergers. The bottom line is that firms are more likely to issue equity when their share prices are high and to resort to borrowing (which makes a heavily financed investment) when interest rates are low. However, unlike Marsh (1982) and Taggart (1977), the authors Choe, Masulis and Nanda (1992) find no evidence that the interest rate effect is significant for M&A.

Hypothesis 4 (H1).

Between mergers and degree of openness of the economy it is a strong link.

The degree of openness of the economy is an indicator that reflects the degree of competitiveness of a country. The main weaknesses of the domestic economy that determine a low degree of competitiveness are: the precarious state of the public health system, government instability, crime, problems faced by the internal labor market (poor ethics, inadequate education, rigidity), inflation, corruption, fiscal instability, government bureaucracy and lack of infrastructure. The degree of openness is measured by the sum of exports and imports to the country's GDP. This variable is often used as a proxy to country's trade restrictions. he size of the economy, the degree of openness and the governance level are, in most cases, positively correlated with all series of inward and outward investment.

The research hypothesis predicts that countries with higher levels of openness tend to attract more foreign investment due to reduced trading costs. A high degree of openness encourages mergers and acquisitions, according to Culem (1988), Janicki and Wunnava (2004). Some studies, namely those conducted by Aminian and Campart (2005) and Kamaly (2007), also refer to the importance of this variable in explaining international M&A activity. Kyrkilis and Pantelis (2003) refer to the fact that the liberalization of international economic trade in a country is expected to positively influence the outflows of all kinds of investments. First, the absence of capital controls allows for unrestricted financing of investments abroad. Second, an export-oriented economy allows firms to acquire relevant information about foreign markets (knowledge, skills in organizing foreign operations and marketing their products internationally). Finally, companies can choose to combat competition from imports by involving them in the domestic markets of importing companies, and a certain form of retaliation is M&A.

Hypothesis 5 (H1).

The inflation rate influences the activity of mergers operations.

Inflation rate is considered one of the most important macroeconomic factors that affects investors decision when making an investment. A few existing research have done study in investigating the relationship between inflation and M&A operations.

Boateng, Hua, Uddin and Du (2014) found a negative relationship between inflation rate and the volume of M&A for UK firms during the period 1990 to 2008. The size of the coefficient shows that M&A will decrease by 1.47% if Inflation rate increases by one unit. However, the result is not statistically significant. Furthermore, the author Black (2000) investigated the M&A activities on American company in mergers and acquisitions deal between 1985 and 1999. The result suggests that inflation rate is negatively related with the growth of M&A transactions.

Materials and Methods

In order to reach the objectives formulated on the thematic approach, the study is based on a research approach and methodology, which is used to obtain information meant to elucidate the questions addressed in the research.

In the research activity, the constructivist paradigm will be used by formulating hypotheses or own opinions and validating them through interpretative demonstrations, using scientific validations.
In view of our scientific approach, I resorted to establishing the following hypotheses: General hypothesis: The evolution of the number of mergers is influenced by the macroeconomic factors.

The data source is the database of the Vienna Mergers and Acquisitions Institute and the European Commission database. Information collected are: number of mergers, economic growth index, stock market index, interest rate, degree of openness of the economy, inflation. Period analyzed is 2015 - 2019.

Analysis tools and procedures: data collection by observation method, statistical analysis using multiple regression procedure, SPSS 20.0 program and Pearson correlation indices.

The nature and characteristics of the variables used in the model are summarized in Table 1.

Table 1: The variables used in the econometric model

Variable	Abbreviation	Description
Dependent variables		
Mergers and acquisitions number rate	M&An	(M&An i,t – M&An i, t-1)/ M&An i, t-1
Independent variables		
Gross domestic product rate	GDP	(GDP i,t – GDPi, t-1)/ GDP i, t-1
Inflation consumer production index	I	(I i,t – I i, t-1)/ I i, t-1
Degree of openness of the economy	G	G = $\frac{Import+Export}{GDP}$ (G i,t – G i, t-1)/ G i, t-1
Interest rate	D	(D i,t – D i, t-1)/ D i, t-1
Stock market index	SMI	(SMI i,t – SMI i, t-1)/SM I i, t-1

The equation of the regression model is

$$\mathbf{N = \alpha + \beta^{1} * GDP + \beta^{2} * SMI + \beta^{3} * G + \beta^{4} * D + \beta^{5} * I + \xi}$$

Results

From table 2 it is observed that between the dependent variable - the number of mergers - and the independent variable - the reference interest - there is a strong direct link, the value of the correlation coefficient is equal to + 0.849, with a value Sig. less than 0.05.

Table 2: Correlations

N	GDP (0.0084)	SMI(0.0393)	G(0.0293)	D(0.008)	I(0.0460)	
1.000	0.104	0.584	0.127	0.849	-0.047	
0.104	1.000	0.444	0.023	0.537	0.435	
0.584	0.444	1.000	-0.500	0.621	-0.471	
0.127	0.023	-0.5000	1.000	0.227	0.825	
0.849	0.537	0.621	0.227	1.000	0.266	
-0.047	0.435	-0.471	0.825	0.266	1.000	

It is observed that 95% of the variation in the number of mergers can be explained by the influence of the independent variables in accordance to table 3. The difference is taken into account by other conjunctural factors.

Table 3: Model Summary

Equation	R	RSquare	Adjusted R square	Std. error
$N = \alpha + \beta^1 * GDP + \beta^2 * SMI + \beta^3 * G + \beta^4 * D + \beta^5 * I + \xi$	*0.958*	*0.918*	*0.505*	*2903*

From table 4 it stands out the equation of the regression model, according to the resulting data, is as follows:

N = 30222.896 + 418.584 * GDP - 1,640 * SMI– 0,000 * G + 5398.247 *D – 6611.128* I

Thus the regression coefficients are α = 30222.896; β_1 = + 418.584; β_2 = - 1,640; β_3 = - 0,000; β_4 = + 5398.247; β_5 = – 6611.128.

The model reflects the influence of economic growth (GDP), the stock market index, the degree of openness of the economy, the central bank's reference interest, inflation, on the number of mergers at European level.

Table 4: Regression coefficients

Variables	B	Std.error	Sig.	Tolerance	VIF
Constant	*30222.896*	*1924.68*	-	-	-
Gdp	*418.584*	*91.36*	*0.413*	*0.002*	*405.445*
Smi	*-1.640*	*14.639*	*0.084*	*0.001*	*772.599*
G	*0.000*	*0.001*	*0.393*	*0.008*	*130.630*
D	*5398.247*	*134.64*	*0.008*	*0.006*	*174.568*
I	*-6611.128*	*48329*	*0.460*	*0.001*	*11.96*

The results provided by the model can be interpreted as follows: If we keep constant: GDP, the stock market index, the degree of openness of the economy, inflation, a percentage increase of the reference interest rate leads to an increase in the number of mergers with 5,398 transactions.

Conclusions

The merger operation is directly influenced by the lack of liquidity and the credit constraint, which occur as a result of the economic crisis.

As the Gross Domestic Product is an indicator of measuring the well-being and quality of life, we can appreciate that a high value of the Gross Domestic Product per capita reveals a good result of the activity of the national economy, being reflected in a high standard of living of population.

A decrease in the reference interest determines a general decrease in the interest rate applied by commercial banks, increases the efficiency of the use of loans for companies and guides them towards developing their activity based on the commitment of additional capital. Increasing the interest rate makes it difficult to provide the capital needed to expand the business of a company.

It is known that the role of scholarships is that of financing. Thus, by listing on a stock exchange a company can finance from shareholders, this being an alternative to bank loans. The stock market is a barometer of the economy, anticipates economic developments. Used for comparisons over time, it turns out that the indicator also expresses the degree to which the general state of the economy allows to obtain high profits and thus, a better remuneration of the owners. The stock market index has been declining since 2016, a year characterized by an economic crisis.

The degree of openness of the economy, is an indicator that reflects the degree of competitiveness of a country. The main weaknesses of the internal economy that determine a low degree of competitiveness are: the precarious state of the public health system, the government instability, the crime, the problems faced by the internal labor market (poor ethics, inadequate education, rigidity), inflation, corruption, fiscal instability, government bureaucracy and lack of infrastructure.

Mergers have a cyclical character. As the economy grows, this market grows oversized, and when the economy is in decline, the merger market shrinks even more. Depending on the period in which the merger operation is analyzed, the results may differ due to the specific characteristics of each merger wave.

In times of economic crisis, the number of mergers increases, a fact due to rising inflation. A euro is worth less than it was before the crisis. Thus, the purchasing power of the population decreases, so the incomes of the companies decrease, and the companies are forced to resort to the merger operation in order to survive.

The period of economic crisis and the decline of interest at global and European level did not encourage companies to merge. A decrease in the reference interest increases the efficiency of the use of loans for companies and guides them towards developing their activity based on the commitment of additional capital. The merger operation is directly influenced by the lack of liquidity and the decrease in credit, which intervene as a result of the economic crisis.

The results of this research coincide with the opinions of the authors: Nelson, Mathur, Cernat-Gruci, Clarke and Ionnadis, Broaddus, namely: there is a significant connection between the economic factors analyzed and the evolution of the number of mergers. The study is useful for knowing the context in which the merging companies operate

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Allocation Organizational Resources for Production of Finished Goods Inventories Using Linear Programming Model

KEHINDE, Busola E.[1]
busola.kehinde@covenantuniversity.edu.ng

OGUNNAIKE, Olaleke O.[2]
olaleke.ogunnaike@covenantuniversity.edu.ng

ADEGBUYI Omotayo A[3]
omotayo.adegbuyi@covenantuniversity.edu.ng

KEHINDE, Oladele J. [4]
oladele.kehinde@covenantuniversity.edu.ng

AMAIHIAN Augusta B.[5]
augusta.amaihian@covenantuniversity.edu.ng

ILOGHO, Simon O. [6]
simon.ilogho@covenantuniversity.edu.ng

ADEDUGBA, Adebayo T. [7]
adebayo.adedugbapgs@cu.edu.ng
[1,2,3,4,5,6&7] Covenant University, Ogun State, Nigeria

Abstract

As a result of the growing competition within the consumer goods industry coupled with expectation of shareholders for profit maximization, the decision of optimal product mix and allocation of resources falls on the managers so that customers expectations can be met. As a result of this, this study examined how organizational resources can be strategically allocated for optimal business performance subject to labor machine and material constraints. These data were then analyzed through the linear programming solver software in order to allocate several the firms resources to competing variables (sachet water, bottle water and dispenser). The study therefore revealed that the Business Unit should focus on invest 23.4 minutes of labour hours, 23.4 minutes of machine and 480 minutes of material. And the analysis recommends x1=0, x2=60, x3=0 should be produced.

Keywords: Business Performance, Labor, Linear Programming, Machine, Materials, Resources

Introduction

Organisations resources vary, some of these resources include, technology, people, finance, raw materials, training, and many more. All these resources are important and crucial to the growth and success of every organisation. Adeyeye (2016) was of the opinion that for successful implementing of strategic plans, there is need for efficient allocation of resources. It is thus a challenging task to implement a strategy when the resources for such implementation of plans are unavailable. There is no disbelief that exists scare resources at the disposal of any organisation and because of this, managers and top level management are confronted with the judgment to select the best means of management of the scarce resources using linear programming in order maximise profit (Adeyeye, Ogunnaike, Amaihian, Olokundun, Inelo, 2016).

Human resource allocation may not sound like a resource, however, it is one of the major areas where resources can be best optimally utilized. Improper allocation of resources especially the human resource, can lead to wastage of energy and man-power. In addition, if the wrong individual is allocated to a task, this individual would end up dropping the productivity level of the organisation, prolong the output time and these would affect the quality of

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the output (Ibidunni, *et al.,* 2018*)*. It is therefore important to allocate the right individual to the specified job (Ibidunni, Ufua, Okorie, & Kehinde, 2019).

Physical resources limit the organisation's set of possibilities of production and affect the cost position. The key characteristics of these resources includes size, location, equipment, flexibility of plant, sophisticated technology, and many more (Nganga *et al.,* 2017)

The absence of conveniently engaging available resources coupled with the delayed in implementation of performance standards recommended has led to increase in operation cost and uncoordinated activities (Ogunnaike, Bishop, Akinsulire, Kehinde, & Oreagba 2018). This has resulted in the ability to effectively use its technology which comes in the form of machines, which when used properly can produce enough quantities of products in the organisation that leads to internally generated profit (Kehinde, Ogunnaike, Adegbuyi, & Ibidunni, 2020). This has also resulted in the inability in attracting and retaining skilled and experienced labour in the organisation, thus resulting in the low performance of the organization (Abiodun & Clement, 2017). Several studies have looked into the application of linear programming techniques to the analysis of manpower planning but little studies have looked into the labour hours and materials needed vis a vis the specified work to be done. The selected business unit for this study is experience high labour turnover. It is therefore expected that the managers of these business unit should be able to harness the available manpower for the required labour hour in order to optimise their profits. Linear programming belongs to the family of mathematical programming which deals with the efficient allocation of scarce and limited resources to diverse competitive activities in the organisation on the foundation of a given optimality criterion (Akpan and Iwok, 2016).

Objectives of the Study

The broad objective of this research is to identify the optimal quantities of products to be produced in order to maximise profit subject to the material/machine/labour constraints in Hebron Drinks.

Literature Review

According to Levinthal (2017), much of the allocation of financial and non-financial resources are facilitated by the firms. Therefore he studied resource allocation and firm boundaries where he considered the impact of perspectives, beliefs , diversity on allocation of resources to investment opportunities. He was of the opinion that mediation of allocation of resources by the organisation plays a major role with respect to resource allocation over time.

Okoye and Ezejiofor (2013) stated the extent to which human resource development can improve organisational productivity in which collected data was gotten from the primary and secondary sources. The data was then analyzed through the use of mean, variance and standard deviation using z-test statistical tool. Findings in their study showed that a business can not exist without the human resource, and allocating labour is behind the sales growth and profitability of any business.

Ismail, Rose, Uli and Abdullah (2012) examined the relationship that exists between resources, systems, capabilities and competitive advantage which was done empirically. Using multiple linear regression model which gave a variance of 56.2% , the findings showed that there exists significant and positive effects of the variables collectively on competitive advantage which provides crucial information to policy makers and practitioners in the research area.

According to Junaid and Muktar (2010), linear programming tools and MATLAB Algorithm was used in the development of optimal cutting plan due to the fact that various organisations and industries faced cutting stock challenges because of generic raw materials production. They made use of Archer (LP) tool and LINGO 8.0 to solve the mathematical and linear program for sheet metal cutting optimization plan in addition with ITEMIZER which is a graphical programming tool. It was then concluded that by keeping the trim loss at the least level, these methods developed can be applied successful to obtain optimal cutting plans and also can be used to solve stock problem

Methodology

The researcher made use of the primary as well as the secondary sources. The primary data was gotten from the survey field through the use of observation and semi-structured interview. Data was obtained directly from observing the activities of people, machines and materials and questions were asked with structured interview to

give light into the observed activities of the production process. Therefore, research was considered for this study is the observation. It involved obtaining information by observing the ongoing behaviour and activities in a phenomena. It relies on information gathered from the working hours of the employees, machines used in the production process and material used to make the product. This would also be done in conjunction with the employee to obtain information about the materials used for producing the different drinks in the organisation. The secondary data was obtained through organisational records such as production records, financial records and sales records. The collected data was analysed through various mathematical technique with the aid Linear Program Solver.

Model Specification

According to Fagoyinbo (2008), linear programming problem may be stated in the following form

Maximization Problem

The generalized variable for linear programming problem is stated below

Maximize $Z = H1X1 + H2X2 + H3X3 + \ldots + CnXn$
Subject to :
$a11x1 + a12x2 + a13x3 + \ldots + a1nxn \leq D1$
$a21x1 + a22x2 + a23x3 + \ldots + a2nxn \leq D2$
$a31x1 + a32x2 + a33x3 + \ldots + a3nxn \leq D3$
$am1x1 + am2x2 + am3x3 + \ldots + amnxn \leq Dn$
Non-negativity constraint
$Xj \geq 0$ (j = 1, 2, ….n)
Where:
Z =total profit contribution of products
H1… H3 = Profit contribution coefficients of products. i.e the numerical values that expresses the contribution of the profit equation per unit.
D1… D3 = This represents the resource values that the organisation needs to fully utilize
a= organisational resources coefficients expressed per unit of the usage of each of the resources (labour time, machine hours, materials resources).

Analysis of Business Decision Making using Linear Programming

Objective: To identify optimal quantities of to be produced to maximise profit subject to machine hours and labour and material constraints

Table 1 : Distribution of Production Cost, Selling Price and Profit for Sachet Water, Bottle Water and Dispensing Water

Name of Product	Production	Cost	Selling Price per loaf	Profit
	per loaf			
Sachet Water (X1)	3		5	2
Bottle Water (X2)	36		50	14
Dispensing Water (X3)	450		600	150

Source: Field Survey, (2020)

Table 2: Quantities of Sachet Water, Bottle Water and Dispensing Water used for Producing Water

Input	Type of Bread and their Raw Material Mix			Total amount of
Basis	X1	X2	X3	time (minutes)
				RHS
Materials	0.5	0.65	19	5000

Machine	0.13	0.39	1.22	480
Labour	3	8	2	480

Source: Field Survey, (2020)

Step 1: Formulate the problem

Max P = 2X1+ 14X2 + 14X3
Subject to
Materials: 0.5X1 + 0.65 X2 + 19 X3≤ 5000
Machine: 0.13X1 + 0.39 X2 + 1.22 X3≤ 480
Labour: 3X1 + 8 X2 + 2 X2 ≤ 480

Step 2: Put the problem in standard form
Max P = 2X1+ 14X2 + 14X3+ 0S1+ 0S2 + 0S3
Subject to
0.5X1 + 0.65 X2 + 19 X3+ S1 = 5000
0.13X1 + 0.39 X2 + 1.22 X3+ S2 = 480
3X1 + 8 X2 + 2 X2 +S3= 480
Non-negativity
X1, X2, S1, S2, S3 ≥0

Table 3: Initial Table

Basis	X1	X2	X3	S1	S2	S3	RHS
S1	0.5	0.65	19	1	0	0	5000
S2	0.13	0.39	1.22	0	1	0	480
S3	3	8	2	0	0	1	480
Obj	2	14	50	0	0	0	0

Source: Field Survey, (2020)

Variable to be made basic : X3
Ratios: RHS/Column X3 : { 5000/19 24000/61 240 }
Variable out of the basic set: S3

Table 4: Iteration 1

Basis	**X1**	**X2**	**X3**	**S1**	**S2**	**S3**	**RHS**
S1	41/160	0	1507/80	1	0	-13/160	4961
S2	-13/800	0	449/400	0	1	-39/800	456.6
X2	3/8	1	0.25	0	0	1/8	60
Obj	-223	-586	0	0	0	1	480

Source: Field Survey, (2020)

Table 5: Results-Variables/Constraints

Variable	Value	Obj cost	Reduced Cost
X1	0	3	0
X2	60	8	0
X3	0	2	0
Constraint	Value	RHS	Dual Price
Labour			
time	39	5000	0
Machine	23.4	480	0
Material	480	480	1

Source: Field Survey, (2020)

Results and Discussion

Based on the study of the output from the optimal mix of 39 minutes of labour hours, 23.4 minutes of machine and 480 minutes of material. Based on this results, it is advisable for SBU to produce 0 units of sachet water (x1) , 60 units of bottle water (X2) and 0 unit of dispensing water (X3) should be produced in order to earn a profit of 480 at optimality.

The objective was to determine how machines, labour and materials can be allocated in order to maximise profit. Results showed that the organisation should invest in 39 minutes of labour hours, 23.4 minutes of machine and 480 minutes of material and 60 units of bottle water to maximise to maximise profit. The results matches with the efficiency argument for profit maximization says that corporations and their managers should maximize profits because this is the course of action that will lead to an 'economically efficient' or 'welfare maximizing' outcome (Agarana, Oguntunde, & Hammed, 2016).

The researcher also found out that in order to efficiently maximize profit in the study organisation, there must avoid wastage by recycling sub-standard products. Also, several factors accounts for the loyalty of customers to the study organisation. Such factors include taste of the product, size of the product, availability of such products to the customers, proximity, affective commitment to parent body, product quality and monopoly of organisations

Conclusion

The research examined the effects of linear programming in allocating resources within a production firm in order to attain profit maximization. The findings in this research revealed that linear programming is a viable technique to use in order to allocate different resources. Linear programming is thus one of the simplest ways to perform optimization (maximization or minimization). This is because it helps solve complex problems by making a few simplifying assumptions. Other studies have made used of other methods to allocate resources, but this study provides evidence of the applicability of linear programming on the strategic allocation of resources for optimal business performance.

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How Does A Building Company Perform In The CE? Analysis Taking Into Account Organizational Levels and LCA Stages

Pedro NUNEZ-CACHO
Universidad de Jaén, Jaén, Spain
pnunez@ujaen.es

Jaroslaw GORECKI
UTP University of Science and Technology, Bydgoszcz, Poland
gorecki@utp.edu.pl

Juan M. MAQUEIRA-MARÍN
Universidad de Jaén, Jaén, Spain
jmaqueira@ujaen.es

Abstract

Society in general and the business world in particular start to behave sustainably. Therefore, we pay more and more attention to the principles of the Circular Economy (CE). The construction industry is no stranger to the problem and its companies are transitioning to this more sustainable production model. Society demands information about this transition, and it is not easy to establish when and with what degree of intensity a company implements the Circular Economy model. To provide a real and effective measurement system, we have designed a dashboard with the main KPIs of the construction industry, related to the CE. To do this, a review of the literature and analysis of the sustainability reports of the companies is first developed. Once the indicators are defined, they are classified into two levels, one based on the Life Cycle Analysis and the other based on the organization's level analysis. After that, a simulation is performed using the Monte Carlo technique. After multiple iterations, this method establishes the most likely KPI values as a result, which will be the limits used in the scorecard, establishing 23 critical indicators.

Keywords: Circular Economy, Construction Industry, Key Performance Indicators, Circular Economy Index, Dashboards.

Introduction

The Circular Economy (CE) consists of the simultaneous consideration of environmental and economic aspects with the objective that the value of products, materials and resources, remain in the economy for as long as possible and that the generation of waste is minimized [1] [2] [3]. It aims to move from the linear approach of the economy (extraction, manufacture, use and disposal) to a new circular one that modifies the traditional life cycle of products, materials and resources (water and energy, among others), by introducing them new in a closed cycle for economic purposes [2] [4]. This increases efficiency in the use of resources, especially in industry and urban areas, achieving a better balance and harmony between economy, environment and society [5] [6] [7].

Being this concept that applies to companies of all sectors [2] [6] [7] [8] [9], including the construction industry [4] [10], the efforts to measure it in this particular sector have been very scarce [11]. However, there is no doubt that the construction industry has a huge impact on the environment [12] and the use of materials [13] [14] and other resources [15] and, therefore, its importance for the Circular Economy is maximum [4] [12] [13] [14] [15].

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The main causes of the construction industry's environmental impact are founded in the use of non-renewable resources and the generation of contaminant residues, both of which are increasing at accelerating pace [13] [14] [16]. The sector's primary effect is the significant destruction of the stock of natural capital [17] through entropic degradation, an issue that is particularly tangible when we observe its most visible or known effects, such as the fall of the native forest, the depletion of fossil fuels, the reduction of water reserves and the pollution of the atmosphere through the emission of greenhouse gases, acid rain and the destruction of the ozone layer [18]. Therefore, construction projects need to be designed from the beginning with criteria of environmental sustainability keeping into consideration their entire Life Cycle Analysis (LCA) (design phase, manufacture materials phase, construction process phase, maintenance phase and end-of-life phase) in a closed cycle [19] [20]. And it is that, in the construction industry, companies turn to general contractors who manage one or several phases of the life cycle of construction projects. Circular Economy must be present in each phase of the construction projects developed by these general contractors. Thus, it is needed the adoption of principles of Cradle to Cradle [21] [22] [23] [24], such as designing for deconstruction [16] [25], Building Information Modeling standard (BIM) [26] and Close loop instruction, in the design phase. Besides, also it is needed more initiatives for sustainable production and the use of sustainable sources, will minimize the waste generated and reduce the number of resources employed during the manufacturing materials, construction and maintenance phases [4] or the reuse and recycle in demolition end phase [16] [25]. All these are strategies of Circular Economy that the companies of the construction industry are already using in their projects' entire life cycle [4] [16] [21] [25] [27] [29]. Because of the importance of the CE today, the generation of a relevant set of Key Performance Indicators (KPIs) that allows us to identify and control if a construction company is applying circular economy practices in the different phases of construction projects, and with what intensity, is a subject of great interest [11]. The generation of these KPIs allows the development of software for control panels or control panels specific to this industry [28]. Precisely, this article puts the focus on these issues. In this way, the objective of this article is to identify a series of key performance indicators (KPIs) related to the CE, which are already being used by companies. On the other hand, it is also intended to illustrate the practical applicability of these indicators through the design and development of a dashboard or control panel software in Circular Economy for a relevant company in the sector.

Circular Economy´S Key Performance Indicators In The Construction Industry

Analysis of the life cycle

Among the tools that help to break down industrial processes are the Life Cycle Analysis (LCA). It is a method responsible for strictly measuring the average environmental impact of a building from five different stages, starting with its initial design and manufacturing, ending with its demolition and final conversion into byproduct [10]. In each of the phases, the sustainability indicators are analyzed. In this way, the LCA can establish the phases in which special care is necessary to avoid any environmental problem. This analysis is widely used by companies due to its optimization of resources and the consequent cost savings, but it can also be used as advertising and good practices of the company because it can be applied to environmental management standards, environmental labelling, etc. This analysis is performed for different sections of Cradle to Gate, which would be in the manufacturing process; Cradle to Grave takes into account from manufacturing to disposal; Cradle to Cradle, would be the new concept on the Circular Economy already explained, therefore there would be no waste [24].

However, this measurement is not simple. As Malabi et al [30] states, the multifunctionality of the CE represents an additional difficulty for the application of the life cycle analysis, which is based on the measurement of the impacts of individual products [31]. For this reason, it is necessary to evolve from a single life cycle approach to a multiple life cycle approach that supports continuous cycles of products and materials [32]. Also, a long-term scenario that presents the useful life of buildings adds another difficulty to its application.

To solve these problems, the segregation of the analysis of the transition to the circular economy in the construction sector could be done by breaking it down into the different phases of the life cycle analysis. This could reduce uncertainty regarding the effectiveness of the measurement of negative externalities of the company, within the CE scenario. As a starting point, a sustainable life cycle consists of five phases: sustainable design process; sustainable production of materials and equipment; sustainable construction process; Sustainable maintenance; demolition = conversion of products into inputs: reuse, remanufacturing or recycling [10].

Levels of organizational analysis

A second complementary classification of the previous one would be to establish levels of organizational analysis. According to Blakeney [33], the company can be considered as a system in which several subsystems interact to carry out a function. In this system, we find three possible levels, first of all, the organizational level, whose effectiveness was defined as the desired impact on the different levels of the organization [34]. The processes at the individual level, which are the basic unit of analysis and the workgroup in which different variables are taken into account, such as the individuals that compose it, the environmental variables and the tasks, certain behaviour is achieved.

To reduce the uncertainty of the LCA analysis, in addition to its life cycle phases, we will include three different levels of study: organizational level, which includes the variables related to planning and organization; Process level: where the variables related to the construction processes are framed; And workgroup level, where the decisions related to the worker are collected.

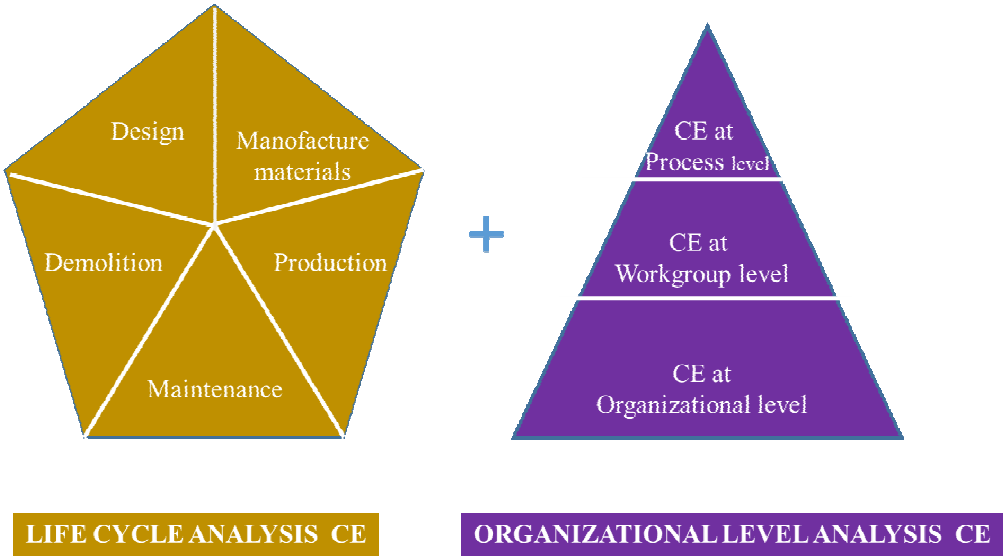

Fig. 1: Levels of analysis

Design of Circular Economy index for the construction industry, applying the Monte Carlo simulation

Index Design

To determine the main KPIs related to CE in the construction industry, we conducted a review of the literature that allowed the first identification of these indicators. A literature review is a technique generally used for this purpose [35] [36] [37].

For this task, two different sources were reviewed. First, the academic literature on the subject, articles previously measured by the CE, initially selected 21 articles. With this source, we intend to obtain a scale with updated and rigorous information. Secondly, for the scorecard to be operational in the field of business, the review was accompanied by an analysis of the sustainability reports of 10 of the main construction companies in the international arena. Indicators of the sustainability reports of the last 3 years were incorporated. With this, we intend to give maximum compliance from the beginning to the control panel that complies, incorporating indicators that companies are already measuring at present.

The next phase was to group the indicators to relate them to the CE and link them to the principles we have developed in the theoretical framework. Thus, with the sum of indicators collected from the two sources, an initial base was generated and then classified. The first classification was made according to its position within the company: based on the analysis of Blakeney [33]. Thus, KPIs related to the organization were obtained (1); KPIs related to the processes (2) and KPIs related to the workgroup (3). Secondly, the articles were reclassified according to the LCA phase [10] in which each one operated (design, material manufacturing, construction process, maintenance and deconstruction or end of life) [38] [36]. Thus, a final questionnaire was generated with 67 indicators classified according to the LCA and the total organizational level forming 15 subcategories (Tables 1, 2, 3, 4, 5).

Table 1: Circular economy Key Performance Indicators of the Design phase of LCA

DESIGN PHASE INDICATORS	SOURCE	ORG. LEVEL
Indicators for toxicity, scarcity and energy	[54]	ORGANIZ.
Existence of a secondary raw material market	[68]	ORGANIZ.
Is there a complete bill of materials and substances for the product?	[54]	ORGANIZ.
Lead indicator for resource productivity	[47]	ORGANIZ.
Resources devoted to preventing environmental risks and pollution	[66]	ORGANIZ.
Are the product's materials passed back into the supply chain?	[54]	WORKGR.
Braskem Amounts used in industrial processes	[59]	PROCESS
Closed-loop recycling management	[68]	ORGANIZ.
Crude steel production	[58]	WORKGR.
Materials production activities that use a tool to manage environmental impacts (environmental certification and/or Colas checklists)	[50]	WORKGR.
Care of Materials, as well as installation, utilisation, recyclability	[50]	WORKGR.
Material improvement	[67]	ORGANIZ.
Annual expenditure on environmental protection	[65]	ORGANIZ.

Table 2: Circular economy KPI´s of Material Manufacture phase of LCA

MAT. MANUFACTURE PHASE INDICATORS	SOURCE	ORG. LEVEL
Material Circularity Indicator	[52]	ORGANIZ.
Indicators for toxicity, scarcity and energy	[54]	ORGANIZ.
Direct Material Input	[58]	PROCESS
Existence a secondary raw material market	[68]	PROCESS
Iron resource efficiency	[57]	WORKGR.
Existence of a bill of materials and substances for the product	[54]	ORGANIZ.
Large amounts of materials used, which involves mineral extraction (steel, cement) and non-renewable fuels	[59]	ORGANIZ.
Lead indicator for resource productivity	[47]	ORGANIZ.
Resource productivity	[56]	WORKGR.
Agroindustrial Generates energy and is self-sufficient in this	[59]	PROCESS

regard		
Agroindustrial Amounts used in agricultural and industrial processes	[59]	PROCESS
Closed-loop recycling management	[68]	ORGANIZ.
Materials production activities that use a tool to manage environmental impacts (environmental certification and/or Colas checklists)	[50]	WORKGR.
Materials: Extensive use of environmentally responsible	[63]	WORKGR.
Measurement of circular material flows	[58]	WORKGR.
Indicadores de Mejora: Materiales	[67]	WORKGR.

Table 3: Circular economy KPI´s of the Production phase of LCA

PRODUCTION PHASE INDICATORS	SOURCE	ORG. LEVEL
Waste generated	[65]	ORGANIZ.
Energy consumption per unit of industrial production value	[53]	PROCESS
Global Asphalt mix production activities	[50]	PROCESS
Iron resource efficiency	[57]	WORKGR.
Large amounts of materials used, which involves mineral extraction (steel, cement) and non-renewable fuels	[59]	PROCESS
Lead indicator for resource productivity	[47]	ORGANIZ.
Resource productivity	[56]	PROCESS
CO2 concentration	[61]	PROCESS
Energy indirect greenhouse gas emissions	[55]	PROCESS
Water Reducing Environmental Footprints	[48]	WORKGR.
Total waste generated (metric ton)	[65]	PROCESS
Waste diverted from landfill.	[63]	PROCESS
Recycling rate of iron scrap	[53]	WORKGR.
Recycling rate of non-ferrous metal	[53]	WORKGR.
Recycling rate of plastic	[53]	WORKGR.
Recycling rate of rubber	[53]	WORKGR.
Recycling rate of waste paper	[53]	WORKGR.
Environmental Chemicals used in treating water and sewage	[59]	ORGANIZ.
BIM contains information, environmental	[50]	ORGANIZ.
Buildings with environmental labelling or certification	[50]	ORGANIZ.
Respect for general biodiversity	[66]	ORGANIZ.

Table 4: Circular economy KPI´s of the Maintenance phase of LCA

MAINTENANCE PHASE INDICATORS	SOURCE	ORG. LEVEL
Intensity of water use	[49]	PROCESS
Greenhouse gas emissions	[66]	ORGANIZ.
Energy consumption per unit GDP	[53]	PROCESS

Protecting water resources	[66]	WORKGR.
Eco-efficiency	[54]	WORKGR.
Recycling rate of industrial solid waste	[53]	WORKGR.
Total amount of industrial wastewater discharge	[53]	WORKGR.
Input for energy-saving technological	[51]	WORKGR.
Lower fuel consumption on a trial basis Digitalisation	[64]	PROCESS
Non-renewable primary energy consumption	[62]	ORGANIZ.
Emergy sustainability index (ESI)	[60]	ORGANIZ.
Employee training and information on environmental protection	[66]	ORGANIZ.
Linear Flow Index	[52]	ORGANIZ.

Table 5: Circular economy KPI´s of the Maintenance phase of LCA

END PHASE INDICATORS	SOURCE	ORG. LEVEL
Unrecoverable Waste	[52]	PROCESS
Total amount of industrial solid waste for final disposal	[53]	WORKGR.
CO2 concentration	[61]	PROCESS
Energy indirect greenhouse gas emissions	[55]	ORGANIZ.
Bouygues group greenhouse gas emissions	[50]	ORGANIZ.
Greenhouse gas emissions	[66]	PROCESS
Recycling rate of industrial solid waste	[53]	PROCESS
Energy consumption	[65]	PROCESS
Total amount of industrial solid waste for final disposal	[53]	PROCESS
Waste by quantity, type, and disposal method	[55]	WORKGR.
Initiatives to recover food waste in establishments open to the general public -	[66]	ORGANIZ.
Energy: Energy positive building – delivered	[63]	ORGANIZ.
Water use	[49]	PROCESS

Generation of probable values for the indicators through the Monte Carlo method

Simulation is an appropriate technique for the analysis and solution of complex problems, which mimics the functioning of a real-world system that evolves. The method applies to any type of problem, random or deterministic. Unlike other numerical methods, it has an absolute error in the estimate that decreases as 1 / N. This error decreases as the number of iterations increases, according to the principles set forth by the central limit theorem.

Monte Carlo simulations have been used to investigate many general aspects of companies and their projects [38], especially in the analysis of investment risks, and also in aspects related to sustainability [11] [39] [40]. Some approaches have been made to its application in the circular economy [41] [42] (Núñez-Cacho et al. 2018; Górecki et al. 2018) that demonstrate its usefulness in this purpose. We consider that Therefore, the use of these simulations as a reference to classify construction companies in terms of their propensity to carry out activities based on the CE concept is an innovative solution.

The procedure followed in the Monte Carlo simulation is as follows. First, a random variable based on probability distributions [38] [39] [40] is generated. Then, after defining a parametric model, we start saving the values. Then, the iterative process is repeated thousands of times (5,000 interactions in our case) until the moment when each range becomes a frequency distribution, which allows us to establish an estimated value and describe its statistics, such as the weighted average, variance, confidence intervals, etc. [40].

In the application of the Monte Carlo method, the following steps are included: first, the model is constructed; second, the stochastic input variables and their probability parameters are defined; third, random numbers are generated for each input variable according to its probability distribution; fourth, run the model; and fourth, system behaviour is visualized and captured [38] [39] [40].

The result of the simulation proposed in this document is a probability distribution for the 65 KPIs employed and their grouping around two levels, the LCA and the organizational analysis. In this way, a total of 24 indicators are generated, 1 general indicator of the Circular Economy that shows a degree of participation of the company in the CE (CE Scale); 5 related to the LCA; 3 related to organizational analysis; 15 indicators related to the subcategories used from the merger between LCA and organizational analysis (5 x 3). The output of the Monte Carlo method provides the most probable values (score) of each indicator, group of indicators and the final index so that these values can be used as cut-off values in the graphic representation in Dashboards (CE Scale).

Based on the frequencies of the indicators obtained in the literature review, the values are weighted according to their participation in the LCA and at the organizational level. The values desired by the organization for the indicator are also established. Companies can take as a reference to the value of the previous year increased in the percentage in which the company wishes to improve its position concerning the Circular Economy. This would show the degree of commitment of the organization to the circular economy. In our calculations, values from the analysis report have been incorporated, observing the evolution and annual improvement of the main construction companies in indicators related to sustainability. The objectives and weights are useful inputs to develop the Monte Carlo simulation technique. The weights performed and the desired values are shown in Annex 1. Thus, the parameters xi, xj and xk are input random variables that affect the probabilistic results of the construction enterprise project maturity in terms of the CE. The probability distributions of the variables and their statistical properties may be taken from a database or may be specified by experts too. The probability distributions, which are established for each random variable, enable simulation of the corresponding random numbers.

The output score is a Circular Economy Scale (CES), which includes two levels of simultaneous analysis, the first with the five phases of the LCA and the second studying each phase at the organizational level, of group work processes. There are a total of 15 categories. The general CES scale is generated in subsequent iterations by the values of the input variables. After each iteration, the output is different because each time a new draw is made, the CES values obtained in the simulation, after a defined number of iterations, create a random variable f. Multiple iterations allow us to calculate the most probable value of the maturity of the construction company in terms of CE and, therefore, the risk of the deterministic estimate of this indicator. The simulations were performed in the "@RISK" software for 5000 preset iterations.

The conceptual model, which is based on the formula for CE Index in the construction industry is described by the following equation:

$$CEI = \frac{SO + SP + SW}{3}, \tag{1}$$

Circular Economy Index (CEI)

Groups of Indicators generated

ORGANIZATIONAL LEVEL:

1. SO_Design – Score for the 'Design' level in the 'Organization' section
2. SO_Manufacture – Score for the 'Manufacture of materials' level in the 'Organization' section
3. SO_Production – Score for the 'Construction' level in the 'Organization' section
4. SO_Maintenance – Score for the 'Maintenance' level in the 'Organization' section
5. SO_End of life – Score for the 'End-of-life' level in the 'Organization' section

PROCESS LEVEL

6. SP_Design – Score for the 'Design' level in the 'Processes' section
7. SP_Manufacture – Score for the 'Manufacture of materials' level in the 'Processes' section
8. SP_Production – Score for the 'Construction' level in the 'Processes' section
9. SP_Maintenance – Score for the 'Maintenance' level in the 'Processes' section
10. SP_End of life – Score for the 'End-of-life' level in the 'Processes' section

WORKGROUP LEVEL

11. SW_Design – Score for the 'Design' level in the 'Workgroup' section
12. SW_Manufacture – Score for the 'Manufacture of materials' level in the 'Workgroup' section
13. SW_Production – Score for the 'Construction' level in the 'Workgroup' section
14. SW_Maintenance – Score for the 'Maintenance' level in the 'Workgroup' section
15. SW_End of life – Score for the 'End-of-life' level in the 'Workgroup' section

The scores are based on deterministic values passed by the experts. These values can vary so should be described by some probabilistic parameters that constitute foundations for the simulation model. The simulations run according to the following equation:

$$CES = \frac{\frac{\sum_{i=1}^{5} w_i \cdot x_i}{\sum_{i=1}^{5} \cdot w_i} + \frac{\sum_{j=1}^{5} w_j \cdot x_j}{\sum_{j=1}^{5} \cdot w_j} + \frac{\sum_{k=1}^{5} w_k \cdot x_k}{\sum_{k=1}^{5} \cdot w_k}}{n}, \quad (2)$$

Where:

wi – weights of particular indicators in the 'Organization' section
xi – set of probabilistic indicator values in the 'Organization' section
wj – weights of particular indicators in the 'Processes' section
xj – set of probabilistic indicator values in the 'Processes' section
wk – weights of particular indicators in the 'Workgroup' section
xk – set of probabilistic indicator values in the 'Workgroup' section
n – number of sections (n=Production)

The indicators related to each phase of the life cycle would be as follows:
Circular Economy LCA phase = Arithmetic mean (S_nO; S_nP; S_nW)

<u>Where:</u>

Weighted arithmetic mean (SO_Design; SP_Design; SW_Design)
Weighted arithmetic mean (SO_Manufacture; SP_Manufacture; SW_Manufacture)
Weighted arithmetic mean (SO_Production; SP_Production; SW_Production)
Weighted arithmetic mean (SO_Maintenance; SP_Maintenance; SW_Maintenance)
Weighted arithmetic mean (SO_End of life; SP_End of life; SW_End of life)
N= Phase of LCA (Design to End of life)

16. S_Design – Score for 'Design

17. S_Manufacture – Score for Manufacture of materials'
18. S_Production – Score for 'Construction' level
19. S_Maintenance – Score for 'Maintenance' level
20. S_End of life – Score for 'End-of-life'

Results

The results of the Montecarlo simulation method application allow us to obtain a probable value (score) for each key performance indicator and each of the three main groups of the organizational analysis and each of the phases of the LCA, starting from the desired target and the assigned weight and applying equations (1) - (2). The most probable value of the final score of the Circular Economy Index in construction companies can also be obtained, executing projects following the CE principles, of each of the phases of the LCA and each of the organizational levels. The result is shown in table 6.

If the indicator offered by the simulation is below the desired values for the specific index, the company in the construction industry is located in an area where it must be cautious (yellow) or in a danger zone (network), where the degree of CE application in the company would be below desirable. The desired value marks the beginning of the green zone and in our clock dashboard corresponds to the 135-degree position, above the desirable values an area of good behaviour starts where the degree of application of the CE would be above of the desirable.

These values can be used to graphically represent a partial CE measure for a company in the construction industry for each of the three main groups of indicators (Organization, Processes, Workgroup), for each of the LCA phases [43] and the general index of the Circular Economy. The general circular economy index is calculated from the arithmetic mean of these three groups (see equations 1 and 2). In this way, the most probable values of the indicators (score result in the Monte Carlo simulation technique or CE Scale) represent the limit that distinguishes when a company has a good performance in CE (its final result in each group and the general index is above the most probable value) or bad behaviour (its result in each group, and the general index, it is below the most probable value). Therefore, when determining the values presented by each KPI in the specific case of a particular company in the sector, and knowing these most probable values, it is possible to graphically represent a Circular Economy Panel for the analyzed company.

Building the Circular Economy dashboard

Introduction

With the results obtained, a dashboard for the measurement of the CE has been developed. As mentioned throughout this work, 15 main indicators will be presented based on the phases of the LCA and the organizational analysis (5x3). Each one is collected in the dashboard through a clock chart, with three categories: red, yellow and green. The beginning of the green category marks the value expected by the company for the indicator and therefore indicates compliance with the expectation. The complete dashboard is presented in Figure 2. In each row, the organizational levels appear and in each column the LCA phases. For example, in the first row, the general CE indicator appears, which establishes the degree of compliance with CE objectives. The arrow indicates the green with what we can see that the company has reached its objectives in general. Row 2 Column 2 shows the indicator of compliance with CE objectives at the organizational level within the design phase. In this case, it is shown in the yellow zone, indicating that it is below expected, without reaching the critical danger zone indicated by the red indicator.

Table 6: Monte Carlo simulation results: probabilistic results for Key Performance Indicators score, KPIs groups score and final CE Index score

MAINS GROUPS			Montecarlo simulation KPI Input data (target and weight) and Output score														
			DESIGN			MATERIALS MAN,			CONSTRUCTION			MAINTENANCE			DEMOLITION		
			SCORE	TARGET	W_i	SCORE	TARGET	W_i	SCORE	TARGET	W_i	SCORE	TARGET	W_i	SCORE	TARGET	W_i
ORGANIZATION	SCORE:	0,5	**0,40**	0,65	0,45	**0,45**	0,70	0,30	**0,52**	0,50	0,20	**0,57**	0,50	0,30	**0,24**	0,40	0,25
	TARGET:	0,55															
	W_j				*0,25*			*0,15*			*0,20*			*0,25*			*0,15*
PROCESSES	SCORE:	0,6	**0,34**	0,55	0,30	**0,82**	0,60	0,35	**0,62**	0,70	0,40	**0,39**	0,60	0,30	**0,47**	0,50	0,35
	TARGET:	0,59															
	W_j				*0,10*			*0,25*			*0,25*			*0,20*			*0,20*
WORKGROUP	SCORE:	0,5	**0,72**	0,50	0,30	**0,39**	0,50	0,35	**0,43**	0,50	0,40	**0,52**	0,50	0,40	**0,77**	0,60	0,40
	TARGET:	0,52															
	Wj				*0,15*			*0,20*			*0,30*			*0,25*			*0,10*
			SCORE:	TARGET:		SCORE:	TARGET:		SCORE:	TARGET:		SCORE:	TARGET:		SCORE:	TARGET:	
			0,50	0,50		0,56	0,50		0,52	0,60		0,50	0,60		0,53	0,50	

Dashboard Design and Development

The KPIs included in Tables 1 to 5 were specified in possible measures, from the conceptual level of the business language to the technical level that allows its graphic representation in the form of a Board. A specific graphic representation was selected for each KPI, each KPI group and the CE Index. Therefore, the speedometer graphs were selected for the General CE Index and each of the three main groups of indicators. This type of representation, similar to those of the dashboard of a car, consists of three colours: (1) green indicative of good compliance; (2) yellow indicative of caution zone and (3) red, indicative of danger zone. The most probable values for each group and general index, according to the results obtained in the Monte Carlo simulation (exit score), represent the limit of the good performance zone (green). Below these values with a reduction of 10 units expressed in%, delimits the precautionary zone (yellow). Data with a greater reduction of this value make up the danger zone (red). Within each group, horizontal bar graphs of the semaphore type were selected for the representation of the individual KPI. The criteria for zone delimitation values (green/good compliance, yellow / caution and red / danger) are the same as before.

Once the graphics were selected, the different CE Board screens were designed. The data for represents and annual reports of Corporate Social Responsibility of the company or were expressly identified [36] [38]. In the development of

a Dashboard, it must prevail that, at a glance, managers can verify whether their objectives in the CE area are met or not [28]. This principle has been followed during the design and development phase [28] (see Figure 1).

When the simulation results are interpreted, it is observed that it obtains a good performance in the General Index of Circular Economy, above the most probable value obtained by the Monte Carlo simulation, as shown in Figure 2. Besides, according to the Indicator groups, both in In the Organization group and the Process group, it achieves good compliance, placing itself in the good zone (green).

Discussion and Conclusions

The measurement of the position of a company before the CE is a topic of great relevance within its corporate social responsibility. Many of the company's stakeholders are waiting for information in this regard, from the government to the surrounding community. The multidisciplinary nature of the CE entails an additional difficulty in carrying out this measurement, making it difficult to apply an approach such as the LCA [31]. To overcome this difficulty, measurement sub categories must be developed that allow us to provide more effective information for decision making. Our work, by jointly incorporating two classifications, such as the LCA and the analysis of different organizations) allows us to decompose information on CE into 15 subcategories. In this way, the company can know which aspects it is working properly in CE and in which not. The idea of transition and the commitment of the organization are also introduced into the model through the desired values of the indicators. On the other hand, the application of the Monte Carlo simulation facilitates the probable values of the 65 variables that make up the scale and with them the 15 commented indicators are formed. From these, eight additional indicators on LCA and organizational level and a general CE indicator that synthesizes the fulfilment of the objective are formed.

The previous contributions cited in this article allow us to design and develop a CE Board for a relevant company in the sector. Based on the specific data obtained from this company, the Board is designed and developed as a practical application. This article could be used as a guide for those companies in the construction industry (general contractors that participate in the complete life cycle of construction projects) who want to know what their performance in the CE is like. Also, the development of Dashboard software applications allows its managers, at a glance, to know the real situation of the company facing CE to make decisions related to this matter [44]. CE practices are needed in the construction industry due to the tremendous impact on the environment. These companies are aware of how their company's performance in CE is a necessity [44] [45] [46]. In this sense, this document contributes by creating an instrument available for managers to evaluate the implementation of the CE.

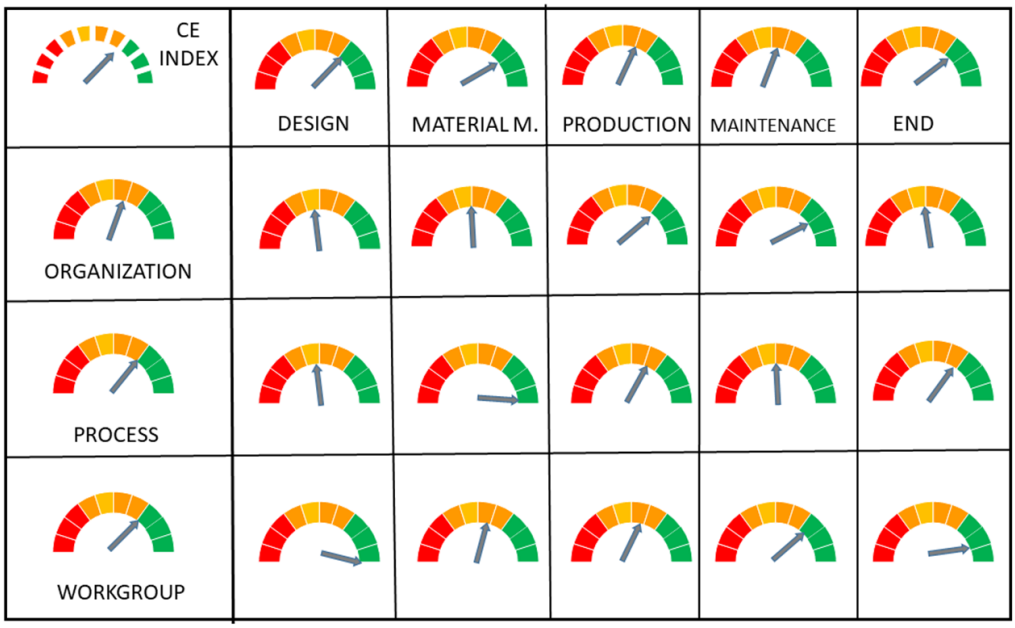

Fig. 2: Dashboard including the information obtained

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Appendices

@RISK Output Results
Performed By: Jarek
Date: 9 luty 2020 21:25:24

Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%
FINAL SCORE / WAGES	Arkusz1	J79	0,35 0,65	0,3799016	0,5021396	0,6059428	0,4506154	0,553694
DESIGN-PLANNING / WAGES	Arkusz1	L14	0,1 0,8	0,1794251	0,4713182	0,7776811	0,3142241	0,6340004
MAT-MANUFACTURE / WAGES	Arkusz1	L30	0,25 0,75	0,2572492	0,5125784	0,7278361	0,3886967	0,6262691
CONSTRUCTION / WAGES	Arkusz1	L51	0,35 0,70	0,36	0,51	0,69	0,43	0,59
MAINTENANCE / WAGES	Arkusz1	L64	0,25 0,75	0,27	0,49	0,70	0,39	0,59
END-OF-LIFE / WAGES	Arkusz1	L77	0,30 0,75	0,31	0,53	0,74	0,42	0,63
DESIGN-PLANNING / MEAN	Arkusz1	N14	0,2 0,8	0,2139414	0,4730773	0,7346294	0,3423285	0,6105354
MAT-MANUFACTURE / MEAN	Arkusz1	N30	0,25 0,75	0,2769452	0,4968748	0,7078275	0,3859167	0,6025633
CONSTRUCTION / MEAN	Arkusz1	N51	0,35 0,70	0,3547316	0,5031744	0,6807249	0,427766	0,5789874
MAINTENANCE / MEAN	Arkusz1	N64	0,20 0,70	0,249864	0,4807692	0,6653936	0,3852788	0,5748442
END-OF-LIFE / MEAN	Arkusz1	N77	0,30 0,75	0,3305721	0,526923	0,7323568	0,4278499	0,621507
FINAL SCORE / MEAN	Arkusz1	N79	0,40 0,60	0,4025817	0,4969298	0,5986149	0,4524129	0,5420647
ORGANIZ. / MEAN	Arkusz1	Q16	0,30 0,70	0,3210845	0,4988504	0,6663152	0,4210752	0,5769256
PROCESS / MEAN	Arkusz1	Q17	0,30 0,70	0,3413976	0,5173914	0,6857519	0,4384546	0,5938186
WORKGR / MEAN	Arkusz1	Q18	0,30 0,70	0,3141019	0,475	0,6541992	0,4004002	0,5514336
FINAL SCORE / WAGES	Arkusz1 (2)	J79	0,35 0,65	0,3947649	0,5021397	0,6176407	0,4506068	0,5540522
DESIGN-PLANNING / WAGES	Arkusz1 (2)	L14	0,1 0,8	0,1907971	0,4713177	0,7720528	0,3124847	0,6333735
MAT-MANUFACTURE / WAGES	Arkusz1 (2)	L30	0,25 0,80	0,2789228	0,5125787	0,7575483	0,390516	0,6248103
CONSTRUCTION / WAGES	Arkusz1 (2)	L51	0,30 0,70	0,35	0,51	0,69	0,43	0,59
MAINTENANCE / WAGES	Arkusz1 (2)	L64	0,20 0,70	0,25	0,49	0,68	0,39	0,59
END-OF-LIFE / WAGES	Arkusz1 (2)	L77	0,25 0,75	0,27	0,53	0,74	0,43	0,63
DESIGN-PLANNING / MEAN	Arkusz1 (2)	N14	0,2 0,8	0,2196103	0,4730766	0,7319061	0,3422526	0,6115834
MAT-MANUFACTURE / MEAN	Arkusz1 (2)	N30	0,25 0,75	0,2592923	0,4968751	0,7349923	0,3893716	0,5982572
CONSTRUCTION / MEAN	Arkusz1 (2)	N51	0,30 0,70	0,3480942	0,5031746	0,6827003	0,4264543	0,5792468
MAINTENANCE / MEAN	Arkusz1 (2)	N64	0,20 0,70	0,2416462	0,4807698	0,6844267	0,3860471	0,5752293
END-OF-LIFE / MEAN	Arkusz1 (2)	N77	0,25 0,80	0,2845367	0,5269227	0,751887	0,4285305	0,6229685

@RISK Output Results
Performed By: Jarek
Date: 9 luty 2020 21:25:24

Name	Worksheet	Cell	Graph	Min	Mean	Max	5%	95%	Errors
FINAL SCORE / MEAN	Arkusz1 (2)	N79	0,35 0,60	0,3901565	0,4969298	0,5975646	0,453113	0,54119	0
ORGANIZ. / MEAN	Arkusz1 (2)	Q16	0,35 0,70	0,3520704	0,4988505	0,6791368	0,4214871	0,5768976	0
PROCESS / MEAN	Arkusz1 (2)	Q17	0,30 0,70	0,3499737	0,5173913	0,6925617	0,4368192	0,5925935	0
WORKGR / MEAN	Arkusz1 (2)	Q18	0,30 0,65	0,3219534	0,4750001	0,6485147	0,3983803	0,5497293	0
ORGANIZATION / DESIGN - MEAN	Arkusz1 (2)	V2	0,1 0,9	0,1655458	0,4812498	0,8795666	0,319419	0,6626232	0
PROCESS / DESIGN - MEAN	Arkusz1 (2)	V3	0,0 1,0	0,003142183	0,4666645	0,9900363	0,1411636	0,8265488	0
WORKGROUP / DESIGN - MEAN	Arkusz1 (2)	V4	0,0 0,9	0,05990412	0,4583331	0,8976474	0,2191107	0,7039847	0
ORGANIZATION / DESIGN - WAGES	Arkusz1 (2)	V9	0,1 0,9	0,1568804	0,4734569	0,870654	0,295671	0,6825346	0
PROCESS / DESIGN - WAGES	Arkusz1 (2)	V10	0,0 1,0	0,003142183	0,4666645	0,9900363	0,1411636	0,8265488	0
WORKGROUP / DESIGN - WAGES	Arkusz1 (2)	V11	0,0 1,0	0,0487421	0,4678571	0,9170959	0,1873918	0,7513138	0
ORGANIZATION / MAT. MANUFACTURE - MEAN	Arkusz1 (2)	W2	0,1 0,9	0,1922785	0,5277773	0,8441923	0,337859	0,7016032	0
PROCESS / MAT. MANUFACTURE - MEAN	Arkusz1 (2)	W3	0,0 1,0	0,06328291	0,479167	0,907497	0,2086266	0,7016964	0
WORKGROUP / MAT. MANUFACTURE - MEAN	Arkusz1 (2)	W4	0,1 0,9	0,164369	0,4777783	0,8393516	0,3417624	0,6147993	0
ORGANIZATION / MAT. MANUFACTURE - WAGES	Arkusz1 (2)	W9	0,1 0,9	0,1692319	0,5275357	0,8440105	0,3327661	0,7068328	0
PROCESS / MAT. MANUFACTURE - WAGES	Arkusz1 (2)	W10	0,0 1,0	0,04000702	0,5574076	0,9359853	0,1706848	0,8075173	0
WORKGROUP / MAT. MANUFACTURE - WAGES	Arkusz1 (2)	W11	0,1 0,9	0,160961	0,4769846	0,8328855	0,3362119	0,6152018	0
ORGANIZATION / CONSTRUCTION - MEAN	Arkusz1 (2)	X2	0,1 0,8	0,1729645	0,5277774	0,7922558	0,3874699	0,6700975	0
PROCESS / CONSTRUCTION - MEAN	Arkusz1 (2)	X3	0,2 0,9	0,2896661	0,5229172	0,8025063	0,3964296	0,6471227	0
WORKGROUP / CONSTRUCTION - MEAN	Arkusz1 (2)	X4	0,1 0,8	0,1800862	0,4595234	0,7421649	0,3321831	0,5901261	0
ORGANIZATION / CONSTRUCTION - WAGES	Arkusz1 (2)	X9	0,1 0,9	0,1715619	0,5442027	0,8184975	0,3952437	0,6903638	0
PROCESS / CONSTRUCTION - WAGES	Arkusz1 (2)	X10	0,2 0,9	0,2662268	0,5344833	0,8186932	0,4033874	0,6627439	0
WORKGROUP / CONSTRUCTION - WAGES	Arkusz1 (2)	X11	0,1 0,8	0,1576815	0,4588537	0,7511563	0,3292738	0,5897005	0
ORGANIZATION / MAINTENANCE - MEAN	Arkusz1 (2)	Y2	0,1 0,9	0,1540383	0,5000005	0,8249797	0,3469268	0,6513842	0
PROCESS / MAINTENANCE - MEAN	Arkusz1 (2)	Y3	0,1 0,9	0,1030963	0,4722228	0,8894963	0,2810237	0,6741619	0
WORKGROUP / MAINTENANCE - MEAN	Arkusz1 (2)	Y4	0,1 0,8	0,1735927	0,4666671	0,7758223	0,3112298	0,6251603	0
ORGANIZATION / MAINTENANCE - WAGES	Arkusz1 (2)	Y9	0,1 0,9	0,1456875	0,5043865	0,8144054	0,3486857	0,6610765	0
PROCESS / MAINTENANCE - WAGES	Arkusz1 (2)	Y10	0,1 0,9	0,1028466	0,470834	0,8924816	0,2775471	0,6793321	0
WORKGROUP / MAINTENANCE - WAGES	Arkusz1 (2)	Y11	0,1 0,8	0,1735927	0,4666671	0,7758223	0,3112298	0,6251603	0
ORGANIZATION / END OF LIFE - MEAN	Arkusz1 (2)	Z2	0,1 0,9	0,11444	0,4458334	0,8818303	0,2693258	0,6307854	0
PROCESS / END OF LIFE - MEAN	Arkusz1 (2)	Z3	0,2 0,9	0,2593764	0,559523	0,8513407	0,4252799	0,6902176	0
WORKGROUP / END OF LIFE - MEAN	Arkusz1 (2)	Z4	0,0 1,0	0,06988133	0,5750003	0,959958	0,3236092	0,8057494	0
ORGANIZATION / END OF LIFE - WAGES	Arkusz1 (2)	Z9	0,1 0,9	0,1114297	0,4533336	0,8687247	0,2623683	0,6594654	0
PROCESS / END OF LIFE - WAGES	Arkusz1 (2)	Z10	0,2 0,9	0,2599567	0,5579702	0,8455395	0,4142124	0,6925182	0
WORKGROUP / END OF LIFE - WAGES	Arkusz1 (2)	Z11	0,0 1,0	0,06988133	0,5750003	0,959958	0,3236092	0,8057494	0

A Conceptual Research of Training Effectiveness, Attitude, And Commitment on Food Safety Behavior in Home-Based Businesses

Shatha Ali AL MUA'LLA

Faculty of Business and Law, The British University in Dubai,
Block 11, Dubai International Academic City (DIAC), P O Box 345015, Dubai,
United Arab Emirates (UAE), 2016156100@student.buid.ac.ae

Prof. Bader Yousef OBEIDAT

Department of Business Management, School of Business, The University of Jordan, b.obeidat@ju.edu.jo,
Unpaid Leave at Faculty of Business and Law, The British University of Dubai, Bader.obeidat@buid.ac.ae

Prof. Ra'ed MASA'DEH

Department of Management Information Systems, School of Business,
The University of Jordan, Amman, Jordan, r.masadeh@ju.edu.jo

Abstract

As, the food safety behavior in the home-based business (HBB) is a concept that has not been given sufficient attention regarding training effectiveness, attitudes and commitment the evaluation of practices to achieve business success in the realization of the important food safety, and since there are fewer researches have been done in the area of HBB. Therefore, this research comes in to measure the effect of the training effectiveness, commitment, and attitude into food safety behavior that can be realized especially in the home-based businesses that serve the interest of the local communities in any given place. A quantitative deductive approach will be conducted to test the model, the research variable, and the outcomes for difference HBB within UAE. The research expects results will be a significant correlation between the food safety behavior variables, training effectiveness variables, commitment variables, and attitude variables, as well as thus developing a conclusion adoptable by the different governments, and other stakeholders may apply in the industry to create a higher value regarding food safety behavior.

Keywords*:* Food Safety Behavior, Training Effectiveness, Commitment, Attitude.

Introduction

There is a dramatic increase in the number of home-based businesses (HBB) especially in food that is showing the prevalence of the sector and its constituents, and for this influx some of the cities getting government regulations for this HBB, and it is still a field of interest in the current time. Food safety behavior concept that has not been given sufficient attention regarding standardization and the evaluation of practices to achieve business success in the realization of the food quality attributes. Hence, the researchers will come to address the effect between training and food safety behavior of home-based business and how it effects on human capital. This research also will focus on the development of the understanding food quality values that are applicable in the home-based business. Understanding the role of HBB in the counties economy is essential since most research do not show the same. Making safe of the operational environment conducive is always the purpose of the everyone and especially home-related business. The training of the personnel for efficacy in the handling of the business is also essential in reaching the said goal. However, the business operations also depend on the food and training of the personnel. The process of food storage and preparation both requires finance. It is therefore vital to moderate the amount of financial investment on the same. Accordingly, this is to be done so that to achieve the premium goal of maintaining HBB, food safety behaviour and training at considerably better finance. Human finance, on the other hand, the trainer and the trainee help in the integration of the said components above.

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This study presents a comprehensive discussion of the three aspects and their separate integration in relation to the home-based business, specifically in training effectiveness, attitudes and commitment. In training effectiveness, it's important to identify and measure the impacts of the individual and observable changes in knowledge, skills, and attitude after training as well as organizational factors that affect training outcomes including training transfer. However, the scope of evaluating the effectiveness of training may help to identify the value of training programs and methods of techniques to improve training programs also will value training resources to the organization. As this study, the criteria to measure the training effectiveness by trainee reaction, learning, behavior and business results through, these criteria the organization can value the training program (MOLLAHOSEINI & FARJAD, 2012). SUN, LIU, WU, & ZHOU (2018) showed the measurement of training effectiveness by using the Kirkpatrick model which will give an indicator of the criteria that want to measure such as: how to evaluate the effectiveness of the trained (learning), how to quantify the improvement of the trainee's ability after training (behavior) and how to ensure the quality of training (knowledge). KIRCHER, & FOX (2019) argued that attitude is the second variable on this research which plays an important role in any organization, most of the studies have argued about this topic such as: that the attitudes composed of three components: cognition which means the beliefs held about the attitude object, affect the feeling elicited, and finally conation means the behavior directed. Additionally, all components are psychological characterized by stereotypes (beliefs), prejudices (feeling) and discrimination (behavior). When the food handlers have knowledge of food safety the attitude and behaviour towards handling food positive because the attitude can be positive or negative on the feeling which may influence the behavior (MOREAUX, ADONGO, MENSAH, & AMUQUANDOH,

2018). The last variable is the commitment defined as the employee's loyalty toward the organization, which reflected on the behaviour for the employees like contribute more effort to work. The benefits of commitment are the level of job satisfaction increase which leads to improved performance for the organization. Thus, when employees have a high commitment can contribute to actions that produce organizationally valued outcomes (MAHTO, VORA, MCDOWELL, &KHANIN, 2020). The employee's commitment grouped into three levels includes affective, normative and continuance. The affective commitment is concerned with employees feeling, continuance commitment which meaning costs associated with separation from the organization and last the normative commitment is concerned with moral commitment to continue with the organization (RAMESHKUMAR, 2019).

The following section views the literature reviews of the research. The third section conceptualizes a framework of the article and the methodology in the fourth section. The fifth section displays the expected results and implications. And the last section will be the conclusion and future works.

Literature Review and Hypothesis Development

Food Safety Behavior

To improve the food safety behaviors which many countries adopt is to implement mandatory food handler training and programs which may help them to correct readily fallen mistakes in their behavior (LIN & ROBERTS, 2020). However, many studies reported that training employees on food safety practices are a very important and essential factor to change the behavior. Therefore, most of the organizations consider developing food safety education for the employees. Building a good habit in behavior performed to lead to regularity behavior based on good practices, and that will order to control for the effects of past behavior which will contribute to reducing foodborne illness (MULLAN, ALLOM, FAYN, & JOHNSTON, 2014).

Additionally, MOREAUX, ADONGO, MENSAH, & AMUQUANDOH (2018)

Specify that the training is the most widely recommended for improving the food safety behaviors for the food handlers and leads to good attitudes which will turn to the practices for them in the future. Based on these when the food handlers have a significant knowledge of food safety they will relate to the attitude and behavior towards handling food.

In research, and based on an extensive literature review for the food safety behavior

(e.g. PARK, KWAK, & CHANG, 2010; ROWELL, BINKLEY, ALVARADO,

THOMPSON, & BURRIS, 2013; TURNBULL-FORTUNE, & BADRIE, 2014; LONDON SOUTH BANK, 2016; OVCA, JEV, KAV, & RASPOR, 2018; IDRISS, 2019; YOUNG, CHUNG, MCWHIRTER, & PAPADOPOULOS, 2020) the most common practices behavior among different researcher are Personal hygiene, Food hygiene, and Environmental hygiene, which will use it as a dimensions to measure the food safety behavior.

Training Effectiveness

The companies need to focus on measuring the effectiveness of the learning program to provide information as well as feedback about the adequacy of the implemented training program, and to have gap analysis to know the shortcomings of the training programs.

To enhance the training effectiveness must measure by some variables that could influence training like training climate, training evaluation, and degree (KODWANI, & PRASHAR, 2019). As a result, all variables can influence trainees, so the trainees need to know all about training. The criteria to measure the training effective depend on What the trainee learned from training course (Knowledge Criteria), how the acquires knowledge will change on job and performance (behavioral criteria) and last evaluate the course (results criteria), which considered as a primary decision to evaluate the effectiveness of training (ARTHUR, BENNETT, EDENS, & BELL, 2003). Although there are many evaluation and effectiveness methods for training must ensure to choose the correct method to measure, So, because this reason choosing the Kirkpatrick evaluation model, which defines the modules in four levels:- Reaction through examine what the trainer's learners and felt about the training, Learning the level of knowledge he gained, Behavior how it contributes on the job performance, and finally, Results examine the effects on organization or environment on the business (CHRYSAFIADI, & VIRVOU, 2012). From the above ideas, the first hypothesis (H1) is built up and presented in Fig.1. Hypotheisi1. There is an effect of training effectiveness on food safety behaviour.

Attitude

Attitudes are one of the characteristics of safety culture in an organization and it defined as a psychological tendency that is expressed by the assessment of a particular entity with some degree of satisfaction or unsatisfied and measured by three components (cognitive, behavioral and affective).

Additionally, the reasons to care about employees' attitudes could be due to the attitude that will affect outcomes of an organization by turnover or performance; also the satisfaction will impact productivity. Through the attitude of employees, the organization will have indicators of business performance and work environment and is there any development or not, because the internal and external factors will affect the attitude on all employees including cultural influences that will contribute to the employee's capabilities, and can evaluated by using the five job areas the promotion, co-workers, pay, supervision and work itself. This can best be described by the theory of planned behavior, which links one’s beliefs and behavior, such as negative employee attitudes to workplace diversity are multifaceted which lead to rejecting many initiatives used to promote workplace diversity. The behavior intention is influenced by the attitude regarding the possibility that the behavior will have the expected results and the subjective evaluation of the risks and benefits of that outcome. The attitude toward behavior, subjective norms, and perceived behavioral controls, together shape someone’s intention behaviors. The theory has successfully been used to predict health-behavioral intentions such as exercise and diet where the attitude and intentions to behave in a certain manner are mediated by objectives rather than need. The theory differentiates between three types of beliefs namely; behavioral, normative and control (ANGLIM, SOJO, ASHFORD, NEWMAN, & MARTY, 2019). The second hypothesis (H2) is there is an effect of attitude on food safety behavior in Fig.1.

Commitment

The employee's commitment can affect the level of organizational performance (JAROS, 2007). The organizational commitment as three components that are affective, continuance and normative. Most of the organizations follow the factors that support commitment like, continuance commitment which meaning employees desire to continue working, normative commitment facing pressure from there and last one affective commitment employee who agrees to work in this environment. The value and beliefs of food handlers can contribute to the commitment of the employees in the organization, and measure this commitment by dimensions such as reward valence (reward expect), reward instrumentality (performance), reward expectancy (personal effort will increase the performance), role overload (to reach to the role expectations must to work hard), role underload (perform excessive in work), job satisfaction (level of emotional), and employee empowerment (responsibility to take the decision).

Over the past years, organizational commitment has been the important subject for the research contributions, which defined as the individual's attitude towards an organization, especially in belief and acceptance of organizational goals and values, work harder for the organization. The definition the organizational commitment is a stage in which the employee recognizes a certain group with the goals (ELIYANA, MA’ARIF, & MUZAKKI, 2019). Also, through the organization's commitment the employees have a strong willingness to stay as a group member to work, also have a

willingness and aspiration to hard work to reach the organization's goals. The relationship between organizational commitment and work performance is very strong and positive and it can influence each other (ELIYANA, MA’ARIF, & MUZAKKI, 2019).

Organizational commitment very important to change employees through attitudes and conditions, and it refers to an employee's bond to the employing organization. The commitment depends on three major forms called continuance, normative and affective commitment, thereby the increase in these forms will contribute in further to the strengthening organizational commitment (LAMBERT, OTU, & ELECHI, 2019). Following this line of argumentation, the second hypothesis (H3) is there is an effect of commitment on food safety behavior in Fig.1.

Home-Based Business and Food Safety

The home-based businesses are a sector in the entrepreneurship whereby a person seeks to own a certain enterprise while working from home (JAYACHANDRAN, 2020). The United Arab Emirates has been experiencing steady increase in the G.D.P especially since the year 2004. There has been a significant and rampant increase in the number of HBB enterprises in many areas of the economy, including the food business sector. In the food industry, women have especially been at the forefront in establishing home-based businesses that prepare and sell all kinds of food products, but primarily cookies and cakes. The foreign policies pertaining to the open border have also contributed to the development of the country's economy. In the country, the number of players in the food industry is wide. In this case, it raises the need to create awareness on safe ways of preparing, transporting, and storing food to evade food health crises that may arise from contaminated foodstuffs. Sensitization of the benefits of handling food safety is an essential sector that should be endeavored by all players in the industry.

Conceptual Framework

This paper assumes in order to test the effect of four variables which are training effectiveness, attitude, and commitment on food safety behavior in HBB, through dimensions on these variables.

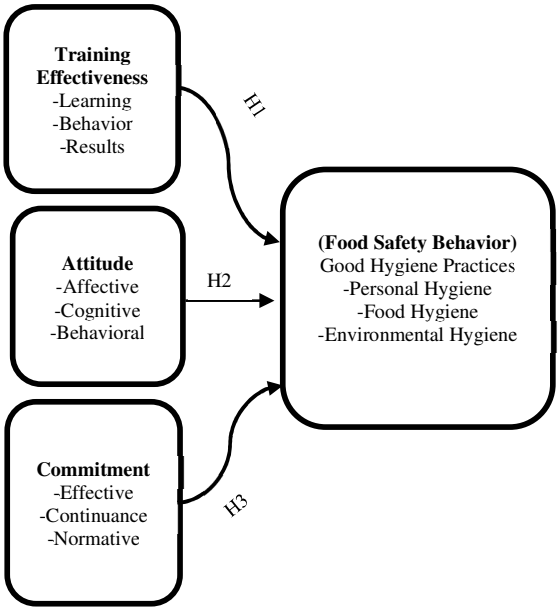

Fig. 1: Detailed Conceptual Research Model

Research Methodology

To test the paper's hypothesis, a home-based businesses sample of firms in UAE will be used. A quantitative deductive approach will be conducted. Hence, questioners will be sent to food handlers of this business. Elements that need to investigate are the effect of the (dependent variable for food safety behavior) and will measure it by dimensions of personal hygiene, food hygiene, and environmental hygiene, and (independent variable for training effectiveness: learning, behavioral, results), (independent variable for attitude: affective, cognitive, and behavioral) and (independent variable for commitment: effective, continuance and normative).

Expected Results and Implications

The anticipated results will be a significant correlation to the effect of training effectiveness, attitude, and commitment on food safety behavior of the home-based business and its effectiveness variables in success. And that support all the questions, hypotheses and the framework proposed for this research.

Conclusion and Future Work

As understand from (HBB) definition, the main goal is to reinforce know the effect of training effectiveness, attitude, and commitment on food safety behavior in a homebased business. The food handler is essential in the development of HBB and food safety behavior assurance. Therefore, it was essential to check the effect of training effectiveness,

attitude, and commitment variables on food safety behavior, as well as a substantial correlation link amongst the food safety behavior variable with other variables. And for future work that can come up from this research is to investigate other linkages, for instance, the food safety culture on (HBB).

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Effects of Product Differentiation Strategy and Pricing Strategy on The Performance of Manufacturing Firms in Nigeria

Mary O. OGUNDIPE
Covenant University, Nigeria
maryogundipe0821@gmail.com

Oladele J. KEHINDE
Covenant University, Nigeria
oladele.kehinde@covenantuniversity.edu.ng

Samuel E. OIKEH
Covenant University, Nigeria
samueloikeh@gmail.com

Dorothy OYO-ITA
Covenant University, Nigeria
oyoitadorothy@yahoo.com

Abstract

The new demand for modernization has made businesses perceive the globalization of their operations as a way of staying competitive. Globally, marketing strategy has been an effective resource for every company to survive in a competitive business environment and have become stronger. The major purpose of this research was to examine the effects of product differentiation strategy and pricing strategy on the performance of manufacturing firms in Nigeria. Product differentiation strategy and pricing strategy have been used as a tool for firm performance. The findings revealed that product differentiation strategy and pricing strategy has great influence on performance of manufacturing industry. This study therefore suggested that management must ensure that the contexts of their business environment are thoroughly examined, before any marketing strategy is adopted to determine whether the proposed step or decision is a suitable strategy for success in the sector.

Keywords: Marketing Strategies, Manufacturing Industry, Product Differentiation Strategy, Pricing strategy.

Introduction

The stiff competition in the market has rendered the success of any given firm to be largely dependent on its strategic awareness. In other words, managers must be cognizant of how these changes can affect their ability to compete remarkably in the marketplace (Onyago, 2017). Porter (2008) purports that business managers should continually look for ways in which they can exploit their strategic capabilities and this can be achieved through adapting and pursuing growths in all aspect of their businesses, building on brand awareness and understandings of present strategies and achievements (Onyago, 2017). Thus, Organizations must have the ability to respond quickly to threats and opportunities. For the purpose of market survival, Organizations need to compete successfully and beat their competitors in the ever-dynamic environment. This can be done by finding appropriate means to create and add value for their consumers in order to gain a competitive edge (Bukirwa and Kissing'u, 2017).

The ability to beat other players and to acquire beyond average returns hinge on pursuing and implementing a suitable business strategy as explained by Akingbade (2014). The pursuit of market competition is at the basis of strategic decision making and as such, having knowledge of the root of sustainable competitive advantage has turned out to be a significant field of study within the area of strategic management (Dirisu et al., 2013). In line with the above, organizations in any industry run their businesses with the awareness of developing their sales, dictating the space and ultimately becoming the dominant player in the market so as to acquire the biggest share of the market. These in mind as focused goals usually enable company to undertake any strategic measures that are ethical, legal and beneficial in an effort to attain those goals as elucidated by Abayomi and Akinmadelo (2014). Strategic decision is a vital decision that every top manager of an organization need to make, as this could ultimately have an effect on their company targets, either directly or indirectly (Monroe, 2003). Making an effective strategic decision for the product

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or service of an organization is one of the most demanding and vital decisions a manager has to make, owing to the number of variables that ought to be considered. Some of the variables influencing strategic decision are customer satisfaction, company market share, sales growth and customer loyalty.

Differentiating one's products with an attempt to outperform competitors is one way of winning competition; differentiation means distinguishing products from those of competitors to make them more appealing to a specific target market. This can be done by observing customers, to discover and please users by offering unique products and creating a culture of innovation to be strategically positioned on the market and withstanding competitor attacks with the primary goal of meeting market demand. Consequently, it can serve as a basis for achieving a sustainable competitive advantage for businesses. It is therefore necessary for companies to offer new thoughts, ideas, differentiate and innovate their products (Kuncoro, 2017).

Marketing strategies has become a competitive strategy firms use to compete in the market as a solution for the difficulties they go through while trying to improve their performance (Onyejiaku, Ghasi, and Okwor, 2018). Even in the manufacturing industry of some western countries like Thailand, Singapore, China and America, marketing strategies is used as an instrument for corporate strategy (Moradian and Soufi 2015). This is why firms in these western countries, according to Moradian and Soufi (2015) have been growing in terms of market share and profit. Several studies [Adefulu (2015); Abu Aliqah, (2012); Gandhy and Harruidini (2018); Okeke and Onyemachi (2018)] have looked into the effect of marketing strategies as a whole in the manufacturing industry, but little research have been carried out on the effect of the composition of market strategies such as product differentiation strategy, pricing strategy, Promotion strategy and distribution strategy and how its affect their organization strategic decision.

Literature Review

Concept of market competition

For an organization to thrive successfully within a market, there must be true market competition. This can be defined as a business environment in which different companies, situated both within and outside a country, have to compete with each other simply on the merits of their goods and services. No company exists alone in the marketplace. There is always competition and knowing as much as possible about one's competitors, managers can make the business more successful, because they can formulate strategies that can help them compete successfully in a market (Adefulu and Adeniran, 2019).

Product Differentiation Strategy

Differentiation strategy aims at delivering products or services that provide results that differ from those of their rivals and are usually appreciated by customers (Virginia, 2017; Al-rfou, and Trawneh, 2010). When an organization can provide a product/service that is different, unique and beneficial to their consumers, it can differentiate itself from its competitors (Kago, Gichunge and Baimwera, 2018; Pereira, 2017). Product differentiation is prevalent throughout the financial world, especially in most production zones, and there is a wide range of differentiated products in the market. This is evident that when one walks into a store, one can encounters different products for instance soap, which comes in different varieties like liquid, detergent and bar soap and all being sold by different companies.

Differentiation is a sustainable strategy used by organization to generate beyond average incomes in a given organization due to the fact that the resulting customer loyalty lessens customers' price sensitivity (Okeke and Onyemachi, 2018; Stanley, Fred and Gregory, 2016). For an organisation to outperform its competitors, they must be able to build their own unique capability to differentiate its products in such a manner that allows them to compete effectively on the market (Anthony, 2018; Tanwar, 2013).

Product differentiation strategies used by business organization

(Stanley, Fred & Gregory, 2016; Thompson, 2014) stated that there are three aspects to successful differentiation: ordering a premium price for a product, growing sales due to the extra customers gained by differentiating attributes and increasing customer loyalty to its brand. They further assumed that a product is differentiated if it is perceived by customers as having features that make it discrete from competitor goods or services and preferably unique in a manner that makes it hard to compete with (Stanley, Fred and Gregory, 2016; Nolega, Oloko, William and Oteki, 2015; Al-rfou, and Trawneh, 2010). When looking at product differentiation, it is correct to say that it is not given by nature. Business firms themselves are the main agents behind the advent of product differentiation. There are times when companies are pressured to lessen the degree of product differentiation, which additionally affects the

profitability of the organizations. Organizations attempt to introduce the same features as their rivals when they discover that customers like some particular feature in the product, they sell with the aim of boosting their sales. The degree of product differentiation may fail when companies are handling products with similar features because differentiating the same product would be a greater challenge (Nolega, Oloko, William and Oteki, 2015).

Pricing Strategy

Pricing decision is a crucial decision that needs to be made at all levels by all organization and it has also posed a major challenge for top managers in these organizations. A company is set up to offer competitive prices whether complex or simple, public or private, large or small. According to Deonir, Gabriel, Evandro and Fabiano (2017), putting up a price for the products or services of an organization is one of the major decisions facing the manager and one of the most demanding because of the range of factors that need to be assessed. A number of the factors that influence pricing decision are competitors, legal, political, demand, environmental, image-related issues and cost. According to Rapaccini, (2015), the main approach to making a successful pricing strategy is to generate revenue in such a way that increase the profit margins of the firms, leading to the question; how well can we enhance the different factors influencing pricing decisions to attain our common goal, which is profit maximization (Deac, Dobrin, Girneata and Voicu, 2016).

Factors Affecting Pricing Decision

When making pricing decisions, some factors need to be evaluated, so that the choice of the decision will not have a negative impact on the firm's overall goal.

1. Cost of Production: for effective pricing decision, managers need to fully determine the total cost of production, leaving no stone unturned. They also need to determine their fixed costs as well as the variable costs and instil all other expenses that may be spent in the marketing process; transportation, sales promotion and advertising expenses.

2. Nature of market competition: knowing the nature of market competition when making pricing decisions is also essential. Competition may possibly not influence pricing decisions for an industry in a monopoly market, but it must be considered for an industry in the free market or oligopoly market where competition is tense.

3. Customers and market segment: when a manufacturer is familiar with its consumers, she can set her prices correctly. They also need to identify the market segment carefully and the price customers may be ready to pay for the identified products. For the manufacturers of phones, there are various models of phones for diverse set of persons, thereby manufacturing various types for different set of individuals.

4. Demand: for a new product, such a product needs to be strategically priced in a manner that penetrates the market, even when it is equivalent to the total cost, whereas in the case of highly demanded product, increase in prices might not have a negative impact on the demand for those products. So manager needs to analyse the demand for such products before making their pricing decisions.

5. Consumer behaviour and perception: when making pricing decisions, the behaviour and perception of consumers about the product must be taken into consideration. The company should also consider whether increase or decrease in price will result in higher or lower demand (Obigbemi, 2010).

6. Channel of distribution: the cost and channel of distribution must also be taken into account, when trying to set a product price. Manager should also consider whether the product will be delivered straight to the end user or it will have to be supplied through the multiple channels of distribution. For a product that have to be moved through the wholesaler, to the retailer and then to the end user, the incomes of these intermediaries as they are called must be taken into account, such that the retailer’s last price will not negatively affect demand (Obigbemi, 2010).

7. Company Objective: When making pricing decisions, manager need to ensure that the decision they are really making are in the line with general objective of the organization, as this will enlighten other members of the organization what the pricing objective is all about. So as to ensure that the pricing decisions made are in line with the general objective of the organization (Obigbemi, 2010; Luqman and Okewale, 2017).

Customer Satisfaction

The success of every organization depends on customer satisfaction. Customers always come "first" and then the profit when a business is about to start. Those companies that succeed in fully satisfying customers will remain in a

market's top position. Businesses today have demonstrated that customer satisfaction is a major element for achieving success in the industry and at the same time plays a major role in expanding their market share (Khadka and Maharjan, 2017). Customers are generally those who purchase products and services from a business or industry that satisfies their requirements and wishes. Customers also buy products to suit their needs in terms of cash. Organizations must therefore assess their price with product quality to attracts customer and maintain a long-term relationship with them (Khadka and Maharjan, 2017). One of the key element managers use to guarantee customer attention is delivering the best and the most satisfying products in this competitive market. If the satisfactions of customers are gained, then customer loyalty is sure to come along with it. Moreover, an organization will not be in existence without these customers. To raise the percentage of customers, it is very essential to develop customer satisfaction. These two terms are very important once it comes to achieving company objectives. Therefore, the most important is the relationship between customers and the business organization (Khadka and Maharjan, 2017).

Sales Growth

According to Kijewska (2016), deciding to grow the firm is the first and foremost strategic decision every organization must make. The political stability in Nigeria has resulted in economic liberalization, which in turn has had a great impact on operations of the company. It has also increased the competitive intensity and consumer demands in particular, especially in the manufacturing sector (Azigwe, Maryir, Asunka and Manamzor, 2016). As a result of this, many companies and organizations have made an effort to raise and develop customer trust and loyalty, which relies heavily on the behaviour of the sales representatives. (Paolo, 2002). As competition in the market becomes increasingly aggressive, the most essential thing for market players is not just to offer quality services or products, but to also retain loyal customers that will add value to their long-term success and profit margins (Kotler, 2012). As a result of this, organization need to constantly make decision on essential parameter for survival and financial growth of the company and this can be done, by creating measure in the firm in order to compete in the competitive market.

Conclusion and Recommendation

Analysis from the study revealed that marketing strategies are very essential for effective results in manufacturing companies as evidence in this research demonstrates how various marketing strategies of product differentiation and pricing strategy have a significant effect on organization strategic decision when measured by customer satisfaction and sales growth respectively. Likewise, based on the results of this research, managers of manufacturing companies should use a great deal of the product differentiation strategy as it has been proven to have the greatest impact on their competitiveness. Differentiating companies also need to look more deeply into how to make uniqueness less expensive, in an effort to make differentiation a major practice in the industry.

Furthermore, survival is a major concern for companies in the dense competitive business environment such as Nigeria. Due to high level of competition from larger businesses, this hasn't been an easy task for most manufacturing companies in Nigeria. For this reason, it is essential for managers to develop and implement appropriate strategies as this will serve as a guide to what the companies have in mind and also help define ways, they can attain their targets and objectives. They also need to consider the fact that they are within a highly competitive business environment and must implement competitive marketing strategies that are efficient and effective in order to have a strong advantage over their competitors and as well increase in all ramifications.

The recommendation to managers is that price is at least as important to consumers when purchasing products as customer service. Managers must spend equal amount of organizational resources on developing appropriate pricing strategies as is spent on customer acquisition and service efforts. Pricing must become a strategic capability within all manufacturing firms as well as other industries. Managers should recognize that differentiation strategies are ideal strategies to keep the organization competitive in the market. Therefore, coordination in terms of human and economic resources is needed to efficiently implement differentiation strategies in order to attain organizational objectives effectively.

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Human Voice and Android Voice: A Comparative Study

Marek ZIMNAK

University of Lower Silesia, Wroclaw, Poland,

Email: marek.zimnak@gmail.com

Abstract

The idea of constructing androids using the human voice has become an element of the intensive development of artificial intelligence. Technological advances have made the android voice difficult to distinguish from the human voice. Such a situation may generate various dangers in the future. The author of the article prepared an experiment aimed at assessing how much people are able to judge the origin of the subject with whom they are in contact, based only on their voice. To this end, he presented samples of human voices and android voices for evaluation by participants in the experiment. Since both the ethical issues and the security issues of cooperation between the two species are not clearly articulated today, the results of this type of pilot study may have a practical dimension in the future in the context of social trust in artificial intelligence entities.

Keywords: Voice, Android, Artificial Intelligence (AI), Ethics.

Introduction

The beginning of Alan Turing's article, extremely important for the entire field of artificial intelligence, entitled Computing machines and intelligence, defines the essence of the challenge we face: Can machines think? The author specified it directly: is it possible to program an android in such a way that when talking to a person its statements are so convincing that it would not be possible to say whether this person is talking to a machine (Turing). And that was the task that the author of the presented article gave to the participants in the experiment. This is also the purpose of the article - to check to what extent we can be misled by a voice that is a very relistic copy of the human voice.

There is a strong research stream among the creators of artificial intelligence for whom the creation of a machine that the most resembles a human being has become the most important task. The ambivalence of this approach is obvious and dates back to the beginning of creating children's toys which exhibited similarity to a person. Artificial intelligence, having to implement its functionality as a competent and universal helper of the human kind, does not have to take human shapes and move, behave and speak like a human. And yet, since the end of the 1990s, that is since Cynthia Breazeal constructed the robotic head of Kismet in MIT, the attempts to bring the android closer in shape to a human being have continued. We would like to remind you that Kismet had a significant capacity for expression because it was designed to interact at a child's level, responding appropriately to people's statements and behaviours (Kaplan 186). This head did not try to "understand" what was said, but only brought out, from what and how it said, emotional overtones, or rather, it evoked emotional reactions in the form of its non-verbal behaviour. It could therefore express admiration, surprise, disappointment, shame, interest, excitement and fear, and other emotions through the movement of the head, eyes, lips, eyebrows and ears.

Over the past twenty years, more and more androids have been closer and closer with their physical shapes to a human being, while their ability to process information and communicate the results in a form adopted by people, and thus vocally or in writing, are now at a level that makes it difficult for a layperson to distinguish them from those communicated by human beings. While the results of work of android processors communicated to us in a form of text do not raise any doubts (they can be verified substantially), the situation changes when an android communicates to us something that depicts the state of its "feelings" and its use of voice is provided with human features, that is intonation, tone, phrasing, accent, etc. We stop handling the verifiable data, as in the case of text, but start dealing with the whole sphere of influence on emotions.

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Du Sautoy (279) quoted a conversation between a client unaware of talking to a commercial client bot. His interlocutor is the early incarnation of Eliza the bot:

Visitor: Could I use the computer today?

Eliza: Why are you asking?

Visitor: Maybe I can conclude one more sale of telecommunications systems.

Eliza: Aren't you sure about that?

Visitor: My potential clients haven't seen the presentation of this system yet.

Eliza: Is that important?

Visitor: Of course.

Eliza: Now it seems you have no doubt.

Visitor: Please, don't make fun of me.

Eliza: What do you mean by saying "Don't make fun of me?"

Visitor: Is there a specific reason I can't use the computer right now?

Eliza: Tell more about these potential clients.

The Visitor lost patience because of evasive answers (…).

It did not take long to talk to Eliza to feel that something was wrong with its reactions. Their scope was limited, they were stiff and there was nothing to indicate that the bot remembered what was said before.

The fact that the currently constructed androids use the voice equipped with the features of the human voice in the sense of a carrier of emotion, not information, prompts a brief reflection on the position of this organ of communication in modern civilisation.

Michalik (278) asked about the ways in which voices function in culture. Development of technology makes us think about how the acoustic area in which we are present is changing, how the nature of voices that constitute it is varied. They come out of people present "here "and "now", but also telephones, radios, TV sets, answering machines, and various types of sound carriers. Artificial intelligence media, and so also androids, evoke these reactions to an even greater extent than only intuitive and thoughtless contact via a computer or a smartphone. And this changes the basically seemingly agreed interpretation of the functionality of technology, which supposedly gave us the possibilities of "how," but still did not give the content of "what." Listening to currently constructed androids, talking to them, we already know "what." However, a "what for" question remains unanswered because intelligent machines do not have this afterthought (a lack of it gives us a considerable margin of time to calm more fatalistic visionaries). Presented at Viva Technology fair in Paris in 2018, Google assistant who arranges a visit to the hairdresser conducting a conversation in such a way that it is difficult to believe that it is not a human, knows "what for", but it rather supports a trend among the creators of artificial intelligence which creates the idea of "a powered-up man" – a super unit that can do more, better and faster (Zaleśny 2018). It does not answer existential questions about the condition and vision of the future of the human species, but raises a number of questions from the border of new technologies and ethics. Can artificial intelligence impersonate a human being? Do we have the right to know that we talk to a robot and not another person? The Google assistant mentioned above, making a phone call does not inform that it is a bot, interrupts non-verbal expressions, deceiving the caller. The presentation evoked many critical opinions in the community, including Zeynep Tufekci, a well-known Turkish writer and lecturer, specialising in the field of new technologies and AI, who accused Silicon Valley on Twitter of ethical loss and inability to draw conclusions from technological development (Kania 2017) and the critical attitude to "animating" objects with the help of artificial intelligence is also manifested in her other texts (Tufekci 2015).

In this analysis, we deliberately omit a huge area of research, extremely useful – from the point of view of human health, therapy, addiction treatment, where the solutions based on artificial intelligence already used today provide the expected results. These include the research at the University of Alberta in Edmonton, where Mashrura Tasnim and her professor Eleni Stroulia developed a method of recognising depression based on the sound of our voice.

Both researchers used two sets of audio recordings of healthy and depressed people to train four different machine learning algorithms. The recordings were of various lengths – from 5 to 50 minutes. The algorithms have learned to correctly differentiate between healthy and sick people, and to correctly measure the severity of depression. In the future, researchers intend to use this method in a phone application that will record a user's voice and inform if there is something disturbing in the sound of the voice. Will we soon have a "depression meter" on our phone that will tell us how we feel, like today many of us have a pedometer on the phone that objectively shows us what distance we have covered in steps during a day? Are we so unaware of our emotions and we repress them so much that it can be universally accepted? Let's hope that is not the case. There are certainly groups for which such help would be very important, for example, people with autism spectrum (Redzisz 2019).

We have no way of controlling research directions in thousands of research centres around the world. If anyone sees development potential in the creation of an android which is an indistinguishable simulation of a person – with the voice, reactions, verbal and non-verbal behaviours, then it is to be hoped that no one will use it against mankind. Is such a construction possible? Assessing the progress so far, the answer is "yes", but these creators still face numerous problems to solve. Those grouped around non-verbal behaviour, as well as those associated with the cultural context seem to be the most difficult today. In conversation with an android, a person transmits a large part of the meaning with the elements of prosody (changes in volume and tone of expression). It is enough if we realise how many meanings we can get with one word "really?" during a dialogue with a bot. Will the android hear in it the desire to confirm previous statements, irony, curiosity or fatigue of an interlocutor? We do not know. "Who the speaker is, a field of discourse, previous context (if any at all), different voices, falling tone, the pace and the inflection complicate this task even more." (Kaplan 81). As we can see, this is about much more than grammar analysis alone can detect. That is the problem of an android which interprets our statement. But the other side of a dialogue is in an equally uncomfortable situation. The challenge posed to us by artificial intelligence is that we do not know how to describe, and thus how to understand and how to think about a phenomenon that human experience has never encountered before. A dialogue with a computational tool capable of perceiving, reasoning, building complex statements, and supporting itself with verbal behaviours modelled on a human being may turn out to be an experience with connotations far exceeding the expectations of normal civilisation – to the extent that even the concept of "singularity" understood as a belief that at some point machines will become intelligent enough to be able to redesign and improve, which will cause the so-called escape of intelligence (Kaplan 172). And it does not matter that the memory in the brain works completely differently than that inscribed in the disk that manages the activity of a bot. Construction is different, operation is different. To download the data from a hard disk, you must indicate where it is located, where it was saved. We bring memories in the brain to life by realising the reason they were recorded there.

Two researchers from the AGH University of Science and Technology in Cracow have identified the way of automatically recognising a person's needs through words, phrases, commonplaces, inflections and sentence structures that help a machine to understand and properly respond to them. Their research showed that satisfaction of a person from co-operation with the artificial intelligence system increases as the system properly relates to human needs. A person also assesses the system as more intelligent if it correctly recognises and responds to this person's needs (Tadeusiewicz, Horzyk 15). However, this is the result of the assumption of harmonious co-operation of both worlds. All that matters is the effects. "Imagine, for example, that one day we get an extremely personalised email, "phishing," trying to get us to disclose personal information. It was sent from a friend's account using AI, which, after hacking the account, impersonates our friend, imitating their writing style by analysing other emails they sent, and the message sent contains a lot of personal information about us downloaded from other sources. Could we be fooled by that? What will happen if a phishing email is allegedly sent by a credit card operator followed by a telephone conversation with a friendly voice generated by artificial intelligence that cannot be distinguished from human?" (Tegmark, 139). We can imagine much more such potential events in which, due to someone's bad will or maybe an operational error, a person, basing on the data obtained from a robot, will take action against themselves because they trusted the data processed from a huge amount of the output data that they would not be able to process in a reasonable amount of time.

Method

The attempt to answer the question to what extent a person is able to distinguish the voice of an android from the voice of a living person prompted the author to choose the survey method. A group of over a hundred students of the University of Lower Silesia, studying such specialisations as Image Management and ePR, Social Media and ePR, Media Design and Image Marketing and Creative Media were selected as respondents to complete the survey. The study was conducted at the beginning of 2020.

The choice of this group of respondents was not fortuitous. Students of these specialisations, due to both their predispositions (as indicated by their decision to choose the field of study) as well as the topics of lectures, exercises and workshops conducted with them, are significantly and above average sensitive to phenomena regarding artificial intelligence, IT applications and the impact of these areas on various spheres of social communication with particular emphasis on non-verbal communication. In the author's assumptions, completing the questionnaire by such a group was to bring the results that were expressive enough to be able to determine and describe the examined difference in the perception of two types of entities whose voices were evaluated by the respondents with a considerable dose of certainty. Random selection of the respondents from various social groups could not provide such clear answers. Also due to the homogeneity of the examined group, the respondent's particulars were omitted; all the respondents were in a similar age range of 20-30 years old, and their sex, place of residence or level of education were not of fundamental importance for the results of the survey. Therefore it was a group and anonymous survey.

The concept of an android understood as a product of artificial intelligence was not a problem in this study population, but the fact that the presented voice samples were not combined with the image contributed to abstraction of the questions asked and as such it was not an easy task (Mayntz, Holm, Hűbner 45).

The author's intention was also to separate the non-verbal features of the analysed voice samples of both people and androids from the linguistic content of the speech. Only the first ones were to be used for analysis, namely features such as speed of speech, tone, pitch, etc. In these statements they could be, and probably were, the direct content hints as to the entity pronouncing them. Therefore it was good that the voice samples available on the Internet used only English and Japanese, which significantly made text analysis more difficult for the respondents – the users of Polish. They were additionally sensitised not to pay attention to the content, but to some extent it was always inevitable – knowledge of English among the surveyed students could to some extent distort the result of such a structured study. However, it was suggested to the respondents that, for the purposes of the experiment, you could make the bots say "I am not an android" and people – reverse statements, so it was important that when making decisions about the type of the entity not to be guided by the content of the statement.

The traditional (paper) research questionnaire used was distributed to the respondents, and after completing it, collected for the results. Eight groups of students surveyed (of 7 to 20 people) as a homogeneous community filled in questionnaires in the presence of the interviewer who presented the subsequent voice samples, and the respondents gradually evaluated them.

From among five questions, the survey used twice (questions 1 and 3) single-choice closed questions, multiple choice closed questions (question 2), and closed matrix questions with one possible answer (questions 4 and 5). These were questions about the assessments, opinions and observations of the respondents, and thus referring to the way the respondents perceive certain facts, phenomena or processes (Krok, 60). All the questions were detailed and related to the assessment of the audio material heard, and the answers were intuitive. The interviewer played a sound file (each 15-35 seconds long), the respondents marked their chosen answer; in the case of questions 2 and 3 they received enough time to mark the selected option. The entire survey in a given group did not exceed 15-20 minutes, and this avoided the known effect of respondent's fatigue, which could bring the opposite effects to the expected (Rossi, Wright, Anderson, 163).

Question 1 contained a request to indicate whether the respondent heard the human voice or the voice of an android, after which the respondents were presented with six female voice samples. Three belonged to people and three to androids, and were arranged in a random order.

The available voice samples of androids came from the laboratories of various research institutes, both scientific and business, and have been presented in recent years (or months) on YouTube. They were listed below in the presented order, along with randomly selected voice files of people – women that appeared on the same website.

1. *Best Pick Up Line That Gets Women Talking*
2. https://www.youtube.com/watch?v=abWCMuFf1Fg&t=20s
   File length 4'04'' – an unknown woman's statement on the reasons for this sex to speak. File shortened to 37 sec.
3. *Erica emotional demo* https://www.youtube.com/watch?v=Qit2sxEmnxk&t=23s
   File length 1'41'' – the statement of Erica the Android in Japanese, shortened to 35 sec.

4. *Ada Lovelace: The Original Woman in Tech | Zoe Philpott | TEDxBucharest*
https://www.youtube.com/watch?v=1QQ3gWmd20s&t=92s
File length 14'01'' – Ada Lovelace's speech at a TED conference in Bucharest, shortened to 37 sec.

5. *Interview With The Lifelike Hot Robot Named Sophia*
https://www.youtube.com/watch?v=S5t6K9iwcdw&t=7s
File length 5'04'' – the presenter's interview with the android named Sophia. File shortened to 29 sec.

6. *Erica: 'I want to be more like a human'* https://www.youtube.com/watch?v=87heidlFqG4&t=186s
File length 5'26'' – Erica the Android answers (this time in English) questions from the Internet users from around the world. File shortened to 32 sec.

7. *MEETING THE ENEMY A feminist comes to terms with the Men's Rights movement | Cassie Jaye | TEDxMarin* https://www.youtube.com/watch?v=3WMuzhQXJoY&t=59s
File length 14'46'' – Cassie Jaye's statement about female-male relationships. File shortened to 30 sec.

Questions 2 and 3 concerned those features of the statements heard that determined the respondent's choice. On the other hand, in question 4, the respondents heard two female voices (two androids talk to each other), and they had one out of four options to choose from: whether it was a conversation between two people or two androids, whether the first voice was human and the second of an android, or the first voice was the voice of an android and the second – the voice of a human:

BINA48 Robot Talks to Evie the Avatar https://www.youtube.com/watch?v=HKOuJDP61NI&t=96s
File length 3'02'' – Android Bina48 talks to Evie the Avatar. File shortened to 31 sec.

And finally, question 5, the last one, in which the question sounded the same as in question 4, and we hear a man-android conversation:

8. Freaky AI robot https://www.youtube.com/watch?v=UIWWLg4wLEY&t=29s
File length 3'11'' – the presentation in the form of a short interview by Chad Cohen with Android Philip – file shortened to 16 sec.

All the files were shortened and edited with the help of *Audacity* software for the needs of the research.

Discussion of the results

The study was conducted in January and February 2020. A total of 121 students from eight different didactic groups, of varying numbers – from 7 to 21, filled in the questionnaire. These groups were undergraduate (7 groups) and master (1 group) as well as full-time (1 group) and extramural (7 groups) students.

Due to a certain result of the study (not assumed by the author of the questionnaire) separate signatures for groups studying specialisations related to Image Creation and Social Media (WS – from the words "image" (Polish wizerunek) and "social") and the other, for groups studying Creative Media (MK for Polish Media Kreatywne) specialisations have been introduced for the presentation of the results. A clear difference in the results of both these groups forced the author to reflect on its cause. To explain it, the professional profile and preferences of the respondents in both groups require characterisation. Students of Image Creation and Social Media (70 people in total), both full-time and extramural, motivate their choice of field of study in a variety of ways. Most of them are hoping to obtain formal qualifications for their interests, which range from motorisation, through sport, fashion, music, and photography to various forms of journalistic activities on the Internet (blogs, newsletters, website administration, etc.). Hardly anyone of those studying these specialisations already works in the chosen profession; in their opinion, the diploma obtained at the university is supposed to increase the chance for such work. The connection of this group with media and internet techniques is certainly above the social average, however we can imagine it, but it is rather due to age and general interests. The case is different with the Creative Media study group (51 people). These are studies closely related to the use of computer graphics for marketing purposes. Most of extramural students work in their specialisation on a daily basis and have considerable practical knowledge, and their everyday professional contact with various computer applications, programs with a much higher complexity than Microsoft Office, has caused, as the research showed, that the chances of correctly distinguishing the difference between the natural voice and the voice of artificial intelligence turned out to be much greater among them.

Table 1

1	Question	WS1 (16)	WS2 (7)	WS3 (11)	WS4 (15)	WS5 (21)	MK1 (17)	MK2 (16	MK3 (18)	Aggregate 121	PERCENT
2	A (person)	8	4	7	12	12	9	12	14	78	64
3	B (android)	13	6	9	14	15	17	16	17	107	88
4	C (person)	16	7	9	13	19	16	16	17	113	93
5	D (android)	14	5	11	12	19	15	16	18	110	91
6	E (android)	11	6	9	12	18	16	15	18	105	87
7	F (person)	15	6	11	13	20	15	16	18	114	94
8	The speed of speech	7	4	2	7	7	7	4	6	44	36
9	The length of the pauses	9	3	3	1	8	7	8	7	46	38
10	Degree of tension	4	5	7	4	8	5	11	9	53	44
11	Diction	7	5	4	10	6	6	3	7	48	40
12	Phrasing	7	3	6	5	5	8	8	9	51	42
13	Voice	8	1	8	12	15	11	8	11	74	61
14	Timbre	4	0	3	4	10	6	7	5	39	32
15	Rythm control										
16	YES	10	6	11	12	15	10	13	6	83	68
17	NO	6	1	0	3	5	5	3	12	35	29
18	Women										
19	P+P	0	0	0	0	0	0	0	0	0	0
20	A+A	2	6	7	11	15	14	12	17	84	69
21	P+A	13	0	1	3	4	2	3	1	27	22
22	A+P	1	1	3	1	2	1	1	0	10	0,8
23	Men										
24	P+P	0	0	0	1	2	1	0	0	4	0,3
25	A+A	12	0	1	4	4	9	4	6	40	33
26	P+A	1	6	5	10	11	7	10	11	61	50
27	A+P	3	1	5	0	3	0	2	1	15	12

Complete Survey Results

The complete survey results have been presented in a table where items 2 to 7 indicate the number of correct indications for question 1 in individual groups. There is the number of the respondents in a given group in parentheses after the group reference (e.g. WS1). In items 8 to 14 the respondents were asked to indicate three features of the voice which prompted them with the correct answer – in their opinion, and in items 16 and 17 there is the number of answers to the question whether the presented voice controlled its rhythm itself or it was to some extent, according to a respondent, mechanised. In items 19-22 and 24-27 there is the number of answers to the questions drawn up in the same way, of which the first concerns two female voices and the second – two male voices. The correct variant is marked in yellow; the letter A means an android, the letter C means a human.

As we can see, the answers to question 1 showed a satisfactory average – over 50% of the correct indications. The lower average for the first voice is worth attention (position 2 in the table) – 64 percent, compared to the higher average when choosing the next voice. Listening to the first sound file, the respondents did not yet know what to expect, only the second voice in comparison with the first brought the determination of their own expectations, and with each subsequent voice these expectations were confirmed or corrected.

Table 2

Question	WS 1 (16)	WS 2 (7)	WS 3 (11)	WS 4 (15)	WS 5 (21)	MK1 (17)	MK2 (16	MK3 (18)	Aggregate 121	PERCENT
A (person)	8	4	7	12	12	9	12	14	78	64
B (android)	13	6	9	14	15	17	16	17	107	88
C (person)	16	7	9	13	19	16	16	17	113	93
D (android)	14	5	11	12	19	15	16	18	110	91
E (android)	11	6	9	12	18	16	15	18	105	87
F (person)	15	6	11	13	20	15	16	18	114	94

Percentage of correct answers in groups

And the second conclusion provided the solution to the issue of a generally high level of correct indications. The respondents had to be informed what the study was about, so from the beginning the answer to question 1 could only be zero-one (either android or human). We can imagine that any of the people asked, unprejudiced about the subject of the study, would answer the question “whose voice you hear” by “female” and the “android” variant would probably never occur to anyone.

The answers to question 2 (items 8 to 14) present the average values of recurrence of the voice characteristics heard in the audio files. The respondents, when asked to indicate three of the proposed set, most often mentioned *the sound* (61 percent), in the second place we see *the degree of tension in the voice* (44 percent), and in the third – *the phrasing* (42 percent). The voice features presented for the selection were defined and discussed before a survey participant completed it.

Table 3

Question	WS 1 (16)	WS 2 (7)	WS 3 (11)	WS 4 (15)	WS 5 (21)	MK1 (17)	MK2 (16	MK3 (18)	Aggregate 121	PERCENT
The speed of speech	7	4	2	7	7	7	4	6	44	36
The length of the pauses	9	3	3	1	8	7	8	7	46	38
Degree of tension	4	5	7	4	8	5	11	9	53	44
Diction	7	5	4	10	6	6	3	7	48	40
Phrasing	7	3	6	5	5	8	8	9	51	42
Voice color	8	1	8	12	15	11	8	11	74	61
Timbre	4	0	3	4	10	6	7	5	39	32

Percentage of voice characteristics heard in the presented statements

However, relatively small differences in the number of indications of the remaining proposed features of the heard statements (the lowest number of indications – tone of the voice, is 32 percent), and therefore the relatively large dispersion among the chosen features indicates rather that our everyday use of the voice, its reception and education around non-verbal features of statements leave much be desired. With the exception of specialised professions (actor, singer), we do not pay attention to the listed features of the voice and in their interpretation we use intuition rather than a conscious choice. Therefore, the answer to question 2 tells more about the respondents and their difficulties in correctly assessing the characteristics of the voice than about the samples presented. Such was the intention of the author of the survey; otherwise, the question about the features of the selected voice sample would have to be repeated for each sample.

On the other hand, the answers to question 3 could bring a suggestion whether the respondents, knowing that they would be dealing with artificial, crafted voices, would see in them too much of external interference, manifested in intuitively felt loss of integrity and sense of their own identity.

Table 4

Question	WS 1 (16)	WS 2 (7)	WS 3 (11)	WS 4 (15)	WS 5 (21)	MK1 (17)	MK2 (16	MK3 (18)	Aggregate 121	PERCENT
YES	10	6	11	12	15	10	13	6	83	68
NO	6	1	0	3	5	5	3	12	35	29

Percentage of responses indicating heard confidence in the presented voice samples

As we can see, almost 70 percent of the answers indicated that the presented voice (whether it was an android or a human), in the opinion of the respondents, controlled their speech, which is (probably unaware) praise of the designers of the presented androids, whose statements in the entire study were six in total compared to only four human voices. It may mean that, in the respondents' opinion, the voices heard, regardless of the species (human – android) did not differ in the control of their rhythm, which we can be indirectly read as the audible confidence of the speaking entity in the presented sample of voice.

And finally, closed matrix questions – 4 and 5, in which the respondents had to choose the right option after hearing a piece of a dialogue between two voices. It was a much more difficult task than that from question 1, as the respondents had two different voices combined in one situation, which gave them four options to choose from.

Table 5 & 6

Women voices	WS 1 (16)	WS 2 (7)	WS 3 (11)	WS 4 (15)	WS 5 (21)	MK1 (17)	MK2 (16	MK3 (18)	Aggregate 121	PERCENT
P+P	0	0	0	0	0	0	0	0	0	0
A+A	2	6	7	11	15	14	12	17	84	69
P+A	13	0	1	3	4	2	3	1	27	22
A+P	1	1	3	1	2	1	1	0	10	0,8

Men voices	WS 1 (16)	WS 2 (7)	WS 3 (11)	WS 4 (15)	WS 5 (21)	MK1 (17)	MK2 (16	MK3 (18)	Aggregate 121	PERCENT
P+P	0	0	0	1	2	1	0	0	4	0,3
A+A	12	0	1	4	4	9	4	6	40	33
P+A	1	6	5	10	11	7	10	11	61	50
A+P	3	1	5	0	3	0	2	1	15	12

Percentage of responses that accurately recognize entities in the android or interspecies dialogue

This increased level of difficulty was reflected in the results of the study. Just as two voices of female androids were recognised by 69 percent of the respondents, in the case of the human-android dialogue only half of the respondents correctly recognised the voices of participants. These indicators are significantly worse than those shown in the answers to question 1.

And finally it is necessary to refer to the result not assumed by the author of the study, differentiating the results of a group of students with a fairly general level of involvement in new media techniques (WS), compared with the results of students working with more advanced applications (MK) on a daily basis.

Table 7

Question	WS	MK
A (person)	61	69
B (android)	81	98
C (person)	91	96
D (android)	87	96
E (android)	80	96
F (person)	93	96
The speed of speech	38	33
The length of the pauses	34	43
Degree of tension	40	49
Diction	46	32
Phrasing	37	39
Voice color	63	59
Timbre	30	35
Rythm control		
YES	77	57
NO	21	39
Women		
P+P	0	0
A+A	58	84
P+A	30	12
A+P	11	0,4
Men		
P+P	0,4	0,2
A+A	30	37
P+A	47	55
A+P	17	0,6

Differences in the level of accurate answers for the groups of participants of the experiment advanced in working with more complex computer applications

A higher result has been marked in bold. As you can see, the MK group significantly better distinguished the voices of androids from human voices in question 1, achieving a result close to perfect in five out of six cases. In question 2, both groups chose slightly different sets of features, but the differences, as already mentioned, were not significant and rather indicated that the overall study population may have problems distinguishing between articulation, tone and pitch of the voice. The WS group achieved the only advantage in determining the level of control of the rhythm of speech, while in both matrix questions the clear advantage of the MK groups was again visible.

Discussion

What kind of conclusions can be drawn from the obtained results? They can be divided into two groups.

Direct conclusions

The respondents, knowing their task (distinguishing the human voice from the voice of artificial intelligence) coped with it satisfactorily, especially where it was necessary to make a zero-one decision. They did worse when they listened to the inter-species dialogue. The concern for the scale of errors could be significant if the respondents were not informed, before listening to the samples of voices, about the type of the task (I choose – whether it is the voice of a human being or an android), but this would probably contribute to the unrealistic results and undermine the sense of such a constructed study. These results are important in a situation when (maybe soon) we will commune with bots' voices on daily basis, and the question of the right decision (who I really talk to) will be important for the interlocutor. This, in turn, will depend on the legislators in different countries – whether they will be able to force artificial intelligence operators to always clearly warn a person entering a dialogue with a bot that they deal with artificial intelligence. This does not have to lead to the total elimination of cases of abuse, but then the situation would be clear from a legal point of view – the operator, without warning the interlocutor, would break a specific law and should bear the consequences.

Another aspect appearing in the background of the above results is another kind of self-defence of the human species against a bot-interlocutor, especially where the legislator does not sufficiently protect a person who, as a result of a conversation with a machine, can make decisions contrary to their own interests. It is likely that then – let's call them for the purposes of this article – "tests of truth", that is a set of behaviours, statements or questions that will allow a fairly simple and quick determination of the origin of the second interlocutor, will be introduced. Today, the creation of such tests seems quite simple, as the weaknesses of the conversation on the androids side are visible. One of them is, for example, taking on the role of the interviewer. A bot asks questions arranged in its algorithm in such a way, without losing the initiative itself, to force the interlocutor to say as much about themselves as possible, which in turn enriches the knowledge of the android with further elements that it will be able to ask about or refer to later in a dialogue.

Nowadays, in the field of computer security, the situation is beginning to resemble the 19th-century arms race between constructors of ever larger cannons and creators of ever thicker armour. Tegmark (139) claimed that unfortunately there is little indication that the defence would win.

Indirect conclusions

Attitude to the threat

Among the researchers, strongly generalising, two attitudes towards possible threats from artificial intelligence can be distinguished. There are those who underestimate the threat or they postpone its appearance until the indefinite but distant future. The reasons cited are different and depend on the adopted philosophy of civilisation development, practiced epistemological assumptions or giving adequate rank to certain technological development possibilities. John Searle proved that the computer really cannot think and understand language: because there is an ontological and philosophical guarantee that the machine does not threaten human uniqueness, so you can accept the machine and play with it (Żiżek 205). Many researchers correctly point out that computers alone cannot "think" in this sense at all because they do not really mean or do anything – they manipulate symbols at best. It is us who associate their calculations with the outside world. Searle went further, though. He indicated that even the statement that computers manipulate symbols is far-fetched. Electrons can flow through an electrical circuit, but this is us who interpret this activity as symbol manipulation (Kaplan 95).

Everett saw it similarly when analysing the essence of a statement: no matter how the grammar is presented in a given language, the whole person is involved in the language – intellect, emotions, hands, lips, tongue, brain. "Similarly, language requires access to cultural information and unutterable knowledge when we create sounds, gestures, key patterns, mimic means of expression, body movements and postures that together form different aspects of the language." – thus recalling such a number of cultural phenomena and behaviours, the number of which does not seem realistic to be simulated by any machine (Everett 311). Among the basic communication strategies, it is clearly noted that someone omits some information because they assume that they share it with the interlocutor. In a dialogue with a machine, the machine is unable to state what its interlocutor could omit. Communication failure can result from not remembering or from the very lack of a word, or more importantly, a sentence that would translate a concept that exists in one culture or mind of a person or some language into the native language of someone else. Human languages have gaps. They are not mathematical, perfectly logical codes, which brings the issue of full agreement of a

dialogue between objects to a level devoid of elemental accuracy (Ibid. 335). The unspoken is always crucial in interpersonal contacts, as there is no language without culture. Just think about how artificial the directions given by a car navigation system sound. Although IT professionals have long known that speech requires intonation, they have not yet produced a machine that can use or interpret it well – as a participant of a dialogue. The voice features, all layers of non-verbal communication supported by the content, create a structure built on stable grammar, being in this dimension unavailable today for artificial intelligence.

In fact, the simple truth according to Kaplan (175) is this: no evidence supports the view that today's technology signals the arrival of superintelligent supergiants of a technological origin. A more appropriate scope of reference, in which the promise and potential of artificial intelligence should be recognised, is perceiving it as a natural extension of long-standing efforts to automate various human activities. We can also include here intelligent machines that were designed to create painting, poetry or music. The Continuator, artificial intelligence programmed to compose and play jazz understood as improvised music, and thus being the expression of one's individuality, can create a few phrases of convincing music, but in the long run it becomes boring. It does not know where it is going. Du Sautoy maliciously wonders if "the algorithms have accidentally already been employed at Netflix and Amazon, where they mass-produce plots that hold our attention but ultimately lead nowhere." (312).

However, there is another group of researchers who do not underestimate the existence of bots in the current reality and indicate areas in which they began to play a significant role. Artificial intelligence has been employed as a serious force on social media. There, it may like people and matters, post comments, react to views contrary to those programmed. Bots can tweet insults in response to specific words, share Facebook pages, repeat slogans, sow distrust. Their influence is slowly growing. A director of a tech company said that, according to his estimates, half of Twitter users are bots created by companies that either sell them or use them to promote various issues. The conclusion is that bots distort communication, but no one knows why. The power of, for example, political arguments on social media eliminates each other; who can afford a larger troll factory, then gains a temporary advantage there. But in the meantime we have created a swamp of unreality, a world in which we do not know whether our emotions are manipulated by people or machines. A world in which, when all the news is online (which will happen) we will soon be unable to distinguish between what is real and what is imagined (Maikowski 2018). Certainly, we owe these growing problems to ever better technology. We are currently able to equip bots with large text resources, and such "bunches," as these text collections are called, have become larger and easier to obtain, as written language was increasingly available in computer-readable form (Kaplan 86). These bulk resources that the machine launches in a split second when necessary (also as needed when talking people) are overwhelming, but that is just one side of the coin. The other, completely different, is its ability to persuade, resulting from the efficiency of non-verbal communication – and here perhaps runs this impassable delineation between two entities: a human being and the machine constructed. And do we have to ask ourselves a question of whether machines feel? Maybe it does not matter; maybe it is important whether these very sophisticated, self-reproducing, adaptive devices, which we may be starting to manufacture, can inherit the Earth from us – regardless of what role we play in this process? Like many other species before, today we can simply be a stepping stone for something that we do not understand and what will come anyway (Kaplan 111). The important question, however, is not whether future generations will believe that machines are conscious, but whether people will recognise them as objects deserving moral judgment. Can we say with certainty that in the future, when this new "race" of intelligent machines will coexist with us, we will apply moral considerations that we extended to other people to certain non-biological entities, regardless of their internal psychological structure (Tegmark 190)? It is imagination and responsibility that command us, taking into consideration the social consequences, to impose "humanistic" restrictions on the "technological" impetus that we are currently experiencing. If we understood in the past what challenges were associated with social effects, technology would be so deeply rooted in our society that it would be very difficult to change its course. We see it today on the social media mentioned above. They ingrained in society before we realised how they could be manipulated in a way that undermines democracy (Wallach 2020).

Selected AI features

We can reach further conclusions as to the degree of possible communication threats by analysing the social characteristics of artificial intelligence, as determined by the researchers. The androids selected for our study certainly met Rogozińska's findings (192): "The difference between radio, television and telephone and the Internet is so large that it needs to be underlined by using the new term – "third orality," referring to communication via instant messengers and discussion forums. It is a type of text communication that has many characteristics of oral culture: it is community-based and community creating, based on participation,

involvement and emotions." According to the author, the orality of the internet statement (not paying attention to spelling and punctuation, informality, repeatability, redundancy) also has a connection with the expected speed of reaction, which in a dialogue with a human allows a bot to establish a common emotional and formal platform, thanks to which a human will feel comfortable in conversations (Ibid. 200). Let the question remain unresolved: Does a person have to feel comfortable during this action or can focus solely on the subject matter?

Harari (357) presented interesting evidence of unpredictability of the result in areas where the decision was left to artificial intelligence. Suppose we are constructing a robot whose processor is connected to a lump of radioactive uranium isotope. It will choose one of two options – pressing the right or left button – counting how many uranium atoms decay every minute. If this number is even – it will press the right button. If it is odd – the left. We can never be sure what the robot will do. But no one would call it "free," nor would it occur to us to allow it to vote in democratic elections or hold it legally responsible for its actions. Therefore paying attention to the area of freedom of artificial intelligence has a moderate sense.

And finally, let's try to place artificial intelligence in terms of that we have been using for decades: narrow and broad intelligence. The chess computer, which defeated grandmaster Garri Kasparov in 1997, could only perform a very narrow chess task and, regardless of the impressive hardware and software, and playing tic-tac-toe it could not even beat a four-year-old player. Google's DeepMind system achieves a slightly broader range of goals: it can play at a human level or better dozens of different computer games on the Atari console. In contrast, human intelligence is extremely broad, capable of mastering a huge range of skills. A healthy child, if trains long enough, can become quite good not only at every game, but also master any language, sport or profession. Comparing today's intelligence of people and machines, we must admit that humans win without a doubt in almost every field, while machines only surpass us in a small, though growing number of narrow areas (Tegmark 74).

Summary

The contradiction of views on the subject and the role of artificial intelligence in the future of the human species, as well as on the degree of danger resulting from the "escape of intelligence" is a fact, but it does not mean intellectual instability when facing the problem. Rather, it is a sign of a deficiency, a lack of a common intellectual framework that would be enough to resolve conflicting opinions, at least for now (Kaplan 91). It is important to understand what Searle did not claim. In his opinion, a player piano does not do the same as the piano virtuoso when it performs Rachmaninov's concert, even if it sounds the same. When it comes to computers – there is nobody there. Nor did he claim that a computer program can ever perform any specific task – whether it is creating beautiful images, discovering the laws of nature, or comforting someone after losing a loved one. However, he was convinced that the program simulates thinking, not duplicates the process that occurs in human minds when they engage in these activities. And this is something completely different.

It is likely that our fears about the future social role of AI are effectively shaped by job concerns. As shown by the well-known Oxford study from 2013, as much as 47% of today's jobs are at high risk of automation over the next few years and decades, and another 19% are at medium risk. The authors of the study say that only a third of today's employees can be confident about their jobs over the next decade or two (Frey, Osborne). According to this study, representatives of such professions performed by white-collar workers as engineers, multimedia artists and animators, executive directors, fashion designers, lawyers, writers, mathematicians, editors, or graphic designers may feel relatively safe. On the list of jobs at risk, in the area of manual and simpler white-collar workers, there are not included people who work mainly in the service sector, where direct contact with clients is an essential component of their duties, but in which observation or expression of human emotions is important, such as waiters and waitresses, police officers, administration employees, teachers, real estate agents, sales consultants, clergymen, controllers and nurses (Ibid.).

It is worth asking the question which "human" features these highly specialised computers with enormous computing power lack to be able to replace people in these professions based on such broadly understood emotional and non-verbal communication. From a technical point of view, when making decisions, a machine that works on the basis of tools uses "utility functions." These are formulas used by systems for data synthesis, variable balancing and maximising benefits. Ultimately, the decision path that gives the most rewards is the path that systems learn to choose to accomplish their tasks. However, these methods turn out to be insufficient for the future AI systems to enable them to operate autonomously, as human values, sometimes in a very short time and under the influence of a temporary stimulus, can clearly change. Ultimately, a Finnish artificial intelligence researcher Kaj Sotala explained that utility agents are too simple

and do not reach the root of human behaviour. "Tool functions describe behaviour rather than its causes ... they are rather a descriptive model, assuming we already know roughly what a person chooses." Although the descriptive model may recognise that people prefer to save money, it does not understand why, and therefore will not be able to predict or determine when other values, for example, the need for security, replaces "saving money." Suppose, for example, that an AI computer learns that people want to be happy, and trying to maximise human happiness, connects our brains with computers that provide electrical stimuli that give us a sense of constant joy. "In this case, the system understands that people value happiness, but there is no appropriate model for how happiness corresponds to other competing values such as freedom. In some ways, it makes us happy and eliminates all suffering, but at the same time people feel that "no, I didn't mean it when I said that AI should make us happy," noted Sotala (Creighton).

As artificial intelligence gets closer to the goal of full production of autonomous agents, the need to answer several questions increases, and the question of how to design and implement an artificial agent equipped with an ethical system is becoming more urgent. Machines with autonomy and the ability to do things useful for people will also have the ability to do things harmful to people and other sentient beings. This is not only a technological challenge, but also a philosophical one: What moral means should artificial intelligence be equipped with? The answer is not easy, because of the controversy among experts in ethics about the moral theory itself, computational limitations and the forms of implementation of these theories. Human actions involve immoral aspects that should not be implemented in machines, but moral perfection may not be computationally achievable, which can lead to threats harming people. "Development of machines with sufficient intelligence to evaluate the effects of their operation in such an aspect may ultimately be the most important task for designers of intelligent machines." (Allen et al. 260). The dispassionate assessment of all this disagreement between experts leads to the conclusion that the singularity, if anything ever happens, will most likely not occur in the near future and we will have many warning signals before it happens, and thus enough time to take appropriate corrective action if we deem it reasonable.

The race leading to the creation of AI has begun and we have no idea how it will develop. However, this should not stop us from wondering what consequences we want because what we want will affect the result. "What do you prefer and why," asked Tegmark:

- Do you want superintelligence to be created?
- Do you want people to still exist, something to replace them, to become cyborgs and/or emulated?
- Who is to take control: people or machines?
- Do you want artificial intelligence to be mindful or not?
- Do you want to maximise positive experiences, minimise suffering or leave these things up to chance?
- Do you want life to spread in space?
- Do you want civilisation that pursues a higher goal that you also share, or do you mind the future life forms suitable for us, even if you think their goals are senseless and trivial?
  (Tegmark 210)

Whatever the answers to the above questions may be, the scientific, technological and social community gathered around the emerging artificial intelligence is trying, on behalf of all of us, to formulate the principles of its development. The 2016 conference in Asilomar, California, during which perhaps the most comprehensive assessment of both the current state of development and development perspectives ended with the definition of a rather long thematic list, which in the form of paragraphs proposed for future legal codes tries to deal with the most important threats and issues of co-existence of the two systems. Let's list some of them that are important from the point of view of the subject of this article:

Security: Artificial intelligence systems should be secure and protected throughout their lifetime and verifiable whenever possible.

Error transparency: If an AI system is causing harm, it should be possible to determine why this is happening.

Human values: Artificial intelligence systems should be designed and applied in a manner consistent with the ideas of human dignity, rights, freedoms and cultural diversity.

Human privacy: People should have the right to access, manage and control the data they create, given the ability of artificial intelligence systems to analyse and use that data.

Freedom and privacy: Applying artificial intelligence to the personal data cannot unreasonably limit people's real freedom or what they perceive as freedom.

Human control: People should have the right to decide if and how artificial intelligence systems can be able to make decisions aimed at achieving goals chosen by people.

Prohibition of subversive activities: The power that gives control of advanced artificial intelligence systems should respect and improve social and civic processes on which healthy society depends, not violate them. (A Principled AI Discussion in Asilomar).

Today, all creativity in generated computer systems is initiated and driven by a code that is a manifestation of humanity. Machines are not forced to express themselves. They seem to have nothing to say, except for what we suggest. They are a ventriloquist doll, a tool for our desire to express ourselves. And this creative momentum is an expression of our faith in free will (Du Sautoy 327). The results of the study, which has been the inspiration for the above content, are also compatible with these desires.

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Financial Crisis and Bank Risks: A Deterioration on Islamic Banks Deposit?

Zuriyati AHMAD[1], Noorhayati YUSOF ALI[2] & Atiqah Rashdah ABU SAMAH[3]

Faculty of Business Management
Universiti Teknologi MARA Terengganu, Dungun 23000, Terengganu, Malaysia
Corresponding email: zuriy271@uitm.edu.my
noorhayatiy@uitm.edu.my
atiqah@uitm.edu.my

Abstract

In recent years, the financial crisis has led to a global impact, affecting the performance of banking system. For the countries which implemented dual banking system, the extent of the impacts in both systems might not be similar because of the characteristics of the banking system structure. Thus, this paper aims to assess the impact of financial crisis and bank risks on deposit variation in Malaysia Islamic banks. The impact of the crisis will be evaluated by a dichotomous variable, which aims to assess level of deposits during the crisis period. Using 15 Islamic banks in Malaysia spanning from 2008 to 2016, with 135 observations, panel data estimation technique is applied. Finding shows that the financial crisis has deteriorated the level of deposits in Islamic banks. It implies that Islamic banks might face a panic attack when crisis happened. This has led banks for not been able to survive during financial crisis as there are huge amount withdrawals of the deposit. While, two major bank risks which are credit and bank risk are used to test whether they can significantly variate the deposit in Islamic banks have reveal a clear indication to Islamic banks that undertaking risks will let to the losses in their deposits. Thus, further actions should be taken to by Islamic banks to overcome the impact of financial crises and bank risks problem.

Keywords: Financial Crisis, Deposits, Bank Risks, Panel Data.

Introduction

Financial crises are considered as one of the most important financial events in recent decades. The financial crisis has impacted the financial institution in particular banking institutions worldwide. In fact, a wide array of impacts to the operating and financial performance of the banks has occurred globally (Smolo & Mirakhor, 2010; Kassim & Majid, 2010). Thus, number of fundamental questions on banking institutions has been raised. It creates challenges to the developed and developing countries in managing the risk management of the crisis. However, there are number of studies, such as Smolo and Mirakhor (2010), Kassim and Majid (2010), Ahmed (2010) and Zuriyati and Nurul Huda (2017) show the impact of financial crisis on banks and number of experts in Islamic banks have even claimed that Islamic banks are either less or not affected by the financial crisis.

Financial crises could affect the financial stability and promote the deterioration of the banking indicators. This is due that the banks hold a small amount of cash deposits and in case of unexpected deposits withdrawals will affect their liquidity. Prompting the emergence of a financial crisis, bank panic can affect the entire banking system. Bank risks also may arise during financial crisis (Zuriyati et al., 2018) and exacerbated the bank conditions. Among the major risks in the banking system are credit risk and liquidity risk. These risks are directly linked to what banks do and why bank fails (Ameni, Hasna & Mohamed Ali, 2017)

The decrease in deposit during the financial crisis might bring a negative impact to the bank. Firstly, it will create an intense deposit competition among banks and leading to higher cost of deposits as well as causing the bank to have thinner margins. Secondly, when deposit is weaker the source of the bank funding might also affect and the operation of the bank activities as well. This is because when source of funding and bank liquidity drop, the confident level of customer toward the bank will also decrease. The conflict between customer and banks will arise and slightly affect the bank profitability. Wiranatakusama and Duasa (2017) stated that the level of resilience of Islamic banking can be determined by bank deposit and financing. As bank deposit is one of the major sources of bank liquidity and it can

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be affected by any changes from the global economic event and led to the problem of Islamic bank resilience. Thus, this paper aims to assess the impact of financial crisis and bank risk on deposit variation in Malaysia's Islamic bank.

The remaining of the paper is organized as follows. Section 2 discusses the literature review. The methodology under consideration will be highlighted in section 3. Section 4 discusses result and discussion. Lastly, section 5 offer conclusions.

Literature Review

There is substantial literature in the area of financial crisis. Earlier works such as Hasan and Dridi (2010), Abdulle and Kassim (2012) Shafique et. al (2012), Hidayat and Abduh (2012), Zuriyati and Roziani (2014) and Zuriyati and Nurul Huda (2017) have explored several dimensions of Islamic banks behavior during financial crisis. Hasan and Dridi (2010) reveal that the recent financial crisis affected Islamic banking institutions differently than conventional banks. Studies by Abdulle and Kassim (2012), Shafique et. al (2012) and Hidayat and Abduh (2012) show the Islamic banks are more stable during global financial crisis. While, Hidayat and Abduh (2012) conduct the study in the case in Bahrain found there is no significant impact to influence the Islamic bank performance during the crisis period. Zuriyati and Roziani (2014) and Zuriyati and Nurul Huda (2017) found financing in Islamic banks are not affected by the crises. Nonetheless, Uppal and Mangla (2010) reveal a contrary result. They examined the experience of Islamic banks of two countries, Pakistan and Malaysia) and found that the Islamic banks in the country "were not immune from the ravages of the global financial crisis" to the financial crisis.

Concentrating on the impact of financial crisis and bank deposit, Abduh, Omar and Duasa (2011) investigates in the case of Malaysian Islamic banks. Using Johansen cointegration test, it shows that financial crisis has a positive impact on fluctuation of Islamic bank deposit level in Malaysia. This study claims that the previous financial crises during 1998 and 2008 had given an opportunity to Islamic Banking to become more resilience on gaining customer trust in managing their deposit. The high expectation from customers has led Islamic banking to have less impact on financial crisis compare to conventional bank. Therefore, whenever the crisis emerges, depositors will not withdraw their money subsequently instead will deposit more in Islamic banking. While, Turhani and Hoda (2016) found macroeconomic crisis has a positive relationship on the level of deposit. The research indicates that financial institution performance showed a positive relationship during the financial crisis due to compliance policy between a commercial bank and central bank. Thus, deposit insurance also becomes one of the reasons why performance level of total deposit in banking system in Albania had improved even during financial. Finding by Ferrouhi (2017) also has been supported by Turhani and Hoda (2016) where financial crisis is not found to be a major impact on deposit behavior in Morrocco.

Concerning the impact of bank risks and deposit behavior, many studies (Andriyanti & Wasiah, 2010; Harfiah, Purwati & Ulfah, 2016; Yulianto & Solikhah, 2016 and Pimada, Mawardi & Herianingrum, 2017) have done in the case of Indonesia. Andriyanti and Wasiah (2010) for example study on deposit level (Mudharabah deposit for the period of one month) at Bank Muamalat Indonesia. Bank liquidity risk is found to be an indication of the impact of liquidity risk on the bank deposit. If the liquidity risk increases the deposit bank of one-month Mudarabbah in BMI will also decrease. Andriyanti and Wasilah (2010) stated that high FDR of banks can be interpreted that the bank's liquidity is low. This is because the higher the bank's FDR, the bank's risk to problem financing will also rise. Therefore, it led to withdrawal of deposits by depositors simultaneously and in large quantities. While, Harfiah et al. (2016) reveals that liquidity risk has a positive and significant effect on bank deposit influence the level of bank deposit of Islamic banks in Indonesia when they tested using seven Islamic banks in Indonesia It indicates that when liquidity risk is high, mudharabah deposit will increase in a similar magnitude.

Yulianto and Solikhah (2016) attempt to determine the internal factors of sharia banking to predict the Mudharabah deposit in Indonesia. This study proposes hypotheses whereby both liquidity and credit risk have negative influence on the amount of deposits mudharabah. 34 banks are selected and cover the period of January 2010 until December 2013. The credit risk shows a negative and significant impact in influencing mudharabah deposit. Meanwhile liquidity risk has a contradict result to credit risk as it is positive but insignificant in affecting the mudharabah deposit in Indonesia. The higher ratio of risk led to high unemployment that recorded by the country in recent years which cause more financing defaults faced by bank. Another study in Indonesia, Pimada et al. (2017) examine the impact of liquidity risk on Mudharabah deposit reveal a similar finding with Yulianto and Solikhah (2016). It is found the higher liquidity risk will influence mudharabah deposit in Indonesia. The positive result is obtained due to the number of Indonesian's financial literacy and financial inclusion keep increasing and people start to gain awareness on how important the function of liquidity risk nowadays.

A comparison in fluctuation of deposit in Islamic bank in Malaysia and Indonesia has been highlighted by Noraziah and Dety (2017). Using generalized method of moment (GMM), this study found that credit risk has negative effect with both deposit of Islamic bank in Malaysia and Indonesia. The study claims that when Islamic banks experienced a higher risk, the performance of Islamic bank deposit will decline. Noraziah and Dety (2017) stated that when relationship of credit risk is negative it showed that the problem that faced by Islamic banks is bigger and can led to unhealthy performance for the Islamic bank. On the other hand, Turhani and Hoda (2016) found that the level of liquidity risk gives impact on the level of deposits in banking system in Albania. The higher level of liquidity risk, the reliability of depositors in the banking system will be shaken. This is due to the role of liquidity is seen as guarantee to depositor to preserve their deposit in when the banking system faced a negative trend.

Methodology

Deposit of Islamic banks is the primary concern of the study to be affected by the financial crisis. While this study also focusing the impact of credit and liquidity risk on deposit, therefore the impacts of these variables need to be controlled. The effect of aforementioned risk factors therefore could be isolated. This is to show the more realistic model the controlling variables are also included. Thus, the estimating model is respectively written as follows:

$$DEP_{it} = \alpha - \beta_1 CR_{it} + \beta_2 LR_{it} + \beta_3 BSit + \beta_4 PR_{it} - \beta_5 UR_{it} - \beta_6 FC_{it} + \varepsilon \qquad \text{Equation 1}$$

Based on Equation 1 DEP represents total deposit from customers in Islamic banks, α is a constant, β represents the coefficient of the variables. CR indicates the credit risk which is represented by non- performing loans. LR is liquidity risk. It is calculated based on the total liquid asset per total deposit acts as a proxy for liquidity risk. BS indicates the bank size representing the total bank asset and PR is the profit rate. UR represents the unemployment rate of the country at the same time showing the economic condition of the country. FC shows the financial crisis is a dichotomous variable. 1 will be indicates if the financial crisis happened and 0 will indicates year without financial crisis. Lastly, Ɛ shows the idiosyncratic error.

This paper uses 15 Islamic banks spanning of nine years from 2008 to 2016, with 135 observations. Due to the characteristic of data under observation itself, panel data estimation technique is more appropriate to be applied. The panel data model has the advantage of handling data limitation and control heterogeneity among variables. Moreover, this estimation technique is appropriate to test more complex behavioral models.

The model specified in equation (1) serves to test the impact of financial crisis and bank risks on deposit behavior of Malaysia's Islamic banks. The models are estimated in three different approaches. Firstly, the model is estimated using panel least square method and test for the pooled ordinary least square regression (POLS) model. POLS is considered to denying heterogeneity or individuality among banks. Thus, the model is assumed to be a constant intercept without explicitly contain an unobserved effect. However, not controlling for this unobserved individual specific effect leads to bias in resulting estimates. Since individual effects are treated included in the model the study should have treated them to Random effect model (REM) and Fixed Effect Model.

For modelling the relationship among bank Islamic bank deposit and bank risks, financial crisis and controlling variables following bank specific data are collected from Eikon and financial statement of annual reports from Malaysian Islamic banks. Meanwhile the macroeconomics data is collected from Bank Negara Malaysia report.

Findings

In order to ensure the robustness of the result, series of diagnostic tests such as multicollinearity and heterocedasticity are conducted. Variance inflation factor (VIF) for example is carried out to confirm the existence of multicollinearity problem Multicollinearity statistics reliable measure to calculate the validity of regression analysis. The Variance Inflation Factor (VIF) and tolerance level are calculated in Table 1. As suggested by Gujarati (2007) the VIF value should be under 5 and the 1/VIF value should be nearer to zero. In order to ensure the analysis to be valid, these conditions need to be met. As shown in Table 1 VIFs of variables are under 5 and 1/VIF values are nearer to zero. The results indicate the absence of multicollinearity in regression analysis. VIF is found to be 1.18 less than 5 threshold. There is absence of multicollinearity problems in the model.

Table 1: The Vector Inflation (VIF)

Variables	VIF	1/VIF
CR	1.07	0.938952
LR	1.12	0.891951
BS	1.15	0.870831
PR	1.09	0.914101
UR	1.23	0.810324
FC	1.41	0.711302
MEAN VIF	1.18	

The problem of heteroscedasticity exists when size of error term distinct across the values of the independent variable. The Breusch Pagan or Cook-Weisberg test is applied to ensure the problem does not exist. The rule of thumb in testing for heteroscedasticity problem is when the probability value is less than significant level of 0.0.5. The result obtained shows that probability value is 0.000. Therefore, there is heteroscedasticity problem exists in this study. Chi^2 (1) = 21.30 Prob > chi^2 = 0.0000. However, following Stock and Warson (2008), the heterocedasticity problem can be dealt using heterocedasticity robust standard error method.

After the series of the test, the results from the models are compared in Table 2. In order to choose, which model is estimated the best, Breusch Pagan test is used to test whether POLS and REM is more appropriate. It is found that the validity of the result is more to Pooled OLS, thus the results will be analyzed based on this model.

Judging from the result obtained in Table 2, the R squared of regression model is 0.6767 which indicates that 67.67% of the variation in total deposit can be explained by financial crisis, bank risks and controlling variables used. The finding shows credit risk and liquidity risk are in the expected magnitude. These bank risks have negative effect towards Islamic bank deposit. Moreover, it is revealed that credit risk has a negative and significant relationship with total deposit where p-value for the credit risk is 0.00. A change in credit risk, will led to reduction of the total deposit of Islamic banks as found in Yulianto and Solikhah (2016) and Noraziah and Dety (2017). It implies that if the problem of credit risk is bigger it can lead to unhealthy performance for the Islamic bank.

Table 2: Result of the Models

Variable	POLS		REM	
	Coefficient	t stat (p value)	Coefficient	z stat (p value)
C	16.5267	17.81 (0.000)	16.6178	36.80 (0.000)
CR	-0.0236	14.85 (0.000)	-0.0077	0.73 (0.466)
LR	-1.1645	3.54 (0.001)	-0.3192	1.67 (0.096)
BS	0.0278	14.85 (0.000)	0.0126	7.92 (0.000)
PR	-0.0793	0.31 (0.758)	-0.01486	1.24 (0.214)
UR	0.0684	0.32 (0.746)	0.7805	0.78 (0.433)
FC	-0.3408	2.79 (0.006)	-0.5112	8.04 (0.000)
R squared	0.6767		0.5801	
F statistics **Prob (F stats)**	44.66 0.0000		281.81 0.0000	

**In the parentheses are t statistics*

While, liquidity risk also shows that there is negative and significant relationship with total deposit is significant at 1% significance level. The result obtained reveals that an increase in the liquidity risk will reduce the total deposit. The result is in parallel with Andriyanti and Wasilah (2010) and Yulianto and Solikhah (2016). This situation happens due to when ratio of liquidity risk is higher, it will reduce the capability of liquidity of bank whereas depositor might withdrawal their money thus it leads to decrease in amount of deposit in bank.

The result for bank size is significantly positive with the total deposit at 1% of significant level. Similar magnitude is found in parallel with Ferrouhi (2017) and Andriyanti and Wasilah (2010). The larger the amount of bank assets, the greater the amount of bank deposit. In other word, larger bank can able to encourages and attract more customer than smaller bank to put their deposit. The positive relationship can be explained as large bank size has stronger financial base as well as the bank performance and the exposures of bank risk is more than bank that have smaller bank size. Besides, depositor feels more secure when bank can manage to paying depositor funding.

This study also reveals that profit rate is insignificant to the total deposit. It shows that profit rate has negative relationship with the amount of deposit where 1 percent increase in profit rate will reduce the total deposit. The assumption from negative relationship between profit rate and total deposit can be assumed where depositor from Islamic banks are not motivated by profit and profit rate are not bring greatness affect towards customer when invest their money (Akhtar, Akhter & Shahbaz, 2015). Depositors might withdraw their money or not putting their money even though the profit rate that bank offer is high which lead to decrease in bank deposit. In addition, the result found that the p-value of unemployment rate is 0.0433 where it shows an insignificant and positive relationship between unemployment rate and total deposit.

The major highlight of this study is the impact of financial crisis on the total deposit. In comparing with previous finding on the bank performance (Hasan & Dridi, 2010; Abdulle & Kassim, 2012; Shafique et. al 2012; Hidayat & Abduh, 2012; Zuriyati & Roziani, 2014; and Zuriyati & Nurul Huda, 2017) the result of financial crisis reveals a really significant impact on total deposit at 1% level of significance. A negative relationship is found when financial crisis happened and it will reduce 0.348% of total deposit. The result obtained in this study is in contrary with previous literature (Abduh, Omar & Duasa, 2011, Turhani & Hoda, 2016 and Ferrouhi, 2017) as it is found financial crisis is significant with total deposit. The highly significant impact is assumed bank faced a panic attack when crisis happened and this has led for customer not able to survive during financial crisis. The withdrawal or not investing in deposit in banks will lead to decline in amount of money. Besides, for the smaller banks, they will experience lower risk exposures and unable to manage efficiently the performance of banks during that time.

Conclusion

This paper attempts to assess the impact of financial crisis and bank risks on the deposit variation in Islamic banks in Malaysia. Two major bank risks which are credit and bank risk with financial crisis are used to test whether they can significantly variate and distort the deposit behavior in Islamic banks. It is found that both risks have significant impact on the depletion of deposit in Islamic banks. The finding shows credit risk and liquidity risk are in the expected magnitude. This result reveals a clear indication to Islamic banks that undertaking risks will let to the losses in of total deposit from Islamic banks. While, as claimed by many researchers that Islamic banks are immune to financial shocks, this paper reveals a different finding which Islamic banks deposit will be distorted by the financial crisis. The highly significant impact of financial crisis will lead to higher withdrawal of money and lower total bank deposit. Islamic banks need to be caution on the global event that can create problems to their total bank deposits.

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Work Life Balance and Remote Working during the Pandemic: Assessment of Parents' Working Conditions in Polish Reality

Malgorzata MARZEC

Jagiellonian University, Krakow, Poland
malgorzata.marzec@uj.edu.pl

Abstract

The study analyzes the issue of reconciliation of private and professional life during the COVID-19 pandemic. For some time now, problems in reconciling work and private life have been noted. The global lockdown has forced workers and employers to change the conditions and the manner in which they work. At the same time, many parents were confronted with the need to reconcile professional work with parental responsibilities in a situation where educational institutions could not provide direct childcare. Parents had to perform their family duties during standard working hours with additional tasks resulting from home education, the required social isolation and childcare. During the pandemic, a strong blurring of boundaries between professional and private life and problems of symbiosis of professional and family duties has taken place. The aim of the study is to indicate the importance of the idea of Work Life Balance in the perspective of changes in the labor market caused by the Covid-19

Keywords: Work Life Balance, COVID-19 pandemic, labor market, remote working

Introduction

The global problem that modern organizations face is the extension and intensification of employees' working time. The problem at hand is subject to numerous analyses, including through the development of the Work Life Balance (WLB) concept; (Directive EU2019/1158). The WLB concept refers to the management of working and leisure time in order to maintain a balance between two aspects of human life – work and personal life. The imbalance between the various aspects of employees' lives has a negative impact on work efficiency and lack of life satisfaction, which in turn may have a negative impact on both the quality of professional duties performed and the way families function, which may lead to a conflict in combining professional and family roles. The pandemic challenged the working conditions and the way work is organized in all areas of the economy. Around the world, employers and employees have been adapting to the need for social distancing measures. The word flexibility (balancing, reconciliation) between work and family life has been redefined. The introduced WLB Directive was a major step towards a healthier way of life for workers at a time when technology was increasingly bringing work into the home. However, no one thought that the proposed idea would be implemented so quickly. The arrangements concerning work during the pandemic have shown how to balance work and private life by using technology that is already at our disposal. The question is, however, whether employees who combine work and parental roles have the right conditions for combining work and private life created for them? Here, the role of the state's instruments (tools) will be important in order to protect those who are most burdened with parental duties / tasks. At present, it is no longer just a matter of ensuring a balance between private and professional life, but also of promoting new rules for functioning of the labor market. In the literature, you can know studies on remote work (telework)(Karczewska,2019; Lescevica & Kreituze , 2018) and a description of idea of Work Life Balance (Crompton & Loynette, 2006; Dolot, 2020; Piecuch&Szczygieł, 2019). However, there are no studies linking the importance of remote work with the performance of parental responsibilities. Additionally, in the new pandemic situation, the problem requires a new analysis and description. Observing the changes in the labor market and the pandemic, a research problem was identified, the aim of which was to determine how working parents combine childcare during a pandemic.

It is important to track the changes in the labor market from the point of view of the idea of Work Life Balance in the perspective of different countries, so that different experiences, instruments / tools used in the labor market can be shared.

Various research methods were used in the study, including mainly descriptive methods, comparative methods and the CAWI (computer assorted Web interview). The results of a nationwide survey, which was piloted and conducted

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among parents working remotely during the pandemic, are presented in Poland.[1] The main aim of the study is to indicate the importance of the idea of WLB in the perspective of changes in the labor market caused by the Covid-19 pandemic The article is a contribution to the global discussion on the problem of work-life balance, especially for employees who are parents. The query of literature, legal acts, analysis of publicly available statistical data and the results of own research made it possible to achieve the aim of the article and to draw conclusions.

Work Life Balance and Remote Working

The contemporary problem of various organizations and the whole economy is the extension and intensification of employees' working time. There are changes in the labor market which are blurring the boundaries between professional and private life and the lack of free time related to family life, social life and leisure. People spend more and more time working, which affects the way people function in the private sphere. (Sadowska-Snarska, 2007). Work provides a person with a certain social and economic position so that they can meet different needs and experience recognition and acceptance in society. Many key decisions in a person's life, related to the choice of education or place of residence, are centered around work. It is often thanks to work that a person has the opportunity to establish social contacts and build interpersonal relations, which often go beyond professional relationships and are formed on a private level. But work should not be the only source of meaning in human life. Work life should be reconciled with the personal sphere, including family duties, but also free time used to regain strength and improve health, and for personal development.

Active professionals face many difficulties in combining family and professional roles. Employed women are in a special situation here, as they are still burdened by the stereotypical duty of caring for children. Traditionally and culturally, there is a conviction that the professional fulfilment of women should not take place at the expense of the family. Many women consciously choose to combine work and family life. There is a structural and cultural conflict that puts women at two polar opposites – from demobilization of women on the labor market to limiting procreation decisions. The structural conflict is related to the mismatch between institutional solutions and women's professional work. In turn, the cultural conflict results from a different understanding of the social roles of women and men, including the relationship between women's professional work and the family. (Urbańska, 2015, p.88)

For several years now, discussions have been taking place on the development of policies to promote reconciliation of professional and private life. The concept of human resources management has become popular, the main aim of which is to find a balance between work and private life. The background to this reflection is ensuring equality between women and men and economic and demographic change in the labor market. (Borkowska, 2011, pp.22-23) The work-life balance is a multidimensional phenomenon. This trend emerged in the late 1970s and early 1980s in the USA and the UK, when regulations limiting weekly working hours came into force. It was then that attention began to be paid to the role of leisure time in the development of individuals, businesses and societies as a whole. The reasons for the idea are sought in social and cultural changes related mainly to the entry of women into the labor market and the need to apply a new division of household duties. The main idea behind this concept was to support employees in combining work and private life. It has been pointed out that a harmonious coexistence of both areas of human life allows to achieve better results than limiting one of them. A satisfied employee is more effective, enjoys work and private life, is resistant to stress, is less ill, but also has convenient conditions to perform family duties and improve the quality of their life.

In 2019, the European Union developed a directive on work-life balance for parents and carers, known as the Work Life Balance Directive. (Directive (EU) 2019/1158) The regulation introduced aims at finding solutions useful for working parents and carers so that women and men have equal opportunities in the labor market and have the possibility to reconcile work and family life. The legal act regulates the issues of employees' access to flexible working conditions, and introduces and expands the existing legal regulations on the use of parental, paternity and partner leave and leave due to force majeure in urgent family matters caused by illness or accident. (Siemienkiewicz, 2020). The introduced regulations were designed to draw attention to the role of men in participating in part of their caring duties. Measures have been taken to change the perception of the role of a woman as a carer and a parent taking on a significant part of the parental responsibilities, with shaping a new model of a woman and new rules of functioning of modern families in mind. The aim of the work was also to prevent women from withdrawing from the labor market and to counteract the professional inactivity of women, in response to the demographic changes of ageing European societies.

[1] Author of the study: A. Szczudlińska-Kanoś, M. Marzec, Institute of Public Affairs, Jagiellonian University. The research was conducted on a random group of 80 people between May 15 and June 15, 2020.

One of the planes that helps to maintain a balance between the private and professional lives of parents and carers is flexible organization of work. Parents of children under 8 years of age have been given the possibility to benefit from flexible working time arrangements under conditions of protection against dismissal and discrimination. (Directive 2019/1158, Article 9) Flexible working time provides opportunities for remote working, as well as the introduction of variable working time schedules or reductions in working time (Labor Code Article 3 sec. 1 item f). So far, Polish legal regulations do not provide for special rights for working parents to introduce remote working, only the regulations concerning teleworking, which are part of the idea of flexible organization of work performance, are in force (Labor Code, Article 67; Siemienkiewicz).

During the pandemic, both companies and employees quickly adapted to the new working conditions. The imposed requirements for social distance have led to the use of remote forms of communication using different tools in all possible areas of the economy and the society. In many areas, remote working on a permanent basis became necessary and required the development of new rules for fulfilling professional duties. Parents were faced with the difficult task of reconciling work in the new conditions with childcare. The idea of WLB requires a redefinition and a new look at the possibilities of reconciling professional and private life. It is interesting to point out how working in new conditions – during a pandemic, can affect the symbiosis of work and private life.

Working Conditions During a pandemic.

The development of modern forms of communication has led to changes in the scope of work performance. Today's workforce, equipped with modern technologies, is ready to work anywhere. For some time now, literature has described the concept of remote working or telework. In 1997, the European Commission recognized that teleworking will become a part of professional life and initiated the European Telework Development to raise awareness of teleworking issues and support development in Europe (Nojszewski, 2004; Belzunegui-Eraso, Erro-Garces, 2020). There is a wide range of new, flexible ways of working, including the possibility of partial relocation outside the traditional office. There is no commonly accepted single definition of teleworking, it can be defined as a type of work and/or service provided remotely, at a distance and online using a computer and telematics technologies (Belzunegui-Eraso & Erro-Garces & Pastor-Gosálbez, 2013). According to the International Labor Organization, teleworking is work that utilizes information and communications technologies (ICTs), such as smartphones, tablets, laptops and/or desktops to perform work outside the employer's premises. (Telework in the European Union, 2010) In practice, teleworking enables employees to work from home or other premises using appropriate information technology. (Hraskova & Rolkowa, 2012, pp. 39 -42). According to the European Commission, remote work is “the form of organization and / or performance of a work, whereby an employee can carry out work that could also be carried out at the employer's premises regularly out of these premises through the use of information technology” (Lescevica & Kreituze, 2018, p. 174).

Today, many workers, but also employers, appreciate the possibility of flexible working hours and remote working, paying more and more attention to the possibility of reconciling work and family responsibilities. (Olson, 1983) In the current conditions of the pandemic, no one is able to accurately estimate the changes that will occur as a result of the popularization of work using various tools of modern communication and information transmission.

In Poland, WLB is slowly being popularized and tools for reconciling professional and private life are being introduced. Poles work a lot and feel overburdened in quantitative and qualitative terms. In addition, they often work overtime and admit having problems related to reconciliation of work and private life. (Pieluch, Szczygieł, 2019, p. 16; Bartkowiak, 2009, p. 47; GUS 2020, Liszka, Walawender, 2019). During the pandemic, Polish parents had the opportunity to use different tools applying the WLB idea.

The COVID-19 epidemic began in November 2019 in China. Initially, it seemed that the problem only affected one part of China. However, in March 2020, the World Health Organization (WHO) announced a state of pandemic, seeing that the virus was spreading worldwide and the number of people affected was increasing. In Poland, in mid-March, all educational institutions were closed down and restrictions on the functioning of many areas of the economy were introduced (shops, cultural institutions, state and local government offices, etc.), and regulations on maintaining social distance were introduced. An attempt has been made to adapt working conditions to the new conditions. According to Polish analyses from June 2020, the COVID-19 epidemic brought negative effects in the sphere of employment. One fifth (20%) of those employed are working reduced hours and three in a hundred (3%) have lost their jobs during the pandemic. Moreover, one fifth of Poles (21%) worked remotely (from home) (CSO Report from June 10, 2020). Only one twentieth (5%) of the employees used the care allowance to take care of children. Due to the epidemic, 7% of people lost or closed their own businesses and a quarter (25%) experienced unfavorable changes in their earning opportunities due to reduced working hours or reduced activity of their company. (CBOS NEWS Newsletter 19/2020)

Remote working during the pandemic made it possible to reconcile work and family responsibilities, but at the same time the boundaries between private and professional life were blurred. It is important to follow developments in the labor market and to continuously monitor the tools for reconciliation of work and private life in line with the WLB concept.

Evaluation of working conditions during the pandemic. Analysis of own research.

On the basis of the literature query and in the new situation of the labor market during the pandemic, it was decided to conduct pilot research. The main aim of the research was to assess and analyze selected aspects of the WLB concept in families with children during a pandemic. The research conducted was of quantitative nature. The selection of the test sample was deliberate. The research was addressed to people working remotely, who looked after children and performed their professional work during the pandemic. The research was anonymous and participation was voluntary. It should be noted that the research was carried out in the form of an internet survey (CAWI) between May 15 and June 15. In total, 80 people participated in the study, including mainly women (92%), people between 31 and 50 years of age (31-40 years of age – 34% and 41-50 years of age – 58%), residents of large cities (100,000 and more – 70%), taking care mainly of two children between 2 and 15 years of age and working professionally for 10 to 20 years (work experience from 11 to 20 years – 69%, work experience from 21 to 30 years – 22%). The characteristics of the research sample do not give grounds for conclusions for the whole population of Poland, as it is not representative. However, the selection of the pilot sample provides the basis for demonstrating general trends and describing the problems of combining remote working and family life in the WLB perspective during the pandemic. In recent years, remote working has been gaining in popularity and has been a privilege for many employees, but it turns out that for most of the respondents such a system of work was a new experience. Only 10% of the respondents were working in a remote system, while 56% of them had no experience with working at a distance using various forms of communication. Such an arrangement of answers characterizes the Polish conditions of remote working well.

WLB promotes work in such conditions that employees can freely reconcile work and private life. The survey asked the respondents to assess the difficulties in combining work with parental duties during the pandemic. A scale from 1 to 5 was used to allow working parents to freely assess the situation. The majority of the respondents assessed reconciliation of professional work and childcare as difficult, with 48% indicating it as very difficult and 24% as difficult. A negligible part of the respondents, because only about 4% of them, assessed the combined professional and private life as easy and very easy. In order to check the symbiosis of work and private life, a question was prepared concerning the possibility of separating working time from private time. The majority of respondents assess the possibility of separating work from private life during the pandemic as definitely impossible (39%) and as rather impossible (36%). Only every 5th employee is able to clearly draw a line between time spent at work and private life. Professional work requires continuous improvement, training and adaptation to the environment. Employees in a highly competitive market and in fast-changing conditions have to take constant care of their professional development. Therefore, the study asked whether the current situation creates opportunities for professional development. A scale was used to determine the issue, so that the respondents could freely assess the situation. A significant proportion of working parents assessed the conditions for professional development during the pandemic as very unfavorable. Three quarters (75%) of the respondents do not have time for professional development, only 7% have enough time to improve their qualifications.

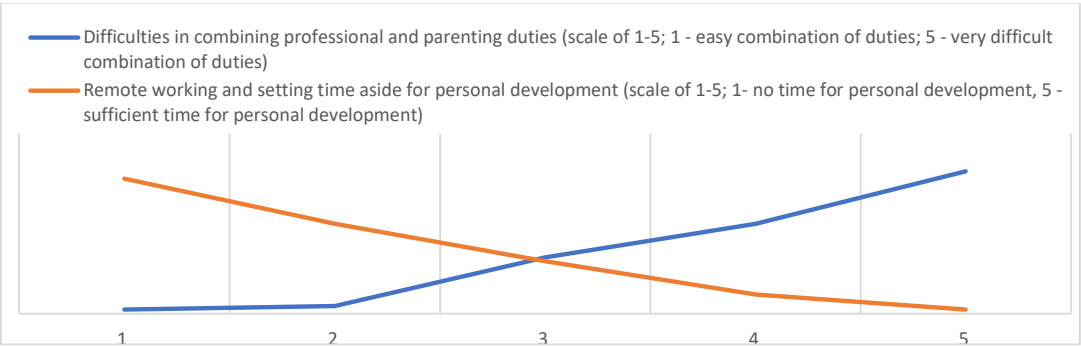

Fig. 1. Combining remote work and parental duties vs. possibility of professional development during a pandemic (data in % at different scale levels)

Source: own study based on research results.

The EU Directive aimed to change the roles played by women and men in modern Europe. In the study, an attempt was made to determine whether there was a change in the performance of family members' duties during the pandemic and the remote work. The pandemic triggered minor changes in the distribution of responsibilities within families. Almost half of the respondents (48%) indicated that there was no change in the division of roles and tasks in the family. Every third working parent (31%) reported that part of the duties were taken over by their spouse or partner. An interesting observation is also the fact that about 8% of the respondents each indicated that children or other people, e.g. grandparents, took over some duties or tasks at home.

The flexible working methods introduced during the pandemic were to ensure, on the one hand, that work would be carried out in new circumstances and, on the other hand, to create conditions for childcare in situations of closure of educational institutions and forced social isolation. The research was summarized by asking a question, the aim of which was to determine the relationship between the reconciliation of work and the performance of parental duties. Respondents had the opportunity to assess their situation through the prism of indicating how their professional and parental responsibilities are adapted to each other. Half of the respondents indicated that "remote work is adapted to childcare". One fourth (24%) of the respondents indicated that "childcare is adapted to the conditions of professional work". 18% of the respondents each indicated that the working time is adjusted to the conditions of functioning of schools and other educational institutions and to the working time of other people who take care of the children. Here we can see that the pandemic work system has made it possible to reconcile private life with professional duties. The manner of working was mainly adapted to childcare, not the other way around.

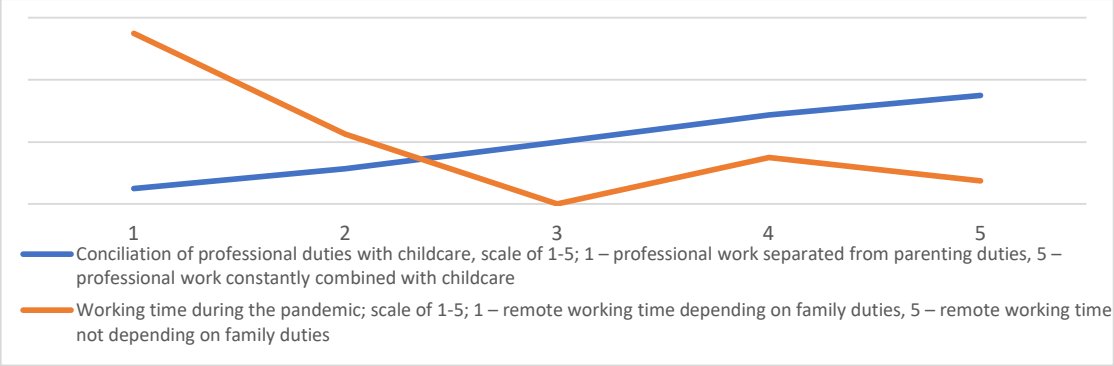

Fig. 2: Reconciliation of professional and family duties vs. remote working hours (data in % at different scale levels)

Source: own study based on research results.

The study also asked to identify improvements / facilitations that could help in the performance of work and parental duties. On a scale from 1 to 5 (where 1- indicated low importance, 5 meant help to a significant extent), the highest grades were given to such determinants as: working time, use of various IT tools, working methods and scope of professional duties. Working parents also pointed to other important elements related to WLB, such as: openness of supervisors to taking days off and holidays, flexible work schedules, support in taking advantage of government benefits, as well as psychological support for those who have difficulties in combining professional and private roles, and the employer's organization of additional online activities for employees' children. Legal regulations were also indicated, which may enable greater flexibility of working time for persons performing parental and caring duties, without the need to take into account the current system of work in individual workplaces, i.e. changes in the Labor Code. Working parents also described social policy instruments such as care allowances, which can supplement family budgets in the absence of a permanent work benefit for the care of family members.

The proposed tools for assessing the use of Work Life Balance showed how difficult it is to reconcile working time and professional development with parental duties. Moreover, the adaptation of the professional duties of remote-working parents to childcare shows what is really a priority in the lives of parents, mainly women. The modern labor market should adapt to the prevailing conditions and not oppose it. The conducted research identified the problems of combining professional and private life during the pandemic and showed the conditions for the dissemination of the Work Life Balance idea in Poland. The conclusions of the research should be used for further analysis, especially for international comparisons and to further develop tools to facilitate symbiosis between professional and private life. Studies show that the pandemic has only made the implementation of WLB more difficult.

Conclusions

Reconciling work and private life requires a comprehensive approach. The pandemic has triggered a process of changes in the functioning of the labor markets, which creates new conditions both for the employees, the employers and the institutions regulating the labor market. It seems extremely important to study and analyze the changes occurring on the labor market, to harmonize different spheres of human life and to set standards of implementable tools facilitating reconciliation of work and private life on different levels. Despite the many solutions available to the employees and the employers, it turns out that most working parents still encounter problems in maintaining their work-life balance. It should be pointed out that employees who enjoy a balanced professional and private life will be more satisfied with their work, will be productive, but also satisfied with their private life.

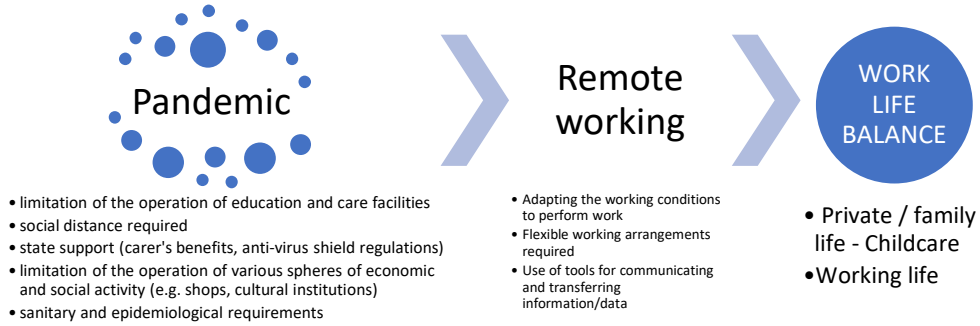

Fig. 1: WORK LIFE BALANCE and remote working during the pandemic.
Source: own study based on research results.

The WLB Directive gives Member States freedom to choose the tools and forms of implementation of ideas. European Union regulations have initiated deeper changes in the labor market and indicated possible trends. However, the Directive itself will not create favorable conditions for promoting WLB. The symbiosis between private and professional life can be reinforced by the actions of various institutions, which include the state, local authorities and individual entities (Borkowska, 2011, pp.22-23).

The global Covid-19 pandemic enabled remote work on a massive scale. Both employees and employers have been forced to adapt to the new conditions of the labor market and different areas of life. At the same time, the pandemic caused factors that hindered the daily performance of professional tasks performed before the pandemic. Working parents were confronted with the fact of reconciling professional work with parental duties under completely new conditions, restrictions of the operation of educational institutions, closing shops and the required social distance. Many parents declare difficulties in combining childcare and work duties. The improvements introduced, for example in relation to childcare benefit, have been used to a small extent by employees, mainly because of fears about the future of employment and the fall in wages. Only the flexible working model, implemented in the remote working system, has been successfully introduced on a mass scale. There is a lack of specific regulations for remote working, especially in the new conditions, but this system of work can reduce the feeling of variability, uncertainty, complexity and ambiguity of the environment in which working parents will have to live after the pandemic. One might ask another question — how long will this be possible? Will employers not want to terminate employment in relation to employees – parents who put childcare before work during the crisis caused by the pandemic. Further research will be needed to find answers to these questions. On the basis of the literature review and the research, it can be concluded that it is extremely important to follow the trends (models) of work performance especially in view of the WLB idea. The presented research results are a contribution to the analysis of changes taking place on the contemporary labor market.

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Social Economy Entities Viewed Through the Prism of Reported Information. Dilemmas of Evaluation of Social Economy Entities Based on The Example of Polish Conditions

Malgorzata MARZEC

Jagiellonian University, Krakow, Poland, malgorzata.marzec@uj.edu.pl

Abstract

Societies are reporting an increasing demand for information on the activities of entities. The social economy sector requires separate recognition and setting of its standards for the presentation and evaluation of entities' activities. The study subsequently describes the operating conditions, evaluation methods and the scope of information provided by social economy entities. The summary indicates the gaps in the possibility of evaluation of social economy entities on the basis of the information collected and presented. The aim of the study is to identify significant problems in the assessment of social economy entities through the prism of provided financial statements and to indicate the gap between the reporting system and the needs of social economy stakeholders.

Keywords: social economy entities, effectiveness, reporting, information gap.

Introduction

Modern societies have a strong demand for information on the activities of individual entities. Information presented in different content and time profiles is required, therefore the actions taken to develop appropriate information systems for different organizations acquire new significance. Social economy entities (SEE) are governed by their own rules of operation, but this does not exempt them from appropriate, legally compliant presentation of their activities through the prism of the objectives and results achieved. In this respect, the SEEs require that their standards for recipients of information be separately presented and established.

The literature on the subject contains theoretical and methodological analyses related to the third sector, applying numerous evaluation criteria. The concepts of effectiveness, efficiency of operation and social impact were introduced. (Głowacki & Jelonek,2013; Głowacki & et al.,2012; Chomluk & Gabrysiewicz,2107; Goleński, 2017; Andrałojć,2012; Clifford, 2015; Holstein-Beck,1987, Price 1968; Steers 1977; Bielski 1986; Kafel & Ziębicki 2009). However, there is a mismatch between the methods and tools for evaluating social economy entities and the information made available to different stakeholder groups. On the basis of a literature review and formal requirements, three levels of analysis of mismatch between presented and needed information can be distinguished. One concerns the conditions of functioning of non-government organizations, their characteristics determining the scope of their activities. The aim of SEE's operation is not to generate a financial surplus (profit) but to achieve social objectives. The second level concerns methods and tools for evaluating social economy entities. The last one is related to formal requirements and the possibility of obtaining data on the basis of reports or obligatory compilations and publicly available information (satellite accounts of social economy enterprises).

The aim of the study is to identify significant problems in the assessment of social economy entities through the prism of provided financial statements and to indicate the information gap limiting the evaluation of social economy entities. There are no studies in the literature that would combine the problem of assessing the efficiency of social economy entities with reports presenting the activities of such entities. Therefore, the study attempts to identify the gap between the information needed and provided by third sector organizations.

Various methods of analysis were used in the study, including descriptive and deductive methods supported by literature studies and analysis of legal acts. The article is a contribution to the discussion on the problem of evaluation of the social economy sector. The query of literature, legal acts, analysis of publicly available statistical data and reporting systems made it possible to achieve the aim of the article and to draw conclusions.

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Features of Social Economy Entities Vs. Operating Conditions.

The manner in which contemporary societies function requires the existence of a separate sector called social economy. Economic and social phenomena are accompanied by positive and negative social effects, which affect the social policy of the state and socio-economic concepts in the background with emerging problems of market or non-market allocation. In the social area, market allocation requires organizational and financial effort and often involves economic risk. Emerging organizations related to the social sector create conditions for the elimination of areas at risk of marginalization and may contribute to the creation of new social value. In addition, social sector organizations can limit the development of social pathologies, accelerate and harmonize the social and economic development of the society as a whole, as well as bring benefits in the long term (Płonka, 2009, p. 207–2016; Hausner, 2008, pp. 12–13).

There is no consensus in the literature on the scope of activity of the social economy sector. Terminological ambiguity makes it difficult to understand the essence of social economy as a sphere of society-oriented economic activity. The principles of operation of social economy entities evolved over time and their operating conditions depend on changes in external conditions. In the CEP-CMAF Charter signed in Brussels on 10 April 2002, the social economy sector is defined as "s*ocial and economic actors active in all sectors, distinguished by their objectives and specific form of entrepreneurship (...) such as cooperatives, mutual societies, associations and foundations*" (CEP-CMAF, Charter 2005, p. 9). The most important thing is that social economy entities are organizations oriented on social utility, and what is important, the surplus accumulated in the course of activity can be used to achieve the social objective set by the entity. An important premise for the development of social economy entities should be the solidarity of members, a well-recognized local market and adaptation to the needs of a given local environment. Social economy entities cannot operate effectively without public support and acceptance of their activities in the local community.(Kwaśnicki,2005,p.16)

The specificity of a given country or region influences the scope of the subject, determining the institutional framework and the possibilities of operation of social economy entities. In Poland, the basic legal act defining the formal, legal and organizational scope of the third sector organizations' activities is the act on Public Benefit Activity and Volunteering (Journal of Laws from 2019, item 688, 1570, 2020, consolidated text from 2020, item 284). Article 3 of the above mentioned Act specifies that <u>non-governmental organizations are entities which are not entities of the public finance sector (separation from the public sector) and entities which do not operate for the purpose of making a profit (non-profit nature), but have legal capacity granted on the basis of relevant provisions (formal nature)</u> (Kwaśnicki, 2005, p.20).

Social economy entities operate in a number of areas of the economy, offering different products or services on different terms. The sense of existence of this type of entities is determined mainly by the implementation of social objectives, which dominate over economic objectives. However, the activities of the social economy entities should be evaluated in terms of the achievement of social objectives in conjunction with economic efficiency. This raises some questions: How to evaluate activities of social economy entities? Is it possible to use tools (methods) used by other actors in the assessment of social economy entities? Or should other ways of assessing their activities be sought? According to Głowacki, Płonka and Rosiek, measuring the effects of operation of SEEs poses some difficulties due to the fact that "*traditional indicators used to assess the effectiveness of companies fail in this respect, as they focus on measuring their value generated within the entity and expressed in money (revenue, income, profit)*" (Głowacki, et al., 2012, p. 327; Łącka, 2015,p. 244). When assessing the activity of social economy entities, tools should be used to determine both the financial value of entities and products and services provided, as well as categories to evaluate the social effects of activity (the concept of social added value can be indicated). A wide range of organizational forms operating in the social economy sector makes it difficult to carry out comparative research, but this does not mean that analyses of individual entities operating in the social economy sector should be abandoned, quite contrary. It is necessary to assess the performance of the entities by examining whether the objectives were achieved, whether the problems for which the entity was established were resolved and whether the needs of the beneficiaries were met. It is also necessary to determine whether an entity has an impact on solving social problems in the short and long term, and to what extent it has done so and what results from the entity's action for the wider community (Juraszek-Kopacz & Tyrowicz 2008; Stiglitz et al., 2009; Zahra et al., 2009; Łącka, 2015,p.244). The catalogue of questions concerning the evaluation of SEEs' performance is very broad and should be combined with some criteria: tools and evaluation methods.

Evaluation of the activities of social economy entities.

There has been a discussion in the literature for some time on the criteria for evaluating social economy entities' activities.(Kafel&Ziębicki 2009; Goleński 2017; Głowacki&Jelonek, 2013; Głowacki&et al., 2012;

Chomluk&Gabrysiewicz, 2107; Andrałojć, 2012; Borzaga&Toria, 2007) There is a terminological ambiguity in the area of evaluation, measurement and influence of the social sector. Against the background of activity of entities operating in the economy, social economy entities are distinguished by the priority of social objectives over economic ones. The social economy sector provides products or services that fill a gap in the market in areas where traditional operators do not operate due to insufficient profitability. The entities operating in the social economy sector, like other entities, need resources to carry out their statutory activities and incur costs in the course of performing their tasks. Two main directions of development of social economy institutions can be distinguished from the point of view of economy analysis — rationalization of management of the resources held, i.e. socialization of economic objectives or economization of social objectives (Płonka, 2017, p. 41). The given criterion for distinguishing social economy institutions is quite important because of social and economic objectives implemented by social economy entities. Social enterprises are those that carry out business activities or paid statutory activities and transfer their surplus to social purposes. The CEP-CMAF's Charter of Principles of the Social Economy states that the success achieved by social economy actors cannot be measured solely in terms of their economic performance, although it must not be overlooked, it should also be assessed in terms of their contribution to solidarity, cohesion and territorial ties (www.cepcmaf.org).

The quantification of effectiveness usually comes down to measurement based on numerical values. However, the effectiveness of certain activities, especially those concerning social economy entities, is difficult to measure using classical economic methods, therefore other ways should be sought to define the effectiveness of their impact or effects. In the literature you can find effectiveness analyses compared with efficiency in economic terms, but also with performance and degree of preference (Pyszka, 2015, p. 17; Stoner & et al.,, 2001, p.24; Guo Bielefeld, 2014, p. 3)

Traditional tools for evaluating the effectiveness of entities do not pass the exam, because they focus on measuring the value generated inside the entity, expressed in money (costs, revenues, income, profit). Therefore, in order to evaluate the effectiveness of social economy entities, tools are necessary that will evaluate not only the financial aspects of the entity's operations, but also measure the social impact of the sector, expressed in terms of external benefits generated by the entities on societies. Table no. 1 presents two levels of effectiveness testing and the tools used to evaluate the performance of social economy entities.

Table 1: Evaluation of effectiveness of social economy entities

Financial / economic effectiveness	Social effectiveness
Based on entity reporting / financial documentation – narrow scope of analysis	Based on reporting and various documents, as well as analysis of the economic and social policy of the country and the region – wide scope of analysis
S□l□□t□d groups of □rit□ria for □valuatio□; us□of mai□ly mo□□tary m□asur□s; pr□domi□a□t a□alysis of economic and financial factors	Larg□group of □rit□ria for a□alysis; us□of mo□□tary and non-mo□□tary m□asur□s; pr□domi□a□t a□alysis of economic and social factors
Examples of indicators: profitability, financial liquidity, efficiency (rotation), debt, rate of return, leverage, analysis of revenue sources, analysis of cost structure, etc.	Examples of indicators: social impact assessment (including: Social Return on Investment (SROI), Local Multipli□r 3, so□ial audit; so□ial □□t□rpris□s□or□□ard, social added value, etc.), determination of social effects of entities' influence (e.g. by determining the impact on environmental protection and ecology, changes in the labor market, revitalization of regions, etc.)

Source: own compilation based on: Emerson & et al.; Płonka 2008; Sacks, 2002; Juraszek-Kopacz & Turowicz, 2008; Clifford, 2015; Goliński, 2017.

Evaluation of the effectiveness of social economy entities should be multidimensional and also cover their non-financial (social) objectives. This requires a different approach as well as the development of different methods and criteria for assessing effectiveness, taking into account the specific conditions of social sector organizations. Several key problems related to the assessment of the effectiveness of social economy entities can be distinguished:

- Diversified distribution of social and economic objectives in the sector, which implies a different approach to social activity in the hierarchy of objectives;
- The achievement of social objectives is less quantifiable and the period of return on social investments is longer than for commercial investments;

- The complementary nature of conducting business activity and generating revenues on this account implies a different distribution of risk of activity conducted by the social economy sector and forces the implementation of separate procedures for its assessment;
- Different sources of financing for the social economy sector, combining features specific to the business sector, the public sector and specific to this sector, imply a specific way of accounting and scope of published financial information;
- The dominance of revenue characterized by low stability (e.g. membership fees, donations and subsidies from public and private institutions and individuals) hinders long-term planning and reduces the credibility of an entity in the commercial environment;
- Low capacity to capitalize the potential of social economy entities related to the fact that a possible financial surplus is used for the implementation of statutory objectives, and not for the increase of assets, or investments, which weakens the sector's potential for market competitiveness;
- The different and internally diverse structure of the sector's resources and capital makes it difficult to assess the credibility and compare the social economy entity to business entities with regard to typical procedures and standards. (based on Płonka, 2008, pp. 26-34).

Diversified scope of activity and degree of economization of social economy entities makes it difficult to determine a uniform system of effectiveness assessment. The main problem in assessing the effectiveness of the social economy sector is the inability to estimate, on the basis of existing financial and management reporting, the key components of social potential and impact, which often influences the underestimations of the values created by social economy entities and distorts the effectiveness of social projects. The presented methods and criteria for assessing the performance of social economy entities aim at estimating the social economy entities activity based on various criteria adjusted to the specificity of the social economy system. In conclusion, it should be stressed that the evaluation of actions taken by social economy entities should take into account not only the relations between objectives, inputs and outputs, but also the social impact of the sector on the economy and society.

Scope of information provided by social economy entities in Polish conditions

The problem of assessing the activity of social economy entities should be linked to the way in which the activity is presented in terms of the information provided. This is where national conditions are important in terms of the information systems developed for individual entities, concerning accounting rules, reports and tax obligations. 1 An assessment of the activities of third sector operators can be made on the basis of information provided by individual operators, such as financial statements or other reports required by law. The Polish legal regulations governing the preparation of financial statements are vague and require great commitment and expertise. The formal requirements for the reports or statements provided depend on the legal and organizational form of the entity and the scope of its activities. The table below compares the types of social economy organizations with the formal requirements for providing information on their activities. The basic criterion here is whether an entity conducts business activity or not and the inclusion of said entity in the group of public benefit organizations and so-called “small” non-governmental organizations. Most organizations are required to prepare and provide basic financial statements, consisting of the balance sheet, the profit and loss account and supplementary information as defined by specific accounting rules (Accounting Act of 29.09.1994 as amended, Journal of Laws from 2020, item 568). The formal requirements for making reports available depend on the organizational form of the entity and sources of funds obtained. Moreover, the foundations are obliged to prepare a report on their activity according to the template defined by the Minister of Justice and deliver it to a competent supervisory body indicated in the statutes of the organization. In addition, public benefit organizations publish their factual reports in the report database maintained by the National Freedom Institute. All registered organizations are obliged, regardless of their scope of activity and budget, to draw up and publish their approved financial statements on their websites. Table no. 2 presents information provided by social economy entities required by law in the system of individual institutions operating in Poland.

Table 2: Information provided by social economy entities and formal requirements taking into account the form of activity

Type of entity	Type of report/publication obligation
Associations Foundations Not conducting businesses / not registered in the National Court Register (without entities conducting tax accounting in the form of a simplified revenue and expense register)	Financial statements (balance sheet, profit and loss account, supplementary information; template in the Accounting Act dedicated to non-governmental organizations) signed by all members of management board. Obligation to publish on websites and the Public Information Bulletin
Associations Foundations Businesses / registered in the National Court Register (without entities conducting tax accounting in the form of a simplified revenue and expense register)	Financial statements (balance sheet, profit and loss account, supplementary information; template in the Accounting Act dedicated to non-governmental organizations) — facilities providing the possibility of filing financial statements through an application provided prepared by the state
Associations, foundations with the status of Public Benefit Organizations	Financial statements (balance sheet, profit and loss account, supplementary information; template in the Accounting Act dedicated to non-governmental organizations) Substantive reports published on a dedicated website of the Public Information Bulletin and the National Freedom Institute
Foundations	Reports and statements drawn up in accordance with the template set by the Minister of Justice shall be submitted to the relevant supervisory authority.
Organizations keeping simplified records of revenues and costs (applies to so-called small non-governmental organizations)	The simplification concerns records of, i.a. the revenue in a division into revenue from unpaid, paid and other activities; costs must be recorded with an indication whether they are tax deductible or not; additional records of individual employees and fixed assets; Detailed list of organizations and imposed formal requirements to meet the conditions to be included in the group of so-called small organizations It does not exempt them from the obligation to submit reports to the tax office (below); Detailed description in the Act on public benefit activity and volunteer work and in the detailed disposition of the Minister of Finance (item. 2050)
All entities	Tax return (CIT-8 form); statement of income and expenses, tax-free income and corporate income tax

Source: own study based on provisions of the law.

In addition to the prepared financial statements, social economy sector entities are required to provide factual or organization activity reports. The non-financial accounts shall include in particular:

- data concerning the scope of the entity's activity (name, form and scope of the statutory activity, specifying the achievement of statutory objectives and information on the business activity, if any),
- information about the amount of revenue gained, with a division into sources and forms of payment for paid benefits provided by the entity under statutory objectives, taking into account the costs of these benefits; if a business activity is conducted, the financial result of this activity should also be presented, as well as the percentage ratio of revenue obtained from business activity to revenue obtained from other sources,
- information about the costs incurred for the implementation of statutory objectives, administration, business activity and other costs with a separate form of payment,
- data on the number and form of persons employed with information on their basic and additional remuneration,

- data on the financing of activities, loans taken and investments made,
- data on the activity commissioned to the foundation by state and local government entities,
- information on the foundations' settlements on account of their tax obligations, as well as data on submitting tax declarations (based on www.poradnik.ngo.pl).

The prepared reports (financial statements and factual reports) provide knowledge on the activities of individual social economy entities. They allow to determine the extent of the assets at the disposal, the amount and structure of the sources of financing, as well as the structure of the revenue generated in combination with the costs necessary to achieve the intended objectives. Factual reports make it possible to assess revenues, costs, employment structure, investments made, as well as cooperation with governmental and local government entities. This provides a basis for evaluating the activities of individual entities. However, the information provided in the reports is not uniform for all actors and, more importantly, may be difficult to understand by some social economy stakeholders. Moreover, the report required by law does not provide an opportunity to assess social effectiveness in terms of the social impact of social economy entities on the local community or society as a whole.

Conclusions. The information gap between social economy entities and recipients of information.

The Polish system of reporting social economy entities is characterized by asymmetry causing gaps between the available and the needed information. A gap can be understood as a mismatch which, due to difficulties in diagnosing and assessing a given phenomenon, may negatively affect the relations of a given entity with its environment. On the one hand, difficulties in the choice of SEEs' assessment methods can be noted, while on the other hand, the information available limits the tools used. The information gap concerns the scope of information provided from the social economy sector as well as the reported needs for information that is not collected. There occurs a dissonance between recipients (stakeholders) and senders (PES) in terms of communication. This situation may result in stakeholders not taking into account the information provided by the SEEs. This may concern, for example, the range of services offered, knowledge about the functioning of individual institutions, cooperation of individual entities with different public or social institutions, the possibility of transferring funds, as well as the feeling of improvement of the quality of life.

In Poland, there is a high discrepancy between the information needs and the formal requirements imposed by financial and factual reports. Based on the analysis, the following information gaps limiting the assessment of SEEs can be identified, i.e.

- Communication gap – it is related to the difference between the information received by users and the level of satisfaction of information needs (e.g. in Poland many tax or accounting reports are required, but these reports do not provide the information needed by all SEE stakeholders, e.g. concerning the scope of services offered),
- Reporting gap – a discrepancy between the assessment of individual categories and the level of activity in reporting (e.g. there is no detailed information on costs and revenues in the perspective of various products and services),
- Perception gap — a difference between the importance of the information provided in the reports and the possibility of using this data by different recipients (e.g. there is no information on the extent of social impact of social economy entities on the local community)
- Gap in understanding — a difference between the information included in the reports and the importance assigned to it by users (e.g. information on the financial result of SEEs)

The article links the three layers, i.e. the characteristics of the activity of social economy entities, conditions of their functioning, methods of activity evaluation, and it indicates a mismatch in the scope of the possibility to evaluate SEEs' activity on the basis of information presented by social economy entities. There is a big discrepancy between the presented information and the needs of information recipients. A gap can be identified that is characterized by hope and disagreement. The hope of providing the relevant information refers to the situation when the recipient receives incomplete information that does not give the opportunity to take the required / expected action. Information does not correspond to the reported needs when the recipient does not agree with some or all of the information provided and is not able to use it for action (decision making, reporting).

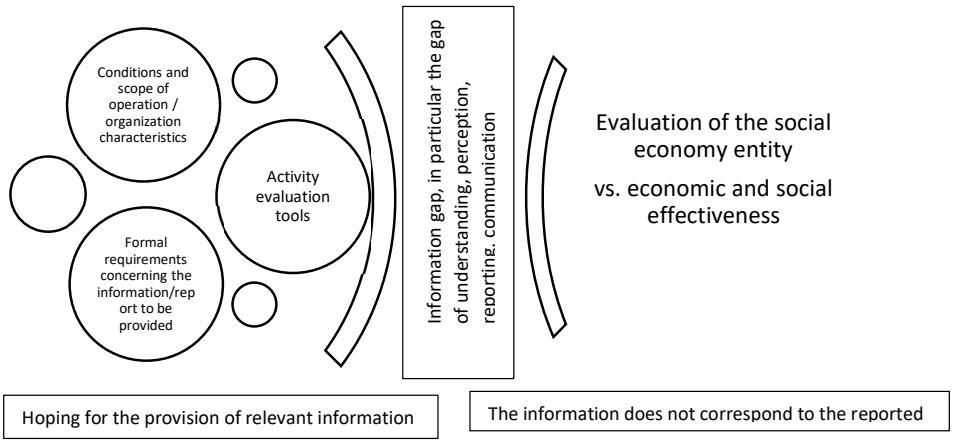

Fig. 1: Information gaps in the evaluation of social economy entities.

Source: own study.

The issue of evaluation of social economy organizations is subject to numerous analyses, at many levels. At the same time, it has not yet been possible to develop a universal model, a concept linking information (reporting) systems with the levels of evaluation of the social economy sector. The paper analyses the complexity of the problem and presents theoretical and cognitive deficiencies in this area. The article presents the conditions of the emerging information gap between social economy actors and its stakeholders. The analysis was made on the basis of Polish conditions, as the scope of activity and the manner of organization of the social economy sector is determined by formal, legal and social conditions in a given country. The presented study may be used for further analysis in individual countries. The problems identified are a contribution to creating theories and standards of evaluation of the social economy sector.

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Infrastructure of Municipal Units

Dmitry N. LEONTIEV
Candidate of Economic Sciences
Peter the Great St.Petersburg Polytechnic University, Politechnicheskaya st., 29, St. Petersburg, 195251, Russia
E-mail address: alain2000@mail.ru

Maxim V. IVANOV
Candidate of Economic Sciences
Peter the Great St.Petersburg Polytechnic University, Politechnicheskaya st., 29, St. Petersburg, 195251, Russia
E-mail address: ivanov_mv@spbstu.ru

Angelina V. NEVZOROVA
Graduate student
Peter the Great St.Petersburg Polytechnic University, Politechnicheskaya st., 29, St. Petersburg, 195251, Russia
E-mail address: ne.angelina.ne@yandex.ru

Abstract

Due to the significant internal regional diversity of territories, spatial settlement and heterogeneity of the population, Russia is faced with the peculiarities of geographical, natural, demographic, historical characters in the development of modern infrastructure. This explains the timeliness and relevance of the study of modern infrastructure, which is aimed at developing and improving the socio-economic triad towards building its equilibrium model in the field of production, social sphere and housing, as a reflection of the universal infrastructure of the region - an integral part of the country. The study is also aimed at a deep study of theory, facts and a description of various points of view of different authors on this topic. This, in turn, requires the organization of a theoretical attempt to synthesize existing approaches in order to overcome the existing diversity and develop a common view on the essence of the concept of infrastructure. In the process of this study, the experience of summarizing various copyright approaches was considered. At the same time, the authors' points of view and their theoretical justifications became the object of analysis.

Keywords: Regional Infrastructure, Municipalities, Crisis.

Introduction

The demand for this study is due to the objective difficulties of both economic and social evolution currently observed, as well as the features of geographical, natural, demographic, historical characters in the development of modern infrastructure, which such a large country as Russia faces due to its significant internal regional diversity of territories, spatial settlement and heterogeneity of the population.

The need for such a study is also caused by the fact that a rather long time was not given due, in-depth attention to such theoretical issues, and their study was limited to the statement of facts and the description of various points of view of different authors on the topic, which led to a colorful and wide variety of opinions, definitions and opinions. This, in turn, requires the organization of a theoretical attempt to synthesize existing approaches in order to overcome the existing diversity and develop a common view on the essence of the concept of infrastructure. In the process of this study, the experience of summarizing various copyright approaches was considered. At the same time, the authors' points of view and their theoretical justifications became the object of analysis.

All this, on the one hand, made it possible to identify the established approaches, on the other, to form a generalization reflecting and summarizing various theoretical views on the concept of infrastructure.

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It should be noted that public planning and regulation of infrastructure development and functioning in different regions and in the country are always the focus of attention of the Governments of almost all States with highly developed market economies. Several well-known scientific studies (for example, D. Ashauer (USA), K. Khubiev (Russia)) have established and justified the strong and direct relationship of government infrastructure costs with economic growth rates in the national economy and regions.

An analysis of the current state of this area shows that research on infrastructure development is taking place mainly in two global directions - from the point of view of management theory and from the point of view of economics. In the first case, it refers to a set of interconnected service structures, and in the second, a set of industries that provides general conditions for the functioning of the economy. Traditional political economic science divides infrastructure into production and non-production. Modern economists practically adhere to traditional political economic definitions, making some adjustments in the spirit of new trends, replacing such concepts as non-productive infrastructure with a more modern-sounding social one. Moreover, in any economy, as a rule, production is the dominant role, which is the basis for the development of society. And, therefore, this provision leads to the fact that the initial consideration of the production infrastructure is determined, sidelining the non-production (social) infrastructure.

Of course, production infrastructure is a direct source of livelihood for each individual and society, providing society with jobs without which it is difficult to satisfy material and spiritual needs, if not impossible. At the same time, this means that production infrastructure is social in nature and that the division of infrastructure into production and social is to some extent conditional. Therefore, the division of infrastructure into production and non-production (social) in its pure form in our time seems somewhat outdated. This is evidenced by the changes in concepts that occur before our eyes - the figurative name "tourism industry" has gained an industrial meaning, the same thing happened with show business and the "entertainment industry." The main determining factor is gradually the monetary valuation of the final product, its ability to be sold as a product.

In view of the above, the aim of our study was to examine existing approaches to the definition of infrastructure in relation to the municipality (region), with the following objectives:

1) determining the place and role of infrastructure in human life and modern society at present;
2) analysis of existing approaches and points of view;
3) their generalization and justification of the division of infrastructure into production and social;
4) formulation of the socio-economic triad.

Theory

In the context of the growth and progressive movement of the modern economy, the development of various territories takes on importance. And such as large economic regions and such as subjects of the Russian Federation and such as municipalities. Currently, the Russian Federation consists of 85 entities and each of them unites and includes a different number of municipalities united by the borders of this particular entity. Almost on the territory of each municipality or region there are some economic facilities - companies, organizations, enterprises, etc., which are parts of industries or sub-sectors and social facilities - kindergartens, polyclinics, schools, etc. In this regard, the issue of subdivision of infrastructure industries in relation to a municipality or region at the level of a subject, at present, can be considered as a certain subject of discussion. You can notice that it (the concept) is applied in many areas of our life. It is enough to recall the collocations that appear in this word - "infrastructure of engineering structures," "transport infrastructure," "information infrastructure," "production infrastructure," "infrastructure of the district," "infrastructure of municipalities," "social infrastructure," etc. The list can be continued. Basically, such phrases when pronouncing and perceiving them are perceived by people quite calmly and do not cut their hearing. Reading any article, listening to a report or the most ordinary news where such words are found, an ordinary person rarely thinks about the essence of the infrastructure itself and takes it as something clear and for granted, without delving completely or very superficially into the content of this concept.

Several specialists, researchers very widely interpret the concept of infrastructure. So, for example, in the Big Economic Dictionary of Borisov A.B. you can find the following definition: Infrastructure - a set of industries, enterprises and organizations that are part of these industries, directed activities designed to create conditions for the normal functioning of the production and circulation of goods, as well as the vital activities of people. The interpretative dictionary of foreign-language words of Krysin L.P. interprets infrastructure as components of the general structure of economic or political life, which are subordinate, auxiliary in nature and ensure the normal activity of the economic (political) system. Rumyantseva E.E. refers to infrastructure as a set of material and organizational and legal conditions that ensure sustainable economic development. Bulyko A.N. believes that infrastructure is a set

of enterprises, institutions, management systems, communications, etc., ensuring the activities of the society or any of its spheres. In general, one cannot disagree with the possibility of a broad and narrow interpretation of this concept, believing that infrastructure is directly related to all spheres of life and activity of a person and society.

Method

The methodological basis of this study is the well-known general scientific methods of cognition - dialectical, deduction, induction, comparison method, observation, hypothesis; special methods - logical, modeling.

The modern development of infrastructure, its consideration in relation to the new, today's conditions challenging the realities of the present, requires a rethinking of the existing traditional approaches in the issues of studying this sphere. Infrastructure development is closely linked to the evolution of both social relations in society and changes in the economic and social spheres. The infrastructure of the municipality, the region is represented in a dialectical relationship with the level of development of social and economic relations and a comparative analysis with existing practice is made to determine the prospects for its development in Russia.

Taking as a basis the basic level of the economic division of the infrastructure for production and social and to avoid various possible conflicts, it makes sense to limit the production infrastructure to industrial material production, which will lead to the fact that only industrial enterprises of all forms of ownership located in the territory of this region or municipality and engaged in material production will fall into it (i.e. in the production infrastructure) of the region.

It is also necessary to allocate the housing sector as a separate component of the infrastructure, without classifying housing as either productive or social infrastructure. Attempts to solve the housing problem over the past 5-6 decades have generated many government programs, none of which have been fully implemented. Russia, which inherited the whole set of social problems from the USSR, aggravated as a result of full-scale social experiments conducted in the country for a couple of decades, is at the level of the third world in terms of the quantitative parameters of housing supply, and in some cases it is significantly lower in terms of housing quality.

Everything that remains applies to social infrastructure. Then, we can conclude that the social infrastructure of the municipality, the region is what ensures life and its comfort for everyone in the territory and the population as a whole, except for housing, and not related to production infrastructure.

The chosen method of conducting the study is based on the study and consideration of the existing approaches to the essence of the concept of infrastructure, their interpretation and assessment of the current state, the identification of options and implementation models in order to summarize the available data for the development of a universal concept and a unified approach to the development and improvement of the existing infrastructure of a particular region, municipality in modern Russia.

Results and Discussion

Currently, it is usually customary to include a combination of industries, organizations and enterprises that are part of these industries, whose activities are of a directional nature. All of them are designed to create conditions for the effective functioning of production or trade, as well as the normal life of people.

At the same time, it should be understood that the specifics of infrastructure industries are that these industries do not create any kind of product (i.e., material products), but create the necessary conditions for its production or provide services without which successful activities and functioning of material production industries, and therefore the entire economy as a whole, are impossible. It is impossible to reserve the products of infrastructure industries, it is impossible to add, save or store in a certain place, since it manifests itself in the form of the process of moving, storing, transferring information.

The study made it possible to identify existing approaches in science and practice to determining the essence and features of the concept of infrastructure, as well as to determine its state, level of development and compliance with today's conditions that have developed at the present stage of socio-economic development. In all definitions and concepts almost all aspects of our lives are affected - and the production aspects and economic, social, political and information. No important area of activity remained unaffected. It seems that they are an attempt to cover, list all possible directions, features and views of our being in modern conditions. On the one hand, such views very broadly and deeply describe infrastructure from different points of view and positions, on the other hand, they can lead far away from the issue being studied.

What's really going on in reality? The study of infrastructure is very important not only in the field of production, but also for the social and cultural life of society. In ordinary life, a person encounters real problems and issues, daily contacting three components in the person of production, social sphere and housing. In our study, based on the literary review, we propose to get acquainted with the below-presented hypothesis, formulating a socio-economic generalization that infrastructure is what ensures the life of each individual person and the human community.

Summary

The study provides some conclusions and suggestions.

1. In modern conditions, the division of infrastructure into production and social seems more consonant than the division into production and non-production.
2. The development of the socio-economic triad in the municipality (region), which includes the sphere of production, social sphere and housing, reflects the development and improvement of the universal infrastructure.

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Corporate Social Responsibility – How to Change the Attitude of the Top Management from Image to Real – A Case Study of a Listed Company

Tomasz URBANCZYK

Nicolaus Copernicus University, Toruń, Poland,
tomasz.urbanczyk@umk.pl

Abstract

The purpose of this article is to take up the discussion about how to change the unethical behaviors of top management in relation to corporate social responsibility (CSR). The research is based on a case study of a company listed on the Polish Stock Exchange (SE) on the Respect Index (RI) of socially responsible companies. The analysis was carried out on the basis of an in-depth interview with selected still working as well as former employees of a listed company. The case study reveals that CSR may only be of an image-related nature. It shows the lack of consistency of the declared values in CSR reports with the unethical behavior of the company's management towards its employees. The author proposes a concept in which SE authorities would extend the scope of their activities to preventive and intervention measures. Preventive actions would concern (1) top management education in relation to the impact of ethical behavior and positive relationships on the company's results; (2) implementation of 360 degree feedback. Intervention, in turn, would relate to (3) whistleblowing.

Keywords: CSR, Ethics, Positive Relations, 360 Degree Feedback, Whistleblowing.

Introduction

In the last few decades, there has been a trend to develop the concept of corporate social responsibility. According to Caroll (1991), it is constituted by four kinds of social responsibilities: economic, legal, ethical, and philanthropic. The author refers to an ethical one. Such standards as ISO 26000 (guidance on social responsibility) or global reporting initiative (GRI) also show different dimensions of CSR, but the presented case study touches the principle of ethical behavior or, respectively, social standards. The analyzed case study shows a contradiction between the unethical behavior of the top management of the listed company and their declared CSR policy in relation to the company's employees. At this point, it is necessary to point to the central role of a human being - the employee. The essence and foundation of human acts - economic ventures, all activities and relationships built - cannot be profit maximization without prior respect and recognition of the good of another person, be it as an employee, as employee teams in a supply chain, or as a customer to whom the subject of work is to serve. "The truth about good is based on the understanding of the nature of man and his goals, because good is what corresponds to nature due to the purpose of being itself" (Wojtyła, 1999, p. 27). An employee is the most important stakeholder and a key asset of any company (Anam et al., 2012). This is mainly reflected in the definition presented below. "CSR is a long-term, voluntary strategy of well-thought-out and ethical relations with all stakeholders, based on the principles of social dialogue, and a management concept in which the company makes decisions and actions that, on the one hand, contribute to the self-interest of the company, and on the other hand, lead to protection and multiplication of social welfare" (Madrak-Grochowska, 2010, p. 46). Although there are many definitions of CSR with differently distributed accents, the key element is the ethical shaping of relations with stakeholders, through dialogue for the good of the company and society. So ultimately, shaping the CSR policy will always relate to the good of the person, and foremostly the employee.

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The analyzed listed company had the status of a socially responsible company (RI) on the Polish Warsaw SE. On the one hand, participation in the index of socially responsible companies can raise the company's rank (GPW, 2018; Lee, 2019; Matuszak and Różańska, 2017) and show it to shareholders as caring for social welfare, as well as ethical in the context of business activity. On the other hand, the companies themselves, and especially their management boards, are interested in increasing the value of companies, which is one of the parameters of the performance assessment by supervisory boards. Consequently, there is a risk that CSR may be perceived as a tool to increase the value of shares, and not as an integral element of the philosophy of doing business (Smit and Bierman, 2017). CSR report, of course, presents the actions taken. However, it may be superficial and may not reveal the true intentions and behavior of the company's management. Dyduch and Krasodomska (2017) confirm existing practice to use CSR disclosures just to create positive impression and build corporate legitimacy despite negative activities.

With regard to the analyzed case study of unethical treatment of employees by top management, the author is looking for a way to eliminate, or at least reduce, such behavior. Hence, the author proposes, as part of the CSR policy, on the one hand, preventive measures consisting in educating the top management in the context of positive economic effects of building positive relations with employees, as well as 360 degrees feedback, in order to reveal pathological behavior among the company's management. On the other hand, intervention measures through whistleblowing, which in relation to SE authorities would be independent and effective in the context of SE supervision.

Research Methodology

This research is based on a case study. As it is advised by Yin (2015), direct observations of the studied phenomena and interviews with their participants should be used. The analysis was carried out on the basis of an in-depth interview with chosen still working as well as former employees of the listed company. They played the role of "key informants". Because of the risk of revealing specific persons, their positions in the organization and other research details are not disclosed. At the same time, the "principle in collection of data in case research" was followed using methods such as "direct observations, content analysis of documents, and archival research" (Voss et al., 2002, p. 206).

Case study

Unethical treatment of employees by top management under the cover of CSR

It would seem that a listed company, especially one listed on the index of socially responsible companies, will pay particular attention to ethical treatment of employees, the more that human capital is the main asset of company (Tejedo-Romero and Araujo, 2018). Moreover, it should promote ethical behavior and eliminate all pathologies. In a special way, such an attitude should be expected from the supervisory board and top management. However, the analyzed case shows that this is not always the case, and CSR can be used primarily to achieve image goals. Loud scandals of multinational companies such as Cendant (1998), Xerox (2000), Enron (2001), Adelphia (2002), WorldCom (2002), AIG (2004), Lehman Brothers (2010) (Mironiuc et al., 2013) or Volkswagen (2015) indicate that the dual morality of management boards is not unique. Hence, in order to properly assess the real motivation of the management boards of CSR companies, it would be necessary to conduct in-depth research that goes far beyond the CSR report.

Based on the interviews conducted with several current and former employees with long seniority level, a picture of sophisticated, consequent and at the same time unethical behavior of the company's top management is drawn. It shows the process of coming to power and exercising it by eliminating unwanted employees, i.e. those with a different opinion, those who did not agree to participate in manipulation, or those who could compete for promotion, as well as those who had to fulfill the role of a scapegoat.

The depicted case shows a career path, from the position of sales manager, through sales director, to the president of the company. It is known that the head of sales is expected to systematically increase

sales through the penetration of new markets and implementation of new products for sale. It is also known that maintaining a managerial position in the sales department in turbulent economic conditions is not easy. The case shows the career tactic of finding the culprit. It was realized by undermining the authority of various organizational units or blaming chosen employees, also from the sales department, for the consequences of lower than expected sales results. It was a ruthless policy of trying to get rid of allegedly underperforming employees that was successfully demonstrated to management board. In this way, the reputation of an uncompromising man in the fight for the company's results could be easily gained. In fact, undermining the authority of other people was usually behind the scenes, systematic and long-lasting, so that the persecuted person was unable to defend themselves. After several months or even years, when a negative opinion about a given person was already well-established, the employee was dismissed. In this way, at least a dozen people were removed from their positions. People who stayed in the organization, but in a different position, were salt in the eye, because in other roles they gained recognition and became valued employees.

When, at one of the internal meetings a former sales employee was insulted in his absence, his new manager publicly defended him, drawing the sales director's attention to his unfair evaluation and unethical behavior. After the meeting, the head of sales made an attempt to intimidate this manager, pointing out that he had no right to reprimand him in public and that he should not speak up, because he would lead to his dismissal, as he had done with other employees before, and in which he was very effective. After some hours the sales director asked the manager not to reveal this incident. However, the same day he contacted the director of this manager, pointing to his offensive behavior. When the manager was informed about this, he decided to report the matter to the then president of the company. He expected support from the president and punishment of the sales director. However, the president said that sales are very important for the company and he did not take any disciplinary steps. After some time, the management board was changed and the sales director was appointed the new president. Taking into account the fact that his practice of firing unwanted people was already known, he announced at a meeting of middle-level managers that he was not planning any layoffs. Moreover, he told the manager in private that he did not have to worry about being dismissed. However, after a few months, the practice of dismissals came back. The manager was dismissed under the pretext of eliminating a position for reasons not related to the employee. After some time, a new manager was hired to replace him.

One may ask why this manager did not receive the support of his director. There are two reasons. First of all, the director, for fear of losing his position, made every effort to flexibly adjust to the decisions of the management board, even if it was to have negative consequences for the company or individual employees. According to the classification of susceptible followers (Padilla et al., 2007), he could be categorized as a conformer who complies with destructive leader out of fear. Secondly, this manager was a very troublesome employee as he questioned some of director's decisions. From the most trivial ones, such as honest payment for employees' overtime, to those that could lead the company to multi-million financial losses. In a situation where the manager refused to purchase a component that would cause mass product complaints, the director not only threatened him with disciplinary action, but when the manager's position was found valid, he never appreciated his effort. Instead of recognizing him as a person protecting the company from negative consequences, there was a desire to weaken the professional position of the manager and then remove him from his post. The director, even before dismissing the manager, during the term of the previous management board, had tried to lower his annual assessment and to issue a written warning. Thus, the unethical behavior of the president was not unique in the company's top management. This is confirmed by Thoroughgood et al. (2012), who observed that "no matter how clever or devious, leaders alone cannot achieve toxic results. Destructive leaders are capable of carrying out their toxic agendas with the assistance of susceptible followers and conducive environments." (p. 901). In this case, conducive environment was created by supervisory board, which supported any human resources (HR) policy, hoping to increase the profitability.

Subsequent reports by respondents indicate attempts of formally unjustified punishments or dismissals of unwanted employees. It concerned people with many years of work experience and committed to the company. Systematic redundancies covered a dozen or so people in managerial or specialist positions. The reasons for the layoffs were to reduce costs, improve efficiency, professionalize staff,

however, they were often perceived by the workers as a form of getting rid of unwanted people. The president's practice has not changed. In response to the company's weaker than planned results, the alleged culprits had to be dismissed or punished so that the supervisory board was convinced that the president was taking corrective actions, as the fight for the company's results was a priority. The conducted HR strategy led to getting rid of people with extensive experience, which had to have a negative impact on the company's results and its development. At the same time, the remaining intimidated employees were made to carry out their over-standard, unpaid work, which was to fill the gaps left by the dismissed employees. Wu et al. (2018) prove that employees significantly resort to silence in the workplace due to their feelings of role overload when they face destructive leadership. Despotic supervisor gains the silence among employees and feels audacious and unpunished.

Einarsen et al. (2007) defined destructive leadership as "the systematic and repeated behavior by a leader, supervisor, or manager that violates the legitimate interest of the organization by undermining and/or sabotaging the organization's goals, tasks, resources, and effectiveness and/or the motivation, well-being or job satisfaction of subordinates" (p. 208). According to the aforementioned definition, negative consequences may concern the employee and the organization. With regard to CSR objectives, the beneficiary of the policy is to be a person, especially an employee who is involved in the development of the organization, especially that abusive supervision can negatively influence human health (Liang et al., 2018). In turn Milliken et al. (2003) point to the counterproductive nature of such behavior. Employees with the fear of retaliation or punishment (loosing job or not getting promoted) do not speak up about potential problems or issues of significance to the organization. Respondents indicated that during managerial meetings or other company meetings, for fear of losing their jobs, employees did not speak out if they were to express a different opinion from the president or even defend themselves against harmful assessment or offensive behavior. Meanwhile, the learning organization should create such an atmosphere that employees feel completely safe when reporting any problems. In turn Schyns and Schilling (2013) show that the highest correlation arises between destructive leadership and attitudes towards the leader, while the second highest correlation is between destructive leadership and counterproductive work behavior. Their "meta-analysis shows the expected negative effects of destructive leadership and thereby confirms the urgency for organizations to deal with prevalent destructive leadership and avoid the occurrence of destructive leadership in the first place" (p. 152).

On the basis of the case study it can be seen that CSR disclosure or the status of social responsible company (RI) obtained on the SE does not have to coincide with the actual behavior of the management board. The purpose of this article is not only to stigmatize the unethical behavior of top management or to point out that destructive leadership leads to the weakening of the organization and its results. It is all about asking a question and discussing how to reveal and change this kind of negative behaviors. The author presents his proposal and encourages a broad discussion in this regard.

Concept

When assessing the company's activities in relation to CSR, it is quite easy to evaluate its activities for the benefit of society, financing education, sport and people in need. Such activity is based on documented financial flows, often publicized, especially in social media. Companies prepare CSR reports which very precisely indicate the positive social impact. However, it is much more difficult to gain insight into internal organizational behavior. In the case of the listed company, none of these incidents went to court. In Polish realities, the use of the court route is not very common. Employees usually only do this in extreme situations. Going to courts is costly, unpleasant, time-consuming and puts the victim in a bad light in the context of finding a new job. Moreover, highly qualified dismissed employees are able to find a new job, leaving behind unhealthy working environment that they would not like to return to, even if it were through a court order. Thus, the absence of litigation does not determine the true behavior of an organization. The company's report, endorsed by its president, shows on the one hand that it undertakes obligations with regard to respect for human rights, emphasizing in the first place that "all employees are treated with respect". On the other hand, the report emphasizes the achievements which resulted in the development of "clear, precise rules of conduct in accordance with the Code of Ethics". As to the achievements concerning human rights, the implementation and

application of a number of internal regulations regarding norms and values applicable in relations between employees, as well as non-acceptance of behaviors such as discrimination, intimidation, mobbing were indicated. The described situation clearly indicates that from the formal point of view, the organization made effort to pay attention to ethical issues, made a number of efforts, also financially, to promote prosocial behavior. However, the declared policies were not consistent with the attitude towards an employee. In the face of such a contradiction, the key question should therefore be asked about the source of unethical behavior. Why does the top management remove valuable employees from the organization. It can be an issue of the whole sphere of the human psyche related to fear, complexes, a sense of internal competition, aggression, the desire to dominate or demonstrate power. But all this may also be accompanied by the conviction that it is the way to achieve maximum organizational results, which is what the company's top management is called for and what shareholders and its representatives on the supervisory board expect. If such goal orientation has the strongest effect, the unethical behavior may be misconstrued as justified.

The analyzed case study shows that such a process may take years. It means that during this time the top management hurts selected employees, losing valuable company capital and lowering the morale of the staff, at the same time not letting the organization develop to the best of its abilities. Diers-Lawson et al. (2020) point to the fact that unfair treatment of employees leads to the CSR declaration being perceived as inauthentic not only by the employees themselves, but also by customers and investors. Thus, even legitimate efforts and undertakings implemented under the CSR program may thus be undermined and not bring the expected effect of building social trust.

In view of the above, is it possible to build a mechanism for changing the attitude of the top management within CSR? It seems so. There can be at least two ways to do this, preventive and interventional. The first way is related to the education of the top management organized by SE authorities for companies listed on the index of socially responsible companies. Education would not be about ethical rules, as these are well known to all, but it would show the impact of ethical behavior and positive relationships on the company's results. Glińska-Neweś (2017) points out that positive interpersonal relations are one of the key dimensions of the innovative climate in an organization. Thus, the long-term development of the enterprise will be strongly dependent on interpersonal relations. Skrzypczyńska (2013), in turn, presents the results of research indicating that among many CSR manifestations, the greatest correlation exists between friendly HR management policy (employee satisfaction, development of careers, work conditions, leaves, safety and remuneration) and organization development as well as company performance. Newman et al. (2020) provide evidence of employees' reciprocity and a positive relationship between adoption of CSR initiatives and firm efficiency. The presented results of scientific research, as well as specific examples from economic life, could be an impulse to free the desire to shape ethical attitudes of the top management. Of course, the source of ethical attitudes should be primarily a person's moral backbone, and not only a vision of greater benefits. But, if such a route could lead to a gradual improvement in behavior, it would also be worth taking. However, it may be difficult to convince managers that business conducted honestly can thrive and prosper. Especially since there are many negative examples from the economic life that taking shortcuts simply pays off, at least in the short term.

An additional preventive measure would be 360 degrees feedback in relation to the disclosure of unethical management behavior towards employees as well as other areas of CSR. In order to be credible, evaluation would have to be organized by SE authorities to achieve the effect of independence from the company's governing bodies. Employee confidence that the survey is completely anonymous and that an employee cannot be identified would also play a key role. Hence, each employee should be able to evaluate not only his supervisor but also other managers in the organization. Especially since employees take part in meetings with different functional managers, work in miscellaneous project teams or organizations with a matrix structure. One of the solutions could be a system where employees would draw envelopes with unique links (or codes) when they leave work, so that they could complete the survey from anywhere using the Internet. In the case of large organizations, perhaps it would be worth arranging a separate draw of blue and white collar workers. The survey results would allow the identification of managers acting in an unethical manner, especially those with the greatest negative impact in the organization. Communicating the results to employees, management and the supervisory

board would have a strong forward-looking and positive impact on management behavior. This behavior has been explained by Kahneman (2012), a Nobel laureate, who describes an experiment with payment for coffee and tea. When a poster with human eyes was hung over the tea and coffee making machine, payments were almost three times higher. It can therefore be expected that awareness of 360 degrees feedback, and especially of making the results public, would stimulate improvement in management behavior. Karkoulian et al. (2016), on the basis of empirical research, indicate that "the implementation of 360-degree feedback in an organization not only gives rise to organizational justice, but also aids in sustaining this justice and making justice an integral part of the organizational culture" (p. 1862). Cheng and Wu (2020), in turn, prove that "implementation of 360 degree evaluation benefits principals in improving leadership effectiveness" (p. 65). However, Bracken and Rose (2011) point out that relevant content, credible data, accountability, and census participation are required to successfully create organization change.

The second way - intervention, would allow employees to report negative incidents directly to SE authorities responsible for the index related to CSR companies on a whistleblowing basis, with the possibility to place complaints past the hierarchy (Christian 2018). At the same time, all employees would need to know that such a possibility exists and is trustworthy. Then it can be expected that in fear of losing reputation by publicizing the matter through stock market announcements or social media, financial consequences and even removal from the CSR index, top management would be much more restrained in their unethical behavior. However, the condition for effectiveness would be the complete financial independence of the supervisory body, which surely would be guaranteed by SE authorities.

Conclusions

The described case study clearly shows that the declaration of compliance with CSR, published CSR reports, or participation in the SE index of CSR companies do not reveal the true intentions and unethical behavior of the top management. Conducted and demonstrated prosocial activities can only be image-related in order to positively influence the public perception and interest of SE investors.

Therefore, the question arises how to react to such situations and what remedial measures should be taken. The author proposes two parallel paths of preventive and intervention measures. Preventive actions would concern two directions. The first direction would be educating the top management and making them aware that ethical behavior can serve the development of the company, while bringing abundant social benefits, at the same time recognizing that only a change in the mindset of the top management is the best guarantor of the implementation of the CSR policy. The second direction would be 360 degrees feedback, which would encourage the reduction of unethical behavior and expose the managers with the greatest negative impact in the area of CSR. The third direction would relate to the following intervention measures. Employees should be able to individually report management behavior inconsistent with the declared CSR policy to SE authorities responsible for the index of CSR companies on the basis of whistleblowing. Certainly, this concept does not fill the entire range of possibilities, but it is an invitation for scholars and specialists in the field of CSR to seek solutions that could motivate entrepreneurs to act not only for show, but to a greater extent for the benefit of all stakeholders.

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Two-Speed Europe Model in the Aspect of Europe 2020 Strategy

Malgorzata CWIEK
Cracow University of Economics, Cracow, Poland, malgorzata.cwiek@uek.krakow.pl

Katarzyna MAJ-WASNIOWSKA
Cracow University of Economics, Cracow, Poland, katarzyna.maj@uek.krakow.pl

Katarzyna STABRYLA-CHUDZIO
Cracow University of Economics, Cracow, Poland, stabrylk@uek.krakow.pl

Abstract

The purpose of the paper is to indicate if two-speed Europe is an existing and real concept in the context of the EU strategy - Europe 2020. Based on the selected indicators of: Employment, Research and Development (R&D), Climate Change and Energy, Education, Poverty and Social Exclusion, it was examined whether the division of countries corresponds to the assumptions of the two-speed Europe concept and if it is equivalent to the countries of the euro area, which is the novelty factor in the paper. Cluster analysis and Mann–Whitney U test were used in the study. It turns out that in the context of conducted research, in the EU we are dealing with a model of a Europe of two speeds, but the separation line is not equal to membership of the Eurozone, i.e. with the concept of two speeds formulated based upon political criteria.

Keywords: Two-speed Europe, Multi-speed Europe, differentiated integration, Europe 2020 Strategy, cluster analysis

Introduction

The economic and financial crisis of 2008 has fostered considerable changes in social and economic policy of the European Union (EU) member states. There is a noticeable tendency to improving integration of countries sharing a single currency, with a simultaneous choice faced by derogating countries – a rapid fulfillment of conditions for fully-fledged membership in the Economic and Monetary Union (EMU) and accepting supplementary requirements imposed as part of the European Semester regarding the economic and budgetary policies, or keeping away from the area with a perspective of greater autonomy in action and internal policies, but at the same time with possibly less decision-making powers regarding the future of integration. In effect, the expression "two-speed Europe" has been used more frequently, dividing EU member states into euro-area countries and the countries beyond of it. Such approach to two-speed Europe is first and foremost political in nature, rather than economic. Two-speed Europe might be interpreted as a theoretical concept considered in terms of science, and moreover as a proposal of the future acts of an international organization that the European Union has become after entry into force of the Lisbon Treaty and finally, as a natural progression of functioning in the Union structure of several dozen countries with a varying level of social and economic development.

The aim of the article is to indicate if the Union of two speeds is an existing and real concept in the context of the EU strategy - Europe 2020. Based on the selected indicators of: Employment, Research and Development (R&D), Climate Change and Energy, Education, Poverty and Social Exclusion, it was examined whether there is indeed a clear division into groups of member states in terms of diversity of the level of economic wealth within individual societies, and finally if the division of countries corresponds to the assumptions of the two-speed Europe concept and whether it is equivalent to the countries of the euro area.

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Two-Speed Europe as a Concept of Differentiated Integration

Two-speed Europe is a concept that has been present in European politics for nearly forty years, i.e. the time when the European Community was joined by Greece, and later Spain and Portugal. The accession of Great Britain, Ireland and Denmark in the 1970s was not yet the origin of the debate on differentiated integration, but the different vision of cooperation that the United Kingdom began to present was a prelude to changes in the activities of six member states. A discussion about the possibility of faster integration of those countries that are more advanced in the adoption of the European Communities' law on its territory was started in the report of Belgian Prime Minister L. Tindemans in the mid-70s of the twentieth century (Stubb, 1996; Tindemans, 1976). Over time, European integration became less uniform, leading to the phenomena of differentiated integration. Certain activities and concepts (for example the Schengen area and the common currency as well as other opt-outs[1]) began to affect some member states or not only member states. (Schimmelfennig, 2016, pp. 5-7).

The question about a two-speed or multi-speed Europe began to emerge mainly in political considerations, followed by scientific deliberations with a progressing process of admitting new members to the European Union, shaping the single European market and, at the same time, geopolitical shifts in Europe in the late 1980s and early 1990s, and then after 2008, along with adopting new solutions in response to the economic and financial crisis and in the face of Brexit (Adler-Nissen, 2016; Campiglio, 2017; Kundera, 2019; Piris, 2012; Troitiño et al. 2018). The first half of the 1990s saw the intensification of the debate on the future of the European Union and its development trends (Alesina & Grilli, 1993; Martin, 1995). It was proposed to integrate the founding members as core countries with the possible German-French leadership at the time. However, this concept involves a statement that other countries can also join this process (Koenig, 2015). This model met with little agreement on the EU forum, where, for example, Great Britain preferred a model with the possibility of freely combining member states for a common aim, which was close to the essence of the concept of variable geometry (Salmon & Nicole, 1997).

Currently, in the literature attention is drawn to the benefit and threats of differentiated integration (Holzinger & Schimmelfennig, 2012; Jensen & Slapin, 2012; Koenig, 2015; Novotný, 2012; Rosefielde, 2019; Yanniris, 2017). Recalled are ideas of multiple or two speeds, where not all countries participate in the same joint actions, but move in the same direction (Piekutowska & Kużelewska 2015), and while the former does not have strictly defined groups of countries, the latter clearly indicates the division: the countries inside and outside the euro area. A considerable threat of these ideas is to move to such functioning of the member states as Europe à la carte, i.e. selecting only those elements that suit a given state. However, in this latter case, there is strong opposition from the majority of member states, defined as "no cherry-picking" expressed in negotiations with the UK on a withdrawal agreement (Laffan, 2019).

Therefore, one can assume that expanding and deepening integration quite naturally causes diversified membership, if members jointly decide under applicable law that only some of them will work together on specific issues (Jokela, 2014). Crucially, however, the group of states that do not join further processes does not object to the new activities of the more strongly integrating countries. According to Art. 20 of the Treaty on European Union: Member States which wish to establish enhanced cooperation between themselves within the framework of the Union's non-exclusive competences may make use of its institutions and exercise those competences by applying the relevant provisions of the Treaties, subject to the limits and in accordance with the detailed arrangements (…). Enhanced cooperation shall aim to further the objectives of the Union, protect its interests and reinforce its integration process. Such cooperation shall be open at any time to all Member States (Treaty on European Union, 2012).

An example of a constructive breaking of the deadlock in decision-making by an increasing number of EU members is the possibility of enhanced cooperation of at least nine member states in matters falling within the scope of Community policy, but covered by the EU's non-exclusive competences enshrined in the Treaty on the Functioning of the European Union (Articles 326-334 of the Treaty on the Functioning of the European Union, 2012). In this formula, of considerable importance are the reservations that, firstly, any country outside the cooperating group may declare its willingness to join and, secondly, activities within the framework of enhanced cooperation may not have harmful effects for countries outside this group (in terms of the rights, competences and obligations of those countries).

According to Schimmelfennig (2017), differential integration is allowing member states to cooperate at different levels of integration that fit their preferences and capacities based on (…) the legal exemption of a member state from an article. In effect, differentiated integration mustn't necessarily be perceived as a threat, but as a solution breaking down the paralysis as part of seamless integration (a facilitator of integration). Therefore, the aim of multi-

speed integration does not need to be the desire to exclude anybody, but undertaking new activities that other members can join at any time (sometimes after meeting certain conditions, which is why discussions about differentiated integration involve talk of capacities and willingness). The quest for solutions for a more robust functioning of the euro area should not violate the cohesion of the entire European Union, and should even lead to its strengthening (Barcz, 2015a). It is possible to maintain the systemic consistency of the European Union and, at the same time, to use its internal differentiation to develop the integration process (Barcz 2015b).

The debate on two-speed Europe was re-opened in 2012 at the occasion of discussion on the future and development of the Economic and Monetary Union, with particular emphasis on the euro area countries (President of the European Council, 2012a, 2012b). There also began a search in the literature of constructive solutions for a smoother functioning of the euro area (Mazier & Valdecantos, 2015). In 2012, the activities and changes in legal acts allowing for the creation of a "genuine Economic and Monetary Union" were also clarified (European Commission 2012, Van Rompuy, 2012). The areas of chief interest include: closer coordination and monitoring of fiscal policy, supervision of banking system, economic policy (including improving competitiveness of economies and employment growth) and decision-making at EU level. It was emphasized that the aim of the measures in the short to medium term until 2025 is to strengthen the stability of the euro area and the European Union as a whole, while scenarios of possible faster and deeper integration of the euro area with its own institutional and legal solutions were presented.

Another document dated 2015 was developed which mainly referred to the euro area countries through, inter alia, creating a future fiscal stabilization mechanism for the euro area to counter the crisis (Juncker et al., 2015). As a consequence of the abovementioned report, a White Paper was published in 2017. It contained scenario analyses of different lines of action in which the formation could evolve in the near future (European Commission, 2017a). Among the options mentioned, a scenario emerged: Some do more: the EU-27 allow groups of Member States to do more in specific areas such as taxation, social issues, defense, internal security and justice. However, it was emphasized that the unity of the European Union remains unchallenged and that other EU countries may join collective undertaking upon their consent. Another important document which included the statement about working in the same direction but at different speeds was the Rome Declaration (European Commission 2017b). As part of EMU, the necessity to complete the banking union and capital markets integration were emphasized, and financial instruments and procedural solutions were proposed to allow for greater convergence in the actions of the euro area countries at the economic and public finance level (European Commission, 2017c). It was stressed at the same time, that the single currency was to be an element uniting the EU member states by proposing the creation of a means of support in the form of technical and financial assistance for countries willing to adopt the single currency (Juncker, 2017; Gostyńska-Jakubowska, 2017; Gordon, 2018, Haas et al. 2018).

Work on deepening the functioning of the Economic and Monetary Union was reflected in a document prepared by the European Commission (2019). It contained a summary of the achievements to date and a call for further actions in the field of completing the construction of the banking union with the European Deposit Insurance Scheme, coordination of details for the Budgetary Instrument for Convergence and Competitiveness, changes in the European Stability Mechanism combined with a backstop to the Single Resolution Fund, progress on the Capital Markets Union and consolidation of the euro as an international currency.

Some EU member states, mainly the Visegrad Group countries, fear that the implementation of a multi-speed Europe will strengthen divisions between the members of the European Union, weaken solidarity not only with regard to the internal policy of the European Union, but also in relations with third countries, and lead to disintegration. At the same time, uneven integration is what some perceive a necessity with such a large number of members, emphasizing that it viably already exists. An interesting concept was proposed by Godino and Verdier (2014), who demonstrated the theoretical possibility of creating a federation within the European Union based on parliamentary democracy with a group of six or seven countries. The proposal became a kind of peculiar novelty in that, firstly, it does not cover all euro area countries, although the authors underline the importance of the single currency for the entire project, and, secondly, Poland could also be included among the federation states, i.e. a country located outside the euro area for the time being.

Methodology

The study covered indicators adopted in the Europe 2020 Strategy for the period of 2010-2018 and additionally GDP per capita. In the Europe 2020 Strategy, the European Commission set out three priorities, which were subsequently divided into headline targets and specific goals: 1) Smart growth: developing an economy based on knowledge and innovation, 2) Sustainable growth: promoting a more resource efficient, greener and more

competitive economy, 3) Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion (European Commission 2010). The indicators for individual areas, their average values in 2008 and the targets for 2020 are presented in Table 1.

Table 1: Prospects for achieving the goals of the Europe 2020 Strategy

Area	Indicator	Past situation - 2008	Target 2020
Employment	Employment rate (% of the population aged 20-64)	70.3	75
Research & Development	Gross domestic expenditure on R&D (% of GDP)	1.85	3
Education	Early leavers from education & training (% of population aged 18-24)	14.6	<10
	Tertiary educational attainment (% of population aged 30-34)	31.2	>+40
Poverty and social exclusion	People at risk of poverty or social exclusion (cumulative difference from 2008 in thousands)[2]	-	-20,000
Climate change and energy	Greenhouse gas emissions (base year 1990=100)	90.64%	80%
	Final energy consumption (million tonnes of oil equivalent (TOE))	1179.5	1086
	Share of renewable energy in gross final energy consumption (%)	11	20
	Primary energy consumption (million tonnes of oil equivalent (TOE))	1693	1483
	Greenhouse gas emissions in ESD sectors (ESD-Effort Sharing Decision base year=100 / million tonnes CO2 equivalent)	2787.7	2618.17

Source: Eurostat (2019)

Variables used in the research are selected indicators from the Europe 2020 Strategy: Employment rate, Gross domestic expenditure on R&D (% of GDP), Greenhouse gas emissions, Early leavers from education and training, Tertiary educational attainment, Poverty and social exclusion. Moreover, GDP per capita was used in the research as an indicator of countries' wealth. Based on the selected data, it was examined whether the division of countries corresponds to the assumptions of the two-speed Europe concept and if it is equivalent to the countries of the euro area. Nonparametric tests of significance for differences were done using a test for independent samples by Mann-Whitney U test (MacFarland & Yates, 2016). This test enables the verification of the research hypothesis that individual samples were taken from the same population, or in more detail – from populations with equal medians (at $\alpha<0.05$ of significance level). The Mann–Whitney U test consists in ranking the value of the dependent variable (from the smallest to the largest) in the studied groups, and comparing them (Aczel & Sounderpandian 2018). The condition for applying this test is measurement of the analyzed variables on at least ordinal scale. Furthermore, multidimensional exploration in the form of data clustering was used to group the EU member states due to similarity as regards the level of indicators of the Europe 2020 Strategy and assessment of the selected groups against the background of countries inside and outside the euro area.

Results of Research and Discussion

Tables 2 and 3 present descriptive statistics for chosen indicators of the Europe 2020 Strategy in 2008 and 2018 for 28 EU countries. Given the average values of the analyzed variables, it should be noted that for all indicators there was an improvement and thus their levels were brought closer to the set goals. The largest improvement was recorded for Share of renewable energy in gross final energy consumption (53%). A dramatic improvement was also noted in the field of education – an increase in the Tertiary educational attainment index by 36% and a decrease in Early leavers from education & training by 32%. It is worth noting that in the analyzed years there was a very slight increase in GDP per capita (by less than 2%). Interestingly, when comparing 2008 and 2018, it can be seen that the minimum value of GDP per capita increased by as much as 18%, and at the same time the maximum value decreased by 1%. These changes could be attributed to the financial crisis that emerged in the EU countries at the end of 2007.

Table 2: Descriptive statistics of the selected indicators from Europe 2020 Strategy in 2008

Specification	N	Mean	Min	Max	SD	CV
Employment rate (% of the population aged 20-64)	28	70.95	59.20	80.40	5.46	7.70
Early leavers from education & training (% of population aged 18-24)	28	13.45	4.40	34.90	7.44	55.30
Gross domestic expenditure on R&D (% of GDP)	28	1.43	0.39	3.54	0.90	62.41
Share of renewable energy in gross final energy consumption (%)	28	13.80	0.20	44.67	10.57	76.57
People at risk of poverty or social exclusion (%)	28	24.05	14.90	44.80	7.79	32.37
Tertiary educational attainment (% of population aged 30-34)	28	31.36	15.40	47.90	10.52	33.56
GDP per capita (in PPS)[3]	28	100.07	43.00	266.00	43.08	43.05

Source: prepared by the authors

Table 3: Descriptive statistics of the selected indicators from Europe 2020 Strategy in 2018

Specification	N	Mean	Min	Max	SD	CV
Employment rate (% of the population aged 20-64)	28	73.84	59.50	82.40	5.38	7.29
Early leavers from education & training (% of population aged 18-24)	28	9.19	3.30	17.90	4.00	43.53
Gross domestic expenditure on R&D (% of GDP)	28	1.63	0.50	3.32	0.88	53.89
Share of renewable energy in gross final energy consumption (%)	28	21.09	7.39	54.65	11.79	55.92
People at risk of poverty or social exclusion (%)	28	21.86	12.20	32.80	5.48	25.05
Tertiary educational attainment (% of population aged 30-34)	28	42.78	24.60	57.60	8.96	20.95
GDP per capita (in PPS)	28	101.82	51.00	263.00	42.92	42.15

Source: prepared by the authors

Tables 4 and 5 present a comparison of values between indicators in the Eurozone countries in 2008 in 2018. In Table 4, 15 countries were included in the Eurozone (according to the actual status for 2008), and in Table 5, the group of Eurozone member states increased to 19 countries due to the adoption of the common currency by other countries (Slovakia, Estonia, Latvia, Lithuania). In 2008, GDP per capita was the only variable which notably differentiated the countries of the Eurozone and those outside of it. Hence, the average level of the analyzed indicator of the Europe 2020 Strategy did not differ substantially in both groups of countries. On the other hand, in 2018 the average level of both GDP per capita and the analyzed Strategy indicators did not differ significantly in the analyzed groups of countries. Interestingly, conducting the Mann–Whitney U test for the 2018 data while maintaining the country breakdown for 2008 indicates that GDP per capita in the Eurozone countries was considerably higher than in other EU countries. On the other hand, adopting a division into euro-area and non-euro-area countries from 2018 (i.e. the inclusion of Slovakia, Estonia, Latvia and Lithuania in the Eurozone) means that GDP per capita from 2008 did not differ significantly in both analyzed groups of countries. This implies that the key to studying the concept of a two-speed Europe is the division of countries, and not the choice of indicators.

Table 4: Mann–Whitney U test for Eurozone countries and beyond in 2008

Specification	Sum of ranks – Eurozone*	Sum of ranks – countries beyond Eurozone**	U	Z	p-value	Z corrected	p-value
Employment rate (% of the population aged 20-64)	212.5000	193.5000	92.5000	-0.2073	0.8358	-0.2073	0.8358
Early leavers from education & training (% of population aged 18-24)	244.5000	161.5000	70.5000	1.2207	0.2222	1.2211	0.2221
Gross domestic expenditure on R&D (% of GDP)	255.0000	151.0000	60.0000	1.7044	0.0883	1.7047	0.0883
Share of renewable energy in gross final energy consumption (%)	191.0000	215.0000	71.0000	-1.1977	0.2310	-1.1977	0.2310
People at risk of poverty or social exclusion (%)	179.5000	226.5000	59.5000	-1.7275	0.0841	-1.7282	0.0840
Tertiary educational attainment (% of population aged 30-34)	252.0000	154.0000	63.0000	1.5662	0.1173	1.5662	0.1173

GDP per capita (in PPS)	281.5000	124.5000	33.5000	2.9252	0.0034	2.9276	0.0034

**Eurozone – 15 countries; **Countries beyond Eurozone – 13 countries*
Source: prepared by the authors

Table 5: Mann–Whitney U test for Eurozone countries and beyond in 2018

Specification	Sum of ranks – Eurozone*	Sum of ranks – countries beyond Eurozone**	U	Z	p-value	Z corrected	p-value
Employment rate (% of the population aged 20-64)	265.0000	141.0000	75.0000	-0.4919	0.6228	-0.4921	0.6226
Early leavers from education & training (% of population aged 18-24)	270.0000	136.0000	80.0000	-0.2460	0.8057	-0.2461	0.8056
Gross domestic expenditure on R&D (% of GDP)	273.5000	132.5000	83.5000	-0.0738	0.9412	-0.0738	0.9412
Share of renewable energy in gross final energy consumption (%)	264.0000	142.0000	74.0000	-0.5411	0.5884	-0.5411	0.5884
People at risk of poverty or social exclusion (%)	272.0000	134.0000	82.0000	-0.1476	0.8827	-0.1476	0.8827
Tertiary educational attainment (% of population aged 30-34)	299.0000	107.0000	62.0000	1.1314	0.2579	1.1322	0.2576
GDP per capita (in PPS)	306.5000	99.5000	54.5000	1.5004	0.1335	1.5008	0.1334

**Eurozone – 19 countries; **Countries beyond Eurozone – 9 countries*
Source: prepared by the authors

The further phase of research involved cluster analysis to distinguish two groups of countries that could be described as a two-speed Europe. The same group of variables was used for the division. Ward's method and Euclidean distance were used. The results of cluster analysis for 2008 and 2018 are presented in Figure 1.

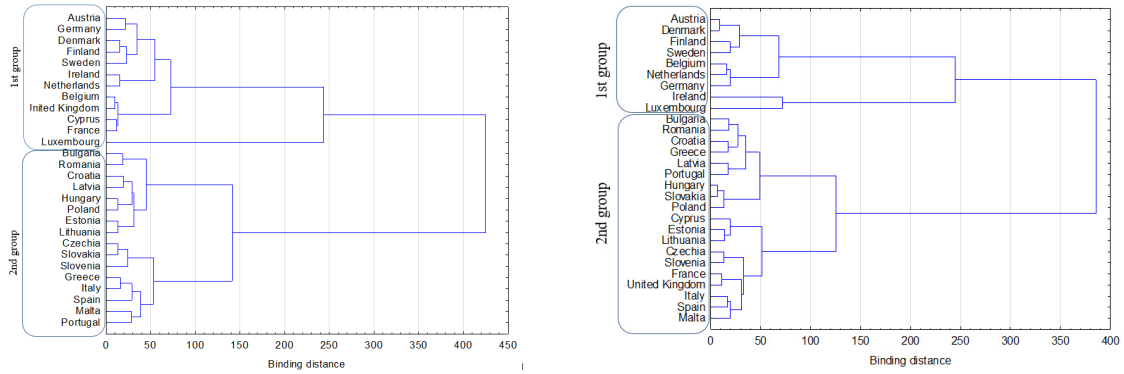

Fig. 1: Cluster analysis for 2008 (left) and 2018 (right)
Source: prepared by the authors

Both in 2008 and 2018, there is a clear division into two groups of countries. In 2008, the first group contained 12 countries, i.e. Austria, Germany, Denmark, Finland, Sweden, Ireland, Netherlands, Belgium, United Kingdom, Cyprus, France and Luxemburg; only 3 of those did not belong to the Eurozone (Denmark, Sweden. United Kingdom). Meanwhile, it is important to mention that it was not due to the non-compliance by these countries with the necessary conditions for joining the zone, but resulted from their voluntary resignation from membership in the zone. With the exception of Cyprus, these countries constituted an essential part of the "first fifteen" (EU15), as they formed precursory elements for the present European Union, first by creating the European Coal and Steel Community, then the European Economic Community and the European Atomic Energy Community. After all, the idea of integration was to promote harmonious and sustainable growth of the European Community and accelerated raising of living standards (Balassa, 1962; Tinbergen, 1964; Baldwin & Wyplosz, 2015).

In 2018, the first group contained nine countries. The first group remained virtually unchanged from 2008 (except for Cyprus, France over United Kingdom, which were placed in the second group). Thus, in 2018 the second group increased by the above-mentioned countries. As part of those countries, we may indicate on the one hand such which were a part of the former Eastern bloc and acceded to the European Union during the last sixteen years, and

on the other, the countries of southern Europe, which were particularly hard-hit by the financial crisis of 2007. Firstly, these states underwent a political and economic transformation and the period of building a market economy in their case is much shorter, and therefore they are continuously treated as developing countries. On the other hand, the Southern European countries, referred to as PIGS (Portugal, Italy, Greece, Spain), have a particularly difficult budgetary situation with a high level of public debt, which is the effect of the existing policy consisting in indebtedness with relatively low economic growth and high unemployment. This problem is more fully explained by Albonico et al. (2016), Christiansen (2014), Siemiatkowski & Jankowska (2013).

The conducted analysis of clusters enabled to select two groups of countries in a substantive manner on the basis of statistical data (key indicators from the perspective of development of the European Union). Such an approach is fundamentally different from the one used in the first part of the analysis, where the criterion of belonging to the Eurozone was adopted, which is the product of economic and political criteria. Afterwards, using the obtained results of the cluster analysis, we compared the levels of indicators of the Europe 2020 Strategy in the selected groups.

Table 6: Mann–Whitney U test for two groups of countries identified as a result of cluster analysis in 2008

Specification	Sum of ranks – Group 1*	Sum of ranks – Group 2**	U	Z	p-value	Z corrected	p-value
Employment rate (% of the population aged 20-64)	235.5000	170.5000	34.5000	2.8319	0.0046	2.8322	0.0046
Early leavers from education & training (% of population aged 18-24)	162.5000	243.5000	84.5000	-0.5107	0.6096	-0.5108	0.6095
Gross domestic expenditure on R&D (% of GDP)	249.0000	157.0000	21.0000	3.4586	0.0005	3.4591	0.0005
Share of renewable energy in gross final energy consumption (%)	156.0000	250.0000	78.0000	-0.8124	0.4166	-0.8124	0.4166
People at risk of poverty or social exclusion (%)	108.5000	297.5000	30.5000	-3.0176	0.0025	-3.0188	0.0025
Tertiary educational attainment (% of population aged 30-34)	247.0000	159.0000	23.0000	3.3657	0.0008	3.3657	0.0008
GDP per capita (in PPS)	268.5000	137.5000	1.5000	4.3638	0.0000	4.3674	0.0000

**Group 1 – 12 countries; **Group 2 – 16 countries*
Source: prepared by the authors

Table 7: Mann–Whitney U test for two groups of countries identified as a result of cluster analysis in 2018

Specification	Sum of ranks – Group 1*	Sum of ranks – Group 2**	U	Z	p-value	Z corrected	p-value
Employment rate (% of the population aged 20-64)	162.5000	243.5000	53.5000	1.5495	0.1213	1.5502	0.1211
Early leavers from education & training (% of population aged 18-24)	110.0000	296.0000	65.0000	-0.9838	0.3252	-0.9842	0.3250
Gross domestic expenditure on R&D (% of GDP)	194.5000	211.5000	21.5000	3.1237	0.0018	3.1241	0.0018
Share of renewable energy in gross final energy consumption (%)	130.0000	276.0000	85.0000	0.0000	1.0000	0.0000	1.0000
People at risk of poverty or social exclusion (%)	88.0000	318.0000	43.0000	-2.0661	0.0388	-2.0661	0.0388
Tertiary educational attainment (% of population aged 30-34)	174.0000	232.0000	42.0000	2.1153	0.0344	2.1167	0.0343
GDP per capita (in PPS)	216.0000	190.0000	0.0000	4.1813	0.0000	4.1825	0.0000

**Group 1 – 9 countries; **Group 2 – 19 countries*
Source: prepared by the authors

The comparison of the average levels of indicators in the Europe 2020 Strategy in two groups distinguished in the cluster analysis reveals the existence of statistically significant differences. In 2008, there were differences in the level of variables: Employment rate, Gross domestic expenditure on R&D, People at risk of poverty or social

exclusion, Tertiary educational attainment. In 2018, differences appeared in the same indicators, except for the Employment rate. The first group, both in 2008 and 2018, had higher levels of the Employment, R&D and education indicators and a lower poverty-related indicator. Thereby, countries from this group are much closer to achieving the goals of the Europe 2020 Strategy in those areas. A second factor significantly differentiating the selected groups is the level of GDP per capita. In 2008, in the first group, the average level of this indicator was almost twice as high as in the second one (134.42 in the first group and 72.31 in the second). Such a relationship also occurred in 2018. In the case of the Share of renewable energy in the gross final energy consumption indicator, there are no considerable differences between the study groups, which stems from the big differences in the level of this indicator in individual countries. In some countries in the second cluster (e.g. Latvia, Estonia, Portugal), this indicator is over 30%, while in others included in the first cluster (Belgium, Netherlands and Luxembourg) it does not exceed 10%. Also in the case of the Early leavers from education & training index, there is a large internal differentiation of its level in groups 1 and 2. Although the observed differences are not statistically significant, the average level of Share of renewable energy in gross final energy consumption in the first group is higher, and the average level of Early leavers from education & training is lower.

In summary, the conducted research suggests the existence of two groups of countries within the European Union, differing in the level of socio-economic development. At the same time, it should be emphasized that although some of those groups correspond to the division into countries of the Eurozone and those beyond it, the group of "faster speed" identified in the cluster analysis covers only part of the euro area countries. Thus, the direct adoption of the political concept of two-speed Europe is not fully consistent with to the actual socio-economic status.

Conclusion

The concept of a two-speed Europe is based on the division of EU countries into two categories of members. i.e. countries seeking closer integration among the founding countries of the European Communities and a group of countries that are outside the euro area. This approach to the two-speed Europe, however, has more political than economic background. The political division based on membership in the Eurozone in 2008 indicated economic differentiation (measured by GDP per capita), but did not entail differentiation in social development in the areas of: education, poverty, R&D, employment, and environmental protection. After the decision to accept subsequent countries to the Eurozone, the economic divergence between the countries inside and outside the euro area also declined in importance. The conducted research indicates that there are two groups of countries within the EU, differing in the level of socio-economic development measured by the indicators of the Europe 2020 Strategy and GDP per capita. The cluster analysis demonstrates that the two separate groups coincide, if only partly, with the division into the euro area and the other member states. On the one hand, this is due to the fact that some wealthy countries with a high level of social development (Denmark, Sweden) have voluntarily resigned from membership in the Eurozone, while on the other hand, especially in the last 10 years, the Eurozone has been joined by, among others, countries of the former Eastern Bloc, whose level of economic development, although it has increased significantly in recent decades, is still lower than in the so-called "European core" (EU15). It turns out that in the context of conducted research, in the EU we are dealing with a model of a Europe of two speeds, but the separation line is not equal to membership of the Eurozone, i.e. with the currently much debated concept of two speeds formulated based upon political criteria (Koenig, 2015; Yanniris, 2017).

There is quite broad consensus that differentiated integration is not a negative phenomenon as long as there is no one strict group of core states and the so-called marginalized countries and that the status quo axis of the Union as a whole, such as: the single European market, including the customs union, competition policy, environmental protection, will remain undisturbed. Those in favor of the multi-speed approach (two or more) mention the benefits of such a solution, when in the absence of comprehensive agreement among all EU members, more immediate actions can be taken in a narrow group of countries. Such a view can be considered correct under the assumption of no more activity in the subgroups at the expense of the development of the entire organization. Moreover, opponents of such a model argue that it can lead to rejection of the idea of solidarity, i.e. decreasing disparities through integration.

In conclusion, it is worth to note that the conducted research may give rise to further, thorough analyses related to the raised topics. Subjects of particular interest are the impact of Brexit on the further functioning of the European Union and the change in the composition of power, as well as continuous EU integration involving the admission of new members. Moreover, interesting findings could be provided by the study of the impact of the economic crisis resulting from the COVID19 pandemic on the shape and scope of revision in the economic policy of the European Union.

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Endnotes

[1]By joint decision, not participating in new activities without the need to withhold other members
[2]People at risk of poverty or social exclusion rate - the sum of persons who are either at risk of poverty, or severely materially deprived or living in a household with a very low work intensity. Persons are only counted once even if they are present in several sub-indicators (Eurostat, 2012).
[3]Purchasing Power Standard (Eurostat, 2008).

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Market Structure and Market Power in Selected Sectors of The Polish Economy Based on COICOP Classification

Pawel Uminski

Gdańsk University of Technology, Faculty of Management and Economics, Gdańsk, Poland
pawel.uminski@zie.pg.gda.pl

Abstract

This paper present new and simple measures of market structure and market power. Based on the classical models of market structures, where a given structure is determined by the number of enterprises, indexes of degree of monopoly have been estimated, representing an average number of entities per branch. Additionally, market power indexes have been determined as an average revenue per an enterprise in a given branch. This approach has been employed to the analysis of market structure and market power in the Polish economy in the period from 2001 to 2013, according to COICOP classification. The obtained results indicate that both market structures and market power of companies are quite diversified. Classes with large number of entities, e.g. Medical Services and low number of entities (Gas) could be indicated. Market power is also diversified – relatively low rates occurred in Medical Services class, while the highest rates were determined for Fuels class. The conclusions from the analysis imply that in many sectors with considerable market power, State Treasury is highly significant. Established measure of market power was compared with the well-known measures – Lerner's index and HHI. Correlation coefficients indicate that the relation is statistically significant but moderate or weak.

Keywords: Degree of Monopoly, Market Power, COICOP, Polish Economy.

JEL Classification: D42, D43, L13

Introduction

Market structure and market power analysis is crucial both for micro and macroeconomics. The way enterprises operate in the market structure in the microeconomic aspect may be essential, through price-setting processes, for the entire economic system. This study focuses on the markets structure and market power of enterprises in the Polish economy in the period from 2001 to 2013. Considering the fact that this study is a part of a wider research project[1], the analysis of the market structure and degree of monopoly will be conducted on the basis of the "Classification of Individual Consumption according to Purpose" adapted to the needs of Harmonized Indices of Consumer Prices (COICOP/HICP) (GUS 2014a).[2]

The purpose of the study is to present new measure of market structure and market power and to determine the degree of monopoly and market power in selected[3] branches of the Polish economy, based on COICOP and determination of the statistical relation between both. The analysis has been conducted using aggregated annual data (from 2001 to 2013), concerning the number of enterprises and net revenue from sales of products under a given PKD code (Polish Classification of Activities). The data refer only to enterprises with 10 or more employees.

The analysis used new and simple measures of degree of monopoly and market power, corresponding to the classical models of market structures. Degree of monopoly has been defined as the index of average number of enterprises present in a given branch based on COICOP. The measure of market power is the index representing the average net revenue from sales of products recorded per enterprise in a given branch based on COICOP. The use of these measures has been determined by the purpose of the research project, analysis of the literature and the availability of statistical data.

In the first place, this paper presents the measures of degree of monopoly and market power most commonly used in empirical studies, as well as theoretical assumptions that must be made when using certain methods of measuring these market categories. Next, it describes the statistical data used in this paper along with their sources, as well as the new approach to the measurement of the degree of monopoly and market power. Necessary assumptions for the approach are discussed. The following part contains the outcomes of the study and results analysis. The paper ends with the summary.

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Degree of Monopoly and Market Power – Theoretical Background

A.P. Lerner defined market power as the inverse of elasticity of the demand for the company product. Assuming profit maximisation, the larger is the difference between the price and marginal cost, the larger is the market power. (Lerner 1934; Elzinga, K., & Mills, D. 2011). Microeconomic data concerning the price and marginal cost are needed to calculate the Lerner's index, which makes it difficult to obtain the result4. J.S. Bain suggested that the rate of profit could be used as the measure of market power. It concerns the profit that exceeds the normal profit, which also occurs in companies functioning based on the perfect competition model (Bain 1941).

This paper presents the numbers of enterprises in individual branches based on COICOP, which allows to compare the results between branches and gives an overview of the market structures in specific sectors of economy. Due to availability of data and the purpose of the study, new measures of degree of monopoly and market power have been used.

As it has already been mentioned, the study of market structure is limited to the analysis of the number of enterprises in a given sector. It is rooted in the classical models of market structures, from the model of perfect competition, through the model of monopolistic competition and oligopoly model to monopoly model (Moss 1984). These assume that market power of enterprises is determined by the market structure. Perfect competition and monopoly models, being the most extreme approaches to the market structure, derived market power (or lack of it) from the number of enterprises that form a given branch. In the perfect competition model, the number of companies was unlimited, which deprived individual entities of any possibility to affect its market environment, including the price of their products (Robinson 1934). In the monopoly model, there was a single company representing a branch, that considering the fact of having no competitors at all, possessed significant market power to be used to set prices allowing to maximise their profit (Fisher 1898; Morrison 2003).

A proper method to measure market power for the purposes of the analysis based on the classical models of market structures, is the Lerner index (Lerner 1934).5 However, it should be noted that this approach to market power analysis requires a number of restrictive assumptions, typical for classical and neoclassical economics, such as products homogeneity and profit maximisation as the goal of business activity. But if we reject the assumption of goods homogeneity, it turns out that individual enterprises can shape their situation, and also their prices (see: Carlton 1986; Gordon 1998).

Another assumption needed to describe the market structure and market power in a given sector using the number of enterprises representing that particular branch, is a reference to literature concerning the growth of the markets and the number of enterprises that form the given market. It indicates that a specific market structure is the effect of the competition, which may lead to bankruptcy of companies that cannot withstand the market conditions. The competition may also lead to acquisitions and mergers between businesses. There are many well acknowledged reasons accounting for motives of M&A, such as opportunity to increase prices of products (Farrell and Shapiro 1990, Deneckere and Davidson 1995) or reduction of the degree of competition (Perry and Porter 1985) (for comprehensive discussion of motives for M&A see Motis 2007) All these activities most often result in a decreasing number of companies representing the given sector, economies of scale and determining a specific market structure (Klepper, Graddy 1990).6 This assumption is necessary to perceive presented in this paper indexes as measures of market structure and market power. Otherwise market structure with one huge firm and great deal of small enterprises is possible, and our market power measure will not point it out.
The usefulness of the Lerner index as a measure of degree of monopoly is also closely related with the assumption of profit maximisation. On the other hand, the theoretical background of economics includes a large number of publications7 which assume alternative goals pursued by enterprises than profit maximisation (Coase 1937; Galbraith 1978, Galbraith 1984, Dunn 2011), which in turn results in a different price policy. Additionally, the assumptions of rationality and complete information available for business entities may be neglected (Simon 1979; Simon 1987). It would be followed by the elimination of the assumption to maximise any values by the enterprise. An enterprise pursues most certain goals, but due to limited rationality and incomplete information, maximising those goals is out of question. Thus the assumption that market power, used e.g. in the pricing decisions, is determined solely by the market structure, may be an oversimplification. In that view, the size of the sector with a given market structure may affect market power of relevant enterprises. Much larger market power is held by companies that operate among a relatively small group of competitors within a branch, and additionally the size of the sector is relatively large (e.g. in terms of net revenue from sales of products), compared to an enterprise that might be a monopolist, but operating in a market niche. The strength of impact on the market environment is completely different in this case (Galbraith 1973). Based on this assumption, average revenue indexes for individual sectors have been estimated according to COICOP. It is assumed that the larger is the revenue of a company representing a given industry, the larger is the market power of enterprises in that sector. It implies that market power is determined by the number of enterprises in particular industry (less players means lower competition) and by the size of the sector (larger revenue generated within the branch increases the chance that enterprises hold significant market power).

In general, assuming the own measures of degree of monopoly and market power in this study is determined by several reasons: 1) broader scope of study – the goal is to verify the dependence between the degree of monopoly, market power and price flexibility in the branch; since time series of price indexes for branches based on COICOP were available, market structure and market power indexes had to be estimated for branches grouped according to the same classification; 2) rejecting the assumption of profit maximisation, and thus rejecting the Lerner's index – as the goal of the company is, for instance, increasing the sales or market participation, most probably it will not maximise the profit; 3) data have been obtained at the level of aggregation of the 4-digit PKD code, which makes it impossible to determine the Concentration Ratio and HHI; 4) it is assumed that in the relevant period, market structures are determined by the market competition in a given institutional environment and the weakest business entities are eliminated.

Statistical data and methods of analysis

The obtained statistical data concerning the number of enterprises and net revenue from sales of products are grouped according to the PKD classification of activities. Considering the fact that the study of market structure and market power in the Polish economy is a part of a wider research8, the PKD and COICOP/HICP classifications must be matched. The method of finding corresponding codes in both classifications is presented in detail in the Appendix.

As it has already been mentioned, in this study, market structure is measured as an average number of enterprises representing a given sector. The lower is the number, the less competitive is the analysed structure. To estimate the degree of monopoly (competitiveness) of a given sector, the Average Numbers of Companies Index (ANoCI)9 has been used. The value of the index has been determined using annual data of the period from 2001 to 2013, concerning the number of active businesses employing more than 9 persons. The data have been acquired from the Polish National Official Business Register REGON, where numbers of registered entities according to the PKD classification are available. The data obtained concerned approximately 40,000 companies (lowest number recorded in 2004 – over 35,000 thousand, highest number in 2013 – almost 42,00010). ANoCI has been determined according to the following formula:

$$ANoCI_i = \frac{\sum_{j=1}^{n} n_{jt}}{\sum_{j=1}^{n} N_{jt}} \Big/ \overline{\frac{\sum_{j=1}^{n} n_{jt}}{\sum_{j=1}^{n} N_{jt}}} \qquad (1)$$

where:

$ANoCI_i$ – average numbers of companies index in sector *i*, based on COICOP

n_{jt} – number of companies having PKD code *j* in the year *t*;

N_{jt} – number of PKD codes representing sector *i*, based on COICOP in the year *t*;
i – COICOP code;
j – PKD code;
t – year (t=2001,…,2013)

This index has been transformed into a single-base index by determining the ratio of the average number of companies in a given COICOP sector (code) in the whole analysed period and the average number of companies in all COICOP sectors (code) in the whole analysed period.[11]

Market Power Index (MPI) has been determined using additional data concerning net revenue from sales of products achieved by companies grouped according to the PKD classification. The input data were annual records of the period from 2001 to 2013, derived from the SP or F-02 analyses (F-01 in 2013) concerning entities with at least 10 employees, conducted by the Central Statistical Office.[12] The obtained average net revenues from sales of products have been transformed into a single-base index base chain by dividing individual values by the average revenue in all COICOP sectors (codes) and in all years encompassed by the analysis. The mean value[13] was PLN 93.733 million, which was the average yearly net revenue from sales of products in all COICOP codes (period from 2001 to 2013). In other words, the average net revenue from sales of products among the companies encompassed by the analysis, in the period from 2001 to 2013, for all COICOP codes, was PLN 93.733 million. Consequently, the values of the MPI index represent the ratio of the average revenue in particular sector and the mean value. MPIs for individual COICOP sectors have been estimated with the use of the following formula:

$$MPI_i = \frac{\sum_{j=1}^{n} \frac{r_{jt}}{n_{jt}}}{\sum_{j=1}^{n} N_{it}} \Big/ \frac{\overline{\sum_{j=1}^{n} \frac{r_{jt}}{n_{jt}}}}{\sum_{j=1}^{n} N_{it}} \qquad (2)$$

where:

n_{jt} – number of companies having PKD code j in the year t;
N_{it} – number of PKD codes representing sector i, based on COICOP in the year t;
r_{jt} – net revenue from sales of products of PKD code j in the year t;
i – COICOP code;
j – PKD code;
t – year (t=2001,…,2013)

Unfortunately, part of the data concerning net revenue from sales had not been disclosed, due to the possibility of identifying the entity concerned. According to the statistical confidentiality principle, individual data or data in which aggregation comprises less than three entities, or in which the proportion of an individual entity exceeds 3/4 in a particular aggregation, cannot be made available (Journal of Laws of 1995 No. 88, item 439). In view of that, Statistical Confidentiality Indexes (SCI) have been determined, being the ratio of companies in which net revenue from sales had been made confidential and the number of all companies included in a given branch. If there were years available in which for a given COICOP branch the value of statistical confidentiality index was 0 (data concerning net revenue from sales have not been made confidential for any of the PKD codes in a given year), then MPI has been calculated based only on those years. If there were no data that have been made statistically confidential in any of the analysed 13 years, the selection has been limited to the years with the lowest SCI level. Considering 58 branches specified based on COICOP, in 20 cases there were no years (in the period from 2001 to 2013) in which the data concerning net revenue from sales were fully open. The data used in determining the MPI have been limited only to those years in which SCI was relatively lowest.14 Considering the high statistical confidentiality in group 08.1 Postal Services (lowest SCI or 23.8%), that group has been excluded from the market power analysis.

Outcomes

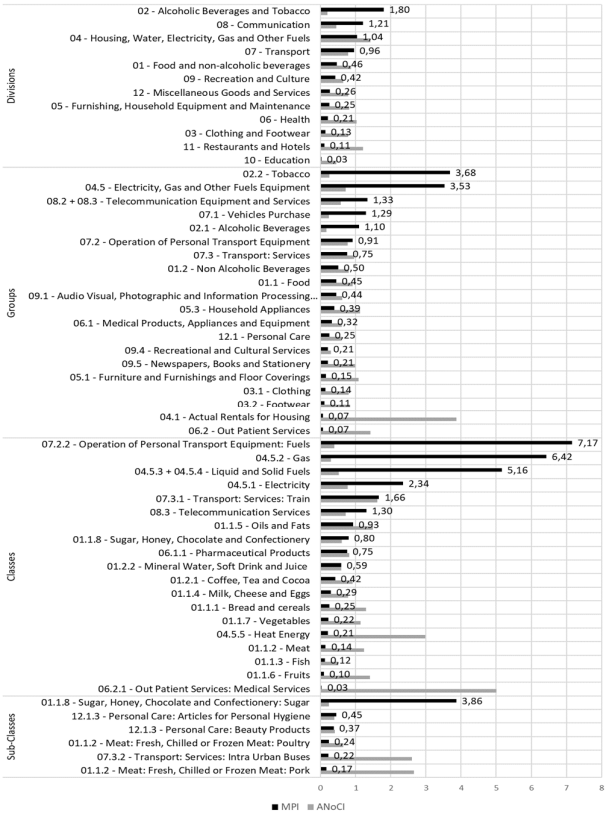

Figure 1: ANoCI and MPI based on COICOP
Source: author's calculations.

Statistical analysis of the dependence between the degree of monopoly index (ANoCI) and the market power index (MPI) indicates that such dependence is statistically significant[15]. The results of the correlation analysis are presented in detail in Table 1, while the simple regression models are shown in Table 2. Correlation coefficient indicate that the larger is the number of companies in the branch, the lower is the average profit achieved by the companies in that branch. The strength of the correlation is moderate (from -0.44 to -0.65; the value of -1 of the correlation at the subclasses level is achieved in very few observations). The correlation analysis is confirmed by the analysis conducted with the use of simple regression models. The market power index (MPI) was the dependent variable, while the predictor was the average numbers of companies index (ANoCI). In all cases, ANoCI was a statistically significant variable, the relation was negative, while the coefficient of determination was from 37% to 57%.

Table 1: Results of calculation of the Spearman's rank correlation and Kendall's Tau coefficients between the MPI (market power indexes) and the ANoCI (degree of monopoly)

			MPI	
			coefficient value	p-value
ANoCI	divisions 12	Spearman	-0,53	0,10
		Kendal	-0,45	0,04
	groups - 20	Spearman	-0,65	0,00
		Kendal	-0,45	0,00
	classes - 19	Spearman	-0,55	0,02
		Kendal	-0,44	0,01
	sub-classes - 6	Spearman	-1,00	0,03
		Kendal	-1,00	0,00

Table 2: Results of regression analysis between the MPI (market power indexes) and the ANoCI (degree of monopoly)[16]

		MPI		
	Sample size	**Model**	**P-value**	**R^2**
ANoCI	divisions - 12	MPI_Divisions = 2,47 - 4,81 ANoCI_Divisions + 2,61 ANoCI_Divisions ^{2}	0,01 0,02	0,56
	divisions - 11[17]	MPI_Divisions = 0,18 - 0,84 ln_ANoCI_Divisions	0,01	0,57
	groups - 20	ln_MPI_Groups = - 1,24 - 1,01 l_ANoCI_Groups	0,00	0,37
	classes - 19	ln_MPI_Classes = - 0,64 - 1,49 ln_ANoCI_Classes	0,00	0,47
	sub-classes - 6	insufficient observations	----------	----------

The correlation analysis has also been used to compare the obtained results with the results presented in the cited analysis of monopolistic margins (Gradzewicz, Hagemejer)[18]. That analysis is a comparison of the results given by the commonly used indexes and the MPI index, used in this study. It is a comparison of the results obtained using the MPI measure and the results obtained based on the commonly used measures. For the purposes of that comparison, MPI indexes had to be calculated based on the PKD classification. Table 3 presents the results of the correlation between the MPI and the Lerner's index, and also the Herfindahl index. The said comparison indicates that there is a statistically significant positive relation

between MPI and the Herfindahl index (all 3 indexes with 10% significance level). The strength of that relation is moderate or low. The dependence of MPI and Lerner's index is moderate but it's statistically independent in two out of three cases.

Table 3: Results of calculation of the Pearson correlation coefficient, Spearman's rank correlation and Kendall's Tau coefficients between the MPI (market power indexes) and the Lerner index and Herfindahl index for PKD classification

		MPI	
		coefficient value	p-value
Lerner index	Pearson	0,43	0,0194
	Spearman	0,11	0,5651
	Kendal	0,08	0,5851
Herfindahl index (3-digit)	Pearson	0,58	0,0011
	Spearman	0,34	0,0687
	Kendal	0,24	0,0828

Conclusion

This analysis gives an overview of the structure of branches and the market power of companies in the Polish economy. New and simple measures of the market structure and market power and been employed. Measure of the market structure was based on the number of enterprises in an industry and the measure of market power takes revenue in the industry into account. A great differentiation of individual branches should be emphasised. MPI values indicate a great diversity of market power in COICOP branches of the Polish economy. The analysis has been conducted on the basis of aggregated data. However, no information concerning the form of ownership of companies in individual branches was available. An in-depth analysis based on individual data would provide an answer to the question of the origin of market force in particular branches, i.e. to what extent it is the effect of the presence of the public sector. However, just a rough analysis of the list of the largest companies in Poland shows that in such classes19 as 07.2.2 Fuels, 04.5.2 Gas and 04.5.3+04.5.4 Liquid and Solid Fuels, 04.5.1 Electricity, 07.3.1 Transport: Service: Train, as well as in subclass 01.1.8 Sugar, companies with a significant State Treasury contribution can be found. They affect the MPI values in the entire branch, also with lower degree of aggregation (groups and divisions). On the other hand, there are branches dominated by few relatively large companies of the private sector, as 02.2 Tobacco, or to a lesser extent class 08.3 Telecommunication Services. Finally, to get a clear overview of the structure of ownership in sectors with high market power, ownership data or individual data are required.

However, it is difficult to compare these results with the outcomes of the other researchers.20 It is possible only when MPI indexes for PKD classification are estimated. The study of Gradziewicz and Hagemejer21 indicates relatively high values of Lerner's index and HHI index in the following branches: 1) Tobacco (16 PKD) and 2) Coke, oil, nuclear fuel (23 PKD), which was also confirmed by high MPI values in these branches. The correlation analysis indicates that higher values of HHI are followed by higher values of the MPI index, but the correlation is weak, and the correlation between Lerner index and MPI is weak, and mostly statistically independent. It may point out differences in theoretical background of those measures – MPI assumes that the size of the industry in the economy matters in market power while the Lerner index and Herfindahl index does not.

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[1] The analysis of degree of monopoly and market power is only a part of the project. The results of this study will be used to verify the assumption pointing out the correlation of degree of monopoly, market power and flexibility of prices. Price indexes used for the estimation of the price flexibility measure are quoted based on COICOP. It is therefore essential to obtain the measures of monopoly, market power and flexibility of prices based on the same classification.

[2] *Classification of Individual Consumption by Purpose worked out for the needs of Harmonized indices of consumer prices*; Considering the fact that there are only minor differences between COICOP/HICP and COICOP classifications, both will be referred to as COICOP in the following part of the paper.

[3] Degree of monopoly and market power have been analysed only for COICOP codes for which price indexes are published by the Central Statistical Office (GUS).

[4] The category of marginal costs is usually replaced with average costs.

[5] Lerner index has been estimated by the authors of the paper: (Gradzewicz and Hagemejer 2007).

[6] See the analysis of changes in the number of American manufacturers representing the following sectors: automotive, tyres, TV sets and penicillin. See (Klepper, Simons 2005)

[7] It is rooted in the study of Veblen and the revolutionary work of Berle and Means. (Veblen 1904; Berle and Means, 1932).

[8] See footnote 3.

[9] In particular it refers to an average number of companies under the same PKD code. One COICOP code usually covers several PKD codes. It is the effect of matching of both classifications.

[10] The variability in the number of companies with at least 9 employees in the analysed period may result from the changes in the number of employees in the enterprise sector.

[11] The average number of companies per PKD code in all COICOP codes, in the whole analysed period, was 102. If ANoCI in group 02.2 Tobacco is 0.26, in means that in PKD codes included in this COICOP group there were 26% of the average number of companies for all analysed branches in the entire period. The average number of companies is 102, so the number of companies having a given PKD code in a given branch can be easily calculated – in this case it would be 26 companies.

[12] These data have been prepared by the Central Statistical Office (GUS) upon the author's request and funded from the grant of the Polish National Science Centre, mentioned above.

[13] Excluding group 08.1 - Postal Services, due to high statistical confidentiality index (further information in the Appendix hereto).

[14] The highest SCI value for which data have been taken into account in MPI estimations was 3.3% (in 3.3% of the number of companies under a given PKD code, the data concerning net revenue from sales of products were not available due to statistical confidentiality).

[15] Of course, it is partially determined by the fact that the market power index calculation formula is related with the average number of companies in a given branch.

[16] The specification of the obtained models meets the requirements of the classical linear regression.

[17] The regression analysis has been performed for all 12 divisions and for the same group without division 04 - Housing, Water, Electricity, Gas and Other Fuels. For this division, relatively high values of MPI (1.04) and ANoCI (1.41) have been obtained. Shifting to a lower level of aggregation indicates that this division includes branches varied in terms of degree of monopoly and market power (in particular 04.1 - Actual Rentals for Housing – fragmented branch with low market power of companies and 04.5 - Electricity, Gas and Other Fuels Equipment – with a relatively low number of companies and high market power.

[18] The research period is not fully covered – the cited paper encompassed the period from 1994 to 2004, so based on the data used in the study, MPI has been estimated according to the PKD classification valid for the period from 2001 to 2004, and these particular measures have been compared.
[19] Which is certainly reflected by higher MPI values in higher COICOP aggregation levels, i.e. in groups and divisions.
[20] In the article cited before, *Marże monopolistyczne i przychody skali w gospodarce polskiej*, authors also claim that their outcomes could not be compared with other results, due to lack of such results. pp. 536-537. As it has also been mentioned, the analysis conducted by Gradzewicz and Hagemejer refers to a different classification than the one used for the purposes of this study.
[21] Data concerning the period from 1996 to 2004 were used.

Incidence of "Premature Sign-off" on Audit Procedure: Preliminary Analysis

Halil Paino[1] and Siti Aisyah Mohd Amran[2]

[1]Faculty of Accountancy, Universiti Teknologi MARA Malaysia
[2]Lieutienant for National Hydrography Department, Royal Malaysian Navy, Malaysia

Abstract

Audit role is significant in determining the fraudulent that occurred in corporate sectors by providing a quality audit report to assist the management in making effective and efficient decision to strengthen the business operation. Throughout the audit career path, completion of audit assignment within the time set by the audit manager is difficult to attain and gives greater pressure to audit staff. Hence, this problem may lead to Premature Sign-Off (PMSO) practices among the audit staff. PMSO occurs when an auditor signs off the required audit procedures without being covered by another procedure. This may lead to mitigating the effectiveness of audit process and compromising the audit quality. This paper examined the current level of incidence of PMSO among Malaysian external auditors, as well as to analyze the audit steps which appearing unnecessary, time budget constraint, inadequate supervision and readily accept the client explanation that affect the PMSO. Questionnaires were distributed to 125 audit firms in the Peninsular Malaysia and 99 responses were received. The result showed that, issues of PMSO definitely exist in Malaysia, and all the variables were significantly influenced the PMSO. Therefore, we should aware that the problem of PMSO exists in the audit environment, and preventive steps are needed to overcome this problem.

Keywords: Premature Sign-Off, Audit Steps Unnecessary, Time Budget Constraint, Inadequate Supervision, Readily Accept Client Explanation.

Introduction

In the recent year, audit profession had been questioned by shareholders in terms of credibility, integrity and objectivity due to the audit failure cases such as collapse of Enron, Worldcom and Parmalat. Auditors are regularly blamed for failing to discover material misstatement and various parties were questioned on the quality of the audit report. Generally, auditors are perceived to complete the audit works on time. However, in real practice this is difficult to attain because time budget allocated to audit staff sometime is not relevant and too short. According to Paino, Ismail, & Smith (2010), performance evaluation and career advancement in audit firm depend on the ability of the auditor to complete audit task on time and within time budget. Eventually, auditors may tend to practice Dysfunctional Audit Behaviors (DAB) in order to achieve good performance appraisal.

According to Paino et al. (2010), DAB comprises of variety of unethical behavior such as premature sign-off (PMSO) of audit procedure. According to Otley & Pierce (1996), PMSO occurs when auditor signed off a required audit step, not covered by another audit step, without actually completing the work or completely omitted the audit procedures which could affect the quality of final audit opinion and report. This would lead the client to make a misleading decision.

The purpose of this study was to investigate the level of incidence of PMSO by Malaysian auditors and examine the significant relationship of four major factors which had been highlighted by previous researcher (Alderman & Deitrick, 1982; Otley & Pierce, 1996; Paino et al., 2010; Reckers, Wheeler, & Wong-On-Wing, 1997) towards PMSO among Malaysian auditors. Besides that, this study also figured out which audit procedures in these behaviors were the most prevalent.

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The Incidence of PMSO

First documentation of exploring PMSO of audit procedure among auditors were made by Rhode (1978) which discovered almost 58 percent of the respondents at least engaged one time of PMSO. Followed by Alderman & Deitrick (1982), the study was actually the replication and extension of the Rhode's study by adding several issues relating to PMSO such as causes for PMSO occurred in the audit field and which audit areas these behaviours are most prevalent. This study pointed out that 31 percent of the respondents acknowledged PMSO occurred in real practice.

Next, the study done by Kelley & Margheim (1987) revealed consistent result with Alderman & Deitrick (1982) with 30 percent of the auditors admitted to commit PMSO at least once in their entire career. Then, Raghunathan (1991) conducted a research of audit personnel in offices of Big Eight accounting firm and discovered 55 percent of respondents responded ranging from very rarely to very frequently in engaging PMSO. After that, research conducted by Otley & Pierce (1996) which collected the data from all of the audit seniors in three Big 6 firms in Ireland found that 60 percent of respondents did at least once in signing off on audit steps without doing the work.

Then, Reckers et al. (1997) examined the incidence of PMSO among auditor using different methodology, namely by comparing the Direct Method (DM) and the Randomized Response Technique (RRT). As a result, the study reported significant higher frequencies of PMSO among auditors by using RRT. Over 78 percent of the auditors admitted that they had engaged at least once in PMSO. This indicated that there was a high degree of biasness when using the DM as compared to RRT as DM tends to influence respondents to respond inaccurately or to refuse to respond at all. In contrast, RRT is the technique that reduces or eliminates respondent's bias by guaranteeing the confidentiality of their responses through a randomization procedure.

The most recent study related to investigation engagement of PMSO among auditors were done by Paino et al. (2010). This study was an exploratory study of the incidence of dysfunctional audit behaviors', particularly in premature sign-off (PMSO), audit quality reduction behaviour (AQRB) and the effect of time budget pressure. This study concluded that PMSO problem exists among Malaysian auditor, with 57 percent of respondents admitting to signing-off prematurely.

Most of the previous studies done were based on the sample which included all range of positions in the audit firm including the top position. However, this study differs by only focusing on junior and senior auditors as the respondents as these groups were regularly face high pressure position to complete the audit works within the time budget planned.

Factors Contributing to PMSO

Audit Steps Appearing Unnecessary or Immaterial

Theoretically, auditors are required to test all audit procedures and give reasonable assurance toward client's financial statement. However in real practice, there are some auditors had prematurely signing off the audit procedures because they consider that audit procedures are unnecessary or immaterial. According to CAR Report explored by Rhode (1978), perceiving audit step as is one of the major causes of dysfunctional audit behavior. This is consistent with the study reported by Alderman & Deitrick (1982); Otley & Pierce (1996); Paino et al. (2010) which found out audit step that appearing unnecessarily is a top perceived cause of PMSO.

Otley & Pierce (1996) and Paino et al. (2010) showed that the incidence of PMSO often occurred during the review of internal control system (ICS) and vouching of expense as the auditor just concerned only with the existence and completeness of the transaction on audit assertions and objectives besides using the previous year's recorded understanding as an evidence of the existence of ICS. Thus, auditors tend to sign-off those audit procedures because they consider it unnecessary or immaterial as these areas involve relatively small amount of working paper documentation (Alderman & Deitrick, 1982).

Time Budget Constraint

Time budget constraint always become a problem to the auditors to finish the audit work on time (Braun, 2000). Supposedly, auditors are allocated with reasonable time budget by the audit manager to complete the audit task. However, time budget allocated to audit staff sometime is not relevant and too short compared to audit task assigned. Based on the survey conducted by Cook & Kelley (1988), 36 percent of the respondents admitted time budgets were ''very tight and practical unattainable''. Similarly, survey conducted by Kelley & Margheim (1990) to audit staff in

US found that 18 percent of the respondents believed time budgets are either ''very tight, practically unattainable'' or ''impossible to achieve''. Willet & Page (1996) reported that 15 percent of the respondents believed time budget was ''not nearly enough'', 53 percent believed it was ''not quite enough''.

Meanwhile, Otley & Pierce (1996) showed that nearly 17 percent of time budget were ''impossible to achieve'', 29 percent were ''very tight and practically unattainable''. Coram, Ng, & Woodliff (2003), indicated that 51 percent of the respondents who were the Australian auditors considered that time budgets ''sometimes'' adequate and 2 percent believed that were ''never'' adequate. Moreover, Pierce & Sweeney (2004) conducted a survey to Ireland senior auditors which finally found 36 percent of the respondents indicated that time budgets were either ''very tight, practically unattainable'' or ''impossible to achieve''. Therefore, from the result of plenty past research indicated that time budget allocated to audit staff was considered inadequate and difficult to attain and to complete the audit task within time budget assigned to them. For that reason, Hyatt & Lovig, (2001) concluded that one of the most common reasons why auditors engaging PMSO was because of the time budget pressure and Coram et al. (2003) recommended that the level of time budget pressure may tend to mitigate the audit quality.

Inadequate Supervision

Audit supervisor or manager's role is quite important to detect the poor work done such as PMSO of audit procedures by audit staff. Generally, audit manager is responsible for organizing and overseeing the audit process in accordance with audit planning and expected to supervise and coach the audit staffs to ensure that audit process are completed in line with all the relevant requirements. According to Alderman & Deitrick (1982), Otley & Pierce (1996) and Paino et al. (2010) inadequate supervision was among the top causes of PMSO.

Sometimes, audit senior or supervisor has discovered PMSO of audit steps done by audit staff, but they refused to report that dysfunctional behavior. In fact, Alderman & Deitrick (1982) found that 78 percent of the respondents agreed that their firm's review procedures were adequate to detect PMSO among the audit staff. According to Hyatt & Taylor (2013) who investigated the reporting intention of auditor's managers discovered that audit staff under their supervision has prematurely signed-off the audit step and they were less likely to report the incidence when the audit staff worked under tight time budget or when unintentionally committed. Due to that reason, audit staff believes that they can easily commit PMSO because audit supervisors are not stringent in formally reported that behavior. Thus, audit staffs feel that they are not adequately supervised by their supervisor or manager and can simply prematurely signed-off the audit steps especially those perceived unnecessary or immaterial. Previous research suggested to solving inadequate supervision by providing adequate training to audit supervisors. The effective training can allow them to prevent and more likely to detect PMSO committed by an auditor under their supervision. In addition, Hyatt & Prawitt (2010) discovered that when the firm policies regarding PMSO were clearly stated, the supervisors were more likely to report the incidence detected.

Readily Accept Client Explanation

Sometimes, when the time budget planned reach the limit or auditors lack an effort to carry out the audit work, they tend to accept the client explanation as a sufficient evidence matter without further investigation. Acceptance of weak client explanations and superficial review documents may give a direct threat to the quality of the audit (Coram et al., 2003; Otley & Pierce, 1996; Paino et al., 2010). Commonly, this factor occurs when auditors do not have enough time to do a proper test or conduct audit procedure to the client's accounts due to time budget constraint. When the auditors need to finish the audit task in a short period, they may tend to omit or sign-off some audit procedures that they feel as immaterial and not significant. Then, they just accept the client explanation without extensively check and review the client's documents. Studies conducted by several past researchers obviously proved inclination to readily accept client explanation was among the major perceived cause towards PMSO.

Based on study conducted by Alderman & Deitrick (1982), unquestioning acceptance of client representation was the top perceived cause contributed to PMSO among auditors. Otley & Pierce (1996) found that the inclination to readily accept client explanation was the fourth place that cause PMSO of audit steps or procedures and this result was consistent with exploratory study by Paino et al. (2010).

Hypothesis Development

The development of hypothesis was to determine the top four perceived causes that have been discovered by previous researchers (Alderman & Deitrick, 1982; Otley & Pierce, 1996; Paino et al., 2010) on engagement of PMSO among Malaysian external auditors. This study examined the relationship between audit steps appearing unnecessary (ASU), time budget constraint (TBC), inadequate supervision (IS) and readily accept client explanation (RACE) on the incidence of PMSO among Malaysian external auditors (IPMSO). Thus, the hypothesis developments are as follows:

H1. High perceived cause of an audit step appearing unnecessary will be associated with high level engagement of PMSO among Malaysian external auditors.

H2. High perceived cause of time budget constraint associated with high level engagement of PMSO among Malaysian external auditors.

H3. High perceived cause of inadequate supervision associated with high level engagement of PMSO among Malaysian external auditors.

H4. High perceived cause of readily accept client explanation associated with high level engagement of PMSO among Malaysian external auditors.

Research Methodology

This study distributed 125 survey questionnaires to the various audit firms in Peninsular Malaysia which randomly selected from the Malaysian Institute of Accountants (MIA) website. 99 responses were received with 79 percent response rate. Sekaran (2007) mentioned that a sample size which was larger than 30 and less than 500 would be appropriate for most research. Thus the sample size was considered acceptable for this study. The focus for this study was the audit seniors and audit juniors from various sizes of firms, Malaysian-wide ranging from small firms to the big '4' firms. In Malaysia, audit senior is usually involves in deciding the audit procedures and the audit programmes. They are also the person around the mid-point in the firm's hierarchy and occupies the most high pressure position in the firm (Otley & Pierce, 1996) and responsible to coordinate and supervise the execution of the audit work programme and are responsible to liaise with client. Meanwhile, audit junior is a person around the lower-point in the firm's hierarchy and also faces high pressure position in order to complete the audit works within the time budget planned. Due to high pressure, audit senior and audit junior may tend to commit PMSO on audit steps.

This study used multiple linear regression analysis to test the relationships. Multiple linear regression analysis was suitable for this study because both independent and dependent variables were numerical (Hair, Anderson, Tatham, & Black, 1998) and was well-recognized for bridging the gap between analysis of variance and correlation in addressing research hypothesis (McNeil, Kelly, & McNeil, 1975).

Analysis and Result Discussion

The incidence of Premature Sign-off (PMSO)

This study found that PMSO problem exists with 34.3 percent of the respondents admitting to commit PMSO during their audit work. This result closes to the 31 percent and 30 percent reported by Alderman & Deitrick (1982) and Kelley & Margheim (1987) respectively, but much lower than the 57 percent reported by Paino et al. (2010). Table 1 shows the level of engagement PMSO among auditors in Malaysia.

Table 1: Level of Engagement PMSO

PMSO among Malaysian external auditors	External Auditor's Rank	
	Yes	No
Number of respondents admitting to signing-off prematurely	34.3 %	65.7 %

Audit Areas or Procedures in Which PMSO Most Prevalent

Next, this study presented with a list of the major audit areas on which auditors felt PMSO prevalently occurred. Two areas of audit stand out as having a significant greater likelihood of PMSO were vouching expenses and

followed by physical inventory count. The finding from this study was slightly different with previous study by (Alderman & Deitrick, 1982; Otley & Pierce, 1996; Paino et al., 2010) which highlighted review/testing of the ICS was the most prevalent audit areas has been prematurely signed-off and followed by vouching expenses. Vouching expenses was expected to be the most common auditors likely to sign-off as it involved relatively small amount of working paper documentation (Otley & Pierce, 1996).

Area	Mean score	SD	Percentage of respondents who reported that PMSO occur at least sometimes
Vouching of expenses	3.20	0.94	77.8
Physical inventory count	3.05	0.98	73.7
Account receivable	2.92	0.94	74.8
Cash	2.92	1.03	73.8
Account payable	2.91	0.97	73.8
Other inventory	2.88	0.90	70.7
Review/testing of internal control system (ICS)	2.84	0.90	68.7
Fixed assets	2.71	0.96	64.6

Note: Frequency was scored on a scale of 1 to 5, where 1=never, 2=rarely, 3=sometimes, 4=often, 5=nearly always.

Statistical test of hypotheses

Results of the regression analysis shows *H1* has positive and significant relationship between audit steps unnecessary with the engagement of PMSO with t-value of 2.435, ($p < 0.01$, one-tailed). Next, *H2* also has been supported whereby time budget constraint were significantly associated with the engagement of PMSO with t-value of 2.075, ($p < 0.05$, one tailed). Based on the result in Table 2 below, the regression result also supported *H3*, inadequate supervision and engagement of PMSO with t-value of 2.833, ($p < 0.01$, one tailed) and *H4* also has positive and significant relationship between readily accept client explanation and engagement of PMSO with t-value of 1.945, ($p < 0.05$, one tailed).

Table 2: Regression Result between variables

	Std Error	Beta	t-value	p-value
Audit Steps Unnecessary (ASU)	.091	.234	2.435**	.017
Time Budget Constraint (TBC)	.100	.198	2.075*	.041
Inadequate Supervision (IS)	.103	.263	2.833**	.006
Readily Accept Client Explanation (RACE)	.090	.190	1.945*	.055

**p<.05; ** p<.01 (One-tailed test for hypothesized analysis)*

Conclusion

This study intended to close the gap by testing the relationship between perceived causes that have been discovered by previous researchers towards the incidence of PMSO among Malaysian external auditors and investigating the current level of PMSO in Malaysia. Subsequently, this study has developed four hypotheses whereby high perceived causes of audit steps unnecessary (ASU), time budget constraint (TBC), inadequate supervision (IS) and readily accept client explanation (RACE) will be associated with high level engagement of PMSO among Malaysian external auditors.

The result showed significant positive relationships between four independent variables with the level incidence of PMSO in Malaysia. The linear regression was used to test the relationship of four independent variables. The t-value of all independent variables reported significant result by using one-tailed measurement, whereby audit steps unnecessary (ASU) having t-value of 2.435, time budget constraint (TBC) with t-value of 2.075, inadequate supervision (IS) with t-value of 2.833 and readily accept client explanation (RACE) with t-value of 1.945. Therefore, all of these independent variables have significant impact to the incidence of PMSO among Malaysian external auditors.

Limitation

The limitation of this study would be the possibility that the respondents may not respond to the survey in the same way that they practice in their audit task. The questionnaire may have not been given to personnel who might have made the most negative behavior during their audit works, namely in relation to PMSO. Respondents may not accurately answer the survey. Thus, a few of respondents may significantly understate the incidence of PMSO.

One of the limitations includes the sampling bias whereby this study only focused on the senior and junior auditors as the target respondents and this do not cover the whole level of personnel in the audit assignment, namely the audit manager and partner.

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The Effect of Job Satisfaction, Fair Treatment and Cooperativeness on Employees' Whistle Blowing Practices

Erlane K GHANI

Faculty of Accountancy, Universiti Teknologi MARA Selangor
Malaysia
Email: erlanekg@uitm.edu.my

Nurliyani JAMALUDDIN

Felcra Berhad
Malaysia
Email: lyaniniey@gmail.com

Kamaruzzaman MUHAMMAD

Faculty of Accountancy
Universiti Teknologi MARA Selangor
Malaysia
Email: kamaruzzaman@uitm.edu.my

Abstract

This study aims to examine the factors influencing employees' whistle blowing practices. Specifically, this study examines the effect of job satisfaction, fair treatment and cooperativeness among the employees in the public listed companies. This study utilizes the Miceli-Near-Dworkin model that discusses on the characteristics of an individual, the situation as well as the organisation that commit events of misconduct and the relative power of the parties over one another as well as the consequences for the individual who blows the whistle. Using questionnaire survey on 137 employees in a public listed company in Malaysia, this study shows that there is a significant relationship between fair treatment and whistle-blowing practices. However, the remaining two factors which are job satisfaction and cooperativeness do not have significant relationship with the whistle blowing practices among the employees in the public listed companies. The findings of this study provides understanding to the management of the public listed companies in relation to whistle blowing practices. The findings of this study offer information to the management of the public listed company regarding the whistle-blowing practices. The findings of this study would be able to raise awareness amongst the officers in terms of being willing to report the occurrence of any wrongdoings in the organisation. This study also provides awareness among the employees and subsequently, create a better and healthier environment in the organisation.

Keywords: Job satisfaction, fair treatment, cooperativeness, corruption, whistle blowing.

Introduction

Corruption has continued to become a serious problem throughout the world. In Malaysia, the Malaysian Anti-Corruption Committee (MACC) in its 2016 annual report reported 6,551 corruption cases. Out of the 6,551 cases, 3,417 cases were related to corruption issues such as accepting bribe, giving bribe, abusing power and false claim. These wrongdoings provide negative impacts to the organisation and affect the nation's economy. The Malaysian government have taken various control mechanisms to curb such practices. One of the control mechanisms to avoid corruption cases is by implementing whistle-blowing practices in the organisation (PWC, 2014). According to Near and Miceli (1985), whistle-blowing can be defined as the disclosure by organisation members on illegal or illegitimate practice to a person (Brennan,

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2012). Good whistle-blowing practices in an organisation may lead to good governance practices as well as ensuring good working environment (Zakaria, 2000)
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The 2009 Global Corruption Report noted that whistle-blowing is one of the control mechanisms that can enhance accountability and honesty in an organisation by detecting wrongdoings which include unethical acts, fraudulent activities, mismanagement and corruption. However, only 23% of the corruption cases were informed by the whistle-blowers (Global Corruption Report, 2009). The low number of whistle blowers indicates that many employees are still afraid to report any wrongdoings in their organisation. In Malaysia, the Act for the protection of whistle-blowers has been established in 2010. The objective of implementing this whistle-blowing protection act is to give protection to those who blow the whistle which is by ensuring confidentiality of the information given and protecting them from criminal actions as well as detrimental actions being done to them. This Act is one of efforts done by the Malaysian Government's to reduce corruption cases as well as promote good governance under the name of Government Transformation Program (GTP).

According to the PWC report in 2014, most of the companies in Malaysia have effective whistle-blowing systems but they are not practiced in the real life. Even in Malaysia, most of the companies are still lacking in whistle-blowing practices due to the gaps in the law (IDEAS, 2017). In addition, the MACC chief commissioner noted that there is still a lack of public awareness on the protection of the informants. The agency has to convince the public that all the information given will be fully protected under the 2010 whistle-blower Act. It was reported that only 214 out of 1.6 million government servants have the courage to practice whistle-blowing since 2011 (Bernama, 2018). For example: A corruption case involves one public listed company, where the MACC has raided the company over alleged power abuse over training contracts worth RM4 million since 2014 (Bernama, 2018). The conflict of interests in the organisation may lead to intentional or unintentional corruption activities. The second issue is regarding the chairman of the company who was accused of feasting with the company's money. This case was reported by an external informant who was willing to report the wrongdoing in the organisation. Based on the cases, it is proven that whistle-blowing might not be practiced in the organisation. Understandably, whistle-blowing is not an easy task. This action needs one's courage to be able to put the public interest ahead of his or her own interest. In order to encourage whistle-blowing practices, the organisation needs to provide the right channel to whistle-blow and implement whistle-blowing policies that can protect the whistle-blowers (Said, Alam, Mohamed & Rafidi, 2017).

This study aims to examine the factors influencing whistle-blowing practices among employees in the public listed company. Specifically, this study examines the effect of job satisfaction, fair treatment and cooperativeness on whistle-blowing practices among employees in a public listed company. These factors are chosen based on the Miceli-Near-Dworkin model that discusses on the characteristics of an individual, the situation as well as the organisation that commit events of misconduct and the relative power of the parties over one another as well as the consequences for the individual who blows the whistle (Near, Dworkin & Miceli, 1993; Miceli, Near & Dworkin, 2008). The findings of this study can provide insights into corruption cases for the management of the public listed companies in general. The findings of this research will assist the management to execute policies to encourage employees to blow the whistle and consequently, promote effective internal control mechanism. The next section, Section 2 presents the relevant literature review. Section 3 explains on the research design. This is followed by Section 4 that presents the results and discussion. The last section, Section 5 concludes this study.

Literature Review

Whistle Blowing

The whistle-blowing term which originated from England, arises from a case of English Policemen who blew the whistle to alert the public and the authority to the crime cases that were occurring among them (Hersh, 2002). It is defined as the disclosure by employees of any organisation of any illegal, unethical or unlawful practices controlled by employers to the person or organisations that may affect the action (Mesmer & Viswesvaran, 2005). Other studies defined whistleblowing as the deliberate disclosure of information on non-trivial activities that are considered hazardous, illegal, unethical or discriminatory as well as any wrongdoings done by any employees in the organisation (Hersh, 2002)

In terms of whistle-blower, the 2010 Whistle-blower Protection Act (WPA, 2010) referred whistle blower as anyone who discloses wrongful behaviour to the enforcement agency. The Securities Commissions Malaysia on the other hand,

defined a whistle-blower as a person who informs someone in the authority on the basis of information reasonably believed to disclose an unlawful, illegal or dishonest activity. Certainly, these definitions involve all activities in which the employees use their power to report a wrongdoing in their organisation to the right channel, which is not for their own benefits, but for the company's sustainability in the industryEssentially, the definitions contain the idea that the employees willingly report any wrongdoings such as corruption, misappropriation of assets, fraudulent activities, and the abuse of power to the right channel. The whistle blower can practice to blow the whistle to the correct channel, either internal or external. Internal channel, such as the department of internal audit is responsible for taking action on all wrongdoings reports done by the employees. They have to investigate the level of seriousness of the case. If the case can affect the whole organisation proper actions will be taken by following the standard procedures (Said et al., 2017). The whistle-blower can report wrongdoings to the external channel as well. In Malaysia, there are a few enforcement agencies who act as an agent to enhance the whistle-blowing practice. Whistle blower may report the wrongdoing to the seven Malaysian law enforcement agencies, such as the Royal Malaysian Police, MACC, Department of Immigration, Department of Road Transportation, Securities Commission and Companies Commission of Malaysia. According to WPA, general powers have been given to enforcement agencies to receive any report of inappropriate conduct, to enforce protection of whistle blower, to deal with the inappropriate conduct disclosure, to receive and deal with complaints of inappropriate actions, and to enhance the provisions of the Act.

There are a few steps in the process of whistle-blowing. First, whistle-blower must do an observation with regard to the wrongdoing. Secondly, the whistle-blower must assess whether the event requires someone to be reported to the right channel or not. Thirdly, the whistle-blower evaluates if that is her/his responsibility to blow the whistle. After that, the whistle-blower will perform a cost-benefit analysis of blowing the whistle. This is required to determine whether the decision is sound or not. Lastly, the whistle-blower may take an action as to whether he or she should leave the organisation or make a report to the right channel or refrain from making any action and remain silent (Keil, Lockhart & Schlegel, 2010). It is hard for the employees to practice whistle-blowing in the organisation due to many factors that may affect the action. In addition, The Miceli-Near-Dworkin model explains about whistle-blowing specifically in terms of its predictors and consequences. This pro-social behaviour model also discusses about the characteristics of an individual, the situation as well as the organisation that is involved with the event of misconduct, the relative power of the parties over one another and also the consequences for the individual who blows the whistle (Miceli, Near & Dworkin, 2008). However, most of the studies that examined whistleblowing focused on individual personal intention and qualities that shape the whistle blowing practice in an organisation. This study extends the literature to include not only individual but also on situation and organisation. Specifically, this study focuses on three factors that may influence whistle-blowing practice of an individual (job satisfaction), the situation (cooperativeness) and the organisation (fairness treatment).

Job Satisfaction

Job satisfaction indicates the degree of the employees' positive emotion toward their job. The definition of job satisfaction is a composition of both the environmental and physiological circumstances that will make the person contented with his or her task (Aziri, 2011). There are three components in job satisfaction which are the affective, cognitive and behavioral components (Jex, 2002). The intuitive component referring to the sentiment towards the job. The cognitive factor represents the belief regarding the job. The cognitive and affective components are two closely related aspects. For instance, an employee may feel motivated towards their job and believe that they can perform well. The behavioral component represents the behavioral aspects of the job such as never being late to work and giving full attention towards their job in order to maintain the quality of work. Job satisfaction is difficult to measure. An individual may be satisfied with one aspect of job, while others may be dissatisfied with the same aspect of the job. Job satisfaction can be measured in many aspects, such as the pay and promotion, level of supervision, colleagues' attitudes, working environment and many more (Cranny, Smith & Stone,1992; Guo, Li & Wu, 2015).

In the context of job satisfaction on whistle-blowing practice, a study found individual factor such as job satisfaction may increase the probability of whistle-blowing practices in an organisation (Said et al., 2017). According to Alleyne (2010), individual factors such as attitudes towards whistle-blowing, perceived behavioural control, independence and commitment can also be factors influencing whistle-blowing. Employees who are highly satisfied with their current job scope, the work environment as well as the payment received, are very likely to protect the job and the organisation from any improper conduct (Cecilia, 2013). This implicates that attitudes of individuals are important in enhancing whistle blower practices. For example: A survey conducted by Cecilia (2013) on 24 federal departments in the US found a negative correlation between job satisfaction and the whistle blowing practice in the federal government. Employees are

highly satisfied with their job, thus reducing the whistle-blowing practice which may affect the image of the organisation. The employee who blows the whistle on any improper conduct can be seen to express revolution (Cecilia, 2013), which mirror to disloyalty to the organisation (Johnson, 2003) and indicates superior's disobedience (Glazer & Glazer., 1987).

To ensure that employees are all able to practice whistle blow, they need to be willing to report the misconduct to the right channel. Other studies found that satisfied workers are less likely to practice whistle blow. For example: Cecilia (2013) found that a good working environment as well as internal control may shape the employees to follow the organisation's policies and procedures, thus reducing number of fraudulent activities in the organisation while Shawner and Clement (2008) found that with a high job satisfaction employees are more likely to blow the whistle internally. There is no evidence on the correlation between job satisfaction and external whistle-blowing. However, if employees do not practice whistle-blowing, it can affect the organisation as a whole. A study in an organisational context by Miceli and Near (1992) stated that people who are satisfied with working life aspects are more likely to participate in whistle-blowing. Hence, the first hypothesis is proposed as follows:

H1: There is a significant positive relationship between practice of whistle-blowing and job satisfaction among employees in a public listed company.

Fair Treatment

Fair treatment can be defined as the state of being equal in many aspects such as in status, right and opportunities among employees in the organisation (Keil et al., 2010). The concept of fair treatment is to ensure that the employees are not be treated differently or less favourably regardless of the different position, characteristic, gender, religious or belief and age. Fair treatment and equality are important to the public value outcome as they can prevent from any negative impacts to the society and economy. In the context of an organisation, fair treatment usually refers to the organisational justice. Generally, the concept of organisational fairness is referring to the employees' fairness perception in the organisation (Colquitt, Greenberg & Zapata-Phelan, 2005). It is a multidimensional structure comprising three components which are distributive justice, procedural justice and interactional justice. Distributive justice refers to the equality of the allocation of company's resources and rewards among the employees (Adams 1965). The work rewards such as the bonus and salary are expected to be fairly allocated among the employees. The second component is the procedural justice. Procedural justice is referring to the equality of treatment and equality in formal policies and procedures which are used for decision-making (Lind & Tyler, 1988). Furthermore, the decision-making process must be fair, accurate, consistent, unbiased, representative as well as ethical. The third component which is interactional justice referring to the quality of interpersonal treatment in the organisation (Bies, 2000).

Fair treatment or equal treatment is one of effective mechanisms for lowering the degree of the employees' intention to leave their current organisation. Some previous studies have found a negative relationship between the perceptions on procedural and distributive justice and federal employees' turnover intention (Rubin 2009). A study has found that equal treatment and equality within the organisation may increase the number of wrongdoings reports (Said et al., 2017). The working environment is one of the factors influencing the employees' behaviour as well as the way they react towards the organisation. The perception of having organisational justice in the organisation will make the employees feel comfortable with the management with regard to improper conducts that may affect the organisation's objective. (Trevino & Weaver, 2011) Found that fair treatment and equality are significant predictors to the number of wrongdoing reports being lodged. It shows that fair treatment makes the employees to be willing to help the organisation to deal with improper conducts. In addition, Murray (2006) also found that the tendency to report improper conducts is positively correlated to the organisational justice. Hence, it can be concluded that fair treatment and equality in the context of whistle-blowing procedures will increase the willingness of employees' to practice whistle-blowing. However, the opposite finding was found by Cecilia (2013) in which there is a negative correlation between fair treatment and whistle-blowing practice. Refusal is one of the reasons why there is none of employees do whistle-blowing.

Previous studies have also found that equality and fair treatment could increase the probability of misconducts within the organisation being reported (Trevino & Weaver, 2001). In contrast with the Miceli-Near-Dworkin Model, their study suggested that higher employee's satisfaction towards the organisation's fairness system leads to more favourable and less retaliatory responses for the whistle blower. A scholar has found that when organisations are perceived to be fair, observers are more likely to blow the whistle internally and less likely to blow the whistle externally. Therefore, this study develops the following hypothesis:

H2: There is a significant positive relationship between whistle-blowing practice and fair treatment among employees in a public listed company.

Cooperation

Cooperation in the organisation is a process whereby employees are involved in the management processes including consultation, discussion, and decision-making and resolving an issue. Cooperation starts with a good communication among the employees which is to understand each other's interests and difficulties. Cooperation is an important aspect in organisational behaviour. An employee who cooperates with the other employee at work is seen to increase his or her loyalty and commitment to the organisation (Hage, 1980). A scholar defines cooperation as a part of the contextual performance or organisational citizen behavior (LePine & Van Dyne, 2001). The competitiveness of any organisation can be enhanced when the top management is able to form a highly motivated, dedicated and efficient team of employees. A dominant factor of workplace cooperation is the support by the employees' and management involvement. Top management's commitment is crucial to ensure that all employees are efficient and effective. Effective workplace cooperation will minimize any misunderstanding or miscommunication. To create a highly motivated workplace, the organisation has to absorb all the costs of training and accept the fact that the process is time-consuming. It will be a worthwhile investment as the outcome may boost the organisation's image in the future. The advantages of having cooperative workers in the organisation include the organisational and the employees' performance as well as the decision-making process will be improved, building trust among one another in the organisation as well as increase the job satisfaction. Other than that, cooperative employees in an organisation may lead to a positive working environment.

In terms of employees' cooperativeness to blow the whistle, a previous study found that whistle blows are more common in the public sector than in the private sector (Rothschild & Miethe, 1999). Whistle-blowing is very likely in an organisation with high performing work groups (Brewer & Selden, 1998). Another scholar has found that an organisation with a strong culture of teamwork or friendship and ethical values or that a democratic organisation is probably more practicing whistle-blow when the employees observe a misconduct. A study conducted by Rothwell and Baldwin (2007) on 184 private employees and 198 public employees in Georgia revealed that team cooperativeness among public employees caused to be more willing to blow the whistle. The result are in lined with prior studies (Vadera, Aguilera, & Caza, 2009) also found similar results, where a cooperative and friendly team is probably more to engage in practicing a whistle blow. In contrast, other scholars found a different results from the above findings. According to (Said, Alam, Mohamed, & Rafidi, 2017), the better cooperative team and flexibility of working environment may diminish the tendency of practicing whistle-blowing. A cooperative team would create a good environment and better communication mechanisms, thus reducing misconducts or whistle-blowing practice (Cecilia, 2013). Cecilia (2013) found that cooperativeness in the working environment may reduce events of wrongdoings. Moreover, cooperative team and flexible working environment with good dissemination and level of dedication would encourage the employees to internally handle the misconduct due to the excellent teamwork. Therefore, the following hypothesis is developed:

H3: There is a significant positive relationship between whistle-blowing practice and cooperativeness among employees in a public listed company.

Research Design

Sample Selection

The target population involved in this study is the employees in one of the public listed companies in Malaysia. This company is chosen due to its corruption case, where the MACC has raided the company over alleged power abuse over training contracts worth RM4 million since 2014 (Bernama, 2018). The conflict of interests in the organisation may lead to intentional or unintentional corruption activities. The second issue is regarding the chairman of the company who was accused of feasting with the company's money. This case was reported by an external informant who was willing to report the wrongdoing in the organisation. Therefore, this company deems suitable to be used to examine the factors on why the employees do not want to do whistle blow.

This study focuses on all departments in the public listed company. The participants for this study range from the lower to the upper ranks which are as follows: Assistant Executive, Senior Assistant Executive, Executive, Senior Executive, Manager, Senior Manager, General Manager, Senior Group General Manager and Top Management. The total number of employees in the company was about 200 employees.

Research Instrument

This study used a questionnaire survey as the research instrument. The questionnaire was developed based on the Miceli et al. (2008) with some modifications. The questionnaire contains five parts, which are Parts A, B, C, D and E. The first Part A contains five questions that dealing with the whistle blowing practice in the company, for example "*Management in this company disciplines unethical behaviour when it occurs", "Penalties for unethical behaviour are strictly enforced in this organisation.", "Top managers regularly show that they care about ethics in this organisation" and "My organisation enforces the code of ethics"*.

Next, Part B contains (5) questions that address the Job Satisfaction that determine the intrapersonal characteristics in the company such as "*I am satisfied with the task given to me", "All jobs done by me are appreciated by the upper level management"* and *"I feel motivated working in this organisation"*. Whilst, Part C contains (5) questions that address the Fair treatment by the organisation towards all employees in the company. For instance, "*There is equal opportunity for advancement at the Company", "Job promotions are awarded fairly and without bias" and "Performance Appraisals are fair and unbiased"*.

Part D contains (5) questions that address the Cooperativeness of the officers in the company such as "*My work unit is able to recruit people with the right skills", "Information is shared freely in my work unit"* and *"A spirit of cooperation and teamwork exist between my work unit and other work units"*. Lastly, Part E consists five questions that address the respondents' demographic. The participant are required to share their basic information such as gender, education level, job position, age, department, years of service in the company and their working experiences.

Data Collection

The data were collected via the Google form to distribute the questionnaires and personally meeting up the respondents, one by one. The total number of respondents in the company's Headquarter was identified to be about 400 employees in total. Thus, a duration of about a month was taken in order to attain the task of collecting all data from the distributed questionnaires. At first, this study tried to gather the information from all employees of the company as well as its subsidiaries. Out of the 200 questionnaires distributed, a total number of 137 respondents was acquired, resulting in a 68.5% response rate.

Results and Discussion

Descriptive Analysis

In this study, descriptive analysis was used to summarize data for each variable namely, job satisfaction, fair treatment, cooperativeness and whistle-blowing practice among employees of the public listed company. Table 1 depicts the overall means and standard deviations for the variables used. The whistle-blowing practice as the dependent variable score a mean value of 3.275 with standard deviation of 0.9208 and it was measured based on a five Likert scale point ranging from 1 as strongly disagree to 5 as strongly agree. The mean for job satisfaction is 3.425 with a standard deviation 0.8428 indicating that the respondents agree that job satisfaction is one of the factors that influence whistle-blowing practice in the public listed company. Meanwhile, the mean values for fair treatment and cooperativeness are 3.003 and 3.546 with standard deviations of 0.9033 and 0.7501 respectively.

Table 1: Descriptive Statistics

	N	Mean	Std. Deviation
Whistleblowing Practices	137	3.275	0.9208
Job Satisfaction	137	3.425	0.8428
Fair Treatment	137	3.003	0.9033
Cooperativeness	137	3.546	0.7501
Valid N (listwise)	137		

Validity Analysis

A factor analysis was carried out to test the validity of the instruments used in this study because the factor analysis is used to reduce a high number of variables to a smaller set of underlying factors containing all the essential information (Pallant, 2005). This method was used in this study to identify the underlying dimensions of job satisfaction, fair treatment and cooperativeness. Two statistical measures of the SPSS are used to assess data factorability, namely the Bartlett Test of Sphericity as well as Kaiser Meyer Olkin (KMO). The KMO measures the sampling adequacy and the sphericility test of Bartlett is used to measure the factorability of the matrix. If the KMO value exceeds 0.60 and the sphericity test of Bartlett is significant (less than 0.05), the data set is therefore suitable for factor analysis, as recommended by Pallant (2005). To interpret the results for each factor, the load factor for each measured item must be at least 0.30 in order to meet the minimum level. According to Field (2009), loading factor that values more than 0.50 is considered important and therefore any item that values a factor load of less than 0.50 has been eliminated in this study to achieve the most significant value.

Table 2 depicts that the result for factor loading for each question on whistle blowing-practices ranges from 0.882 (A01) to 0.807 (A03). The KMO test shows a value of greater than 0.60 which is 0.655 (Chi-square = 184.828, p-value = 0.000). However, there are two items removed which are B04 and A05 because the factor loading values were lower than 0.50. Therefore, the sample is sufficient to be used in this factor analysis and the knowledge variable supported in this study.

Table 2: Factor Analysis – Whistle blowing practice

Whistle blowing Practice	Factor	
A01	0.882	
A02	0.88	
A03	0.807	
A04	0.201	
A05	-0.145	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.655
Bartlett's Test of Sphericity	Approx. Chi-Square	184.828
	df	10
	Sig.	0.000

Table 3 depicts that the result for the factor loading for each question on job satisfaction ranges from 0.899 (B03) to 0.729 (B01). The Kaiser-Mayer Olkin test shows a value of greater than 0.60 that is 0.824 (Chi-square = 381.092, p-value = 0.000). Therefore, the sample is sufficient to be used in this factor analysis and the knowledge variable supported in this study.

Table 3: Factor Analysis – Job Satisfaction

Job Satisfaction	Factor	
B01	0.729	
B02	0.839	
B03	0.899	
B04	0.879	
B05	0.735	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.824
Bartlett's Test of Sphericity	Approx. Chi-Square	381.092
	df	10
	Sig.	0.000

Table 4 shows that the result for the loading factor for each question on fair treatment ranges from 0.905 (C02) to 0.598 (C03). The KMO test shows a value of greater than 0.60 that is 0.837 (Chi-square = 342.369, p-value = 0.000). Therefore, the sample is sufficient to be used in this factor analysis and the knowledge variable supported in this study.

Table 4: Factor Analysis – Fair treatment

Fair Treatment	Factor	
C01	0.858	
C02	0.905	
C03	0.598	
C04	0.865	
C05	0.762	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.837
Bartlett's Test of Sphericity	Approx. Chi-Square	342.369
	df	10
	Sig.	0.000

Table 5 shows that the factor loading result for each cooperative question ranges from 0.820 (D02) to 0.674 (D01). The Kaiser-Mayer Olkin test shows a value of 0.60 that is 0.775 (Chi-square= 252.285, p-value= 0.000). The sample is therefore adequate for this factor analysis and the test supported the variability of knowledge in this study.

Table 5: Factor Analysis- Cooperativeness

Cooperativeness	Factor	
D01	0.674	
D02	0.820	
D03	0.819	
D04	0.781	
D05	0.749	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.775
Bartlett's Test of Sphericity	Approx. Chi-Square	252.285
	df	10
	Sig.	0.000

Reliability Test

The ideal alpha coefficient of Cronbach should be higher than 0.700, according to Pallant (2005). Likewise, a modest reliability of 0.500 to 0.600 would be sufficient, as supported by Nunally (1978). Before testing the hypotheses in this study, an alpha test was used to ensure the reliability of the questionnaire instruments developed in this study. All variables used in this study were measured on the basis of a 5-point liker scale from 1 to 5. Table 6 shows the statistical test of reliability for all variables. The reliability coefficient Cronbach's alpha for whistle blowing practice had a scale of 0.824. This shows that the practice of whistling is good for the reliability of all three scaled items. Besides that, the job satisfaction had a reliability coefficient of 0.876. This result indicates that job satisfaction are consistent for the 5 items in the questionnaire where it is good and reliable. This results in a good and reliable job satisfaction for the five items in the questionnaire. In addition, Cronbach's alpha reliability coefficients were 0.858 and 0.823 respectively for fair treatment and cooperation. This indicates that both variables are good and reliable with 5 scaled items.

Table 6: Reliability test

Reliability coefficients	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Dependent Variable			
Whistle Blowing Practice	0.824	0.824	3
Independent Variables			
Job Satisfaction	0.876	0.875	5
Fair Treatment	0.858	0.858	5
Cooperativeness	0.823	0.827	5

Normality Statistic

A normality test was conducted to determine whether the data used in this study are properly modelled according to the rules of normality. Table 7 shows that all data sets are normally distributed across all variables where the skewness values for the variables are in the positive or negative range of 2, while the kurtosis values for all variables are below 7.

Table 7: Normality test

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Dependent Variable					
Whistle blowing Practice	137	-0.414	0.207	0.006	0.411
Independent Variables					
Job Satisfaction	137	-0.078	0.207	-0.501	0.411
Fair Treatment	137	0.060	0.207	-0.341	0.411
Cooperativeness	137	-0.154	0.207	0.002	0.411
Valid N (listwise)	137				

Pearson Correlation Analysis

This study carried out a correlation coefficient test of Pearson to measure the strength of the variables. Based on Table 8, the correlation between whistle blowing practice and fair treatment is moderately positive with a coefficient of r= .537 with a p- value of less than.01. This indicates that there is a positive relationship between both variables with an increase in fair treatment, the whistle blowing practice is likely to increase and vice versa. In addition, there is a low positive correlation with a coefficient of r = .482 and r = .405 with a p-value of less than .01 between the whistle blowing practice and job satisfaction and cooperativeness. This indicates that there is a positive relationship between these three variables, where an increase job satisfaction and cooperativeness will likely result in an increase in whistle blowing practice.

Table 8: Correlation Test

Pearson Correlations Coefficient Test				
	Whistle Blowing Practices	Job Satisfaction	Fair Treatment	Cooperat iveness
Whistle blowing Practice	1			
Job Satisfaction	.482**	1		
Fair Treatment	.537**	.782**	1	
Cooperativeness	.405**	.676**	.602**	1
***. Correlation is significant at the 0.01 level (2-tailed).*				

The Pearson correlation coefficient was used in the previous section to determine whether there is an important relationship between the independent variables and the dependent variable. The result shows that all independent variables have positive related to the dependent variable in a significant way. However, the correlation is interpreted as moderate and low based on the r coefficient, as all values are below 0.70 and 0.50. Fair treatment has the strongest correlation between the three independent variables with whistle blowing in comparison with job satisfaction and cooperativeness. However, correlation analysis could only explain the relationship between two variables in terms of their magnitude and direction, in which they are a direct relationship. It can therefore be said that cooperativeness, fair treatment and job satisfaction are the causes of whistling among the employees.

Multiple Regression Analysis

Multiple linear regressions can be used to investigate the linear relationship between one variable dependent and two or more independent variables. It can therefore be used in this study to determine the relationship between the independent variables and the dependent variable. There are three independent variables, job satisfaction, fair treatment and cooperativeness. The results of the multiple linear regression test are shown below in Table 9. The results indicate that R is 0.303. This indicates that 30% of the variation in whistle blowing practice is due to the variation in job satisfaction, fair treatment and cooperativeness.

Table 9: Regression Analysis

Variables	B	Std. Error	t-stat	P-value	VIF
(Constant)	1.250	0.332	3.767	0.000	
Job Satisfaction	0.121	0.139	0.865	0.389	3.104
Fair Treatment	0.403	0.120	3.356	0.001	2.644
Cooperativeness	0.114	0.122	0.930	0.354	1.889
R				0.55	
R Square (Adjusted R Square)				0.303 (0.287)	
F-statistic				19.261	
Durbin-Watson statistic				1.848	
a. Dependent Variable: Whistleblowing Practice					

Based on Table 9, the result for job satisfaction is no significant positive relationship between job satisfaction and whistle blowing practice ($\beta = 0.121$, $t = 0.865$, $p = 0.865$) and hence the H1 hypothesis is not supported. Although the result shows a positive relationship, however, the result is insignificant. This finding could be attributed to the attitude or character of the employees. Often when the employees are not happy with their job, it is not because of corruption but more because they are not happy with their job. Therefore, they would leave instead of detecting corruption activities and reporting to higher authorities. In contrast, the result for fair treatment indicates that there is a significant positive relationship between fair treatment and whistle blowing practice ($\beta = 0.403$, $t = 3.356$, $p = 0.001$) and hence, H2 hypothesis is supported. The beta coefficient for fair treatment is 0.403 indicating that for every 1 variation change in fair treatment could contribute to a change in whistle blowing practice by 0.403. Arguably, employees who feel that they are not being treated fairly by their superiors would likely report their superiors' wrongdoing. For example: the salary of an existing employee obtained lower salary compared to a new employee who has been accepted into the company. As for cooperativeness, the result shows no significant positive relationship with whistle blowing practice ($\beta = 0.114$, $t = 0.930$, $p = 0.354$), hence, the H3 hypothesis is not supported. This finding suggests that cooperative which is more related to task

and teamwork and may not be able to influence whistle blower practice. For example, an employee who is willing to do whistle blower whilst his team mate is against it may somehow deter the one who is willing to do whistle blow due to no cooperativeness from his team mate.

Conclusion

This study examines the factors influencing whistle blowing practices among the employees in a public listed company in Malaysia. Specifically, this study examines the effect of job satisfaction, fair treatment and cooperativeness among the employees in the public listed companies. The results of this study provide information on the practice of whistling among the employees. The first hypothesis, H1 predicts that there is a relationship between job satisfaction and whistle blowing practice in the public listed company. Based on analysis, it was found that there is no significant relationship between these two variables. This result is similar with a study done by Said et al (2017). The finding is also similar to an earlier study conducted by Shawver and Clement (2008) which revealed a positive but insignificant relationship between employees' job satisfaction and whistle blowing practice.

Secondly, the results for fair treatment in this study showed that the employees have a significant and positive relationship between fair treatments and whistle blowing practice. The result of this study show the consistency result with a research done by Said et al. (2017) which described that fair treatment dimensions such as performance appraisal, job assignment, career advancement, award and pay have positive significant relationships with whistle blowing practice. The result of this study also shows consistency with a study done by Trevinor and Weaver (2001) which noted that equality treatment in the workplace may increase the number of misconduct reports.

Thirdly, the results of this study for cooperativeness variable showed that there is no significant relationship between cooperativeness and whistleblowing practice among the employees. This indicates that employees' cooperativeness does not influence whistle blowing practice. The finding is consistent with the results previously observed by Said et al. (2017). A previous study conducted by Cecilia (2013) also found similar results where cooperativeness and flexible environment did give any impact to whistle blowing practice.

The findings of this study have several implications. First, this study revealed that fair treatment has a significant influence as well as positive impact on the perception on whistle-blowing practice among the employees of the public listed company, where the existence of fair treatment would trigger wrongdoings to be reported. A prior study discovered that fair treatment in the workplace would increase the number of wrongdoing reports (Said et. al, 2017). Additionally, according to other studies such as the research by Trevino and Weaver (2001), it is indicated that the environment of fairness in the workplace will be a factor for employees to be more open-minded with regard to reporting wrongdoings. Hence, the management should treat all employees' fairly to prevent any wrongdoings from happening. However, this study found that cooperativeness is not significantly and positively linked to the practice of whistle blowing among the employees. Hence, cooperativeness among employees would not influence or drive employees to report any wrongdoings.

This study is not without limitations. First, the number of respondents is significantly small and a large number of respondents would lead to a more concrete analysis and results. Another limitation of this study is that the first and third objectives have not been achieved as discussed previously, where the results show that job satisfaction and cooperation have not influenced the practice of whistling among employees of the public listed company. It is therefore suggested that more respondents should be involved in the future to enable the researcher to generalize the entire population of the selected group of respondents. It is also suggested that, in order to avoid biased responses in the survey, as whistling normally requires respondents to answer sensitive questions, the researchers may also use indirect ways to ask questions. However, the limitations of this study do not affect the findings of this study, but have been recognized to highlight possible future research opportunities.

The findings of this study offer information to the management of the public listed company regarding the whistle-blowing practice. The outcomes of this study would be able to raise awareness amongst the officers in terms of being willing to report the occurrence of any wrongdoings in the organisation. Most officers know of fraudulent activities in the organisation, but they may be too afraid to act. The aim of this study is to improve the practice of whistleblowing among employees and to create a better and healthier environment in the organisation. This study also helps to view the concept of whistle from a new perspective. Most of the research carried out on whistleblowing focused only on individual personal intention and qualities that shape whistleblowing in an organisation. However, this study attempted to shift the focus on

job satisfaction, fair treatment and cooperativeness in an organisation and how these factors lead to the practice of whistle-blowing in an organisation.

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Management of Ergonomic Interventions When Modeling The Technological Processes in The Industry 4.0

Kamil WRÓBEL

Poznan University of Technology, Faculty of Engineering Management, Division of Applied Ergonomics, Poznań, Poland, kamil.wrobel@put.poznan.pl

Tomasz HOFFMANN

Supercomputing and Networking Center, Poznań, Poland, tomhof@man.poznan.pl

Krzysztof CZARNECKI

Poznan University of Technology, Faculty of Computing and Telecommunications, Poznań, Poland, krzysztof.r.czarnecki@student.put.poznan.pl

Abstract

The Industry 4.0 solutions have capabilities of enriching the labor of the 4.0 operator, so they are perceived as the ergonomic interventions. According to the analysis of technological processes (TP) in a world-class organization of manufacturing, the complexity of human-machine-environment (HME) systems contributes to the occurrence of ergonomic factors adversely affecting the efficiency of the pursued tasks. In this context, it is important to develop the proper methodology for comprehensive determination of the ergonomic intervention scope within the 4.0 Industry, as well as the artificial intelligence systems taking into account the impact of ergonomic interventions within the 4.0 Industry. The purpose of this papers is the holistic approach into the TP ergonomics intervention management, within the 4.0 Industry. The result of such considerations is the holistic model determining the scope of ergonomic interventions within the I 4.0, as well as the example of the Hybrid Expert System (HES), in order to determine the scope of ergonomic interventions on the operational level of organization (microeconomy), with its subsequent integration with superior levels of the ergonomic intervention management. When reaching the settled goal, the following was detailed in the papers: ergonomic intervention types and examples, the levels and stages of their implementation, the areas and states of their impact, i.e. resulting from the route of technological lines, the selection criteria and their implementation approaches. The selected results of the relationship between the preferential variables of users under research with resource deficits (lacking capabilities) and the properties of manual control devices, are also presented. The obtained results demonstrate differentiation of the preferred device properties in relation to the preferences (age, anthropometric features and health ailments) of the group of people under research. The test results were implemented into the HES inference model and validated, and nearly 80% factor of the system was obtained.

Keywords: Management, Ergonomic Interventions, 4.0 Industry, Artificial Intelligence.

Introduction

The 4.0 Industry (I 4.0) has capabilities of qualitative improvements on operational level, as it is based on proven solutions arising from the Industry 3.0 and implements many new (innovative or inventive) solutions. In this context, the I 4.0 solutions have the capabilities of ergonomic interventions (EI) (as long as their selection increases the quality of human-machine-environment interaction, also referred to as the HME), with consideration to the fact that focus in the I 4.0 is made on a human being, who is referred to as the 4.0 Operator (O 4.0). The O 4.0 in smart factories constitutes the element of operation, with respect to which the remaining elements of the organization make self-improvements towards diversified skills, capabilities and preferences of the O 4.0 (Kaasinen at in., 2020; Fletcher et al., 2020), and technological processes (TP) are simultaneously implemented on a previously unprecedented perfection level, with a dynamic reaction to the changes in the organization and its environment.

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This concept is achieved with means of the solutions based on artificial intelligence (AI). On the one hand, such solutions adapt the TP to the changes at higher levels of organization's operation, with a simultaneous consideration to interaction between the HME and the TP. On the other hand, such solutions improve the manufacturing organization management (Longo, Nicoletti, Padovano, 2017). In terms of ensuring the proper quality of HME interaction, there are measures for the replacement or strengthening the O 4.0. Whereas, the empowerment of O 4.0 is based on the holistic implementation of the EI, by designing or reengineering the products, TP (means of production, i.e. technological lines, technological devices (TD), etc.), as well as the management systems and organization of labor. Thus, the purpose is application of the approaches and methods of ergonomics design and reengineering in the complex and smart (with application of) EI management within the I 4.0.

The ergonomic interventions within the I 4.0 are nothing more than the response to the posed paradigms i. e. Panetto et al., (2019), Pacholski and Kałkowska (2019) and Tan et al. (2019) indicating the integration on the i.e. management, production, logistics and analysis level of organization, whereas their implementation enables i.e. unlocking creativity of the employees (Taylor et al., 2020), the ergonomics improvement for the HME interaction through the selection of the TP elements and their properties, establishing the competitive advantages (Wróbel, 2020b), as well as professional stimulation of people with resource deficits (Butlewski, 2018).

The results of the analysis for EI processes and technological lines of a world-class manufacturing organization demonstrate lacking holistic approach to the management (modeling, implementation and diagnosis) of ergonomic interventions (fig. 1).

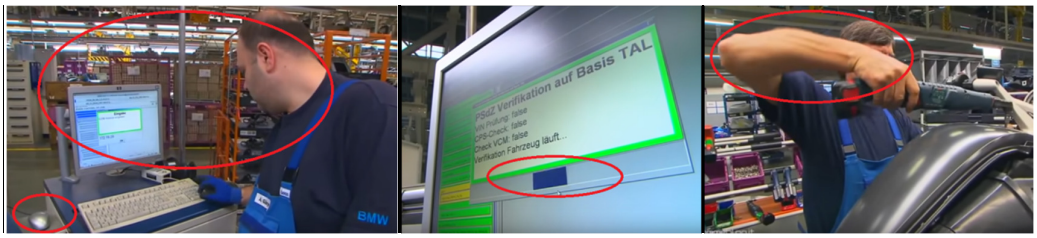

a). b). c).

Fig. 1: The examples of lacking EI holistic implementation and diagnosis - a) BMW S1000RR technological line - a standard static computer stand is seen, whereas the display monitor distance to the stand under research is considerable, what requires remote communication; b) BMW S1000RR technological line - the system status indicator insufficiently informs about the progress in operation when completing the motorcycle; c) BMW S1000RR technological line - despite the ergonomic electric handheld devices, the workspace of the assembly stand induces the forced body posture

Source: based on (Vyas 2017)

In the context of difficulties that arise when modeling the I 4.0 solutions, there are detailed directions of researches for development of a methodology, towards the EI implementation within the I 4.0.

On the other hand, the purpose of this papers constitutes determination of the nature of variables that are substantial for the EI implementation, as well as presentation of the Hybrid Expert System used for determination of the EI scope, in terms of adjusting the manual devices and control elements to the O 4.0 with specific resource deficits.

The EI in modeling the HME interaction of technological processes within the I 4.0

Types of Ergonomic Interventions

When modeling the I 4.0 technological processes, the ergonomic interventions constitute the activities and solutions aimed at increasing the quality of HME interactions. They are based on:

1. improving a specific product, organizational operation, IT system or service within the defined ranges of changes, e.g. technological device parameters, duration of operational tasks, or brightness of computer monitors - which allows a slight increase in the overall quality of the solution, service, interactions, etc.,

2. innovation, i.e. a new product, service, or application, that results from the innovative combination of the existing elements; innovation does not exclusively pertain to the technical cases, devices and systems; it can also be searched in development, implementation and improvement of organizational processes on a macro- and micro-scale, as well as organization of people and multidimensional feedback to people (Grabowski, Muraszkiewicz, 2017); as well as ergonomic innovations are also an interdisciplinary approach to the radical and continuous search for new ideas and concepts, based on the knowledge from the applied/development researches from the anthropocentric, social, biotic and technical point of view (Dewicka, 2016); they synergistically increase the overall quality of the solution, or
3. inventions - substantially defining a new quality level for a given solution.

Among the types of interventions referred to above, the ergonomic innovations, constituting the innovations in general, are one of the main factors enabling the comparative and/or competitive advantage. Nevertheless, such innovations may become a decisive factor for the survival on the market (Grabowski, Muraszkiewicz, 2017). The EI are of great importance at times of progressive globalization, development of communication, the increasing competitiveness, the overwhelming importance of financial markets, as well as the enormous advancement in science and technology (Grabowski, Muraszkiewicz, 2017) . In this context, the EI can be discerned as the product, process, technological, marketing, organizational and development innovations, according to the direction of activities (Dewicka, 2016).

The levels and areas of EI implementation during modelling the HME interaction in the technological processes

The ergonomic interventions within the organization are implemented at the strategic, tactical, operational and activity levels (fig. 2). Whereas, the interventions are implemented in relation to the resources and with means of the resources, that are typical to them (soft and hard elements of organization (Marilungo et al., 2017), as well as resource relationships (Wróbel, 2020a).

At the strategic level, it is important to define the goal, form and method of operation in the organization, in a specific environment. The tactical level includes the selection and development of system management solutions. The operational level requires stipulation of technological processes (their number, types, properties of the features). Based on the higher-order levels, the activity levels should be determined, e.g. the implemented movements and their ranges, with division into the activities of the O 4.0, Technical equipment and robots. Panetto and Molina (2008) also distinguish the areas of the I 4.0, such as business, knowledge, applications and communications, in which the EI is implemented (Panetto, Molina, 2008; Panetto at al., 2019). Whereas, the I 4.0 technological frameworks are distinguished (fig. 2) (Frank, Dalenogare, Ayala, 2019).

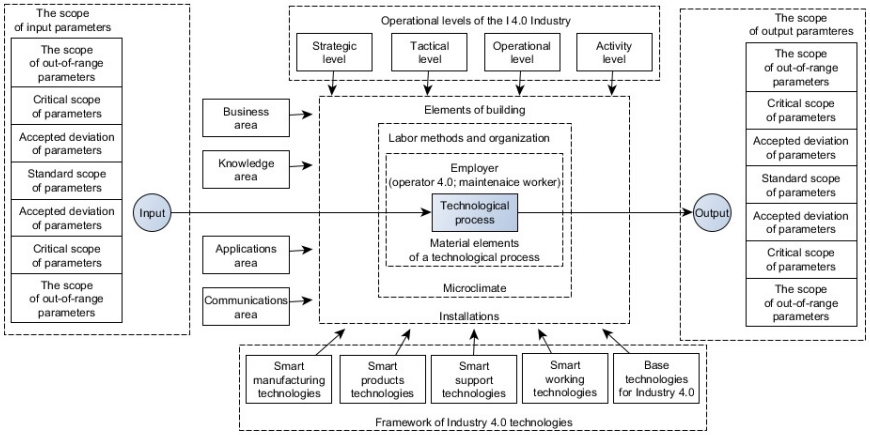

Fig. 2: The levels and measures for the EI implementation within the TP environment of the 4.0 Industry

Source: Own study based on (Panetto, Molina, 2008; Sławińska, 2011; Panetto et al., 2019; Pacholski and Kałkowska, 2019; Sparrow, 2020)

The social function, such as meeting the customer needs, is implemented with means of functional levels of manufacturing organizations. Thus, the qualitative satisfaction of consumer needs depends on the quality of the designed and manufactured product. According to the I 4.0 paradigms, this function is implemented at the TP level. The quality of TP, as well as its outputs, depends on the quality (the range of parameters) of inputs, i.e. resources (TP elements), according to the systems theory. Technological processes are implemented in the environment with three layers (fig. 2) (Sparrow, 2020).

In the presented TP environment within the I 4.0, interactions in the area of cyber-physical systems are also typical, diagram of which is presented and discussed by Molina and Jacob (2018).

Based on the literature analysis and the adopted division of the I 4.0 solutions, the range of examples for EI types has been presented, according to their areas of application (table 1), which shows the method of their aggregation.

Tab. 1: The examples of ergonomic solutions/interventions within the I 4.0

		The level of organizational operation and implementation of the ergonomic interventions			
		Strategic	**Tactical**	**Operating**	**Functional**
The theoretical frameworks for the Industry 4.0 technology	Smart manufacturing technologies	Supervisory Control and Data Acquisition (SCADA)		Sensors, actuators and Programmable Logic Controllers (PLC)	
			Manufacturing Execution System (MES)		
		Enterprise Resource Planning (ERP)			
			Simulation of processes (e.g. digital manufacturing) Artificial Intelligence for predictive maintenance Artificial Intelligence for planning of production Virtual commissioning		
				Machine-to-machine communication (M2M) Robots (e.g. Industrial Robots, Autonomous Guided Vehicles, or similar)	
			Automatic nonconformities identification in production		
		Identification and traceability of raw materials Identification and traceability of final products			
			Additive manufacturing Flexible and autonomous lines		
				Energy efficiency monitoring system Energy efficiency improving system	
	Smart products technologies	Product's connectivity Product's monitoring Product's control Product's optimization Product's autonomy			
	Smart support technologies	Digital platforms with suppliers Digital platforms with customers Digital platforms with other company units			
	Smart working technologies			Remote monitoring of production Remote operation of production	
				Augmented reality for maintenance	
					Virtual reality for workers training
			Augmented and virtual reality for product development		
				Collaborative robots	
		The examples of ergonomic solutions/interventions within the I 4.0			

Source: own study based on (Sławińska, 2011; Dewicka, 2016; Frank, Dalenogare, Ayala, 2019; Li, Fast-Berglund, Paulin, 2019; Villalba-Díez et al., 2020)

The list of I 4.0 ergonomic solutions/interventions, that is presented in table 1, is certainly not exhaustive. With regard to the fact, that the issue of the I 4.0 concept is under research, new directions for its concept, implementation and validation may take place. For example, Rauch, Linder and Dallasega (2020) present directions for new researches in the field of CPS systems, whereas Hofmann et al. (2019) discusses directions for further researches in the field of supply chain management. In the field of CPS systems, the convergence of the 3.0 ergonomics and the 4.0 ergonomics is interesting, that was presented by Rauch, Linder and Dallasega (2020).

Implementation stages for the ergonomic interventions within the I 4.0

Panetto and Molina (2008), based on the paradigms and requirements of the I 4.0, proposed 4 implementation challenges/stages for ergonomic solutions (Panetto, Molina, 2008; Panetto et al., 2019):

1. grand-challenge 1 – cpps-based manufacturing plant control,
2. grand challenge 2 – resilient digital manufacturing networks, collaborative control for industry 4.0 and cyberphysical supply chains,
3. grand challenge 3 – cyber-physical system of-systems interoperability
4. grand challenge 4 – interdependent networked systems and data analytics for decision suport.

Above presented challenges constitute the possible stages and directions of EI implementation, and their sequence and degree of implementation depends on the decision criteria. For example, the research results of Frank, Dalenogare and Ayala (2019) demonstrate that the order can be different, depending on the organization size and its industry.

Implementation criteria and limits for ergonomic interventions within the Industry 4.0

When modeling the complex anthropotechnical systems, decision criteria are also important. It can be proved by the fact, that many criteria for the EI scope can be found in the literature. These include the economic and organizational criteria (e.g. with consideration to the organizational structure and division of labor), methods of organizing and performing the work (Pacholski and Kałkowska, 2019), operational (Sparrow, 2020), as well as ergonomic criteria (e.g. Jasiak, Misztal, 2004) (cognitive, sociological, physiological, physical, anthropometric, motor, cultural, etc. requirements). While these criteria constitute decisive factors for certain levels of organization's operation, you should remember that they may appear at other activity levels.

When reaching the specific implementation criteria for the I 4.0 ergonomic interventions, the problems within the manufacturing organizations are related to the specific barriers. According to the research of Türkeș et al., the EI implementation barriers, with application of the solutions determining the I 4.0, involve lacking knowledge of the Industry 4.0, lacking standards, greater emphasis on activities at the expense of the company's development, lacking knowledge of the strategic importance of the Industry 4.0, shortages in human resources, as well as requirements towards continuous employee trainings (Türkeș at in., 2019). Ślusarczyk and Ul Haque came to similar conclusions with means of the research results, in which they demonstrated that "a limited knowledge", "implementation barriers", "identification of potential changes", "periods of new advantages", "preparation of the personnel to challenges" and "priorities other than implementation of the Industry 4.0", in relation to the Industry 4.0, are statistically significant and are intermediate in the relationships between the I 4.0 solutions and the efficiency of logistics companies in Canada and Poland (Ślusarczyk, UL HAQUE, 2019).

Whereas, the stimuli for implementation of the I 4.0 solution are as follows: customer requirements, implementation of the I 4.0 concept in competitive companies, cost-reduction related requirements, time-reduction related requirements for placing the product on the market, as well as legal or industry requirements (Türkeș at in., 2019).

Types of processes and technological lines in the aspect of EI modeling

In the aspect of the IE modeling for the processes and technological lines, one should find the properties existing between the respective elements of operation, and consequently the properties affecting the respective O 4.0. The properties existing between the elements of operation i.e. depend on the order and location of them along the technological line (fig. 3) and the location of the O 4.0 workstations in relation to them, which is i.e. determined by technological process during the production of a specific product.

The functionally grouped elements in a given three-dimensional space (it should be noted in this respect, that the technological line can be i.e. single or multi-storey) create specific workstations, e.g. assembly station, packing station, quality-control station, or the area of raw material processing into semi-finished products or products (e.g. the operational area of the injection molding machine, also consisting of the operator's or the service worker's workstation).

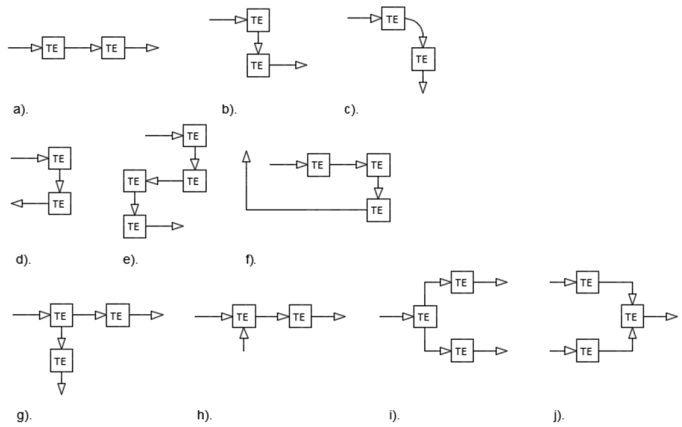

Fig. 3. Types of technological lines according to the orientation of technological equipment (TE) - a). straight; b). broken; c). in an arc; d). reverse; e). zigzag; f). circular; g). with one input direction and multiple output directions; h). with many input directions and one output direction; i) with one input and multiple outputs in the same direction; j). with multiple inputs from the same direction and one output

Source: own study based on (Marilungo et al., 2017)

In the context of the I 4.0, the applied and deployed passive, active and post-accident safety system elements, as well as the ICT systems, are also important (Marilungo at al., 2017).

Implementation of Ergonomic Interventions in The Technological Processes

Designing and Reengineering During Implementation of The Ergonomic Interventions Within The TP

In order to implement the ergonomic interventions within the TP, it is important to consider the relationships in the activity management process in the area of organization's ergonomics (Słowikowski, 2003), as well as process design and reengineering.

During the design and reengineering works, both, it is important to consider the state of other systems in the conceptually or correctively established, new HME systems, which requires a macro-ergonomic approach (Jasiak, Misztal, 2004). Differences between the HME systems are multidimensional, what i.e. results from the changes in general techniques, as well as the changing user features of such systems, as well as the manufacturing systems, by which they are produced (Butlewski, 2019). The result of these changes is the increasing technicalization of human life and TP. Consequently, a human being must be considered, altogether with its role, limitations, etc., when modeling the objects and TP. Despite the fact that designing is often an unstructured process, several stages are discerned, i.e. identification of the problem, formulation of the problem, selection of the solution evaluation criteria, generating the alternatives, evaluating the alternatives, selection of solutions, implementation of decisions, as well as evaluation of a decision effectiveness. It should be noted that these stages are based on a selected decision-making and design strategy (Butlewski, 2019).

On the other hand, the TP reengineering is defined, i.e. as a research procedure including the analysis and diagnostics of the HME system, with purpose of establishing the information processing mechanisms for the designed operational system, thanks to which the optimal load is ensured for a human being who operate the Automated Technical Equipment (Sławińska, 2011).

Determining the scope of EI with means of reengineering i.e. includes consideration to and acquisition of data for O 4.0 labor load factors, a matrix of ergonomic reengineering elements for operational processes, the ergonomic sub-system model, the ergonomic reengineering model for operational processes, data resources on the ergonomics of anthropotechnical systems when modeling the operational chain, criteria for ergonomic reengineering variants, the ergonomics reengineering variants - ergonomic interventions, a model of labor situation for the operational control function with respect to ergonomics, the human activity stages as an operator, human reaction times, methods and techniques of data acquisition and analysis for ergonomic factors when designing the technical systems, the stages of ergonomic data acquisition during the ergonomic reengineering, cyclical reconfiguration model for operational chain supporting the ergonomic reengineering, as well as the stages of research documentation for modification of operational conditions of the O 4.0 (Sławińska, 2011).

Despite the distinction between the design and reengineering processes, it can be clearly seen that these processes are interrelated and require a comprehensive approach to the diagnosis and modeling the HME systems (Wróbel, 2020a).

Identification of The EI Scope for The Technological Processes

With consideration to the issues presented in the article (types and examples of EI, the levels and stages of their implementation, areas and states of their impact, the selection criteria and implementation approaches), a general model of EI implementation with means of the expert system was defined. (fig. 4).

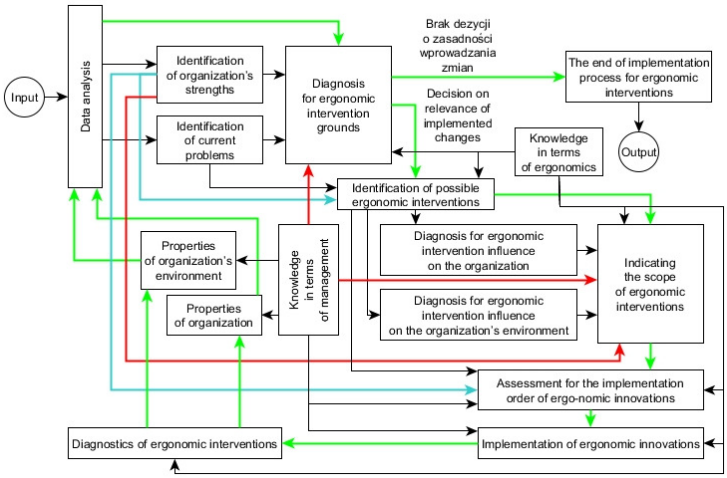

Fig. 4: The inference model for identification of the scope ergonomic interventions in the I 4.0
Source: own study

The model includes data analysis stage for current characteristics of environment and organization, validity diagnostics for EI implementation at an early management stage (AI inference), identification of possible EI determined on the basis of the organization strengths, the identified ergonomic problems (at all levels and areas of the organization) and knowledge in the field of ergonomics, determination of the scope of planned EI implementation when diagnosing the intervention impact on the organization and its environment, as well as resource analyzes of the organization (economic, etc.), evaluation and determination of the sequence for implemented innovations, implementation of innovations, diagnosis and determination of characteristics of the organization and its surrounding (fig. 4).

Application of AI inference based on the presented identification model for EI scope can be carried out in accordance with the Demming's improvement model, in a closed inference cycle (fig. 4 - directions of activities are highlighted in green; while directions of complementary activities are highlighted in black, red and blue, or are periodical.

Determining the EI on the example of shaping the ergonomics of handheld control devices and elements for the O 4.0 having resource deficits

Operation of the O 4.0 is largely based on the human-computer interaction. In this aspect, a hybrid expert system (HES) was developed with consideration to the required feedback for determination of ergonomic interventions and the diagnostics of interaction between the O 4.0 and manual control devices (MCD) for people characterized by resource deficits (the elderly – E). The HES consists of four classification blocks of inference and a fuzzy cognitive map (FCM) (Wróbel, 2020b) for which the methods of supervised learning (node determination module; node strengthening or weakening module; FCM activator module) and unsupervised learning (data control approach with non-linear Hebbian learning; particle swarm optimization approach) have been selected (Stach, Kurgan, Pedrycz, 2008). This system constitutes a proposal for a holistic modeling, implementation and diagnosis of a functional level within the I 4.0. The inference stages and scope, based on the analysis of the operational context, include the selection of the MCD type and the test type in order to validate the system recommendations, the selection of MCD features based on the user's preference options, as well as validation of the system recommendations.

The system was built with consideration to the conclusions from the literature analysis (incl. Hertzum, Hornbæk, 2013; Lin, Young, Dennerlein, 2015) and the empirical research results. The research included the preferences of 14 people aged 52-77 and the properties of 18 MCD features, i.e. vertical and horizontal computer mice, trackballs, joysticks and touch screens. In order to carry out the research, the E had to perform 5 interaction attempts with each device. The tests produced 1225 observations of interactions with partial indices, on the basis of which the aggregated evaluations of interaction ergonomics (AEI) were calculated.

Surprisingly, there was a very large differentiation in the significance of relationship between individual variables, thus the strength of interaction between them (fig. 5).

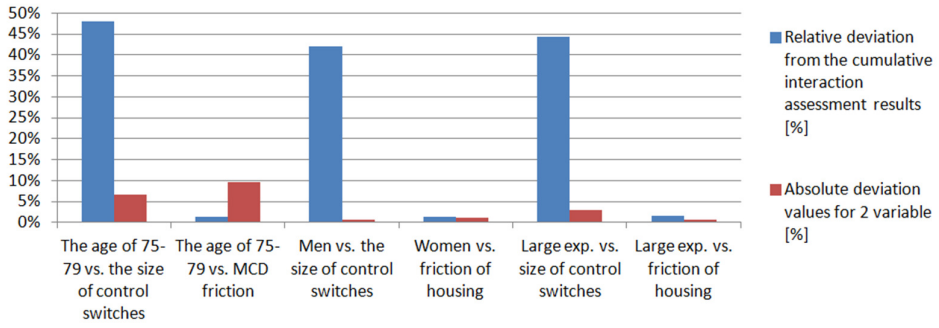

Fig. 5: Significance of the selected relationships between the E preferences and the MCD properties

Source: (Wróbel, 2020b)

The research also produced directions and strength of relationships between the selected variables, with consideration to characteristics of tested people and devices. Whereas, device features were divided into two extreme properties, e.g. small/large or light/heavy, etc. in order to demonstrate direction and strength of relationships between the variables, as well as the ergonomic interaction was evaluated in a cumulative manner, on the basis of which the relative deviation was calculated, as well as the absolute values for such deviation for 2 variable (tab. 2). The results of the relative deviation demonstrated that there are differences in the influence of MCD properties on the obtained ergonomic interaction level, with respect to the specific preferences of elderly people. However, there were few such observations and they pertained to three groups of preferences - age, anthropometric features and upper limb ailments (tab. 2) (Wróbel, 2020b).

Tab. 2: Differentiation of the MCD properties, with regard to the specific preferences of the E - selected results of the relationship between variables under research

Variables			Research results			Assessment	
Variable 2 (feature MCD)	Variable 1 (option elderly preferences)		Variable 2 Characteristics of the feature 1	Variable 2 Characteristics of the feature 2	Aver-age	Relative deviation [%]	Absolute value of the deviation from variable 2 result [%]
Mass of the device	Age	50-54	1.85	1.93	1.89	4.3	3.1
		55-59	1.75	1.97	1.87	11.9	4.5
		60-64	2.09	2.30	2.21	9.8	2.3
		65-69	2.04	2.21	2.13	7.8	0.3
		70-74	1.82	1.94	1.89	6.0	1.4
		75-79	2.24	2.15	2.19	-4.0	11.5
The length of the device under the fingers	The length of hand (130-170 mm)	Yes	2.00	2.09	2.04	4.3	9.2
		No	2.08	1.96	2.03	-5.6	0.7
The length of the device under the fingers	Finger cramps 3-5	Yes	2.00	2.09	2.04	4.3	9.2
		No	2.08	1.96	2.03	-5.6	0.7

Source: (Wróbel, 2020b)

Conclusions and data from the research were implemented into the HES inference model and validated for the selected input and output data. For example nearly 80% of the system efficiency was achieved for the selected device type in relation to the preferences of the group of people under research (Wróbel, 2020b).

Conclusions

The issues discussed in the article along with the studies cited above provide a holistic view of the undertaken research goal. The development of the methodology and integrated EI management system in I 4.0 is also justified by Fantini, Pinzone and Taisch (2020). On the other hand, supporting the determination of ergonomic interventions and the diagnosis of O 4.0-MCD interactions for people characterized by resource deficits (the elderly) due to demographic changes and aging societies becomes crucial. In these contexts, the novelty of the article are the methodology and the developed HES, which, however, require detailed refinement. Therefore, it is postulated to develop and use HES to support E in the work of O 4.0, which requires, inter alia, creating and selecting AI methods and approaches dedicated to the purpose of supporting decisions, teaching expert systems with different input and output data, or integrating expert systems at various levels of the organization.

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Evidence Driven Model for the Rationality of HR Decisions in the Organization

Kamila LUDWIKOWSKA

Wroclaw University of Science and Technology, Poland
kamila.ludwikowska@pwr.edu.pl

Abstract

The article indicates that human resource decisions (HRD) are one of the most critical tasks of the modern manager. HRD refer to the human resources in the organization and aims at shaping the desired job-related behavior of employees to carry out organizational tasks efficiently. Due to that fact, in human resources (HR) literature, there is a growing interest in how to make more efficient decisions, and rationality is one of its indicators. The first part of the article explains models of decision making, elements, and connections between them, pointing at those who are essential from the rationality point of view. Next, the notion of rationality in the context of HRD is explained. On this basis, the rationality model of HRD is proposed with factors which should be analyzed before making any of HR decision.

Keywords: Human Resource Decision, Rationality, Evidence-Based, Decision Making, HRM, Decision Theory.

Introduction

Making human resources decisions (HRD) in the human resources management (HRM) area is the key domain of modern managers. HRD refer to all decisions that involve organizational human resources (HR), aimed at shaping the desired job-related behaviors of employees to carry out organizational tasks efficiently. Some HRD may be guided by organizational rules, hence staying beyond the manager influence. However, many decisions are dependent on the decision-maker and the way he analyzes the best choice.

In recent years, in the HRM literature, the issue of making mature HRD and the right choices has been analyzed. Scholars try to answer the question of how to make the right choices and decisions to improve decision quality and avoid errors. One of the factors is rational decision making.

Rationality in management sciences has been mostly shaped by economics. However, in the last decades, an increased influence from psychology has been observed (Basel and Brühl, 2013). The notion of rationality is not operationalized in HRM, and there is little study on how to make the right HR decisions.

A consistent conclusion resulting from the currently available research is that the concept of rationality is a complex, ambiguous, and differently perceived problem (Power, Cyphert, and Roth, 2019). HRM researchers are consent that decisions in the HRM field do not consider reflection, critical thinking. Decisions are intuitive and based on wrong beliefs and subjective opinions (Bezzina *et al.*, 2017). Moreover, while making decisions, managers do not consider the variety of available information (Martelli and Hayirli, 2018). HRD decide about people's existence in an organization (e.g., decisions regarding promotion, dismissal, awarding, training), hence cannot be guided solely by intuition (Dhami and Thomson, 2012) or past experiences.

Although the nexus of rationality and decision making has been explored, there is very little academic work that links rationality with human resources decisions. Each decision making concept has its limitations. Rationality and intuition are significant components of most of the models. Both are likely to be effective cognitive mode. Hence, they cannot be neglected (Dhami and Thomson, 2012). However, their interdependence is not evident. Hence, further analysis should reflect how intuition and rationality interact and under which circumstances managers make decisions (Basel and Brühl, 2013). This article refers to the human resources management field. It provides an overview of rationality and decision making models pointing at those which are essential from the rationality point of view. Therefore, the article seeks to contribute to the HRM literature developing the evidence-driven model of rational HRD in the organization.

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Decision-Making Models and Approaches

Decision-making describes certain patterns of behavior in specific decision-making situations, aimed at maximizing the effect of the decision made. The literature provides different decision approaches: rational, behavioral (bounded rationality, heuristic), dual process models (intuitive and integrative approach oriented to rational analysis with an approach oriented to intuition). In management sciences, there are two more approaches to decision making: normative and descriptive. The first approach aims at following universal rules and patterns in specific activities. The second considers recreating processes and activities that are carried out in reality. Decision-making models may also be categorized into rational and intuitive. All remaining are a combination of both approaches, hence called dual-process models. It is worth to notice that the rational model complies with the normative approach and the intuitive model with a descriptive approach (Gigerenzer and Gaissmaier, 2015).

Rational Models of Decision Making

Rational models emerged from the decision theory that describes a rational human having more than one option. In such circumstances, a decision-maker will be guided by utility rule, taking into consideration options that will bring benefit (or the smallest possible loss), and probability rule option less probable (Dhami and Thomson, 2012). Expected utility theory has been developed in the frame of the normative model of rational choice and is applied as a descriptive model of economic behavior.

Rational models describe the most appropriate procedure where performing a certain number of intentional, structured actions will lead to an optimal solution (McGuire *et al.*, 2006). Those steps are describing the problem situation, defining the problem and goal, establishing the selection criteria, creating and examining variants, choosing the optimal variant, implementation of the selected variant. It assumes that the manager has complete information, is logical, and makes an optimal choice with maximum utility. Rational decision making requires substantive, analytical, forecasting competences.

However, there are various definitions and approaches to rational decision making. Hence, there is no one universal model of rational decision making (Gigerenzer and Gaissmaier, 2015). Cabantous et al. (2010) revised rational decision theory into practice and developed a three-step process model of decision making, including contextualization, quantification, and calculation. Contextualization aims to create a fit between the organizational context and decision analysis principles, turning potential problem situations into decision analyzed problem. The contextualization step relies on social interactions. It requires gaining information from other sources and organizational members to develop possible solutions for identified problems. The quantification step aims to make the decision context calculable. It includes data collection. In the last step, calculation, organizational members are already prepared for finding a solution to the problem through decision analysis. They use statistic techniques to calculate solutions (Cabantous, Gond, and Johnson-Cramer, 2010). These three stages describe how rational decision is constructed and finalized. Using the model requires the support of analysts-engineers. Hence, it cannot be fully utilized by managers for HRD making in the HRM area. However, the social context and practice approach is relevant to HRM decisions. In such a context, rationality becomes something that can be acquired by managers. The model brings new insight into normative theory by enabling an understanding of the process from inside.

Critics of rational theories noted some limitations. In reality, decision problems and situations do not work according to the laws of logic. Hence, they are not compatible with the assumptions of the models described. Moreover, factors that hinder the implementation of a rational decision-making process are not taken into account, assumptions of making the right choice by the decision-maker, also knowledge, skills, and experience of the decision-maker are not analyzed.

Behavioral Models – Bounded Rationality

Alternative decision-making models manifest real decision processes performed in organizations. In the literature, those models are named behavioral, and two models have been distinguished within: bounded rationality models and heuristic models.

In the bounded rationality approach manager has limited access to information and hence is bounded in own rationality. The manager makes a satisfying choice, with a minimum level of sufficiency. Decision-makers follow rationality rules; however, their rationality is prevented due to cognitive and motivational limitations.

Bounded rationality, introduced by Simon (Simon, 1979), is focused on how we deal with the limitations of decision-makers (Basel and Brühl, 2013). The model reveals a vital role of unconscious factors, stereotypical thinking, and job avoiding. These factors result in cognitive limitations when a decision-maker is not able to gain required information and generate potential solutions, and motivational limitations, when decision makes aims to achieve satisfaction through finding the solution that meets the minimum level of sufficiency (Aharoni, Tihanyi and Connelly, 2011), however, cannot reach perfect outcomes (Basel and Brühl, 2013). The theory assumes that human is not guided by the maximum utility of a variant but make value-maximizing calculations (Dhami and Thomson, 2012) to find an option that meets a minimum of "satisfaction". Both limitations may lead to deterioration of the quality of the decision.

Behavioral Models – Heuristics

Heuristics in decision-making is the ability to make decisions based on unjustified or routine thinking. Heuristic models, also considered as behavioral, are concerned with psychological realism related to the capacities and limitations of humans (Gigerenzer and Gaissmaier, 2015). A heuristic is a strategy that ignores part of the information to make the decision making process accurate and quick (Gigerenzer and Gaissmaier, 2015). Heuristic models present real decision processes, rationality assumptions are rejected. These decision-makers do not even consider bounded rationality. They are creative without any specified algorithm of decision making.

In relation to heuristics and contrary to the theory of expected utility, Kahneman and Tversky developed an alternative model, called prospect theory (Kahneman and Tversky, 1979). They showed that human decisions depart from ideals of logic, unbounded rationality and behavior (Basel and Brühl, 2013). The theory demonstrates that humans reduce cognitive effort through the use of heuristics (Aharoni, Tihanyi, and Connelly, 2011). It assumes that people consider some benchmark when making decisions and judge the results as profit or loss. According to this theory, people are more likely to take a risk when they judge the outcome as a loss against a set benchmark. If, on the other hand, the result is perceived as profit, they will be risk-averse and will choose a small but specific reward, rather than profit, which is uncertain (Bromiley, 2010; Aharoni, Tihanyi and Connelly, 2011). Their study revealed that choices among risky prospects reveal effects which are not consistent with assumptions of utility theory. In particular, people underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. It is crucial to formulate the problem because it largely determines what option the decision-makers choose. They may be risk-averse and may remain risk indifferent. The theory is explained mostly by the literature on strategy and influence the development of the economy (Bromiley, 2010).

An example of a heuristic model is a garbage can model developed by Cohen (1972). This model can be broadly defined as a form of organized anarchy, where problems, solutions, and participants exist as a separate organizational stream, goals, plans, selection rules, and priorities are mixed. The organization initiates opportunities, however, decision-makers do not know what they want. They do not find the resources to solve the problem; they solve problems by chance without a structured decision-making process (Cohen, March, and Olsen, 1972).

A critical assessment of heuristics stresses that heuristics lead people to errors in decision making. Hence, they are not considered as efficient solutions compared to logical analysis (Basel and Brühl, 2013). However, it should be noted that heuristics revealed significant insight into human decision making showing that cognitive restrictions cause errors in the decision-making process.

This debate illustrates that heuristics do not clearly define how humans decide. Such contribution is made by the dual processes framework (Basel and Brühl, 2013).

Dual-Process Models

In the literature, dual-process models describe intuition-oriented decision-making models and an approach to integrating rational and intuitive decision making. These models respond to complex conditions of modern organizations, related to excess or lack of information, high levels of uncertainty, and strong competition.

In recent years, the dual-process received lots of scholars' interest. While the notion of cognitive processing has been sufficiently discussed, there is an ongoing discussion about the components of mind and how they both interact (Basel and Brühl, 2013). The dual-process theory stresses the role of intuition. However, it is assumed that managers should make decisions based on rational reasoning, intuition, or a combination of both approaches. Intuition is linked with experience, which leads to intuition as an expertise perspective (Salas, Rosen, and DiazGranados, 2010). Expertise is built during learning.

Among dual process models, Evans (2008) distinguished models with a clear distinction between rationality and intuition based on defined features; models suggesting using both rationality and intuition; and models which assumes that the decision-making process first activates intuition, analysis is used when corrections or support for intuition is needed (Evans, 2008).

Stanovich and West (2000) distinguished two categories of decision making. The first, intuitive, is characterized by automatic, rapid, and effortless processing, second, reflective, is controlled, effortful, self-aware, and deductive (Stanovich and West, 2003). Both systems are working concurrently. The theory has been criticized for its limited explanation of how the two systems may interact (Dhami and Thomson, 2012).

Considering the interaction of both systems leads to a holistic approach where heuristics are initiated by intuition but adopted by reflective thinking. Both systems highlight a dynamic relationship. Such development has been made in Hammond's Cognitive Continuum Theory. The theory differentiates intuition from rationality but also allows to integrate both (Dhami and Thomson, 2012). The theory distinguished cognitive processes based on rational analysis, intuition, and those who integrate both. Rationality and intuition are assumed as a continuum where different experiences happen between those two notions. The combination of rationality and intuition is the most common choice while making decisions in organizations. It depends on the type of problem and task performed by managers, as well as the decision situation. The theory allows measuring the properties of managerial rationality (Dhami and Thomson, 2012).

Burciu and Hapenciuc (2010) distinguished nonrational thinking, called also double bounded rationality, as an extension of rational thinking, which requires abilities and skills of conscious and unconscious thinking for decision making (Burciu and Hapenciuc, 2010). They state that nonrational thinking and acting does not assume a lack of logical thinking (Gigerenzer and Gaissmaier, 2015), it considers different than rational rules of thinking. Nonrational thinking consists of diverse human skills, including experience, intuition, imagination, and emotions (Burciu and Hapenciuc, 2010). Intuition is a vital element of the decision process and is defined as the ability to identify a solution resulting from the unique experience and combination of explicit and implicit knowledge of an individual. Experience indicates a set of abilities a person accumulates during life through formal and informal practice, learning, observation (Burciu and Hapenciuc, 2010). Each decision-maker has intuitive potential, which may be developed by gaining knowledge and experience. Imagination refers to the human capacity to create new ideas based on knowledge gained in the past. The last component, management of emotions, is comparable to intuition and imagination. All components are activated during the decision making process. The authors argue that both rational and nonrational thinking is influenced by the manager's personality type and the context of the situation.

Also, Gigerenzer et al. (2000) proposed several heuristics as adaptative strategies of environmental structures. They depart from rationality and go beyond the satisfying heuristics of Simon, describing the problem-solving process in a fast fashion (Gigerenzer, Todd, and Group, 2000; Basel and Brühl, 2013). The ecological rationality view of decision making describes heuristics as cognitive shortcuts that exploit the social environment to seek for information to make a quick decision (Gigerenzer, Todd, and Group, 2000; Fodor, Curşeu and Fleştea, 2016). Managers engage in the social learning process and use the experience of others to validate their views.

Nonrational thinking assumes that there is no specific scheme of conducting for decision making. The decision-maker is looking for a solution to problems that may appear in the future. Hence collect information to be ready to confront initial intuition with facts gathered. The intuitive model requires conceptual competences and the ability to synthesize.

Intuition is a necessary cognitive mode, however, it is not sufficient and cannot constitute the sole base of the decision-making process (Dhami and Thomson, 2012). Each solution generated as a result of using intuition should go through steps of rational assessment. Moreover, relying only on intuition may result in adopting the same standards of conduct that have worked well in a similar decision-making situation in the past.

Nonrational thinking is a result of managers' thinking mechanisms, while bounded rationality results from organizational rules, not sufficient resources, time, and information.

The debate on two types of rationality reveals that they are not mutually exclusive and do not impose unrealistic standards of decision making (Basel and Brühl, 2013). Unbounded rationality shows how humans achieve goals, and bounded rationality explores the true beliefs of the world (Gigerenzer, Todd, and Group, 2000; Stanovich, 2010). In order to be successful, managers need to apply both types of rationality.

In the classical model of decision making, some stages may require the application of nonrational thinking, such as identifying a decision problem and selecting a decision among various alternative solutions. Correct implementation

of these stages requires the use of all available sources of information, even such as intuition, imagination, emotions (Burciu and Hapenciuc, 2010), values (McGuire *et al.*, 2006; Dhami and Thomson, 2012).

From the above discussion, it may be concluded that managers who strive to achieve high efficiency of the decision process should enrich rational thinking with nonrational. They should also use all available data calling to their consciousness and subconsciousness, use both explicit and implicit knowledge. They should also continuously gain new knowledge and experience to be able to develop new strategies of acting and make good choices.

Nowadays, managers make decisions in complex, uncertain, and unpredictable contexts. The efficiency of their actions requires the ability to use analytic techniques and to react quickly.

Rationality as the condition of effective HRD

HRD refer to all decisions that involve organizational human resources (HR). The notion of decision is defined as a conscious choice made by the decision-maker and as a human activity aimed to find goal-oriented solutions. In HRM, that process is initiated by an HR problem that needs to be solved. It happens when the real state is inconsistent with the desired one, i.e., with the defined goal of HRM. Decisions are finalized with a manifestation of choice. Formalization of HR processes relates to organizational policies, procedures set by the employer. Those decisions are repetitive and routine, named programmed (Larsson, 2000) (for example, taking leaves). Hence, they are not recognized as a decision problem.

On the other hand, some decisions require creative effort at different stages of the decision-making process, named non-programmed (Larsson, 2000). Those are decision problems (Dhami and Thomson, 2012), where intuition, decision-makers' and experts' experience play a significant role (for example, effective task execution, giving feedback to employees). Since they have not occurred before, they require extensive analysis. Managers use skills and subjective judgments of the situation to solve problems through analysis and logical reasoning.

Both types of decisions lie on the continuum between totally programmed and non-programmed. In HRM, both types of decisions are present, however, more decisions are non-programmable.

The outcomes of decisions made in the HRM have been clearly defined by the Harvard model of HRM, which shows that these are both direct effects: job performance, commitment, employee competencies, compliance; as well as future (long-term) effects: employee satisfaction, organizational efficiency and social welfare (Brunetto, Farr-Wharton and Shacklock, 2011). The most crucial component and effect of implementing HR decisions are gaining approval by employees. Acceptance is the main element of the readiness and ability of the personnel to perform organizational tasks. Expressing consent or acceptance by the employee results in making their own decision concerning a specific HR decision. The implementation of an agreed decision results in changes in job-related behaviors. Acceptance of HRD by employees influence the efficiency of HRD.

The concept of rationality is deeply rooted in economics, however, rationality as a concept has many facets and is one of the broadest concepts used in social science (Basel and Brühl, 2013). One of the main reasons is that the concept of rationality is complex, ambiguous, and incoherent (Basel and Brühl, 2013; Power, Cyphert and Roth, 2019). Rationality is a product of social interaction, collaboration in a broad context, not merely organizational. Hence, rational decision making is considered as social practice (Reckwitz, 2004).

The rationality of the decision-making process is a central topic in the organization theory (Hodgkinson and Starbuck, 2008). Researchers have clarified the rationalistic model in terms of its positive consequences on organizational performance. Nevertheless, it has received criticism as well. There is a gap between what the ideal normative model is and what decision-makers do (Cabantous, Gond, and Johnson-Cramer, 2010). Also, the normative model does not refer to the analysis of socio-technical conditions that may enable to construct the rational decision (Cabantous, Gond and Johnson-Cramer, 2010).

This study provides an overview of rationality and decision making models. It can be noticed that all the distinguished typologies include rational and intuitive components as well as others, often constituting a specific combination of the models mentioned.

In the context of existing decision-making models, it seems to be significant to identify key conclusions that should be considered for HR decisions:

in the view of rational decision-making models:

- decision-maker resources (skills, knowledge) are not analyzed
- gaining information from other sources and organizational members indicates the social context
- statistic techniques are used to calculate solutions

in the view of bounded rationality theories:

- in reality, decision problems and situations do not work according to the laws of logic
- human has limited access to information
- rationality rules are followed
- the maximum utility of a variant does not guide human, human looks for a minimum of satisfaction
- nowadays, the world is full of uncertainty

in the view of heuristics:

- the decision-making process is accurate and quick
- creativity has great importance
- the environment is uncertain and competitive
- intuition plays a significant role; however, it is assumed that managers should make decisions based on rational reasoning also
- nonrational thinking and acting does not assume a lack of logical thinking
- an intuitive potential which may be developed by gaining knowledge and experience.
- the social environment is a source for information to make a quick decision

The above conclusions indicate that each component does not exist exclusively. They are influenced by the classical theory of decision, and the assumption of humans are both rational and social beings. In HR practice, there are many situations where both modes will be necessary to make a decision. However, it may be difficult to apply some of the practices into HRM, for instance, applying statistic techniques to calculate solutions of everyday HR decisions.

HRD Rationality Model

In response to the conclusions of the analysis of decision-making models and limitations identified, the author proposed a theoretical evidence-driven model of HRD rationality stressing real decision-making context. The rationality of HRD is a measurable feature of decisions (Dhami and Thomson, 2012), which measures its maturity and accuracy in specific HRM context. Evidence-driven indicates the significance of information through an analysis of available data to support variants of possible solutions (Barends and Rousseau, 2018). Evidence includes a broad spectrum of internal and external data that may support a decision, including scientific data, expert opinion, big data, analytics, organizational information, case studies, opinions of individual colleagues, as well as intuition. Evidence-based approach is central in the proposed model to understand how the decision should be made. It requires asking good questions to the organizational problem, collecting, assessing, and aggregating data, making a decision, and its implementation (Barends and Rousseau, 2018). Evidence-based approach is a novel perspective of acting and looking at the everyday life of the organization, and decision making is one of such activities.

The author points out that efficient use of the rational model of HRD needs to consider four major criteria: analysis of the situation and resources, analysis of solutions, data analysis, potential problem analysis.

The process is initiated by the HR problem and followed by a willingness to act. The first criterion, analysis of the situation and resources, refers to environmental variables that may influence the decision (McGuire *et al.*, 2006), including organizational strategy, HRM philosophy, technology, others, and analysis of decision-maker resources, including knowledge, skills, experience, as well as emotions (Burciu and Hapenciuc, 2010) and values (McGuire *et al.*, 2006). It aims to recognize the current situation based on the facts, the environment of the situation, and decision-maker resources. Analysis of solutions indicates an alternative solution to the HR problem. The third criterion, data analysis, highlights the importance of information for enabling better HRM decision-making (Cassar and Bezzina, 2017). It refers to a broad scope of possible evidence, not only analytic-approach but also experience, intuition. As an outcome, the best variant is selected. The last criterion, potential problem analysis, aims to forecast potential future problems emerging from the decision selected.

HRD outcomes have been framed based on the Harvard model of HRM (Brunetto, Farr-Wharton, and Shacklock, 2011), including direct and future (long-term) outcomes.

The proposed model considers HR decisions as a social construction that involves seeking information and a set of analyses.

The model is presented in Figure 1 and will be used for empirical verification of the hypothesis on the rationality of HRD in contemporary organizations. However, its empirical verification is necessary before using it.

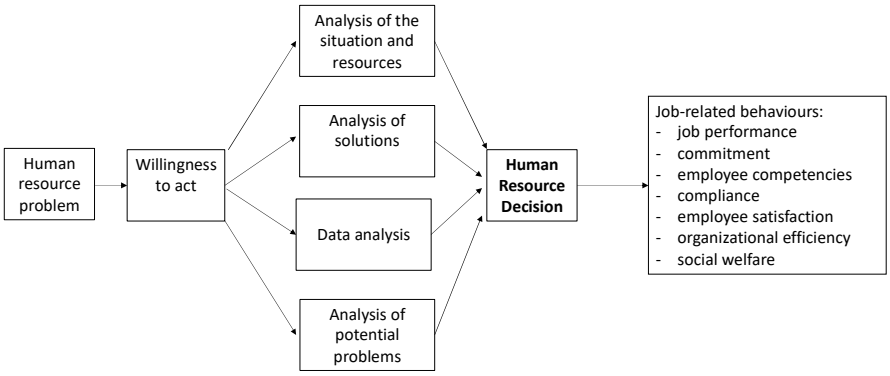

Fig. 1: HRD rationality model

Source: own work

Summary

A dynamic and uncertain environment requires managers to work under time pressure and make fast decisions. The literature review revealed that both rational and intuitive thinking has a significant meaning. In the real world, managers make decisions based on logic, experience, rationality, intuition, emotions. Human thinking is not always precise, structured, predictable. However, while considering the organizational context and objectives of managers' performance, it is evident that their decisions in the HRM impact humans and their organizational existence. Hence, the decision should be supported by the best available evidence.

Each decision-making concept has its limitations, and there is no unified conceptualization of rationality and intuition. Hence, researchers call for more studies in managerial decision making (Basel and Brühl, 2013). Further analysis should reflect how intuition and rationality interact (Dhami and Thomson, 2012) and under which circumstances managers make decisions. This article fills that gap through exploiting those notions in the human resources management field and attempt to build a novel evidence-based model of HR rationality in organizational practice.

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The Cause-Effect Relationship Between Greenhouse Gases and The Safety of Agricultural Production

POPESCU Lavinia

PhD Student, The University of Economic Studies, Bucharest, Romania, popesculavinia14@stud.ase.ro

SAFTA Adela Sorinela

PhD Student,The University of Economic Studies, Bucharest, Romania
saftaadela19@stud.ase.ro

Abstract

Recent events and data provided by Eurostat on pesticide sales lead us to highlight once again the concerns about pesticides consumption in agriculture. That is why this paper aims to provide an analysis of risks and vices with consequences in the sustainable agricultural economy, influenced by traditional agricultural practices. Last but not least, we consider it important to analyze the subsidies granted to support farmers who practice sustainable agriculture, thus eliminating fertilizers, in the context of the demands imposed by climate change. From this perspective, we have highlighted in part why it is important to pay attention to the risks of pesticides in the agricultural sector, and how good faith influences the use of good practices, agricultural production. That is why during the research we tried to highlight aspects that, in our opinion, are important for the food security of the agricultural sector, to the current challenges caused by the need to supply agricultural products of the highest quality, using pesticide control. Proper land management plays an important role. We hoped that our guidelines would capitalize on those alternative methods of reducing pesticide use by switching to organic fertilizers.

Keywords: Traditional Agricultural Practices, Pesticides, Fertilizers

The article addresses a possible interdependence between pesticide consumption of the European Union (EU) agro-ecological indicator as a concern of recent growth data during the Pandemic in 2020, the increase being statistical. We ask ourselves serious questions if this increase in the sale of pesticides is not aimed at price increases or decreases on world stock exchanges and interested groups cartels or consortia would have a purpose in themselves, these being only presumptions, which will be certified with subsequent data.

Without moving away from the subject of research in our opinion, the consumption of pesticides provides an image of agro-ecological indicators in the EU, which would show the percentage allocated for organic products to which traditional practices can be applied in Romania zonal products, for example mountain products. But how do we understand to promote sustainability for farmers, or associated producer companies if we do not analyze the concrete possibilities of correct application of fertilizers in the production process? How do we guide the purpose of pesticide application and what processes should be applied by farmers to avoid and even exclude the risk of climate pollution, but also the role of fertilizers in increasing the performance of soil properties? To increase plant resistance, properly applied fertilizers can increase the resilience of our global food system by providing nutritious products. The word sustainability is often spoken, but we do not know the scope of this definition. That is why we will say sustainable for farmers means sustainable for the environment, plants, soil, climate and biodiversity all contribute as a whole to the sustainability of the agricultural system.

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Figures and Tables

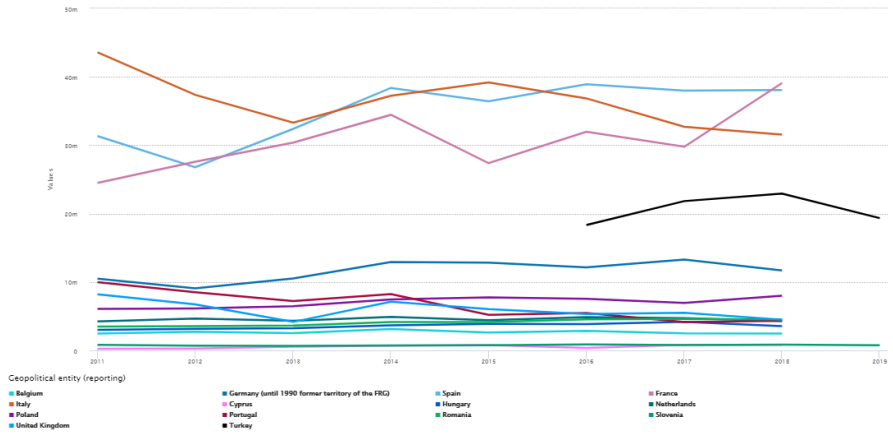

Fig 1. Pesticide sales

Source: Eurostat

Table 1: The chemical composition for some classical fertilizers used in basic fertilization

FERTILIZER	N(%)	P_2O_5(%)	K_2O(%)
Nitrogen fertilizers			
1. Ammonium sulfate $(NH_4)2SO_4$	21		
2. Calcium nitrate $Ca(NO_3)2$	16		
3. Ammonium nitrate NH_4NO_3	34		
4. Calcium and ammonium nitrate NH_4NO_3 + $CaCO_3$ (CAN)	27		
5. Urea $CO(NH_2)2$	46		
Phosphorus fertilizers			
1. Simple superphosphate (SSP), $CaH_4(PO_4)2$+ CaHPO4· $2H_2O$		16-18	
2. Triple superphosphate (TSP), $Ca(H_2PO_4)2$+ CaHPO4		46	
3. Phosphate rock (PR), activated or not		22-40	
3. Phosphate rock (PR), activated or not	18	46	
3. Phosphate rock (PR), activated or not	11	48	
Potassium fertilizers			
1. Potassium chloride (MOP), KCl			60
2. Potassium sulphate (SOP), K2SO4			50
3. Potassium nitrate, KNO3	13		44
Complex fertilizers			
1. NPK	15	15	15
2. NPK	17	17	17
3. NPK	22	22	11

Source: ICPA Bucharest

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The Relation Between A Three-Sector Economic Model with Social Inequality in Poland, Differentiated by Region

LUDWICZAK Anna

University: CALISIA UNIVERSITY - KALISZ, POLAND, Faculty of Social Sciences
City: Kalisz, Country: Poland
E-mail: a.ludwiczak@pwsz.kalisz.pl

Abstract

One of the most vital goals of any national policy is economic development. This however poses the interesting question of whether this should be treated as a means to an end or as an end in itself. Everyone surely expects that economic development inexorably delivers both an improved quality of life and social wellbeing. For this reason we have differentiated between the concept of economic growth and development/efficiency with socio-economic-related wellbeing; thus clearly demonstrating the multi-dimensional nature between these two areas. This study aims to investigate the relationship between the economical structure in a three-sector system with social inequalities according to the diversity of regions found in Poland. Straightforward statistics were used to seek for correlations between the factors under study. A strong correlation was found between employment structure in those regions with existing social inequalities; especially in poverty and social exclusion.

Keywords: Sustainable Development, Economic Structure, Quality of Life, Regional Diversity.

Introduction

Economic growth appears to be a key term or lock by means of which a given country's economic status is defined. Quite clearly, achieving the best growth rates is a situation best desired. Such growth most commonly refers to a tangible part of the economy such as the manufacturing base, raw materials/natural resources, population changes and the manufacture of products and consumer goods. When perceived in this way, economic growth is however a narrower concept than economic development, which is much more broadly defined.

The actual structure of any given economy is mainly determined by markers/indicators/indicies of economic development and the degree to which a given economy is market-based. Numerous theoretical studies have been devoted to economic structures and economic growth in attempts to formulate models/theories of structural change; this including empirical studies for investigating the structural regularities of economic development. The first historical writings on this subject can be traced back to the works of classical economists. Adam Smith (1776) refers to the perception of such structures in 'Studies on the nature and causes of the wealth of nations'. Other international literature of significance on these issues inter alia include: AG Fisher (1935; 1945), C Clark (1957), J Schumpeter (1934; 1942) and later S Kuznets(1955; 1966).

One of the earliest models of economic development was proposed by Fisher-Clark, often termed as the three-sector concept of economic structures. This theory propounds that economies develop in three stages: the first most predominantly consists of agricultural production (sector I), the second realises the advantages of the industrial sector (sector II), whilst the third is dominated by the services industry (including education). Economies thus pass through successive stages in achieving higher levels of development due to cross-sectoral differentiation in labour productivity. Countries where agricultural production dominates, however have low GDP growth rates because this sector is limited by inefficient labour productivity. Market forces trigger change which primarily arise from demand-related variation in the income elasticity for a variety of consumer product categories. As the GDP per capita increases, the demand for foodstuffs and low-value goods decreases, whilst there is variable demand for quality industrial products and in providing different types of commercial services. An increasing proportion of the GDP and national added value is thus provided by industry and services. Such changes typically lead to higher/more efficient labour productivity, resulting in higher economic growth. Economic progress enhances the demand for services, thereby

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constraining a labour-force to abandon those sectors with the lowest productivity (ie. sector I) to ones where productivities are higher; sector III, (Nordhaus, 2001; McMillan, Rodrik, 2011).

Changes considered desirable in a given economic structure bring about increases in the indicators of economic performance such as gross domestic product or gross value added. Although these are not ideal, they are undoubtedly some of the best measures that reflect economic growth. However, does this refer to growth or development? The concept of development is considered both broad and qualitative in nature, however if economic changes are meant to improve people's quality of life, then the aforementioned indicators cannot alone suffice. A leading question could be posed about whether conditions harmonious and conducive to economic growth can achieve a fair form of social equity. Studies by Piketty (2014) have importantly concluded that the dynamics of how wealth is distributed triggers powerful mechanisms that alternate between convergence or divergence and that there are no spontaneous nor natural processes which can avoid permanent trends that destabilise or promote inequality. This book has been so widely read that it has lived to see a collective and polemical work published, entitled 'Piketty and what next? A plan for economics and inequality' (2017). Among the authors were three Nobel Prize laureates, Robert *Merton Solov, Paul Krugman* and *Michael Spence* as well as *Thomas Piketty* himself.

Economic analysts are ever more frequently drawing attention to how a nation's increased wealth can be fairly/equitably distributed. To quote, *Joseph Stiglitz* writes 'For many years, the dominant economic paradigm [...] has ignored the problem of inequality- both its role in triggering crises and the impact of economic fluctuations on inequality, and whenever such crises occur. The recent financial crisis has however proved that this thinking is flawed and these views are at last now finally being questioned' (Stiglitz, 2012, 2013). Social inequity has been much studied, but is often presented in a global context; for example by C. Lakner and B. Milanovic (2016), who found that inequality decreased during 1988-2008, as measured by the global Gini coefficient. They also showed that the majority of the world's population live in countries where inequality is intensifying. Nonetheless, small-scale/ local/ micro-data studies are still lacking.

It should be remembered how important inequalities are (or should be important), to the quality of an individual's life in their given country. These determine the dislikes of a person's life, which off course are inherently relative and usually based on ones immediate surroundings.

This study has aimed to investigate the relationships between economic structure in a three-sector system with that of social inequalities divided according to Polish regions, by means of using simple statistics. Objectives were to establish whether employment structure and socio-economic development are correlated; namely, does having high proportions of farm workers within a given region adversely affect its economic development, and also does having a higher proportion of workers in the services sector benefit the economy and reduce any adverse effects thereof.

Materials and Methods

The relevant study data for 2015 was taken from the Chief Statistical Office for all provincial regions of Poland (these are the latest official data on the regional level). Levels of employment were compared in 3 economic sectors throughout Poland; ie. the rural/agricultural, industrial and services sectors. Outcomes were then also compared to those indicators chosen that reflect levels of economic development and people's financial status; based on the so-called 'social cohesion studies' (2017). These indicators consisted of: gross domestic product (GDP) per capita, median income groups, high income groups and a poverty income index.

Gross domestic product- GDP is a monetary measure traditionally adopted for assessing economic development, but however this should not be confused with being a measure of the quality of life; although this could also be used for its improvement.

Middle income- median income is the amount that splits a given population equally in half, where one half earns above this amount, whilst the other half less. When used formally, this divides income into so-called equivalence units and is thus not per person. The Central Statistical Office uses the so-called modified OECD equivalence scale for its calculations, adopting equivalence unit values per person, per household as follows: for the first adult - 1, for each subsequent household member (aged>14 years) - 0.5 and for each child below 14 years old – 0.3.

High income index- the proportion (%) of households with the highest income ie. those whose monthly equivalent income was higher than 5/3 (approx. 167%) of the median equivalent income, ie. approximately 2.8 times higher than the accepted relative poverty line/threshold.

Income poverty index- the proportion (%) of households in which the disposable monthly equivalent income, (in the 12 months prior to the survey), was lower than the poverty threshold amount. This poverty threshold was set at 60% of the median equivalent income, ie. comparable between households with diverse demographies.

Descriptive statistics were used for our study and the employment structure in the country was analysed according to region/province (voivodship). The correlation was then determined between employment rates per individual sector of the economy with indicators of socio-economic circumstances.

Results

Economic structure broken down according to sector employment

Poland's economic structure is disadvantageous. The employment rate for sector I (agriculture) in 2015 was 11.5%, whereas the European Union (EU) average was 4.2%. In addition, Poland's employment rate in sector II (services) is lower than the EU average; respectively 60% vs 71.6%.

Employment rates throughout individual sectors of the economy show a large regional variation. Compared to the country's overall 11.5% employment rate for agriculture, the Silesian and Lower-Silesian regions are significantly lower at respectively 2.6% and 4.8%, whilst conversely they are the highest in Podlasia, the Holy-Cross province and the Lublin province; all being at over 22%. Employment rates in the industrial sector are however less diversified, with the average rate being 30.5% and ranging from 40% (the highest) in Silesia and the lowest in Mazovia (22.3%). The latter province however, has the highest employment rate in the third sector (services) at 66%, compared to the country's average of 57%; with the lowest service sector rate being in the Holy-Cross province at less than 50%.

Table 1: Economic structure in Poland (2015); employment rates according to economic sectors; agriculture, industry and services broken down by region.

Region/province	Agriculture	Industry	Services
Lower Silesia	4.8	35.3	60.0
Kujawy-Pomerania	14.0	30.9	55.1
Lublin province	22.0	23.1	54.9
Lubusk province	6.3	35.0	58.6
Lodz province	12.3	30.6	57.1
Lesser Poland	11.6	31.2	57.3
Mazovia	11.7	22.3	66.0
Opole province	10.3	35.9	53.8
Sub-Carpathia	15.7	30.8	53.5
Podlasia	23.9	24.7	51.5
Pomerania	6.6	32.7	60.7
Silesia	2.6	39.8	57.5
Holy-Cross province	22.7	28.3	49.1
Varmia- Mazuria	13.5	30.1	56.4
Greater Poland	12.9	34.7	52.4
Western Pomerania	7.6	30.3	62.2
Poland	**11.5**	**30.6**	**57.9**

Source: prepared in-house, based on Central Statistical Office data.

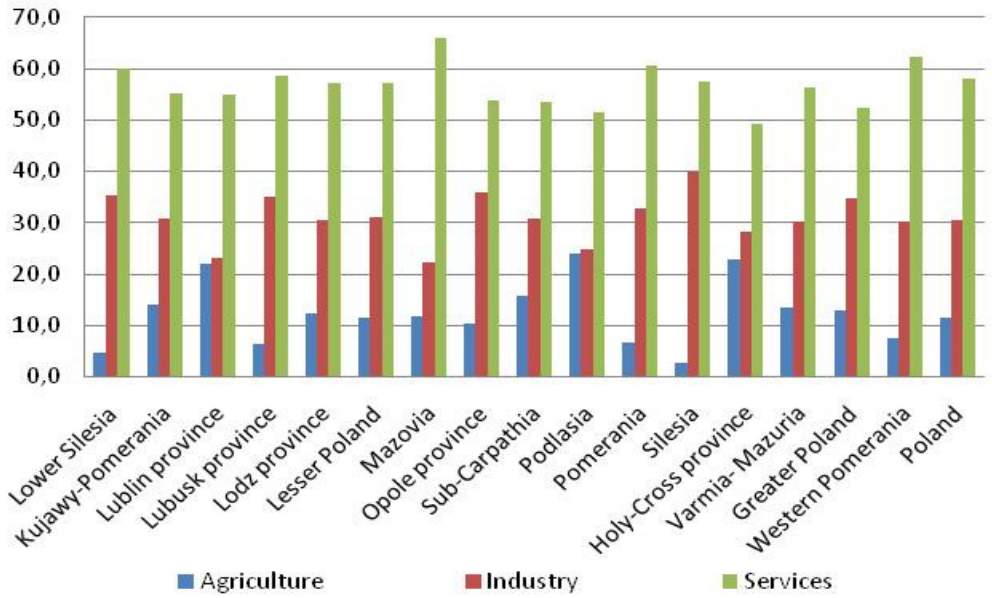

Fig. 1: Economic structure in Poland (2015); employment rates according to economic sectors; agriculture, industry and services broken down by region.

Source: prepared in-house, based on Central Statistical Office data.

It appears that there are very large regional variations in the country's three-sector economy. It should however be stressed that this is nothing new in Poland, which has witnessed significant changes over the last 20 years; although ultimately not to a sufficiently strong extent. As a comparison, in 1995 the average employment rate in the agricultural sector was 22.6%, whilst the then employment rates in the aforementioned provinces (Podlasia, Holy-Cross province and Lublin province) were significantly the highest, just like today, and were respectively at 42.2%; 41.6% and 44.5. Nevertheless, sectorial variations between regions has declined overall within the last 20 years.

The economic theory of sectorial division states that higher employment in agriculture coupled with low rates in the services sector result in a reduced regional productivity, thus a lower GDP per capita.

Economic structure and socio-economic indicators

Table 2 shows the breakdown of employment rates according to economic sectors in terms of socio-economic factors by region in 2015.

Table 2: Economic structure in Poland (2015) and socio-economic factors broken down by region.

	Employed in the sector (as %)			Indicators of the socio-economic circumstances			
	Agriculture	Industry	Services	GDP per capita	Middle income (median)	High income indicator	Income poverty rate
Lower Silesia	4,8	35,3	60,0	52203,0	1883,8	21,2	11,3
Kujawy-Pomerania	14,0	30,9	55,1	38190,0	1666,7	13,6	17,3
Lublin province	22,0	23,1	54,9	32074,0	1381,5	8,9	26,5
Lubusk province	6,3	35,0	58,6	39052,0	1785,7	13,8	10,8
Lodz province	12,3	30,6	57,1	43772,0	1700,0	16,8	15,4
Lesser Poland	11,6	31,2	57,3	42160,0	1731,2	15,0	15,4
Mazovia	11,7	22,3	66,0	74682,0	1969,4	26,4	10,7
Opole province	10,3	35,9	53,8	37816,0	1777,8	14,5	10,5
Sub-Carpathia	15,7	30,8	53,5	33176,0	1402,0	6,9	20,7
Podlasia	23,9	24,7	51,5	33272,0	1666,7	12,0	16,5
Pomerania	6,6	32,7	60,7	44955,0	1904,8	21,3	12,6
Silesia	2,6	39,8	57,5	48670,0	1935,5	18,6	9,2
Holy-Cross province	22,7	28,3	49,1	33841,0	1486,1	6,7	23,9
Varmia- Mazuria	13,5	30,1	56,4	33179,0	1600,0	12,0	16,8
Greater Poland	12,9	34,7	52,4	50790,0	1680,0	14,4	13,4
Western-Pomerania	7,6	30,3	62,2	39569,0	1733,3	14,5	16,2
Poland	**11,5**	**30,5**	**57,9**	**46792,0**	**1737,9**	**16,7**	**14,4**

Source: prepared in-house, based on Central Statistical Office data.

Gross domestic product (GDP) per capita

This indicator is first discussed. The Mazovia region had the highest rates, quite naturally, because this is where Poland's capital city is located; for this reason statistics often treat the capital subregion and the remaining region separately. The Upper Silesian, Greater Poland and Silesian regions had above average rates.

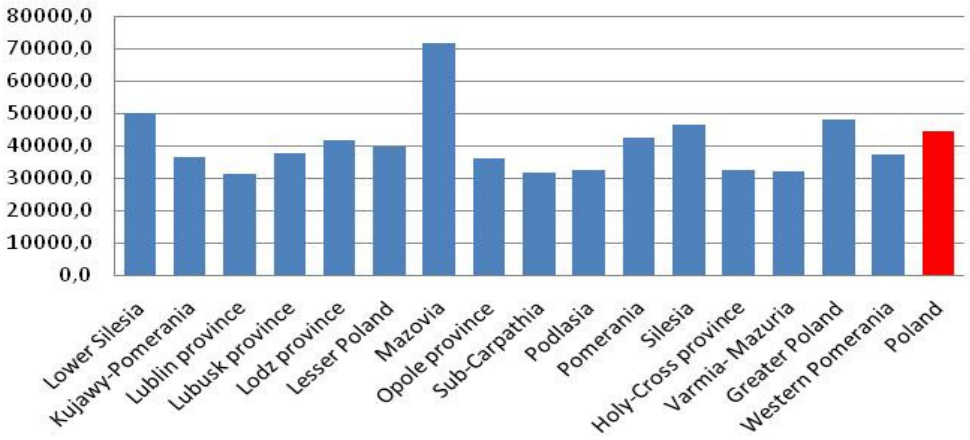

Fig. 2: Gross domestic product per capita according to regions in Poland (2015).

The distribution of GDP per capita according to regions shows that their economic structure is correlated with economic efficiency. This is particularly evident in those regions with high employment rates in the agricultural sector coupled with relatively lower efficiency per capita indicators. However, employment rates in the services sector have a more powerful impact on the productivity of the economy; especially in Mazovia.

Middle income groupings

The median income (middle income) indicator more clearly reflects the potential quality of life than for example the average income (like ordinary wages in relation to the average wage).

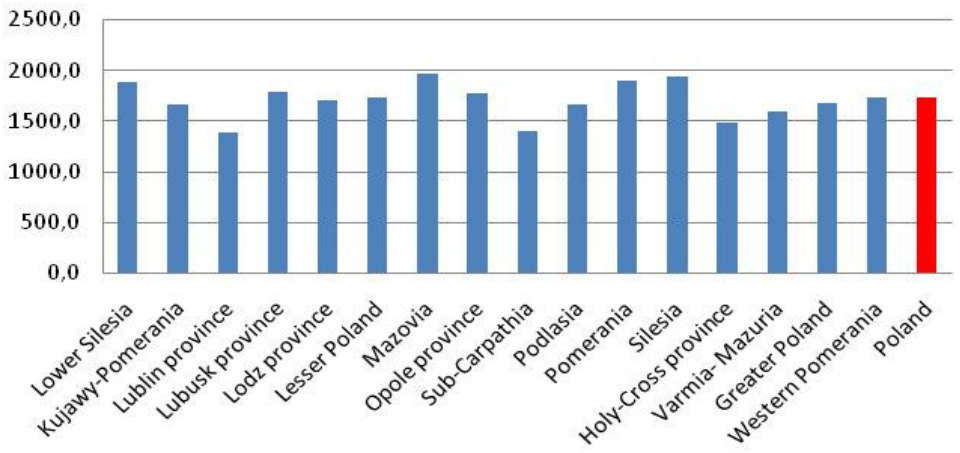

Fig. 3: Median income within Polish regions in 2015.

The highest scores were found in the Mazovian, Silesian, Pomeranian and Lower Silesian regions. However, the distribution trends of middle-income scores by region proved to be inconclusive. For instance the Podlasian region has the highest employment rates in the agricultural sector but relatively low rates in services (51.5%) ie. the one before last in the rankings. Nevertheless, any unfavourable indicators are absent.

High income indicator

This represents the proportion of households whose income exceeds 5/3rds of the average income. Likewise with the median incomes scores, higher than average high income scores were observed in the same regions ie. Mazovia, Silesia, Pomerania and Lower Silesia.

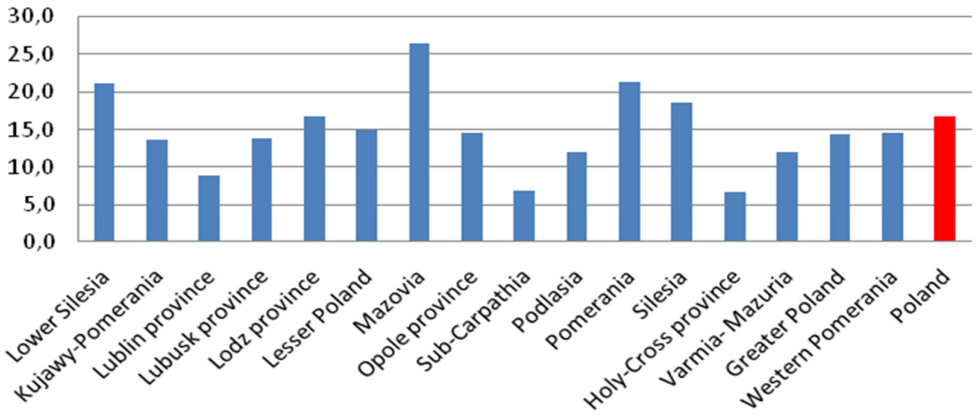

Fig. 4: Breakdown of high-income indicator outcomes in Polish regions (2015)

The greater diversity between regions merits attention. The largest differences to average levels of this indicator were noted in the Sub-Carpathian, Holy-Cross province and Lublin province regions, which are precisely those regions with a disadvantageous employment structure; although this is somewhat less marked in the Sub-Carpathian region.

Income poverty index

This represents the proportion of households with a monthly income lower than the accepted value considered as the poverty threshold, ie. 60% of the country's median income. Overall, 14.4% of households in Poland are in this situation. Nine regions had higher than average indicators, whilst they were lower in seven. The Lublin province was worst-off in this respect, with more than a quarter of the population affected. Other regions showing high rates were the Holy-Cross province, Sub-Carpathia and Podlasia. It should also be noted that these regions have the highest rates of employment in the agricultural sector; although not in this order.

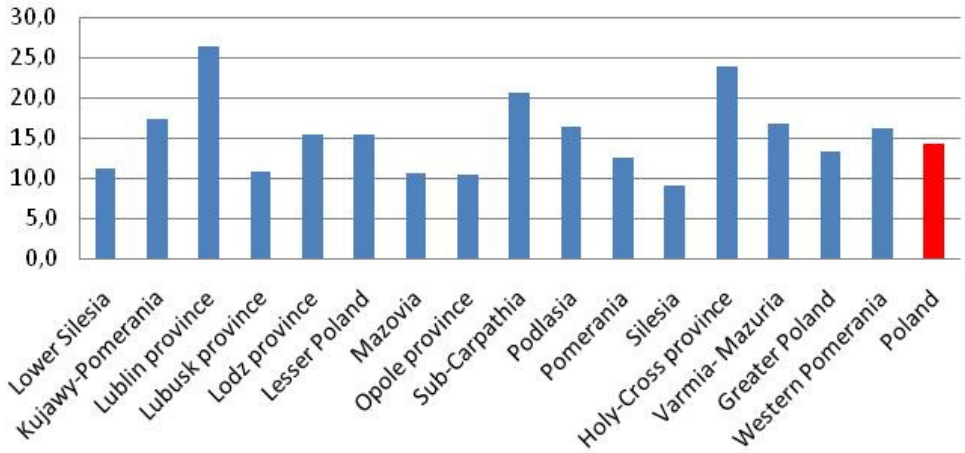

Fig. 5: Breakdown of the income poverty index in Polish regions (2015).

Polish regions with the lowest rates for these poverty indices were Silesia, the Opole province, Mazovia and the Lubusk province.

Correlation between economic employment structure with selected indicators/indices

For each region, correlations were calculated between employment structure and socio-economic circumstances; shown in Table 3.

Correlation coefficients were calculated by the formula below, with values ranging from -1 to +1.

$$Correl(X,Y) = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}}$$

To ensure clarity of interpreting the magnitude of the correlation coefficient (r), the following ranges and degrees of significance were adopted: 0.3-0.5 (+/-) was considered moderately significant, whilst 0.5-0.7 (+/-) was highly significant (ie. highly correlated and marked in a light font in Table 3). Any values of (r) above 0.7 (+/-) were taken as very highly significant/correlated (marked in a bold font).

Table 3: Correlation between employment rates within the defined sectors of the economy and selected indices/indicators of socio-economic circumstances according to the regions of Poland (2015)

	Employed In the sector (as%)		
	Agriculture	**Industry**	**Services**
GDP per capita	**-0,46**	**-0,02**	**0,68**
Middle income	**-0,76**	**0,39**	**0,68**
High income indicator	**-0,65**	**0,14**	**0,80**
Income poverty rate	**0,80**	**-0,59**	**-0,52**

The most significant correlations within the agricultural sector were found as follows:

1) A highly significant and positive relationship between employment rates in the agricultural sector with the income poverty index.
2) A significant correlation of employment rates with median income.
3) A highly significant negative correlation with the high income index.
4) A highly significant negative correlation with the GDP per capita.

Equally important correlations can be observed between employment rates with socio-economic indicators that are negative. A highly significant correlation was demonstrated between services employment rates with high income indices/indicators as well as with all the other socio-economic indicators; as had been expected. Lowest (r) values were found within the industrial sector, nevertheless employment rates were significantly correlated with the poverty income index.

Conclusions

This study has demonstrated a significant relationship between economic structure with the socio-economic development according to the regions of Poland. Whenever employment rates are higher in the agricultural sector, then the poorer become the economic outcomes. Both GDP per capita and the average income of residents are reduced, coupled with an elevated income poverty index, where there are strong correlations pointing to higher employment rates in the services sector delivering a higher value to the economy. This confirms one the study's initial suppositions as well as validating the well-recognised development of the three-sector economic division adopted in other studies.

This study aimed to investigate and highlight the relationships between economic structure, with productivity and social inequalities. The issue of whether the economic structure of Poland's economy has the ability to generate sufficient income has been an ongoing concern for many years. Evidence suggests that the three-sector economic model is still valid, based on studies carried out in the 1940s and 1950s (for example: Hirschman (1958), Rosenstein-Rodan (1943), Singer (1950)) and thence has continued on in seeking for effective development pathways/strategies (Hausmann et al, 2014; Cristelli, 2015; Hartmann, 2014). This is frequently found to depend on studying the evolution of economic structures according to changes in productivity of selected individual economic sectors (Go et al., 2019; Quintana-Romero et al., 2019).

There have been many studies done on a theory proposed more than half a century ago by *Simon Kuznetz,* which states that economic structural transformation leads to an increase in the level of inequality, whose effect should be treated as a by-product of economic growth. This had been extensively researched by for example '*C. Baumul and K. Sen*', who demonstrated that the influx of employees from the agricultural sector to the production sector did not increase social inequality. On the contrary, this reduced income inequalities regardless of the stage of transformation, whilst the influx of the labour-force to the service sector increased social inequality during the early stages of transformation, but which then later became decreased (Baymul, Sen, 2019; Baymul, Sen, 2020). Indeed, this can be considered to confirm our study's hypothesis.

The relationship between economic growth with poverty levels (Bourguignon, 2004; Ravallion, 2004) and social inequalities (Forbes, 2000; Madsen et al, 2018) has also been extensively investigated. Such studies have been ongoing for years, where outcomes of the latest studies have proved inconclusive. A frequently encountered problem is to decide which phenomenon is the cause and which is the effect: does economic growth increase or decrease social inequality in a given country? Or perhaps the converse is true, that a certain level of inequality determines growth opportunities? Studies often divide countries into high-, middle- and low-income, or to developed and developing ones or they are grouped according to their consumption proclivities; and there are many other proposed division (Sakaki, 2019; Vo et al., 2019; Arestis, 2020; Xx Alvaredo, 2018). It seems that despite so much knowledge, successful outcomes have still not been achieved and remained elusive; income inequalities are rising in many countries and reaching alarming levels.

The literature often also abounds with critical and polemic articles regarding existing scientific studies. These rather do not rely on refuting any analyses of the aforementioned relationships, but are mainly concerned with their simplification. Such criticism may certainly be levelled at this paper: dividing Poland's economy into three sectors is, after all, greatly simplifing the currently complex economic realities of this country. In the end, internal differentiation of each sector is important. This issue has indeed been addressed by studies on productivity, particularly within the agricultural sector. These studies do not agree with making any simplified comparisons such as labour productivity between agricultural and non-agricultural sectors, but note the heterogeneity of such divisions, as well as synergies existing between such sectors (Imai et al, 2019; Dorosh, Thurlow, 2018). For example, large increases of people

employed within services in 'naturally agricultural' or 'historically agricultural' areas (especially in developing countries) appear to be due to the creation of small, trade or transport companies (often sole ownership ones), whose economic activities are small scale and may not only be inefficient, but also lead to income disparities becoming wider, or at the very least being ineffectual in reducing poverty levels.

For this reason studies should not only focus on the economic effects of growth, but also duly address the way it is distributed (Hartman et al, 2017). At all times it should be emphasised that a high level of inequality can lead to serious social, political and economic problems (Choi, 2019), which in turn cause unrelenting demands for sustainable development and by what appropriate means this can be achieved (Bilan et al, 2020; Ergashey, 2019; Georgescu, Herman, 2019).

Hence, there is a constant need for in-depth research between the developed products of an economy, its productivity, income levels and degrees of social inequality. This issue is not only of interest to economic scientists/experts (Lyubimov, 2017), its subject matter appears in popular science publications/magazines, as well as being readily available to everyone. After all, such issues raised affect everyone. However, knowledge is very widespread now about social inequalities and the risk of poverty, the scale of these phenomena, as well as their adverse consequences, and even social and political threats. The problem is that the world is still unable to deal with them.

It appears that the scale on which economic research is performed is also vital, especially when it concerns all the measures of a population's quality of life. Differences in the quality of life within a given area, a given country, region, subregion, etc. may turn out to be more socially acute than if comparisons are made on an international or global scale. Therefore, despite the undoubtedly very important studies conducted on a global scale, one must never forget about the unique character of conducting research at the local level.

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Developing Inland Waterway Transport as A Potential Method of Balancing the Transport System in Europe – Opportunities and Limitations

Maciej CZAPLEWSKI

University of Szczecin, Institute of Spatial Management and Socio-Economic Geography, Szczecin, Poland, maciej.czaplewski@usz.edu.pl

Rafał KLÓSKA

University of Szczecin, Institute of Spatial Management and Socio-Economic Geography, Szczecin, Poland, rafal.kloska@usz.edu.pl

Abstract

Inland waterway transport and its development is way of creating a more sustainable transport system in any country or region in the world. At declaration level, the EU shows some action in this regard. However, at the level of real actions the situation is far less satisfactionary. The main objective of the article is to identify opportunities to enhance the role of inland waterway transport (IWT) in the EU transport system and thus create a more sustainable transport system. On the basis of a critical analysis of the professional literature, the participation of IWT in freight transport in the EU, examination of EU programmes for the IWT development and the adoption of a logical reasoning approach, it might be concluded that, in the best-case scenario, the current role of IWT in the EU transport system will be maintained.

Keywords: Inland waterway transport, sustainable development, transport system.

Introduction

Modern economies, as a result of progressing liberalization and globalization, are characterized by accelerated growth and development and a growing dynamics of contacts established on a national and international scale. This contributes to, among other things, the increase in the quantity of goods to be transported and stresses the importance of rationalizing the transport service of the increasing load weight. In rationalizing this service, the basic conditions are created by the transport system, including in particular its spatial arrangement, the mode structure and participation of individual modes in the system.

In the context of increasing overloading of certain modes of the transport system (TS) as well as the occurrence of bottlenecks in certain areas of the transport systems, the issue of seeking methods to use the resources of individual modes of the transport system in a more sustainable manner has been raised. This requires a greater focus on inland waterway transport (IWT) and, more specifically, on the search for opportunities to make better use of IWT resources and the validity of taking such actions.

The purpose of the analysis is to present: the characteristics of sustainable development, EU TS policy and the grounds for EU's support for IWT in order to increase the sustainability of the European TS.

The manner in which the EU has influenced IWT raises the following research questions: how to assess the EU's activities in the area of IWT so far and what are the chances of increasing the role of IWT in the European TS in practice?

With reference to the adopted objective of the analysis and the research questions raised, the article focuses on the characteristics of sustainable development of TS and EU transport policy with particular emphasis on the impact on IWT, the conditions for increasing the role of IWT in the EU TS and the capability of providing these conditions.

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For the purpose of this article, the following methods were adopted: scientific methods for critical analysis of literature on economic policy, land management and transport economics and organization with a particular focus on IWT, analysis of the contribution of IWT to freight transport in the EU and EU programmes and regulations concerning TS and IWT, a method of observing the socio-economic policies applied in this area and a method of logical reasoning.

The Characteristics of a Sustainable Transport System

The concept of sustainable development was first defined by the World Commission on Environment and Development (Kotowska, 2014, p. 43). In a report published in 1987, sustainable development was defined as "development which meets the needs of present generations without compromising the ability of future generations to meet their own needs" (UN, 1987). Moreover, sustainability was addressed, for example, at the so-called Earth Summits in Rio de Janeiro in 1992 and 2012, and the first summit resulted in a document entitled Agenda 21, which sets, inter alia, objectives of sustainable transport like: reducing transport demand, development of public transport and integration of transport processes between various countries (EC, 2001, p. 6).

In the European Union, the foundations for the sustainable development of transport systems were laid in the early 1990s, issuing Community legislation and developing scientific and research programmes in the field of environmental protection (Załoga, 2013, p. 85). Today's definition of the concept of sustainable transport often uses the approach of the European Federation for Transport and Environment which considers sustainable transport as "a movement which meets the mobility needs of today's generations while taking care of the state of the environment, living conditions and economic development opportunities of future generations, emphasizing the contribution of transport to sustainable development" (T&E, 2004, p. 7).

European Union transport policy with a particular focus on inland waterway transport

The development of transport systems comprising different modes entails the need to improve individual modes, a process which should encourage their integration through the introduction of inter-modal technologies. The EU attaches great importance to the development of integration processes for transport infrastructure, as exemplified by the implementation of the so-called common transport policy.

The principles of the transport policy introduced in the EU reveal the need to create multi-modal transport systems which allow the use of different functions and properties of individual modes. The changes in EU TS observed in economic practice, especially at the turn of the 20th and 21st century, indicate that the actions taken within these systems are primarily focused on the role of car transport and thus contribute to a relative decline in the roles of rail transport and IWT. Data on the role of road, rail and inland waterway transport in freight transport in the European Union in the years 1995, 2000, 2005, 2010, 2015 and 2018 are presented in Table 1.

Table 1: Data on the role of road, rail and inland waterway transport in European Union freight transport in the years 1995, 2000, 2005, 2010, 2015 and 2018 (in billion tkm)

Year	Road transport	Rail transport	Inland waterway transport
1995	1289	388	122
2000	1509	405	134
2005	1755	416	139
2010	1710	394	156
2015	1722	418	148
2018	1908	421*	135
2018/1995	+48%	+9%	+10%

** data for 2017*

Source: Own work based on (Eurostat, 2012, p. 36; Eurostat, 2017, p. 36; Eurostat, 2019, p. 34).

The forecasts prepared for the inland waterway transport in the EU between 2017 and 2030 do not predict a major increase in the role of IWT. At the same time, the scientific literature emphasizes the need for a greater inclusion of high-performing, energy-efficient and environmentally friendly modes of transport in transport systems (Gorlewski, 2007, p. 315), which include, inter alia, IWT. In order to strengthen the market position of IWT, EU began to:

- take measures to liberalize the market of EU IWT services, particularly through Regulation 1356/96/EC of 8 July 1996 aiming at full freedom to provide inland waterway services and ensuring full market access within the EU for inland waterway operators after 1 January 2000;

- implement transport investment programmes, e.g. TEN-T presenting the main transport route systems and underpinning the EU common transport policy;

- implement combined transport development programmes, such as Marco Polo;

- implement inland waterway development programmes, such as NAIADES.

The approved EU programmes and documents indicate that the EU transport policy strongly emphasizes the positive features of inland waterway transport, in particular its relatively low level of adverse environmental impact (Neider, 2012, p. 106-107; Wojewódzka-Król, Rolbiecki, 2007, p. 247) and the need to strengthen the role of this mode in the European transport system mainly through:

- development of navigable inland waterways (Łepek, 2008, p. 275);

- development of container shipping which additionally requires improvement of the infrastructure of inland waterway transport (Rydzkowski, Rolbiecki, 2008, p. 318);

- introduction of an obligation for carriers of particular transport modes to bear external costs generated by them, e.g. the costs of adverse environmental impact (Montwiłł, 2008, p. 301).

However, the positive attitude to strengthening the role of inland waterway transport in the transport system as presented in EU documents rarely translates into concrete investment measures in the area of inland waterway transport and consequently is not reflected in the improvement of statistical data demonstrating the role of inland waterway transport in the European transport system. This is proven by Eurostat data, according to which in the last 30 years the weight of goods transported through inland waterways in Europe has only increased by 17% (Künast, Trittin, 2012), while the participation of inland waterways in the total load weight transported in the EU in 2010 was 6.1% and was clearly higher mainly in the Rhine corridor (14.3%) and the Danube corridor (7.2%) (Theologitis, 2012).

In June 2006, the European Commission reviewed the achievement statues of the White Paper's objectives (COM, 2006). It decided that achievements were not satisfactory and initiated the introduction of new instruments, including, inter alia, the integrated European inland waterway programme – NAIADES (Navigation and inland waterway action and development in Europe) (EP, 2006). The NAIADES programme was formally terminated in 2013, however it is to be continued through “NAIADES II: European inland waterway policy for the next decade”.

The European Commission indicates that the NAIADES II programme may be financed by the funds from the Marco Polo Programme and the Trans-European Transport Network (TEN-T) programme. In line with the priorities of the TEN-T programme (EC, 2013), it may be assumed that this will involve the modernization of two inland waterway corridors included on the list of priorities of the TEN-T programme (EU, 2013) – the Rhine Main-Danube corridor (EBU, 2005, pp. 46-47) and the Seine-Scheldt corridor (Hacksteiner, 2010, p. 12). Recent EU actions taken under the TEN-T programme, relating to IWT. focus on the financing of River Information Services (RIS), a system to provide and obtain information on inland waterway traffic, shipping and port charges, hydrological conditions, investment plans as well as other statistics and administrative regulations (Schilk, Seemann, 2012, pp. 622-631). This means, however, that no funds are earmarked for the implementation of NAIADES II programme (COM, 2013).

The conducted study indicates that, at a declaratory level, the EU emphasizes the need to strengthen the role of inland waterway transport in the European transport system. On the other hand, EU actions to strengthen the role of IWT in economic practice are very limited. They solely include analyzing forecasts for the development of inland waterway transport and designs of future inland waterway networks as well as very limited financial involvement in the development of the inland waterway network, and the investment support is mainly planned for the expansion of the inland waterway network in regions already having a well-developed inland waterway network, which raises concerns about reinforcing inequalities within the EU.

Conditions and opportunities for strengthening the role of inland waterway transport in the European transport system

The development of inland waterway transport in markets which already have a high demand for its services requires substantial and comprehensive infrastructure investment to improve navigation conditions, including in particular the capacity of inland waterways, and to enhance the performance of watercraft and transport technologies used. In more analytical terms, in order to ensure the strengthening of the inland waterway transport role in markets in which this mode of transport is already present, it may be particularly desirable to integrate more closely inland waterway transport with the inter-modal logistic chains, achieved through:

- actions to reduce the adverse effects on inland waterway transport resulting from so called low water levels, which should in particular involve: construction of storage yards and warehouses used by loaders during periods of low water levels and construction of multi-modal ports allowing other modes of transport to take over the tasks of inland waterway transport during periods of low water levels;

- the development of containerization, which will ensure a better connection between inland waterway transport and seaports;

- increasing the participation of inland waterway transport in waste and bulk transport.

In order to open up new markets for inland waterway transport, infrastructure investments in the improvement of the waterway system and the development of inland waterway connections should play the major role. Taking into account the fact that economic results and the supply of transport infrastructure determine each other (Ahlfeldt et.al., 2015), improvement and expansion of this infrastructure should take place especially in respect of water connections between the countries of the so-called old Union and the new EU members, representing Central and Eastern Europe, characterized by high quality navigation conditions.

Amongst the projects prepared by the EU to develop inland waterways and their connections, particular attention should be paid to:

- the project to connect the Oder with the Elbe and then with the Danube (Janak, 2003);

- the TEN-V waterway project (COM, 2017);

- the project for trans-European inland waterways, including, inter alia, the planned connection between the Oder and the Elbe and Danube (EFIN, 2004, p. 95).

These projects are not new and the International Union for Inland Navigation (IBU) and the European Skippers Organization (ESO) in particular are making efforts to implement them. To this end, they appeal to individual Member States to increase expenditure on removing barriers on national inland waterways, and to EU authorities to take greater interest in the trans-European inland waterway network.

Significant investment is needed to pursue both main courses of action which may support the development of inland waterway transport, i.e. developing existing markets and opening up new ones. In 2003 (Ion), the costs of building a trans-European waterway system was already estimated at 220 billion euros. It will be difficult to meet the investment needs of inland waterway transport to increase its role in EU transport systems. This is mainly due to two important reasons:

- the limited budgetary resources of individual countries due to “tying up” budgetary expenditure and revenue and the necessity to abide by the maximum level of the budget deficit imposed by the Union;

- relatively small investment resources of inland waterway carriers, the large number of which are small enterprises.

This situation creates the need to look for other sources of financing the development of inland waterway transport, including e.g. EU funds, bank loans, the creation of national and sector-specific funds. It may be predicted that raising funds for the development of inland waterway transport in Europe will not be easy, especially considering the limited interest of the EU itself in engaging in investment projects to expand the inland waterway network and

thus improve the European inland waterway system. The lack of interest in financing the European Inland Waterway Network stems additionally from the fact that different economic sectors, such as tourism, sport and leisure, housing, the natural environment and water management, report their needs and requirements, which are clearly contradictory, in respect of the said waterways (TINA, 2007). This means, in the broadest sense, that it is necessary to consider the waterways used by IWT both in economic and ecological terms. With regard to the economic aspect, the opportunities for the development of IWT are primarily contingent upon access to infrastructure enabling the provision of transport services at competitive prices and upon shipping significant masses of cargo through IWT.

As regards IWT infrastructure, with certain exceptions (e.g. the Rhine), investments in this area are at best stagnant (EFIN, 2004, p. 21), which entails high costs and expenses and the need to comply with environmental requirements, the fulfilment of which increases expenditure further. Moreover, unwillingness to invest in IWT infrastructure results from the limited interest of shippers in using IWT. To certain extent, this is due to the fact that the economies are dominated by small and medium enterprises, for which the parameters offered by IWT are less useful and which are neither willing nor financially capable to adapt to the service provided by IWT. Such caution also stems from the fact that the environmental aspect is playing an increasingly important role in this area. There is a tendency to depart from recommendations of cautious fulfilment of IWT and environmental protection requirements and to emphasize the need to prioritize ecology, tourism and flood protection requirements. The conflict between flood protection and IWT is primarily due to the fact that to protect against flooding it is necessary to maintain empty retention tanks, whereas IWT needs full tanks, emptied to create a wave on which barges can sail (Gawlik, Smolnicki, 2000, pp. 1-2). Furthermore, the declining position of IWT results from the growing impact of climate change on the deterioration of the water level of inland waterways, which in turn deteriorates navigational conditions. The conducted analyses indicate that IWT is adversely affected by climate change and, in connection with the regulatory changes introduced as a result of the liberalization of its market, it may be considered as a so-called double loser.

These factors are not conducive to the development of IWT, and this trend may be observed not only in moderately developed countries, such as Poland, but also in rich countries, where IWT has traditionally played a greater role in the transport system, such as Germany.

Conclusions

On a declaratory level, EU transport policy emphasizes the strengths of inland waterway transport and the need to strengthen its role in the European transport system. In practice, however, the EU approach towards inland waterway transport is not very consistent. It often boils down to formulating recommendations which are not connected with specific funds allocated for the implementation of these recommendations. The EU stronger financial commitment to promote the role of inland waterway transport in the European transport system is mainly hampered by the limited and often declining interest of customers in inland waterway services. This results in a small share of cargo transported through inland waterways in the total transported cargo, which according to Eurostat estimates (2020) averaged 6.5% in the EU at the end of 2017, while for Poland it was 0.1%, and it is also one of the lowest results among the EU countries. Furthermore, the unwillingness to financially contribute to the development of inland waterways results from the growing need to abide by ecological requirements, which significantly increases capital expenditure related to the improvement of the waterways. In the current situation, the EU is unlikely to invest significant resources in inland waterway transport. Therefore, it may be expected that, in the best case scenario, the EU will take measures to maintain the status quo of this mode of transport.

Acknowledgment

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Corruption as The Main Problem of Russia's Competitiveness

Olga RUDAKOVA
Central Russian Institute of Management – Branch of The Russian Presidential Academy of National Economy and Public Administration
rudakova71@yandex.ru

Elena KOLESNICHENKO
Tambov state university named after G.R. Derzhavin
ekolesnichenko@live.ru

Lyudmila KUZNETSOVA
Orel State University of Economics and Trade
gambeeva-1969@mail.ru

Natalia PYANOVA
Orel state University named after I.S. Turgenev
lyginani@mail.ru

Abstract

The end of the XXth– beginning of the XXIst century is characterized by the significant increase of competition basically at all world markets. For Russia, full-fledged entry into the global system of the world economy acts, on the one hand, as a vital resource for development, on the other hand, as a threat of displacement to the periphery of the world economy. From this point of view, it is relevant to analyze general trends in ensuring national competitiveness worldwide and for the Russian economy in particular. The current stage of economic development brings to the fore the issue of increasing the competitiveness of the Russian economy. The main weaknesses of Russia's competitiveness are related to administrative procedures and rules. Corruption in Russian society today is one of the main internal risk factors. Nowadays, it has turned from a trivial criminal problem into a key threat to Russia's competitiveness.

Keywords*:* Competition, Hypercompetition, National Competitiveness, Competitiveness Rating, Problems of Competitiveness, Corruption, Corruption Perception Index, Globalization, World Economy.

Relevance and Problem Statement

A distinctive feature of recent decades is the increased competition basically at all global markets. More recently, it has been absent in a number of countries and industries. The competition was not so fierce there where it took place. Global transformations that have taken place in the world development since the last quarter of the XXth century have led to significant changes in the world economic environment. The main positive effect of globalization is related to the effect of competition. The globality of markets means nothing more than the globality of competition. Under the condition of the globalization in the economic space, competition has been filled with a new, more complex content, and therefore a new form of competition has emerged such as hypercompetition (Strokov, Rudakova and Kusnetzova, 2016).

The problem to determine the level of national competitiveness and develop measures of its improvement has become particularly urgent when the global financial and economic crisis made fundamental changes, both in the economic development of most countries and in the dynamics of the development of the entire world economy. These changes have had a significant impact on the level of competitiveness between many national firms, as a result there have been significant changes in the ratings of the national competitiveness level (Strokov, Rudakova, 2016).

As for Russia, on the one hand, full integration into the global system of the world economy is a vital resource for development, on the other hand, it poses a threat of displacement to the periphery of the world economy. It is obvious that there is a possibility to solve the problem of strengthening Russian authority in the international arena, improving the standard of living of the country's population, and gradually approaching the standard of living of the most

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developed countries in the world only if there is a strong, dynamically developing economy. From this point of view, it is relevant to analyze global trends in ensuring national competitiveness and the conceptual theoretical and methodological foundations to form competitive strategies of international firms.

Until the 90s of the last century, there was no practical need to study the problems of competition and competitiveness in Russia. It was assumed that there was no competition in an administrative-command economy based on public ownership, on the means of production and systematic organization of production. The economic crisis of 1998 became the starting point for studying the problems of competitiveness in Russia, since the growth of the competitiveness of national enterprises was one of the positive consequences after this crisis. It should also be noted that since 2003 the growth of national competitiveness has become an integral part of the country's development priorities.

Research Result

World economic forum (WEF) has been ranking countries in terms of competitiveness since 1979. Global competitiveness monitoring is based on a combination of publicly available statistical information and the results of a survey of CEOs conducted annually by the WEF in conjunction with a network of partner organizations in the countries analyzed in the report. The global Competitiveness Index 4.0 is based on 113 variables grouped into 12 sub-indices divided into 4 groups. The 2019 global competitiveness index was calculated for 141 States. Beginning from 2018, each global economy is assigned a GCI on a scale from 0 to 100, where 100 represents the ideal state when considered factors are no longer obstacles to productivity growth.

According to the Global Competitiveness Report 2019, Singapore, the United States, Hong Kong SAR, the Netherlands and Switzerland led the national competitiveness ranking (figure 1). The last place in the ranking was taken by Chad, scoring only 35.1 points out of possible 100. Among the countries of the BRICS group, China has the best position in the ranking (28th place), and Brazil has the worst (71st place), while China's positions in 2019 did not change in comparison with 2018, and Brazil fell one line down. India dropped to 68th place in the GCI 2019 ranking compared to 2018. South Africa, on the other hand, significantly improved its position in the 2019 ranking, rising by 7 lines and taking 60th place. The Russian Federation ranked 43rd in the 2019 ranking, the same as the year before, with 66.7 points this time. It should be noted that the neighbors of our country in the rating were Slovak Republic (42nd place) and Cyprus (44th place).

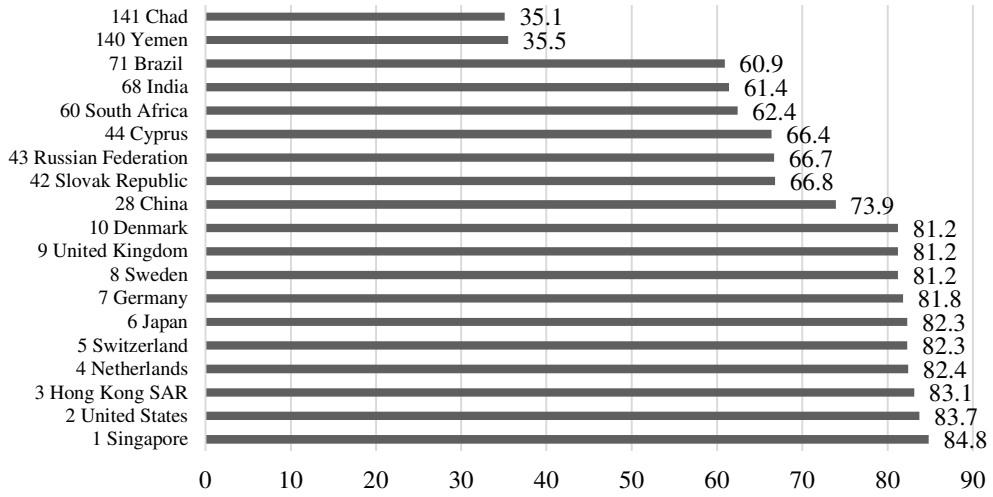

Figure 1: Position of some countries in the rating by The Global Competitiveness Index 4.0 2019 (The Global Competitiveness Report 2019)

Russia is ranked 43rd for the second year in a row, gaining an additional 1.1 points in 2019 compared to 2018. The Russian Federation's positions in the global Competitiveness Index 4.0 2018-2019 ranking are shown in table 1. Our country's best position in Pillar 10: Market size is 6th in both 2018 and 2019; the worst in Pillar 5: Health is 100th in 2018 and 97th in 2019. It should be noted that in 2019, compared to 2018, Russia significantly improved its position on Pillar 4: macroeconomic stability, rising from 55th place to 43rd (+12 positions in the rating) due to low inflation and stable finances. In addition, progress has been made in Pillar 12: Innovation capability, moving from 36th to 32nd (+4 positions in the ranking) due to improved quality of research institutions, increased R&D spending, and widespread Internet coverage. There was a significant deterioration in the position of Pillar 9: Financial system, the country moved from 86th place in 2018 to 95th place in 2019 (-9 positions in the rating), which was due to an increase

in the share of problem loans from banks, problems with obtaining loans for small and medium-sized enterprises, and a relatively low development level of the stock market.

Table 1: Components of Global Competitiveness Index 4.0 for the Russian Federation in 2018-2019 (The Global Competitiveness Report 2018, 2019)

Index Component	2018		2019	
	Score	Rank/140	Score	Rank/141
Pillar 1: Institutions	52,7	72	52,6	74
Pillar 2: Infrastructure	72,2	51	73,8	50
Pillar 3: ICT adoption	72,1	25	77,0	22
Pillar 4: Macroeconomic stability	87,5	55	90,0	43
Pillar 5: Health	68,5	100	69,2	97
Pillar 6: Skills	68,5	50	68,3	54
Pillar 7: Product market	54,2	83	52,9	87
Pillar 8: Labour market	59,5	67	61,0	62
Pillar 9: Financial system	54,8	86	55,7	95
Pillar 10: Market size	84,0	6	84,2	6
Pillar 11: Business dynamism	62,9	51	63,1	53
Pillar 12: Innovation capability	50,7	36	52,9	32
Global Competitiveness Index	65,6	43	66,7	43

Based on the Global Competitiveness Report 2019, it can be confirmed that the main competitive advantages of the Russian economy were the inflation rate (1st place), electricity access (2nd place), gross domestic product by purchasing power parity (6th place), the number of mobile-cellular telephone subscriptions (9th place), the news of research institutes prominence (9th place), budget transparency (15th place), shareholder governance (17th place).

Figure 2 shows the weaknesses of Russian competitiveness. The labour tax rate in Russia is one of the highest among the economies considered in the Global Competitiveness Report, which puts our country on the 134th place out of 141 according to this indicator. Banks' regulatory capital ratio allowed Russia to take only the 132nd place in the Global Competitiveness Index 4.0 rating. Significant difficulties exist in the Russian economy: financing of SME-only 118th place. A distinctive feature of the Russian economy is the incident of corruption – 116th place. It should be noted that in the Global Competitiveness Index 4.0 rating in 2018 Russia ranked 113th out of 140 possible countries.

International ratings indicate that Russia has a very low corruption perception index. The Corruption Perception Index (CPI) is a composite indicator calculated on the basis of statistical and expert information. The value of this indicator can vary from "0" (the highest level of corruption) to "100" (the lowest level of corruption). The ranking of countries on the corruption perception index is compiled by the international non-governmental organization Transparency International.

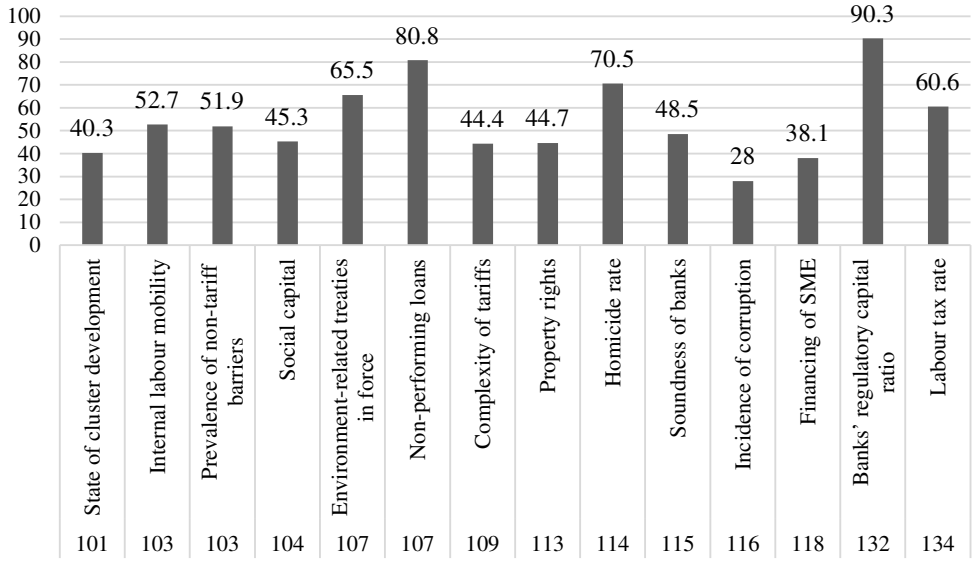

Figure 2: Weak points of national competitiveness in Russia in 2019
The Global Competitiveness Report 2019

In 2019 Transparency International presented the next corruption perception rating for countries all around the world. The 2019 ranking compiled 180 countries, including Russia. The leaders of the Corruption Perception Index 2019 rating were New Zealand and Denmark (87 points each), Finland (86 points), Singapore, Sweden and Switzerland (85 points each), outsiders – Somalia (9 points), South Sudan (12 points) and Syria (13 points). Russia ranked 137th out of 180 possible countries in the 2019 CPI ranking, scoring 28 points. Lebanon, Kenya, Mauritania, Uganda, Liberia, Paraguay, the Dominican Republic and Papua New Guinea scored the same number of points and were in the same positions. In recent years, Russia's position in the rating under review has been relatively stable (Fig. 3). Minor changes are due to changes in the ranking of other countries, the inclusion (or exclusion) of other countries from the rating, and the lack of a systematic fight against corruption. It is obvious that the world community perceives Russia to be a country with a high level of corruption and low efficiency of public administration. It should be noted that the Convention on civil liability for corruption has not been ratified by Russia yet (Civil Law Convention on Corruption, 2020).

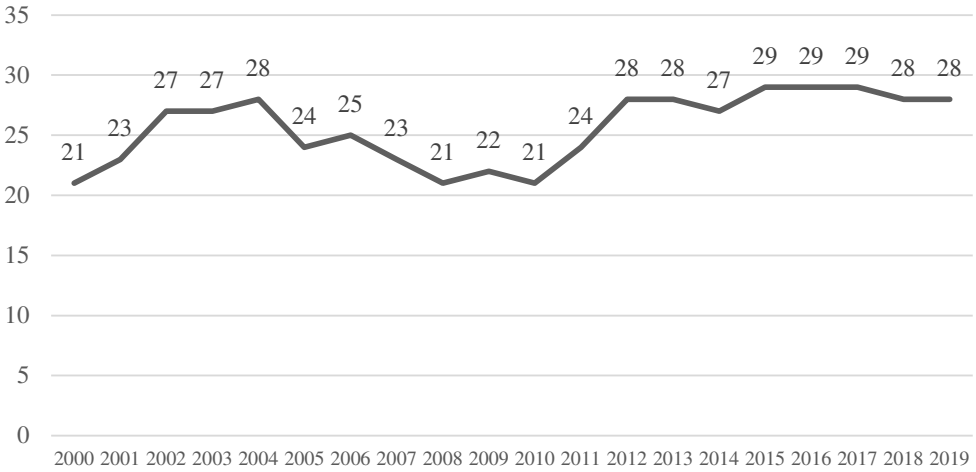

Figure 3: Corruption perception index in Russia in 2000-2019
(CPI 2019 Global Highlights, 2020)

According to Russian law, corruption is "abuse of official position, giving a bribe, receiving a bribe, abuse of authority, commercial bribery or other illegal use of an official position by an individual contrary to the legitimate interests of society and the state in order to obtain benefits...". Statistical reporting on corruption-related crimes can become one of the most effective administrative and legal means to improve the anti-corruption mechanism.

According to the General Prosecutor's office of the Russian Federation, in 2019, the country's law enforcement agencies registered 30,991 corruption-related crimes, which accounted for 1.5% of the total number of all crimes. According to the data provided in table 2, the number of registered corruption-related crimes in 2014-2019 is relatively stable, as well as the number of people involved in this type of illegal activity.

Table 2: Dynamics of the number of registered corruption crimes in the Russian Federation in 2014-2019 (Crime situation in Russia, 2020)

	2014	2015	2016	2017	2018	2019
Number of registered corruption-related crimes	32,060	32,455	32,924	29,634	30,495	30,991
Identified people committing crimes	15,831	16,926	16,680	15,940	15,908	15,773

The percentage of corruption-related crimes in the Federal districts of the Russian Federation is of interest (Fig. 4). The largest share of corruption-related crimes in 2019 was in the Volga (24.9%) and Central (21.0%) Federal districts, the smallest was in the Far Eastern Federal district (5.2%). It should be noted that this situation persists throughout the analyzed period. In 2014 the Volga and Central Federal districts accounted for 23.9% and 20.5% of corruption-related crimes registered throughout the country, while the Far Eastern Federal district accounted for only 4.2%.

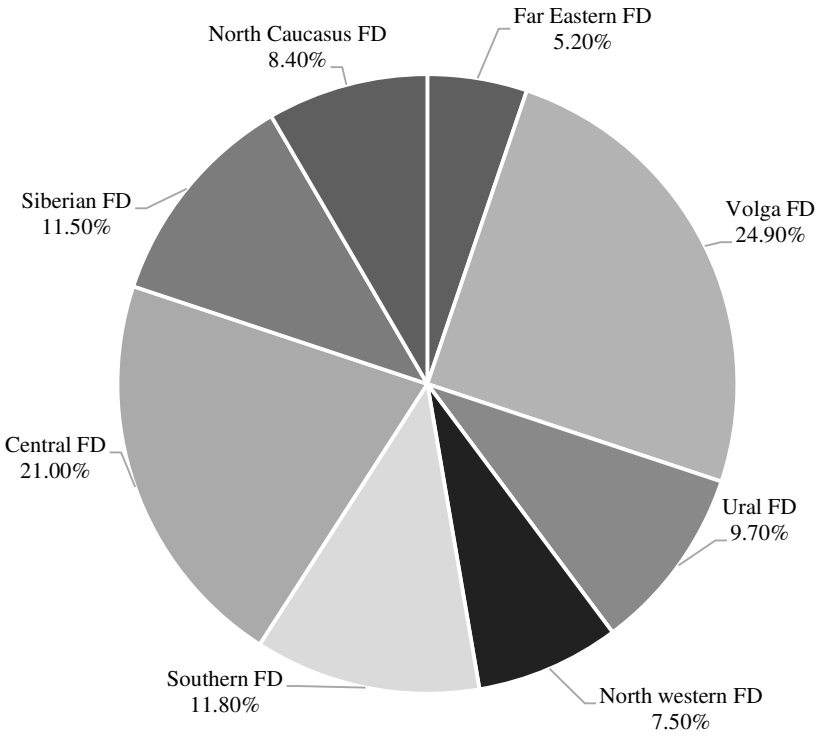

Figure 4: The share of corruption-related crimes registered in Federal districts, as compared to their total number in Federal districts of the Russian Federation (Crime situation in Russia, 2020)

Bribery (articles 290, 291, 291.1, 291.2 from the criminal code) is the main type of corruption-related crimes (Criminal code of the Russian Federation, 2020). If the share of all corruption-related crimes in 2019 was 1.5% of the total number of registered crimes, then fraud accounted for 0.7% of their number. We should note a steady increase in the number and proportion of crimes related to bribery in the period 2016-2019.

In general, the number of crimes under article 290 from the criminal code of the Russian Federation (receiving a bribe) has increased in the Russian Federation: from 3,499 in 2018 to 3,988 in 2019. The number of crimes under article 291 from the criminal code (bribery) increased by 21.5%: from 2,612 in 2018 to 3,174 in 2019. The increase

in the number of crimes under article 291.1 from the criminal code (mediation in bribery) was 32.5%: from 979 in 2918 to 1,297 in 2019, there was a slight (0.5%) decrease in the number of crimes under article 291.2 from the criminal code (petty bribery) - from 5,437 in 2018 to 5,408 in 2019 (General Prosecutor's office of the Russian Federation, 2019).

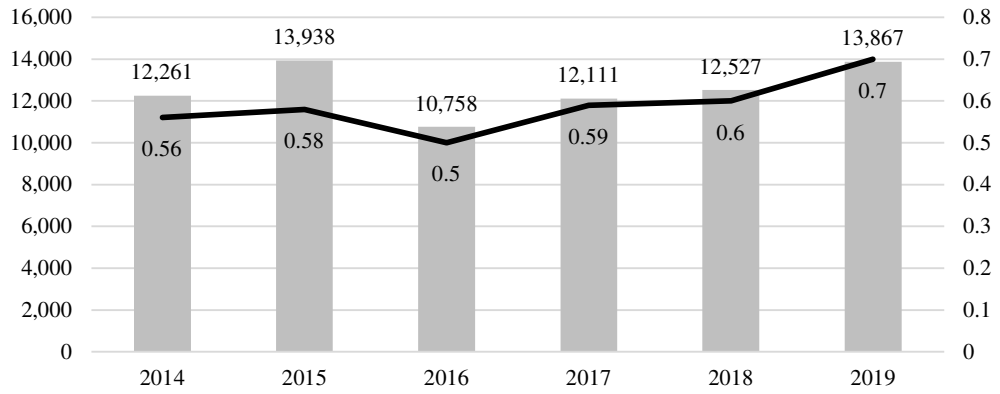

Figure 5 : Dynamics of the number of crimes under articles 290, 291, 291.1, 291.2 from the criminal code (bribery) in 2014-2019 (General Prosecutor's office of the Russian Federation, 2019)

The overall increase in the number of corruption-related crimes is associated with an increase in the number of crimes under article 285 from the criminal code in the Russian Federation (abuse of official authority). Abuse of official authority undermines the effectiveness of state power and undermines the belief of citizens that their interests can be protected. An important measure of anti-corruption policy is the inevitability of punishing those who abuse their official authority. According to the data in figure 6, the number of registered crimes under article 285 from the criminal code of the Russian Federation in 2014-2019 is relatively stable. A significant reduction was recorded only in 2017.

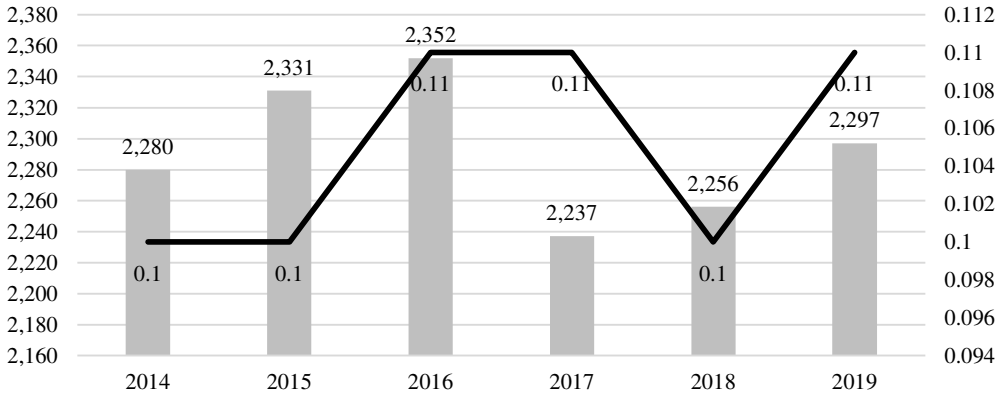

Figure 6: Dynamics of the number of crimes under articles 285 from the criminal code in the Russian Federation (abuse of official authority) in 2014-2019 (Crime situation in Russia, 2020)

Conclusions and Suggestions

It should be noted that the weakness of Russia's position in the Global Competitiveness Index 4.0 rating is largely due to the low effectiveness of public policy. Russian corruption has been systematic for a long time. Corruption has permeated all strata of Russian society. It particularly affected the state authorities and administration. Illegal actions of officials covered a wide range of public relations.

We should agree with Transparency International experts that in order to establish an economy where corruption is not a threat to national security and personal safety of citizens, as well as to the country's competitiveness on the world stage, Russia needs to (Russia in CPI – 2019: 28 points and 137th place (2019):

- regulate lobbying activities by ensuring the openness of decision-making in government bodies;
- exclude the influence of personal interests and connections on any decisions made by public authorities, especially those related to the allocation of budget funds;
- improve the legislation concerning settlement between conflicts of interest;
- ensure the protection of journalists, activists and other applicants for corruption crimes;
- follow the norms of international law and comply with the obligations assumed in the framework of interaction with other states and supranational organizations.

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The Effect of Perceived Person-Organization Fit on Organizational Attractiveness: Mediating Role of Employer Branding and Use of Social Media

Yessi INES

Department of Management, Faculty of Economics and Business, Universitas Indonesia, Widjojo Nitisastro Campus, Prof. Dr. Sumitro Djojohadikusumo Street, 16424, Depok, West Java, Indonesia
E-mail: yessi.ines@ui.ac.id

Elok Savitri PUSPARINI

Department of Management, Faculty of Economics and Business, Universitas Indonesia, Widjojo Nitisastro Campus, Prof. Dr. Sumitro Djojohadikusumo Street, 16424, Depok, West Java, Indonesia
E-mail: eloksp@ui.ac.id

Abstract

The organizational attractiveness is crucial in attracting talent amidst the talent crunch in Indonesia. A frequently cited recommendation of organizational attractiveness is to use perceived person-organization fit to attract talent to work within the organization. Given its importance, the impact of perceived person-organization fit on organizational attractiveness is essential to explore. Several studies have shown that perceived person-organization fit has a positive influence on employer branding and use of social media. Also, employer branding and use of social media were found to have a positive influence on organizational attractiveness. However, empirical evidence demonstrating the usefulness of addressing employer branding and use of social media as a mediation between perceived person-organization fit to organizational attractiveness is limited. Therefore, this study examined the role of employer branding and use of social media in transferring perceived person-organization fit to organizational attractiveness. This study uses a quantitative approach with cross-sectional design and purposive sampling method to collect primary data. The sample was obtained from 311 Undergraduate and Graduate Students in Indonesia while data is analyzed using Structural Equation Modelling (SEM). The findings indicate that perceived person-organization fit has a negative effect on organizational attractiveness. However, perceived person-organization fit's influence becomes positive on organizational attractiveness when adding the role of employer branding and social media as mediation.

Keywords: Organizational Attractiveness, Employer Branding, Use of Social Media, Perceived Person-Organization Fit.

Introduction

Talent is seen as an essential asset in the organization (Ahmad, 2018). They are unique and take a vital position to achieve a sustainable competitive advantage (Dries, 2013). Talent cannot be bought (Greene, 2020); however, companies can obtain, utilize, and protect these resources through talent management (Sparrow & Makram, 2017). In recent practices, talent management has been recognized as an innovative instrument of human resource management practices and has become the main focus of organizations in the twenty-first century (Mensah, 2019). However, organizations worldwide view talent management as the most critical challenge in this century (Jooss, Burbach, & Ruël, 2019). This challenge arises because of talent issues that have become the primary concern of many CEOs (Bhalla, Caye, Lovich, & Tollman, 2018). A survey conducted by PWC in 2019 showed that four out of five CEOs complained about a lack of skills in their employees and identified this factor as a threat to company growth. Moreover, the lack of skills in employees can also obstruct innovation and increase labor costs.

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Companies in Indonesia also experience a lack of skills in the availability of labor. Based on the research by Korn Ferry in 2018 revealed that Indonesia will experience the gap between supply and demand for the availability of skilled labor called talent crunch in 2020 and will continue to increase until 2030. Talent crunch in a category of individuals who have completed tertiary education reaches 1.3 million in 2020 and will continue to grow until 3.8 million in 2030 (Korn Ferry, 2018). This indicates that 29.9% of people who have completed tertiary education lack the skills and abilities that the organization needs in 2030.

This condition is exacerbated by the low level of people who took tertiary education in Indonesia. A survey conducted by Kemenristekdikti (2018) showed that the total number of people aged 19 - 23 years who should be currently studying in tertiary education are 80 - 107 million. However, only 7.5 million of them were pursuing tertiary education. The main problem in Indonesia's workforce is the low number of people who have been completed tertiary education and have the skills they should possess. Based on the survey conducted by Badan Pusat Statistik (BPS) Indonesia in 2020 regarding the workforce percentage according to education level, the total workforce in Indonesia is 137.910.000 people, 13.16% or equivalent to 18.148.956 of them who had taken tertiary education. The survey results support the gap between the demand and supply of skilled labor in Indonesia. Besides, a survey conducted by BPS Indonesia in 2020 shows that 5.95% of people who took tertiary education have no job or can be categorized as unemployed.

Given the low availability of skilled labor supply, there are several ways that organizations can protect themselves from the effects of this condition. To attract, retain, and motivate talent, organizations must be seen as the employer of choice (Greene, 2020). Organizations must be able to attract the right talent by using organizational attractiveness (Greene, 2020). Organizational attractiveness is applicants' willingness to pursue the jobs and to accept job offers in an organization (Story, Castanheira, & Hartig, 2016). The survey conducted by Korn Ferry Indonesia and collaborated with SWA since 2013 regarding The Top Companies Organization to Work For in Indonesia in 2019 was aimed to provide consistent feedback to the companies to increase employee engagement. There are top 5 companies that become Top Companies Organizations to Work For, namely Pertamina, Bank Central Asia, Bank Mandiri, Bank Rakyat Indonesia, and Unilever Indonesia.

Related to organizational attractiveness, De Cooman and Sels (2020) found that perceived person-organization fit has a strong antecedent to organizational attractiveness. This indicates that people try to find an environment that can meet their needs and strengthen themselves. Cable and Judge (1996) suggest that job seekers develop their perceived person-organization fit, which came from the congruence between their perceived values and their values. Perceived person-organization fit is a person's perception of the conformity between the values he has and the values that the organization has (Hoffman & Woehr 2006).

The perceived fit between applicants and companies can be achieved with the use of social media. Research conducted by Tanwar and Kumar (2019) found that use of social media helps strengthen the existing relationship between potential employee's perceived person-organization fit on organizational attractiveness. In addition to using social media, companies can also use employer branding to increase perceived person-organization fit on organizational attractiveness. Chawla (2019) found that person-organization fit has a positive relationship with employer branding. Chhabra and Sharma (2014) found that employer branding has a positive influence on organizational attractiveness. Therefore, perceived person-organization fit can affect organizational attractiveness through use of social media and employer branding.

Literature Review

Relationship Between Perceived Person-Organization Fit and Organizational Attractiveness

Perceived person-organization fit is defined as a condition in which there is a match between the individual's values and the organization (Kristof-Brown, Zimmerman, & Johnson, 2005). Hoffman and Woehr (2006) define perceived person-organization fit as a person's perception of the conformity between the values he has and the values that the organization has. A research study by Ghielen, De Cooman, and Sels (2020) found that person-organization fit has a robust positive relationship with organizational attractiveness. Organizational attractiveness is defined as the extent to which potential employees view the company as an excellent place to work (Ehrhart & Ziegert, 2005). This study confirms the idea that individuals seek an environment that can fulfill their needs and strengthen themselves. This study is also in line with previous research that states a positive relationship between the value of person-organization fit and organizational attractiveness (Uggerslev, Fassina, & Kraichy, 2012). Also, a research study by Dineen, Ash, and Noe (2002) found that a higher level of person-organization fit leads to a higher level of organizational attractiveness. Therefore, the researcher proposes the following hypothesis:

H1: perceived person-organization fit has a direct, positive, and significant influence on organizational attractiveness.

Relationship Between Perceived Person-Organization Fit and Employer Branding

Person-organization fit has generally been defined as an organization's compatibility with an organization (Sekiguchi, 2004). Within employment selection research, specifically, the person-organization fit has been defined as a match between a prospective employee and the organization aside from knowledge, skills, and other physical and cognitive abilities (KSAs) (Westerman & Cyr, 2004). In a research study by Chawla (2019) found that person-organization fit has a positive relationship with employer branding. Employer branding is defined as the total of a company's efforts to communicate to existing and prospective employees about the company as a desirable place to work at, with advertising being key to creating an employer brand that is differentiated and compelling (Berthon, Ewing & Hah, 2005). Employer branding can also be defined as the employer attractiveness, that is, envisioned benefits that potential and current employees see in working for a specific organization (Berthon, Ewing & Hah, 2005). Also, as a total package of functional, economic, and psychological benefits provided by an employment experience (Ambler & Barrow, 1996). Therefore, the researcher proposes the following hypothesis:

H2: perceived person-organization fit has a direct, positive, and significant influence on employer branding.

Relationship Between Perceived Person-Organization Fit and Use of Social Media

Person-organization fit is defined as the congruence between organizations' norms and values and persons' values (Chatman, 1989). Job seekers prefer organizations whose characteristics align with organizational attributes (Cable & Judge, 1994). Theories about the person-organization fit state that person-organization fit is formed when the company's characteristics match a person's characteristics. The level of conformity will affect individual attitudes and characteristics (Pervin, 1989). According to Kristof (1996), the person-organization fit will occur when a company meets individual needs, wants, and preferences. A research study by Tanwar and Kumar (2019) found that person-organization fit has a positive and significant relationship to use of social media. Social media is defined as digital applications that facilitate interactive information, user-created content, and collaboration (Elefant, 2011). Tanwar and Kumar (2019) mentioned that the contribution of person-organization fit depends on the contribution of social media in building the company as an attractive employer. Therefore, the researcher proposes the following hypothesis:

H3: perceived person-organization fit has a direct, positive, and significant influence on use of social media.

Relationship Between Employer Branding and Organizational Attractiveness

Employer brand is the perception the world has about a company as an excellent workplace (TTI, 2010). The perception indicates a company as a great place to work in current and potential employees (Berthon, Ewing & Hah, 2005). Backhaus and Tikoo (2004) define employer branding as an effort by the organization to market their employment value proposition to improve recruitment and retention and also increase the value of human capital. A research study by Jiang and Iles (2011) found that employer branding could be a robust antecedent of organizational attractiveness. In a research study by Chhabra and Sharma (2014) found a significant and positive relationship between a strong employer brand and organizational attractiveness. Organizational attractiveness is defined as applicants' willingness to pursue the jobs and to accept job offers in an organization (Story, Castanheira, & Hartig, 2016). Berthon, Ewing and Hah (2005) defined organizational attractiveness as the intangible and invisible benefits of an organization for future employees. By implementing a substantial employer, branding will encourage companies to become attractive companies. Therefore, the researcher proposes the following hypothesis:

H4: employer branding has a direct, positive, and significant influence on organizational attractiveness.

Relationship Between Use of Social Media and Organizational Attractiveness

Social media is defined as digital applications that facilitate interactive information, user-created content, and collaboration (Elefant, 2011). In human resource management, especially in the recruitment process, social media can be used to win the competition in getting potential employees who have the required skills. In a research study by Carpentier, Van Hoye, Stockman, Schollaert, Van Theemsche, and Jacobs (2017) found that social media significantly affects organizational attractiveness, which means that the more information available to the potential employees on a company's social media, the higher their interest to the company. Organizational attractiveness refers

to the extent to which potential employees view the company as a positive place to work (Ehrhart & Ziegert, 2005). Besides, a research study by Kaur, Sharma, Kaur and Sharma (2015) mentioned that companies should consider using social media and organizational attractiveness as two critical things. Applicant perceptions of a company changed after viewing the company's web site, and those site design impressions were positively related to application intentions (Dineen, Ash & Noe, 2002)). Therefore, the researcher proposes the following hypothesis:

H5: use of social media has a direct, positive, and significant influence on organizational attractiveness.

Relationship Between Employer Branding and Use of Social Media

Employer branding is defined as a process that is concerned with building a positive image of a company in the minds of current and potential employees. Above all others, it is a great place to work and is an employer of choice (Ewing, Pitt, De Bussy and Berthon, 2002). Wallace, Lings, Cameron, and Sheldon (2014) defined employer branding as a combination of marketing and recruitment practices that allows employees and other stakeholders to recognize the desired corporate image. In other words, employer brand can be represented as the organization's image is perceived by actual and prospective employees (Gehrels, Wienen & Mendes, 2016). A research study by Kaur, Sharma, Kaur and Sharma (2015) found that social media and employer branding have a significant relationship and revealed that the most effective tool for communicating a brand is using social media. Bondarouk, Ruël, Axinia, and Arama (2013) mentioned using social media can encourage a company that wants to build a strong employer brand reputation. Therefore, the researcher proposes the following hypothesis:

H6: employer branding has a positive and significant direct effect on use of social media.

Relationship Between Perceived Person-Organization Fit, Employer Branding, and Organizational Attractiveness

Employer branding refers to how branding concepts and marketing, communications, and Human Resources techniques are applied to create an employer brand (Martin, Gollan, and Grigg, 2011). Employer brands aim to create an identity through differentiation in key stakeholders (Carrington, 2007). In a previous research study by Ghielen, De Cooman, and Sels (2020) has tested the role of employer branding as a moderation between the relationship of person-organization fit and organizational attractiveness. These findings found that person-organization fit has a robust positive relationship with organizational attractiveness. However, the relationship between person-organization fit and organizational attractiveness becomes low because of employer branding. A research study by Chawla (2019) found that person-organization fit has a positive relationship with employer branding. A research study by Chhabra and Sharma (2014) found that positive employer branding will increase organizational attractiveness. In this study, the researcher wanted to expand the research by examining the role of employer branding as a mediator in the influence of perceived person-organization fit on organizational attractiveness. Therefore, the researcher proposes the following hypothesis.

H7: employer branding mediates the relationship between perceived person-organization fit and organizational attractiveness.

Relationship Between Perceived Person-Organization Fit, Use of Social Media and Organizational Attractiveness

Social media is digital applications that facilitate interactive information, user-created content, and collaboration (Elefant, 2011). In human resource management, especially in the recruitment process, social media can be used to win the competition in getting potential employees who have the required skills. Dineen, Ash, and Noe (2002) mentioned an individual interest in a company is based on the fit between the individual and the organization (person-organization fit), which indicates a higher PO-fit will result in a higher level of interest to the organization. A previous research study by Tanwar and Kumar (2019) found that person-organization fit has a positive relationship with use of social media. A research study by Carpentier, Van Hoye, Stockman, Schollaert, Van Theemsche and Jacobs (2017) found that social media significantly affects organizational attractiveness. In this study, the researcher wanted to expand the research by examining the role of social media in mediating the influence of perceived person-organization fit on organizational attractiveness. Therefore, the researcher proposes the following hypothesis:

H8: use of social media mediates the relationship between perceived person-organization fit and organizational attractiveness.

Research Methodology

This study obtains primary data using survey techniques, conducted with structured questionnaires and a single cross-sectional design. Questionnaires are self-administered and distributed online using social media. This study uses a non-probability sampling with a purposive method to obtain samples within the required information criteria. Other than primary data, this study also collects secondary data from the literature review, books, institutional research reports, and other related literature to identify, define, develop an approach, formulate the design, answer research questions and test hypotheses, and interpret primary data more meaningfully (Malhotra and Dash, 2016).

Five different sources are used as indicators of each variable. *Perceived person-organization fit,* the scale developed by Kristof (1996) and Cable and Judge (1996) with four items, "My skills and abilities match the skills and abilities that this organization looks for in employees." *Employer branding,* the scale developed by Tanwar and Kumar (2019) with eighteen items, "This organization offers good internal training opportunities. *The use of social media* was measured using six items developed by Collins and Stevens (2002) "I have seen advertising for jobs at this organization in social media." *Organizational attractiveness,* the scale developed by Highhouse, Lievens, and Sinar (2003) with fifteen items "This organization is the most attractive employer for me."

This study uses a Likert scale ranging from 1 (Highly Disagree) to 7 (Highly Agree) for each indicator used. The questionnaires were addressed to Undergraduate and Graduate Students in Indonesia. Before the main test questionnaire distribution, the researchers first conducted a wording test of 10 people whose characteristics matched the targeted population to ensure the questionnaire's understandability and minimize bias. The pre-test stage involves 30 respondents, and the data were processed using SPSS to ensure the validity and reliability of questionnaire items used.
The research model presented below:

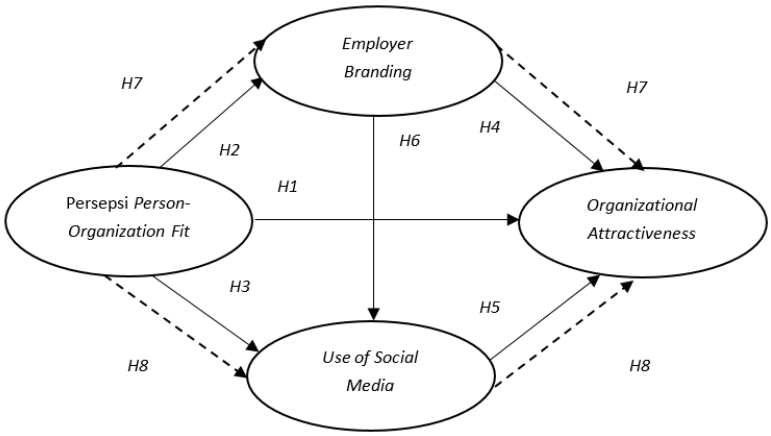

Fig. 1: Research Model

Results

Demographics

A total of 226 (72.67%) women and 85 (27.33%) men have participated in this study. Respondents in the range of 21 - 25 years dominated by 81.67%. Based on the level of education, undergraduate students dominated as much as 96.78%. The majority of respondents came from the faculty of economics and business, 52.73%. This could happen because the questionnaires' distribution was carried out around students from the economics and business faculty and includes influencers from the economics to distribute the questionnaire. Hence the data collected was dominated by the students who studied at the faculty of economics and business. Furthermore, 151 respondents (48.55%) chose Unilever Indonesia as the organization to work for, 100 respondents (32.15%) chose Pertamina, 25 respondents (8.04%) chose Bank Central Asia, 21 respondents (6.75%) chose Bank Mandiri, and 14 respondents (4.50%) chose Bank BRI.

Analysis – Structural Equation Modelling (SEM)

The primary test analysis consists of first-order and second-order measurement models analysis involving tests of validity, reliability, and goodness of fit and analysis of structural models consisting of analysis of causal relationships, the goodness of fit, and hypothesis testing. The data was processed using Lisrel 8.80.

The Measurement Model

Based on the results of validity and reliability testing data on the first order of measurement model in this study showed that all indicators of organizational attractiveness, employer branding, use of social media, and perceived person-organization fit had valid SLF ≥ 0.05 and reliable CR ≥ 0.7 and VE ≥ 0.5 (Hair, Black, Babin & Anderson, 2014). Furthermore, the goodness of fit on first-order measurement model showed a good fit result such as ECVI = 5.43, NNFI = 0.98, NFI = 0.96, RFI = 0.96, IFI = 0.99, CFI = 0.99, and critical N = 206.08. Meanwhile, the rest of the GFI, RMR, and AGFI showed a marginal fit. After conducting the first order, the second-order measurement model was carried out. The validity and reliability testing data on all indicators of the second order measurement model showed valid and reliable. In addition, the goodness of fit on first-order measurement model showed a good fit result such as RMR = 0.051, ECVI = 5.31, NNFI = 0.98, NFI = 0.96, RFI = 0.96, IFI = 0.98, CFI = 0.98. On the other hand, RMSEA, AGFI, and critical N showed a poor fit.

The Structural Model

The structural model fit was evaluated and the result of GOF showed good fit for RMR = 0.059, ECVI = 6.02, NNFI = 0.98, NFI = 0.96, RFI = 0.96, IFI = 0.98, CFI = 0.98. Meanwhile, RMSEA, AGFI, and critical N showed a poor fit. Table 1 showed the hypothesis test results in the path analysis that illustrated the causality relationship between variables in the structural model. According to the result of the structural model, perceived person-organization fit had a negative and significant direct effect on organizational attractiveness (SLF: -64.11, t-value ≥ -1.645), but perceived person-organization fit had a positive and significant direct effect on employer branding (SLF: 1.00, t-value ≥ 1.645) and also had a positive and significant direct effect on the use of social media (SLF: 8.33, t-value ≥ 1.645). Employer branding had a positive and significant direct effect on organizational attractiveness (SLF: 56.96, t-value ≥ 1.645). Social media also had a positive and significant direct effect on organizational attractiveness (SLF: 8.77, t-value ≥ 1.645). Employer branding had a negative and significant direct effect on social media (SLF: -7.43, t-value ≥ -1.645). Hence, this study also found the indirect effect of perceived person-organization fit on organizational attractiveness through employer branding and use of social media. Therefore, H2, H3, H4, H5, H7, and H8 were supported, but H1 and H6 were not supported.

Table 1: Hypothesis Testing

Hypothesis	Path	SLF	T-value	Result
1	Perceived Person-Organization Fit → Organizational Attractiveness	-64.11	-1.92	Significant
2	Perceived Person-Organization Fit → Employer Branding	1.00	11.08	Significant
3	Perceived Person-Organization Fit → Use of Social Media	8.33	4.37	Significant
4	Employer Branding → Organizational Attractiveness	56.96	1.85	Significant
5	Use of Social Media → Organizational Attractiveness	8.77	3.51	Significant
6	Employer Branding → Use of Social Media	-7.43	-4.30	Significant
7	Perceived Person-Organization Fit → Employer Branding → Organizational Attractiveness	56.96	20.498	Significant
8	Perceived Person-Organization Fit → Use of Social Media → Organizational Attractiveness	73.054	15.3387	Significant

Discussion

The first hypothesis (H1) regarding the positive influence of perceived person-organization fit on organizational attractiveness is rejected. The finding contradicts the studies belonging to Ghielen, De Cooman, and Sels (2020), which showed that perceived person-organization fit positively influences organizational attractiveness. However, the negative influence may be explained through the studies belonging to Rentcsh and McEwen (2002), which showed that perceived person-organization fit (value and goals) sometimes has different effects on the individual to organizational attractiveness. This indicates the possibility that several undergraduate and graduate students in Indonesia also have the same behavior to the compatibility of their values and goals with the company's values and goals. Thus they were not interested to the company. Although perceived person-organization fit was found to harm organizational attractiveness in the first hypothesis, perceived person-organization fit was found to positively affect organizational attractiveness when mediated by employer branding and use of social media.

The indirect effect of perceived person-organization fit on organizational attractiveness is measured by looking at the effect of perceived person-organization fit on employer branding in the second hypothesis (H2) and employer branding on organizational attractiveness in the fourth hypothesis (H4). The second hypothesis (H2) regarding the effect of perceived person-organization fit on employer branding was found to have a positive effect, which aligned with Chawla (2019) findings. This study shows that undergraduate and graduate students in Indonesia believe they will find colleagues who have the same thoughts like them on the company. This indicates a high perceived person-organization fit on undergraduate and graduate students in Indonesia will affect their complementary view of the company's employer branding. Furthermore, the fourth hypothesis (H4) regarding the effect of employer branding were found to have a positive effect on organizational attractiveness, which aligned to the previous research by Chhabra and Sharma (2014). The positive and significant effect can be explained through the high average value of employer branding and organizational attractiveness. Refers to the dimensions of salary and incentives with the highest average value show undergraduate and graduate students in Indonesia will be more interested in companies that offer salary and incentives above their competitors' average. Moreover, the companies should build a strong employer brand because potential employees are willing to work to companies with a positive and strong reputation and prestige. Therefore, to attract potential employees, the company should increase potential employees' perceived person-organization fit by utilizing employer branding dimensions.

Furthermore, the indirect effect of perceived person-organization fit on organizational attractiveness can also be measured through the effect of perceived person-organization fit on the use of social media in the third hypothesis (H3) and the effect of the use of social media on organizational attractiveness in the fifth hypothesis (H5). The third hypothesis (H3) regarding the effect of perceived person-organization fit on use of social media were found to have a positive and significant effect that aligned with the findings of Tanwar and Kumar (2019). Refers to the result of the highest average value on use of social media, shows students attracted to the job advertisement with the company they aspire to. High perceived person-organization fit in students would be easier to attract them through the use of social media by the company. Furthermore, the fifth hypothesis (H5) regarding the effect of use of social media by the company positively affect organizational attractiveness are aligned to the previous research from Carpentier et al. (2017). The positive influence of social media on organizational attractiveness can be explained through the word-of-mouth endorsement dimension. The finding indicates students who receive a positive view from their lecturers about a company as a place to work probably think of the company as a prestigious place to work. Moreover, using word-of-mouth endorsement can accelerate the spread of information about the company and deliver the information directly to the intended object. This study's object is undergraduate and graduate students in Indonesia, which implies the lecturers are the right subject to deliver the information and can be trusted by the students.

Further attention is given to the rejection of the sixth hypothesis (H6) regarding the positive influence of employer branding on use of social media. This study suspects that employer branding's negative influence on use of social media can occur because three out of five companies used as triggers are in the banking industry. This assumption is supported by the average value of work culture dimensions. The statement "the company provide flexible working hours" has the lowest average value among other employer branding indicators.

Based on the previous hypothesis testing, there is a positive and significant influence from perceived person-organization fit on employer branding, employer branding on organizational attractiveness, perceived person-organization fit and use of social media, and use of social media on organizational attractiveness. This finding supports the acceptance of the hypothesis that tests the mediating role of employer branding and use of social media. The seventh hypothesis (H7) found a positive influence on perceived person-organization fit on employer branding and influence on employer branding on organizational attractiveness. Perceived person-organization fit of undergraduate and graduate students in Indonesia can affect organizational attractiveness through employer branding. Therefore, to improve organizational attractiveness, the company has to pay attention to employer branding to increase perceived

person-organization fit. The findings of the eighth hypothesis (H8) found a positive influence on perceived person-organization fit on use of social media and influence on the use of social media on organizational attractiveness. Perceived person-organization fit of undergraduate and graduate students in Indonesia can affect organizational attractiveness through use of social media. Therefore, to improve organizational attractiveness, the company has to increase their intensity and quality of company's social media to increase student's perceived person-organization fit.

Conclusion

Conclusion

This research indicates that undergraduate and graduate students in Indonesia have different actions towards the conformity between the values and goals they have and the organizations have, thus indicating a negative and significant influence of student's perceived person-organization fit on organizational attractiveness. However, perceived person-organization fit positively and significantly impacts employer branding and use of social media by the company. Employer branding and the use of social media have a direct and positive influence on organizational attractiveness. These findings indicate that students will be more attracted to companies with a strong employer branding by offering salaries and incentives above their competitors. Companies can also attract students through use of social media by using word-of-mouth endorsement, which involves the roles of the closest parties to the students they trust the most, namely the lecturer in college. In terms of mediation relationship, employer branding and use of social media positively mediate the effect of perceived person-organization fit on employer branding. This finding indicates to attract students in Indonesia, the company should consider the role of employer branding and the use of social media in increasing student's perceived person-organization fit.

Limitation

The distribution of respondents in the study was dominated by students who come from the faculty of economics and business, which have an impact on the high number of enthusiasts towards the company were not evenly distributed to other trigger companies, which can potentially cause a little or much bias to the results. Moreover, the study was conducted when coronavirus (COVID19) occurred in Indonesia and obliged universities to implement a distance learning policy that affected the low response rate of research objects in filling out questionnaires and made it difficult to collect data distribution evenly.

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Going Serverless with AWS Athena, Data as a service

George Paul OPRESCU

PHD Student at The Bucharest University of Economic Studies, Bucharest, Romania
oprescugp@gmail.com

Abstract

An e-commerce platform is not just a web page with buttons and text that can be easily controlled. In addition to the economic factors and the field in which it operates, the technologies behind the platform are critical in its development. Maintenance involves costs, and they vary depending on the complexity of the data storage services. The layout of the page is also essential, but in order to develop it, a favorable environment for storing data and information is needed. It is essential to know how data is being transformed for analysis and statistics that facilitate business decisions. Most applications use a relational database, the most common being SQL Server from Microsoft. This database is physically stored on virtual machines alongside the application. There is the possibility of having a virtual machine for each application, but in the presence of several applications, users can experience an increase in costs. Kubernetes allows an application to start a virtual machine only when it is being used, resulting in low maintenance costs. However, the future does not consist of virtual machines and servers, cloud services from Amazon being much more efficient. Data and information are stored in the cloud, being exposed to the customer whenever he needs them. Data is then intelligently transformed into statistics and business information through various, almost autonomous data streaming and business intelligence tools.

Keywords: Amazon Web Services, Amazon Athena, Artificial Intelligence, S3 Buckets, Data-as-a-service, Big Data, Cloud Computing, PostgreSQL.

JEL Classification: IT Management, Business Economics, Mathematical and Quantitative Methods.

Introduction

Information is one of the most important resources we have, both digitally and physically. Before the appearance of the Internet, information in society was perpetuated with the help of one of the most enigmatic entities that does not yet know its own limits, namely, man itself. Man was the "hardware and software" through which information circulated in the world, later managing to store all his knowledge in the form of papers, parchments, books and if we use the time machine beyond, stone inscriptions. The power of this resource is the reason why society has reached the pinnacle of technology and manages to surprise even more. With the appearance of technology and the Internet, information has been redefined, evolved into a form easily accessible through television, computers, tablets and mobile devices. By definition, information is the meaning of certain variables, the links between them and is most often associated today with data manipulation and transformation. The data is taken by various methods and subsequently converted into information, to be used further by any individual. In a technology-dominated society however, those who reap the benefits are the big data companies, with Amazon being one of them. The company initially operated as an e-commerce platform, being a simple website for purchasing books online. Subsequently, the business developed in several fields, from electronics, mobile, toys, food, video games and of course their main source of income that currently expands: software services. Amazon is one of the top 4 technology companies in the world to provide a multitude of cloud, e-commerce and artificial intelligence services, all integrated into AWS or Amazon Web Services. [**Figure 1**] A subsidiary of the giant provides companies, state entities or individuals the ability to access on-demand cloud computing platforms and APIs, or application programming interfaces. These services charge the user based on how much they use them. In the case of cloud services, a user is charged according to the storage space used. Microsoft Athena is a cloud data query service, through which a client can extract only the data he needs through his own scripts. After the execution of the scripts, a fee is charged and the results displayed. Thus, the client only gets the information he needs and pays for it accordingly.As mentioned on the official Amazon website, in extracting and preparing data for analysis, customers can use AWS Glue, **Error! Reference source not found.** an ETL service more commonly known as Extract Transform and Load. AWS Glue "pastes" data stored in the AWS

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cloud, along with their metadata into a data catalog. This data catalog is then easily accessible by any other AWS service, such as Athena. In terms of structured query language, PostgreSQL is preferred in this case due to the scalability and speed with which it executes queries, much more efficient than the traditional SQL Server from Microsoft or the database management system from Oracle.

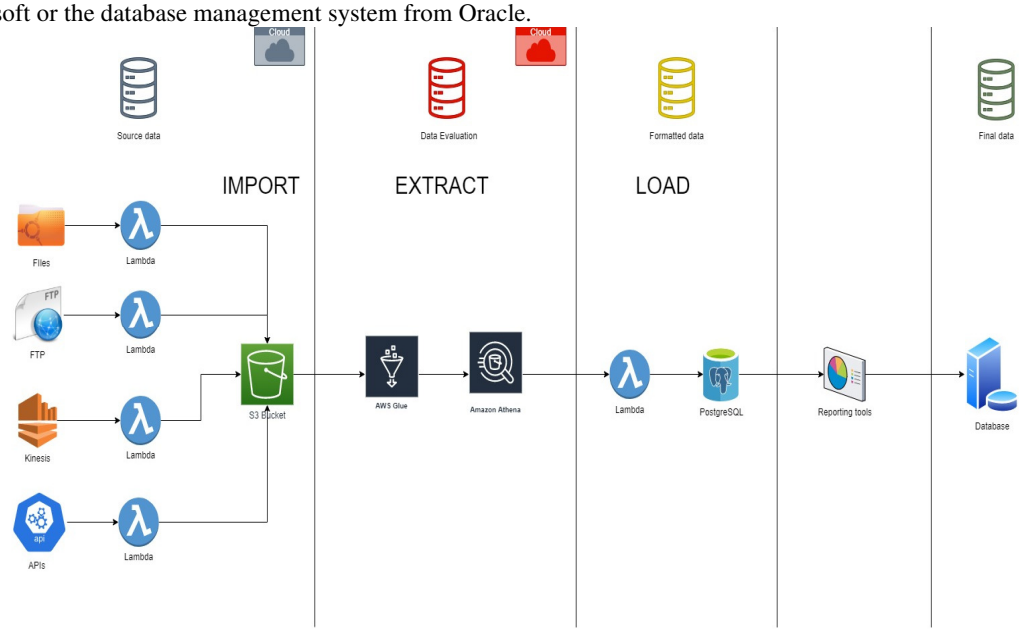

Figure 1 : Going serverless with AWS

Amazon Web Services

PostgreSQL is an open source relational database management system that supports several types of queries (relational - SQL or non-relational - JSON). Most PostgreSQL users focus on the area of mobile and web applications, analytics, statistics and geospatial data. Compared to SQL Server, PostreSQL can integrate other programming languages into its code to run at the same time without the need for an external application. The net framework through which the application interface is created or the front end used with PostgreSQL, currently has the fastest response time, thus offering users the comfort of an application that does not crash and responds in real time to business requirements. The programming languages that integrate well with PostgreSQL are among the top 10 most used and efficient: Python, Java, .NET, C / C ++, Ruby, ODBC and Pearl. Amazon manages to integrate this relational database management system directly from the cloud into its services. Through a PostgreSQL extension, geospatial databases and graphical objects can be created to store both traditional and geospatial data with geographic data, under the name of GIS (Graphic Information System). A recent practical application involving geospatial data can be found at Johns Hopkins University in the United States, which has managed to monitor in real time all coronavirus cases displayed in each country, along with their location on the map.

Amazon Athena is a serverless service that allows users to run queries on a cloud stored database. Each query depending on its complexity and the number of data, generates costs for users. Therefore, they can carry out their economic activity in real time knowing exactly how much data they have extracted and what their costs are. By serverless it refers to the ability to interact with Athena without the need for external applications or tools and a server to monitor. The database is strictly created in the cloud by data-as-a-service providers, and then through Athena data is prepared in an intelligent and efficient way for statistical analysis and forecasts. They will afterwards integrate the data into their informational system and use different query languages and reporting tools to get the desired business results.

As depicted in 'Streaming Data Solutions on AWS with Amazon Kinesis', The entire Amazon suite offers a wide range of tools through which a developer can create his application. Source data that comes from files, FTP (File Transfer Protocol), other APIs, but also a tool called Amazon Kinesis. Through it, a user can obtain real-time data from other applications, logs and recorded events obtained from user-client interaction, audio and video recordings. The recorded data reaches the user in real time without the need for him to wait a certain period of time for the data to be collected. Kinesis does not require the user to perform any maintenance or monitoring of the process, the data extraction being completely autonomous for millions of rows in real time. Through artificial intelligence algorithms, the data is taken in an intelligent way, and in time, after its model has been sufficiently trained, it can even learn new

rules of data extraction, as well as adapt to new data that is being streamed in the process. With batch processing data is not being processed in real time, requiring a certain amount of delay for it to be uploaded to the database. The advantage of stream processing is that it does not store data in a database, which will then be processed and forwarded. Instead, it processes data even before being stored in the database, all without user intervention. Building such a system, with the participation of artificial intelligence is a complex process and very difficult to build. The system must be prepared to collect, manipulate and transmit data efficiently from several external or internal sources. Initially, it is necessary to monitor the system during its implementation, due to errors that may occur along the way. Once it is revealed that the data is being processed the wrong way, the intervention is necessary to modify the algorithm so that in the future it knows what kind of model to apply. Once sufficient maintenance has been performed and the system has filled all its gaps, it becomes autonomous. The data sources may have different data upload speeds, all of which are updated based on data priority. If the user receives data that he does not need very quickly, because it depends on other processes that are slower, the accuracy of the whole streaming process is bottlenecked. Thus, the speed at which the data reaches and how each transfer from different sources complement each other is very important. Another step to take when making the system is for the user to monitor duplicated data. Duplicated data is not wrong, but a large amount of the same data can ruin statistical indicators in the data formatting and analysis processes. An aggregation function such as minimum and maximum would not be influenced by data duplication, but other data aggregation functions and statistical indicators like average, median, aggregation by weeks, month, year, have a major impact. Although it doesn't seem like an advantage at first glance, the presence of real-time data can save many businesses or multi-million euro contracts, and the opportunity can be seized faster, compared to a company operating on the same market that relies on traditional predictions. In order to make subscription costs more efficient, critical processes within a company should be monitored through Kinesis, while other processes, although equally important, do not always require real-time data. Many companies prefer to use automated data collection processes from the services their customers use, as they are being notified how much they have to pay by the end of the month. With real-time data, customers can analyze how much they should use the services and whether they are still able to pay without having a surprise bill. As depicted on the official Amazon website, Amazon Kinesis uses Amazon Firehose to collect and upload real-time data in an S3 Bucket, alongside Amazon Redshift, and Amazon's fast search engine Elastricsearch. Kinesis Firehose is a stand-alone, autonomous service that does not require maintenance and training, data being sent or even processed directly to the chosen destination. The only parameters that need to be changed are the destination of the data and the amount, specifying the categories to which they belong. Data is being transmitted regardless of their type, each having a storage capacity of 1000kb in the form of data BLOB. In a database management system, a blob is a collection of data stored binary on a drive. Most BLOBs are multimedia: images, video and audio. Amazon Firehose's rotation of uploading and sending data is automatically monitored by a service called Amazon Kinesis Agent. It always checks the integrity of the data and whether it has been sent successfully or not. In case of a transfer with incorrect data, Amazon Kinesis applies new methods to analyze why the process in question was not executed successfully and records all the information in a log so that it can be subsequently accessed by the user. After accessing the logs, the user can make the decision to change the destination parameters or the type of data transferred, in case of incompatibility. The user can monitor the behavior of these Amazon services, through another service in the same suite called Amazon CloudWatch. A very important resource for storing data of any type, both traditional and multidimensional (images, videos) is Amazon S3 Bucket and the objects that it stores. The name of a bucket is unique and cannot be duplicated in Amazon's service infrastructure. Regardless of the region in which it is created, the bucket is globally unique. The data is encrypted and integrated into an object, which is then stored in an S3 Bucket. There are some limitations depending on the subscription that each user has, from 100 to 1000 objects. Items can be stored in a single bucket or in separate buckets by preference.

Artificial Intelligence in AWS

Artificial Intelligence makes its appearance in AWS with Sage Maker, a service through which a developer or a data scientist can train and automate learning models or machine learning. [**Figure 2**] By machine learning training, the behavior of an individual or robot that adapts over time, changes and learns from its previous iterations to perfect the process. With each iteration, he comes close to simulating the behavior of an intelligent decision-maker. Without entering the realm of fiction, most processes of artificial intelligence are used for economic purposes, such as the evolution of prices over time and forecasts or the detection of diseases in patients depending on how accurate and trained the algorithm is. Within e-commerce platforms, understanding the consumer's needs, studying them in order to provide exactly the products and services they require, is crucial for the proper functioning of any online trading company.

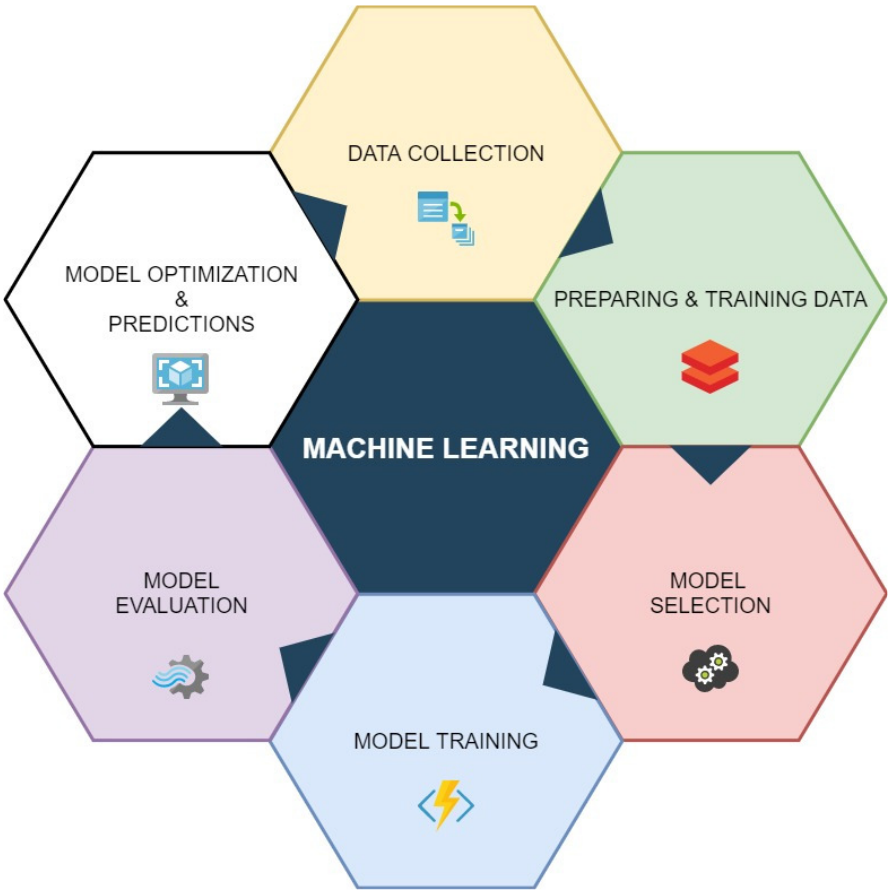

Figure 2: Machine Learning steps

When working with machine learning, there are a few steps a programmer needs to keep in mind according to Matthew Mayo:

- **Data collection**

- the data come both from external sources and from the training of the artificial intelligence model
- as mentioned in 'A Survey on Data Collection for Machine Learning', the model is much more accurate depending on the amount and quality of the data; a more complicated forecasting operation would need much more data to understand the behavior of the factor in question; As an example, a study to identify flu symptoms and the optimal use of appropriate treatment can cause problems in artificial intelligence; despite the fact that the model is trained and receives large amount of data, the virus undergoes unique mutations in each person affected by it, and therefore the model is not able to understand the new behavior; in this case it is necessary to adapt the model to apply methods similar to the previous scenarios, discovering methods that would not be obvious with a simple visit to the doctor;
- can be achieved through efficient data mining methods and complex analysis processes that train the model in future decision making; these data collection techniques fall into the Big Data area;
- there are 3 data collection methods that can be used separately, in any order or even at the same time: identification of data sets and new data collection methods; once these data sets are valid, the behavior is identified and trained for each set; behavior recognition can be replaced with the training of existing data;

- **Data preparation**

- the data is prepared for "training"
- data is cleaned, normalized, duplicates and errors are removed as well as missing values being replaced with relevant or similar data in order not to confused the algorithm, assigned data types and necessary conversions being made along the way;
- the data may also be mixed in order to preserve their initial meaning, without the intervention of the user;
- data can be previewed in order to observe the relationships that reside behind; subsequently they are included in categories according to the most dominant features; this type of inclusion is similar to the cluster group, where the

variables have common features; based on these features, statistics can be made and sent to the model; another method is filtering until the cleaning is complete

- **Model selection**

- the stage at which the model is chosen based on to the characteristics of the data; not every model is a good match for all types of data;
- According to Vladimir Fedak, there are several models in artificial intelligence, the most popular being: linear regression, decision trees, nearest neighbors, logistic regression, neural networks, and linear discriminant analysis
-linear regression is an algorithm and is most often used in mathematics and statistics, in order to train the accuracy of the model and to discover the values of the coefficients that have the greatest impact; by adjusting these coefficients more training results can be discovered by data analysts or data scientists;
- logistic regression is used when we want to understand the connections between two events or two variables and their behavior; the logistic regression is binary and discovers in itself how well two variables can reach a common goal; like linear regression, it is a prediction algorithm, but often the result is difficult to interpret as several such analyzes are needed before the final decision is made;
- linear discriminant analysis is the simplest algorithm of them all and is used to integrate different values into their specific classes; then the class that can bring the highest value to the model is determined and the predictive model is further constructed;
- decision trees appear not only in the statistical and mathematical field, but also in computer science; decision trees are the reason why many programming languages exist today; for example in SQL or Structured Query Language, when creating an index that physically or logically creates a sorted list; this list helps the user in quickly retrieving data; in this case the b-tree or binary tree is used to easily traverse the list and reach the sorting order specified by the index as soon as possible; the index can be physically stored, clustered and is declared only once, being the image of a table in the database; an image cannot exist multiple times and the rows can only be placed in one order; a similar example would be three chairs sitting in a room, a chair can't be to the right, middle or left at the same time, having a fixed position; in addition to the clustered index that is created based on the unique key of a table, the non-clustered index declared by the user intervenes to facilitate subsequent data searches in a certain order; being a binary tree, it helps to search for data, but encounters extensive problems when the user is changing the contents of a table; if the user constantly adds, updates and deletes data, the list is sorted with each data manipulation operation and thus we encounter performance issues; because sorting is the main function of a binary tree, if a search returns more than 70% of the rows in a table, the index loses its functionality and advantage due to the number of rows very close to the total number of rows in the table ; the binary search tree is also a recursive algorithm;
- the Naive Bayes model is one of the most powerful algorithms, easy to use; this is a "naive" model because it always assumes that all data entered by the user is not correlated; this scenario in practice does not present cases that can happen in reality, but due to the possibility to imagine that several participants are not correlated, it determines a very high accuracy for the artificial intelligence model.

- **Model training**

-the purpose of artificial intelligence training is to get a correct prediction or to answer certain questions as often as possible
-every time the model gets a result it will be much more accurate in its next iteration; the more interactions a model performs, the more effective it will be in the future; for example, a test was conducted online in a game in which there were two characters: red people looking for blue people in order to catch them; the blue people had walls and objects to make it impossible for the red people to reach them; after being found a few times at first, they learned how to isolate themselves better; In the following iterations, the people in red discovered a way to use the objects of the blue people to their own advantage and thus adapted to the adaptation of the blue ones; As a result, the blue people have increasingly isolated themselves by learning new effective methods of isolation along the way;

- **Model evaluation**

-a scale of results is used to verify that the model has met all the conditions, reached the results and answered all the questions;
-the model can be tested by adding new parameters to observe the change in behavior or if it can adapt to a similar scenario in another context or even a completely different scenario; in reality things may differ from the virtual scene; some analyzes and predictions cannot be made in reality and the intervention of artificial intelligence is needed to go further than the human mind can;

- **Improvement of the model**

- after evaluating the model, the initialization parameters can be changed to better answer questions depending on how close or far the model was to the result; a major change can confuse the algorithm, if it has not been trained enough to adapt;

-a few questions can be asked in at this stage: how fast the algorithm can learn and whether the learning rate evolves over time, the number of training steps required for the model to reach a state of accuracy of more than 80%; a model can use few resources to reach this threshold; after exceeding the threshold, the chances of the accuracy to increase by even 1% become more difficult than its previous stages and the real question would be whether it is ultimately worth to exponentially increase your costs and usage time for greater accuracy and whether accuracy itself makes sense for the decision, as the existing vision (with an accuracy of 80%) of the result may be sufficient for the user's purposes, even without the remaining 20%, the prediction was made and the user understood which direction he could take in order to satisfy the business requirements;

- **Predictions**

- the model itself can predict a result according to the parameters provided by the user and adapts over time; in order to be as efficient as possible, he needs to get data that it has never trained before, a test to see how he would react in real life and not just in the virtual environment;
-there are models that are specially trained to procure parameters for other artificial intelligence models; training and learning can go both ways, each model learning from the other in order to limit human interaction; one model can expect results from another model, which will then provide back results; this is much more efficient, with greater accuracy than a user's ability to parameterize new data for the algorithm; thus forming a chain of models that adjust exponentially is crucial for machine learning;
-the problem with predictions can be incorrect data or out-of-date data, most often found in the field of statistics under the name of outliers; the places where the algorithms get their data can be from multiple sources such as video cameras, images, sensors and therefore, a point of interest would be the places that are very often accessed by people; they can provide data online from e-commerce platforms, shops, gas stations, tv shows, traffic interactions and cafes; a lot of people go to gas stations and supermarkets every day because of the need for mobility and in general just to get food; in the event of an economic crisis or pandemic, these facilities are restricted and therefore the rate at which they are accessed by people drops drastically; the question is whether artificial intelligence algorithms and their trained model can understand when the profits that came daily in considerable quantities will be reduced to 0 the very next day; here the level of training of the algorithm is determined, whether it has been prepared for such a situation, or if not, whether it has an ability to adapt to the new situation; depending on the amount of data provided in time and learning rate, the algorithm is more likely to understand the new behavior; later, after the event that caused the instability has been removed from the equation and prices return to their initial value, it would be able to understand both scenarios in the future: the day by day average activity and further fluctuations;

Amazon SageMaker and new tools for artificial intelligence

Traditional artificial intelligence methods are part of a complex process that requires a lot of effort and time to follow the steps mentioned above and combine the necessary tools for machine learning. In **Amazon SageMaker**, as mentioned on the official Amazon website, all these tools are integrated and can be easily accessed by the user. [

Figure ***3***] Because these tools are available to the user in an instant and facilitate the development of AI processes, the effort distribution is oriented more to the logical side and algorithm implementation. All steps are highlighted in a web platform in the Amazon suite, where the user can control and access them, enter data ready to be processed, train and supervise the performance of artificial intelligence models, observe the results and create Python notebooks. These one-click Jupyter Notebooks are available at any time for any user in the respective Amazon account, the resources being accessible in real time regardless of when the code change was made. This is a favorable working environment where collaboration between developers is encouraged. The SageMaker autopilot chooses for itself the best artificial intelligence models, the right algorithm, the number of processors to use together with the analysis of the raw data received from the user. Manual intervention of the user is possible, where he can choose from 50 models of artificial intelligence. If he does not consider any of them suitable to answer business requirements, there is the possibility to combine them or even create a new model. In general, people with experience in the field of artificial intelligence and data scientists are the ones who create the model and all its specifications, after which application developers intervene to use the model in order to create intelligent predictions. In artificial intelligence, it is not all about algorithms and models, but also the quality of the data entered. Amazon SageMaker Debugger, as mentioned on the official Amazon website, is a compiler that gives the user transparency when he runs the model, by providing easy access to change the parameters for a different set of results. This transparency is described by the compiler's ability to provide the user with real-time metrics for a good understanding of the behavior, learned by the model. The processing capacity of the platform is due to the Amazon TensorFlow tool, an open-source library that offers the possibility to go through all the necessary stages of popular data and create complicated models in a short period of time, with the help of hundreds of processing units.

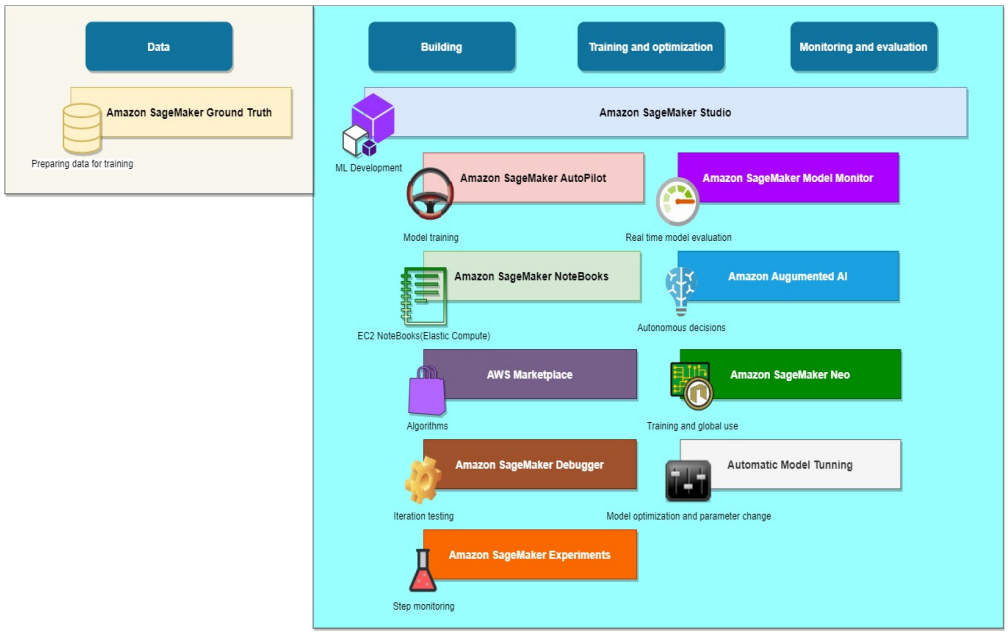

Figure 3 : Amazon SageMaker Tool for ML

Automatic Model Tunning, as depicted on the official Amazon website, most commonly referred to as hyperparametrization, involves, as the name suggests, changing model execution parameters and performing training multiple times on the same data set. Subsequently, the parameters that obtain the best result according to the test indicators chosen by the user become the basic hyperparameters. In order to best understand how hyperparametrization works, a user must know very well the type of algorithm used and its specifications, the origin and quality of the data set and an efficient method of checking and testing the results, while comparing them with the expected values. There are two types of parameter search:

- **Random search**

- the user specifies a range of values, from where values are randomly selected by hyperparametrization, that will be sent further to start the training iteration; the values of these hyperparameters do not depend on the values of past data and can be run multiple times without affecting performance and quality

- **Bayesian search**

- in the Bayesian search the hyperparametrization process tries to reach the best result assuming which values would be optimal; hyperparametrization in this case uses statistical regression to solve the problem, looking for previous values that were very close to the desired result, to see if they can further increase the accuracy; in some cases hyperparameterisation looks for outliers that would normally provide a incorrect result in order to observe the behavior and the result of their hyperparametrization;

SageMaker Neo, as depicted on the official Amazon website, allows users to store their artificial intelligence models in the cloud and run them anytime, anywhere and twice as fast. This tool is most often used in cases where the user's resources are limited and a real-time performance and fast prediction is desired. SageMaker Neo targets a user-chosen destination to solve performance issues using neural networks, Apache TVM, and kernel libraries. Apache TVM is a compiler that optimizes the execution time of applications by increasing the performance of processors or graphical processing units.

Conclusions

With the appearance of new cloud services, compared to traditional machine learning and data mining models, Amazon Web Services provides users with a set of smart, standalone tools that facilitate the creation of an automated process for extracting and transforming data into information to be later used for business decisions. All of these cloud services do not require a database or server for the user to monitor, everything being controlled directly from AWS. Data is obtained from different sources and using BIG Data they are stored in clusters, later to be retrieved by

ML algorithms or data collection processes. Algorithms and machine learning models have evolved so that the user's intervention is at a minimum and even aids him in their optimization and monitorization of the processes in a transparent and suggestive approach.

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The Leader's Roles in Nonprofit, For-Profit and Public Organizations: The Case of Poland

PhD Eng. Hanna BORTNOWSKA
University of Zielona Gora, Zielona Gora, Poland
h.bortnowska@wez.uz.zgora.pl,

PhD Bartosz SEILER
University of Zielona Gora, Zielona Gora, Poland
b.seiler@wez.uz.zgora.pl

Abstract

Leadership in organizations is one of the most important subjects analysed in contemporary management literature. This paper focuses on the roles of leaders that they can play in different types of organisations. The purpose of the article is to answer the following research question: Are there any differences between nonprofit, for-profit and public organizations regarding the performance of the leader's roles? To that end, a cross-sectoral survey was conducted in 2019 among 105 leaders and 210 non-leaders (the sampling was non-random). The statistical analysis showed that there are no fundamental differences in leaders' roles in nonprofits, for-profits and public organizations. In all three, the most important roles were those of a: working leader, trusted leader, strategic leader, and supportive leader.

Keywords: Leader's Roles, Nonprofit Organizations, For-profit Organizations, Public Organizations

Introduction

Leadership in organizations is one of the most important problems analysed by scholars in various disciplines, including management science. Inadequate leadership or lack thereof may, in certain circumstances, provoke a crisis in prosperous organizations that may prove difficult to overcome, even in the long-term perspective. Therefore, understanding the essence of leadership is crucial not only for the theorists but also for the practitioners of management science. Despite the numerous publications on leadership, there are still many research gaps in this area.

The leadership literature examines topics such as: attributes of an effective leader (e.g. Bass and Bass, 2008; Hughes, 2005; Zaccaro et al., 2018), leadership styles (e.g. Blake and Mouton, 1985; Bryman, 1986; Hersey and Blanchard, 1977; Nanjundeswaraswamy and Swamy, 2014), leadership models (e.g. Avolio et al., 2003; Morrison, 2000; Sarros and Santora, 2001), etc. The leader's roles have also been analysed (cf. Quinn, 1988; Simerson and Venn, 2006; Wegner, 2016). It should be noted that the display of these roles may depend on the organizational context. We know from current research that organizational behaviour in public, for-profit and nonprofit entities varies (Almond and Kendall, 2000; Benz, 2005; Borzaga and Depedri, 2005; Borzaga and Tortia, 2006; Laczo and Hanisch, 1999; Melnik et al., 2013; Mirvis, 2006). Cross-sectoral differences have also been found in the performance of the leadership function (Neck et al., 1998; Egri and Herman, 2000; Rierson and Miller, 2006; Suarez, 2009; Rowold et al., 2014).

The literature review showed a lack of comparative research concerning the leader's roles in various types of organizations. The purpose of the article is to answer the following research question: Are there any differences between nonprofit, for-profit and public organizations regarding the performance of the leader's roles?

The article is divided into sections, which are as follows: introduction, literature review, methods, results, and conclusions.

Leader, leadership and the leader's roles

Leaders and leadership have been the focus of research investigations spanning across different scientific disciplines, including sociology, psychology, education, political science, etc. These topics have also for years been relevant for management theorists and practitioners. A search ran in the Google Scholar database for articles employing the term

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'leadership' in the title, performed in July 2020, returned more than 287,000 items. The growing scale and complexity of global problems and challenges make the need for effective leaders and better leadership more pivotal than ever.

Drucker (1996, p. 54) states briefly that 'the only definition of a leader is someone who has followers'. A more detailed definition of the leader is presented, e.g. by Winston and Patterson (2006, p. 7), according to whom 'a leader is one or more people who selects, equips, trains, and influences one or more follower(s) who have diverse gifts, abilities, and skills and focuses the follower(s) to the organization's mission and objectives causing the follower(s) to willingly and enthusiastically expend spiritual, emotional, and physical energy in a concerted coordinated effort to achieve the organizational mission and objectives'. Leaders normally deal with issues such as future directions, goal-setting and strategies necessary to meet goals (Kaplan and Kaiser, 2003). Although leadership is the ability 'to get men do what they don't want to do and like it' (Cohen et al., 1984) or 'to inspire, direct, motivate and encourage others positively to targeted end' (Olusoji, 2002), it is perceived as a process, too. According to Northouse (2013, p. 5; cf. Hogan et al., 1994; Hogan and Kaiser 2005; Schermerhorn et al., 2000), while in that process 'an individual influences a group of individuals to achieve a common goal'. Cohen et al. (1984) add to it that leadership is 'the process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task. It is ultimately about creating a way for people to contribute to making something extraordinary happen'. Leaders influence their followers 'through motivating, inspiring a shared vision, and supporting higher level of need of the followers; and defining a competent rewarding system, so as achieve the challenging organizational goals, effectively and efficiently, through collective efforts' (Aalateeg, 2017, p. 37). Bass (1990a; cf. Antonakis et al., 2004, p. 5) argues that leadership consists of two elements, which are: 1) the focus of group processes and a form of persuasion in inducing compliance and influence, 2) a particular behaviour, a personality, a power relation, an instrument to achieve goals, an effect of interaction, a differentiated role and an initiation of structure.

There are several explanations, classifications and theories of leadership to be found in the contemporary literature. A study of some of these scientific works reveals that their theories have been refined and modified over time (Ahmed et al., 2016; cf. Aalateeg, 2017; Avolio et al., 2009; Asrar-ul-Haq and Anwar, 2018; Bass and Bass, 2008; Day, 2012) and none of them is entirely irrelevant. The main directions of empirical research on leadership include, e.g. leadership vs. management, traits and skills, power and influence, situational determinants of leader behaviour, and the importance of leadership for organizational effectiveness (Yukl, 1989).

Early research used to analyse leadership based on hereditary attributes (e.g. Galton, 1969); the trait approach emphasizes leaders' attributes such as personality, assets, motives, cognitive abilities, values and skills. By identifying the specific characteristics of leaders, a leader could be distinguished from a follower (Hughes, 2005, p. 25). These characteristics include: drive, desire to lead, honesty and integrity, self-confidence, cognitive ability, and knowledge of business (Bass and Bass, 2008). As the time went on, attention was focused on the behavioural styles of leadership (e.g. Blake and Mouton, 1985; Bryman, 1986). This is essentially when researchers attempted to identify the critical situational factors that affect leadership effectiveness, including the degree of structure in the task being performed, the quality of leader-follower relations, the leader's position power, subordinates' role clarity, group norms, information availability, subordinate acceptance of leaders decisions or subordinate maturity (e.g. Hersey and Blanchard, 1979; Howell et al., 1986; Robbins, 1997). Furthermore, Burns (1978) indicated the concept of transactional leadership while e.g. Bass (1990b) defined the transactional leader as a person who pursues a cost-benefit, economic exchange to meet subordinates' current material and psychic needs in return for contracted services rendered by the subordinate. Burns and Bass also examined the concept of transformational leadership. According to Burns (1978), transformational leadership is a process where leaders and their followers help each other in order to advance to a higher level of morale and motivation. For Bass (1990b, p. 21; cf. Chemers, 1997) meanwhile, transformational leadership occurs when 'leaders broaden and elevate the interests of their employees, when they generate awareness and acceptance of the purpose and mission of the group, and when they stir employees to look beyond their own self-interest for the good of the group'. Avolio et al. (2009) reviewed the more recent theoretical and practical developments made within the leadership literature. This led them to outlining concepts such as: authentic leadership, cognitive leadership, complexity leadership, cross-cultural leadership, new-genre leadership, shared leadership. Hiller et al. (2011) summarized leadership outcomes in four domains, based on the nature of leadership and on the measurement criteria, namely: effectiveness, attitude, behaviour and cognition. According to

Boal and Hooijberg (2000; cf. Osborn et al., 2002), many leadership theories appear to be context-free and they fail to consider how environmental or organizational context influences that process.

Research indicates that leaders can perform different roles as a way to impact employees. The review of leadership literature and the analysis of leadership behaviour, performed by Simerson and Venn (2006; cf. Quinn, 1988; Wegner, 2016), suggest that successful leaders perform the following nine roles: custodial leader, trusted leader, trusting leader, nurturing leader, strategic leader, supportive leader, developmental leader, inspiring leader, working leader (Table 1). However, no cross-sectoral research findings were identified that would report on the roles performed by leaders in organizations.

Table 1: Leader's roles in organizations

Leader's roles	Characteristics
Custodial leader	He/she strives to secure the continuity of the organization in the long term, ensures a steady flow of leadership talents, sometimes being side-lined in order not to stop others.
Trusted leader	He/she is fair, honest, keeps his promises, sets an example, admits mistakes, is consistent, collaborative.
Trusting leader	He/she trusts others, relies on their work and support, praises their achievements and allows failures, appreciates ideas, shares power
Nurturing leader	He/she shapes family relations in the organization, takes care of the needs of co-workers, including the development of their knowledge and skills
Strategic leader	He/she observes the environment, develops a vision and a strategy of the organization, motivates.
Supportive leader	He/she shares important information, provides conditions conducive to the achievement of objectives, encourages cooperation, ensures an even distribution of work, delegates competitions, reorganizes teams in order to increase effectiveness.
Development leader	He/she creates conditions for learning, gaining experience, enhancing talent, shaping the path of development, challenges, stimulates creative thinking.
Inspiring leader	He/she motivates to act, encourages to achieve goals, reminds about successes, creates a feeling in members of the organization that they are not alone, that obstacles can be overcome together.
Working leader	He/she helps to focus on the goal, is creative, works with others on solving problems, provides tools, is open to suggestions from others, monitors progress.

Source: own elaboration based on Simerson and Venn (2006)

Leadership roles are performed in a specific organizational context, so let us now look at the differences between three types of organizations: nonprofit, for-profit and public.

Differences between nonprofit, for-profit and public organizations

The three main types of organization: public, for-profit and non-profit, differ in their goals, methods of obtaining financial resources, organizational structure, staff structure, cultural values and norms, and organizational behavior. According to Moore (2000; cf. Drucker, 1990), public organizations implement politically mandated mission, satisfy the needs of citizens and their aspirations, and they derive their income from taxes. For-profits provide financial returns to shareholders and value in use to buyers, and their source of income are proceeds from sales. Nonprofits, meanwhile, pursue social purposes and guarantee satisfaction to donors, raising funds through charitable contributions. However, the differences between these three types of organizations are also axiological. The principle value for nonprofits is solidarity (Jager and Schroer, 2014), but they also profess values such as: equality, compassion, community, responsibility, trust (Whitman, 2009). Ultimately, they are driven by the beliefs and passions of their employees (Rothschild and Milofsky, 2006) and what stands out in their behavior is, among others, self-transcendence, universalism and kindness (Stukas et al. 2016). Managerial positions in nonprofits are usually held by women, which may suggest a more feminine dimension of the organizational culture of the third sector (Claus et al., 2013; cf. Lee and Wilkins, 2011). In commercial organizations, the most important thing is the ability to break profit (Van der

Wal et al., 2008), but also competition on the market, growth, quality, adaptation, rigour in management, professional integrity, will to be number one (Calori and Samin, 1991; cf. Marcoulides and Heck, 1993). In what concerns public organizations, a still separate set of values can be distinguished (Van der Wal et al., 2008).

The three types of organization under review are also structurally different (Anheier, 2005; cf. Froelich, 1999). While public and for-profit entities tend to be larger, more complex, hierarchical and bureaucratic, also their staff structure is what sets them apart, in the sense that they employ paid workers whereas nonprofits rely on free work. In nonprofits, participation is voluntary, rather than compulsory, and the activity itself has no explicit ownership or accountability (Frumkin, 2002). Nonprofits also lack the element of top-down superiority exerted over volunteers, whose work instead is based on values (Neck et al., 1998). The literature also identifies the differences regarding aspects such as personality, motivation, values and attitudes between paid and non-paid employees. Altruism (Rose-Ackerman, 1997; cf. Hustinx and Lammertyn, 2003; Rehberg, 2005) and the pro-social orientation of non-profit workers (Briggs et al., 2010; Studer and Von Schnurbein, 2012; Stukas et al., 2016) are indicated. Additionally, volunteers have been shown to be more agreeable and extraverted than paid workers (Elshaug and Metzer, 2001), while Ackermann (2019; cf. Vantilborgh et al., 2013) found that extraversion is the most consistent driver of volunteering. There are also differences in job attitudes between these two categories of employees. Pearce (1993) identified reliability as the central distinguishing feature between volunteers and paid workers. Volunteer workers exhibited lower levels of both job withdrawal and work withdrawal than paid employees, and higher levels of organizational commitment than paid employees (Laczo and Hanisch, 1999). Volunteers also were more likely to participate in organizational citizenship behaviors. Non-profit workers are more willing to 'donate work' and more loyal to the organization than paid workers (Almond and Kendall, 2000). Non-profit work is also associated with greater overall job satisfaction, where staff in nonprofits is more satisfied with work than employees in for-profits (Benz, 2005; Borzaga and Depedri, 2005; Melnik et al., 2013).

The results of studies cutting across these three sectors show that people employed in nonprofits experience greater job satisfaction compared to employees of public and business organizations, plus they also have greater trust in their superiors (Mirvis, 2006). Borzaga and Tortia (2006) found that nonprofit workers tend to be more satisfied with their professional tasks compared to those employed in the other two types of organizations, despite the fact their salary is generally lower. Public-sector employees have been found to be the least satisfied of all three. Goulet and Frank (2002) argue that organizational commitment is the highest among employees in commercial enterprises, followed by employees of nonprofits, and then those hired in public organizations. Lyons et al. (2006) pinpointed differences in the value of labor between employees operating in the private, public and para-public sectors, and they confirmed that commercial employees tend to be more committed to work than employees in the other two sectors.

Study findings touching on institutional, cultural and personal differences in individual sectors prompt an assumption that can applied to the differences between the leaders representing each of these sectors (Suarez, 2009). Liao-Troth (2003) found that organizational context influences the behavior of non-profit and for-profit employees, which is why it can be expected that their leadership model will also differ. Voluntary-work entities 'have people who work with them and not for them' (Rierson and Miller, 2006), which is one of the conditions that favors the development of self-leadership in nonprofits (Neck et al., 1998). In working with volunteers, leaders have limited opportunities to impose their plans and decisions on a top-down basis. Jager et al. (2009) identified five major practices relating to volunteers, which are: focusing on people first, cautiously balancing ‘free wills’, awakening a volunteer’s strength, leading by recognition and selective non-recognition, leading by immediacy.

Rowold et al. (2014) found that the greatest impact on job satisfaction in nonprofits is the use of the leader-member exchange (LMX) model, whereas the transformational leadership model stimulates employee commitment. In for-profits, job satisfaction is mostly influenced by the LMX model while commitment draws from the initiating structure model. Among environmental organizations, nonprofits were highly receptive contexts for transformational leadership, whereas for-profits were moderately receptive in this regard (Egri and Herman, 2000; cf. Riggio et al., 2004; Jaskyte, 2004).

Suarez (2009) draws attention to the importance of the ethical dimension of leadership in nonprofits. Among the CEOs of voluntary and for-profit organizations, the tendency to use power in a morally responsible way was differentially related to charismatic leadership (De Hoogh et al., 2005). Leaders high on both power motivation and responsibility were rated more charismatic in voluntary organizations than in for-profits.

The analysis of the literature did not allow for the identification of publications concerning the comparison of the leader's roles in the discussed types of organizations. The identified research gap was the inspiration for our research.

Methods

The cross-sectoral study was conducted in 2019, in Poland's Lubuskie Voivodship. It concerned differences in the management of three types of organisations: nonprofit, for-profit, and public[i]. One of the research areas was related to the leader's roles.

The research process consisted of the following stages: literature analysis, research gap identification, formulation of research questions and hypotheses, sample selection and development of adequate research tools, data collection and analysis, formulation of conclusions, indication of research limitations and future directions.

The following general hypothesis was formulated: There are differences between nonprofit, for-profit and public organizations regarding the implementation of the leader's roles. To test this hypothesis, a survey was conducted.

The research tools comprised six questionnaires designed for six samples (leaders and non-leaders of nonprofit, for-profit and public organizations). They were used to identify whether there are differences between certain aspects of management and the type of organization. One of the questions concerned the roles of the leader. The questionnaires were sent out to different respondents (representatives of one of the three types of organizations - public, for-profit and nonprofit) whose participation in the study was voluntary.

Nonparametric tests were performed - the Kruskal-Wallis test and the U Mann Whitney test. These were preceded by examining the normality of the distribution of individual research groups - using to this end the Kolmogorov-Smirnov test along with the Lilliefors correction.
A total of 315 questionnaires were completed correctly by 105 leaders and 210 non-leaders (3*35 and 3*70). There were more women (65.23%) than men. The average age of participants in the research was 36.6.

Public employees most often worked in medium-sized (50-249 employees; 35.14%) or large entities (over 250 employees; 35.24%), while other members mostly worked in small or micro entities (up to 50 employees; 27.62% in total). Those were mostly: offices (42.86%), army and police and prison (18.09%), educational institutions (15.24%), hospitals (13.33%). Every fifth (19.05%) for-profit respondent worked in a company with fewer than 10 employees, while every fourth (25.71%) - in a small, every third (30.48%) - in a medium-sized and every fourth (24.76%) - in a large enterprise. The predominant industries were wholesale and retail trade (23.81%) and manufacturing (22.86%). Nonprofit employees more often represented associations (74.3%) than foundations (25.7%). Every third (30.48%) worked for an entity with fewer than 10 permanent employees (paid, non-paid, members). Almost half (47.62%) were involved with organizations employing 11-50 people, while the rest (11.90%) worked for larger organizations. They represented entities operating in various areas but mostly: social & humanitarian aid (37.14%), education & research (35.24%), culture & recreation (24.76 %) or development & housing (22.86%).

The Roles of The Leader – The Perspective of Leaders and Non-Leaders

The six groups of participants were presented with a short description of nine leader's roles according to Simerson and Venn (2006). They were then offered the opportunity to identify the three roles most frequently performed in the organisation by themselves (in the case of leaders) or by their superiors (in the case of non-leaders). During the research, these opinions were compared with each other. The Kruskal-Wallis test was performed to determine whether the roles played by leaders differentiate the type of organization. The feedback obtained from leaders and non-leaders was analysed separately (Table 2).

Table 2: Results of the Kruskal-Wallis test regarding the leader's roles assessment by the surveyed employees representing nonprofits, for-profits and public organizations

Leader's roles	Independent (grouping) variable: **organization type** α=0,05 Kruskal-Wallis Test					
	Leaders			**Non-leaders**		
	H(2,N=105)	**Chi²**	**Results of partial hypotheses testing[ii]**	**H(2,N=210)**	**Chi²**	**Results of partial hypotheses testing**
Custodial leader	3,792941	3,829412		4,992347	5,016234	
Trusted leader	0,075472	0,076197		7,159483	7,193739	
Trusting leader	0,000000	0,000000		0,483796	0,486111	
Nurturing leader	0,398467	0,402299		3,265625	3,281250	
Strategic leader	4,962025	5,009737		2,035175	2,044913	
Supportive leader	4,959762	5,007452		0,562759	0,565452	
Developmental leader	0,146067	0,147472		0,000000	0,000000	
Inspiring leader	1,620253	1,635833		1,117647	1,122995	
Working leader	1,552239	0,000000		1,045000	1,050000	

Source: own study

Reasons for rejection found
No reasons for rejection found

It was found that only in 2 out of 18 cases there were reasons for rejecting the null hypotheses about the uniform distribution of the assessment of the leader's roles by leaders and non-leaders working in nonprofit, for-profit and public organizations. In the case of leaders, this concerned the role 'working leader', while in the case of non-leaders – 'trusting leader'. Subsequently, the U Mann Whitney test was conducted to determine whether leaders' roles in the analysed three types of organizations are differentiated by the function of the employee in the workplace (Table 3).

Table 3: Results of the U Mann Whitney test regarding the leader's roles assessment by the surveyed employees representing nonprofits, for-profits and public organizations

Leader's roles	Independent (grouping) variable: **function within the organization** α=0,05 U Mann Whitney Test					
	Nonprofit		**For-profit**		**Public**	
	p-value	**Results of partial hypotheses testing[iii]**	**p-value**	**Results of partial hypotheses testing**	**p-value**	**Results of partial hypotheses testing**
Custodial leader	0,55426		0,636619		0,074919	
Trusted leader	0,40693		0,012606		0,032530	
Trusting leader	0,40693		0,235553		0,406932	
Nurturing leader	0,47749		0,191847		0,908002	
Strategic leader	0,81458		0,122819		0,191847	
Supportive leader	0,81458		0,723733		0,074919	

Developmental leader	0,90800		0,723733		0,723733	
Inspiring leader	0,47749		0,814584		0,235553	
Working leader	0,23555		0,043500		0,043500	

Source: own study

Reasons for rejection found
No reasons for rejection found

In nonprofits, there were no reasons for rejecting the null hypotheses about the uniform distribution of the assessment of the leader's roles by employees performing different functions within the organization. In for-profits and public organizations, reasons were found for rejecting the null hypotheses in 4 cases, which concerned the roles 'trusted leader' and 'working leader'. Hence the decision to undertake further analyses (Table 4).

Table 4: Leader's roles in nonprofits, for-profits and public organizations –the perspective of leaders and non-leaders

Leader's roles	Total		Nonprofit		For-profit		Public	
	Leaders	Non-leaders	Leaders	Non-leaders	Leaders	Non-leaders	Leaders	Non-leaders
	[%]							
1. **Custodial leader**	19,05	26,67	25,71	32,86	22,86	17,14	8,57	30,00
2. **Trusted leader**	**49,52**	27,62	48,57	38,57	48,57	18,57	51,43	25,71
3. **Trusting leader**	11,43	22,86	11,43	21,43	11,43	21,43	11,43	25,71
4. **Nurturing leader**	17,14	8,57	17,14	8,57	20,00	4,29	14,29	12,86
5. **Strategic leader**	24,76	**35,24**	37,14	34,29	22,86	41,43	14,29	30,00
6. **Supportive leader**	**41,90**	**32,38**	34,29	31,43	34,29	30,00	57,14	35,71
7. **Developmen-tal leader**	15,24	18,57	17,14	18,57	14,29	18,57	14,29	18,57
8. **Inspiring leader**	24,76	16,19	28,57	20,00	17,14	14,29	28,57	14,29
9. **Working leader**	**63,81**	**42,86**	57,14	42,86	71,43	47,14	62,86	38,57

Source: own study

According to the leaders' self-assessed feedback, they most often performed the role of a 'working leader' (63.81%), 'trusted leader' (49.52%) and/or 'supportive leader' (41.90%) in their organizations. Less frequently they displayed behaviors characteristic of a 'trusting leader' (11.43%), 'developmental leader' (15.24%) or 'nurturing leader' (17.14%). Employees who did not hold managerial posts also indicated the following roles as those most often performed by their leaders: 'working leader' (42.86%) and 'supportive leader' (32.38%). This, however, was a smaller percentage share compared to superiors. Let us also note that this group of respondents identified another role of their leaders, which was 'strategic leader' (35.24%). In their view, superiors relatively less frequently displayed behaviors typical of the following leadership roles: 'nurturing' (8.57%), 'inspiring' (16.19%) or 'developmental' (18.57%).

Leaders of all three types of organizations indicated the 'working leader' as the most frequently performed role, followed by the 'trusted leader' (2nd in for-profits and nonprofits, and 3rd in public), and then the 'supportive leader' (2nd in public, 3rd in for-profits, 4th in nonprofits). Similar feedback was observed among non-leaders, who indicated the working leader as the most common role performed by their superiors. The rest of the ranking, meanwhile, was

slightly more diverse than in the case of leaders, but among the three most frequently cited roles, in addition to the 'working leader', there were: 'trusted leader', 'strategic leader' and 'supportive leader'.

Conclusions

The visible structural, cultural and personal differences between public, for-profit and non-profit organizations prompt the question about the differences regarding leadership in these entities (Rowe, 2014). In fact, similar explorations can already be found in the literature (Egri and Herman, 2000; Suarez, 2009; Rowold et al., 2014), with the results of these studies suggesting that said differences do not relate largely the implementation of leadership roles. The statistical analysis showed there are no fundamental differences in this respect. Leaders of organizations of various types tend to prioritize very much the same roles, and in a similar fashion, too. The most frequently performed roles included: 'working leader', 'trusted leader', 'strategic leader', and 'supportive leader'. In public, for-profit and non-profit entities alike, leaders decided that the 'working leader' role is the most common, with the 'trusted leader' role also ranking high. Noteworthy here is the significant similarity of the roles in for-profits and non-profit. The hierarchy in public organizations is only slightly different, where the 'supportive leader' role ranked second while that of the 'inspiring leader' was indicated as important.

Feedback obtained from leaders coincided with that shared by non-leaders representing the three analyzed sectors. Also, according to their indications, in all types of organizations the role of the 'working leader' was the most common, although it was cited as important somewhat less frequently. In the case of nonprofits, the arrangement of the four most important roles, as per responses of their leaders and non-leaders, was identical. In for-profits, non-leaders pointed to the priority of the 'working leader' role, but in their view, the 'strategic leader' role was performed more often while the 'trusted leader' role – less often. In this context, non-leaders suggested that leaders overestimate their ability to build trust. In what concerns public organizations, non-leaders affirmed the 'working leader' and 'supportive leader' roles, but similarly to for-profits, they hinted at a greater importance of 'strategic' over 'trusted leader'. Let us also note that these minor differences in the perception of leadership by leaders and non-leaders in public and for-profit organizations provide a valuable springboard for further research. Why do these differences exist, and why are the disparities between leaders and non-leaders smaller for nonprofits? This certainly warrants further investigation.

Finally, let us stress once again that the results of our research indicate that the performance of leadership roles in for-profit, public and nonprofit organizations is essentially the same (cf. Rowe, 2014). This conclusion is an important one to draw, as it can be applied, among others, to the context of nonprofits and to the debate on optimal management in these entities. Having said that, these findings require further testing against a larger research sample, as well as additional qualitative methods, such as in-depth interview or observation, that will allow to overcome the limitations of the survey method.

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[i] The sampling was non-random. No list of leaders' and non-leaders working in organizations of Lubuskie Voivodship was available.
[ii] The null hypothesis (about uniform distribution) is rejected when H value is larger than the Chi^2 distribution (Ostertagová et al., 2014).
[iii] If the p-value is below the materiality threshold, there are reasons to reject the null hypothesis (Moczko, 2014).

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Community and Human Resources Collaboration In Waste Management

Andra Diaconescu

Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara, Romania
andra.diaconescu@upt.ro

Gabriela Prostean

Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara, Romania
gabriela.prostean@upt.ro

Matei Tamasila

Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara, Romania
matei.tamasila@upt.ro

Dan Pascu

Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara, Romania
dan.pascu@retim.ro

Abstract

The present paper identifies new ways of adaptability for human resources in waste management and highlighting the challenges on how organizations influence and deeply can affect the sustainable development of areas and communities regarding the responsibilities related to waste collection and recycling. The research team used the concept of the "4 R", respectively reduction, reuse, recycling, recovery. This concept is attributed because it can optimize and increase product life, generating advantages for achieving a circular economy. Capabilities of human resources in waste management at the local level play a key role in communities' ability to use resources efficiently and make progress towards achieving a more circular economy. The research problem arises from how we stimulate managers to generate proactive ideas to upgrade human resources in waste management and spread ecological education to communities. The primary objective of the paper is to motivate managers to invest in special training of current employees according to the economic realities. Waste management will develop innovatively over the years. For an efficient and sustainable system, some useful strategies are needed to achieve the objectives, such as recycling, reuse, rethinking the current rules. Using appropriate creative tools, human resources management pays more attention to training processes, improvement, promotion, reward, all this leading to more substantiation of specific smart decisions.

Keywords: Waste Management, Sustainable, Human Resources, Selective Collection, Recycling, Reuse, Reduction, Rethinking.

Introduction

Economic progress at the level of the European Union countries has contributed to the increase of the living standard, implicitly supporting the consumerism of the people, who have generated an increased volume of waste from both production goods and consumption. (Guerrero, et al., 2013). Due to the increase in waste volume, it was essential to find the best experts in the field to find proactive solutions for waste management both for the

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introduction of innovative technological mechanisms and for the ecological education of operators and communities. Fortunately, businesses, decision-makers, researchers are taking steps to manage waste in the community, being achieved a collaboration between companies, non-profit organizations, foundations and government leaders that have come together to analyse the problems caused by waste and to develop practical solutions (Xu, et al., 2018). Thus, visionary initiatives to support ecological activities among the population have led to an emphasis on methods and techniques for integrating social responsibility among communities on the waste selection and cultivating environmentally-focused behaviour. (Troschinetz, and Mihelcic, 2009). Such an initiative can be achieved by rethinking the directions in human resources management, putting more emphasis on the collaboration of the parties directly involved in the issue of waste management. Human resource management provides a supporting role in sustainable development, as well as basic guidelines for actors who are internal or external to the waste organization (Iacovidou, et al., 2017). Human resource management allows the use and maximization of labor resources at an optimized cost and time by ensuring a key commitment to people and people-related activities. In a very simple sense, coordinating the relationship between human resource management, sustainable development, and waste management leads to effective results for the community if they are done correctly. (Dhokhikah, 2015).

In this sense, although there are situations when the collaboration actions between the municipality and the sanitation companies are often hindered by bureaucratic procedures, there is a need to find a common efficient direction through which must allocate the necessary resources for waste control in the community. Thus, on the one hand, the municipality, the local authorities must present to the community the problems caused by the faulty selection of waste, so that they are aware of the damage caused to the environment in which they live. (Al-Khatib, 2015). At the same time, it is essential to promote the best practices of waste management in the community through all means of communication. On the other hand, actions of education, training and finding the responsible workforce for waste management are needed. Training and finding a workforce is a complex topic that needs debate because the tasks and duties of workers are not properly rewarded.

Treating this subject is based on the improper waste selection, respectively waste evidence provided by the community following the emergency situation instauration due to the COVID-19 pandemic. The emergency situation instauration caused an exaltation/hysteria in the buying behavior of the citizens. Was noticed excessive buying products that exceed the normal consumption limit. Also was noted the incorrect storage of waste by some citizens, although the collection operator made public the information on ten rules to follow regarding waste management during the coronavirus pandemic.
The paper started from the premise that by ecologically educating the human resource and the local community, sanitation companies are motivated to carry out optimal collection activities even in risky conditions (COVID-19) and also can cultivate behaviors that can generate changes in community. Ecological education is a process meant to attract categories of people who are aware and concerned about environmental and complementary issues, people who have the knowledge, attitude, ability, motivation and ability to work individually and collectively, to find solutions to current problems but also to prevent the appearance of others.

In this research, the emphasis is on educating the community in a sustainable way in risk conditions. More precisely, the education of the community leads to a better collaboration between the municipality and the sanitation companies, for the redesign of the new positions in the hazardous waste management. (Ahmed and Ali, 2004).

In the realization of the proposed research direction, the authors of the paper reconfigured a conceptual framework, starting from the research initiated by Muller and Hoffman (2001). This framework provides a sustainable direction for the proper conduct of waste management under special conditions. Muller and Hoffman (2001) carried out a pilot project aimed at expanding waste collection services in several lower- and middle-class neighborhoods. Their recycling program has had a positive impact, motivating neighborhood associations, community members to participate and initiate neighborhood cleanup activities. Thus, the research team considered this model opportune, using the concept of the 4Rs (Reduce, Reuse, Recycle, Recover). Although in the case of applying the model of Muller and Hoffman (2001) the organizers ignored the political realities and did not build an institutional development strategy, in the current situation, in the Western region the authorities are dormant to create a sustainable environment for the inhabitants.

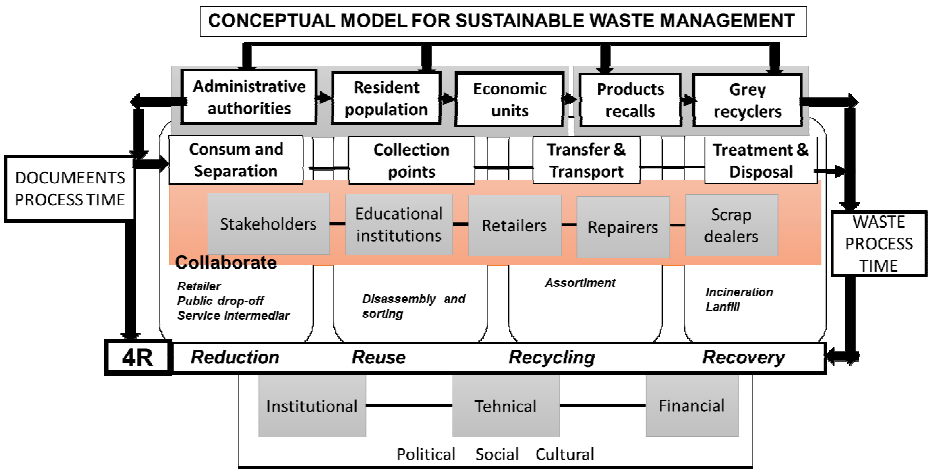

Fig. 1: Conceptual model for sustainable management

The research team used the concept of the "4 R", respectively reduction, reuse, recycling, recovery. This concept is attributed because it can optimize and increase the life of a product, generating advantages for achieving a circular economy:

- Reduction means minimizing product consumption that cannot be reused and raising in communities public waste awareness, or means by which portions of the consumed products can be reused. Through reduction, people are informed not to buy products that they do not use, not to waste, and to buy products that can be reused.
- Reuse refers to the reuse of the product (by reselling / donating it to another customer) or the partial reuse of the product. The population is informed to manage their products by classifying them into products they use and products they no longer need. Waste products can be resold and donated so that the amount of waste is reduced.
- Recycling allows the reintroduction of waste into the consumption cycle in general and secondary applications. Optimal recycling is achieved only if the amount of energy consumed in the recycling process is less than the energy required to produce new objects. Plastic objects can be recycled using two different approaches: mechanical recycling and raw material recycling. In the first situation, plastic objects are recycled as polymers, while in the second situation, plastic waste is transformed into chemicals or fuels.
- Recovery involves the partial or total use of the product in the manufacturing process of a new product. Materials recovery encourages people to turn waste materials into new products, thus saving natural resources (Sadi, et al., 2012).

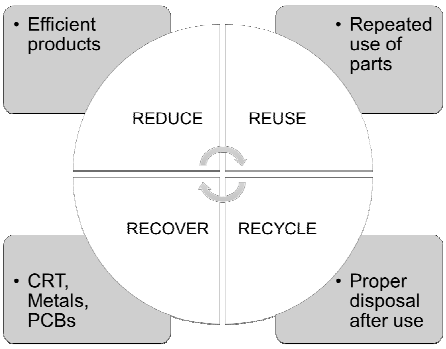

Fig. 2: The 4R for Waste Management

To achieve the 4R it's absolutely necessary to educate the population to find effective ways to sustain a cleaner environment. People need to understand that the harmfulness of the waste produced spreads to their health and well-being. Information projects are timely to raise public awareness. The media, the internet, school programs are optimal tools that can present the real impact of waste on the environment.

Changing Community Responsibilities in Urban Waste Management

The local authority, from a traditional and ideal point of view, is the only legal entity that allows the provision of services for waste collection. It provides all the elements of the waste management system: physical and intellectual infrastructure; institutional framework and day-to-day operation of collection services. Although it can be considered an ideal module of operation, there is also a deviation from this ideal in certain areas where waste collection is done improperly.

For a real scenario the local authority has teams for collection services only for a relatively small section of the central business and residential area, while the middle- and lower-class neighbourhood's and areas outside the city center, in crisis scenarios (economic, sanitary) do not have the same validity for the same services. In these areas, structural adjustment and fiscal discipline impose strict limits on government spending, which restricts the expansion of conventional services. Expectations for quality services demanded by the urban population are increasing but in most cases the authorities cannot give up traditional services this leading to the inability to provide satisfactory services to the community. The local administration is able to take responsible measures while being aware of the effects caused by inadequate waste management. At the same time, they are looking for new ways to share traditional collection responsibilities with the neighborhood by seeking partnerships with micro, small and medium-sized enterprises (SMEs), large entrepreneurs and private industries, hospitals, schools and other stakeholders. (Taboada-González, et al., 2011).

Increasingly, the local authority is trying to mobilize the human and financial resources of these actors to develop an appropriate system for expanding collection services. By understanding waste management issues, the population can participate in certain effective actions to reduce waste in the community. For example, there are certain volunteer programs in which people are engaged in actions to collect waste spread irresponsibly in nature. Another situation is the selective collection, proper recycling of waste, are two good ways to reduce the amount of waste.

Thus, there are actions through which the responsibilities of the community related to waste collection and recycling can be implemented:

- Application of 4Rs principles;
- Increased responsibility of producers;
- Citizen participation;
- Cooperation partnerships between economic units in the field.

Reducing the impact on the environment and implicitly the amount of waste starts by educating mankind, every human being should be informed, aware, and act so as to produce less waste, recycle and contribute to the cleaning of contaminated sites. Responsibility for a clean environment is not only attributed to the authorities but also to every human being in particular.

Approaching an ecological education in the community also implies a visibility on the civic responsibilities. By being aware of the harmful effects produced on the environment we can reduce our consumption, waste production and our impact on the environment, practicing responsible consumption. All that is needed is a limitation on our purchasing power. Buying something means guaranteeing the waste and greenhouse gases that have been caused in future production, transport, packaging and disposal.

A correct approach would be to try to reuse the products. Reuse helps to reduce not only the contents of the rubbish bins but also the contents of the recycling bin. The process itself is simple, economical, and available to everyone. Extending the life of a product by using it several times requires only a drop of creativity. Like reuse, recycling means recovering an object and giving it a new life. Recycling brings back an object in the raw material: the paper returns to cellulose, the plastics are melted and poured into new products. Those products that were considered waste are reintroduced in the process of extraction-production-consumption-destruction, becoming an important resource for the realization of other products. Addressing this mentality, the community restores an ecological cycle and sustainable development, which over time reduces consumption and the negative impact on natural resources. A recycling center is indispensable in the community because all recovered materials (paper, cardboard, plastics, glass and metals) after sorting can sustain a community economically. More, each material after being compressed into a cubic shape that weighs a ton can be sold to the companies that actually recycle these resources.

Applying 4Rs means smart consumption, thus making substantial savings (in terms of money, time, pollution, waste and energy).

Waste collection by training the community and using the 4Rs

In this paper, several solutions are developed to improve the waste management system in Timiș County. Creative solutions have been proposed to encourage citizens to pay more attention to selective collection, recycling, responsible consumption so as to reduce the amount of waste produced. In order to fulfill the mentioned objective, the concept of the 4Rs was used and the main benefits brought by the creative ideas through the prism of the concept were shown.

Case study on solid waste management for the western region of Romania

Taking into account the collection systems designed (feasibility study) 7-8 years ago, the situation was reconsidered taking into account new challenges (objectives set and tools to be implemented), as well as market developments (standards life and waste generation, behavioral trends). According to the plans made for the improvement of waste collection services, a new collection system is foreseen which is being implemented in Timișoara, Romania as part of the EU funded projects. Integrated waste management systems at county level, creation of infrastructure (transfer stations, integrated waste management sites: sorting, mechano-biological treatment, storage) and provision of new collection systems in order to achieve environmental objectives for the recycling and reduction of landfilled waste.

The analysis is reduced to the current systems designed and / or used in Romania, focusing on the correct match with the category of users (urban or rural population, individual or collective building, business), as well as with the desired results. The collection system should be analyzed in particular for each waste fraction (a type of waste collected separately): residual waste, biodegradable waste (still collected mostly together with residues), recyclable waste.
In general, waste is a waste of natural resources, such as recyclables, which, if not recycled, harm both the environment and the economy. (loss of the ability to become a source of energy). The amount of waste will continue to increase, with the economic development and the increase of the living standard of the population. The lack of specific structures for waste storage and mismanagement leads to a high risk to the environment and society. The main effects of waste pollution are: contaminated water, air and soil, changes in soil fertility, visual and olfactory discomfort. In Timiș County, the way in which the waste management system works is the classic one, it is based on the waste collection by the sanitation companies.

Waste collection in Timiş County is divided into three categories:

• "wet fraction" (residual and biodegradable waste)
• "dry fraction" (recyclable waste, such as paper, plastic, cans of aluminum, metal and wood, cardboard)
• glass.

In recent years, Timiș County has prepared and financed a new integrated system for waste management. Thus, various aspects were analyzed in Timiș County, such as environmental, economic, sociocultural and technical issues. The zones division of Timiș County according to the specificity, distribution of the population and according to the amount of municipal solid waste generated led to its division into five collection areas comprising four transfer stations and a central waste disposal site. Timiș County is divided according to the waste collection and waste transfer areas at the Ghizela central landfill.

Methodology

The methodology used involved finding creative ideas within the 4R concept and analyzing the benefits they bring. In order to analyze the performance of the ideas, we calculated the proposed practices in relation to a small number of citizens (275), and these calculations will be subsequently reported to the entire population of Timisoara.

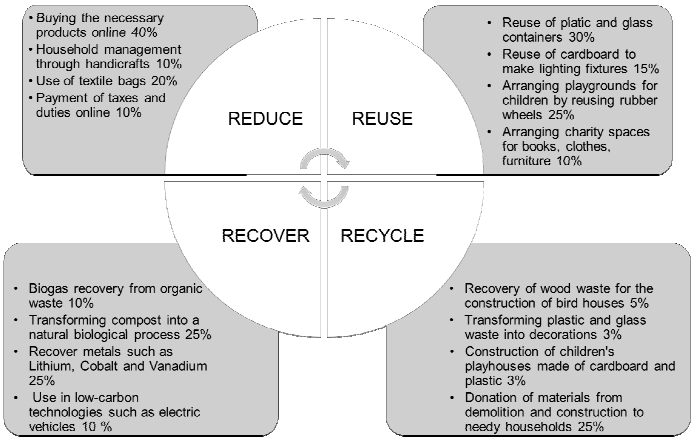

Fig. 3: The 4R concept and the percentages that capitalize on the degree of 275 citizens involvement

With the help of the percentages present in Figure 2, we calculated the percentages coming from the population of Timișoara, which according to the data from the 2011 census, the municipality of Timisoara had approximately a value of 310,000 inhabitants. The percentage was 62.89%, which means that the level of citizen involvement in reducing the amount of waste has increased favorably, and the waste management system has improved considerably. Through 4R solutions, 62.89% of citizens will be involved in responsible waste management. Less waste will be produced, more will be recycled, and awareness will be growing. With the involvement of the population and by creating an underground collection system, the use of individual application and transport, recycling and recovery of materials, reducing product consumption, reusing products, the amount of waste in the city of Timisoara would decrease consecutively. Below, a table is made with the analysis of a residential complex house (southern area of Timisoara) with 275 citizens respecting the mentioned solutions.

Table 1: Waste statistics in Timisoara after the application of creative solutions through the "4R"

The number of citizens of the residential area	The volume of purchased products tons/4 weeks	The volume of reused products tons/4 weeks	The volume of waste collected tons/4 weeks	The volume of recycled waste tons/4 weeks
275	40,00	25,00	5,00	2,00

From the total number of inhabitants of Timișoara, 310,000, we calculated the waste collected from 275 inhabitants per month. Referring to the entire population of the city, we divide no. of inhabitants at the reference number in the table and the result (310,000: 275 = 1,127) we multiply by the volume of waste collected per month (5 tons / 4 weeks) and by the number of months in a year, to result the quantity of waste collected in -one year. The result is lower, which means that the volume of waste has decreased, following the path of the 4R applied in Timisoara.

By implementing these solutions, the city of Timisoara would benefit from a volume of 8,229.09 tons of waste collected / year, given that in 2019, 134,446 tons of waste were collected. Involvement and awareness of the population is the most important way to reduce consumption and efficient waste management. Using real solutions, waste is controlled and can become significant resources. For example, with the help of building a proper system, waste can be turned into fuel and produce energy used for the whole city. The reuse, recycling and reduction of products consumed by citizens must be done in a smart way so that waste generation decreases.

Also, a participatory approach of stakeholders interested in local waste management could lead to the sustainable development of the area, supporting the local economy. Some alliances with community stakeholders have numerous advantages, and some examples are presented below:

• A mixture of waste categories services is responding very often (to variation) for residents' demands.
• Household and community resources are mobilized by taking responsibility for environmental cleanliness and payment of waste collection fees.
• The economy of waste collection and recycling is offering a lot of jobs and income opportunities.
• Residents are pleased of the local authority and respond appropriately to their requests for waste services

• Residents gain a better understanding of the problems and the ability to organize waste services for themselves.
Partnering is a process that gradually attracts more residents and more organizations to promote various aspects of waste management and urban sanitation at the local level. The partnership process makes the municipal waste system more efficient - meeting the needs of residents more directly - and more sustainable.

Conclusions

Urbanization has an overwhelming impact on the way communities expand and produce more and more waste annually. Due to this, urgent measures are needed to implement proactive actions for household waste and transform it into other resources. At present, consumerism is one of the great problems of our society, a consumption that generates tons of waste daily. One of the first steps we need to take is to understand through environmental education the benefits of separate waste collection, how we can recycle products and how we help the community to improve living conditions.

Waste management in Timisoara will develop innovatively over the years. For an efficient and sustainable system, some useful strategies are needed to achieve the objectives, such as recycling, reuse, rethinking the current rules.

Reducing per capita consumption is one of the priorities that the city of Timisoara must take into account.

We need to be aware of reducing waste consumption as an important first step in waste management, because if we continue to abuse natural resources and maximize the amount of waste consumed, we will reach a level of atrocious pollution that can no longer be controlled by the authorities.

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Polish Experience from 25 Years of the Operation of Special Economic Zones as a Form of Support for the Development of Selected Regions

Malgorzata OFIARSKA

University of Szczecin, Szczecin, Poland
malgorzata.ofiarska@usz.edu.pl

Abstract

The study involves an examination and assessment of the period of 25 years of the operation of special economic zones in Poland, using the legal-dogmatic, legal-historical, and empirical methods. Special preferences are applied in these zones, the primary aim of which should be to promote investment and increase employment in economically neglected areas. The intended purpose of the research was successfully achieved, showing that despite several significant changes in the legal regulations regarding the forms of state aid (subsidies, support from a separate special-purpose Zone Fund, tax reliefs and exemptions), special economic zones do not fulfil their basic function, i.e. they are not a mechanism to promote investments involving advanced technologies and associating economic activity with scientific research. Furthermore, the possibilities of extensive development of the zones by expanding their areas have been exhausted, and even some of these areas have not been developed. It was found that these were the main reasons for the radical change in the concept of promoting new investments implemented from 2018 throughout the country and the possibility of granting state aid in this regard in the form of income tax exemptions for a period of 10 to 15 years. The "Polish Investment Zone" thus created did not, however, result in the liquidation of the existing special economic zones, which will exist until the end of 2026. Under the conditions specified by the legislator, an entrepreneur may simultaneously benefit from state aid for investing in both types of zones.

Keywords: Economic Zones, Economic Development, New Investments, State Aid, Tax Privileges.

JEL Classification: H 25, K 20, K 34,

Introduction

The issues related to the functioning of special economic zones (hereinafter referred to as SEZs), as one of the categories of economically privileged areas, has been the subject of research in various aspects in the doctrine for many years. However, areas in which economic activity can be conducted and developed on preferential terms do not constitute a uniform category (Artman, 2019, pp. 93-99). They vary in terms of their genesis, organisational and legal features, and development directions. They constitute a permanent element of the modern world economy and exist in countries with different levels of regional development, while being most common in developing countries.

The aim of this study is to demonstrate that despite the relatively frequent changes in the legal regulations concerning SEZs and the large scale of state aid granted to investors, the effectiveness of SEZs is too low in promoting regional economic development. In particular, there has been no intense development in the high-technology sector and no increase in research spending. The complicated and lengthy procedures for expanding SEZ areas also represent a serious problem.

The functioning of SEZs is associated with legal and economic problems. This determined the use of appropriate research methods. Using the dogmatic and legal method, the basic elements of the legal structure of SEZ (Special Economic Zone), as well as the interpretation of legal provisions and their exegesis were established. This made it possible to examine the legal essence of the SEZ institution. In order to present the evolution and its main trends in the development of SEZ in Poland, the historical and legal method was used, examining the scope and context of changes in the applicable legislation. Using the empirical method, numerical data showing the most important effects of SEZ functioning in Poland, including the development of their area, dynamics of investment outlays,

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increase in the number of jobs and the amount of public aid in the form of tax exemptions for investors, were presented.

Literature Overview

The problem of special economic zones has been studied in many countries. The world literature analyses various aspects of the organisation, functioning and impact of economically privileged zones, most often in: China (Zeng, 2010; Crane et al., 2018, pp. 98-107), India (Tantri, 2016; Mukherjee et al., 2016), Mexico (Zaldivar, Molina, 2018, pp. 11-32), the Dominican Republic (Reyes, et al., 2017), Russia (Maslikhina, 2016, pp. 275-279; Boyko, Usmanova, 2018, pp. 48-57) and Ukraine (Pidorycheva, 2020, pp. 5-30). The research conducted so far focused on the importance of special economic zones and their impact on: economic development and acceleration of transformation processes, local economy, inflow of investments and employment growth, promotion of industrialisation in developing countries. Comprehensive analyses of the functioning of special economic zones worldwide and the prospects for their development are also prepared by the World Bank (World Bank Group, 2017; Farole, 2011; Farole, Akinci, 2011).

In Polish literature on the subject, special economic zones are the subject of in-depth interest in legal sciences (Ofiarska, 2000; Białas, 2015) as well as economics and finance (Ambroziak, 2009; Kryńska 2000; Pastusiak, 2011; Nazarczuk, Umiński, 2019), and less frequently in management sciences (Glinkowska, 2016, pp. 283-293) and urban planning (Błachut, 2011, pp. 209-213). In the last decade of the 21st century, the leading issues of research on SEZs in Poland included: conditions and instruments of state aid (Nazarczuk, Kisiel, 2013, pp. 7-16; Borkowski, 2014, pp. 30-47; Piontek, 2020) and the effectiveness of state aid in SEZs (Kisiel, Lizińska 2012); assessment of the effects of SEZ functioning on the basis of various indicators (Pastusiak et al., 2016; Ajchel, 2016, pp. 517-527; Lichota, 2016, pp. 99-130; Ciżkowicz et al., 2015); the impact of SEZs on the development of the commune (Józefowski, Młodak, 2017, pp. 33-47; Pastusiak, Jasiniak, 2015, pp. 261-274), poviat (district) (Ciżkowicz et al., 2014, pp. 17-29; Typa, 2013, pp. 16-25) or voivodeship (province) (Narojek, 2015, pp. 119-134) in which they are located (these are the units of the three-tier territorial state division in Poland) and on regional (Ambroziak, Hartwell, 2018, pp. 1322-1331; Szymańska, Wajer, 2012, pp. 219-232) or country development (Przetacznik, 2016, pp. 27-43); the effectiveness of SEZs as an instrument of economic policy (Kołodziejczyk, 2018, pp. 84-89; Pastusiak, Keller, 2014, pp. 29-39); the impact of SEZs on local labour markets (Cicha-Nazarczuk, Nazarczuk, 2017, pp. 183; Wysocka, 2018, pp. 373-388; Struzik, 2014, pp. 212-219); factors influencing the level of investment attractiveness of SEZs in Poland (Sobol, 2016, pp. 155-170; Franczak, 2015, pp. 26-35). Research also covered the impact of the global economic and financial crisis on the functioning of SEZs in Poland (Golik, Kątnik-Prokop, 2014, pp. 180-193; Hajduga, 2013, pp. 190-198; Nazarczuk, 2013, pp. 241-250). The SEZs existing in the European Union Member States were also analysed and assessments of the prospects for their further operation and development were formulated (Stawicka, 2012, pp. 434-443).

A review of the Polish literature relating to SEZ issues leads to the conclusion that the most studies were prepared in the field of economics and finance. Less frequently analysed are the adopted legal solutions concerning the principles of establishing, organising and operating special economic zones. Meanwhile, the quality of legal regulations largely determines the results of the operation of SEZs (Zeng, 2016, p. 22).

Genesis and motives for establishing SEZ in Poland

Recognizing the diversity of definitions, typologies and examples of SEZs (Mokrzyc, 1998, p. 20; The World Bank, 2008, pp. 7-22; Typa, 2016, pp. 25-26) used in world and Polish literature, the considerations focused mainly on their legal structure regulated in the Act on special economic zones of 20 October 1994. The SEZ Act - setting out the principles and procedure for establishing and managing SEZs on the territory of the Republic of Poland, as well as specific rules and conditions for conducting business activity in SEZ areas - has been amended over 30 times since its adoption. Over 300 executive acts were issued for it, which were also amended many times. The amendments varied in scope and nature, but they primarily determined the variety of forms of state aid granted to entrepreneurs operating in SEZs. These, in turn, were: budget subsidies, tax reliefs and exemptions, support from a separate special-purpose fund.

Since 1994, 17 SEZs have been established in Poland, and after the liquidation of two zones and the merger of two zones into one in 2001, 14 such zones are currently in operation. Decisions regarding their operation period were made three times. When creating individual zones by way of a regulation of the Council of Ministers, it was assumed that they would only function for 20 years. Nevertheless, as a result of subsequent amendments to the legislation, the period of their operation was extended (in 2008 - until 2020, and then in 2013 - until 31 December

2026), so that entrepreneurs had more time to benefit from the maximum permissible state aid for the activities conducted in the SEZs. This did not, however, increase the confidence of entrepreneurs, especially foreign ones, in the idea of SEZs in Poland and, as a result, did not increase the inflow of investments to these zones.

They cover areas located in 186 towns and 311 communes, with a total area of 22,949.5 ha (0.08% of the country's area). In Poland, SEZs are not territorially compact. Some of them are in the form of dispersed zones (groups of separate "subzones", located at a considerable distance from each other), located in the most attractive regions in central and south-western Poland, where infrastructure and human capital are at a higher level. They are located in all voivodeships, but due to their dispersed nature, in some voivodeships there are more than one SEZ.

The motive for establishing SEZs in Poland is to create separate areas with more favourable conditions for running business activities than those available outside the zones, in order to accelerate the development of underdeveloped regions by locating new investments, increasing innovation and competitiveness of entrepreneurs, as well as reducing structural unemployment and promoting the creation of new jobs. The function of stimulating (motivating) entrepreneurs to conduct business activity in SEZ areas is performed primarily by tax exemptions and reliefs. Moreover, non-returnable support from the Zone Fund is used for new investments in SEZs. The types, forms and scope of aid have evolved over the 25-year period of SEZ operation. So far, however, the largest role has been played by tax preferences, the scope of which has been changed several times. The most significant changes can be divided into six stages. The first three stages fall on the period of Poland's preparations for accession to the European Union. The next three stages of profound changes to Polish legislation were determined by the necessity to adjust national solutions to EU standards. The directions of these changes resulted from the obligations of the Polish state which already had the status of a member state.

The Period of The Initial Concept of Tax Preferences

By adopting the SEZ Act in 1994, special legal solutions were introduced in the field of personal and corporate income taxes, as well as real estate tax and in the procedure of issuing permits for the purchase of real estate by foreigners. Special legal solutions in regards to taxes took the form of tax exemptions and other preferences in this area. The first group included: income tax exemption for all or part of the income obtained from business activity specified in the permit to conduct business in a SEZ and exemption from property tax. The other group consisted of: accelerated (degressive) depreciation of fixed assets used to conduct business activity specified in the permit or the possibility of including expenses incurred for the purchase of intangible or legal assets related directly to the economic activity in the zone specified in the permit as tax deductible expenses. Income tax exemptions and preferences were granted on equal terms to both domestic entrepreneurs (residents) and foreign entrepreneurs (non-residents). Income tax exemptions could only be used by natural persons and legal persons in connection with conducting business activity in a SEZ on the basis of a permit and meeting the requirements set out in the regulation of the Council of Ministers on the establishment of a given zone (e.g. as regards the scale of permanent production investments implemented within the zone and achieving the designated level of employment and maintaining it for a specified period of time).

The period of including SEZ in the public aid program

As of 1 January 2001 - as a result of adjusting Polish law to the Community state aid regulation - the conditions for conducting business activity in SEZs were changed for entrepreneurs who obtained a permit to conduct business in a SEZ after 1 January 2001 (Act amending the Act on special economic zones and amending certain acts of 16 November 2000). SEZs were included in the state aid program as part of the state's regional policy. The accumulation of tax exemptions for entrepreneurs conducting business activity in SEZs was limited to the level of the aid value established for the region in which the zone is located. The amount of state aid for entrepreneurs taking up economic activity in SEZs was covered by the limit set by the Council of Ministers and could not exceed the maximum value set for a given area (the maximum level of SEZ state aid was 50%, but it was possible to increase it to 65% for small and medium-sized enterprises). At the same time, the possibility of using tax preferences by new entrepreneurs was abolished. Additionally, in the same period, the obligatory real estate tax exemption for land, structures and buildings located in SEZs was abolished (Act amending the Act on the income of local government units in 1999 and 2000 and certain other acts of 13 October 2000). Entrepreneurs who obtained permits to conduct business in SEZs by the end of 2000 were guaranteed to retain the right to tax exemptions and tax preferences under the previous rules throughout the entire validity period of the permit.

The period of modification of the rules of public aid for investors from SEZ

In the course of negotiations for membership in the European Union, the rules of Poland's participation in the Community policies in the first years of membership were established, and in November 2002, a transitional period, i.e. the maintenance of the existing rights, was agreed for medium and small entrepreneurs in SEZs (until the end of 2010 and 2011, respectively), as well as the ceilings of state aid for large entrepreneurs (The Council of Ministers, 2002, p. 15). These arrangements were included in the Act amending the Act on special economic zones and certain acts of 2 October 2003, which introduced new rules for granting state aid in SEZs as of the day of Poland's accession to the EU. For all entrepreneurs operating in SEZs, on the basis of the permits issued before 1 January 2001, new, less favourable rules were introduced regarding income tax exemptions on income earned from running business activities in SEZs. The principle of guaranteeing that tax exemptions and tax preferences for entrepreneurs set by the Council of Ministers when establishing a SEZ would be maintained throughout the period of its operation, in force since 1994, was repealed. The established rules for granting state aid in SEZs were made dependent on, inter alia, the entrepreneur category and the date of obtaining the permit to operate in a SEZ (e.g. large enterprises operating in a SEZ on the basis of a permit issued by the end of 1999 received the maximum allowable aid in the amount of 75% of the investment costs incurred by 31 December 2006, while large enterprises authorised after 31 December 1999 received the maximum allowable aid of 50% of the investment costs incurred by 31 December 2006). In order to encourage entrepreneurs to accept the new conditions regarding tax exemptions, solutions were introduced to partially compensate for lost profits. Their essence consisted in:

– the possibility of changing the terms of a permit to conduct business activity in a given zone, entitling to benefit from state aid, to more favourable conditions (e.g. in terms of the level of employment and the size of investment outlays);
– creating, for the period 2005-2023, an account of special funds intended for non-returnable support for new investments (the Zone Fund) from part of the amounts of taxes paid by entrepreneurs operating on the basis of permits issued before 1 January 2001. The aid may be one-off or successive (i.e. in annual tranches), whereas the total amount of support may not exceed the amount of funds accumulated on the separate fund account for a given taxpayer and the maximum allowable amount of state aid;
– restoration of the statutory exemption from real estate tax on land, structures and buildings located within SEZs, but at the rates applicable in 2000 in relation to land, structures and buildings put into operation in 1999 (communes receive compensation from the state budget for lost revenues from this tax).

The period of differentiating the amount of public aid according to the status of an entrepreneur operating in SEZ

The fourth stage of changes in tax preferences applied in SEZs was carried out in 2007-2009 in connection with the new EU planning period covering the years 2007-2013.

Taking into account the new EU rules for national regional aid, the aid map for Poland (Regulation of the Council of Ministers on the establishment of the regional aid map of 13 October 2006; Journal of Laws No. 190, item 1402) has been changed (the maximum amount of state aid varies by region and concerns mainly the poorest regions, the so-called eastern wall). The SEZ Development Concept developed in January 2009 by the government defines the categories of investments most desirable for the Polish economy (i.e. innovative investments or investments in priority sectors, which include the automotive, aviation, and electronic sectors). The general area of SEZs was increased from 12,000 to 20,000 hectares (by almost 70%) (Act amending the act on special economic zones of 30 May 2008), which made it possible to include new investment areas, attractive from the point of view of entrepreneurs, into the zones (the harmonisation of state aid regulations with EU law prevents the creation of new zones). However, the maximum intensity of state aid for 6 out of 16 voivodeships in Poland was reduced. They became less attractive to investors, despite the increase in the maximum allowable state aid ceilings for small- and medium-sized enterprises compared to the pre-2007 level. Large investments (i.e. investments with a value exceeding the equivalent of EUR 50 million) were redefined and subjected to state aid restrictions. However, the existing tax preferences in the form of income tax exemptions and real estate tax exemptions were retained. In conclusion, the changes introduced in this period were less favourable for entrepreneurs planning to start operations in SEZs as compared to the conditions applicable to entrepreneurs continuing such activities. The level of state aid was reduced mainly for large entrepreneurs, while small entrepreneurs were given preferential treatment. At the same time, the required level of consistency of national regulations with EU standards was achieved.

The period of increased support for new investments in SEZ

The fifth stage of changes in the functioning of SEZs covers the years 2014-2017. As in the previous period, the possibility of differentiating the intensity of state aid in individual SEZs was maintained. With regard to the maximum value of regional aid, it has been significantly reduced (Regulation of the Council of Ministers on the establishment of the regional aid map for 2014-2020 of 30 June 2014), e.g. by 15% in the areas of the Łódź, Lesser Poland, and Opole voivodeships. The level of state aid intensity was left unchanged only in a few regions (i.e. at the level of up to 50% in the areas belonging to the Lublin, Podkarpackie, Podlaskie and Warmian-Masurian voivodeships). The same rules were maintained for determining the maximum value of regional aid granted for the implementation of large investment projects as in the 2007-2013 perspective. In order to encourage entrepreneurs to take up business activities in SEZs, the concept of initial investment was extended to include the acquisition of an enterprise that is in liquidation or would have been liquidated had it not been acquired. Significant changes were made to the so-called relocation of investment projects. It was prohibited to grant regional investment aid to an entrepreneur who discontinued the same or similar activity in the European Economic Area within 2 years preceding their application for regional investment aid.

The period of departing from the concept of territorial dispersion of SEZ

The last (sixth) stage of significant changes to the legal basis for the operation of SEZs in Poland occurred in 2018. Due to the entry into force of the Act on supporting new investments of 10 May 2018, the entire country in fact became a special zone and thus the lengthy procedure related to the expansion of the boundaries of SEZs was eliminated. Support for a new investment is now possible regardless of its location. Therefore, the doctrine and some official documents use the term "Polish Investment Zone". However, this does not equal full freedom of action in this area. The scope of support only covers new investments located in the poviats included in the list prepared by the Council of Ministers. In addition, new investments must meet certain quantitative criteria (regarding the eligible costs of investment implementation, which vary for individual poviats depending on the unemployment rate; the requirements for the amount of investment outlays decrease with the increase in the unemployment rate) and, what is a novelty, also certain qualitative criteria (conditions of compliance with medium-term national development strategy, in particular relating to investing in specific sectors of the economy with the aim of strengthening Poland's competitiveness and economic growth of a given region). The minimum investment costs are PLN 10 million (i.e. approx. EUR 2.4 million) in the poviats with the highest unemployment rate, while in the poviats with the lowest unemployment rate, the minimum investment costs are PLN 100 million (i.e. approx. EUR 24 million). Moreover, the fulfilment of both types of criteria depends on the size and nature of the planned investment, as well as the size of the enterprise (small, medium or large), with the size of the enterprise being determined on the basis of EU law, not Polish law. The support consists in tax exemption of income obtained from the new investment. It is granted on the basis of an administrative decision for a period of 10 to 15 years (up to 15 years for entrepreneurs in areas belonging to the existing SEZs). Continuing the previous solutions applied in SEZs, the Polish Investment Zone adopted the definition of a new investment which was already used for the needs of SEZs since 1 July 2014.

Conclusions

Poland was a precursor among the countries of Central and Eastern Europe in terms of establishing special economic zones. The solutions applied in Western European countries were modelled on, but legislative errors were not avoided, especially in the pre-accession period. Nevertheless, Poland's experiences, including the negative ones, may be used in other countries in order to apply the correct mechanisms for the functioning of similar-type zones.

After about 25 years of the operation of SEZs in Poland, it was not decided to liquidate them on entry into force of the act on supporting new investments, i.e. making the territory of the country one Polish Investment Zone. Instead, it was decided to operate SEZs and the Polish Investment Zone in parallel until 2026. The introduction of radical changes in the form of the Polish Investment Zone was caused by negative experiences related to the functioning of SEZs, which included, in particular: long-term and complicated procedures for incorporating new areas into SEZs, the functioning period of SEZs in Poland only until 2026 as defined by the act, relatively low effects in relation to the value of state aid granted to entrepreneurs (annually approx. 2.5 billion PLN, i.e. approx. EUR 0.6 billion), failure to achieve territorial and economic cohesion, and creating only narrow enclaves of accelerated economic development. The analysis of the successive changes to the law regulating the functioning of SEZs shows that they were too frequent and even chaotic. A certain justification, especially referring to the application of various principles of granting state aid to various groups of entrepreneurs, may be the need to adjust the national legal regulations to EU standards in the first period after the country's accession to the European Union.

Table 1: Dynamics of tax preferences in SEZ for taxpayers of personal income tax in 2010-2018

Year	Personal Income tax				
	Number of taxpayers	Tax-exempt income (in PLN thousand)	Dynamics of the value of tax-exempt income (in%)	Tax exemption (in PLN thousand)	Dynamics of the value of tax exemptions (in%)
2010	115	223 861	100,00	70 195	100,00
2011	105	150 181	67,09	46 942	66,87
2012	107	119 548	79,60	36 915	78,64
2013	164	212 504	177,76	38 846	105,23
2014	182	134 551	63,32	39 678	102,14
2015	173	151 574	112,65	46 357	116,83
2016	136	160 521	105,90	49 416	106,60
2017	147	185 515	115,57	57 701	116,77
2018	145	184 730	99,58	57 397	99,47

Source: Own study based on the Information of the Ministry of Economic Development on the implementation of the Act on SEZ, Warsaw, May 2020.

The data contained in Table 1 shows that the greatest effects in the form of the amount of tax-exempt income were achieved in 2013, i.e. directly after the previously amended legislation governing tax preferences for investors in SEZ. This result was mainly due to an increase in the total number of investors and an increase in investment expenditure. In the following years, however, the interest in running a business in SEZ clearly decreased (a decrease in the number of investors and the related decrease in investment outlays). It can be concluded that the positive motivation of investors was related to the so-called effect of new legal regulations.

Table 2: Dynamics of tax preferences in SEZ for taxpayers of corporate income tax in 2010-2018

Year	Corporate Income tax				
	Number of taxpayers	Tax-exempt income (in PLN thousand)	Dynamics of the value of tax-exempt income (in%)	Tax exemption (in PLN thousand)	Dynamics of the value of tax exemptions (in%)
2010	511	7 619 874	100,00	1 447 776	100,00
2011	535	9 383 215	123,14	1 782 811	123,14
2012	538	8 402 465	89,55	1 596 468	89,55
2013	603	11 843 653	140,95	2 250 294	140,95
2014	687	13 220 306	111,62	2 511 858	111,62
2015	763	13 237 183	100,13	2 515 065	100,13
2016	775	14 102 223	106,53	2 679 422	106,53
2017	785	13 707 132	97,20	2 603 539	97,17
2018	823	14 312 698	104,42	2 718 585	104,42

Source: Own study based on the Information of the Ministry of Economic Development on the implementation of the Act on SEZ, Warsaw, May 2020.

The data contained in Table 2 on the effects of the legislator's influence on taxpayers of corporate income tax allow for the identification of similar trends as in the case of personal income tax payers. The best results were also achieved in 2013, thus discounting the changes to the legislation introduced in the previous year. Their stimulus impact on investors, however, was short-lived, because in the following years, despite the growing number of taxpayers, their investment outlays decreased, so it had a direct impact on the decrease in the value of tax-exempt income. The passage of time had a decisive impact on the decline in interest in locating new investments in SEZ.

Table 3: Growth rate in the number of taxpayers of personal and corporate income tax and the value of tax exemptions used by them in 2010-2018

Year	Number of taxpayers	Dynamics (in%)	Total value of tax exemptions (in PLN thousand)	Dynamics (in%)
2010	626	100,00	1 517 971	100,00
2011	640	102,24	1 829 753	120,54
2012	645	100,78	1 633 383	89,27
2013	767	118,91	2 289 140	140,15
2014	869	113,30	2 551 536	111,46
2015	936	107,71	2 561 422	100,39
2016	911	97,33	2 728 838	106,54
2017	932	102,31	2 661 240	97,52
2018	968	103,86	2 775 982	104,31

Source: Own study based on the Information of the Ministry of Economic Development on the implementation of the Act on SEZ, Warsaw, May 2020.

The data contained in Table 3, covering taxpayers of personal and corporate income tax, shows that the increase in the total number of taxpayers operating in the SEZ brought the greatest effects also in 2013. They reacted positively by increasing investment outlays in response to changes in legislation and in this way, they used the tax exemptions they were entitled to. In the following years, investment outlays grew, but the dynamics of this growth was lower and lower. The interest in creating new investments with the passage of time was exhausted. The effect of the novelty of changes to the legislation turned out to be short-lived. The legislator used the experience gained in this area to carry out a revolutionary change of law in 2018, establishing the entire country as an investment zone. Too short period of time since the changes were made does not yet allow for reliable assessments of their impact on investors.

However, the functioning of SEZs in Poland cannot be assessed solely negatively. From the beginning of their existence until 2019 inclusive, entrepreneurs made investment outlays in the amount of PLN 132 billion (i.e. Approx. EUR 31.4 billion) and employed approx. 388,000 people. Nevertheless, SEZs have not become an effective instrument encouraging foreign entrepreneurs to invest. Moreover, in recent years, zones and subzones have not been located in the most economically neglected areas, but in locations agreed with investors, i.e. those that are already well-equipped with infrastructure (e.g. roads, airports, on the outskirts of large cities). This means that SEZs are systematically losing their original function, which should be the activation of the most economically and developmentally backward areas. From the macroeconomic perspective, it can be concluded that the long-term operation of SEZs did not significantly reduce the disproportions in the regional development of Poland.

Also, government strategic objectives related to servicing large investors and complex investment processes have not been achieved. The waning interest of investors in locating their activities in SEZs is also evidenced by the incomplete use of the available area of the zones. This is partly due to the inclusion of areas of low attractiveness for investors within the SEZs. Another noticeable phenomenon is the little interest in starting a business in SEZs by investors from the priority sectors of the economy, in particular those using advanced technologies and creating jobs for people with the highest qualifications. There are relatively few production plants located in SEZs, whereas logistic parks, storage facilities and assembly plants for devices and components are most prevalent.

High hopes are associated with the new act on supporting investments. The resignation from the territorial restrictions regarding the possibility of obtaining support in the form of income tax exemption should intensify the investment process. More favourable conditions for the implementation of the sustainable development principle have thus been created. This is in line with the objectives adopted in the Strategy for Responsible Development - a government document constituting the framework for Poland's socio-economic development until 2030.

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Fostering the Engagement on The Companies' Facebook Pages in The Fuel's Retail Sector

Martin CEPEL

Pan-European University, Faculty of Economics and Business, Bratislava, Slovakia
martin.cepel@paneurouni.com

Abstract

Social networks change the way how companies realize their marketing activities. Potential customers become part of companies' marketing activities instead of just being passive participants. The ability to actively involve customers thus becomes a critical factor in the success of marketing activities. The study aims to determine how the posts' different content on the companies' Facebook pages affects the engagement of the message recipients. A retrospective, longitudinal study approach was used. Five hundred fifty-three posts from the four Slovak largest fuel retail sellers' Facebook pages were analyzed. The results revealed the significant difference in the medians of the passive engagement ($\chi2$ (3, N = 533) = 85.685, p-value = < 0.0001) and active engagement ($\chi2$ (3, N = 533) = 85.685, p-value = < 0.0001) according to different content types. The paired rank differences suggest that while entertainment messages (EM) significantly encourage both types of engagement (passive and active), informational messages (IM) and social messages (SM) encourage mainly passive engagement. The study extends the research on active and passive customer engagement, and thus, it contributes directly to understanding engagement and customer experience with social media and expands the knowledge about the Facebook content strategy. Finally, it offers recommendations for future research in the examined area.

Keywords: Content, Engagement, Fuel, Retail, Facebook.

JEL classification: M31, M370, M15.

Introduction

Social networks such as Facebook, Instagram, and Twitter affect how today companies deliver their services (Zilber et al., 2019) and realize their marketing activities. In particular, marketing activities are increasingly being transferred to social networks because they easily allow reaching right customers, include them to participate in marketing activities (Rehman et al., 2020), and make them more aware about the benefits of companies' products (Dincă et al., 2019). The ability to actively involve customers in marketing activities becomes a critical factor of companies' success (Rozsa et al., 2020; Mura et al., 2019), mainly because their resources for traditional forms of marketing are limited (Kotaskova et al., 2020). Social media have a positive impact on the entrepreneurship intention of a student to start doing business (Ojewumi, Fagbenro, 2019) and also for raising of the entrepreneurship in many lines of business (e.g. in services (Ferencakova et al., 2020), tourism (Srovnalíková et al., 2020) or transportation (Bertan, 2020).

Facebook, as the most popular social network in the Slovak Republic (Hootsuite, 2019), allows customers to engage with organizational messages through different tools (Like (in various forms), Share, and Comment) (Cho et al., 2014). However, not all tools indicate the same customer engagement. For instance, sharing and commenting requires more appreciable support from customers, and thus it can be considered as a more engaging behavior (Bitiktas et al., 2020; Cooper et al., 2019; Kent et al., 2020; Ngai et al., 2020; Rakoczy et al., 2019; Rajnoha et al., 2016), than liking. Consequently, companies should achieve higher levels of the customers' engagement because it positively impacts outcomes such us sales, competitive advantage, profit, and brand evaluation (Gruss et al., 2020; Harrigan et al., 2017; Kim et al., 2020; Rather, 2020; So et al., 2016; Zheng et al., 2016, Zámečník et al., 2015). Nevertheless, the link between the content and customer engagement in the form of likes, comments, and shares is still under-researched (Ngai et al., 2020).

Because of the above reasons, the study aims to determine how the different content of the posts on the companies' Facebook pages affects customer engagement to address the mentioned research gap. However, unlike already published studies, which in most cases deals with the influence of post type (f. e. link, status, picture, video, (Siyam et al., 2020; Thongmak, 2015; Villamediana-Pedrosa et al., 2019; Wijonarko et al., 2019)), media richness (Banerjee

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et al., 2019; Moran et al., 2019) or posts' frequency or timing (Fähnrich et al., 2020; Mariani et al., 2018) on customer engagement, this study focuses on posts' text analysis, specifically in terms of used message type (informational, entertainment, remuneration, social).

The paper contains four sections, besides this introduction. Firstly, it presents a brief theoretical background on customer engagement and social media message categorization. Secondly, the methodology section explains the research context, methods of data collection, and analysis. After that, the results are discussed. Afterward, suggestions for further research and the study's limitation are presented in the conclusion.

Literature Review

Customer engagement marketing is defined as a company's "deliberate effort to motivate, empower, and measure customer contributions to marketing functions"(Harmeling et al., 2016), beyond purchasing (Kim et al., 2020). Customer engagement (CE) in the online environment refers to the motivational state that occurs through the interactive experience with brand content on social networks and is expressed in the form of relevant cognitive, emotional, and behavioral practices such us sharing company's messages, writing reviews, recommending company's products and other similar activities (Abuljadail et al., 2019; Avnet et al., 2018; Brodie, 2011; Dolan et al., 2019; Eigenraam et al., 2018; Hollebeek et al., 2014). Therefore, this study operationalizes CE as customers' liking, commenting, and sharing behaviors on a company's activities on the Facebook Page (Gruss et al., 2020).

Several authors divide individual customer responses on Facebook (or social media in general) into those that require less or more customer involvement (Cooper et al., 2019; Dolan et al., 2019; Malthouse et al., 2013; van Asperen et al., 2018). Van Asperen et al. (2018) recognize two forms of social media engagement. Passive (engagement) which is based primarily on consuming social media content, and active (engagement) which occurs when customers contribute to social media. Similarly, Cooper et al. (2019) consider liking as a static measure that is not good for engagement measurements because of customers' limited interaction. On the other hand, they indicate that commenting is the highest form of engagement, requiring the customers to write and post their thoughts or tag friends and thus provides them with the opportunity to engage in dialogue with brands and their own social networks simultaneously (Cooper et al., 2019). A highly engaged customer might even choose to distribute an independent review of the company's product or reveal promotional offers that the company might prefer not to expose to a wide audience (Malthouse et al., 2013). In accordance with the above-mentioned research works, the study operationalizes passive engagement customer behaviors which manifests itself as liking (i.e. Like, Love, Haha, Wow, Sorry, Anger) of the company content and active engagement as the commenting of the company content. Sharing company content is also considered an active form of engagement, despite the fact that this contradicts with the above findings, mainly due to the fact that by sharing company content, the customers actively identify with the company among their friends. Customer reviews are not classified because they are not the subject of this study.

Based on the Uses and gratifications theory (UGT), which explain how media consumers' social and psychological needs are satisfied by actively choosing media channels and information (Li et al., 2019), social media content can be categorized into four main groups as follows (Dolan et al., 2016): Informational, Entertaining, Remunerative, Relational (social interaction) content. Informational messages contain resourceful and helpful information about the company brand or its products and services. Entertainment messages are a type of messages which contain fun and entertaining information and do not directly encourage the customer to consume the company's products or services such as questions, quiz memes, funny videos. Remuneration company messages include specific monetary and rewards information such as special promotions, trials or other offers. Social messages contain information that usually occurs in personal interaction and may include information such as shared personal experience, sociable events (e.g. Birthdays) or small talk (Dolan et al., 2019; Kujur et al., 2020; Vaičiukynaitė et al., 2018; Seilerová, 2019). In line with the UGT, these four specific types of content result in different expressions of active and passive engagement (Dolan et al., 2019).

Methodology

The study aims to determine how the different content of the posts on the companies' Facebook pages affects the engagement of the message recipients. The hypotheses were formulated as follows:

- H1: Diverse post content does not lead to different degrees of passive engagement on the companies' Facebook pages.
- H2: Diverse post content does not lead to different degrees of active engagement on the companies' Facebook pages.

A retrospective, longitudinal study approach was used. The four largest companies engaged in the retail sale of fuels in the Slovak republic were selected as participants in the study. Data (posts) from participants' company Facebook

pages were extracted using the Fanpage Karma web application (https://www.fanpagekarma.com/) for 12 months period (from 1st August 2019 to 31st July 2020). A total of 556 posts were collected. Thirty-six of them were excluded because they did not contain text; therefore, 553 posts were used for further analysis (see Table 1).

Table 1: The study participants

Participant	Facebook page ID	Number of Posts	% of Total
Benzinol	1089162457824646	109	20.45%
OMV Filling Stations (SK)	342218085894136	148	27.77%
Shell	304290527049134	128	24.02%
Slovnaft	52904571954	148	27.77%
All		**533**	**100.00%**

Source: Author calculations

Deductive coding was used to analyze posts' content (independent variable). Firstly, the flat coding frame was set with codes as follows: informational message (IM), entertainment message (EM), remuneration message (RM), social message (SM). Secondly, three doctoral students were hired to assign codes to posts manually. To eliminate cognitive biases, coders checked one another's coding, and the founded differences were resolved by mutual agreement. Table 2 presents the posts coding final results.

Table 2: Posts coding final results

Participant	**EM** Count Total % Col% Row%	**IM** Count Total % Col% Row	**RM** Count Total % Col% Row	**SM** Count Total % Col% Row	**Total** Count Total % Col% Row
Benzinol	27	41	24	17	109
	5.07	7.69	4.5	3.19	20.45
	32.14	22.04	22.43	10.9	
	24.77	37.61	22.02	15.6	
OMV Filling Stations (SK)	26	44	30	48	148
	4.88	8.26	5.63	9.01	27.77
	30.95	23.66	28.04	30.77	
	17.57	29.73	20.27	32.43	
Shell	14	50	30	34	128
	2.63	9.38	5.63	6.38	24.02
	16.67	26.88	28.04	21.79	
	10.94	39.06	23.44	26.56	
Slovnaft	17	51	23	57	148
	3.19	9.57	4.32	10.69	27.77
	20.24	27.42	21.5	36.54	
	11.49	34.46	15.54	38.51	
Total	**84**	**186**	**107**	**156**	**533**
	15.76	**34.9**	**20.08**	**29.27**	

Source: Author calculations

The dependent variables were calculated as follows. The passive engagement was calculated as the sum of all forms post's Likes (i.e., Love, Haha, Wow, Sorry, Anger). The active engagement was calculated as the sum of the post's comments and shares. The above procedure corresponds with studies of Cooper et al., 2019; Dolan et al., 2019; Malthouse et al., 2013; van Asperen et al., 2018.

Before data analysis, ANOVA assumptions were checked. The normal quantile plot and the Anderson–Darling test showed that both Passive (p-value < 0.0001) and Active (p-value < 0.0001) engagement data are from a non-normal distribution. Bartlett test of homogeneity of variances showed that data were not from populations with equal variances (Passive engagement data p-value < 0.0001, Active engagement data p-value < 0.0001). Because the ANOVA's assumptions were severely violated Kruskal-Wallis Test instead of an ANOVA was used. SAS JMP 15 was used for all calculations.

Results and Discussion

The results of the passive engagement data analysis indicate that there is a significant difference in the medians, $\chi 2$ (3, N = 533) = 46.1106, p-value = < 0.0001 (see Tab. 3), and thus H1 can be rejected. Because the overall test is significant, pairwise comparisons among the four groups should be completed.

Table 3: Kruskal-Wallis Tests (Rank Sums) for passive engagement

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
EM	84	30014.5	22428	357.315	5.856
IM	186	50263.5	49662	270.234	0.355
RM	107	22137.5	28569	206.893	-4.516
SM	156	39895.5	41652	255.74	-1.086
Total	533				

Source: Author calculations

The p-values indicates that we should reject the null hypothesis that the paired rank differences in passive engagement are symmetric around zero between SM and RM (p-value = 0.0222), RM and IM (p-value = 0.0002), SM and EM (p-value < 0.0001), IM and EM (p-value < 0.0001), and RM and EM (p-value < 0.0001).

Table 4: Comparisons for each pair using Wilcoxon Method (Passive engagement)

Level	- Level	Score Mean Difference	StdErr Dif	Z	p-Value
SM	RM	21.83	9.54597	2.28683	0.0222
SM	IM	-10.1542	10.7329	-0.94608	0.3441
RM	IM	-37.9831	10.27869	-3.69533	0.0002
SM	EM	-41.7582	9.39493	-4.44477	<0.0001
IM	EM	-49,0870	10,26449	-4,78221	<0,0001
RM	EM	-52,3720	8,05785	-6,49950	<0,0001

Source: Author calculations

Table 4 also presents the pairwise differences in passive engagement, which can be interpreted as follows: Difference scores above zero mean that the engagement of the message type in the first-row exceeds engagement of the message type in the second-row. Analogically, difference scores below zero mean that the engagement of the message type in the second-row exceeds engagement of the message type in the first-row. Practically speaking, we conclude with 95% certainty that performance (passive engagement) of the social messages (SM) exceeds the performance of the remuneration messages (RM, the median of the difference in performance fall between 1 and 18); that performance

of the informational messages (IM) exceeds the performance of the remuneration messages (RM, the median of the difference in performance fall between -22 and -5). Also, we can conclude that the entertainment messages (EM) exceed the performance of the social messages (SM, the median of the difference in performance fall between -77 and -28), informational messages (IM, the median of the difference in performance fall between -76 and -30), and remuneration messages (RM, the median of the difference in performance fall between -99 and -52).

The results of the active engagement data analysis indicate that there is a significant difference in the medians, $\chi 2$ (3, N = 533) = 85.685, p-value = < 0.0001 (see Tab. 5), and thus H2 can be rejected. Because the overall test is significant, pairwise comparisons among the four groups should be completed.

Table 5: Kruskal-Wallis Tests (Rank Sums) for Active engagement

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
EM	84	34147.5	22428	406.518	9.051
IM	186	47911	49662	257.586	-1.033
RM	107	24300	28569	227.103	-2.999
SM	156	35952.5	41652	230.465	-3.525
Total	533				

Source: Author calculations

The p-values indicate that we should reject the null hypothesis that the paired rank differences in active engagement are symmetric around zero between RM and EM (p-value < 0.0001), SM and EM (p-value < 0.0001), and IM and EM (p-value < 0.0001).

Table 6: Comparisons for each pair using Wilcoxon Method (Active engagement)

Level	- Level	Score Mean Difference	StdErr Dif	Z	p-Value
SM	RM	-0.1103	9.53748	-0.01156	0.9908
SM	IM	-18.5580	10.72753	-1.72994	0.0836
RM	IM	-19.6688	10.27209	-1.91478	0.0555
RM	EM	-62.4660	8.05336	-7.75652	<0.0001
SM	EM	-75.3938	9.39155	-8.02783	<0.0001
IM	EM	-80.5645	10.26211	-7.85068	<0.0001

Source: Author calculations

Table 6 also presents the pairwise differences in active engagement, which can be interpreted as follows: Difference scores below zero mean that the engagement of the message type in the second-row exceeds engagement of the message type in the first-row. Practically speaking, we conclude with 95% certainty that performance (active engagement) of entertainment messages (EM) exceeds the performance of the informational messages (IM, the median of the difference in performance fall between -165 and -69), social messages (SM, the median of the difference in performance fall between -164 and -63), and remuneration messages (RM, the median of the difference in performance fall between -174 and -65).

The previous results also suggest that while entertainment messages (EM) significantly encourage both types of engagement (passive and active), informational messages (IM) and social messages (SM) encourage mainly passive engagement.

The results of this research in line with Dolan et al. (2019) demonstrate that the effectiveness of different types of social media content have varying effects on social media engagement behavior. Contrary to Vaičiukynaitė & Gatautis (2018) and Mura et al. (2018) they show that in the fuel's retail sector social messages do not support active engagement.

Conclusions

As part of their social media marketing efforts, many company brands seek to communicate with the customers online. They create Facebook Fan Pages, submitting posts, and try to involve customers in their marketing activities through liking, sharing, and commenting published content. The importance of content is frequently highlighted (Eggers et al., 2017). Especially in the service sector, where the use of social media platforms is the most significant (Bejtkovsky et al., 2018). However, few studies consider the effort and resources the content creation process takes, or what alternative tactics can be employed (Kraus et al., 2019; Mészáros et al., 2019) to create compelling content.

The study aimed to determine how the different content of the posts on the companies' Facebook pages affects the engagement of the customers. The results revealed that different content types (Informational, Entertaining, Remunerative, Social) affect differently passive and active engagement. Specifically, entertainment messages (EM) significantly encourage both types of engagement (passive and active), informational messages (IM), and social messages (SM) encourage mainly passive engagement.

These findings show that social media marketers should better select content based on their marketing goals, as well as provide a potential explanation for the success of campaigns, gingerly. For instance, they should be careful with using entertainment messages even if they cause a high degree of engagement, because their significance for achieving other marketing outputs may be questionable.

Although the study extends the research on passive and active customer engagement in relation to the content type, the results should be generalized with consideration of the following limitations. Firstly, the study focused exclusively on one social network channel (Facebook). Secondly, posts on the Facebook pages in the fuel's retail sector were analyzed.

In future research, it would be useful to address the limitations of this research and other content strategy elements, such as another network channel, and passive and active customer engagement, according to the types of appeals.

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Formation of a Nomenclature of Indicators of Household Appliances Quality and Its Qualification Assessment

Olga KOTOMENKOVA

PhD in Tech Sc., associate professor
Peter the Great St. Petersburg Polytechnic University,
195251, Russia, St. Petersburg, Polytechnicheskaya str., 29
e-mail: kot-og@yandex.ru

Anna VINOGRADOVA

PhD in Tech Sc., associate professor
Peter the Great St. Petersburg Polytechnic University,
195251, Russia, St. Petersburg, Polytechnicheskaya str., 29
e-mail: ann-vin@yandex.ru

Abstract

The article proposes an algorithm for the formation of a nomenclature of quality indicators and qualification assessment of household appliances. The range of quality indicators is formed on the basis of the applicability of products to a group, taking into account the definition of complex quality indicators and single quality indicators of different levels. Qualification assessment was carried out by an expert method based on the calculation of a comprehensive quality indicator taking into account the weighting coefficients of individual indicators of quality and safety of individual consumer properties of technical products.

Keywords: Household Appliances, Quality of Household Devices and Machines, Nomenclature of Quality Indicators, Qualification Assessment.

Introduction

According to several authors (Borgia et al, 2013), increasing competition in global markets requires companies to focus on two main aspects of the production system: cost reduction and product quality.

On the one hand, cost reductions are directly related to improving the energy efficiency of products. Here too, experience in researching purchasing intentions for energy-efficient appliances (Zhaohua Wang et al, 2019) and assessing the noise level of household appliances (Jackson & Leventhall, 1975) is of particular interest.

Reducing the environmental impact of household appliances is also an important aspect. For example, a number of authors proposed a mitigation scenario (Hischier et al. 2020) or an analysis of particulate emissions from household electrical appliances (Schripp et al., 2011).

On the other hand, cost reductions are due to the introduction of innovative developments that improve certain consumer properties of products.

Thus, a number of authors (Bansal et al., 2011) reviewed achievements aimed at potential energy savings through the use of advanced technologies in household appliances. In our view, the development of intelligent online machine quality control using discrete wavelet analysis (Goumas et al., 2001) and a prototype of an ice machine with periodic solar energy adsorption using water as a cooling agent and silica gel as an adsorbent (Souissi, Guidara and Maalej, 2019) may have some interest.

In the case of household appliance products, we cannot help but notice the trend towards fault diagnosis and longer product life. A number of studies are being carried out in this area by teams of authors (Arcos et al., 2020), the

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analysis of which can be widely used in the practice of repair or disposal of equipment (Tecchio, Ardente and Mathieux, 2019), and the development of an interactive diagnostic system for monitoring the quality of household appliances (Paone et al.,1999).

At the same time, the competitiveness of any product on the market, including household appliances, is conditioned by consumer preferences in market segmentation. According to a number of authors (Huang et al., 2018), ergonomic factors, reliability factors (Krumm, 1986) and, of course, environmental ones (Holsteijn & Kemna, 2018) must be taken into account.

At present, authors (Stamminger, 2020) are paying increasing attention to testing the condition of products, including household appliances, in order to determine their competitiveness in the market.

In order to create competitive products that meet all customer requirements and maintain a targeted assortment policy, it is proposed to use qualification evaluation.

Previously, we proposed an algorithm for forming a nomenclature of quality indicators and qualified assessment of perfumes and cosmetics products using the example of hair care products (Kotomenkova & Vinogradova, 2019). However, the nomenclature of quality and safety of technically complex products has its own characteristics.

Methods

To assess the quality of technical products, all indicators of their properties are organized into 5 groups. The applicability of quality indicators to product groups is shown in Table 1.

On the basis of Table 1 materials, a list of quality indicators is formed taking into account the technical characteristics of products offered by manufacturers for information to potential consumers of household appliances and the requirements set forth in regulatory and technical documentation for a particular type of technical product (Figure 1).
In order to implement the expert method for determining the weighting coefficients of product quality indicators, a preferred method is used in which an expert group of 5 people numbers the weighting coefficients of product quality indicators in the order of their importance (weighting): the least important property is assigned to property 1, the most important property to property −2 and further increasing.

The expert method for determining weightiness is based on the averaging of weight ratings given by the expert group. The weight of the object propertiesq_i is determined through an expert survey.

The reference (complex) property weighting factor is one (1):

$$\sum_{i=1}^{n} q_i = 1 \quad , \tag{1}$$

where q_i is the weighting factor of the i-th quality and safety indicator;
n is the number of assessed quality and safety indicators.

Table 1: Groups of product quality indicators

Name of the group of indicators	Product groups				
	group 1: natural raw materials and fuel	group 2: materials and products	group 3: consumables	group 4: non-repairable items	group 5: repairable items
1. Destination indicators	+	+	+	+	+
2. Reliability indicators:					
– reliability	–	–	–	+	+
– durability	–	(+)	–	+	+
– repairability	–	(+)*	(+)*	–	+
– maintainability	+	+	+	+	+
3. Indicators of economic use of raw materials, fuel and energy	–	–	–	+	+
4. Indicators of manufacturability	+	+	+	+	+
5. Indicators of transportability	+	+	+	+	+
6. Indicators of ergonomics	–	(+)	+	+	+
7. Indicators of environmental	(+)	(+)	(+)	(+)	+
8. Indicators of safety	(+)	(+)	(+)	(+)	(+)
9. Indicators of aesthetics	–	(+)	+	+	+
10. Indicators of standardization and unification	–	(+)	(+)	+	+
11. Patent and legal indicators	–	(+)	(+)	(+)	+
12. Economic quality indicators	+	+	+	+	+

*Note: – non-applicability; + applicability; (+) limited applicability; * instead of repairability - recoverability.*
The weights of all properties of the same level have a certain relationship: "the sum of the weights always remains constant, a predetermined number" - the weights are determined by the requirements of the related property (i-1)-level (2):

$$\sum_{j=1}^{n} q_{ij} = const \quad , \tag{2}$$

where $\sum_{j=1}^{n} q_{ij}$ in the sum of the weighting factors of the i-th quality and safety indicator of the j-th expert;
n is the number of assessed quality and safety indicators.

On the basis of the developed nomenclature of product quality indicators, the weighting coefficients of all selected product quality indicators are calculated using the rank method, where the expert group directly assesses the importance of each property on a scale of relative significance with a range of values from 1 to 10. It is permissible to assign both whole and fractional values to the properties. The same values are permitted for indicators of equal importance.
The value of the weighting factors for quality indicators is calculated using the formula (3):

$$q_i = \frac{p_i}{\sum_{i=1}^{n} p_i} \quad , \tag{3}$$

where q_i in the weighting factor of the i-th quality and safety indicator;

p_i in the rank (assessment) of the significance of the quality and safety indicator by an expert;
n is the number of assessed quality and safety indicators.

The accuracy of expert assessments is determined by the consistency of expert opinions. The degree of coincidence of the experts on the commission is calculated using a reconciliation factor (4):

$$W = \frac{12 \cdot S}{m^2(n^3 - n)} \quad , \tag{4}$$

where W – reconciliation factor;
S is the squared deviation of the ranks or scores of the quality and safety indicator from the arithmetic mean;
n is the number of assessed quality and safety indicators;
m is the number of experts.

The sum of squares of deviations of rank (S) from the arithmetic mean for all quality indicators and the auditors is calculated using the formula (5):

$$S = \sum_{i=1}^{n} (\sum_{j=1}^{m} p_{ij} - \frac{\sum_{i=1}^{n} \sum_{j=1}^{m} p_{ij}}{n})^2 \quad , \qquad (5)$$

where S is the squared deviation of the ranks or scores of the quality and safety indicator from the arithmetic mean;
p_{ij} is the score in ranks given to the i-th quality and safety indicator by the j-th expert;
n is the number of assessed quality and safety indicators;
m is the number of experts.

In order to carry out the qualification evaluation of products, the values of quality and safety indicators are systematized according to their hierarchical structure.

The product quality assessment methodology consists of the following grades: "excellent" (3), "good" (2), "satisfactory" (1), "bad" (0).

An arithmetic weighted average can be selected for a comprehensive product quality assessment.

Determination of the arithmetic mean weighted index taking into account the weighting factor of the i-th index calculated by the expert method using the formula (6):

$$Q_i = q_i \times a_i, \qquad (6)$$

where Q_i is the a single quality indicator of the i-th property, taking into account the weighting factor a_i;
q_i is the single absolute indicator of quality;
a_i is the the weighting factor of the i-th quality and safety indicator.

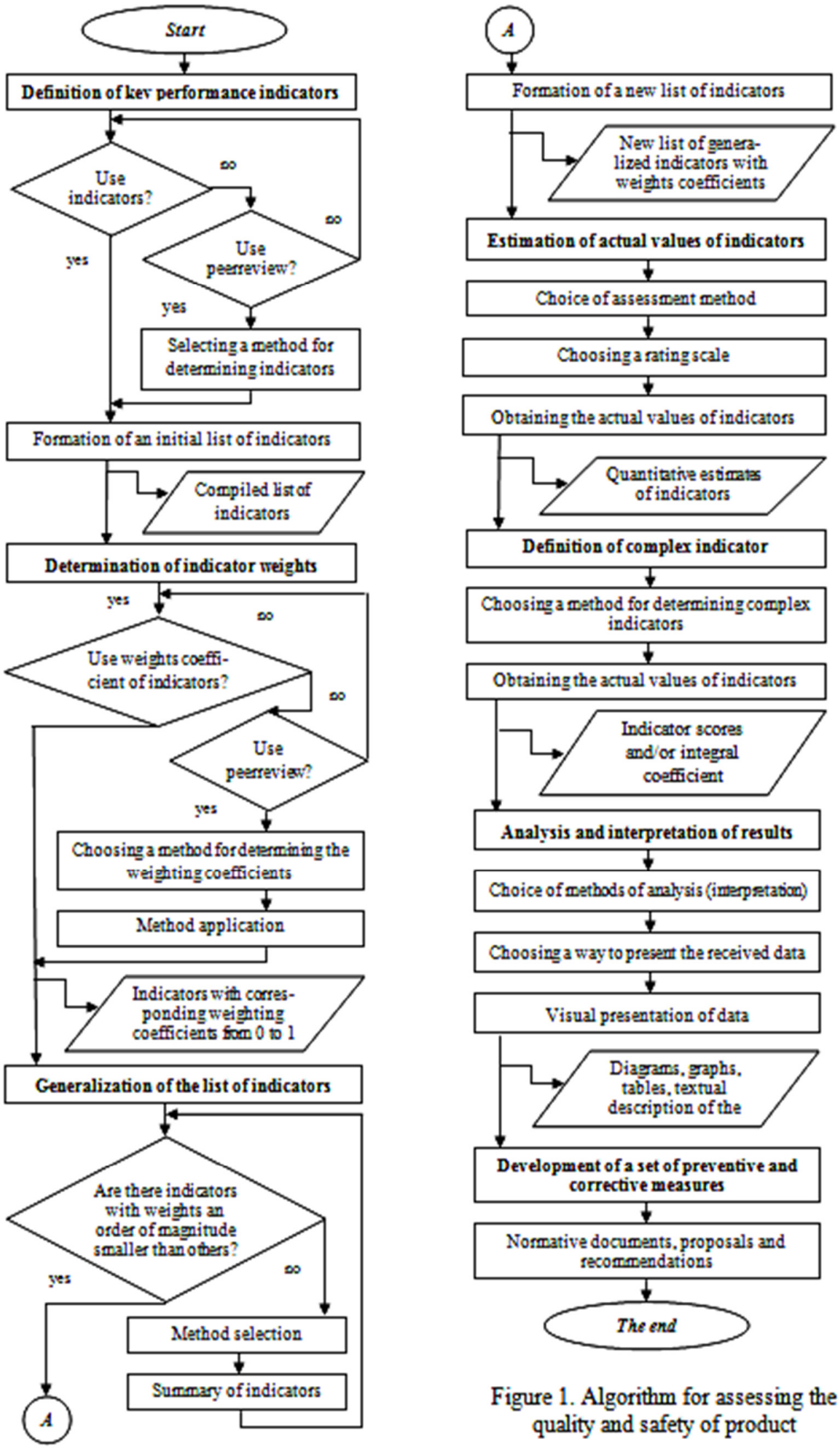

Figure 1. Algorithm for assessing the quality and safety of product

Results and Discussion

According to Table 1, household appliances can be classified as Group 5 products - repairable products, therefore, its range of quality and safety indicators will include single indicators of all 12 complex properties. For example, 24 quality and safety indicators were defined for domestic robots; 26 for domestic air conditioners and 36 for domestic refrigerators (Figure 2).

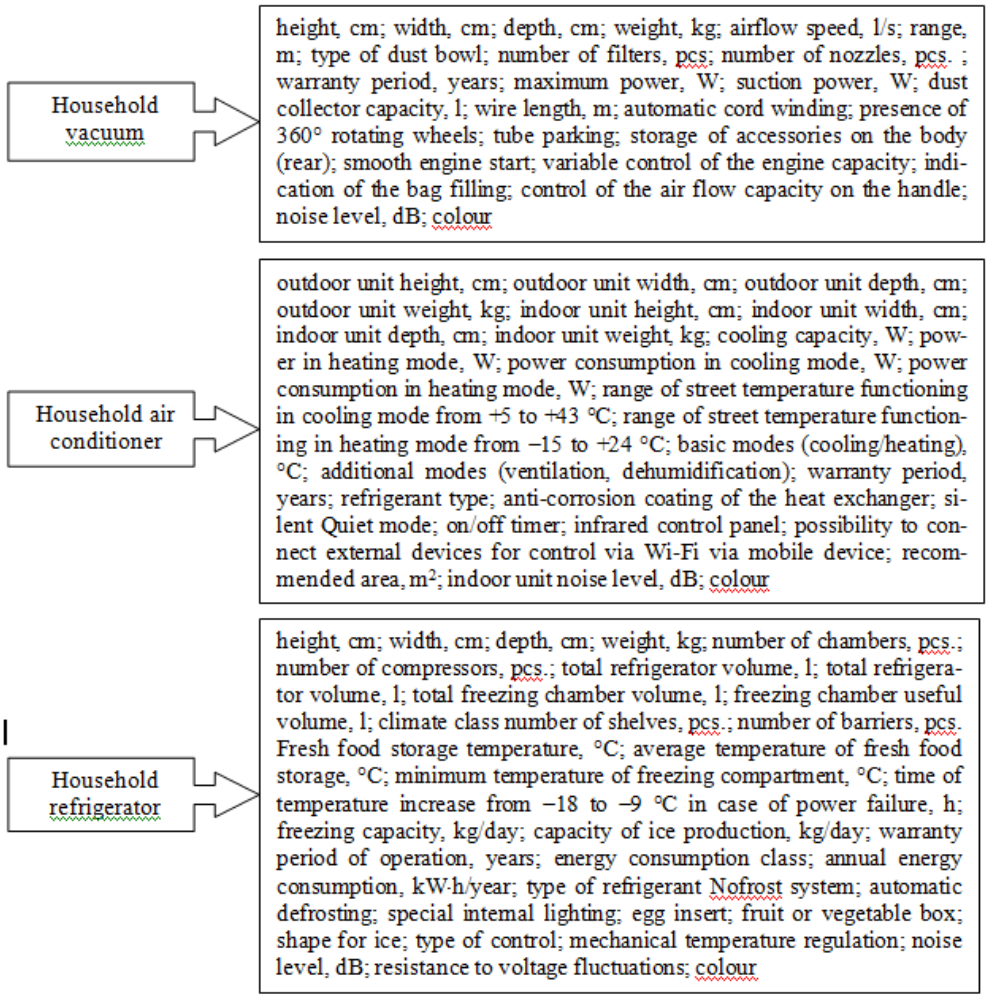

Figure 2. Quality and safety indicators of household appliances

The analysis of the data in Figure 2 shows that in the process of formation the consumer properties of the products under study were taken into account to the maximum extent possible. It should be noted that indicators can be defined both quantitatively and qualitatively (those that do not have specific values in quantitative terms, but can be represented, for example, in the meaning of "presence" or "absence").

Also, not all indicators can be used for preliminary (initial) qualification assessment, but a part of them, which have the highest weighting coefficients based on the results of expert assessment.

The results of the qualification assessment of individual models of household appliances sold on the Russian market are presented in Figures 3-5.

It should be noted that the consolidation ratios of this study were in the range of 0.82-0.84, which indicates a high degree of consistency of opinion among the members of the expert group.

The data in Figures 3-5 show that, overall, the quality of the products studied was assessed by the expert group as good, often closer to excellent.

At the same time, this method allows for end-to-end analysis of the indicators of the products under study to identify their "strengths" and "weaknesses" in relation to competitive products in the household appliances market. For example, the most preferable household refrigerators in their segment were Liebherr, Daewoo and Samsung; Hoover and Bosch household vacuums and Ballu and Samsung household air conditioners.

In conclusion, the qualification assessment includes a set of methods for measuring and quantifying the quality of products and processes used to make informed decisions during product quality management. The application of this assessment method will not only create a high level of quality, but also minimize adjustments to products after they enter the market and establish a high level of safety for consumers.

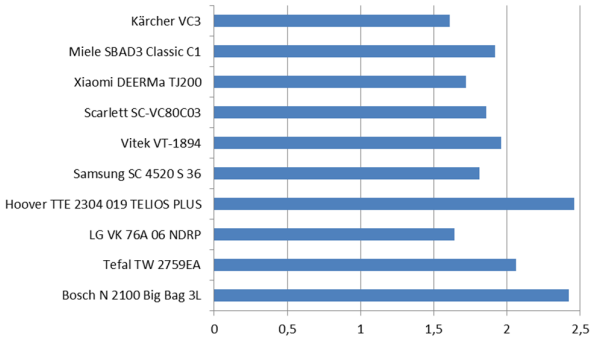

Figure 3: Qualimetric assessment of household vacuum

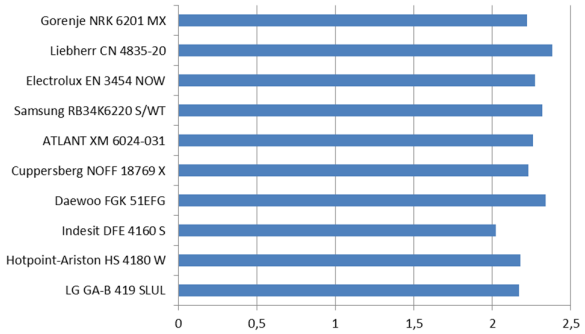

Figure 4: Qualimetric assessment of household air conditioner

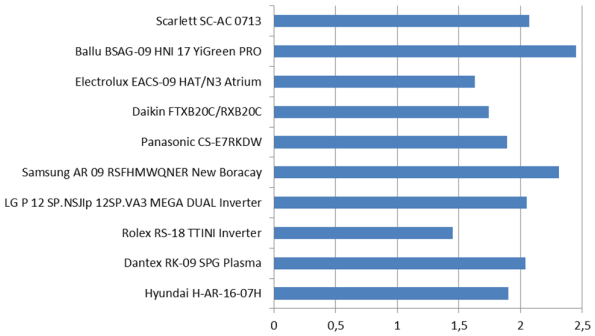

Figure 5: Qualimetric assessment of household refrigerator

Conclusions

1. The empirical study presented is dedicated to assessing the quality of household appliances. The study presents the methodology of the study and its testing in assessing the real quality of products on the Russian market of

household appliances. An evaluation algorithm is presented.
2. The range of quality indicators is formed on the basis of the applicability of products to a group, taking into account the definition of complex quality indicators and single quality indicators of different levels. In the case of household appliances, all performance indicators, including those for consumer properties, must be taken into account to assess quality and safety: …
3. The qualification assessment of household appliances sold on the Russian market was carried out by an expert method based on the calculation of a comprehensive quality indicator taking into account the weighting coefficients of individual indicators of quality and safety of individual consumer properties of technical products. The results of the assessment identified the most consumer-friendly household appliances in their segment.
4. In conclusion, it's noted that the qualification assessment includes a set of methods for measuring and quantifying the quality of products and processes used to make informed decisions during product quality management.

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Policy for Empty and Abandoned Houses in Rural Areas

Norhafiza ABDULLAH

Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia.
Email: norhafizaabdullah01@gmail.com

Ainur Zaireen ZAINUDIN*

LAnDS Research Group, Faculty of Built Environment and Surveying,
Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia.
ainurzaireen@utm.my
Corresponding Author

Abstract

Depopulated villages have contributed to the increasing number of empty and abandoned houses in rural areas, which have subsequently causing wasteful use of rural land resources. Having this phenomenon, many countries have undertaken measures to repopulate the rural areas in a way to make it more livable as well as to secure its resources so that the environment, social and economic benefits could be sustained. In this paper, the policy undertaken by the Malaysian Government to address and overcome the issue of depopulated villages, particularly the empty and abandoned houses in the country is presented. This is done by analyzing secondary data on rural population, rural population issues as presented in past studies besides looking into the respective policy implemented by the responsible rural agencies in the country. Lastly, this paper concludes with recommendations for further policy improvements.

Keywords: Depopulation, Empty and Abandoned House, Hollow Village, Rural, Policy

Introduction

Rural areas, with its natural beauty and tranquil surroundings, should be an attractive option of lifestyle for most people. However, rapid industrialization and urbanization have contributing to massive migration of the rural communities to the urban areas. As a result, rural depopulation has turned out severe, increasing the number of empty and abandoned houses and farmlands over the years. Sun et al (2011) mentioned, China called this as 'Hollow Village' phenomenon; whereby, likely phenomenon has long hit other countries too including North America, Japan (see Caraveli, 2000; Rudel et al., 2005; Sluiter & De Jong, 2007; Yunjie, 2017), Western & Eastern Europe (see Garcia & Ayuga, 2007; Reichert-Schick, 2010; Aleksander, K. & Tomasz, M., 2013), Iran (see Dewey et al., 2014) and United States (see Adam, et al., 2016).

This paper focuses particularly on the empty and abandoned houses in the rural areas, as a result of the massive rural communities' migration to the urban areas over the years. The houses that were kept unoccupied and abandoned for a long period as described by Jianping & Yasushi (2016) are in a state of grave disrepair, that could be strewn with trash, and scrawled with graffiti. Liu et al. (2010) initially illustrated that damaged houses have different degrees of destruction, ranging from slight to severe, as some vacant houses fall into disrepair; some may even collapse and weeds growing in half-meter height; some get damaged to such a degree that they are deemed unsafe for inhabitation. In worst situation, Liu et al. (2010) who studied the Hollow Village in China found that the phenomenon has changed the whole socio-economic function of a village, whereby the tendency of a village to completely vanish is high. As they described, it shows that empty and abandoned houses would bring negative image to a rural settlement, affecting the sustainability of the rural area.

In a study carried out in Malaysia (see Abdullah et al. 2019), it was found that the 49 out of 172 houses that were left empty and abandoned by their owners were mainly due to the death of the first generation of family members, who were the first to settle down when the village was opened around the 1990s. When this first generation dies, the

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tendency for the next generations to move out of the village to continue living elsewhere were high then. With nearly 30 percent of the houses have been left abandoned, it was worst enough to have caused the increasing unsafe and discomfort feeling among the remaining villagers. The abandoned houses were left without maintenance, mostly filled with bushes and dirty courtyards.

Therefore, rural repopulation is vital, being the foundation for rural settlement development that could support local shops, schools and other facilities, to sustain the local economy (Owen, 1996). The movement of population outflow to the city limits rural workforce, thus worsening agricultural activities and less developed land has subsequently increased. In pursuant to this phenomenon and the awareness on the needs to sustain the rural areas, rural development strategies have been established and implemented in the affected countries, most importantly are aimed to repopulate the rural areas. In this paper, the policy undertaken by the Malaysian Government to address and overcome the issue on empty and abandoned houses in the rural areas in the country is presented. This is done by first analyzing secondary data on rural population, rural population issues as presented in past studies besides looking into the respective policies implemented by the responsible rural agencies in the country. Lastly, this paper concludes with recommendations for further studies.

Rural Population Issues

The problems that are often faced by rural communities have narrowed their thinking, especially young people in continuing a better life in the urban areas that seem to have more attractions. In Europe, Owen (1996) found that the common problems of its local rural communities were their difficulties in gaining employment, the young and elderly were socially and physically isolated due to the reduction in services and accessibility by public transport to facilities and services in urban areas as well as the reduced investment in rural infrastructure. These have long been the pushing factors that making rural communities to move to urban areas, whilst the urban attractions have been the pulling factor that keep worsening the rural-urban migration issues. Mabogunje (1970) elaborates that when the attraction factor in one area is greater, it has prompted people to move to that area on a more privileged basis than the other area. Therefore, it shows that rural depopulation has been contributed by the failure of the attractiveness factors in rural areas to keep their people in. He further suggests for the rural communities to sustain, the economic development, provision of facilities, and protection of nature should first be strengthened.

Repopulating the Rural Areas

Sustaining rural areas involves multidisciplinary efforts. From the perspective of rural depopulation issue itself, we could not ignore for instance the role of the agricultural sector since the areas are largely and naturally landscaped with land resources that vital for agricultural related economic sectors. Besides providing food for people, the land resources create socio-economic mobility opportunities that thereafter would at least support local services. Having all these in one place, thus outmigration could be prevented. This is the ecosystem that needs to be taken care of by rural institution for the rural areas to be independent.

Rural depopulation that have kept houses in villages empty and abandoned is an alarming indicator of rural decay. Without sufficient source of labour in the rural areas, agricultural investments would be affected. When the investments slowing down further, rural decay becomes severe. Repopulation of rural areas is thus important and effective policy is needed. In China, in addressing the rural hollowing issue, the country acts by launching a new 'increasing vs. decreasing balance' land use policy in 2005 that was aimed to reconciling demands of urban development and protecting farmlands. The strategies involve agricultural modernization and improvements to rural infrastructure as an effort for rural settlement rationalization (Long et al. 2012). Germany have seen protecting agricultural industry in rural area as a good step towards overcoming the problem of rural decay too. They have introduced their Land Consolidation Policy, a comprehensive reallocation procedure of a rural area consisting of fragmented agricultural (Long et al., 2009). With the policy, the production and working conditions in agriculture have been improved through the re-arrangement of agricultural land. Nevertheless, besides strengthening the agricultural industry in rural areas, Owen (1996) also suggests that sustaining rural communities should involve strategies to protecting water quality and natural heritage, and strengthening the established village and smaller settlements structure to accommodate people in a way that supports the viability of public transport and services.

Policy for Empty and Abandoned Houses in Malaysia's Rural Areas

Our analysis is based on a set of policies established and implemented in Malaysia by its responsible agencies for rural development. Policies involving rural development in Malaysia have evolved since the First Rural Development Transformation Policy was issued in 1957 until the National Rural Physical Planning Policy 2030 (NRPPP2030) was launched, to be guiding the physical planning in the rural areas for the period from 2014 to 2030. In the NRPPP2030, the issue of rural depopulation has been highlighted. It is reported that by 2020, the total rural population is expected

to decrease from 7.7 million people in 2016 to 7.39 million people (NRPPP2030). The same concern is also mentioned in Rural Development Policy 2019 (RDP2019), in which, the policy is targeting to create economic opportunities with conducive environment and social atmosphere to attract rural communities especially the youth for continue to live in the rural areas. More than that, the Government also intends to attract some urban dwellers and investors to migrate to rural areas to increase the volume of productive population and economic capacity in rural areas. In contrast to other rural development policies in Malaysia which are led and monitored by the Ministry of Rural Development, NRPPP2030 is on the other hand formulated by PLANMalaysia under the responsibility of the Ministry of Urban Wellbeing, Housing and Local Government.

NRPPP2030 is needed to clearly address and overcome rural development issues especially on the lack of rural data, rural-urban development and economic gap, rural to urban migration, increasingly affected rural image and characters, unsustainable rural resources and biodiversity as well as the failure of rural institution. Therefore, through the implementation of NRPPP2030, all related rural policies in the country are interpreted into physical plans, integrated into databases established by PLANMalaysia. The databases are established to gather and classify spatial data to ease the formulation of better and specific strategy according to the villages' characters and also to monitor the implementation of the NRPPP2030. Rural Grid System and Characteristics of Rural Malaysia System (CHARMs) are two examples of databases developed to fully support the recent rural planning and development in Malaysia.

The issue of rural depopulation and empty and abandoned houses are specifically mentioned under Thrust 3 (Reinforcing Rural Liveability) of NRPPP2030. This thrust is aimed to turn the rural area as an option for living because of its nature, supported by employment opportunities and good public facilities. This effort is to be achieved through the implementation of five Policy Statements and 19 Strategies as follows:

Table 1: Policy Statements and Strategies for Reinforcing Rural Liveability

Policy Statement	Strategy
Preservation of Village Spatial Characters	1. Determining village boundary 2. Asset Mapping 3. Controlling land use conservation 4. Preserving the 'green belt' areas 5. Increasing rural population especially the young people and retirees from the cities 6. Managing abandoned houses for better image
Preservation and Conservation of Village Heritage	1. Conserve traditional Malay house 2. Foster Malay traditional house industry 3. Raise public awareness on cultural heritage 4. Recognize the living person heritage
Increasing Efficient Infrastructure	1. Ensuring a continuous and adequate source of clean water supply 2. Supports comprehensive 24-hour distribution of electricity supply 3. Driving Information and Communication Technology in supporting the rural economy 4. Strengthen solid waste management system 5. Strengthen sewerage system
Provision of Public Amenities	1. Providing of adequate and quality public amenities 2. Foster community ownership element and social enterprise concept
Strengthening and Increasing Public Participation	1. Strengthen feelings of love and a sense of belonging 2. Strengthen the concept of neighborhood and community in daily life

Source: NRPPP2030

Clearly, issue on empty and abandoned houses in rural areas is mentioned by Policy Statement No.1 Strategy No. 5 and 6. It is reported in the NRPPP2030 that 7.5 percent of villages in the country (especially within the areas that

PLANMalaysia categorized as Rural and Major Rural Grid) were found to have low occupancy rate. From the Rural Grid System that monitored by PLANMalaysia, there are a total of 43 grids that with empty and abandoned houses exceeding 30 percent. This situation is due to population size that becoming smaller over the years thus has not entitled them to be equipped with basic amenities, high reliance on a single economic sector i.e. agriculture and lack of diversity and aspects of employment, business and technological facilities. Without immediate actions, it is feared that the image of the village will be affected, disrupting the smooth running of development programs. Therefore, Strategy No. 6 is planned to manage the empty and abandoned houses by first, building up the 'old and abandoned house inventory' to gather the details of the house physical conditions as well as the ownership information. The physical conditions are to be classified into three stages:

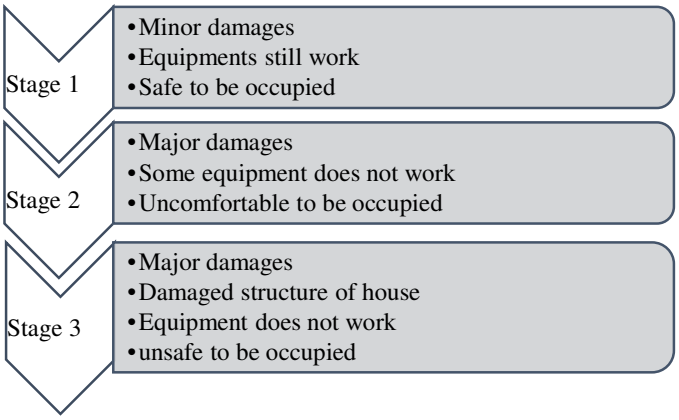

Fig .1: Stages of Old Houses

Source: NRPPP2030

The whole process to manage the empty and abandoned houses in the villages starts with identifying the old houses, categorizing their stages and finally to be managed according to their conditions. If the houses are still occupied, thus minor repair works will be carried out by the community itself. And, if the houses are abandoned and not claimed by the heirs, the houses will be demolished or may be repaired if they are still potentially developed as rental houses.

PLANMalaysia have set for this process to be executed within three phases of timeline. The first phase has begun in 2017 and to be ended in 2020. The second phase will be implemented from 2021 until 2025 and the final phase is beginning 2026 until 2030. All these phases are to be monitored by PLANMalaysia; whereby, they have identified several agents to directly involve in executing the process namely the Village Development and Security Committees, Land and District Offices as well as the local authorities. Eventually, this process is targeting to renovate the empty and abandoned houses in rural areas and to develop them as homestays or rental houses.

Conclusion

A policy that formed to solve the communities' problems must have clear goal, target and indicators so that it can easily be evaluated for further and better decision making and management. Same goes to NRPPP2030, when tackling rural depopulation issue, it goes into detail about the ecosystem that manifesting the whole issue, including the empty and abandoned houses. The houses form the rural settlement, being an important support system to sustain the rural areas. The setting up of Thrust 3 to reinforce rural livability in NRPPP2030 shows that the Malaysian Government has been taking proactive measures to strengthen the rural settlement structure by looking into the abandonment of houses in its rural areas. This effort is important as the basis for supporting the social and economic development planning in the rural areas. Without the people to reside in the rural areas, the country would be losing source of labour for rural economic industry, which without them, the productivity thus investment in such industry would be detrimental. The implementation of the Thrust 3 is targeted to be completed by year 2030. Along the way, reports on its progress should be regularly monitored to assure its success. The monitoring should involve the assessment on the agents that have been assigned to that tasks too. It is to ensure proper implementation of the policy so that the targeted goal would be attainable. Therefore, it is suggested for studies to be further conducted from the perspective of the appointed agents, as an effort to closely evaluate the effectiveness of the set policy.

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Wage Level Survey in Croatia in Comparison to Countries of The Region and The EU from 2011-2019

Stela PRVONOŽEC

Master of Economics
University of Zadar, Department of Economics, Zadar, Croatia
stela.prvonozec@gmail.com

Anita PEŠA, Ph.D

University of Zadar, Department of Economics, Zadar, Croatia
apesa@unizd.hr

Berislav BOLFEK, Ph.D

University of Zadar, Department of Economics, Zadar, Croatia
bbolfek@unizd.hr

Abstract

The level of wages and their ability to cover the cost of living is a key issue for both employees and economic policy makers. In some cases, wages paid to a worker are not sufficient to cover the average cost of living, which is especially relevant in Croatia, Bosnia and Herzegovina, Serbia and Montenegro, so the topic of this paper is the level of wages in Croatia, Bosnia and Herzegovina, Serbia and Montenegro in the period from 2011to 2019 and comparing them with the EU. The survey is based on Eurostat data and authors calculations. The average monthly net salary is not sufficient to cover the average cost of living in Croatia, Bosnia and Herzegovina, Serbia and Montenegro. The observed countries record significantly lower levels of purchasing power and living standards compared to other European countries, and achieving stronger economic growth has been hampered by inefficient economic policies. The corona crisis will have a profound effect on the economy of these countries.

Keywords: Croatia, wage levels, cost of living, countries of the region.

Introduction

Numerous authors have dealt with the topic of wage values and living standards in general in the Republic of Croatia. In 2011, Radman Peša, Stanković and Štajduhar published a paper entitled "Survey of the level of salaries in Croatia in relation to countries of the region and EU countries" in which the level of salaries in Croatia in relation to Bosnia and Herzegovina, Serbia and Montenegro and the EU countries for the period 2001-2010 was analyzed. This paper is intended as a continuation of this work, and the purpose is to investigate the level of wages in Croatia in relation to Bosnia and Herzegovina, Serbia and Montenegro and EU countries for the period 2011-2019**.** According to the newest data by Central Bureau of Statistics, average net wages in Croatia. Similar trends were recorded in Bosnia and Herzegovina, Serbia and Montenegro, but regardless of wage growth, available data indicates significant differences in purchasing power and living standards in Croatia, Bosnia and Herzegovina, Serbia and Montenegro compared to other countries. Available sources indicate a problematic feature in the observed group: the average monthly net wage is not sufficient to cover the cost of living (coverage rate generally ranges from 40-80). At the same time, Croatia is one of the European countries with an above-average share of wages in GDP (Eurostat, 2020a). In this paper,

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therefore, the value of wages in Croatia and selected countries in the region is analyzed, as well as the present differences in purchasing power and living standards in these countries towards the EU. Considering the current global pandemic of coronavirus, the paper also deals with the current socio - economic effects of the corona crisis on the economies of Croatia, Bosnia and Herzegovina, Serbia and Montenegro. This paper is divided into three parts: the introductory part that briefly introduces the reader to the issues addressed in this paper, elaboration of the topic analyzing the value of wages in Croatia compared to countries in the region and the EU and the conclusion that summarizes the most important facts presented in this paper.

Literature Review

Šućur (2014) notes in his paper that the crisis in 2008 resulted in the emergence of new subgroups in the category of poor citizens. As members of these subgroups, Šućur lists the employed, young people, children, the homeless and the unemployed. As sources of poverty in Croatia, Šućur cites financial uncertainty, indebtedness, rising unemployment, an increase in the number of people living in absolute and deep poverty and child poverty. In 2018, 24.8% of people in Croatia lived at risk of poverty or social exclusion, and there is a significant dependence of the population on social transfers (Croatian Bureau of statistics, 2019d). According to Eurostat (2019) data, in 2017 Croatia was one of nine EU member states with one fifth of the population or more at risk of poverty. Nestić and Vecchi (2007) note that the level of wages and living standards in Croatia vary according to the counties, and the leader is Zagreb. Bejaković (2018) also mentions the issue of the employed population that receives a salary insufficient to cover the average cost of living. According to Eurostat data (2020b), in Croatia in 2018, after social transfers, 19.2% of the total population lived at risk of poverty, of which 5.2% were employed and 30.3% were not employed. Similar trends can be observed in Serbia and Montenegro, while data for Bosnia and Herzegovina is not available. Ivanda (2017) mentions that it is extremely important that economic growth "spills over" to the living standards of the citizens. Rančić and Durbić (2016) also emphasize the importance of high employability and adequate salaries of employees in the process of increasing the standard of living in Croatia. It is clear from the mentioned sources that the problem of wages in Croatia cannot be examined individually. Savić and Zubović (2015) point out that the countries of the Western Balkans have a common characteristic that prevents the improvement of labor markets: inflexibility. Muja and Gunar (2019) state that in the countries of the Western Balkans the standard of living is largely conditioned by the quality of government in the country. Economic situation in Serbia is described by Pavlović et. al (2016). The authors state that the macroeconomic environment in Serbia is extremely unsatisfactory, and is characterized by a high level of illiquidity, high inflation rates, rising unemployment and declining capacity utilization. Fetahi-Vehapi et. al. (2015) note that there are significant differences between the countries of the Western Balkan in terms of economic development.

Economic Review of Croatia from 2011-2019

In 2008, the effects of the global financial crisis that started in the United States spilled onto Europe. The macroeconomic implications of the crisis were most pronounced in the countries of Central and Eastern Europe (Mihaljek, 2009). In six years, Croatia's GDP has fallen by 12.6% in real terms. During 2014 and 2015, the fall in oil prices and changes in the income tax system enabled the gradual recovery of the Croatian economy (Croatian Chamber of Economy, 2017a). In the following period (2016-2018) positive trends from 2015 continued, although the dynamics of growth itself slowed down. In 2018, the most profitable economic activities in Croatia were trade, tourism and transport, and the most unprofitable were industry and mining and quarrying (Croatian Chamber of Economy, 2019b; Croatian National Bank, 2017b, 2018c). Eurostat (2019c) states that in the third quarter of 2019, Croatia was one of the European countries with the highest growth rates compared to the previous quarter (along with Poland, Hungary, Estonia, Bulgaria and Slovenia). The global corona virus pandemic will determine economic trends in 2020 and later, and it remains to be seen whether economic policy measures adopted in Croatia, Bosnia and Herzegovina, Serbia and Montenegro will result in faster stabilization of the national economies.

The share of wages in GDP in Croatia

According to Eurostat data (2020a), in 2019, above-average shares of wages in GDP were recorded in eleven EU Member States, including Croatia (40.5%). At the same time, Eurostat (2020d) notes that the share of wages in Croatia's GDP in 2019 is lower by 3.2 percentage points than in 1999. Similar developments have been reported in Ireland, Portugal and Malta. In 2010 nominal and real wages began to decline (Kunovac and Pufnik, 2015). 2014 marked a turning point in terms of wages; Croatian Chamber of Economy (2019a) states that real wages in Croatia have been growing continuously since 2014. However, the same source states that wages in Croatia are growing more slowly than in similar countries. The link between wage growth and productivity is described by Orsini and Ostojić (2015). They state that wage growth that is faster than productivity growth will adversely affect countries 'competitiveness. According to the European Commission (2018a), wage growth that occurred in 2017 was higher than productivity growth in most Central and Eastern European countries, with the following exceptions: Croatia, Poland and Slovenia.

Wages and consumer baskets in Croatia and the region

In this segment of the paper, data on wages and consumer baskets in Croatia, Bosnia and Herzegovina, Serbia and Montenegro is processed. All mentioned countries have one thing in common: the average wage is insufficient to cover the consumer basket (Nacional, 2019). For example, in Bosnia and Herzegovina, more than two average wages are needed to cover the necessary costs, while in Serbia in November 2018, 1.39 average wages were needed to cover the average consumer basket (Obrenović, 2019). In Montenegro, at least two average wages are required to cover minimum costs (Nacional, 2019). Below are the average net wages in the countries of the region for the period 2011-2019 years. For easier comparison, all values are expressed in Croatian kuna. Average net wages in Bosnia and Herzegovina, Serbia and Montenegro are all expressed in Croatian kuna and were obtained as follows: values expressed in the domestic currency of the observed country were converted into euro and then converted into Croatian kuna (according to the middle excange rate of Croatian National Bank on July 29, 2020).

The average net wage in Croatia grew during the observed period, and is at the same time the highest in the observed group of countries.

Table 1: Average net wages in Croatia from 2011-2019

2011	2012	2013	2014	2015	2016	2017	2018	2019
5.441,00 kn	5.478,00 kn	5.515,00 kn	5.533,00 kn	5.711,00 kn	5.685,00 kn	5.985,00 kn	6.242,00 kn	6.457,00 kn

Source: National Bureau of Statistics, Croatia (2015c, 2020d)

Data on the consumer basket in Croatia is as follows: prices are very high compared to the incomes of Croatian citizens, in most European countries the consumer basket is cheaper than in Croatia, the purchasing power of Croatian citizens is among the worst in the EU and finally, the indebtedness of Croatian citizens is high. Also, the growth of purchasing power in Croatia is relatively slow compared to other European countries (Turčin and Milovan, 2019).

Bosnia and Herzegovina also recorded an increase in average net wages in the period 2011-2019. However, the coverage of the average consumer basket by wages in Bosnia and Herzegovina remains very low; the latest data from March 2020 indicate that the coverage of the consumer basket with the average wage is only 47.43% (Vrisak.info, 2020).

Table 2: Average net wages in Bosnia and Herzegovina from 2011-2019 (in Croatian kuna)

2011	2012	2013	2014	2015	2016	2017	2018	2019
3.132,67 kn	3.171,12 kn	3.174,94 kn	3.186,43 kn	3.186,43 kn	3.217,14 kn	3.267,08 kn	3.412,97 kn	3.562,69 kn

Source: Author developed (2020)

In November 2018, the average wage in Serbia was approx. 428 EUR, and the consumption of a family of four in the same period amounted to 597 EUR. In the structure of the consumer basket in Serbia, 41% of monthly expenditures are spent on food. In Croatia, this figure is 32%, in Montenegro 37%, and in Bosnia and Herzegovina 36% (Nacional, 2019).

Table 3: Average net wages in Serbia from 2011-2019 (in Croatian kuna)

2011	2012	2013	2014	2015	2016	2017	2018	2019
2.434,52 kn	2.652,57 kn	2.186,33 kn	2.854,70 kn	2.848,39 kn	2.955,17 kn	3.070,27 kn	3.182,90 kn	3.520,72 kn

Source: Author developed (2020)

In Montenegro, the average net wage in December 2019 was EUR 484, and the average consumer basket in the same period was EUR 484. Data on the net wage in 2011 is not available on the official website of the Montenegrin Statistical Office. As in other countries, the average wage is not enough to cover the cost of living - additional sources of income in this case are obtained by borrowing (Nacional, 2019).

Table 4: Average net wages in Montenegro from 2011-2019 (in Croatian kuna)

2011	2012	2013	2014	2015	2016	2017	2018	2019
	3.656,70 kn	3.596,63 kn	3.581,61 kn	3.604,14 kn	3.746,80 kn	3.829,40 kn	3.836,90 kn	3.866,94 kn

Source: Author developed (2020)

The graph below shows that the highest wages in the observed group of countries were recorded in Croatia, followed by Montenegro, Bosnia and Herzegovina, while the lowest wage levels were recorded in Serbia.

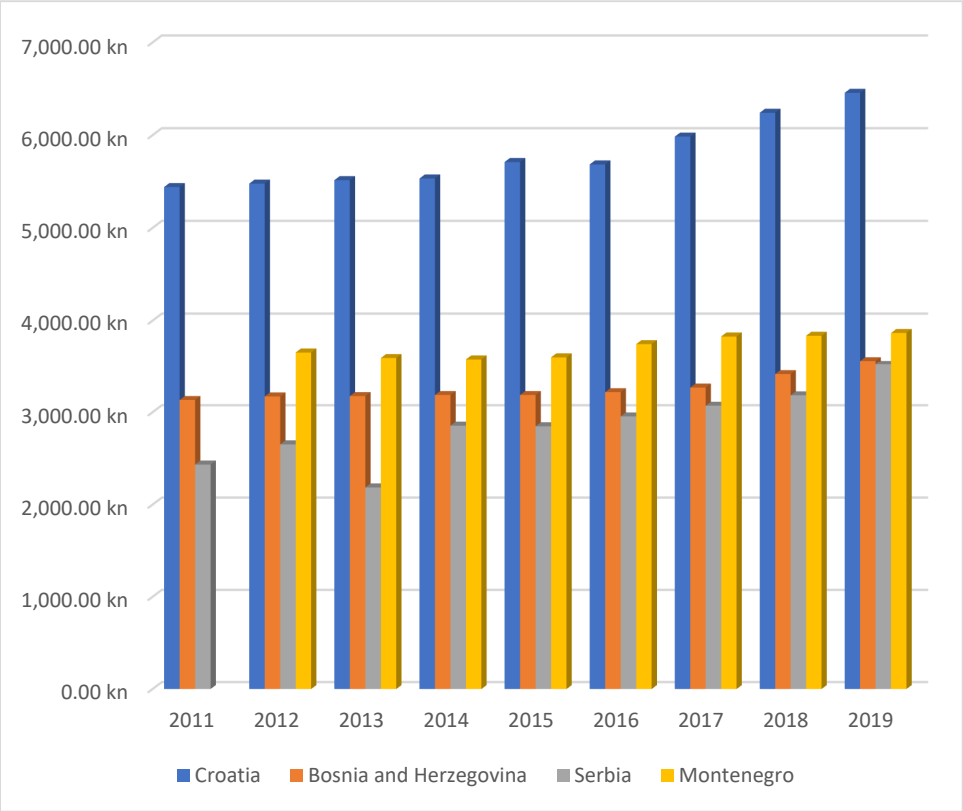

Figure 1: Wage level comparison in Croatia, Bosnia and Herzegovina, Serbia and Montenegro from 2011-2019, Author developed (2020), source: Croatian Bureau of Statistics (2015; 2020), Agencija za statistiku BiH; Avaz.ba; Monstat; Republički zavod za statistiku (2020)

Below is a graphical representation of the value of wages in Croatia, Bosnia and Herzegovina, Serbia and Montenegro and the average cost of living in 2018.

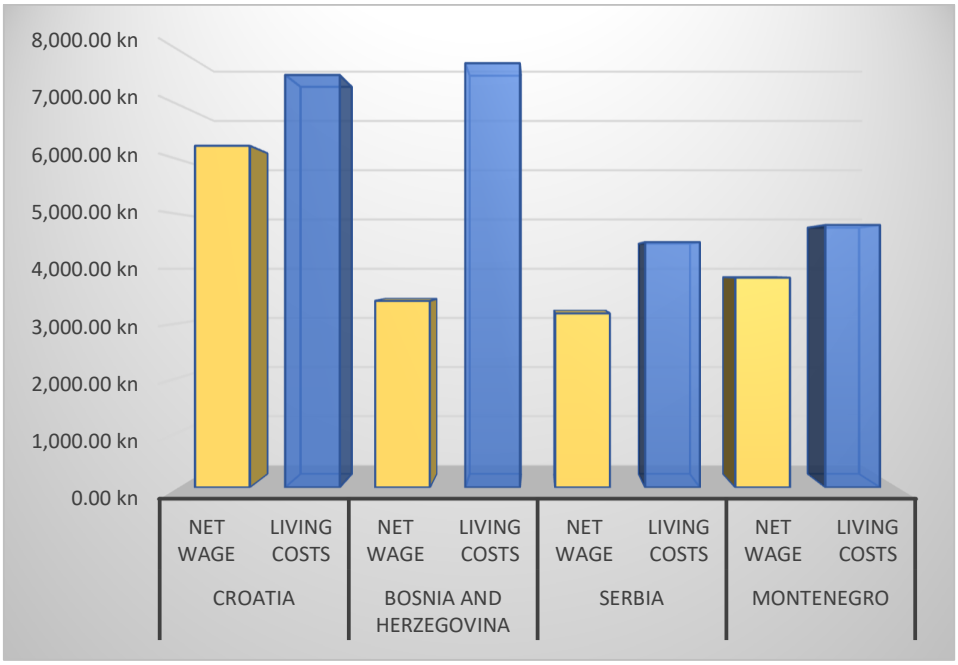

Figure 2: Average net wages and living costs comparison for the year 2018 for Croatia, Bosnia and Herzegovina, Serbia and Montenegro, Author developed (2020), source: Lemajić, Nacional, I.Dž (2019)

Net wage in Croatia 2018 covered 83% of living costs in 2018, in Bosnia and Herzegovina only 44%, in Serbia 71% and in Montenegro 80%.

Wages in Croatia and the EU

Šućur and Babić (2019) in their analysis of IWP (in-work-poverty) in Croatia, state the following: first, Croatia records a high share of low-paid employees, secondly, after 2008 the share of temporary employment contracts increased significantly, third, taxes are high, which reduces net wages and finally, the availability of tax breaks or social benefits is limited and affects only employees earning more than the minimum wage (European Commission, 2019b). All of the above contributes to the increase in the number of residents at risk of poverty. According to Urban (2016), Croatia, along with Estonia, Slovakia, the Czech Republic, Poland and Hungary, is the EU member state with the lowest wage level. In 2019, the estimated hourly wage in Croatia was 11.1, Euro for the EU = 27 the average was EUR 37.7, and for the euro area member states 31.4 Euro. In particular, the highest hourly rates were recorded in Norway (50.2 Euro) and Denmark (44.7 Euro). The countries that, along with Croatia, recorded the lowest hourly rates are Poland (10.7 Euro), Latvia (9.9 Euro), Hungary (9.9 Euro), Lithuania (9.4 Euro), Romania (7.7 Euro). and Bulgaria (6.0 Euro) (Eurostat, 2020). According to the data on the minimum wage from January 2020, Croatia is classified in group 2 - countries with a minimum wage of at least 500 EUR, but not more than 1000 Euro per month (specifically, in Croatia the minimum wage for January 2020 was 546 Euro). The countries with the highest minimum wage in January 2020 are Spain, France, Germany, Belgium, the Netherlands, Ireland and Luxembourg (Eurostat, 2020e). When it comes to the minimum wage expressed in PPPs, two groups of countries are distinguished within the EU; the first group, with a minimum wage of less than 1000 PPPs (Latvia, Bulgaria, Estonia, Slovakia, the Czech Republic, Croatia, Hungary, Portugal, Greece, Romania, Lithuania and Malta) and the second group, countries with a minimum wage of at least 1000 PPPs (Poland, Slovenia, Spain, Ireland, France, Belgium, the Netherlands, Germany and Luxembourg).

In 2019, Eurostat (2020f) recorded data on annual net earnings according to the following categories (all values are expressed in EUR): a married couple with two children in which both partners are employed (both 100% of the average worker), a married couple in which both partners are employed,

without children (both 100% average worker), a married couple in which one partner works with two children (100% average worker) and singles without children (100% average worker). In 2019, the values by categories for Croatia are as follows: for the first and second category, the annual net earnings amounted to approx. 20,000 EUR, and for the third and fourth category approx. 10,000 EUR. In addition to Croatia, countries with similar trends are Slovakia, Hungary, Latvia, Lithuania, Romania and Bulgaria. The average for EU = 27 is 50,000 EUR (1st category), approx. 48,000 EUR (2nd category), approx. 29,000 EUR (3rd category) and finally, approx. 23,000 EUR (4th category). The highest values were recorded in Luxembourg, the Netherlands and Denmark (Eurostat, 2020).

Expected future trends in the region

Economic trends in the region in the coming period will be conditioned by the consequences of the corona crisis. On the official website of the Croatian Chamber of Commerce, it is stated that the corona crisis has an increasingly strong impact on the Croatian economy, with micro-entrepreneurs being the most endangered (Croatian Chamber of Economy, 2020c). Other unfavorable trends include the decline in retail turnover (data for May 2020) (Croatian Chamber of Economy, 2020e), the decline in tourist activity of the population (noting that the corona crisis has affected the change in the structure of guests, so entrepreneurs in tourism are increasingly oriented to domestic tourists (Croatian Chamber of Economy, 2020d).

The Croatian National Bank Council (2020a) projected a 9.7% drop in real GDP in 2020 and a 6.2% growth in economic activity in 2021, but also noted that the projections of the trends themselves are very uncertain due to their conditionality by the epidemiological situation. Projections of economic trends are also affected by the potential deterioration of the epidemiological situation announced for the end of the year.

Adverse developments are expected in the labor market, although somewhat mitigated by economic policy measures (Croatian National Bank, 2020a). Bosnia and Herzegovina also witnessed a serious decline in the number of people employed (approx. 28,000 workers in the Federation of BiH and approx. 2,000 workers in the Republic of Serbia since mid-March), and the effects of the crisis have hit services, trade and manufacturing the hardest. It is estimated that three billion euros will be needed to address the coronavirus crisis in Bosnia and Herzegovina (Husenović, 2020). In addition, the crisis caused by the coronavirus will result in worsening of the already unfavorable demographic trends in Bosnia and Herzegovina. Job losses will also affect the health and pension system of Bosnia and Herzegovina (Domazet, 2020).

Companies in Serbia expect a 25% drop in profits and a 30% drop in investments as result of the corona crisis. At the same time, 63% of companies plan to keep their business at the current level. The sectors most affected by the crisis are tourism, catering, transport and real estate, the auto industry, the consumer durables industry and the consumer goods industry. Losses of up to 80% were recorded in these industries (Poslovni dnevnik, 2020b). Also, a state measure was adopted according to which the citizens will be able to apply for financial assistance in the amount of 100 Euro until June 5 (Poslovni dnevnik, 2020c).

Tourist trends in Montenegro are very unfavorable; more than 50% of hotels along the coast have been closed due to undercapacity, the situation is similar in private accommodation, with domestic guests as the dominant group (Maksimović, 2020). The IMF predicts a 9% drop in GDP in Montenegro, and a high share of citizens who have applied for one-time social assistance. The corona crisis will also affect public finances in Montenegro, as well as the living standards of its citizens (Poslovni dnevnik, 2020a).

Tisdell (2020) states that most pandemics resulted in declining economic activity and rising unemployment. In the case of the corona virus pandemic, governments have enacted a series of measures aimed at halting the spread of the virus, which have resulted in reduced employment and economic activity globally. The author also notes that the recovery of economic activity after COVID-19 is highly dependent on medical discoveries regarding the treatment and prevention of disease.

Nicola et. al. (2020) note that the consequences of a pandemic are felt in all sectors, but that some sectors recorded sharp increase in revenue (for example, the video game industry, the pharmaceutical

industry) due to the nature of the disease and the method of prevention. Also, in some industries, the increase in demand for products required a change in the business model (food industry).

The European Union adopted a number of economic policy measures aimed at remedying the consequences caused by the corona virus pandemic. Each Member State has been granted a financial assistance package to remedy the crisis. According to the forecasts, the European economy will record a decline of 8.3% in 2020 and a growth of 5.8% in 2021, assuming the gradual abolition of restrictive measures and the absence of a "second wave". The European Commission Summer Forecast for 2020 notes that the differences in the extent of the consequences of pandemics and the speed of recovery of member states' economies will be even greater than those predicted in the spring forecast (European Semester, 2020a).

In the context of a global pandemic, making forecasts for economic recovery is extremely difficult due to the unpredictable epidemiological situation, and in countries such as Croatia, Bosnia and Herzegovina, Serbia and Montenegro it is even more demanding.

Purchasing Power Parity

Purchasing power parity (PPPs) is an indicator of the level of prices present in countries. The official website of the European Commission states that data on purchasing power parity is used for international comparisons of GDP and for analysis of relative price levels in countries. It is also an important tool for comparing and analyzing the purchasing power of the population (Eurostat, 2018g). PPPs is also used by the IMF to determine quotas for its members (Croatian Bureau of Statistcs, 2019d).

GDP per capita in PPS

According to Eurostat (2020h) data from for EU = 27_2020 = 100, in 2019 the highest levels of GDP per capita according to purchasing power parity were recorded in Luxembourg (261) and Ireland (191). The lowest values were recorded in Romania (69), Greece (68), Croatia (65) and Bulgaria (53). Although at the bottom of the EU, Croatia's GDP per capita in purchasing power parity is the highest among the observed countries in the region.

Consumer price levels in Croatia

According to Eurostat (2020i), in 2019 consumer price levels varied significantly within the EU; the highest levels of consumer goods prices were recorded in Denmark (41% above the European average) and the lowest in Bulgaria (47% below the European average). The EU has also defined the HFCE (household final consumption expenditure) parameter, which consists of an overall overview of individual goods and services purchased in resident households, including those sold at below-market prices. HFCE also includes an estimate of non-monetary costs or transactions that cannot be measured directly (Eurostat, 2017j).

Consumer goods are divided into the following categories: food, beverages, tobacco products, clothing and footwear, energy, furniture, white goods, consumer electronics, personal transport equipment, transport services, communications and restaurants and hotels. Price levels in Croatia for all described categories of goods in 2019 are below the European average, and the leading category is "household costs" (53.3% below the European average) (source: Eurostat, 2020; 2019), "recreation and culture" (24.7% below the European average) and “furniture and carpets” (23.3% below the European average).

Wage growth comparison in Croatia and EU

Croatian Chamber of Economy (2019b) points out that real wages in Croatia have been growing continuously since 2014, which has a positive effect on household consumption and GDP in general. The sources of wage growth are the stabilization of the economy, positive developments in the labor market and tax changes (which result in reduced labor taxation and a general increase in net wages).

The same source states that there are significant differences in the amount of wages by counties; above - average wages were recorded in the City of Zagreb, Dubrovnik - Neretva County and occasionally in Primorje - Gorski Kotar County. In 2016, the counties in Adriatic Croatia recorded an acceleration in

wage growth (all except Lika-Senj County). In the years preceding the global financial crisis, wages in Croatia not only grew at a similar rate as in the EU = 10, but also adjusted more slowly to contractions in economic activity (Orsini, Ostojić, 2015). Kunovac and Pufnik (2015) also mention this. The Joint Employment Report (2019) points to another important feature of the economies of Central and Eastern Europe - wage growth is present, but not accompanied by adequate productivity growth.

Since the mid-1990s, nominal wage growth in the EU has been closely linked to inflation and productivity growth. The EU also points to the importance of economic policies that result in increased labor productivity in order to achieve wage convergence. In the post - crisis period, wage growth was moderate due to low inflation, high unemployment rates and declining productivity. At EU level, only a few countries (including Croatia) recorded nominal wage growth below the expected level based on inflation, productivity growth and unemployment rates after the global financial crisis (Labor market and Wage Developments in Europe, Annual Review 2018).

Wage growth in Croatia is largely “artificial” - it is the result of temporarily positive economic trends (the effects of the corona crisis are yet to be seen) and changes in labor taxation. The European approach to wage growth is based on effective economic policies that result in increased labor productivity and, consequently, lead to a change in living standards.

Purchasing power of the citizens of the Republic of Croatia

According to Croatian Bureau of Statistics data (2019a), in 2018 the Republic of Croatia recorded one of the lowest levels of actual individual consumption (AIC) per capita in the EU. In Montenegro and Serbia, the value of CEC ranged between 30-60% below the European average, while in Bosnia and Herzegovina the value of CEC was 59% below the European average.

In 2017, in the structure of consumption expenditures in Croatia, the dominant item was "food and non-alcoholic beverages" with 28.2% (on average, 23,253 HRK per household was spent on food and non-alcoholic beverages, and within this category food expenditures dominated - 91.8%). In addition, in 2017, Croatian citizens spent the most on "housing and energy consumption" (on average HRK 12,967 per household - the dominant item is the cost of electricity, gas and other fuels with 62.8%) and for "transport" (on average HRK 12,766 per household - the dominant item is vehicle maintenance expenditures with 63.3%). During 2010 and 2011, there was a decrease in total consumption expenditure in Croatia compared to 2009. In 2014, the total value of household expenditure amounted to HRK 81,315. In 2017, consumption expenditures amounted to HRK 82,530 per household, but due to changes in the methodology of data collection, it is not possible to compare them with previous years (Croatian Bureau of Statistics, 2019b).

In 2018, the dominant consumer item in the EU was "household expenses" with 24.0% in total expenditures and "food" with 11.0% in total expenditures. Similar trends were recorded in Croatia (the most represented consumer categories were also “household expenditure” (16.8% in total expenditure) and “food” (16% in total expenditure)) (Eurostat, 2019k).

Results of the research

As part of this research, wage values in Croatia, Bosnia and Herzegovina, Serbia and Montenegro for the period 2011-2019 were analyzed. The crisis in 2008 resulted in a number of changes in the labor market, including the emergence of new subgroups in the category of poor citizens (Šućur, 2014). In 2018, a quarter of the population in Croatia lived at risk of poverty (Croatian Bureau of Statistics, 2019). The research established that the highest levels of wages were recorded in the Republic of Croatia, while the lowest were in Serbia. The paper also analyzes the adequacy of wages to cover average monthly expenses in 2018. In all observed countries, average net wages were not sufficient to cover all living expenses, but covered approx. 70-80% of living costs (with the worst situation being recorded in Bosnia and Herzegovina, where the average net salary covered only 44% of costs). In general, the standard of living and purchasing power in all observed countries are below the European average (Croatian Bureau of Statistics, 2019). For foreign citizens who buy in Croatia, Bosnia and Herzegovina, Serbia and Montenegro, consumer goods are very affordable, but the situation is completely different when it comes to the domestic population. Eurostat data (2019k) indicate Croatia's

convergence with the EU when it comes to consumer goods - both in Croatia and in the EU the highest share in the structure of food waste expenditure and household costs (although prices vary significantly). Wages in Croatia are growing as a result of temporary positive trends in the economy, but also changes in legislation in labor taxation (Croatian Chamber of Economy, 2019b). According to Eurostat (2020h) data on GDP according to PPS for the period 2011-2019, it is evident that a more serious change in Croatia occurred only in 2019. In 2020, and later, economic trends will be determined by the global corona virus pandemic. Tisdell (2020) notes that most of the pandemics the world has faced in the past have resulted in rising unemployment and declining economic activity, and that the recovery of national economies will depend heavily on medical discoveries in COVID-19 prevention and treatment. The European Commission (2020l) notes that the recovery of the European economy will be asymmetric and that the differences in the consequences of the epidemic and the strength of the recovery in each Member State will be even more pronounced than projected in the spring forecast. Labor market and Wage Developments in Europe, Annual Review 2018) notes that Croatia is one of the European countries with nominal wage growth is below the level expected given inflation, productivity growth and unemployment rates after the global financial crisis. In future research, the topic of wage values could be extended to other countries from the group of southeastern countries - Albania, Kosovo and Macedonia and their comparison with the EU. Given the current situation of the global corona virus pandemic, future research could analyze the speed and background of the recovery of Southeast European countries in relation to the EU.

Conclusion

The dynamic of wage growth in Croatia is slower compared to countries with similar economic characteristics. In all observed countries, an increase in average net wages was recorded in the period from 2011 to 2019, however, wages are not sufficient to cover the average monthly cost of living. Croatia's GDP in terms PPPs is one of the lowest in the EU but it is the highest among the countries in the region (followed by Montenegro, Serbia and Bosnia and Herzegovina). Wages in Croatia, grew at the same rate as the EU = 10 in the pre-crisis period, they also adjusted more slowly to the contractions of economic activity. Central and Eastern European countries record wage growth that is slower than productivity growth. The levels of actual individual consumption (AIC) in Croatia, Bosnia and Herzegovina, Serbia and Montenegro generally range from 30-60% below the European average. Future economic policies will be determined by the corona virus pandemic, so it remains to be seen whether the measures taken by the states will accelerate the remediation of the consequences of the crisis in Croatia, Bosnia and Herzegovina, Serbia and Montenegro.

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Factors Affecting Customer's Online Purchase Behavior: The case study of Karachi, PK

Maria José Palma Lampreia DOS-SANTOS

Instituto Universitário de Lisboa (ISCTE-IUL), Dinâmia'CET-IUL, Lisboa, Portugal and ESCS-IPL.
mjpls@iscte-iul.pt

Nawaz AHMAD
Aveiro University, Aveiro, Portugal and IoBM, Karachi, Pakistan
nawaz.ahmad@iobm.edu.pk

Aisha Yusuf MESIYA
IoBM, Karachi, Pakistan
aisha.yousuf@iobm.edu.pk

Abstract

The main aim of this paper is to analyses the impact of consumer behavior on online shopping in order to increase the sales and respective profit and also the confidence of consumers on this process. For this purpose, an online and direct questionnaire was used in Karachi City (Pakistan) in order to analyses consumers' attitudes via unrestricted non-probabilistic sampling technique. The methods used includes univariate and econometric models, including the main dimensions of online shopping. The main results highlines confirm the importance of the dimensions attributed by the consumers while they choose to shop online, namely, delivery risk, financial risk, trust and security and web design. Therefore, marketers should ensure that all these elements are included in their source of online shopping forum. It will certainly provide them increasing sales and loyalty from consumers. Also, marketers should consider that there is minimal risk involved for the online shoppers and should develop all the software support tools to avoid fraud in order to increases the confidence of consumers on online purchase system.

Keywords: Consumer Behavior, Web Design, Convenience, Financial Risk, Non-Delivery Risk.

Introduction

The innovation of Web has changed the world and the way how organizations run the business (Greenfeld, Becker, Bornman, Dos Santos, & Angel, 2020). Nowadays, there are so many ways that customer can connect with the organization. One of the main options that are available is via *online*. Online shopping behavior can be defined as "The course of online purchasing of goods or services through e-commerce platforms" (Wai, Dastane, Johari, & Ismail, 2019). Online shopping is attracting more customers because of the time saving, comfort, and convenience available. Quick delivery is one of the main factors that differentiate online shopping with the tradition shopping (Adnan, 2014). Besides that, other authors, namely Nowadays the web has turned into a critical medium of communication and web-based shopping. The customer can now search different types of products or information about any specific product any time by using the internet. Due to the advancement in technology, the customer can now obtain a product without actually visiting the market physically. Online shopping not only acts as a platform where the consumer

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can buy products but also gain information about the product. Web-based shopping relates to the consumer's psychological state in regard to the achievement of online purchasing. Before buying an item, buyer keeps all the risks involved in the purchasing product online. It can be financial, product or non-delivery risk and web design are also psychological factors that can impact consumer's buying decision (Moshref Javadi, Dolatabadi, Nourbakhsh, Poursaeedi, & Asadollahi, 2012). The manner in which consumers perceive these risks shape their purchasing behavior, as their target is to minimize the risks to the utmost level (Donni, Dastane, Haba, & Selvaraj, 2018). If these consumers engage actively in online shopping behavior, it depicts success on the marketers' side (Satar, Safie, Dastane, & Maarif, 2019).

Consumers can easily receive the products they buy in less than 24 hours due to the fast delivery services offered now. Consumers have less trust over online sellers and for this reason they resist to shop online. These factors influence the buying intentions of the online buyers (Yu & Wu, 2007).

Although online deals have peaked as of late, there improve that customer only buys a product after proper research and on recommendations of others. Costumers sometimes search online just to get the information about the product, which does not necessarily lead to actual buy (Kim, Lee, & Hae, 2004). In Pakistan, increasing numbers of customers have started to buy a product online. Organizations need to decide the key factors that impact consumer motivation. Once the factors are determined organizations then can formulate the strategy according to it.

Product association is a critical factor that has an extensive effect on buyers' buy choices and has along these lines pulled in significant consideration from consumer behavior research. Customers tend to effectively accumulate and scatter data on items or services that they are keen on, while low-contribution shoppers don't. Item inclusion has been found to have an extensive impact on different sorts of customer reactions. (Richins & Bloch, 1983).

The relation of buyer and seller through online shopping forums is an interesting topic to discuss and evaluate. It gives a picture of potential buyers and what they choose and what sellers they reject. This insight helps how the seller can expand their business, it implies through what ways they can facilitate the buyers that can attract and retain them. The consumer first decides what he wants to purchase and then chooses from the variety of available online shopping forums where he can purchase the product of his choice. The choice of selecting the source of buying something is based on certain factors including trustworthiness of the seller, its image in the market and what is the brand-named etc. (Hong & Cho, 2011). The case study will be comprised of the youth of the city of the Karachi. We will be analyzing the shopping patterns of the people living here and particularly the youth will be focused. As the internet is most used by young people and online shopping is an increasing trend among people because they want to save time and travel hassle. Therefore, people who are leading busy lives are more prone to order stuff online rather than going for shopping themselves.

The main aim of the study is to find the importance of the factors that can impact consumer online buying behavior. It is also important to know how much these factors impact the consumer's online shopping behavior.

Online shopping, where it is convenient and comforting for the people, it also has some issues associated that we will focus on this research study. For instance, late delivery of goods, wrong goods delivery, the threat of use of information of the consumer, overcharging and getting something else instead what was ordered all are the concerns that we will address in this study.
The research questions are the following:

1) How does the convenience of online shopping impact consumer buying behavior?
2) How do financial risks impact online buying behavior?
3) How do non-delivery risks influence online shopping behavior?

4) How do trust and security issues impact online buying behavior?
5) How does website design can affect the online buying behavior?

Literature Review

The literature has identified convenience as a discrete intention to visit physically malls, general stores, and street shops. Consumers always prefer to those stores that based on time or effort saving (Nobre and Dos-Santos, 2020). Previous research suggests that convenience is a most important factor it is necessary location relate to irrelevant in the online shopping scenario online shopper may be motivated by the convenience to place the order through websites at the general public place where they can easily punch the order for home delivery any suitable time. Convenience consistency with past research regarding time and effort saving (Bellenger, Danny, & Korgaonkar, 1980). Overall convenience is defined as time and effort saving for the purchaser. Convenience is a key intention that encourages the consumer to do shopping online (Swaminathan, Lepkowska-White, & Rao, 1999). However, according to other authors to (Dos Santos, 2018 and Nobre & Simões, 2019), convenience is a not relevant item for the consumer. Based on these previous literature, convinience is not relevant for consumers of short supply chains (ex: agricultural products) or luxury goods according to Nobre & Simões, (2019).

Time and effort cut down and sellers could be found easily through E-commerce (Schaupp & Bélanger, 2005). According to another research, if we match conventional shopping to online shopping, online shopping is more comfortable due to its easy usage and convenience and it is getting more prominence in Pakistan (Nazir, Tayyab, Sajid, Rashid, & Javed, 2012). Convenience is beginning to product information and penetration it could facilitate and help shoppers to motivate an online purchase decision.

According to Katawetawaraks & Wang (2011), customers tries to find out products on online stores not only for getting products but also to catch related special discounts and offers. Bhatnagar & Ghose (2004) confirm that convenience is one of the key factors for online purchasing. But for Robinson, Riley, Ruth & Gill (2007), convenience is most of the stimulus for online buyers as it provides benefits and people can buy anytime and can deliver anywhere to their preferred places. According to these authors, accessibility provides consumers to save their time and effort and it possibly poises buyers Brand conscious and store-oriented customers it based upon their present shopping motivation. On the other hand, Rohm & Swaminathan (2004), suggested that online shoppers may convenience shoppers to save time and effort or it may be balanced buyers Brand conscious and store-oriented customers it based upon their present shopping motivation.

The topmost benefit of online shopping is convenience is referred for (Clemes, Gan, & Zhang, 2014): "People who do online shopping can identify the prices and offers old-style purchases and therefore price is considered to another important aspect of convenience for online shopping. Convenience is a key motive for shopping online and save energy to buy from nearby stores".

Usually, customers get a return of a product, repair, substitute, or refund of money. It must be free of cost, if the customers have to pay for acquiring these services then definitely, they get dissatisfied which affect the online shopping market unconstructively. It is normally observed that most of the online retailers do not let the customers examine the product before the buying process and then after the delivery of products, charge on the return or delay the process of services and make the customers dissatisfied (Kunz, 1997).

Another side online customers have apprehension about monetary loss if item they shopped online neglect to execute as they are predicting besides Shoppers might be apathetic to buy online because of another cost, for example, shipping general monetary threat has been contrarily connected with web-based shopping (Forsythe, Liu, Shannon, & Gardner, (2006) and Bhattacharjee, Salman, & Rao (1999).

As customers cannot try products before buying so they are given options like money-back guarantee which must include shipping expenditure to decrease risk. Also, they should avoid delays by working together with logistics proficiency to improve delivery channel according to Comegys, Hannula, & Váisánen (2009). The capacity by which protection is given for personal information of the customer on the website is termed as security. The data of the customer must be kept secure from unauthorized use of information or disclosure of the private items during an online transaction. Security is always taken as an important factor by any online customer. It assumes an essential part of creating trust in internet shopping condition. Security alludes similarly to two sections the information and exchange security and in addition validation of the client or user (Guo, Ling, & Liu, 2012).

Trust towards web-based shopping could be measured by the security level for credit cards, private subtle elements of the client, and wellbeing and the dependability of the site. If these elements are overlooked, then it can influence the maintenance of potential clients according to Merrilees & Fry (2003).

Security refers to safe, protected and defensive acts during an online transaction in terms of financial assets and the privacy of the personal data and information. Apparently, customers have taken online transactions as a greater risk than traditional buying trend. Risks include the immoral usage of credit card information that must be safeguard by the sellers and they must assure the minimum risk to build strong relationships with the customers to retain them and provide trust over this new trend (Bhianmani, 1996).

Hong (2015) suggested that if a product is purchased from a famous online shopping store the delivery risk could have a positive result. If the online sellers are reliable, they minimize the delivery risk amongst the consumers. Because of the good reputation of big stores, consumers feel secure from unwanted transfer matters. According to Adnan (2014), the product delivery negatively affected the customer's purchasing conduct. This author also proposed that an online seller needs to give insurance coverage to online purchasers if a thing isn't conveyed to the customer in time. One of the biggest fears in consumer’s mind is not to receive the product in time and at right address (Yeniçeri & Akin, 2013).

Due to delivery risk, many consumers don’t purchase the product online. This then motivates consumers to purchase a product by hand rather than online. Those peoples who make very few purchases online do not have the effect of delivery risk. Similarly, the one who makes a lot of purchases online does have a constructive effect on product delivery (Koyuncu & Bhattacharya, 2004).

Moshref Javadi, Dolatabadi, Nourbakhsh, Poursaeedi, & Asadollahi (2012), analyses the attitudes of Iranian consumers who shop online and to see the impact of varying perceived delivery or transferring of goods risk that is involved in online shopping. They concluded that delivery risk and financial risk has not that much of an impact on consumers. While others factors positively affected the buying behavior of online customers of Iran (Moshref Javadi, Dolatabadi, Nourbakhsh, Poursaeedi, & Asadollahi, 2012).

Psychological features that include belief recognized with the graduation of the assurance a site and safeguard the consumer’s material and data secure are referred by Ariff, Yan, Zakuan, Bahari, & Jusoh (2013). They further stated that security and trust had an essential and constructive impact on consumer’s demeanor in web-based spending. The security factor demonstrates shopper’s conviction viewing web-constructed shopping and in addition the safety of money of clients’ information that must not be compensated to a stranger in web-constructed shopping according to Roman (2007).

Monsuwe & Dellaert, (2004) defined that if the consumer trust is broken; it has a negative effect on the online shopping. Again, when there is strict vigilance of the security of the client it built a positive approach towards internet-based shopping by the consumers. In this way, trust plays an important role which serves as a psychological factor that impacts the expectation of the buyer over the internet.

Online shopping has gained spark in the past years. It disguised itself as the safest thing for the customers but most people don't feel safe while shopping online. They think that it is not a safe platform for revealing their personal information because of the virtual dealing. People find online market risky and there is uncertainty among people but however, people are getting similar to online shopping (Forsythe, Liu, Shannon, & Gardner, 2006).

According to Turkey and Rome (2019); Véreb, Nobre, & Farhangmehr (2020) and Dos Santos (2018) the purpose of shopping is more towards socializing, they like to go to different markets for shopping, interact with the people over there and want to touch the product before buying it but online shopping is opposite of it. It gives ease to the shopper but beside this, there are some trust and security issues too. People don't rely on online businesses as there is no physical appearance of it (Yörük, Dündar, Mihaela Moga, & Mihaela, 2011).

The level or intensity of trust towards shopping through online sources could be gauged through several factors including credit card information protection, personal information provided by the buyer and the dependability and protection of the online shopping source (Dos Santos, & Ahmad, 2020; Nobre, Dos-Santos, & Silva, 2020). If such elements are not clearly watched and addressed, it can lose the loyal and the probable buyers (Merrilees & Fry, 2003). The key to success for the online seller is to build the trust among consumers. Surveys show that the consumer buys a product from the online websites, which they trust the most (Jiang, Jones, & Javie, 2008).

The literature confirm that websites design may attract or prevent the customers from online shopping. A customer friendly website may attract new and existing customers. Excellency of websites also increases the customer's satisfaction.

For online shopping, Secure Web design possesses fundamental importance (Shergill & Chen, 2005). A decent web design would look after all the aspects of privacy and customer services. Buyers become a victim of fraud commonly in online shopping. Therefore, having good quality websites play a vital role in attracting the customers as they can rely on the security of the website. The first impact is created by the design of the website on consumers. Prime quality and secure website captivate more customers. Most customer's gratification and disappointment depend upon the web design features.

There is a strong relationship between companies' website and consumers satisfaction. Researchers show that the positive relationship between the authentic website and customer's relationship. The more customers are satisfied with the website the more persistently they will buy from it. The appearance of the website also counts as it shows two acute elements; entertainment and information. A strong relationship was found between online shopping and website design (Prashar, Vijay, & Parsad, 2017).

The research not just focused on the impact of post-purchase on uncertainty but also on the part of pre-purchase. For retention and satisfaction of the consumer, the company should focus on pre and post-purchase level in the decision process made by the customers, for that manager should take the design of website seriously as it is the only channel which communicates the customer with the company. Website designs do not directly play a vital role in the satisfaction of the customer but may help the customer to visualize the product more conveniently (Luo, Ba, & Zhang, 2012).

To appear on the market, it is necessary for the online businesses to have their own website. The superior quality of website differentiates the company from others. It is the first interaction of the customer to the company, so, it has to be faultless. User-friendly websites play a vital role in attracting and retaining the customers (Kalia, Kaur, & Singh, 2014). For the online business, the website is the only way through which they sell their product to the end user. Indeed, depth information should be provided in the websites to clear

any type of confusion in the mind of the users. By providing good services through websites companies can attract more people and can be successful in changing the perception of doubtful quality of the product.

Consumer Behavior

Consumers use many different channels that are uncontrollable by the manufacturers and retailers (Nobre & Simões, 2019). However, there is a must needed redesign of the traditional marketing strategies to be made. All modern technologies have become modified and the internet has changed our way of shopping (Edelman & Singer, 2015).The issue that consumer has with online shopping is they hesitate due to the inability of touching the product (Choudhury & Dey, 2014).

Shopping has moved from offline to online and it is evident that stores are closing down (Cuong, 2020). Quality, trust, customer's income, security and delivery risks are such factors that emphases consumer towards online purchasing. People find online shopping more easily than traditional shopping. Online shopping does not only save time but gives a platform from where the consumer can compare product easily. However, the perceived risks associated with online transactions hold more significant and detrimental influence on consumers' shopping behaviors as compared to offline or traditional means (Li et al., 2020). There is a factor in product customization that is not much appreciated by the respondents. In a nutshell, high security during transaction should be given to the customer in order to create loyalty in them towards the company. According to the research, there are 3 big causes "fear regarding security"," poor navigation" and "inconvenience" that are creating hurdles in changing the minds of people from traditional shopping to online shopping (Vaghela, 2014).

Based on the literature the present paper presents the following hypotheses:

H1: Convenience in online shopping has no impact on the online buying behavior of the consumer.
H2: Financial risks have no impact on consumer's online buying behavior.
H3: Non-delivery risks have no impact on consumer's online buying behavior.
H4: Trust and security issues have no impact on consumer's online buying behavior.
H5: Website design has no impact on consumer's online buying behavior.

Methodology

To find the relationship between convenience, financial risks, non-delivery risks, and website design and trust and security issues on online consumer's online buying behavior of Karachi, following theoretical framework is used.

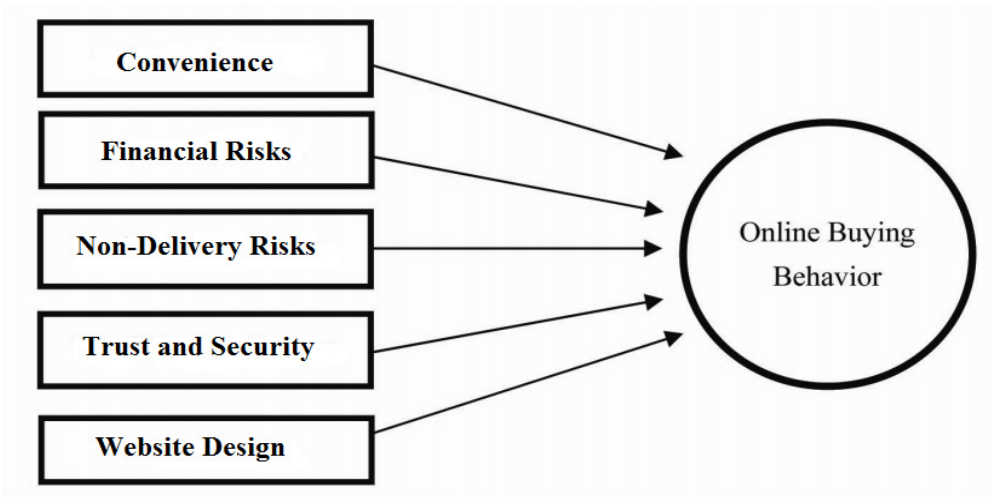

Figure 1: Theoretical Framework

Source: Results of authors (2020).

The paper determines the impact of different factors (convenience, financial risks, non-delivery, trust and security and website design) on the online buying behavior of the consumer.

Quantitative research was conducted to analyses the impact of factors on the online buying behavior of the consumer. To meet the objective of the study, primary data was collected through a direct and online questionnaire in Karachi. The Likert scale questionnaire was used to find the relationship between dependent and independent variable. It consisted of 28 questions and the response rate was about 90 %.

The sample of population consisted of those people who are frequent online shoppers and are of the middle-middle class, middle-upper class, lower-upper class and middle-upper class. Moreover, the geographical location used for this study duly comprises of Karachi, Pakistan. A total of 390 sample size was taken and convenient sampling technique was used. These also included students (from different universities of Karachi), housewives, teachers, businessman, and employees.

The model used the multiple regression model (*1*) to identify the impact of different variables on online consumer buying behavior.

$$Yij = \alpha + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \beta_3 X_3 ij + \beta_4 X_{4ij} + \beta_5 X_{5ij} + \theta \qquad (1)$$

Where,

Yij= Online buying behavior of the consumer.

X_{1ij}= *Convenience.*

X_{2ij}= *Financial Risk.*

X_{3ij}= *Delivery Risk.*

X_{4ij}= *Trust and Security.*

X_{5ij}= *Website Design.*

α and β= Coefficients for i consumer *and j* period of time and error *θ.*

The econometric analysis was done in SPSS version 23 and EViews version 11..

Results and Discussion

The main age of consumers was between 21 to 30, which is almost 63.1% of the sample size. More female respondents participated in this study compared to male. Moreover, the respondents include a slightly higher percentage of unemployed and unmarried people.

Table 1: Socio-demographic characteristics of respondents

Socio-Economic Characteristics		Frequency (number)	Percent (%)
Age (years)	Under-20	123	31.5
	21-30	246	63.1
	31-40	17	4.4
	41-50	1	.3
	51+	3	.8
Gender	Female	221	56.7
	Male	169	43.3
	Other	0	0
Marital status	Single	337	86.4
	Married	48	12.3
	Divorced	5	1.3
	Other	0	0
Employment	Unemployed	285	73.1
	Employed	105	26.9
	Total	390	100.0

Source: Results of authors (2020).

The Cronbach's Alpha value of convenience is 0.727 which is greater than 0.6, which shows the reliability of the variable.

Table 2: Cronbach's Alpha value

	Cronbach's Alpha	Number of Items
Convenience	.727	5
Financial Risk	.805	4
Non-delivery Risk	.689	3
Trust & Security	.738	4
Website design	.819	4
Consumer Behavior	.727	4

Source: Results of authors (2020).

There is a statistically significant relationship between consumer behavior and convenience, financial risk, delivery risk, trust and security risk and web design in online shopping. Because sig value is less than 0.05.

Table 3: Correlation Analysis

		Convenience	Financial Risk	Delivery Risk	Trust Security	Web-Design	Cons_Behav
Convenience	**Pearson Correlation**	1	.062	-.003	.069	.299**	.340**
	Sig. (2-tailed)		.222	.950	.172	.000	.000
	N	390	390	390	390	390	390
Financial Risk	**Pearson Correlation**	.062	1	.229**	.370**	.212**	.331**
	Sig. (2-tailed)	.222		.000	.000	.000	.000
	N	390	390	390	390	390	390
Delivery Risk	**Pearson Correlation**	-.003	.229**	1	.228**	.037	.229**
	Sig. (2-tailed)	.950	.000		.000	.462	.000
	N	390	390	390	390	390	390
Trust Security	**Pearson Correlation**	.069	.370**	.228**	1	.152**	.364**
	Sig. (2-tailed)	.172	.000	.000		.003	.000
	N	390	390	390	390	390	390
Web-Design	**Pearson Correlation**	.299**	.212**	.037	.152**	1	.365**
	Sig. (2-tailed)	.000	.000	.462	.003		.000
	N	390	390	390	390	390	390
Cons_Behav	**Pearson Correlation**	.340**	.331**	.229**	.364**	.365**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	390	390	390	390	390	390
**. Correlation is significant at the 0.01 level (2-tailed).							

Source: Results of authors (2020).

There is a statistically significant relationship between consumer behavior and convenience, financial risk, delivery risk, trust and security risk and web design in online shopping. Because sig value is less than 0.05.

Table 4 presents the results of regression analysis. The simple correlation is .574, which shows a moderate degree of correlation. About 32.1% variation in dependent variable (Consumer behavior) can be explained by Independent variables (web design, delivery risk, trust and security, convenience and financial risks).

Table 4: Results of Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.574[a]	.329	.321	.677

a. Predictors: (Constant), Web-Design, Delivery_Risk, Trust_Security, Convenience, Financial_Risk
Source: Results of authors (2020).

Table 5 presents the ANOVA analysis and indicates the significance of the model. Since the sig value is less than 0.05, the model is statistically significant.

Table 5: ANOVA Results

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	**Regression**	86.356	5	17.271	37.712	.000[b]
	Residual	175.861	384	.458		
	Total	262.216	389			

a. Dependent Variable: Cons_Behav

b. Predictors: (Constant), Web-Design, Delivery_Risk, Trust_Security, Convenience, Financial_Risk

Source: Results of authors (2020).

Table 6: Results of Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.431	.218		1.975	.049
	Convenience	.233	.041	.250	5.709	.000
	Financial_Risk	.135	.040	.155	3.356	.001
	Delivery_Risk	.115	.037	.135	3.109	.002
	Trust_Security	.180	.037	.225	4.926	.000
	Web-Design	.199	.041	.218	4.866	.000

a. Dependent Variable: Consumer Behavior

Source: Results of authors (2020).

The equation of the regression will be:

Consumer Behavior = .049 + .233(Convenience) + .135(financial risk) + .115(delivery risk) + .180(trust and security) + .199(Web design).

Table 7 refers the results of hypothesis evaluation. The results highlines confirm that all the hypothesis from H1 to H5 was rejected. All the five hypotheses have been rejected that implies that all the factors studied have an impact on consumer buying behavior.

Table 7: Hypothesis Assessment Summary

Hypothesis	Sig value	Retain or Rejected
Convenience in online shopping has no impact on online buying behavior of the consumer.	.000	Rejected
Financial risks have no impact on consumer's online buying behavior.	.001	Rejected
Non-delivery risks have no impact on consumer's online buying behavior.	.002	Rejected
Trust and security issues have no impact on consumer's online buying behavior	.000	Rejected
Website design has no impact on consumer's online buying behavior.	.000	Rejected

Source: Results of authors (2020).

H1: Since p-value = .000, which is less than .05. Therefore, convenience in online shopping has an impact on consumer's online buying behavior. That means one unit change in convenience in online shopping will brings .233 unit changes in consumer's online buying behavior.
H2: Since p-value = .001, so, financial risks in online shopping have an impact on consumer's online buying behavior.
H3: Since p-value = .002, delivery risk in online shopping has an impact on consumer's online buying behavior and the hypothesis was rejected.
H4: Since p-value = .000, which is less than .05. So, trust and security issues in online shopping have an impact on consumer's online buying behavior. One unit change in trust and security issues in online shopping will bring .180 unit changes in consumer's online buying behavior.
H5: Since p-value = .000, which is less than .05. Therefore, web design has an impact on consumer's online buying behavior. One unit change in web design will bring .199 unit changes in consumer's online buying behavior.

Discussion

Convenience in online shopping has a direct impact on consumer's online buying behavior. This study also relates to the (Iqbal, Rehman, & Hunjra, 2012) that convenience in online shopping is one of the main variables. Different variety of products available online, availability of product 24/7 helps consumers to save time and traveling cost. The risks involved in online shopping like trust and security, financial risk, non-delivery risk can impact consumer's behavior online. In studies conducted by (Iqbal, Rehman, & Hunjra, 2012), (Nazir, Tayyab, Sajid, Rashid, & Javed, 2012) stated that consumer show reluctance in buying products online because of these risks. Web design of the online website shows an impact on consumer's attitude towards online shopping. A study conducted by (Lee & Lin, 2005) also showed the impact of web design on consumer buying intentions. Marketers can change the consumer attitude towards online shopping by increasing the convenience in online shopping and by improving the web design of the page but also keeping in mind all the perceived risks (financial risk, delivery risk, trust and security risk) involved in the online shopping.

Conclusion

The main results confirm that for online consumers' convenience, delivery risk, financial risk, trust and security and web design all are of importance while they choose to shop online. Therefore, marketers should ensure that all these elements are included in their source of online shopping forum. It will certainly provide them with higher sales and more loyal consumers. Also, marketers should consider that there is minimal risk involved for the online shoppers. Furthermore, there must be enough variety of products offered by one's online shopping site so that consumers can select out of the many different options. However, there must be easy exchange or return policy procedures defined by the online sellers as this facilitates the shopping patterns of the consumers. In this fast-moving world and in the era of tough competition marketers should also design their shopping platform in a way that is attractive and easy to use for the consumers so that they retain as their regular customers.

Therefore, it should be of integral importance for the marketers when they are launching an online business. It portrays that consumers focus how easily and without hassle, they can receive any product, their money is safe during transactions and they won't be overcharged or being tracked by the scammers during this process. Their personal information should be taken care of by the seller source in order not to be exploited by any scammer. Consumers are also concerned about the product safe reach to their doorstep; therefore, this should be taken care of by the online sellers. Also, the designing of the website or any other source of online shopping should be designed in a way that is lucrative for the shoppers and is user-friendly.

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The Breakthrough Technologies of a New Generation Are the Basis of An Innovative Method of Social Reproduction in Russia

Victor N. Potekhin

Candidate of economic sciences, The Urals State Agrarian University,
Ekaterinburg, Russia, e-mail: vnp1@ya.ru

Abstract

The article considers the requirements and characteristics of new-generation breakthrough technologies as the basis of a new – innovative method of social reproduction. They will provide a multiple increase in labor productivity, quality improvement of working conditions, life and well-being of the entire population of the country. On their basis, humanity will create technological, economic and basic environmental conditions for the preservation and sustainable development of civilization on Earth.

Keywords: Innovative Reproduction, Breakthrough Technologies of a New Generation, Innovative Method of Social Reproduction, Sustainable Development of Civilization on Earth.

Introduction

The history of the evolution of civilization and the constantly increasing systemic crises of the world community over the past 50 years confirm the inevitability of the transition of leading countries, and with them other countries, to a new cycle of renewal of social production. This new cycle is called an innovative production method [1]. An innovative method of reproduction is a qualitatively new set of interacting productive forces, production, superstructure and environmental relations, based on a radically new scientific, socio-economic, scientific and technical, educational, information, management base, and environmentally friendly technologies that ensure the implementation of the idea of sustainable development of society and civilization without crises and losses.

The essence of the innovative method of social reproduction

The innovative method of social reproduction involves:

- a qualitatively new scientific base for research and use of all breakthrough domestic and foreign developments in science and practice, including cinetronic supertechnologies, for the entire previous period of the history of human development. It provides a concentrated, comprehensive in a short time, the accelerated implementation of the Second industrialization in Russia, and then on the basis of cinetronic supertechnologies the creation of material-technical, socio-economic, natural, environmental, scientific-technical, educational, moral and spiritual and other prerequisites for sustainable development of the entire population on Earth [2; 3];
- transition to a qualitatively new humane model of human and social life - "Each person is the master of his life", to the advanced development of fundamentally educated and professionally trained personnel of all categories on a new scientific basis, who possess a system-integrated methodology for understanding the phenomena of nature and society, and have a harmonious high level of spiritual, moral, physical, cultural and professional development;
- breakthrough and cinetronic supertechnologies (CST), environmentally friendly and humane production of household and personal consumption;
- new generation information technologies using artificial intelligence;
- effective management systems based on a new generation of information systems at the levels of management, providing universal synergy with the plus sign;
- multiple growth of social labor productivity;
- growth of welfare and cardinal improvement of living conditions of the entire population of the country to the level of comfortable, humane, harmonious;
- environmentally friendly technologies and 100% reclamation of man-made waste and the natural environment;

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- a General civilizational approach, and with it taking into account the totality of common goals, interests, needs, and opportunities for further growth of each person, society, and the world community of the planet Earth;
- significant increase in the budget structure of social time in the proportion of useful cost-benefit and a corresponding decrease in the proportion of useless, harmful, loss cost results in the structure of social time budget [1].

The innovative method of social reproduction completely excludes: aggressive approaches and concepts of the "new world order", "golden billion", "order from chaos-controlled chaos", "liberal-democratic reforms and restructuring of the social system"; absolutization of the role of the market in regulating social production; degradation of the development of the population of Russia and the countries of the world community using various explicit and hidden methods of socio-economic, organizational-political, religious, environmental, military, etc. order and with all the resulting negative consequences.

To fully understand the essence of breakthrough technologies that make up the scientific and technological base of an innovative production method, it is necessary to recall the types (groupings) of technologies known to mankind:

- first group. Traditional technologies and groups of traditional technologies are distinguished by the degree of mechanization, automation and complexity. Moreover, the efficiency is about 0.16-0.3 of the unit;
- second group. There are breakthrough technologies based on individual physical effects of materials (for example, the so-called nanotechnologies) and their combination, on the properties of living organisms, etc., aimed at solving the problem of multiple increases in labor productivity, product quality, environmental cleanliness of production and the environment with high efficiency and EC (efficiency coefficient), close to one, but used only in individual industries and very rarely encountered in practice;
- third group. Qualitatively new cinetronic supertechnologies based on the constant use of the effect of basic physical particles in the conditions of Brownian motion of Chaos, aimed at creating hybrid cinetronic and optimizing all types of technologies into complex multifunctional modules, based on the holistic knowledge and systematic use of universal fundamental laws in practice, are distinguished – energy conservation, power conservation, cinetron pulse, golden ratio, energy information potential conservation, and others that reflect all types of movement of inanimate and living matter, the possibility of conducting public production with very high efficiency, quality, reliability, environmental cleanliness, do not violate or impoverish the natural environment in general, and provide comfortable living conditions for civilization on Earth [3; 4; 5].

Moreover, if traditional technologies are based on electromagnetism, on individual physical effects, then cinetronic supertechnologies are based on the widespread and constant use of the movement of the smallest particles, physical and socio-economic effects of the flow of Brownian Chaos, which excludes harmful effects on humans and the environment in the production and management of production. An example is the work of N. Tesla on energy.

The integration of cinetronic supertechnologies and other alternative technologies based on individual physical effects, etc. into unified complexes and systems is designed to form the scientific and technological core of using new-generation breakthrough technologies in public production in modern conditions – the basis for innovative development of Russia and the entire world community.

The most important objective characteristics of new-generation breakthrough technologies are the coefficients:

- the efficiency coefficient (EC) of the society in nature, including the tools used by it (the society), objects of labor, means of labor – means of production, production and superstructure relations, expenses for restoring the environment, from diseases, etc.;
- efficiency of machinery, equipment, machinery, technology, and other technical systems;
- the coefficient of reproducibility of natural resources (CRNR) used in public production.

They (the specified coefficients) reflect the effect of general and socio-economic laws in social production and give an objective picture of the state of affairs.

Until now, the scientific and practical literature has not developed requirements and criteria for such breakthrough technologies of a new generation, and they have not received legislative consolidation in regulatory legal acts and state standards. Accordingly, such breakthrough technologies, in our opinion, should meet the following set of criteria:

- maintaining the heat balance in nature, increasing the share of renewable and reducing the share of non-renewable energy and natural resources at the first stage to 62% and 38%, at the second-to 100% and 0%, respectively;

- high degree of technical, socio-economic and environmental efficiency of breakthrough technologies (efficiency, EC and CRNR (coefficient of reproduction of natural resources), close or more units, 100% ecological purity);
- high degree of organization of society and production through a multiple increase in the share of utility costs-results, positive implementation of the provisions in the budget structure of social time and its links simultaneously, an adequate decrease in the proportion of useless, harmful, loss cost results;
- multiple increase (in 2 – 8 times) of useful expenses-results in the budget of social time of society and its links;
- multiple (corresponding) reduction of losses, useless and harmful costs-results in the social time budget of the society and its links;
- multiple growth of social labor productivity;
- multiple reduction of production costs and saving of all types of resources;
- environmental cleanliness of production, use of man

The widespread introduction and use of advanced technologies of new generation, providing an innovative path of development and implementation of scientific and technological breakthrough, involves going on a qualitatively new level of scientific productivity, socio-economic, cultural, environmental activities economic complex of Russia, which makes it inaccessible to other states and their enterprises, developing on the basis of theories of the "golden billion", "order out of chaos", "competitive advantage", "liberal-democratic" state-monopoly system, crisis management and other similar concepts.

There are opportunities to implement such a scientific and technical breakthrough-the Second industrialization (as a form of transition to an innovative model of development – an innovative method of production) in Russia. It has the necessary scientific, technical, resource and human resources that can implement complex implementation of breakthrough technologies in all other areas of public production in a historically short time and in a concentrated manner, most of which will not become obsolete for another 50-75 years.

This will determine the strategy of socio-economic, scientific and technological development of Russia and the geopolitical development of the world civilization of the XXI century on a qualitatively new system of goals, principles, criteria and management mechanism.

The most important problem of the implementation of this technological breakthrough – the Second industrialization in Russia-is the dead-end ideas that have developed among would-be leaders about the forms and ways of technical re-equipment of industry, agriculture and other areas in the country. The prevailing traditional opinions and experience of "modern managers" to purchase foreign equipment and technology 10 or more times more expensive than a similar domestic one – with personal benefit for themselves-lead to the fact that the ratio known for extensive production remains: ensuring a 2-fold increase in labor productivity requires an 8-fold increase in investment costs. Purchased imported equipment and technologies increase labor productivity, as a rule, by 10-30%. Hence, the investment costs will be 8 times more, plus an increase of another 10 times, taking into account the prices of foreign equipment and spare parts, a total of 80 times. Is such equipment and technology worth the cost? Moreover, this technique and technology are quite old. They are usually produced for more than 40 years. This automatically determines the lag in quality and cost, and implies high costs for the products of Russian enterprises in the domestic and foreign markets.

The accelerated introduction of new-generation breakthrough technologies will allow changing the above-mentioned ratio between labor productivity growth and investment almost completely to the opposite: labor productivity will increase by 6-8 or more times, while investment will only increase by 1.5 – 2 times. As a result, government and domestic business spending on technical re-equipment of industry and other spheres of life will be significantly reduced.

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Monitoring A Company's Performance by Analyzing Key Performance Indicators and Developing A Dashboard

Ionuț Costinel NICA
Bucharest University of Economic Studies, Bucharest, Romania
ionut.nica@csie.ase.ro

Simona Liliana CRĂCIUNESCU (PARAMON)
Bucharest University of Economic Studies, Bucharest, Romania
liliana.craciunesc@gmail.com

Daniela ALEXANDRU
Bucharest University of Economic Studies, Bucharest, Romania
daniela.alexandru195@gmail.com

Ștefan-Andrei IONESCU
Bucharest University of Economic Studies, Bucharest, Romania
stefion09@gmail.com

Abstract

Economic activity is the main concern of society and it takes place in enterprises that use resources and become sources of wealth for the same society. The main goal of any business/enterprise, regardless of its form, has been to make a profit and gradually improve it. This is only possible through cost control and revenue growth, which is directly linked to the constant adaptation to market demands. Managing the company's activity and analyzing the level of performance are essential to have financial stability and a competitive advantage. Performance analysis techniques have a special role in following the evolution of the company and determining the problems in the processes. Thus, the company manager can set standards of excellence and ensure that they are met. The use of these methods ensures that appropriate decisions are taken to reduce costs and maximize profits. This paper aims to identify the main methods and techniques of enterprise performance analysis and proper data management, and the case study is focused on Carrefour, with the aim of studying the main key performance indicators and identifying problems. The own approach of this research consists in identifying the most important key performance indicators from the financial perspective for the elaboration of a dashboard at the level of the Carrefour organization. It could contribute to a change in the way of analyzing and investigating performance, by intervening in time on the analyzed indicators when they no longer perform.

Keywords: KPI, Dashboard, logistic regresion, performance analysis techniques;

Introduction

Currently, the enterprise has a special role in the economy, the ability of the entrepreneur being a very important neo-factor of production. Western entrepreneurship and technological progress have sprung up for centuries, with a positive influence on the world.

The basic context for the emergence of the enterprise is considered to be composed of constants such as money, accounting for the calculation of earnings, credit and basic contractual formalities.

The company's origins date back to the 16th century in India, when there were certain groups of merchants and artisans who played an important role in trade. The importance of traders grew in medieval Europe. Trade began as a profitable exchange between individuals and households, gradually growing in an organized form. Since the 1980s, organizations have replaced typewriters with computers to perform certain tasks, such as processing fees. During this

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period there was a rapid increase in the outsourcing of goods and services, while firms sought new ways to reduce costs and increase efficiency.

The end of the twentieth century was marked by a rapid transition from mechanical to digital, with new technologies being used more and more, and at the same time the Internet would become a platform with a major impact on world trade. It significantly changed the way businesses operated and began to be used as an important aspect of a stable business model, through which reservations could be made for means of transport or banking.

The 21st century has meant the development of new technologies with a role in the outsourcing of administrative services, thus creating a new branch of service companies, now a competitive industry. The company has evolved in direct proportion to technology, leading to the facilitation of operations through digitization, the result being an increase in the complexity of how the company operates.

The article is structured in three main chapters that combine the theoretical elements with the practical ones, considering the efficient management of the activity and the monitoring of the performance using certain instruments later transposed in a dashboard.

The first section looks at the evolution of the company and how it was born, as well as the role of knowledge in achieving performance. Theoretical aspects of managing large volumes of data and in-depth understanding of the activity are also described. Also, in this chapter is analyzed the composition of the supply chain of a company and its importance in terms of consumer satisfaction.

The second chapter presents at a theoretical level the analysis of performance in terms of efficiency, effectiveness and adaptability. This chapter highlights the most important methods for obtaining a clear picture of the entire business and increasing customer satisfaction. At the same time, the key performance indicators that underlie the diagnosis of the company's economic activity are described, as they have an essential role in measuring progress. Also, the methods through which forecasts can be made are detailed, some of them based on mathematical elements.

The last section contains the case study on the Carrefour company, having as objective the analysis of the performance and the identification of the problems using the key performance indicators. The analysis was performed over a period of eight years (2012-2019), using as a forecasting method the logistic regression starting from financial indicators. In addition, in order to have an overview of the entire activity, a performance dashboard will be created.

The key performance indicators (KPIs) considered were used to track the evolution of the company from several points of view such as the ability to use capital efficiently and make profitable investments. On the other hand, the degree of indebtedness and the ability to fulfill one's obligations are monitored. The results of the scoreboard analysis were used to identify the level of financial stability and the degree of risk in the last eight years.

Enterprise, big data and the role of knowledge in the enterprise

At present, the enterprise has a special role in the economy, the ability of the entrepreneur being a very important neo-factor of production. Western entrepreneurship and technological progress have sprung up for centuries, with a positive influence on the world.

The basic context for the emergence of the enterprise is considered to be composed of constants such as money, accounting for the calculation of earnings, credit and basic contractual formalities.

The notion of knowledge-based organization was born in 1984-1988, being “a community of workers with design work, interconnected through a computerized infrastructure” (Holsapple C.W., 1987). A knowledge-based enterprise is focused on using and integrating knowledge to achieve performance, and resources are mainly focused on learning. Within such a company there are many opportunities for employees to learn, which are non-existent in a traditional company.

The main aspects of the knowledge-based organization are the knowledge fund, which is considered a main resource of the organization, with an important role for its performance and intellectual-intensive processes, essential for the functioning of the enterprise and achieving its objectives.

A knowledge-based enterprise has four essential dimensions:

1. Process - consists of activities carried out within the company, some of which are related to the production or sale of a product. A knowledge-based organization is focused on two interconnected processes, which support the core activities: the efficient use of existing knowledge, and the creation of new knowledge.
2. Place - refers to the boundaries of an enterprise that, for the purpose of sharing or creating knowledge, can cross traditional legal boundaries.
3. Purpose - includes the mission and strategy of the company, starting from the premise that the main strategic resource is knowledge.
4. Perspective - a knowledge-based enterprise is oriented more towards the exploitation of knowledge than towards the sale of products, knowledge being applied in any aspect of the activity.

Knowledge and organizational culture are strongly linked, and improving the way a company creates and implements knowledge could not be achieved without a simultaneous change in culture.

In its basic form, knowledge is a combination of information and the human context that enhances the capacity for action. The first dimension of knowledge can be seen at the individual, group or organizational level. The second dimension includes explicit and implicit knowledge, or structured and unstructured. Explicit or structured knowledge can be found in documents, databases and processes, and implicit or unstructured knowledge is dependent on context and personal experience.

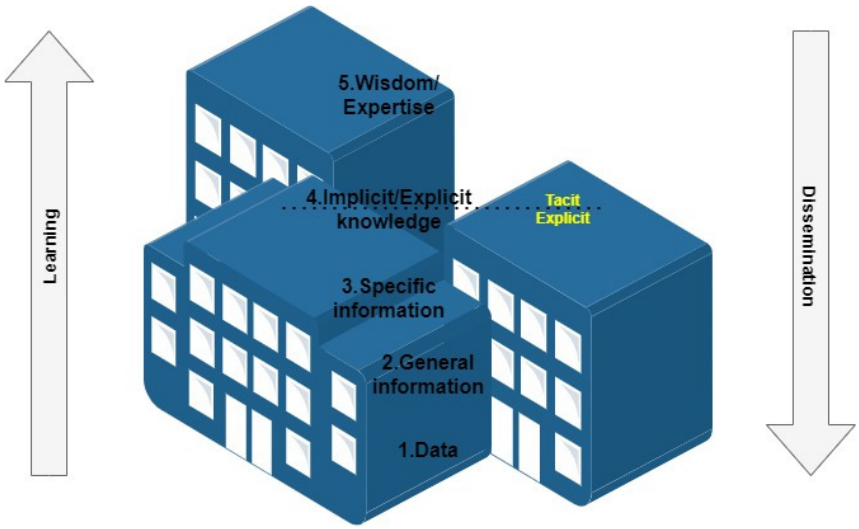

Figure 1: The hierarchy of knowledge

Knowledge management helps the company find, select and organize important information for problem solving and decision making. It addresses issues of organizational adaptation and survival in the context of discontinuous environmental change.

Organizational culture is an important aspect in promoting knowledge sharing and creation. It can be described by values, norms and practices. Values highlight the beliefs of members of an organization about what should be done, indicating preferences for a specific outcome or behavior. The rules are common views on how members should behave or how to perform their tasks. Practices include the formal or informal routines of the organization to achieve its goals, such as implementation processes or group meetings.

Culture has a mediating role in the relationship between knowledge at the individual level and at the organizational level, creating the context for social interaction. It also has a significant role in the efficient management of knowledge. Knowledge shared and maintained within the enterprise has a key role to play in productivity and process improvement. Knowledge management aims at the simultaneous development of each component within a company, such as staff, equipment, space.

Big Data refers to the large volume of data that is difficult to manage, which requires the use of various technologies in order to obtain information. The term "Big Data" was coined to differentiate the abundance of unstructured data, machine-generated data from ordinary data that has been generated by transactional systems for many years. Unstructured data is represented by documents, photos, videos, social media, while structured data comes from relational databases, company resource planning, customer relationship management.

The McKinsey Global Institute predicts that the volume of data will increase by 40% per year (James Manyika, 2011). Although the volume of data is often the most visible parameter, there are other issues that matter. The four characteristics that define Big Data are:

- Volume: Represents the amount of data generated, the volume of data can reach unprecedented levels. It is estimated that 2.5 quintillion bytes of data are generated every day, with large companies having terabytes or petabytes of data stored on devices or servers. This data is used to shape the future of an enterprise and its activities, while monitoring progress.
- Speed: Social media data produces a large flow of valuable opinions for the customer relationship. Facebook users upload more than 900 million photos in a single day. Speed is directly related to the entire data infrastructure in managing and delivering data to recipients as quickly as possible.
- Variety: Variety in Big Data refers to structured and unstructured data that can be generated by either humans or machines. The most frequently added data are txt structures, tweets, videos and images. Variety involves the ability to divide the data received into various categories.
- Truthfulness: refers to an uncertainty of available data, preventing companies from reacting quickly and finding appropriate solutions. The main problem in such a large data environment is accuracy. For a better data use strategy, the data must be organized according to groups, value and significance; data needs to be clean, consistent and consolidated.

Big Data analysis can be used to discover certain opportunities that are not obvious at first glance; many companies extract large amounts of data in order to find out hidden information that was not previously available to them.

In order to capitalize on everything related to a large volume of data, it is necessary to structure all non-structured data, and this can be done by using approaches to decipher the meaning of unstructured data and group them according to important areas, such as customer, product, market, company, etc. The next step is to perform a predictive analysis by extracting templates from the data and using them to predict possible future trends. Because they cannot be determined exactly, probability intervals can be useful in regulating resource implementation decisions and setting expectations.

Following the predictive analysis, the future requirements of the market can be identified, thus managing to attract a larger number of consumers. Big Data also allows you to profile customers and engage in a real-time conversation with them. For example, when a customer enters the bank, the official can check his profile, finding out his preferences, using this information to recommend the relevant products and services for that customer.
The tools in this field allow the mapping of all data within the company and the analysis of all internal threats. Thus, sensitive information can be kept secure in accordance with regulatory requirements. Security and data protection are indispensable in financial organizations.

Methods for measuring the performance of an enterprise

Regarding the analysis of a company's performance, as well as its competitiveness in the market, three dimensions can be identified: efficiency, effectiveness and adaptability.

Efficiency assesses the proportion of limited resources used in the production process to achieve a certain result. This concept is based on the terms inputs and outputs, an efficient enterprise being the one that results in as much volume as possible using a limited amount of inputs. Efficiency is not a measure of market success, pursuing productivity and minimizing costs.

Effectiveness is determined by the degree to which the result obtained is in line with the proposed objective. It is also closely linked to the means adopted by each company to generate sustainable growth in the business environment.

Adaptability involves analyzing changes in efficiency and effectiveness that have occurred as a result of a change in the company's environment.

An important aspect is also the focus on efficiency and neglect of effectiveness result in temporary profitability. On the other hand, considering only efficiency has the effect of lack of profitability given that the opportunity cost of capital is higher compared to the profit obtained.

Efficiency involves financial discipline as well as control over working capital, while efficiency requires the ability to adopt the appropriate means for sustainable growth, being directly proportional to the firm's access to and differentiation from other companies' private resources.

Businesses apply various methods to increase both the level of efficiency and effectiveness. More and more companies have taken over the organization of staff in teams as a technique to increase performance, being considered a key element for increased efficiency. It was also tried to identify the bases of effectiveness starting from the nature of teamwork. Cloud computing has proven to be a tool with many advantages in terms of efficiency through easy document sharing and active collaboration, while reducing certain costs.

In order to be considered competitive, a company must use its resources to produce the appropriate, quality goods, setting an appropriate price. In the long run, competitiveness is measured by the company's ability to continue its business and protect its investment, generating its profitability. Productivity is considered a determining factor for a company's competitiveness, along with profitability and participation in the internal and external market.

Productivity is the result of the interaction between organizational management and external factors, constituting the ability to transform the inputs used into products. In economics, this is the rationale of what is produced and what resources are needed for that production, which is measured by comparing inputs and outputs. Productivity measurement is reflected in changes in production efficiency. Also, in order to increase the company's productivity, it is recommended to identify and analyze inefficient resources, so as to reduce unnecessary expenses. In highly productive organizations a direct link can be seen between productivity and competitive advantage.

Customer Relationship Management

Customer Relationship Management is a business strategy that involves understanding, anticipating and managing customer needs, in order to maintain long-term mutually beneficial relationships. This is a shift from traditional marketing that focuses on retaining current customers and attracting others. A CRM tool creates a simple interface for a data collection, so that the company can communicate with consumers in an accessible way.

The objective of this strategy is to create value for both buyers and the company in the long run, offering the opportunity to have a competitive advantage over companies in the market that offer similar products and also an increase in profit.

Customer relationship management helps companies find out useful information about them, such as the category they belong to and why they buy products, forecasting purchasing trends. Thus, the needs that need to be met later can be anticipated. By organizing customer data, the appropriate selection of recipients for promotions and new products is ensured.

Another advantage of this concept is the increase of efficiency by automating certain aspects such as sales processes and marketing campaigns, allowing the structuring of processes into simpler data.

The main types of customer relationship management are: operational, analytical and collaborative.

Operational CRM focuses on automating and improving processes based on customer relationships, being suitable for companies with a shorter sales cycle and e-commerce.

Analytical CRM specializes in analyzing information about buyers, determining their behavior and market trends. It uses data mining techniques, being suitable for companies in a market with high prices and many competitors.

Collaborative CRM involves sharing information with external companies, by combining data, being possible to increase customer satisfaction. It is suitable for markets where innovation and the development of new products are essential for success.

Technology has an important role in customer relationship management, involving the use of databases and data mining techniques. The benefits are reduced costs by increasing effectiveness and efficiency, making a long-term profit and maximizing opportunities.

Dashboard

A dashboard is an information management tool that analyzes, selects and displays key performance indicators (KPIs) to identify the situation of the company and the synthesis of the activity carried out. It offers the possibility to monitor in real time and increase the performance, thus reducing the analysis time.

Dashboards can make it easier to view data and share key information both internally and outside the company. They also contain predictive analyzes, determining trends and patterns. Thus, it can be useful for strategy, planning and analysis.

The main features of a dashboard are:

- Synergy- A visually efficient and ergonomic design is needed to be able to synthesize certain information from a single view.
- Accuracy - The information captured must be accurate in its entirety, the rendering of economic processes must be accurate, and their transmission in real time.
- Flexibility- The structure can be adjusted according to the changes.
- Accessibility- The information must be configured so that it can be used quickly and meet predefined thresholds.
- News- Data display must be done in real time for effective decisions.

The elaboration of a dashboard can be done in four stages:

1. Identifying problems and determining objectives- Choosing key data and performance indicators to be highlighted in the dashboard.
2. Determining end-users and establishing a plan- Identifying information that is relevant to the end-user and that directly influences the objective.
3. Selection of appropriate indicators - Selection of the most relevant indicators in terms of assessing the outcome of actions.
4. Drawing up the dashboard - Using ways that allow a good view of the indicators, so that the message is communicated effectively.

Dashboards can be of three types: operational (allow supervisors to monitor operational processes), tactical (allow analysis of processes in each department) and strategic (monitor progress towards the proposed objective).

The advantages of dashboards include: real-time monitoring of changes, centralization of all data in one place so that they can be accessed by all users, forecasting based on current trends and identifying negative trends.

Dashboards can be made for each department of the company, such as: legal, IT, financial, human resources, accounting, marketing.

Balanced Scorecard

Balanced Scorecard is a method of aligning the company's activities with the vision, while evaluating performance. It is also a mechanism that can be used to implement the strategy, defining important success factors.

This technique can be used to improve organizational performance, focus on strategy and results, and communicate vision and strategy appropriately. Scorecards consist of quantitative components, both visual (tables, graphs) and symbolic (key performance indicators).

The Balanced Scorecard model includes viewing the business from four perspectives:

- Financial- Satisfying the requirements of shareholders and creating value. Examples of measures: economic added value, cash flow.
- Internal business processes - The quality of internal processes, establishing the desired level of productivity. Includes measurements in terms of innovation, activities (quality, time, cost) and after-sales services.

- Development and innovation- Engaging all intangible resources in order to improve critical processes. Includes measurements in terms of staff (training, skills) and system.
- Customer- Satisfying customer needs. Examples of measures: customer satisfaction, profitability, market share.

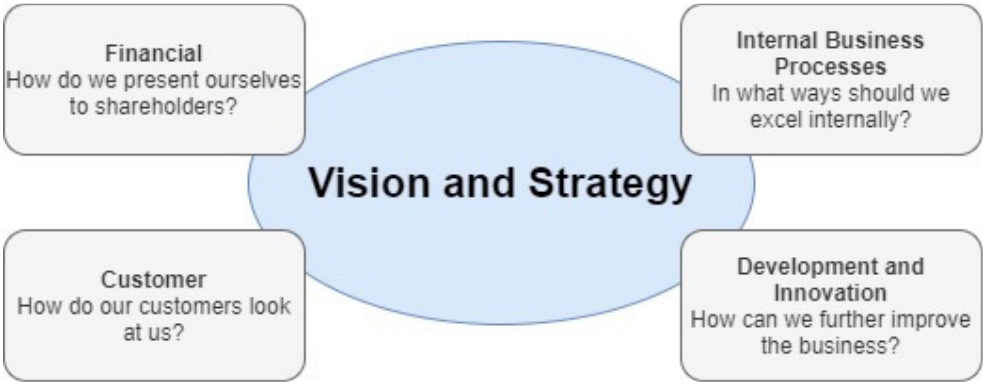

Figure 2: Integrating the four perspectives of the Balanced Scorecard

Source: Processing according to Building Performance Dashboards and Balanced Scorecards, Christopher Price et al., 2014, pp 7;

The main advantages of Balanced Scorecards are: providing a clear image of the company, understanding strategies at all levels and continuous improvement of economic activity.

The difference between scorecards and dashboards is their functions: although they are related techniques, the former can be used to manage performance, while the latter helps to monitor performance. Also, the application context is different: scorecards are strategic and dashboards operational. A scorecard provides information that is not found in a dashboard, with in-depth analysis capabilities and performance predictions. On the other hand, the second is more open to interpretation.

Benchmarking

Benchmarking is a continuous systematic process of measuring outputs and processes, identifying the main sources of competitive advantage. Through this method an enterprise can protect itself against competition.

The main types of benchmarking are:

- Internal - Comparison of processes carried out within the company. It is easy to implement and provides quick access to data, but is time consuming.
- Functional - Comparison of functions and work tactics activated in different sectors. It is not suitable for any type of business.
- General- Identifying innovative technologies that can be used in several types of economic activities.
- Competitive - Comparison with similar companies based on performance measures.

The benefits of benchmarking include identifying the strengths and weaknesses of an enterprise and improving its competitive advantage. It is also cost-effective and time-efficient. These can be done for goods and services, work processes, human resources department, organizational performance and strategies.
Using this method, standards of excellence can be established and met by constantly searching for the best processes and applying them, while improving organizational performance. On the other hand, one can identify how the processes of the best listed companies on the market work.

Key Performance Indicators

Key performance indicators are financial and non-financial indicators used to estimate a company's success, pursuing long-term goals previously set. High-level KPIs focus on the overall performance of the company, and on the other hand low-level KPIs consider processes in departments such as marketing, sales, human resources.

These indicators are focused on future results, underlying decision-making by providing accurate information on trends. They are also used in various industries for specialized purposes, such as: maintenance, sales, construction, marketing, supply chain management and information technology (IT). KPIs used in IT contain: code (number of lines of code), complexity (loops), understanding inputs and outputs, antivirus.

The purpose of a KPI is to track performance measures that track changes towards a target, indicating the level of progress made in achieving the project objectives. At the same time, key performance indicators identify the relevant elements for performance and for providing information on the appropriate controllable factors for making decisions that will lead to a positive outcome. On the other hand, they do not indicate the measures to be taken to correct deviations from the target.

The three high-level goals of the indicators are: team motivation, compliance with the use of organizational process assets and alignment with company objectives, improving performance and taking over best practices.

The SMART rule is used in the literature to identify the characteristics of a KPI:

- Specific (S) - is focused on performance goals;
- Measurable (M) - can be expressed quantitatively;
- Achievable (A-attainable) - targets are reasonable, achievable;
- Realistic (R) - is relevant to the work done in the project;
- Time-based (T) - is measurable over a period of time.

The components of a key performance indicator are: measurement, target (a set of values against which measurements will be made), data source and reporting frequency (at least monthly). The main types of targets are: simple quantitative, time-based objectives (measurements performed at a certain time interval), completion objectives (measurements performed at the end of the project).

The most used financial KPIs are: net profit margin, operating cash flow, inventory turnover (sales / inventory), return on equity (return on equity) and EBITDA (profit before interest, taxes, depreciation and depreciation). The latter is calculated by the sum of net profit, interest expense, tax expense, depreciation and amortization expense. Depreciation refers to property, plant and equipment and depreciation to intangible assets.

The net profit margin (net profit / income) indicates the level of efficiency of a company that generates profit compared to its income. Usually calculated as a percentage, it shows how many monetary units earned are translated into profit.

Return on equity measures a company's ability to use shareholder investments efficiently, generating high profits. It is calculated by dividing net income by equity.

Non-financial KPIs can be an advantage in identifying strengths and weaknesses, as well as providing better feedback to employees on how to meet strategic objectives. Thus, the staff is able to understand exactly what they have to do, there is a link between daily tasks and strategic direction.

Examples of non-financial indicators are: customer retention rate (number of consumers remaining customers over a given reporting period, calculated as the ratio of customers lost in a given period to the number of customers at the beginning of the period), employee productivity rate (force efficiency of labor, calculated as the ratio between the total income of the company and the total number of employees), the percentage of project delays (number of delayed projects / total number of projects).

Key performance indicators are of particular importance in monitoring the state of the enterprise and in measuring progress. They can also be used to make adjustments and predict future results, but also to solve certain problems and address opportunities.

The techniques of analyzing the performance of an enterprise are of particular importance for its stability, determining the current financial position. They identify the company's situation, assessing whether it is in line with the vision and objectives, thus highlighting the main problems.

The main advantages of these techniques are the centralization of all data in one place so that it can be accessed by all users, the identification of trends and the significant reduction of time. Also, through these techniques predictive analyzes can be performed based on current trends, highlighting certain patterns useful for strategy and planning.

Proper management of information using these techniques ensures that the right decisions are made to remedy problems and focus on results. On the other hand, standards of excellence are set and the best processes are determined to achieve them.

In conclusion, the techniques of analyzing the performance of an enterprise are essential for an enterprise, providing a clear picture and understanding of strategies at all levels. With their help, a continuous improvement of the economic activity can be ensured, at the same time reducing the costs.

Case Study: Carrefour performance monitoring

Carrefour is a French multinational corporation specializing in retail, being among the first positions in the top supermarket chains globally. It was founded in 1959, with Marcel Fouriner and Louis Defforey as founders. In 1960, the first store was opened in the Annecy district of Haute-Savoie.

The Carrefour Group was the first to introduce the concept of a hypermarket in Europe, opening one in 1963 in a town near Paris, Sainte-Geneviève-des-bois. The success was based on low prices, stock turnover and reduced equipment costs. The innovative nature of weighing, packaging and collection has also attracted a large number of consumers, with a negative impact on small businesses.

In 1970, the company's shares were listed on the Paris Stock Exchange. At that time, high inflation resulted in increased competition for food prices. In 1973, the Royer law was passed in France, imposing restrictions on large stores. Thus, Carrefour focused on expanding to other countries (Spain in 1973, Brazil in 1976 and Argentina in 1982).

In April 1976, a line of fifty foodstuffs was launched with a private label called “Produits libres” and substantially lower prices.

Carrefour merged in 1999 with its main competitor, Promodès SA, with the effect of increased competition and weaker sales in France, and thus its market share decreased. On the other hand, during this period the first hypermarkets were opened in Asia.

In 2017 Carrefour gave birth to a French start-up, Expliceat, building a mill designed to crush the remaining bread, later using the crumbs for various pastries. A strategic plan ("Carrefour 2022") was also announced a year later, which includes improved food sustainability, waste reduction and the development of organic products.

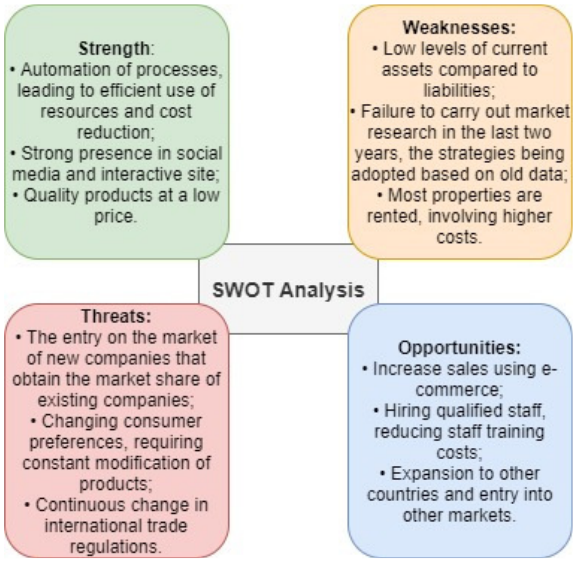

Figure 3: Swot Analysis

In terms of listing, the market capitalization is $ 12.04 billion and the value of the enterprise is $ 29.76 billion. Also, the profit margin is 1.53%, which means that the company earns $ 0.0153 for every dollar traded.

Database Description

In this research we chose as an analysis study the financial indicators of Carrefour from the period between 2012 and 2019, the data source being the site http://www.carrefour.com/content/results, accessed on 15.09.2020. Thus, the indicators contained in the database are total revenues, gross profit, net sales and net income, expressed in millions of euros. Also, the evolution of performance can be analyzed using EBITDA (profit before interest, taxes, depreciation and amortization), cash flow, but also marginal indicators such as gross margin (calculated as the ratio between the difference between income and costs of goods sold and income) , net profit margin, return on equity (ROE), return on investment (ROI) and return on assets (ROA).

Return on investment measures the return on investment relative to its cost, calculated as net profit divided by cost and expressed as a percentage.

The return on assets indicates the efficiency of the firm's use of assets, calculated as the ratio between net profit and total assets.

In terms of net sales, they are recorded between 2012 and 2019, expressed in detail for each continent (Europe, Latin America and Asia). On the other hand, the database contains information on the main categories of products sold in Carrefour stores, as well as the number of products of each type.

Another category of financial indicators included in the database is liquidity, efficiency and exchange ratios. Thus, data on the current ratio, the fast ratio and the debt / equity ratio of the last eight years were introduced in order to analyze the company's ability to meet its financial obligations. The database also contains stock turnover rates, which are then used to measure the short-term performance of the company.

In addition, essential data of the company are included such as share capital (contributions of all partners), depreciation, amortization and investment expenses, net debts and the total number of employees.

Behavioral influence of consumers using logistic regression

Key performance indicators are of particular importance in measuring overall performance and determining the factors that directly influence consumers. In the case of Carrefour, there is a strong link between these indicators, significantly impacting financial results and market positioning.

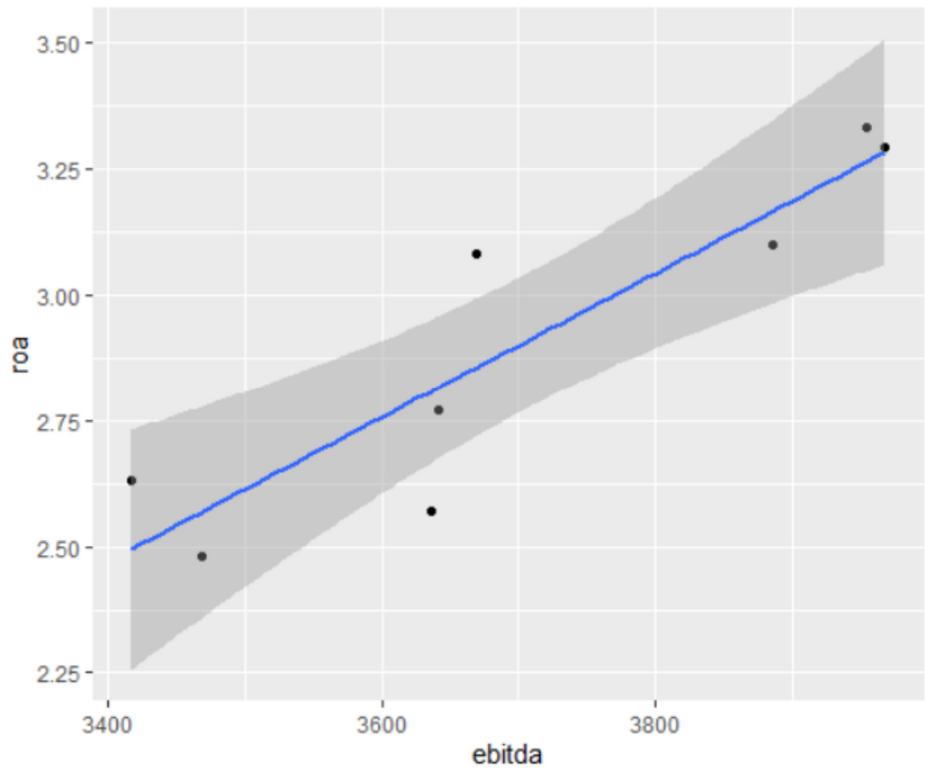

Figure 4: Correlation matrix of key performance indicators

At first glance, we can say that in the matrix of correlation coefficients there are both positive and negative correlations. Also, some variables are strongly correlated with others, with a correlation coefficient higher than 70%. Thus, they have a similar behavior and evolve in the same direction. In the figure above you can see very high correlation coefficients. Thus, the net sales strongly impact the revenues (correlation coefficient 93%) and implicitly the gross profit (correlation coefficient 94%), these variables having a special relevance in the analysis of Carrefour's performance. On the other hand, gross profit is 75% influenced by investment expenditure, suggesting that the increase in investment would result in higher gross profit.

Another direct relationship is between the net result and ROE, the correlation coefficient being 73%.

It can be stated that EBITDA has a behavior similar to that of the ROA variable, the first indicator directly influencing the return on total invested capital, but also the efficiency of shareholders' capital use with ROE, coefficient of 73%). Also, the ROA variable is 74% dependent on net debt, an increase in debt means a low rate of return on assets. On the other hand, in terms of net profit margin, it is strongly correlated with ROI, the coefficient being 72%, both indicators being significant for determining the level of efficiency of Carrefour.

Observing the two figures, one can see a low relevance of the variables net cash flow and operating expenses, which can be eliminated from the analysis.

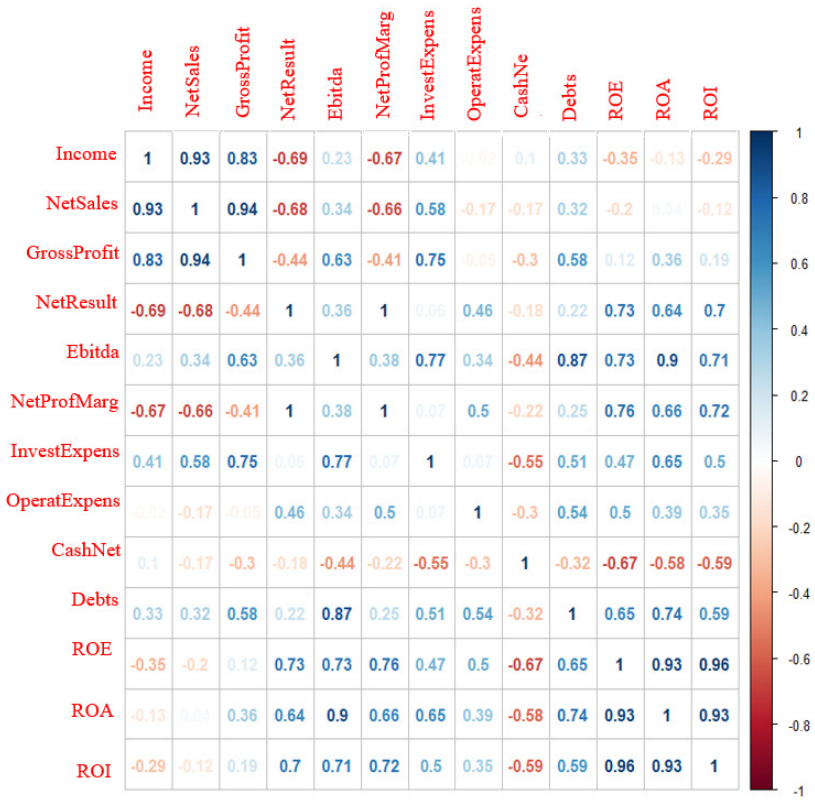

Figure 5: Analysis of the evolution of the ROA indicator according to the EBITDA indicator

Although it is a difficult approach to understand and can be criticized if we think only inside the box and not outside the box, the following regression was performed to observe the links between ROE and EBITDA influence in measuring the performance of the analyzed enterprise. From the figure above, we can see a direct and positive link between the financial indicators EBITDA and ROA in the case of Carrefour, evolving in the same direction. On the other hand, the values are not evenly distributed on the regression line, there are certain values as outliers.

```
Call:
lm(formula = roa ~ ebitda)

Residuals:
     Min       1Q   Median       3Q      Max 
-0.23725 -0.07062 -0.01886  0.08398  0.22557 

Coefficients:
              Estimate Std. Error t value Pr(>|t|)  
(Intercept) -2.3909668  1.0282060  -2.325   0.0590 .
ebitda       0.0014297  0.0002771   5.159   0.0021 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1551 on 6 degrees of freedom
Multiple R-squared:  0.8161,	Adjusted R-squared:  0.7854 
F-statistic: 26.62 on 1 and 6 DF,  p-value: 0.002096
```

Figure 6: Relationship between EBITDA and ROA indicators

Regarding the analysis of the link between EBITDA and ROA indicators, we can say that the linear regression model is a valid one, p-value having the value of 0.002096, less than 0.05.

The relationship between the two financial indicators is strong, the variation of the ROA variable being determined in proportion of 81.61% by the evolution of the EBITDA variable, the rest being explained by other factors. Thus, a higher value of profit before interest, taxes, depreciation and amortization would mean an increase in the efficiency of the use of assets.

The linear regression equation is $y = -2.39097 + 0.00143 * x$, where the dependent variable (y) is ROA and the independent one (x) is EBITDA, which assumes that when changing the value of the EBITDA indicator by a monetary unit, the rate of return on assets for the firm Carrefour will be modified by 0.00143 units.

The Carrefour store network is predominant in France and other European countries, as well as in Latin America. Also, approximately 250 supermarkets are opened in Asia, in 2016 the company also approached the African market. Consumer satisfaction varies from region to region, being influenced by certain factors.

We will establish the link between consumer satisfaction and the number of stores open in each region, net sales and operating income. The dependent variable is the degree of satisfaction, having 3 values: dissatisfied, satisfied and very satisfied, taking as a reference the number of very satisfied consumers.

The equations of the regression model can be described as:

$$\ln\left(p\left(\frac{Dissatisfied\ customers}{Very\ satisfied\ customers}\right)\right) = 0.0032 + 0.00022 * net_{sales} + 0.22 * operating_{income} - 0.033 * number_{stores} = y_1;$$

$$\ln\left(p\left(\frac{Dissatisfied\ customers}{Very\ satisfied\ customers}\right)\right) = -0.0017 + 0.0026 * net_{sales} - 0.16 * operating_{income} + 0.005 * number_{stores} = y_2;$$

$$\frac{p(Dissatisfied\ customers)+p(Satisfied\ customers)}{p(Very\ satisfied\ customers)} = e^{y_1} + e^{y_2};$$

$$p(Dissatisfied\ customers) = \frac{e^{y_1}}{e^{y_1}+e^{y_2}};$$

$$p(Satisfied\ customers) = \frac{e^{y_2}}{e^{y_1}+e^{y_2}};$$

Thus, we can see that an increase by one unit in the number of stores is associated with a decrease in the chances of being dissatisfied consumers compared to those who are very satisfied by 0.033 and also an increase in the chances of being satisfied consumers by 0.005.

>exp(coef(model)

Table 1: Coefficients of the logistic regression model

	Intercept	Net sales	Operating income	Number of stories
Dissatisfied	1.0031857	1.000224	1.2444328	0.9674362
Satisfied	0.9983065	1.002599	0.8539176	1.0046503

We can say that the chances that the degree of satisfaction will be reduced are 3% lower, and those that the degree will be high are 0.5% higher than the chances that the degree of satisfaction will be very high in case of increasing the variable number of stores by one unit.

Table 2: Matrix of confusion

	Very satisfied	Dissatisfied	Satisfied
Very satisfied	1	0	0
Dissatisfied	0	2	0
Satisfied	0	0	1

Of the 4 regions (Latin America, Asia, France, Other European countries), all were correctly labeled (being positioned on the main diagonal). Thus, consumers attracted by Carrefour in Latin America and Asia are dissatisfied, those in France are satisfied, and customers in other European countries are very satisfied. Following the analysis, we can see that the opening of new supermarkets would result in a higher degree of satisfaction.

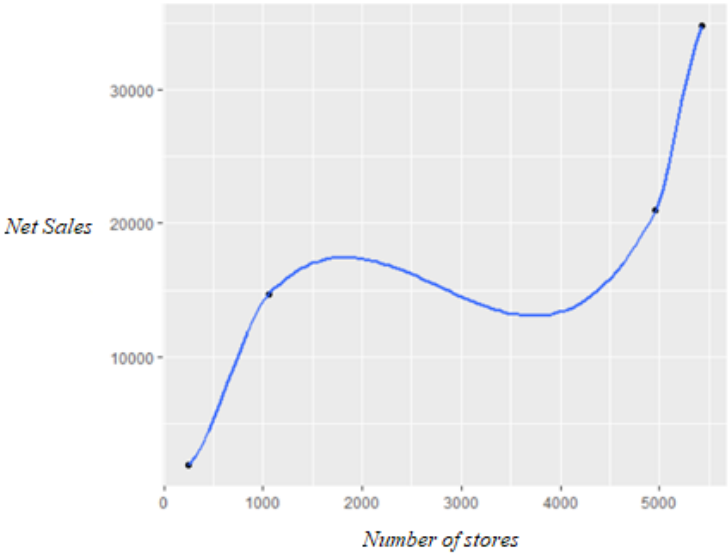

Figure 7: Analysis of the evolution of net sales according to the number of stores

Also, the link between the number of stores and net sales in the four regions is a direct one, and the increase in the number of supermarkets would lead to an increase in sales.

Key performance indicators (KPIs) are of particular importance in analyzing the evolution of the enterprise from a financial point of view. As for Carrefour, there is a strong link between certain kpi, the indicators can be divided into several classes. These indicators represent the effects of the realized production and the services offered to the consumers, highlighting the company's efficiency.

Based on the analysis of the correlations between the indicators, we proposed the grouping of revenues, net sales and gross profit in a first cluster, debt and EBITDA in a second cluster, and ROI, ROE and net income in a third cluster, evolving in the same sense.

The first cluster contains the most important results, highlighting the company's ability to obtain revenue and at the same time satisfy customer demand. It is directly related to the company's objectives, indicating its financial stabilization and position.

The second cluster contains indices through which it is possible to analyze how efficiently the assets are used and the ability to pay their debts. It has a direct relationship with the third cluster, highlighting how efficiently equity is used, but also investments to increase the value of the net result, this being one of the main objectives of Carrefour.

As for the financial indicators belonging to the first class, they have an oscillating trend. Between 2012 and 2014, the trend was a decrease in net sales and revenues, following a slight increase that reached its peak in 2017. Starting with 2017, revenues and implicitly profit were continuously decreasing.

The decrease in revenues is caused, according to critics, by the follow-up of a business model developed in 1960, which does not comply with the current market situation, requiring an improvement in the mode of operation. Also, the negative trend of margins in France was caused by high costs related to the acquisition and transformation of a network of 400 Dia supermarkets, this acquisition being made in the fourth quarter of 2016. Thus, in 2017 the company Carrefour suffered significant losses, taking at least a year to form a customer base. These results were also felt in the company's net result.

Although the net result has been steadily declining since 2014, it was positive until 2017. In 2017 and 2018 Carrefour had very high losses in France, which represents half of the group's revenues, sales falling for six quarters row. The negative net results were a consequence of the large loans made to purchase the Dia chain of stores in France. The investment did not generate the expected revenue, and the costs of keeping stores in France open resulted in significant losses.

After two years in which negative results were registered, in 2019 the net result was 1311 million euros, Carrefour investing in remodeling the initial format and modernizing the stores to increase sales. The company's transformation plan includes reducing sales promotions in France, focusing on lower prices and reducing the number of non-food items. In addition, they initiated the merging of supply chains of supermarkets with those of hypermarkets and the restructuring of IT systems to generate savings.

Carrefour recorded the highest level of debt in 2014, reaching the threshold of 9 billion euros. The increase in net debt was caused by the group's desire to accelerate expansion in emerging markets in Brazil and China by taking over a network of competing stores, which is only possible through large loans. After 2014, the debt level had an increasing trend, in 2019 reaching the lowest threshold in the last 10 years.

Regarding the EBITDA indicator (the company's earnings before interest, taxes, depreciation and amortization), it had an upward trend until 2016, after which it started to decrease gradually. Thus, the company generated a higher income before the acquisition of the Dia supermarket network.

Return on equity decreased significantly between 2014 and 2017, reaching a negative threshold, suggesting an inefficient use of shareholder investments by acquiring non-profit chain stores in France and Latin America during that period. Starting with 2018, the results have increased as a result of the implementation of the project to transform the initial format.

Regarding the ROI indicator, it fluctuates from year to year, registering decreases between 2013-2014 and 2015-2017, in 2017 having a negative value. Thus, Carrefour did not always invest efficiently, with the total costs exceeding the return on the investment. Starting with 2018, the return on investment has been constantly growing, with the competing networks purchased generating higher and higher revenues.

The decreasing trend of net profit was also felt in the net profit margin, which had a negative value in 2017, indicating that Carrefour no longer had the ability to make a profit effectively relative to its revenues. As a result, the market share decreased, leading to an increase in the market share of the main competitors.

Since 2018, the net profit margin has had an increasing trend, the evolution being similar to the other key performance indicators, this being the year in which Carrefour began to recover financially.

Another category of financial accounting indicator used as enterprise performance measures includes liquidity, efficiency and exchange ratios. Liquidity ratios highlight the company's ability to meet its short-term financial obligations without the use of external capital. The main liquidity ratios are the current ratio and the fast ratio.

The current ratio measures the ability to pay current debts with current assets (cash, accounts receivable and inventories). It is calculated by dividing current assets by current liabilities.

The rapid report analyzes the ability to meet short-term obligations with the most liquid assets.

Efficiency reports (or activity reports) are used to measure the company's short-term performance, highlighting the ability to use assets appropriately to generate revenue. An example of such a report is the stock turnover rate, which shows how many times the inventory has been sold and replaced in a given period.

In terms of stock turnover, its value is quite high, meaning that Carrefour can meet consumer demand without depleting its stock, and at the same time does not have a lot of money stuck in stocks. Also, the costs of storing the products are low, because they are sold in a short time. The lowest value of the stock turnover rate in the case of Carrefour was met in 2016 as a result of the slowdown in sales.

In 2018, Carrefour started implementing the Carrefour 2022 strategic plan, with the main objectives of streamlining the organizational structure, obtaining higher productivity gains, investing in e-commerce and focusing on product quality. Thus, the aim is to reduce management costs in order to offer competitive prices, increased control over

expenditure and improve operational efficiency. The initial proposal is to reduce spending by 2.8 billion euros gross by 2020.

Significant cost reductions and a more effective investment policy are needed to increase growth and improve competitiveness. The cost reduction plan focuses on the operational efficiency of the supply chain and the simplification of headquarters organizations. Therefore, the group's intention is to reduce the number of stores that belonged to the Dia chain by 273, as they are not adapted to their catchment area.

In terms of investments, a large part of them will be allocated to the supply chain for the automation of order preparation platforms. It also aims to open 2,000 stores between 2018 and 2022 and invest 2.8 billion euros in the digital platform.

Following the implementation of the strategic plan, in 2019 there were solid increases in sales, with 25% more in terms of organic products (sales worth 2.3 billion euros) and 30% more in the case of e-commerce (up to € 1.3 billion). At the same time, recurring operating income increased by 145 million euros compared to the previous year, suggesting a solid and profitable growth.

Carrefour has managed to achieve a satisfactory level of competitiveness in key regions such as Latin America and Spain, and in France it has refocused, improving its price positioning. While the profit margin decreased by 0.7% in France due to increased competition, it stabilized at 3.2% in the rest of Europe, and in Latin America Carrefour consolidated its operating profit margin from 4.5% to 5.7%. The company also managed to save 1.05 billion euros following the closure of the 273 Dia stores.

Observing the results obtained by applying the Carrefour 2022 plan, we can say an increase in the level of efficiency due to financial discipline, complemented by an increase in efficiency, the results being in line with the proposed objectives. Thus, Carrefour has adopted the appropriate means for sustainable growth and high competitiveness.

The productivity of the company can be measured by comparing the inputs used and outputs, also reflected in changes in efficiency.

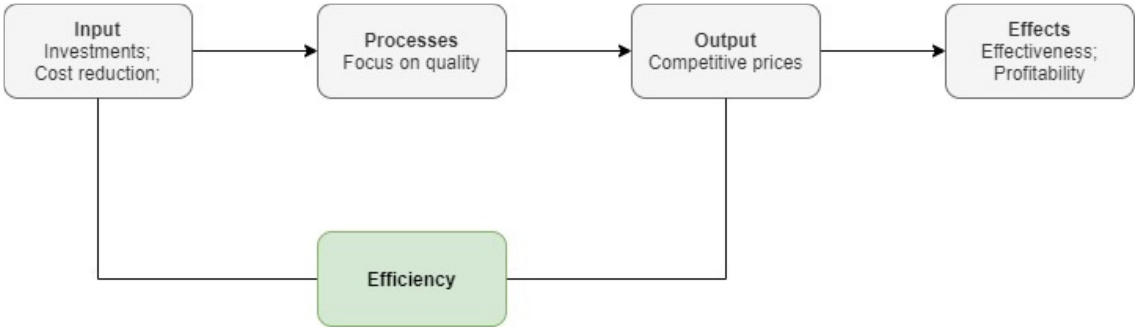

Figure 8: Value flow analysis

Dashboard Carrefour

There are many factors that directly influence the performance of Carrefour and should be taken into account to improve the business. Given that about 50% of the company's revenue comes from sales in France, it is necessary to bring innovative elements to retain or even increase the number of customers. Latin America is also an investment-friendly region, with the opening of new stores leading to increased profits. As for the Asia region, it has a lot of potential for the development of a hypermarket chain, with high purchasing power.

Figure 9: Dashboard Carrefour

Debts are an important aspect in the company's analysis, as they have been growing since the last quarter of 2016. Thus, the debt / equity ratio has had a significantly higher value in recent years, indicating that much of Carrefour's financing comes from bank loans. Observing these indicators, we can say that the company is subject to a rather high risk, and it has a low capacity to pay its outstanding debts.

In the case of returns, in recent years the company has used its capital inefficiently, and on the other hand has had losses caused by certain investments, meaning that in the future the following investments should be analyzed in detail for a low degree of risk.

The current report recently suggests that the Carrefour group does not have enough assets to pay its current debts, unable to meet its obligations without selling inventory. One cause of the low current ratio would be too many loans made to buy a competing chain of stores.

Gross margin has a declining trend since 2017, although it does not deviate much from the average of recent years. The average value of the gross margin is 23, meaning that for every euro generated from sales, Carrefour generated 23 eurocents in gross profit before other expenses, which is not a high value. Also, the company's problems between 2016 and 2018 were felt in the net profit margin, suggesting a reduced ability to generate profit from sales.

Regarding the overall performance of Carrefour, it reached the lower threshold between 2017 and 2018, the uninspired decisions of the company being felt in the case of all financial indicators. The gradual increase in debt has led to financial instability, and the inefficient use of all available resources has severely reduced profitability. In addition, there was a major impact on the net result, which was negative for two consecutive years.

Although in 2019 the indicators suggest an improvement in the financial situation, a careful analysis of all investments and avoidance of loans is necessary. In order to increase profits, it would be advisable to exploit potential regions by gradually opening new stores. The region that could negatively influence the results is France, and for this reason a strategy for financial stabilization is indicated by closing stores that have low sales and offering competitive prices.

After the large losses in 2017 and 2018, Carrefour is on an upward slope due to the Carrefour 2022 project aimed at improving the business by reducing costs and investing in technology. However, the level of performance cannot be maintained on this upward trend if equity and equity are not used effectively, which is something to keep in mind. On the other hand, the increase in sales and the increase in net income are directly linked to meeting market requirements and openness to online commerce, which are among the main objectives of Carrefour's new strategic plan. Thus, the chances of paying off debts and generating profit are high.

Conclusions

Performance analysis is one of the main concerns of a company's management, because only by analyzing the activity and identifying problems in the processes can maximize profit. Thus, it is necessary to select the most appropriate methods according to the company's objectives.

Another important concept for the company is customer relationship management (CRM), facilitating communication between the company and consumers and helping to increase efficiency by automating certain sales processes.

The main tools for information management and analysis of the indicators detailed in this paper are: Balanced Scorecard, which aligns the company's activities with its vision, Benchmarking, through which you can identify strengths and weaknesses, the performance pyramid, which is focuses on external effectiveness and internal efficiency and the dashboard, which presents an overview of the company's results. At the same time, it is necessary to determine trends and predict future market requirements, in this regard being addressed certain methods such as logistic regression and extrapolation.

An effective analysis of an enterprise starts from key performance indicators (KPIs), which are the basis for decision-making. They aim to align with the objectives and take over the best strategies and practices.
The present research has as practical object of study the analysis of the KPIs of Carrefour and the follow-up of the evolution from the financial point of view between 2012 and 2019. Thus, we noticed a strong relationship between certain indicators which were later grouped as follows: revenues, net sales and gross profit in a first cluster, debt and EBITDA in a second cluster, and ROI, ROE and net income in a third cluster, evolving in the same direction.

Analyzing with the help of Excel the indicators of Carrefour company, we identified certain problems starting with the last quarter of 2016 until the end of 2018, being registered a net negative result two consecutive years. In 2017, the losses caused by the investment made at the end of 2016 were most felt through the purchase of a competing chain of stores in France, the profitability and the net profit margin decreasing sharply.

Although Carrefour encountered some difficulties and a high degree of risk generated by inefficient investments and excessive bank lending, the strategic plan "Carrefour 2022" launched in 2018 generated positive results and a visible upward slope due to reduced spending and investment in technology. In 2019, the company managed to reach a satisfactory level of competitiveness in key regions and to save more and more. Thus, we can say that through the implementation of this project the levels of efficiency and effectiveness and implicitly the performance has increased.

The evolution of the main key performance indicators of Carrefour company was captured in a Dashboard, through which they can be monitored by year.

In future research we want to apply the viable system model developed by the father of managerial cybernetics, Stafford Beer, to make a diagnosis of Carrefour which would have the role of investigating the functioning of the organization and its management. This qualitative method helps to identify the basic deficiencies that can lead to poor performance.

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Elimination of Correction Mechanisms in The EU Budget – Financial Consequences for Member States

Katarzyna STABRYLA-CHUDZIO

Cracow University of Economics, Cracow, Poland
E-mail: stabrylk@uek.krakow.pl

Abstract

The withdrawal of the United Kingdom from the European Union and the negotiations on the Multiannual Financial Framework 2021-2027 prompted a discussion on the possible liquidation of correction mechanisms in the EU budget and thus simplification of the EU's own revenue system. The article attempts to estimate the changes in the contribution to the EU budget after the UK withdrawal and resignation from any correction mechanisms. Two research problems were posed - what would the payments of member states to the EU budget look like after elimination of the British rebate or other correction mechanisms, and which country would gain and lose with each of the solutions, taking into account the net budgetary balances concerning EU budget. In the considerations, Eurostat data from 2014-2019 were used, including the currently functioning correction mechanisms and scenario analysis. The balances of the member states were calculated based on the modified formula of the European Commission. The research was limited only to determining possible changes in amounts of payments to the EU budget. This research may contribute to the ongoing negotiations and scientific debate on the European Union's financial plans for the next seven years.

Keywords: Correction Mechanisms, EU Budget, British Rebate.

Introduction

In the face of new Multiannual Financial Framework negotiations and the resignation of Great Britain from membership in the European Union, a question arises about the further contributions to the EU budget. The elimination of the British rebate and other correction mechanisms could be a fundamental change in the way the EU budget works. The fact that Great Britain leaves the European Union makes it possible to eliminate at least two correction mechanisms, i.e. the British rebate and its addition, i.e. rebate on the rebate. So Brexit simplifies EU finances in this regard, which has not been possible for at least thirty years. This paper addresses two questions:

- what would the payments of the Member States to the EU budget look like after the British rebate or other correction mechanisms were eliminated,
- which country would gain and which would lose from such a solution.

In the paper the author attempts to estimate changes in the contribution to the EU budget as a consequence of resignation of all correction mechanisms.

The considerations are divided into three main parts. The first section describes the application of correction mechanisms in the EU budget so far and highlights the critical opinions expressed in the literature on the subject in terms of the structure of the EU budget own revenues. The second part presents the adopted research methodology, while part 3 shows the research results and alternative solutions for the contribution to the EU budget of individual member states after resigning from the correction mechanisms or eliminating only the British rebate and thus adopting the assumptions resulting from the European Council's proposal of July 2020 on the Multiannual Financial Framework for 2021-2027.

The research used Eurostat data and a scenario analysis based on data from the current Multiannual Financial Framework. The research was limited only to determining possible changes in amounts of payments to the EU budget. This research may contribute to the ongoing negotiations and scientific debate on the European Union's financial plans for the next seven years.

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Correction mechanisms as a bargaining force in budgetary negotiations

The system of EU budget revenues requires profound changes due to the lack of transparency, complexity and little connection with the essence of the functioning of the European Union as an international organization. It consists of the so-called own resources, which include: traditional own resources, value added tax and contributions based on gross national income (Council of the European Union, 2014). The remaining revenue of the European Union is of marginal importance and includes, among others, budgetary surpluses from previous years, fines, interest on late payment, taxes on EU staff salaries and pensions, proceeds from bank interest and contributions from third countries participating in common programs etc. A critical approach to the structure of the EU budget revenues, the lack of real European taxes and the maintenance of correction mechanisms was the subject of multiple analyzes, which emphasized the need for changes and proposed new sources of own revenues of the EU budget (Le Cacheux, 2007; D'Alfonso, 2014; 2016; 2017; Cieślukowski, 2013; Núñez Ferrer et al., 2016; De Feo and Laffan, 2016). Additionally the High-Level Group on Own Resources established in 2014 and chaired by M. Monti prepared analysis of the current EU financial system and gave specific highlights for the reform inside EU budget including the proposal of new own resources and abolition of correction mechanisms (Monti et al., 2016).

So far, the rebate in favor of Great Britain has been the most controversial. Corrective mechanisms appeared in the Community budget as one of the consequences of Great Britain's accession to the European Communities. The turn of the 1970s and 1980s is an attempt to find a constructive solution to UK claims concerning the reduction of contributions to the Community budget. During the meeting of the European Council in Fontainebleau on June 25-26, 1984, the model on the basis of which the value of the British rebate was to be calculated was approved. This mechanism was modified several times to take into account the changes introduced in the EU budget financing system and the accession of new member states (Begg, 2016, p. 7-8; Keedus et al., 2018, p. 141-143; Keep, 2019, p. 11).

According to European Commission (2019, p. 36) and Núñez Ferrer et al. (2016, p. 24-25) the computation mechanism is quite opaque, and consists of several stages due to the numerous adjustments introduced over time. First, the difference between the UK VAT base in total VAT base for all member states is determined as if the 1980s own resources system (VAT based) was still in place and the UK share in total EU expenditure allocated to member states. Then, a downward adjustment is made for the allocation of the costs of the EU enlargement with new members, which joined the EU after 30 April 2004 (because this financing was classified as an external action, and therefore is not part of the calculation of the rebate excluding agricultural payments) and the neutralization of the effects of the introduction GNI-based contribution and change in the cost of collection of traditional own resources. As a result, 66% of the difference between what the UK contributes and what it receives from the EU budget is returned to the UK, and in fact reduces its contribution. The cost of the UK correction is borne by the other Member States in proportion to their GNI, but the share of Germany, the Netherlands, Austria and Sweden is reduced by three-quarters of their normal share. The reduction is covered by the remaining 23 member states (table 1).

Cipriani (2014, p. 45-47) points out that the rebate algorithm does not take into account the full changes in the wealth of Great Britain, which has become one of the richest EU member states over the last few decades. Since the creation of the formula for calculating the correction mechanism for the United Kingdom in the mid-1980s, this solution has been widely criticized among member states. As a consequence, other net payers to the EU budget have begun demanding corrections and discounts, which led to further complicating EU finances. In addition, since the beginning of the 1990s, the European Commission has unsuccessfully proposed to member states other solutions to reduce a financial burden of other major net contributors.

In addition to a special mechanism for Great Britain, there are also less complicated discounts for other countries that are net contributors to the EU budget. In the EU value added tax, the rate is 0.3% of member state's harmonized VAT base, with Germany, the Netherlands and Sweden benefit from the reduced call rate of 0.15%. In the previous programming period, i.e. in 2007-2013, the rate of collection of VAT-based resources for Austria was 0.225%, for Germany 0.15%, and for the Netherlands and Sweden 0.10% (table 1).

In order to improve the balance of payments and withdrawals from the EU budget to the largest net payers, the Council of the European Union, by virtue of a decision of 2007 (Council of the European Union, 2007), introduced another change in the calculation of the contribution based on gross national income. For two countries that are net payers to the EU budget, i.e. the Netherlands and Sweden, lump sum reductions were introduced. As a result, after calculating the nominal GNI contributions of both countries, the amounts assumed in advance are deducted from them. In 2007, it was agreed that the reductions would amount to EUR 605 million for the Netherlands and EUR 150 million for Sweden. Values are indexed annually based on the price deflator. Then, under the decision of 2014 (Council of the European Union, 2014) Denmark, the Netherlands and Sweden benefit from reductions of their GNI payments of

EUR 130m, EUR 695m and EUR 185m, respectively. The Austrian annual GNI contribution was reduced in the period 2014-2016 by EUR 30m, EUR 20m and EUR 10m, respectively (table 1).

Table 1: Evolution of the EU correction mechanisms

Member state	1985	2002	2007	2014
Austria		Rebate on the UK rebate (three quarters)	Rebate on the UK rebate (three quarters); Reduced VAT call rate	Rebate on the UK rebate (three quarters); GNI contribution reduction (lump-sum correction)
Denmark				GNI contribution reduction (lump-sum correction)
Germany	Rebate on the UK rebate (one third)	Rebate on the UK rebate (three quarters)	Rebate on the UK rebate (three quarters); Reduced VAT call rate	Rebate on the UK rebate (three quarters)' Reduced VAT call rate
Great Britain	UK rebate	UK rebate	UK rebate	UK rebate
Sweden		Rebate on the UK rebate (three quarters)	Rebate on the UK rebate (three quarters); Reduced VAT call rate; GNI contribution reduction (lump-sum correction)	Rebate on the UK rebate (three quarters); Reduced VAT call rate; GNI contribution reduction (lump-sum correction)
The Netherlands		Rebate on the UK rebate (three quarters)	Rebate on the UK rebate (three quarters); Reduced VAT call rate; GNI contribution reduction (lump-sum correction)	Rebate on the UK rebate (three quarters); Reduced VAT call rate; GNI contribution reduction (lump-sum correction)

Source: Asatryan et al. (2020a); Benedetto (2017).

The proposals of the European Commission of 2018 and 2020 (European Commission, 2018; 2020) present the gradual elimination of all corrections. It can be assumed that the European Commission (1998; 2004a; 2004b; 2011) and the European Parliament (1999; 2007; 2011; 2018; 2020), after unsuccessful attempts from the 1990s and the beginning of the 2000s, decided to introduce greater transparency in financing EU expenditure. take advantage of the opportunity that arose due to the withdrawal of Great Britain from the EU and thus the automatic abandonment of the so far inviolable rebate and carry out a major reform of the EU budget. Nevertheless, there are many important issues to be resolved with vital implications for the EU budget as well (Chomicz, 2016, p. 8). Zuleeg (2014), Bachtler and Begg (2016), Bachtler and Mendez (2016), Núñez Ferrer and Rinaldi (2016), Begg (2017), Haas and Rubio (2017) and Gordon (2018) were among the first to write about possible changes in the size and structure of the EU budget after Brexit. These works often postulate the abandonment of correction mechanisms. For example Pasimeni and Riso (2016, p. 19) have shown that various correction mechanisms applied to the EU budget significantly limit its redistribution capacity. In turn, possible alternative scenarios after Brexit from the point of view of British public finances and the continuation of activities previously financed from the EU budget are presented, among others, by Darvas et al. (2017) and Wishlade (2019).

However, the conclusions of the European Council (2020) summit in July show that the member states assumed the continuity of the existing mechanisms, excluding the British rebate. As a consequence, political decisions and particular interests of EU members continue to be put before the pursuit of a more efficient functioning of the European Union as a whole. As Haas and Rubio (2017) emphasizes, Brexit may therefore have a negative impact on the structure of the EU budget, giving room for the implementation of the particular interests of some member states.

Methodology

The study used averaged data from 2014-2019, i.e. the period preceding the transition phase before the United Kingdom finally left the European Union. Averaging is necessary due to year-to-year fluctuations in individual values and retroactive adjustments made by the European Commission. The following correction mechanisms were taken into account: the British rebate and the so-called rebate on the rebate, i.e. lower payments from Germany, Austria, the Netherlands and Sweden, lower by half the payment on account of VAT for Germany, the Netherlands and Sweden, reduction of the contribution for the Netherlands, Sweden, Denmark and Austria and the so-called opt-out for Denmark, Ireland and Great Britain which are exempted from contributing to some parts of security and citizenship policies.

The data on Great Britain was left in the research due to the fact that the elimination of UK's share, both on the revenue and expenditure side, would force the necessity to make additional assumptions regarding the size of the EU budget, which would significantly change the amount of contributions from other member states. Meanwhile, the simulation carried out was to compare the actual data for 2014-2019 with two possible changes related only to the correction mechanisms that may occur after 2020. The contribution of this research is to show possible financial effects in member states payments to the EU budget after eliminating correction mechanisms which could be useful for the future reform of the EU financial system.

After these adjustments were made, two alternative results were presented, ie the amount of burdening the member states with the contribution to the EU budget, leaving the other correction mechanisms without the British rebate and after eliminating these mechanisms. For both solutions, it was also examined whether the current status of net payers and beneficiaries will change using the modified European Commission method (operating budgetary balances method).

The approach based on the net balance is treated only as an accounting exercise (calculating only the values of budget revenues and expenditures) and consequently does not take into account real integration effects and the consequences of the investments made. Real investment flows are very significant for the creation of European added value (Núñez Ferrer et al., 2016, p. 30, 35; Monti et al., 2016, p. 57; Heinemann, 2011). Critical analysis of operating budgetary balances (OBB) in a wider context of European integration is performed by Asatryan et al. (2020a; 2020b), Pilati and Zuleeg (2020) and Le Cacheux (2005). However, in this study, the aim is to show the effects of abandoning the correction mechanisms in terms of strictly financial terms.

The OBB method consists of calculating the difference between the amount that MS receives from and pays into the EU budget. Total national contributions (own-revenues payments, excluding traditional own resources considered as a result of common policies, not national contributions) are adjusted to total EU allocated operating expenditure (excluding external and administration expenditure) as weighted national contributions, so that operating budgetary balances sum to zero (European Commission, 2019, p. 72). In the simulation presented in the article, a weighting procedure was abandoned, as it was intended to show the actual flow of funds. Modified equation presents as follows:

$$OBB_i = (TAE_i - AE_i) - (TR_i - TOR_i)$$

where:

OBB_i - operating budgetary balance of member state *i*, where i = 28;
TAE_i - total allocated expenditure of member state *i*, where i = 28;
AE_i - administrative expenditures allocated to member state *i*, where i = 28;
TR_i - total revenue of member state *i* , with i = 28.
TOR_i – traditional own resources of member state *i* , with i = 28.

Research Results

Presented simulation show that the removal of all discounts leads to a reduction in the membership contribution for 21 countries in the range of 6.5-7.5% on average in the period 2014-2019 (figure 1). Belgium, Austria and Denmark generate a slightly lower benefit, while Germany, the Netherlands, Sweden and the United Kingdom record an increase in payments to the EU budget, which is due to the fact that these members are among the largest beneficiaries of correction mechanisms in the analyzed period. In the case of resignation from the British rebate only and the rebate on the rebate, the only losing country is, of course, the United Kingdom (contribution increases by one third), while Austria, Germany, the Netherlands and Sweden record a reduction in payments, but relatively small compared to other countries (between 1.1 and 1.4%) due to the previously mentioned limited share in covering the British rebate.

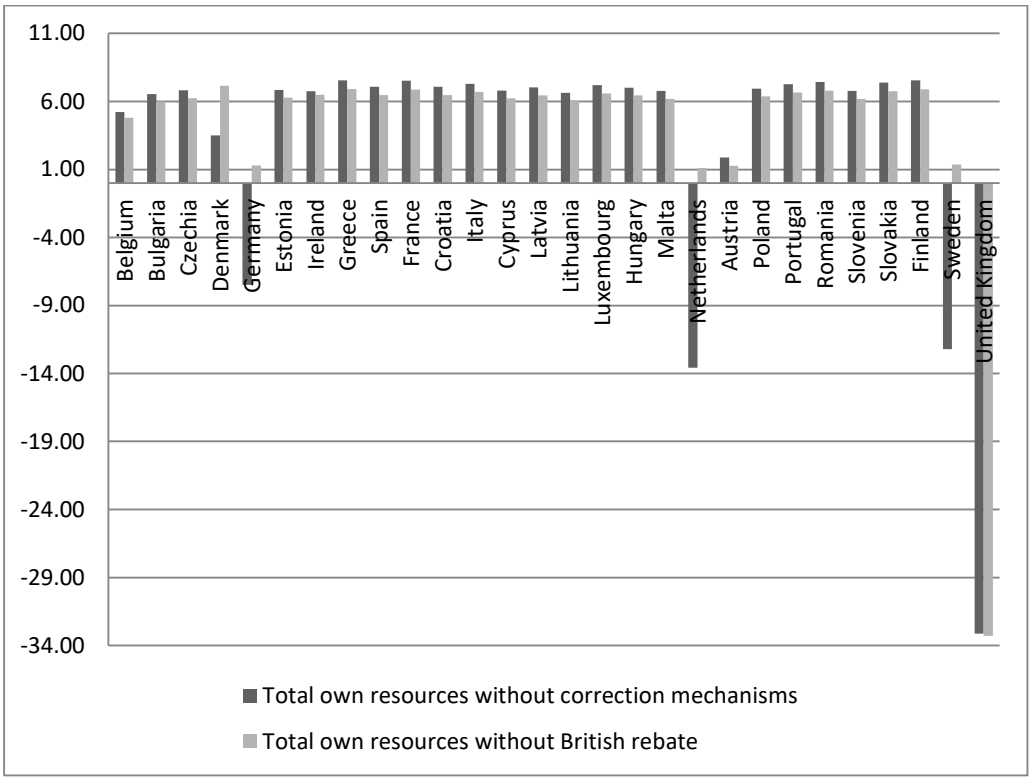

Figure 1: Simulation of changes in the amount of contributions to the EU budget, average change from 2014-2019, in % of MS total own revenues

Source: Author's own calculations based on Eurostat database (2020).

The results shown in Figure 2 confirm the previous observations. After calculating the modified operational budgetary balances, attention is drawn to the MS division into net payers (with a negative balance), which include the "first fifteen" (EU15), except for Ireland, Greece, Spain, Portugal and Luxembourg. These five countries, along with the so-called "new members" form a group of net beneficiaries. Figure 2 also presents the change in budgetary balances in the two variants previously shown. Resignation from all correction mechanisms means that the negative budget balance improves in the case of all net contributors, except for Germany, the Netherlands, Sweden and Great Britain. The negative change for net beneficiaries shows that their balances are also improving. In the second option, i.e. removing the British rebate and rebates on the rebate, the situation of Germany, the Netherlands and Sweden (to a lesser extent of Denmark) changes significantly compared to the first option, which improve their negative balances while still remaining net payers. In the case of other countries (except Great Britain), the improvement in the balance is obviously lower than in the first option.

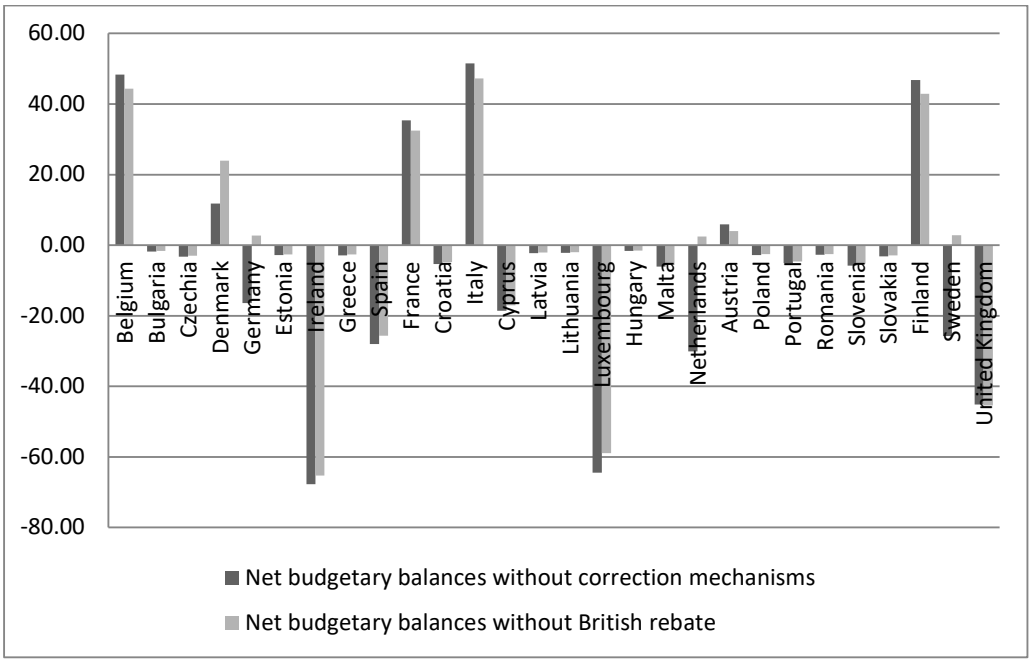

Figure 2: Simulation of changes in net budgetary balances, average change from 2014-2019, in % of MS net budgetary balances

Source: Author's own calculations based on Eurostat database (2020).

Conclusions

The results presented above indicate that resignation from all discounts will be difficult to implement for political reasons. Most likely, Germany, the Netherlands and Sweden will opt for keeping the current correction mechanisms with the exception of the British rebate. As significant net contributors, they have an important voice in the discussion on the future structure of the budget, especially since changes to the revenue side of the budget (including rebates) require unanimity.

In order to find constructive solutions in spring 2020, the president of the European Commission has already announced a new proposal for the Multiannual Financial Framework for 2021-2027 and a recovery plan "Next Generation EU", the idea of which was largely based on obtaining funds from the financial markets in the form of loans, but also on the need to reform the revenues of the EU budget. The fundamental problem arises in terms of repayment of loans taken, which is to be done gradually after 2027. The loans will be guaranteed by the EU budget, and not directly by the member states. It proposes either an increase in the contribution to the EU budget based on Gross National Income or new taxes: revenues from the EU's Emissions Trading System (ETS), digital tax, a carbon border adjustment mechanism and fees on non-recycled plastic packaging waste. While these proposals allow for a significant change in the structure of EU budget revenues, the issue of correction mechanisms is not so obvious. In July 2020, the European Council proposed that the corrections reducing the contributions to the EU budget of five member states (Austria, Denmark, Germany, the Netherlands and Sweden) should not be gradually withdrawn (as requested by the European Commission), but, on the contrary, maintained and increased overall (European Council, 2020).

As Cipriani (2014, p. 49) rightly points out, the proposed possible limitation of the lump sums in time, linking to the duration of the Multiannual Financial Framework provides only apparent progress. This is because the time limitation does not in itself constitute a guarantee against the consolidation of such corrections, especially as the rebate beneficiaries may treat it as given once and for all. Thus, there is a risk that the concept of improving the transparency of EU revenues in this area will have to wait until the next budget negotiations without any guarantee of success.

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The Quality of Local Government Websites from The Technical SEO Perspective

Karol KROL* (PhD)

University of Agriculture in Kraków, Faculty of Environmental Engineering and Land Surveying
al. Mickiewicza 24/28, 30-059 Kraków, Poland, E-mail: k.krol@onet.com.pl,
website: http://homeproject.pl, ORCID: https://orcid.org/0000-0003-0534-8471
*corresponding author

Dariusz ZDONEK (PhD)

Silesian University of Technology in Gliwice, Faculty of Organization and Management
ul. Roosevelta 26, 41-800 Zabrze, Poland, E-mail: dariusz.zdonek@polsl.pl,
ORCID: https://orcid.org/0000-0002-6190-9643

Abstract

The website is the foundation of electronic administration. A website that has been search-engine optimised has a better potential to reach users. The purpose of the paper is to assess the degree of search engine optimisation of local government websites in Lesser Poland. The research covered 182 websites. The website quality was measured with selected automatic testing tools. Each test gave a final synthetic score. The scores were aggregated with zero unitarisation. The investigated websites scored 1,007.5 technical SEO points in total, which is about 55% of the available points. The websites demonstrated a significant potential for search engine optimisation (in the employed research design). A significant variance in technical SEO attribute scores urges in-depth analysis of results offered by each tool. The synthetic technical SEO score identifies websites in need of in-depth quality analysis or an SEO audit. Such an analysis will pinpoint trouble attributes requiring optimisation. A large number of relatively easy to fix errors and technical flaws suggests that municipalities do not audit their websites. Insufficient knowledge regarding weak points of municipal websites can hinder the development of e-administration. The research approached the websites from two browsing perspectives, desktop and mobile. Such a design facilitated a comprehensive investigation of technical attributes of the websites. The results were presented as statistics and in spatial terms.

Keywords: website quality, e-administration, quality audit, optimisation.

Introduction

The website is the e-administration hub for all levels of e-service provision. Its sites offer components that facilitate information flow between the citizen and administration, such as interactive forms or scripts. Public administration websites are developed in various ways and provide diversified e-services (Manoharan and Carrizales 2011, Cegarra-Navarro et al. 2012, Fietkiewicz et al. 2017).

As e-administration developed, its models of e-services grew more numerous. Most of them consist of four levels of maturity, presence, interaction, transaction, and integration (Layne and Lee 2001, Andersen and Henriksen 2006, Coursey and Norris 2008, Shareef et al. 2011). Moreover, in most cases, the framework for the models are the citizen – service and operations – technology relationships (Lee 2010). At the basic level, e-administration merely informs and presents. Information about the office and its services is displayed on a website. The customer is just a passive recipient of content that was prepared for them. In the one-way communication model, information comes with electronic forms that can be downloaded, printed, and filled in, or filled in and printed if they are interactive. In the transaction model, customers can search for information as well as download and send completed forms online (two-way communication). Ultimately, e-administration should follow the integration model and the personalisation model. The integration model

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provides for completion of all activities necessary to handle official business online. It further offers an electronic way of certification of the arrangements made, for example, with a digital document, such as a permit or certificate. In the personalisation model, the customer is offered services tailored to their needs and situation. Thanks to data processing algorithms, services are automatic and provided proactively.

To exploit the potential of digital technologies in e-administration, one needs hardware infrastructure, software, organisational and legal changes, and a way of making sure e-services meet the demand. Moreover, activities are necessary to improve the public interest in e-services and present their advantages. The primary benefits of e-administration are the speed of business handling and no queues (Wolniak and Skotnicka-Zasadzień 2012). The technical quality of websites used to provide the services and their general accessibility for people with disabilities, mobile devices, and search engines are just as important (Galvez and Youngblood 2016).

Search engine website optimisation (SEO) is usually a personalised commercial service. Its quality depends mostly on the experience of the SEO auditor or interactive agency. A website that has been search-engine optimised has a better potential to reach users with its message. It applies to public administration websites as well. The purpose of the paper is to assess the degree of search engine optimisation of local government websites in Lesser Poland.

This paper is organised as follows. The second section describes the essence of SEO with a particular focus on technical SEO and its impact on the quality of a website. Section three describes the methodological framework for the research. Next, we presented the results in tables and in spatial terms. The paper ends with a discussion and summary.

Search Engine Optimisation

Search engines are an important way of obtaining information on the Internet. Many people use search engines as a starting point for navigating the Web, making search engines a crucial link in connecting content providers and users (Baye et al. 2016, p. 6). Search engines have two primary functions: they build a content index and provide an ordered list of websites (resources, search results). Search engines answer questions. The search engine searches a corpus of documents (indexed resources) and returns results that answer the question.

Website quality verification and determination of popularity and accuracy of results are not done manually. They are decided by algorithms that analyse up to several hundred variables, so-called ranking factors. Many of them are technical. When optimised, they can improve website usability (user experience) and their rank in search results (machine experience).

Search engine optimsation (SEO) is a process of increasing the number of visitors to a website by achieving a high rank in search results returned by a search engine (Moreno and Martinez 2013, p. 564). The higher a website ranks in the search engine results pages (SERPs), the greater the likelihood of users visiting the site. Search engine optimisation is a process of improving a website's position so that the webpage comes up higher in the search results of major search engines (Curran 2004, p. 202). SEO is a process that manipulates website characteristics and incoming links to improve a site's ranking in the search engines for particular search terms. Because of the importance of high search engine rankings and the profits involved, search engine optimisers look for tools, methods, and techniques that will help them achieve their goals (Malaga 2010, p. 3). The practice of search engine optimisation can significantly increase a website's search rankings, driving more traffic to the website, and thereby increasing revenue. The three primary SEO strategies are Content, Link Building, and Social Sharing (Zhang and Cabage 2017). Moreover, search engine optimisation has been considered one of the most important techniques in Internet marketing (Tsuei et al. 2020).

In general, the process of SEO can be broken into four main steps: (1) keyword research, (2) indexing, (3) on-site optimisation, and (4) off-site optimisation. One can distinguish between technical SEO and search experience optimisation (SXO) (Figure 1).

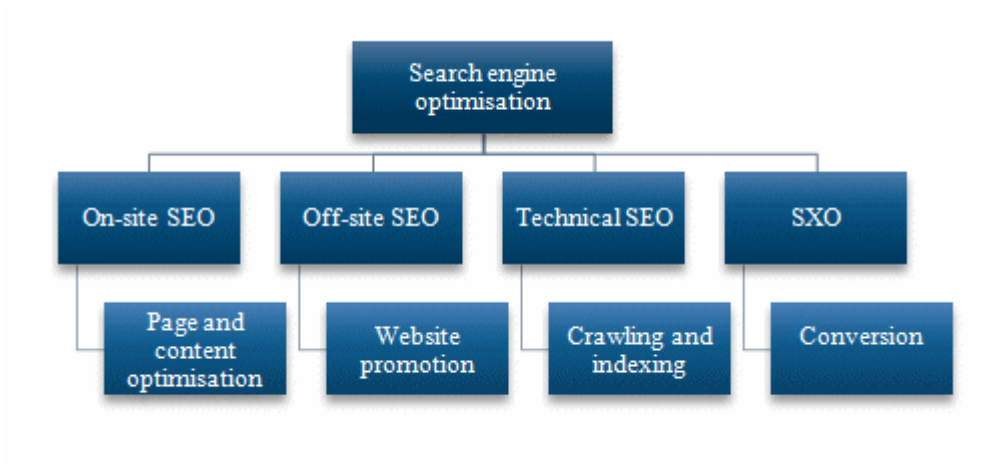

Fig. 1: The scope of website search engine optimisation

On-site optimisation is a process of developing or making changes to a website to improve its search engine rankings. Search engines return the most relevant documents determined by complex algorithms that adopt a plethora of criteria or ranking factors continually changing over the last decade (Mavridis and Symeonidis 2015).

There are a lot of on-site factors that are considered in determining a site's ranking for a particular term (Malaga 2010, p. 11). Some of them are technical and hence belong to technical SEO. Search experience optimisation (SXO) is a process aimed at improving the experience related to the presentation of a specific website in search results. Moreover, search experience optimisation recognizes that it is the user experience, not search engines (machine experience) that ultimately determines SERP position and rank.

Some of the main on-site factors used by search engines to determine rank include the title tag, meta description tag, bold text, keyword density, and the constant addition of relevant, unique content (Malaga 2010).

Technical SEO

Technical SEO focuses on the improvement of technical attributes of websites. The perfected technical side of a website enhances both machine experience and user experience. Technical SEO is part of on-site SEO and supplements activities belonging to off-site SEO to amend site visibility. A technical SEO audit includes such operations as the verification of the robots.txt file and sitemap, verification of the structure of URLs (Uniform Resource Locators), including breadcrumbs, and measurement of website performance and usability on mobile devices. A sitemap presents information on sites and other pieces of content (files, resources) that comprise the website and their relations, which facilitates indexation of individual sites. The robot.txt file contains information for search engine crawlers regarding indexable resources (Gudivada et al. 2015). Technical SEO is also about security (for example, Secure Socket Layer certificates, SSL) and website indexing in search results.

A technically well-developed website has a carefully built link profile, Especially internal links and outbound links. A large number of bad links hinders user experience and machine experience and may contribute to worse ranks in search results (Król and Zdonek 2019). Technical SEO concerns optimisation of metadata as well (title tag, meta description, meta keywords, favicon). Furthermore, it identifies and eliminates duplicate content, optimises internal links and URLs, optimises anchor texts and descriptions of images (alt tags), and optimises headers (header tags) (Tsuei et al. 2020). Technical SEO attaches great weight to website conformity to the standards of the World Wide Web Consortium (W3C), including code syntax, and Web Content Accessibility Guidelines (WCAG) for accessibility to people with disabilities (Król and Zdonek 2020a). Technical SEO effort focuses particularly on improving website performance, including the load time. Performance optimisation includes file compression or code minification (Giannakoulopoulos et al. 2019). Things technical SEO strives to avoid is embedded objects, such as iframes or Flash. It rather tends to

optimise websites for mobile use instead. Optimisation of all these factors affects website quality and may improve its search results rank (Berman and Katona 2013, Zhang and Cabage 2017).

Materials and Methods

The research involved 182 websites of local government units of Małopolskie Voivodeship, Poland (Figure 2). The study included all municipalities of the province. Their technical SEO quality measurement was conducted with eight web applications and the Lighthouse plugin (Table 1).

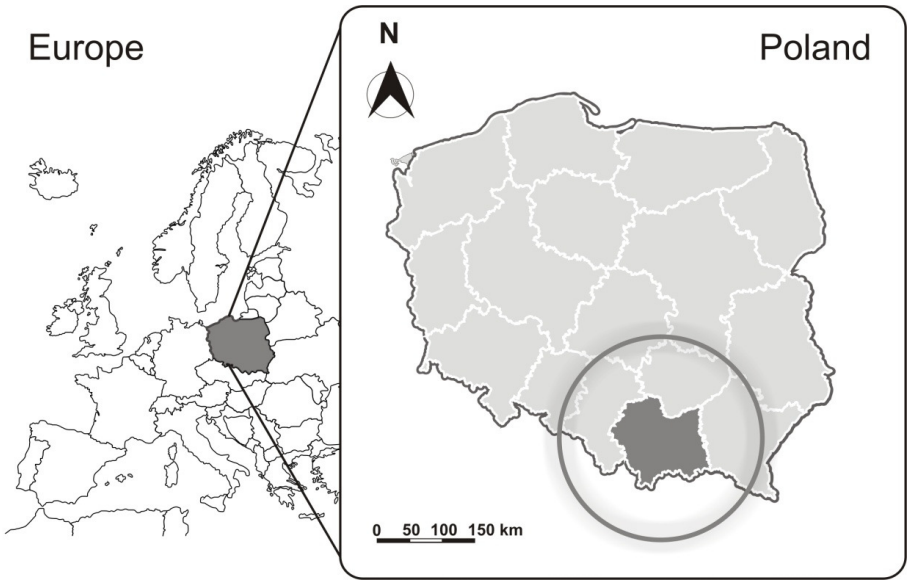

Fig. 2: Małopolskie Voivodeship, Poland

The research was informal, quantitative, and carried out under normal use conditions. The total number of unique tests amounted to 1,820. We have selected free tools available under a thin client framework. It means that the entire infrastructure the test application requires is on the service provider's end and tests are performed on a client device in a web browser window. Each test was concluded with a final score aggregated from individual technical SEO tests. The final scores were positioned in various ranges and resulted from the aggregation of multiple tests (Table 1).

Table 1: Test applications and scope of tests

Item	Test application (Application type)	Scope	Score range
1.	SEO audit (online)	SEO analysis, analysis of the most frequent keywords, backlink analysis, number of sites indexed by Google	0–5
2.	ZadroWeb SEO Auditor (online)	Page Authority; Domain Authority; Google Page Speed; SEO stats: meta title, description, keywords, heading tags, img alt tags, site map, inline code; URL stats	0–100
3.	Website Grader (online)	Website tests: performance (including page size, page speed, minified JavaScript and CSS, image size), mobile, SEO, security	0–100
4	Blink SEO Audit (online)	HTML structure and metatag analysis, website load time analysis, security analysis, and semantic analysis	0–100

5.	Seobility SEO Checker (online)	Meta information, page quality, page structure, link structure, server parameters, external factors	0–100
6.	Sitechecker (online)	SEO stats: description tag, headings, title tag, alt tag, etc.	0–100
7.	Ionos SEO Checker (online)	Search engine visibility, content (link, page title, headlines, page descriptions), backlinks audit, mobile tests	0–100
8.	Foxy SEO Checker (online)	SEO stats: title tag, description tag, keywords tag, headings, alt attribute, text/HTML ratio, XML sitemap, robots.txt, embedded objects, iframe, etc.	0–100
9.	Lighthouse (Chrome plugin)	Mobile mode measurements. Google Developers. Content best practices, meta tags, alt tags, other.	0–100
10.	Lighthouse (Chrome plugin)	Desktop mode measurements. Google Developers. Content best practices, meta tags, alt tags, other.	0–100

1) https://www.pozycjonowanie.pl/audyt-seo; 2) https://zadroweb.com/seo-auditor; 3) https://website.grader.com; 4) https://audyt.blink.pl/; 5) https://freetools.seobility.net/en/seocheck; 6) https://sitechecker.pro/pl/; 7) https://www.ionos.com/tools/seo-check; 8) https://www.seofoxy.com/seo-checker/

The research approached the websites from two browsing perspectives, desktop and mobile. Such a design facilitated a comprehensive investigation of the technical attributes of the websites (Figure 3). The tests followed the cross-validation model with the test tools chosen to complement each other (Król and Zdonek 2020b).

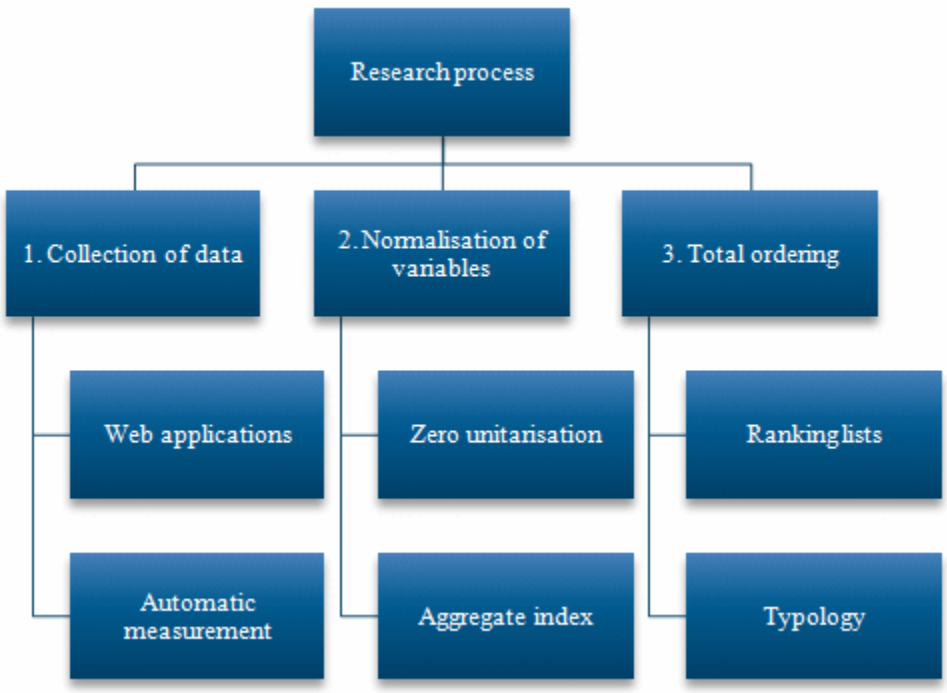

Fig. 3: Diagram of the research process

Each website was described with ten different quality indices. The scores were normalised and aggregated with zero unitarisation so that the websites could be juxtaposed. Zero unitarisation is recommended for multidimensional comparative assessment (Jarocka 2015).

Normalisation was performed with Equation 1. Normalised variables lie in the (0,1) interval. We then added up all the normalised variables to obtain the aggregate index. It means that each website we tested could earn up to 10 points.

$$zij = (xij - mini\{xij\}) / rj \quad (1)$$

where $zij \in (0,1)$. and:
zij – a normalised characteristic;
$zij = 0 \Leftrightarrow xij = mini\{xij\}$;
$zij = 1 \Leftrightarrow xij = maxi\{xij\}$;
xij – the value of the characteristic before normalisation;
mini{xij} – the minimum value of the characteristic before normalisation;
maxi{xij} – the maximum value of the characteristic before normalisation;
rj – the range for the j-th variable.

The normalisation of diagnostic characteristics is an important stage of comparative analysis of multivariate objects. The idea behind a multidimensional comparative analysis is to build a synthetic index that facilitates the total ordering of objects. Here, the term normalisation means unification, standardisation of values of characteristics regarding a specific criterion. The main objective of the transformation is to conform to the addition postulate by rendering characteristics of different measures comparable (Jarocka 2015).

We then used QGIS to visualise the results in spatial terms. Finally, we classified the municipalities to respective types (using the technical SEO aggregate index). We used the equal interval classification method to this end (objects are divided into types delineated by equal intervals). The typology was based on the technical quality of the websites.

Results

A website in need of complete optimisation reached 2.77 points out of 10, which was the smallest technical SEO score in the study. A website that has been search-engine optimised scored a little over 8 points out of 10 (Table 2).

In total, the websites had 1,007.47 technical SEO points out of 1820, which is about 55% of the maximum number of points. The websites demonstrated a significant potential for search engine optimisation of a little over 44.5%.

Table 2: Selected technical SEO statistics

Quality index	Numeric value	Percentage (%)
Minimum	2.77	27.69
Maximum	8.06	80.64
Range	5.29	52.90
Maximum score	1,820	100.00
Measured score	1,007.47	55.36
SEO potential	812.53	44.64

About 45% of the websites needed a comprehensive search engine optimisation (Table 3). The websites usually scored about 5 points for technical SEO attributes and were classified to types III and IV (in the employed research design). Websites classified to type II scored slightly better, from 5.4 to 6.8 points. Only 11.5% of the websites scored high.

Table 3: Quantitative summary of websites classified with the technical SEO index

Website type	Type IV	Type III	Type II	Type I
Technical SEO quality index	2.5–4.099	4.1–5.417	5.417–6.741	6.741–8.064
No. of municipalities	11	71	79	21
Percentage (%)	6.04	39.01	43.41	11.54
SEO summary	Websites requiring search engine optimisation		Websites (relatively) search-engine optimised	
Number of websites	82.00		100.00	
Percentage (%)	45.05		54.95	

The websites could score up to one point in each test. Therefore, each test tool could award up to 182 points (for the set of investigated websites). Each test application performed a different set of tests both as regards the number of tests and the scope of tested attributes. The websites scored the best in technical SEO measurement by Lighthouse (both desktop and mobile mode). The worst scores were awarded by Ionos SEO Checker (Table 4). A significant variance in technical SEO attribute scores urges an in-depth analysis of the results.

Table 4: Technical SEO potential according to each test application

Item	Measuring tool	Total for measurement (normalised); max. 182	Percentage (%)	SEO potential (%)
1.	SEO audit	122.60	67.36	32.64
2.	ZadroWeb SEO Auditor	87.33	47.98	52.02
3.	Website Grader	83.65	45.96	54.04
4.	Blink SEO Audit	94.73	52.05	47.95
5.	Seobility SEO Checker	105.80	58.13	41.87
6.	Sitechecker	98.97	54.38	45.62
7.	Ionos SEO Checker	35.99	19.77	80.23
8.	Foxy SEO Checker	121.79	66.92	33.08
9.	Lighthouse mobile test	127.05	69.81	30.19
10.	Lighthouse desktop test	129.56	71.19	28.81

The spatial distribution of the website quality results for the municipalities of Małopolskie Voivodeship demonstrated that large urban municipalities, often tourism destinations, such as Kraków, Krzeszowice, Zator, Muszyna, or Tuchów, boasted better-designed websites (Figure 4). Moreover, municipalities situated near large tourism destinations such as Kraków, Łącko, Bukowina Tatrzańska, or Limanowa also scored high.

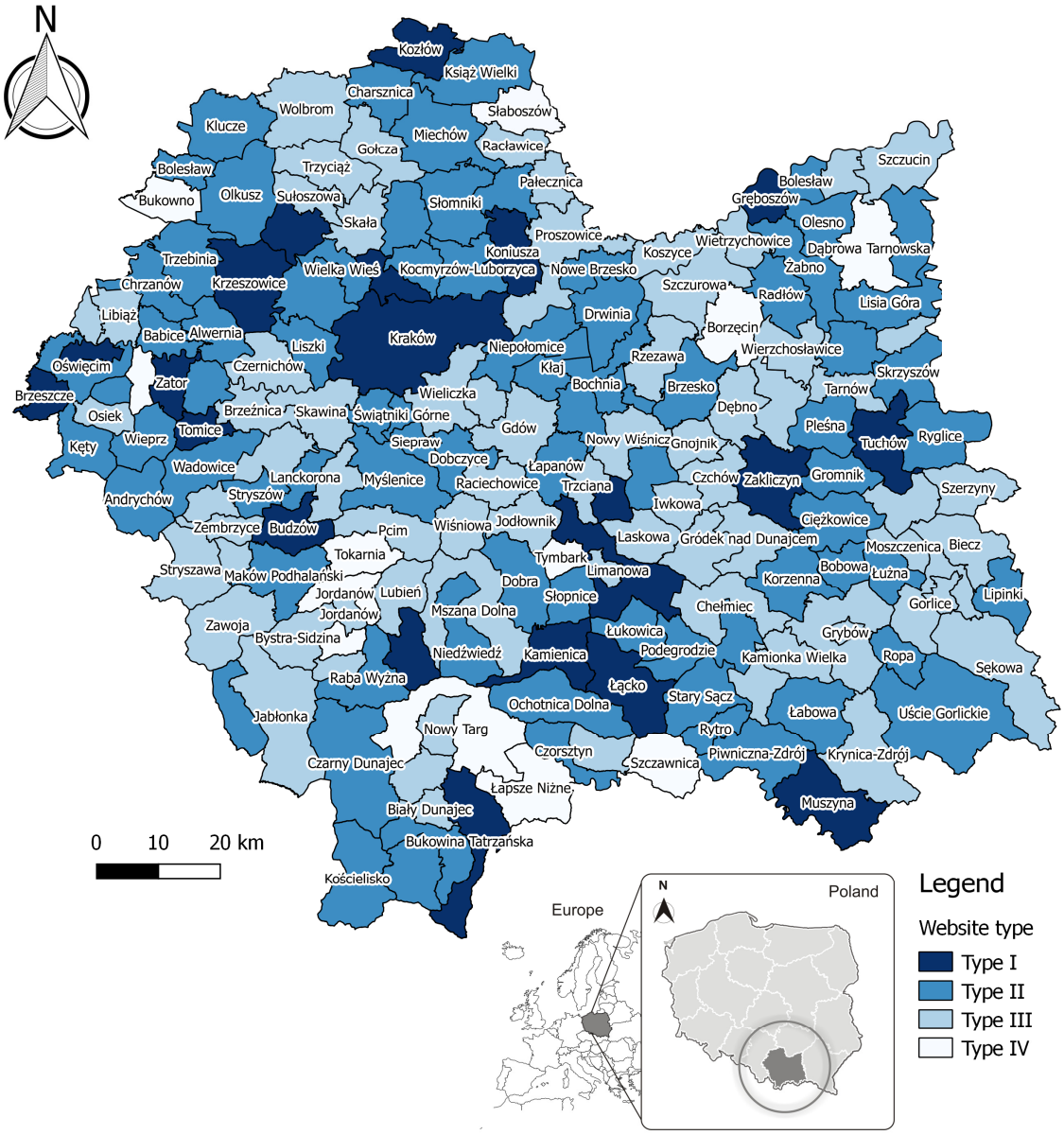

Fig. 4: Typology of municipalities in Małopolskie Voivodeship regarding website optimisation. Source: own research

There were relatively few websites with the lowest scores. The synthetic technical SEO score identifies websites in need of an in-depth quality analysis or an SEO audit that will pinpoint trouble attributes in need of optimisation.

Conclusions

Websites of local government units classified to type I (6.7 to 8 technical SEO points) were usually performance-optimised; their load times were short. What is more, they were optimised for use on mobile devices. It was possible to browse them comfortably on smartphones, tablets, and similar equipment. Websites of this type usually had a complete set of metadata. They had no objects advised against, such as iframes or Flash objects. Type I websites had a well-

designed profile of external links and usually a significant number of quality inbound links. Type IV websites, the ones that reached the lowest technical SEO scores, required a thorough optimisation or redevelopment. Note that these websites scored poorly in all the tests, which indicated the reliability of the assessment.

The research investigated the technical attributes of websites. Nevertheless, it is people who are behind the quality of websites. Many of the identified 'SEO flaws' could be easily fixed. With no qualified personnel and a quality assurance system in place, the implementation and development of e-services can be significantly hindered or even impossible. SEO is a process, and each website is dynamic if only because of new content. Hence, every website has to be reviewed regularly and corrected in terms of technical SEO attributes.

Websites of local-government units in Małopolskie Voivodeship exhibited a relatively high degree of search engine optimisation. An in-depth analysis of selected websites indicated that it was often just minor details that required improvements, such as meta information, which can be done by the municipal IT department. A large number of relatively easy to fix errors suggests that municipalities do not audit their websites. Insufficient knowledge regarding weak points of municipal websites can hinder the development of e-administration.

The results indicate that public administration websites are not given sufficient attention. Their fate depends on the strategy of the unit, knowledge about e-services, and the attitude towards databases and IT systems. What is also necessary is to implement a quality management system for both e-services and the website (or web application). An internal control system with a checklist can be useful to ensure the quality of websites and web applications. Efficient, functional, and convenient websites contribute to the perception of the office as customer friendly and helpful.

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Expatriate Instructors in the Middle East: Adjustment to COVID-19

Ilya BYSTROV
University of Buraimi, Al Buraimi, Oman, ilya.bystrov@gmail.com

Brindha NATARAJAN
Sri Hayagreeva Arts and Science College, India

Abstract

The article is dedicated to the way instructors of higher education institutions have coped with the COVID-19 pandemic in two countries of the Middle East— the Kingdom of Saudi Arabia and the Sultanate of Oman. The research was carried out using qualitative design. Data were collected during semi-structured interviews with 15 respondents who work at higher education establishments of these countries. Observations were used as an auxiliary instrument. The results are summarized in the form of five cases that reflect different strategies and reactions of instructors to address the stressful emergency conditions. The research revealed the following behavioral patterns: Survivor, Victim, Skeptic, Promoter, and One of the Crowd. Coping strategies were differentiated through information consumption, information dissemination, assertiveness, and anxiety level. Respondents demonstrated shrinkage of planning horizons, caused by the pandemic and economic downfall. The research showed that respondents had increased levels of anxiety, which should be addressed by academic managers.

Keywords: COVID-19, SARS-CoV2, behavior pattern, GCC, expatriate instructors, social media, social interaction

Introduction

COVID-19 (SARS-CoV2) has caused major disruptions, and has resulted in significant upheaval in the everyday lives that many people have become used to and taken for granted for many years. Among such disruptions are restrictions of travel and movement, personal interactions, and interpersonal communications, resulting in impaired economic relations and supply chains. Globally, this has put dozens of industries — including education — under enormous stress, augmenting changes of routine and professional lives. Social interactions, and even social organization itself, has been affected; that is, a fundamental element of the biological environment has introduced changes to the socio-cultural level.

According to Meijer, Verloop, & Beijaard (2002), educators' mental processes mutually define what is happening with the learning environment. How well expatriate instructors can adjust to the environment depends on multiple factors. The goal of the present research is to reveal how instructors of higher education institutions have coped with the stressful conditions caused by the pandemic and how this situation has changed the behavior patterns that are part of their personalities.

Multiple studies have identified the psychological impacts of the current situation on people globally. According to Liu, Ren, Yan, Li, Xu, Yu, Qu, Wang, Tian, Yang, Yao, Tan, Jiang, & Tan (2020) evaluated more than 14,000 respondents from 31 provinces of China and concluded that the emergency medical health system needed to pay attention to the extent of stress and psychological distress among the general public during and even after the biodisaster, thus contributing to the timely and targeted psychological services put into effect.

A study from Italy (Favieri, Forte, Tambelli & Casagrande (2020)) suggests that the COVID-19 pandemic appears to be a risk factor for psychological diseases in the Italian population, in a situation similar to that of China. According to this study, about half of respondents reported a significant psychological impact. The study also confirmed the role of restraining measures in modifying lifestyles, social perceptions, and confidence in the institutions. Notably, this study of more than 1600 Italian residents revealed that 5.1% of respondents demonstrated post-traumatic syndrome distress symptomatology and 48.2% evidenced lower psychological well-being linked to COVID-19 diffusion.

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The relationship between mental health, the current pandemic situation, and social media has also attracted the attention of scholars. Gao, Zheng, Jia, Chen, Mao, Chen, Wang, Fu & Dai (2020), conducted a cross-sectional study among Chinese citizens who were older than 18 years. Their findings show that there is a high prevalence of mental health problems during the COVID-19 outbreak.

As highlighted, the media element plays an important role. Earlier studies, e.g., Cameron, Wolf, & Baker (2011), demonstrated the effectiveness of dissemination of health-related information for the improvement of health literacy and reduction of mortality rates and hospitalizations. According to Casero-Ripolles (2020), who conducted an exploratory analysis of media usage before and during the current situation, the COVID-19 pandemic has a certain impact on the media system. His findings suggest the emergence of important developments, such as the resurgence of the role of legacy media, especially television, and the fact that citizens who usually maintain a distance from such information have reconnected with news sources.

The role of social media in anxiety-related phenomena has interested researchers since its introduction. For example, Hampton, Rainie, Lu, Shin, & Purcell (2015), stipulated that social anxiety can originate from managing a large network of social media friends, feeling jealous of others' lives, and the "fear of missing out" on activities in online interactions. Recent research, however, argues that, by itself, social media usually does not cause negative effects. According to Jiang and Ngien (2020), who explored the effect of usage of one of the social networks on social anxiety, its use did not directly increase social anxiety. Instead, social comparison, a proximal outcome, and self-esteem, an intermediate outcome, played mediating roles, supporting the complete mediation effects.

Relationships between human behavior and disasters, catastrophic events, and calamities interested authors prior to the current pandemic. Even without examining Ancient history, the Medieval Period, or the Renaissance, the 20th century has provided numerous examples of studies and analysis, produced by religious thinkers, philosophers and researchers. For example, almost 80 years ago, Sorokin (1946), tried to analyze the nature of the relationship between man and society, and shared his thoughts on the effects of war, revolution, famine, and pestilence upon the human mind, behavior, social organization, and cultural life.

Later studies (e.g., Lazarus & Folkman, 1984) provided an understanding that stress is faced differently by personalities with different characteristics. This research suggested two types of coping: problem-focused and emotion-focused. The former is focused on problem-solving and the circumstances leading to stress, whereas the latter presupposes the regulation of emotions and their expression. Leventhal, Leventhal & Contrada (1998) viewed a person as a problem-solver who responds to social, physical, and institutional environments in which he or she faces health threats. In a wider evaluation, they perceived these elements of the environment as the basis for efficient use of resources that allows implementation of coping procedures that, in turn, allow a self-regulating system to adapt.

Quarantelli (1999) summarized the preceding studies of disasters and made several important conclusions regarding the mechanisms by which disasters affect social behavior. Saleebey (2001) widened the scope of study and introduced the social element into consideration; in his analysis of human behavior he used a biopsychosocial approach.

More recent studies, e.g., Codreanu, Celenza, & Jacobs (2014), analyzed the effect of disaster education on behavioral changes. In the most recent studies, e.g. Pan, Dresner, Martin, Mantin & Zhang (2020), behavioral peculiarities related to catastrophes have been studied in a very utilitarian way—that is, from the perspective of consumer behavior.

The effect of existing global work conditions should not be ignored as well. Multiple studies demonstrate that the economic and organizational changes of the last decades have altered the productive processes (Carreri, 2020).

As can be seen, this topic has been studied relatively well. Our study will contribute to existing research by focusing on how expatriate instructors, a distinctive social and cultural group, have faced the stress related to COVID-19, and identifying their behavior patterns in relation to the use of social media and social contacts.

Methodology

For this research, we used a design similar to that applied by Romar & Frisk (2017) to study the influence of occupational socialization on novice teachers' practical knowledge, confidence, and teaching in physical education

and also similar to that applied by Bystrov, Natarajan & Mirza (2019) to study adjustment of expatriates. We paired semi-structured interviews with the participant observation method (when possible). The latter gave us an opportunity to study individuals in their natural environment and make observations that would either support or contradict their stories. The majority of interviews (9) were carried out in the place of the respondents' choice—either the respondent's home or the interviewer's home. Six interviews were conducted with the help of a videoconference application.

Respondents represented faculties of several higher education institutions located in Saudi Arabia and the Sultanate of Oman. None of the respondents had a medical or health science background. This was a conscious decision, in order to try to understand the processes and dynamics happening inside relatively educated communities and groups that, nonetheless, do not possess medical expertise.

We summarized the results of the conducted interviews as five cases, giving them names that best reflected their nature. While the behavior patterns described in the first four cases were encountered in only one interview each, the last case represented the most common pattern, and was met multiple times. In this way, the description of the last case is aggregative.

Results & Discussion

Upon completion of interviews, we were able to differentiate the following cases:

Case A—Survivor.

Case A was a male in his mid-forties. He was Muslim and originated from the Indian sub-continent. In the country of residency, he stayed with his family—wife and two children; both children were of junior school age. A was an MBA degree holder, but at the moment of interview was finalizing his PhD thesis.

When A heard about the outbreak of a new virus in China, he had some concerns. As he stated, "Asia and Africa are always giving headaches. They scared us with Ebola, SARS and MERS; now this COVID". He couldn't recall using any precautionary measures prior to the beginning of 2020. The turning point for him was the news announcement about the construction of temporary hospitals in China. Thereafter, he began to perceive the situation as dangerous.

Respondent A followed all recommendations issued by the local Ministry of Health. He went even further and implemented measures that were not requested. Prior to the announcement of lockdown in the country where he resided, he went to the hypermarket and created a reserve of products that would be enough for him and his family to last for two months.

A also reported that his family minimized contacts outside the home even before social distancing and isolation were recommended. It was arranged that both children stopped going to school and started home studies under the mother's supervision two weeks before schools were closed and reassigned to remote teaching. Once food reserves were created, visits for groceries were minimized to once every three weeks to replenish them. Such food runs to the hypermarket were carried out at times of minimal presence of other customers—immediately after opening or 30 minutes before closing.

When asked about the usage of social media, the first thing A mentioned was the communication group in one of messengers that he and other residents of his ethnicity (about a dozen families) organized. A evaluated the communication group especially highly for its support during a time of slight panic "… when hand sanitizers, gloves and masks were wiped out almost everywhere. A almost ignored all other media—he only mentioned a website with coronavirus statistics that he visited occasionally and a videoconferencing application to communicate with members of broader family.

A did not complain about any health-related issues, sleep irregularity, or increased level of anxiety. He mentioned, however, that he was worried that his family members could be infected; however, he perceived these only as a motivating factor for proper actions. It is worth mentioning that during the interview A expressed his concerns about his immediate family, broader family, and his local community multiple times, while never expressing worries about himself.

A did not think that there would be any consequences that would affect his long-term plans. His plan to stay with his current employer was unchanged. He still believed that his current place of residence was one of the most secure places in the world (due to culture, relative geographic isolation, and low number of population). However, he anticipated changes to the style of social contacts, especially in face-to-face mode, which would, in his opinion, "become a luxury". He also expressed some concerns regarding the state of the world economy.
Overall, A's character can be described as properly planned and ready to take on the challenges that life presents. He is calm in approach, practical, and slightly extra cautious. To a certain extent, his behavior can be characterized as assertive, which presumes a high degree of self-confidence and self-respect, and allows a maximum degree of self–determination. According to Pfafman (2017), assertiveness is also a social competence. Assertive people are comfortable with constructive criticism; they are planners and try not to blame anything unnecessarily. They are willing to explore other new solutions (Michel, 2008). In perceiving a pandemic, they try to determine the exact scenario and accept inconveniences for betterment without hesitation.

From the communication perspective, assertiveness is expected to coincide with polite performance. Thus, according to Jenkins and Dragojevic (2013), politeness is a socially and contextually negotiated subset of appropriateness determined by the inter-play between identity, context, and relationship. It allows people to make requests that are less invading of others while maintaining a positive relationship (Brown and Levinson, 1987). Both were demonstrated by A in his problem-focused behavior.

Case B—Victim.

Respondent B was an eastern-European male, in his early forties. He was married, but at the moment of the interview, his wife was staying with relatives in her home country and B resided alone. B had a doctoral degree; he was a Christian, but not very religious.

When B first heard mention of a new disease in China, he did not pay much attention to it. At the beginning of January, he and his wife travelled to his home country for a week. Later, when the situation had deteriorated, he did not object to his wife's visit home. On the day that he heard measures for containing the spread of the virus would include closure of the majority of non-essential businesses, he went to the hypermarket and secured some food reserves—mostly rice and canned food.

The social contacts of B did not change significantly. As an introvert (as he characterized himself), he did not require a large number of contacts. He still maintained connection with his elderly parents and wife via videoconference application.

When asked about his usage of traditional and social media, B noted that the amount of time he started to spend watching online videos, listening to broadcasts, or reading posts in messengers or social networks increased considerably once his employer introduced a remote mode of work. "Every day I start with checking online coronavirus statistics for three countries—my home country, country where I am now and country my wife is from… My wife has asthma, my parents are almost 80, I am myself an ex-smoker—we all are in the risk group". He continued, then: "During the day I read posts in social networks and messengers in groups that are related to the disease, and while I do this I listen to radio or TV broadcasts where medical experts give updates". When asked if he watched or read anything that was not related to the disease, B said that he could watch a TV show occasionally, but overall, more than 50% of his time was dedicated to pandemic-related content.

It appears as if B had become trapped in a loop: feeling anxious, he started to look for information that would ease his fears; finding predominantly negative information increased his anxiety and forced him to spend more time searching for positive information. This cycle started to repeat daily.

When asked about his physical condition compared with the time before pandemic, B said that it was hard to define. From one point of view, when "it got serious" he quit smoking and from that perspective he felt noticeably better. From another perspective, B mentioned that his sleep pattern changed in negative way. Since he began to work remotely, he stayed awake until 03:00 or 04:00 and then slept until 10:00–11:00. He also complained that it became much harder for him to get to sleep.

Finally, B characterized his state the following way: "I felt very irritated with everything. Lost a couple of chess games while playing online—hit my smartphone several times. My cat demanded something too loudly—I shouted back at it." The state of B clearly showed anxiety-related hyperesthesia, as he couldn't remember doing or feeling anything similar before.

Regarding his future plans, B took a time-out for a minute and then stated that he wished everything would get back to normal, but he doubted it. He mentioned that he was looking for a new job placement in another region, but "with globalization turned backwards" it would hardly be possible. He sadly admitted that he would have to stay with the same employer at least for another contract term, as the coming few years did not have good employment prospects.

Overall B presented himself as a "take it on the run" type of person, emotionally-driven and with fears about life. Within the assertiveness model, his behavior pattern and responses can be characterized as partially passive, sometimes even as passive–aggressive.

Case C—Skeptic

Respondent C was a male in his mid-fifties. He was Muslim, originated from the Indian subcontinent, and was a master's degree holder. He was married, with two children from his first marriage that were already living independently. At the moment of the interview, he resided alone, as his wife was staying with her parents in their home country.

Respondent C admitted that he did not believe that the disease was as dangerous as the majority thought. In his understanding, the virus definitely existed, people became sick, and some even died. However, he then asked the rhetorical question: "What are the odds? I am not afraid of flying back home, or going in the car to the campus – both activities are much more dangerous than this virus". His point of view was that the dangers were deliberately exaggerated too much. When asked to elaborate on that, C started by defining himself as an Islamic socialist. He then told the interviewer that "… the existing organization of the world economy couldn't last anymore… Politicians and big corporations don't want to assume responsibility for economic crisis of the century and quarantine measures give a good explanation for 20–30% downfall in world economy". It appeared that the picture of the world that existed in C's mind was very well thought out and explained well his behavior and attitudes.

This skeptical perception of events was reflected in the way C maintained his social contacts. He admitted that, in comparison with the pre-pandemic situation, his social interactions declined, although only to a little extent.

When asked about his usage of media, C specified that he was not a big fan. However, occasionally he communicated with his friends who mostly shared the same point of view. Respondent C said that they "… exchange links between each other that undoubtfully shows this "pandemic" is not as scary as media is trying to demonstrate".

The major concerns of C were related to economic issues. Although he admitted praying for the health of his relatives and friends, he also specified that this was the same as the routine he followed in the previous several years. The anticipated economic crash, on the contrary, made him much more worried—for the two sons that he had to support until they finished their education, as well as for his and his wife's parents.

Overall, C demonstrated an example of problem-focused behavior.

Case D—Promoter.

Case D was a central European male, with a PhD degree, who was a Christian. He was married with two children. His immediate family resided with him.

Initially, when cases of the new disease were reported only in China, D did not worry much. His concerns started to grow at the end of January, when cases were reported in multiple parts of the world, and reached their peak in the middle of March, when the European Union closed its external borders.

Speaking about changes in the structure of his social contacts, D mentioned that he read in one group chat that "the safest way to avoid being infected is to avoid people. When you don't meet anyone, you have no chance of getting this virus". Following this understanding, D minimized his face-to-face social contacts to an absolute minimum.

When asked about how did he use media during the pandemic, D immediately became excited. He shared with the interviewer that he spent a large amount of time using social media and messengers, collecting and then reposting information. When asked about the reasons for doing so, D exclaimed: "… What if it is true? In this case I can save people by warning them." Later he additionally clarified: "Doctors don't know any more than we do. Many of them

are just clueless about how to treat this disease. If I pass the word that this or another method can help, somebody will be able to survive". Case D was not an author of any of the facts or claims that he spread. Rather, he only propagated them, with good intentions. Another interesting point mentioned by D was that broadcasting of messages allowed him "to introduce some order in the chaotic environment, where no one knows what to do". Preference was given to messages that "originated" from a "respectable" source—"doctors from Wuhan", "Center for Disease Control", and similar. Such an approach creates an illusion around events, as analyzed by Kapferer (1989). He described the spread of a rumor that certain food products were dangerous and caused cancer. The rumor was in circulation across different European countries for a decade, which happened without social networks and solely by physical dissemination in shops or mailboxes. Even educated people—teachers and doctors—participated in this activity, because the initial document was made on behalf of a clinic that specialized in cancer treatment. Although occurring at a different time, and with different means of communication, this is the same phenomenon as that in evidence with D.

Speaking about possible changes in his future plans, D stated that he didn't anticipate major changes. Some changes might happen, he believed, to traditional means of interaction between people.

During the interview, D demonstrated traits that placed him between an assertive and aggressive personality. While being emotion-focused, he was engaged in dissemination of facts that sometimes were far from reality.

Case E—Part of a Crowd.

Case E was a collective case that reflects the results of more than two-thirds of the conducted interviews—11 interviews of 15. All respondents representing this case were either master's degree holders (four), or had completed their doctorate (seven). Male and female respondents numbered five and six, respectfully. Eight of these respondents were married, while three were either unmarried or divorced. Members of this group of respondents originated from the Indian subcontinent, Europe, and South-East Asia.

Initial estimations of the situation were largely similar among respondents of this group. As one of the respondents noted, "People pass away every day. If I think about every poor soul that dies, I get crazy". Another respondent formulated in the similar manner: "If something happens, but it doesn't directly affect me—let it be, I don't care much".

Respondents of this group were mostly concerned with themselves and their immediate families. Most often they mentioned the fear that they or their family members would be infected, while there was no effective scheme of treatment or vaccine.

All respondents that represented this case reduced their face-to-face contacts and shifted communication activities mostly to social networks and messengers. Half subscribed to groups and channels that either specialized in the distribution of news related to the current pandemic situation or represented official sources of information. However, their participation in the spread of information was limited.

All respondents that constituted this case were united with a high rate of conformism and exhibited susceptibility to a bandwagon effect. All respondents, at some stage, made similar observations: "… but when all around me started to wear face masks…"; or in the social network they were using "everyone became really scared".

The majority of respondents who formed the aggregate basis for Case E demonstrated verbal aggressiveness during the interview in their reactions. Experiences, behaviors, and responses they shared or demonstrated evidenced maladaptive aggression and predominantly emotion-based approach.

Conclusion

The conducted research allowed us to draw several major conclusions:

- Despite the limited number of interviews conducted, we were able to differentiate several distinct profiles of how respondents reacted to the pandemic danger: Survivor, Victim, Skeptic, Promoter, and One of a Crowd.

- Respondents demonstrated that they preferred to group together with respect to how they understand the current situation. Skeptics grouped with skeptics, survivors grouped with survivors, etc. This grouping was reflected

in respondents' preferences for social media. Sources and facts that supported their points of view were prioritized, while those that contradicted them were ignored.

- Cases C and D can be interpreted as demonstrating higher degrees of uncertainty, in which people do not know how the external environment will surprise them tomorrow. A feeling of loss of control over their own lives makes such respondents susceptible to conspiracy theories, which was reflected in their behavior.

- All cases that were different from the conformist majority were relatively more skeptical regarding the state of the post-virus economy. While the collective conformist Case E had mixed results in this respect—some were concerned, while others were not— the other four cases demonstrated explicit concerns in this regard that were also logically backed.

- The described cases and the revealed corresponding types likely cover the majority of pandemic reactions. Nonetheless, the existence of other types, particularly mixed types, is probable.

- During the pandemic, the planning horizons of respondents shrank. The circumstances meant that it became more complicated to plan for the future, taking into consideration both the medical and economic aspects.

- The conducted interviews showed that a majority of respondents had an increased level of anxiety, which, in some cases, was a reason to seek professional help. This should be understood by academic managers and appropriate measures should be taken.

- The obtained results of our qualitative study are consistent with the results of mass studies.

The implemented methodology allows us to formulate more accurate questions for the quantitative, correlational research that will follow, in which we plan to undertake quantitative evaluations to characterize the types revealed by this study.

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An Overview of Corporate Sustainability in Malaysia: The Current Practices and Potentials

Nur Syuhada JASNI[1] & Haslinda YUSOFF[2]

Faculty of Accountancy, Universiti Teknologi MARA (UiTM) Selangor, Malaysia
nursy168@uitm.edu.my[1], hasli229@salam.uitm.edu.my[2]

Abstract

This paper provides the current practices and potentials of corporate sustainability in Malaysia: Based on carefully selected from high-performance Public-listed Companies (PLCs) in Malaysia, we present a detailed picture of the current state of this research. Therefore, this paper is aimed at exploring the readiness of Malaysian companies thus point to promising future directions. The present study found that quality management and managing stakeholders' expectations are essentials in contributing to corporate sustainability development. Quality management provides consistent and organised in sustainability effort, which facilitated by quality employees. The findings provide evidence that managing stakeholders also includes efforts on building ethics, i.e. data protection and engaging with meaningful social projects for positive returns. Investigating more complex multi-level corporate sustainability, including sustainability risks and stakeholders' pressures, are among the promising future research opportunities.

Keywords: Corporate sustainability, Quality management, Stakeholders' expectation

Introduction

The Malaysian government has been working with the primary sources of finance, i.e. investors and financiers from bank institutions with significant roles in a company's growth. As a government arm, the Malaysia Stock Exchange, Bursa Malaysia has established the Sustainability Index known as FTSE4Good Bursa Malaysia (F4GBM) Index with an international consulting company, i.e. FTSE Group in 2014. The aim is to meet the expectations of sustainable investors in the financial market. Companies listed in the F4GBM Index must be reviewed semi-annually to verify whether each company has met sufficient sustainability factors incorporated in the company. Meanwhile, another source of financing is the financier, whereby the bank institution has worked with the government. Recently, CIMB Bank has provided Sustainability-Linked Loans (SLLs) in which the borrower receives financial incentives in the form of interest rate rebates if the borrower can demonstrate that the company has achieved its Sustainability Performance Targets (SPTs). According to CIMB website, the initiative has become a catalyst for businesses to embed environmental considerations into their strategies. It is promising to see investors and financiers working together in promoting responsible corporate citizenship in Malaysia. In this sustainability development, companies need to work on sustainability strategies to win both sources of financing for their company's prosperity.

Consequently, at a company level, a study is needed to shed some light on issues that have not yet been resolved by identifying the root causes of challenges to implement successful corporate sustainability and to address them appropriately. The contributions can potentially assist companies in rethinking and recognising their way of doing business that is beneficial internally and externally in synergising between profit-making intention and sustainable development. Thus, sustainability problems can be mitigated before they become worse and unmanageable, besides supporting policies at the macro-level (country) and sustainable development progress over time.

Hence, to understand the current situation, this study conducted a preliminary study to explore the readiness of Malaysian companies in practising corporate sustainability. It has been a definite lack of research focus within this context. Semi-structured interviews were conducted with five representatives from the Sustainability Department of high-performance Public-listed Companies (PLCs) in between June 2019- October 2019. The PLCs (involve in

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trading/services operation) are identified actively practising incorporate sustainability in Malaysia by Bloomberg's Environmental, Social, and Governance (ESG) Index.

Present and future view of corporate sustainability practices

This study offered some useful insights obtained from interviewees of this study regarding their view of corporate sustainability at present and the expectation of the future. The findings are discussed in the following:

Quality Management

Top-bottom approach is essential in assisting corporate sustainability to be more consistent and organised. Two of the interviewees ardently explained:

"I want to champion the company sustainability, and now I can say that I am pleased seeing how our management is putting the effort. They are becoming more aware, maybe through the exposure from our discussion, and maybe through their interaction, perhaps with other stakeholders, or maybe with other companies or investors. I am not sure. But now, it seems that they want us to move towards this direction. So, I think the future of corporate ESG in the company is looking bright because we don't acknowledge it before, but now, it is part of our corporate strategy..." (P1)

"Usually, the annual report is prepared by the communication group and the finance group. And, of course, corporate governance. But, since last year, or the last two years, we started to involve more relevant units—group strategy. Somehow we learn in a hard way. But it's getting better. We start within ourselves first, the idea began with Corporate Responsible, then Sustainability. Slowly, the idea to make the business sustainable has spread out. Not just for the community or environment. The other units are also aware of the need to be sustained. The concept also recognised among the leaders and the management. They will ask about how to measure, what the impact is, how it can be sustained. So, these kinds of questions have started flying around, which is good. Previously, when there is a new boss, there will be new initiatives. But now, by implementing the sustainability concept, the business becomes more consistent, organised, and develop good communication. When we manage a program, we leverage what we had. We are looking forward to how we can benefit more, how we can make it sustainable" (P3).

More companies established the Sustainability Department and taking sustainability seriously and adapt to changes from time to time. Two interviewees claimed:

"They appointed me to lead sustainability. To me, that is a major step for a company to decide that there is someone who will focus on sustainability. Not many companies want to invest in that, so for me, it is a sign that it is only going to grow, and I really hope that it is something that will continue to develop and improve at the company, or even not at the company. I like to see corporations, companies, or any organisation in general, to improve the way they address ESG matters" (P1).

"Corporate sustainability should not sit under the Public Relation (PR) department or Communication department. Then it becomes very, either very PR centric or sometimes it's a bit more of damage control. Oh yeah so it should be led by the management team that should be champion or advocate for the management team" (P2)

Meanwhile, one of the interviewees from, P5, clarified the academic background of the Chief Sustainability Officer:

"We have a Chief Sustainability Officer. His background is in Accounting. He is handling our corporate sustainability and also in the Board of Directors" (P5).

P5 added:

"Business growth has driven corporate sustainability commitments. In the Sustainability Department, we are focussing on sustainability management and have different units, for example, safety, certification, environmental, lean" (P5).

Results show that quality management includes the top-bottom approach, whereas, top management provides supports and direction leading to be more consistent and organised. Besides, it is an advantage for a company established their managerial autonomy, Sustainability Department that facilitated by qualified employees as it is contributing to the corporate sustainability development as well.

Managing stakeholders' expectations

Company internalising more compliance policies and tighten sustainability efforts to meet with stakeholders' pressures. P5 believes that:

"Talking about the future of sustainability, I think it will be even bigger because outsiders are attacking palm oil. So, we will be tightening our sustainability effort" (P5).

The company is aiming to become a trusted brand. Thus, more efforts on building ethics, for instance, data protection, as data privacy is part of good governance. The following interesting quote explains this situation:

"I think one main area for the future is ethics. Why did I say ethics? Because the forefront of technology that we are involved in, things like Big Data, Machine Learning, and AI, have a lot of ethical questions, which have not been answered yet. How much data privacy does one has? Obviously, we can actually capture a lot of data from all our subscribers; you know why there are people who want to buy, what they can do. All of these are related to ethics. So I think for us, we do see that as both an opportunity and a risk. If we don't do it well, it will be risks. But if you do it well, you will be seen as a leader and trusted by your customers" (P2).

The company is interested in reaching more people to find quality talent and build a strong base of satisfied customers. This quote explains the situation:

"We see that as a significant growth factor for the millennial relevance. Because technology is changing the industry, and you'll always take young people. Technology comes from them. So, we train talents and customers as very important. It's a risk and benefit for our reputation" (P2).

Consequently, corporate sustainability also related to social project. Hence, measuring the impact of the project is also crucial as engaging in a meaningful project will contribute positive returns. One of the interviewees, P3, believes:

"Based on the progress now, we already started the buy-in from the management. And somehow the culture has started. Everybody is asking, 'What's the impact?' 'How to measure it?' These kinds of questions don't even exist in past meetings. But, recently, all the bosses, they're not even bosses. Anybody can ask. What's the impact of this program? This is the kind of culture that we want to create. I'm sure this sustainability culture can grow in the company and can drive us towards business sustainability. If we do it correctly, we will stay in the industry. We'll survive, and we'll do better" (P3).

The findings provide evidence that managing stakeholders also includes internalising more compliance policies to meet with stakeholders' pressures and putting more efforts on building ethics, i.e. data protection. Furthermore, engaging with meaningful social projects in reaching more people to find quality talent and build a strong base of satisfied customers.

Conclusion

The ways Malaysian companies are taking corporate sustainability suggest that the continuous support from top management on corporate sustainability is crucial to encourage all employees to cooperate and adapt faster within the company. In the next few years, more companies are likely to set up the Sustainability department as their managerial autonomy and not sitting under other departments. It is no surprise that a manager leads the Sustainability Department with accounting qualifications, who has broad knowledge in this field. Therefore, it is generally accepted the nature and scope of accounting have diverse beyond account and reporting financial matters to manage non-financial on sustainability issues, such as Environmental, Social, and Governance matters. The purpose of central management is to measure sustainability in an organised and consistent way, hence convincing employees that sustainability is manageable and achievable. Recognition of successful corporate sustainability is believed to be a trusted brand that can create a significant influence in reaching more people, for instance, attracting quality talent and building a strong base of satisfied customers. In the light of sustainability risks and stakeholders' pressures, companies are driven to address the sustainability risks by tightening the efforts and communicating effectively with stakeholders.

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Human-Centric Approach in Corporate Sustainability: The Changing Landscape

Nur Syuhada JASNI[1] & Haslinda YUSOFF[2]

Faculty of Accountancy, Universiti Teknologi MARA (UiTM) Selangor, Malaysia
nursy168@uitm.edu.my[1], hasli229@salam.uitm.edu.my[2]

Abstract

Today, a growing number of corporate behaviour studies are linking between human-centric approach and corporate sustainability. However, the critical elements of the human-centric approach that contributing to greater corporate sustainability have yet to be undertaken. This paper points the key elements that are important in a human-centric approach that is accelerating the integration of corporate sustainability into strategic management. The literature review revealed that greater corporate sustainability are achieved through: (1) ethical leadership that derived from endogenous (internal) or exogenous (external) events pressures; (2) managerial autonomy that centralised sustainability commitment; (3) trained employees with skills and knowledge that also driver of innovations; and (4) utilising internal and external communication tools. The contribution of this paper provides a summary of the most critical issues that emerged in this field to improve business excellence. The basis of the human-centric movement is demanded a more structured development, hence should be addressed by further research.

Keywords: Corporate sustainability, Human-centric approach, Strategic

Introduction

Today, many companies are transforming the way their business operates by alleviating humanity and restoring the ecosystem to be more human-centric to become successful resilient businesses. Dutch Lady, Honda, Toyota, and Samsung are among the Multinational Companies (MNCs) that actively promote and practice human-centric concepts in their business operation. The implementation of a human-centric concept is aligned with fulfilling stakeholders' social needs. Internally, companies proactively involve employees on matters regarding innovation, wellbeing, and wellness. At the same time, externally, they focus on customers that concerns a tactical blend of human values (e.g., connection, engagement, satisfaction, loyalty, care, and respect). The human-centric concept is also integrated with digital interaction to establish trust and provide assurance that satisfies certain parties. Furthermore, companies remain true to their vision, promptly deliver their promises, and ensure all employees embrace the organisational values. This human-centric idea rapidly nurtures from the core, which is powered from the inside out.

Elements that are contributing to greater corporate sustainability

This study identified a few elements that are contributing to greater corporate sustainability for strategic business purposes. In the following, our discussion will be restricted to a human-centric approach context.

Ethical leadership

Sustainability practices emphasise the role of human resources for the implementation that able to strengthen the company's reputation (Ali, 2014; Tang, Hull, & Rothenberg, 2012) and efficiency, reduction of waste, energy, and raw materials. A great deal of previous research in a human resource focused on how ethical leadership, for example, Chief Executive Officers (CEOs) and other top managers, can vitalise investments into company resources and capabilities. Meanwhile, Board of Directors is the primary functional body of the corporate governance mechanism that works on

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monitoring corporate management activities, designs corporate strategies, resolve agency problems between the management and external shareholders and enhance the quality of business decisions (Hou, 2019). Therefore, BOD must contribute their on-going commitment to corporate sustainability. Ethical leadership is most commonly associated with the work of (Meyer, 1982), which pointed out that the motivation for ethical leadership change is derived from endogenous (internal) or exogenous (external) events pressures. Thus, internally, the commitment arises from the personal perseverance of a CEO. Although, or possibly external forces when the business takes stakeholder accountability very seriously. For instance, Nike received accusations about violations of human rights, resulting in Nike addressed the issues ethically and operating responsibly within the supply chain.

Managerial Autonomy

Ethical leadership is also influenced by the growth of corporate strategy and corporate governance structure in establishing managerial autonomy (Dill, 1958; Li, X., Gao-Zeller, X., Rizzuto, T. E., & Yang, F., 2018; Lioukas, Bourantas, & Papadakis, 1993; Xiao, 1991). Dill (1958) specified managerial autonomy independence in developing tasks or measures. Similarly, Hambrick and Mason (1984) explained that managerial autonomy potentially manages and shapes actions in the company. Prior studies supported managerial autonomy important position in promoting the effect of managerial leadership beyond traditional corporate performance (Dill, 1958; Lioukas et al., 1993; Xiao, 1991) and corporate social performance (Chung & Cho, 2018; Li et al., 2018). The rationale of managerial autonomy by hiring a Corporate Sustainability Officer (CSO) is to centralise sustainability commitment under the position; meanwhile, the CEO can retain sponsorship of the change (Henderson, Gulati, & Tushman, 2015). To date, several studies contributed to the improved sustainability-related decision-making, which balanced the concerns and needs of numerous stakeholder groups. These are resulting in improving long-term reputation, motivation and profits (Waldman & Siegel, 2008), sustainability strategy of employee wellbeing (Piccolo, Greenbaum, den Hartog, & Folger, 2010) and green supply chain management (Ardakani & Soltanmohammadi, 2019). By including directors with sustainability expertise or establishing board committees that centred on sustainability matters will enhance sustainability performance, hence, demonstrating their sustainability commitment to stakeholders.

Training

The moves to increase individual knowledge acquisition will make employees more motivated. Also, stimulating the internal motivations of the employees should be developed progressively as part of sustainability strategies (Li et al., 2018). Apart from that, employees' confidence increased by continuous training and development that increase knowledge and skills related to the job description (Egri & Hornal, 2002; Ramus & Steger, 2000). Previous studies of Langwell and Heaton (2016) and Jackson, Renwick, Jabbour, & Muller-Camen (2011) revealed the significance by measuring the return on investment (ROI) of the training programmes, resulting in the understanding of the training impact on human development and cost-effectiveness.

Accumulation of skills and knowledge is the driver of innovations (Altenburger, 2018a; Nidumolu, Prahalad, & Rangaswami, 2009). Innovative approaches restructured and reinvented products and services, making them for consumers (Henderson et al., 2015); hence, contributing to the development of a strong infrastructure, and building meaningful brands that offer sustainable and organic material (Altenburger, 2018b; Hoffman & Bansal, 2012). It is possible that innovation is not related to technical advancements only, but also the utilisation of technological know-how changes at a modest level in enhancement or expansion (Engert, Rauter, & Baumgartner, 2016). Meanwhile, investing in "experiments" will develop company capabilities in engaging multiple-player-based, critical sustainable changes (Henderson et al., 2015) that eventually lead to long-term success. For example, Samsung's philosophy, "inspired by humans, creating the future" guiding them to create human-driven innovations that enrich customer's lives and contribute to social prosperity and sustainable environment.

Communications

A critical study provided groundwork evidence of corporate communication of the World Business Council For Sustainable Development (2011), which utilised a particular tool of communication, whether for internal and external

communication. Besides, everyone, from the CEO to the janitor of the company, should be part of sustainability routines to understand the processes and goals and develop endless support for corporate sustainability. It was argued that leader alone could not create change; thus, the notion that organisational change occurs through social exchanges. Thornton, Ocasio, and Lounsbury (2012) stated that "social interactions provide the key motor that reproduces, alters, or transforms practices and organizational identities." While a CEO may initiate change by creating a new vision, it is the social interactions that create a common understanding and shared vision that predicate action (Henderson et al., 2015; Micklethwait & Dimond, 2017).

Conclusion

In summary, it was shown from the literature review that four key elements; ethical leadership, managerial autonomy, training, and communications are crucial in a human-centric approach that contributing to greater corporate sustainability. First, ethical leadership is derived from endogenous (internal) from the personal perseverance of a CEO and exogenous (external) when the business address stakeholder accountability ethically. Second, the specified managerial autonomy, i.e. Sustainability Department will manage and shapes proactive sustainability actions in the company. Third, innovation also related to utilisation of technological know-how and experimenting process. Fourth, communication involves internal and external, leading to endless support for corporate sustainability. The basis of the human-centric movement is demanded a more structured development from the company.

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Issues and Prospects of Involvement of Economic Entities in The Process of Lifelong Learning in Russia

Galina TIMOKHINA
Plekhanov Russian University of Economics, Moscow, Russia
galinatimokhina@yandex.ru

Irina SHIROCHENSKAYA
Plekhanov Russian University of Economics, Moscow, Russia
Shirotchenskaya.IP@rea.ru

Evgeniya ZHADKO
Ural State University of Economics, Russia
sylva@list.ru

Emil VELINOV
Skoda Auto University, Czech Republic
emil.velinov@savs.czimur

Inga KORYAGINA
Plekhanov Russian University of Economics, Russia
Koryagina.IA@rea.ru

Venera KADEROVA
Plekhanov Russian University of Economics, Russia
Kaderova.VA@rea.ru

Abstract

This article attempts to systemize the results of existing research on the issues of lifelong education of adult population in Russia, based on the fragmented comparison of Russian education system with the lifelong learning system in Czech Republic to define key issues and opportunities for efficient engagement of main Russian economic entities in the lifelong learning process, namely adult population/households, training institutions and the state. The following desk research methods were used for study: content analysis and traditional analysis of data, collected in the framework of surveys of key entities involved in the process of lifelong education of adult urban and rural population in Russia in real time mode. Based on data analysis the authors highlighted the problems and prospects of lifelong learning in the future for the main Russian economic entities for the purposes of improving the wellbeing of adult population in Russia. In particular, the authors identified potential opportunities for greater engagement of adult population in the process of lifelong learning; exposed factors, hindering the efficient management of adult lifelong education by corporate employers; demonstrated positive changes in the activity of institutions providing lifelong learning services to adults; detailed main functions of the state in further development of the system of lifelong learning in Russia.

Keywords: Research, Participants of Lifelong Learning Process.

Introduction

Lifelong learning is one of the factors in the formation of human capital, and all economic entities interested in it should invest in it. From the authors' point of view lifelong learning is, on the one hand, an independent choice each person can make; on the other hand, it is a whole system based on the interaction of such economic entities as:

- adults / households with a demand for lifelong learning services;

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- employers who formulate the offer of educational services, indirectly consuming these services through their employees' competencies;
- educational organizations that create demand for training programs at various levels;
- the state acting as a regulator of relations between economic entities in the process of organizing and coordinating lifelong learning services.

Within the framework of the implementation of lifelong learning concept in the EU countries, as well as in Russia an information and analytical system has been created to collect and analyze information about the availability of lifelong learning services for various groups of population. In particular, monitoring studies on the problems of the population and organization participation in lifelong education have been carried out by the Federal State Statistics Service, the Higher School of Economics and the Levada Analytical Center (Levada-Center) in Russia since 2002.

Despite the active research carried out within the framework of this scientific direction, it should be noted that it is not sufficiently developed in the context of a systematic analysis of the problems of lifelong education, in the organization of which all interested economic entities are involved.

The purpose of this research is to systematize existing studies on the problems of adult lifelong learning in Russia, based on fragmentary comparisons with the system of lifelong learning in Czech Republic, to determine the possibilities of major economic actors to productively participate in this process.

Research hypothesis: systematization of existing research on the involvement of economic entities in the process of adult lifelong education over a fourteen-year period will identify problems and potential opportunities for the effective organization of this process.

The present study is based on the following methods of analysis: comparison, abstraction and generalization of primary data obtained by the Higher School of Economics within the framework of a series of monitoring studies in the field of educational economics. The following methods of desk research were chosen:

- content analysis for the systematization of analytical research on lifelong learning issues for the period from 2006 to 2019;
- traditional analysis of survey data of the main subjects involved in the process of lifelong education. The selected methods allowed us to analyze a large array of information over 14 years of research on this topic in order to systematize them; to consider the object under study from different angles with the purpose of determining the problems and opportunities for productive participation of economic entities in the process of lifelong adult education. Limitations of the desk research resulted in the need for more detailed verification of data relevance and reliability.

This study uses some fragmentary data on the organization of lifelong learning in Czech Republic. The authors found the comparison of approaches to lifelong learning in Russia and Czech Republic interesting from an applied point of view and due to the following considerations. A significant part of the adult working-age population of both countries grew up and formed under the domination of the socialist ideology and received education in a similar format system. This fact could not but affect the models of economic behaviour of the main economic entities, including the field of lifelong learning. However, after the collapse of the Council for Mutual Economic Assistance (COMECON), behavioural patterns of economic entities of both countries mutated along multi-directional paths, which probably influenced the organization of various social and economic processes, including the process of lifelong education.

The structure of the article includes a brief literature review on this scientific direction. The first Chapter contains the analysis of the Russian adult population involvement in the process of lifelong learning; the second chapter presents the results of analysis of employers' participation, as well as the participation of educational organizations and the state in the process of lifelong learning.
In conclusion, the article presents conclusions, identifies opportunities for effective interaction of economic entities for greater involvement of the adult population in the learning process throughout life, and provides directions for future research.

Literature Review

A brief review of scientific articles in the field of our research shows the interest of scientists in the issues and problems of the involvement of economic entities in the process of adult lifelong education.

Thus, Boeren (2017) discusses the multi-level nature of adult participation in lifelong learning, describes the roles and responsibilities of participants in the process: adults, education providers, and subjects of social educational policy in the country. Makino et al. (2017) investigate the issues of organizing lifelong education not only by economic entities, but also by social communities in order to create a new educated society. In their research Hafford-Letchfield and Formos (2016) raise the problems of a co-productive approach in providing lifelong learning services to elderly people.
A significant part of the research focuses on the involvement of working Russians in obtaining additional vocational education (Karavai, 2016; Galitskiy,2016). In her research, Pushkareva (2016) pays attention to various changing conditions of social. Kalimullin and. Shaidullina (2015) consider the possibility of training competitive personnel in the system of lifelong education in the context of various integration models of production and education.

Zeer et al. (2017), Popova et.al. (2020) focus on the importance of lifelong education in the process of professional development of an individual. Prikot and Vinogradov (2016) consider lifelong education as an "infinite" number of educational options for each individual. Sergeeva and Voskresenko (2016) believe that the optimal conditions for the development of lifelong education can be created precisely in universities as multilevel educational clusters.

Sabria-Bernado et al. (2017) and Vera-Toscano et al.(2017) identified the following determining factors that influence consumer demand for lifelong learning in higher education through empirical data: motivation, conflict / difficulty, and career development. These data can be used by educational organizations in building relationships with consumers of lifelong education services. Kiseleva and Anikina (2015), Kiseleva et al. (2016) further specify the possibilities et al. further specify the possibilities of building relationships with service consumers through the development of relationship models.

Summing up a brief literature review on lifelong education, we would like to stress a considerable lack of scientific articles devoted to the systematization of current research on the organization of lifelong learning by its main participants: the adult population, as well as organizations involved in this process, and the state.

In our opinion, the participants in the process of lifelong education are interested both in seeing the possibilities of developing lifelong education and in understanding the problems and ways to overcome them.

Research Results

Analysis of Russian adult population involvement in the process of lifelong learning

Content analysis and traditional analysis of survey results aimed at participants in the lifelong education process conducted by the Higher School of Economics from 2006 to 2018 in the framework of monitoring the economy of education showed a certain dependence of adult involvement in lifelong learning and the cyclical nature of the economy: during periods of recession, enrolment in lifelong learning decreases by about 5-6 points compared to a more stable periods in the country's economy (fig. 1).

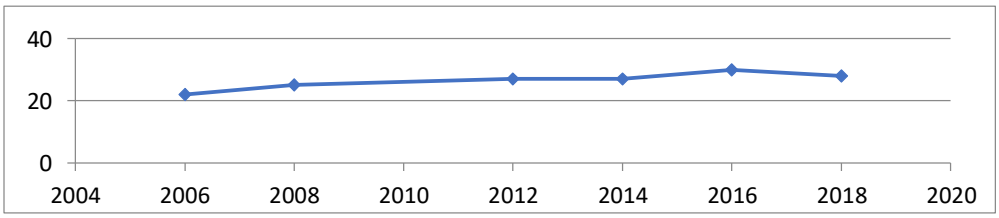

Fig. 1: Dynamics of adult involvement in lifelong learning in 2006–2018, %
Source: Bondarenko, 2018, 12 (132)

From the data analysis received from the 2017-2018 survey results on a sample of 1,600 units, which included adults aged 25-64 years, it follows that in Russia there is a serious lag in involvement in formal and non-formal education for all age groups, as well as a differentiation between the involvement of the younger age group (aged 25-35 years) and the older age group (55-64 years), which in 2017-2018 was 2.5 times (for comparison, in Czech Republic about two times) (Bondarenko, 2018, 12 (132)), (Weiss-Gal, 2016).

A worldwide trend shows a more active interest in lifelong learning among population groups with a higher level of educational capital (Timokhina, et.al, 2017). In 2017-2018 Russian respondents with higher education participated in lifelong learning almost 1.5 times more often than those with secondary vocational education (Bondarenko, 2018,12 (132)). A significant differentiation in terms of involvement in lifelong learning between the least and the most prosperous groups of population is also worth mentioning: more affluent people were able to participate in the process twice as often as low-income groups. Moreover, a significant lag in low-income groups will persist steadily over the past 10 years.

According to monitoring studies, the structure of demand for formal education services does not change significantly in 2013-2017. In formal education less than 3% of the adult population completed secondary special education programs, and 1.4% completed higher education programs (1.4%).

Data on adult involvement in non-formal education confirms Russian and European trends in the growth of demand for lifelong learning services. Among the total population aged 25-64, 4% were enrolled in them, and of the employed reached 6% (Bondarenko, 2017, 5(104) p. 28; Bondarenko, 2017, 5(104) p. 1-23). At the same time, the most popular programs are advanced training and professional retraining for professional development as well as courses for obtaining a new profession. This is due to the low time and money spent by adults.

Secondary data analysis from the 2017-2018 survey results showed that the most common type of lifelong education is informal - self-education: 24% of respondents aged 25 to 64 inclusively engaged in self-education in 2018, which reduces last year's figures by 3 points. The adult population is increasingly using online technology: an increase of 12% in 2018 compared to 2006 (fig.2).

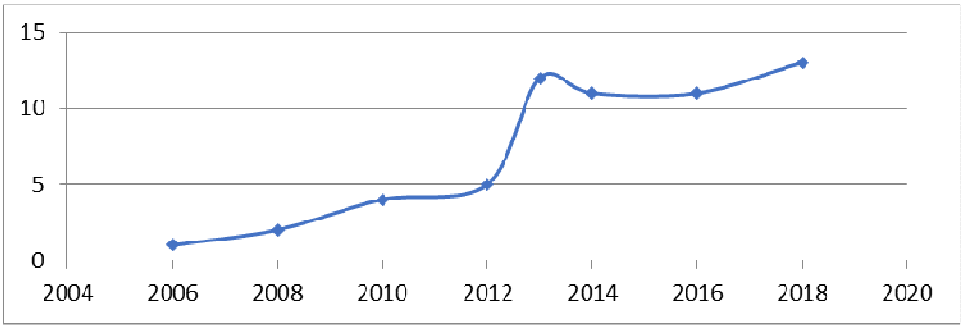

Fig. 2. Use of information and computer technologies in self-education in 2006-2018 (in % of the number of respondents)

Source: Bondarenko, 2018, 5(125)

Approximately the same number of adults is engaged in full-time and part-time self-education (15% and 17%, respectively), similar proportions are observed in the statistics of adult self-education in Czech Republic (Beloiu, et.al, 2015).

The systematization of the survey data of adults conducted by the Higher School of Economics for the period from 2006 to 2018-2019 allowed us to identify internal and external barriers to the provision of lifelong learning services to adults. As internal barriers, we highlighted the lack of a formed need for additional knowledge, unwillingness to develop professional and personal qualities (Malkina, 2017). As external barriers to education for adults who need it, we can identify weak financial and organizational support of students on the part of employer, the state; time constraints, difficulties of combining study and work, family responsibilities, as well as educational infrastructure.

Similar internal and external barriers to involvement in lifelong learning are observed among Czech adults, in particular, low motivation characteristic of the least educated adults, limited time due to family responsibilities (14% of respondents), employment at work (34%), high cost of training (17%) (OECD, 2019).

Analysis of adult involvement in lifelong learning in Russia allows us to identify the following problems that impede its development:

- differentiation between involvement in all types of lifelong learning of younger and older age groups, the

least and most affluent segments of the population, adults with different levels of educational capital;
- completely surmountable internal and external barriers for the adult population to receive lifelong learning services.

The authors see a solution to these problems by using potential opportunities to increase the degree of adult involvement in the process of lifelong education, taking into account the best European and, in particular, Czech practices. It includes the development of short-term training programs, the modular structuring of educational programs, the widespread use of digital learning technologies, the development of educational programs that are understandable and accessible to adults with a low level of education, the development of programs that are in demand on the labor market, the provision of flexible training schedules, financial support from the state and employers, the formation motivational incentives in adults for lifelong learning.

Analysis of enterprises (employers and educational organizations) participation and the state participation in the process of lifelong learning

In order to analyze the organization of lifelong learning by employer companies, we compared the companies' survey results in Russia and Czech Republic for the period of 2016-2017. A qualitative study through a rotation panel and face to face formalized interviews was conducted by Russian research companies in 2016 and 2017 on a sample of 511 company executives (Bondarenko, 2018, 2 (122)). Czech research companies conducted a quantitative study in 2016-2017 on a random sample of 402 units (Fajčíková,et.al, 2017).

Big businesses are the leaders in organizing in-house training both in Russia and in Czech Republic. Despite some differences in the classification of business by size depending on the number of employees, small businesses show less involvement in in-house training in both countries, however, Russian small-size businesses demonstrated a more significant lag behind the average indicators shown by large companies than in Czech Republic (fig.3,4).

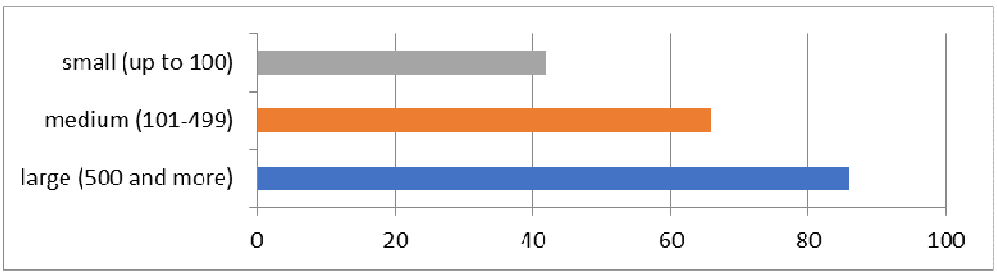

Fig. 3: Training by Russian companies of various sizes (in % of the number of surveyed employers)
Source: Bondarenko, 2018, 2 (122)

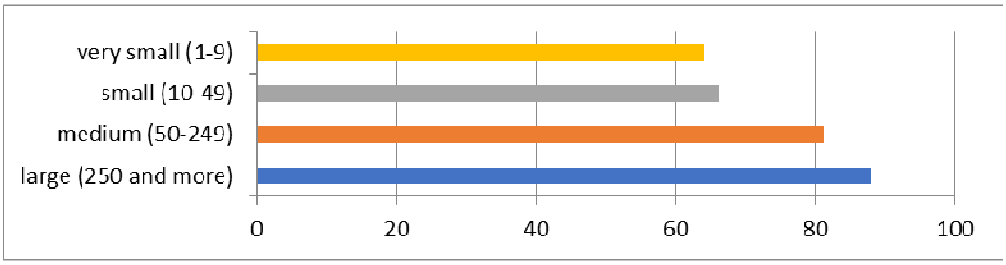

Fig. 4: Training by Czech companies of various sizes (in % of the number of surveyed employers)
Source: Fajčíková,et.al, 2017

Planning, organizing and monitoring the effectiveness of employee training is carried out mainly by high-tech companies of Russian large businesses that have R&D expenses. Unlike Russian companies, most Czech employers have the practice of forming plans and budgets for organizing employee training. Significant differences were revealed when comparing the organization of training in Czech and Russian small businesses: in Czech Republic, even in very small enterprises of 1-9 people, staff training is carried out (22% of the number of surveyed employers) (fig.5).

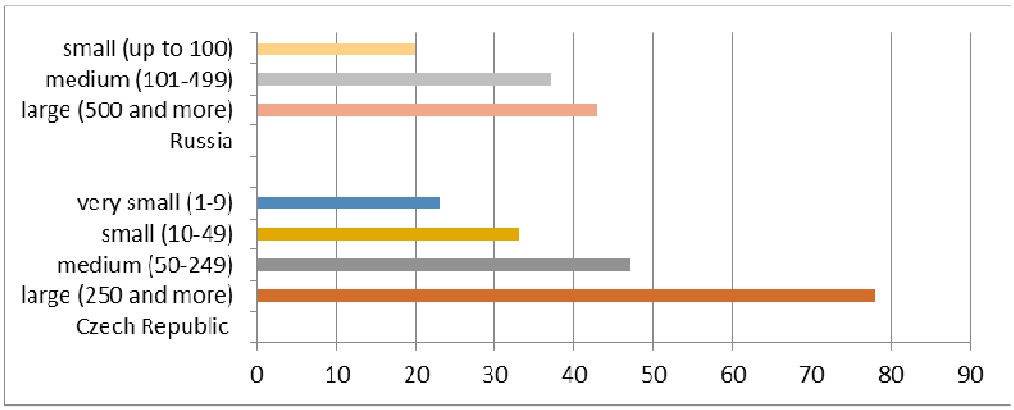

Source: Fajčíková,et.al, 2017; Bondarenko, 2018, 2 (122)

Fig.5: Availability of an official detailed plan/ budget for organizing staff training in companies of different sizes in Russia and Czech Republic (in % of (in % of the number of surveyed employers)

In order to train personnel for their own needs, save time and money, as well as eliminate the disadvantages of training by educational organizations, companies conduct internal training, creating in-house training infrastructure. According to a 2018 study, one in three Russian companies creates its own educational infrastructure; less than 10% of companies form it together with educational organizations. The organization of staff training through the use of its own resources is typical mainly for large businesses: 47% of companies with more than 500 employees have training centers, and 36% of these companies have training courses.

Despite the development of in-house training environment, about 40% of high-tech companies demand lifelong learning services from third-party structures: 20% of companies apply to educational organizations, about 20% - to business partners, recruitment agencies, coaches. A weak level of interaction between Russian employers and employees on training and skills exchange issues can be noted: only 16% of companies conduct joint activities on training and employee skills exchange. As a rule, such cooperation is based on the principle of vertical integration. Although in European countries and, in particular, in Czech Republic, the cooperation of companies on staff training is carried out on the basis of horizontal integration.

Based on the results of a comparative analysis of employee training organization by Russian and Czech employers, the authors identified a number of problems:

- Russian enterprises of large, medium and small businesses underuse the practice of forming plans or budgets for organizing employee training;
- Russian small-size enterprises are quite limitedly involved in lifelong learning programs for adults;
- The interaction between employers, in high-tech sectors on issues of training and skills exchange between employees, as well as with educational organizations is quite limited.

Educational organizations make perhaps the most significant contribution to non-formal and informal adult education. However, a systematic study of the organization of lifelong learning in the field of continuing education was carried out seven years ago. The results of the 2018-2019 study of strategies, motivations and students' and teachers' economic behavior in 94 Russian universities allow us to draw very scanty conclusions on the organization of informal adult education (Rudakov, et.al, 2019).

Continuing adult education is implemented through professional development programs, increase of the professional level of adults in about 80% of educational organizations.

Analysis of teaching practices shows that in 2012-2017, teachers of educational organizations began to rely more often in teaching on their own curricula of continuing education and teaching aids: if in 2012 70% of respondents used their own curriculum, and 45% used academic aids, then 2017 - respectively 74% and 52% (Zborovskiy and Ambarova, 2016).

In the process of adult learning, electronic methods of presenting information are more often used: presentations, slides and handouts (57% of respondents in 2012 and 62% in 2017), digital libraries and scientific portals - 54% of

respondents.

It should be noted that in 2017, 10% of teachers used the materials from Massive Open Online Courses (MOOCs) for training. Over the period under review, the proportion of teachers reading professional literature in a foreign language increased significantly (from 29% in 2012 to 42% in 2017), the share of those who prepare texts for publication in a foreign language has more than doubled (from 13% to 28%).

There is a tendency towards a shift in demand for short-term programs lasting less than 72 hours in the form of seminars, training courses compared with long-term professional training programs with the duration from 72 to 499 hours (Zhadko, Popova, 2018).

The results of the data analysis allow us to draw the following conclusions:

- vocational training programs predominate in comparison with general education programs in the portfolio of continuing education;
- there is a tendency to increase the supply of short-term programs in comparison to long-term training programs in organizations of continuing education;
- educational organizations began to use educational programs of continuing education and manuals created by teachers to a greater extent; they began to use electronic methods of submitting information more often in the process of adult learning.

The lack of up-to-date data on the market of continuing educational services, monitoring of the current situation and problems in adult continuing education does not allow making adequate decisions to improve the effectiveness of lifelong education by market participants.

Systematic work in the field of lifelong education can be possible only with the direct participation of the state and its fulfillment of a set of functions: regulatory, expert, analytical, informational, coordinating, controlling, etc. In particular, the expert-analytical function should be carried out by organizing systematic and objective statistical observations monitoring the involvement of the main economic entities in the process of lifelong education.

The information function of the state in the field of lifelong education is implemented in the creation of a system for informing the main economic entities about the regulatory framework, market participants, educational infrastructure, targeted educational initiatives, mechanisms that ensure access to adult education, educational routes, etc. Within the framework of this function, the propaganda function of the state is also important, which consists in explaining and encouraging the population to study throughout life.

The coordinating function involves establishing a dialogue between the educational system and the owners of medium- and small-size businesses who find it difficult to create an effective system of lifelong employee training without state assistance (Kapustina, et.al, 2016). The state coordinating function will help to attract employers more actively to cooperation within the horizontal integration framework through modern forms of interaction, for example, the creation of innovative educational clusters.

The implementation of a set of functions becomes possible with proper funding of lifelong education by the state. However, the OECD 2019 research on lifelong education highlights that in almost all EU countries, adults and organizations invest more in the development of lifelong education than the state: public spending is 0.1% -0.2% of GDP against 0.4-0.5% of employer companies and 0.2-0.3% of individuals – those adults who are interested in lifelong education (OECD, 2019). Data of this kind in the Russian sphere of lifelong education is not available to the authors of the article, however, but we assume that these indicators have even lower values.

Conclusion

In conclusion, we would like to state that the research goals formulated in the article have been achieved, and the hypothesis put forward has been confirmed. Based on the systematization of existing research on engagement issues of economic entities: adults / households, training organizations and the state in the process of lifelong education, the authors revealed both the problems that impede its development and potential opportunities.

In the first chapter of the article, the authors identified the problems of involvement of adult population in lifelong education in Russia due to different indicators of involvement for different strata and the presence of completely surmountable barriers for adults to receive lifelong education services. The authors propose ways to solve the

identified problems by using potential opportunities to increase the degree of adult involvement in the process of lifelong education.

The authors believe that in order to increase the participation of the adult population in lifelong education, employers, educational organizations and the state need to work to reduce the disparity in indicators of involvement in training between the least and most educated and well-off segments of the population, and different age categories. Potential opportunities should be used to remove internal and external barriers to adult involvement in lifelong learning, taking into account the best European and, in particular, Czech practices.

The results of a comparative analysis of employee training organization by Russian and Czech employers, which were presented in the second chapter highlighted a number of problems in terms of the weak application of Russian enterprises to the practice of forming plans or budgets for the organization of employee training, limited interaction between employers and educational organizations. Domestic employer companies need to study foreign and Czech experience in organizing lifelong education for employees, and introduce it more widely. It is necessary to develop short-term training programs, structure them modularly, offer training programs with flexible schedules that are in demand in the labour market, etc.

The analysis performed by the authors confirms that it is necessary to integrate the efforts of all economic entities in order to increase the level of involvement in this process.
Along with the problems of organizing lifelong adult education, the authors show positive changes in the activities of organizations supplementary education. However, the authors emphasize the lack of research on the organization of non-formal education by educational organizations in dynamics over the past seven years.

From our point of view, the prospects for the development of lifelong education in the future will be determined by the systematic approach on the part of the state to the implementation of the concept of adult education throughout life and the performance of its set of functions. With a systematic approach to the organization of lifelong education, knowledge of the problems identified in the study will allow us to set targets for increasing the involvement of economic entities in this process.

Thus, the directions of future research may result in the study of system-forming factors that determine the effectiveness of interaction between economic entities in organizing the process of lifelong education of adults in Russia. The authors believe such research may be of scientific and academic interest to researchers, and will also have an applied nature. This will allow the interested parties to make effective decisions on integrating efforts in order to increase the needs formation of the Russian adult population in a conscious desire for further education.

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Managing the Competitiveness of Moscow Underground (Metro) Based on Customer Satisfaction Ratings with the Technical Quality of Services

Irina LOPATINSKAYA
Plekhanov Russian University of Economics, Russia, Lopatinskaya.IV@rea.ru

Natalia IVASHKOVA
Plekhanov Russian University of Economics, Russia, Ivashkova.NI@rea.ru

Galina TIMOKHINA
Plekhanov Russian University of Economics, Russia, galinatimokhina@yandex.ru

Irina SKOROBOGATYKH
Plekhanov Russian University of Economics, Russia, Skorobogatykh.II@rea.ru

Irina SHIROCHENSKAYA
Plekhanov Russian University of Economics, Russia, Shirotchenskaya.IP@rea.ru

Olga GRINEVA
Plekhanov Russian University of Economics, Russia, Grineva.OO@rea.ru

Abstract

This article presents an original methodology of consumer assessments of satisfaction with the quality of a product / service based on N. Kano's model; the article describes a study of customer satisfaction with the technical quality of Moscow underground (metro) services carried out in accordance with the methodology developed by the authors aimed at justifying management decisions to increase the competitiveness of metro system. Within the framework of the author's methodology, the relative importance of product attributes, including rail transport services, was determined; the calculation of descriptive statistics indicators for each attribute was carried out; for each attribute, the indices of influence on passengers' satisfaction and dissatisfaction with services were calculated according R. Best method; the total index of attribute influence on consumer satisfaction; the matrix for interpreting quality categories developed by M. Timko was modified; as well as a comprehensive determination of the impact of an attribute on consumer satisfaction. This methodology makes it possible to highlight problem points in the competitiveness of services and make management decisions to improve them. The authors propose management solutions to improve the competitiveness of Moscow underground (metro) services based on the developed methodology: make capital investments in the introduction of important and attractive attributes of technical quality of Moscow underground (metro) services for consumers; reduce costs of introducing quality attributes that are indifferent to consumers; increase the presence of one-dimensional attributes of technical quality of Moscow metro services; monitor technical quality attributes of a service and study their perception by consumers.

Keywords: Competitiveness, Consumer Satisfaction, Underground Services, Methodology.

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Introduction

In the context of intense functional competition of various types of transport services, an indisputable and extremely urgent task of market economic entities is to manage the competitiveness of these services. The competitiveness of transport services, in particular, rail transport services, is understood as a higher ratio of the aggregate of quality characteristics, costs of its acquisition and consumption, as compared to goods / services-substitutes, when they meet market requirements (Mokronosov, Mavrina, 2014, Sidorchuk & Skorobogatykh, 2015).

The results of international and Russian scientific research substantiate and confirm that the key factor in ensuring and improving the competitiveness of any goods and services, including rail transport services, is their compliance with market requirements, that is, the needs, expectations, preferences, and values of potential and actual consumers of these services (De Oña, R, et al 2016; Eboli, Fu, Mazzulla, 2016; Seifullaeva et al., 2018; Seifullaeva et al., 2018) and others.

Since the set of behavioral variables of each individual consumer is formed under the influence of a wide range of factors, consumer assessments of the same type of transport service made by different consumers may not coincide. Each consumer will assess the level of competitiveness of services, in particular, services of rail modes of transport, purely individually (Friman, Fellesson, 2009; Ivashkova, et al., 2009). The competitiveness of a service is determined, in contrast to its quality, by a combination of only those specific properties that are of clear interest to a given consumer and ensure the satisfaction of this specific need, while other characteristics of the service may not be taken into account.

Accordingly, the starting point in the formation and improvement of the competitiveness of services, including rail transport services, is the study of various consumer behavior variables, including passenger satisfaction of specific needs when consuming these services (Givoni, Rietveld, 2007).

World and Russian experience in measuring consumer satisfaction ratings with the quality of rail transport services is represented by a certain variety of methods and techniques that make it possible to highlight problem points in the competitiveness of a service and make management decisions to improve it (Geetika, 2010; Eboli, Mazzulla, 2012; Sidorchuk, Skorobogatykh, 2015; Sidorchuk, et al., 2015; De Oña, et al 2016; Fraszczyk, Marinov, 2017; Machado-Leóna, et.al., 2017; Seifullaeva, et al, 2018; Lukina et al., 2018; 2019; Ibrahim, et.al, 2020; Jomnonkwao, et. al., 2020). At the same time, due to the dynamics of scientific research and the emergence of new links and relationships between their components, the strategy of scientific search for methodology and research on the problems of providing and increasing the competitiveness of rail transport services based on the study of consumer ratings is changing.

Project Goals

The purpose of this research is to develop an original methodology for consumer satisfaction ratings with the quality of goods/services based on N. Kano model and to study consumer satisfaction with the technical quality of services of the Moscow underground (metro) according to the author's methodology in order to justify management decisions of increasing its competitiveness.

Author's Methodology

The authors developed an original methodology for consumer ratings of service quality based on a model for analyzing attributes and their impact on consumer perception of a complete product by N. Kano. According to N. Kano's methodology, based on the study of the consumer's reaction to the presence and absence of a product attribute (feature), it is determined how this attribute will affect the consumer satisfaction or dissatisfaction with the product as a whole (Cowell, 1984; Grönroos, 1998).

Kano's methodology involves classifying product attributes in order to determine the degree of their impact on customer satisfaction or dissatisfaction. Kano's model includes five quality categories

(dimensions), each of which characterizes a special relationship between the quality of performance of a product attribute and customer satisfaction / dissatisfaction, as well as the sixth category, which covers contradictory and questionable answers from respondents (Table 1).

Table 1: classification of product attributes by Kano Model

Category	
Must-be (basic)	M
Attractive (desired/factors of delight)	A
One-dimensional (attributes of quality	O
Reverse	R
Indifferent	I
Questionable result.	Q

The first three categories of attributes are considered basic, since their contribution to satisfaction / dissatisfaction can be indented. The category of "questionable" attributes is excluded from the analysis, since the respondents' answers are contradictory and impossible to interpret. A large proportion of reverse attributes that are irrelevant and questionable are likely to indicate errors in the preparation of the questionnaire: they are either too general or, on the contrary, too detailed in formulation (Berger, et al., 1993). The sequence of research by the Kano method is described in detail in a number of research (Berger et al., 1993; Tsysar, 2002; Lopatinskaya, et al., 2015).

In order to assign an attribute to a specific category, the authors developed an original methodology which consists of the following steps:

1) Determine the relative importance of an attribute. The Kano method does not directly assess the importance of attributes. However, we assume that those attributes whose perception is determined are more important. That is, when respondents can assign an attribute to one of three main quality categories: basic, one-dimensional, or attractive factors. Therefore, the important attributes are those for which the equation is the following: (O+A+M)>(I+R+Q).

2) Calculate descriptive statistics. Fractions, modes, and standard deviation were calculated for each attribute.

3) Calculate the indices of influence on satisfaction. For each attribute, the indices of influence on passenger satisfaction (SII) and dissatisfaction (DDI) were calculated according to the method of R. Best, as well as the aggregate satisfaction impact index (CSI).

4) Build a modified matrix for interpreting quality categories. The authors propose to expand the graphical interpretation of quality categories developed by M. Timko by including two additional indicators: the relative importance of the attribute (the total share of responses in categories A, O, M) and the consistency of attribute ratings, which will improve classification accuracy and the information content of the graphical presentation. In order to use it on an existing matrix, add the size of the point that characterizes the attribute position (the percentage of responses O+A+M) and the color of the point (the value of the standard deviation)

5) Comprehensive determination of the attribute's impact on satisfaction based on graphical analysis and descriptive statistics. Comprehensive determination of the impact of an attribute on satisfaction based on a graphical analysis and descriptive statistics.

Thus, the methodology developed by the authors will make it possible to determine consumer satisfaction with the technical quality of the underground (metro) services, which will allow to formulate recommendations for making management decisions in order to increase the competitiveness of the Moscow metro services.

For the study, passengers of the Moscow metro (46% of men and 247% of women) were selected as sample units, the sample size was 461 units.

Research Results

The survey showed that the average customer satisfaction with the technical quality of metro services is 3.8 points on a five-point scale. The share of satisfied respondents is 63.1%, including a quarter of respondents fully satisfied with the technical quality of metro services. More than half (56%) of respondents believe that there is enough equipment for cars and trains and/or nothing else they can offer.

According to the author's methodology, four groups of important attributes of the technical quality of Moscow underground (metro) services were identified, see table 2.

Table 2: importance of technical quality attributes of Moscow underground (metro) services

Attributes	**The total share of basic, one-dimensional and attractive factors according to Kano,%**
Most important attributes	Over 65%
Electronic display indicating the next station	85
Working air conditioner	81
Availability of Wi-Fi	73
Separation of side seats by configuration or partition	69
Sound insulation	69
Space for strollers, bicycles and bulky luggage	68
Important attributes	51-65%
Leaning seats	63
Seat type: soft, springy	61
USB charges for smartphones	60
Allocated space for standing	59
The scheme of allocation of seats	59
Informing about the load of cars for the arriving train	57
Feeling of air movement, light blowing	57
Pass-through between the train cars	57
Interactive panel for setting the route in the car	55
The least important attributes	41-50%
Window leaf or the possibility to open a window	47%
Separation of seats by handrails	46%
Type of finish seat leatherette or fabric	45%
Configuration: wider seat spacing	41%
Unimportant or questionable attributes	Less than 40% or with a high proportion of reverse factors
Temperature control in the car at the request of passengers	42 /27
Increased glazing area	37 /14
Additional vertical handrails: at the edges and in the middle of the sofas	36 /32
Adjusting the type of lighting	31 /25
Luggage racks above the seats	22 / 38
The vertical rail	22 / 19
Additional board on the side of the carriage indicating the terminal station	17 / 18
Opening doors with a button	8 / 67

The most important group includes six technical quality attributes of Moscow underground (metro) services with a total share of basic, one-dimensional and attractive attributes of more than 65%. The most definite were of passengers' opinions regarding the presence of an electronic display indicating the next station, working air conditioner and the availability of Wi-Fi. The important group includes

nine technical quality attributes of metro services, for which the total share of basic, one-dimensional and attractive attributes exceeds the share of questionable and reverse estimates.

Four attributes are considered the least important. Here, respondents' opinions are split roughly in half: about half of respondents classify these attributes as factors that influence satisfaction or dissatisfaction. And about the same number of respondents attribute them to uncertain, reverse, or questionable factors. Attributes that have little impact on passenger satisfaction and/or have a high proportion of reverse factors (more than 25%) are allocated to a separate group.

We classified the technical quality attributes of Moscow underground (metro) services Moscow underground (metro) services based on the Kano model. Of the 27 technical quality attributes of Moscow metro services, a group of three attributes stands out: "Air conditioning", "Electronic display indicating the next station" and "Availability of Wi-Fi". These are the most important attributes (the share of O + A + M is maximum), the estimates for which are most consistent (standard deviation <1). The CSI Satisfaction Index has a value close to zero, since these attributes have an equally strong influence on both passenger satisfaction and dissatisfaction. This clearly characterizes these attributes as one-dimensional according to the Kano model.

The following three attributes, which we also ranked as the most important – "Separation of side seats by configuration or partition", "Space for strollers, bicycles and bulky luggage", "sound insulation" - are evaluated in a similar way.

Consistency estimates for the "sound insulation" attribute are contradictory: if the presence of increased sound insulation is attractive to respondents, then the standard noise level is rated by some respondents as normal, and by others as unacceptable.

Therefore, the "sound insulation" attribute has a high share of ratings both as attractive and as a one-dimensional factor. Taking into account the mode values, we have assigned this attribute to the one-dimensional category.

Thus, six attributes of technical quality of Moscow underground (metro) services are classified as one-dimensional (table 3). These attributes affect passenger satisfaction based on the "more is better" principle.

Table 3: characteristics of a group of "one-dimensional" technical quality attributes of Moscow underground (metro) services

Attribute	**Base, people.**	**Mode**	**Standard deviation**	**Proportion of AOM, %**	**Proportion of Kano categories %**						**SII, %**	**DDI, %**	**CSI, %**
					A	O	M	I	R	Q			
Electronic display indicating the next station	458	O	0,8	85	16	48	21	13	1	1	65	-71	-6
Air conditioner	452	O	1,0	81	18	48	16	14	4	1	66	-68	-3
Availability of Wi-Fi	457	O	0,9	73	12	51	10	25	2	0	64	-62	1
Separation of side seats by configuration or partition	458	O	1,1	69	16	38	16	24	6	0	54	-60	-6
Sound insulation	459	O	1,2	69	30	33	6	18	8	5	67	-49	18
Space for strollers,	457	O	1,0	68	15	3	1	2	4	1	53	-58	-4

bicycles and bulky luggage						7	6	7					

Seven technical quality attributes of Moscow underground (metro) services were assigned to the "attractive" group (table 4). These attributes make a big contribution to the formation of satisfaction, at the same time, passengers will not be dissatisfied with the absence of such attributes. Attributes are relatively important for the "O+A+M share" indicator, although the share of "indifferent" estimates is high. Consensus level is average, except for seat type ratings, where the standard deviation is high.

Table 4: characteristics of the group of "attractive" technical quality attributes of Moscow underground (metro) services

Attribute	**Base, people.**	**Mode**	**Standard deviation**	**Proportion of AOM, %**	**Proportion of Kano categories %**						**SII, %**	**DDI, %**	**CSI, %**
					A	O	M	I	R	Q			
Leaning seats	456	O	1,1	63	27	27	9	30	5	1	55	-42	13
Seat type: soft, springy	459	O	1,2	61	31	26	4	28	9	2	58	-40	19
USB charges for smartphones	458	O	1,1	60	26	31	3	36	3	1	56	-38	19
Allocated space for standing	457	A	1,2	59	37	16	7	28	10	3	54	-33	21
Informing about the load of cars for the arriving train	457	O	1,1	57	31	23	4	36	5	1	54	-32	22
Pass-through between the train cars	459	O	1,2	57	32	20	5	33	7	3	54	-33	20
Interactive panel for setting the route in the car	456	I	1,0	55	30	22	2	42	3	0	53	-28	25

We should say that this group does not have uniquely attractive attributes in the sense that N. Kano referred to this category as "delight factors": the upper quadrant of the matrix (maximum SII with minimum DDI) is free, the group inclines to the zone of "indifferent" attributes.

The next group includes attributes that should or should not be used when consuming Moscow metro services: must-be factors and reverse factors. The category of "reverse action" is uniquely related to the attribute "Opening doors with a button", while the opinions of the respondents are quite consistent (standard deviation is average). Its influence on increasing satisfaction tends to zero, while its influence on the growth of dissatisfaction is maximal. If, following D. Shen's remarks, we recalculate the respondents' answers for the attribute with the opposite value ("Automatic door opening"), then such an attribute will fall into the first category - important one-dimensional attributes (table 5).

Table 5: characteristics of the "reverse" technical quality attributes of Moscow underground (metro) services and alternative (opposite in value) attributes

Attribute	Base, people.	Mode	Standard deviation	Proportion of AOM, %	Proportion of Kano categories %						SII, %	DDI, %	CSI, %
					A	O	M	I	R	Q			
Reverse													
Opening doors with a button	459	R	1,2	8	6	1	1	18	67	7	8	-74	-65
One-dimension													
Automatic door opening	459	O	1,2	67	25	31	12	18	8	7	59	-54	5
Reverse													
Luggage racks above the seats	457	I/R	1,4	22	11	8	4	38	38	2	18	-50	-32
"Indifferent"													
No luggage racks above the seats	457	I/R	1,4	38	6	22	10	38	22	2	28	-55	-27
Reverse													
Type of finish – fabric	458	I	1,2	9	4	4	2	28	61	2	7	-68	-60
"Indifferent"													
Type of finish – leatherette	458	I	1,2	45	15	19	11	41	8	5	36	-40	-4

Similarly, the attributes "Luggage Racks above the seats" and "Type of finish – fabric" can be classified as "reverse" attributes. However, they have a high percentage of" "indifferent" ratings. Therefore, when analyzing the alternatives "No Luggage racks above the seats" and "type of finish (leatherette)", the latter are more likely to be included in the group of attributes "indifferent" than "one-dimensional". It should be noted that in a qualitative study, respondents mentioned that the fabric wears out and gets dirty rather quickly, so even new cars with fabric seats can look untidy.

The "must-be" attributes were attributed to the climate control attributes in the car "Feeling of air movement" and "Window leaf/possibility to open a window", as well as "The standard scheme of seat allocation" (table 6).

Table 6: characteristics of the group of "basic/must-be" technical quality attributes of Moscow underground (metro) services

Attribute	Base, people.	Mode	Standard deviation	Proportion of AOM, %	Proportion of Kano categories %						SII, %	DDI, %	CSI, %
					A	O	M	I	R	Q			
Basic/Must-be													
Feeling of air movement, light blowing	456	O	1,2	59	12	28	17	32	17	1	41	-51	-15
Window leaf/possibility to open a window	456	O	1,4	57	13	23	10	36	17	1	37	-56	-14
The standard scheme of seat allocation ("sofas")	456	O	1,2	47	11	26	22	24	15	3	38	-64	-27
Reverse													
Seats are arranged one behind the other (as in buses)	456	R	1,2	15	13	2	0	24	58	3	15	-62	-47

The attribute "Seats are arranged one behind the other (as in buses)" was classified with the opposite value. As can be seen the "bus" seat arrangement is perceived as an attribute of reverse action and has a high potential for growing discontent.

The remaining attributes are included in the "indifferent" or "questionable" attribute group. For these attributes, the percentage of "indifferent" assessments are maximum, with an average consistency of respondents' opinions. This means that the introduction of these attributes will have little impact on passenger satisfaction, although this impact is positive (relatively high CSI index).

The group of "questionable" attributes included, firstly, the attributes on which the opinions of the respondents differed greatly. The range of answers is great (standard deviation > 1.4) for the attributes "Separation of seats with handrails", "Temperature control" and "Vertical handrail in the center of the car". Secondly, attributes with a high proportion of "dubious" (contradictory) assessments are included in the questionable group. In our opinion, this is due to the novelty of the attributes "Lighting control by time of day", "Additional handrails at the edges and in the middle of the car", 'Additional board on the side of the carriage indicating the terminal station".

These attributes were used by interviewers to provide most of the passenger explanations, who use the "old" cars. A more detailed assessment can be given by comparing passengers' responses – those who are already familiar with these attributes (sample for "new" cars) with the answers of respondents who learned about such an attribute from the interviewer.

Table 7 summarizes the results of the technical quality attributes of Moscow underground (metro) services classification based on the Kano model.

For convenience, additional alternatives are given for a number of attributes (for example, "Upholstery Type"), in italics.

Table 7: classification of technical quality attributes of Moscow underground (metro) services based on the Kano model

Category based on the Kano model	Technical quality attributes of Moscow underground (metro) services
Must-be (basic)	Electronic display indicating the next station Air conditioner Availability of Wi-Fi Separation of side seats by configuration or partition Sound insulation Space for strollers, bicycles and bulky luggage *Automatic door opening*
Attractive	Feeling of air movement, light blow-off air Window leaf/ possibility to open a window *The standard scheme of seat allocation ("sofas")*
One-dimensional	Leaning seats Seat type: soft, springy USB charges for smartphones Allocated space for standing Informing about the load of cars for the arriving train Pass-through between the train cars Interactive panel for setting the route in the car
Reverse	*Opening doors with a button* *Luggage racks above the seats* *Type of finish – fabric* *Seats are arranged one behind the other (as in buses)*
Indifferent	Configuration (wider seat spacing) Increased glazing area *No luggage racks above the seats* *Type of finish – leatherette*
Questionable	Separation of seats with handrails Temperature control Vertical handrail in the center of the car
	Lighting control by time of day Additional handrails at the edges and in the middle of the car Additional board on the side of the carriage indicating the terminal station

A comparative analysis evaluating the importance of attributes and assigning them to appropriate categories based on the Kano model (one-dimensional, attractive, basic, indifferent, reverse, questionable) allows to group the technical quality attributes of Moscow underground (metro) services according to the degree to which they need to be taken into account in order to increase competitiveness of underground services. We have identified five groups shown in table 8.

Table 8: degree the degree to which the technical quality attributes need to be taken into to increase the competitiveness of the service

Degree the degree to which the attributes need to be taken into	Technical quality attributes of Moscow underground (metro) services
Zero degree of necessity The strategy is not to introduce / eliminate	New scheme of seat arrangement: one behind the other (as in buses) Opening doors with a button Vertical handrail in the center of the car Luggage racks above the seats Type of finish – fabric
First degree of necessity Strategy: high priority implementation / monitoring the quality	Electronic display indicating the next station Air conditioner Availability of Wi-Fi Sound insulation Automatic door opening Separation of side seats by configuration or partition Space for strollers, bicycles and bulky luggage
Second degree of necessity Strategies: implementation in the second place, investment in the growth of satisfaction	Leaning seats Seat type: soft, springy USB charges Allocated space for standing Informing about the load of cars for the arriving train Pass-through between the train cars Interactive panel for setting the route in the car
Third degree of necessity Strategies: cost savings	Configuration - wider seat spacing Increased glazing area
Fourth degree of necessity Strategies: additional study of attributes	Separation of seats with handrails Temperature control Lighting control by time of day Additional handrails at the edges and in the middle of the car Additional board on the side of the carriage indicating the terminal station

Among the considered technical quality attributes of Moscow underground (metro) services, five groups of attributes are identified, the introduction of which can lead to an increase in passenger dissatisfaction. Attributes of the first degree of necessity are perceived as mandatory, must be present in metro and do not significantly affect the competitiveness of metro services.

Group of the second degree of necessity to consider attributes aimed to increase underground services competitiveness covers the technical quality attributes of services that increase customer satisfaction. They are the second highest priority for implementation, regarded as investments in events aimed at increasing passenger satisfaction, and can significantly increase the competitiveness of underground (metro) services.

The strategy for the third-degree group of necessity is to save costs, because from the passengers' point of view, it is good if these attributes are present, but they do not have a big impact on passenger satisfaction and competitiveness

The meaning of the attributes included in the fourth group is not unambiguous. To substantiate their impact on passenger satisfaction and the competitiveness of metro services, it seems necessary to conduct additional research.

Conclusion

The authors' methodology developed and applied in this study allows us to offer sound management solutions aimed at increasing customer satisfaction with the technical quality of Moscow

underground (metro) services as well as their competitiveness, taking into account the relative importance of attributes.

As a result of the proposed classification of attributes based on Kano model and the author's methodology, several management decisions are proposed to improve the competitiveness of Moscow metro services:

1. Increase the availability of one-dimensional attributes of the technical quality of Moscow metro services, and invest in monitoring the quality of their performance.
2. Invest in the implementation of important and attractive attributes of Moscow underground (metro) service quality for consumers.
3. Reduce the costs of introducing unimportant attributes, or introduce them gradually until, as the novelty for the market decreases, they will not pass into the category of one-dimensional or basic.
4. Further study attributes and their perception by consumers, the value of which according to the Kano method is not unambiguous. First of all, the authors suggest conducting experimental studies to determine the optimal car climate.

The results of the research conducted in the framework of the Kano model and the author's methodology showed that the life cycle of attributes within the framework of the Kano method is not enough studied in the literature (Lofgren, et.al., 2008). Over time, attributes can shift from one category to another. For example, Wi-Fi availability in metro cars belongs to basic or one-dimensional (mandatory) category; in Moscow Central Circle cars they are also likely to move from the category of attractive attributes to the category of basic ones, it was in metro.

Therefore, periodic measurements of passenger satisfaction with the service attributes will allow to predict changes in the contribution of technical quality attribute of underground (metro) services to the assessment of passenger satisfaction and adjust the level of technical quality of services and their competitiveness in advance.

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The Effect of Household Type on Income Inequality: Evidence from the EU-15 Countries

Joanna MUSZYNSKA

Nicolaus Copernicus University in Torun, Torun, Poland
Joanna.Muszynska@umk.pl

Ewa WEDROWSKA

Nicolaus Copernicus University in Torun, Torun
Poland, ewaw@umk.pl

Abstract

Specialist literature presents multiple factors that are believed to affect income inequality. Our study focuses on household type as a determinant of overall inequality since it employs household as the unit of analysis, and examines the extent of inequality among households by incorporating household income data. Therefore, apart from assessing the level of income inequality, the aim of the study is to verify the extent to which household type affects household income inequality. Moreover, we endeavour to answer the question of whether there exists any common pattern of the influence of household type on income inequality.Our study aims at expanding and updating the knowledge regarding the dimensions of household income inequality in European countries. We employ the latest available representative microdata derived from the EU-SILC study. This study builds upon the Mean Logarithmic Deviation (Theil L index) and its property of being additively decomposable to assess the effect of household type on household income inequality. Our results indicate that households in the EU-15 countries differ in structure, with the most noteworthy differences occurring between the Mediterranean and the Nordic countries. The situation of households run by a single parent is on average worse than in case of other households. Generally, households run by couples without children or couples with one or two children are best-off. The effect of differences in household structure on income inequality is the most noteworthy in the Nordic and in the Anglo-Saxon countries, while in Luxemburg and the Mediterranean region this effect is the least notable.

Keywords: Income Inequality, Household Type, Mean Logarithmic Deviation, Theil Index L, Gini Coefficient

Introduction

Among the factors that are considered to account for the dissimilarities and trends in income inequality, differences and alterations in the characteristics of households are also examined. Household composition reflects the structure of household members in terms of their number, age, and mutual relations (*e.g.,* parents-children). In income inequality studies, household composition plays a crucial role due to the fact that equivalised household income is calculated on the basis of the number and age of household members. Household structure is also worthy of note with respect to international comparisons. Iacovou and Skew (2010) point out that international differences in household structure reflect considerable discrepancies between societies: in culture and norms, in the cost and availability of housing, in the incomes of various social groups, and in social policy, where the dissimilarities in tax and benefit systems can lead to radically diverse patterns of household structure.

The effect of household type on income inequality is frequently examined in empirical studies.

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Examples of such analyses can be found in the works of Papatheodorou (2000), Brandolini and D'Alessio (2001), Martin (2006), Muszyńska and Wędrowska (2018a, 2018b, 2020). Medgyesi (2014) documented a growing inequality between household structures from 2004 and 2007 in the EU-15 countries, with the exception of Greece and Sweden. His analysis suggests that stratification between family structures continued to increase until 2010 in countries such as: Portugal, Italy, Luxemburg, France, Germany, and the Netherlands. In turn, Robling and Pareliussen (2017) found that the altered household composition accounted for 16% of the increase in overall disposable income inequality in Sweden from 1987 to 2013. Nevertheless, studies taking into account household type as a determinant of income inequality should be continued due to constant changes in the population structure resulting from the development of societies.

Guerin (2013) indicates that household structures vary in European countries, which affects the scope and form of income inequality. The key reasons for these discrepancies include a growing proportion of men and women who remain childless, a decreasing stability of marriages, a rising number of divorces, and also an increasing prevalence of cohabitation without marriage, single-parent households and step-parenting. However, two fundamental issues emerge as projected effects of these changes on the growth of income inequality. The first one concerns an increasing share of households particularly exposed to poverty (such as single-adult households and single-person households of elderly people). The second is related to declining fertility and assortative mating (well-educated high-income people marry in the same income groups, which leads to an increase in their income, thus creating a stronger income gap between household types). Peichl *et. al.,* (2010) reveal that - in the case of Germany - the changing household structure is associated with increasing inequalities arising from a drop in the average number of people inhabiting a household. In turn, Burtless (1999) and Martin (2006) report a growth in the share of single-parent families among households as one of the factors behind the increase in inequality.

The impact of changes in relationship formation on the emergence of income inequality between different types of households in modern societies has been studied also by Blossfeld and Buchholz (2009) and Grotti and Scherer (2016). Their empirical results support the notion that, over the past decades, income inequalities between different types of households have increased substantially due to lifetime accumulation of resources in higher skilled couples.

Our study centres on household type as a determinant of overall inequality. Therefore, in addition to assessing the level of income inequality, the aim of the study is to verify the extent to which household type affects household income inequality. Furthermore, we endeavour to answer the question of whether there exists any common pattern of the influence of household type on income inequality.

The study is based on microdata obtained from the European Union Statistics on Income and Living Conditions (EU-SILC). We employed the Mean Logarithmic Deviation (MLD) to assess the effect of household type on household income inequality, whereas the Gini coefficient was used to measure and compare the level of income inequality between European households.

Data

The paper presents the results of a study conducted within the scope of the project 'Income and inequality of income of European households' (RPP 162/2018-EU-SILC). The analysis includes fifteen countries forming the European Union before the accession of new members in 2004, *i.e.* the so-called 'Old Union'. The study was conducted on the basis of income data from 369,740 individuals. Depending on the country, the sample varied in size from 10,431 (Luxemburg) to 54,806 observations (Greece).

The study employs the latest available microdata obtained from the European Union Statistics on Income and Living Conditions (EU-SILC) and extracted from the cross-sectional database of the EU-SILC 2018 (version as of September 2019). The microdata contains information on the income achieved by individual household members in 2017. This is due to the fact that in the EU-SILC

survey, for the majority of countries, the income reference period is the calendar year previous to the year of the survey. The only two exceptions are the United Kingdom and Ireland. In Ireland, the income reference period is the last twelve months, whereas in the United Kingdom the current income is annualised and reflects the present calendar year (Eurostat, 2020).

For the purpose of the study, income was defined as equivalised household disposable income per household member. Total household disposable income was calculated as a sum of gross personal income components for all household members and gross income components at the household level reduced by taxes, social insurance contributions and interhousehold cash transfers paid. To account for the differences in the size and composition of households, household disposable income was divided by the number of equivalent adults in the household, and then the equivalised value was assigned to each household member. When making an adjustment, we applied the OECD-modified equivalence scale.

It should be noticed that the measures of inequality reported in the study were calculated using personal cross-sectional weights, therefore they are equivalent to an extrapolation of the measures to the entire population.

In our study, while analysing income inequality, we focused on household type, which is understood as a description of the household according to certain characteristics of its membership, such as the number of household members, their age and the relation between them, as well as whether household members are over the retirement age, or whether there are dependent children living in the household. For the purpose of the study, we devised seven household subgroups, that is:

- a single person (H-5),
- a childless couple, both under 65 (H-6),
- other households without children (H-7 and H-8),
- a single parent (H-9),
- a couple with 1 or 2 children (H-10 and H-11),
- a couple with 3 or more children (H-12),
- multi-generation household (H-13 and H-16).

When assigning households to the subgroups, we based on the household types distinguished in the EU-SILC database, hence the EU-SILC denotations of the households types included in the distinguished subgroups in the brackets.

Methodology

In the study, we apply two measures of inequality that arise from different intellectual approaches to inequality. Our empirical analysis employs the Mean Logarithmic Deviation (MLD), which belongs to the family of the Generalized Entropy measures, and the Gini coefficient, which is based on the Lorenz curve. The MLD is also referred to as the Theil L index, therefore, later in the paper the term Theil L index will be used.

Both indices – the Theil L index and the Gini coefficient - meet the most highly desired requirements for any measure of inequality, namely: anonymity principle, scale independence, population independence and the Pigou-Dalton principle (Litchfield, 1999). The advantage of the Theil L index over the Gini is its property of being additively decomposable (Bourguignon 1979; Shorrocks 1980, 1984). This property allows overall inequality to be expressed as a sum of the inequalities existing within the subgroups distinguished on the basis of a specific population characteristic, and the inequalities existing between the subgroups. In our study, we employ this property to verify the extent to which household type affects household income inequality.

A weakness of the Theil L index is the lack of an upper limit (Theil, 1967). For this reason, we also employ the Gini coefficient as another measure of inequality. The advantage of the Gini index over the Theil L index is that it is bounded in the interval [0;1], and can be easily interpreted and

compared. In the study, we use the Gini index to assess and compare the level of income inequality between the examined countries.

For a population of n income units with mean income μ and income for unit i denoted as y_i, the Theil L index can be depicted with the formula:

$$\mathrm{L} = \frac{1}{n}\sum_{i=1}^{n} ln\left(\frac{\mu}{y_i}\right) \quad (1)$$

As already mentioned, the Theil L index can be additively partitioned into a sum of the inequalities existing within subgroups of the population and the inequalities existing between them. Assuming that all households are partitioned into K subgroups, the Theil index L can be decomposed into the two components, as follows:

$$\mathrm{L} = \sum_{k=1}^{K} p_k L_k + \sum_{k=1}^{K} p_k ln\left(\frac{\mu}{\mu_k}\right) = L_w + L_b\ , \quad (2)$$

where K is the number of subgroups, p_k is the population share of a subgroup k in total population, μ_k is the mean income of a subgroup k, L_k is the Theil index L corresponding to a subgroup k, L_w and L_b denote within-group and between-group components, respectively.

The within-group component describes the part of overall inequality that arises from inequality within subgroups, whereas the between-group component presents the extent of inequality arising solely from the differences in the mean incomes of subgroups. The ratio of inequality between subgroups to overall inequality reflects the extent to which the feature on the basis of which the subgroups are distinguished contributes to household income inequality.

The Gini coefficient of inequality can be expressed in various ways. One of them is to define the Gini coefficient as a half of the relative mean difference, i.e. the expected distance between two randomly selected incomes in a population divided by average income. In population of n units and mean income μ, the Gini index can be expressed as follows:

$$\mathrm{G} = \frac{1}{2n^2\mu}\sum_{i-1}^{n}\sum_{j=1}^{n}\left|y_i - y_j\right| \quad (3)$$

In other words, the Gini coefficient is the ratio of the mean difference between all pairs of incomes y_i, y_j, to the two-fold mean level of income μ (Pyatt, 1976).

Results

The descriptive statistics on equivalised disposable income and population of the examined households are presented in Table 1. Over the past decades, household structures have been changing across the EU-15 countries, and these alternations have been extensively documented in many studies. Evidence from the EU-SILC data shows that the proportion of the population living in different types of households varied considerably from one EU-15 country to another in 2017. In general, the proportion of couple-only households (where both partners are under 65) were higher in the Nordic and North-Western countries than in the Mediterranean countries, while the proportion of two-adult households with at least one adult at the age of 65 years or more was the highest in the Mediterranean region. There are important disparities in single-parent households: the proportion of single parents with minor children was also higher in the Nordic and North-Western countries than in the Mediterranean countries. These figures should not, however, be treated as indicative of the level of lone parenthood across the EU-15 countries since in Southern Europe single parents are more likely to live in extended-family households rather than in single units (Iacovou and Skew, 2011). The proportion of the population living in single-adult households differed widely across EU-15: it ranged from above 9% in Ireland, Greece, Portugal, and Spain to more than 20% in Sweden, Finland, Germany, and Denmark. In all countries (except Greece and Italy), the most common of the seven household types is a household run by a couple with one or two dependent children.

Households differ in size and composition, therefore a simple comparison of aggregate household income can be quite misleading with respect to the well-being of individuals in each household. This is why we focus on income inequality, and - in particular - on equivalised household disposable income as the income concept that best approaches individuals' and households' standards of living (DiPrete, 2003). The profile of equivalised disposable income by household type in all countries was noteworthy as the highest average income was achieved by households run by two adults, both under 65, with no dependent children. In Finland, Ireland, the Netherlands, and Sweden the average income of this group demonstrated the highest divergence from the national average (it was higher by more than 25%). The situation of households run by childless couples - both partners under 65 years of age - was on average more favourable than in other households without children. Our analysis shows that in all examined countries, except Italy and Greece, one-person households obtained lower mean income than the average income of all households. One-person households often consist of young, unemployed individuals or elderly retirees, both of which face higher risks of poverty. Guerin (2013, p. 11) emphasizes that poverty among single-person households can be higher than in two-adult households, where income pooling can facilitate responses to income shocks if they affect one of the two individuals.

Table 1: Summary statistics in the EU-15 countries

		H5	H6	H7-8	H9	H10-11	H12	H13-16
AT	Popn. share	0.1656	0.1533	0.2150	0.0287	0.2697	0.0758	0.0918
	Relative mean	0.8864	1.1990	1.1014	0.6961	0.9990	0.7379	0.9493
	Gini	0.2629	0.2866	0.2307	0.2569	0.2534	0.2160	0.2013
BE	Popn. share	0.1444	0.1236	0.2104	0.0530	0.2482	0.1265	0.0939
	Relative mean	0.8558	1.2447	1.0024	0.7236	1.0747	0.8973	0.9911
	Gini	0.2507	0.2455	0.2294	0.2321	0.2140	0.2500	0.2476
DE	Popn. share	0.2052	0.1694	0.2069	0.0513	0.2597	0.0620	0.0456
	Relative mean	0.8469	1.2058	0.9735	0.6858	1.0299	1.1734	0.9919
	Gini	0.3203	0.2911	0.2583	0.2462	0.2508	0.4167	0.2653
DK	Popn. share	0.2222	0.1703	0.1501	0.0746	0.2581	0.0867	0.0381
	Relative mean	0.7954	1.2193	1.0415	0.7187	1.0964	0.9552	1.0488
	Gini	0.2712	0.2956	0.2884	0.1868	0.2131	0.2656	0.1831
EL	Popn. share	0.0918	0.0878	0.3406	0.0130	0.2835	0.0601	0.1232
	Relative mean	1.0083	1.2474	1.0239	0.8485	1.0368	0.8098	0.7756
	Gini	0.2925	0.3459	0.2753	0.2948	0.3362	0.2617	0.2901
ES	Popn. share	0.0998	0.1151	0.2802	0.0300	0.3165	0.0438	0.1147
	Relative mean	0.9456	1.1554	1.0496	0.7630	1.0054	0.9140	0.8500
	Gini	0.3268	0.3303	0.3014	0.3697	0.3169	0.3977	0.3195
FI	Popn. share	0.2122	0.1743	0.1776	0.0479	0.2534	0.1112	0.0233
	Relative mean	0.7671	1.2612	1.0348	0.7331	1.0825	0.8766	1.1422
	Gini	0.2506	0.2680	0.2235	0.2034	0.2154	0.2202	0.2713
FR	Popn. share	0.1603	0.1432	0.1830	0.0608	0.2927	0.0914	0.0685
	Relative mean	0.9852	1.1994	1.0975	0.6844	0.9942	0.8468	0.8665
	Gini	0.3074	0.2918	0.2598	0.2240	0.2341	0.2815	0.2663
IE	Popn. share	0.0910	0.1056	0.1921	0.0648	0.2944	0.1405	0.1117
	Relative mean	0.8753	1.2806	1.0373	0.6013	1.0818	0.8427	0.9862
	Gini	0.3731	0.3002	0.2750	0.2493	0.2750	0.2563	0.2850
IT	Popn. share	0.1357	0.0837	0.3107	0.0364	0.2958	0.0411	0.0966
	Relative mean	1.0041	1.2405	1.0926	0.7454	0.9539	0.8002	0.8103
	Gini	0.3315	0.3217	0.3055	0.3167	0.3108	0.3613	0.3099
LU	Popn. share	0.1410	0.1409	0.1796	0.0500	0.3309	0.0683	0.0893
	Relative mean	0.8572	1.1744	1.1401	0.8041	1.0032	0.8089	0.9123
	Gini	0.3233	0.3214	0.3049	0.3771	0.2974	0.3264	0.3176
NL	Popn. share	0.1669	0.1523	0.1900	0.0420	0.2929	0.1045	0.0515

	Relative mean	0.8338	1.2675	0.9455	0.7673	1.0528	0.9773	0.8849
	Gini	0.2833	0.2724	0.2390	0.2569	0.2228	0.2899	0.2169
PT	Popn. share	0.0918	0.1061	0.3023	0.0390	0.3071	0.0307	0.1231
	Relative mean	0.9349	1.1334	1.0500	0.8048	1.0239	0.8668	0.8462
	Gini	0.3573	0.3224	0.3178	0.2799	0.2928	0.3342	0.2907
SE	Popn. share	0.2037	0.1476	0.1671	0.0712	0.2839	0.0853	0.0412
	Relative mean	0.7869	1.3083	1.0944	0.6890	1.0622	0.8657	0.9537
	Gini	0.2581	0.2451	0.2499	0.2062	0.2182	0.2448	0.2255
UK	Popn. share	0.1280	0.1467	0.2212	0.0719	0.2754	0.0722	0.0847
	Relative mean	0.8617	1.2916	1.0533	0.5920	1.0649	0.7300	0.9305
	Gini	0.3331	0.3164	0.2883	0.2153	0.3218	0.3079	0.2828

Source: Authors' calculation using the EU-SILC data.

In all countries - with the exception of Germany - the situation of couples with one or two children was on average more favourable than in households with three or more minor children. The most unfavourable differentials for couples with three or more children were found in the United Kingdom and in Austria, while the opposite was true of Germany, where the mean income of households with three or more children was higher by 17.3%than the national average. Papatheodorou (2000) points out that children have a negative effect on the total equivalent household income. Children are usually not entitled to any income from labour, only from family and children related allowances, which are relatively low. However, the lowest income among all household types in each country was achieved by single parents with children under 18. This pattern can be observed in all EU-15 countries. The situation of single-parent households with one or more children appears to be the worst in the Anglo-Saxon countries (the mean income equalled only around 60% of the national average). Quite interestingly, in Greece and Portugal the group of one-parent families was not found to have a particularly low disposable income, as evidence shows in other countries. Research on poverty emphasizes an increase of single-parent families, and especially single-mothers, as they are economically distressed and concentrated at the bottom rungs of the income ladder (Martin 2006).

Average income varied from a household type to a household type, and this alone implies some inequality between the groups. Moreover, income varied inside each household type, adding a within-group component to total inequality. The Theil L index mentioned above can be used to assess the impact of household type on income inequality in different subgroups of the population. This subsection presents and analyses the results of the decomposition of the Theil L index, using STATA software. Total inequality is partitioned by household type into within- and between-group components based on equation (2).

The Gini coefficient reveals that equivalised disposable income appear to be more equally distributed in Belgium, Finland, and Sweden. The most unequal income distribution among the EU-15 countries was observed in the Mediterranean region, Luxemburg, Ireland, and the United Kingdom. Our analysis shows that the distinguished household groups also experienced a different extent of inequality (Table 1). Equivalised disposable income was more equally distributed among two-adult households than among one-person households in countries such as: Belgium, Germany, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Sweden, and the United Kingdom. We observed that households run by two adults under 65 were characterised by a more unequally distributed income than in the case of other households without children (including households run by two adults, where at least one is 65 years old or more). This is not surprising since it is expected of the social security system to work towards a more equalised income distribution in the old age. However, it is difficult to establish a common pattern comparing income inequality among households with children and among those without children. Of course, the category 'households with children' also includes both couples and single parents.

Despite the significant differences in mean incomes by household type, there was in fact more inequality within household types than between them. The lighter shaded area in Figure 1 displays the amount of inequality within household types, and the darker area displays inequality between household types. Between-group inequality represents the extent to which various household types

are stratified by income. The impact of household type on overall income inequality varies across Europe. When the groups are identified on the basis of household type, between 2% (in Greece) and 14,5% (in Finland) of overall inequality can be attributed to a different composition of the population. In 2017 the effect of household type on income inequality was the highest in the Anglo-Saxon and Nordic countries. Our results demonstrate that between-household-types inequality was responsible for more than 9% of overall inequality (see Figure 1). Household structure was of negligible importance in Luxemburg and the Mediterranean region: it accounted for less than 5% of overall inequality.

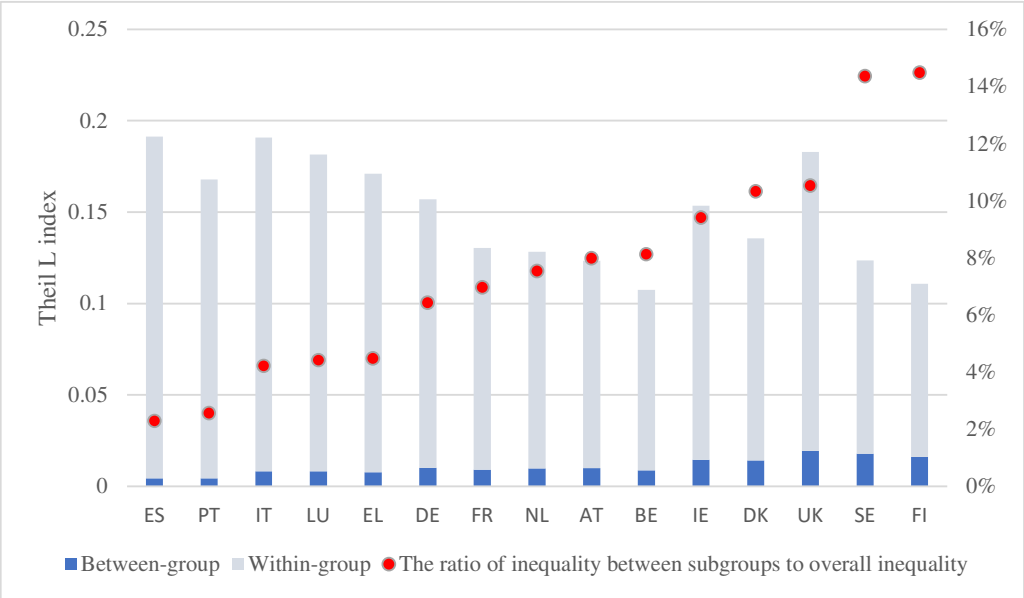

Fig. 1: The Theil L index decomposition

Source: Authors' own calculation using EU-SILC data.

Discussion and Conclusions

Household structure differed across the EU-15 countries, with the most significant differences between the Mediterranean and the Nordic countries. In this paper, we endeavoured to answer the question of whether the effects of these disparities on inequality in equivalised disposable income vary among countries. For the purposes of empirical analysis we employed the Theil L index, a measure of inequality that is additively decomposable. This paper uses data from the European Survey on Income and Living Conditions. The database covers information on income of 369,740 individuals achieved in the year 2017.

Decomposition of the Theil L index by household structure reveals disparities between the economic situation of different household groups across countries. In most cases, households run by one person and couples with three or more children obtained lower mean incomes than the average income of all households. However, the situation of households run by a single parent with one or more children was on average worse than the situation of other households. The households without children, or those run by couples with one or two children were generally best-off.

The effect of differences in household structure on income inequality was the most prevalent in the Nordic (especially in Finland and Sweden) and in the Anglo-Saxon countries. By contrast, the effect was the least notable in Luxemburg and the Mediterranean region. This conclusion is clearly in line with empirical research on the impact of household structure on the degree of income inequality in the EU-15 countries (Medgyesi 2014).

It may seem paradoxical that the Nordics, which have unrestricted economies, providing a high level of social protection while simultaneously encouraging a high labour force participation through various instruments of active labour market policies and the provision of extensive child care (Fuest *et. al.,* 2010), are characterised by the highest level of inequality between the subgroups distinguished on the basis of household type. Firstly, when compared with other countries, the Nordic countries had the lowest within-group inequality in each group. Secondly, the household structure in the Nordic countries differed considerably from that in other countries. In the Nordics, the shares of single-adult households and couple-households without children have risen from high initial levels since the early 1990s, especially in Sweden and Finland (Pareliussen *et. al.,* 2018, p. 37). This tends to amplify inequality between subgroups distinguished on the basis of household type due to the fact that such households often have relatively low equivalised disposable income, and because it reduces overall income sharing among household members. Pareliussen and Robling (2018) indicated that changing household composition boosted inequality substantially in the Nordics from 1995 to 2013. On the other hand, Brandolini and D'Alessio (2001) stressed that demographic changes are not exogenous, but they respond to socio-economic circumstances: the growth in the number of single-adult households, for instance, certainly reflects a lengthening of the average lifespan, but it is also caused by a modification of the parent-child relations, as well as by improved economic conditions and, in particular, improved social security.

The effect of differences in household structure on income inequality was the least observable in Luxemburg and the Mediterranean countries. It should be stressed that the dispersion of equivalised disposable income between household members in these countries was higher than in other EU-15 countries, of which the Nordic countries proved to be the most egalitarian. Luxemburg and the Mediterranean region had the highest income inequality in each subgroup of households, and the observed inequality stemmed mostly from heterogeneity within the groups based on household type (from 95.7 percent to 95.6 percent). A minor influence of household type observed in the Mediterranean region may result from a more composite household structure, where a number of generations and various sources of income often coexist. These countries are characterised by extended co-residence of adult children with their parents, and of elderly people with their adult offspring; these arrangements, together with a much lower incidence of lone-parent families, make for considerably larger household sizes (Iacovou and Skew, 2011, p. 467). This makes the classification based on the simple variables used here that much less significant than in other countries (Brandolini and D'Alessio, 2001, p. 23).

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Performance Analysis of US Stock Market during the 2020 Market Crash using Recurrent Neural Network

Stefan-Razvan ANTON
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, antonstefan000@gmail.com

Octavian POSTAVARU
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, opostavaru@linuxmail.com

Antonela TOMA
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, antonela2222@yahoo.com

Abstract

As our world moves more and more into the online medium so does our data. This massive movement allows the analysis of financial markets using methods that would not have been possible 10 years ago due to a lack of sufficient data. In this paper, we review some basic ideas of stock market data handled as a time series, need of RNN (Recurrent Neural Network), survey previous works, and use a LSTM (Long Short-Term Memory) network to forecast stock value during and after the 2020 market crash. The prediction accuracy is calculated and investigated with reference to S&P 500, PHLX Semiconductor (SOX), and XLRE.

Keywords: Recurrent Neural Network; Time Series; Data Mining; Pattern Recognition.

Introduction

Time series arise from chronological measurements made at a constant time interval. Such type of data is frequently used in signal processing, mathematical finance, econometrics, sales forecasting, and many other applications. In deciding actions that involve uncertainty in the future, time series models are one of the most efficient methods of forecasting. The man's desire to make the future less uncertain has led to the development of more and better forecasting techniques. Following the increase in computational capability and the availability of data in the last 20 years, AI has been able to leap forward in time series forecasting. Artificial Neural Networks modelled after the human brain can now recognize patterns and can generalize them to predict future patterns. Today, NNs (Neural Networks) are considered a common Data Mining technique in science, economy, and industry.

In this paper we propose an analysis of the effects of the 2020 Market crash, caused by the Covid - 19 Pandemic, using RNNs. Our hope is to uncover whether there is a fundamental difference between the normal stock market and its daily volatility and the market undergoing a sudden dramatic decline. The possible implications of this paper are that maybe a market crash is not as unpredictable as we thought, and that historical data might be used in identifying such a crash. The research method is based on a LSTM network that is trained on pre-pandemic data to recognize patterns in the daily fluctuations of the market and then used as a forecasting tool on past-pandemic data. If the fundamentals behind the stock market change during a crash, then the LSTM model will have a poor forecasting accuracy. In our simulations, the exact opposite is observed, the forecasting accuracy seems to stay the same, and even increase as the pandemic progresses. The results seem to prove that there is no fundamental difference between a bull market and a crash and universal market forecasting tools can be developed.

The need of better tools for forecasting

Market Indexes

The stock market refers to the collection of markets and exchanges where regular activities of buying, selling, and issuance of shares of publicly held companies take place. The stock market can be best described by its chaotic nature and nonlinearity, where the extracted time series have structural breaks, are noisy, and random. Moreover, the stock market is influenced by several factors such as political events, currency exchange rate, general economic conditions,

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trade goods worth, and so on. All of this makes the individual stock analysis useless and any prediction made on an individual stock will most likely be wrong. By instead analysing a market index, which should theoretically describe the behaviour of the overall market, we are able to achieve a forecast better anchored in reality. Other advantages of using market indexes are that they offer a historic perspective of stock market performance, that may be utilized by traders to gain better insight into their investment and that they provide a baseline that can be used for comparison when evaluating the overall performance of certain portfolios. In this paper, S&P 500, SOX, and XLRE are considered for stock market index evaluation and prediction.

The S&P 500 is a stock market index that measures the stock performance of 500 big businesses listed on stock exchanges within the United States, the top five S&P 500 stocks by index weight are AAPL 7.3%, MSFT 5.9%, AMZN 5%, FB 2.4%, GOOGL 1.7%.

The SOX (PHLX Semiconductor) sector is a Philadelphia Stock Exchange index composed of companies involved with the design, distribution, manufacture, and sale of semiconductors, the top five PHLX Semiconductors stocks by index weight are QCOM 9.55%, NVDA 9.44%, AVGO 8.44%, TXN 7.95%, TSM 5.47%.

XLRE represents the new real estate sector, composed companies involved in real estate, excluding mortgage, the top five XLRE stocks by index weight are AMT 15.2%, PLD 9.87%, CCI 8.86%, EQIX 8.84%, DLR 5.14%.

Literature Survey

An artificial neuron, as described by McCulloch (1943) is a mathematical function proposed as the computational equivalent of a biological neuron. The artificial neuron receives one or more inputs, sums them, and applies an activation function to produce an output. By stacking artificial neurons in layers, one obtains a basic neural network, or" B-type unorganized machines" as first proposed by Alan Turing. Although a single artificial neuron performs worse in time series forecasting than traditional methods, such as linear regression, exponential smoothing, and autoregressive integrated moving average, a neural network can outperform any traditional method many times over. Today, almost all time series forecasting models use some type of neural network. This is mainly to the fact that neural networks can approximate any complex continuous function given enough data and can recognize new patterns even after training.Hu (1964) proposed the idea of using a neural network together with time series in short-range weather forecasting, thus igniting the idea of using NNs for time series forecasting. Since then, many other neural network models for time series forecasting have been developed, with the most successful one being LSTM based ones. In 1999 Nag and Mitra attempted to evaluate the Signals approach and the ANN approach to identify a class of economic indications that can function as warning signals to an emerging currency crisis. Their findings were that while the signals approach has been widely used, in the context of the East Asian 1998 currency crisis, such models were found to be wanting in their predictive capability, and that the ANN approach managed to capture the nonlinear relationship between the economic fundamentals and the probability of a crisis.

Similarly, in 2008 Fioramanti used a NN model to predict the evolution of the debt crisis in less developed countries by using historical data from the time period of 1980 and 2004. In his study, he argues that NNs constantly outperform other classical analysis models due to the plasticity of the model and its ability to recognise patterns in highly nonlinear data.

Due to the unanticipated coronavirus disease 2019 (Covid - 19) pandemic, we are given the opportunity to measure the impact of an unexpected epidemic on the affected nations.

Qing He et al. (2020) found out that Covid - 19 had a small negative impact on the stock markets of China and other Asian countries that were affected during the early stages of the pandemic with the spill-over effect ton European and American countries being minimal. The considered indices underperformed after the epidemic, as opposed to the middle and late stages. In the later stages of the pandemic, as the spread of the disease in China has been stabilised, but with other countries being amid the global spread, China's stock market started to be affected by the spill-over effect.

In our paper, building o the previous work of Nag and Mitra (1999), Fioramanti (2008), Qing He et al. (2020), and many others, we investigate whether this nonlinear way of interaction between crashing markets is fundamentally different from regular day to day interactions.

LSTM Networks

First introduced by Hochreiter and Schmidhuber in 1997, LSTMs (Long Short-Term Memory Networks) are a special kind of RNN (Recurrent Neural Network), that are able to learn long-term dependencies, that is, remembering information for long periods of time. Since their invention in 1997 LSTMs have set accuracy records in multiple application domains, revolutionizing speech recognition, handwriting recognition, machine translation, language

modelling, and automatic image capturing. In LSTMs, LSTM cells are used in order to remember data from thousands or even millions of discrete time steps earlier. In an LSTM cell, there are extra gates added, namely the input, forget, and output gate that are used to decide which signals get forwarded to another node. The equations for a forward pass of an LSTM cell at time-step t, on layer l are:

$$\mathrm{f}_t^l = \sigma_g\left(W_f h_{t-1}^{l-1} + U_f h_{t-1}^l\right),$$

$$i_t^l = \sigma_g(W_i h_{t-1}^{l-1} + U_i h_{t-1}^l),$$

$$o_t^l = \sigma_g(W_o h_{t-1}^{l-1} + U_o h_{t-1}^l),$$

$$\widetilde{c_t^l} = \sigma_c(W_c h_{t-1}^{l-1} + U_c h_{t-1}^l),$$

$$c_t^l = f_t \circ c_{t-1}^l + i_t^l \circ \widetilde{c_t^l},$$

$$h_t^l = o_t^l \circ \sigma(c_t^l).$$

Where, f_t^l is the forget gate's activation vector, i_t^l is the input gate's activation vector, o_t^l is the output gate's activation vector, $\widetilde{c_t^l}$ is the cell input activation vector, c_t^l is the cell state vector, h_t^l is the hidden state vector, and where matrices W_k and U_k contain, respectively, the weights of the input and recurrent connections, where the subscript k can either be the input gate i, output gate o, forget gate f or the memory cell c, depending on which activation is being calculated.

Preliminaries

Data Preparation

The market data first needs to be processed. Each time period consists of date, open price, highest price during the day, lowest price during the day, close price, adjusted close price, and volume. In this paper, we will only need the date and the adjusted close price, which factors in things like new stock offerings, stock splits, and dividends. The data is first split into training, development, and test sets according to the following ratio 0.6:0.2:0.2, as can be seen in Table 1.

Table 1: Dataset distribution for S&P500, SOX, and XLRE

Year	Year Number	Total Number of time periods	Number of items in the training set	Number of items in the development set	Number of items in the test set
2016	1	252	152	50	50
2017	2	503	302	100	100
2018	3	754	452	151	151
2019	4	1006	604	201	201
2020	5	1187	712	237	237

In order to achieve better performance on the test set, the data on the training set needs to be normalized on the interval [-1, 1]. The effect can be observed in Fig. 1,2,3, where we plot the normalized data for S&P 500, SOX, and XLRE. This process is done in order to change the numerical values of the adjusted price, while keeping the overall characteristics of the dataset.

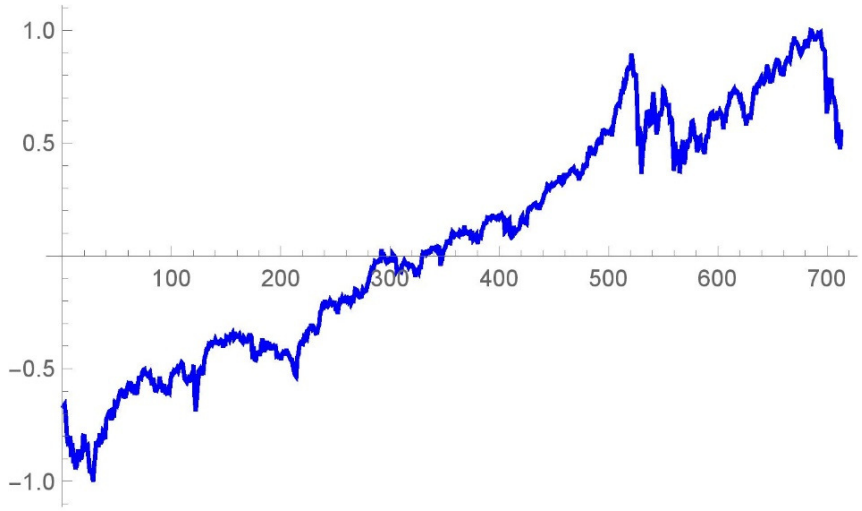

Fig. 1: Normalized data for S&P 500 on the period 4 Jan 2016 - 19 Sep 2020.

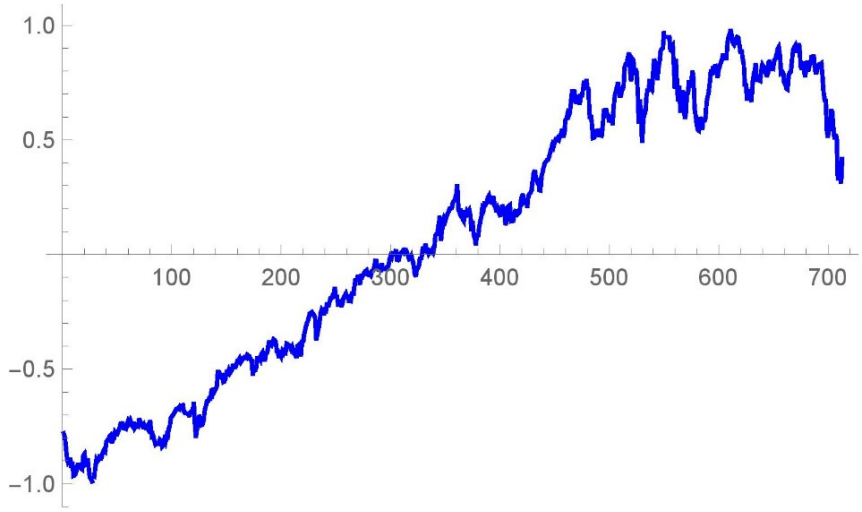

Fig. 2: Normalized data for SOX on the period 4 Jan 2016 - 19 Sep 2020.

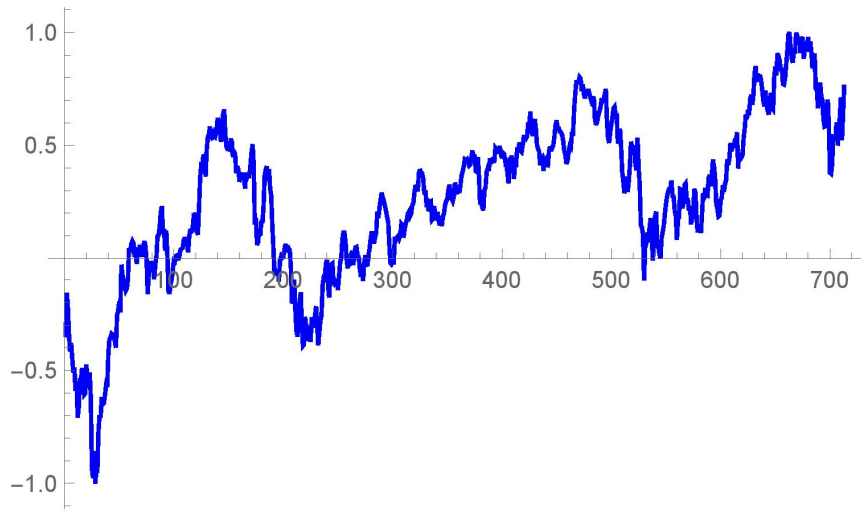

Fig. 3: Normalized data for XLRE on the period 4 Jan 2016 - 19 Sep 2020.

Evaluation Criteria

For the forecasting problem, the best measure of performance is the prediction error.

$$E_t = Y_t - F_t \ ,$$

where E is the error at time t, Y is the actual value at time t, and F is the forecast value at time t. In order to achieve a robust evaluation of the results, one should consider more than one performance measure. In this paper we analyse the performance of the forecast using the following five general criteria:

Mean Absolute Error (MAE): $\frac{\sum_{t=1}^{N}|E_t|}{N}$

Mean Absolute Percentage Error (MAPE): $\frac{\sum_{t=1}^{N}|\frac{E_t}{Y_t}|}{N}$

Mean Square error (MSE): $\frac{\sum_{t=1}^{N}E_t^2}{N}$

Root Mean Square Error (RMSE): $\sqrt{\frac{\sum_{t=1}^{N}E_t^2}{N}}$

Percent Mean Absolute Deviation (PMAD): $\frac{\sum_{t=1}^{N}|E_t|}{\sum_{t=1}^{N}|Y_t|}$

Simulation Results and Performance Analysis

For this study, an LSTM network is used. The network contains one input layer, five hidden layers, and one output layer. In total, the network has 92251 trainable parameters that get updated each iteration in order to minimize the error between the forecast and the real data. The experimental procedure consists of:

1) Training the network separately for each of the three indexes to be analysed on the training set, corresponding to the time period 4 Jan 2016 - 31 Oct 2018.

2) Optimising the network parameters on the development set, corresponding to the time period 1 Nov 2018 - 9 Oct 2019.

3) Testing the network on the testing set, corresponding to the time interval 10 Oct 2019 - 19 Sep 2020, that is, on the early days of the Covid-19 Global Pandemic and on the 2020 Market crash.

After training and using hyperparameter optimization on the development set we have found that the hyperparameters that give the best accuracy are: 50 for the number of LSTM units per layer, 70 for the Number of Epochs (Number of passes through the entire training set), and 8 for the Batch Size (Number of examples used in one iteration). The forecast results for the period 10 Oct 2019 - 19 Sep 2020 for S&P 500, SOX, and XLRE are presented in Fig. 3, 4, 5. One can immediately notice that the network does a great job following each day trend, even in the highly irregular conditions of the 2020 market crash.

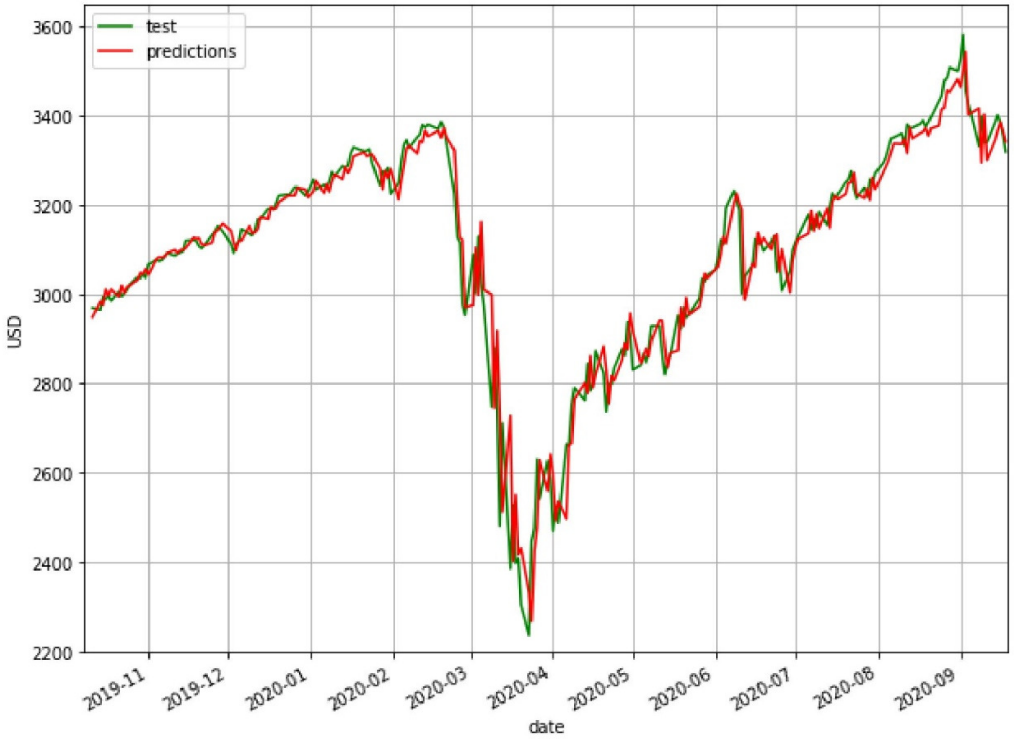

Figure 4: S&P 500 real price (green) and forecasted price (red) on the period 10 Oct 2019 -19 Sep 2020.

In fig. 4 it is clear that the initial crash of 1100 points takes place in approximately a month, with the rebound happening over a period of 5 months. For this whole period, the network closely follows each day trend and is able to correctly forecast the closing price with a daily average PMAD error of 1.8%.

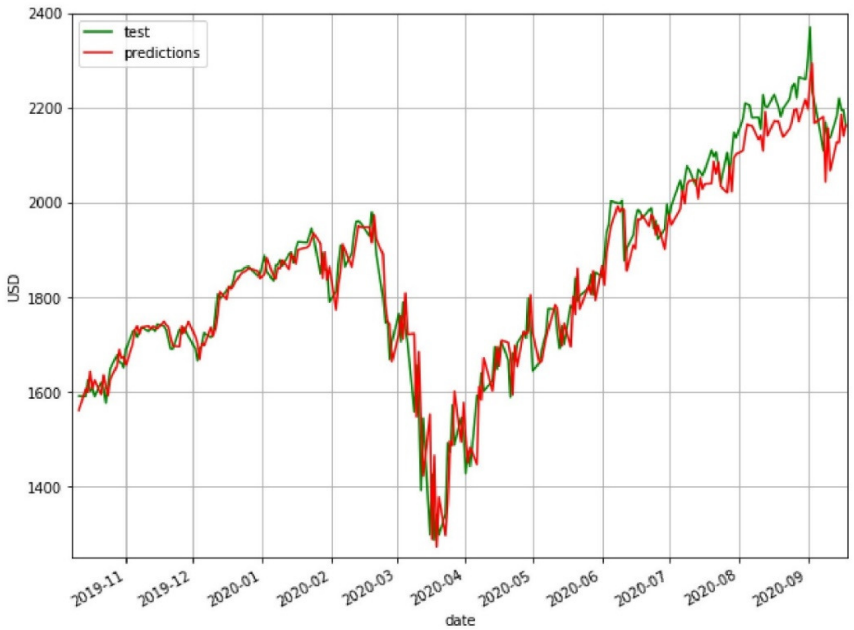

Figure 5: SOX real price (green) and forecasted price (red) on the period 10 Oct 2019 - 19 Sep 2020.

In fig. 5 we see that the initial crash of 700 points takes place in approximately a month, with the rebound happening over a period of three months, two months quicker than in the case of the S&P 500. In the next two months, the trend maintains, and SOX gains another 250 points. For this whole rebound period, the network closely follows each day trend and is able to correctly forecast the closing price, but on the continued uptrend we see a decrease in inaccuracy. This behaviour is reflected in the daily average PMAD error of 2.9%.

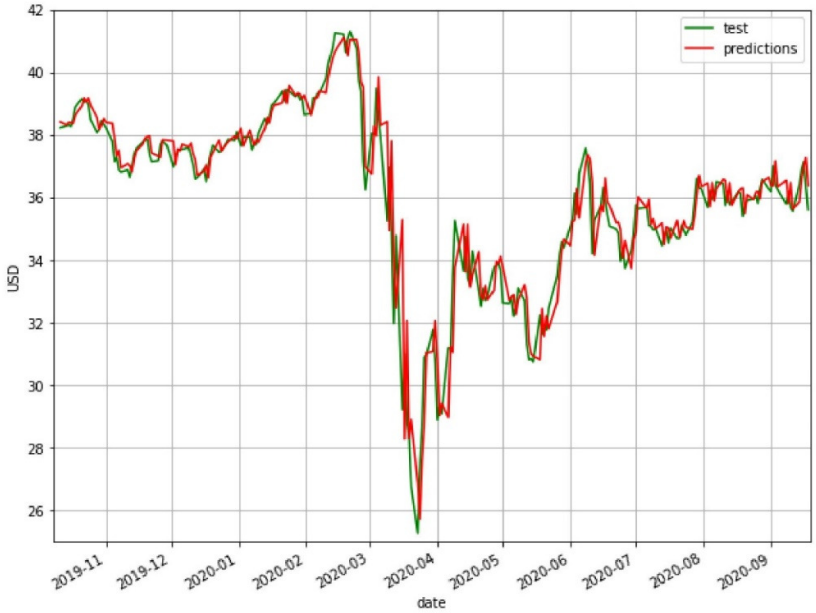

Figure 6: XLRE real price (green) and forecasted price (red) on the period 10 Oct 2019 – 19 Sep 2020.

In fig. 6 we observe that after the initial crash of 15 points, the index does not manage to recover, seeing an increase of only 10 points over a period of six months. XLRE, having the most volatility of the three, is also the hardest to make accurate predictions on, having a daily average PMAD error of 4.9%.

The first experiment on the trained and optimized network is to find the influence of the number of days N, considered when making a forecast about day N+1. The results were that, usually, considering N between 2 and 5 gives the best accuracy, and particularly, the optimal number of days N, considered by the network when making a forecast about day N+1 is 4 for SP 500, 3 for SOX, and 5 for XLRE. In the following figures, both MSE, and MAE are scaled down by a factor of 120, in order to fit into the graph. Immediately a certain regularity arises, the errors seem to move with a certain rhythm, achieving peaks and valleys at an almost regular interval of 5 days.

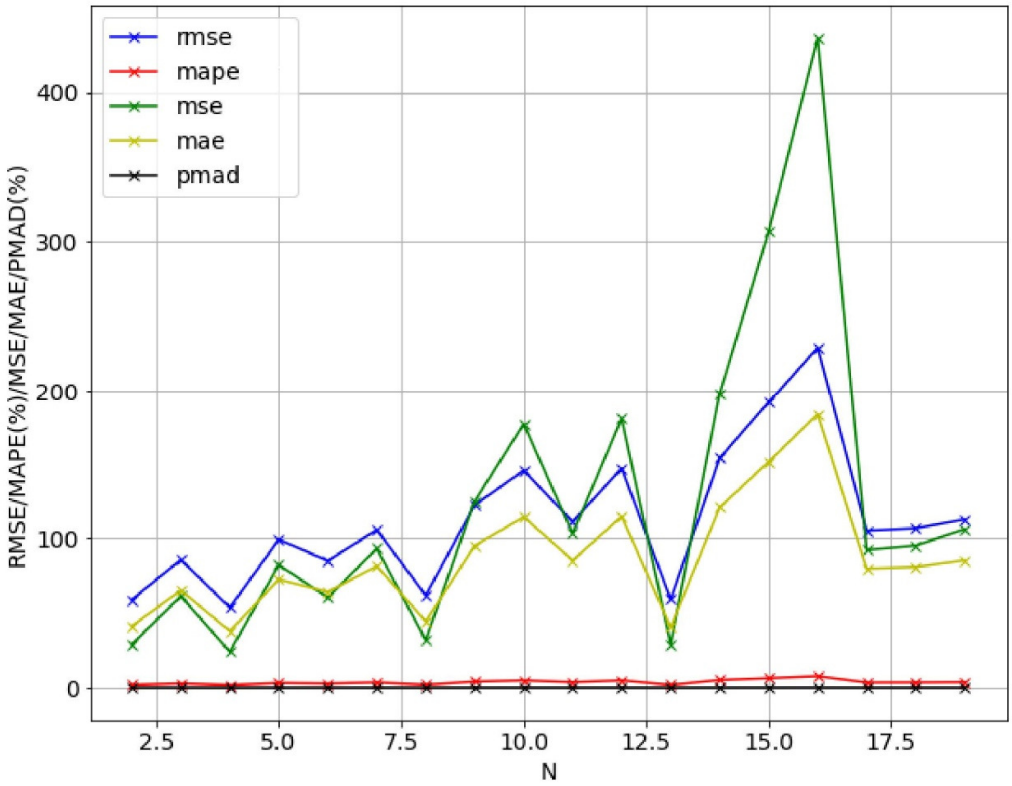

Figure 7: Error Analysis on the number of days N used in making N+1 day forecast on the S&P 500.

In fig. 7 we notice that every local maximum of the error functions takes place at a regular interval of 3 days and every local minimum taking place at a regular interval of 5 days. The global minimum is obtained when N is 4, and the maximum when N is 16. It turns out that for S&P 500 medium-term fluctuations in price have a greater influence on the forecasted price than fluctuations that took place more than 5 days before the forecast.

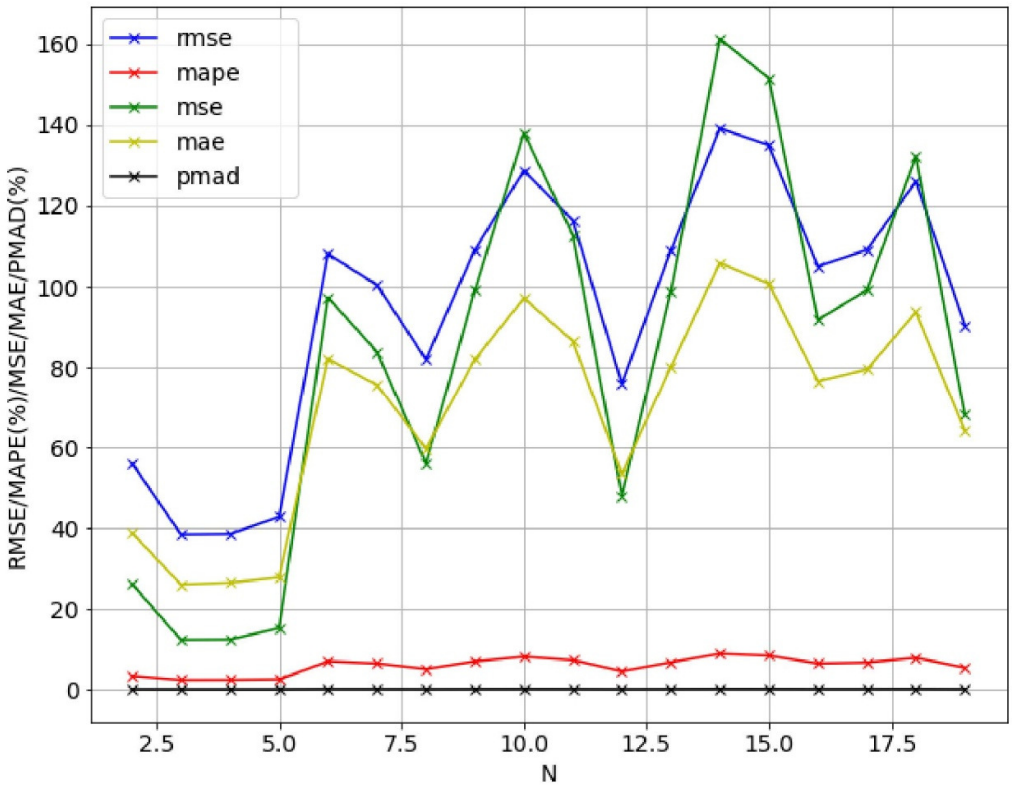

Figure 8: Error Analysis on the number of days N used in making N+1 day forecast on the SOX.

In fig. 8 we notice that every local maximum of the error functions takes place at a regular interval of 4 days and every local minimum taking place at a regular interval of 3 days. The global minimum is obtained when N is 3, and the maximum when N is 14. For SOX, the most decisive factors seem to be in the last five days before the forecast, with the last day of the working week being the most influential.

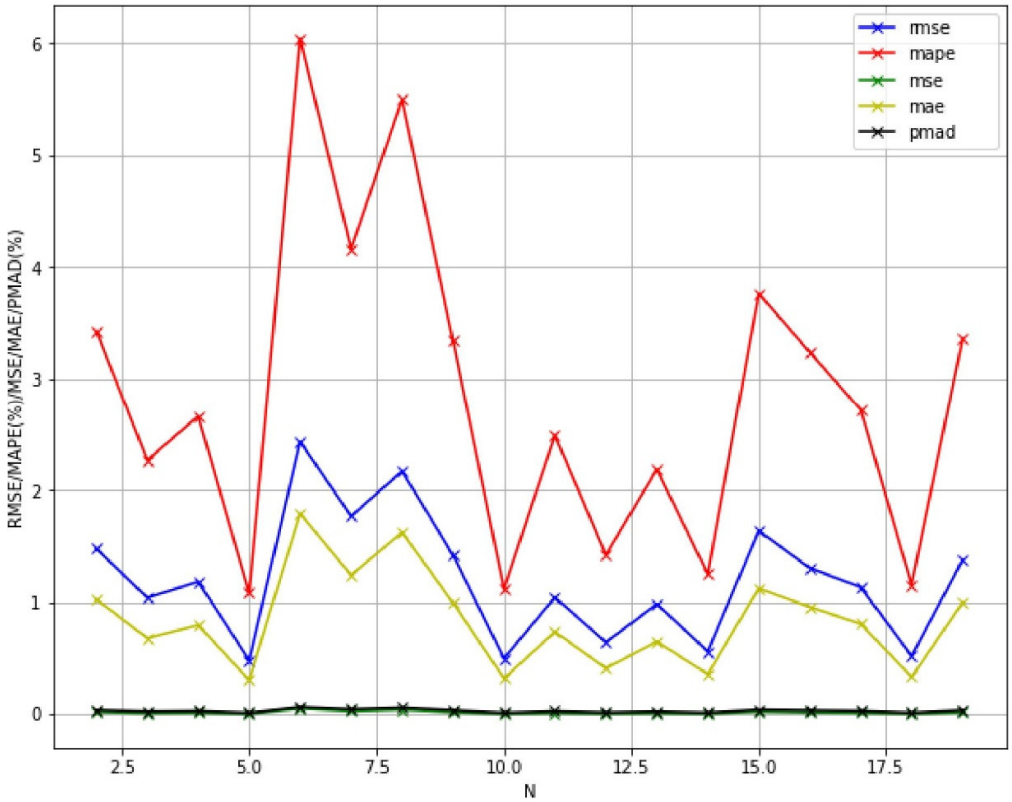

Figure 9: Error Analysis on the number of days N used in making N+1 day forecast on the XLRE.

In fig. 9 we notice that every local maximum of the error functions takes place at a regular interval of 3 days and every local minimum taking place at a regular interval of 2 days. The global minimum is obtained when N is 5, and the maximum when N is 6. When we analyse the XLRE forecast error chart we notice a periodicity in the errors. The forecast seems to be most influenced by the fluctuations of the last week rather than the current one.

The second experiment is to analyse the influence of the instability of the 2020 market on the network's ability to make accurate forecasts. For this, we compare the MAE, MAPE, MSE, PMAD of the S&P 500, SOX, and XLRE indexes before and after the 2020 market crash.

As expected, S&P 500 and SOX having higher prices than XLRE, also have proportionally higher MAE, MSE, and RMSE. That means, only MAPE and PMAD can be used to accurately analyse indexes with big price differences.

One can immediately observe that a certain behaviour emerges. Even in a chaotic market by human standards, the LSTM Neural Network is able to make forecasts with a certain degree of accuracy. Surprisingly, in most areas, the network manages to achieve a better accuracy during and after the 2020 market crash than before it, when the general market trend was up. The largest improvement was noticed in the XLRE forecast, with all the error measures being two or even three times less than the before ones. This is undeniably a consequence of the network's ability to constantly learn and to find new emerging patterns.

Table 2: Forecast error analysis for before and after Covid-19 Global Pandemic and 2020 Market Crash.

Name	MAE	MAPE	MSE	RMSE	PMAD
S&P 500 Before	5133.8	0.018	3126.71	55.91	0.018
S&P 500 After	3861.67	0.0132	3808.48	61.71	0.012
SOX Before	4087.22	0.0285	2389.75	48.88	0.029
SOX After	3997.43	0.0226	2909.76	53.94	0.022
XLRE Before	167.21	0.0469	3.67	1.91	0.049
XLRE after	55.65	0.0163	0.81	0.9	0.015

Conclusions

In this paper, S&P 500, SOX, and XLRE are analysed via LSTM Neural Networks with regards to the before and after market conditions of the Covid - 19 Global Pandemic and 2020 Market Crash. Using MAE, MAPE, MSE, RMSE, and PMAD as means to measure the forecast accuracy, we manage to achieve satisfactory results on the time interval 10 Oct 2019 - 19 Sep 2020. Later by comparing the forecasting accuracy for before and after the Covid - 19 Pandemic, we arrive at the conclusion that the model is unable to detect any fundamental difference between a healthy and stable market and a market crash. This result implies that the underlying mechanism behind the stock market remains the same no matter the market conditions, in our case, between a bull run and a crash. This paper is useful in confirming that universal forecasting tools, that give an accurate answer no matter the market conditions, can be developed. Some limitations of the LSTMs are it's heavy need of high processing power, for a NN model to be able to compete with current algorithms for split-second decisions it needs more computational capabilities than an individual or a small investment company can manage, and the need of high amount of data in order to get an accurate forecast. We believe that, due to the natural increase of computational power due to Moore's law and the exponentially increasing amount of data available on the internet, these limitations will dwindle in time, leaving us with one of the most accurate forecasting model that exists.

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Development and Economic Analysis of a Posture Correction Orthosis

Roman MURZAC
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, roman.murzac@upb.ro

Cristian-Vasile DOICIN
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, cristian.doicin@upb.ro

Mihaela-Elena ULMEANU
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CE Building, District 6, Bucharest, Romania, mihaela.ulmeanu@upb.ro

Gabriela-Marina ENE
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, gabriela.ene4427@gmail.com

Abstract

Early cost estimation is a common prerequisite for the profitability assessment of the development of complex products. Thus, the combination of numerous technical and economic factors poses a challenge for product developers when little more than the desired functionality of the product is known. In the field of medical devices, this issue is exacerbated by the fact that many devices should be custom products. The current research paper presents a detailed methodology for linking custom product architecture with cost analysis within the product design and development process for a posture correction orthosis. In order to make a cost estimation of hardware components for the posture correction orthosis, essential technical features and prices of typical components were identified via empirical research. The preceding selection of examined component categories was based on expert interviews, the analysis of finalized spinal orthosis projects and relevant literature. Several cost analyses were developed for each category of constructive solution. The most suitable constructive solution was chosen from these, based on their technical and economical characteristics. Nine constructive solutions for spinal orthoses were developed and several cost aggregates estimated using the presented method. The results were examined regarding their accomplishment of technical requirements and the value of estimated total cost. Costs were estimated for a built prototype that involved the chosen constructive solution shown in this study.

Keywords: Constructive Solutions, Product Architecture, Economic Analysis.

Introduction

According with Hägele (2011) the field of service robotics and medical devices is a comparatively young area that is expected to economically boom within the next decades into an economically significant multibillion Euro market. For this to become reality, the cost effectiveness of medical devices must be assured. However, only few studies have been published on economic aspects of medical devices and, in particular, of spinal orthosis. Most of these articles seem to focus on technical feasibility and solutions. Prassler (2010) mentioned that the lack of cost consideration has led to many product prototypes that were able to fulfil a certain purpose but prohibitively expensive. However, if profit-oriented enterprises are to engage in this field they must be able to predict the profitability of those undertakings that concern the development and marketing of a medical devices in order to make rational planning.

In the research study conducted by Bluemlein (2013) it is estimated that the development cost of a prototypical product is difficult for several reasons. Most technical cost estimation methods require more detail knowledge than is available at early development stages, thus reducing the appropriate selection of methods to expert opinion and comparison to similar products if possible. Also, robots represent complex systems where the costs cannot simply be reduced to material costs as is often the case for simple products; higher complexity entails an elevated development risk. Estimating the efforts and costs for developing a robot requires expertise not only in a variety of

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technical fields such as electronics, systems engineering and software development but also an understanding of costing concepts and risk management. Furthermore, the cost of the estimation itself must not be prohibitively expensive as that would lead to abandonment of the attempt to predict project costs at all.

Hägele (2011) mentioned that often the estimation of manufacturing costs is based on the hardware structure. But nowadays, the software development has become equally as important for robots as the study on profitability of innovative robot applications has shown; because robots are complex systems the software development costs are considerable. This major cost block is incurred in preproduction phases whereas the direct software costs in the manufacturing stage are negligible. Therefore, the classical definition of production costs falls short for a complex product and cost intensive constituents of a system where hardware and software are equally important as it does not capture the indirect cost incurred in the development stage.

Ehrlenspiel et al (2007) says that the dilemma is exacerbated by the phenomenon that up to 90% of the life-cycle costs are determined in planning and development phases although the majority of the costs are incurred during production as depicted in Figure 1. This means that solid decision-making is highly important in early phases despite bounded rationality. At the time detailed product knowledge is available the possibilities of influencing costs will have decreased significantly.

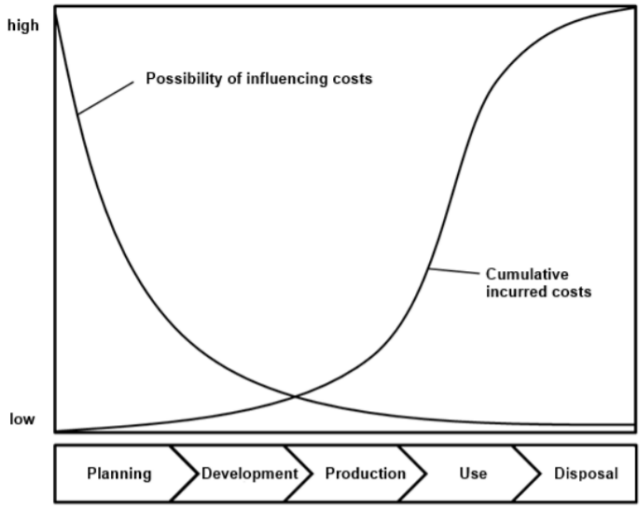

Fig. 1: Influence on costs vs. incurrence of costs over product life-cycle [Blumlein, N. (2013)]

In a research study by Trivailo et al (2012) it is mentioned that enterprises interested in serving the market for complex products as robots require means to predict the profitability of such engagements. Ehrlenspiel et al (2007) considers that committing to the development of a robot that is technically feasible but economically not viable could result in profound financial losses therefore early cost considerations are the developer's responsibility. Cost estimates can also be used for comparison of variants, recognition of cost reduction potentials, production controlling or supplier cost examination.

According with Coenenberg et al (2009) the costing theory offers a wide range of cost terms. From a business-oriented point of view, costs are the consumption of goods and services incurred with the purpose of creating products or services, evaluated in monetary terms.

Considering the aforementioned, economic analysis of bespoke complex medical products is mandatory to the market viability of the developed concept. Hereafter, the authors propose a detailed methodology for economic analysis of a variety of construction options for a posture correction orthosis.

Product Architecture

Mortensen (2018) remarked that engineering design has traditionally studied and improved the development of single products. In order to increase ability to launch new products and strengthen the ability to launch on time, product architecture is one possible approach. The goal is to be able to make explicit and quantitative models describing the constitutive elements of a product architecture.

Ulrich (1995) presented the product architecture like a scheme by which the function of a product is allocated to physical components. This research paper further defines product architecture, provides a typology of product architectures, and articulates the potential linkages between the architecture of the product and the economic analysis of physical components.

Generally, orthoses for posture correction are composed from four systems: Software, Support, Data acquisition and Drive. Each of these systems contain few subassemblies and each subassembly is composed from components. In this study, the development of the Software system is not analysed and does not constitute a target of the study in the current stage. A general structure of the posture correction orthosis architecture is proposed in Figure 2, below.

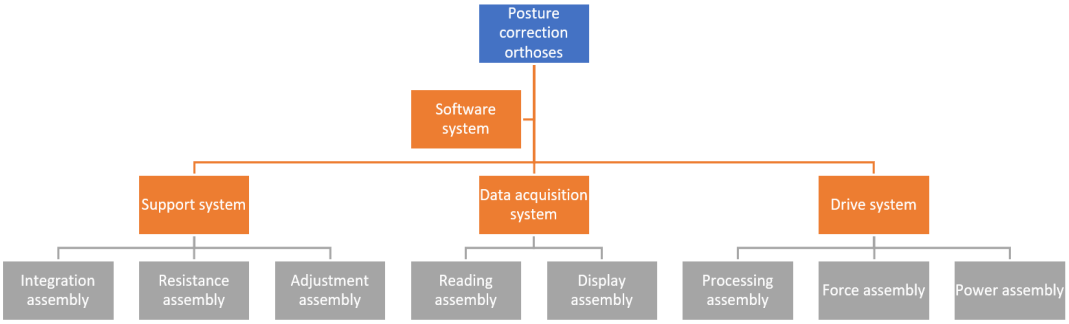

Fig. 2: Posture correction orthoses architecture

Constructive Solutions

According to Ritchey (1998) the Morphological Analysis or General Morphological Analysis is a method that attempts to investigate all possible solutions to a multi-dimensional nonquantifiable complex problem in order to find the most adequate one by means of comparison. Ehrlenspiel et al (2007) said that the central concept is the use of a so-called morphological matrix. This matrix is constructed by setting different product aspects against each other along usually two or three dimensions, by mapping required product subfunctions to components as possible sub-solutions or by mapping product features to possible implementation forms as depicted in Table 1, for designing the posture correction orthosis.

In this stage of the analysis three of four systems are completed and constructive solutions are generated. The role of the Data acquisition system is to read the user's position. It is composed of a Vertebral body (VB) that simulates the user spine and the potentiometers that read the positions between two consecutive vertebral bodies.

Table 1: The morphological matrix for the solutions

	Positions reading	Vertebral body
Solution 1	Rotary encoder, MA3	Straight Vertebra
Solution 2	Potentiometer, 10k, continuously	Tappet Vertebra
Solution 3	Potentiometer, 10K, linear	Symmetrical Vertebra
Solution 4	Potentiometer, 10k, variable	-
Solution 5	Potentiometer, linear	-
Solution 6	Potentiometer, module	-
Solution 7	Potentiometer, EC 11, digital	-

According with the morphological matrix for constructive solutions shown in Table 1, seven commercial components were identified for Positions reading (PR). The constructive solution that will be chosen will be bought and integrated in the final prototype of the orthosis. For the Vertebral body, three custom designs were generated as the optimal solutions. Considering the specificity of the product, Additive Manufacturing (AM) technologies will be used to manufacture the final selected concept. The possible solutions for each component are shown in Figure 3.

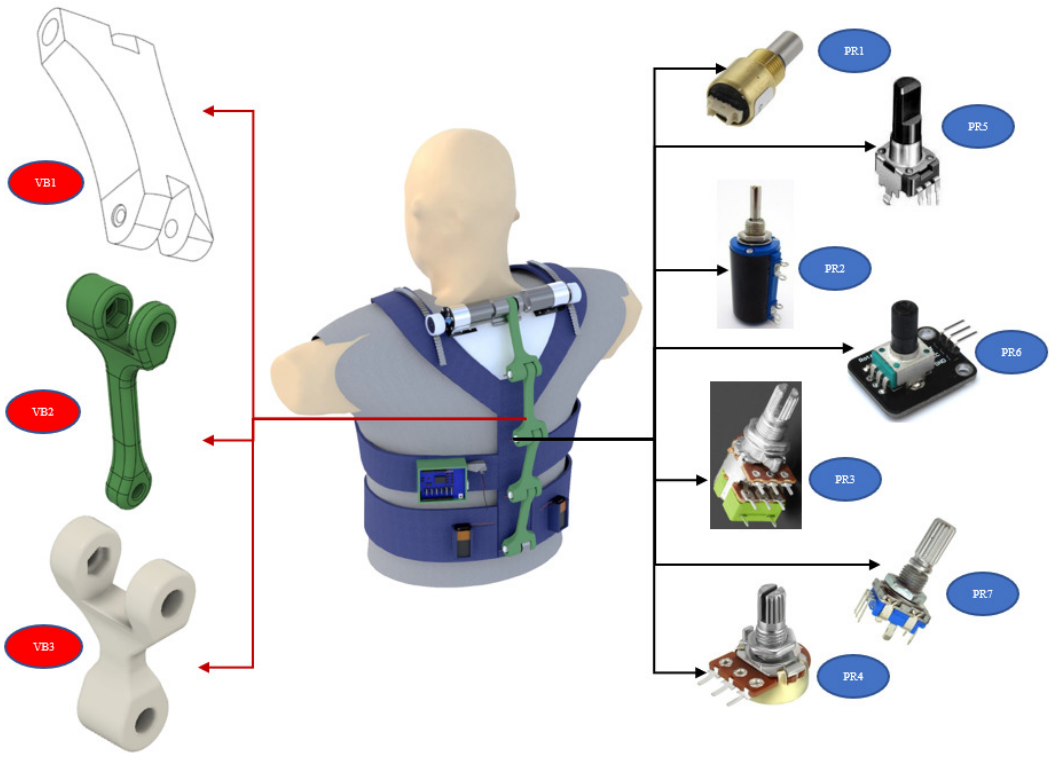

Fig. 3: Posture correction orthosis constructive solutions

The technical data and the price for each of the analysed solutions were collected from the manufacturers' websites. Table 2 centralizes the characteristics of PR components that are relevant for technical and economic analysis. For reading the various positions of the user's spine it is necessary to be able to rotate the PR components at a maximum of 180°. Thus, all the proposed components are eligible, because the minimum value of the rotation angle is 300° for PR3 and PR4 (Table 2). The precision of components is given by the number of positions that can be read. The most imprecise component can register one reading at every 20°. This precision is not enough for a final product, but it can be considered for testing in the prototype stage. For the final product, this constructive solution will be replaced by the one that has the closest total cost.

Table 2: The characteristics of the analysed Position Reading solutions

Solution	Price [€]	Precision [pos./rot.]	Angle of rotation [°]
PR1	41.45	1024	continuous
PR2	2.86	120	360
PR3	2.89	60	300
PR4	0.51	18	300
PR5	1.24	24	continuous
PR6	2.06	36	continuous
PR7	1.03	24	350

Figure 4 presents all constructive solutions that were analysed from economical and technical point of view. This graph quickly identifies which solutions are better for a specific product depending on what technical precision is required. Figure 4a represents all constructive solutions that are analysed to see the difference between a very accurate component and its' price and other categories of components with same functions. This allows to decide if a more accurate component is necessary for this specific application. In order to identify the best solution for a posture correction orthosis, Figure 4b is generated, which zooms in ten times on the initial graph.

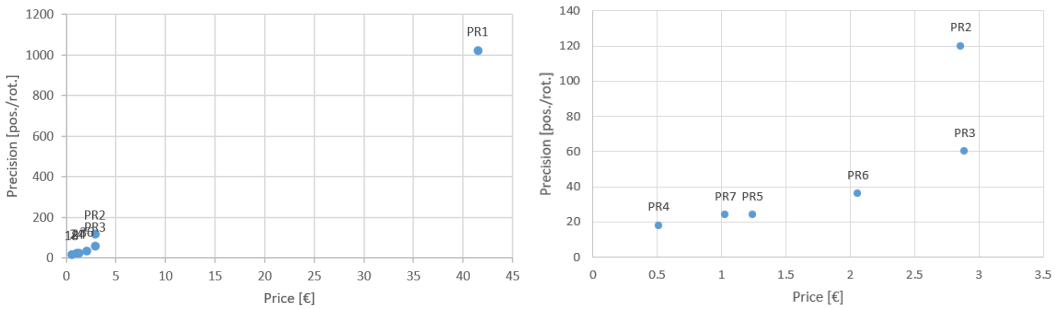

a) b)

Fig. 4: Comparation of Position Reading solutions

The Vertebral body (VB) is not a commercial component, thus the price for each option was calculated. Economic analysis is undertaken for VB2 in next chapter. All three vertebral bodies were designed using two types of construction options: asymmetrical and symmetrical. Full interchangeability between constructive solutions cannot be assured due to the different geometry of the PR components, which are commercially acquired. In this regard, Table 3 is put together to showcase the possible compatibility between different constructive solutions of VB and PR.

Table 3: The characteristics of the analysed Vertebral Body (VB) solutions

Solution	Price [€]	Type	Compatibility
VB1	4.01	Asymmetrical	PR1, PR2, PR3, PR4
VB2	2.36	Asymmetrical	PR1, PR2, PR6
VB3	2.15	Symmetrical	PR5, PR7

Hereafter, economic analysis is undertaken to determine if the separate lowest price component can lead to the optimum technical-economic subassembly.

Economic Analysis

Standard Cost

Mundhenk et al. (2003) describe a "low cost, high performance robot design utilizing off-the-shelf parts". In his opinion off-the-shelf parts led to the highest cost reductions and could ensure a good interchangeability rate. In this regard, a bill of materials (BOM) was put together for the posture correction orthosis (Table 4).

The BOM for the proposed posture correction orthosis was designed in a hierarchical way, to easily find identify subassemblies and specific components, if specific adjustments are needed. The last column of the table registers notifications, such as which components from final product is manufactured in house (own production). These in house manufactured components are specific and custom adapted to each end user of the spinal orthosis. For these components, the cost was calculated based on the methodology presented in the next subchapter, namely for Vertebral body VB2.

Table 4: Bill of Materials for the Posture correction orthosis

Product	System	Subassembly	Component	Qty	Unit Cost, €	Σ Cost, €	Notif.
Posture correction orthoses	Resistance	Jacket	Fabric	6	7.231	43.386	
			Thread	2	4.649	9.297	
		Resistance	Belt 1	2	0.715	1.4297	
			Belt 2	6	1.504	9.0243	
			Timing belt	1	8.057	8.0574	
			Support plate	1	7.795	7.795	own prod.

			Buckle	2	2.066	4.132	
			Velcro	2	2.583	5.165	
	Data acquisition	Reading	Vertebra	8	2.153	17.222	own prod.
			Thoracic joint	1	1.707	1.7065	own prod.
			Lumbar joint	1	0.667	0.6673	own prod.
			Potentiometer	8	0.349	2.7932	
			Shaft	8	0.149	1.19	own prod.
		Display	Display	1	7.231	7.231	
			Housing	1	0.442	0.4421	own prod.
	Drive	Processing	Arduino board	1	12.19	12.189	
			Arduino shield	1	7.438	7.4376	
			Housing	1	0.769	0.7686	own prod.
			Pins	1	0.413	0.4132	
			Cable	1	0.826	0.8264	
		Force	Motor	2	36.98	73.963	
			Support	2	0.556	1.1115	own prod.
			Gearwheel	2	10.33	20.66	
			Coupling	2	0.386	0.7727	own prod.
			Screw M3	32	0.103	3.3056	
			Nut M3	26	0.052	1.3429	
			Wire 1	40	0.062	2.4792	
			Cable	40	0.103	4.132	
		Power	Battery	2	1.24	2.4792	
			Housing	2	0.419	0.8388	own prod.
			Connector	2	0.413	0.8264	
Total Cost [€]						**253.09**	

Cost calculation for Vertebral body VB2

For those components that are customized for each user the price included in BOM (Table 4) was calculated separately, as presented in the methodology below.

The total cost of the product consists of direct costs and indirect costs. Direct costs considered the plastic material from which the vest support piece was made (Figure 3). Indirect costs included the price of a 3D printer, salary costs for workers and administrative costs.

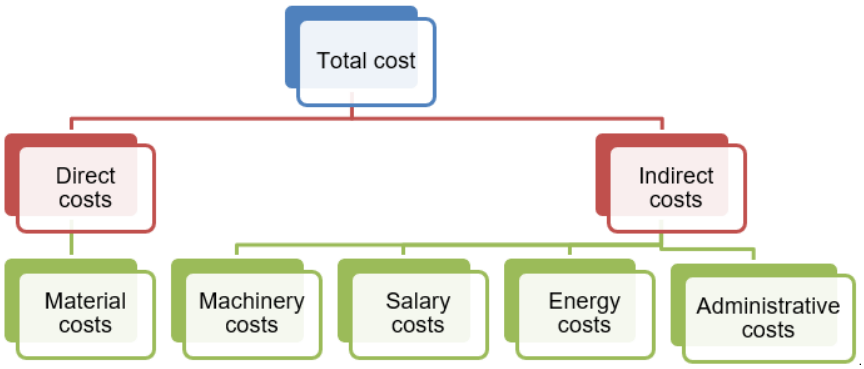

Fig. 5: Total cost scheme [adapted from Ulmeanu et al (2018)]

According with Andrei and Dragulanescu (1987) the manufacturing cost of a part is:

$$C = A_i + \frac{D_i}{n} \text{ [€/piece]} \quad (1)$$

where: A_i are batch independent expenses [€/piece];
D_d – expenses dependent on the manufacturing batch;
n – number of manufactured pieces.

$$A_i = c_m + c_s + c_{if} + c_{ind} \text{ [€/piece]} \quad (2)$$

where: c_m is the cost of the material of the part;
c_s – direct remuneration expenses;
c_{if} – expenses for the maintenance and operation of the equipment during the actual working time;
c_{ind} – indirect costs of manufacturing departments.

$$c_m = m_{sf} \cdot c_{sf} \text{ [€/piece]} \quad (3)$$

where: m_{sf} is the mass of raw material and m_{sf} = 0,029 kg;
c_{sf} – the cost of one kg of raw material, c_{sf} = 50.74 €/kg.

Thus, c_m can be calculated as c_m = 0,029 · 50.74 = 1,47 €/piece.

$$c_s = \sum_{i=1}^{k} \frac{\tau_{ui}}{60} \cdot s_{mi} \quad (4)$$

where: c_s are expenses with the salaries of the workers;
τ_{ui} – unitary time at operation "i", [min];
s_{mi} – expenses with the salaries at operation "*i*", [min]; expenses with the salaries for a plastics worker – 4.13 €/h.

Thus, c_s can be calculated as $c_s = \frac{5}{60} \cdot 4.13 = 0.34$ €/piece.

$$c_{if} = \sum_{i=1}^{k} \frac{\tau_{ui}}{60} \cdot a_i \quad (5)$$

where: c_{if} are the costs of maintenance and operation, respectively depreciation of the equipment;
a_i – the depreciation rate of the equipment as well as the repairs and maintenance.

$$a_i = \frac{2.3 \cdot C_{MU}}{A \cdot z_l \cdot k_s \cdot h} \quad (6)$$

where: C_{MU} is the price of the 3D printing equipment;
z_l – the number of working days in a year;
k_s – number of shifts;
h – duration of a shift.

VB2 was manufactured using a Zortrax M300Plus 3D printer, thus the depreciation rate can be calculated as: $a_i = \frac{2.3 \cdot 4038}{5 \cdot 245 \cdot 2 \cdot 8 \cdot 60}$ = 0,005. Also, the maintenance and operation costs are calculated as: $c_{if} = \frac{5}{60} \cdot 0{,}005 = 0{,}0004$ €/piece.

$$c_{ind} = c_s \cdot \frac{R_f}{100} \quad (7)$$

where: R_f are the administrative expenses, R_f = 150…200%;

Thus, the indirect costs of manufacturing are: $c_{ind} = 0.34 \cdot \frac{150}{100} = 0.51$ €/piece.

Considering the abovementioned, the independent batch expenses are A_i = 1.47 + 0.34 + 0,0004 + 0.51 = 2.32 €/piece.

Expenses dependent on the manufacturing batch consists of two categories:

$$D = B + C \tag{8}$$

where: B are the expenses with the preparation – completion of the manufacture and the administrative preparation of the launch of the lot;
C – expenses for the maintenance and depreciation of the equipment during the preparation-completion time.

$$B = (1 + \frac{p}{100}) \cdot \sum_{i=1}^{k} \frac{\tau_{pi}}{60} \cdot m_i \cdot s_{ri} \tag{9}$$

where: p is the administrative expenses, p = 25%;
m_i – number of equipment's working on operation "i";
s_{ri} – salary of worker at operation "i".

The expenses with the preparation – completion of the manufacture and the administrative preparation of the launch of the lot are: $B = (1 + \frac{25}{100}) \cdot (\frac{25}{60} \cdot 1 \cdot 4.13) = 2.15$ €/piece.

$$C = \sum_{i=1}^{k} \frac{\tau_{pi}}{60} \cdot m_i \cdot a_i \tag{10}$$

The expenses for the maintenance and depreciation of the equipment during the preparation-completion time are: $C = \frac{25}{60} \cdot 1 \cdot 0{,}0004 = 0{,}00016$ €/piece.

Thus, the expenses dependent on the manufacturing batch are: D = 2.15 + 0,00016 = 2.15 €/piece.
Considering that one batch was comprised of 50 pieces (n_0 = 50 pieces), the total cost for VB2 is as follows:

$$C_p = A_i + \frac{D}{n_0} = 2.32 + \frac{2.15}{50} = 2.363 \text{ €}.$$

Selection of the constructive solution

Economic Efficiency

From a technical perspective all the proposed constructive solutions are eligible to be used. One technical constraint which needed to be considered was that not all PR options could be assembled with all VBs. Thus, the selection of the cheapest option for the Posture correction orthosis had to follow this mandatory technical requirement. To select the most economically convenient solution percentual cost was established for each component and for all possible constructive solutions, using relation (11) below:

$$\Pi_{PC} = (CC*N/TC) *100 \tag{11}$$

where: CC is the component cost;
N – number of the same components used in a final product;
TC – total cost of the final product.

Using relation (11) and the values established in Table 4, the percentual costs for all PRs and VBs were calculated:

Π_{PR1} = (41.45*8/253.09) *100 = 131.02%
Π_{PR2} = (2.86*8/253.09) *100 = 9.04%
Π_{PR3} = (2.89*8/253.09) *100 = 9.14%
Π_{PR4} = (0.51*8/253.09) *100 = 1.61%
Π_{PR5} = (1.24*8/253.09) *100 = 3.92%
Π_{PR6} = (2.06*8/253.09) *100 = 6.51%
Π_{PR7} = (1.03*8/253.09) *100 = 3.26%
Π_{VB1} = (4.01*8/253.09) *100 = 12.68%
Π_{VB2} = (2.36*8/253.09) *100 = 7.45%
Π_{VB3} = (2.15*8/253.09) *100 = 6.80%

Based on relation (12) the percentage cost of all constructive solutions for the Reading subassembly is presented in Table 5 below.

$$\Pi_{CS} = \Pi_{PRi} + \Pi_{VBi} \tag{12}$$

Table 5: Percentual cost for constructive solutions of the reading subassembly

CS1	CS2	CS3	CS4	CS5	CS6	CS7	CS8	CS9
VB1-PR1	VB1-PR2	VB1-PR3	VB1-PR4	VB2-PR1	VB2-PR2	VB2-PR6	VB3-PR5	VB3-PR7
143.70%	21.72%	21.82%	14.29%	138.47%	16.49%	13.96%	10.72%	10.06%

Constructive Solutions Analyse

As shown in Figure 6a, the CS1 and CS5 constructive solutions have a higher cost (143.7% and 138.5%) than the total standard cost of the final product. These two solutions were eliminated and in Figure 6b the analysed solutions are presented.

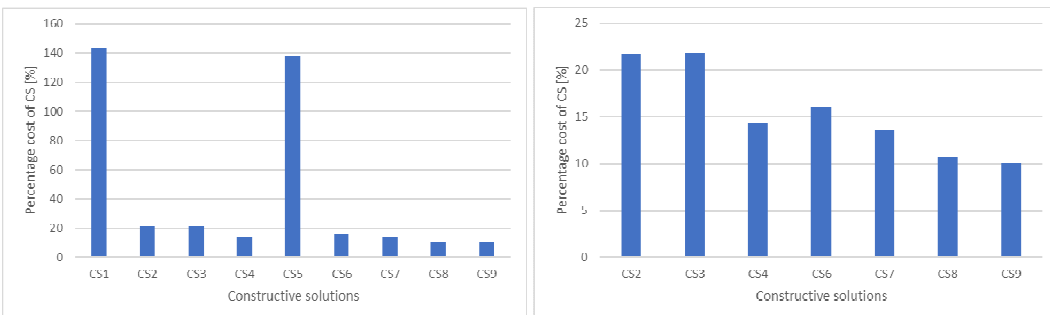

a) b)

Fig. 6: Total costs for constructive solutions of the reading subassembly

For a PF component the lowest price is PR4, and for the VB component the lowest price is VB3. Because of technical requirements the combination between these two components is not possible. Thus a comprehensive graph is put together in Figure 7 to facilitate the selection of the optimal constructive solution.

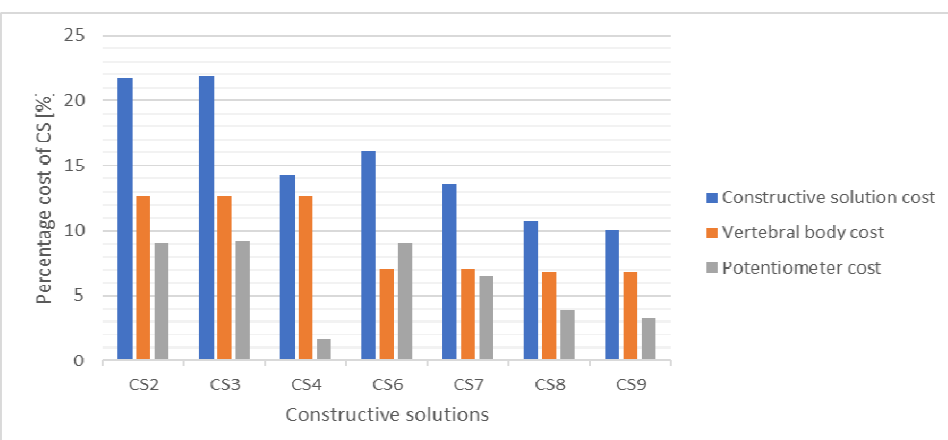

Fig. 7: Constructive solution selecting graph

The constructive solution selecting graph allows the selection of the most appropriate constructive solution for a specific subassembly, system and even the constructive solution for a totally different version of a product. In our studied case, the optimum constructive solution cost is CS9.

Conclusion

Early cost estimation is a common prerequisite for the profitability assessment of the development of complex products. The combination of numerous technical and economic factors poses a complex challenge for product developers. In the field of medical devices, this issue is acerbated by the fact that many devices should be customised to the user's needs.

The paper presented a detailed methodology for linking custom product architecture with cost analysis within the product design and development process for a posture correction orthosis. Nine constructive solutions for spinal orthoses were developed and several cost aggregates estimated. The results were examined regarding their accomplishment of technical requirements and the value of estimated total costs. CS9 was chosen as the most suitable constructive solution based on technical and economical characteristics. From a technical perspective all constructive solutions were eligible to be used. Nevertheless, technical constraints regarding the assembly of VBs and PRs led to the selection of one particular constructive solution. If VB and PR costs were to be analysed separately, a wrong constructive could be selected. Thus, a selecting graph was put in place, allowing the designer to select the appropriate constructive solution for a specific subassembly, system and even the constructive solution for a totally different version of the posture correction orthosis.

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In Searching of Sources of Family Business Succession Failure

Magdalena BARYŃ

The Management Faculty, Czestochowa University of Technology, Częstochowa, Poland
magdabaryn@op.pl

Oliwia ŚLUSARCZYK

Geneva School Of Economics And Management, University of Genewa, Genewa, Switzerland
The Management Faculty, Czestochowa University of Technology, Częstochowa, Poland,
olislusarczyk@gmail.com

Abstract

One of the basic goals of family businesses, determining the essence and uniqueness of these entities, is to last for generations. That is why successful succession is one of the most important tasks facing family businesses. Meanwhile statistics show that few companies pass into the hands of the next generations. The aim of this article is to examine the succession situation in Polish family businesses and to try to answer the question what factors may determine the failure of an intergenerational transfer. The research is based on two main secondary sources which are reports from studies conducted among Polish owners of family businesses and potential successors. Research results show that Polish family entrepreneurs make many mistakes that hinder the successful implementation of the succession process. These errors include, among others, insufficient knowledge of the time horizon of succession, lack of proper communication regarding succession, or lack of formal, written confirmation of succession. A very important factor affecting the low effectiveness of succession processes is the low interest of successors in taking over the family business. It may result from internal factors, relationships in family as well as factors from the social environment. To increase the chances of successful succession of Polish family businesses, it is therefore necessary to act in many ways. First, the owners' knowledge should be raised so that they can plan and then carry out the succession process. Secondly, it is necessary to convince potential successors that taking over the family business is a challenge that they can cope with and which will give them professional satisfaction. Thirdly, it is necessary to ensure the society that family businesses are a treasure of the national economy, and successors take over companies with a sense of well-understood duty and are able to contribute a lot to them.

Keywords: Failure in Succession, Family Business, Family Firms, Succession, Transgenerational Transfer.

Introduction

One of the basic goals of family businesses, determining the essence and uniqueness of these entities, is to last for generations. This multi-generational perspective is inseparably connected with the need to carry out the process of succession, i.e. the transfer of ownership and power to the next generation. Successful succession is one of the most important tasks facing family businesses and is necessary for their continuation for generations (Leotta et al., 2017; Hytti et al., 2017; Zhou et. al., 2016). Unsuccessful succession is one of the main reasons for the failure of family businesses or the loss of their family character. Statistics show that few companies pass into the hands of the next generations. About 30% of enterprises are successfully transferred to the second generation, about 10-15% to the third, and only 3% of family businesses to the fourth (Bizri, 2016). Therefore, it is very important to recognize the factors affecting the quality and effectiveness of succession and the main barriers hindering, and sometimes even preventing it.

The purpose of the article is to examine the succession situation in Polish family businesses and to try to answer the question what factors may determine the failure of an intergenerational transfer. This will allow recommendations to be made to facilitate the succession process in the future.

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Literature Review

Succession is a specific and at the same time one of the most complex problems of family businesses. It touches the areas of enterprise strategy, personnel strategy, organizational culture and ownership structure (Sułkowski & Marjański, 2011). This is a broad topic and therefore it is not surprising that it is one of the most frequently discussed in the context of family businesses. Numerous authors are looking at such issues as the involvement of the senior in the company after the succession process (Ahrens et al., 2018), the key determinants which inhibit intra-family business succession (Lockamy et al., 2016), typology of next generation's future leadership projections (Lefebvre & Lefebvre, 2016), knowledge generation in the process of succession (Duh, 2014) and its transfer to the next generation (Boyd et. al., 2015; Pavel, 2013), new CEO selection and the skills that successors should possess (Schlepphorst & Moog, 2014), planning the succession process (Drury, 2016; Collins et al., 2015), influence of paternalistic management style on successors (Mussolino &. Calabro, 2014), management philosophy in pre- and post-succession phase (Steier & Miller, 2010), the importance of psychological aspects in the process of succession (Filser et al., 2013), influence of religion on succession intentions (Shen & Su, 2017), factors determining the choice of a successor (Luan et al., 2018; Bizri, 2016; Ansari et al., 2014), the impact of family relationships on succession (Soto Maciel et al., 2015), role of successor's involvement in the succession process (Peters et al., 2012), impact of taxes on succession (Vincencová et al., 2015), role and influence of external advisors and service providers (Cesaroni & Sentuti, 2016; Michel & Kammerlander, 2015). They are also often discussed Gender issues in the CEO successions of family businesses (Ramadani et al., 2017; Aldamiz-Echevarría et al., 2017; Deng, 2015; Ahrens et al., 2015; Glover, 2014; Remery et al., 2014; Overbeke et al., 2013; Humphreys, 2013; Otten-Pappas, 2013; Pyplacz 2013; Skačkauskienė et al., 2019) and there are also many studies indicating the succession in specific countries and industries (di Belmonte et al., 2016; Vassiliadis et al., 2015; Vassiliadis & Vassiliadis, 2014; Tirdasaria & Dhewanto, 2012; Lussier & Sonfield, 2012; Putri & Viverita, 2019). Despite such a wide range of interest, there are still many gaps that will probably be gradually filled in the coming years.

When considering issues related to succession, it is worth trying to define it, because as the scope of the topics related to it is wide, so are its definitions. Succession can be described as "the transference of ownership control and management to the next generation" (Woodfield et al., 2017). Corbetta and Priete capture it more broadly and define it as "a process whose goal is to ensure the continuation of the enterprise, i.e. its survival on the market. This process leads to a new ownership structure and changes in management in connection with the successor's takeover of both ownership and power in the company." (Roszko-Wójtowicz, 2014). Often is also defined as "the actions, events, and organizational mechanisms by which leadership at the top of the firm, and often ownership, are transferred" (Leotta et al., 2017). The literature also emphasizes that succession should be understood as a process, not just the moment when the transfer of the "baton" to the successor takes place (Lefebvre & Lefebvre, 2016). Budziak (2012) notes that "the problem of succession is the biggest challenge for the business family, the ultimate test of the sustainability of the entrepreneur's and his family's many years of effort. This is not a one-time event related to the opening of an inheritance or the transfer of shares and power in business to the next generation, but an element of a long-term business family strategy." One of the conditions for successful implementation of the intergenerational transfer process is a properly prepared succession plan. It should contain answers to such basic questions as: who, when and how will take over power and ownership in the family business (Sułkowski & Marjański, 2011). Ownership and power are two different issues, but they should be considered together - many succession processes have been unsuccessful because these issues were not transmitted in parallel (Winnicka-Popczyk, 2010). Drawing up a succession plan is not the only factor determining the success of the intergenerational transfer process. Issues related to the senior and successor also play a significant role. Seniors may be characterized by different levels of readiness to transfer ownership and power and acceptance of the successor's vision of running a business (Sułkowski, 2005). Often they constitute a significant barrier to effective succession. Their reluctance to surrender power may result in many factors, e.g. fear of losing the company and loss of authority in the family, strong emotional attachment to the enterprise, inability to reconcile with the passing of time and treating the resignation from active business as reconciliation with the inevitable death (Roszko-Wójtowicz, 2014).

No less important than the senior's willingness to leave is the willingness of the successor to get involved in managing the company. Financial security, the possibility of self-fulfillment, and trust on the part of the senior undoubtedly have a positive impact on the junior's attitude to taking control of the family business. The personal preferences of the potential successor and his professional interests also play a significant role. Family relations, which condition the successor's agreement with relatives, also affect succession success (Sułkowski & Marjański, 2011). The success of intergenerational transfer is determined by many factors, and disruption in any area may result in serious problems in the implementation of the succession process. Therefore, identifying and investigating

sources of disturbances can significantly contribute to improving the effectiveness of the succession process of Polish family businesses.

Research Methodology

The research is based on several secondary sources. The first is *Kody wartości. Diagnoza sytuacji sukcesyjnej w przedsiębiorstwach rodzinnych w Polsce (2013)* - the Synthetic Report on research carried out under the Kody wartości – efektywna sukcesja w polskich firmach rodzinnych project. The purpose of this study was to analyze the state of preparation of Polish family businesses for the succession process, and to identify key success factors for this process as well as to examine the emotions that appear among owners and potential successors. A total of 416 people took part in the study. As part of the research, comprehensive quantitative research (surveys) and qualitative research (diagnostic workshops and in-depth interviews) were carried out. In the quantitative survey conducted from January 7 to 28, 2013, answers from 332 respondents were obtained. The majority of respondents were owners - 250 people, while 82 respondents were potential successors. The qualitative research, conducted by a group of experts from the project, was divided into diagnostic workshops (took place on February 7, 2013, with 62 people from family businesses) and in-depth interviews (implemented from January 31 to February 9, 2013, with 22 people from family businesses).

The second source is *Barometr Sukcesyjny - ścieżki kariery pokolenia Next Generation w polskich firmach rodzinnych Report (2017)*, which was based on the largest successor survey in Poland, implemented by the Family Business Institute as part of the second Polish edition of the international GUESSS project (Global University Entrepreneurial Student Spirit Students' Survey) implemented in 50 countries on all continents. 50 universities from Poland took part in the survey carried out in 2016. 1471 successors were tested, who could potentially be owners of businesses currently run by their parents. The report also uses the results of the study from the first edition of the project, which were collected in October-December 2013 (11,860 students took part).

Results and Discussion

One of the most important issues regarding succession is its perception by both current family business owners and potential successors. According to the research (see Fig. 1), in both groups the majority of people in Poland are aware of the fact that succession is a very important process that should be planned and managed. However, it is worrying that approximately every fourth owner and successor underestimates the complexity of succession and believes that this process should be carried out spontaneously, depending on the circumstances.

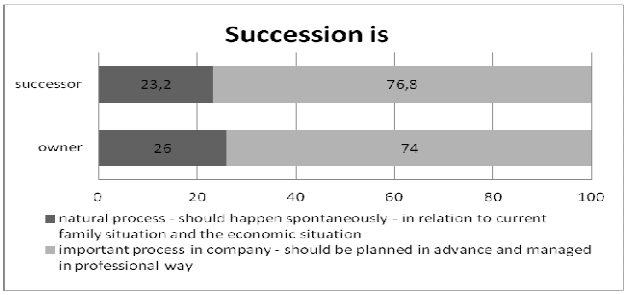

Fig. 1: Perception of succession.

(Source: Lewandowska, 2013).

The literature very often emphasizes the need to plan the succession process. It seems that entrepreneurs also agree with this approach, because less than 15% of owners and successors do not see the need for succession planning. However, the majority of respondents believe that succession planning is a short-term process - according to only slightly more than 25% of owners and successors, it should last longer than a year.

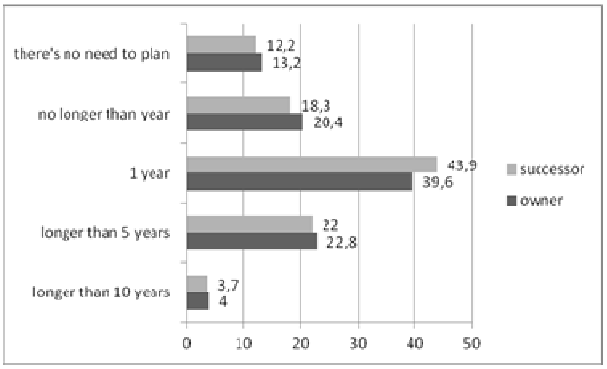

Fig. 2: How long should a well-prepared succession process last?

(Source: Lewandowska, 2013).

According to specialists, succession should be discussed a lot and often in the family. This is necessary to be able to accurately determine and plan its course. Meanwhile, Polish family businesses talk about it rarely or not at all. Particularly worrying are the responses of the owners, among which over 20% indicated that succession is not discussed at all. Interestingly, the successors present a more positive picture of the frequency of succession conversations - 12% of them admitted that they do not talk about succession (9 percentage points less than among owners), while 17% indicated that succession is a very common topic of conversation.

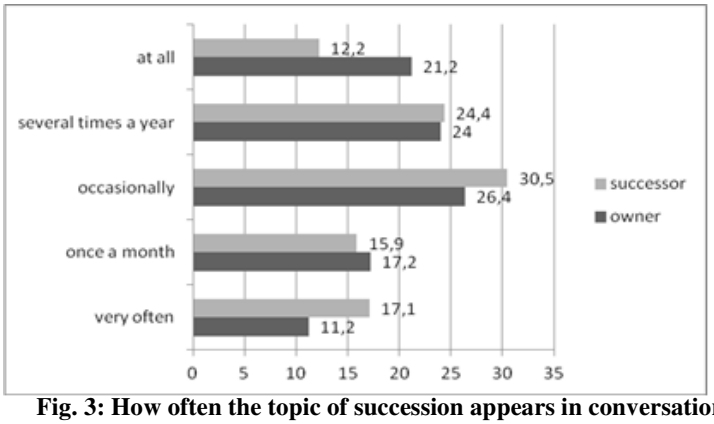

Fig. 3: How often the topic of succession appears in conversations?

(Source: Lewandowska, 2013).

Research indicates a large discrepancy in the perception of succession phases between the owners and successors of Polish family businesses. Most owners are still in the succession planning phase (over 70% of responses), possibly seeking successors phase. Only 17% of owners believe that the process of succession is currently implemented in their companies. Successors have a definitely different view on this issue. Although almost 44% of them agree with the owners and believe that succession is only planned, but another 40% of successors believe that this process is already being implemented. Also, twice as many successors than the owners indicated that their family businesses are already in the post-succession phase.

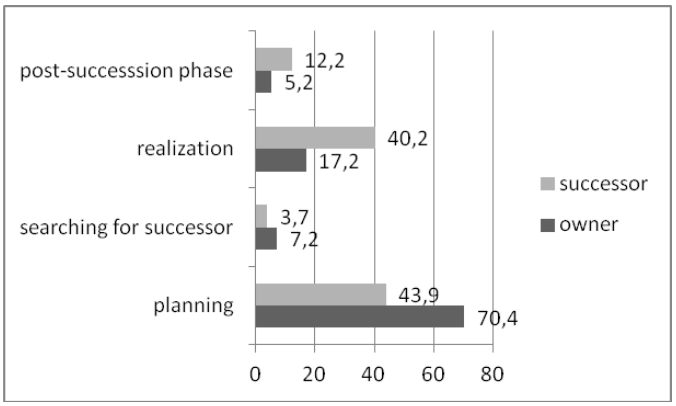

Fig. 4: Succession process phases

(Source: Lewandowska, 2013).

For successful succession extremely important is the method of confirming it and informing successor about it. Meanwhile, almost half of the respondents (both owners and successors) indicated that the only form of confirmation of succession was an oral proposal to a potential successor. Moreover, 34% of the owners and 26% of the successors admitted that in their enterprises there is no formal way of confirming the succession. Only about 5% of surveyed family businesses use written forms of confirmation of succession.

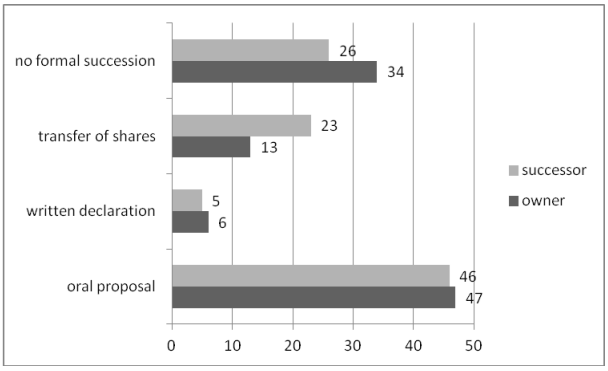

Fig. 5: Way of confirming succession in family business.

(Source: Lewandowska, 2013).

The process of succession is not possible without the willingness and commitment of successors taking over the family business. Meanwhile, less than 10% of potential successors declare their willingness to become a successor in a family business. They do not see themselves in this role either immediately after graduation or 5 years after graduation. Although in the 2nd edition of the survey slightly more respondents expressed the desire to take over the family business, it is far too early to call this change a trend and draw far-reaching conclusions on its basis. There is no doubt, however, that growing up in the entrepreneurial climate has an impact on young people, because almost half of them, after working with others, would like to start their own business.

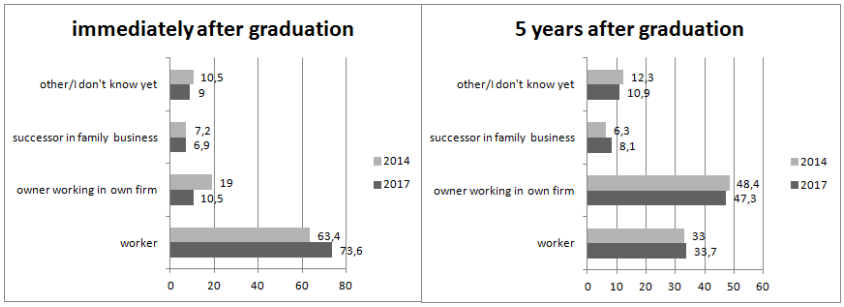

Fig. 6: Planned career path of the successor immediately after graduation and 5 years after graduation.

(Source: Lewandowska & Tylczyński, 2017).

Successors deciding to take over family businesses follow different motivations. Research shows that the most motivating factor to stay in a family business as a successor is a sense of responsibility for the work of ancestors. The desire to introduce changes in the company and the need to test own skills is slightly less important.

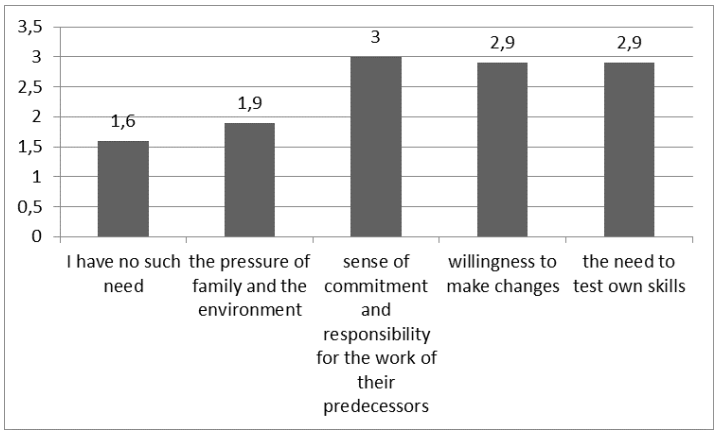

Fig. 7: Successor motivations for succession.

(Source: Lewandowska, 2013).

Conclusion

The research results cited in the previous section indicate that although the owners and successors of family businesses rightly believe that the succession process should be planned and managed, they make many mistakes during its implementation. These errors can significantly contribute to the failure of the succession process. The first mistake is the wrong perception of the time needed to carry out succession. Most owners and successors believe that it should last a year or less, while researchers indicate that for it to be truly effective it must last at least a few years. Succession is not a one-time act of transferring power and ownership, but a long-term process, during which the successor is selected and prepared to perform his duties and builds his own position and authority in the company. Another mistake is too rarely addressing the topic of succession in family discussions, whether between the owner and the successor. It is impossible to successfully carry out the succession process without talking about it and not establishing all the issues related to it together. This can lead to the situation observed in the quoted study in which successors and owners perceive the succession phase in which the enterprise is located differently. This can lead to many misunderstandings and discourage successors from succession. The lack of proper communication is associated with another mistake, which is the lack of formal confirmation of succession and informing all interested parties about it. Written confirmation of the successor's choice and transfer of authority is definitely clearer and binding than just an oral proposal. These errors are mainly due to the low level of knowledge of entrepreneurs about succession. Many mistakes in the process of succession also result from the guiding of emotions and family ties instead of competences (compare Roszko-Wójtowicz, 2013; Surdej & Wach, 2010). The successor should be the person who has the greatest predispositions for this, and not the one who is the oldest or

closest to the heart of the owner. Sometimes it may be necessary to look for a successor in the extended family or entrust the management of the company to an external manager (however, in this case some are already talking about losing the family nature of the business).The owners and successors intuitively feel the importance of the succession process, but they lack reliable, professional knowledge about its mechanisms and good practices. The way to increase the chances for successful successions is therefore to educate owners and successors and provide them with practical tips to avoid the most common mistakes. Such activities are already being carried out in Poland, primarily by associations of family businesses, so can be expect that more and more entrepreneurs will be able to successfully hand over companies to their successors.

The lack of willingness to take over the family business by potential successors is another and at the same time one of the most important reasons for the succession failure. No one can be forced to continue the family heritage, and no succession can be carried out without a successor. Therefore, factors that discourage the next generation from becoming involved in a family business should be considered very thoroughly. In many cases, this is the senior's reluctance to turn over power to the company and step into the shadows. This prevents the successor from building authority and realizing his own vision of running a business. In such situations, potential successors often prefer to start their own business than wait until the senior is finally ready to hand them over to the family business (research on the career path of the successors indicates this). Another source of reluctance to take over a family business can be the fear of responsibility and failure, disappointment of family and loss of family heritage built by predecessors (compare Więcek-Janka et al., 2016). Also, the inevitable comparison of the successor with the senior and judging the successor through the prism of the predecessor's achievements do not encourage participation in the succession process. It seems that in Polish reality, there are other important, but overlooked cause of reluctance of potential successors to take over the family business. They have their sources not in family relationships or a family business, but in its social environment. The first is the quite negative image of private entrepreneurship (which also includes family businesses) associated with selfish, soulless capitalism. This image grew on the basis of the previous political system prevailing in Poland and despite significant changes, one can still meet with maintaining its. Another reason is the negative image of the children of entrepreneurs (i.e. potential successors) in some local communities. Already at the school stage, future successors can sometimes meet with a negative attitude of the environment and mocking opinions in the style of “even if nothing can do, he does not have to worry, because he will take over daddy's company anyway”. Such opinions often result from jealousy and are the aftermath of the aforementioned negative attitude to private entrepreneurship, but they can have a big impact on successors. To prove their worth and free themselves from such perception, potential successors may forgo resigning from taking over family businesses. This is unfavourable for all parties, so it is important to eliminate this type of phenomenon. Therefore, it is important not only to change the attitude of potential successors and to show them that taking over a family business will allow them to develop professionally, but also to show the society that being a successor is not going on a easy task, but requires appropriate skills and competences.

The sources of unsuccessful succession discussed above do not exhaust the entire catalogue. For example, Więcek-Janka (2018) indicates differences in perception of the world and values between representatives of the BB, X, Y and Z generations. These differences significantly impede the cooperation of different generations in family businesses, and consequently negatively affect the succession process. Klimek et al. (2019) researching key determinants of succession attitudes of students indicate that knowledge of succession plans and knowledge of expectations about the successor have a positive impact on the choice of career path as successor. Therefore, it can be concluded that the lack of precisely defined succession plans and the requirements for successors are further factors hindering succession. Also Bieńkowska (2011), giving a catalog of determinants influencing the successor's motivation to take over the company, indicates automatically factors potentially hindering or preventing succession.

There are certainly many more sources of unsuccessful succession. This article is only an attempt to systematize the problem and an invitation to further analysis. Undoubtedly, its limitation is the lack of primary data that can extend the quoted data and confirm the presented theses. In the course of further research, it is worth focusing on potential successors and their feelings, especially regarding aspects that discourage taking over family businesses. Investigating the social factors of this reluctance seems quite reasonable and can significantly contribute to expanding knowledge about succession.

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The Classification of Social and Cultural Risks

Anna MAYAKOVA

Senior researcher, SWSU, Kursk, Russian Federation
berryannett@yandex.ru

Abstract

The article introduces author's classification of risks that has been formed in virtue of the author's previous research as well as the works of scientists and specialists of economic (Batova I., Acharya V., Pedersen L., Philippon T., Richardson M., Semernik S., Cristea G., Constantinescu D.), sociological (Grimov O.A., Kamensky E.G., Shestopal E. B., Selezneva A.B.), technical (Khodydevskaya S.V., Khalin V.G., Chernova G.V.), psychological (Molokostova A.M.) and other scientific spheres. Within the framework of the study the characteristics of the classification (type of risk, the risk content, cause (source) of the risk, the direction of risk, degree of risk impact, the probability of the risk occurring, risk function, level of risk, the trend manifestation of risk, form of risk) and corresponding with them types of risk have been defined. The classification of social and cultural risks offered is a universal one to use in different spheres of science and for practical use.

Keywords: Risk · Social and Cultural Risk · Classification of Risks · Type of Risk · Characteristic of Classification.

Introduction

The development of classification of social and cultural risks is one of the most urgent problems of modern philosophy and science. It is possible to solve this problem basing only on the following concepts: the concept of comprehensiveness, which will enable to study this scientific problem multidimensionally, the concept of complexity in the framework of which the scientific problem under study is investigated with different interdisciplinary approaches as a whole, the concept of systematicity with the help of which we can trace the structural elements and evaluate the problem as an entire system of interdependent and interacting elements.

Results and Discussion

The global practice of risk management is contained in the developed regulatory documents, which contain elements of risk management. Recommendations of the European Union on risk management contain a general requirement, which is supported by the Russian Federation that is a detailed expert analysis to be carried out by employees engaged in risk management activities both within the same organization and at the state and interstate levels. Risk analysis supports this initiative. As can be seen from the risk analysis procedure, the whole methodology is based on the expert analysis principle. Along with expert analysis, international standards for risk management are similar in the dynamics of this process, its systematicity and consistency, focus on strategic goals, transparency and content. So, effective risk management allows not only more efficiently carrying out daily activities, but also planning and making strategic decisions on significant issues at various levels. Risk analysis within risk management is a documented process that enhances traceability of decision making.

In the framework of technical sciences there exists an extended ranging of risks into real, potential and " force majeure " ones (Hoodat, 2009). The appearance of a real risk leads to creating some correcting measures which can eliminate or minimize the risk, and then a system of measures to prevent risk is created. A potential risk is a risk that doesn't exist at the moment, but in can be anticipated, planned, forecasted. Force majeure is a risk that arises unplanned and unpredicted during some action. The main distinguishing feature of social and cultural risks is the absence of force majeure risk, respectively the classification of social and cultural risks by the type implies two types of risks: real and

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potential ones. Potential social and cultural risks are the ones that can't be planned, anticipated and even imagined, because the scholarly knowledge in the sphere of risk arising is minimal or does not exist at all. Therefore, the evaluation of social and cultural risks is the evaluation of all possible assumptions (both positive and negative) about an event (development, implementation or usage of a technology). In general potential social and cultural risk is any possible risk with a minimal possibility of happening, even non-existent one.

Particularly such statement is applicable in the sphere of convergent technologies. It can be explained by the increased uncertainty of social and humanitarian perspective of development and the usage of convergent technologies which is connected with ambiguous end result in the framework of convergent technologies development: on the one hand the positive meaning and performance dynamic(creating a new technology), on the other hand a (potential) risk of using this technology for "non-positive" purpose. This risk is potential, because we cannot predict in what sphere a useful humanitarian elaboration will be applied. If such a prediction can be made, the risk is not potential anymore, it becomes a real one with low or medium possibility of arising (in the ideal case) and high or catastrophic degree of impact. The examples of risks with a high degree of impact can be the appearance of new qualities and characteristics of known materials (i.e. nanoparticles of gold < 2nm are toxic for humans); creating artificial materials generates anxiety of how the existing eco systems will interact with them and how humans will adopt to them.

In terms of introducing real and potential risks the author has mentioned two other criteria of risk classification: degree of impact and possibility of arising of the risk. These criteria of classification are also the criteria of risk evaluation when holding risk analyses with the help of risk management methodology. Classification of risks according to the criterion "the degree of impact" presumes the following types of risk: low medium, high or catastrophic degree of impact. According to the "the possibility of arising " criterion we can name such types as low, medium, high. With the purpose of more precise classification of social and cultural risks according to these criteria it is reasonable to apply the methods of SWOT-analyses (Gurel, 2017) and FME(C)A-analyses (Cristea, 2017).

One the key criteria of risk classification is the contents of risks. Basing on the sociological research of E. Shestopal and A. Selezneva (Shestopal, 2018) and a detailed analyses of the previous research in the sphere of risk management the following global threats have been pointed out:

- digitalization;
- westernization;
- massification;
- technification;
- virtualization of culture;
- moral crisis;
- deformation of channels and tools of spiritual heritage transmission.

Speaking about the sources of social and cultural risks mentioned above we can point out social division, identity crisis, structural misbalance in professional, ethnic and other social groups, in addition to psychological dysfunctions of the society, anomy, shortage of sympathy, discontented enquiry for social justice, state of uncertainty in the future, lack of long-term perspectives (Shestopal, 2018, Grimov, 2015, Kamensky, 2012). The chosen types of social and cultural risks are global, structured, the architectonic of each of them can be examined in more detail. The influence of risks on the quality of life is great, it can be proved by the analyses of social and cultural risks held by the author (Mayakova, 2019). Therein all risks can be minimized but cannot be eliminated because of their coverage. With the purpose to minimize risks for every of them the events that can and should be held are offered. Nowadays in Russia there exists a number of documents and initiatives that can help minimize social and cultural risks. The main condition of their execution is systematicity.

Bearing in mind the analyses of "risk contents" classification criteria we can make one more conclusion: the formation of a new classification criterion is a reason(source) of risk appearance. On the example mentioned above we can see the anthropological, economic and technological reasons. Speaking about the sources of risk appearance we should separately mention natural factors: earthquake, flood, extreme weather conditions and so on. It is natural that the reason of risk is seldom separate, that is why it is reasonable to introduce a "hybrid" source of risk appearance into the classification.

Taking into account different aspects of the concept of "social and cultural risk" it is relevant to introduce such criterion as "the direction of risk". Every direction reflects not only a social and cultural aspect, but also a field of philosophy and science, which is applicable in this discourse. Thus, taking into account everything mentioned above we can point out the following directions of risk:

- ethic;
- legislative;
- economic(technological);
- cultural(also esthetical);
- psychological;
- ecological;
- social
- hybrid.

The hybrid one implies the synthesis of several types of risk. Let us take the risk of "moral crisis" as an example that has a catastrophic influence on human and society in general. Taking into account the contents of the risk and the specific character of its influence(lowering the moral standards and the general cultural level of the society, dehumanization of all the spheres of human life, the development of destructive and illegal forms of behavior, lowering the general level of law and order, stability and security in the country and soon), this risk cannot be referred to a single particular direction. Consequently, this risk is a hybrid one, in the framework of which such directions as ethical, legislative, cultural, psychological, social are integrated. When necessary one direction can be split into several, being introduced as a complex system.

One of the most important characteristics of risk is the purpose of risk or its function. This or that event, action, technology, especially with an innovative meaning, some risks apriori. Thus, the function of risk is not necessarily negative, because the event examined in general leads to a positive effect i.e. profit. This concept was borrowed from the methodology of anti-crisis management where risk can be seen as a positive thing (Acharya, 2017). This type of risk is most pronounced in the sphere of some modernization. The transformation of something (system, technology, invention) is impossible without some risks, however the effect can overcome all our expectations. For example, within the framework of risks "Virtualization of culture" a threat of lowering communicative skills is identified, in other words, "failure of intercommunication", but this treat led to the development of new ways and types of communication. It is logical that if there is a risk that allows for profit, there must be identifies a type of risk that is opposite to it, the one that allows for losses. It is the most widespread type of risk.

Taking into account the fact that the problem of risks is important at different hierarchic levels of social order, it is necessary to introduce such criterion of classification as risk level (Batova, 2015). On the groungs of the meaning of "social and cultural risk" concept and the extent of its coverage let us define the following levels of risk:

- personal;
- group (small and medium group);
- sectorial/regional;
- institutional;
- governmental;
- international;
- global.

Most risks, especially of global threats, can be evaluated at each level of classification. This criterion of classification can be logically used as one of the stages of risk analyses, because it supposes all-round study of risk, we can say, its unfolding.

In order to have an opportunity to study one or several reasons, it is necessary for them to appear at some rate. Taking this into account, we complete our classification with such criterion as "the tendency of risk appearance". The risk can appear at different steps of one event or accompany it at every appearance of this event, then the risk will be objective (for example the discrimination of the idea of labor in the social and cultural context of economy centric society). If the risk can appear under the influence of subjective decisions, it will be classified as a subjective one (for example, risk

connected with responsible taking effort to rationally coordinate individual goals). Both examples of social cultural risks refer to the global threat of technification, in particular, in the direction of economocentrizm (Semernik, 2018). The risk, the appearance of which can be explained by some reasons (events, factors) is a motivated one. Consequently, if the motivation is not possible, the risk in unmotivated. As examples of motivated risks we can name the following: modern information technologies represent a powerful mechanism of conscience control, which contributes to substitution of values, destruction of cultural memory, change of identity (Khalin, 2018), i.e. the total manipulation of human sense; the risk(problem) of choosing unbounded self-development or self-protection (Molokostova, 2013). Finally, if the risk results into crime or leads to it, it can be called a criminogenic one. For example, the threat of criminalization of social relation emerging in the process of reforming the social -political system and the economic activity is such a risk.

The general classification is shown in Table 1.

Table 1: Classification of social and cultural risks

Characteristic of classification	Type of risk
1. Type of risk	1.1 Real 1.2 Potential
2. The risk content	2.1 Digitalization; 2.2 Westernization; 2.3 Massification; 2.4 Technologization; 2.5 Virtualization of culture; 2.6 Moral crisis; 2.7 Deformation of channels and mechanisms for transmitting spiritual heritage
3. Cause (source) of the risk	3.1 Anthropological 3.2 Technology 3.3 Economic 3.4 Natural 3.5 Mixed
4. The direction of risk	4.1 Ethic 4.2 Legislative 4.3 Economic(technological) 4.4 Cultural (also esthetical) 4.5 Psychological 46 Ecological 4.7 Social 4.8 Hybrid
5. Degree of risk impact	5.1 Low 5.2 Average 5.3 High 5.4 Catastrophic
6. The probability of the risk occurring	6.1 Low 6.2 Average 6.3 High
7. Risk function	7.1 Risk that allows for profit 7.2 Risk that allows for losses
8. Level of risk	8.1 Personal 8.2 Group (small and medium group) 8.3 Sectorial/regional 8.4 Institutional 8.5 Governmental 8.6 International 8.7 Global

9. The trend manifestation of risk	9.1 Subjective 9.2 Objective 9.3 Unsubstantiated 9.4 Reasonable 9.5 Criminogenic
10. Form of risk	10.1 Conceptual 10.2 Planned 10.3 Forecasted 10.4 Structured 10.5 System 10.6 Sudden

Conclusion

The classification of social and cultural risks offered is a universal one to use in different spheres of science and for practical use. The classification criteria and the risks corresponding to them are generated not only basing on the author's previous research, but also on the works of scientists and specialists of economic (Batova I., Acharya V., Pedersen L., Philippon T., Richardson M., Semernik S., Cristea G., Constantinescu D.), sociological (Grimov O.A., Kamensky E.G., Shestopal E. B., Selezneva A.B.), technical (Khalin V.G., Chernova G.V.), psychological (Molokostova A.M.) and other scientific spheres. The classification of social and cultural risks can be used in research work connected with further studying of the problem of risk in postnonclassical science and philosophy as well as in other spheres of fundamental and applied science.

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Mapa de conflictos de Derechos de Agua Por Intervención minera en la Zona Norte de Chile

Leticia CAMPOS
Universidad de Atacama, Copiapó, Chile
leticia.campos@uda.cl

Daniel ALVARADO
Universidad de Atacama, Copiapó, Chile
daniel.alvarado@uda.cl

Andrés PARDO
Universidad de Atacama, Copiapó, Chile
andres.parado@uda.cl

Jorge ROJAS
Universidad de Atacama, Copiapó, Chile
jorge.rojas.torres@alumnos.uda.cl

Sergio Varas
Universidad de Atacama, Copiapó, Chile
sergio.varas@alumnos.uda.cl

Resumen

En este artículo se recopilaron todos los conflictos socio-ambientales presentes en Chile, para determinar a través de los datos levantados, los conflictos que se vinculan directamente con el uso, acceso y contaminación del Agua, y que además eran causados por la intervención de la Industria Minera. El objetivo de este trabajo fue en primer lugar, realizar una interrelación entre la Constitución Chilena de 1980, creada en el Gobierno Cívico-Militar, el Código de Minería y el Código de Aguas, para establecer algunas de las razones que facilitan los conflictos de Agua entre Empresas Mineras y las Comunidades circundantes y en segundo lugar, crear un Sistema de Información Geográfica, a través del levantamiento y localización de conflictos manifestados a través de varias fuentes: información bibliográfica, datos geo-referenciados y uso de imágenes satelitales, fuentes que luego se cruzaron para establecer el espacio territorial donde se producen los conflictos. Los resultados obtenidos mostraron una tendencia a la concentración de los conflictos socio-ambientales, sobre el uso del Agua, en los territorios donde se centraliza la Actividad Minera, a partir de ello, se discute y se reflexiona la relación sobre los principales desafíos que la industria y la comunidad deben sortear. El texto se estructuró en cuatro partes: (I) introducción al artículo, (II) los métodos y materiales, (III) Resultados y (IV) Discusión de los productos cartográficos y las principales conclusiones obtenidas durante el desarrollo de la investigación.

Palabras claves: Conflictos Socio-ambientales, Cartografía Social, Intervención Minera, Uso del Agua.

Introducción

Las regulaciones para el acceso y la gestión del agua en Chile están declaradas en el Código de Agua de 1981, donde se separa el dominio de la propiedad del agua con respecto a la Tierra, por tanto, alguien puede ser dueño de la tierra, pero no del Agua, lo que ha permitido un comercio de del recurso. Bolados et al (2017), indica que fue Chile uno de los primeros países en crear un Mercado entorno el agua, legitimando los usos productivos y energéticos, por medio de la separación de las Aguas Consuntivas y no consuntivas.

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La Corporación Nacional Forestal (CONAF, 2017), informa que el 72% de la superficie del país ha sufrido sequía, provocada por el cambio climático, lo que ha hecho que exista un 15% menos de lluvia en los últimos 50 años, además de no contar con una robusta infraestructura hídrica, todo esto asociado a la condición mercantil del agua, donde la misma es privatizada, ha repercutido para que proliferen los conflictos por el uso, acceso y contaminación de las aguas, entre varios de los sectores productivos y las comunidades del país. Muchas de la problemáticas que se han producido son por la intervención de la Industria Minera, segunda actividad productiva que más aporta al país (13% del PIB nacional) y que atrae mayor inversión extranjera.

Esta industria utiliza una gran cantidad de agua en sus procesos y a pesar que según la Dirección General de Aguas (DGA), sólo ocupa el 3% del agua a nivel nacional, "contaminación, usurpación y envenenamiento del agua", son argumentos que se escuchan día a día en el país, por ser un sector altamente contaminante, según lo indica Valderrama et al (2019). La Sociedad Nacional de Minería, SONAMI (2013), establece que aún cuando el agua tiene un alto grado de reutilización en las operaciones mineras, no se puede volver a utilizar para el consumo humano, de la vida animal y vegetal, por lo que se acrecientan las expectativas negativas sobre los Proyectos Mineros que se quieren establecer en algún territorio.

La minería se ha planteado desafíos en relación al uso del agua, primero, asegurar la suficiente agua para satisfacer la producción, segundo, reducir el consumo de agua utilizada en los procesos mineros, y por último la comprensión de los vínculos entre el agua, energía y emisiones en una mirada integral.

La sustentabilidad del negocio minero, cuenta como factores críticos, como el uso de la energía, el territorio y el agua, siendo este último el polo de estudio de este trabajo, por lo que surgen las preguntas: ¿Es realmente la industria minera la que genera mayores conflictos con el agua en Chile?, ¿Cuál es la distribución territorial de los conflictos de aguas en el país?; ¿Cuáles son los conflictos entre Empresas Mineras y Comunidades en temas de conflictos de Agua?

Para afirmar que: "Los conflictos por el uso, acceso, aprovechamiento y contaminación del agua en Chile, se producen por la industria minera, asentada en la zona norte de Chile", surge la necesidad de crear un Sistema de Información Geográfico, que permita demostrar esta situación, para que las comunidades puedan visualizar lo que ocurre en sus territorios.

Materiales y Métodos

En primera instancia se realizó un estudio bibliográfico de la Constitución de 1980, el Código de Aguas de 1981 y el Código de Minería de 1983, para encontrar relaciones entre ellos, de esta forma poder analizar los conflictos desprendidos entre Comunidad y Minería.

En segunda instancia, se segmentó el territorio chileno en tres sectores principalmente asociados por la división política-administrativa de las regiones del país, su geografía, el clima y el índice de precipitaciones anuales.

En tercera instancia se realizó un levantamiento de todos los conflictos socio-ambientales que se han producido en Chile, durante los últimos 30 años, utilizando información del Instituto Nacional de Derechos Humanos (INDH), la Coordinadora de la Defensa de Agua y la Vida CDAyV y el Observatorio Latinoamericano de Conflictos Ambientales (OLCA).

En cuarta instancia, se construyó una base de datos con todos conflictos socio-ambientales, donde se seleccionaron solo los que tenían referencia a los conflictos de agua, distinguiendo los que tenían directa relación con el Área Minera, lo que a su vez permitió determinar su ubicación geográfica en el territorio.

En quinta instancia, se realizó el geo-procesamiento para la creación del mapa, con apoyo de un software GIS, para su posterior análisis espacial, utilizando los insumos obtenidos en las dos instancias anteriores, los cuales fueron integrados en un SIG representando cada conflicto ambiental como un objeto geográfico. Se utilizaron además imágenes satelitales del territorio, coberturas como los límites políticos administrativos, asentamientos humanos, aéreas climáticas, morfología del territorio y coordenadas Universal Transversal de Mercator (UTM) de los puntos en conflicto.

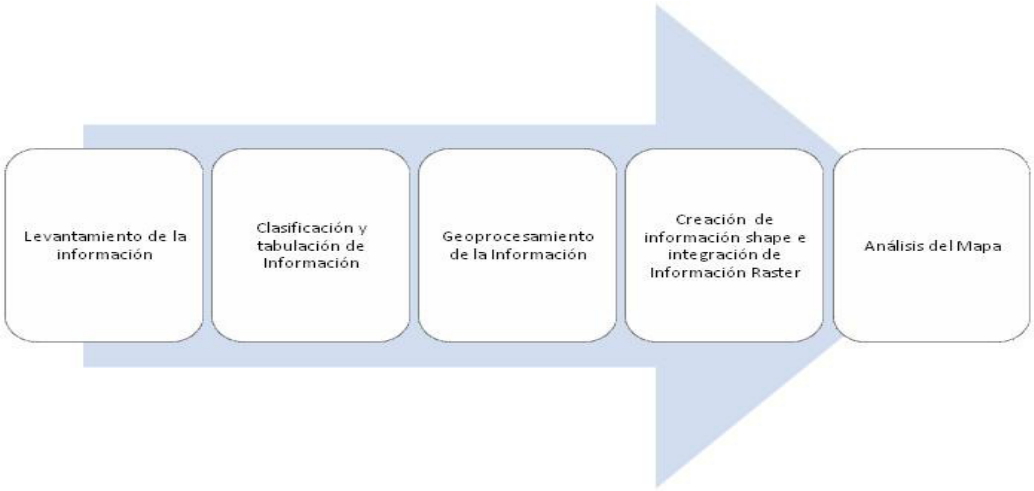

Figura1: Creación del SIG

Resultados

Constitución, Código de Aguas y Código de Minería

La Constitución Política de 1980, en su capítulo III: "De los derechos y deberes constitucionales", establece consideraciones para dos recursos naturales: El Agua y las Minas, con el fin de proteger el Derecho de la Propiedad Privada, este hecho tiene más una fundamentación más histórica, que jurídica, la nacionalización de la gran minería del cobre y la reforma agraria (Alburneque, 2001).

Estos dos Códigos, fueron promulgados bajo el Gobierno Cívico-Militar, el Código de Aguas en 1981, mientras que el Código de Minería 1983. En el primero separa la propiedad del agua del dominio de la tierra, pudiendo entregar el Estado los derechos de aprovechamiento de agua a privados de forma gratuita y a perpetuidad y en el segundo se establecen las consideraciones de la propiedad del estado sobre todas las tierras y yacimientos, además detalla los mecanismos para su concesión y explotación a privados. En la Tabla 1, se pueden apreciar todos los artículos que se vinculan entre el Código de Minería y el Código de Aguas en Chile, con una columna de síntesis, para saber de qué trata cada uno:

Tabla 1: Síntesis de artículos relacionados entre el Código de Minería y Aguas.

CÓDIGO	N°	SÍNTESIS		CÓDIGO	N°	SÍNTESIS
MINERÍA	3	Construcciones inmuebles		AGUAS	1	División de aguas
	17	Permisos especiales			4	Aguas inmuebles
	110	Aprovechamiento de aguas			5	Aguas bien nacional
	111	Aguas fuera de concesión			6	Derecho de aprovechamiento
	120	Gravámenes superficiales			7	Medida del aprovechamiento
					13	Derecho consuntivo
					14	Derecho no consuntivo
					16	Ejercicio permanente
					17	Dotación permanente
					18	Ejercicio eventual
					19	Ejercicio continuo
					27	Población

					41	Disposiciones especiales
					56	Pozos
					58	Aguas subterráneas
					62	Perjuicios
					122	Dirección General de Aguas
					132	Oposición
					147	Constitución del derecho
					173	Multas

Haciendo revisión de los dos textos legislativos, se encontraron las siguientes relaciones entre el Código de Minería y el Código de Aguas, en cuanto al uso de las aguas, se estipula en el primero, que el uso de las aguas que sean necesarias para explorar, explotar o beneficiar sustancias minerales se sujetará a las disposiciones del código de aguas y demás leyes aplicables (Artículo 111), específicamente en el artículo 110, se indica que el titular de la concesión minera tiene el *derecho de aprovechamiento de las aguas* halladas en las labores de su concesión, en la medida que tales aguas sean necesarias para los trabajos de exploración, de explotación y de beneficio que pueda realizar, siendo estos derechos inseparables de la concesión minera y que se extinguirán con ésta, esto mismo se establece en el Código de Aguas en su artículo 56. Con respecto a las construcciones que se pueden realizar dentro de los límites de la Concesión Minera, en el artículo 120 queda estipulado que se pueden construir tranques, canales, cañerías y demás construcciones, y que estos a su vez se considerarán bienes inmuebles (Artículo 3).

Por otra parte el Código de Aguas establece que su legislación sólo es para las aguas terrestres (artículo n°1), las que pueden ser superficiales o subterráneas (Artículo n°2), y que no rige a las aguas marítimas, una consideración de importancia, ya que *el uso de las aguas marítimas para la minería no está restringida por ninguna ley.* Para este código las aguas son muebles, esto quiere decir que pueden ser movidas, para ser destinadas al uso, cultivo o beneficio de un inmueble. El derecho de aprovechamiento es de dominio de su titular, quien podrá usar, gozar y disponer de él, pero en conformidad con la ley, este derecho se expresa en volumen por unidad de tiempo (m^3/seg) y además el que goce de este derecho puede hacer las obras necesarias para poder hacer uso de las aguas.

Sobre las disposiciones que entrega el Código de Agua, sobre la expropiación del derecho de aprovechamiento de aguas, cuando sea imprescindible ocupar estas aguas para satisfacer los menesteres domésticos (Articulo 27), la reserva del recurso para el establecimiento de la población, por no existir otros medios para obtener agua, recaen en que el presidente de la república podrá, mediante decreto fundado, con informe de la Dirección General de Aguas (DGA), disponer la negación parcial de una petición de derecho de aprovechamiento (Articulo 144). Finalmente en el artículo 173 se señala que toda contravención a este código que no esté especialmente sancionada, será penada con una multa de veinte unidades tributarias mensuales, además de otras responsabilidades civiles y penales.

Macrozonas de Chile

Chile, se divide política y administrativamente, según la Constitución de 1980 de forma descentralizada, en 16 regiones, 56 provincias y 346 comunas (INE, 2020). La Corporación del Fomento de la Producción (CORFO), a su vez divide al país con respecto a su Geografía Económica desde 1951 en 5 zonas naturales, el Norte Grande, el Norte Chico, Zona Central, la Zona Sur y la Zona Austral. Para fines de este estudio se reclasificó el país sólo en tres “Macrozonas”, según la naturaleza de las precipitaciones, clima asociado y actividad productiva principal, tal como se ve en la tabla 2:

Tabla 2: Reclasificación de Macrozonas

MACROZONA	REGIÓN	PRECIPITACIONES (mm/año)	CLIMA	ACTIVIDAD ECONÓMICA
Norte	Arica y Parinacota	87	Desértico- Semidesértico	Minería
	Tarapacá			
	Antofagasta			
	Atacama			
	Coquimbo			
Centro	Valparaíso	943	Mediterráneo	Agricultura y forestal
	Metropolitana			
	O´Higgins			
	Maule			
	Biobío			
Sur	La Araucanía	2690	Templado lluvioso, estepárico frío y polar	Forestal y ganadería.
	Los Ríos			
	Los Lagos			
	Aysén			
	Magallanes y La Antártica Chilena			

Chile cuenta con alrededor de más de 15 mil lagunas y lagos, 1.251 ríos a esto se le debe sumar el agua proveniente de las lluvias, lo que conlleva que cada persona en el país podrá hacer uso 53 mil m³ al año del recurso hídrico. Esto no es aplicable en todo el país, debido a diversos factores como aumento en la población, cambios climáticos, desarrollo económico y social, lo que ha terminado generando escasez hídrica en zonas o regiones específicas. A lo anterior se suma la heterogeneidad de las zonas geográficas que posee Chile, mientras que en el sur los caudales tienen un promedio de 100 mil m³ por persona al año, en la zona centro-norte alcanza sólo a 800 m³ por persona al año, lo que se encuentra bajo el promedio mundial que es de 1.000 m^3 por persona al año.

Chile tiene un déficit de agua de 82,6 m^3/s, y se piensa que aumentará a 149 m^3/s ya para el año 2030. La demanda de agua que requiere la industria minera llega a 24.95 m³/s, asociados a los Derechos de Agua que en comparación a la oferta hídrica la demanda es muy reducida según las cuencas hidrográficas donde estas actividades son realizadas. Para disminuir el uso de agua proveniente de ríos y cuencas de agua dulce, las industrias mineras comenzaron la implementación el uso de agua de mar mediante plantas desaladoras las cuales equivalen a un 15% aproximadamente de las aguas utilizadas en la industria minera.

Levantamiento de Conflictos

Al hacer el levantamiento de todos los conflictos socio-ambientales en Chile, se encontraron 118 casos, con esta información se creó una base datos dividida en 4 grandes elementos (ítems), sobre el Territorio, la Industria asociada al conflicto, los términos legales y sociales en que se encuentra el conflicto y por último el conflicto como tal.

Tabla 2: Estructura Base de Datos

I. TERRITORIO								
NOMBRE	COORDENADAS UTM	REGIÓN	DIVISIÓN POLÍTICA			MACRO ZONA		
			REGIONAL	INTERREGIONAL	NACIONAL	NORTE	CENTRO	SUR
II. INDUSTRIA								
SECTOR PRODUCTIVO						TIPO DE EMPRESA		
MINERÍA	ENERGÍA	INFRAESTRUCTURA	FORESTAL	PESCA	OTRO	PÚBLICA	PRIVADA	MIXTA
III. LEGISLACIÓN Y SOCIAL								
SEIA			SITUACIÓN SEIA				OCUPACIÓN DE TIERRAS INDIGENAS	
DIA	EIA	NO APLICA	APROBADO	RECHAZADO	DESISTIDO	NO APLICA	SI	NO
IV. CONFLICTO								
CAUSA DEL CONFLICTO			TIPO CONFLICTO			ESTADO DEL CONFLICTO		
			EXTRACCIÓN	CONTAMINACIÓN	RESIDUOS	ACTIVO	CERRADO	LATENTE

- *Conflictos por el Agua*

Los Conflictos estaban ubicados de la siguiente forma con respecto a la división político administrativa del país 2 Conflictos a Nivel Nacional, 2 Conflictos Interregionales y 110 Conflictos Regionales. De estos 118 conflictos socio-ambientales, existían 36 conflictos por uso y/o contaminación del agua lo que representa 30,5 % del total nacional lo que se aprecia en la tabla 3:

Tabla 3: Conflictos geo-referenciados

N°	Nombre del Conflicto	Norte	Este
1	Pozos de extracción de agua en el Parque Nacional Lauca	7984161	466795
2	Desafectación del Parque Nacional Lauca	7984161	466795
3	Proyecto minero Catanave	7939729	478904
4	Proyecto minero Choque Limpie	7939729	478904
5	Minera Quiborax	7920427	489212
6	Proyecto minero Los Pumas	8003487	433406
7	Mina Salamanqueja	7874520	378598
8	Extracción ilegal de agua en pampa del Tamarugal	7736098	429788
9	Proyecto minero Pampa Hermosa	7682252	431104
10	Perforación geotérmica profunda El Tatio Fase I	7529776	601644
11	Modificaciones Sistema de evaporación solar en el salar de Atacama	7400931	576575
12	Contaminación de la bahía de Chañaral	7096034	452168
13	Pascua Lama	6756165	400305
14	Proyecto minero Las Flechas	6817246	354866
15	Proyecto minero Caserones	6884099	446190
16	Proyecto minero Cerro Casale	6926659	470574

17	Proyecto minero Refugio	6952660	470403
18	Proyecto minero La Candelaria	7188054	38155
19	Proyecto minero El Morro	6833744	413439
20	Contaminación del río Chopa por Mina Los Pelambres	6448219	357957
21	Tranque de relave El Mauro y Comunidad de Caimanes	6460000	310000
22	Proyecto minero El Pachón	6485896	364488
23	Central termoeléctrica Punta Colorada	6749585	301464
24	Proyecto Los Pingos	6581171	349907
25	Proyecto minero Tres Valles (Mina Don Gabriel)	6490274	309997
26	Mina Carmen de Andacollo	6651988	298400
27	Embalse Chacrillas	6388555	338844
28	Embalse Puntilla del Viento	6367654	351793
29	Proyecto hidroeléctrico Alto Maipo	6288981	384797
30	Proyecto hidroeléctrico Achibueno	6022936	262335
31	Planta de celulosa Licancel	6124475	227510
32	Central hidroeléctrica Aguas Calientes	5915873	766338
33	Lavadero de oro en río Colico	5721910	658955
34	Piscicultura Newenco	5649087	739043
35	Regularización y ampliación piscicultura Quetroleufú	5650644	256493
36	Proyecto Mina Invierno (Isla Riesco)	4138012	322861

- ***Sector Productivo y conflictos de aguas***

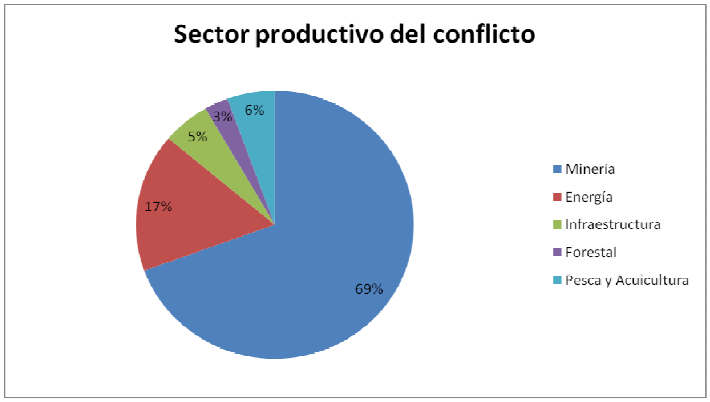

Gráfico 1: Sectores productivos involucrados en Conflictos con temas de Agua

En este gráfico se puede apreciar que el 69,4% (25 casos) de los casos de conflictos por el agua en Chile se generan por intervención minera, seguido de la industria energética con un 16,7% y en tercer lugar la industria de la infraestructura con un 5,6%.

Analizando la situación por región, se detectaron 11 regiones afectadas por conflictos de agua, de las 5 primeras, 4 estaban ubicadas en la macrozona norte.

Tabla 4: Ranking de conflictos por región

Ranking	Región del conflicto	Cantidad	Porcentaje (%)	Macrozona
1°	Atacama	8	22.22	Norte
2°	Arica y Parinacota	7	19.44	Norte
3°	Coquimbo	7	19.44	Norte
4°	Araucanía	3	8.33	Sur
5°	Antofagasta	2	5.56	Norte

- ***División de los conflictos de agua por macrozona***

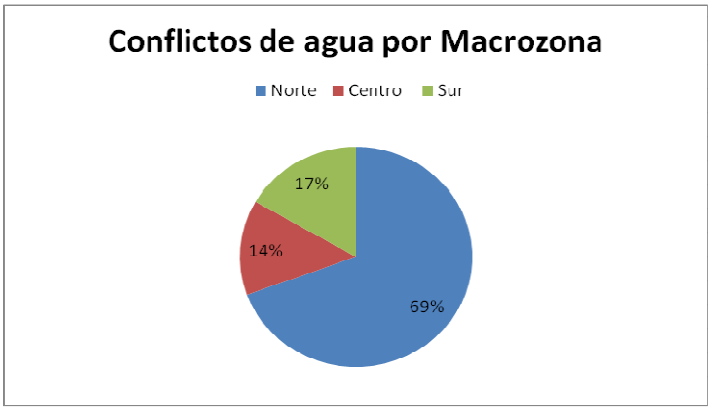

Gráfico 2: Macrozona de conflictos de agua

Conflictos de agua por actividad minera

Como este estudio se enmarca en el impacto que la minería tiene sobre el recurso hídrico, se trabajará con los 25 casos de esta área detectados a lo largo del país. Se estudiaron las causas, si existe afectación de tierras indígenas, en qué etapa se encuentran en el Servicio de Evaluación de Impacto Ambiental y en qué estado está el conflicto (latente, activo o cerrado).

- ***Causas del conflicto por actividad minera***

Tras el análisis se encontraron diversas causas del conflicto tales como; Extracción y desvío de aguas, Sobreexplotación de los recursos hídricos, Explotación de los recursos hídricos de reservas, Perforaciones que afectan a la flora y fauna, Disminución y contaminación de aguas, Extracción del recurso hídrico destinado a las comunidades, Contaminación de napas subterráneas, entre otros. Los cuales fueron agrupados en “macrocausas”; extracción, contaminación y residuos.

- Extracción: Extracción de aguas en lugares de exploración geológica o explotación de minas.
- Contaminación: Contaminación confirmada de recurso hídrico.
- Residuos: Probable contaminación por residuos, emisiones e inmisiones.

Tabla 5: Macrocausas que han producido conflictos de Agua.

Macrocausas	Cantidad de conflictos	Porcentaje (%)
Extracción	17	68
Contaminación	4	16
Residuos	4	16
Total	**25**	**100**

- ***Tipo de Empresa Involucrada en el conflicto de Agua***

Las empresas privadas involucradas en conflictos de Agua equivalen al 84,5% , mayormente de capitales extranjeros.

- ***Tierras Indígenas comprometidas***

Un dato relevante fue determinar que a nivel nacional el 55,6% de los conflictos, se generaron entre comunidades indígenas y la industria minera.

- ***Servicio de Evaluación de Impacto Ambiental***

El 84% de los proyectos mineros en conflicto (21) se habían sometido al Servicio de Evaluación de Impacto Ambiental (SEIA), 17 de ellos mediante un Estudio de Impacto Ambiental (EIA) y 4 con una Declaración de Impacto Ambiental (DIA). De los EIA, 14 estaban en calidad de aprobados y 3 en calificación, en cuanto a DIA, 3 estaban aprobados y 1 en calidad de "desistido", este último buscaba emplazarse en el río Colico Región de la Araucanía.

- ***Estado del conflicto***

El INDH realizó una clasificación de los estados de los conflictos socio-ambientales que ocurren en Chile según su repercusión mediática, lo que también puede ser aplicado a los conflictos de uso de agua.

- Activo: Manifestación del conflicto en la esfera pública mediante protestas, acciones judiciales o peticiones que hayan tenido repercusión en los medios de comunicación durante el último año.
- Latente: el conflicto sigue vigente pero no registra apariciones públicas.
- Cerrado: existe un acuerdo entre las partes o una resolución institucional que pone término al conflicto.

Del estudio se determinó que un 60% de los conflictos estaban activos (15), 36% en calidad de latentes (9) y solo el 4% que representa a 1 conflicto, estaba cerrado tras un acuerdo entre las partes.

Macrozona Norte lidera conflictos por uso de agua

El análisis arrojó que el 92% de los conflictos (23) se dieron en las 5 regiones que componen la macrozona norte y el 8% en 2 regiones de la macrozona sur, no evidenciándose ningún conflicto en la zona central, se puede apreciar estos resultados en la Figura 2: Mapa de Conflictos de Agua, por intervención minera e Chile.

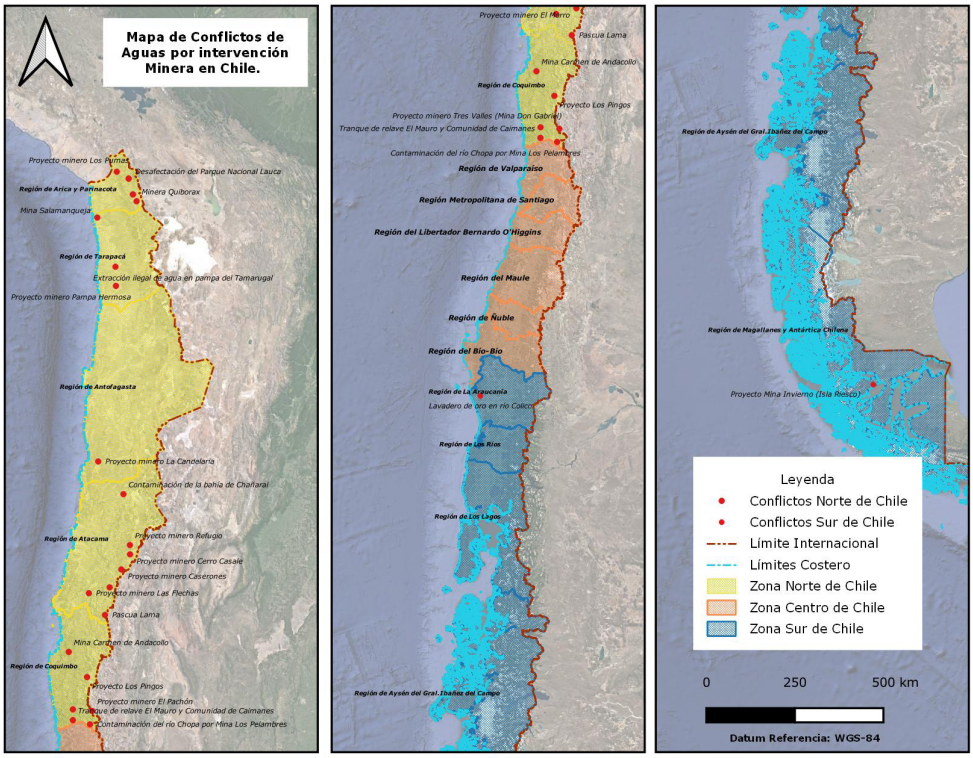

Figura 2: Mapa de conflictos de agua

Discusión

En Chile existe un sinnúmero de eventos que causan daño al medio ambiente, tanto a nivel civil como a nivel industrial, una de las aristas más preocupantes tanto para el gobierno de Chile como para su población, es el daño que se produce día a día con el agua. La contaminación, el mal uso, y la sobreexplotación de este recurso vital se puede encontrar a lo largo de todo el territorio nacional, sin embargo, es en la macrozona norte donde se encuentran las principales y la mayor cantidad de problemáticas detectadas, específicamente por la minería.

En Chile existe un déficit hídrico de un 82,6 m^3/seg, donde sólo 4 fuentes de agua (ríos y cuencas) de la macrozona norte aportan 10 m^3/seg, el resto está bajo dicho valor alcanzando un máximo de 1 m^3/seg. La minería en tanto, demanda 24,95 m^3/seg, hay empresas que en la búsqueda de la reutilización y mejor aprovechamiento del agua, están incorporando agua desalada en sus procesos, tanto para alcanzar los indicadores de producción requeridos en el tratamiento del mineral, como por los conflictos generados con las comunidades circundantes debido a la extracción y contaminación del agua dulce.

El código de aguas actual que rige en Chile es un documento muy completo y claro que establece parámetros para el uso de agua dulce superficial y subterránea, pero no contempla normas ni restricciones para el uso de agua de mar, lo que pudiera con llevar a posibles nuevos tipos de conflictos con la comunidad, por lo que es necesario fortalecer el marco legal, institucional y regulatorio para el uso del agua de mar desde todos los puntos de vista que éste conlleva.

En la zona norte del país los conflictos de aguas se agudizan debido a la escasez de agua por su geografía (zonas áridas), lo que ha causado sobre-explotación de las cuencas, generando un clima de tensión entre las comunidades locales con las empresas mineras.

No sólo las empresas mineras presentan interés en desarrollar el sistema de Plantas desalinizadoras para mitigar la escasez hídrica que afecta al país, también el gobierno apoya esta iniciativa que representa una inversión millonaria, pero que a largo plazo sería una vía sustentable en la lucha contra la sequía en la zona norte.

Según el Observatorio Latinoamericano de Conflictos Ambientales (OLCA), las empresas trasnacionales tienden a aprovecharse de los débiles marcos regulatorios de países subdesarrollados, con proyectos que carecen de toda lógica ambiental.

La mayor de conflictos por derechos de agua se reflejen en esta zona de Chile, por el momento, ya que según todas las proyecciones del Consejo Minero, prontamente la minería se trasladará con todo su potencial a la zona sur del país, determinado por la gran cantidad de reservas de oro que han arrojado las campañas de exploración geológica de grandes trasnacionales y la cantidad de yacimientos polimetálicos allí presentes, por ende este % puede cambiar. Lo anterior en relación que en las regiones del sur se encuentran grandes depósitos de agua dulce, como ríos y lagos, lo que incrementará los problemas del uso del agua ligado a la biodiversidad presentes en esta zona.

Los mapas siempre ayudan a tener una visión por lo menos general, de los fenómenos que ocurren en un territorio; por lo cual este Sistema Información Geográfica, que particulariza los Conflictos de Aguas, por intervención minera, permite evidenciar la crisis producida por el extractivismo, presente no sólo en Chile, sino que en toda Latinoamérica y que afecta a muchas comunidades indígenas.

Reconocimiento

Agradecer a Sergio Varas y Jorge Rojas, quienes a través de su Tesis de grado, la que estaba enfocada en la importancia de la utilización de un Sistema de Información Geográfica en un caso de Estudio sobre Comunidad, Minería y Agua, obtuvieron los datos para esta investigación. De la misma forma agradecer a Nathaly Campos Olivares, quien fue la revisora del presente artículo, aportando a la difusión de la ciencia.

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Impact of Technological Innovation on United Kingdom Labor Market

Piotr WIŚNIEWSKI

Nicolaus Copernicus University, Toruń, Poland
psw@umk.pl

Abstract

Idea of Industry 4.0 is presented as a next step in our development. The age of intelligent machines and full automation. This process will have an impact on economic development, but also on structure of labor market. Industry sectors are the most exposed to changes brought by Industry 4.0. The mainstream publications like Forbes tries to predict jobs that will be obsolete due to automation. (Expert Panel, Forbes Technology Council, 2019). Among them are warehouse and manufacturing jobs, production line etc. The purpose of this research is to analyze relation between employment in industry and services and technological progress in United Kingdom. Additionally, there will be presented context of wider economic growth by using GDP per capita as measure of it. All datasets are from World Bank database. Vector Aurogression was chosen as the method. Gretl software was used to perform the study.

Keywords: Industry 4.0, Economic Development, Industry Employment, Econometrics.

Introduction

Most of the current literature about impact of technological innovation on a society sees this process as something exclusively positive. The optimistic view sees the fourth industrial revolution as an opportunity for new types of occupations and industries to emerge, as well as chance to improving living standards. However, everything has assorted effects – not only positive ones for everything and everyone. Innovations had impacted employment in some sectors of economy in less positive manner. For industry workers automation means higher probability of losing their jobs. Also, robots can be viewed as substitutes for unskilled labor. The economic consensus is: the change is negative in short term for unskilled labor in industry, but has positive impact on welfare of whole society outweighs. A few factors were included in research as variables to determine how much they affect the declining demand for labor in industry. This narrower focus may help to understand how to act on behalf of unskilled workers. Even if the transition in country's economy is inevitable, it may be carried out in many different ways. The first step on the path to make this process as painless as possible is for workers to better understand it.

Technology, Society and Economy

Technology is not only determined by society, but also is able to influence social changes. These two are closely connected and coexistent. Social computing is the best example of the complexity of the relation between these factors.

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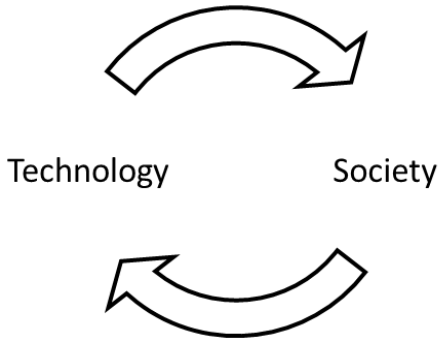

Fig. 1: Relationship between technology and society

Source: Vannoy and Palvia, 2010

Vannoy and Palvia (2010, p. 150) presents concept of the co-determinization of technology and society. The idea is that societal change creates demand for new technologies and shapes the way for technology develops, but also technology has influenced how the society functions. The most prominent example is cybercrime. It is relatively new entity that was created as a result of new information technologies. Boehlke and Wiśniewski (2016, p. 60) have presented individual and institutional aspects that made cybercrime as profitable and widespread as it is. That includes increasing data value, different approach to ownership on the Internet and popularization of online banking.

The fourth industrial revolution has even more severe consequences for all aspects of life. Burgess and Connell (2020) quotes Schwab to highlight the ability of new technologies to change "…production, consumption, employment, industry structure and living standards." Past experiences with industrial revolutions from steam power to information technology always resulted in improvements on all these fields. New industries replace old ones and new types of jobs are created when others are becoming obsolete. Many low-skilled workers in industry are losing their jobs because of this process.

There is also some distrust to technological impact on economy. Both Keynes as well as Lentief have predicted that labor will become less and less important (Acemoglu and Resrepo, 2019). Previous industrial revolutions does not resulted in such scenario. Robotization has renewed these concerns for workers in both developing as well as developed countries. For developed countries it means that their work will become substituted with robots. In developing countries, on the other hand, there is danger of reshore. That means that developed countries will produce goods domestically using machines. In theory this should bring back to developed countries some of the jobs what was offshored before. In reality this means that unskilled workers will be exchanged for machines that will be operated by highly-skilled employees. In these terms the technological innovation will cost jobs, both in developed as well as developing countries. Robots have potential to fuel reshoring (Faber, 2020).

Industry 4.0 is defined by things it influences, that include changes in traditional models of production, trade and integration, as well as change in dynamics and configuration of work (Beliz et al., 2019). In theory, it should results in self-optimization and self-development. Computers would not be operated but communicated with. This deeply suggesting that changes will be most severe in industry sectors. Rifkin (2015) has hoped that positive results will include almost zero transactional costs, increased productivity and reorganization of society.

This opinions may be disputed, but in the end, it does not matter for currently employed in industry. What seems to matter is how this new structure of the market impacts their jobs and life. In the macroeconomic scale technological progress is definitely welcomed and positive. On the individual level this is not as easy to state. Did employee of industry sectors have a reason to be afraid of being replaced by machines?

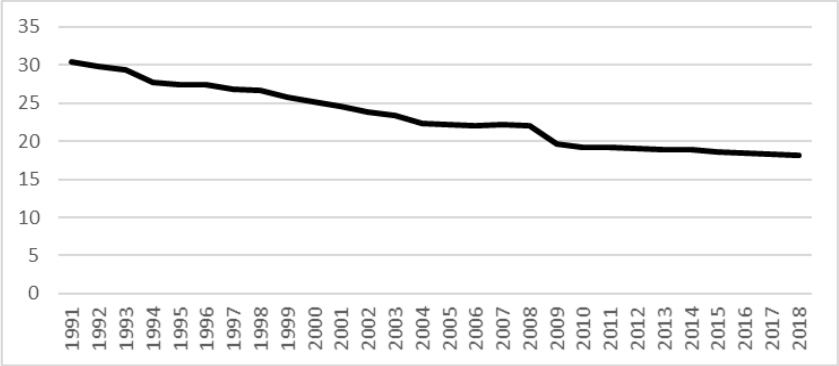

Fig. 2: Employment in Industry between 1991 and 2018 in United kingdom.

Source: World Bank

Figure 2. has presented the employment in industry, which has been constantly decreasing since 1991. Du and Wei (2020) have presented two stands of research. The first one considers the aggregate impact of technological change on employment. The second one examines the impact of technological change on the skills and employment structure (Burgess and Connell, 2020). This research focuses on aggregate impact of this change.

Vector Autoregression Model

Figure 2. has presented the employment in industry, which has been constantly decreasing since 1991. Of course, raw data is not enough to draw any conclusions. This is the reason why in this article Vector Autoregression model will be use.

Vector Autoregression model (VAR) are based on these rules (Osińska, 2007 p.367):

- there is no a priory difference between endogenous and exogenous variables,
- there are no limitation as to variables value, including assumption that some variables are equal to 0,
- there is no prior economic theory that model is built on.

Basic model VAR:

$$Z_t = \sum_{i=t}^{q} A_i Z_{t-i} + \varepsilon_i$$

Where:
Z_t- vector of current values of variables Nx1
A_i-matrix of autoregressive operators of processes.
ε_i- vector of errors.
In the presented model, four variables were chosen. Patent applications are named in model simply as 'Patents'. Employment in industry (% of total employment) (modeled ILO estimate) is presented in model as 'Industry'. GDP per capita, PPP (current international $) is named 'GDPpc'. Employment in services (% of total employment) (modeled ILO estimate) is presented simply as 'Services'. World Bank data was used in model.
The first phase of building VAR model is to choose a lag.

In the VAR system, the maximum lag order is 3.

The asterisks below indicate the best (that is, minimized) values of the respective information criteria, AIC = Akaike criterion, BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion.

Table 1: Choosing time lag based on information criteria

Lags	loglik	p(LR)	AIC	BIC	HQC
1	-363.01120		30.640896	31.615996*	30.911347
2	-343.03268	0.00079	30.322614*	32.077795	30.809427*
3	-334.21528	0.34571	30.897222	33.432484	31.600396

In this case I have chosen the lag based on Schwarz Bayesian criterion.

VAR system, lag order 1. OLS estimates, observations 1992-2018 (T = 27). Log-likelihood = -392.73908

Determinant of covariance matrix = 50641173. AIC = 30.5733, BIC = 31.5331, HQC = 30.8587 Portmanteau test: LB(6) = 105.638, df = 80 [0.0290]

Table 2: Patents applications ('Patents'), first equation

	coefficient	std. error	t-ratio	p-value
Const	−34420.1	166041	−0.2073	0.8377
Patents_1	0.861162	0.137316	6.271	2.60e-06 ***
Industry_1	365.879	1812.53	0.2019	0.8419
GDPpc_1	−0.0903065	0.0838245	−1.077	0.2930
Services_1	410.821	1686.08	0.2437	0.8098

Equation 1 can be described by values below:

- Mean dependent var = 17472.41
- Sum squared resid= 10794686
- R-squared= 0.936333
- rho= 0.478630
- Standard Deviation of dependent var= 2553.641
- Standard error of regression= 700.4767
- Adjusted R-squared= 0.924757

Table 3: Employment in Industry (Industry), second equation

	coefficient	std. error	t-ratio	p-value
const	422.431	87.3198	4.838	7.81e-05 ***
Patents_1	0.000204495	7.22135e-05	2.832	0.0097 ***
Industry_1	−3.71652	0.953197	−3.899	0.0008 ***
GDPpc_1	−1.47944e-06	4.40828e-05	−0.03356	0.9735
Services_1	−4.20847	0.886698	−4.746	9.76e-05 ***

Equation 2 can be described by values below:

- Mean dependent var = 22.86774

- Sum squared resid= 2.985420
- R-squared= 0.991996
- rho= −0.134798
- Standard Deviation of dependent var= 3.787616
- Standard error of regression= 0.368376
- Adjusted R-squared= 0.990541

Equation 3: GDP per capita (GDPpc), third equation

	coefficient	std. error	t-ratio	p-value
const	456607	132875	3.436	0.0024 ***
Patents_1	0.357744	0.109888	3.256	0.0036 ***
Industry_1	−5133.23	1450.48	−3.539	0.0018 ***
GDPpc_1	1.00160	0.0670809	14.93	5.39e-013 ***
Services_1	−4550.37	1349.29	−3.372	0.0027 ***

Equation 3 can be described by values below:

- Mean dependent var = 31914.93
- Sum squared resid= 6912989
- R-squared= 0.996577
- rho= −0.328127
- Standard Deviation of dependent var= 8813.458
- Standard error of regression= 560.5593
- Adjusted R-squared= 0.995955

Table 5: Employment in Services ('Services'), forth equation

	coefficient	std. error	t-ratio	p-value
const	−363.996	93.3642	−3.899	0.0008 ***
Patents_1	−0.000160456	7.72122e-05	−2.078	0.0496 **
Industry_1	4.09930	1.01918	4.022	0.0006 ***
GDPpc_1	2.69672e-05	4.71342e-05	0.5721	0.5730
Services_1	4.60253	0.948076	4.855	7.50e-05 ***

Equation 4 can be described by values below:

- Mean dependent var = 75.69093
- Sum squared resid= 3.413032
- R-squared= 0.992252
- rho= −0.176457
- Standard Deviation of dependent var= 4.116128
- Standard error of regression= 0.393875
- Adjusted R-squared= 0.990843

Autocorrelation of random process does not occur. There is no reason to reject null hypothesis of ARCH effect test at significance level of 5%. Result of Doornik-Hansen test is Chi-square(8) = 15.1726 [0.0559]. There is no reason to reject null hypothesis of this test at significance level of 5%. Presented model is good quality: there is no ARCH effect, residuals are normally distributed and there is no autocorrelation.

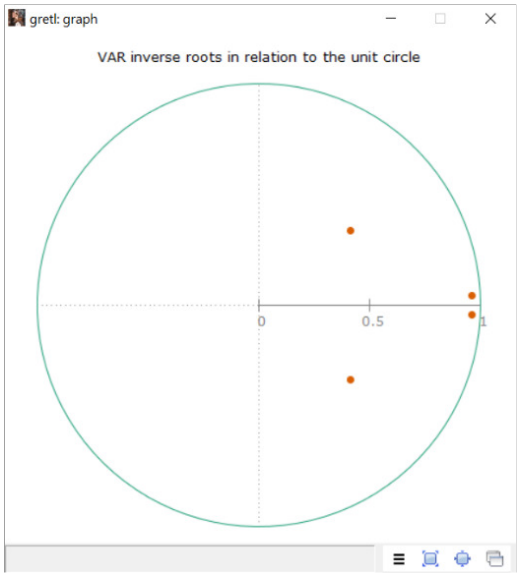

Fig. 3: VAR inverse roots in relation to the unit circle

VAR inverse roots are lower than 1. This means that process is stationary.

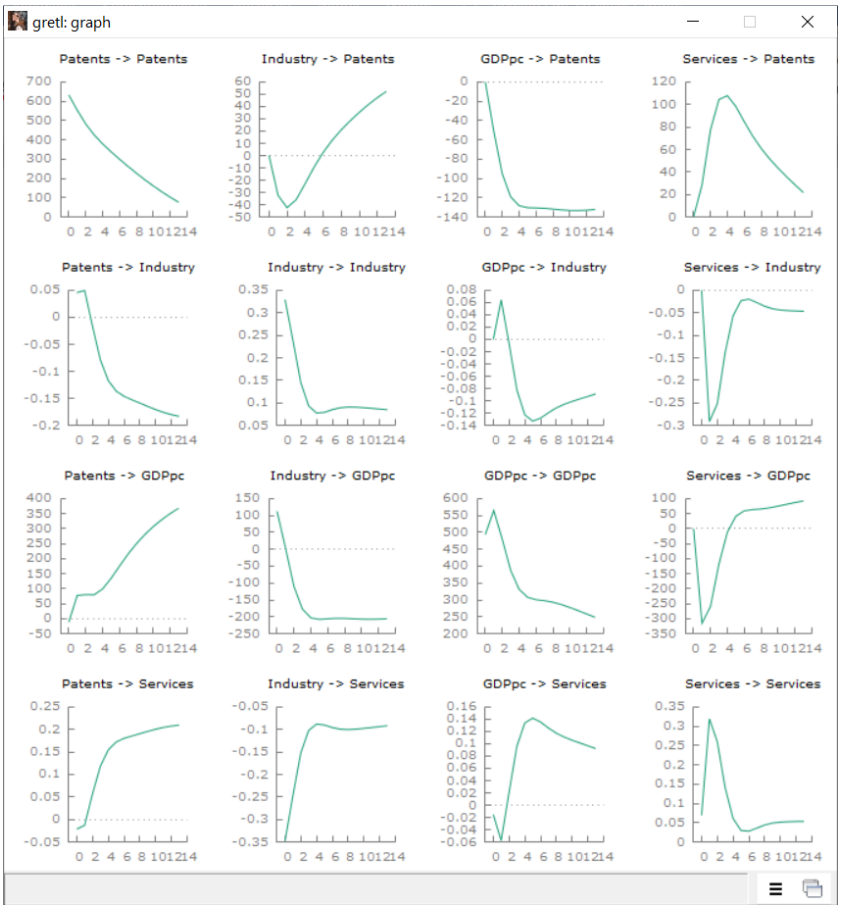

Fig. 4: Combined graph of impulse response

One standard deviation shot to employment in industry causes at first significant decrease in patent applications in the first 2 periods, but then it causes a significant increase that, in presented timeframe, not dissipates.

One standard deviation shot to GDP per capita causes at first significant decrease in patent applications that not dissipates in presented timeframe.

One standard deviation shot to employment in services causes at first significant increase in patent applications in the first 6 periods after which the effect dissipates.

One standard deviation shot to patent applications causes significant decrease in employment in industry in next 4 periods. After that, effect seems to start to dissipate.

One standard deviation shot to patent applications causes significant decrease in employment in industry in next 4 periods. After that, effect seems starting to dissipate

One standard deviation shot to employment in services causes at first significant decrease in employment in industry in the first period, after which the effect dissipates.

One standard deviation shot to patent applications causes significant increase in GDP per capita. Effect does not dissipate in presented timeframe.

One standard deviation shot to employment in industry causes at first significant increase in GDP per capita, but after first period it causes permanent decrease.

One standard deviation shot to employment in services causes at first significant decrease in GDP per capita in the first period, after which it has permanently increased.

One standard deviation shot to patent applications causes a significant, permanent increase in employment in services.

One standard deviation shot to employment in industry causes a significant decrease to employment in services. Effect is not dissipated in presented timeframe.

One standard deviation shot to employment in industry causes a significant decrease to employment in services in the first period, after which it causes permanent increase.

Number of patents applications, GDP per capita and employment in services have negative influence on employment in industry. At the same time, employment in industry has positive influence on number of patent applications and does not have permanent effect on employment in services. It has negative influence on GDP per capita. Why is that? It is easy to imagine that the more developed economy of United Kingdom is, the more processes are automated. More efficient industry sectors have more resources for research and development which results in more processes being automated. This explains both positive impact to number of patents applications as well as negative feedback in reverse. Increasing number of employees, for example, in a factory, it creates strong incentive to create technology; to cut cost and automate processes. The negative impact of employment in industry on GDP per capita may be explained by changing structure of developed countries. Industry is most prominent in developing part of the world. Developed countries are usually driven by high-technology and services.

This research confirms conclusions of Acemoglu and Restrepo (2020) work. In their research, they have found that one new robot reduces employment by six workers in United States. They also quoted Graetz and Michaels (2018) research that has stated that "… industrial robots increase productivity and wages, but reduce the employment of low-skill workers."

Conclusion

The problematic nature of employment in industry in relation to automation requires complex analysis and explanation. It is true that automation and Industry 4.0 will surely be the reason for further decrease in employment in industry. This process seems to be inevitable. People are more expensive than machines. Besides that, work in industry is usually not as safe as in other branches of economy. Trying to save jobs in industry would mean that welfare of whole country would be decreased (as presented industry has negative impact on GDP per capita). What to do with people who inevitably lose their jobs? This is beyond this research. True is that all developing and developed countries will face this problem. All of them need to find their own way to deal with it. Trying to forcefully keep employment in industry seems to be one of the worst solution for the economic system of the country as a whole.

Future Directions of Research

This research presents aggregated look on technological impact on employment in industry. Some aspects of reshoring were presented by not empirically confirmed. Next step of research should be either focused on reshoring and challenges for labor in developing countries or focusing on options for unskilled workers after fourth industrial revolution. Both options have their own set of challenges and difficulties. In terms of reshore, there is a question about scale of this process. How many industries can be automated and move back to developed countries? As well as how fast this will be possible? If only fraction of industries may be fully automated, then problem of reshore is less severe and developing countries will need to simply refocus on different industries. In case of automation in almost all types of industries, economies of whole countries may collapse. On the other hand, problem with unskilled workers after fourth industrial revolution is that it did not happened yet, or at least it is in early stage. Almost all aspects of fourth industrial revolution are speculative and it is hard to predict how they influence other aspects of economy. Both these research paths are viable and worth exploring.

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Economic Assessment of The Efficiency of Organic Crop Production in The South Ural's Regions in Russia

Nikolai D. ZAVODCHIKOV
Orenburg State Agrarian University, Orenburg, Russian Federation,
znd-nik@mail.ru

Tatiana N. LARINA
Orenburg State Agrarian University, Orenburg, Russian Federation
lartn.oren@mail.ru

Dmitriy A. SIUSIURA
Orenburg State Agrarian University, Orenburg, Russian Federation
syusyura_d@mail.ru

Abstract

The production of organic crop products is a profitable direction for the development of agriculture in Russia. Most of the agricultural land in Russia is not contaminated with chemicals. Many vast territories are located in ecologically clean areas. Reasons that hinder the development of organic agriculture are the following: lack of targeted governmental financial support, farmers' lack of awareness about the difference between certified organic products and non-certified products et cetera. The authors of the article analyzed data from the National Organic Union of Russia, FiBL, IFOAM on the level of development of organic production in Russia and other countries. A more detailed analysis was carried out according to the Rosstat data in the context of the regions of the South Ural. Taking the present conditions of the Orenburg region and utilizing an optimization model, the authors substantiated the structure of production costs and assessed the economic efficiency of the production of winter and spring wheat with the usage of the traditional technology and of the methods associated with organic technology.

Keywords: Organic Products, Crop Production, Assessment, Economic Efficiency.

Introduction

The global market of organic products is currently in a state of dynamic development. The criteria for the identification of organic products were, for the first time, formulated internationally in 2006: «Organic food is to be processed by biological, mechanical and physical methods in a way that maintains the vital quality of each ingredient, the finished product, and nutritional value…» (Glossary on organic Agriculture 2009). During the period from 2000 to 2018, the global market of organic products grew from about 18 billion euros to about 97 billion euros. According to expert calculations, the market volume may reach $ 212-230 billion by 2025, which equals to about 3-5% of the global agricultural market (FiBL & IFOAM 2020). Organic products have to be certified, just like the farms (plots of lands) where such organic products are produced. As of the end of 2018, about 72 million hectares were certified globally, which, however, means, that in the world as a whole, no more than 1 per cent of land has been certified. As expected, the scale of the development of organic agriculture is different in different countries. For example, while more than 10% of agricultural land is certified in the EU, only about 0,1% of such land is certified in Russia. The statistics show that in the period from 2017 to 2019, the market of organic products grew by 8 to 10 per cent every year. At the beginning of the century, all of Russia's organic products were imported. By 2019, however, as much as 20% of all organic products sold on the Russian domestic market were produced in Russia (Organic market in Russia in 2020).

According to the Organic Union of Russia, 23% of organic products on the market produced in Russian consist of cereals, grain, bakery products (Fig. 1). A significant part of these products is intended for export. Particularly speaking, more than 60 thousand hectares of arable land have been certified in Russia for growing grain, oilseeds and, forage crops for export. The main exported crops are wheat, barley, oats, buckwheat, flax, peas, rapeseed, rye, triticale, soybeans, and broad beans. These products are currently sent to the countries of Western and Eastern Europe (Organic market in Russia in 2020).

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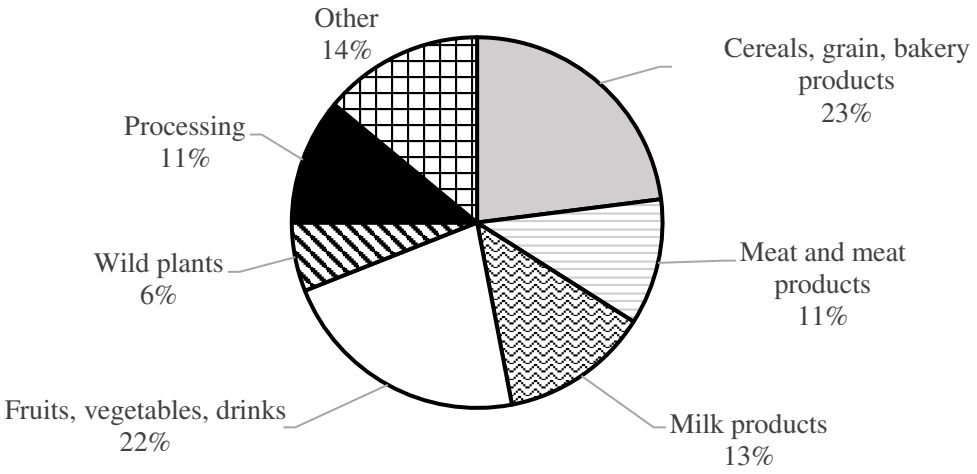

Fig. 1: The structure of Russia's organic producers by product type

Source: Organic market in Russia in 2020, National Organic Union of Russia [Online], [Retrieved August 20, 2020], http://rosorganic.ru/files/Analiz%20organic%20RF%202020%20г.pdf.

The development of organic production is hindered by the lack of state investment. Russian farmers are in a situation where they have to take all the risks associated with the production of organic products and rely only on their own resources. Practically speaking, there are only private investments in this area of agriculture. At the same time, a significant number of farmers who produce organic products in the EU receive direct and indirect governmental support. For example, the year 2020 is marked by a plan to allocate 200.9 million euros exclusively for the purpose of promoting European organic products to enter the markets (Organic farming). To be completely fair, it is necessary to note that the European approach is not based on market mechanisms, and the mechanism of organic farming promotion is based upon the top-down structures which don't always benefit local farmers. At the same time, organic production in a number of countries is exclusively export-oriented. (Stoeva S. 2016). Russian farmers are mostly focused specifically on organizing the production of environmentally friendly products to meet the domestic demand in large cities and of the international market. According to scientists, the introduction of innovative technologies related to environmental protection and resource conservation will be a deciding factor that will increase the public interest in the production and consumption of organic products (Ermilova M., Maksimova T. ets. 2019).

Reviewing the legal situation in this field in Russia, we can see that in 2018, a new law was published which came into force on the 1st January of 2020, named Federal Law N280-FZ "On organic products and on amendments to certain legislative acts of the Russian Federation" (Федеральный закон N280-ФЗ «Об органической продукции и о внесении изменений в отдельные законодательные акты Российской Федерации»). We should also note that state standards which determine the procedure for the production of organic products in Russia and the countries of the Eurasian Economic Union (a straightforward example would be GOST 33980-2016) came into force even earlier. It is also important to add that the year 2019 was marked by the state approval of the symbols of organic products and of the regulated procedure for their certification. The public interest on the part of agricultural producers is growing in this direction, although the mass introduction of this technology into practice has not yet been observed in the Russian Federation. In some of Russia's regions, such as the Republic of Bashkortostan, the Republic of Tatarstan, Belgorod Oblast, Voronezh Oblast, Kaluga Oblast, Tomsk Oblast, Yaroslavl Oblast, and the Krasnodar Krai the production of organic products is present the most. In the next paragraphs, we will assess the conditions and the efficiency of organic crop farming in the regions of the South Ural.

Research Design and Methodology

The authors analyzed the state of grain production in three key regions of the Southern Ural for the period from 2016 to 2018, utilizing the data provided by Rosstat. The calculations for the Orenburg region were carried out in the most detailed manner. The aim of the study is to substantiate the structure of production costs for winter and spring wheat according to

two options (traditional technology, organic technology) and to assess the economic efficiency of wheat production without the use of mineral fertilizers and chemical plant protection products in the Orenburg region. Research methods used consisted of optimization modeling and of the structure analysis method, as well as the method of time series analysis.

Results

Three regions of Russia are located in the South Ural: the Republic of Bashkortostan, the Orenburg Oblast, and the Chelyabinsk oblast. These regions share a similar economic structure. Agricultural production, and, in particular, the production of grain, plays a significant role in the regional economy. 11% of all sown areas in Russia are concentrated in these regions. Also, the Orenburg oblast is in third place in the country in terms of sown area (after the Altai Krai and the Rostov Oblast). 4246.2 thousand hectares in the Orenburg region were covered crops in the year 2018. (see Table 1).

Table 1: The main indicators of the production of grain and leguminous crops in the regions of the South Ural (in farms of all categories)

Indicators	Republic of Bashkortostan			Orenburg region			Chelyabinsk region		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
The sown area of all crops, thousand ha	3069.3	3004.1	2952.8	4218.1	4225.2	4246.2	1858.6	1895.2	1918.0
Share of the area under grain, % of the total sown area	59.0	59.4	59.3	64.5	63.7	63.7	72.8	74.2	72.6
Weight of the gross harvest of grain after processing, thousand tons	3324.0	3782.7	3058.9	3138.6	4207.2	2033.6	1947.7	2307.3	1850.3
The yield of grain and leguminous crops after processing, quintal/ha	18.8	21.8	18.6	12.1	15.8	8.8	14.5	16.8	13.4
Mineral fertilizers introduced per hectare of crops in agricultural corporations (in terms of 100% active ingredients), kg	22.6	25.9	23.2	1.8	2.5	3.7	6.0	10.8	11.7

Source: Agriculture of Russia. 2019: Statistical Yearbook. / Rosstat. Moscow. 91 p. [Online], [Retrieved August 20, 2020], https://rosstat.gov.ru/folder/210/document/13226.

The structure of agricultural crops is dominated by cereals, of which wheat (winter and spring) are the most prominent ones. The climate in the regions leads to fluctuations in yields and gross grain harvests over time. 2017 was very favorable in terms of weather conditions, which made it possible to obtain a large grain harvest (4207.2 thousand tons, in the Orenburg region, with an average yield of 15.8 centners per hectare). One of the requirements for the production of organic products is the minimal use of mineral fertilizers and pesticides. For many years, only very small amounts of mineral fertilizers have been applied in the Orenburg region. The share of crops with mineral fertilizers applied in this region was only about 9.4% in 2018 (while in Russia as a whole it was about 61.1%). More than half of the farmland in

Russia is not treated with pesticides. In the Orenburg region, no more than 0.3 kg of pesticides are applied per hectare of crops. The noted circumstances make it possible to shorten the transition period and to begin certification of fields for organic matter in the shortest terms possible. Orenburg region has very favorable conditions for the production of organic products since the region has a large territory and the level of pollution of arable land with chemicals is low. Let us now consider the prospects for the development of organic crop production in the Orenburg region in more detail.

The Orenburg Oblast is located in the south-east of the Russian Federation, on the border with the Republic of Kazakhstan. The region itself is located in the dry steppe zone. Here, chernozem (black soil) and dark chestnut soil are the most widespread soils. The sharply continental climate of this area is characterized by its harsh winters and dry and hot summers. This means that a scientifically grounded farming is of great importance in this region, serving as the bases for a full realization use of the region's bioclimatic potential. As studies of Orenburg scientists show, a biologized agricultural system is indeed a preferred one for the region. Such a system involves carrying out snow retention procedures in winter, the use of crop rotations, usage of zoned varieties, a combination of crop and livestock production, etc. (Filippova, Petrova, Mikhina 2017). This is exactly the approach that is used in crop organic production.

The investments in agriculture in the Orenburg Oblast in 2018 amounted to 3,035.5 million rubles. (34.5 million euros). The value of agricultural products produced amounted to 107.9 billion rubles. (1.2 billion euros). Of this, 52% is the value of crop production, while 47% is animal husbandry. Large agricultural organizations produce 36% of crop production, while private farms produce 34%, and the region's population itself produces 30% (see Fig. 2). At the same time, agricultural corporations are the main grain producers.

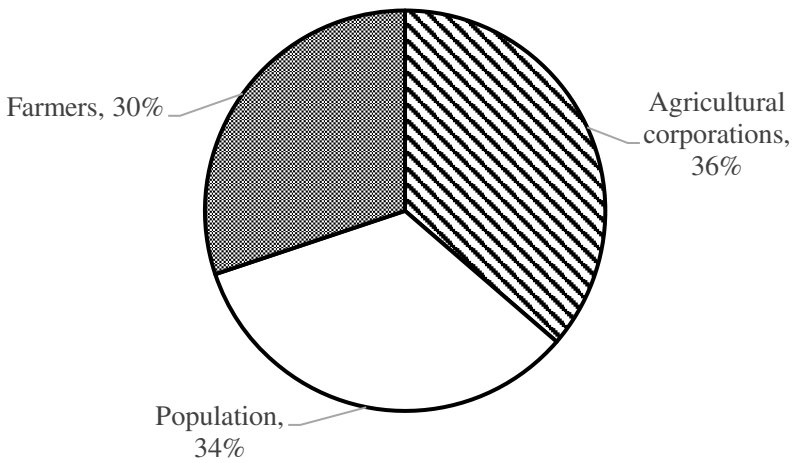

Fig. 2: The structure of crop production in the Orenburg region in 2018

Source: Agriculture, hunting and forestry of the Orenburg region. Statistical Yearbook 2019 / Orenburgstat. Orenburg, 2019. 149 p.

We have conducted optimization calculations in order to assess the economic efficiency of grain production using organic technology for agricultural corporations in the Orenburg region. We took profit before tax as the target function of the optimization model, while also taking into account the following limitations:

- Limitations of the usage of resources, taking into account the availability of resources, requirements for crop rotation, and the maximum size of industries;
- Limitations of the needs of fodder for farm animals, taking into account the number and the animals' productivity, guaranteeing the structure of the diet, its nutritional value, and the optimal number of fodder and protein units.
- Limitations of the amount of crop production produced;
- Limitations of the amount of crop production held for sale.

Two models were created. The first model reflects the structure of production costs for growing winter and spring wheat using traditional technology with the use of mineral fertilizers and chemical plant protection products. The second model reflects the structure of production costs without taking into consideration the costs of purchasing mineral fertilizers and plant protection chemicals. The calculations for the first model take into account the actual area covered by crops: winter

wheat – 234068 hectares and spring wheat – 557891 hectares (data from the Ministry of Agriculture, Trade, Food, and Processing Industry of the Orenburg Region for 2019). The second model was created upon the calculations in which 20% of arable land will be allocated for the cultivation of organic products: winter wheat – 46814 hectares and spring wheat – 111578 hectares. (The area calculated for the region as a whole). The size of the plots in each agricultural corporation will differ based on its capabilities and choices.

As a result of the calculation, we can see the structure of production costs (see Table 2).

Table 2: The structure of production costs for growing winter and spring wheat using traditional and organic technologies (for agricultural corporations in the Orenburg region)

Expenditures	Winter wheat		Spring wheat	
	Traditional technology	Organic technology	Traditional technology	Organic technology
Salary	13.7	15.9	16.5	18.1
Seeds	14.2	16.4	21.9	24.0
Mineral fertilizers	6.6	0.0	2.7	0.0
Organic fertilizers	0.2	0.3	0.1	0.2
Pesticides and other chemicals	7.0	0.0	6.1	0.0
Electricity	1.4	1.6	1.2	1.3
Fuel	19.1	22.1	19.2	21.1
Maintenance costs of fixed assets	12.1	14.0	10.7	11.8
Insurance	0.1	0.2	0.2	0.3
Other	25.6	29.5	21.3	23.3
Total	100.0	100.0	100.0	100.0

Source: Authors' calculations.

If the condition that agricultural corporations will sell at least 75% of the grain produced in the time period and the price of organic products will be at least 7% higher compared to similar but uncertified products, then, according to our calculations, the profitability of organic wheat production will be higher even without the use of mineral fertilizers and chemicals (see Fig. 3). The level of profitability is calculated as the ratio of profit before tax to the total cost of production and the products' sales.

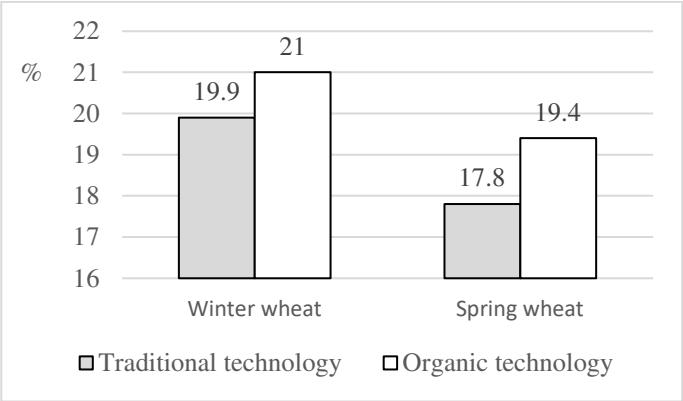

Fig. 3. The level of profitability of the production of winter and spring wheat using traditional and organic technologies, %

Source: Authors' calculations.

It is necessary to clarify that at the first stage of introducing organic technology without the use of fertilizers and plant protection chemicals, the yield of agricultural crops may decrease (on average, the yield is lower by 2 centners per hectare for winter wheat and 1 centner per hectare for spring wheat). This is probably the main obstacle to the introduction of technologies for the production of organic crops in Russian. Without due government support, these technologies can be implemented only either by large, financially stable corporations, or by those small manufacturers who are ready to take risks and have a guaranteed market for their more expensive products.

The size of the fields allocated for organic production in Russia varies from 2-3 hectares to 6000 hectares. The prices of organic products in the consumer market may differ from an uncertified counterpart by 20-30% (Organic market in Russia in 2020).

Conclusion

Thus, the regions of the South Ural of Russia can provide every opportunity for the introduction of organic agriculture. The main obstacles to this, in our opinion, are lack of targeted governmental financial support, high selling prices for organic products in the domestic market, and poor awareness of most farmers about how certified organic products differ from non-certified products. Another important problem is that the infrastructure for storing and selling organic products has not been formed. The main direction for the development of organic crop production for the Orenburg region can be the cultivation of grain crops, as well as fodder and industrial crops. It is important to add that at the initial stage of introducing organic crop production technology, with the complete exclusion of mineral fertilizers and chemical plant protection products, the economic efficiency of wheat production does not decrease due to an increase in the sales price of products.

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YouTube Immersion as A Content Marketing of Experiences

Michal OTROCKI
University of Lower Silesia, Wroclaw, Poland
michal.otrocki@dsw.edu.pl

Abstract

This article describes YouTube as an immersive medium on a level not as much of interface operation as of communication practices driving attention engagement with the content as the main source of experiences. The operation of the service will be analysed with regard to both the interface along with the algorithm behind it, and user practices. This new approach — as compared to existing studies — is based on the proposition that immersion mechanisms be analysed through the lens of marketing pragmatics (content, organic and experimental marketing). Relying on critical reflection from the fields of media and cultural studies, one can identify certain technical and social factors to immersion — sensory activity but also engagement and absorption as a sort of game with the content. The predominant strategy for content dissemination, however, is to generate organic traffic. Content is understood here as an exchange medium for which the user's attention is an equivalent, while content experience should strive to build lasting relationships with the channel-brand and the latter's community.
Despite the great potential for the building of engaged communities, one can still note some negative consequences of building communication communities on the basis of the logic of market exchange — immersion can lead to the construction of a closed, inward-looking social-value system.

Keywords: Immersion, Content Marketing, Marketing of Experiences.

Introduction

The main goal of this article is to substantiate the claim that YouTube is an immersive environment. That is so not through the delivery of sensory experience, however, as much as through the implementation of attention economics proper to content marketing — for content is the base medium of the exchange.

This article joins the category of immersion developed in marketing to the perspective of media and cultural studies. The chosen method is critical analysis of literature — mainly concerning the concept of marketing of experiences, VR, and immersion in new media.

The operation of the service will be analysed on the level of both the interface and user practices. In the broader perspective one also has to ask about potential negative consequences of building communication communities on the basis of the logic of market exchange.

YouTube, one of the largest social media, is nowadays part of the mainstream (Burges and Green, 2007). According to the portal's own data used in advertising, in 2020 YouTube has more than two billion regular users, every minute 400 hours of unique video material is published, and the total daily video play time exceeds one billion hours. Additionally, YouTube is the world's second-most frequently used content-search engine after Google. This is because, unlike other large-scale social media, it continues to be more of a huge content repository than a messenger service. Its user engagement is predicated mainly on the availability of the various contents, including a gargantuan collection of knowledge in diverse fields. In spite of whatever exceptions one could take to the quality of information on the Internet, one has to grant that the Web — including YouTube — currently serves as the primary source of knowledge for the self-educating prosumer society.

By design, YouTube is an open and free service (bar YouTube Premium — ads are not displayed for paid subscribers, unlike in the free version; the portal shares the subscription proceeds with the participants of its Partner Programme), both for channel operators and for the user audience. It cannot escape notice that the portal — itself being a commercial enterprise and providing a platform for business operations for practically everyone —

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currently relies on a mechanic tightly linked with marketing communication. As an advertising platform it allows publishers to profit from monetizing their videos, whether directly, rewarding the number of impressions of third-party ads while playing the video (YouTube enables profit to be made on video, graphical or textual ads displayed to the audience while watching videos on the basis of the users' interests and browsing histories), and indirectly, by constituting a medium for marketing activities of one's own. One can assume the majority of the users to be aware of this aspect and eager to participate in it. The results may include the adoption of activity patterns subordinated to the logic of content exchange along with the associated rewards even where the commercial aspect is not the main reason for using the portal.

Content — Experiencing — Immersion

The understanding of content as an exchange medium inscribed in a pragmatic communication model will be of key significance to our discussion.

This perspective could appear less than self-evident from the perspective of media and social-communication studies. Marketing, in being more practice than theory, is a field that still continues to supply cultural reflection more often with subjects than tools. As a practical discipline it formulates its theory in a doctrinal way and, sometimes irritatingly, in the form of recommendations. Although sometimes it merely assigns different names to phenomena already having their explanations in other fields of knowledge, it does so in a pragmatic spirit, for it reduces its claims in practice according to measurable criteria and indicators (e.g. conversion rates).

Traditionally understood marketing can be focused on sales goals, but a perspective based on participatory-culture patterns is gaining popularity; the overarching goal starts to be the creation of a positive image for the brand and stimulation of community activity focused around it. Long-term recipient relationships are the cornerstone here, not messages as unilateral actions.

This approach is the result of the evolution of a certain holistic concept (self-definition) of marketing as a discipline. When describing the changes in the perception of marketing-communication functions and contents in the successive 'eras' (versions) of marketing, one can draw upon the classic perspective of Philip Kotler (Kotler, Kartajaya and Setiawan, 2010, 2016):

1.0: Starting from the Industrial Revolution the focus had been on the product, with the message content mostly being the technical and functional description, and the customer simply a buyer making a rational decision.

2.0: Along with growing competition and access to information, customers began to be regarded as individuals making a choice. Messages were, therefore, reorientated on the consumer and the consumer's emotive sphere; the content was addressed to a specific target group according to the diagnosis of the problems and needs of its members.

3.0: Orientation on the customer, the customer's needs and values becomes in turn founded in the brand's mission and values. The company's goal is to improve the world and face up to social problems demanding to be solved. The company establishes a stronger connection with its customers thanks to identical values — with the values being responsible for the majority of communication content. The intention is for such activities to solidify companies market position in reliance on the social engagement around which they design their products and services. Charitable donations or a pro-ecological stance could serve as an example.

4.0: In terms of orientation, this approach should lead to a focus on building an engaged (digital) community around the brand. Communication is based on creating and publishing attractive contents, useful and interesting to a specific group of people for whom consumption is a motive to initiate discussion. In this way one enables the customers to participate in the refinement of existing services or products, or creation of new ones.

Let us note that in this area the evolution of content-based communication proceeds by the gradual deepening of the relationship through four spheres of impact (persuasion) — rationality (*logos*), emotion (*pathos*), values (*ethos*) and commitment to action (*kairos*).

The marketing founded on this perspective is an extraordinarily expansive practice nowadays, mainly thanks to its adaptability. It remains an important element of a strategy that enables brands to endure and improve recognition in the face of constantly changing trends and intensive evolution of technical solutions.

Here, one could distinguish three complementary perspectives-practices — content marketing, organic marketing and experimental marketing.

Content marketing provides a relatively simple explanation for the functional aspects of communication focused on content creation and management. According to an industry-popular definition, it is simply delivering the contents the audience seeks (Mandour, 2014). According to Joe Pulizzi (2020), founder of Content Marketing Institute: 'Content marketing is the marketing and business process for creating and distributing relevant and valuable content to attract, acquire, and engage a clearly defined and understood target audience – with the objective of driving profitable customer action.'

Organic marketing, in turn, focuses on techniques for stimulating and moderating interest. Organic traffic linked to certain content is often erroneously referred to as 'natural' and 'spontaneous'. Being the object of organic-marketing operations, after all, it can be neither completely natural nor spontaneous — to look no further, it is stimulated, for example, by appropriate content curation and positioning (SEO). The creators of organic marketing speak, on the one hand, about 'natural' interest, and on the other hand they claim it as their own personal merit; this, in a way, testifies to the inherent pragmatism of this discipline: 'we don't exactly know how it works, but it does work, so it's true to practice.'

The sphere of commitment to action is explored to the greatest depth by experiential marketing, which focuses on creating relationships with customers on the basis of their subjecthood and realistic, direct experiences. It is in this context that one speaks predominately of immersion as the most desired and effective — 'embodied' — experience abolishing the distance between the consumer and the relevant situation (Carù and Cova, 2007).

Sensory Immersion as An Aggregate of Content and Attention

In YouTube, as in any audio-visual medium, immersion occurs first and foremost through sensory impression, via image and sound. However, it would be at the very least a dubious claim to assert that YouTube is an immersive platform for virtual reality only on this particular level; the screen interface would be problematic, to look no further. One has to bear in mind that, according to the classic concepts of Michael Heim (1993) and Oliver Grau (2003), immersion continues to be described as multisensory immersion in an artificial virtual reality (VR), breaking off contact with the natural world, from which it follows that the screen as such leaves the spectator on the outside, preventing the sensory impact ('overwhelming') of virtual reality (Koszela, Kukiełka and Wantoch-Rekowski, 2016).

Other than the portal's — rather futile — attempts made since 2015 to popularize the 360 video technology (Smith, 2015), we are mostly dealing with a dynamic windowed screen wherein virtual reality is created by the fragmentized field of view (Manovich, 2001). This field-interface's dynamics constitute the space of immersion occurring in a different way from sensory illusion. As a psycho-social ('psycho-cultural') phenomenon, immersion can consist in: 'absorbing the consciousness of a spectator fascinated without limit with the message perceived (Pietrzak, 2016). The scope of immersion in this meaning can be broad, encompassing diverse and gradable forms of relationship with the presented world — the mediated presence itself, the process of engagement, the act of faith, the experiencing, and identification/projection or living out. Users entering the virtual world do so with a certain dose of trust, which makes them want to abide in such a reality (Prajzner, 2010).

Let us invoke O. Grau's intuition here (2003, p. 345) — 'perhaps the single most important factor is the possibility to access and exchange images via global data networks.' One can, therefore, conclude that immersion could also be found in mass-scale long-term participation in a network, manifesting itself in activities 'of often a very personal nature, contributing to the creation of an everyday [life] in the digital environment,' such as in social media (Ostrowicki, 2007; 2013, p. 13). Here, consciously participating in YouTube's specific *realis* would establish immersion of a depth depending on the quality and type of the interface; should one, therefore, grade immersion only on a scale from navigating an interface to experiencing the cyberspace, YouTube would be a technologically 'shallow' environment (Ostrowicki, 2006).

While discussing the mechanics of YouTube's operation, however, one has to consider not so much the interface (its multi-screen nature, audiovisuality and interactivity) as the non-transparent algorithms controlling it and with it any activity in the service. Inferences about their actual operation can be drawn only indirectly, by observing data and trends and remembering about YouTube's integration with other Google services (most importantly AdSense, a Google ad-distribution service enabling account monetization under the Partner Programme). Examples of immersion in YouTube can be observed with relative precision via its Analytics module, which provides insight

into summary data on related content use, mainly as a function of time and various forms of activity registered by the interface. The average single user session extends to 40 minutes play time of materials available on the platform. Though the analytical module does not provide insight into individual behaviours of individual users, there is still enough ground on which to assume personal conscious participation as the basis of activity. This is provided that the depth of immersion is even more dependent on attention economics than on the delivery of sensory experience.

The phenomenon of the immersion occurring in the YouTube environment can be described as a function of content and attention — for these two are the resources being exchanged on that medium. Creators and distributors provide contents, and spectators provide attention. Both share their experiences. Content engages attention, attention follows content toward desired sensations-experiences — and this particular phenomenon is the catalyst of the YouTube environment's immersion, of which organic traffic is the most desirable result and predominant distribution strategy in the service (this means content spread achieved without paid forms of promotion and either reaching potentially interested recipients or being found by them themselves via search engine). Organic marketing, therefore, is tightly linked to content, for the attractive content of a video is what enables organic publishing and reception, which is conducive to building experience and, in effect, an engagement-filled relationship with the brand.

Immersion as A Game — Engagement and Absorption

Immersion-deepening activities in YouTube could be described by analogy to reflection on video games (McMahan, 2010). There are three conditions for immersion to happen. Firstly, the topic must be compatible with the spectator's expectations. Secondly, the activities must significantly affect the digital environment — for example by debate-sparking comments, positive or negative ratings, flagging clips as harmful to the community. Thirdly, the relevant creation-environment must follow a consistent convention (a YouTube channel's audience will not be returning upon finding that the creator is neither trustworthy nor consistent).

Two dimensions can be distinguished — engagement and absorption (Brown and Cairns, 2004). Engagement, in a way, constitutes an entry level — just as a gamer must invest time and break the competence barrier in order to understand the rules of the game, the spectator must learn the specificity of the relevant YouTube channel's operation by watching a greater number of videos published therein. While in the case of games we can speak of an intuitive interface and ergonomic controls facilitating this, for YouTube that could be 'nice' audio-visual presentation (appropriate quality of sound, and legible audio layer) but above all interestingly, attractively delivered content.

Here, it is worth noting that care to the quality of the content influences its dissemination by the service and enables the chosen — and at once as numerous as possible — audience to be reached (Gonciarz, 2013). The most important element drawing the attention of a YouTube surfer, for example at the stage of choosing among the many clips featured by the portal on its main page, is the thumbnail or 'cover'. Among the main indicators Analytics names the number of impressions and the clickability of the thumbnails (the ration of thumbnail impressions to the number of times the video is played). The service provides a number of recommendations on how to improve thumbnail effectiveness, from title selection to graphical composition (YouTube, 2020). The recommendations use the marketing aspect as the main motivation for quality — 'Craft advertiser-friendly thumbnails and titles to help your monetization'. The appropriate title and description are elements of textual marketing and at the same time immersive action engaging the spectator's attention. Fitting and catchy titles and precise descriptions shedding light on the video's topic allow it to distinguish itself against the many alternatives and obtain better positioning in the search engine. Only appropriate (accurate) coupling of the title and content of a video improve the probability of immersion. A badly chosen or misleading title can create disappointment in visitors who were looking for something else.

The aforementioned entry barrier can result from the creator's chosen range of topics — those must catch the spectator's interest and hold the spectator's attention. The spectator can satisfy the need for entertainment and gain the benefits of watching the video, for example by learning useful information. Although options for holding spectator's attention are limited at this stage of immersion, overcoming the initial difficulties can reinforce emotional attachment, positive reception and willingness to continue to invest time in accessing the content.

In a virtual game absorption — the second degree of immersion — refers to plot consistency and cohesion of the presented world, while for YouTube materials it will be driven by subject, genre or narration consistency (e.g. in a history delivered by a serious of videos). At the stage of immersive absorption such factors as empathizing with the atmosphere of the perceived world and with the characters appearing in it increase the chance of successful

immersion, as the spectator becomes increasingly able to identify with the presented world. The claim that virtual sensory impressions are not the success driver could find support in the fact that a lot of materials are amateur-produced, with the quality of the sound and image leaving much to be desired, and yet they boast great popularity — the content is much more important to the audience than the audio-visual layer.

It is worth highlighting the absorption of attention focused on practical information-knowledge connected with action. One particular form of it can be the cognitive impact of the plot (content) — satisfaction of the need for the acquisition of certain competences such as problem solving or honing practical skills (Ermi and Mayra, 2005). The video form enables precise instruction (e.g. in correct exercise or cooking techniques), is more economic and more effective than textual descriptions (Garret, 2015). This is reflected by the popularity of vlogs containing tests, reviews, advice and tutorials but also specialized education materials and overviews — e.g. professional documentation of a multitude of medical procedures medical trainees and practitioners can use. The University of Iowa Hospitals and Clinics' Department of Surgery has conducted a survey showing 90% of people to prepare for their surgery by watching videos, with 86% doing so with YouTube (Rapp et al., 2016).

Emphasis is laid in this context on providing the audience with their desired experience in the form of the information they seek, for example how to solve a specific problem, without being intrusive (unlike an ad message, which usually discourages its viewers, preventing immersion). One person who willingly makes the informed choice to subscribe to the brand's blog, profile or YouTube channel — thus one who decides to stay in touch — is more precious than 100 leads generated using traditional methods of advertising (Dobaj et al., 2014).

Besides the delivery of information, narrative creations originating with a thought to the modern recipient engage that recipient primarily on the emotional and not the intellectual level — they are, therefore, conduits for experience building. Immersion could be regarded as engagement orientated on a product or topic but at the same time also living through something not in the nature of consumption — for example entertainment could be the goal.

The absorption process drives strong emotional attachment to characters (e.g. vloggers), translating into willingness to continue watching an ever increasing number of video materials relating to the person or brand. A similar phenomenon can be observed in users of popular Internet video platforms providing VOD services, where immersion takes the form of so-called binge-watching, that is the compulsive watching of a series (Jurgensen, 2012). Binge-watching is the result of an adaptive chemical reaction in the human brain (Doidge, 2007). Watching a history that is shown on a screen and interesting to the viewer generates a certain type of sensory-ideatory trance — in identifying with the characters and following the plot the spectator feels strong emotions. The desire to sustain such states triggers watching more episodes. Attempts to encapsulate this phenomenon have not so far resulted in identifying the minimum number of episodes watched or time spent watching — one can, however, recall the Netflix study in which as many as 73% of respondents-platform users claimed to watch anywhere from two to six episodes in a row, with as many as 61% admitting to uninterrupted watching in such a session.

In YouTube's case, binge-watching traces its source also to the effective algorithms embedded in interface functionality. This includes recommendations of videos for watching (the main page, 'recommended for you', 'see also', pop-up notifications of new videos on channels), playlists generated by the portal on the basis of similar contents (after a video ends, another, similar one is played in order to hold the viewer's attention) or enabling the viewer to interact with the digital environment (e.g. conversations in the comments section).

A similar role falls to the driving of recipient engagement by the video creators themselves — direct communication with audience members and creation of emotionally engaging content cause the immersion probability to grow (Witmer and Singer, 1998). Activities potentially influencing this dimension of immersion could include, among others, standard repeatable formulaic greetings; requests for subscriptions, 'likes' and comments; asking questions or for asking for the audience's topic suggestions. The greater the number of such activities undertaken by engaged users, the greater the increase of the video's potential impact; this translates not only into measurable monetization benefits but also into future audience absorption (YouTube Creators, 2017). Crowdsourcing understood as a design process involving the community certainly is one such immersive mechanic (Kasprzycki-Rosikoń and Piątkowski, 2013). Creators enable the viewer community to participate in the creation process, for example by asking — in the video — for comments with ideas for new materials; for example, the strangest questions asked in comments under the previous episode could be used as a basis for creation (Gonciarz, 2013).

Cross-appearances, or guest appearances by popular YouTubers in other channels, also deserve a mention as a practice calculated to increase the reach (Ptasińska, 2018). The goal of activities of this type is to reach potential

new audience already gathered in the host's and the guest's respective channels. In a certain sense this operates on the basis of recommendation — the favourite creator recommends another one as worth giving one's attention to.

All of the above activities are geared to leverage the potential enabled by YouTube's algorithm, some insight into the operation of which the user-publisher is given through the Analytics module. There, among other things, one can trace the number of impression and average viewing time and draw conclusions as to after what time and at which time the users gave up watching. Also the clickability ratio of impressions is important, in suggesting whether the video managed to engage the users enough to give it a rating and share their opinion or make a reference to the subject discussed. Finally, the module makes it possible to check have many people became permanent subscribers after watching the relevant material. One can surmise that a textbook case of immersion while watching YouTube materials occurs when the viewer watches the video from start to finish, with activity in the comments section and ratings confirming engagement. Films given the most time by users engaged in discussions and ratings reach even greater numbers of users potentially interested in the given range of topics (Missfeldt, 2017). Such videos are also capable of absorbing a viewer who interacts with the community interested in the subject and shares the video further (Gonciarz, 2013).

The mechanisms, as described here, on which the YouTube environment is based cause the recipients primarily to be reached by contents interesting to them within a specific subject range and therewith also personalized Adsense ads. As YouTube itself lets us know, the main assumption in the algorithm operation is content adaptation to the user so as to recommend potentially engaging videos. That is done by analysing each video for the most important variables — title, thumbnail, subject field, average play time (as percentage of total length), number of positive and negative ratings, and number and content of comments.

Discussion — YouTube as a closed medium

Already near the end of the 20th century it had been forecast that the following half-century would be characterized by constantly improving access of Internet communities to video production and distribution (Davis, 1997) — technological progress relating to network bandwidth and increasing accessibility of hardware certainly facilitated this. Internet 2.0 was supposed to provide everyone with the possibility of becoming not only a content consumer but also a content producer (Celiński, 2013). The creator was to become a publisher with ease, which Paul Levinson (2013) described in enthusiastic terms in his own time.

From the perspective of content marketing as a cultural practice YouTube appears as a near-perfect tool. The platform brings together video producers and viewers-users (who are especially valuable as subscribers building engaged communities). The former group includes professional media producers with corporate backing, copyright holders (TV outlets, publishing houses, film studios, etc.), advertisers, small and medium companies looking for an inexpensive distribution channel for their marketing materials, as well as cultural institutions and, last but not least, so-called YouTubers with an established personal brand, activists and amateur creators (vloggers). The latter share their knowledge absolutely free of charge or in exchange for the monetization of ads inserted by YouTube as part of its Partner Programme for creators. Very frequently amateurs are better than experts in their fields at successfully disseminating knowledge in a simple and friendly form adapted to the audience's level and age group. According to data from the last decade of the portal's existence, the greatest popularity (estimated on the basis of subscription and impression counts) is garnered by 'amateur' channels, which could be interpreted as a manifestation of bottom-up content generation (Burges and Green, 2009). Obviously, one also has to reckon with the adverse consequences of that trend, for which A. Keen (2007) offers the most complete description.

The content itself of the published video serves as the basic communication medium and catalyst for the creation of social groups. John C. Paolillo (2008) recognizes the platform's active users as its 'social core', for they create and share content and refer to each other's videos as a basis for critical analysis or concurrence in their respective opinions. He identifies the activities of YouTubers and other publishers as an important driver of the platform's attention economics with also an important role in shaping the YouTube culture. The contents are of assistance to solving the various individual potential or actual customers' problems, while YouTube itself, as a platform for discussions and comments (below the individual videos and on channels), creates a mutually beneficial communication channel for publishers and their communities.

One of the forms of generating organic traffic on the platform is the viral strategy; however, YouTube blocks (by restricting their reach) materials such as until-recently popular 'pranks' (practical jokes based on surprise and often intimidation or repulsion, set up on purpose and recorded as a video to be shared on the Internet). Attention is also drawn to YouTube's policy restricting the dissemination of contents that are socially harmful or misleading — the

platform encourages the user community to report them, which proves that automated blocking by the algorithm has not yet achieved perfection.

Communities form around a specific subject range, establishing mutual relations thanks to it. Thanks to the possibility to express their emotions by 'likes' or comments, YouTube contents as a *sui-generis*' common good' builds relationships between users (Homfokl, 2009).

YouTube thus presents as a medium supplying viewers with topics in a sort of general social debate, helping build a communication community (Bendyk, 2011). Burgess and Green (2009) go as far as asserting that the origin of YouTube's success lies precisely in the participatory culture enabling the publication and exchange of independent opinions and comments. As its welcome page proclaims: 'YouTube's mission is to give everyone a voice and show them the world.' The belief that the world becomes a better place when creators share histories and views on them is a value underpinning YouTube's activity. This enthusiastic and idealized vision, however, has to be subjected to realistic critical analysis. In the opinion of, among others, Jenkins, Ford and Green (2013, p. 48), even the concept of Web 2.0 itself, having emerged in 2004 (that is one year before YouTube's launch), quickly went on to become the cornerstone of the cultural logic of e-business — 'a set of corporate practices that seek to capture and exploit participatory culture'.

YouTube's operation model currently based on attention economics created for content marketing causes the use of the platform to acquire numerous characteristics of immersion. The immersive mechanic, in turn, is nothing else than the pursuit of corporate logic and pragmatism, successfully concealed.

In this context it is worth noting the thought given by M. Heim (1993) to the consequences of adopting a computer-search logic (contrasted with intuitive logic) for orientation forming in virtual reality. Communication based on content searched happens in an online environment governed by a logic of creation and sharing, an environment that registers, reinforces and multiplies the recipients' collective interpretation and appropriates their materials (Jenkins, Ford and Green, 2013). This clearly influences a certain pattern of thinking. The users generating contents in YouTube are proud of what they do — irrespective of the value they generate for the portal, whether they want it or not. They create videos as media contents out of a simple willingness to share, but each such type of activity has the characteristics of self-marketing. In this way, as Jenkins (ibid.) observes, they find themselves submerged in a value system used by companies for the evaluation of materials, as YouTube encourages them to treat interest in their contents as a sort of currency — the number of impressions their materials get will translate into social prestige. This being inside of a system is one of the potentially negative dimensions of the immersion discussed herein. This mechanism's failure to be transparent should inspire further studies into its social and cultural consequences. If one looks at the functioning of this medium as a sort of immersive content market, the fact that it creates a closed value system becoming increasingly difficult to leave can be quite concerning.

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Society 5.0

Zdenek VRBA
Institute for Medical Humanities, First Faculty of Medicine, Charles University,
Prague 2, Czech Republic, vrba@1az.cz

Josef DOLISTA
Institute for Medical Humanities, First Faculty of Medicine, Charles University,
Prague 2, Czech Republic, josef.dolista@lf1.cuni.cz

Martin VÍTEK
Institute of Technology and Business in Ceské Budejovice, Faculty of Corporate Strategy,
Department of Tourism and Marketing, Ceské Budejovice, Czech Republic
vitek@mail.vstecb.cz

Abstract

Society's changes are jumping tremendously. Another leap is underway, and part of the planet is already approaching company 4.0. External and internal influences are preparing society 5.0. The one-child policy and the change in society's population's structure in the next 30 and 50 years the qualitative birth rate in the developed part of the world and quantitative birth rate in other places. There will be 16 billion people on the planet in 100 years, or 5 billion. Global sustainability of development. A change in society affected by the natural change, the end of the mantra of GDP. Changes in production and consumption. Nationalization instead of globalization in production with the help of Industry 4.0. Recycling as a phenomenon of the future. Changes in the education of people and the profession of the future. Why fundamentally change education towards the information society, not to the education of the new generation, but to a comprehensive opportunity to work with information and the ability to perceive the world in a holistic dimension. New understanding of medicine, holistic approach. Current cryptocurrencies only as an intermediate step to currencies owned by corporations. Artificial intelligence as a normal part of life. Security protocols of people in connection with cybersecurity and information society controlled by artificial intelligence. Political and military changes. Further changes to human rights and freedoms. We will have nature under control, or nature will again control us considerably.

Keywords: Artificial Intelligence, Future, GDP, Industry 4.0, Natality, Society

Introduction

When we deal with the society of the future, there are several possible avenues of development. One of them is the constant continuation of the current trajectory, only with the change of equipment and technological background.Or the society of the future as a new configuration of social systems, infrastructure, goals and its own functioning.Why are we dealing with the society and its big jumps? The society and its development can be similarly classified.Is it modern to adapt business companies to the level of Industry 4.0.where we have company 2.0, 4.0 ordoes the article refer directly to 5.0?Is this about science fiction? Or has development become so rapid? Looking at it all from a global point of view, humanity has really broken free from its chains. Then came the global "pandemic" Covid. It doesn't matter whether this virus is of natural or scientific origin. We expect according to the formula Industry 4.0, Labor 4.0 status Society 4.0.Company 4.0 should be characterized by a sociable change based on scientific and technological development, new discoveries and innovation of higher order.We expect vertical and horizontal integration, the interconnection of production, and distribution systems. It expresses a new vision, concept, a fundamental comprehensive society-wide change with overlap into a change in thinking.

Friedrich Nietzsche, for his part, states that another higher order of man, Übermensch, will be able to free one's need to follow the usual conventions and thus to follow social status, mammon, etc.This will allow Superhumans to break free from the cycle of constant repetition of history ("history is repeated all the time"), to find and pursue the achievement of higher goals through the "essential ego" (free from social conventions). Only then, inadvertently, will he reach a shift incl. Higher morale and ethical characteristics. Will simple evolution move us? But the development of the brain itself (i.e. a radical increase in the number of neurons of the gray cortex) , in terms of

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human evolutionary development, is unlikely to make a significant shift any time soon, as it takes place very slow pace. After all, mankind has had virtually the same brain for about 300,000 years. What about bio-digital fusion, i.e., human-technology connections?This is likely to bring development and improvement rather at the level of the senses, i.e., enhanced perception, or an extension of the context of perception, or a closer connection to people. The question is how our brains are going to handle it. In any case, a significant change in the way humanity as a whole operates in the wake of the connection with technology is not to be expected. A radical change may be the arrival of ASI, i.e. "Artificial Super-Intelligence".The question, however, is whether human evolution will continue at all.

Vision of The Future Society

Contemporary society is governed mainly by economic laws, which are often illogically constructed, but supposedly support the logicality or illogicality of the behavior of mankind. Everything is tied to GDP (Strachotová et al., 2018a), which includes more and more distorted parameters.From the point of view of microeconomics, it is important that the work is delegated to suppliers or sold to customers, because what one does for himself is not quantified in GDP.Therefore, grown vegetables from the farmer are not sold in the immediate vicinity or consumed by the farmer himself but are transported, sold to intermediate warehouses (Dyntar et al., 2020), which store it and sell it to retail chains that use logistics chains to distribute it (Strachotová, Strachota, 2017). Control institutions that control economic processes or hygiene regulations watch over all of this. As a result, everyone realizes "added value", the price of the product increases, the product is unnecessarily transported over long distances, an incredible amount of natural resources are drawn. Moreover, from the point of view of natural resources, there is often a nonsensical drawdown just to increase GDP (Rozenský et al., 2019). The result is overcrowded highways carrying trucks of goods across Europe or the world. Nowadays, It is common for merchants who are transporting goods to pay for the ferry to take a significantly longer route around several continents, just because they will need it for Christmas and at the moment they have full warehouses, there is no cash flow to pay for these goods to suppliers. Distortions in both microeconomics and macroeconomics take place here. A common example is that, a bank or a small business charges the price of a product or service in full, as they have it in their price lists (Kutnohorská, Strachotová, 2019). You then have a registered discount amount in your account that makes the product cheaper. However, this discount must not be recognized in the accounts as a decrease in sales, as it would reduce all the economic parameters observed. This discount is billed as a "marketing expense".This will make the end customer's view of the sales price realistic. From an economic point of view, the discount is recognized as an advertising expense, which from the point of view of shareholders or the bank, is taken as a positive step because the supplier invests in advertising and thus promotes sales growth. Does that sound illogical? Franchise chains routinely transfer fees between the franchisee and the franchisees this way, so there is a dramatic increase in similar costs and revenues.The shareholder does not have a chance to unprop this even with a detailed examination, so he is satisfied, the value of the shares is growing or the dividend of them. There are estimates that in this way, at the macroeconomic level, they are deformed with the help of transnational corporations, budgets in the range of 5 - 15 percent of GDP. Everything is included in national budgets, including health insurance and social pensions, just to ensure that GDP's ratio to the national budget is correct, because that is what the price of debt service is all about at a given percentage of the state's debt.There are several countries in the world that do not follow GDP, but are mostly at the very bottom of the economic rankings of the entire planet. Already sustainability becomes important to many investors, and non-financial reporting is very strongly based on the CSR.

Society 5.0

Production, Industry, Services

Processes and production are deformed in the same way as GDP. For the correct economic calculation of the product or for the value of the company's shares (and subsequently its credit value, dividends, and others), it is necessary that the product is simply sold a given in the scheduled quantity. Banks and other institutions have segmentation according to how reliable manufacturers achieve this parameter. For example, the VW group has a 95% probability of selling its planned production in terms of car sales, whereas Fiat or Opel, for example, is normally only 50%. It is a parameter that subcontracting companies can use for their operating lending to the producers. But even companies with a high probability of meeting the plan no longer have these outlets. What about production? Products cannot be scraped, although it is stated that up to 15% of the production of newly produced vehicles are actually scrapped (Dyntar, Strachotová, 2015). Why doesn't the production get cheaper? All processes would be disrupted, as seen above when analyzing revenues and marketing costs. A decrease in production would only result in a decrease in total sales for the total production of the product or service concerned, followed by a decrease in the value of the manufacturer's shares, etc.The products are purchased by the subsidiaries of the manufacturer, the leasing company, the product is often leased for short-term or long-term leasing.In 2020, a

bankruptcy rent car was divested by Hertz, VW's market leader in car rentals. Will Hertz continue to buy 80,000 vehicles a year from the Ford Group?Certainly not, but the VW group has ensured who they will sell a large part of the products to, which have a worse application in terms of sales. At the same time, there will be a greater marketing concept, in terms of brand and other synergic ally effects. All of this has one major global impact. It's for the environment (Strachotová et al., 2018b). Unnecessarily manufactured products that do not find their real application and are soon scrapped or otherwise relatively ecologically disposed of are increasing in the long term. But building sand and most colored metals, we only have enough supplies for a few decades. That's why we're planning to go into space, to other planets, so we can continue to pillage because there's nothing to loot on Earth. In this dramatic way, the use of virtual products and services is also increasing. The actual videos were available 30 to 60 years ago, but one needed a video camera, a cutting device, then a computer, and most of the production thus produced ended in a home archive or photo album. For the past ten years, videos have been filmed by the entire population, stored on disk arrays by multinationals that continue to use them for marketing, and even share a few percent of the ad's revenue with their users. So, in addition to sharing content, there is a growing virtual race for the number of views. People are having fun; multinational giants are still growing with the amount of money they have. The estimate for free cash flow for Microsoft, Google, Apple, or Facebook is about $250 million for each. Companies do not even invest it. In their words, "there is nothing."What do they know about our future consumption or behavior when they know more about our lives than the secret services of the states in which we live? First of all, it's about changing the behavior of the population. Many of our future sales will be digital. The electronic footprint that we all leave behind is so vast that it is practically no longer necessary for people to be purging themselves of science fiction novels. This is actually happening or done by other means. Modern space races are underway, but it's no longer a China-US duel. Russia is already partially out of the picture. For this, Elon Musk has put into orbit a multiple of satellites for the spread of Internet connectivity and other services in 2020 than any country in the world in the last 50 years. All of this leads to many changes in society and our lives—industry, manufacturing services.

Industry 2.0

V4 economies are called the assembly plants of Western Europe. We qualified for this position. We have production here, often top production. Why are these economies weaker than their western part? Where the added value is hidden, the margins. Most of the population thinks they are hidden in export dividends from these businesses. The opposite is true. In Central Europe, there is a significantly smaller share of the pre-production part, i.e., the development and post-production part, i.e., trade and marketing.This is mostly retained by the producers' headquarters under their own supervision as part of the parent company (Strachotová, Pavlištík, 2017). Production margins are often only in single digits, and everything is catching up with the production volume. Development, trade, and marketing have a margin component, often several orders of magnitude higher—a key position in the area. For the last 30 years, foreign and Czech producers have loved the Czech economy for 3 factors.1) Discipline and low cost of the Czech workforce. Low mainly labor costs related to Western Europe or North America.2) Geopolitical proximity = neighboring with Germany, as Europe's industrial leader.3) Quality production. Within the VW Group, for example, the quality of production in Czech Škoda Auto plants is higher than in the parent VW. But these are factors for Industry 2.0. These 3 factors may be uninteresting within a few years, and foreign investors may begin to withdraw their industrial capacities during the current nationalization.

Industry 4.0 and influence on Society 4.0 and 5.0

Industry 4.0 is characterized by a high degree of robotization of production and individualization of production (Strachotová et al., 2019). This trend is already underway. A large manufacturer of railway vehicles, the Swiss company Stadler, decided to produce a large order of decker trains KISS (2010 and 2014) directly in Switzerland with the deployment of a high degree in robotization and automation of production.Siemens won previous competitions for similar trains and trains were produced in Prague, for example, which is characteristic of Industry 2.0. The manufacturer Stadler has its plants in Germany (Pankow), Poland (Siedlce), and many others, for the production of "cheaper" countries.This is the first example, as early as 2011, of the use of modern production lines in Europe.VW has taken a similar path, building a new electric car production line (EmDem) in Germany over the past two years, where instead of the classic few thousand employees, there are only about 100 technical engineers with tablets in their hands, which are controlled and adjusted by production robots, chatbots. Manually working human hands can only be found here minimally. Deploying robots and artificial intelligence costs a similar amount everywhere (Botek, Strachotová, 2018). But we do not need to educate thousands of employees for specific fields; a few dozen engineers and system specialists are enough to replace them. What will those thousands of lower-level employees do? From an environmental point of view, this is about saving resources for transporting intermediate

stages of production across the continent; from an economic point of view, this is precisely the threat to the employment of "manufacturing" not to the production countries.

Professions of the future

Which professions will remain, which will arise and which will disappear? Anything that is just routine work, described in an algorithm, will be performed by robots. We are already routinely sending so-called case from the Society 4.0, to production processes in India, where workers in Industry 1.0 produce or assemble products. The most common mistake that causes things to malfunction in our lives is that the following production step is not identified in the algorithm sent for production to India or China. Restart the computer. Then mark the step in green to check if the information system will start, and then turn it off and wrap it for submission. It seems normal for a standard European technician to wait 20 seconds after restarting to check that the product has started up.Management in the production countries has calculated the time it takes to produce the product and therefore do not count for the additional 20 seconds during which the worker waits at the production line to see if the product has run properly (and still draws an extra 20 seconds of electricity) (Strachotová et al., 2020). This thinking is important to society 5.0. The most common profession will be the profession of a programmer or an analyst. The customer will present to them their vision of what they would like to produce or obtain, and the programmer will have to carry out modeling for robots for individual production of the given product. The professions they replace are now unimaginable as a vehicle driver or accountant, where automated data processing will take place, and the accountant will be left with a role that is now called a tax advisor and solves optimization processes. All professions that demand creativity will surely stay. Robot and artificial intelligence, certainly, in the beginning, can not creatively prepare food, here the role of chefs will surely remain. Within 20 years, call center workers, telemarketers, telephone salespeople, insurance, and pension fund agents will disappear.

Education

Covid's situation has fundamentally changed education. At least 80% of pupils and students learn a different style of work. They were always ready to learn what they received from their teachers. Now pupils and students themselves have to learn based on what they already know. This is crucial for them in the future because they will learn to learn based on their own knowledge and skills. They will need this core knowledge and experience for the rest of their lives for their own lifelong learning (Hukal et al. 2018). We could call the 21st century a century of lifelong learning. It is no longer enough for us to acquire certain pumice of knowledge and skills by the age of 25, but we must learn to learn all our lives. Self-learning will become an organic part of our lives. From the point of view of the current model of education, thanks to the COVID crisis, there was a strong pressure not to draw a line between what the student should learn at home from common sources and what activities need to be implemented in the school team with the support of the teacher. All this had to be absorbed by the parents of pupils and students, where many of them understood that it is not only a problem in the teacher but to find a way to educate and motivate their children internally. This will also be helped by artificial intelligence, which does not replace the teacher in their complex role, but can correct written works for them.

Finance, banking

From a financial point of view, the world will change fundamentally. Physical money is likely to be abandoned with a switch to electronic money. Moving from traditional currencies to cyber currencies. The world's strongest companies will create their own currencies (Facebook = Pound). At the same time, these global companies have so much client information that they can offer targeted loans in better ways than existing banks. What happens when these financial giants pool their resources in parallel with the fall in the share price of today's "normal companies". They will gradually buy them. Ordinary companies will adapt their digital strategies not to a potential customer, but rather with the vision of getting as many customers as possible and we will sell our services to these multinational corporations (Facebook, Google, Apple, Microsoft and others). The use of these currencies will be a flexible and efficient tool for exchanging domestic and international payments characterized by low costs. Similar digital currencies can have far-reaching macroeconomic implications. First of all, they can change the position of traditional banks and the whole process of digital currency spreadmay , in the worst case, disrupt the process of intermediation and the stability of the financial. Some countries could also face declining demand for their domestic currency and capital outflows. In terms of macroeconomic impact, this is a situation similar to the process of dollarization.

Transport, logistics

Most of the main transport arteries have long been directed between large cities and conurbations. This is the cause of a paradoxical situation where regional settlements with several thousand inhabitants that also have a topographic isolation of 30 km from each other are dependent on public transport to the nearest metropolis and back from this metropolis, where a direct transport route either does not exist at all or only IAD is implemented (Dyntar et al., 2020). The society of the future expects different transportation and transport services. Now they still have no idea what the concept will be because they have no complete idea about it. For most of the population, nothing else was imaginable. Transport was represented by railways and horse-drawn stagecoaches. Cars were in their infancy, the road transport network next to the railway was in a deplorable state; most of the roads were unpaved, the asphalt or concrete surface of the roads did not exist. By asking the general population what kind of transport they would like now, 110 years ago, we got the answer that they would like faster horses. Now we get the answer: Faster cars, empty roads, comfort, or individuality. Cars, they did not know of planes, trains were relatively slow and often far from settlements. Cars then saved us from an environmental disaster in Manhattan because there was a lot of horse droppings everywhere. A similar change awaits us, because just faster cars, like 100 years ago, is not the answer. Even the New York subway, which runs in stop mode and speed, is not a complete solution. Capacity is obviously at the limit. Beijing is addressing this through the constant construction of additional subway lines, where dozens have been built over the past ten years, often running in parallel and at different heights.

Changing transport systems and preferences takes time. In agglomerations, it's in units of years. In small territorial units, it is often even decades. At least on a European scale, construction does not take place in the order of months, but in the order of years to decades. All approval processes are complicated and lengthy; there must be an EIA for everything, many institutions comment on the issue, and there are also many associations and lobby groups that boycott this.

Our traffic in terms of small-scale logistics has also grown significantly. Formerly one monopoly delivery service, set up by the post office, has competed in DHL, DPD, PPL, and courier services for the past 30 years. Formerly a thing for the B2B segment, today for everyone. In recent years, competitors have emerged on local or global platforms in terms of shipments in the C2C segment. On the one hand, these are services such as zaskovna.cz or the mentioned forwarding services that now have many collection points, often in the vicinity. On the other hand, Uber drivers today routinely deliver consignments or new food from the global platform. Often these services are another engine of further unnecessary traffic in agglomerations. Uber and others also pay drivers for so-called empty rides, which is when they drive and do not transport anyone, because they want to give the impression of the number of available means of transport and to reduce travel time to customers. In a million-dollar agglomeration of the Prague system, it is estimated that at least 500, rather 1,500 cars drive unnecessarily around the center this way. In larger systems, such as London, despite the toll for entering the city, it is many times higher.

Attempts to solve this using capacity railway transport by raising it to the level of the 21st century, with a modern signaling device of the ETCS level 2 type (3). We can reduce the interval between trains to the frequency of connections below 2 minutes, but the limit will still be the boarding and alighting of passengers. This is a technological limit. Even a wide door and a barrier-free level will not allow for a faster transfer of passengers. The railway solves this with the so-called fast and slow layer, when the slow layer of trains stops everywhere, only minimally fast, but the capacity of the lines is not infinite. The conversion of the station to a more modern concept takes countless years rather than months, and even this is not enough. It is important to understand this problem comprehensively. Measure the travel time from point A to point B. Door to door. It is not a problem to have a high-speed train that will cover a distance of 100 km in 25 to 30 minutes instead of an hour. However, it is then necessary to add the travel time to the train and especially the transfer times. The stations in the larger nodes are so extensive that even a change in the platform takes, for example, 5 minutes, a change in the means of transport, for example, 10 to 15 minutes, from the express train to the metro. During that time, however, the high-speed train traveled 50 km. Traffic at speeds of 200 to 320 km/h is more energy-intensive than at speeds of 120 km/h per hour, and this time savings are wasted by transfers. The concepts of direct connections, without transfers, and the principle of morning express from one metropolis to another and an afternoon back is long overdue. We have clock traffic in the interval of 2 hours, 1 hour, 30, 20, 15, 10, or even 5 minutes. This time loss caused by transfers has already been found in China, where until recently in the hunt for the highest commonly used speed of high-speed trains the speed was up to 380 km/h. Now, China, with regard to energy intensity, has forced itself to reduce the speed of trains to a maximum level of 300 to 320 km/h. A more important parameter is that the correct time block for transport from agglomeration to agglomeration occurs. To explain, when the transport between places A and B needs 4 hours and 15 minutes, it is economically more advantageous to rebuild the line or speed up the transport to 3 hours 50 minutes. In 10 minutes, the set can be brought to a state that it is ready to go back in 4 hours. If we cross this magical limit for an hour, even a few minutes later, we need another train for the same route. Which in world

conditions and prices ICE, AVE, AGV, Shikansenis approximately 25 million EUR per train. In addition to increased demands on service, additional maintenance (more trains), efficiency, more staff, etc.. The same problem, of course, is also with ordinary trains. To understand the tragedy of the situation.The famous completion of the third track and the subsequent reconstruction and reconfiguration of signaling equipment and stations on the extremely busy Hamburg Hannover train route at the cost of huge investments added a capacity of only 13 additional trains per hour. Why wasn't the four-track version built right away is supposedly a complicated thing with regard to land purchases, let's really look at construction and other lobbies behind it, because for another crazy amount, this will have to be redone anyway in the foreseeable future. This is clearly an agreement on the lobbying of individual car traffic, where traffic from point A to destination B can be just as fast, despite congestion and significantly lower traffic speeds. But there is no place to take up more space for the construction of other roads, the existing capacity is overloaded, the construction is lengthy, the synergy effects in terms of impact on nature are catastrophic. From a simple economic point of view, do we want a doctor, an IT engineer with an hourly salary of 500 EUR, to normally make a driver with a salary of 10 EUR per hour for the same amount time?

Artificial intelligence is already solving transportation of the future. UBER, Liftago and more integrate ride-sharing, shared cars, public transport and resources such as shared bicycles or scooters for last mile solutions. At the same time, it indicates the most endangered jobs. With the help of artificial intelligence and self-driving vehicles, we can handle equally efficient transport, but with a significantly smaller number of employees. Self-driving trains or self-driving subways are common in the world. It's just about prejudice and implementation and also about hundreds of thousands of jobs (political pressure).

Information society

Society 4.0 already contains elements of artificial intelligence. The timeline is poorly predicted, but the future 5.0 society will be more virtual than real. In everyday life, work life or private life, virtual assistants of the next generations will come to organize our day with us, monitor our life functions and health status, and help with future routine activities. They give us psychological support, they can translate between languages simultaneously. It will not be a robotic replacement for a human, but rather his software support. In today's form, it is, for example, Google Assistant, Amazon Alex, Siri from Apple. Smart dresses will change shape, look, structure. The human body will be serviced by nanorobots. For a long time, only emotional abilities, creativity and social intelligence remain.

Virtual reality penetrates our lives. There will be a small percentage of people on the planet who will have "real" experiences (estimated at 10% in 2050), 80% of the population will be able to afford the experience in a virtual environment and the rest will have none or no need. It is estimated that around 2040, 50% of the electricity produced on the planet will be used to run data servers with low or even unnecessary video content. The society of the future

The image of the future society will be reflected primarily in the degree of diversity of the society. The current society is not a homogeneous whole not only in terms of assets, income, regional distribution. Uniformity is not even desirable. It is a hierarchical structure of various individuals who form a social whole. Despite all efforts to prevent this effect, regional disparities within countries are deepening. There is a gradual convergence of levels between states in the economic and technical fields, but within the states, unpromising regions where poverty reigns are emerging. This internal tension between regions is a more significant risk than problems between states at the global level. The spread of scissors between regions further supports urbanization and the growth of global megacities, which are growing both in width and height. The concentration of the population is increasing. The younger, more educated and economically active part, which is crucial from an economic perspective, has always exacerbated internal disparities to have the best ability to migrate. Until 2020, we only knew this from the 1984 novels (Orwell, 1949). Then the global intervention of the Covid 19 virus, or SARS II, and suddenly most of the planet's population wore masks, the economies of the states stopped for a short time, there were global changes in the approach to life, education, travel. This is just the beginning, we know that human freedom has shrunk considerably again. Free of charge, and voluntarily. The short-term closeness of society has not been used for positive changes in relation to the environment of us, as the dominant animal species on the planet. Only the indebtedness of future societies has taken place and continues to take place everywhere, which is nothing more than a form of new vassalism and slavery.

Global Sustainability

Mankind can no longer solve current problems, which are collectively called climate change. These are whole continents of plastic floating in oceans, melting permafrost, deforestation of the planet (Siberia, South America),

pollution of drinking water, increase in CO2 (Hájek et al., 2019). We can only solve this with the help of very advanced technologies and artificial intelligence. Slovakia has developed technology that will produce carbon fuels from plastic. There are machines that can draw COx from the air and thus produce, for example, asphalt or electricity. These machines controlled by artificial intelligence will be common in a few decades. The German model of a sustainable society is based on quality agriculture that can produce quality food, so we have a healthier population that needs less medical care, where the resources saved are in prevention programs, which again save and improve the quality of life (Willow, 2020, Ibima). We can produce electricity in several ways and, above all, there will be newer methods of its accumulation, so there will be no problems with the construction of new or renovation of existing distribution networks. The whole ecological program of green Europe, which is the EU's vision for the years 2020-2030, has, in addition to opponents of electro-mobility, secret admirers from Asian agglomerations. In today's not only Asian agglomerations, mortality is high every year due to the increased content of particles in the air. There are hundreds of thousands more dead each year. Transport is one of the serious sources of these dust pollutants (exhaust gases, brake and tire wear), often significantly greater than from thermal power plants.

Artificial Intelligence

Society 4.0 can characterize the initial onset of change in working relationships and life reality models. (Mařík, 2018).We left our privacy for money, or in worse cases for free, to multinational companies and social network owners, who make a lot of money from it. For a large part of the population, social networks have become an electronic drug. However, they were not here at all 20 years ago. Society 5.0 will be characterized by virtual reality. An emerging phenomenon, today imaginable as a 5D cinema, but in real practical life it is already imaginable in many forms. In addition to self-driving cars, we have electronic assistants controlled by artificial intelligence. Artificial intelligence can, for example, design a new painting from thousands of scans of Rembrandt's paintings, which has a clear characteristic of the painting from this legendary painter. He can compose music by studying the Beatles style, speaking in the voice or image of politicians, so we don't have a chance to recognize at first sight or listening whether it's real news or a hoax. This phenomenon now starts under the term Deep Fake. It will be the next message from the president, broadcast on television, reality or it will be Deep Fake, Text messages are much simpler, today part of the content is compiled using algorithms and artificial intelligence, actually at the request of the target listener or reader segment. It will become a complete part of our lives, and we cannot distinguish between the real reality and the reality created by artificial intelligence. Artificial intelligence is now based on the use of neural networks and maps. Artificial intelligence does not yet understand the human context. When driving a vehicle, it is able to drive with maximum overload, which will be perfect in terms of time, but unusable in terms of the human body. Sci-fi is artificial intelligence at the human level, also called general artificial intelligence. Its risk to humanity is that this artificial intelligence can control itself and will not need humanity to do so. Then it will be exterminated because it draws an excessive amount of resources from the planet.

Political, military and power interests

The basic rule is that war is just a policy waged by other means. For more than 107 years, there was an empire, far larger than the legendary Roman Empire, reaching all continents. The British Empire = the sun does not set above it, and whose wealth in the global world was created by inserting 40,000 gold pounds several hundred years ago. It's been just rubble for over 75 years. During the last 100 years of World War II, there were several new political regimes that called themselves the power of the people, even though they were dictatorships and ruled a huge part of the world. However, this large part of the world has these regimes under their skin. Part of the population resists them; part sympathizes with them. The population of citizens who could not even physically experience them (USA, Western Europe) perceives them as the perpetrators of all evil, even though there were forms of racial segregation, oppression or totalitarianism in the territory of these states 2-3 generations ago. In many other territories, so-called proxy wars were fought, with the powers not fighting directly, but providing assistance to these parties. These were Russia, Spain, after 2WW Korea, Vietnam, Central America, the Middle East, Afghanistan, in the new millennium Iraq, Yemen, Syria, Mali. Forms of war conflicts gradually moved from the model of regular armies to all forms of guerrilla wars or wars in cities with strong involvement of the civilian population. It's just about money. It is estimated that the 9/11/2011 attack on New York cost only a few years of preparation, a few months of training, and a sum in the hundreds of thousands of USD. The direct damage is in the order of billions of USD, indirectly it is felt by the whole world in changing security rules in transport, tourism, war, and other areas. Due to its destruction, man has stopped building on weapons from the Second World War. The followers of the German war V2 rockets carried the first astronaut into space (CCCP) or to the moon (USA). A fundamental cultural difference was already visible here. Russian missiles are autonomously controlled or allow interference with control from Earth. American space rockets also allow manual control by humans. The military industry with an unlimited budget provides for things that the ordinary commercial world would not accept. Forty-five years ago, aircraft

flying at Mach3 speed, today 4-generation thermonuclear missiles were without a fallout as a successor to neutron bombs. But today, we don't have to occupy the territory; we just need to exterminate it. What the German army used for horses in 1941 and subsequently American or Soviet troops against it a lot of mechanization, there we now have self-steering drones that can perform espionage tasks much better than the legendary U2 (1960) aircraft, flying at altitudes above 20km. But this technique can no longer be controlled by ordinary operators and computers. Artificial intelligence is already used here. We have autonomous weapons that are not controlled by man. Their first version was actually supposed to be the legendary tsar bomb with a force of hundreds of thousands of kilotons. It was supposed to be like a ship, and if radioactive radiation of a certain intensity appeared over the Soviet Union, it would explode on its own because it was assumed that if the Soviet Union did not survive, it would have no right to survive the world. Fortunately, this project was suspended 20 years before the Chernobyl explosion. Today we envisage a ban on autonomous weapons of all kinds. But it is especially true in politics that we cannot ensure that these weapons are not produced illegally in the world. Only artificial intelligence can protect us from this form of weapon, controlled by artificial intelligence. The key conclusion, then, is who controls this artificial intelligence. Game theory tells us that we assume that our competitor is secretly developing this, so we have to do it too.

Artificial intelligence has been deployed for several terms, in fact, a model of management is already emerging, where there are no politicians with a vision, but only experienced marketers who follow social perceptions and trends. The current COVID crisis shows us this and sets restrictions on freedoms for the future that we could not have imagined 1-2 years ago, and we now accept them voluntarily. The global trend and the shift from democracy to a technocratic model of governance is everywhere. Majdan, yellow vests in France, a million moments in the Czech Republic, problems in Hong Kong, behind all of which hid the company Analytica, which managed to influence public opinions with the help of Deep Fake. Seventy years ago, radio broadcasting and leaflets or film weeklies were enough for this. After that, film and television were able to significantly influence public opinion; today, social networks, and next, it will be cyber-attacks that will eliminate the critical infrastructure of states.

Population Trends

People are the predominant animal species whose requirements for resources keep growing (Matos et al., 2020). In Europe (and other developed countries such as the USA, South Korea, Japan, Singapore etc.) we have seen depopulation for at least the past 30 years. Fewer babies are born than before. The average in Europe has been around 1.4 babies per mother in the past 30 years, the exception being rich countries such as Norway and Switzerland with an average near 3. In the USA, the natality growth is mainly due to the Hispanic minority that has historically always had more children. The fundamental difference is quite obvious. Africa and a large part of Asia prefer quantity to quality, while Europe, the USA, Russia, South Korea, Japan, Singapore are heading down the quality street. The policy of one child with the preference of a son was applied for decades in mainland China. Is it normal that we decided, on our own accord, to decrease the population in the northern hemisphere? No country from the G20, the most developed economies in the world, does not achieve - with the exceptions of aforementioned (Norway, Switzerland) - the reproduction value of 2.1. According to a new IHME study (Lancet, 2020), civilization will grow to 10 billion by 2050. In 2100, the original estimates were between 11 and 16.5 billion people on the globe (Vollset, 2019), with the dominant powers of India, Nigeria, China, and the United States. (United Nations, 2019). The new scenarios predict the end of population growth around 2064 of around 9.7 billion people, and the population will then start to decline. According to this scenario, in 2010, there should be about 732 million people in China, 1.1 billion in India, 791 million in Nigeria, 6.7 million in the Czech Republic, 2.5 million in Slovakia, 15.5 million in Poland, 7.8 million in Romania, Bulgaria 2.6 million, Serbia 4.4 million. The birth rate falls to Poland 1.17 and the Czech Republic to 1.37 children per woman. The average in Africa will drop from today's 4.3 to 1.8 children.

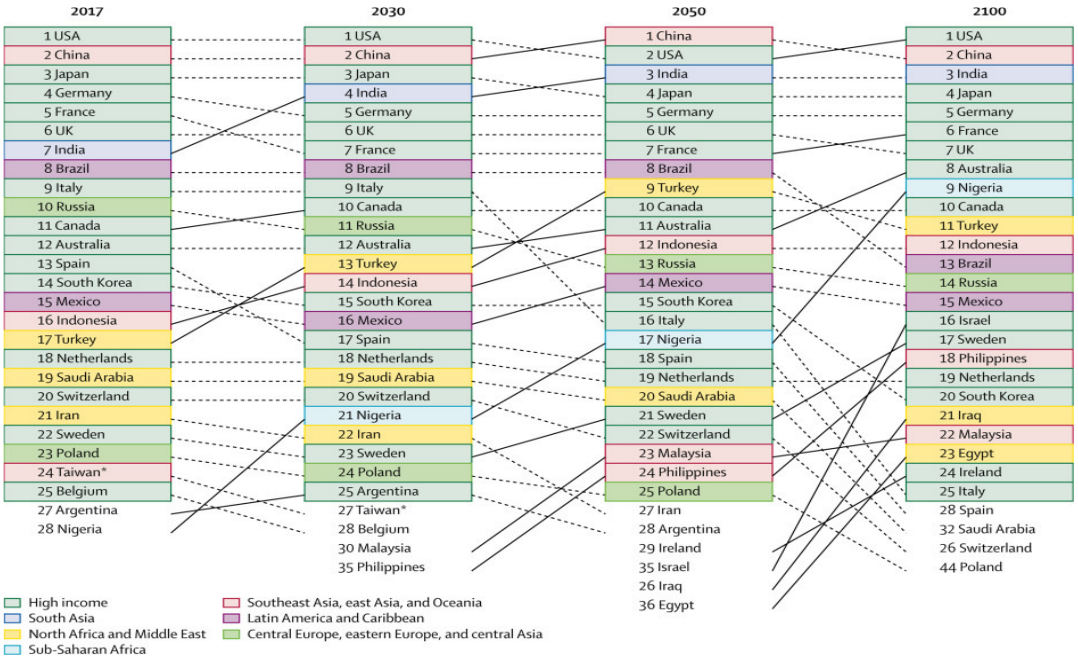

Figure 1: Ranking the top 25 economies by total GDP in 2017 and the reference scenario in 2030, 2050, and 2100

Source : IHME, 2019, https://www.thelancet.com/article/S0140-6736(20)30677-2/fulltext

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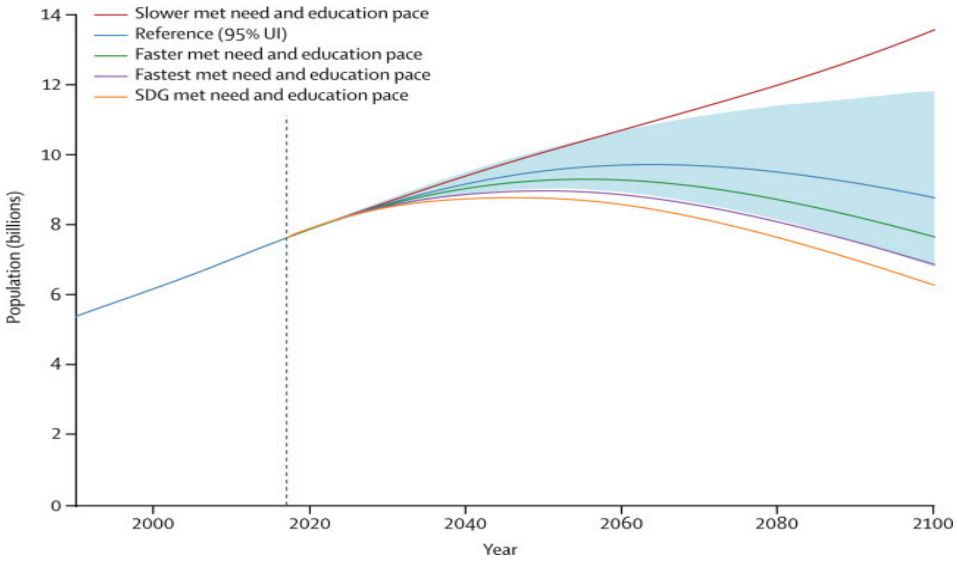

Figure 3 : Global population in the reference, slower, faster, fastest, and SDG pace scenarios, 1990–2100

Source : IHME, 2019, https://www.thelancet.com/article/S0140-6736(20)30677-2/fulltext processed by the authors

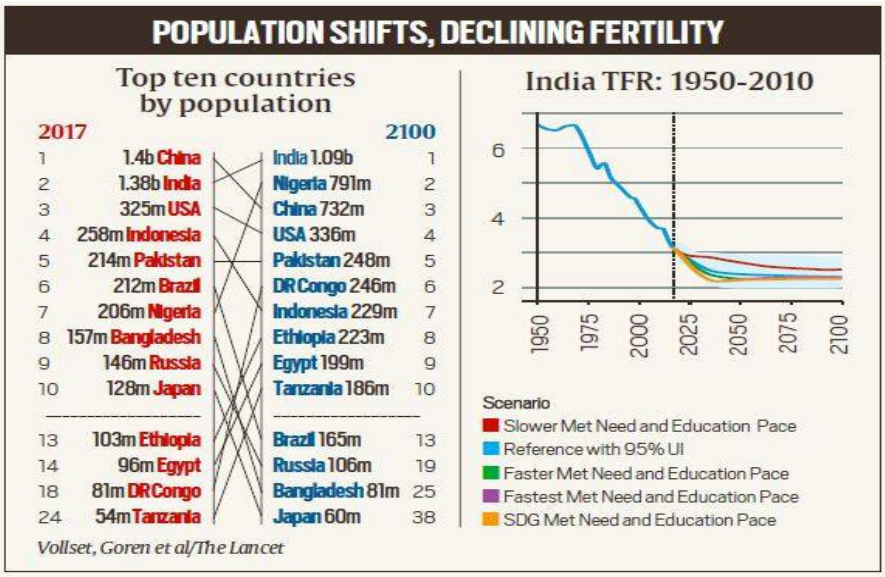

Figure 2 :Population shifts, declining fertility

Age segmentation will change fundamentally. People over the age of 80 will increase from 141 million people to 866 million people, which will be a huge burden on the health and social system.

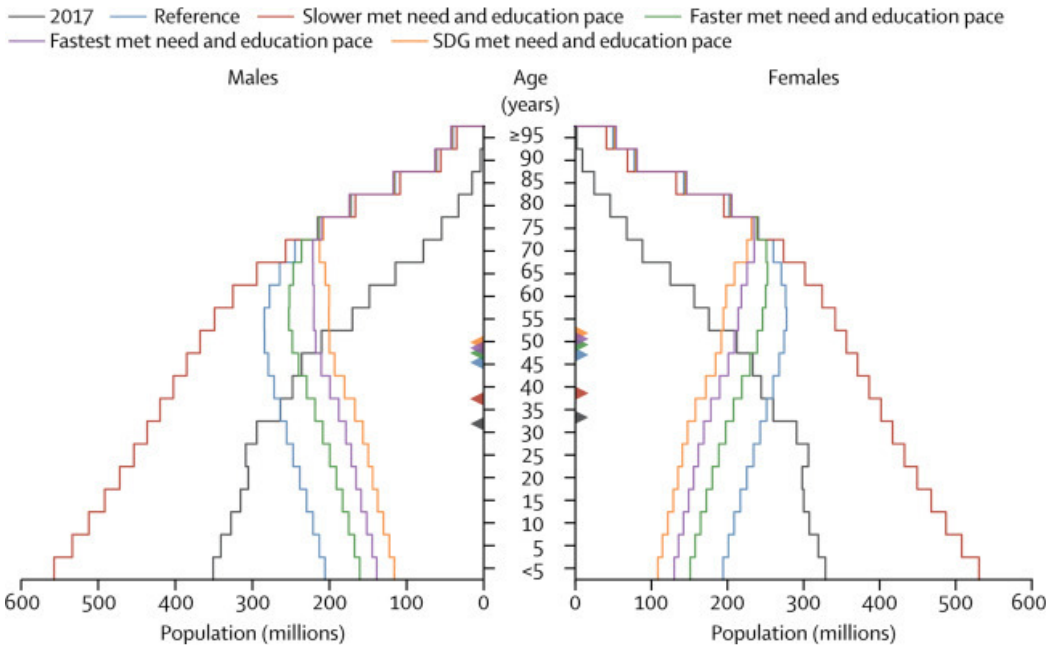

Figure 3 :Global population age structure in 2017 and in 2100 in the reference, slower, faster, fastest, and SDG pace scenarios

Source : IHME, 2019, https://www.thelancet.com/article/S0140-6736(20)30677-2/fulltext
processed by the authors

Healthcare

Artificial Intelligence processes a patient's diagnostics, but it cannot tell what disease it is, what are the prospects of healing and what are the consequences. Telling patients whether they are terminally ill or whether they will suffer

lifelong consequences depends only on a physician's empathy and approach. The Hippocratic Oath includes an ethical dimension. What does this dimension actually mean? The crucial dimension of ethicality in medicine is to do no harm to patients. There are still many diseases that do not need to be treated; the effort should only be to manage it. But it is often omitted that patients should be done no harm. How can this be achieved in the modern over mechanized times we are living in when everyone is extremely busy and doesn't have time for anything? By giving patients the time. The second crucial moment in medical ethics is the patient-physician relationship. What relationship can we actually establish when a patient only answers a physician 3-4 questions? This could be the solution to the problem: giving medical staff in the health care sector where everything is limited, and physicians are rather clerks who spend 3 minutes out of the 4 they have typed on their computer.

Health care costs keep growing. While it is to the joy of pharmaceutical companies, physicians often work extremely long hours and their job requirements are huge: their mistakes can damage patients' health fatally. Physicians should avoid prescribing statistically defined medicine that has no effect on solving a patient's problems whatsoever. This is non-ethical on the part of the physician, it yields no results, it is only a waste of resources. The economy is directly concerned (physicians' salaries, costs of medicine, operating costs of medical facilities) as well as indirectly when patients, instead of generating GDP, use up resources, often unnecessarily and with no use. (Monte, 2019) If holistic medicine is applied with the help of Artificial Intelligence, the total treatment time will reduce up to 40%, treatment costs will decrease and patients will recover soon in all aspects. Artificial Intelligence can make operations more considerate, shortening, in consequence, the time of hospitalization. In some cases, it might no longer be needed at all. Artificial Intelligence can also help with a personalized medical procedure as it will check all medicine used by a patient together with their contraindications. Personalized medicine, tailor-made to a given patient, can also be useful in the future. Estimates of decreasing medicine consumption are about 50 - 60% of current values. This economic dimension will often have a positive impact on the ethical dimension as these measures will significantly improve patients' quality of life.

Conclusion

How will we live with this and how will we resist it. Do we want to be in control? Or are we controlled? What can you do? It always starts with education. We need to have properly educated people at the right time in the right place and in the required quality producing the required activity or performance. It is still about investing in education, science and research and also the ability to apply this research in practice. Silicon Valley (USA) and Silicon Valley (Israel) are clearly the world leaders in connecting science and business. The largest artificial intelligence network we have in the world now has about 1 million neurons. The human brain has 86 billion of them. The architecture of the change of society has been very intensive thanks to mobile communication for the last 10 years. The architecture of the goals has changed priorities, opportunities and responses of society. At the same time, it blocks new opportunities for change. The difference between cause and effect in society's behavior has disappeared. We are more and more subject to fashionable technological waves, and we involve our own selves less as a defensive element. The security protocol of the people can protect us. It has its own cybersecurity. It can maneuver us in the information society that is controlled by artificial intelligence. We probably only have the chance to change for a few more decades. Then the chaining of processes will reach a turning point, beyond which change will be possible, but only at the cost of the implosion of society as we know it. The human species will survive this as well, but the question is the degree of futility and nonsense of the sacrifices it will bring. It is necessary to reflect changes in the conditions in which the society operates—both external = natural conditions and internal, which are in the hands of society itself. Natural change has its own autonomy and mechanism of functioning; human society must find a new way to homeostasis with nature. It is not a question of whether or not society is able to change and adapt to natural changes on the planet, but whether it is willing to do so. Even now, the popular bird flu affair (COVID 19) suggests that nature is able to eliminate humanity on the planet as a useless species, drawing vast amounts of sources of drinking water, clean air, and energy for survival.

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Earnings Management and The Quality of Financial Statements After The transfer into IFRS. Case of Poland.

Agnieszka PIECHOCKA-KALUZNA

Poznan University of Life Sciences, Poznan, Poland
agnieszka.piechocka@icloud.com

Abstract

This article discusses one of the most important features of financial statement – its quality under different accounting frameworks. Although there is no sole criterion for measuring such quality, it is largely accepted that it may be assessed indirectly by examining the potential earning management and high-quality financial statements should show no signs of being managed in such a way. This paper presented results of studies on earning management measures related to a large sample of financial statements issued by companies listed on the Warsaw Stock Exchange which transferred their accounting framework from Polish local GAAP to International Financial Reporting Standards (IFRS) during the period 2004-2019. To measure it, the author used well recognized methods as well as a new approach based on xgboost (eXtreme Gradient Boosting).

Keywords: quality of financial statement, earning management, International Financial Reporting Standards (IFRS)

Introduction

Every well designed and well composed system requires certain frameworks in order to achieve its goals set. As Maciucia et al (2015) mentioned, within an accounting system, such conceptual frameworks ought to ensure some kind of triumph of good accounting practices over bad ones. Such triumph, in turn, is necessary to release appropriate financial reports of entities, that is reports of high quality that reflect their real financial situations and genuine results.

Since 2005, every company whose shares are quoted on the European Union (EU) regulated market must prepare its financial statements (on group level) under the International Financial Reporting Standards (IFRS), as endorsed by the EU Commission. According to Ho (2011) the IFRSs are built on a framework that provides an economic foundation for establishing accounting standards based on consistent concepts, rather than a collection of arbitrary accounting conventions such as conservatism, historical cost accounting, prudence, and matching.

The idea of international accounting convergence seems to be highly desirable by many academicals, regulators and capital markets participants (Alexander and Jermakowicz 2006). Moreover, most of these people point at IFRS as a set of regulatory frameworks that would best match their expectations. Especially their expectations related to the quality of financial reporting. The reason why a just IFRS set aspires to become the basis for future benchmark in accounting quality is that it has already been widely adopted around the world. In fact, as Ho (2016) observed, there are over 100 countries that require or permit at least IFRS while preparing the financial statements of entities.

It seems that the widespread adoption of a common, international set of standards will increase the transparency and comparability of financial reporting between regions, countries and corporations and will minimize global stakeholder apprehension. According to Rogdaki et al (2011) The international mandatory application of IFRS is a practical demonstration of the latest effort to ensure quality information.

Having realized that many companies have changed their accounting environment and transferred financial statements to meet the IFRS standards, it is worth using quality measurement to show whether the financial statements will be of higher quality after implementing the new (IFRS) standards in comparison with those prepared under the previous legal regime.

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Review of literature on the quality of financial accounting

The measures applied in this paper refer to recognized models described in acknowledged literature on the quality of financial statements during the transformation to IFRS. These measures concentrate on one of the key areas potentially exposed to the risk of distortion, namely earning management. According to the theoretical expectations, high-quality financial statements should not bear any signs of earning management – neither earning smoothing nor tendencies towards achieving small positive results rather than losses.

In many recognized studies, ad Barth et al (2008), Chritensen et al (2015) or Lang et al (2006), earning management distortion was divided into two classes. First, it is a tendency for managers to smooth earning. In fact, direct measurement of smoothing is rather difficult to detect. Therefore, the studies should derive on indirect evidence. It is assumed that better quality standards will lead to higher earnings volatility. Since accruals are often use to smooth companies' earnings, it also worth analyzing the relationship between changes in the level of accruals and changes in operating earnings or changes in operating cashflows.

Another manifestation of earning management is management toward small positive net income rather than negative result (net loss). If there is room for some discretion in preparing the financial statement and a company is going to report relatively low loss, then there is a higher probability that management will use discretionary accruals to obtain even small but positive final result. Thereby the application of high-quality accounting standards (IFRS) should result in reporting small positive earnings with lower frequency than when employing local domestic (worse) accounting standards. Of course, the definition of such 'small' income or 'small' loss is extremely subjective, but most recognized studies, like Burgstahler and Dichev (1997) assume that 'small' refers to results giving return on assets (ROA) ratio in a range from -0.01 to 0.00 for net loss and from 0.00 to 0.01 for net income. According to Barth et al (2008) and Christensen et al (2015), the most appropriate models for the measurement of the smoothing of financial statements would be the following ones:

[1]

$$\Delta\mathrm{NI}_{it} = \alpha_0 + \alpha_1\mathrm{SIZE}_{it} + \alpha_2\mathrm{GROWTH}_{it} + \alpha_3\mathrm{EISSUE}_{it} + \alpha_4\mathrm{LEV}_{it} + \alpha_5\mathrm{DISSUE}_{it} + \alpha_6\mathrm{TURN}_{it} + \alpha_7\mathrm{CF}_{it} + \alpha_8\mathrm{AUD}_{it} + \alpha_9\mathrm{NUMEX}_{it} + \alpha_{10}\mathrm{XLIST}_{it} + \alpha_{11}\mathrm{CLOSE}_{it} + \sum_{k=1}^{11}\alpha_{k+11}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

[2]

$$\Delta\mathrm{CF}_{it} = \alpha_0 + \alpha_1\mathrm{SIZE}_{it} + \alpha_2\mathrm{GROWTH}_{it} + \alpha_3\mathrm{EISSUE}_{it} + \alpha_4\mathrm{LEV}_{it} + \alpha_5\mathrm{DISSUE}_{it} + \alpha_6\mathrm{TURN}_{it} + \alpha_7\mathrm{CF}_{it} + \alpha_8\mathrm{AUD}_{it} + \alpha_9\mathrm{NUMEX}_{it} + \alpha_{10}\mathrm{XLIST}_{it} + \alpha_{11}\mathrm{CLOSE}_{it} + \sum_{k=1}^{11}\alpha_{k+11}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

[3]

$$\mathrm{CF}_{it} = \alpha_0 + \alpha_1\mathrm{SIZE}_{it} + \alpha_2\mathrm{GROWTH}_{it} + \alpha_3\mathrm{EISSUE}_{it} + \alpha_4\mathrm{LEV}_{it} + \alpha_5\mathrm{DISSUE}_{it} + \alpha_6\mathrm{TURN}_{it} + \alpha_7\mathrm{CF}_{it} + \alpha_8\mathrm{AUD}_{it} + \alpha_9\mathrm{NUMEX}_{it} + \alpha_{10}\mathrm{XLIST}_{it} + \alpha_{11}\mathrm{CLOSE}_{it} + \sum_{k=1}^{11}\alpha_{k+11}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

[4]

$$\mathrm{ACC}_{it} = \alpha_0 + \alpha_1\mathrm{SIZE}_{it} + \alpha_2\mathrm{GROWTH}_{it} + \alpha_3\mathrm{EISSUE}_{it} + \alpha_4\mathrm{LEV}_{it} + \alpha_5\mathrm{DISSUE}_{it} + \alpha_6\mathrm{TURN}_{it} + \alpha_7\mathrm{CF}_{it} + \alpha_8\mathrm{AUD}_{it} + \alpha_9\mathrm{NUMEX}_{it} + \alpha_{10}\mathrm{XLIST}_{it} + \alpha_{11}\mathrm{CLOSE}_{it} + \sum_{k=1}^{11}\alpha_{k+11}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

where ΔNI is the change in net income, scaled by end-of-year total assets, ΔCF is the change in annual cash flow from operations, scaled by end-of-year total assets, ACC is the earnings less cash flow from operations, scaled by end-of-year total assets, CF is the annual net cash flow from operating activities, scaled by end-of-year total assets, SIZE is the natural logarithm of the market value of equity at the end of the year, GROWTH is the percentage change in sales, EISSUE is an indicator that equals one if the company issued equity, LEV is the end-of-year total liabilities divided by the end-of-year book value of equity, DISSUE is the percentage change in total liabilities, TURN is the sales divided by the end-of-year total assets, AUD is an indicator variable that equals one if the company's auditor is BIG4 (which means PwC, KPMG, E&Y or Deloitte), and zero otherwise, NUMEX is the number of exchanges on which a company's stock is listed, XLIST is an indicator variable that equals one if the company is listed on any US stock exchange, CLOSE is the percentage of closely held shares of the company reported by WorldScope, and IDUM are industry dummies.

A smaller variance of the change in net income in model [1], change in cashflow from operations in model [2], change in cashflow from operations, scaled end-of-year total assets in model [3] and change in earnings less cash flow from operations, scaled by end-of-year total assets in model [4] will be treated as an evidence of profit smoothing.

According to the study of Sun et al (2011), profit smoothing may be also detected using the analysis of absolute value of discretionary accruals:

[5]

$$\mathrm{ADAC}_{it} = b_0 + b_1\mathrm{XLIST}_{it} + b_2\mathrm{POST}_{it} + b_3\mathrm{XLIST}_{it}:\mathrm{POST}_{it} + b_4\mathrm{SIZE}_{it} + b_5\mathrm{GROWTH}_{it} + b_6\mathrm{EISSUE}_{it} + b_7\mathrm{LEV}_{it} + b_8\mathrm{DISSUE}_{it} + b_9\mathrm{TURN}_{it} + b_{10}\mathrm{CF}_{it} + \sum_{k=1}^{11} b_{k+10}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

where ADAC is the absolute value of discretionary accruals, XLIST is an indicator variable coded 1 for cross-listed companies and 0 for matched U.S. companies, POST is an indicator variable coded 1 for cross-listed companies in post-IFRS periods and 0 in pre- IFRS observations; for matched U.S. companies, POST has the same value as the cross-listed company it is matched to, SIZE is the company's size, measured as the log of market value of common equity, GROWTH is the company's growth, measured as the annual percentage change in sales, EISSUE is an increase in equity, measured as the annual percentage change in common equity, LEV is leverage, measured as the ratio of total liabilities to common equity, DISSUE is an increase in debt, measured as the annual percentage change in total liabilities, TURN is turnover, measured as the ratio of sales to total assets, and CFO is cash flow from operations, measured as cash flow from operations deflated by total assets. The key for the analysis of potential smoothing under different accounting regulations (pre- and post-implementation of IFRS) is factor $b_{3,}$ which represents incremental change in ADAC for cross-listed companies in the post-IFRS period relative to cross-listed companies in the pre-IFRS period.

Earning management may also lead to the targeting of the level of earnings. To calculate that type of measurement of earnings management, the following model [6] can also be used

[6]

$$\mathrm{POST(0,1)}_{it} = \alpha_0 + \alpha_1\mathrm{SPOS}_{it} + \alpha_2\mathrm{SIZE}_{it} + \alpha_3\mathrm{GROWTH}_{it} + \alpha_4\mathrm{EISSUE}_{it} + \alpha_5\mathrm{LEV}_{it} + \alpha_6\mathrm{DISSUE}_{it} + \alpha_7\mathrm{TURN}_{it} + \alpha_8\mathrm{CF}_{it} + \alpha_9\mathrm{AUD}_{it} + \alpha_{10}\mathrm{NUMEX}_{it} + \alpha_{11}\mathrm{XLIST}_{it} + \alpha_{12}\mathrm{CLOSE}_{it} + \sum_{k=1}^{11} \alpha_{k+12}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

where POST (0,1) is an indicator variable that equals one for observations in the post-adoption period and zero otherwise, while SPOS is an indicator variable that equals one for observations where net income scaled by total assets is between 0 and 0.01. A negative coefficient on SPOS, as Christensen et al (2015) mentioned, suggests that companies manage earnings less towards a small positive target in the post-adoption period.
The last facet of potential earning management refers to earnings persistence, and according to Dechow et al (2010), is important because more persistent earnings can result in better inputs to equity valuation models and to higher equity market valuations. Following Sun et al (2011), model [7] can be used to appraise persistence:

[7]

$$\mathrm{E}_{i(t+1)} = b_0 + b_1\mathrm{XLIST}_{it} + b_2\mathrm{POST}_{it} + b_3\mathrm{E}_{it} + b_4\mathrm{XLST}_{it}:\mathrm{POST}_{it} + b_5\mathrm{XLIST}_{it}:\mathrm{E}_{it} + b_6\mathrm{POST}_{it}:\mathrm{E}_{it} + b_7\mathrm{XLIST}_{it}:\mathrm{POST}_{it}:\mathrm{E}_{it} + \sum_{k=1}^{11} b_{k+12}\mathrm{IDUM}_{it} + \varepsilon_{it}.$$

where E_t is earnings before extraordinary items for year t, deflated by beginning-of-period market value of common equity. B_7 is the most interesting factor because it represents incremental effect on persistence for cross-listed companies in the post-IFRS period. It means that if IFRS leads to more persistent or higher-quality earnings, one should expect b_7 to be positive. Alternatively, b_7 could be positive if the decrease in persistence was less for IFRS than for the matched sample group.

Methodology and Sample Description

This paper examines a case study based on entities listed on the Warsaw Stock Exchange that transferred the framework of their financial statements (from the Polish Accounting Act to the International Financial Reporting

Standards). To evaluate if that kind of transformation led to preparing financial statements of higher quality, I applied the measures which are recognized as the most appropriate in assessing the value and quality of financial statements. This paper is the natural continuation and refinement of comparative research on companies conducted by Piechocka-Kaluzna (2018) and Piechocka-Kaluzna (2019) that prepared their financial statements under IFRS and local accounting regulations presented on separate samples in 2019.

A novelty in relation to the approach used in the literature is the use of the XGBoost method, which is discussed later in this section. In addition, various types of modifications were applied (which had not been seen before in the world literature), such as the use of a model with fixed effects instead of an unobservable effect model for panel data. I decided to take such a step where the procedure used so far in the literature gave uninterpretable results.

The sample consists of 2977 firm-year observations of Polish-based companies quoted on the Warsaw Stock Exchange – WSE (Poland) between 2004 and 2019. During the study, I used year-end standalone financial statements, auditors' opinions, share quotations that come from the Notoria base. Additionally, I analyzed data of the above-mentioned companies obtained from a court register. For each of these companies, I checked the accounting standards applied to the annual reports and designed a sample of 'switch companies' – companies that transferred their accounting framework from the Polish Accounting Rules (PAR) to the International Financial Reporting Standards (IFRS). These were all transfers to IFRS during the years 2004-2019 on WSE that referred solely to standalone financial statements. The sample excluded group financial statements. Table 1 and chart 1 present industry breakdown and year breakdown of the sample.

Table 1: Industry breakdown of the sample

Industry breakdown	Number of Firm-Year Observations	Percentage of Firm-Year Observations	Number of IFRS firms	Percentage of IFRS firms
Construction	232	8%	195	9%
Chemical	30	1%	30	1%
Energy	16	1%	13	1%
Mining	10	0%	10	0%
Information technology	153	5%	125	6%
Other	2259	76%	1475	71%
Media	59	2%	58	3%
Real Estate	74	2%	62	3%
Oil and gas	15	1%	15	1%
Food and drink	101	3%	78	4%
Telecommunication	28	1%	27	1%
Total	**2977**	**100%**	**2088**	**100%**

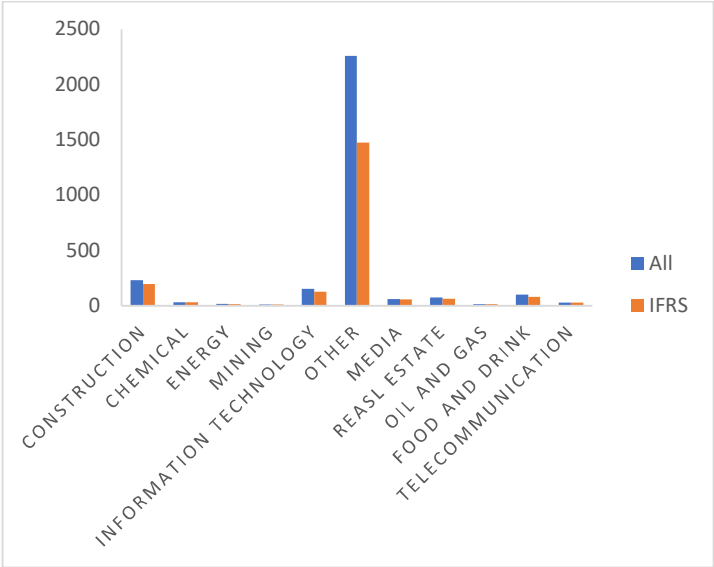

Fig. 1: Industry breakdown of the sample

In accordance with the well-recognized studies of Ball et al (2003), Ball and Shivakumar (2005), Basu (1997) and Barth et al (2008), I removed the outliers using the following empirical criteria for the variables:

- GROWTH > -100 or GROWTH < 100,
- LEV < 100 or LEV > -100,
- DISSUE < 100 or DISSUE > -100,
- BVPS < 100 or BVPS > -100,
- EPS < 100 or EPS > -100,
- ΔNI < 100 or ΔNI > -100,
- ΔCF < 100 or ΔCF > -100,
- ADAC < 2.000.000.

Table 2 presents descriptive statistics on all variables chosen for the analysis of accounting quality of the 'switch companies'. All of test variables and control variables were defined in a manner most similar to the corresponding formulas described in models [1]-[7], except the IDUM control variable for which (following the WSE methodology) industries were divided based on sub-indices:

- WIG-budownictwo – for construction industry,
- WIG-chemia for chemical industry,
- WIG-energia for energy,
- WIG-górnictwo for mining,
- WIG-informatyka for information technology,
- WIG-media for media,
- WIG-paliwa for oil and gas industry,
- WIG-spożywczy for food and drink industry,
- WIG-nieruchomosci for real estates industry,
- WIG-telekomunikacja for telecoms,
- others not included in any of the above sub-indices.

The significance of the means was calculated using the t-test (two-sided tests) and significance for medians was calculated using the Wilcox test (two-sided tests). The following are of material significance:

- ACC, SPOS, LNEG, P, DISSUE, XLIST for means significance of 1‰,
- ΔNI, EISSUE and CLOSE for means significance of 1%,
- CF and TURN for means significance of 5%,

- ΔNI, ΔCF, ACC, CF, SPOS, LNEG, P, LEV, EISSUE, DISSUE, AUD, XLIST for medians significance of 1‰,
- TURN for medians significance of 5%.

Table 2: Descriptive statistics

	IFRS (N = 2088)			Non-IFRS (N = 889)			p-value (means)	p-value (medians)
	Mean	Median	Stand. Dev.	Mean	Median	Stand. Dev.		
Test variables								
ΔNI	0,05	0,00	2,05	0,08	0,01	0,58	0,670	0,000***
ΔCF	0,02	0,00	0,25	0,00	0,00	0,40	0,276	0,598
ACC	-0,06	-0,02	2,18	-0,02	0,00	0,42	0,448	0,000***
CF	0,03	0,03	0,24	0,03	0,04	0,24	0,000***	0,000***
SPOS	0,35	0,00	0,48	0,30	0,00	0,46	0,006**	0,006**
LNEG	0,07	0,00	0,26	0,07	0,00	0,25	0,607	0,612
R	0,03	0,05	2,63	0,05	0,09	1,95	0,842	0,000***
NI/P	0,02	0,00	0,00	0,01	0,00	0,00	0,485	0,469
P	17,66	5,95	50,09	19,99	6,46	58,84	0,196	0,000***
BVPS	9,91	5,31	13,89	7,06	2,88	13,36	0,000***	0,000***
EPS	0,40	0,20	3,71	0,68	0,20	2,78	0,035	0,364
Control variables								
LEV	1,01	0,65	3,67	1,29	0,74	3,84	0,081	0,000***
GROWTH	0,34	0,04	3,56	0,44	0,13	2,69	0,444	0,000***
EISSUE	0,20	0,00	0,40	0,39	0,00	0,49	0,000***	0,000***
DISSUE	0,39	0,05	2,99	0,84	0,14	4,62	0,012*	0,000***
TURN	0,94	0,77	0,98	1,31	1,09	1,12	0,000***	0,000***
SIZE	11,78	11,51	1,66	11,24	11,23	1,53	0,000***	0,000***
CF	0,03	0,03	0,24	0,03	0,04	0,24	0,896	0,199
NUMEX	1,86	2,00	1,08	1,91	2,00	1,00	0,236	0,001***
AUD	0,22	0,00	0,41	0,13	0,00	0,34	0,000***	0,000***
XLIST	0,05	0,00	0,22	0,05	0,00	0,23	0,531	0,522
CLOSE	0,52	0,51	0,23	0,56	0,58	0,22	0,000***	0,000***

*where '***' means significance of 1‰ for p-value, '**' means significance of 1% for p-value, '*' means significance of 5% for p-value and '.' means significance of 10% for p-value.*

Each of the models applied was estimated twofold. First, for companies before transformation into IFRS (which was referred to as -pre); second, for the same companies but for periods after transferring into IFRS (which was referred to as -post).

For each of the 7 models used for measuring quality, there are estimated regressions with results (presented in tables) which depict the significance of particular variables on a given significance level ('***' for 1‰, ''**' for 1%, '*' for 5% or '.' for 10% significance). If there is no asterix or dot, it means that variable data was statistically insignificant in explaining the control variable.

Additionally, for measuring the significance of particular features, I applied the xgboost (eXtreme Gradient Boosting) method, as described by Chen et al (2016). The method refers to regression tree learning, characterized by Breiman et al (1984) and is widely used for classification, regression and ranking issues. Its undisputable advantage is the possibility of measuring the importance of the features (variables) used in the model. The importance is calculated separately for each tree as an improvement in the quality of the division in the tree and then it is weighted by the number of observations in nodes. Subsequently, it is averaged over all trees and scaled so that the most important feature has a measure of importance of 100. During model construction, 1000 regression trees were used for each model considered. The results are presented using graphs. If there is no such drawing for some models, it means that the tree with only one division was optimal and only one feature is important according to this criterion.

Results

Models [1]–[5] were applied to study earning smoothing within the sample.

Table 3-4 and charts 2-3 present results for model [1], which assesses earning management for companies before (-pre) and after (-post) the transfer into IFRS.

Applying the fixed effect panel model [1], I received the following parameters:

- n = 145, T = 1-12 and N = 388 (where n is the number of companies in the model, T means the number of years and N is the number of observations) for -pre companies,
- n = 205, T = 1-14 and N = 1223 for -post companies.

Table 3: Panel regression for model [1] – pre-transformation

	Parameter	p-value	Significance
SIZE	-0,05	0,003	**
GROWTH	0,01	0,314	
EISSUE	0,03	0,231	
LEV	0,01	0,092	.
DISSUE	0,04	0,000	***
TURN	0,00	0,986	
CF	0,45	0,000	***
AUD	-0,04	0,515	
CLOSE	-0,38	0,001	***
wig_budow	-0,03	0,760	
wig_energ	0,11	0,382	
wig_info	0,02	0,869	
wig_media	0,12	0,598	
wig_nrchom	0,00	0,980	
wig_spozyw	-0,22	0,045	*

The significant features for model [1] for companies in the years before the transfer to IFRS are the following variables:

- DISSUE, CF and CLOSE at 1‰ significance level,
- SIZE at 1% significance level,
- Food and drink at 5% significance level.

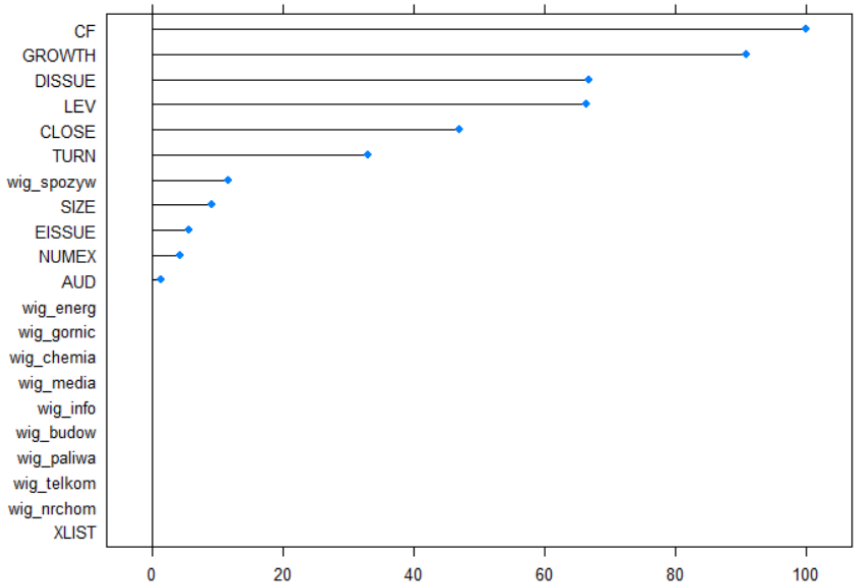

Fig. 2: Importance of features for model [1] – pre-transformation.

A ranking of importance estimated using the xgboost method indicates that the most important variables are CF, GROWTH, DISSUE and LEV, which is partially consistent with panel regression results for the same model.

Table 4: Panel regression for model [1] – post-transformation

	Parameter	p-value	Significance
SIZE	0,09	0,007	**
GROWTH	0,02	0,216	
EISSUE	0,08	0,243	
LEV	0,01	0,708	
DISSUE	0,00	0,791	
TURN	-0,17	0,024	*
CF	7,39	0,000	***
AUD	0,01	0,882	
CLOSE	0,10	0,125	
wig_budow	-0,35	0,319	
wig_chemia	0,04	0,793	
wig_info	0,20	0,307	
wig_media	0,20	0,733	
wig_nrchom	-0,10	0,547	
wig_paliwa	0,21	0,313	
wig_spozyw	0,31	0,336	
wig_telkom	-0,13	0,828	

The following variables were significant for model [1] in the years after the application of IFRS:

- CF at 1‰ significance level,
- SIZE at 1% significance level,
- TURN at 5% significance level.

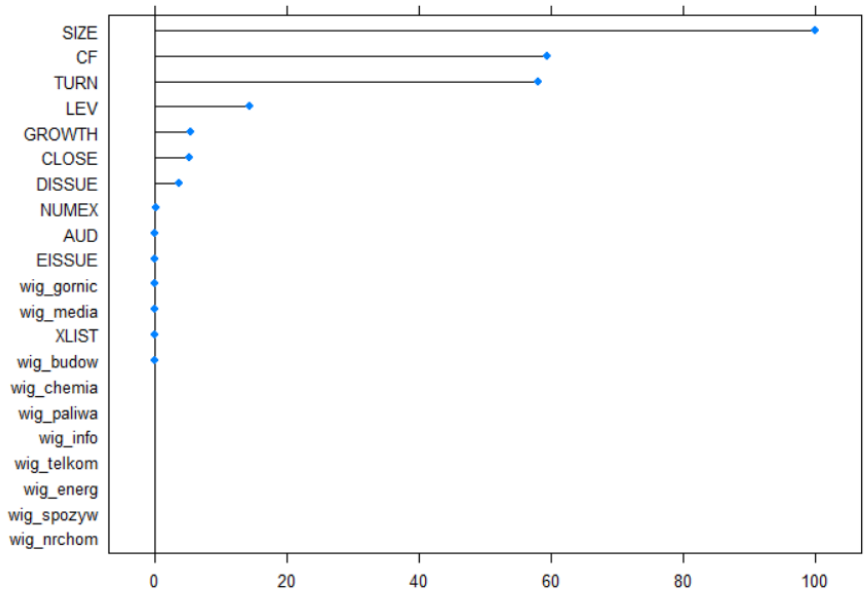

Fig. 3: Importance of features for model [1] – post-transformation.

A ranking of importance estimated using the xgboost method indicates that SIZE is the most important feature, which is generally consistent with the outcomes of panel regression.

Tables 5-6 present results for fixed effect panel model [2], where, following Christensen et al (2015) approach, ΔCF is the change in year cashflows from operations scaled to net assets.

I received the following parameters:

- n = 145, T = 1-12 and N = 388 for pre-transformation companies,
- n = 205, T = 1-14 and N = 1223 for post-transformation companies.

Charts 4-5 show the importance of features calculated with the use of the xgboost method.

Table 5: Panel regression for model [2] – pre-transformation

	Parameter	p-value	Significance
SIZE	-0,01	0,664	
GROWTH	0,02	0,088	*
EISSUE	-0,02	0,335	
LEV	0,00	0,393	
DISSUE	-0,01	0,087	*
TURN	0,05	0,122	
CF	-1,02	0,000	***
AUD	-0,03	0,563	
CLOSE	-0,07	0,428	
wig_budow	0,03	0,647	
wig_energ	0,03	0,802	
wig_info	0,02	0,750	
wig_media	-0,02	0,905	
wig_nrchom	-0,03	0,779	
wig_spozyw	-0,05	0,588	

In model [2], for years before the transfer to IFRS, variable CF is significant at the 1‰ level and variables GROWTH and DISSUE are significant at the 10% level.

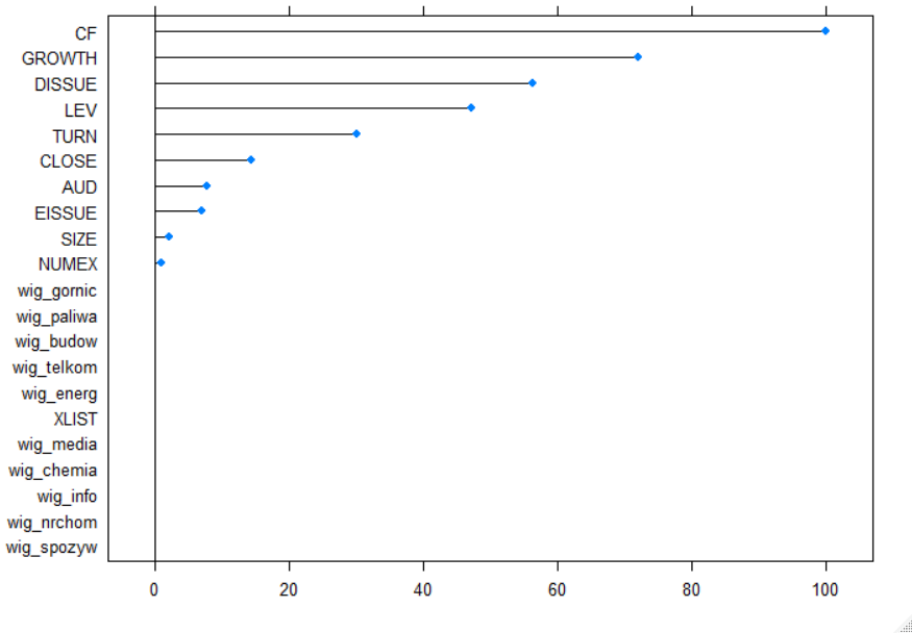

Fig. 4: Importance of features for model [2] – pre-transformation

A ranking of importance estimated using the xgboost method indicates that CF is the most important feature in model [2] – pre-transformation and it gave the same result as in panel regression.

Table 6: Panel regression for model [2] – post-transformation

	Parameter	p-value	Significance
SIZE	0,00	0,561	
GROWTH	0,00	0,009	**
EISSUE	-0,01	0,296	
LEV	0,00	0,550	
DISSUE	0,00	0,847	
TURN	0,05	0,000	***
CF	-0,92	0,000	***
AUD	0,01	0,486	
CLOSE	0,00	0,690	
wig_budow	0,05	0,367	.
wig_chemia	0,02	0,382	
wig_info	0,05	0,085	.
wig_media	-0,05	0,586	
wig_nrchom	-0,04	0,059	
wig_spozyw	-0,02	0,550	
wig_telkom	0,05	0,271	

In model [2], for years after the transfer to IFRS, significant variables are:

- CF and TURN on 1‰ significance level,
- GROWTH on 1% significance level,
- variables construction and information technology on 10% significance level.

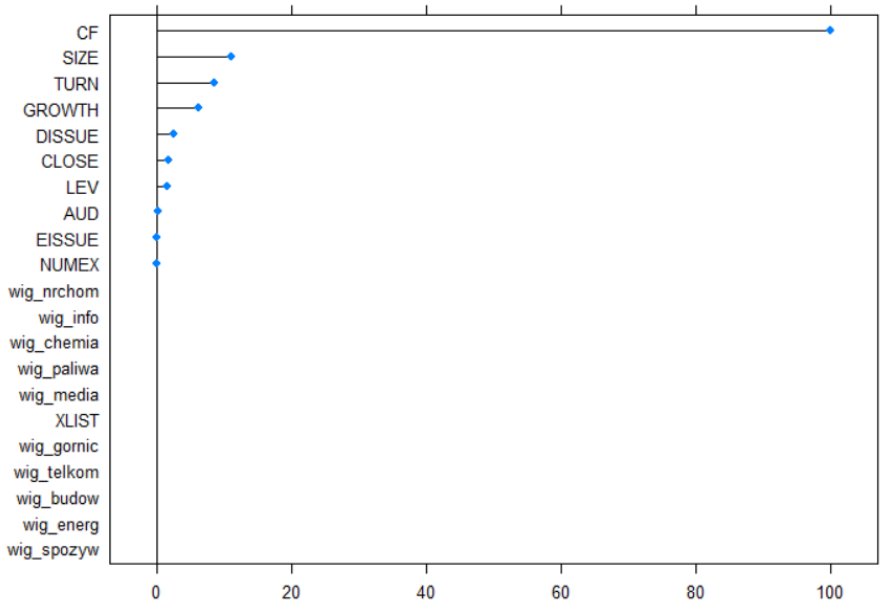

Fig. 5: Importance of features for model [2] – post-transformation

A ranking of importance estimated using the xgboost method indicates that CF is the most important feature in model [2] -post-transformation, which is partially consistent with the results of panel regression.

In model [3], the control variable CF, just like in formula [2], means year cashflows from operations scaled to net assets on the beginning of the year.

Tables 7-8 present results for fixed effect panel model [3] with the following parameters:

- n = 145, T = 1-12 and N = 388 for pre-transformation companies,
- n = 205, T = 1-14 and N = 1223 for post-transformation companies.

Charts 6-7 show the importance of features calculated with the use of the xgboost method.

Table 7: Panel regression for model [3] – pre-transformation

	Parameter	p-value	Significance
SIZE	0,00	0,815	
GROWTH	-0,01	0,256	
EISSUE	-0,01	0,740	
LEV	0,00	0,930	
DISSUE	0,00	0,441	
TURN	0,05	0,042	*
XLIST	0,01	0,935	
CLOSE	-0,04	0,483	
wig_chemia	-0,05	0,556	
wig_gornic	0,00	0,959	
wig_info	-0,04	0,802	
wig_media	-0,06	0,413	
wig_paliwa	0,07	0,307	

According to Table 13, only the TURN variable is statistically significant on 5%.

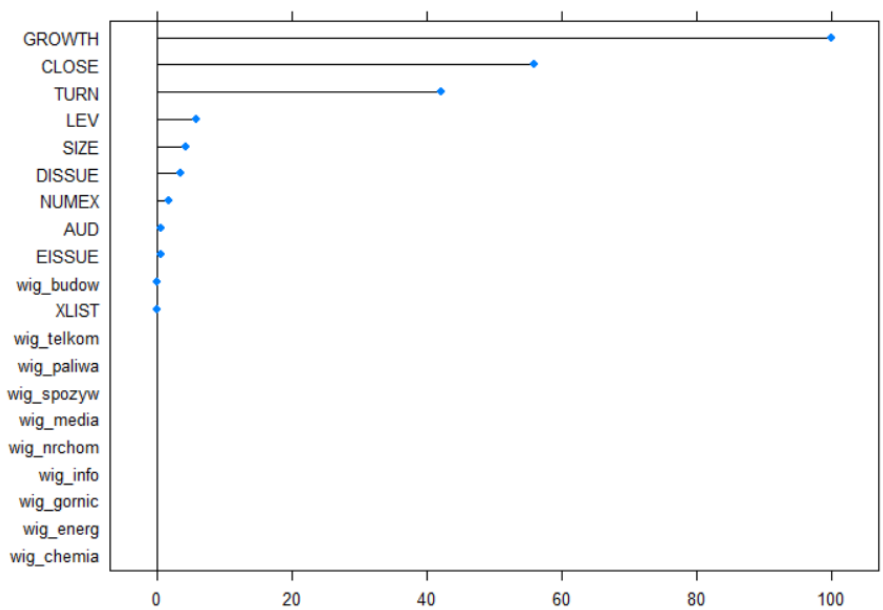

Fig. 6: Importance of features for model [3] – pre-transformation

A ranking of importance estimated using the xgboost method indicates that the most important variable is GROWTH, which gave a different result in comparison to panel regression.

Table 8: Panel regression for model [3] – post-transformation

	Parameter	p-value	Significance
SIZE	0,03	0,016	*
GROWTH	0,00	0,967	
EISSUE	0,01	0,584	
LEV	-0,01	0,019	*
DISSUE	0,00	0,666	
TURN	0,03	0,220	
AUD	0,00	0,958	
NUMEX	0,02	0,258	
XLIST	-0,01	0,927	
CLOSE	0,09	0,067	.
wig_budow	0,00	0,984	
wig_chemia	-0,05	0,805	
wig_info	0,00	0,939	
wig_media	-0,01	0,837	
wig_paliwa	0,01	0,918	
wig_nrchom	0,05	0,806	
wig_spozyw	0,02	0,822	
wig_telkom	-0,08	0,593	

For model [3] - post-transformation, variables SIZE and LEV are significant at the 5% level and variable CLOSE are at the 10% level of significance.

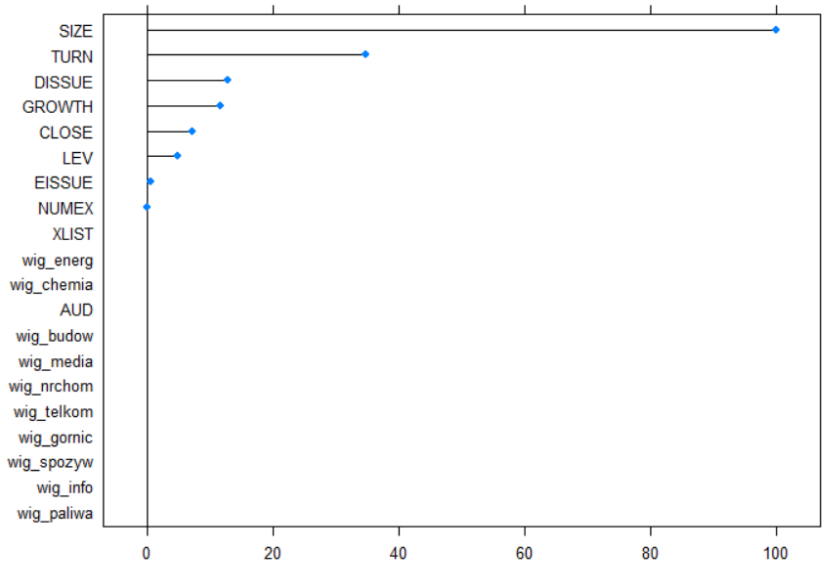

Fig. 7: Importance of features for model [3] – post-transformation

A ranking of importance estimated using the xgboost method indicates that the SIZE and LEV variables are the most important, which is partially compatible to panel regression.

Applying model [4], I treated ACC as accruals scaled to total assets as at the balance sheet date.

Tables 9-10 present results for fixed effect panel model [4] with the following parameters:

- n = 145, T = 1-12 and N = 388 for pre-transformation companies,

- n = 205, T = 1-14 and N = 1223 for post-transformation companies.

Charts 8-9 show the importance of features calculated with the use of the xgboost method.

Table 9: Panel regression for model [4] – pre-transformation

	Parameter	p-value	Significance
SIZE	0,03	0,080	.
GROWTH	0,00	0,668	
EISSUE	0,03	0,213	
LEV	0,00	0,896	
DISSUE	0,01	0,094	.
TURN	-0,04	0,312	
AUD	-0,01	0,852	
CLOSE	0,03	0,728	
wig_budow	0,02	0,770	
wig_energ	0,06	0,587	
wig_info	0,02	0,793	
wig_media	0,00	0,997	
wig_nrchom	0,07	0,474	
wig_spozyw	-0,10	0,286	

For model [4], for the years before the transfer to IFRS, only variables SIZE and DISSUE are significant at the 10% level of significance.

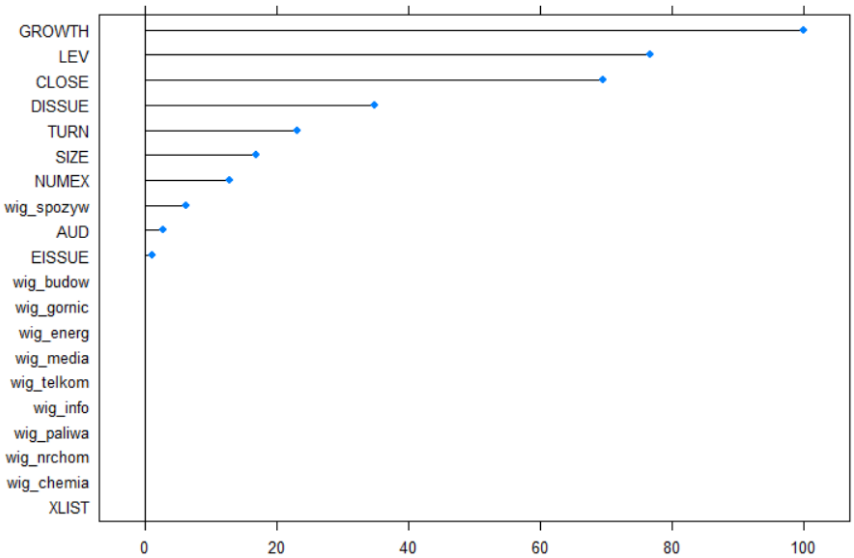

Fig. 8: Importance of features for model [4] – pre-transformation

A ranking of importance estimated using the xgboost method indicates that the most important variable is GROWTH, which is not consistent with panel regression for the same model.

Table 10: Panel regression for model [4] – post-transformation.

¤	Parameter¤	p-value¤	Significance¤
SIZE¤	-0,30¤	0,001¤	***¤
GROWTH¤	-0,01¤	0,724¤	¤
EISSUE¤	-0,13¤	0,511¤	¤
LEV¤	0,11¤	0,029¤	*¤
DISSUE¤	0,02¤	0,505¤	¤
TURN¤	-0,01¤	0,979¤	¤
AUD¤	0,01¤	0,980¤	¤
CLOSE¤	-0,31¤	0,101¤	¤
wig_budow¤	0,41¤	0,678¤	¤
wig_chemia¤	-0,76¤	0,071¤	.¤
wig_info¤	-0,18¤	0,739¤	¤
wig_media¤	0,18¤	0,915¤	¤
wig_nrchom¤	0,00¤	0,999¤	¤
wig_spozyw¤	-0,15¤	0,800¤	¤
wig_telkom¤	-0,53¤	0,568¤	¤

The significant variables in panel regression for model [4] -post-transformation are SIZE at the 1‰ level of significance, SIZE at the 5% level of significance and chemical at the 10% level of significance.

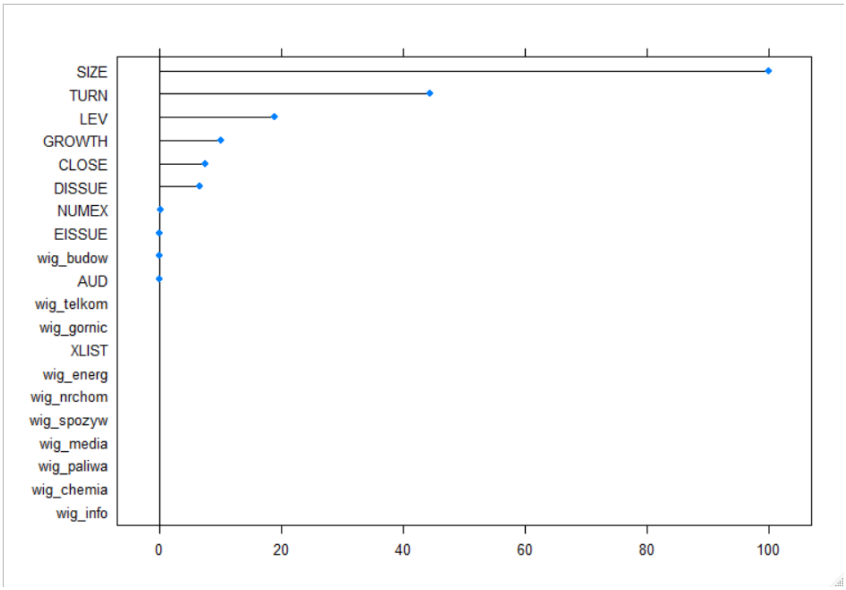

Fig. 9: Importance of features for model [4] – post-transformation

A ranking of importance for model [4] - post-transformation estimated using the xgboost method indicates that the most important variable is SIZE, which gave partially the same result in comparison to panel regression.

The results of model [5], which is difference-in-difference regression analyzed by Bertrand et al (2004), the ADAC control variable means the absolute value of all accruals.

Table 11 presents the results obtained for model [5].

Table 11: Difference-in-difference regression for model [5]

	Parameter	p-value	Significance
constant value	0,086	0,000	***
XLIST	0,049	0,003	**
POST	-0,021	0,000	***
SIZE	-0,003	0,031	*
GROWTH	0,000	0,750	
EISSUE	-0,006	0,234	
LEV	0,003	0,002	**
DISSUE	-0,001	0,462	
TURN	0,000	0,841	
CF	0,027	0,097	.
wig_budow	0,053	0,000	***
wig_chemia	-0,015	0,446	
wig_energ	-0,008	0,770	
wig_info	0,029	0,001	**
wig_media	0,024	0,106	
wig_nrchom	0,015	0,293	
wig_paliwa	0,019	0,491	
wig_spozyw	-0,010	0,404	
wig_telkom	0,014	0,600	
XLIST:POST	-0,063	0,003	**

According to model [5], the following variables are significant:

- constant value, POST, construction at the 1‰ significance level,
- XLIST, LEV, information technology and XLIST:POST at the 1% significance level,
- SIZE at the 5% significance level,
- CF at the 10% significance level.

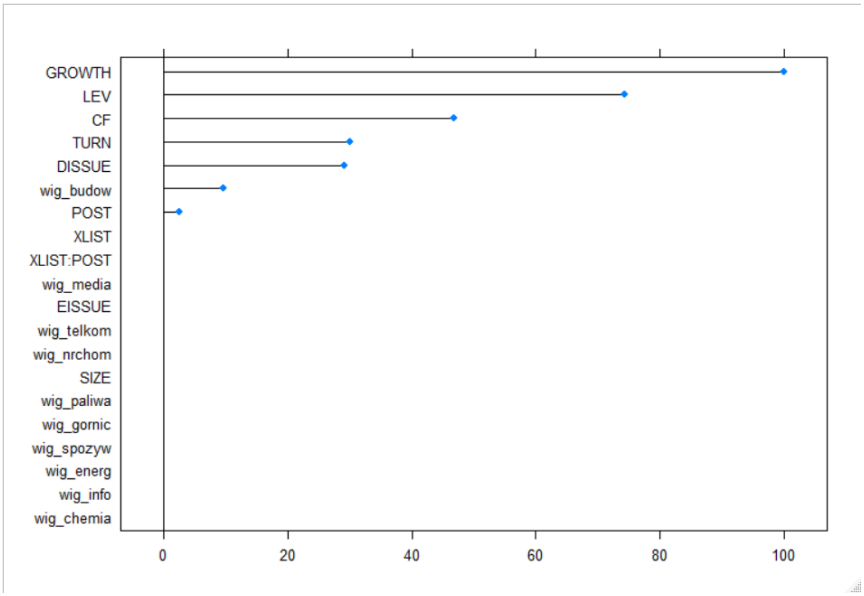

Fig. 10: Importance of features for model [5].

A ranking of importance for model [5] estimated using the xgboost method indicates that the most important variables are GROWTH, LEV, CF and TURN, which is not consistent with the results of difference-in-difference regression.

Model [6] is a logistic regression for panel data described by Chan et al (2015). It was applied to estimate the potential earning management toward target profit.

According to Table 12, which presents the results for this model (where n = 221, T = 1 – 15 and N = 1611), the following variables are significant:

- SIZE, TURN, NUMEX, CLOSE, construction and information technology on 1‰ significance level,
- DISSUE and mining es on 5% significance level,
- XLIST and chemical on 10% significance level.

Table 12: Logistic regression for model [6]

	Parameter	p-value	Significance
SPOS	-0,01	0,683	
SIZE	0,07	0,000	***
GROWTH	0,00	0,885	
EISSUE	-0,03	0,149	
LEV	0,00	0,911	
DISSUE	-0,01	0,023	*
TURN	-0,12	0,000	***
CF	0,05	0,239	
AUD	0,04	0,288	
NUMEX	-0,12	0,000	***
XLIST	0,04	0,735	.
CLOSE	-0,21	0,000	***
wig_budow	0,26	0,000	***
wig_chemia	0,34	0,065	.
wig_energ	-0,18	0,413	
wig_gornic	0,84	0,042	*
wig_info	0,22	0,000	***
wig_media	0,07	0,412	
wig_nrchom	0,10	0,292	
wig_spozyw	-0,06	0,798	
wig_telkom	0,35	0,000	***

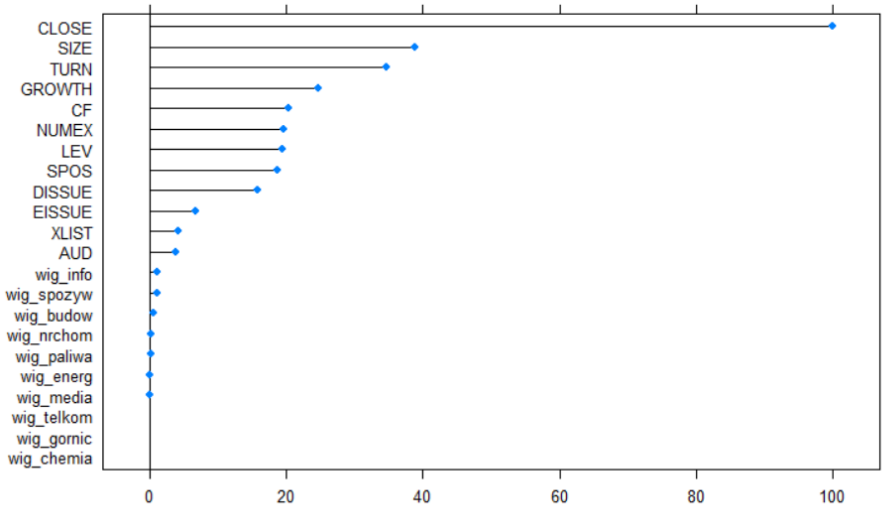

Fig. 11: Importance of features for model [6]

A ranking of importance for model [6] estimated using the xgboost method indicates that the most important variable is CLOSE, which is practically consistent with the logistic regression model.

Model [7], applied to evaluate earnings persistence, resulted in a fixed effect panel model, where n = 229, T = 2 – 15 and N = 2829.

Table 13: Panel regression for model [7]

	Parameter	p-value	Significance
E	0,89	0,030	*
XLIST	198978,90	0,018	*
POST	-9201,16	0,531	
wig_budow	18192,87	0,568	
wig_chemia	49814,15	0,576	
wig_energ	52530,56	0,635	
wig_gornic	-135074,44	0,305	
wig_info	-12603,99	0,709	
wig_media	1288,02	0,978	
wig_nrchom	12939,22	0,810	
wig_paliwa	103288,19	0,469	
wig_spozyw	36584,62	0,477	
wig_telkom	-132410,02	0,158	
E: XLIST	-1,69	0,000	***
E: POST	-0,60	0,145	
XLIST: POST	316180,75	0,000	***
XLIST: POST: E	2,00	0,000	***

As we can see, according to Table 13 the significant variables in model [7] are E:XLIST, XLIST:POST and XLIST:POST:E at the 1‰ significance level and E and XLIST at 5%.

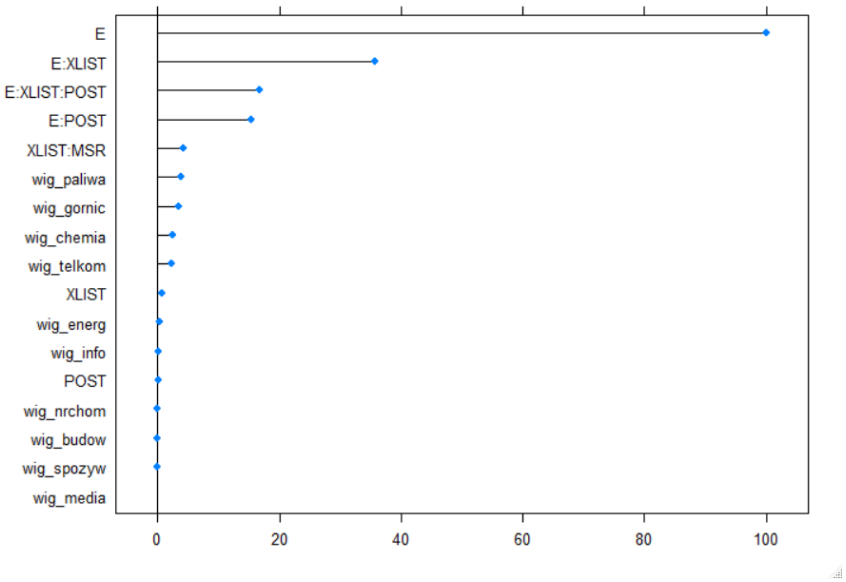

Fig. 12: Importance of features for model [7].

A ranking of importance for model [7] estimated using the xgboost method indicates that only control data E explains its changes and none of the variable data is important.

Conclusions

The final results of increasing the accounting quality for companies after the transfer to IFRS is presented in Table 14. The volatility of the control data was calculated as the variance of the examined variable. An asterix ('*') means that it was based on residuals instead of raw data. Thanks to estimating models [3] and [4], it is possible to calculate the Spearman's coefficient between cashflows from operations and accruals. According to the accepted approach, the Spearman's coefficient level is interpreted as:

- weak correlation if it ranges from 0.00 to 0.29,
- moderate correlation if it ranges from 0.30 to 0.49,
- substantial correlation if it ranges from 0.50 to 0.69,
- strong correlation if it ranges from 0.70 to 0.89,
- very strong correlation if it is higher than 0.90.

According to recognized studies like Barth et al (2008), it is much more appropriate to examine the residuals of the models than the absolute value of CF and ACC. To test the equality of two variations (variances), the F-test was used. When testing other differences, the bootstrap test was used. It consists in drawing (with return) a sample of companies with the same number as the whole sample. For each such sample, the size of interest was determined and compared with the observed one. The whole procedure was repeated 1000 times. The percentage greater than the observed value shall be recognized as p-value. The match factor reported in the Table is an improved match factor that can serve as a measure of quality of the model if the number of explanatory variables is greater than 1. It informs us how many percent of the changes in the explanatory variable are due to changes in the explanatory variables.

Table 14: Accounting quality of financial statements

Earnings management	Pre-adoption	Post-adoption	Expected sign	Difference	Difference (%)	Level of significance
Variability of ΔNI	0,3420	1,4220	+	1,0800	316%	***
Variability of ΔNI*	0,0201	0,0468	+	0,0267	132%	***
Variability of ΔNI/ΔCF	2,0990	46,0300	+	43,9310	2093%	***
Variability of ΔNI*/ΔCF*	1,6500	2,4800	+	0,8300	50%	***
Correlation between ACC and CF	-0,2080	0,6046	+	0,8126	-391%	***
Correlation between ACC* and CF*	-0,8908	-0,9379	+	-0,0471	5%	*
Small Positive NI (SPOS) (*N* = 1278)		-0,0100	–			No

Table 14 presents the outcomes of comparison of accounting quality in the period before (pre-) and after (post-) the transfer to IFRS in Poland, based on 804 pre- and 1802 for post-transfer observations. The variability of earnings (ΔNI) increases significantly in post-adoption periods, which is consistent with the expected decrease in earning management. According to Christensen, the change in the variability of earnings could also be driven by a natural change of scope or nature of activity (which is also accompanied by a change in cash flows from operations), rather than merely by a positive effect of the implemented regulations. However, an analysis of the variability of earnings relative to cashflows from operations (ΔNI/ΔCF) proves that it is not the case. My studies demonstrate that a positive change in the variability of earnings is a consequence of implementation of IFRS, because the variability of earnings is higher than the variability of cashflows from operations. Consequently, it strengthens the positive effects of implementation of IFRS on the quality of financial statements.

The negative correlation between accruals and operating cashflows in the periods before IFRS adoption changed significantly to a positive correlation, which is also argued to reduce earning management after the adoption of international standards while preparing financial statements. All of these changes were significant on 1‰ significance level.

The coefficient on small positive profits for model [6] is slightly below 0. Therefore, the inference about reduced earnings management towards target profit in periods after the adoption of IFRS is not allowed.

To sum up, it can be said that the analysis of the sample of companies quoted on WSE in 2004-2019 which transferred their accounting framework into IFRS is partially consistent with the prior research. In general, within the examined sample, there is a slight trend towards a decrease in earning management. However, some changes observed are not as strong as it would be expected given the results of previous studies. It demonstrates that IFRS are better than local Polish regulations (in terms of the quality of financial statement), but the difference was downright symbolic.
Consequently, this may lead to the conclusion that the prior local accounting regime (PAR) was on a fair level. However, consistent with the many caveats to this study, it can be concluded that the adoption of IFRS lead to even higher quality of accounting.

To summarize, the implications mentioned above support the conclusion that I contribute to the accounting literature on IFRS in the following ways. First, because no one has done such comprehensive research in the field of accounting in Poland before. The results of current studies confirm the outcomes of the research I conducted in earlier times (Piechocka-Kałużna 2019) on a broader but more general sample.

Second, my current studies exhibit the quality of financial statements prepared under IFRS in the same entities that had used Polish local GAAP previously. Even though the current studies are more detailed, targeted and objective than previously examined by Piechocka-Kałużna (2019) and Piechocka-Kałużna (2014), they still lead to the same conclusions. That in effect highlights the thesis that IFRS are rather of better quality.

Third, my studies generally prove that implementation IFRS as a framework for preparation of financial statements makes an improvement in accounting quality. Although they resulted in changes in accounting quality between the pre and postadoption periods, it is not a big difference. This leads to the conclusion that Polish accounting regulations should be considered as high-quality set of regulations as well. It likely explains why for many years the issue of IFRS implementation in Poland was approached with a distance. On the other way it may also justify why after using

IFRS in practice, many respondents to my earlier studies decided to change their attitude to IFRS. Like Frost et al. (2009), I do believe that academic research has a great role to play in the debate over the future of IFRS.

Moreover, I need to emphasized that accounting quality measures do not capture all possible benefits from IFRS adoption. Brochet et al (2013) find capital market benefits following mandatory IFRS adoption in the UK, which had previous domestic standards that are considered by Bae et al (2008) to be very similar to IFRS. According to DeFond et al (2010) and Wang (2014) the benefits are more likely to arise from changes in accounting comparability than changes in accounting quality.

Finally, I suppose that interesting, important and a novelty in relation to the approach used in the previous literature is also the innovative use of the XGBoost method. In addition, various types of modifications were applied (which had not been seen before in the world literature), such as the use of a model with fixed effects instead of an unobservable effect model for panel data.

I am confident that my findings should be of interest for research on financial statements' quality. This research might serve as a base for future studies on IFRS transfer on other markets. Furthermore, there exist considerable avenues for future research on the applying new approaches within financial reporting area as XGBoost.

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A Different Approach to Inflection Points Detection In L-Shape Curves

Alexandra BAICOIANU
Transilvania University of Brașov, Brașov, Romania
a.baicoianu@unitbv.ro

Bianca A. LIXANDRU
Transilvania University of Brașov, Brașov, Romania
andreea.lixandru@student.unitbv.ro

Abstract

This paper is organized around the problem of detecting the inflection point in a L-shaped curve. Nowadays, this problem is often encountered both in academic environment and in real situations, being found in fields such as engineering, mathematics and acoustics. This research study extends two specific procedures for detecting the inflection point in L-shaped curves: triangle method and optimal regularization method. A number of different experiments have been used to determine and recommend which method is superior and in which situations. We defined heuristics for which we defined an adaptive way of working given by the curve offered as input. Our research is focused on making both correct and efficient calculations, using parallel computation for example. In the following sections we will present the simplification of the curve, the methods, their results, the comparison between the two methods and all the conclusions.

Keywords: Inflection Point, SVD, L-Shaped Curve, Triangle Method, Simplified Curve, Optimal Regularization Method, Adaptive Algorithms.

Introduction

This article describes two ways of detecting the inflection point in a L-shaped curve. In order to solve this issue, we propose two procedures. The first solution is to simplify the curve and apply the algorithm for detecting the optimal regularization parameter, while the second solution is to simplify the curve and apply the triangle method.

Our algorithms need regularization and some of the most commonly used methods of regularization are: Singular Value Decomposition (SVD), Generalized Singular Value Decomposition (GSVD) [Rodriguez G., Theis D. (2005)], Tikonov Regularization and hybrid methods derived from the Krylov, Arnoldi, Lanczos techniques [Gazzola S., Novati P., Russo M. R. (2015), Sanders T., Platte R. B., Skeel R. D. (2020)]. Following research, we decided to use Singular Value Decomposition for regularization, since its main benefit is to reduce computational cost.

The preferred method is to use a simplified curve instead of a normal curve because it reduces noises and redundant information, examples in Fig1. (a) and (b), and hence facilities the analysis of derivatives. Also, it allows us to generate an accentuated curve and to identify the point more easily. For the points we used the logarithmic scale because this is a more efficient and compact way of displaying numerical data over a very wide range of values. Also, as we want to obtain only the significant points from the curve, we normalize all the data as to reduce large distances between points.

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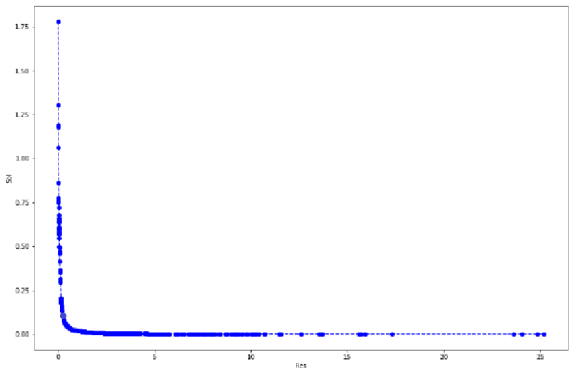

Fig. 1: (a) Curve without simplification

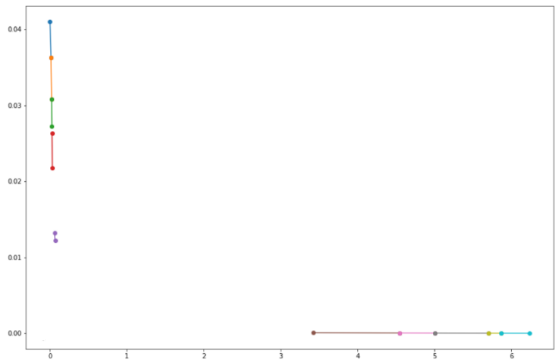

Fig. 1: (b) Curve with simplification

After the first stage of simplification, we need to apply the two algorithms. A very good practice to reduce noise and unnecessary points is to use a simplified curve to compute the algorithms. More than G. Rodriguez and D. Theis (2005) tried in their research study which propose an implementation for detecting the optimal regularization parameter [Rodriguez G., Theis D. (2005)], we tried to make a variadic selection to choose multiple or less points and see which constant is applied better. In their research, G. Rodriguez and D. Theis (2005) proposed a distance smaller than the distance between the first and last point divided by 2*number of points. We tried to divide by a number of 3*number of points, 5*number of points, 6*number of points and 10*number of points and obtained better results in almost all cases. As for the optimal regularization method G. Rodriguez and D. Theis (2005) had a different way to choose the inflection point. We chose the inflection point as the minimum wedge product, because we noticed that not all L-shaped curves have a wedge product of less than -0.5.

For the second algorithm, an excellent starting point was the triangle method proposed by P. Ch. Hansen, T. K. Jensen and G. Rodriguez (2007) [Hansen P. Ch., Jensen T. K., Rodriguez G. (2007)]. Though this algorithm satisfied a numerous cases, we tried to improve their method and ran the algorithm over the simplified curve which turned out to be a very good idea. Moreover, we used Adaptive Pruning Method on the simplified curve, but this technique did not show impressive results.

We also followed the research of A. Kerkri, J. Allal and Z. Zarrouk (2019), which presents their results on triangle method and adaptive pruning method [Kerkri, A., Allal J., Zarrouk Z. (2019)]. As for our own input, we improved triangle method and ran the algorithm over simplified curve. The results we obtained will be presented in the following paragraphs.

The technique by which A. Cultrera and L. Callegaro (2020) solve the issue of finding the inflection point in a L-shaped curve [Cultrera A., Callegaro L. (2020)] had a beneficial impact on this paper, being a good source for further research. Their algorithm includes the Menger curvature of a circumcircle and the golden section search method, which will not be presented in this research study.

Design and analysis of computational experiments

These notations are mostly used in the context of our research study:

n - initial number of values, integer value
p - number of points from simplified curve, integer value
ε_1, ε_2, ε_3 - tolerance, constant values, chosen
x - velocity, uni-dimensional vector
b - pressure, uni-dimensional vector
$|b - Ax|$ - residuals, uni-dimensional vector
$|Hx|$ - solution norms, uni-dimensional vector
P - point with x value equal to logarithmic value of residual and y value equal to logarithmic value of solution norm

We will compare optimal regularization parameter and triangle method and try to decide which algorithm is better. The main problem that arises when applying this kind of algorithms is that they will not provide the best solution in all cases. So, we used two adaptive algorithms that use heuristics rules to obtain a satisfactory result. Before running the algorithm we have to simplify the curve, after which we will apply the two algorithms in turn. All of these will be presented in the following sections, after which we will draw conclusions regarding the positive and negative aspects of the algorithms.

The stages of curve simplification

The first stage involves understanding whether the solution is roughly in the kernel of the regularization operator. If the condition is met, our curve is not L type and then the corner search is impractical. The above is possible through the detection of exceptionally small semi-norms, with a test of the type:

$$\frac{\min |Hx|}{\max |Hx|} < \varepsilon_1$$

The subroutine applies this test in conjunction with:

$$\min \left\{ \frac{|Hx_i|}{|x_i|}, i = 1, \dots, n \right\} < \varepsilon_2.$$

Whenever, the 2-norms of the regularized solutions are provided. The tolerances ε_1 and ε_2 are constants of the algorithm. Their values have been established to 10^{-12} and 10^{-4} respectively, working in double precision, while the results do not appear to be much sensitive to any changes in these parameters.
We then compute the points, P_i of the L-curve:

$$P_i = \{\lg |b - Ax_i|, \lg |Hx_i|), i = 1, \dots, p$$

and the vectors, v_i:

$$v_i = P_j - P_i, i = 1, \dots, p - 1, j = i + 1$$

As to remove clusters we remove all the "short" vectors, i.e. those used to validate the condition:

$$|v_i| < \varepsilon_3,$$

and assigning q acceptable vectors, with $q \leq p$. The constant ε_3, formerly established at $\frac{|P_p - P_1|}{2*p}$, is rather significant, because it allows the use of more or less vectors. When we divide to a value that is inferior to $2 * p$, we obtain less vectors. Alternatively, if we divide to a greater value than $2 * p$, we further the number of vectors in simplified curve. While considering lower values may provide very good results, it may also lead to risky over-estimates. Therefore, this is the reason why we decided to analyze the choice of ε_3.
To simplify the curve, we tried multiple approaches. An essential element for simplifying the curve is the number by which the value of the distance between the first and the last point is divided. This helps us keep track of the number of segments on which the algorithm will run.

The number chosen for division depends on the number of points in the curve. We will exemplify this for a curve with 100 points and the values 2, 5, 6 and 10.

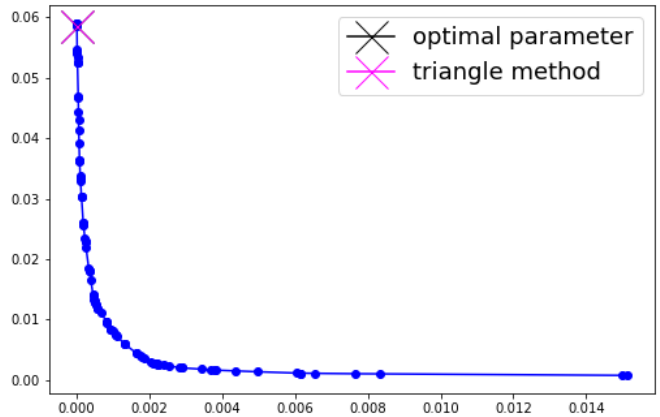

Fig. 2: Curve with divide number 2 $*$ *p*

It can be seen in Fig 2. that the inflection point overlaps for both methods. Moreover, the point chosen is very high because as very few segments are chosen, an accurate choice would be practically impossible.

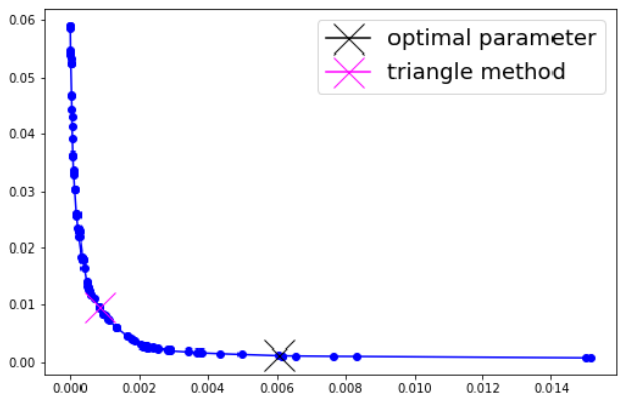

Fig. 3: Curve with divide number 5 $*$ *p*

It can be seen in Fig 3. that the triangle method provides a satisfactory result, but for the optimal parameter method, we notice that the inflection point is chosen on the right side which leads to the possible loss of important data.

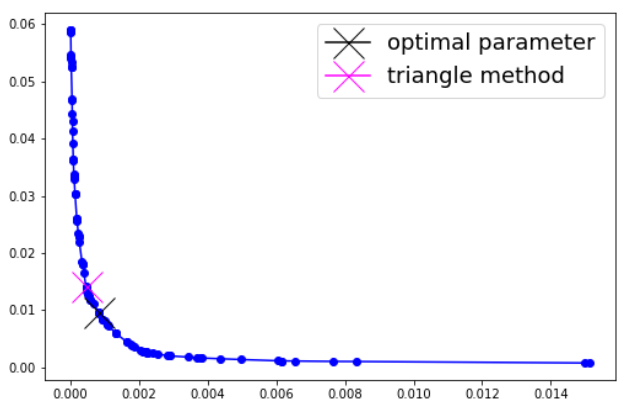

Fig. 4: Curve with divide number 6 $*$ *p*

Fig 4. shows that the results are very good and that both methods propose some satisfactory inflection points.

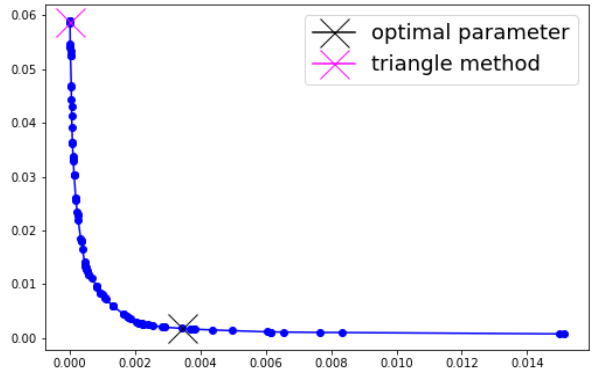

Fig. 5: Curve with divide number $10 * p$

In Fig 5. many segments are already chosen and this produces an unexpected result for both algorithms.
As we saw in the previous examples an important role in determining the inflection point is the number of segments that we use as input for the algorithm. Therefore, based on the number of points, we need to decide which constant to use for division. With a large number of points, we will choose a smaller number. Conversely, with a small number of points we will choose a larger number. Thus, we may conclude that this is a problem-dependent heuristic and requires repeated attempts.

An adaptive algorithm for detecting the optimal regularization parameter

This section aims to introduce an algorithm designed to detect the optimal regularization parameter in truncated singular value decomposition (TSDV) regularization methods for the numerical solution of gravely "ill-posed linear systems" [Rodriguez G., Theis D. (2005)].

The considered algorithm merges a geometrical approach meant to identify the corner of the L-curve related problem with a set of experimental guidelines. A linear system of equation is $Ax = b$. We will refer to the state of "ill-conditioned when the condition number $k(A) = |A||A^{-1}|$ in a given matrix norm is of the same order of magnitude or larger than the reciprocal of the relative precision on the entries of the matrix A and of the right hand side vector b" [Rodriguez G., Theis D. (2005)].

Next, we apply the algorithm over the simplified curve and calculate the wedge product for each vector in the curve:

$$w_i = \det([v_i, v_j]), j = i + 1$$

We have to choose which is the point which represents the inflection point. We compute all the determinants between all consecutive vectors from curve (order of vectors is important) and the smallest wedge product is the inflection point we searched for:

$$point_l = \min(w)$$

For the given curve we will consider each two consecutive vectors in ascending order, which are defined by an angle $\propto \approx \frac{-\pi}{2}$. The corner exploration can be obtained by finding the minimum p-coordinates of the products with a w between two successive vectors.

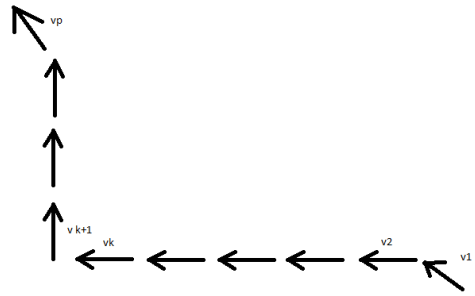

Fig. 6: Identification of inflection point in simplified curve

In Fig 6. it can be seen that the vectors are oriented from right to left and that for every two consecutive vectors the point at their intersection is taken into account.

In addition to the algorithm proposed by G. Rodriguez and D. Theis (2005), we have modified the way in which the number of segments is chosen. Aside from that, we opted out the conditions containing ε_1 and ε_2 because we noticed that those values negatively influenced the results. For example, for some L-shaped curves, the algorithm predicted that they would not be L-shaped due to the condition with the ratio.

Using the adaptive algorithm proposed by us on multiple curves we discovered the following particular cases:

- If simplified curve contains just a vector, algorithm returns left point of the vector.
- If simplified curve contains two vectors, algorithm returns right point from first vector.
- If we use as input a curve with collinear points, algorithm returns right most point in the curve.

Triangle Method

Here, we aim to illustrate a robust and adaptive implementation of the L-curve criterion as to locate the corner of a discrete L-curve comprising a log-log plot of correlative residuals and solution norms for the regularized solutions describing a method with a discrete regularization parameter. First, we need to remove all the points with zero norm. Hence, let us consider the following tuple of L-curve points:

$$\left(P_{i_1}, P_{i_2}, P_n\right), i_1 = 1, \dots, n-2, i_2 = i_1 + 1, \dots, n-1$$

and determine the corner as the triple defined by a minimal oriented angle $\theta(i_1, i_2, i_n)$. When all angles $\theta(i_1, i_2, i_n)$ are greater than $\frac{-\pi}{8}$, then the L-curve is considered "flat" and the leftmost point is designated. Please consider that P_n, the leftmost point, is always included in the calculations.
We calculate the following vectors:

$$v_1 = P_{i_2} - P_{i_1}$$
$$v_2 = P_{i_1} - P_n$$

We compute for each pair of vectors:

$$\theta = \frac{-v_1^T * v_2}{|v_1|^2 |v_2|^2}$$

Also, we have to determine the weight computed as:

$$w = \det\left([v_1, v_2]\right)$$

Through these stages, we have to find the maximum θ which is bigger than $\cos(\frac{7\pi}{8})$ and have a weight smaller than 0. Also, the angle θ is very important because it should be bigger or smaller than a constant which allows us to predict that the angle between two segments is big enough to say that the intersection between that two vectors is the point we were searching for.

For the algorithm proposed by P. Ch. Hansen, T. K. Jensen and G. Rodriguez (2007) we tried several experiments with the $\cos(\frac{7\pi}{8})$ which provided very similar values and we obtained the same results. Like for the other algorithm, the simplification of the curve becomes very significant in obtaining a satisfactory result.

Through our experiments we considered several scenarios and we discovered some particular cases such as:

- If simplified curve contains only two points, algorithm returns first point.
- If curve contains three collinear points, algorithm returns second point.
- If curve contains multiple collinear points, algorithm returns a random point from right side.

Comparative Analysis of Algorithms

A helpful thing for these two algorithms is that we use simplified curve because simplification is beneficial for implementation. It helps us to remove the noise and redundant points from the curve which means that the simplified curve contains only significant points and more realistic data.

Following multiple experiments, we found that the optimal regularization parameter algorithm is better than the triangle method because this algorithm has satisfactory results even in cases where the curves are very noisy or not L-shaped.

We created an interactive interface by means of which we could see the results of the two algorithms in order to compare them and see what happens depending on the parameters we choose.

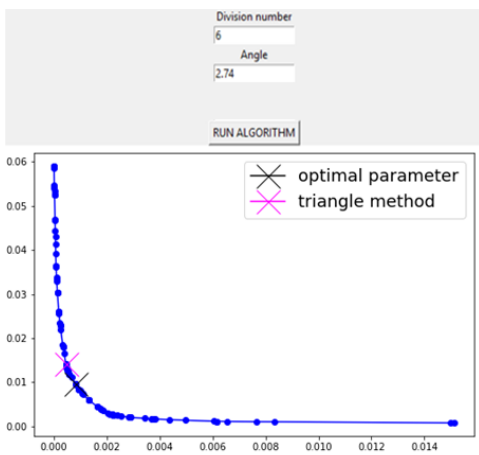

Fig. 7: Visualization of the division number of optimal regularization method

Fig 7. it is illustrated the interface which we used to do the all experiments. This shows an example in which the division number for optimal regularization method was set at value 6 and the angle for triangle method was set at 2.74 value, which is the equivalent of $\cos(\frac{7\pi}{8})$.

The project is medium in size and the implementation of the algorithms was done in C++ and with the help of the Python language we made a friendly interface with which we managed to see the results and call algorithms with various parameters much easier. One of the challenges encountered in carrying out the project was the optimization and one of the ways in which we performed efficient calculations was to solve the linear systems by parallel computation.

Our implementation uses Math Kernel Library (MKL) which is a library that has the following advantages: optimizations, efficiency and the possibility to have parallel computation. In developing our algorithms, MKL was very helpful because we managed to make calculations much faster due to the ability to make parallel calculations. We used this advantage of MKL to treat the following situations: multiplication of medium and large matrices, calculation of the inverse of a matrix.

Conclusions

We detailed new adaptive algorithms used to identify the corner of a discrete L-curve. It was shown that some L-curves are ill behaved due to particular features of the SVD coefficients. In such situations, any L-curve algorithms would fail to find the exact optimal solution, regardless of how it may have been implemented.

But using several numerical examples, we noticed that the optimal parameter method offers very good solutions in almost all cases. It is an algorithm that gives satisfactory results even when we are talking about collinear points. It is a fairly stable algorithm that provides a predictable result.

In most situations, the triangle method also returns a very good result. However, it is not desirable for this algorithm to be used for curves that contain only collinear points or points that are placed on an approximately straight line. In this case, the algorithm would be quite unpredictable.

In some particular cases you can configure the behaviour of the algorithm for both methods may be configured.

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Escape Clauses vs. Strength of Fiscal Rules – Experience of EU Countries

Slawomir FRANEK

University of Szczecin, Poland
slawomir.franek@usz.edu.pl

Abstract

One of the criteria for assessing the strength of fiscal rules is the occurrence of escape clauses, which allow to provide fiscal rules with resilience to shocks and give those rules flexibility. The meaning of this criteria is demonstrated by the experience related with the sharp downturn of sustainability in public finances in the face of the COVID-19 pandemic. The following paper indicates that despite the still insufficient commonness of escape clauses in fiscal rules, their presence is a factor affecting the strength of fiscal rules. The studies conducted have confirmed that the real effect of including the escape clause in the fiscal rule on the Fiscal Rule Strength Index is admittedly not decisive, but noticeable enough that it allows to demonstrate statistically significant differences in the strength of fiscal rules in relation to the criteria of occurrence of escape clauses. It was pointed out, in addition, that a challenge for the fiscal stability of EU Member States will be determining the moment of return to the use of rules in relation to which the escape clauses have been applied in response to the crisis caused by the COVID-19 pandemic.

Keywords: fiscal frameworks, fiscal rules, COVID-19.

Introduction

Fiscal rules are understood as permanent constraints of the fiscal policy expressed in the form of a synthetic measure determining the permissible value of basic budgetary parameters (Kopits, Symansky 1998). In this way, the boundaries of fiscal policy are set, and they cannot be changed frequently. This would be on the assumption that rules are objectives established in the form of a legal act or a political obligation, which can rarely be revised (e.g. within an electoral cycle) and are binding for at least three years. In line with this approach, medium-term budgetary frameworks or expenditure ceilings treated as multi-annual projections that can be revised annually are not considered fiscal rules (Lledo et al. 2017). There is extensive literature on fiscal rules, covering both the characteristics of factors leading to their implementation and the consequences of their application. For example, using a heavy section of countries, Altunbas and Thornton (2017) investigate the economic, institutional and political characteristics of countries affecting the likelihood that the numerical rule will be adopted as part of a fiscal strategy to reduce public debt levels. Research on the consequences of applying fiscal rules indicates that they reduce macroeconomic volatility (Fatas and Mihov, 2006), decrease the procyclicality of fiscal policy (Bergman and Hutchison 2015), and cause public debt to be declined (Azzimonti et al. 2016), lower budget deficits (Caselli and Reynaud 2020) and mitigate the probability of government debt crisis (Asatryan et al. 2018). An analysis of a comprehensive sample of over 140 countries over the period 1985-2015 reveals that fiscal deficits averaged 2.1 percent of GDP in the absence of fiscal rules against 1.7 percent of GDP in the presence of fiscal rules (Caselli and Reynaud 2020).

More refined analysis, using the strength of the fiscal rule (instead of a dummy variable for the existence of a fiscal rule) - and correcting the endogeneity issues - reveals that only well-designed fiscal rules lead to more fiscal discipline (Caselli and Reynaud 2020). This means that in order for there to be efficiency in the application of fiscal rules, postulates regarding their construction should be formulated (Ayuso-i-Casals et al. 2009). They refer to such criteria as: enshrinement of the rule, monitoring system, system of sanctions related to breach of this rule, rules of waiving the rule.

Fiscal rules should set out in advance the procedures for suspension them (so-called escape clauses), especially in emergency situations such as natural disasters or a sharp deterioration of the economic situation. The credibility of the rule is demonstrated by the extent to which the possibility of abandonment of rule (or a temporary suspension) has been defined as a unique case and applied as a last resort and not as a situation that would find use in all conditions.

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The aim of the paper is to establish the meaning of escape clauses for the strength of fiscal rules of EU countries, measured by the value of the *Fiscal Rule Strength Index.* In the analysis, information about fiscal rules included in the *Fiscal rules database* from 2008-2018 (provided by European Commission) were included. Additionally, a review was made of the escape clauses launched in the EU countries as a response to fiscal disturbances caused by the COVID-19 pandemic.

Flexibility of Fiscal Rules

Flexibility of the rule means the possibility of mitigating impact beyond the influence of the authorities through a well-formulated exit clause launched by a self-standing institution. When designing fiscal rules, escape clauses play a fundamental role in ensuring a proper balance between commitment reliability on the one hand and shock response flexibility on the other. It is generally acknowledged that the budgetary framework should be structured with sufficient flexibility to enable an appropriate response to large negative and unpredictable shocks. However, this should not jeopardize the discipline imposed by rules and benefits associated with ensuring the credibility of government commitment. Generally, it can be achieved thanks to well-defined escape clauses, which take into account the occurrence of such shocks. Careful design is important to avoid abusing escape clauses to circumvent fiscal rules. Research on the effects of escape clauses is not unequivocal. On the one hand, the use of escape clauses may lead to lower likelihood of compliance, contributing to an increase in public debt (Reuter, 2019). However, it also turns out that well-defined escape clauses make the fiscal framework less pro-cyclical (IMF 2013). Bova et al. (2014) indicate that flexible fiscal rules taking into account escape clauses and excluding public investment favor countercyclical fiscal policy. When it comes to their design, five main dimensions of escape clauses can be identified: (i) the nature and magnitude of future shocks; (ii) the magnitude of the budgetary response to the shock; (iii) the length of the period during which the rule would be relaxed or suspended; (iv) the path to full rule compliance; (v) and responsibility for clause activation and monitoring (Ter-Minassian 2010).

Only when escape clauses have predefined triggering conditions and defined mechanisms of returning to previously used rules, they meet the requirement of fixed rules and at the same time substantially limit discretion. The existence of an escape clause in a rule means fitting with a mechanism that enables systemic actions aimed at restoring the current macroeconomic balance.

A well-designed escape clause should therefore specify: 1) the reason for the application of the clause; 2) the relationship between this reason and the conditions defined in the applicable legislation; 3) suspension period of the rule; 4) conditions that should be met in order to return to the rule's application. It is also desirable that the activation of the clause be approved by parliament, both in terms of budgetary implications and to ensure the proper use of the clause (IMF 2020).

A few reasons justify that escape clauses must have country-specific elements. This is due to the type of shocks the country is most exposed to and the sensitivity of individual budgetary aggregates to them. Similarly, the available fiscal space for shock absorption depends on the situation of public finances in a given country (European Commission 2010). These factors are a sufficient argument to engage fiscal councils in the implementation of escape clauses. Therefore, it is proposed that truly exceptional circumstances allow for triggering of a clause. This means that their use is strictly limited to (i) harsh economic recessions or (ii) natural disasters or other events beyond the control of the government that have an overall adverse impact on a budget balance of at least 1% of GDP. The latter threshold ensures extraordinariness of the event and indicates a considerable impact on public finances; thus, its occurrence is exceptional (AIReF 2018). An independent fiscal institution should evaluate conditions based on a combination of macroeconomic indicators that trigger an escape clause. Creating institutions responsible for activating escape clauses is a key area where their involvement can contribute to finding a fair balance between flexibility and credibility of commitment. This is particularly important due to the fact that the state of the economic situation is assessed on the basis of the forecast of the output gap level. In practice, though, output gap revisions are quite frequent and ambiguous in the context of expansion and recession. Relying on real GDP growth projections is not conducive to the accuracy of the forecast cyclical position. Thus, it can be concluded that the revisions of the output gap are mainly due to errors in GDP growth forecasts, and not to corrections of potential GDP growth (Hernández de Cos et al 2016). This means that fiscal policy should be judged against the context of uncertainty of forecasts. Hence the need to involve an independent fiscal institution as an arbiter assessing the probability of achieving the assumed macroeconomic parameters.

The size of the allowed fiscal response to the shock should be decided on a case-by-case basis. In the event of a natural disaster, it may be sufficient that the derogation from the rule may be temporary. As regards a harsh economic recession, a more decisive fiscal impulse may be required. In any case, the size of the allowed fiscal impulse should also depend on the fiscal position of a given country's budget, i.e. the fiscal space available. In such case, it should

be sought that the escape clause has a specific period of validity, preferably no more than one year. In a situation where the fiscal conditions do not radically improve within this time, it will be possible to extend it, but after reassessing the fiscal outlook. For fiscal credibility, it is important to clarify the procedure to be followed in order to restore fiscal discipline. This implies an indication of criteria, whose achievement will mean a return to the application of the rule.

Escape clauses are designed to deal with the consequences of large but temporary shocks. More sustained trends (for example, a permanent reduction in growth potential due to the situation in the labor market or demographic trends; or a lasting change in a country's resources) require a permanent alteration in the purpose of the rule (or, in some circumstances, even the basis of the rule). Therefore, it is good when ex ante provisions concerning such changes are included in the provisions introducing the fiscal rule. This is useful for avoiding re-opening of political debates on the entire rule framework in the event of permanent changes. In practice, however, it would be speculative to predict all factors that may require a revision of the rule. That said, the continual recourse to escape clauses has nothing to do with designing flexibility, but is due to the demands of the political economy.

Methodology and Data

The research of the importance of escape clauses was conducted in two stages. First, the number of fiscal rules with built-in escape clauses for EU countries was analyzed. Secondly, the strength of fiscal rules with built-in escape clauses was compared with the strength of fiscal rules without escape clauses. For this purpose, the Mann-Whitney (two-sample Wilcoxon rank-sum) test was performed. The source of data for these analyzes is information on fiscal rules in EU countries published by the European Commission in the *Fiscal rules database*. These analyzes use the FRSI (Fiscal Rule Strength Index), which is a synthetic measure of the strength of the rules. The presence of an escape clause is one of the characteristics of a fiscal rule taken into account in measuring the strength of the rule. The methodology of calculating the strength of fiscal rules assumes the influence of five criteria: 1) legal base of rule, 2) binding character of rule, 3) monitoring bodies of rule, 4) correction mechanisms of rule, and 5) resilience to shocks of rule. The occurrence of an escape clause in a fiscal rule is one of the elements for the assessment of criterion 5 (the other criteria for resilience of shocks are: existence of budgetary margin defined in relations to the rule; targets defined in cyclically-adjusted terms, and exclusions from the rule).

Additionally, the legitimacy of launching escape clauses in response to the fiscal crisis caused by the COVID-19 pandemic was examined. The research in this area was based on the fiscal forecasts included in the EU countries' Convergence/Stability Programs. The fiscal effects of Covid-related fiscal measures approved in individual EU countries in 2020 are shown by differences in the forecasts of the core macroeconomic parameters between Convergence/Stability Programs from 2020 and Convergence/Stability Programs from 2019. The source of data for these analyzes are the texts of Convergence /Stability Programs for EU countries available on the website of the European Commission

The Importance of Escape Clauses in Fiscal Rules of EU Countries – Empirical Analysis

The recent global financial crisis (2008-09) has clearly revealed the shortcomings of a budgetary framework that does not contain appropriate escape clauses. At that time, only about half of the countries operating under the fiscal rule were able to conduct a counter-cyclical political response within the rule. Other countries had to either explicitly modify the rule or abandon its application (Ter-Minansion 2010). This meant that decisions on this matter were made ad hoc. However, while recent years have brought a noticeable increase in the number of fiscal rules across the EU, it has not resulted in a significant spread of escape clauses.

Tab. 1: Number of fiscal rules (including rules with escape clauses – EC) in EU countries

	2008		2014		2015		2016		2017		2018	
	All	With EC	All	With EC	All	With EC	All	With EC	All	With EC	All	With EC
BBR	29	6	49	18	52	21	57	23	61	25	61	25
DR	18	6	32	7	30	11	22	11	28	7	29	7
ER	14	4	25	7	26	9	21	8	20	3	19	4

RR	5	2	7	1	6	0	5	0	4	0	4	0
Overall	**66**	**18**	**113**	**33**	**114**	**41**	**105**	**42**	**113**	**35**	**113**	**36**

Source: Own calculations based on Fiscal Rules Database, European Commission

Table 1 presents the number of fiscal rules in the European Union countries, with the division into: balance budget rules (BBR), debt rules (DR), expenditure rules (ER) and revenue rules (RR). Additionally, the number of rules with built-in escape clauses is listed for each group. The noticeable increase in the number of fiscal rules since 2008 has not led to a considerable increase in the importance of escape clauses. The share of rules containing escape clauses in the total number of fiscal rules in force across the EU has remained slightly above 30% in recent years, and was the highest in 2016 at 40%. This means that rules containing escape clauses are still not yet generally used. There is still a dominance of rules with no escape clauses. In 2018, in six EU countries none of the fiscal rules had any escape clauses still. These countries were: Czech Republic, Greece, Luxembourg, Hungary, Sweden, UK. It is pertinent to note that in the Fiscal Rules Database, the European Commission also takes into account subnational fiscal rules (unlike the IMF database, which only contains information about national rules). The problem of the lack of escape clauses mainly concerns the rules applied to local governments in EU countries. In 2018, out of all fiscal rules applicable to local governments, only two had an escape clause. This represented 8.3% of the fiscal rules used only in local governments. In the previous years, the share of rules with escape clauses among rules for local governments was even smaller.

Similar research conducted by Nandeleng and Ellyne (2020) based on the analysis of 20 sub-Saharan African countries identifies 57 fiscal rules in force in these countries in 1997-2016 and indicates that only 15 of them have escape clauses. Nandelenge and Ellyne also note that there is a lack of unambiguous criteria for activating and deactivating escape clauses in these countries.

The inclusion of IMF data (which cover 96 countries around the world) in the analysis shows that fiscal rules with built-in escape clauses are also uncommon on a global scale. At the same time, similarly to EU countries, the number of rules containing escape clauses has increased in the last decade. A comparison of data for 2008 with that for 2015 (the latest available in the IMF database) shows that in 2008, across the EU the share of escape clauses in the total number of national fiscal rules was two times lower than in the group of 96 countries listed in IMF statistics. Until 2015, both groups of countries saw a substantial deterioration in this share, with higher dynamics for the EU countries. Thus, in 2015 the share of escape clauses in the total number of national fiscal rules in EU countries was comparable to their share in 96 countries around the world.

Despite the still insufficient universality of escape clauses in fiscal rules, their presence is a factor for the strength of fiscal rules. Since 2004, the European Commission has published data on the FRSI constructed to capture the influence of institutional features of fiscal rules on effective containing of budgetary imbalances. The presence of an escape clause is one of the characteristics of a fiscal rule taken into account in measuring the strength of the rule. Table 1 demonstrates the differences between the mean FRSI value for rules containing escape clauses and the mean FRSI value for rules without escape clauses.

Tab. 2: Mann-Whitney U test statistics for Fiscal Rules Strength Index (sample 1 – rules with escape clauses, sample 2 – rules without escape clauses)

	Sample 1		**Sample 2**		**U**	**Z**	**p**
	Mean FRSI	**Median FRSI**	**Mean FRSI**	**Median FRSI**			
2008	4.7024	4.7743	2.5160	1.9484	188.0000	3.5716	0.0004
2014	7.8922	7.7834	6.5927	6.6698	536.5000	4.9442	0.0000
2015	6.8970	7.2222	4.8432	4.9444	482.5000	-5.9843	0.0000
2016	7.4102	7.6850	4.7987	4.8000	338.5000	-6.4363	0.0000
2017	7.8180	8.2300	5.2669	5.5300	301.0000	-6.6038	0.0000
2018	7.7547	8.2800	5.3621	5.5300	350.0000	6.3810	0.0000

Source: Own calculations based on Fiscal Rules Database, European Commission

A comparison of the FRSI values over subsequent years shows that in each of the analyzed years the strength of rules with built-in escape clauses is higher than the strength of rules without escape clauses. The values of the Mann-

Whitney test (two-sample Wilcoxon rank-sum) confirm the statistical significance of the differences between the average FRSI values for rules with escape clauses and the average FRSI values for rules without escape clauses. Importantly, in each of the studied years, these differences were higher than 1 (usually higher than 2). This means that the strength of fiscal rules is not determined by escape clauses. Thus, the genuine effect of entering an escape clause in a fiscal rule on the perception of the rule's strength is not considerable, but it is noticeable enough to show statistically significant differences in the strength of fiscal rules against the criterion of the presence of an escape clause.

Escape clauses in fiscal rules of EU countries as a response to the fiscal crisis caused by the COVID-19 pandemic

Experiences of many countries show that the credibility and efficiency of escape clauses requires a precise definition of conditions for their activation, so that they cover events that are actually beyond the control of the government (Mbaye and Ture, 2018). An example of such an event is the COVID-19 pandemic. The scale of the fiscal effort needed to protect member countries from the consequences of the COVID-19 crisis required the use of more far-reaching flexibility under the Stability and Growth Pact. Hence, on 20 March 2020, the European Commission published a communication in which the general escape clause of the Stability and Growth Pact was activated based on the severe economic downturn caused by the coronavirus outbreak throughout the EU and the need for a sufficiently large fiscal response (European Commission 2020). On 23 March, the ECOFIN Council agreed with the European Commission that the conditions for applying the general escape clause of the EU fiscal framework had been met. It continued that this activation would allow member states to depart temporarily from the budgetary requirements that would normally apply, thus enabling them to tackle the economic consequences of the pandemic. Overall, EU member states approved more than 350 different Covid-related fiscal measures. Of these, nearly half are fiscal expenditures (EU Independent Fiscal Institutions 2020).

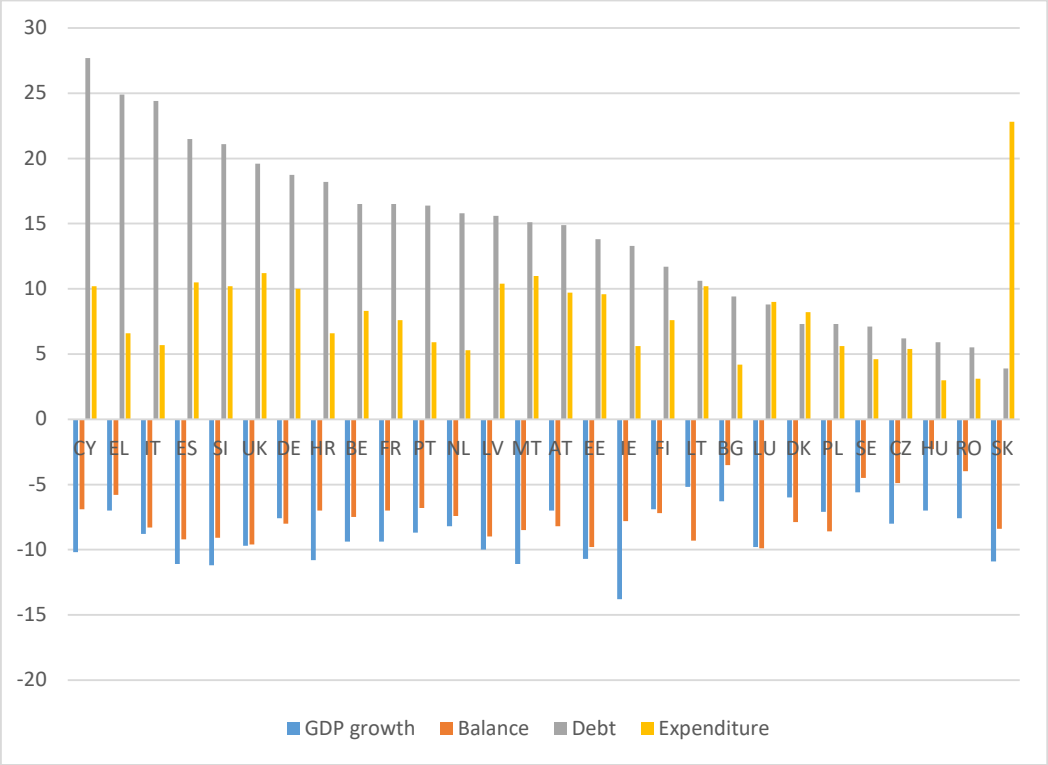

Chart 1: Differences of forecasts [in pp.] between CP 2019 and CP 2020 for EU-28 countries
Source: Own calculations based on Stability and Convergence Programs, European Commission

The fiscal effects of these activities in individual EU countries in 2020 are shown by differences in the forecasts of the core macroeconomic parameters between Convergence/Stability Programs from 2019 and Convergence/Stability Programs from 2020. Chart 1 shows the differences (in percentage points) between the forecasts for 2020 for the EU countries of such macroeconomic variables as: GDP growth, general government balance, public debt and general

government expenditure included in Convergence/Stability Programs (CP) of 2019 and 2020. In this way, changes in the expected macroeconomic situation caused by the COVID-19 pandemic have been shown. The sharp economic downturn caused by the lockdown has led to a deterioration in the expected fiscal indicators, forced by the need for rapid introduction of unprecedented economic measures. The scale of deterioration in the Member States' economic situation is evidenced by the fact that in 2/3 of the EU countries the public debt to GDP is assumed to increase by more than 10 pp., and in over 80% of the EU countries the budget balance will deteriorate by more than 5%. At the same time, in as many as nine EU countries the economic growth rate is to drop by more than 10 pp. compared to the forecasts from 2019, and every EU country forecasts an increase of at least a few percent in the general government expenditure/GDP indicator. In nine countries, the increase in public expenditure to GDP is expected to exceed 10 pp compared to the 2019 forecast. These data show the extraordinary nature of the changes in fiscal conditions of all EU countries. It shall suffice to indicate that in each of the EU countries, the economic downturn in 2020 is assumed to be more than 5 pp. compared to the forecasts for 2020 published in 2019. In addition, in five countries (Cyprus, Greece, Italy, Spain, Slovenia) in 2020 the public debt ratio is forecast to increase by over 20 pp. compared to the levels assumed in the forecasts a year earlier. These figures are sufficient evidence of the need for extraordinary measures in the fiscal sphere. Such extraordinary measures are escape clauses.

At the end of May 2020, 19 EU countries launched an escape clause suspending national budget restrictions. In some cases, this activation was automatic with the announcement of a general escape clause. This was the case in Portugal, France and Italy. Other countries have their own fiscal rules and escape clauses. For example, in Germany, parliament approved a supplementary budget by majority - with a large fiscal package - and suspended the debt brake rule. While most countries only have exit clauses in place until the end of 2020, some have suspended their fiscal rules for a longer period. For example, the Czech Republic raised the ceiling for the structural deficit from 1% to 4% for 2021, with its gradual reduction by 0.5% annually until 2027. This decision was the subject of almost a month of debate and was heavily criticized, also by the Czech Fiscal Council. Italy has accepted the possibility of deviations in the structural deficit by 2032. Finland has activated escape clauses for a shorter period - until the end of 2022 - suspending expenditure ceilings, which is expected to allow for greater public spending of around EUR 0.5 billion per year (EU Independent Fiscal Institutions 2020). In Poland, the Public Finance Act was amended (Act of May 28, 2020 amending the Public Finance Act), which made it possible to suspend the stabilizing expenditure rule and apply an escape clause in the event of a declared state of epidemic and a simultaneous considerable deterioration in the macroeconomic situation. The condition for activating the escape clause is, in accordance with the provisions of the Public Finance Act, a drop in the annual GDP growth by more than 2 pp. against the average dynamics of GDP in the period of the business cycle.

Amidst the current crisis, there are several factors that justify the use of exit clauses:

- The need to use significant additional fiscal sources, which would result in breaking fiscal rules.

- The decline in economic activity will significantly change the budgetary situation by limiting tax revenues and increasing expenditure both in the form of automatic stabilizers (unemployment benefits) and discretionary ones.

- The fall in commodity prices means a reduction in the income of those countries that are commodity exporters.

Obviously, the escape clauses activation strategy, together with the determination of the amount of deviation from the rule, depends on the impact of the shock on public finances (health expenditure needs, the economic condition of households and enterprises) and the limitations resulting from the available fiscal space. Depending on the individual national budgetary frameworks, the initiation of escape clauses, as well as their expiry, are carried out either by the government, parliament or self-standing bodies. In some countries, independent fiscal institutions are tasked with assessing whether the government's launching of an escape clause is justified. This was the case in countries like Austria, Belgium, the Czech Republic and Finland (OECD 2020).

Some EU Member States lack the "classic" escape clause for their national fiscal framework. For example, in Slovakia the public debt rule based on the Maastricht criterion, but stricter in terms of the debt limit, entails quasi-automatic sanctions when certain thresholds are reached. Exceeding the permissible debt levels triggers sanctions defined in the Slovak constitution. Although the fiscal framework shows exceptions to the imposition of sanctions (war, strong decline in nominal GDP, natural disasters), it still does not mean the same type of escape clause that exists at the European level (Eisl 2020).

Some escape clauses impose restrictions on how long fiscal policy may deviate from the objectives set out in the rule and requirements that must be met to return to fiscal goals. Specific requirements can make the framework more robust, but must strike the right balance between ensuring a quick reversion to the rule and avoiding sudden

corrections. Countries have adopted approaches with varying degrees of flexibility. The German constitution requires that the application of the escape clause in the event of a natural disaster or state of emergency is accompanied by the adoption of a "repayment plan" for additional loans "within a reasonable timeframe" (OECD 2020).

The economic impact of such a unique event as the current pandemic is associated with a high level of uncertainty and may require greater deviations or a longer return to the rule. For example, budgetary and economic forecasts in most countries are based upon standardization in the second half of 2020. Countries are now expected to follow the alignment path set out in the escape clause, in many cases anticipating a return to the rule within one or two years - in some cases there is no clear date as for EU activation, but this depends on the conditions. Considering the high level of uncertainty, countries should prepare plans based on the baseline scenario, activating the escape clause. Governments should be ready to reassess and use all the flexibility allowed under the framework, including the renewal or extension of escape clauses, if necessary. This makes it very important to keep the process fully transparent. A well-designed communication strategy has a fundamental meaning when launching escape clauses, to increase the credibility of the fiscal framework and avoid negative market reactions. An effective communication strategy should be based on simple and clear messages designed to inform the public and the markets about current economic developments and the assumptions behind fiscal forecasts and the uncertainties surrounding them.

Also, the possible extension of the use of an escape clause should follow the same principles that underlie the activation of escape clauses in the first place, including the revised plan to return to the rules. It is essential that this process is subject to external scrutiny and parliamentary approval, which will balance flexibility with credibility. This means that the EU countries will face a heated discussion on decisions regarding the coordination of fiscal policy, if the term of escape clauses is extended.

Conclusion

The presence of escape clauses in fiscal rules increases the flexibility of rules and their resilience to the appearance of shocks. Their occurrence supports the counter-cyclical impact of fiscal rules on macroeconomic conditions. However, the use of escape clauses requires careful prudence. The credibility of the rule is demonstrated by the extent to which the possibility of departing from it (or a temporary suspension) has been defined as a unique case and applied as a last resort and not as a situation that would apply in all conditions.

The analyses presented in the paper confirm that the recent years have brought a noticeable increase in the number of fiscal rules in the EU countries. Along with this increase, there has been no significant spread of escape clauses. The share of rules containing escape clauses in the total number of fiscal rules in force across the EU has been slightly above 30% in recent years, and was the highest in 2016 and accounted for 40%. This means that rules containing escape clauses are still not yet generally used. There is still a dominance of rules with no escape clauses. Similar trends occur in other countries of the world. Based on IMF data, the share of escape clauses in the total number of national fiscal rules in EU countries was comparable to their share in 96 countries of the world. The issue of the lack of escape clauses concerns especially rules for local governments.

At the same time, the presence of an escape clause is one of the characteristics of a fiscal rule taken into account in measuring the strength of the rule. A comparison of the FRSI values in the period 2008-2018 shows that in each of the analyzed years the strength of rules with built-in escape clauses is greater than that of rules without escape clauses. At the same time, research indicates that escape clauses are not the decisive factor that differentiates the strength of fiscal rules. This fact means that the genuine effect of entering an escape clause in a fiscal rule on the perception of the rule's strength is not considerable, but it is noticeable enough to show statistically significant differences in the strength of fiscal rules against the criterion of the presence of an escape clause.

The fiscal effects of the COVID-19 pandemic have contributed to the rapid activation of escape clauses for the fiscal rules of most EU countries. The initial point for these activities was the introduction of a general escape clause by the European Commission. However, actions in this respect may turn out to be insufficient. The macroeconomic uncertainty resulting from the COVID-19 shock may require further fiscal flexibility, including the renewal or extension of escape clauses. This means that EU countries will face sizeable challenges in the field of fiscal policy coordination if the escape clauses are extended.

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Preferences of Rail Transport Passengers with Regard to Modern Technologies

Grazyna ROSA

University of Szczecin, Szczecin, Poland
grazyna.rosa@usz.edu.pl

Abstract

The aim of the article is to indicate and establish the hierarchy of the features of rail passenger transport services with regard to modern technologies most preferred by the service users, and their evaluation. In order to achieve this aim, a method of critical analysis of available secondary research results and a method involving a questionnaire in primary research were adopted. Own research was conducted on a representative sample of 331 young travellers.

Keywords: Modern Technologies, User Preferences, Passenger Transport, Rail Transport.

Introduction

Contemporary transport industry (including both passenger and freight transport services) is a part of the consumer market. The oversupply of services in the passenger transport industry stems from the development of private transportation which satisfies most of the demand for transport services on the market. The share of rail transport in passenger transport is small and amounts to approx. 3%, while car transport accounts for the remaining 97%. (Wykorzystanie i potencjał…, April 2017), (GUS 2019). The passenger transport industry is very dynamic and is undergoing various transformations which result primarily from changes taking place in the area of transportation. On the one hand, the phenomenon of congestion, heavy road traffic, and, as a result, longer travel time by means of private and national public transport (buses), and, on the other hand, a significant improvement of railway infrastructure, acquisition of modern rolling stock which enables spending travel time productively, gradual introduction of an integrated rail ticket, availability of electronic tickets additionally improve the competitiveness of railway companies in respect of road transport, mainly private transport.

This is chiefly reflected in the number of passengers, and in the case of rail transport in Poland it reached 280.3 million in 2015, which represented an increase of 4.2% compared to 2014 (269.1 million). The year 2016 saw an increase of 4.3% and ended with the result of 292.5 million passengers, while in the years 2017 and 2018 a further increase to 303 and 310 million passengers respectively was achieved. At the same time, these figures reflect that an average Polish resident travelled only several times in 2016, 2017 and 2018. (Wykorzystanie i potencjał…, 2017), (GUS 2019).

The aim of the article is to indicate and establish the hierarchy of the features of passenger rail transport services with regard to modern technologies most preferred by the service users, and to evaluate them. In order to achieve this aim, the method of critical analysis of available secondary research results and survey methodology, involving questionnaires in primary research, were applied.

Literature Review

Consumer behaviour on the market is limited by a number of factors, the most important of which include: consumer tastes and preferences; the amount of money available, i.e. an available budget, and the prices of alternative goods (Teoria wyboru konsumenta) [15.07.2019].

Preferences of consumers depend on their knowledge, opinions, emotions or beliefs; they are a reflection of their perception of a given product and brand. This perception is subjective (Rosa (eds.), 2015). Consumers' preferences result from the fact that they strive to satisfy their needs by selecting goods which are available on the market in

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great numbers and which meet their expectations. These choices reflect their tastes, preferences and personalities; they are a determinant of demand, specifying the products consumers want to purchase. (Szymańska, 2012).

The analysis of the approaches to passenger transport presented in the literature reveals that for many years, common carriers and transport providers have assumed that if their services are relatively reliable and the condition of their vehicles (often outdated) does not pose an immediate threat to travellers, then the customers will be satisfied with the service provided (Bąkowski, Szewczuk (ed.) 2000), (Engelhardt, 2007, 2018), (Paprocki, 1996), (Wyszomirski, (ed.), 1994, 1998), (Tomanek, 2002). They considered price as the main instrument of competition. The analysis of the results available in the literature indicates that the capability to provide reliable services is insufficient to achieve and maintain a strong competitive position in a changing environment. The importance of standard services is diminishing. The role of knowledge, cooperation skills, entrepreneurship and innovation is growing. The importance of innovation in the field of transport service, technology as well as customer relations is recognised (Rosa, 2013, 2018), (*Koleje pasażerskie w województwach - dynamika zmian…* (b) kwiecień 2017), (Drewnowski 2019). The customers are increasingly demanding in respect of, for example, the quality of services offered, safety, provision of current information, the carrier's partnership approach, customer service, often even comprehensive logistics service on a national and international scale (Bocheński, Wojtkiewicz 2019), (Krawiec, Ćwiek, 2019), (Massel, 2019), (Mężyk, 2019), (Szałucki, 2019). Where these elements come to the fore, companies competing in the passenger transport market must carry out a professional analysis of the market and the preferences of customers in order to provide the values most appreciated by customers.

On the other hand, customer preferences in the field of modern technologies are a new subject which is insufficiently investigated in the literature (cf: Rosa, 2018.)

The preferences of passenger rail transport customers stem from the necessity to satisfy transport needs, which reflect their expectations and personality.

Research Method

The research was carried out from October 2017 to March 2018 on a random sample of 350 people from all over Poland, meeting the age requirement and thus constituting a homogeneous sample of “young adults” aged 18-29 years. Survey methodology involving a questionnaire was applied. The analysis of the completed questionnaires revealed that 19 of them were incomplete, and thus a sample of 331 persons was eligible for further study.

Table 1 presents the characteristics of the respondents based on the information contained in the particulars.

Table 1: Respondents' socio-demographic characteristics (N=331)

	Total (%)
Gender	
Female	50.61%
Male	49.39%
Education	
Higher education	18.54%
Secondary education	78.72%
Vocational education	2.74%
Household composition	
Single	9.37%
Two people	14.5%
Three people	23.26%
Four people	36.25%
Five and more	16.62%
Household net income/month/ per capita	
Very low income (<232 EURO)	9.24%
Low income (232-464 EURO)	39.81%
Medium income (465-696 EURO)	35.03%
High income (696 EURO<)	15.92%

Job status	
Employed	83.42%
Unemployed	16.58%
*Student	76.74%
Place of residence	
Countryside	22.80%
City up to 99,000 inhabitants	32.22%
City with 100,000 to 199,000 inhabitants	14.29%
City with over 200,000 inhabitants	30.70%

Source: own work

The aim of the research was to select the key features of passenger transport services relevant to customers, and have these features assessed by the providers of rail passenger transport services in Poland in respect of modern technologies. In order to achieve the intended aim of the article, an attempt was made to answer the following research questions:

1. How important are characteristics of the services provided by railway companies in passenger transport in the context of marketing activities making up the modern technologies category?
2. What is the assessment of characteristics of the services provided by railway companies in passenger transport in the context of marketing activities making up the modern technologies category?
3. Which statistically significant socio-demographic variables correlate with the preferences of users of railway passenger transport services?

A hypothesis assuming that overall railway transport assessment grew along with increase in importance of particular categories of modern technologies to passengers was put forward in the research.

In order to answer the research questions and test the hypotheses, statistical analyses were carried out using the IBM SPSS Statistics version 25. The software was used to analyse the main descriptive statistics, characterise the respondents with the use of frequency analysis, as well as to carry out several Pearson's Chi2 correlation tests, student's *t* for independent samples, one-way analysis of variance, Pearson's *r* and regression analysis. The classical threshold of $\alpha = 0.05$ was designated as the significance level. The probability results of the test statistics at the level of $0.05 < p < 0.1$ were interpreted as significant at the level of statistical tendency.

Research Results

The respondents replied in the following scale: very important, important, less important, not important and expressed their assessment as follows: very good, good, bad, very bad. Analysis of the respondents' answers enabled drawing the following conclusions:

a) Basic descriptive statistics of the quantitative variables measured along with the test of normal distribution.

Firstly, basic descriptive statistics were calculated along with the Shapiro-Wilk test examining the normality of distribution of all measured variables on the quantitative scale. The result indicated that the distributions significantly deviated from the Gaussian curve. However, the skewness of all variables did not exceed the range of $-2 < Sk. > 2$, and thus it could be assumed that the variables have distributions close to normal.

Table 2: Descriptive statistics

Descriptive statistics	M	Me	SD	Min.	Max	Curt.	Sk.	S-W	p
Importance of modern technologies in rail transport services	**1.8**	**1.71**	**0.57**	**1**	**4**	**1.34**	**0.97**	**0.92**	**<0.001**
Assessment of the availability of modern technologies in rail transport services	**1.97**	**2**	**0.53**	**1**	**4**	**1.24**	**0.47**	**0.96**	**<0.001**
Overall assessment of rail transport services	2.1	2.09	0.49	1	4	1.74	0.2	0.96	<0.001

Source: own work based on primary research (N = 331)

b) The relations between socio-demographic variables and the preferences of the respondents regarding passenger rail transport services

In order to verify how socio-demographic variables, which are statistically significant, correlate with the preferences of passenger rail transport customers, student's *t-distribution* for independent tests and a one-way analysis of variance were performed. The examination concerned the existence of correlation between the assessment of the significance of modern technologies in trains and the socio-demographic variables, such as gender, education, household size, income, professional status, student status and place of residence. The *t* test for independent samples was used for socio-demographic variables with only two groups.

Table 3: Relations between preferences regarding railway transport and socio-demographic variables

		t	*p*	*d*	*95% CL*	
					LL	*UL*
Importance of modern technologies	Gender	-2.11	0.036	-0.01	-0.27	-0.1
	Professional status	0.16	0.874	0	-0.15	0.18
	Student status	-1.24	0.215	-0.01	-0.25	0.06

Source: own work based on primary research (N = 331)

In the next step, a one-way analysis of variance was carried out several times using the tested variables which were related to the opinions on the importance of modern technology as well as the price and time of travel in rail transport. A statistical analysis was carried out for grouping variables, which were on the qualitative scale and comprised more than two groups. These socio-demographic variables included education, household size, household income, and the place of residence of the respondents. The correlation was calculated using omega^2.

Table 4: Relations between travellers' preferences regarding railway transport services and socio-demographic variables

		F	p	ω^2
Importance of modern technologies	Education	2.18	0.090	0.01
	Household size	0.98	0.421	0
	Income	0.73	0.535	0
	Place of residence	2.46	0.063	0.01

Source: own work based on primary research (N = 331)

The relations between preferences regarding modern technologies and the gender proved to be significant. In addition, an interdependence between preferences concerning modern technologies and education, as well as place of residence was observed at the level of statistical tendency. All relations, both significant and those at the level of statistical tendency, were weak.

Due to the importance of the gender in the assessment of the significance of modern technologies, the preferences were investigated in detail and their relations with the gender were analysed in the following sections. Due to the uneven distribution of respondents in the groups in regard to education and the student status, this socio-demographic variable was not taken into account.

c) Preferences of travellers regarding modern technologies

In order to determine the preferences of the respondents regarding modern technologies, a factor analysis was carried out for all questions included in this category, namely:

1 Importance of being able to check information in social media;
2 Importance of obtaining additional services, such as Wi-Fi in rail transport;
3 Importance of being able to check railway connections on the Internet;
4 Importance of availability of an electronic ticket when using rail transport;
5 Importance of being able to purchase a ticket via the Internet;
6 Importance of being able to purchase a ticket via mobile devices;
7 Importance of being able to track the current location of the train using a mobile application.

In addition, Pearson's Chi^2 analysis was carried out to verify the relations between the gender and particular answers regarding the opinions on the importance of modern technology.

It was concluded that first of all the general preferences regarding modern technologies should be described. The average of the respondents was $M = 1.8$, with a standard deviation amounting to $SD = 0.57$, which meant that for the majority of respondents, modern technologies were important or very important, as the lower the score, the more important the given aspect was for the respondents. However, modern technologies were less important for women ($M = 1.73$, $SD = 0.5$) than for men ($M = 1.48$, $SD = 0.63$).

The importance of being able to check information in social media

In the next step, the importance of being able to check information in social media when using rail transport was assessed. Firstly, Pearson's Chi^2 analysis was carried out in order to verify the correlation between the gender and the respondents' assessment. It turned out that men and women responded so similarly that no statistically significant difference was observed between them [$\chi 2(3) = 1.46$; $p = 0.692$; $V = 0.07$].

In the next step, a frequency analysis was carried out for all respondents which concerned the responses to the question about the importance of being able to check information in social media regarding the use of rail transport.

Table 5: The importance of being able to check information in social media

	n	**percent**
Very important	56	16.9
Important	85	28.8
Less important	114	38.6
Not important	40	13.6

Source: own work based on primary research (N = 331)

According to the majority of respondents, being able to check information in social media regarding the use of rail transport is of little importance. The second most common answer was “important”. The option “not important” was chosen the least frequently.

The importance of obtaining additional services such as Wi-Fi in rail transport

In the next step, the importance of obtaining additional services such as Wi-Fi in rail transport was analysed. The analysis of the respondents' answers, taking into account their gender, proved that there was no statistically significant difference between men and women [$\chi 2(3) = 1.46$; $p = 0.701$; $V = 0.07$]. Therefore, it was decided to perform a frequency analysis for the entire sample without gender division.

Table 6: The importance of obtaining additional services such as Wi-Fi in rail transport

	n	**percent**
Very important	98	33
Important	115	38.7
Less important	66	22.2
Not important	18	6.1

Source: own work based on primary research (N = 331)

The majority of the respondents admitted that additional services such as Wi-Fi are important. Slightly fewer respondents considered this form of services to be very important in rail transport, and only a few considered it to be completely irrelevant.

The importance of being able to check railway connections on the Internet

As regards the opinions on the importance of being able to check railway connections on the Internet, the gender of the respondents, which slightly differentiated their opinions [$\chi 2(3) = 15.63$; $p = 0.002$; $V = 0.23$], proved to be statistically significant. Since the expected minimum value was less than 5, the Fisher's correction for Pearson's Chi^2 analysis was applied.

Table 7: The importance of being able to check railway connections on the Internet

	Women		**Men**		**Total**	
	n	**gender percentage**	***n***	**gender percentage**	***n***	**percent**
Very important	121	79.6	84	59.6	205	70
Important	23	15.1	35	24.8	58	19.8
Less important	7	4.6	16	11.3	23	7.8
Not important	1	0.7	6	4.3	7	2.4

Source: own work based on primary research (N = 331)

Generally, being able to check railway connections on the Internet was considered to be very important. Women answered “very important” relatively more often than men. Men were more likely to mark middle responses. In both cases, the least chosen option was “not important”, which was selected by more men than women.

In summary, being able to check railway connections on the Internet is usually very important or important for the respondents. Few people consider it less important and almost no one believes it is completely unimportant.

The importance of availability of an electronic ticket when using rail transport

In order to verify the importance of availability of an electronic ticket for the respondents, a frequency analysis was carried out. The results were presented for all respondents, without division into gender due to the lack of statistical significant correlation between the gender and the responses [$\chi 2(3) = 5.12$; $p = 0.163$; $V = 0.13$].

Table 8: The importance of availability of an electronic ticket when using rail transport

	n	percent
Very important	161	54.2
Important	90	30.3
Less important	33	11.1
Not important	13	4.4

Source: own work based on primary research (N = 331)

The majority of respondents indicated that the availability of an electronic ticket is very important. More than half of the respondents gave this answer. This option was considered to be completely unimportant by the smallest number of respondents. Moreover, the answer "less important" was chosen only by a small number of respondents. In conclusion, the respondents considered the availability of an electronic train ticket as significant.

The importance of being able to purchase a ticket via the Internet

Next, the importance of being able to purchase a ticket via the Internet was investigated. Due to the lack of a significant relation between the gender and respondents' answers [$\chi 2(3) = 2.52$; $p = 0.480$; $V = 0.09$], a frequency analysis without the gender division was once again carried out. It is worth noting that the test of the presented relation was carried out using the Fisher's correction, taking into account a breach of the condition regarding the minimum expected value equal to 5.

Table 9: The importance of being able to purchase a ticket via the Internet

	n	percent
Very important	182	61.3
Important	76	25.6
Less important	33	11.1
Not important	6	2

Source: own work based on primary research (N = 331)

Over half of the respondents confirmed the importance of being able to purchase a ticket via the Internet. It was significant for more than three quarters of the respondents. Few respondents have admitted that it is less important or completely unimportant.

The Importance of Being Able to Purchase A Ticket Via Mobile Devices

Furthermore, in the assessment of the significance of being able to purchase a ticket via mobile devices, the gender did not have a considerable statistical significance [$\chi 2(3) = 4.44$; $p = 0.208$; $V = 0.12$]. The lack of significant correlation was verified and calculated by carrying out Chi^2 analysis with the Fisher's exact test, taking into account the expected values below 5.

A frequency analysis of the importance of being able to purchase a ticket via mobile devices was carried out for the entire sample. The data was presented in the form of frequency and percentage of responses.

Table 10: The importance of being able to purchase a ticket via mobile devices

	n	percent
Very important	171	57.4
Important	84	28.2
Less important	34	11.4
Not important	9	3

Source: own work based on primary research (N = 331)

In this case as well, over half of the respondents marked the answer "very important". And as previously, it turned out that a small number of respondents indicated that this aspect is of little or no importance. For those who took part in the survey, being able to purchase a train ticket using mobile devices was important.

The importance of being able to track the current location of the train using a mobile application

The last question in the category of modern technology preferences concerned the importance of being able to track the current location of the train using a mobile application. In this case as well, no statistically significant gender effect was observed [$\chi 2(3) = 2.92$; $p = 0.406$; $V = 0.1$]. Therefore, it was decided to carry out a frequency analysis without a breakdown by gender.

Table 11: The importance of being able to track the current location of the train using a mobile application

	n	percent
Very important	117	39.3
Important	81	27.2
Less important	80	26.8
Not important	20	6.7

Source: own work based on primary research (N = 331)

The majority of the respondents declared that being able to track the current location of the train using a mobile application is very important. However, answers: "important" and "less important" were almost as frequent. As with other questions, the least common answer was that this aspect is completely irrelevant.

Conclusions from The Research on Travellers' Preferences Regarding Modern Technologies

A detailed analysis of travellers' preferences regarding modern technologies revealed that only the importance of being able to check the connections via the Internet is statistically and significantly different depending on the gender. As men and women gave sufficiently similar answers to the remaining questions, it was concluded that there is no statistically significant correlation.

Moreover, it was determined that in general the most important feature of modern technology was the ability to check rail connections on the Internet. The majority of respondents considered it to be very important. After converting responses to numerical values, with the lowest number representing the greatest importance of a given aspect, the average of responses indicating the importance of checking railway connections on the Internet amounted to $M = 1.43$, that is between the answer "very important" and "important", slightly closer to the "very important" answer.

The second important element of modern technology was the ability to purchase a train ticket via the Internet. Again, the majority of respondents considered it to be very important. After converting the variants of responses to numerical values, the average of responses was located between "very important" and “important” answers, slightly closer to the answer “important” *(M* = 1.54).

The ability to purchase a train ticket via a mobile device was the third significant feature of modern technologies. In this case as well, more than half of the respondents considered that this is a very important aspect of travelling by train. Moreover, this feature had the least number of answers: “not important”. Once again, after the responses were converted, the average between the “very important” and “important” answers was established, with slightly greater number of “important” answers *(M* = 1.6).

The “important” feature indicated by the respondents least frequently was the availability of an electronic ticket. After converting the responses to numerical values, the average *M* = 1.66 was obtained. This was the last feature of modern technology, whose average did not exceed 2, which meant a less important answer. Less than half of the respondents considered the availability of an electronic ticket as very important.

Provision of additional services such as Wi-Fi and being able to track the route and location of the train using a mobile application were definitely less important for the respondents than the above-mentioned issues. Both features were assessed similarly in terms of their significance, and after conversion amounted to an average of *M* = 2.01, which indicates a low importance of these two elements. As regards the importance of obtaining additional services, the majority of respondents declared that this was a moderately important aspect of rail transport services. However, the most common answer regarding the ability to track the route of the train during the trip was the “very important” option. The similar average of both features was significantly affected by a smaller number of “important” responses and a larger number of respondents who considered this to be a less important element than the provision of additional services.

According to the respondents, the least important feature was being able to check information in social media. As regards this feature of modern technology, the highest number of “not important” responses was recorded. At the same time, fewer respondents than in the case with other questions indicated that it was very important. After converting the responses, it was found that the average obtained is between the answers “less important” and “not important” *(M* = 2.47).

Summary

Services offered by railway companies should be tailored to the preferences of customers. The conducted research revealed that in the field of new technologies only four of the studied features are very important or important for young travellers.

The respondents considered the following features as the most important in rail transport services. The features are presented in order of importance:

1 checking railway connections on the Internet;
2 purchasing a train ticket via the Internet;
3 purchasing a train ticket via a mobile device;
4 availability of an electronic train ticket.

According to young travellers, the less important or unimportant features include:

1 provision of additional services such as Wi-Fi;
2 being able to track the current location of the train using a mobile application;
3 being able to check information in social media (least important).

The presented hierarchy is not conditioned by the gender of respondents – both men and women indicated the same order of individual characteristics. Only the ability to check connections on the Internet is statistically and significantly different depending on gender, which was reflected in the fact that for women this feature was much more often “very important”.

The research results demonstrate that railway companies should pay particular attention to reliable and up-to-date information on the Internet, facilitate the ticket purchase via the Internet and mobile devices as much as possible

and provide the availability of electronic tickets. In the event that the customer forgets or loses an electronic device, they should have constant access to their data on their devices.

Summing up, one should also emphasise that the implications and pace of modern technology development in railway transport in Poland differ from the global standard, as a result of which the solutions covered by the research are not the latest or state of the art ones from the global perspective, but they are adequate to the development standard of such services in Poland. Results of the analyses performed will be the basis for development of further, more extensive research in the future.

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The Impact of IoT Technology on the Management of Logistics Processes in a Slovak Energy Company: GGE Case Study

Gabriel KOMAN
Department of Management Theories
Faculty of Management Science and Informatics, University of Žilina
Žilina, Slovak Republic
gabriel.koman@fri.uniza.sk

Dominika ŠULYOVÁ
Department of Management Theories
Faculty of Management Science and Informatics, University of Žilina
Žilina, Slovak Republic
dominika.sulyova@fri.uniza.sk

Abstract

IoT technology represents an important segment for the next stage of the industrial revolution (INDUSTRY 4.0); in addition, it can be also seen as a way for the smart devices to communicate with each other within a modern enterprise, as also with employees and suppliers or customers in the future. In energy companies, the Internet of Things (IoT) mainly affects the logistics processes, especially their acceleration and overall streamlining. The aim of the article is to find out how benefits and limitations are included with implementation and use of technology IoT in decision-making at strategic, tactical and operational level in the energetics companies. The focus was on the field of logistics processes with regard to input parameters and restrictive conditions of the Slovak Republic. The results of primary survey carried out in cooperation with Slovak energy company GGE served as a basis for the creation of a general model of IoT technology for the energy sector in Slovakia. Methodological section includes results of interviews with the manager of GGE company and primary survey by observing current operation and management of logistics processes, synthesis, method of comparing critical success factors with best practice by Ipecon, induction in conclusion, deduction and summarization of knowledge in the form of own model. The results confirmed the positive impact of IoT not only in the field of distribution, but also on management and decision-making processes at all levels. Through the data collected from the sensors, managers have the real-time data available, provide fast feedback and ensure a quality power supply. The implementation of IoT technology thus represents a competitive advantage for energy companies, which generates a high added value for the customer. The impact of the implementation of the proposed model in practice is part of the following research activities.

Keywords: Industry 4.0. IoT. Logistics processes. Energy distribution. Management.

Introduction

Generating and analysis of Big Data needs support of new technologies including Internet of Things. The research trend has potential to make company´s processes more effective, whether in the field of logistics or support of decision-making in strategic, tactical and operational level. Sensors collect data from the external environment and distribute it through the network for analysis. With this the current state of activities is evaluated and relevant results are received for improvement of processes in the future. This results in savings in terms of time, human capital, but also the company's total funds. IoT can also be used in direct contact of employees with technologies, which help monitor the human work and control of machines. The new Industry 4.0 concept, which will be introduced into the industrial sphere from 2020, envisages shortening of all processes. This will be achieved by using new, better materials, but also by using the mentioned IoT. Artificial intelligence in these technologies will also help visually modeling the ongoing processes. The transition to IoT is also conditioned by the technological readiness of the company. At the same time, however, it will make the work of the systems used more efficient and will be able to interconnect them. A large number of devices can thus be interconnected by uniform systems, which will simplify their operation. IoT is also of great benefit in decision-making processes, as it gathers the information needed for the system promoting decision-making, or systems for architectural decision-making. In the end, it can

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be stated that IoT brings many benefits to companies; processes can be executed faster, which leads to valuable savings, especially time and financial savings.

Literature Review

In 2011, the German government, led by Angela Merkel, created a new concept, Industry 4.0. "Smart manufacturing" followed up on the previous three phases (steam, electricity, automation). Table 1 includes some definitions of Industry 4.0.

Table 1: Defining the Industry 4.0 concept

Author(s)	Definition
Science Direct	
Frank, et. all, 2019	It represents a new stage in the production systems by integrating technologies that add value to the product life cycle.
Ivanov et. all, 2020	The basic goal of I4.0 is to shorten lead times and prevent the "Bullwhip" effect (The accuracy of demand forecasting decreases).
Muhuri et. all, 2019	The overall transformation through smart engineering and digitization concerns the concepts of robotics, IoT or augmented reality.
Scopus	
Diez-Oliva et. all, 2019	"Smartization" of production processes, the Industry 4.0, is an implementation of the new ICT applied to industrial products.
Castelo-Branco et. all, 2019	A concept that represents the adoption of Cloud Computing, Big Data, IoT, and digitization to gain a competitive advantage of industrial enterprises at home and abroad.
MDPI – "Machines" Magazine	
Sanders et. all, 2016	It applies the principles of Cyber-Physical Systems (CPS), the Internet and the future-oriented technologies and smart systems with the improved human-machine paradigms.
Mabkhot et. all, 2018	The new concept of industrialization, at the heart of which is a "smart factory", uses the progress of ICT.

The definitions indicated in Table 1 have the common elements, which are mainly the global trends in the information and communication technologies (ICT), such as artificial intelligence, robotics, automation, "smart manufacturing, logistics or energy", Cloud Computing, etc. Sanders took a different view of the issue, as he included a man-machine communication relationship in this concept, indirectly indicating that even the most advanced technologies still need a human factor to run. Devices and sensors are able to collect the information and transform it into data; they facilitate management and decision-making; however, ultimately the resulting variant is selected and implemented by the manager. Within this article the term Industry 4.0 is perceived as communicating devices (device-to-device or machine-to-machine), element of artificial intelligence, robotics or sensors that mediate a digital form of business, together with trends such as Blockchain, Omni-channel, internet of things, industrial Internet of Things, etc. In the 21st century, automation (the 3rd wave of the industrial revolution) is far from enough. The fourth wave is no longer only in the corporate environment (production, logistics, energy), but it interferes with our daily lives in the form of "smart" mobile phones, homes, or entire cities. The main goal of this concept is to transform companies into a digital form and start using elements of Industrial IoT, i.e. the Internet of Things. Table 2 lists some definitions of IoT by foreign and domestic authors.

Table 2: Defining the IoT (Internet of Things) concept

Author(s)	Definition
IEEE Explore	
Siegel et. all, 2018	Sensors and action units can communicate and collaborate based on a concept that connects people, things, data and processes – IoT. The technology brings low costs, efficient systems and flexibility.
Li-Minn, Kah Phooi Seng, 2019	IoT is a technology composed of Cloud, Cloud Computing and sensors that influence the modern world and customer needs through platforms.
Wiley Online Library	
Samaila et. all, 2018	The concept was defined in 1999 by Kevin Ashton. IoT uses the standards, such as Zigbee, Bluetooth, Wi-Fi, NFC, for the network communication.
Paul, Jeyaraj, 2019	It combines Wi-Fi technologies and Internet protocols providing network communication and connects physical and virtual components.
Home Authors	
Jurová et. all, 2017; Soviar et all, 2019	The interoperability of cyber-physical systems in households, businesses or hospitals creates a precondition for IoT. The technology is used to monitor processes and control them.
Vaculík, 2018a; Vaculík, 2018b; Varmus et all, 2015	IoT was primarily concerned with tracking things through RFID technology; later, the concept was enriched with EAN codes, chip cards, NFC and QR codes.

Within the article is the Internet of Things a technological view of the interconnected things, people, processes, and data that together make up Internet of Everything (reflecting the purpose of IoT implementation). With the development of the Internet, the way of work, life, but also leisure time has changed. In an enterprise environment, the innovation simplifies the real-time data-based planning, management, and decision-making for managers. The Internet of Things is divided according to the area of implementation into the territorial, medical, animal tracking, mobile, nanotechnology, underwater, underground and waste consumption monitoring IoT (Li-Minn, Kah Phooi Seng, 2019). IoT technology has a significant impact on the company's production, logistics, information and communication processes. (Koman et all., 2018; Ferenc et all, 2017; Hittmar et all, 2015; Soviar et all, 2018; Jankalova, Jankal, 2018; Soviar et all, 2017; Jankalova, Jankal, 2016)

Internet of Things Architecture

The conversion of the information and operational technologies (M2M communication) brings managers cost savings, efficient production and logistics, fulfillment of business goals (profit, customer satisfaction, higher market share). The three basic implementation layers are described in Figure 1. The infrastructure layer consists of sensors and action units; it includes functions for automatic door opening, asset monitoring via RFID, real-time alerts and energy consumption measurement. The network layer mediates the acquired data to the next layer via the Internet (router and gateways). The application works on a client/server basis; data is stored on Cloud storage. (Calihman, 2017)

At present, large international companies are involved in the development and implementation of new architectures for the IoT area. A good example from practice is Google, which developed the “Brillo” platform; it can work with a large amount of memory and data is transmitted via Wi-Fi network or Bluetooth. Data applications are based on the Android operating system. (Bouhaï, Saleh, 2017).

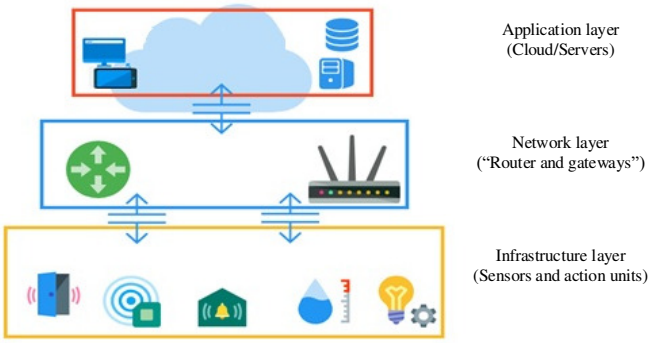

Fig. 1: IoT architecture (Calihman, 2017)

The platform upgrade was named "Android Things"; it includes tools like Google Play or Cloud Platform. The interaction is provided by the "Weave" protocol, which Samsung and Philips also implemented into their devices. The "Brillo" architecture consists of a Linux Kernel (core); the middle layer consists of the HW API library, and the highest one of Android (Ličko, 2016). Huawei manufactures The Agile IoT platform for Samsung's Artik. Microsoft is currently joining the development trend with its new version of the Windows 10 operating system. (Bouhaï, Saleh, 2017, Kubina, Lendel, 2015)

Materials and Methods

The understanding of the issue was achieved by analyzing foreign literature for the field of Industry 4.0 concepts, IoT technology, which were enriched with own definitions. For the selection of relevant literature were used keywords as IoT, Industry 4.0, distribution processes in power engineering, Big Data, the Internet of Things in decision-making processes etc. The selection of the company was determined by cooperation on a project on the use of the Internet of Things in the field of distribution in the Slovak Republic. The best practice was selected with the help of the GGE´s manager who has many years of experience in the researched field. The research itself was conducted through interviews with the management of GGE, the Slovak energy company, by setting two research questions.

Research Questions

1. *Are there any energy companies in Slovakia that have successfully implemented IoT and Industry 4.0 into their processes?*

2. *What benefits has the implementation and use of IoT brought in processes, management and decision-making for managers and their employees?*

The primary survey was also carried out by observing the current situation of logistics processes, the activities of managers at all levels (strategic, tactical and operational) during the duration of the three-month cooperation. Observation took place in a standardized form, it means personally in the logistical and economic departments.

The documents on the Tedis information system were provided by Ipecon company. The company also carried out an illustrative demonstration of the system, its functioning and its contribution to distribution and decision-making processes. Critical success factors were selected, reviewed and evaluated in cooperation with the manager of GGE, who also participated in defining the mathematical basis of specified intervals and scoring. The article used the method of induction in the creation of the conclusion. In the whole case study was also applied deduction summarizing the results.

The comparation with best practice has the form of the critical success factors mentioned above. The obtained results served as a basis for the construction of a general model for the implementation of IoT technology for Slovak energy companies. Model verification in practice and its testing are part of other future research activities.

Results

The interviews show that the most important element of competitiveness is the precise regulation of energy (Table 3) with minimal deviations (according to the subjective scoring, it received 5 points, i.e. the maximum in a given interval).

Table 3: Critical Success Factor

Factor	Weight	Score (1 – 5)		Weighted value	
		GGE	Ipecon	G	I
Precise energy regulation	0.50	5	5	2.50	2.50
Lower operating costs	0.10	3	4	0.30	0.40
Predictive maintenance	0.15	4	5	0.60	0.75
Management and decision-making support	0.25	4	5	1.00	1.25
Total	1.00	Overall competitiveness		4.40	4.90

Defining the mathematical basis determined in cooperation with the CEO of GGE:

- Precise energy regulation, interval (0-15%) = 1 point; (16-31%) = 2 points; (32-66%) = 3 points; (67-94%) = 4 points; (95-100%) = 5 points; i.e. the upper regulatory limits are much stricter than the lower ones (according to the interview);
- Lower operating costs – (0-20%) = 1 point; (21-40%) = 2 points; (41-55%) = 3 points; (56-77%) = 4 points; 78 and more = 5 points.
- Predictive maintenance – Elimination of errors up to 10% = 1 point; (11-22%) = 2 points; (23-44%) = 3 points; (45-67%) = 4 points; 68% and more = 5 points.
- Decision-making management support – Effective use of documentation, (0-12%) = 1 point; (13-24%) = 2 points; (25-45%) = 3 points; (46-60%) = 4 points; 61% and more = 5 points.

It is essential for Ipecon to predict maintenance and provide management and decision-making support when designing systems and providing energy services. In both cases, the lower operating costs were not the primary success factor, but an associated positive effect (Table 4).

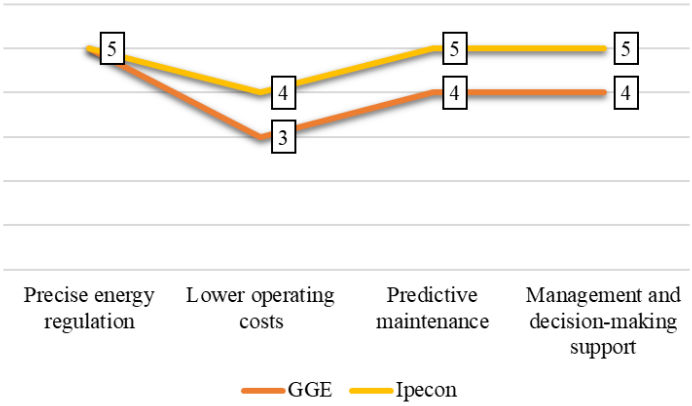

Fig. 2: Critical Success Factors of GGE and Ipecon

Observation of work with the Tedis information system by Ipecon

A branch of the energy company GGE in Považská Bystrica was observed. The goal of the observation was to determine the impact of IoT technology on the logistics and decision-making processes through practical demonstrations of work with the Tedis information system by Ipecon, to reveal the positive and negative aspects of IoT technology implementation and, upon the facts ascertained, to propose a model solution for Slovak energy

companies. Time span – February 2019; three meetings; documents obtained in the form of data from the interview, and the Act 657/2004 Coll.; a description of the Tedis system by Ipecon (more info on the website). Scope – Focus on the logistics processes and management and decision-making support. Location – Production/logistics department and management.

Observation Results

The information system contains 10 basic functions used by companies dealing with energy distribution in Slovakia, including the GGE branch in Považská Bystrica. IS manages and monitors the thermal units in real time – Information and simulation of inputs, outputs, sensors, alarms, GPS coordinates, data collection and their processing into graphs/tables. Control of energy units and a ¾ hourly maximum – Monitoring of turbines and power stations; setting the maximum allowed energy consumption. Energy balances and their processing – Calculation of daily and hourly sums of energy prices; comparison of the values measured and required; measurement of deviations and their elimination. Reports and their automatic sending via e-mail – Reports in MS Excel; a possibility of their immediate printing; transfer to the invoicing module in the company. Fault notification via SMS messages – To the mobile phone/tablet; possibility of quick repair and inspection; use of the GSM modem. Redundant system – Works 24/7 throughout the year; a redundant system serves as a backup against outage. Effect – Higher reliability and operability of the system. Diagnostics – Scans processes/D2D device communication; an activity control tool; visual processing and demonstrations; see the following figures.

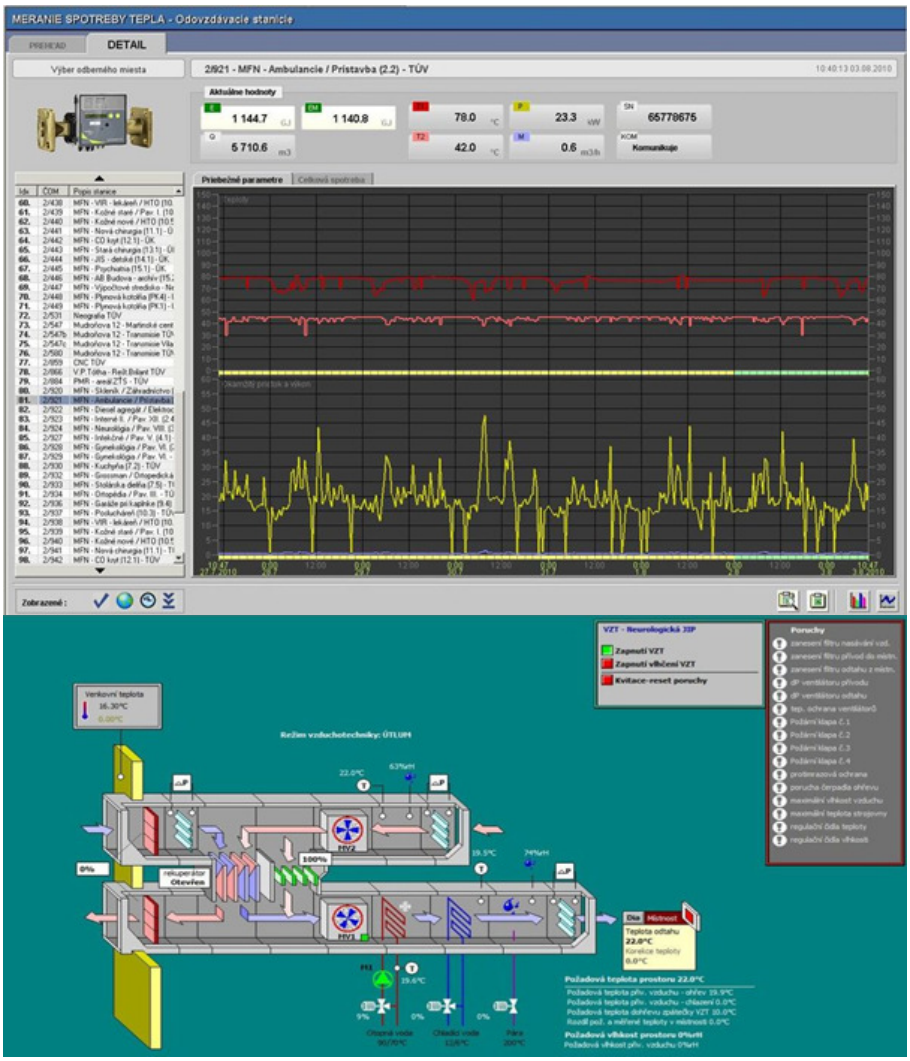

Fig. 3: Preview of Tedis outputs and simulations (Ipecon, 2020)

A competent employee obtains data at the regular 1-minute intervals from sensors that collect data in the field and convert it into electrical signals. If the temperature is too high, the employee will command the active unit to turn on the fan. The movement is carried out pneumatically (Air pressure – Figure 3 and 4).

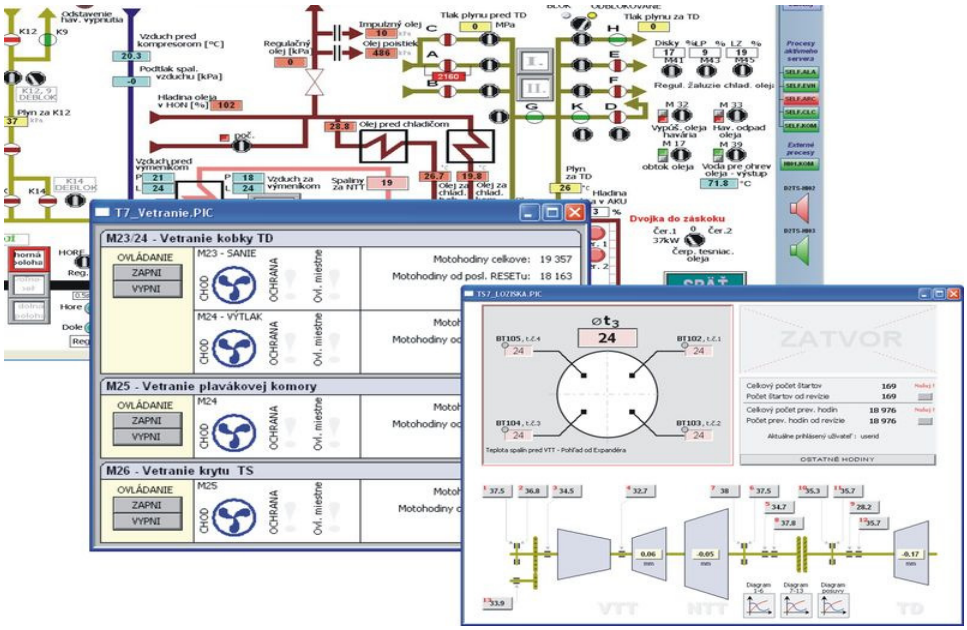

Fig. 4: Ventilation process through controller instructions (Ipecon, 2020)

Data is transmitted over the enterprise LAN through a router that is connected to a radio network. Servers and workstations are also included in the connection architecture. The demonstration was carried out directly at GGE; subsequently, additional information was provided by a telephone conversation with a representative of Ipecon, which supplies the Tedis system.

Main Results

The interviews provided answers to two research questions and from the methodological section. It was found that in Slovakia, there is a sufficient number of energy companies that have implemented new trends in the field and thus improved their processes. For example, GGE, based on the data collected via sensors and the Tedis system, can predict the future energy consumption, determine the quality of the mains, and adjust the prices offer according to customer needs (based on seasons, day vs. night). Based on the data, managers are able to make faster decisions and, with the real-time feedback, they can also evaluate the consequences of their actions. They know how to choose a most suitable alternative out of several possible ones, which creates a fact-based decision-making and management system. Reducing the costs of monitoring failures and maintenance (formerly in the form of daily trips of employees) brings the opportunity to invest free funds in other innovative improvements of the company. Employees feel safe at work (early warning system via sensors), and thus a pleasant working environment is provided.

The financial statement results showed that the deployment of IoT in the company increased profits by more than 100% (Table 4).

Table 4: Economic result after tax (before and after the implementation of IoT in the company GGE)

Year	GGE distribution, a. s.	
	2011 (Before implementing the Tedis system)	2012 (Year of implementation)
Economic result after tax	€ 17,438	€ 645,318

Finstat, 2020

In the interview, the CEO of GEE distribution confirmed that the number of printed documents decreased by approx. 50%. All data is clearly archived and backed up via the Tedis system. Information is disseminated through individual modules, e.g. billing across the company, which is efficient whether in terms of time, management, or cost.

The obtained information confirmed or refuted the importance and significance of the implementation of IoT technology in the company practice. The findings were used in the design of a general implementation model in the field of energy distribution in Slovakia, which can be used as a pattern for another energetic companies in the same geographical and industrial area. Methods of analysis, synthesis, critical success factors, comparison, induction, deduction and summarization were also used in the article.

General model of implementation of IoT technology into the Slovak energy companies

General implementation model (Figure 5) IoT in the observed company can be used as a reference point for the existing heat and energy suppliers in Slovakia. The starting part of the model are the houses and apartments of clients, in which the heat consumption probes and sensors are located. The data is automatically recorded on the Cloud storage via the Internet. Businesses access this data through a server and a computer. Internal processes (operational level in Figure 5) of work with the IoT system include diagnostics, real time-monitoring of thermal aspects, energy balances and their processing, reporting and fault notification via SMS messages. At the strategic level (a blue rectangle in Figure 5), data is transformed into information and knowledge that will enable managers to effectively manage and make decisions. Deviation analysis, monitoring and consequences of decisions are the basis for the implementation of feedback between the manager (company representative) and the client. Through the obtained data and decisions, the manager can improve the quality of, and optimize, energy consumption through the setting of sensors, respecting customer requirements and their preferences. The second feedback is between the logistics processes that connect the company and heat consumers. First, it is necessary to process the biomass to generate steam, which is then distributed through pipes to the heat exchanger.

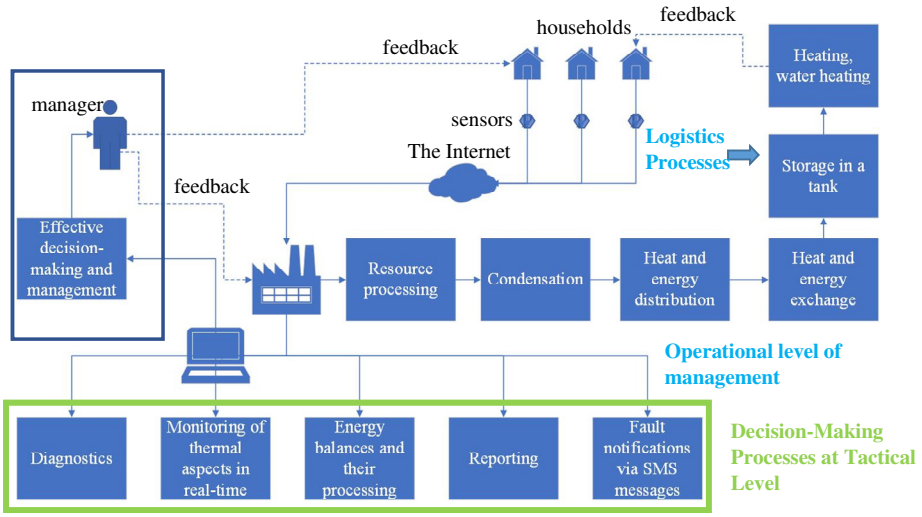

Fig. 5: General model of IoT technology implementation in energy companies in Slovakia to support management and decision-making

The energy will be stored in a storage tank; it will be used to heat residential units and water. The sensors can be used to collect data in every single logistics process. When they return to the company via the Internet, they influence ICT and decision-making processes.

Discussion

The research carried out at GGE confirmed the positive impact of IoT technology on the support of management and decision-making in the energy industry, together with the associated negatives. Benefits of introducing IoT into the energy company upon from the conducted interviews are as follows:

- Work simplification; fast feedback; real-time data collection;
- Transformation of data into information;
- Management and decision support at all levels of the company;
- Lower personnel costs in the form of downsizing employees;
- Preventive maintenance and fault reporting;
- Stabilization of adequate quality of the electricity network;
- Minimum deviations; precise regulation of heat/water/electricity/gas;
- Efficient reporting;
- Optimization of the company's distribution processes, especially the activities of dispatching and distribution stations.

The benefits confirm the suitability of introducing the intelligent sensors and D2D (sub-component of Industry 4.0 and IoT) into the company, thus fulfilling the main goal, purpose, and task of research. However, in addition to the positives, the technology brings in practice and use also negative aspects, namely:

- Increased training costs;
- A manager with a strong personality is needed who can motivate people to change;
- Traditional processes are being replaced by new ones = frequent reluctance of employees to change established habits in the work environment;
- Hacker attacks on the system and data in it;
- Finance and time.

Ultimately, however, the benefits outweigh the barriers, as evidenced by the research questions met.

Conclusion

The results of the research conducted through an interview with the CEO of GGE, the energy company, formed the basis for designing a general model for the implementation of IoT technology in the logistics processes of Slovak energy companies. The main outcome was to offer a relevant proof of the benefits of IoT technology in the logistical support of management and decision-making through real-time data, and to support it with arguments. Based on the best practice of a selected company in Slovakia, GGE branch in Považská Bystrica, it was possible to design a general model that can be adapted to the needs of individual heat and energy providers in the conditions of the national market. The results of the observation identified ten key areas and/or processes that are based on the use of raw field data to be processed through a selected information system. The analyzed company obtains data through built-in sensors, and thus effectively manages the processes of diagnostics, monitoring of thermal aspects in real time, energy balances and their processing, reporting, and fault reporting via SMS messages. The implementation model includes both, the operational and strategic level, as well as feedback among individual actors, such as business managers, households (residents) and the relevant company. If necessary, some steps of the model can be modified, eliminated, or extended depending on the internal and external conditions that will affect the company that decides to implement IoT technology in its logistics and management processes. To anticipate and eliminate any potential problems, it is essential to focus mainly on changing the thinking and motivation of employees, on a participation in training, the correct setting of requirements based on an analysis of the current situation and the selection of an adequate supplier with sufficient experience with the issue. To achieve the maximum effect, it is beneficial to test the selected solution in practice and perform its subsequent modification, including the associated feedback between specific activities.

By elaborating the theoretical basis of knowledge of the given issue, the concepts from the given area were clarified, which needed to be understood for the implementation of research activities in practice. Trends and technologies, customer purchasing behavior, as well as the needs and motivation of employees are key factors that affect the company's performance and the ability to optimize the production and logistics processes. The funnel-like model reduced the information in order for it to be effectively used in the field of energy distribution in the conditions of Slovakia at a practical level in real conditions. By implementing IoT into business processes, the research shows that CSF mainly include precise energy regulation (quality with minimal deviations), safety, low costs, management, and decision-making support. Other benefits are in work simplification, fault reporting, predictive maintenance, real-time data collection, etc. Training, changing the mindset of employees, higher demands on the management of the company, hacker attacks and financially demanding investments are limitations that can slow down the successful introduction of new technologies or make it impossible. The elaboration of the article confirmed the assumption that IoT technology is beneficial for management and decision-making in complex

activities of the company and forms a competitive advantage in the current market of trends. Exploring the effects of implementing the model into practice will be part of the following research activities.

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Credit Risk and Financial Performance-Evidence from the Commercial Banks of Oman listed in Muscat Securities Market

Dr. Anitha RAVIKUMAR
Faculty, University of Technology and Applied Sciences (HCT)
Department of Business Studies
Muscat, Sultanate of Oman
Email: anitharaveekumar@gmail.com

Mr. Ravi VinodKumar SHARMA
Faculty, University of Technology and Applied Sciences (HCT)
Department of Business Studies
Muscat, Sultanate of Oman
Email: ravi.vk.sharma@gmail.com

Mr. Gopalan PUTHUKULAM
Faculty, University of Technology and Applied Sciences (HCT)
Department of Business Studies
Muscat, Sultanate of Oman
gopalpshankar@gmail.com

Dr Stephen ARO-GORDON
Faculty Department of Business and Accounting,
Muscat College, Sultanate of Oman,
Mail: stephen@muscatcollege.edu.om.

Dr. Krishna Murthy MEESAALA
Faculty, University of Technology and Applied Sciences (HCT)
Department of Business Studies
Muscat, Sultanate of Oman
Mail: drkmty@gmail.com.

Abstract

This study aims at investigating the quantifiable effect of credit risk on the performance of listed banks in the sultanate of Oman over the period of 10 years (2010-2019). The analysis of this study is based on Secondary data extracted from the Muscat Securities Market (MSM). Panel data has been employed in this study. Return on Assets (ROA) and Return on Equity (ROE) are the performance indicators and Bank specific variables like Non-performing loans, size of the bank and oil price have been taken as indicators of inherent credit risk . The study employed Random effects model to analyze the time series data. The result showed that the quality of the assets on the balance sheet and the inherent credit risk have an inverse relation whereas the bank size had not significant relationship with ROA and ROE. Oil prices has an effect on ROE but not on ROA. As Oil prices cannot be controlled by the banks, they need to focus more on alleviating themselves by controlling, regulating and monitoring the non-performing loan book. Banks are recommended to adhere to highest standard of credit appraisal ensuring lending to credit worth borrowers with the highest ratings

Keywords: Commercial banks, Credit risk, Financial performance, ROE, ROA, Size of bank, Non-performing loans.

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Introduction

The performance of the economic sector of an economy is considered imperative to the growth of a nation and hence the economic sector needs to be at the forefront in terms of performance. One of the most important economic segments of an economy is the financial services sector. This tertiary sector includes the most important and conventional financial service i. e. Banking. The dependency and importance of the banking sector for the developing and underdeveloped economies was reviewed with a view that these economies have less than 1/10th share of financial assets in financial sectors other than banking(ADB, 2013). Banks are responsible for the confidence and growth of an economy and hence this sector should be well structured. A well-structured banking sector would be viable, robust, and successful (Saeed and Zahid, 2016).

Banks being intermediaries have the primary function of accepting deposits and lending loans. The basic income generated by the banks is through credit lines on and off the balance sheet having intrinsic credit risk (Allen, 2012). Banks face risks that are classified as credit risk, liquidity risk, market risk, operational risk, nominal risk, and legal risks(Van Gestel and Baesens, 2009;W.Koch and MacDonald, 2009). Credit risk has the possibility of a borrower to default by failing to make payments as per his contractual agreement (Richard *et al.*, 2008). The Basel Committee on banking supervision (2000) explains credit risk as the possibility that the borrower of funds will be unsuccessful in meeting its commitments in line with the established contract. Such credit risk predominantly affects the lender and may cause a complete or partial loss of principal and interest, problems in cash flow, and higher collection costs.(Basel Committee on Banking Supervision, 2000)

In general terms, credit risk means the critical risk which shapes the financial performance of the bank. If a bank's balance sheet shows high level of non-performing loans, it means the profitability of the bank will be low which consequently will affect the performance of the bank. Banks' exposure to credit risk is more than any other risk. Thus, efficient credit risk management is vital for the very existence and progress of the banks (Ekinci and Poyraz, 2019).

Risks not only create negative impacts on operations and profits but also on the market value of the institution. Credit risk is regarded as the most important type of risk as it is contemporary to 8 out of 10 balance sheet items (Perera, Ralston and Wickramanayake, 2014). To ensure financial health, banks need to identify in time the potential credit risk as such leads to lower liquidity levels. Credit risk also arises in case of the banks' guidelines to risk management are frail and incomplete (Richard *et al.*, 2008).

Need for the study

Oman's banking sector has an overwhelming domination in the financial sector. Banking sector acts as a vital intermediary and also plays a fundamental part in the payment and settlement mechanism. Henceforth, the financial well-being of the banking sector is crucial for the economic stability and development of the country. (Central Bank of Oman, 2019).

The management of credit risk is vital as it explains the exposure banks have with counterparties and vice versa, whereby enabling the creation of mitigation techniques. Eminent studies have pointed out that inappropriate credit risk management coupled with excessive lending was one of the major causes of the global meltdown (GAO, 2013).

Only a strong and lucrative banking sector has the capacity to endure detrimental setbacks and can contribute to the constancy and reliability of the financial system. Any non-performance of banks will lead to the adverse impacts on the macro economy which would be extensive and mammoth.

Evaluating performances of banks are critical for the investors and for the sustainable growth of a nation (Pekkaya & Demir, 2018). Hence, this study has been undertaken to examine the impact of credit risk management on the financial performance of banks.

Review of literature

The credit risk is assessed based on three variables - doubtful loans, non-performing loans and loan loss. Panel data analysis of both fixed and random effect model and GLS was employed to know the impact of credit risk on the

financial performance of banks and found that that the credit risk has significant negative impact on Return on asset (ROA) and Return on Equity (ROE). The result also showed that the size of the bank and the total deposit have a positive impact on the financial performance of banks. (Al-Eitan and Bani-Khalid, 2019).

Credit risk has a negative relationship with the profitability of the banks. Poor asset quality to total assets in short run and long run has a direct impact on the profitability. Banks with high asset quality and low in non-performing loans are more profitable than the others. (Jane GathigiaMuriithi, 2016)

Decrease in capital adequacy ratio, total asset and interest ratio decreases the credit risk. Also the study reveals that there is a positive relationship between the unemployment rate and credit risk in Azerbaijani banks. (Shahriyar Mukhtarov, 2018)

The characteristics of banks play a major role in the risk taking capacity of Tunisian banks. The ratio of return on asset is positively influenced by credit risk and the ratio of capital adequacy negatively affect the credit risk. Moreover, the banks' profitability is correlated with the macro economic variables. (Nabila Zribi, 2011).

The effect of Credit Risk Management on the financial performance was analyzed by considering ROA as a financial performance indicator. Credit risk indicators include Default ratio(NPL/TL), Cost per loan asset (CLA) and Capital Adequacy Ratio (CAR). All the credit risk indicators have a negative impact on the financial performance on the banks taken for the study. The results further indicated that credit risk is the major determinant of financial performance of banks. (Poudel, 2012). The negative impact of NPL on financial performance is also confirmed by (Patwary and Tasneem, 2019). The study further mentions NPL as the main reason for the failure of majority of banks.

(Delis, 2005) in their study has taken ROA and ROE as profitability indicators of Banks. For measuring the credit risk, loan-loss provisions to loans ratio (PL) has been used. The loan-loss provisions to loans ratio (PL) has a negative and significant impact on the profitability indicating the need to minimize the NPL to increase the profits of the banks. (Titko, Skvarciany and Jurevičienė, 2015) analysed the drivers of bank profitability. The results of the study indicate that bank size, improved infrastructure and e-banking services positively affect bank profitability whereas operational efficiency has a negative influence on bank profitability.

Most of the studies examined have used either bank specific variables or macro-economic variables separately and some studies have used both bank specific variables and macro-economic variables like GDP, CPI inflation. But none of the studies have used oil prices as the macroeconomic variable along with bank specific variables in their study.
The main reason for including oil prices in the study is Sultanate of Oman's economy earns more than 70 per cent of its revenue from oil exports alone. As a result, any decline in oil prices would have a negative impact on the fiscal and external balance of the economy. This decelerating economic growth may adversely impact borrowers which may escalate non-performing loans and provisioning requirements. A study conducted by (Hesse and Poghosyan, 2009) shows that oil price has an impact on the banks' financial performance which clearly indicate the importance of oil prices on banks' profitability.

In order to find out whether bank specific variables and oil prices have an impact on banks' profitability , a study has been undertaken considering both the bank specific variables and macro-economic variables to evaluate the credit risk and financial performance of listed banks in Muscat Securities Market(MSM).

Data and Methodology

The current study focusses on the credit risk and financial performance of listed banks in Muscat Securities Market. In Muscat Securities Market(MSM), 8 banks are listed viz. Ahli Bank, Bank Dhofar, Bank Muscat, Bank Nizwa, Sohar International Bank, HSBC Oman, National Bank of Oman and Oman Arab Bank. Out of these 8 banks, financial reports are available for the complete period of this study(2010 to 2019) only for 6 banks as bank Nizwa was established only in the year 2012 and Oman Arab Bank was listed in Muscat Securities Market only in the year 2020. So, except Bank Nizwa and Oman Arab Bank all the other 6 banks are included for the study. The annual financial statements of these 6 listed banks which were audited and published in the Muscat Securities Market(MSM) (https://www.msm.gov.om/) was collected for the years 2010 to 2019.

The ratios and the variables used in this study was determined from extensive literature study and are listed below in table no.1.

Table 1: Ratios and variables used

S.No.	Variables	Name of the Ratios/ variables used	Explanation	References
1.	**Profitability indicators**	Return on Assets(ROA)	It is the ratio between the profit after tax divided by total or average assets. It aids in the determination of the efficient usage of banks assets and its capability to generate revenue from the assets	(Alshatti, 2015; Noman et al., 2015; Saeed and Zahid, 2016; Noor, Das and Banik, 2018; Sun, 2018; Al-Eitan and Bani-Khalid, 2019; Ekinci & Poyraz, 2019)
		Return on Equity(ROE)	ROE is calculated using the formula profit after tax divided by total/average equity. This ratio measures the competence of a bank in utilizing the investment made by shareholders to generate profit.	(Alshatti, 2015; Noman et al., 2015; Saeed and Zahid, 2016; Noor, Das and Banik, 2018; Sun, 2018; Al-Eitan and Bani-Khalid, 2019; Ekinci & Poyraz, 2019;Kajirwa and Katherine, 2019))
2.	**Influencers of profitability**	Non-performing loans to Total loans (NPL/TL)	It is used to measure credit risk. If the ratio is low, it indicates better asset quality and lower credit risk and vice versa.	(Taiwo et al., 2017; Mukhtarov, Yüksel and Mammadov, 2018; Sun, 2018; Abubakar *et al.*, 2019)
		Total equity to Total assets(TE/ TA)	The performance of the financial institution is well explained by this ratio	(Ekinci & Poyraz, 2019)
		Total loans to Total assets(NPL/TA)	This ratio is considered to be the good indicator of Asset quality of banks. As loans bring interest earnings which constitute the major revenue for the banks, higher the ratio means higher profits for the banks.	(Ekinci & Poyraz, 2019)
		Size of the bank(SOB)	Total assets of the banks are used to determine the size of the banks. Banks having larger assets are more probable to have larger diversified assets or portfolios. Hence, their opportunity to reduce the risks and increasing their profits are more.	(Zribi and Boujelbène, 2011; Saeed and Zahid, 2016; Mukhtarov, Yüksel and Mammadov, 2018; Ekinci & Poyraz, 2019)
		Oil prices	Evaluation of the effect of oil prices on banks' profitability reveals that the influence of the oil price shock on profitability is affirmative and substantial irrespective of the explanation of the oil price shock.	(Hesse and Poghosyan, 2009)

Return on Assets and Return on Equity which are the profitability indicators are taken as dependent variables. Bank specific variables like NPL/TL, TE/TA, NPL/TA, SOB are considered to be the determinants of profitability are taken as independent variables. (Hesse and Poghosyan, 2009) point out that macro-economic variables occupy a strategic

position on the performance of the banking sector. Hence, macro-economic variable oil prices which is likely to affect the bank performance is taken along with bank specific variables are taken as independent variables

The data was analyzed by using descriptive statistics, correlation and Regression. The adoption of this technique was inspired from (Kajirwa and Katherine; Ekinci & Poyraz; Abubakar *et al.*, 2019) and also from similar studies conducted on the bank credit risk and financial performace of banks.

Table 1: Descriptive Statistics

Descriptive Statistics	ROA	ROE	Bank size	Asset Quality	Capitalization	Credit risk	Oil prices
Mean	10	10	195357445	10	10	10	78.331
Median	9.95846	10.5516	25882169	9.91155	8.57171	10.1819	75.105
Std. Deviation	1.0040	1.9401	362353964.7	0.3894	3.2712	1.8575	25.4850
Minimum	8.6938	6.8237	17894529	9.4871	7.7697	7.4424	40.1
Maximum	11.6127	12.4346	943703683	10.7722	16.2657	12.5321	109.6

Table 1 shows that the means of ROA, ROE, Asset Quality, Capitalization and Credit risk are 10. The average oil prices are 78.331.

The capitalization ratio calculated on the basis of owned capital in the total capital structure appears to be good with a median of 8.57171684 and a standard deviation of 3. 27122027.Large ratio of owned capital means the managers of the bank have to simply follow the objectives set by the owners. Thus, when the owned capital is more the non-performing loans level will be lesser. (Bawa *et al.*, 2019).

Credit risk(NPL/ TL) has a median of 8.5717 and a maximum of 16.2657 shows that the Non-performing loans of the banks are less when compared with the total loans lend by the banks. According to (Bawa *et al.*, 2019), non-performing loans will have a negative impact on the banks' profitability.

Table 2: Correlation

	ROA	ROE	Bank size	Asset Quality	Capitalization	Credit risk	Oil prices
ROA	1						
ROE	.902**	1					
Bank size	.332	.432	1				
Asset Quality	-.039	-.130	-.735*	1			
Capitalization	-.800**	-.595	-.279	.085	1		
Credit risk	.906**	.935**	.502	-.130	-.562	1	
Oil prices	.847**	.657*	.249	.106	-.763*	.664*	1

Source: Authors' calculated results using SPSS
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Correlation analysis has been done to show that there exists no robust correlation between dependent and independent variables (Al-Eitan and Bani-Khalid, 2019). The independent variables like bank size, Asset quality, Capitalization, Credit risk and Oil prices and the dependent variables namely., ROA and ROE shows a weak to medium relations in most cases which reveals that there is no correlation between them.

The Dicky-Fuller and Phyllis-Peron test was used to prove the stationarity of the time series of the variables taken for the study. This test also examines the stability of the time series for the study period as the time series instability will result in unrealistic regression results. (Al-Eitan and Bani-Khalid, 2019)

Table 3: The unit root results (Dickie-Fuller & Phillips-Peron)

t-statistics in Log First Differences		
	ADF (First differences)	PP
ROA	56.5531***	65.6018***
ROE	50.2603***	50.7365***
Bank size	30.2865***	36.1567***
Asset quality	44.7566***	44.4393***
Capitalization	59.6521***	64.9466***
Credit risk	38.8799***	38.0756***
Oil prices	42.3884***	42.2676***

Source: Authors' calculated results using SPSS
****, indicates significance at 1 %*

Table 3 shows the Dickie-Fuller & Phillips-Peron test. As the results in the level are insignificant and unstable, Dickie-Fuller & Phillips-Peron test was conducted for all the variables at first differences. The results at the first difference shows that the variables are stable and the null hypothesis of instability was rejected.

Regression Results and Discussions

Wald test was calculated to find out if the independent variables in a model are significant. The results of the Wald test show that it is significant. Hausman test was carried out to select between fixed effect or random effect method. If Hausman Test probability value is more than 5%, the method to be chosen is random effect.(zulfikar, 2018); (Al-Eitan and Bani-Khalid, 2019) As the Hausman test probability value for ROA is (0.9228) and ROE is (0.8624) which is more than 5%. Hence, Random effects model is used to analyze the data. The results of the Random effects model are presented below in Table 4.

Table 4: Random effects model

Dependent Variable: ROA		Dependent Variable: ROE	
Bank size(SOB)	1.81E-12 (2.34E-12)	Bank size(SOB)	0.027576 (2.05E-11)
Asset quality (NPL/TA)	-0.024217*** (0.006237)	Asset quality (NPL/TA)	-1.79E-11*** (0.051769)
Credit risk(NPL/TL)	-0.039399*** (0.012672)	Credit risk(NPL/TL)	-0.141153*** (0.106810)
Oil prices	2.45E-05 (1.56E-05)	Oil prices	0.309289*** (0.000136)
Capitalization(TE/TA)	0.004851*** (0.003215)	Capitalization(TE/TA)	0.000366*** (0.028182)
R-squared	0.691627	R-squared	0.716313
Wald Chi-square	93.899	Wald Chi-square	123.9412

Probability (Chi-square)	<0.00001	Probability (Chi-square)	<0.00001
Hausman Test (Prob.)	0.9228	Hausman Test (Prob.)	0.8624
Total Observations	60	Total Observations	60

*Source: Authors' calculated results using EViews 11. *, **, ***, indicates significance at 10 %, 5 % and 1 %.. standard errors are shown in parentheses.*

The Asset quality(NPL/TA) and also the credit risk(NPL/TL) has a negative relationship with both ROA and ROE and the results are significant at 1% level. This result is consistent with (Delis, 2005; (Jane GathigiaMuriithi, 2016); Al-Eitan and Bani-Khalid, 2019).

Bank size or the size of the bank has no significant relationship with ROA and ROE. This result is in contrast with the previous studies. Previous studies like(Titko, Skvarciany and Jurevičienė, 2015; Al-Eitan and Bani-Khalid, 2019) Ekinci & Poyraz, 2019) showed a positive and significant relationship between Size of the bank and profitability.

Capitalization ratio(TE/TA) is positive and has a significant relationship with ROA and ROE. This result is supported by (Ekinci & Poyraz, 2019). (Ekinci & Poyraz, 2019) reasoned that this strong relationship is due to the fact that well capitalized banks' dependence on external funding is less and as a consequence cost of funding will be less which ultimately results in huge profits.

Conclusion

The study evaluated the credit risk and the financial performance of Listed commercial banks in Sultanate of Oman. The result shows that Asset quality, Capitalization and Credit risk has an impact on both ROA and ROE. It indicates that the banks should be very careful in lending because more Non-Performing Assets in the bank's balance sheet will have a negative impact on its credibility. Oil prices has a positive effect on ROE but not on ROA which proves the impact of oil prices on banks performance. Even though oil prices have an impact on the Return on Equity, banks do not have the authority to control the oil prices.
As the Oil prices cannot be controlled by the banks, they need to focus more on alleviating themselves by controlling, regulating and monitoring the non-performing loan book. Banks are recommended to adhere to highest standard of credit appraisal ensuring lending to credit worth borrowers with the highest ratings. Apart from that, Bankers must have a clear understanding of the business environment, its current position and also must be able to forecast the business prospective in order to reduce the non-performing assets.

The data analyzed is only for 6 commercial banks of Oman due to non-availability of data for the period and also only 6 banks were listed in Muscat Securities Market during the period of analysis. As the data anlaysed is not sufficient to substantiate the results, it is difficult to generalize the results obtained. The authors recommend that data can be collected from the securities market of all the commercial banks functioning in the gulf countries in order to find a conclusive evidence for the impact of credit risk on the financial performance of commercial banks.

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Study of Young Adults' Preferences in Passenger Rail Transport Services as A Basis for Marketing Activities

Grazyna ROSA
University of Szczecin, Institute of Socio-Economic Geography and Spatial Management, Szczecin, Poland
grazyna.rosa@usz.edu.pl

Izabela OSTROWSKA
University of Szczecin, Institute of Socio-Economic Geography and Spatial Management, Szczecin, Poland
izabela.ostrowska@usz.edu.pl

Agnieszka TOMASZEWICZ
University of Szczecin, Institute of Socio-Economic Geography and Spatial Management, Szczecin, Poland
agnieszka.tomaszewicz@usz.edu.pl

Abstract

Since the 1990s, the macro environment of passenger transport companies has changed radically. As a consequence of changing conditions, marketing is being atomised and the demand for new marketing instruments is rapidly increasing. In societies of abundance, consumers are better educated and more demanding, thus a need arises for new marketing activities and adapting products to the requirements of the target market, taking into account the individual needs of buyers. This article focuses on the literature concerning young people, especially the group of young adults (18-29 years old) who often travel and are considered an important target group for railway companies due to continuing education outside their place of residence, work or sightseeing. The research investigates passenger rail transport in regions and agglomerations in Poland. In order to achieve the research objective, the method of critical analysis of available results of secondary research and a questionnaire in primary research were used. Modern marketing in passenger rail transport services should therefore target areas where particular factors are related to travel times, service prices, customer service processes and availability of new technologies.

Keywords: Passenger Rail Transport, Customer Preferences, Marketing.
YEL codes: R41, M30. L92, N74, O18.

Introduction

The turbulent changes taking place in the global economy, especially at the beginning of the 21st century, have had and continue to have a strong impact on the perception of marketing and the definition of its role and principles in companies. These changes are related to a greater inclusion of marketing in the management of enterprises (e.g. orientation towards enterprise value, strategic management orientation, market orientation, increase in the importance of information technology, taking care of a positive image of the enterprise) (Pomykalski 2005, p. 3). The modern market for rail transport services (both passenger and freight) is a market oriented toward a service user. The oversupply of services in the passenger transport market results from the development of private transportation which satisfies most of the demand for transport services on the market and reduces the demand for the services in the public transport market. This situation forces railway companies to focus on customer needs and use modern marketing not only to convince customers to use the services, but also to ensure that the quality of the services provided is satisfactory and that the purchasing process runs smoothly and according to their increasing expectations.

The concept and nature of marketing of transport services derives from the nature of marketing and, more specifically, marketing of services. Marketing solutions and activities are constantly evolving. In the beginning, marketing was defined as: the art of selling products, then as the art of finding and keeping customers, and eventually as the science and art of establishing, maintaining and improving relationships with profitable buyers. In the above definitions, the orientation of marketing changes from a company to a customer. A change in the way marketing is defined may be observed in marketing concepts 1.0, 2.0 and 3.0. Product-oriented marketing is referred to in the literature as marketing 1.0, while its orientation towards customers as marketing 2.0 (Kotler, Kartajaya, Setiawan, 2010, p. 18). In marketing 2.0, which originated in the age of information, consumers are in

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the limelight, however they are only perceived as passive recipients of marketing activities. The philosophy of marketing 3.0, on the other hand, focuses on specific behaviours of consumers and underlines that marketing activities should be related to human aspirations, values and spirit. In this sense, consumers not only meet their practical needs, but emotional as well. They are looking for goods and services (brands) which promote the pursuit of social, economic and environmental justice (Kotler, Kartajaya, Setiawan 2010, pp. 18-19). Another concept, currently the most up-to-date one, is the concept proposed by Ph. Kotler, referred to as Marketing 4.0. It involves a change from vertical to horizontal relations: inclusive and social. The originators of this approach describe marketing 4.0 as "deepened and extended human-centric marketing which addresses every aspect of consumer journey (Kotler, Kartajaya, Setiawan 2017, p. 15).

In the middle of the last century, the discussion on the then "service revolution" redefined services, going beyond the sale of "basic services". In this broader context, the emergence of a more distinct and autonomous marketing of services in areas such as transport, communication, education and e-commerce was recognised and envisaged (Gilmore 2006, p. 13). The marketing of transport services may be defined analogously as the way transport companies act in the market. Perceived through the prism of the process of rational stimulation and satisfaction of the needs reported by users, transport requires continuous adaptation of products and services to the changing market reality and customer requirements (Wyszomirski, Rucińska 2007 and Wojewódzka – Król 2007, p. 303).

The subject of passenger transport, including rail transport, is discussed in the literature by numerous authors such as (Bąkowski, Szewczuk (red.) 2000), (Engelhardt, 2007, 2015), (Paprocki, 1996), (Rosa, 2013, 2018), (Tomanek, 2002), (Wyszomirski, (red.), 1994), (White, 2016.), (Koleje pasażerskie…, 2017), (Cherkashin, 2018), (Abramovic, Sipus, 2019), (Drewnowski, 2019), (Bocheński, Wojtkiewicz 2019), (Krawiec, Ćwiek, 2019), (Massel, 2019), (Mężyk, 2019), (Szałucki 2019). The article focuses on the issue poorly examined in the source literature, namely young customers' preferences. The analysis will be based on the results of own research.

Customers' preferences in rail transport – current state of the art

Since the 1990s, the macro environment of passenger transport companies has changed radically. The internationalisation of the global economy, the creation of the European single market and the emergence of new competitors have consequently forced changes in transport companies. The main change, however, is the acceleration and proliferation of technical progress, which renders it necessary to introduce amenities for customers: to facilitate planning a journey, purchasing a ticket or providing a transport service. As may be observed, the ever-progressing and evolving digital age sets a new framework for marketing in the digital economy. The human element and the classic customer service allowing individual treatment are not used to a large extent, as opposed to self-service in the purchasing process and automation of the customer service process. As a consequence of technological changes, it is necessary to adapt all marketing tools to the changing nature of consumer journey leading to purchasing in the digital economy age (Rosa, 2020).

In societies of abundance, consumers are better educated and more demanding, thus a need arises for new marketing activities, for example customised marketing which involves specialising and adapting products to the requirements of the target market, taking into account the individual needs of buyers (Rosa 2020). Shaping and developing market orientation in this most recent approach – marketing 4.0, i.e. deepened and extended human-centric marketing, requires systematic recognition of transport needs, detailed research and analysis of needs, preferences and behaviours of transport users, taking into account their results in improving the products and services offered and building lasting relations with the market, internal and external environment of a company.

The market of transport services is undoubtedly a competitive market, thus the flow of marketing information, necessary in the decision-making process, concerning primarily marketing decision (Rosa, Mindur, 2014, pp. 583-588), is of great importance. Due to the specific nature of transport services, the main areas of research include: identification of transport needs and demand, customer preferences and competitive behaviour. The analysis of market share and competitive benchmarking is also crucial (Grzelec 2012, p. 108). The study of customer preferences enables extending the knowledge of transport needs and transport assumptions, and allows the determination of conditions under which these transport needs should be satisfied. The subject of this research are the users of freight or passenger transport services. It includes both studies of external phenomena (study of cultural conditions and freight transport practices), all elements of the marketing mix (mainly the transport service) and the evaluation of image of transport companies (customer survey) (Rosa, 2020).

As regards the transport situation in Poland, according to Eurostat data, in 2000-2016 the number of cars per 1,000 inhabitants in Poland increased from 261 to 599, which means that a potential rail transport customer in Poland may actually choose between a passenger car and a train. It should be noted that in many European countries this

indicator is at the level of 550, which means that in Poland it is higher than the European average by 35 (higher than in Italy, Norway, Germany, Austria, Luxembourg, Malta or Cyprus) (Bartosiewicz, Pielesiak 2019). At present, according to Eurostat and Statistics Poland data, the share of rail transport in passenger transport in Poland amounts to 7.3%. The EU average for trains is only 0.3 percentage points higher. Cars account for the largest share of land transport, with 81.3% in the EU and 77.2% in Poland. However, the share of bus and trolleybus services on the Polish market is higher than the EU average (Eurostat, 2019).

Table 1: Passenger transport in the European Union countries

Countries	Passenger transport			
	passenger cars	coaches, buses and trolleybuses	trains	trams and metro
	% of total passenger-kilometres			
EU-28	81.3	9.3	7.6	1.8
POLAND	77.2	13.9	7.3	1.6

Source: Eurostat, Road transport in Poland in the years 2016 and 2017, GUS, Warszawa, Szczecin 2019, s. 164.

The analysis of the global situation reveals that the rail network has been extended in countries such as China and Thailand, and has been reduced in countries such as Brazil, Japan, France and New Zealand. Certain railway companies (in USA, former Soviet Union countries, China and Mexico) mainly carry freight, which enhances efficiency and enables a "commercial" approach to prices and services. Other railway companies (in Sri Lanka, India and most of Western Europe) provide considerably more passenger services than freight services, which reduces productivity, increases costs and leads to political interference in transactions and pricing. As regards India and Western European railways, passenger transport services are, to a significant extent, provided to suburban passengers, which is both costly and generates only limited revenues (Banerji, 2017).

It is assumed that in rail passenger transport the basic factors influencing demand are: population size, location and density of settlements, level of economic development of the region, purchasing power of the society, time allocated to various forms of activity, operating costs of individual means of transport in relation to the prices of public transport services, the significance of particular preferences which affect the quality of services offered (Pielesiak, Bartosiewicz, 2019). It should be noted that the transport needs of the population related to the organisation of social life are determined by the location of: workplaces, educational institutions, shopping centres, leisure facilities, cultural and scientific institutions and public administration units. The movement of people may be additionally related to the maintenance of interpersonal relations (Kos, Krawczyk, Tomanek, 2018, p. 47). The behaviour of travellers is related to socioeconomic factors that characterise a given population, such as: age, education, car ownership, household size, income (De Witte et al., 2013, 329-341). As a result, the railway use varies across the European Union. The results, demonstrating the number of journeys per capita, are presented in Figure 1.

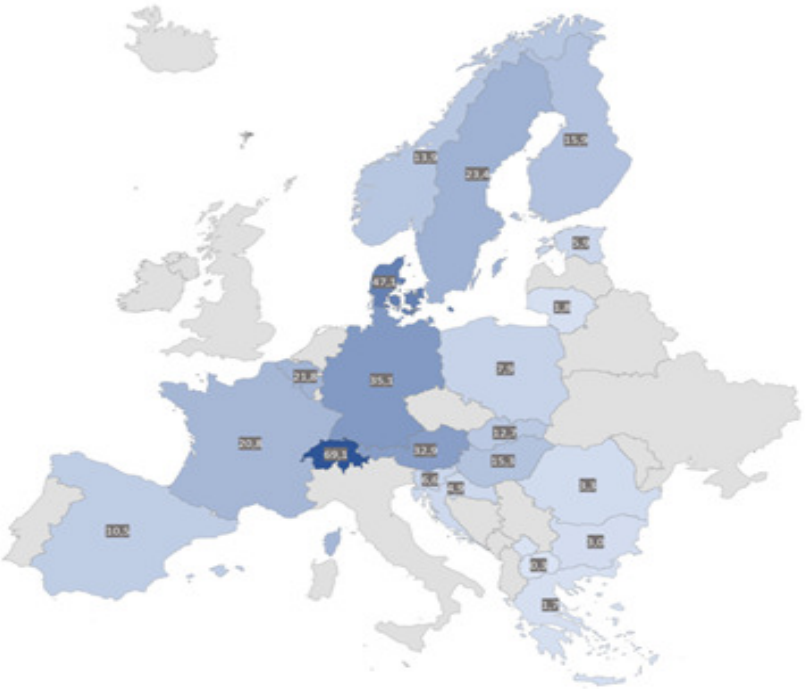

Fig. 1: The rate of railway use in selected European countries (Office of Rail Transportation 2017).

Switzerland has the highest rate of rail use in Europe, with nearly 70 journeys per capita per year. Travelling by rail in this country is characterised by (Urząd Transportu Kolejowego, 2017, p. 11):

- high availability of railway services (large number of trains per day and cyclical train timetable);
- reliability;
- travel comfort (comfortable and well-muted cars available even in regional transportation);
- well-organised connections with other modes of transport, as well as a wide range of services offered under a single ticket for all modes of transport.

Competition in passenger transport mainly involves instruments such as product (time, comfort and safety, physical accessibility and number of connections) and price. Competition in the market for passenger transport services is based on the substitutability of services provided by carriers representing different transport modes and offering different yet substitutional services for the transportation of passengers or cargo (Paprocki 1996, p. 62). The competitors in passenger transport may include (Engelhardt 2007, s. 171):

- mass transportation (rail and road carriers) and private transportation through cars;
- railway carriers and local municipal carriers (bus, metro, tram) providing services of short-distance transportation in urban agglomerations;
- railway and bus carriers providing services of short, medium and long distance transportation, the latter concerning in particular international connections;
- railway and air carriers (mainly low cost lines) providing medium and long distance transportation services.

Correct recognition of consumer preferences which influence purchasing behaviours often has a decisive impact on the market position of companies. This results from the fact that the consumer is under the influence of numerous factors of a subjective nature, which are difficult to specify as they stem from feelings and experiences which the consumer acquires throughout their life. Feelings of this type are defined as internal preferences which reflect consumer's tastes. Research on consumer preferences may be conducted on the basis of historical observations as well as data describing consumer intentions included in the methods of analysis of expressed preferences. They refer to market behaviours declared by consumers. Under this assumption, the primary source of information is data collected through direct and indirect surveys, which record consumers' purchasing preferences. (Ostrowska, Rosa, Tomaszewicz, 2019).

Consumers make decisions about the preferred means of transport in conditions of uncertainty. The variables known to the customer at the time of making the decision usually include travel costs, departure time and estimated travel time. When making a decision, they take into account the likelihood of such events as delayed departure and arrival at the destination, the need for a transfer, the risk of an accident or the occurrence of various inconveniences during the journey (e.g. heating failure, no seats available, fellow travellers causing inconvenience). There are studies investigating decisions made by the consumers when choosing means of transport, which enable the prediction of risks they are willing to take when choosing different means of transport (Rasouli S., Timmermans H., 2014). The authors stress that the consumer's decision is influenced by the routine, customary behaviour related to transportation, i.e. preferences based on their experience. Moreover, the choice of means of transport is contingent upon the consumer's disability and the fact that it might be difficult for them to travel independently, for example by train, and they must be assisted. It was observed that as the length of the journey increases, the likelihood of having to assist a disabled person during the journey raises. People with disabilities may travel more independently if they could use additional door-to-door services which are not offered by railway companies (Ermagum et al., 2016).

People attempt to make rational decisions in accordance with their preferences, which transform into attitudes and influence purchasing behaviour (Kroesen M., Chorus C. 2018). Recognition of consumers' preferences, existing and predicted ones, and their purchasing habits allows the preparation and implementation of an effective programme of influencing consumers (Szymańska 2007). Consumers' preferences are generally understood as subjective assessments or a system of assessments which is the basis for choices made in the purchasing process (Trojanek 2009, Black 2006, Rybicka 2003) which motivate consumer behaviour. Convictions are formed in a situation in which a consumer chooses a good or a service from a number of available options and prefers one product over others. Convictions (preferences) may be shaped by consumers on the basis of their opinions, knowledge, emotions or beliefs. They are a reflection of what the consumer thinks of a given product or brand. They are consumer's subjective feelings which reflect the consumer's tastes. Consumers are constantly extending their knowledge about the market, and as a consequence their preferences change. As a result of competitive activities, especially aimed at increasing customer value, even loyal customers may consider changing their current service provider (Gracz, Ostrowska 2014, Ostrowska, Rosa, Tomaszewicz, 2019).

Preferences have the following features:

- they concern specific objects of choice, i.e. tangible or intangible items;
- they are demonstrated immediately before or during the purchase;
- they very often reveal themselves in the purchasing decision process and are one of the factors determining the decision to purchase a particular product;
- their measurement depends on their type (internal and external preferences) (Trojanek 2009, Kaczmarczyk 2006, Ostrowska, Rosa, Tomaszewicz, 2019).

The preferences of passenger rail transport service users may be defined as the necessity to satisfy transport needs, which reflect their expectations and personality (Rosa, 2020). Preferences in the purchasing process usually translate into consumer behaviour on the market, which may also be exhibited when choosing transport services. Due to the availability of online services and information, the "digital traveller" has ever-increasing requirements and expects customised service (Nyurenberger, et al., 2019).

The analysis of consumers' preferences enables the identification of product characteristics which guide consumers in making their purchasing decisions, however the significance of individual factors in making these decisions varies. For that reason, studies of consumers' preferences are carried out (Rybicka 2003). These studies explain the motivation behind purchasing decisions in passenger rail transport as well. Therefore, identifying these factors is significant in the process of choosing a means of transport. In addition, the structure of preferences reflects the hierarchical structure of unrestricted choice of services offered on the market and indicates the order in which consumers choose individual services (Ostrowska, Rosa, Tomaszewicz, 2019).

Study Methodology

On the basis of the results of marketing research, the target segments (markets) for the researcher may be identified. The target market is the group of existing or potential customers of the company. Services on offer and other marketing tools are developed for this market (which may consist of several segments). Segmentation relating to passenger transport is the division of the market of service users into uniform, homogeneous groups which form units similar to each other in respect of, for example: travel destinations, distance travelled, type of transport, frequency of service use, having similar response to external stimuli as well as similar in respect of age, gender,

income, place of residence, etc. (Rosa, 2020). In the transport services market, there are segments to which transport companies target their marketing offer, differentiated in terms of scope and type, promotion and information, prices and distribution. An important segment of the passenger transport market is young adults, i.e. people aged 18-29 years.

The research was carried out from October 2017 to March 2018 on a random sample of 350 people from all over Poland, meeting the age requirement and thus constituting a homogeneous sample of "young adults" aged 18-29 years (50,61% females, 49,39% males). The analysis of the completed questionnaires revealed that 19 of them were incomplete, and thus a sample of 331 people was eligible for further study (error 0.03 and $\alpha = 0.95$). The aim of the research was to select the key features of passenger rail transport services relevant to customers, and have these features assessed by the providers of passenger rail transport services in Poland.

Table 2 presents the characteristics of the respondents based on the information contained in the particulars.

Table 2: Respondents' socio-demographic characteristics (N=331)

	Total (%)
Gender	
Female	50.61%
Male	49.39%
Education	
Higher education	18.54%
Secondary education	78.72%
Vocational education	2.74%
Household composition	
Single	9.37%
Two people	14.5%
Three people	23.26%
Four people	36.25%
Five and more	16.62%
Household net income/month/ per capita	
Very low income (<232 EURO)	9.24%
Low income (232-464 EURO)	39.81%
Medium income (465-696 EURO)	35.03%
High income (696 EURO<)	15.92%
Job status	
Employed	83.42%
Unemployed	16.58%
*Student	76.74%
Place of residence	
Countryside	22.80%
City up to 99,000 inhabitants	32.22%
City with 100,000 to 199,000 inhabitants	14.29%
City with over 200,000 inhabitants	30.70%

Results

On the basis of conducted research, Figure 2 presents a summary of the answers given to the question about the importance of different features of passenger rail transport.

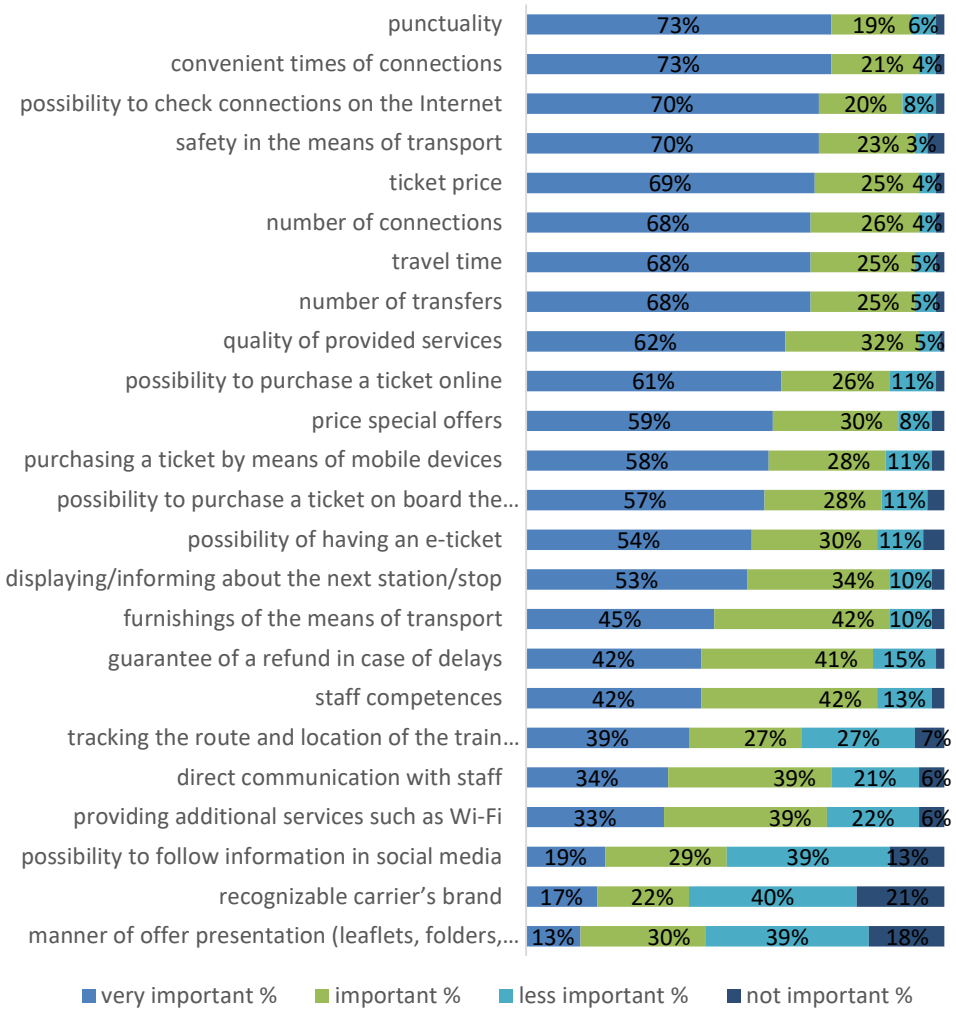

Fig. 2: Ranking of features of passenger rail transport services (results of own study)

The most important features identified by respondents which influence purchasing decisions were punctuality and convenient times of connections, which were assessed as very important by 73 percent of all respondents. Slightly fewer people indicated that being able to check connections on the Internet and safety in means of transport are very important (70 percent). The following features were identified as the next most important features of rail passenger transport services (answers: very important) by young customers:

• ticket price (69 percent);
• number of connections (68 percent);
• travel time (68 percent);
• number of transfers (68 percent);
• quality of provided services (62 percent);
• being able to purchase a ticket online (61 percent).

These factors may be grouped according to specific types of preferences concerning:

a) the duration of the transport service;
b) price of the transport service;
c) customer service during transport service provision;
d) use of modern technologies in the process of service provision.

In order to determine the respondents' preferences concerning particular categories, a factor analysis was carried out for all questions included in a given category. The lower the average for a given category, the more important was a given aspect for the respondents. In addition, Pearson's Chi^2 analysis was performed to verify the correlation with gender and the significance of each category.

In the first category, factors related to travel time were grouped (Fig. 3). The category "travel time in passenger rail transport" included:

- convenient times of connections;
- the punctuality of trains;
- time of travel;
- the number of transfers;
- number of connections.

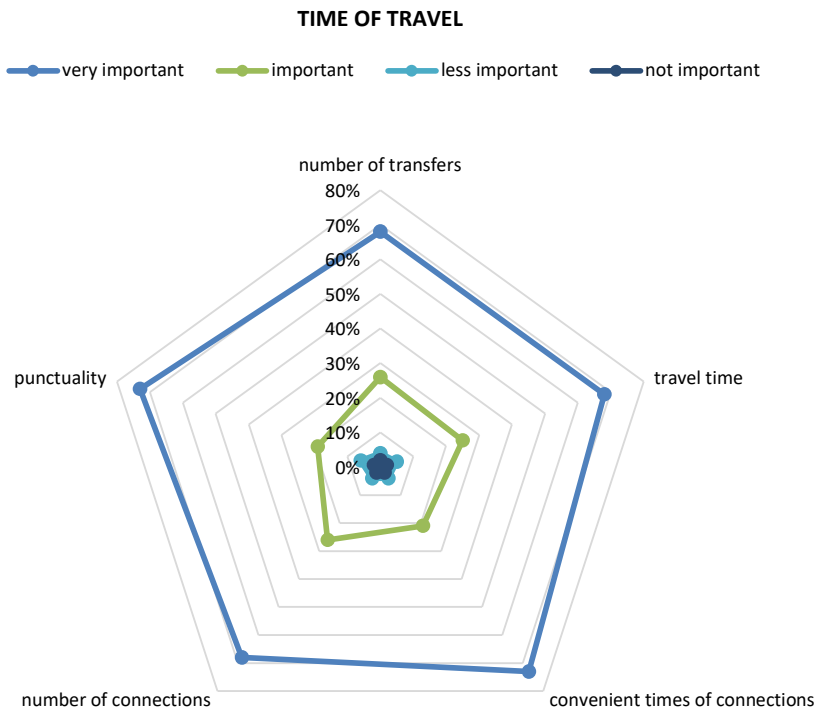

Fig. 3: Preferences in the duration of the transport service and its importance to customers (based on the results of own study)

According to the obtained average $M = 1.38$; $SD = 0.55$, travel time was the most important aspect in rail transport. Closer examination revealed that women were more concerned about travel time ($M = 1.21$; $SD = 0.33$) than men ($M = 1.48$; $SD = 0.53$).

The second category, in which the respondents' preferences were investigated, was the fare (Fig. 4). The category "price for passenger rail transport service" included:

- price of the ticket;
- special offers;
- guarantee of reimbursement due to delays.

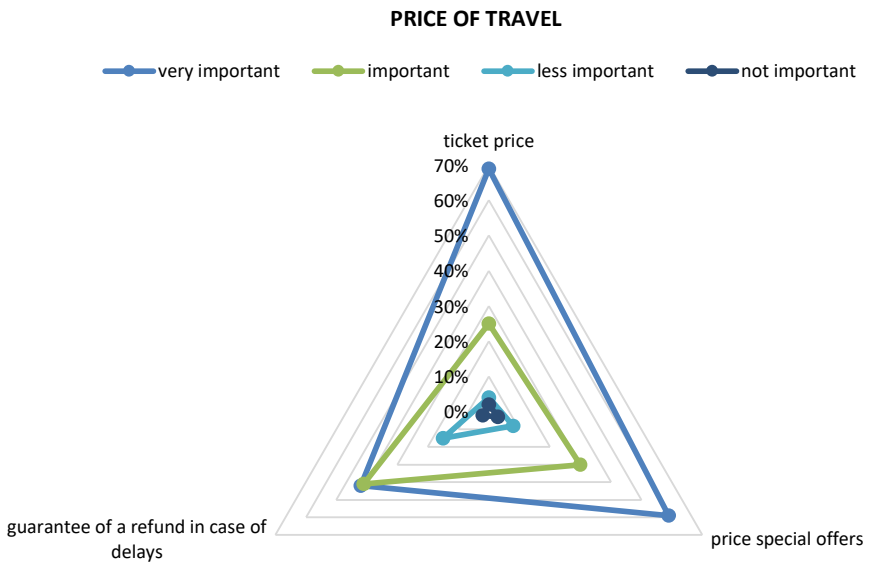

Fig. 4: Preferences in prices for transport service and their importance for customers (based on the results of the own study)

According to the average obtained, this was the second most important aspect in rail transport(*M* = 1.57; *SD* = 0.57). In addition, a statistically significant difference was observed in the assessment of the significance of the ticket price, between women (*M* = 1.48; *SD* = 0.47) and men (*M* = 1.67; *SD* = 0.66). Women attached more importance to the price of rail travel than men.

The third category included aspects related to broadly understood customer service during transport service provision (Fig. 5). This category included:

- safety in means of transport;
- quality of services provided;
- being able to purchase a ticket in the train;
- information about the next station;
- equipment in the means of transport;
- competence of the service staff;
- direct communication with service staff;
- the way the offer is presented.

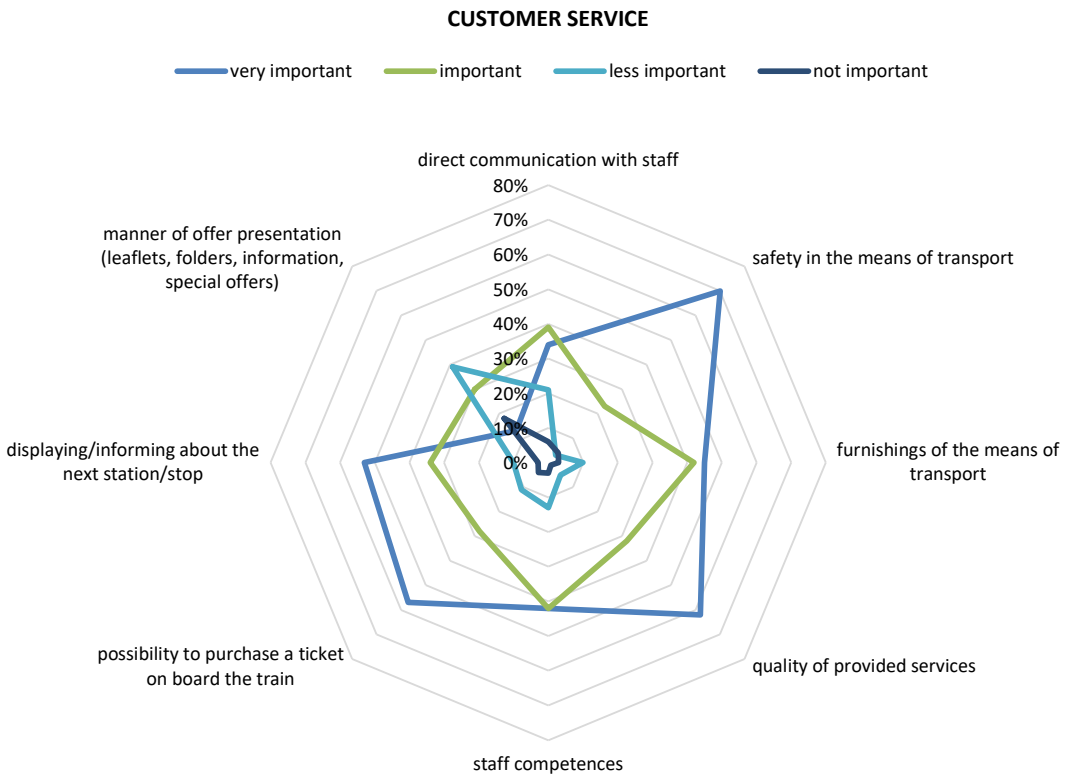

Fig. 5: Preferences in customer service in rail transport and its importance to customers (based on the results of own study)

The category average amounts to 1.73 and a standard deviation is 0.4. In this case, there is also a difference in the level of statistical trend between women and men [t(225) = -1.91; p = 0.57; d = -0.25; 95% CL(LL = -0.21; UL =0)], which means that women paid more attention to customer service aspects (M = 1.68; SD = 0.38) than men (M = 1.78; SD = 0.42).

The last category defined as "modern technologies in passenger rail transport" includes (Fig. 6):

- being able to check rail connections on the Internet;
- being able to purchase a train ticket online;
- being able to purchase a ticket using mobile devices;
- availability of an electronic ticket during the journey;
- being able to track the route and location of the train during the journey through the mobile application;
- provision of additional services, such as Wi-Fi;
- being able to check information in social media during the journey.

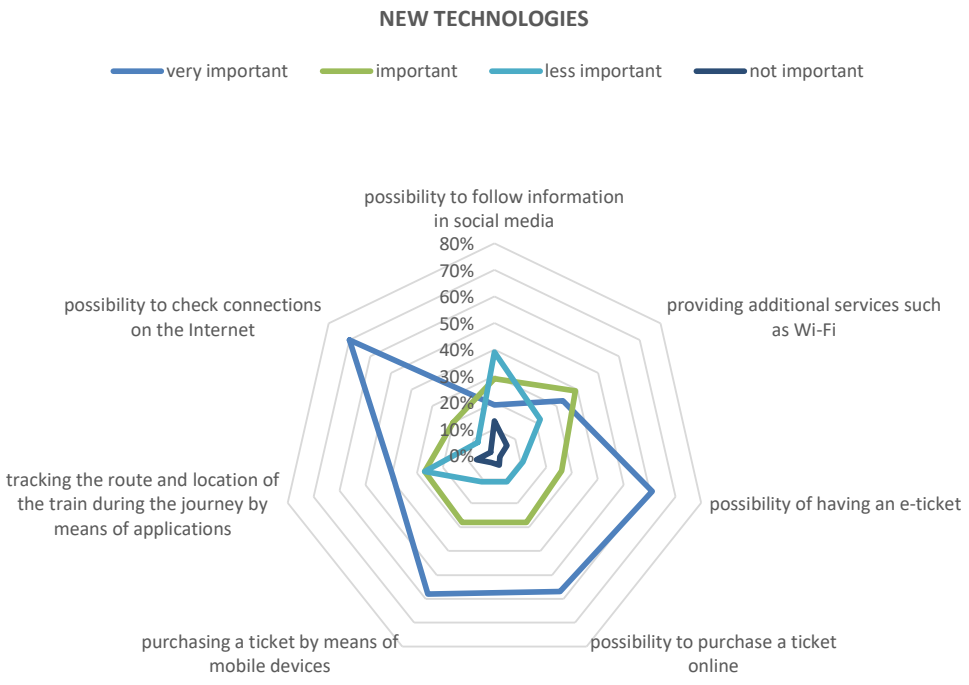

Fig. 6: Preferences in the use of modern technologies in the process of providing transport services and their importance for customers (based on the results of own study)

The average for this category was M = 1.8 with standard deviation SD = 0.57, which meant that for most of the examined categories the use of modern technologies in the provision of transport services was the least significant. In this respect, the use of modern technologies in the provision of transport services was less important for women(M = 1.73; SD = 0.5) than for men (M = 1.48; SD = 0.63).

Conclusions

As a consequence of technological changes, it is necessary to develop and adapt classical marketing to the changing nature of consumer journey, leading to purchases in the age of digital economy and the development of modern marketing, also in the passenger rail transport market. The ever-progressing and evolving digital age sets a new framework for marketing in the digital economy for passenger transport, including rail transport. Unlike the traditional approach, modern marketing should introduce new and advanced elements, so far not experienced by travellers, which are in the sphere of imagination or expectations.

Modern marketing of passenger rail transport services may be oriented towards factors relating to such areas as:

- travel time which has proved to be the most important for young customers. Convenience of transfers and punctuality of trains are of great importance to customers. In communication with customers, the competitiveness of rail travel distances compared to other modes of transport may be emphasised. Companies must ensure that their services are timely and may gain a significant competitive advantage in this respect.
- in the second place, consumers ranked the factors related to the price of services, which means that they compare different modes of transport in terms of the cost of the service. In their activity, transport companies should pay special attention to the level of prices, but also to the availability of special offers allowing price differentiation according to the age of the customer (special offers for students, seniors), length of the route, size of the group (family tickets, group tickets), travel time (weekend routes).
- the third most important category included the factors related to the customer service process. In this respect, the safety of passengers, the quality of service, being able to buy a ticket in the train, being informed about the next station and the competence of the service staff proved to be of great importance. The information

contained in traditional leaflets or folders is the least important for people searching for information on the Internet.

- the last group concerned the aspects related to the availability of new technologies. In this area, companies should develop professional passenger information systems – especially the online availability of information on connection times, travel times and possible holdbacks on the route. It is necessary to introduce modern forms of distribution of services (tickets) through online systems and ticket machines, treated as an important complement to traditional sales – ticket offices and on trains. Less important are solutions that enable tracking the route and location of the train during the journey through a mobile application, Wi-Fi services in the train or tracking information in social media during the journey.

In the transport services market, the concepts of marketing 3.0 are manifested in the fact that customers, striving for self-fulfilment and self-development, travel for a specific purpose or for specific reasons, at specific times, do not want to wait for the means of transport, but instead require constant online information, facilities, e.g. place for bicycles, suitcases, power sources, a comfortable and intimate place to sit, air-conditioning, according to the conviction that the goods and services they use should have the expected values (marketing of value). A further step in its development could be marketing 4.0 covering horizontal, integrative and social relationships in transport with a focus on social media, elimination of geographical and demographic barriers, development of new technologies and social networks integrating communities interested in tourism, sharing knowledge and their own travel experiences.

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Economic And Social Consequences of The Covid-19 Pandemic: The Experience of Ukraine and Sweden

Oksana MARUKHLENKO
Borys Grinchenko Kyiv University, Kyiv, Ukraine
o.marukhlenko@kubg.edu.ua

Tetiana POSPIELOVA
Borys Grinchenko Kyiv University, Kyiv, Ukraine
t.pospielova@kubg.edu.ua

Svitlana SOKOLOVSKA
Borys Grinchenko Kyiv University, Kyiv, Ukraine
s.sokolovska@kubg.edu.ua

Abstract

The article examines the economic and social consequences of the COVID-19 pandemic. By constructing a multifactor regression model, the authors analyzed the economic and social indicators of development of Ukraine and Sweden, investigated the dependence of selected indicators on quarantine measures. In order to identify the basic patterns of development of economic and social processes under the influence of quarantine measures related to COVID-19, regression models of socialization of economic development were calculated. Indicators that during the correlation analysis revealed the greatest dependence on domestic policy and the level of economic development of regions in the conditions of COVID-19 were selected as dependent variables, namely: employment rate (%), average per capita disposable income (USD); indicators of economic development and financial condition of the regional budget: revenues of the regional budget per 1 person (USD), subventions from the state budget per 1 person (USD), gross national product per 1 person (USD), capital investments per 1 person (USD). The obtained regression parameters in the analyzed regions are equally targeted and show a direct relationship between the studied indicators of social development and regional budget revenues and inverse dependence on government subsidies, which confirms the reduction of this tool to influence the development of social sphere in the region under COVID-19. At the same time, there is a direct and stable relationship between local budget revenues and citizens' incomes. Regression models showed that in the conditions of COVID-19 both in Sweden and in Ukraine, the average per capita disposable income of the population directly depends on subventions from the state budget. Regression analysis showed a close link between quarantine measures related to the COVID-19 pandemic and the socio-economic development of Sweden and Ukraine.

Keywords: COVID-19, pandemic, economic and social consequences, public policy, Ukraine, Sweden.

Introduction

Today is characterized by a large-scale global crisis related to the spread of COVID 19, as evidenced by four main parameters: the rate of spread (the disease was first recorded on December 31, 2019 in Wuhan, China; on March 11, 2020 it was recognized by the WHO as a pandemic; as of August 28, 2020, more than 24 million confirmed cases worldwide) [2]; geographical scale (it is difficult to name a country or territory that would not be affected by the disease); their depth (consequences are observed in all spheres of life, all strata of society); unpredictability of the course and depth of influence (scientists have not reached the unity in their conclusions and forecasts. In the media there constantly appear explanations and recommendations that contradict each other).

At present, governments in most countries around the world are focused on effective countering the global threats of the COVID-19 pandemic. Effective tools to protect the population from infectious diseases include such measures as: "suspension of certain facilities, the introduction of restrictions to significantly reduce population mobility, social distancing and localization of centres of the infection" [2]. At the same time, the scale of restrictions, their prolongation over time negatively affect the daily life of the population, respect for rights and freedoms; functioning of public and state institutions, national economies. In addition, different countries have different socio-economic potential, respectively, face different consequences. Some researchers claim that the losses to the economy and society

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from quarantine are much greater than the probable losses from a pandemic. This is especially true in regions with low socio-economic potential. Under these conditions, the study of the socio-economic potential of the region and its consideration in the development of state policy to counter COVID 19 becomes an extremely important issue. Waiting for the second wave of the pandemic further highlights this problem.

Actual scientific researches and issues analysis.

The search for scientific literature on the subject of this study was conducted in the international bibliographic databases Scopus (https://www.scopus.com/). The following data reflect the situation as of August 25, 2020. The analysis of 2,084 documents from the Scopus database showed that 2,079 documents were published in the current 2020. At the same time, almost 700 of them are still in press, ie published in the database in absentia. A significant percentage of publications (79.9%) are published in open access journals.

About 35% of all publications belong to authors from China, in second place (about 20%) researchers from the United States, followed by scientists from the UK (11%), Italy (7.5%), France (3.8%), Canada 3.7%), Australia (3.3%), Germany (3.3%), India (3.3%).

The largest number of publications is devoted to the origin, clinical characteristics, epidemiological analysis of the coronavirus. In particular, the most cited are the following publications: "SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients"; "Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study"; «Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records»; "Early epidemiological analysis of the coronavirus disease 2019 outbreak based on crowdsourced data: a population-level observational study"; «Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modeling study».Despite the large number of studies on the problems of COVID-19 in the world, the socio-economic consequences of the pandemic remain unnoticed by scientists, which led to the study.

Despite the large number of studies on the problems of COVID-19 in the world, the socio-economic consequences of the pandemic remain unnoticed by scientists, which led to the study.

The purpose of the article is to study the economic and social consequences of the COVID-19 pandemic.

The Main Part

The COVID-19 pandemic has forced states to impose quarantine measures, including closing state borders, suspending transportation, shutting down a large number of service-related businesses, and imposing restrictions on businesses. There is a significant impact of quarantine measures related to COVID-19 on the social and economic development of EU countries. As a result, the world economy is plunged into a deep recession – countries with the most stable economic system are projected to lose at least 2.4% of their GDP by the end of 2020. There is also a decrease in the forecasts for the growth rate of domestic GDP for 2020 from 2.9% to 2.4%.

The Swedish economy lost twice less during the pandemic, compared to other European countries - 7%. And although this economic downturn is record-high for Sweden, it still has not had as significant impact on the quality of life of the population as it has had in other European countries. As for Ukraine, according to the updated data of the State Statistics Service, for five months of 2020, the real GDP of Ukraine decreased by 5.9%. The Cabinet of Ministers forecasts a possible decline in Ukraine's GDP in 2020 by 4-8% compared to 2019. The International Monetary Fund has downgraded its forecast for Ukraine's GDP to fall to 8.2% in 2020. This indicates that although GDP in Ukraine and Sweden fell significantly less in 2020 than in other European countries, the impact of COVID-19 on their social and economic indicators differs. The state policy of counteracting COVID-19 also differs. The state policy of counteracting COVID-19 also differs. Sweden has become the only EU country where the authorities have not imposed the strict quarantine in connection with the pandemic. That is why the article examines the experience of these countries. In further consideration the socio-economic potential of these countries will be presented in more detail. The trends in economic activity and budgetary capacity in Ukraine and Sweden are shown in Tables 1 and 2.

Table 1: Indicators of the social situation in Ukraine and Sweden*

Indicators of the social status of the region / Period	Total population, people	Employment rate, %	Average life expectancy at birth, years	The incidence of COVID-19, %	Disposable income per capita, %	average salary, $	The level of criminogenic danger
SWEDEN							
2015	9836003	65,2	81,9	0	41965,2	3497,1	15,342
2016	9836003	65,7	82,31	0	43188,0	3599,0	15,219
2017	9904895	66,2	82,31	0	31800,0	2650,0	15,062
2018	9971630	66,8	82,0	0	31752,0	2893,0	15,239
2019	10036391	67,6	82,7	0	38352,0	3196,0	15,064
2020*	10099269	66,9	81,1	0,84	39502,6	3291,88	15,055
UKRAINE							
2015	42760500	56,7	71,38	0	1942,44	161,87	48,3
2016	42584500	56,3	71,68	0	2176,8	181,4	47,3
2017	42386403	56,1	71,98	0	2767,68	230,64	50,1
2018	42153201	57,1	71,76	0	3210,96	267,58	46,8
2019	41902416	58,2	72,01	0	4662,84	388,57	47,4
2020*	41762138	58,2	72,3	0,31	4756,68	396,39	47,4

* As of September 4, 2020

Table 2: Indicators of economic development of Sweden and Ukraine

Indicators of the social status of the region / Period	Gross national product, million $	Budget revenues per 1 person, $	Subventions from the state budget per 1 person, $	Capital investment per 1 person, $
ШВЕЦІЯ				
2015	484200,0	23854	295	12026
2016	493800,0	25411	407	12410
2017	529700,0	26353	414	13755
2018	550200,0	27311	404	14351
2019	528930,0	27773	404	13897
2020*	144244,0	793	413	3656
Україна				
2015	68109,0476	595	642	304
2016	81233,579	578	642	337

2017	89911,2868	688	728	358
2018	110516,452	789	838	287
2019	155159,477	1006	1081	589
2020*	29530,8303	509	550	1416

Analyzing the indicators given in Tables 1 and 2, it should be noted that both in Sweden and in Ukraine over the past five years there has been a positive increase in key economic development indicators, including: GDP growth per capita, capital investment per capita, increase of own revenues of local budgets per capita. The dynamics also shows a significant increase in subventions from the state budget for socio-economic development of separate territories.

However, if we consider the economic indicators in terms of a separate territory, we can see that there is a significant difference between the economic model itself. In Sweden, almost half of the population's income goes to the country's budget. Subventions from the state budget average about 14.5% of budget revenues. At the same time, capital investments account for almost 50% of budget revenues, which indicates directing funds to the development of the country's economy, its well-being and, as a consequence, the development of the country's social potential. Unlike Sweden, Ukraine's budget revenues are higher than those of the country's population. At the same time, subventions from the state budget per person are higher than revenues. This indicates a constant budget deficit. Great burden on business structures. Investments to the country's development are almost non-existent. That is, the bulk of the funds goes to provide the social component. With such an economic model, it is very difficult to keep economies at least at a satisfactory level, especially in times of crisis and under the influence of such global challenges as COVID-19.

Research Methodology

Quarantine conditions not only significantly affect the development of socio-economic potential of countries, but also cause profound changes in the economy and social sphere. The consequences of this influence have both positive and negative effects. The latter, first of all, includes the growing dependence of countries on changes on international markets, reducing the role of domestic sources of funding, accelerating the spread of global financial crises in the national financial and social environment and so on. Undoubtedly, all these effects are reproduced not only in the economic sphere, but also in social development. To ensure a decent welfare of the population, positive social dynamics, social and economic processes must be combined as a necessary condition for maintaining the correlation between opportunities and needs. This also applies to the impact of the pandemic on social development.

In order to study these effects, we were faced with the task of determining the impact of economic indicators on indicators that characterize the social component of the regions. For this purpose, a multifactor regression model was built:

$$Y(x) = f(x_1, x_2, \ldots\ldots x_{n-1}, x_n), \quad (1)$$

де X_i– variable economic factors;

n - number of factors.

Unquestionably, it is important to check the quality of the found parameters of the model and evaluate the model as a whole for adequacy to the real processes of social development and ensuring the welfare of the population. The solution of the two above tasks to assess the adequacy and quality of the model would allow to use the constructed econometric model to explain the results of the impact of the studied socio-economic factors. Moreover, it will provide an opportunity to model in the future the importance of socio-economic factors.

It should be noted that it is possible to formulate the general set of indicators that most reproduce the socio-economic potential, subject to the presence of previous research by scientists on this issue and available statistics.

Indicators that during the correlation analysis revealed the greatest dependence on domestic policy and the level of economic development of regions in the conditions of COVID-19 were selected as dependent variables:

- y_1- Employment rate, %

- y_2- Average per capita disposable income, USD

Indicators of economic development and financial condition of the regional budget are chosen as dependent variables:

- x_1 - revenues of the regional budget per 1 person, USD;

- x_2 - subventions from the state budget per 1 person, USD;

- x_3 - gross national product per 1 person, USD;

- x_4 - capital investment per 1 person, USD.

In this case, the total multicollinearity in the array is detected by the Pearson test ($\chi 2$) with a reliability of p = 0.95. The partial correlation coefficients that characterize the closeness of the relationship between two variables are determined later, provided that the third one does not affect this relationship. Then, with the help of e-statistics with a reliability of p = 0.95, pairs of factors are identified, between which there is multicollinearity.

After establishing stochastic multicollinearity, it should be eliminated if possible. One such method is the method of extracting variables (factors). Its essence is to remove (should be consistent with the purpose of the study and economic feasibility) one or more highly correlated explanatory variables from the regression. Then the new model is re-evaluated. To verify, several possible models are constructed and the value of the coefficient of determination R2 is calculated, which measures the share of variation of the indicator, which is explained by the relationship between the independent variable and factors and the calculated value of Fisher's criterion Fp by formulas:

$$R^2 = \frac{\sum_{i=1}^{n}(\hat{Y}_i - \bar{Y})^2}{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}, \quad (2)$$

де $\hat{Y}_i$ - the estimated value of the indicator for the i-th observation;

Y_i - statistical value of the indicator for the i-th observation;

$\bar{Y}$ - sample average value of the indicator.

$$F_p = \frac{R^2}{1-R^2}\left(\frac{n-m-1}{m}\right), \quad (3)$$

де n - number of observations;

m - number of factors.

The closer the value of R2 to one, the better the statistics correspond to the constructed regression function. The value of Fp should be several times larger than the tabular one, then the regression will not only be significant, but also have practical value for forecasting.

After deleting one variable, a two-factor model is built. The coefficients of the regression equation Y = a0 + a1X1 + a2X2 are calculated using matrix operations by the formula:

$$\vec{a} = \left[[X]^T[X]\right]^{-1}[X]^T\vec{Y} \quad (4)$$

After finding the estimates of the regression parameters a0, a1, a2, the new model is checked for multicollinearity. If the result is positive, the adequacy of the model (regression equation) according to Fisher's criterion and the significance of the parameters (individual factors) of the regression according to Student's criterion are performed.

Then the forecast value of the indicator and the interval forecast (reliable interval) for the set values of factors according to formulas (4 and 6) are calculated:

$$DY = t_c S\sqrt{X_p[X^TX]^{-1}X_p^T + 1}, \quad (5)$$

де t_c - tabular value of the Student's criterion;

Xp - vector-string with predictive values of factors;

S - standard deviation of the estimate (measures the scattering of the value of the indicator relative to the line of the regression function) is the square root of the variance of adequacy:

$$S = \sqrt{\frac{\sum_{i=1}^{n}(Y - \hat{Y}_i)^2}{n-m-1}}, \quad (6)$$

$$Y_{\max\,(min)} = Y_p \pm DY, \quad (7)$$

де *Yp* - point forecast of the indicator.

The calculated partial regression coefficients indicate the average change of the dependent variable for a single change of the corresponding independent variable and the constant values of other independent variables. According to the known regression equation, it is possible to model the future parameters of the indicator when changing the values of one of the factors. Next, partial elasticity coefficients are calculated for the forecast.

Research Findings

In order to identify the basic patterns of development of social processes under the influence of quarantine measures related to COVID-19, regression models of socialization of economic development were calculated. In the process of regression analysis, statistical methods of analysis and a package of applied statistical analysis SPSS were used. Using the selected data given in Tables 1 and 2, a regression analysis of the impact of economic development factors of the regions in the conditions of COVID-19 on the development of social potential for Sweden and Ukraine was carried out.

As a result of calculations for ***Sweden*** on the first dependent indicator, the multiple regression equation was obtained: Y1 = 71.8165-0.000115X1 + 0.000344X2-0.00322X3 + 0.00349X4. Economic interpretation of the model parameters: increasing X1 by 1 unit leads to a decrease of Y1 by an average of 0.000115 units; an increase in X2 by 1 unit leads to an increase in Y1 by an average of 0.000344 units; an increase in X3 by 1 unit leads to a decrease in Y1 by an average of 0.00322 units; an increase in X4 by 1 unit leads to an increase in Y1 by an average of 0.00349 units. According to the maximum coefficient β4 = 16.113, we conclude that the greatest impact on the result Y1 (employment rate) has a factor X4 (capital investment per capita).

As a result of calculations on the indicator Y2 (average per capita disposable income of the population) the multiple regression equation was obtained: Y2 = 85637.6118-0.1065X1 + 4.2674X2-17.5706X3-7.3677X4. Economic interpretation of the model parameters: increasing X1 by 1 unit leads to a decrease in Y2 by an average of 0.107 units; an increase in X2 by 1 unit leads to an increase in Y2 by an average of 4,267 units; an increase in X3 by 1 unit leads to a decrease in Y2 by an average of 17,571 units; an increase in X4 by 1 unit leads to a decrease in Y2 by an average of 7,368 units. According to the maximum coefficient β2 = 9.016, we conclude that the greatest influence on the result Y2 has a factor X2 (subventions from the state budget per 1 person).

As a result of calculations for ***Ukraine*** on the indicator Y1 (employment rate), the multiple regression equation was obtained: Y1 = 49.5016-8.3E-5X1-0.03273X2 + 0.05048X3 + 5.0E-6X4. Economic interpretation of the model parameters: an increase in X1 by 1 unit leads to a decrease in Y1 by an average of 8.3E-5 units; an increase in X2 by 1 unit leads to a decrease in Y1 by an average of 0.0327 units; an increase in X3 by 1 unit leads to an increase in Y1 by an average of 0.0505 units; an increase in X4 by 1 unit leads to an increase in Y1 by an average of 5.0E-6 units. According to the maximum coefficient β3 = 10.457, we conclude that the greatest influence on the result Y1 has a factor X3 (gross national product per capita).

As a result of calculations of the indicator Y2 (average per capita disposable income of the population) the multiple regression equation was obtained: Y2 = 105.3154 + 0.02691X1 + 18.4021X2-18.5105X3 + 3.2835X4. Economic interpretation of the model parameters: an increase in X1 by 1 unit leads to an increase in Y2 by an average of 0.0269 units; an increase in X2 by 1 unit leads to an increase in Y2 by an average of 18,402 units; an increase in X3 by 1 unit leads to a decrease in Y2 by an average of 18.51 units; an increase in X4 by 1 unit leads to an increase in Y2 by an average of 3,283 units. According to the maximum coefficient β2 = 2.746, we conclude that the greatest influence on the result of Y2 has a factor X2 (subventions from the state budget per 1 person).

The statistical significance of the equations is verified using the coefficient of determination and Fisher's test. It is established that in the studied situation 99.26% of the total variability Y is explained by the change of factors Xj.

The obtained regression parameters in the analyzed regions are equally targeted and show a direct relationship between the studied indicators of social development and regional budget revenues and inverse dependence on government subventions, which confirms the reduction of this tool to the influence social development in the region under COVID-19. At the same time, there is a direct and stable relationship between local budget revenues and citizens' incomes. Regression models showed that in the conditions of COVID-19 both in Sweden and in Ukraine, the average per capita disposable income of the population directly depends on subventions from the state budget.

Based on the results of the analysis, the corresponding regression models were constructed and verified, which are shown in Table 3.

Table 3: Regression models of the dependence of the development in the social sphere on the economic indicators connected with COVID-19 in terms of the analyzed regions

Regression indicators	Economic indicators in the conditions of COVID-19				Multiple correlation coefficient, R	Adjusted coefficient of determination, R2	The greatest influence on the result of Y
	x_1	x_2	x_3	x_4			
Sweden							
Y_1	$Y_1 = 71.8165-0.000115X_1 + 0.000344X_2-0.00322X_3 + 0.00349X_4$				0,981	0,813	X_4
Y_2	$Y_2 = 85637.6118-0.1065X_1 + 4.2674X_2-17.5706X_3-7.3677X_4$				0,989	0,89	X_2
Ukraine							
Y_1	$Y_1 = 49.5016-8.3E-5X_1-0.03273X_2 + 0.05048X_3 + 5.0E-6X_4$.				0,985	0,846	X_3
Y_2	$Y = 105.3154 + 0.02691X_1 + 18.4021X_2-18.5105X_3 + 3.2835X_4$				0,996	0,963	X_2

The level of impact of COVID-19 on the socio-economic development of the region depends on the state policy for counteracting the pandemic. The main idea of the Swedish model of coronavirus control, authored by the country's chief epidemiologist Anders Tegnell, was the natural development of mass immunity to infection, serious support for the economy, minimization of restrictions.

Among the restrictions that have been introduced are the following: the transition of secondary schools and universities to distance learning; ban on visiting all places for the elderly; temporary (from April 18 to June 30) restrictions on meetings, closure of shopping centers, termination of transportation; ensuring the redistribution of drugs and medical equipment.

To mitigate the impact on the Swedish economy, a package of emergency measures has been proposed to overcome the crisis for small and medium-sized enterprises and employees. The total amount of the anti-crisis package is up to 300 billion kronas, or about 30 billion dollars. The IMF website, with reference to official data, provides slightly higher estimates: from 380 billion to 668 billion Swedish kronas (from 7.6 to 13.3% of GDP in 2019), depending on the depth and duration of the decline in economic activity. Under an agreement between the government, the Centrist Party and the Liberal Party, the municipalities and regions most affected by the ongoing COVID-19 outbreak will receive additional funding totaling SEK 22 billion. Prior to the epidemic, the amount of support for regions and municipalities was estimated at 5 billion kronas. This additional funding will be provided both in the form of an increase in state subsidies and in the form of an additional amount to cover additional costs for health care and social services.

Business Support

1. Guaranteed government loans. The main model of supporting Swedish business is to provide guarantees to banks that accommodate with loans. The central government will ensure that at least 70% of new loans are issued to companies that are experiencing financial difficulties due to the COVID-19 virus, but otherwise are sustainable. Financing will be issued to banks, which, in turn, will provide guaranteed loans to companies.

2. Temporary discount on the cost of rent in particularly vulnerable sectors of the economy. To reduce costs for companies experiencing significant hardship as a result of the spread of COVID-19 - in sectors such as the durable goods trade, hotels, restaurants and some other activities - provides support aimed at facilitating and speeding up rent revisions.

3. Tax benefits. There is a deferral of no more than 3 months for corporate social security contributions, VAT and payroll taxes for up to 12 months (SEK 27 billion if used similarly to GFC and SEK 315 billion if fully used by all firms), deferral of annual VAT (SEK 7 billion) and deferral of SME taxes (SEK 13 billion).

4. Support for individual entrepreneurs. The rules for allocating tax reserves have been temporarily changed, so that for individual entrepreneurs affected by COVID-19 containment measures, taxes have been reduced.

5. Support for culture and sports. The government plans to increase funding for culture and sports by SEK 1 billion (500 million kronas each). The funds are intended to compensate for the losses of these areas due to the restriction of fees and social distancing.

Employment support, unemployment benefits and other labour market measures

1. Support for underemployment and wage subsidies. As in many other European countries, the Swedish government, in a crisis caused by the spread of coronavirus, supports the preservation of employment by co-financing the cost of part-time employment. The government will cover up to 75% of business costs at the risk of reducing working hours or laying off employees. Employers will be able to halve wage costs under the so-called "short-term redundancies" programme, and employees will be able to receive 90% of their initial salary. In addition, there are additional costs for subsidizing wages for short-term leave.

2. Temporary reduction of employers' contributions to social insurance and individual contributions. For the period from March 1 to June 30, 2020, small businesses are offered a temporary reduction in employers' social security contributions so that companies can only pay old-age pension insurance premiums. It is assumed that this reduction should apply to no more than 30 employees and to the part of the employee's salary that does not exceed 25,000 Swedish kronas ($ 2,500) per month. This entails tax breaks of up to SEK 5,300 ($ 530). The value of this proposal for public finances is estimated at SEK 33 billion (USD 3.3 billion).

3. Unemployment benefits. The government is proposing to temporarily ease the conditions for joining the number of recipients of unemployment benefits. It is also proposed to increase the minimum and maximum amounts of unemployment benefits.

4. Education and training programmes. To expand the opportunities for study in higher education, it is proposed to increase the number of places, including summer courses. In addition, it is proposed to increase funding for universities to develop distance learning. Funds are also allocated for online education, also known as MOOC (Mass Open Online Courses), which are free and open to the public. To compensate for the increase in workload, it is also proposed to increase funding for the Swedish Council for Higher Education and the Swedish Council for Student Finance. Higher education programmes are available to anyone who has been notified of the termination of their contract.

It is proposed to increase funding for regional vocational education for adults. It is proposed to expand the number of budget places in the system of additional professional higher education; offer the population new short courses and packages of courses, as well as various types of pilot projects so that more people can improve their skills. It is proposed to expand the number of places in the public high school with full funding from the central government.

In addition, greater opportunities for distance learning are offered, partly through additional support for distance learning providers in vocational higher education, and partly through the provision of more distance learning courses in training associations.

5. Active policy in the labor market. It is proposed to increase funding for Arbetsf6rmedlmgen programmes (Swedish Public Employment Service) and active programmes in the labour market.

Support of the population by social insurance instruments

1. The qualification day for the payment of sickness benefits has been canceled (from March 11 to May 31, 2020). This decision means that workers will receive sickness benefit from the time they are absent from work due to illness, and the central government, not employers, will cover the cost of the first day of leave.

2. Self-employed people are also paid compensation due to illness for 1-14 days. The state pays for sick leaves for two months, until May 2020.

In contrast to Sweden, the Government of Ukraine has introduced stricter restrictive measures, in particular: closure of all educational institutions (by the end of May); restriction of passenger transport and public events; suspension of food, cultural, trade and entertainment establishments.

The Government of Ukraine has also approved a law providing for administrative consequences for violating sanitary and epidemiological requirements and increasing criminal liability for violating requirements aimed at preventing the

spread of an infectious disease. During this period, only citizens of Ukraine and people who have the right of permanent residence in the country, including accredited representatives of the diplomatic and international community, will have the right to enter the country. Long-distance transport and subway work were stopped.

The parliament has also introduced a number of measures to minimize the economic consequences for companies, including small and medium-sized enterprises [10], by amending the Tax Code. The President of Ukraine has ordered customs clearance of humanitarian goods within 24 hours, and in case of delay, the State Customs Service / Ministry of Reintegration of the Temporarily Occupied Territories must notify the relevant humanitarian organization.

Operational response. By Order № 185 of January 2020, the Ministry of Health provided technical recommendations for the preparation and response of the health care system. The government has stepped up health measures at intersections, expanded the dissemination of information and communication campaigns on the risks of infection, and strengthened the national epidemiological surveillance system to facilitate the detection of cases; has designated 51 medical facilities across the country as support facilities for responding to coronavirus infection COVID-19. The Ministry of Health and the WHO are conducting a joint assessment of the operational readiness of the designated medical facilities. Rapid response teams have been established at the regional level and training of epidemiologists and virologists has been launched at the national level by the Ministry of Health with the support of the WHO.

Clinical response. The Ministry of Health has developed a number of guidelines and recommendations for case identification, biological sampling, referral of patients for services, etc., and has established testing systems, with the National Virology Reference Laboratory Kyiv. The Ministry also provided the regional laboratories with reagent kits for polymerase chain reaction to detect cases of COVID-19 to increase on-site testing.

Accordingly, we can conclude that the state policy to combat COVID-19 in Sweden is actively preventive, uses mostly investment mechanisms and aims to support the socio-economic potential of the region and meets the regression model of dependence of social development on economic indicators connected with COVID -19. Unlike Sweden, in Ukraine the state policy for counteracting COVID-19 is mostly reactive, uses administrative and legal mechanisms and is focused on coordination and control. It contradicts the regression models of the dependence of social development on the economic indicators associated with COVID-19. It is clear that the budget opportunities of Sweden and Ukraine are different. In January-June 2020, the revenue plan of the general fund of the state budget of Ukraine was not fulfilled by UAH 38.4 billion, or 7.8% (according to the Chamber of Accounts), and accordingly the state does not have the funds to apply the investment mechanism to support socio-economic potential. Meanwhile, under such conditions, it is advisable to minimize restrictions for businesses and households and give them the opportunity to take care of themselves.

Conclusions

The construction of a multifactor regression model allowed the authors to establish the impact of COVID-19 on the social and economic development indicators of Sweden and Ukraine. Indicators that during the correlation analysis showed the greatest dependence on domestic policy and the level of economic development of regions in terms of COVID-19 were: the level of employment (%), average per capita disposable income (USD); indicators of economic development and financial condition of the regional budget: revenues of the regional budget per 1 person (USD), subventions from the state budget per 1 person (USD), gross national product per 1 person (USD), capital investments per 1 person (USD). The regression parameters for Sweden and Ukraine are equally targeted and show a direct relationship between the studied indicators of social development and regional budget revenues and an inverse dependence on government subventions. Under COVID-19, both in Sweden and in Ukraine, the average per capita disposable income of the population directly depends on subventions from the state budget.

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The Practice of Using the SROI Methodology for Assessing the Performance of Municipal Sports Schools: Russian Practice

Andrey V. LITVIN
PhD in Economics,
Udmurt State University, Izhevsk, Russia
e-mail: litvin-andrey@mail.ru

Dmitry P. ARKALOV
Graduate student,
Ural State Economic University, Yekaterinburg, Russia
e-mail: lao48@yandex.ru

Abstract

The study is devoted to assessing the activities of municipal sports schools from the point of view of the SROI concept. The study analyzed the financial support of sports schools, the availability of sports facilities in the management of a sports school, the number of athletes and results in sports competitions. As a result of the work done, sports schools were divided into four categories in terms of the ratio of cost to sports performance. The results obtained served as the basis for further optimization of the management of sports schools, and also showed the ineffective aspects of the use of budget funds.

keywords: SROI, sport, sports costs.

Introduction

Social sector developmental investments are designed to cover every system level (federal, regional and local), with the private partnerships being increasingly involved in the investment projects.

This process needs to be supported by the relevant toolkits for calculations and analyses of the relevant performance rates and criteria which, in their turn, require special calculation methodology being applied and tested in practice.

It should be noted that the social investment projects face a variety of challenges both in the public social disbursements and private investment management systems, particularly in the context of the modern business social responsibility concept.

It should also be mentioned that due to the challenges of the modern social investment processes on the whole and the sports sector investments in particular the above issues still need to be studied in more detail, with the relevant notions being further developed and sorted out whilst many conceptual issues are still being vividly discussed and also waiting for detailed analyses.

A key calculation problem of the social returns on investment projects is due to the difficulties in assessing the project benefits in sound monetary terms.

The traditional rates of investment project benefits are not always applicable, and this is one of the reasons for virtually every social project being now rated as economically inefficient.

On the other hand, sports are known to be highly beneficial for society in many aspects as they effectively cut down the public expenditures for health services and crime prevention services and facilitate integration of the human capital.

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Thus, sport contributes to solving many problems for many government agencies and business circles, including promoting a corporate image, developing infrastructure, risks of preventing or mitigating the consequences of civil unrest, etc.

The modern SROI-concept-based investment benefit calculation technology is also not free of certain drawbacks that include the following:

1. need for a commonly accepted classification of the relevant social values;
2. the available project benefit interpretation and implementation algorithm is still underdeveloped and too complicated;
3. social benefits of the investment projects are rated by a limited range of indicators;
4. some project benefits can hardly be expressed in clear monetary terms.

The modern concept of social return on investments was primarily designed in the early 2000ies by a research team of Roberts Enterprise Development Fund (San-Francisco, USA) followed by the concept being further developed by the UK-based New Economics Foundation research team that made an attempt to harmonise the SROI concept with the existing social benefits reporting systems.

Currently, there has been little research on the application of the modern SROI concept to assess the social benefits of sports investment projects in Russia.

The purpose of the study was to develop an applied SROI model to clarify the methodology for calculating the social return on government resources invested in the sports sector as part of specific projects (Millar, Hall, 2013).

Methods and structure of the study

We believe that we need to further standardize the calculation technology within the frame of the base SROI concept and customise the outcome data including a set of special checklists being developed for convenience of the investment project management experts. The main contradiction that needs to be addressed is due to the need for monetary terms/ equivalents or some similar terms and procedures being applied to integrate and harmonise the diverse model characteristics and parameters that can hardly be quantified in practice. There are also many other aspects in the study subject that need to be duly addressed in the study. In the theoretical aspect, the study needs to factor in and analyse the relevant axiological, psychological, sociological, economical and legal components of the process. In addition, the formal calculation procedure cannot be designed unless supported by due mathematical and logical methods, including fuzzy logic methods. In the process management aspect, the study needs to thoroughly analyse the existing decision-making, reporting, planning and forecasting practices. It should be mentioned that the global studies in this area are still making the first steps and, hence, the theoretical basics are still insufficient. The study area may be expanded with time when new statistical data on the country-specific experiences and/or specific social investment projects are reported. Furthermore, studies of this problem need to be governed both by the general methodological principles and more specific ones developed within the concept under consideration. Ranked with the former (general methodological principles) may be the system-approach, determinism, development, relevance, humanism and the individual social responsibility principles. Ranked with the specific ones i.e. developed within the SROI methodology may be the stakeholders' commitment, change monitoring, importance, substantiality, adequate self-rating, transparency and verification principles; and some of the key corporate social responsibility principles (Kazakov and others 2017). Calculations under the modified SROI model will be based on the relevant investment impact and social return data. To further clarify the model itself, the researchers need to mine the statistical data relating to the traditional SROI model parameters. Having designed the new mathematical model, we can further clarify the list of the necessary parameters. These parameters (invested amount, for example) may be classified into two groups: expected and actual. The actual data may be mined from the official sources and by the relevant questionnaire survey (opinion polling) methods, with the questionnaire forms being distributed via email to speed up and save costs of the process. The expected data for each of the parameters may be also mined via polling, with the process outcomes being additionally discussed in the focus groups. A representative sample will include at least 50-60 respondents. The proposed procedure will be designed to ensure due authenticity, dependability and interpretability of the outcome data.

Research

We have conducted research to assess the social effectiveness of financing sports organizations based on the SROI concept (Litvin and others 2019). As an empirical base, data are used on sports schools in Izhevsk for 2017-2018 (table 1). The data was obtained on the basis of the state statistical reporting form 5FK «Information about the sports

school», and from the official open site for posting information on the financial and economic activities of state (municipal) institutions bus.gov.ru. To process the information, methods of calculating average values, grouping, correlation analysis, Data Mining were applied. The analysis showed that between sports schools there are significant differences in terms of the social efficiency of investments - the number of athletes and the number of gold medals per 1 ruble invested in financing sports schools of budgetary funds. From the position of the SROI concept, there is considerable potential for optimizing the financing of certain sports and in improving the performance of sports schools (Ponkin, 2017). A model for grouping sports schools according to the level of social efficiency of investments is formed, based on the available sample, four categories of sports schools with different parameters of social efficiency of investments in sports are identified. At present, it is important to improve methods for calculating indicators of the social efficiency of using funds allocated to specific sports facilities, sports, sports events, etc. These problems must find their place in the framework of training professional sports managers (Howard, Cromptonб 2018).

Table 1: Indicators of sports schools in Izhevsk

Sports School Code	The cost of maintaining a sports school, thousand rubles	Number of Athletes	Costs per Athlete	The ratio of athletes studying to «excellent» and «good» to the total number of athletes (Russian system for assessing knowledge at school)	The number of gold medals at the All-Russian competitions per athlete	The number of gold medals at the All-Russian competitions
1	17 936,20	984	18,23	0,58	0,021	21
2	14 655,70	555	26,41	0,63	0,000	0
3	20 717,80	753	27,51	0,63	0,008	6
4	19 250,30	949	20,28	0,21	0,005	5
5	11 130,80	705	15,79	0,48	0,000	0
6	10 181,80	732	13,91	0,70	0,003	2
7	33 699,00	826	40,80	0,40	0,011	9
8	12 267,90	312	39,32	0,53	0,054	17
9	10 701,00	259	41,32	0,41	0,000	0
10	7349,40	325	22,61	0,52	0,006	2
11	8920,90	531	16,80	0,58	0,064	34
12	10 395,90	355	29,28	0,59	0,006	2
13	5170,30	97	53,30	0,49	0,000	0
14	36 866,20	1156	31,89	0,44	0,007	8
15	10 329,60	407	25,38	0,76	0,000	0
16	3469,10	43	80,68	0,05	0,023	1
17	24 188,70	1590	15,21	0,89	0,000	0
18	16 177,50	621	26,05	0,54	0,031	19
19	19 083,50	492	38,79	0,82	0,026	13
20	8817,10	552	15,97	0,90	0,013	7

The costs of maintaining sports schools, the number of athletes, and the number of winners were obtained on the basis of the reported statistical information (statistical reporting form 5FK «Information about the sports school», the official website for posting information on state (municipal) institutions bus.gov.ru).

The share of students athletes who study «excellent» and «good» in the contingent of students is determined using a survey of the heads of sports schools. For the analysis of the social effectiveness of investments in the activities of sports schools for each sports school, the expenses for one athlete are calculated, as well as the number of gold medals at the All-Russian competitions for one athlete. In the future, the ratio of the number of gold medals to the volume of financing («the price of one victory») was also calculated. From the point of view of social efficiency, the correlation between the sporting success of a sports school (the ratio of the number of gold medals to the number of athletes) and success in getting an education at school (the share of «excellent students» and «good») is of interest. To conduct the study, traditional methods of applied multivariate statistical analysis Data Mining were used. The peculiarity of this group of methods is that they do not require preliminary formulation of hypotheses, for this reason they are referred to as «exploratory analysis».

Research Results and Discussion

All sports schools are divided into two groups according to the cost of one athlete (table. 2). The average cost is the median of 26.23 (twenty six thousand two hundred thirty rubles) The arithmetic mean value of costs in the 1st group is 19.02 (nineteen thousand twenty rubles), in the 2nd - 40.03 (forty thousand thirty rubles)

Table 2: Grouping of sports schools by the level of costs per athlete

Data	1st group	2nd group
Sports School Code	6; 17; 5; 20; 11; 1; 4; 10; 15; 18	2; 3; 12; 19; 8; 7; 9; 13; 16
Average costs for a group of sports schools per athlete, thousand rubles	19,02	40,93

The data in the table indicate that between the two groups of sports schools there is a double gap in costs per athlete, due to the difference in sports, and in differences in the effectiveness of cost management between sports schools. We will construct a similar table for the number of gold medals per unit of financing (Table 3). The median value in the sample is 0.26 (zero point two six). In this case, there is an eightfold gap between the two groups of sports schools, which indicates a very significant difference in the «price of victory». The reasons for this require further study. It should be noted that in the 1st group sports schools with mainly playing sports are concentrated.

Table 3: Grouping of sports schools by the number of gold medals per 1 million rubles of budget financing

Indicators	1st group	2nd group
Sports School Code	17; 5; 15; 2; 9; 13; 12; 6; 14; 4	7; 10; 16; 3; 19; 20; 1; 18; 8; 11
The average number of gold medals per 1 million rubles of budget funding for a sports school, for a group of schools	0,11	0,87

We summarize both tables in table 4.

Table 4 allows you to identify four categories of objects - with an efficiency higher than the average for two positions; with efficiency below average in two positions; two categories in an intermediate position. The most effective category (bottom left of the table) includes primarily individual sports, martial arts, athletics

Table 4: Grouping of sports schools by two indicators of social efficiency of investments

Indicators	The cost per athlete is below average	The cost per athlete is above average
The number of gold medals per 1 million rubles of budget costs is below average	6; 17; 5; 4; 15	2; 12; 14; 9; 13
The number of gold medals per 1 million rubles of budget costs is above average	20; 11; 1; 10; 18	3; 19; 8; 7; 16

It should be noted that the assignment of an object to one of the categories can be explained by both natural causes (for example, features of a sport) and the effectiveness of managing a sports school.
In any case, from the point of view of the SROI concept, special attention should be paid to those positions (sports, sports schools) that provide the highest return on investment.

Findings

There are significant differences between sports schools in terms of indicators of the social efficiency of investments. In this case, the gap in costs per athlete between the two groups of sports schools was 2 times, the discrepancies in the number of gold medals per unit of expenditure exceeded 8 times. From the position of the SROI concept, in this case, there is considerable potential for optimizing the financing of certain sports and increasing the efficiency of

sports schools. In the course of the analysis, a model for assessing the social effectiveness of investments was formed and four categories of sports schools with different parameters of the social effectiveness of investments in sports were identified. The factors that caused a particular school to fall into the appropriate category, as well as the necessary conclusions for management, require additional research. Our study did not confirm the hypothesis that there is a correlation between sports and educational success of athletes in the context of sports (the correlation coefficient was – 0.07). At the same time, it can take place within certain sports or among athletes in a specific organization.

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Backpacking Example of Niche Tourism- Analysis of Directions of Travel with A Backpack and The Motives of Their Choice

Wojciech LEWICKI

Faculty of Economics, West Pomeranian University of Technology Szczecin, Poland.
E-mail:Wojciech.Lewicki@zut.edu.pl

Boguslaw STANKIEWICZ

Faculty of Tourism and Health Sciences, The Jacob of Paradies University in Gorzów Wielkopolski, Poland
E-mail: bstankiewicz@zut.edu.pl

Abstract

Observed global trends in behavioural changes in the contemporary tourism market indicate a tendency of tourists to seek new active forms of spending free time, based primarily on the need to explore the world combined with new and extreme experiences. On this basis, numerous new models and forms of tourism have been identified, often referred to as "niche" tourism to distinguish it from mass tourism. One such form of niche tourism is undoubtedly Backpacking. The aim of the study is to analyse the directions of backpacking trips and motives for their selection on the example of tourists from Poland and abroad. The basis for the measurement was a survey consisting of a total of 29 substantive questions, supplemented with socio-demographic questions. The research was also conducted in two ways: as field research (July-August 2018) and via the Internet (2018-2019). In the course of the study, statements by 290 backpackers were collected The results of the research indicate that the dominant model among the inhabitants of Western Europe were long journeys (i.e. those crucial for backpackers). Also indicated the differences between Polish and foreign backpackers when it comes to motivations to return or not to return to given countries. This publication is an attempt to capture the advantages of modern Backpacking and to answer questions about the directions of travel and motives for their choice by Backpackers from Poland and abroad.

Keywords: Backpacking, Niche Tourism, Themes of Choice, Travel Destinations.

Introduction

Backpacking entered the field of tourism in the 1980s, on the Australian continent. It found its way into the academic discourse owing to (Pearce,1990), who described, in the early 1990s, individual tourists called backpackers by the Australian tourist industry. Those were tourists traveling Australia who made particular choices and displayed a specific set of characteristics. Among the most essentials ones were: young age; independence (including free planning of routes and itineraries, using one's own geography of travel); low costs of travel, and thus a preference for cheap accommodation and meals; traveling for periods of time longer than the holiday entitlement at work; and also – which was their distinguishing feature – informal participation in various local forms of spending free time and interacting socially with other travellers and with residents of visited countries (Loker-Murphy,1996).

One of the first countries which noticed the backpackers' driving force for the local economy was Australia. In order to attract the biggest possible number of backpackers, they introduced innovative economic solutions which brought benefits not only in the economic, but also in the social sphere (Loker, 1991). Among other solutions, a migration visa program Working Holiday Visa (WHV) was adopted, aiming extensively at meeting the expectations of the backpacking market (Visa 2007), which merges this sector of tourism with many other branches of the industry. It was also in Australia (followed by Thailand, Indonesia, New Zealand) where the tourist industry was significantly targeting the needs of backpackers. The infrastructure (hostels, bars, pubs, gyms, nightclubs, taxi services, buses, stores) was expanded and diversified, catering specifically to the backpacking community. As a result, these countries became not only important destinations of backpacking travels, but also in a way their proverbial Mecca, especially for people beginning their adventures with backpacking (due to numerous conveniences and developed services offered by the tourist market). In Australia alone, an almost 5% increase in the

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number of backpackers is recorded annually (for example, in 2013 the continent was visited by 571,000 backpackers ; they bring over 3 billion AUD into the country's budget (Jarvis & Peel, 2013).

After more than thirty years since the first attempts at capturing the phenomenon, the image of backpacking – hitherto a cohesive entity – breaks into many different portraits which escape homogenous classification. The way of backpackers' self-identification and their experiences are polarized (Hannam, & Diekmann, 2010). And although one might still search for features co-creating backpacking in general space, on the level of individual travel awareness different variables can be noticed, for instance in travel methodology or in classifying motivation. Van Vaals suggests that forms of tourism which emerge from backpacking and are currently barely visible will also develop with time and will become full-fledged types of tourism, among them the money-saving techno-traveller, the anti-tech glampacker, the primitive green backpacker (Van Vaals, 2012).

It cannot be ruled out that the model of backpacker formed in the twentieth century is slowly disappearing and being replaced by a new type, which is a product of contemporary mass and consumer culture. The following publication attempts to supplement the knowledge about the specifics of backpacking, characteristic for the nations who practice it, and so to demonstrate the experience of Poles against the background of foreign backpackers. The analysis of the literature on the subject has shown that such research is lacking, which additionally emphasizes the advisability of addressing this topic from both the scientific and practical side.

The aim of the study is to analyse the directions of backpacking trips and motives for their selection on the example of tourists from Poland and abroad. The article is organized in the following way. Chapter 2 contains a detailed description of the research method used in response to research questions. Chapter 3 describes the results of experimental research. Chapter 4 presents conclusions, at the same time indicating future directions of research in this area.

Materials and Methods

Conceptual Assumptions

The purpose of the entire research enterprise was to portray the contemporary Polish and foreign backpacker through characterizing their multi-dimensional subjectivity and describing their travel practices. Following this line of reflection, an attempt was made to answer the following research questions:

1.What are the directions of the first backpacking trips, grouped according to the main regions of the world, taking into account the preferences of Polish and foreign tourists?
2.What are the reasons for choosing a destination for your first backpacking trip?
3.What are the reasons for returning or not returning to previously visited countries for tourists from Poland and abroad?

Method of Sample Selection

In the context of the changing nature of foreign backpacking, and the still undefined specificity of Polish backpackers, selecting people with a backpacker identity based on objective criteria was not feasible because in the case of backpackers it is impossible to have a sample that would meet the requirements of a representative study based on a probabilistic method, especially one that would provide a greater than zero probability of the respondent taking part in the survey. And also one that would meet the condition that the probability would be the same for all units of observation (elements of the population). Due to these circumstances, the selection of respondents for research did not proceed in the representative scheme. Methodological arguments supporting this decision resulted from several premises:

- descriptive character of the research, and in particular the implementation of its cognitive purpose, which referred to the concept of comparative research through the recognition of the Polish and foreign tourism environment;
- significant heterogeneity of the backpackers' environment;
- the lack of opportunities to standardize access to respondents, and what is related to this - creating a homogeneous and effective sample survey.

Affirmative actions were taken in the selection of people for research, addressing them to the environments in which backpackers were present. Therefore, the criterion of consciousness was the main factor determining the

participation of a given person in the study – potential interlocutors were asked if they were backpackers. During the survey, almost all respondents (except one) agreed to be assigned such a role and responded positively to the first question asked for this purpose.

The selection of respondents for the research was carried out among many backpacker communities scattered around the world; they were found:

- during journeys made by the authors herself;
- through the use of places of traditional community meetings in the form of clubs, lectures;
- through the use of information about existing websites which act as forums for community contacts.

Due to the diversity of respondents in terms of travel experience, level of participation in backpacking and origin from different geographical regions of the world, two relatively independent research courses were conducted, with all the above-mentioned communication channels used in both Polish and foreign thread.

During the research phase, 290 interviews were collected. In view of the fact that the non-probabilistic scheme did not impose a predetermined sample size as the minimum, the adopted strategy was connected with the recognition of the sample as sufficient for the adopted analysis scheme and allowing comparisons between Polish and foreign backpackers.

The research in Poland was conducted in two ways. Firstly – at travellers' meetings in the period from September 2018 to July 2019. 40 respondents were included. The meetings were held in public places, recognized by the community as travellers' spots (in Wroclaw, Warsaw, Poznan, and Krakow). Secondly – via the Internet. In order to conduct research arranged on the Internet, available travel forums and Internet blogs were used as a medium of communication; information about the study was posted along with a contact request in order to complete a survey. The result of such a large-scale recruitment of backpackers were 139 answers to the survey. The reasons for refusals to participate in the study were most often planned or ongoing travels.

The research abroad was also conducted in two ways: as field research (July-August 2018, 98 respondents) and via the Internet (2018-2019, 13 respondents). As in the case of Polish research, Internet research was used in foreign surveys. On 47 forums, and backpacking and travel websites, information was posted about the study along with a participation request. Overall, the number of individual e-mails sent to members of foreign travel and backpacking groups was 304. The most common reason for refusal was lack of identification with the role of a backpacker. Eventually, in the group of foreign backpackers 111 respondents qualified for further analysis.

Description of the Tool

The basis for the measurement was a survey consisting of a total of 29 substantive questions, supplemented with socio-demographic questions. Due to the adopted concept of targeted research, the trial was carried out in two environments – Polish and foreign, using the same tool and question-based content. The group of survey questions was dedicated to the reconstruction of various backpacking practices connected with typical aspects of travel such as travel directions, preferences and practices concerning organization of a journey. The survey was closed with a standard set of variables describing the social profile of the respondent.

Analysis Scheme

In the course of the study, statements by 290 backpackers were collected. The method of empirical material analysis was based on quantitative and qualitative techniques which form generic analyses. Here we can distinguish: quantitative analysis, mainly through indicating and describing the distribution of responses to the questions of the survey in the studied collective of backpackers; typological (qualitative) analysis – accompanying the quantitative categorization of closed-ended questions and enriching this categorization with information on the qualitative context of facts; comparative analysis (schemes of intercategorical comparisons) – key from the point of view of the exploratory research objectives, based on the concept of analysing differences in percentage distributions and values of variables in comparison groups. The groups formed categories of respondents (subsets of observation), distinguished due to the distribution of features (variables) differentiating the respondents. The basic dimension of the studied differences was the status of a backpacker defined by his nationality. In the adopted scheme, two basic comparison groups were distinguished: Polish backpackers (179 observations – 61.7% of respondents) and foreign (111 observations – 38.3% of respondents). This system of comparisons was supplemented successively in the course of analysis with various variables, including: age of respondents, gender, number and time of travel, social and professional situation, material situation, etc. Unless otherwise stated, percentages were added up to 100 in each

(separated by variable values) independent comparative group (respondent category). In the case of multiple choice questions and more than one answer to a question, percentage distribution did not add up to 100, but were calculated in percent's by comparing the number of people giving a given answer to the total number of respondents. Technical comments on the method of data presentation were put in titles and footers of tables and figures. Since the respondents were not obligated to answer all the questions in the survey, the number of important answers varied, depending on the question, which influenced the variable size of comparison groups. Usually, numerical and percentage losses were not significant, but for orientation the total number of responses included in the analysis was given. Where order-based response scales were used, the intergroup comparison scheme was based on the average values of point scales**.** In each case, a point definition of the scale used was given. The layout of all analyses has been subordinated to the objectives of the study.

Results

The study showed that Europe was the most frequently chosen destination for the first backpacking trip (Fig. 1). Essentially, the dominance of Europe as the destination of the first trips was the result of the largest share of European nations in the surveyed population. Moreover, the domination of Polish respondents in the study was the reason for indicating Poland as the first destination for a backpacking journey. A previously unreported conclusion thus emerges that backpacking usually begins in one's mother country.

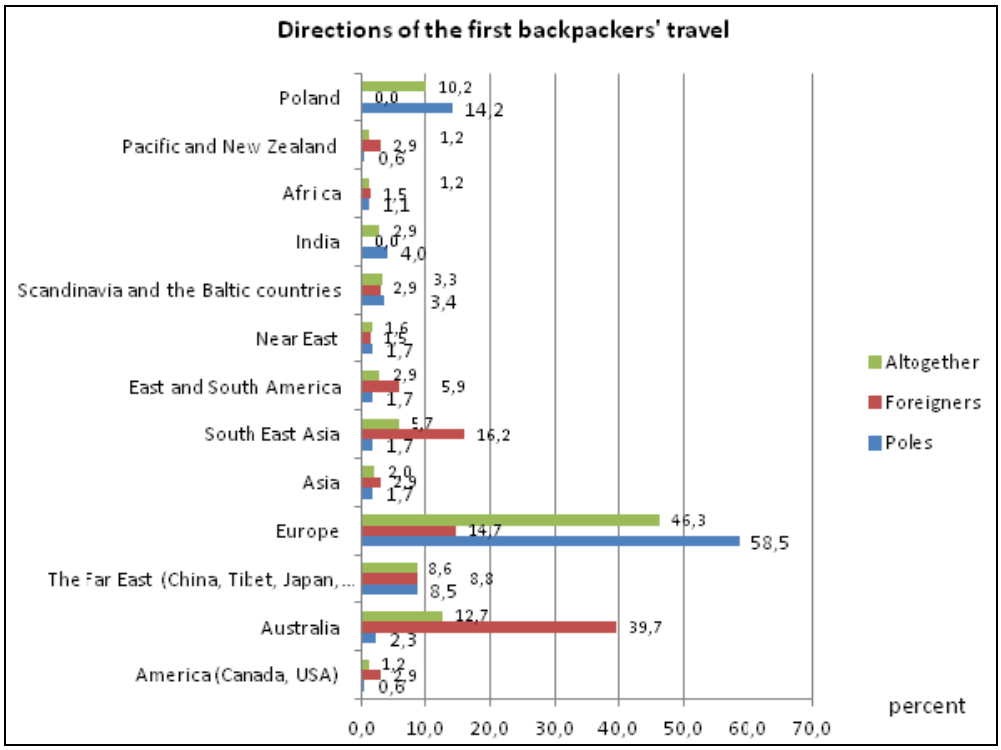

Fig.1: Directions of the first journeys of Polish and foreign backpackers

Source: own study, total n = 244 = 100%, Poles n = 176, foreigners n = 68

The analysis of the directions of the first trips of Polish and foreign backpackers differs significantly. While Poles, apart from Poland, mostly opted for European countries (total 58.5%), especially neighbouring ones (Czechia) and Southern Europe (Italy), the foreign backpackers' mecca was definitely Australia (40% of foreign respondents chose this destination for their first trip).

The differences in choices of the first destination were clearly marked in the motivations (Fig.2). While for foreigners their first journeys were definitely connected with cognitive aspects – exploring the culture and people of the country they went to (19%) combined with following a dream ("I've always wanted to"), in the case of Poles,

those motives remained important but the most essential motive was the proximity and friendliness of the country (33%).

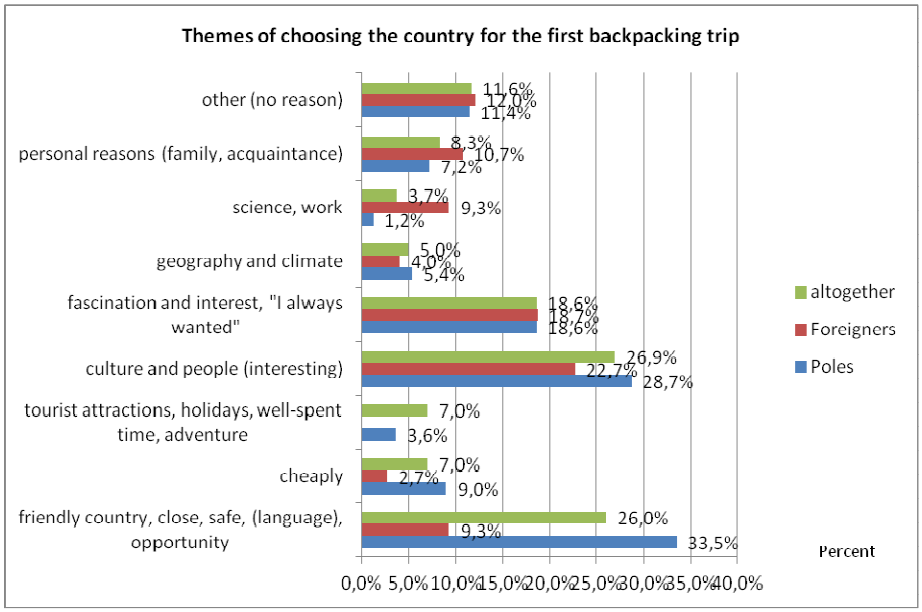

Fig.2: Motives for the choice of destination for the first backpacking trip

Source: own study, multiple answers do not sum up to 100%, total n = 242, foreigners n = 75, Poles n = 167

Asked about their motives to return (Fig.3), they mentioned (albeit not too often – only 192 responses were received to this question) sentiment and positive experiences connected with a given country and direction of travel. Although the general structure of the motifs was similar as far as hierarchy is concerned, this element was more often indicated by foreign backpackers than Polish ones (59% against 41%).

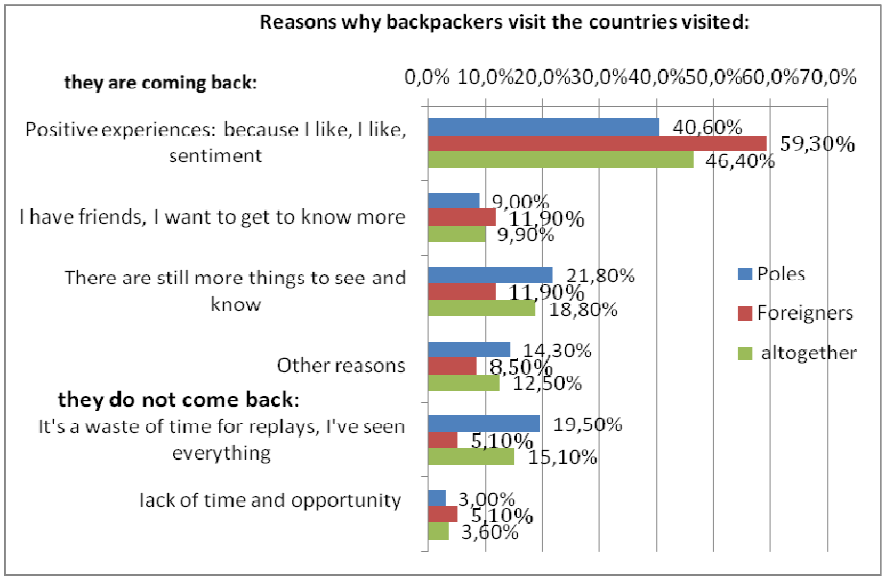

Fig. 3: Motives for returning or choosing not to return to formerly visited countries for Polish and foreign backpackers

Source: own study, multiple answers do not sum up to 100%, total n = 192. Foreigners n = 59, Poles n = 133.

Respondents were asked to name places they rejected as tourist destinations (Fig.4). In this aspect, Arab countries took the lead, with 35% of respondents stating they would not like to visit them, Europe ranked as number two (23%). Other countries and regions were mentioned sporadically.

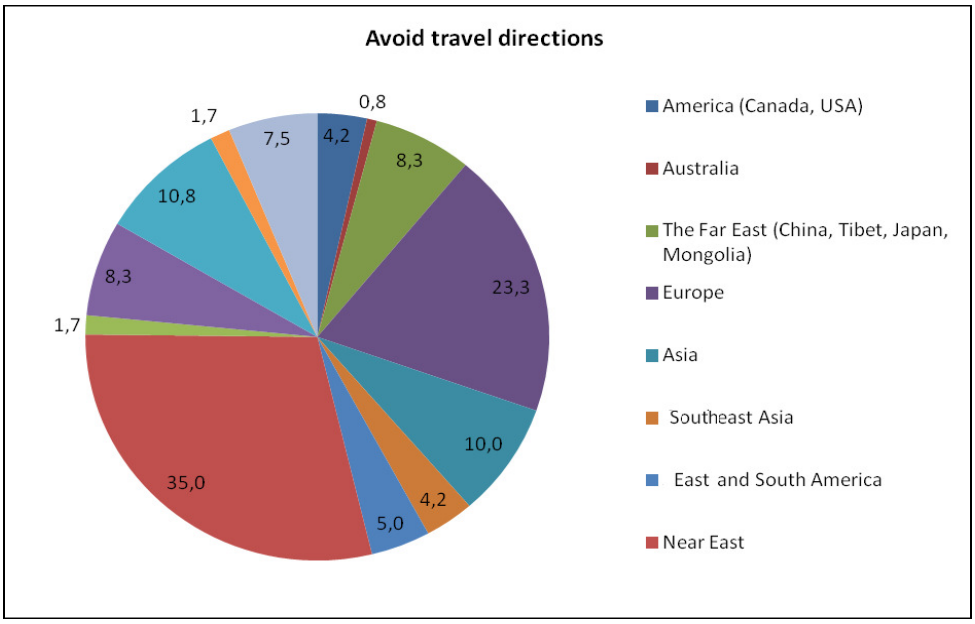

Fig. 4: Destinations avoided by Polish and foreign backpackers

Source: own study, total n = 120

Among the most often mentioned countries in this category were: Russia (7.6%) and India (6.9%). Equally often various Arab countries were selected. Among the countries whose character was described, there was those considered too cold or too hot. When asked to justify their choices, (number of responses = 120) indicated the following reasons: war, danger and life threatening conditions, unstable political situation, stereotypes of countries and residents; about post-communist countries: these are still wild countries) – 44.8% of respondents; too many cultural differences, intolerance (especially emphasized in relation to Arab countries):– 12% violence and crime (e.g. about Africa: bad experiences – 12.9%;discrimination against women; bad treatment and rapes – 8.6% poverty, illnesses, filth – 7.8%; expensive or boring – 6.9%.

It turns out that the main obstacle to visiting a given country or region of the world is first and foremost political instability, conflict (of different types: power, culture, religion), which incites fear – directly or indirectly – and poses a threat to safety. Most of these threats were associated with the Near East (52% of motives).

In the context of the discussed issue, it is worth taking a look at specific convictions and circumstances which might influence the decision not to undertake a backpacking journey (Fig.5).

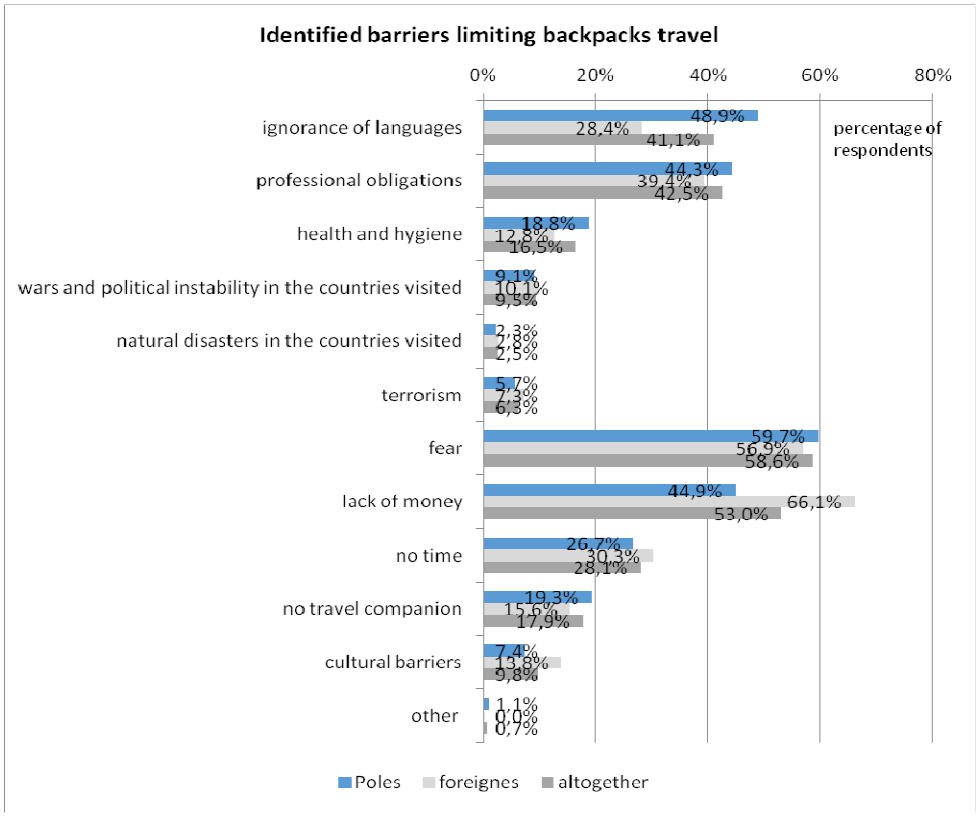

Fig.5: Limitations in backpacking travels for both studied groups: Poles and foreigners

Source: own study, multiple answers do not sum up to 100%, total n = 285, Poles n = 176, foreigners n = 109

The analysis of distribution of answers (one could choose up to three main obstacles) partially overlaps with the answers about the avoided directions of travel. Fear of danger, according to the respondents, is the main reason limiting the freedom of traveling. Over 20% of respondents mentioned also: lack of money (53% total) – a major barrier especially for foreign backpackers - 66.1%, Poles 44.9%; professional obligations (42.5% total) – similar in both groups: Poles 44.3%, foreigners 39.4%; lack of time (28.1% total; Poles - 26.7%; foreigners - 30.3%); not knowing foreign languages (total - 41.1%) – indicated more often by Polish backpackers (48.9%) than foreign ones (28.4%).

The key issue in numerous threads of the study were directions and countries of traveling. The respondents were asked to list all the countries they had travelled to (no limitations). The names of visited countries were then classified into regions of the world (Fig.6)

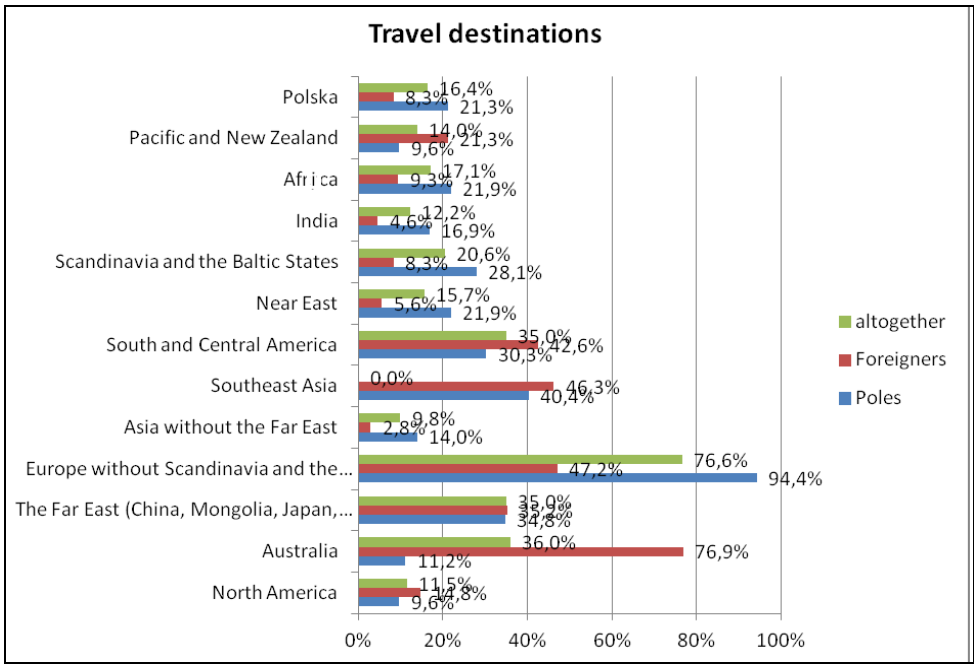

Fig. 6: Directions of travels for Polish and foreign backpackers

Source: own study, multiple answers do not sum up to 100%, total n = 286, Poles n = 178, foreigners n = 108.

The analysis of the answers provided show that European travels were a standard for all respondents (Poles and Foreigners) however, countries of Northern Europe were chosen far less often than neighbouring countries and Southern Europe. Perhaps because the majority of respondents were Poles, while among the foreigners the most represented groups were the British, the Germans, and the French, Europe remained the dominant geographical region of travels. Foreign backpackers, unlike the Polish ones, chose Australia significantly often.

The dominance of Europe could be explained with the difference between an interest in a given journey and its actual realization in European countries, which causes a significant disproportion in quantity between the large number of declared European destinations and fewer indications of other directions. Southern regions of Europe were far more popular than northern ones. A similarly high percentage of people chose Asian regions, especially South-East Asia; it was chosen by both Polish and foreign backpackers. As the traveling experience of backpackers grew, the tendency to visit more exotic places also grew. Without a doubt, a special region for traveling was Australia - especially for foreigners, who made it an important element of their journeys (77% of foreign backpackers went there), while among Poles, the North of Europe - Scandinavia and the Baltic states - was very popular. At the next stage of the research, an attempt was made to identify the directions and the number of trips of tourists from Poland and abroad (fig.7).

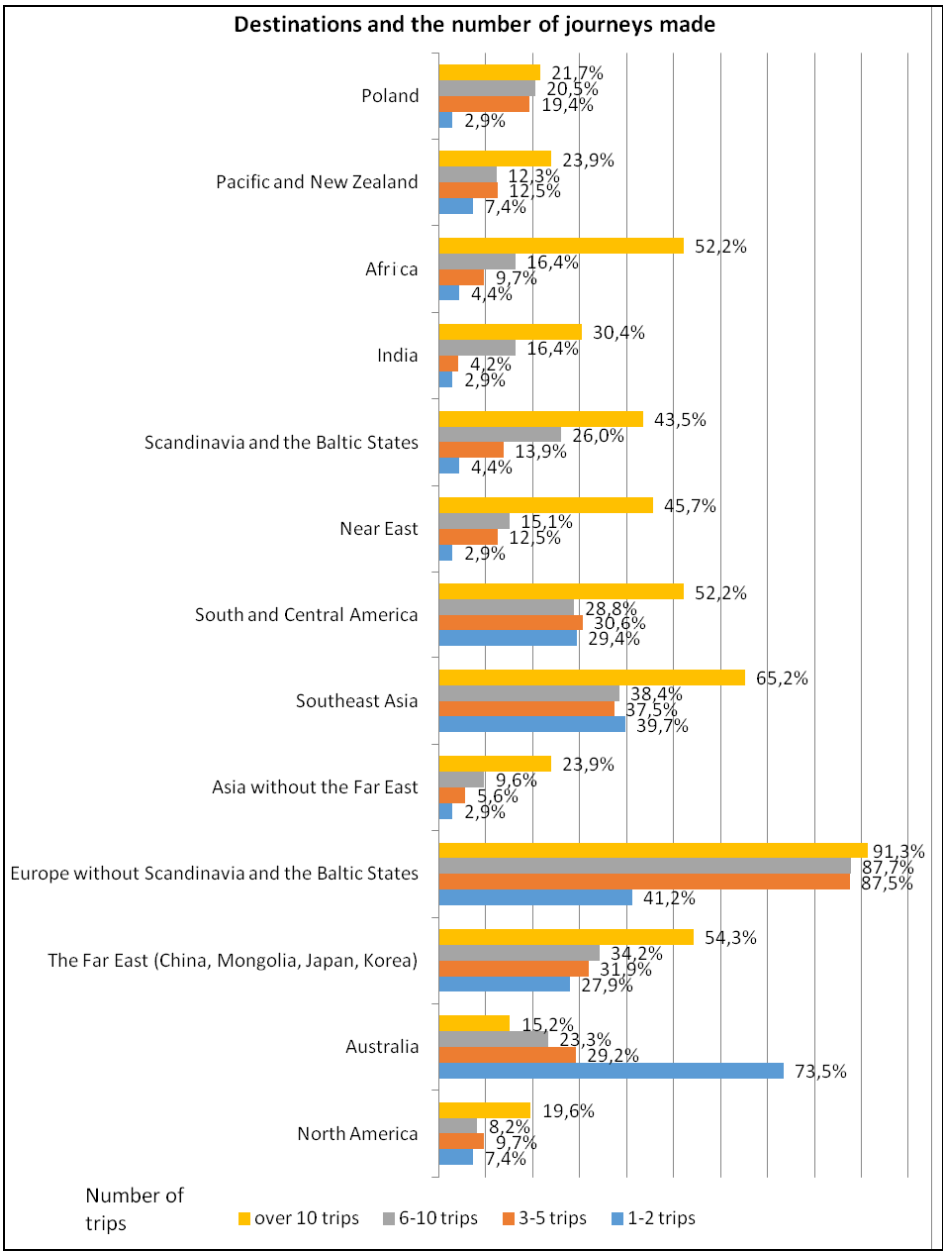

Fig.7: Destinations versus number of trips of Polish and foreign backpackers.

Source: own study. Multiple answers do not sum up to 100%. N total = 259, 1-2 trips n = 68, 3-4 trips n = 72, 6-10 trips n = 73, more than 10 trips n = 46.

An analysis of the number of responses indicates that Australia was one of the priority regions, while the number of trips to Africa, Southeast Asia and the Middle East increased with the travel experience. All these regions, however, started to dominate only after at least 5 departures, unlike in Europe, where a sharp increase in the number of departures was recorded after just two departures.

Discussion and Conclusions

Although the Destinations of backpacking tourists were of interest to other researchers as well (Ross, 1997; Smith, 1994; Wilson, 1997; Hampton, 1998; Spreitzhofer ,1998; Paris & Teye 2010), It is in most cases that the effects of massaging backpacking trips to individual countries have been described (Mohsin & Ryan, 2003; Richards & Wilson, 2004; Liu et. al 2018).Or the dynamically developing tourist infrastructure, created mainly to meet the

specific requirements of contemporary tourists (Matthews, 2008; Visser 2003), was indicated. The results of the research indicate that the dominant model among the inhabitants of Western Europe were long journeys (i.e. those crucial for backpackers) by Wilson (1997). First of all, Australia has remained their Mecca, and it is difficult to formulate unambiguous opinions in the case of other destinations. However, it can be suspected that an important factor in the selection of individual countries and regions may be historical and cultural relations, because just like for Polish respondents, Scandinavia and the Baltic countries were interesting travel destinations due to their historical connections, for British backpackers the journey in the footsteps of the old British empire seemed obvious. For this reason, O'Reilly (2006) saw some neo-colonial and neo-imperial accents in backpacker travel and considered modern backpacking to be a continuation of the post-colonial behaviour of earlier generations. He maintained that there were significant similarities between them. The most important of these is the constant expansion of Western influence into the East through the presence of backpackers in the Orient world, although of course the intentions of today's backpackers are definitely different from those of former colonialists (Desforges, 1998). India is an exception. This country has hardly been chosen by the British backpacker despite the great historical and cultural importance this country has for them.

Symptomatic for the ongoing discussions about the nature of backpacking are the differences between Polish and foreign backpackers when it comes to motivations to return or not to return to given countries. It is Poles, more than foreigners, that can be attributed to the characteristics of stereotypical backpackers, i.e. people focused on searching and exploring, for whom an important reason for a potential return is more things to see and learn, but if they do not come back, mainly because repeating is a waste of time ; the time is too short to return to the same places; I am not coming back because there are still too many places and cities in this world that I want to see; I don't go back to places I've seen because I don't have enough time and I need something new. This is confirmed by the difference of 14.4 percentage points of the answers obtained.

Equally interesting research results were obtained when answering the question why backpackers wanted to return to certain countries or finding out why they did not want to travel to others. Backpackers did not choose some countries mainly because of various threats, such as weather disasters, natural disasters and diseases, hostility of the local community, acts of terror, crime, political unrest (Fesenmaier & Johnson 1989). Interestingly, foreign literature repeatedly emphasized that risk - inscribed in traveling - is an experience that backpackers themselves are looking for in their journey choosing (Beezer,1994). The authors agree with the thesis that backpackers decide to traverse unknown roads and virgin territories, penetrate different cultures through a conscious agreement to abandon the stability and routine of institutionalized tourism in favour of experiences bordering on risk (Elsrud, 2001;Walters, Wallin, & Hartley, 2019). And at least, as noted by Scheyvens (2002), seeking adventures, especially those involving risk, cannot be considered one of the features of the identity of backpackers, it should be noted that their behavior in visited places and readiness to face potential threats or daring actions, albeit not uniform, are very important for this group of tourists (Jabłonowska 2015; Chen & Huang, 2019)

To sum up, although the results of the research provide interesting conclusions on niche tourism such as Backpacking, there is a need for more extensive research, covering other factors such as the cost and financing of backpacking travel. This data can provide a broader context and insight into the analysis of backpacking destinations and motives for their selection. Therefore, such analyses will be the subject of future work in order to identify and identify the factors of development of Backpacking in the era of global changes in the contemporary tourism market.

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Research on the Financing Sources of Start-Ups: A Case Study of Poland

Wojciech LEWICKI

Faculty of Economics, West Pomeranian University of Technology Szczecin, Poland.
E-mail:Wojciech.Lewicki@zut.edu.pl

Abstract

In today's market reality, nobody doubts that financing the activities of enterprises is a complex process influenced by many factors. It is obvious that a market entity with several years of experience and an established market position has different opportunities to raise capital, and a start-up that bases its strategy solely on assumptions that a given product will find its buyers in the future. The article presents selected research results on the sources of financing startups in Poland. The aim of the research was to gain extensive knowledge on the methods of raising capital by these entities. In particular, identification of business models, types of selected financing sources, determination of current needs and indication of barriers to obtaining funds. This research may contribute to the development of universal solutions in the field of financing startup activities especially in Central European countries. The presented and interpreted results can be the basis and incentive for further research on the topic related to the development of entrepreneurship and startup ecosystems, both at the local and global level.

Keywords*:* Start-Ups, Financing, Entrepreneurship.

Introduction

The dominant statement in the literature on the subject is that we live in the era of startups (Shane, Locke & Collins, 2012; Baron, 2004; Cui et al, 2016; Davila et al, 2015). Every now and then there is information about a new fantastic startup that will change our reality - examples include Google and Facebook, which were also startups in the past. One definition emphasizes that a startup is an enterprise created to search for a specific business model (Block et al, 2018). As many authors mention, the goal of such an organization is to search for new markets for the development of its product and to achieve quick financial success (Block et al, 2018;Gilbert, McDougall & Audretsch, 2006;Huynh, Petrunia & Voia, 2012) Many researchers see startups as the key to the development of entrepreneurship and innovative economy (Huynh, Petrunia & Voia, 2012; Hall & Lerner, 2010; Gartner & Carter, 2003). At the same time indicating that it is a form of business that was created to provide a new product, service, technology or process under conditions of high uncertainty. As it is commonly known, mature enterprises are usually characterized by a clearly defined purpose and specificity of activity and implement a plan that involves acquiring customers and generating revenues. By contrast, startups are only looking for a scalable and repeatable business model that would allow them to stay on the market and further develop. Therefore, the choice of both the right business model and, consequently, the sources of financing, may determine the market success of this type of entities on the contemporary global market.

Available reports OECD (2019) and research of the European Economic Commission European, (2017) indicate that the Polish economy is one of the most dynamically developing economies in Central Europe (Ministry, 2018). Although the concept of startup in Poland has been known for only a few years, in 2020 there are already around 3,000 startups in Poland. Thus, both the position and role of the startup sector in the Polish and EU economy is becoming more and more significant (Matejun, 2014; Gwizdała, 2017) and certainly requires analyzes and research.

The analysis of the available literature has shown that there are many publications on both the issues of identifying startup features and the description of funding sources available on the market. However, in most cases, these studies refer to the economies of Western Europe or developing countries (Info, 2016; IFC, 2017; Godke Veiga, & McCahery, 2019; McCann & Ortega Argiles, 2016). However, there are no publications describing the startup sector compared to the economies of Central European countries such as Poland and focusing on the analysis of selected business models, financing sources, or identification of barriers to obtaining financial resources by future startups. The presented study is therefore an attempt to fill the gap in the literature on the subject in terms of the above-mentioned research problems,

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while at the same time providing a basis for further considerations on startups, business models and their financing sources.

Therefore, this article has many important practical implications, both political and economic. Considering that the aim of the research is to gain extensive knowledge on how Polish startups raise capital. The article was organized as follows. Chapter 2 contains a detailed description of the purpose, scope and research method used to answer the research questions posed. Chapter 3 describes the results of experimental research and their interpretation. In turn, Chapter 4 discusses the results achieved by the author and presents conclusions - pointing to their limitations in the perspective of the research conducted so far and indicates future research directions in relation to the issue of startups and their sources of financing.

Materials and Methods

Conceptual assumptions

The aim of the entire research project was to obtain extensive knowledge about selected sources of financing startups in Poland. The description of the selected issue related to the start-up topic was therefore included in one basic aspect. In the research area, the focus was on identifying business models, the type of financing sources selected, current needs and barriers to obtaining funds by future startups - i.e. the first stage covering the ideation, vision and formation of a startup. Following this line of reflection, an attempt was made to answer the following research questions:

1.What are the most frequently chosen business models by future startup people?
2.Which sources of financing are most often chosen by future startup people?
3.What are the financing needs for future startups?
4. Which of the barriers, in the opinion of future startup people, limit the most obtaining financing?

Method of Sample Selection

Affirmative actions were taken with regard to the correct selection of people for the research, directing the questionnaire to the environment and future startups. Therefore, the awareness criterion was the main factor determining the participation of a given person in the survey - potential respondents were initially asked if they were future startups. During the survey, all respondents confirmed such a role and answered positively to the first question asked for this purpose. The selection of respondents for the study was carried out among the startup community, both related to academic entrepreneurship and those who start their startup activities outside the university. Due to the diversity of respondents in terms of age, gender, type of activity and market sector, one research course was conducted using one communication channel - the Internet.

In the research phase, 500 interviews were collected. Therefore, the adopted strategy meant that the sample was considered sufficient for the adopted analysis scheme and made it possible to answer the research questions asked.

Description of the Tool

The CAWI method (interviews conducted via the Internet) was used as part of the study. The questionnaire form enabling its completion by electronic means was available on the university's website. The survey was anonymous, which allowed for free expression of the respondents' opinions. The layout of the presented results reflects the completed questionnaires.

Analysis Scheme

In the course of the research, 500 completed answer sheets were obtained in electronic form through a questionnaire posted on the website. The research was conducted in Poland in the period from October 2019 to December 2019. The survey contained 10 questions (answers to 4 of them are presented in the article) related to the issue of financing sources of startups in Poland. In the adopted scheme, the questions asked concerned the selected business models, startup financing sources, startup financing needs and barriers related to obtaining funds. The questions were open-ended. The study consists of substantive comments and charts containing the results of answers to the questions contained in the forms. After entering the answers into the spreadsheet, the obtained research data was subjected to statistical and

content-related analysis. In order to improve the clarity of the obtained answers, the results are presented in the simplest form (percentage value) in individual figures 1 to 4.

Unless otherwise stated, the percentages were summed up to 100% of the surveyed group. In the case of multiple-choice questions and more than one answer to the question, the percentage distribution did not add up to 100%, but was calculated as a percentage by comparing the number of people giving the same answer with the total number of respondents.

Technical notes on the data presentation method are included in the titles and footnotes of the figures. As the respondents were not required to answer all the questions in the survey, the number of valid answers varied from one question to another, which did not affect the final result as the number and percentage losses were not significant. The layout of all analyzes was subordinated to the objectives of the study.

Results

In the first stage of the research, respondents were asked to indicate the concept of a business model, the one they are going to choose for their startup (Fig.1)

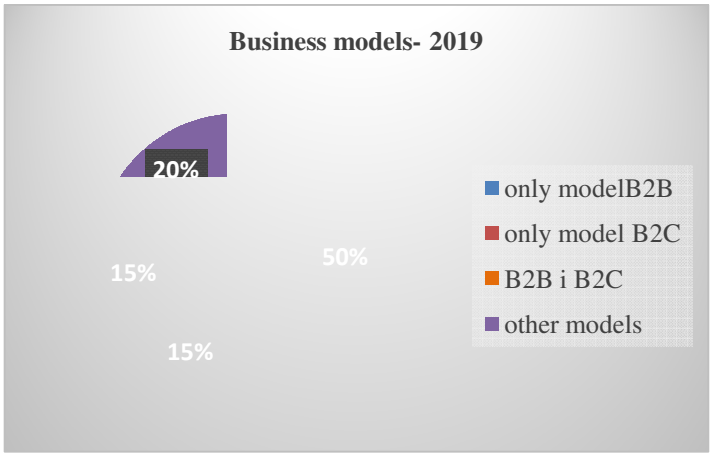

Fig.1: Startup business models selected by startups

Source: own study

The analysis of the obtained results showed that the most popular concept of a business model chosen among future startups is the B2B model, indicated by 50% of the respondents. As a result of the research, it was found that 15% of the surveyed startups declared to operate only in the B2C model. It is worth noting that 15% of startups will implement both models simultaneously. On the other hand, activities based on other business models were declared by as many as 20% of startups.

At the next stage, the respondents were asked to indicate sources of financing for their startups (Fig.2).

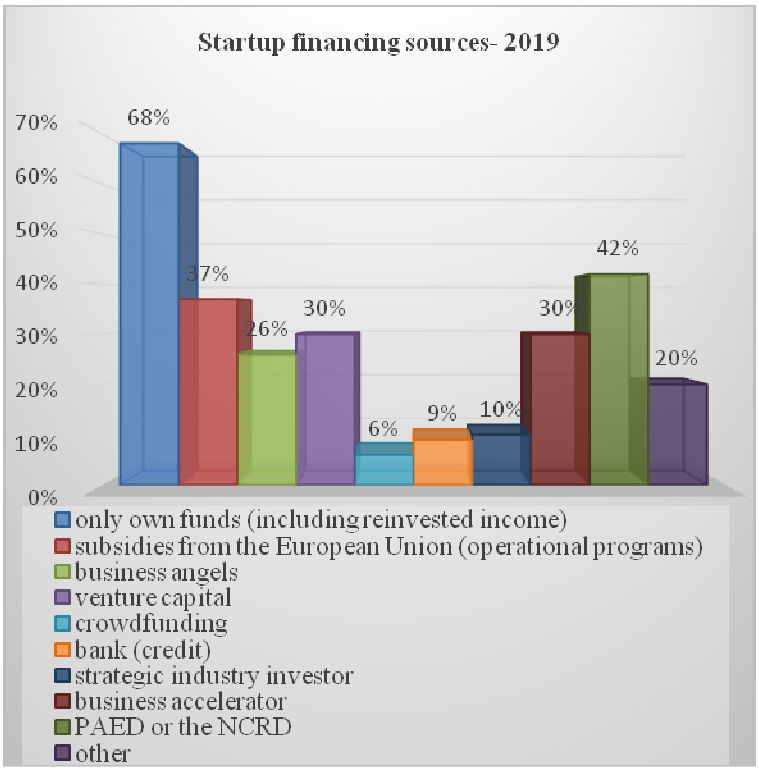

Fig.2: Startup financing sources selected by startup founders

Source: own study

The research shows that 68% of Polish startups will be financed from their own funds (including reinvested income). On the other hand, 30% of startups plan financing by Venture Capital. Funds from the European Union (37%) are equally popular as a form of financing startups. It is worth noting that 42% of Polish startups are planning funding by the Polish Agency for Enterprise Development or the National Center for Research and Development. The key role in financing startup activities of business angels was indicated by 26% of the surveyed respondents. Only 6% of Polish startups will benefit from crowdfunding. Only 9% of Polish startups will be financed from a bank loan, and 10% of startups will be financed by a strategic industry investor.

At the next stage of the research, respondents were asked to indicate the current needs of startups (Fig.3).

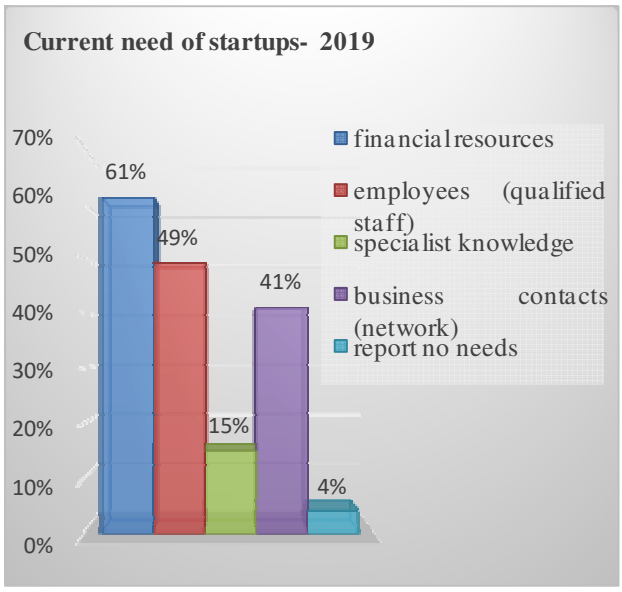

Fig.3: Current startup needs

Source: own study

The results of the answers obtained indicate that future startups most often declare the need for financial resources of 61% of respondents. The percentage of startups indicating the need for employees was 49%, and 41% of the respondents reported the need to expand their network of business contacts. On the other hand, 15% of respondents feel the need to increase the resources of specialist knowledge. Only 4% of the startups surveyed did not report any needs.

The last stage of the research included the answer to the question regarding the identification of barriers related to obtaining financing for starting a startup activity (Fig.4)

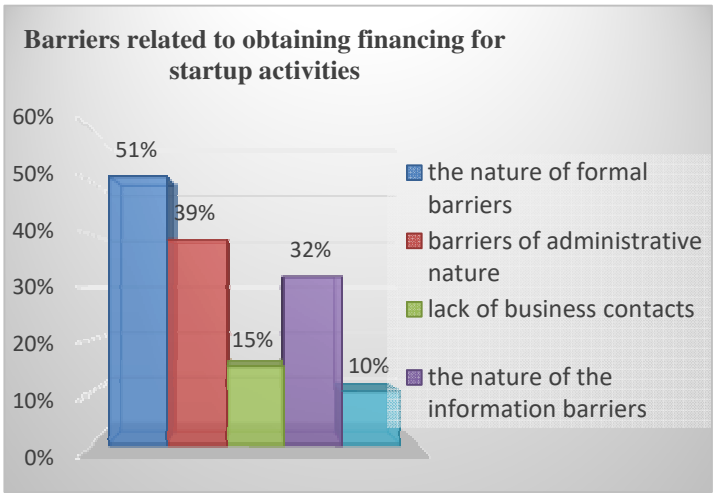

Fig.4: Barriers related to obtaining funds for startup activities

Source: own study

The results of the obtained answers indicate that the largest number of respondents, i.e. over 51%, indicate formal barriers, and over 39% - administrative barriers. Moreover, 32% indicated information barriers. On the other hand, 15% of respondents faced a barrier in the form of lack of business contacts. Only 10% of respondents did not report any barriers related to obtaining funds for startup activities

Discussion and Conclusions

The literature emphasizes that the sources of financing or the business model - apart from the very idea for business activity - are the most important condition for a startup's success (Atherton, 2012). The main aim of the research was to gain extensive knowledge about the sources of financing for startups in Poland. Future startup founders can choose between equity and foreign capital. Many researchers emphasize that the choice of a business model and financing source is related to the loss-up life cycle (Cassar, 2004; Paul, Whittam, & Wyper, 2007). Although there are many different approaches to identifying the stages of a startup's development depending on whether the development model relates to the customer (customer development model proposed by Blank and Dorf (2012), product (product development model proposed by Berman,. Dogrultan, Herrmann and Mamer (2011) or financing (investment development model proposed by practitioners from Deloitte, in this particular case the research referred to the first stage, that is the first phase - combining ideation, vision and startup formation. On the basis of the presented research results, it was found that future Polish startups most often choose a B2B business model, just like startup founders from Western Europe (Cucculelli & Bettinelli, 2015). The model in which they target their own goods and services to other enterprises. As one of the authors emphasizes, this sales channel is chosen for its benefits, as it is intended to generate higher earnings and faster growth (Leek & Christodoulides, 2011). Selling products and services only to the consumers (B2C) is more difficult. Research has shown that many future startuppers in Poland decide to choose a mixed model, that is B2B2C. The author agrees with other researchers, in this context that future startups focusing only, for example, on the purely consumer channel may lose due to the fact that more and more new product variants are launching, which tempt and distract from the current choices (Mingione & Leoni ,2020). Referring to the sources of financing startups at the sowing stage, classical sources of financing play a very important role. M. Zwilling (2015) noted that a specific source of startup financing at this stage is bootstrapping, that is financing from own savings, which is confirmed in the presented research. This form of financing is also indicated by other researchers (Čalopa, Horvat & Lalić, 2014; Saini & Plowman, 2007), comparative analyzes of the most frequently chosen sources of financing for startups in other countries. The author's research confirmed that. On the other hand, obtaining bank loans - due to the lack of collateral and high risk of project failure - is still limited. This is important information for the banking sector to analyze the current rules for granting financing for this specific form of activity.

As the author proves in terms of current needs, future startups from Poland most often declare the need for financial resources and business contacts. On this basis, the author agree with the thesis promoted by other authors (Colombo, Cumming, & Vismara,2016; Cosh, Cumming, & Hughes, 2009) that the knowledge of risk factors related to running a business or building cooperation with the business environment is crucial, especially in the initial stage of development, and these aspects were noted by the respondents in this study. The analysis of the responses collected from the respondents also allowed for the identification of barriers related to obtaining funds for startup activities. On this basis, the author put forward the thesis that along with the further construction of the systems of governmental and non-governmental institutions, the search for ways to eliminate formal and administrative barriers should be continued. Because, as suggested by many other authors, this restrictions may lead to blocking the opportunities and development path of startups, in particular in the SME sector (Davila et al. 2015, McCann, & Ortega Argiles 2016;Blank & Dorf, 2012). And as it is well known, the startup ecosystem in most cases determines the success of development. On this basis, the author conclude that effective cooperation between various groups of the business community will foster the emergence of innovative startups. The implementation of such a task should also be included in the strategy activities of the state administration.

As regards the assessment of conventional and alternative sources of financing for startups author remains in dispute with other authors of the research in this matter. External financing in the form of debt or external equity is often difficult to obtain for start-ups. This is confirmed by the research of Hazudin, Kader, Tarmuji, Ishak and Ali (2015), as well as Beck and Demirguc-Kunta (2006), Fielden, Davidson and Makin (2002). This thesis was partially confirmed by this study. Hence, bootstrap financing is a response to financial constraints faced by small companies (Winborg & Landstrom, 2001). In addition to the above-mentioned classic sources of financing at the sowing stage, among others, the following alternative sources are mentioned (Paschen, 2017): crowdfunding, business angels and venture capital (VC). As indicated by other research studies, donation crowdfunding is the most beneficial for the initial stage of a startup, as it is characterized by the greatest operational flexibility compared to other forms of crowdfunding (Argerich & Cruz-Cázares, 2017). Moreover, the role of business angels who invest their capital in the early stage of startup

development (Seed Stage) is crucial (Teker & Teker, 2016). In addition to financial support, they provide strategic consulting services and offer a network of business contacts. Many researchers also emphasize the role of venture capital. According to Davila, Foster and Gupta (2003), this type of financing is an important factor in the development of modern startups. However, as research in Poland has shown, this form of financing and the others discussed above are still not recognized by future startups. It should be noted, however, that comparing the selection of individual sources of financing by future startups in individual countries, e.g. the United States or Other Western European countries, would be a logical error, taking into account other economic conditions in these countries and the role of startup ecosystems in this process. Considering that in the realities of the Polish economy, operational programs from the European Union and funds from the Polish Agency for Enterprise Development and the National Center for Research and Development are of key importance. On this basis, the author concludes that state institutions should to a greater extent encourage future entrepreneurs to use also other forms of financing.

This document uses data from a survey on a specific research sample of 500 startups, so a much broader analysis is needed, in particular using the variability of time series, data taking into account the individual life cycles of a startup and case studies on specific industries and market sectors. In addition, further research in this topic should focus on issues related to the definition of motives and criteria determining the selection of both specific sources of financing and business models by startups, taking into account the role of government institutions in this process.

Summarizing the presented research on the sources of financing for startups in Poland case study, they do not fully exhaust the matter, but are an attempt to signal the complexity of the presented research problem. Although the conclusions of the research can be used by future startups and administrative authorities responsible for the development of entrepreneurship .Certainly, this subject requires further analysis and research to understand both the essence of startups themselves and the motives determining the selection of individual sources of financing by startups, both at the local and global level. Therefore, such analyzes will be the subject of future work to identify the factors of startup development and entrepreneurship

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The Use of Reserves and Accrued Liabilities for Discretionary Shaping of Financial Results of Stock Exchange Listed Companies: Case of Poland

Anna STASZEL

Cracow University of Economics, Krakow
Poland, staszela@uek.krakow.pl

Pawel ZIENIUK

Cracow University of Economics, Krakow, Poland
zieniukp@uek.krakow.pl

Abstract

Reserves and accruals belong to the measurement category in which a lack of credibility is considered to be at a high-risk value. Due to subjectivity and possibility of choosing many premises during the valuation process, reserves and accruals are treated as instruments of aggressive accounting. Therefore, those items can influence the discretionary shaping of financial results that are presented in financial reports which pose as the final product of the accounting system. The main objective of the empirical research conducted by the Authors was to prove the influence of the decisions - taken by the management of companies listed on the stock exchange - regarding the establishment and release of reserves as well as accruals with the financial result value indicated in the profit and loss statement. The research sample consists of 68 companies listed on the Warsaw Stock Exchange which prepare financial reports in accordance with International Financial Reporting Standards (IFRS). The applied time period is 11 years - reports from 2007 to 2018. Theoretical considerations were conducted with the use of national and international literature regarding the subject, and applicable legal provisions concerning the accounting framework. A review of empirical research on the possibility of manipulating financial results through reserves and accruals was also made. The Authors analysed full versions of 748 financial reports with the inclusion of explanatory notes. T for the average and chi square tests were applied to confirm the statistical significance of the received results. Statistically significant dependences stem from the received results and confirm formulated research hypotheses that entities with high financial results do not avoid establishing reserves, but entities with low financial results release the previously established reserves and thus improve their profit levels. Conclusions that stem from the conducted empirical research take part in the discussion on the credibility of financial reports and on the possibility of using the items from reserves and accruals by the management in order to shape the value of the financial result in a discretionary manner. The results may be a prerequisite for conducting further empirical research that would consist of a larger research sample and that would take into account other tools that can be used for manipulating the value of financial results by companies listed on the stock exchange.

Keywords: Credibility of Financial Reports, Manipulation of Financial Results, Aggressive Accounting, Reserves, Accrued Liabilities.

Introduction

Both the establishment of reserves and accrued expenses, as well as their release, are associated with the creation of costs or revenues and affect the financial result. Decisions concerning the establishment and release of reserves are made on a discretionary basis and based on estimates. Therefore, they can be successfully used to manipulate the financial result. There are two main directions of manipulation: improving the image of the entity or showing a situation worse than in reality (Hońko, 2007, p.140).

Managers, while improving the image of an entity, may aim at e.g:

- receiving additional remuneration (bonus) from the profits made,
- increasing the share price on the stock exchange, in order to resell it,
- improving creditworthiness when applying for external financing,
- improving financial indicators and raising capital from the capital market (issue of new shares),

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- gaining new business contacts.

However, showing a situation worse than in reality may aim at:

- showing a significant improvement in the situation of the enterprise in subsequent reporting periods,
- reducing the number of dividends paid,
- reducing employees' claims if part of their remuneration depends on the profits made,
- understating the company's value before its acquisition,
- seeking to launch a recovery programme or initiating insolvency proceedings.

In economic practice, it has been accepted that financial result is one of the main measures of economic efficiency of the conducted business activity, however, it should be remembered that the amount of profit or loss depends not only on the course of real economic processes, but also on the adopted accounting principles in a given entity. Moreover, it is possible to influence the amount of the financial result through skilful selection of appropriate accounting instruments. The question is whether users of financial statements are aware of the limited usefulness of not only the category of financial result, but of the financial statements as a whole, not because of the lack of such attributes as reliability or trustworthiness, but precisely because of the possibility of legitimately influencing the content of the statements. Despite many limitations, it is the financial result and other reporting data that remain the primary measure of an entity's economic performance used for the purpose of making judgements and decisions.

The article presents the results of empirical research conducted on a sample of 68 companies listed on the Warsaw Stock Exchange over a time horizon of 11 years. The authors formulated the main hypothesis of the empirical research, according to which: changes in reserves are used by the Management Board to shape the gross financial result for a given period. In order to verify the main hypothesis, two detailed hypotheses were formulated:
H1:The values of changes in the balance of reserves depend on the financial results achieved by the entities.
H2: Decisions to establish and release reserves depend on the entity's gross financial result.

Both detailed hypotheses were positively verified by means of: ANOVA test. t for the average and chi square.

Literature Review

The research on reserves focuses primarily on the possibility of discretionary creation of financial result using this category. It is worth noting that such procedures as income smoothing, big bath or cookie jar reserves are based on appropriate manipulation of the size of reserves, because the effects of increasing or decreasing the balance of reserves, with only a few exceptions, directly correct the financial result of an entity, and most of the reserves are treated as estimates. It is therefore a category that can be successfully used to manage profits.

Analyses conducted by many authors show that the share of reserves in the balance sheet total of the studied business entities usually does not exceed 5%, and yet, they constitute an effective tool for the manipulation of the financial result. The authors noticed a correlation between the fact of establishing or releasing provisions and the financial result, financial indicators, including ROE. Research conducted by Polish authors also shows that entities are willing to establish excessive reserves, which they then use (reverse) to create higher financial result.

Empirical research conducted by A. Chraścina (2015) on a sample of 263 listed companies for the years 2010-2013 showed that:

- the average share of reserves was 4.64% of the average balance sheet total
- the level of disclosed reserves depends on the management and reporting factors, for example changes in the management personnel, the quality of audit or making the managers' remuneration dependent on the financial results of entities.
- Reserves are a tool for shaping financial results (earnings management) in order to smooth the financial result, apply the "big baths" strategy, avoid showing a decrease in the financial result and avoid showing a small loss.

Research conducted by A. Duraj (2004a, 2004b) confirmed that reserves are an important tool in the financial management of enterprises and that the increase in reserves is accompanied by a decrease in ROE. The research was conducted on a sample of companies from the metal industry sector for the years 1997-2002. Confirmation of the

use of reserves as a tool of discretionary shaping of the financial result also stems from the research conducted by E. Walińska and B. Bek-Gaik (2012) on companies included in the WIG20 index for 2007-2010.

On the other hand, research conducted by A. Staszel (2020) on a sample of 148 companies listed on the Warsaw Stock Exchange, for the years 2007-2014, showed that the statements prepared in accordance with IFRS are less reliable than the statements prepared in accordance with the Accounting Law. Statistically significant dependencies were found in the statements prepared in accordance with IFRS, indicating that entities shape their reporting data in a discretionary manner through the reserve policy

Many authors from Poland were interested in the possible use of reserves for discretionary profit management. In most cases, the hypotheses that reserves are a tool for profit management were confirmed. In particular, the research conducted by A. Staszel showed that reserves are a tool used to manipulate financial reporting. As part of the research on 1 036 financial statements, a distinction was made between statements prepared in accordance with the Accounting Law and statements prepared in accordance with IFRS. After the distinction was made, it turned out that statistically significant dependencies (indicating the use of reserves to manipulate reporting data) were observed in the group of entities preparing statements in accordance with IFRS. According to the knowledge of the authors, these were the first researches of this type in Poland, while abroad, more attention is paid to the differences in the reliability of statements prepared in accordance with local standards and those prepared in accordance with IFRS.

E. Peek (2004), while conducting research on Dutch companies covering the time horizon of 1989-2000, showed that reserves are used to shape profits, also confirming that entities have large reserves to smooth out current profits. Cohen, Darrough, Huang and Zach (2011) used a sample of 800 companies to show that reserves for warranty repairs can be used by managers as a tool to shape financial results.

The research concerning the impact of reserves on the financial results of entities operating in the banking sector should be considered as an interesting current of research in international literature. Leventis, Dimitropoulus and Anandrajan (2011) confirmed on a sample of 91 commercial banks that before the introduction of IFRS, the banks used the reserves for losses to shape their financial results. On the other hand, the introduction of the obligation to apply IFRS minimized the process of shaping financial results by means of reserves for credit losses. In turn, the Abou-El-Sood research (2012) conducted on a sample of 878 American commercial banks, for the years 2001 - 2009, shows that reserves for losses are a tool used to smooth out the financial results of banks. Before the crisis, banks reported higher reserves understating their financial results, while during the crisis they reduced the level of reserves in order to show higher financial results.

Both researches conducted in Poland and worldwide shown that with the use of reserves - constituting an estimated category - companies can shape the image of their property and financial situation (Poniatowska, 2013, p.119). Reserves can therefore be successfully used to shape the financial result in order to smooth it, apply a “big bath” strategy, avoid showing a small loss or avoid showing a decrease in financial results (Chraścina, 2015, p.53). Manipulation of financial reporting by means of reserves is possible due to the fact that their value is determined by means of estimates and they directly affect the financial result. Manipulation of the financial result is possible through: avoiding the establishment of reserves or understating their value, establishing excessive reserves or overstating their value, hiding real reserves under the category of contingent liabilities, or even releasing reserves despite an absence of circumstances justifying their release
Even the most precise reserve regulations cannot eliminate the elements of subjective choice. There are areas where the possibilities of manipulation are relatively small (for example, reserves on account of deferred income tax), as well as areas heavily exposed to the risk of distortion, such as reserves for retirement benefits.

The research conducted by A. Hołda and A. Staszel (2019) proved that a small 1% change in the assumptions used to estimate the discount rate (estimated using the CAPM or WACC model) causes a 1% change in the discount rate. These researches indicated that only a 1% change in the discount rate can cause a material change in reserves that could distort the reporting information.

Empirical Research

As part of the empirical research, it was decided to investigate dependencies between the reserves and the results of business entities. The analysis was made with a view to eliminate the impact of deferred tax. The analysis was made with a view to eliminate the impact of deferred tax.

For this reason, the research included the impact of reserves on the amount of gross financial result, which may be affected by both pension reserves and other reserves, regardless of the entity's activity (basic, other operating or financial).

Determination of the sample

The research was conducted on the basis of a detailed analysis of individual financial statements of companies whose shares are listed on the Warsaw Stock Exchange. The empirical research of the financial statements, due to their time-consuming nature, lasted from January 2018 to December 2019, while the research sample was finally determined in November 2018. After initial analysis of data, all those entities listed on the Warsaw Stock Exchange that have been preparing their financial statements in accordance with IFRS since 2007 were selected for further research.

From the initially selected pool, a significant number of companies could not be covered by the research: the financial statements had to be rejected from the research sample for objective reasons:

- banks, insurance companies and other financial institutions whose statements were prepared on different models,
- companies that provided only consolidated financial reports;
- companies that did not make their financial statements available for all the years covered by the research time horizon (i.e. statements from 2008 to 2017, data for 2007 were derived from comparative data of financial statements for 2008); this pool included:
  a) companies that entered the stock exchange in 2010 and beyond, and were therefore not required to provide their financial statements for earlier years,
  b) companies that entered the stock exchange before 2010, but:

  i) do not provide financial statements for the years under review,
  ii) make financial reports available, but they contain incomplete financial statements (for example, only the balance sheet and profit and loss account without any explanatory notes, or only selected financial data with selected notes).

Ultimately, only those companies that provided full financial statements together with additional information for all years from 2007 to 2018 were accepted as the sample. The main source of information was the financial statements published on the official company websites.

An Excel spreadsheet was used to collect data and to develop them. Statistical analyses were conducted in Statistica version 13.1 (t tests for averages, ANOVA tests) and in an Excel spreadsheet (Pearson's chi-squared test, averages, standard deviations, etc.).

Ultimately, the sample included 68 companies, i.e. all of the companies listed on the WSE that met the criteria set by the authors. For each financial statement, it was determined whether the entity:

- shows a gross loss, or
- shows a gross profit, but this is a small profit (below the general materiality for the financial statements as a whole, which is set at 1 % of the balance sheet total),
- shows a gross profit of a significant amount, which means that irregularities related to the reported gross profit may mislead users of financial statements.

The methodology used to calculate the materiality threshold (i.e. the amount above which omissions or distortions of reporting information are considered to have a material impact on the decisions made by the users of financial statements) at 1% is a materiality level very often adopted in the realities of Polish business entities, and the same materiality threshold, used in practice by auditors, was adopted for the purposes of this research.

Results of Empirical Research

It has been hypothesized that the amount of changes in reserves and accrued expenses reported in the financial statements depends on whether the entity reported a loss, an immaterial profit or a material gross profit. In order to

exclude the impact of the size of the examined companies, the annual change in reserves and accrued expenses divided by the balance sheet total was tested. Absolute values of changes in reserves and accruals were taken into account. The aim of the test was to verify whether changes in the balance (regardless of whether they were increased or decreased) depend on the results achieved.

In order to verify the assumed hypothesis, an independent t tests for averages was applied, which allows to verify whether generating a gross loss or gross profit by the company significantly differentiates the size of changes in reserves and accruals.

Table 1 presents the average values of changes in reserves and accrued expenses, divided by the balance sheet total, depending on the entity's performance. On the other hand, Table 2 presents the results of one-factor analysis of an independent t tests for averages.

Table 1: Average levels of changes in reserves and accrued expenses depending on the gross financial result achieved

Specification	The average absolute value of changes in reserves and accrued expenses divided by the balance sheet total
Reporting a loss in the statement	0.008514
Reporting gross profit	0.014576

Source: own elaboration based on data obtained from the conducted research

The information presented in Table 1 shows that in the case of companies that show a loss, the change in reserves and accrued expenses represents on average 1.5% of the balance sheet total, while in the case of companies that show a gross profit, the change in reserves and accrued expenses represents slightly below 1% of the balance sheet total. Whether the observed differences between the averages are statistically significant can be determined by means of independent t tests for averages analysis.

Table 2: Results of independent t tests for averages for the variants of proceeding in connection with the change in reserves as a factor differentiating the level of gross financial result

Independent t tests for averages	
Reporting a loss versus reporting a gross profit	
Mean Gross profit	0.008514
Mean Loss	0.014576
t-value	-2.00637
df	746
p	0.045177
Valid N Gross Profit	603
Valid N Loss	145
Std. dev Gross profit	0.027191
Std. dev Loss	0.049368
F-ratio variance	3.296240
p-value variance	0.000000

Source: own elaboration based on data obtained from the conducted research

The dependencies presented in Table 2 show that the gross financial result (loss or gross profit) is a factor significantly differentiating the amount of changes in reserves and accrued expenses. Statistically significant differences occur in average changes in reserves depending on whether the entity achieved gross profit or gross loss. To sum up, gross profit or loss is a factor significantly differentiating the amount of the change in reserves reported in the financial statements.

The hypothesis H1: "The values of changes in the balance of reserves depend on the financial results achieved by the entities" has been confirmed.

In order to verify whether the entities' policies with regard to reserves and accrued expenses (decrease in the balance of reserves or decrease in the balance of reserves, which is analogous to the increase or decrease in the gross financial result) depend on the achieved financial results, the authors created a table of multi-divisional frequency of increases and decreases in the balance of reserves, broken down into entities which showed a gross loss, immaterial gross profit or material gross profit. Table 3 contains a summary of the number of cases, with the percentage of cases given in brackets, calculated as a percentage from among the entities showing a loss, immaterial and material gross financial result.

Table 3: Dependency between decreasing or increasing reserves and accrued expenses and the nature of the achieved gross result

Specification		Loss	Immaterial gross financial result	Material gross financial result
Operations of the given year in companies	Decrease in reserves	72 (50%)	20 (43%)	220 (39%)
	Reserves remain unchanged	5 (3%)	6 (13%)	2 (1%)
	Increase in reserves	68 (47%)	20 (43%)	335 (60%)
		100%	*100%*	*100%*

Source: own elaboration based on data obtained from the conducted research

The information presented in Table 3 shows that among the entities that generate profits (both material and immaterial), 58% increase the balance of reserves, while 39% decrease the balance of reserves. On the other hand, in the case of entities that generated a loss, as many as half of them decrease the balance of reserves. This may be explained by the fact that the entity, by reducing the balance of reserves, wishes to improve its financial situation and reduce the size of losses.

In order to verify whether the frequency of increases and decreases in reserves depends on the achieved gross financial result, the Pearson's chi-squared test was applied. The value of test statistic is 50.29776 with a test probability of p=3,1292E-10, which means that the dependence in question is statistically significant at the level of significance of 0.05. Thus, the test result indicates that the policy in the scope of change in reserves and accrued expenses (increase or decrease in reserves) depends on the nature of the financial result (material result, loss, immaterial result) for a given period.

In order to verify whether the entities' policies with regard to reserves and accrued expenses (decrease in the balance of reserves or decrease in the balance of reserves, which is analogous to the increase or decrease in the gross financial result) depend on the financial results (loss or gross protit) an independent t tests for averages was also applied, which allows to verify whether the financial results in a year determine decision to increase or decrease reserves and accruals. Table 4 shows the results of independent t tests for averages.

Table 4: Results of independent t tests for averages for the financial result in connection with the change in reserves (decrease in reserves or increase in reserves) as a factor differentiating the level of gross financial result

Independent t tests for averages	
Decrease in reserves versus increase in reserve	
Mean financial result while decrease in reserves	99189.83
Mean financial result while increase in reserves	232395.9
t-value	-2.01560
df	746
p	0.044199
Valid N financial result while decrease in reserves	308
Valid N financial result while increase in reserves	440
Std. dev financial result while decrease in reserves	492117.7
Std. dev financial result while increase in reserves	1084114
F-ratio variance	4,853018
p-value variance	0.00

Source: own elaboration based on data obtained from the conducted research

The information presented in Table 4 shows that the average gross profit in entities which increase reserves is 232 395 900 PLN, while the average gross profit in entities which decrease reserves is about 2.5 times less: it is 99 189 830 PLN. The test probability (p-value) is 0,0000, so the hypothesis H2: "Decisions to establish and release reserves depend on the entity's gross financial result" has been confirmed. Indeed entities with bigger gross profit are more likely to increase reserves and accruals, and entities with lower gross profit or with loss usually decrease reserves, to show that way less costs and more profits.

Conclusion

The purpose of the research was to determine whether a category of reserves may be used to manipulate financial reporting. The answer to this question was attempted on the basis of an analysis of 748 financial statements of companies listed on the Warsaw Stock Exchange, preparing financial statements in accordance with IFRS, using triangulation of research methods.

The conducted research showed that reserves and accrued expenses constituted a small part of the balance sheet: only 4.2% of the balance sheet total. However, the annual changes in reserves (increases or decreases in reserves) constituted on average as much as 170% of the gross financial result of the examined entities. This fact proves that the change in the balance of reserves (which is accounted for as a result) has a significant impact on the data presented in the profit and loss account, and above all on the amount of the reported financial result.

It was then decided to verify whether the amount of changes in the balance of reserves (the amount of increases or decreases in the balance of reserves from year to year) is dependent on the financial results achieved by the entities. This dependence was statistically confirmed (in entities that show a gross loss, the change in reserves is almost twice as big as in entities showing profits). Moreover, it was possible to statistically confirm the dependence between the entity's policy regarding changes in reserves and accrued expenses (increase or decrease in reserves) and the nature of the financial result (material result, loss, immaterial result) for a given period. The entities that

generated a loss avoided increasing the balance of reserves (which generates costs), instead decreasing it (thus showing profits) more often than the entities that generated profits.

The main hypothesis, according to which: changes in the balance of reserves are used by the management board to shape the gross financial result for a given period, was confirmed.

The detailed hypotheses were also confirmed. Therefore, it can be concluded that the amount of changes in reserves depends on the financial results achieved by the entities, and decisions to establish and release reserves depend on the entity's gross financial result.

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Interpersonal Conflict In Organizations: Handling Conflict Styles Between Peers In A Portuguese Public Organization

Paulo PINTO-MOREIRA

Coimbra Business School – ISCAC, Coimbra, Portugal
pmoreira@iscac.pt

Abstract

We live in a society that is highly evolved from the social and technological points of view, in which new trends in work organization and human resource management appear to move towards a growing level of behavioral requirements. There is a need for workers at different levels to learn and develop new behaviors, namely regarding interpersonal relationships with co-workers. This article focuses on the studies of conflict at the micro level more specifically the interpersonal conflict in organizational context. In order to evaluate interpersonal conflict handling styles, the ROCI-II Rahim Organizational Conflict Inventory was used in a sample of 181 subjects, workers from several hierarchical levels and departments from a Portuguese public organization. The main goal of this study is to deepen knowledge about interpersonal conflicts handled by peers themselves, establishing to what extent handling styles are determined by demographic variables – sex and level of education. The results indicate a greater predominance of the integrating and compromising styles, and that obliging, avoiding and dominating styles are less frequent. The subjects, whether they are men or women, share a very similar position regarding conflict handling. Subjects with higher levels of education qualifications are less avoidant.

Keywords: Interpersonal Conflict in Organizations, Handling Conflict Styles Between Peers.

Introduction

According to Ibañez (1988), the most relevant aspect in the definition of conflict is that it should stem from the social players' subjectivity, and more specifically from their cognitive representations, so as to differentiate it from other similar states of discord such as an objective counter-position or competition. Several conflict literature reviews show little consensus when it comes to accepting a generic definition of conflict. Cunha et al (2016), Lewicki, Weiss and Lewin (1992), Kolb and Putnam (1992) follow suit, noting that perspectives, as well as difficulties in defining conflict, abound - and, in general, no definition prevails over the others. According to Serrano and Rodriguez (1993), despite conflict being analyzed from several points of view, which correspond to different analytical perspectives and different phenomenon explanation levels, these are not, on principle, contradictory. Different scholars converge, arguing that conflict is an interactive process and may occur whenever two or more social entities (individuals, groups, organizations, nations) interact and their interests or goals are perceived as incompatible or dissonant. (Deutsh, 1994; Pruitt et al, 1994; Smith, 1966, Thomas, 1976; Ting-Toomey, Oetzel and Yee-Jung, 2001). Others add that the relationship between entities might become incompatible or inconsistent either when two or more entities seek the same goods or resources and these are scarce, arousing feelings of exclusivity towards said goods or resources between these entities, or when they have different attitudes, values, beliefs or abilities (Antonioni, 1998; Bercovitch, 1984; Cunha, 2001; Rahim, 2001 and 2002; Einarsen et al, 2018; Van de Vliert, 1985).

Cunha (2001) draws attention to the fact that to speak with authority in conflict, the parties in the litigation must understand the incompatibility of their goals, and that there are interdependent ties - either functional, structural or merely historical -, that prevent each party from achieving their goals without counteracting the other. On the other hand, Serrano and Rodriguez (1993) caution that there is subjectivity in terms of connotations of definitions centered on the incompatibility of the parties. They mention that partial or total incompatibility of the goals does not imply they really are so: regardless of what happens, incompatibility often stems from a distorted perception that accentuates the most diverging elements and not the common interests. Therefore, according to the author, the analysis of this dimension requires not only a motivational perspective, but also a perceptive one, given that any conflict carries with itself a particular background of stereotypes, prejudices, ethnocentric visions and biased perceptions of the opponent that curtail the supposed inability to reach an agreement.

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Interpersonal conflict in organizations

Interpersonal conflict is a fundamental component of the organizational experience, in which one's individual goals, desires and expectations suffer interferences from others, creating diverging interests or the belief that each player's aspirations cannot be achieved simultaneously (Lee, 2002; Moberg, 2001; O´Connor et al, 2002; Ohbuchi and Fukushima, 1997; Pruitt et al, 1994). In a more enlightening manner, Rahim (1992 and 2001) mention that interpersonal conflict in organizations refers to manifestations of incompatibility or to disagreement between two or more people at the same or at a different hierarchical level, in a situation where one or more person's goals are mutually exclusive, creating hostile attitudes.

The subjectivity of the emergence of conflict very often arises from the fact that many people do not like engaging in conflict because of its negative consequences. The natural reaction is to avoid or end conflicts as soon as possible. The negative associations that exist towards conflict influence, without a doubt, how we face and respond to it (Jehn, Northcraft and Neale,1999). If conflict becomes intense, social players will stray from a convenient and sensible relationship and focus their efforts towards victory. Once the immediate objective of each of the parties is to win or have control over the situation, the interest in solving the problem(s) becomes less and less important. Therefore, the players are less predisposed to contribute to effective organizational goals (Rahim, 2002). According to Bergmann and Volkema (1994), interpersonal conflict between co-workers has the potential to divide a team and proliferate throughout the company. However, avoiding or suppressing conflict is often a mistake, and does not always meet the real interests of those involved. In that regard, Tjosvold (1997) argues that interpersonal conflict may develop each person's individuality, so as to feel satisfied and able, given that it provides an opportunity to express one's needs, opinions and stances. At the same time, there is an attempt to understand the other party's positions, which contributes to diminishing an egocentric attitude.

Given the aforementioned assumption – that conflicts are a consequence of one's own social interaction – the idea that the goal should consist in displaying adequate skills and tools to face them with a positive demeanor, should be reinforced. Beitler, Scherer and Zapf (2018); Deutsh (1994); Munduate et al (1993), Pruitt et al (1994) and Serrano & Rodriguez (1993) argue that the effects of conflict are positive when we know how to handle them properly, in a way that establishes relationships that are increasingly cooperative. This once again seems to reinforce the vision of Rahim (2000) regarding increased organizational learning, so as to boost people's efficiency in handling conflicts in a sustained manner.

Interpersonal Conflict Handling

According to Van de Vliert (1985), conflict handling is what those involved intend to do, as well as what they really do. It encompasses changes in attitude, behavior and in the organizational structure that allow members of the same organization to work with each other effectively, achieving their individual and/or group goals (Scherer and Zapf, 2018; Rahim, 1992; 2001; Yoko, Hartel and Callon, 2002). Despite the growing awareness that conflict in organizations can be functional, many of the recommendations continue to fall on the spectrum of mitigation, resolution or minimization, which is to say they promote conflict resolution and not conflict management. The difference between the two concepts is not just semantics (Robbins, 1978). What contemporary organizations need is conflict management and not conflict resolution. Conflict management does not necessarily imply avoiding, decreasing or ending conflicts altogether, it involves effectively outlining strategies to minimize dysfunctions and fostering constructive roles so as to increase organizational learning and efficiency (Rahim, 2001 and 2002; Kessler et al, 2013).

Organizational learning is of the essence, and many contemporary academics state that it is not a matter of wanting or not wanting to learn, but rather that organizations need to learn as soon as possible. The presence of tension and conflict seem to be essential characteristics of learning organizations, in which tension and conflict are underlined by questioning, unbalancing and challenging the *status quo* (Garvin, 1993, Schein, 1993, Senge, 1990). Argyris (1994) suggests that existing theories reveal processes of anti-learning, which can be better described as *quasi*-conflict resolution models. Several scholars mention the need to handle conflicts in a constructive way, to realize the collective learning potential. Thus, corroborating Rahim (2001 and 2002), the need to strengthen and consolidate conflict handling at the highest organizational levels is implied to encourage organizational learning and efficiency. Amason (1996), Jehn, Northcraft and Neale (1999), among others, suggest that conflict handling involves the acknowledgement of the following principles in regard to the performance of individuals and groups: certain specific types of conflicts may cause negative effects and should be diluted, these conflicts are generally caused by the actions and negative reactions of members of the organization, for example personal attacks, racial disharmony and sexual harassment; yet there are other types of conflicts that may have positive aspects, and such is the case of disagreements that spurred from tasks, action plans and other organizational issues. The members of the organization, in their

interactions with one another, will have to deal with their disagreements in a constructive manner, which leads to serious learning about how to use conflict handling styles to face different situations in an effective way.

According to Tjosvold (1997), well-managed conflicts are an investment for the future. People believe in one another, feel more powerful, effective and more prepared to contribute to their groups and organizations. In fact, in an organizational environment, individuals that handle conflicts effectively are seen as competent speakers and as having leadership skills (Gross & Guerrero, 2000; Luthans, Rosenkrantz and Hennessey, 1985). In line with Blake & Mouton (1978) and Thomas (1976), Rahim and Bonoma (1979) and Rahim (1983a) differentiate interpersonal conflict handling styles through two basic dimensions: personal interest, which explains the degree (high or low) to which a given subject seeks to satisfy their own interest, and the other's interests. These dimensions are subject to different combinations, resulting in five specific styles, designated as follows (Rahim 1983a, 1986, 2000, 2001 and 2002; Rahim and Bonoma, 1979):

- Integrating, which is characterized by a high interest both in one's own results and the other party. This style implies collaboration between both parties, exchange of information and an active search for an acceptable solution that works for both. Therefore, a direct communication between the parties is established, boosting the occurrence of creative solutions for both;
- Obliging, which is characterized by low investment in oneself, but high investment in the other party. This style implies the satisfaction of the other party's interests over one's own interests. When one of the parties adopts this style, they opt not to consider their differences towards the other and weigh in shared aspects seeking to satisfy the other party's interests;
- Dominating, which is characterized by high investment in oneself and low investment in the other party. In this style, one tries to achieve their own goals without caring for the other's interests;
- Avoiding, characterized by low investment in one's own results and in the other party's;
- Compromising, this style positions itself in the middle of the aforementioned four styles, characterized by an intermediate interest for oneself and other parties.

Empirical Study

The overall objective of this research is to describe the conduct of individuals in situations of interpersonal conflict in an organizational context among co-workers, and check how conflict handling styles are determined by the variables sex and level of education. The specific goals that we set are the following: identify profiles of interpersonal conflict handling between peers in each of the subjects; assess to what extent interpersonal conflict handling styles is determined by certain demographic characteristics.

Using the theoretical studies as a reference, we propose the following hypothesis:

H1 - The integrating and compromising styles are the most used in interpersonal conflict situations between peers – co-workers. On the contrary, avoiding, obliging and dominating styles are less frequently used.

H2 - In interpersonal conflict situations between peers – co-workers, the dominating style is more predominant in male subjects than in women.

H3 - In interpersonal conflict situations between peers – co-workers, the avoiding and obliging styles are more predominant in females than in mens.

H4 - In interpersonal conflict situations between peers – co-workers, subjects with a higher level of education integrate more and use avoiding less than those with a lower level of education.

Sample and Methodology

In this study, independent demographic variables and one dependent variable were considered - interpersonal conflict handling styles between peers in an organizational context.

Independent variables: Sex - the sample includes male and female subjects. Level of education - this variable is composed of three levels, Basic Education (up to 9th grade), Secondary Education (up to 12th grade/ K-12) and Higher Education (University degree). Years of professional experience - divided into five groups - up to 5 years; 6 to 15 years; 16 to 25 years; 26 to 35 years and over 36 years of professional experience.

Dependent variable: conflict handling styles. In this category we include the five interpersonal conflict handling styles between peers - co-workers in an organizational context: integrating, compromising, obliging, dominating and avoiding, using the approach suggested by Rahim and Bonoma (1979) and Rahim (1983a).

Measurement tool: To assess interpersonal conflict handling styles, we used the "ROCI-II, Rahim Organizational Conflict Inventory". (Rahim,1983b). This inventory has its theoretical basis in the two-dimensional approach of five factors by Rahim & Bonoma (1979) and Rahim (1983a). Thus, conflict management is considered on the basis of a two-dimensional model. On the one hand, there is the importance attributed to one's own interests and, on the other hand, the importance attached to the interests of the other party. This defines the five conflict handling styles: integrating, obliging, dominating, avoiding and compromise (Rahim, 1983a, 1983b). The tool consists of 28 questions and comprises A, B, C forms, through which we intended to measure how individuals handle interpersonal conflict situations with their superiors (A), their subordinates (B) and their peers (C). In this study we apply the C form referring to peer conflict - co-workers, comprised of 28 questions which are answered through a Likert scale with five potential replies, in which 1 corresponds to Strongly Disagree and 5 to Strongly Agree, and in which higher values represent greater use of a style and vice-versa. (Rahim, 1983c, 2001). ROCI-II also requests information regarding sex, level of education and profession.

With the translation and adaptation of the questionnaire's C form in mind, we used the original version of the questionnaire by Rahim (1983b) after being translated to portuguese. So as to test the interpretation and comprehension of each question, the questionnaire was trialed on 20 workers from the public organization where the sample for this study was collected later on. After revising it and consulting the original questionnaire also translated to Portuguese in the study by Cunha, Moreira & Silva (2003) with a national sample of 197, and it was submitted to a new trial with 41 workers. With data analysis and its respective conclusions in mind, several quantitative analysis were made using the SPSS - Statistical Package for the Social Sciences, version 16.0.

The study used a sample of 181 subjects, workers from several hierarchical levels and departments from a Portuguese public organization. There were 113 female subjects, which represent 62% of the total and 68 male subjects, who represent 38%. About half (49%) of the subjects have a university degree, followed by secondary education (36%9) and finally by subjects with only basic education, who represent 15%.

Analysis and Interpretation of The Results

Regarding the C form questionnaires of the "ROCI-II" inventory, we calculated an average value for each questionnaire and for each one of the five conflict handling styles, whose minimum value could be 1 and the maximum could be 5, which means 3 is the average value. From table 1, we ascertain that the predominant style is integrating, followed by compromise. Avoiding appears in the third position, followed by obliging, which is displayed in above-average values. The least adopted style is domination. The response scattering is more accentuated in the dominating style, followed by avoiding and obliging. There is less scattering in the integrating and compromising styles.

Table 1: Statistical data observed in the responses related to the five styles of conflict management

	Integrating Mean	**Avoiding** Mean	**Dominating** Mean	**Obligation** Mean	**Compromising** Mean
Valid N	181	181	181	181	181
Omississions N	0	0	0	0	0
Mean	4.1981	3.4954	2.7580	3.1096	3.9006
Median	4.1429	3.5000	2.6000	3.1667	4.0000
Standard deviation	.38817	.62987	.69857	.59014	.42547
Asymmetry	.064	-.332	.265	-.261	-1.056
Standard error of asymmetry	.181	.181	.181	.181	.181
Minimum	3.00	1.67	1.40	1.67	2.25
Maximum	5.00	4.83	4.60	4.50	4.75
25%Percentile	4.0000	3.0000	2.2000	2.6667	3.7500
50%Percentile	4.1429	3.5000	2.6000	3.1667	4.0000
75% Percentile	4.4286	4.0000	3.2000	3.6667	4.2500

Source: Own elaboration based on SPSS output

Therefore, taking into consideration the results, we confirm our hypothesis #1, which mentioned a greater predominance of the integrating and compromising styles and that obliging, avoiding and dominating are less frequent. So as to verify the significance level of the differences between the values surveyed for both sexes, we used the *t-test*, preceded by the hypothesis test to the equality of variances. Table 2, presents .019 test values for integrating and .002 for avoiding, therefore less than 5%. Dominating registers .195, obliging .579 and compromising .277, with significance values above 5%. Therefore, dominating, obliging and compromising have the same variance, but integrating and avoiding do not.

Table 2: Significance of gender differences in conflict management style, preceded by hypothesis testing to the equality of variances

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2-tailed)
I1_Integration Mean	**Equal variances assumed**	5.556	**.019**	1.663	179	.098
	Equal variances not assumed			1.731	159.087	**.085**
I2_Avoiding Mean	**Equal variances assumed**	9.707	**.002**	-.036	179	.972
	Equal variances not assumed			-.033	112.865	**.974**
I3_Dominating Mean	**Equal variances assumed**	1.695	**.195**	.251	179	**.802**
	Equal variances not assumed			.259	155.312	.796
I4_Obligation Mean	**Equal variances assumed**	.308	**.579**	1.246	179	**.214**
	Equal variances not assumed			1.234	136.802	.219
I5_Compromising Mean	**Equal variances assumed**	1.189	**.277**	1.626	179	**.106**
	Equal variances not assumed			1.732	168.012	.085

Source: Own elaboration based on SPSS output

Taking into consideration these values for the *t-test,* we verify that test values are always above 5%, so they never allow us to reject the null hypothesis, which would be having the same variables for both sexes in integrating, avoiding, dominating, obliging and compromising or, in other words, that there are no differences between both sexes in what concerns conflict handling styles. This leads us to conclude that the subjects of this study, whether they are men or women, share a very similar position regarding conflict handling. Thus, we deny our hypothesis #2, which mentioned a greater prevalence of dominance in males, as well as hypothesis #3, that pointed towards a greater predominance of avoiding and obliging amongst the female sex. The analysis of variance - ANOVA (Table 3), allows us to see that for avoiding (.001), dominating (0.013) and obliging (.003), the hypothesis that the averages are the same across different levels of education is denied.

Table 3: ANOVA - Hypothesis testing for equality of Variances for educational qualifications

		Sum of Squares	df	Mean Square	F	Sig.
I1_Integration Mean	Between Groups	.820	2	.410	2.773	.065
	Within Groups	26.301	178	.148		
	Total	27.121	180			
I2_Avoiding Mean	Between Groups	5.809	2	2.905	7.881	**.001**
	Within Groups	65.604	178	.369		
	Total	71.413	180			
I3_Dominating Mean	Between Groups	4.164	2	2.082	4.429	**.013**
	Within Groups	83.677	178	.470		
	Total	87.841	180			
I4_Obligating Mean	Between Groups	4.071	2	2.035	6.180	**.003**
	Within Groups	58.617	178	.329		
	Total	62.688	180			
I5_Compromising Mean	Between Groups	.335	2	.168	.926	.398
	Within Groups	32.250	178	.181		
	Total	32.585	180			

Source: Own elaboration based on SPSS output

Hypothesis #4 is partially confirmed, when we point towards subjects with higher levels of education as less avoidant. Not confirming that the subjects with higher educational qualifications would be more integrators. There are no significant differences, which support this hypothesis.

Conclusions and Guidelines for Management

Through this study we conclude that men and women share very similar positions towards conflict handling, concurring with the results of studies conducted by Cunha, Moreira & Silva (2003), Munduate, Ganaza, and Alcaide (1993), Shockley-Zalabak, (1981) Sorenson, Hawkins and Sorenson (1995). The relation between gender differences and interpersonal conflict handling styles has been the subject of several studies, and the authors that encountered significant differences do not present unanimous tendencies. For example, Rahim (1986), obtained results that suggest that women use avoiding, integration and compromise more and obliging less than men; whilst studies by Brewer, Mitchell and Weber (2002) suggest that women use avoiding more and men use dominance more; studies by Baxter and Shepard (1978) and Hill, Henry and Green (1997) found evidence that suggests women prefer non-confrontational styles, while men prefer competition and controlling styles.

The registered predominance of the integrating and compromising styles and the lower frequency of avoiding, obliging and dominating styles in conflict situations between peers seems to concur with studies by Munduate Ganaza and Alcaide (1993), Lee (2002) and Rahim (1986), amongst others. As Lewicki, Weiss and Lewin (1992) mention, responses to conflict are a result of the subject's direct learning and relearning through behaviors and previous experiences, clearly influenced by individual perception and comprehension of the organizational context. This may lead those who are less experienced to adopt conflict handling styles in a less premeditated manner, according to the circumstances and the way they perceive them, probably due to greater irreverence, competitiveness and, mostly, less knowledge about all the implications it may have in an organizational context.

More than a succession of categorical conclusions, this article aims to draw attention to the social relevance of this issue. Being an exploratory research as well, it will restrict the extrapolation of the results to different organization realities. It seems pertinent, however, to make some management recommendations that could be extended to other organizational contexts. The first recommendation of this study refers to the acceptance, by organizations, that

conflicts are a consequence of social interaction itself, and that, beyond legitimate, they are inevitable, and therefore must be handled and not resolved (or mitigated). As Robbins (1978) refers, the difference between the two concepts is much greater than semantics. The challenge will be incorporating and promoting human resources management procedures and guidelines that reflect that reality. Creating tools and skills that allow handling interpersonal conflict properly, which according to Rahim (2001) should be achieved through the increase of organizational learning, so as to increase people's efficiency in conflict handling in a sustained fashion. Organizational learning is of the essence, and many contemporary academics state that for organizations it is no longer a matter of wanting to learn, but rather learning as fast as possible - given the importance that conflict has in an organization's life and the complexity associated with its handling, it is essential that workers across all hierarchical levels understand the contexts in which organizational conflicts occur, and know a variety of techniques to handle them. Corroborating Garvin (1993) and Rahim (2002), organizational learning, in what concerns conflict management, requires company cultures that support experimentation, risk-taking, openness to new points of view and a continuous attitude that questions and inspires, sharing information and knowledge.

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Moving Average in A Binary Representation

Michał Dominik STASIAK

Department of Investment and Real Estate, Poznan University of Economics and Business, Poznań, Poland
michal.stasiak@ue.poznan.pl

Abstract

One of the basic methods of technical analysis that are commonly used in investor practice is the analysis of moving averages. Moving averages are appointed based on the candlestick representation of the price, which has the drawback of possible decrease in the informative value carried by the exchange rate trajectory data. Better results of course modeling can be obtained by using the binary-temporal representation. The article presents a new algorithm for calculating the weighted moving average for the quotations in a binary-temporal representation. The algorithm assigns each change of course trajectory in the binary-temporal representation a weighted average to form an extended binary-temporal re-representation, which in turn can be the basis to construct a state prediction model.

Keywords: Technical Analysis, Investment Decision Support, Moving Average, Binary-Temporal Representation.

Introduction

This section should follow keywords. Technical analysis and exchange rate modeling methods are created in order to support investors in decision making (e.g. indicators) or to fully automate the process of investing (algorithmic systems, HFT) (Aldridge 2013; Alonso-Monsalve et al. 2020; Nuti et al. 2011). The main goal of the following article is to propose an algorithm to implement one of the most popular methods of technical analysis – the average analysis – for a binary-temporal representation.

In majority of exchange rate modeling papers, the course trajectory is given in the so called candlestick representation (Burgess 2010; Lim 2015; Murphy 1999). Using this representation can lead to significant losses in the informative value of exchange rate trajectory data. Moreover, because of the different quotation frequency, the loss is variable in time and impossible to assess. Application of historical data formatted into the candlestick representation can, in consequence, lead to falsified results of the course modeling. A more precise and easier to interpret is the binary-temporal representation (Stasiak 2018).

In the paper we propose a new algorithm to determine the weighted moving average dedicated to the binary-temporal representation. The algorithm assigns every binary change an average calculated from previous n changes. The average construction encompasses both the information about the size of changes and their duration.

The article is organized in the following order. After a short introduction (section 1), the second section describes the binary-temporal representation, its advantages and properties. The third section recalls the methods for calculating averages in technical analysis. In the following section a new algorithm is proposed, intended to appoint weighted moving averages in the binary temporal representation. Also, a concept of extended binary-temporal representation is given, in which the representation includes information about averages and can be applied to construct prediction state models. The last section summarizes the research.

Binary-Temporal Representation

Courses of most of financial instruments change with a high frequency. Often few changes occur during even one second. Many of these changes oscillate around specific values, with small amplitude of 1-3 pips. Such changes have a

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character of random fluctuations (noise) and do not carry any informative value which could be used to model exchange rate trajectory (Neely & Weller 2011; Lo et al. 2000;). Therefore, applying so-called tick data to exchange rate analysis, that is data about each, even the smallest, change of the course, is ineffective because of both the size of data and the possible hindrances in the proper process of course analysis. For this reason, it is necessary to use proper formatting of historical data, which is equivalent to applying an appropriate data representation.

In the majority of scientific research, as well as in the investment practice, candlestick representation (Aldridge 2013; Gallo 2014; Nuti et al. 2011) is used in order to analyze the market. This kind of data presentation is offered by all broker platforms (e.g. Metatrader 4/5, JForex, etc.). In the candlestick representation the course changes in a given timeframe are described by four parameters: opening and closing prices, and highest and lowest registered prices.

The characteristics of the exchange rate given in a candlestick representation depend on the assumed time interval, but do not depend on the dynamics of the course changes. The amplitude of changes of night candles can be few or even few dozen times smaller than the one registered during presentation of important macroeconomic data (e.g. changes in interest rates) or during important geopolitical events (e.g. publication of elections outcomes). Because of these reasons, using candlestick representation can lead to a loss of important information about the frequency and direction of smaller changes, i.e. changes 'inside' the candle. This, in consequence, reduces the effectivity and precision of technical analysis. Mentioned drawbacks are especially significant in the construction of HFT systems, since decision making algorithms often wrongly determinate the outcome of a given transaction (i.e. they determine wrongly if the transaction would end with a profit of a loss) (Stasiak 2020).

As an answer to the problem of serious disadvantages of the candlestick representation and the need to filtrate the noise, in (Stasiak 2018) a binary-temporal representation was introduced. This kind of representation is free of mentioned faults and was inspired by the point-symbolic visual method (DeVilliers 1933) that was used prior to the candlestick one but was supplanted by it despite being more accurate.

The construction of the binary-temporal representation consist in assigning two parameters to each course change of a given value δ (the so-called discretization unit). First one, ε_i describes the direction of *i*-th change. If the exchange rate drops by one discretization unit, the algorithm assigns the value 0. If the course increases by one discretization unit, the change is assigned a '1'. The second parameter is denoted Δt_i and represents the duration of a given change, expressed in seconds. Hence, each *i*-th course change in the binary-temporal representation is assigned a pair $(\varepsilon_i, \Delta t_i)$. Therefore, the exchange rate trajectory from an arbitrary historical time period can be represented as a ordered sequence of pairs $\{(\varepsilon_i, \Delta t_i)\}_{i=1}^{N}$, where N denotes the number of observed changes.

Let us now take a look on the comparison between the two representations. Using the binary-temporal representation eliminates the periods of non-activity from the exchange rate analysis, such as nights. In the same time, it retains key information such as the direction and size of the course change and its duration. In the Figure 1 we can see different exchange rate trajectories represented by the same candle in the candlestick representation.

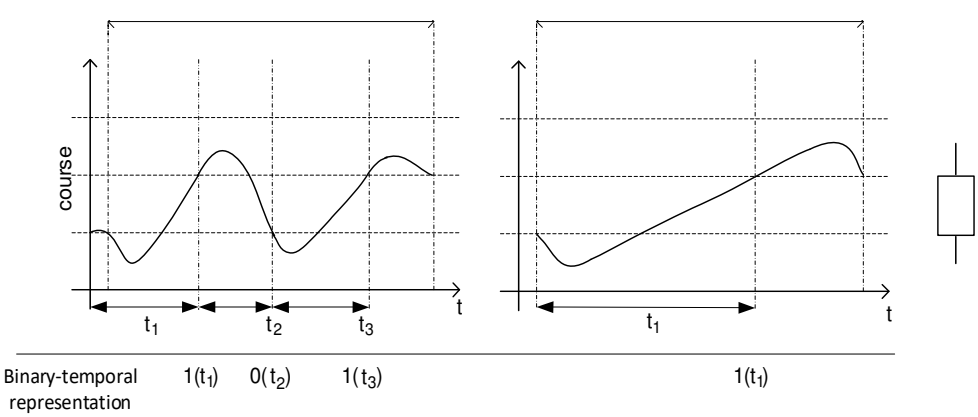

Fig. 1: Two different exchange rate trajectories 'inside' the same candle

As visible in the example above, the binary-temporal representation carries precise information about the size of change and its duration. The form and properties of the course in this representation depend only on one parameter – the assumed discretization unit. Too small value of this parameter leads to registering small fluctuations, majority of which can be considered as noise. On the other hand, a too big discretization unit results in a loss of the informative value of the data, losing information about the exchange rate trajectory. The algorithm in such case does not register significant changes, which is visible in the small number of registered changes in the researched time period. As a consequence, this may lead to less credible results of statistical analysis.

While analyzing the exchange rate there arises the question if the course changes are random as stated in the assumptions of e.g. theory of efficient market or random walks (Peters 1991). The assumption about the randomness of changes negates the possibility of predicting the direction of future changes based on the history of previous variations. In consequence, it denies the effectiveness of applying technical analysis methods in course modeling (Yao & Tan 2000).

In order to verify the assumption about the random character of course changes we can use means of statistical testing, e.g. by using three tests recommended by National Institute of Standards and Technology (NIST) to test random number generators in cryptographic modules (Bassham et al. 2010). The tests are: monobit test, series test and longest series in a block test (Bassham et al. 2010; Menezes, Van Oorschot, Vanstone 2018). These tests allow to verify the hypothesis of randomness of course changes on a given significance level (usually 0.01).

In the situation of assuming a too small discretization unit, the test results for noisy data show random character of the course changes. Similarly, when assuming a too big discretization unit, in the data that has lost its informative value the tests indicate a random character of changes. Hence, the assumed discretization unit should be possibly small, so that it would convey the character of fluctuation in the most precise way. In the same time, it should be big enough to eliminate changes considered as noise. In order to indicate an accurate range of discretization units for which the exchange rate in a binary-temporal representation does not have a random character, all representations were tested, starting from a 1-pip one. Next, the discretization unit was increased until the obtained representation was random. This way we obtained an interval of discretization units for which the course can be subjected to prediction analysis.

A detailed description of the tests and the process of determining the appropriate range of discretization units can be found in (Piasecki and Stasiak 2020). For selected discretization units, it is justified to use technical analysis methods aimed at predicting the direction of future exchange rate changes.

Moving average in a Candlestick Representation

In the applications of today's technical analysis, the averages are one of the basic tools in modeling exchange rate trajectories for financial instruments. Analysts make investing decisions using the ratio of the current rate to the average or averages from different observation periods. As the rate is traditionally presented in the candlestick form, the average is also derived from the candlestick representation. In practice, the most commonly used is the so-called moving average, determined based on closing prices from a given number *n* of periods (candles), preceding the current quotations. The oldest and simplest type of average is the so-called simple moving average (SMA), which is defined as an arithmetic mean of the closing prices of the *n* previous candles. Therefore, for the *i*-th candle, we can calculate a simple moving average using the following formula:

$$\mathrm{SMA}_i(n) = \frac{\sum_{j=0}^{n} P_{i-j}}{n} \qquad (1)$$

where P_i is the closing price of the *i*-th candlestick. Simple moving average is rarely applied, since it does not take into account the order of changes and, in consequence, the newest change has the same influence on the average as the oldest one. Starting from the assumption that the newest changes have the highest prognostic value, a weighted moving average was defined, in which each change is assigned a weight: the newest change has the biggest weight and the oldest one has the smallest. The most popular weighted moving average (WMA) uses weights decreasing in an arithmetic progress.

Hence, for the *i*-th candle, the weighted moving average can be determined by:

$$\mathrm{WMA_i}(n) = \frac{\sum_{j=0}^{n}(n-j)P_{i-j}}{\sum_{j=0}^{n}(n-j)}, \tag{2}$$

There are many other means of defining the weighted moving average, in which the weights are calculated by different methods, e.g. according to the exponential distribution (EMA), etc. The averages are used e.g. in analyzing and prediction of exchange rate trajectory changes in many techniques of today's technical analysis.

Defining the moving average in a binary-temporal representation

Let us consider application of averages in exchange rate analysis in a binary-temporal representation. A base for determining the average is information about the direction and size of the change and the time of its occurrence. As contrary to the candlestick representation, in the binary temporal representation the basic parameter is not the time but the change size. Therefore, in case of using the binary-temporal representation it is crucial to define a proper methodology of calculating the averages.

In papers pertaining the binary representation, usually the value '1' is assigned to an increase and '0' to a decrease in the exchange rate (Stasiak 2018). If after an increase we encounter a drop, then it would nullify the previous change. In order to map this property in the modeling of averages in the binary-temporal representation, a modified notation was adopted and the parameter representing the change direction *E* was assigned the value '1' for the increase and the value '-1' for the decrease:

$$E_i = \begin{cases} \text{If } \varepsilon_i = 1 \text{ then } \quad E_i = 1 \\ \text{If } \varepsilon_i = 0 \text{ then } E_i = -1 \end{cases}, \tag{3}$$

In the binary-temporal representation it is rather hard to indicate the value of a simple moving average (SMA). Defining the average only for the size of changes for *n* periods ($\frac{\sum_{j=0}^{n} E_{i-j}}{n}$) does not carry the information about the time of given change occurring. Assuming that the time is an important parameter of a prognostic value, defining the average without including the time parameter can lead to a not sufficient effectiveness of the prognostic models.

Let us now consider the concept of a weighted moving average, in which the closing price from each period is multiplied by a corresponding weight and then divided by the sum of all weights. We can assume the change value (*E*) to be the measure of the closing price, and the number of researched periods can be measured by the number *n* of analyzed changes in the binary-temporal representation.

Analogous to the case of WMA, time can be the base to determinate weights. In the standard method of appointing WMA parameter (formula (2)), the period of time (so time base of each candle) is constant, and so the weights are assigned according to the order of changes. In case of binary-temporal representation, it is important to include both the change order and the time of their occurrence. By considering *n* previous binary changes for *i*-th change we can determine the time in which the changes are currently analyzed T_i^n:

$$T_i^n = \sum_{j=0}^{n} t_{i-j} \tag{4}$$

We assume that the closest changes have the highest influence on the average, which means that the weights are inversely proportional to the distance, i.e. the shorter the time elapsed since the recorded change, the greater the weight assigned to the change. If for each *i*-th change the time will be registered in the moment where the change ended, then the last change can be assigned the highest value, that is '1'. The second to last change ended in the moment of the last change occurrence, i.e. exactly t_i seconds earlier. Therefore, for a given *j*-th change, when appointing an average for the *i*-th change, the weight can be determined by the following formula:

$$w_i^j = \begin{cases} w_i^j = 1 \; if \; j = 0 \\ w_i^j = 1 - \frac{\sum_{k=0}^{j-1} t_{i-k}}{T_i^n} \; if \; j \neq 0 \end{cases} \quad (5)$$

The weight calculated from (5) describes the ratio of the time that passed from the end of change to the present, to the duration of analyzed changes.

By applying the abovementioned method of weights calculation, we can propose a way to determine the average for the current change given in a binary-temporal representation:

$$BWMA_i(n) = \frac{\sum_{j=0}^{n} w_i^j E_{i-j}}{\sum_{j=0}^{n} w_i^j} \quad (6)$$

One can notice that in the formula (6) the average depends only on the assumed parameter *n*, i.e. the number of analyzed binary changes.

Let us now consider the construction of a binary-temporal representation extended by information about the average. The main idea of this representation is to add information about current average for each ensuing change. The construction of this method consists in assigning the direction of the change ε_i and two additional parameters to each i-th change in the binary representation: the duration of change t_i and the average value assigned to this change ($BWMA_i$ (n)), which is given by the formula (6)

Tab. 1: Binary-temporal representation extended by information about the average

i	…	512	513	514	515
ε_i	…	1	0	1	1
t_i	…	30	20	10	40
$BWMA_i(4)$	…	0.43	0.40	0.52	0.58

The form of the proposed representation is presented in the Table 1. It is dependent on the assumed discretization unit δ and on the number of analyzed changes *n*, based on which the $BWMA_i(n)$ average was determined – in the example presented in Table 1 the n equals 4. The extended (by the average) binary-temporal representation can stand as a basis to construct prognostic state models (Stasiak 2018), where the information about the average will be used to determine the probability distribution of the direction of future changes of the course.

Summary

In the paper we proposed a new concept of modeling exchange rate trajectory in the binary-temporal representation, with use of one of the most basic techniques of technical analysis, i.e. the moving average. We introduced a method that allows to determine the present value of the moving average for each change in the binary-temporal representation. Moreover, we suggested an extension to the binary-temporal representation, which includes information about the average. The representation can be used to realize adequate state models, that are crucial in constructing prediction systems for the future changes in course trajectory.

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Challenges and Barriers of Science and Technology Commercialisation at Public Universities: Introducing a Relation-Based Analytical Framework

Katarzyna ŁOBACZ

University of Szczecin, Szczecin, Poland
katarzyna.lobacz@usz.edu.pl

Paweł GŁODEK

University of Lodz, Lodz, Poland
pawel.glodek@uni.lodz.pl

Abstract

The paper presents a model that provides the framework for the analysis of the legal, organizational, and social context of science and technology commercialization at public universities. The model covers three levels of analysis: (1) systemic level, encompassing existing legal system as well as systems and environment for commercialization (2) organizational level, including universities, their authorities and institutions as well as departments directly responsible for the commercialization of science and technologies, and (3) social level, i.e. academic community, to include scientific workers, administration, students. All those create a square-shaped framework in which relationships between subsequent factors are analyzed, as a result of which the generic weaknesses of commercialization systems at public universities may be easily identified. Thus it is argued that the proposed analytical framework can be successfully used for the needs of identification of challenges and barriers for science and technology commercialization either at a single university, or concerning a group of universities in a specific socio-economic environment (e.g. region, or country). It can be also useful when comparisons between systems determining effective commercialization at subsequent universities or groups of universities with specific features, are in question.

Keywords: Commercialization, Universities, Barriers, Challenges, Model, Science Commercialization, Technology Commercialization, Knowledge Commercialization, Public Universities.

Introduction

Accumulation and the use of knowledge are becoming increasingly important in the development of the modern economy. According to the concept of the knowledge-based economy, knowledge is a key production factor that determines sustainable economic growth (Jasiński et al., 2019). For this reason, many scientific efforts as well as political aspirations are directed at the development of knowledge and an increase in the level of its commercial use. Universities play a vital role in this development process. First of all, they are an essential source of new knowledge (Raivio, 2008). Secondly, their involvement in the commercialization of science-based knowledge contributes to its transformation into marketable innovative products (Etzkowitz, 2003; Łobacz, 2018).

The commercialization of science and technologies is challenging for universities (Bianchi et al. 2013). They face numerous factors that influence their ability to operate effectively in this area (Migliorini et al. 2010). The literature focus on several of them (Etzkowitz, 2016). They are related to university structures, resources, and procedures, but also external regulations and cultural context. However, there is a need for an approach to provide a complex understanding of the phenomena and its' interacting components.

Thus, this paper aims to develop, present, and discuss the model that provides the framework for the analysis of the legal, organizational, and social context of science and technology commercialization at public universities. The model has been conceptualized based on literature review and expertise works and tested in practice.

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Science and Technology Commercialization at Universities: Identifying The Issues of Concern

Commercialization of technology is related to all activities related to the transformation of knowledge (including scientific knowledge) into new products, technologies, and organizational solutions that have practical application and generate commercial value (Jolly 1997). This process relates to the technological innovation process, which by definition, refers to introducing a new idea, be it a technological solution, product, service, policy, or an organizational form, to the market (Mattila, Lehtimaki, 2016).

Universities are involved in the process of new knowledge creation as well as its commercialization. However high complexity of the knowledge commercialization process in the conditions of universities is emphasized (Zechner et al., 2011) and their competency in the commercialization of technology is of great concern. Thus the question, that may be raised here is, how the existing university commercialization systems may be analyzed and compared.

Literature focuses, among others on human resources (Migliorini et al., 2010; Criaco et al., 2014; Alibekova, 2019), university technology commercialization support structures (Bianchi et al., 2013; Fernandez-Alles et al., 2015; Kolymprisis, Klein, 2017), financial issues (Halt et al., 2017), university technology commercialization models (Etzkowitz, 2016; Głodek, Stawasz, 2017) or specificity of university knowledge (Karnani, 2013; Głodek, 2018). Organizational structures and procedures are directly affected by two forces defining how, in reality, the processes are applied, how decisions are made and executed, and, as result, how strong is science and commercialization system at public university.

The existing legal and social context should be mentioned. While the legal system defines the top-down framework of restrictions, obligations, and rights in regards to the organization of commercialization systems at universities, the academic community behaviors push organizational behaviors from the bottom-up perspective. In addition, the environment, in which the university operates, i.e. its location and relationships with the external environment strongly defines the opportunities for science and technology commercialization, and thus the results achieved.

Therefore, when the challenges and barriers of science and technology commercialization at universities are regarded, three problem levels should be taken into consideration: (1) the organizational level, which relates to internal university procedures and formal organization, (2) the systemic level – including in particular external environment, i.e. legal regulations and external stakeholders relationships, and (3) the social level, referring to typical behaviors, emotions, and peer-to-peer relations. All of these will be discussed below.

The Organizational Level

First of all, processes of knowledge commercialization require an efficient and flexible *decision-making system*. Thus, decentralization and bureaucratic nature of decisions related to technology commercialization and transfer (Shen, 2017); decentralization of decisions related to the financing of individual activities; lack of flexibility in researchers' employment and transfers, are perceived as barriers in science and technology commercialization systems (Tidd et al., 2005). The centralization of key decisions in the process of commercialization is justified by their importance and disposition of university assets (IP). But, the decentralization of financial decisions relating to the various stages of the commercialization process limits the speed of the decision-making process. A factor that indirectly hinders the process of commercialization is also the problem of the limited mobility of researchers (Whittle et al. 2018). This limits the process of acquiring new experience and knowledge exchange, which significantly affects the ability to generate new ideas with commercial potential.

The *attitudes of university authorities towards the commercialization* of knowledge and their active involvement in related actions are key factors affecting their effectiveness (Clark, 2008). There are many obstacles related to it, such as insufficient experience related to the science and technology commercialization; a lack of awareness of the need for undertaking activities related to commercialization; a lack of willingness to employ more risky management strategies; a lack of awareness of the complexity of the process or underestimation of existing problems. As a result, the science and technology commercialization-related activities may be marginalized or delegated to university bodies that do not have sufficient resources to perform it effectively, including financial resources, people, or knowledge.

The scope of employees' responsibilities and the motivation system. Due to the extremely great significance of the human factor at universities, resulting from the high independence of activities undertaken by researchers and a self-regulatory knowledge management system, *the scope of employees' responsibilities and the motivation system* affects

to a large extent their involvement in knowledge commercialization. The existing motivation system, reflected in internal evaluations, intensifies employees' activities which are most desirable for university authorities. A factor hampering the knowledge commercialization in this regard is a significant slowdown in the scientific career resulting from more intensive business work. If the system does not support the existence of cases of such a slowdown, it happens often that scientists cease to be academic entrepreneurs (Belkhodja, Landry, 2007).

Other factors limiting the efficiency of knowledge commercialization at universities are related to the *human resources policy*. Here two barriers are usually identified. The first one is the system of recruitment and dismissal which prefers scientific and teaching expertise and rejects entrepreneurial mindsets and business competences. The second one is an employment strategy recultant to employ in full-time research positions (favoring instead of employment in teaching positions).

Also, barriers resulting from the s*ettlement system between the university and its employees* are observed (Sá et al., 2011). Those include the demotivating role of the university surcharge system; and problems with defining clear rules for sharing profits derived from commercialization. University surcharge systems that constitute a significant burden for projects implemented for the business environment, should stimulate activities related to the commercialization of knowledge (Edler et al., 2011). A similar problem results from a lack of clear rules for sharing profits from commercialization.

Another problem is bureaucracy at universities and *administrative support and procedures*. Complex and time-consuming procedures towards IP protection, signing contracts with business organizations, etc. are additional barriers that inhibit significantly science and technology commercialization activities.

In addition, to facilitate science and technology processes, universities are entitled and very often encouraged to initiate and develop specialized bodies or departments directly responsible for the commercialization of knowledge. Those include Technology Transfer Centers (TTOs), Business Incubators (BI), and/or Science and Technology Parks (STP), created as internal structures or separate organizations (Bianchi et. al, 2013; Fernandez-Alles et. al, 2015). It is however argued that, regardless of formal conditions, these bodies need to be given good conditions to act effectively (Kolymprisis, Klein, 2017).

The first one is *the human resources capacities.* It was widely demonstrated that the possibility of active involvement of university technology transfer centers in the process of knowledge commercialization is essentially limited by the insufficient personnel potential. The problem is related to two factors in particular: relatively low employment (Matusiak and Guliński, 2010); and competence deficiencies of the employed staff. Both factors are to a large extent a consequence of financial constraints (including a lack of long-term *financial stability*). The lack of stable and adequate financial resources makes it necessary to concentrate the activities more on obtaining financing for their operations, than on operations themselves. The lack of financial stability additionally limits the possibilities of employing external specialists, both permanently and as experts and advisers, e.g.: in the field of assessing the commercial value of projects, creating business plans, etc. (Łobacz and Głodek, 2011). Additionally, this implies a lack of possibility of employing surrogate entrepreneurs (Migliorini et al., 2010; Lundquist, 2014).

The specificity of the functioning of higher education institutions in the context of their potential to commercialize knowledge may imply a large dispersion of information about the scope of activities and knowledge that can be commercialized, while *access to information* support science and technology commercialization (Galán-Muros, Plewa, 2016). In this area, key problems are a degree of openness of the scientific community to cooperation and knowledge sharing; a system of information acquisition; and a system of obtaining and sharing information.

The Systemic Level

A systemic level includes many barriers and challenges to science and technology commercialization at public universities that are highly dependent on the environment in which they operate, i.e. the existing legal system and directions of external environment development. Several conditions for effective operations can be defined in this regard. It can be anticipated that the existence of these factors differentiates the economic impact of universities located in different regions.

Firstly, with regards to *legal regulations governing the activities of public entities*, two issues seem to affect significantly the science and knowledge commercialization process at public universities (Hsu, Wu, 2012). The first one is the responsibility of authorities for commercial use of public funds. The second one is related to existing procedures of operation regulating business relationships of public entities with for-profit operating organizations.

The legal regulations here imply several issues associated especially with the valuation of intellectual assets, being a subject to commercialization (Siegel et al., 2004; Matusiak, Guliński, 2010).

Another group of barriers may be defined concerning *legal regulations governing the activities of universities.* Apart from overall legal regulations, which generally impose certain restrictions on public entities, universities are subject to additional regulations, which may also constitute a significant barrier to activities related to the commercialization of knowledge. These include in particular legal regulations regarding the creation of academic spin-off companies (Głodek, 2018) and legal regulations regarding the ability to manage the budget related to science and technology commercialization. The existing regulations may hinder long-term planning in terms of commercialization-related activities, for example, if subsidies that may be granted are purposeful and support only short-term projects with easily estimated indicators of success.

Systems and environment for commercialization play also a crucial role. Since the processes taking place at universities are influenced by the external environment, the high quality of the environment in which a given university operates may facilitate processes of commercialization, and vice versa – the limitations resulting from environmental deficiencies increase the challenges and problems that a given university faces in terms of commercialization. Here, the factors that can limit commercialization processes include the willingness of the environment to cooperate with universities, the proximity and availability of markets absorbing new solutions, the availability and quality of human and institutional resources related to knowledge commercialization and technology transfer, and the availability of funds that can be used to commercialize knowledge, and availability of behavioral patterns (the so-called success stories).

A Social Level

The social environment impacts the way people act and behave. Here, in regards to science and technology commercialization at public universities several issues are of great importance.

The first one is *the existing values hierarchy,* which includes values cultivated by the academic community (Gilsing et al. 2011). Barriers resulting from the mentality of scientific employees include in particular a lack of general acceptance of activities related to commercialization of knowledge and profits resulting from it; the perception of the superiority of basic research over applied research; the perception of the university as a unit generating knowledge and not transforming it into marketable products. Muscio and Vallanti (2014) underline a different perception of the research stage, expectations, and working methods by scientists and entrepreneurs.

The *existing patterns of behavior* have a similar significance to the cultivated value systems. For example, the existence of good practices in the field of knowledge commercialization and cooperation with business enables easy replication of existing patterns of behavior. The positive or negative behavior towards scientists who have been successful in business defines another pattern. As people tend to replicate the behavior of others, the more people with business experience work for the university, the more positive patterns towards their behaviors exist.

The above has a direct impact on *access to knowledge of what, how, and where to commercialize,* which is another important issue. Many scientists hold their business-directed actions as they lack knowledge on how to act and where to look for support. The main factors implying this lack of knowledge include lack of contacts with the business environment; a lack of skills enabling communication with enterprises; a lack of skills to translate knowledge into practical applications; a lack of skills in the valuation of commercial knowledge (Matusiak, Guliński, 2010).

A negative *perception of bodies responsible for knowledge commercialization* may create more barriers and concerns mostly the issue of trust. It concerns the belief is the goodwill of the institutions supporting the business activities of university researchers and their competences. If the trust exists, scientists are more open to sharing their ideas and thus the commercial potential of their technologies may be more adequately evaluated and further steps planned more professionally.

Methodology

Based on literature review as well as practical experiences of authors on science and technologies commercialization at different universities, there has been conceptualized a complex model providing a very insightful framework for the analysis of different aspects of organizational and legal factors which determine propensity for actions related to knowledge commercialization at the university and efficiency of those actions. Those aspects have been organized in groups and meta-groups according to the description of their features. Furthermore, all aspects have been shaped in a

way that enables analysis of relationships between subsequent aspects, thus helping in determining aspects and factors with higher influence and consequences of this influence.

The model distinguishes three levels of analysis: (1) systemic level, encompassing existing legal system and system environment (2) organizational level, including universities, their authorities and institutions as well as departments directly responsible for the commercialization of science and technologies, and (3) social level, i.e. academic community, to include scientific workers, administration, students. All those create a square-shaped framework with mutually related factors distinguished, which makes it clear and easy for results understanding. The framework enables analysis of relationships between subsequent factors, thus helping in determining aspects with the highest impact and consequences of this impact.

A Relation-Based Analytical Framework

The literature studies on science and technology commercialization reveal that the related systems at public universities are generally complex formations dependent on internal and external factors that are historically rooted or form a kind of overlay with new regulations more or less accurately concordant with existing procedures or formal and informal habits. This means that these commercialization systems are usually combinations of legal regulations, organizational procedures, and social behaviors, which in practice may not be consistent, thus providing inefficiencies in real actions, which – in the result – impede outcomes and impact. All that means that, if the barriers of science and technology commercialization at universities are to be removed, all of the factors which can be identified in all of the above-mentioned categories should be analyzed simultaneously and relations between them should be determined to understand the underlying causes of ineffectiveness.

The development of external systems, able to support or hinder actions related to the commercialization of science and technology defines the frames in which actions are pursued or stifled. This includes existing legal systems governing activities of public entities in general, as publically funded organizations, as well as the economic environment, in which those actions are taken, concerning the existing business environment and character of its links with universities.

As universities are knowledgeable organizations, where human capital is of key importance and people designate the quality and directions of undertaken activities, it must be recognized that values and behaviors of internal university stakeholders, directly involved in the process, as well as their knowledge and trust-related issues, shape the floor for science and technology commercialization. It has been acknowledged that the academic community (academic staff, university administration, students) represents diversified attitudes and behaviors towards science and technology commercialization and those have a significant impact on the propensity to knowledge commercialization as well as on real actions pursued towards active participation in actions required at various stages.

Thus it is argued that, if the challenges and real barriers existing at a given university are to be indicated, all of the factors mentioned above should be investigated and the relationships between individual factors clearly determined.

The three distinctive problem levels related to processes of science and technology commercialization at public universities with its problem areas and specific problem factors distinguished within each of the areas, define a framework, which can be used to analyze challenges and barriers to commercialization at universities in a particular environment. This framework has been summarised in Table 1. The framework summarises the literature studies, in which the main factors affecting the effective commercialization systems at universities has been determined.

Table 1: Problem factors and areas

Problem levels	Problem areas	Problem factors
A systemic level	The existing legal system and the systemic environment	Legal regulations governing activities of public entities
		Legal regulations governing activities of universities
		Systems and environment for commercialization
An organizational level	Universities, university authorities, and bodies	Decision-making systems
		Attitudes of university' authorities towards commercialization
		The scope of employees' responsibilities and the motivation system

		Human resources policy
		Settlement system between the university and its employees
		Administrative support and procedures
	Bodies responsible for activities related directly to the commercialization of knowledge (TTOs, BI, STP, etc.)	Human resources capacities
		Financial stability
		Access to information
A social level	Academic community (academic staff, administration, students)	Existing value hierarchy and behavioral patterns
		Access to knowledge of what, how, and where to commercialize
		Perception of structures responsible for commercialization

Source: own study

The approach presented here allows organizing the way of thinking about factors that may be important barriers to science and technology commercialization processes at public universities. The existence of links between the individual diagnosed problems means that there is a need to look for cause-and-effect relationships. Therefore all factors distinguished in the analytical model have been organized in a square-shaped framework, as presented in Figure 1.

An organizational level has been placed in the horizontal axis and all factors were divided into two groups: the first one covering all general issues related to university organization, and the second one concerning all factors that include development and operations of bodies responsible for activities related directly to the commercialization of knowledge (TTOs, BI, STP, etc.). On the vertical axis, on the other hand, the external economic and internal social factors have been compiled.

This kind of organization, very simple in its nature, provides a space in which all relationships between subsequent factors can be easily identified, and thus aspects with the highest impact and, furthermore, consequences of this impact can be easily determined. It is therefore a kind of a map of issues that is designed to facilitate a comprehensive analysis of the matter considered. It also gives an insight into small barriers existing at any level, which may however have a meaningful impact on other issues, thus slowing down the overall development of the culture of commercialization, and have serious consequences for the effectiveness of the whole system.

		A SYSTEMIC LEVEL				
		Legal regulations governing activities of public entities	Legal regulations governing activities of universities	Systems and environment for commercialization		
AN ORGANISATIONAL LEVEL 1	Decision-making systems				Human resources capacities	AN ORGANISATIONAL LEVEL 2
	Attitudes of university' authorities towards commercialization					
	The scope of employees' responsibilities and the motivation system		AREA FOR INTERACTION ANALYSIS		Financial stability	
	Human resources policy					
	Settlement system between the university and its employees				Access to information	
	Administrative support and procedures					
		Existing value hierarchy and behavioral patterns	Access to knowledge of what, how, and where to commercialize	Perception of structures responsible for commercialization		
		A SOCIAL LEVEL				

Figure 1: Links between the problem areas

Source: own study

The relationships between the problem areas are factors that can be easily determined by using direction pointing arrows, which determines the relationship. This kind of visualization is very clear in presenting the real sources of barriers that exist and challenges to face, naturally if it is preceded by in-depth narrative analysis. The example of this kind of analysis has been presented in Figure 2.

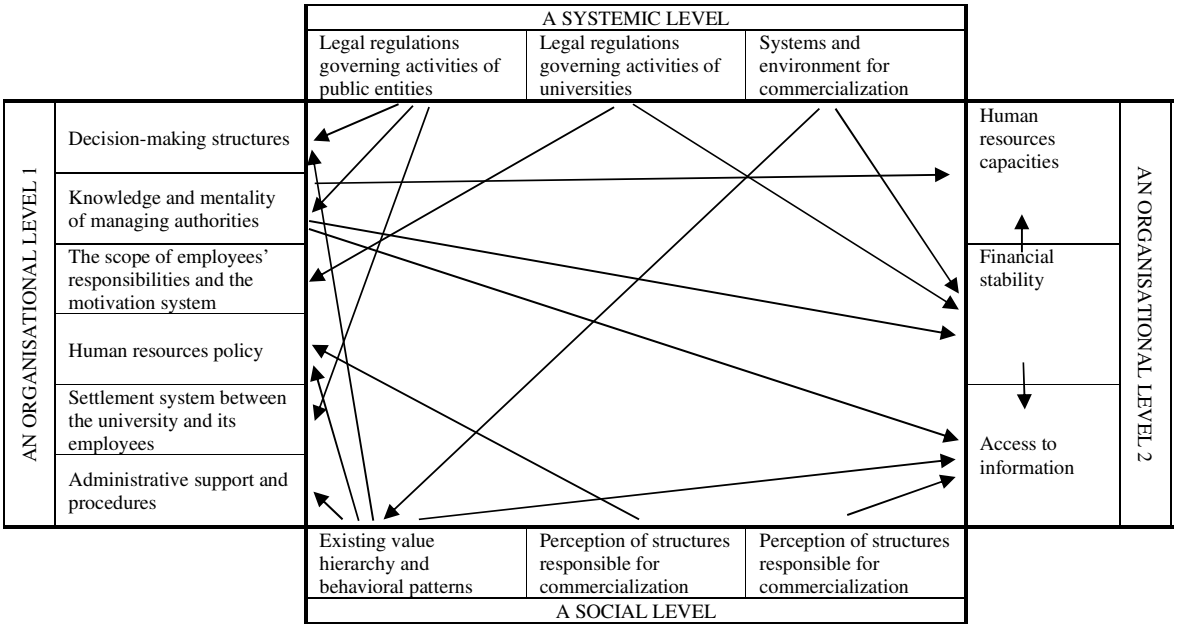

Figure 2: Links between the problem areas – example of analysis

Source: own study

The analysis presented in Figure 2, reveals that the main barriers associated with the science and technology commercialization at the university lie in the systemic and social level. The organizational behaviors defined are their consequence, and additionally, affect other organizational areas. The analysis of cause and effect relations also indicates that organizational determinants depend to a large extent on the mentality and behavior patterns found in a given entity. External factors are important as well, especially the ones connected with legal determinants (independent of the university) and systemic issues (the level of development of innovative systems capable of adopting new solutions and supporting their commercialization, e.g.: by providing capital).

Conclusions and Implications

Analyzing indicated factors and the whole model, one should nevertheless take into account dynamic changes occurring in commercialization systems at universities in recent years, resulting in different intensities of the above-mentioned problems at individual universities. However, it should be noted that even if some of these factors do not occur, or occur only to a small extent, at a given university, they may slow down the overall development of the culture of commercialization.

The proposed analytical framework can be successfully used for the needs of identification of challenges and barriers for science and technology commercialization either at a single university, or concerning a group of universities in a specific socio-economic environment (e.g. region, or country). The use of the model allows for a comprehensive analysis, taking into account different levels of factors, as well as the mutual relations between them. Thanks to this, it is possible to observe changes not only in individual factors but also their impact on the functioning of the entire model.

The developed model can be useful when comparisons between systems determining effective commercialization at subsequent universities or groups of universities with specific features, are in question. This might be especially useful when the comparison should be made between universities operating in different legal, organizational, and cultural contexts.

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The Importance of Biophilic Cities for Local Communities

Marta SZAJA

University of Szczecin, Institute of Spatial Management and Socio-Economic Geography, Szczecin, Poland
E-mail: marta.szaja@usz.edu.pl

Abstract

The aim of this article is an attempt to show the relations between integrating green and natural elements into building, neighborhood and city design, and providing the basis for healthier lives and lifestyles, e.g. reduction in stress and increased levels of physical and mental health. This paper presents a research study which adopts a qualitative, inductive case study approach. The author used the following two methods to distil and connect research results focused on bringing nature into urban areas and its favorable consequences for local communities: literature review and case studies.
The literature review provides an insight into the existing experience in integrating nature into urban areas to provide health and well-being benefits for citizens. The article also considers four case studies of cities around the world. In each city the biophilic elements of the urban structure were used in various ways in order to improve the living conditions of the local community. This allowed to explore the processes through which urban nature was used as a strategic, mainstream measure to build livability in urban design and development. Analysis of presented examples shows that the biophilic cities go beyond mere provision of parks and preserving the nearby nature, but seek to actively entice and induce urbanites to enjoy nature and be part of it. Those kinds of solutions can help to provide in many ways the basis for healthier lives and lifestyles of local communities and should be considered more often in urban design.

Keywords city, biophilic city, biophilic urbanism, local community

Introduction

The concept of 'biophilia' was first popularized by Edward Osborne Wilson in the early 1980s with his seminal book of the same title. The author was using the term to mean 'the innately emotional affiliation of human beings to other living organisms'. (Kellart, Wilson 1995)

The biophilia hypothesis provides a theoretical basis with potential to explain and enhance health and wellbeing benefits of the urban nature. These benefits have the potential to substantially improve the livability of dense urban areas, and to provide economic benefits through reduced physical and mental healthcare costs. (Reeve, Desha, Hargreaves, Hargroves 2015: 215–233). Biophilia is now being applied to urban design, and leaders in this area such as T. Beatley, P. Newman and H. Boyer have created the field of 'biophilic urbanism', or 'nature loving cities'. (Newman, Beatley, Boyer 2009)

Now there is a growing body of evidence of the positive physical and mental health benefits associated with greenery and green elements in living and work environments. Research at the building scale shows strong positive relationships between the presence of natural daylight, fresh air and greenery, and increases in worker happiness and productivity. (Leather, Pyrgas, Beale, Lawrence 1998: 739–762). Similar studies show the positive power of schools that incorporate natural daylight and other green elements, to raise test scores of the students. (Herschong, Roger, Stacia 2002: 101–114)

Considerable evidence and research, dating to the 1980s, have suggested the healing and recuperative power of nature in hospitals and health care facilities (including Ulrich's classic study showing recovery from gall bladder surgery is significantly enhanced by views of nature). (Ulrich 1984: 421). Evidence of the power of the green qualities and features is also emerging at neighborhood community scales. Green neighborhoods and more natural living environments have been associated with reduction in stress and increased levels of physical and mental health. (DeVries, Verheij, Groenewegen, Spreeuwenberg 2003: 1717–1731; Nielsen, Hansen 2007: 839–850;

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MIND 2007; Van den Berg, Hartig, Straats 2007: 79–96; Ma, Zhou, Lei, Wen, Htun 2018; Hartig, Mang, Evans 1991: 3–26; Ma, Zhou, Lei, Wen, Htun, 2018; Hong, Lee, Jo, Yoo 2019: 1–25)

The aim of this article is an attempt to show the relations between integrating green and natural elements into building, neighborhood and city design, and providing the basis for healthier lives and lifestyles, e.g. reduction in stress and increased levels of physical and mental health.

What are biophilic urbanism and biophilic cities?

Biophilic urbanism is an important emerging design principle for buildings, featuring a suite of natural design features that address multiple pressures related to climate changes, increasing urban populations, finite resources, and our inherent need for contact with nature. The principle directs the creation of urban environments that are conducive to life, delivering a range of benefits to stakeholders including building owners, occupiers and the surrounding community (Definition developed by Peter Newman, Charlie Hargroves, Cheryl Desha, Angela Reeve, Omniya Bagdadi, Mariela Zingoni and Jana Soderlund, November 2012).

For the purposes of this article, biophilic urbanism was categorized into three scales: the building, neighborhood, and city scales (see Table 1).

Table 1: The main elements of biophilic urbanism

ELEMENT		FORMS	SPECIFIC BENEFITS	COMMON BENEFITS
BUILDING	Indoor Plants	Pot plants, on desks, around office, or in banks of pots. Indoor living walls, including pots within a mess frame (also see Green Walls). Indoor planted vegetation, such as atriums and large planted installations.	Reduces illness Increases productivity Improves air quality	Responds effectively to the growing need for densification of cities Revitalizes urban environments Alleviates urban heat island effect Improves air quality Improves microclimate Sequesters carbon/ reduces greenhouse gas emissions Increases biodiversity
	Green Roofs	'Intensive': Soil deeper than 200 mm and vegetation up to the size of trees 'Extensive': Soil up to 200 mm with ground cover vegetation	Improves building energy efficiency Water management Space efficiency Food production Sound insulation Increases roof/wall lifespan Vertical urban farming	
	Green Walls	*Panel System*: Pre-planted structural panels that are secured to wall and have an in-built watering system *Felt System*: Pre-fabricated structural panel with felt planting pockets that is planted onsite and kept moist *Container/Trellis System*: Pre-fabricated structural panel with planting pots		
NEIGHBORHOOD	Green Verges	Street trees and canopies chosen depending on physical properties Shade planting for buildings placed to remove heat load Green streets and alleys that create cool pervious greenways Rain gardens and bio-swales	Reduces traffic / encourages walking, and cycling Reduces building cooling/heating energy use Windbreak	

		integrated into stormwater management plan and consisting of pervious channels Green permeable sidewalks	Water management Food production	Improves water cycle management
	Green Islands	Urban parks and gardens placed close to transportation routes Community farms close to homes Residential backyards with space for food production Lawns and gardens reducing UHI effects Waterways and streams uncovered and rehabilitated	Reduces traffic/encourages walking and cycling Food production Reduces reflection Community sense Education	Provides amenity Enhances well-being/reduces stress Recreation
CITY	Green Corridors	Green corridors (biodiversity corridors) reaching outside the urban area Highway crossings and migratory routes Backyard commons that can be part of the green corridor Buffer protection from storms surges along coastal areas	Links biophilic elements Reduces traffic/encourages walking and cycling Connectivity Increases tourism Cognitive way finding	Reconnects with nature Revitalizes cities Increases property value
	Urban Farming	Community gardens City farms Urban and peri-urban agriculture	Food production Creates employment Education	
	Water Ways	Wetlands Constructed wetlands Ponds and lakes Day-lighted streams Vegetated swales and drainage corridors Infiltration basins Mangroves	Water management Water treatment Water storage Filtration / enhance water quality Protects downstream water bodies	Enhances tourism

Source: Beatley, T. (2010) Biophilic Cities: Integrating Nature into Urban Design and Planning; Island Press: Washington, D.C., USA; SBEnrc (2012), 'Can biophilic urbanism deliver strong economic and social benefits in cities? An economic and policy investigation into the increased use of natural elements in urban design,' Sustainable Built Environment National Research, Centre (SBEnrc), Curtin University and Queensland University of Technology, 8. doi:10.13140/RG.2.1.2137.2886; Girling, C. and Ronald, K. (2005) Skinny Streets and Green Neighborhoods: Design for Environment and Community; Island Press: Washington, D.C., USA.

The potential for application of building scale features is high. The proximity of these features to the infrastructure and people combined with the potential for widespread use is such that these features are likely to provide substantial overall benefits to environmental systems and individuals. The potential use of neighborhood scale features is high, given the proportion of urban spaces dedicated to streets and roads. These features need to allow for (and potentially enhance) other activities that occur in these spaces, such as car, bicycle and pedestrian traffic, access by emergency and service vehicles, parking, underground and overhead services, and in the case of pocket parks, potential property development. City scale features are large in size and difficult to retrofit into already developed urban areas other than in major land-use change situations. These features generally have lower technical and engineering design requirements, as these may be less connected to urban infrastructure and other land uses. They may provide opportunities for recreation, nature-based experiences and biodiversity conservation not possible

at the building or city-scale due to the size of individual features and separation from the built environment (Reeve, Desha, Hargreaves, Hargroves 2015: 215-233).

Biophilic cities are biodiverse cities, cities full of nature, places where in the normal course of work and play and life residents feel, see, and experience rich nature – plants, trees, animals. The nature is both large and small – from treetop lichens, invertebrates, and even microorganisms to larger natural features and ecosystems that define a city and give it its character and feel. Biophilic cities cherish what already exists, but also work hard to restore and repair what has been lost or degraded and to integrate new forms of nature into the design of every new structure or built project. Human beings need contact with nature, and the nature can take the form of shapes and images integrated into building designs (Beatley, 2010: 45; Bratman, Daily, Levy, Gross 2015: 41–50).

Cities and urban environments contain a variety of ecological and green assets, from parks to trees to rivers and riparian habitats, and increasingly, efforts are being made to further enhance the green elements and features of these living and work environments. Daylighting urban streams (taking them out of underground pipes and returning them to the surface), installing trails, planting new trees and forests, community gardens, installing green walls and vertical gardens, are among the many ways in which cities and urban environments can become greener (Beatley, Newman 2013: 3328-3345).

A biophilic city is not only a greener city but also a city in which residents are actively involved in experiencing nature – e.g., hiking, bird watching, sky-gazing, gardening, among many other activities. Furthermore, citizens in biophilic cities have abundant opportunities to be engaged in restoring and caring for the nature around them. Table 2 presents a more comprehensive listing of the key qualities, not just those of physical design, by which a biophilic city might be described or defined (Beatley 2010; Weinstein, Balmford, DeHaan, Gladwell, Bradbury, Amano 2015: 1141–1153; Carrus, Scopelliti, Lafortezza, Colangelo, Ferrini, Salbitano, Agrimi, Portoghesi, Semenzato, Sansei 2015: 221–228).

Table 2: Important dimensions of biophilic cities (with possible indicators thereof)

Biophilic Conditions and Infrastructure
– Percentage of population within a few hundred feet or meters of a park or greenspace; – Percentage of city land area covered by trees or other vegetation; – Number of green design features (e.g. green rooftops, green walls, rain gardens); – Extent of natural images, shapes, forms employed in architecture and seen in the city; – Extent of flora and fauna (e.g. number of species) found within the city;
Biophilic Behaviors, Patterns, Practices, Lifestyles
– Average portion of the day spent outside; – Visitation rates for city parks; – Percentage of trips made by walking; – Extent of membership and participation in local nature clubs and organizations;
Biophilic Attitudes and Knowledge
– Percentage of residents who express care and concern for nature; – Percentage of residents who can identify common species of flora and fauna;
Biophilic Institutions and Governance
– Priority given to nature conservation by local government; percent of municipal budget dedicated to biophilic programs; – Existence of design and planning regulations that promote biophilic conditions (e.g. mandatory green rooftop requirement, bird-friendly building design guidelines); – Presence and importance of institutions, from aquaria to natural history museums, that promote education and awareness of nature; – Number/extent of educational programs in local schools aimed at teaching about nature; – Number of nature organizations and clubs of various sorts in the city, from advocacy to social groups.

Source: Beatley, T. (2010) Biophilic Cities: Integrating Nature into Urban Design and Planning, Island Press: Washington, D.C., USA, 47–49.

It is important to recognize that biophilic cities are not simply green cities. The presence of abundant nature is a necessary, but not sufficient condition. In biophilic cities, residents are directly and actively engaged in learning about, enjoying and caring for the nature around them and have developed important emotional connections with this nature (Beatley, Newman 2013: 3328–3345; Silva, Rogers, Buckley 2018: 9545–9555).

Social Benefits of Urban Projects on Biophilic Urbanism – The Selected Case Studies

Biophilic cities deliver a host of positive benefits at an individual and family level that will help to enhance ability to successfully cope with and adapt to future stressors and shocks. Nature in cities delivers considerable and often underappreciated health benefits, furthering bolstering city's capacity and ability to adapt to stresses and shocks in the future. Residents of greener neighborhoods have been found to walk more and spend more time outside, in turn with considerable positive health effects (Schantz, Stigell 2008; Biedenweg , Scott, Scott 2017: 112–124; Frumkin, Bratman, Breslow, Cochran, Kahn, Lawler, Levin, Tandon, Varanasi, Wolf 2017: 075001; Markevych, Schoierer, Hartig, Chudnovsky, Hystad, Dzhambov, de Vries, Triguero-Mas, Brauer, Niewenhuijsen 2017: 301–317; Taylor, Hochuli 2015: 747–762).

The strong ecological tradition in Germany, with mainstream appreciation of the benefits of integrating nature into cities and towns, has been a key driver for Berlin's urban greening. It continues to ensure that the city preserves and even enhances its urban nature in the face of financial pressures and demand for urban development. Hence there is a good understanding of the social benefits of green space and features in the city. According to the Berlin Senate Department for Urban Development and the Environment: "The appearance of the city is defined as much by open space as by individual buildings or architectural ensembles. The size of the open spaces and the extent to which they blend harmoniously with the surrounding buildings make a first and lasting impression. They are responsible for the feeling of well-being and ease which the city provokes, and are crucial for the sense of identity the inhabitants have with their city. Open space brings to life the natural and cultural development of Berlin."(Senate Department for Urban Development and the Environment
The City of Berlin, German).

A study by Ryerson University identified a range of direct and indirect economic benefits from green roofs in Toronto (Banting, Doshi, Missios 2005). Benefits can accrue to the local municipality, such as through reduced stormwater flows, or to building occupants, such as at the Toronto Metro Central YMCA, where the green roof installed in 2009 has been used for conferences, movie nights, yoga classes, school classes, as well as for running, relaxation, and recuperation. According to Vice President, Property Management YMCA of Greater Toronto, there has been significant community engagement in the design, installation, and ongoing maintenance of the roof (City of Toronto 2011).

The City of Portland has investigated and developed metrics for the potential social benefits of urban greening, focusing on health and community livability. In the area of health these metrics consider air quality improvements (relating to particulate matter and respiratory illnesses) along with other impacts on physical and mental health. Community livability metrics consider improvements in amenity and aesthetics (including how these are reflected in increased property values), community cohesion (such as social capital and crime), access to nature (including the number of people affected by urban greening elements), and environmental equity (such as the share of urban greening elements in minority or low-income neighborhoods) (ENTRIX 2010).

The benefits of urban nature on people can be seen in Singapore's hospitals. The Alexandra Hospital was renovated to include a medicinal garden, fragrance garden and water features (Newman 2014: 47-65), and its success led to the biophilic design of the new Khoo Teck Puat (KTP) Hospital, which integrates food producing roof gardens, green walls, green balconies and a public garden, using the concept that 'nature would nurture' (Design Singapore Council 2011). The innovative design of this hospital is driven by the challenge of integrating nature within the constraints of minimal space, as the relatively small block (3.4 hectares) had to house the 110,000 m^2 building (Newman, 2014: 47-65).

Conclusions

Environment is crucially important for the lives and lifestyles of human beings. Local communities need contact with nature, and the nature can take the form of shapes and images integrated into building designs. Biophilic cities are biodiverse cities, places where in the normal course of work and play and life residents feel, see, and experience rich nature (i.e. plants, trees, animals). Their residents are actively involved in experiencing nature. They also have abundant opportunities to be engaged in restoring and caring for the nature around them. Biophilic cities nurture

what already exists, but also try to restore and repair what has been lost or degraded of every new urban structure or built project.

According to P. Newman "Biophilic urbanism is bringing tangible benefits to cities, ranging from improved stormwater management, reduced air-conditioning loads, reduced urban temperatures, improved health and well-being, lower crime rates, and increased productivity. It is providing a way to continue the great urban experiment which has created so much economic value by balancing the concrete and steel urban infrastructure with innovative and well-integrated forms of urban nature that ensure urban environments remain aesthetic, livable and attractive to existing and future residents" (SBEnrc 2012).

As T. Beatley and P. Newman indicate there are many more direct ways, in which green urbanism and biophilic urban design can create more healthful environments. Planting trees and installing green rooftops and walls, permeable paving, are all strategies that provide shade and cooling through evapotranspiration. These help to moderate urban temperatures. Trees help to ameliorate air pollution, and a robust and extensive network of storm water collection features (from permeable paving to rain gardens to urban forests) helps to reduce the problem of combined sewer overflow (CSO), a serious water quality problem that many cities are afflicted with (Beatley, Newman 2013: 3328-3345).

Biophilic urbanism can help to provide the basis for healthier lives and lifestyles in many ways. An extensive network of walking and hiking trails, the close physical proximity of large blocks of greenspaces to urban neighborhoods and an urban land use pattern of nearby parks, all contribute to at the least a possibility of a more physically active, healthier lifestyle. Gardening and food production opportunities in the city provide similar benefits: the opportunity to engage in an emotionally rewarding activity, but also one with substantial calorie-burning potential and the possibility of improving diets, as well (Cobb 2011; Bertram, Rehdanz 2015:139–152).

Along with the general increase in interest in ecological issues, there is a growing interest in environmental protection and sustainable development in shaping urban spaces. As a result of the adoption of the sustainable development paradigm by the city authorities and the local community, actions should be taken to contribute to the optimization of the urban design process and to obtain the most beneficial solutions in the name of optimal use of available resources (not only to save them, but also to maximize their usability).

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Individual and Team Creativity, Leadership style and Business Performance among SMEs in UAE: Proposed Framework

Duha Hashim Ali ALKHAZRAJI

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Johor, Malaysia, Lily_143@hotmail.com

Wan Fauziah bt Wan YUSOFF

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Johor, Malaysia, fauziahy@uthm.edu.my

Abstract

The Government of UAE conducted many programs and incentives to support SMEs continuity. However, the current outcome does not meet the desired objectives. Research findings statistics shows that Emirati citizens are less motivated to start SMEs business, and generally, there is the uncertainty of success due to a lack of innovativeness and leadership skills. Furthermore, SMEs faced lots of obstacles consisting of creativity, synergy, technique completion, creating an attractive business, leadership, culture, technique, prioritizing your employees, systems and methods, determining performance. This study is to explore the impact of individual creativity and team creativity on business performance; with consideration of the moderation effect of leadership style among SMEs in UAE. The proposed conceptual framework of this study has individual creativity and team creativity as predictors of business performance. Along with six leadership styles, which are individually examined as moderators to evaluate the leadership style that has the greatest significant change in the relations between creativity factors and business performance. It is to hope that the proposed framework can be tested to evaluate the current scenario of creativity, leadership style and performance of SMEs in UAE.

Keywords: Individual Creativity, Team Creativity, Business Performance, Leadership Styles, SMEs, UAE.

Introduction

Small and medium enterprises (SMEs) are particularly important nowadays and are considered to be the core driver of any economy, whether in developed or developing countries (Ribau, Moreira, & Raposo, 2018). SMEs provide around 45% of overall employment and 33% of GDP in these countries, according to the Organization for Economic Co-operation and Development (OCED) (Hamilton & Beck, 2016). It has been viewed that in current times, there is a huge decrease in unemployment number in many countries around the world, and that has been a result of SMEs progression (Burns, 2016).

In UAE, SMEs role in advancing the economic development of the country is comprehensive, and the National Programme for SMEs has a big responsibility which involves more than 1,700 Emirati businessmen that possess the passion for exploring additional engaging opportunities in various aspects from around the world (Lasrado & Pereira, 2018). In United Arab Emirates (UAE), the government designed many programs that provide financial grants, technical support, and other forms of aid to creative young Emiratis who are willing to start a new business (PROF, Fadillah, & Ismail, 2018). SMEs in the UAE has proved to be the strategic operator of the nation and is predicted to have a vital role in the future. Based on reports from the Ministry of Economy, SMEs market includes more than 94% of the total number of active firms in the country, and it provides job opportunities to more than 86% of the employees in the private sector. Based on Dubai government reports (2017); micro, small, and medium enterprises constitute 95% of total registered firms, contribute to 40% of gross value add, and it helps in employing 42% of total workforce. The ministry is aiming to increase this contribution to reach 60% by 2021 (The UAE government portal, 2020).

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The Government of UAE conducted many programs and incentives to support SMEs continuity. However, the current outcome does not meet the desired objectives. This suggests that the plan was not properly analysed, and risk factor was not fully weighed. As a result, fear of failing can possibly increase among native people which lead to more problems concerning entrepreneurship (Chabrak et al., 2017). Research findings statistics shows that Emirati citizens are less motivated to start SMEs business, and generally, there is the uncertainty of success due to a lack of innovativeness and leadership skills. Furthermore, SMEs faced lots of obstacles consisting of creativity, synergy, technique completion, creating an attractive business, leadership, culture, technique, prioritizing your employees, systems and methods, determining performance (Hanifah, Halim, Ahmad, & Vafaei-Zadeh, 2019). Therefore, this study is to explore the impact of individual creativity and team creativity on business performance; with consideration of the moderation effect of leadership style among SMEs in UAE.

Literature Review

SMEs Definition

SMEs are businesses that sustain earnings, properties or employees below a particular limit (Zhou, 2016) Each country possesses its very own interpretation of what is SMEs. In the UK, SME is a medium-sized or small enterprise with fewer than 250 employees. The EU defines an SME as a business with less than 250 employees, a revenue of less than EUR50 million, or an overall balance sheet of less than EUR43 million. There are three different types: medium-sized, small, and micro-businesses. These types are actually defined based on their turnover and number of employees. A medium-sized business possesses less than 250 employees and either a turnover of approximately EUR50 million or an annual balance sheet of up to EUR43 million. A small business has less than 50 employees and a turnover of around EUR10 million or an annual balance sheet of EUR10 million. At the same time, a micro-business has less than ten employees and a turnover of up to EUR2 million or a balance sheet up to EUR2 million. In Canada, SMEs are companies that have fewer than 500 employees, and any company that has 500 or more employees are considered to be a large organisation. In the United States, SMEs refers to companies with fewer than 500 employees (Müller et al., 2018). Small organisations are usually those with less than 50 employees, while micro-enterprises contains 10, or in many cases, five employees (Moeuf et al., 2018).

As the scope of the study is the Dubai SMEs market, then it is important to illustrate Abu Dhabi and Dubai's definition of SMEs. According to a mandate released by Abu Dhabi Executive Council on 30 June 2013, Abu Dhabi defines a micro-business as a business with less than five employees, and small business as a business that has more than five employees but a maximum of 19. in contrast, a medium-sized business is one with a minimum of 20 and a maximum of 49 employees. Having Said That, Dubai SME interpretation is detailed and divided into three types; trading, manufacturing, and services. A small business in the trading field, for instance, is one with nine or fewer employees and a maximum turnover of AED9 Million. In manufacturing, a micro SME is one with 20 or fewer employees, with a turnover of less than AED10 Million. In service, a micro business is one with a maximum of 20 employees and a turnover of lower than AED3 Million. Table 1 shows the SMEs criteria of Dubai.

Table 1: SMEs Definition in Dubai

Turnover, AED m	Trading	Manufacturing	Services
Micro	<=9	<=10	<=10
Small	<=50	<=100	<=100
Medium	<=250	<=250	<=250

Individual and Creativity

Creativity is described as the capacity of an individual or even group to offer new and unique ideas. It is a principal source for innovations, and it can highly influence business performance (Beghetto & Kaufman, 2017). Creativity is considered a significant prerequisite for innovation to a lot of organisations (Alayoubi et al., 2020). Creativity is very important in businesses that need continues improvement such as technology, but it is less significant in traditional business such as food processing (Aureli et al., 2019). Creative people are characterised by their ability to high adaptability, as some risks need this trait (Sica et al., 2019). Most of the creativity definitions conceptualise

it with bright ideas or new thought (Harris & de Bruin, 2018). Creativity suggests the application of innovation in companies, and creativity primarily defines the progression of concepts concerning practices, procedures, items, and/or companies that are (a) unique and (b) possibly valuable to a company (Lee et al., 2019).

Over the last few years, measuring creativity has shown to be an urgent task (Baer & McKool, 2009; Batey et al., 2010). The uncertainty encompassing the measurement of creativity is due to the lack of its own interpretation (Batey, 2012; Piffer, 2012). However, the majority of those scales are an adaption or a development to the root concept of creativity that proposed by Treffinger et al. (1971). These scales are normally categorized into four methods embodying the four main types of creativity definitions: process, trait, press, and product (Barbot et al., 2011; Couger et al., 1993).

- Press - focusses on the evaluation of the job environment or climate where creativity is recognized (Batey, 2012; Hennessey & Amabile, 2010). The measurement of these environmental factors is based upon the idea that there is an indirect relationship between these factors and creativity (Li et al., 2020).
- Trait - scale in this field were designed through investigating the attributes or passions of people that have innovative accomplishments (Pitafi et al., 2020). The created set of unique individuality traits include; featuring attraction to difficulty, higher energy, behavior adaptability, intuitiveness, mental variability, self-esteem, danger taking, perseverance, self-reliance, introversion, social grace, and endurance to vagueness (Barron & Harrington, 1981; Feist, 1998; Runco, 2007).
- Product- product strategy based analysis of creativity has been extensively suggested for evaluating creativity (Amabile, 1982; Baer, 1994c; Baer & McKool, 2009; Kaufman et al., 2012).
- Process - measurement focuses on cognitive processes and structures that contribute to imaginative production (Barbot et al., 2011; Finke et al., 1992).

Researches of individual creativity in different environments suggest that creative people possess a certain set of characteristics (Ribeiro et al., 2020). On top of that, creativity has a role in connecting individual creativity and company creativity (Gu et al., 2020). Employees are the source of bright ideas for solving a problem and making development and organisation convert those ideas into the process to generate services and products (Secundo et al., 2019). Creativity is adequately significant at the team level and should be examined using various techniques (Tu et al., 2019).

Business Performance

Performance is a frequent subject in many divisions of management (Chung-Wen, 2008). There has been a debate among researchers about the meaning of business performance (Aminu, 2015). Previous studies, which focused on business performance, failed to resolve several openings on performance conceptualisation. The reality of business performance as a multidimensional phenomenon may have contributed to the different opinions on business performance (Roslan, 2010). For many years, researchers on business performance have been preoccupied with discussions and debates on terminology, level of analysis and conceptual basis for assessment of performance (Arief, Thoyib, Sudiro, & Rohman, 2013; Arshad & Rasli, 2013). A balanced scorecard is a significant approach to measuring business performance. Taking the Balanced Scorecard strategy, there are four main aspects involved in strategy management: customer, interior processes (functions), knowing and growth (Human Resources), and financial (Mehralian, Nazari, Nooriparto, & Rasekh, 2017). Three categories are related to nonfinancial measures; however, firms normally choose a suitable strategy based on the business, environment, and management approach.

Leadership style

Leaders are necessary for any company and have various roles and contributions. Nowadays, the aim of any sort of institutions is to maintain its success through performance-enhancing. To enhance company performance, leadership has a vital role, therefore, to create the best product or services using accessible resources, leaders are the ones liable to the stakeholders of their companies (MITRA Madanchian & Taherdoost, 2017). Many studies have found that poor leadership of an organisation can lead to many drawbacks and affect business performance. For example, Ntenga and Awuor (2018) explored the impact of different leadership styles on employee turnover in different companies in Nigeria and concluded that poor leadership and management by fear in some organisation caused in increment and turnover intention and affect the overall performance of the organisation. Likewise, Gardanova, Nikitina, and Strielkowski (2019) revealed that managers lack critical leadership skills caused set-up-to-fail syndrome on their employees, which negatively affect employee and organisation performance.

According to Goleman (2000), there are six styles of leadership. Transformational leadership is when innovator habits affect followers and influence them to perform beyond their perceived abilities. Fans of these leaders usually attempt to mimic their leader as they tend to feel connected with them (Vallina & Guerrero, 2018). Within transactional leadership, there are two factors, contingent reward and management-by-exception. The contingent reward provides rewards for effort and recognises good performance (Barth & Benoliel, 2019). Autocratic leadership is a management style in which someone handles all the decisions and considers the opinions of very few people. Autocratic leaders make their decisions based on their very own beliefs and do not consider other people opinions (Patil, 2020). Democratic leadership, also recognised as participative leadership, is the kind of leadership where members of the team are more involved in the process of decision making (Caillier, 2020). Paternalistic leadership is an administrative approach that entails a controlling authority figure who acts as a patriarch, and handles workers, and collaborates as though they are members of a huge, extensive family. In exchange, the leader anticipates support from staff members, as well as compliance (Tang, 2019). The laissez-faire leadership concept is, in fact, at the opposite of the autocratic style. Out all the leadership styles, this style involves the minimum amount of leadership. Laissez-faire leadership is a hands-off style that lets followers set directions. However, this is mostly the leadership style that leads to the lowest productivity (Asghar & Oino, 2017).

Proposed Conceptual Framework

Based on the literature review, the proposed conceptual framework of this study has individual creativity and team creativity as predictors of business performance. In addition, leadership styles, six styles, are individually examined as moderators to evaluate the leadership style that has the greatest significant change in the relations between creativity factors and business performance. Figure 1 shows the proposed variables and their relations.

According to some researchers; such as (Al Mamun & Fazal, 2018; Awan et al., 2019; Castillo-Vergara et al., 2018; Cirella, 2016; Lussier et al., 2017; Rodríguez-Sánchez et al., 2017); In the workplace, the focus is usually on creativity as it always has a positive impact on the overall business performance. Furthermore, Hirst et al., (2011), in his research about individual creativity impact on business performance, concluded that creativity has a significant positive impact on employees performance. Another study of Ferreira et al., (2020) about dynamic capabilities, creativity and innovation capability and their impact on competitive advantage and firm performance discovered that creativity has the largest positive impact on improving the firm performance and competitive advantage. The same results are confirmed in a study by Munizu & Hamid, (2018) to examine the relationship between creativity and business performance at furniture industry in Indonesia, as they revealed that creativity is rapidly elevating business performance. In conclusion, the researcher can deduce that all studies related were expecting a positive direct impact of creativity on business performance in the workplace.

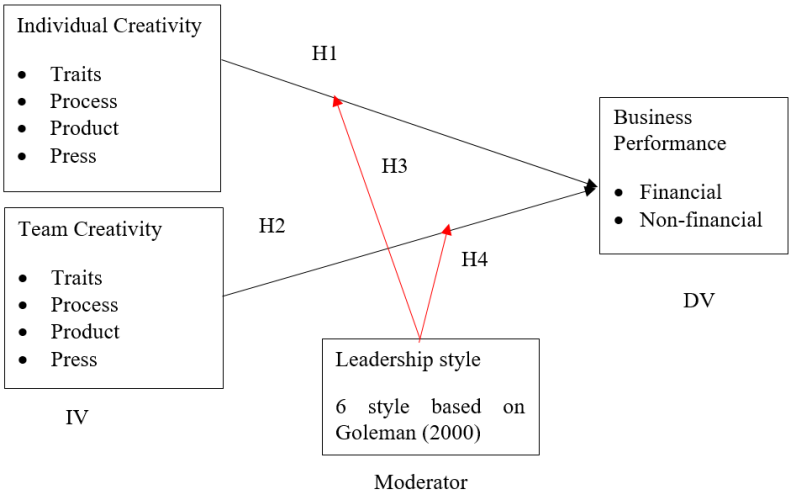

Fig. 1: Proposed Framework

Meanwhile, the leadership style is the leader's strategy of providing a path, applying plans, and encouraging individuals. Several leadership styles were proposed by many researchers as shown by pioneers in the political, business or various other fields. Overall, leadership style as a moderator has been explored in a lot of studies (Chellani, 2019; Daud & Hanafi, 2018; Desai & Srivastava, 2017; Kalsoom et al., 2020; Mahdinezhad et al., 2019;

Putra & Rasmini, 2018; Zheng et al., 2017). Previous studies of leadership styles concluded that there is always a positive moderation role in the relationships, which positively strengthen the impact between the variables within the relationship. In particular, to business performance, Ugheoke, 2019 and Yasmeen et al., 2020 discovered that those leadership styles are constantly having a positive role in improving the relationship between the proposed antecedents and business performance. As the outcome of this studies is compatible with the study hypothesis, we are expecting a positive moderating impact of leadership styles on the relationship between creativity variables and business performance.

Potential contributions

The proposed framework can be used:

- For management and practical side, the study is particularly beneficial to SMEs in UAE, as it highlights the role of creativity and leadership in the success rather than the traditional management and economic antecedents. Together, it could have dominant effects on various other fields in various companies, specialists, managers, selection analysts, manufacturers, and scholastics. Current investigation helps in understanding the productive factor of SMEs. Therefore, findings will be useful for the leaders of SMEs to have a better knowledge of the relations between the proposed variables.
- For Policymakers, The study is beneficial to decision-makers in funded programs in UAE or worldwide, because the study reveals that the success and failure in institutions could be related to something beyond financial and managerial structure Investigating variables related to individuals and group qualities, could make valuable add on to the information available for decision-makers to improve the future policies and requirement for the funds and grants offers.
- For theory and knowledge, discovering the role of leadership styles as a moderator towards the success of the organisation will increase the knowledge of these relations and will emphasise the importance of creativity and leadership to competitive advantages and improve the performance of organisations at SMEs.

Conclusion

The significance of medium and small business (SMEs) in increasing employment rate and in supporting the economic growth of a country has been recognised by governments and researchers. It is counted as the main source of creativity and innovation, which have significant effects on business performance. Individual creativity in the workplace and organisations has been the centre of interest in the past two decades in research. Individual creativity is using one's own mind to create something authentic, whereas team creativity suggests that a group of people interact with each other to increase the level of creativity. Leadership is both a topic of research and useful skill which includes the ability of an individual, group or an organisation to "lead" or direct other people, staffs, or whole organisations. There are four theories that contribute to the conceptual model; those include Goleman Leadership Styles Theory and institutional theory. The proposed conceptual model of this study has individual creativity and team creativity as predictors of business performance. In addition, leadership styles, six styles, are examined as moderators one by one to evaluate the leadership style that has the greatest significant change in the relations between creativity factors and business performance.

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The Concept of The Financial System in The Digital Economy

Ekaterina P. MOCHALINA
PRUE, Moscow, Russia
Mochalina.EP@rea.ru

Galina V. IVANKOVA
PRUE, Moscow, Russia
Ivankova.GV@rea.ru

Oleg V. TATARNIKOV
PRUE, Moscow, Russia
Tatarnikov.OV@rea.ru

Valery A. TITOV
PRUE, Moscow, Russia
Titov.VA@rea.ru

Abstract

The work is devoted to the development of the financial system and its institutions under the conditions of digitalization of the economy. Banks and their development prospects under the influence of the digital economy were also considered. Moreover, the advantages and disadvantages of using tools such as White Label and Big Data have been studied. There was considered a new financial institution - Fintech.

Keywords: Fintech, digitalization, Big Data.

Introduction

It is impossible to imagine our life without "smart" devices now, as well as without the Internet. Today it is not difficult to buy plane tickets online or pay in a store using a smartphone. All these actions are united by the concept of "digital economy". According to the World Bank, the digital economy is a system of economic, social, and cultural relations based on the use of digital information and communication technologies. The merger of online and offline spheres confirms the prospects for the development of the digital economy. However, the digital economy involves not only the online processes and transactions, but also the digitalization of almost all the aspects of business.

The key objectives of our research are:

- consideration of the main trends in the development of key financial institutions, such as banks, in framework of digital economy
- an overview of the appearance of such a phenomenon as Fintech in the Russian economy
- analysis of changes in the labor market in the digital economy.

Literature Overview

Columnists and authors from different countries include in their work the variety of areas: platform, business to consumer, mobile technology, business to business, retail banking, investment banking, financial transaction processing, financial data and analysis, corporate banking, risk management, compliance, asset management, blockchain, private banking, cryptocurrencies, insurance, cybersecurity (See Deloitte Report, 2017; Dasgupta et al, 2019; Divya and Murali, 2019; Oladapo and Rita, 2020).

The FinTech Book by Chishti and Barberis (2016) is the first crowdsourced book on fintech. 86 authors from 20 countries took part in its creation. About half of them are financial technology entrepreneurs, a quarter work in large financial or technology companies, and another quarter are companies engaged in the provision of professional

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services. Users perceive these services positively. This all opens new opportunities for small businesses and small investors.

Study by Haycock and Richmond (2015) explores approaches to promoting customer service using mobile phones. The authors propose the new concept, it is an independent organization where leadership and headquarters are separate.

Note that five years ago BBVA chairman and CEO Francisco Gonzalez had pay attention that it would be increasingly difficult for banks to simplify invest in doing the banking business digitally. In the new world it is necessary to control a range of competencies, just one of which is banking (See Gonzalez, 2015).

The world-renowned Wikinomics author Don Tapscott and his son, former investment banker Alex Tapscott, examine is study Tapscott and Tapscott (2016) the impact of blockchain on the economy, governance, culture, access to financial services, and potential challenges.

To highlight the current situation in the fintech market, the Financial Times has published a special report, The Future of FinTech (See Financial Times, 2019). It contains several articles on various topics: the growing market for regulatory technology, the low adoption rate of blockchain in banks, and a call for green fintech.

Sironi (2016) describes the impact of using technology to provide more personalized advice on the work of financial advisors, who no longer sell a portfolio of specific products, but support purposeful investment.

Materials and Methods

The theme of digital economy got a clear outline in Russia only in 2016. At the same time, a strategic direction for the development of the digital economy was adopted. The digitalization of the economy forces both workers and employers to adapt to new conditions (See Smirnov et al, 2019). Soon, in a number of industries, human labour will be replaced by machine labour, which will create difficulties for companies and the state as a whole. The Russian labour market has never faced such changes before: according to the McKinsey Global Institute study, by 2036, from 2% to 50% of the volume of work previously expressed in man-hours will be automated. Businesses, educational institutions, and the state as a whole are required to take coordinated actions to retrain personnel. On the other hand, digital technologies also have a positive impact on the labour market, making it easier to find personnel, shortening the search time and increasing labour productivity.

On October 21, 2019, the McKinsey released a study of the banking industry, in which experts predicted the closure of many banks in the world (See McKinsey Global Institute Report, 2019). They will be replaced by IT and Fintech companies, analysts believe. The report was titled 'The last pit stop? Time for bold late-cycle moves.' According to experts, about 60% of banks in the world are unable to withstand the financial crisis and may disappear because of this. To survive, they need to "reinvent the business model" and follow the example of tech companies like Amazon and Ping. They attract customers with new solutions in the most profitable areas, for example, they pay special attention to acquiring, which has traditionally brought good income to banks. The study cites data according to which Fintech companies allocate more than 70% of the budget to technology development, while traditional banks - about 35%. So, banks should increase their investment in technology, gain weight through mergers, and also actively outsource.

In September 2019, PwC Luxembourg and the development agency Luxembourg for France also said that European banks and wealth managers should actively embrace 'Amazonization' and embed consumer technology driven by online platforms (See Pwc Report, 2019).

The formation in any country of ways of interaction between banks and Fintech companies directly depends on the policy of the financial regulator in relation to companies in this segment. Accordingly, it is worth noting the inequality in how regulators treat IT companies and traditional banks. In any country, lending institutions experience regulatory pressure from central banks. In particular, the regulator applies the requirements for the growth of equity capital to the bank, reducing the risk ratio, and forces it to abandon low-liquid assets.

Russia quickly appreciated all these challenges: The Bank of Russia highlights Big Data and Data Analysis, robotization and cloud technologies as the most promising financial technologies. The introduction of new technology must be accompanied by regulatory changes. The Department for the Development of Financial Technologies of the Bank of Russia identifies the following areas: regulation of marketplaces; development of blockchain technology (the

Bank is studying the market from the point of view of the possibility of using this technology); security and access rights of digital services; payment services; Big Data.

The modern banking system carries out most of its transactions through deposits, investments, and various lending operations. Every year the share of customers switching to using remote service channels is increasing due to the changing competitive environment in this industry with the emergence of Fintech companies, which will be discussed in more detail below. According to McKinsey study, 65% of Russian bank customers expressed a desire to buy banking products using tools such as mobile banking and internet banking. Russian banks' mobile applications have twice as many functions as their European counterparts, largely because Russian banks were already developing their competencies in the digital era, thereby making Russia one of the leaders in digital banking by 2018. This is a favourable condition for the rapid transition of Russian banks to digital services, even though Russia is still far from the Europe's level (60-70%).

Four main directions of development of the business model in the banking industry are being monitored at the current moment, taking into consideration the influence of the digital economy:

- Formation of own ecosystem
- Development of partnerships with other companies
- Provision of banking services under another's brand
- Creation of new lines of business based on blockchain

The transition to a financial ecosystem involves increased attention to consumer needs and building partnerships with other companies. Own ecosystem allows banks to increase loyalty and increase customer's base. An excellent example is the "Thank you" bonus program from Sberbank. The bonuses themself are not enough to attract customers, so the bank's management decided to supplement the program with such offers as "Thank you from Sberbank. Travel" and "Thank you from Sberbank. Impressions" to increase the interest and to attract the attention of customers. Such offers make the program unique and convenient for different categories of customers. Examples of outsourcing innovations, joint development and implementation of innovative solutions are the scoring systems of Alfa-Bank, Tinkoff Bank, etc. The banks' partners are social networks or cellular operators in these cases.

Another example is White Label (work under a foreign brand). It is used by banks when the long-term competitiveness of a bank is primarily determined by success in drastically cutting costs. White Label has both a number of advantages (focusing on the core business, additional income from the partner's program, etc.), and significant disadvantages: with a successful launch of the product, the reputation is not strengthened, additional resources are needed for technical support and product maintenance, etc. The largest banks in the USA and Australia can serve as an example of cooperation, which issue White Label cards for smaller banks, which can thus save on production.

Blockchain will also be able to dramatically change the banking sector. It can be noted that the use of blockchain will be effective in areas such as documentation and transactions already today. Nowadays, banking sector companies are faced with the task of optimizing transactions, so the implementation of blockchain can be an effective innovation that opens the opportunities and creates unique offers.

Let us move on to the concept of Fintech. Fintech (financial technology) is a technology that helps financial services and companies to manage the financial aspects of business. It includes software, applications, processes, and business models. Fintech also refers to an industry where companies use new financial technologies and solutions to compete with traditional financial institutions for clients. Fintech companies are very dynamic companies, often startups, focused on a specific innovative technology or process, covering everything from mobile payments to insurance. They attack the most profitable elements of the value chain. The latest PwC Fintech study indicates that Fintech companies could take at least a quarter of financial services business over the next five years.

The global investment in Fintech in 2019 is estimated to $ 53.3 billion showing a slight decrease of 3.7% compared to 2018. Thus, 2019 turned out to be the second in terms of investments since 2013 (see the Figure 1 below). The maximum in 2018 was achieved largely thanks to Ant Financial Services (known primarily as the owner of the Alipay payment system), which then raised a total of $ 14 billion. Without this number, investments in the Fintech sector in 2019 would have jumped by 29 % and updated the record.

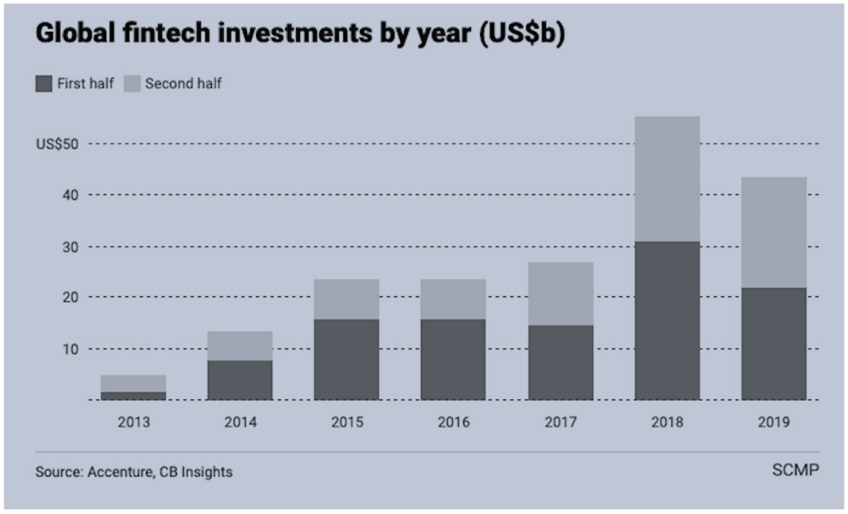

Figure 1: Global Fintech investments

Russia is entered the top three countries in terms of the popularity of Fintech services. This is evidenced by the results of the EY study, released on November 21, 2019 (See EY Report, 2019). Experts estimate the penetration index of Fintech services in Russia at 82%. The higher rate is only in China and India (87%). The five top leaders also included South Africa (82%) and Colombia (76%). According to the forecasts of the development of perspective Fintech segments in Russia by 2035 (See EY Report, 2018):

- 96.3% of all transactions will be made using innovative services
- 9.8% of all insurance premiums will be paid by operators of Fintech services for insurance
- 36.7% of funds will be allocated through innovative financing services
- 46.1% of assets will be managed by innovative services for investment

The main drivers for the development of the Fintech market are the development of technologies, changes in consumer preferences and the growth of Internet penetration. The second factor can easily be attributed to such a factor as the low level of customer satisfaction with banking services or their inaccessibility. This is mainly due to the lack of banking infrastructure, the creation of which requires a significant amount of time and investment, as well as a low level of consumer commitment to traditional banking services and, accordingly, their willingness to use innovative solutions.

Let now outline several promising Fintech areas in Russia. The optimal platform will be the emergency response system in case of accidents "ERA GLONASS". According to experts of NP "Glonass", the Russian market is the most promising market in the world for the implementation of smart insurance solutions for vehicles. Note that NP "GLONASS" together with insurance companies are actively shaping the market for "smart" insurance services in transport, improving the legislative regulation of the sphere, organizing pilot projects to test technical solutions, equipment, platforms and business models for providing innovative insurance services.

P2P insurance can also be another promising area. As world practice shows, P2P communities may well be additional or independent channels for the distribution of insurance services and a way to form a positive customer experience. However, now the development of P2P insurance is still constrained by the lack of an appropriate legislative framework.

Let us dwell separately on one more direction, which is at the stage of emergence not only in the Russian Federation, but throughout the world - predictive banking. Today, banks have access to large arrays of client data, thanks to the analysis of which financial institutions not only know their clients well but can also offer the client possible subsequent financial actions.

It is also worth noting what impact the digitalization of the economy has on Russia's GDP (see table 1 below):

Table 1: Sources of GDP growth

Optimization of production and logistics operations	– Production line monitoring in real time – Logistic optimization and determining priority directions	1,4-4,0
Improving the efficiency of the labor market	– Effective and quick job search and filling of vacancies – Distant work – New workplaces	2,1-2,9
Improving equipment performance	– Reduced equipment downtime and repair costs – Equipment utilization increase	0,4-1,4
Improving the efficiency of R&D and product development	– Quality control – Big data analysis for product development and improvement	0,2-0,5
Reduction the resource consumption and production losses	– Reduced energy and fuel consumption – Reduction production losses of raw materials	<0,1

The main source of economic growth in the sectors of the economy is a multifactorial increase in the operating productivity of companies, the estimated effect of which is 1.6–4.6 trillion rubles. per year by 2025. Another factor affecting GDP growth from digitalization of the economy is an increase in the return on productive and non-productive assets. The introduction of the Internet of Things can allow companies to achieve an increase in finished product yield, reduce equipment downtime, and optimize the utilization of production facilities; the estimated effect of the implementation of these measures is from 0.4 to 1.4 trillion rubles. per year by 2025.

In general, by 2025, according to McKinsey [1], the digitalization of the Russian economy will increase the country's GDP by 4.1-8.9 trillion rubles. Digitalization will provide from 19 to 34% of Russia's GDP growth, and the share of the digital economy itself may amount to 8-10% of GDP. Now the share of the digital economy in Russia's GDP is 3.9%. According to the McKinsey digitalization index, Russia is included in the group of so-called active followers through investments in the expansion of information and communication technologies (ICT) infrastructure and the introduction of technologies in government agencies. Despite this, the country is still behind the leaders in this area - Singapore, USA, Israel, and Western Europe (Great Britain, Germany, Spain, Italy, etc.). As a result, the possibilities of supporting the competitiveness of Russian companies are lower not only on an international scale (insignificant volume of high-tech exports), but also domestically (displacement by foreign companies of Russian players in the segments of e-commerce, social networks, and search engines).

Discussion

So, to develop the financial system in digital era the creation and effective functioning of the Fintech ecosystem is required. This requires the development of technologies and increasing demand for Fintech services and products through comprehensive measures aimed at providing Fintech companies with access to finance, as well as improving the regulatory environment and the training process.

The imperfection of the structure of the financial sector leads to arising of risks that leads to ineffective functioning of financial institutions. In economic theory, all these problems have been sufficiently studied, but in the new conditions of the digital economy, financial intermediaries are more often faced with new risks.
Cyber risk management now is a complex and rapidly developing industry. Another risk is that digitalization is gradually blurring the line between banking and non-banking activities; the speed of creation of new payment instruments outstrips the adaptability of the banking environment to it. An important question arises also on consequences of technical failures. In case the external service provider dominates the market will be systemic risk, since the problem may already happen outside the financial industry - for example, through the introduction of cloud technology. And, of course, a huge problem is the lack of awareness of consumers about the proper level of protection of their data.

But it is possible to minimize the appearance of these problems in the financial sector with the necessary level of government regulation soon.

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The Dilemmas of Measuring the Regional Socio-Economic Development: A Case Study of Poland

Elżbieta OCIEPA-KICINSKA, PhD Ing.
Institute of Spatial Management and Socio-Economic Geography,
University of Szczecin, 70-453 Szczecin, Poland, elzbieta.ociepa-kicinska@usz.edu.pl

Rafał CZYZYCKI, PhD
Institute of Spatial Management and Socio-Economic Geography,
University of Szczecin, 70-453 Szczecin, Poland, rafal.czyzycki@usz.edu.pl

Piotr SZKLARZ, PhD
Institute of Spatial Management and Socio-Economic Geography,
University of Szczecin, 70-453 Szczecin, Poland, piotr.szklarz@usz.edu.pl

Rafał KLOSKA
Professor of the Univeristy of Szczecin, PhD
Institute of Spatial Management and Socio-Economic Geography,
University of Szczecin, 70-453 Szczecin, Poland, rafal.kloska@usz.edu.pl

Abstract

Processes of social, economic, and regional development are of interdisciplinary nature and they are described by a host of definitions. The academic literature on the subject also emphasises the specific subjectivity of measuring such phenomena, predominantly determined by the lack of up-to-date and universal measures dedicated for this process. Analysing the literature on the subject as well as studies conducted on a national and international scale, it is possible to notice there is no measure dedicated for evaluation of a regional level of socio-economic development, which is adequate for Poland (or other countries at a similar level of development). This article aims at analysing the level of socio-economic development of individual regions in Poland. To this end, a relative coefficient of regional socio-economic development was constructed, which takes into account a broad, up-to-date set of factors of regional socio-economic development. The research study covers the years 2010 – 2018 and consists of three stages: preparing a comprehensive set of variables that describe regional socio-economic development, analysing the input data by means of the linear ordering method based on the data prepared with the zero unitarisation method and the relative coefficient of regional socio-economic development, and analysing the regional well-being ranking according to OECD, including verification of the correlation level of both rankings results. The analysis of the relative coefficient of regional socio-economic development demonstrated increasing discrepancy between the highest and lowest values for the individual regions is astonishing. The presented findings confirm the extreme ranking positions taken by the particular regions, as a result of applying various research methods.

Keywords: Economic Cohesion; Regional Policy; Economic Governance; Social Governance.

Introduction

Processes of socio-economic and regional development are often addressed in academic studies. The concept of a region as a research tool boils down to separating homogeneous areas where a certain feature or a set of features are observed, which are relevant from the point of view of the research problem in question (Chojnicki & Czyż, 1992, p. 2). EU policy identifies regions in Poland with Polish voivodeships (NUTS 2). Domański (2012, p. 18) emphasises that EU regulations apply the principle that vital development processes take place at the regional level, therefore the EU earmarks a considerable part of its budget for regional development, and it also runs research projects on economic development of regions. According to Regional Development Policy presented by OECD, regional development may be

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perceived in most general terms as an effort made in order to decrease the regional disproportions via supporting business activity in those regions. The objective of a regional policy should be ensuring a possibility of development and high living standard to the inhabitants in various types of regions (OECD Regional Outlook 2016, p. 26).

Development is a process of positive changes comprising both quantitative growth and qualitative progress, where the quantitative aspect encompasses the concept of economic growth, while the qualitative aspect regards transformation of socio-economic structures, as a result of which they acquire new characteristics (Klóska, 2015, p. 14). Salecka (2018, p. 68) asserts that the result of development is the continuous improvement of people's living conditions. Parysek (2018, pp. 39, 41) emphasises that this is a multi-level and long-lasting process, nevertheless it seems that despite the complex and structured nature, it can be interpreted also in terms of changes of concrete properties of the individual constituents of the socio-economic system, i.e. its distinguished elements that are decisive for the developed structures. Analysing this phenomenon, it can be said that the condition necessary for any socio-economic development is economic development – the public in the first place must meet their basic needs which grow and implicate socio-economic development, whereas economic development is determined by the economic growth which at the same time is a derivative of the socio-economic development.

Over the recent years, many studies addressed the theory and determinants of regional and socio-economic development, methods and tools for managing the regional development (for more details please refer to: Aivazian et al., 2018, 2018; Florida et al., 2008; Herbst, 2007, 2012; Klasik & Kuźnik, 2017; Klóska, 2015; Nowakowska, 2015; Zakrzewska-Półtorak, 2012). However, according to the author of this article, there is no up-to-date study that accounts for the broadest possible scope of research regarding the level of socio-economic development, which is adequate for the regions in Poland. This study aims at analysing the level of socio-economic development of the regions in Poland. To this end, a relative coefficient of regional socio-economic development was constructed, which takes into account a broad, up-to-date set of factors of regional socio-economic development. This is particularly important in view of the fact that, at the moment, the COVID-19 pandemic is paralysing the global economy, which also affects all the national and regional economies. It is too early to evaluate the possible outcomes of this event, nevertheless in the future this study may constitute a basis for analysing the situation before the economy slowed down. Application of analogous computation methods will make it possible to objectively assess the changes in the levels of regional socio-economic development in Poland.

The Literature Review

The older studies generally applied the traditional measures of economic development, based on the national accounts systems (GDP, GNP, NNP), as the approximate, general indicator of the social development and across-the-board progress level (Obrębalski, 2013, p. 40). Kubiczek (2014, pp. 52, 53) emphasises that not all countries are interested in standardising the measures of development, as such indexes often demonstrate a lower level of the given country's development and adversely affect its image.

In the OECD analyses the data are broken down into five categories of socio-economic factors (Gross domestic expenditure on R-D by sector of performance and socio-economic objective, 2020): environment, energy, industrial production and technology, agriculture, education. Eurostat is based on 12 indicators demonstrating activities in 3 categories: economic development, competitiveness, innovations and eco-effectiveness and employment (Table 1).

Table 1: Socio-economic development indicators applied by Eurostat

Headline indicators	Operational indicators	Explanatory indicators
Real GDP per inhabitant	Economic development	
	Investments Disposable income of household per capita	GDP per capita Net national income Household savings
	Competitiveness, innovations and eco-effectiveness	
	Labour productivity increase	Eco-innovation indexes R&D expenditure Relative price and cost index Turnover from innovation Energy intensity of the economy
	Employment	
	Employment rate Young people neither in employment nor in education and training	Employment rate as per employment level Employment rate across regions Unemployment rate Labour cost to labour productivity ratio

Source: Zimny (2016, p. 76).

OECD also presents the tool: *Regional Well-Being: A Closer Measure of Life*, which makes it possible to measure the well-being level in a concrete region and compare it with 402 other regions (For analytical purposes, the OECD classifies regions as the first administrative tier of sub-national government. This classification is used by National Statistical Offices to collect information and it represents in many countries the framework for implementing the regional policies) on the basis of eleven key themes related to inhabitants' life quality. According to OECD, in order to better understand how the society functions, it is necessary to go beyond GDP level measurement and other economic statistics (OECD, 2018). The set of ratios illustrating the regional well-being level consists of three categories comprising from 2 to 6 topics:

1. material conditions:
   - household income per capita,
   - labour market (employment rate and unemployment level)
   - housing conditions (number of rooms per person),
2. life quality:
   - health (life expectancy, age-specific mortality rate)
   - education (percentage of labour with at least upper secondary education),
   - environment (estimated average exposure to air pollution with PM2.5 ($\mu g/m^3$)), assessed by means of satellite-based data,
   - security (homicide rate),
   - civic engagement (voter turnout),
   - availability of services (percentage of households with broad-band access),
3. subjective level of well-being:
   - community (percentage of people having friends or relatives they can rely on in case of need),
   - life satisfaction (average self-assessment of satisfaction with life, on a scale from 0 to 10).

An intersting set of indicators of Poland's sustainable development was proposed by the Central Statistical Office of Poland in the study *Wskaźniki zrównoważonego rozwoju Polski 2015* [Indicators of sustainable development of Poland] (GUS, 2015) (Figure 1).

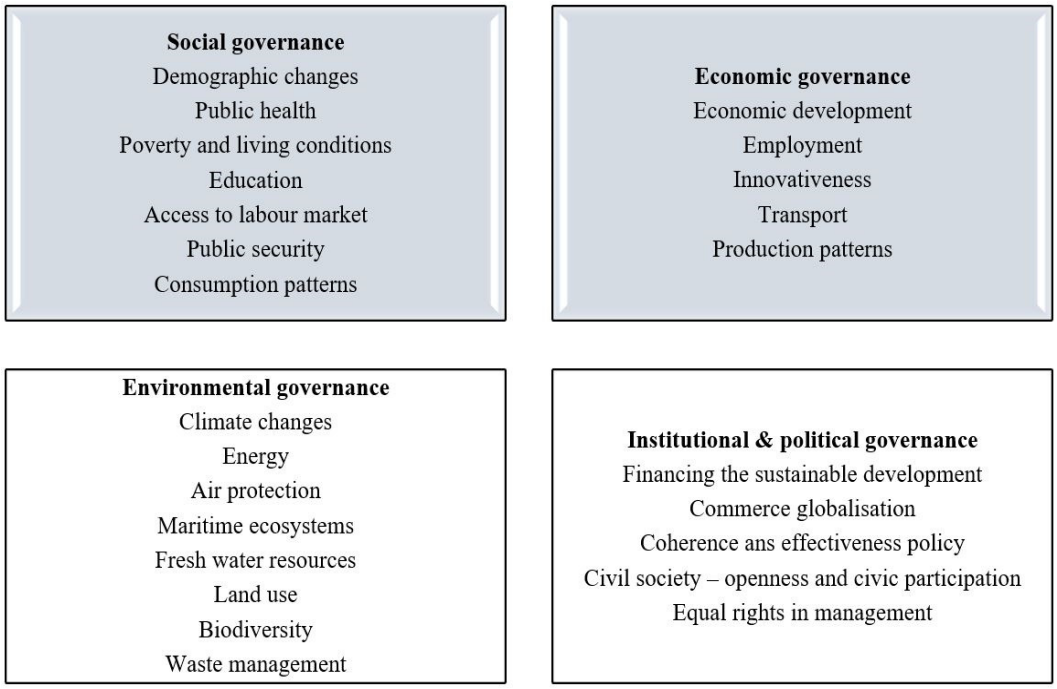

Figure 1: Thematic areas of indicators of Poland's sustainable development, according to the Central Statistical Office of Poland.

Source: own study based on (GUS, 2015, pp. 54–297).

In the study entitled "Innovation and Regional Socio-Economic Development – Evidence from the Finnish Local Administrative Units" (2011), Makkonen proposes a set of 15 variables that describe innovations and socio-economic development (Table 2).

Malganova & Zagladina (2015), researching socio-economic development, distinguished three groups of factors determining the process, breaking them down into:

- positively affecting (e.g. daytime educational institutions per 1000 pupils, number of teachers in daytime general education institutions per 1000 pupils, provision of population with home telephones of urban and rural public network per 100 families pieces),
- negatively affecting (e.g. mortality per 1000 persons of population, mortality of infants at the age under 1 year per 1000 births),
- neutral (e.g. places in kindergartens provision for children of 1-6 of age per 1000 children, books in public libraries per 1000 persons of population.

Table 2: Chosen variables for depicting innovation and regional socio-economic development

Category	Variable
Patents	Patents granted/1,000 inhabitants
Population	Number of inhabitants
Population change	Net population change % (natural population change and migration)
Working population	Percentage of people of working age (between 15 and 64 years of age)
Unemployment	Unemployment rate %
Dependency ratio	Non-working population compared with working population
Gender structure	Number of women compared with 1,000 men
Education	Percentage of population with higher education (20 years and older)
Urbanization	Percentage of densely populated areas
GDP	Gross domestic product/inhabitant
GVA	Gross value added/inhabitant
Income	Gross income/inhabitant
Housing	Percentage of small and/or inadequate housing
Housing costs	Average cost of housing €/m²

Source: Makkonen, 2011, p. 34.

The study pertained to the Republic of Tatarstan (the Russian Federation), which is currently at a different stage of socio-economic development than Poland, therefore not all of the data are adequate to be applied in an analysis concerning Poland.

Among the factors taken into account in measuring the level of the socio-economic development in Poland, the predominant ones are those which characterise the condition and structure of the population and population-related processes, labour market, with a particular focus on unemployment level, pay level, quantity (and structure) of national economy entities entered in the REGON register (entrepreneurship), budget spending of local administrative units, prices level, investment expenditure level, GDP per capita, and aspects related to education, health protection and (more and more often) the broadly understood ecological awareness (Salecka, 2018; Stanny, 2012; Stasiak, 2016; Ziemiańczyk, 2010; Zimny, 2016). The literature on the subject emphasises that the population is a carrier of specific needs, and at the same time it generates labour force which will meet those needs (Kupiec, 2011, pp. 9–11). Human capital is a factor that affects the long-term economic growth rate – investing in human capital results in internal effects in the form of increased labour productivity, and also external effects in the form of increased productivity of material capital, therefore it may be deemed to be the key element of the contemporary economy, which stimulates the productivity in the economies where it is found (Korenik, 2008, p. 107).

As Ziemiańczyk (2010, p. 34) concluded: complex phenomena, which undoubtedly include socio-economic development, are very difficult to assess in an objective and unambiguous manner. Czyżycki (Czyżycki, 2012, pp. 22, 23) points out that preparing any types of rankings, and putting them in any sort of order in terms of socio-economic development, is to a certain extent subjective.

Based on the literature review it was found that the most relevant and broad set of indicators was proposed by the Central Statistical Office of Poland (GUS, 2015). When analysing the indicators that apply to social and economic governance, it is possible to notice that they are coherent with those applied by the aforementioned authors (however, no other author utilised them in such a broad array). The only study which to a partial extent proposed application of totally different indicators was the article of Malganova & Zagladina (2015), where the analysed data were inadequate to the current situation in Poland, such as e.g. quantity of landline telephones. Unfortunately, in the said study the Central Statistical Office of Poland did not present any analyses at the regional level – the study only addressed changes in the indicators over time and their values were compared to the analogous values for individual EU member states or general data describing the EU. In view of the above, for the purposes of this analysis the author decided to use the set of indicators proposed by the Central Statistical Office of Poland. Nevertheless, it was necessary to slightly adjust them, which was due to the data availability and the specific nature of the regional data – some of the data held by the Central Statistical Office were typical for characteristics on a national scale.

Data and Methodology

The methodology comprises the following sequence of stages:

1. preparing a comprehensive set of variables describing the regional socio-economic development: selecting and categorising the input data, preparing a comprehensive system of indicators;
2. analysing the input data by means of the linear ordering method based on the data prepared with the use of the zero unitarisation method and the relative coefficient of regional socio-economic development,
3. analysing the regional well-being ranking according to OECD, as well as verifying the correlation of the results of both rankings.

Based on the conclusions drawn from the literature review, the key measures of regional socio-economic development in Poland were selected. The input data used in the computations come from Bank Danych Lokalnych GUS [Local Statistical Data Bank] and pertain to the years 2010 – 2018. This period was determined by the data availability and the system of data presented by the Central Statistical Office. Where occasionally data were missing for a given year, interpolation methods were used to supplement them. The socio-economic development of the individual regions was characterised by means of 32 features assigned to 8 categories. Based on the analysis of the selected diagnostic variables, equal weights were attached. Table 3 presents the data applied in the study.

Table 3: Indicators of regional socio-economic development in Poland

s/n	Category	Indicator	Symbol	LTB/ STB
1	economic development	GDP per capita	x_1	LTB
		GDP dynamics per capita	x_2	LTB
		investment rate / GDP	x_3	LTB
2	employment and access to labour market	employment rate for people aged 20 – 64	x_4	LTB
		occupational inactivity rate for people aged 15 – 29	x_5	STB
		occupational activity coefficient	x_6	LTB
		registered unemployed/ working age population	x_7	STB
		employment rate for people with disabilities, aged 16 – 64	x_8	LTB
		number of national businesses per 10,000 of the working age population	x_9	LTB
3	innovativeness	net revenues from sale of innovative products/ total sales revenues	x_{10}	LTB
		number of people working in R&D/ total working population	x_{11}	LTB
		internal expenditure on R&D in relation to GDP (current prices)	x_{12}	LTB
		patents applications filed with the Polish Patent Office per 1,000,000 population	x_{13}	LTB
4	production and consumption patterns	percentage of certified ecological farms in total cultivated land	x_{14}	LTB
		total PM emissions per km^2	x_{15}	STB
		electric power consumption per inhabitant	x_{16}	LTB
		average monthly spending per person	x_{17}	LTB
5	demographic changes	fertility rate and gross reproduction rate	x_{18}	LTB
		migration balance	x_{19}	LTB
		rate of natural increase per 1000 population as per place of residence	x_{20}	LTB
		post-working age population per 100 working population	x_{21}	STB
6	poverty and life conditions	poverty ratio (% of people in households with spending below the relative poverty line)	x_{22}	STB
		average monthly disposable income per person	x_{23}	LTB
		residential units commissioned in the given year/ population aged 25 – 34	x_{24}	LTB
7	education	percentage of adults aged 25 – 64 participating in education or training	x_{25}	LTB
		percentage of children aged 3 – 6 years attending kindergarten – in total	x_{26}	LTB
		expenses related to Section 801 – Education, in relation to GDP per capita	x_{27}	LTB
		graduates of tertiary education institutions per 10,000 population	x_{28}	LTB
8	public services and public security	physicians (as per their basic place of employment) per 10,000 population	x_{29}	LTB
		traffic accident fatalities per 100,000 population	x_{30}	STB
		total crimes confirmed by the Police per 1,000 population	x_{31}	STB
		expressways and motorways per 1,000 km^2	x_{32}	LTB

Source: own study.

The enumerated diagnostic variables are expressed in different units of measurement, which made any direct comparison impossible. In order to make them comparable and additive, they were transformed by means of the zero unitarisation method based on the span between the maximum and minimum values of the feature in question. Obtained values of the variables are positive and fall within the range from 0 to 1 ("1" stands for the most beneficial, and "0" for the least beneficial value of the examined variable). It was assumed that when a high value of the diagnostic variable for a given phenomenon is associated with beneficial growth, the feature is considered Larger-the-better (LTB), whereas in a situation where a low value of the variable is beneficial for the phenomenon in question, it is deemed Smaller-the-better (STB). The standardisation was carried out with the use of the following formulas (Ziemiańczyk, 2010, p. 34):

LTB:

$$Z_{ij} = \frac{x_{ij} - min x_{ij}}{max x_{ij} - min x_{ij}},$$

STB:

$$Z_{ij} = \frac{max x_{ij} - x_{ij}}{max x_{ij} - min x_{ij}},$$

where:

Zij – diagnostic variable, falling within the range from 0 to 1,
xij – the feature value for a given municipality,
min xij – the lowest value of the feature among the examined municipalities,
max xij – the highest value of the feature among the examined municipalities.
In the next step, a relative coefficient of regional socio-economic development was computed, by means of the following formula (Klóska 2015):

$$W_i = \frac{100}{k} \sum_{j=1}^{k} \alpha_j z_{ij},$$

where:

Wi – relative coefficient of regional socio-economic development,
k – quantity of variables considered in the study,
αj – weight of the jth variable,
zij – values of the statistical features xij considered in the study, standardised by means of the zero unitarisation method.
It was assumed that a higher value of the aggregate formula is associated with a higher level of socio-economic development. The analyses were carried out for each of the 16 regions over the years covered by the study (2010 – 2018), thus the input data in total included 4608 variables.

In the second part of the study, the regional well-being ranking according to OECD will be compared to the results of the analysis involving the relative coefficient of regional socio-economic development. The tool OECD Regional Well-Being: A Closer Measure of Life, which measures the well-being level in a concrete region and makes it possible to compare it to 402 other regions on the basis of eleven key themes related to inhabitants' life quality. The compared regional well-being measures offer a new way to assess the effects of policies implementation, and make it possible to take actions to attain a higher level of well-being for the citizens, also enabling a classification of regions both within any given country and in relation to regions in other countries (OECD, 2018).

Results and Discussion

The analysis of the relative coefficient of regional socio-economic development, which was computed for the individual regions in Poland for the years 2010 – 2018 (Figure 3) indicates stability of positions taken by individual regions, as well as considerable and persisting disproportions in the social and economic development between regions taking the positions at both ends of the ranking. Throughout the researched period, the top position in the ranking has been held by the region of Mazowieckie, whereas Świętokrzyskie has continually been in the weakest position. Slight changes between individual positions may be observed in the middle part of the ranking (Śląskie, Łódzkie, Zachodniopomorskie, Podkarpackie, Podlaskie), however, the changes tend to be incidental. What is interesting, the span between the highest and the lowest values of the relative coefficient of regional socio-economic development in the studied period rose from 37.2 in 2010 to 49.5 in 2018.

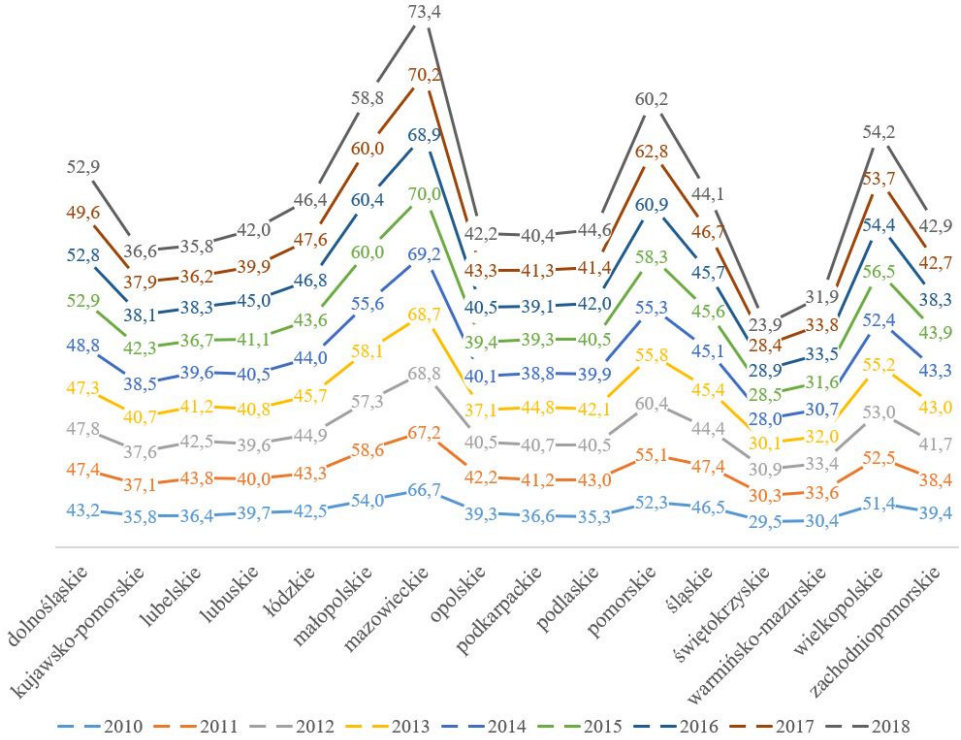

Figure 3: Ranking of Polish regions in the years 2010 – 2018 based on the relative coefficient of regional socio-economic development.

Source: own study

Figure 4 presents the regions ranking created by means of linear ordering of the value of the relative coefficient of regional socio-economic development for 2018.

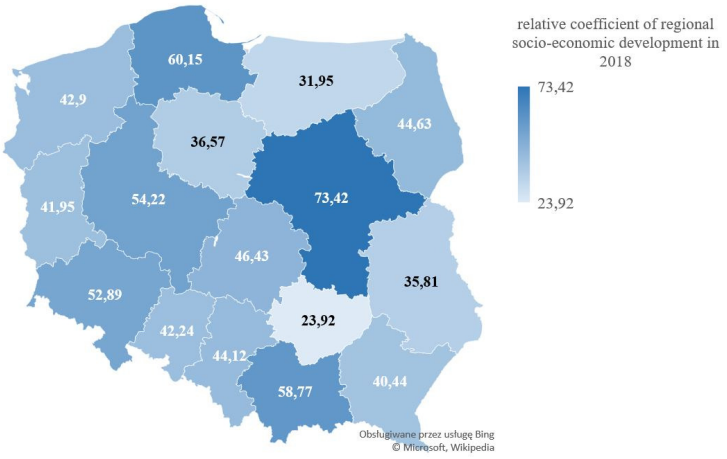

Figure 4: Value of the relative coefficient of regional socio-economic development in Poland in 2018

Source: own study.

The analysis results may question the effectiveness of the EU regional programmes aimed at decreasing the disproportions between regions. On the other hand, the more developed regions keep developing.

The further stage of the study involved an analysis of the set of indicators illustrating the level of regional well-being, consisting of three categories comprising from 2 to 6 topics which were described in the Introduction to this article (for more details please refer to: OECD Regional Well-Being: A user's guide). The well-being indicators are expressed in various units. In order to make it possible to compare them on the same scale, they are standardised by means of the min-max method, bringing them to values ranging from 0 to 10. Table 4 presents 11 well-being indicators for the individual regions in Poland, against all the 403 regions evaluated by OECD. The values of the indicators specified by OECD for the individual Polish regions and for all the 11 categories vs. the values of the relative coefficient of regional socio-economic development computed for 2018.

Table 4: *OECD Regional Well-Being* indicators for the individual regions in Poland (scale from 0 to 10).

Region	Education	Labour market	Income	Security	Health	Environment	Civic engagement	Availability of services	Housing conditions	Society	Life satisfaction
Dolnośląskie	10.00	6.66	2.72	8.27	3.27	1.74	1.58	6.63	1.11	5.95	3.33
Kujawsko-pomorskie	9.71	6.17	2.18	9.14	3.33	2.25	0.96	5.65	0.00	8.06	2.96
Łódzkie	9.68	7.47	2.60	9.14	1.87	0.06	2.03	5.82	0.56	7.15	2.59
Lubelskie	9.63	5.59	2.06	8.40	3.73	1.82	1.49	6.14	0.56	8.78	2.22
Lubuskie	9.64	6.84	2.22	7.04	2.92	3.47	0.59	5.82	0.56	6.27	2.96
Małopolskie	10.00	6.84	2.40	9.88	4.89	0.33	2.70	6.63	0.56	7.86	2.59
Mazowieckie	10.00	7.63	3.24	8.89	4.03	1.00	3.48	6.79	1.11	7.59	2.96
Opolskie	9.75	6.63	2.32	9.51	3.83	0.00	0.28	5.98	1.11	6.51	2.59
Podkarpackie	10.00	4.96	1.88	9.63	4.84	2.07	1.78	7.60	0.00	8.78	1.11
Podlaskie	9.57	6.43	1.99	9.38	4.03	3.24	1.10	5.65	1.11	8.10	2.59
Pomorskie	9.75	7.11	2.47	9.38	3.88	4.14	2.09	7.27	0.56	6.63	3.70
Śląskie	10.00	6.74	3.03	8.64	2.92	0.00	2.15	6.14	0.56	7.03	2.59
Świętokrzyskie	9.63	5.76	2.14	9.38	3.38	0.82	1.04	4.93	0.00	7.23	1.11
Warmińsko -mazurskie	9.12	5.06	2.10	8.52	2.57	3.37	0.12	5.49	0.00	7.90	3.33
Wielkopolskie	9.96	7.94	2.69	9.75	3.34	2.03	1.74	6.79	0.56	7.98	3.33
Zachodniopomorskie	9.47	6.22	2.48	8.52	3.27	4.50	0.86	6.30	0.56	8.34	5.56

Source: own study based on OECD, 2018.

In both rankings, the highest values were attained by Mazowieckie and Pomorskie (1st and 2nd place), Podlaskie ranked in the middle (6th and 7th position), whereas the last two regions were Warmińsko-mazurskie (15th place) and Świętokrzyskie (16th place). In the case of some regions the evaluations are not that coherent, e.g. Zachodniopomorskie (4th and 9th place), Podkarpackie (7th and 12th place), Dolnośląskie (8th and 5th place) or Kujawsko-pomorskie (9th and 13th place). Still, the analysis of the findings with the use of Pearson coefficient demonstrates a significant correlation between the analysed variables (0.79).

Summary and conclusions

There is no ideal method to compute the level of social and economic development, nevertheless, this study attempts to analyse the available and up-to-date methods that are appropriate for conducting research studies at the regional level and make it possible to provide a broad array of variables. The subject tackled in this article is not novel and it is addressed in the literature on the subject, however, the presented way of measuring the regional socio-economic development was predicated on a thorough literature review resulting in a vast number of variables.

The time span covered by the study was 9 years, and the obtained findings demonstrated coherent values for all the years – to be more specific, the values of the relative coefficient of regional socio-economic development computed for a given region were not significantly divergent from each other over the subsequent years. This study does not contain any generalisations, and it was aimed at possibly the most detailed analysis of the level of the regional socio-economic development in Poland. In this respect, it is possible to notice disproportions between some regions, which persist over

time. On the one hand, the more developed regions have better conditions that facilitate further regional growth. On the other hand, the less developed regions are provided with support to enable their development. In this aspect, the increasing discrepancy between the highest and lowest values for the individual regions is astonishing. Pursuant to the assumptions of the EU Cohesion Policy, this value should be decreasing. One may consider whether or not it would be reasonable to quote more rankings kept by other institutions. However, in the opinion of the author of this article, this is not necessary, because – as already pointed out in the Introduction – not each type of ranking is appropriate for all countries (which also does not mean that it is not worth making an attempt to supplement the created indicator to cover other countries, e.g. within the European Union). On the other hand, the obtained findings are strongly correlated with the results of the study on the regional well-being level as per OECD's standards, which provides the grounds to believe that the variables applied in this study as well as the adopted methods are correct.

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Impact of COVID-19 on Digital Transformation in B2B Small Companies

Ksenia RAYTER
M. Econ., 2nd year PhD student, HSE University – Saint-Petersburg, Russia
(ksenia.rayter@mail.ru)

Olga KONNIKOVA
PhD, Ass. Professor of Marketing Department, Saint-Petersburg State University of Economics, Russia.
(olga.a.konnikova@gmail.com)

Abstract

This paper deals with digital integration in marketing strategies for B2B small companies. The use of digital technologies is widespread in creating the marketing strategies of small B2C companies, but small B2B companies before the pandemic denied the need to use digital technologies due to the lack of budget, time and human resources. The impact of the COVID-19 has dramatically changed marketing and business priorities. The efficiency of companies has dropped markedly due to working from home, reductions and social distance between people. This has prompted many companies to look for new innovative solutions to maintain their market positions. Since everyone moved to the online space, the digital transformation of their marketing strategies can be such a solution for small B2B companies. The goal of the work is to analyze the main prerequisites and reasons for the digital transformation of marketing strategies for small B2B companies in the context of economic instability caused by COVID-19. To test our hypothesis, it is planned to conduct in-depth interviews and online questionnaires among small B2B enterprises.

Keywords: COVID-19, pandemic crisis, digitalization, B2B, SMEs.

The starting point for changes introduced due to or in spite of COVID-19 can be considered December 2019. In other words, in some countries (for example, China), certain changes have been taking place for almost a year now.

During the pandemic, almost all countries managed to close all mass gatherings of people (shopping centers, gyms, universities, schools, etc.), postpone or cancel concerts, theater productions, etc.), close borders between countries, restrict movement between cities, and switch the maximum number of enterprises to distant or modification operation. Small businesses and individual entrepreneurs are closing down at a breakneck rate, and people are losing their jobs. According to the latest data From Rosstat (July 2020), unemployment in Russia is 6.3 %. This is the highest level of unemployment since the economic crisis in 2008.

In fact, the financial situation of the countries has "sunk" even lower than in 2008. Obviously, there is no hope that economic growth can be restored quickly after the Covid-19 pandemic (OECD 2020). At the same time, the economic recession inevitably leads to a decline in business activity in most companies (Ahmed et al. 2014). Today small businesses are closing both because of bankruptcy and needlessness, since the nature of demand is changing.

To survive the coronavirus crisis and gain competitive advantages, small companies have to develop innovative strategies. That means they should be more flexible in their marketing strategies. Companies are now more aware of their customers ' needs, and they are trying to use the pandemic situation to appeal to people's emotions, and marketing is a great tool for this. As the whole world has switched to online mode these days, you can see the abundant growth of social media marketing and other types of digital marketing.

However, B2C companies have much more opportunities to invest and develop innovative strategies using Internet marketing technologies and digital tools than B2B companies. The large number in the use of digital tools by B2C companies is due to the fact that B2B sales require an individual approach to customers, including the use of not only system, but also socio-psychological tools for sales and promotion. In this regard, when planning their presence on the Internet, B2B companies need to analyze the needs of their consumers in more detail at each stage.

Moreover, the lack of perception of the Internet marketing relevance, as well as the lack of budget, time and human resources for small B2B companies persisted until the beginning of the pandemic. The situation with the pandemic

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has led to the tremendous changes around the world. Therefore, those companies that were able to quickly respond to the situation and start a digital transformation were able to maintain their position in the market, and some even made profits.

Small B2B companies are most vulnerable to the effects of COVID-19. In consequence of the transition to the online world, social distance between people, bankruptcy of companies, dismissals, reductions and transfer of workers in remote, the usual operation mode of B2B sales managers is almost impossible. Companies have to create short-term solutions and future-oriented strategies for their businesses and their customers. They have to be creative with their products, services and communications. They need to give the right message: that they can successfully work in a crisis.

In accordance with the article (Guo et al 2020), in the context of a crisis, the dynamic capabilities of companies can be divided into three aspects: sensing the crisis, seizing new opportunities in the crisis (Ballesteros et al. 2017; Teece 2007), and reconfiguring resources to cope with a crisis. Of course, it was impossible to anticipate the coronavirus crisis, but companies could rethink the ways to submit marketing campaigns and their content. For the majority, this means focusing spending in the survey, studying consumers ' lifestyles, and adapting their marketing strategies.

The results of an online survey of Chinese companies (Guo, H., Yang, Z., Huang, R. et al 2020) showed a high awareness of the need for digital transformation in all indicators: social, mobile, big data, cloud computing, IoT (Internet of Things), platform development, and Artificial Intelligence (Bharadwaj et al. 2013; Sebastian et al. 2017; Vial 2019).

Today, small B2C SMEs include in their marketing strategies an increasing use of social networks, online software, re-budgeting, monitoring business transactions and inventory (Winarsih et al. 2020). As for B2B companies, unfortunately, so far they mostly survive due to subsidies from the state and rapid cuts in expenses, both operational and organizational.

However, the crisis is a unique opportunity for the company's growth and prosperity (Civi 2013). Above all, B2B companies do not need to reduce their marketing budgets during a recession. (Rizomyliotis et al. 2017). The research has shown that increasing the marketing budget during downturns leads to a full return on investment, an increase in market share, and an increase in sales (Nickell et al. 2013).

Further research can be refined by checking the structure of the frame. To collect data, we will use the method of online questionnaires and in-depth interviews with stakeholders of small B2B companies. The results of this study are expected to provide recommendations for small B2B companies to implement and digitally adapt their marketing strategies to achieve sustainability.

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Dynamics of the World and Russian Economy in the Coronavirus Pandemic Context

Irina A. KATSYUBA
Ph. D, Associate Professor, Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia, k4589@mail.ru

Elena N. KLOCHKOVA
Ph. D, Associate Professor, Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia, klochkovaen@yandex.ru

Julia N. LVOVA
Ph. D, Associate Professor, Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia, jnlvova@gmail.com

Nadezhda P. RADKOVSKAYA
Dr., Professor, Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia, nprad2@gmail.com

Julia A. STEPKINA
Ph. D, Associate Professor, Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia, yulessa@yandex.ru

Abstract

The article considers and systematizes the main prerequisites for the emergence of the global economic crisis in 2020. A comparative analysis of the crisis of 2008 and 2020 is carried out. The article describes the economic situation in Russia on the eve of the crisis in 2020, by taking into account national characteristics and geopolitical factors in the form of international sanctions which affect its development. The assessment of measures of state support to the Russian economy during the crisis is given. There are defined and well thought out the principles of companies' and corporations' activity in the current conditions.

Keywords: Coronavirus Pandemic, Financial Market, Economy, Financial Crisis.

Introduction

The relevance of the research of the scientific problem is due to the new economic crisis, the trigger of which for the first time in modern history was a coronavirus infection that brought down several industries and financial markets. The peculiarity of this crisis is that it is impossible to predict the depth of the recession in advance due to the dependence of its end date on the release and effectiveness of the vaccine.

Another significant problem is that against the background of the global crisis, geopolitical disunity between countries and regional associations come into existence and is in progress, which makes it difficult to join efforts in order to resist the pandemic and the crisis caused by it.

The purpose of this article is to conduct a comparative analysis of the global crisis of 2008 and 2020 on the basis of systematization of distinctive features and factors influencing their occurrence.

This purpose determines the assessment of measures to support the national economy, allowing to minimize losses in the recovery from the crisis caused by the pandemic.

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Degree of The Problem Development

Currently, many countries are conducting research on the impact of the coronavirus pandemic on the national economy (Tiirinki et al (2020), Finland; Higginson et al (2020), Australia; Norouzi et al (2020), China etc.), the global economy and industry markets. We analyzed the researches of the different authors, such as NICA (2020), Yue (2020) and Hiscott (2020). These research papers assess the possibilities of preventing and identifying risks, predict the impact of the crisis on various industries, and discuss the long-term global consequences of the crisis.

Analytics

The current economic crisis was predicted long before it began and was presented by expert communities as another classic cyclical crisis without any major disturbances. However, by the end of March 2020 The international monetary Fund (IMF) has officially announced a contraction in the global economy and the beginning of a recession. It was announced that the coronavirus pandemic COVID-19 was the main reason for this. For the first time (in the history of the modern world, an unprecedented situation has come about when a deadly disease has dealt a serious blow to the global economic and financial systems. However, it should be noted that the coronavirus was only a trigger, and not the main reason for the beginning of another crisis.

The main prerequisites for the 2020 crisis include the following

Slowdown in the Global Economy Growth

According to the Organization for Economic Cooperation and Development (OECD), the growth rate of the global economy in 2019 was the lowest since the financial crisis of 2008 and amounted to 2.3% (2008 – 4.1%).

By the beginning of 2020, a slowdown in economic growth was already observed in all leading economies: China 2019 – 6.1% (2008 – 11.4%), the EU – 1.2% (2.3%), Russia – 1.1% (7.5%). Over the past ten years, the probability of an economic downturn in the United States has increased at most (Fig. 1).

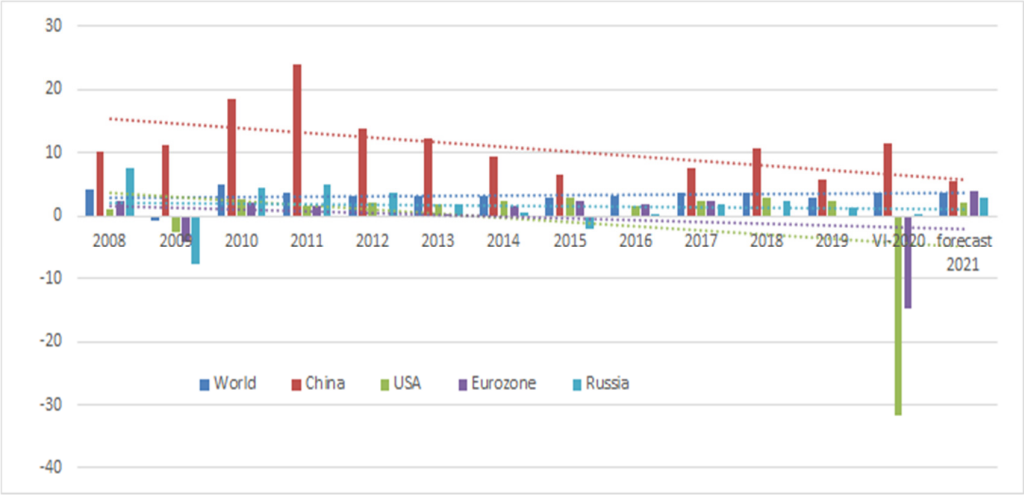

Fig. 1: GDP growth rate and forecast for 2021 (%)

(Source: compiled by the authors based on own research)

This existing situation allowed John Graham, a Professor of Finance at Duke University, to confirm that for the first time in a decade, no region of the world was in a strong enough economic position to become the driving force of the global economy.

According to a research study by Grishin (2020), the globality and uncertainty of the situation, the dynamics of the development of processes, the lack of precedents and social experience in resolving it makes it complicated to give real forecasts for the future.

High Level of Global Debt

In November 2019 the International Monetary Fund (IMF) reported that global debt has broken another record — 188 trillion US dollars, which is 230% of the value of all goods and services on the planet. Despite the fact that the economy is considered unstable even with a debt exceeding 80 % of GDP (Fig. 2).

According to the IMF estimates, under the baseline scenario, public debt on a global scale is expected to reach its historical maximum in 2020 – 2021 and exceed 101% of GDP, an increase of 19 percentage points compared to the level of 2019.

At the same time, a significant threat to the global economy is the US debt of almost 70 trillion US dollars, of which 22 trillion US dollars (106% of GDP) are accounted for government loans. Economists estimate that by 2028, the United States will spend a fifth of the state budget on interest payments alone. The situation is complicated by the fact that almost 40% of the national debt belongs to foreign investors who are losing confidence in American assets.

Aggravation of Foreign Trade Conflicts

In the recent years, the US foreign economic policy has been characterized by an aggressive form of promoting national interests and protecting the domestic market through an uncoordinated increase in import tariffs on goods involved in international trade. This resulted in an ongoing standoff between the United States and China, which arose after the signing of the Memorandum "On Combating China's Economic Aggression" by the US President in 2018.

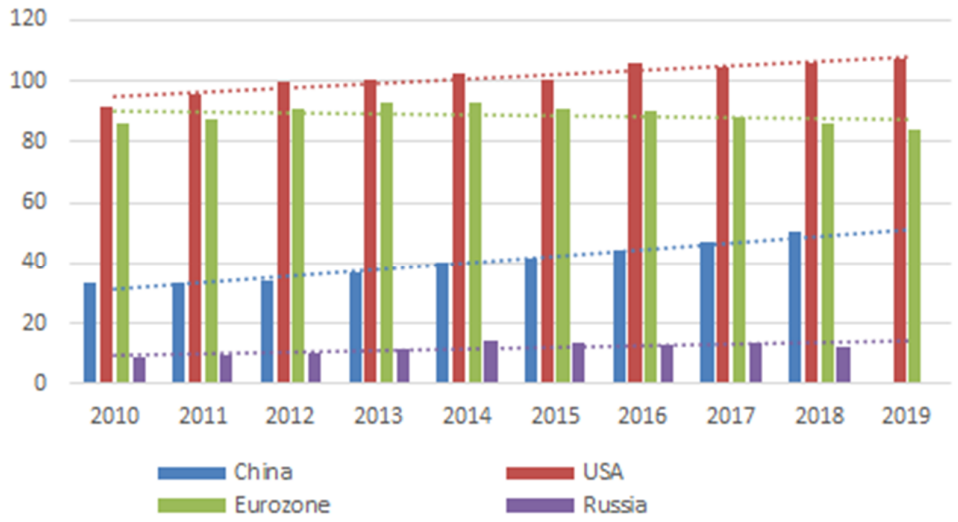

Fig. 2: Government debt-to-GDP ratio (%)

(Source: compiled by the authors based on own research)

The sanctions that followed were mainly directed at Chinese industrial products, while China's response (primarily) was directed at agricultural products. The conflict resulted in a redistribution of goods flows on the world market.

Falling Prices for Raw Materials and Energy

The growth of oil reserves in storage facilities and the constant increase in its production by oil-producing countries (including at the expense of shale oil in the United States) led to a decrease in its cost. In addition, this was affected by the fall in the growth rate of the world's leading economy and the main oil consumer of China. So, if the average price for Brent crude oil in 2019 was $ 63.59, then at the beginning of the pandemic and the transition to self-isolation in March 2020, it was $ 26.35.

Restrictions imposed in various sectors of the economy related to countering the spread of a new infection, as well as the termination of the OPEC + deal, and the continuation of price wars have served as catalysts for a decline in global oil demand and, as a result, an oversupply of raw materials on the market and lower oil prices.

The Russian economy, as an integral part of the global economic system, generally follows global trends, as can be seen in Figures 1 and 3.

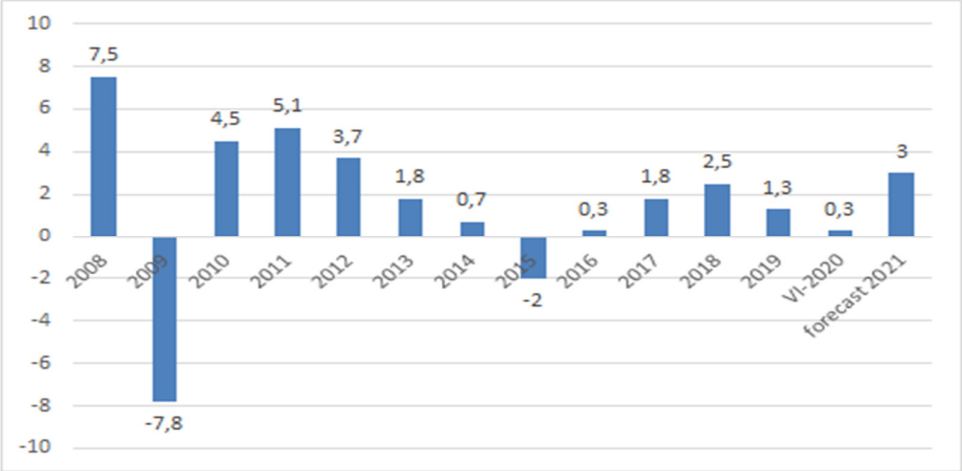

Fig. 3: Russia's GDP growth rate and forecast for 2021 (%)
(Source: compiled by the authors based on own research)

However, along with global trends, that affect GDP growth, the Russian economy has its own characteristics that hinder its progressive development. These characteristics are the following:

- raw material orientation of export. Exports of mineral resources, metal and wood account for more than 80 % of the Russian trade balance;
- weak competitiveness of domestic producers' products. Low share of exports of high-value-added goods, such as Mechanical engineering and Metalworking, which decreased from 20 to 5 %;
- technological lag in a number of industries and low labor productivity;

The most important factor, hindering the country's development, is the anti-Russian sanctions imposed by a number of foreign countries since 2014, which make it difficult not only to attract foreign investment, but also to enter international financial markets. As a result, the sanctions affected almost a fifth of Russia's GDP. Experts from the Analytical Credit Rating Agency (ACRA) estimated that the restrictions covered 54 % of the banking sector's assets, 95 % of the revenue of oil and gas companies, and almost all enterprises of the military-industrial complex. Every year, sanctions lead to Russia losing 1.5 % of GDP growth.

The negative impact of sanctions primarily affects the activities of companies and enterprises in the real sector of the economy and the financial sector. Restrictions on Russian companies' access to the international capital market have significantly reduced their business activity, forcing them to limit themselves mainly to the resources of the domestic market (Fig. 4).

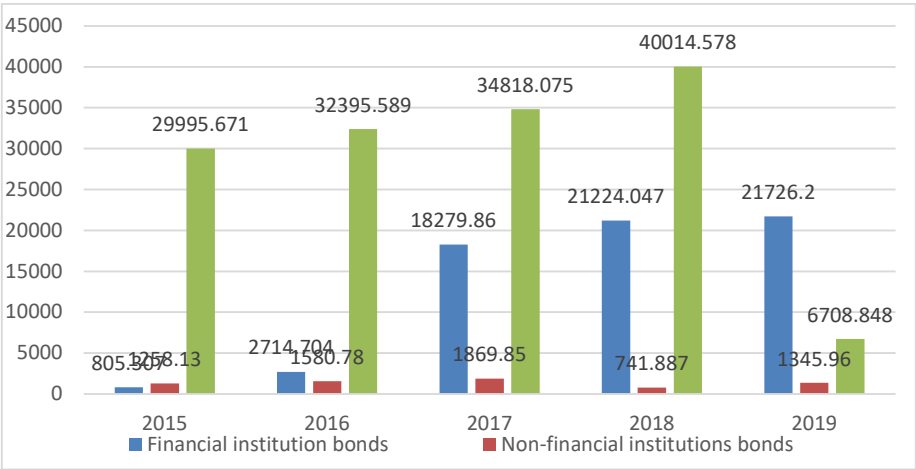

Fig. 4: Structure of Russian companies' borrowings on the domestic market (in billion rubles)
(Source: compiled by the authors based on own research)

Under these circumstances, the implementation of national projects financed from the budget should have provided significant support to the real sector of the economy and the social sphere. However, the cost of fighting the pandemic has required the Government to reduce costs, including on national projects. For example, Federal budget expenditures on the National Project "Comprehensive Plan for Modernization and Expansion of the Main Infrastructure" will be reduced from 158 billion rubles to 92 billion rubles. by optimizing the cost of building seaports (by 54 billion rubles) and communications between economic growth centers (by 38 billion rubles).

Thus, the world and Russian economies came to the beginning of a new crisis with a certain load of unresolved problems.

In Russian and foreign scientific and analytical publications crisis 2020 is often compared to the previous financial crisis of 2008 (Table 1).

Table 1: Comparative analysis of economic crises 2008 and 2020 years

Criterion	2008 year	2020 year
Trigger	Crisis in the US mortgage market	The COVID-19 pandemic that started in China
Nature	Financial Global	Event-driven Global
Degree of exposure on the economy	Bankruptcy of major banks and financial institutions; The depreciation of the currencies of developing countries; Rising oil and gold prices; Job cuts and rising unemployment; Decrease in real incomes of the population; The drop in consumer demand	Closing or restricting the operation of public catering, tourism, passenger and cargo transportation companies for the period of quarantine and self-isolation, which affected their financial condition up to bankruptcy; The depreciation of the currencies of developing countries; Falling oil prices and rising gold prices; Job cuts and rising unemployment; Decrease in real incomes of the population; The drop-in consumer demand
Support measures economy	Support of significant financial institutions by national governments and Central banks; Lower interest rates.	Support by national governments and Central banks for small businesses and the public; Lower interest rates; Reducing the tax burden on businesses; Reducing the regulatory burden on financial institutions
Main factors influencing the recovery from the crisis	Reform of the financial system (financial markets and financial institutions)	The likelihood of a second wave of the pandemic and the introduction of repeated restrictive measures; Creating a vaccine

(Source: compiled by the authors based on own research)

Using previous experience, leading experts, analytical agencies and international institutions try to make forecasts on the timing and depth of the recession, determine the impact of the crisis on the global and national economies, develop new models of the post-crisis economy and financial markets, and etc. At the same time, they take into account existing global threats and risks.

The International Economic Forum in 2020 prepared a Report on Global Risks, that may affect the world in 2020 and in the next decade (Table 2).

Table 2: Risk map 2020

Risks	Content
Geopolitical instability	The national policies of many countries show strong divisions combined with increasingly unstable international relations. This volatility is likely to continue
Economic problem	As economic confrontations between powers grow, the global economy shows more signs of slowing down
Climate	Weak international agreements contradict the growing involvement of society in climate change issues. Public pressure on the government against the backdrop of many natural disasters will make 2020 a turning point for accelerating processes aimed at significantly reducing emissions and increasing investment in this area
Biodiversity reduction	Many ecosystems are in decline or at risk of extinction. The loss of biodiversity will have irreversible consequences for society, the economy and the health of the planet
Digital fragmentation consequences	Geopolitical and geo-economic uncertainty, including the possibility of fragmentation of cyberspace, threatens to hinder the full potential of next-generation technologies
New pressure on health systems	Health systems around the world are at risk of becoming unusable. New vulnerabilities resulting from changing social, environmental, demographic, and technological patterns threaten to offset the significant gains in well-being and prosperity that health systems have sustained over the past century

(Source: compiled by the authors based on own research)

Announced March 11, 2020 the beginning of the coronavirus pandemic and subsequent measures to combat it in conditions of restrictions and self-isolation by the World Health Organization (WHO) have made significant changes to the risk map, changing priorities and causing tension in society.

The beginning of the coronavirus pandemic and subsequent measures to combat it in conditions of restrictions and self-isolation which was announced by the World Health Organization (WHO) on March 11, 2020 have made significant changes to the risk map, changing priorities and causing tension in society.

At the same time, even in the pre-crisis years, problems related to disagreements in society caused by property and social inequality, political splits, etc. were growing. Key global trends in 2019. were recognized the following:

- deglobalization, the growth of nationalist sentiments and selfishness, the increasing obsession of the authorities to support state interests. Previously, the trend towards globalization was supported by the leading Western countries, which are now closing in on themselves, turning to protectionism (for example, Brexit);
- destabilization of the liberal economic order;
- expected global tightening of tax regimes in almost all countries;
- the growth of geopolitical unpredictability.

Grishin (2020) mentioned that the crisis of 2020 in the context of a pandemic has only strengthened these trends, and the globality and uncertainty of the situation, the dynamics of development processes, the lack of precedents and social experience in resolving it make it difficult to make real forecasts for the future.

Despite this fact, various international institutions, expert communities and individual governments publish forecasts for economic recovery after the crisis caused by the pandemic. First of all this is necessary for developing measures to support national economics, the social sphere, the formation of budget policy, etc. According to the World Bank experts, it will take 5 years for the global economy to fully recover. The Russian government believes that the country's economy will recover in about 3 years, but the rate of return of various industries to the indicators achieved before the pandemic can vary from one year to five years or more. We should also take into account the fact that the recovery of the national economy is impossible without the support of the state and the Central Bank.

Therefore, since the beginning of the crisis in Russia, unprecedented measures have been taken to support primarily small businesses, the most affected by the crisis and the population. This is evidenced by the adoption of a number of

resolutions by the Government of the Russian Federation and the approval of a Plan to Overcome the Economic Consequences caused by a New Coronavirus Infection.

The state's participation in overcoming the consequences of the crisis in the economy can be represented as a system (Fig. 5).

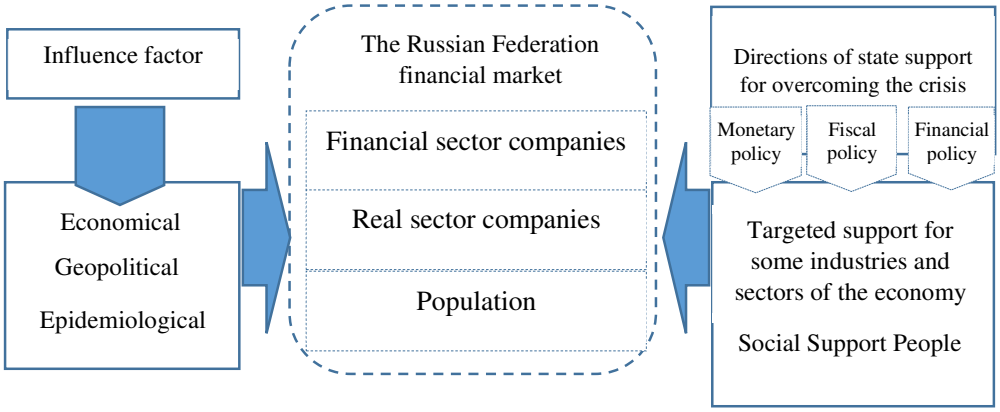

Fig 5: Support system for the Russian economy to overcome the consequences of the crisis
(Source: designed by the authors based on own research)

Consistency and targeting are the main factors determining the effectiveness of state support for all participants in the economic process. A more detailed structuring of the system will allow monitoring cash flows and the provision of non-financial support measures.

Along with priority support for small businesses and the population, the state pays considerable attention to corporate business in the non-financial sector as a support for the formation of a new post-crisis model of the economy. At present, almost all large companies and corporations were forced to change their business strategy under the influence of the crisis (regardless of the reduction, suspension or continuation of activities in full). The analysis of the existing experience of companies' performance during this period allowed us to identify the main principles of organizing their activities in the new conditions:

- diversification of the company's activities (offline and online) which allows to generate profit;
- temporary or final closure of a business that creates the possibility of opening another one;
- reduction of expenses (at least for the next three months) in order to determine the future prospects for business development;
- creating new products that attract the interest of customers.

Restrictive measures have effectively stopped the work of mass-consumer-oriented industries. Although recovery is relatively rapid after the quarantine is lifted, in the event of a second and subsequent waves of pandemics and repeated restrictive measures, the development of such sectors may again be at risk.

Exporting industries were not subject to large-scale restrictions during the anti-epidemic measures and continued to work throughout the first half of 2020. However, their return to 2019 indicators may be slow due to possible systemic problems or a significant imbalance in supply and demand. Several industries and companies have benefited from the crisis such as pharmaceutical and medical companies, manufacturers of medical equipment and inventory, IT-services, online sales, delivery, etc. These sectors of the economy include agriculture, because the issue of food security is a strategic one for each state.

Conclusion

There has never been a time in modern human history when a pandemic established the economic and social strategy of a society. In order to understand how long and how exactly we will get out of this situation, we needed to assess how much the current crisis is similar or not similar to the previous one (2008), which, according to many experts, still continues to have a negative impact on various areas of our lives. The analysis of previous experience and

prerequisites for the 2020 crisis allows us to assess the effectiveness of the state plan to support the Russian economy and get out of the crisis.

The main purpose of the plan is to overcome the recession caused by the epidemic and achieve a stable GDP growth rate, which will allow for a stable increase in real incomes of citizens. However, the atypical crisis that has protracted nature, and the influence of specific factors on its manifestation (the possibility of the second wave of the pandemic, forthcoming development of the vaccine and its effectiveness, health care situation) will force the Government to make adjustments in the approved plan. At the same time, at all stages of its implementation, it is necessary to observe the consistency and targeting of state support measures, as well as to carry out constant financial and public control.

In addition, it should be borne in mind that the current crisis is developing at the end of the current globalization cycle and, due to its features (quarantines, self-isolation and other restrictive measures imposed by individual countries), leads to the "regionalization" of the world economic system. Therefore, any state, including Russia, needs to learn to live in a new reality, where there will be a high degree of competition and uncertainty.

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The Development of Products with Personality and Co-Created Products

Teodora-Iustina TUDOR

Polytechnic University of Bucharest, Romania
tr.iustina@yahoo.com

Nicolae IONESCU

Polytechnic University of Bucharest, Romania
ionescu_upb@yahoo.com

Abstract

The purpose of this paper is to assess the importance of co-created products and products with personality and people's reaction to them. In a world in which people want to stand out and be unique, this kind of products gain increasing importance by eliciting emotions and pleasant feelings. Thus, strong bonds are created between users and these types of products, and some of them end up being preserved long after they are unable to fulfil their primary functions. Products with personality and co-created products will become the future of design, because people have a growing desire to be surprised and intrigued.

Keywords: Product with Personality, Co-Created Products, Design, Emotions.

Introduction

The first contact between man and object – which is predominantly visual - sets the tone of his experience with the product design. Man reacts emotionally to everything around him, without necessarily interacting with people - tending to develop thoughts and emotions. We attributes human characteristics, states and feelings to things in our environment such as objects, plants, and animals.

Norbert Bolz describes how the emotional design strategy is used to endow objects with the illusion of depth and feeling. A designer aims at aesthetically modeling the product by integrating state-ofthe-art technology in an intuitive way, and putting the user first and the object second. Emotional design participates in the transfer of "interpersonal" values in the world of things, to induce a state of well-being and familiarity to the user. [Bolz, 1994]

The different ways in which designers treat things allows them to be inspired by the empathy for the emotional experiences of people who use with their product in their day to day life. From this idea emerges the concept that the user can and should be a key factor in the design process. [Sanders, Dandavate, 1996] This can take place in a context that generates the experience the consumer has with the product. It is necessary to plan in advance some scenarios of human - product interaction that involve all the senses and result in a pleasant experience which is intended to be repeated.

Not long ago, the emphasis was on the optimal functioning of the product and its ease of use. Now, these objectives began to give way to the pleasant experience that man derives from the product. This experience can simply mean a visual contact with the product or a complex interaction, but regardless of type, its sole purpose is to satisfy all human senses. However, the many challenges of research focused on the user's emotion, product personality and the user's contribution to the creation process led to this topic being vaguely and fragmentarily addressed. The few related studies of the last 20 years are sectoral approaches and do not fully address issues connected to the personality of products and their co-creation.

The role and importance of experience and emotion in design

Andrei Dumitrescu claims that the experience of design can be defined as a contact, even if only a visual one, with a product. According to him, the experience of a product falls into two broad categories: casual and projected experience. The user may have a casual experience when the creators only focus on product functionality and

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ergonomics, but the experience of the product (albeit ignored) exists, and it can be either felicitous or infelicitous. The projected experience generates a series of pleasant emotions such as satisfaction, pleasure or delight [Dumitrescu A., 2013].

In the past, designers devoted all their resources to make the product easy to use, ergonomically sound and eye-catching. In the last 30 years, they focused on positive experiences that the user can gain from interacting with the product. With new generations being captivated by the product's response to their reactions (even those of confusion), the consumer shows a general tendency towards surprise and amusement and seeks to relive this experience. This reaction has an important role in the purchase decision. At the foundation of this concept lies man's inclination to react to all things around him through emotions.

Another important aspect is the very wide variety of products nowadays, compared to the offer from 100 years ago, when the first products appeared. This forces designers to find new ways to differentiate their products from their competitors, focusing more on the emotional responses and experiences in the user-product relation, leaving functional benefits in the background [Diener, Lucas 2000].

Pieter Desmet argues that “skilled designers understand the strong appeal of emotions and have used their intuition and artistic skills to exploit this aspect” [Desmet, 2002]. For them, the design process that arouses increased interest on the user side comes from creating products that involve emotion in design, by bringing together two contradictory terms. As William Green says, design involves order and reason, while emotion brings irrationality and spontaneity. [Green, 2002]

Man's perception of his objects changes throughout time. If at first, it is more or less a necessity, as the years go by, the object gains emotional value, through the memories and emotions created around it. This feature cannot be given by a designer, it is a personal contribution that goes beyond the traits predefined by the creator. Norman reinforces this idea by stating that the objects in our environment represent much more than material possessions, they gain a value through the meaning they bring to our lives, becoming a symbol. [Norman, 2004].

The century we live in is constantly developing, consumer expectations increase day by day. Whether they are influenced by marketing strategies, trends or advertisements, the requirements for consumer products have changed. If until recently, designers and users appreciated the functionality, ease of use and attractiveness, now these qualities are taken for granted. Moreover, they have higher expectations from everyday products. The task of the designer is hampered by new standards, because the consumer doesn't only expect a product to perform all its functions correctly and quickly, but he also looks for a message to respond to.

The emotional response is the result of an interaction that takes place in a given context between an individual and a product. Donald Norman argues that the emotional aspect of the product can replace functional ones stating that “... there is also a strong emotional component of how products are designed and used, more critical to a product's success than its practical elements" [Norman, 2004] .

Desmet and Hekkert launch three key concepts designed to outline the process of triggering emotions, being represented by a series of stimuli that come from a product: concern and appreciation. [Desmet, Hekkert, 2002]. Unfortunately, analyzing these models we can identify an important element that is missing, namely, the designers' lack of preoccupation for the characteristics of the object to which the subject will react. Chakrabarti and Gupta thus remark that “the subject is capable of a variety of responses and it is unlikely that those consistent patterns between them and objects will be found" [Chakrabarti, Gupta, 2007]. Psychologist Robert Plutchick has created a model that includes eight universally valid human emotions as follows: acceptance, anger, anticipation, disgust, joy, fear, sadness and surprise. [Plutchik, 1980] Based on these eight emotions and the three basic states of arousal established by Ekman, Chakrabarti and Gupta developed the “Emotional Response Model” - ERM, representing the characteristics of the object that are stimuli for the user. The subject's preferences trigger one or more emotions. They argue that "emotional traits provide the bridge between object traits and primary emotions." [referinta] The model of the two stipulates that a number of characteristics of the object have direct relationships with the emotional traits, that in turn have a specific relationship with the eight primary emotions, the evaluation process being facilitated by the structure of the model [Chakrabarti, Gupta, 2007].

The attachment for the product is defined as the power of the emotional connection experienced by man with a product, thus involving the existence of an emotional connection between a user and an object with a significance for him. [Schifferstein and Pelgrim 2004] Creating the emotional relationship in design is based on a series of moderate emotions of surprise, delight, satisfaction and pleasure, so that the user can decide what matters to him; there is no need to arouse high-intensity emotions that are experienced on the first contact with the product, but rather numerous small pleasures [Andrei Dumitrescu, 2013]. Due to the personal nature of the emotions, the user has complete freedom

regarding their type and degree of intensity. There is no valid general relationship between the appearance of the product and the emotion it generates.

The experience can also be induced through advertising. The manufacturer simulates a possible situation in which the buyer lives a pleasant experience in relation to the presented product, which triggers an emotional relationship with it.

Fig.1: Hornbach's advertisement that induces emotion by simulating an experience [1]

Experience is equally important for designers who may have informative personal experiences that make it easier for them to understand current issues and feel greater empathy for the people who will be influenced by their decisions. The ability of designers to access buyers' experiences through a number of methods such as listening, observing and deducing customer wishes gives them the satisfaction of generating pleasant emotions [Sanders, Dandavate, 1999].

After building the sentimental relationship between man and product, the occurrence of several disruptive factors can decrease consumer satisfaction with the product, one of which is perceptual wear and tear. This happens after the purchase, when the person sees the product very often, thus the emotions that stirred him at the beginning have diminished now. The buyer compares the new product purchased with the old purchases or with the best similar alternatives on the market, because the objects in his life represent much more than simple material goods [Andrei Dumitrescu, 2013]. He identifies with the success of purchasing the best product to experience positive emotions such as feelings of pride, self-esteem and achieving a goal by buying something useful. Sometimes, for the sake of reliving these emotions and changing his mood, the buyer may exaggerate, purchasing several similar or unnecessary products.

Fig.2: Varied range of products that are part of the same family[2]

The comparison can be made before the purchase, when the buyer shapes an opinion about the product, looking for as much information as possible about similar offers on the market. The comparison stirrs feelings of confusion and disorientation due to the multitude of varieties on the market. Advertising is of major importance in this case. It provides the buyer with a series of selective information that highlights the product and presents its functions. Although superficial, it gives the buyer confidence and can have decisive power in choosing the product.

Fig.3: Advertisement presenting selective information about the product[3]

Although these two rules can work for many products, on the market, there are inventions that have failed to generate an emotional relationship with the user, despite their intense and long-term use. The telephone and the computer are two of the most indispensable products nowadays, used consistently throughout the day, either at work, or - most frequently - during spare time. Despite the fact that phones gained a remarkable importance in social relationships and can also generate strong emotions when being used, Norman notes that the product fails to instill affection. [Norman, 2004]

The typologies of emotions can be classified in terms of the feelings it arouses. Desmet initiated several methods to quantify the emotions transmitted by products. He relied on numerous researches which show that facial expression and body language are universal, and to support this assumption, he used photographs and short animations that suggest the expression of emotions using his face, hands and body. These 14 emotions established by Desmest make up an instrument called "PrEmo", and fall into two main categories: negative emotions and positive emotions. The conclusions of the study conducted by Pieter Desmet is that that "there is no one-to-one correspondence between design and the emotion the product produces; it is not a mere emotion, but the meaning that the product has for the customer". [Desmet, 2002] However, many products manage to induce such strong emotions that some people end up loving them, and others deeply disliking them. It follows that different products will succeed in satisfying one type of people, while failing to do so for another type.

Numerous studies have shown that attractive products keep their function longer, because they are used with more care. The variety of emotions aroused by the product can fuse into a strong feeling of affection called attachment, which differs from the others by increasing in intensity over time.

Attachment is defined by Mugge as "the strength of the emotional connection that the consumer experiences for a certain product" [Mugge, 2007]. An important advantage of this attachment is the lasting connection between man and product, which prevents him from giving up the product even when it breaks down or no longer fulfills its default functions. Belk states that when a person is attached to a product that belongs to him, it is very possible to treat it with care, postponing the replacement of the product by repairing it when it breaks down" [Belk, 1991].

Emotions help us perceive the environment beyond the rational elements, after we go through a physical perception through our senses. They are meant to create relationships based on how we feel around an object, being or person. Depending on the experience, the user tends to associate a product with memories, feelings and emotions. This information is difficult to identify and manage for each individual, and even more so for the masses. Nonetheless, its impact is difficult to neglect. Based on a series of general emotions encountered, researchers in the field have come to the conclusion that by managing and dosing the positive and negative emotions generated by products, the decision-making process can be influenced to a great extent. Thus, the buyer is impressed by products that stir positive emotions and kindle his interest through the complexity of its features put together in an attractive and intuitive way, while being discouraged by products that seem difficult to use and don't have an appealing appearance.

Products that stir emotions are sustainable, because they determine the user's attachment over time and his inability to give up the product easily, postponing its replacement by consecutive repairs or keeping it for years despite not being used anymore.

Definition and classification of the personality of the products

In the promotion and sale of products, three different practices are encountered: product personalization, customized products and product personality. The common goal of these is the adaptation of marketing strategies to the user's

interest by improving his experience in relation to the product, but also include a number of elements which differentiate them.

Product personalization “aims to create individual communication with a single consumer or consumer segment". [5] The customized product differs from the product available on the market in that it is individually designed and has a unique character depending on the customer's need. Thus, it stands out from the standard product through shape, size, material and even components. Personalization uses basic demographic information, behavioral patterns, and buying preferences with respect to craft marketing experiences for a specific audience segment [5].

Customization is initiated by the user according to his preferences and claims to the product expressed directly through target information to meet his own needs, for which he is willing to pay more [6]. Customization responds to a real need that the customer cannot give up or satisfy through the rest of the standard products on the market. Stan Davis provides a complete definition of the term "customization", described as "the process of delivering goods and services on the broad market that are modified to meet a specific customer need" [5].

The personality of products, unlike customization and personalization, involves characteristics of the human personality and attributes them to the products man comes into contact and identifies with. Thus, that product passes from the sphere of mass-produced goods, to that of a different product, enriched with human-like qualities and features, that the consumer can identify with and treat with care and attention.

The product can be defined as a lifeless object produced as a result of a design activity, with a predefined shape, functionality and appearance. The product can be devoid of personality in the first stage of its existence. Over time through contemplation and usage, it manages to create an emotional relationship with the user, thus gaining a personality similar to thiers.

Pascalle Govers states that “Product personality is the profile of personality traits used by people to describe the specifics of the product and differentiate it from other products” [Govers, Mugge 2004]. Patrick Jordan considers that it represents a set of characteristics of the human personality used in the description of the specificity of a product [Jordan, 1997].

Bloom argues that personality is "a process that changes the functionality, interface, information content, or distinctiveness of a system to increase personal relevance to the individual" [Blom 2000].

Andrei Dumitrescu offers a more comprehensive definition stating that “the personality of the product is the set of strongly outlined features of the human personality used by man to distinguish the product from others and to justify the sentimental relationship with it” [Dumitrescu, 2013].

The congruence theory launched by Patrick Jordan in 1997 in the article "Product as Personalities" argued that the personality of future buyers is reflected in the design of new products that will achieve success [Jordan, 1997]. After launching this theory, many other authors have stated that the similarity between the personality of the products and that of the user have a beneficial contribution on the attachment that occurs between the buyer and the product. Among them are Govers and Mugge, who claim that the process of identifying a person with the personality of a product determines a positive influence in the perception and evaluation of the product [Govers, Mugge, 2004].

As Congruence Theory holds, people tend to make a comparison between the concept of self and the image of the product, preferring those products that have an image compatible with their self. They identify their own personality traits and look for products consistent with themselves [Aaker, 1999] and [Govers and Schoormans 2005].

The development of the relationship between user and product has a significant positive contribution to the success of the product and the extension of its life. The most precious objects of a man are not necessarily those with a significant material value, but the things that could be difficult to replace, to which he becomes strongly attached. It is not the material loss of the product that the owner regrets, but the emotional loss that he suffers as a result of investing time and developing feelings about the product [Schultz, Kleine and Kernan 1989]. An emotional relationship between a person and a product requires similarity of personality, so that they become more attached to products with a personality congruent to theirs, thus strengthening the theory of congruence and the concept developed by Schultz, Kleine și Kernan. [Ruth, Hendrik and Jan, 2005].

Dumitrescu classifies the relationship determined by the personality of the product into two broad categories: either perceived at the individual level or at the general level. At the individual level “the personality of the product is the result of the interaction of each user or contemplator with the respective product”, and at the general level “the personality of the product is generated by the creator and producer”. Thus, the personality of the product stands out when considering aspects related to the appearance and dynamics of the product [Dumitrescu, 2013].

Thus, the role of designers in designing products with personality becomes very important, because it can stimulate the attachment to the product and extend its life, provided it has a classic rather than a modern design.

One of the potential problems that arise in the design of products with personality is given by the fact that designers and users may perceive the meaning of products differently [Hsu et al., 2000].

Wishing to perfect the design process to make products with personality, many authors have developed a series of methods to analyze people's perception of the product personality in relation to their own personality. A convenient method is the statistical survey in which a number of subjects are asked to associate different personality traits with a predetermined product. If there is unity in the subjects' opinions, then the product is considered to have personality. Otherwise, if opinions are strikingly different, it results that the product does not have a clearly defined personality. Janet Finch believes that the surveys come with a series of formulation and coding constraints around the questions, which aim at predicting a series of actions based on the answers provided by the participant. The scenario method yields much better results provided the purpose is obtaining general images, and not details.

Patrick Jordan builds a rather controversial model considered difficult to understand and apply, it was based on the model from psychology called Briggs-Myers. It was considered difficult due to its cumbersome terminology, making it increasingly difficult for ordinary people who had no contact with the field of psychology to deepen it. [Jordan, 2002].

Andrei Dumitrescu proposes a model inspired by that of Jordan, based on an experiment that confirms the validity of the concept and the analyzed personality traits. The experiment achieved its goal, with the first objective being that of successfully testing and validating the concept of product personality and not evaluating the personality of the products used in the experiment [Dumitrescu, 2007]. This scale has the advantage that it can be used to compare different products belonging to the same category - necessary to evaluate a product in relation to its competitors, as well as products belonging to different categories. This comparison contributes to the creation of a database of reference products which have different personalities - a source of inspiration for designers.

The user tends to invest more time analyzing the product to determine how it works and pays more attention to it. Janlert and Stolterman argue that this interaction is greatly influenced by the appearance and personality of the product. [Janlert and Stolterman, 1997]

Product personality can help determine the user anticipate how to use and interact with the product. Intuitively, the user shows involvement in interacting carefully with a product that has a delicate, sensitive personality and design.

The user's preference is guided by his own personality which he involuntarily seeks in the things and objects around him to confirm his identity [Govers and Mugge, 2004; Govers and Schoormans,
2005]. The desire to express his personality and find it in the things around him is also supported by Jordan: "it is about people's desire to assert their individual identity in an increasingly impersonal world" [Jordan, 2000].

Today's consumer is in a constant search for objects to help him stand out, and to satisfy his desire to be noticed and appreciated in a group. Sirgy states that possessions of personal identity are particularly important, as the use of products is a means of defining and symbolically expressing ones' identity [Sirgy 1982]. The user gains a state of comfort by the fact that his products help him to stand out in society. Sener and Kurtgozu explain that products can be useful in increasing our emotional communication, self-expression and other personal traits. [Sener and Kurtgozu, 2008]

It is known that some people invest impressive amounts of money in products that reflect their personality and help them improve their mood, shifting from a necessity to a means of expression.

Products become a tool through which people express their personality in front of others and the fastest way to stand out in a group. Objects enable them to connect more easily with new people and reconfirm their unique character in front of acquaintances, giving them confidence and balance. A product with personality stands out and is immediately identified by the user. It is also analyzed and labeled as appropriate or not to his own personality. The consumer's behavior changes in relation to a particular product, stirring his interest and causing him to handle it with more care. Products with personality are given a remarkable importance by the user. He comes to interact with them much more than with other products in the same category and that do not have a clearly defined personality.

3.Definition and classification of co-created products

At the foundation of the growth and continuous improvement of a company that wants to become a key player in the market lies the process of developing new products. Since a large volume of innovative ideas is required to properly meet the wishes and needs of customers with the possibility of reducing the huge costs of study and research, more

and more companies choose to use the concept of co-creation. It is a process of designing a product or service in which the consumer is actively contributing with their own ideas and suggestions, bringing uniqueness and innovation to the product.

In an article, Jhon Czepiel suggests that the customer's input can lead to greater satisfaction [Czepiel, 1990]. Authors Kelley, Donnelly, and Skinner bring to the forefront a number of benefits that arise from customer involvement in the production process, namely: quality, employee performance and emotional responses [Kelley et al., 1990].

Consumption is an extremely symbolic cultural activity through which consumers give subjective meanings to products and services. Thus, from the cultural perspective of consumer studies, cocreation pushes companies to be responsible for setting the value of goods and services [Holbrook and O"Shaughnessy 1988, Belk et al.1989].

Michael Schrage points out that the ability of clients to provide valuable ideas and suggestions should not be neglected, but it cannot be considered a valence present in every client, implying a selection is needed [Schrage, 1995].

The co-creation process helps firms improve the growth and profitability of companies by enabling customers to play an active part [Prahalad and Ramaswamy, 2000]. At the same time, it is acknowledged the importance of marketing a product based on the process of co-creating its value through the exchange of knowledge and opinions. This takes place between customers and partners who develop a service orientation based on common values creation. [Vargo and Lusch, 2004] In the process of collaboration, exchanges of opinions and arguments take place, unique experiences are created and are meant to bring consumers and companies closer in a collaborative relationship, with benefits on both sides. [Prahalad and Ramaswamy, 2004]

Aric Rindfleisch and Matt O'Hern defined co-creation as a collaborative NPD (product development) activity in which customers actively and constantly contribute to the selection of content for a new product offer to be launched on the market. It consists of two stages: customers' contribution with ideas/suggestions, and the rigorous selection of the best input. Thus, customers become "essential participants in the product development process and in some cases, are able to create new products with little help from companies" [O'Hern and Rindfleisch, 2008]. The authors reinforce this definition by offering as examples successful computer applications such as Apache, Linux and Firefox, which are projects managed exclusively by communities organized by volunteer programmers.

Companies seek to surprise their consumers with a series of interactive challenges that enable customers to customize the products they purchase. For example, www.nike.com provides customers with a Nike By You page that allows them to customize their own shoes, choosing from a wide range of colors and details.

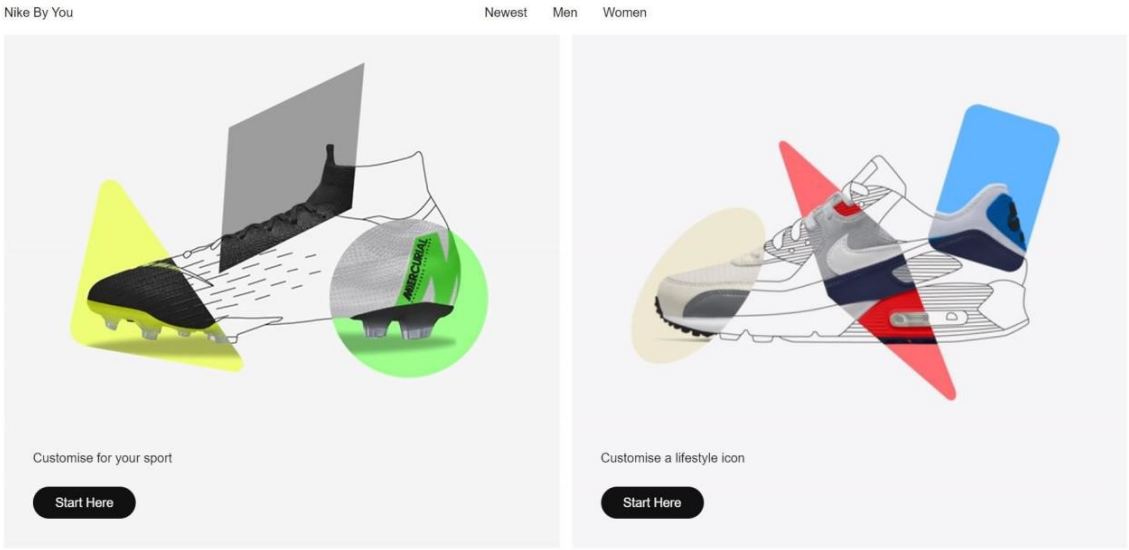

Fig.4: Example of products that can be customized by consumers[4]

For a healthy evolution of the product development process, two types of fundamental information are needed: 1-information about customer needs and 2-information about how these needs can be met [Thomke and von Hippel2002; von Hippel 2005]. Manufacturers have solid and accurate knowledge of how they can meet customer needs, investing

and working constantly to do their best. A shortcoming of information about customer needs has steered large investments go into marketing research with the purpose of shedding more light in this area.

Von Hippel and his colleagues have found a way to deal with this imbalance between known and hard-to-obtain information, by providing customers some knowledge and tools to actively participate in product development [Thomke and von Hippel 2002; von Hippel 2005; von Hippel and Katz 2002].

Starting from the idea supported by Belk, Richins and Dawson, that material objects do not have the capacity to respond to intrinsic psychological needs. Psychologists in the field claim that only by stimulating creativity these needs can be met [Csikszentmihalyi, 1996]. Thus, bringing customers in the product creation process gains more ground and is facilitated by the development of the Internet.

Contribution and selection are two key processes which underline co-creation and are presented by O'Hern and Rindfleisch. They give rise to a conceptual typology of four forms of co-creation. The contribution process trains the public to offer the company a series of ideas, while the selection process picks the most promising contribution. The four types of co-creation are: collaborating, tinkering, co-designing and submitting, which are delimited according to the control exercised by the company or the public over the two components of the co-creation process.

This classification of the co-creation process represents a real progress compared to the traditional approach, first in the way customers are viewed and treated, and secondly by the role they play. [O'Hern and Rindfleisch, 2008]

The co-creation process benefits both the consumer and the company that adopts such a process for its services. Thus, we can distinguish the collection, classification and analysis of consumer preferences in order to provide real-time information, as well as make them known to the merchant. Reviews are another source of useful information for both parties. Reviews are designed to provide honest opinions and information to prospective buyers, as well as a feedback to the company [Zwass, 2010].

Conclusions Regarding the Strategies Studied

The concepts elaborated in this article represent an important starting point in terms of strengthening the relationship between user and product. This also brings to the table ideas like the user's emotion, the product's personality and the user's contribution in the creation process, with the benefits of discovering a fresh perspective on this topic. I believe that emotion in design is closely related to the user experience, leading to attachment and then nostalgia. Research has shown that the emotional product-consumer bond improves personal satisfaction and life quality. The personality of the product has a pertinent contribution in terms of the user's self-esteem, making him stand out from the crowds that use mass products. Thus, co-creation is the missing link in a complete strategy regarding the optimal product development process in which the customer brings his personal touch to a product that manufacturers are now so eager to bring forth. I consider that the studied concepts play a role in creating the best version of products for consumers and if combined, they can meet their goal better than independently.

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Design of Payment Rates for Pollutant Discharge into Water Bodies

Maria P. IVANOVA
National Research Tomsk Polytechnic University, Tomsk
Russia, margo-sea@yandex.ru,

Tatiana O. TAGAEVA
Novosibirsk State University, Novosibirsk, Russia
to-tagaeva@rambler.ru

Abstract

While understanding that the environment is a set of components allowing for provision of environmental sustainability, special priority should be given to the issues of adverse impact on nature, particularly, the problem of quality deterioration of water bodies when polluted with harmful substances in the process of socio-economic development. In this case, an indispensable component of thorough treatment of the issue is solution of the problems in the sphere of rental resource management, namely, monitoring of payment rates for pollutant discharge into water bodies. Numerous investigations in this sphere allow for efficient treatment of the problem of the negative impact on the environment, providing favorable environmental condition. The above mentioned issue necessitates a throughout consideration of multiple calculation principles of payment rate for pollutant discharge into water bodies. Thus, the authors suggest an auxiliary principle of calculating such payment rates using simple logarithmic equation.

Keywords: Water Bodies, Payment Rate, Environment, Pollution, Equation.

Introduction

The present paper focuses on the issues of environmental protection via paying for adverse consequences in the process of chemical discharge polluting water bodies. In this case, much attention is paid to reasonable and adequate functioning of appropriate mechanisms for calculation of adverse impacts on the environment.

In the process of interacting with the nature, there appears a risk of negative impact on it. To date, consideration and analysis of such issues is rather topical, since quality of water bodies is strongly influenced by thorough treatment of this problem (Ryumina Ye.V, 2019, Ershov D.N., 2019).

For example, in Tomsk Oblast there is regular monitoring of surface water condition. The results of such monitoring are reflected in annual state reports (State reports "On the state and protection…", 2014-2018). According to the monitoring results on water body pollution (within the period from 2014 to 2018) presented in these reports, one can observe the dynamics of changes (table 1, table 2).

Table 1: Dynamics of water body pollution growth with harmful chemicals in Tomsk Oblast

Pollutants	2014/2018	Pollutants	2014/2018
Boron	+174%	Nitrites	+35%
Phenols	+120%	Urea (carbomide)	+19%
Sulphates	+63%	SSAS (synthetic surface-active substances)	+16%
Ammonia nitrogen	+54%	Fluorine	+10%
Zinc	+53%	Chromium 6+	+7%

Source: Author creation (2020)

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Table 2: Dynamics of decrease in water body pollution with harmful chemicals in Tomsk Oblast

Pollutants	2014/2018	Pollutants	2014/2018
Phosphates (P)	-1%	COD (chemical oxygen demand)	-24%
Dry residue	-2%	Suspended substances	-26%
Nitrates	-4%	BOD full (biochemical oxygen demand)	-32%
Formaldehyde	-7%	Manganese	-45%
Copper	-10%	Petrochemicals	-60%
Iron	-15%	Nickel	-78%
Chlorides	-19%	Aluminum	-100%
Lead	-23%	Methanol	-100%

Source: Author creation (2020)

Despite the dynamics of water body pollution growth in Tomsk Oblast, there are some substances which significantly decreased over 5 years (starting from 2014) (table 2, fig. 1).

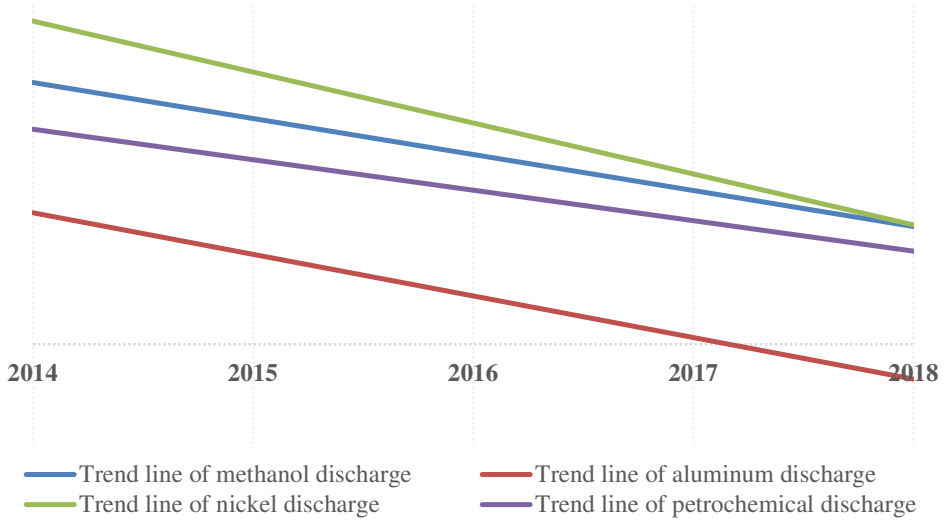

Fig. 1: Trend chart of pollutant discharge decrease in water bodies of Tomsk Oblast (2014-2018)
Source: Author creation (2020)

In terms of some components their discharge into water bodies of Tomsk Oblast increased over the recent 5 years (from 2014), which is shown in the chart (fig. 2).

Thus, according to Table 1 and chart 2, one can state that a large volume of harmful substances are discharged into the surface water bodies of Tomsk Oblast without special treatment (State reports on condition and environmental protection in Tomsk Oblast", 2014-2018).

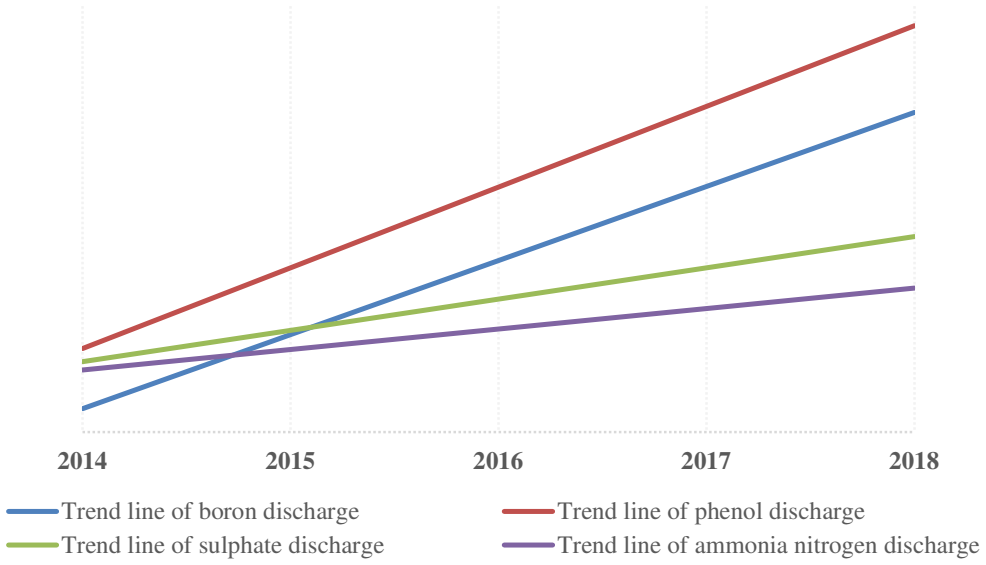

Fig. 2: Trend chart of pollutants discharges into water bodies of the Tomsk region (2014-2018)
Source: Author creation (2020)

The above studies indicate the need to monitor additionally negative discharges into water bodies and, first of all, by means of the methods used to charge payments for these consequences.

Results and Discussion

Due to the fact that one of the economic control instruments is considered to be the methodology to determine the payments rates for a negative impact on the environment, a deeper assessment is necessary to present an alternative concept for calculation of such rates, since the detailed study of such calculation methods will influence the state of nature as a whole.

If we consider some regulatory documents in relation to environmental quality control, we can identify different kinds of discrepancies in the data concerning the amount of pollutants and the possibility to charge fees for these substances in the process of the negative impact on water bodies. Thus, the document (Resolution No. 78, 2017) regulates the values of maximum permissible concentrations (MPC) of 1363 substances in the water of water bodies for drinking and household and amenity needs of water use. While, according to the document (Resolution No. 913, 2020), there are payments rates for discharges of only 159 pollutants into water bodies. Thus, about 90% of all MPC of substances discharged into water bodies does not seem possible to take payments in case of negative consequences.

For this reason, the authors offer to consider an alternative approach to the existing calculation algorithm of the payments rates for the negative impact on water bodies, in the discharges process of pollutants into water bodies, taking into account the MPC, thanks to which an appropriate assessment of real environmental hazard is possible.

To define an alternative approach for determining the payment rates, the data of the maximum permissible concentrations of chemicals in the water of water bodies for drinking and household and amenity needs of water use, and data of the payment rates for discharges of 46 polluting substances were used. Due to the fact that the linear display of data in Figures 1, 2 would not show a proper visual understanding of the problem of the ratio of payment and the quantitative discharge of pollutants, and to display the data, decimal logarithms of the necessary indicators were used (Fig. 3).

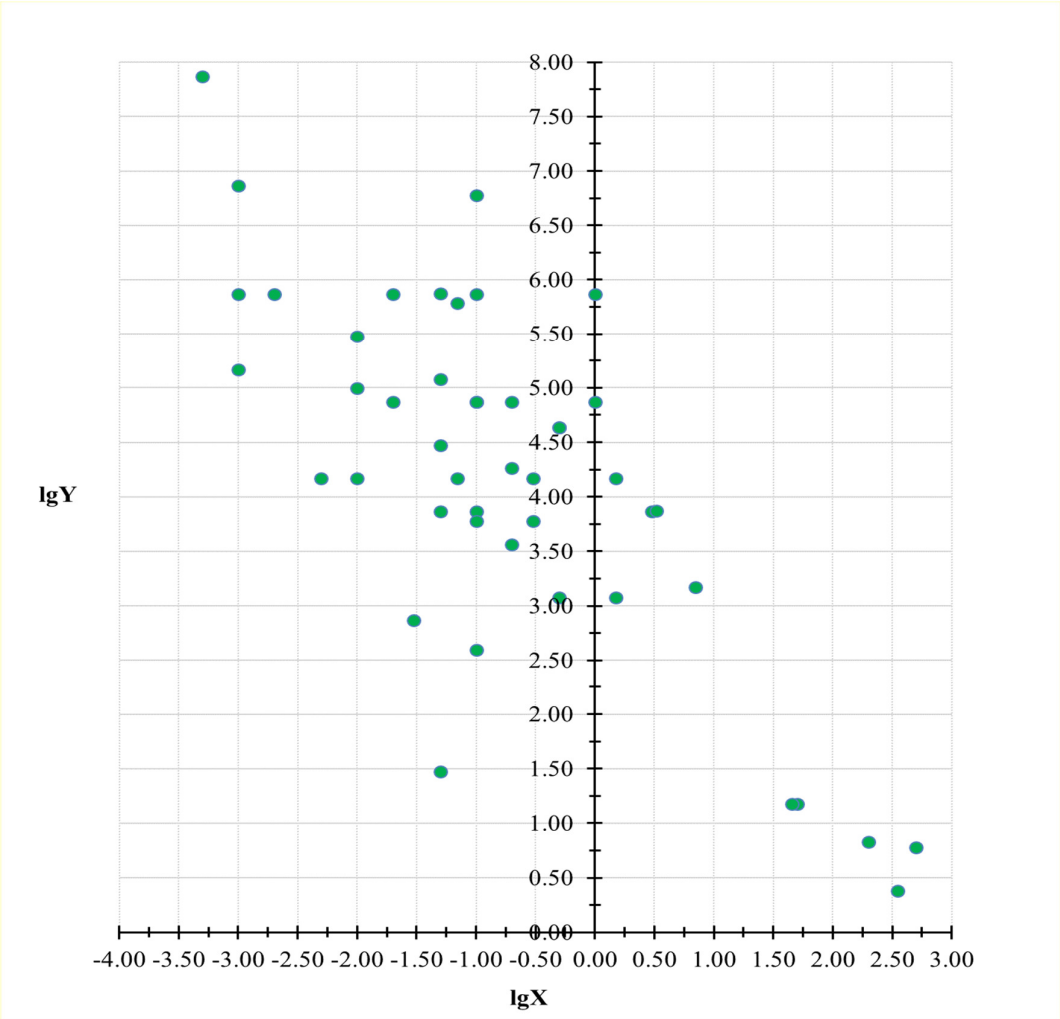

Fig. 3: Dependence of MPC and payment rates for 1 ton of polluted water
(Y is the payment rate for 1 ton of pollutants, X - value of MPC of pollutants)
Source: Author creation (2020)

The results of the dependence analysis of the existing data on the payment rates and the maximum permissible concentrations of chemical substances in the water of water bodies of drinking and household and amenity needs of water use can be estimated in Figure 4.

It became possible to show the formula during the experiment (Fig. 4).

The straight line shown in Fig. 3 can be described by the following function:

$$\lg Y = -0.8955 * \lg X + 3.5269, \quad (1)$$

where Y is the payment rate for 1 ton of polluting discharges into water bodies,
X - value of MPC of pollutants.

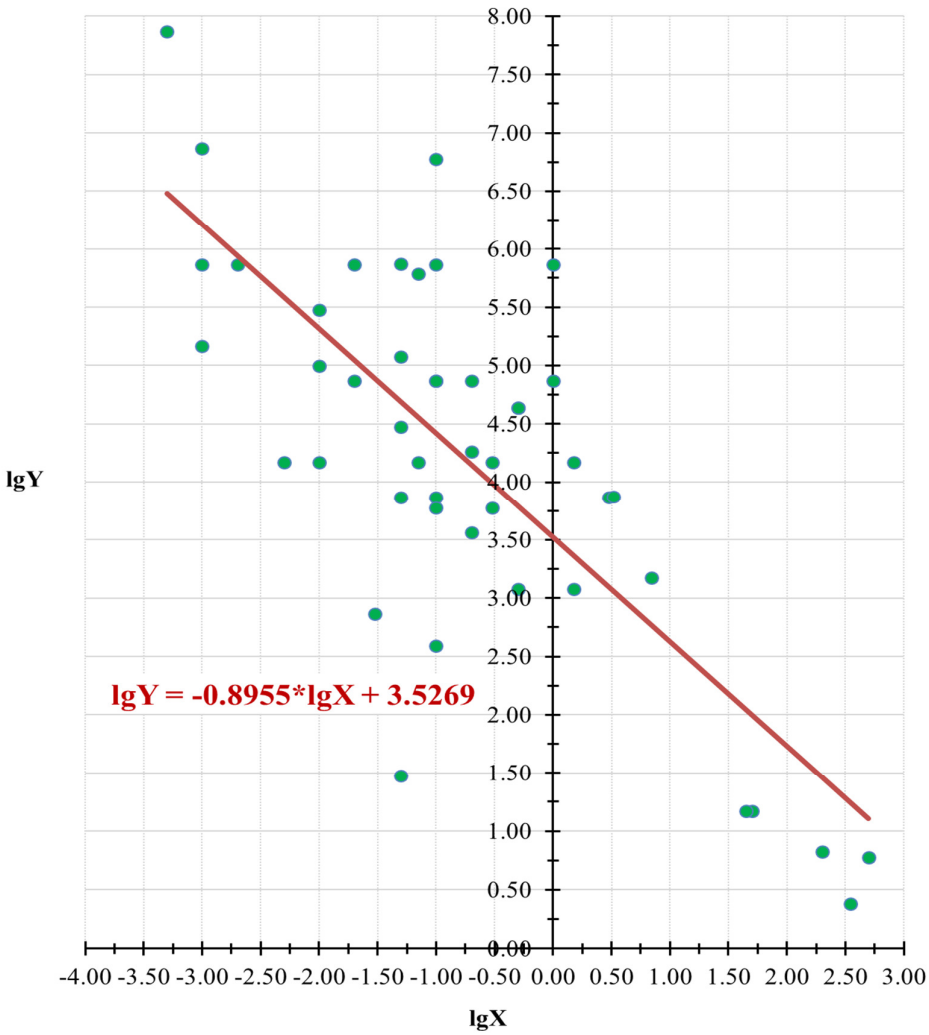

Fig. 4: The change trend of MPC and payment rates for 1 ton of polluted water (Y is the payment rate for 1 ton of pollutants, X - value of MPC of pollutants)

Source: Author creation (2020)

Formula 2 (based on formula 1) is an equation to calculate the non-available payment rates for discharges of harmful substances into water bodies.

$$Y = 10^{(3.5269-0.8955*\lg X)}, \quad (2)$$

where Y is the proposed payment rate for 1 ton of polluting discharges into water bodies,
X is the value of MPC of pollutants.

Conclusion

According to the problem studied in the article, we obtained the data based on the analysis to conclude that in some documents the data is inconsistent. Considering the above, it can be proposed that a detailed study of this problem has made it possible to present an alternative approach to charge fees for discharges of pollutants. The definition of such an approach to the study allowed the authors to show an additional principle for calculating the rates at which fees are charged for discharges of harmful substances into water bodies. This approach became possible due to the logarithmic equation, with the hazard of each substance to be taken into consideration during calculation.

Thus, the application of the concept mentioned above will provide the possibility to eliminate the disadvantages related to the absence of payment rates for discharges of pollutants into water bodies.

Acknowledgment

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Innovative Transformation of The Volga Region's Economic Space

Dmitry L. NAPOLSKIKH

Candidate of Economic Sciences, Associate Professor of the Department of Management and Law
Volga State University of Technology, Yoshkar-Ola, Russia
E-mail: NapolskihDL@yandex.ru

Abstract

The article deals with the analysis of economic, financial, scientific and technological conditions for regulating clustering processes and innovative development of the Volga region. The subject of the study is innovative transformation of the regional economic space. The aim of the work is to analyze the processes of innovative transformation of the economic systems of the Volga region regions. The scientific novelty of the work lies in the method of complex analysis of the potential of innovative development of regions. The proposed methodology includes both indicators for assessing the factors of formation of a new innovative economy, and indicators of the effectiveness of innovative development, which form the technological and resource reserve for further economic development of the region. The advantage of using proposed methodology is the possibility of separating for each economic district and interregional cluster the leading regions, which acts as the center of innovative transformation of the economic space of the neighboring regions. It is concluded that the key regions for innovative transformation are Samara region and Republic of Tatarstan.

Keywords*:* Clusters, Institutional Development, Innovative Potential, Scientific and Technical Development.

Introduction

In modern conditions, increasing the region's competitiveness through innovative transformation is a fundamental element of development strategies in most of the majority of countries (Solvell, Lindqvist & Ketels, 2003). At the same time, support for cluster initiatives becomes an important factor in innovative development (Porter and Ketels, 2009). A network of innovation clusters is also being formed in the Russian Federation on the base of the experience of the world's leading economies. Despite the fact that the distribution of cluster initiatives covers all Federal districts of the country, their number in the district, the scale and level of development differ significantly (The concept of long-term socio-economic development of the Russian Federation, 2008). The economic space of the Volga region is also significantly differentiated by the level of innovative development and the degree of production clustering (Bodrunov, 2013). The distribution of successfully implemented cluster initiatives by Federal districts is shown in table 1.

Table 1: Number of successfully implemented cluster initiatives in the Federal districts of the Russian Federation

Federal district	Year of cluster formation													total
	1999	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Central	0	0	0	2	1	6	2	10	4	4	2	1	0	**32**
North-West	1	0	1	1	1	3	2	8	5	0	0	1	0	**23**
South	0	0	0	0	0	1	2	0	5	1	2	0	0	**11**
North-Caucasus	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Volga	0	0	1	1	0	6	3	4	5	1	0	0	0	**21**
Ural	0	0	0	0	0	1	1	1	2	0	0	0	0	**5**
Siberian	0	1	1	0	1	2	3	3	2	3	1	0	0	**17**
Far-East	0	0	1	0	1	2	0	0	0	0	0	0	0	**4**
Russian Federation, total	**1**	**1**	**4**	**4**	**4**	**21**	**13**	**26**	**23**	**9**	**5**	**2**	**0**	**113**

Calculated by the author based on open data

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Note the high cluster activity of the subjects of the Russian Federation that are part of the Volga Federal district. The most developed regions of the Volga region in terms of cluster formation and development are traditionally considered to be the republics of Tatarstan and Bashkortostan, Perm, Samara, Ulyanovsk and Penza regions (Maksimov, 2014). At the same time, it should be emphasized that the pace of activity in implementing cluster initiatives has decreased since 2014-15, both in Russia as a whole and in the Volga region.

A significant number of works by leading researchers and research teams are devoted to the study of clustering economy (Hart, 2006; Lindqvist, 2009; Ketels, 2013). At the same time, the processes of innovative development in the Volga region and their relationship with the cluster policy of regional development remain insufficiently studied. The need for a detailed assessment of the processes of changing the innovation potential of the Volga region regions at the first stage of implementing cluster policy in the Russian Federation determined the purpose and objectives of this study.

The purpose of the study is to analyze the processes of innovative transformation of the economic systems of the Volga regions, as well as the features of the spatial distribution of the potential for the formation of an innovative economy in the context of cluster policy. The study set the following tasks:

- development of a system of indicators for evaluating innovative regional innovation systems;
- analysis of the potential for innovative development of the Volga region regions in the context of clustering features of their economic systems;
- defining the features of innovative transformation of the Volga region's economic space.

Research Methodology

To assess the innovative transformation of the economic systems of the Volga region regions, the author developed a method for a comprehensive analysis of the potential of innovative development of the regions. The proposed methodology includes both indicators for assessing the factors of formation of a new innovative economy, and indicators of the effectiveness of innovative development, which form the technological and resource reserve for further economic development of the region.

The final index of the region's innovative development potential (IRIDP) is formed on the basis of four sub-indices that reflect the key factors and directions of development of the innovative economy. These four sub-indexes include the following:

- index of economic potential of innovative development (IEP-1);
- innovative development human resources index (IHRP-2);
- the index of financial potential of innovative development (IFP-3);
- index of scientific and technological potential of innovative development (ISTP-4).

These subindex in turn are formed from the second level subindexes and separate indicators of innovative development of the region, calculated by Federal state statistics service of the Russian Federation. Indicators and subindexes of the potential for innovative development of regions are presented in table 2.

Table 2: Indicators and sub-indices of the region's innovative development potential

Indicators and sub-indices of the region's innovative development potential	Convention
1. Economic potential of innovative development of the region	IEP-1
1.1. Economic development of the region	IEP-1.1
1.1.1. Gross regional product per employed resident of the region	IEP-1.1.1
1.1.2. The coefficient of renewal of fixed assets in the region	IEP-1.1.2
1.2. Effectiveness of innovative development of the region	IEP-1.2
1.2.1. Share of innovative goods, works, and services in the total volume shipped by industrial enterprises	IEP-1.2.1
1.2.2. Share of innovative goods, works, and services new to the market that have been newly introduced or have undergone significant technological changes in the total volume shipped by industrial enterprises	IEP-1.2.2
2. Personnel potential of innovative development of the region	IHRP-2

2.1. Human resources potential of the knowledge-intensive and high-tech sectors of the economy	IHRP-2.1
2.1.1. Share of employees in high-tech industries in the total number of employees	IHRP-2.1.1
2.1.2. Share of employees in knowledge-intensive service industries in the total number of employees	IHRP-2.1.2
2.2. Educational potential of the region	IHRP-2.2
2.2.1. Share of the population with higher education in the total economically active population of the region	IHRP-2.2.1
2.2.2. Number of students enrolled in higher education programs by 10 thousand. inhabitant of region	IHRP-2.2.2
2.3. Personnel potential of regional science	IHRP-2.3
2.3.1. The ratio of the average wages of employees engaged in R&D in the average salaries in the region	IHRP-2.3.1
2.3.2. Share of employees engaged in R&D in the average annual number of employees in the region	IHRP-2.3.2
2.3.3. The share of young researchers total number of researchers in the region	IHRP-2.3.3
2.3.4. The ratio of researchers with a degree in the total number of researchers in the region	IHRP-2.3.4
3. Financial potential of innovative development of the region	IFP-3
3.1. Budget financing of innovative development of the region	IFP-3.1
3.1.1. Share of expenditures on civil science from the consolidated budget of the region in the total amount of expenditures	IFP-3.1.1
3.1.2. Share of expenditures of the consolidated budget of the region in the total amount of expenditures on technological innovations	IFP-3.1.2
3.1.3 Ratio of Federal subsidies for the development of innovative infrastructure to the gross regional product	IFP-3.1.3
3.2. The R&D funding at the expense of own funds of organizations	IFP-3.2
3.2.1. Internal costs on research and development in % to gross regional product	IFP-3.2.1
3.2.2. Internal costs on research and development per researcher in the region	IFP-3.2.2
3.2.3. Share of expenses of commercial organizations in the total volume of internal expenses of organizations for R&D	IFP-3.2.3
3.2.4. Intensity of expenditures on technological innovations by industrial enterprises	IFP-3.2.4
4. Scientific and technological potential of innovative development of the region	ISTP-4
4.1. Scientific potential of innovative development of the region	ISTP-4.1
4.1.1 Number of published scientific articles per 10 researchers in the region	ISTP-4.1.1
4.1.2. Number of patent applications for inventions per 1 million of the economically active population of the region	ISTP-4.1.2
4.1.3. Number of advanced production technologies created per 1 million people of the economically active population of the region	ISTP-4.1.3
4.1.4. The ratio of the volume of revenues from technology exports to the gross regional product	ISTP-4.1.4
4.2. Technological potential of innovative development of the region	ISTP-4.2
4.2.1. Share of industrial enterprises that implemented technological innovations	ISTP-4.2.1
4.2.2. Share of industrial enterprises that implemented organizational and marketing innovations	ISTP-4.2.2
4.2.3. Share of industrial enterprises that have developed and implemented technological innovations on their own	ISTP-4.2.3
4.2.4. Share of industrial enterprises implementing joint research projects	ISTP-4.2.4
4.2.5. Share of small enterprises that implemented technological innovations	ISTP-4.2.5

Developed by the author

When calculating the region's innovation development potential index (IRIDP), as well as sub-indices of both levels, all indicators are used with equal weight coefficients. At the same time, the initial values of indicators should be normalized in order to be able to use them within a single methodology. Accordingly, the region's innovation development potential index (IRIDP) is calculated using the following formula:

$$\mathrm{IRIDP}^r = \frac{1}{n}\sum_{i=1}^{n}\frac{x_i^r - x_i^{min}}{x_i^{max} - x_i^{min}}$$

IRIDP^r – index of innovative development potential of the *r*-th region;

n – number of indicators of the region's innovative development potential used for calculating the final index (*n*=28);

x_i^r – value of the *i*-th indicator of innovative development potential in the *r*-th region;

x_i^{max} – the highest value of the *i*-th indicator of innovative development potential in the analyzed sample;

x_i^{min} – the lowest value of the *i*-th indicator of innovative development potential in the analyzed sample.

Information base of the study

In addition to official statistical data from Rosstat (2020), data from «Rating of innovative development of the subjects of the Russian Federation» (Gokhberg and others, 2020) published by the National Research University Higher School of Economics (HSE) were used as an information base for calculating the region's innovation development potential index (IRIDP). The indicators used to compile the Rating, as in the proposed methodology, are formed on the basis of official statistics. Methodological benefits of using a HSE rating is: balanced (normalized) for all 85 subjects of the Russian Federation of the values of indicators of innovative development, estimation of degree of asymmetry of a distribution relative to the average value. It is worth noting the large amount of work done by the team under the leadership of L.M. Gokhberg, as well as the ease of using the information provided for further research. The disadvantage of this rating is the lack of data for 2016, while based on the dynamics of clustering processes (table 1), a methodological assumption is made to use data from 2013 to 2015 (the "third wave" of clustering of the Russian economy) and 2017 as the result of five-year development.

The grouping of regions was carried out on the basis of the author's model of clustering of the economic space of the Volga region, within were identified 2 macro-regions (Volga-Kama and Volga-Ural); 4 districts (Volga-Vyatka, Kama, Middle Volga and South Pre-Ural), as well as 4 interregional clusters (Nizhny Novgorod, Kazan, Samara and Saratov).

Research Result

The analysis of clustering processes in the Volga region regions revealed a significant differentiation of the economic space in terms of institutionalization of clusters. The uneven distribution of clusters by region, as well as differences in the level of their development, considered in table 3, are explained both by objective economic and geographical prerequisites and by the effectiveness of regional authorities in the framework of federal programs.

Table 3: Level of institutional development of clusters formed in the Volga region regions

Region	The number of cluster on level of institutional development		
	low	medium	high
Nizhny Novgorod region	1	0	0
Republic of Mordovia	0	1	0
Republic of Tatarstan	3	2	1
Republic Of Mari El	0	0	0
Chuvash Republic	1	0	0
Kirov region	0	0	0
Perm region	1	2	0
Udmurt Republic	0	0	1
Samara region	1	1	0
Ulyanovsk region	0	0	2
Saratov region	0	0	0
Penza region	3	1	0
Republic of Bashkortostan	0	0	1
Orenburg region	0	0	0

Calculated by the author based on data from the Russian Cluster Observatory of the Higher School of Economics

It can be concluded that the most active cluster policy is implemented by such regions as the Republic of Tatarstan, Perm, Penza and Ulyanovsk regions. Cluster initiatives are noted in such traditional economic centers of the Volga region as the Nizhny Novgorod and Samara regions, the Republic of Bashkortostan. The" outsider regions " in the implementation of cluster policy include the Republic of Mari El, the Kirov and Orenburg regions. We can observe a similar distribution of regions into leaders and outsiders when analyzing the dynamics of the regional innovation development potential index (IRIDP) presented in table 4.

Table 4: Index of innovative development potential of the Volga region regions

Region	Year			
	2013	2014	2015	2017
VOLGA FEDERAL DISTRICT	0,344	0,357	0,355	0,356
VOLGA-KAMA MACROREGION	0,345	0,368	0,369	0,373
Volgo-Vyatka district	0,355	0,382	0,388	0,392
Nizhny Novgorod interregional cluster	0,384	0,435	0,424	0,426
Nizhny Novgorod region	0,404	0,418	0,422	0,480
Republic of Mordovia	0,364	0,452	0,427	0,373
Kazan interregional cluster	0,340	0,356	0,369	0,375
Republic of Tatarstan	0,435	0,467	0,490	0,480
Republic Of Mari El	0,282	0,294	0,308	0,332
Chuvash Republic	0,388	0,387	0,409	0,390
Kirov region	0,255	0,275	0,269	0,299
Kama district	0,316	0,324	0,313	0,315
Perm region	0,363	0,360	0,354	0,346
Udmurt Republic	0,268	0,287	0,272	0,285
VOLGA-URAL MACROREGION	0,343	0,342	0,336	0,332
Middle Volga district	0,361	0,350	0,339	0,345
Samara interregional cluster	0,399	0,376	0,370	0,366
Samara region	0,376	0,364	0,379	0,346
Ulyanovsk region	0,423	0,389	0,361	0,386
Saratov interregional cluster	0,323	0,323	0,309	0,324
Saratov region	0,274	0,290	0,295	0,287
Penza region	0,372	0,357	0,322	0,360
South Pre-Ural distric	0,308	0,326	0,328	0,307
Republic of Bashkortostan	0,347	0,392	0,408	0,366
Orenburg region	0,269	0,261	0,248	0,247

Calculated by the author

The author combined the Volga regions into macro-regions, districts, and interregional clusters based on previous research. In each group, you can identify the "leading region" and lagging regions. We can conclude that there is a fairly strong heterogeneity of regions in terms of the average level and direction of the dynamics of the index values. The high value of the index and its positive dynamics over the analyzed period are demonstrated by only two regions: Nizhny Novgorod region and the Republic of Tatarstan. Consider the dynamics of the economic potential of the Volga regions, the subindexes of the economic potential of innovative development are presented in table 5.

Table 5: Economic potential of innovative development of the Volga region regions

Region	IEP-1				IEP-1.1				IEP-1.2			
	2013	2014	2015	2017	2013	2014	2015	2017	2013	2014	2015	2017
VOLGA FEDERAL DISTRICT	**0,16**	**0,22**	**0,31**	**0,24**	**0,21**	**0,23**	**0,32**	**0,22**	**0,11**	**0,22**	**0,31**	**0,26**
VOLGA-KAMA MACROREGION	**0,16**	**0,23**	**0,34**	**0,27**	**0,20**	**0,20**	**0,30**	**0,21**	**0,13**	**0,26**	**0,38**	**0,33**
Volgo-Vyatka district	***0,17***	***0,26***	***0,38***	***0,28***	***0,20***	***0,20***	***0,29***	***0,19***	***0,14***	***0,32***	***0,47***	***0,36***
Nizhny Novgorod interregional cluster	*0,19*	*0,28*	*0,42*	*0,29*	*0,18*	*0,20*	*0,26*	*0,15*	*0,20*	*0,35*	*0,59*	*0,42*
Nizhny Novgorod region	0,18	0,23	0,29	0,25	0,20	0,28	0,29	0,19	0,16	0,18	0,28	0,32
Republic of Mordovia	0,21	0,33	0,56	0,32	0,17	0,13	0,22	0,11	0,25	0,53	0,89	0,53
Kazan interregional cluster	*0,15*	*0,25*	*0,36*	*0,27*	*0,20*	*0,20*	*0,31*	*0,21*	*0,10*	*0,30*	*0,41*	*0,33*
Republic of Tatarstan	0,29	0,35	0,53	0,41	0,37	0,41	0,54	0,42	0,21	0,30	0,52	0,39
Republic Of Mari El	0,12	0,36	0,44	0,30	0,20	0,14	0,21	0,12	0,04	0,59	0,67	0,49
Chuvash Republic	0,13	0,12	0,30	0,22	0,15	0,08	0,29	0,14	0,10	0,16	0,31	0,29
Kirov region	0,08	0,15	0,18	0,16	0,10	0,15	0,21	0,16	0,07	0,15	0,15	0,16
Kama district	*0,15*	*0,16*	*0,22*	*0,25*	*0,20*	*0,22*	*0,32*	*0,25*	*0,09*	*0,11*	*0,12*	*0,25*
Perm region	0,18	0,16	0,26	0,28	0,22	0,23	0,37	0,27	0,14	0,09	0,14	0,29
Udmurt Republic	0,11	0,17	0,18	0,22	0,18	0,21	0,28	0,23	0,05	0,12	0,09	0,21
VOLGA-URAL MACROREGION	**0,16**	**0,21**	**0,28**	**0,21**	**0,23**	**0,27**	**0,34**	**0,24**	**0,08**	**0,15**	**0,22**	**0,17**
Middle Volga district	***0,16***	***0,20***	***0,29***	***0,22***	***0,21***	***0,27***	***0,31***	***0,23***	***0,11***	***0,13***	***0,26***	***0,21***
Samara interregional cluster	*0,21*	*0,22*	*0,37*	*0,27*	*0,24*	*0,24*	*0,34*	*0,26*	*0,18*	*0,21*	*0,39*	*0,29*
Samara region	0,24	0,31	0,44	0,31	0,27	0,29	0,36	0,29	0,22	0,32	0,53	0,33
Ulyanovsk region	0,17	0,14	0,29	0,23	0,21	0,18	0,33	0,22	0,14	0,10	0,24	0,24
Saratov interregional cluster	*0,11*	*0,17*	*0,21*	*0,17*	*0,17*	*0,30*	*0,29*	*0,21*	*0,04*	*0,05*	*0,13*	*0,14*
Saratov region	0,09	0,12	0,18	0,13	0,15	0,20	0,27	0,22	0,04	0,03	0,09	0,05
Penza region	0,12	0,23	0,23	0,21	0,20	0,40	0,30	0,20	0,04	0,06	0,17	0,23
South Pre-Ural distric	**0,16**	**0,24**	**0,26**	**0,18**	**0,28**	**0,28**	**0,38**	**0,26**	**0,04**	**0,20**	**0,14**	**0,09**
Republic of Bashkortostan	0,17	0,34	0,30	0,19	0,28	0,31	0,37	0,26	0,06	0,38	0,24	0,13
Orenburg region	0,15	0,13	0,22	0,16	0,28	0,25	0,39	0,26	0,01	0,01	0,05	0,06

Calculated by the author

Consider the dynamics of the second-level subindex "1.1. Economic development of the region", which includes indicators of the gross regional product per employed resident and the coefficient of renewal of fixed assets. For all regions, there is a significant increase in the values of the subindex in 2015 and an equally significant decrease in the software in 2017 compared to 2015. For the second-level sub-index " 1.2. Effectiveness of innovative development of the region "(characterizes the share of innovative and newly introduced goods, works, and services), there are generally similar trends with more stable growth over the analyzed five-year period.

Comparison of regions based on quantitative values of indicators included in the second-level subindex "1. The economic potential of innovative development" and their dynamics allowed us to draw the following conclusions. We note the key role of the Republic of Tatarstan for the innovative development of the entire Volga-Kama region, as well as the activation of innovative effects within the selected Kazan interregional cluster. Tatarstan is also one of the most active regions of Russia in implementing cluster initiatives. The high performance of the Republic of Mari El is explained by the system-forming role of large high-tech enterprises, including the military-industrial complex, for the economy of a small territory and population of the Republic. The Chuvash Republic is characterized by a developed electrical engineering cluster and a number of cluster initiatives in the field of high-tech manufacturing industries.

Rather high values of subindixes for the Republic of Mordovia against the background of the more developed Nizhny Novgorod region are due, among other things, to the active development of the electrical industry. These regions have sufficient economic potential for interregional integration and the formation of both independent and joint cluster initiatives with other regions. In the Kama region, we note the leading role of the Perm region, which also shows sufficient activity in the cluster policy of economic development, while the Republic of Udmurtia is characterized by the concentration of large-scale production within a single machine-building cluster.

In the Middle Volga district, the leading role is played by the Samara region. The Saratov and Orenburg regions lag behind other regions both in terms of the economic potential of innovative development and in the use of cluster mechanisms for economic growth. We also consider the values of the subindixes of human resources potential for innovative development of the Volga region regions, presented in table 6.

Table 6: Personnel potential of innovative development of the Volga region regions

Region	2. Personnel potential of innovative development of the region				2.1. Personnel potential of knowledge-intensive and high-tech sectors of the economy				2.2. Educational potential of the region				2.3. Personnel potential of regional science			
	2013	2014	2015	2017	2013	2014	2015	2017	2013	2014	2015	2017	2013	2014	2015	2017
VOLGA FEDERAL DISTRICT	**0,40**	**0,40**	**0,38**	**0,44**	**0,41**	**0,43**	**0,45**	**0,46**	**0,41**	**0,40**	**0,39**	**0,38**	**0,39**	**0,39**	**0,35**	**0,46**
VOLGA-KAMA MACROREGION	**0,39**	**0,40**	**0,38**	**0,44**	**0,40**	**0,42**	**0,45**	**0,48**	**0,41**	**0,40**	**0,39**	**0,38**	**0,38**	**0,39**	**0,35**	**0,45**
Volgo-Vyatka district	***0,40***	***0,42***	***0,40***	***0,46***	***0,40***	***0,42***	***0,45***	***0,50***	***0,43***	***0,43***	***0,42***	***0,41***	***0,39***	***0,41***	***0,36***	***0,47***
Nizhny Novgorod interregional cluster	*0,42*	*0,44*	*0,42*	*0,48*	*0,42*	*0,44*	*0,46*	*0,49*	*0,46*	*0,48*	*0,47*	*0,45*	*0,40*	*0,42*	*0,38*	*0,48*
Nizhny Novgorod region	0,49	0,51	0,49	0,53	0,46	0,48	0,50	0,46	0,43	0,43	0,43	0,41	0,54	0,57	0,51	0,64
Republic of Mordovia	0,35	0,37	0,35	0,42	0,39	0,40	0,41	0,52	0,48	0,53	0,51	0,50	0,26	0,27	0,25	0,33
Kazan interregional cluster	*0,40*	*0,41*	*0,39*	*0,45*	*0,39*	*0,41*	*0,44*	*0,50*	*0,42*	*0,41*	*0,40*	*0,39*	*0,39*	*0,40*	*0,35*	*0,46*
Republic of Tatarstan	0,43	0,45	0,44	0,49	0,50	0,54	0,55	0,49	0,55	0,55	0,56	0,56	0,34	0,35	0,33	0,45
Republic Of Mari El	0,37	0,37	0,38	0,47	0,36	0,37	0,44	0,56	0,39	0,35	0,35	0,35	0,37	0,39	0,36	0,48
Chuvash Republic	0,44	0,44	0,41	0,47	0,42	0,44	0,49	0,58	0,42	0,40	0,39	0,40	0,45	0,46	0,38	0,45
Kirov region	0,34	0,36	0,32	0,39	0,28	0,29	0,30	0,36	0,33	0,32	0,28	0,26	0,38	0,42	0,35	0,47
Kama district	*0,36*	*0,35*	*0,34*	*0,38*	*0,41*	*0,43*	*0,45*	*0,44*	*0,36*	*0,31*	*0,31*	*0,27*	*0,35*	*0,33*	*0,31*	*0,41*
Perm region	0,43	0,41	0,40	0,41	0,51	0,53	0,55	0,49	0,32	0,26	0,27	0,24	0,44	0,43	0,40	0,46
Udmurt Republic	0,30	0,29	0,28	0,35	0,30	0,33	0,34	0,39	0,39	0,35	0,35	0,31	0,25	0,23	0,22	0,35
VOLGA-URAL MACROREGION	**0,41**	**0,40**	**0,38**	**0,43**	**0,42**	**0,44**	**0,46**	**0,44**	**0,40**	**0,41**	**0,39**	**0,37**	**0,41**	**0,39**	**0,34**	**0,46**
Middle Volga district	***0,42***	***0,42***	***0,40***	***0,46***	***0,48***	***0,50***	***0,52***	***0,49***	***0,44***	***0,44***	***0,43***	***0,41***	***0,39***	***0,37***	***0,34***	***0,47***
Samara interregional cluster	*0,49*	*0,48*	*0,45*	*0,50*	*0,60*	*0,62*	*0,64*	*0,61*	*0,47*	*0,46*	*0,45*	*0,44*	*0,45*	*0,41*	*0,36*	*0,48*
Samara region	0,52	0,49	0,47	0,50	0,67	0,69	0,68	0,58	0,58	0,56	0,56	0,56	0,42	0,37	0,31	0,44
Ulyanovsk region	0,46	0,46	0,44	0,50	0,52	0,56	0,59	0,64	0,36	0,37	0,33	0,33	0,48	0,45	0,41	0,52
Saratov interregional cluster	*0,36*	*0,36*	*0,36*	*0,42*	*0,36*	*0,37*	*0,40*	*0,38*	*0,40*	*0,41*	*0,41*	*0,38*	*0,34*	*0,33*	*0,31*	*0,46*
Saratov region	0,33	0,35	0,36	0,43	0,34	0,35	0,38	0,41	0,43	0,44	0,46	0,43	0,28	0,30	0,31	0,43
Penza region	0,38	0,37	0,35	0,41	0,37	0,38	0,41	0,35	0,37	0,38	0,37	0,33	0,39	0,35	0,31	0,48
South Pre-Ural distric	***0,38***	***0,38***	***0,34***	***0,37***	***0,30***	***0,32***	***0,34***	***0,32***	***0,34***	***0,35***	***0,31***	***0,30***	***0,44***	***0,42***	***0,36***	***0,43***
Republic of Bashkortostan	0,41	0,40	0,40	0,43	0,40	0,41	0,44	0,42	0,35	0,33	0,32	0,32	0,46	0,42	0,41	0,48
Orenburg region	0,35	0,36	0,29	0,32	0,21	0,23	0,23	0,21	0,33	0,36	0,30	0,28	0,42	0,42	0,31	0,38

Calculated by the author

The values of the subindex "2.1. Personnel potential of the knowledge-intensive and high-tech sectors of the economy" show growth in most regions of the Volga region, with the exception of the Penza and Orenburg regions. The Samara region, despite a significant decrease in the subindex values, retains a leading position. The situation with the educational potential of the Volga region is much worse, the Republic of Tatarstan and Mordovia demonstrate growth over the past 5 years, and the Samara region also retains a leading position. This situation is explained by a general decrease in the number of school graduates and, consequently, students, as well as the outflow of applicants to large agglomerations and the capital region.

We note the growth of the values of the subindex "2.3. Personnel potential of regional science" for the analyzed period for all regions of the Volga region, with the leaders being the Nizhny Novgorod region and the Ulyanovsk region, whose scientific and educational centers are Ulyanovsk and Dimitrovgrad. Values of subindixes of the financial potential of innovative development of the Volga region regions, presented in table 7.

Table 7: Financial potential of innovative development of the Volga regions

Region	IFP-3				IFP-3.1				IFP-3.2			
	2013	2014	2015	2017	2013	2014	2015	2017	2013	2014	2015	2017
VOLGA FEDERAL DISTRICT	**0,26**	**0,29**	**0,29**	**0,30**	**0,10**	**0,17**	**0,17**	**0,13**	**0,38**	**0,39**	**0,51**	**0,43**
VOLGA-KAMA MACROREGION	**0,24**	**0,28**	**0,28**	**0,29**	**0,08**	**0,17**	**0,17**	**0,14**	**0,36**	**0,37**	**0,48**	**0,41**
Volgo-Vyatka district	***0,26***	***0,31***	***0,30***	***0,31***	***0,10***	***0,20***	***0,20***	***0,14***	***0,38***	***0,39***	***0,50***	***0,43***
Nizhny Novgorod interregional cluster	*0,29*	*0,41*	*0,35*	*0,39*	*0,10*	*0,32*	*0,17*	*0,21*	*0,44*	*0,47*	*0,66*	*0,53*
Nizhny Novgorod region	0,35	0,35	0,37	0,52	0,00	0,00	0,00	0,24	0,61	0,61	0,87	0,73
Republic of Mordovia	0,24	0,46	0,33	0,26	0,19	0,64	0,33	0,17	0,28	0,33	0,44	0,33
Kazan interregional cluster	*0,24*	*0,26*	*0,28*	*0,27*	*0,09*	*0,15*	*0,22*	*0,11*	*0,35*	*0,35*	*0,43*	*0,39*
Republic of Tatarstan	0,34	0,39	0,40	0,35	0,29	0,37	0,43	0,13	0,39	0,41	0,50	0,51
Republic Of Mari El	0,17	0,15	0,13	0,21	0,05	0,05	0,03	0,09	0,26	0,22	0,28	0,30
Chuvash Republic	0,23	0,29	0,33	0,25	0,04	0,16	0,30	0,13	0,37	0,38	0,48	0,34
Kirov region	0,21	0,21	0,25	0,28	0,00	0,00	0,12	0,09	0,37	0,37	0,46	0,41
Kama district	***0,17***	***0,20***	***0,20***	***0,24***	***0,02***	***0,05***	***0,07***	***0,12***	***0,29***	***0,31***	***0,41***	***0,33***
Perm region	0,23	0,24	0,24	0,29	0,04	0,02	0,02	0,15	0,37	0,40	0,53	0,40
Udmurt Republic	0,12	0,16	0,17	0,18	0,01	0,08	0,12	0,08	0,21	0,22	0,28	0,25
VOLGA-URAL MACROREGION	**0,30**	**0,31**	**0,31**	**0,31**	**0,14**	**0,17**	**0,18**	**0,11**	**0,41**	**0,41**	**0,55**	**0,46**
Middle Volga district	***0,33***	***0,31***	***0,31***	***0,31***	***0,18***	***0,16***	***0,15***	***0,09***	***0,44***	***0,43***	***0,57***	***0,47***
Samara interregional cluster	*0,44*	*0,40*	*0,38*	*0,36*	*0,21*	*0,16*	*0,10*	*0,10*	*0,61*	*0,58*	*0,77*	*0,56*
Samara region	0,33	0,30	0,33	0,26	0,18	0,18	0,21	0,14	0,45	0,39	0,56	0,35
Ulyanovsk region	0,54	0,49	0,42	0,47	0,24	0,14	0,00	0,05	0,77	0,76	0,99	0,78
Saratov interregional cluster	*0,22*	*0,22*	*0,24*	*0,25*	*0,14*	*0,15*	*0,20*	*0,09*	*0,28*	*0,28*	*0,37*	*0,37*
Saratov region	0,15	0,23	0,25	0,21	0,00	0,17	0,15	0,02	0,26	0,27	0,44	0,35
Penza region	0,29	0,22	0,24	0,29	0,28	0,14	0,24	0,16	0,30	0,28	0,31	0,39
South Pre-Ural distric	***0,23***	***0,30***	***0,31***	***0,32***	***0,08***	***0,18***	***0,23***	***0,16***	***0,35***	***0,38***	***0,49***	***0,44***
Republic of Bashkortostan	0,30	0,43	0,46	0,43	0,11	0,32	0,42	0,26	0,45	0,52	0,65	0,55
Orenburg region	0,16	0,16	0,15	0,21	0,04	0,05	0,03	0,05	0,25	0,24	0,33	0,34

Calculated by the author

Based on the values of the subindex "3.1. Budget financing of innovative development of the region", it is possible to identify regions that widely attract budget financing to the sphere of science and innovation at different stages. These regions are Nizhny Novgorod, republics of Mordovia, Tatarstan, Chuvashia; Samara, Ulyanovsk and Penza regions, the Republic of Bashkortostan. It should be noted that all the listed regions of the Volga region, in contrast to those lagging behind in this indicator, have a more active policy in the field of creating cluster initiatives within the framework of various federal programs. The values of the sub-index "3.2. R&D financing at the expense of organizations 'own funds" indicate that the following regions have significant internal R&D financing potential: Nizhny Novgorod region, Republic of Tatarstan, Perm region, Samara and Ulyanovsk regions, Republic of Bashkortostan. Next, we will consider the values of the subindexes of the scientific and technological potential of innovative development of the Volga region regions, presented in table 8.

Table 8: Scientific and technical potential of innovative development of the Volga regions

Region	ISTP-4				ISTP-4.1				ISTP-4.2			
	2013	2014	2015	2017	2013	2014	2015	2017	2013	2014	2015	2017
VOLGA FEDERAL DISTRICT	**0,44**	**0,43**	**0,40**	**0,38**	**0,44**	**0,39**	**0,36**	**0,37**	**0,44**	**0,45**	**0,43**	**0,38**
VOLGA-KAMA MACROREGION	**0,47**	**0,46**	**0,44**	**0,42**	**0,42**	**0,38**	**0,35**	**0,39**	**0,50**	**0,54**	**0,51**	**0,45**
Volgo-Vyatka district	***0,47***	***0,46***	***0,45***	***0,45***	***0,41***	***0,37***	***0,35***	***0,39***	***0,52***	***0,54***	***0,52***	***0,49***
Nizhny Novgorod interregional cluster	*0,51*	*0,52*	*0,49*	*0,47*	*0,42*	*0,41*	*0,39*	*0,43*	*0,58*	*0,61*	*0,56*	*0,50*
Nizhny Novgorod region	0,47	0,47	0,47	0,50	0,46	0,47	0,46	0,54	0,49	0,47	0,47	0,48
Republic of Mordovia	0,54	0,57	0,51	0,44	0,39	0,35	0,33	0,33	0,66	0,76	0,65	0,53
Kazan interregional cluster	*0,45*	*0,43*	*0,43*	*0,43*	*0,40*	*0,36*	*0,33*	*0,37*	*0,49*	*0,50*	*0,50*	*0,48*
Republic of Tatarstan	0,57	0,59	0,58	0,61	0,53	0,51	0,50	0,52	0,61	0,65	0,65	0,68
Republic Of Mari El	0,36	0,31	0,32	0,32	0,42	0,38	0,37	0,47	0,31	0,25	0,29	0,21
Chuvash Republic	0,58	0,53	0,52	0,51	0,34	0,26	0,21	0,24	0,78	0,75	0,76	0,72
Kirov region	0,29	0,30	0,28	0,30	0,30	0,27	0,24	0,28	0,28	0,33	0,31	0,32
Kama district	*0,46*	*0,47*	*0,41*	*0,35*	*0,46*	*0,38*	*0,35*	*0,38*	*0,45*	*0,53*	*0,46*	*0,32*
Perm region	0,49	0,50	0,45	0,35	0,50	0,44	0,40	0,41	0,48	0,54	0,49	0,31
Udmurt Republic	0,42	0,44	0,38	0,34	0,42	0,33	0,31	0,36	0,43	0,52	0,43	0,32
VOLGA-URAL MACROREGION	**0,40**	**0,37**	**0,34**	**0,32**	**0,47**	**0,41**	**0,36**	**0,35**	**0,35**	**0,34**	**0,32**	**0,29**
Middle Volga district	***0,42***	***0,39***	***0,33***	***0,33***	***0,49***	***0,45***	***0,36***	***0,37***	***0,36***	***0,34***	***0,30***	***0,29***
Samara interregional cluster	*0,37*	*0,34*	*0,29*	*0,29*	*0,52*	*0,47*	*0,39*	*0,44*	*0,25*	*0,24*	*0,22*	*0,17*
Samara region	0,34	0,32	0,31	0,29	0,48	0,44	0,41	0,42	0,22	0,23	0,23	0,18
Ulyanovsk region	0,41	0,36	0,28	0,29	0,57	0,50	0,37	0,46	0,28	0,25	0,20	0,15
Saratov interregional cluster	*0,47*	*0,44*	*0,36*	*0,36*	*0,46*	*0,42*	*0,33*	*0,30*	*0,48*	*0,45*	*0,39*	*0,41*
Saratov region	0,40	0,36	0,32	0,29	0,48	0,41	0,36	0,37	0,33	0,32	0,28	0,24
Penza region	0,54	0,51	0,40	0,43	0,44	0,44	0,30	0,23	0,62	0,57	0,49	0,59
South Pre-Ural distric	***0,37***	***0,34***	***0,36***	***0,30***	***0,42***	***0,34***	***0,37***	***0,32***	***0,33***	***0,35***	***0,35***	***0,27***
Republic of Bashkortostan	0,40	0,38	0,42	0,34	0,43	0,35	0,49	0,36	0,38	0,40	0,37	0,33
Orenburg region	0,33	0,31	0,30	0,25	0,41	0,34	0,25	0,29	0,28	0,29	0,33	0,22

Calculated by the author

In terms of scientific and technological potential, the following leaders were identified among the Volga regions, which showed an increase in the values of the first-level sub-index "4. Scientific and technological potential of innovative development of the region" for the analyzed period:

– Republic of Tatarstan, steady growth of science and innovation performance indicators in the analyzed period;
– Nizhny Novgorod region, growth rate by 2017, high level of development of science and innovation in production.

The rest of the Volga region and the Federal district as a whole show a decline in science and innovation indicators by 2017. The situation remains relatively good in the regions that implement cluster initiatives. The republics of Mordovia and Chuvashia, as well as the Penza region, are characterized by a decrease in the values of the subindex, while we note the preservation of high innovation activity of enterprises and organizations. Samara and Ulyanovsk regions, on the contrary, demonstrate a significant excess of scientific potential over technological. In 2017, there was a significant decrease in the scientific and technological potential of the Perm region and the Republic of Bashkortostan, which held leading positions in 2015.

Discussion

Based on the results obtained, which certainly have a debatable nature, it is possible to expand the scientific and practical discussion in relation to the chosen research problem. In particular, we can draw a conclusion about the correctly chosen goals and objectives of Russia's strategic development in the framework of an innovative scenario of economic growth (The concept of long-term socio-economic development of the Russian Federation, 2008). At the same time, it should be concluded that the implementation of cluster policy is insufficient for the innovative transformation of the economy of Russian regions. We also note the concentration of these strategic documents on the already industrialized territories without due attention to the processes of interregional cooperation in order to equalize the pace of socio-economic development (Forecast of long-term socio-economic development of the Russian Federation, 2013).

The results obtained allow us to suggest hypothetical directions for refining the spatial development Strategy of the Russian Federation (2019). In particular, add the Ulyanovsk region (Ulyanovsk-Dimitrovgrad) to the list of promising research and educational centers of economic growth in Russia. Also," raise the level " of Saransk from group III to group II, considering it as a promising development center that will contribute to the economic growth of the Russian Federation from 0.2 percent to 1 percent annually.

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Conclusions

Thus, we can observe an increase in the economic potential for the formation of an innovative economy in the Volga regions (sub-index 1). At the same time, it is necessary to note the positive impact of cluster development programs and complementary projects on the dynamics of performance indicators of innovative development in the region (sub-index 1.2), in particular for such regions as the Penza region, the Republic of Mordovia and Bashkortostan. The dynamics of indicators that characterize the financial potential of innovative development allows us to conclude that it is more effective to attract innovation financing for regions that have an active cluster policy. A key constraint for drawing conclusions about the impact of cluster policy on the innovative transformation of the Volga region economy is the fact that at the first stage of clustering, competitive industries in large economic and scientific and educational centers were subjected to clustering. At the same time, the relationship between innovation potential, innovation and cluster activity is traced.

Quite interesting conclusions follow from the interpretation of the results obtained within the author's multi-level model of the Volga region economic space. For each economic district and interregional cluster, a leading region is traced, which acts as the center of innovative transformation of the economic space of the neighboring regions. In the Volga-Kama macroregion such leaders at the level of "pairwise" comparisons of three regions: Nizhny Novgorod, Perm and Tatarstan. Despite the presence of two clear leaders (Nizhny Novgorod region and the Republic of Tatarstan), the key region for innovative transformation is Tatarstan, which has two transformation centers: the Kazan and Kama agglomeration. The first is considered as a potential point of growth of innovation activity and cluster initiatives for the republics of Chuvashia and Mari El, the second – for the Vyatka-Kama zone (Kama district and Kirov region).

In the Volga-Ural macroregion the Samara interregional cluster (Samara and Ulyanovsk regions) can be identified as the space with the greatest potential for innovative development. This territory is of key importance for the transformation of the economic space of the entire Middle Volga district and adjacent territories. Note the Penza region, which has a higher value of a comprehensive assessment of innovation potential in comparison with the Saratov region, as well as the Republic of Bashkortostan in comparison with the Orenburg region. The obtained conclusions can serve as a basis for the formation of spatial contours and vectors of a new stage of clustering of the Volga region economy, the implementation of the complementary nature of innovation and cluster activity in the regions.

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Polish And Spanish Managers' Views on The Role and Importance Of Cultural Intelligence in A Multicultural Work Environment

Agnieszka KNAP-STEFANIUK

Jesuit University Ignatianum in Krakow, Faculty of Education, Institute of Political and Administrative Sciences, Department of Law, Management and Economics, Krakow, Poland,
agnieszka.knap.stefaniuk@ignatianum.edu.pl

Abstract

Since the beginning of the 21st century, the issue of cultural intelligence has been gaining in importance. It is particularly topical and relevant from the perspective of management in a multicultural work environment. At present cultural intelligence is described and analysed in numerous sources, often in the context of managers' attitudes and behaviours and their tasks or responsibilities in the area of managing multicultural teams.
Cultural intelligence (or Cultural Quotient-CQ) is defined as the skills and qualities that allow effective functioning in a multicultural environment and considerably influence the understanding and acceptance of cultural differences. It is particularly helpful in the process of adapting to diverse cultural conditions, which are frequently characterised by totally different values and rules as well as the ways of acting, thinking, and solving problems. Cultural intelligence, especially managers' cultural intelligence, supports the effectiveness of multicultural teams. It leads to employees' greater openness and tolerance to cultural diversity, acceptance of different views, attitudes, and behaviours of co-workers. Above all, it is conductive to developing sensitivity and flexibility in building positive, intercultural relations.
The study described in the article (individual in-depth interviews conducted with the use of IT tools) investigated the role and importance of cultural intelligence in a multicultural work environment and was conducted among Polish and Spanish managers. The main aim of the article is to identify the role and importance of cultural intelligence in multicultural environments from the point of view of managers who participated in the study.

Keywords: Cultural Intelligence, Cultural Quotient (CQ), Managers, Multicultural Work Environment.

Introduction

In today's globalized business world, managers' work increasingly often involves managing multicultural teams which comprise employees from diverse cultural backgrounds.

Modern companies expand their international business activity, which leads to the dynamic growth and development of intercultural interactions. Therefore, being aware of the role and importance of cultural intelligence (CQ) is particularly important for those managers in these companies who are responsible for the functioning of multicultural teams and for maintaining intercultural relationships, both with employees and customers.

Cultural intelligence, understood as the ability to effectively adapt to various cultural contexts and to understand the complexity of functioning in a multicultural environment, affects managers' ability to act efficiently and to achieve the goals set for their teams and, consequently, for the whole organization.

Managers who work in intercultural environments should realise that the same values may not be shared across cultures and that some of them may be obvious and understandable in one culture but not in others. Hence, they should be ready to continuously expand and update their knowledge about other cultures as well as be open to new ideas, ways of working, and business practices.

The theoretical part of the article defines the concept of cultural intelligence, describes its role in managing multicultural teams, and outlines the components of cultural intelligence.

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The empirical part presents the results of the study conducted by the author. This qualitative study (16 individual in-depth interviews) was conducted among Polish and Spanish managers (8 interviews with managers of each nationality) who work in multicultural environments and manage culturally diverse teams.

The aim of the article is to present managers' views on the role and importance of cultural intelligence in a multicultural work environment.

Bearing in mind the above premises and the aim of the article, the following research question was formulated: Do managers who manage multicultural teams possess knowledge about cultural intelligence and how they perceive its role and importance in a multicultural work environment?

Cultural Intelligence (CQ) - definitions, importance, and role in managing multicultural teams

In our globalised world, contemporary companies do not limit their activity to one country but develop their international operations in search of new markets and growth opportunities.

Companies which operate on international markets find it necessary to establish and maintain intercultural interactions and develop trading ties in the international business environment. In order to successfully cooperate with companies from other cultures, employees must acquire and deepen their knowledge about these cultures (Sozbilir&Yesil 2016; Day 2017). Thus, the role and importance of cultural intelligence as a skill that is needed in modern management in the global market is systematically growing. Cultural intelligence is of particular significance for managers who work in multicultural environments and manage culturally diverse teams.

Since the beginning of the 21st century many authors have investigated the issue of cultural intelligence in their studies. These include: Earley, 2002; Earley & Ang, 2003; Peterson, 2004; Thomas & Inkson, 2004; Earley & Mosakowski, 2004; Ang, Dyne, Koh, &Ng, 2004; Earley, Ang, & Tan, 2006; Ang&Van Dyne, 2008; Crowne, 2009; Lee&Sukoco, 2010; Creque&Gooden, 2011; Engle&Nehrt, 2012; Ang, Van Dyne & Rockstuhl, 2015; Brancu, Munteanu, Golet, 2016; Simpson, 2017; Fang, Schei&Selart, 2018; Hu, Wu&Gu, 2019; Knap-Stefaniuk&Sowa-Behtane, 2020; Knap-Stefaniuk, 2020).

Cultural intelligence (CQ) refers to a person's capability to adapt and function effectively in culturally diverse contexts (Ang and Van Dyne, 2008; Earley and Ang, 2003). This adaptation requires skills and capabilities quite different from those used by people within their own cultural context. Cultural intelligence is also defined as "multifaceted competency consisting of cultural knowledge, the practice of mindfulness, and the repertoire of behavioral skills" (Thomas and Inkson, 2004).

CQ is also considered to be an ability that allows individuals to understand and act properly in many cultures (Thomas, 2006). Earley, Ang &Tan (2006) define CQ as the ability to successfully and effectively adapt to new cultural environments, that is, these previously unfamiliar conditions that can be attributed to another cultural context. CQ is also described as a system of knowledge and skills, linked by cultural meta-cognition that allows people to adapt to, select and shape cultural aspects of their environment (Thomas, Elron, et al. 2008).

Engle and Nehrt believe that cultural intelligence is a person's ability to successfully engage in relationships in culturally diverse environments (Engle, Nehrt, 2012). Khodadady and Ghahari point out that CQ is "the ability to interact effectively in multiple cultures" (2012, p. 22). In the organizational context, from the perspective of the tasks faced by contemporary managers who manage multicultural teams, cultural intelligence is also defined as the ability to effectively deal with cultural differences in an organization (Hu, Wu, et al., 2019).

Cultural intelligence is also described as an ability of managers who are involved in intercultural interactions to effectively operate in a globalised environment (Fang, Schei, et al., 2018). It is worth noting that the concept of CQ helps to explain why some managers are able to adapt their behaviours to various cultures more easily than others (Van Dyne, Ang and Livermore, 2010). Culturally intelligent individuals are described as competent and effective in many cross-cultural interactions (Ang & Inkpen, 2008; Ang et al., 2015), which is particularly important for managers who work with multicultural teams.

Summarizing the above considerations, it can be said that cultural intelligence reflects a general set of capabilities that facilitate efficiency in diverse cultural environments and makes some individuals more

successful in effective adaptation to various cultural contexts than others (Ang, Rockstuhl, Mei Ling Tan 2015, p. 433; Brancu, Munteanu, et al., 2016, p. 336).

It should be emphasized that cultural intelligence of managers who manage multicultural teams can be defined as the ability to effectively adapt to new cultural realities and the skills necessary to successfully function in environments characterized by cultural diversity of employees.

If contemporary companies want their managers to be successful on a global scale, they must try to attract people who possess the right skills and experience and must attend to their systematic development, especially in the area of cultural intelligence (Alon, Higgins 2005, p. 510). Such managers are indispensable because in contemporary organizations multiculturalism is reflected in a number of areas which are affected by differences in values, behaviors, and beliefs of people who come from diverse cultures (Griffin, 1996, p. 178).

Being aware of and possessing knowledge about cultural differences is a must for managers working in multicultural environments. Sensitivity to their employees' international diversity and knowledge about intercultural determinants of their teams should be part and parcel of modern managers' work. Managers who function in multicultural environments should try to understand the differences between employees and behave tactfully and patiently in intercultural relations (Glinkowska 2016, p. 58).

Managers' attitudes and behaviours, including their cultural intelligence, to a great extent shape the effects of cultural diversity, which may be both beneficial and unfavourable for the functioning of multicultural teams. Negative effects of cultural diversity include dysfunctional conflicts, decreased productivity, and difficulties in reaching agreement and achieving team goals. Positive effects of employees' cultural diversity primarily result from the knowledge base which covers a whole range of various cultural experiences, knowledge of different markets and customers' behaviours and needs, and greater willingness to expand company's activity to other countries and cultures.

It is worth noticing that the effects of cultural diversity in the workplace (positive or negative) depend primarily on managers and their effectiveness in managing multicultural teams (Martin 2014, p. 90). These effects, in the author's opinion, to a great extent depend on managers' cultural intelligence (their adaptability, openness, commitment to intercultural interactions, and an ability to build positive relationships with employees from other cultures). This intelligence plays a key role in creating positive effects of cultural diversity.

"Managers – especially those who work in a culturally diverse environment – play a vital role in modern management and the achievement of organizational goals. The challenges they face and responsibilities they shoulder result from the need to reconcile different ways in which employees from various – sometimes poles apart – cultures think and behave" (Burkiewicz, Knap-Stefaniuk 2020, p. 7474).

Managers who manage multicultural teams should create such working conditions (atmosphere, communication, relations between people) and solutions within a team (motivating employees, attending to their development, fair evaluation of their achievements) that will make employees from other cultures feel at ease and comfortable. It is important that they feel they can openly present their ideas and proposals, share their native market experiences, and propose new solutions.

Dealing with cultural differences is based primarily on respecting all the values represented by employees of multicultural teams (Glinkowska 2016). Managers' cultural intelligence affects the effective functioning of culturally diverse teams. It facilitates understanding and acceptance of those cultural norms, principles, and values which are held by employees from different countries. It also shapes managers' greater flexibility in selecting and implementing the best management style, working methods, ways of building relations with employees, and is conductive to efficient communication and differentiation of methods used to motivate employees.

A high level of managers' CQ is crucial for the company's successful functioning in a culturally diverse environment. Thus, cultural trainings and workshops are necessary to develop cultural awareness and sensitivity of managers who are responsible for the work of multicultural teams.

Components of Cultural Intelligence

"CQ helps people to understand other cultures" (Joost, Bücker, et al 2014, p. 2070). Based on the work of various authors (Ang, Van Dyne, et al., 2006; Van Dyne, Ang, et al., 2009; Ng, Van Dyne, et al., 2012; Ang,

Van Dyne, et al., 2012; Ang, Van Dyne, et al., 2015; Brancu, Munteanu, et al., 2016), the following components of cultural intelligence can be listed.

Metacognitive CQ is a mental capability which allows a person to acquire and evaluate their cultural knowledge. This component focuses on becoming aware of and monitoring the cognitive process in relation to one's own cultural identity and that of others when interacting with them (Simpson 2017). "Metacognitive CQ makes people more alert looking for explanations of unexpected reactions or behaviors of the person they are interacting with" (Joost, Bücker, et al 2014, p. 2070). Metacognitive CQ stimulates the formation of novel heuristics for intercultural interfaces and promotes the questioning of one's own cultural suppositions (And, Van Dyne, 2011).

Cognitive CQ is a component that refers to a person's general knowledge and the structure of their knowledge about cultures and differences between them (Simpson 2017). "Cognitive CQ stimulates thinking about other cultures and searching for explanatory models that bring a certain order in cultural differences" (Joost, Bücker, et al 2014, p. 2070). This component represents a person's knowledge about other cultures, examples of which include customs, standards, and values (Van Dyne et al., 2012).

Motivational CQ is a person's internal motivation to make an effort to function effectively in a culturally alien environment (Simpcon 2017). This component portrays the leader's, manager's desire to acclimate interculturally (Van Dyne et al., 2010). "Motivational CQ helps people to develop self-efficacy; it gives them energy to put effort in a cross-cultural situation and to develop the trust needed to enable control of the unfamiliar situation" (Joost, Bücker, et al 2014, p. 2070).

Behavioural CQ is the ability to respond appropriately – verbally and non-verbally – when dealing with representatives of other cultures. This component denotes the adoption and display of culture-appropriate actions (Ang, Van Dyne 2008). "Behavioral CQ supports individuals to use certain verbal and non-verbal behavioral repertoires which enable them to take initiative and act in an interaction" (Joost J.L.E. Bücker, et al, 2014, p. 2070).

Methodology

The qualitative study described in the article was conducted by means of the interview method (the interview was semi-structured) and the technique of individual in-depth interview. A special research tool (interview scenario) was developed to be used in the study, in which most questions were open-ended ones, and those closed-ended only verified the respondents' familiarity with the term "cultural intelligence" and their knowledge of components of cultural intelligence. The interviews were conducted using ITC tools (ZOOM and Microsoft Teams), which was motivated by the epidemiological situation and the inability to conduct interviews at face-to-face meetings. The author had planned to conduct these interviews with managers during her two research trips (to Spain and the Czech Republic) in the period between March and July 2020 (Spain, Czech Republic). Unfortunately, the situation related to COVID-19 changed this plan. So far, interviews have been held with Polish and Spanish managers, and the ones with Czech managers will take place in the near future.

Respondents, i.e. managers working in multicultural environments, were recruited through social networks (the snowball sampling). The search for them was initiated in several different places to avoid narrowing down the group of respondents only to those linked, for example, by professional ties. The key criterion for recruiting suitable respondents (managers) was their employment in international companies, their managerial position, and their managing a culturally diverse team (minimum 3 years at a managerial position; employees of minimum 3 different nationalities in the team). The author assumed that after such period (minimum 3 years) a manger has enough knowledge and experience in managing a multicultural team. In her previous study, the criterion was teams with employees of at least 2 different nationalities, however, in this study, it was changed to 3, as the author wanted to obtain the opinions of managers who have contact and experience in working with employees who come from more than 2 different cultures and thus have a broader perspective on issues related to those investigated in the article.

The interviews (16 individual in-depth interviews) were conducted with Polish and Spanish managers (8 interviews with managers of each nationality) who work in multicultural environments and manage culturally diverse teams. Originally, the author intended to conduct 20 interviews (10 with Polish managers and 10 with Spanish managers), unfortunately, due to organizational reasons, it proved impossible.

The interviews took place between March and August 2020. One interview lasted from 50 to 65 minutes. Before the beginning of each interview, the respondents were informed about the aims of the study, the way in which the interviews were to be conducted, the confidentiality of the study (the empirical material will be used only for publications, the respondents' anonymity will be respected). Not all respondents (managers) agreed to have their interviews recorded with ITC tools (4 Polish and 3 Spanish managers gave their consent). The interviews were conducted in Polish with the Polish managers and in English with the Spanish managers.

During the interviews the author tried to create a friendly atmosphere so that the respondents felt comfortable (this way of conducting an interview was a completely new situation for many of them). The data collected during the interviews were transcribed, coded, and categorized, and served as the basis for qualitative analysis of the respondents' statements. The empirical material was also subjected to quantitative analysis.

The respondents participating in the interviews included 8 Poles, aged between 33 to 45 (3 women and 5 men) and 8 Spaniards, aged between 35 and 48 (1 woman and 7 men). The aim of the interviews was to discover the opinions of managers from two different cultures on the role and importance of cultural intelligence in a multicultural work environment.

Cultural intelligence - The Results of The Study

The author conducted 16 in-depth individual interviews with 8 Polish and 8 Spanish managers who work with multicultural teams.

The specific aims of the study (interviews) was to find out whether the respondents know, understand, and can explain the term "cultural intelligence", whether they know the components of cultural intelligence, and whether they are able to determine which component(s) are the most relevant to their work and why. Other aims were to discover the respondents' opinions about the role of cultural intelligence in managing culturally diverse teams (in general contexts and with reference to managers' CQ) and to find out whether the respondents have participated in workshops on cultural diversity, CQ, and management of multicultural teams and whether they have participated in trainings during which their cultural competence (including cultural intelligence) was developed, as it may have an impact on their knowledge or lack thereof in this area.

One of the first questions asked during the interviews concerned the respondents' knowledge of the term "cultural intelligence". Taking into account the qualitative nature of the empirical material, the author provides the quotes of managers' answers (in the order in which the interviews with respondents were held).

All Polish managers were familiar with the term cultural intelligence (8 people confirmed that they knew and understood the term). When asked what cultural intelligence means, the respondents replied as follows. Manager 1 (female, 38) – "Cultural intelligence is the ability to understand people, employees from other cultures". Manager 2 (female, 40) – "It is the ability to work in conditions of cultural diversity". Manager 3 (male, 43) – "Cultural intelligence is the ability to understand and accept cultural diversity in social contacts and at work". Manager 4 (male, 33) – "It is openness to people from other cultures and acceptance that their culture may be completely different from ours". Manager 4 (female, 41) – "It is sensitivity to the other person and to the other culture from which he comes, even if this culture seems alien and unknown to us; it is tolerance and tact towards this otherness, which we sometimes do not understand". Manager 5 (male, 35) – "It is freedom and a certain ability to be flexible in relationships with co-workers and subordinates from other cultures". Manager 6 (male, 45) – "Cultural intelligence is the ability to act effectively in an environment of cultural differences". Manager 7 (male, 40) – "It is the competence of managers who work and have experience in working in an intercultural environment; it is easier for them to accept other cultures and working style or communication of employees from other cultures". Manager 8 (male, 43) – "I have knowledge of cultural intelligence because for a long time I have been working in an environment where there are employees from different cultures; it is simply about being able to deal with cultural differences in your daily work, especially when you are a manager and have employees of different nationalities in your team".

Also all Spanish managers were familiar with the term of cultural intelligence (8 respondents gave a positive answer to this question). They all confirmed that they understand this term and can explain it. Their answers are quoted below.

Manager 1 (male, 42) – "Cultural intelligence is about being open, kind, and tolerant to employees from other cultures". Manager 2 (female, 35) – "It is a smile and kindness to employees who come from a culture different than mine; it is an attempt that even if sometimes we differ a lot, together we realize the goals of the team; it is

also an ability to cooperate, despite these differences. Manager 3 (male, 48) – "After many years of work, I believe it is an ability to accept cultural differences, to be open to them and willing to learn, but also to share knowledge with employees from other cultures and seek the best solutions together". Manager 4 (male, 43) – "I think it is the effectiveness in managing a team that comes from being able to work with people from cultures other than yours; you know how to listen to them, appreciate what they do, build good relationships, although we often differ due to cultural backgrounds. Manager 5 (male, 45) – "Cultural intelligence means understanding and accepting people from other cultures with whom you work; it is flexibility and an ability to act in difficult situations when we are very different in our approach to work, in the way we perform our duties, in our different ideas of how to achieve goals in a team". Manager 6 (male, 43) – "Cultural intelligence comes from our experience; once you have experience of working with other cultures you are usually more tolerant, you try to understand other cultures, you act more flexibly". Manager 7 (male, 44) – "It is a skill to adapt to a team where you have employees from different cultures; you accept that they are different, you are tolerant". Manager 8 (male, 38) – "Cultural intelligence is a set of qualities and skills that makes work easier when you lead a team with different people, employees from different countries; you try to respect them, not to offend them because of their culture; you are tolerant and open-minded; you know how to act in such conditions".

During the interviews, managers were also asked about the components of cultural intelligence, whether they know them (or have heard of them before), whether they can name them, whether they can explain or define them briefly, and whether they can describe their role and importance in managing multicultural teams. This part of the interview was difficult for the respondents and yielded very few positive answers. Managers, both Polish and Spanish, answered that they "heard something" about components of cultural intelligence, but these were very general answers, which revealed that they lacked knowledge from this area. Two Polish managers (both females, 38 and 41) and one Spanish manager (male, 38) heard about the components of cultural intelligence and were able to name them correctly.

During the interviews, the author listed the components of cultural intelligence (metacognitive CQ, cognitive CQ, motivational CQ, and behavioural CQ), briefly described them and asked the respondents which of them seem the most significant in managing multicultural teams. The Polish managers most frequently chose cognitive CQ and motivational CQ (7 answers both), while the Spanish managers valued motivational CQ (8 answers) and behavioural CQ (6 answers) the highest.

The aim of the study was also to find out the respondents' opinions on the role of cultural intelligence (in general contexts and in terms of managers' CQ) in managing culturally diverse teams. All Polish managers (8 respondents) and all Spanish ones (8 respondents) stated that cultural intelligence generally plays a very important role in relations with other cultures and in the functioning in culturally diverse environments. It facilitates understanding other people and adjusting one's behaviour and communication to various cultural requirements. As far as working and functioning in a culturally diverse environment and managing multicultural teams is concerned, the respondents believed that cultural intelligence: helps to achieve goals (7 answers from Polish managers; 7 answers from Spanish managers); facilitates conflict resolution (7 answers from Polish and 8 answers from Spanish managers); improves the effectiveness of motivating employees (7 answers from both Polish and Spanish managers) and communication in the team (8 answers from both Polish and Spanish managers); builds positive atmosphere at work (6 answers from Polish managers; 7 answers from Spanish managers); influences the formation of intercultural relations within the team (8 answers from both Polish and Spanish managers); and facilitates effective cooperation and search for new solutions (based on the knowledge and experience of employees from different cultures) (7 answers from both Polish and Spanish managers).

During the interviews, the respondents were also asked questions about the ways in which they acquired knowledge on cultural intelligence and in which they developed it. The managers, both Polish and Spanish, primarily listed the Internet sources and articles, and trainings and workshops in which they participated.

Another aim of the study was to obtain information whether the respondents have participated in workshops on cultural diversity, CQ, multicultural team management and whether they have participated in trainings in which their cultural competence (including cultural intelligence) was developed. 6 Polish managers took part in workshops devoted to multicultural team management and 4 of them also participated in cultural trainings, and 5 Spanish managers took part in workshops on cultural differences organised in their companies.

During the interviews, Spanish managers pointed out that the analysis of the role and importance of cultural intelligence for managers who manage multicultural teams, or simply the importance of cultural intelligence in general, should also be analysed from the perspective of the cultural diversity of the population concerned (e.g. Spaniards, employees or managers, depending on the objectives of the study, who live in different regions of the country, e.g. in Madrid, Catalonia, Andalusia or others).

Summing up, the interviews confirmed that the respondents (all Polish and all Spanish managers) know the term "cultural intelligence". They encountered this term before at work or/and during workshops or trainings. Some of them, in order to develop their knowledge of CQ, read articles on the subject, although the Internet was the main source of information. The respondents (Polish and Spanish) notice and understand the link between managers' cultural intelligence and their effectiveness in managing multicultural teams (e.g. in achieving goals, sharing knowledge and experience, implementing new solutions, looking for innovative ideas, evaluating employees' individual achievements or successes achieved by teams).

Discussion

The data obtained through the interviews allowed to answer the research question formulated in the Introduction: Do managers who manage multicultural teams possess knowledge about cultural intelligence and how they perceive its role and importance in a multicultural work environment?

As a result of individual in-depth interviews conducted with 8 Polish and 8 Spanish managers, the author collected empirical material which demonstrates that all Polish (8 respondents) and all Spanish (8 respondents) managers know the term "cultural intelligence" and are able to explain and describe it. In the author's opinion, the respondents gained this knowledge while working in a multicultural environment for several years (5 to 12 on average) and managing culturally diverse teams (for 4 to 10 years).

Most managers were unable to list and describe the components of cultural intelligence. Only 2 Polish managers and 1 Spanish manager had some knowledge on this subject. After listening to descriptions of particular CQ components, the Polish managers declared cognitive CQ and motivational CQ to be the most important in effective management of culturally diverse teams, whereas the Spanish managers pointed at motivational CQ and behavioural CQ.

The respondents, both Polish and Spanish managers, acknowledged and were able to explain the significant role played by cultural intelligence, both in general contexts, in intercultural relations, and in working and managing multicultural teams. As far as the management of multicultural teams was concerned, they mentioned its positive effects in the following areas: goal achievement, conflict resolution, employees' motivation, communication, work atmosphere, team relations, cooperation, knowledge and experience sharing.

Some Polish and Spanish managers have participated in trainings and workshops directly related to their work in multicultural environments, during which they gained knowledge about cultural intelligence. Managers broaden their knowledge in this area by mostly reaching for the Internet sources.

As an extension and complement to this study, the author intends to conduct individual in-depth interviews with Czech managers and to expand the empirical material collected so far with new nationalities.

Limitations and Recommendations

The greatest limitation of this study is linked with the fact that it was based on a convenience sample. The sample was selected using the snowball sampling, based on the author's social and professional contacts. However, in the author's opinion, due to the epidemiological circumstances, it was a reasonable way to find people who meet the criteria set in the study.

The interviews were conducted by means of in-depth interview technique, using ITC technologies, which could also be a certain limitation. Direct contact with respondents (especially in qualitative research) creates better opportunities and freedom in going deeper into the issues of interest to the researcher, in asking respondents for details, and in establishing more direct contact with them.

The study was qualitative in nature. The author is aware of the fact that the scope for generalisation of the results of such studies to the population as a whole can be limited. It should also be mentioned that the interviews with Spanish managers were conducted in English; the fact that interviews are not conducted in native tongues can be an additional difficulty for both respondents and researchers.

The author intends (everything depends on the epidemiological situation) to conduct a similar study among Czech managers (as was the original plan). It might be worth considering whether to conduct a more detailed study on cultural intelligence among managers of different nationalities that accounts for cultural diversity of a given population (for example, cultural differences between various regions in Spain, such as Catalonia, Andalusia or others; in Poland - Mazovia, Silesia or others; and in other countries). Adding more variables (e.g.

the values held by managers) may enrich the empirical material on the role and importance of cultural intelligence in a multicultural work environment.

Conclusions and Future Research

The analysis of the subject literature and interviews with Polish and Spanish managers allowed the author to demonstrate the role and importance of cultural intelligence in a multicultural work environment (from the perspective of managers of two different nationalities).

Cultural intelligence is very important, especially for managers who are responsible for the work of multicultural teams and the achievement of goals. This intelligence affects managers' attitudes and behaviours in their contacts and relations with employees from other cultures, their ability to accept and quickly adapt to cultural differences, and their way of building relationships and effective cooperation at the meeting point of different cultures. Managers who work in a culturally diverse environment should continuously develop their cultural intelligence (their company's support is necessary here, e.g. by providing workshops, trainings, or coaching) and expand their competences in all components of cultural intelligence.

Further research in the field of cultural intelligence should focus on, among other things, the components of CQ and their role and importance in effective management of people in a multicultural work environment. It is worth expanding the scope of the study, for example, by adding quantitative research, by using a larger sample, by using different methods and techniques, or by including other nationalities (managers from Italy or Portugal). Moreover, when analysing the cultural diversity of a given population, it might be useful to take into account not only the country but also the region of managers' origin.

Summing up, managers' cultural intelligence facilitates managing people who come from different cultures and who differ in terms of values, beliefs, norms and principles, who prefer different ways of communication, who have different working styles and different perceptions of time or relationships in professional life. In order to increase the effectiveness of cooperation in intercultural relations (in multicultural teams), modern companies should focus on recruiting managers who understand the role and importance of cultural intelligence in their work and possess a high dose of cultural awareness and sensitivity.

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Pilot Course for Sustainable Development of E-Learning Tools

BEJENARU Dan-Alexandru
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, bejenarudan.alex@gmail.com

ULMEANU Mihaela-Elena
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CE Building, District 6, Bucharest, Romania, mihaela.ulmeanu@upb.ro

DOICIN Cristian-Vasile
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, cristian.doicin@upb.ro

SPÂNU Paulina
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, paulina.spanu@upb.ro

TUNSOIU Nicolae
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, tunsoiunicolae@gmail.com

Abstract

Online learning allows offers a variety of advantages amongst which can be mentioned: increased productivity, learner customization, content flexibility, targeted features etc. Nevertheless, most learning management systems are subscription-based and can prove to be quite expensive. For educational purposes in academic activities, freemiums and open source LMS solutions are readily available. The current research study follows the development of a pilot course using Talent LMS e-learning platform, which fulfills current requirements for new teaching methods that are more attractive and interactive. The importance of e-learning tools is exacerbated in the current socio-economic environment, which is currently dominated by the SARS-Cov2 epidemic. Authors propose a customizable learning environment using ready to use design tools, but also CSS code for a targeted user experience. The methodology for designing a Web Development for 3D Printing Start-ups pilot course was thoroughly presented, highlighting the main structural components. Implementation was undertaken during a seven-day intensive summer school held at POLITEHNICA University of Bucharest from Romania. Received feedback helped improve the contents, presentation and the structure of the course.

Keywords: E-learning, Teaching Methods, Adaptability, Gamification.

Introduction

As the world changes, continuous progress is made with the purpose of offering a better quality of life. Technology is increasingly available and advanced, with many advantages and disadvantages as well. Newer generations embrace a new way of thinking and develop different life-principles.

Recent studies conducted by Nagashibaevna Y.K. (2019) have shown that students have progressively lost interest in studying and that is mainly since some areas of education do not keep up with modern teaching technologies. Although many students use technology daily, they seem to agree that there is a lack of innovative and technology appropriate learning content.

In June 2020 the European Data Portal (2020) concluded that the current socio-economic environment caused by the SARS-Cov2 epidemic is forcing the shift of learning experiences from face to face into an online environment. This also made the Commission to review the Digital Education Action Plan in 2020, which was intended to

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support the development of online learning at different levels of education across Europe. The necessity of cohesive and reliable e-learning tools is felt more astringently than ever before.

According to Eurostat (2020) in 2019, four in five young people (80%) aged 16 to 24 in the European Union (EU) had basic or above basic digital skills. Among EU Member States, Romania had the lowest share of individuals aged 16 to 24 with basic or above basic overall digital skills (56%). This shows that almost half of young Romanians do not have the necessary digital skills to access educational services online. To support the global efforts of maintaining an adequate educational process the European Commission (2020) offers a wide range of online learning resources for learners, teachers and educators during the outbreak of COVID-19.

Rapanta C. et al. (2020) concludes in his research that universities, now more than ever, should invest in teacher professional development of their faculty, for them to be updated on effective pedagogical methods with or without the use of online technologies.

Considering the abovementioned, the authors propose the design of an intuitive pilot e-course for sustainable development of e-learning tools. The course addresses *Web Development for 3D Printing Start-ups* in an attempt to create an interactive learning experience for users and encouraging participative development of educational e-tools.

Study Background and Methods

The current study proposes the development of a pilot course module using the online Talent LMS e-learning platform. The pilot course was designed and implemented within an intensive summer school program financed through a partnership Erasmus+ project. *TecHUB 4.0 - Technology and Entrepreneurship Education for Bridging the Gap in Smart Product Development*, is an international project with POLITEHNICA University of Bucharest (UPB) from Romania as the project leader, and partnering up with three other universities: Czestochowa University of Technology (PCz) from Poland, Lancaster University (LU) from the United Kingdom of Great Britain and "Lucian Blaga" University of Sibiu (ULBS) from Romania. TecHUB 4.0 aims at delivering, with methods based on modern teaching technologies, especially based on web-based platforms and digital technologies – e-learning and interactive platforms, the knowledge of professors, industry specialists, researchers, managers, and entrepreneurs to young students wishing to become entrepreneurs in the additive manufacturing (AM) area. To address this main target, the pilot course on *Web Development for 3D Printing Start-ups* was custom designed using CSS coding within Talent LMS.

Most learning management systems (LMS) are subscription-based and can prove to be quite expensive, reaching up to four figures a month. For educational purposes in academic activities, freemiums and open source LMS solutions are readily available. Aside budget considerations, another reason for opting for a free LMS is the size of the application area. For small businesses with small staff, for example, the features of a free e-learning platform are more than satisfactory.

According to Chang J. (2020) from Finances Online TalentLMS is the top free solution for e-learning (Figure 1). It is a very flexible cloud hosted LMS designed to help users simplify how they facilitate online seminars, courses, and other training programs. The cloud powered LMS solution does not need installation, upgrade or a back-up, thus being very user friendly even for a beginner admin.

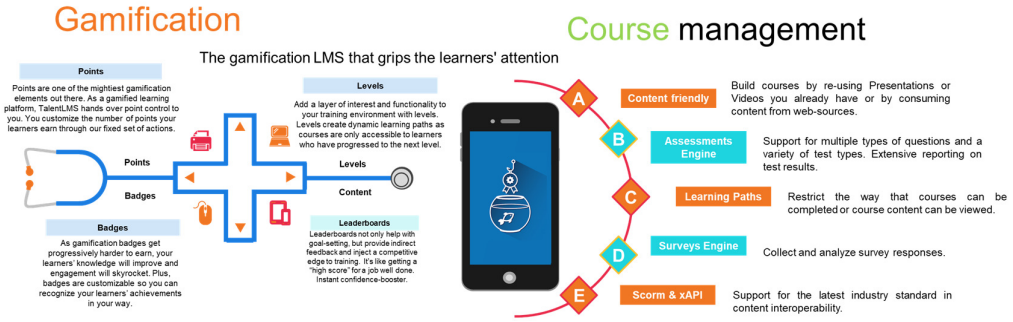

Figure 1: Talent LMS main e-learning platform features

The key features that made TalentLMS the optimum choice for TecHUB 4.0 implementation and pilot course development were the comprehensive analytics service, the gamification of content and the availability of feature customisation through CSS coding.

In association with Talent LMS, WIX was selected as the designated website builder, mainly due to its' competitive advantages for beginners through advanced designing tools, as stated by Jenner N. (2018). Using WIX learners created a personal website by using the Artificial Design Intelligence (ADI) that the platform provides. A step-by-step learning process revealed how to create a website, add and edit content for a 3D printing start-up business.

Pilot Course Development

TalentLMS can be deployed with an open Application Programming Interface (API), but it is also an excellent solution when using Cloud hosting. It can support various languages, so that the developed pilot e-course could be not only delivered in a native language, but also administrated and designed that way by admins and, respectively instructors. TalentLMS as the main web platform for designing and delivering the pilot e-course mainly due to the open source characteristics and the available pricing plans. It is one of the very few platforms which can run cloud based, can offer a free pricing plan, has an open source on CSS coding and also has a variety of interactive content design and development tools. Five registered users and unlimited unregistered users were available and divided in several ways throughout the pilot e-course development process, as follows:

- 1 super admin and four instructors (registered users) – initial design and development stage;
- 1 super admin, 1 instructor and 3 learners (registered users) – first testing stage of the e-course;
- 1 super admin and 4 learners (registered users) – pilot testing during the focus group;
- 1 super admin, 4 instructors (registered users) and 100 learners (unregistered users) – pilot testing during the intensive summer school.

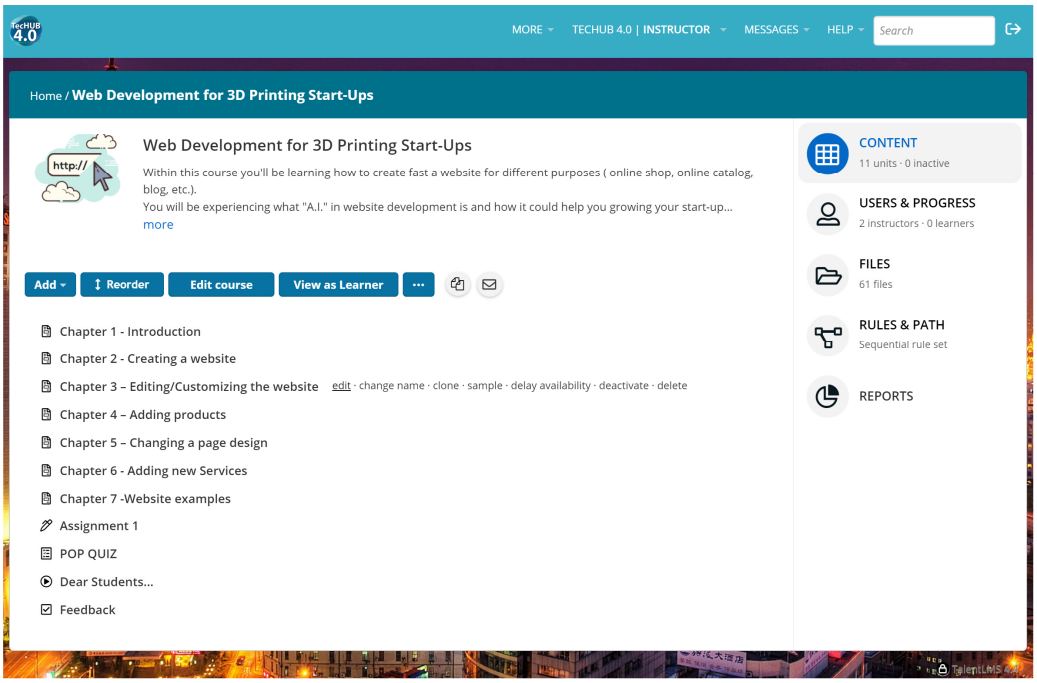

Figure 2: Module Structure for the module Web Development for 3D Printing Start-ups

The pilot e-course can be completed by an unlimited number of students, without having to open a specific TalentLMS user account. Nevertheless, the capabilities of the platform allow the development of very large data bases, the main customer types targeted ranging from freelancers and small businesses to large enterprises. The e-learning platform supports a series of common devices, like Windows, Linux, Android, iPhone/iPad, Mac, Web-based, Windows Mobile. This facilitated the adaptation of the pilot course to mobile devices.

The structure of the *Web Development for 3D Printing Start-ups* pilot course uses five different content types, namely: chapters, assignments, quizzes, presentations, and feedback questionnaires. As Talent LMS offers users three main roles as administrator, instructor and learner, the interface for each one is different. The content interface of an instructor for the *Web Development for 3D Printing Start-ups* module is presented in Figure 2. A learner will see a similarly structured interface, apart from the editing menu of each content type.

Each module starts with an introductory chapter, where a short description regarding the purpose and objectives of the module was made.

The main challenge in developing the pilot e-course was how to design it in a manner that will arouse curiosity and intrigue students in learning while doing practical work at the same time. Thus, an informal approach with the students was chosen, in order to make the studying process more relaxed and fun while making short funny jokes with the use of gifs, you tube videos and other custom features. CSS programming was undertaken in several set-ups of tables, pictures and gifs, but the most important ones were for exemplifying certain aspects with the use of "buttons" that lead to other websites and embedded videos, where a re-dimension and re-position of the frame was necessary (Figure 3, Figure 4 and Figure 5).

Figure 3: Buttons and Embedded videos developed with CSS code – learner interface

```
<span style="font-family: Georgia; text-align: left;"> <span style="background-color: rgb(255, 255, 255);"><br></span>
</span>
<div style="text-align: center;"> <a class="btn btn-primary btn-large ts-iframe-popup"
href="http://www.markammay.com/top-10-reasons-to-start-a-website/" target="_blank" data-url="http://www.markammay.com/top-10-
reasons-to-start-a-website/">Top 10 reasons to start a website</a><span style="text-align: left; font-family:
Georgia;"> 
 </span><a class="btn btn-primary btn-large ts-iframe-popup" href="https://tubikstudio.com/6-big-reasons-to-start-a-
website/&quot;" target="_blank" data-url="https://tubikstudio.com/6-big-reasons-to-start-a-website/">6 Big reasons to start a
website</a><span style="text-align: left; font-family: Georgia;">   </span><a class="btn btn-primary btn-large ts-
iframe-popup" href="https://en.webself.net/why-create-a-website" target="_blank" data-url="https://en.webself.net/why-create-
a-website">Why create a
website</a></div>
<center><br>
```

Figure 4: CSS code for outside linked buttons designed within the chapter content of the module – instructor interface

```
<iframe width="360" height="215" src="https://www.youtube.com/embed/PWfJSLBN_Bs" frameborder="0" allow="accelerometer;
autoplay; encrypted-media; gyroscope; picture-in-picture" allowfullscreen="allowfullscreen"></iframe> <iframe
width="360" height="215" src="https://www.youtube.com/embed/EDeOzFQJvdc" frameborder="0" allow="accelerometer; autoplay;
encrypted-media; gyroscope; picture-in-picture" allowfullscreen="allowfullscreen"></iframe>
<center>
```

Figure 5: CSS code for embedded videos with dimensioning and repositioning of content – instructor interface An informal addressing method was used, for a "friendly environment". Students seemed to be more attracted by subjects that are taught in a friendly manner, rather than a strict and serious method.

The pilot e-course follows a simple structure, where students were encouraged to develop their skills in web design. Nevertheless, the proposed pilot e-course was implemented throughout the seven-day summer school together with

three more modules, namely: Product Design and Development of Smart Products; Business Plan Development for The Future Engineer as an Entrepreneur; Smart Product Computer Aided Design and 3D Printing. Thus, while completing the e-course, students were asked to develop a business plan, design and manufacture 3D printing applications, and also develop their own website where they must "sell" their 3D printed products.

Web Development for 3D Printing Start-Ups was used as a pilot-course mainly to gather information and feedback for the optimization of the other three modules such as structural optimization, information layout specific requirements, uploading assignments (Figure 6) and pop-quiz tasks (Figure 7). Thus, for the best optimization, the ongoing feedback method was chosen. Depending on what type of module students completed, they encountered assignments, pop-quizzes (Figure 7) and ongoing feedback forms (Figure 8).

The final e-course assignment was designed using CSS and allowed learners to upload: a text reply (own web page link); a file (PPT presentation of the start-up); video (demo pitch presentation of the start-up); audio (motto of the 3D printing start-up). After assignment completion learners can receive feedback from their instructors, make the appropriate amendments and reply (Figure 6).

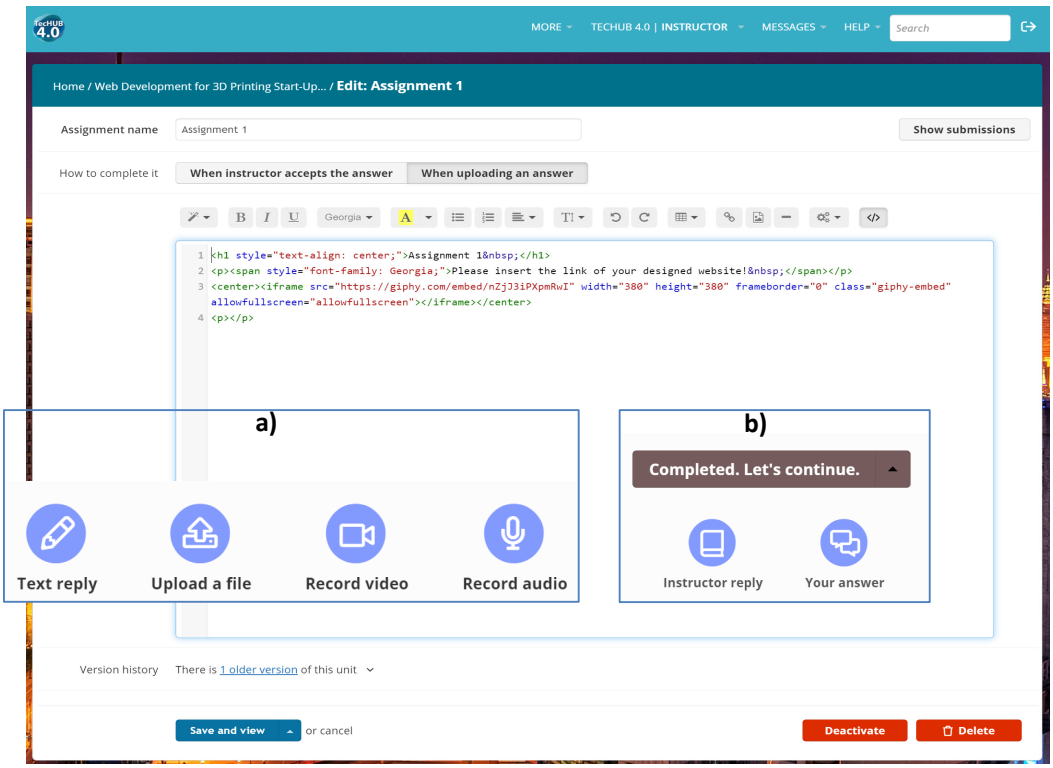

Figure 6: Assignment 1 in CSS code – instructor interface; a) learner options before submitting answer; b) learner options after submitting answer

The pop-quiz was designed using several types of questions, such as: multiple choice answers, gap filling, ordering answers, drag-and-drop, free text and randomized. Thus, the instructor could choose bespoke methods for each group of learners (Figure 7). Instructors can define the question type and edit the content of the question using CSS code. Also, both questions and answers could be arranged in a specific order or randomized for each individual learner. Each of the questions had equal weights. The duration of the quiz could not exceed 15 minutes and learners would pass if they achieved 80% of the score. A maximum of two attempts were allowed on the test with a five minutes delay between attempts. In order to start the test a password was required, which students received during live online sessions with the instructors.

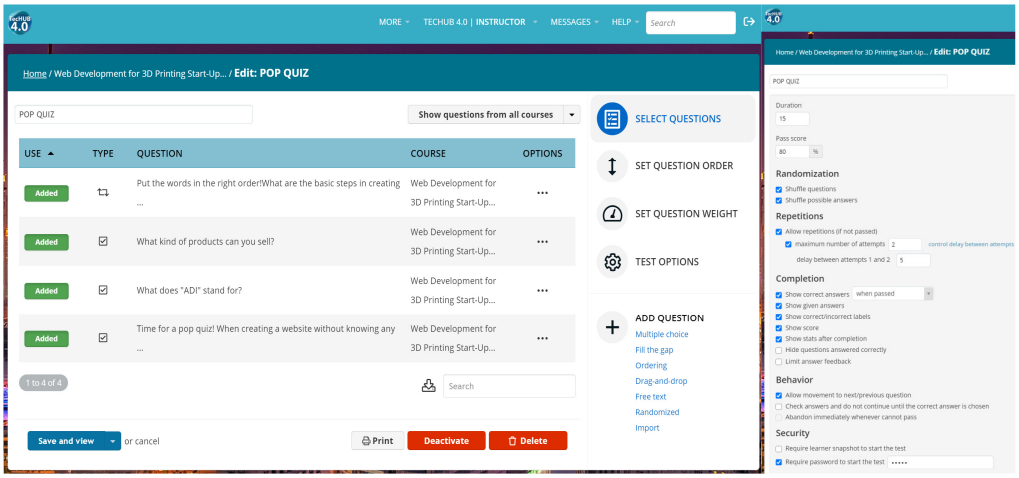

Figure 7: Pop-quiz within course content – instructor interface

The feedback form was designed based on the same rules as the pop-quiz, and it included open answer questions (Figure 8).

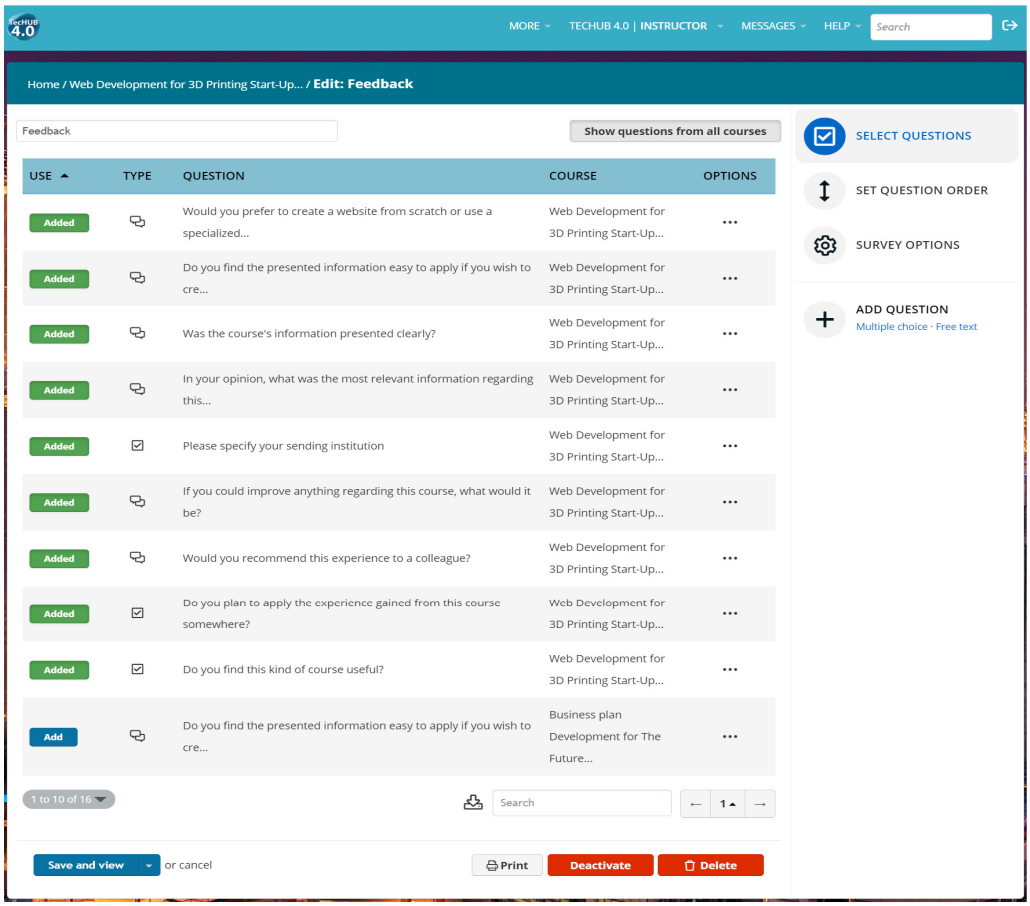

Figure 8: Ongoing feedback form – instructor interface

The key role of the feedback form was to establish if the proposed approach was more suitable for learners than traditional delivery of learning content. Throughout the pilot e-course, learners found the course rather interesting, funny and easy to follow. Moreover, as learners gave feedback on certain aspects, optimizations and modifications within the content and information layout was made.

Talent LMS has an integrated gamification process, where learners can get points when completing modules, pop-quizzes and registering. Instructors can also modify the gamification options and view student's progress, either individually or either the whole class. Thus, with interactive courses and current or new topics of interest, students should improve their activity within daily courses.

Conclusion

With no doubt, the future of teaching will be linked to e-learning tools and adapted to student's evolving needs. The designed pilot e-course could be used simultaneously with current teaching methods, focusing on advantages like:

- Presentations can be made within the e-learning Talent LMS platform, without any other specialized software;
- The physical attendance under certain specific aspects may no longer be mandatory;
- Learners can propose throughout the e-course feedback on what aspects can be further developed and improved;
- Learners can become involved in the active development of their own e-courses by learning how to use CSS code to customize their favorite features.

It seems that the conventional teaching methods need upgrade and an adaptation to the current requirements must be made.

Influenced by the current socio-economic developments caused by the SARS-Cov2 epidemic, the teaching process has greatly shifted in the online environment. Practice has shown that not all educational systems were ready for such a mass exodus, but they all made a real effort to adapt in a very short amount of time. Thus, an online attractive, intuitive and interactive platform must be used and adapted according to the current requirements, which shall also encompass the already existing platforms, all in one place. Students should access one platform for online meetings, course studies, pop-quizzes and uploading homework.

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The Essence of Technology Transfer and The Specifics of Its Implementation: Economic Aspects

Artem GAVRILYUK
Lomonosov Moscow State University, Moscow, Russia
Gavriliuk@spa.msu.ru

Olga PYATAEVA
Russian State Academy of Intellectual Property, Moscow, Russia
opyataeva@gmail.com

Gulmira NURGAZINA
Russian State Academy of Intellectual Property, Moscow, Russia
gulmiranurgazina64@gmail.com

Alexander ANISIMOV
PhD, associate's professor, Moscow, Russia
anisimov_au@mail.ru

Valentina BRITVINA
Moscow Polytech University, MSTU STANKIN, Moscow, Russia
saaturn2015@mail.ru

Abstract

Implementing a successful technology transfer is essential for universities, companies, the national economy and society at large. For universities, technology transfer can bring additional revenues that can be used for further scientific research, and also contributes to the recognition of scientific achievements of scientists, which, in turn, can help in attracting grants. For companies, the benefits of technology transfer include the ability to use the results of intellectual activity without spending on internal research and development, as well as the introduction and development of new technological processes that can contribute to the success of their business. For the national economy, technology transfer is a key growth factor through the development of high-tech companies, increasing the number of jobs and the production of innovative products. For society as a whole, the benefits of technology transfer are incalculable in terms of improving the quality of life, environmental conditions, technical advances that provide not only new opportunities, but also stimulate the development of the national and global economy through digital transformations. Digital technology solutions accelerate technology transfer, and one such solution is a technology transfer platform that facilitates networking.

Keywords: Technology Transfer, Results of Intellectual Activity, Intellectual Property, Innovation, Digital Platforms, Innovative Economy.

Introduction

One of the key factors in the current development of the world economy is the intensive exchange of scientific, technological and productive information at the regional and transnational levels. Educational and research institutions provide an enabling environment for the creation of innovations that change lifestyles. There are many new products and inventions on the market every year. Since the turn of the millennium, the world has witnessed the emergence of social networks, smartphones, autonomous vehicles and autonomous aircraft. Society is nearing the point where life has completely immersed itself in digital technology. The storage devices are smaller, but they can store huge amounts of data. Unmanned vehicles, robotic complexes, artificial intelligence, 3D printing and 3D manufacturing are just some of the inventions that everyone.

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About Technology Transfer

Technology is the result of scientific research. However, the availability of technology, even if revolutionary, is not enough. The value of a technology is reduced if it cannot be transferred to a user who intends to use it to obtain a tangible production benefit. Universities and research institutions need assistance in moving the results of research, development and technology to the stage of creation of the final product or service, so the importance of technology transfer cannot be overemphasized.

Technology transfer is a process that combines exchange operations (between inventor and recipient) with production functions (measurement during start-up operations, individual testing, adaptation of equipment to specific operational conditions, repair of faults, refinement of technology) to reduce transaction costs and value addition.

Technology transfer is both a one-time technology transfer (patent commercialization) through a certain communication channel from one entity (technology owner) to another (technology implementer) and a technology transfer in several stages, depending on its specification and purpose and in accordance with the stages of technical development and contractual arrangements.

Technology transfer can be expressed in the form of transfer of results of intellectual activity, transfer of objects of intellectual property, realization of patentless inventions, exchange of scientific and technical information, implementation of joint research and development design and technological outputs.

Main activities of TT

Assessing the effectiveness of technology transfer implementation is a complex task that requires an integrated approach to identifying the economic, social, environmental, technological and other impacts derived from the introduction and deployment of knowledge-based development.
Technology transfer includes the following activities:

- technology selection, search and identification;
- performing technical and economic analysis and conducting expert work;
- the determination of the methods of dissemination of non-patentable ideas and inventions;
- search for technology partners and strategic investors;
- consulting support for an innovative project;
- creation of academic and corporate alliances for the implementation of high-tech projects;
- formation, incubation and positioning of innovative companies;
- attracting talented teachers, staff and students to innovative activities.

Technology transfer involves the transfer of material knowledge (technical data and drawings, design prototypes, instructions, inventions, utility models, industrial designs, software, and trade secrets) from one organization to another. The technology transfer mechanism is determined by the organization's policies and values.

Technology transfer in the context of research institutes involves a process in which high-tech developments created in the laboratories of these institutions are commercialized through licensing of patented intellectual property objects and the creation of start-UPS, and transformed into high-tech products.

Domestic and foreign practice of TT

The participation of the industrial complex of the economy in the transfer of technologies includes various constructive actions aimed at combining the efforts of manufacturing companies and scientific organizations for mutual benefit. Participation can be one-time – the implementation of a project/scientific and technical initiative, or it can include a so-called "strategic partnership", in which the University and the company work together on a continuous series of projects and activities: attracting teachers and students to innovative activities, developing curricula, performing research, training staff, and much more.

Domestic and foreign practice shows that there are various ways of interaction between industry and research organizations, ranging from the exchange of results of research, development and technological work, participation in joint project work, and ending with financial support for basic research . Industry is often a key source of funding and practical experience, which can speed up the process of creating material knowledge in the research environment. Constructive economic relations that arise between participants in innovation activities can complement joint research programs and investment mechanisms designed to synthesize new knowledge and make scientific discoveries.
For manufacturing companies, commercial relationships with research organizations can present a number of problems that are not obvious to the academic sector in relation to a particular technology or development. Therefore, it is important for representatives of science and industry to interact with technology transfer entities, which help identify possible difficulties, risks and problems at the early stages of implementing a joint innovation project.

Subjects of technology transfer have a culture of academic cooperation and have experience in strategic partnership with representatives of the real sector of the economy, which allows you to build a chain of effective interaction "University-industrial enterprise", contributing to the generation of material knowledge and their implementation in innovative products.

Qualified specialists working in the field of technology transfer help accelerate the processes of technological transformation in various spheres, complexes and sectors of the economy. They contribute to the successful management of innovation, involving companies in the innovation process, the protection and licensing of intellectual property, to market of science intensive products, the creation of new start-UPS and development of high-tech enterprises.

Technology transfer specialists interact with lawyers for the protection of patent and other intellectual property rights, evaluate the commercial potential of inventions, promote technologies to potential licensees and partners, train researchers on the principles and strategies of commercialization, participate in partnership negotiations and licensing agreements, and help create innovative ecosystems that contribute to the innovative development of the economy, promote the development of educational programs in the field of innovative entrepreneurship.

Personal contacts and trusting relationships between technology transfer specialists and developers/implementers of intellectual activity results are of particular importance in the implementation of technology transfer. The emergence of digital technologies that convert analog information into digital format has greatly simplified and accelerated the process of such relationships.

Digital technologies in TT practice

Digital technologies provide a better view of performance and results in real time by integrating structured and unstructured information, providing a better overview of the organization's data and data from external sources. One of the digital technological solutions in the field of innovation dissemination is a platform for technology transfer.

The technology transfer platform is a web resource where registered users can post technology requests and offers, exchange information, and search for experts, technology partners, and strategic investors.

The functional advantage of the technology transfer platform, in addition to constantly updated information, is an intelligent communication system for technology suppliers and recipients. The platform accumulates data on the technological resources of technology suppliers who seek to commercialize the results of intellectual activity, informs about the needs of technology recipients who are interested in acquiring innovative solutions, and offers expert resources that can be used in the process of technology transfer.

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How far Perceived Quality and Satisfaction are Important for Customer Brand loyalty? The Case of the Portuguese Mobile Market

Sílvia FARIA
Departamento de Economia e Gestão, Universidade Portucalense
Porto, Portugal
sfaria@mail.upt.pt

Pedro FERREIRA

Departamento de Economia e Gestão
Universidade Portucalense
Porto, Portugal
pferreira@upt.pt

Abstract

This paper aims to analyze the importance of quality and customer satisfaction in the Portuguese mobile market as variables leading to customer loyalty. Several attitudinal and behavioral drivers of brand loyalty were examined, as well as the possible relationship between them and how they impact in lasting relationships between consumers and mobile brands. Previous literature supported the development of a set of hypotheses. The model was tested on an empirical study based on a survey to 231 Portuguese consumers, with questions measuring the main concepts (brand loyalty, trust, involvement/engagement, satisfaction and quality). Statistical analysis included descriptive statistics (means, standard deviation, Cronbach's alpha), paired-samples T-test, data reduction techniques and hierarchical regression analysis. Results reveal that repurchase intention, as a proxy to brand loyalty, is influenced by all the considered concepts. However, brand trust and brand involvement impact on brand commitment and seem to be stronger predictors of brand loyalty. Since this article considered brand loyalty as the sum of repurchase intention and brand commitment, expected quality is not relevant for neither of them. Trust seems to impact on brand commitment but not in repurchase intention. Performed Quality is statistically significant but through consumer satisfaction. Therefore, Satisfaction and Involvement/Engagement lead to strong brand commitment and repurchase intention and performed quality is also an independent variable that leads customers to brand loyalty in the mobile market. Results are discussed in light of the consumer-brand relationship theory. Despite some limitations (our study is only limited to Portugal, to a sample of young consumers mainly from the north of the country), this study offers a reasoned view on consumer-brand relationship. Aiming to identify the role of quality and customer satisfaction in the Portuguese telecommunication market, we hypothesized customer satisfaction as a mediator to involvement/engagement, trust and brand loyalty. To keep customers' attention and achieve brand loyalty (commitment + repurchase intention), any Portuguese telecommunication player needs to satisfy clients by betting on perceived quality in time and to involve them, offering accurate information on products and services. If so, consumers will feel satisfied, trust and develop a strong feeling towards the brand.

Keywords: Quality; Satisfaction; Involvement/Engagement; Trust; Brand Loyalty.

Introduction

Customer loyalty is generally accepted as very important to companies, consisting in the individual positive attitude towards a certain brand, a personal identification with its products/services and positioning and the predisposition to defend and recommend it to others (Caruana, 2002; Rai and Srivastava, 2012; Bhatti et al, 2017). Retaining clients goes on being one of the companies' main concerns, due to aggressive competitors always surprising consumers and getting their attention in time (Bharadwaj et al, 1993; Bon and Tissier-D., 2000; Ray and Srivastava, 2012). Opposite, getting a new customer is understood as a more expensive process (Bon e Tissier-D., 2000; Edward and Sahadev, 2011; Bhathi et al, 2017); all the brands' efforts to keep clients with them affect their results (Santouridis and Trivellas, 2010; Edward and Sahadev, 2011; Bathi et al, 201). Wanting to act in global and competitive markets,

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approaching sales estimations to real demand and betting on differentiation as the way to cope with competitors made customer loyalty a crucial issue in companies' strategies (Fournier and Yao, 1997; Santos-Vijande et al, 2018; Asch and Bowman, 2017; Hill and Alexander, 2017).

This research tries to understand the antecedents affecting customer attitudes and loyalty in mobile telecommunication, pointing out for some already studied variables -customers' satisfaction, involvement/engagement and trust. Bearing in mind that service quality has a positive impact on customer satisfaction (Steenkamp, 1990; Spreng and Mackoy, 1996; Bhatti et al, 2016), we also included this variable in the study.

This paper is structured as follows: Section 2 presents the theoretical framework, with related work on the loyalty concept. Section 3 presents conceptual model and hypothesis to be tested. Section 4 presents findings and Section 5 present main conclusions, some limitations and recommendations for future research.

The main contribution of our work is helping the Portuguese mobile brands to better understand what makes a customer choose for a certain player, stay with it and learn what to do in order to increase retaining rates. Results reveal that trust and involvement impact on brand commitment, therefore being stronger predictors of brand loyalty; furthermore, for our sample, Expected Quality is not relevant but Performed Quality is statistically significant through consumer Satisfaction. I.e., satisfaction and Involvement lead to strong brand commitment and repurchase intention and performed quality is also an independent variable that lead customers to become loyal.

Theoretical Framework

Several studies were developed on brand and customer loyalty and their importance on companies' revenue and competitiveness: the higher the consumers' loyalty, the lower the marketing costs (Jacoby and Chestnut, 1978; Assael, 1992; Bloemer and Kasper, 1995; Hallberg, 1997; Bon and Tissier-D., 2000; Know and Walker, 2001; Kuo et al, 2009; Bathi et al, 2017). Loyalty is about products/services (Reichheld, 1996; Bon and Tissier-D., 2000), about the company's employees (Macintosh and Locksin, 1997; Bon and Tissier-D., 2000; Butsher, S., 2017), their points of sale (Carmen, 1970; Rousseau, 2008) or any other factor (ex.: promotions – Payne et al, 1998; Mações, 2015). Being also the way for consumers to show their satisfaction with a product or service (Bloemer and Kasper, 1995; Han et al, 2018), some related concepts must be considered (Payne et al, 1998 and Kearney, 1998): differentiation, promotion, efficient distribution, after-sales services and communication.

The main purpose of any company must be establishing a true relationship of trust with consumers, satisfying, meeting and even exceeding their expectations, gradually creating a trust shield (Lehu, 2000; Kotler and Armstrong, 2012; Esterik-P. P.W.J. and Raaij, 2017; Kotler and Armstrong, 2017; Han et al, 2018). Kang et al. (2011) believed that it is important to create a sense of trust if brands want to have positive reactions from their clients; positive attitudes and favorable behaviors are the basis for a good relationship in time (Ganesh et al, 2000). To trust a brand, clients' need to see its effort to meet and exceed their expectations through time (Anderson and Sullivan, 1003; Caruana, 2002; Husasain et al, 2015), reducing any perceived risk (Delgado-B. and Munuera- A., 2005; Kamaruddin et al, 2017; Frasquet et al, 2017; Manni and Singh, 2018; Zakzuk and Núñez, 2018). Building trust in a buyer–seller relationship is crucial and a background of loyalty (Morgan and Hunt, 1994; Fournier, 1995; Gurviez, 1996; Chaudhri and Holbrook, 2001; Harris and Goode, 2004; Chiu, Huang and Yen, 2010; Hong and Cho, 2011; Kang et al, 2011; Paparoidamis, 2019; Khadim et al, 2018).

In work founded, loyalty has different meanings and approaches. Being much more than repeated purchases, it should be understood in three main approaches: (1) Behavioral, (2) Attitudinal (Dick and Basu, 1994; Dekimple et al, 1997; East, 1997; Bhatti et al, 2017) and (3) Integrated approach (Cross and Smith, 1995; Griffin, 1995; Mowen, 1995; Fournier and Yao, 1997; Bon and Tissier.D., 2000). Also referred as brand commitment, it considers the consumer's participation and connection with the brand offers (Mowen, 1995; Bon and Tissier-D., 2000; So et al, 2014; Vivek et al., 2012; Rhadita et al, 2017), joining two other concepts: band engagement and brand involvement. Engagement has recently emerged in both academic literature and practitioner discussions as an important brand loyalty predictor (So et al, 2014): a truly engaged customer reveals a psychological connection with a brand and a connection with its offers (So et al, 2014; Vivek et al, 2012). Involvement shows the level of brand interest and its significance to the consumer (Guthrie and Kim, 2009).

Satisfaction and quality seem to lead to competitive advantages (Steenkamp, 1990; Aaker, 1991; Cristopher et al, 1995; Ganesh et al, 2000; O'Shaughnessy, 1995; Spreng and Mackoy, 1996; Chi et al, 2009; Vinita et al, 2015; Bhatti et al, 2016; Nyadzayo and Khajehzadeh, 2016; Raditha et al, 2017). Satisfaction is, to a considerable number of authors, an important antecedent for brand loyalty (Kotler and Dubois, 1989; Selnes, 1998; Ganesh et al, 2000; Bloemer and Odekerken, 2002; Hussain et al, 2015; Ashraf et al, 2018; Kamarudding et al, 2018; Saham et al, 2018),

since consumers need to feel satisfied to consider buying again. One may say that satisfaction is an antecedent for repeated purchases and or use of a product/service, leading to positive word of mouth and/or recommendations (Shaham et al, 2018). The consumers' degree of satisfaction influences their subsequent behavior: when satisfied, consumers tend to buy again; if unsatisfied, they have an opposite reaction, probably speaking negatively about a brand, product and/or service (Kotler and Dubois, 1989; Samson, 2006).

Satisfied clients develop a relationship through time –loyalty-, feeling committed and wanting to buy again (Carmen, 1970; Vinita et al, 2015; Nyadzayo and Khajehzadeh, 2016; Paparoidaimis, 2017; Raditha et al, 2017).

Methodology

The research model follows a quantitative approach; hypotheses were drawn from the literature review. We established relations and variables were measured using already validated constructs.

Customer loyalty is increasingly understood as one prime factor inducing a long-term relationship between consumers and brands, therefore positively influencing a company's financial performance (Carmen, 1970; Reicheld, 1996; Hong and Cho, 2011; Mallika et al, 2014; Nyadzayo and Khajezadeh, 2016; Frasquet et al, 2017), therefore being crucial to clearly understand its antecedents (Chuah, 2017; Frasquet et al, 2017). This paper aims to analyze the importance of quality and customer satisfaction in the Portuguese mobile market as variables leading to customer loyalty. Since consumers' perception of quality is the result of their assessment of the general superiority of a brand vis-à-vis other brands (O'Shaughnessy, 1995), it seems to exist a direct relationship between quality and loyalty (Aaker, 1991; Christopher, 1995; Vinita et al, 2015; Nyadzayo and Khajehzadeh, 2016; Raditha et al, 2017). The higher the consumer's quality perception, the higher the level of satisfaction, the higher the connection with a brand, the bigger the possibility of ending up trusting and the greater the probability of becoming loyal, establishing a relationship in time and repurchase intention.

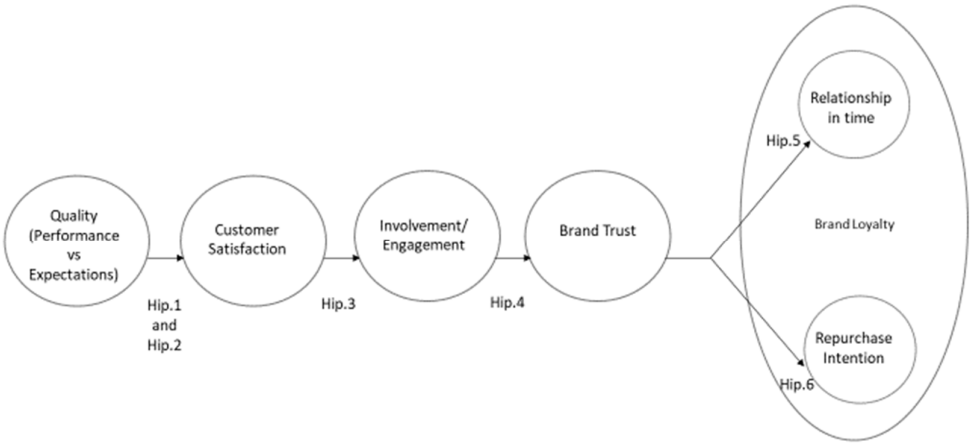

Fig. 1: Theoretical Model

When consumers choose a product, they care about perceived quality (Chi et al, 2009):

H1. The mobile consumer' satisfaction towards a brand depends on how he/she perceives its products and services' quality: *there is a positive association between perceived quality and mobile consumers' satisfaction*.

Some authors believe that the higher the brand's capacity to surprise consumers and offer them products and services capable to exceed expectations, the higher the positive perceptions they create and the greater the brand's image

(Ganesh et al, 2000). It has become very important for organizations to act in order to exceed consumers' expectations (Anderson and Sullivan, 1993; Kandampully, 1998; Caruana, 2002; Hussain et al, 2015):

H2. The mobile consumer' satisfaction with a brand depends on its capacity to exceed his/her expectations: *there is a positive association between exceeding expectations and the mobile consumers satisfaction with brands.*

Various studies have looked for the relationship between satisfaction, involvement/engagement, trust and brand loyalty: LeClerc and Little (1997), Park (1996) and So et al (2014) found that brand loyalty was also the result of involvement/engagement. Therefore, the higher the consumer's involvement/engagement, the more he/she becomes to trust a brand and to develop a loyal behavior:

H3. The effect of mobile consumer Satisfaction on the development of brand trust is higher, the greater the degree of involvement/engagement (Steenkamp, 1990; So et al., 2014): *the higher the consumers' connection and intensity of interest with a brand, the higher probability of becoming loyal.*

Trust is one of the backgrounds of loyalty for a considerable number of authors (Morgan and Hunt, 1994; Fournier, 1995; Gurviez, 1996; Chaudhri and Holbrook, 2001; Harris and Goode, 2004; Chiu, Huang and Yen, 2010; Ganesh et al, 2000; Hong and Cho, 2011; Kang et al, 2011; Khadim et al, 2018):

H4. The higher the mobile consumer's degree of satisfaction with a brand, the higher his/her psychological connection and level of interest and the higher the probability to trust: *there is a positive association between a high degree of satisfaction, involvement/engagement and the mobile consumer's brand trust and purchase intentions.*

Satisfied customers are good sellers (Kotler and Dubois, 1989; Bon and Tissier, 2000); the main purpose of any company must be to establish a true relationship of trust with consumers, creating a trust shield (Lehu, 2000; Kotler and Armstrong, 2012; Esterik-P. P.W.J. and Raaij, 2017; Kotler and Armstrong, 2017; Han et al, 2018). Larzelere and Hunt (1980) and Morgand and Hunt (1994) understood Trust as a central construct of any long-lasting relationship. Satisfaction leads to Brand Trust and this leads to the mobile consumer's willing to have a relationship in time and go on buying. There is a positive association between Satisfaction, Brand Trust and the mobile consumer's intention to keep coming back.

To many authors, trust is one of the backgrounds of loyalty (Morgan and Hunt, 1994; Fournier, 1995; Gurviez, 1996; Chaudhri and Holbrook, 2001; Harris and Goode, 2004; Chiu, Huang and Yen, 2010; Hong and Cho, 2011; Kang et al, 2011; Khadim et al, 2018); therefore, it is expected that:

H5. The higher the mobile consumer trust a brand, the higher the probability to develop a relationship with it and become a loyal client: t*here is a positive association between Trust and Brand relationship in time.*

When a brand is capable to keep a client committed, trusting and having repurchase intentions, it has created the ideal scenario for that client to become a satisfied person, predisposed to pay more, act as a kind of lawyer and buy more often (Carmen, 1970; Assael, 1992; Bloemer and Ruyter, 1997; Ganesh et al, 2000; Chaudhuri and Holbrook, 2001; Fullerton, 2005; Doorn et al, 2010; Mallika et al, 2014; Vinita et al, 2015; Messaoud and Deboki, 2016; Nyadzayo and Khajehzadeh, 2016; Kumar, 2016; Paparoidaimis, 2017; Raditha et al, 2017):

H6. The higher the brand trust, the higher the mobile consumer's intention to repurchase and to become a loyal client: *there is a positive association between Brand Trust and Repurchase intentions.*

Results

Data collected was the result of a questionnaire applied in 2018 (December) to a non-probability purposive sample (budget constraints), composed mainly by higher education students, in a total of 231 respondents. A pre-test was done to a convenience sample of 20 individuals; consequent analysis allowed some layout improvements, but did not imply changes regarding main variables. Final questionnaire was developed using the variables that met the bibliography research done in related concepts: Quality- gap between reality and perceptions, to evaluate the basis of satisfaction and consequent brand loyalty, using the SERVQUAL model (Zeithalm et al, 1985, 1988 and 1990) and its 5 dimensions: Tangibility, Trust, Answering Capacity, Warranty and Empathy. We used a Likert 7 points scale (Totally Disagree to Totally Agree). For Satisfaction, we used Spreng et al. scale (1996): satisfaction is the result of the consumer's evaluation of the use and/or previous experience with the brand. We used a 7 points' Likert scale (Very Dissatisfied to Very Satisfied). Involvement/Engagement were measured according to Zaichkowsky (1985),

trying to evaluate perceived risk; 7 point's Likert scale (Nothing Important to Important)**.** For Trust**,** we've used Delgado and Munuera scale (2001), with the following items:

a) Offers me a product/service with a constant quality level;
b) Helps me solving any problem that may occur with the product or service;
c) Offers me a variety of new products always adapted to my needs;
d) Is worried in satisfying me;
e) Values me as a customer;
f) Gives me support and advices on how to better use its products and/or services.

For Commitment (intention to keep a relationship) and considering it as an affective and/or emotional process, we based ourselves on Beaty and Kahle (1988), Bloemer and Kasper (1995) and Muncy (1996) studies, developing some questions trying to represent the main characteristics of a possible relationship between a consumer and a brand (ex.: I consider myself loyal to X brand; for me X brand is surely the best one in the market; I intend to go on buying X brand's product). A 5 point's Likert scale was used (Totally Disagree to Totally Agree), as the authors suggest. For repurchase intention, we based ourselves in some questions used by some authors (Morgan and Hunt, 1994; Fournier, 1995; Gurviez, 1996; Chaudhri and Holbrook, 2001; Harris and Goode, 2004; Chiu, Huang and Yen, 2010; Hong and Cho, 2011; Kang et al, 2011; Khadim et al, 2018) and developed 12 questions which content allow us to prove the consumer's intention to go on buying through time and his/her degree of certainty.

We then added two more complementary questions: (i) to confirm the respondents' intention to go on using their mobile operator's goods and services; (ii) to understand the needs that lead respondents to use mobile telecommunications.

Hypotheses vs Dimensions vs Questions

Table 1

Hyp.	Dimension/Variables	Questions vs Sources
1	**Quality** (Expectations) (Actual Performance)	1-22 23-44 (SERVQUAL, Zeithalm et al, 1985, 1986 and 1990)
2	**Satisfaction** (Consumer's evaluation - experience)	45-54 (Spreng et al, 1996)
3	**Involvement** (How important is the product and the decision process to the consumer)	65-70 (Zaichkowsky (1996)
4	**Trust** (Consumer's degree of certainty about the brand's characteristics described)	55-64 (Delgado and Munuera, 2001)
5	**Commitment – Brand's Identification** (Consumers' degree of certainty about staying with the brand)	71-81 (Bethy and Kale, 1998; Bloemer and Kasper, 1995; Muncy, 1996)

6	**Commitment – Repurchase Intention** (Consumers' degree of certainty about repurchasing)	82-93 (Morgan and Hunt, 1994; Fournier, 1995; Gurviez, 1996; Chaudhri and Holbrook, 2001; Harris and Goode, 2004; Chiu, Huang and Yen, 2010; Hong and Cho, 2011; Kang et al, 2011; Khadim et al, 2018)

Data analysis and Results

Statistical procedures were as follow: a confirmatory factor analysis was conducted in the scales used to measure the constructs; hypotheses were tested using SPSS. A set of validated scales taken from the academic literature were used.

Our sample is made of 51.9% of male respondents, ages between 17 and 24; the majority of the respondents stated a monthly household income until 250 euros, as already expected since they are all students. Table 2 shows their degree of education:

Table 2

Education Degree

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Until the 9th year	2	,9	,9	,9
	10º - 12º year	48	20,8	20,8	21,6
	University Frequence - Graduation (attending)	174	75,3	75,3	97,0
	Graduatin (done)	4	1,7	1,7	98,7
	University Frequence - Master	3	1,3	1,3	100,0
	Total	231	100,0	100,0	

EFA was used to validate the measurement models consisting of six constructs measured:

Table 3

	FACTORIAL ANALYSIS
EXPECTED QUALITY	One Factor, accounting for 33,4% of variance.
PERCEIVED QUALITY	One Factor, accounting for 45,5% of variance.
SATISFACTION	One Factor extracted accounting for 71,6% of variance.
TRUST	One Factor extracted accounting for 57,8% of variance.
INVOLVEMENT	One Factor extracted accounting for 66,4% of variance.
BRAND COMMITMENT	2 Factors extracted accounting for 64,4% of variance.
REPURCHASE INTENTION	2 Factors extracted accounting for 67,5% of variance.

Regression was also done to find Inter-correlations:

Table 4

	EXPQUAL	PERFQUAL	SAT	TRUST	INVOLV	BCOMM	REPINT
EXPQUAL							
PERFQUAL	.73						
SAT	.114	.610**					
TRUST	.485**	.309**	.317**				
INVOLV	.147*	.633**	.767**	.289**			
BCOMM	.135*	.576**	.755**	.293**	.836**		
REPINT	.097	.551*	.722**	.225**	.801**	.906**	

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed).

Reliability was tested by examining the Cronbach's Alpha coefficients; findings show that Expected Quality is not relevant for Brand Commitment, neither for Repurchase Intention (altogether assumed as Brand Loyalty in this study). Trust seems to impact on Brand Commitment but not in the Repurchase Intention (therefore contributing in a moderate way). Performed Quality (real performance) is statistically significant, but through consumer's Satisfaction (when we introduce Involvement, Performed Quality stops having statistical significance and/or direct impact on Brand Loyalty):

Table 5

	BCOMM		REPINT	
Predictor	R^2	β	R^2	β
Block 1	.335		.307	
EXPQUAL		.094		.057
PERFQUAL		.569**		.547**
Block 2	.588		.535	
EXPQUAL		.050		.015
PERFQUAL		.184**		.176**
SAT		.637**		.613**
Block 3	.587		.535	
EXPQUAL		.043		.036
PERFQUAL		.181**		.185**
SAT		.635**		.620**
TRUST		.015		-.046
Block 4	.726		.664	
EXPQUAL		.002		-.004
PERFQUAL		.018		.027
SAT		.264**		.261**
TRUST		.025		-.037
INVOLV		.615**		.595**

Conclusions

The goal of this study was to examine brand loyalty antecedents in the Portuguese mobile consumers, considering some of the most common variables related to the concept. Based on the consumer-brand loyalty theory it was assumed that Quality and Satisfaction are important for inducing positive feelings on consumers, making them want to repurchase a brand's products and services and, at the same time, feel committed to it (loyalty).

In this research, we assumed Quality as an important variable to make consumers feel satisfied; once satisfied, consumers will feel connected to the brand, interested on it, therefore assumed that the higher the consumer's degree of involvement/engagement, the more he becomes to trust a brand and develop a loyal behavior. When individuals get more involved in the buying decision process, being capable to gather reasonable and accurate information, they begin to trust the brand (and trust is one of the backgrounds of loyalty for a considerable number of marketeers and authors). The higher the consumer trust a brand, the higher the probability to become loyal to it (committed and with the intention to buy again).

Table 6

Hypothesis	Final Results
H.1	Accepted
H.2	Rejected
H.3	Accepted
H.4	Accepted
H.5	Accepted
H.6	Rejected

According to data obtained, only Perceived Quality seem to impact on customer satisfaction and, as a consequence, on brand loyalty (performed quality is statistically significant, affecting satisfaction and, through it, leading to brand loyalty).This conclusion looks contrary to the main aspects referred to in the literature review (pointing for both perceived and performed quality), but we have to notice that our sample, mainly composed by young consumers, may impact in these findings.

As far as telecommunications are concerned and for the Portuguese mobile consumers, involvement/engagement are a result of satisfaction, leading to brand trust. Trust seems to impact on brand commitment, but not in the repurchase intention; i.e., for the mobile consumers, a brand that induces trust is a brand that they will go on paying attention through time, even if that attention does not lead to a purchase situation. This may allow us to assume that trusting a brand is crucial for the customer to feel identified (committed) and, if receiving the right stimulus, to consider repurchasing their products or services.

Our study is only limited to Portugal and, specifically, to young consumers from the north region, which limits extrapolating conclusions; therefore, comparative studies are recommended, to generalize findings to individuals of different ages, to allow establishing direct comparisons and have a wider understanding of the Portuguese mobile consumer behavior. Also extending the topic under review to other products, services and within an international context could be of consideration in future research.

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Consumption as a Growth Factor of the Russian Economy

Gulnaz F. GALIEVA
Ufa State Petroleum Technological University, Ufa, Russian Federation,
https://orcid.org/0000-0002-0199-7784, GalievaGF@mail.ru

Luiza I. IL`INA
Syktyvkar State University named after Pitirim Sorokin, Syktyvkar, Russian Federation,
https://orcid.org/0000-0002-6481-0534, luiza_ilina@mail.ru

Sergey V. PONOMAREV
Financial University under the Government of the Russian Federation, Kaluga branch, Kaluga, Russian Federation,
https://orcid.org/0000-0001-6216-1190, pionerday@yandex.ru

Bella O. KHASHIR
Kuban state technological university, Krasnodar, Russian Federation,
https://orcid.org/0000-0003-0596-9606, ms.khashir@mail.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation, https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru
corresponding author

Abstract

The purpose of the research is to study the role of consumption in the processes of ensuring economic dynamics and social development and to reveal the specifics of consumption of the Russian population in the period 2013-2018, as well as to identify existing contradictions. The authors made international comparisons and revealed a low share of final household consumption in Russia's GDP in comparison with similar indicators of developed consumer society models in the leading countries of the world. The authors studied the Russian dynamics of changes in the structure of GDP by expenditure. The article analyzes the conditions and factors that determine the structure of final consumption of households in Russia. It is determined that the structure of consumption in Russia is characterized by an extremely low share of services in comparison with developed countries and rapidly developing BRICS countries. It is proved that the decrease in final consumption in the period 2015-2017 is due to a drop in real disposable income of the population and a reduction in personal consumption opportunities.

Keywords: consumption, GDP, household expenditure, final household consumption, income inequality, Russia

Introduction

The role of consumption in the processes of socio-economic development is multifaceted. On the one hand, consumption and its characteristics are an indicator of the standard of living and well-being of the population. The quality of life of the population depends on what needs consumers ' incomes are spent on, what goods and services they purchase, and what the structure of these purchases is. The amount of income determines the ability of people to meet their needs and, accordingly, sets the framework for spending money. The growth of household consumption expenditures is possible if the population's income increases, confidence in the future and trust in the state increases, access to credit resources increases, and savings can be formed.

On the other hand, the expansion of consumption transforms the relationship between consumers and producers: growing consumer demand creates prerequisites for increasing production volumes, grow production capacity, raise employment, and enhance profits. Thus, consumption stimulates the business activity of producers and provides positive economic dynamics.

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However, not all countries are characterized by a balanced structure of consumption, and consumer demand is not always the engine of economic growth. As a rule, in developed countries (the United States, the United Kingdom, etc.), a high level of consumption, provided by constant income growth, a healthy labor market and high credit activity of the population, contributes to economic growth.
Meanwhile, the share of final household consumption in Russia's GDP and the structure of population consumption are radically different from the European or American ones. How do these factors affect the country's economic dynamics? How does the structure of household consumption change during crisis periods? These issues require special research attention.

Methodology

The purpose of the study is to establish the relationship between population consumption and the processes of ensuring positive economic dynamics, as well as to identify the specifics of consumption of the Russian population in the period 2013-2018.

Research objectives:

- determine the share of final household consumption in Russia's GDP in comparison with other countries;
- analyze the dynamics of changes in the structure of GDP by expenditure in Russia;
- identify conditions and factors that affect household final consumption;
- analyze the consumption structure of Russian households and its changes.

The theoretical basis of the research is the works of Keynes (2013), Kudinova (2014), Struchenevsky (2018), Zombart (2005), Kapelyushnikov (2013), Zubarevich and Safronov (2019).

Keynes (2013) claims that consumption is a function of real income. Income is a source of satisfaction of people's personal needs and determines the level and structure of final consumption.

Kudinova (2014) explores the role of personal consumption in economic growth and cyclical processes. The author refutes the thesis that consumer actions aimed at maximizing personal satisfaction create prerequisites for economic growth regardless of the existing institutional conditions.

Takmakova (2010) argues that in order to revive the economy, it is necessary to form effective demand by increasing part of the population's income in GDP.

Zubarevich and Safronov (2019) analyze the transformation of consumption in the regions of Russia and identify its dependence on the level of income of the population of the regions, adjusted for the cost of living, and the level of poverty.

Struchenevsky (2018) emphasizes that population consumption is one of the main factors that ensure GDP growth, along with investment and exports.

Ovcharova and Popova (2013) note that Russia is far from developed European countries in terms of household consumption. Zemskova (2009) proves that in Russia, where a quarter of all expenditures are spent on food purchases, both the industrial and post-industrial orientation of the national economy is blocked.

Research methods: theoretical analysis, comparative analysis, economic analysis, system approach.

The research is based on materials from the Federal state statistics service of the Russian Federation, the Analytical center under the Government of the Russian Federation, United Nations, and the World Bank.

Results

International comparisons on the indicator “share of consumption in the country's GDP”

The share of consumption in a country's GDP (the share of household final consumption expenditure in GDP) can be considered one of the most important indicators of the population's well-being.

As a rule, the consumption rate is higher in developed economies than in developing ones (table 1) (Analytical center under the Government of the Russian Federation, 2019a).

Table 1: Structure of nominal GDP of the world's economies by expenditure, % of GDP, 2018

The group of economies	Final consumption		Fixed capital formation	Net export
	Households	Government		
World	56,52	16,23	26,13	0,7
Emerging economies	50,89	14,36	32,89	0,94
Transition economies	51,96	16,36	23,42	7,07
Developed economies	60,61	17,51	21,61	0,25
Russia	49,6	17,5	22,9	10,0

Source: compiled by the authors according to Unctadstat (2020)

The share of household consumption in global gross output in 2018 was 56.52%. In developing countries, the share of household consumption was 50.89%, while in developed economies it was 60.61%.

In 2018, the leaders in this indicator were the United States (68.4%), Mexico (67.3%), the United Kingdom (66.0%), Argentina (65.0%) and Brazil (64.3%). The US and the United Kingdom are characterized by a developed consumer society and low gross domestic savings. Argentina, Brazil, and Mexico support the level of consumption by public spending on social policy, optimizing the labor market, and increasing real incomes (Unctadstat, 2020).

The share of final household consumption in Russia in 2018 was 49.6 % of GDP, which is 7.3 percentage points lower than the average for the G20 countries (ECLAC, 2018).

Dynamics of changes in the structure of GDP by expenditure in Russia

In the structure of Russia's GDP by expenditure, there was a noticeable reduction in the share of household expenditure on final consumption of goods in the period 2014-2018 (table 2).

Table 2: Dynamics of changes in the structure of Russia's GDP by expenditure

Year	GDP, in current prices, billion rubles	Final consumption		Fixed capital formation	Net export
		Households	Government		
2013	72985.7	53,2	18,7	23,6	4,5
2014	79030.0	53,8	18,0	22,4	5,8
2015	83087.4	52,7	17,7	22,1	7,5
2016	85616.1	53,2	18,5	23,1	5,2
2017	91843.2	52,9	18,2	23,6	5,3
2018	104629.6	49,6	17,5	22,9	10,0

Source: compiled by the authors based on their own calculations and data from the Federal state statistics service of the Russian Federation (2020a)

As can be seen from the table, the decline in household final consumption expenditures began in 2015 (52.7%) and continued until 2016.in 2017, the dynamics leveled off, and in 2018, household final consumption expenditures fell again to 49.6% of GDP.

The quarterly dynamics of the contribution of GDP elements by expenditure to GDP growth shows that the main contribution to GDP growth in 2018 was made by consumer spending of households (+1.2 p. p.), gross fixed capital accumulation (+0.6 p. p.) and net exports (+0.8 p. p.) (Analytical center under the Government of the Russian Federation, 2019c)

The analysis of social conditions influencing final consumption of households.

The size of final consumption is determined primarily by the size of the population's income. Therefore, we will analyze the sources of formation of consumer budgets in Russia, as well as the nature of income distribution (table 3).

Table 3: Size and structure of personal income of the population

Year	Total monetary income, million rubles	Including as a percentage:				
		income from business and other production activities	wage of employees	social benefits	property income	other money receipts
2013	44, 230.6	7,0	55,1	18,7	4,7	14,5
2014	47,309.2	7,0	54,9	18,2	4,8	15,1
2015	53,153.2	6,5	52,8	18,2	5,1	17,4
2016	54,325.3	6,4	54,0	18,8	5,1	15,7
2017	56,205.1	6,3	55,1	19,3	4,6	14,7
2018	58,458.7	6,1	57,4	19,1	4,6	12,8
2019	62,080.1	6,1	57,9	19,0	4,4	12,6

Source: compiled by the authors according to the Federal state statistics service of the Russian Federation (2020a)

Most of the monetary income of the population in 2019 was generated by wages (57.9%). The second largest share of income comes from unofficial wages (calculated as the difference between consumption, savings growth, and officially earned income) (23%) (Struchenevsky, 2018). The dynamics of the population's income is also determined by social payments (pensions and surcharges to pensions, social assistance, scholarships, insurance indemnities), the amount of which in the period 2013-2018 showed growth dynamics, in 2018 they amounted to 19% of GDP.

Since 2013, the country has seen a decline in the real disposable income of the population. Only by 2018, the growth rate of real monetary income of the population reached a positive value, but real disposable income increased by only 0.1% (figure 1).

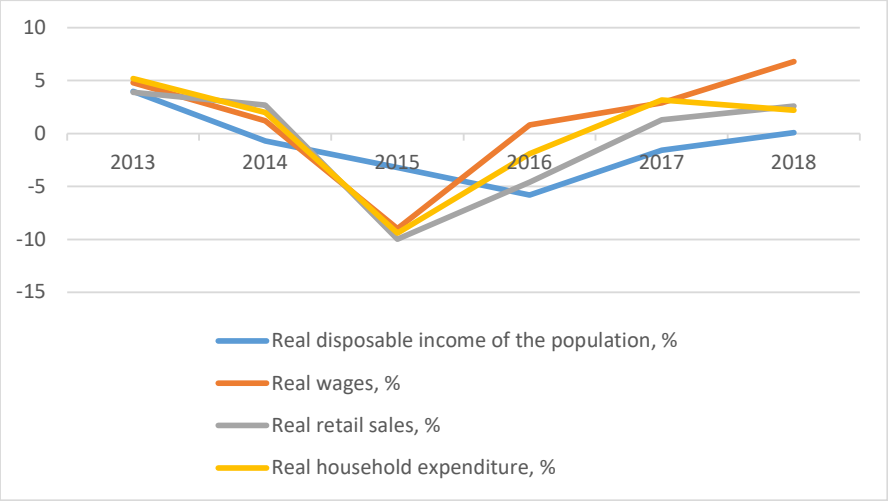

Fig. 1: Dynamics of disposable income of the population, real wages, real retail sales, and real household expenditures, %, 2013-2018 (compiled by the authors according to the Federal state statistics service of the Russian Federation, 2020b)

Figure 1 shows the decline dynamics in real retail sales and real household consumption expenditures due to a sharp drop in real monetary incomes and wages after the 2014 crisis (due to a sharp drop in world oil prices, which caused, among other things, a reduction in retail lending and an increase in the savings rate) (Struchenevsky, 2018). In addition, the figure shows that the monetary income of the Russian population significantly lags behind real wages

due to the fact that a large segment of the population is unofficially unemployed, or organizations overestimate data on the wage fund.

The growth of indicators in 2018 was due to several reasons: 1) higher wages for public sector employees and the minimum wage; 2) low inflation (2.2-2.4% per year) (Analytical center under the Government of the Russian Federation, 2019c); 3) growth in the number of the labor force and an increase in its level of education (Struchenevsky, 2018). In addition, in the period 2013-2014, the level of differentiation of monetary incomes of the population decreased – the value of the Gini coefficient in 2013 was 0.417, in 2018-0.411, this is evidence of positive dynamics in the socio-economic sphere. (Analytical center under the Government of the Russian Federation, 2019c). Thus, the decline in final consumption is due to a drop in real disposable income of the population and a reduction in personal consumption opportunities.

Consumption structure of Russian households and its changes

The World Bank classifies Russia as a group of high-income countries. This allows us to hope for future qualitative changes in the structure of consumer demand. However, changes in the structure of monetary income of population in the period 2013-2018 shows a significant reduction in the proportion of purchases of goods and services in the total amount used in income and increase in savings (associated with declining consumer confidence and negative consumer expectations in the post-crisis period) (table 4).

Table 4: Structure of the use of monetary income of the population of the Russian Federation, 2013-2018

Year	Total income used, %	Including as a percentage			
		Purchase of goods and payment for services	Payment of mandatory payments, contributions, and other expenses	Increase (+), decrease (-) in household savings	Increase (+), decrease (-) in cash on hand in rubles and foreign currency in ruble equivalent
2013	100	80,8	14,8	3,8	0,6
2014	100	82,0	15,3	0,3	2,4
2015	100	77,2	13,7	10,1	-1,0
2016	100	77,5	13,8	6,6	2,1
2017	100	79,1	14,1	4,6	2,2
2018	100	80,7	15,1	1,7	2,5

Source: compiled by the authors according to the Federal state statistics service of the Russian Federation (2020b)

Let's look at the content of the population's expenditures on the purchase of goods and payment for services (figure 2).

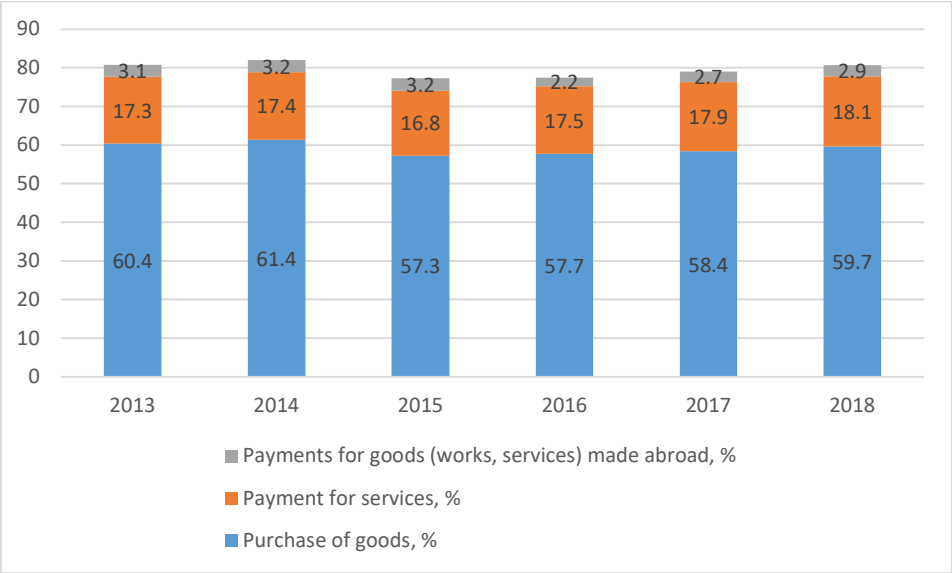

Fig. 2: Public expenditures on purchasing goods and services, in % , 2013-2018
(Source: compiled by the authors according to the Federal state statistics service of the Russian Federation , 2019)

Most of the population's expenditures (59.7% in 2018) are spent on the purchase of goods. The consumption structure in Russia is characterized by an extremely low share of services-below not only developed countries, but also their BRICS partners. In 2013, the share of public expenditures on services was 17.3%, and by 2018, it had increased to 18.1%.

The low share of services in the structure of public spending is characteristic of those countries where the supply of services is not developed, and their cost is also high; the population saves on services for the sake of purchasing goods; has a wide range of free services provided by the government; the shadow sector in the service sector is developed, the state of which is not reflected in official statistics.

The structure of household expenditures on the purchase of goods and services also includes the component "payments for goods and services produced abroad", the dynamics of which makes it possible to clearly identify the period of the collapse of the national currency of the Russian Federation in 2015. Prior to this period there is a steady state of this segment of 3.1-3.2 percent in 2013-2015. Due to the sharp weakening of the ruble, in 2016 there was a strong reduction in spending on the purchase of goods and services abroad (up to 2.2%), which indicates a reduction in the effective demand of the population.

The structure of final consumption of households is an indicator of the standard of living of the population and the nature of economic development. The factors that determine final consumption involve the structure of production, the state of the country's foreign trade on the supply side, the size and stability of the population's income, and the level of social inequality (Analytical center under the Government of the Russian Federation, 2019a).

In the period 2005-2014, with oil prices still high, household final consumption grew rapidly. For example, in 2008, the share of durable goods accounted for 16.7% of total purchases of goods and services, and in 2017 it decreased to 12.0%. As a result of the crisis in the Russian economy, the share of short-term goods in 2017 was 49.2%, and services 31.7%.

In times of crisis, the structure of consumption changes: discretionary expenditures are reduced, and food expenditures increase (mostly among low-income segments of the population). The structure of retail sales is also changing, as well as the ratio between individual product groups - food and non-food products, paid services of the population.

The results of a sample survey of Russian households allow us to assess the change in the structure of consumption of the Russian population in the period 2013-2018. (Fig. 3).

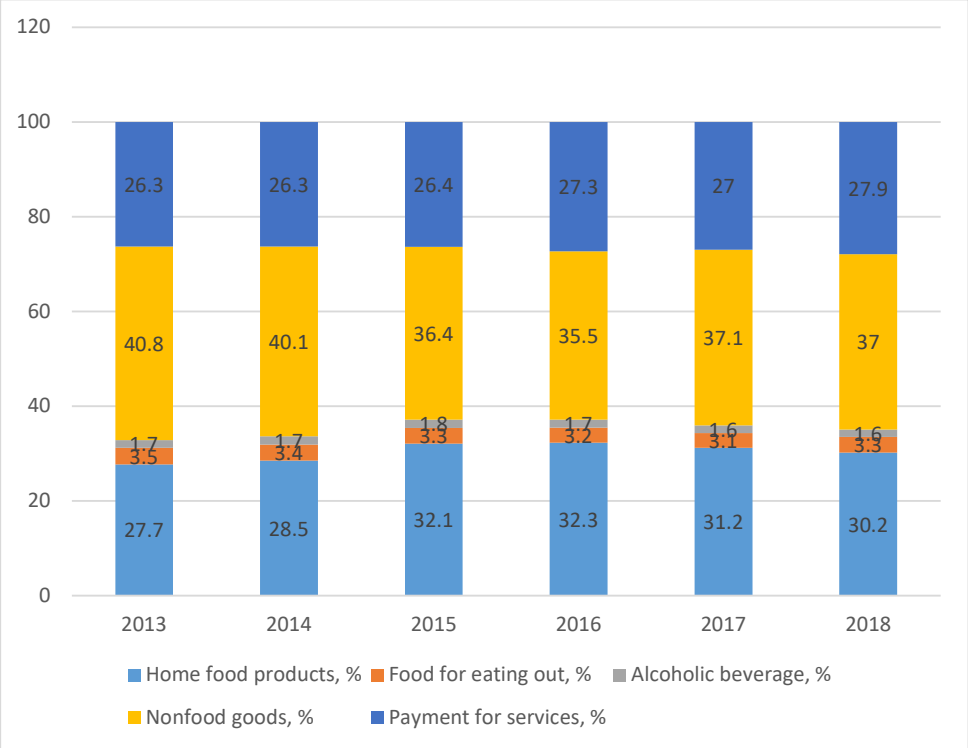

Fig. 3: Structure of population consumption, %, 2013-2018

(Source: compiled by the authors according to the Federal state statistics service of the Russian Federation, 2020c)

Russia has high income inequality and one of the highest shares of expenditures on durable goods – transport, furniture, household appliances, electronics, and construction materials. In 2013, the share of expenses for the purchase of vehicles was 10.2% of the total expenditures of the population, the population spent 5.6% on furniture and home equipment, and -1.3% on construction materials. By 2014, the cost of purchasing transport increased to 10.3%. The crisis year 2015 made significant adjustments to the structure of population consumption: the share of expenditures on the purchase of transport (5.3% - in 2016), the purchase of furniture and household appliances (4.5%), and construction materials (1.0%) sharply decreased. Thus, there is an increase in negative consumer expectations of the population, as well as an increase in pessimistic moods of consumers in assessing their personal financial situation and the economic situation in the country (Financial agency of the city of Moscow, 2014).

Only in 2017, the economy began to recover slowly, and spending on durable goods increased (spending on the purchase of transport increased to 8.2%). Also during the crisis of 2015, household expenditures on recreation and travel, purchasing alcohol and eating out decreased.

According to the World Bank, an indicator of slowing consumer demand is a reduction in the consumer credit market. Thus, in 2016, there was a sharp reduction in the volume of loans granted to individuals (by 32%): in 2015, loans were issued in the amount of 8,629,722 million rubles, in 2016 only 5,861,351 million rubles (Zotova and Tyurina, 2018).

As for short-term goods (primarily food products), their share in the expenditures of the Russian population is disproportionately large in comparison with developed countries. For example, in 2017, the share of food expenditures in Germany was 8%, in the United Kingdom - 13.5%, in the US – 5.9%, in Russia-more than 30% (The Federal state statistics service of the Russian Federation, 2017).

The development of the existing consumption model in the future could be based on a gradual increase in the share of paid services closer to the indicators of developed countries. This would keep services accessible to the lower strata of society. The increase in population with higher income should lead to a decline in the share of food expenditure in the poor layers and to reduce the share of food purchases by all households.

Conclusions

The authors conducted international comparisons on the indicator "share of household consumption in GDP", which showed that developed countries are characterized by a model of a developed consumer society and a low level of gross domestic savings. It is revealed that the share of final consumption of households in Russia is significantly lower than the average for the G20 countries.

The authors studied the Russian dynamics of changes in the structure of GDP by expenditure. A noticeable reduction in the share of household expenditure on final consumption of goods in the period 2014-2018 was found, which is associated with the currency crisis of 2015.

The authors studied the conditions that affect the final consumption of households: the income of the population and the nature of their distribution. It is revealed that most of the monetary income of the Russian population is formed by wages. It is determined that the decrease in final consumption in the period 2015-2017 is due to a drop in real disposable income of the population and a reduction in personal consumption opportunities.

The authors analyzed the structure of consumption of Russian households and its changes in the period 2013-2018, consisting in a significant reduction in the share of purchases of goods and services in the total amount of income used and an increase in household savings. It defines the specific structural characteristics of the consumption of the population in Russia.

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Psychological Features of Attitude Towards Health and Violation of Healthy Lifestyle in Russian University Students

Anna N. ZAKHAROVA
Chuvash State University, Cheboksary, Russia
E-mail: zaharova_an@mail.ru

Evgeny L. NIKOLAEV
Chuvash State University, Cheboksary, Russia

Denis V. HARTFELDER
Chuvash State University, Cheboksary, Russia

Galina S. DULINA
Chuvash State University, Cheboksary, Russia

Elena Yu. LAZAREVA
Chuvash State University, Cheboksary, Russia

Tamara V. TALANOVA
Chuvash State University, Cheboksary, Russia
E-mail: tamaragoncharova@mail.ru

Abstract

The problem of responsibility of own health, health of other people, healthy lifestyle and prevention of health-related problems are important topics in modern society as health is determined by both current state of the healthcare system and personal attitudes towards one's health. With the spread of the covid-19 pandemic, it is becoming more and more relevant to study the attitude to health of various population groups and behavioral practices to maintain a healthy lifestyle. Nowadays health depends not only on the state of healthcare but also on the psychological characteristics and person's attitudes towards health. Therefore finding differences in health attitudes among various socio-economic and age groups could provide more efficient approaches to health preservation among individuals and in society, which in turn requiring more studies of students' health preservation behavior management in educational organizations from psychological perspective. In this study, psychological characteristics of health and healthy lifestyle attitudes among state university students were studied. Total of 177 participants (49 male and 128 female students aged 18 - 41) had participated in the study. The article highlights results of these students obtained with Attitude towards health questionnaire (Berezovskaya R.A., 2005) and Violation of healthy behavior questionnaire (Lutzenko E.L. & Gabelkova O.E., 2013). The major question of the study was the effect of educational form on attitude towards health and specific healthy behavior violations, as well as which of these forms has the greatest potential for developing and maintaining healthy behavior of students. The results of comparative analysis of full-time and extramural students are provided.

Keywords: University students, health attitude, psychological characteristics, healthy lifestyle disorders, age differences, extramural and full-time education differences.

Introduction

The problem of responsibility of own health, health of other people, promotion of healthy lifestyle and prevention of health-related problems are important topics in modern society. In adolescence this problem is even more important as this age is critical for development of attitude towards one's health and lifestyle in general.

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Nowadays attitude towards health is being studied by specialists in various fields – medicine, sociology, psychology etc. The psychological characteristics of attitude towards health is currently being studied in the framework of clinical, psychological and social studies as an interdisciplinary topic.

Russian psychology considers attitude towards health as a system of personality's selective interrelations with surrounding reality that considered either as beneficial or threatening for health and also being the determinants of physical and mental state assessment for the person (Nikiforov G.S, 2003; Berezovskaya R.A., Nikiforov G.S, 2003). According to Kulikov, attitude towards health as predisposition to preservation or wasting health could be considered a personality trait (Kulikov L.V., 2011).

The structure of health in the framework of the personal model of health includes: attitude to one's own body; personal understanding of the essence of health and the goals of its preservation; knowledge of body functioning principles and limits of volitional regulation; individual attitude towards diseases, including development of ability to actively search ways to recover from disease; expressiveness level of personal attitudes and motives in the process of recovery (Serzhantov V.F., Korolkov A.A., 2006).

The most common integral indicators of individual attitude towards health are: self-esteem of health characterized by temporary and territorial stability; value of health as one of the top items in the hierarchy of values of various population groups; health satisfaction closely related to life satisfaction; care for one's health with relevant activities and practices (Sokolskaya M.I., 2008).

The concept of “attitude to health” integrates all psychological categories, within the framework of which the concept of the internal picture of health is analyzed: this is knowledge about health, awareness and understanding of the role of health in the process of human life, its impact on social functions, emotional and behavioral reactions (Vasilieva N. Yu. ., 2014).

Attitude to health, possessing all the characteristics inherent in a mental attitude, has several main components: cognitive, emotional, value-motivational, behavioral.

Serious contradictions are hidden in many people's attitudes towards health: on the one hand, the value of health is also quite high in the ordinary mind, without reference to scientific evidence. At the same time, in the attitude towards maintaining health, the severity of an effective, behavioral component does not correspond to either the volume of knowledge about health, or the strength of emotional reactions to its weakening (Sokolskaya M.I., Rubanova E. Yu., 2008).

The psychological attitude to health in the process of personality development does not remain unchanged, it is constantly changing based on new life experiences (Berezovskaya, 2010). Currently, special attention of researchers is attracted to various aspects of the problem of attitudes to the health of student youth (Zakharova A.N., Talanova T.V., et al, 2018). Health problems at the student age are associated with high educational, informational, psychoemotional stress, systematic malnutrition, daily routine disturbances, exam stress, insufficient material security, a lot of time spent at the computer, physical inactivity, the spread of alcohol, smoking, and smoking mixtures among some young people. . Media propaganda of unrealistic models of the physical body, standards of physical attractiveness, leading to psychological problems of dissatisfaction with one's own body, to which young people are most susceptible also plays a role (Vasilieva, O.S., Filatov F.R., 2001).

Attitudes toward health can now be considered as a significant factor in determining the psychological well-being and quality of life of students, which have their own cross-cultural and sociocultural characteristics associated with traditions and the transformation of modern society, value meanings, identity, religious orientations (Zakharova A.N., Dulina G.S., Gartfelder D.V., Semenov V.L., 2018).

The study of the cultural and psychological characteristics of the attitude towards the health of Chinese and Russian students showed the relationship with positive attitudes towards health in both samples with indicators of social capital such as the level and radius of trust, the significance of ethnic and civic identity (Lebedeva N.M., Tatarko A.N., Chirkov V.I., Liu Ts., 2007).

In the study of Lebedeva N.M., Bushina E.V. (Lebedeva N.M., Bushina E.V., 2011; Bushina E.V., 2009), existing cultural and gender differences in attitudes and health-related behavior in Russian and Canadian students were identified

An assessment of the predicted values of a wide range of lifestyle options for positive mental health and mental health problems among German and Chinese students revealed the presence of specific effects for different countries. A positive prognosis for mental health problems among Chinese students was more frequent drinking of alcohol, whereas for German students this characteristic may indicate better mental health (Velten, J., Bieda, A., Scholten, S., Wannemüller, A., & Margraf, J., 2018).

Neglect of health, low commitment to healthy behavior, and high stress among medical students can be factors in the development of depressive and anxiety disorders (Hoying, J., Melnyk, B. M., Hutson, E., & Tan, A., 2020). Suboptimal diet, decreased physical activity combined with stress (McSharry, P., & Timmins, F., 2017) can lead to mental and somatic health problems in first-year students. A study by students at Jazzan University showed a high prevalence of overweight and obesity among students, which is in most cases due to unhealthy eating habits (Mahfouz, M. S., Makeen, et al, 2016).

Comparison of differences in knowledge about maintaining health and their practical application showed that knowledge about a healthy lifestyle does not necessarily lead to better following healthy behavior (Sajwani, R. A., Shoukat, 2009). Another study found that female dietetic students have a lower prevalence of eating disorders and an intermediate level of healthy behavior (Alkan, S., Ersoy, N., Eskici, G., & Ersoy, G., 2017).

Students' attitude to health is determined by their motivation to maintain health and follow healthy behavior habits. Identified gender differences in habits and motivation for healthy behavior among students show the presence of the most healthy habits and high stress exposure among female students, unlike male students who are more likely to have unhealthy diets and low physical activity (Von Bothmer, M.I., & Fridlund, B., 2005; Tirodimos, I., Georgouvia, I. et al, 2009; Badger, J., Quatromoni, P.A., & Morrell, J.S., 2019).

There is evidence showing significant differences in student health responsibility in terms of spirituality, body mass index, and marital status (Mehri, A., Solhi, M., Garmaroudi, et al, 2016). At the same time, the characteristics that contribute to increasing students' commitment to healthy behavior are the desire for self-realization, a sense of responsibility for their well-being, while habitual exercises have the lowest rates (Çalışkan, C., Arberk, K., & Üner, S., 2017).

A study of the value attitude to health and healthy lifestyles among students showed that most students have a critical (low) level of formation of these values (Imas, Y., Dutchak, M., Andrieieva, O., & Kensytska, I., 2019). The focus of students' internal health control is interconnected with healthy behavior through self-efficacy in maintaining health, while external health control reduces students' sense of self-efficacy and negatively affects students' healthy behavior (Açıkgöz Çepni, S., & Kitiş, Y., 2017) .

A person's attitude to his health, on the one hand, reflects the experience of the individual, and on the other hand, has a significant impact on his behavior. Therefore, it can be considered as one of the main “targets”, on which the psychocorrectional effect should be directed. Moreover, a differentiated approach to psychocorrectional work should be based on a comprehensive study of the characteristics of people's attitudes to their health.

In modern conditions, health depends on the state of medicine and healthcare, as well as on the psychological characteristics of attitudes toward health.

Currently, the most urgent problem requiring further research is the study of the relationship between the characteristics of the social situation of education (Zalevsky G.V., Kuzmina Yu.V., 2010), with the process of transforming knowledge of healthy behavior into personal meanings of students' healthy life (Yugova E.A., 2016).

Researchers focus on the fact that in order to manage the health-saving behavior of students, it is necessary to take into account the characteristics of student youth associated with the age period, the active process of social, cultural adaptation, inclusion in social and working life), the formation of a value orientation, since the transfer of the value of health in individual and social measurement occurs during the socialization and upbringing of the young generation (Puzanova Zh.V., Vyalov I.S., 2013).

In a study of the values that influence the attitude to health among three generations of modern Russia (Fedotova V.A., 2019), it was found that young people's attitudes toward health are more positive than among representatives of other generations of Russians.

Thus, identifying differences in perceptions of attitudes toward health in different social and age groups will help to find more effective ways to maintain the health of the individual and society as a whole (Bovina I.B., 2007).

One of the least disclosed areas in the psychological aspects of the attitude of young people to health and disorders of healthy behavior, in our opinion, is to study the specifics of students' attitude to health, taking into account the form of their education at the university. At present, distance learning forms are becoming more and more popular, which do not require students to attend the lesson daily. When fulfilling the requirements of the curriculum by correspondence, students can receive only part of the knowledge in direct contact with teachers. They get the rest of the knowledge, skills and abilities during independent tasks, being in constant contact with the teacher through modern information and communication technologies, including the use of distance education. The main feature of distance learning is the combination of distance learning methods, full-time studies, where there is an adjustment and discussion of insufficiently understood topics and sections. In this connection, questions arise about the extent to which a student's educational form in a university affects his attitude to health, how much a learning form is associated with certain health problems of students, and what form of learning has the greatest potential in developing and maintaining healthy behavior for students.

The purpose of this work is to study the specifics of the psychological characteristics of the attitude to health and the disturbances in the healthy behavior of university students belonging to different age groups and forms of education.

Research hypothesis - full-time and part-time students have differences in the psychological characteristics of their attitude to health and violations of healthy behavior.

Methods

The study was conducted in Chuvash State University (Cheboksary, Russian Federation). The study involved 177 participants (49 male and 128 female, aged 18…41), 117 of them (66.1%) were full-time students and 60 (33.9%) were extramural students.

The following methods were used in the study: theoretical analysis of scientific literature on the research problem, systematization and generalization of the information, empirical methods (questioning, testing), statistical methods (descriptive statistics, T-student test for means). The following psychdiagnostic tools were used:

1) Attitude towards health questionnaire by R.A. Berezovskaya for determination of psychological characteristics of attitudes towards health (Berezovskaya R.A., 2005). The questionnaire consists of 10 questions which forms four scales: cognitive scale, emotional scale, behavioral scale and value-motivational scale.
2) Violation of healthy behavior questionnaire by E.L. Lutzenko & O.E. Gabelkova for determination of specific healthy behavior violation (Lutzenko E.L., Gabelkova O.E., 2013). The questionnaire has such scales as craving for smoking, poor nutrition, neglect of safety, craving for alcohol, pursuit of a fashionable image, low self-control, emotional incompetence, self-destructive behavior and summary score representing general tendency of healthy behavior violation.

Results and Discussion

Student t-test for independent samples had revealed statistically significant differences between full-time ($n = 117$) and extramural students' ($n = 60$) psychodiagnostics results.

The analysis of Attitude towards health questionnaire by R.A. Berezovskaya was concluded by individual sections, main scales and levels (cognitive, emotional, behavioral, value-motivational). Comparison of the individual sections turned out to be more informative compared to integrative indicators.

The value-motivational component determines the role of health in the hierarchy of terminal and instrumental values of a person and also describes the features of motivation in healthy lifestyle sphere.

Comparison of the questionnaire results for the value-motivational component in full-time and extramural student's had shown that the former have higher mean scores for all values in the questionnaire. For some of these values – "Independence (freedom) " (5.82 ± 1.3 for full-time students, 5.15 ± 1.41 for extramural students; $t = 3.1580$; $p = 0.0019$), "Faithful friends" (6.05 ± 1.24 and 5.42 ± 1.41; $t = 3.0716$; $p = 0.0025$), "Health" (6.36 ± 1.2 and 5.72 ± 1.6; $t = 3.0050$; $p = 0.0030$) and "Happy family life" (6.15 ± 1.29 and 5.6 ± 1.86; $t = 2.3139$; $p = 0.0218$) – the differences are statistically significant (Table 1).

Table 1: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 1 (values)

Values	Full time	Extramural	t	p
Happy family life *	6.15±1.29	5.6±1.86	2.3139	0.0218
Financial well-being	5.96±1.26	5.55±1.4	1.9601	0.0516
Faithful friends **	6.05±1.24	5.42±1.41	3.0716	0.0025
Health **	6.36±1.2	5.72±1.6	3.0050	0.0030
Interesting work (career)	6.12±1.17	5.75±1.28	1.9264	0.0557
Acknowledgement and respect	5.57±1.37	5.52±1.26	0.2651	0.7913
Independence (freedom) **	5.82±1.3	5.15±1.41	3.1580	0.0019

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005*

We may conclude that of all the values the full-time students consider more important those that are associated with subjective personality-oriented signs of well-being, while for the values associated with successful career there're no differences between full-time students and extramural students.

The similar results were found for achievement success in life: full-time students had higher scores for factors considered important for success and for most of the factors statistically significant differences were discovered, except for "Good education" and "Useful social connections (supporting friends and acquaintances)" factors. Both full-time and extramural students has the highest means scores for "Persistence and hard work" factor, 6.3 ± 1.33 and 5.55 ± 1.87 respectively (Table 2).

Table 2: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 2 (factors of achievement success in life)

Factors	Full time	Extramural	t	p
Good education	5.38±1.47	4.97±1.82	1.6458	0.1016
Financial wealth**	5.51±1.52	4.53±1.53	4.0490	0.0001
Abilities**	6.17±1.34	5.28±1.87	3.6310	0.0004
Luck (luckiness) **	5.62±1.38	4.6±1.73	4.2767	0.0000
Health*	6.09±1.39	5.47±1.74	2.5710	0.0110
Persistence and industriousness**	6.3±1.33	5.55±1.87	3.0697	0.0025
Useful social connections (supporting friends and acquaintances)	5.56±1.44	5.1±1.65	1.9280	0.0555

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005*

No statistically significant differences between full-time and extramural students were found in reasons for lack of health self-care scores, except for expensiveness of the costs (4,02 ± 1.97 and 3.4 ± 1.92 respectively; t = 1.9886; p = 0.0483), is mostly due to the difference in economic situation and income level of the students (Table 3).

Table 3: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 9 (lack of health self-care)

Reasons	Full time	Extramural	t	p
This is not necessary, I am healthy already	3.86±1.85	3.53±1.62	1.1712	0.2431
Lack of willpower	4.16±1.82	4.17±1.7	0.0151	0.9880
Lack of time	4.38±1.73	4.05±1.67	1.2314	0.2198
Lack of partners ("It's too boring to do this alone")	3.59±1.97	3.65±1.55	0.2063	0.8368
I don't want to set limits for myself	3.62±1.6	3.88±1.52	1.0378	0.3008
Lack of information	3.34±1.93	3.12±1.8	0.7520	0.4531
Lack of conditions	3.51±1.94	3.55±1.77	0.1244	0.9012
Lack of money*	4.02±1.97	3.4±1.92	1.9886	0.0483
There are more important things than health	3.8±1.84	3.88±1.7	0.2807	0.7793
Other reasons	3.46±1.97	3.95±1.67	1.6424	0.1023

** - statistical significance level p<0.05*

The ***cognitive component*** of the attitude towards health mostly depends on the psychological competence of the individual, which in turn defined by peculiarities of the common knowledge about psychology and psychohygiene in society or ethnic group to which the person belongs. The cognitive component is used for evaluation and classification of one's knowledge of health; it determines the understanding of the role of health in person's life and reveals knowledge of the main factors that have both negative and positive effects on health.

Comparison of indicators of cognitive component parts revealed some differences in the sources of attitude to health concept: while most of the information sources scores has no significant differences for full-time and extramural students, the former consider doctors (5.69 ± 1.37 and 4, 77 ± 1.62; t = 3.9894; p = 0.0001) and popular science publications (5.09 ± 1.58 and 4.55 ± 1.36; t = 2.2361; p = 0.0266) being more informative (Table 4).

Table 4: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 4 (sources of health awareness)

Source of awareness	Full time	Extramural	t	p
Media (radio, TV)	4.45±1.46	4.17±1.63	1.1878	0.2365
Doctors (health specialists) **	5.69±1.37	4.77±1.62	3.9894	0.0001
Newspapers and magazines	4.19±1.6	3.82±1.31	1.5531	0.1222
Friends, acquaintances	4.74±1.42	4.77±1.05	0.1522	0.8792
Popular science books *	5.09±1.58	4.55±1.36	2.2361	0.0266

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005*

The influence of various factors on the state of health were statistically significant higher for full-time students compared to extramural students. The most influential factor are lifestyle (6.31 ± 1.21) for full-times students and nutritional characteristics (5.5 ± 1.32) for extramural students (Table 5).

Table 5: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 5 (factors affecting health)

Influence of the factor	Full time	Extramural	t	p
Quality of medical care*	5.95±1.35	5.47±1.52	2.1509	0.0329
Ecological situation **	6.0±1.34	5.13±1.62	3.7900	0.0002
Professional activity*	5.67±1.31	5.22±1.3	2.1638	0.0318
Nutrition**	6.19±1.31	5.5±1.32	3.3047	0.0012
Bad habits (alcohol and tobacco use) **	6.09±1.38	5.23±1.58	3.7343	0.0003
Lifestyle **	6.31±1.21	5.38±1.71	4.1575	0.0001
Lack of health self-care**	6.1±1.4	5.33±1.51	3.3585	0.0010

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005*

The ***emotional component*** of attitude towards health implies experiencing one's good or bad health and very significant in the context of a person's overall self-esteem, in determining one's life line, life plan as well as life style. The emotional component reflects the feelings of a person that are associated with the state of his health, as well as emotional state caused by the deterioration of a person's physical or mental well-being.

The emotional component of the questionnaire consists of questions about severity of feelings in case of having and not having worries about one's health. In the absence of diseases full-time students had statistically significant higher scores than extramural students for feelings of calmness (6.26 ± 1.09 and 5.67 ± 1.64; t = 2.8479; p = 0.0049), satisfaction (6.23 ± 1.13 and 5.65 ± 1.56; t = 2.8294; p = 0.0052), happiness (6.21 ± 1.14 and 5.67 ± 1.41; t = 2.7890; p = 0.0059), safe (6.06 ± 1.25 and 5.58 ± 1.39; t = 2.3106; p = 0.0220) and self-confidence (5.86 ± 1.38 and 5.38 ± 1.46; t = 2.1495; p = 0.0330), while feeling of indifference had statistically significant lower scores (3.22 ± 1.92 and 3.83 ± 1.87; t = 2.0243; p = 0.0445). With exception of the latter indicator, the greater vividness and intensity of sensations in the absence of health problems is typical for full-time students compared to extramural students, although the distribution of certain types of sensations in both groups are almost identical for lower mean scores. (Table 6)

Table 6: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 6 (the absence of health problems)

The severity of the sensation/feeling	Full time	Extramural	t	p
I am calm**	6.26±1.09	5.67±1.64	2.8479	0.0049
I am satisfied**	6.23±1.13	5.65±1.56	2.8294	0.0052
I am happy**	6.21±1.14	5.67±1.41	2.7890	0.0059
I feel joy	6.12±1.12	5.78±1.25	1.8220	0.0702
Nothing threatens me*	6.06±1.25	5.58±1.39	2.3106	0.0220
I feel indifference*	3.22±1.92	3.83±1.87	2.0243	0.0445
Nothing bothers me	5.04±1.83	4.58±1.66	1.6299	0.1049
I feel confident*	5.86±1.38	5.38±1.46	2.1495	0.0330
I feel free	5.9±1.26	5.53±1.28	1.8073	0.0724
I experience a sense of inner satisfaction	5.94±1.26	5.52±1.59	1.9318	0.0550

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005*

The most statistically significant differences of mean scores in the presence of health problems are feeling of regret (4.52 ± 1.47 for full-time students, 4.02 ± 1.62 for extramural students; t = 2.0915; p = 0.0379) and sense of shame (3.36 ± 1.81 and 4 ± 1.69; t = 2.2794; p = 0.0239), with former being higher and latter being lower for full-time students. Unlike the situation with no health problems, the ratio of mean scores and distribution of sensations for full-time and extramural students are different and there is no clear tendency for greater manifestation of sensations in no one of these groups (Table 7).

Table 7: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 7 (the presence of health problems)

The severity of the sensation/feeling	Full time	Extramural	t	p
I am calm	3.09±1.56	3.43±1.69	1.3663	0.1736
I am regretful*	4.52±1.47	4.02±1.62	2.0915	0.0379
I am concerned	5.16±1.45	4.73±1.68	1.7661	0.0791
I feel guilty	4.49±1.74	4.07±1.42	1.6143	0.1083
I am upset	5.11±1.42	4.73±1.89	1.4915	0.1376
I feel scared	4.69±1.56	4.75±1.78	0.2221	0.8245
I am annoyed	4.37±1.74	4.33±1.87	0.1210	0.9039
I feel myself down	4.76±1.57	4.63±1.72	0.4940	0.6219
I am worried and very nervous	4.37±1.77	4.57±1.8	0.7049	0.4818
I am ashamed*	3.36±1.81	4.0±1.69	2.2794	0.0239

** - statistical significance level p<0.05*

The ***behavioral component*** of the questionnaire characterizes the health-related behavior, as well as the degree of commitment to healthy lifestyle and behavior in case of deterioration of health.

Analysis of the behavioral component revealed that full-time students are more likely to take preventive measures such as bad habits rejection (mean score 5.48 ± 1.82 for full-time students, 4, 8 ± 1.64 for extramural students; t = 2.4267; p = 0.0163), physical exercises (5.34 ± 1.61 and 4.78 ± 1.56; t = 2.2071; p = 0.0286), sauna (5 ± 1.81 and 4.37 ± 1.81; t = 2.1986; p = 0.0292) and body weight control (4.74 ± 1.76 and 4.15 ± 1.63; t = 2.1448; p = 0.0334) to maintain health. The most preferable way of health maintaining for extramural students is yoga, gymnastics and other wellness systems, while for full-time students this measure is the least popular (4.25 ± 1.4 and 3.49 ± 1,96 respectively; t = 2.6844; p = 0.0080). (Table 8)

Table 8: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 8 (regular measures to maintain health)

Measures taken to maintain health	Full time	Extramural	t	p
Engaged in physical exercises (exercise, running, etc.) *	5.34±1.61	4.78±1.56	2.2071	0.0286
Dieting	4.04±1.78	4±1.58	0.1566	0.8757
Sleep and rest regime	4.81±1.74	4.67±1.53	0.5473	0.5849
Hardiness training	3.62±1.9	3.78±1.44	0.6011	0.5486
Preventive physician visits	4.22±1.9	4.05±1.77	0.5833	0.5604
Body weight control*	4.74±1.76	4.15±1.63	2.1448	0.0334
Visiting sauna*	5±1.81	4.37±1.81	2.1986	0.0292
Bad habits rejection*	5.48±1.82	4.8±1.64	2.4267	0.0163
Visiting sport sections (shaping, gym, pool, etc.)	4.62±1.96	4.22±1.57	1.3654	0.1739
Practicing wellness systems (yoga, Chinese gymnastics etc.) **	3.49±1.96	4.25±1.4	2.6844	0.0080
Other health measures	3.75±2.19	4.15±1.67	1.2375	0.2176

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005*

There are no statistically significant differences of behavioral strategies in these groups in case of health problems. It could be noted that for extramural students of the strategy of independent adoption of certain measures based on their past experience is more preferable (mean score of 4.92 ± 1.27 for extramural students and 4.48 ± 1.56 for full-time students). It can be concluded that overall full-time students take more intensive measures to maintain their health, or at least perceive certain types of their behavior as such. (Table 9)

Table 9: Differences between full-time and extramural students' results of Attitude towards health questionnaire: section 10 (strategies in case of health deterioration)

Behavioral Strategy	Full time	Extramural	t	p
Visiting doctor	5.03±1.56	4.9±1.66	0.4955	0.6209
Trying not to pay attention	3.16±1.6	3.37±1.48	0.8228	0.4118
Taking action yourself based on past experience	4.48±1.56	4.92±1.27	1.8825	0.0614
Seeking advice from friends, relatives and acquaintances	4.63±1.56	4.5±1.37	0.5559	0.5790
Other	3.74±1.93	4.15±1.38	1.4491	0.1491

Analysis of Attitude towards health questionnaire integrative score revealed significant differences in such indicators as set of personal values, factors of achievement success in life, sources of health awareness, factors affecting health, feelings and sensations in the absence of health problems (Table 10).

Table 10: Differences between full-time and extramural students' results of Attitude towards health questionnaire: mean integrative scores

	Full time	Extramural	t	p
1: Set of values*	6.01±1.11	5.53±1.26	2.5842	0.0106
2: Factors of achievement success in life***	5.81±1.22	5.07±1.53	3.4728	0.0006
4: Effect of sources of health awareness*	4.83±1.18	4.41±1.06	2.2993	0.0227
5: Factors affecting health***	6.04±1.19	5.32±1.37	3.6209	0.0004
6: Sensations in the absence of health probems*	5.68±0.98	5.32±1.13	2.2176	0.0279
7: Sensations in case of health problems	4.39±1.08	4.33±1.22	0.3625	0.7174
8: Using regular measures to maintain health	4.46±1.27	4.29±0.97	0.9177	0.3601
9: Reasons for lack of health self-care	3.78±1.42	3.72±1.17	0.2711	0.7866
10: Strategies in case of health deterioration	4.21±0.92	4.37±0.94	-1.0731	0.2847

** - statistical significance level p<0.05;*
**** - statistical significance level p<0.001*

Analysis of results obtained with ***Violation of healthy behavior questionnaire*** by E.L. Lutzenko & O.E. Gabelkova revealed more frequent occurrence of such violations in full-time students compared to extramural students for both specific types of violations (scales) such as self-destructive behavior (full-time students 5.0 ± 1.67, extramural students 6.08 ± 2.41; t = 3.5010; p = 0.0006), craving for alcohol (13.92 ± 5.8 and 16.77 ± 5.98 respectively; t = 3.0561; p = 0.0026), Craving for smoking (12.24 ± 5.85 and 14.63 ± 6.83; t = 2.4339; p = 0.0159) and eating disorders (15.4 ± 3.7 and 16.77 ± 3.11; t = 2.4497; p = 0,0153) and integrative score (111.15 ± 18.81 and 122.63 ± 23.42; t = 3,5300; p = 0,0005) (Table 11).

Table 11: Differences between full-time and extramural students' results of Violation of healthy behavior questionnaire by E.L. Lutzenko & O.E. Gabelkova

Violation of healthy behavior questionnaire	Full time	Extramural	t	p
Craving for Smoking*	12.24±5.85	14.63±6.83	2.4339	0.0159
Eating Disorders Scale*	15.4±3.7	16.77±3.11	2.4497	0.0153
Safety Neglect (Risk Behavior) Scale	22.92±4.2	23.55±5.58	0.8379	0.4032
Craving for Alcohol**	13.92±5.8	16.77±5.98	3.0561	0.0026
Pursuit of Fashionable Image Scale	19.11±4.03	20.28±3.28	1.9478	0.0530
Low self-control scale (impulsiveness)	9.81±3.91	10.92±3	1.9163	0.0570
Emotional incompetence (inability to cope with stress)	12.74±3.23	13.63±3.15	1.7480	0.0822
Self-Destructive Behavior Scale***	5.0±1.67	6.08±2.41	3.5010	0.0006
Total Points***	111.15±18.81	122.63±23.42	3.5300	0.0005

** - statistical significance level p<0.05;*
*** - statistical significance level p<0.005;*
**** - statistical significance level p<0.001*

The emotional incompetence factor consists of statements that describe ineffective strategies for dealing with stressful situations, such as somatization of anxiety and the formation of a hypochondriacal disposition to one's health, depressive response, as well as concentration on negative emotions.

The factor of self-destructive behavior includes individual traits that encourage participation in life- and health threatening activities, such as drugs abuse, dangerous experiments and unprotected sex.

It can be concluded that in along with higher probability of having health problems due to older age, extramural students more often note their own bad habits and self-destructive behaviors of varying severity and regard them as healthy behavior violation.

Conclusions

The motivational-value component of the attitude to health among students has its own specifics for full-time and part-time students, characterized by more pronounced personality-oriented signs of well-being and a large number of factors for achieving success in life among full-time students.

By the values associated with a successful career, the factor of getting a good education and acquiring the necessary connections, differences between full-time and part-time students were not revealed. This may be due to the various age stages of development of full-time and part-time students. So for full-time students, the relevant values at this stage are building their own lives, they have expressed a desire to gain independence from significant adults, they pay more attention to finding a life partner, building social contacts for which students tend to keep themselves in good shape, be healthy, successful, purposeful, financially secure. Most part-time students have already formed social contacts, have families, so career values, recognition and respect, getting a good education and acquiring the necessary connections that are expressed in the same way as full-time students are more relevant values.

Moreover, insufficient health care for full-time students may be due to the need for high material costs, which are impossible due to the unstable economic situation of these students. Therefore, in general, full-time students have a large degree of formation of motivation for maintaining and strengthening health.

The cognitive component of the attitude to health in full-time and part-time students is characterized by various sources of awareness that form an idea of health. Full-time students are more oriented to information received from doctors and from popular science publications compared to correspondence students who are more likely to trust doctors, friends, and acquaintances relative to other sources of information. The largest factors affecting the state of health, full-time students are called lifestyle, and correspondence students are called nutritional features. These features largely depend on the beliefs and perceptions of students due to previous life experiences and the characteristics of the community to which they belong.

The emotional component of the attitude to students' health is characterized by an increased intensity of experiencing positive emotions associated with the absence of a disease in full-time students compared to external students. The emotional attitude to the situation of health problems in full-time students is manifested in a more pronounced feeling of regret and a less pronounced sense of shame compared to students in correspondence. According to the results, there is no clear tendency to a large intensity of manifestation of emotional experiences in a particular group of students. The emotional attitude to health is determined by the individual characteristics of the lifestyle and self-esteem of the person.

The behavioral component of the attitude to the health of students characterizes the features of commitment to a healthy lifestyle. In full-time students, it is more manifested by behavior aimed at avoiding bad habits, engaging in physical exercises, controlling body weight and visiting the sauna. For correspondence students, behavior toward classes in special wellness systems is more characteristic. In the event of health problems, students in both full-time and part-time studies have the same behavioral strategies. In general, part-time students more often take measures to overcome health problems based on past experience, and part-time students assess the measures taken to maintain their health as quite active.

An analysis of the identified characteristics of a violation of healthy behavior in full-time and part-time students shows a more frequent occurrence of such violations in part-time students compared to full-time students. It can be concluded that in addition to the more likely for older people the likelihood of health problems, correspondence students more often note the presence of malnutrition, craving for bad habits and self-destructive behaviors of varying severity.

A comparative analysis of violations of healthy behavior showed greater severity among students of part-time education (compared with full-time students) indicators on the scales "Craving for alcohol", "Craving for smoking" and "Eating disorders", "Self-destructive behavior."

Thus, students have formed motivation to maintain and strengthen health, more pronounced among full-time students. Full-time and part-time students use various sources of information that form an idea of health. The emotional component of the attitude towards health is characterized by the absence of a clear tendency towards a high intensity of emotional experiences in connection with health problems in a particular group of students. Part-time students are more likely to take measures to overcome health problems based on past experience, while they often have impaired healthy behavior than full-time students.

On the basis of the study, the relevant "targets" of psycho-correctional work have been identified, psychological and pedagogical recommendations have been developed for the formation of a healthy lifestyle in the educational space of the university, aimed at the psychological correction of students' health-saving behavior, factors of healthy behavior that impede the formation and maintenance of a healthy lifestyle, having specifics for university students of various forms of education and age.

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Russia Between Developing Countries in Europe and Asia

Valery V. SMIRNOV
Chuvash State University, Cheboksary, Russia
E-mail : walera712006@mail.ru

Vladislav L. SEMENOV
Chuvash State University, Cheboksary, Russia

Olga O. KOLOSOVA
Chuvash State University, Cheboksary, Russia

Anna N. ZAKHAROVA
Chuvash State University, Cheboksary, Russia
E-mail : zaharova_an@mail.ru

Marina M. MITYUGINA
Chuvash State University, Cheboksary, Russia

Tamara V. TALANOVA
Chuvash State University, Cheboksary, Russia
E-mail : tamaragoncharova@mail.ru

Nikolay A. EFREMOV
Chuvash State University, Cheboksary, Russia

Abstract

Research background: Financial and economic status of Russia between developing countries in Europe and Asia. **Purpose of the article:** Determine the financial and economic role and development opportunities of Russia as a border between developing countries in Europe and Asia. **Methods:** The research is based on a systematic approach using methods of descriptive statistics and cluster analysis. **Findings & Value added:** The article describes the need to determine the conditions and opportunities for the financial and economic development of modern Russia, taking into account the economic and geographical location and international economic cooperation. The development of Russia is considered not only as a criterion, but also as a category for countries that are borders between different socio-economic formations. The study revealed the overall dominant indicator-the GDP deflator, which reflects the activity and instability of the price index. Developing countries have consistently low values relative to Russia, and the Russian GDP deflator is the limit. Asia, with a less capital-intensive economy of the countries, is more stable in the growth rate of the corresponding indicator. Russia has been identified as a source of price index instability and a marginal benchmark for developing countries in Europe and Asia. The main causes of instability are public administration and GDP. As a result of the study, significant groups of instability between Russia and the countries of Asia and Europe were identified. The success of Russia's development as a border between developing countries in Europe and Asia is determined by the correspondence between the limits of economic relations and the existing structure of the Russian economy. This correspondence is the current financial and economic situation of Russia, defined as its status and opportunities for successful development.

Keywords: Border, Instability, Development Limit, Growth Rate.

INTRODUCTION

The relevance of the research is related to the need to determine the conditions and opportunities for the financial and economic development of modern Russia, taking into account the economic and geographical location and

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international economic cooperation. The concept of financial and economic status (formation) appears as a generalizing form of development of a set of economic relations in the process of creating and using funds of money.
The problem is considered at a higher level than just the economic and geographical location and international economic cooperation. The development of Russia at this level is considered not only as a criterion, but also as a category for countries that are, in fact, borders between different socio-economic formations.

So, for Russia, as the border between the developing countries of Europe and Asia, the main criterion for the limit of economic development is a stable socio-economic formation of a primitive raw material structure of the economy, in accordance with the interests of the ruling class (Smirnov V., et al., 2019), which is unable to overcome the barrier that separates the developed countries from the developing ones. This is facilitated by the developing countries of Europe and Asia themselves, perceiving Russia as the border of various socio-economic formations.

LITERATURE REVIEW

The analysis of the financial and economic situation of Russia as the border between the developing countries of Europe and Asia is based on the problem of ensuring sustainable GDP growth (Miller C., 2020). At the present stage of development of the world economy, high values of GDP growth dynamics are demonstrated by developing countries in Asia. The source of this dynamics is resource-intensive (labor-intensive) production, which is associated with a sharp increase in energy consumption and emissions of pollutants, as well as a decrease in the stability of the structure of the economy, due to accelerated development (Li J., Lin B., 2019).

But this dynamic is gradually losing its strength due to the rising cost of labor in developing countries and the decline in the cost of capital in developed countries. The loss of economic growth rates directs Asian economies to move to capital-intensive and resource-saving production. This, in turn, leads to the need to adjust the economic interests and policies of Asian countries in the context of the benefits of joint development with European countries with high-tech capital.

Mutually beneficial international cooperation helps reduce the impact and eliminate the consequences of cyclical global economic crises. In particular, adding the Chinese total investment portfolio to the European market in the medium term reduces the risk before and during the periods of the global financial crisis and the Euro zone sovereign debt crisis (Mensi W., et al., 2017; Kannadhasan M., Das D., 2019).

High values of economic growth dynamics in developing Asian countries indicate accelerated development, which causes an increase in the asymmetry of the exchange rate to consumer prices, thereby reducing the elasticity of demand and competition (Narayan S., Rehman M.U., 2017). High exchange rate volatility is associated with capital inflows to Asian countries. In this situation, capital control should become an effective tool for stabilizing the foreign exchange market (Caporale G.M., et al., 2017).

On the one hand, restrictions on capital inflows to Asian countries will positively affect the stability of the exchange rate, on the other hand, these measures go beyond investment flows. Restrictions on flows in one direction can affect flows in the opposite direction. Restrictions on one asset class can affect the flows of other asset classes (Jongwanich J., 2019). For example, China's two-way exchange rate, both on land and at sea, as well as the macroeconomic climate in the long term, largely determine the yuan as a regional factor that affects the exchange rate of the Japanese yen and the Korean won (Chiappini R., Lahet D., 2020).

Against this background, there is inevitably a General deepening of ties between the Asian market and the rest of the world. Many of the Asian markets are linked to global markets through key markets. The increased integration of Asian financial markets into the global financial network is clearly evident during periods of stress (the Asian financial crisis of 1997-1998 and the global financial crisis of 2008-2009), and the decrease in the number of connections in post-crisis periods. Many of the Asian markets ceased to be linked to global markets through key markets (such as Hong Kong), and over time developed stronger direct links to external markets (Chowdhury B., et al., 2019).

The stock market is becoming more integrated in a crisis. In turn, this has led to increased volatility between stock markets and financial markets during times of crisis. Negative shocks generate more instability than positive shocks of the same magnitude. Integration between financial markets (in terms of volatility overflow) implies low potential diversification opportunities for investors (Jebran K., et al., 2017).

Financial factors began to have a greater impact on stock returns. Thus, the global business cycle has become a priority for predicting stock returns. From the point of view of intra-industry relations, developed stock and currency markets demonstrate a strong connection with emerging Asian stock markets due to the integration of financial markets (Dong, X., Yoon, S.-M., 2019).

In General, the disadvantage of financial markets in Asia is a pronounced conservatism, including the difficult secondary trading of assets. In comparison with Asian countries, Russia's problems lie in the lack of conservative institutional investors (Smirnov V., et al., 2019).

Europe is showing a growing unemployment rate in economically weak countries against the background of a General normalization of unemployment and high wages in the strong countries of the Euro zone. The stability of the European financial system is higher than it was 10 years ago, which allows us to strengthen the policy of quantitative easing and asset purchases to maintain stability in the Euro area and save the Euro as a single European currency.

The most important direction for the development of the Eurasian economic integration is the emergence of a common market for financial and banking services. The principles, structure and content of measures of the concept of forming a common market for financial and banking services take into account the peculiarities of national economies and financial systems.

At the same time, the European market is not self-contained. Sentiment in Europe affects emerging market sentiment in both the short and long term. At the same time, emerging markets affect the mood in Europe only in the long term. A bi-directional causal relationship between the moods of emerging markets and developed markets in Europe in the long term suggests that the sentiment index of the two economies may feed each other during crisis periods (Dash S.R., Maitra D., 2019).

European markets are full-fledged receivers, while North American and Asia-Pacific markets are high-order risk transmitters (Brio E.B.D., et al., 2017). The peculiarity of the modern development of European markets is related to Bank lending. It is Pro-cyclical in the eight new (non-Baltic) EU countries, which includes the initial credit boom (2005-2007), followed by the global financial crisis (2008 and 2009) and the beginning of the Eurozone crisis (2010). Bank lending was negatively affected by both crises, but the two types of foreign banks behaved differently. The Big six banks remained committed to the lending behavior of national banks that support the idea of a second domestic market. Others were involved in fueling the credit boom, but then sharply reduced their lending during crisis periods (Bonin J.P., Louie D., 2017).

A significant role in assessing the creditworthiness of forms has become played by the ownership structure, which is unusual for European countries. However, from the point of view of firm management specifics, indicators of ownership structure and aggregate financial indicators are the most economically significant factors associated with increasing the probability of firms ' survival in European emerging markets (Baumöhl E., et al., 2019).

Although the European sovereign crisis was triggered by the deteriorating financial conditions of developed countries, the sovereign debt markets of developing countries outperformed the CDS markets of peripheral EU countries in terms of information transfer in the short term. This is due to the fact that in a developing country with less openness to international trade and a higher market value of sovereign debt, the country's sovereign debt is more vulnerable to EU sovereign risk (Wang A.T., 2019).

For the Russian reality, the value drivers of a credit institution are: high margin of safety for compliance with the Bank of Russia capital requirements, the availability of opportunities to attract funds at a reasonable cost, a reasonable balance between the profitability and riskiness of the loan portfolio, effective management of operating expenses. In General, managing the Bank in order to maximize its value and ensure sustainable operation in the future.

So, the differences in the conditions of existence of developing countries in Europe and Asia, whose border is Russia, actualizes the need to analyze its financial and economic situation and role in the development of dividing socio-economic formations.

METHOD

To analyze the financial and economic situation of Russia as the border between developing countries in Europe and Asia, we apply descriptive statistics methods, including processing of empirical data, systematization, visual

representation in the form of graphs and tables, and their quantitative description by means of basic statistical indicators (King A.P., Eckersley R.J., 2019; Brownstein N.C., et al., 2019). Tables, charts, and summary metrics are used to describe the behavior of each variable. Tables, charts and graphs are built using "MS Excel", "IBM SPSS Statistics Software" (Fávero L.P., Belfiore P., 2019). Descriptive statistics assesses an array of data by statistical indicators.

Statistical analysis will serve as a method for collecting, studying and presenting large amounts of data based on features () (Lazar J., et al., 2017) and data relationships (Schofield S. 1993), correlation relationships of spatial and time series of indicators, while preserving the research methodology.

The use of cluster analysis is due to the fact that statistical methodologies rely on a probabilistic understanding of causality (Urlacher B.R., 2020) and require justification of the connectivity of changes in the estimated indicators.

ANALYSIS

Analysis of financial and economic situation of Russia between developing countries in Europe and Asia is based on the results of evaluating the median (Me) and the asymmetry of the distribution relative to the average (AD), as well as their growth rates (Rates of gain, RG) of financial and economic indicators: current account balance; General government gross debt; General government net debt; General government net lending/borrowing; General government primary net lending/borrowing; General government revenue; General government total expenditure; Gross domestic product, constant prices; gross domestic product, deflator; gross national savings and total investment according to the International Monetary Fund, World Economic Outlook Database.

The result of the analysis of the dynamics of financial and economic indicators of developing countries in Asia and Europe is their hierarchy (tables 1 and 2) and the overall dominant indicator – GDP, deflator, i.e. the activity and instability of the price index.

Table 1: Hierarchy of developing countries in Asia, 2000 – 2024 гг.

Indicator	Country	Me > 5,0%	The asymmetry of the distribution relative to the average, AD
General government gross debt	Timor-Leste	73.47	0.74
Gross domestic product, deflator	Timor-Leste	9.12	-0.76
Gross domestic product, deflator	Russia	8.44	1.55
Gross domestic product, deflator	Mongolia	7.74	1.94
Gross domestic product, deflator	Myanmar	6.95	0.79
General government gross debt	Kiribati	6.54	2.97
Gross national savings	Maldives	6.44	1.93
General government primary net lending/borrowing	Indonesia	6.41	3.84
General government structural balance	China	6.39	2.09
Gross domestic product, deflator	Nepal	6.12	1.68

Source: calculated in "SPSS Statistics" based on data ©International Monetary Fund, World Economic Outlook Database, https://www.imf.org/external/pubs/ft/weo/2019/01/weodata (02 March 2020).

Table 2: Hierarchy of developing countries in Europe, 2000 – 2024 гг.

Indicator	Country	Me > 5,0%	The asymmetry of the distribution relative to the average, AD
Gross domestic product, deflator	Turkey	11.32	2.26
Current account balance	North Macedonia	9.10	4.11
Gross domestic product, deflator	Russia	8.44	1.55
General government gross debt	Kosovo	8.37	-0.04
Current account balance	Turkey	7.08	2.69

Gross national savings	Montenegro	6.93	1.18
General government primary net lending/borrowing	Albania	6.33	2.18
Gross domestic product, deflator	Turkey	11.32	2.26
Current account balance	North Macedonia	9.10	4.11

Source: calculated in "SPSS Statistics" based on data ©International Monetary Fund, World Economic Outlook Database, https://www.imf.org/external/pubs/ft/weo/2019/01/weodata (02 March 2020).

The difference lies in the level of this indicator for the leading countries of Asia and Europe, namely, in the dynamics relative to the average median values and the asymmetry of the distribution of the relative average value: Asia-average Me = 4.33% and AD = 0.79; Europe-Me = 4.49% and AD = 1.68.

Russia is the second largest country in Europe and Asia. But if we consider that Turkey is only 5% (Thrace on the Balkan Peninsula) located in South-Eastern Europe, and 95% – "Anatolia" (Asia Minor or Asian Turkey), then Russia ranks first in Europe.

So, Russia is a source of price index instability for developing countries in Europe and Asia. The main reasons for the instability of the Russian price index are General government primary net lending/borrowing and Gross domestic product, constant prices as the dominant in the hierarchy of the ratio of growth rates of absolute Me values to the distribution asymmetry relative to the average for Russia (table 3).

Table 3: Hierarchy of relations between the growth rate of absolute Me values and the distribution asymmetry relative to the average for Russia, 2000 – 2024 гг.

Indicator	**Me, %**	**The asymmetry of the distribution relative to the average, AD**	**ABS (Me / AD)**
General government primary net lending/borrowing	-23.19	-0.03	806.77
Gross domestic product, constant prices	-4.55	0.17	26.78
General government structural balance	-54.45	-4.73	11.52
General government gross debt	-1.18	-0.12	10.17
General government net lending/borrowing	-44.33	-4.99	8.88
Gross national savings	-1.18	0.16	7.40
Gross domestic product, deflator	8.44	1.55	5.45
Current account balance	-11.45	2.61	4.39
Total investment	0.42	0.16	2.58
General government revenue	-0.24	0.15	1.56
General government total expenditure	0.21	1.23	0.17

Source: calculated in "SPSS Statistics" based on data ©International Monetary Fund, World Economic Outlook Database, https://www.imf.org/external/pubs/ft/weo/2019/01/weodata (02 March 2020).

Cluster analysis of the RG of the financial and economic indicators under study (see above) revealed significant groups of instability between Russia and the countries in:

1) Asia (table 4):

- indicators: Current account balance and General government, net lending/borrowing, primary net lending/borrowing, General government structural balance, Gross domestic product, constant prices, gross national savings;

Table 4: Cluster Russia and developing countries in Asia, 2000 – 2024 гг.

Rates of gain (RG), Indicator, Cluster Russia & Emerging and developing of Country Asia		Emerging and developing of Country Asia	The square of the Euclidean distance < 1.0E+07
Current account balance	Current account balance	Brunei Darussalam	8.96E+04
		China	1.04E+05
		Cambodia	1.51E+05
		Maldives	1.72E+05
		Tonga	1.95E+05
		India	2.04E+05
		Micronesia	3.29E+05
		Samoa	3.50E+05
		Mongolia	3.92E+05
		Solomon Islands	3.97E+05
		Bhutan	5.72E+05
		Myanmar	6.10E+05
		Fiji	6.50E+05
		Sri Lanka	7.96E+05
		Vanuatu	8.10E+05
		Lao P.D.R.	1.00E+06
		Kiribati	1.02E+06
		Marshall Islands	1.32E+06
		Papua New Guinea	1.86E+06
		Thailand	6.72E+06
	General government net lending/borrowing	Maldives	1.83E+05
		Micronesia	6.11E+05
		Bhutan	1.16E+06
		Papua New Guinea	1.39E+06
		Cambodia	1.49E+06
		Mongolia	1.51E+06
		Tonga	1.61E+06
		Brunei Darussalam	1.81E+06
		Vietnam	2.92E+06
		Samoa	5.18E+06
		Marshall Islands	6.47E+06
		Vanuatu	9.60E+06
	General government primary net lending/borrowing	Philippines	9.88E+04
		Malaysia	1.48E+05
		Bangladesh	2.64E+05
		Fiji	7.24E+05
		China	7.69E+05
		Solomon Islands	2.99E+06
		India	3.42E+06
		Bhutan	5.27E+06
		Myanmar	5.96E+06
		Marshall Islands	7.35E+06
	General government structural balance	China	6.80E+05
		Philippines	3.46E+06
	Gross domestic product, constant prices	Sri Lanka	1.75E+05
		Philippines	3.61E+05
		Maldives	4.98E+05
		Malaysia	1.37E+06

Rates of gain (RG), Indicator, Cluster Russia & Emerging and developing of Country Asia		Emerging and developing of Country Asia	The square of the Euclidean distance < 1.0E+07
		Tonga	1.48E+06
		Samoa	2.19E+06
		Thailand	2.27E+06
		Marshall Islands	2.80E+06
		Micronesia	3.24E+06
		Solomon Islands	8.15E+06
		Brunei Darussalam	9.99E+06
	Gross national savings	Solomon Islands	8.51E+05
		Maldives	9.05E+05

Note: Hierarchical cluster analysis – the average distance between clusters, the square of the Euclidean distance.
Source: calculated in "SPSS Statistics" based on data ©International Monetary Fund, World Economic Outlook Database, https://www.imf.org/external/pubs/ft/weo/2019/01/weodata (02 March 2020).

- close countries: China, Bhutan, Brunei Darussalam, Maldives, Marshall Islands, Micronesia, Samoa, Solomon Islands, and Tonga;

2) Europe (table 5):

- indicators: current account balance and total government net debt, net lending / borrowing, primary net lending/borrowing, GDP (constant prices);

Table 5: Cluster Russia and developing countries in Europe 2000 – 2024 гг.

Rates of gain (RG), Indicator, Cluster Russia & Emerging and developing of Country Europa		Emerging and developing of Country Europa	The square of the Euclidean distance < 1.0E+07
Current account balanc	Current account balance	Bosnia and Herzegovina	9.03E+04
		Albania	9.42E+04
		Hungary	1.43E+05
		Croatia	6.31E+05
		Poland	6.60E+05
		Turkey	1.76E+06
		North Macedonia	2.78E+06
	General government net debt	Bosnia and Herzegovina	1.72E+05
	General government net lending/borrowing	Poland	1.26E+05
		Croatia	2.65E+05
		Bosnia and Herzegovina	6.41E+06
	General government primary net lending/borrowing	Albania	4.55E+05
		Bosnia and Herzegovina	4.80E+05
		North Macedonia	5.62E+05
		Bulgaria	1.17E+06
		Romania	2.08E+06
		Croatia	2.68E+06
	Gross domestic product, constant prices	Romania	2.28E+05
		Hungary	9.36E+05
		North Macedonia	2.92E+06
		Bulgaria	3.90E+06

Note: Hierarchical cluster analysis – the average distance between clusters, the square of the Euclidean distance.
Source: calculated in "SPSS Statistics" based on data ©International Monetary Fund, World Economic Outlook Database, https://www.imf.org/external/pubs/ft/weo/2019/01/weodata (02 March 2020).

- close countries: Bosnia and Herzegovina, Croatia and North Macedonia.

So, Russia, dividing the developing countries of Asia and Europe, significantly affects and depends (mutually dependent) on public administration, the overall structural balance and gross national savings of Asian countries –

China, Bhutan, Brunei, Maldives, the Marshall Islands, Micronesia, Samoa, Solomon Islands and Tonga, as well as the management of the total public net debt of European countries – Bosnia and Herzegovina, Croatia and North Macedonia.

DISCUSSION OF RESULTS

The results of evaluating the median (Me) and the asymmetry of the distribution relative to the average (AD), as well as their growth rates (Rates of gain, RG) of the main financial and economic indicators that determine, corresponding to these indicators, the position of Russia between the developing countries of Europe and Asia indicate the overall dominant indicator-GDP, deflator, namely, the activity and instability of the price index.

Europe has higher values of price instability than Asia. At the same time, Russia, being a source of instability in the price index for developing countries in Europe and Asia, conditionally shares the causes of instability – for Asia, public administration, the formation of a common structural balance and gross national savings, and for Europe, the management of a common public net debt.

CONCLUSIONS

The problem of the success of Russia's development in the state of the border between developing countries in Europe and Asia is a burden on the current structure of the Russian economy, which is still unable to overcome the barrier that separates developed countries from developing countries. This is facilitated by the developing countries of Europe and Asia themselves, perceiving Russia as the limit of economic development.

This explains the overall dominant indicator of the GDP deflator, which reflects the activity and instability of the price index. Developing countries have consistently low values relative to Russia, and the Russian GDP deflator is the limit. Asia, with a less capital-intensive economy of the countries, is more stable in the growth rate of the corresponding indicator.

In General, Russia is a source of price index instability and a marginal benchmark for developing countries in Europe and Asia. The main causes of instability are public administration (net lending / borrowing) and GDP (constant prices). The study identified significant groups of instability between Russia and the Asian countries: China, Bhutan, Brunei, Maldives, Marshall Islands, Micronesia, Samoa, Solomon Islands and Tonga – public administration, the overall structural balance and gross national savings; Europe – Bosnia and Herzegovina, Croatia and North Macedonia-managing total public net debt.

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Digital Reality: Temporal Aspects of Discursive Representation, Social Construction, Predictive Experience

Anna MAYAKOVA
Senior researcher, SWSU, Kursk, Russian Federation
berryannett@yandex.ru

Oleg Grimov
Associate professor, SWSU, Kursk, Russian Federation
grimoleg@yandex.ru

Abstract

The present paper considers the whole of experience of sociological and socio-philosophical understanding of digital reality phenomenon in the categories of its temporal coordinates. The article discusses the influence of digital technologies' temporality on their social construction practices, as well as the main parameters of representation in various discursive spaces. In conclusion, the experience of predicting the development of digital technologies in the aspect of their riskogenics is presented.

Keywords: Digital Reality, Digital Technologies, Social Construction, Discourse, Temporality, Risks, Predictive Scenarios.

Introduction

High rates of technological development, including those connected with the emergence of digital reality, cause significant social, political, economic, and in a broad sense, existential consequences. The process of new reality formation, described in terms of digital discourse, has become the object of numerous studies that consider the content of the process itself and assess its consequences. At the same time, the theoretical and methodological question of determining how the process of social construction of digital reality, its discursive representations, and what their temporal coordinates are remains insufficiently clarified.

The technological transformations taking place in the context of the modern society formation and the consequences caused by them are currently ahead of the dynamics of public control and the degree of scientific reflection. However, each artifact of digital technological reality is reflected in various discursive spaces (scientific, everyday-practical, artistic, etc.) in various forms - in the form of a myth, an ideologeme, a pattern, etc. As a result, the meta-theoretical problem of studying the common logic and temporal dynamics of digital reality representations in various discursive spaces is important. Not only the content of representations is significant, but also the principles of their development and changes, considered as part of time dynamics.

Results and Discussion

The initial intuition of the analysis carried out in this study is the assumption that the temporal parameter is embedded in the very semantic essence of technological development. It is obvious that each technology as a fact and object of social reality is caused by a number of reasons of social and scientific and technological nature: that is, it has the past, relies on users' practices in the present, and is limited to a certain horizon in the future. This horizon is potentially distant, but unavoidable; outside of it, the functioning of an artifact or technology will cease to be relevant, or at least lose its instrumental modality. Thus, a chain of three temporal modalities is built: past - present – future. However, behind this obvious fact there are also less obvious temporal aspects of technological and more broadly – digital development.

Digital technologies form special temporal loci in the common physical and social chronotopos. This trend is noted by a number of modern sociologists [1, 2, 3]. Also, within the framework of synergetics, the concept of

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tempoworlds – the loci of the world provided by the existence of a special temporal order is developed. That is, explaining this idea, we can say that a tempoworld is interpreted as an autonomous fragment of the world with its own internal time, running independently of the rest of the world – other tempoworlds, due to restrictions or lack of interaction with them. In different tempoworlds, the pace of time can be radically different.

The overall growth of research interest in the problem of time is largely due to the role of modern technologies. It is their development that defines the form and content of temporality in a new way, expanding classical ideas about the linear nature of time, its irreversibility, etc. Since conceptualization of engineering and technology gets widespread as an independent actor with genuine subjectivity (e.g. in the framework of actor-network theory), there should be analyzed the status of technology and time symbiosis as equal subjects in the structure of special technotemporality. We can observe various configurations of this technotemporality. The practical aspects of this question are clear when analyzing time budgets and trying to isolate the actual technological time, or, on the contrary, considering technological time as an important aspect of social time. The solution of this issue will have both social and applied economic meaning. V. A. Artemov and O. V. Novokhatskaya ask the question: "...is it not necessary to reject only the 'human' time itself and include the functioning of everything that is created by man in social time to facilitate his work, its high productivity, release his time for new activities, etc.? [4]. In other words, should we not include in the social dimension of time those technological aspects that shape it, in particular, accelerate or save?

Discussing the issues of technologies' temporality allows us to assess their prospects, as well as their general profile. Using the terminology of R. Kozellek, we can evaluate "the space of experience" and "the horizon of expectations" of technologies [5]. Technologies that are relevant to their time (in our case, digital ones) have unique temporal characteristics at various stages of their manifestations. The main temporal parameters of technologies are "the space of experience" – a set of routine practices of application and, as a result, of technology domestication, as well as "the horizon of expectations" – a hypothetical description of the experience of technologies' application in terms of their prospects and risks.

Another important aspect is the issue of temporal organization of discursive representations of engineering and technology. It is obvious that these representations are temporally based and limited. Any stable forms of discursive representation are related to the actual experience of social actors and their temporal strategies. Representations have an objective temporal goal and an inevitably limited temporal horizon (although it may be relatively distant and / or blurry). The influence of time as a context or resource can be reflected in various myths and ideologies, program texts that show the temporal organization of technologies in the concentrated form of hopes, fears, and instrumental patterns caused by them.

The multiplicity of discursive spaces of digital reality technologies representation correlates with the general understanding of multiplicity in modern scientific knowledge as an important categorical framework that fixes the ontological diversification of an object, its structural mechanisms, practices, and optics of its analysis. An important manifestation of multiplicity is the phenomenological idea of the multiplicity of worlds by A. Schutz [6]. This idea is important for a common understanding of the processes of social construction of scientific knowledge and technology. A. Schutz notes the existence of a number of relatively autonomous worlds of finite values, each of which has its own reality and level of significance (as well as imperativeness) for the individual. The ultimate reality according to A. Schutz is the reality of the everyday world. The idea of multiple realities can be transposed to the idea of representing scientific knowledge and technology in various forms and discursive spaces. As a result, their special configuration forms the landscape in which technological artifacts function.

The phenomenological idea of the social constructionist nature of reality has been developed in a number of sociological theories. Thus, the representatives of sociology of science and engineering B. Latour, S. Woolgar [7] and emphasize the social nature of scientific fact production. The content of scientific knowledge is determined by social practices of its production. The production of scientific fact, as is said by the representatives of the actor-network theory, involves both material and non-material, both human and non-human entities. Together, these entities, as well as actions and interpretations affordances they define, form a material-semiotic network.

The sociological theory of the Social Construction of Technology (SCOT) analyzes the processes of building the image of technology that eventually becomes familiar or, conversely, is rejected by practice. An important principle of this theory is to consider any technology or invention as the result of interaction between different social groups. Any inventions, whether successful, well - established, or not fixed in real practice, are analyzed. The process of social construction of technology is complex and is provided by the so-called conceptual framework, which includes:

- related social groups – social groups that are connected with or related to a technological artifact. Their function is to give this artifact a social shell, to determine its degree of utility to society;

- interpretative flexibility – a set of ideas of different social groups about a technological artifact that determine its successful or unsuccessful implementation, as well as its evolution and the entire course of its development;

- closure and stabilization are two aspects of social construction that describe the use of technology in everyday practices. Closure means reducing the possibility of interpretation of an artifact and finally recognizing its social necessity in relations between groups. Stabilization means the same process within a group and leads to the formation of technologies for different social groups [8].

It may be added that the practice of applying and accepting technology is largely related to the experience of previous legitimation of previously conducted practices of its application. In the process of applying the technology, its public discussion, etc., its final image is polished. This is relevant both for relatively simple artifacts and for complex phenomena, which include digital technologies that hold a valuable place not only in the field of economy, production, institutional communication, etc., but also in the field of leisure and interpersonal user communication. In other words, a significant amount of practices in the use of modern technologies is not necessary, which in its own way distorts the original utilitarian orientation of technologies and reflects the consistent experience of their domestication. Thus, the public discourse builds an image of technologies and the range of acceptable practices for their application. Some issues of this kind are particularly acute and are resolved within the framework of ethics and legal practice (for example, the issue of electronic chipping of citizens, trust in a robot- judge, etc.). The practice of public discussion is extremely mobile and, in fact, is the Overton window, which defines corridors of legitimate social actions and interpretations related to this technology. In the course of public discussion, not only the affordances of actions (practices) are crystallized, but also the affor-dances of meanings and values that reflect the value-normative parameters inscribed in the technology.

One of the important temporal aspects of social construction is the prediction of possible scenarios for the development of events, including risk-related ones in the digital world. There are a large number of classifications of forecasts, but the most popular one is the division into search and normative forecasts. The search forecast determines the probable states of the studied processes and phenomena in the future. Past and present trends are extrapolated to the future, without regard to possible subjective actions that can change and destroy existing trends. The normative forecast formulates goals, standards, incentives, and ideals in advance, and develops the most effective ways and rates of achieving the likely target states of the studied processes. Depending on the situational orientation of the methods under use and the characteristics of organization, various types of forecasts can be developed - target, planned, program and project ones, and by time coverage - operational, short - term, medium-term, long-term and very long-term ones [9].

The peculiarity of scenario forecasting lies in the parallel study of several development options with characteristic opportunities and risks, subjective and objective, internal and external factors, criteria and indicators. According to Herman Kahn, one of the founders of the scenario method, when solving such problems, one should “avoid simple extrapolations and thinking by analogy, which are also undoubtedly important, but do not provide the level of separation from reality that is characteristic of strategic thinking” [10]. Scenarios allow researchers of “yesterday’s», «today’s” and “tomorrow’s” risks to be focused on establishing a personal perception of the future in order to make effective strategic decisions. As well as scenarios in theatre and cinematography, social scenarios are “stories based on carefully constructed plots” [11], which, owing to the possibility of execution, become important in terms of minimizing potential risks, dangers and threats.

Variants of the conditions under which the expected development of the analyzed, evaluated or projected system is carried out are an assumed sequence of events created in order to focus attention on key points in the development of social processes [12, p. 1 38-139]. Kahn said that “a scenario is understood as a dynamic sequence of possible events that focuses attention on the causal relationship between these events and decision points that can change their course and the trajectory of movement in time of the entire system under consideration as a whole or its individual subsystems” [13, p.97].

In accordance with the ideas of H. Kahn and A. Wiener, which are expressed in one of the scenario studies “The Year 2000: A Framework for Speculation on the Next Thirty-Three Years”, scenarios make it possible to perform several functions at once [14]. They draw attention to a wide range of possibilities by dramatizing and illustrating them; force you to work with details and dynamics; focus on the interaction of social, political, psychological, and

military factors; identify problems; and can be used to analyze alternatives of the likely consequences of past and current crises.

The main advantage of the scenario analysis is a comprehensive assessment of all development options, research of structural features and potential consequences of implementing solutions. These advantages will be realized owing to methods and a number of unique techniques for obtaining and processing multi-scale special information from experts who represent various fields of science and management.

When applying the scenario approach, various types of difficulties arise, which are due to the subjectivity of judgments and expert assessments. These difficulties include the following:

1. “representativeness hindrances” (caused by insufficient representation of factors and information about them);
2. “accessibility hindrances” (when what is known or what is easier to imagine is considered as the most possible and is evaluated for all practical purposes);
3. “confirmation interference” (when experts consciously or unconsciously “look for” evidence of their judgments and deny information that does not correspond to their ideas);
4. “retrospective interference” (manifestation of excessive confidence in previous opinions as clearer and more accurate than they actually are).

Building a “Problem tree” and/or “System map” is a common technique for categorizing problems with complex interactions. This construction is an ordered record of the analysis and solution components. The problem formed at the top level of the tree is generally divided into specific problems that allow the use of well-known methods of solving (economic, political, technological ones, etc.). To consider the hierarchy of problems and causes, well-known quality management tools are used, for example, “Ishikawa chart” (“fishbone graph”) and “Cross-diagnostics” [15, p.28]. We shall consider the application of “Problem Tree” on the example of one of the socio-cultural risks of digitalization, taking into account possible scenarios for the development of events in the aspect of social construction – “Culture virtualization” [16].

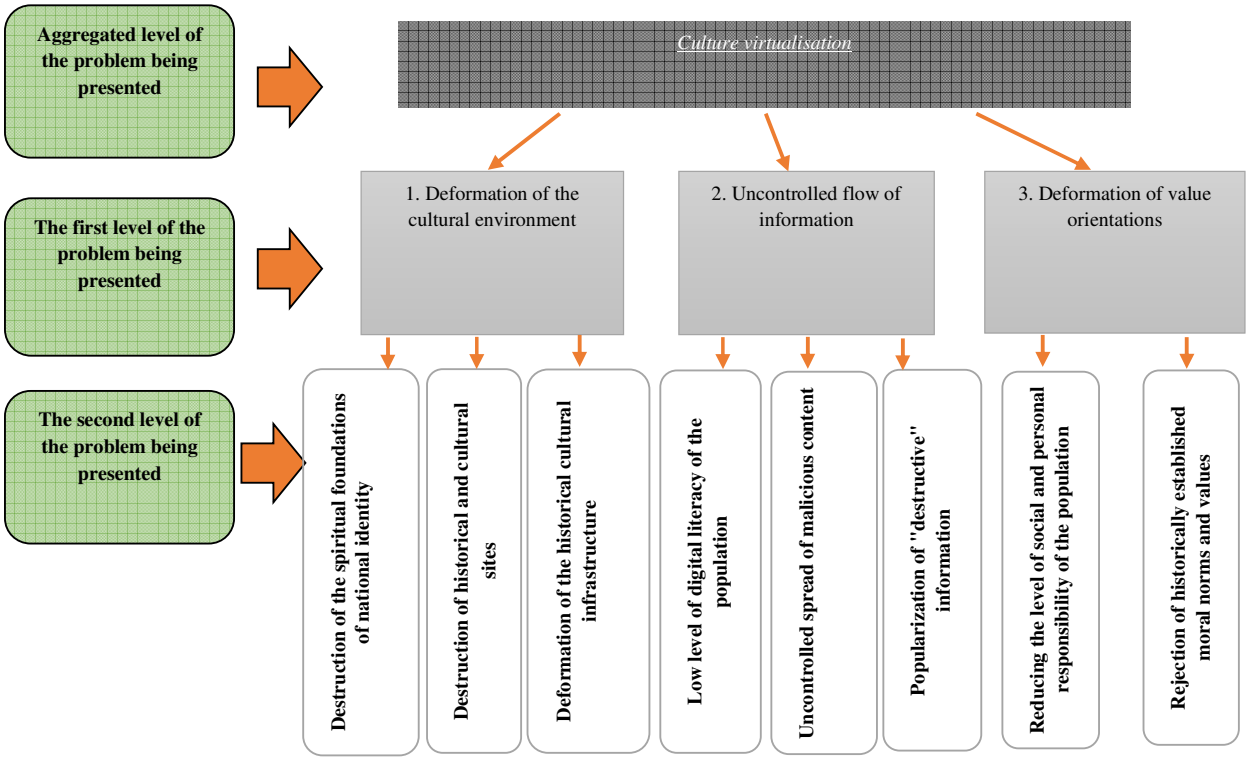

Fig.1: Problem tree of potential digital risks “Culture virtualization”

Conclusion

Summing up, we can make the following conclusions:

1) the issue of digital development is one of the most popular in modern technological discourse and is reflected in a variety of discursive spaces;

2) a significant influence on the representation and social construction of digital reality images is exerted by their temporal coordinates, described in the categories of real experience and the horizon of expectations.

Acknowledgment

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Improving the Efficiency of Macroeconomic Systems by Spurring up Resource Saving

Irina P. BOGOMOLOVA
Voronezh State University of Engineering Technologies,
Voronezh, Russian Federation, uopioe@yandex.ru

Elena I. KRIVENKO
Voronezh State University of Engineering Technologies,
Voronezh, Russian Federation, e.krivenko@bk.ru

Maria B. CHIRKOVA
Voronezh State Agrarian University named after Emperor Peter the Great,
Voronezh, Russian Federation, chirkovamb@mail.ru

Julia N. VORONTSOVA
Voronezh State University of Engineering Technologies,
Voronezh, Russian Federation, voronzowa904214@yandex.ru

Elena S. STRYAPCHIKH
Voronezh State University of Engineering Technologies,
Voronezh, Russian Federation, elena_stryapchih@mail.ru

Abstract

As the national economy transits to a resource saving model the need for tailoring managerial methods, principles and approaches for the strategic goal becomes urgent. With that in mind, this research analyses resource saving efficiency of producing systems at the macroeconomic level, including analysis of changes in energy intensity of the economy; we cite depreciation indicators of fixed assets of high, medium and low degree of technology; we have calculated the coefficient of fixed assets upgrade in the Russian Federation; we outline the dynamics of creation, utilization, neutralization and disposal of production and consumption wastes in Russia; changes in the environmental operating costs in the Russian Federation; we have calculated the share of R&D costs on the priority directions of science, technology and engineering in the total spending on R&D for the country in general; we have defined innovation activity of the Russian companies; the share of companies with technological innovations; the number of created advanced, new and fundamentally new production technologies in Russia; the share of energy resources produced with the use of renewable energy sources in the total volume of the Russian Federation's energy resources. We have formulated a conceptual goal of spurring up Russia's resource saving activities by way of conclusion.

Keywords: Economy, Management, Resource Saving, Mechanism, Effectiveness, Intensification, Research

Introduction

At the moment the bulk of concepts of the national economic development strategies aim at ensuring sustainable economic growth, solving engineering, technological, social and production problems with the help of spurring up the use (speed) of the existing resource potential (natural, technological, labour, financial, innovation, intellectual, scientific, educational and others). This model creates an inefficient practice of resource use, which is in conflict with the growing international problem of their deficit.

The negative consequences of environmental damage, ill-considered and uncontrolled use of natural resources, globalization of ecological problems are building up forcing the modern society to take a fresh look at the problems

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and push forward with looking for new qualitatively new environmentally balanced models of economic development.

For instance, a Concept of Sustainable Social Development to ensure comprehensive solution of socio-environmental, industrial, technological, financial and economic problems has been developed. Part of the concept is creation of resource-oriented economy, where:

first, international ecological indicators (minimal emissions and wastes, the highest safety level and the level of waste recycling) of industrial facilities, transport, household activities are met;
second, the resources are used to maximum effect (the maximum effect with minimal resources, minimization of losses and waste);
third, existing (hidden) resource potential is revealed;
fourth, ecologically clean technologies and renewable sources are used as much as possible.

Literature Review

In the last 5 years, the ideals and models of building a resource oriented economy are widely discussed not only by specialized local and foreign scientists, but also by industry specialists and experts. The urgency of such initiatives is conditioned by a growing frequency of the market economy mechanism crises and stiff competition on the world market, when quality, price and production costs account for 85% of competitiveness. It is the resource saving technologies together with innovations that render an economic model due competitiveness. The modern society is increasingly interested in transformation of old and the appearance of new economic models, where the society will not be forced to pay for new material wealth with rising environmental risks, the lack of natural resources and increasing social tension.

One of the key goals of the transfer is a shift of the national models 'production-consumption' towards resource saving.

Research by such scientists as M. Aliyev (2007), V. Baranovskaya (2011), A. Bassi (2005), A. Bondar (2014), B. Burkinsky (2009), T. Galushkina(2016), M. Johnson (2010), I. Zalygina (2009), V. Klyuchenovich (2015), Yu. Lapshin (2018), K. Podvorskaya (2009), G. Saskevich (2010), P. Sukhlev (2016), R. Ayres (2003), etc. deal with the creation of a theoretical and practical basis of macroeconomic models' shift towards higher resource effectiveness. R. Balashova (2015), O. Veklich (2016), H. Daly (2015), N. Konishcheva (2017), D. Meadows (2015), L. Melnik (2010), I. Ippolitova (2016), S. Polovnikova (2010), S. Skokova (2014), N. Kondratenko (2017), V. Tarady (2014), etc closely, with the use of a comprehensive scientific approach researched resource saving as one of the promising directions of modern economic transformation. Despite the scientific works, researchers have not yet formulated a universal comprehensive approach and method towards the resource saving process in the national economic systems complicating implementation of the modern development concept seriously.

Research Question

The goal of our research is to develop an algorithm of comprehensive mechanism of resource management at the macroeconomic level based on the analysis of problems of implementing resource-saving processes in the national economy and providing for the use of chiefly economic regulation methods.

We should note that the goal of transformation of national production and consumption models is very pressing not only for Russia, but also for many developed states with high resource intensity.

For example, the resource intensity indicator of the national economy fell in 2019, but was still higher than the world average by more than 50%, and by 100-150% of the indicator of the developed states.

At the moment resource and energy saving is acknowledged one of Russia's state policy's priorities, but the speed of resource saving measures implementation remain insufficient to ensure development of a breakthrough type. Here some statistics will come handy.

Figure 1 demonstrates depreciation indicators of fixed assets of high, medium and low degree of technology.

As we see, fixed assets depreciation is growing steadily -- in 2008 the indicator amounted to 43.4%, while in 2018 it stood at 49.4%. The growing wear is directly proportional to resource efficiency of production systems and the whole producing sector of the national economy.

Like we have said before, one of the basic ideas of the Concept of Sustainable Social Development is strict compliance with the international ecologic indicators.

The data in Tables 1 and 2 point to strong dynamics of production and consumption wastes growth in our country. However, financial and organizational levels of utilization, neutralization, disposal, storage and burial of wastes leave much to be desired and lag behind waste formation.

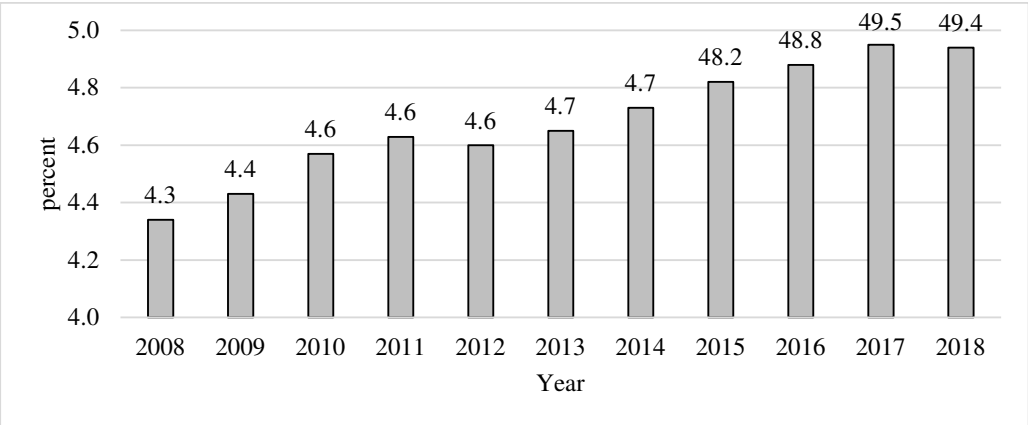

Fig. 1: Depreciation indicators of fixed assets of high, medium and low degree of technology

The 2019 coefficient of fixed assets upgrade amounted to a mere 4.6% (Fig 2), which is also too little for deep industry modernization.

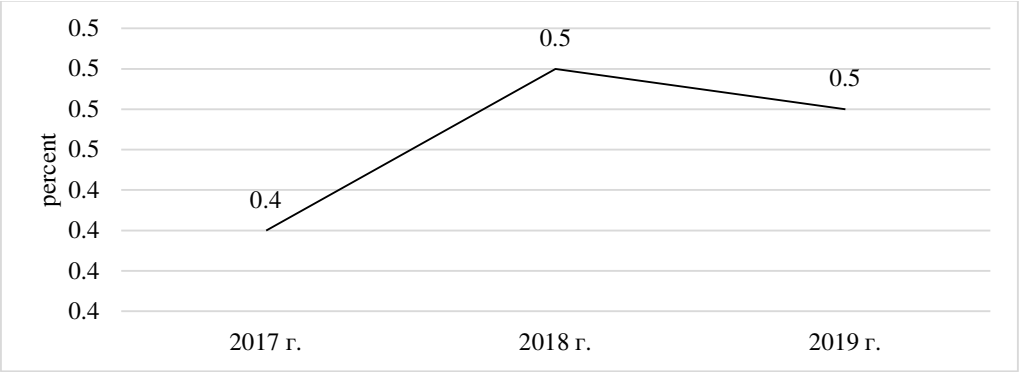

Fig. 2: Coefficient of fixed assets upgrade in the Russian Federation

Table 1: Formation, utilization, neutralization and disposal of production and consumption wastes in Russia, mln tonnes [9]

Year	Wastes formation		Dangerous	Utilization and neutralization of wastes	Placement of waste at enterprises	including:	
						storage	burial
2005	3,035.5		142.5	1,265.7	2,077.3	1,670.9	406,.5
2010	3,734.7		114.4	1,738.1	2,227.5	1,634.5	593.0
2015	5,060.2		110.1	2,685.1	2,333.1	1,978.1	354.6
2016	5,441.3		98.3	3,243.7	2,620.8	2,105.3	503.8
2017	6,220.6		107.2	3,264.6	3,204.5	2,378.5	826.0

2018	7,266.1		98.1	3,818.4	3,575.4	2,546.2	1,029.2
2019	7,750.9		100.6	3,881.9	3,800.8	2,621.9	1,178.9

Table 2: Operation costs for environmental protection in Russia, mln rbls [9]

Year	Total	Directions								
		air protection	waste water collection and treatment	waste treatment	protection and restoration of disturbed lands	noise and vibration protection	conservation of biodiversity	radiation safety	reduction of anthropogenic impact	other directions
2012	239,170	47,062	121,332	45,798	13,701	262	534	4,795	460	5,225
2013	254,377	44,800	132,818	50,402	15,337	273	314	5,342	1,022	4,069
2014	269,838	50,920	136,468	55,702	15,266	308	350	6,088	937	3,799
2015	292,074	58,250	145,147	60,256	16,660	289	336	5,459	582	5,096
2016	306,534	56,851	154,313	63,580	19,526	357	396	5,843	647	5,022
2017	320,947	56,906	163,261	70,041	15,452	289	422	6,328	464	7,783
2018	345,464	61,075	173,688	79,885	15,347	381	514	7,728	205	6,641
2019	374,411	63,760	174,921	102,396	16,348	354	639	8,266	219	7,506

The share of internal costs on R&D on the priority scientific, engineering and technology directions in the total volume of internal costs in the country is shown in table 3.

Table 3: The share of internal costs on R&D on the priority scientific, engineering and technology directions in the total volume of internal costs in the country, %

Types of economic activities	**Years**								
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Total	56.5	59.2	67.6	65.5	67.9	68.6	71.0	70.5	69.8
High-tech	-	-	61.3	66.3	60.6	76.7	76.4	72.4	56.8
Medium-tech	-	-	47.3	59.0	65.2	46.3	65.1	49.9	79.6
Science-intensive	-	-	68.2	65.9	68.2	69.0	71.5	71.4	70.4

Innovation activities of Russian organizations is shown on Fig 3.

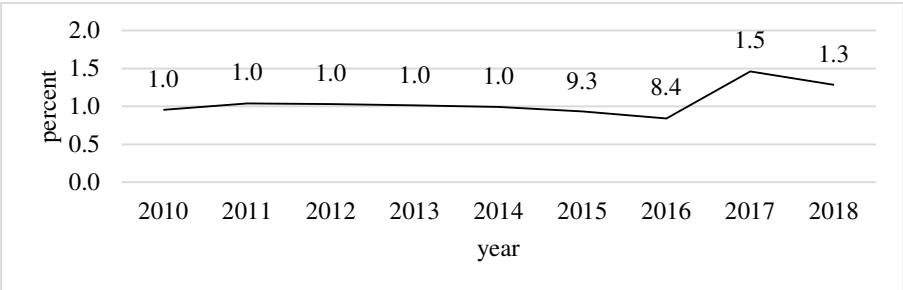

Fig. 3: Innovation activities of Russian organizations

The data show that between 2017 and 2018 innovation activities of Russian companies increased albeit insignificantly. For example, in 2018 the indicator amounted to 12.8%. Absolute figures are very low and call for a significant increase.

Despite the diversity and urgency of the problems, we believe that the primary issue that determines containment of the resource saving processes and requires prompt resolution is the insufficient level of economic interest of companies due to the lack of comprehensive mechanisms for managing resource conservation in the country.

The share of companies implementing technical innovations has more than doubled recently (Chart 4). This means that the situation has changed seriously, but the share of the companies involved is still insufficient.

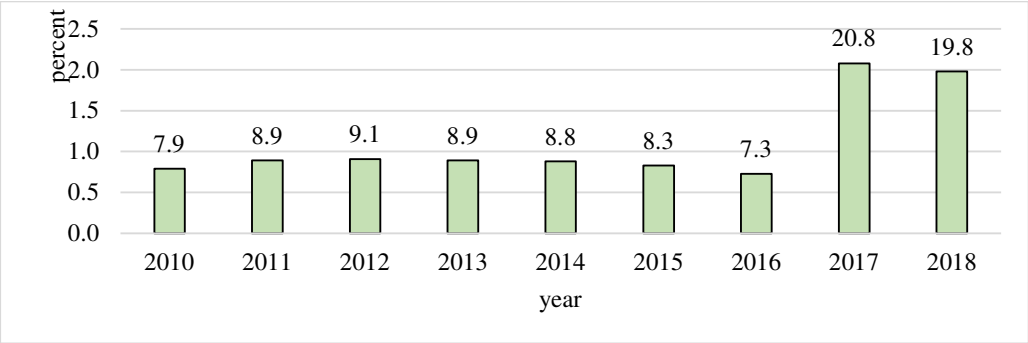

Fig. 4: The share of companies implementing technical innovations

The number of advanced, new and fundamentally new production technologies developed in Russia is shown in Table 4.

Table 4: The number of advanced, new and fundamentally new production technologies developed in Russia, units

Types of technologies	Years					
	2014	**2015**	**2016**	**2017**	**2018**	**2019**
Advanced production technologies	1,409	1,398	1,534	1,402	1,565	1,620
Advanced production technologies that are new for the Russian Federation	1,245	1,223	1,342	1,212	1,384	1,403
fundamentally new production technologies	164	175	192	190	181	217
The number of advanced production technologies in use	204,546	218,018	232,388	240,054	254,927	262,645
The number of new production technologies acquired by organizations	28,705	24361	64,914	20,042	22,678	-

The share of fundamentally new developed advanced production technologies is very small.

Chart 5 demonstrates the share of energy resources produced with the use of renewable sources in Russia's total energy resources. This resource efficiency criterion, also mentioned in the Concept of Sustainable Social Development, has been at 17.2% for the last four years in our country. All these points to inertia of transformations in this resource saving segment.

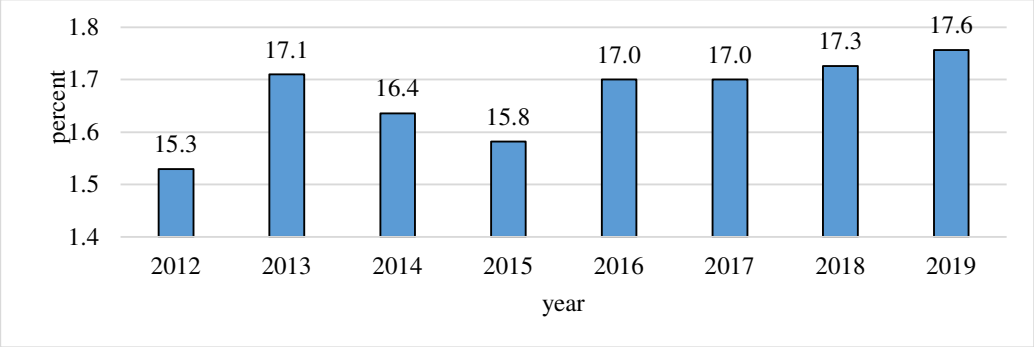

Fig. 5: The share of energy resources produced with the use of renewable sources in Russia's total energy resources

Discussion and Results

Industry resource saving and energy efficiency have recently become a pressing issue for the Russian economy and management. We can identify the following resource saving instruments:

first, optimization of resource consumption by setting consumption norms not only in the technological production processes, but also in business processes;

second, assessment of restrictions in the production, consumption and operation systems;

third, analysis and evaluation of resource saving in each economic system element;
fourth, the principle of continuous improvement through introduction of the best production and management technologies.

Our analysis of the causes of the situation, which accounts for investment in the economy revealed the following key problems in the sphere:

1) the imperfect and declarative nature of the legislative and regulatory system for regulating and stimulating resource saving activities;
2) the absence of sufficient financial resources for resource saving measures, R&D and introduction of innovative resource saving developments;
3) the absence of working financial schemes for resource saving projects in various economic areas;
4) the absence of modern and well-developed market of resource saving, development of its infrastructure;
5) the absence of working economic mechanisms to stimulate resource saving that would ensure economic interest of its participants;
6) the shortage of information of the population, company managers about resource saving machines and technologies, resource efficient products, the possibilities of saving resources of various types;
7) the lack of resource management professionals, the absence of such services at companies, etc.

Analysis of expert assessments of the problems with raising the efficiency of macroeconomic systems based on faster resource saving processes in Russia helped us formulate recommendations aimed at solving the current problems.

1. Formation of an effective resource saving policy at all levels of economic system management, which will require a revision of industries' development strategies;
2. A transfer to a new model of resource consumption and distribution;
3. Formation of a modern management system at economic producing subjects.
4. A search for a reproductive component in the resource consumption model not only during production, but also consumption and operation.
5 Development of new instruments of state regulation of resource saving, which should fit into the united mechanism of economic modernization.
6. The resource saving process should be considered as part of the economic system, thereby directing it to sustainable development that focuses not only on resource saving but also on application of the principles of resource rationing with the available technology that will stimulate rational use of resources in the system.

7. Take into account industry specifics, resource intensity indicators of different industries.
8. Constant comparison of the resource consumption share at different production stages with the best available technologies to reveal the industries with the highest resource intensity and the industries with a resource saving potential.
9. Creation of necessary and sufficient prerequisites at companies to ensure the resource saving measures with maximum social, ecologic and economic effect on a national scale. The experience of developed states show that economic incentives are the best, if they are technically feasible. However, there should be understanding of the amount of funds the government can allocate to motivate resource saving and how they should be distributed among the industries to achieve the best social, ecologic and economic effect of resource saving at a national level.
Thus, misallocation of resources in conjunction with the existing environmental, social and economic problems poses the task of a manifold increase of the resource use efficiency, introduction of energy saving technologies with active support of the state. Here introduction of innovative resource saving technologies as one of the key factors able to ensure a breakthrough of the national economy is important.

At the same time, a transfer to a resource-oriented economy calls for creation of some necessary and sufficient prerequisites:

first, creation of the legal basis;
second, implementation of such initiatives as part of state policies;
third, development and use of economic stimulation instruments;
fourth, creation of infrastructure (scientific, educational, engineering and technological, social, informational and consultative);
fifth, organization of the world market.

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Speech Quality Management in Project Stakeholder Consultation through Online Interview

Tadeusz A. GRZESZCZYK
Warsaw University of Technology, Faculty of Management
ul. Narbutta 85, 02-524 Warsaw, Poland
tadeusz.grzeszczyk@pw.edu.pl

Michal K. GRZESZCZYK
Warsaw University of Technology, Faculty of Electronics and Information Technology
ul. Nowowiejska 15/19, 00-665 Warsaw, Poland
michal.k.grzeszczyk@gmail.com

Abstract

Stakeholders play a fundamental role in carrying out planned tasks, achieving goals and managing them effectively, therefore it is important to know and collect opinions from a wide group of them. Limiting interpersonal relations resulting from the pandemic, as well as costs of business, lead to a rapid increase in the use of information technology in the contacts of organizations with their stakeholders. Consequently, effective speech quality management is essential to ensure the smooth running of ICT-supported stakeholder engagement and consultation processes. The main purpose of this paper is to propose a model based on selected AI methods supporting quality management in stakeholder consultation through online interview based on audio recordings. This model fills the gap resulting from the lack of such solutions used during stakeholder consultation, which requires the collection of audio content of an appropriate quality from the digital space. The correct course of consultations and the effective use of their results depend on the quality of the speech data gathered. The proposed model makes it possible to support quality management and eliminate data that does not meet the requirements for the level and legibility of the recording. Audio data from individuals or fragments of illegible records may be automatically identified and deleted. In addition to theoretical considerations and the model, the results of empirical research are also presented in this paper, including a discussion on the errors in the classification of empirical speech data. The considerations are supplemented with the results of a comparative analysis of models based on two methods: Gradient Boosting and Fully Connected Deep Neural Network.

Keywords: stakeholder management, stakeholder consultation, speech quality management, online interview, AI methods.

Introduction

Stakeholders play an essential role in carrying out planned tasks, meeting targets and managing them effectively. Appropriate stakeholder management has a significant impact on the level of various types of trust (intuition, integrity, and competence) in project environments and therefore project managers should undertake effective actions related to communication with empathy and consultation in environments of projects (Francisco de Oliveira & Rabechini, 2019). Proper stakeholder engagement and taking their opinions into consideration are critical success factors for most contemporary projects (Achterkamp & Vos, 2008). Therefore, it is important to know and collect the opinions of a wide range of stakeholders who support and oppose results and have bias or maintain a neutral attitude. It is necessary to strengthen effective stakeholder engagement, conduct consultations with them, collect contextual knowledge from them (regardless of the existence of conflicting interests), allocate project resources in accordance with the designated priorities of conflict areas, as well as integrate various stakeholder points of view with the goals of the project management team (Bahadorestani, Naderpajouh & Sadiq, 2020).

Recently, there has been a rapid increase in the use of information technology in contacts of various types of organizations with their stakeholders, which are implemented on several levels: organizational, regional and global. Research on engaging citizens and stakeholders is undertaken by applying ICT to political decision-making processes, service delivery and others (UN, 2020). In interactive online communication and consultation processes between organizations and stakeholders it is essential, among others, to ensure quality of citizen-centric online environment to justify e-participation efforts (EC, 2009). Stakeholders' opinions may be collected in the form of

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text or audio recordings using the following ICT-supported methods: virtual/distance platform for stakeholder engagement, co-creation methods (e.g. based on online public consultations, social network analysis), online surveys and web discussion forums (Routzouni et al., 2019). A significant increase in the interest in recording statements in audio form is expected as it is a convenient form of providing feedback from stakeholders. Effective speech quality management is therefore essential to ensure the smooth running of ICT-assisted stakeholder consultation processes.

During the project stakeholder consultation through online interview, large datasets on speech content are to be collected. The proper conduct of such consultations and the effective use of their results depend on the quality of these datasets. On their basis, manual or automated transcription software of audio recordings (automated speech recognition technologies) is used. It is possible to identify the challenges and limitations of solutions applied in this field, as well as to analyze the development opportunities of audio recordings automated transcription (Stonehouse, 2019). The existing solutions in this field are insufficient, because they do not ensure the appropriate quality of speech recognition and automatic elimination of recordings that are not legible human statements. Using such recordings during online stakeholder consultations is a relatively new idea. Hence, it is necessary to develop new models to fill the gap related to the lack of quality management support when conducting stakeholder interview and consultation through online interview.

Attempts are made to use selected AI and machine learning (ML) methods in stakeholder analysis and management, e.g. Random Forest (Grzeszczyk, 2020), Convolutional Neural Network (Perez-Poch, 2019) and Fuzzy Cognitive Map (Sperry & Jetter, 2019). Taking advantage of advances in AI and ML could be also useful while expanding the set of existing quality management approaches, methods and models during online consultation with stakeholders. The main purpose of this paper is to propose a model based on selected AI methods supporting quality management in stakeholder consultation through online interview based on audio recordings. Two experimental implementations of this model, empirical verification studies and a comparative analysis of the obtained results were based on two methods: Gradient Boosting (GB) and Fully Connected Deep Neural Network (FCDNN). The choice of these two methods is justified by the fact that it is difficult to decide a priori which of them is more suitable for this type of analysis. GB is one of the ensemble methods which are based on multiple learning algorithms, while FCDNN is one of the more well-known and very challenging types of artificial neural networks. At the end of the paper, the limitations of the proposed model and the carried-out research are signaled. The obtained research results constitute a solid basis for the development of further research in this field.

Stakeholder Management, Engagement and Consultation

In the case of classic definitions, stakeholders are individuals or groups that are or may be influenced by the achievement of different goals of the organization (Freeman, 1984). Today, it is rather assumed that stakeholders are people, groups or organizations that have a significant interest in the implementation and operation of specific projects or programs (Rossi et al., 2019). Thus, they are people, groups of people or organizations that directly or indirectly, positively or negatively affect the results of projects or may be influenced by selected projects or programs (EC, 2005). Appropriate stakeholder management, engagement and consultation can help explain the existing local and regional problems and needs, and are also a reliable basis for social justification of the necessity to implement specific projects. Such credible justifications enable planning and setting goals in line with stakeholder needs.

The results of literature studies on project management confirm that stakeholders are of key importance for achieving the planned goals and it is necessary to focus on appropriate stakeholder engagement, proper consideration of their stakeholder influences and interests, improvement of stakeholder management processes, as well as development of stakeholder analysis approaches and methods (Mok, Shen & Yang, 2015). Stakeholder engagement and consultation are critical factors that bind critical decision steps and final project outcomes (Yu, Leung & Jiang, 2020). The course of consultations carried out in a traditional way can be documented using stakeholder surveys and questionnaires, daily field notes, video recordings, photographic evidence as well as audio recordings of stakeholders' opinions and views.

Taking into account the guidelines and good practices presented by international financial institutions and by United Nations agencies (e.g. UNDP - United Nations Development Programme), environmental and social security policies and legislation in many countries, the principles of civil society and opinions of academic communities, the following principles of meaningful stakeholder consultation can be formulated (Kvam, 2017):

- the consultation process should be carried out continuously and iteratively repeated throughout the project cycle,

- as a result, the main stakeholders should be identified and involved - individuals, groups, as well as formal and informal institutions operating at local and regional levels,
- it is necessary to reserve sufficient resources needed for the proper implementation of consultations, which include the budget, human resources, involvement of project authorities prepared to take the results of consultations seriously, and possible modifications to projects in line with the views expressed by stakeholders who have equal opportunity to present their views,
- consultations need to be transparent, based on facts and clearly reflect design decisions resulting from various stakeholder opinions,
- the process is to ensure a fair, non-discriminatory approach and collect the opinions of also less vocal stakeholders,
- consultations should be preceded by the effective provision of clear and comprehensive information to stakeholders about the most important aspects of the project, which are essencial for specific groups participating in these processes,
- it is vital to respect all stakeholders, not to impose specific views, any critical voices against the project should be protected,
- if it is necessary, the confidentiality of information from selected stakeholders must be ensured,
- avoiding too lengthy consultations without logical justification, excessive discussions that do not lead to results achieved within a reasonable time is essential,
- the results obtained ought to be systematically documented, and in the case of projects financed from public funds, the more important aspects should be made public.

When recording the consultation process, it is also necessary to take into account ethical aspects. Stakeholders should be informed about the objectives of the consultations, the fact the consultations are recorded and the possibility of withdrawing at any time. Audio recordings and their possible transcriptions need to be encoded to ensure anonymity and the lack of traceability of their origin.

Web technologies create real opportunities for online text and audio recording-based consultations regarding, for example, citizens' participation in decision-making processes related to the improvement of development strategies and determining the assumptions of various types of policies. Online text consultations supported by ICT tools can be conducted using websites, social networking sites or blogs, and concern, for example, commenting on proposed regulations or acts on which work is currently underway, etc. (Pulfrey-Taylor et al., 2011). Various types of ICT tools are designed with built-in reference models and argumentation schemes to support online consultation and enable stakeholder views to be exchanged during public policy discussions. Such tools can automate reasoning about the arguments used by stakeholders and pose relatively simple questions to improve consultation processes based on text (Wyner, Atkinson & Bench-Capon, 2011).

Effective quality management of audio recordings is essential to ensure the smooth running of online consultation processes, stakeholder engagement and ICT-assisted consultation. It is necessary to develop research on methods and systems supporting quality management and eliminating audio data that do not meet the requirements for the level and readability of the record. One possibility is to rely on AI models in this field, which can ensure the collection of audio content of appropriate quality from the digital space. The developed models can be based on single AI methods or mixed intelligent systems (Grzeszczyk, 2018).

Among the AI methods that can be used in the discussed case, for example, GB and FCDNN deserve attention. GB models are built based on decision trees that are trained subsequently mainly with data which had been incorrectly recognized by previous trees. Such models are characterized by fast learning and great suitability for solving classification problems, but are sensitive to even relatively small changes in training datasets and for these reasons the obtained results are sometimes difficult to explain (Akerkar, 2019). Similar limitations related to the difficulties in explaining the obtained results also apply to neural networks. Despite these limitations, neural networks find numerous applications, and in this case it was decided to use FCDNN to build one of the tested models. A detailed mathematical description of GB models as well as vast information on neural networks, FCDNN in particular, are abundantly available in the literature, e.g. (Beysolow, 2017; Aggarwal, 2018; Ghatak, 2019).

Methodology

The basis for the selection of an appropriate research methodology and methods is the pursuit of the main goal of proposing a model based on selected AI methods supporting quality management in stakeholder consultation through automated online interview. The following research methods and techniques were used: literature studies,

non-participatory unstructured observations of stakeholder's consultation, models based on selected AI methods (GB and FCDNN) and comparative analysis of the obtained results of computational experiments.

For computer calculations, hypothetical audio recordings prepared by the authors for the planned experiments were used (ninety 15 seconds long recordings were created). Ten recordings contain clear audible speech simulating interview process of answering questions asked through ICT system. Other sample recordings are a set of different background noises obscuring the speech e.g. working coffee machine or traffic. Among them, ten quiet recordings were prepared to increase difficulty for AI methods. Finally, recordings imitating the human speech that sometimes is played in the background of the interviews, like TV or radio, were added. During recording of the samples, the average level of noise was measured additionally.

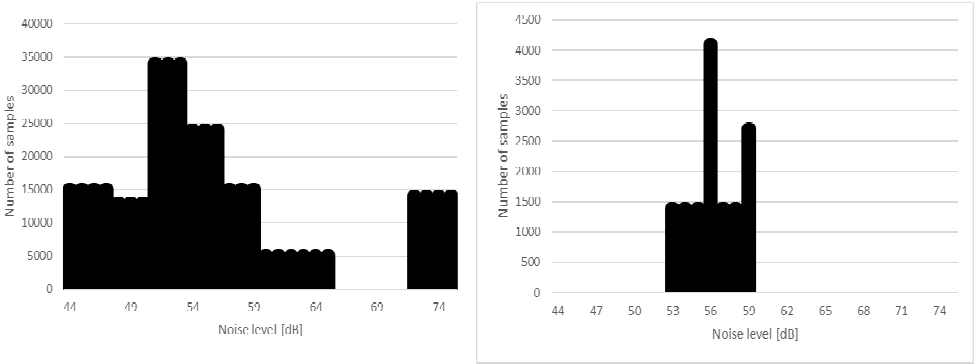

a) b)

Fig. 1. Distributions of noise levels: a) all recordings, b) speech recordings
Source: own graphic representation

The level of noises was assumed in the range from 40 dB (quiet) to 90 dB (the maximum level of machine operation or heavy traffic). The sound intensity for a stakeholder consultation speech was specified in the range 50-60 dB. The following two decision classes were defined: *Speech* and *Other*. The class labeled as *Speech* involves a recording of an appropriate level, audible speech that can be used in stakeholder consultation processes related to specific projects and programs. In Figure 1, the distributions of noise levels among all samples extracted from prepared recordings are presented. Speech recordings are placed in the center of the distribution of all recordings, which could be another struggle for AI algorithms.

Having been gathered, the recordings had to be preprocessed to prepare the dataset for further training. All the recordings were sampled with 22500 sampling rate resulting in around 1400 samples for each of the recording. All of the rows were transformed to 13 Mel-Frequency Cepstrum Coefficients (MFCCs) producing 13 features for each of the rows. After preprocessing the dataset contained more than 126000 samples for training and testing (all samples from single recordings were given classes and treated as separate samples – the recording was not considered as a whole). During the training process it was guaranteed that samples from one recording were in a single set (training or testing) to avoid the situation in which samples from one file would appear in both sets and disrupt the validity of accuracy measurements. Finally, all examples were normalized so that the whole dataset had zero mean and unit variance (in order to assure stable learning).

Two tasks were solved during the experiments. GB and FCDNN classifiers were used to develop and compare two different AI methods to classify if the sample from the recording was of *speech* type. GB is an ensemble ML technique during which small weak models (e.g. decision trees with small number of splits) are combined in order to produce powerful classifiers. Multiple connected weak models allow to build ensemble models and achieve better results compared to using single models. The advantage of FCDNN is that by stacking many layers it acquires the ability to find meaningful relations between features and expected class/predicted noise level by optimizing a large number of parameters during the training process. Both methods can be used for regression tasks, therefore, additionally, the second conducted experiment was a prediction of noise level of samples. Automated measurements of the noise level can help indicate that the stakeholder's speech is inaudible or background noises are too loud. 10-fold cross validation was used during training to visualize that experiments are repeatable (the training set was composed of around 85% of the dataset, the rest was used as testing set in each fold). GB and FCDNN algorithms were used with standard parameters from Scikit-learn Python package (Scikit-learn, 2020).

Results and Discussion

Table 1 presents the results obtained from 10-fold cross validation with the use of two types of studied classifiers and regressors: GB and FCDNN.

Table 1: Comparing the results of GB and FCDNN classifiers and regressors

	GB		FCDNN	
Fold	**Accuracy**	**R-squared**	**Accuracy**	**R-squared**
1	0.95	0.93	0.97	0.94
2	0.95	0.82	0.98	0.88
3	0.98	0.87	0.99	0.92
4	0.97	0.92	0.99	0.93
5	0.92	0.93	0.98	0.95
6	0.95	0.94	0.98	0.95
7	0.95	0.97	0.98	0.96
8	0.96	0.91	0.97	0.95
9	0.91	0.89	0.92	0.92
10	0.95	0.92	0.95	0.94
Average	**0.95**	**0.90**	**0.98**	**0.93**

Source: own calculations

The obtained values of classification accuracy (for classifiers) and the statistical measure R-squared (for regressors) are at satisfactory levels, which confirms the appropriateness of the selection of AI methods for this application. On average, GB achieved 95% accuracy and FCDNN - a better result of 98% on average. The better results of FCDNN are also visible in the confusion matrices. Regressors created basing on GB and FCDNN also reached high scores with 0.90 and 0.93 measured by R-squared metrics respectively. Slightly better results of FCDNN than GB might appear due to higher complexity of the method which usually surpasses more traditional approaches. It is worth mentioning that measurement tools used during dataset creation were not 100% accurate, therefore some samples could differ with their dB values from the given label. Hence, results higher than 0.9 indicate that regressors were predicting precise values.

Table 2: Confusion matrix for GB

True label \ Predicted label	Speech	Other
Speech	957	450
Other	267	13785

Source: own calculations

The confusion matrix of GB and FCDNN classifiers (for the two defined classes) can be seen in Tables 2 and 3 (presented tables are results from the first fold of 10-fold cross validation). The values shown in these matrices prove the proper functioning of the tested classifiers and correct properties of models based on both selected methods. It can be seen that the defined decision classes can be easily separated from each other. This also confirms the usefulness of such models even with relatively few cases from the training set. This is especially worth noting regarding FCDNN because, as it is known, neural networks usually require large sets of training data, which is not always reasonable for many practical applications.

Table 3: Confusion matrix for FCDNN

True label \ Predicted label	Speech	Other
Speech	1211	196
Other	140	13912

Source: own calculations

The results for the FCDNN-based model are better, which is a bit surprising as GB models tend to perform better for small datasets compared to deep learning models. At first sight it might look unpromising that more than 200 samples were misclassified. However, this is due to the fact that classifiers were not being trained on whole recordings, but on 13 MFCCs for each of the samples which represented a very short part of the recording. Thus, some parts of the speech recordings might have had pauses (summing up to 1 second for the whole recording). This property results in shown misclassification (label of class *Other* was indicated by model, but label of class *Speech* should have been given). In future experiments this might be used for automated cutting of the recordings to make them shorter. On the other hand, some samples were classified as *Speech* when they should not have been. This is due to the fact that some example recordings contained TV or radio sounds. Therefore, in some of them background speech could be noticed. This misclassification of human speech and audio from TV or radio could be also made by humans.

Table 4: Classification metrics for GB and FCDNN

	GB		FCDNN	
Label	**Precision**	**Recall**	**Precision**	**Recall**
Speech	0.78	0.68	0.90	0.86
Other	0.97	0.98	0.99	0.99

Source: own calculations

Since the prepared dataset is imbalanced, accuracy measures do not always display the results that show the whole performance of the ML algorithms. Therefore, it is worth using such classification indicators as precision and recall. The results are again shown for the first fold. In Table 4 the advantage of FCDNN over GB is clearly visible. FCDNN achieved high metrics for both classes and proved to be better for this type of experiments and solutions. Slightly lower recall and precision for *Speech* class for both algorithms results from the reasons that have been described in the previous paragraph. Additionally, due to a high number of samples from the class labeled as *Other* the achieved metrics are also very high and promising for further research.

The good results obtained for FCDNN provide a solid basis for further development of various types of AI methods and classifiers based on them using deep learning, as well as for the formulation of reliable conclusions. During creation of the business solution there would be much more recordings prepared for training process, which would result in even higher metrics. The proposed method allows for an automated quality management of the collected recordings from the stakeholder consultation processes. In case of inaudible recording or too quite/loud speech with lots of background noises, a stakeholder might be automatically asked to repeat the interview in better conditions. This allows for a higher quality of services, feedback and communication between collaborators.

Conclusions

Audio recording-based consultations and online interviews will become more and more common. In this kind of stakeholder consultation, it is necessary to collect large datasets on the opinions expressed, and the proper conduct of the consultation and the effective use of its results depends on the quality of the data collected. The solutions existing so far are often insufficient, do not ensure adequate quality of speech recognition and automatic elimination of recordings that are not legible human statements. Thus, it is worth paying attention to the possibilities of filling this gap by using the development of AI methods.

The main purpose of this paper has been achieved and a model based on selected AI methods has been proposed, which enables effective support for quality management in stakeholder consultation through online interview based on audio recordings. The practical usefulness of this model has been confirmed by two experimental implementations, empirical verification studies and a comparative analysis of the obtained results. The use of this analysis made it possible to conclude that the FCDNN-based model provides a smaller classification error compared to the GB model (even for relatively small training datasets). The proposed model enables the automatic elimination of recorded audio data that are not identified as legible recordings of human speech. Fragments of illegible recordings are also automatically removed, while retaining the remaining content.

Performing computational experiments for only two types of AI methods is a significant limitation of the research carried out, therefore it is necessary to look for other AI and ML methods that can be used. It is also worth increasing and diversifying the sets of empirical data used in future comparative analyzes. Further development of research may also be related to the identification and real-time online transmission to stakeholders of the most likely

causes of deletion of recordings originating from them. Improved models may enable the determination of the type of disturbance, e.g. caused by passing cars, home appliances working in the background or other noises.

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Commitment of Senior Management Towards Public Sector Transformational Change: A Rasch Analysis

Nazirah AZIZ
Senior lecturer, Faculty of Accountancy, Universiti Teknologi MARA, Puncak Alam Campus, 40450 Bandar Puncak Alam, Selangor, Malaysia
nazirahaziz@uitm.edu.my

Emmarelda Maswesi AHMAD
Lecturer, Faculty of Accountancy, Universiti Teknologi MARA, Puncak Alam Campus, 40450 Bandar Puncak Alam, Selangor, Malaysia
emmarelda@uitm.edu.my

Zamalia MAHMUD
Professor, Faculty of Computer and Mathematical Science, Universiti Teknologi MARA, Shah Alam Campus, 40000 Shah Alam, Selangor, Malaysia
zamal669@uitm.edu.my

Jamaliah SAID
Professor, Accounting Research Institute, Universiti Teknologi MARA, Shah Alam Campus, 40000 Shah Alam, Selangor, Malaysia
jamaliah533@uitm.edu.my

Abstract

In enhancing the performance of civil services, the Government of Malaysia has taken extensive change initiatives to continuously reform the administration of the public sector in Malaysia. The transformation programme has been introduced to improve the overall performance of civil personnel and to improve the delivery of services towards the public at large. Among other change initiatives taken is strengthening the Performance Measurement System (PMS) towards improving the performance of civil personnel and public sector organizations. The purpose of this study is to provide an extensive review of past literatures regarding financial management reforms in the Malaysian public sector organization which brings to the establishment of PMS. This study also aims to explore the pattern of senior management commitment in predicting their readiness towards public sector transformational change. A total of 40 useable responses were collected from May to August 2015 using a web-based survey. Data were analyzed using Rasch measurement and Winsteps@ 3.72.3. The study showed that the public sector managers seriously recognize the role and commitment of senior management as an important driver towards the successful implementation of change in Malaysia. This study also found that longer-tenured managers with several numbers of working experience are more committed to change than less tenured managers with limited experience. Findings from this study are expected to benefit the authorities by assisting them in executing their roles to ensure the public sector managers accept change and able to improve their performance as to support the government aspiration.

Keywords: Performance Measurement, Public Sector Organization, Rasch Measurement Model.

Introduction

Background of the Study

Globalization has placed strong pressure on the organization to compete for trade flows, investment, and resources (Auditor General, 2007; Goyal, 2006). Since then, the process of reforming the public sector was also known as Public Sector Reform (PSR) has taken place to replace the traditional administrative structures (Siddiquee, 2010; Norhayati & Siti Nabiha, 2009). The movement is known as the New Public Management (NPM) has sought to solve the problem of inefficiency with its emphasis on managing for outcomes and results as one of the ways to improve performance in the public sector (Siddiquee, 2010). Auditor General (2007) further points out that it is

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important to have a high quality and excellent public sector delivery system as a poor delivery system can damage investors' confidence to do business and invest in Malaysia.

The process of reforming the public sector in Malaysia was addressed by the previous Prime Minister of Malaysia towards emphasizing "Performance Now" as the new administration's tag line. This indicates that the government is seriously focusing on improving performance towards achieving Vision 2020. Performance management is a key agenda in public sector change on the basis that it will help them meet improvement targets. In addition, the government has established a Key Performance Indicators (KPIs) system. The aim of establishing the transformation program is to improve public services and to help the government to achieve the ideals of a developed nation. Recently, the current government has established the *Wawasan Kemakmuran Bersama* 2030 (Shared Prosperity Vision 2030) as the new transformation program introduced by the government to improve performance and service delivery towards the public at large. This Vision focus on the commitment of the government to make Malaysia a nation that achieves sustainable growth, and equitable wealth distribution across income groups, ethnicities, regions and supply chains.

One of the main issues addressed by previous scholars regarding change efforts is resistance to change (Hameed, Roques, & Ali Arain, 2013; Pryor, Taneja, Humphreys, Anderson & Singleton, 2008). Resistance to change emanates from many sources, including lack of information, lack of perceived benefits, lack of management commitment and motivation and lack of adequate resources to implement ideas (Al-Alawi et al., 2019; Liu & Zhang, 2019; Self & Schraeder, 2009). A group of researchers has argued that resistance to change will lead to high losses in government, and change is often resisted (Northcott & Taulapapa, 2012; Pryor et al., 2008).

The present study asserts the significance of inculcating managers' Perceived Readiness for Change (PRC) towards improving public sector performance. So far, however, there has been little discussion on the role of PRC in enhancing the efficiency and effectiveness of public sector performance. The present study explores the pattern (based on the response pattern of respondents on the Person-Item Distribution Map of Rasch Analysis) managers' PRC after the implementation of the change program.

Findings from this study are expected to benefit the government by enhancing their awareness of the importance of inculcating the readiness among public sector managers towards change. This in turn would help the authorities executing their roles to ensure the public sector managers accept change wholeheartedly and able to improve their performance to support the government agenda of the Shared Prosperity Vision by 2030.

Motivation and Objective of the Study

Prior researchers have attempted to identify the underlying reasons that caused a failure in organizational change. According to Burnes (2003), it is important to understand the causes of failure and drive for success in managing organizational change. It is necessary to have the right people to lead the organization with skills, competencies and aptitude to implement the guidelines for successful change. Hoag, Ritschard, and Cooper (2002) indicate that the failure of management is the strong factor that contributed to the failure of change. Previous research acknowledged the important role played by senior management in change effort (Kitsios & Kamariotou, 2017; Boukenooghe, Devos, & Broeck, 2009; Cinite, Duxbury, Higgins, 2009). However, no studies offer psychometric measurement in exploring readiness towards change, especially in measuring the commitment of senior management towards change. Do managers agree that commitment of senior management is essential during the change process? And, what are other factors (i.e. Age, tenure, or gender) that might contribute to this agreement?

This study aims to explore the pattern of senior management commitment in response to public sector transformational change. This study also aims to examine the commitment of senior management in the public sector towards successful change efforts. It is important to note that the senior management received information from the policymakers, and then they are responsible for disseminating the information to the middle management and staff.

Contribution of the Study

The contributions of this study are significant in the literature of performance measurement practices and readiness for change in the public sector. Other than that, the present study also contributes to the development of psychometric measurement using the Rasch Measurement Model. In addition, the findings of this study are expected to contribute to policymakers in enhancing the role played by the senior management towards successful change.

An extensive review of the literature in management accounting change studies in Malaysia revealed a connection with the reform and the public sector change (Atan & Yahya, 2015; Azmi & Mohamed, 2014; Danilah & Siti Nabiha, 2011; Nor Hayati & Siti Nabiha, 2009). However, studies that offer explanations for the readiness of managers for such reform is currently limited (Siddiquee, 2010; 2006; Norhayati & Siti-Nabiha, 2009). Hence, this study aims to assess senior management commitment as a new approach in the successful implementation of change initiatives with specific attention to management accounting change. This study employs a psychometric measurement, namely the Rasch Measurement Model to assess the readiness of public sector managers towards change through the commitment of the senior management. This is the first attempt to use Rasch analysis in a management accounting change study in Malaysia. In line with the transformation programs introduced by the government, this study seeks to draw inferences from the evidence about senior management's commitment to change concerning the effectiveness of transformation programs.

Organization of the Paper

The remainder of this paper is organized as follows. Section 2 develops an understanding of the readiness for change and discussion on the commitment of senior management towards a successful change. Section 3 discusses the methodology employed for the study. Section 4 reports the analysis and results of the study. Finally, a summary of the findings and conclusion of the study is presented in Section 5.

Literature Review

Readiness for Change

Previous scholars viewed the success and even the mere survival of an organization is depending on their ability to adapt to change (Greenberg, 2005). Change occurs first at the individual level, and then, at the organizational level (Elias, 2009). The readiness of individuals working in an organization reflects the readiness of the organization towards transformation. Individual readiness is an important driver for successful change in an organization (Burnes, 2004; Armenakis & Harris, 2002).

Change denoted not only members' belief in subscribing to change, but also members actively engaging in practices that will lead to its successful implementation (Cinite et al., 2009; Burnes, 2004). Cinite et al. (2009) further added that the announcement of transformation is not sufficient enough to persuade employees that the organization is ready to implement the change. If the organization failed to persuade or ensure that the change is needed, then the employees might feel that the organization may fail to change (Norhayati & Siti Nabiha, 2009; Cinite et al., 2009).

Prior researchers had attempted to identify the underlying reasons that caused the failure in organizational change. Burnes (2003) emphasized that it is important to understand the causes of failure and drive for success in managing organizational change. It is important to have the right people to lead the organization with skills, competencies and aptitude to implement the guidelines for successful change. Hoag et al. (2002) indicated that failure of management is a strong factor that contributed to the failure of change.

Hence, it is important to understand the s to change management implementation in public sector organizations (Adel Ismail Al-Alawi et al., 2019). As summarized in Kitsios and Kamariotou (2017), public sector servants have dealt with several changes, but there is a lack commitment from the management, unclear vision, and insufficient training.

Commitment of Senior Management towards Change

Scholars have identified that trust plays an important role in change management research (Hodges, Abrahamson, Agarwal, Bhargawa…, 2019; Michaelis, Stegmaier, & Sonntag, 2009). Employees' trust in the change agents is crucial to establish readiness towards change. In the case of reforming the public sector organization in Malaysia, the top management has been identified as the change agent that plays an important role to create readiness towards change. Michaelis et al. (2009) addressed that top management that has leadership qualities will promote trust from the employees and consequently improve employees' affective commitment towards change.

The extensive review on the discussion of the change models as provided by Pryor et al. (2008) indicates that Jick's Model (2003) and Mento, Jones and Dirmdofer's Model (2002) highlighted on the importance of the commitment of senior management in facilitating the change process. Mento et al. (2002) addressed the importance of establishing a change leadership team to direct the change initiatives. In addition to this, Jick's Model (2003) also demanded strong support from the leader in implementing change. Cinite et al. (2009) also addressed the need of establishing a 'champion' to direct the change. Thus, this study proposes that there is a need for leaders that are committed to ensuring successful change initiatives. It is important to note that the senior management is responsible to define the course of change to their subordinates and demonstrate their commitment to change through their behaviors. Moreover, senior managers are responsible for taking an overview of the presents and future direction and activities of their organizations (Burnes, 2003). Hence, organizations that want to be perceived by their employees to be ready for the transformation should pay close attention to the commitment of senior management.

The commitment of senior management plays a vital role in ensuring successful change initiatives (Bouchenooghe et al., 2009; Cinite et al., 2009; Pryor et al., 2009). This is very important to ensure the subordinates have trust in their leaders as their work culture is normally shaped by the action and the words of those leaders (Hodges et al., 2019). The public sector reform literature highlighted the importance of the commitment of senior management in the implementation of PMS in public agencies (Cavalluzzo & Ittner, 2004). The commitment of senior management is crucial in the process of implementing PMS as those leaders are responsible for resource allocation, strategies on the initiative, and to motivate subordinates who resist changing (Liu & Zhang, 2019). Subordinates who received strong support from top management are more likely to accept change compared to those who did not receive strong support from their leaders (Hodges et al., 2019; Cavalluzzo & Ittner, 2004). Consequently, top management commitment will influence the subordinates to contribute towards improving their performance and subsequently achieving organizational objectives.

This study viewed the commitment of senior management as an important driver to drive government agencies and civil personnel towards successful implementation of PMS practices in the public sector organizations in Malaysia. This study found that the role of readiness towards change, especially measured by the commitment of senior management is still under-explored.

Methodology

This section describes the research method employed by this study. A brief explanation on the use of the Rasch Measurement Model also been outlined in this section. In addition, this section also exhibits the measurement of variables used in this study.

Research Method

This study employed a survey method to gather information from 40 managers working in various public sector organizations using convenience sampling. Managers were randomly selected from the database available on Prime Minister Office's website (www.pmo.org.my). Four ministries agreed to be involved in this study. There are Ministry of Housing and Local Government (MHLG), Ministry of Health (MOH), Ministry of Domestic Trade, Cooperatives and Consumerism (MDTCC), and Ministry of Tourism (MTour). Only senior managers (grade 48 and above) and hold the position as Head of Department were chosen to be involved in this study as it is believed that the senior managers aware of performance measurement system of their department. In addition, it is believed that this group of managers is also responsible for disseminating information on change efforts made the policymaker to their staff. Managers were assessed on their perceived readiness towards change where they need to respond to nine items based on a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The data collection process was conducted between May to August 2015 using an online digital questionnaire. The the draft questionnaire has also been sent to the Deputy Director of Audit Department in Ministry of Finance to get an expert opinion regarding the content validity of the instrument. In addition, the questionnaire was also subjected to reliability and validity analysis using selected Rasch measurement tools via the WINSTEPS$^{@}$ 3.72.3 software.

Rasch Measurement Model

The Rasch measurement is based on a probabilistic model which originates from the Linear Hierarchical Logistic Model (Zakaria, Abdul Aziz, Mohamed, Arshad, Ahmad Ghulman, & Masodi, 2008). In the Rasch philosophy, the data have to comply with the principles, or in other words, the data has to fit the model. From Rasch point of view,

it is required to test whether the data allow for measurement on a linear interval scale specifically in a cumulative response process (Zakaria et a., 2008). Following the measurement theory, it has been addressed that a scale should demonstrate that all items in the questionnaire belong to the same construct, and has monotonically increasing steps, and these properties can be illustrated by the Rasch model (Pinyopornpanish, Pinyopornpanish, Wongpakaran, 2020).

Based on the Rasch rating scale model, we will estimate P_{ni1}, the probability of person n choosing "disagree" (category 2) over "strongly disagree" (category 1) on any item *(i)*. D_i is the difficulty of item *i* and F_1 is the difficulty of the first threshold on item (*i*). The rating scale model is illustrated in Eq. (1):

$$P_{ni1}(x = 1 / B_n, D_i, F_1) = \frac{e^{(B-[D_i+F_1])}}{1+e^{(B-[D_i+F_1])}} \qquad (1)$$

Measurements of variable

The commitment of senior management towards transformation was measured using 3-items adopted from Cinite et al. (2009), and 3-items adopted from Allen and Meyer (1990). A further 3-items were adapted from Bouckenooghe et al. (2009) and used in this study. The choice of the scale from these three prior studies was due to their suitability with the context of the present study, which is to explore the pattern of senior management commitment towards public sector change. The first 3-items and the last 3-items has been tested in both private and public sectors (Cinite et al., 2009; Bouckenooghe et al., 2009); while the other 3-items has been widely used in change management research (Allen & Meyer, 1990). Respondents are required to answer by way of 5 point Likert scale from "5" strongly agree to "1" strongly disagree.

Analysis and Results

This section provides the descriptive statistics of the respondents' profile, the assessment of the validity and reliability of the data using the Rasch Measurement Model, and followed by the discussion of the output in Person-Item Distribution Map (PIDM).

Respondent Profile

Table 1 below presents the profile of respondents, including the gender, age, ministry, managerial tenure in the department, and size (represents by the number of employees under supervision). Referring to Table 1, 13 respondents were from MHLG, 12 respondents were from MOH, 12 respondents were from MDTCC, and 8 respondents were from MTour. The majority of the respondents were female (57.5%). 75% of the respondents were 40 years old and below, while 25% of managers were more than 40 years old. Slightly half of the respondents (52.5%) have been working in the department for less than 5 years. In addition, the majority of the respondents or 80 % supervised less than 200 employees in their department.

Table 1: Respondent Profile

Description	Frequency	%
Gender:		
Male	17	42.5
Female	23	57.5
Age:		
Less than 30 years	17	42.5
31-40 years	13	32.5
41-50 years	7	17.5
51-60 years	3	7.50
Ministry		
MHLG	13	32.5
MOH	7	17.5
MDTCC	12	30.0
MTour	8	20.0
Tenure in the Department		
Less than 2 years	7	17.5
3-5 years	14	35.0
6-8 years	10	25.0
9-11 years	6	15.0
More than 11 years	3	7.50
Number of employees		
Less than 100 employees	20	50.0
100-200 employees	12	30.0
200- 500 employees	8	20.0
More than 500 employees	0	0.00

Person- Item Distribution Map (PIDM)

The heart of Rasch analysis is provided in Figure 1, which is the person-item distribution map. Referring to the person-item distribution map (PIDM) in Figure 1, Managers with ID 1-13 were from MHLG, managers with ID 14-20 were from MOH, managers with ID 21-32 were from MDTCC, and managers with ID 33-40 were from MTour. Items and persons (or respondents) share the same linear measurement units known as *logits*. Referring to Zakaria et al. (2008), a logit is a unit derived from transforming ordinal data into an interval scale. Each person and item have its logit value that represented their ability and difficulty.

Figure 1 demonstrates unidimensional variable that was intended to measure the level of readiness of Malaysian public sector managers. As can be seen in the map in Figure 1, the person and the items are located along the line. The items at the top are more difficult to endorse or to agree with; and the persons at the top of the line are more able (agreed/ endorsed to most difficult items). As the items were scrolled down the line, those items became easier (to endorse/ to agree) and the persons became less able.

As can be seen in Figure 1, 40 managers are mapped on the left side of the map under the heading 'persons'. The distribution of respondents' positions is on the left side of the vertical dashed line in increasing order of ability. Those at the upper end of the scale agreed with more items and agreed strongly. On the map, we can see that 57.5% (n=23) of the managers fall above of all 9 items. This group of managers also agreed that the senior management people in their organization pay attention to the ideas brought to them by the middle managers and employees (*refer to item Commit_5*). Managers with ID number 14 and 26 are found to have agreed completely with all the items, followed closely by managers with ID number 25, 19, 23, 37. Manager with ID 14 are from MOH, while a manager with ID 26 are from MDTCC. Both managers shared almost similar characteristic, i.e, both are male, aged in between 31-40 years old, and tenure in the department for 9 to 11 years. Manager with ID 14 supervised 100 to 200 employees, while manager with ID 26 supervised less than 100 employees.

About 42.5% (n=17) managers did not find all items to be important driver to reflect the commitment of the senior management towards transformation (ID number 22, 07, 33,…08). As can be seen on the map, managers with ID 27, 35 and 32 fall below -7logit. This indicates their disagreement with almost every item measuring the commitment of senior management towards change. Further investigation has been done by checking with their

profile reveals that both managers with ID 35 and 32 are from MTour, while a manager with ID 27 is from MDTCC. Manager with ID 35 is female, while managers with ID 32 and 27 are male, all aged less than 30, tenure less than 2 years and supervised less than 100 employees. Hence, it can be assumed that these managers are less experienced, and may not have enough exposure or information regarding the change process in the public sector organizations.

Figure 1 reported that the readiness of managers with ID number 34, 17 and 36 matches items Commit_4 and Commit_8. This indicates that these three managers neither agree nor disagree that there is a champion of transformation at the most senior level in their organization (*refer to item Commit_4*). They also have a neutral agreement that the senior management team in their department is actively involved with the transformation (*refer to item Commit_8)*.

Those managers who are mapped above Item Commit_6 agreed that all these items or constructs are important drivers to improve readiness towards transformation through the commitment of the senior management.

There is also an indication of redundancy among the items as shown on the map. These items are labeled as Commit_1, Commit_2 and Commit_3. Commit_1 is measuring whether managers agree that the senior management is decisive with respect to organizational goals, priorities and strategies concerning the transformation. Commit_2 is measuring whether the senior management themselves have brought into the transformation and promote it by behaving in a manner consistent with the transformation. Item Commit_3 is measuring whether senior management defines the course of transformation to their subordinates.

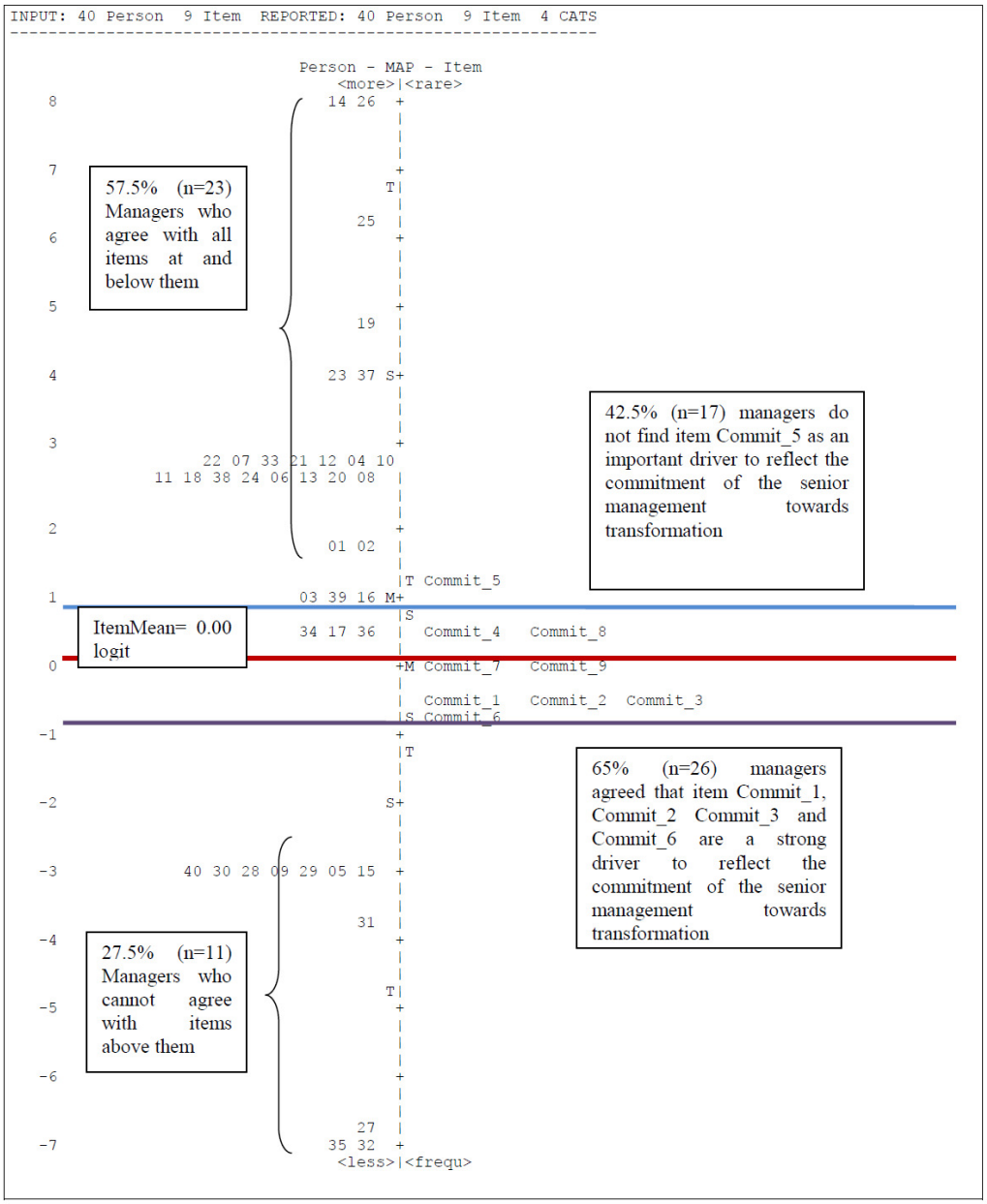

Figure 1: Person-Item Distribution Map (PIDM)

Discussions and Conclusions

This section provides discussions on the findings, implications of the research, limitation of the research and suggestions for future research. In addition, this section also provides a summary and conclusion of the study.

Discussions

The public sector reform literature highlighted the importance of the commitment of senior management in the implementation of PMS in public agencies (Cavalluzzo & Ittner, 2004). The commitment of senior management is needed in the process of implementing PMS as those leaders are responsible for resource allocation, strategies on the initiative, and to motivate subordinates who resist changing. Subordinates who received strong support from top management are more likely to accept change compared to those who did not receive strong support from their

leaders (Hodges et al., 2019; Cavalluzzo & Ittner, 2004). Consequently, top management commitment will influence the subordinates to contribute towards improving their performance and subsequently achieving organizational objectives. The present study asserts that the commitment of senior management during public sector transformational change is crucial towards achieving the government aspiration.

The main findings of the present study exhibited in PIDM. This study found that slightly half of the respondents (57.5%) agree that the commitment of senior management plays a vital role in ensuring successful change initiatives. This proves that the commitment of the leaders towards improving organizational change engagement is essential to gaining management buy-in as well as to ensure that employees, and other stakeholders to engage with change (Hodges et al., 2019).

Based on a further investigation with the respondents' profile reveals that longer-tenured managers are located at the top position on the map, while less tenured managers (working with the same department for less than 2 years) are located at the lower position on the map. As noted in Hameed et al. (2013), as tenure increases, individuals develop a better understanding of the practices and routines of the organization, and their own roles in the organization. Thus, the present study suggests that as the tenure of the manager increases, the positive effect of the use of PMS increases, and the managers can easily adopt change.

The findings of this study lead to argument that less tenured managers might not receive adequate information regards to change initiatives implemented by the policymaker. Kitsios and Kamariotou (2017) claimed that public sector servants's reluctant to change could emanate from lack commitment from the management, insufficient information about change, and insufficient training to adopt change.

Another possible reason that could lead to this pattern is due to a lack of experience with their working environment. Further investigation with the respondent profile also reveals that managers aged less than 30 years old are located at the bottom position on the map. This issue needs to be tackled by the policymaker to ensure managers receive adequate information regarding any program introduced by the government. This can be done by providing proper training and improve communication channels. As summarized in Kitsios and Kamariotou (2017), public sector servants have dealt with several changes, but there is a lack commitment from the management, unclear vision, and insufficient training.

Implications of the Research

An important implication of the findings of this study is that they serve as a reminder to the Malaysian government to concentrate on having the senior management that is committed in the change process. By focusing on this issue, this could improve the senior management to be more supportive, decisive and participative in the change process.

The findings are useful for the Malaysian government and its agencies, including the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), Malaysia Productivity Corporation (MPC) to find new approaches in improving the performance of individual managers and organizations through strengthening the readiness for change. The Malaysian government, through MAMPU, MPC and other agencies, have done so much in providing training in the aspects of skill development, capability enhancement to change initiatives introduced by the government. However, the focus of the training should be provided on how to improve the values of readiness towards change through strengthening the commitment of senior management towards change.

This study employs Rasch Measurement Model to explore the importance of the commitment of the senior management team in the public sector change as an alternative method to management accounting change research as most researchers used classical ways of analyzing, namely SPSS. Rasch Model applied the use of psychometric measurement to establish more insights for the present study, which help provide a more comprehensive conclusion. Thus, the attempt made by this study could be emulated by other researchers in the future to use Rasch Model with more rigorous analysis, that is to do subtest on each item so that the gap between items could be traced and therefore, new items could be identified and added to the instrument more accurately.

Limitations and Directions for Future Research

Among the limitations of this study were a small number of respondents, where the respondents were mostly working with Federal tier located in Putrajaya. In the future the number of participants of public sector managers from different tiers (including government agencies outside Putrajaya, the state and local government) should be increased because they might have different views on the issue of the commitment of senior management towards

change. A wider geographical area should be considered for better generalization of the results to the overall population, thus producing a more convincing conclusion. It is also suggested to increase the number of sample sizes to produce better results as cross-validation can be done by dividing the large data into a few files to cross-validate. From here, comparisons could be made to confirm the validity of the instrument and the model. The larger sample size could generate more convincing results (Field, 2009).

This study is basically an exploratory in nature. There was no hypothesis or relationship between variables to be tested. Hence, this limits the discussion on the impact of the commitment of senior management towards change during the reform process. Future research can be undertaken by adding more variables, i.e. to test the effect of the commitment of senior management towards change on the individual or firm performance. This can be done by extending the analysis through the use of Hierarchical regression, or structural equation modeling (SEM) techniques such as AMOS or PLS any other methods that suit to test those relationships.

The use of bilinguals is advised for research involves responses from the managers working with public sector organizations in Malaysia. Many respondents suggested the researcher use both English and Bahasa Melayu for the questionnaire. One of the reasons is that there are familiar and feel more comfortable with Bahasa Melayu as the language is being used in their day to day working environment including preparing the reports, conducting the meetings and so on.

Conclusion

In enhancing efficiency and effectiveness in delivering public services, the Government of Malaysia grapples with various issues concerning continual administrative reforms, in particular, issues pertaining to the improvement of performance. Consequently, several transformation programs has been established, as change is essential for success. As such, the purpose of this study is to explore the role and commitment of senior management towards successful change efforts made the government of Malaysia, which is to emphasize on improving performance through enhancing the current Performance Measurement System (PMS). This study asserts that the senior management team plays a very important role in ensuring the successful implementation of change efforts.

Data were collected from 40 managers working in the public sector organizations, specifically in the federal government. Rasch analysis determined the validity and reliability of each item (*questions in the survey*) and the person (*the respondents*). The results imply that a larger number of respondents are needed to improve the reliability of the item used in the survey.

This study has shown that the measurement of managers' response towards readiness for transformation can be precisely measured using the Rasch probabilistic model. More than half of the respondents indicated their agreement to almost every item in the dimension of the commitment of senior management to the transformation. The result is also consistent with the previous study where the commitment of senior management is seen as an important driver for successful transformation.

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The Study on Satisfaction of Outpatient Treatment of Doctor's Consultation in ESIC Hospitals & Private Hospitals at Ernakulum Dist. Kerala.

Sasna M.S

Research Scholar, Department of Commerce and Management, Amrita School of Arts and Sciences, Kochi, Ernakulam, India
Email ID: sasna.anas0214@gmail.com

Dr Sony VIJAYAN

ID:56115452600
Associate Professor, Department of Commerce and Management, Amrita School of Arts and Sciences, Kochi, Ernakulam, India
Email ID: sonyvineeth@gmail.com

Abstract

Health and social security is the two most momentous parts of every human being. In this concept following the India government was formed Employees' State Insurance Scheme (ESI) this scheme was inaugurated in Kanpur on 24th February, 1952 (ESIC Day) by then Prime Minister Jawaharlal Nehru. According to the section 46 of the employee states insurance act envisage following six social security Medical related benefits, Sickness related benefits, benefits of maternity, disablement related benefits, benefits of dependant's, and other benefits. It is a self-financing social security. ESI is a health insurance scheme for Indian employees who get below 21,000 salaries or remuneration. This scheme is mainly focused on the middle-income category of the employees'. The main motive of this study is found the reason for beneficiaries are opting private hospital rather than ESI hospitals. This study is mainly finding out the satisfaction level of who is using the specialist consultation and specialist treatment in both private hospitals and ESI Hospitals. After that find out the major problems to meet ESI Hospitals and find out the reason for why beneficiaries are opting private hospitals rather than ESI hospitals. This is mainly focused on the comparative analysis of ESI Hospital at Udyogamandal Ernakulum and Private Hospitals in Ernakulum, Kerala. The sample consisting 60 beneficiaries randomly collected in ESI Hospital Udyogamandal Ernakulam District. The conclusion of this study is the private hospital is providing more satisfaction compare to ESI hospitals Udyogamandal Ernakulam District.

Keywords: Employees state insurance out patient satisfaction, private hospital outpatient satisfaction, social security, medical protection.

Introduction

Employee state insurance scheme is the most important social security scheme of an India. This scheme is helping to employees for helping to ensure medical and social security. It was inaugurated on 1954 February 24th (ESIC Day) and the services were launched simultaneously in Delhi. Employees' State Insurance (ESI) Scheme is a social security scheme in India. The ESI provides social security and medical protection to beneficiaries and dependents. The ESI Act 1948guaranteed to good health and medical care, social security survivors of dead enrolee and their family member's.

According to ESI Act 1948, if any institutions or workplace is work 10 or more than persons work, they are eligible to join ESI scheme. The textile shops, restaurants, education institutions, hospitals are eligible for this scheme. The ESI provide medical care through ESI dispensaries and ESI Hospitals, Diagnostic centres. If any case of medical emergency the ESI provides super speciality facilities. After the new renovation, the wages limit is increased to Rs.21, 000. Earlier the limit is Rs.15, 000 per year. The ESI is providing health security and social security for all beneficiaries and their dependant.

This study is mainly finding out the satisfaction level of who is using the specialist consultation and specialist treatment in both private hospitals and ESI Hospitals. After that find out the major problems to meet ESI Hospitals and find out the reason for why beneficiaries are opting private hospitals rather than ESI hospitals. This is mainly

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focused on the comparative analysis of ESI Hospital at Udyogamandal, Ernakulum and Private Hospitals in Ernakulum, Kerala. The sample consisting 60 beneficiaries randomly collected in ESI Hospital Udyogamandal Ernakulam District. This study is help to increasing the efficiency of the services provided by ESI hospitals.

Need for The Study

The study was conducted to compare the satisfaction of services provided by ESIC Hospital and Private Hospital based on Consultation of outpatients 'services. The ESI beneficiaries are including the middle-income category that means below 21000 salaries. If this categories people face lot of problems in meet hospital expenses and caring health. It's very difficult to meet their hospital expenses according to their income. If the similar circumstances the ESI schemes are very useful to employees and their dependents. But the majority of beneficiaries are still not aware of proper use and it's potential. Majority of the beneficiaries' are used to private hospital for treatment. This study is mainly finding out the satisfaction level of who is using the specialist consultation and specialist treatment in both private hospitals and ESI. After that find out the major problems to meet ESI Hospitals and find out the reason for why beneficiaries are opting private hospitals rather than ESI hospitals.

Objectives of The Study

- To identify the satisfaction level of beneficiaries and their dependants in ESI Hospitals and Private Hospitals based on doctor's consultation.
- To find out the factors of influencing satisfaction of doctors' consultation services.
- To compare the satisfaction based on doctors consultation in ESI Hospitals and Private Hospitals.

Research Methodology

The study adopted the descriptive type and evaluating the comparative analysis of ESI Hospitals and Private Hospitals. And find out the major problems and find out the reasons and solutions. The questionnaire is a major tool of this study. The sample consisting 60 beneficiaries randomly collected in ESI Hospital Udyogamandal Ernakulam District.

Sources of Data

The primary data were collected from who is comes in ESI Hospital Udyogamandal in Ernakulam District with the help of questionnaire. Secondary Data were collected from various sources like books, newspapers, magazines, internet and journals.

Sample Size (Target Population)

The insured person (IP) and their dependant have been selected as respondents for the samples. The sample size consisted of 60 randomly selected beneficiaries and sample frame is whose comes in ESI Hospital in Udyogamandal Ernakulum District.

Research Tools

The questionnaire contains the information about both Private Hospitals and ESI Hospitals. In this study they use Likert scale (Highly Satisfied /Satisfied/Average/Dissatisfied/Highly Dissatisfied) Closed-Ended Questions for analysis of the data, SPSS was used. Reports' Codebook is used to refine data. Cronbach's alpha is used to reliability of Likert questions in the survey.

Reliability of The Study

In this table No 1.1 show that Cronbach's Alpha is .913. Which indicate a high level of internal consistency of this study. Cronbach's Alpha is the most commonly used measure of find internal consistency. And it helps to measure the quality of questionnaire and reliability of the questionnaire.

Table 1: Reliability of Study

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.913	.912	10

Item-Total Statistics

This column presents the value that Cronbach's Alpha. It was help to delete the irrelevant question. After the analysis of reliability test reduce the irrelevant questions and variable from this study.

Type of Hospitals	Variables	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ESI Hospitals	Behaviour of Doctor	31.7333	24.741	.793	.895	.897
	Quality of communicatio n	31.7333	25.453	.837	.938	.894
	Waiting time for consultation	33.0167	27.779	.635	.833	.907
	Privacy of Consultation	33.1333	27.745	.545	.756	.912
	Time spent with Doctor	31.8167	26.017	.738	.949	.900
Private Hospitals	Behaviour of Doctor	31.6333	24.779	.820	.941	.895
	Quality of communicatio n	31.6333	27.931	.692	.868	.904
	Waiting time for consultation	31.5333	28.524	.491	.614	.914
	Privacy of Consultation	30.9333	28.029	.592	.611	.909
	Time spent with Doctor	31.7333	26.640	.672	.791	.904

Limitations of Study

Study is restricted to the city of ESI Hospital in Udyogamandal Ernakulum. While the findings can be replicated in cities similar o ESI Hospital in Udyogamandal Ernakulum, the same probably cannot be deduced for tier. This study is limited to only 60 peoples who are using both ESI Hospitals and Private hospitals.

Analysis of Satisfaction Variables

Waiting time for consultation, Behaviour of doctor, Quality of communication, Privacy of consultation and spending time with doctor are the main satisfaction variable of in this study.

Table 2: Analysis of Demographic Variable

Demographic Variable	Scale	Percentages
Gender	Male	48.3%
	Female	51.7%
Marital Status	Unmarried	33.3%
	Married	65.0%
	Widow/Widower	1.7%
Education	SSLC	10.0%
	Plus Two	31.7%
	Degree	40.0%
	Above Degree	18.3%
LOCATION	Below 20km	33.3%
	20km-30km	43.3%
	30km-40km	23.3%
	40km-50km	0.0%
	Above 50km	0.0%
Status of Beneficiaries	Insured Person	65.0%
	Dependent	35.0%
Frequency of Visit	Once in a While	56.7%
	Frequent User	33.3%
	Rarely User	10.0%
Taking Regular medicine	Yes	53.3%
	No	46.7%

Table 3: Waiting Time for Consultation in ESI & Private Hospitals

Variables	Scale	ESI		Private Hospitals	
		Frequency	Percentage	Frequency	Percentage
Waiting Time For Consultation	Highly Satisfied	0	0%	12	20%
	Satisfied	0	0%	30	50%
	Average	31	51.7%	18	30%
	Dissatisfied	23	38.3%	0	0%
	Highly Dissatisfied	6	10%	0	0%
	Total	60	100%	60	100%

The table No 3 shows that comparing of waiting time for consultation in ESI Hospital and Private Hospital. Waiting time for consultation is a lead to patient satisfaction. In case of ESI Hospitals, there is nobody rating for highly satisfied or satisfied. In case of Private Hospital, there are 70% of peoples satisfied with waiting time for consultation. The ESI Hospital 48% of peoples are dissatisfied with the waiting time for consultation and in case of Private hospitals, there is nobody rating for dissatisfaction. This analysis shows that Private Hospital is better than ESI Hospital in the context of waiting time for consultation

Table 4: Behaviour of Doctor in ESI Hospitals & Private Hospitals

Variables	Scale	ESI		Private Hospitals	
		Frequency	Percentage	Frequency	Percentage
Behaviour of Doctor	Highly Satisfied	12	20%	12	20%
	Satisfied	24	40%	30	50%
	Average	18	30%	12	20%
	Dissatisfied	6	10%	6	10%
	Highly Dissatisfied	0	0%	0	0%
	Total	60	100%	60	100%

It could be seen from the table No 4,that the level of satisfaction perceived by the behaviour of doctors in ESI Hospital and Private Hospital. From the analysis concluded that the beneficiaries are more than 60% of peoples are satisfied in ESI Hospital and 70% of peoples satisfied in private hospitals. In the case of ESI Hospitals and Private Hospitals, there is nobody rating for Highly Dissatisfied or Dissatisfied.

Table 5: Quality of Communication in ESI Hospitals & Private hospitals

Variables	Scale	ESI		Private Hospitals	
		Frequency	Percentage	Frequency	Percentage
Quality of Communication	Highly Satisfied	6	10%	6	10%
	Satisfied	36	60%	36	60%
	Average	12	20%	18	30%
	Dissatisfied	6	10%	0	0%
	Highly Dissatisfied	0	0	0	0%
	Total	60	100%	60	100%

It is highlighted from the table No 5, there is a nominal difference between in Quality of Communication on ESI Hospitals and Private Hospitals. There are 10% of beneficiaries are dissatisfied in the quality of communication in ESI Hospitals and nobody rating for Highly Dissatisfied or Dissatisfied Private hospitals.

Table 6: Privacy of Consultation in ESI Hospitals and Private Hospitals

Variables	Scale	ESI		Private Hospitals	
		Frequency	Percentage	Frequency	Percentage
Privacy of Consultation	Highly Satisfied	0	0%	36	60%
	Satisfied	5	5%	18	30%
	Average	14	14%	6	10%
	Dissatisfied	35	35%	0	0%
	Highly Dissatisfied	6	6%	0	0%
	Total	60	100%	60	100%

To find out the difference between ESI Hospitals and Private Hospitals in the category of privacy of consultations in comparative analysis is shown the table No 6. This analysis is the most significant category. This table highlighted that the major problems lead to beneficiaries are opting private hospitals rather than ESI Hospitals. The privacy of the patient is the most important right of a patient. This analysis shows that 41% of patients are dissatisfied with the privacy of ESI Hospitals and nobody rating for Highly Dissatisfied or Dissatisfied Private hospitals.

Table 7: Spending Time with Doctor in ESI Hospitals & Private Hospitals

Variables	Scale	ESI		Private Hospitals	
		Frequency	Percentage	Frequency	Percentage
Spending Time with Doctor	Highly Satisfied	6	10%	6	10%
	Satisfied	31	51.7%	36	60%
	Average	17	28.3%	12	20%
	Dissatisfied	6	10%	6	10%
	Highly Dissatisfied	0	0%	0	0%
	Total	60	100%	60	100%

It is identified from the table No 7, there is no significant difference between ESI Hospitals and Private Hospital in the category of spending time. There are only 10% of respondents are rating in dissatisfied and highly satisfied in both ESI Hospitals and Private Hospitals. There are 52% of beneficiaries satisfied in ESI Hospital and 60% of patience satisfied in Private Hospitals.

Suggestions

The ESI is a social security scheme of Indian employees. The ESI is providing so many benefits for their beneficiaries and their dependents. According to the analysis of the study the ESI Hospital faces some drawbacks compare to private hospitals. The waiting time is a one of the major drawback of ESI hospital. The proper administration and management can improve these issues. We all are know time is very precious than money. They reducing waiting time and it help to increasing patient satisfaction.

The privacy is another negatively influenced the factor of this study. The confidentiality of a treatment is a right of a person. The confidentiality and privacy protect patient rights. The patient has right of keep his or her medical records and health information. The ESI is negatively affected privacy compare to private hospitals. The proper manual queue system or automatic queue system is help to reducing the effect of this factor.

Discussions and Conclusions

In the analysis reveal that Private Hospital is better than ESI Hospitals In some category. This study is mainly focused on the outpatient treatment on the basis of doctors' consultation. Waiting time for consultation, behaviour of doctor, quality of communication, privacy of consultation, spending time with doctors' those are the main variables to find the satisfaction of ESI Hospitals and Private Hospitals for in this study.

According to the first objective of the study the analysis shows that the private hospital is lead to more satisfaction in doctor consultation. The ESI Hospital is less satisfaction compare to Private Hospitals. This conclusion is made by the help of data analysis and interpretation of questionnaire.

The second objective of the study is related to factors affecting influence of satisfaction of doctor's consultation. The literature review is help to and finding relevant satisfaction variables. Waiting time for consultation, quality of communication, Behaviour of doctor, spending time with doctor and privacy of consultations are the basic factors of influencing satisfaction of patients.

According to the third objective of this studies finding, the privacy of consultation is the major drawback of ESI Hospitals. In the case of private hospitals, they provide more privacy for patients. Patient privacy is the most important factor of lead to patient satisfaction. The every patient is very conscious about the privacy of treatments and history of treatment. This is the major reason for ESI beneficiaries choose private hospitals rather than ESI hospital. If the ESI Hospital provides more privacy to patients the beneficiaries are more opting ESI Hospitals for the treatments.

In case of waiting time for consultation, the ESI beneficiaries are face lot of problems rather than private hospitals this is the another reason for the ESI beneficiaries choose private hospitals. The time consuming is a relevant factor of lead to patient satisfaction. If the proper administration and best queuing systems are helping to improve to reduce the waiting time for consultation it helps to increase the level of satisfaction and the beneficiaries are more opting ESI Hospitals for the treatments.

The Behaviour of doctor, quality of communication and spending time with doctors are face nominal problems lead to dissatisfaction of beneficiaries' compare to private hospitals. The proper management and administration team can help to improve these difficulties. The proper training helps to increase the efficiency of medical and non-medical staffs. These are the main suggestion and conclusion to this study. This study helps gain knowledge and finds out the problems and solution to the most important social security schemes in ESI.

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Inequalities in the European Green Deal context

Tamara-Maria NAE
Bucharest University of Economic Studies, Bucharest, Romania
E-mail: nae.tamara@gmail.com

Narcisa- Alexandra PANIE
Bucharest University of Economic Studies, Bucharest, Romania
E-mail: panie.narcisa.alexandra@gmail.com

Abstract

Climate and environmental challenges are a serious concern of our generation. Along with inequalities, the negative effects of environmental degradation are a barrier to a fair and modern economy as well as a sustainable future. The European Green Deal is an ambitious and serious strategy that the EU has taken on to reduce these negative effects as well as to ensure green convergence. In order to be politically feasible and socially acceptable, the European Green Deal's objectives have to respond to economic and social needs of the EU Member States, to eliminate greenhouse gas emissions, to improve social and economic conditions, as well as reduce social inequality throughout Europe's regions.
The main aim of this article is to intensify the debate in terms of addressing the relationship between inequalities and the Green Deal, as well as to suggest some improvement measures and to find some alternative solutions.

Keywords: Green Deal; inequalities; climate change;

Introduction

Climate and environmental challenges facing the world have become increasingly pressing, and we need to take urgent measures to combat environmental degradation and climate change. To meet these challenges, the European Commission is committed to making a significant contribution to mediating the issues by launching a new growth strategy, the European Green Deal. The implementation of this strategy marks the change of the paradigm of economic growth based on consumption, thus, the aim is to move to a sustainable economic growth, based on the efficient use of natural resources. The main objectives of the European Green Deal are: i) the elimination of greenhouse gases by 2050; ii) streamlining the use of resources and decoupling them from economic growth (eliminating the dependence of economic growth on the use of resources); iii) as well as the commitment to "leave no one behind", an objective that involves eliminating inequalities and creating a favorable framework for all EU citizens.

A fair transition from which everyone can benefit requires a well-developed strategy as well as a consistent budget for the necessary investments. Thus, the implementation budget is a significant one of about 1000 billion Euros, for the next 10 years. These transition funds depend on the authorities' ability to develop projects and how they will manage their implementation.

At its meeting on 17th-21st July 2020, the European Council agreed to allocate € 1 824.3 billion to the Multiannual Financial Framework and the Next Generation EU recovery instrument. Of this amount, 30% will go to climate change projects, in particular with the goal of eliminating greenhouse gases by 2050 (EU climate target for 2030) and the Paris Agreement.

The most important objective of the Green Deal refers to the decarbonization of the energy sector because over 75% of greenhouse gas emissions are produced by the use of energy in economic sectors. This is a matter of concern among member states, who point out that the lack of alternatives for carbon-intensive sectors or a too abrupt transition will lead to job losses and regional inequalities.

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The effects of climate change are being felt unequally in the world . The areas in which we live influence the way we are affected by environmental degradation. Environmental degradation generally affects more disadvantaged and vulnerable people and households living in areas prone to drastic climate change or with limited access to environmental quality (green spaces, fresh air, fresh food), thus contributing to increasing poverty and inequality.

Inequality has been a constant concern in the climate change debate. From the perspective of responsibility for tackling climate change, there is inequity between countries because they are countries with a low carbon footprint, but from which significant indirect contributions can be sought that could deepen existing inequalities. Development gaps between countries or regions risk placing a much greater burden on certain categories of vulnerable citizens who cannot easily find alternatives or adapt to new changes due to geographical factors or specific robust skills, and conversion difficulties professional.

What is clear is that for less developed countries, such as Central and Eastern European countries, the European Green Deal must not be a choice between development and combating climate change, but this pact must connect the improvement of the economic and social situation with actions to fight against environmental degradation.

The purpose of this article is to generate debate on the link between the Green Deal and inequalities and how we can propose policy measures and recommendations to combine the objectives of a green economy with reducing inequalities.

Literature Review

The concept of climate change is not a new one, but it has recently become more widespread in the context of the European Green Deal. The risks to which the entire globe is exposed due to these changes are both on the health of the environment and the population, and on the economy. Thus, extreme climate change as well as calamities affect the economy on the one hand, by degrading crops and reducing trade, as well as the health and well-being of the population by reducing the quality of life. Excessive use of natural resources is also a major concern for Europe's sustainability, but also for the quality of life of future generations.

Not surprisingly, in terms of climate change, the most disadvantaged are low-income and vulnerable people with no or limited recovery capacity. There are numerous studies that have analyzed the negative effects of climate change on the economy and society. Climate change has been analyzed as a major concern for poverty reduction (World Bank, 2002; Skoufias 2012). Since poverty, analyzes have expanded rapidly in the field of inequality, and it has been analyzed and demonstrated that the link between climate change and inequality forms a vicious circle, so that existing economic and social inequalities contribute to the unequal distribution of environmental degradation then generating greater inequalities. (WESS, 2016; Islam et. Al, 2017).

Other studies such as (The Intergovernmental Panel on Climate Change, 2014) conclude that climate change “exacerbates inequalities”. The explanation is that in disadvantaged regions in terms of geographical location, as well as infrastructure, there is a high risk that a burden of climate change will further disadvantage people living in those regions. The study also shows that people in countries facing significant social inequalities are more affected by climate change.

With regard to the Green Deal objectives, there are concerns that some countries cannot easily cope with the transition period and that complementary policies are needed to deal not only with reducing the effects on the environment but also on the economy and society. “We must understand that ecological and social progress go hand in hand. We cannot end poverty and build a fairer society by letting the ecological crisis destroy our planet. However, we also cannot end the ecological crisis while high levels of poverty and inequality persist.” (Sassoli, 2020)

According to some authors (Pianta, Lucchese and Nascia 2020), the European Green Deal will generate an expansionary fiscal policy that will end the period of stagnation in Europe due to fiscal constraints. This new fiscal policy is needed to increase the demand and investment needed for sustainable production systems. If this does not happen and only give up old polluting production without increasing investment, current spending on environmental goods and services, there will be a reduction in jobs and incomes.

Green deal and the other EU's policies

The adoption of the European Green Deal is the European Union's responsible response to climate change that affects us all and, implicitly, our future. The consequences of climate change affect important issues such as public health, quality of life, and even life expectancy. Article 3 of the Lisbon Treaty states that “the Union shall establish an internal market. It works for the sustainable development of Europe, based on balanced economic growth and price stability, a highly competitive social market economy, which aims for full employment and social progress, as well as a level of high level of protection and improvement of the quality of the environment. " (Treaty of Lisbon) and that “In its relations with the rest of the international community, the Union affirms and promotes its values and interests and contributes to the protection of its citizens. It contributes to peace, security, the sustainable development of the planet, solidarity and mutual respect between people, free and fair trade, the eradication of poverty and the protection of human rights, and in particular the rights of the child, and the strict observance and development of international law, including compliance with the principles of the Charter of the United Nations. "(Treaty of Lisbon).

Thus, the sustainable development of Europe as well as the sustainable development of the planet includes three main components, the economic, the social and the environmental. The European Union is proposing an ambitious environmental policy plan and intends to place the Community in a position of global leadership in reducing greenhouse gas emissions. To achieve these results, the budget for the European Green Plan is significant, amounting to around € 1 trillion over the next 10 years. Negotiations on the EU's long-term budget for 2021-2027 have shown political support for this plan due to large sums allocated.

The European Green Deal is directly related to Cohesion Policy, in which investment in regional development will focus on two objectives. Specifically, the European Commission wants 65% -85% of European Regional Development Fund and Cohesion Fund funds to be focused on developing a smarter Europe and developing a greener Europe. We point out that the European Green Deal promotes the objective of cohesion policy, reducing the disparities between different regions and more disadvantaged regions, through the Mechanism for a Fair Transition. Thus, we want to move to a green economy but without this process creating gaps between regions and inequalities in society. Many regions that have industries that are based on processes with a high carbon dioxide emission factor that generate greenhouse gas emissions or whose workers are part of these fields could suffer heavy losses if they are not taken into account in defining measures. One initiative is the Fair Transition Mechanism, which will pay attention to the regions facing the greatest challenges and which will have 3 indicators on which to allocate funds: the extent of the challenge posed by the transition for regions with a dioxide emission factor; high carbon and greenhouse gas emissions; the social challenges posed, on the one hand, by the potential loss of jobs in industry, in the sector of oil shale mining, coal and lignite mining and peat production and, on the other hand, by the need for further retraining of workers to be able to find a new job; the level of economic development and investment capacity of the Member States. The identified regions will benefit from around € 30-50 billion between 2021 and 2027, for every € 1 invested through the Fair Transition Mechanism Fund Member States will contribute a minimum of € 1.5 and a maximum of € 3 from the European Development Fund and the European Social Fund Plus, to which will be added the national co-financing of cohesion policy.

Green Deal and inequalities

Climate change is negatively affecting the lives of each of us and for some it makes it even more difficult. The challenges that climate change offers us are as important as the problem of inequalities, both of which are manifested globally, and there is even a relationship between them. This implies the need for ambitious policies, both at EU and global level, because only through the active and serious involvement of both policy makers and citizens will we be able to develop a sustainable future. The European Green Deal is the EU's response to climate challenges, and involves tracing the current economy and society on a more sustainable and inclusive path.

One of the objectives of the European Green Deal is to reduce greenhouse gas emissions by at least 55% by 2030 compared to 1990 level, making Europe the first neutral continent of greenhouse gas emission in 2050. At the level of the European Union, Greenhouse gas emissions have been on a downward trend since 1990. Peak values are marked by either extreme climatic phenomena (1996 - very low winter temperatures that led to increased heat demand), or the adverse effects of the financial crisis (2009) that affected the plants generating strong greenhouse gas emissions. In 2018, the amount of greenhouse gas emissions has decreased considerably compared to 1990 and is constantly decreasing. (Fig.1)

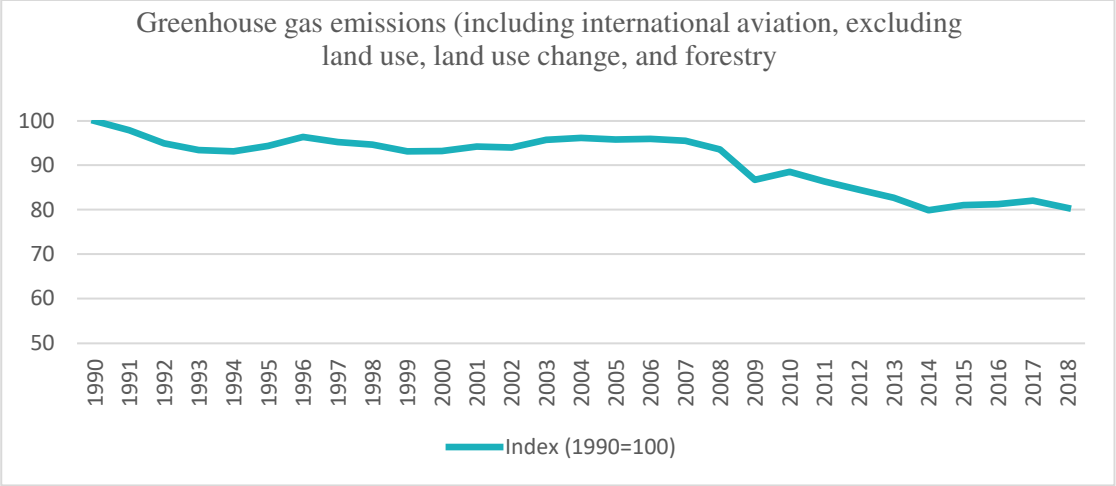

Fig. 1: Greenhouse gas emissions (including international aviation, excluding land use, land use change, and forestry, EU-27, 1990–2018 (Index 1990 = 100)

Source: Eurostat

Among the EU countries, the highest reductions in greenhouse gas emissions from 1990 to 2018 were registered in Lithuania (-57.36%), Latvia (54.05%) and Romania (53.16%), and the countries with the highest level were Cyprus (53.81%), Spain (19.74%) and Portugal (18.90%).

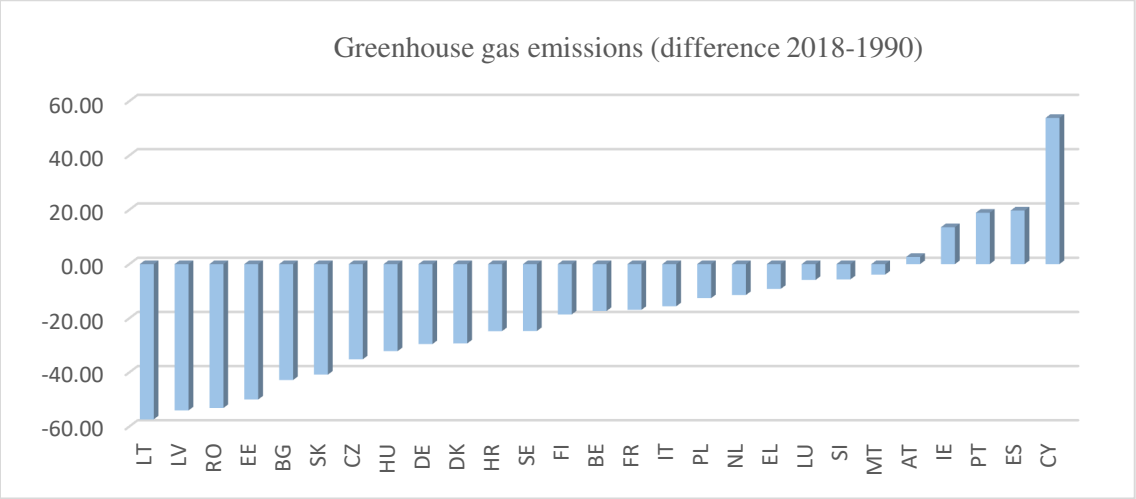

Fig. 2 : Greenhouse gas emissions (difference 2018-1990)

Source: Eurostat

The relationship between inequalities and greenhouse gas emissions has been the subject of numerous specialized studies. Environment Kuznets Curve (EKC) hypothesis describes an inverted U-shaped relationship between economic development and environmental degradation. He asserts that environmental quality deteriorates as per capita income increases at the initial stage of development but improves after a certain threshold of per capita income (Magnani, 2000). Most studies are based on the relationship between income inequality and environmental quality**.**

Another theory about the relationship between inequalities and the environment concludes there is a difference between social classes on environmental pollution. (Boyce, 2007). The rich class pollutes the environment more because they consume more goods and they own polluting firms. Under Boyce's political economy model, the political class can avoid environmental laws that would bring them additional costs by influencing politicians. He demonstrates that the wealthy class can use their economic and political bargaining power to undermine policy makers' efforts on environmental protection. Scruggs (1998) launches a hypothesis that demonstrates that environment is a normal good, an increase in per

capita income could be associated with the same level of preference for environmental degradation. But, if we define environment as a superior good, an increase in income will determine a preference for a cleaner environment because the wealthy prefer a clean environment consequently they will promote strict measures.

Another area of action of the European Green Deal is agriculture and nature. Climate change is affecting agriculture, there are areas where due to rising temperatures the soil is desertifying or we have situations where crops have been destroyed by the increasingly present extreme phenomena. The most affected are the small producers for whom the income from agriculture is the only revenue in the family, many of them also having credits for the necessary equipment or materials. There were 10.5 milion farm in the EU in 2016, the majority of these classified as family farms (95.2). According to Eurostat, in 2016, a third of the EU farms are developed in Romania, followed by Poland, Italy and Spain. Although about 65% are farms with an area of less than 5 hectares, about 7% of farms with an area of 50 hectares or more have cultivated 68% of the EU's agricultural area. Many small farms are characterised by the fact that farm holders may struggle to make a living. A characteristic of very small farms is that they are often subsistence households. These small farms can play an important role in reducing the risk of rural poverty, providing additional income and food. Thus, climate change tends to aggravate income inequalities by affecting crops that leave farmers with no income and only expenses. Romania, the country that in 2016 had the most farms in the EU, was hit in 2020 by one of the strongest droughts that destroyed most of the cereal crops. This will lead to a decrease in supply and an increase in prices amid high demand, which will worsen the financial situation of vulnerable low-income people.

Another problem facing the European agricultural sector is the widespread use of pesticides that affect human health. Countries such as France and Spain have sales of more than 35 million kilograms of pesticides per year, according to Eurostat. The use of pesticides aims to keep the plant healthy, but at the same time produces negative effects, they infiltrate in the soil and water. In the long run, this may mean destroying soil biodiversity and making it impossible to use it in the future. At EU level, the number of organic farms is very low, as can be seen in the graph below, with an average of 8%. Austria, Sweden and Estonia have the highest results.

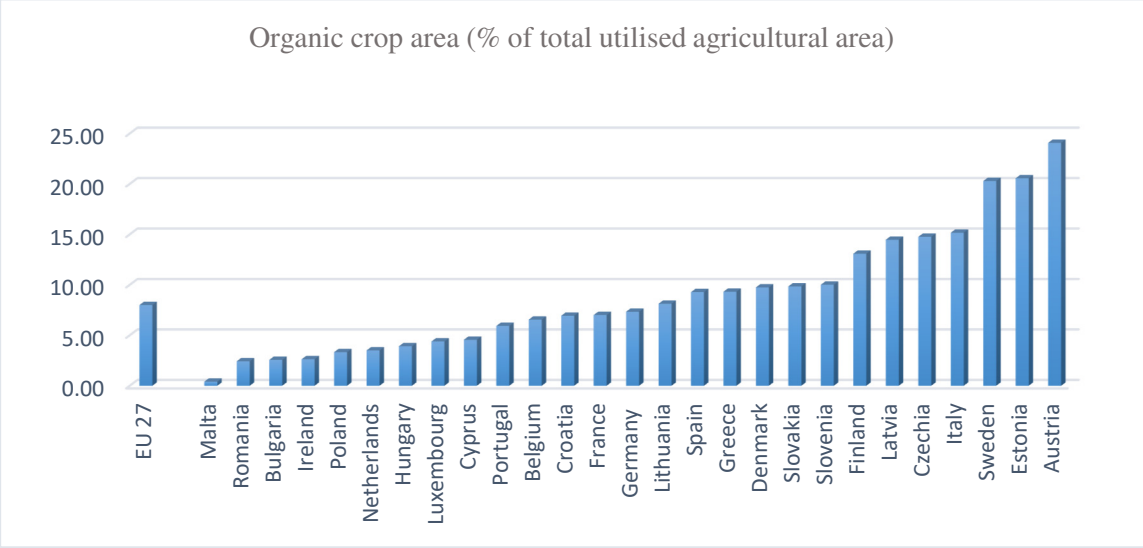

Fig. 3: Organic crop area (% of total utilised agricultural area)

Source: Eurostat

The objectives proposed by the European Green Pact are to reduce by 50% the pesticides used in agriculture by 2030, to increase the area of organic farms and to invest in research and development in agriculture to develop sustainable agriculture. The European Commission proposes that 40% of the budget allocated to the common agricultural policy should contribute to combating climate change and 30% of the Fisheries and Maritime Fund should contribute to climate goals.

Mobilizing the industrial sector for a green and circular economy is another objective of the European Green Deal. European industry continues to be highly dependent on newly extracted, marketed materials, which then end up in

landfills. According to the European Commission, in 2017 the world extraction of materials had tripled compared to 1970 and continues to have an upward trend. As can be seen in the figure below, the generation of waste is very high, which indicates a waste of resources. Romania, Sweden and Bulgaria have the highest amounts of waste. The storage of this waste, sometimes illegal, causes some areas where there are landfills to suffer numerous losses. From soil and river contamination to the release of pollutants into the atmosphere, landfills cause consequences that intensify regional inequalities.

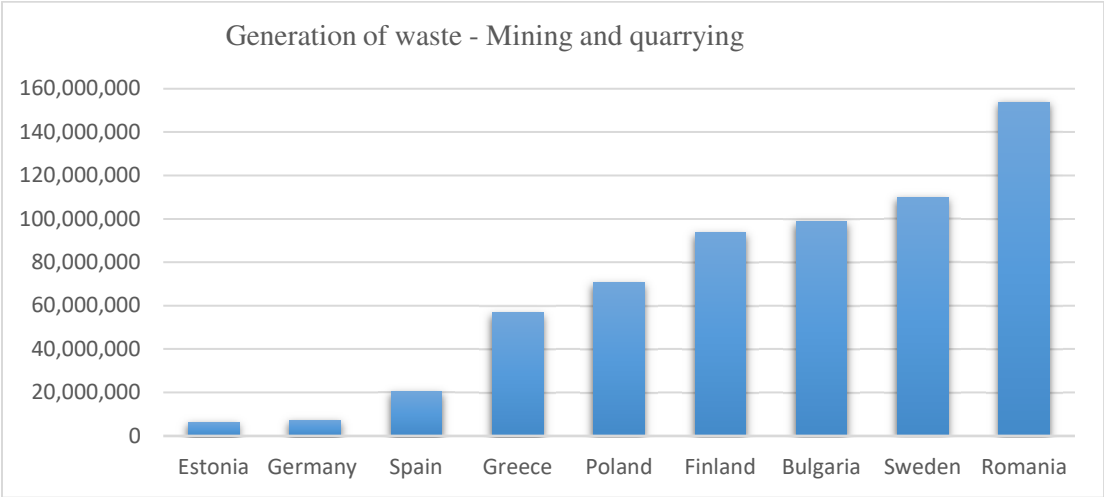

Fig. 4 : Generation of waste- Mining and quarrying

Source: Eurostat

The solution would be to recycle and reuse materials in production processes. At this point, the situation at EU level on recycling can be seen in the figure below. We can see that countries that are at the top of the ranking at the level of waste, such as Romania or Bulgaria are at the bottom of the ranking in terms of waste recycling. The European Green Deal aims to stimulate a green economy, based on renewable resources and the reuse of materials and products. Consumers will also be encouraged to recycle more and give up buying single-use or limited-use products.

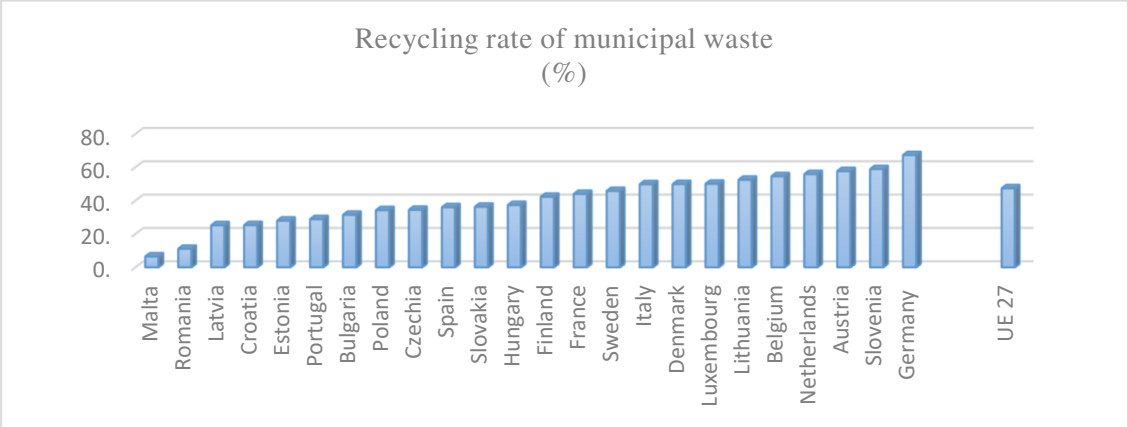

Fig. 5: Recycling rate of municipal waste

Source: Eurostat

Last but not least, the objectives and areas of action of the European Green Deal are designed to develop a sustainable growth model conducive to inclusion. The transition can affect many people and regions, leading to growing inequalities. Also, not all member state will have the same starting point, some will have to implement many or even more drastic measures and for others, who have adopted environmentally friendly measures for years, the transition will be smoother. It is important that people always be at the forefront of taking action, as well as managing the process to take into account

difficulties and prevent them. The challenges of climate change can be turned into a unique opportunity to transform the economy into a more environmentally friendly one, create new and better paid jobs, and improve the health of citizens and their lives daily.

Policy Recommendations

The implementation of the Green Deal has both beneficial effects for the environment and the population and challenges that are felt differently for European Union countries, so we propose a series of policy recommendations in order to achieve the most efficient objectives of this project, without creating new problems and without aggravating the existing ones.

- **Profound changes in technologies and production process.** There is a need to replace old and polluting production technologies with new and efficient ones, improved in terms of resources used. It is also necessary to transform the capacities and abilities of the population in order to be able to use and develop new production technologies.
- **Interconnection of environmental and industrial policies.** A common approach to environmental and industrial policy is closely linked to the fiscal, monetary, competition, trade, technology and labor and wage policies that need to be considered.
- **Ensuring social equity.** The participation of all citizens in the transition activities and the equal distribution of benefits is essential for the implementation of the Green Deal.
- **Identifying alternative solutions for the specificity of each region affected by the transition.** It is necessary to identify alternative solutions taking into account the industry specific to each region, identifying a single alternative solution without taking into account this aspect can increase the burden for certain groups of people.
- **Collective practices**. The government must ensure that all citizens are involved in combating climate action. It also aims to create a mix of appropriate policies to ensure that the achievement of ambitious climate change goals will not intensify economic and social problems but mediate them.
- **Public and private investments.** It is recommended to boost demand for private and public investment, current public spending on environmental goods and services, and exports and consumption. On the contrary, eliminating old polluting production would simply lead to a reduction in production, jobs and income, destroying the consensus for the Green Deal.

Concluding Remarks

In the current pandemic context, climate change policy can be seen as an opportunity for economic recovery, but the unequal effects of society as well as regions must be taken into account. Otherwise, the Green Deal will not be able to meet the inclusion target.

In terms of social inequalities, they pose risks both in the context of climate change and in the attempt to combat climate change. Thus, I think that it is absolutely necessary that inequality be at the heart of economic recovery policies as well as at the heart of Green Deal policies.

Regarding gas emissions, the evolution at EU level has not been uniform, with some countries managing to reduce gas emissions while others have increased them. This issue leads to climate change that affects agriculture and creates social and economic inequalities. As presented above, most farms in Europe are classified as family farms. Thus, the present increasingly of extreme phenomena destroy cultures and leave many families without income. Another major problem is the exess use u of pesticides and the low number of organic crops. At EU level only 8% of the total agricultural area used is organic. In addition, the European Green Deal also aims to increase recycling. In the EU, countries such as Romania and Bulgaria have the highest levels of waste generation. In terms of municipal waste recycling, Slovenia and Germany are the countries that recycle the most, while the EU average is around 45%.

Investment, both public and private, is the key to a successful transition for EU countries, but the management of the Green Deal depends on each country's absorption capacities and their ability to develop feasible projects that can be financed through the European Commission’s instruments.

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Cyberspace and Cybersecurity Models Based on Theory of Systems and Cybernetics

Tomasz PROTASOWICKI
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, tomasz.protasowicki@wat.edu.pl

Jerzy STANIK
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Abstract

Paper presents results of research taken to define and analyze the cyberspace and cybersecurity with use of achievements of theory of systems and cybernetics. Introduced models of cyberspace and cybersecurity refer to them as complex systems that remain in relations and system dependencies, which enables them to carry out a common mission. Their functioning has been illustrated within models by separate elements (components). The structures of systems create appropriate functional and safety configurations. Which when properly designed can minimize the effects of cyber incidents and reduce the set of risk factors of the nature of cyber threats or cyber attacks.

Keywords: Cyberspace, Cybersecurity, Security Configuration, Functional Configuration, Modeling.

Introduction

The current challenges related to cyberspace threats that must be faced by each entity of action (e.g. the European Union, state, organization) and the general development of the situation in the world require constant commitment on the part of security specialists and continuous improvement of solutions in area of cyberspace and cybersecurity. The increasingly global scarcity of cybersecurity skills makes it essential to develop and implement new or improved cybersecurity models. Another issue is a need to develop competencies and raise awareness across all sectors of cybersecurity engineering. Creating trustworthy cyberspace is crucial to increasing its overall resilience.

Cyberspace has become a new security environment. Thusly the necessity to make numerous changes, both in the pragmatics, legal and organizational dimensions of the functioning of security systems in the world and in the approach to constructing various models of cybersecurity. In this context, it is particularly important to understand the dynamics of changes in this environment.

Progressive development of information technologies application in almost all areas of life, business and administration makes crucial to determine what cyberspace actually is. This step allows to take further considerations on cybersecurity, as an area of research. This area is widely explored since years, but literature review demonstrate that taking into consideration the perspective of systems theory and cybernetics in this field is not common approach among researchers. Nevertheless there could be found a few of recent research delivering valuable results with use of this approach like Alqurashi et al (2013), Anjaria et al (2017) and Silhavy (2020).

Generally the cyberspace can be treated as an entity that transforms certain external and internal factors into specific goods. The effectiveness of this process is essentially the product of proper control and circumstances. Control means the process of making decisions in various spheres, which often have a different time horizon. It is done on the basis of the information provided. Their important source are various types of system analyzes, most of which concern only certain selected spheres of cyberspace operation, rarely covering cyberspace as a whole.

Digital systems, as the basic elements of cyberspace, have become so complex that it is impossible to prevent all cyber attacks. This problem can be solved by ensuring rapid detection and response. These in turn is only possible if we have adequate models of cyberspace and cybersecurity. Meanwhile, cybersecurity has not yet been fully integrated into the into management systems of the entities of action (e.g. existing EU-wide crisis response coordination mechanisms, national cybersecurity systems, nor organization's security management systems). A tool

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that can significantly support cybersecurity management is a comprehensive model of cyberspace and cybersecurity.

The system and control theory assumes the possibility of application an universal theoretical framework for various concepts in the field of security engineering. This may be an useful paradigm to order the discussion on cybersecurity, which allows to combine results of interdisciplinary research of various scientific disciplines. The system approach enables modeling of changes taking place both in the cyberspace and elements of its environment. Results of these changes or effects of interactions between previously mentioned elements might be unsatisfactory due to the adopted criterion. Therefore there is a need to introduce a mechanism to enable the control of the usability properties of cyberspace in such a way as to achieve the goal of the operating e.g. an acceptable level of security.

Presented paper is an attempt to present a general way of modeling cyberspace, which would allow to describe and study its functioning in terms of utility, security and risk assessment. System approach to description of cyberspace, have been treated by authors as a starting point allowing to elaborate proposal a cybersecurity model. This in turn will enable the measurement of the state or level of security of individual domain systems in cyberspace and will ensure the maintenance of an acceptable level of cyberspace security.

The necessary process of building and expanding the cybersecurity management system should take place as part of a dialogue between all cyberspace stakeholders, in which the cybersecurity service should play the role of a coordinator and catalyst of cooperation between interested parties.

Cyberspace Model

Cyberspace is a time-dependent set of interconnected information systems and people that interact with these systems like in research study by Sienkiewicz (2015) or in documents released by the Cabinet Office (2011). It is the entirety of connections between human activity and information communication technology. It is a virtual object, devoid of geographical parameters, immeasurable and unlimited. Its boundaries are determined by the level of the current development of information technology and the degree of communication network development of the world. In the system approach, cyberspace is treated as an open system (Fig. 1).

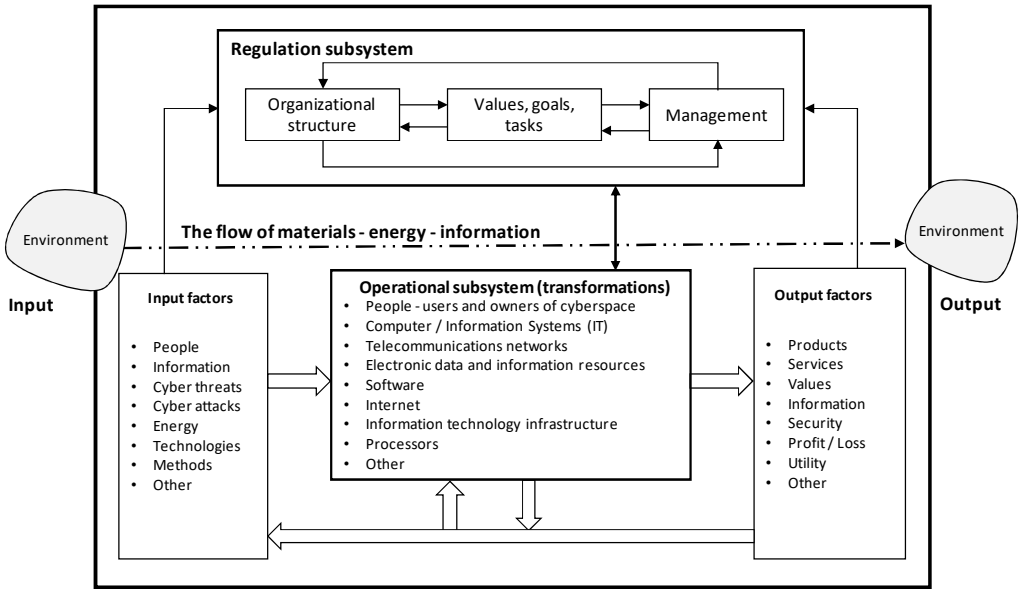

Fig. 1: Illustration of basic objects of the production system and their relations.

The openness of the system lies in the fact of exchange the information, energy or matter with the environment as presented in the book by Morgan (2005). A system approach to the analysis of cyberspace forces it to be treated as a compact structure with various inputs and outputs. Inside this structure there are smaller elements that are treated as systems or subsystems that enable the processing of inputs to outputs in accordance with the goals of cyberspace. The most important elements of cyberspace are the regulation (management) subsystem and the operational (execution, transformation) subsystem (Fig.1).

The regulation subsystem consists of the following elements: organizational structure, organization's values, goals and tasks, management subsystem. The literature in the field of cybernetics contains a very extensive discussion of the issues of regulation (control), distinguishing its three basic methods: compensation of deviations, compensation of disturbances, elimination of disturbances, like in book by Regulski (1974). Apart from the technical and technological subsystem, the elements of the operational (transformation, execution) system are also the social subsystem.

The essence of the exchange between cyberspace and the environment is to provide the environment with products, services, values and the current level of security (output factors) resulting from the activities of cyberspace (i.e. the result of transformation of input factors). In turn, the environment provides cyberspace, in addition to tangible and intangible resources (input factors), which allow it to continue its operations, also disruptions in the nature of cyber threats and cyber attacks.

Respecting the above, model of cyberspace in terms of systems theory has been stated as follows:

$$CS =< \mathbb{S}, \mathbb{R} \subseteq \mathbb{S} \times \mathbb{S}, \mathbb{E}, \mathbb{U}, \mathbb{IC} > \tag{1}$$

where:

$\mathbb{S}$ – is a set of cyberspace systems,
$\mathbb{R}$ – is a finite set of relations defined on the set $\mathbb{S}$,
$\mathbb{E}$ – is an cyberspace environment,
$\mathbb{U}$ – is a set of cyberspace usability features,
$\mathbb{IC}$ – is a set of cyberspace security indicators.

Set of cyberspace systems is given by following formula:

$$\mathbb{S} = \mathbb{S}^K \cup \mathbb{S}^I \cup \mathbb{S}^T \cup IoT \tag{2}$$

where:

$\mathbb{S}^K$ – is a set of computer systems,
$\mathbb{S}^I$ – is a set of information systems,
$\mathbb{S}^T$ – is a set of telecommunications networks,
IoT – Internet of Things – is a network of everyday objects equipped with hardware, software and sensors so that they can connect and exchange data via the Internet.

Set $\mathbb{R}$ of relations defined on the set $\mathbb{S}$ is given by following formula:

$$\mathbb{R} = \mathbb{R}^{SS} \cup \mathbb{R}^{SE} \tag{3}$$

where:

$\mathbb{R}^{SS} \subseteq \mathbb{S} \times \mathbb{S}$ – is a set of relationships between systems responsible for performing of specific actions,
$\mathbb{R}^{SE} \subseteq \mathbb{S} \times \mathbb{E}$ – is a set of relationships between systems and elements of the cyberspace environment.

The cyberspace environment consists of all internal and external factors as well as the input and output factors of cyberspace, what has been stated as follows:

$$\mathbb{E} = \mathbb{E}^{CW} \cup \mathbb{E}^{CZ} \cup \mathbb{E}^{WE} \cup \mathbb{E}^{WY} \tag{4}$$

where:

$\mathbb{E}^{CW}$ – is a set of internal factors,
$\mathbb{E}^{CZ}$ – is a set of external factors,
$\mathbb{E}^{WE}$ – is a set of input factors,
$\mathbb{E}^{WY}$ – is a set of output factors.

Set $\mathbb{U}$ of cyberspace usability features is given by following formula:

$$\mathbb{U} = \mathbb{U}^{CF} \cup \mathbb{E}^{CR} \cup \mathbb{E}^{CS} \cup \mathbb{E}^{CE} \cup \mathbb{E}^{CN} \cup \mathbb{E}^{CB} \tag{5}$$

where:

$\mathbb{U}^{CF}$ – is a set of features related to the attribute of cyberspace functionality,
$\mathbb{U}^{CR}$ – is a set of features related to the attribute of cyberspace operational rationality,
$\mathbb{U}^{CS}$ – is a set of features related to the attribute of cyberspace efficiency,
$\mathbb{U}^{CE}$ – is a set of features related to the attribute of cyberspace operational effectiveness,
$\mathbb{U}^{CN}$ – is a set of features related to the attribute of cyberspace operational reliability,
$\mathbb{U}^{CB}$ – is a set of features related to the attribute of cyberspace security.

Set $\mathbb{IC}$ of cyberspace security indicators has been stated as follows:

$$\mathbb{IC} = \mathbb{IC}^1 \cup \mathbb{IC}^2 \cup, \dots, \cup \mathbb{IC}^s \cup, \dots \cup \mathbb{IC}^{\overline{\mathbb{S}}}, \tag{6}$$

where:

$\mathbb{U}^s$ – is a set of security indicators related to the s-th cyberspace system,
$\overline{\mathbb{S}}$ – is the number of distinguished systems in cyberspace.

Set $\mathbb{U}^s$ of security indicators related to the s-th cyberspace system is defined by following formula:

$$\mathbb{U}^s = \{b_d^s : d = \overline{1, D^s}\} \tag{7}$$

where b_d^s is an d-th security indicator related to the s-th cyberspace system.
The main goal of modeling cyberspace is to prepare such operating procedures that will allow for optimal management of it or its elements, in the sense of the adopted usability indicator which is the criterion function.

Cybersecurity Model

In ISO/IEC 27032 cybersecurity or cyberspace security is defined as the protection of privacy, integrity, and accessibility of data information in the cyberspace. But actually cybersecurity is wider concept, which refer to different domains of security i.e. Communications Security, Operations Security, Information Security, Physical Security, Public/National Security.

While considering the protection of cyberspace key resources we assumed that it should be carried out using the Cyberspace Security Management System (CSMS). From a system theory perspective, this subsystem is defined as a coherent, hierarchical organization (structure) aimed to maintain the required level of security for all systems included in cyberspace as mentioned by Mrówka (2015). In the structure of cyberspace, the CSMS takes a supporting role against the priority needs and requirements of cyberspace. Formally it can be stated as with following formula:

$$CSMS = \langle \mathrm{O}_{CSMS}, O_{CSMS} \times O_{CSMS} \rangle = \langle O_{CSMS}, \{R_{CSMS}\} \rangle \tag{8}$$

where:

O_{CSMS} – is a set of elements of the organizational and functional structure of the CSMS,
R_{CSMS} – is a set of system relationships and protection tasks implemented for the maintain required level of cyberspace security.

For the purposes of building a cybersecurity model, the CSMS will be represented in the cybernetic system convention, so written as a Cartesian product of: inputs (security system needs), outputs (CSMS capabilities) and decisions:

$$CSMS \subseteq \{P \times D_{CSMS} \times M_{CSMS}\} \xrightarrow{P_{CSMS}(t)} F_{CSMS} \tag{9}$$

where:

P – is a cyberspace needs in terms of security and protection of its sensitive resources (e.g. cyberspace security requirements specification),
D_{CSMS} – are decisions controlling cyberspace security management processes,
M_{CSMS} – are execution capabilities of the cyberspace security management system,
$P_{CSMS}(t)$ – is a function of cyberspace security management,
F_{CSMS} – is an objective function (effectiveness, usability) of cyberspace security management.

Wherein functions $P_{CSMS}(t)$ and F_{CSMS} are given by following formulas:

$$P_{CSMS}(t) : P \times D_{CSMS} \longrightarrow M_{CSMS} \tag{10}$$

$$F_{CSMS} : D_{CSMS} \times M_{CSMS} \longrightarrow R^+ \tag{11}$$

where: R^+ is a set of real numbers (indicator of quality or usefulness of cyberspace security management system).
The CSMS, as one of the cyberspace support systems, is responsible for maintaining and supporting the functioning of basic cyberspace systems. In the functional sense main task of CSMS is the preparation and maintenance of the required cyberspace security potential ($\Phi_O(t)$. In cyberspace security structures it is transformed into operational potential ($\Phi(\mathrm{t})$). The balance equation of the operational potential $\Phi(\mathrm{t})$ w in terms of cyberspace security can be written as below:

$$\Phi(\mathrm{t}) = \Phi_P - \Phi_Z(t) + \Phi_O(t), \tag{12}$$

where:

$\Phi(\mathrm{t})$ – is current operational potential at time t,
Φ_P – is initial operational potential at time t,
$\Phi_Z(t)$ – is spent cyberspace security potential,
$\Phi_O(t)$ – is recreated potential of cyberspace security.

As can be seen from equation (12), the operational potential $\Phi(\mathrm{t})$ is a function of, on the one hand, the intensity of destruction of the cyberspace security potential $\Phi_Z(t)$, on the other hand, a function of the intensity of its reconstruction. Its third independent variable (relatively constant) is the initial value of the operational potential Φ_P, so we can give it as follows:

$$\Phi(\mathrm{t}) = g(\Phi_P.\Phi_Z(t), \Phi_O(t)) \tag{13}$$

The cybersecurity management process is a continuous process and must be conducted with appropriate intensity, reliability, efficiency and with rationally justified material (O_M),, time (O_T) and financial (O_F) expenditures.

The conditions and needs pointed above impose certain requirements and restrictions on the CSMS, which must be met often while critical conditions occurs (e.g. during crisis situations). The cybersecurity management process (PR_{CSMS}) can be formally defined as the transformation of cyberspace potential ($\Phi_O(t)$) into operational potential ($\Phi(\mathrm{t})$), the highest form of which is the cyberspace security potential ($\mathrm{A}(\mathrm{t})$) understood as for specific tasks:

$$(PR_{CSMS}|O_M, O_T, O_F) : \Phi_O(t) \longrightarrow \Phi(\mathrm{t}) \longrightarrow \mathrm{A}(\mathrm{t}) \tag{14}$$

The CSMS is a dynamic system that must keep up with the rapidly changing needs of cyberspace systems, according to the actual geopolitical situation. The rational shaping of the organizational and functional structure and its operating procedures is a particularly complex and responsible task. Therefore, its development and improvement takes place through both theoretical and practical modeling. Simulation modeling and specialized tool software turn out to be particularly useful in this respect.

The cybersecurity models are only a certain approximation of a specific reality and illustrate only some aspects of the general structure of the real cyberspace security system. Successively developed and increasingly closer to reality models contribute a closer knowledge of the actual state of affairs and to attempts to improve this state and improve functions and processes.

One such model is the cybersecurity model. It is a formal model given in the form of logical-mathematical rules with the use of symbolic expressions, functions and formal structures. According to the general assumptions of system analysis and the sciences of systems theory and cybernetics, the Cybersecurity Model (CM) has been stated as follows:

$$MM_{CM} = \langle PD_{CM}, PC_{CM}, C_{CM,} \mathrm{B}_{CM}, \{D_{CM}, R_{CM}\}, ZZ_{CM}, \boldsymbol{Q_{CM}} \rangle \tag{15}$$

where:

PD_{CM} – are an entities of action, which are management bodies and functional persons responsible for the efficiency, reliability and safety of objects, domain systems, devices and installations included in cyberspace,
PC_{CM} – is a matter of action, which includes: objects, systems, devices and installations in relation to which the required level of security must be maintained,
$C_{CM,}$ – is the goal of the cybersecurity management system,
B_{CM} – is the cybersecurity policy for cyberspace,
D_{CM} – is the domain of cybersecurity management system,
R_{CM} – are relationships in the cybersecurity management system,
ZZ_{CM} – are rules of operation of the cybersecurity management system,
Q_{CM} – control subsystem regulating the usability properties of cyberspace and cybersecurity configurations.

Set PD_{CM} of entities of action could be decomposed as follows:

$$PD_{CM} = PD_{CM}^{OK} \cup PD_{CM}^{WŁ} \cup PD_{CM}^{SB} \tag{16}$$

where:

PD_{CM}^{OK} – is a set of management bodies responsible for the efficiency and reliability of cyberspace,
$PD_{CM}^{WŁ}$ – is a set of owners of domain systems, objects, devices and installations in cyberspace,
PD_{CM}^{SB} – is a set of decision-maker appointed within the structure of the cybersecurity staff.

In relation to individual elements or systems of cyberspace and the possibility of adjustment the current level of their security, the matter of action is a set of $e_j \in \mathbb{S}$ elements. The desired state of such elements can be determined by the decision-makers (authorized cybersecurity staff). The elements of the set $\mathbb{S}$ (Fig. 1) can be i.e.:

- domain systems of cyberspace,

- telecommunications networks,
- key business processes,
- information processing processes,
- information resources collected or processed within domain systems,
- software.

The main goal of the CSMS is to minimize cyber threats and maximize the security level of cyberspace domain systems. Its mission (goal) can be considered on several levels (e.g. strategic, tactical and operational).
The operational goal is the implementation of dynamic cybersecurity management processes in the critical infrastructure of cyberspace in a three-dimensional space including: cyber threats or cyber attacks, space and time. It is a transformation of cybersecurity management processes into schedules of operational protective activities in relation to cyber threats:

$$C_{CM}^{O} : \ \Phi_{CM} \longrightarrow H_{CM} \subseteq X \times Y \times T \tag{17}$$

where:

C_{CM}^{O} – is the operational goal of cybersecurity management system,
Φ_{CM} – is the operational potential of a cybersecurity management system,
H_{CM} – are a cybersecurity management process schedules
$X \times Y \times T$ – is the cybersecurity management space.

A cybersecurity policy is a document containing the assumptions and requirements of a given cyberspace in terms of security of its critical elements. It is a key element of the protection of cyberspace domain systems without which the use of even the most advanced technical, software or organizational security is not able to ensure a sufficient level of security of cyberspace.

The set of cybersecurity policy requirements for the system $S \in \mathbb{S}$ is a finite and countable set given as follows:

$$W_S = \{w_S^j : j = \overline{1, J^s}\} \tag{18}$$

where J^S is the number of cybersecurity policy requirements for the s-th cyberspace system.

For each of the requirements $w_S^j \in W_S$, we define the priority of the requirement in relation to a given domain system using the number $p_S^j \in \{0, \dots, 5\}$, where: 0 - means that the requirement has lowest importance to the $S \in \mathbb{S}$, system, 5 - means that the requirement has highest importance to the $S \in \mathbb{S}$, system.

The concept of the domain of cybersecurity management system D_{CM} will be considered in several aspects, according to various classification criteria. Most generally, the domain of D_{CM} model is a set of elements that a given system consists, which are possible to distinguish with respect of the adopted rules of topological division. Due to the dynamic and interactive nature of the analyzed system, the model domain was divided into two classes relating to the external and internal environment. The external system environment D_{CM}^{Z} includes all factors and external elements of the economic, social, political and military environment that affect the implementation of the cybersecurity management process. Internal environment D_{CM}^{W} of the cybersecurity management system, there are all factors and elements that make up the internal organizational and functional structure of the cybersecurity management system. For organizational and technical reasons, the separated internal elements operate in specific organizational and functional structures that can be identified with autonomous cyberspace systems.

One of the basic determinants of the cybersecurity management system is the set of $\boldsymbol{R_{CM}}$ relationships which define the relationships and dependencies between cyberspace objects, systems, devices and services. Due to the complexity of the cybersecurity management system and the very extensive scope of the $\boldsymbol{D_{CM}}$ domain mean that the set of relationships and connections between its elements and the environment is also complex and intricate. Relationships in the cybersecurity management system can be divided into two main groups as follows:

$$R_{CM} = \{R_{CM}^{S}, R_{CM}^{I}\} \tag{19}$$

where:

R_{CM}^{S} – is a set of system relationships including internal and external dependencies,
R_{CM}^{I} – is a set of cybersecurity management relationships.

The control subsystem for the usability properties of cyberspace and cybersecurity configurations will be formally defined by following expression:

$$Q_{CM} = \langle\, PM_{CM}, \Delta_{CM}, KF_{CM} \xrightarrow{\delta \in \Delta_{CM}} (KB_{CM} | L_{CM}), F_{CM}, S_{CM} \rangle \tag{20}$$

where:

PM_{CM} – is a decision subject,
Δ_{CM} – is a set of control decisions or directives,
KF_{CM} – is a set of cyberspace functional configurations,
KB_{CM} – is a set of cyberspace security configurations,
L_{CM} – is a set of cyberspace protection constraints,
F_{CM} – is a general functional reconfiguration function for cyberspace,
S_{CM} – is a set of cyberspace protection scenarios.

The subject of decision-making is a set of PM_{CM} functional persons who are members of the security staff of individual domain systems of cyberspace, playing various roles in the cybersecurity management process and having the right to make steering decisions.

The set of control decisions Δ_{CM} could be decomposed as follows:

$$\Delta_{CM} = \Delta_{CM}^{ZW} \cup \Delta_{CM}^{WU} \cup \Delta_{CM}^{AB} \tag{21}$$

where:

Δ_{CM}^{ZW} – is a set of control decisions for sensitive resources,
Δ_{CM}^{WU} – is a set of control decisions for establish usability properties of cyberspace,
Δ_{CM}^{AB} – is a set of control decisions for establish level of security attributes properties of sensitive resources.

The functional cyberspace configuration $KF^{k,l} \in KF_{CM}$ is given as follows:

$$KF^{k,l} = \langle Z^{k,l}, O^{k}, ZT^{l} \rangle \tag{22}$$

where:

$Z^{k,l}$ – is a set of tasks (activities or functions) that can be performed in a specific cyberspace with a specific functional configuration,
O^{k} – is a set of resources involved in the execution of tasks from set $Z^{k,l}$,
ZT^{l} – a set of technically efficient hardware and software resources used to appoint a kl-th functional configuration.

The cyberspace security configuration $KB^{m,n} \in KB_{CM}$ is given as follows:

$$KB^{m,n} = \langle ZW^{m,n}, O^{m}, MB^{n} \rangle \tag{23}$$

where:

$ZW^{m,n}$ – is a set of sensitive resources secured by kl-th security configuration;
O^{m} – a set of cybersecurity staff involved in ensuring the security of sensitive resources from a set $ZW^{m,n}$,
MB^{n} – a set of security mechanisms (technical or organizational) that make up the kl-th security configuration.

The cognizance of the security configuration $KB^{m,n}$ makes it possible to assign to each set $ZW^{m,n}$, a corresponding set of O^{m}., with a security mechanisms defined by set of MB^{n}. The cyberspace security configuration $KB^{m,n}$ is realized if and only if the set $ZW^{m,n}$, with certain elements of the set MB^{n}, can be assigned such a set O^{m} that will ensure the maintenance of the required security level of a set of sensitive resources $ZW^{m,n}$. Assuming the above, a result set $ZW^{m,n}$, for a given the set MB^{n}, is related to the set $ZW^{m,n}$, i.e. $ZW^{m,n} \times KB^{m,n} \times O^{m}$. Thus, we can consider the cyberspace security configuration (23) as an analog of the transformation system described in terms of theory of Mesarovic (1976), in which the inputs are resources from the set $ZW^{m,n}$ and outputs are elements from the set O^{m}.

The subsets of $ZW^{m,n} \subseteq ZW_{CM}$ constitute sensitive cyberspace resources and relate to the basic material and non-material categories used by cyberspace. The key sensitive resources are IT systems and telecommunications

networks. They constitute a kind of operational media that are the essence of cyberspace protection processes in the dynamics of operational activities. Effective protection of cyberspace systems requires the effective use of both tangible and intangible resources to prevent crisis situations and prepare for adverse events (e.g. cyber attacks or cyber threats, reacting during the destruction or disruption of individual domain systems), as well as when restoring cyberspace to operation. All these activities lead to the cybersecurity management system becoming ready and launch operational processes to protect the key elements for assure required level of the cybersecurity:

$$ZW_{CM} \times MB_{CM} \longrightarrow PP_{CM} \tag{24}$$

where:

ZW_{CM} – is a set of sensitive resources of cyberspace,
MB_{CM} – is a set of technical and organizational security means,
PP_{CM} – is a set of protection processes that guarantee the implementation of tasks in the field of cybersecurity.

Set PP_{CM} of protection processes could be decomposed as follows:

$$PP_{CM} \subset \{PP_{CM}^{A}, PP_{CM}^{Z}, PP_{CM}^{ZZ}, PP_{CM}^{OD}\} \tag{25}$$

where:

PP_{CM}^{A} – are processes of preparing cyberspace for cyber attacks,
PP_{CM}^{Z} – are processes of preparing cyberspace for cyber threats,
PP_{CM}^{ZZ} – are processes of preventing the disruption of critical elements of cyberspace,
PP_{CM}^{OD} – are processes of cyberspace restoration.

The implementation of cyberspace protection processes requires the fulfillment of a number of necessary and sufficient conditions relating to the internal and external environment of the cybersecurity management system. The set L_{CM} of system constraints and conditions can be decomposed as follows:

$$L_{CM} \subset \{L_{CM}^{S}, L_{CM}^{Z}, L_{CM}^{W}\} \tag{26}$$

where:

L_{CM} – is a set of cyberspace protection restrictions,
L_{CM}^{S} – is a set of system constraints,
L_{CM}^{Z} – is a set of constraints generated by the external environment,
L_{CM}^{W} – is a set of constraints generated by the internal environment.

The scope of the functional reconfiguration (F_{CM}) of the cyberspace security management system includes the following elements:

$$F_{CM} \subset \{F_{CM}^{E}, F_{CM}^{N}, F_{CM}^{S} | L_{CM}^{S}, L_{CM}^{Z}, L_{CM}^{W}\} \tag{27}$$

where:

F_{CM}^{E} – is function of effectiveness,
F_{CM}^{N} – is function of reliability,
F_{CM}^{S} – is function of security.

In order to create the possibility of equalize the loss of an acceptable level of cyberspace security, it is required to define, at the stage of designing cyberspace, a set of permissible control decisions (directives), with the help of which the cybersecurity management staff would be able to determine such current properties of the functional configuration and security configuration whose enable or ensure the achievement of the required cybersecurity state as a research study by Hoffmann and Stanik (2017).

Family of sets for acceptable safety configurations is given as follows:

$$\mathbb{KB} = \left\{KB_{dop}^{v}, v = \overline{1, V}\right\} \tag{28}$$

where V is the number of distinguished types of crisis or emergency situations in cyberspace.

The transition from the state "loss of the required security state" to the state "acceptable level of cybersecurity" can be described by the following projection:

$$F_{CM} : \mathbb{KB} \longrightarrow \mathbb{KB} \tag{29}$$

given as:

$$F_{CM}\left(\mathbb{K}B_{dop}^{w}\right) = \mathbb{K}B_{dop}^{v}, \;\; w, v \in V, w \neq v \tag{30}$$

where:

$\mathbb{K}B_{dop}^{w}$ – is a set of a set of acceptable security configurations before the occurrence of a crisis or emergency situation with the number $v \in V$,

$\mathbb{K}B_{dop}^{v}$ – is a set of a set of acceptable security configurations after the occurrence of a crisis or emergency situation with the number $v \in V$.

F_{CM} is determined at the stage of designing cyberspace so that it provides the desired features or usability properties of cyberspace during its operation.

Conclusions

The main goal of modeling cyberspace and cybersecurity is to enable the construction of an effective cybersecurity management system and the preparation of such steering decisions (directives), operating procedures, which will allow for the optimal management (control) of cybersecurity, in the sense of the adopted security criterion. In practical terms, optimal decisions consist in determining detailed plans and procedures for protecting cyberspace systems in relation to identified cyber threats and possible occurrence of cyber attacks, while meeting the actual system constraints and the current boundary conditions. As a result of forecasting the state of cyber threats and assessing the level of cybersecurity, decisions are made with regard to the course of operational activities based on the established function of the security criterion and a wide spectrum of various conditions and limitations. The physical manifestation of these decisions will be e.g. detailed plans for the protection of domain-specific cyberspace systems which take form of cyberspace protection scenarios.

The views on the essence of cyberspace and cybersecurity presented in this article are the result of certain arbitrary assumptions and subjective choices, hence they are necessarily incomplete in the sense of exhausting the topic of research on cyberspace and cybersecurity models. The most risky question remains open, namely about the future of cyberspace and the information society that is realized in it. Considering the growing dynamics of changes in the sphere of ICT solutions (technosphere), infosphere (explosion of information, but also information smog), as well as in the socio-sphere (creation and development of social media), it should be assumed that the future of cyberspace and cybersecurity will probably be different than we currently imagine. Undoubtedly, phase of development of contemporary civilization, or rather the current and future phase (in the sense of predictable trends or megatrends), can be referred to as a developing information civilization as mentioned by Sienkiewicz (2015). Its development brings with it numerous benefits as well as new unknown threats related to cyberspace. Therefore, it is important to constantly conduct research in the area of cybersecurity and search for answers to emerging questions regarding effective management and ensuring the required level of security. In searching for answers to these questions, models undoubtedly play an important role, allowing for research on large systems, including cyberspace. Models of cyberspace and cybersecurity introduced in this paper refer to them as a complex systems that remain in relations and system dependencies, which enables them to carry out a common mission. Their functioning has been illustrated within models by separate elements (components). The structures of systems create appropriate functional and safety configurations. Which when properly designed can minimize the effects of cyber incidents and reduce the set of risk factors of the nature of cyber threats or cyber attacks.

Effective counteracting of identified cyber threats and cyber attacks requires building an effective cybersecurity management system, the key elements of which are appropriately selected functional and cyberspace security configurations. Generated security configurations should ensure an appropriate level or state of cyberspace security, accepted by all cyberspace entities of action. Experience shows that the cybersecurity management system requires the construction of an adequate cybersecurity model, a clear division of competences of cybersecurity staff and their absolute cooperation. In addition, building an effective cybersecurity management system is a long-term process that requires a lot of work and large financial resources. The models presented in this study may prove useful at the

stage of designing this system and testing its properties (e.g. by simulation), including effectiveness, operating costs, etc.

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Formation of A Safe Digital Educational Environment as The Basis for Solving Economic Security Problems in The Conditions of The Formation of An Innovative Economy

Chvyakin Vladimir Alekseevich
127550, Russia Moscow, st. Bolshaya Semyonovskaya, 38. e-mail: enigma3021@mail.ru

Zhakhov Nikolay Vladimirovich
305021, Russia Kursk, to st. is 50 years of October, 94 e-mail: zhakhov@mail.ru

Tarakanov Alexander Valerievich
119261, Russia Moscow, Leninsky Prospekt, 80 e-mail: enigma3021@mail.ru

Orlov Vitaly Vladimirovich
119261, Russia Moscow, Leninsky Prospekt, 80 e-mail: enigma3021@mail.ru

Abstract

The central link in ensuring economic security in the education system is the economic security of an educational organization. The economic security of an educational organization depends on a large number of factors of a very different nature, duration and scale, which determines its essence. Three groups of factors of economic security of an educational organization have been identified. As indicators of the degree of risk, it is advisable to use risk coefficients showing the likelihood of unfavorable outcomes when the goal of a certain level is achieved by one of the interested parties. Special types of risks for education are presented. The work highlights two aspects of information security: protection from the negative impact of the influencing information environment and the provision of a basis for positive socialization and individualization of the teacher in the context of achieving a high level of education quality.

Keywords: Digital Educational Environment, Economic Security, Information Security, Innovative Economy.

In modern economic literature, much attention is paid to both theoretical and practical security issues. Proceeding from a common understanding of security (at any level) as protection from external and internal threats, relying on the research of Russian economists O.V. Komarov, Yu.Yu. Velichko, N.V. Zhakhov, N.V. Sirotkina, V.Krivoshlykov. FROM. and other economic security of the country means, including the rhythmic functioning of all spheres of public life and national economy (industry, energy, finance, education, health care, etc.) [1-9].

The central link in ensuring economic security in the education system is the economic security of an educational organization. The economic security of an educational organization depends on a large number of factors of a very different nature, duration and scale, which determines its essence.

It should be noted that modern legislation does not contain specific norms aimed at ensuring the security of the digital educational environment. Nevertheless, it should be noted that paragraph 27 of the Doctrine of information security of the Russian Federation, approved by the Decree of the President of the Russian Federation of 05.12.2016 No. 646 [10] (hereinafter the Doctrine), proclaims the main directions of ensuring information security in the field of science, technology and education:

- achieving the competitiveness of Russian information technologies and the development of scientific and technical potential in the field of information security;
- creation and implementation of information technologies, initially resistant to various types of impact;
- conducting scientific research and carrying out experimental developments in order to create promising information technologies and information security means;
- development of human resources in the field of information security and the use of information technology [11];

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- ensuring the protection of citizens from information threats, including through the formation of a culture of personal information security.

Thus, within the framework of the implementation of the goals proclaimed in the Doctrine, it is necessary to develop and adopt a separate regulatory legal act that will provide a legal basis for the security of the digital educational environment in order to exclude unauthorized entry into educational information resources of “harmful” information that can have a negative impact on students.

It is advisable to present the system of factors of economic security of an educational organization as follows:

The first group of factors is associated with resource provision: personnel, financial, material. Since all economic resources receive a monetary value, this group of factors is associated with the financial condition of the organization.

The second group of factors is associated with the economic security of the person involved in the educational process. For educational organizations, there is an urgent need to take into account this system of factors, which is due to the large number of individuals participating in educational activities. Information security, legal security, life safety, etc. are intertwined in educational activities.

The third group of factors is associated with the adoption of management decisions in the field of economic security for a given educational organization. This aspect must be introduced due to the fact that, ultimately, both resource provision and the economic security of an individual depend on what management decisions in the field of economic security are made in a given organization.

The level of economic security of an educational organization depends not only on the level of internal factors, but also on the state of the education economy in the country as a whole.

In the course of their educational activities, educational organizations are faced with a set of different types of risk, which differ from each other in the place and time of occurrence, and are interconnected by the fact that a change in one type of risk can cause a change in most of the rest. Therefore, it is important not only to identify the risks of educational activities, but also to systematize, analyze them, determine the interdependence among themselves and the degree of influence on the achievement of the main goal of the educational organization - the provision of high-quality educational services.

As indicators of the degree of risk, it is advisable to use risk ratios showing the probability of unfavorable outcomes when the goal of a certain level of one of the interested parties is achieved. The education sector is characterized by special types of risks (Figure 1).

One of the ways to solve information security problems in modern educational organizations is seen in the formation of a safe personal information space.

The modern information system in the field of education is a complex system consisting of a large number of components of varying degrees of autonomy, which are interconnected and exchange data.

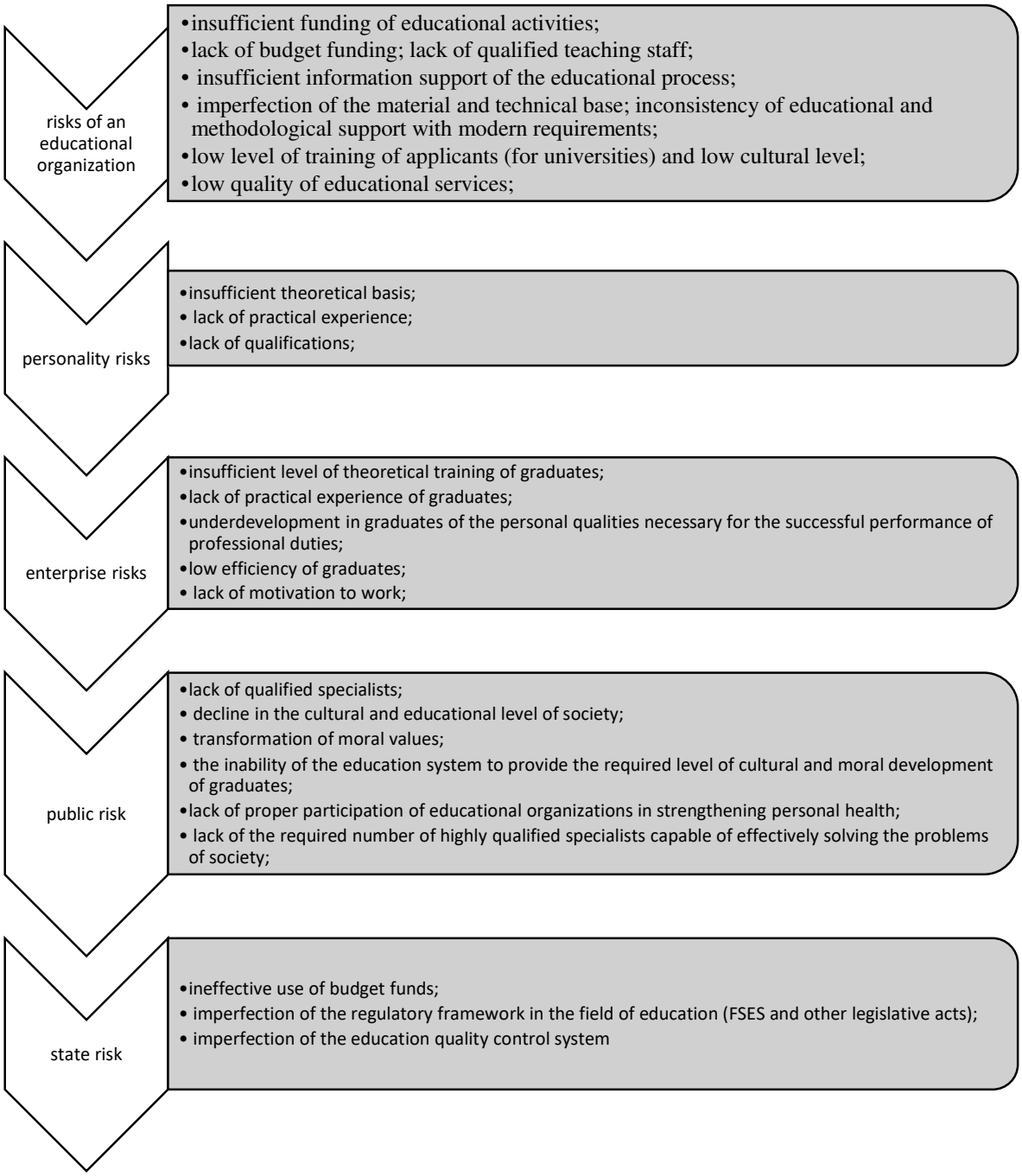

Figure 1: Risks specific to the education sector

Almost every component can be damaged or damaged. It is advisable to divide the components of an automated information system in the field of education into the following groups:

- hardware - computers and their components (processors, monitors, terminals, peripheral devices - disk drives, printers, controllers, cables, communication lines, etc.);
- software - purchased programs, source, object, load modules; operating systems and system programs (compilers, linkers, etc.), utilities, diagnostic programs, etc .;
- data stored temporarily and permanently, on magnetic media, printed, archives, system logs, etc .;
- personnel - service personnel and users.

Dangerous impacts on a computer information system can be divided into accidental and intentional. Information

is exposed to various random influences at all stages of the life cycle of the system.
The reasons for accidental impacts during operation can be:

- emergency situations due to natural disasters and power outages;
- hardware failures and failures;
- bugs in software;
- mistakes in staff work;
- interference in communication lines due to environmental influences.

Intentional actions are deliberate actions of the offender. An employee, visitor, competitor, mercenary can act as an offender. The actions of the offender can be caused by different motives:

- employee's dissatisfaction with his career;
- a bribe;
- curiosity;
- competition;
- the desire to assert itself at any cost.

The most widespread and diverse type of computer violations is unauthorized access (UA). NSD uses any error in the protection system and is possible with an irrational choice of protection means, their incorrect installation and configuration.

The researchers of this issue refer the following to the factors of the information and educational environment that can become dangers of information security of schoolchildren:

- availability and unlimited amount of information coming to the child;
- the presence in the information environment of means of manipulating consciousness, affecting the mental and physiological systems of a person;
- the presence in the information content of specific elements that purposefully change the psychophysiological state of children and adolescents.

Information security in an educational institution in modern science is defined as a system of mandatory contexts of the social situation of development. In order to determine the level of information security, due attention should be paid to fixing the levels of cognitive and personal development of the student, which are a determining factor in assessing the ability to withstand the unfavorable components of the social situation of development in the context of information security.

Thus, two aspects of information security are distinguished: protection from the negative impact of the influencing information environment and the provision of the basis for positive socialization and individualization of the teacher in the context of achieving a high level of education quality (Figure 2).

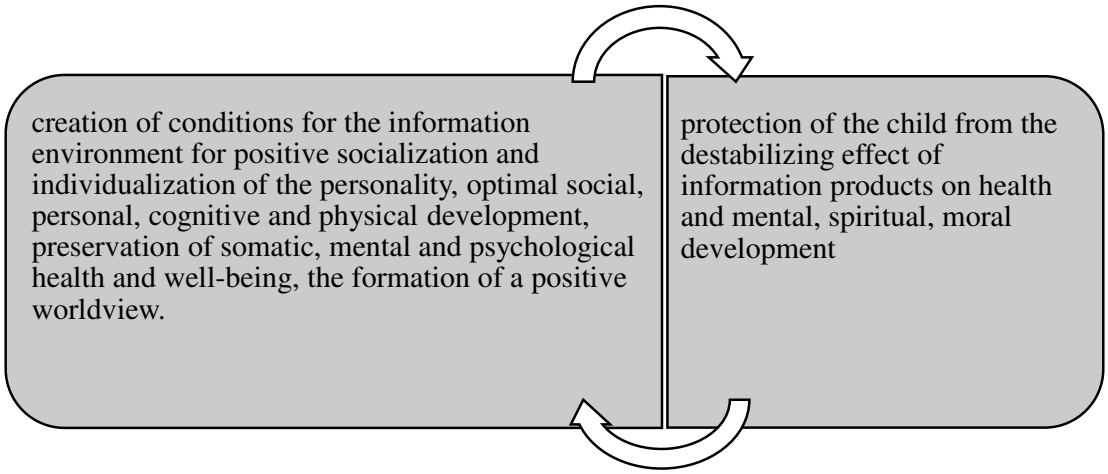

Figure 2: Information security structure

A safe information educational environment of each institution should be based on the integration of information and

communication technologies into the methodological aspect of pedagogical influence, which determines the need for the formation of new technological and information levels of all processes accompanying this activity. One of the ways is the formation of positive educational content in the educational process, which serves as the basis for a high degree of interest of students, interactivity of teaching, and its differentiation.

Thus, to ensure the safety of the digital educational environment, it is necessary to conduct regular interdisciplinary scientific and scientific-organizational events aimed at identifying the features of the impact of ICT on the physical condition of children and adolescents; to develop methodological approaches to the use of digital technologies in the educational process; create safe conditions for visual work with modern digital equipment (interactive panels, tablets); develop modern hygienic regulations to ensure the hygienic safety of digital education.

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What is Global in The Domestic Financial Cycle? A Case Study on Romania and 3 Other EEMS

Andreea MURARU

PhD., The Bucharest University of Economic Studies, Bucharest, Romania
Email: andreea.muraru@ie.ase.ro

Cristina BEJENARU

PhD Candidate, The Bucharest University of Economic Studies Bucharest, Romania
Email: bejenarucristina@yahoo.com

Abstract

In this paper we investigated some possible common influences behind the synchronicity of financial cycles in Romania, Hungary, Poland and Czech Republic. We tried to see whether the common movements in these EEMS appear under the influence of the global financial cycle measured in terms of quantities – through capital flows –, risks premiums and global investor risk aversion. The results showed that the high co-movement in yields, equity prices, house prices and credit is highly associated with global capital flows and to a somewhat lesser degree with risk premiums (represented in our analysis by the CDS) and the global investor sentiment or risk aversion (measured by the VIX index) – measure traditionally correlated with the global financial cycle.

Keywords: Financial Cycle; Global Financial Cycle; Capital Flows, Factor Analysis, Comovement.

Introduction

Domestic financial cycles have become increasingly synchronized over the last decades, making way for a stream of literature that investigates the common movement of financial cycles and their connection with the global financial cycle (a notion popularized by Rey, 2015). The literature on the subject considers that the effects of the global financial cycle, more intense and more visible lately, largely impact domestic financial cycles.

In this paper we considered the variables most commonly used for the study of financial cycles (bond yields, equity prices, house prices and credit data) in 4 European emerging markets, Romania, Poland, Czech Republic and Hungary, and we analyzed their common movement with the goal of identifying the importance that the global financial cycle (measured in quantity terms as in Borio, 2019, Habib and Venditti, 2019), investors global risk aversion (measured by the VIX index), and risk premium (measured by the CDS – credit default swap) have in their development. We found very high cross-country synchronization among all variables but especially between equity prices and bond yields. Consequently, we built common cycles for the 4 countries for all our variables. We haven't built one unique measure of the financial cycle in the 4 economies because we wanted to see the manner in which each of the financial indicators responds to the global financial cycle. Our findings suggest that the highest impact in the evolution of the common movement in the domestic financial cycles comes form the capital flow measure of the global financial cycle followed by the risk premium (especially for equity prices) and lastly from the VIX. The conclusion that the VIX influence seems to be somewhat smaller is not surprising, as the economic literature on financial cycles argues that its high correlation with the asset measure of the financial cycle has somewhat weakened recently (Borio, 2019).

Our study comes to enrich the scarce literature on financial cycles for the emerging economies by evaluating the importance of global factors in the common movement of the domestic financial cycles. Studies on synchronicity and co-movement with the global financial cycle cover mainly advanced economies for which the data sample is generous. The short data span available for emerging economies is both a limitation and a challenge as we tried to extract as much information as possible from the available data.

The paper is structured as follows: the first part reviews the literature on the subject, the second part presents the data and methodology and the last part contains the results of our analyses. The paper ends with concluding remarks.

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Literature Review

Global financial cycles have recently become the subject of numerous research papers. Starting with Rey (2015) – who described the global cycles in asset prices, capital flows and credit growth and identified the monetary policy of the US as one of the determinants of the global financial cycle – researchers have studied the phenomenon on multiple facets: the asset based cycle and the propagation of US financial conditions to the world economies (Miranda-Agrippino and Rey, 2020a, Miranda-Agrippino and Rey, 2020b; Dées and Gales, 2019), the capital flows – quantity measure – of the global financial cycle (Avdjiev and Hale, 2018; Davis et. al, 2019; Habibm Venditti, 2019), the relation between the global and the domestic cycle (Aldasoro et al., 2020, Borio, 2019).

Synchronicity among cycles was also extensively studied in the dedicated literature in terms of common movement between financial cycles in a cross-country framework or between the economic and the financial sector. Some papers from this category are Rünstler, Vlekke (2016), Breitung and Eickmeier (2016), Comunale (2017), WGEM Team (2018) and Kunovac et al. (2018).

Another problem when investigating financial cycles is how to measure them. We visited earlier papers on financial cycles which develop upon the characteristics and construction options and found that the most frequently used measures are turning point analyses and different types of filters, among which the band pass filter is the most common (Aikamn et al., 2015, Claessens et al., 2011, Claessens et al., 2012, Drehmann et al. 2012, Haavio, 2012). There are also other methods like multi-level factor model (Breitung and Eickmeier, 2016), synchronicity index (Comunale, 2017), multivariate structural model (Rünstler and Vlekke, 2016), principal component analysis, similarity and wavelet coherence (WGEM Team, 2018; Kunovac et al., 2018).

After the global financial crisis, financial cycles became highly important for macroprudential policy, the credit gap (the deviation of Credit/GDP from its long-run trend) being explicitly mentioned in the Basel III regulations (see for example Borio, 2014, Benes et al. 2016, Bruno and Shin, 2015, Drehmann et al., 2011, Gadanecz and Jayaram, 2016).

Data and Methodology

Data and sources

We considered 4 variables characteristic for the financial cycle: 10 year government bond yields, equity prices (we considered the total share price for all shares in the respective countries), house price index (which captures price changes of all residential properties purchased by households and is different from the real estate index, which is a stock market index) total credit to GDP ratio and two measures of the global financial cycle – the global capital flows as share in GDP and the VIX index as measure of global risk aversion. The data had different time spans and was collected for Czech Republic, Hungary, Poland and Romania (as well as world countries for the capital flows), from multiple sources, as can be seen from the table 1 below.

Table 1: Data sources and samples

Variable	Sample	Source
10Y bond yields	2001Q1-2020Q2	FRED database for the Czech Republic, Hungary and Poland and the Romanian National Bank and author calculations for Romania (the data series was extended backwards through regression on long term interest rates for convergence purposes - source ECB, SDW- and ROBOR 12M - source NBR)
Equity prices	1997Q4-2020Q2	FRED database for Czech Republic, Hungary and Poland and the Bucharest Stock Exchange for Romania
House price index	2005Q1-2020Q1	Czech Central Bank and Eurostat for the Czech Republic and Poland, Magyar Nemzeti Bank for Hungary, National Statistical Institute and the Romanian National Bank for Romania
Credit/GDP	2005Q1-2020Q1	BIS for Czech Republic, Hungary and Poland and the Romanian National Bank for Romania
VIX index	2007Q1 – 2020Q2	FRED database
Capital flows/GDP	2007Q1 – 2020Q1	IMF, Balance of Payment data

Methodology

As this study is a continuation of previous research with some common variables, the information presented here can have some minor similarities to that in Muraru (2019), Muraru (2020).

In order to isolate the cyclical components in the series we used the band-pass filter with the filtering bounds of 8 and 60, accounting therefore for a cycle of median length. Even though traditionally financial cycles are considered to be longer (30 years – time span too long for our dataset), the literature on financial cycles considers the median length of a cycle to be 15 years (Drehmann et al., 2010). We further investigated the synchronicity among cycles on each of the selected variables in a cross-country framework by computing the concordance index (developed by Harding and Pagan, 2002) between all 4 countries after identifying the peaks and troughs with the *Bry-Boschan* algorithm for quarterly series. The concordance index is a statistical measure that indicates the proportion of time in which the analysed series move in the same direction, without giving any information about the amplitude of their movements.

We also investigated the common movement of the cycles by applying factor analysis and crosschecking it with the results obtained from principal component analysis. Both methods are multivariate data analysis techniques for data reduction. Factor analysis, identifies the factors that induce the common movement of the dataset and at the same time explain the correlations between the series. Those factors are latent variables and they participate in explaining the initial variables in terms of common influence and unique characteristics.

In the factor model, each variable is written as a linear combination of common and specific factors. The common factors are usually in lower number than the initial variables. In matrix form, the model can be written as:

$$X - \mu = AF + U \tag{1}$$

where:

$X = (x_1\ x_2\ \cdots x_n)'$ is the vector of n initial variables, $\mu = (\mu_1\ \mu_2\ \cdots \mu_n)'$ the mean of the variables, $A =$ matrix of factor coefficients, $F = \left(f_1\ f_2\ \cdots f_p\right)'$ the *p* common factors (p<n) and

$U = (u_1\ u_2\ \cdots u_n)'$ the unique factors for each initial variable.

The assumptions of the factor model are:

(i) common factors have zero mean $E(f_i) = 0,\ i = 1, 2, \dots, p$, unit variance ($var(f_i) = 1$) and are uncorrelated $cov\left(f_i, f_j\right) = 0, i \neq j)$; (ii) unique factors are uncorrelated and of zero mean $E(u_i) = 0,\ i = 1, 2, \dots, n$, but with a different variance ($var(u_i) = \psi_i$); (iii) Common factors are not correlated with unique factors ($cov(f_i, u_i) = 0, \forall i, j$).

Consequently, the variance of a variable x_i can be expressed as: $var(x_i) = \sigma_i^2 = \alpha_{i1}^2 var(f_1) + \alpha_{i2}^2 var(f_2) + \cdots + \alpha_{ip}^2 var\left(f_p\right) + var(u_i)$ z (2)

which can be written as:

$$\sigma_i^2 = h_i^2 + \psi_i \tag{3}$$

where $h_i^2 = \alpha_{i1}^2 + \alpha_{i2}^2 + \cdots + \alpha_{ip}^2$ is the communality, the share of variance explained by common factors and $\psi_i$is the uniqueness, the variance explained by particular factors that influence the evolution of the indicator. These two elements, communality and uniqueness, sum to 1 when the variables are standardised.

Principal components rewrites the information from the initial variables in orthogonal components with decreasing variance therefore allowing for data reduction with a minimum loss of information. Mathematically, principal components are linear combinations of the initial variables. In matrix form:

$$z = A'x, \tag{4}$$

where $Z = (z_1\ z_2\ \cdots z_n)'$ are the principal components, A is the matrix of coefficients

and $X = (x_1\ x_2\ \cdots x_n)'$ is the vector of n initial variables.

The starting point in computing principal components is variance maximization problem. The variance of one component z_i can be written as:

$var(z_i) = var(\alpha^{(i)\prime}x) = \alpha^{(i)\prime}\Sigma\alpha^{(i)}$, where $\alpha^{(i)} = \begin{pmatrix} \alpha_{1i} \\ \vdots \\ \alpha_{ni} \end{pmatrix}$ is the *i*th column vector of *A*.

Consequently, the maximization problem is :

$$\begin{cases} max_{\alpha}\ \alpha^{(i)\prime}\Sigma\alpha^{(i)} \\ \alpha^{(i)\prime}\alpha^{(i)} = 1 \end{cases} \tag{5}$$

where $\alpha^{(i)\prime}\alpha^{(i)} = 1$ is an identification condition.

For studying the common movement of variables, we used the concordance indicator which is a statistical measure that shows the number of times the series are in the same phase of the cycle, and also historical decomposition and wavelet coherence.

The dynamic common movement or coherence among the data series at different frequencies and periods can be investigated by wavelet coherence (see for e.g. Cazelles et al., 2008, Aguiar-Conraria et al., 2008, Aguiar-Conraria and Soares, 2014.). This technique analyses how the different periodic elements in which it decomposes the data series evolve in time. The most commonly used is the Morlet wavelet, which we also used in this application.

Historical decomposition identifies the contribution of shocks in the evolution of the variable. In describing the contribution of shocks, we have to start from the MA representation of the VAR

$$y_t = \sum_{i=0}^{t-1} \varphi_i \vartheta_{t-i} + A_1^t y_0 + \cdots + A_p^t y_{-p+1} \tag{6}$$

from which we can extract the contribution of the kth structural shock to the jth component series of y :

$$y_{jt}^k = \sum_{i=0}^{t-1} \varphi_{jk,i} \vartheta_{k,t-i} + \alpha_{j1}^t y_0 + \cdots + \alpha_{jp}^t y_{-p+1} \tag{7}$$

(Lutkepohl, 2011).

Results

Cycle Synchronicity

The first step in investigating the synchronicity between the domestic financial cycles of the considered countries was to detrend the series by applying a band-pass filter with bounds corresponding to a cycle of median length (we performed this analysis on different time horizons, because data series had different available samples). The following step was to identify the peaks and troughs by applying the Bry-Boschan algorithm (we used the Matlab code provided by Engel, 2019) and to calculate the concordance between the series – the number of times the series shared the same phase of the cycle in all 4 countries.

The results show high concordance for 10Y bond yields and equity prices (Table 2 and Table 3 below), components which had a more rapid increase in synchronicity worldwide on account of the rise in global covariation of equity return premiums and risk premiums (Jordà et al., 2018).

Table 2: Bond yield synchronization

10Y bond	***Factor Analysis***		***PCA***	***Concordance (%)***
	Communality	***Uniquness***	***% variance 1stPC***	
Czech Republic	*0.87*	*0.13*	*91.79*	*62.82*
Hungary	*0.61*	*0.39*		
Poland	*0.86*	*0.14*		
Romania	*0.92*	*0.08*		

Table 3: Equity price synchronization

Equity	*Factor Analysis*		*PCA*	*Concordance (%)*
	Communality	*Uniquness*	*% variance 1stPC*	
Czech Republic	*0.995*	*0.005*	*88.37*	*60.44*
Hungary	*0.71*	*0.29*		
Poland	*0.86*	*0.14*		
Romania	*0.87*	*0.13*		

House prices and total credit/GDP seem to share to a lesser extent the same phase of the cycle, they are concordant about one third of the times (see Table 4 and Table 5). In what concerns credit/GDP, the lower synchronicity comes from credit – we investigated the concordance across countries separately for total credit and GDP and while for GDP the concordance was around 45 percent, for total credit, it was lower than 30 percent. This result suggests that there are national specificities (even policies, changes in legislation) on housing and credit markets which occasionally induce a different pattern (conclusion similar to Breitung and Eickmeier, 2016). Still, factor analysis and principal component analysis give strong support for the existence of a common latent factor that explains the correlation between the evolution of house prices and total credit in the 4 EEMS. In both cases, one common factor is enough to summarise the data with an acceptable loss of information (12 percent in the case of house prices and 22 percent for total credit). In addition, the common factor has high communality both for house prices and credit for all countries, with the exception of Poland, in which case the common factor for total credit had a much higher uniqueness.

Table 4: House prices synchronization

House prices	*Factor Analysis*		*PCA*	*Concordance (%)*
	Communality	*Uniqueness*	*% variance 1stPC*	
Czech Republic	*0.82*	*0.18*	*87.83*	*36.07*
Hungary	*0.61*	*0.39*		
Poland	*0.61*	*0.39*		
Romania	*0.61*	*0.39*		

Table 5: Credit/GDP synchronization

Credit/GDP (%)	*Factor Analysis*		*PCA*	*Concordance (%)*
	Communality	*Uniqueness*	*% variance 1stPC*	
Czech Republic	*0.30*	*0.70*	*77.87*	*25.81*
Hungary	*0.36*	*0.64*		
Poland	*0.995*	*0.005*		
Romania	*0.60*	*0.40*		

The communality accounted by the common factor and the share of variance described by the first principal component are very high in the case of equity prices and 10Y bond yields, therefore one factor proves to be sufficient for explaining their common movement (see Table 2 and Table 3).

Identifying Global Influences

The goal of our paper was to identify to what extent the common evolution of domestic cycles is explained by global evolutions. We considered three measures for global influences: risk premiums (measured by the CDS), global risk aversion (measured by the VIX index) and a measure for global capital flows.

We considered the CDS variables for our sample of countries and then applied principal component analysis to build an aggregate measure for the risk premium. We have used the same methodology for building the global measure of capital flows. In building this measure we used gross inflows/GDP and not the net position because the net position has lower volatility, especially in the latest period, and a lower synchronicity with global risk aversion (Davis et al., 2019). The

global measure of capital flows can be considered a proxy for the global financial cycle as it is strongly connected with other measures of the global cycle. Habib and Venditti (2019) and Avdjiev et al. (2017) show that it is tightly correlated with the Miranda-Agrippino and Rey measure of the global financial cycle, with the VIX index and also with other price measures of the global financial cycle.

After applying principal component analysis on the capital flows data (we used a number of 31 countries which had a balanced data set for the period 2005Q1-2020q1), we obtained a global cycle measure that explains 62 percent of total variance and which is strongly correlated to the inverted form of the VIX index – a correlation coefficient of 0.52.

For the capital flows variable we studied the concordance with the common movement extracted for each of our variables in the cross-country framework and they proved to be highly synchronous with the equity price and credit/GDP variables (Table 6).

Table 6: Concordance between capital flows and domestic financial cycle variables

Variable	10Y bond	Equity	House prices	Credit/GDP
Concordance (%)	*24,59*	*62,30*	*49,18*	*59,02*

Sample period: 2008q1-2020q1

Also, wavelet coherence (we used the Matlab Cross Wavelet and Wavelet Coherence Toolbox provided free of charge by Grinsted, 2004) represented in Fig. 1 below, shows high synchronicity between capital flows and the financial cycle measures, especially at lower frequencies, higher frequency coherence being identified in a persistent manner only with credit to GDP ratio. The graph below shows the coherence between the series at different frequencies, identified by the periods on the y-axis – the lower part of the graph represents higher frequencies while the upper part the lower frequency. The intensity of the correlation is shown by the colour – yellow means a high level of coherence between the series (higher that 0.8) while the dark blue is an indicator of very low correlation between the series. The black continuous lines in the graph are the confidence interval for the measure.

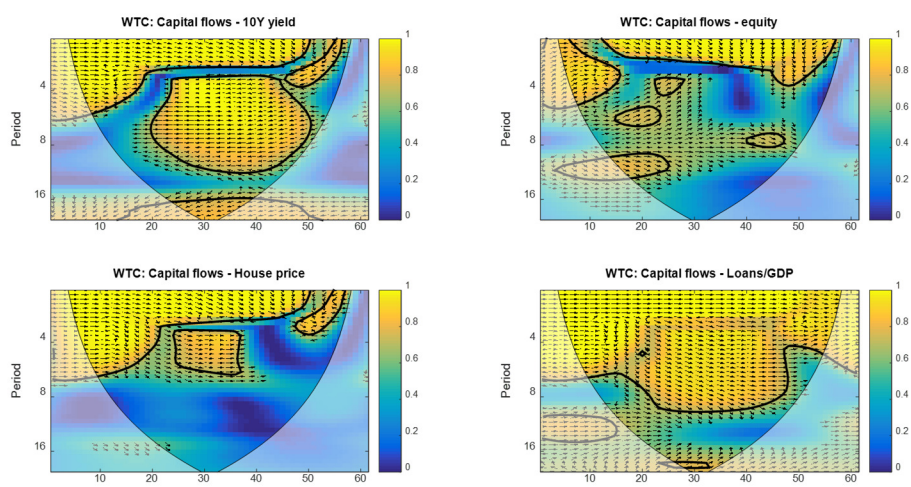

Fig. 1: Wavelet coherence between capital flows and financial cycle measures

We also investigated the historical decomposition (Fig. 2) of each of the financial cycle series in a Bayesian VAR with CDS, VIX and the global capital flow/GDP measure. As can be seen from Fig. 2 below, the highest impact comes from the global capital flows. Regarding the magnitude of the impact, the global capital flows mostly influence the common cycle in house prices (explaining at certain moments even 80 percent of its evolution), but are also significant for equity prices and credit/GDP (explaining about 20-30 percent of their evolution at certain moments). None of the measure is capable of explaining the evolution of the common cyclical measure of 10Y bond yields, their contributions are very low. Risk premium and risk aversion also contribute to explaining the common cycles but to a much lower level.

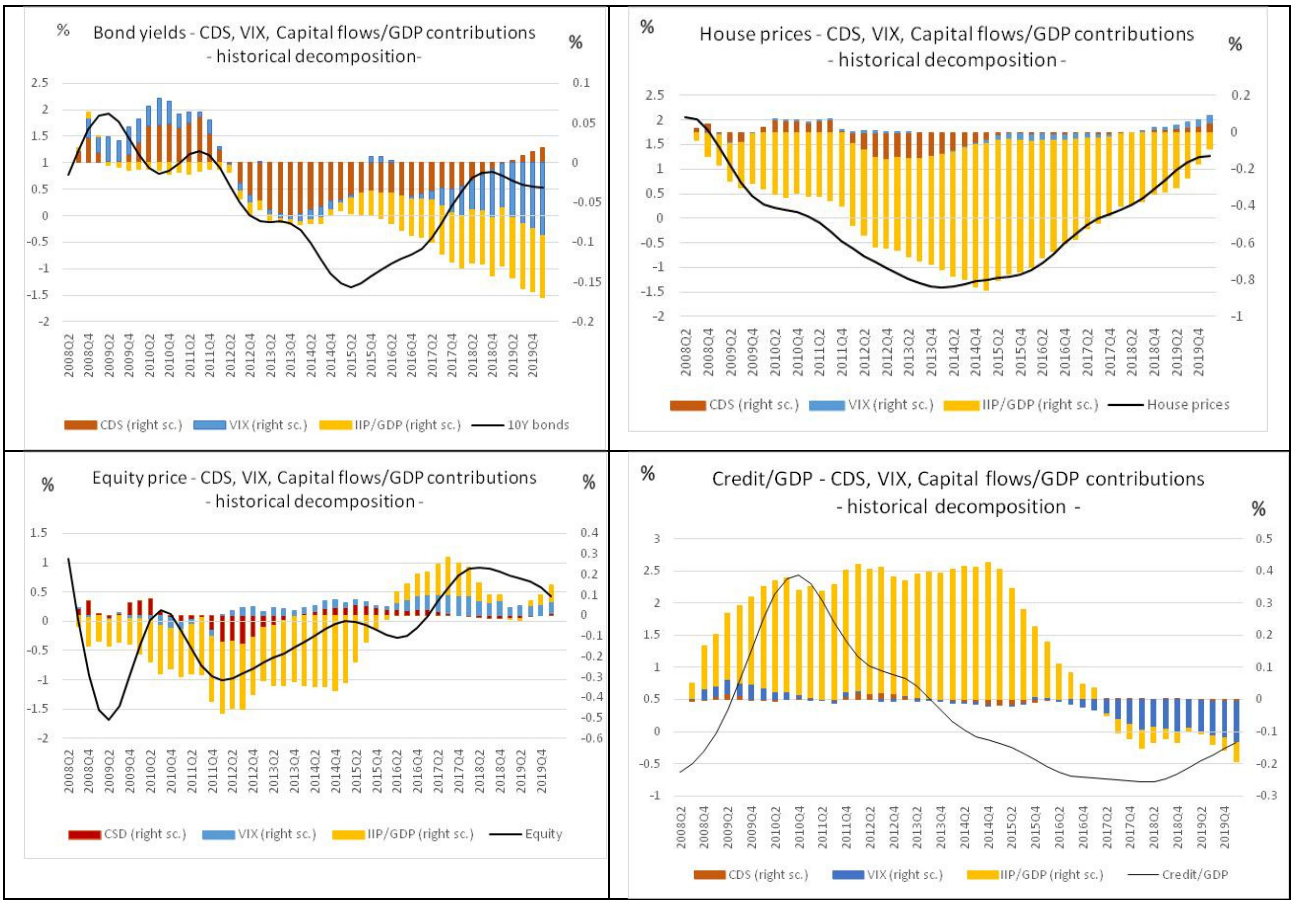

Fig. 2: Historical decomposition

Conclusions

In this paper we investigated the role of some global factors in explaining the common movement in financial cycle variables (bond yields, equity prices, house prices, credit/GDP) for 4 emerging European countries: Romania, Hungary, Poland and Czech Republic. We have chosen measures of risk premium, global risk aversion and capital flows (the last two being good approximations of the global financial cycle) and reached the conclusion that the common domestic cycles are largely attributable to the global cycle in capital flows. The reason for this is that the global cycle in capital flows is highly correlated to different measures of the global financial cycle as global risks are transferred to capital flows especially through cross-border flows, loans by banks and other financial institutions (Habib and Venditti, 2019). The risk premium is of lower importance when compared to the capital flows, but still has a relatively important contribution in explaining the common cycles of some variables. The importance of risk premiums in explaining financial cycles co-movement has been debated in the related literature and explained especially for equity price synchronisation (Jordà et al. 2018), for which in our dataset is the main contributor in historical decomposition. The historical decomposition shows an even weaker impact from the global risk measure, but this could become higher as financial integration deepens and there is a change in investors' sources of financing. From a practical point of view, the results confirm our hypothesis that domestic financial cycles cannot be interpreted individually, that there is important synchronicity in their evolution, especially in terms of bond yields and equity prices, indicators mostly prone to react to external evolutions. As our results point out, the co-movement of cycles can be associated with the global financial cycle, through the influence of capital flows, risk premium and risk aversion. Still, besides the undoubtedly global influence, there are also national specificities that shape domestic financial cycles. An interesting research subject and a perspective for our future research is to see how the domestic economic cycles are connected to a global measure of capital flows as there is a known and much studied connection between economic growth and capital flows.

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Exploring the Relationship between Big Data Analytic Capability and Business Performance

Gheorghe MILITARU
University POLITEHNICA of Bucharest, Bucharest, Romania
gheorghe.militaru@upb.ro

Andreea BARBU
University POLITEHNICA of Bucharest, Bucharest, Romania
barbu.andreeab@yahoo.com

Mihaela-Rodica GANCIU
Energomontaj S.A., Bucharest, Romania
mihaella.ganciu@gmail.com

Abstract

This study extends the existing research by examining the direct effects of big data analytic capability on business performance, as well as the mediating effects of dynamic capabilities on the relationship between big data analytic capability and business performance. Big data analytic capability can catalyze the ability of firms to improve their business performance, but there is little research to explore the mediating role of technological and managerial capabilities. To address these gaps in the literature and practice a conceptual model was developed to test the hypotheses between these variables. The research methodology was based on quantitative method and a cross-sectional study. We employed a structural equation model (SEM) to test our conceptual model using questionnaire data from a sample of PhD students enrolled in the A-Success project from University POLITEHNICA of Bucharest (UPB), Romania, working in different companies. As expected, we found that management, and technological capabilities mediate the relationship between big data analytic capability and business performance. This finding suggest that firms should look beyond direct effects of big data analytic capability on business performance and to investigate the mediating effects of technological and managerial capabilities to improve the business performance. This study attempts to contribute to the literature through novel findings and recommendations. These findings require further investigation in future research on theories, and practices for academic leadership development. Finally, implications for practice are discussed, and future research directions are proposed considering the limitations of our study.

Keywords: big data, business analytics, business performance, value.

Introduction

McAfee et al. (2012) showed that the value of big data analytics derives from the fact that data is a strategic resource that allows businesses to develop critical insight and gain a competitive advantage. Data can be considered as observation or experience about real world and can be expressed as a set of values of variables. Data has a different format and can be stored in a database in various forms – structured data, semi-structured, or unstructured. The volume of data is growing fast, but the largest share of this growth is represented by unstructured data such as video, images, or social media posts. The key to information and knowledge is data what can be analyzed and processed for value. Zeng et al. (2018) mentioned that having more data, information and knowledge can enable firms to identify and exploit business opportunities.

Baltzan (2017) defined that big data is a collection of large and complex data which cannot be analyzed using traditional methods and tools. That is to say, big data include extremely large volumes of data characterized by high velocity, wide variety, and veracity need advanced analytics to capture insights for decision making. Chen et al. (2012) showed that analytics involves the ability to gain insight from data using simulation, optimization, statistics, and other techniques to a help firms gain a competitive advantage. Gillon et al. (2014) point out that big data

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requires sophisticated tools to analyze and visualization data such as correlation analysis, exploratory data analysis, pattern recognition analysis, behavioral analysis, social media analysis, speech analysis, text analysis, or web analysis.

The existing research has focused primarily on relationship between big data analytics and different variables. Chakravarty et al. (2013) point out that big data analytics improve business processes in a way to enable firms to explore new opportunities as well as to exploit those opportunities efficiently. Lu and Ramamurthy (2011) showed that prior studies have identified a positive link between big data analytics and firm outcomes. While empirical studies suggest that big data analytics have a positive impact on the competitive performance, more research is required to investigate the mediating effects of different factors. Mikalef et al. (2020) highlight that big data analytics has an indirect effect on marketing and technological capabilities, which is mediated by dynamic capabilities. Firms need to exploit the full potential of big data analytics to improve innovation, competition, and productivity that can ultimately provide a competitive advantage.

The purpose of this paper is to investigate the direct effects of big data analytic capability on business performance, as well as the mediating effects of technological and managerial capabilities on the relationship between big data analytic capability and business performance. Sharma et al. (2014) argue that big data analytics can create value. Yet, there is scarce research on how firms should proceed to embed the big data analytics into their business processes. Therefore, there is limited understanding on how firms should approach their big data solutions and how they could increase their business performance. To address these gaps in the literature and practice a conceptual model was developed and for testing it a structural equation model (SEM) is applied. This study investigates the mediating effects of technological and managerial capabilities between a firm's big data analytics and business performance. The results have supported the hypothesized direct and mediated relationship. The significance of the theoretical relationship was assessed using structural model. A sample of PhD students was used to test the hypotheses. They worked in the small business that used big data analytics to some extent (Hadoop). The study was based on the analysis of students' perceptions regarding the role of big data in increasing business performance.

We extend big data literature by examining the role of technological and management capabilities on relationship between big data analytics and business performance. Main contribution of this paper to the literature consists in the fact that management, and technological capabilities mediate the relationship between big data analytic capability and business performance. We also provide a way of improving business performance by using big data analytics. Thus, using questionnaire survey data collected from 38 PhD students, we found that there is a significantly effect of technological and management capabilities on relationship between big data analytics and business performance. This finding suggest that firms should look beyond direct effects of big data analytic capability on business performance and to investigate the mediating effects of technological and managerial capabilities to improve the business performance.

The paper is structured as follows. In the next section we provide a theoretical background and develop the hypotheses. Next, we present the research method employed in this study. This is followed by the result analysis and provides the main findings. Finally, managerial implications, limitations, future directions and conclusions are discussed.

Theoretical Background and Hypotheses

According to Gupta and George (2016), big data analytics are defined as the ability of the organization to capture and analyze data toward the generation of insights, and use advanced analytics to make better decisions. Kiron (2017) showed that big data analytics in the organization enable the identification of new business opportunities through the combination of diverse data sources and seek the necessary knowledge and assets to seize those opportunities. Liu (2014) notes that big data analytics make the difference between high-performing and low-performing firms and enable firms to identify new business opportunities and gain a competitive edge. McAfee et al (2012) stress the importance of data because managers base their decisions on insight rather than instinct. Rialti et al. (2019) showed that there is a need for more empirical research explicating because the proper implementation of big data analytics allows firms to effectively exploit it.

Wamba et al. (2017) have found a positive impact of big data analytics on business performance. The gradual decrease in costs for collect and data storage has determined firms to invest in big data analytics. Big data analytics can generate multiple useful effects in different industrial sectors. Companies need to evaluate the potential value that an opportunity can create. For example, service firms can achieve improved customer satisfaction or more efficient use of resources. In the manufacturing sector, the production processes be improved or operations in the

supply chain can be optimized. Nevertheless, the main problem facing companies is the lack of human resources with digital skills. The ability to analyze new sources of data and stay agile and work faster gives companies a competitive edge and possibility to identify new opportunities. Artificial intelligence will learn patterns of human behavior over time. Machine learning offers companies the opportunity to build models that can analyze bigger and more complex data to identify profitable opportunities or avoiding unknown risks. Hagel (2015) mentioned that big data analytics gained more and more attention in the business environment because it has become a vital solution of the decision-making process of agile organizations. Furthermore, Ji-fan Ren et al. (2017) showed that big data analytics has become a catalyst for the improvement of business processes, and the acceleration of business innovation

According to Rialti et al. (2019), big data analytics is an emerging technology and for this reason there is little research on how to effectively use and exploit it. Even though prior studies have shown of adopting big data analytics can lead to competitive preference gains, there is a lack of evidence on how to apply this technology to create value and gain a competitive advantage. Furthermore, Ashrafi and Zare (2018) showed that some managers decided not to invest in big data analytics, especially those who have not successfully adopted business intelligence. These mediation effects occur as a result of increasing the capacity of firms to sense emerging opportunities and threat, size opportunities before competitors, and enhanced operational capabilities. According to Turban et al (2017) there are some obstacles to adoption of business analytics solutions such as lack of talented employees with analytics training, slow technology adoption due to cost or risk aversion associated with security and privacy issues.

Business performance refers to the efficiency and effectiveness of a company measured by the degree of achievement of its objectives in relation to the resources used. The correlation between big data analytic capability and business performance can be expressed as profitability, growth, efficiency, or product differentiation. The insight form the speech analytics is used to develop a deeper understanding of customer preferences and their perception of the offers of competing companies. Wills (2014) showed that “Amazon” generate 35% of sales from personal recommendations to customers based on big data analytics. According to Germann et al (2014) big data analytic capability is positively related to business performance. Moreover, this technology is used to make the difference between high and low performing companies and to sustain to stay current with trends and operate efficiently. Mikalef et al (2020) showed that firms must constantly reconfiguration their capabilities to respond to changes for survival and better fit market needs. Therefore, big data analytics can improve business performance for any company. Hence, this technology can lead to improving business performance.

***H1**. There is a positive relationship between big data analytics and business performance*

According to Ho (2008), a managerial capability refers to an organization’s skills, knowledge and experience, which are used to handle different managerial tasks. Lorenzo et al., (2018) showed that managerial capability has a significant positive influence on business performance. Big data analytics exploit huge amounts of data form different sources to generate new knowledge that along with existing ones help forms to make decisions in the real time. The collected information is used to identify new opportunities through the combination of diverse data sources. Managers need to know customer preferences and future needs or market expectations. Communication also is easy nowadays by using big data analysis. Managerial capabilities enable managers to improve business performance through clear definition of objectives, implementing cost reduction, or product differentiation. Better profitability may provide the firms with greater resources to expend. Therefore, companies must invest in different means to generate new knowledge and improve the skills that can be used to improve business performance. According to McAfee (2012) big data analytics will lead to best prediction and best prediction produce best decisions. Thus an investigation is required to determine whether managerial capability mediate the relationship between big data analytics and business performance. Therefore, the following is hypothesized:

***H2.** There is a positive relationship between big data analytics and managerial capability*

***H3.** There is a positive relationship between managerial capability and business performance*

Technological capability is valuable asset and not easy to replicate by rivals. Technological capabilities are the information and skills, technical, managerial and institutional those allow company to utilize equipment and technology efficiently. They are considered a dynamic capability held a company, skills and knowledge of technology are strategic resources that enable companies to be profitable. Technological capability enables the company to transform inputs into outputs in an efficient way. Technological absorptive capacity can affect the company’s capability for generate new knowledge and improve business performance. Technical knowledge must be transformed into specific product designs that constitute product innovation. However, technology alone is an

insufficient resource unless there is a technological capability which encourages creativity contributes to new product development. Therefore, technological capabilities refer to a company's ability to search, develop and capitalize new innovative products.

According to Coombs and Bierly (2006), technological capability is a very significant source of competitive advantage such as by increasing revenue, reducing costs, and improving the quality of a firm's existing products and processes. Zeng et al. (2018) showed that technological complexity could determine managers to reject big data analytics because they may not understand their potential and how such system work. Big data analytics can provide firms the opportunity to innovate and create more value for their customers. Technological capabilities are important for firms to obtain core competencies and to achieve competitive advantage that leads to an improve business performance. However, there is a lack of empirical studies that investigates the mediating effect of technological capabilities between big data analytics and business performance. For survival companies must be able to identify changes in customer preferences and demand. Thus an investigation is required to determine whether managerial capabilities mediate the relationship between big data analytics and business performance. Based on the above arguments, the following assertion is therefore hypothesized:

H4. *There is a positive relationship between big data analytics and technological capability*

H5. *There is a positive relationship between technological capability and business performance*

Method

Research Design

In order to meet the research objectives and to test the proposed hypotheses, we developed a quantitative empirical study of the mediating effect of management and technological capabilities on the relationships between big data analytics and business performance. As for research, a survey instrument was created using a combination of existing and newly development measures. The constructs and survey items used in this research are based on previously published latent variables that support their validity. This exploratory study used cross-sectional survey data. The proposed model will be empirically examined using the Structural Equation Model (SEM) to analyse data collected by a survey. The data for this study were collected using a questionnaire consisted of four constructs that was administrated to the respondents from sample. The majority of respondents who participated in the survey have good digital skills and have access to information about business performance where they work. The first phase of the research was a pilot study. In this phase, we conducted a discussion with two specialists in computer science with experience in big data analytics. Based on their comments, we designed the questionnaire used in the survey. Therefore, questionnaire was taken as acceptable instruments to be administrated.

Data for the research were collected through over a period from October to November 2019. Data were collected from a sample of PhD students (38 students) enrolled in the A-Success project from University Politehnica of Bucharest (UPB), Romania, working in manufacturing and service companies. This university is the largest and the oldest technical university in Romania. About 60 percent of the respondents worked in manufacturing companies and 40 percent of the respondents worked in service companies. The firm age ranged from 3 to 16 years (SD=2.16 years). The average firm age was 6.3 years. The response rate was 71 percent and resulted in 27 valid questionnaires (N=27). The data were assessed for the extent of missing values. The missing values were completely at random and the means substitution method was used the replace them. All of the items were also measured on a 7- point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Profile of respondents and their experiences in business are the following. A total of 20 respondents (52.6%, 20 out of 38) had experience between 2 to 3 years; 26.3% (10 out of 38) of them had 1 to 2 years of working experience and followed by 7.9% (8 out of 38) of the respondents had more than 3 years of working experience.

Measures

The scales for the various constructs were adopted from prior literature and have been previously tested in empirical studies. In order to ensure the reliability criterion, the study instrument is based on the existing measures whenever possible, reverse questions and pretesting of the questionnaire. Scales were taken from the existent literature and previous research and adapted to our requirements.

Dependent variable. *Business performance* is a multidimensional construct covering more indicators – financial performance, customer – related outcomes, innovation and internal organizational processes. In this research we used 4 items adapted from Satwinder et al (2016): "Employees are satisfied with the organization – **EO**"; "Sales revenue has increased in the last two years – **SR**"; "Company's profitability has increased in the last year – **PRO**" and "Company innovates to develop new products – **INOV**".

Independent variables. *Technological capabilities* were measured using a version developed by Wilden and Gudergan (2015) and it was measured using 3 items: "The company owns valuable technological assets (equipment, software, information systems) – **TA**"; "The company uses in its operations the external networks of technology – **NET**", and "Technological assets are integrated within the company – **OIT**". *Managerial capabilities* were measured using 3 items developed by Mahoney (1995): "Management team attract and retain talented employees – **TE**"; "Management team make good decision – **GD**" and "Management team perceives opportunities and potential threats – **OT**". *Big data analytics capabilities* were measured using 3 items adapted for this study from Gupta and George (2016): "The company invests in technology systematically – **TECH**"; "The key employees have technical skills – **TEC**"; "Data plays a key role in employees' decisions and business processes – **DAT**".

Control variables. We included three control variables such as industry type, firm size, and firm age that were not of direct interest for testing our hypotheses but could be theoretically related to the business performance and might provide plausible alternative explanations for our findings. We controlled firm size by taking into account the natural log of the number of full-time employees of individual firms in our sample. The natural log was taken in order to normalize the data.

Analysis and Results

Given that the aim of this study is to predict the influence of big data analytics capabilities on the business performance and the mediating effects between big data analytics and business performance of technological and managerial capabilities. We have tested all of the hypotheses using the research model described above. All measurements of the constructs are based upon the respondent's perceptions. Because measures for the dependent and independent variables were taken from the same questionnaire, we performed Harman's one-factor test to see whether one factor accounted for the majority of variance in the data. Therefore, we entered all items used in the questionnaire into an unrotated exploratory factor analysis. The first factor accounted for 23 % of the variance. Since a single factor did not emerge and one-factor did not account for most of the variance, this suggested that common method bias was not a serious concern in our data set.

Table 1 presents the descriptive statistics and correlations for all variables used in this research. We can see that correlation coefficients are within acceptable levels. That is, no bivariate correlation is greater than 0.7, and there is little threat of common methods in our data. The highest correlation coefficient is equal to 0.67. Therefore, no constructs were found to correlate so highly (at .90 or more). The correlation analysis shows that most coefficients are low (well under 0.7), which minimizes concern with multicollinearity issues in our analysis. Many indicators showed a significant positive correlation. Correlation greater than or equal to 0.22 are significant at $p<0.05$. Correlation greater than or equal to 0.42 are significantly at $p<0.01$.

Table 1: Descriptive statistics and scale reliabilities

Variables	M	SD	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
EO (1)	6.12	.88	-											
SR (2)	6.04	.78	.42	-										
PRO (3)	6.34	.96	.33	.63	-									
INOV (4)	5.66	1.04	.48	.56	-.1	-								
TA (5)	5.49	.86	.34	.55	.42	.63	-							
NET (6)	6,03	.76	.24	.18	.06	.39	.54	-						
OIT (7)	5.75	.69	-.2	-.1	.02	.19	.26	.42	-					
TE (8)	6.29	1.2	.64	.53	.67	.46	.51	.62	.38	-				

GD (9)	6.09	.87	.36	.29	.15	,09	.28	.43	.18	.22	-			
OT (10)	5.27	.84	.29	.58	-.1	.09	.11	.19	.29	.22	.18	-		
TECH (11)	5.44	.95	.04	.18	-.1	-.1	.01	.08	.12	.23	.33	.18	-	
TEC (12)	5.32	.87	.47	.63	.56	.38	.44	.39	.51	.22	.48	.39	.41	-
DAT (13)	5.98	1.2	.14	.33	-.1	.22	.08	-.1	.18	.23	.09	-.1	.11	.07

*Note. N =27, *p <0.05, **p<0.01*

Data was analyzed with SPSS 20.0 software with maximum – likelihood estimation. Cronbach's alpha was used to determine the internal consistency of items in each scale. Statistical procedures were used to establish the reliability and validity of the measures with all items. Reliability of the factors was measured using Cronbach's alpha for each construct and was found to be greater than 0.7 indicating acceptable level of reliability. Hair et al. (2007) have recommended minimum of 0.6 which suggest that the constructs are internally stable and reliable for analysis. Also, the significant Keiser-Meyer-Olkin (0.728) and Bartlett's test of sphericity of 1362.7 confirms the data are valid for the data analysis. Table 2 shows the Cronbach's alpha and factor loadings of each variable. The factor loadings range between 0.765 and 0.847 and they exceed the minimum 0.5, as suggested by Hair et al. (2007).

Table 2: The Cronbach's alpha and factor loadings of each variable

Variables	Factor loading	Cronbach's alpha
Business performance		
▪ EO	0.783	0.708
▪ SR	0.822	
▪ PRO	0.785	
▪ INOV	0.847	
Technological capabilities		
▪ TA	0.823	0.821
▪ NET	0.812	
▪ OIT	0.784	
Managerial capabilities		
▪ TE	0.788	0.844
▪ GD	0.829	
▪ OT	0.765	
Big data analytics capabilities		
▪ TECH	0.765	0.788
▪ TEC	0.833	
▪ DAT	0.817	

Hypothesis Testing

The hypothesized relationships among variables were examined by means of structural equation modelling (SEM) analyses using LISREL 8.80 program. A path-analytic model was developed and tested. Path analysis allows researchers to test direct and indirect effects of multiple independent variables on multiple dependent variables. In this way, we were able to test all study variables simultaneously. On the predictor side, the structural model included the big data analytic capability variable. Two mediating variables (technological and management capabilities) and one dependent variable (business performance) were included.

The fit indices for this model were as follows: $\chi 2$ = 49.32, df=47, CFI=0.82, RMSEA= 0.034, GFI=0.923, PNFI=0.53, NFI=0.53, AGFI=0.87 and AIC=103.27. The validity of the entire model needs to measure the goodness of fit (GFI), which checks for sample size effects and should be above 0.9. Adjusted goodness-of-fit index (AGFI) is generally accepted so that values of 0.90 or greater indicate well-fitting model. Our results indicate the AGFI=0.87 very close to the cut-off of 0.90. As suggested by Hair et al. (2007), the root mean square error of approximation (RMSEA) measures population discrepancy per degree of freedom. A value of the RMSEA of about 0.05 or less would indicate a close fit of the model in the relation to the degrees of freedom. Our results indicate a good fit, RMSEA=0.034. Thus, the results indicate an acceptable fit of our model.

The results of the hypothesis testing were as follows: Hypothesis 1 states that big data analytic capability will positively affect the business performance. The path coefficient of big data analytic capability to business performance (β=0.356, t=3526, p<0.01) is positive and significant. Thus, the hypothesis H1 was supported. This result is compatible with previous research which shows that big data analytic capability exerts a positive and significant effect on organization performance. The path coefficient of big data analytic capability to managerial capability (β=0.34, t=3392, p<0.01) is significant and this result provide support for hypothesis H2. Managerial capability had a positive impact on the business performance (β = 0.478, t=8691, p<0.001). This suggests that big data analytic capability has an indirect effect on business performance by managerial capability. Therefore, hypothesis H3 was supported. The path coefficient of big data analytic capability to technological capability (β = 0.289, t=2786, p<0.01) is positive and significant, and hypothesis H4 was supported. The path coefficient of technological capability to business performance (β=0.209, t=1896, p<0.01) is positive and significant. This result provides support for hypothesis H5. Finally, we tested for the mediating effects of technological capability. We additionally tasted whether technological capability has an impact on management capability. Contrary to our expectations, no such significant effect was found (β=0.062, t=472, p>0.05). Thus, the hypothesis was rejected. One might think that the effect of technological capability on managerial capability is weaker and difficult to be identified through PhD students' perception measurements. We also examined the influence of control variables on business performance. The relationship with the business performance was found to be nonsignificant in all cases.

Conclusion

The study results imply that the management must understand the business implications of big data analytics and how to use technology as a source for competitive advantage. The key managerial insight provided by this study is that it provides managers some guidelines about how they can use big data analytics to improve business performance. This research tested and found a positive relationship between big data analytic capability and business performance. This result is consistent with prior studies that assessed the relationship between these variables. Our empirical findings indicate that big data analytics alone has direct effect on business performance but also has an indirect effect on business performance through managerial and technological mediating contributions. Thereby, managers need to invest in big data analytics, adopt solutions of business intelligence, and attract employees with analytics skills. Big data technologies can be at the core of the business processes contributing to the decrees of the operational costs and to increase the competitiveness on the market.

The practical implications are very important for managers and practitioners, but these aspects are largely neglected. Although big data analytic capability has been discussed from a variety of perspective, this study highlights big data analytic capability affects a company's performance which, in turn, strengthens both management and technological capabilities. An interesting implication for practice is as big data analytic capability is much more than a simple investment in technology. Companies that have employees with good technical skills and managers who understand how big data analytics can be used to make good decisions which, in turn, result in strengthened business performance. Our findings indicate that technological and managerial capabilities can be used to improve the business performance because they mediate the relationship between big data analytic capability and business performance. Observed in more detail, big data analytics usage contributes to make good decisions and identifying solutions to minimize risk while seeking to maximize opportunities for growth. In other words, big data analytics give companies a competitive edge and possibility to identify new opportunities or avoiding unknown risks, their capabilities have become a vital solution of the decision-making process of agile organizations.

The findings of this study should be interpreted in light of some limitations and these need to take into account in the current study. First, for each firms included in sample was a single PhD student as the source of information. Only the perceptions of PhD students were surveyed in this study. Because the data were collected from a single source (e.g., PhD students) there is possibility of common method bias. Therefore, it would be helpful if future researchers examine perspectives of not only the PhD students but the managers and business specialists (multiple sources of survey data). Second, the present research assumes that relationships between variables are in some kind of statistical equilibrium. Nonetheless, we encourage researchers to engage in longitudinal research on the effects of the relationship between predictors and business performance for big data analytic capability in companies. Researchers using a longitudinal study can provide more specific information about the stability and change of the variables, and thus could complement the present empirical finding. Third, our findings are also limited to the Romanian economic context. Fourth, the sample size provides the minimum number of participants required, the result would be more reliable with additional respondents. As regards the sample, a larger sample would reduce the influence of random variation. Future studies look to refine this variable through further pilot testing with managers, entrepreneurs, and business specialists, or by selecting a different set of items to represent the constructs.

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Applications of Fractal Theory and Quantum Computing Regarding Cryptography Infrastructures, Information Security and GDPR Issues

Valentina BORDEI
Faculty of Electronics, Telecommunications and Information Technology, University POLITEHNICA of Bucharest, Bucharest, Romania
valentina.bordei@stud.etti.upb.ro

Andrei IVANOV
Faculty of Electronics, Telecommunications and Information Technology, University POLITEHNICA of Bucharest, Bucharest, Romania
andrei.ivanov@stud.etti.upb.ro

Antonie L. TRIFAN
Faculty of Electronics, Telecommunications and Information Technology, University POLITEHNICA of Bucharest, Bucharest, Romania
antonie_luca.trifan@stud.etti.upb.ro

Antonela TOMA
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University POLITEHNICA of Bucharest, Bucharest, Romania
antonela.toma@upb.ro

Abstract

This work is meant to provide a conceptual insight on how properties of fractals could be used into modelling an encryption solution and the way it could complement quantum architectures for data protection, taking into consideration how data safety takes its toll on adapting to and adopting evolving Internet technologies. This need comes from the assumption that, soon, the sheer power of quantum computing will be able to break modern day algorithms and could put at risk the majority of our personal data. Avoiding turning data safety into a social crisis means the Internet can be governed ethically and people's privacy is not undervalued.

Keywords: Cybersecurity Threats, Organic Computing, Cryptographic Algorithms, Ethics.

Introduction

General motivation; shaping the context of our concepts

In our days information is everywhere but behind all of it stands a secure environment assuring that only people that are meant to access sensitive data actually get a hold of it. Thus, data security plays an important role in our daily lives. Technological progress can be considered, on one hand, a well-deserved evolution of mankind but, on the other hand, a threat to the models of data encryption.

The evolution of a frequently used cryptographical algorithm is a recurring pattern of the exploits that we're able to crack it and the temporary solutions that we're found for that specific problem until another inherent breach is found.

Privacy becomes a matter worth looking into as so many details about ourselves are one press away and could potentially be revealed to unauthorized persons or used with malicious intents. This is where the importance of regulatory actions, such as the European GDPR, shines through and demands for future-oriented visions.

The security of data flow on the Internet becomes an important issue of social scale when confidentiality can't be imposed. Major breaches over the years (such as the Yahoo or Uber ones), along with secret national data surfacing through leaks show us that our current cryptographic models and solutions don't always protect us.

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A powerful data encryption algorithm used as of today is the RSA. It's incredibly unlikely that any actual supercomputer will crack such an infrastructure in a relevant or reasonable time if correctly implemented. However, quantum computing holds the promise of much greater computing resources that could hypothetically reduce the time needed to brute-force its way into protected areas, thus making current algorithms obsolete.

Fractals and their potential use in cryptography algorithms

Profoundly studying Kant's reflections regarding the „mathematization" of natural sciences that define culture and civilization, we can conclude that there exists a logical structure in scientifical investigation.

We'll further present the Mandelbrot Set as an example of a remarkable fractal having applications in theoretical physics, engineering and how it helps us demonstrate the theoretical aspects of our concept.

Named by James Gleick in his book from 1987, „the most complex object in mathematics", it is obtained beginning from the set of points "c" from the complex plane (starting with zero) on which we recursively apply the $f(z) = z^2+c$ polynomial. The set can't be generated for any set of numbers from the complex plane, though. It's important to mention the fact that the Mandelbrot Set is a bidimensional representation of this complex polynomial and it manifests its self-similarity only for periodic iterations generated into a specific direction and having a special scale factor close to a Feigenbaum constant. Such properties are useful for us describing the utility of fractals in data security.

Introducing the notion of fractals implies the need of characterizing this mathematical object that has some special properties. The concept of a fractal's dimension was brought to light in order to describe how complicated a self-similar figure actually is.

Based on the way they are generated, fractals can be classified as: fractals that are time-independent, being defined by a recurrence relation at each full point (the Mandelbrot set, the Julia set, the Lyapunov fractal), iterating systems that function using a set rule of geometrical manipulation (Sierpinski's triangle, Koch's curve) and random fractals that follow stochastic generating processes instead of deterministic ones (the trajectory of Brownian motion, dendritical fractals).

So, if the fractal is made out of N similar parts with the scale factor L, the formula corresponding to the Hausdorff dimension D is:

$$D = \frac{\log\ (number\ of\ similar\ fragments)}{\log\ (scale\ factor)} = \frac{\log N}{\log L}$$

Fig 1. Formula describing a fractal's Hausdorff

Regarding their self-similarity, fractals possess true self-similarity, quasi-self-similarity and statistical self-similarity (per se being the „weakest kind" of self-similarity).

Our proposal regards the use of dendritical fractals as a model for a concept of graphical cryptography. These are generated randomly and are of biological inspiration. The principles of organic computing can be taken into consideration for creating such fractals. An organic computing principle used for analyzing such graphical structures is the Moran Process. Its formulation that is useful to us is derived below.

$$D = \frac{\log N}{\log L} \leftrightarrow D \log L = \log N \leftrightarrow \log L^D = \log N => L^D = N \leftrightarrow \frac{N}{L^D} = 1 \leftrightarrow$$

$$\frac{1}{L^D} + \frac{1}{L^D} + \cdots + \frac{1}{L^D} = 1$$

Fig 2. Derivation of a formulation of the statistical Moran

Considering the sum of all the individual iterations with a specific scale factor L of an N-dimensional fractal we reach the Moran equation where P is the probability that our scale factor associated to a self-similar structure is actually correct:

$$P\left(\frac{1}{L_1^D}+\frac{1}{L_2^D}+\cdots+\frac{1}{L_N^D}\right)=1$$

Fig 3. The Moran equation

Looking at this equation from a statistical point of view, we can analyze the classification of the fractal in question but there can be hidden possible "traps" for "parasitic" decryption algorithms, given the complex nature of fractals.

We can imagine this process by attributing the concept of a "map" or maze with many branches blocked over the fractal graphical representation of such a security.

Quantum Computing: A Threat or The Future of Cryptography?

The RSA encryption algorithm is efficient because the process of obtaining the prime factors from a key (usually a number between 225 and 232) is time consuming using conventional methods. For example, if we have a 78-digit key (this "key" is usually the result of the product of two or more prime numbers), the prime factors could be extracted in about 10 minutes. For a key consisting of 231 digits, however, it would take 2000 years of calculation for a single computer or, on the other hand, a month for 24000 computers.

A substantially more efficient way (but also impractical in everyday life) involves using Shor's algorithm. Initially, it is made an attempt to guess randomly a prime factor; if the guessed factor does not match then it is converted to another prime number, which is more likely to be correct.

The advantage of quantum computers is due to the fact that the generation of a convenient power takes place almost instantly. Thus, several "consecutive guesses" can be taken in turn until all the prime factors of N are obtained (from 10 guesses we can obtain the prime factors with a probability of 99%).

Given the nature of qubits and the quantum mechanics' properties they possess it is necessary to concentrate our attention towards the processing potential of quantum computers, rather than the processing speed.

The addition of an additional qubit doubles the available "resources", as opposed to the redundant linearity of the additional power conferred by the increase in the number of bits available. The efficiency of quantum computers is relevant only in the context of tasks of considerable complexity where the possibility of performing processing tasks in parallel matters. Meanwhile, a conventional problem could be solved faster with just bits.

Their efficiency consists in the fact that a conventional computer runs the iterations of a task one-by-one at a given time, while a quantum computer runs "all" of the needed operations at the same time, in a probabilistic manner.

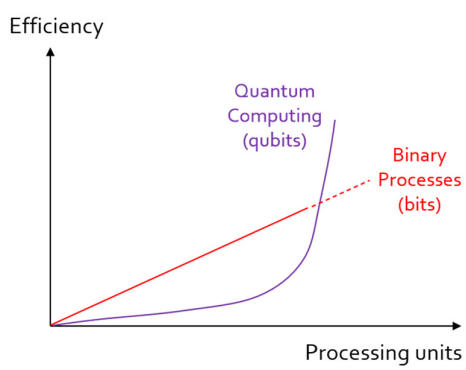

Fig. 3: Graph showing how increasing the number of processing units impacts the efficiency

Two scenarios are thus outlined:

1. Quantum computers will pose a threat to usual encryption
2. Quantum computers will be always "one step ahead" the attackers (theoretically unbeatable in the context of data security)

This being said, the RSA algorithm presented earlier succumbs to the power of quantum computing and loses its relevance.

We propose an approach to cryptographic algorithms based on the mathematical model of latices.

Given the fact that, from a topological point of view, fractals have their Hausdorff dimension greater than their inductive one, this irrational "N"-dimensionality shapes a family of random fractal latices. Their random nature creates links between neighboring regions.

In a research study by Kosior and Sacha (2018) a graphical representation of such a fractal was contoured and we can use it to better visualize our concept; it implies its representation in two Gaussian dimensions where its border is composed of these links that end up being called „short" vectors.

Without knowing a basis of these latices (generated on a big number of layers) that can shape their solution it is impossible, as of current knowledge, even for a quantum computer to break this algorithm. Cryptanalysis problems get classified as "worst case hardness" if at least one of their underlying instances is very hard to solve.

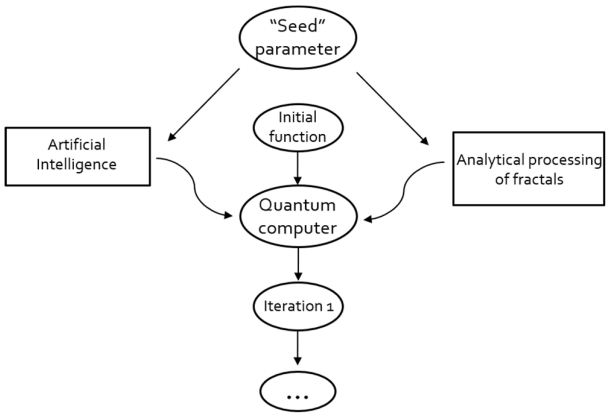

Fig. 4: Schematic representation of a quantum-aided system of generating fractal

All of these can be the basis of a dynamic system that uses organic computing techniques to impose self-security (similar to the way immune systems respond to the contact with unwanted organisms). Using a quantum computer for both generating and overseeing the encryption deed will facilitate the real-time recognition of a "brute-force" attack.

The self-similar structure of the algorithm will be broken by introducing a misleading parameter that will lead the source of the attack towards the infinite processing of one of the fractalized lattice's dimensions that doesn't contain the key to the wanted information.

The next logical step in the evolution of cryptographic solutions is the use of quantum units of information along with the implied quantum mechanics properties for implementing encryption algorithms.

We propose the use of neutrinos as quantum bits. Their state is characterized by the superposition of the possible masses for such quanta.

The advantage of choosing neutrinos over photons or electrons lies in their state as they have a very weak interaction with regular matter). Though, we must acknowledge the fact that they are really hard to detect and manipulate using actual techniques.

Any attempt at measuring the states of the entangled neutrinos is, on one hand, infeasibly expensive and, on the other hand, actually useless, as the act of measuring the superposition of the particle will lead to its wave function collapsing.

This is a possibility of simultaneously implementing a quantum key distribution along with using fractal lattices for the main encryption (in this case, the neutrinos performing the task of qubits).

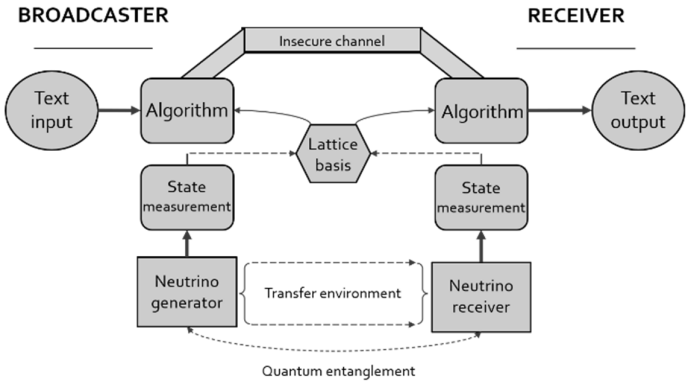

Fig. 5: Model of our conceptual data security infrastructure, combining each aspect previously

We can watch this process step by step: N pairs of entangled neutrinos, having superpositions corresponding to the vectors in the basis of the fractal lattice are generated. Their state is measured after they've been captured by the receiver and has to be equivalent to the initial one.

This leads to finding the basis of the fractal lattice that will be used to encrypt the input text. After communicating the encrypted message to the receiver, it has to be decrypted using that aforementioned basis if it has been correctly deduced. The outcome is the successful transmission of that message as the output.

Overall, this can be compared to a rather common asymmetrical data encryption algorithm.

Overview. Social and Ethical Implications

Even though information security breakthroughs and novel understandings of how our evolving society behaves don't seem that close related, it's safe to assume that relieving pressure on both organizations providing various services on the Internet (e-commerce, e-learning, e-mail etc.) and their users will help transform the tech landscape. A virtually impenetrable data encryption algorithm could transform the Internet into a place that has a stronger bond to ethics.

The classic way that organizations today comply to the EU GDPR is sometimes vulnerable to easy interceptions. For example, a lot of data operators that have a mixed interaction with its clients (a very common approach in the COVID-19 pandemic context), such as banks or public offices, still required physical papers to be completed by hand and later be processed by other employees. Obviously, this is a soon-to-be redundant practice and personal information can easily be mishandled this way. In an era where the Internet of Things is a reality human kind will have to embrace, data encryption becomes even more so important and it represents an area with a huge development potential.

Looking at all of the aforementioned ideas as the components of an abstract data protection system could serve as a basis for imagining a dynamic system utilizing organic computing techniques with self-securing capabilities, much like the way immune systems respond to the contact with unwanted organisms. A quantum computer assigned with both generating and overseeing the process of data securing could identify the occurrence of a brute-force type attack in real time. Brute-forcing the solution, however, would only result in breaking the self-similar structure of the fractal-based algorithm and, consequently, divert the source of the attack towards infinite processing by introducing a misleading parameter.

Practical implementation of our data encryption concept is unlikely, but quantum computers may be used to bring into discussion the 2nd aforementioned scenario, revolving around the existing Quantum Key Distribution proposed encryption algorithm. Though, the generation of complex latices benefits from quantum properties possessed by qubits and neutrino maneuvering.

Conclusion

Considering all the discussed technical concepts, there is enormous potential for exploiting mathematical resources and imagination is only the limit of emerging cryptography concepts. People's trust in the way organizations protect their data is the leading factor that could make or break future practices involving sensitive information. Fractal theory gives us a graphical feedback of the complex domain and while quantum computing is still developing, exciting properties are already discovered and their sheer power prove there can be new encryption solutions being outlined, leading to a safer environment for the people browsing the Internet.

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Healthcare Organizations – Analysis of Systems, Entrepreneurial Approach and Management of the COVID-19 Pandemic

Monica DUMITRA
POLITEHNICA University of Bucharest, Bucharest, Romania
monica.dumitra@upb.ro

Corina Ionela DUMITRESCU
POLITEHNICA University of Bucharest, Bucharest, Romania
corina.dumitrescu@upb.ro

Vlad Alexandru SANDU
POLITEHNICA University of Bucharest, Bucharest, Romania
vlad.sandu@hotmail.com

Cătălina Georgiana DÎLBEA
POLITEHNICA University of Bucharest, Bucharest, Romania
cata.dilbea@hotmail.com

Răzvan Mihai Dobrescu
POLITEHNICA University of Bucharest, Bucharest, Romania
razvan.dobrescu@upb.ro

Abstract

The purpose of this article was not to analyze the idea of laying the foundation of new firms; entrepreneurship can happen inside an organization already established. This concept is defined as corporate entrepreneurship. Entrepreneurs usually operate in small businesses, but they have several traits which can refresh the old-fashion bureaucratic way of the healthcare industry. Healthcare looks at the macro level as any industry in the marketplace, but in reality, there are factors in this environment which can discourage entrepreneurship or investors to innovate the market. With these two contradictory goals in place, it takes serious creativity to succeed. In most of the cases, bureaucracy and the public health system can hinder patients to look for a solution of treatment or seek the most qualitative medical service without spending too much money out of their pockets.[1] In order to do proper screening of the current situation of the pandemic, the best tool is a qualitative and quantitative statistical survey, formulated with open questions addressed to both healthcare professionals and citizens or patients. The number of study participants varied depending on the target audience group – for healthcare workers a number of 35 respondents versus 76 respondents on the general audience survey. It was much easier to reach and share the study survey to regular people via multiple channels; instead, healthcare workers were more difficult to reach and attract their eagerness to respond. The results in this research project are presented below in a statistical and interpretational manner, through charts and SWOT analysis. The critical point has been reached in the health systems and now more than ever we need new players, especially leaders, to adopt and propose creativity, innovation, thinking and entrepreneurial behaviour as a major catalyst to achieve positive change in our health care system and delivery of healthcare.

Keywords: COVID-19; Pandemic; Healthcare Crisis; Healthcare Systems; Survey Analysis.

Introduction

On December 31, 2019, Chinese Health officials informed World Health Organization about 41 patients with a different type of pneumonia. The cases are connected to a seafood market in Wuhan city, Hubei province, China. A week later, Chinese authorities identify the virus which caused the pneumonia – a new type of coronavirus. On January 30, 2020, World Health Organization declares a global public-health emergency, then, on March 11, 2020, a pandemic. The 23 million of infected persons mark was surpassed on August 22nd, 2020.

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The official name of the virus which currently affects the Planet is SARS-CoV-2. COVID-19 is the disease it causes, which stands for CORONAVIRUS DISEASE 2019. The disease spreads primarily from human to human through small droplets which are released when a person infected with COVID-19 sneezes, coughs or speaks, and can enter the human body directly through our eyes, nose or mouth.

The entire humanity has to face now with this war against the unexpected and unknown variables in all plans generated by the pandemic. Society must understand that prevention and the contribution of each individual together have a key role.

Healthcare systems are facing high challenges and trying to do their best in order to stop the spreading of the virus and also keep a closer monitoring and treatment for those who were infected and hospitalized in ICU's. [2]

Literature Review

The COVID-19 Crisis and its Management in the Medical/Healthcare Systems

In this pandemic context, healthcare professionals and technical support personnel are unfortunately the first-line fighters of the virus who are also the most exposed to infection. Therefore, many medical units and hospitals have adopted vital and necessary precautions in order to avoid further spread of the virus. Although through the medical world, hit by the pandemic, there were many protesting actions due to the shortage of personal protective equipment. Awareness of that issue have mobilized NGOs and private businesses to raise funds to supplement the hospital workers' needs. Also, it is very important to optimize the usage of the supplies in order to avoid the shortage explained earlier.

Operational Strategies developed in Italy - Radiology department staff measures from Milan, Parma, Bologna, Rome Hospitals

There were introduced operations and measures to facilitate the triage of patients and to make disinfection of the rooms and equipment more efficient:

- Special isolated rooms were established in order to provide CT scans to suspected or confirmed COVID-19 patients, including console and examination room for both X-ray and CT. The equipment in these rooms should be covered with waterproof protective material. The personnel working in these areas should wear personnel protective equipment PPE: waterproof gowns, as well as surgical masks, gloves. Special training regarding the correct way of dressing and undressing the PPE and sanitization of surfaces ought to be performed.
- Patients have to wear surgical masks at all times.
- Patients with diagnosed COVID-19 should not be mixed with those that are suspects during examination
- Items which were not essential were moved to allow simpler sanitization.
- For suspected and confirmed infections, a dedicated pathway to perform radiological examinations to be planned, along with the appropriate sanitization scheduling for the equipment, as all equipment ought to be sanitized after suspected or confirmed patients were in contact with them (e.g. CT or X-Ray equipment).
- Dedicated mobile X-Ray units should be utilized for imaging of the suspected or confirmed COVID-19 cases, especially in the intensive care ward and high isolation therapies ward (COVID Units). [3]

Operational Strategies developed in China - West China Hospital of Sichuan University

- The conductors of the study used WHO guidelines in order to categorize and diagnosing COVID-19 via CT scans and treatment plans elaborate by their National Health Commission NHC.
- Suspected patients with the virus, may undergo chest CT. Isolation and barrier procedures are necessary to protect department staff from other patients in the hospital [4].
- The hospital provide personal protective equipment (medical protective clothing, surgical caps, N95 mask, gloves, face shields, an googles) to all its workers who are in first line. Also, in the parking lot were created medical tents for better screening of symptomatic patients, examine areas for patients suspecting that harboring the virus, and place confirmed patients in isolation ward. They have also established separate means of access in the hospital building and fever tents in order to prevent cross-contamination.
- The emergency management and infection control measures, and the implemented plan in the radiology department during the outbreak, have been approved by the infection control committee of the hospital. These measures are in accordance with relevant laws and regulations to protect patients as well as the staff:
- Radiology Emergency Management and Infection Control Team (EMICT) which include deputy director, chief technologist, head nurse, equipment engineer supervisor, infection control nurse.

- Team responsibilities include:

  - Coordination between the hospital's management and planning of infection control and hospital departments (including radiology).
  - Collection of up-to-date information in order to elaborate material to educate and train department staff.
  - Reallocation of staff according to current and future situations.
  - Establishment of an emergency plan to ensure safety and order in hospital daily operations.

Operational strategies developed in Singapore

Strategy 1—Equipment and Manpower Readiness
Similar to the SARS outbreak in 2003, hospital's EMD (emergency department) have set outdoor extensions of tents ("fever facilities") with portable radiography services effectively triage patients. The immediate priority is to identify patients with symptoms concerning for COVID-19 with or without relevant contact or travel history, which is updated daily by local health authorities according to global situation and manage them separately from low-risk patients to minimize disease transmission.

The hospital also experienced a large nee for manpower due to the following factors:
Increased workload in certain modalities (e.g. Portable CXRs) with necessary quick turn-around times.
Increased time required to perform procedures for case suspects due to additional precautions required.
Limitation of staff cross-coverage due to team segregation strategies

Strategy 2—Strict Infection Control
Strict Adherence to PPE Guidelines - All staff are required to wear surgical masks when on clinical duty. The use of PPE with fluid-resistant characteristics, disposable gloves with coverage over gown cuff, eye protection (including face shields or goggles), and fit-tested N95 or higher face mask is mandatory when handling suspected or confirmed COVID-19 patients. The department also advocates the double glove practice with the outermost layer of gloves changed between every patient. The inner layer of gloves are not removed when cleaning surfaces that had patient contact to minimize the risk of contact transmission [5].

Strategy 3—Team Segregation (Physical and Temporal)
Gaining experience from the SARS outbreak in 2003, local radiology departments have adopted team segregation strategies to: reduce risk of human-to-human transmission with team quarantine in the event of staff infection and (2) maintaining the capabilities to meet the hospital needs. The department is hence split into independent teams, each comprising of selected individuals with different skill sets (i.e., radiologists, radiographers, nurses) to serve the daily hospital needs. In our institution, we adopted a combination of temporal and physical segregation strategies.

Strategy 4—Limitation of Staff Interactions
Although physical segregation of radiology staff serves to limit intra department staff interactions, additional steps can be implemented to limit interdepartmental staff interactions. These interdepartmental interactions may be unscheduled interactions, such as doctors coming to the department for urgent scans request or discussion, or scheduled interactions, such as multidisciplinary meetings. Scheduled interactions, such as multidisciplinary meetings, are performed through third party video-conferencing applications (e.g., Zoom [San Jose, California]) to facilitate complex patient care discussions, while maintaining physical segregation.

On a social level, lunch meetings and after-office-hours social gatherings between colleagues are discouraged during this period, as is attendance at professional conferences and seminars. This is to minimize congregation of health care workers from different institutions or different countries. [6]

COVID-19 Crisis in the Romanian Healthcare System

All health units in the public and private system have the obligation to ensure the provision of medical care to all patients, in accordance with the provisions of the approved plan of measures. The refusal to ensure the provision of medical care according to the specific attributions is sanctioned according to the legal provisions.

As a first step, designated support hospitals are non-emergency medical units that can provide medical care for other medical and surgical emergencies. Included in the network of support hospitals, municipal / city units and hospitals in other counties mainly those with Infectious Diseases departments, as well as hospitals in other networks than the Ministry of Health (Ministry of Transport, Ministry of National Defense, private health units).

In the context of COVID-19, personal protective equipment should be used based on the risk of exposure (e.g. type of activity) and the transmission dynamics of the pathogen (e.g. contact, drops or aerosols).

The type of PPE used when caring for patients with COVID-19 will vary depending on the situation, healthcare staff and work carried out. Medical personnel involved in the direct care of patients should use the following PPE: gowns, gloves, mask and eye protection (goggles or face shield).

Specifically, for aerosol-generating procedures for patients with COVID-19 (e.g. intubation, noninvasive ventilation, tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, gastroscopy, and COVID PCR testing) medical personnel should use as protection, gloves, gowns, masks FFP2 and FFP3; waterproof aprons will also be used if overalls / gowns are not waterproof.

Evaluation of current situation via open question questionnaire poll

In order to do a proper screening of the current situation of the pandemic, we consider that the best tool to bring a statistical both qualitative and quantitative is to formulate open questions addressed to both healthcare professionals and simple citizens or patients. [7]

Data interpretation from the online launched surveys:

The questions listed below were uploaded on Google Forms and distributed on different channels, most of them online – Facebook and LinkedIn groups in order to reach the target audience (especially healthcare professionals).

The number of study participants varied depending on the target audience group – for healthcare workers we reached a number of 35 respondents vs 76 respondents on the general audience survey. It was much easier to reach and share the study to regular people via multiple channels and my network of people; instead, healthcare workers were more difficult to reach and attract their eagerness to respond.

COVID-19 Survey for the general audience

1. How old are you? (open)

63.2 % of the respondents for the general audience survey were aged between 20 and 30, which is plausible regarding my age reported to my social network. 1.3% are aged between 15-20, so just 1 high-school teen-aged respondent (so not much interest of this age segment), between 30-40, 11.8%, 9 respondents, 40-50 10.5% 8 respondents, over 50, 13.2 % 10 respondents.

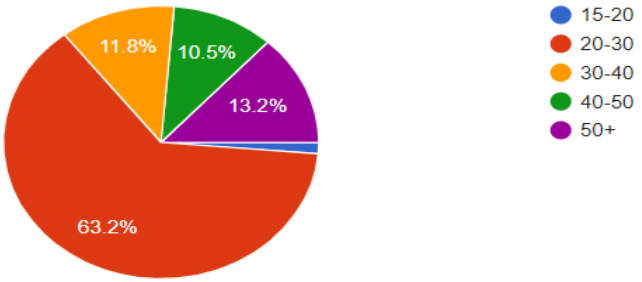

2. Please provide your country of origin.

Geographically, it can be observed that social media can be a great tool to create long distances pipelines of feedback. Obviously, the majority of my network is established in Romania, 69 respondents (91%) and the rest of the world which one candidate of each country, except Germany where were two respondents (USA 1, UAE 1, France 1, Spain 1, Turkey 1).

3. The thought of illness scares me. (1-5; 1 – No, 5 - Yes)

The majority of 32 respondents (42.1%) considered that the level of fear (from 1 to 5) is medium scaled.

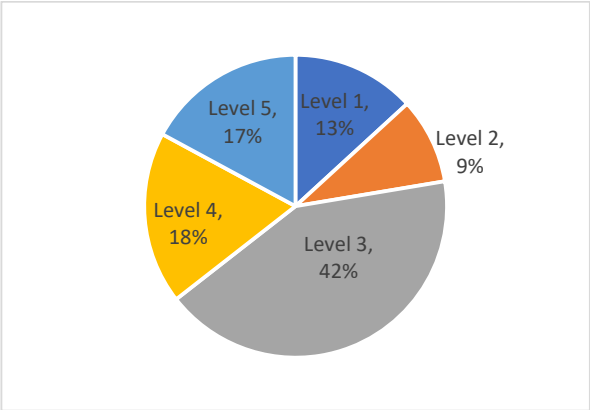

4. Do you think that you had/have/will have problems at your current job due to the crisis generated by the pandemic? (1-5; 1 – No, 5 - Yes)

The majority (28 respondents - 37%) affirmed that the job loss is less probable to happen, and only 18.4% are seeing the pandemic as a catalyzer for their businesses and jobs.

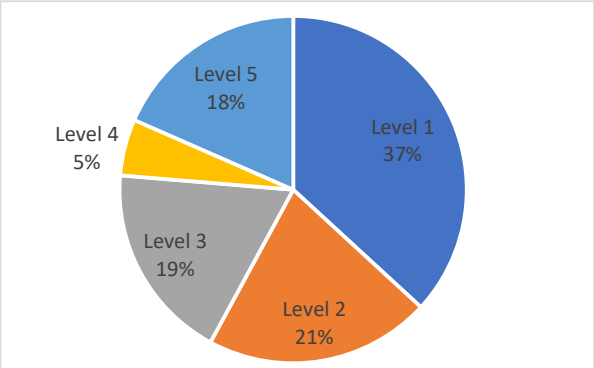

5. I feel good and safe when I action to prevent COVID-19. (1-5; 1 – No, 5 - Yes)

The majority of 35 respondents (46.1%) chose 3 from 1-5 scale, probably because they sense a slightly discomfort in order to keep themselves safe (wearing mask and disinfect hands, belongings, house, every time) when in the normal non-pandemic times, there were not so many guidelines and sanitation recommendations.

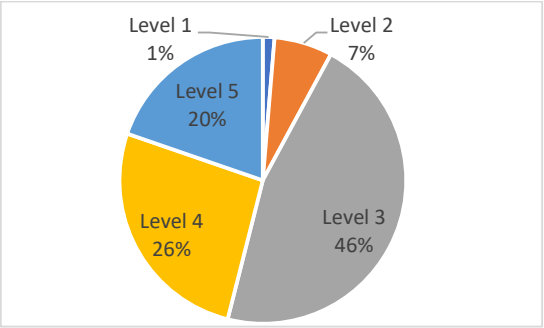

6. Do you believe the citizens have settled in the current situation and follow the rules and regulations? (1-5; 1 – No, 5 - Yes)

There is an interesting fact of the results of this topic, as many people and fellow citizens are not following the recommendations from the authorities and acted irresponsibly, getting fined; more than 50% of the respondents (levels 1 and 2) have noticed the same problems.

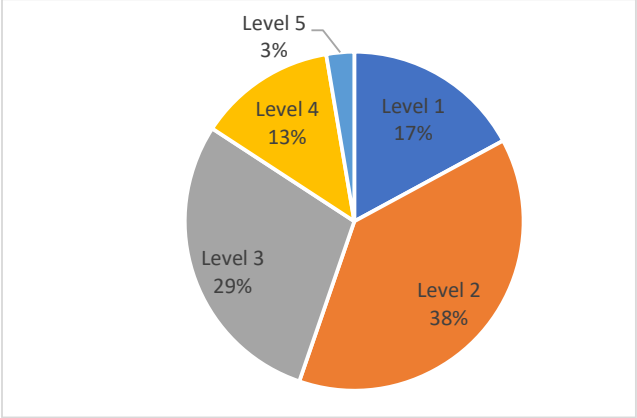

7. Are you well informed or do you follow news feeds regarding COVID-19 updates? (1-5; 1 – No, 5 - Yes)

There is no doubt that nowadays people and audience in general get very easy access to information and get in touch with the news feed even if they are voluntarily watching/listening or not. Therefore, most of the respondents are updated with the situation of the pandemic.

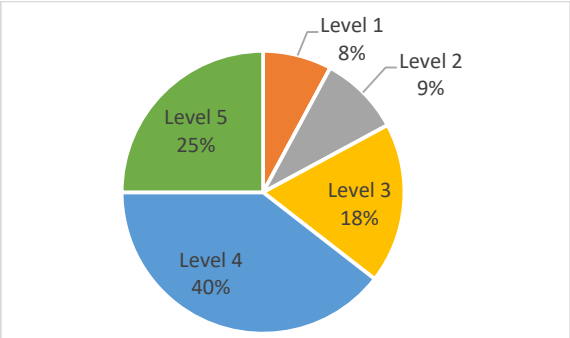

8. Which source of information do you use? (multiple choice)

Regarding the sources of information, it depends on the age and level of education of respondents. While the elderly Romanian population consider more accessible to watch TV to gather their information and TV information is not all the time transparent and well researched, the younger segment prefers to search into detail the statistics and details.

In this case, the majority prefer Social Media & TV to get informed regarding the pandemic, while 35 respondents also use scientific papers to enrich their knowledge of COVID-19.

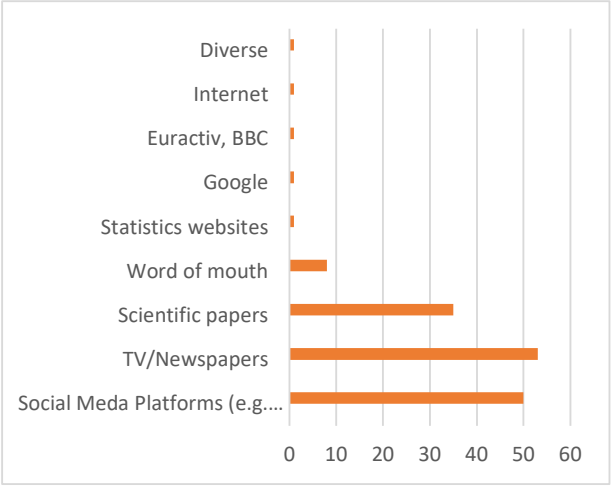

9. Do you consider quarantine a fair measure for a person who contact an infected one? (1-5; 1 – No, 5 - Yes)

Quarantine is considered the right and fair measure by 61.8% of respondents, and few of them considered that is not that necessarily to respect the quarantine. That is the first mistake in managing this pandemic by the population side. It is true that most of the people are feeling constrained by the measures imposed, but in order to eradicate the new blooming cases of infected people, the population must understand the necessity of this measures, imposed for their healthiness.

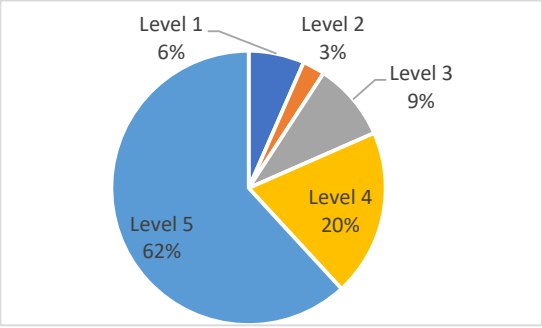

10. On a scale 1-5, how much do you adopt the behavior and measures to prevent the COVID-19 spread?

A previous question in the survey was centered on how good people feel in acting to prevent the disease from spreading. Here, most of respondents 47.4%, act and take preventive measures against COVID-19, but their actions are most likely based on fear.

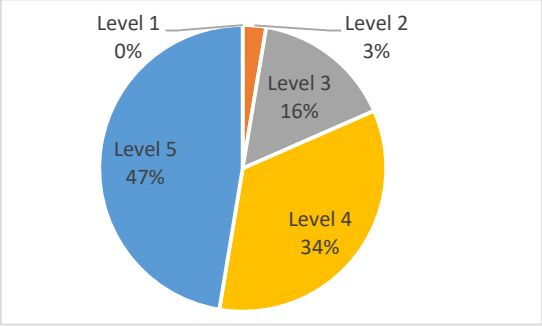

11. Do you believe the authorities have adopted the all right measures? (1-5; 1 – No, 5 - Yes)

There is no doubt that most of the governments worldwide have taken care to implement emergency and action plans to fight against the virus, even though in some countries the measures have been implemented much later that in others. Still, the respondents think that the measures adopted have been fair and imperative.

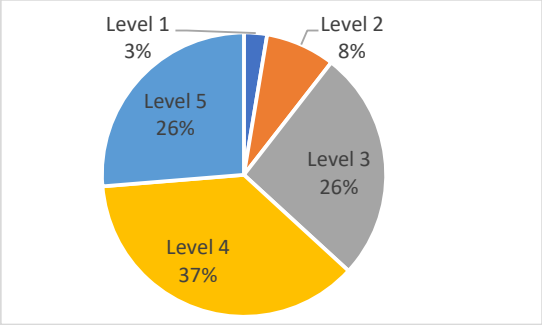

12. Is there place for better measures or lessons to be learnt? (open short 2-3 sentences)

Some of the answers given are focused on science-based approaches for treating COVID-19 patients and preventing the disease from spreading. More tests done on a daily basis, more PPE stocks for the medical personnel and avoiding fake news and panic are also suggested as measures for improvement.

13. Have you reached psychological assistance since the beginning of the outbreak until the present time? (yes, no)

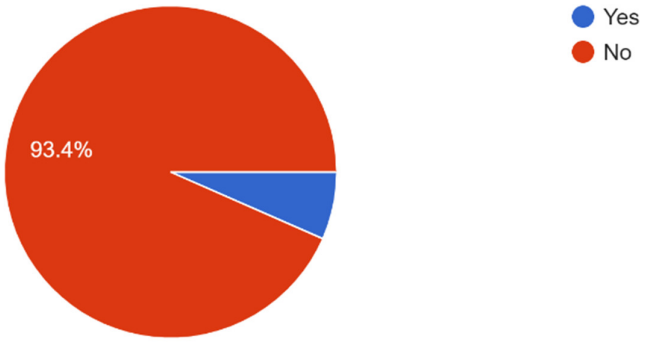

Considering the psychological impact of the pandemic, some of the population have gone into mental breakdown due to economic crisis, business' fall downs, and job losses, but most of the respondents were from Romania, and here the crisis has not such a great impact like in the US for instance, therefore most of the respondents did not appeal to or seek for psychological assistance or therapy.

COVID-19 Survey for the healthcare professionals

1. How old are you?

As far as the age of respondents, the young medical workers aged from 20 to 40 are the majority category who responded to this study.

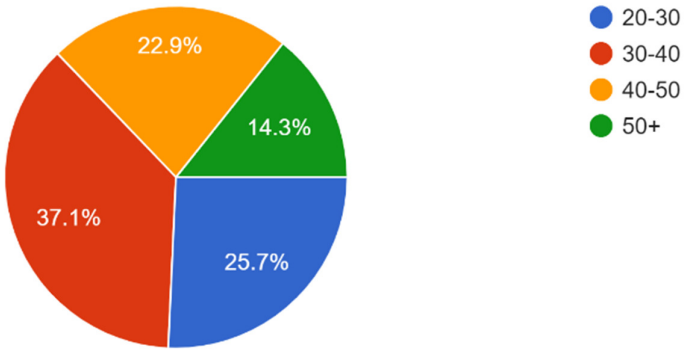

2. Please provide your country of origin.

As in the previous survey, the majority of healthcare workers who responded are from Romania - 31, and a few spread in Health/Medical Centers Worldwide (2 from Canada, 1 South Africa and 1 from Germany).

3. Please select the appropriate category of the hospital in which you are employed.

As the chart shows, there are many types of centers involved in the healthcare system and patient care in the context of the COVID-19 pandemic. The majority of healthcare workers are hired in private centers (28.6%), where the measures are slightly mild compared public hospitals. On the second place, with 22.9%, are workers from University Hospitals.

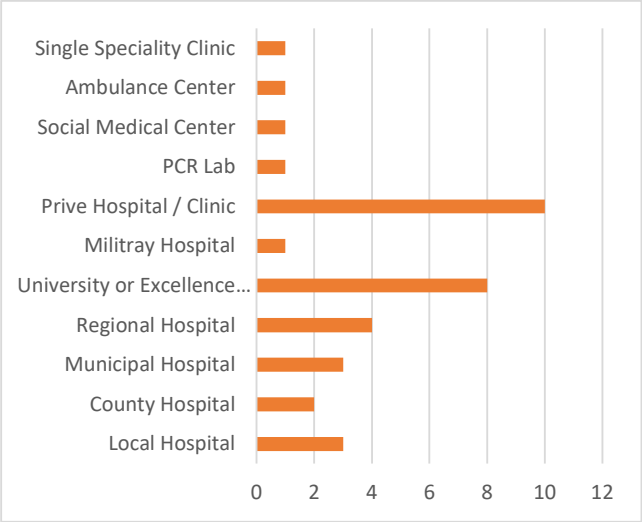

4. Is there an emergency protocol adopted for treatment/prevention of medical staff in your hospital? (yes/no)

As shown, most of the Healthcare Units have adopted a plan for prevention for their medical staff in proportion of 88.6%.

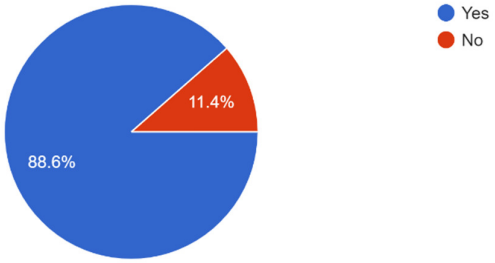

5. Do you consider that this protocol helps prevent the spread of disease among yourself and your colleagues? (1-5; 1 – No, 5 - Yes)

The workers consider that the protocol mentioned earlier is efficient in order to protect them in doing their daily shift activities.

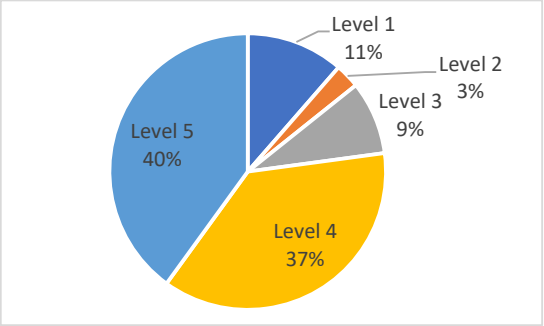

6. Did your managers provide PPE for hospital workers? (yes/no)

For this protocol to work, the managers from healthcare units have to provide, as a mandatory task, PPE for their employees; in the majority centers from which the respondents are, this task was performed.

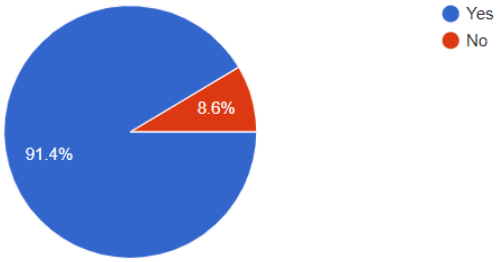

7. Do you consider the PPE provide efficient and qualitative? (1-5; 1 – No, 5 - Yes)

Very important is the quality of the PPE provided to the workers, in order not to get infected. Almost all the participants have received good quality materials.

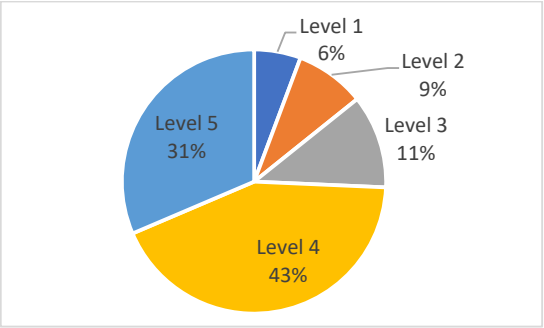

8. Did your hospital treat COVID-19 patients? (yes/no)

Only 10 respondents (28.6 %) have confronted with COVID-19 cases and plans of treatment for their infected patients.

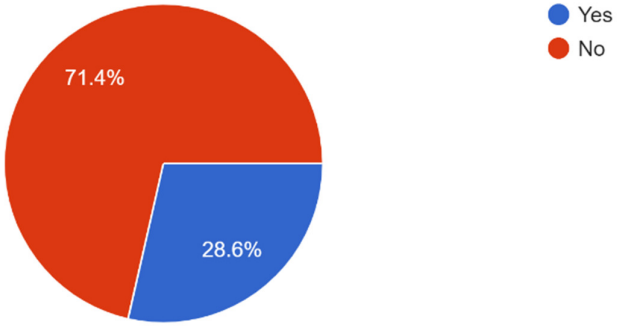

9. If yes, how many?

Most of respondents' centers (67%) have treated a small number of infected patients, between 1-50 patients, 8% treated between 50 and 100, 17% treated between 100 and 200, and 8% had above 200 cases.

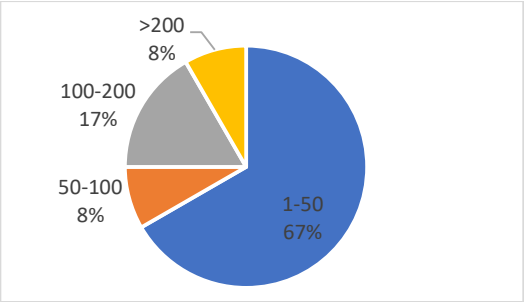

10. Which measures would you add to or remove from the protocol implemented in your hospital?

Many recommendations were made, the most important being:

- Accommodation provided for medical personnel;
- 48h waiting time before surgery, even if the PCR test of the patient is negative;
- Relaxation/break room for the medical personnel;
- Before being admitted to the hospital, patients should be tested;
- Making the removal of the contaminated gear clear in the protocols;
- Clearly specifying the correct disinfection substances;
- Better triage of the medical personnel and the patients.

11. Have you got an option of accommodation in case you do not want to return to your family after finishing the shift?

Here is a debatable topic: not all hospitals have provided accommodation for their workers as it was imposed by the authorities; 42.9% of the participants had to return home to their families, with a high risk of contaminating or infecting them.

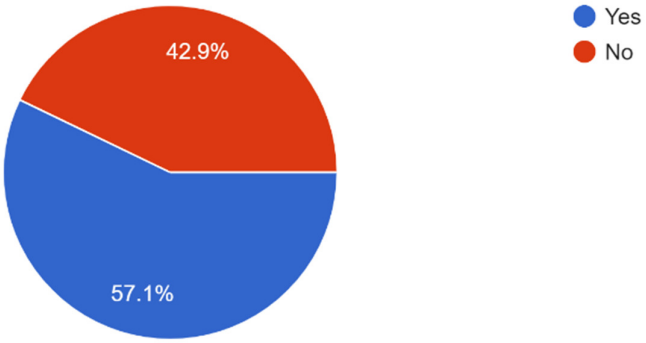

12. Do hospital workers have access to psychological assistance?

A very important aspect is for hospital managers is to offer to their workers psychological assistance, because in emergency state, things can go in a very stressful way for worker on a daily basis shift. The ratio is 51 to 49 in favor for those participants who can benefit from this therapy sessions.

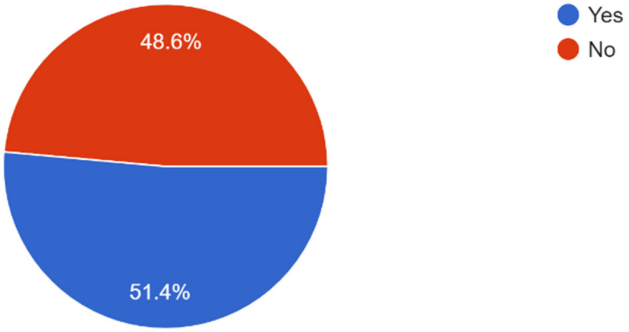

Data Interpretation – SWOT Analysis

After reviewing the recommendations and feedback receive from both parties, the inputs were transformed in a SWOT analysis, to have a clearer picture of the actual situation [8][9].

Strengths:

- Fast response of the state officials to the COVID-19 crisis, fast implementations of rules, regulations and lockdown – head start vs Spain, Italy, France, US, Brazil (for states with lower cases of confirmed cases of infected/deaths).
- Well implemented awareness campaigns on social media and TV to respect the measures and adopt proper hygiene and disinfection.

Weaknesses:

- Stocks of certain materials (PPE).
- Misconduct of and lack of leadership in healthcare organizations.
- Not enough tests performed for the general population on a daily basis by healthcare system.
- Late reaction in closing the borders to help prevent the infection
- Fear caused the authorities and law enforcement by applying severe measures against the citizens, and not trying to implement an approach based on education.

- Low mental health for people seriously affected by the crisis (jobs loss, shut down of business', etc.
- Restricting certain rights and freedoms of citizens during the pandemic can provoke certain revolt and dissatisfaction reactions towards the authorities.
- Poor system funding in order to fight the pandemic, especially in emerging and underdeveloped countries.
- Poor adaptability for population and authorities if the wave of infections reaches high peaks.

Opportunity:

- More tests among the population.
- Education and better understanding the measures proposed and implemented by state officials.
- Social distancing by physical outdoor activities in small groups, not for partying and large venue activities.
- Combating fake news and panic spread; more transparency about all pandemic related topics; better flagging on social media.
- Better mobilizing the law enforcement.
- Psychological assistance programs for the citizens in need for discussing their mental issues and give population hope.
- Hygiene products to be offered for free to the population with a lower income by the government.
- Home monitoring for infected patients

Threats:

- Stocks of certain materials (PPE).
- Misconduct of and lack of leadership in healthcare organizations.
- Lack of population perception to the rules and regulations implemented by the authorities
- Fake news propaganda, and lack of transparency in some TV Journal programs.

Conclusions

The critical point has been reached in the health system and now more than ever we need new players, especially leaders, to adopt and propose creativity, innovation, thinking and entrepreneurial behavior as a major catalyst to achieve positive change in our health care system and delivery of healthcare.
Entrepreneurial activities should be used by healthcare organizations to improve organizational growth and profitability and should be promoted as a means to achieve more efficient, flexible and adaptable management in external environments competitive and turbulent.

Different healthcare systems across the globe, encourage corporate entrepreneurship at all levels. Entrepreneurship and healthcare are linked with bonds which propose improved business practices, professionals and resource allocation (price/service, product ratio), in order to deliver the best solutions in patient care. Therefore, entrepreneurship is moving the healthcare industry forward, it has to evolve and keep the trending at higher levels.

The COVID-19 pandemic was and is, beside a catastrophe, a starting point for healthcare organizations and the individuals with entrepreneurial skills and abilities to help improve the system as a whole. Many more challenges will be faced, not only by the healthcare systems around the globe, but by humanity entirely; corporate entrepreneurship will ensure the survival of industries and individuals – improvise, adapt, overcome.

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The Impact of New Public Management Reforms on State Owned Enterprises

Ioana Andreea CIOLOMIC
Babes-Bolyai University, Cluj-Napoca, Romania
costea.ioanaandreea@yahoo.com

Ioana Natalia BELEIU
Babes-Bolyai University, Cluj-Napoca, Romania
ioana.beleiu@econ.ubbcluj.ro

Abstract

State-owned enterprises (SOEs) play a notable role in the economy representing an important part of the whole government activities, performance and financial position. The analysis of the role of state's control over productive property in progressive restructuring of market-based economies figures largely in heterodox economics discourse. That is why research that clarifies what should be categorized as a SOE is of unquestionable importance for scholars researching the subject and working with data on SOEs. In achieving the objective of this research, a qualitative analysis was conducted using organized, transparent, and replicable procedures at each step in the process. By comparing and discussing different academic definitions of SOEs, we identified the key elements that should be used in defining SOEs: ownership, control, activity, objective, legal form. Furthermore, our work has proposed an explicit, neutral, reliable, transparent and rigorous layout for defining SOEs based on the previous literature.

Keywords: State-owned enterprises, governance, performance, accountability.

Introduction

Transferring public service provision to state-owned enterprises (SOEs) raises concerns over accountability deficits (Klausen, Winsvold, 2019). The importance of SOEs on global market, but also on a state economy is crystal clear for economists, politicians, and area researchers. Despite of massive privatization efforts during the past decades, the state often retains a central role in some sectors of the economy, especially utilities and infrastructure (Ennser, 2014). The share of gross domestic product (GDP) contributed by state-owned enterprises (SOEs) still represent an important part for the global markets. More than 10% of the world's largest firms are state-owned coming from 37 different countries and their joint sales represents more than 6% of world GDP (Buge et al., 2013). In Organisation for Economic Co-Operation and Development (OECD) countries, the value of SOEs is more than 2 trillion USD and employ over 6 million people even if they represent only 2.5% of national employment on average. In the majority of economies, the SOEs are highly concentrated in strategic sectors on which large parts of the private economy depend, and half of SOEs by value operate in the network industries (telecoms, electricity and gas, transportation and postal services) (OECD, 2014). There is the belief that SOEs are and will be an important part of economies, especially in developing economies (Papenfus et al. 2019; Ennser-Jedernastik, 2014) and former communist countries.

Previous academic studies have broadly analysed the research patterns on public administration and management (Bruton et al., 2015) focused on the more general stream of literature on privatization and nationalization reform (Murray, 2010), or alternatively, on the SOEs' role in economies (Buge et al., 2013; Papenfuss and Schmidt, 2015). The impact of incentive structures on SOEs performance (Ulf et al, 2020), the theory of SOEs in the market economy or the balance between the quality and the quantity of innovations developed in SOEs (Jia et al., 2019) are also covered topics. Privatization reform is seen as an improvement of SOEs' governance, as a step prior to private sector participation (Murray, 2010), and performance (Aivazian et al., 2005). Contrarily, others consider that privatization is not the sole right solution for restructuring public enterprises. They argue that services could be more efficient if provided by for-

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profit entities, rather than subject to ministerial control and government interference (Luke, 2010). The nationalization of some traditional public service activities is another topic of interests for researchers. Several governments' temporary nationalised private companies (banks, manufacturers) to face the economic crisis better (Bernier, 2011). For example, in Italy, SOEs appeared on the strength of financial issues (Antonelli et al., 2014; Rinaldi et al., 2012). In the UK, their origins are related to the problem of merging utility networks (Millward, 2011), while Canada uses SOEs to exploit their natural resources and develop various industries that the private sector was not naturally inclined to create (Bernier, 2011).

Despite the relevant body of literature on SOEs and the wide variety of research findings, surprisingly there has not been any systematization of the knowledge regarding SOEs definitions. The defining concern of the SOEs concept has played only a marginal role in the previous researches. The unquestionable importance for scholars and practitioners researching or working with data on SOEs is endorsed by the progressive restructuring of market-based economies. The state's control over productive property figures largely in heterodox economies discourse. These challenges were the starting point for a literature review intended to examine the understanding of SOEs' concept in various research areas and to offer a definition that includes a multitude of research streams.

The novelty of the study is circumscribed to the idea that SOEs are and will be an important part of economies. Through our proposed layout that comprise the main characteristics of SOEs, we offer support in delineating the boundaries of their sectors. We consider that this research based on a multi-disciplinary approach and a broad range of perspective will be especially used by emerging countries that, as all the other countries, need to have clearly delimited the sectors and, most of the time they do not have the necessary resources as professional bodies, qualified personnel, to fulfil their obligations as regulators. This brings us to the outline of this article. After an introduction which describes the current state-of-art and the importance of the study, we derive for the methodology used to achieve the aim of the paper. Further, section 3, comprises the research results highlighting aspects concerning SOEs definition. Conclusions to the study follow in the final section.

Methodological Approach

The analysis of the role of state's control over productive property in progressive restructuring of market-based economies figures largely in heterodox economics discourse. That is why research that clarifies what should be categorized as a SOE is of unquestionable importance for scholars researching the subject and working with data on state-owned entities. In achieving the objective of this research, a qualitative analysis was conducted. Through a descriptive and thematic investigations, our review provides an interdisciplinary and an international overview of current understanding of the SOEs appellations, definitions/ key elements and characteristics.

A preliminary step was performed aiming to determine what labels were the most used when referring to these types of enterprises. The result of the preliminary step was that the most commonly used terminology is "state-owned enterprises"/"SOE". The methodological approach used in order to analyse the academicians' point of view presumes four steps. First, a selection of papers was performed, based on relevant keywords: "state-owned enterprises" and "SOE". We carried out an electronic search in WOS and screened the studies by scanning the abstracts and titles. In the second step, we screened studies by reading the full abstracts and/or text. We were interested in discovering the different contributions from the research areas: business administrations and public administrations (Mauro et al., 2016), the most relevant disciplines in studies approaching SOEs considering their pattern of activating at the intersection of sectors (Grossi and Steccolini, 2015). Previous studies reveal that governments are directing more attention and spending more resources on the improvement of their system of governance, accountability and performance measurement and management (Broadbent and Guthrie, 2008; Mauro et al., 2016). Consequently, the enthusiasm of previous research should gravitate around governance, performance, and accountability to be included in this analysis. The third step in data-gathering, consisted in reading the full text of the studies included in this investigation in order to eliminate the loosely focused papers. The last step consisted in analysing three types of information: bibliographical, methodological, and manner of defining SOEs.

Findings and discussions concerning SOEs

The variety of terms used in literature

The process of defining the concept of "state-owned enterprises" is quite laborious and exciting, as countries differ with respect to the range of institutions that they consider as state-owned enterprises, and these types of companies are found under various names and several entities are described as SOEs. We looked for related terms and how these terms were defined.

One of the first conclusion of the investigation reveals the fact that depending on the country, different terms are used when referring to SOEs. Although, the enterprises where the state has ownerships are common, the terminology often differs from country to country. For example, European countries such as Greece, Norway, Germany, Ireland, Italy, Austria, Switzerland, UK, Estonia use the terminology "state-owned enterprises" (Burnes, 2004; Ongaro et al., 2008; Tonurist, 2015; Wettenhall, 2005), while non-European countries use the following terms: government-linked companies (GLC) in Malaysia (Roper and Schoenberger-Orgad, 2011), government-owned companies (GOCs) or SOEs in New Zealand, government business enterprises (GBEs) in Australia, crown corporations in Canada, public sector undertaking in India, government-sponsored enterprises in USA (Stan et al., 2014). Research also exposes the use of public organizations (Bolivar, 2007), public enterprises (Millward, 2011; Wettenhall, 2004), state ownership of public utilities (Parker, 1999), public corporations (Atkinson and Paschall, 2011) and hybrid organisation (Argento et al., 2019, Stecker, 2014). Taking into account the fact that SOEs is the most frequently used term among those listed above, we decided to focus our study on discussing the SOE concept, but not before saying a few words about the other widely used terms in the literature: "government business enterprises", "public enterprises" and "hybrid organizations".

Government business enterprises are defined as "public companies limited by shares and organised under corporate law" (Wettenhall, 1998), "involved in international activities" (Wettenhall, 1992) which "had to compete against the private sector" (Coates, 1990). Analysing the definition used by Coates and Wettenhall, it can be observed that government business enterprises are not recognised as a part of the public sector. Due to the changes that arose through public sector reforms, they started to apply and to be organised under private law. In our opinion, even so, government business enterprises are public companies which act at the intersection of public and private sector, because the public ownership requires more than in the private sector. It implies social responsibility for their decisions, trust for their actions and transparency for the use of public money.

Some authors are using the notion of "public enterprises" when referring to SOEs. Thynne and Wetternhall (2001) state that it is inaccurate the use of the term "public enterprises" in referring to a particular organizational category. Public enterprises are "established through regular company formation procedures" (Wettenhall, 2005) and represent a "functional category conducted by government (national, regional or local level) or another non-departmental-organization, with functions such as commercial, executive, regulatory, adjudicative, appellate or advisory" (Wettenhall, 2004). Thynne and Wetternhall and Grossi et al. (2019) highlight through the definition provided the interdisciplinary character of SOEs. Another important aspect endorsed by them, but disapproved by others, refers to the fact that public enterprises are conducted by governments. The first consequence of these contradictory statements leads to important gaps in identification, definition and organisation of these types of companies.

From another point of view, SOEs are considered "hybrid organizations that have elements of state ownership and control on one hand and private participation in ownership and control on the other" (Bauwens et al., 2020; Bruton et al., 2015). Being created by the government (Koppell, 2007) and operating in both the market and public sector (Grossi and Thomasson, 2015), these hybrid organisations are structured and managed according to the private sector but created to address public needs, in an attempt to increase the efficiency of the public sector (Cornforth, 2020; Thomasson, 2009). With a long history in the USA, they were designed to accomplish specific policy objectives, while achieving performance requirements related to the policy objectives (Koppell, 2007). The term used by Bruton, Koppell, Grossi and Thomasson focuses and succeeds highlighting the position of these type of companies into the public and private sector. Moreover, through the term "hybrid" they recognise not only the positioning element, but also the activity (split between market and public sector) and legal form element (created by governments, but organised according to the corporate law).

How are SOEs defined by academicians?

Some authors prefer to define the concept of SOEs using the definitions provided by international organizations (Kloviene and Gimzauskiene, 2014), while others define the concept using key elements as ownership, control, objective, activity, legal form (Avsar et al.,2013; Bajona et al.,2010; Collins et al.,2013; Du et al.,2012; Ho, 2012; Holz, 2011). Even if the definitions provided by authors usually approach the term by combining at least two of the identified key elements, SOEs are non-uniformly understood and defined by researchers.

A broad definition of the concept is given by Bozec et al. (2004, 2007), who indicate the connection between the governments and SOEs by nominating them as arm's length corporate companies. In both articles (2004 and 2007), the authors define SOEs as companies established to pursue public policy and commercial objectives, highlighting their ability to operate in many important sectors, aiming to provide services and goods to the consumer. Considering the fact that Bozec et al (2004, 2007) argue that SOEs are not exposed to pressure from the stock market, we can deduce that even if a SOEs could have commercial activities, they still have a special statute in the public sector and their commercial characteristic definitely doesn't imply the same obligations and rights like in the private sector. Goldeng et al. (2008) also present a rather broad definition, which additionally highlights the non-economic goals followed by governments through these types of entities, such as the need for public control over natural resources, employment or social issues.

Another definition is provided by Lawson (1994) and Lin et al. (2003) who define SOEs from control and ownership perspective. They consider that the ownership characteristic may be insufficient in practice, complementing the definition based on ownership criteria with another one grounded on the control characteristic. In other words, SOEs are defined as enterprises either partially or totally owned by the state, in which control is exercised directly by the government when it comes to major policy changes or delegated to the SOEs board's members (Li et al., 2014; Papenfuss, 2014; Siqueira et al.,2009; Wang, 2013; Wettenhall et al.,2009; Zhu et al.,2007).

Even if researchers provide definitions of the concept using key elements as ownership, objectives, control and legal form, we were able to identify on one hand, important restrictive criteria, and on the other hand several controversial issues. The discussions are presented in the following section in a structured manner depending on the key elements.

(a) Ownership

One of the most studied elements of defining relates to ownership criteria. Based on our analysis we identified three different approaches related to the ownership structure. The first approach recognises as SOEs only those entities that are wholly owned by the government (Bird, 2015). By introducing the restrictive criteria of state ownership (100%), significant enterprises that still meet all other criteria are not recognised as SOEs, and consequently the whole picture of the sector is patently distorted. The second approach focuses on SOEs as companies partially owned by the governments, introducing the hybrid character of SOEs. Hybrid SOEs have elements of state ownership on one hand and private participation in ownership on the other hand (Bruton et al., 2015). Even if, this approach is less used by researchers, scholars should devote additional attention to this organizational form that generates significant revenues and represents some of the world's largest firms (Bruton et al., 2015). A more permissive approach is the third one, being the most widely used from the sampled studies (Belloc, 2014; Chan, 2009; Chiwamit et al.,2014; Ding, 2014; Hertog, 2010; MacCarthaigh, 2011; O'Conner et al.,2004, 2006; Stan et al.,2014; Sun et al.,2005; Wang, 2014). From our point of view is a more reliable approach, considering that it acknowledges both types of state ownership (totally or partially).

(b) Control

For the analysis regarding the control criteria of our pool of papers, we refer to our bibliographic analysis, which shows that the publications focus on two different types of control: direct (Millward, 2011; Sun et al., 2005; Wang, 2014) and indirect (Lawson, 1994). The differences between direct and indirect control is that under the first, government has the power to set the organizational, social and political objective of the SOEs, while under the second, SOEs would not be (anymore) to government control. As subject of indirect control, SOEs are transformed from integral part of state-bureaucracy into legal independent entities, entailing substantial delegation of decision-making rights (Chiwamit et al., 2014; Hauptman et al., 2015). Party-state control of SOEs is a puzzle to many researchers (Chan, 2009; Chiwamit et al.,

2014; Cooke, 2006; Goldeng et al.,2008; Sun et al.,2005). For example, Bird (2015) highlights the influences of party-state control and how it works: governments still have the power to control the long-term policies of the subjected SOE, while the board is responsible for the sort-term strategies. There is a belief that due to economic difficulties, the state often cannot fully support these activities, resulting in a mixture of public and private ownership. However, it is crucial that the state remains in control, being able to intervene when deemed necessary to do so, in order to defend national interests. In other words, using control key element, SOEs can be defined as enterprises either partially or totally owned by the state, in which control is exercised directly by the government when it comes to major policy changes or delegated to the SOEs board's members.

(c) Activity

The activity criterion is another key element used by researchers in defining SOEs. We were able to identify two types of activities used by researchers in defining the concept: commercial activities and non-commercial activities. Although, SOEs were created to pursue goals other than profit maximization (Enderle, 2001), they became much more (yet not completely) market-oriented (Cooke, 2006). A common insight derived from the studies is that researchers have disagreed on the SOE's activity. On one hand, Goldeng et al. (2008) and Sun et al. (2005) reported that SOEs are entities with a large number of social/political roles and obligations, recognising (only) the non-commercial type of activity. Chiwamit et al. (2014), MacCarthaigh (2011), Morsing (2011), O'Conner et al. (2004, 2006) defined SOEs using the commercial type of activity. However, a considerable number of studies recognised both types of activities undertaken by SOEs in practice (Bozec et al., 2004, 2007; Bird, 2015; Chan, 2009; Kankaanpaa et al., 2014; Stan et al.,2014). In our opinion, it is the most reliable approach, because, SOEs are still fundamental enterprises with high strategic importance for national security, and domestic and economic livelihood (Chan, 2009). Even if SOEs were initially created to achieve either non-commercial or commercial objectives, we believe that in order to provide a comprehensive definition of this type of public entities, it is more appropriate to consider both types of activities.

(d) Legal form

Despite the highlighted interest in studying SOE's ownership and control, it is surprising that the legal form characteristic has attracted such limited research attention in the scholarly literature. The practices demonstrate the use of one specific regulation for this kind of enterprises or the use of corporate law. On this matter, Wang (2014) recognises that SOEs are regulated by the corporate legislation, while Morsing (2011) argue that SOEs should comply with a legal framework tailored in accordance to their specific characteristics. Even if, for the purpose of this paper we are considering both types of legal form, we consider that the most appropriate form of regulation is the second one, the specific regulation. SOEs are unique, essential and complex public entities, which ask for, and should embrace a specific regulation.

(e) Objective

By analysing the studies focused on state-owned enterprises, we were able to identify that SOEs could have economic, social, and/or political objectives. There is the belief that SOEs are instruments of their holders to meet their political objectives, promoting social and political unification, securing national defence and related to strategic considerations (Bozec et al.,2004, 2007; Chan, 2009). On the other hand, SOEs are recognised as useful strategies to pursue social goals (Goldeng et al., 2008; Koppell, 2007), while others define SOEs recognising only their economic/commercial objective (MacCarthaigh, 2011). A broader approach that perceives SOEs as entities with mixed objective is endorsed by Bird (2015) -economic and political; Bruton (2015), Millward (2011), Stan et al.(2014) -social, economic, political; Morsing (2011) -social, economic; Sappington et al.(2003) -it should be mainly social objectives; Sun et al.(2005) – mixed objectives only for "partially privatized" SOEs. Even if the authors recognise the mixed objective of SOEs, some of them highlighted one of goals as being principal. For example, Sappington et al (2003) focused on the social objective as essential, while O'Connor et al. (2006) displayed the commercial objective. So, SOEs serve economic, political and socio-economical spheres of society, reflecting the multi-purpose reality on society (Enderle, 2001).

Conclusions

As markets where SOEs operate become increasingly competitive, the role of state's control over productive property in progressive reorganisation of market-based economies figures largely in heterodox economics discourse. Our study aimed to determine what type of entities should be categorized as a state-owned enterprise is of unquestionable

importance for scholars and practitioners focusing the subject and working with data on SOEs. By comparing and discussing different academic definitions of SOEs, we identified the key elements that should be used in defining SOEs: ownership, control, activity, objective, legal form. Furthermore, our work has proposed an explicit, neutral, reliable, transparent and rigorous framework for defining SOEs based on the previous literature.

The brief overview of main features of the SOE may help identify and clarify a number of critical issues, which led to the proposal below (Figure 1). The importance of the layout (Figure 1) could be explained as follows. First, the ups and downs of the reform process of SOEs over the last decades generated a wide range of variants of SOEs. Second, the questionable role of SOEs in providing public policy functions and the extent of government business activities in economy led to important gaps in terms of governance, transparency and accountability. Third, a proper definition for SOEs will positively affect research on SOEs and help countries understand how such organisations can play key economic and development roles (Buge et al.,2013). Forth, the generally and neutrally proposed layout is meant to capture the entire casuistry, useful for future studies approaching the macroeconomic and microeconomic areas, as well as commercial or even public sector studies.

The results of this study show that scientific literature authors prefer to use one of these definitions or they are just describing the term. Although a definition is not provided, they focus in the effects of reforms or events that affected SOEs, on explaining SOEs through their importance in the economy, their role and the way they operate. The terminology used by academicians is state-owned enterprises, government business enterprises and crown corporations.

The imperative achievement of the study is that the main features of SOEs identified through this investigation must be used altogether both by practitioners and academicians in referring to SOEs. The definitions of SOEs provided by academicians have a comprehensive approach linking different key elements, but most of the times, no more than two or three key characteristics. For example, the researchers who address topics as governance and performance in their research provide complex, but not restrictive definitions, while researchers who discuss topics as accounting and accountability treat the concept in a restrictive way, providing simpler definitions, and often using criteria as ownership and control.

The results of the paper are relevant both for scholars and practitioners, as it clarifies aspects regarding the complex topic of SOEs. Besides, acknowledging that there is a shortage of research on SOEs concept, it closes the gap in the literature related to the existence of an article focused on the definition on this term. The studies selected for this review provide insights on the challenges faced by governments in different settings, therefore the results of this investigation might be generalized at international level. Through our proposed layout that comprise the characteristics of SOEs we offer support in delineating the boundaries of the sectors. However, further research in the area of SOEs concept is still needed. There is still limited insight on the appropriate design and influences of interfaces between theory and context. Moreover, the influence of SOEs on consolidated financial statements in the public sector could be further researched.

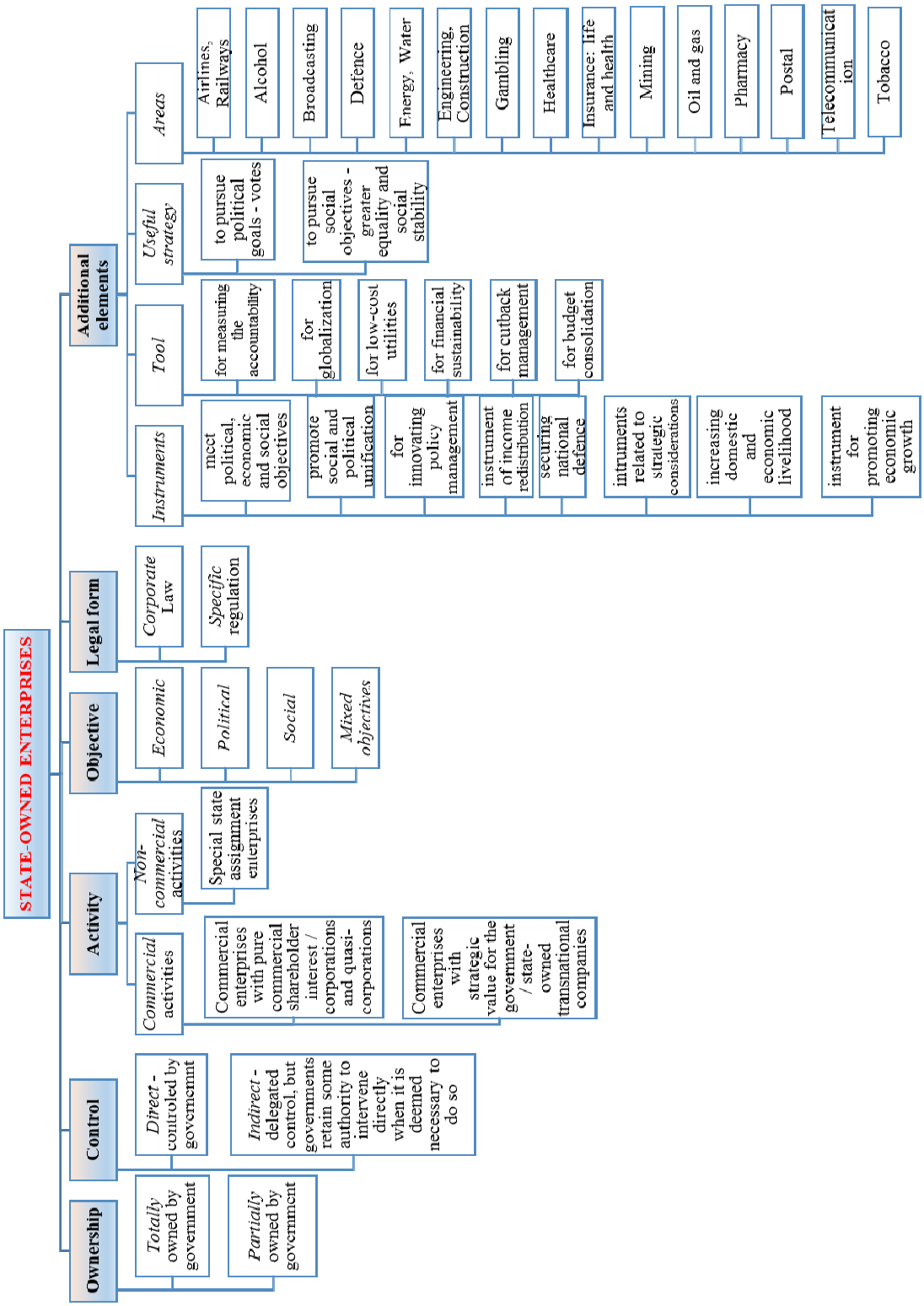

Figure 1: A comprehensive layout of the main features

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PID Controller with Fractional Calculus

Dorian Valentin-RĂDUCAN
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering,
University Politehnica of Bucharest, Bucharest, Romania
raducan_dorian@yahoo.ro

Cristian Constantin-ROMAN
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering,
University Politehnica of Bucharest, Bucharest, Romania
cristir1021@gmail.com

Mihai REBENCIUC
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering,
University Politehnica of Bucharest, Bucharest
m.rebenciuc11@gmail.com

Abstract

Different systems and processes such as proportional valves, temperature regulators, motors, etc. require certain controllers for optimum performance; compared to common controllers, the fractional PID controller provides the optimal solution for these systems because they have memory, quick answers and few errors. Various evolutionary algorithms can be used to optimize the parameters of the fractional PID controller, such as artificial bee colony irony (ABC), particle swarm optimization (PSO), genetic algorithm (GA), etc. In order to optimize our performance, we will implement these algorithms in different ways and we'll compare to the classic mode of operation of the controllers. These implementations and trials are based on code sequences in different languages such as python, c++, matlab, based on which results we can prove why these algorithms are an optimal solution. Different system components are modified within the PSO algorithm, optimizing some properties such as configuration or location.

Keywords: PID controller, fractional calculus, Swarm particle, PSO algorithm.

Introduction

PID controllers are well known and used in power system control applications, making it simple to do and easy to adjust. These controllers are commonly used to cushion system oscillation, increase stability and reduce errors in a constant state. These controllers are full order controllers because the part of its derivative is integral to these controllers. The fractional pid regulator consists of five parameters kVp, ki, kd, λ and μ. The comparison between the normal PID regulator and controller is complete and the features are studied in detail. Different algorithms such as the PSO algorithm (optimization

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of particle rots) can be used to optimize fractional pid parameters. Figure 1 shows the diagram of a PID controller circuit.

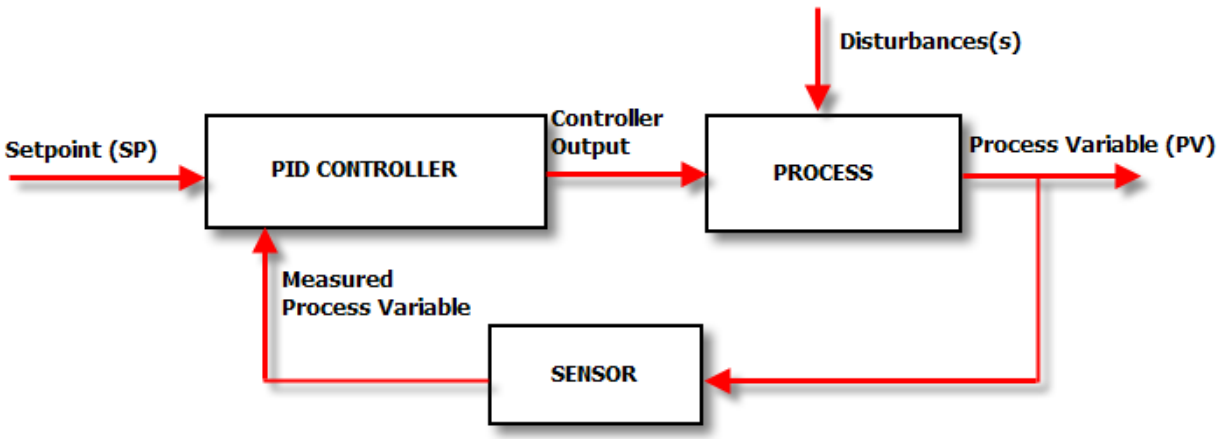

Fig. 1

FRACTIONAL ORDER CONTROLLER PID

The full-differential equation defining the control action of a fractional-order PID is given by:

$$u(t) = K_p\, e(t) + K_i D^{-\lambda} e(t) + K_d D^{\mu} e(t) + \cdots \quad (1)$$

Where:

λ- "in order

μ - differential order

K_p, K_i, K_d - The parameters for the PID Controller

u(t)- control signal

e(t)- error signal

The classic proportional-integrated-derivative controller is the most used controller for industrial applications because of its simplicity in performing and adjusting. Extension of derivative and integration order from full to fractional provides more flexibility in controller design, thereby controlling the wide range of dynamics in a system.

The generalized transfer function of the fractional controller is given as:

$$C(s) = K_p + \frac{K_i}{S^{\lambda}} + K_d .s^{\mu} \quad (2)$$

A fractional integrator of the order k+α, k-based N , 0<α<1 is to perform the error cancellation.

Fractionation effect should be limited when implemented. The fractional integrator must therefore be implemented as:

$$\frac{1}{s^{\alpha}} = \frac{1}{s}\, s^{1-\alpha} \quad (3)$$

Similar to the fractional integrator, the fractional differentiator, s^{u}, the fractional differentiator must be limited when implemented. This ensures fine control effort and high requency noise rejection.

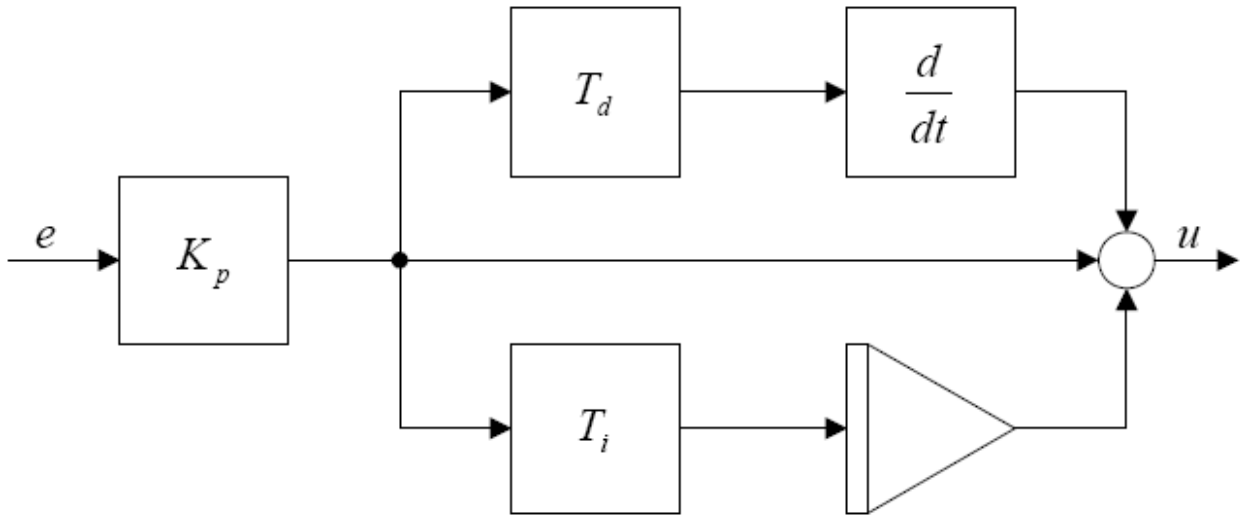

Fig. 2: Circuit regulator PID

PID CONTROLLER COMPONENTS

1. Proportional component

The proportional component (P) gives the control signal proportional to the calculated error. Using a single proportional control always provides a stationary error, unless the control signal is zero and the system process value equals the desired value.

The proportional part is given by equation (4):

$$P_{out} = k_p e(t) \tag{4}$$

2. Integral component

The integral part (I) is a previous error. The error summary will continue until the system process value equals the desired value. The integral part is usually used together with proportional in so-called PI regulators. Using the integral part only gives a slow response and often an oscillating system.

The whole part is given by equation (7):

$$I_{out} = k_i \int_0^t e(\tau) d\tau \tag{5}$$

3. Differential component

Differential component (D) is the rate of change of error. Adding this component improves the response of the system to a sudden change in its status. The differential component D is typically used with P or PI algorithms, such as PD or PID controllers. The high differential component D usually provides an unstable system.

The differential is given by equation (6):

$$D_{out} = k_d \frac{de(t)}{dt} \quad (6)$$

OPTIMIZE PID TEMPERATURE CONTROLLER PARAMETERS

1. Abc (algorithm of artificial bee colonies)

Based on the intelligent feeding behavior of bees , optimization will be done in the ABC algorithm. There are three types of bees in the model of this algorithm: Bees "employees", bees concerning and bees investigated. Colony includes half as employed bees and half of them consists of observant bees. One bee artificially engaged in one feed source. The algorithm contains the following steps:

1. For all engaged bees the initial source of feed will be produced;
2. REPEAT
3. A source will be found when each committed bee goes to the food source in the memory. Increasing it determines the amount of nectar.
4. Observant bees select their source according to the dance of engaged bees. After selecting the neighbor they go to the nectar source.
5. If new sources of feed are found by the research, abandoned food sources shall be evaluated and replacedCea mai bună sursă de hrană este înregistrată

Until the requirements are met, steps are executed.

2. Smart particulate optimization (PSO)

The aim of this optimization is to solve the problems in terms of the calculation, where it is a robust technique of acquisition based on the motion and intelligence of the wheels. It is inspired by nature from bird swarms, fish, etc. the PSO algorithm tries to copy the natural group communication process of individual knowledge, which occurs when such swarms are crowded, migrating, etc., to achieve some optimal properties such as configuration or location.

In the PSO, an roi consists of N particles moving within a dimensional D search space The random speed is assigned to each particle. Each private changes their flight based on their own experience and the attendant at each iteration. Together with ANT Colony Optimization, they form the Swarm Intelligence algorithm class.

Swarm intelligence (SI) is the collective behavior of decentralized, self-organized, natural or artificial systems. The concept is used in working on artificial intelligence. The expression was introduced by Gerardo Beni and Jing Wang in 1989 in the context of cell robotic systems.

The formulae (1) and (2) are the formulae for updating the speed and position of the particulates:

$$v_{id}^{t} = \omega \times v_{id}^{t-1} + c_1 \times r_1 \times (p_{id}^{t-1} - x_{id}^{t-1}) + c_2 \times r_2 \times \left(p_{gd}^{t-1} - x_{vd}^{t-1}\right) \quad (7)$$

$$x_{id}^{t} = x_{id}^{t-1} + v_{id}^{t} \quad (8)$$

The particle i^{th} is noted that $x_i = (x_{i1}, x_{i2} \ldots\ldots x_{id})$, whose best previous solution is as $P_i = (p_{i1}, p_{i2} \ldots\ldots p_{i2})$, the current speed (position change speed) is described as $V_i = (v_{i1}, v_{i2} \ldots\ldots v_{id})$. The best solution achieved so far by the entire roi it is represented as: $P_g\left(p_{i1}, p_{i2} \ldots\ldots\ldots p_{gd}\right)$.

At any of the steps, each private goes to the locations P_{best}, g_{best}. Fitness evaluates the performance of particles to determine if we'll get the best mounting solution.The ω is the inertia factor, c_1 and c_2 are acceleration constants; r_1 and r_2 are random numbers between zero and one; ω can be developed using the following formula:

$$\omega = \omega_{max} - \frac{\omega_{max} - \omega_{min}}{T_{max}} t \quad (9)$$

Where, ω_{max} and ω_{min} is the maximum and minimum values for the inertia factor, and T_{max} is the maximum iteration, t is the current number of iterations.

Algorithm Elements

The method consists of a group of particles moving within the search area, their trajectory being determined by the value of the best fitness found. Each particle is represented by a vector x length n indicating the position in n-dimensional space and has a speed used to update the current position. The vector velocity is calculated taking into account the following rules:

• each particle tends to retain its current direction (inertia);

• each particle is attracted by the best position on that has reached her so far;

• every particle is attracted by the best particle of the population g (or from the neighborhood).

The formulas used to update each individual in the population to iteration t+1 are:

$$v[t+1] = w_1 v[t] + w_2 rand(\,)(p - x) + w_3 rand(\,)(g - x) \quad (10)$$

$$x[t+1] = x[t] + v[t+1] \quad (11)$$

Parameters

w_2 and w_3 - learning factors - is the weight of acceleration terms that attract each particle to particles p and g

- w_2 - cognitive parameter - a tendency to duplicate past actions of its own which they have proved successful
- w_3 - social parameter - the tendency to follow the success of other individuals
- w_1 - Inertia weight - ensures the balance between exploration/exploitation; also used as a decreasing weight over time (as in Simulted Annealg)
- • maximum allowable speed - indirectly affects the ability to scan, reducing the speed value below an allowable limit.

Results

In order to better understand the two algorithms I produced a simulation in MATLAB to optimize the parameters of the fractional PID controller, and used various performance indices to arrive at more concrete answers.

Performance indices used are: ISE, IAE, ITAE, ITSE and have mathematical expressions:

1. Root root square error (ISE):

$$ISE = \int_0^\infty [e(t)]^2 dt \quad (12)$$

2. Full of the absolute value of the error (IAE):

$$IAE = \int_0^\infty e(t) dt \quad (13)$$

3. Time-weighted ITEE:

$$ITAE = \int_0^{\infty} t\big(e(t)\big)dt \tag{14}$$

4. ITSE time-weighted:

$$ITSE = \int_0^{\infty} t[e(t)]^2 dt \tag{15}$$

For simulation, we have used the parameter limits of Table 1 for k_p,k_I and k_d.

Table 1: Controller parameter limits

Limits of wins of the controller	k_p	k_i	k_d
Upper limit	0	0	0
Lower limit	10	10	10

The simulation applications have resulted in optimized parameters that are given in Table 2.

Table 2: Parameters optimized by 2 tests

System	Algorithm	Components	IAE	ISE	ITSE	ITAE
Test system 1	PSO	k_p	9.874	9.342	7.505	9.505
		k_i	8.479	8.614	9.454	5.68
		k_d	9.934	1.793	8.915	2.305
	ABC	k_p	8.602	6.405	8.580	7.331
		k_i	9.510	9.047	9.461	9.214
		k_d	1.225	1.791	7.817	1.821
Test system 2	PSO	k_p	2.093	5.782	2.277	4.591
		k_i	7.341	9.998	1.273	7.141
		k_d	0.545	1.520	1.774	1.149
	ABC	k_p	5.818	4.327	6.358	5.191
		k_i	1.483	3.026	9.998	7.119
		k_d	1.263	1.458	1.547	1.298

Also, to observe the optimization of fractional PID temperature Controller parameters, we used the MATLAB simulation to observe the deviations of that controller. These deviations are shown in the following figures.

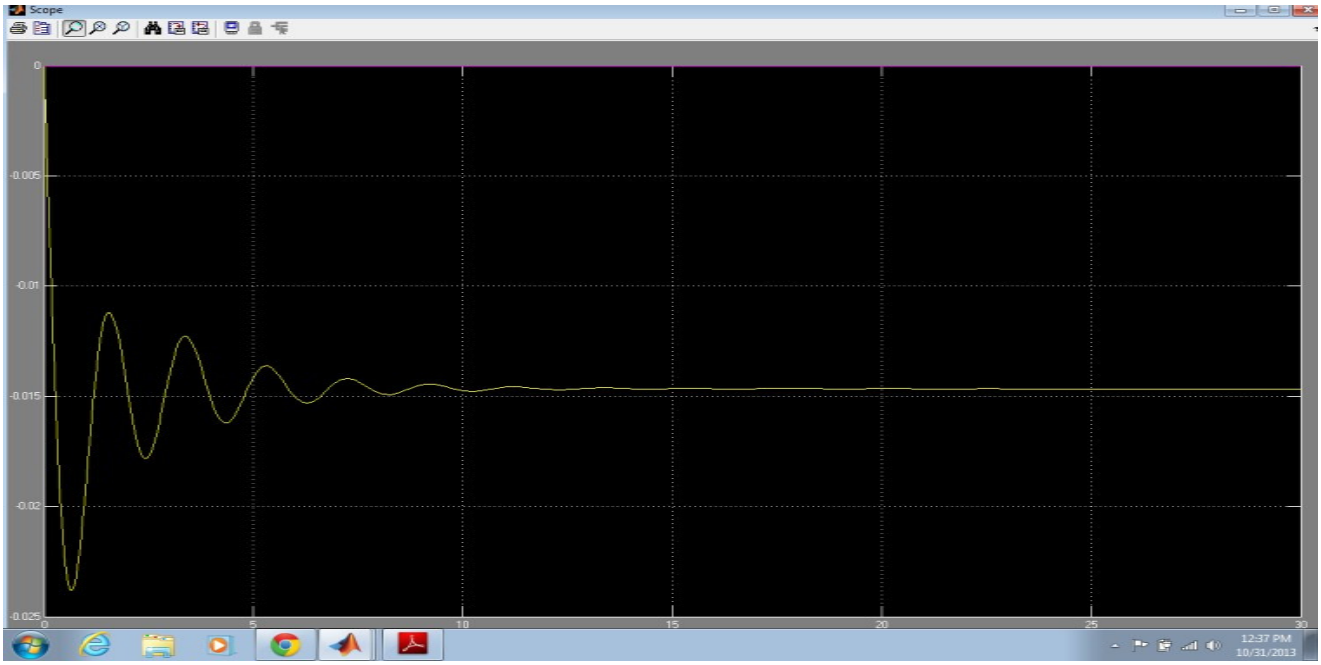

Fig. 3: Frequency deviation in System Zone 1 heat reheater with integral regulator

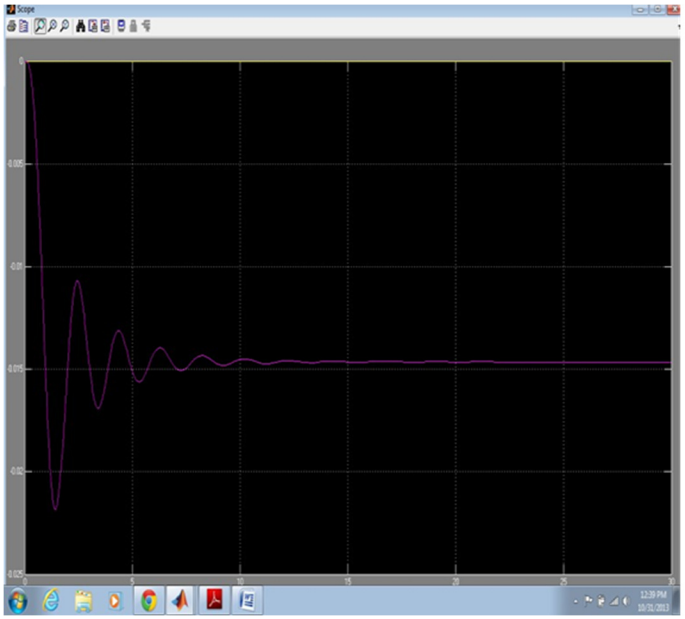

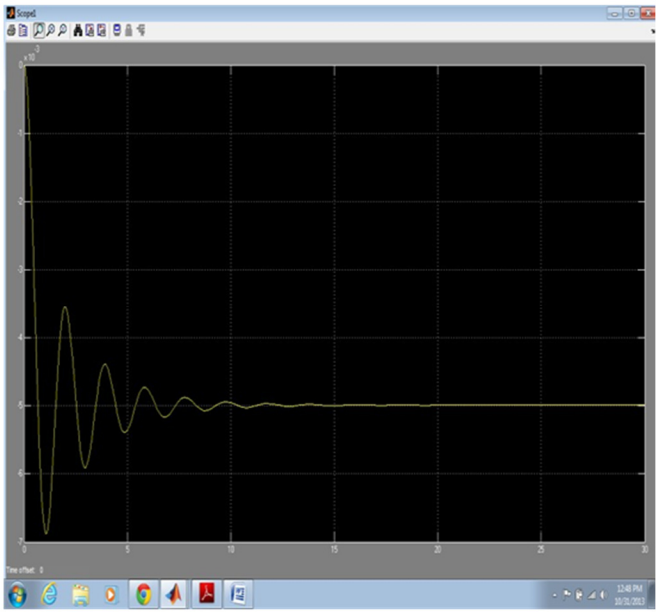

Fig 4 Frequency deviations in zone 2 of the regulator complete connection line of the heat reheating power two interrelated thermal systems with heated fuel system with regulator

Fig 5 deviation of the power of the

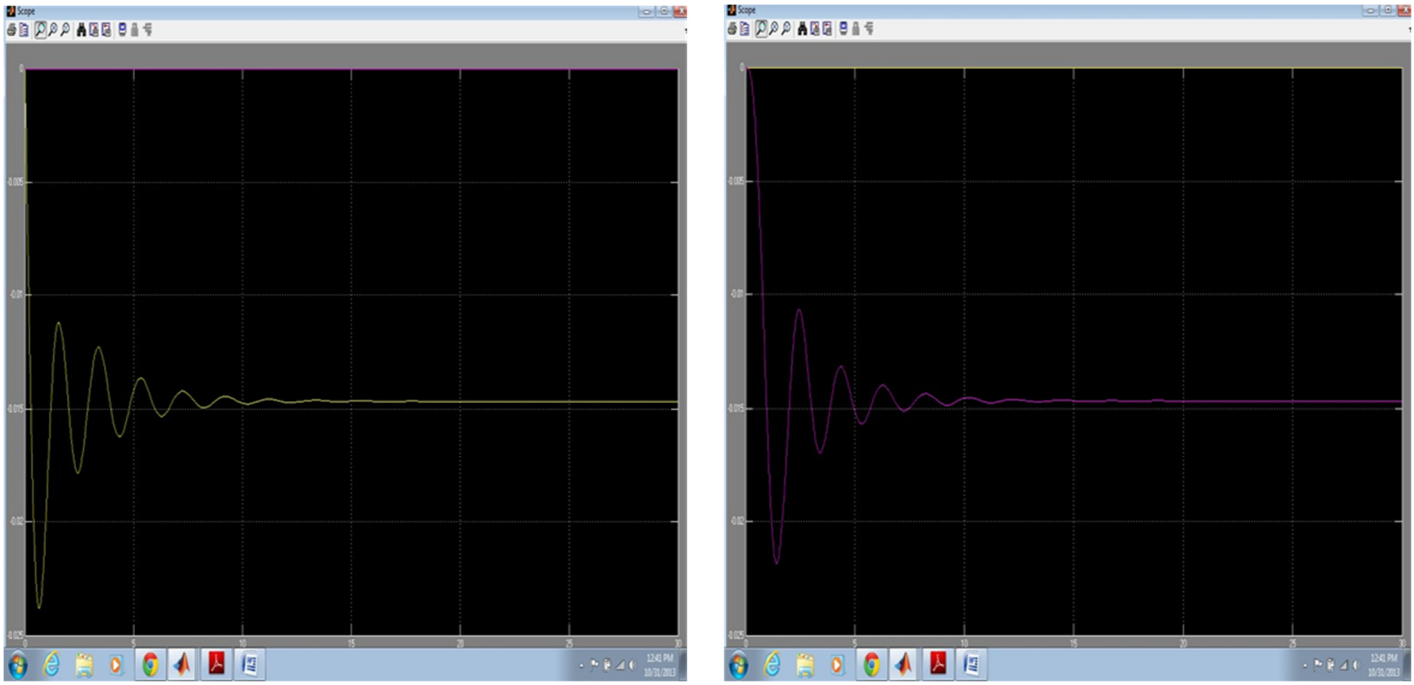

Fig. 6: Frequency deviation in zone 1 of the integral regulator

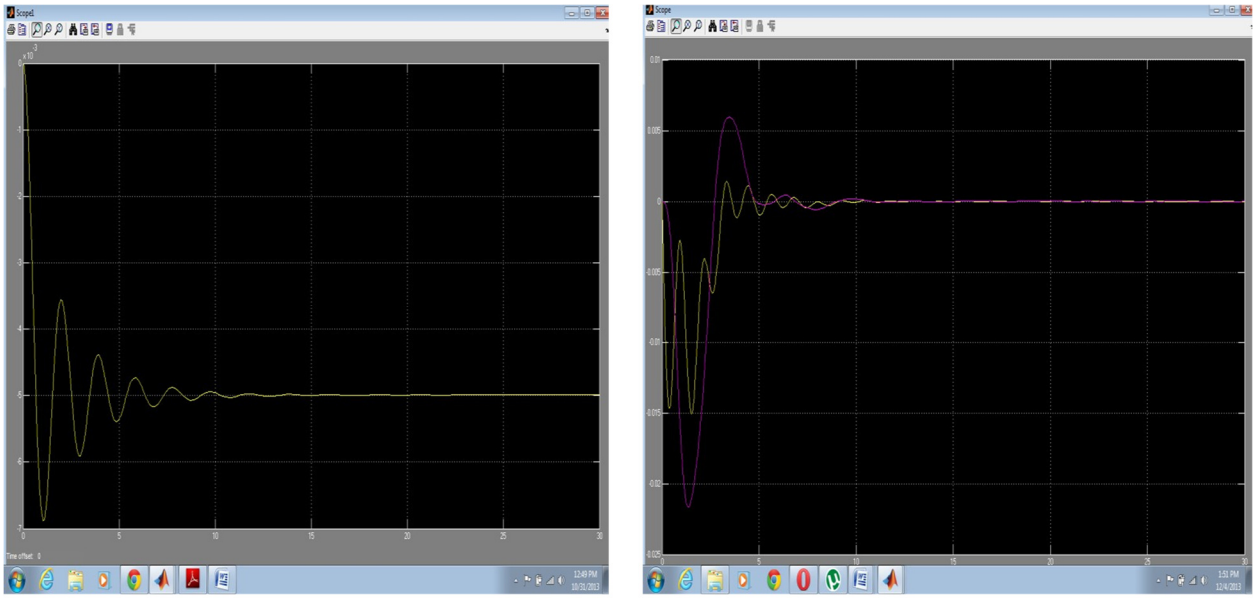

Fig. 7: Deviation of the power of the connecting line in thermal reheat supply system interconnected in two optimized areas proportional to the ros

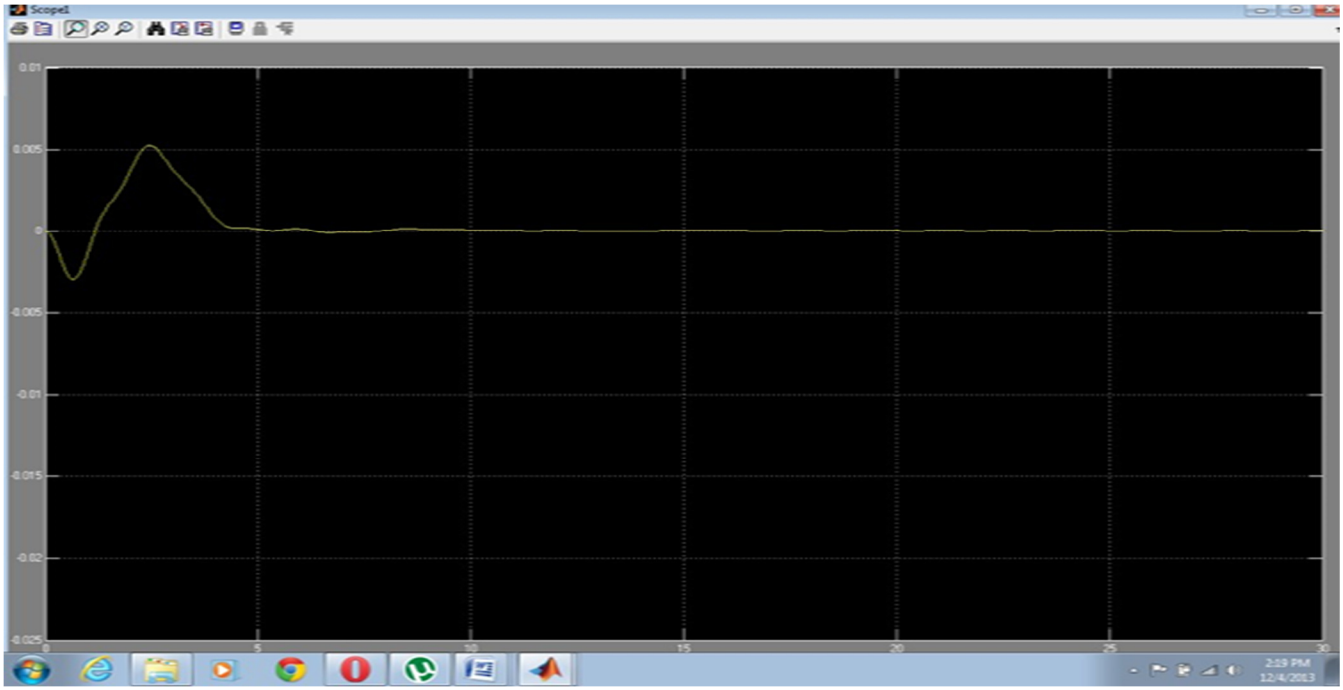

Fig. 7: Deviation of the line power in the interconnected thermal reheating system in two zones with particle-optimization

Conclusion

- The PID control algorithm is a robust and simple algorithm that is widely used in the industry.
- PID control algorithms are popular and offer many advantages, such as ease of use, the new development helps implement other PID control and control options for common industrial applications.
- This work examined some PID implementations and how to improve system performance.
- We will then try to impose these algorithms on the "Cruise system control" of a car

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- Vibha Kashyap, Rahul Rahangdale – Determination of Optimla Location of Upfc Controller Devices in electric Transmission System by using Pso Method

Annex

Implementation of the ABC algorithm with the matlab

```
clc;
clear;
close all;
%% Problem definition
CostFunction=@(x) Sphere(x);        % The cost of function
nVar=5;            % Number of decision variables
VarSize=[1 nVar];   % The size of the matrix decision variables
VarMin=-10;         % Decision variables-Lower limit
VarMax= 10;         % Decision variables-Upper limit
%% ABC
MaxIt=200;             % Maximum number of iterations
nPop=100;              % Population size (Colony size)
nOnlooker=nPop;        % Number of bees in sight
L=round(0.6*nVar*nPop); % Abandonment limit parameter (test limit)
a=1;                   % Upper limit of acceleration coefficient
%% Initialization
% Empty bee structure
empty_bee.Position=[];
empty_bee.Cost=[];
% Vector population initialization
pop=repmat(empty_bee,nPop,1);
% Solution initialization
BestSol.Cost=inf;
% Create initial population
for i=1:nPop
   pop(i).Position=unifrnd(VarMin,VarMax,VarSize);
   pop(i).Cost=CostFunction(pop(i).Position);
   if pop(i).Cost<=BestSol.Cost
      BestSol=pop(i);
   end
end
% Abandonment metering
C=zeros(nPop,1);
% Archive to maintain the best cost values
BestCost=zeros(MaxIt,1);
%% Main loop ABC
for it=1:MaxIt
  % Recruited bees
   for i=1:nPop

      % Choose k at random, not equal to i
      K=[1:i-1 i+1:nPop];
      k=K(randi([1 numel(K)]));

      % Defin the acceleration coefficient
      phi=a*unifrnd(-1,+1,VarSize);
```

```
    % New position of bee
    newbee.Position=pop(i).Position+phi.*(pop(i).Position-pop(k).Position);

    % Evaluation
    newbee.Cost=CostFunction(newbee.Position);

    % Comparation
    if newbee.Cost<=pop(i).Cost
        pop(i)=newbee;
    else
        C(i)=C(i)+1;
    end

end

% We comput the fitness value
F=zeros(nPop,1);
MeanCost = mean([pop.Cost]);
for i=1:nPop
    F(i) = exp(-pop(i).Cost/MeanCost); % We convert the cost of fitness
end
P=F/sum(F);

% The bees with audience
for m=1:nOnlooker

    % Select location source
    i=RouletteWheelSelection(P);

    % Choose k random, not equal with i
    K=[1:i-1 i+1:nPop];
    k=K(randi([1 numel(K)]));

    % Defin acceleration coefficient
    phi=a*unifrnd(-1,+1,VarSize);

    % New position of bee
    newbee.Position=pop(i).Position+phi.*(pop(i).Position-pop(k).Position);

    % Evaluation
    newbee.Cost=CostFunction(newbee.Position);

    % Comparation
    if newbee.Cost<=pop(i).Cost
        pop(i)=newbee;
    else
        C(i)=C(i)+1;
    end

end

% The scout bees
for i=1:nPop
    if C(i)>=L
        pop(i).Position=unifrnd(VarMin,VarMax,VarSize);
```

```
        pop(i).Cost=CostFunction(pop(i).Position);
        C(i)=0;
    end
end

% Upgrade the best solution
for i=1:nPop
    if pop(i).Cost<=BestSol.Cost
        BestSol=pop(i);
    end
end

% The best cost found
BestCost(it)=BestSol.Cost;

% Disp information of iteration
disp(['Iteration ' num2str(it) ': Best Cost = ' num2str(BestCost(it))]);

end

%% Result
figure;
%plot(BestCost,'LineWidth',2);
semilogy(BestCost,'LineWidth',2);
xlabel('Iteration');
ylabel('Best Cost');
grid on;
```

Implementation of the ABC algorithm with python

```
import lib
from swarm import ABC

def main():
    abc_sphere = ABC(30, 49, lib.sphere, fn_lb=[-5, -5], fn_ub=[5, 5])
    abc_ackley = ABC(30, 49, lib.ackley, fn_lb=[-20, -20], fn_ub=[20, 20])
    abc_rastrigin = ABC(30, 49, lib.rastrigin, fn_lb=[-5, -5], fn_ub=[5, 5])

    min_x, min_y = abc_sphere.optimize()
    eval_result = lib.sphere([min_x, min_y])

    print(f'Sphere MIN: x={min_x}, y={min_y}')
    print(f'Sphere({min_x}, {min_y}) = {round(eval_result, 4)}')

    min_x, min_y = abc_rastrigin.optimize()
    eval_result = lib.rastrigin([min_x, min_y])

    print(f'Rastrigin MIN: x={min_x}, y={min_y}')
    print(f'Rastrigin({min_x}, {min_y}) = {round(eval_result, 4)}')
```

```
    min_x, min_y = abc_ackley.optimize()
    eval_result = lib.ackley([min_x, min_y])

    print(f'Ackley MIN: x={min_x}, y={min_y}')
    print(f'Ackley({min_x}, {min_y}) = {round(eval_result, 4)}')

if __name__ == '__main__':
    main()
```

Algorithm PSO (Pseudocod)

INITIALIZATION **begin**
***t* := 0**
generates *P(t)* (position *x* and y speed vectors *v*)
ITERATION **while** (not STOP CONDITION) **do begin**
t := *t* + 1
evaluate *P(t)*
updates *p*, *g*
for each particle **in** *P(t)*
apply the formula (1)
apply the formula (2)
end

Implementation of the PSO algorithm in MATLAB

```
clc
clear all
if ~isempty(instrfind)
   fclose(instrfind);
   delete(instrfind);
end
close all
clc
disp('Serial Port Closed')
clear
clc

%User Defined Properties
serialPort = 'COM7';          % define COM port #

plotTitle = 'Serial Data Log';  % plot title
xLabel = 'Elapsed Time (s)';    % x-axis label
yLabel = 'Data';                % y-axis label
plotGrid = 'on';                % 'off' to turn off grid
min =0;                  % set y-min
max = 3;                 % set y-max
scrollWidth = 5;         % display period in plot, plot entire data log if <= 0
delay = .01;             % make sure sample faster than resolution

%Define Function Variables
time = 0;
data = 0;
```

```
count = 0;
bdata = 0;
btime = 0;

%Set up Plot
plotGraph = plot(time,data,'b');

title(plotTitle,'FontSize',25);
xlabel(xLabel,'FontSize',15);
ylabel(yLabel,'FontSize',15);
axis([0 10 min max]);
grid(plotGrid);

%Open Serial COM Port
s = serial(serialPort)
set(s,'DataBits',8);
set(s,'StopBits',1);
set(s,'BaudRate',9600 );
set(s,'Parity','none');

disp('Close Plot to End Session');
fopen(s);

tic




Setpoint=1;
Kp=2;
Ki=3;
Kd=0;
lastt=0;
dsum=0;
ddt=0.03
err=0;
itt=0;
dtr1=0;
dtr2=0;

while ishandle(plotGraph) %Loop when Plot is Active
   zz=fscanf(s);
   uu=regexp(zz,'@', 'split');
   dat =sscanf(uu{1},'%f');
   bdat =sscanf(uu{2},'%f');




   if(~isempty(dat) && isfloat(dat)&& isfloat(bdat)) %Make sure Data Type is Correct
      count = count + 1;
      time(count) = toc;    %Extract Elapsed Time
      data(count) = dat(1); %Extract 1st Data Element
      bdata(count) = bdat(1);
```

```
    set(plotGraph,'XData',time(time > time(count)-scrollWidth),'YData',data(time > time(count)-scrollWidth));hold on
      btime=time;

      plot(btime,bdata,'r');hold off

     axis([time(count)-scrollWidth time(count) min max]);
      else
     set(bplotGraph,'XData',time,'YData',bdata);
     axis([0 time(count) min max]);

   end

   drawnow;
end

%Close Serial COM Port and Delete useless Variables
fclose(s);
clear count dat delay max min plotGraph plotGrid plotTitle s ...
       scrollWidth serialPort xLabel yLabel;


disp('Session Terminated...');
```

Optimization of Test Case Allocation Scheme in Program Partition Testing

Kazimierz WORWA

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland
kazimierz.worwa@wat.edu.pl

Abstract

The issue of random testing of the program in the aspect of comparing the effectiveness of random testing and partitioning testing was considered in this paper. However, unlike other works on this subject, the term partition does not refer directly to a specific subset of the all program testing cases, but to a fragment of the program, which is a specific set of paths, leading from the beginning of the program to its end, where each path belongs to exactly one of the selected subsets of paths. A formal model of the program under the testing is presented. This model is based on the notion of a control flow graph. The relationship between faults and failures is characterizes by means so called the characteristic matrix of the program under testing. The main result of the paper is obtaining formulae for the mean value of the number of faults encountered during the random testing and program partition testing. The formulation of the single-criterion optimization task which allows the determination of a testing strategy that maximizes the expected value of the number of program faults is also formulated. Considerations are illustrated with a simple numerical example.

Keywords: random testing, partition testing, software reliability

Introduction

It is well known that a software development process consists of the following four phases: specification (including user requirements definition and software requirements definition), design (structural design and detailed design), coding and testing. The practice of modern software engineering shows that the testing stage has the largest impact on the error detection process.

The method of generating the test data set, on the basis of which the software testing process will be carried out, depends on the adopted testing method, each of which is based on a specific criterion for the selection of test data set. Depending on the approach to the problem of designing the test data set, the testing methods used in practice can be divided into deterministic methods and random methods.

Deterministic testing methods assume the generation of a test data set in a exclusively deterministic way, i.e. without the participation of a random factor. Individual sets of input data, which are elements of the designed test set, are determined based on the analysis of the requirements specification or analysis of the source code of the tested program.

Unlike deterministic methods in random methods, part of the test data sets (or even all) used in the software testing process is created using a random factor, i.e. by randomly selection, whereby the most commonly used in practice of designing test cases is the sampling without returning. The method of creating a test data set based on a randomly selection is very widely used in testing practice. This is mainly due to its simplicity (it does not require e.g. a very labor-intensive analysis of the logical structure of the tested program), the direct consequence of which is the low cost of the testing process and high susceptibility to its automation. The second, which determines the wide practical use, feature of the random method is its high efficiency, measured by the number of errors detected in the testing process. Research conducted to compare the effectiveness of the most-used testing methods in practice has shown that for a wide class of programs, testing based on random generation of test data is more effective in terms of error detection capability than other methods, see e.g. Duran and Ntafos (1984), Weyuker and Jeng (1991). In practice, random testing is carried out as random testing or partition testing.

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Random testing consists in using in the testing process a set of test cases, created by randomly selection (usually without returning) its subsequent elements from the entire set of program input domain, i.e. set of all test cases of the tested program. The main problem here is determining the probability distribution with which individual test cases are randomly drawn. In the absence of relevant premises as to the nature of this distribution, a uniform distribution is often assumed over the program domain. Very often used in practice variation of the random testing is a such testing in which the sampling of subsequent test cases is based on the probability distribution specified by the so-called the operational profile of the program, determining the probability of occurrence of individual test cases of the program in the conditions of its actual use.

Partition testing, also called subdomain testing, consists in dividing the set of a program domain into subsets called partitions and then drawing a specific number of tests from each subset. Consequently, the testing process is carried out based on a number of test sets (corresponding to the number of separate partitions), with the sampling of individual data case within the extracted partitions is most often based on an uniform distribution.

The rest of this paper is organized as follows. Section 2 present related works, Section 3 describes the formal model of the program under the testing. Section 4 discusses the use of the expected number of faults detected during the random testing of the program. Section 5 analyzes partition testing using the expected number of faults and compares it with random testing. Section 6 presents formulation of the single-criterion optimization task, which allows the determination of a testing strategy that maximizes the expected value of the number of program faults. Section 7 summarizes and concludes this paper.

Related Works

A comparison analysis of partition testing and random testing has attracted significant attention in the literature. Specific contributions have been made by Boland et al (2003), Duran and Ntafos (1984), Gutjahr (1999), Hamlet and Taylor (1990), Weyuker and Jeng (1991), Chen and Yu (1994, 1996), Chen et al (2004, 2010). Duran and Ntafos (1984) as well as Hamlet and Taylor (1990) performed a series of simulations and experiments to compare the effectiveness of partition testing and random testing. Their results were at first surprising to many people. They found that even when partition testing was better than random testing at finding bugs, the difference in effectiveness was marginal. Thus, when the overhead of partitioning is relatively expensive to random testing, it is likely that random testing will be more cost effective than partition testing in terms of cost per fault found. Weyuker and Jeng (1991) conducted a formal analysis of partition testing strategies and compared the effectiveness of partition testing and random testing. They found that partition testing can be an excellent testing strategy or a poor one, as compared to random testing. Essentially, they found that the effectiveness of a particular partition testing strategy depends on how well that strategy groups together the failure-causing inputs, that is, inputs which produce incorrect outputs. In particular, partition testing is most successful when the subdomain definitions are fault-based. Their findings were very helpful in explaining the seemingly counter-intuitive results in the empirical analysis of partition testing and random testing by Duran and Ntafos (1984). Gutjahr (1999) has compared partition testing and random testing on the assumption that program failure rates are not known with certainty before testing and are, therefore, modeled by random variables. He has shown that under uncertainty, partition testing compares more favorably to random testing than suggested by prior investigations concerning the deterministic case.

Boland et al (2003) have studied how the concepts of majorization and Schur-Convexity can be used in determining conditions under which partition testing is more effective than random testing. They have generalized some of the results of Weyuker and Jeng (1991), Chen and Yu (1994, 1996) and Gutjahr (1999) and established more precise conditions under which partition testing outperforms random testing.

Various reliability metrics have been in use in the analysis of the effectiveness of subdomain testing and random testing, each based on a different intuition. Almost all of these measures are formulated in terms of failures rather than faults. Ideally, we would like to assess the effectiveness of testing in terms of the faults detected. Faults are the software defects caused by programmer errors, while a failure is an observed departure from the specified behavior of the software. Normally, only failures are revealed by testing, and the associated faults are usually identified during debugging. It is worth noting that the above-cited works completely ignore the distinction between terms failures and faults.

In the article, as in the analytical works, see e.g. Boland et al (2003), Chen and Yu (1994, 1996), Gutjahr (1999), Weyuker and Jeng and Worwa (2009), the issue of random testing of the program in the aspect of comparing the effectiveness of random testing and partitioning testing is considered. However, unlike the works cited above, the term partition does not refer directly to a specific subset of the all program testing cases, but to a fragment of the program, which is a specific set of paths, leading from the beginning of the program to its end, where each path

belongs to exactly one of the selected subsets of paths. This means that the division of the program domain into disjoint subsets of test cases is determined by the method of dividing the set of all paths leading from the beginning to the end of the program into subsets of these paths, referred to as program partitions in this article. It is worth emphasizing that such an approach is close to the random path testing proposed by Gotlieb and Petit (2010).

Unlike the software reliability measures used in these works formulated in terms of failures the expected number of faults detected to analyze subdomain and random testing will be used in this paper. A program fault may cause a number of failures, while a program failure may have more than one fault associated with it. There is no simple relationship between faults and failures. This makes it difficult to use faults in measuring the effectiveness of testing. In this paper relationship between faults and failures is characterizes by means so called the characteristic matrix of a program under testing.

Description of the program under the testing

The tested program will be characterized by means of a directed *G* graph, defined as follows:

$$G = (\boldsymbol{I}, \boldsymbol{U}),$$

where:

$\boldsymbol{I}$ - set of graph vertices corresponding to the set of module numbers of the tested program:

$$\boldsymbol{I} = \{1, 2, ..., i, ..., I\},$$

$\boldsymbol{U} \subset \boldsymbol{I} \times \boldsymbol{I}$ - set of ordered pairs $(i, j) \in \boldsymbol{I} \times \boldsymbol{I}$, while a pair $(i, j) \in \boldsymbol{U}$, if after the *i*-th module is executed, the *j*-th module can be executed next.

Without loss of generality it can be assumed that the relevant program has one input module and one output module with numbers i_{IN}, i_{OUT} respectively, $i_{IN}, i_{OUT} \in \boldsymbol{I}$. In literature, the graph *G* is called the control flow graph.

Let $\boldsymbol{D}$ denote the set of numbers of all paths of the tested program, while the term path means the sequence of modules from the input module i_{IN} to the output module i_{OUT} for which there is at least one input data set that activates it:

$$\boldsymbol{D} = \{1, 2, ..., d,..., D\}.$$

It is worth noting that the set $\boldsymbol{D}$ can be very numerous but it is always finished.

Let $\boldsymbol{I}_d$ denote a set of all module numbers of the *d*-th path:

$$\boldsymbol{I}_d = \left\{ i_{d,1},\ i_{d,2},\ ...,\ i_{d,k},\ ...,\ i_{d,I_d} \right\},\ d \in \boldsymbol{D},$$

where:

$i_{d,k}$ – a number of the *k*-th module of the *d*-th path (in the order of execution of the modules included in it), while $i_{d,1} = 1$ and $i_{d,I_d} = I$,

I_d – the number of modules forming the *d*-th program path.

Let us define the reliability of a module as the probability that the module performs its function correctly, i.e., the module produces the correct output and transfers control to the next module correctly. When a set of user input is supplied to the program, a sequence of modules will be executed. The reliability of the output will depend on the sequence of modules executed and the reliability of each individual module. We first assume that the reliabilities of the modules are independent. This means that faults will not compensate each other, i.e., an incorrect output from a module will not be corrected later by subsequent modules. Since errors do not compensate each other, the result of the execution of the program is correct if and only if the proper sequence of modules is executed and in every instance of module execution, the module produces the correct result. The reliability of a module, in general, is a function of many factors, and the study of the reliability function of a module is beyond the scope of this paper. However, if no modification is made on the modules and the user environment does not change, the reliability function of a module should remain invariant. Let r_i stand for the *i*-th module reliability coefficient. The module reliability coefficients form a following vector $\boldsymbol{R}$, called program reliability vector

$$\boldsymbol{R} = (r_1, r_2, ..., r_i, ..., r_I).$$

We next assume that the transfer of control among program modules is a Markov process. This implies that the next module to be executed will depend probabilistically on the present module only and is independent of the past history. It is noteworthy that this assumption may not be valid for all types of programs.

Let us represent the logical structure of the program by a directed graph where every node *i* represents a program module and a directed branch $(i, j) \in \boldsymbol{U}$ represents a possible transfer of control from the *i*-th module to the *j*-th module. To every directed branch $(i, j) \in \boldsymbol{U}$ we will attach a probability p_{ij} as the probability that the transition (*i*, *j*) will be taken when control is at *i*-th node. If $p_{ij} = 0$, the branch (*i*, *j*) does not exist. Without loss of generality, let us assume that the program graph has a single entry node *1* and a single exit node *M*.

Probabilities p_{ij}, $i, j = 1,2,..,I$, form the following square matrix $P = \left[p_{ij} \right]_{I \times I}$, called the transition matrix:

$$P = \begin{bmatrix} p_{11} & p_{12} & \cdots & p_{1i} & \cdots & p_{1I} \\ p_{21} & p_{22} & \cdots & p_{2i} & \cdots & p_{2M} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ p_{i1} & p_{i2} & \cdots & p_{ii} & \cdots & p_{iI} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ p_{I1} & p_{I2} & \cdots & p_{Ii} & \cdots & p_{II} \end{bmatrix} \tag{1}$$

where element p_{ij} means the probability of the event that after execution of the *i*-th module, the *j*-th module will be executed next, $i, j = 1,2,...,i,...,I$. The matrix *P* determines so called the operational profile of the program.

Let $p_q, p_q > 0$, mean probability of an activation by a single test case of the *d*-th path of the tested program, wherein

$$p_q = \prod_{i,j \in \boldsymbol{I}_d} p_{ij}, \; d \in \boldsymbol{D}. \tag{2}$$

The process of program execution for a given test case of program input domain consists in activating a certain sequence of modules corresponding to this case, forming one of the executable paths of the program. It is assumed that the measure of reliability of the considered program is the probability of its correct execution for a single, randomly selected, test case. This probability is equal to the product of the probabilities of the correct execution of the modules included in the path from the input module to the output module, which activates the given test case. Using the introduced assumptions, the program reliability coefficient with the reliability structure $\boldsymbol{R}$ and the transition matrix *P* can be determined as follows:

$$r = \sum_{d \in \boldsymbol{D}} p_d \prod_{i \in \boldsymbol{I}_d} r_i \; . \tag{3}$$

The random testing of the program

Execution of the program under the testing process with one input data set (test case) will be called a run in this paper. The run can be successful, if program execution did not lead to encounter any default or not successful, if program execution was incorrect, i.e. some default were encountered.

It is assumed that the testing process of the considered program consists in carrying out n test cases (tests), drawn from the set of all possible test cases, with the draw being carried out based on the probability distribution, determined by the operational profile of the program, determined by the transition matrix *P*, defined by (1).

According to assumed testing scheme a situation that a number of different test cases of all *n* tests encounter the same program fault is possible. So, according to the note mentioned above, a situation that several runs will lead to encounter the same program fault is possible.

Let q_{nm} define the probability of an event that *n* faults will be encountered as a result of the program testing if there are *m* tests that lead to reveal failures during the program testing process. If we assume that every run of the program

with a single test can lead to reveal at most one program failure, and every failure makes it possible to detect exactly one fault we have

$$0 \le q_{nm} \le 1 \text{ if } n \le m,\ n \ge 0, \tag{4}$$

where in particular

$$\begin{aligned} q_{00} &= q_{11} = 1 \\ q_{nm} &= 0 \quad if\ n > m \end{aligned} \tag{5}$$

Probabilities q_{nm}, $n \in \{0,1,2,...,m\}$, $m \in \{0,1,2,...,\}$, that are defined by (4-5) form an infinite matrix $Q = [q_{nm}]$ that has a following form

$$Q = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & ... \\ 0 & 1 & q_{12} & q_{13} & q_{14} & ... \\ 0 & 0 & q_{22} & q_{23} & q_{24} & ... \\ 0 & 0 & 0 & q_{33} & q_{34} & .. \\ 0 & 0 & 0 & 0 & q_{44} & ... \\ & & ... & & & \end{bmatrix}, \tag{6}$$

while

$$\sum_{n=0}^{\infty} q_{nm} = 1, \quad m \in \{0,1,2,...\}. \tag{7}$$

The matrix Q contains the values 0 below the main diagonal because – in accordance with earlier assumption that every run of the program with a single test can lead to reveal at most one program failure and every failure makes it possible to detect exactly one fault - it is not possible to encounter more different faults than the number of failures. The values of probabilities q_{nm} that form the matrix Q depend on a logical structure of the program under the testing.

In particular, an important impact on these probabilities has: number of paths that have been identified in the program, degree of covering individual paths, that can be measured by number of program instructions that belong to two or more paths and length of individual paths, i.e. measured by number of program instructions that are executed in case of path activation. The matrix Q will be called the characteristic matrix of the program under the testing.

As a result of the program testing process in accordance with the assumed testing scheme a number of failures may be revealed. Because different tests can reveal the same failures, the real number of faults encounter as a result of running n tests may be less. of course, the faults associated with reveal failures are usually identified during debugging.

Let $M(P)$ denote the number of tests that lead to incorrect execution of the program under the testing with the transition matrix P, i.e. to reveal failures, during the program testing process.

Let $N(P,Q)$ mean the total number of faults encountered during the program testing process with the transition matrix P and the characteristic matrix Q. While planning the program testing process it is reasonable to consider the values $M(P,Q)$ and $N(P,Q)$, as random variables, while $N(P,Q) \le M(P)$.

Joint distribution of the random variables ($N(P,Q)$, $M(P)$) can be determined as follows:

$$Pr\{N(P,Q) = n, M(P) = m\} = Pr\{N(P,Q) = n|_{M(P)=m}\} Pr\{M(P) = m\} \tag{8}$$

According to earlier denotations we have

$$q_{nm} = Pr\{N(P,Q) = n|_{M(P)=m}\}, \tag{9}$$

and

$$Pr\{M(P) = m) = \binom{L}{m}(1-r)^m r^{L-m}, \tag{10}$$

where L is the number of tests performed during program testing process.
So,

$$Pr\{N(P,Q) = n, M(P) = m\} = q_{nm}\binom{L}{m}(1-r)^m r^{L-m}. \tag{11}$$

Probability distribution of the random variable $N(P,Q)$ can be determined as a marginal distribution in a distribution of two-dimensional random variable (N, M):

$$Pr\{N(P,Q)=n\}=\sum_{m=0}^{L}Pr\{N(P,Q)=n,M(P)=m\}=$$
$$\sum_{m=0}^{L}Pr\{N(P,Q)=n|_{M(P)=m}\}Pr\{M(P)=m\}=\sum_{m=0}^{L}q_{nm}\binom{L}{m}(1-r)^m r^{L-m}. \quad (12)$$

The knowledge of the probability distribution function (11) makes possible to obtain a formula for the mean value of the number of faults encountered during the program testing process. We have

$$E_r[N(P,Q)] = \sum_{n=0}^{L} n\,Pr\{N(P,Q)=n\}, \quad (13)$$

and then, according to (12):

$$E_r[N(P,Q)] = \sum_{n=0}^{L} n \sum_{m=0}^{L} q_{nm}\binom{L}{m}(1-r)^m r^{L-m}. \quad (14)$$

Let Q^*, Q^{**} denote characteristic matrices that have form:

$$Q^* = \begin{bmatrix} 1 & 0 & 0 & 0 & \dots \\ 0 & 1 & 0 & 0 & \dots \\ 0 & 0 & 1 & 0 & \dots \\ 0 & 0 & 0 & 1 & \dots \\ & & \dots & & \end{bmatrix}, \qquad Q^{**} = \begin{bmatrix} 1 & 0 & 0 & 0 & \dots \\ 0 & 1 & 1 & 1 & \dots \\ 0 & 0 & 0 & 0 & \dots \\ 0 & 0 & 0 & 0 & \dots \\ & & \dots & & \end{bmatrix}. \quad (15)$$

The characteristic matrices Q^*, Q^{**} correspond with some specific, extreme forms of the program testing scheme. The matrix Q^* correspond with a such testing scheme in which different tests can encounter only new faults, i.e. not encounter by tests that were executed earlier. The matrix Q^{**} correspond with a such testing scheme in which all tests can encounter at most one and the same program fault.

The formula (14) will be simplified if the program characteristic matrix Q is of the form (15), i.e.:

$$E_r[N(P,Q^*)] = \sum_{n=0}^{L} n\binom{L}{n}(1-r)^n r^{L-n} = L(1-r) \quad (16)$$

and

$$E_r[N(P,Q^{**})] = \sum_{n=0}^{L} q_{nm}\binom{L}{n}(1-r)^n r^{L-n} = \sum_{m=1}^{L} 1\binom{L}{m}(1-r)^m r^{L-m} = 1-P\{M(P)=0\} = 1-r^L. \quad (17)$$

In practice, the formula (14) for evaluating the mean value of the number of faults encountered during the program testing process can be used if the program characteristic matrix Q is known. If the probabilities q_{nm}, $n,m \in \{0,1,2,...L\}$, , are unknown, it is possible to determine the boundary values of this evaluation.

Let Q^*, Q^{**} denote characteristic matrices of the program under the testing of forms (15). Then, as proved by Worwa (2005), for any characteristic matrix P is:

$$E_r[N(P,Q^{**})] \le E_r[N(P,Q)] \le E_r[N(P,Q^*)], \quad (18)$$

where the quantities $E_r[N(P,Q^*)]$ and $E_r[N(P,Q^{**})]$ are determined by (16) and (17), respectively.

The partition testing of the program

Testing a program with partitions consists in dividing the program into fragments, each of which is a specific set of program paths, leading from the input module i_{IN} to the output module i_{OUT}, with each path belonging to exactly one of the selected subsets of paths. In further considerations, these subsets will be called program partitions.

Let's consider the division of the graph $G = (\boldsymbol{I}, \boldsymbol{U})$ of the tested program into the subgraphs $G_k = (\boldsymbol{I}_k, \boldsymbol{U}_k)$ such that $\boldsymbol{I}_k \subseteq \boldsymbol{I}$, $\boldsymbol{U}_k \subseteq \boldsymbol{U}$, while $i_{IN}, i_{OUT} \in \boldsymbol{I}_k$, $k=1,2 \dots K$, and

$$\bigcup_{k=1}^{K} \boldsymbol{I}_k = \boldsymbol{I}, \quad \bigcup_{k=1}^{K} \boldsymbol{U}_k = \boldsymbol{I}. \quad (19)$$

Let's consider the division of the set of numbers of all paths of the tested program leading from the input module i_{IN} to the output module i_{OUT} into disjoint subsets $\boldsymbol{D}_k \subseteq \boldsymbol{D}$:

$$\boldsymbol{D}_k = \left\{ d_{k,1},\ d_{k,2},\ ...,\ d_{k,l},\ ...,\ d_{k,D_k} \right\},\ k=1,2\ ...K,$$

wherein

$$\bigcup_{k=1}^{K} \boldsymbol{D}_k = \boldsymbol{D} \text{ and } \bigcap_{k=1}^{K} \boldsymbol{D}_k = \boldsymbol{\Phi}\ . \tag{20}$$

Each subgraph $G_k = (\boldsymbol{I}_k, \boldsymbol{U}_k)$ has a fragment of the transition matrix $P_k = \left[p_{ij}^{k} \right]_{I_k \times I_k}$. It takes place

$$\sum_{k=1}^{K} P_k = P\ , \tag{21}$$

where the summation operator is the matrix summation operator.

The division of the set of all program paths leading from the input module i_{IN} to the output module i_{OUT} into disjoint subsets $\boldsymbol{D}_k \subseteq \boldsymbol{D}$ means the division of the set of all possible test cases into disjoint subsets, with each test case activating exactly one path. Therefore, this division can be treated as one of the ways to divide the all program input domain into the partitions referred to in Boland et al (2003), Chen and Yu (1994, 1996), Duran and Ntafos (1984), Gutjahr (1999), Weuyker and Jeng (1991) and Worwa (2009). In the presented considerations, the term "partition" refers, however, not so much to a specific subset of all possible test cases, but to a part of the program being tested, represented by the subgraph $G_k = (\boldsymbol{I}_k, \boldsymbol{U}_k)$, the probability of transitions between modules described by the matrix P_k, $k=1,2,\ldots, K$. In further considerations, the term "partition" will be understood as a part of the program being tested, which is a subset of the set of paths leading from the input module i_{IN} to the output module i_{OUT}.

Similarly to the formulae (3), the reliability coefficient of the k-th partition of the program with the transition matrix P_k, understood as the probability of correct execution of the program for a single test case activating the path with the number from the set $\boldsymbol{D}_k$, can be determined as follows:

$$r_k = \sum_{d \in \boldsymbol{D}_k} p_d \prod_{i \in \boldsymbol{I}_d} r_i\ ,\ k=1,2,\ldots, K. \tag{22}$$

Let n_k be the number of test cases randomly selected from the subset of all test cases that activate the set of paths with the numbers from the set $\boldsymbol{D}_k$, $k=1,2,\ldots, K$.
As an alternative to the testing strategy described in Section 3, the testing strategy consisting in randomly selection from each set $\boldsymbol{D}_k$ $n_k > 0$ test cases, $k = 1,2, \ldots, K$, will be now considered.
Let $\mathcal{L}$ denote the set of vectors as follows

$$\mathcal{L} = \{ \boldsymbol{L} = (L_1, L_2, \ldots L_k, \ldots, L_K):\ \ L_k > 0,\ \sum_{k=1}^{K} L_k = L \} \tag{23}$$

The vector $\boldsymbol{L} \in \mathcal{L}$ will be called a testing strategy with program partitioning. To ensure the proper conditions for comparability of random testing strategy and testing strategy with program partitioning, it is assumed that this occurs

$$\sum_{k=1}^{K} L_k = L \text{ and } \sum_{k=1}^{K} r_k = r\ . \tag{24}$$

Let $M_k(\boldsymbol{L},P)$ denote the number of tests that lead to incorrect execution of the k-th program partition under the testing with the testing strategy $\boldsymbol{L}$ and transition matrix P_k, i.e. to reveal failures, during the program partition testing process. Let $N_k(\boldsymbol{L},P,Q)$ mean the total number of faults encountered during the program partition testing process with the testing strategy $\boldsymbol{L}$ and the transition matrix P and the characteristic matrix Q. While planning the program testing process it is reasonable to consider the values $M_k(\boldsymbol{L},P)$ and $N_k(\boldsymbol{L},P,Q)$, as random variables, while $N_k(\boldsymbol{L},P,Q) \leq M_k(\boldsymbol{L},P)$.
Conducting considerations analogous to those presented in Section 3, it can be shown that the expected value of a number of faults encountered during the testing the k-th partition determines the following relationship:

$$E_k\,[N(\boldsymbol{L}, P_k, Q_k)\,] = \sum_{n=0}^{L_k} n \sum_{m=0}^{L_k} q_{nm} \binom{L_k}{m} (1-r_k)^m r_k^{L_k - m}\ ,\quad k=1,2,\ldots, K. \tag{25}$$

Thus, the mean value of total number of faults encountered during the testing of all K partitions takes the form

$$E_p\,[N(\boldsymbol{L}, P, Q)\,] = \sum_{k=1}^{K} E[N_k(\boldsymbol{L}, P_k, Q_k)\,] = \sum_{k=1}^{K} \sum_{n=0}^{L_k} n \sum_{m=0}^{L_k} q_{nm} \binom{L_k}{m} (1-r_k)^m r_k^{L_k - m}\ , \tag{26}$$

while L_k is the number of tests performed during testing the k-th program partition.

The formula (26) will be simplified if the program characteristic matrix Q is of the form (15), i.e.:

$$E_p[N\left(\boldsymbol{L},P,Q^*\right)] = \sum_{k=1}^{K}\sum_{n=0}^{L_k} n\binom{L_k}{n}(1-r_k)^n r^{L_k-n} = \sum_{k=1}^{K} L_k(1-r_k) = L-\sum_{k=1}^{K} L_k r_k \tag{27}$$

and

$$\begin{aligned} \mathrm{E}_p[\mathrm{N}\left(\boldsymbol{L},P,Q^{**}\right)] &= \sum_{k=1}^{K}\sum_{n=0}^{L_k} q_{nm}\binom{L_k}{n}(1-r_k \sum_{n=0}^{L_k} q_{nm}\binom{L_k}{n}(1-r_k)^n r^{L_k-n})^n r_k^{L_k-n} = \\ &= \sum_{k=1}^{K}\sum_{m=1}^{L_k}\binom{L_k}{m}(1-r_k)^m r_k^{L_k-m} = \sum_{k=1}^{K}(1-P\{M_k(\boldsymbol{L},P_k)=0\}) = \sum_{k=1}^{K}(1-r_k^{L_k}) = K-\sum_{k=1}^{K} r_k^{L_k}. \end{aligned} \tag{28}$$

Taking into account the relationship (28), the following lower and upper estimations of the mean value of total number of faults encountered during the partition testing of the program with a given characteristic matrix Q can be determined in the form:

$$E_p[N\left(\boldsymbol{L},P,Q^{**}\right)] \le E_p[N\left(\boldsymbol{L},P,Q\right)] \le E_p[N\left(\boldsymbol{L},P,Q^*\right)]. \tag{29}$$

Taking into account the relationship (18), the following lower and upper estimations of the mean value of total number of faults encountered during the partition testing of the program with a given characteristic matrix Q can be determined in the form:

$$E_p[N\left(\boldsymbol{L},P,Q^{**}\right)] \le E_p[N\left(\boldsymbol{L},P,Q\right)] \le E_p[N\left(\boldsymbol{L},P,Q^*\right)], \tag{30}$$

and therefore

$$\sum_{k=1}^{K-1}(1-r_k^{L_k})+1-r_K^{L-K+1} \le E_p[\boldsymbol{L},P,N\left(Q\right)] \le L(1-r_k)+Kr_k-r. \tag{31}$$

Optimization of the program partition testing

The basic problem to be solved at the planning and organization stage of the software testing process is to specify a subset of the set of all possible test cases that would maximize the probability of detecting all program faults made in earlier stages of the software development process. This problem arises because, in general, due to the duration and cost of the testing process, it is impossible to test the software based on the entire set of all possible test cases. The problem of defining the mentioned subset is the problem of designing the test cases (tests). Each test is an acceptable combination of values that can take the input variables of the software program being tested, required for its single run, and the input variables are those variables whose values are determined directly based on the input data, e.g. as a result of executing the data loading instructions.

As noted earlier, the partition program testing consists of dividing the program into fragments, each of which is a specific set of paths, leading from the input module i_{IN} to the output module i_{OUT}, with each path belonging to exactly one of the selected subsets of paths. In the process of planning the implementation of the program testing stage, it is necessary to decide how many test cases should be used for testing each of program partitions.

Mentioned problem can be solved based on the formulation and solution of a single-criterion optimization task, allowing the determination of a testing strategy that maximizes the expected value of the number of program faults.

As noted earlier, the program testing process with partitions involves splitting the program into fragments, each of which is a specific set of program paths, leading from the initial vertex i_{IN} to the final vertex i_{OUT}, with each path belonging to exactly one of the selected subsets of paths. In the process of planning the program testing process, we should decide how many test cases should be used for testing each of program partitions.

The aforementioned problem can be solved based on the formulation and solution of the single-criterion optimization task, which allows the determination of a testing strategy that maximizes the expected value of the number of program faults. The optimization problem that was mentioned above can be formulated as follows:

for specific transition matrices P and characteristic matrix Q determine the testing strategy $\overline{\boldsymbol{L}} \in \mathcal{L}$ such that:

$$E_p[N\left(\overline{\boldsymbol{L}},P,Q\right)] = \max_{\boldsymbol{L}\in\mathcal{L}} E_p[N\left(\boldsymbol{L},P,Q\right)], \tag{32}$$

where quantity $E_p[N(\boldsymbol{L},P,Q)]$ is determined by the formula (26) and $\mathcal{L}$ is a set of acceptable strategies defined as follows

$$\mathcal{L} = \{\boldsymbol{L} = (L_1, L_2, \ldots L_k, \ldots, L_K): \ K>1, L_k>0, \sum_{k=1}^{K} L_k = L\}. \tag{33}$$

Numerical Example

The methodology of determination of the program reliability structure that has been presented can be illustrated by the following numerical example. Let Fig. 1 be the directed graph representing the control structure of a program with seven modules, where the module number *1* represents the input module and the module number *7* is the output module.

Let's assume that the control flow graph of the tested program has the form shown in Fig. 1.

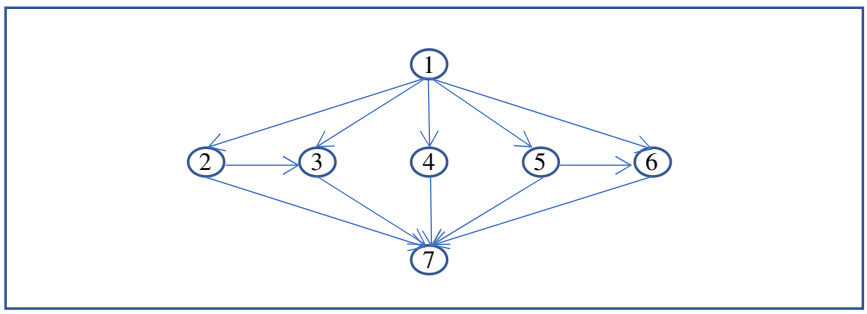

Fig. 1. Graph of the sample program

According to the Figure 1 we have:

$\boldsymbol{I} = \{1, 2, 3, 4, 5, 6, 7\}$, $i_{IN}=1$, $i_{OUT}=7$,

$\boldsymbol{U} = \{(1, 2),(1, 3), (1, 4), (1, 5), (1, 6),(2, 3), (5, 6), (2, 7), (3, 7), (4, 7), (5, 7), (6, 7)\}$,

$\boldsymbol{D} = \{1, 2, 3, 4, 5, 6, 7\}$,

$\boldsymbol{I}_1 = \{1, 2, 7\}$, $\boldsymbol{I}_2 = \{1, 2, 3, 7\}$, $\boldsymbol{I}_3 = \{1, 3, 7\}$, $\boldsymbol{I}_4 = \{1, 4, 7\}$, $\boldsymbol{I}_5 = \{1, 5, 7\}$, $\boldsymbol{I}_6 = \{1, 5, 6, 7\}$, $\boldsymbol{I}_7 = \{1, 6, 7\}$.

Let the program transition matrix has the form

$$P = \begin{bmatrix} 0 & 0{,}4 & 0{,}1 & 0{,}3 & 0{,}1 & 0{,}1 & 0 \\ 0 & 0 & 0{,}7 & 0 & 0 & 0 & 0{,}3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0{,}6 & 0{,}4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

T

hen, according to (2), the probabilities of activation by a single test case of paths have the following values:

$p_1 = p_{12}p_{27} = 0{,}096$, $p_2 = p_{12}p_{23}p_{37} = 0{,}2016$, $p_3 = p_{13}p_{37} = 0{,}09$, $p_4 = p_{14}p_{47} = 0{,}24$,

$p_5 = p_{15}p_{57} = 0{,}028$, $p_6 = p_{15}p_{56}p_{67} = 0{,}0294$, $p_7 = p_{16}p_{67} = 0{,}07$.

Let the values of the program reliability vector is as in Table 1.

Table 1: module reliability coefficients

i	1	2	3	4	5	6	7
r_i	1	0,8	0,9	0,8	0,7	0,7	1

Then, according to (3), the value of the program reliability coefficient is $r = 0.755$. Let's assume that the testing process of the investigated program consists in executing 10 randomly selected test cases, i.e. $L = 10$. Let the characteristic matrix Q has the form

$$Q = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0,8 & 0,3 & 0,1 & 0,05 & 0,05 & 0,05 & 0,05 & 0,05 \\ 0 & 0 & 0,2 & 0,5 & 0,6 & 0,2 & 0,1 & 0,05 & 0,05 & 0,05 \\ 0 & 0 & 0 & 0,2 & 0,2 & 0,5 & 0,3 & 0,3 & 0,1 & 0,05 \\ 0 & 0 & 0 & 0 & 0,1 & 0,2 & 0,4 & 0,3 & 0,3 & 0,15 \\ 0 & 0 & 0 & 0 & 0 & 0,05 & 0,1 & 0,2 & 0,2 & 0,3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0,05 & 0,05 & 0,1 & 0,2 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,05 & 0,1 & 0,05 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,05 & 0,05 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0,05 \end{bmatrix}$$

According to (16), the value of mean value of the number of faults encountered during the program testing process is $E_r[N(P,Q)] = 1,557$. If the characteristic matrices have the form (15) we have respectively $E[N(P,Q^*)] = 2,45$ and $E[N(P,Q^{**})] = 0,9398$. That means, according to (18), that indeed it happens

$$E_r[N(P,Q^{**})] = 0,9398 \le E_r[N(P,Q)] \le E_r[N(P,Q^*)] = 2,45 .$$

Let $K=3$ and program partitions have the form presented on the Fig. 2.
According to (22) we can calculate the values of the k-th program partition coefficients, $k=1, 2, 3$. The values of these coefficients are summarized in Table 2.

Table 2: values of the program partitions coefficients

k	1	2	3
r_k	0,3876	0,24	0,1274

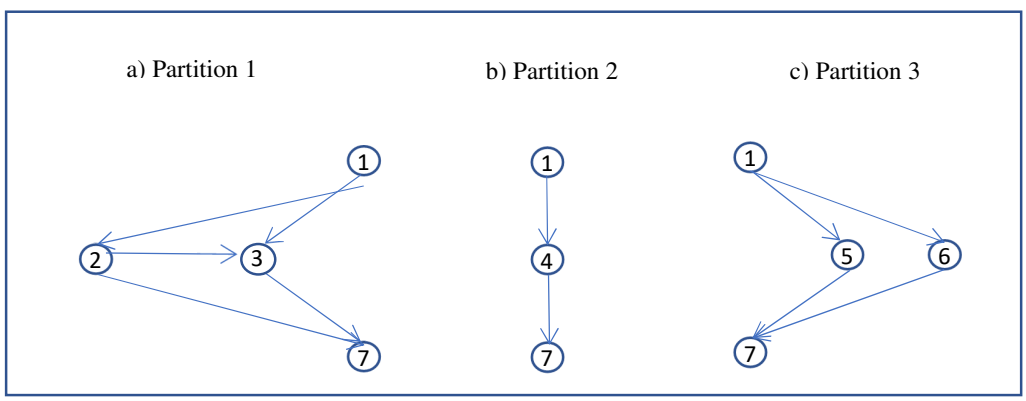

Fig. 2: Sample program partitions

Of course, according to (24) it occurs $\sum_{k=1}^{3} r_k = r = 0,775$.

Table 3: the mean values of the number of faults encountered during the program testing

Strategy number	***L***			$E_p[N(\boldsymbol{L},P,Q)]$	$E_r[N(P,Q)]$
	L_1	L_2	L_3		
1	8	1	1	4,512690	1,557041
2	7	2	1	4,481045	
3	6	3	1	4,546941	
4	5	4	1	4,594280	
5	4	5	1	4,691253	
6	3	6	1	4,819420	
7	2	7	1	4,918613	
8	1	8	1	4,971773	
9	7	1	2	4,446580	
10	6	2	2	4,403888	
11	5	3	2	4,472574	
12	4	4	2	4,534005	
13	3	5	2	4,642040	
14	2	6	2	4,771958	
15	1	7	2	4,869695	
16	6	1	3	4,624030	
17	5	2	3	4,584128	
18	4	3	3	4,666907	
19	3	4	3	4,739398	
20	2	5	3	4,849184	
21	1	6	3	4,977647	
22	5	1	4	4,705099	
23	4	2	4	4,679288	
24	3	3	4	4,773128	
25	2	4	4	4,847371	
26	1	5	4	4,955702	
27	4	1	5	4,900472	
28	3	2	5	4,885723	
29	2	3	5	4,981314	
30	1	4	5	5,054102	
31	3	1	6	5,103681	
32	2	2	6	5,090683	
33	1	3	6	5,184819	
34	2	1	7	5,210870	
35	1	2	7	5,196417	
36	1	1	8	5,264051	

The analysis of the data contained in Table 3 shows that for each strategy $\boldsymbol{L} \in \mathcal{L}$ the relationship (30) happens indeed. We can also notice that the best, i.e. the strategy that maximizes the expected value of the number of errors detected is the strategy $\overline{\boldsymbol{L}} = (1,1,8)$ for which $E_p[N(\boldsymbol{L},P,Q)] = 5,264051$. Successively, the worst, i.e. the strategy that minimizes the expected value of the number of errors detected is the strategy $\overline{\overline{\boldsymbol{L}}} = (6,2,2)$ for which $E_p[N(\boldsymbol{L},P,Q)] = 4,403888$. From the calculations carried out in the example under consideration it follows that in the light of the program reliability coefficient, any program testing strategy with partitioning is better than a random testing strategy.

Conclusions

In this paper, as in the analytical works, see e.g. Boland et al (2003), Chen and Yu (1994, 1996), Gutjahr (1999) and Worwa (2009), the issue of random testing of the program in the aspect of comparing the effectiveness of random testing and partitioning testing was considered. However, unlike the works cited above, the term partition does not refer directly to a specific subset of the all program testing cases, but to a fragment of the program, which is a specific set of paths, leading from the beginning of the program to its end, where each path belongs to exactly one of the selected subsets of paths.

A formal model of the program under the testing was presented. This model is based on the notion of a control flow graph. It was assumed that the probabilities of transitions between individual program modules are determined by the transition matrix *P*, the element p_{ij} means the probability of the event that after execution of the *i*-th module, the *j*-

th module will be executed next. The transition matrix defines so called operational profile of the program, determining the probability of occurrence of individual test cases of the program in the conditions of its actual use.

The use of the expected number of faults detected during the random testing of the program was discusses. Unlike the software reliability measures used in these works formulated in terms of the expected number of faults to analyze subdomain and random testing have been used. The relationship between faults and failures is characterizes by means so called the characteristic matrix Q of the program under testing, while the q_{nm} element of that matrix define the probability of an event that n faults will be encountered as a result of the program testing if there are m tests that lead to reveal failures during the program testing process. The values of probabilities q_{nm} that form the matrix Q depend on a logical structure of the program under the testing. The main result of this section is obtaining a formula for the mean value of the number of faults encountered during the program testing process. In practice, the formula for evaluating the mean value of the number of faults encountered during the program testing process can be used if the program characteristic matrix Q is known. In this section shown that if this matrix is unknown, it is possible to determine the both sides boundary values of the mean value of the number of faults encountered during the program testing.

Using the expected number of faults partition testing was analyzed and compares with random testing. The main result of this section is obtaining a formula for the total mean value of the number of faults encountered during the testing of all partitions.

A formulation of the single-criterion optimization task, which allows the determination of a testing strategy that maximizes the expected value of the number of program faults.

Presented considerations have been illustrated by a simple numerical example.

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Does the Pandemic Drive the Use of Artificial Intelligence? Evidence of China

Anton Andreevich KAZANTSEV

Saint-Petersburg University, Saint-Petersburg, Russian Federation
anton.kazantsev.spb@gmail.com

Natalia Anatolyevna NAVROTSKAIA

Saint-Petersburg University, Saint-Petersburg, Russian Federation
n.navrotskaya@spbu.ru

Abstract

Artificial intelligence (AI) has become an important component of the digital economy due to the increase in the efficiency of digital systems and the expansion of their scope. The analysis showed that the pandemic really acted as a driver for the introduction of AI into technological, production and economic processes and has already led to irreversible processes of digital transformation of the economy. In the context of the COVID-19 pandemic, the importance of AI has clearly increased; it has shown itself to be unusually effective in solving emergency problems and outlined promising areas for the development of technologies in the coming years. Using the case method, significant changes in technological and economic processes in China were analyzed. The areas of application of artificial intelligence technologies were identified, in which, due to the pandemic, the use of AI was the fastest: 1) providing remote work for business (2) tracking systems, (3) smart city technologies, (4) big data, (5) medicine and (6) unmanned vehicles. The main directions of state support for the development of AI in China are considered.

Keywords: Artificial Intelligence, COVID-19 pandemic, China, technological and economic processes

Introduction

The Chinese economy is facing new challenges due to a slowdown in economic growth and higher wages, which leads to the transfer of industry from China to other countries, and this, in turn, leads to an outflow of capital from the country. In the context of increasing global competition, the People's Republic of China (PRC) is looking for new drivers of economic growth based on the digitalization of the economy and capable of providing a technological breakthrough and increasing the efficiency of the economy. Artificial intelligence has become an important component of the digital economy due to the increase in the efficiency of digital systems and the expansion of their scope. Research and projects in the field of AI are currently receiving priority development in the world. Experts agree that the development of AI will lead to the next technological revolution, which will change human daily life and production.

The existing forecasts for the development of AI are based on its application in traditional areas, taking into account their growth. The COVID-19 pandemic led to the transition of many production processes to remote mode, made it possible to make sure of the effectiveness of using artificial intelligence to solve various new problems in new areas of the economy. It is becoming clear that the pandemic will accelerate the development of technology, as well as change the composition of those industries where artificial intelligence will be most actively implemented.

China has a huge progress towards the development and application of AI. At the same time, the experience of recent years has shown tremendous opportunities and great prospects for using AI, which requires deep study. This paper examines positive experiences and evaluates opportunities for the development of artificial intelligence in the PRC.

Review of relevant studies and problem statement

The concepts of digital economy development originate in the papers of D. Bell (1999) and E. Toffler (1980) in the

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1960s. Later, in the paper of D. Tapscott (1997), the definition of “digital economy” was first used. These concepts laid the foundation for research into the digital transformation of the economy, which is entering a new stage of development.

The changing importance of the digital economy and artificial intelligence for the development of China's economy is discussed in various papers, analytical materials and studies. Thus T.H. Davenport and R. Ronanki (2018) write that a number of areas such as health care, financial services and education can become less costly for society, but at the same time improve their quality and efficiency. First of all, according to the authors, this will happen due to the automation of routine work, as well as through the use of cognitive technologies. A number of authors note the threats and risks associated with the development of AI. So, M. Buiten (2019) writes that AI is non-transparent and complex from the point of view of legal regulation. The authors propose to develop an approach to working with AI with completely transparent algorithms in order to reduce risks, control them and regulate them by law.

Many papers on AI are exploring its technological features. At the same time, since the inception of this technology, scientists have sought to make AI as similar as possible to the human mind. Jeste, D., Graham, S. et al., (2020) offer their point of view on this issue. They believe that artificial intelligence should be based on human neurobiology. In their opinion, this will allow AI to self-learn and correct mistakes, comply with ethical norms, recognize human emotions and help people make decisions. K. W. Church (2018) discusses the general issues of the development of artificial intelligence in China, the prospects for speech recognition technologies and the activities of Baidu.

In studies of the development of the European market for AI and technological leadership in this area, it is noted that China is a serious competitor and challenge. J. Straus (2020) also mentions the impact of coronavirus on the development of the AI sector and draws attention to the need for government support for large IT companies and startups.

At the same time, the coronavirus pandemic has brought medical technologies and artificial intelligence technologies in medicine to the fore. S. E. Davies (2019) writes about the high potential of AI in vaccine development and cancer treatment. More importantly, in the context of the COVID-19 epidemic, AI can predict the spread of disease and the emergence of disease outbreaks.

It should be emphasized that the use of AI in medicine is prohibited in most countries of the world, which proves the existence of many problems in the field of regulation of its application and the importance of the problem under study.

Thus, we came to the conclusion, that existing research affects certain areas of application of artificial intelligence, the prospects for its development and risks. At the same time, the new challenges and opportunities for the use of AI caused by the pandemic have not yet been sufficiently reflected in science and practice. It is especially interesting to study the development of these processes in China, in which the digitalization of the economy and the development of AI technologies are proceeding most rapidly.

Research Methodology

Our conclusions and proposals are based on the results of the analysis and interpretation of the main concepts that are associated with the analysis of the digital economy, Industry 4.0 and AI. We also pay special attention to the study of the Chinese experience in the development of artificial intelligence, because this sector is developing rapidly. Market volumes and investment dynamics are significant on a global scale, which is especially associated with a sharp change in technological processes in the economy.

Our hypothesis is the assumption that the pandemic acts as a catalyst for the introduction of AI and in the future will lead to significant irreversible changes in technologies and, as a result, in the organization of production and economic processes.

From a methodological point of view, we use new methods and their combinations to get an idea of the changes that the coronavirus has brought to the world economy and in particular to the Chinese economy. Using the method of system analysis, we consider the relationship of problems caused by coronavirus with the prospects for the development of AI. In addition, we use the case study method to analyze the successful application of AI technologies in China, to identify main areas of AI development in the coming years in key areas and industries. We do an analysis of specific successful projects, while the existing research mostly considers only individual industries without taking into account Chinese characteristics, or studies Chinese industries rather superficially, focusing mainly on investment and government support.

The data used for the analysis represents information from companies and the evidence of leading companies in China on the implementation of artificial intelligence, official information from government websites, analytical firms and news publications, as well as information from current scientific research.

Results

Case study analysis of the use of AI in China

AI is an important part of modern technological and business processes. Its importance is due to the automation of production and the rapid digitalization of the global economy. It is widely used in a number of industries such as medicine, finance, education, autonomous driving technology, language recognition, and so on. Currently, more and more companies are starting to implement AI, which is due to the fact that artificial intelligence reduces costs and increases efficiency, it allows you to automate routine work and make it even faster.

In a pandemic, there is an active search for new and expansion of existing areas of application of AI technologies in connection with changes in production processes.

It is possible to identify a number of sectors of the economy in which AI has received the greatest development in the epidemic COVID-19 is: (1) providing remote work for business (2) tracking system, (3) technology (4) "smart cities", (5) big data, (6) medicine and (7) unmanned vehicles.

One of the main features of 2020 is self-isolation, which implies a remote work format. As well as throughout the world, China has sharply increased the popularity of working at home after COVID-19 crisis, when the company ordered its employees to stay home. About 200 million people were working remotely by the end of the Chinese New Year (Bick, R. et al., 2020).

Amid the protracted global fight against the COVID-19 pandemic, China is experimenting with remote work on collaboration platforms. Companies have started buying online work platforms with various features such as DingTalk (Alibaba), Feishu (ByteDance) and Wechat Work (Tencent). All of these platforms offer the same services as Google Drive, Dropbox, Zoom and Doodle Survey, and more. Firms are so eager to keep doing business as usual that their demand is generating a huge market for online tools to work with. This experience has changed the perceptions of many businessmen about how their companies should be organized. Most likely, the trend for remote work will continue after the coronavirus. Artificial intelligence in this case will be able to help those that provide the necessary technological capabilities to employees who work from home. In addition, some of the business processes will strive for automation, this is a good prospect for the development of various robots, chat bots, and so on. We can say that this is more likely not only Chinese, but also a global trend. Thus, the first area where AI will develop is the technological support of the remote work mode for business.

The next area, which is also related to self-isolation in a pandemic, is tracking the movement of people. For these purposes, artificial intelligence is extremely useful. The results of China's fight against the spread of COVID-19 were the best in the world. The coronavirus pandemic has shown how closely and effectively Chinese IT giants and Chinese authorities can interact. On February 10, 2020, at a press conference of the State Council of the PRC, the authorities announced the need to create an application that could help control the spread of the virus by analyzing the movement of people. Aliyun has released a free smart mini-app for community prevention and control of the epidemic. The application registered the entrances and exits of company employees, tracked the health status of employees. At the same time, Tencent almost simultaneously released the Tencent electronic pass, which detects people's movements, records body temperature, identifies a high-risk group and encourages people to report information about their health (Yueliang (李月亮), 2020). It seems possible that even after the coronavirus pandemic, such applications will be in demand to control the spread of seasonal diseases.

We can also show the experience of other Chinese companies that have successfully worked in the field of tracking the movements of citizens. The “Health QR code” system, which tracked the movements and contacts of the Chinese, was integrated with the Wechat and Alipay applications, which increased the reach of users. In this case, the “Health QR Code” receives user data from the National Online Government Service Platform. Telecommunications companies such as China Mobile, China Unicom and China Telecom monitored the movements of citizens using cellular communications and passed this information to government agencies. All of the above applications, together with the consciousness of the Chinese population, have brought good results and helped to localize the epidemic foci, reduce isolation times and minimize economic damage to business.

Xi Jinping said in April 2020 that the experience of controlling the epidemiological situation in the country is a "historic chance" for China to turn the crisis into an opportunity. It is the coronavirus pandemic that can become a driver for a faster change in China's economic model, and will increase the share of exported goods with high added value precisely thanks to high technologies, one of which is artificial intelligence (Shevko, 2020).

The idea of tracking the movements of citizens is not new for China, especially when you think about the social responsibility system. Cameras on the streets of cities, which can identify a person in a few seconds, have already become commonplace in Chinese cities. But in addition to surveillance, AI technologies in China can be used to develop smart cities. The Hangzhou City Brain is a good example of such a smart city - a smart city where AI processes huge amounts of data on the movement of people, traffic and safety in the city. Xi Jinping, during his visit to this city (March, 2020), praised the experience of City Brain. It is very likely that such a smart city system will be extended to other cities in the PRC. In addition, the development of smart cities is included in the so-called “Digital Silk Road” plan.

Delving deeper into the technologies that will be in demand after the pandemic in the context of smart cities, it is worth noting the Chinese system for regulating passenger traffic SensCrowd Analytics Server. It helps regulate passenger traffic so that there is no overcrowding in transport. This system can be actively used in crowded places: in parks or at stadiums. The system analyzes crowd behavior and can notify administrators about possible dangers so that measures can be taken to eliminate them. This technology is especially useful during riots and protests. The system allows you to track and analyze the actions of more than 100 people using one camera (SenceTime company, 2019b).

Such systems that help to recognize faces are in demand not only in China. At the moment, about 18 countries use intelligent monitoring systems that were produced in China. For example, the monitoring system for Ecuador (ECU-911) was developed by two Chinese companies - C.E.I.E.C. and Huawei (Mozur et al., 2019).

Continuing the theme of change during a pandemic, it should be noted the trend in contactless delivery of goods. Self-driving cars can ensure the delivery of goods as safely as possible for the buyer. Grubhub, Uber Eats, DoorDash, and others have introduced contactless food delivery to minimize contact between couriers and users (Cai, 2020).

This trend could be an excellent opportunity for China, as the self-driving car sector is actively developing in the country. According to experts, in 2018 the market for self-driving cars was estimated at more than 89 trillion. yuan, by the end of 2020, there may be more than 15 million self-driving cars in the country. Deloitte predicts that by 2030, annual sales of new self-driving cars in China will exceed 500 thousand units, which will account for 24% of annual sales in the world (Hecker, et al., 2018).

The self-driving car market includes many car companies and IT companies. The IT sphere is represented by most of Baidu and Alibaba. So Alibaba is developing the AutoNavi project, which provides the creation of accurate maps of highways in the PRC. In addition, startups such as “Pony.ai” are active players in this market and are already partnering with major car companies. For example, Toyota invested $ 400 million in this company in 2020 (Pony.ai company, 2020). The Pony.ai startup uses machine learning and deep learning to practice driving situations in a variety of conditions. James Feng (head of Pony.ai) believes that self-driving transportation can become not only safer, but also truly contactless. However, the most important thing in this area is that Chinese companies can now build complete production chains without the help of foreign companies. In turn, this will allow China to produce more goods with high added value, which the country has been striving for in recent years. The centers of this industry are expected to be Beijing, Shanghai and Shenzhen.

During the pandemic, AI was most widespread in medicine. The main challenge in the fight against the virus has become the development of a vaccine. The process of searching for a cure is complex and long, the mass vaccination of the country is expected to begin only in 2021. The long term is always due to the need for clinical trials. TwoXAR CEO Andrew Radin is confident that AI technology can accelerate this process, primarily through patient group matching and forecasting (Cai, 2020).

Tom Siebel, owner of C3.ai, has decided to use AI to fight the coronavirus. Within a few weeks, a “data lake” was created, where information about the pandemic was collected. Using this app, healthcare providers could access valuable data for free, which was then shared with the World Health Organization, the Institute for Health Metrics and Evaluation, and other organizations that collected data from COVID-19 patients. About 2000 researchers are already using the C3.ai database (Feldman, 2020). Thus, AI can be developed in the processing and systematization

of medical data.

It is also worth noting the development of Chinese specialists for intelligent diagnosis and treatment. So the SenceTime startup created the SenseCare platform, which, using AI and Big Data technologies, makes it possible to more effectively diagnose, treat and rehabilitate patients. The platform provides technical support to medical personnel with a minimum investment of time. The system automates some processes for scientific and clinical trials and has a high degree of information security (SenceTime company, 2019a).

In addition, the Chinese startup Megvii Technology Limited has developed intelligent temperature measurement systems based on artificial intelligence, the system is called MingJi. This system has been widely used in China in places with large numbers of people. This technology has also been used in other countries, which also confirms the demand for Chinese AI systems (Megvii Technology Limited, 2020).

For China, the interaction of local authorities and large companies is quite typical. During the pandemic, the National Health Commission of China decided to include computed tomography as the standard for clinical diagnosis of COVID-19 in the Hubei Province. At that time, hospitals did not have the necessary equipment to automate diagnostics. Therefore, doctors had to analyze a huge number of images, double-check them and make their diagnosis. Doctors manually reviewed up to 300 images a day. A large amount of information not only reduced the speed of obtaining a diagnosis, but also reduced its quality, since there is always a fact of human error, especially when we talk about such a load on doctors.

HUAWEI CLOUD with the cooperation of Huazhong University of Science & Technology and Lanwon Technology have created and launched an AI-assisted quantitative medical image analysis service for COVID-19. With HUAWEI CLOUD's leading AI technologies such as computer vision and medical image analysis, the service can automatically, quickly, and correctly output CT quantification results to imaging and clinical doctors, alleviating the shortage of imaging doctors who can accurately diagnose COVID-19, relieving the pressures of quarantines, and reducing the heavy workloads of doctors. "AI + doctor review" is dozens of times faster than manual quantitative image evaluation, which greatly improves the diagnosis efficiency.

The AI-Assistance system can analyze the image in a short time and draw conclusions for doctors. This facilitates the work of medical personnel, increases efficiency, since the image analysis process is performed by a computer. By analyzing the condition of patients' lungs based on clinical and laboratory data, the system assists doctors in determining the stage of coronavirus disease, which helps in prescribing the correct treatment. AI technology has the potential not only to diagnose diseases, but also to treat them. It is worth noting that this system can analyze 4D dynamic data that tracks the patient's lung condition. This helps doctors monitor the patient's condition and see the results of the prescribed treatment or drug (Huawei Cloud, 2020c).

The Chinese company HY Medical, which developed an algorithm based on the actions of doctors and machine learning technologies showed another positive experience, which was able to analyze images and make a diagnosis. The HY Medical AI system automatically adapts to medical images that come from different sources and are created on different equipment. The detection of the disease and the accuracy of the diagnosis were 96%. But the most important thing is the efficient use of doctors' time and the automation of this routine operation. The processing of 500 images with the HY Medical system takes only 2-3 seconds (Bloomberg Business, 2020). An analysis of the experience of using AI in medicine showed that the automation of the process of analyzing images greatly helped medical personnel, allowing them to do things that cannot yet be done using a computer.

Artificial intelligence can even automate the imaging process. This will eliminate physical contact with infected patients, which significantly reduces the risk of illness for doctors. In addition, the hospital saves on personal protective equipment. If the AI diagnoses a coronavirus in a patient, then the image is transferred to the doctor to confirm the diagnosis; the doctor excludes work with cases when the disease is absent. At the same time, AI can distinguish between types of infection, give recommendations suitable for a specific situation (Liu, 2020).

Thus, the pandemic has become an opportunity to adapt the use of AI technologies in medicine. A number of Chinese companies, including Huawei Cloud, have established a free trial period for some AI technologies with the prospect of further cooperation in the future (Huawei Cloud, 2020a). In March 2020, Ecuador began using the coronavirus screening system developed by Huawei Cloud and HY Medical. This screening system using AI technologies was able to determine the affected areas of the human body, and the diagnosis fully corresponded to the actual infection (Huawei Cloud, 2020b).

Such a system significantly speeds up the diagnosis of patients, it has great potential for development in the entire

medical field. It can be noted that there is a demand for such technologies, primarily in developing countries, and China will count on these markets. There he will be forced to compete with the United States and European countries. However, there is no doubt that such technologies will develop and improve, thanks to them it will be possible to reduce the damage from possible epidemics in the future.

Thus, we can say that due to the pandemic, AI technologies in medicine will be introduced much more actively than before, since they have successfully proven themselves.

Development of AI Support System in China

To better understand the experience of China, it is worth paying attention to the conditions that exist for the development of artificial intelligence technologies. The basis for supporting the development of AI in China is made up of government programs and development strategies, investment programs and research centers.

Thus in 2018, the volume of Chinese investments in artificial intelligence reached 131.1 billion yuan, which is 60% of global investment in this sector. According to rough estimates, the number of companies that are engaged in the development of AI technologies in China is already more than 400 thousand. In March 2020, the Chinese authorities announced a new development program, which was called "New infrastructure," the need for it arose, including due to the coronavirus pandemic. This strategy is designed to mitigate the economic damage from the epidemic, as well as to contribute to the sustainable development not only of the economy, but also of the whole country. Li Keqiang in May formulated the main building blocks of this new infrastructure: 5G, AI, industrial Internet, big data, smart energy and transportation (Xinhua, 2020). According to Chinese experts, the volume of investments in the "new infrastructure" industry by 2025 could amount to 17.5 trillion yuan. Taking into account the fact that the idea of a new infrastructure resonates with the "Made in China-2025" plan, such a volume of investments seems to be quite acceptable, especially since these programs will be implemented in parallel. Artificial intelligence in the new infrastructure, in our opinion, is the most important, since its development and active implementation will ensure growth in other industries as well. The plan for AI development in China can be seen in the "Notice of the State Council Issuing the New Generation of Artificial Intelligence Development Plan".

According to the report, in 2022, the scale of the AI industry in China is expected to approach $30 billion. It is likely that after 2022, investments in artificial intelligence will grow, this assumption can be confirmed with the help of the state plan, which was put forward back in 2017, it states that by 2030 China will become a center for AI development (Shevko, 2020).

One of the most important conditions for the development of AI in China is the active assistance of the country's authorities at all levels. The Internet of Things (IoT) is also developing in China, and here is an example of the active participation of local authorities. In 2019, a large number of enterprises in the field of the IoT appeared in Jiangxi Province. Since October 2018, local authorities began to provide comprehensive support to companies working in the field of the IoT. As a result, 828 IoT companies were registered in Jiangxi Province, which is 57.7% more than in 2018. (Official website of the People's Government of Jiangxi Province (People’s Government of Jiangxi Province, 2019). More than half of the companies are engaged in software development, information transfer and information technology services. With the development of the IoT, Jiangxi Province wants to become the center of this industry in China. This is a really good example of how the interest of the authorities helps businesses and at the same time increases the level of digitalization of the economy.

To find new unique solutions in the field of AI, Chinese companies work closely with Chinese universities: as a rule, joint research centers and laboratories are created. For example, the Law and Artificial Intelligence Laboratory (Peking University) and the Shenzhen Institute of Artificial Intelligence and Big Data. Thus, artificial intelligence makes business processes more efficient, reduces costs and creates completely new jobs globally. These places are created mainly in the developed eastern provinces and in traditional innovation centers: Beijing, Shanghai and Shenzhen, but at the same time, as part of the program to reduce the imbalances in development between regions, western regions, such as Sichuan, can also become AI centers. There is also a conditional specialization of regions: Beijing is a scientific center where new solutions are being sought, while Shenzhen is more focused on practical applications, since a huge number of IT companies are concentrated there, including Huawei, Tencent and ZTE.

At the present time, the demand for AI specialists exceeds their supply. According to Chinese experts, China lacks 30,000 AI specialists. The greatest demand is for specialists in the development of AI chips, machine learning technologies, natural language processing, sound recognition, and computer vision (Liqin (力琴), 2020).

In the short term, the demand can be satisfied by foreign specialists, however, this does not meet the interests of China. China needs its own specialists. According to the AI Innovation Action Plan for College and Universities, by 2020, China should create a favorable technological and scientific environment for the development of AI. There are already concrete results: 32 Chinese universities have opened colleges specializing in the training of AI specialists by 2019, and 19 universities have created separate research institutes. In addition, Chinese IT companies have collaborated with universities to create AI colleges. The training of new specialists has just begun, but in the long term, China will provide itself with highly qualified personnel. Mutual cooperation between universities and business to improve the quality of education looks very successful. Students can receive not only theoretical education, but also apply it in practice in order to gain the necessary experience (Synced Review, 2018).

Conclusions

The analysis showed that the pandemic really acted as a driver for the introduction of AI into technological, industrial and economic processes and has already led to irreversible processes of digital transformation of the economy.

Based on the reviewed cases of the use of AI in China, we can conclude that the COVID-19 epidemic has changed many business processes, opened up new directions for the use of AI. We have identified the following areas in which AI has developed most rapidly in the context of the pandemic: providing a remote work mode for business, tracking systems, smart city technologies, big data, medicine and unmanned vehicles. In these areas, AI has shown itself to be very effective in eliminating damage from the coronavirus or in adapting to new business conditions.

China has shown an unusually high rate of AI adoption in technological processes. China's experience is based primarily on government development programs and investments. At the same time, an important component of the successful development of AI is an established mechanism of interaction between authorities and business. China is making significant efforts to address the challenges that hinder the development of AI. The government is taking measures to eliminate the shortage of qualified specialists in this area. Here the most effective is the format of interaction between business and universities, as well as the system of clusters. In addition to training future specialists, the state, together with companies, promotes scientific research in the field of AI.

Many scientists and businessmen believe that the economy in a post-pandemic world will never be the same again. AI turned out to be one of the most demanded drivers for transformation and adaptation of technological processes to new challenges. For China, the pandemic has become an opportunity for a more rapid development of AI, which may allow China to become the world leader in this field. When asked, "Can China do it?" the future will answer.

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Selected Aspects of Today's Leaders and Their Potential Development

David ULLRICH
University of Defence, Brno, Czech republic
david.ullrich@unob.cz

Pavel SLÁDEK
University of Defence, Brno, Czech republic
pa.sladek@gmail.com

Jan ZEZULA
University of Defence, Brno, Czech republic
jan.zezula@unob.cz

Tereza TRNKOVÁ
University of Defence, Brno, Czech republic
tereza.trnkova@unob.cz

Introduction

The topic of leader and leadership is popular and frequently visited, and not just these days too. From the definitions and opinions on who actually a leader is, through various style and approaches to leadership all the way to competences or characteristics which should be found in a leader. Ability to improvise, development of professional intuition, creativity and openness to change are necessary attributes of a good leader. However, these require specific ways and methods which we discuss in this work. The point being the development and cultivation of both analytical and intuitive thinking, creative and critical approach, since both of these qualities are complementary to each other and their use alternates depending on the ongoing process. In this article we discuss selected aspects of thinking of people in general and leaders in particular, with the focus on cultivation and potential development of thinking which leads, through the leader, to achieving the goals of the group, company, or organization.

Our goal was to introduce unconventional approaches to development of leaders' way of thinking. These are not entirely usual but they allow for much deeper and vaster experiences, or open ways towards new, so far unexplored directions, which may be crucial for future leaders and may influence their future success.

A Leader in The Digital Age

The human created environment and the way of life we are forming in various societies is changing and developing more dynamically, than the natural environment. In relations to these changes and transformations there are also changes in needs for quality, potential and abilities of professionals and leaders. These are people who hold specific roles and perform activities related to organizing environments of human systems and their governing. Through the process of human society development and thanks to various changes and transformations (modern information technology, globalization, etc.), the characteristics of our environment are approaching characteristics of an unstable environment.

In the industry 4.0 environment, considering natural potentials of human resources, there is a tendency to discuss the problematics of information digitalization, artificial intelligence, virtual reality and vicarious communication. Aside from undeniable direct and obvious advantages and positive effects of these aspects, there are also secondary and asymmetrical, hidden or obscure, complex and non-linear influences and effects on psyche, mind and thinking of particular people or human societies. We perceive the shadowy effect of digitalization and vicarious communication in two modalities. The first suggests, that by overusing them, the quality of consciousness, of self-consciousness, in the literal meaning of the term, is changing. The second effect related to the growth of digitalization, algorithmization

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and artificial intelligence, is lessening of the part the intuition and analogy on the cognitive processes and on building of knowledge used for decision making and behavior in a concrete situation. It also lessens the spontaneous adaptability to the change of conditions and the circumstances of the roles situations. (Ullrich, Pokorny, Sladek, 2018)

The Threat To The Divergent Way Of Thinking

The mental mobility skill, openness towards changes and selected subtle skills directly influence the flexibility of paradigm. We think, that clairvoyance is a necessary part of thinking of a leader. There is an emergence of many programs focusing on NGL – next generation leadership. The essence is to focus not only on what leaders need for their work today, but more importantly, what they'll need in the future; and to focus on how to prepare them for future challenges. The question is, how to measure and develop the ability to "foresee"? Logically, the ability to predict influences the level of useful creativity of the given individual.

There is a whole range of threats to the creative, divergent way of thinking. We may point out the paradigm effect[1], or the selective point of view, blocking of the "clairvoyance", rigid adherence to paradigm, paradigm paralysis, or blindness of success of the old paradigm and of our investment into it, personality type, fear and impatience, dependency and many others.

Mental Mobility And Critical Thinking

Systemic (ecological) and situational mobility

a) Systemic (ecological) mobility relates to the environment and is recognized by the mobility in environments with largely artificial characteristics and in environments with largely natural characteristics. Also in professional environment and in environments of cooperation and collaboration.
b) Situational mobility is formed as the proactivity in the adaptability to the change of conditions and circumstances.

Relationship mobility

This includes social and organizational mobility. It manifests in the social continuum (self vs team member), organizational continuum (hierarchical vs organization network structures) as well as in managerial continuum (control/management/leadership).

Mental Mobility

Thinking in terms of ability to build up knowledge fro decision making and acting in the process of fulfilling a task in the most energetically effective and the least demanding way.

The mobility in the cognitive, ecological, situational, social and organizational continuum requires in the end a change in the inner attitude of every member (human individual). This change needs to go towards the self-development and self-actualization, individual development and cultivation of natural potentials in a professional role and work position (Ambrozova, et al. 2016). This fact applies equally to professional moral and value orientation. An example is the results of value orientation research on military leaders, which has shown that, that „the value orientation of CAF members changes depending on their military rank" (Mikulka, et al. 2020). The above mentioned trends of changes and the quality of potentials requirements of people and human systems demand an innovation in the perception of the terms of control, management and leadership. At the same time these trends require new approaches to identification and development of resources and potentials and qualities of the leaders operating in today's environments.

The following is one possible way of operationalization of the critical thinking as a quality, or ability, which should be found in every individual who takes for himself the right to lead other people and other human systems: "*Critical thinking is an individual ability to create optimal conditions for correct discernment in a situation or a role. This ability is shown in the mental mobility. Mental mobility satisfies the following measurable parameters:*

a) Cognitive variability and mobility between analysis and intuition[2].

[1] Paradox being, that people who don't know the old paradigm, have the potential to advance them, since they're not limited by them

[2] Includes both the ability of overview of the whole and the insight in a sense of subtle and accurate detail discernment; concrete (positivist) and abstract thinking; work with the similarity, difference and also relationship. The cognitive variability relates to professional quality, not the expert appearance, and is seen in the ability to

b) *Skeptical[3] curiosity and courage[4], openness and spontaneity of learning*
c) *Psychophysical condition, stability of quality and quantity of output of psychological functions in time (attention and memory). (Ambrozova, et al. 2016).*

From the point of view of situational and systemic leadership, the critical thinking plays a dominant role and manifests as a mobility in the cognitive continuum. The central aspect of the cognitive continuum is the quasi-rationality (Kostron, 1997, Hammond, 2000), which represents an adequate substitute for intuition and analysis, as modalities of ways of learning for particular situation and task.

Hidden Qualities Of Consciousness And Their Potential Development[5]

President Masaryk spoke frequently about hidden human qualities and spiritual nature of our own self: *"…. It is not to be doubted, that more and further, blind forces drive a human more, than functional autonomy of the reason. … We are driven to work by urges material as well as spiritual."* (Tvrdy, 1930, s. 36). He speaks about the inner truth, which shapes the character, with the state of society and democracy is a reflection of the character of the democrats. *"We must love the truth, we must bravely be the whole humans, in short – we must find our soul and have faith in that soul and all will be taken care of. We need ideas, living and grand ideas, and so we won't be little. Our ideas need to be world encompassing, ideas not for ourselves, but for all. One who wants to persevere and stay strong, needs to think, feel and work for all others, not just for himself. We need ourselves grand and living ideas. Those will redeem us because they will redeem the others."* (Belobradek, Slama, 2012).

A stay in altered or expanded states of consciousness helps to internalize individual parts of our self and, therefore enables their development, integration and reflection. In the case of fear and pain it helps us to understand its source and eliminate its influence. By these stays, it is possible to experience of a very specific state of being, existence, which burdens are in the least possible way, energetically speaking. We could call this stay the optimal state of mind, body and spirit, all connected in harmony. Thoughts, emotions and acts are not opposing one another, but are in synergy. Remaining in such a state is regenerative and healing. By applying the experiences from the inner work in the altered states of consciousness, we reach certain lessening of the effect of the pendulum of life, emotions, assumptions and we cease to be slaves of blaming ourselves and everything in our surroundings. The effect is priceless and has an enormous potential for a making of a leader.

Jakobi (1967, s. 130) states that only in the very center, it is possible to be a full human being. Have we forgotten? It is the return to our center, to our own source, balance, health and power, that is the central theme connecting the cognitive management, altered states of consciousness and sweat lodge rituals. Already, in 17th century Komensky spoke of staying in the center, where we can obtain the power to live in truth and to live in harmonic relationships. He also stressed the importance of not dwelling on unimportant matters and put the importance on strictly own experience: *"We acquire knowledge from our own experiences, while ascending a spiral."* (Lectorium Rosicrucianum, 2002, s. 45) We search and search; we are fascinated by new trends and we don't notice the wealth, leaders, personalities and ancestors, who in so many ways prepared our path. During sweat lodge ceremonies and specific ex ante and ex post programs, it is possible to gain experience of all mentioned above.

Altered states of consciousness are perceived as a significant subgroup of extraordinary states of mind, having a curious therapeutic and transformational potential. "In the practice of modern psychiatry, its significance is far-reaching." Grof states that in these states we are able to "transcend narrow boundaries, limitations of our body and ego. We may reach the full understanding of our true and real identity." (2014, s. 19 – 20) Epstejn (2008) explains them as the return to the infancy, when we experienced undifferentiated bliss and oneness with mother. Walsch

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pragmatically, situationally create "meta-method" for learning in the actual role (either from the known elements and method principles (innovation), or to create "discover" a new one). There exists a continuous relationship between intuition and analysis (continuum, gradual transition). This is whence the theory of cognitive continuum takes its name from. A transition in a sense of adequate way of cognition when it comes to a situational task, can be understood as "common sense", or, as per K. R. Hammond, as quasi-rationality.

[3] Skeptical, in the sense of inquisitive, discerning thinking, containing detachment, neutrality and impartiality. It enables to formulate well-based doubts and to make justified arguments which separate simple meaning from an opinion.

[4] In a sense of going beyond boundaries of the task, context in time, space, conditions; to think "the unthinkable" (Taleb, 2011).

[5] Subchapter was processed as a citation of a part of an article; authors: SLADEK, Pavel, ULLRICH David. The potentials of Methods Working with Altered States of Consciousness for the Development of Selected Managerial Competencies. Scientia et Societas, 2018, vol. XIV, no. 3, p. 85-92. ISSN 1801-6057.

describes that he was very taken aback by the experience and that he was stricken by an exceptional paradox. In a common state of consciousness, he advocates the requirements for one field of science for all states of consciousness, which would study both common states of mind and extraordinary experiences. (2011, s. 269). Maslow (1967) thinks about these mystical experiences as rebirth, "little death", coming from various sources and being brought up by various means. The content is similar, though. Individual contents, meticulously studied and categorized. Grof adds that he was repeatedly a witness to other people using this direct experience to open themselves to an alternative perception of reality and the whole world. They wake up form, so called "Newton's sleep". (Laszlo, Grof, Russel, 2013)

Cultures all-around the world work with the potentials of these states of mind for thousands of years; see Zeleny (2007), Eliade (1997), Harner (2010), Van Gennep (1997) and others. They use them not only to survive, but also for self-actualization, self-cultivation, understanding, healing, psychological and physiological resources activation, education and shaping and cultivation of personalities of chiefs of given societies, those we call leaders.

Sweat Lodge Method And Its Use[6]

To be able to speak of sweat lodge as a method affecting multiple levels (physical, mental, spiritual), it is necessary to add exact elements bringing about the altered state of consciousness and also psychophysical preparation. Only then the ritual has the capacity to purify and harmonize the body, mind and soul, all together. We can call this method a multi-dimensional one. This phenomenon and its use all over the world, was studied by Aaland (1978) who states that the ritual was in the past extensively used by the native Americans and, after some time, also by the colonists. It was used for both healing and harmonization of the body, mind, emotions and spirit. Smith (2005) uses sweat lodge as a form of psychotherapy. The sweat lodge ceremonies were also compared to group therapies (Colmant & Merta, 1999; Smith, 2005) and were described as holistic experiences, improving the quality of emotional, physical, cognitive and spiritual life (Wilson, 2003). Colmant and Merta (1999) found that many native Americans speak about the importance of strengthening of socialization and friendship due to the healing nature of the ceremony, which comes about with group laughter and positive mood in the sweat lodge.

Altered States of Consciousness Through The Eyes of Psychologists

Maslow (1976) perceives these mystical experiences as rebirth, "little death". He stems from various sources, although their content is similar. Maslow meticulously studied these contents and divided them into 25 points:

1. At the peak of the experience, the individual perceives the whole universe as an integrated and united whole.
2. The attention is solely on the experience, there comes a change of cognition, it becomes non-judgmental, non-comparative and non-evaluating.
3. The world, outside objects and individual human beings are being perceived separately from human interests – there comes an ability to perceive world from within a distance, like it was independent on human beings. We are able to grow and are becoming bigger.
4. The perception may become ego-transcendental, a person reaches a state of being without needs and requirements. A person is able to forgive oneself and to be selfless.
5. Mystical state is self-asserting. It proves its own truth and inner value.
6. Mystical state is more the desired end, rather than means to an end.
7. Typical is time and space disorientation or non-perception of time and space.
8. The world is perceived and accepted as beautiful, attractive, valuable, etc. Bad things on the other hand are perceived more holistically.
9. The positive perception of the world is closely related to the all-encompassing understanding.
10. The content are inner values of existence, infinite truths, or spiritual, highest religious values.
11. A human is more ready to listen and is capable of deeper listening.
12. The state is characterized by emotions such are wonder, awe, respect, humility, surrender and reconciliation.
13. Dichotomies of life, polarities and conflicts are being dissolved.
14. Fear, anxiety, reservations, awkwardness and defense mechanisms disappear temporarily.
15. The experience has sometimes immediate, or gradual effect on the individual. It is often a very profound and powerful effect which can transform the individual forever.
16. Using a metaphor, the mystical states can be compared to a visit in personally defined heaven.
17. A person grows closer to perfection

[6] Subchapter was processed as a citation of a part of an article; authors: SLADEK, Pavel, ULLRICH David. The potentials of Methods Working with Altered States of Consciousness for the Development of Selected Managerial Competencies. Scientia et Societas, 2018, vol. XIV, no. 3, p. 85-92. ISSN 1801-6057.

18. A person feels greater responsibility to him/herself and has more "free will".
19. Liberation from self and transcending ego is directly related to the strength and purity of identity of each individual.
20. Thanks to increased ability to love and accept, a person becomes more spontaneous, honest and free.
21. A person is governed more by the psychological laws, particularly the laws of a "higher life", rather than laws of physics.
22. Other typical characteristics of the state are selflessness and decreasing of motivation which leads to the person not having wants, needs or wishes.
23. Typical for the state is the feeling of gratitude and all-encompassing love for all and everything.
24. The polarity between humility and pride disappears.
25. Very common is a feeling of sacred, "unified consciousness" (1976, s. 65-74).

Below, we present some of the principals and techniques which can be used to reach the altered state of consciousness. Modified, based on Grof (2014):

- Work with mind and attention (meditation, prayer, contemplation, self-hypnosis, visualization),
- Direct and indirect work with breath (pranayama, throat singing, nada yoga, holotropic breath work),
- Sound techniques (drumming, rattling, recitation, rhythmic sounds),
- Dancing (whirling dance, trance dance),
- Social isolation and sensory deprivation (isolated stay in remote places, often with more difficult living conditions, deprivation of one or more senses, sudden change of environment),
- Sensory overload (combination of acoustic, visual and other sensory inputs, pain),
- Physiological means (fasting, sleep deprivation, dehydration),
- Specific body work and stretching (yoga, qi-gong),
- Zero gravity simulation (floating tank),
- Consumption of plants or animal secrets.

With the help of these techniques, the practitioner enters the stet of trance, thanks to which there is the possibility for quantitative transformation of personality, individual's life quality enhancement, finding new sources of creativity, inspiration, strengthening of particular ways of thinking and reasoning.

Psilocybin and Its Effect on Creativity of Thinking and Wellbeing

Contemporary neurological studies prove effective methods for <u>*increasing the neuroplasticity of brain and the growth of new neurons.*</u> *"Psilocybin is a certain biological key, which we use to open and enable a psychological material, such are suppressed emotions for psychotherapy."* (Tyls, 2018)

The newest study proved a very intense neuroplasticity effect of members of main chemical groups of serotonergic psychedelics *in vitro* and *in vivo*. (Ly et al., 2018) LSD, DMT, DOI increased the complexity of dendritic tree (neuritogenesis), stimulated the growth of dendritic spines (spinogenesis) and stimulated formation of synapses (synaptogenesis). (Tyls, 2018)

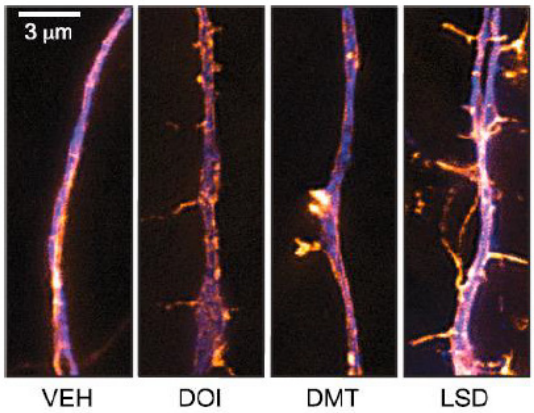

Fig. 2: Neuron growth after administration of various psychedelic substances[7]

[7] Figure 2. Psychedelics Promote Spinogenesis, Synaptogenesis, and Functional Plasticity (Ly et al. 2018)

Source: Ly et al. 2018

Psilocybin effect in healthy volunteers (Tyls, 2018)

- Long term wellbeing enhancement. (PEQ) (Griffiths, 2008)
- Trend for decrease in utilitarian / deontological solution ratio in moral dilemmas. (Pokorny, 2017)

Apparent potential use is seen in personal and personality development, stress reduction, creative process enhancement, mental activities, psychological dysfunctions prevention, solution to complex dilemmas and problems.

Conclusion

Today's modern age, although it wields newest technological innovations, is still not able to fully substitute role of human as the principal agent, being with the ability to think and to lead. As written by Horak, Kutej (2016, s. 8): *"Only human mind can give meaning to data, or added value to information."*

Modern technological innovations are in many areas a substitute for human work. But they are not able to penetrate into human minds, discover human habits, way of thinking and behavior. In the end it is again a human being, who can discern the true essence of things, predict future development and to lead a team to a successful task fulfillment. There is no doubt, the role of leader is a difficult one not only due to complex ways of thinking. A leader must be capable of good mental flexibility, critical thinking and continuous reflection. Fulfillment of these attributes leads to the leader's ability to adapt to the environment, to act quickly, creatively and effectively (Kompan, 2019), in the military environment is used the term "mindset" for it (Hrnčiar, 2018).

To fall for the paradigm paralysis may mean a threat to accuracy or correctness of a decision. There are many factors influencing the quality of decision. These factors are dependent on history, values, availability of information and personality. It is very important to cultivate inner potentials and metal work of leaders, to prevent erroneous decisions and illnesses that may come from the great psychological stress, dependency and fear. For the greater mobility in cognitive continuum, a person can learn better utilization of analytic and intuitive way of thinking which are complementary to each other. Many of the qualities which could enrich the work and life of not only leaders are hidden and can, over time, be discovered, trained and enhanced by appropriate methods, presented in this text. Since the science already knows the ways of enabling brain plasticity and neuron growth, it would be interesting to perform further testing in the context of a leader's work competencies.

The complex regeneration of organism and mind using the sweat lodge may be suitable especially in the phases of incubation and illumination, when a people change their regular environment they are used to, which can be limiting for their relationship with creativity and foreseeing of future events. Individual methods would have to be set up, tailored to attitude and leaders' personality type. They hide a great potential which is so far not recorded or explored in a scientific literature.

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Analysis Motivation to Start A Start-Up Business Start-Up To the Youth of Romania

David-Florin CIOCODEICA

Bucharest University of Economic Studies, Bucharest, Romania
david.ciocodeica@mk.ase.ro

Abstract

One of the main aims of European policies in the new knowledge-based society is to make the economy in the European space the most competitive and dynamic, capable of sustainable growth, with more and better jobs, with greater social cohesion. In order to achieve this objective, the competitiveness of the organizations must continuously improve, in the conditions of a labour market that will adapt quickly to the changes in the economic, social and informational environment and to the modernization of the work process based on higher qualifications, efficiently capitalizing on the well-prepared human resources from a professional point of view. The purpose of this paper is to bring a surplus of value by presenting the most important information about entrepreneurship in Romania, starting with the conceptual delimitations of entrepreneurship and entrepreneur, and continuing with the sector of small and medium-sized enterprises, management, managerial functions, creation and development of the start-up sector and specific strategies for start-ups. It also brings to mind the motivation of young people to start their own business and to have the most efficient and accurate information when they decide to set up an organization / enterprise, as well as how the entrepreneurial principles can be applied in any area and area, in every action carried out in daily activities.

Keywords: Entrepreneurship, Entrepreneurial Marketing, Start-Ups, Campaign, Economic.

Introduction

The concept of entrepreneurship is not just about the economic environment. Antonoaie, Antonoaie and Antonoaie (2013, p. 40) highlight this concept by suggesting about entrepreneurship that “it is not just about economic activities; being possible to encounter entrepreneurial behaviour at any time in most of our fields and actions”.

Entrepreneurship is that "process by which individuals have the opportunity to become aware of the viable option that represents the development of a business, formulate new business ideas, acquire the skills necessary for a true entrepreneur and take the necessary steps to start and develop the business" (Chigunta, 2002)

The entrepreneurial spirit at the youth level is sensitive to a variety of factors, such as entrepreneurial education, institutional and business environment, access to various sources of financing, etc. (Schoof, 2006)

Peter Drucker (1985) says about entrepreneurship that it is the process of creating a new organization, without considering the organization's ability to maintain itself. Thus, Drucker considers it sufficient for an individual to open a new business, for later to be listed as an entrepreneur. This exposure to risk and uncertainty is the element that differentiates entrepreneurship from the routine tasks of management regarding the allocation of resources in an organization that is already developed.

Entrepreneurs are those innovative individuals, with a proactive orientation, who take many calculated risks (Carree, Thurik, 2005, p. 8). They are the ones who create or develop the economic activities, identifying new opportunities, with the purpose of generating value, depending on the temporal and spatial context.

In a context of globalization and technological changes, much faster that have managed to fundamentally change the importance of the innovation process, all entrepreneurial firms that fall into the category of small and medium enterprises are the engine of the whole innovative activity (Ács, Audretsch, 2003), representing the growth factor.

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Entrepreneurial Marketing

Marketing, although present for a long time in the economic environment, has begun to be customized in the fields of activity: marketing and business communication, direct marketing, political marketing, international marketing, tourism marketing, event marketing. It was also implemented in entrepreneurship, although "marketing and entrepreneurship were traditionally considered two distinct fields of study. Awareness of the increasing importance of entrepreneurship and innovation, as well as of marketing for a successful entrepreneurship, has led to attempts to combine the two disciplines at present, thus forming entrepreneurial marketing" (Stokes, 2000)

"Entrepreneurial marketing is the way in which the individual and / or the organization that applies a philosophy of challenging existing conventions in the market in the process of developing new solutions behaves" (Chaston, 2000)

"The ability of entrepreneurs and small firms to manage the scale and complexity of regulations depends on entrepreneurial ability, which is an important concern of members of small business associations and representatives of entrepreneurs worldwide" (Deakins, Bensemann and Battisti, 2016).

Through entrepreneurial marketing we can capitalize on the opportunities on the market and the realization through human resources, material resources and information resources of products that consumers will love.

"Entrepreneurial marketing is based on identifying opportunities on the market and transforming the resources - knowledge, money and technology - acquired, both internally and externally (networks and alliances of the organization), in order to make products that consumers perceive. as being valuable" (Shaw, 2004).

The activities characteristic of this type of marketing involve attracting and coordinating resources necessary for the realization of innovative dreams and ideas that represent opportunities on the business market.

Entrepreneurial Process

The entrepreneurial process, according to the literature, comprises a series of five distinct stages. These are: identifying and analysing opportunities; obtaining the necessary resources; elaboration of a business plan; setting up the organization; ensuring its management. The stages of entrepreneurship can be represented graphically, using the structure that Hisrich and Peters have performed, as follows:

1. The identification and analysis of the opportunities can be realized intuitively or in a scientific way, by researching the types known by the opportunities, some of them being accessible to the entrepreneur who starts an entrepreneurial process.
2. Obtaining the necessary resources can be achieved by combining the resources that come from own sources, attracted or borrowed, taking care of the costs of each source.
3. Developing a business plan is one of the most used entrepreneurial tools.
4. The establishment of the company depends on the factors that influence the pace of this phenomenon (national economy, macroeconomic fluctuations, unemployment cost, etc.).
5. Management assurance is the entrepreneurial leadership that is absolutely necessary in any field. The knowledge of the entrepreneurial practices is not only used by those companies that face some more complex situations, generating many changes, but also in the interest of the company (Neguţ, 2010, p. 3).

The conceptual model regarding the entrepreneurial process in Romania

This conceptual model that was proposed, regarding the Romanian entrepreneurial process, starts from the GEM (Global Entrepreneurship Monitor) model published in 2008, which was revised minor (European Commission, Innovation Union Scoreboard, 2011, p. 6).

The GEM model we refer to highlights the different stages of economic development that can be experienced by a country and also claims that the activity of large companies can be modified according to the general conditions of the national economy, and the entrepreneurial activity according to the conditions within entrepreneurship.

The proposed model does not represent a gap, and within it has neglected the entrepreneurial behaviour manifested in large companies, both internally and internationally. Consequently, this model refers exclusively to the entrepreneur's representative of Schumpeter's model and the SME managers. (Wennekers, Thurik, 1999, p. 442).

The former is represented by entrepreneurs in training. After achieving their goals, entrepreneurs in training usually become owner-managers for companies (Reynolds et al., 2005, p. 209).
Taking into consideration the definition of entrepreneurship presented, the proposed model considered a similarity between entrepreneurship and entrepreneurial behaviour respectively. Behaviour that is based on the specific entrepreneurial perceptions and attitudes, namely the entrepreneurial activity.

Starting from those stages of major importance of the economic development of many countries, economies based on the factors of production, efficiency and innovation (Porter, Schwab, 2008, p. 7), focus on the conditions of the entrepreneurial framework that appear only in the last two stages of development. In Romania, the conditions of the entrepreneurial framework are focused on increasing efficiency and innovation, reflecting animated major characteristics of the economy and society (Györfy et al., 2007, p. 8).

The evolution of the Start-ups sector in Romania

Peter Drucker said that "small business is the main catalyst for growth." These businesses contribute intensely to achieving those fundamental objectives of the national economy, becoming "driving forces" for economic and social progress. (Drucker, 1999)

In connection with these two economic manifestations, prior to 1989, D. Voiculescu (Voiculescu, 1999) stated that privatization refers, in fact, to an operation to divide the national wealth, carried out while encouraging the establishment of new enterprises, which is a function of construction, which should be assumed by the authorities much more determined, as it causes the increase of the national wealth.

In the Romanian economy at present, start-ups are those that hold the first place as a share of their number: 99.44% of the total number of companies that have been registered in recent years, in Romania.

Defining the decision problem

Currently, in Romania, an increasing number of young people would like to access European public funding, so it is very important for them to have access to all the information regarding the modalities of obtaining these funds. For most young people, the most important problem they encounter when they want to access non-reimbursable funds is the lack of entrepreneurial education and information about funding opportunities, and this research aims to provide information that can help young people who want to access non-reimbursable funds and then start a start-up business.

The purpose of the research

The main purpose of this research is to study the perception of young people regarding entrepreneurship programs financed by non-reimbursable funds.

The research objectives

O1. Identifying the degree of development of start-up businesses on the market.
O2. Determining the advantages and risks associated with launching start-up businesses and highlighting the difficulties encountered when setting up the business.
O3. Identifying the entrepreneurial and managerial skills needed for a successful entrepreneur.
O4. Identify the advantages and disadvantages encountered in the success of an entrepreneur.
O5. Identification of the facilities that an entrepreneur will have from a start-up business.

Design of the questionnaire

The questionnaire was made according to the funnel principle, the questions being addressed from general to specific and it had a number of 22 questions, of which 2 filter questions, 5 closed, 4 questions measured on a Likert scale, 4 questions of a semantic differential scale type. The questionnaire comprises 7 socio-demographic identification questions.

The questionnaire contains open, closed, dichotomous and multiphotonic closed questions.

The questionnaire was designed in electronic format on the platform http://www.esurveyspro.com/. It was sent to the individuals who set up a start-up with financing European for the last 2 years within the entrepreneurship projects carried out in the Academy of Economic Studies in Bucharest, this being distributed to other groups of entrepreneurships in Romania.

In the research presented, a non-probability sample of 72 respondents was used, the technique of selecting the respondents was "snowball". The questionnaire was distributed to 107 respondents, out of 72 respondents completed the questionnaire, and 35 respondents were eliminated through the 2 filter questions.

Univariate analysis and interpretation of research results

Most of the respondents (70%) set up a start-up business with European non-reimbursable funds, while the remaining 30% did not set up the first start-up business with European non-reimbursable funds.

37.70% of the respondents agree that accessing the non-reimbursable funds was a difficult process and only 9.84% fully agree. 34, 43% are indifferent to this statement. 34.43% and 3.28% disagree, respectively total disagreement.

45.90% of the respondents disagree with the fact that the opening of the start-up was a costly and difficult task and 14.75% are in total disagreement. 21.31% of the people surveyed are indifferent to this statement. In contrast, a percentage of 14.75% and 3.28% agree, respectively, in total agreement that the opening of the company (start-up) was a costly and difficult action.

Most of the respondents (50.82%) agree with the statement "The eligibility conditions regarding the accomplishment of the business plan were easy to fulfil" and 9.84% totally agree with this statement. 26.23% of the surveyed persons are indifferent about the eligibility conditions. 9.84% and 3.28% disagree, respectively totally disagree with this statement.

37.70% and 16.39% agree, respectively completely agree with the statement "The knowledge necessary to achieve a business plan I have acquired them through ANC accredited entrepreneurship courses". 22.95% and 3.28% of those surveyed disagree, respectively completely disagree with the statement and 19.67% are indifferent.

A percentage of 45.90% and 9.84% agree, respectively in total agreement with the fact that the provisions regarding the financing required a considerable effort to fulfil the conditions for setting up the start-up, as well as obtaining the subsidies. 24.59% of the people questioned are indifferent to this statement. 16.39% and 3.28% disagree, respectively totally disagree with this statement.

A percentage of 31.15% and 11.48% of the respondents agree, respectively in total agreement with the statement "We have easily solved the administrative aspects regarding obtaining the financing". 28.51% and 9.84% disagree, respectively total disagreement with the fact that they easily solved the administrative issues regarding obtaining the financing and 18.03% are indifferent.

Over half of the respondents had problems with launching the start-up regarding high administrative costs (54% of cases), lack of information on tax law (54%), delay of financing (88% of cases), lack of entrepreneurial education (56%), lack of organization development location (57%) and competitive barriers (66%).

The small number of people interested in a start-up business was not a hindrance, nor was the lack of knowledge regarding the steps to be taken when launching a start-up.

30% of young people with start-ups agree that entrepreneurial and managerial education is the main facility that an entrepreneur can benefit from financing and only 27% consider that reducing taxes is the main facility. Another 18% consider that this main facility is the qualification and training of the personnel, 16% sports legislation, and 9% consider that the access »within the associations of entrepreneurs is the main facility of the given list.

Conclusion

Entrepreneurship cannot be done by anyone, it involves initiative and ideas, a high degree of creativity, competence, knowledge and skills that allow you to move quickly in any field of activity. It involves attracting and using in an effective way some categories of resources for solving certain requirements in our society, regardless of the activity we carry out.

Consumer behaviour differs because people's needs and perceptions are different, influence factors differ. In addition, the cultures are different, and this is one of the essential factors of the consumption decision. In other words, producers who want to operate in a different market must model themselves according to its specificity and culture if they want to meet their needs.

The main conclusions from the research are:

• 47.54% of the respondents agreed that accessing some non-reimbursable funds was a difficult process while 37.71% considered that the funds could be easily accessed.

• Opening the company (start-up) is not a costly and difficult task, as stated by 60.65% of the respondents, while only 18.08 do not agree with this.

• Most of the respondents (50.82%) agree with the statement "The eligibility conditions regarding the realization of a business plan were easy to fulfil" while 13.12% reject this statement

• 54% of the respondents stated that they have entrepreneurial knowledge acquired through ANC accredited entrepreneurship courses".

• A percentage of 45.90% and 9.84% agree, respectively in total agreement that the provisions regarding the financing required a considerable effort to fulfil the conditions for setting up the start-up, as well as obtaining the subsidies. 24.59% of the people questioned are indifferent to this statement. 16.39% and 3.28% disagree, respectively totally disagree with this statement.

• A percentage of 42.63% of the respondents stated that it was easy to solve the administrative aspects regarding obtaining the financing". 28.51% and 9.84% say the opposite.

• A total of 88% of the respondents consider that the implementation of their own business idea is an advantage of opening a start-up, 74% that the operational management is the sought advantage, and 85% that obtaining non-refundable funds is the advantage of opening such a project. The risks perceived by young people when initiating start-ups from non-reimbursable funds are represented by the existence of an laborious process of accessing the sources of financing of the business (69%), the implementation of an inappropriate idea that can have an unfavourable result (69%) , long start-up time (67%), high costs for financing a start-up (63%), lack of information on European regulations targeting various development areas (60%), fierce competitive environment (58%) .

• Over half of the respondents had problems with launching the start-up regarding high administrative costs (54% of cases), lack of information on tax law (54%), delay of financing (88% of cases), lack of education entrepreneurial (56%), lack of an organization development location (57%) and competitive barriers (66%).

• The small number of people interested in a start-up business was not a hindrance, nor was the lack of knowledge regarding the steps to be taken when launching a start-up.

• The respondents consider that the most important competences for a successful entrepreneur are: prioritizing tasks (91%), successfully completing activities (90%), analytical (89%), proactivity (86%), sociable (70%), efficient communication (66%).

• 30% of young people with start-ups consider that entrepreneurial and managerial education is the main facility that an entrepreneur can benefit from in the financing and only 27% consider that reducing taxes is the main facility.

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Communication Using Celebrities in The Non-Profit Sector: Case Study of BAZNAS

Nadifa Nur Aliza SHAFIRA

Program Studi Bisnis Islam, Fakultas Ekonomi dan Bisnis, Universitas Indonesia,
Depok, 16424, Indonesia
nadifa.nur@ui.ac.id

N.I.S PUTRI

Departemen Manajemen, Fakultas Ekonomi dan Bisnis, Universitas Indonesia,
Depok, 16424, Indonesia
nisputri@ui.ac.id

Abstract

The use of celebrities to alert people about social causes is currently a popular marketing technique used by non-profit organizations, and philanthropy becoming a trend for the younger generation gave the spotlight for non-profit organizations to do social campaigns, especially campaigns using celebrities. Therefore, this research intent is to know how effective communication using celebrities in the non-profit sector. This research discusses Celebrity Credibility, Entity Credibility, Attitude Towards Ad, Behavioural Intentions, Perceived Fit, General Fit, Motivation Attribution, Attitude Towards Celebrity being used in communication using celebrities. Structural Equation Modelling using Lisrel 8.8 was used to analyze communication effectiveness using a celebrity in the non-profit sector. The research result shows that Attitude Towards Ad and Entity Credibility influences Behavioural Intentions, Entity Credibility, and Celebrity Credibility influences Attitude Towards Ad, Motivation Attribution along with Perceived Fit influences Celebrity Credibility, Perceived Fit influences Motivation Attribution, and Perceived Fit is being influenced by Attitude Towards Celebrity and General Fit.

Keywords: Attitude Towards Ad, Motivation Attribution, Attitude Towards Celebrity, Non-Profit Sector

Introductions

An advertisement spending survey conducted by Nielsen in 2017 reports about Indonesia's advertisement income growth of 8%, surpassing more than 10 million dollars. The growth can be explained with the growth of digital advertising itself in Indonesia. Another survey by PubMatic 2019 Digital Ad Trends Report predicts Indonesian digital advertising will increase by 26% in the future. Advertising using celebrities is a form of brand advertising used by companies to form a long mutual bond with consumers. Generally, using celebrity endorsement is a well-established marketing strategy. Multinational companies like Nike and Adidas have long used this strategy, and it's always a success. For instance, Badenhausen from Forbes (2018) reported that Lionel Messi alone yields a massive 111 million dollar for Nike, and Cristiano Ronaldo yields around 216 million dollars for Adidas. Not only massive multinational companies use this strategy, big regional companies such as E-Commerce company Shopee is also known to have Cristiano Ronaldo and famous K-Pop girl group Blackpink as their ambassador. Shopee is also known for its viral catchy campaign video song with Blackpink. In Indonesia, local E-Commerce company Tokopedia hauls K-Pop superstar BTS as their brand ambassador. A local cosmetic company called Wardah also has a lot of celebrity spokespersons for their cosmetic campaigns. The usage of celebrities in advertising is a part of the persuasive advertising technique. Other than celebrities, companies can use emotional appeal, bandwagon advertising, or patriotic advertisements to use persuasive advertising (Romanova & Smirnova, 2019). Celebrity endorsement itself is defined as 'every person who gains popularity from the public and use it for advertising products or services' (Osei-Frimpong et al., 2019).

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There is growing interest in the non-profit sector to use a different marketing strategy, and using celebrities to convey messages about social causes become a popular marketing technique (Kotler & Andreasen, 2003). Many celebrities are supporting non-profit organizations and campaigns about social cause actively. Even though a celebrity's popularity is deemed extremely useful for the non-profit organization, the public may question the celebrity true motives during social campaigns (Samman et al., 2009). Amidst the popularity of using celebrity amongst non-profit organizations, a celebrity's association with a non-profit organization can either improve or worsen public perspective towards non-profit organizations. A relationship between celebrity endorser and a non-profit organization can be strengthened if the celebrity fits the non-profit organization's image. The public's response towards messages conveyed by celebrity endorsers about a social cause can be perceived differently depending on the public who accepts the message (Hajjat, 2003).

For instance, Leonardo DiCaprio is a well-known activist and is listed as WWF's leaders, where his campaigns about climate change have gathered 65 million dollars so far for WWF. In Asia, actor and idol Choi Siwon has donated 1.4 million won to UNICEF and encourages his fans to do the same, resulting in many donations made by his fans under his name. In Indonesia, it's a trend for Indonesian youth to be a social entrepreneur. With the founding of new philanthropic movements for youth such as Pekan Donasi Online Indonesia (PEDOELI) and the Filantrop Muda Festival, the competition between one non-profit organization and another tightens using celebrities to endorse their social cause became a popular marketing strategy. For example, UNICEF is naming Nicholas Saputra as their national ambassador for Indonesia and using him for campaigns about the lack of sanitation in isolated areas for children. The campaign eventually gains interest from the public because Nicholas Saputra is endorsing it. Another example is the young singer Maudy Ayunda who created a famous youth philanthropic movement called 'Kejar Mimpi' to help young children fulfil their dreams.

Not every celebrity or public figure can be an eligible endorser for non-profit organizations. Mostly, non-profit organizations chose public figures who have been an activist for quite a while, since non-profit organizations need a fit between their social cause and celebrities representing them (de los Salmones et al., 2013). A celebrity itself is a famous figure who enjoys public recognition by a group of people (Schlecht, 2003). A celebrity can be a comedian, athlete, actor or actresses, singer, or anyone known to the public by their merits. According to Legg, (2009), televangelism or religious public figure is popular in America during the 1980s, and famous pastors on the television are equivalent to a celebrity. Besides preaching, famous television pastors raise funds for their church through the television. Raising funds through television is proven effective because famous pastors on television have a cult following who will do as what the pastor said, therefore making religious public figures raising funds a known strategy.

In this research, the research's focus will be on a non-profit organization called Badan Amil Zakat Nasional, known as BAZNAS. BAZNAS is a non-profit organization established by the government to raise and allocate Zakat, Infaq, and Sedekah in Indonesia. The youth philanthropy trend could be a breakthrough for BAZNAS to raise awareness of the youth to pay zakat once they fall to the Zakat-able category dutifully. On July 11 of 2018, Ustadz Abdul somad, a famous Indonesian preacher and well-known religious public figure from Asahan, North Sumatera, is named as Indonesian Zakat Ambassador by BAZNAS. Indonesian Zakat Ambassador is hoped to inspire Indonesian people, especially its youth, to dutifully pay their zakat through BAZNAS and perform BAZNAS' motto, "Strong because of BAZNAS," symbolizes that Indonesia will be stronger because of zakat. Ustadz Abdul Somad is a popular religious public figure amongst the youth, making him the perfect influence for the younger generation to pay zakat later in life. According to BAZNAS, Indonesia has a 233,8 billion untouched Zakat potential that has been failed to be optimized, making BAZNAS resorts to creative marketing strategies to optimize said potentials.

This research aim is to see the impact of communication using celebrities for the non-profit sector. Using celebrities in the non-profit sector differ from the profit sector; therefore, this research also evaluates credibility attributes that can change public perception towards the celebrity's social cause. This research also aims to identify the role of a non-profit organization towards celebrity endorsing them, research the influence of altruistic motivation attribution of a celebrity towards its effectiveness of conveying social cause, and research the fit between celebrity and social cause. Therefore the research title is "Communication Using Celebrities In The Non-Profit Sector: Case Study of BAZNAS" to achieve those aims.

Theoretical Review

Celebrity Credibility

A celebrity is a famous figure who enjoys public recognition by a group of people (Schlecht, 2003). A celebrity can be a comedian, athlete, actor or actresses, singer, or anyone known to the public by their merits. Celebrity credibility is one factor considered for choosing a celebrity to endorse a brand (Terrence, 2000). Celebrity credibility can be explained by the source credibility model and source attractivity model. This model explains that the effectiveness of a message conveyed by a celebrity depends on their expertise, attractiveness, and trustworthiness, which also the factors affecting advertising effectiveness using celebrities (Clarke, 2002).

Entity Credibility

A non-profit organization can be defined as an organization in which profit is used for an organizational social purpose. A non-profit organization's key factors are accountability, trustworthiness, honesty, and openness to each stakeholder who has invested money, time, and trust in the organization. A non-profit organization is responsible for its donors, funders, volunteers, program recipients, and the public. The more focused a non-profit organization with their missions, the more credible they are to the public, and the more people will donate to their organization (Ciconte, Barbara L.; Jacob, 2011).

Attitude Towards Ad

Attitude towards ad can also be defined as a tendency to respond positively or unfavorably to a particular advertising stimulus during a particular situation (Ahmed Sallam & Ali Algammash, 2016). According to Ahmed Sallam & Ali Algammash, (2016), attitude toward advertisement is already presumed with any consumer. Since the consumer is already exposed to the advertisement, the advertisement's influence can be observed from the consumer's reaction. Brand beliefs and feelings also thought to be affecting attitudes towards ad. (Kaushal & Kumar, 2016)

Fit

Generally, the fit is defined by the strategic fit between a celebrity and a non-profit organization's social cause, audience target, and values (Becker-Olsen et al., 2006). The more compatible a non-profit organization with a celebrity who endorsed them, the higher consumer's cognitive consistency, and the higher the positive response is (Speed & Thompson, 2000). If the fit between a non-profit organization and the celebrity-endorsed them is low, the consumer will undergo a cognitive inconsistency that affects their response negatively (Porter & Kramer, 2002). One of the factors of successful communication advertising using celebrities is fit, which refers to similarity and suitability between a social cause and a celebrity. Generally, a good fit increases celebrity credibility and eventually increases communication effectiveness.

Motivation Attribution

The relationship between a non-profit organization or a celebrity with altruistic motivation can result in higher credibility of both if there is a high fit between a non-profit organization or celebrity with social motivations (Klein & Dawar, 2004); Ellen et al., 2006). According to Forehand & Grier, (2003), it's shown that consumer responds negatively towards a non-profit organization social campaign if they have egoistic motives, the consumer would feel cheated and deceived. Consumer's perception towards altruistic motivation needs the similarity between social messages conveyed with the organization's real motives; if not, the consumer will feel deceived and manipulated (Enrique Bigné et al., 2009).

Behavioral Intentions

Specific behavior marks a consumer's relationship with a non-profit organization. When the consumer exhibits a positive attitude towards a non-profit organization, it proves a positive relationship between the consumer and the non-profit, and has the consumer will have a positive tendency to donate (Ranganathan & Henley, 2008). According to Zeithaml et al. (1996), consumers' satisfaction and positive quality perception positively affect behavioral intentions. There is a positive relationship between the quality perception of service and the consumer's desire to recommend a service company (Parasuraman & Berry, 2004). A consumer can be concluded to have positive

behavioral intentions towards a company if they have a favorable opinion towards the said company, recommending the company to other people, paid extra to the company, and is loyal to the company (Parasuraman & Berry, 2004).

Ustadz Abdul Somad and Badan Zakat Nasional

Ustadz Abdul Somad Batubara is a preacher and religious public figure from Asahan, North Sumatera. He was a lecturer in Universitas Islam Negeri Sultan Syarif Kasim, is a bachelor graduate of Al-Azhar Egypt, and a master graduate of Dar al-Hadith al-Hassania Marocco. BAZNAS or Badan Zakat Nasional is the only official organization that is entrusted to allocate zakat. BAZNAS is an independent organization that is responsible to the Ministry of Religious Affairs of Indonesia.

Methodology

The study population comprises Indonesian people who are Muslim and aged 18 to 24 years old, a university student and are familiar with both Ustadz Abdul Somad and Badan Zakat Nasional. Before completing the questionnaire, the respondent was asked whether they are familiar with Ustadz Abdul Somad or not, and only those who are familiar can continue the survey. Respondents were also given a reading passage about Ustadz Abdul Somad and BAZNAS. The sampling method used is non-probability sampling, with a purposive sampling technique. The questionnaire is given using google form. This research was able to gather 283 respondents, but only 170 are eligible for the research. One hundred thirteen of the collected response wasn't eligible because of incomplete responses and did not fit the criteria needed in this study. The respondents are mostly female, boasting an 84.5% or 142 out of 170, and the rest was male, 28 out of 170, or 16.50%. This research is also adapted from de los Salmones et al. (2013) for a non-profit organization context, without changing any variables. However, the criteria of respondents are changed to match the non-profit organization used in this research.

There are nine hypotheses on this research, which is;

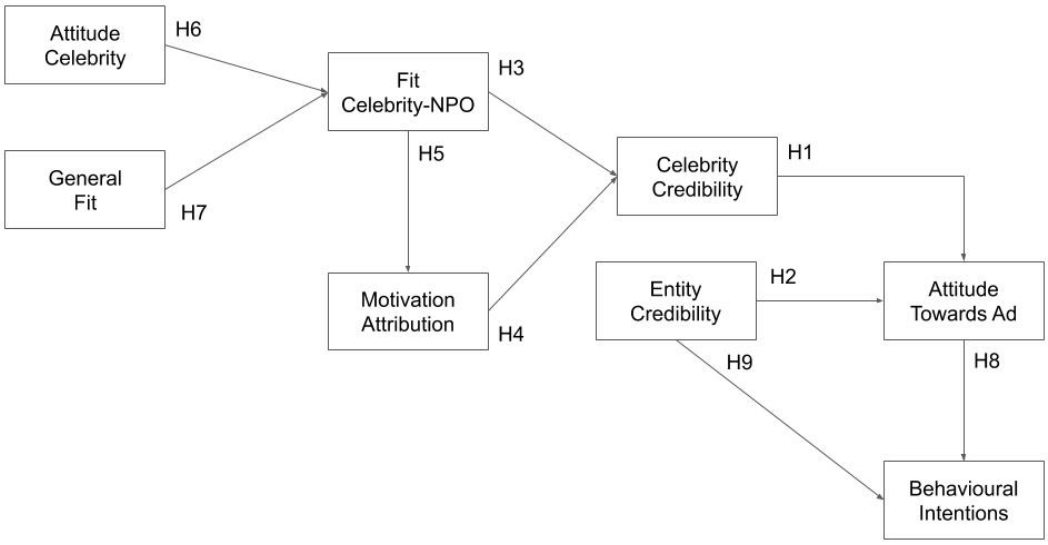

Figure 1: Research Model

H1: Celebrity credibility is directly and positively related to the attitude towards the advertisement.
H2: Entity credibility is directly and positively related to attitude towards the advertisement.
H3: A good image fit between the celebrity and the social cause is directly and positively related to celebrity credibility.
H4: Attribution of altruistic motivations to the celebrity is directly and positively related to their credibility**.**
H5: A good image fit between celebrity and the social cause is directly and positively related to the attribution of the altruistic motivation of the celebrity
H6: The attitude towards celebrity is positively related to the perceived fit between the celebrity and social cause.

H7: The positive attitude towards the involvement of celebrities in social causes is directly related to the perceived fit between the celebrity and the social cause
H8: The attitude towards advertisement is directly and positively related to behavioral intentions
H9: Entity credibility is directly and positively related to behavioral intentions.

This research is causal analysis research using Structural Equation Modelling or SEM. The SEM method is used because this method can analyze relationship patterns between the latent variable and its indicator, one latent variable to another, and can find measurement mistakes directly (Hair et al., 2010). Primary data that has been gathered is analyzed using SPSS 25 and LISREL 8.80. SEM method begins with a validity and reliability test for the measurement model, followed by a model compatibility test using the goodness of fit test. Model compatibility is also tested within the structural model, also using the goodness of fit test. The structural model test is run using a causality relationship analysis to see significance and value between hypotheses variables by evaluating the t-value, SLF, and determination coefficiency in the research model.

Results

Descriptive Statistics

The result obtained from the main test showed 283 respondents, but only 170 is eligible for the research. This sample size is adequate as there are only 35 items in the questionnaire. Hair (2010) stated that 10 times the maximum number of inner or outer model links pointing at any latent variable in the model (Goodhue et al., 2012), which is 175 from 35 multiplied by 5 because 10 divided with two for the inner and outer model links equals 5. This research's criteria are specific, which only those whose age is between 18 to 24 years old, is currently a university student, and a Muslim is eligible for the research. Based on said criteria, 19 of the initial respondents do not fit the criteria under the age of 18, and 94 of the respondents are not familiar with BAZNAS nor Ustadz Abdul Somad. Therefore, only 170 of the remaining respondents are eligible for the research and free of central tendency.

Table 1: Respondents

No.	Profile		Amount	Percentage
1	Gender	Female	142	83.50%
		Male	28	16.50%

On the above table, most of the respondent is female, 83.50% of the majority and the rest is male, around 16.50% percent.

Validity and Reliability Analysis

Measurement model analysis starts with a validity test and reliability test; in which the test is conducted using Composite Reliability measure (CR) value and Variance Extracted measure or VE value from all of the variables used in this research. CR value must be above 0.70 to be deemed reliable, and the VE value must be above 0.5 to be deemed valid. All the variable of this research is valid because all the VE value exceeded 0.5, and t-value exceeded 1.645. All variables also concluded as reliable because the CR value exceeded 0.7.

Table 2: Reliability Analysis

GOF Measures	Value	Fit Indicator
Absolute Fit Measures		
Chi Square	1062.40 (P = 0.0	
Value NCP	413.96	
Value GFI	0.76	Poor Fit
Value RMR	0.038	Good Fit
Value RMSEA	0.066	Good Fit
Incremental Fit Measures		
TLI/Non-Normed Fit Index	0.98	Good Fit
Value NFI	0.96	Good Fit
Value Adjusted Goodness of Fit Index	0.71	Poor Fit
Value RFI	0.95	Good Fit
Value IFI	0.98	Good Fit
Value CFI	0.98	Good Fit
Parsimonious Fit Measures		
Value PGFI	0.64	-
Value PNFI	0.86	-
Value Akaike Information Criterion	1179.96	Good Fit
Value Saturated AIC	1332	
Value Independence AIC	23869.89	
Value Consistent Akaike Information Criterion (CAIC)	1593.54	Good Fit
Value Saturated CAIC	4086.44	
Value Independence CAIC	24018.78	
Other GOFI		
Value Critical N	103.95	-

Followed by the compatibility of the model test using the goodness of fit test. The goodness of fit is used to evaluate the fit between data and model (Wijanto, 2008). There are three measures of GOF, absolute fit measures, incremental fit measures, and parsimonious fit measures (Hair et al., 2010). For a model to be called fit, there have to be three indices that can be deduced as a good fit, one from absolute fit measures, one from incremental fit measures, and one from parsimonious fit measures. The chi-square value and degree of freedom value are also considered. For this research, the model is concluded as a good fit because the RMSEA value is 0.066, CFI, and IFI value is 0.97. The AIC and CAIC value is also concluded as a good fit because both values approached the saturated value more than its independence value. Therefore, the model can be concluded as a good fit.

Structural Model Analysis

The next step is to analyze the structural model, starting with a goodness of fit test conducted to the structural model. The goodness of fit of the overall structural model is concluded with a good fit; the RMSEA value is 0.08, the CFI and IFI value is 0.97. The AIC and CAIC value is also concluded as a good fit because both values approached the saturated value more than its independence value. Therefore, the model can be concluded as a good fit.

Structural analysis is conducted by analyzing the relationship between latent variables by evaluating t-value and standardized loading factor or SLF value. T-value is used to analyze the influence on the latent variable of the model. T-value used in this research is T-value≥ 1.645 since this research is one-tailed. The criteria for the SLF value of the observed variable is above 0.5.

Table 2: Causal Model Analysis

Hypotheses	Path	*t-value*	Explanation
H1	CC → AAD	**8,26**	Significant and positively influent
H2	EC → AAD	**2,25**	Significant and positively influent
H3	FIT → CC	**4,07**	Significant and positively influent
H4	MA → CC	**3,85**	Significant and positively influent
H5	FIT → MA	**8,8**	Significant and positively influent
H6	AAD → FIT	**7,58**	Significant and positively influent
H7	GFIT → FIT	**4,24**	Significant and positively influent
H8	AAD → BI	**3,31**	Significant and positively influent
H9	EC → BI	**5,50**	Significant and positively influent

This research also showed the determination coefficiency or R^2 to see the dependent variable's influence towards the independent variable. R^2 is seen from a reduced form equation (Wijanto, 2008).

Table 3: Determination Coefficiency

No.	Variable	R^2 Value
1	Celebrity Credibility	0.75
2	Attitude Towards Ad	0.66
3	Perceived Fit	0.60
4	Motivation Attribution	0.67
5	Behavioral Intentions	0.41

a. Celebrity Credibility R^2 is 0.75, which means 75% of the celebrity credibility variable is explained by perceived fit and motivation attribution, and other variables explain the rest.
b. Attitude towards ad R^2 is 0.66, which means 66% of the ad variable's attitude is explained by entity credibility and celebrity credibility, and other variables explain the rest.
c. Perceived Fit R^2 is 0.60, which means 60% of the perceived fit variable is explained by the attitude towards celebrity and celebrity credibility, and other variables explain the rest.
d. Motivation attribution R^2 is 0.67, which means 67% of the motivation attribution variable is explained by perceived fit, and other variables explain the rest.
e. Behavioral intentions R^2 is 0.41, which means 41% of the behavioral intentions variable is explained by the attitude towards ad and entity credibility, and other variables explain the rest.

Mediation Analysis

In the model used for this research, some variables have a mediation effect, the hypothesis which tests the relationship between entity credibility and behavioral intentions. The relationship between both variables happens directly and indirectly through the attitude towards the ad variable.

Table 4: Mediation Analysis

Relationship	Indirect Effect Coefficient	T-value Indirect Effect	Direct Effect Coefficient	T-value Direct Effect	Mediation
ECRED→ AAD→BEHINT	0.04	1.89	0.52	6.04	*Complementary mediation*

From the direct effect and indirect effect test conducted above, the results show that both effects have significant t-values. It can be concluded that the entity credibility variable significantly and positively influenced behavioral intentions, both directly and indirectly. The indirect effect coefficient of entity credibility towards behavioral intentions is 0.04; meanwhile, the direct effect coefficient of entity credibility towards behavioral intentions is 0.52; therefore, it can be concluded that the direct effect is greater than the indirect effect. The result corresponds with de los Salmones et al., (2013) research, which also concluded that behavioral intentions are mostly explained with entity credibility. The same research also explains that attitude towards ad is also influencing behavioral intentions, so behavioral intentions are not entirely only explained by entity credibility.

Explanations

Based on the result of this research, this research accepted all the hypotheses available.

H1: Celebrity credibility is directly and positively related to the attitude towards the advertisement.

H1 shown that celebrity credibility is directly and positively related to the attitude towards the advertisement. The relationship between the two variables shown a T-value of 8.26, therefore accepting the hypothesis. Results correspond with de los Salmones et al. (2013), which also shown celebrity credibility is directly and positively related to the attitude towards advertisement and corresponds with Eisend & Langner, (2010) research, which explains that credible celebrities increase advertisement effect.

H2: Entity credibility is directly and positively related to attitude towards the advertisement.

H2 shown that entity credibility is directly and positively related to attitude towards the advertisement. The relationships between said variables have a T-value of 2.25, therefore accepting the hypothesis. Results correspond with (de los Salmones et al., 2013) and with (Newell & Goldsmith, 2001), which explains that the more credible a company is, the more positive results can be gained.

H3: A good image fit between the celebrity and the social cause is directly and positively related to celebrity credibility.

H3 results in good image fit between celebrity and the social cause are directly and positively related to celebrity credibility. The relationships between both variables have a T-value of 4.07, therefore accepting the hypothesis. Results correspond with (de los Salmones et al., 2013). Another research also corresponds with the result (Enrique Bigné et al., 2009), which explains how consumers would assess a celebrity if the celebrity fits the social cause.

H4: Attribution of altruistic motivations to the celebrity is directly and positively related to their credibility.

H4 results in attribution of altruistic motivations to the celebrity are directly and positively related to their credibility. The relationship between the two variables has a T-value of 3.87, therefore accepting the hypothesis. Results correspond with (de los Salmones et al., 2013), which explains the egoistic motive of a celebrity can decrease the credibility of a celebrity, therefore making an altruistic celebrity more credible.

H5: A good image fit between celebrity and the social cause is directly and positively related to the attribution of the altruistic motivation of the celebrity

H5 shown that a good image fit between celebrity and the social cause is directly and positively related to the attribution of the celebrity's altruistic motivation. The relationship between both variables has a T-value of 8.80, therefore accepting the hypothesis. It can be concluded that this research corresponds with (de los Salmones et al., 2013), and (Rohini & Zeynep, 2000), which explains that if there is a good fit between celebrity and social cause, the consumer will assume that said celebrity’s motivation is altruistic.

H6: The attitude towards celebrity is positively related to the perceived fit between the celebrity and social cause.

H6 shown that attitude towards celebrity is positively related to the perceived fit between the celebrity and social cause. The relationship between both variables has a T-value of 7.58, therefore accepting the hypothesis. Results correspond with (de los Salmones et al., 2013), Choi & Rifon (2007), which explain that consumers' perceptions towards celebrity can affect consumers' perceptions of fit between celebrity and social cause.

H7: The positive attitude towards the involvement of celebrities in social causes is directly related to the perceived fit between the celebrity and the social cause

H7 shown that a positive attitude towards celebrities' involvement in social causes is directly related to the perceived fit between the celebrity and the social cause. The relationship between the two variables has a T-value of 4.24, therefore accepting the hypothesis. This also corresponds with (de los Salmones et al., 2013) and Van den Bulck et al. (2016), which explains that generally, consumer supports the use of celebrity to convey messages; therefore they will have a more positive attitude towards other celebrities who represent social causes.

H8: The attitude towards advertisement is directly and positively related to behavioral intentions

H8 results in attitude towards advertisement are directly and positively related to behavioral intentions. The relationship between the two variables has a T-value of 3.31, therefore accepting the hypothesis. This corresponds with (de los Salmones et al., 2013) and Ranganathan & Henley (2008), which explains that a positive attitude towards advertisement leads to a positive attitude towards donating to non-profit organizations.

H9: Entity credibility is directly and positively related to behavioral intentions.

H9 results in entity credibility are directly and positively related to behavioral intentions. The relationship between the two variables has a T-value of 5.50, therefore accepting the hypothesis. This corresponds with (de los Salmones et al., 2013) and Ranganathan & Henley (2008), which explains that non-profit organizations' credibility affects consumers' behavioral intentions.

Results and Discussions

According to Zahaf & Anderson (2008), the celebrity factor might not have any real effect on consumers even though consumers' willingness to buy can be complemented by a celebrity endorser. Therefore, in some cases, celebrity endorsers would not have any impact on the consumer. The effectiveness of celebrity endorsers can also decrease when the celebrity overexposes themself to the public (Osei-Frimpong et al., 2019). From these results, it can be concluded that using celebrities is not always effective, whether the celebrity is used for the profit sector or the non-profit sector. Even so, celebrities are still considered very effective fundraisers. De los Salmones et al. (2013) have proven that even though celebrity activism is criticized, many people realize that using celebrities for promoting non-profit organizations is beneficial. Therefore, non-profit organizations using celebrities as their marketing strategy won't be questioned anymore, making the strategy even more effective.

This research aims to know the effectiveness of communication using celebrities in the non-profit sector. Based on previous explanations, it can be concluded that this research generally has the same results as de los Salmones et al. (2013). The results show that attitude towards ad and BAZNAS' entity credibility directly and positively affect consumer's behavioral intentions. BAZNAS' entity credibility and Ustadz Abdul Somad's celebrity credibility directly and positively affect attitude towards the ad. Motivation attribution and perceived fit between Ustadz Abdul Somad and BAZNAS directly and positively affect Ustadz Abdul Somad's celebrity credibility. The perceived fit between Ustadz Abdul Somad and BAZNAS also positively and directly affect consumer's perception of their attribution of motivation. Also, attitude towards celebrity and general fit directly and positively affect perceived fit between BAZNAS and Ustadz Abdul Somad.

Suggestions and Future Research

This research can conclude that attitude towards ad and entity credibility affects consumers' behavioral intentions towards non-profit organizations. Explained with mediation analysis, it is known that the indirect effect of entity credibility towards behavioral intentions is less influential compared with the direct effect of entity credibility towards behavioral intentions. It can be concluded that it's more effective for the non-profit organization to directly increase entity credibility to affect consumers' behavioral intentions positively. Entity credibility is also greatly affected by the effectivity of conveying social messages to the public; therefore, a credible entity is an entity that is honest with their claims.

To effectively convey messages using celebrities, one must pay attention to said celebrities' credibility, since a celebrity's credibility significantly affects the effectivity of conveying social causes. The more credible a celebrity, the more effective the communication is. To convey a social cause, a celebrity needs to have a vast knowledge of social causes to be perceived as credible to represent the public's social cause.

For future research, there is a need to further study the effectivity of communication using celebrities. This research has researched only the non-profit sector. To see a different result, a comparison could be made with a study of communication using a celebrity in the profit sector. Future research can use broader occupation criteria for respondents and a broader age limit for the respondents as well.

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Women Entrepreneurial Inclusiveness And Performance: Perspective From Non-Oil Export In Lagos State, Nigeria

Oluwatoyin ADESANYA,
College of Management and Social Sciences, Covenant University, Ota, Ogun State, Nigeria
oluwatoyin.adesanyapgs@stu.cu.edu.ng

Chinonye MOSES,
College of Management and Social Sciences, Covenant University, Ota, Ogun State, Nigeria
chinonye.moses@covenantuniversity.edu.ng

Rowland WORLU,
College of Management and Social Sciences,Covenant University, Ota, Ogun State, Nigeria
rowland.worlu@covenantuniversity.edu.ng

Olaleke OGUNNAIKE,
College of Management and Social Sciences,Covenant University, Ota, Ogun State, Nigeria
olaleke.ogunnaike@covenantuniversity.edu.ng

Olufunke ADEBAYO,
College of Management and Social Sciences,Covenant University, Ota, Ogun State, Nigeria
olufunke.adebayopgs@stu.cu.edu.ng

Aloysius ISOWEDE,
College of Management and Social Sciences,Covenant University, Ota, Ogun State, Nigeria
aloysius.isowedepgs@stu.cu.edu.ng

Abstract

Women entrepreneurship is an inclusive entrepreneurial activity of women who initiates businesses with potential for innovation and competitiveness. Women contribution both in domestic and international trade is significantly essential to the overall economy and for improved national GDP. The assumption is that women entrepreneurs' contribution to export is critical to achieving SDG plans 1 -5, 10 and 12- zero hunger, good health and wellbeing, gender equality, quality education, poverty reduction and responsible consumption and production. However, women entrepreneurs face limitations ranging from the initial start-up fund, socio-cultural, political, legal and environmental problems, governmental inconsistencies, operational infrastructure constraints. These evolved low intensity of entrepreneurial involvement, and many women are establishing their businesses in the low-growth informal sector, thereby hindering sustainable growth in the nation. Hence the focus of the study is to measure the relationship between women entrepreneurial inclusiveness and the inherent constraints in the non-oil export sector and the performance implication. The study adopted a descriptive approach using SPSS version 24 via both correlational and regression data analyses. The study employed one hundred and thirty-four (134) women entrepreneurs in Spice and Food processing, Apparel/Fashion, and Information Technology services as sample population for the survey. The findings indicated governmental policy inconsistent and support constraint have an inverse relationship with women entrepreneurs' performance, explaining it as a critical issue, while procedural, and environmental have a moderate effect, marketing constraint has no significant effect. Hence, women entrepreneurs need improved government support, favourable policies, and entrepreneurial training required for sustainable higher innovative performance in the export market.

Keywords: Women entrepreneurial inclusiveness, Entrepreneurial Constrains, Non-Oil Export, Performance.

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Introduction

Women involvement in international trade is recognised as equally important to the overall economy and improved GDP of nations. Conversely, existing literature uncovered that women are under-represented due to the socio-cultural perception of being incapable of accomplishing entrepreneurial feats and unfit to participate in emerging business opportunities. Yet, their contribution to society and poverty reduction cannot be overemphasised (Misango & Ongiti, 2013; Sajuyigbe & Fadeyibi, 2017). Women entrepreneurs own close to 10 million of the world's small and medium-sized enterprises (SMEs); and account for almost 80% of jobs around the world, as well as generate 50% of global GDP (OECD, 2018). Nigeria pursues a more diversified economy that allows more inclusive opportunities for women entrepreneurs to participate actively and complementarily, and benefit from entrepreneurship incentives. However, there exists a significant number of constraints facing women entrepreneurs in their efforts to participate in emerging business opportunities competitively. The inequity in resource allocation is a clog in the growth of entrepreneurship, as well as widened the gender gap in the contribution towards sustainable development (Bako & Seyd, 2018). Women entrepreneurs face limitations ranging from the initial start-up fund, skill gaps, socio-cultural, and environmental problems, governmental inconsistencies, operational infrastructure constraints. These constraints evolved low intensity of entrepreneurial involvement, and many women establish their businesses in the low-growth informal sector, thereby hindering sustainable growth in the nation (Ekwochi, 2020; Kolawole & Adeigbe, 2016). Still, McKinsey report (2015) posited that women could grow Nigeria's GDP by 23% ($229 Billion) by 2025, based on achieving gender parity in the distribution of resources.

In the non-oil export sector, the Nigeria Export Promotion Council report (NEPC, 2016) alluded that women entrepreneurs face a harsh struggle in Nigeria. They have challenges regarding creating and managing high-performance ventures premised on inadequate financing, low education, weak social networks, insufficient information, as well as deficient quality standards measures. Exporting women entrepreneurs also face the dilemma of choosing and making decisions on how to grow and sustain their businesses in the face of rapid changes in foreign market environments. These reasons, among others, make few women own or manage firms engaged in foreign markets to operate sustainably (International Trade Centre (ITC, 2019). The assumption is that women inclusiveness and growth in export sector (international business) is critical to achieving SDG goals 1 -5 (People- no poverty, zero hunger, good health /wellbeing, gender equality, quality education); goals 8-10 (Prosperity- decent work/ economic growth, Industry/innovation/infrastructure, reduced inequalities); and goal 12 (Planet- responsible consumption/production). Trade flows stimulate productive capacity, efficient markets, transforming economies, reducing vulnerabilities and building resilience (Osakwe & Kilolo, 2018; UNCTAD, 2020). Hence the study investigates the relationship between the women entrepreneurial inclusiveness and related constraints in the non-oil export sector and performance.

Literature Review

Women Entrepreneurial Inclusiveness

Women entrepreneurship is an inclusive entrepreneurial activity of women who initiates businesses with potential for innovation and competitiveness (Ariffin, Baqutayan, & Mahdzir, 2018; ITC,2018). Women entrepreneurs intentionally scan their environment for opportunity identified, take risks to combine resources uniquely and manage the production of goods/services innovatively, which could alter the norm in the industry of choice. Several studies concluded that economic development is closely related to advancing women participation in the economy to enable consistent growth; otherwise, women restriction may slow the economy (Bako & Syed, 2018; Sajuyigbe, & Fadeyibi, 2017). Women entrepreneurship has a power drive for employment generation, poverty alleviation and economic expansion (Etim & Iwu, 2019; Moses, Olokundun, Falola, Ibidunni, Amaihian, & Inelo, 2016; Nsengimana, Tengeh, & Iwu, 2017b).

Entrepreneurship, according to Perez-Perez and Aviles-Hernandez (2016), exposed from a gender perspective, the difference in orientation, motives, level of participation, and strive for opportunity identification between women and men. Women entrepreneurial activities are linked to push (necessity-driven) factor necessitated by unemployment and economic downturn. However, this may be common to both gender, particularly in the art of putting family obligations over business activities, but it is weightier for women than for men (Mahadeo, Dusoye, & Aujayeb-Rogbeer, 2015). Many women start businesses based on the push factors like economic necessities, inflexible working

hour/condition, wage differences between sexes, workplace segregation and discrimination, lack of child care facilities, dissatisfaction with employ/employer relationships, glass ceilings. Conversely, some other women engaged for pull factor (opportunity-driven) reasons, like autonomy, self-fulfilment, personal growth, financial independence, flexible working hours, market opportunities identified, social networking (Chhbra, Raghnathan, & Rao, 2020; Ekwochi, 2020; Hardiani, Hastuti, Junaidi, 2019). However, factors like socio-economic demographics like age, education, related experience, income, and institutional influence the underlying motive for entrepreneurship (Adom, Asare-Yeboa, Quaye, & Ampomah, 2018; Devece, Peris-Ortiz, & Rueda-Armengot, 2016; Wu, Li, & Zhang, 2019). Women in their dual roles are found in family enterprises because it is a way to manage their business activities and at the same time, perform their motherly tasks (Sodipo, 2017). They concentrate more on personal fulfilment than economic values, so they situate their businesses in low capital required and retail sector. This view made entrepreneurship perception a masculine-oriented pursuit and remained dominated by men (Cesaroni, & Paoloni, 2016; Dileo & Pereiro 2018).

In recent times, however, women entrepreneurial activities have grown globally, contributing significantly to the wellbeing and national economic growth (GEM 2015/2016; Kelley *et al*. 2017). The changes in entrepreneurial activities are explained by the influence of globalisation and urbanisation, improved level of education, increased autonomy, crave for financial independence, delayed marriage, family planning, increased support from relevant institutions, agencies, and government (GEM, 2015/2016). Women entrepreneurs drive the world economy and enhance entrepreneurial diversity, especially in developing nations where women start businesses at a double rate than their men counterparts (GEM, 2015/2016). In Nigeria, the level of women entrepreneurial activities has increased in comparison with men in Nigeria (GEM, 2012). Women entrepreneurial success points to their achievement drive, motivation, foresight, pre-business start-up training, and being members of cooperatives, as well as essential factors of entrepreneurial success. However, most Nigerian female entrepreneurs examined had no employment before the establishment of their businesses (Ekpe, 2011). Women entrepreneurs, in Nigeria, comprised of 40% to 50%, own or manage a micro, small or medium scale enterprises (MSMEs) in the private sector, most of which are in the informal segment. Still, they generate over 70% of employment and contributes 60% to the GDP of the nation (Imhonopi, Urim, Kasumu, & Onwumah, 2016; Shmiln, 2017). Despite the growth of women entrepreneurs, a range of constraints constrained their activities and limited the growth of their firms (Asongu & Odhiambo, 2019; Jamali, 2009; Makama, 2013; Naidu & Chand 2017; Amadi & Adim, 2020). Women entrepreneurs are marginalised in every sector because their productivities are rarely acknowledged (Aladejebi, 2020).

Nigerian Non-Oil Export and Women Inclusiveness

The non-oil sector is any chain of economic activities, outside crude oil and natural gas (Ude & Agodi, 2014). With a focus on non-oil export, Nigeria is in control of her commodities prices, and quantities as guided by the law of demand and supply, as against the oil price that is exogenously determined and thus limit the potential of the economy (Olayungbo & Olayemi, 2018). For instance, NEPC (2016) reported that 13per cent of GDP is from information and communication Sector; 40per cent from agricultural products; 23per cent from agriculture, and 60per cent from service export. Other sectors that have the potential for significant growth are consumer goods, retail industry, including E-shopping; and real estate due to a rising middle class and urban migration, the manufacture, as well as, infrastructure, especially transportation and power (PWC, 2015; Uwajumogu, Nwokoye, & Ogbonna, 2019). Nigeria's endowment of over ninety per cent (90per cent) arable land size, besides her large workforce with seventy-two per cent (72per cent) under the age of 30 is strategically positioned within the ECOWAS region to cover a market of three hundred (300) million people. She also has comparative advantages in forty-four (44) solid minerals in commercial quantities, among which Iron-ore is the twelve (12th) largest reserves in the world (NEPC, 2016).

This positive contribution propels Nigeria to look inward to her vast natural resources deposits and an extensive service sector to support the oil and gas value chain, which has significant market potential via exploration and exploitation opportunities. Onwualu (2012), and Olayungbo and Olayemi (2018) stated that the agriculture value chain has enormous potential for enhancing industrialisation, thereby creating massive employment that will lead to economic growth and poverty alleviation. For instance, the Economic Recovery Growth Plan (ERGP 2017- 2020) program launched as a medium-term economic growth plan, was founded on direct or indirect diversification of the export sector and non-oil export development. By progressive implementation, it spurred a positive signal at the close of 2017 when the economy grew to 1.92 per cent, from the contracted -1.73 per cent recorded in 2016. Therefore, the huge opportunity in the comparative economic advantage of the nation, women now spur entrepreneurship more inclusively both domestically and internationally.

Many women are productively engaged in export activities, but are situated in the informal segment and are mostly for survival. With improved effort in the education and training of women entrepreneurs recently engaged in by Nigeria Export Promotion Council in collaboration with the SheTrade initiative anchored by Internation Trade Centre (ITC), some women entrepreneurs own or manage small businesses with few employees' in agribusiness, manufacturing, textile, service, and other real sector value chains with a sustainability perspective. Nigerian spice market, an area where women entrepreneurs are actively involved is, for instance, valued at USD 15.11 billion with a future growth plan of USD 20.99 billion by 2024 (Daily Trust, August 18, 2019).

Women Entrepreneurial Constraints

Studies have shown that women entrepreneurs often face more challenges than their male entrepreneurs, and have attributed the constraints to socio-cultural, political, legal and environmental problems (Agbionu *et al*., 2015; Moses *et al.,* 2015; Sodipo, 2017; Vossenberg, 2013). Specifically, Aliyu, (2013), and Amadi and Adim, (2020) summarised the problems as motherhood, socio-cultural, finance, weak social networks, inadequate information, educational and institutional constraints (Iyiola & Azuh, 2014; Moses *et al.,* 2016; Uchegbulam, Akinyele, & lbidunni, 2015). These reasons, among others, make few women own or manage firms engaged in foreign markets to operate sustainably (International Trade Centre (ITC), 2018).

Women entrepreneurs in non-oil export, however, are constrained by inadequate resources to access broader foreign markets. Unavailability of innovation infrastructure to perform their tasks inhibits compliance of sanitary and phyto-sanitary requirements, problems of quality packaging and labelling, product-specific standard conformity, and inability to meet up with supply-side quantity and price competitiveness (Nigeria Export Promotion Council (NEPC), 2016). They have little knowledge of internal functioning- (strategic and marketing capabilities), and external business environment influences (policies and regulations, and institutional support) making their performance low in terms of sales, revenue, customer base, and profitability (Ibidunni, Olokundun, Falola, & Ogunnaike, 2018). These reasons, among others, make few women own or manage firms engaged in foreign markets to operate sustainably (Adedeji, Uchenna, & Oluyemisi, 2020; ITC, 2018). The commitment to removing these constraints to innovation and growth might be critical to women entrepreneurs' higher performance. The objective of the study, therefore, set to investigate the relationship between women entrepreneurial inclusiveness and the inherent constraints to their output in the non-oil export sector in Lagos State, Nigeria.

The constraints are succinctly categorised into the following four factors:

i. Procedural Constraints

Procedural limitations are hurdles from processing exports to international markets. The export procedure includes documentation of firms' processes, licencing, export clearance and certifications. However, the inherent complexities often result in poor management of export price negotiation, transaction language, supply invoice and receipt of payment delay (Chandra, Paul, & Chavan, 2020). These may be uncontrollable in the short-run, but manageable in the long run as experience in internationalisation increases; yet, there are some beyond the firms' control (Chandra, Paul, & Chavan, 2020). However, issues related to procedure difficulties could be mitigated by engaging commercial experts in export logistics (Ramaswami & Yang, 1990; Madu, 2012).

ii. Governmental constraints

Governmental constraints refer to government constructive or unconstructive outlook to exporting through supportive disposition to aiding policies or impeding framework of regulations on export practices (Han & Park, 2019). Studies have shown the positive correlation between government incentives, promotional policies with export operations success (Nakku, Agbola, Miles, & Mahmood, 2020). However, in developing economy like Nigeria, struggles with export promotion activities due to the inhibitive governmental bureaucracies, corruption in policies implementation processes, inadequate quality information, lack of strong visionary leadership resulting into unsatisfactory support, and expansion in export. The Dutch disease- being monolithic and import dependent-, created constraints to giving adequate constructive aids to non-oil trade, especially, in the manufacture (Oghenerobo, 2019; Zoramawa, Ezekiel, & Umar, 2020).

iii. Market constraints

Women entrepreneurs in non-oil export are constrained with different consumers' behaviours, preferences and competition in the foreign market (Leonedou, 2004). Consumers have different products demand specifications due to differing natural and economic climates, socio-cultural inclinations, which makes firms to incur varying more transaction costs, products differentiation. Of importance is the reduction in the product life due to global competition

and the foreign government protection policies and legal frameworks making strategic management decision to foster competitiveness, a challenge (Narayanan, 2015; Samudro, Sumarwan, Yusuf, & Simanjuntak, 2018; Wach & Wojciechowski, 2014).

iv. External Environmental Constraints

Exogenous constraints are associated with the exterior environments consisting of the economic, socio-cultural, political and legal context of the global markets in which the firms operate (Leonidou, 2004; Wach, 2015). Women entrepreneurs battle with comprehending the interplay of the environment. They have to analyse their external operational situation for possible opportunities and threats that may foster or hinder the growth of the firms via the paradigm of PESTLE (Political/ Economic/ Social/ Technological/ Legal/ Ecological environment) classifications (Narayanan, 2015).

Theoretical Link

The liberal feminist theory underpinned this study. It attributes gender-based differences to the variations in power and opportunity accorded men and women in society, that is, the structural positions women and men occupy in society (Beasley, 1999). The differences in the achievements of men and women are ascribed to the inability of women to realise their full potential because they have limited access to opportunities, resources and involvement in the labour markets than their male counterparts. This limitation, in turn, hindered women from acquiring the knowledge, skills and capabilities necessary for development. The development of a nation, however, premised on gender inclusiveness, particularly the rating and positioning of women in society. According to Aliyu (2020) and Bako and Seyd (2018), neglecting women create a typical colossal human capital waste otherwise pivotal to all-inclusiveness growth in the political, social, and economic developments of the nation.

Liberal feminism consciousness propagated improved women entrepreneurial activities formally. It has improved the policy framework for gender blind access to resources, but patriarchy philosophy empowered by cultural systems reduces the full integrating of women entrepreneurship in the national socio-economic strata (Ayimoro, 2020; Jaiyeola & Isaac, 2020). This inequality and constraints hindered the expansion and growth of women in entrepreneurial activities. It is consistent with the unwritten gender disparity in the allocation of resources in Nigeria (Nkama, 2019; Urim, Imhonopi, & Ahmadu, 2014). Women entrepreneurs, in Nigeria for instance, have 20% access to resource allocation (Awolowo, 2018), and constrained access to financial support, among others, based on their inadequate exposure to financial literacy, lack of owned property rights required as collateral, and technical skills and support (Moses et al., 2015; Taiwo, Agwu, Adetiloye, & Afolabi, 2016).

Although liberal feminism works within the conventional social structure to integrate and influence more responsive women's rights, still, it does not directly challenge the system itself or the ideology behind women's oppression. It focuses on women's ability to maintain their equality through individual actions and choices (Lorber, 1997). However, when resources are accessed equally, gender differences in performance seemingly disappear (Henry& Marlow, 2014). Women entrepreneurs in non-oil export are not different in underlying psychology but are more resolute in overcoming these challenges due to their exposure to entrepreneurial orientation propensity. They make a crucial contribution to equating women's status with control of economic resources and cognitive development for sustainable growth in entrepreneurial activities and growth (Hechavarria, Bullough, Brush, & Edelman, 2019; Owoseni, Wakunuma, Tolani, & Twinomurinzi, 2020).

Hence the study investigates the following Hypotheses:

i. H_O There is no significant effect on non-oil export women entrepreneurs' procedural constraints and their performance.
ii. H_O There is no significant effect between non-oil export women entrepreneurs' governmental constraints and their performance
iii. H_O There is no significant effect between non-oil export women entrepreneurs' market constraints and their performance.
iv. HO There is no significant effect between non-oil export women entrepreneurs' environmental constraints and their performance.

Methodology

This study adopted a descriptive research design via the structured survey instrument- questionnaire. The population for this study comprises of five hundred and twenty-nine (529) enterprises with Nigerian Export Promotion Council, Women Desk (NEPC Conserve list, 2019). The researcher, however, limited the population to sample frame of 320 women entrepreneurs that are listed both on the NEPC registered list and are accessible through associations (NASME/ OWIT/ NASSI) located in Lagos State. The choice of Lagos State because it remains the foremost commercial hub in sub- Sahara Africa and in Nigeria, thus can adequately represent the nation Nigeria. Lagos State hosts the major seaports and national borders to other African countries and the world where most of the export activities take place. Hence, it is a significant contributor to the financial revenue of the Federal Government of Nigeria. It hosts significantly about 60% of women exporters in Nigeria based on the number of registered enterprises in the NEPC Women Desk Directory (NEPC Conserve list, 2019). In estimating the sample size, a five per cent (5%) margin of error (confidence interval) and 95% confidence level were used, making one hundred and seventy-five respondents.

Reliability of the research instrument, which contained ten items, was ascertained and tested using the Cronbach's Alpha with a value of 0.739. The researcher administered one hundred and seventy-five (SS 175) questionnaires to randomly selected respondents from the prior determined population (SF 320) based on Krejcie and Morgan (1970). One hundred and thirty-four (134) copies of the questionnaire were retrieved, which showed a 77% response rate used for the analysis. The researcher tested the hypothesis with the aid of the Statistical Package for Social Sciences (SPSS version 23) using regression analysis.

Analysis of Data and Result

Specifically, the study raises the question on the effect of the constraints on the performance of women entrepreneurs in non-oil export.

Table 1: Response to Procedural Constraints

RESEARCH ITEM	SA %	A %	U %	D %	SD %	Total	Mean	SD∂
Documentation requirements	36 26.9	50 37.3	6 4.5	12 9.0	30 22.4	134 100	3.37	1.52
Fees and charges	28 20.9	56 41.8	4 3.0	14 10.4	32 23.9	134 100	3.25	1.50
Customs valuation	42 31.3	44 32.8	2 1.5	12 9.0	34 25.4	134 100	3.37	1.52
Inspections and controls during clearance	46 34.3	34 25.4	8 6.0	22 16.4	24 17.9	134 100	3.42	1.53

The survey table above revealed the hassles in the exporting women entrepreneurs' business system. The response on the documentation requirements and procedures depicted that 36(26.9%) of the respondents strongly agreed, 50(37.3%) agreed, 6(4.5%) are undecided, 12(9.0%) disagreed and 30(22.4%) strongly disagreed with the difficulties experienced. It also explained that 28(20.9%) strongly agreed, 56(41.8%) agreed, 4(3.0%) are undecided, 14(10.4%) disagreed and 32(23.9%) strongly disagreed with the vast entrant and process fees required. Furthermore, the customs valuation protocol and indiscriminate charges made 42(31.3%) of the respondent to strongly agreed to the irregularities inherent, 44(32.8%) agreed to it, 2(1.5%) were undecided, 12(9.0%) disagreed and 34(25.4%) strongly disagreed. For the inspections and controls during clearance, 46(34.3%) of the respondents strongly agreed to the porous system and time-wasting process, 34(25.4%) concurred, 8(6.0%) were undecided, 22(16.4%) disagreed and 24(17.9%) strongly disagreed with the assertion. The mean values of above 3.0 revealed that the typical (average) responses of agreeing with the questions asked. By the statistics, standard deviation depicted the variability level of cluster around the mean without the outlier. The small value of the difference between the highest standard deviation and the lowest standard deviation that is far less than one or two further validate the level of clustering around the construct been measured (Julius, 2005).

Table 2: Response to Market Constraints

RESEARCH ITEM	SA %	A %	U %	D %	SD %	Total	Mean	SD∂
My product capability competes positively with the competitor's in the overseas markets	24 17.9	50 37.3	14 10.4	18 13.4	28 20.9	134 100	2.82	1.42
My exported products are of quality compared to that of competitors in the overseas market.	22 16.4	52 38.8	22 16.4	12 9.0	26 19.4	134 100	2.76	1.37

The table explained the interconnectivity in the business environment. The heterogeneity of Nigerian non-oil basket created the platform for the complementary domestic market, and that informed the drive for improved productivity vis-a-vis the foreign market. The study showed 24(17.9%) of the respondents strongly validated the competitiveness in the market environment, 50(37.3%) agreed, 14(10.4%) are undecided, 18(13.4%) disagreed and 28(20.9%) strongly disagreed with the fact that their product capability competes positively with the competitors in the overseas markets. Women entrepreneurs' exported products are of quality compared to the competitors' in the overseas market as 22(16.4%) of the respondents strongly agreed, 52(38.8%) agreed, 22(16.4%) are undecided, 12(9.0%) disagreed and 26(19.4%) strongly disagreed with the claim. The mean values of above 3.0 revealed that the typical (average) responses tend toward agreeing with the research items. The results of the standard indicated level of variability can be said to cluster around the mean and that no outlier is discovered. The small value of the difference between the highest standard deviation and the lowest standard deviation that is far less than one or two further validate the level of clustering around the construct been measured. (Julius, 2005).

Table 3: Response to Governmental Constraints

RESEARCH ITEM	SA %	A %	U %	D %	SD %	Total	Mean	SD∂
Export incentives are effective in boosting export market	32 23.9	52 38.8	8 6.0	18 13.4	24 17.9	134 100	2.82	1.42
Government export financing is realistic	24 17.9	46 34.3	24 17.9	20 14.9	20 14.9	134 100	2.76	1.37

The table above clarified that 32(23.9%) of the respondents strongly agreed that government export financing is realistic. 52(38.8%) agreed to the fact, 8(6.0%) are undecided, 18(13.4%) disagreed, and 24(17.9%) strongly disagreed. Also, 24(17.9%) of the respondents strongly agreed, 46(34.3%) agreed, 24(17.9%) are undecided, 20(14.9%) disagreed and 20(14.9%) strongly disagreed with the fact that export incentives are effective in boosting the export market. The mean values of above 3.0 revealed that the standard (average) responses tend toward agreeing with the research items. The results of standard deviation showed that the level of variability can be said to cluster around the mean and that no outlier is discovered. The small value of the difference between the highest standard deviation and the lowest standard deviation that is far less than one or two further validate the level of clustering around the construct been measured. (Julius, 2005).

Table 4: Response to External Environment Constraints

RESEARCH ITEM	SA %	A %	U %	D %	SD %	Total	Mean	SD∂
I encounter cultural/ethical/language constraints	40 29.9	32 23.9	20 14.9	14 10.4	28 20.9	134 100	3.31	1.51
The image rating of women exporters by my customers is positive	50 37.3	44 32.8	18 13.4	8 6.0	14 10.4	134 100	2.19	1.29

The table above showed that when respondents were asked if they encounter cultural/ethical/language constraints, 40(29.9%) of the respondents strongly agree, 32(23.9%) agree, 20(14.9%) are undecided, 14(9.0%) disagree and 28(20.9%) strongly disagree with the claim. Also, the table explains that 50(37.3%) of the respondents strongly agree, 44(32.8%) agree, 18(13.4%) are undecided, 8(6.0%) disagree and 14(10.4%) strongly disagree with the claim that the image rating of Nigeria exporters by their customers is positive. The mean values of above 3.0 revealed that the common (average) responses tend toward agreeing with the research items. The results of the standard deviation also showed the level of variability clustered around the mean and that no outlier is discovered. The small value of the difference between the highest standard deviation and the lowest standard deviation that is far less than one or two further validate the level of clustering around the construct been measured. (Julius, 2005).

Test of Hypotheses

The tables below revealed the results of the five hypotheses tested as measures of the relationships and effects of the variables proposed.

Ho: There is no significant effect between non-oil export women entrepreneurs' constraints and their performance

Table 5: Regression Analysis of the Effects of the Non-Oil Export Women Entrepreneurs' Constraints and their Performance

Model		Unstandardised Coefficients	Standardised Coefficients	t	R2	F	Sig.	Remark
		B	Beta					
PC→ P	(Constant)	.205	.185	2.158	.034	4.656	.033	Rejected
GC→ P		-.371	-.213	.186	.045	6.272	.013	Rejected
MC→ P		.063	.016	.186	.000	.034	.853	Accepted
ENVC→P		-.312	-.243	-2.878	.059	8.284	.005	Rejected

The decision rule states r-value of less than 0.5 has a weak relationship; the r-value within the range of 0.5 is moderate while r- values above 0.05 is said to be high. The associated sign (+/-) with the r-value determines either a positive or negative relationship between the variables. Also, the p-value must be less than 0.05 to be considered significant at 95% confidence level.

R is the correlation coefficient, and R2 is the coefficient of determination. R measures the linear association between the explained and explanatory (dependent and independent) variable, while R2 measures how the independent variable explained the total variability in the dependent variable. Table 5 above shows the regression analysis of the four hypotheses tested in this study.

The regression result in hypothesis one indicated that procedural constraint explained 3.4% of the variance (R2 = .0.034, F = 4.656 @ P<.05). It can be concluded that procedural constraints significantly influence the export performance even though with a limited contribution (3.4%). The result implies that the rejection of the null hypothesis while the alternate is accepted.

The second model tested the effect of governmental constraints on export performance. The result concluded that the null hypothesis should be rejected based on the overall significance level of the model. The alternate hypothesis accepted This is because the governmental constraints explained 4.5% of the variance in export performance variance (R2 = 0.045, F = 6.272 P < .05). of note is the significant inverse relationship between governmental constraints and export performance.

Meanwhile, the regression model showed that no contribution from market constraints to the variance in export performance. (R2 = 0.000, F = 0.034 @ P > .05) further indicated that the market constraints make no significant contribution to export performance. In other words, the null hypothesis is accepted while the alternate is rejected. Therefore, there is no significant effect of non-oil export women entrepreneurs' governmental constraints on performance.

The fourth model tested the effect of environmental constraints on export performance, and it was found that the null hypothesis should be rejected. The alternate hypothesis accepted based on the overall significance level of the model. This is because the environmental constraints explained 5.9% of the variance in export performance variance ($R2 = 0.059$, $F = 8.284$ $P < .05$). It implied that environmental constraints have significant effects on export performance

Discussion of Finding

The findings indicated that governmental policy inconsistencies and inadequate support have an inverse relationship with women entrepreneurs' performance, explaining it as a critical issue. Still, women entrepreneurs' inclusiveness has expanded the non-oil sector, in terms of job creation, increased revenue, improved networks, education and training. Procedural and environmental have a moderate effect, and marketing constraint has no significant impact. The result showed the variance in the level impact of the limitations on women entrepreneurs could be traced to opportunity perception and motivation. Other reasons could be context-specific decisions and actions, use of digital technology, visionary leadership which alter these constraints for high- growth-oriented women entrepreneurs, but limit low-growth women entrepreneurs (Hechavarria et al., 2019). The result explained the reason many women situate their businesses in the informal, low- growth areas. It caused international business operations to be unpredictable and immensely challenging. The study is in line with the works of Aliyu, 2020; Amadi and Adim, 2020, and Narayanan, 2015.

Conclusion/ Recommendations

This study attempted to investigate the relationship and effect of constraints inhibiting the performance of women entrepreneurs' inclusiveness in Nigeria non-oil export sector. The dependency on the oil sector export boom caused the imbalance in the economic structure of the nation and the consequent under-representation of women. Women inclusiveness is critical to driving export diversification and significant industrial GDP growth, especially in the non-oil sector of the economy. The outcome of this study recommends, therefore, intense and prompt attention to resolving the constraints- facing women inclusiveness to enhance increased productivity and contribution to the GDP of the economy. Export women entrepreneurs/ managers should take the measures to alleviate the perceived inhibiting impact of constraints on exporting firms through improved knowledge acquisition and knowledge sharing within the eco-system via exposure to education and training, to reform the practices in the non-oil export sector.

By policy implication, the government should promote quality export practices by instituting real-time and practicable policies and regulations. The government should control the instability of Nigeria macroeconomic policies like high inflation rate, over-evaluation of currency, unstable exchange rate which has been the clogs in the wheel of non-oil export practice for effective export planning and engagement.

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Workout Assistant Using Kinect Camera to Prevent Dumbbell Related Injuries

Diaa SALAMA ABD ELMINAAM[1,2], Hager SOBEAH[1], Ahmed MOHAMED MORABEA[1], Abd El-Rahman TAREK KHASHABA[1], Ahmed NAGY ABE EL LATIF[1] and Poula MOHEB1

[1]Misr International University, Faculty of Computers and Informatics, Cairo, Egypt

[2]Benha University, Faculty of Computers and Artificial Intelligence, Benha, Egypt

diaa.salama@fci.bu.edu.eg

hager.sobeah, ahmed1505750, abdelrahman1509218, ahmed1601656, poula1500398 {@miuegypt.edu.eg}

Abstract

Weightlifting exercises are not easy to get the hang of, especially for beginners. Weightlifters need to be well informed and ready before they start working out with dumbbells, or otherwise, they might end up with very problematic injuries. This paper builds a model that allows the detection of wrong movements during the workout so that users can quickly check it and correct their mistakes using machine learning and deep learning techniques. It presents the possibility of having a model that can guide people throughout their weightlifting process. This model will help reduce injuries by tracking body motion with no requirements needed other than the Kinect camera. The results of testing showed the difference in performance by three different algorithms k-nearest neighbors algorithm (KNN), the support vector machine (SVM), and the FAST Dynamic time warping (FAST-DTW) dynamic time warping, concluding that the FAST-DTW was the most efficient one with higher accuracy and faster processing time.

Keywords: Machine learning, Gym injures, and IR Camera.

Introduction

Gym exercises are more complicated than they might seem; many factors play an important role, like the technique (Mayo Clinic, 2020) and its angle of motion. Those factors need to be considered to achieve the target of working the muscles correctly and healthy. Another essential factor in weightlifting exercises precisely is ensuring that the weight being lifted is the right one at the specific stage of exercising. Weightlifting exercises using dumbbells must be accurately executed in every way, or they will almost definitely result in injuries. In some cases, it can be very severe and may lead to permanent damages. Most of the Gym related injuries occur due to dumbbells' inappropriate use, so the workout technique must be on point. Moreover, the solution to this problem is to get a personal training expert to help master the workout technique and guide you all the way, but this will cost much money and not an option for every gym-goer out there.

Another research scope was the weightlifting injuries, specifically the back and leg injuries, and avoiding them by using sensors to track body motion (Ebert et al., 2017). Alternative projects used the normal camera for the same objective, but the Kinect camera is the optimal solution for a sensor-less tracking of body motion (Zhang et al., 2012; Yun & Lee, 2014) because it accurately detects body joints and saves it as numerical data so it is less time consuming than a regular camera. Shoulder injuries are the most common dumbbell-related injury. This project focuses on detecting and correcting every movement using the kinect camera to track the upper body joints. Additionally data collection is essential in optimizing the accuracy of the overall system. The dataset should be divided into right and wrong moves to train and test the classifier.

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The video will be taken by a Kinect camera that analyses and extracts the upper-body joints in the video frames in x, y, and z dimensions. The system will be trained at first on five different subjects to optimize the system's accuracy and then test it on various topics. The classifier's training and testing phases were done by using three different algorithms, the SVM, which achieved 83 % accuracy, KNN achieved 86 % accuracy, and Fast-DTW achieved 90 % accuracy. Based on that, we used the Fast-DTW algorithm and started to classify each rep recorded, whether it is right or wrong, by dividing the whole testing file into a set of frames containing each rep.

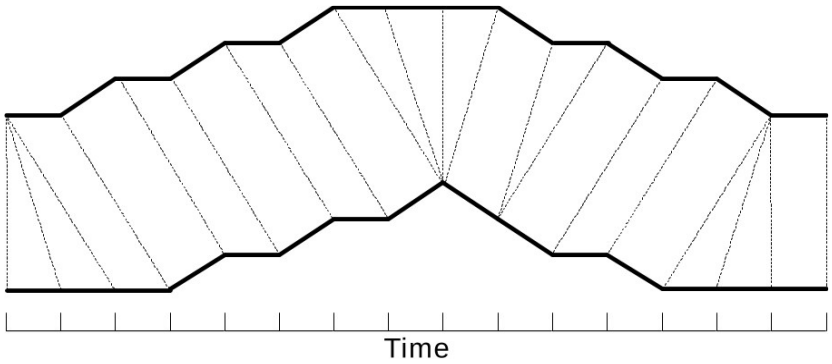

Fig. 1: Graph Representation of the Dynamic Time Wrapping.

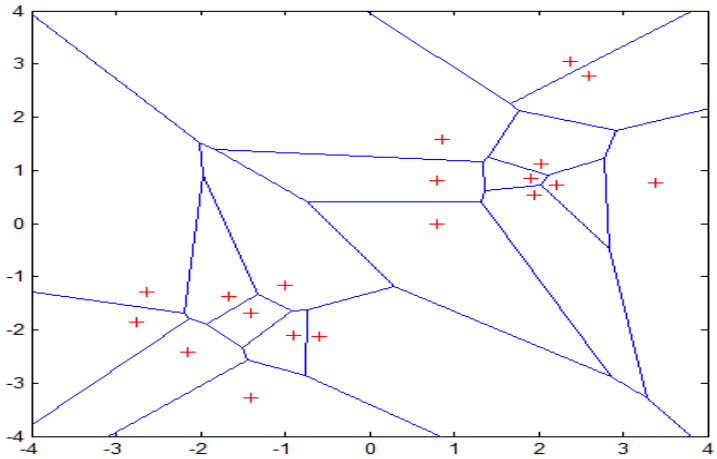

Fig. 2: KNN Visual representation fro similarity on the dataset

The paper's remainder is organized as follows; section 3 recognizes the previously published work related to the system. Section 4 **presents** the methodology of the project containing the pre-processing and the processing phases in detail. Afterward, the experimental results of both right and wrong movements will be shown in section 5. Moreover, section 6 summarizes our work and gives a conclusion to the overall system. Lastly, in section 7, we recognize everyone who helped to make this research possible.

Related Works

Many papers and researches used similar algorithms and equipment for the same idea of automating a trainer and to get different accuracy and results as: In (Ebert et al., 2017) proposed: in SensX using the sensors to and sports equipment to take the demand of the work out without a trainer or a supervisor, a sensor-based architecture for monitoring, recording, and analyzing complex and multi-dimensional motion chains, using the **HMM** with 90 % accuracy, NBC 85 %, SVM, 96 %. , In (Yun & Lee, 2014) proposed: a wearable device used to monitor muscle movement, heart rate, and other bio-signals an affordable tool The sensor is made by infusing graphene nano-flakes (GNF) into a rubber-like adhesive pad, using GNF to monitor the muscle movement, In (Wiehr et al., 2017) An EMS-based Assistance System for Real-Time Running Style Correction Today, by using an FSR force-sensing resistor to

collect the data and analyses it. In (Chatzitofis et al., 2013), Anargyros Chatzitofis created a weight lifting assistance program using the IR of the Kinect camera to calculate the angle and the velocity of the weight and the angle of the knee position, In (Zhang et al., 2012) Lichao Zhang et al., presented using the Kinect camera in detecting the golf player swings. The used the SVM for classifying and GMM for clustering, In (Wiehr et al., 2016) Frederik With et used IR in kinect2 camera to detect the skeleton of a climber, In (Gaddam et al., 2015) Sai Prakash Reddy Gaddam et used the kinect2 and vicon and the force plates to calculate the force of a jump.

Many other researchers who are recognized in the literature on Optimization and Metaheuristics algorithms and applications such as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] studied the predictions problems and its solutions. As a result of the collected information, we decided to combine all the features that the previous attempts worked on to enhance the expected results' efficiency.

Methodology

'Firstly, the proposed model will detect the body and track its motion. After that, the pre-processing and joints extraction by static analysis. Lastly, the classifier will predict the output and specifies how to correct the wrong movements if it occurred to prevent the injury from happening, as shown in Fig. 3 & Fig.4.

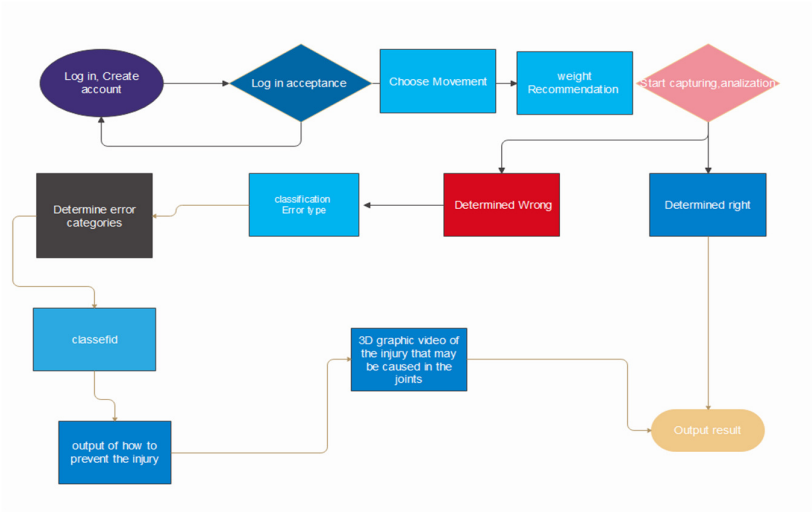

Fig. 3: Activity Diagram

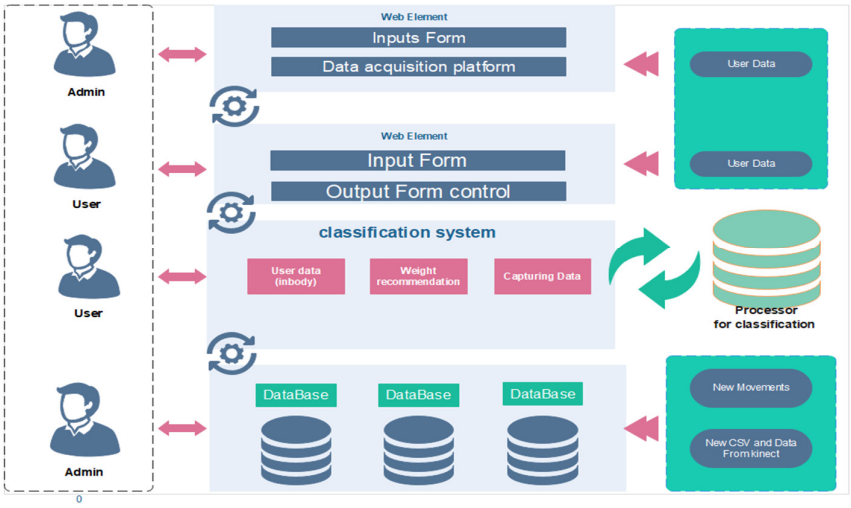

Fig. 4: The architecture diagram

Our proposed model aims to massively reduce weightlifting-related injuries shown in Fig. 5. by having **every day** the easily usable application that guides the way to mastering the workout techniques. The app will also help choose the dumbbell weight by calculating the one rep maximum weight of the user (Men's Health, 2019; Lauren Bebosky, 2018) and then recommending his suitable weight and providing instruction before attempting the exercise. Additionally, it will inform the user of the maximum load ever to be lifted based on his/her body weight (Strengthlevel.com, 2020). That way, the user can entirely depend on the system and start exercising without worrying about getting injured.

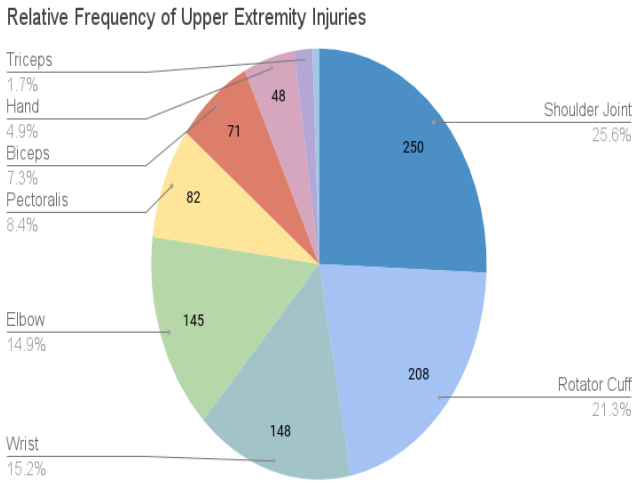

Fig. 5: Charts of Injuries That Could Happen Due to the Wrong Weightlifting.

Video Extracting

Extract all upper-body joints from the whole video to **reduce** the processing time of the classier.

Pre-Processing

After the **extraction** using the Moving Average Smoothing technique to clean the noise from the data to improve the accuracy as in fig.6 and fig.7

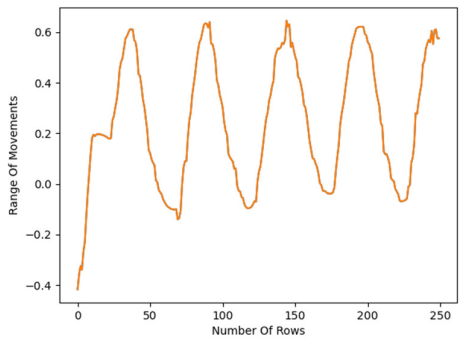

Fig. 6 Before smoothing

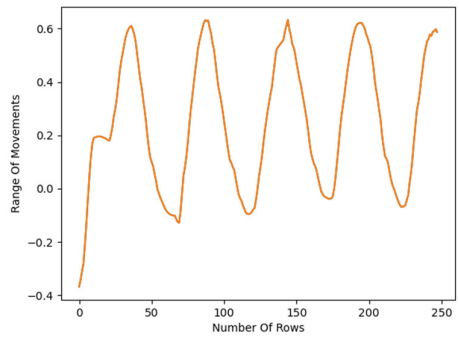

Fig. 7 After smoothing

Processing

After Pre-processing, we will start to work on the dataset by using KNN and get the Euclidean distance between a test sample and the specified training samples, and also the k-Nearest-Neighbors (Trstenjak et al., 2014; Zhang et al., 2017; Cai et al., 2010; Peterson, 2009)

d(xi,xl)=SQRT((xi1xl1)2+(xi2xl2)2++(xipxlp))

SVM The problem of learning a binary classifier can be expressed as that of learning the function \textbf f <R^n → ± 1 (Kim & Choi, 2014; Tong & Koller, 2001)

The dynamic time warping (FAST-DTW) is used to find the shortest distance between two-time series (Salvador & Chan, 2007), the range will be in arbitrary lengths (Al-Naymat et al, 2012), and by using the Euclidean distance between the two waves the ratio will be calculated (Choi & Kim, 2018). It is a lot faster than the previous algorithm as its worst complexity is O(N*N), so it will be perfect for the short time series (Strle, 2009).

Experimental Results

The video will be taken by Kinect the camera, which will analyze and extract the joints in the video frames. This system aims to detect the movement that will be recorded by the Kinect camera, which will be analyzed to get the dimensions of x y z (see Fig. 1) of the specific joints. The system will be trained at first on five different subjects to make the data set more accurate, and the testing subjects will be different from the training subjects to test the system's accuracy. Moreover, The training and testing phases of the classifier with algorithms for the detected movements were done by using the SVM which achieved 83 accuracy, KNN achieved 86 accuracy and Fast-DTW which made 90 accuracy algorithms, for more achievement of the perspective of the project we used the Fast-DTW due to its high efficiency, and started to classify the movements one by one not the whole video , by dividing the progress of the testing dataset and training the training data set has more then 2400 rep of shoulder press movement to be classified.

Table 1: Accuracy %age of the classifiers

SVM	KNN	Fast-DTW
83%	86%	90%

Detecting Right Movement

The workout was executed correctly, with the arms going up and down in just the right range.

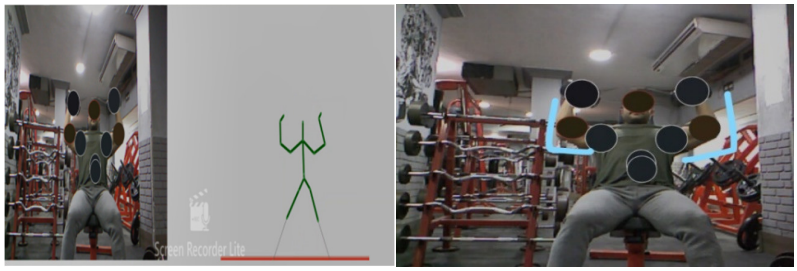

Fig. 8: Right Movement

Detecting the Wrong Movement

The workout is wrong because the elbows went below the shoulders, resulting in damaging the rotator cuff, which is the primary shoulder joint.

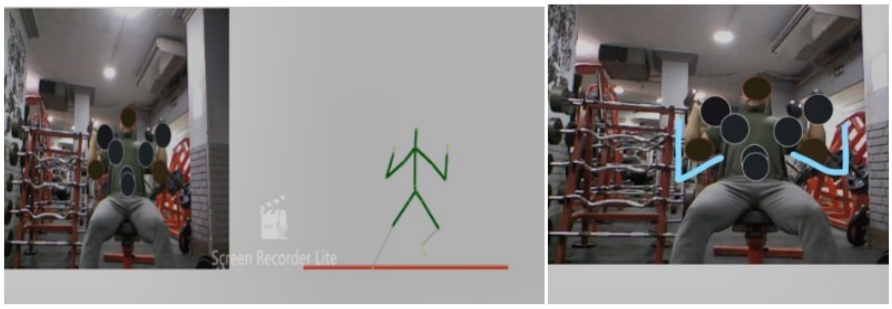

Fig. 9: Wrong movement

Conclusion and Future Work

The prosed model introduces an efficient approach to recognize and correct the motion in workout movements using machine learning and AI. The proposed method consists of three main phases the input of signals as video, extract frames, classification, and movement correction. Using sensors to detect body motion could be efficient but not usable for everyone, so this system is the best alternative to achieving high accuracy. Our future work will enhance the

system's efficiency even more and add different types of workouts that will need the tracking of more body joints motion.

Acknowledgment

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Fake News Detector Using Machine Learning Algorithms

Diaa SALAMA ABD ELMINAAM[1,2], Yomna M.I.HASSAN[1], Radwa MOSTAFA [1], AbdElrahman TOLBA[1] , Mariam KHALED[1], and John GERGES[1]

[1] Misr International University, Faculty of Computers and Informatics, Cairo, Egypt
diaa.salama, yomna.ibrahim, radwa1600674, abdelrahman1610437, mariam1604761, john1600284{@miuegypt.edu.eg}

[2] Benha University, Faculty of Computers and Artificial Intelligence, Benha, Egypt
diaa.salama@fci.bu.edu.eg

Abstract

With the Covid-19 (Corona Virus) spread worldwide, people are using this propaganda, and the citizens' desperate need to know the news about this mysterious virus by spreading fake news. Moreover, since Social Media has become a significant news source, it is profoundly needed to detect this fake news. This research aims to develop a web-based model using machine learning algorithms to detect fake news. The proposed model includes an advanced framework to identify tweets with fake news using Context Analysis. We suggest that Natural Language Processing (NLP) would not be enough alone to make context analysis. Tweets are usually short and do not follow even the most straightforward syntactic rules, so we used Tweets Features as several retweets, several likes, and tweet-length. We also added statistical credibility analysis for Twitter users. The proposed algorithms are tested on four different benchmark datasets. To achieve the best accuracy, we combined two of the best algorithms used: SVM (widely accepted as a baseline classifier, especially with binary classification problems) and Naive Base for comparison.

Keywords : Fake News, SVM, NLP.

Introduction

Nowadays, Social Media has been taking a considerable part in people's lives. It has become one of the most common places for fake news as it has no restrictions on people's posts since anyone can edit their posts whenever they want. However, that did not stop people from using Social Media as their source. The extensive use of social media has an enormous impact on many aspects of our life. Considering the harmful outcome of spreading fake news, it has an enormous social impact. It can mislead citizens into believing misinformation about a specific product/ person or situation. The spread of economic and political fake News can directly affect the stock market government economics in general. For example, publishing politically fake news significantly affects society, security, tourism, economics, and many more things. Also, during the 2016 US presidential election on Twitter, it was found that it was responsible for the early promotion of misinformation. They targeted influential users through replies and mentions. The sharing of fact-checking articles nearly disappears in the core of the network, while social bots proliferate.

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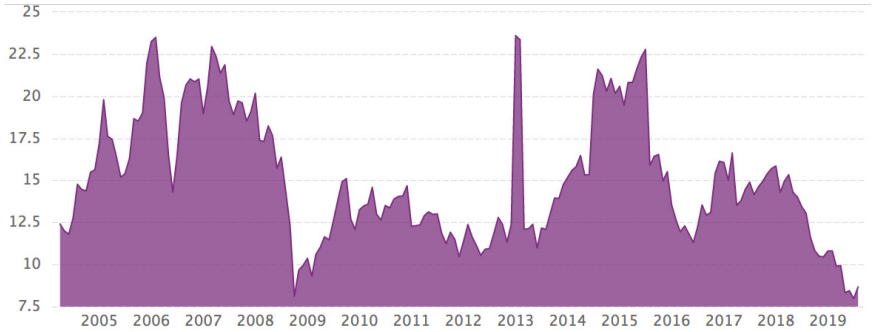

Figure 1: statistics show how the stock market was affected by the fake news.

This fake news spread several times, and the last one was on the 12th of December, the rumor also spread vigorously through the social networking site" Twitter" to top the hashtags" Mubarak Matt," the list of the most frequently used tags on" Twitter," and ranked first in the list of the most traded in Egypt. Also, Tourism income can be affected by fake news, as spreading fake news in countries can make tourists not interested in visiting certain places, which costs losing much revenue. This targets social media users that rely on social as their source of information.

This study aims to build a robust intelligent model for detecting fake news using machine learning algorithms. The rest of the paper is described as follows: the paper's related work can be found In Section 2. The methodology is presented in Section 3. Section 4 shows a comparison between proposed algorithms and the experimental results. Finally, Section 5 shows the conclusions and future work.

Related Work

Various researchers have worked on the analysis of fake news in different social media venues. Some of the work performed focused on identifying the text's linguistic properties and identifying the context [Atodiresei, C.S (2018)]. They have utilized a news dataset represented on Kaggle and performed the analysis using multiple classifiers, including deep neural networks.

In [Jang, Y.(2019)] this research, the proposed research is Identifying fake news and fake users on Twitter . in this paper, the authors have credibility models to calculate the score for each of the tweets and the users and uses TWITTER CRAWLER for gathering data to use it as a dataset to train.

Another paper mentioned in the survey [Ajao, O.(2018)] was a publication discussing sentiment analysis based on SVM, which also focused on the linguistic approach. Lukas Povoda, Radim Burget, and Malay Kishore Dutta discussed that Support Vector Machine(SVM) is mainly used in text analysis. It can be trained by the massive amount of data and can deal with tricky combined words and deal with different languages. At the same time, they were working with big data (SVM) improved accuracy. The best accuracy obtained was 95.31 % for recognition of the rate of positivity and negativity.

In a similar paper [Gilda, S.(2017)], Gilda, Shlok used two different datasets: signal media, which gets news from local news, blogs, articles, and the outgoing list of fake and real News from OpenSource.co. They used SVM, Bounded decision tree, Random Forests, and Gradient Boosting as classifiers to increase accuracy and to get the difference between them. SVM happened to get the highest accuracy (77.2 %).

In another publication [Girgis, S. (2018)], Eslam Amer has talked first about social media and how it is the right place for fake news; he also mentioned that Facebook has a 50% percentage of fake news traffic. He said that 62% of US adults get their news from social media. He also discussed the impact of fake news and its usefulness, and

how it will help people overcome this problem. The paper also mentioned that NLP is used to reach optimum results. The utilized algorithms are RNN and LSTM, and he used the Liar dataset.

In the closest research to our intended work [Jain, A.(2018)] the authors aim to Identify relevant features associated with fake news stories without previous knowledge of the domain; they used a variety of dataset like CharlieHebdo • SydneySiege • Ottawa Shooting • Germanwings-Crash • Ferguson Shooting, and classifiers like LSTM-CNN, LSTMdrop.

Another publication [Krishnan, S.(2018)] identified tweets with fake news: by making user analysis and context analysis by using NLP using only one classifier, which is SVM, and the result accuracy was 62%.

Other work [Povoda, L.(2016)] focused on the tweet features only, the authors choose tweets features to work on and select LSVM and KNN as a classifier to test the best accuracy and also worked on the Effect of increasing character N-grams on the efficiency of LSVM classifier to finally choose the best approach. Identifying fake news and fake users on Twitter:

Another feature used to analyze the creditability was the users' score [Ajao, O. (2019)] and TWITTER CRAWLER for gathering data to use it as a dataset to train. This paper used machine learning and deep learning classification and the sentiment analysis feature to detect the news's effect on people's emotions by using an equation. The authors train their classifier by using PHEME labeled twitter dataset.

Many other researchers who are recognized in the literature on Optimization and Metaheuristics algorithms and applications such as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] studied the predictions problems and its solutions. As a result of the collected information, we decided to combine all the features that the previous attempts worked on to enhance the expected results' efficiency.

Methodology

Our Proposed model aims to detect fake news by using machine learning and a combination of algorithms. The proposed diagram uses the MVC model (Model View Controller). The user views a web-based application, entering a topic to search on, passing tweets related to this topic to the controller. These tweets need pre-processing to be well-defined data to work on like (stemming, stop words, tokenizer, n-grams). After that, the controller will send organized tweets to work on additional features.

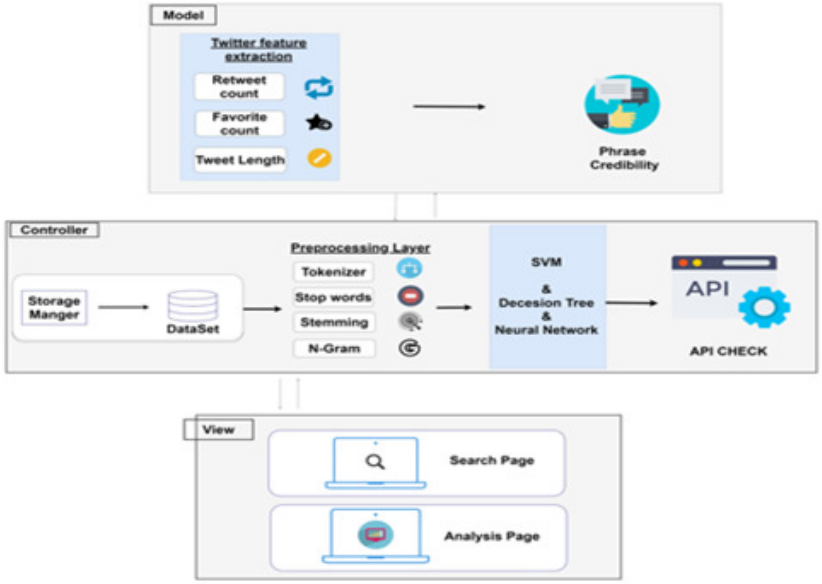

Fig. 1: Architectural Diagram

Architectural Design

*A-**Model**:* The model part is responsible for the functionality of the system, which is first doing pre-processing on data to make it in the form that is suitable for the functions to use (Tokenizer, stop words, Stemming, N-Gram) and then extracting tweet features like Retweet count, Favourite count and Tweet length, sentiment analysis, and phrase credibility, the final step is entering those features is a hybrid classifier between SVM, Decision Tree and Neural networks those are the algorithms we will use and sends it to the controller to save it in the database.

a) Algorithms:

- **SVM:**

SVM plot each data item as a point in n-dimensional space where n is the number of classes we have, which is fake and real. Then we perform classification by finding the hyperplane that differentiates the classes very well.

- **Decision Tree:**

The decision tree uses the tree representation to solve the problem in which each leaf node corresponds to a class label, and attributes are represented on the tree's internal node.

- **Neural networks:**

Set of algorithms, modeled loosely after the human brain, that is designed to recognize patterns. They interpret sensory data through a kind of machine perception, labeling, or raw clustering input.

b) Libraries:

Twitter API: its REST API allows you to read and write Twitter data; in other words, it can be used to create new tweets, read user-profiles and the data of followers (among other data from each profile), since it identifies the various Twitter applications and the users who register.

Fig. 2: Twitter API Diagram

NLTK:
the Natural Language Toolkit (NLTK) is a platform for building Python programs that work with human language data to apply in statistical natural language processing (NLP). It contains text processing libraries for tokenization, parsing, classification, stemming, tagging, and semantic reasoning.

Fig. 3: NLTK

Sci-kit Learn:
Scikit-learn is a free machine learning library for Python. It features various algorithms like support vector machines, random forests, and decision trees, and it also supports Python numerical and scientific libraries like NumPy.
Numpy: This library is responsible for handling arrays.

B- ***View:*** It is responsible for the presentation of data and representing the User Interface(UI). We have two different interfaces. One is responsible for retrieving the data from the user. The second one is responsible for displaying the user's output data and the data analysis.

C- ***Controller:*** It is responsible for binding the view and model. The interactions and requests made within the view are taken and sent to the database to fetch data using models, then it forwards data to the view again to be shown. The controller we have is the user controller that deals with the user input stored in the database. Applying our functionality to it then sends data to the view model to display the user's result.

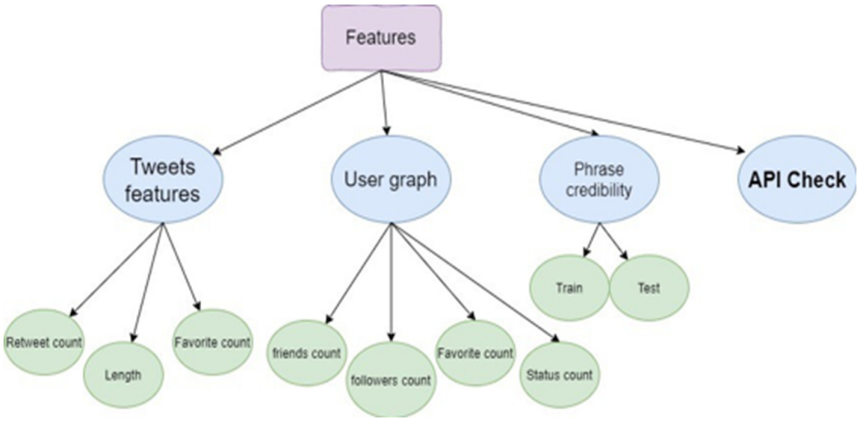

Fig. 4: Features diagram

After that, the controller sends the organized tweets; they have to work on additional features, which are :

- The first feature is gathering information about each tweet and actions made upon them like the retweet count, length of the tweet, and the favorite count to determine the tweet's credibility and generate a prediction.
- The second feature is the user graph, which is gathering information about each user and actions made by them like the friend's count
- , screen name and the favorite count and representing it using a graph structure helping us determining the credibility of the person is he trusted or not
- The second feature is the phrase credibility; we check whether this tweet is credible or generates a prediction.
- The Final feature is the API check; we check if this piece of news does exist in a credible source of news like BBC or not and generating a prediction.

Those features differentiate between real and fake accounts and tweets on Twitter

Dataset Description

In our work, we utilize different types of the dataset; the first type is datasets of documents and string to compare the tweets' linguistic features to, we focused on the politics and celebrity fields as domains. Below are the details of these datasets.
The first dataset we utilized was politics-data. The data set is composed of 2 columns. The first one is Text (The tweet or the news), and label (0 means false, and one means true. This dataset was extracted from kaggele.com. Below is a screenshot of the extracted dataset.

A	B
text	label
BREAKING First NFL Team Declares Bankruptcy C	0
National Federation Independent Business	1
Court Orders Obama To Pay 400 Million In Restit	0
comments Fayetteville NC	1
UPDATE Second Roy Moore Accuser Works For N	0
Romney makes pitch hoping close deal Election	1
Oscar Pistorius Attempts To Commit Suicide	0
Democratic Leaders Say House Democrats Are U	1
Trump Votes For Death Penalty For Being Gay	0
Budget United States Government FY 2008	1
Putin says Pope Francis Is Not A Man Of God Mu	0
Donald Trump exaggerates says China total cont	1
New York Man Wanted For Infecting 240 Men Ar	0
25th Amendment	1
Saudi Arabia Behead 6 School Girls Being With T	0
Malia Obama Fired From Cushy Internship At Sp	0
Briefing White House Press Secretary Robert Gil	1
Target Discontinue Sale Holy Bible	0
A Solar Grand Plan Scientific American	1
Youngest World Leader Bans George Soros Foun	0

poldata

Fig. 5: politics dataset

The second was political data as well called Dataset politics-data2. The data set is composed of 4 columns. The first one is Url of News, Headline of the tweet or News, Body of the tweet, and label (0 for fake and 1 for real).This dataset from kaggele.com

	A	B	C	D
1	URLs	Headline	Body	Label
2	http://w	Four ways Bob Corker skewered Donald Trump	Image	1
3	https://w	Linklater's war veteran comedy speaks to modern America, say	LONDON	1
4	https://w	Trump's Fight With Corker Jeopardizes His Legislative Agenda	The feud	1
5	https://w	Egypt's Cheiron wins tie-up with Pemex for Mexican onshore o	MEXICO	1
6	http://w	Jason Aldean opens 'SNL' with Vegas tribute	Country si	1
7	http://be	JetNation FanDuel League; Week 4	JetNatio	0
8	https://w	Kansas Tried a Tax Plan Similar to Trump's. It Failed.	In 2012,	1
9	https://w	India RBI chief: growth important, but not at cost of inflation - r	The	1
10	https://w	EPA chief to sign rule on Clean Power Plan exit on Tuesday	Scott	1
11	https://w	Talks on sale of Air Berlin planes to easyJet at risk of collapse: r	FILE	1
12	https://w	U.S. President Donald Trump Quietly Signs Law To Allow Warra	By Aaron	0
13	http://be	2017 Fantasy Football Team Defense Rankings - Week 5	2017	0
14	http://be	Just Shut Up & Play Some Damn Baseball!!	Just Shut	0
15	https://w	Deloitte cyber attack affected up to 350 clients: Guardian	FILE	1
16	http://be	10/7: Chuck Axed; HBD Brickyard, Adam, Moonlight Ace & Chuc	A Potato E	0
17	https://w	Gunman's Girlfriend Said She Didn't Know He Planned Harm	• The	1
18	https://w	Marilou Danley, Gunman's Girlfriend, Says She Was Unaware o	The	1
19	https://w	Trump's Immigration Rhetoric Echoes a Bitter Fight in the 90s	In bold do	1
20	http://be	Trump Bemoans 'Little Appreciation' As San Juan Mayor Begs F	Red Flag V	0
21	http://be	In Meeting With Military, Trump Talks Of 'Calm Before The Stor	In	0

Fig. 6: politics dataset 2

The third domain dataset used was a set of celebrity news strings that was also extracted from kaggle with a structure similar to the previous two datasets.

	A	B
1	text	label
2	Did Miley Cyrus Liam Hemsworth secretly get married	0
3	Teen Mom Star Jenelle Evans Wedding Dress Is Available Her	1
4	Paris Jackson Cara Delevingne Enjoy Night Out In Matching Ou	0
5	Kylie Jenner refusing discuss Tyga Life Kylie	1
6	Celebrities Join Tax March Protest Donald Trump	0
7	Quinn Perkins	1
8	Cindy Crawford daughter Kaia Gerber wears wig dining Harry	0
9	I Tried Kim Kardashian Butt Workout Am Forever Changed	1
10	Full List 2018 Oscar Nominations Variety	0
11	Celine Dion donates concert proceeds Vegas shooting victims	1
12	Here What Really Happened When JFK Jr Met Princess Diana	0
13	Chris Evans Millie Bobby Brown Snoop Dogg stars Shower Bul	1
14	Biggest celebrity scandals 2016	0
15	Handmaid Tale Renewed Season 3	1
16	Caitlyn Jenner Addresses Rumored Romance With Sophia Hut	0
17	A Complete Timeline Selena Gomez Justin Bieber Relationsh	1
18	Taylor Swift Reportedly Reacts To Tom Hiddleston Golden Glo	0
19	When Will Claws Season 2 Be On Hulu	1
20	For The Love Of God Why Can Anyone Write Kate McKinnon A	0
21	Critics Choice Awards Critics Choice Awards	1

gossipdata

Fig. 7: Celebrity dataset

The second type of datasets used is a dataset representing the authoring users of tweets. This dataset includes details about the user like the number of tweets published, friends count and followers count. We use this dataset as one of the scores to determine the credibility of the user himself.

	A	B	C	D	E	F	G
1	screen_name	followers_count	friends_count	favourites_count	listed_count	statuses_count	bot
2	"HoustonPokeMap"	1291	0	0	10	78554	1
3	kernyeahx	1	349	38	0	31	1
4	mattlieberisbot	1086	0	0	14	713	1
5	sc_papers	33	0	0	8	676	1
6	lucarivera16	11	745	146	0	185	1
7	dantheimprover	1	186	0	0	11	1
8	_all_of_us_	193	0	0	19	6068	1
9	KatamariItems	8227	2	26	89	2597	1
10	AutophagyPapers	275	0	23	17	9922	1
11	HSC_papers	51	3	0	9	2515	1
12	everycheese	51	1	0	12	111	1
13	gyr_papers	2	1	0	4	230	1
14	lavon_court	0	29	0	0	0	1
15	AjstyleAlen	1	206	0	0	0	1
16	Rupesh93505	0	38	0	0	0	1
17	hard_to_yelp	109	0	0	16	16067	1
18	fuckeverywordza	250	0	0	25	31721	1
19	yeahTonyaGonzal	15	1941	319	1	406	1
20	BbbbggU	190	1899	27	0	0	1
21	ecin_gnihtaseod	181	0	0	24	21506	1

training_data_2_csv_UTF

Fig. 8: User dataset

Results and Discussions

In this section, we review the results of the experiments we performed to determine the best possible feature and classifier to be used in any future work. In the first experiment, we used various weights to determine how changing the features would affect the classification result.

Analysis of Weight variation of features on the results

Test2

Tweet: Taylor Swift cancels all appearances

Type: True

Number of tweets: 9

API check	Phrase	Tweet-Features	Sentiment	TP	FN	FP	TN
1 .5	1	0.5	0.5	6	3	0	0
0	0.5	1	0.5	0	9	0	0
1.5	1	0.5	0	9	0	0	0
1	1	1	0	9	0	0	0
1	1	1	1	5	4	0	0
1	1.5	1	0	2	7	0	0
0.5	0	1.5	1.5	1	8	0	0
1.5	1.5	1.5	0	9	0	0	0
0.8	0.9	0.9	0.3	5	4	0	0
1	0.7	0.9	0.2	8	1	0	0
0.7	1	0.9	0.2	4	5	0	0
0.9	0.9	0.9	0.5	5	4	0	0

Fig. 9:Weight combinations

Results displayed below have shown that the sentiment analysis influence in determining a tweet's factuality is not as significant as surveyed earlier, with the most substantial influence on comparing the tweet to credible news sources through their API.

RESULT

Test	API check	Phrase	Tweet-Features	Sentiment
Test1	1.5	1	0.5	0
Test2	1.5	1	0.5	0
	1	1	1	0
	1.5	1.5	1.5	0
Test3	1 .5	1	0.5	0.5
	0.8	0.9	0.9	0.3
	1	1	1	1
	0.9	0.9	0.9	0.5
Test4	1	0.7	0.9	0.2
	1.5	1	0.5	0
	1	1	1	0
	1.5	1.5	1.5	0
Test5	1.5	1	0.5	0
	1	0.7	0.9	0.2
	1.5	1.5	1.5	0

Best Weight Combination:

API check	Phrase	Tweet-Features	Sentiment
1.5	1	0.5	0

Fig.10: Weight combinations results

Analysis of the variation of the Utilized algorithm

We used a hybrid model of multiple classifiers after testing each classifier independently to enhance accuracy. The classifiers utilized in creating the hybrid model are Neural networks, Support vector machines, and decision trees.

```
Decision tree Accuracy 81.13050706566915
Decision tree FScore [0.82443929 0.79604672]
Decision tree Precisoin [0.84202212 0.77719298]
Decision tree Recall [0.80757576 0.81583794]
Neural Network Accuracy 84.70490440565254
Neural Network  FScore [0.86268657 0.82739212]
Neural Network  Precisoin [0.85       0.84321224]
Neural Network  Recall [0.87575758 0.8121547 ]
svm Accuracy 84.53865336658353
svm FScore [0.8575804  0.83090909]
svm Precisoin [0.86687307 0.82046679]
svm Recall [0.84848485 0.84162063]
hybird Accuracy 85.20365752285952
hybird FScore [0.86535552 0.83579336]
hybird Precisoin [0.86404834 0.83733826]
hybird Recall [0.86666667 0.83425414]
```

Figure 11: Hybrid combination Diagram

Conclusion and Future Works

In recent years, detecting fake news on social media plays a huge role, especially this year as a pandemic and a disease is spreading worldwide; most people take this as a chance to spread fake news and mislead people, causing them to panic. This paper explains our web-based system that aims to detect fake news by using machine learning. The training of a system with many datasets is categorized to help achieve the best accuracy. They also combined features with experiments finding the best of them working together and with a combination of algorithms like SVM, decision tree, and neural network. Our future work includes the use of different pre-trained models, followed by deep-learning systems. In this paper, the content features are used in the binary classification. In the future, we intend to use a combination of content, temporal, and context features to be used in multi-class classification. Capsule networks can be included in plans to detect their effect on the performance.

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Identifying, Analyzing And Evaluating the Impact of Quality of Supply Chain in Construction Sector Using Lean Six Sigma Methodology

Suhaila Ali Abdula

MS QBE, Abu Dhabi School of Management, Abu Dhabi, UAE
Suhaila-ali@hotmail.com

Dr. Muhammad Usman

Abu Dhabi School of Management, Abu Dhabi, UAE
usmankazi100@gmail.com, m.tariq@adsm.ac.ae

Abstract

The construction sector is highly prone to non-value additional activities and uncertainty regarding a disturbance in labor and material on site. These factors make projects prone to overruns and humongous costs. Being the hub of massive construction projects, UAE is a popular tourist attraction and an investor's eye candy. However, the construction firms have been keen on making their projects defect-free to provide minimum variability and maximum customer satisfaction. In this regard, the SCM principles, especially Lean Six Sigma (LSS) principles, have served as a beacon to improvise the UAE's construction sector. The paper thoroughly evaluates the LSS techniques and tools to study the SCM impact on the UAE's quality of the construction sector. Under the analysis in this report, the company's Arabtec Holding incurred losses of 774.5 million dirhams in 2019 from a profit of 256.3 million dirhams in 2018 (Gulf News Reporter, 2020).

Keywords: Quality Improvement, Quality in service, Lean Six Sigma, JITT, TQM.

Introduction

Today, manufacturing businesses are more inclined towards reducing product defects. They are focused on product optimization, improvement of quality day in and day out while streamlining the production line. Construction businesses are no far behind in this regard. The companies are using multiple quality management systems such as TQM (total quality management), JIT (just in time), DFM (design for manufacturability), and LSS (lean six sigma), among many others for waste reduction and quality improvement by eliminating defects in production (Ricardo Antunes, Vicente Gonzalez, 2015). Being the hub of massive construction in the twenty-first century, Middle Eastern construction companies that venture on mega construction projects of building skyrocketing towers and robust stadium share the same concern about quality management.

Delivering residential and commercial construction projects throughout the Middle East, Arabtec has gained expertise in building the most complex yet flawless infrastructures. The Arabtec Construction, established in 1975 as the largest subsidiary of Arabtec Holding PJSC, aims at providing maximum value to the customer while maintaining the quality of construction projects. The three-phase strategic roadmap of Arabtec envisages maintaining a leaner organization at the target benchmark level (Nahyan, 2017). Experience of more than 40 years combined with a highly skilled team let Arabtec Construction completed more than 240 projects, including the world's tallest building, Burj Khalifa, in Dubai, and the inspirational Louvre at Abu Dhabi (Arabtec UAE Team, 2020).

After having a profitable ending of the year 2018, Arabtecncurred a huge loss of $210 million by the end of the year 2019 that resulted in the resignation of its group CFO (Dadlani, 2020). The company has handed over six big projects since the third quarter of 2019 and is expected to complete nine more legacy projects by the end of 2020. It

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shows that the economy did not get slow, but the issues arose inside the company. Therefore, this report will thoroughly evaluate the Lean Six Sigma tools and techniques for identifying Arabtec's relevant issue.

Literature Review

The construction sector tends to be the most important sector for the economic development of a country. The construction activities are gradually becoming complicated, and traditional management methods have failed to manage over the years (Shaharudin et al. 2018). The complexity of designs is the major problem that needs different goods and services from different suppliers. It has become an issue with selecting experienced and specialized suppliers in any project. In the projects' design, suppliers handle each fragment at their specialized end, which helps to complete the whole project on time. Here, Supply chain management plays the most important role to efficiently manage all the complexities of the whole project (Peter et al. 2020).

So, Supply Chain Management plays a very important role in the construction industry for the following reasons:

1. Decentralization lessens the time which is needed to attain efficient control.
2. Management of contractual agreements become very difficult to manage as many different suppliers are involved.
3. The intersection of different suppliers/ contractors could lead to conflicts.
4. Technological advancements have moderated timings for project completion, so there is very little time to concentrate on the clients (Lekan et al. 2019).

Regardless of these challenges, Supply Chain Management helps the construction industry around the globe. Construction projects consist of many types and complexities. Supply Chain Management has improved the construction industry's performance in this competitive world by minimizing costs (Okagbue et al. 2018).

"Procurement": Procurement is the most important component in the construction sector. Supply Chain Management is the system of interrelated people including suppliers, manufacturers, and logistics required to complete the procurement process. With the use of technology, there is a modification in the procurement process and traditional methods are fading away (Tansakul et al. 2018). The implementation of technological advancements ensures continuous Supply Chain management in the construction industry procurement, which helps increase profits and reduce costs (Vardhana & Venugopal, 2019). Research about the originality of suppliers (Wang et al. 2017) and efficient supply quality at different phases of projects reduces the stress of delays, time, and resource wastage (Thunberg & Fredriksson, 2018). It also helps to make sure that rules are not invaded (Morrison & Trushell, 2016). Management of materials also requires strategy, so the quality is maintained and procured throughout the supply chain (Caldas et al. 2015). Despite all these strategies, there are still some challenges present. The complexities of the supply chain evaluate quality complicated (AlMaian et al. 2016). The partitioned nature of projects by different parts helps the tasks be completed in some restricted time and makes the supplies quality-oriented. This affects the quality at the pre-construction stage (Seng et al. 2018).

Supply Chain Management Models

Models are designed and practically applied when there are some gaps in managing the supplying chain. The complexities, timings, and size in the construction industry can be managed through supply chain models. The models can help to lessen the rework changes, cost reduction, time management, helps logistics, and information flow management (Nuss et al. 2016). The construction industry can improve logistics by applying models that help assess the propinquity of suppliers (Dallasega et al. 2018). Cost models for the supply chain can help to manage the total cost of the project. This can be managed by assessing each fragment's impacts as the total construction cost is related to it (Kim et al. 2016). Different suppliers have different decisions and objectives which end in creating conflicts among them and it becomes very difficult to achieve similar goals and intrusts for the project (Peter et al. 2020). Models designed for the partnership with suppliers and managing the life cycle of the product help improve the effectiveness of supply chain management in the construction sector (Ju et al. 2017). Furthermore, collective risk can be excluded from the construction projects by determining the risk models (Liu et al. 2017). If the risks are ignored, the construction projects can be exposed to supply chain troubles (Peter et al. 2020).

Improvement in Construction Supply Chain Management

The construction sector consists of huge industries and needs to have the best and efficient supply chain management for the construction chain. Construction companies need structured approaches to achieve the best relationships with suppliers and the best results for the whole supply chain. Strategic planning is the first and important step in the Supply Chain Management process. All the other steps are based on the planning stage. The working of contractors affects the whole project. Construction companies should develop initiatives to improve the performance of suppliers. These initiatives should include training, providing feedback, and consultation of suppliers. Effective training also positively affects managerial and employee performance and commitment. It reduces the obstructions and enhances the supply chain performance (Papadopoulos et al. 2016).

Measurement of Performance: Measuring performance has become a competition for all the construction companies. In this competitive era, construction companies provide their managers with the guidelines so they can evaluate the performance of suppliers. Firstly, the managers need to set some benchmarks for the suppliers to measure their performances. Secondly, the usage of the information after measuring the performance to improve it (Acquaye et al. 2018).

Benchmarking: The development of benchmarking is still in the initial phase. Benchmarking is based on comparing the performance of metrics to determine objectives to attain in a specific period. So, it would be very beneficial for the construction sector if they upgrade benchmarking for their projects. However, setting benchmarks for the construction project becomes very difficult without supply chain management (Kärnä & Junnonen, 2016).

Information Management: During the supply chain management process, suppliers and contractors get the chance to get information about the whole supply chain, which helps implement the knowledge to improve the performance during the whole construction project (Pucihar et al. 2017).

Waste Identification and Exclusion: it is very important to identify the non-value-added services and activities present in the supply chain process to eliminate the costs, wastage of energy, and material. It can be done at the operational level during purchasing, managing, stocking, etc (Papadopoulos et al. 2016).

Application of Information Technology in Supply Chain Management: In this technological era, it is very important to know about the developed technology. The construction industry should apply technological advancements throughout the supply chain management process to achieve the best and effective results (Kaushik, 2018).

The construction projects are quite dynamic with myriad participants involved and many processes, making it difficult to implement the supply chain management principles. However, the same reason becomes the basis of implying SCM principles (Johnson & Babu, 2020). Thus, the Lean construction model has significantly helped to generate active coordination among highly fragmented sectors of the construction project (Algan Tezel, Yasemin Nielsen, 2013). As reported by the Khaleej Times, the value of ongoing construction work in UAEs estimated to be $3 trillion (Abbas, 2019). The construction projects are expected to continue until 2030, making UAE the second-largest hub of construction. Such issues affect the cost of labor and material and thus affect supply chain management.

Arabtec construction firm is facing challenges with the start of the current year, swinging to a third-quarter loss in revenue of about Dh774 m in 2019 (John, 2020). In a former statement, the company has attributed the loss to its construction industry. It poses a high time for the firm to realize a lean model for its projects (Gulf News Reporter, 2020). One such model is Lean Six Sigma that is the blend of Lean Manufacturing and Six Sigma. It is developed to create a comprehensive system that removes waste and reduces process variation for efficient manufacturing and optimum product yield (Saad Sarhan, Andrew Fox, 2013).

Lean Six Sigma principally uses Six Sigma processes and methods, including DMAIC and the belt system as the mainstay of the system to drive dedicated improvements in manufacturing while incorporating many techniques and tools from Lean to reduce wasteful steps and processes (Dear Systems Staff, 2018). Some of the renowned methods of six sigma used by Lean Six Sigma are DMAIC (that stands for Define, Measure, Analyze, Improve and Control) and DMADV (that stands for Define, Measure, Analyze, Design and Verify). While DMAIC is for the existing projects, six sigma uses DMADV for new projects and designs (Algan Tezel, Yasemin Nielsen, 2013).

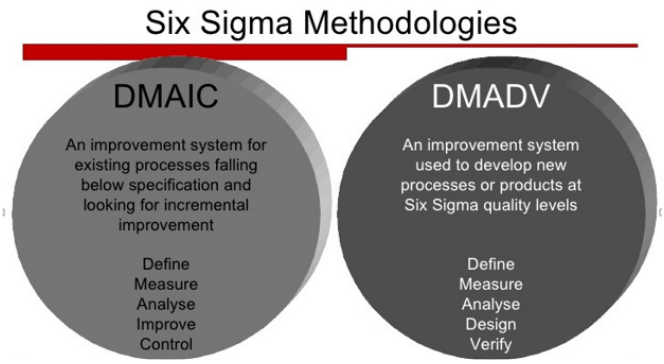

Figure 1: Six Sigma Methodologies

In construction projects, the key issue is having an increased non-value, adding actions regarding the flow of material and labor on-site (Hasim et al. 2020). This waste can be related to material like excessive material stock, vandalism, or mass production or it can be labor efficiency-related such as delays in work in process, laziness, poor working status, etc. (Ricardo Antunes, Vicente Gonzalez, 2015). In brief, there are eight key concerns for construction projects that are identified by different researchers namely; the flow of on-site material challenges such as inventory-related challenges, overproduction, over-processing, transportation (freight costs), and flow of labor on-site such as skills mismatch (Saad Sarhan, Andrew Fox, 2013). Issues related to Arabtec can be regarding the flow of labor and material on the construction site.

Research Methodology

This study's primary objective is to analyze the impact on quality in the supply chain in the construction sector in UAE (concerning analyzing the Arabtec project). The methodology envisages a thorough review of the literature to identify that if the flow of material and labor on site is a major issue in the United Arab Emirates or not. To analyze that either flow of labor and material on site does affect the satisfaction of the customer or the services provided by the construction company, a survey was conducted based upon ten questions. There were a total of 30 responses for each question.

Data Analysis & Results

From the survey, the following data were analyzed:

Figure 2 shows that 80% strongly agreed that the flow of material and labor on-site is a main and continuous worry within the construction industry, 10% partially agreed while 10% disagreed.

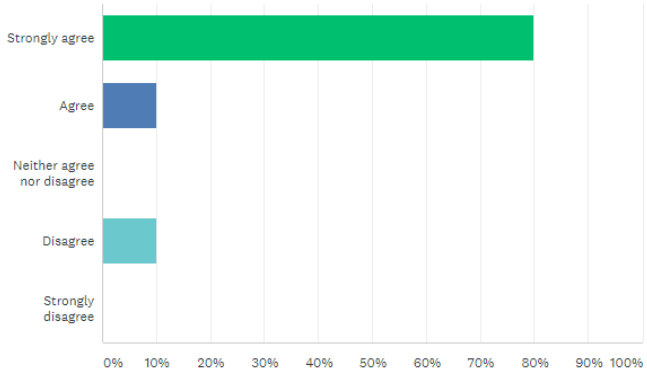

Figure 2: Flow of Material

Figure 3 shows that 53.33% strongly agreed that SCM in the United Arab Emirate's construction industry needs to modify the flow of material and labor on-site, 20% partially agreed, while 23.33% partially disagreed and 3.33% strongly disagreed.

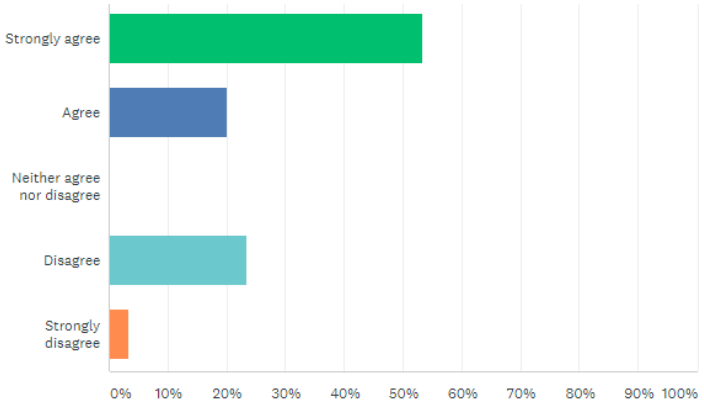

Figure 3: SCM in UAE

Figure 4 shows that 76.67% faced difficulty with the construction industry's construction process due to the flow of material and labor on-site, and 23.33% didn't.

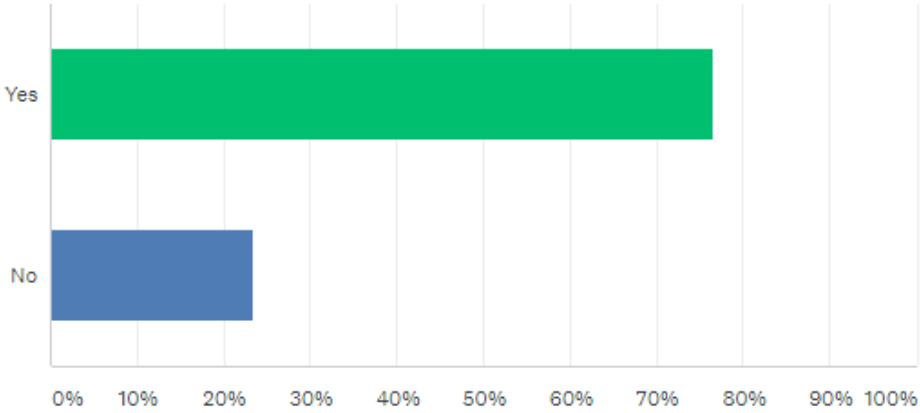

Figure 4: Construction Industry Process

Figure 5 shows that 43.33% strongly agreed that the flow of material and labor on-site strategies and ways should be modified, 23.33% partially agreed, 6.67% were neutral, 6.67% disagreed, and 20.00% strongly disagreed.

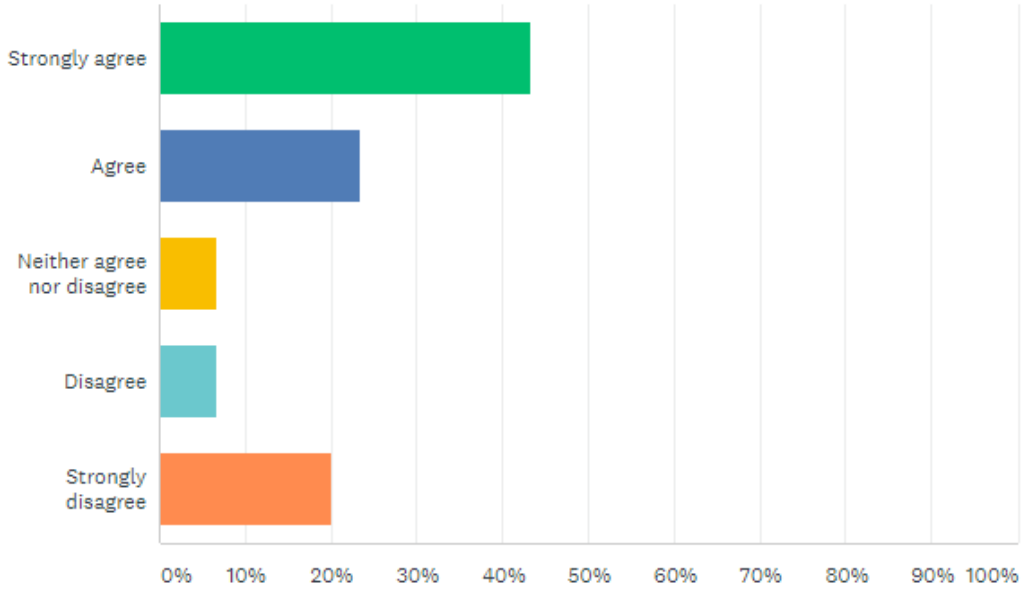

Figure 5: Labor on-site strategies

Figure 6 shows that 73.33% agreed that the modified flow of material and labor on-site within the supply chain management overcame the issues between the supplier and client, 20.00% disagreed, and 6.67% weren't sure about it.

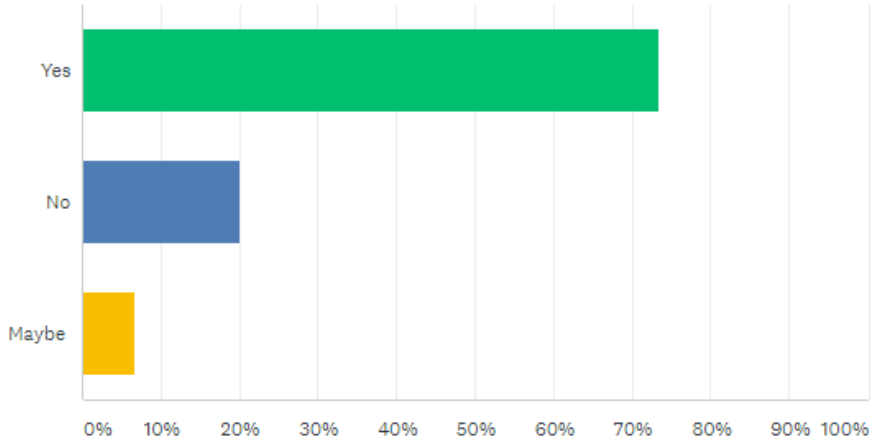

Figure 6: Final Product Change

Figure 7 shows that 36.67% agreed that the final product's quality changed due to the material and labor movement on construction sites, 43.33% disagreed, 13.33% said sometimes, and 6.67% didn't know about such stuff.

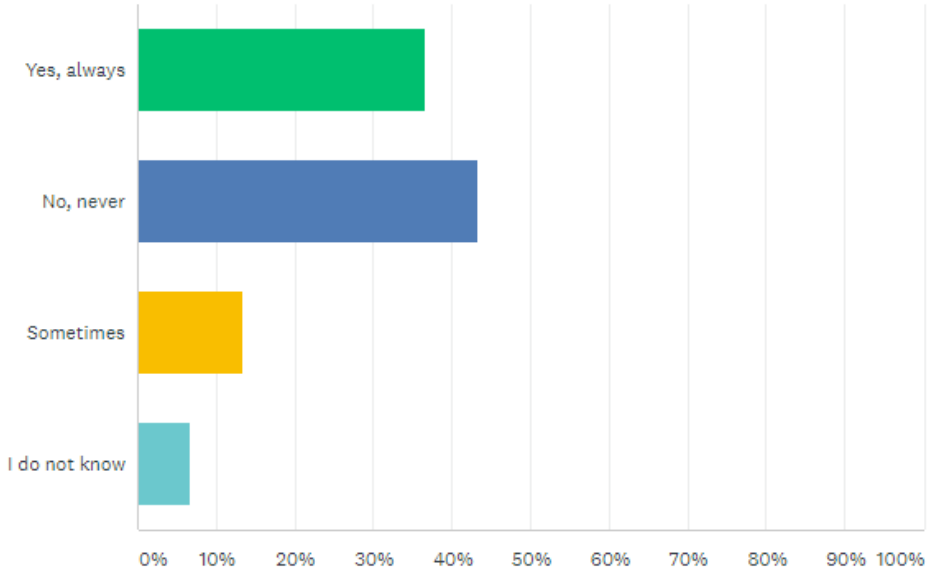

Figure 7: Companies Relationships

Figure 8 shows that 70% agreed that the relationships between companies and their client could be fruitful with a sustainable flow of material and labor on-site, 3.33% were partial, 6.67% disagreed, and 20.00% strongly disagreed.

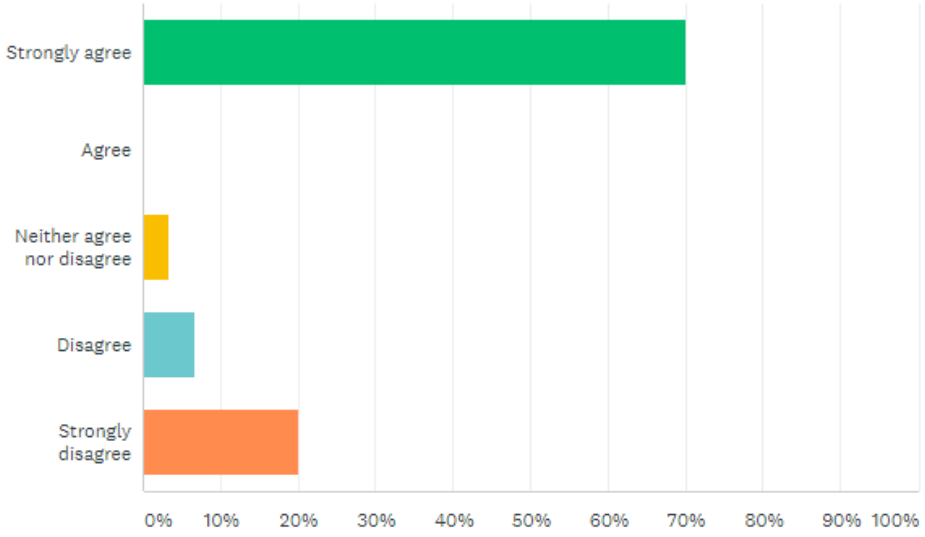

Figure 8: SCM principles

Figure 9 shows that 80% said a need to change the supply chain management's principles and rules regarding the flow of material and labor on-site, 16.67% disagreed, and 3.33% wasn't aware of such issues.

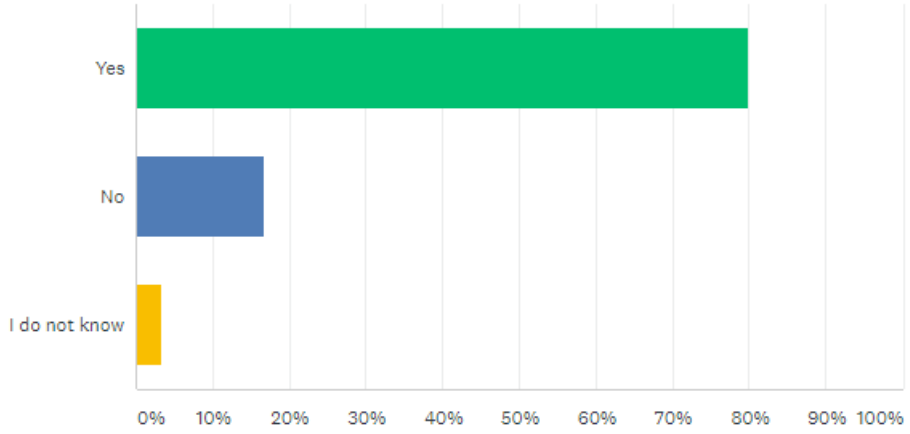

Figure 9: Lean Construction

Figure 10 shows that 43.33% were aware of the lean construction models regarding the United Arab Emirates construction industry, 33.33% weren't, 20.00% knew a little bit, and 3.33% were experts in it.

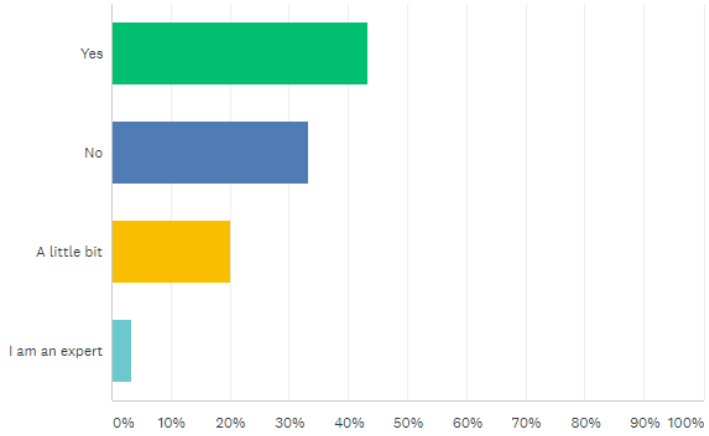

Figure 10: Construction Industry Transparency

Figure 11 shows that 60% strongly agreed that the construction industry still needs a transparent and decentralized approach regarding the flow of material and labor on-site, 16.67% partially agreed, 6.67% disagreed and 16.67% strongly disagreed.

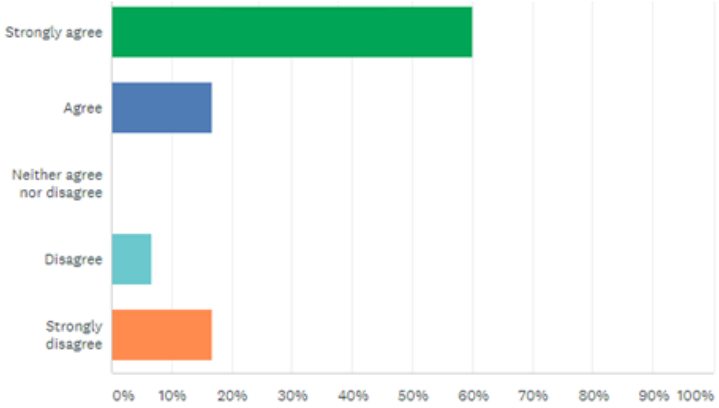

Figure 11: Construction Industry Decentralized Approach

Discussion

The data analysis identified two key factors that hamper the performance of Arabtec Construction in the UAE. These key factors are the disturbance in the flow of labor and material on site. The above data analysis showed that disturbance in labor and material on site causes a lot of trouble in Supply chain management. Because of this, customers and clients don't seem much satisfied with the services and final products. Following is the fish map showing the issues and possible challenges in the Supply chain management regarding material and labor issues:

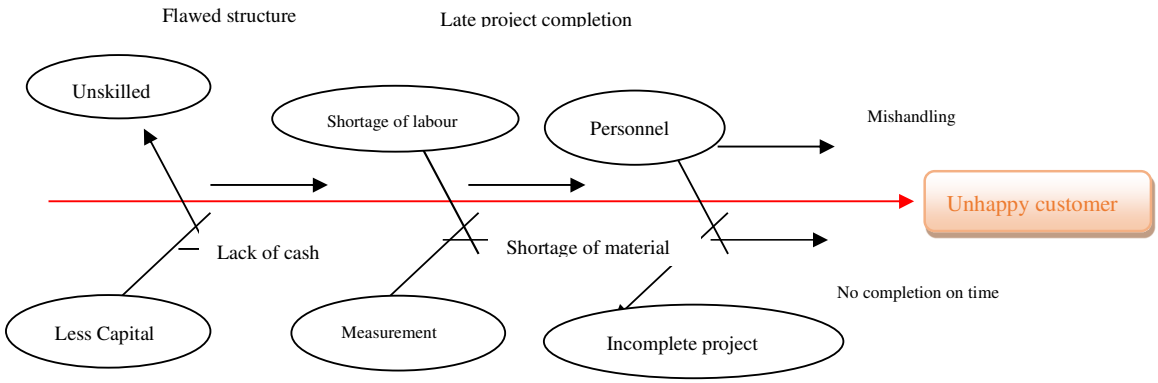

Figure 12: Cause and Effect Diagram

Any project in the construction industry can be successful if accurate labor has relatable skillfulness and material is delivered at the right time with reasonable finances. The project will be unsuccessful if the flow of material and labor on-site goes wrong or disturbed due to the wrong material in the wrong location at the wrong time. To obtain the labor and material on time, it's necessary to have the capital and cash flow without which this all is impossible.

There are multiple tools and techniques of lean six sigma that can be used in this situation at Arabtec to better labor and material flow. Some of the tools and techniques of Lean Six Sigma that can be useful in this situation are as follows:

- A one-piece flow model enables the manufacturer to focus on flow efficiency.
- JIT – Just in Time: Reducing production time, supplier, and customer response time.
- Kanban: This is a technique to eliminate MUDA (waste) by ensuring continuous workflow.
- Kaizen: A methodology to incorporate small, ongoing changes in the system to ensure regular improvements.
- 5S (Sort, Set Order, Shine, Standardize, and Sustain)
- Value Stream Mapping: It shows the flow of materials and information in one of the processes and developed to improve and optimize flow throughout the organization.
- Six sigma conversion table: It identifies the main issues in the disturbance of material and labor on-site by studying the project's weekly activities.

Recommendation

Following is the figure of the Lean construction model, which can assist in overcoming the challenges faced regarding the flow of labor and material on site:

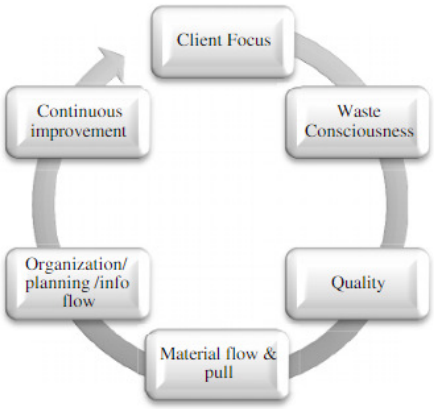

Figure 13: Lean Construction Cycle

Also, there is a need to have skilled planning regarding the material and labor on-site flow for the projects, a thorough analysis of the projects to curtail indicators mentioned in the fish map. To minimize disturbance of the flow of material and labor on-site in high-rise construction, Arabtec Construction must use multiple lean six sigma tools and techniques from the ones mentioned in the report's discussion, including JIT, Kanban, 5S, and standard six sigma conversion tables.

The data gathered through six sigma conversion tables will help to construct control charts, thereby mitigating the uncontrollable uncertainty to a certain extent. The sigma level could be improvised after a thorough analysis of data. Another important consideration for this project is classifying and identifying sustainability factors based on risk management standards. The company should also consider it imperative to improve productivity through a special focus on utilizing the Value Stream Mapping tool.

Conclusion

Lean Six Sigma is a well-regulated and data-based method for the improvement of quality. The tools and approaches adopted in Lean Six Sigma are similar to other quality improvement techniques, but the structured methods used for improvement procedures give it a recognized value. However, Lean Six Sigma in the construction sector is a novel idea in developing nations like India, China, etc, and is being adopted in developed countries. Because of non-standardized procedures and insufficiency in advanced quality capabilities in the construction sector, it falls behind the other important industries like services and manufacturing. The recent challenge to satisfy customers' demand for enhanced quality and good products at reduced costs needs sustainable tools and structured methods for quality improvement.

Leans Sig Sigma confirms that there are no issues and decreased variations in a procedure and concentrates on consumer satisfaction. It also supports reducing energy, waste, and pollution during construction and presents the concepts and key plans for sustainable development. Lean Six Sigma is a prominent solution for all the issues related to quality in construction. It supports the improvement procedures, which result in the reduction of cost and waste. Lean Six Sigma can also introduce a culture that guarantees uninterrupted improvement and perform appropriate re-evaluation of procedures, which supports sustaining a competitive position in the international market environment.

. Additionally, SS can develop a culture that ensures continuous improvement and conduct a timely and purposeful reassessment of processes, which will help maintain a competitive edge in the global business environment.

The impact of Supply chain management on the UAE construction industry has been noticeable. However, there is still room for a more transparent and decentralized project management approach. Incorporating Lean Six Sigma (LSS) tools and techniques, customized as per project needs, is imperative for a rise in customer satisfaction and revival of monetary gains, especially for Arabtec Construction and other construction companies in general.

The UAE's construction industry will grow with project timelines as long as the year 2030. Such timelines need to have more synergized processes, with each process well integrated with the final output to retain customer

satisfaction. Among the many tools for such projects, LSS is the most advisable option for UAE construction firms' managers. The models have a proven impact on the quality of the product ranging from manufacturing, software, IT firms to the infrastructure industry.

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Selected Forms of Support for the Development of Small and Medium-Sized Enterprises (SMEs) by the Public Sector at the Local and Regional Level

Zbigniew GRZYMAŁA

Warsaw School of Economics, Warsaw, Poland
zgrzym@sgh.waw.pl

Grzegorz MAŚLOCH

Warsaw School of Economics, Warsaw, Poland
gmaslo@sgh.waw.pl

Abstract

Supporting the sector of small and medium-sized enterprises (SMEs) by public sector institutions takes place through a variety of instruments such as: ranging from advisory and educational programs to financial support through various loan funds, subsidies, including grants in EU funds in the case of European Union countries. The purpose of the article is to present partial research as a part of a research project carried out by the Kujawsko-Pomorskie Voivodeship, the Warsaw School of Economics and the Nicolaus Copernicus University in Toruń. These institutions are as a part of the Gospostrateg - Regiogmina project: "Location of support instruments for SMEs at the level of local governments, operating on the basis for a model of multi-level regional governance". Examples of such support in several analysed countries out of 16 respondents and assumptions of such support for the Kuyavian-Pomeranian Voivodeship are presented. The main purpose was to focus on financial instruments, including the developed of "Local Economic Development Fund (LFRG)", which may be one of the instrument supporting small and medium-sized enterprises in a given local or regional area. The concept is based on a combination of the initiative of representatives of the regional and local public sector and private entities, mainly entrepreneurs with SMEs.

Keywords: SMEs, Public sector, enterprise support.

Introduction

Initiatives and activities aiming to support entrepreneurship with an outlook to increase competitiveness and wealth of our economies have become part of our everyday lives. Supporting the sector of small and medium-sized enterprises (SMEs) by public sector institutions takes place through a variety of instruments such as: ranging from advisory and educational programs to financial support through various loan funds, subsidies, including grants in EU funds in the case of European Union countries.

The purpose of the article is to present partial research as a part of a research project carried out by the Kujawsko-Pomorskie Voivodeship, the Warsaw School of Economics and the Nicolaus Copernicus University in Toruń. These institutions are as a part of the Gospostrateg - Regiogmina project: "Location of support instruments for SMEs at the level of local governments, operating on the basis for a model of multi-level regional governance". Examples of such support in several analysed countries out of 16 respondents and assumptions of such support for the Kuyavian-Pomeranian Voivodeship are presented. The main purpose was to focus on financial instruments, including the developed of "Local Economic Development Fund (LFRG)", which may be one of the instrument supporting small and medium-sized enterprises in a given local or regional area. The concept is based on a combination of the initiative of representatives of the regional and local public sector and private entities, mainly entrepreneurs with SMEs

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Basic SME Support Instruments

The instruments of SME support on the part of public sector institutions include: direct and indirect financial and non-material aid as well as all activities aimed at creating a climate conducive to the activity of economic entities. The basic instruments for such support include (Cowling & 2018, Foreman-Peck & 2014, Jarosiński & 2015):

- information instruments,
- promotional and organizational instruments,
- training and advisory instruments,
- financial instruments,
- fiscal instruments,
- infrastructure instruments.

Information instruments may be, for example: informing entrepreneurs about subsidies from EU funds or other aid programs, information e.g. about changes in the local spatial development plan indicating business zones, also communal real estate databases, etc. (Maśloch 2012). Information instruments are complemented by promotional and organizational instruments, such as local economic organizations, local economic development plans, programs supporting the promotion of local products, promotion of the commune itself, its infrastructural potential, development strategy, relatively lower taxes and local fees, etc.

These instruments also include the establishment of a unit for the promotion of entrepreneurship, the organization of competitions for the best product and enterprise by the commune, organizing foreign trips by the commune for entrepreneurs, frequent meetings with presidents of local companies and exchange of experiences, mutual support in the field of advertising and promotion, joint activities promotional activities outside the commune, integration of entrepreneurs from a given commune, development of special aid programs for small businesses by the commune, creation of fast paths for investment projects in the commune, economic cooperation of the commune with local entities in the implementation of investment projects, frequent meetings with presidents of local companies and exchange of experiences.

Among the training and advisory instruments, we can distinguish: active participation of the commune in training for entrepreneurs and the unemployed, providing consulting and training centres in the commune, The financial instruments include: local and regional economic development funds, loan guarantees for entrepreneurs, establishment of business incubators or technology parks in the commune, involvement of the commune in venture-capital projects, contributing property to companies by the commune, communal guarantee fund, purchase of services from local companies by the commune, purchase of land by the commune for the purpose of consolidation, reinforcement and division. Sale of communal land for economic purposes (Maśloch 2020).

Fiscal instruments that complement or even overlap with financial instruments may be: forest tax rates lower than the maximum, the application of maximum reductions for newly established plants that create new jobs in the commune, real estate tax rates lower than the maximum, further tax cuts on real estate or means of transport, forest tax reliefs and exemptions, agricultural tax rates lower than the maximum ones, agricultural tax reliefs and exemptions, stability of the commune's tax policy (Boonvut 2017).

The infrastructural instruments include, among others: land development for economic activity, infrastructure investments, such as road, water and sewage, heating, gas, telecommunication, and educational investments (Bhattacharya & 2015, Studart & 2018).

SME support funds and organizations in selected countries

In many European countries, support for the development of SMEs is provided under the Small Business Act (SBA). For example in Denmark. In 2007, five regional business development institutions (in Aalborg, Aarhus, Odense, Vordingborg and Copenhagen) were established to improve the quality of specialist advice to entrepreneurs. These institutions, called Houses of Growth (Væksthuse), were established by the municipalities as foundations. They had a uniform structure, and their activity encompassed both regional and national initiatives. Houses of Growth provided

entrepreneurs with access to various types of experts, they also helped SMEs in preparing market analyses, allowed them to exchange experiences and connect on the web. They were also responsible for the 'second chance' system, providing free, impartial and confidential advice to SMEs in financial distress. If it was too late for changes, the Houses of Growth strived to make the bankruptcy process as efficient as possible (Dilger 2016, Giebe & 2006, Honore & 2014).

In line with the assumptions of the 2007 local government reform, Business Forums (Virksomhedsforum) were also established at the regional level. There were six of them - they operated in each of the regions and on Bornholm. Business Forums consisted of representatives of local and regional authorities, entrepreneurs, educational institutions, employees and managers. They were responsible for preparing regional business development strategies, as well as for monitoring development conditions. They were also assigned to recommending the government to co-finance activities for business development (including from the European Union funds). The Danish Growth Fund, which is a state-owned investment fund, is the most important source of financing for Danish entrepreneurs. The fund is not only an equity investor; it also provides loans and guarantees to small and medium-sized enterprises in cooperation with private partners and Danish financial institutions. The Growth Fund offers loans and guarantees to companies from all sectors and all stages of development, both start-up loans and loans suitable for more mature companies intending to invest in further development. The Fund's offer includes, among others start-up loans for young entrepreneurs. They are granted in the amount of 0.4-1.5 million DKK, for a period of up to six years, require co-financing by private investors in a 1: 1 ratio (Malinowska-Misiąg 2020).

In Finland, despite broad autonomy, central and regional institutions are designated to promote entrepreneurship. Such institutions include ELY Centres (Economic Development, Transport and Environment) playing a significant role in promoting regional business policy. An effective regional business policy is the result of cooperation with other regional entities. ELY Centres aim to provide a balanced regional structure that provides a solid foundation for competence, entrepreneurship and growth and to promote employment opportunities. ELY centres support the establishment, development and development of small and medium-sized enterprises by providing consulting, training and expert services as well as financing investment and development projects.

One of the development ideas for SMEs in Finland is the so-called "Business Finland" - Sustainable Production program in Finland. It aims to strengthen the innovation and production volumes of companies in a sustainable manner. Targeted at companies aiming for international growth, particularly small and medium-sized companies. Funding is available for start-up companies, SME's, large companies, and research organizations. In some cases, a company may apply to organizations such as Finnvera for funding for projects financed by Business Finland. Finnvera is a specialized financing company owned by the State of Finland. It provides risk financing to enterprises with a sound business idea and preconditions for profitability when a company has insufficient collateral to raise funds for investments and development projects (Business).

In Finland, there are self-government entities whose permanent and main goal is economic promotion, e.g. Lahti Region Development, Turku Science Park (under the Turku Business Region brand. The governmental institution operating at the national level is the mentioned Business Finland. Local government institutions are e.g. Lahti Region Development, Turku Science Park, Business Tampere, Cursor Oy (Kotka-Hamina region), Helsinki Business Hub. Institutions created by entrepreneurs are, for example, Turku Chamber of Commerce, Oulu Chamber of Commerce. Government institutions are financed by the government, while self-government institutions are financed by the local government and possible Government grants EU funds are an important source of external financing, but depending on the organization, for example, the statute may include provisions on the obligatory membership of entrepreneurs in its bodies, such as the Advisor Board, but this is not a legal requirement, but the will of the owners. One of the largest entities on the market of credit institutions is the company MuniFin dealing with providing financing for local governments, local government companies and housing companies. It is 100% owned by the Finnish public sector. Such companies may be established jointly with other communes (André & 2018, Meyer 2005, Väänänen 2003).

One of the instruments for supporting SMEs are business incubators. The creation of business incubators and technology parks are activities of local governments or, more often, local government institutions / companies promoting economic development. The created entities most often have legal personality. In France, on the other hand, local entrepreneurship is supported by regions and local governments. Regions are responsible for carrying out an annual quantitative and qualitative evaluation of the aid and support programs implemented in their territory. The region is also responsible for organizing local consultations and convening a regional council in case the economic

balance of the region or part of it is disturbed. The region may also decide to adopt a regional economic development plan. In its coordinating role, the region is responsible for carrying out an annual, quantitative and qualitative evaluation of the aid and support programs implemented in its territory. One of the tools for local development in France at the local level is the so-called financial engineering, i.e. the possibility of granting subsidies by local governments and / or their grouping to organisms whose sole task is to provide financial support for the implementation of investments by SMEs, or to non-profit organizations. The purpose of this support is not to ensure full project financing, but to facilitate the intervention of the traditional banking system through technical and financial assistance. Another tool is the protection of the economic and social interests of the population, consisting in the intervention of the commune to ensure economic development or to correct irregularities resulting from a private initiative by supporting:

- establishing or maintaining services in rural areas,
- companies in difficulty,
- the field of cinema and audio-visual services,
- the implementation of cultural projects of common interest at the local level,
- the cinema room operators,
- companies in the field of cinematographic and audio-visual production,
- the field of health in rural areas,
- conventional for healthcare professionals,
- tax,
- local government interventions.

Another instrument are entrepreneurship centres (pépinière d'entreprises / hôtel d'entreprises), which are established by local government units interested in creating jobs in their territory. The centres most often offer office space, warehouses, logistic services such as joint printing, meeting rooms and consulting services. Thanks to public support, the centres offer the above-mentioned services at preferential rates for a period of 5 years. Incubators of innovative enterprises are a similar instrument. These incubators in France (around 30) were established by higher education and research institutions (universities, colleges, research institutes) following a project competition announced by the Research Minister in March 1999 under the so-called the Allègre Act on Innovation and Research. Their main goal is to support the development of enterprises commercializing the research results of research institutions, although they may also be innovative projects from the business world.

In Spain, support for SMEs takes place through the Directorate General for Industry and SMEs of the Ministry of Industry, Trade and Tourism. There is a platform with a database of support programs and incentives addressed to enterprises by the public administration and its subordinate institutions aimed at supporting, maintaining and developing economic activity and entrepreneurship. Additionally, on the websites of city offices you can find offers aimed at local business. City halls are responsible for developing projects for local entrepreneurship. Economic planning and development of the region is carried out in agreement between the regional government and the central government. The exceptions are the Basque Country and Galicia, which have exclusive competence in this regard. Equity instruments for local SMEs are formulated at the level of the 17 regional governments of the Autonomous Communities and city halls. There is no uniform basis for such instruments. In Slovakia, support is practiced for small and medium-sized enterprises in the form of abandoning the collection of rental fees or their reduction, especially in the current pandemic situation. These decisions depend on the decisions of local governments and are related to their economic situation. To support business in Slovakia, the Slovak Trade and Investment Agency was established, which, however, focuses primarily on supporting strategic or large investments, especially direct foreign investments. In Slovakia, the Economic and Social Development Program of the PHSR commune was introduced, which is a planning document of local self-government in the field of local economic development. There are other institutions, including Slovak Business Agency (SBA).In Slovakia, there are no financial institutions supporting entrepreneurs at the local level, but local governments can participate in PPP projects or issue municipal bonds. Communes organize industrial parks and business incubators. If they are the property of the commune, the commune has the right to determine the amount of the rent (Romero-Jordán & 2014).

In Italy, according to the Constitution of the Italian Republic (Art. 117), the tasks of local government units also include the promotion and coordination of economic development and the provision of support for economic activities

in line with the territorial strategic plan. The following instruments are examples of forms of support for entrepreneurs by the local government:

- Grants to support innovative investments by SMEs aimed at introducing new products and / or production processes into the company, which will contribute to increasing production efficiency and employment;
- Tax credits for SMEs operating in industrial crisis areas to promote entrepreneurial initiatives that will help to strengthen local production structures and attract new investments;
- Contribution to the development of the production activities of SMEs from the tourism and cultural sector located in the Aquilia seismic crater;
- Funding for projects that produce socially desirable outcomes: SMEs can obtain funding for social innovation projects in areas related to citizens' well-being and territory development;
- Lending at low interest rates to SMEs operating in the agricultural production, processing and marketing sectors to finance investments in projects to increase productivity or employment;
- Facilitate the transition of SMEs to a low carbon economy: incentives to reduce energy consumption and gas emissions from businesses and production areas, including the installation of renewable energy production systems for own use, with priority to high-efficiency technologies (Costa 2017, Jędrzejewski & 2020, Xu & 2016).

A popular formula for capital support for SMEs in Italy, both at the commune and provincial levels, is the mobilization of liquidity potential and the popularization of confide (mutual credit guarantee syndicates). Examples of initiatives include:

- TrevisoFund - an instrument created by the commune as part of the response to the economic crisis in connection with COVID-19, assuming the transfer of a total of 200,000 to those involved in the confidi initiative EUR - for each EUR 1 received from the city, the consortia undertake to provide a guarantee of EUR 6 for local SMEs. An agreement was reached with the banks on the launch of a credit line of up to EUR 2.5 million with an interest rate of 0.70%. Under the initiative, SMEs can apply for loans in the amount of PLN 10-35 thousand. EUR with max. 72 months the repayment period,
- Provincial Microcredit Fund for Women - a system of counter-guarantees (up to 50% of the loan value) granted by the province of Reggio Emilia Confidi supporting access to credit for entrepreneurs from the SME sector. Under the facility, it is possible to obtain a loan of up to 25,000 EUR from 60 months the repayment period,
- Agreements concluded by the autonomous provinces involving much greater means,
- Reaching EUR 250 million and involving various partners, including confidi, the Trento Economic Recovery Fund established in order to combat the economic effects of COVID-19 (entrepreneurs using the Confidi guarantee may apply for a loan of up to PLN 300,000. EUR with a two-year repayment period and an interest rate of 0.40%),
- Alto Adige's € 1 billion recovery program provides for the active involvement of Confidi in a guarantee (90% of value) of interest-free two-year loans (assuming that the bank will waive interest in the first year and pay it by the province in the second) of 35 thousand EUR. In addition, loans of up to 800 thousand. EUR interest free for the first 6 months (Jędrzejewski & 2020).

Financial support instruments in Poland for SMEs

In Poland, at the central level, the SME sector is supported, among others, by the Polish Development Fund, which co-finances selected investments carried out by Polish entrepreneurs. Other forms of support are national programs and programs with the participation of EU funds addressed to entrepreneurs from various industries. At the commune level, forms of support include, for example, tax breaks, economic zones or regional loan funds. As part of the Regiogmina project implemented by the Kujawsko-Pomorskie Voivodeship, the Warsaw School of Economics and the Nicolaus Copernicus University, a proposal for a financial support instrument for SMEs was developed - the local economic development fund (LFRG).The intention of the Local Economic Development Fund is to provide joint resources for financing SMEs, which both banks and existing investment and loan funds do not provide. The formula of operation Local Economic Development Fund is therefore to create a local financial cluster. Through the implementation of investment projects involving the local capital of entrepreneurs and small investors, it creates a local capital market to support projects within the powiat (s) in which it operates.

The consequence of the measures taken is to build the investment attractiveness of the local economy and increase productivity and stabilize the economic development of enterprises from the SME sector in the area of influence of individual LFRGs. The LFRG should ensure access to financing that can be allocated to working capital and investments.

Proposed organization and operating principles of the LFRG (see Chart 1):

- The fund will be established as an Alternative Investment Company in the form of a limited joint-stock partnership,
- The company will be managed and represented by a general partner - a limited liability company as an internal managing body of the LFRG,
- The size of the fund is PLN 120-150 million, gradually paid over 4 years for projects selected and not questioned by the investment committee. LFRG's share in a particular project is PLN 2-5 million.
- LFRG will complete approximately 30 transactions (6-7 annually). Investment process: investment analysis (project analysis, due diligence and negotiations) - 6 months; 2 investment rounds (1 per year). After 4-6 years, the fund resells the shares to business owners or the stock exchange, or to other companies or funds.

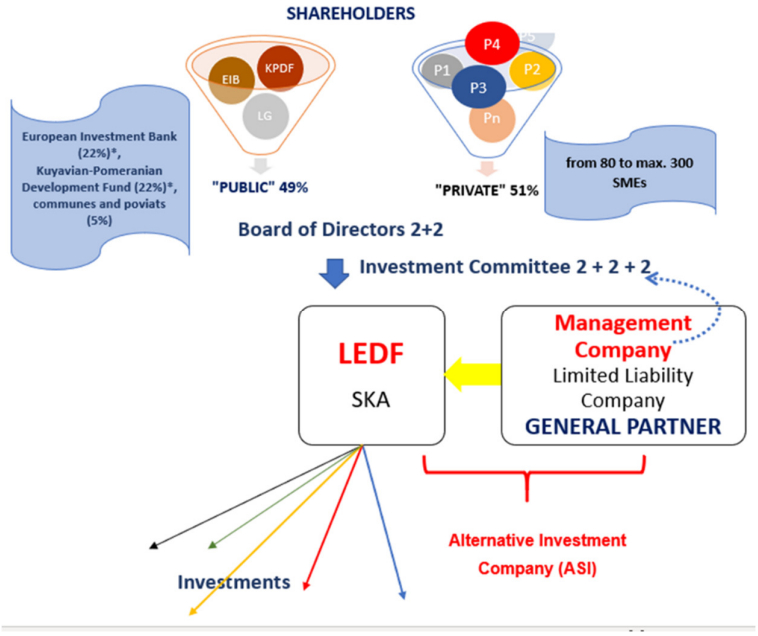

Chart. 1: Proposed Organizational Chart

Source: (Own research)

The scope of financing offered by the fund:

- Loans for private companies (grants loans for projects to natural persons running a business by converting them into shares by converting them into commercial companies),
- Capital involvement for local companies (it will finance the company's development with capital (business scaling, new products, entering new markets) and will make available funds in the early stages of operations in the form of equity financing for companies as commercial companies),
- Buyout of shares in companies resigning from activity (it will finance the buyout of shares, their takeover and stabilization of management in the event that the original owner and creator, for random reasons, can no longer run his business and there are no successors),

- Supporting companies in the period of recovery from the crisis after the coronavirus epidemic (it will provide loans to companies of natural persons operating with conversion into shares and transforming them into commercial companies, and will finance commercial law companies to strengthen their liquidity and development opportunities after the crisis).

The Fund is expected to start operating in the second half of 2021. It is assumed that the LFRG will start investing after the first half of the year, and the investment period will run from 2022 to 2027 (Table 1).

Table 1: The Fund's financial flows over a period of 10 years

Data in PLN milion	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Sum
Contributions : capital + debt	1	10	23	20	20	20	16	1	1	1	1	113
Proceeds from sales							47	57	37	38	18	196
Investment costs		- 7	- 22	- 19	- 19	- 19	- 14					- 99
Operating costs	- 1	- 2	- 2	- 1	- 2	- 1	- 1	- 1	- 1	- 1	- 1	- 13
Payment of interest on bonds							- 2	- 5	- 4	- 5	- 7	- 23
Bond redemption							- 4	- 11	- 9	- 10	- 17	- 51
Annual flows	0	1	- 1	0	0	0	40	40	24	23	- 6	121

Source: Own research

Private shareholders - limited partners, are entrepreneurs or natural persons from one or two powiats, cities, participate as shareholders in SKA / ASI in which they always have equal shares, together with 51% of shares they co-finance management costs, grant loans in the form of bonds for projects proposed by the company managing. The rate of return on investment may differ between public and private investors. Based on the current bond offers, it has been assumed that the interest rate for the issued bonds will be set at 7-8% per annum. Public shareholders - limited partners are the Kujawsko-Pomorski Development Fund 22%, the Polish Development Fund and / or the European Investment Bank 22%, municipalities and powiats in the LFRG area of operation 5%, as SKA / ASI shareholders.

Conclusion

Many countries support the development of the SME sector at various levels of public administration. They use various support instruments for this. In most European countries, financial instruments are proposed by central and regional levels of government and business environment institutions. At the level of communes, support is based on building technical infrastructure by communes and fiscal instruments such as tax breaks. In most cases, loans and credits for SMEs are offered by national and regional entities providing this type of service, such as banks or loan funds. A local fund for economic development, being prepared in Poland, is a new proposal.

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La Couleur De L'interface Virtuelle Des Sites Web E-Commerce : Impact Sur L'internaute Marocain

Zineb LAHMIDI

Faculté des Sciences Juridiques, Économiques et Sociales- Souissi, Université Mohammed V de Rabat, Rabat, Maroc
zineb.lahmidi@um5s.net.ma

Amina AOMARI

Faculté des Sciences Juridiques, Économiques et Sociales- Souissi, Université Mohammed V de Rabat, Rabat, Maroc
a.aomari@um5s.net.ma

Résumé

L'objectif de cet article est d'évaluer l'incidence de la couleur comme composante atmosphérique inhérente aux sites web commerciaux, sur les réactions à la fois affectives (l'état d'humeur) et cognitives (la mémorisation et l'intention d'achat) du e-consommateur marocain.
En se basant sur une revue de littérature approfondie et une étude exploratoire menée auprès des webmasters marocains, la présente étude expose les fondements méthodologiques menant à la proposition d'un modèle conceptuel qui traite de la question.
La collecte des données s'est effectuée via un questionnaire administré auprès de 384 personnes interrogées. La modélisation par équations structurelles et plus particulièrement LISREL est l'approche d'analyse mobilisée.
L'analyse réalisée n'a révélé aucun effet de la couleur sur les états humoraux de l'internaute marocain. Toutefois, l'humeur impacte la mémorisation et l'intention d'achat de ce dernier.
Les apports de cette étude sont synthétisés en trois pôles : théoriques, méthodologiques et managériaux.

Mots clés : Couleur, Site Web, Commerce Electronique, Humeur, Mémorisation, Intention D'achat.

Abstract

This article aims to assess the impact of color as an atmospheric component inherent to commercial websites, on both affective (mood state) and cognitive (memorization and purchase intention) reactions of the Moroccan e-consumer. Based on an extensive literature review and an exploratory study conducted among Moroccan webmasters, this study outlines the methodological foundations leading to the proposal of a conceptual model that addresses the issue.

The questionnaire is the privileged tool for collecting data from 384 respondents. Structural equations modeling and more particularly, LISREL is the used analysis approach.

The analysis carried out doesn't reveal any effect of color on the humoral states of the Moroccan web user. However, mood does impact the memorization and purchase intention of the Moroccan web user.

The contributions of this study are synthesized in three poles: theoretical, methodological and managerial.

Keywords: Color, website, e-commerce, mood, memorization, purchase intention.

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Introduction

À la lumière du développement révolutionnaire d'Internet, le panorama de l'achat virtuel et de la vente en ligne a été aussi modifié. Ainsi, la conquête d'un consommateur en ligne reste tributaire de l'utilisation propice des facteurs atmosphériques dont la couleur joue un rôle communicationnel et affectif clé.

Dotée d'une ubiquité multidisciplinaire, la couleur se veut présente avec force dans les environnements commerciaux. Plus particulièrement, cette dernière figure à côté de la musique et des senteurs, parmi les outils les plus probants du marketing sensoriel qui semblent affecter notablement les différentes offres mercatiques.

Parmi les composantes clés du marketing visuel, nous retrouvons la couleur ; une composante quoique élémentaire joue un rôle important.

L'intérêt porté à la couleur peut être expliqué par deux raisons :

- La première, c'est que le marketing visuel est considéré comme un levier du Marketing Sensoriel, puisque la vue est le sens le plus sollicité chez le consommateur (Lahmidi, 2015).
En effet, l'atmosphère des sites web marchands se base tout d'abord sur l'apparence de l'interface. De ce fait, la vue capte non seulement 80% des informations environnantes, mais exerce aussi une influence sur d'autres aspects perceptuels (Mattelart, 1996).
- La seconde, c'est que l'élément atmosphérique « couleur » reste un élément très étudié (Divard & Urien, 2001) que ce soit dans le lieu de vente, au niveau du packaging ou en publicité.
Mais, jusqu'à présent, très peu d'études s'y sont intéressées dans le contexte du commerce électronique.
Il nous semble ainsi judicieux de comprendre l'impact de la couleur sur les réactions du consommateur, dans le contexte des sites web de commerce électronique. Soit un terrain fertile et d'actualité au Maroc (Lahmidi et Aomari, 2019).

Dans cette optique, la couleur en tant que composante de l'interface d'un site web commercial est susceptible d'être manipulée comme une variable explicative du comportement de l'internaute.

Nous pouvons avancer la problématique suivante : **Dans quelle mesure la couleur de l'interface virtuelle des sites web e-commerce, pourrait-elle impacter la mémorisation et l'intention d'achat de l'internaute marocain tout en influençant son état humoral ?**

Le présent article fournit une revue de littérature présentant le fondement conceptuel de l'étude, étale le protocole méthodologique mis en place, expose l'analyse statistique des données recueillies et souligne les principaux résultats dégagés en les confrontant avec les études ayant précédé.

Soubassement Théorique

Avec le progrès croissant du World Wide Web, la question de l'efficacité des efforts commerciaux appliqués aux sites Internet nécessite d'être reconsidérée (Moss, Gunn, et Heller, 2006).

Dès lors, bon nombre de travaux comme ceux de Lemoine (2008a ; 2008b) ont mis en relief un certain rapprochement entre les atmosphères physiques (points de vente classiques) et les atmosphères virtuelles (sites web marchands).

Si dans un magasin traditionnel, le consommateur parcourt des espaces, des rayons, des produits, des publicités, tous, disposés de façon à attirer son attention et ainsi à le stimuler pour passer à l'acte d'achat. Nous retrouvons parallèlement sur un site web, des pages dont l'objectif est de mettre en exergue tout un mécanisme d'attraction en recourant à des stimuli autour de la couleur, de la musique, des animations…etc., Tous, faisant partie de l'atmosphère virtuelle des sites web.

Ainsi, en transposant la définition proposée par Kotler (1973- 1974) relative au concept de l'atmosphère, Dailey (2000) y voit : « *la conception volontaire de l'environnement Internet visant à créer des effets positifs (par exemple un affect ou des cognitions positifs) chez l'internaute, afin d'accroître ses réponses favorables de fréquentation (revisites, butinage etc.)* ».

C'est via cette vision que Dailey (2000) propose une définition de l'indice environnemental virtuel qui désigne « *tout élément d'interface web contenu dans le champ perceptuel de l'individu et susceptible de stimuler ses sens, comme l'ont suggéré Milliman & Fugate (1993)*».

De ce fait, la couleur dans le contexte des sites web est considérée comme un indice environnemental virtuel qui joue un rôle crucial dans l'apparence de l'interface du site web (environ 80% des informations recueillies proviennent de la vue (Mattelart, 1996)) et ainsi contribue à la création d'un climat virtuel favorable et propice, susceptible d'influencer les comportements des internautes.

À partir du postulat selon lequel les facteurs atmosphériques affectent les états internes du consommateur (Pelet, 2008), nous modélisons de quelle manière les composantes atmosphériques d'un site web e-commerce et plus justement le stimulus chromatique « couleur », pourrait agir sur l'état affectif de l'internaute.

Par définition la notion de couleur est tridimensionnelle. Elle comporte trois paramètres : la teinte, la luminosité et la saturation (Munsell, 1966). Dans la présente étude nous nous sommes intéressés à la teinte chromatique, étant la dimension la plus marquante selon Pelet (2008) dans le contexte des sites web e-commerce.
Au sein du point de vente, l'étude de l'impact qu'exerce la couleur s'étale sur un niveau à la fois physiologique et psychologique.
Psychologiquement, les couleurs influencent l'affect dans sa globalité.
Sur le plan physiologique, la couleur a le pouvoir d'attirer l'attention et donc d'activer le système émotionnel chez le consommateur (Pelet, 2008).

En plus des états affectifs, le stimulus couleur influe sur les perceptions sensorielles et les mécanismes cognitifs (Elbachir et Chenini, 2016).
Le paradigme Stimulus- Organisme- Réponse (S.O.R) de Mehrabian et Russell (1974) constitue le fondement du modèle conceptuel étudié. Ce dernier considère trois composantes clefs : Stimulus (S), Organisme (O), Réponse (R) (Bitner, 1992 ; Eroglu, Machleit et Davis, 2001 ; Turley et Milliman, 2000).
Dans notre cas :

- Le stimulus S désigne la couleur de l'interface virtuelle des sites web e-commerce ;
- L'organisme O correspond aux états affectifs ressentis par les internautes ; et
- La réponse R concerne le comportement d'approche (passer plus de temps sur le site, revenir sur le site à nouveau, recommander le site à son entourage) ou encore d'évitement (quitter le site, déconseiller le site, ne pas recommander l'achat du site).

Dans la présente étude, nous nous sommes focalisés sur les volets affectifs et cognitifs de l'internaute, sans pour autant se pencher vers le pilier conatif.

Nous considérons ainsi que le stimulus atmosphérique « couleur des sites web e-commerce » est susceptible d'influencer et de conditionner l'état affectif de l'e-consommateur, en prenant en considération l'humeur plus distinctement.

L'objectif est d'appréhender le comportement d'approche ou d'évitement adopté par le e-consommateur, et ce, en fonction de la couleur du site web e-commerce, susceptible d'occasionner à la fois la mémorisation de ce dernier et l'intention d'en acheter également.

Impact direct de la couleur sur l'organisme (O) de l'internaute : Lien « Couleur- Affect »

Considéré comme concept prêtant à confusion (Derbaix et Pham, 1989), l'affect, l'état affectif ou encore les réactions affectives se présentent sous sept catégories (Lichtlé et Plichon, 2005) : l'émotion choc, le sentiment, l'humeur, le tempérament, la préférence, l'attitude et l'appréciation.

Derbaix et Poncin (2005) qualifient les réactions affectives éprouvées par le consommateur, après l'exposition à un stimulus atmosphérique, de l'affectif intégral. Bien entendu, la perception du stimulus (la couleur pour notre cas) est déterminante de l'affectif intégral (sentir de la joie par exemple).

Ainsi, nous tentons de mesurer l'influence de la couleur des sites web e-commerce sur l'état d'humeur éprouvé par l'internaute.

Lien : Couleur - Humeur

Qualifiée de longue durée mais de faible intensité, l'humeur est un état affectif explicatif des réponses comportementales (Zhang, 1999). D'où, l'importance de l'intégrer parmi les états affectifs à évaluer.

En effet, plusieurs recherches ont montré les liaisons pouvant exister entre la couleur et les états d'humeur (Wexner, 1954). Tout comme les associations reliant les couleurs aux émotions, et au regard des expériences vécues par l'individu modifiant ses propres perceptions émotionnelles de couleurs, la combinaison des couleurs avec l'état d'humeur se voit également altérée.

À titre illustratif, Odom et Sholtz (2004) constatent qu'en fonction des couleurs, certains états d'humeur sont les plus récurrents par rapport à d'autres. Le jaune est lié tantôt à la gaieté tantôt à l'excitation, tandis que le bleu se voit plutôt rattaché à la tranquillité.

Pourtant, face à la même atmosphère commerciale colorée, un consommateur avec un état d'humeur positif ne sera pas influencé de la même façon qu'un consommateur ayant une humeur plutôt négative (Elbachir, 2016).

Selon Chebat et Morrin (2006), dans un contexte d'achat traditionnel, la perception du consommateur est souvent affectée par les couleurs utilisées. Ce constat est transposable au contexte des sites web e-commerce. Car, si la couleur est susceptible d'occasionner la stimulation émotionnelle du consommateur, il est également envisageable de le rendre en bonne humeur.

En vue d'évaluer concrètement le lien entre la couleur et l'humeur, nous émettons l'hypothèse suivante :

H1 : La couleur de l'atmosphère virtuelle des sites e-commerce influence positivement l'humeur.

Impact indirect de la couleur sur les réponses cognitives (R) de l'internaute

Après que l'internaute ait développé un ressenti interne, de type affectif notamment, quant à la couleur du site web commercial. La réaction affective est susceptible d'influencer son comportement. Dans cette optique, le comportement d'approche n'est pas souvent couronné par l'acte d'achat, mais peut se manifester par l'intention d'achat (Donovan et Rossiter, 1982).

Ceci, rejoint l'idée stipulant que le comportement d'approche inclut tout type de comportement revêtant un caractère positif (Vinitzky et Mazursky 2011), le cas échéant la mémorisation et l'intention d'achat pour notre cas.

Les travaux d'Hall et Hanna (2003) précisent que les effets des couleurs à la fois dominantes et dynamiques sur les perceptions de lisibilité, par rapport à la dimension esthétique éprouvée, quant à la rétention des informations et à l'égard de l'intention d'achat ne sont nullement insignifiants.

Lien : Affect – Mémorisation

Il est évident que la rétention de l'information n'est pas directement liée à la couleur de la charte graphique du site web. C'est plutôt la lisibilité et la visibilité de l'information permise par le contraste des couleurs, qui affectent la mémorisation (Hill et Scharff, 1997, 1999).

Le mécanisme de mémorisation prend ainsi place selon la réceptivité de ladite couleur par l'internaute (Biers et Richard, 2002).

En effet, le ressenti émotionnel contribue considérablement à l'optimisation de la mémorisation. Ainsi, les souvenirs scrupuleusement gravés en mémoire sont à l'origine d'un ressenti affectif assez intense (Roullet, 2004).

La présence de l'affect est évidente que ce soit au niveau perceptif, cognitif ou encore décisionnel (Damasio, 1999 ; 2003).

Ainsi, la composante affective et le processus cognitif majeur « la mémorisation » semblent indissociablement rattachés.

Selon Davidson (1994), si l'émotion modère les actions, l'humeur impacte plus les cognitions.

Ainsi, nous émettons l'hypothèse suivante :

H2 : L'humeur positive de l'internaute lors de sa visite d'un site web e-commerce influence positivement sa mémorisation.

Lien : Affect - Intention d'achat

Suite aux recherches en psychologie environnementale, les réactions internes du consommateur à savoir ses réactions affectives, influencent son comportement (Bitner, 1992). Ces états affectifs sont susceptibles d'augmenter l'éventualité d'achat et se voient désormais modifiés, lorsque l'environnement et plus justement les composantes atmosphériques sont considérées (Kotler, 1973).

En effet, étant une variable atmosphérique, la couleur d'un site web de commerce électronique par analogie aux points de vente traditionnels est perçue comme étant un facteur situationnel spécifique aidant à convertir les intentions cognitives en comportements d'achats.

Ainsi, la couleur des sites web de commerce électronique est certes liée au processus de traitement cognitif et est susceptible d'influencer la prise de décision et par conséquent l'intention d'achat.

Dans un environnement virtuel par exemple, les sites web commerciaux recourant aux couleurs sont plus appréciés sur le plan esthétique. Ainsi, l'appréciation esthétique est liée à de grandes intentions d'achat (Hall et Hanna, 2003). Dans cette lignée, Percy et Rossiter (1983) précisent l'effet marquant qu'exerce la couleur en tant que composante esthétique sur l'intention d'achat. Hamilton et Luo (1999), rajoutent plus tard que le degré de complexité de l'interface virtuelle du site web e-commerce affecte l'intention d'achat des utilisateurs.

Notons à ce niveau que l'appréciation esthétique du site web est généralement rattachée à l'intention d'achat (Hall et Hanna, 2003). Quoique, les associations de couleurs n'ont pas d'impact marquant sur l'intention d'achat du consommateur (Hall et Hanna, 2003).

Ainsi, l'humeur générée d'une atmosphère plaisante ; l'atmosphère d'un site web commercial en l'occurrence, est susceptible de susciter l'intention d'achat (Park, Lennon et Stoel, 2005).

Nous énonçons l'hypothèse suivante :

H3 : L'humeur positive éprouvée par l'internaute lors de sa visite d'un site web e-commerce influence positivement son intention d'achat.

Notons que sur la base de la logique paradigmatique du Stimulus- Organisme- Réponse de Mehrabian et Russell (1974), l'humeur faisant partie de l'affect et intégrant la composante « organisme » joue le rôle d'intermédiation sur le plan théorique.
Pour plus de lucidité, cette relation d'intermédiation est à vérifier via le test de significativité statistique.

Le modèle conceptuel de l'étude se présente comme suit :

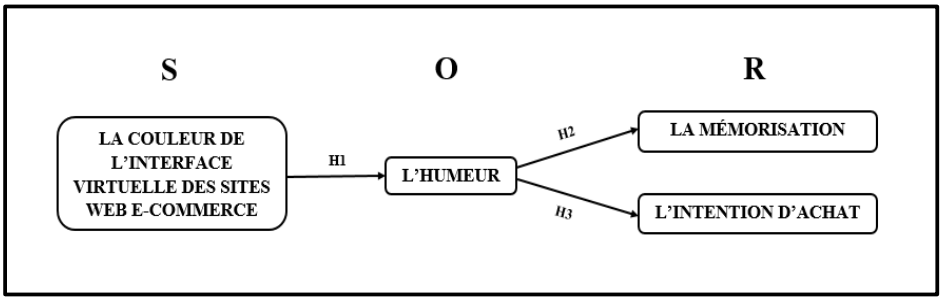

Figure 1 : Modèle conceptuel de l'étude fondé sur le paradigme S.O.R de Mehrabian et Russell (1974)

Protocole Méthodologique

La réalisation de l'étude quantitative auprès de 384 internautes marocains, vient à la suite d'une étude exploratoire élaborée en tant que prélude.

L'objectif de cette étude consiste à vérifier la validité du modèle conceptuel, en faisant preuve de beaucoup de lucidité. Pour ce faire, nous présentons d'abord le cadre d'échantillonnage, pour exposer ensuite les échelles de mesure manipulées pour l'évaluation des construits théoriques.

Cadre D'échantillonnage

Pour déterminer l'échantillon étudié, nous préconisons l'utilisation de la méthode probabiliste, à trois degrés. En effet, le nombre important de notre population mère et la rigueur scientifique que confère la démarche probabiliste sont les deux principales raisons qui justifient notre choix.

Dès lors, la population retenue est extraite du dernier rapport « Maroc en chiffres » de 2018 établi par le Haut-Commissariat au Plan [1].

La population concernée par cette étude comporte les individus ayant plus de 10 ans et résidant dans le milieu urbain. Selon le rapport de l'Agence Nationale de Réglementation des Télécommunications (ANRT), intitulé « Usages des TIC dans les ménages et par les individus » [2], l'éducation des enfants à l'usage d'Internet doit commencer avant l'âge de 15ans. Nous avons ainsi considéré la tranche d'âge (10- 14ans).

Pour ce faire, nous avons déterminé tout d'abord, les unités d'échantillonnage primaires en passant par l'échantillonnage stratifié non proportionnel, calculé sur la base de la population observée.

En effet, notre population observée a fait l'objet d'une segmentation en fonction de la tranche d'âge, afin de déterminer la proportion que représente chaque segment d'âge. Ce premier degré d'échantillonnage nous a permis de déterminer l'échantillon à sélectionner de chaque catégorie d'âge.

Sur la base des unités d'échantillonnages primaires, les unités d'échantillonnages secondaires sont construites. Nous obtenons ainsi un échantillon à un seul degré comportant 1.491.371 individus. Toutefois, ce nombre reste important et fera l'objet d'un deuxième échantillonnage.

Comme deuxième degré, nous optons pour l'échantillonnage aléatoire de type simple.
Cette deuxième étape est concrétisée via la formule de Steven K. Thompson (2012).
La formule de calcul de l'échantillon, se présente ainsi :

$$n = \frac{N \times p\,(1-p)}{[N-1(d^2/z^2)] + p\,(1-p)}$$

En admettant que :

n : Représente la taille de l'échantillon ;

z : Constitue le coefficient de marge de 1,96 et correspondant au niveau de confiance le plus élevé (95%) ;
N : Corresponde à la taille de la population observée ;
p : Soit la proportion estimée de la population. p est fixée à 0,5 (l'intervalle de confiance le plus petit) ;
d : Constitue la marge d'erreur acceptable ou estimée e est fixée à 5%.
Après l'application de la formule :

$$n = \frac{17.899.990 * 0,5*(1-0,5)}{[17.899.990 - 1(0,05^2/1,96^2)] + 0,5*(1-0,5)}$$

Nous obtenons un échantillon de **384 personnes**.

L'échantillon Statistique De L'étude

Au final, nous avons abouti à un total de 384 questionnaires, soit 384 observations.
Nous présentons ci-après les principales caractéristiques de l'échantillon étudié.

- ***Caractéristiques De L'échantillon***

Nous présentons plus particulièrement la répartition de l'échantillon selon la tranche d'âge d'une part et selon le sexe d'autre part.

Tableau 1 : Répartition de l'échantillon selon l'âge

	Effectif	Pourcentage	Pourcentage cumulé
De 10 à 24 ans	114	29,7	29,7
De 25 à 34 ans	79	20,6	50,3
De 35 à 44 ans	67	17,4	67,7
De 45 à 59 ans	77	20,1	87,8
De 60 ans et plus	47	12,2	100,0
Total	384	100,0	

Nous remarquons d'après le tableau, une prépondérance au niveau des tranches d'âge [10- 24 ans], [25- 34 ans], [45- 59 ans], [35- 44 ans] et [60 ans et plus], ce qui correspond respectivement à : 29,7%, 20,6%, 20,1%, 17,4% et 12,2%. Nous constatons également que les femmes ayant contribué à l'étude représentent 67,7%, contre 32,29% pour les hommes.

- ***Fréquence de consultation des sites web e-commerce***

Il nous est important de savoir le niveau de fréquentation des sites web de commerce électronique de notre échantillon étudié.

Tableau 2 : Fréquence de consultation des sites web e-commerce

	Effectif	Pourcentage	Pourcentage cumulé
Jamais	7	1,8	1,8
Parfois	155	40,4	42,2
Rarement	55	14,3	56,8
Souvent	109	28,4	84,9
Toujours	58	15,1	100,0
Total	384	100,0	

Suite au tableau, nous pouvons dire que : 40% des répondants fréquentent parfois les sites e-commerce, 28,4% les consultent souvent, 15% visitent les sites web marchands toujours et 14,3% le font rarement.

- ***Déficience de la vision des couleurs***

Par la déficience de la vision des couleurs, nous entendons les personnes daltoniennes. Le tableau ci-dessous présente la proportion des répondants daltoniens et non daltoniens.

Tableau 3 : Nombre des répondants daltoniens et non daltoniens

	Effectif	Pourcentage	Pourcentage cumulé
Non	308	80,2	80,2
Oui	41	10,7	90,9
Peut-être	35	9,1	100,0
Total	384	100,0	

D'après le tableau : 10,7% des individus interrogés sont atteints de daltonisme, 9,1% doutent qu'ils sont daltoniens, alors que la majorité soit 80% des répondants ne sont pas daltoniens.

Échelles de mesure des variables de l'étude

Selon Argot et Milano (2007) : *« assurer le lien entre les concepts théoriques et les données empiriques est l'étape cruciale de tout travail de recherche »*.

Pour une conception fiable du questionnaire, il est important de présenter les items utilisés, nécessaires à l'évaluation de chaque concept faisant partie de notre modèle conceptuel de recherche.

Items de la variable « couleur de l'atmosphère virtuelle des sites e-commerce »

Nous avons jugé propice de puiser les items relatifs à la « couleur », à partir de l'étude exploratoire préalablement menée (Lahmidi et Aomari, 2019).

Étant donné la nature descriptive et générale de notre étude, nous avons mesuré la variable couleur globalement, sans pour autant considérer ses trois paramètres.

Certes, nous ne nions guère l'importance de la teinte, la luminosité et la saturation. Mais compte tenu de la nature préliminaire de notre étude au Maroc, il serait judicieux d'évaluer d'abord la couleur dans sa dimension générale, pour pouvoir mesurer ensuite, dans des études ultérieures ses trois dimensions sous-jacentes.
Les items considérés pour l'évaluation de la variable « couleur » sont ainsi issus d'une confrontation entre la théorie et l'étude exploratoire.

Tableau 4 : L'échelle de mesure de la couleur sur la base de la confrontation théorie-exploratoire (Lahmidi et Aomari, 2019)

Dans un site e-commerce, le sens de la couleur est dépendant de mon goût et de ma préférence personnelle.
Dans un site e-commerce, la signification d'une couleur est construite sur la base de mes expériences virtuelles vécues.
Une couleur de site e-commerce relaxante, me permet de naviguer plus longtemps.
La première opinion constituée d'un site e-commerce est fondée sur les couleurs employées seulement.
Face à un site e-commerce dont la couleur est claire, je risque de ne pas faire attention à toutes les rubriques.
Tout comme le lieu de vente classique, la couleur est la première composante permettant la visibilité d'un site e-commerce.
Dans l'interface des sites e-commerce, la couleur joue un rôle purement esthétique.

Items de la variable de « humeur »

Pour mesurer l'humeur, nous avons utilisé l'échelle « Brief Mood Introspection Scale », connue par BMIS, de Mayer et Gaschke (1988), notée de 1 à 5 et composés de 16 items dont 8 sont des états d'humeur positifs et 8 sont des états d'humeur négatifs.

Tableau 5 : Items de l'humeur de Mayer et Gaschke (1988)

Heureux (se)
Excédé (e)
Paisible
Mélancolique
Nerveux (se)
Satisfait (e)
Plein (e) d'entrain
Affectueux (se)
Triste
Énergique
Bienveillant (e)
Somnolent (e)
Agité (e)
Maussade
Fatigué (e)
Actif (ive)

Items de la variable « mémorisation »

En ce qui concerne l'évaluation de la mémorisation, nous proposons une échelle de mesure qui prend en considération le contexte marocain. Pour la construction de notre instrument de mesure, nous avons aussi puisé des constats déduits de notre étude exploratoire (Lahmidi et Aomari, 2019).

Pour s'assurer de sa fiabilité, cette échelle de mesure fera l'objet d'une épuration via l'analyse en composantes principales.

De ce fait, la mesure de la variable mémorisation se fera à travers 8 items.

Tableau 6 : L'échelle de mesure de la mémorisation proposée par l'auteur sur la base de l'étude exploratoire menée (Lahmidi et Aomari, 2019)

Il m'arrive de mémoriser les informations commerciales *(comme le prix, certaines caractéristiques du produit souhaité…)* **d'un site e-commerce grâce à la couleur utilisée seulement.**
Plus je passe du temps sur un site e-commerce, plus je retiens ce qu'il y a dedans.
Face à une couleur donnée, plus je navigue plus longtemps sur un site e-commerce, plus je mémorise les informations qui s'y trouvent.
La couleur sombre d'un site e-commerce me rappelle instantanément le type de site visité.
En me rappelant d'un site e-commerce déjà visité, je m'aperçois que c'est la couleur qui m'a facilité ce rappel.
Ma première expérience infructueuse dans un site e-commerce, m'a permis de me rappeler très bien de ce dernier.
Une expérience de navigation réussie sur un site e-commerce, favorise le rappel de la couleur de ce dernier.
Parmi plusieurs sites e-commerce, j'ai pu reconnaître un site qui m'a beaucoup marqué, grâce à sa couleur uniquement.

L'intention D'achat

Pour évaluer l'intention d'achat, nous jugeons propice d'utiliser une échelle adaptée au contexte des sites web e-commerce. Les items de la variable intention d'achat sont également déduits de l'étude exploratoire réalisée (Lahmidi et Aomari, 2019). Il s'agit de 6 items, adaptés au champ du commerce électronique.

Tableau 7 : Items de l'intention d'achat proposés par l'auteur sur la base de l'étude exploratoire menée (Lahmidi et Aomari, 2019)

Auriez-vous l'intention d'acheter d'un site e-commerce, si sa couleur inspire confiance ?
Penserez-vous à acheter d'un site e-commerce dont la couleur est sombre ?
Quand je suis satisfait (e) de la couleur du site e-commerce, je suis prédisposé (e) à acheter de ce dernier.
Plus je passe du temps à naviguer sur le site e-commerce, à explorer ses produits et à regarder/ sa couleur plus la probabilité d'en acheter est élevée.
Me rappeler d'un site e-commerce qui m'a marqué (positivement ou négativement) pourrait susciter mon intérêt afin d'en acheter.
Lors de mes consultations de sites e-commerce, il m'est arrivé de visiter un site e-commerce que j'ai déjà consulté auparavant. **Le fait que je le reconnaisse parmi d'autres m'a permis de penser à en acheter.**

Analyse Des Résultats

Pour mesurer efficacement les construits latents de notre étude et après s'être assuré de la faisabilité de l'analyse factorielle, nous présentons d'abord, une analyse factorielle avec rotation Varimax. Pour tester ensuite la validité du modèle structurel à travers l'étude de la significativité des liens causaux.

L'ISREL (LInear Structural RELations), fondée sur l'analyse des covariances est l'approche poursuivie dans la modélisation par équations structurelles. Celle-ci s'oriente vers l'estimation des paramètres et privilégie l'analyse des constructions causales.

Analyse factorielle avec rotation Varimax

Pour la validation des items des variables de l'étude, nous élaborons une analyse factorielle avec rotation Varimax sous SPSS.

Validation des items de la « Couleur »

Concernant la variable « couleur », sur sept items deux ont été retenus : « La première opinion constituée d'un site e-commerce est fondée sur les couleurs employées seulement » et « Tout comme le lieu de vente classique, la couleur est la première composante permettant la visibilité d'un site e-commerce ».

Tableau 8 : Analyse factorielle avec rotation Varimax pour la « Couleur »

Axes	Variables	Contribution relative	Valeurs propres	Variance totale expliquée	Alpha de Cronbach
Couleur	La première opinion constituée d'un site e-commerce est fondée sur les couleurs employées seulement.	,835	1,395	69,730	,566
	Tout comme le lieu de vente classique, la couleur est la première composante permettant la visibilité d'un site e-commerce.	,835			

Validation des items de l' « Humeur »

Concernant l'humeur, quatre items ont été retenus : « Plein (e) d'entrain », « Affectueux (se) », « Énergique » et « Bienveillant (e) ». Ces derniers sont les plus explicatifs de l'humeur.

Tableau 9 : Analyse factorielle avec rotation Varimax pour l'« Humeur»

Axes	Variables	Contribution relative	Valeurs propres	Variance totale expliquée	Alpha de Cronbach
Humeur	Plein (e) d'entrain	,766	2,335	58,371	,761
	Affectueux (se)	,792			
	Énergique	,745			
	Bienveillant (e)	,752			

Par rapport à la variable « Humeur », nous pouvons dire que l'information sauvegardée est de 58,371%. Chacun des quatre items conservés, comporte une contribution relative dépassant 0,7, ce qui traduit un très bon résultat.

Aussi, le coefficient Alpha de Cronbach est satisfaisant, il est supérieur à la norme minimale recommandée par la littérature, et il est de 0,761.

Validation des items de la « Mémorisation »

Comme il figure dans le tableau ci-dessous, l'analyse avec rotation Varimax a constaté trois items.

Tableau 10 : Analyse factorielle avec rotation Varimax pour la « Mémorisation »

Axes	Variables	Contribution relative	Valeurs propres	Variance totale expliquée	Alpha de Cronbach
Mémorisation	Face à une couleur donnée, plus je navigue plus longtemps sur un site e-commerce, plus je mémorise les informations qui s'y trouvent.	,785	1,886	62,855	,704
	En me rappelant d'un site e-commerce déjà visité, je m'aperçois que c'est la couleur qui m'a facilité ce rappel.	,808			
	Une expérience de navigation réussie sur un site e-commerce, favorise le rappel de la couleur de ce dernier.	,785			

En effet, pour la variable « Mémorisation », l'information retenue suite à la rotation Varimax est de 62,855%. De ce fait, chacun des trois items maintenus, a une contribution relative qui dépasse 0,7, ce qui reflète un très bon résultat.

Le coefficient Alpha de Cronbach est satisfaisant, il est supérieur à la norme minimale recommandée par la littérature. Ce dernier est de 0,704.

Validation des items de l'« Intention d'achat »

Au niveau de l'intention d'achat, trois items ont été exclus :

- *« Auriez-vous l'intention d'acheter d'un site e-commerce, si sa couleur inspire confiance ? »*
- *« Penserez-vous à acheter d'un site e-commerce dont la couleur est sombre ? »*
- *« Quand je suis satisfait (e) de la couleur du site e-commerce, je suis prédisposé (e) à acheter de ce dernier. »*

Lesdits items ne sont pas explicatifs de l'axe « intention d'achat ».

Tableau 11 : Analyse factorielle avec rotation Varimax pour l' « Intention d'achat »

Axes	Variables	Contribution relative	Valeurs propres	Variance totale expliquée	Alpha de Cronbach
Intention d'achat	Plus je passe du temps à naviguer sur le site e-commerce, à explorer ses produits et à regarder/ sa couleur plus la probabilité d'en acheter est élevée.	,727	1,719	57,286	,624
	Me rappeler d'un site e-commerce qui m'a marqué (positivement ou négativement) pourrait susciter mon intérêt afin d'en acheter.	,797			
	Lors de mes consultations de sites e-commerce, il m'est arrivé de visiter un site e-commerce que j'ai déjà consulté auparavant. Le fait que je le reconnaisse parmi d'autres m'a permis de penser à en acheter.	,745			

Ainsi, l'information maintenue après l'élaboration de la rotation Varimax est de 69,156%. Chacun des trois items conservés, a une contribution relative excédant 0,7, ce qui reflète un très bon résultat.

Le coefficient Alpha de Cronbach reste satisfaisant, il est supérieur à la norme minimale recommandée par la littérature. Il est de 0,624.

Pour l'ensemble des axes créés, la variance totale expliquée est satisfaisante, elle est nettement supérieure à 50% (le seuil minimal admis par la littérature).

De ce fait, nous jugeons que l'information conservée après avoir rassemblé les items dans des variables latentes, est supérieure à 50% de l'information initiale.

Étant donné que le coefficient Alpha de Cronbach est sensible à la taille de l'échantillon et au nombre d'items, nous pouvons dire que les résultats sont très satisfaisants à l'exception de la variable couleur.

Test de la validité du modèle structurel

À travers l'étude empirique, nous avons mis en relation les différents facteurs à savoir : *Couleur, Humeur, Intention d'achat, Mémorisation,* dans un test de corrélation s'appuyant sur le test de Corrélation de Pearson.

De ce fait, nous mettons en relation les différentes variables par le test de corrélation. Les résultats se présentent ainsi :

Tableau 12 : Test de corrélation entre variables sous SPSS

		Couleur	Humeur	Mémorisation	Intention d'achat
Couleur	Corrélation de Pearson	1	,033	,002	,028
	Sig. (bilatérale)		,514	,969	,581
	N	383	383	383	383
Humeur	Corrélation de Pearson	,033	1	,366**	,204**
	Sig. (bilatérale)	,514		,000	,000
	N	383	384	384	384
Mémorisation	Corrélation de Pearson	,002	,366**	1	,319**
	Sig. (bilatérale)	,969	,000		,000
	N	383	384	384	384
Intention d'achat	Corrélation de Pearson	,028	,204**	,319**	1
	Sig. (bilatérale)	,581	,000	,000	
	N	383	384	384	384

D'après les résultats du tableau nous remarquons :

- Une corrélation positive et non significative entre la variable « couleur » et les variables : humeur (R= 0,033 ; P-value= 0,514), mémorisation (R= 0,002 ; P-value= 0,969) et intention d'achat (R= 0,028 ; P-value= 0,581). C'est-à-dire que lorsque la couleur augmente, les variables : humeur, mémorisation et intention d'achat augmentent aussi.
- Une forte corrélation entre l'humeur et les variables : mémorisation, intention d'achat. Soit des corrélations respectives aux valeurs : (R= 0,366 ; P-value= 0,000), (R= 0,204 ; P-value= 0,000). Ce résultat sous-entend que lorsque l'humeur augmente, la mémorisation, l'intention d'achat, augmentent aussi.
- Une corrélation à la fois positive et significative entre la mémorisation et l'intention d'achat (R= 0,319 ; P-value= 0,000). En effet, quand la mémorisation augmente, la variable : intention d'achat augmente aussi.

L'analyse de la nature des corrélations liant entre les différentes variables ne peut pas à elle seule confirmer ou infirmer les hypothèses de la recherche.

En vue de confirmer la nature du lien entre les différentes variables de l'étude, nous analysons les résultats de la modélisation par équations structurelles.

Analyse des estimations des paramètres

Pour étudier la significativité des liens causaux, nous analysons les estimations des paramètres de notre modèle causal.
Le tableau suivant présente les résultats du test T de Student et de la signification.

Tableau 13 : Résultats des liens de causalité et validation des hypothèses de recherche

			Estimate	S.E.	C.R.	P	Label
Humeur	<---	**Couleur**	6,082	5,481	1,11	0,267	**Non Validé**
Intention d'achat	<---	**Humeur**	0,336	0,11	3,048	0,002	**Validé**
Mémorisation	<---	**Humeur**	0,646	0,122	5,295	0,000	**Validé**

La variable " Couleur " a un impact positif mais non significatif sur la variable " Humeur " (R= 6,082 ; T de Student= 1,11 ; p-value= 0,267). ***(Impact rejeté).***
La variable " Humeur " a un impact positif et significatif sur la variable " Intention d'achat " (R= 0,336 ; T de Student= 3,048 ; p-value= 0,002). ***(Impact accepté).***
La variable " Humeur " a un impact positif et significatif sur la variable " Mémorisation " (R= 0,646 ; T de Student= 5,295 ; p-value= 0,000). ***(Impact accepté).***

L'humeur : test d'une variable médiatrice

En voulant vérifier le lien de médiation de la variable « humeur », nous sommes contraints de passer par trois étapes, conformément à la démarche d'analyse des effets médiateurs de Baron et Kenny (1986). Il s'agit de :

1)- Vérifier la significativité du lien entre la variable indépendante (couleur) sur les variables dépendantes (mémorisation et intention d'achat), en vue de montrer l'existence d'un effet à médiatiser ;
2)- Vérifier l'impact significatif qu'exerce la variable indépendante (couleur) sur la variable médiatrice considérée (humeur) ;
3)- Vérifier l'effet significatif de la variable médiatrice sur les variables dépendantes (mémorisation et intention d'achat).
Ce n'est qu'en validant les trois étapes précitées, que la variable « humeur » est bel et bien considérée en tant que médiatrice.

Rien qu'en évaluant l'incidence directe de la variable explicative (couleur) sur les variables à expliquer (mémorisation et intention d'achat) ; soit la première étape, il s'avère que la validité du lien causal entre la couleur et les deux variables cognitives à expliquer n'est pas vérifiée.

Du moment que cette première phase n'est pas validée, il nous est impossible de poursuivre l'analyse. Nous ne pouvons donc considérer la médiation au sein de notre modèle conceptuel.

Discussion des Résultats

Lors de la phase de validation des hypothèses de recherche, les résultats obtenus énoncent que l'atmosphère colorée des sites web e-commerce n'affecte pas les états humoraux de l'internaute marocain.

Cette constatation est en opposition avec les travaux de recherche qui ont précédé.

En effet, une imposante littérature révèle que la couleur en tant que composante situationnelle inhérente à l'environnement commercial est susceptible de modifier positivement ou encore d'altérer les états affectifs du consommateur (Roullet, 2004).

Par ailleurs, nous avons constaté que l'état d'humeur éprouvé par l'internaute n'est pas influencé par l'atmosphère virtuelle colorée du site commercial. Sachant que les items ayant reflété l'humeur sont tous positifs, ce qui est à l'encontre des apports théoriques stipulant que l'état d'humeur positif n'est pas influencé de la même façon pour un consommateur ayant une humeur plutôt négative (Elbachir, 2016).

Dans le contexte considéré : celui des sites web de commerce électronique et au sein du terrain marocain, nous avons rejeté l'hypothèse de la relation d'impact de la couleur sur les états humoraux de l'internaute.

Ce résultat peut être expliqué par la différence du contexte d'application : les points de vente classiques versus les sites web e-commerce, car les comportements du consommateur au sein de l'espace de vente classique peuvent clairement différer de ceux des internautes face à l'interface commerciale virtuelle (Hoffman et Novak, 1996).

Cependant, nous soulignons avoir relevé une relation positivement significative entre l'humeur et la mémorisation. Ce qui confirme les dires de Davidson (1994) témoignant de l'impact exercé par l'humeur sur les cognitions à l'instar du processus mémoriel en l'occurrence.

Pour ce qui est de la relation : humeur- mémorisation, celle-ci a été bel et bien approuvée dans la mesure où une bonne humeur suscitera une meilleure mémorisation.

De ce fait, l'hypothèse énonçant que l'humeur positive de l'internaute lors de sa visite d'un site web e-commerce influence positivement sa mémorisation est confirmée.

De même, l'humeur générée d'une atmosphère plaisante, celle d'un site web commercial en l'occurrence, semblerait susciter l'intention d'achat (Park, Lennon et Stoel, 2005). Constat théorique qui concorde avec notre résultat empirique.

En effet, suite à notre test d'hypothèse, nous avons relevé un effet significatif de l'humeur sur l'intention d'achat. Notre hypothèse annonçant que l'humeur positive éprouvée par l'internaute lors de sa visite d'un site web e-commerce influence positivement son intention d'achat est ainsi confirmée.

À vrai-dire, dans un contexte d'achat classique les états affectifs sont susceptibles d'influencer les processus d'évaluation, d'appréciation ou encore de prise de décision (Mehrabian, 1996) et implicitement l'intention d'achat. Ce constat est validé dans le contexte d'achat virtuel, sur notre terrain d'enquête, avec comme états affectifs : l'humeur.

Nous pouvons dire que les réponses cognitives considérées sont affectées par les réactions internes de l'internaute, à l'instar de l'humeur.

Conclusion

Cette étude souligne que l'état d'humeur positif du visiteur des sites web e-commerce est susceptible d'entraîner aussi bien la mémorisation que l'intention d'achat de ce dernier.

Nous pouvons dire que les réponses comportementales cognitives considérées sont affectées par les réactions internes de l'internaute, à l'instar de l'humeur.

Cependant, l'atmosphère colorée des sites web e-commerce est loin d'affecter l'état d'humeur de l'internaute marocain.

Ainsi, l'infirmation de la première hypothèse, reste attachée à plusieurs facteurs. Nous citons :

- Le contexte d'application (le point de vente classique versus le site web de e-commerce),
- Le biais de désirabilité sociale (Crowne et Marlowe, 1960), étant donné qu'une bonne partie des questionnaires recueillis était administrée aux répondants en présentiel et en présence de l'enquêteur ;
- L'étude de l'impact engendré par la teinte chromatique comme dimension unique de la couleur. Ceci, au détriment des deux autres paramètres cités dans la littérature à savoir : la luminosité et l'intention d'achat.

Ainsi, lors des recherches à venir, une manipulation tridimensionnelle de la notion « couleur » est vivement recommandée avec la potentialité de reprendre l'enquête, en envisageant de passer par l'immersion ou encore par l'expérimentation.

La principale contribution de cette étude se rapporte au cadre conceptuel de recherche qui apparaît dans la continuité du principe : affect-cognition (Derbaix et Pham, 1989) et du fondement de la psychologie environnementale (Mehrabian et Russel, 1974), portant sur le paradigme Stimulus- Organisme- Réponse (SOR) initié par Mehrabian et Russell (1974) et développé par Eroglu et alii (2001).

Le principe de ce modèle consiste à montrer l'impact de l'environnement physique sur le comportement d'approche ou d'évitement de l'individu, en passant par ses ressentis affectifs. Dans la présente étude, nous avons transposé le même modèle en l'adaptant au contexte d'Internet.

Méthodologiquement, pour une analyse efficace des données, nous avons privilégié la modélisation par équations structurelles, largement manipulée en sciences sociales (Hair et al., 2010) et couramment adoptée par les travaux empiriques (Valette Florence, 1988 ; Evrard et al, 2003). Celle-ci, intégrant l'analyse factorielle confirmatoire nous a permis de tester les relations causales multiples afin de vérifier la validité des construits latents (El Akremi, 2005).
Sur le plan managérial, le stimulus chromatique ne semble pas affecter à lui seul les réponses aussi bien affectives que cognitives des internautes marocains. Pour ce, les webmasters peuvent éventuellement orienter leurs facultés de création- web vers les facteurs d'apparence, les facteurs de navigabilité et les facteurs sociaux, tous combinés.

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[1] https://www.hcp.ma/downloads/Maroc-en-chiffres_t13053.html. (Consulté le 10/12/2019, à 21h41).

[2] https://www.anrt.ma/sites/default/files/publications/enquete-tic-2018.pdf (Consulté le 28/05/2019 à 16h57).

Multivariate Item Response Theory Models in Measurement of Social Attitudes

Justyna BRZEZIŃSKA

University of Economics in Katowice, Katowice, Poland
justyna.brzezinska@ue.katowice.pl

Abstract

Item Response Theory (ITR) is an extension of Classical Test Theory (CTT). The mathematical foundation of IRT is a function that relates the probability of a person responding to an item in a specific manner to the standing of that person on the trait that the item is measuring. It means that the function describes, in probabilistic terms, how a person with a higher standing on a trait is likely to provide a response in a different category to a person with a low standing on the trait. In this paper we present multivariate IRT models as an extension of classical and unidimensional IRT models. Multidiensional models explain the probability of a correct response to a given item as a function of a vector of latent traits, instead of a single latent trait. In this paper we present the background, theory, and application of MIRT models for the measurement of social attitudes based on own studies. All calculations will be conducted in R from CRAN.

Keywords: Multivariate Item Response Model, Test Item, Measurement Theory, R Software.

Introduction

The classical test theory (CTT) and the item response theory (IRT) are two commonly used psychometric theories in conducting item selection and reduction for measures. These two theories work based on different assumptions and statistical approaches, and both have shortcomings. Although CTT was the dominant statistical test model in the first half of the 20th century (Guilford, 1936, Gulliksen, 1950), other developments were also taking place. In England, Walker (1931) set the stage for what later was to become known as Guttman (1944, 1950) scaling, by introducing the idea that if a respondent can answer a harder question correctly then he or she should be able to answer easier questions on the same topic correctly as well. Walker also introduced the idea of an quantitative index measuring deviation from this deterministic model in real data (Loevinger, 1948). This was a deterministic approach without a random error component to the analysis of data collected by a set of items that are assumed to measure one psychological property in common. A little earlier, in the 1920s, Thurstone (1928) developed his statistical measurement method of comparative judgment. Thurstone's work may be viewed as the most important probabilistic predecessor of item response theory (IRT).

According to Bartholomew (1987) there are different types of latent variable models, depending on the type of manifest (observed) variable and latent variable.

Table 1: Classification of latent variable models

Manifest variable	Latentvariable	
	Continous	**Discrete**
Continous	Factoranalysis	Latent profile analysis
Discrete	Item response theory models Latent trait analysis	Latent class analysis

Source: Bartholomew (1987).

The main advantage of IRT models is the fact that the item location parameter (b) and the person trait level (θ) are indexed on the same metric. Therefore, when a person`s trait level is higher than the item location on the trait continuum, that person is more likely than not to provide a trait-indicating (positive or true) response. The converse is true when a person`s trait level is below the item location. IRT models are well suited to cope with dichotomous and polytomous responses, where the response categories may be unordered as well as ordered. The incorporation

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of linear structures allows for modeling the effects of covariates and enables the analysis of repeated categorical measurements.

In the literature the most common IRT models are models that are dichotomously scored. Test items have a polytomous format when the responses are scored in more than two categories. Such models have a reponse function for each different category. Although the response categories of dichotomous items typically have a fixed order (e.g., correct–incorrect; true–false), this does not necessarily hold for polytomous items. Polytomous items have a nominal response format if their response categories can be classified but an a priori order between them does not exist. The nominal response model below is appropriate for items with this format. If an a priori ordering of the categories does exist, a graded response model or partial-credit model should be chosen. The two models differ in the problem-solving process that is assumed to lead to the responses. Models for a graded-response format are more generally known as cumulative models in ordinal categorical data analysis. The partial-credit models below are known as adjacent-category models. These two options do not exhaust all possibilities, a more comprehensive review of different polytomous response formats and IRT models is given in Mellenbergh (1994).

Multivariate IRT Models

Unidimensional IRT models are appropriate for analyzing examinees' responses to items measuring a single latent trait or ability. However, for complex items that measure multiple latent traits simultaneously, item responses should not be modeled using a unidimensional IRT model because the probability of a correct response would not be a function of a single latent trait anymore. When item response data do not satisfy the unidimensionality assumption, multidimensional item response theory (MIRT) should be used to model the item-examinee interaction. MIRT enables one to model the interaction of items that are capable of discriminating between levels of several different abilities and examinees that vary in their proficiencies on these abilities. In this article graphical MIRT analyses designed to provide better insight into what individual items are measuring as well as what the test as a whole is assessing are presented and discussed.

Multidimensional item response theory (MIRT) provides an ideal foundation for modeling performance in complex domains, taking into account multiple basic abilities simultaneously, and representing different mixtures of the abilities required for different test items. MIRT models explain the probability of a correct response to a given item as a function of a vector of latent traits, instead of a single latent trait. Although MIRT can be used for various purposes, this modeling framework is particularly useful for modeling the item response data when one or more items measure multiple latent traits simultaneously (Reckase, 2009), and for improving measurement precision when there are individual tests or subtests measuring correlated latent traits (Wang, Chen, & Cheng, 2004). MIRT models can be categorized into two groups based on the test structure. These are between-item models and within-item MIRT models (Adams et al., 1997; Wang et al., 2004). In a between-item MIRT model, each latent trait is measured by a unique set of items. In other words, each item is associated with only one of the latent traits measured by the test. This type of test structure is also known as simple structure, as with a factor analytic solution where items load onto a single factor. Between-item MIRT models are typically used for estimating subscores from subtests measuring correlated latent traits (e.g., Bulut, Davison, & Rodriguez, 2017; de la Torre, Song, & Hong, 2011; Wang et al., 2004). In a within-item MIRT model, each item can be associated with two or more latent traits measured by the test. This type of test structure is known as a nonsimple or complex structure. A good example of within-item multidimensionality is the bi-factor test structure from cognitive ability assessments, where all items are associated with a general latent trait (i.e., general intelligence) and each item is associated with a secondary latent trait (i.e., specific cognitive abilities).

Multivariate Item Response Theory models are mostly used for complex items for measuring complex items that involve multiple latent traits. Such models explain the probability of a correct response to a given response item as a function of a vector of latent traits, instead of a single latent trait. Multivariate IRT models are mostly used for various purposes:

- for modeling the item response data when one or more items measure multiple latent traits simultaneously (Reckase, 2009),
- for improving measurement precision when there are individual test or subtests measuring correlated latent traits (Wang, Chen, Chen 2004).

Multidimensional IRT models can be categorized based on whether the weakness or deficit in one dimension.

First, we present the two-parameter multidimensional model (M2PL), which is an extension of the unidimensional Birnbaum model. This M2PL model is a compensatory MIRT model including item difficulty and item discrimination parameter from a multidimensional test. The M2PL model is defined as:

$$P\left(u_{ij}=1\middle|\boldsymbol{\theta}_{\mathbf{j}},\mathbf{a}_{\mathbf{i}},d_i\right)=\frac{\exp(\mathbf{a}_{\mathbf{i}}\boldsymbol{\theta}_{\mathbf{j}}^{`}-d_i)}{1+\exp(\mathbf{a}_{\mathbf{i}}\boldsymbol{\theta}_{\mathbf{j}}^{`}-d_i)}, \qquad ()$$

where: $\boldsymbol{\theta}_{\mathbf{j}}$ is a $1\times M$ vector of latent traits for examinee j $\left(\boldsymbol{\theta}_{\mathbf{j}}=\left(\theta_{j1},\theta_{j2},\ldots,\theta_{jM}\right)\right)$, $\mathbf{a}_{\mathbf{i}}$ is a $1\times M$ vector of slope (i.e., item discrimination) parameters for item i $\left(\mathbf{a}_{\mathbf{i}}=\left(a_{i1},a_{i2},\ldots,a_{iM}\right)\right)$, and d_i is the intercept term for item i. The intercept in M2PL model is not similar to the difficulty parameter in 2PL model, because it cannot be considered a unique indicator of the difficulty of the item (Reckase, 2009). To obtain a multidimensional difficulty parameter for item i we can use a transformation formula:

$$B_i=\frac{-d_i}{\sqrt{\sum_{m=1}^{M}a_{im}^2}}. \qquad ()$$

The higher the value of B_i gets, the more difficult the item becomes. Similarly, we can obtain the discrimination parameter using the transformation presented below:

$$A_i=\sqrt{\sum_{m=1}^{M}a_{im}^2}, \qquad ()$$

where A_i is the multidimensional discrimination parameter representing the overall discrimination power of a multidimensional item. For unidimensional IRT models with a single latent trait the difficulty parameter would contain only one non-zero element.

Multidimensional Rasch model was introduced by Adams (1997). This model can be used for estimating item parameters from a test measuring multiple latent traits. The general form of the Rasch model is (Adams 1997):

$$P\left(u_{ij}=1\middle|\boldsymbol{\xi},\boldsymbol{\theta}_{\mathbf{j}}\right)=\frac{\exp(\mathbf{b}_{\mathbf{ik}}^{`}\boldsymbol{\theta}_{\mathbf{j}}^{`}+\mathbf{a}_{\mathbf{ik}}^{`}\boldsymbol{\xi})}{\sum_{k=0}^{K}\exp(\mathbf{b}_{\mathbf{ik}}^{`}\boldsymbol{\theta}_{\mathbf{j}}^{`}+\mathbf{a}_{\mathbf{ik}}^{`}\boldsymbol{\xi})}, \qquad ()$$

where $\mathbf{b}_{\mathbf{ik}}$ is a score vector for category k of item i across the M dimensions, $\mathbf{a}_{\mathbf{ik}}$ is a design vector for score category k of item i across that defines the relationship between the item difficulty parameters, $\boldsymbol{\theta}_{\mathbf{j}}$ is a vector of latent traits $\left(\boldsymbol{\theta}_{\mathbf{j}}=\left(\theta_{j1},\theta_{j2},\ldots,\theta_{jM}\right)\right)$, and $\boldsymbol{\xi}$ is a vector of item difficulty parameters for item i. In multidimensional Rasch model presented above $\mathbf{a}_{\mathbf{ik}}$ and $\mathbf{b}_{\mathbf{ik}}$ do not refer to item discrimination and item difficulty parameters. In multidimensional case of Rasch model they refer to weights derived from the test structure based on the researcher`s hypothesis. Parameters that are estimated under multidimensional Rasch model are $\boldsymbol{\xi}$ and $\boldsymbol{\theta}_{\mathbf{j}}$.

Now we present multidimensional IRT model that is used for polytomously scored items. This model is an extension of unidimensional Graded Response Model (GRM) and presents the probability of examinee j selecting response category k in item i:

$$P\left(u_{ij}=k\middle|\boldsymbol{\theta}_{\mathbf{j}},\mathbf{a}_{\mathbf{i}},\delta_{ik}\right)=\frac{1}{1+\exp\left[-\sum_{m=1}^{M}-\left[a_{im}\left(\theta_{jm}-\delta_{ik}\right)\right]\right]}, \qquad ()$$

where $\boldsymbol{\theta}_{\mathbf{j}}$ is a $1\times M$ vector of latent traits examinee j $\left(\boldsymbol{\theta}_{\mathbf{j}}=\left(\theta_{j1},\theta_{j2},\ldots,\theta_{jM}\right)\right)$, a_i is a $1\times M$ vector of slope (i.e., item discrimination) parameter for item i $\left(\mathbf{a}_{\mathbf{i}}=\left(a_{i1},a_{i2},\ldots,a_{iM}\right)\right)$, and δ_{ik} is the category boundary location for the response category k of item i. As we compute the probability of responding on the k th category of item i, $P\left(u_{ij}=0\middle|\boldsymbol{\theta}_{\mathbf{j}},\mathbf{a}_{\mathbf{i}},\delta_{ik}\right)=1$ and $P\left(u_{ij}=K+1\middle|\boldsymbol{\theta}_{\mathbf{j}},\mathbf{a}_{\mathbf{i}},\delta_{ik}\right)=0$.

In the further part of this paper we present the application on multidimensional item response models using R software.

Applications in R

In this paragraph we present results of our studies based on a test measuring social attitudes toward university students. We conducted research at the University among group of students asking them 26 questions. First 16 questions are not connected with the social attitude so we skip them and we choose only 10 questions from 17 to 26. The answers were binary with categories: 1 (yes) and 0 (no). Now we conduct IRT analysis, first classical (unidimensional), and multidimensional comparing several IRT models. The data set contains the responses from 242 examinees to 26 items.

We stard from unidimensional IRT models. We use eRm package of R. We build one, two and three IRT model using rasch and ltm function. The results of the analysis and goodness-of-fit statistics are presented in Table 2.

Table 2: Goodness of fit statistics for IRT Models

IRT Model	AIC	BIC	LogLik
Rasch model	2111.301	2149.679	-1044.65
Birnbaum two parameter	2096.752	2166.53	-1028.376
Birnbaum three parameter	2107.227	2180.495	-1032.614

Source: own calculations in R.

The analysis of information criteria shows that the smallest value of AIC is obtained for two parameter Birnbaum IRT model with AIC=2096.752.

The analysis of model coefficients shows that the most difficult question in the test was those with difficulty parameter greater than 0 (only question 22). Questions with negative values of difficulty parameter indicate easy items (question 17, 18, 19, 20, 21, 23, 24, 25 and 26). The discrimination coefficient for most of the questions is high and very high (discrimination coefficient greater than 1.35); only questions 20 and 22 present low discrimination level.

Now, for the chosen two-parameter Birnbaum IRT model, we apply graphical presentation of the model using Item Characteristic Curve and Item Information Curve (Fig. 1).

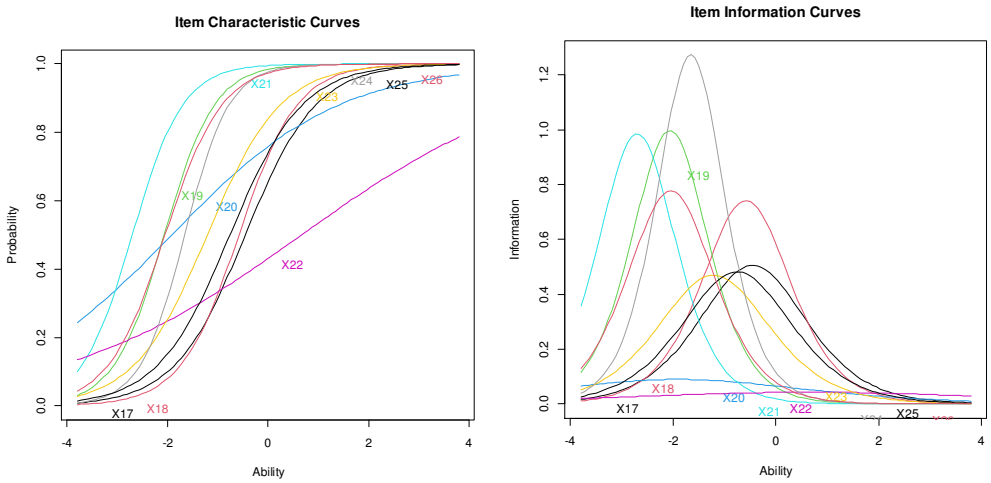

Fig. 1: Item Characteristic Curves and Item Information Curve for two-parameter Birnbaum model. Source: own calculations using R.

On the Item Characteristic Curve there is a relationship between ability (latent unidimensional trait) and probability of answering correctly for a particular item. The curves are mostly S-shaped, however there are two more linear for item 20 and 22. Those items had low discrimination level.

The other part of Fig. 1 is Item Information Curve presenting the relationship between ability (latent characteristic) and information level. From the analysis of those curves we can see that there are two lines lying very low having very low information level on all levels of ability. Those are items 20 and 22. The rest is bell-shaped differing with the level of kurtosis.

In this part of the paper we focus on multidimensional IRT models (MIRT). We use mirt package of R and we build several types of MIRT models. The test structure and unidimensional IRT analysis allows to structure multidimensionality, where item 20 and 22 are associated with the first latent trait, while items 17-19, 23 and 23-26 are associated with the second latent trait. Due to the characteristic of dataset, we define two latent traits: θ_1 and θ_2. To fit multidimensional Rasch IRT model we use mirt function in the mirt package with mrasch model setting, for Birnbaum two-parameter model we set 2PL setting.

Table 3: Goodness of fit statistics for IRT Models

Multidimensional IRT Model	AIC	BIC	LogLik
Rasch model	2265.656	2307.523	-1120.828
Birnbaum two parameter	2096.831	2170.099	-1027.416
Birnbaum three parameter	215.332	2223.489	-10266.666

Source: own calculations in R.

From table 3 we can see that using AIC information criteria for model selection we can choose Birnbaum multidimensional two parameter IRT model as fitting best with AIC=2096.831.

For Graphical presentation of multidimensional IRT models we present Test Standard Errors and Test Information Functions for Rasch (Fig. 2), two- (Fig. 3) and three-parameter (Fig. 4) Birnbaum multidimensional IRT model as a surface in three dimensional space.

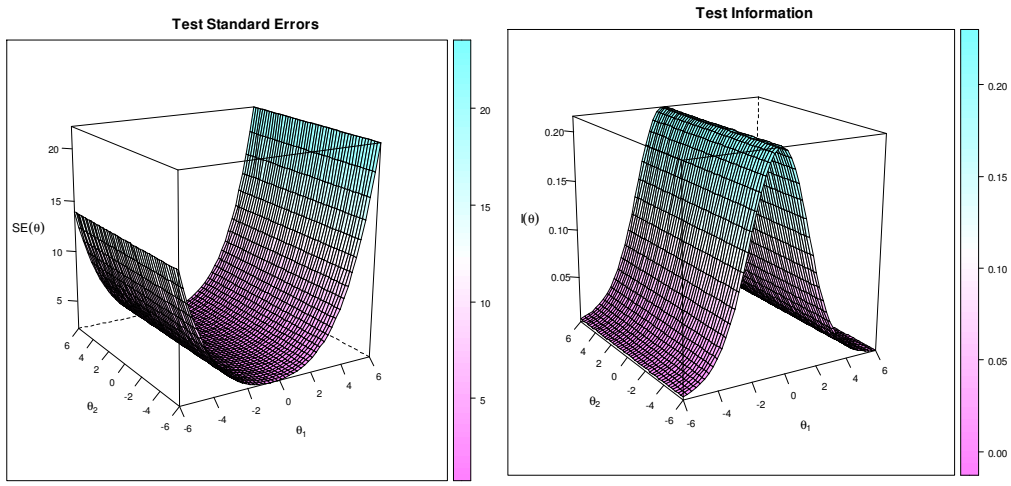

Fig. 2: Test Standard Errors and Test Information Function for multidimensional Rasch model.

Source: own calculations using R.

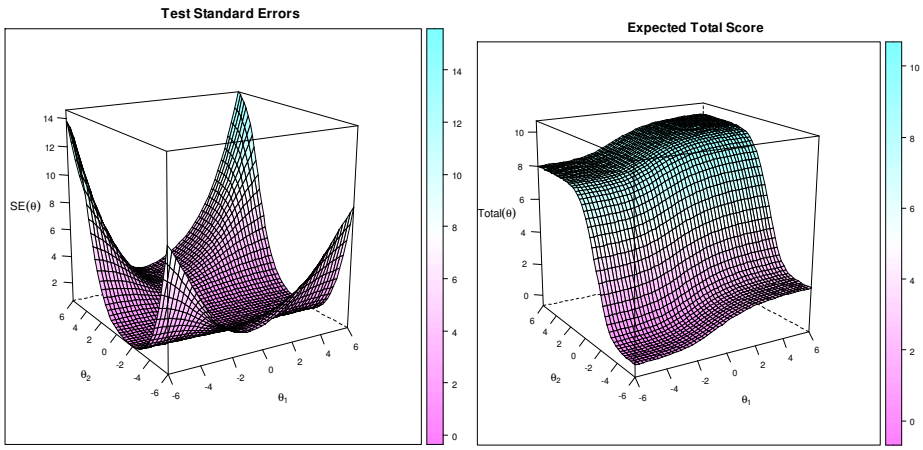

Fig. 3: Test Standard Errors and Test Information Function for two-parameter Birnbaum model

Source: own calculations using R.

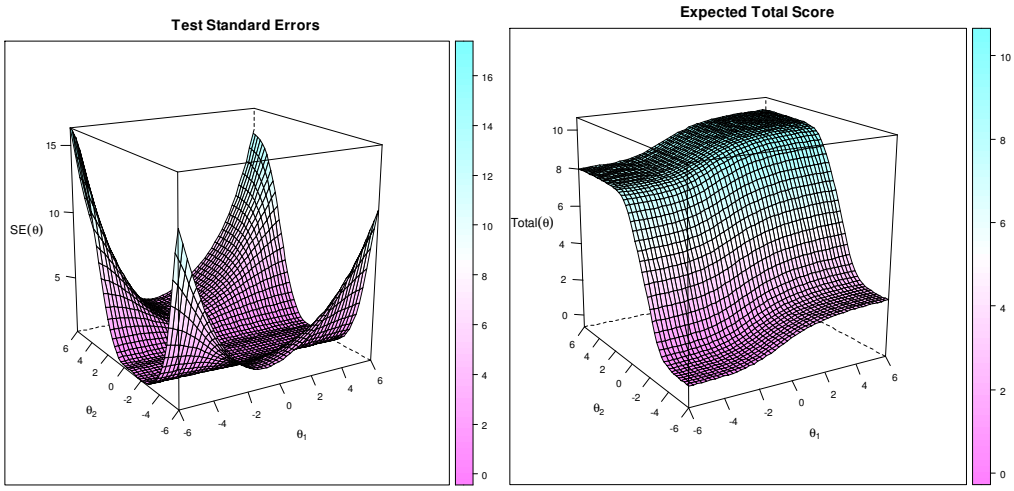

Fig. 4: Test Standard Errors and Test Information Function for two-parameter Birnbaum model.

Source: own calculations using R.

As information criteria from the analysis of multidimensional IRT models are very close for two- and three-parameter Birnbaum models, plots of Test Standard Errors and Expected Total Scores are also very similar.

Summary

Item response theory (IRT) is widely used in assessment and evaluation research to explain how participants respond to item level stimuli. This method is widely used in educational and psychological research to model how participants respond to test items in isolation and in bundles (Thissen and Wainer 2001).It is a general framework for specifying the functional relationship between a respondent's underlying latent trait level.

In this paper we introduce multidimensional Item Response Theory models (MIRT) that are suitable statistical method for the analysis of multivariate test structures where two or more latent traits are intended to be measured. MIRT models can be characterized as either compensatory or noncompensatory based on the presence of a compensatory relationship between the latent traits. To demonstrate how to estimate MIRT model we applied mirt

package of R and we presented results from own study on social ability among students. We compared uni- and multidimensional IRT models and we provided graphical presentation of IIC and ICC in two and three dimensional space. We applied information criteria for model selection.

In this paper we discussed theoretical and practical aspects of item analysis in the measurement theory. We presented Multidimensional IRT models as an extension for classical unidiemnsional IRT models providing more information about the latent trait under analysis. The variety of statistical packages and computer software that enable the analysis of latent characteristics give a great opportunity for applying IRT models in the analysis in different backgrounds.

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Supply Chain Management Challenges Facing Industry 4.0

Olga BUCOVETCHI
University "Politehnica" of Bucharest, Bucharest, Romania, olga.bucovetchi@upb.ro

Radu D. STANCIU
University "Politehnica" of Bucharest, Bucharest, Romania, radu.stanciu@upb.ro

Andreia Elena DINACHE (SIMIOANA)
University "Politehnica" of Bucharest, Bucharest, Romania, andreia.dinache@gmail.com

Marius Eugen OPRAN
University "Politehnica" of Bucharest and Romanian Space Agency, Bucharest, Romania, mariusopran@rosa.ro

Abstract

The complexity in production has increased with each phase of industrialization. This complexity must be managed by appropriate methods and tools. The fast and dynamic development of globalization processes would be impossible without the logistics supply chains support. The present demarche is to emphasize the challenges managers have to face towards Industry 4.0 period.

Keywords: Industry 4.0, complexity, resilience

Introduction

The changes that have taken place within the theoretical and practical approach regarding the physical flow of raw materials, products and people have led to the emergence of new terms, including physical distribution, logistics, materials management, logistics management, supply chain management or supply-delivery. Often, these terms are considered synonymous, being used to describe the same field called logistics. Some experts believe that these terms are interchangeable, others give a different meaning to each concept and believe that there is no single definition that can be applied to any product or company. (Badea, D. and Petrisor, S.M.. 2012)

Thoben, D.K. et al, 2017 stated that the industrial transformation associated with the smart manufacturing revolution and the introduction of CPS (cyber-physical systems) creates numerous challenges for organizations, technologies, and employees. The complexity in production has increased with each industrial revolution. Complexity is now a ubiquitous part of our lives. The "complex" view of reality is perceived as increasingly fundamental to understanding strategies at all levels, from the international consensus to domestic realm, and from governmental to private entities everywhere. Therefore, the inclusion of complexity into management discourse is a natural consequence, and many researchers, strategists, or managers have attempted to find the right approach to managing complexity.

Complexity in a system is a hard thing to measure and can be approached from numerous different ways. We can measure complexity based off the number of complex systems needed to accomplish the solution, from the degree of difficulty in describing the system, the amount of outcomes that are produced from the system or even the amount of inputs and monitoring of the system needed and numerous other ways that we can create to measure complexity.

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Dynamic socio-technical systems have emerged, consisting of many tangibles, intangible, as well as human elements. This complexity must be managed by appropriate methods and tools.

Phases of industrialization

According to Encyclopaedia Britannica, the Industrial Revolution describes “the process of change from an agrarian and handicraft economy to one dominated by industry and machine manufacturing”.

Furthermore, Kagermann et al., 2013 argued that “industrialisation began with the introduction of mechanical manufacturing equipment at the end of the 18th century, when machines like the mechanical loom revolutionised the way goods were made. This first industrial revolution was followed by a second one that began around the turn of the 20th century and involved electrically powered mass production of goods based on the division of labour. This was in turn superseded by the third industrial revolution that started during the early 1970s and has continued right up to the present day. This third revolution employed electronics and information technology (IT) to achieve increased automation of manufacturing processes”.

Industrial wave	Characteristics
Industry 1.0	Mechanization, waterpower, steam power
Industry 2.0	Mass production, assembly line, electricity
Industry 3.0	Computer and automation
Industry 4.0	Cyber physical systems

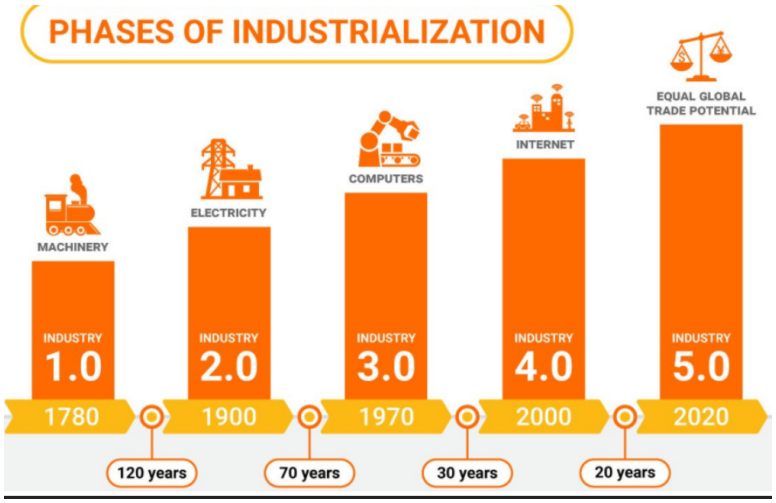

Fig.1: Phases of industrialization [source: Cadcam-group.eu]

According to Cadcam Group, "Industry 4.0" represents the integration of modern information systems and technologies with physical production and processes, which enables the development of new markets and models.

According to infopulse.com the new digital systems, emerging as part of Industry 4.0, gauge data from both physical and digital sources including:

- Industrial IoT devices;
- Robotics tools and autonomous robots;
- Big Data analytics systems;
- AI and Cognitive systems;
- Augmented Reality.

Economic Context

Simultaneously with the globalization of the markets, the products become more and more "globalized", resulting from the combination of inputs coming from several countries.

The old framework of production in one country and sale in another country have given way to international manufacturing operations. Technological progress has made it possible to decompose and disaggregate the production of goods in various phases, which take place in different countries. The lower costs of transport and communication and the liberalization of foreign trade have created economic incentives to locate the different phases of production in various countries. Firms choose for each production phase or component of a good country that meets the optimal production conditions, allowing yarns to capitalize on the comparative advantage offered by production locations in different countries, including differences in labour costs between different locations.

Within the functional fields of the international enterprise, the production management occupies a very important position. The proper governance of risks becomes a must (Pulfer R et al. 2015). It should be mentioned that the economic discussions on the theory of a company's location analyse, mainly, the location of the productive entity. According to the classic usage of choosing the location of the enterprise, priority has importance for production, only then following the other functions. Another reason why production management has such great significance is that the internationalization of production in the industrial sector is related to the substantial use of resources than in the case of other functions. Criteria such as product quality, logistics costs, supply prices, wages and hours of work, the percentage of employee participation in the company's profit are just a few examples of decision-making variables of enterprise policy, which decisively influence the location of the production unit. To these are added the effects of hiring staff often influenced by the social policy of the host country (an example is the privatizations in the former communist countries which stipulate that the new buyer of the factory must keep the same number of employees for a certain period of time)

The increase of the internationalization of the enterprise's activities has a considerable importance for the central function of the enterprise, the production. We can talk about the company's activities as being international from two points of view:

- On one hand, in the case of deliveries of goods across national borders to reach the customer (export-based strategy)

- On the other hand, in the case of increasing investments of companies in manufacturing units abroad (policy based on investments abroad)

The term "national competitiveness" is important from the point of view of international production management for 2 reasons:

- On one hand, the relocation of production units abroad is discussed as a key word of "national competitiveness", being not infrequently the subject of numerous political influences. The reason is the unilateral approach to production, which focuses heavily on job competitiveness. Topics such as marketing

competence or infrastructure do not remain out of the discussion even if fundamental topics such as wages, working time, manufacturing costs are in the forefront.

- On the other hand, besides the microeconomic effects, it is necessary to analyse to what extent these effects also have on the employment and the well-being of the nation, so important for the economic policy of the country. Production figures are therefore at the heart of the competitiveness debate. Relocation of production abroad, respectively foreign direct investment in the country, these can be the key variables of political success, which often means the re-election of the government to power. In order to ensure the long-term well-being of the nation, the state acts through interventionist measures, especially before the elections, when in no case should there be problems of employment or lowering of living standards.

It follows that in industrial policy the term "competitiveness" has meanwhile become the key word, not least and due to the example offered by the Japanese economy in the 80s and early 90s. Especially in the case of large multinational enterprises governments to try to influence the relocation of production abroad through subsidies, tax relief, favourable ways of amortization.

An organization might outsource certain activities in the value chain where there may be a specific comparative advantage. Production based on labour-intensive use can be relocated, for example, to countries with cheap labour, while capital-intensive processes require the employment of highly skilled personnel. Therefore, production will always be oriented towards external locations that have a supply of adequate labour and the necessary infrastructure. Regarding the optimal allocation of the production process from a geographical-spatial point of view, each production level must be examined with its cost structure (determined by the intensity of use of labour and capital production factors) in order to evaluate the efficiency of relocating that level. On the other hand, in this case, the costs of production logistics must be considered, first of all, those with transport and storage.

In general, the distribution of production levels in different countries can be established according to the needs and characteristics of each location, considering logistics and transfer costs. Such a production configuration is often meaningful when transportation costs for components and finished products are relatively.

Discussions

Essential for the international relocation of production is that, in principle, an optimal degree of concentration can be chosen for each level of production. This allows, on the one hand, to use the advantages of location-specific production factors and, at the same time, to achieve economies of scale.

In case of a high degree of concentration each stage of production can be achieved / concentrated only in one country, while the other levels are in at least 2 different countries. In an opposite case, the raw materials and the finished product are obtained in several production units dispersed spatially in more than 2 countries while the intermediate production is realized concentrated from a geographical point of view. Knuppell shown that the related international production can be achieved in a great variety of forms

This is how, for example, the first level of supply can be achieved in different countries, while the next 2 levels - intermediate and final production - are concentrated in one country. Conversely, the last level is oriented on the sale of several products, while the first 2 levels operate centrally.

Thus, in case of dispersion of the last level of the related international production, several variations can be found at the level of the finished product, without these implying disadvantages for the production efficiency. Based on the unique levels of supply and intermediate production, the same finished product can be made in different countries (product A), there can be slight variations of the finished product (product A and product A ') or different products can be manufactured, at least partially - starting from the same intermediate product on the principle of modular construction of the product. (product A and

product B) A relevant example in this sense is provided by Renault, which created the Megane and Logan models based on the same structure (intermediate product), differentiated modulated for each model. These are standardized components and intermediate products, which are then assembled in their own assembly units located near the sales markets. Such an adaptation is possible in the case of the short distance between the place of manufacture of the finished product and the buyer for communication reasons and it is preferred to concentrate all levels of production in a country, from where to then export to markets.

An essential advantage in terms of coordinating all partial processes in a given location is to minimize transportation costs and risks for raw and prefabricated materials. This is primarily explained by shorter transport distances. This results in a reduction of risks, as on short distances quantitative shortages or qualitative deteriorations are less likely than on cross-border transport over longer distances, as will be necessary in the case of decentralization of production levels. Spatial dislocation of production levels leads in addition to high transport costs and risks and the need to establish costly buffer deposits at each level, to avoid interruptions in the transport chain and thus a fall in production of production levels that follow in the cycle of production.

Delloite cited by infopulse.com proposes the following 3 solutions in order to use Industry 4.0 as organizational advantage: process optimization, process flow and quality monitoring and new business models implementation. All elements shall follow the initial connectivity stage as described in fig.2.

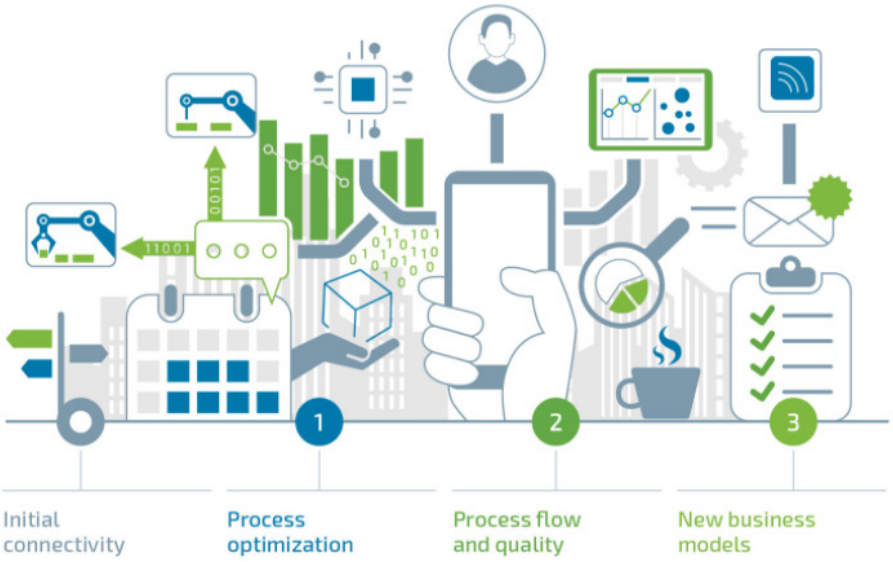

Fig. 2: Implementing Industry 4.0 [source: infopulse.com]

Process optimization implies increasing networking and digitalization, improving current process, and optimizing use of assets. Moreover, this means increasing automation and upgrading other standards to reduce costs and maximizing collected data and leveraging data with advanced algorithms

Process flow and quality implies creating digital threads throughout the entire process, from sourcing of raw materials to post sales and implementing new cybersecurity measures to address risks of increased connectivity

Within the present approach the new business models step embeds using collected data and insights to create new revenue streams and value for customers and building new products based on insight digitally gathered from clients

Furthermore, we should also emphasize the challenges of new technologies, as for example Artificial Inteligence, Quantum Computing or Blockchain.

The incorporation of artificial intelligence into defense strategies is already beginning to act as a trigger for the major transformation in terms of data assimilation and processing to effectively identify strategies. Scientific and technological advances contribute to shaping both the requirements and solutions for new approaches to meet the EU's defense capability needs.

The subject of recent discussions on Big Data and AI for military decision-making has been to highlight where that technology is heading and what opportunities it allows to improve military decision-making. Emphasis was placed on the impact on the OODA loop (Observe, Orient, Decide, Act). We can see major consequences from AI , Machine Learning and Big Data in terms of observation in terms of the ability to collect and assimilate large amounts of data streams generated and then process them efficiently.

When scientists refer to the way in which the principles of quantum computing are formulated using the most fundamental ideas of quantum mechanics, in fact the embodiment of which can be contemplated in virtually every branch of quantum physics. Efforts are now fully dedicated to producing operational devices using a profoundly new form of information processing resulting from specialties in atomic physics, quantum optics, nuclear and electronic magnetic resonance spectroscopy, superconducting device physics, electron physics and mesoscopic research, and with quantum dots.

Due to the scientific attractiveness of the new product, including its huge commercial potential, we are actually witnessing a global race that has as competitors Google, Microsoft, Intel, IBM, etc. to build the world's first operational QC, the perfect hardware scientists to develop new materials, accurately predict the evolution of weather globally and communicate through impenetrable encrypted messages.

In terms of blockchain technology, we are talking about an IT protocol dating back to the 1990s. However, its widespread use and success are related to the spread of cryptocurrencies and virtual currencies, the best known of which is Bitcoin. However, it would be a mistake to think that blockchain and cryptocurrencies are one and the same thing . Indeed, as a result of capitalizing on the blockchain to increase the computing power and capacity of IT systems for data analysis and given the strengthening of connectivity in Europe and the continued development of artificial intelligence systems, the potential to use distributed registry technology to a number of purposes unrelated to cryptocurrencies are growing exponentially. (Bucovetchi et al., 2018)

Blockchain is both a code, ie a communication protocol, and a public register, in which all transactions between network participants are recorded one after the other, with a high degree of transparency and in a way that cannot be changed. This order of records comprises a set of "blocks" (parts of code) that are cryptographically linked, making each part of the block that forms the chain traceable and unchangeable. These "linked blocks" are registered simultaneously on each of the devices through which blockchain participants connect. Each participant is a link in the chain, helping to validate and store the data that is exchanged. In this way, transactions always take place horizontally and are validated by a number of participants, which makes it impossible for a single operator to modify or destroy records.

Conclusions

Contemporary supply chain entities must realize that they function in the changing environment. Unfamiliarity with business partners, the establishment of economic organizations, e.g. global chains, on an ad hoc basis, sometimes

merely for the sake of fulfilling one single task, together with a lack of adequate legal regulations are the common challenges facing organizations while managing their business processes, to mention only a few. The fast and dynamic development of globalization processes would be impossible without the logistics supply chains support.

However, at the same time, globalization itself poses many challenges to logistics. Globalization is accelerating and this in turn leads to huge structural changes in the supply chains and to new challenges as regards effective supply chain performance management. The priority for businesses should be to develop new products and technologies. For companies to be competitive on the market and monitor further development flows, full digitization of the process is one of the primary goals and general principles on which Industry 4.0 is based. Furthermore, people should prepare for Industry 5.0 as the fifth-generation industry will bring a higher level of personalization to the final products, making the end customer feel more satisfactory.

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Consulting in the Implementation of ERP Systems – Benefits and Threats

Katarzyna RAGIN-SKORECKA
Faculty of Engineering Management, Poznan University of Technology, Poznań, Poland
katarzyna.ragin-skorecka@put.poznan.pl

Daria MOTAŁA
Faculty of Engineering Management, Poznan University of Technology, Poznań, Poland
daria.motala@put.poznan.pl

Abstract

Implementing ERP systems in an enterprise requires taking a number of actions to ensure full success of this process. It is particularly difficult to implement an ERP system in a small or medium-size enterprise due to their limited resources. The existing body of literature provides a great number of publications on launching ERP systems and instances of good and bad practices involving ERP. The aim of this article is to point to an additional aspect of launching ERP systems, i.e. the role of IT consulting in this type of projects. What was an inspiration to study this subject was the involvement of multiple authors in seeking critical elements for the successful implementation of enterprise resource planning. In order to achieve the goal of the article, we undertook the analysis of the literature on the subject and conduct surveys amongst those managers who decided to implement an ERP system in their organisation. This research is of a preliminary nature and its major limitation is the modest amount of collected feedback and the limited time scope and geographical range of the research. The results presented can be of useful reference to managers facing the implementation of IT projects with the assistance of external consultants.

Keywords: ERP system, IT consulting, implementation of IT system.

IT systems for supporting management and the methods of implementing them in organisations

Integrated IT management systems are construed as information systems for providing support in managing business enterprises, and which are implemented using specialist software. They could emerge thanks to the development of science and technology; in particular, in such fields as computer-aided product design, process design, quality assurance, and manufacturing (Muscatello, Small, Chen, 2003). Integrated IT management systems combine the application of IT in assisting technical production preparation and control over production processes with the management issues of running the whole organisation (Trana, 2014).

An integrated IT system in an enterprise is broadly defined as modularly organised software embracing such areas of running a company as marketing, planning, purchasing, technical preparation and production control, distribution of ready goods, sales, servicing, financial-accountancy work, or human resources (Ehie, Madsen, 2005, p. 546; Ömür, 2009). In effect, what happens is the combination of the assistance in enterprise management processes with comprehensive systems of computerised manufacturing. In order to achieve full efficiency, it is necessary to develop IT resources for the whole organisation along with the rules of collecting, processing and sending them, as well as uniform rules for applying the tools and procedures of the system development (Ferreira, Kuniyoshi, 2015; Parthasarathy, Sharma, 2016; Umar et al., 2016; Maditinos et al., 2012; Wang et al, 2007; Ranjan et al., 2016).

Contemporary computer systems emerged through the development and refinement of such systems as CAD (Computer Aided Design), CAM (Computer-Aided Manufacturing, Computer-Assisted Manufacturing), CIM (Computer Integrated Manufacturing), or CAE (Computer Aided Engineering). Attempts were made to combine demand for goods with demand for the resources required to manufacture them (Chung, Snyder, 2000). In this way, the MRP (Material Requirements Planning) system was developed. Following its further development, the system was enriched with the following modules: business planning, sales, production capacities, and production

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scheduling, HR-payroll scheduling and financial accounting scheduling. The MRP II concept is already an integrated multi-access IT system. Apart from production and purchasing, planning the MRP II also involves sales and resources planning, balancing production capacities and finance (Klaus et al., 2000; Ranjan et al., 2016; Koh et al.; 2009).
Another stage in the development of integrated systems was the emergence of two-sided mechanisms for the optimisation of planning processes and allowing integration with external entities under the supply and sales chain. Consequently, another integrated system emerged, i.e. ERP (Enterprise Resource Planning) (Botta-Genoulaz V., Millet, 2006). The growing popularity and access to the Internet allowed a) extending ERP systems with access to the base through an Internet browser for the benefit of both organisation members, clients and suppliers, b) integrating ERP systems with other systems via the Internet, interfaces for analytic systems, and tools for modelling economic processes (Koh, Gunasekaran, Rajkumar, 2008).

The effect of yet another stage of the development of the systems accessible on the market is ERP III. Under this solution, it is possible to plan the enterprise's resources with particular attention and emphasis on mobility. Additionally, data integration and data exchange were improved, not only between the organisation and its business partners, but also between such institutions as banks, the Social Security Office, or public administration. Those enterprises which take advantage of this solution can fulfil the concept of conducting their activity in real time. Under this concept, enterprises gain competitive advantage through eliminating lags in taking decisions by the management and being able to maintain operational continuity in implementing key processes (Øverseth, 2017, pp. 28-29; Das, Dayal, 2016, pp. 11-13). However, what is the most important thing is the possibility to use mobile devices such as smartphones or tablets. Access to the system from personal devices means quick access to the organisation's data and, possibly, a quick response.

The process of the implementation of IT systems with a view to giving assistance to the enterprise's management can take multiple forms. Depending on the approach and strategy selected, the implementation process will involve different types of risk. None of strategies can become the ultimate solution due to the varied features of enterprises, processes and environments in which they operate (Mahmood, Lloyd, 2017).

When the management are expecting immediate effects, achieved at a small cost, the strategy that is applied is the 'breakneck speed' strategy. It is relatively popular as it does not take as much time as other implementation strategies. This, however, means eliminating a number of key activities normally performed as the pre-implementation analysis. A rarely used method of implementation is the 'star strategy'. That it is rarely applied results from the fact that it requires a lot of involvement on the part of top managers. On the one hand, this strategy means obtaining immediate acceptance for the implemented solutions, which reduces the risk of failure and shortens the implementation time, but, on the other hand, it consumes the time the management might otherwise spend on other issues concerning the running of the enterprise. Then, the 'turnkey strategy' does not take much of the employees' time. All of the work is done by the provider of the product. This model most often uses standard solutions to which the ways of doing work by staff are adjusted. The staff's not having influence on the implemented solutions and new ways of working reduces the probability of their active use of the new software. Then, the strategy of 'own' implementation means relying on the company's own cadres in the process of implementation. However, the expertise and skills of the staff delegated to conduct the implementation are often not good enough to effectively complete the given task. Giving up external consulting services results in elongating the implementation time due to the lack of experience in performing this type of tasks by the organisation's own cadres. The 'budget' strategy entails similar threats as it relies on keeping costs down by purchasing relatively inexpensive software and delegating own staff to perform the implementation. In such an event, the company runs the risk of mismatching the selected IT system to the actual needs of the company and having the implementation conducted by incompetent staff. Then, the 'partner' strategy significantly reduces the risk of having incompetent staff to perform the implementation as it means the cooperation of the company's own staff with the experts of an external implementation company. The drawback is that long and numerous talks on optimally adjusting the new software to the needs of the buyer might considerably elongate the implementation process. In such a case, the dispersed responsibility of both the buyer's and provider's staff may lead to conflicts the resolving of which only extends the implementation time. Next, the 'low risk' strategy means that work is carefully planned and achieving each subsequent task proceeds according to detailed measures of performance. Moving to the next stage is only possible after completing the previous stage, while the completion time is not determined. In case of failing to complete a task, its implementation is withheld and work on the troublesome issues is continued until the problems are finally solved. Projects implemented with the application of this strategy entail considerable financial and human resources with little complexity of tasks and no time pressure. A side effect of this solution are high costs against potentially limited benefits and the risk of having the solutions run out-of-date before the project is even completed.

Most of the above presented strategies of implementing IT systems in enterprises involve cooperation with an external IT provider or consultant. This may take the form of consulting, which also involves particular types of risk.

Consulting in the implementation of IT systems

Implementing new systems in an organisation is a strategically important project which, on the one hand, opens up new opportunities for the business, but, on the other hand, generates huge risks and challenges. Choosing a wrong IT system or implementing it incorrectly can translate into lost opportunities in the organisation's further development or, worse still, generate significant losses (Ranjan et al., 2016). The implementation of an IT system is a time and money-consuming process. As many research findings show (Khaparde, 2012; Ömür, 2009; Loh, Koh, 2004), the implementation of ERP systems is not always successful. One way to avoid such a failure is to use the expertise of consultants (Wang et al., 2007). Even though hiring consultants itself is not a guarantee of success, their work often allows having a new look at the issues concerning system implementation and, in effect, achieving better results.

An overview of the literature on the assistance provided by consultants in ERP systems implementation reveals that it is an issue which still requires further in-depth analyses. In the literature, the assistance is mostly reduced to transferring knowledge between consultants and enterprises (Wang et al., 2007). However, a mere transfer of knowledge is not the only type of support that an organisation aiming to implement ERP is after. Managers expect consultants to show such skills as technical skills, human interaction skills, business context skills and consulting framework skills. In particular, consultants should be experienced and familiar with the issues in the implementation; they should have the ability to determine the organization's needs and expectations and assign personnel to meet those needs and expectations; and have expertise in systems implementations (Metrejean, Stocks, 2011). Furthermore, it is very often emphasised that with this type of projects the cultural context and industry practices are also of key significance.

The process of IT consulting most often involves the following actions (Wang et al., 2007):

- process analysis – current state and target state,
- selection of relevant solutions tailored to the specifics of the organisation,
- setting optimum implementation scope and its schedule,
- proper preparation of the organisation to project launch.

The selection of IT solutions by the organisation itself may prove to be suboptimal, mainly due to information provision shortcomings. IT systems are often chosen on the basis of the first good impression, general presentations, and partial and oversimplified lists of requirements. Such an approach fails to ensure the reliable verification of solutions and the optimum composition of implementation teams. Managers sometimes forget about it or they lack in the competence to enter into a secure contract with providers. In effect, they only focus on simple issues, such as contractual penalty for delays or extending the deadline of receiving the product, rather than focus on critical issues (Bakari et al., 2013). In such an event, external consultants should step in as early as the stage of agreeing the requirements the new system should meet and finding a capable provider. This requires relevant expertise and experience gained while working with previous clients (Chen et al., 2008). A consultant with high competences can provide support to the organisation at every single stage of the system implementation process.

Research Methodology

The recognised need for further analyses into the issues of the implementation of ERP systems concerns the research gap relating to the advantages and threats of using consulting companies in IT systems implementation projects.

The basis for the launch of this research was a survey conducted on a group of 66 enterprises, that were clients of a consulting company in the field of implementing IT solutions. The findings showed that companies do appreciate the services of IT consulting. As a consequence, we wanted to check the advantages and threats of such consulting. In the research process, two methods were applied – a literature overview and case study – which allowed the triangulation of the study (Saunders et al., 2003). The literature overview in accessible databases involved the following concepts: "ERP system implementation", "success factors in ERP implementation", "IT consulting". The case study method was chosen due to the type of the research question, the scope of the researcher's control over behavioural facts going on in reality and the level of interest in contemporary facts (Yin, 2014).

The research question asked was: "how does IT consulting impacts the process of selection and implementation of the ERP IT system?" In the study, it was assumed that IT consulting would be analysed in the context of the process approach to the implementation of an ERP system as presented by, among others, (Loh, Koh, 2004; Mahmood, Lloyd, 2017), and that IT consulting provides tangible benefits during ERP systems implementation. The subject of the analysis is enterprises which implemented the ERP system using the assistance of an IT consulting company. Combining the results of the literature overview with the cases under analysis, a table was drawn up featuring the dependencies between the implementation subprocess and the potential assistance provided by consulting companies. The analysis method used was patterns matching (Yin, 2014).

Results

An overview of the literature

Economic practice and the publications available show that ERP systems implementations are still not a very common practice in Poland. According to data by the Main Statistical Office, in 2019, only 28.5% enterprises used an ERP system. In industrial processing, heading towards industry 4.0, the figure was only 32.5%. According to Eurostat data, Poland takes the 6th last place across the European Union in terms of utilising ERP systems (https://portalprzemyslowy.pl/wyroznione/raport-erp/).

In the implementation of ERP systems, a number of steps must be taken. Being a process project, it requires going through the following stages: pre-implementation analysis, solution selection, project management (system implementation), post-implementation issues (Al-Mashari et al., 2003; Mahmood, Lloyd, 2017; Stojkić et al. 2015; Loh, Koh, 2004). Figure 1 presents the subsequent stages of the implementation of ERP systems.

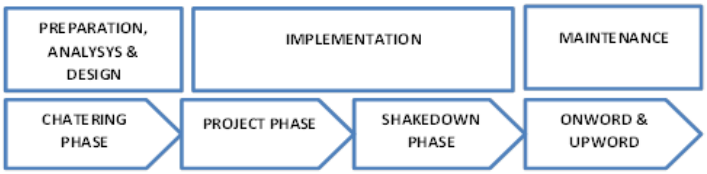

Fig. 1: The stages of ERP systems implementation. Source: (Loh, Koh, 2004)

The implementation of ERP systems usually entails a change in the whole organisation, including changes in the approach to management from functional to process. Implementing IT systems improperly can lead to conflicts and failure of the whole project (Loh, Koh, 2004; Maguire et al., 2010). Success is achieved when the enterprise can run its business processes more efficiently owing to the implemented ERP system (Wei et al., 2008). The indicators of implementation success include: costs reduction, lower stocks, shorter order processing time, etc. (Umble et al. 2003).

Many authors have attempted to define the key success factors of the implementation of ERP systems. Most often they point to: support provided by top managers, a well-knit project team and effective communication. Furthermore, equally important are: a well-devised plan and a vision of future changes, a project manager with high and adequate qualifications, well prepared processes of managing the organisational change, a well identified current and target state of the processes within the organisation, properly devised approval tests, monitoring and control of implementation advances, organisational culture focused on change, and consultants' support (Loh, Koh, 2004; Mahmood, Lloyd, 2017; Markus and Tanis, 2000; Bingi et al. 1999; Duchessi et al. 1988; Nah et al. 2001; Ehie and Madsen 2005; Sarkar and Lee 2003; Umble et al. 2003; Kim et al. 2005; Nah and Delgado 2006; Maguire et al. 2010; Umar et al., 2016).

An analysis of scientific publications on ERP systems shows that it is also important to identify and point to the causes of failures in this type of IT projects (Calisir and Calisir, 2004). The literature identifies the following threats: the excessive alignment of IT system with the organisation's actual needs, lack of involvement on the part of top managers, improper project team composition, inefficient communication, lack of trainings, lack of change leaders, conflicts, combining old (already implemented) and new IT systems, erroneous needs analyses, mis-identified processes in the organisation (Nah et al. 2001, Huang et al. 2004; Mahmood, Lloyd, 2017).

Analysis and discussion

An analysis of the Polish market of the implementation of ERP systems reveals that most projects are conducted in the large enterprise sector (https://portalprzemyslowy.pl/wyroznione/raport-erp/). Meanwhile, the ERP system also allows streamlining the operations of small and medium-sized enterprises. The major obstacles for the widespread implementation of ERP systems in this sector are the lack of expertise and insufficient resources (Vijay, 2012).

As evidenced by the results of the preliminary inquiries, the 66 surveyed enterprises pointed to the helpful role of IT consultants in implementing ERP systems. Most of the respondents (company or project managers) admitted they had used the services of a consulting company in the process of ERP implementation for the following reasons:

- they lacked in expertise on IT systems – 40 responses,
- they lacked in the knowledge on the IT market and its standards (costs, implementation scope, agreements) – 34 responses,
- they lacked in the time needed to draw up the documentation on the company's expectations – 31 responses.

The respondents also said that in the area of "the specification of functional and non-functional requirements", the assistance of a consulting company was most important – 24 responses. The other activities, such as assistance in preparing tender procedure for the system delivery, propositions on processes streamlining, and business processes mapping and analysis, scored fewer responses (13 each).

The subject of the discussion is an attempt to find the answer to the research question of "how does IT consulting impact the process of selection and implementation of ERP IT systems?" The first element to be analysed was the selection of ERP systems implementation success factors. Based on a literature overview, a set of factors believed to play the most important role was selected. They include as follows: project management, ERP teamwork and composition, effective communication, top management support, business plan and vision, project champion, Business Process Reengineering and minimum customisation, change management program and culture, Software development, testing and troubleshooting, monitoring and evaluation of performance.

The second aspect under discussion was the position of the consulting company and its positive or negative influence on the implementation of ERP systems. Table 1 provides data obtained through a literature overview and a case study – an enterprise having implemented an ERP system with the assistance from a consulting company.

Table 1:The benefits and threats of using IT consulting in the implementation of an ERP system

Process phases	Critical Success Factors (CSFs)	The benefits of consulting	The threats of consulting
Chartering Phase	Project management	- matching the implementation scope to the specific conditions of the organisation - expertise in projects methodology	- using ready schemes - reluctance to understand how the organisation works and conducts processes
	ERP teamwork and composition	- access to consultants' expertise - matching team members' competence with tasks more effectively	- not enough competence of the consultants - inability to motivate the team - reluctance to point to software benefits
	Effective communication	- allows revealing the clients' subconscious know-how - applying tools and standards of communication – helpful in the organisation's future operations - talking staff into the implemented changes	- lack of rapport in terms of consulting scope - lack of rapport in terms of the client's expectations about software - excessive amount of communication tools and channels - mis-matched information recipient - reluctance of personnel to share knowledge with external consultants - lack of consistency in maintaining effective communication
	Top management support	- sharing expertise in the area of available ERP systems and their functionality - support to top management in managing the change - knowledge on implementation costs and system maintenance	- wrong identification of problem leading to recommendation of impossible solutions - passing the implementation responsibility on consultants (lack of management's support)
	Business plan and vision	- knowledge of planning tools and technology - ability of sharing the vision with personnel - setting strategic targets and ERP implementation targets compatibility	- reluctance of staff to share knowledge with external consultants - reluctance of staff to adopt the vision imposed from outside the organisation - failing to include the organisation's basic activity in the plan
	Project champion	- expertise transfer	- consultants' reluctance to get fully involved due to their already won reputation

Project Phase	BPR and minimum customization	- adequate expertise and experience allow minimising the technical problems of implementation - adequate conflicts management allows improving the implemented software - evaluation of organisation's processes and data allows determining the scope of integration and pointing to useful solutions for data analysis and reporting, including those based on AI technology	- lack of expertise and due experience leads to introducing improper solutions in terms of software and the quality of its implementation - conflicts resulting from different approaches to problem solving during system implementation
Shakedown Phase	Change management program and culture	- support to staff in understanding the validity of the changes - finding change leaders - support in building organisational culture favourable to the changes	- reluctance of staff to share knowledge with external consultants - treating consultants as strangers and reluctance to the changes they propose
Shakedown Phase	Software development, testing and troubleshooting	- awareness of system functionality and dependencies between modules - ability to devise approval tests - consulting and training on system exploitation	- lack of knowledge about other systems in the organisation and thus problems with systems integration - consultants' conviction of knowing better if the system is working properly - improperly devised and conducted training scheme
Onward & upward Phase	Monitoring and evaluation of performance	- analysis into the ERP system implementation effectiveness - recommendations for system streamlining	- lack of post-implementation servicing

Source: Author's own work on the basis of a case study and Muscatello, Small, Chen, 2003; Loh i Koh, 2004; Wang, Chen, 2005; Wei, Chien, Wang, 2005; Soja, 2006; Wang et al., 2007; Woo, 2007; Ömür, 2009; Maditinos et al., 2012; Bakari et al., 2013

Having an ERP system implemented with the assistance of consultants requires paying attention to the aspects of the quality of such cooperation. Referring to the research done amongst Taiwanese companies by (Wang, Chen, 2005), the successful cooperation of the client with IT consulting companies depends on the effectiveness of communication and conflict resolution. Effective communication is the prerequisite for successful client-consultant cooperation. The lack of it can result in the misconceived expectations and needs of the client (Qurashi et al., 2013). Furthermore, effective communication ensures grasping well the business needs of the client and the scope and possibilities of the implemented and sought-after changes following the implementation of ERP systems (Bloomfield, Danieli, 1995). The complexity of projects involving ERP systems implementation calls for long-lasting cooperation within the project team. Similarly, the assistance provided by consultants must evolve into a long-lasting relationship, which might result in conflicts, given different approaches to the issues and different organisational cultures (King, 2005; Koh et al.; 2009). Resolving those conflicts for the benefit of all the parties concerned enables the project team to learn and develop (Robey et al., 1993) and determines the success of ERP systems implementation. Swift and effective communication between the organisation and the consultant helps build mutual trust and resolve conflicts (Janka et al., 2019). The prime task of a consulting company is to provide expertise for the proper selection of ERP system and its smooth implementation. This is exactly the area in which companies recognise their major shortcomings. The lack of own staff's expertise is the main reason why consultants are approached to provide their assistance (Al-Mashari et al., 2003; Bingi et al. 1999; McLachlin, 1999; Wang et al, 2007).

Conclusions and Further Research

One of the major trends of development globally is the 4.0 industry. A successfully implemented ERP system is a key element for the company's success in using IT solutions (Stojkić et al. 2015; Stachowiak et al. 2019). The ERP system, in particular its latest versions which allow working in real time, allows achieving higher efficiency of running the enterprise on condition that is it properly implemented. Companies try to minimise the difficulties of the implementation of systems by using the assistance of external experts in the area of using expertise and good practice offered by IT consulting companies. If those companies are truly professional and can embrace the area of the organisation's operations, their services become invaluable. However, it happens that services are provided by companies lacking in expertise and experience, which results in doing more harm than good. In such an event, the selected ERP system will not match the needs and expectations of the organisation, and the organisation's staff will be reluctant to use it. It is also important that technical consultants have extensive knowledge about the system's implementation aspects allowing pre-implementation development of relevant IT infrastructure. They should also have enough knowledge and skills to be able to calculate and present the benefits derived from the implementation of ERP system in the organisation.

The basic limitation for the effective involvement of consultants in the ERP systems implementation process is their lack of competence – expertise and experience. When this potentially negative aspect of consulting is non-existent, their role is mostly positive (Maditinos et al., 2012). Organisations which decide to have ERP systems implemented

with the assistance of consultants can rely on their help in matching targets with the system's capabilities, support given to staff in achieving essential competences and a sense of the newly implemented solutions being meaningful. Well prepared consultants can adjust the organisation's software to the needs of specialist analyses required for the smooth running of the enterprise.

The analysis of the literature and the case study conducted allow me to draw only preliminary conclusions, presented in a tabular form. The identified advantages of consulting and the threats involved require further analysis, primarily, conducting more case studies supported by questionnaires. This will allow giving them due significance and, in effect, pointing to the extent of available advantages and risks involved.

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The Efficient Performance of a Caravanning Microenterprise – Case Study

Daria MOTAŁA
Faculty of Engineering Management, Poznan University of Technology, Poznań, Poland
daria.motala@put.poznan.pl

Katarzyna WRÓBLEWSKA
katarzyna.a.wroblewska@student.put.poznan.pl

Abstract

The Covid-19 crisis has led to a significant rise of interest in renting and purchasing recreational vehicles. It is not the only determinant of the efficient performance of companies in this field of tourism industry. The aim of the study was to identify other factors that may affect economic operations in this sector. The conclusions were based on the analysis of an exemplary micro-enterprise which has operated and has been constantly developing in the field of the rent, sale and service of campervans for years.

Keywords: Micro-Enterprise, Motorhomes, Determinants of The Efficient Performance.

The Industry Origin and Current Interest

Caravanning is perceived as a form of car tourism, travelling by recreational vehicles for sightseeing and leisure (Cudny, 2018). A recreational vehicle refers both to caravans (camper trailers) and campervans or motorhomes. They may be used to travel, i.e. go caravanning, or to go camping, i.e. use them as a form of stationary tourism and camping (www.encyclopedia.com). This kind of leisure is suitable for people who appreciate independence and high mobility, at the same time accepting conditions which are far from luxury.

The world's first leisure trailer was built by the Bristol Wagon & Carriage Works in Great Britain. In the 1890s, the first trailer appeared in the US. In 1912, Bill Riley's team of the UK developed the first professional camper trailer. In the 1950s and 1960s, the first campervans were built (Greenwood, 2011; Hogue, 2011; Fenton, 2013; Østby, 2013; Prideaux, 2018).

There are approximately 140 manufacturers of recreational vehicles (cars and trailers) in Europe. The four largest producers, whose share accounts for 75% of the European market are (Motorhome Market Outlook, 2020): Erwin Hymer Group, Trigano VDL, Knaus Tabbert and Hobby.

As far as the resources and registrations of new camping vehicles are concerned, the regions of the world with the biggest potential of the caravanning industry are: the US and Canada (64.8%), Europe (25.5%) and Australia (6.7%). In Europe, in turn, the sales of campervans are growing more quickly (about 60% of the caravanning market) (Recreational Vehicle Market Report, 2020).

In the years 2009 – 2010 in Europe, we observed the crisis in the caravanning market. The number of registered campervans and motorhomes fell in the three leading countries – by 10.6% in Germany, by 31.5% in France, and by 13.8% in the Netherlands. The recession hit the top European manufacturers with their sales dropping by as much as 30%. The owners of companies dealing with the sales of campervans and caravans had to reduce the size of their fleets by 50% on average. As a result of the crisis, a number of European companies reported losses, and, consequently, had to go bust. In 2014, the sales started to increase and have continued to rise ever since (see: https://www.civd.de/en/artikel/european-market).

The Polish caravanning market is far less developed in comparison to Western countries. This is probably due to citizens' lower income, inadequate infrastructure, the shortage of proper camping sites and the lack of service facilities. Another reason seems to be increased interest in the offer of cheap airlines, which make it possible to travel easily to many parts of the world. The statistics show, however, that, year by year, the Polish caravanning market is growing (https://www.motorhome.pl/rynek-kamperow-w-polsce). This is shown in the diagram which presents the number of recreational vehicles registered in Poland in consecutive years.

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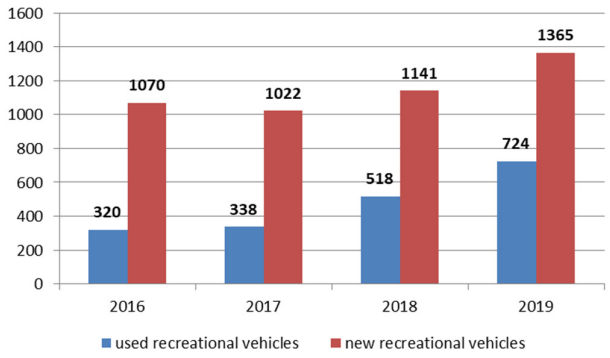

Fig. 1. The number of recreational vehicles registered in Poland

Source: https://www.motorhome.pl/rynek-kamperow-w-polsce/

In April and May 2020, we observed a significant rise in the interest in recreational vehicle in Poland, which was a direct effect of the Covid-19 pandemic (Łukaszeiwcz, 2020). This form of leisure seems to be the safest and was one of the first to be allowed after the period of compulsory isolation. When people travel in a recreational vehicle, they stay with their closest family and use personal lavatories and kitchen, just like at home, which considerably reduces the risk of infection (COVID – 19 https://www.civd.de/en/artikel/effects-on-caravanning-tourism).

The determinants of the development of tourism services

The development of the tourism market depends on complex rules and processes. It is difficult to consider these factors in a uniform way, because they may be discussed from a number of perspectives, including aspects of economy, demography, geography, law and politics, and mass-media (Middleton, 1992; Prideaux, Carson, 2011).

What is the most important economic factor affecting tourism demand is the income of a potential customer. Tourism is a luxury good, so the demand for services arises after the basic needs have been fulfilled. Due to the differences in customers' expectations and forms of travel, it is impossible to define the level of income determining interest in tourism services (Cheng-Fei, 2020; Camilleri, 2018).

Demographic determinants are connected with economic factors. They include population, the size of household, its structure, the age of household members, their level of education, the place of living, and profession. As people gain education, they often express the need for personal development, reflected in their desire to learn about new places and cultures. This is achieved a lot more easily by travelling on one's own in a campervan rather than by all-inclusive holiday (Prideaux, 2019).

Legal and political factors regulate tourism demand. The pandemic blocked the freedom of movement for a few months, which significantly affected tourism. The later easing regulations restored the possibility of moving within the country and abroad relatively freely.

The importance of the impact of mass-media is a very broad topic. The media play the key role in informing the mass recipient. It is them, which create people's opinions and choices in the 21st century. Thus, they indirectly influence consumers' decisions (Patluang, 2017).

Psychosocial factors constitute a very complicated and diverse group. Each trip can thus be motivated by different factors and will be different for each social group. Holidays spent driving a motorhome have been in fashion for a few years and are preferred by specific groups of people. Moreover, they are now perceived as one of the safest forms of leisure, allowing people to be isolated from others.

The efficiency of Microenterprises

A microenterprise is defined according to the number of employed people and the maximum balance sheet total or revenue. The European Commission defines an enterprise as any business entity, irrespective of its legal form. A microenterprise is an entity which employs no more than nine people and the annual balance sheet total or turnover of which does not exceed EUR two million (European Commission Recommendation 2003/361/EC).

The efficiency of enterprises is usually assessed in the context of financial results, which enable the development of a company (Baumast, 2017). However, this type of approach does not always reflect how micro-entrepreneurs perceive success and effective operations (Ioniță, 2013). For many of them, it is enough to stay in the market for a long time to find their companies successful. They often define their objectives as job satisfaction, making a

reasonable living, need for autonomy, creativity and community respect (Toledo-López i in., 2012; Bhattacharyaa S., Londhe B.R. 2014; Henrekson M., Sananda T., 2014).

Regardless of the detailed assumptions concerning the goals of business operations, it is customers and information that are the most important elements in the long-term functioning of a company. Customers' interest depends on the scope of information and the way in which it is communicated. Well prepared and properly conducted marketing activities are thus important here (Porto et al., 2017). This factor and the abovementioned aspects of the perception of success are also found in the findings of studies carried out in the company. Like other microenterprises, also the one under study does not aim to expand its range of operations, focusing on improving its existing activities (Gherhes et al., 2016).

Characteristics of the Enterprise

The company under analysis, which meets the above criteria, deals with the sales, rent and service of campervans. It was established in 2006, which makes it one of the longest operating caravanning enterprises in Poland. It is owned by a natural person conducting a business activity and is located in Poznań.

The company operates in seasonal business. Vehicles are rented from March to November, with the highest demand between May and September. As regards sales and maintenance, these activities are conducted throughout the whole year. In the periods of lessened demand, the company focuses on the preparation for the next season. This involves drawing up new price offers, marketing activity, seeking cooperation opportunities, preparing vehicles for rent and sale, or industry training. The enterprise cooperates mainly with Italian and French partners, currently among the largest recreational vehicles in Europe.

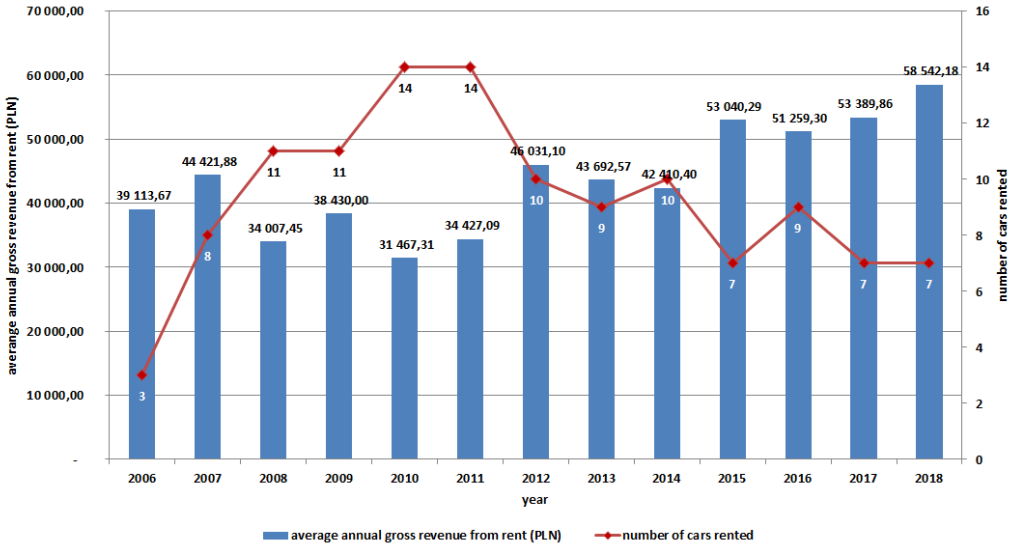

Fig. 2. Average annual gross revenue from the rent of recreational vehicles and the number of rented vehicles in the years 2006-2018

Source: authors' own study

The figure shows the average annual gross revenue from the rent of RVs and the number of vehicles rented in the period from 2006 to 2018. The average annual gross revenue from renting one vehicle is 43,864.08 PLN, which accounts for approximately 5% of the total turnover of the company, including sales and maintenance. In the initial years of operation, the enterprise put more emphasis on rent; thus, it had more vehicles available in the years 2008-2011. The value of revenue from the rent of recreational vehicles led to a change in the corporate strategy and shifting focus to sales.

Research Methodology and Results

Research on the functioning of enterprises related to the car tourism industry is rarely conducted (Cudny, Jolliffe, 2019). The aim of our study was to identify the determinants of the efficient performance of the company under analysis in the specific business conditions (Middleton, 1992).

We assumed that there are specific external factors and features of an enterprise which help it operate in the market efficiently. The findings below concern one company, which stems from the relatively small size of this sector. Our

aim is to identify those elements which can serve as the starting point for further study and obtaining more general results.

The SWOT analysis (Gürel E., Tat M., 2017) and Porter's Five Forces Framework (Grundy, 2006) were used here because of their highly complex character, which allows us to identify both the inetrnal and external factors affecting the company. This made it possible to distinguish the most imporant determinants of the efficient performance of the microenterprise.

In order to obtain necessary information, we interviewed the owner of the company and its employees (SWOT analysis and Porter's five forces analysis) (Middleton, 1992; Prideaux, Carson, 2011). On this basis, we attempted to identify the factors which are key for maintaining the competitiveness of a caravanning enterprise (see: Lee, 2020). Due to the key role of marketing in the functioning of the company, we asked its customers to fill in a questionnaire.

As a consequence the results of our analysis of the functioning of the microenterprise and its competitive environment were additionally verified by a survey carried out among its customers. It was done online and its findings were summed up at the end of 2019.

SWOT analysis of the functioning of an enterprise

What has been the prevailing external factor in the last few months is the Covid-19 pandemic, the influence of which has two aspects. As a consequence of isolation introduced in order to prevent the spread of the disease, many people's wages have been reduced, which may be temporary or may pose a problem connected with the loss of job. At the same time, the fear of becoming infected makes Poles less willing to travel abroad, even despite the loosening of restrictions and opening borders. Poles have shifted their attention to home holiday destinations. They also seek a solution which would allow them to stay isolated from other people and spend their free time relatively freely and comfortably. A camping trailer or a campervan are often the result of their search.

From the long-term perspective, the increasing wealth of the society plays a role. Year by year, the company under analysis improves its financial performance, especially in two fields of activity: the sales and rent of recreational vehicles. The growing interest of potential customers, manifested by the number of e-mails asking for an offer and the rising number of visitors at industry fairs, may reflect the improvement of their financial condition.

The brands that the company under study cooperates with have been present in the market since the 1960s. The strong tradition and experience of car manufacturers, who constantly improve their vehicles and extend maintenance offer, make the potential customer trustful and loyal to them. Regular cooperation helps to retain customers – people interested in using recreational vehicles – by offering cars of well-known makes to them. In turn, selling vehicles made by the same manufacturers boosts their sales. Thus, the relation between RV manufacturers and salesmen is very strong.

What is an opportunity for the development of the caravanning industry is the extension of the infrastructure of national expressways, which enable customers to access the company swiftly and move easily in campervans. Expressways ensure fast and comfortable connections within the whole country. Moreover, the location of the microenterprise in the vicinity of the motorway is another asset as it is a starting point for trips to Western Europe countries, which have been the most popular tourist destinations so far.

As exchange rates tend to fluctuate these days, changes in the Euro to PLN rate are a factor that impedes the further development of the company. All vehicles it buys come from French or Italian manufacturers, who use Euro as the basic currency. Even the slightest change of the rate automatically increases the car's value in zlotys, which discourages customers from purchasing vehicles.

Banks' decisions, especially those concerning loans, may affect the condition of a company. The development of an enterprise requires financial outlays. Difficulties in obtaining bank loans or adverse interest rate movements pose a direct threat to the company, which purchases new vehicles every year. Customers are also dependent on banks because, without sufficient credit rating, they will not buy a car, which, consequently, reduces the company's revenue.

Another industry-specific threat is the possibility that cars with the engine capacity of more than two litres will cease to be produced. Campervans with such engines are mainly manufactured for the Polish market. Poles' interest in 2.0l engines stems from the significantly lower excise duty. If the production of such vehicles was reduced, a given manufacturer would probably sell a lot fewer of them, which would make cooperation with the Polish sales office unprofitable and could lead to the termination of the contract.

Problems with the fulfilment of customers' individual requirements and long delivery time may discourage people from purchasing a new recreational vehicle. Cars have fixed specifications and the choice is limited to what is

offered in the catalogue. If a customer has any individual needs that cannot be met, they will seek models that would suit them better at the dealers of other brands.

Delivery time may be as long as six months. This is due to a number of reasons, usually on the manufacturer's part. The production capacity is one of them. The production of a recreational vehicle is not a fully automated process and is additionally dependent on the fulfilment of orders from subcontractors (e.g. chassis, heaters, fridges). What is more, all car models offered by the company under analysis are made in Italy, where there is a three-month shutdown of production in the summer period. As a result, customers may not wish to wait so long for a new car and often decide to buy a second-hand vehicle.

What is a significant advantage of the company is its location in a place well visible and easily accessible from the main road leading from a big city, in the vicinity of the motorway. Customers are also attracted by an interesting design of the building. Visitors often come with a view to learning more about the caravanning industry and its products, but, in the end, they often rent or buy a recreational vehicle.

As the company has operated in the Polish market for a long time – more than ten years – its employees have a lot of experience in customer service. On a regular basis, they participate in different training courses concerning both technical areas connected with caravanning vehicles and fields such as customer care and corporate management.

Customer loyalty is also increased by the complexity of services offered: the rent, sales and maintenance of vehicles. A potential customer, who is not yet convinced of the caravanning industry products, usually starts from renting a vehicle. Having experienced this form of spending leisure time, customers seek to purchase their own, customized vehicle. After the purchase, they can also rely on the company to service their car. Customers' individual expectations can be met to a certain extent thanks to cooperation with a few suppliers, who deliver diverse cars in terms of size, finish and accessories. Manufacturers offer a wide range of models and specifications. The above factors make the company highly rated by customers, who return every year to rent or service a vehicle and encourage other people to visit the company, too.

What some customers may find a problem is the fact that the company does not deliver vehicles to their door. This is difficult for logistics reasons and because the company cannot afford to delegate workers to this task. In high season, in the period of customers' increased interest in renting vehicles, the headquarters must be fully staffed.

Another barrier to the rent of a vehicle is the amount of deposit claimed. It is necessary, however, because it is the only guarantee for the company in case of damage caused by a customer. This does not obviously refer to collisions or road accidents, which are covered by an insurance policy.

The company has also decided to introduce a daily mileage limit for short-term rents. This was the implication of numerous rents in which the daily mileage highly exceeded the average, which significantly affected the appreciation of a vehicle. For those customers who are more interested in travelling by a campervan than in leisure, this may be the factor that will turn them to other renting companies.

Vehicle appreciation is also affected by its use in winter season. The company has to provide additional accessories then: winter tyres, extra isolation of containers to prevent water from freezing, etc. These costs and risks related to worse road conditions made winter rents unprofitable and the company gave them up.

Prospective buyers often pay attention to the insufficient number of demonstration cars. Manufacturers' offer is very wide and the middleman is not able to ensure that each model will be on display on site. Consequently, a person seeking a car to buy has to rely on catalogue visualizations and similar vehicle models of the same manufacturer that are available in the company.

The company owners also decided not to hold cars on consignment. Their experience and preliminary calculations showed that this type of activity is not profitable. The condition of cars left on consignment is often far below the standards accepted by buyers and they are more difficult to sell that new vehicles.

The analysis of the competitive environment based on Porter's Five Forces Framework

Depending on the examined field of activity, competition for the company under analysis differs. There are relatively fewer companies offering recreational vehicles for sale than those which deal with rent or sell used cars. It requires a lot more capital and effort to become the dealer of new cars as it involves establishing relations with manufacturers and signing contracts with them. The same applies to opening car service points, for which the manufacturer's authorization is needed. As a result, there are not many rivals in the new recreational vehicles market, but their competition is quite tough as customers are more interested in second-hand cars. This is mainly due to their lower price.

There is a lot bigger competition in the sector of car rent, with a number of microenterprises and large companies dealing with hiring caravanning vehicles. Actually, it is enough to be the owner of just one car and offer it for rent

when one does not need it and, thus, become a competitor in the market. Large-scale competition, however, requires investing more capital, which is seen as a barrier to entry for new entities.

The need for raising large initial capital and low profit are obstacles to purchasing the sufficient number of cars for rent and demonstration to meet the expectations of prospective buyers. Another expense is the purchase or lease of location. The premises have to be large enough to accommodate an office, a place for campervans, a car service hall and free space for moving vehicles easily. What is more, a company and its brand have to be promoted. This involves launching a website, search engine positioning, placing information banners, permanent social media administration, radio and press advertising, as well as hiring and training the sufficient number of employees.

What may be another barrier to entry, which reduces a threat of competition in the sector, is the limited access to RV manufacturers. Some of them have already signed exclusive contracts with brokers in Poland, which decreases chances of establishing new cooperation. Moreover, car makers demand the specific organization and design of the company headquarters to represent the products of their prestigious brand in a proper way. New entrants lack sufficient knowledge of the sector, which is usually acquired through learning and gaining experience. This usually concerns the regulations in Poland, the technical solutions applied, logistics skills and broadly defined "know-how".

Depending on the expectations of campervan users, different substitutes can be distinguished. When it comes to the freedom of travelling and the possibility of sleeping in any chosen place, it is a towed trailer that can be considered a substitute product. After reaching a specific destination, it is almost as comfortable to use as a campervan or a motorhome. The main difference is that it is a bit more complicated to drive a car with a trailer. It is an obvious disadvantage, but, on the other hand, one can park a caravan and then go sightseeing by car. Sleeping in tents also guarantees relative freedom as one can put them up at camping grounds and wild campsites. Comfort is significantly lower, though. If a campervan user only wants to reach a given destination and spend some time there, it will probably be cheaper and more comfortable to rent a cottage or a holiday apartment. In such a case, the trip will also be shorter as passenger cars move faster than caravanning vehicles.

It should be noted, however, that those who took to travelling by RV rarely give it up. If they have bought a campervan, they somehow want to compensate for the high cost of purchase and use the car intensively. Another kind of barrier would be cheap airline flights, which allow people travel freely. On the other hand, they have become less accessible due to the risk caused by Covid-19. A campervan or a caravan seem the safest way of spending holiday nowadays.

What is the strongest bargaining power of suppliers is the arbitrary mark-up on a vehicle, where the buyer has little influence on its amount. Discounts are only available to those entrepreneurs who order a large number of cars. Unfortunately, the caravanning industry in Poland is at the developing stage, so it is highly unlikely for any company to purchase cars in bulk. An enterprise would have to invest a lot without any guarantee that it would resell all cars, thus, risking insolvency. Manufacturers have an advantage of choosing the company that will represent them in a given region. It is first of all the market position of a car seller that is taken into account, with special consideration given to the guarantee of car sale. There are relatively few RV producers, especially as compared to buyers, including intermediaries and end consumers. This makes them feel safe and lets them dictate price conditions.

Buyers do have some influence on the type of vehicles manufactured. In Poland, campervans with 2.0l engines account for a large share of the market. This is due to a lot lower excise duty (by 15.5%), which constitutes 3.1% of the car's market value based on Eurotax system. If cars with such engine capacity ceased to be produced, the contract with the manufacturer could be terminated.

Porter's Five Forces Analysis we conducted shows that access to the sector is hindered mainly by necessary financial resources and by the knowledge and experience of incumbent businesses in the market. Substitute competition has some influence on the attractiveness of the caravanning industry, but it is hardly likely that recreational vehicles will be supplanted. RV manufacturers cooperate closely with representatives in individual countries. They do not deal with the direct sales of cars to customers, but do it through dealers. The lack of mutual cooperation between producers and buyers would lead to the fall of sales. There is tough competition between companies in Poland because not many customers have been interested in buying or renting a campervan so far. Moreover, there are only a few enterprises offering new RVs for sale because the demand for them has only begun to rise. That is why more attention is paid to customer satisfaction and efficient marketing activity.

Customers' feedback on the microenterprise's activity

74 respondents were asked to indicate the source of information about the company (press, social media, radio, website, motor show, personal recommendation), state whether they were satisfied with the service received and what factors determined their satisfaction or dissatisfaction. The vast majority of the survey participants found out

about the company from their acquaintances (43%) or at a motor show (26%). Most of them (66 people – 89%) expressed their satisfaction with the service, with only eight (11%) people dissatisfied.

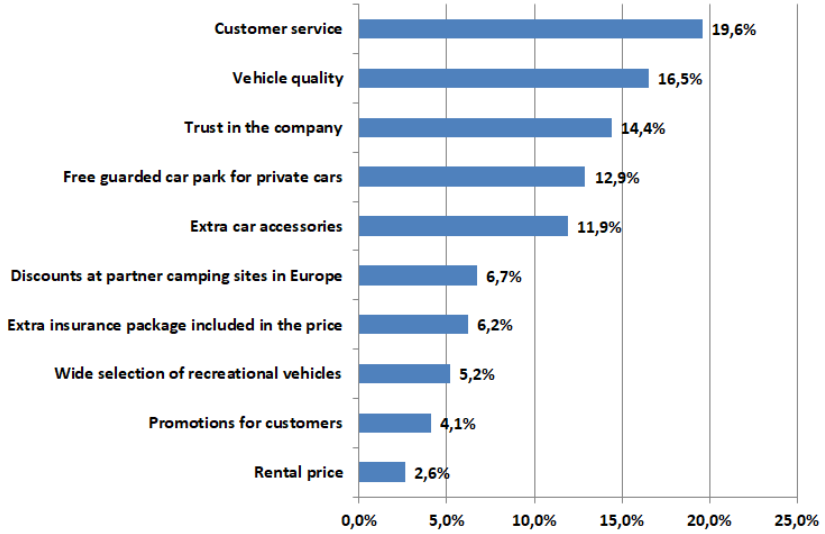

Fig. 3. Factors influencing rental car satisfaction

Source: authors' own study

Depending on whether they had expressed satisfaction or dissatisfaction with the services of the company, the respondents were directed to the next question in which they were asked to tick the three most important elements (out of ten) which had influenced their opinion. The results were presented in the diagrams. The most common reasons for customer satisfaction included the high quality of customer service (19.6%) and of the vehicle (16.5%), trust in the company (14.4%), the possibility of leaving their private car free of charge for the rental period (12.9%) and additional accessories in a campervan (11.9%). Much less frequently did they indicate discounts at partner camping sites in Europe (6.7%), extra insurance package included in the rental price (6.2%), the wide selection of vehicles for rent (5.2%), promotions for customers (4.1%), and the rental price (2.6%).

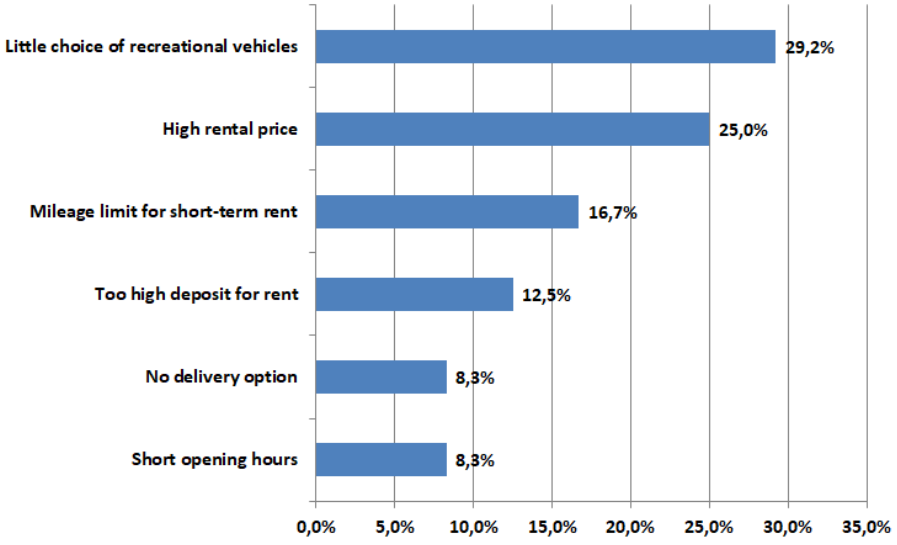

Fig. 4. Factors influencing rental car dissatisfaction

Source: authors' own study

The main factors influencing customers' dissatisfaction included the insufficient range of vehicles for rent (29.2%), too high rental price (25%), mileage limit for short-term rent (16.7%) and too high deposit (12.5%). The least frequently given reasons were the lack of possibility of delivering a car to the place indicated by the customer and short opening hours (both answers – 8.3%).

In the end, the survey participants were asked whether they would be willing to use the company's services again. The results correspond to the findings of the car rental satisfaction study. The overwhelming majority of the respondents expressed their willingness to rent the car from the company again (66 people – 89%), while only eight people (11%) gave the opposite answer.

Factors influencing the efficient performance of a caravanning microenterprise in Poland

Following our analysis, we identified the factors which significantly influence the performance of the company. The aim of the study was to single out those which have the strongest impact. It was done by comparing factors resulting from the SWOT analysis with the conclusions drawn from the analysis of the company based on Porter's Five Forces Framework and the findings of the customer survey.

Tab. 1: The factors influence the performance of the company

SWOT		Porter
Opportunities	A campervan is a safe choice in the context of the ongoing pandemic	Only a towed trailer and a holiday cottage or apartment can be substitutes for a campervan
	Increase of household income in recent years	
	Customers' loyalty to companies offering RVs due to their experience	
	Difficulty in the entry to the market of potential customers because of high financial outlays	Little competition in the area of the sales and maintenance of new cars because of the necessity of authorizing sale and service points by manufacturers
	Little competition in the local market as far as sales and service are concerned	Limited access of new companies to RV manufacturers
	Development of road infrastructure	
Threats	Covid-19 related travel restrictions	Limitations concerning the use of budget airlines to travel abroad
	Decrease of household income due to isolation during the pandemic	
	Exchange rate fluctuations	Manufacturers' mark-up on cars without a chance to negotiate
	Dependence on banks and their credit decisions	Difficulties in ensuring the sufficient number of demonstration cars and exhibition space for the owner, and in promoting the company
	Little possibility of customers' contribution to the specification of the car in production	The range of new vehicles offered includes models available in the European market without the possibility of introducing any changes to their specification
	Long waiting time for the delivery of the car ordered	
	Cessation of the production of vehicles with 2.0 l engine capacity	Potential loss of interest in new vehicles caused by the withdrawal of 2.0 l engines because of high excise duty
SWOT		**Questionnaire survey**
Strengths	Convenient location of a company	Free guarded car park for the private cars of customers who rent vehicles
	Long experience in running an enterprise	Extra car accessories to suit customers' expectations
	Cooperation with a few manufacturers	
	Comprehensive range of services – rent, sales and maintenance	High quality of recreational vehicles offered
	High customer rating	Trust in the company
	Systematic development of a company and its employees	High quality of customer service
Weaknesses	No possibility of holding cars on consignment	
	No possibility of delivering the vehicle to the customer	
	Insufficient number of demonstration cars	Limited choice of vehicles both as regards rented and demonstration cars
	High deposit	Too high deposit
	Mileage limit for short-term rent	Mileage limit for short-term rent
	Rent offered from spring to autumn, without the winter season	

Source: authors' own study

The above table shows that both the incumbent business and potential entrants to the market do not pose a great threat. This is due to the fact that manufacturers have signed exclusive contracts with representatives in Poland and that significant amount of capital is required to start and develop a business. The reason for which prospective customers may lose interest in recreational vehicles is that they are difficult to customize and that there is a limited choice of cars, mileage limit for short-term rents and a high deposit. Demand may also fall if RV manufacturers cease to produce cars with 2.0l engines because this would entail an increase in the price, which is already high enough to position campervans and motorhomes in the category of luxury vehicles.

The time for summing up the findings of our study coincided with the Covid-19 pandemic and school holiday. It showed how much popularity the option of spending leisure time in relatively safe conditions enjoyed – people appreciate the fact that only members of the same group of holidaymakers have access to sanitary facilities and the so-called shared space. Most RV rentals fully booked all their cars for the holiday period weeks ago. Thus, the pandemic opened a great opportunity for this market, particularly with limits imposed on budget flights to popular destinations.

The examined enterprise has gained a competitive advantage owing to customers' trust based on its constant attention paid to the high quality of services offered. Not only are the vehicles well-maintained and additionally equipped to suit customers' current expectations, but also the employees regularly improve qualifications to serve them better. People renting campervans are offered the possibility of leaving their private cars on a guarded car park for the rent period. This solution makes up for the lack of delivery option. The above factors have an impact on

positive customer rating. Customers express their satisfaction and declare willingness to use the company's services again.

The study of a single micro-enterprise does not allow for drawing general conclusions, however, it points to specific factors that require analysis on a larger group of caravanning companies. The final results of our analyses show that the information given by the company management is consistent with what its customers say. This allows us to view the obtained results as a well-established set of factors that enable achieving efficiency perceived by the company's owners and employees. These factors should thus be considered the proper set on which to base the further study of the efficiency of companies in the sector of sale and rent of recreational vehicles.

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Market Volatility and Asset Pricing in The Conventional And Downside Risk Frameworks

Leslaw Markowski

University of Warmia and Mazury in Olsztyn, Poland
The Faculty of Economics, Department of Finance
E-mail: leszekm@uwm.edu.pl

Abstract

The purpose of this paper is to investigate risk-return relationships for assets quoted on the Polish capital market. Besides unconditional relations, the study proposes the conditional relationships, considering different market volatility regimes and different market condition. The unconditional relations and conditional relations on market volatility are estimated in the downside risk approach as well. The unconditional cross-sectional regressions demonstrate that the downside beta outperform the classical one in asset pricing. While the market condition is incorporated as the conditioning variable the asset pricing is insignificant and independent on market volatility in conventional risk approach. When the downside systematic risk was arranged the positive and significant risk premiums were observed in two volatility regimes under third quartile threshold. The CAPM holds when models are tested based on both in high and low market volatility and market condition. Beta coefficients generate positive premiums in the up market and high and low volatility periods and negative premiums in the down market and high and low volatility periods.

Keywords: CAPM, downside risk, market volatility, conditional relations

Introduction

Rational decisions of investors allow achieving the equilibrium of the capital market, presented in the theory of finance in the form of the Capital Asset Pricing Model (CAPM). According to it, the adjustment of prices, and thus rates of return to the level of market balance, results from the linear relation of the expected return on assets to the level of systematic risk, expressed as beta (Sharpe, 1964; Lintner, 1965; Mossin, 1966). CAPM is widely used to determine, among others cost of capital, therefore, verification of this model on a given capital market is a desirable task. Many studies on capital markets indicate CAPM as proper to determine the price of financial instruments (Chan et al, 1991; Hawawini, 1991). Others studies, however, show discrepancy of the capital assets pricing with its postulates (Östermark, 1991; Cheung and Wong, 1992) or propose extended version of the model with risk factors, such as: company size, price-to-profit ratio or book value per share (Banz, 1981; Fama and French, 1992; Dimson and Musavian, 1999).

It is worth noting that the previous research assumed that risk-return relationship is independent of market conditions or market volatility and moreover beta coefficient is the only relevant systematic risk measure that investors should consider in decisions making. This statement enables other approaches to CAPM testing. In this paper some research theses are formulated. Firstly, the downside beta coefficient is appropriate measure of assets' risk on the Polish capital market. Secondly, conventional CAPM is plausible in different market volatility periods and thirdly the model describes inverse risk-return relations in the bear market periods.

Given the fact that only the pricing of assets in the light of the CAPM can be tested however, it should be noted that the verification of the risk-return relationship in the context of that model is associated with a number of assumptions regarding this model. Is it possible to verify the CAPM when the market portfolio is not exactly known. Another problem is the Error In Variables phenomenon. Certainly, the solution to avoid the deviations caused by this phenomenon would be to use equity portfolios. The single-stock biases in risk measures estimates would cancel out by portfolios constructions. However, Markowski (2020) indicated that estimates both for individual assets and portfolios do not differ significantly in terms of sign and value of risk premium.

The main objective of this study is to investigate risk-return relationships for assets quoted on the Polish capital market. Besides unconditional relations, the study proposes the conditional relationships, considering different market

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volatility regimes and different market condition. The unconditional relations and conditional relations on market volatility are estimated in the downside risk approach as well.

This study is organized as follows: Section 2 shortly reviews the literature on testing of CAPM. Section 3 describes the methodology with hypotheses of conditional and unconditional cross-sectional regression. Section 4 introduces a dataset and research findings and discussion is on Section 5. The last section offers conclusion.

Literature Review

Many past CAPM tests based on conventional beta coefficient poorly explained returns of assets. The reason for criticism may be a different understanding of risk. Rational investors differently perceive deviations below and above the threshold, e.g. risk-free rate. Deviations above the accepted rate are treated as a profit, but below that rate as a potential loss. Under this approach, we have a new concept of risk called downside risk. Numerous studies in developed capital markets provide convincing findings for downside risk measures (Ang et al, 2006; Post and Vliet, 2006). Furthermore, the downside asset pricing models achieve higher level of explanatory power of returns than conventional CAPM (Chen et al, 2009). Tsai et al (2014) demonstrate that downside betas outperform classical ones in explaining volatility of expected returns of assets. In the emerging markets, Estrada (2002; 2007) and Momcilovic et al (2017) proposed new measures of the downside risk and showed that investors are rewarded with a market premium for these measures.

One of the key issues that decided to reject CAPM was the proper use of realized returns. While in up market periods the theory of asset pricing is valid but in down market periods assets with high beta reach much lower returns than assets with low beta (Kurach, 2013). This suggests the use of conditional risk-return regressions in contrast to the unconditional procedure proposed by Fama and MacBeth (1973). Pettengill, Sundaram and Mathur (1995) prove that relations between the realized rates of return and the beta coefficients are positively correlated with the sign of the difference between the realized market return and the risk-free rate. Isakov (1999) based on assets listed on the Swiss stock market found a statistically significant positive (negative) relationship between betas and realized returns in the up and down markets, respectively. The approach of conditional relationships is also supported in many studies which illuminate often pessimistic conclusions regarding the CAPM tests (Kim and Zumwald, 1979; Jagannathan and Wang, 1996; Tang and Shum, 2003; Bilgin and Basti, 2014; Markowski, 2019).

The third crucial aspect closely related to the topic of the work is whether changes in market movement has an impact on risk-return relationships. In the other words an important aspect of cross-sectional regressions is to examine the impact of market volatility on the market risk premiums, especially for high frequency data. Galagedera and Faff (2005) defining conditional market volatility by ARCH-type models, found that the beta risk premium under three market volatility regimes is priced but only when market conditions are applied contemporaneously. Nurjannah et al (2012) confirmed previous research and provided further insights in conditional beta-return relation giving an evidence from Indonesian stock market. Abdymomunov and Morley (2011) using Markov-switching process found time variation in betas across volatility and rejected the unconditional CAPM.

Methodology

Unconditional Relationships of Conventional and Downside Risk Pricing

The conditional and unconditional relationships is fulfilled in two-stage procedure. In the first stage, based on an estimation period the systematic risk measures were approximated. In the second stage, in cross-sectional regression the realized excess returns of securities were determined by risk measures of these securities estimated in the first stage of the procedure.

The conventional beta coefficients of individual securities were estimated as follows:

$$R_{it} = \alpha_i + \beta_i R_{Mt} + \xi_{it} \quad (t = 1, \dots, T_e;\ i = 1, \dots, N) \tag{1}$$

where R_{it}, R_{Mt} – rates of return for the *i*-th security and the rate of return of the market portfolio, respectively; α_i – constant term; β_i – beta coefficient of *i*-th security; ξ_{it} – random error term of *i*-th equation; T_e – length of estimation period; N – number of assets in sample.

In addition to estimate from Equation (1) only one value of the beta coefficient (constant beta), the moving regression with rolling window was applicated to determine rolling beta for each testing period.

The verification of pricing relationships in the downside framework is based on the data generating process given as:

$$R_{it} = \alpha_i^d + \beta_i^d \min(R_{Mt}, 0) + \xi_{it} \quad (t = 1, \dots, T_e;\ i = 1, \dots, N) \tag{2}$$

where α_i^d – constant term; β_i^d – downside beta coefficient of *i*-th security. This equation examines the sensitivity of securities' returns to negative returns of market portfolio. The slope coefficient in Equation (2) can be taken as a measure of downside risk due to the fact that

$$\beta_i^d = \beta_i^{BL} - \alpha_i^d E(\min(R_{Mt}, 0))/E(\min(R_{Mt}, 0))^2 \tag{3}$$

where β_i^{BL} is the special case of downside beta coefficient of Bawa and Lindenberg with zero return as the threshold and is given as follows:

$$\beta_i^{BL}(\tau = 0) = \frac{E(R_{it},\ \min(R_{Mt}, 0))}{E(\min(R_{Mt}, 0))^2}. \tag{4}$$

Therefore β_i^d can be used in this research to study the risk-return relationships in the downside approach.

The beta coefficients obtained in Equations (1-2) were used to estimated market risk premiums from unconditional relations in testing period. The cross-sectional models for each observation t from testing period ($t = T_e + 1, \dots, T$) are as follows:

$$R_{it} - R_{ft} = \lambda_{0t} + \lambda_{1t}\hat{\beta}_i + \eta_{it} \quad (i = 1, \dots, N) \tag{5}$$

$$R_{it} - R_{ft} = \lambda_{0t} + \lambda_{1t}\hat{\beta}_i^d + \eta_{it} \quad (i = 1, \dots, N) \tag{6}$$

where R_{ft} denotes risk-free rate; $\lambda_{0t}, \lambda_{1t}$ – parameters of t-th equation; η_{it} – random error term of t-th equation; T – the whole period length.

The relationships (5-6) implicate the testable hypotheses regarding asset pricing theory. The average values of parameter λ_1 should correspond to the market risk premium for conventional and downside risk and these premiums are expected to be positive. The relevant statistical hypotheses are as follows:

$$H_0: E(\lambda_1) = 0 \qquad H_1: E(\lambda_1) > 0\,. \tag{7}$$

In addition, since the asset uncorrelated with the market portfolio has the expected rate of return equal to the risk-free rate, the average value of parameter λ_0 should be statistically insignificant which means that:

$$H_0: E(\lambda_0) = 0 \qquad H_1: E(\lambda_0) \neq 0\,. \tag{8}$$

The hypotheses in (7-8) were tested using *t* test for average value with a one-sided or two-sided critical area.

Conditional on Market Volatility Relationships of Risk Pricing

Conditional pricing relationships involve separate testing of individual versions of this model in the situation of high and low conditional market volatility regimes. Conditional, due to the market volatility, the standard testing equations are given as follows:

$$R_{it} - R_{ft} = \nu\lambda_{0t}^H + (1-\nu)\lambda_{0t}^L + \nu\lambda_{1t}^H\hat{\beta}_i + (1-\nu)\lambda_{1t}^L\hat{\beta}_i + \eta_{it} \tag{9}$$

$$R_{it} - R_{ft} = \nu\lambda_{0t}^H + (1-\nu)\lambda_{0t}^L + \nu\lambda_{1t}^H\hat{\beta}_i^d + (1-\nu)\lambda_{1t}^L\hat{\beta}_i^d + \eta_{it} \tag{10}$$

where ν is a dichotomous variable used to determine the observation day with high market volatility ($\nu = 1$ if $\sigma_t^2 > \sigma_{0.5}^2$ or $\sigma_t^2 > \sigma_{0.75}^2$) and the observation day with low market volatility ($\nu = 0$) in otherwise, where σ_t^2 is the conditional variance of market returns and $\sigma_{0.5}^2, \sigma_{0.75}^2$ are the median and the third quartile of conditional market series; $\lambda_{0t,}^H \lambda_{0t}^L, \lambda_{1t}^H, \lambda_{1t}^L$ – parameters of t-th equation; η_{it}– random error term of t-th equation.

Hypotheses regarding parameters λ_{1t}^H and λ_{1t}^L are the same as the hypotheses written for unconditional relationships in (7-8). Rejection of null hypotheses in both cases (high and low market volatility) indicate the occurrence of systematic, conditional relations between the risk measures and realized rates of returns.

Finally, the conditional relationships based on market volatility and market condition were estimated during the testing period in each observation interval as follows:

$$R_{it} - R_{ft} = \nu\delta\lambda_{0t}^{HU} + (1-\nu)\delta\lambda_{0t}^{LU} + \nu(1-\delta)\lambda_{0t}^{HD} + (1-\nu)(1-\delta)\lambda_{0t}^{LD} +$$

$$\nu\delta\lambda_{1t}^{HU}\hat{\beta}_i + (1-\nu)\delta\lambda_{1t}^{LU}\hat{\beta}_i + \nu(1-\delta)\lambda_{1t}^{HD}\hat{\beta}_i + (1-\nu)(1-\delta)\lambda_{1t}^{LD}\hat{\beta}_i + \eta_{it} \quad (11)$$

where δ is a dichotomous variable used to determine the positive and negative market excess return, then $\delta = 1$ if $R_{Mt} - R_{ft} > 0$ (up market) and $\delta = 0$ if $R_{Mt} - R_{ft} < 0$ (down market); $\lambda_{0t,}^{HU} \lambda_{0t}^{LU}, \lambda_{0t}^{HD}, \lambda_{0t}^{LD}, \lambda_{1t}^{HU}, \lambda_{1t}^{LU}, \lambda_{1t}^{HD}, \lambda_{1t}^{LD}$ – parameters of t-th equation; η_{it}– random error term of t-th equation.

Regardless of the market volatility an inverse relationship between the beta coefficient and realized returns should be expected when the market excess return is negative. In periods with positive market excess return this relationship should obviously be positive. This approach for average parameters λ_1^U, λ_1^D in the case of beta coefficient and co-kurtosis is result in hypotheses as follows:

$$H_0: E(\lambda_1^{HD}) = 0;\ H_1: E(\lambda_1^{HD}) < 0 \ \text{ and } \ H_0: E(\lambda_1^{LD}) = 0;\ H_1: E(\lambda_1^{LD}) < 0 \quad (12)$$

$$H_0: E(\lambda_1^{HU}) = 0;\ H_1: E(\lambda_1^{HU}) > 0 \ \text{ and } \ H_0: E(\lambda_1^{LU}) = 0;\ H_1: E(\lambda_1^{LU}) > 0\,. \quad (13)$$

Rejection of null hypotheses in both cases indicates the occurrence of systematic relations between beta coefficient and the realized returns of securities.

Data

A dataset includes a full-time series of daily log returns of 16 securities quoted on the Warsaw Stock Exchange and belonging to the index WIG20. The time period is from January 3, 2011 to December 30, 2019 what spans 2244 observations. The WIG index is used as the market portfolio approximation and the proxy for the risk-free rate was the Warsaw Interbank Offer Rate (WIBOR 3M) for a three-month investment. All data were obtained from the EMIS database. According to the adopted methodology, the period sample was divided into two sub-periods. The first of them (2011) was the period of estimation, while the second one (2012-2019) was the period of CAPM testing. The above division does not apply to the use of moving regressions for which the rolling window comprise 252 observations, that is about one year. The number of the observations in individual parts of testing period are presented in Table 1.

Table 1: The number of observations for testing period of conditional CAPM relationships

Market volatility	Market condition	Median	Third Quartile
High volatility	Up market	542	279
	Down market	454	219
Low volatility	Up market	491	754
	Down market	505	740

Source: own study.

For modelling conditional volatility of WIG returns was used GARCH(1, 1) process with mean equation $R_{Mt} = \mu + \varepsilon_t$ and conditional variance equation $\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \sigma_{t-1}^2$. The estimates were: $\mu = 0.000220$, $\alpha_0 = 0.000003$, $\alpha_1 = 0.045088$, $\alpha_2 = 0.919455$ and statistically significant at the 1 per cent level. Based on the value of conditional variance and its median and third quartile, observations with low and high market volatility were distinguished. The up and down market condition are an observation with positive $(R_{Mt} - R_{ft}) > 0$ and negative $(R_{Mt} - R_{ft}) < 0$ market excess returns.

Results and Discussion

In the first step, unconditional risk-return relations in both conventional and downside risk are discussed (Tab. 2-3). Estimates of models (5-6) reveal that there are statistically significant positive relations at the 5 per cent level between systematic risk and returns only in the downside framework and using constant beta approach. Downside risk results refer to the study of Ang et al (2006) and Lee et al (2008). The contradiction between these results and CAPM theory arise from overlapping risk premiums estimated in periods with positive and negative market excess returns. These results are partly consistent with Nurjannah et al (2012) where the significance of the premium for both types of risk were not confirmed.

Table 2: Estimates of unconditional CAPM relations in the conventional framework

Coefficient	**Mean**	***t*-Stat**	***p-value***
Model: $R_{it} - R_{ft} = \lambda_{0t} + \lambda_{1t}\hat{\beta}_i + \eta_{it}$,			
Rolling betas			
λ_{0t}	0.0004	0.902	0.367
λ_{1t}	-0.0002	-0.467	0.679
Constant betas			
λ_{0t}	-0.0001	-0.389	0.697
λ_{1t}	0.0003	1.390	0.082***

*Notes: *, **, *** indicates significance at the 1%, 5% and 10%, respectively.*
Source: own study.

Table 3: Estimates of unconditional CAPM relations in the downside framework

Coefficient	**Mean**	***t*-Stat**	***p-value***
Model: $R_{it} - R_{ft} = \lambda_{0t} + \lambda_{1t}\hat{\beta}_i^d + \eta_{it}$,			
Rolling betas			
λ_{0t}	0.0001	0.236	0.813
λ_{1t}	0.0001	0.224	0.411
Constant betas			
λ_{0t}	-0.0003	-0.948	0.343
λ_{1t}	0.0004	2.037	0.021**

*Notes: *, **, *** indicates significance at the 1%, 5% and 10%, respectively.*
Source: own study.

The support for downside risk was obtained using average returns of portfolios based on six companies with the highest and lowest conventional and downside beta coefficients. Mean returns for sorted securities are presented in Fig. 1 and the Table 4 shows results for composed portfolios.

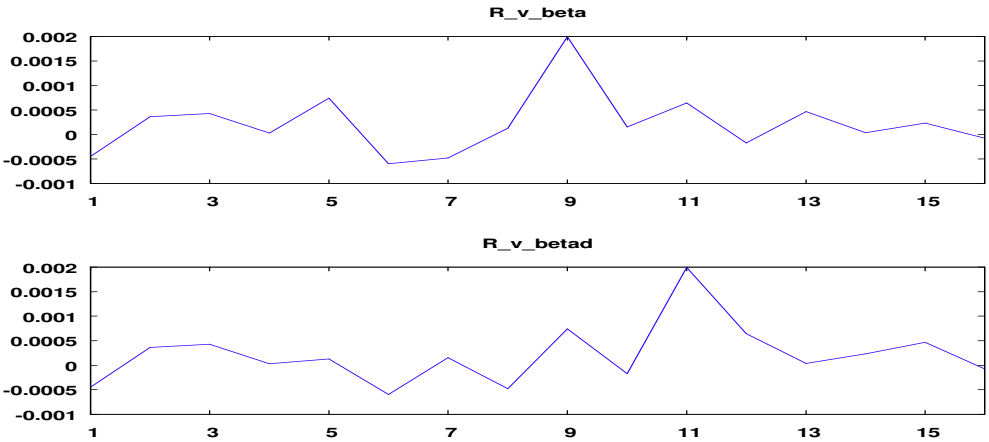

Fig. 1: Average returns of securities sorted by beta and downside beta coefficient

Source: own study.

Table 4: Return and risk level in the conventional and downside framework

Risk level	Securities	Average beta	Average return
Securities sorted by conventional beta			
Low risk	Orange Polska, Cyfrowy Polsat, CCC, PGNiG, LPP, Tauron Polska Energia	0.911	0.000088
High risk	Grupa Lotos, Bank Pekao, PKN Orlen, PKO BP, mBank, KGHM	1.293	0.000188
Spread		0.382	0.000100
Average return per unit of risk		0.00026	
Securities sorted by downside beta			
Low risk	Orange Polska, Cyfrowy Polsat, CCC, PGNiG, PZU, Tauron Polska Energia	1.239	-0.000014
High risk	CD Projekt, Grupa Lotos, PKO BP, mBank, PKN Orlen, KGHM	1.764	0.000549
Spread		0.525	0.000563
Average return per unit of risk		0.00107	

Source: own study.

Using the downside beta, the composition of high and low risk portfolios changes and differ from one asset. As a result, the difference in spread of risk is relatively lower than the difference in return. In the consequence the return per unit of downside risk (0.00107) is several times higher than the ratio for conventional beta coefficient (0.00026) and thus portfolio based on downside risk is more effective than portfolio based on conventional risk.

The conditional cross-sectional regressions are further continuation of the research where the market movement as measured of conditional volatility were considered. The estimates of risk premiums in high and low market volatility regime (median and third quartile thresholds) are presented in Tables 5-6. The premiums for CAPM beta risk are positive and statistically significant but only for periods with high volatility determined by third quartile. Therefore, the results cannot support the relationship between conventional systematic risk and realised returns conditional on market volatility. For downside risk the results are more convincing. The premium associated with downside risk is statistically

significantly different from zero (at the level of 10%) both two market volatility of third quartile regime and under assumption of using of constant beta. The obtained results are partly consistent with estimates of conditional relationships with respect to the market volatility in Indonesian Stock Exchange (Nurjannah et al., 2012).

Table 5: Estimates of conditional on market volatility CAPM relations in the conventional framework

Market volatility	Coefficient	Median			Third Quartile		
		Mean	*t*-Stat	*p-value*	Mean	*t*-Stat	*p-value*
Model: $R_{it} - R_{ft} = \nu\lambda_{0t}^{H} + (1-\nu)\lambda_{0t}^{L} + \nu\lambda_{1t}^{H}\hat{\beta}_i + (1-\nu)\lambda_{1t}^{L}\hat{\beta}_i + \eta_{it}$							
Rolling betas							
High volatility $\nu = 1$	λ_{0t}^{H}	0.0003	0.525	0.600	-0.0004	-0.398	0.691
	λ_{1t}^{H}	0.0003	0.502	0.308	0.0015	1.567	0.059***
Low volatility $\nu = 0$	λ_{0t}^{L}	0.0005	0.760	0.447	0.0007	1.349	0.177
	λ_{1t}^{L}	-0.0007	-1.254	0.894	-0.0008	-1.641	0.949
Constant betas							
High volatility $\nu = 1$	λ_{0t}^{H}	0.0002	0.498	0.618	0.0007	1.008	0.314
	λ_{1t}^{H}	0.0006	1.536	0.062***	0.0006	1.323	0.093***
Low volatility $\nu = 0$	λ_{0t}^{L}	-0.0005	-1.103	0.270	-0.0004	-1.125	0.261
	λ_{1t}^{L}	0.0002	0.435	0.332	0.0002	0.817	0.207

*Notes: *, **, *** indicates significance at the 1%, 5% and 10%, respectively.*
Source: own study.

Table 6: Estimates of conditional on market volatility CAPM relations in the downside framework

Market volatility	Coefficient	Median			Third Quartile		
		Mean	*t*-Stat	*p-value*	Mean	*t*-Stat	*p-value*
Model: $R_{it} - R_{ft} = \nu\lambda_{0t}^{H} + (1-\nu)\lambda_{0t}^{L} + \nu\lambda_{1t}^{H}\hat{\beta}_i^{d} + (1-\nu)\lambda_{1t}^{L}\hat{\beta}_i^{d} + \eta_{it}$							
Rolling betas							
High volatility $\nu = 1$	λ_{0t}^{H}	0.0002	0.381	0.703	-0.0004	-0.454	0.650
	λ_{1t}^{H}	0.0003	0.665	0.253	0.0012	1.660	0.048**
Low volatility $\nu = 0$	λ_{0t}^{L}	0.0003	0.475	0.647	0.0005	0.981	0.327
	λ_{1t}^{L}	-0.0004	-0.996	0.840	-0.0004	-1.288	0.901
Constant betas							
	λ_{0t}^{H}	0.0001	0.110	0.912	0.0006	0.831	0.406

High volatility $\nu = 1$	λ_{1t}^{H}	0.0006	1.950	0.026**	0.0006	1.364	0.086***
Low volatility $\nu = 0$	λ_{0t}^{L}	-0.0007	-1.501	0.133	-0.0006	-1.685	0.092***
	λ_{1t}^{L}	0.0003	0.937	0.174	0.0004	1.503	0.066***

*Notes: *, **, *** indicates significance at the 1%, 5% and 10%, respectively.*
Source: own study

The final part of the analyses were cross-sectional regressions considering both market volatility and market condition according to the relation (11). These analyses provide important practical implication on the relationship between the realised returns and the CAPM beta and they are presented in Table 7. The beta risk premiums are statistically significant at the 1 per cent level. In the high and low volatility regimes, these premiums are positive (negative) in the up (down) market, that is, what was expected. It should be noted that the absolute values of the market risk premium based on rolling betas were higher than the premiums estimated in constant beta approach.

Table 7: Estimates of conditional on market volatility CAPM relations in the conventional framework

Market volatility	**Market condition**	**Coef.**	**Median**			**Third Quartile**		
			Mean	***t*-Stat**	***p-value***	**Mean**	***t*-Stat**	***p-value***
Model: $R_{it} - R_{ft} = \nu\delta\lambda_{0t}^{HU} + (1-\nu)\delta\lambda_{0t}^{LU} + \nu(1-\delta)\lambda_{0t}^{HD} + (1-\nu)(1-\delta)\lambda_{0t}^{LD} + \nu\delta\lambda_{1t}^{HU}\hat{\beta}_i + +(1-\nu)\delta\lambda_{1t}^{LU}\hat{\beta}_i + \nu(1-\delta)\lambda_{1t}^{HD}\hat{\beta}_i + (1-\nu)(1-\delta)\lambda_{1t}^{LD}\hat{\beta}_i + \eta_{it}$								
Rolling betas								
High volatility $\delta = 1$	Up market $\delta = 1$	λ_{0t}^{HU}	0.0018	1.976	0.048**	0.0011	0.818	0,414
		λ_{1t}^{HU}	0.0057	6.845	0.000*	0.0069	5.633	0.000*
	Down market $\delta = 0$	λ_{0t}^{HD}	-0.0014	-1.547	0.122	-0.0023	-1.578	0.116
		λ_{1t}^{HD}	-0.0062	-7.563	0.000*	-0.0054	-4.213	0.000*
Low volatility $\delta = 0$	Up market $\delta = 1$	λ_{0t}^{LU}	0.0020	2.275	0.023**	0.0022	3.070	0.002*
		λ_{1t}^{LU}	0.0041	5.250	0.000*	0.0042	6.590	0.000*
	Down market $\delta = 0$	λ_{0t}^{LD}	-0.0010	-1.155	0.249	-0.0009	-1.254	0.210
		λ_{1t}^{LD}	-0.0053	-7.123	0.000*	-0.0059	-9.600	0.000*
Constant betas								
High volatility $\delta = 1$	Up market $\delta = 1$	λ_{0t}^{HU}	0.0059	10.581	0.000*	0.0071	8.671	0.000*
		λ_{1t}^{HU}	0.0025	5.207	0.000*	0.0018	2.628	0.004*
	Down market $\delta = 0$	λ_{0t}^{HD}	-0.0066	-10.532	0.000*	-0.0075	-8.089	0.000*
		λ_{1t}^{HD}	-0.0017	-3.371	0.000*	-0.0022	-1.733	0.042**
Low volatility $\delta = 0$	Up market $\delta = 1$	λ_{0t}^{LU}	0.0043	7.374	0.000*	0.0044	9.593	0.000*
		λ_{1t}^{LU}	0.0022	4.385	0.000*	0.0026	6.378	0.000*
	Down market $\delta = 0$	λ_{0t}^{LD}	-0.0051	-9.200	0.000*	-0.0053	-11.447	0.000*
		λ_{1t}^{LD}	-0.0018	-3.654	0.000*	-0.0021	-5.041	0.000*

*Notes: *, **, *** indicates significance at the 1%, 5% and 10%, respectively.*
Source: own study.

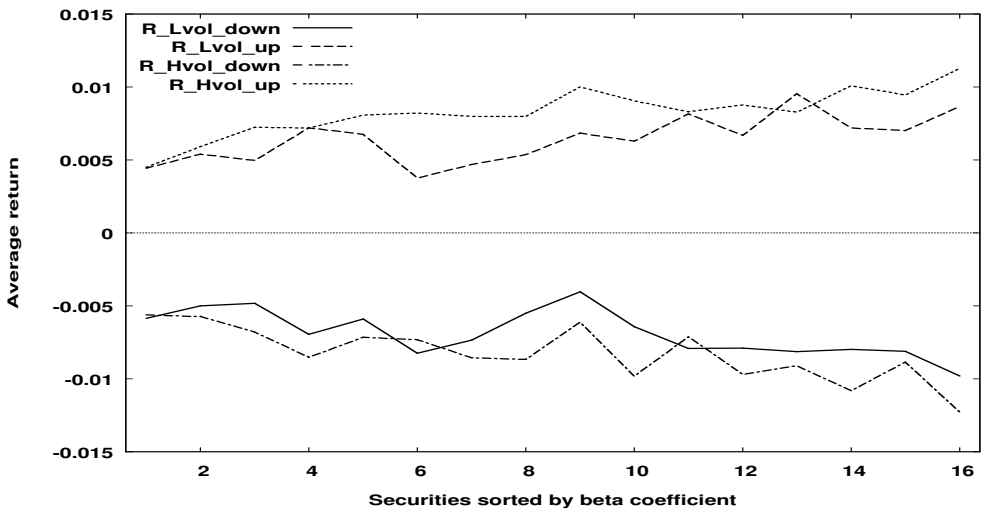

Fig. 2: Average returns of securities sorted by beta coefficient in different volatility regimes and other market conditions

Source: own study.

Empirical correspondence of the results with capital asset pricing model in the context of expected values is presented in Fig. 2. The study finds the positive relationship between beta coefficients and expected rates of return in periods of positive market excess return and negative relation in periods of negative market excess return, under the two volatility thresholds. The results give the strong evidence that the higher the beta values, the higher the absolute average returns. This means that on the Polish capital market the market risk is dependent on the market volatility and market condition.

Conclusion

The paper presents research verifying the pricing of the biggest securities listed on the Warsaw Stock Exchange in the context of the CAPM model. In this study, the unconditional risk-return relationships were estimated using classical and downside measures and conditional relations not only in terms of market volatility and additionally, the market condition.

This research provided some important findings. The unconditional relations reveal that the downside beta is a more appropriate risk measure than their classical counterpart. The downside risk premiums in using constant beta approaches are significantly positive which means, that the downside risk is priced in Polish stock market. The conditional cross-sectional regressions demonstrate that the asset pricing is insignificant and independent on market volatility in conventional risk approach. When the downside systematic risk was arranged the positive and significant risk premiums were observed in two volatility regimes under third quartile threshold. While the market condition is incorporated as the conditioning variable the beta factor acquire significance. Beta coefficients generate positive premiums in the up market and high and low volatility periods and negative premiums in the down market and high and low volatility periods.

Conditional relationships confirmed the validity of assets pricing in accordance with the CAPM postulates, which was often rejected in many tests of this theory. The study proves that the measures of systematic risk such as the beta coefficient in conventional and downside approach are appropriate risk factors of asset pricing. Additionally, the pricing model is much more sensitive to market condition than market volatility.

Endnotes

The Bawa and Lindenberg (1977) coefficient based on the lower partial moments (Rutkowska-Ziarko et al, 2019) assume risk-free rate as the threshold: $\beta_i^{BL}(\tau = R_f) = \frac{E[(R_{it}-(R_f))\min(R_{Mt}-(R_f);0)]}{E[\min(R_{Mt}-(R_f);0)]^2}$. Other downside beta coefficient with the mean return as the threshold was proposed by Harlow and Rao (1989) and it is given by: $\beta_i^{HR} = \frac{E[(R_{it}-E(R_i))\min(R_{Mt}-E(R_M);0)]}{E[\min(R_{Mt}-E(R_M);0)]^2}$.

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The Correctness of the Organisational Structure

Marian HOPEJ
Wroclaw University of Science and Technology, Wroclaw, Poland
e-mail: marian.hopej@pwr.edu.pl

Magdalena HOPEJ-TOMASZYCKA
General Tadeusz Kościuszko Military University of Land Forces, Wroclaw, Poland
magdalena.hopej-tomaszycka@awl.edu.pl

Anna ZGRZYWA-ZIEMAK
Wroclaw University of Science and Technology, Wroclaw, Poland
anna.zgrzywa-ziemak@pwr.edu.pl

Abstract

The article is an attempt to answer the question about the correctness of the organisational structure. The dominant literature view on structural solution correctness is based on the situational approach, standing that the structure is appropriate when it is adjusted to both external and internal circumstances. In the article, the shortcomings of situational appropriateness of the structure are discussed: the adjustment of the structure and context to each other is considered statically, conflicting demands on the shaping of different features of the structure and limited rationality of decision makers. Based on principle of the simplicity of the structural solution, the attempt to correctness of the structural solution, taking into account the time factor and – to a greater extent – the realities of management decisions, is developed.

Keywords: Organisational Structure, Simplicity, Management.

Introduction

The organisational structure is an element of every organisation – a fundamental instrument of the management process. This process, in turn, influences the executive process, thus determining the efficiency of functioning and the development of the organisation.

It is assumed that the organisational structure (i.e. a structural solution) is a set of rules organising the behaviours of the organisation members, which are, to some extent, are of a formal nature, i.e. they are introduced officially. Sometimes, however, they arise spontaneously and turn out to be appropriate in everyday work. Such informal rules are as if they were behind the scenes and are an additional source of orientation patterns and expectations that usually correspond to formal rules (Steinmann and Schreyögg, 2001).

The structured organisational rules set out the ways in which members operate, making their activities more predictable. This limits the freedom of action. Moreover, the more rules there are, the more work and management is devoid of the stigma of individuality (Steinmann and Schreyögg, 2001).

Many literature reports assume that the structure is correct or, as the representatives of the situational approach to management science would put it, appropriate when it is adjusted to both external and internal circumstances (Pugh *et al*, 1968; Kieser and Kubicek, 1983; Donaldson, 2006). It means that:

- Such an organisational structure is adapted to the organisation's environment and its other elements, which, according to Leavitt (1965) are people, goals and technology. More specifically, its features are adapted to the characteristics of the environment and the other elements of the organisation that form the context of the structure.

- There is a kind of mapping relationship between the organisational structure and its context at some "t" point. The structure and context are then entirely appropriate for each other since the adjustment value is maximum.

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Such an understanding of correctness (appropriateness) is treated as a point of departure for research on organisational structures within the framework of the already mentioned situational approach – one of the main strands of research projects concerning structural solutions. Such undertakings focus on looking for the answers to the question of what factors shape the structure. Scholars working within this strand aim at detecting general regularities of structural solutions as a certain whole or particular dimensions depending on situational conditions (Nalepka and Kozina, 2007).

However, the situational appropriateness of the structure is not free from certain doubts and shortcomings. It pertains to the following points:

- The adjustment of the structure and context to each other is considered statically. However, what we deal with it is the entanglement of structure in time. In any of its states, references can be found not only to the present structure-forming pressures but also to the past because the development of a structural solution is characterised by interactive continuity (Mreła, 1983). Moreover, there are also references to the future when the forecast of its conditions is taken into account when making changes.

- The full (total) appropriateness of the structure is also a theoretical construct, abstracted from reality since its contextual features may place conflicting demands on the shaping of the features of the structure. In such a situation, adapting the structure and context to each other requires the use of simplified models of both sets, which consequently leads to the fact that a given state of context is accompanied not by one state but by a set of permissible structure states.

- Obviously, it is underestimated that it is people – not its context – who shape and modify structural solutions. According to the theory of limited rationality, it is, therefore, unrealistic to demand the optimisation of decisions concerning the function of organising activities.

This calls for a new look at the correctness of the organisational structure, at least partially devoid of the shortcomings that have been signalled. More specifically, it seems necessary to answer the question concerning the correctness of the structural solution, which should take into account the time factor and – to a greater extent – the realities of management decisions. Thus, the purpose of this article is to attempt to answer this question. This attempt is based on the principle of the simplicity of the structural solution, which will be presented in the first part of the study. The second part of this paper is dedicated to the presentation of the concept of the simplification of the structure and its suitability.

The principle of a Simple Organisational Structure

It is assumed that simplicity is "(...) a feature of a complex object being an element, and in the case of a complex object having a (relatively) small number of elements or relations between them which do not differ in terms of their characteristics" (Pszczołowski, 1978, p. 190). Simplicity understood in this way is a relative concept. Thus, what is simple for one person is not necessarily so for another person.

Therefore, if the structure is made up of organisational rules, in a simple solution, there are few of them. The image of the simple solution is quite similar in many literary reports (Table 1) – it is based on the model of a simple structure developed by Mintzberg (1979). The so-called strategic apex (no middle management), with broad decision-making powers, is of crucial importance and the main instrument of coordination is direct supervision. The activities performed are characterised by low specialisation, standardisation and formalisation. Most often, such a solution can be found in small and young organisations operating in a dynamic environment. Over time, it tends to bureaucratise its solutions.

Table 1: simple organisational structure according to some authors

Author(s)	Simple organisational structure
Hopej-Kamińska *et al* (2015, p. 265)	A flat structural solution, characterized by small number of hierarchical levels and a large span of control, low degree of centralization, formalization, specialization and standardization
Pawlak and Smoleń (2008, p. 109)	A small number of positions, organisational units, organisational ties
Robbins and DeCenzo (2002, p. 245)	Low degree of specialisation, formalisation, flattened hierarchy,

	significant centralisation
Sobczak (2006, pp. 277-278)	Low degree of internal differentiation, high degree of centralisation
Zakrzewska-Bielawska (2012, p. 295)	Small number of management levels, low degree of specialisation, variable centralisation

Source: based on the literature reports cited

If one person sets the rules and everyone else has to obey them, there is little room for manoeuvre under these conditions. It is undoubtedly greater when coordinating activities not through direct supervision but through the mechanism of mutual adjustment, consisting of direct arrangements among participants in the organisation during their work. The calculations carried out using the fatal calculus indicate that the structural solution is simpler because along with the decrease in the intensity of direct supervision, simplicity increases and it decreases (complexity increases) when intensity increases (Hopej-Kamińska *et al*, 2015). A simple structure is, therefore, not a centralised solution but a decentralised one, expediting the decision-making processes.

A structure similar to the simple one is the solution that Silbiger (2014) described as amorphous. It gives the members of the organisation a great deal of freedom in decision-making and action, allowing them to establish and terminate organisational relations depending on the current requirements related to their tasks. When Facebook started, it was organised in this way. The opposite is the complex structure, characterised by an extensive and complex hierarchy, a high degree of specialisation, centralisation, formalisation and standardisation. An example is a multi-line, bureaucratic tensor solution.

Simple and complex structural solutions are the extremes of the continuum of organisational structures presented in Figure 1.

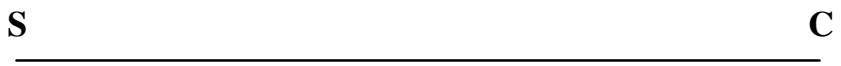

Fig. 1: A continuum of organisational structures

Source: the author's own study

Moving it towards the S-point means an increase in simplicity while moving it away from the S-point stands for an increase in the complexity of the structural solution. Some of its symptoms are listed in Table 2.

Table 2: some symptoms of the increased complexity of the organisational structure

Increase in complexity	Symptoms
Increase in the degree of specialisation, centralisation, formalisation and standardisation and the expansion of the organisational hierarchy	• Increase in the inertia, friction and sluggishness of the organisation
	• Generating "noise" in information channels, distorting information
	• Focusing members' attention on irrelevant problems
	• The decreased rationality of decisions taken
	• The decreased motivation for work
	• Monotony, physical and mental fatigue
	• The reduction of members' commitment to common goals
	• Lowered ability to respond to new problems
	• Learned incapability
	• The vicious circle of bureaucracy
	• Many meetings with many people
	• The need for employing specialists and coordinators
	• More discussion than action

Source: based on Hopej and Kandora, 2019.

Thus, one question can be asked: what should the organisational structure be in terms of simplicity? It should be emphasized that although there is a growing amount of research on the relationship between the simplicity of structural solutions and contextual factors, there is still little of it. To paraphrase the words attributed to Einstein

("everything should be made as simple as possible, but no simpler"), one can assume that the structure should be as simple as possible but not simpler. Thus, it should be:

- an element of the set of structural solutions allowed by its context;
- the simplest solution of this set, i.e. located on the continuum closest to the P point (characterised by the least developed hierarchy and the lowest degree of specialisation, centralisation, standardisation and formalisation).

This raises another question: what does the simplicity of the organisational structure depend on? The research carried out on a sample of 100 companies assumed that it depends on 11 factors, distinguished mainly on the basis of the four-element organisation model devised by Leavitt (1965). The research covered business organizations operating in Poland, employing at least 10 people. One survey was filled in by each organization. Higher-level managers or other people who have a broad view of the entire enterprise were the respondents (it was assumed that such a person, in addition to the president and his/her deputy, could be, for instance, an organizational specialist, a business process management specialist, a quality specialist, *etc.*). Due to the purpose of the study, the sample was not representative. First of all, the aim was to obtain numerically similar groups as far as their sizes and significant diversification in terms of their activity type.

The regression analysis performed for particular structural characteristics (the step-by-step regression method was applied) revealed the following phenomena:

- The hierarchy is explained in 47% (adjusted R2=0.473) by four variables (factors), i.e. employment size, income level, the degree of the diversification of activities and the management's desire to simplify the organisation. This means that the hierarchy is, therefore, less developed, the smaller the organisation (due to the number of its members and revenues)is, the less diversified the business activity is and the stronger the management's drive to simplify the organisation.
- The degree of centralisation is explained in 19% (adjusted R2=0.191) by manufacturing technology, employment size, organisational culture and the period of the operation of the enterprise (the more non-routine the technology, the bigger and younger the enterprise and the more open the organisational culture is, the lower the degree of centralisation is).
- The degree of specialisation is explained in 65% (adjusted R2=0.649) by manufacturing technology. Thus, the more non-routine the technology is used, the simpler the structure is in terms of the specialisation of activities.
- The degree of formalisation is explained in 43% (adjusted R2=0.433) by employment size, the organisation's dependence on its environment and the management's desire to simplify the organisation.
- The degree of standardisation is explained in 20% (adjusted R2=0.203) by manufacturing technology and employment size, i.e. the more non-routine the technology and the smaller the organisation, the simpler the organisational structure is in terms of standardisation.

What would, therefore, result from this is that the simplicity of the organisational structure is linked to such factors as the size of the organisation, the manufacturing technology used, the diversification of activities, organisational culture, the involvement of management in simplifying the organisation or its dependence on its environment. However, in the light of the research, no factor is the predictor of all dimensions (characteristics) of the structure (Kaminska-Hopej *et al*, 2015).

Research by Davis *et al* (2009) prove, by means of simulation methods, that it is necessary to adjust between the simplicity of the organizational structure, the organizational strategy and the dynamics of the environment in the context of coping with the tension between flexibility and organizational performance.

In turn, e Cunha and Rego (2010) postulate a match between the simplicity of a structural solution, the complexity of the workforce and the complexity of the environment. Empirical research by Tworek *et al* (2019) confirmed the match between the degree of simplicity of the structure, the complexity of the workforce and the features of the environment, however, only in a complex, dynamic and uncertain environment such a fit led to high organizational results, in other conditions the relationship between this fit and the results was ambiguous.

Simplifying the Organisational Structure

The changing external and internal conditions of organisational structures are the reason why organisations often change them. However, their management receives conflicting signals as to when and how to do it. It also, and perhaps even more importantly, pertains to whether a new structural solution is necessary or whether a modification of the existing one is sufficient.

One of the most interesting answers to this question that has been recently formulated is the concept developed by Girod and Karim (2017). They distinguished two types of reorganisation – restructuring and reconfiguration. Restructuring entails changing the structural archetype of the organisation, i.e. adopting a new type of structural solution while reconfiguration is an evolutionary change, not affecting the foundations of the organisational structure.

Both types of such a change aim to increase the organisation's innovation. The authors referred to above write that "(...) success in this field almost always depends on circumstances. Organisations need to shake up their structures from time to time to get rid of the organisational cholesterol – that is, inertia, cumbersome procedures and arrangements that gradually weaken the pace of growth – to change the strategic direction in the face of a profound transformation of the industry. Besides, in the era of the unsustainable competitive advantage, companies must constantly adapt to market changes through small-scale reconfigurations. The leaders of organisations should not choose between revolution and evolution. They must subject their businesses to both processes in the right way and at the right time" (Girod and Karim, 2017, p. 78).

Due to the tensions and uncertainties that accompany any revolutionary change, Girod and Karim are of the opinion that it is vital to keep subsequent restructurings separate for at least five years because if too many structural solutions are tried out in too short a period, chaos creeps into the organisation. It should also be remembered that after restructuring, a new organisational culture is often necessary. It also refers to new processes and operating systems.

In addition, the right rhythm of reconfiguration needs to be found as too few reconfigurations lead to the risk of not gaining sufficient experience and thus, to making those reconfigurations irrational. At the same time, however, too frequent reconfigurations can cause overload with changes. There is also a danger that they will take the form of a snowball, unintentional restructuring (Girod and Karim, 2017).

However, it should be stressed that the concept of balancing between evolutionary and revolutionary changes in the organisational structure is consistent with the principle of simplicity understood in the following manner:

- all changes involve adapting structural solutions to their external and internal conditions;
- the need to get rid of "the organisational cholesterol" from time to time, manifesting itself as a hindrance to innovative activities, is emphasised;
- the postulate of a proper rhythm of reorganisation is formulated; it manifests itself in the abandonment of the strategy of continuous change.

However, the principle of simplicity may also be the basis for certain complementation of the concept developed by Girod and Karim. It is linked to the following aspects:

- Both restructuring and reconfiguration should result in the most flexible structural solution, which is possible in a given context. However, when making a decision, one may encounter barriers that limit its rationality. Overcoming them requires, above all, that the bureaucracy be treated as an enemy which must be fought absolutely. It is well understood, among others, by J. Welch, who once asked by a college student about what he should do when encountering bureaucracy in a large organisation, advised him to throw a grenade there. He believed that releasing people's potential is inextricably linked to removing harmful bureaucracy by giving people the freedom to decide and act (Krames, 2005).
- Although people can adapt to change and do it better and better, they also need peace and stability to be able to act effectively. Therefore, it seems that limiting the number of structure changes should be as far-reaching as possible. Good surgeons know that if an operation is not necessary, it should not be performed. Managers do the same thing, simplifying their work and lives. They do not want

"everything to be in motion all the time". Instead, they change structural solutions only when they have to do so, after best planning the change and employing the protective measures (Malik, 2015). This point of view is supported by the results obtained by McKinsey's analysts, which show that changes should only be made if there is clear evidence that the current structural solution is inappropriate and if it is not possible to overcome specific inadequacies with less intrusive actions (Fraser and Strickland, 2006).

- The actions to simplify the organisational structure may be carried out not only by the organisation's management but also by other participants, within the limits of their powers. They should, however, be preceded by the process of agreeing on the amendment with all those concerned as well as with those who have some expertise in this field. Naturally, the more important the change, the wider the network of arrangements should be imposed, including, if necessary, the supervisor.

Although the idea of removing the structural burden within self-organisation is not complicated, its implementation is not easy. It can take the form of a permanent routine, based on an appropriate level of the so-called productive organisational energy. It can be mobilised both by communicating the risks associated with complexity and by making people aware of the opportunities associated with simplicity. In each case, it is desirable to evoke the desired emotions and link them to the simplicity (complexity) of the structure so that those emotions can be spontaneously become activated by people when coming in contact with it. The concept of the prevention and removal of the structural burden is discussed in the literature (Hopej and Kandora, 2019).

In the light of the above, the following statement can be formulated: in making (both evolutionary and revolutionary) structural changes which is in line with the principle of simplicity, what seems more important is the very process of simplifying and not describing the solutions adopted in detail. The innovative potential of the organisation members which is inextricably connected with this principle may result in various solutions characterised by the least developed hierarchy in the given conditions and the lowest degree of specialisation, centralisation, formalisation and standardisation.

For this reason, the following question can be posed: what is the correct organisational structure? What follows from the above considerations is that its subsequent states must be adapted to the present and future conditions and, at the same time, they need to have the most far-reaching flexibility under these conditions, giving people the possibility of self-organisation. It should be added that as far as it is possible, evolutionary changes should be characterised by continuity, building an organisational identity as an essential factor of its success (Linke *et al*, 2018).

Generally speaking, a structural solution at any "t" time is correct when it is the result of the process of its simplification, which is consistent with the concept outlined above. Moreover, it should be emphasised that this process ought to be based – so to speak – on dedicated organisational staff who maintain a kind of organisation's civic community (Drucker, 1994). Not only does it promote innovative organisational behaviours but it also lowers management costs. Furthermore, this happens when the correlations between structural and contextual characteristics are not particularly high.

Concluding Remarks

The article has been an attempt to answer the question about the correctness of the organisational structure. More precisely, its purpose was to answer the question concerning what structure is correct. The answer can be formulated in the following way: it is correct when its subsequent states are the result of the rational process of simplifying the organisational rules which constitute it. Above all, it manifests itself in the following areas:

- adopting further structural solutions with the greatest possible flexibility which – at the same time – are the least expensive. On the one hand, they should be adapted to the current and future conditions (i.e. context). On the other hand, however, due to the need to take care of the organisation's identity, they should be continuous;

- making both evolutionary and revolutionary changes, the number of which should be limited to the necessary minimum, because who reorganises all the time for the changes themselves causes chaos and risks chronic disorganisation (Kotarbinski, 1973).

There is also one more point which needs a brief remark. The ability to organise, and thus to create and modify the organisational structure, is (or at least it should be) one of the necessary managerial skills. Next to the ability to stimulate the energy of the organisation members by motivating them, the ability to organise efficiently is

increasingly appreciated. Some scholars go even further and view it as a permanent source of competitive advantage in times of a fleeting environment whose complexity and dynamics are the norm (Nadler and Tushman, 1997; Hopej and Kandora, 2019).

It is essential to underline that the research presented above has some limitations. First of all, the research sample was not representative, the research is therefore rather pilot than conclusive. Secondly, the verification is based only on the sample of organizations operating in Poland. The concept requires further verification in different business contexts. Additionally, there are different factors influencing an the simplicity of organisational structure solution. However, it would be advisable to consider in the future the time as an variable. Further research could attempt to test continuity to see changes in organizational structure together while the sets of conditions are changing. Finally, also the features of decision makers would be incorporated in the model to consider the issue of the optimization of decisions concerning the function of organizing activities.

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The Crisis Management but the Civil Protection in Poland

Grzegorz PIETREK

WSB Banking University in Gdansk
Poland, gpietrek@wsb.gda.pl

Abstract

The system of the civil protection in Poland has numerous challenges ahead of it and changes which are necessary. He seems to be essential, in order to execution of tasks associated with the civil protection she was consistent with tasks performed in frames of the act on the crisis management, this way, so that the system of the crisis management harmonized and supplemented taken action in favor of the civil protection. In contingencies they are endangered different values. Mainly for exchange oneself life and human health, possessions in great sizes or also natural environment. The research purpose of the article is to present the essence of crisis management in Poland and the related civil protection issues. On this basis, differences, and similarities in both conceptual and functional layers will be indicated. This will form the basis for conclusions and proposals on the functioning of these security areas in Poland.

In order to achieve the intended research objective, the author in his article first carried out a critical analysis of the literature of the subject, mainly Polish - speaking, since this area concerns the text. The two systems (crisis management and civil protection) were analyzed and compared. Through the use of other research methods, including induction, deduction and synthesis and abstraction, a number of generalizations have been made, allowing for the formulation of final conclusions which synthetically indicate further prospects for system development, integration and evolution.

Keywords: Crisis Management, Civil Protection, Government.

Crisis Management

In the European Union, the emphasis has been laid in a different way. Crisis management is more focused on the political dimension of security than on undertakings which immediately satisfy civilians' needs. Such an approach suggests that the European Union is focused on the limitation of threats, preparation for response and recovery after a particular event to the normal state of affairs. Hence, response has been left to the countries.

"Crisis management" as a term entered the vocabulary for good after the end of the Cold War. This term appeared in place of another, replacing (in many countries) the concept of civil defense, which in its Cold War dimension was exhausted at the end of the twentieth century. For the record, "civil defence" at the end of the Cold War was defined as an undertaking that could significantly reduce the impact of all forms of military action on civilians, including conventional, nuclear, chemical and biological attacks. These projects were generally passive, unrelated to defence activities within the remit of the armed forces.

Considering implementation of humanitarian tasks, civil defence used to perform an important role in civil protection when a threat of the use of mass destruction weapon was real. At that time, considering its basic assumptions, the structures of civil defence were usually located at the ministries of defence. However, in new conditions related to security, it required some changes, because until then civil defence tasks had mainly referred to two or three stages:

- preparation to the global war;
-response to the outbreak of the global war;
-general reconstruction after total destruction (the use of nuclear weapon).

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Hence, preparations were made with regard to the war, with a possibility to use the structures of civil defence during the time of peace. Considering new conditions, there was a number of notions which required redefinition, a number of better solutions to be found and new concepts to be defined. A new integrated system had to be developed, which was supposed to include all the entities and the whole society.
New solutions mainly considered recognition and elimination of risk factors, risk modeling, prevention of threats and recovery after disasters that would be adjusted to the relevant requirements. Such an approach emphasized the universal character of the systemic solutions, integration of the systems in terms of their capabilities to face any dangers and their civil (non-military) character.

The first specified concept refers to the suggestion presented by FEMA (the Federal Emergency Management Agency) in the USA. The concept presents a closed cycle of crisis activities consisting of four stages:

- mitigation;
- preparedness;
- response;
- recovery.

Each of the stages has been assigned with 12 to 15 undertakings which provide them with the required efficiency. Crisis management has already gone through numerous modifications. In 2007 in the USA, under the supervision of FEMA, a group of specialists and scientists developed general principles which since then have been adapted in various countries. These are namely:

1. universality – it refers to all threats, all stages, all entities responsible (threat addressees) and those exposed to risk;
2. development capabilities – undertaken activities optimise readiness. A society is developed which is resistant to catastrophes and which can face difficult situations;
3. risk – endurance – the use of risk management achievements for the development of priority rankings and for the securing of resources;
4. integrity – making all the levels of authority, all the elements and links of a society concentrate their efforts on the priority aims;
5. cooperation – development and implementation of broad, transparent relations which are based on honesty, including team work performed by individuals, communities, teams and organisations which are based on trust and understanding;
6. coordination – it consists in synchronisation of activities performed by all the threat addressees in order to achieve a common aim;
7. flexibility – it results from creativity and innovativeness in the approach towards solving problems connected with catastrophes;
8. consequence – it results from the rationality of the activities performed in the field of security – there is no room for negligence and abandonment in the field of crisis management;
9. harmony – it consists in the development, implementation and permanent verification of standards and crisis law;
10. professionalism – it refers to the superiority of science and knowledge based on education, training, exercises, practice, ethics, values, efficiency and permanent improvement.

Considering the point of view presented in this article, it should be advisable to notice that during the recent years the perception of crisis management has changed. It has been perceived in systemic categories, that means a pursuit of integration but not of centralisation of various elements, links, micro-systems and sub-systems into one integrated system which shall include all the actors in the field of security. It shall refer to all the levels (government, self-government, non-government), sectors (public, private, cooperative, communal) in all the stages and in the reference to all threats, with the use of all the available resources (civil emergency planning).

Having emerged and strengthened among practitioners and theoreticians, a modern concept of crisis management has also been recognised by international organisations. Let us mention the International Association of Emergency Managers (IAEM) as an example. It is a non-profit organisation which has been established to promote protection of life and property during disasters. Similar great merits in the development of crisis management standards are assigned to the World Bank, which in 2006 established the Global Facility for Disaster Reduction and Recovery (GFDRR). It turned out to be of great significance for the long-term partnership in the field of loss reduction during disasters through the channeling, modification and reduction of disaster risk. Such activities of the World Bank forced rational use of financial means in the field of security, because states and international organisations, who

wanted to acquire funds for the implementation of some undertakings, were forced to follow systemic reinforcement of their crisis readiness through formalisation and legitimisation of the recovery stage.

Also in the European Union some positive tendencies could be observed. However, it was only in 2001 when the Community Mechanism in the field of civil defence was accepted and implemented (a counterpart of crisis management in the EU terminology). It was a significant fact for the unitary character of such activities, because the main aim was to systematise cooperation in civil defence and support provided to the EU members in that respect. It referred to major disasters, because minor disasters were left in the national competences of the states. A novelty was the fact that there appeared activities which preceded a disaster (prevention and preparedness).

Generic Crisis Handbook also cites an interesting definition of crisis management according to NATO's concept. In line with this concept, crisis management should be seen broadly, taking into account the procedures and actions aimed at taking control of the crisis situation by crisis managers, enabling them to shape the course of the crisis through preparatory action.

Western states also made their attempts at some legislation efforts in the field of the systematisation of crisis law. Most legal acts from that period came from the years 2001-2005, that is namely: after the attack on the WTC on 11th September 2001.

The acquired knowledge, experience and disasters which had been faced, forced the EU states and NATO to make general changes in their security systems. At that time, the structures of civil defence were still under their liquidation, because they had been considered as non-adjustable to the conditions of a decentralised society. However, practicism suggested that some of their elements should be used in the redevelopment of the new systems. The new situation required verification of axioms and solutions, performance of research and implementation of research results, training provided to services, new law and adaptation to the surrounding reality.

The crisis management system is aimed at a decrease in risk related to the possibility of threats and at the development of activities that would provide security to people, protection of critical infrastructure and natural environment. Hence, it is one of the most important systems which affects the functioning of the state and the sense of security in its citizens. Therefore, it can be assumed that the priority objective of the operation of that system is the implementation of the tasks which provide proper civil protection, which should be nowadays understood as *a set of activities undertaken by the relevant public authorities, rescue units and humanitarian organisations, as well as by individual citizens, which are to provide security to the whole society*.

Civil Protection

Civil protection is defined in a different, broad sense by Waldemar Kitler, who identifies it as one of the fundamental missions implemented for national security by state administration authorities, other state bodies and state institutions, entrepreneurs and other organisational units, non-government organisations and citizens themselves, and in some justified cases by the armed forces. Such a mission involves the implementation of numerous preventive, preparatory, interventional and recovering tasks in order to protect life and health of people, to protect their property, objects of cultural legacy and natural environment to the extent indispensable for survival. The mission also involves any humanitarian and legal aid provided during catastrophes, natural disasters, armed conflicts and occupation and directly after such events.

Expert literature provides another interesting opinion on the discussed problem. Aleksandra Skrabacz defines civil protection as a set of interdisciplinary undertakings implemented by joint efforts made by all entities of the state law who act in order to protect life, health, property and natural environment against any potential danger caused by the forces of nature or by people, to overcome their consequences and to provide conditions indispensable for survival.
So far, civil protection has not been defined in any currently binding legal act. It is, however, possible to fall back on a draft act on civil protection of 31st August 2009, article 2 which states that civil protection comes as integrated operation of state administration authorities and entities which implement tasks of civil protection in order to provide security to citizens, public order, protection of life and health of people who reside in the territory of Poland, protection of property, natural environment and cultural legacy in any cases of potential threats.

The above-mentioned draft act defines the principles referring to the organisation and functioning of the civil protection system, relevant authorities responsible for civil protection and their tasks, entities responsible for the implementation of these tasks. The draft act also defines the principles of alarming and warning, education of people, citizens' rights and obligations. Additionally, the document states the main assumptions of the practical implementation of civil protection, viewed through the prism of the following:

- providing conditions indispensable to protect human life and health, to provide people with basic conditions necessary to survive in emergency situations;
- providing cooperation of all the rescue systems, monitoring, warning, alarming, informing about potential threats, also units, services and other entities which implement tasks for civil protection;
- providing substantive, organisational, material and financial support to the operations implemented by non-government organisations which perform tasks for civil protection, particularly to social rescue and humanitarian organisations and voluntary service;
- organisation and coordination of humanitarian aid;
- maintaining resources which may be used to implement tasks for civil protection;
-providing education to society to increase awareness of potential threats and to teach proper behaviour in case such threats should take place.

It seems indispensable to accept and implement a new regulation on civil protection into life. In fact, there is such a project, however since 2009 the related legislation work has not been finished yet. While analysing that document, it is possible to find a number of very significant elements there, the implementation of which would be favourable for its assumed aim, that is namely: the development of relevant legal framework in order to provide conditions indispensable for protection of human life and health, basic conditions for the survival of people in emergency situations, cooperation of rescue systems, authorities, services and other entities which implement tasks in the field of civil protection, improvement in coordination, receiving and providing humanitarian aid, providing proper resources used in rescue operations and civil protection. The contents of the draft act allows us to draw a rightful conclusion that it should also strongly emphasize the development of the awareness in the society and promotion of proper behaviour in the face of threats in order to increase security and to decrease any direct consequences resulting from threats. The act should pay particular attention to the processes of prevention and preparedness which are undertaken in order to minimise natural or man-made threats. An important point in the implementation of the act is the development of a mechanism which enable people who work in social, rescue and humanitarian organisations to acquire indispensable knowledge and skills, along with protection of their legal interests. The protection of interests of employers who employ the above-mentioned people comes as another important aspect which makes the whole mechanism work properly.

Based on the above-mentioned range of tasks and a pragmatic approach towards the question of civil protection, it is advisable to pay some attention to the institutional context of their implementation, that is namely: specification of entities which are competent to perform such tasks.

There is another important opinion worth noticing. It has been provided by Romuald Kalinowski who sees civil protection as an institution (in this case: a formation) that is: Civil Protection. For Kalinowski, civil protection – considered in a systemic approach as well as in an individual one – is significant because of the legal and humanitarian approach of various entities towards that question. He indicates that it is important to provide civil protection to the whole population of the country in the time of peace as well as in the time of war.

Considering the semantic approach, the above-mentioned W. Kitler states that the term *civil defence* may refer to: civilians' resistance or civil fighting, non-military protection, civil (non-military) protection, facing threats by civilians, aid and self-aid in the society, social self-defense, civil power used in defensive fight. It can also describe non-military power and means applied for fight, defence, protection and self-defense; it can refer to the method of fighting with the use of non-military tools, the character, the type and the set of defensive or protective operations performed with the use of non-military tools and activities undertaken by civilians in the face of military and non-military threats.

Leaving aside the changes which have taken place in the way of understanding the term *civil defence*, it is possible to assume that it comes as one of the most important components in the national defence system which functions within the framework of so called non-military defence system. In the world, civil defence operates on the basis provided by the regulations of the Geneva Convention of 12th August 1949, with Amendment Protocols ratified by Poland in 1991. In our country, legal regulations referring to civil defence can be found, first of all, in the Act on General Obligation to Defend the Republic of Poland, of 1967. According to the author, one of the most important concepts which result from the analysis of that document is an indication that organisations (structures) of civil defence in the time of peace may be applied for cooperation in fighting against natural disasters, threats to natural environment, in removing their results, organised and led by other authorities.

Therefore, it is possible to assume that civil defence is aimed at protection of people, places of employment, public facilities, objects of cultural legacy, rescue operations and support provided to victims in the time of war and at

cooperation in fighting against natural disasters, threats to natural environment and removing their results. It is also possible to conclude clearly that the time range of the functioning of civil defence has not been confined only to the time of war (as it is commonly thought).

Considering the aspect of time of peace and time of war, some theoreticians state that a division into civil protection during the time of peace and civil defence during the time of war is irrelevant. They claim that regardless of the time, the right notion is civil defence, which in turn should be divided into civil protection, general rescue services, and other tasks. Considering the systemic approach, the above-mentioned author, R. Kalinowski sees a great role performed by Civil Defence as one of the leading entities of the national defence system of Poland, that is namely: an organisation based on the structures of state administration which implements humanitarian tasks in order to protect people. Hence, civil defence can be perceived in a very broad sense, and it can be defined as a system of civil protection in Poland which consists of an operational sub-system of Civil Defence, a sub-system of local support, a sub-system of national support and a sub-system of international support.

Following the thought of the cited author, it is possible to assume that in general understanding civil defence refers to structures, tasks, operational principles and forces which provide services to people. Considering modern character of civil defence, it should be emphasized that it is based on coordinated operation of forces and resources of all the departments, regional authorities of state administration and self-governments, other units, entities and organisations along with widespread involvement of the whole society. The implementation of tasks takes place in accordance with the principle of territorial primacy, with the consideration of three-level division of the country, in consistency with the current legal regulations. This is the most proper procedure, considering the aspects of economy and efficiency of operations and responsibility for decisions made in the field of civil protection.

The above-presented considerations may lead to a well-grounded conclusion that in our national system, the tasks referring to civil protection against various threats are entrusted to numerous centres, administration structures and self-governments. The efficiency of operation is ensured by collective cooperation coordinating rescue actions undertaken by particular entities.

Considering a number of tasks implemented in that field, A. Skrabacz presents their systematisation, divided into three main modes:

a. *permanent standing-by and ad hoc response* – performance of routine activities oriented towards rescue of people, property and natural environment; elimination of direct results of sudden emergency situations; prevention and counteraction undertaken against any potential threats;
b. *crisis* – response to situations in which any direct threats may lead to a crisis and response during an ongoing crisis;
c. *armed conflict (war)* – civil protection in accordance with the regulations of international law.

Considering the high level of the implementation of undertakings which are aimed at civil protection, the same author also suggests some principles which should systemise such implementation, that is namely:

- primacy of a territorial system; it means that the foundation of the whole model of civil protection is a horizontal system of authorities formed on the basis of a three-level division of the country, in which the department system performs only an auxiliary function;
- one-person leadership and responsibility for the standing-by mode to provide civil protection; it does not mean any resignation from teams who provide opinion and advice, but it implies resignation from making decisions by a collective body;
- the adequacy of the character and scale of a threat and of the level of the state administration authority which should response to such a threat; it means that all activities should be performed by the lowest level of competences in a particular situation;
- the common character of the civil protection system means that it refers to all the citizens, and it imposes particular tasks and obligations on them, depending on a situation in which the stand-by system is functioning at a particular moment;
- management and responsibility held by one-person authorities of general administration: a village head, a starost as the self-government authorities of a borough and a district, and a provincial governor (voivode) who represents government authorities at the level of the province.

Hence, the area in which the tasks of civil protection are implemented is very broad. It is advisable to provide a systematisation of the problem, as I.T. Dziubek suggests. The discussed undertakings are divided by the category of tasks implemented for:

- collective protection – it comes as systemic activity run by relevant institutions; it involves: recognition of threats and alarming, providing proper shelter, evacuation and blackout;
- individual protection – various activities undertaken by citizens who are prepared to behave adequately to particular situations.

In reference to the above-presented considerations, it is possible to conclude that further development of civil protection structures is inseparably connected with the development of the crisis management system. In accordance with the legal act, the latter system has been developed in order to carry out preventive and rescue operations and to reconstruct the critical infrastructure in the case of any potential threat. The system of civil protection in Poland faces numerous challenges, and it has to undergo some inevitable changes. It seems necessary to make the implementation of civil protection tasks cohesive with tasks implemented within the framework of the Act on Crisis Management in such a way that the crisis management system should cooperate and complete activities performed for civil protection. Considering civil defence, it is possible to observe that solutions and structures applied for the tasks are dispersed in various legal regulations, and sometimes they are not covered by any of them. Therefore, it is possible to suggest some regulations in that field, for example:

- definition and introduction of a term of civil protection into legal regulations – so far it has not been done, hence there is some terminological chaos in that respect;
- explicit indication and identification of tasks assigned to state administration authorities in the field of civil protection, and consequently, indication of authorities responsible for the implementation of such tasks at the level of a borough, a district, a province and the country;
- new definition of the way in which the state should implement civil defence tasks referring to the protection of victims of international armed conflicts – it should be considered whether particular entities who perform civil protection tasks should be granted a status of entities performing civil defense tasks in the time of armed conflict (war) in an automatic, statutory way.

It also seems necessary to provide statutory regulations referring to tasks performed to rescue life, health, property and natural environment, to provide aid to those who need ad hoc humanitarian support in the time of peace and in the time of emergency. It can be specified in a single legal act which would indicate such elements as: principles of providing humanitarian aid, citizens' obligations in the field of civil protection, programmes of civil protection, methods and principles of informing, warning and alarming, tasks and entities responsible for education and training provided to citizens, shelters provided to people, protection of property in emergency situations, methods and principles of creating resource reserves, definition of the functioning of civil protection during the "W" period; the funding of tasks, penal regulations.

Such a solution does not come down to the development of new structures. It should be considered whether these are the structures responsible for that question are the structures of the crisis management system or the structures of the civil defence system, all the more that some of the above-mentioned tasks are implemented based on some other legal acts. In order to introduce new solutions, it is first necessary to identify entities of civil protection, because it is possible to assume that they shall be activated during the state of emergency, and in the state of mobilisation they could be transformed in National Defence in the time of an armed conflict or war.

It seems advisable to place tasks of civil protection and civil defence in the current system of national security as well as in the latest solutions which refer to crisis management and general defence obligation (e.g.: the conscription of Territorial Defence Forces), in order to properly and clearly define competences of territorial self-government authorities. Consequently, it would be possible to implement civil protection tasks and to adjust legal regulations to current threats and to improve ways of response to such threats.

There is one more conclusion: the perception of the implementation of civil protection tasks takes place through the prism of civil defence. It is not surprising though, considering the stages of civil defence development[1].

Integration of the Systems

The crisis management system and the civil defence system have a lot in common. Let us have planning for example. At each of their operational levels bodies and institutions involved into civil defence must follow their plans, as well as it takes place at each level of crisis management. The detailed content of civil defence plans and the content of crisis management plans is similar. However, despite the fact that there are some consistencies, it

should be emphasized that the civil defence plan is to be applied during a situation of external threats to national security and during the time of war, whereas the crisis management plan is to be applied during the time of peace. It can be an indication referring to the necessity and tendency to maintain the structures of civil defence in Poland. Although at present civil protection is perceived through the prism of crisis management, and as a result, civil defence is pushed into operation exclusively during the time of war, it does not mean it cannot be used during a crisis.

A decision made by the government on the Programme of Rescue Services and Civil Protection in 2014-2020 seems to be very promising. It is actually the first document which – in a holistic and complete way - describes the problems referring to the organisation of rescue operations undertaken to protect life, health, property and natural environment by all public and social entities which perform such tasks. The resolution No. 59/2014 of the Council of Ministers of 29th April 2014 on the acceptance of the Programme of Rescue Services and Civil Protection in 2014-2020. The programme is to define objectives which must be achieved in the field of rescue services and civil protection in the years 2014-2020, conditions which must be met to achieve such objectives, with all the basic but indispensable legal, financial and organisational instruments. The suggested solutions shall be applied to provide comprehensive support and development of the potential of national security within which an executive sub-system is operated, that is namely: protective capabilities formed by services and organisations which implement rescue and civil protection tasks, along with entities of the crisis management system.

An important element which improves the crisis management system is incorporation of the problems of civil protection into the field of crisis management and integration of the current systems through new legal regulations, including integration of tasks and structures. New legal regulations should provide a framework for conditions indispensable for protection of human life and health, basic conditions for survival, cooperation of systems, authorities, services and other entities which perform civil protection tasks, for improvement in coordination of humanitarian aid and, additionally, for securing proper resources.

Another element is incorporation of a range of tasks referring to the field of civil protection, which come as a particular form of civil protection implemented by the same authorities and executive entities during the time of war. It is related to international obligations of Poland and a possibility to integrate already prepared organisational and legal solutions which function during the time of peace, with the rescue elements, and during the time of war. Considering the anachronistic character of the solutions applied in currently functioning civil defence, it is necessary to implement new legal regulations which enable the state authorities to meet their obligations in the field of broadly understood security provided to citizens in the time of war and peace.

Summary

The civil protection system in Poland is multi-element. It can be concluded that specialists in this field have a considerable problem with determining the components of this system. According to the authors, it can be pointed out that the civil protection system operates a crisis management subsystem (together with some of the implementing elements – and here the State Fire Service – which is important for the rest of the process). In addition, it can be included in the system of rescue subsystem (among others, the National Rescue and Fire-Fighting System - headed by the Commander-in-Chief of the State Fire Brigade), including the Armed Forces of the Republic of Poland or the State Medical Rescue. In addition, it is complemented by an element related to Civil Defence, which is now more of a theoretical subsystem than a practical one. Civil defence is based on the General Obligation to Defend the Republic of Poland Act 1967 and is generally adapted to the conditions of military conflict or crisis with such elements. Very often, the rescue, civil defence and crisis management systems are confused and conceptually mixed.

Considering the functioning of the civil protection systems and their integration, it seems necessary to provide statutory regulations referring to tasks performed in the field of rescuing human life and health, property and natural environment, providing ad hoc humanitarian aid to the people in need in the time of peace and in emergency situations. It would be possible through a specification confined in one, relevant legal act that would integrate all the dispersed elements. However, it would not be advisable to develop new structures and the tasks should be entirely entrusted to the units of the crisis management system or civil defence, even more that some tasks have been already implemented on the basis of some other legal acts. In order to implement new solutions, prior identification of civil protection entities shall be necessary, because it can be assumed that they shall be activated during natural disasters, and in a situation when mobilisation is announced such entities could be transformed into Civil Defence during the time or war or a military conflict.

The civil protection and crisis management system in Poland must be universal and interdisciplinary. It should reach the lowest levels of local government and a large number of companies, workplaces, museums and cultural institutions. The new generation of threats, including hybrid threats and those below the threshold of war, but also those we are currently facing, mean that the state must have instruments that support and complement the work of specialised services, but above all relieve them when necessary.

The civil protection system in Poland faces numerous challenges and changes which are unavoidable. It seems necessary to make the implementation of civil protection tasks consistent with tasks implemented within the framework of the act of crisis management, in such a way that the crisis management system should cooperate and complete operations undertaken for civil protection.

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Smart Cities Governance: Lessons Learnt from Amsterdam

Rasha ALABDALI

Ministry of Transport, Communication, and Information Technology,
Muscat, Sultanate of Oman
rasha.alabdali@mtc.gov.om

Abstract

The adoption of the Smart City (SC) concept has been evolving with the growing need to utilize the technological advancements for serving communities and people and provide better services and solutions for their daily needs and problems. Many implementations of this concept, SC, have been taking place around the world, yet handling such a multi-disciplinary domain which requires huge engagement of stakeholders from various areas with different needs and expectations is not an easy job, as we are looking at it from a city level. ***Ruhlant*** mentions in his study that "city governance is enormously complex with the multi-faceted and multi-level ecosystem of various agencies and stakeholder groups (e.g. local governments, citizens, urban planners) that are often driven by conflicting interests" **(*Ruhlant*, 2018).** Thus, the need to have a model or an approach to govern the interactions and engagement of all stakeholders within this context becomes very essential. The purpose of this paper is to look at the governance mechanisms used by the city of Amsterdam to draw a better understanding of how a successful smart city governs its projects.

Keywords: Smart Cities, Governance, Model, Amsterdam.

Introduction

The concept of smart city has been defined as city that is making an effective use of information and technology communication as platforms to elevate the quality of human life, while improving the city`s operations and services that allow for competitiveness (Tanaka et al, 2018).

Smart city has been described by Ruhlandt as "a multi-dimensional mixture of: human, infrastructural , social open network and entrepreneurial capital, that are merged, coordinated and integrated into the fabrics of the city using new technologies to address social, economic and environmental problems, involving multi-actor, multi-sector and multi-level perspectives" (Ruhlandt, 2018). This complexity urges a fresh governance perspective that would facilitate human interactions with all these elements, using ICT to enhance the outcomes of the governance process with more openness (Meijer et. al, 2016).

In the context of Smart City, governance primarily refers to citizen participation and the collaboration among all stakeholders (Castelnovo et. al, 2016). Pereira et al define Smart City Governance as: "the smartness of a city refers to its ability to attract human capital and to mobilize this human capital in collaborations between the various (organized and individual) actors through the use of information and communication technologies" (Pereira et. al, 2016). Understanding smart city governance is vital to learn how to accommodate the complex government needs of SC and support any changes that will be required to handle the transformation of a city`s vision (Dameri and Benevolo, 2016).

The next section discusses the key aspects of smart city governance based on previous work conducted by other researchers.

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Literature Review

Challenges in governing smart cities

1. Technology-driven:

Previous research has focused on the current status of the adoption of smart cities and the underlying challenges that require new venues of governance. One of the remarkable views that characterizes smart cities projects is the fact that they are mostly driven by ICT-oriented governments in order to provide better services to their residents. Despite those benefits however, aside from technological problems, there is a whole other set of social and organizational issues significantly linked to various stakeholders, competing values, social and political complexity, and interdependence (Pereira et al, 2016). Almeida et al also support that view by stating: "This peculiar view led to a certain bias, assuming smart cities' implementation as mostly a technological issue, which results in a set of outcomes that are not alien to other related environments such as the tendency to see technology as the primary means to solve problems or the increasing power of platforms that may be able to offer viable solutions for cities' problems". Thus, a holistic approach is required to govern Smart Cities, which examines the needs and issues of a city from all dimensions first, then utilizes technology as an enabler to overcome them.

2. Market driven:

The concept of smart cities was originated by the traditional ICT industry aiming to discover new opportunities in the market. According to Alfamicro and Alfamicro (2015), "The technology "pushed" solutions failed to engage the citizens and the public authorities who didn't take ownership of the "smart" services". Corporate interests along with the technological agenda in the background have been shaping the direction of smart cities. Key players in the ICT market such as IBM claimed to be the originators of the smart cities concept back in 2008, as Joss mentioned in his study, leaving no surprise that government applications of SC has generally been led by corporates and innovation agencies (Joss, 2018). Yet, smart city initiatives require a neutral approach and guidance that focuses more on the particular city's agenda and priorities to achieve public value while acquiring market offerings.

3. Emerging technologies and impact on society:

Technological advances along with city growth have had a huge impact on societies, which has resulted in a new wave of urban issues. Emerging trends in technology such as big data, open data, and global communication are all moving societies into a digital era with a new way of life and sharing knowledge. Despite all the improvements in communication that arose out of this technological evolution, the "social cohesiveness of small groups" according to Alfamicro and Alfamicro (2015), has not been satisfied. It is still at its inadequate levels as interactions among people in cities have become unnecessary, whereas in the past they used to play a central role in connecting people with each other.

Context

The word "smart" has different connotations depending on various conditions under different contexts, such as: political system, geographical situation, and technology status (Ruhlandt, 2018). Meijer et.al state in their study that "Smart solutions cannot be simply copied but need to be assessed on their value for different contexts and translated to fit other conditions" (Meijer et. al, 2016). For instance, European smart cities have adopted various patterns, roles and relations of their actors, implementation approaches, and policy instruments (European Parliament, 2014). Hence, It becomes very crucial to understand the main elements in any given context before applying governance practices imported from another city`s implementations of the smart city concept.

A good example for understanding contextual differences in applying smart cities governance is a case study conducted by Lin. Y (2008) where he makes a comparison between selected Western countries and China. The key finding of his study was that various political systems and institutions have significantly affected the strategies of smart governance, the arrangements, and the outcomes. According to Lin, the Western model of smart city initiatives focuses on e-democracy and e-governance, while in China the focus is directed towards smart management and services. Such a difference led to selecting opposite governance approaches as discussed in his case study. Western countries went with a bottom-up approach that encourages participation in decision making to satisfy democracy

needs. Conversely, China is using a top-down approach to support "the integration, openness, and use of datasets for governmental management and services" (Lin, 2018).

Key Actors

Previous literatures classify key actors within smart cities into four main categories: public, private, academic, and civic; at which these categories represent the wider range of stakeholders who could relate to city issues under the governance umbrella (Ruhlandt, 2018). Some authors highlight that dedicated non-governmental organizations (i.e. associations, foundations, etc.) could play an effective role in empowering participation, collaboration, and partnership (Dameri and Benevolo, 2016). Whereas Kourtit et al. (2017) and Bolívar (2016) both point out that city governments should play a bigger role in smart cities, the latter suggested three potential roles for governments: as a coordinator, as a funder, and as a regulator. In contrast, Taylor Buck and While (2017) emphasize on the importance of public-private partnerships and how their cooperation and exchange could build a strong network that enriches smart cities governance. Chourabi et al. (2012) agree with that as well by highlighting such partnerships as essential characteristics of smart governance and smart cities.

ICT Role in SCG

Misuraca defines ICT-enabled governance as "the use of ICT to comprehensively simplify and improve the internal administrative operations of government; facilitate public service interaction among government, citizens, and other stakeholders, enable citizen participation, and ensure inclusiveness and equal opportunity for all" (Misuraca, 2010).

Although many smart cities have claimed to be ICT-enabled cities in the race of digitizing everything, city governance has been left behind (Castelnovo et al, 2016). New technologies can now contribute to building effective governance (Marek et al., 2017) through creating communication platforms among different stakeholders where government and citizen participation can be more enhanced, and public-private collaboration can be strengthened (Cano et al., 2014). Examples of such technologies have been highlighted in some previous studies, such as: "geo-science tools and big data" (Kourtit et al, 2017), "data warehousing and monitoring tools" (Meijer, 2016), "sensors, virtualizations, geographic information technologies, social media applications" (Gil-Garcia, 2012).

Research Question

Many research studies have determined key aspects for governing smart cities. These studies however were either conceptual or discuss smart governance from a different perspective. The purpose of conducting a case study on Amsterdam is to learn about how the city has managed to run a successful governance program on its smart cities initiative.

Amsterdam was chosen as a case study for the following reasons:

1) Amsterdam is generally considered a leading European SC example (Manville et. al., 2014).
2) The Amsterdam Smart City Association (ASCA) proved to settle within the early stages of the smart program`s establishments (Dameri, and Benevolo, 2016). At European levels it is considered as a model for allowing bottom-up projects within different fields (Papa et al, 2013).
3) It has a unique partnership among businesses, authorities, research institutions and the people of Amsterdam with the objective of developing the Amsterdam Metropolitan Area into a smart city with a focus on the themes living, working, mobility, public facilities and open data (Meijer and Bolivar, 2018).
4) The city presents itself as an 'urban living lab' that allows businesses to both test and demonstrate innovative products and services. This partnership creates an infrastructure for knowledge exchange and learning among all these actors and results in concrete projects focusing on sustainable energy, innovative health solutions, better transport and more (digital) citizen participation (Almeida et al, 2018).

The case study aims to capture answers for the following questions:

Q1: What governance structures are being used?
Q2: What stakeholders are involved and how do they participate?

Q3: Why has this approach been effective for Amsterdam?

The results of this study will aid in setting policy recommendations for Smart Cities Governance.

Methodology

The author collected literature from registered online libraries such as Web-Science, ResearchGate, and Springer. In addition, many articles were found using google scholars engine. More than 40 papers were collected using key words such as "smart city" and "smart governance" to narrow the search parameters and identify relevant publications that would assist the author throughout the study. Moreover, the author used NVevo software for the literature review that enabled generating specific nodes to aid in the analysis of the literatures. The total number of references that were used for collecting data after review was **32**.

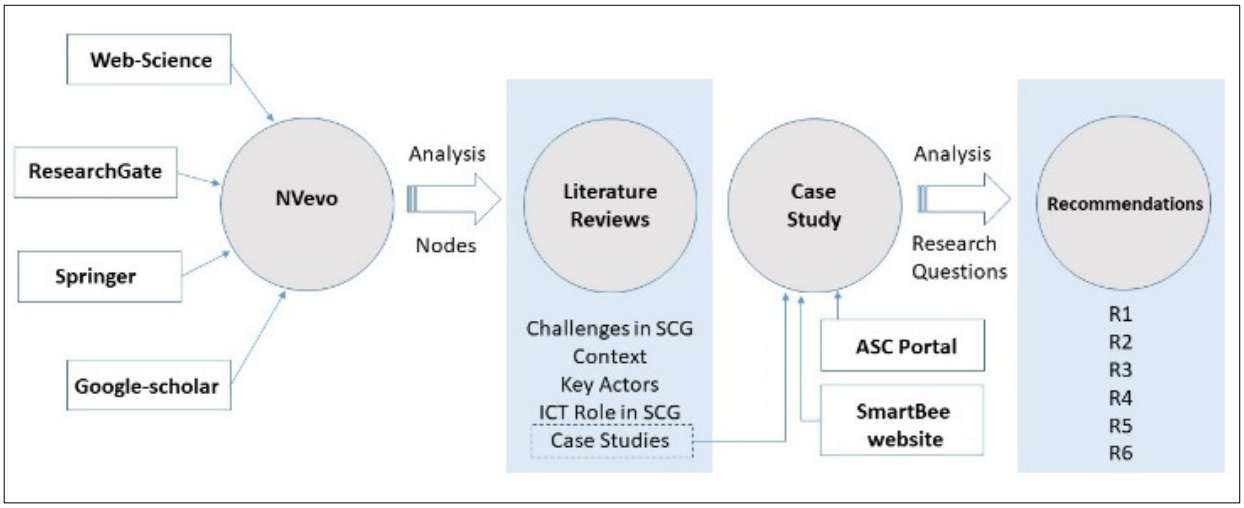

Figure 1: Research Methodology

Table 1: Nodes generated by NVevo while conducting literatures reviews to aid with the analysis and the related references

Node No.	Node Title	Number of references	Number of coded sub-references
1	Important Considerations for a Governance Model	15	71
2	Challenges	15	53
3	Examples of governance models	12	32
4	Definition of Smart Governance	6	23
5	Citizens Engagement	6	21
6	Why we need smart governance	7	19
7	Case Studies	9	18
8	Data Governance for Intelligent Governance	7	14
9	Governance Cycle	4	9
10	Benefits of Social-tech Perspective	5	7
11	Stakeholders	1	5
12	Benefits	3	4
13	ICTs Role	2	4
14	Recommendations	1	4

15	Gov Org. Vs. Cities	2	3
16	Parameters	2	2
17	Public Value	1	2
18	Context	1	1
19	Legislation Role	1	1
20	Limitations	1	1
21	Roles and Responsibilities	1	1
22	Smart Governance Elements - Data Governance	1	1

Literature reviews assisted the author in exploring the main components of SCG and drafting the key questions for the case study. Due to the limitation of resources and time, the author utilized existing online platforms to collect data and articles for building the case study about Amsterdam, such as: Amsterdam Smart City portal, SmartBee website, and other published case studies.

Case Study: Amsterdam

Amsterdam Smart City Journey

The Amsterdam Smart City (ASC) program was initiated in 2009 as a collaboration between Amsterdam Innovation Motor (AIM, now merged into the Amsterdam Economic Board) and grid operator "Liander". The program received support from the municipality of Amsterdam, City Government, and Amsterdam Climate Program. For this reason, the first smart city project was focused on energy efficiency. The first phase of ASC program ran from 2009 until 2011 where 16 pilot projects were developed with the main goal of testing both new technical solutions and new forms of collaboration. The second phase of the ASC program was between 2012 and 2014: in this phase the focus was shifted towards the creation of scalable models, with the objective of allowing end-users to take action. In 2011, KPN Telecom joined as co-founder and invested in the city telecommunications infrastructure, allowing ASC to enter a new range of implementation other than energy (i.e. internet-related applications.). In August 2014, the program consisted of 54 projects, involving 143 partners, an increase from the initial phase which involved only 16 projects and 71 partners in end of 2011 (Capra, 2016).

ASC Governance Model

Amsterdam has adopted a holistic approach in governing smart cities in which multiple actors have been involved to contribute effectively to creating a real smart city. Those key actors consist of government, business, academia and research, and citizens. The city has adopted a hybrid approach, making use of both bottom-up and top-down approaches. The bottom-up approach has been used to facilitate the city projects that focus more on enhancing the quality of life, boosting economic growth and start-ups, as well as enriching social inclusion (European Commission, 2016). For that, the city uses citizen-centric and stakeholder-centric methods for promoting participation, transparency, openness, and broad mind-sets to work on bringing excellent solutions with added value for all. Likewise, the top-down approach was used to implement ensure proper governance, especially with regard to connecting the city government with the private sector under one vision to achieve the program objectives.

Amsterdam has covered key verticals that were considered indicators for its smart city program. Those verticals are: smart economy, smart environment, smart government, smart living, smart mobility and smart people (Smith, 2017). There are number of projects that fall under each one of these indicators and managed at a "program level" along with the key sponsoring partners. Those partners are responsible for funding and managing the smart city projects, where each founding partner handles each indicator and works on developing the underlying projects with relevant stakeholders and with the collaboration of the other partners (Capra, 2014).

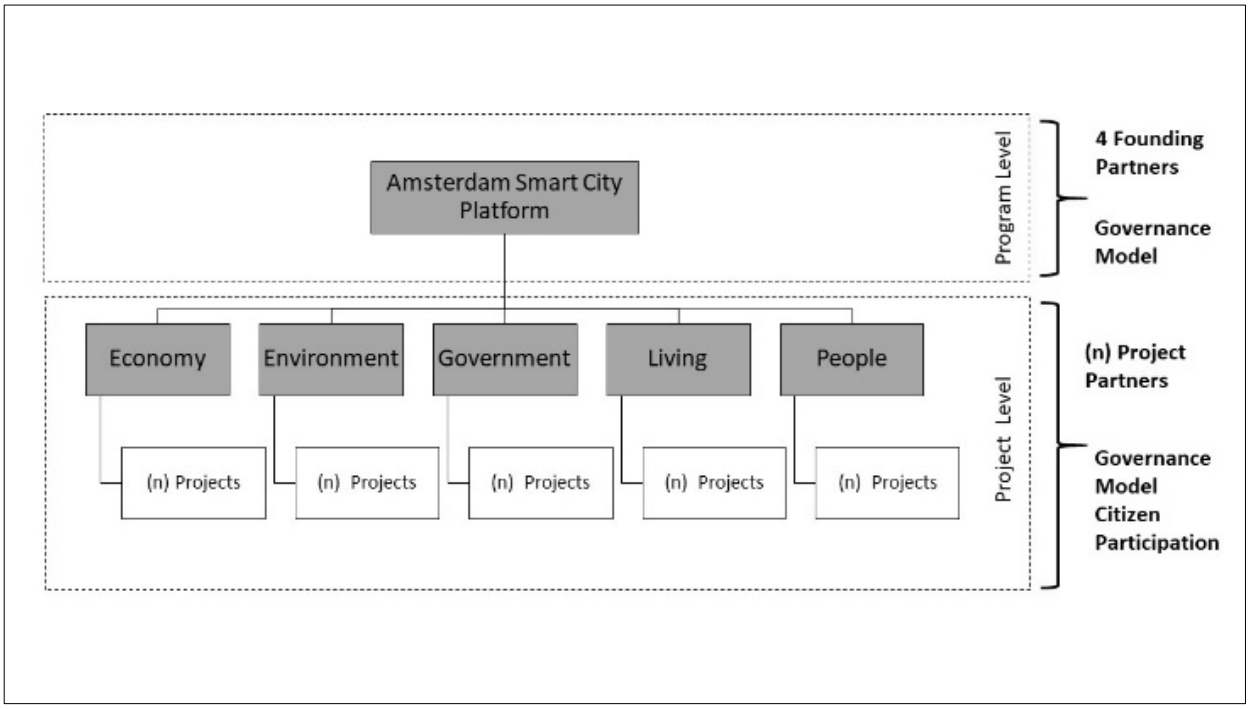

Figure 2: Smart City Governance Structure (adapted from Capra 2016)

Citizens` Participation

Meeting citizens' needs and goals is the main priority for Amsterdam. In order to achieve that, a co-creation model has been used by the municipality to engage its citizens in developing smart cities initiatives. This cooperation is considered to be one of the key reasons that the city won an innovation award (Putra, 2018).

Although there are official governance settings for Amsterdam Smart City at the program level, various governance models co-exist at the projects level. Some of them take formal and legal forms while others are more informal, and governance is practiced based on a given trust among different stakeholders. The government institutions act as a partner, rather than a decision maker with the other stakeholders when it comes to developing smart initiatives (Project level). This empowerment has encouraged experimenting organizational set ups, supported partnerships, and cooperation among various stakeholders. Amsterdam has defined different topologies of citizen` participation in the development of smart cities projects which vary based on the complexity of these projects. Citizen participation ranges from being informed and consulted to being a close partner in projects related to social innovation (Capra, 2016).

Furthermore, many venues have been offered as platforms for citizen participation. Two good examples are the WAAG Society and FABLAB Amsterdam:

- *Waag Society:* Waag Society was established back in 1994 and is considered as one of the world-renowned institutes for research, built to be a hub for artists, scientists and technology innovators. This hub works as a think tank for people coming from various disciplines (such as artists scientists, hackers, designers, academics, entrepreneurs, government officials, or any curious citizens) to learn about the recent technological solutions and think together about how to capitalize on knowledge, expertise and skills to create creative solutions that benefit their city (Henriquez, 2018).
- *FABLAB Amsterdam:* FABLAB was built by WAAG in 2007 and the name is an acronym for "Fabrication Laboratory." The concept was founded by MIT student Neil Gershenfeld and was subsequently led to a

global network of standardised open hardware setups, where people can play, try, learn, experiment and implement ideas, as well as mentor others (Henriquez, 2018).

ICT Platform and Governance

In the Amsterdam case, technology has been considered as an enabler even though the overall concept is not tied exclusively to technological solutions (Gorynski, 2017). The following are key initiatives by the city to enable the SC program using ICT platforms and establish good governance.

Ecosystem of smart city solutions

The city has established an ecosystem that combines fresh collaborative mindsets with governmental regulations that are favourable. That encouraged the rise of the entrepreneurship and attracted big number of various stakeholders from within and outside the city, which resulted in creating a big network for testing and experimenting new ideas and innovative projects, which is the core that has shaped city to become "smart" and a leader in this domain. Amsterdam was able to showcase forty-seven completed projects at least because of that with the other projects that are active in the Amsterdam Smart City Platform (Gorynski, 2017).

Amsterdam's City Data

Amsterdam launched a project called "Amsterdam's City Data", an open database, after consolidating data sets and records from more than thirty individual city departments. The database contained topographical and address data, land value and ownership information, healthcare data, traffic data and more. However, data on its own would not be useful without establishing a dynamic interaction and cooperation among all stakeholders from public sector, private organizations, and the citizens` input, which is considered to be a key success factor. Thus, Amsterdam has established an online platform as "a primary cross-sector actor" for that and appointed a Chief Technology Officer for the city as a project leader, to push the smart city program forward (Smith, 2017).

Internet of Things (IoT) Living Lab

This lab is mostly a network that was built with the collaboration of several companies to connect end users to data over the cloud using Bluetooth-enabled devices in order to create smart city applications. The network is located in the city and it consists of iBeacons that uses machine-to-machine standard protocol, which made it possible to achieve such an integrative and smooth process (Gorynski, 2017).

Case Study Summary

The below table provides a summary of the case study results.

Table 2: Case Study Results

Research Question	Finding
Q1: What governance structures are being used?	Bottom-up + Top-Down Approaches
Q2: What stakeholders are involved and how do they participate?	• *Government:* Set the needed regulations to set the program direction and enable smart city agenda. Establish a collaborative ecosystem by collaborating with the private sector and inviting all stakeholders to participate and contribute to smart cities initiatives. • *Businesses:* as co-founders of the city program, key investors, and subject-matter experts in the technical and knowledge related projects. Academia and research: serve as innovation think-tank and development hubs • *Citizens:* their participation vary based on the complexity of the projects from being informed and consulted to being a

	close partner in leading social innovation projects.
Q3: Why has this approach been effective for Amsterdam?	• Amsterdam has empowered all stakeholders to contribute in driving the smart city initiatives within an organized framework that created a balance of control and innovation, which led to building trust among the different stakeholders to take ownership. • Amsterdam partnership with the private sector ensured continues support and funding for its SC initiatives • Amsterdam provided open platforms for the citizen to participate in the SC projects at various degrees • Amsterdam utilized ICT to integrate city data for providing timely services, and established accessible infrastructure to allow for innovation. • At the same time, it focused on creating an ecosystem for with talents from inside and outside the city for developing innovative solutions.

Conclusion and Policy Recommendations

The study highlighted many challenges that are facing the governance of smart cities programs, such as having initiatives that are mostly technology focused and are led in many cases by the market more than municipalities. In addition, other challenges were discussed related to the digital divide and its impact on societies and it`s connection with its citizens. Moreover, several key aspects of smart cities governance have been addressed by the author in this study to understand the essential elements of governing smart cities, such as: context, key actors, and the role of ICT.

The study focused on Amsterdam as a case study as the city has proven to adopt one of the successful models in governing its smart cities initiatives. The focus on the big picture and allowing all actors to contribute to its smart initiatives within an organized framework are key factors to its success. Empowering citizen participation platforms where the city can gain access to talent and capitalize on it has also strengthened the collaboration and its impact. Moreover, partnership with the private sector has led to increased investment and support that has enabled financing the city's smart initiatives. Finally, ICT has played a key role in enabling smart cities initiatives and facilitated the governance processes.

Several recommendations can be drawn from this study and after benchmarking Amsterdam as a leading city in this domain:

- ***Recommendation No.1:*** When building a Smart City Governance Model, policymakers need to consider all stakeholders from all domains via establishing an active ecosystem and open platforms. The involvement of the stakeholders should not be limited to technology organizations alone. Government representatives from all fields covered under smart city indicators, academic institutions (including researchers, students, etc.), private sector (including CNI organizations) and citizens should be part of that model.
- ***Recommendation No.2:*** Policymakers need to follow a balanced approach on their governance practices for leading smart cities initiatives, in which a mixture of top-down and bottom-up styles can be adopted depending on the specific context (European Parliament, 2014).
- ***Recommendation No.3:*** Municipalities need to take a leadership role in the governance of smart cities and be part of policy-making to support smart cities initiatives.
- ***Recommendation No.4****:* Citizens are the main beneficiaries of smart cities initiatives; therefore, their direct engagement and empowerment can subsequently lead to creating services that match the actual needs and enhance the quality of their life. Policymakers need to create powerful platforms for effective citizen participation in addressing their needs and be part of smart city projects.
- ***Recommendation No.5****:* Government partnership with the private sector as co-founders of smart cities initiatives can result in enriching the experience, opening more opportunities, and increasing the investments.
- ***Recommendation No.6:*** ICT should be used as an enabler to build collaborative platforms that establishes effective interactions among all stakeholders to be able to interact, innovate, and share ideas.

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Machine Learning for Diagnosis of Heart Disease: A Systematic Review

Brandon GRADOS-ALVAREZ
Universidad Autónoma del Perú, Perú, bgrados@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Autónoma del Perú, Perú, jgamboa65@hotmail.com

Norma GÁLVEZ-DÍAZ
Universidad Señor de Sipán S.A.C., Perú, ncarmengd@hotmail.com

Guillermo PAUCAR-CARLOS
Universidad Nacional de San Antonio Abad del Cusco, Perú, guillermo.paucar@unsaac.edu.pe

Carlos ALMIDÓN ORTIZ
Universidad Nacional de Huancavelica, Perú, carlos.almidon@unh.edu.pe

Renzo CAÑOTE FLORES
Clínica de Ojos Oftalmosalud, Perú, renzocanote@gmail.com

Abstract

Cardiovascular diseases (CVDs) are "the leading cause of death" according to WHO (2017) and the Organization for Economic Cooperation and Development (OECD), which points out that the "rate of obesity and diabetes is on the rise", and that by 2030, 180 million people will be at risk of CVDs (2015). For this reason, the demand for cardiac diagnostics in health care facilities has increased significantly. Hospitals have improved diagnostic processes owing to their influence on the time, cost, and efficiency of medical care. In this study, a systematic review of the literature was carried out on the subject of machine learning in cardiac diagnostics. Articles related to the research topic were consulted to answer questions raised as the first step of the systematic review method. The review has shown the relevant trends in medical precision and revealed the most appropriate and effective machine learning techniques in cardiac diagnosis.

Keywords: Machine Learning, Diagnosis, Heart Disease, Systematic Literature Review, Method.

Introduction

Diagnosis of diseases is the most important activity in cardiology. Inaccurate results can be dangerous for hospitals because they lead to significant losses, such as time and labor costs, which directly affect the hospital's budget and patient care. Therefore, effective prediction plays an important role in the cardiac diagnostic process. Many predictive estimates are based on measurements, models, and algorithms that are aimed at increasing diagnostic accuracy for cardiologists.

Owing to the complexity inherent in accurate estimation in diagnoses, machine learning techniques can be applied to cardiac diagnostic procedures. This review focuses on highlighting the relevant and prevalent trends in the use of machine learning to diagnose heart disease.

A detailed review of the existing techniques was performed to identify research gaps in the literature. This article is organized as follows. Section II contains the background and work related to the investigation. Section III details the review methodology. Section IV showcases the results of the systematic review, section V presents the discussions on the work, and Section VI provides the conclusions and suggested future investigation.

Background and Related Work

Research conducted in Colombia by Saldarriaga-Giraldo (2020) on a cardiovascular syndrome called heart failure

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with preserved ejection fraction (HFpEF) demonstrates the complexity of diagnosis, since this variable tends to increase in prevalence and involves factors such as genetics, lifestyle, and a high burden of chronic conditions. In their research, Ayon et al. (2020) state that cardiac diagnostics encounter more cases like the previous one, making it a demanding task for doctors and physicians. For this reason, many organizations opt for several methods to improve their diagnoses. Relevant statements by different authors have been summarized below.

In their web-based CVD detection system article, Alshraideh et al. (2015) propose cross-validation for the decision tree classification algorithm, which provides an accuracy of 98.29% to verify the patient's health status at all times. These types of complementary techniques significantly improve the precision of the algorithm.

Gupta et al. (2017) propose an intelligent model to support the decisions of physicians in predicting heart disease based on historical patient data. Naïve Bayes is the most efficient model, providing an accuracy of 86.42%.

In their study on the identification of heart diseases from patient publications, Ahmed et al. (2020) compared four types of algorithms, applying hyperparameter adjustment and cross-validation. The Random Forest algorithm garnered the greatest precision with an accuracy of 94.9%.

Diagnostic or prediction results are not perfect owing to errors in misclassification. To reduce misclassification, bagging techniques are proposed. The classification algorithm used in the study is Random Forest, in accordance with Saifudin et al. (2020).

It can be concluded that the most prominent studies applied complementary methods to improve accuracy and reduce error in cardiac medical diagnosis. Although it is true that these studies are from different authors in different domains, they have the same purpose—that of achieving the highest precision in diagnosis prediction.

Review Method

Marshall, Kitchenham, and Brereton (2018) defined the systematic review process to help mitigate the drawbacks of conventional literature reviews. According to Salinas (2020), literature reviews are becoming increasingly frequent, whether they are narrative, systematic reviews, or meta-analyses.

Narrative reviews in many cases included a simple quantification of the results, limiting itself to counting the number of studies with positive and negative results (Guirao, 2015).

Systematic reviews can identify the reasons for discrepancies or contradictions between the results of the various investigations, encouraging the redesign of studies with the aim of improving research (Beltrán, 2005).

In this article, a systematic review of the literature was chosen; a study with this type of detail requires many criteria and a series of steps in order to propose an improvement to the research. Following the steps of the systematic review proposed by Marshall, Kitchenham, and Brereton, eight steps were performed: research questions, search equations, search, exclusion criteria, selection of studies, quality of studies, classification of studies and, finally, the review of studies.

Research Questions

The first step of the review is to choose the research questions that will serve as guidance for the review process. In this step, our goal is to map the research on machine learning for heart disease diagnosis and be able to answer the following questions.

RQ1: What methods are used for applying machine learning to the diagnosis of heart disease?

RQ2: What complementary methods are the most relevant for applying machine learning to the diagnosis of heart disease?

RQ3: What variables are most related to machine learning for the diagnosis of heart disease?

RQ4: Who are the most active authors in the domain?

RQ5: Which are the preferred publications in the research domain?

Search Equations

In this step of the procedure, search equations were proposed. Before applying the equation, the following variables were used (Table 1).

Table 1: Search Descriptors

Name	Variable Type
Mobile app	Independent Variable
Machine learning	Intervening Variable
Method/Methodology/Model	
Diagnosis of heart disease	Dependent Variable
Heart disease	

These words were key to the framing of the equation, since they perfectly describe the research topic. The dependent variable "Mobile app" is undoubtedly the most used by the population. Machine Learning encompasses the entire topic of methods, methodology, and model, which has also been defined as an intervening variable. The final dependent variable is "Diagnosis of heart disease". Once the variables were established, the following equations were obtained according to the search source.

As a fundamental equation based on the search terms, the following was obtained.

[All: mobile app] AND [All: machine learning] AND [All: diagnosis of heart disease] AND [All: method or methodology or model]

Table 2: Sources and Equation

Source	Generic Search Equation
Taylor & Francis	[All: mobile app] AND [All: machine learning] AND [All: diagnosis of heart disease] AND [All: method or methodology or model]
ProQuest	(Mobile app) AND (Machine Learning) AND (diagnosis of heart disease) AND ((method OR methodology OR model))
EBSCOhost	TX mobile app AND TX machine learning AND TX diagnosis of heart disease AND TX (Method OR TX Methodology OR TX Model)
IEEE Xplore	((("Full Text & Metadata": mobile app) AND "Full Text & Metadata": machine learning) AND "Full Text & Metadata": diagnosis of heart disease) AND "Full Text & Metadata": method or methodology or model)
ScienceDirect	("mobile app" and "machine learning" and "heart disease" and ("method" or "methodology" or "model"))
Scopus	ALL ('app AND mobile' AND machine AND learning AND diagnosis AND of AND heart AND disease AND (method OR methodology OR model))
Microsoft Academic	mobile app AND machine Learning AND diagnosis of heart disease AND (method OR methodology OR model)
Wiley Online Library	"mobile app" anywhere and "machine learning" anywhere and "diagnosis of heart disease" anywhere and "method or methodology or model" anywhere
IOP	machine learning AND diagnosis of heart disease AND (mobile app OR method OR methodology OR model)
ERIC	machine learning AND (diagnosis of heart disease OR mobile app) AND (method OR methodology OR model)
ARDI	(machine learning) AND (diagnosis of heart disease) AND (mobile app or method or methodology or model)
ACM Digital Library	[All: mobile app] AND [All: diagnosis of heart disease] AND [All: machine learning] AND [All: method or methodology or model]
ETHzurich	All fields containing app mobile AND All fields containing diagnosis of heart disease OR All fields containing heart disease AND All fields containing machine learning AND All fields containing (method OR All fields contains methodology OR All fields containing model)
Google Scholar	Mobile app AND heart disease AND machine learning AND (method OR methodology OR model)

Search

In this step of the research, searches were performed in the 14 selected sources. When performing the searches a large amount of information was obtained and processed. The quantities of articles found were as follows the Fig 1.

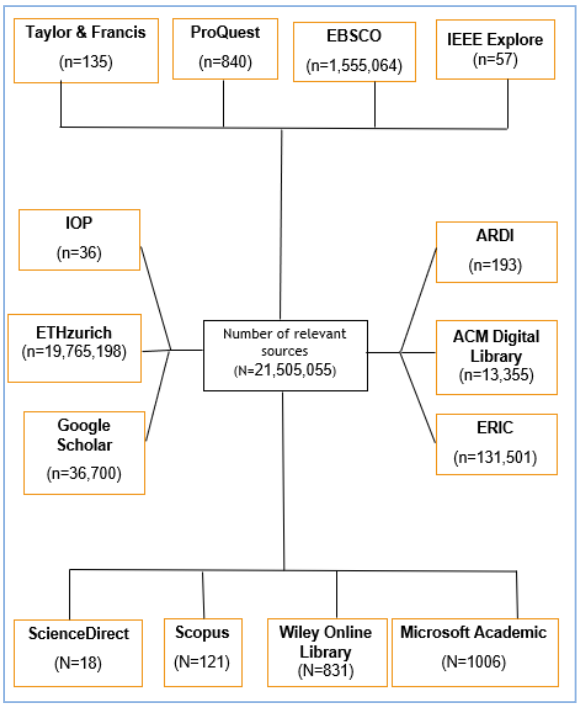

Fig. 1: Search Results

It can be seen that the total amount of searches was considerable, with a total of 21,505,055 articles related to machine learning in cardiac diagnosis, with ETHzurich being the search engine providing the highest amount of results.

Exclusion Criteria

In this step, ten exclusion criteria were formulated and applied to the articles. Given that this topic is constantly being updated, it was decided to exclude articles that were more than five years old. Furthermore, owing to the variety of techniques that can be applied in this domain, the most relevant studies were referenced and those that do not apply machine learning, neural networks, artificial intelligence, and internet of things (IoT) were excluded.

Therefore, non-experimental articles were excluded as the purpose of the study is to propose prediction techniques. In addition, it was decided to exclude articles that did not use predictive algorithms or models. Therefore, articles with qualitative data were also excluded.

The most relevant research has considerable sample size, and for this reason articles with a sample size of less than 30 were not considered. Investigations in the field of machine learning are complex, and there are different ways of using the techniques. Therefore, image processing was excluded, since it is a topic that deserves separate research. For similar reasons, studies on children were excluded given that they present different indicators.

Finally, articles that did not answer the research questions posed above and those that did not adequately describe data collection methods, were also excluded.

Study Selection

This corresponds to the articles obtained after the criteria proposed above were applied. In sections 3 and 4, the automatic search was applied, and 329 articles were obtained, of which the last section was manually processed. Furthermore, the quality studies were applied to the exclusion criteria, of which the number of results was maintained, given that the information met the quality requirements established by the automatic search. Based on these criteria, we started filtering the articles. The Fig 1. shows this process.

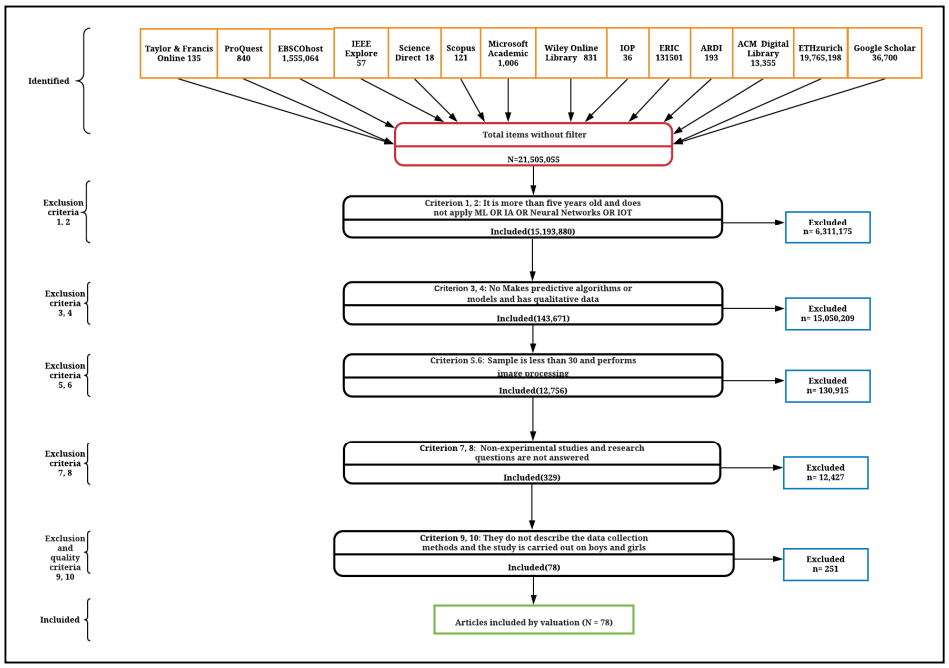

Fig. 2: Stages of the Study Selection Process

Based on the previous selection criteria, a total of 78 articles were obtained for the study. Table III shows the final number of articles obtained by source, with ARDI and ETHzurich accounting for the largest number of studies.

Quality Criteria

In this step of the review, the following quality criteria were established.

QA1: The results of experiments are identified and reported.
QA2: The investigation describes how the sample was extracted.
QA3: Appropriate methods are used to analyze the results.
QA4: The context in which the research was carried out is explained.
QA5: The purpose of the research is explained.
QA6: The research findings are explained.

These criteria were applied to all selected articles (n=78). They were all retained because they all met the quality criteria.

Classification of studies

Before proceeding to the review, the final studies were organized using Zotero, which classifies articles and provides tools for research analysis (Fig 3.).

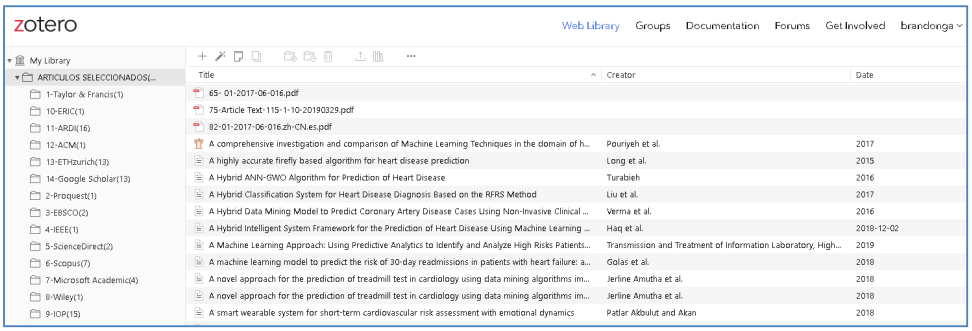

Fig. 3: Zotero Reports of Classified Studies

Study Review

In this stage, a detailed review of the articles was carried out. RQ4 was answered with the purpose of obtaining the number of articles per year on this research topic. Responses to RQ5 revealed the most active authors in the domain of research. The dates of publications of the articles were also obtained to respond to RQ6. Finally, the country of origin of each study was determined with the purpose of establishing a global vision of machine learning around the world.

For providing information relevant to research questions RQ1, RQ2, and RQ3, word processing was used with Power BI, which optimized the search for relevant ideas.

Results

This section contains the results of the systematic review analysis with respect to the five research questions set out in section III.

RQ1: What methods are used for applying machine learning to the diagnosis of heart disease?

The following table shows the number of machine learning methods and the percentage of these used in the articles, to answer the research questions.

Table 3: Machine Learning Method Estimation Approaches

Machine Learning Method	No. Articles	Percentage
Neuronal Network	40	49%
Decision Tree	46	57%
Random Forest	37	46%
Clustering	29	36%
Logistic Regression	35	43%
Support Vector Machine	61	75%
Deep Neural Network	26	32%
Naïve Bayes	19	23%
K-Nearest Neighbor	22	27%

Table 3 indicates that currently the most commonly used method is Support Vector Machine, accounting for 75% of the 78 articles reviewed (see Appendix A). This result is expected, since in recent years there have been many regression and classification problems in supervised learning for medical data, and this method is tailor-made, so it should be taken into account when highlighting this type of project. Decision Tree is second with 57%, owing to

the popularity and feasibility of the method when correct estimates are required for diagnostic data reliability.

RQ2: What complementary methods are the most relevant for applying machine learning to the diagnosis of heart disease?

To answer this question, four fundamental methods for data validation were analyzed. Table 4 shows that cross-validation, apart from being the best known, has good documentation for researchers, and is the most used. Many of the studies that applied this method were able to significantly improve machine learning.

Table 4: Machine Learning Complementary Method Estimation Approaches

Complementary Method	No. Articles	Percentage
Cross-validation	57	69%
hyperparameter	8	9%
hyper parameter adjustment	4	4%
K-Fold Cross validation	14	16%

RQ3: What variables are most related to machine learning for the diagnosis of heart disease?

The performance of the algorithm depends on this fundamental question, so it is important to determine which variables are related to CVDs (Table 5).

Table 5: Machine Learning Attribute Estimation Approaches

Machine Learning Attribute	No. Articles	Percentage
Thal	17	21%
Main vessels	15	19%
ST segment	37	46%
Old Peak	26	32%
Angina	20	25%
Heart rate	80	99%
Resting electrocardiographic	6	7%
Fasting blood sugar	14	17%
Serum cholesterol	8	10%
Blood pressure	46	57%
Chest pain	20	25%

Eleven machine learning attributes were analyzed for the data validation. It can be observed that the heart rate data is widely used for cardiac diagnosis, and the least used is Resting electrocardiographic; this is closely related, since performing an analysis on this type of patient implies a high cost and therefore, other variables that serve equally well for the diagnosis tend to be used without harming the budget of the organizations. In general, most of these variables do not fall below 7% and are used frequently, because they are key to the diagnosis of the disease.

RQ4: Who are the most active authors in the domain?

Similar to RQ3, this question is fundamental, because of this depends the performance of the algorithm, thus, it is important to determine which variables are related to CVDs.

Autores	2015	2016	2017	2018	2019	2020	Total
Weng et al.			341				341
Zeinab et al.			121				121
Goldstein et al.			120				120
Long et al.	113						113
Manogaran et al.				90			90
Verma et al.		79					79
Haq et al.				54			54
Ballinger et al				50			50
Liu et al.			49				49
Pouriyeh et al.			48				48
Kim, Jae Kwon and Kang, Sanggil			43				43
Clifford et al.			41				41
Mohan et al.					40		40
Senthilkumar et al.					40		40
Golas et al.				39			39
Diller et al.					34		34
Boursalie et al.	25						25
Kakadiaris et al.				23			23

Fig. 4: Number of citations by author per year

To determine the most active authors in the domain, article citations were processed to obtain the authors with the highest mentions. Fig 4 shows that Weng et al. (2017) are the most renowned authors with 341 citations, which give them a significant advantage over the other authors, followed by Arabasadi et al. (2017) with 121 and Goldstein et al. (2017) with 120.

RQ5: Which are the preferred publications in the research domain?

Fig 5 shows the number of articles per publication over the last 5 years. This will help identify the main publications in this research domain.

Nombre Publicación	2015	2016	2017	2018	2019	2020	Total
Physiological Measurement		2	3	6	3		14
Future Generation Computer Systems					2	1	3
IEEE Access					2	1	3
Journal of Medical Systems	1	1				1	3
Mobile Information Systems				2		1	3
Computer Methods and Programs in Biomedicine		1	1				2
European Heart Journal			1		1		2
Indian Heart Journal				2			2
Informatics in Medicine Unlocked					1	1	2
Journal of Computers				2			2
Journal of Hypertension		1			1		2
PLOS ONE			1	1			2
the 2019 3rd International Conference					2		2
2017 IEEE Symposium on Computers and Commu...			1				1
2017 International Conference on Intelligent Envi...			1				1
2018 18th International Conference on Advances ...				1			1
ADCAIJ: Advances in Distributed Computing and ...				1			1
AIMS Public Health					1		1

Fig. 5: Number of articles by publication

For publications in the research domain, articles were analyzed to determine the one with the most mentions. Physiological Measurement is the most popular publication on the subject of cardiovascular diagnosis using machine learning, with 14 relevant articles in recent years.

Discussion

Implications for Research and Practice

The findings revealed a significant number of relevant articles on the diagnosis of CVDs using machine learning. The results achieved were achieved following the systematic review of literature methods.

For professional use, the study results need to be applied in a relevant manner. The results suggest that the field of research is not mature, and that directly applying the methods and instruments used in the studies may not produce the desired effects. In view of this, we believe that a detailed analysis of the context in which the research was carried out is necessary in order to assess the possibility of generalizing the results to other fields.

Limitations of this Review

The limitations of this work are common among this type of research. By following the guidelines established by Marshall, Kitchenham and Brereton (2018), the automatic search was used to obtain relevant publications for the selection process, reducing the biases. A multi-stage selection process was applied and the exclusion criteria were recorded at each stage. The issues in the selection process were specifically solved through virtual meetings.

Conclusion and Future Work

In this review, 21 505055 studies processed using the automatic search were analyzed. Of them, 78 studies provided answers to the six research questions. These studies encompass the topic of the use of machine learning in diagnosing heart diseases, and address issues such as methods and variables that are used to develop this field.

It is concluded that the articles respond effectively to the research questions, with the Support Vector Machine method being the most used and the cross-validation method being the relevant complementary method. Regarding the variables, it is not possible to determine in a general way which would be the most accurate, since it depends on the field of research and other factors involved in a diagnosis.

For future work the research variables should be considered as they are unknown in the diagnosis process. Therefore, the intention is to identify variables with more correlation that do not imply high costs.

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Appendix A - Selected Primary Studies

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Taxonomic Analysis of Spatial Differentiation in The Transport Development Level in Poland

Agnieszka WANIEWSKA

Faculty of Management, General Tadeusz Kościuszko Military University of Land Forces,
51-147 Wroclaw, Czajkowskiego Street 109, Poland, agnieszka.waniewska@awl.edu.pl

Abstract

The article attempts to use taxonomic methods to analyze Polish regions' diversity in terms of transport development. The article aims to answer the question of what is the degree of diversification of transport development in Poland by voivodeships. The research object was sixteen voivodeships in Poland. The analysis was carried out only for the data from 2018 from the quantitative data available in the sources of the Central Statistical Office (GUS). The linear ordering method was used based on the taxonomic measure of development (TMR) according to Hellwig's concept, which allowed distinguishing the ranking of the development transportation level. A modern state functions properly when transport is developed at a high level. The analysis result is the presentation of the spatial differentiation of transport development in individual voivodeships in terms of the adopted measures.

Keywords: Linear Ordering, Hellwig's Method, Transport.

Introduction

Transport is one of the world's most important service sectors. Most frequently the term is understood as the deliberate movement of people and loads. The transport development depends mainly on technical progress, innovation, and entrepreneurship, which change as economies and societies develop. The dynamic development of transport (mainly cars) is at the same time a significant source of problems. The unfavorable effects of transport are felt both by the society (mainly related to the consequences of accidents and collisions) and the environment. In the face of contemporary social and economic changes, the development of transport is one of the effective and modern factors of competitiveness and development of regions in the conditions of a knowledge-based economy. Therefore, in recent years, significant efforts to develop transport in Poland have been made. The article aims to use taxonomic methods to analyze the spatial differentiation of transport development in individual voivodeships in Poland.

The concept and determinants of transport development

Two approaches to defining transport are noticeable in the literature. The first one indicates that transport and communication are "hierarchically subordinated concepts, according to which transport is the broadest term encompassing all activities of moving people, cargo and, messages (communication deals with the movement of messages). While communication is a special form of organizing the transport of persons, cargo, or messages, which ensures the permanent possibility of using the transport facilities of a given route" (Małek, 1997). The second approach treats transport and communication as "partially overlapping concepts, where transport is the activity of deliberately moving people and cargo, and communication is the process of exchanging information between people, which consists of communication (transporting messages) and enabling communication by means of transport. Thus, the concept of transport overlaps with the concept of communication" (Piskozub, 1975).

Transport should be considered in terms of a system. The transport system is "an ordered whole of all modes of transport operating with the use of infrastructure (Skorobogatova, Kuzmina-Merlino, 2017) in a specific area, with the size and structure of the human factor, inter-branch connections within this whole, and the connections of the entire transport system with the environment" (Gołembska, 2009).
The elements of the transport system are infrastructure and supra-structural objects (Skorobogatova, Kuzmina-Merlino, 2017).

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The transport system development depends on two types of conditions.
Internal conditions are related to the functioning of the transport market and the quantitative and qualitative changes taking place there. External determinants concern those factors and phenomena that are somewhat outside the sphere of transport (Merkisz-Guranowska, Merkisz, Kozak, Jacyna, 2013). They are determined by the changes occurring in the social and economic life, which include (Koźlak , 2008):

- the ongoing process of globalization and the development of world trade,
- creating a network of connections to rationalize economic processes,
- development of information and communication technologies,
- implementing the concept of sustainable development.

Linear Ordering – Hellwig's Method

Multidimensional comparative analysis enables the assessment of complex objects and phenomena, i.e., those whose state and behavior are simultaneously influenced by many features (variables) and factors (Surówka, 2019). The concise definition given by Hellwig says that (...) *the methods and technique of comparing multi-feature objects are called multidimensional comparative analysis* (...) (Hellwig, 1981). The main goal of a multidimensional comparative analysis is the construction of a synthetic measure that allows for comparing the elements of a set (of objects) described by means of many variables (features). To achieve that, linear ordering methods are often applied.

These methods assume that the result obtained following the application of an appropriate algorithm will be such an arrangement of a set of objects in which (Bąk, 2018):

- each object has at least one neighbor and no more than two neighbors,
- if the object *a* is a neighbor of object *b*, then the object *b* is a neighbor of the object *a*,
- there are only two objects with one neighbor.

It should be emphasized that the concept of a taxonomic measure of development is a useful tool that allows universal application in economic research. The great advantage of Hellwig's concept lies in its cognitive qualities in the process of explaining economic reality and the usage flexibility (Pietrzak, 2014).
The construction of Hellwig's synthetic measure is as follows:
a) normalization of variables (standardization):

$$z_{ij} = \left(\frac{x_{ij} - \overline{x_j}}{s_j} \right) \tag{1}$$

where:

x_{ij}- observation of the *j*-th variable for the object *i*,
$\overline{x_j}$— arithmetic mean of observations of the *j*-th variable,
s_j— standard deviation of the observation of the *j*-th variable,
b) pattern coordinates:

$$z_{oj} = \begin{cases} \max\limits_i \{z_{ij}\} \text{dla zmiennych o charakterze stymulat;} \\ \min\limits_i \{z_{ij}\} \text{dla zmiennych o charakterzedestymulat;} \end{cases} \tag{2}$$

c) distances of objects from the pattern: $$d_{i0} = \left[\sum_{j=1}^{m} \left(z_{ij} - z_{0j} \right)^2 \right]^{\frac{1}{2}} \tag{3}$$

d) aggregate variable values:

$$q_i = 1 - \frac{d_{io}}{d_o} \tag{4}$$

where:
$q_i \in [0; 1]$, $\max\limits_i \{q_i\}$ — the best object, $\min\limits_i \{q_i\}$— the worst object,

wherein:

$$d_0 = \bar{d}_0 + 2S(d_0) \tag{5}$$

$$\bar{d}_0 = \frac{1}{n}\sum_{i=1}^{n} d_{i0} \tag{6}$$

$$S(d_0) = \left[\frac{1}{n}\sum_{i=1}^{n}\left(d_{i0} - \bar{d}_0\right)^2\right]^{\frac{1}{2}} \tag{7}$$

The measure d_i usually takes values from the interval [0; 1]. These values are the higher, the closer the object is to the pattern.

Selection and statistical verification of variables

Following the above remarks and previous experience, as well as the availability of statistical data (the Central Statistical Office was an important source of the numerical information), to measure the degree of diversification of transport development in Polish voivodship, it was assumed that the potential variables proposed for the research cover the following set of diagnostic features:

X_1 – expressways and highways per 1000 km^2 (stimulant)
X_2 – passenger cars per 1000 population (stimulant)
X_3 – trucks per 1000 population (stimulant)
X_4 – fatal accidents (destimulant)
X_5 – injured in accidents (destimulant)
X_6 – railway lines in operation
X_7 – passenger transport per capita (stimulant)
X_8 – commune and poviat hard surface roads per 100 km^2 (stimulant)
X_9 – commune and district roads with unsurfaced surface per 100 km^2 (stimulant)
X_{10} – suburban railway lines in km (stimulant)
X_{11} – regional railway lines in km (stimulant)
X_{12} – long-distance railway lines in km (stimulant)
X_{13} – average mileage of 1 car (bus) during the year (stimulant)
X_{14} – the number of parking lots in the Park & Ride system (stimulant)
X_{15} – passenger transport per capita (stimulant)
X_{16} – the public transport fleet adapted to the transport of disabled people (buses).

Table 1: Statistical characteristics of diagnostic variables

Voivodeship	X_4	X_5	X_7	X_8	X_9	X_{10}	X_{15}
Dolnośląskie	203	2 674	94,73	8 071,2	345,5	22 484	768
Kujawsko-Pomorskie	171	1 031	82,89	6 720,9	314,3	55 652	479
Lubelskie	179	1 286	60,71	9 314,8	1 279,2	24 576	404
Lubuskie	79	790	42,74	3 485,7	676,6	13 357	200
Łódzkie	229	4 600	101,68	7 445,6	346,7	17 201	576
Małopolskie	223	4 003	132,73	6 533,2	91,9	4 717	853
Mazowieckie	448	4 682	180,87	14 033,8	1 107,8	37 498	2 609
Opolskie	81	787	26,21	3 692,2	197,8	11 250	133
Podkarpackie	125	1 775	29,74	6 464,5	223,7	20 761	372
Podlaskie	102	771	86,08	6 700,8	970,4	13 125	335
Pomorskie	146	3 098	125,46	5 250,1	464,1	17 676	675
Śląskie	219	3 783	88,94	6 068,4	282,4	11 850	1 478
Świętokrzyskie	127	1 450	36,32	5 842,4	357,5	6 121	323
Warmińsko-Mazurskie	140	1 506	45,48	6 950,5	1 463,2	11 738	276
Wielkopolskie	261	3 766	89,78	11 258,9	936,6	25 285	826
Zachodniopomorskie	129	1 357	98,00	7 041,2	640,5	19 309	454

arithmetic mean	178,9	2 334,9	82,6	7 179,6	606,1	19 537,5	672,6
standard deviation	90,2	1438,4	42,0	2620,9	422,1	12575,1	612,6
V_x[%]	0,5	0,6	0,5	0,4	0,7	0,6	0,9
min	79	771	26,21	3 485,7	91,9	4 717	133
max	448,0	4 682,0	180,9	14 033,8	1 463,2	55 652,0	2 609,0
max-min	369,0	3 911,0	154,7	10 548,1	1 371,3	50 935,0	2 476,0

Source: Own study based on data from the Regional Data Bank.

The verified set of variables included in the analysis, basic information about them and the results of statistical verification are summarized in Table 1. Next, the data was statistically verified for the coefficient of variation. Only those features were selected for the analysis where the coefficient of variation V(x) was within 10% - 30%, which indicates that the selected variables can be considered diagnostic. The following one were excluded from the taxonomic analysis are: X_1 - expressways and highways per 1,000 km^2, X_2 - passenger cars per 1,000 population, X_3 - trucks per 1,000 population, X_6 - railway lines in operation, X_{11} - regional railway lines in km, X_{12} - long-distance railway lines in km, X_{13} - average mileage of 1 car (bus) per year, X_{14} – the number of car parks in the Park & Ride system. Among the proposed variables, those that were destimulants[1] were reduced to stimulants[2].

Table 2: Organizing Polish voivodeships according to the TMR value

Position	Voivodeship	TMR Hellwig	Position	Voivodeship	TMR Hellwig
1	Mazowieckie	0,47	9	Lubelskie	0,15
2	Wielkopolskie	0,42	10	Zachodniopomorskie	0,13
3	Opolskie	0,36	11	Podkarpackie	0,11
4	Dolnośląskie	0,32	12	Śląskie	0,10
5	Kujawsko-Pomorskie	0,27	13	Łódzkie	0,08
6	Warmińsko-Mazurskie	0,26	14	Lubuskie	0,06
7	Podlaskie	0,21	15	Pomorskie	0,05
8	Świętokrzyskie	0,19	16	Małopolskie	0,03

Source: own study.

The results of organizing the voivodships using the Hellwig's method are presented in Table 2. The Mazowieckie and Wielkopolskie voivodeships are in the leading positions in terms of transport development. In the Mazowieckie voivodeship, the maximum values were reached by the variable X_7 (passenger transport per 1 inhabitant) and X_8 (commune and poviat roads with hard surface per 100 km^2), while in the Wielkopolskie voivodeship the variables X_4 X_7, and X_8 were predominantly shaped, at least at the level of 75% of the values of the reference object's corresponding variables. The last positions (in different order) are taken by the following voivodeships: Lubuskie, Pomorskie, and Małopolskie (positions 14 to 16). The low position in the ranking of these voivodeships is due to low values of variables.

Conclusions

The article presents the possibilities of assessing the road infrastructure in Polish voivodeships based on statistical data using the Hellwig's linear ordering method. In the case of the method applied, the Mazowieckie voivodeship was ranked first in the study. Furthermore, based on the analysis, it can be concluded that Polish voivodeships are characterized by a diversified level of road infrastructure. There is no clear division into Eastern Poland and the rest of the country in the spatial diversity of road infrastructure in Poland.

[1] destimulant - a feature for which lower values are desirable (e.g., unemployment rate - the lower the better)
[2] stimulant - a feature for which higher values are desired (e.g. GDP - the higher the GDP, the better the economy develops),

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The Effect of Exchange Rate on Cross-Border Mergers and Acquisitions (CBMAs) Success: Evidence from ASEAN CBMA

Nurhazrina MAT RAHIM*
Faculty of Accountancy, UiTM, Selangor, Kampus Puncak Alam, 42300 Bandar Puncak Alam, Selangor, Malaysia
Email: hazrina@uitm.edu.my

Ruhani ALI
Graduate School of Business, Universiti Sains Malaysia, 11800, Pulau Pinang, Malaysia
Email: ruhani@usm.my

Ei Yet CHU
Graduate School of Business, Universiti Sains Malaysia, 11800, Pulau Pinang, Malaysia
Email: eychu@usm.my

**Corresponding Author*

Abstract

CBMA is one of the preferred external growth strategies by many firms worldwide. Similar trend is also observed for firms from ASEAN member countries. Nevertheless, it is reported that there is high rate of non-value creation involving CBMAs transactions due to higher risk as compared to domestic M&As. Exchange rate is one of the sources of risk related to CBMAs transaction. This study aims at examining the role of exchange rate in ASEAN firms' CBMA success. This is due to the active involvement of ASEAN firms in CBMA and high exchange rate volatility in ASEAN countries. This study used CBMA involving 348 ASEAN bidding firms and 246 ASEAN target firms from the year 2002 to 2013 from Thomson One Banker Database. The results from multiple regression analysis indicate that exchange rate strength is disadvantageous for ASEAN target firms as it would decrease the possibility of CBMA success. The results contradict to cost of capital view which argue that stronger bidder's currency resulted high premium payment and increase the possibility of CBMA success. Hence ASEAN target firms should be more cautious in due diligence process prior to accepting CBMA offer from country with stronger currency.

Keywords: Cross-border mergers and acquisitions (CBMAs), Exchange rate, CBMA Success, ASEAN.

Introduction

Cross-border mergers and acquisitions (CBMAs) have been widely used as an external growth strategy for firms worldwide. This is corroborated by the statistic from the World Investment Report 2016 (UNCTAD, 2016), which reported a large increase (66.8%) in worldwide CBMA value in the year 2015. World Investment Report 2015 indicated that the firms from countries of Association Southeast Asian Nation (ASEAN) actively involved in CBMAs, consistent with the worldwide CBMA trends. Among the contributing factors is the establishment of ASEAN Economic Community (AEC) (UNCTAD, 2015; ASEAN Secretariat, 2019). Despite the popularity of CBMAs, a study by Froese (2010) revealed that 50% of CBMA failed to create value. The reason for this is because CBMA is riskier than domestic M&A. One of the sources of CBMA risks originated from the difference in currency between target and bidding country.

However, the debates persist whether exchange rate could affect the firm's performance and hence, a CBMA success or it leaves no effect at all on CBMA success. While Froot and Stein (1991) argued that exchange rate could affect the firm's performance based on the cost of capital argument, Kish and Vasconcellos (1993) proposed an opposite view by arguing based on profit remittance following CBMA. A later study by Blonigen (1997) is consistent with Froot and Stein (1991) where exchange rate could affect a firm's performance, but Blonigen (1997) used the firm-specific asset as the basis to support the argument.

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The effect of exchange rate on CBMA success is more prevalent for ASEAN firms. This is due to the fact that ASEAN countries have a volatile exchange rate (Rahutami, 2013) and they are actively involved in CBMA. The World Investment Report 2016 (UNCTAD, 2016) reported an increase in both ASEAN CBMA purchase (33.8%) and CBMA sales (15%) in the year 2015. In addition, Rahutami (2013) reported that ASEAN countries have volatile exchange rate where Malaysia and Philippines recorded the highest exchange rate volatility in the year 2002 to 2003 while Indonesia in the year 2011. Thus, there is a high possibility that the currency movement of ASEAN countries would be detrimental to the success of CBMA deals. Therefore, this fact indicates that the exchange rate could decidedly affect the success of CBMA deals involving ASEAN firms. Thus, this study aims to examine the exchange rate effect on ASEAN firms' CBMA success.

This study provides an opportunity to advance our knowledge on the impact of exchange rate on ASEAN firms' CBMA success. Even though the study on exchange rate by Jongwanich, Brooks, and Kohpaiboon (2013) involving emerging ASEAN economies, their focused was on the exchange rate effect on CBMA intensity, not the firm's performance and CBMA success. Thus, the uncertainness of the role of exchange rate for CBMA success in ASEAN firms still exists.

The results indicated that there is a significant negative impact of exchange rate on ASEAN target firm's CBMA success. This study highlight that the inferior governance standard of ASEAN target countries has resulted in low premium paid to ASEAN target firm, contrary with cost of capital argument. Hence, there is deterioration in performance which led to low possibility of CBMAs success. The remaining part of the paper proceeds as follows: Section 2 discusses the literature and hypothesis development, Section 3 describes the research methodology, Section 4 presents the results and discussions, and the last section concludes the paper.

Literature Review

The studies on the impact of exchange rate on CBMA outcome (intensity and firm's performance) had commenced since the 1990s. However, debates are still ongoing not only with regards to the underlying views but also the mechanism (exchange rate strength or exchange rate volatility) on how exchange rate affects CBMA outcome. There are three main views, which are widely discussed in the previous CBMA literature and they are; cost of capital view, (2) profit remittance view, and firm-specific asset view.

Cost of capital view

First, an early study by Froot and Stein (1991) asserted that informational imperfection and asymmetries in the capital market could explain the influence of exchange rate on the intensity of foreign company acquisition in a country. They claimed that information asymmetry, which resulted from imperfection in the capital market makes internal financing cheaper as compared to external financing. Thus, the bidder will utilise their net wealth to finance the CBMA transaction. The bidder's net wealth will appreciate if the bidding country's currency strengthens relative to the target country's currency, hence reducing the bidder's cost of capital to acquire the target. Consequently, the intensity of foreign acquisition in the target country will also increase. The Froot and Stein (1991) cost of capital view has been supported by later studies (Uddin and Boateng, 2011; Erel, Liao and Weisbach, 2012; Boateng *et al.*, 2014) where the bidding country's currency appreciation relative to the target positively affects the CBMA intensity in the target countries.

Other than increasing CBMA intensity, Harris and Ravenscraft (1991) argued that the relative change in bidder's currency as compared to the target will also affect the firm's performance during CBMA. This study also used Froot and Stein (1991) cost of capital view and claimed that the cost of capital advantage resulted in lower acquisition price and enabled bidding firms to pay a higher premium to the target firms (Kiymaz, 2004; Starks and Wei, 2013). This would positively affect the wealth gains for the target firms during CBMA, hence improving the firm's performance. Later studies by Kang (1993), Danbolt and Maciver (2012), and Gregory and O'Donohoe (2014) also put forth the Froot and Stein (1991) cost of capital view where they asserted that informational imperfection and asymmetries in capital market resulted in decreasing cost of capital and thus, explain the variation in bidding firm's return during CBMA. Therefore, the low cost of capital would positively affect both target and bidding firms' performance following CBMAs. However, a later study by Shetty et al. (2019) indicated no relationship between change in bidders' currency and bidding firm's return.

Profit Remittance View

Even though numerous studies found support for Froot and Stein (1991) cost of capital view, there are also studies that found no significant impact of bidding country's currency strength on neither CBMA intensity (Kish and Vasconcellos, 1993; Rajan, 2008; Brooks and Jongwanich, 2011; Jongwanich, Brooks and Kohpaiboon, 2013) nor a firm's performance (Cakici, Hessel and Tandon, 1996; Kiymaz, 2004; Bhagat, Malhotra and Zhu, 2011; Steigner and Sutton, 2011; Danbolt and Maciver, 2012; Chang, Choi and Huang, 2015). Kish and Vasconcellos (1993) argued that the absence of exchange rate impact on both CBMA intensity and the firm's performance was due to the remittance of profit to bidding country at a higher exchange rate. Thus, it will result in less amount of profit repatriated, setting off the advantage of earlier lower acquisition cost.

Kish and Vasconcellos (1993) profit remittance view was supported by a later study by Kiymaz (2004) who stated that currency strength not only affects the acquisition cost but also the value of profits repatriated to the bidding firms. Therefore, according to Kiymaz (2004), bidding firms would benefit if their country's currency is strong during acquisition and weak during profit remittance. As a result, Kiymaz (2004) claimed that it is the exchange rate volatility (variation in the exchange rate of the home country of bidding and target firms), not the bidder currency strength, which could affect the firm's performance during CBMA. The study hypothesised that high exchange rate volatility will negatively affect a firm's performance during CBMA because it represents a high uncertainty of profit remittance. The results indicated that the exchange rate volatility only gives a significant negative impact on bidding firm's performance and not for target firm, though the coefficient is also negative.

Chakrabarti, Gupta-mukherjee, and Jayaraman (2009) also reported a negative impact of exchange rate volatility on bidding firm's performance during CBMA, though it is not significant. Anomalous results were reported in later studies by Morresi and Pezzi (2014) and Ahern, Daminelli, and Fracassi (2015). They found that the exchange rate volatility gives a significant positive impact on a firm's performance creation during CBMA. There are also studies (Filobok, 2006; Rajan, 2008; Lim, Makhija and Shenkar, 2016) that examined the impact of exchange rate volatility on CBMA intensity. However, their results indicated an insignificant negative effect of exchange rate volatility on CBMA intensity.

Firm-Specific Asset View

Even though Kish and Vasconcellos (1993) claimed that exchange rate leaves no significant impact on CBMA intensity and the firm's performance, there is another view that recognised the significance of exchange rate on CBMA intensity, which is Blonigen (1997) firm-specific asset view. Blonigen (1997) claimed that exchange rate could affect CBMA intensity when the acquisition involved purchases of firm-specific assets, which are able to generate profit in currencies other than that were used to acquire the asset. Therefore, there is no issue of profit remittance that could offset the low acquisition cost. This study reported an increase in U.S. CBMAs by Japanese firms in industries with the firm-specific asset when the real U.S. dollar depreciates. The Blonigen (1997) firm-specific asset view was supported by Georgopoulos (2008) who reported that depreciation of home country currency resulted in an increase of CBMAs in industries with firm-specific asset (high R&D intensity). Therefore, according to this view, exchange rate is relevant in explaining the variation in CBMA intensity and possibly the firm's performance.

Hypothesis Development

As stated in the previous section, exchange rate (exchange rate strength or exchange rate volatility) could explain the variation of CBMA outcome (intensity and firm's performance). Since there are numerous arguments regarding the impact of exchange rate on post-CBMAs firm's performance, it is interesting to examine the impact of exchange rate on a firm's performance, and hence, a CBMA success. This is due to the fact that CBMA success is represented by the improvement in the firm's performance following CBMA as compared to before CBMA.

This is more crucial for ASEAN firms as they are highly involved in CBMA and one of the unique and diverse characteristics of ASEAN countries is the exchange rate volatility (Rahutami, 2013). Therefore, CBMA involving firms from ASEAN countries would serve as a perfect backdrop to examine the exchange rate impact on ASEAN firms' CBMA success. Furthermore, it would provide an insight as to whether the volatility of the ASEAN countries exchange rate is advantageous in the context of CBMA success.

Contrary to Kish and Vasconcellos (1993), this study hypothesised that exchange rate will have a significant positive impact on CBMA success for both target and bidding firms. The reason is related to the high information asmmetry in emerging market such as ASEAN countries. According to Yokotaki and Kashijuku (2015), the difficulty percentage of getting reliable information from ASEAN countries is the highest (27%), surpassing India (17%) or China (14%). Hence, ASEAN bidder would utilise internal financing to finance CBMA transaction as per Froot & Stein (1991) view.

The strength of the bidding country's currency relative to the target's would result in purchasing advantage to the bidding firm (Harris and Ravenscraft, 1991; Danbolt and Maciver, 2012). This was supported by latter studies which claimed that a strong bidder's currency would result in lower price to be paid to acquire the target firm (Boateng *et al.*, 2014). Consequently, the lower acquisition price would reduce the cost of financing the acquisition (Gregory and O'Donohoe, 2014). Thus, the transaction cost involved in CBMA could be minimized, hence advantageous especially for the bidding firm performance.

Additionally, a strong bidder's currency relative to the ASEAN target country would also be advantagoeus to the ASEAN target firm. This is caused by the changes in the relative wealth of the bidder against the target, which induced the bidder to pay a higher premium (Starks and Wei, 2013). Hence, this study posits that both reduction in bidding firm's transaction cost and target firm's gain through receiving high premium would result in improvement in both ASEAN target and bidding firm's performance following CBMAs. This could ultimately Therefore, the hypotheses are:

H1: There is a significant positive relationship between exchange rate and CBMA success for ASEAN bidding firms.

H2: There is a significant positive relationship between exchange rate and CBMA success for ASEAN target firms.

Methodology

Research Design

This study intends to examine the effect of exchange rate on the CBMAs success for both ASEAN target and bidding firms. The focus of this study are CBMAs involved firms from ASEAN member countries as either target or bidding firms. The exchange rate data for the countries related to the target or bidding were collected to examine the relative changes in exchange rate. The Tobin's Q is used as a proxy for CBMAs success. The following section will discuss the data source, sample selection and the data analysis.

Data Source

CBMAs were extracted from the Thomson One Banker Database. This database has been widely used in many studies (Danbolt & Maciver, 2012; Hogholm & Knif, 2015; Song et al., 2010b, 2010a; Thenmozhi & Narayanan, 2016; Uddin & Boateng, 2011) as a source of mergers and acquisitions data. The financial data were obtained from Thomson Reuters DataStream.

Sample

The CBMA sample involving ASEAN member countries as bidding or target firms was extracted from the population of all CBMAs involving ASEAN firms in Thomson One Banker Database. This study focused on bidding and target firms from six ASEAN member countries (Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam) because they are the most active CBMA players in the region. The selected CBMAs involving ASEAN firms as the bidder and target were announced and completed between the years 2002 and 2013. The selection of sample ended in the year 2013 to enable the computation of long-term (three years) performance following CBMA as the proxy for CBMA success.

In addition, the CBMA deal is completed by the end of the sample period. The ASEAN bidding and target firms are public-listed companies and are not classified under financial industries. This study also excludes the CBMA in which the target completed more than one transaction in the same financial year. Lastly, the financial data in Thomson Reuters DataStream for one year prior to the completion year and three years following completion

year must be available. The total number of CBMA transactions that satisfied the sample selection criteria was 594. They comprised of 348 CBMAs involving ASEAN firms as bidder and 246 CBMAs involving ASEAN firms as target firms.

Definition of Operational Variable

CBMA Success

CBMA success is the dependent variable of this study. A CBMA is considered a success not only when it is completed, but also when it created value to ASEAN firms through an improvement in the firms' performance following CBMA as compared to before CBMA. The study by Chakrabarti et al. (2009) also used long-term performance as a proxy for CBMA success. Therefore, in this study, the changes in the ASEAN bidding and target firms' performance after CBMA are the proxy for the CBMA success.

This study utilised Tobin's Q to measure the firm's performance. Following Chung and Pruitt (1994), Tobin's Q is calculated by deflating the sum of market capitalisation, preferred stock, and total liabilities by the total asset. The change in the ASEAN bidding and target firms' Tobin's Q was calculated by deducting Tobin's Q in the financial year prior to the completion of the CBMA transaction from the average Tobin's Q of the bidding and target firms three years following CBMA completion (Wang and Xie, 2009; Jory and Ngo, 2011).

Exchange rate (EXR_{BT})

Following Ahern et al. (2015), and Danbolt and Maciver (2012), the exchange rate is the relative change in exchange rate between the bidding and target country currencies over the period of 12 months before the date of the bid completion.

Control variables

This study incorporated a few control variables (firm-specific factors and deal characteristic factors) because they are important determinants of CBMA success. These factors are firm's size (SIZE) (Martynova and Renneboog, 2008; Song *et al.*, 2010; Basuil, 2011; Du and Boateng, 2015; Sharma and Raat, 2016; Wu *et al.*, 2016), firm's leverage (LEVERAGE) (Thao Ngo, Durand and Laing, 2014), firm's financial advantage (pre-acquisition performance: ROA_{-1}) (Changqi and Ningling, 2010; Song *et al.*, 2010; Du and Boateng, 2015), transaction size (TRVLUE) (Aybar and Ficici, 2009; Bhagat, Malhotra and Zhu, 2011; Aybar and Thanakijsombat, 2015), advisor (ADVISOR) (Lowinski, Schiereck and Thomas, 2004), and relatedness (RELATED) (Corhay and Rad, 2000; Aybar and Ficici, 2009; Song *et al.*, 2010; Jory and Ngo, 2011).

Data Analysis

Model specification

To examine the effect of exchange rate on ASEAN bidder and target CBMA success, this study regresses the bidders' or target performance change (Tobin's Q) on:

$$Performance\ \ change = \alpha + EXR_{BT} + \Sigma\beta kControlsk + \varepsilon$$

Where EXR_{BT} is the relative change in exchange rate between the bidding and target country currencies over the period of 12 months before the date of the bid completion and *Controls* is the control variables.

Results and Discussion

This section presents the result of the study, beginning with descriptive statistics and inferential statistics for both target and bidding firms. The multiple regression will then be presented followed by the discussion of the results.

Descriptive Statistics

Table 1: Descriptive statistics for ASEAN Bidding firms

Variable	Descriptive statistic				
	Mean	**Med**	**SD**	**Min**	**Max**
EXR_{BT}	-0.0215	-0.0011	0.5142	-2.5573	1.7644

BSIZE	5.1517	5.0414	0.7969	3.3758	7.4966
BLEVERAGE	0.4345	0.4200	0.2320	0.0057	2.4710
BROAY-1	8.0238	10.1904	21.1015	-221.9887	49.9995
TRVALUE	5.1705	6.2981	2.9446	-3.1549	9.3372
ADVISOR	0.1925	0.0000	0.3949	0.0000	1.0000
RELATED	0.4713	0.0000	0.4999	0.0000	1.0000

Table 1 present the descriptive statistics for ASEAN bidding firms Table 1 shows that the relative change in exchange rate of ASEAN bidding firms is negative, indicating that on average ASEAN bidding countries' currency weaken relative to target countries' currency.

Table 2: Descriptive statistics for ASEAN Target firms

Variable	**Descriptive statistic**				
	Mean	**Med**	**SD**	**Min**	**Max**
EXR_{BT}	-0.0914	-0.0886	0.6710	-2.1048	1.9131
TSIZE	5.0942	5.1079	0.7965	2.8525	7.0236
TLEVERAGE	0.4984	0.4655	0.3814	0.0055	5.0248
TROAY-1	11.6035	9.8278	31.2979	-64.2384	434.8933
TRVALUE	7.2405	7.1677	0.8736	4.2304	9.5633
ADVISOR	0.1626	0.0000	0.3698	0.0000	1.0000
RELATED	0.3089	0.0000	0.4630	0.0000	1.0000

Table 2 display the descriptive statistics for ASEAN target firms. Table 2 shows that the relative change in exchange rate ASEAN firms is also negative. This indicates that on average bidding countries' currency weaken relative to ASEAN target countries' currency.

Inferential Statistics

Table 3: Correlation Matrix for ASEAN bidding firms

Variable	**EXRVOL**	**BSIZE**	**BLEVERAGE**	**BROAY-1**	**TRVALUE**	**ADVISOR**	**RELATED**
EXR_{BT}	1.000	-0.077	0.056	-.146**	-0.014	-.119*	-0.001
BSIZE		1.000	0.037	.212**	.235**	0.073	0.076
BLEVERAGE			1.000	-.314**	-.126*	-.135*	-.113*
BROAY-1				1.000	0.049	0.069	0.014
TRVALUE					1.000	.333**	.234**
ADVISOR						1.000	0.021
RELATED							1.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 4: Correlation Matrix for ASEAN Target firms

Variable	EXRVOL	TSIZE	TLEVERAGE	TROAY-1	TRVALUE	ADVISOR	RELATED
EXR_{BT}	1.000	0.053	0.035	0.058	0.004	0.016	0.028
TSIZE		1.000	-0.030	-0.004	.693**	.260**	0.001
TLEVERAGE			1.000	.593**	0.051	0.031	-0.024
TROAY-1				1.000	0.090	0.044	-0.013
TRVALUE					1.000	.359**	0.087
ADVISOR						1.000	0.015
RELATED							1.000
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).							

Table 3 and Table 4 present the correlation table for ASEAN bidding firms and ASEAN target firms, respectively. Both tables indicated that there is no significant high correlation between the variables. In addition, the variance inflation factor (VIF) test was also conducted for all of the regression models, and none of the value exceeded 10.

Multiple Regression Result

Table 5: Impact of exchange rate (EXR_{BT}) on Tobin's Q change

	Panel A : Linear regression		Panel B : Logistic regression	
Model Number	Model 1.1	Model 1.2	Model 2.1	Model 2.2
Constant	-1.0844***	1.1735	-2.0518***	2.7859**
	0.3554	0.8931	0.7759	1.2554
Country-specific factors				
EXR_{BT}	-0.1345	-0.2844**	-0.4199*	-0.3763*
	0.0830	0.1314	0.2225	0.2026
Control Variables				
SIZE	0.1713**	0.0600	0.4524***	0.4221*
	0.0764	0.2356	0.1530	0.2515
LEVERAGE	0.4425	-0.4649	-0.5748	-0.6757
	0.4172	0.5823	0.5798	0.5557
ROA_{-1}	-0.0122***	-0.0117*	-0.0330***	-0.0073
	0.0039	0.0063	0.0101	0.0092
TRVALUE	0.0010	-0.1585	-0.0050	-0.6133**
	0.0183	0.1931	0.0428	0.2487
ADVISOR	-0.0341	0.2982	0.3215	0.2597
	0.1202	0.2057	0.3012	0.3907
RELATED	0.0073	0.0305	-0.1403	0.1297
	0.0878	0.1913	0.2345	0.2869
N	348	246	348	246
R^2 / Cox and Snell R^2	11.39%	13.08%	7.29%	5.65%
F / Nagelkerke R^2	6.24***	5.11***	9.78%	7.56%
Durbin-Watson / Correctly classified (%)	2.22	2.30	59.77%	59.76%
*Notes: Unstandardized coefficients are shown with standard errors in parentheses. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.*				

The regression models are reported in Table 5 (Panel A). Model 1.1 is the regression model for ASEAN bidding firms while Model 1.2 is the regression model for ASEAN target firms. Both regression models reported a

Durbin-Watson statistic of close to 2.0 and hence, there is no autocorrelation issue in the regression analysis. The heteroscedasticity issue in the estimation of the regression model is addressed using White's adjustment procedure.

Model 1.1 indicated that the coefficient for the exchange rate is negative but not significant. Therefore, this result is contrary to hypothesis H1. This is because exchange rate leaves no significant impact on bidding firms' performance, aligned with Kish and Vasconcellos (1993). However, the negative sign means that the stronger the ASEAN bidding country's currency relative to target country's currency, the lower the bidding firms' Tobin's Q change, and the lower possibility of CBMA success. This negative relationship contradicts to Froot and Stein (1991) cost of capital view.

Discussion

The negative impact of exchange rate on ASEAN Bidder CBMA success might be due to the features of ASEAN countries as emerging countries which has poor corporate governance standard (Yen, Chou and André, 2013; Lebedev *et al.*, 2015). Hence, this indicated that ASEAN bidder might pursue CBMA because of hubris. Therefore, instead of benefiting from the low cost of capital when ASEAN bidding country's currency strengthens, they might have utilised the cost of capital advantage to overpay the target firms during CBMA due to hubris. As a result, high acquisition cost negatively affects the firms' performance and CBMA success. Thus, Hypothesis 1 is not supported.

Similarly, for ASEAN target firms, Model 1.2 also reported a negative coefficient for the exchange rate, significant at 5% level. This indicates that the stronger the bidding country's currency relative to ASEAN target country's currency, the lower the ASEAN target firms' Tobin's Q change, and the lower the possibility of CBMA success. The result is also contradicted to Froot and Stein (1991) cost of capital view because according to this view, target firms are also expected to benefit from the strengthening of bidding country's currency due to a high premium paid. However, similar to the above argument for ASEAN bidder, the bidding firms might have paid a minimum premium due to the risk of exposure to inferior corporate governance standard of ASEAN target country (Starks and Wei, 2013). Therefore, Hypothesis 2 is also not supported. Table 6 summarize the hypothesis testing.

Table 6: Summary of Hypothesis testing

Hypothesis		Results	
H1	There is a significant positive relationship between exchange rate and CBMA success for ASEAN bidding firms	Not significant (Negative)	Not supported
H2	There is a significant positive relationship between exchange rate and CBMA success for ASEAN target firms	Significantly negative	Not supported

Robustness Test

Table 3 (Panel B) presents the robustness test for both ASEAN bidding and target firms, using binary logistic regression analysis as per previous M&A literature (Aybar and Ficici, 2009; Zhu and Jog, 2012; Popli and Sinha, 2014). For this analysis, the dependent variable, which is Tobin's Q change is modified to the dichotomous variable. Instead of a continuous scale dependent variable, a dummy variable of one (1) is assigned when there is positive Tobin's Q change and zero (0) when there is negative Tobin's Q change.

Model 2.1 is the regression model for ASEAN bidding firms while Model 2.2 is the regression model for ASEAN target firms. The result is consistent with the earlier regression model. In fact, the coefficient of the exchange rate for ASEAN bidding firms is significantly negative, as shown in Model 2.1. This indicates that the exchange rate is disadvantageous in influencing both ASEAN bidding and target firm's CBMA success because it has a significant negative effect on the firm's performance.

Conclusion

The popularity of CBMA as external growth strategies by firms worldwide does not preclude it from the fact that CBMA is unable to create value for the firms and thus jeopardise the CBMA success. This is due to the fact that CBMA is more challenging than domestic M&A because of the difference in target and bidding firms' country of origin. One of the main differences risks CBMA success is the exchange rate. The features of ASEAN countries with high exchange rate volatility and high involvement of ASEAN firms in CBMA raise a question if the exchange rate could have an adverse impact on the CBMA success of ASEAN firms. The results indicated that there is a negative effect of exchange rate on CBMA success for both ASEAN bidding and target firms. Both hypotheses are not supported. Nevertheless, this study provides an insight that the change in ASEAN bidding country currency relative to target country currency neither benefit nor jeopardise the CMBAs success. Additionally, the stronger the bidding country currency relative to ASEAN target country, the lower the possibility of CBMAs success. This result contradicts with cost of capital view where ASEAN target firms might have received low premium due to inferior governance standard of ASEAN countries. Hence, a more vigilant due diligence process must be executed by ASEAN firms when the bidder is from country with stronger currency. This study is limited to the impact of one factor only (exchange rate) on the CBMA success. There are more factors related to country differences, which could affect CBMA success such as geographic distance and cultural differences. Further research should be undertaken to provide an additional insight into the limited CBMA literature on the role of other country-related factors in the CBMA success.

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Eating Habits and Lifestyle of The Executive Managers in Hierarchized Organizational Systems of Sport and Tourism

Agnieszka Gorka-CHOWANIEC
J. Kukuczka Academy of Physical Education in Katowice, Poland
a.chowaniec@awf.katowice.pl

Kazimierz NAGODY-MROZOWICZ
General Tadeusz Kościuszko Military Academy of Land Forces, Poland
kazimierz.mrozowicz@awl.edu.pl

Slawomir PATERAK
General Tadeusz Kościuszko Military Academy of Land Forces, Poland
slawomir.paterak@awl.edu.pl

Abstract

The diet and regularity of physical activity are two areas that determine a person's lifestyle and components of all health determinants. In turn, maintaining an individual's health at an appropriate level determines the effectiveness of his or her activities in both the private and professional sphere. The professional function of a manager is a profession characterized by high pressure of the environment, high professional mobility, high levels of stress and "non-standard" working time. The research concerned a socio-professional group of middle-level managers in hierarchical organizational systems of hospitality and sport. As a result of the sampling methodology adopted, the final sample size (GB) reached N = 107 observations. Two subgroups were identified in the study group: P1 n = 43 (sport managers/trainers) and P2 n = 67 (hotel managers/managers of four-star hotels). The selection of the sample was deliberate. Along with the increase in the assessment of the impact of diet, an increase in self-esteem of eating habits was noted (rtt = 0.391) and vice versa, the assessment of the impact of physical fitness on the effectiveness of work performed also increased (rtt = 0, 356); a strong and positive correlation was observed between opinions on eating habits and physical fitness of the subjects (rtt = 0.393); in the strong, positive and transitive correlationship relationship are also the physical fitness of the subjects and assessment of their impact on work efficiency (rtt = 0.380); the number of hours of professional work escalates the intensity of stress resulting from work (rtt = 0.359). nAs a result of our research, we can observe, in particular, that managers assess their eating habits as average. The study also showed that in the opinion of the analyzed group of respondents, the diet is determined by the effectiveness of their professional work.

Keywords: Lifestyle, Manager, Management, Sport, Tourism, Eating Habits.

Introduction

The currently growing social awareness of the importance of healthy eating and physical activity both in the private and professional life of each individual is not always connected with the realities of everyday existence. It is particularly difficult to meet these requirements for persons with high professional activity, whose specificity of work makes it impossible to maintain regularity in the way of satisfying basic physiological needs, which undoubtedly include: the need to satisfy hunger and physical activity (Maslow, 2009; Sekuła 2008). This group undoubtedly includes the managerial profession. To apply for a managerial position, a candidate must meet many requirements included in a multi-stage, often stressful recruitment process. In addition to the desired hard competences in today's managerial staff, which is reflected in appropriate education, the importance of a wide range of soft skills is increasingly emphasized, such as: charisma, diligence, availability, interpersonal skills, resistance to stress, intelligence, self-control skills, loyalty, the ability to organize both own work and the work of the subordinates, flexibility, high manners, eloquence, holistic thinking skills, entrepreneurship. Due to the complexity of all the requirements posed by the professional sphere, the managers often forget about leading a hygienic lifestyle while focusing on the perfect fulfillment of their roles on the organizational level. The physical activity and proper eating habits are considered to be one of the positive measures of human health (Drabik, 1997). The higher its level, the

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better health, which is undoubtedly an important determinant of the development of efficiency and intellectual capacity, so required for the effective operation of modern managerial staff.

The issue of the influence of diet and the frequency of physical activity on the effectiveness of the work of the executives (managers) in the Polish scientific reality has only recently been recognized, which means that we cannot find many studies on this subject, therefore the authors took up the challenge of filling the gap in this area, which may become a contribution to further research in this field. In Europe, however, the issue of the diet of this professional group and its impact on the effectiveness of managers' work has been the subject of research by many scientists for many years (Hutchin, 1966; Klarreich, 1987; Lalonde, 1974).

Undoubtedly, it is worth analyzing the lifestyle of people occupying managerial positions, it is worth diagnosing health behaviors in order to be able to limit their negative effects, which may also affect the effectiveness of their goals fulfilment in the professional space.

Taking into account the above premises, the aim of this study was to identify and evaluate eating habits with particular emphasis on physical activity as a pro-health behavior in the attitudes of middle-level managers in the hospitality and tourism sector. Making use of empirical research, the authors decided to answer the following study questions: **P1** What are the eating habits of modern middle-level managers in the hospitality and tourism sector and what are they characterized by? **P2** What is the awareness of the needs and importance of rational nutrition of middle-level hospitality and tourism managers for effective managerial work? **P3** What are the attitudes of middle-level management in the hospitality and tourism sector towards physical activity? **P4** How do the surveyed managers assess the quality of their lives?

In the spectrum of the presented research issues, the following hypotheses were put forward: **H1** Taking into account the highly stressful work environment of the surveyed managerial staff and the high time absorption during the performed managerial duties, it can be concluded that work conditions significantly translate into de-escalation of pro-health behaviors, i.e. irregular meals, low quality of consumed food and a low frequency of eating. **H2** Middle-level hospitality and tourism managers are aware of the needs and importance of rational nutrition for maintaining the effectiveness of their managerial work. **H3** Contemporary managers in the analyzed sector are characterized by positive attitude towards physical recreation, although its behavioral component is not shared by the majority of the surveyed executives. **H4** The level of the quality of life in the opinion of the respondents is not satisfactory. This state of affairs should be seen mainly in the nature of their professional work, its high mobility, which does not create favorable circumstances for undertaking pro-health physical activity and regular eating.

Material and Methods

The research covered the socio-professional group of executive managers (middle-level) in hierarchical organizational systems of hospitality and sport. In managerial practice, they fulfill their socio-professional roles based on their knowledge and education, managing hotel companies or sports teams.

Employee or sports teams are directly subordinated to managers who fulfil the executive function in the organizational system in relation to hierarchically higher-placed management positions. The middle line of managers in the organizational structures of hotels and sports centers simultaneously plays managerial and executive roles, which entails duplication of roles and antagonisms of their regulations, causing work overload, psychophysical stress, or potentially even occupational burnout. An important role for psychophysical health is played by a healthy lifestyle, physical activity and nutrition, which have a secondary impact on the effectiveness of leading employee teams.

As a result of the adopted methodology of sample selection, the final size of the study group (GB) reached N = 107 observations. Two subgroups (samples) were distinguished in the study group: P1 n = 43 (sports managers/coaches) and P2 n = 67 (hotel managers/hotel executives). The process of collecting the study sample was carried out in several stages and in three channels in order to provide the test group with the appropriate level of representativeness (size and structure). The common feature that connects both subgroups (conjunction factor) (P1 and P2) is the fact that their members have education (related to sports or recreation and hotel industry) or have learned and performed a socio-professional role. It was also assumed that both these factors related to the learning process distinguish the studied group of GB from other social and professional groups. This research is therefore a contribution to planning and carrying out a comparative analysis of different professional groups in terms of eating habits and lifestyle. Due to the asymmetrical size of the P1 and P2 subgroups and their small size, no comparative analyzes were performed regarding the significance of differences in the shaping of the studied variables in both P1 and P2 subgroups.

The sample was collected purposefully using the traditional method and indirectly using the Internet. In order to select the study group, recommendations and connections in the research community were used, as well as social networks: LinkedIn, Goldenline, Tweeter and Facebook social groups: Mission Hotel, Association of AWF Kraków students, Psyche Zone of SWPS University, AWF Katowice Students + Graduates, AWF Wrocław - Academy of Physical Education in Wrocław, Personal Trainer - Katowice, AWF Warsaw, Physical Education and Sport, AWF Katowice, AWF Warsaw, AWF Kraków, Fitness Instructors - replacements/work in Silesia, Fitness Instructors' and personal trainers' work, Human capital management - mgr 2016- 2018 and Hotels.

Direct routes were taken to the following facilities: Hotel Mariacki - Katowice, Hotel Imperial Resort&MediSpa Sianożęty, "Ambassador" gastronomic service - Zabrze, Focus Hotels- Bydgoszcz, Hotel Diament S.A. Gliwice, Hotel Diament Bella Notte - Chorzów/Katowice, Hotel Krynica - Krynica Zdrój, Hotel Gołębiewski - Karpacz, Hotel Arłamów, Hotel Grand Lubicz - Uzdrowisko Ustka and Hotel Gołębiewski Mikołajki.

The e-mail channel allowed sampling from the following hotels: Hotel Amadeus - Wodzisław Śląski, Hotel Angelo - Katowice, Hotel BEST WESTERN - Katowice, Hotel Gołębiewski - Wisła, Hotel Gorczowski - Chorzów Batory, Hotel HOLIDAY INN - Dąbrowa Górnicza, Hotel Jawor - Jaworze, Hotel Klimczok - Szczyrk, Hotel Meta - Szczyrk, Hotel na Podzamczu - Tarnowskie Góry, Hotel Noma Residence - Tychy, Hotel Pałac Czarny Las - Woźniki, Hotel Pałac Kotulińskich - Dziedzice, Hotel Hotel Paruga - Bielsko-Biała, Hotel Park - Hotel - Diament - Katowice, Hotel Poziom 511 Design Hotel Spa - Podzamcze, Hotel President - Bielsko-Biała, Hotel Qubus Hotel - Bielsko-Biała, Hotel Rezydencja - Piekary Śląskie, Hotel Sahara - Bielsko-Biała, Hotel Spa & Wellness Hotel Diament - Ustroń, Hotel Stok - Wisła, Hotel Szafran - Czeladź, Hotel Zawiercie - Zawiercie and Hotel Zimnik Luksus Natury - Lipowa.

Participation in the survey was voluntary and resulted from the respondents' willingness to share their professional knowledge as well as issues related to their positions and social functions. This was thanks to the social nature of specific forums used by their participants to share their experiences and professional knowledge. Thus, the selection of the subjects was on their own accord, spontaneous and natural, which objectifies the motivation to participate in the studies and gives them credibility.

In the structure of the GB study group, there was a share of 68% of women and 32% of men aged 25-45 [98%] with higher [82%] and secondary [15%] education.

The diagnostic survey was carried out in the period from 1 June to 31 July 2018 using the questionnaire: *Dietary habits in the attitudes of managers,* which was composed of 15 mixed-type questions, from which for six were chosen for statistical verification, measured with scales: *1) assessment of eating habits, 2) assessment of the influence of eating habits on work efficiency, 3) assessment of physical fitness, 4) assessment of the average amount of sleep on working days, 5) assessment of the level of experienced stress, 6) assessment of the time-consuming work during the working day*. The questions were constructed on the basis of metric scales, which allowed for their statistical verification and further operationalization. The numerical values of the scales are as follows: for questions numbered 1,2,3,5: 0-1 - definitely wrong; 2: rather bad; 3 - wrong; 4 - rather good; 5 - good; 6 - definitely good. Numeric values for questions 4 and 6 in accordance with the content of the numerical value (e.g. 6 hours of sleep, 10 hours of work). Statistical analyzes were performed using the STATISTICA software.

Results

As a result of the research, it was possible to note several facts.

The executive managers in the surveyed organizations assess their eating habits on average at a rather good level (x = 3.9) and almost 30% of the respondents describe them as bad (see Table 1, Figure 1). They estimate that the diet influences the effectiveness of their work on average at a rather good level (Table 1). The members of the study group did not satisfactorily assess their physical fitness, describing its average level as rather bad (x = 3.3, Table 1). It should be added that the respondents showed clearly unanimous opinions in their assessments (SD does not reach the level of statistical significance in any case, cf. Table 1).

Table 1: Assessment of the eating habits and lifestyle of middle-level managers in chain hotels and sports clubs

Measuring scales	Controlled variables	Descriptive statistics of the development of the studied variables				
Question number		Not important	Average	Minimum	Maximum	Standard deviation
1.	Assessment of eating habits	107	3,981308	1,000000	6,00000	1,220743
2.	Impact of the assessment of eating habits on work efficiency	107	4,093458	2,000000	5,00000	0,852662
3.	Assessment of physical fitness	107	3,327103	1,000000	5,00000	0,798297
4.	Assessment of the average length of sleep on working days	107	6,579439	4,000000	9,00000	0,971649
5.	Assessment of the level of experienced stress	107	3,897196	1,000000	6,00000	1,106879
6.	Assessment of the number of working hours on a business day	107	7,906542	3,000000	12,00000	2,204338

Source: own study based on the conducted research

In the case of the assessment of experienced stress (question No. 5, Table 1), the situation looks a bit better, because, according to the study group, this variable reaches a rather good level.

With regard to the assessment of the length of sleep on working days, the respondents unanimously indicated its average duration as 6.5 hours and the time of managerial work as 8 hours, i.e. the numbers that are generally considered standard and not causing any surprise (Table 1).

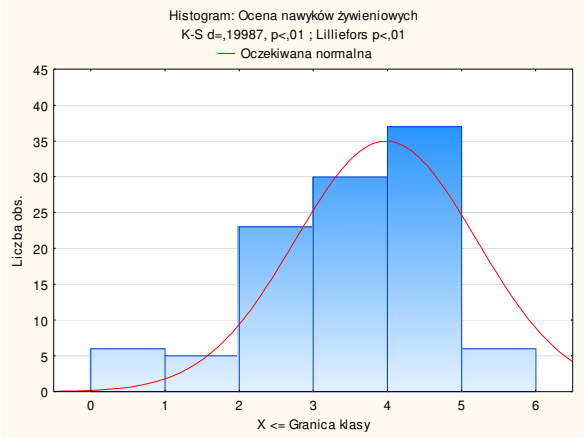

Histogram: assessments of eating habits

- Expected standard
  Number of observations
  Class boundary

Fig. 1: Distribution of assessments of eating habits

Source: own study based on the conducted research

The analysis of the interdependence of the studied variables showed the existence of a number of interesting and, most importantly, statistically significant, correlation relationships between the assessments of the test group, which

will be listed for order and clarity in points (Table 2). Due to the limited amount of space, the following conclusions will be presented that best illuminate the research issues of the conducted analysis:

- *as the assessment of the influence of eating habits increased, the self-assessment of eating habits increased* (rtt = 0.391) and vice versa, *the assessment of the influence of physical fitness on the effectiveness of work performed* (rtt = 0.356) also increased,
- strong and positive correlation was observed between the opinions on *eating habits and physical fitness of the respondents* (rtt = 0.393),
- *physical fitness of the respondents and the assessment of their impact on work efficiency* is also in strong, positive and transitive relationship of interdependencies (rtt = 0.380),
- *the number of working hours escalates the intensity of stress resulting from work* (rtt = 0.359),
- *the intensity of occupational stress and the assessment of eating habits* (rtt = -0.292) as well as the amount of work during the working day (rtt = -0.299) were found in a statistically significant and negative correlation, which means that involvement in work limits the possibility of working out healthy eating habits,
- in the respondents' opinions, no statistically significant correlation was found between *the level of stress intensity and the time devoted to sleep* (rtt = -0.113) as well as between *the duration of sleep of the respondents and the development of eating habits* (rtt = 0.052).

Table 2: Spearman rtt rank test results in the study of eating habits and lifestyle of the studied group

Dependent variables	Spearman's rank order correlation (Assessment of eating habits of middle-level managers) BD removed in pairs. Correlation coefficients marked in red are significant with p <0.05000					
	Assessment of eating habits	Impact of the assessment of diet on work efficiency	Assessment of physical fitness of middle-level managers	Average amount of sleep per day on weekdays	Occupational stress level	The number of hours of substantive work performed during the day
Assessment of eating habits	1,000000	0,391102	0,393365	0,052682	-0,292799	-0,299970
Impact of the assessment of diet on work efficiency	0,391102	1,000000	0,380928	0,090653	-0,298841	-0,208497
Assessment of physical fitness of middle-level managers	0,393365	0,380928	1,000000	0,012165	-0,275426	-0,214967
Average amount of sleep per day on weekdays	0,052682	0,090653	0,012165	1,000000	-0,113831	0,012466
Occupational stress level	-0,292799	-0,298841	-0,275426	-0,113831	1,000000	0,359668
The number of hours of substantive work performed during the day	-0,299970	-0,208497	-0,214967	0,012466	0,359668	1,000000

Source: own study based on the conducted research

Table 3: Test of means against a fixed reference value

Dependent variables	Test of means against a fixed reference value (Assessment of eating habits and lifestyles of middle-level managers). The statistically significant difference was marked in red							
	Mean	Standard deviation	Valid test	Standard error	Reference Constant	t	df	p
Assessment of eating habits	3,981308	1,220743	107	0,118014	0,00	33,73599	106	0,00
Impact of the assessment of diet on work efficiency	4,093458	0,852662	107	0,082430	0,00	49,65985	106	0,00
Assessment of physical fitness of middle-level managers	3,327103	0,798297	107	0,077174	0,00	43,11157	106	0,00
Average amount of sleep per day on weekdays	6,579439	0,971649	107	0,093933	0,00	70,04408	106	0,00
Occupational stress level	3,897196	1,106879	107	0,107006	0,00	36,42035	106	0,00
The number of hours of substantive work performed during the day	7,906542	2,204338	107	0,213101	0,00	37,10225	106	0,00

Source: own study based on the conducted research

The test of means against a fixed reference value showed that the values of the analyzed variables: 1) assessment of eating habits, 2) assessment of the influence of eating habits on work efficiency, 3) assessment of physical fitness, 4) assessment of the average amount of sleep on working days, 5) assessment of the level of experienced stress, 6) assessments of the time-consuming work during the working day *reached statistically significantly higher values than the fixed reference value.*

Summary

Nutritional awareness is the sum of knowledge about the principles of healthy eating, appropriate technological processing of food products and the method of storing food products, which will ensure the consumer the least possible loss of valuable nutrients in a balanced daily diet.

In the literature on the subject, there are no unequivocal reports on research that would give real recommendations for determining the level of nutritional awareness of consumers, taking into account their professional roles (at the managerial level), which is an indicator of the quality of their professional life (with particular emphasis on the effectiveness of their work), which at present is undertaken not only in the philosophical, psychological, sociological and economic context, but also in the field of medical sciences and health sciences (Kowalska, Szemik, 2016).

In view of the above arguments, it is worth emphasizing that the results of other authors quoted below will refer to the holistic dimension, however, according to the authors, they give the opportunity to make comparisons in the analyzed area and to draw constructive conclusions.

The results obtained by the authors in the course of the conducted research fill the gap in scientific reflection in the area of the discussed issues while finding confirmation of the trends obtained in other national and international studies. The results of the health survey conducted by the National Institute of Public Health - National Institute of Hygiene indicate that no voluntary forms of physical activity for at least 30 minutes continuously) are undertaken by as many as 59.2% of Poles (57.2% of men and 61.0% of women) (Wojtyniak, Goryński, 2018). Additionally, there is a strong correlation between the level of physical activity and the level of education. For example, people with secondary or lower educational level (80.8% of respondents) have little physical activity, while as for the higher educational level this percentage is much lower (only 36.1% of respondents declare lack of physical activity)

(Wojtyniak, Goryński, 2018). In addition, the results of the 2017 Eurobarometer survey show that only 7% of EU residents aged 15 and over regularly (5 times a week or more) play sports or engage in other physical activity (TNS Opinion & Social, 2017). Taking into account the above research results, the authors expected that the surveyed managers with undoubtedly higher education would declare a higher level of their physical fitness. Meanwhile, members of the surveyed group of managers did not satisfactorily assess their physical fitness, additionally defining its average level as "rather bad" (x = 3.3). When analyzing the obtained results, a clear unanimity of the respondents in this respect is also visible (the SP does not reach the level of statistical significance in any case). The obtained result is undoubtedly not very optimistic, taking into account e.g. the fact that, according to the latest Global Disease Burden Study (GBD Study 2017), low levels of physical activity in Poland are responsible for the loss of 1.7% of health years (DALY) (Institute for Health Metrics and Evaluation, 2020). With regard to the surveyed population of managers, characterized by high professional activity and responsibility not only for themselves, but also for their subordinates, high absenteeism at the workplace may significantly affect the effectiveness of the work of an individual, team and the effectiveness of the entire entity they manage.

When analyzing the variable that takes into account the level of experienced stress declared by the respondents, the reader may notice that, in the opinion of the respondents, this variable reached a rather good level (x = 3.9). This state of affairs should be considered very favorable, but it may be somewhat surprising, given the prevalence of the stress epidemic (Marino, 1997). This state of affairs may result from the specificity of the professional role played, the content of which is related to tourism and sport. Perhaps managers in sports and hospitality would like to be seen through the prism of their role as physically fit, healthy and stress-resistant. The results of the research indicate, however, that 88% of managers declare that they achieve high levels of stress at work (Tillson, 1997). How is it possible that the stress level of the respondents was assessed as relatively good. The rational explanation of the obtained research result may be related to the aforementioned self-assessment mechanism. The research entitled "Stress at work", conducted by Pentor Research International in 2007, showed that as many as 85% of professionally active Poles experience stress at work, therefore, the obtained results cannot be clearly interpreted in terms of the assessment of the experienced stress. On the other hand, however, it should be taken into account that the members of the study group are graduates of a field of study that requires increased physical fitness and teaches how to care for health.

The results concerning the length of sleep of the respondents on the days of their professional activity (from Monday to Friday) show that the average duration of sleep varies at the level of 6.5 hours, while the managerial work time is at the level of 8 hours.

According to Carl Hunt, director of the National Center for the Study of Sleep Disorders, sleep is one of the main factors, along with exercise and diet, in maintaining good health. The sleep disorders are the third reported complaint, after headaches and symptoms of colds. They become more common as you get older due to many factors. With age, the organism becomes more sensitive to hormonal changes, physiological functions, many environmental factors (light, noise, temperature) (Bizan, 2011).

The research conducted in the USA showed that approximately 20% of respondents sleep 6 hours or less, 33% - 7 hours, 38% - 8 hours, and 9% - 9 or more hours (Cieślik-Guerra, 2009).

Based on Polish studies, it can be concluded that the average number of hours of sleep in adults in the country is 7 hours and 22 minutes, which is more or less the same as in the study group (Sykut et al., 2017).

The results concerning the eating habits of the respondents turned out to be slightly more optimistic. The surveyed managers assess their eating habits at a rather good level (x = 3.9), which allows the authors to classify this result to the average level of accuracy of the results. Additionally, it is worth emphasizing that almost 30% of the respondents describe their eating habits as bad (Table 1). Taking into account the second result, according to the authors, in order to increase the nutritional awareness of the surveyed group of respondents, their knowledge should be expanded in terms of:

- the content of nutrients in the daily food ration consumed (e.g. proteins, fats, carbohydrates, vitamins, minerals).
- the number of meals recommended in daily food rations and the time horizon in which they should be eaten.
- pro-health value (e.g. the presence of functional products in the diet or dietary supplements in the case of diagnosed deficiencies).
- principles and awareness of the use of diets appropriate to the physiological state of a given organism.
- recommendations on how to store food products at home,
- rules for preparing meals (with particular emphasis on hygiene),

- awareness of the existence of organic, low-processed and low-calorie food,
- the essence of exercise as the most important element in addition to a balanced diet in our daily life.

The knowledge of the essence of a healthy lifestyle, including the principles of rational eating, is essential in the process of shaping correct eating habits (Chlebna-Sokół, Zbęk, Sobczak, 2007). The report of the Public Opinion Research Center (CBOS) (Health and pro-health behavior of the Poles, 2016) of 2016 on the knowledge of Poles about health shows that the awareness of the need to take care of health is systematically and significantly growing among the public. The percentage of respondents who notice the increased interest of Poles in taking care of their own health has more than tripled compared to 1993 (from 19% to 64%). The percentage of persons who declare that they care for their own health is also systematically growing (it has increased by 27% since 1993).

On the other hand, when asked about the types of activities that, in their opinion, determine the health level of an individual to the greatest extent, they most often mentioned: healthy eating, which, in the opinion of the respondents, is associated with the consumption of large amounts of vegetables and fruit and limitation in the daily diet of animal fats (48% of respondents), regular visits to the doctor (30% of respondents), avoiding nervous and stressful situations (30% of respondents) and spending free time on active leisure activities (27% of respondents)[1].

Reflections in the area of theoretical and empirical considerations related to the area of eating habits can be conducted on many levels. The most important ones mentioned by the authors are: consumer behavior, an element of culture, hierarchies of values passed down from generation to generation, adherence to norms and rules as an important area of pro-health behavior conditioning longevity. An improper nutritional attitude of an individual may contribute to the emergence of a number of factors that increase the risk of diet-related diseases, in particular cancer. As indicated by the authors: M. Wiszniewska et al., the most important were those related to the inappropriate lifestyle, incl. improper diet, obesity, lack of physical activity, smoking or alcohol abuse (Wiszniewska et al., 2018). The results are confirmed by the list of three risk factors responsible for the loss of the largest number of years lived in health presented by the Institute for Health Metrics and Evaluation, namely (Institute for Health Metrics and Evaluation, 2020):

- diseases arising from improper nutrition,
- food of inadequate health quality,
- negligible physical activity.

Incorrect eating habits, high professional mobility, work under constant stress undoubtedly have an impact on the health condition of modern managerial staff, and determine their tendency to absenteeism and at the same time reduced efficiency of the entire enterprise. This thesis is confirmed by the results of the study obtained by the authors, in which the respondents indicated that the diet may significantly correlate with the effectiveness of their work and thus affect the quantitative and qualitative dimension of their goals ($x = 4.09$). Although it may seem that employers do not have a direct influence on the shaping of the diet of their subordinates, they can organize the work space of individual members of the organization in such a way as to enable the appropriate shaping of eating habits. J. Kwiecień points to three factors, the simultaneous occurrence of which may become allies in shaping pro-health attitudes of an individual, namely: (Kwiecień, 1019):

1. Awareness of the need for change (training, dietary consultations, educational leaflets).
2. Availability of healthy products.
3. Regularity (both in the educational process of employees and the availability of healthy products in the company).

In addition, the results of research conducted by the Health Enhancement Research Organization clearly indicate that the employees who have healthy eating habits (i.e. regularly eat healthy meals) are characterized by 25% higher productivity at work compared to persons who do not exhibit these habits. (www1).

At this point, the reader is asked the question: what steps in the field of promoting health, healthy eating and increasing physical activity can be taken in contemporary organizational spaces? According to the authors, an effective solution in this regard may be Entrepreneurial Programs for the Promotion of Healthy Eating and Physical Activation of modern managerial staff, the initiation of which should include several stages:

[1] The study was conducted using the method of computer-assisted face-to-face interviews on 8-15 September 2016 on a surveyed sample of 981 adult Polish residents (Health and pro-health behaviors of the Poles, 2016).

STAGE 1 Appointing a team and developing a strategy for the Program of Promotion of Healthy Eating and Physical Activation of the managerial staff.

STAGE 2 Integrate the program strategy into the overall corporate strategy and treat it in the long term.

STAGE 3 Implementation of activities under the program, taking into account a number of initiatives (including *in the area of shaping correct eating habits*: dietary platforms, health week/healthy day, scientific articles on nutrition published on the company's website, dietitians' advice, 24/7 medical care, generally available water dispensers, regularity of meals during employee duties performance, time to eat breakfast, employee canteens with healthy food; *in the area of physical activation:* multisport cards, initiating enterprising sports teams, e.g. football, running, cycling teams, etc.), mobile bicycle service or a calendar of preventive activities.

STAGE 4 Efficient and effective communication process in the area of initiatives undertaken within the program with the use of internal mail, e.g. Intranet.

STAGE 5 Development of mechanisms motivating management staff to participate effectively in the program.

STAGE 6 Continuous improvement of the quality of pro-health activities of the company with the use of ongoing control and implementation of possible corrective programs.

As we can see in the presented analytical materials on the economic effects of health-promoting activities of those companies that have already implemented similar programs, the benefits that the employer obtains on this account entail a return on investments made in this area (Goetzel, 2014; O'Donnell, 2014) .

The research results presented in the article are not without limitations. The authors of the study are aware that the analyzed group was relatively small (n = 107) and the presented results are selective.

Conclusions

As a result of the research, it was observed that the managers assessed their eating habits as normal, not deviating from the average social trends. The research has also shown that, according to the sports and hospitality managers, the diet influences the effectiveness of their professional work. However, the members of the study group did not assess their physical fitness as satisfactory, describing its level as low. They indicated that the number of hours devoted to professional activity during the day increases the intensity of stress resulting from work.

The conclusion that the employers of the management cadre of the studied socio-professional group should put more emphasis on the issue of developing healthy eating habits may sound somewhat truistic.

Despite the observed interest in the above-mentioned issues, unfortunately, there are still no current results of the research analyzing the eating habits and lifestyle of sports and tourism sector managers (at least the authors of this study did not find any), and thus there are no specific recommendations on how to increase awareness of nutrition in organizational structures among middle-level managers and how to activate them to greater physical activity, with particular emphasis on the inter-organizational space.

Managing the human capital of an organization is mainly based on shaping the right and desired employee attitudes, among which there should be room for aspects of a hygienic lifestyle. One of the important areas of the management is the development and improvement of employees through properly planned training methods and techniques.

Summarizing the above considerations, the growing social awareness of the importance of proper nutrition is not always confirmed in the sphere of its professional activity. Therefore, the challenge is to build a strategy for the development of enterprises in the sports and tourism sector in such a way that its important pillar, the pro-health aspect of the individual is taken into account, bearing in mind that the shaping of the correct eating habits is influenced by three dimensions of the environment, including the working environment (Figure 2).

Fig. 2: Social determinants of shaping individual eating habits

Source: Author's concept.

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Gender-Based Perception and Lifestyle of Megamall Patrons in Ibadan, Nigeria

Olawale Y. OLONADE
Covenant University, Ota, Nigeria
Olawale.olonade@covenantuniversity.edu.ng

Dauda A. BUSARI
University of Ibadan, Ibadan, Nigeria
daudabusari@covenantuniversity.edu.ng

David IMHONOPI
Covenant University, Ota, Nigeria
David.imhonopi@covenantuniversity.edu.ng

Tayo GEORGE
Covenant University, Ota, Nigeria
Tayo.george@covenantuniversity.edu.ng

Christiana O. ADETUNDE
Covenant University Ota, Nigeria
Christiana.adetunde@covenantuniversity.edu.ng

Abstract

This paper examines gender-based perception and lifestyle of megamall patrons in Ibadan metropolis of Nigeria. Gender is viewed as a socially constructed ideas about the role of an individual in the society. Megamall shopping has been regarded has a female activity due to their insatiable characteristics of placing wants above need. Women have the tendencies to patronize megamall for groceries and personal treat because they are hedonic in nature. While men are specializing in utilitarian valued items. However, this world views are getting phased out as societal activities and roles are not restricted to only one gender. Two hundred and sixteen respondents were purposively selected from five different megamalls and responses in the questionnaire were analyzed using descriptive statistics and independent sample t-test to show the differences based on gender. The result shows that men visit malls but solely for recreations purposes, while women perceive megamalls as a place to shop, relate, sight-see, talk, relax, beautify and emotionally-lean on women driven life values. It has clearly shown that megamall patrons have average level of perception of megamall. Also, there is significant difference between male and female shoppers in megamall. It was also discovered that megamalls, among others provide a platform for social interaction where people enjoy their leisure activities. It was therefore recommended that there should be a public enlightenment campaign programme to negate the notion that male folks hardly frequent megamall and make purchases. They should be treated as viable customers like their female counterparts.

Keywords: Gender, Perception, Lifestyle, Megamall, Patrons, Nigeria

Introduction

It has been historically documented in the nineteenth century that urban life for male was separated from their female counterpart. This opened a line of thought on gender perception of viewing mall centres. The split in between male and female world led to mental and emotional representations of gender world and activities. Due to

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this purchasing and shopping power which shifted from one male directional route to a 'female thing' due to their insatiable characteristics of placing wants above need (Vijaya, Niharika, and Lahari, 2017). Female folks began to build activities, formulate identity and demonstration of shopping behaviour which gave birth to modern interest to the establishment of malls in nooks and crannies of the society (Olonade, Busari, Iruonagbe & George, 2020). Mega mall is growing at a rapid and significant pace in Nigeria but still evolving in some parts of the country. The essence of megamalls originated from the variable choices that people make. People love to live a serene, urbanized, safe and secured environment which depicts oneness and totality (Busari, Olonade & Asamu, 2019).

Megamalls provide utopian world with comfort which embodies experiential values. They accommodate social meanings and create social values and image. The advent of mega shopping malls tends to show a high dichotomous divide between gender- male and female folks. Shopping is an everyday commercial activity which allows for social dimension, practices, interest, perceptions and consumptions (Busari, Olonade & Asamu, 2019). It is a reflection of lifestyle which offers social relations. According to Miller (1998), purchasers assemble around items which characterize their personality and move toward becoming highlights of specific schedules of amiability. Hence, mega malls proffer plausible leverage for identity, needs of people and social space. In this vein, literatures have shown that megamalls, recreational and film centres are enmeshed with the presence of female folks more than their counterpart – males (Dholakial and Uusitalo 2002; Osibanjo, Ibidunni, Jevwegaga, Olokundun, Obaoye, and Adebanji, 2019).

Authors and scholars have opened a line of thought on gendered perceptions about the concept of shopping and megamalls. Some schools of thoughts believe there are separate worlds for male and females with peculiarities to needs, wants and recreations ascribed to them according to the society. The importance of gender-factor in mall shopping cannot be over-emphasized. As noted by Vijaya *et al.,* (2017), differences in socialization and upbringing of men and women will ultimately influence their shopping behavior. The quest to get, retain and serve customers to the fullest is increasing, so goes for patrons and shoppers. There is a shortage of literature that shows significant differences in shopping behavior between gender. Shopping has been viewed as women's activities from different quarters. They are more likely to be shopping for food and personal treat while their male counterparts are likely to be shopping for valued and productive. However, these is gradually phasing out as their role is gradually connecting and overlapping. It became an issue for reference to understand the impact the development of mega shopping has on people, male and female as well as the decisions they have formed over time.

Thanaraj (2011) affirmed that mega mall styles have many added features to attract shoppers. Mega malls are putting up measures to assessing consumers' behaviours, loyalty, interest and services so that they can easily be lured from small street stores. Gender difference on its part, is an external influence on consumers' behaviour. In the works of Alreck and Settle (2002), Dholakia and Uusitalo (2002), there has been dossier of information on gender differences such as in message processing, price promotions, impulse purchases, advertising and responses towards the different shopping forms.

Sohail (2015) attests that way of life grasps social association, economic wellbeing, family foundation, identity, inspiration, discernment, and advertising upgrade, which can be recognized by a wide scope of exercises, interests, and sentiments. The shopping courses of action and examples of exercises in which customers invest their energy and cash delineates their way of life just as structure their discernment. Shopping orientations extended to incorporate individual, financial, social and recreational attributes of customers (Visser and Du Preez, 2001). Gem (2001) and Mattew, Osabohien, Olawande and Urhie (2019) sees that megamall turn into an advantageous direction for living that concentrates alluring components of utilization inside a solitary defensive and clear condition. Megamall portrays and offers itself as an option in contrast to the downtown area with offices and feeling to make customer exercises thrilling ones where relationship, unwinding and shopping interlaced in a verified domain (Olonade et al., 2020).

Megamall experience depicts knowledge of, or skills that relate to megamall shopping events which one gains through involvement with those particular events. As far as gender and mega mall are concerned, studies have examined shopping mall patronage and its effects on gender in developed countries, but there is a dearth of study in Nigeria and especially in Ibadan. The way things are, the theme's understanding has remained setting explicitly restricting shopping center support information in creating nations like Nigeria dependent on sexual orientation. And it is apparently important to look at it in relation to some other variables in order to have a rooted understanding of the correlation between gender and megamall shopping. Here, the study added perception and

lifestyle and report the differences. It is against this backdrop that the study tries to look into gender-based perception and lifestyle of patrons in some selected megamalls in Ibadan metropolis.

Study Objectives

i. To examines patrons' perception of megamalls and shopping activities
ii. To ascertain gender differences in megamalls and shopping lifestyle

Conceptual Review

The Concept of Gender

Gender depicts an attribute which constitute masculine or feminine in the society. a persons' gender symbolizes his or her sex whether female or male as biological evidences outlines in many society characterizes sexual orientation as the consequence of socially built thoughts regarding the conduct, activities and jobs a specific sex performs (World Health Organization, 2010). These convictions, qualities, and frame of mind display demonstrate the general public's pleasant and satisfying standards and the individual's genuine beliefs. They are learned from various intersecting sources such as parental influences, a child's socialization in school, and what is depicted in the media is of paramount importance to gender awareness growth, the role to be played, and world view. To fully understand the assignment of gender, the physiological and biological attributes assigned by nature must be taken into account, followed by socially constructed behaviour. Gender obviously involves a wide range of characteristics related to and distinguishing between masculinity and femininity on the basis of these characteristics; biological sex (variation of male or female or intersex), gender- and gender - based social structures.

Gender and Megamall

Among various demographic characteristics, gender is one of the sorts after variable when assessing difference in shopping behaviour. It was seen and perceived that shopping was mainly a gendered activity or directly a "female type" task. In today's big societies, gender roles have changed, studies have shown differences in gender shopping behavior (Otnes and McGrath, 2001; Kuruvilla and Ranjan, 2007). There is vested interest to attract and retain customers and this is increasingly alarming among mega malls. There is dearth of literature that shows staunch difference in shopping behaviors of both gender. Even when shopping is misconstrued to be female activities, men go shopping as well. Women shop more for items such as food and clothing, while men are driven by utilitarian values (Chebat et al, 2005). Nevertheless, as the roles of men and women in society begin to intertwine, these trends are fenced out. Gender peculiarities are a consumer behavior external influence.

According to Klein (1998), 67% of women enjoy shopping compared to 37% of men. Yin (2003) found that women are more likely than women to buy in-store gifts. It was also found that women go shopping to see and browse shopping as a pleasant adventure while men go shopping in Durakbaşa and Cindoğlu, 2002, just to meet their needs. Kuruvilla et al. (2009) and Hawkins et al. (2009) classify buyers and employers as functional, recreational and browser buyers in three broad categories. Functional shoppers are those who mainly visit malls to make purchases with utilitarian shopping motives. Browsers and leisure activities visit the malls without proper plans, but only in the window shop. When interest or appetites are whetted, recreational buyers come to the mall for leisure and browser shops. This paradigm is used because gender-based shopping perceptions are clearly distinguished.

Gender-Based Perception of Megamalls Shopping

There are many factors that can influences the interest in megamall shopping, one of it is gender. In addition, countless studies have been performed on the patronage of shopping malls and the associated enjoyment of customers ' shopping experience. Shopping activities is usually approach by men and women with diverse intentions, perceptions, reasons and contemplations. Literature has shown noticeable differences in men's and women's behaviour, shows attitude and perceives megamalls and shopping. It is apparently clear that men and women think differently about their interest and worldview of megamall patronage. Hence gaining understanding and full knowledge of these gender-based tendencies and perceptions is sacrosanct to the mall owners and the growth of economy in the business world.

Kotze, North, Venter and Stols (2012) carried out a study on gender differences in source of shopping enjoyment. Research has identified different sources of shopping pleasure as socializing shopping, shopping, gratification, entertainment, shopping for others, browsing, exercising, and sensory stimulation. The study's main objective was to investigate gender differences in shopping enjoyment experiences. For the study, self-administered questionnaire was used and findings show gender differences in all shopping enjoyment except for entertainment shopping.

Also, research has shown that perception, purchase, interest and lifestyle of patrons and shoppers are all in the brain. Men are seen to be on a mission, while women are seen to be on a journey (Alreck and Settle, 2002). That is men visit or make purchase in shopping megamalls for specific reasons and not a generic mission like the women folks. A research-based platform, Scientific American, argues that there are numerous physical and noticeable differences between men and women. It was collected through the World Health Organization that women have a thicker callus corpus, the nerve tissue bridge that connects the brain's left and right side. It enables women to use both sides of the brain to solve problems faster, whereas men mainly use the left side of the brain. The left hemisphere carries out logical calculations and processing facts, while the right hemisphere dominates visual imagery and context interpretation. They also use more organized cerebral cortex to perform tasks, whereas men on the left brain use more gray matter. The different brain structure in the shopping language leads to men who tend to be mission-oriented and task-oriented buyers, whereas women are more likely to be discoverer-oriented buyers who readily adjust their goals if a more satisfactory result is achieved by the world. A study conducted by the Mediterranean Journal of Science (2017) indicates that men have an ulterior motive for shopping for utilitarian, whereas women are hedonic. The study shows that customers have different ranges of fundamental drives that activate their shopping behaviors and attitude. It is utilitarian when a intended consequence is consciously pursued. To get some things done, that's shopping. Men tend to follow a more logical, utilitarian approach. They need consumer education that is sufficiently convincing as to why in the megamall they should visit or buy an item. When it is associated with intrinsic and extrinsic responses, it is hedonic. Women, because they love it, shop or visit megamalls. Most of them are hedonic shoppers. They want to know more about a product, the brand, the lifestyle being sold, and how it will make them feel about the product or their presence in the mall. Zappos.com summed up that men focus on clear product category (megamall) navigation while women are emotionally driven.

A study on the perceived quality of online shopping was conducted by Sebastianelli, Tamimi and Rajan (2018). In their perceptions of factors affecting the perceived quality of online retailers on gender differences, data from a sample of U.S. consumers are examined. Factor analysis is statistically derived from seven electronic retailers (e-tailing), dimensions of quality (reliability, accessibility, service ordering, convenience, product content, assurance and credibility). Insurance has been found to be far more important to women than to men. It was also found that there are no gender-based differences in the frequency of online browsing or purchasing, but there are differences in product types that women and men prefer to buy online and at mega malls.

Shopping centers have grown as a result of rapid developments in the food retail industry, particularly in large cities in Saudi Arabia. Sohail (2015) looked at mall shopping's gender difference; a study of an emerging nation's shopping behavior. The aim of the study was to compare men and women for mall shopping differences. The study uses empirical research to examine differences between genders related to mall patronage. Based on a survey of 513 shoppers across Saudi Arabia, the study found significant differences in shopping behaviors.

Theoretical Framework

This study hinges on two theories; William Glasser’s Choice theory and Henri Tajfel and John Turner’s Social identity theory in 1979.

William Glasser’s Choice theory

Choice theory posits behaviour that one chooses are central to his/her existence. Five cardinal needs drive one’s behaviour: love and belonging, freedom, fun and power. While survival needs include food, clothing, shelter, respiration, personal safety, safety, and sex, children. Glasser has four fundamental and psychological needs: power / significance / competence; freedom / autonomy; and fun / learning. The theory of choice suggests that an individual's existence depends on a conscious comfort zone and role models of a perfect world of parents, relationships, possessions, beliefs, etc.

Social Identity Theory

Social identity theory submits that a personality largely depends on the group they belong. The theory was postulated by the two British social psychology Henri Tajfei anf John Turner in the year 1979. It depicts that individual self-concept, belief, persuasion is derived from membership of an organization. It relates the study of the interplay between personal and social identities. It promotes a common identification with a collective or social category that creates a common culture among the participants involved. Tajfel (1979) submits that group serves as one of the important pointer to source of pride and self-esteem.

Theories application to the study

Gender has connection with specific social roles and expectations. The concept of being a woman has a great deal to do with their system of choices, values and beliefs. The group one belongs to tends to influence the life and perception of one's own. This group of individuals belongs to give them a definition of who they are and how in the social sphere they should behave. The classification of male and female into social roles therefore creates problems because people feel they must be at one end of the spectrum and identify themselves as men or women. Overall, communities interpret biological differences between men and women to create a set of social expectations that define men and women's appropriate behaviors and determine the different access to women's and men's rights, power, resources, social power, shopping and lifestyle. The social roles of men and women in relation to each other are based on societal cultural standards that lead to the creation of a gender system. In many societies, the gender system is the basis of social patterns that include gender separation and the primacy of male standards. But in terms of mega mall patronage, females are likely to still lead because of their insatiable desire motive, which does not necessarily mean need.

Methodology

Data were obtained through questionnaire administration and secondary sources (different reviews of related studies from various published and unpublished records, reports, books, journals, and magazines). The questionnaire consisted of questions related shoppers' demographic characteristics, frequency in megamalls and perception of users about shopping. Five (5) different malls in Ibadan with two hundred and sixteen respondents (male and female) were employed for the study. Independent sample t-test, Percentage, Mean and Standard deviation was used for the study.

Table1: Demographic representation of respondents in the study

Age	**Frequency**	**Percentage**
15-24	83	38.4
25-34	101	46.8
35-44	18	8.3
45-54	8	3.7
55 and above	6	2.8
Total	**216**	**100**
Gender	**Frequency**	**Percentage**
Male	120	55.6
Female	96	44.4
Total	216	100
Level of Education	**Frequency**	**Percentage**
Primary	3	1.4
Secondary	16	7.4
Tertiary	173	80.1
Others	24	11.1
Total	216	100
Monthly Income	**Frequency**	**Percentage**
Less than #20,000	42	19.4

#20,000-40,000	70	32.4
#40,000-60,000	33	15.3
#60,000-#80,000	21	9.7
80,000 and above	50	23.2
Total	**216**	**100**
Type of residence	**Frequency**	**Percentage**
Single room	51	23.6
Self-contain	45	20.8
Two bedroom	99	45.8
Three bedroom	19	8.8
Others (please specify)	2	0.9
Total	**216**	**100**

Authors' survey, 2019

Table 1 shows the demographic distribution of respondents. Based on age; 46.8% respondents fall between 25-34 age intervals which has the highest frequency while 2.8% falls between 55years and above. On gender, 120 of the respondents were male and 96 of the respondents were female. This implies that majority of the respondents are male. On level of education, 80.1% falls in the category of tertiary level of education and ranked the highest while, 1.4% only had primary education. This implies that virtually all of the respondents are highly education and knows the important of a mall. On monthly income, 32.4% respondents earn between #20,000--#40,000 which serves as the highest frequency while 9.7% respondents earn between #60,000-#80,000. This ranked the least among monthly earners in the study. On the type of residence, 45.8% respondents live in at least two bedrooms flat while only 0.9% lives in other forms of accommodations. They both ranked highest and least in the distribution. By implication, respondents can afford a decent accommodation to live it which could translate their status to buying from mall.

Research Questions

RQ1: How do megamall patrons and shoppers perceive megamall?

Table 2: Shows perception of megamall patrons

Items	SA	A	D	SD	M	SD	P
I like megamalls	142 65.7	45 20.8	21 9.7	8 3.7	2.89	1.038	Ist
I see it as an avenue to un-mind and mingle	118 54.6	69 31.9	11 5.1	18 8.3	2.48	.993	7th
Hardly can one have access to needed items	10 4.6	51 23.6	49 22.7	106 49.1	2.77	1.061	2nd
It is meant for rich families most especially women	12 5.6	17 7.9	91 42.1	96 44.4	2.56	.985	6th
Megamall does not provide a serene and secured atmosphere	39 18.1	47 21.8	98 45.4	32 14.8	2.67	.989	4th
Customer service relations is second to none	121 56	15 6.9	58 26.9	24 11.1	2.77	1.031	3rd
Megamall exhibits efficient service delivery which is better than street vendors	65 30.1	57 26.4	45 20.8	49 22.7	2.67	.954	5th
There is price reduction service which is better than street vendors	76 35.2	91 42.1	33 15.3	19 8.8	2.48	.979	8th
					Grand mean: 2.67		

Source: Author's survey, 2019

Table 2 shows that majority of respondents indicated that 'I like megamalls' (χ = 2.89) and 'Customer service relations is second to none' (χ =2.77). These were ranked first and second respectively among students. Conversely, 'I see it as an avenue to un-mind and mingle (χ=2.48) and 'There is price reduction service which is better than street vendors' (χ=2.48) were ranked least. It has a grand mean 2.61.

Test of norm conducted was conducted on the perception of patrons in megamalls. The maximum scores for a respondent on 8 items scale above is 32 (8 x 4), that is, the number of items on perception scale multiplied by number of possible response. The level thereof is three which are high, average and low level of perception. Therefore, to establish an interval score the maximum score was to be divided by the number of levels which is (32/3) = 10.7. Therefore, an interval score of 11 was used to chart the norm table.

Table 4.1. Test norm table on patrons' perception of megamall

Interval	Total mean score	Remark (Perception level)
1 – 11		Low
12 – 22	21.29	Average
23 –33		High

Thus, the overall mean score of the patrons' perception of megamalls is 21.29 which fall within the interval distribution of 12-22. It has clearly shown that megamall patrons have average level of perception of megamall and shopping lifestyle.

RQ2: Is there is any significant difference between patrons' perception of megamall shopping based on gender (male and female)?

Table 3: Independent sample t-test analysis of difference in the perception of male and female to megamall shopping

Variable (patrons' perception of megamall shopping)	N	Mean	Standard Deviation	Df	t	Remarks
Female	120	24.20	5.029	223	12.164	.000
Male	96	23.70	5-054	222.808		

Source: Authors' survey, 2019

There is significant difference in the perception of male and female shoppers in megamall.

Summary and Conclusion

Over the years, shopping has been seen as gendered activity. Majority of shoppers today are women and their numbers are increasing so goes for their taste. They tend to shop more than men for items like for items like groceries, beauty cares and clothing materials, men on the other hand shop for automobiles, shirt and house appliances especially electronics. This belief is getting out of place and there has been role reversal. Even choices are becoming global and the narrative is changing. In this present world, personalization is the key which makes businesses and institutions like burgeoning megamalls in Ibadan are keeping abreast of the fact that gender has a role to play in patronage**.** Megamalls' effective operation lies with customer engagement, conversion and loyalty which is devoid of separation or bipolarization in consumerism.

Recommendations

The following recommendations are made to guide gender related research as well as serve as template to changing the narrative of non-empirical views of

i. There should be a public enlightenment campaign programme to negate the notion that male folks hardly frequent megamall and should not be treated as viable customers. The only difference between male and female shoppers is the time used in the mall and what was used for.
ii. Megamall should provide itself with opportunities for all and sundry. Dividing sections and structure for patrons may likely cause gender discrimination and division in thinking patterns as per shopping.
iii. Since megamalls provide avenue for relationship building and interaction among people of different background characteristics irrespective of age, gender and tribe. It is of paramount importance to
iv. Though ostentatious life of patrons most especially women propelled the perception that is making the round, hence there is need for more megamalls as it provides irrespective gender with choice of materials and products, business, relations and pleasures.

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The Impact of Information Technologies on Reducing Poverty in The Context of COVID-19

Agnieszka SZEWCZYK

University of Szczecin, Szczecin, Poland
agnieszka.szewczyk@usz.edu.pl

Abstract

Poverty is one of the most disturbing issues in the world. This problem touches virtually everyone since poverty has many faces and it has particularly intensified now, amid the COVID-19 pandemic. Preventing its causes and minimizing its effects is a great task for each of us. Appropriately selected information technologies may be helpful, because they can be fine-tuned to answer the needs of the poor. This article defines poverty very broadly, as various shortages or an inability to fulfil one's needs – not only the "traditional" ones, such as hunger, thirst, cold but also loneliness, that is the absence of another human, ill health, unemployment, or lack of education, proper living conditions, information…

This article is an answer to this challenge. It presents an overview of various types of poverty, their causes and results, and a wide range of information technologies. This data was then used to procure, with the use of an innovative C-E-T (cause – effect – technology) method – based on Gittman-Levine's algorithm and with the use of a method of similarity matrix construction – groups of information technology offers (applications, Internet services, software systems, etc.) which address the needs of the poor who experience the effects of poverty in various areas of life and for various reasons.

Keywords: Poverty, Causes, Effects, Information Technologies, COVID-19.

Introduction

The creation of information society – even though we can all glorify the technological development and all-embracing improvement – is also plagued with a number of disturbing issues. One of the most significant ones is poverty (see Weber, 2007, pp. 437-445; Ringold, 2007, pp. 10-15; The Social, 2008; Tilak, 2007, pp. 430-435).

„How can it be that even today there are still people dying of hunger? Condemned to illiteracy? Lacking the most basic medical care? Without a roof over their heads? The scenario of poverty can extend indefinitely, if in addition to its traditional forms we think of its newer patterns. These latter often affect financially affluent sectors and groups which are nevertheless threatened by despair at the lack of meaning in their lives, by drug addiction, by fear of abandonment in old age or sickness, by marginalization or social discrimination (…).

At the beginning of the new millennium, the poverty of billions of men and women is a problem that more than anything else challenges our human and Christian conscience" (John Paul II, 2001, p. 2).

This article is an answer to this challenge. It presents an overview of various types of poverty – starting with "traditional" financial poverty, through information poverty (also known as digital exclusion), ending with moral poverty – and it also offers certain solutions to these issues. Information society is characterised by the merging of various types of poverty that are qualitatively different and are generated by different determinants, which eventually leads to the need to redefine this notion.

This distribution of poverty has its roots partly in the development of information technologies, which expressly affect this phenomenon. On the one hand they may participate in fighting poverty, but on the other – they contribute to creating deep divisions between people rich and poor in various goods, therefore increasing the disbelief in improving the situation and causing multiple repercussions.

Thus, traditional typologies of poverty are no longer functional in the information society. It has become necessary to create a new approach that would take into account new influence profiles and generating the notion of "new poverty" as well as looking into ways to minimise it.

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This „new poverty" is clearly connected with broadly understood notion of information. A person who is "informationally" poor is both an individual who does not have full and easy access to information (and that puts him/her at a disadvantage in comparison with others) and an individual who has plenty of information but it does not meet his/her expectations and is largely disqualified.

People marked with this „new poverty" are also those who enjoy dummy luxury, i.e. moral confusion caused by the mass media that do not respect moral principles and the so-called infoholics, people addicted to information which they get from the Internet, computer games, smartphones, etc. They are hungry for truth, free will, time and… freedom.

The „old" and „new" poverty should be battled against with various methods, both traditional and modern ones, adapted to the needs of the 21st century – the age of information, knowledge and wisdom. The weapons in this battle may be information itself and technological inventions, or – to be more specific – people who create and disseminate it, by taking care of its quality and the just distribution of information (Szewczyk, 2006, pp. 9-10).

Faces of Poverty in The Information Society – Theoretical Background

When analysing the essence of information technology and admiring technological achievements that carry the promise of improving life quality, we should, however, ask this question: why are there so many poor people around us?

"They" – the beggars, alcoholics, homeless, drug addicts, prostitutes, mentally handicapped, those with a criminal record. They make us afraid and disgusted; they annoy us with their looks, provocations and their life "style". Who were they before and who could they have been, if…? Those who arouse pity get from us a little money – just to soother our conscience. But it seems this is not enough, because just round the corner there are yet other poor people, so it is simply easier not to notice them.

The poor are also behind walls and fences – more hidden, embarrassed by their condition, but also hungry, cold, helpless, lonely in their poverty…

This is the reality of today! It is also disturbing that poverty came in second when predicting the threats of information society (Maziarz, 1999). The first place was occupied by unemployment, which is one of the main causes of poverty.

Theses formulated by many futurologists clearly show that the issue of poverty requires extensive diagnosis – also in the context of information society – and not burying our heads in the sand and pretending that this is but a marginal issue and we should concentrate on the positives.

Poverty is part of our world history. It is experienced by all societies to a lesser or greater extent. Not only developing/undeveloped countries deal with poverty, but also ones that are higher (or even very high) on the world ladder of economic development. However, each type of poverty is distinct – since its range, scope and depth and factors determining it are different (Szewczyk, 2005, pp. 25-35).

Although we intuitively understand what poverty is, it is difficult to come up with a common definition. There is no definition of poverty that has been unanimously adapted by all governments (politicians). Every group defines poverty in a different way, pointing to a specific criterion which is the centre of their definition.

Respondents to a questionnaire (Szewczyk, 2020, pp. 9-11) understood a poor person as someone hungry, dishevelled or wearing clearly unfashionable clothes, homeless or living in poor conditions, without basic appliances – washing machine, fridge, vacuum cleaner, without bathroom or toilet. They are also people who cannot afford heating their homes, buying new furniture, going on holiday, going to the theatre or cinema or buying even a used car.

More and more respondents see poverty as the lack of radio, home cinema, computer, phone, Internet access…, no money to buy medicine and good healthy food or fruit. Poor people are the ones who barely make ends meet!

Out of many definitions of poverty, the following one can be adapted: „ the situation of a relatively permanent and involuntary low level of satisfaction of one, some or all universal and basic human needs" (Szarfenberg, 2017, p. 121).

And each human has many various needs and is deeply affected by situations, when a lack, shortage or insufficiency of… something or someone prevents him/her from satisfying those needs. In this way, which is very important to our considerations, a poor person is not only someone lacking money, hungry, naked or homeless, without certain material goods, but also a person who is lonely, childless, unhealthy, who has no time or work, a prisoner or an addicted person, that is one who experiences a deficit of freedom, right authorities, or someone who is digitally excluded or has no fresh water or clean air…

We can therefore state that there are people who are poor in the "traditional" sense and who are poor in a different way! Both of these groups need our help, our gift that would allow them to eliminate their specific type of poverty.

They need bread and water, clothes and work, roof over their heads, medicine, access to education and information, someone's presence, family warmth, someone's time, smile and question: how can I help you? And even if the offer to help is not accepted or used, it is important that it is given. Because we all are – or can be – poor!

Experience has taught us that we must engage both heart and brains in the battle against poverty and social exclusion. The causes and effects of various types of poverty are therefore worth exploring objectively so that we can offer help.

Considering poverty through its causes and effects, we encounter a number of problems with identifying what is an effect and what is a cause. For instance a disease may be an effect of poverty if one lacks the funds for treatment, appropriate diet, healthy lifestyle, etc. But it may also be a cause: a person is not able to work or undertake additional activities, earn enough and therefore their living conditions begin to worsen. Similarly alcoholism causes poverty of many families, but it may also be its effect, when poverty drives people to despair. There are many such examples. Hence an innovative approach to research methodology is necessary.

Another problem when considering the issue of poverty is the on-going novel coronavirus (COVID-19) pandemic. This, as we may call it, macrodisease, has changed many areas of life practically all over the world. The notion of poverty is, unfortunately, no exception. The extent of this problem constantly calls for new methods of fighting poverty. There is a chance that a combination of new and traditional methods will give the desired effect, reducing the scale of various types of poverty. It is worth noting that COVID-19 has generated a grand boom of needs, arising from a new situation. "Typical" material poverty, threatening many employers and employees (galloping unemployment!) was joined by a lack of health (risk of death!), lack of contact with other people (dying alone!), no freedom (quarantine!)…

These problems are still relatively new and are growing dynamically. Therefore, this is the reason for the lack of appropriate scientific, theoretical studies, as well as proven practical actions.

Governments of many states propose different methods – anti-crisis shields, subsidies, increased emergency social assistance. Which is good, but in order to help we should also use diverse information and telecommunications technologies, available mainly in the forms of applications or Internet services since we live in a developing information society.

Information Technologies in The Battle Against Poverty in A Situation of the COVID-19 Pandemic

Of course we should not defy ready and proven methods of fighting poverty and we must remember that various types of poverty exist in our society "despite" – and not "due to" – techno-economic development and the development of information technologies. Moreover, information technologies may be a great tool facilitating meeting people's needs (Szewczyk, 2006, pp. 135-148). And according to the adopted definition of poverty (see point 1), which covers its different aspects, a wide spectrum of needs must be taken into consideration.

Studies done in July 2020 (Ericsson, 2020) have shown that information technologies to a large extent help people cope with COVID-19 crisis. It has been demonstrated that 74% of the people studied have increased their use of the Internet (46% - fixed Internet connection, 16% - mobile Internet connection and 12% - both). The increase in the average (declared) time of use is also significant: FBB – an increase of 2,5 hours/day and MBB – 1 hour/day, compared to the time before COVID-19 (Base group were smartphone users aged 15-69 who claimed they have experienced the effects of lockdown and restrictions – from Brazil, China, France, Spain, India, South Korea, Germany, Sweden, the USA, the UK and Italy.) (Majchrzyk, 2020a).

A study conducted during the coronavirus pandemic by the research company Ipsos on behalf of PayPal has shown that during the quarantine as much as 47% of Polish people were paying their bills via web or mobile applications. Furthermore, 75% of respondents have declared that they will continue to do so even after the pandemic has ended. 51% of the respondents over the age of 65 would like to live cashless (Technosenior, 2020).

A ranking of mobile applications in May 2020 in Poland showed an increase in using the Allegro service by 17.4%, OLX.pl – by 15.2% and other services – by 1.6% to 3%. The number of users of the two leading applications is around 4.8 million. And according to the latest data from the analytical company App Annie, the use of mobile applications in the world increased by 40% in the second quarter of 2020, hitting a record high of over 200 billion hours in April. And curiously – the biggest increase was noted in India, Brazil, Italy and Spain. There is therefore a direct correlation with the pandemic (Majchrzyk, 2020c).

The analysis of the use of video messaging in Europe during the pandemic is also interesting. WhapsApp is the most popular application in 22 countries, including Portugal (36% of all video messaging applications users), Spain (20%), Switzerland (43%), Italy (49%) and Germany (33%). Zoom was the most popular in 14 countries (mostly in northern Europe – Sweden 44%, Norway – 34%, and in some Baltic states – Lithuania 26%). The leader of this category in Poland is technological veteran Skype (37%) (Majchrzyk, 2020b).

The presented sample numerical data on the most common behaviours related to COVID-19, according to the report (Digital, 2020) for Q1 2020, indicate:

- huge increase in digital activity, especially in countries with the harshest restrictions,
- a significant increase in the use of social media, with an emphasis on making video calls,
- accelerated growth of e-commerce, especially in the case of grocery shopping,
- more time spent playing video games and watching e-sports,
- new opportunities for digital advertisers.

The process of express interest in information technologies has been going on for a long time but in recent months it has clearly sped up. New friendly applications have been literally mushrooming the market.

Due to the rapidly increasing number of them, it seems necessary to assess and classify as well as to demonstrate what human needs can be satisfied by them – the lack of information about work, COVID-19 and mobility, no possibility to leave home and run errands, no possibility to meet other people… The list could continue infinitely. And we can safely say that information technologies give us such possibilities even now. But we should point to solutions which would allow us to eradicate the groups of similar causes and similar results of various forms of poverty.

The C-E-T method of classifying the causes and effects of poverty and their translation into information technologies

In order to comprehensively cover the three issues discussed (the causes and effects of poverty and the means to help), three stages of bounding, i.e. classification of elements, should be performed. These terms are used interchangeably in the literature. Bounding occurs especially when choosing a method for combining objects. There is, for example, multi-aspect bounding, i.e. according to many criteria, and a single-aspect bounding.

The so-called royalty, i.e. the measure of closeness centrality (similarity) of elements, is usually accepted as the basis for classification; the selection of the similarity function does not significantly affect the result of bounding. The measure of closeness centrality is successfully used by many authors. Some of them require determining *a priori* target number of classes, e.g. the method of factor analysis. Other methods, for instance Rocchio algorithm or Hill method, allow to regulate the number of classes. The Vaswani method uses indirect connections between the elements of future classes and the method developed by Datolii assumes that the set is divided *a priori* into so-called starting classes. Some methods are based on single-aspect classification and others use more criteria, for example the Gitman-Levine method. This is the approach adopted in this article (Pawlak, 1981. pp. 25-27; Salton, 1974. p. 12; Nowak, 1990, pp. 50-65; Ho, Hull, Srihari, 1994; Gitman, Levine, 2000, pp. 30-40).

The analysis of classification methods leads to the conclusion that the method closest to the premises of this article is a bounding method derived from the designer, two-aspect and automatic approach. This is the approach that the Gitman-Levine method favors, which positively distinguishes it from many other methods - both traditional and

those of the newer generations. Moreover, there is no need to set a priori the number of classes or to limit their number.

The designer aspect creates the possibility to bound elements omitting the limitations resulting from the actual state of the tested system. The two-aspect feature allows to include two key criteria of bounding elements, i.e. closeness and validity (weight). It is worth mentioning that the author has successfully applied this approach to classification in economic applications.

The essence of this classification algorithm can be summarised in the following stages:

1. Establishing input data, i.e. the causes and effects of various forms of poverty. The systematization and weighting of these elements is the result of analysing the results of screening tests (in the form of a diagnostic survey) obtained from the Central Statistical Office (Główny Urząd Statystyczny) in Poland and Eurostat, weights of social economy experts and analysis of source literature. These data are then collected in tables. In the side of the first table causes of poverty are listed, sorted by decreasing weights, and in the head – the effects of poverty. Their order is irrelevant. If a certain cause results in a certain effect or effects, then an "x" sign is placed at the intersection of their coordinates in the table. Its location is determined on the basis of an analysis of source literature. The relationship of causes and effects (C-E) is presented in the form of a matrix:

$$C\text{-}E=\{\begin{matrix} C_{11} & C_{12} & \dots & C_{1j} \\ C_{21} & C_{22} & \dots & C_{2j} \\ \dots & \dots & \dots & \dots \\ C_{i1} & C_{i2} & \dots & C_{ij} \end{matrix}\}$$

   where probability:

   p_{ij} = {1 – if the cause causes the effect, 0 – otherwise}
2. This matrix is then transformed into the area of the closeness of causes using the closeness function, e.g.:

   $$b(p_i, p_j) = \frac{p_i \cap p_j}{p_i \cup p_j} \quad \text{where: } b \in \langle 0,1 \rangle$$

   Based on this function, the pairs of causes are compared and closeness factors are defined. It is worth emphasizing that the presented procedure does not convert these coefficients into binary values, like some researchers do, because this conversion, based on adapting a certain, subjective threshold value, would reduce the accuracy of the results.
3. Constructing chains of causes, ordered by decreasing values of function b (decreasing similarities). This process continues until all the elements in the chain are exhausted. As a result, classes of similar causes are obtained, the so-called pmacros. For example – from three different rows of the C-E matrix, only one (i.e. one class of causes similar to each other) arises because they cause the same or similar effects.
4. Check that the following situations apply:

   a. The cause is a candidate for more than one pmacro class; if so, it will be included only in one, i.e. in the one in which there is the closest, in terms of function b, cause with a higher weight,
   b. The cause is not a candidate for any of the previously created pmacro classes, then it becomes the creator of a new class; the remaining single-element classes are then appended to it, resulting in the so-called atypical pmacro class,
5. As mentioned above, in some cases it is difficult to decide what are the causes and the effects of different forms of poverty. Therefore, it is advisable to perform steps 1-4 on the basis of data from the table, constructed according to similar principles as in step 1, and then on the input matrix but in an "inverted" manner, i.e. classifying the effects. The order of causes is irrelevant. This way a matrix showing the relationship of effects and causes (E-C) is constructed, and, as before, situations a) and b) in stage 4 are eliminated. As a result of this classes of similar effects, the so-called syndromes, are created. For example, from four different rows of the E-C matrix, one row will be created, that is one class of effects, similar to each other, because they are caused by the same or similar causes.

6. Specifying a sample offer of information technologies and assigning them weights and classifying them in the same way as above, examining similar offers in terms of satisfying the needs resulting from the pmacros classes and syndromes (excluding possible repetitions). In this situation the table shows offers of information technologies in the side, sorted by decreasing weights, and pmacros and syndromes in the head. Offer classes created in the same way, so-called otis, may be helpful to users when completing: applications, Internet services or other mobile phone offers. They may also be an indication for the creators of various IT solutions, when designing, for example: applications for the "new poor", or macro applications fulfilling many tasks – so-called "n" – at the same time. With the multitude of individual proposals, such a personalized solution will certainly be an attractive offer.

It is also important that people who are "traditionally" poor will also find it easier to, for example, make purchases with application discounts. It may facilitate helping them, directing them in the right way if they cannot afford all modern IT tools.

Application aspects of the C-E-T method – data and results

The practical evaluation of the presented algorithm was carried out on selected model data. It should be emphasized that these data are not complete by definition, because they have been prepared taking into account various forms of poverty during the on-going coronavirus pandemic, i.e. since January 2020. The input data for the model - causes and effects of poverty were obtained from Eurostat and Central Statistical Office in Poland as well as from the literature cited in the beginning part of the article (point 1.). They have not been discussed in detail due to the text size limitations of the article. The choice of information technologies has been limited to those most willingly used by users in the COVID-19 pandemic (point 2.).

First, they were subjected to the process of bounding – causes of poverty, and as a result, classes of similar causes (pmacros) were obtained in view of the effects they cause. Thus, 8 pmacros was obtained:

pmacro 1 = {unemployment, low labour productivity, ruthless market rules, bad income distribution system},

pmacro 2 = {excessive welfare state, inappropriate social policy of the state, decline in the level of economic activity of the country, lack of propensity to risk, refraining from making any effort to get out of poverty, difficulty in accessing basic social institutions, choosing this way of life},

pmacro 3 = {no aspirations, submission to fate, laziness, no hope, no authority, no information},

pmacro 4 = {racial discrimination, discrimination against certain categories of people, gender discrimination, lack of education, weak family and interpersonal structures, social isolation, concentration of the poor, various types of social ills},

pmacro 5 = {sudden unexpected expenditure, debt spiral, not receiving child support, theft of property},

pmacro 6 = {hereditary tendencies and patterns, bad upbringing, unstable family life, absence of one parent},

pmacro 7 = {diseases, disability, accidents},

pmacro 8 = {loneliness, no love, no children, no healthy living conditions, no freedom}.

Then, in accordance with the justification given in step 5, the effects of poverty were subjected to the bounding process, as a result of which classes of similar effects (syndromes) were obtained according to their causes. This way 6 syndromes were obtained:

syndrome 1 = {inappropriate social, economic and educational patterns, restriction of access to rest, homelessness, withdrawal from education, life in the ghetto, digital illiteracy, entering into hooligan groups, withdrawal from participation in social and cultural life},

syndrome 2 = {alcoholism, drugs, designer drugs, crime, demanding attitudes},

syndrome 3 = {diseases, inability to take medication, inability to follow the recommended diet},

syndrome 4 = {loneliness, depression, lowered self-esteem, lack of self-confidence, suicide attempts, unrealistic ideas and expectations, lack of rules or life patterns, feeling of being trapped, feeling of injustice, conviction that you have no influence on your own life},

syndrome 5 = {increased fear for one's own health and life, early motherhood, complexes, distrust of others, passivity, helplessness},

syndrome 6 = {lack of communication between parents and children, unequal start in life, conflicts, domestic violence, debt spiral, indebtedness, arrears in payments}.

And finally, in stage 6, information technology offers were subjected to bounding. They were grouped in terms of the possibility of their use, especially in difficult, specific conditions of a pandemic, i.e. illness, isolation, loneliness, quarantine, joblessness and getting relatively low income, that is when it can be said that there is widespread poverty, and therefore a lot of shortages: lack of health, freedom, trust in others, lack of hope, authority, financial resources, contacts with other people, lack of information ... when the number of family conflicts and suicide attempts increase, people feel they are being trapped and education fails.

As a result of the bounding process, 12 classes of similar offers were obtained:

oti 1 = {text and video communicators, overview of articles and news, systems of reminders and motivational texts, remembering passwords, logins or card numbers, “contact” application – COVID threat, social networks, “where are you” application},

oti 2 = { selection and delivery of products, food, medicines, ready meals, virtual shopping list, e-shopping of a wide range of goods, healthy shopping, remote opening of a parcel locker, e-health, "discount" application},

oti 3 = {software for remote work, distance learning software, creating a list of tasks to be performed (work and home), systems monitoring learning progress, control of working time and the number of breaks},

oti 4 = {fitness applications, building diets, controlling caloric intake, controlling the physical parameters of the body},

oti 5 = {mobile banking applications, virtual wallet, systems controlling expenses and receipts, "lowest prices" application},

oti 6 = {applications for communication in teamwork, planning, description of tasks and deadlines, websites for people looking for employees, websites for people looking for a job},

oti 7 = {charity applications and services},

oti 8 = {scanning old photos, reference books about works of art},

oti 9 = {game collections},

oti 10 = {venture risk management systems, e-psychologists, "faith every day" portals},

oti 11 = {real estate services},

oti 12 = {e-office application for everyone}.

Conclusions from the implementation of the C-E-T algorithm

- Collection of input model data, i.e. the causes and effects of poverty and the desired IT offers, especially for the duration of the pandemic, and assigning weights to them, enabled the C-E-T algorithm to be implemented. Thus, its applicability was found.
- All three types of input data, i.e. the causes and effects of poverty, and information technology offers are bound into groups (classes) that are mostly multi-element, i.e. they are directly related to each other. The few occurring repetitions do not affect the final classification results.

- A thorough analysis of twelve otis (information technology offers) can provide a basis for their correction, development of detailed solutions, and then to link individual applications and build their macro versions so that they respond to the needs of poor people in various areas and for various reasons.

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Emerging of the Idea of Criminalization of Corporate Misconduct in the Russian Federation

Anna V. SHASHKOVA

Full Professor MGIMO-University, Moscow, Russia
a.shashkova@inno.mgimo.ru

Ekaterina Kudryashova

Researcher the Institute of legislation and comparative law under the Government of Russian Federation (Moscow, Russia)

Abstract

The present article is dedicated to the problem of interaction between the state and corporations at the industrial period of society, establishment of corporations and their liability. The present article analyses positive and negative examples of participation of corporations in social problems' solution. The author researches corporate crimes and analyses those who have particular importance nowadays. The article focuses on different theoretical approaches towards ideas of establishing corporate criminal liability in the national legislation of the Russian Federation. The article analyses such symbolic court precedents as those elaborated in the UK in cases 'Santa Clara County v. Southern Pacific Railroad Co.' in the USA and 'Salomon v. Salomon & Co. Ltd'. The article states that at the stage of industrial society emerged the current concept of the corporation as a separate subject of the civil turnover with the necessary scope of rights and liabilities. The methodological ground of the present Article represents the dialectic scientific method of the socio-political, legal and organizational processes with the principles of development, integrity, consistency, etc. The consistency analysis method is used while researching the object of the analysis. Some public-private research methods are also used: formally-logical or comparative legal method are used to compare legislation of the United States of America, the United Kingdom and the Russian Federation in the area of corporate liability for bribery. The aim of the present article is to find the root of the problem of interaction between the state and corporations, to show political will behind introduction criminalization of corporate liability. The core part of the research is dedicated to the analysis of emerging of the corporate liability. The question on emerging of corporate liability is analysed from a political point of view concluding that at present the Russian Federation political conditions are not set in for the matter.

Keywords: Industrial Society, Corporate Liability, Criminal Liability, Corporate Crime

Introduction

Introduction of criminal liability for corporate misconduct is a question, which is being discussed in the Russian Federation since 2015, when a draft law 'On Introduction of Amendments to Legislative Acts of the Russian Federation in the Light of Introduction of the Institute of Criminal Liability for Corporations' was submitted by the Investigation Committee of the Russian Federation to the State Duma. Most developed countries criminalised corporate misconduct and there are arguments that Russia shall follow the route of such countries [Bytko, 2015]. At the same time here are strong opponents to the criminalization of corporate crime. For example, the Russian Federal Chamber of Lawyers is in strong opposition to this idea. The arguments here concern mostly the subjective side of a crime, the principle of a personal culpability: actus reus non facit reum nisi mens sit rea (the act is not punishable if there is no perception of guilt), as well as the purpose of criminal liability.

The problem of criminalization of some act is a question of public order, a political question. Criminal action must violate public order, not just rights of particular individuals. An act shall be of great political or social importance, to deserve the stigma to be called a 'crime'. And the problem has mostly political and not legal routs of emergence and evolution [Schumpeter, 1934].

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Arising of a Concept of 'Corporation'

A corporation is normally considered as a structure, which acts independently in commercial turnover. It acts independently in its relations with the state as well [Yin, Wang, 2018]. A corporation represents a veil for owners as such corporation hiding it from other counteragents and shareholders of corporation. The court precedent of the House of Lords of the United Kingdom elaborated such concept in 1896. Of course, the idea of a limited liability is much older, than XIX century. Some vestiges are found it in the medieval era in monasteries and religious institutions. Later in XVI century large corporations exploited the trade with the East Indians (e.g. the Vereenigde Oostindische Compagnie) [Grimes, 2013].

The case is recorded under the name of 'Salomon v. Salomon & Co. Ltd'. The concept of this case is of particular interest notwithstanding the decision of the United States court 'Santa Clara County v. Southern Pacific Railroad Co.' adopted 10 years before the UK decision, in 1886 [Bloch, 2013]. The American court applied Amendment Four to the US Constitution to a corporation. It was for the first time in history when the notion 'person' was applied to a legal entity and not to a physical person.

"The right of the people to be secure in their persons, houses, papers and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized"[i].

The concept delivered in the judgment is of current importance: those who gave loans to the company have priority over general creditors [Pulbrook, 1865].

Lifting a 'Corporate Veil'

Such concept of lifting a 'corporate veil' is applied in case there are reasons to look inside the company in order to claim liability of the persons standing behind the company [Goulding, 1999]. In case of breach of law persons in charge will not enjoy limited liability of the corporation and its 'separate personality' [Croal, 2013]. They will be answerable on their fraudulent actions. Thus, the concept of lifting a 'corporate veil' is the integral part of the concept of corporate personality and independence of the company [Dignam, 2011].

Not only English law uses the concept. In German law such concept is called 'Durchgriff hinter den gesellschaftsrechtlichen Schleier', which means penetrating liability, in the American law it is know as 'Piercing the Corporate Veil' [Shashkova, 2015]. In the case Kinney Shoe Corp. v. Polan the court stated that the concept of a separate liability of a corporation may be ignored in case of "use of a corporation as a mere shell or conduit to operate a single venture or some particular aspect of the business of an individual or another corporation»[ii]. Implementation of such concept by courts leads to another concept – 'corporate crime' [Bequali, 1978].

The Interaction between Governments and Corporations

Thus, basing on the analysis of the precedent in the case 'Salomon v. Salomon & Co. Ltd' and the precedent in the case 'Santa Clara County v. Southern Pacific Railroad Co.' the author can conclude that a 'corporation' as a separate person, which can execute self-committing legal actions, meet its obligation, act as a plaintiff or as a defendant in court, as a self-governing legal entity, whose rights and duties are distinct from those of its members, appears only at the end of the nineteenth century.

At this particular stage of industrial society, when private property becomes sacred, the current understanding of a 'corporation' is created [Galbraith, 2007]. Such concept of 'corporativity' of a company means that the company can make transactions on their own behalf, may act as a plaintiff and a defendant in court, can sell, buy, rent, lease, and mortgage property in its own name. The corporation's property is inviolable [Mankoff, 1972]. However, it does not give the individuals that are standing behind a corporation complete indulgence. The legislation and judicial practice clearly show that in case of violation of the law, it is possible to transfer liability to persons actually committed their actions, even if they are covered by the corporation. Thus, the concept of 'lifting a corporate veil' is also a part of the concept of corporativity [Grantham, 1998]. Such concept of 'lifting a corporate veil' is as well an integral part of the concept of the autonomy of the company, an integral part of the corporation as an independent entity. At the same time if the state becomes weak corporations shall assume some functions of the state [Fedorov, 2017].

In early industrial society monopolies acted as land owners in the Roman Empire, collecting tribute for the passage of goods via the river. American railroad tycoons wiped out of business competitors in the same way at the end of XIX century. The mass media adds to the political rhetoric the idea of the antagonistic relationship between the state and corporations in the post-industrial society. The right-wing forces claim that the state intervention in the process of making money is too strong. Therefore, the state rather prevents than helps trading activity and activity of corporations. The left-wing forces draw an image of a corporation as a predator, exploiting workers and consumers and evading taxes. They claim tighter control of corporations from part of the state.

Such contradictions between the state and corporations lead to ineffective operational response to the banking crisis of 2007 - 2008. The Russian government responded to such crisis by passing new acts, more strictly regulating the financial and especially the banking sector, attempted to crack down on corporations using tax havensiii. Was it effective? Some countries such as the United Kingdom did the opposite. They reduced corporate taxes to attract more investment to the economy of the country. The French President François Hollande did the same. He came to power in 2012 on a wave of anti-capitalist rhetoric and in January 2014 announced the reduction of corporate taxes of 30 million euros to resuscitate the stagnating French economy. Though after increase up to 75% of the luxury tax such action of the French President was not noticediv.

It should be noted that notwithstanding all existing controversies between the state and corporations each other is sine qua non. Only because of corporations the economic growth of the state happens, jobs are created, export of goods is realised [Marx, 1844]. All these lead to increase a position of the country in the global economy. Transnational corporations (TNCs) are of specific importance. Such corporations generally pay higher salary, export more goods and pay higher attention to research and development (R&D) of new products and technologies. The state is forced to compromise at this point. An interesting example of the particular case is an advertising and marketing group WPP, which moved its head office from London to Dublin due to tax claims in the area of revenue earned abroad. Later after changes in tax regulations WPP returned its head office back to Londonv.

Corporations cannot exist without the state either. The state legalizes corporations, trains employees of such corporations, creates infrastructure (roads, air control) [Kosolapov, 2011]. All these actions of the state allow corporations to manage business, to deliver their goods in a specific place [Duff, Farmer, Marshall, Renzo, Tadros, 2014]. It is the state that carries out research and development, requiring significant capital investment [Etudaiyae-Muhtar, Ahmad, Matemilda, 2017]. Subsequently corporations commercialize such R&D products: from satellite systems to medical devices.

In certain business sectors, the state is a major client for corporations itself: defence systems, pharmaceutical products. The development of the construction industry also very much depends on public policies [Curti, Mihov, 2018].

Public policy affects corporate structure of business as well. In the USA, for example, high corporate taxes and an increasingly strict legislative regulation of public corporations led to a reduction in the number of public corporations and the establishment instead of limited liability partnerships. Tax regulation according to which the taxation of interest from investments in securities is different in the case of stocks and bonds (for taxation of bonds applies tax deductible, while dividends are paid from net profit) has led to the increase in the number of debt instruments and to the decrease the investment in stocks.

Progress development in the technological area provided the state with the opportunity of total control over citizens through telephony or email. In this field also, the government and corporations can both confront and interact [Ramirez, Ramirez, 2017]. There are almost no areas of business with secrecy and anonymity, especially when the issue at stake is cash money. Will corporations protect their customers from the control of the government, risking accusations of violation of legislative acts?

Social problems' regulation drives the state and corporations into a conflict as well. The Patient Protection and Affordable Care Actvi, which entered into force in the USA in 2010, imposed significant bureaucratic burden on small businesses. Formalities that small businesses had to comply when providing maternity leave for the mother, or even worse for the father, forced small businesses to allocate additional funds and people to comply with the law. In fighting for voters opposing tax increases, the state shifted the burden of social problems onto the shoulders of corporations. That is one of the reasons why the Patient Protection and Affordable Care Act was abolished and substituted with the American Health Care Act (AHCA)vii: to make businesses do business.

Big business corporations clearly understand the dependence of their success on the relations with the state: lobbying rather than brilliant business ideas can put business into effect. Tax regulation can be favourable or can simply swallow the corporation as a whole [Whelan, 2014].

While opening the boundaries and globalization of major types business and social activities the state identified areas of business that must be protected from foreign invasion [Berezko, 2016]. The state decided to determine the maximum share participation of foreign persons in such strategic corporations. In each country these areas may vary depending on the strategic goal of the state: in France it is agriculture, in the UK – financial services, in Russia - gas industry. The state also creates special state corporations dealing in such strategic areas [Alekseeva, Lebedeva, 2016].

It should be noted that the tools of interaction between state and corporations in the rich world and poor world differ. In the rich world, it is the government that dictates the rules, which corporations shall comply. Corporations have to structure their business and corporate organization in accordance with these rules. The role of taxes, government regulations of competition, the understanding of strategic development of technology, the impact of lobbying is of great importance here. In the poor world, everything is easier and more complicated at the same time: corporations of big business feel free to determine the best financial and fiscal conditions for themselves with the help of corrupt schemes. They cover nearly all areas, including the area of security, which traditionally has to be under the regulation of the state. The creation of non-governmental organizations (NGOs) does not allow distinguishing any more between the competence of the corporations and the state as such competence is mixed. The scope of activities of the state and corporations is also mixed: the state begins to do business, and corporations and NGOs start dealing with peoples' security.

The Idea of Criminalization of Corporate Misconduct

Such a notion as 'corporate crime' comes to life. Russian dictionaries define a 'corporate crime' as a 'white collar' crimeviii. At the same time European dictionaries give to a doctrine of 'corporate crime' a broader interpretation.

Criminology refers to a corporate crime as to a crime committed either by a corporation (i.e., a business entity, which is a separate legal entity and not dependent on natural persons that manage its activities), or persons acting on behalf of a corporation or other entity [Fisch, 2007].

The concept of corporation being a separate person means equality in application of liability to such separate person. The starting point for such interpretation was the above-named decision of the US court 'Santa Clara County v. Southern Pacific Railroad Co.'. It applied the notion 'person' to a company.

"The Court does not wish to hear argument on the question whether the provision in the Fourteenth Amendment to the Constitution which forbids a state to deny to any person within its jurisdiction the equal protection of the laws applies to these corporations. We are all of opinion that it does[ix]".

Regulation of corporate crimes arises to the political level. After a large number of fatal accidents on the rail network and at sea a term 'corporate manslaughter' was elaborated in the UK. This was done to attract more attention to technological hazards associated with corporations. In 2007 such offence was criminalized with the adoption of the Corporate Manslaughter and Corporate Homicide Actx. The Corporate Manslaughter and Corporate Homicide Act 2007 is a landmark in law. For the first time, companies and organisations can be found guilty of corporate manslaughter as a result of serious management failures resulting in a gross breach of a duty of care.

The Law Reform Commission of New South Wales states that a corporate crime may create a big threat to the prosperity of the community. The reason is that in case of a corporate crime a group of people to be affected is wider than in case of an individual action. And economic harm potentially caused is much higher as well.

On the one hand these are corporations that develop new technologies and economies of scale. These may serve the economic interests of mass consumers by introducing new products and most efficient methods of mass production [Hagan, 2010]. On the other hand, given the absence of political control today, corporations serve to destroy the foundations of the civic community and the lives of people who reside in them.

The case of the decision of the US court 'Santa Clara County v. Southern Pacific Railroad Co.' and its further construction by the Supreme Court of the US provide an understanding of possibility and reasonability of criminal responsibility of corporations.

"Congress can impute to a corporation the commission of certain criminal offenses and subject it to criminal prosecution thereforxi".

It was held that a corporation should be responsible for the acts of its representative or agent, whom can be a management body or other empowered employee or another person. It shall be stressed that a corporation shall be held liable even if such agent had acted against the express order of the corporation being a principal. A corporation is liable for tort within the agent's authorized powers, not only powers strictly construed. That means that even in case there is no direct contract between the corporation and the agent, the agent is considered to be a legal representative of the corporation.

There are of course certain court decisions against such construction, e.g. Connecticut General Life Insurance Company v. Johnson.

"I do not believe the word "person" in the Fourteenth Amendment includes corporations. The doctrine of stare decisis, however appropriate and even necessary at times, has only a limited application in the field of constitutional law.[xii]"

Decision on the case 'Burnet v. Colorado Oil & Gas Co.', dated 11 April 1932, claims that the court is constantly changing its interpretations of the Constitution of the United States, thus reaching improper construction in the case 'Santa Clara County v. Southern Pacific Railroad Co.'[xiii].

Notwithstanding such decisions the baseline of the American courts' construction of the problem is clear - criminalization of corporate misconduct of a separate legal person.

The Corporate Manslaughter and Corporate Homicide Act of the UK states that it is applicable to particular cases, which are cases of a corporation, a department, a police force, a partnership.[xiv]" The Act also states that a corporation is guilty of an offence only if the way in which its activities are managed or organised by its senior management is a substantial element in the breach. Thus, the Corporate Manslaughter and Corporate Homicide Act stipulates the necessity of the guilt of a corporation. The Act establishes no guilt or liability of an individual of aiding, abetting, counselling or procuring the commission of an offence of corporate manslaughter. It is very important because to make a corporation accountable for the guilty act, such guilty act of a corporation must be accompanied by a mental understanding of the guiltiness of the act. The corporation shall be aware of the guiltiness, which is hardly to believe in case of an artificial person.

In determining a crime and prospective responsibility for the crime the due level of care shall be considered. A 'relevant duty of care' of a corporation that must take place in particular circumstances is provided for in the Corporate Manslaughter and Corporate Homicide Act[xv].

Similar as in case of money laundering crime the liability under the Corporate Manslaughter and Corporate Homicide Act shall be incurred only in case of some predicate crime. That means that the liability under the Act does not arise as is. It arises only after some other crime that is considered to be a crime under the general criminal law has been proved[xvi]". The procedure for incurring liability by a corporation starts from a remedial order. In case a remedial order is not executed with a specified period liability under the Corporate Manslaughter and Corporate Homicide Act shall arise.

"An organisation that fails to comply with a remedial order is guilty of an offence, and liable on conviction on indictment to a fine[xvii]".

Thus, the responsibilities of a corporation as of the Corporate Manslaughter and Corporate Homicide Act shall be: compensation of losses, the publication of information on the crime of the corporation in mass media or unlimited fine.

Analysing the practice of application of the Act the author realizes that in case initiation of criminal prosecution on the murder under the Corporate Manslaughter and Corporate Homicide Act such criminal case is initiated simultaneously against the specific officials of the corporation and against the corporation itself. In contrast to the civil procedure, cases of independent corporate liability of a corporation have not yet happened[xviii].

A Northern Irish company and two other companies JMW Farms Ltd and Lion Steel Ltd were convicted under the Corporate Manslaughter and Corporate Homicide Act under the guilty plea. Another company Cotswold

Geotechnical Holdings Ltd got conviction after a trial. The patterns that emerge after the analysis of the above case and taking in consideration other cases of are these:

- Prosecutions tend to be of small, owner-managed companies, not companies of big business.
- Convictions by guilty plea seem likely to continue if the alternative is the risk to one of the owners of personal conviction and imprisonment.
- Fines remain below the lower threshold of £500,000 suggested by the Sentencing Guidelines Council.

Conclusion

Looking through the Corporate Manslaughter and Corporate Homicide Act the author can state turning backwards in the responsibility system. In case of court decisions of the XIX century lifting of corporate veil was the leading idea of corporate responsibility and inevitability of responsibility of a particular guilty person [Nicholson, 2007]. Nowadays a corporation is the primary responsible person. At the same time application of corporate criminal liability e.g. under the FCPA and the UK Bribery Act demonstrates clear trend to punish both legal entities and natural persons [McGrath, 2017]. Neither punishment of a corporation in accordance with criminal court's decision nor plea bargaining exclude individual criminal liability. The risk of individual liability also increased significantly after the release of the Yates Memorandum in the United States in 2015.

Coming back to introduction of criminal liability for corporate misconduct, the author concludes that under the concept of lifting a corporate veil, liability for corporations is already introduced. However, most Governments introduced civil or administrative liability for companies. Criminal liability for corporations is introduced in many countries as well, e.g. in the majority of the developed countries. Though in the Russian Federation the issue is still pending. Nowadays the absence of criminal liability for corporations in the Russian Federation does not release officials of the corporation from criminal liability – officials are recognized culpable for corporate crimes. Such officials are in fact the persons committed a crime; they signed the documents and made real deeds. According to the Tables given below the number of economic crimes in the Russian Federation drastically decreased from year 2013. The same sign can be traced comparing the first semester of the year 2019 to the first semester of the year 2018. That is a sign that criminal liability is being replaced in particular cases with administrative or civil liability. There is no legal obstacle to introduce criminal liability for corporations, which means that the routs of the problem of criminal liability of corporations are purely political. Thus, a decision to introduce or not such liability shall be considered from political point of view and not a legal one. At present political conditions in the Russian Federation have not come to the point of criminalization of corporate misconduct. From both political and legal concepts of view the author understands that currently there is no necessity in criminalizing corporate misconduct in the Russian Federation.

Table 1: Economic Crime Statistics in the RF, thousands

2013 year	141,2
2014 year	107,3
2015 year	112,4
2016 year	108,8
2017 year	105,1
2018 year	109,5

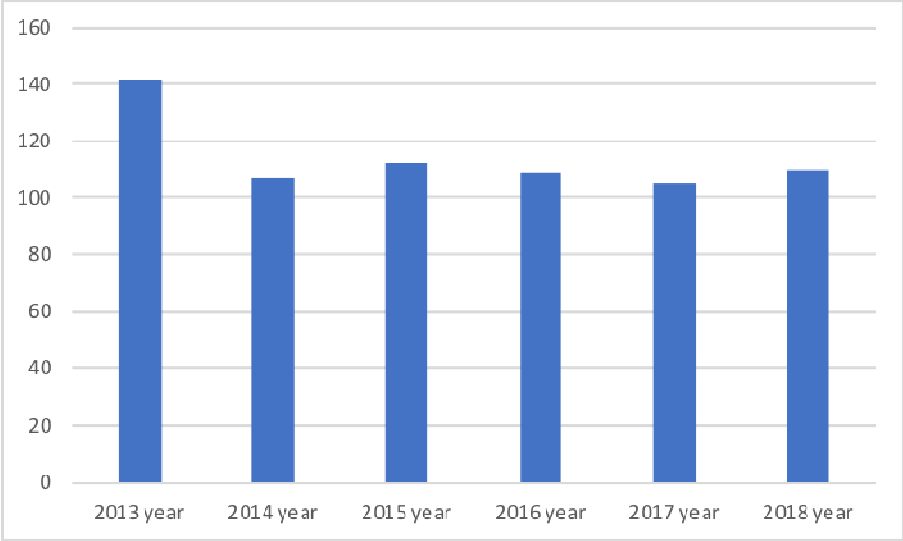

Source: Elaborated by author based on Ministry of Internal Affairs report. https://xn--b1aew.xn--p1ai/Deljatelnost/statistics

Table 2: Economic Crime Statistics in the RF, thousands

January – June 2018 year	68,7
January – June 2019 year	65,5

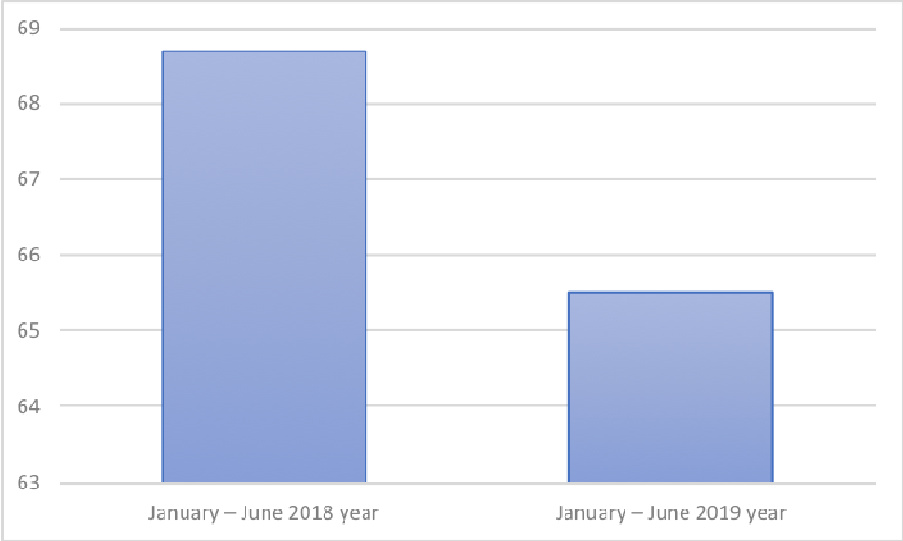

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Machine Learning with Python and NLP for Bibliographic Analysis: A Systematic Literature Review

Bryan ESTRADA-GOMEZ
Universidad Autónoma del Perú, Lima, Perú, bestrada@autonoma.edu.pe

Oscar DE LA CRUZ-OCAS
Universidad Autónoma del Perú, Lima, Perú, odelacruz@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Nacional Mayor de San Marcos, Lima, Perú, jgamboa65@hotmail.com

Huber RODRIGUEZ-NOMURA
Universidad Señor de Sipán S.A.C., Lima, Perú, hub_rono@hotmail.com

Percy DE LA CRUZ-VELEZ DE VILLA
Universidad Nacional Mayor de San Marcos, Lima, Perú, pdelacruzv@unmsm.edu.pe

Magaly ARANGÜENA-YLLANES
Universidad Nacional de Huancavelica, Lima, Perú, magalyyllanes@gmail.com

Carlos ALMIDÓN ORTIZ
Universidad Nacional de Huancavelica, Perú, carlos.almidon@unh.edu.pe

Abstract

The bibliographic analysis process in the world today faces a critical problem because of the fact that people lack reading habits. This happens because the bibliographies do not capture the attention of readers and in addition to having content that is too extensive, do not motivate their reading. This systematic literature review (SLR) was oriented to bibliographical analysis using machine learning with Python and natural language processing (NLP), and the collection and analysis of articles from different search engines, which helped to meet the determined objectives. Additionally, the information was used in the plotting of the statistical graphs. The research considers studies published between 2015 and 2020 obtained from various sources, making a total of 80 articles selected for publication and review; these contained the information necessary to answer the research questions. The obtained results were satisfactory thanks to the research conducted.

Keywords: Machine Learning, NLP, Python, Systematic Literature Review, Bibliographic Analysis.

Introduction

The situation in the world regarding bibliographic analysis is in a critical state. This is because of the absence of a reading and text analysis culture. Most people simply enjoy seeing the large number of pages in articles, books, work, etc., but do not find them attractive or worth reading.

In Latin American countries, reading rates in the general population have decreased dramatically in recent years. According to Gutiérrez Valencia & Montes de Oca Garcia, 1996, for example, the number of readers in Peru is below average in Latin America, because they do not practice the habit of reading.

Studies have shown that a large percentage of readers does not contribute to bibliographic analysis research, creating a big gap within this area. However, other research works demonstrate the use of tools and techniques that could

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address this problem and their efficient optimization. From the SLR process, it is deduced that machine learning technology with Python and NLP has the potential for solving the problem of bibliographic analysis. Studies were found with results that solve or improve the problem posed by the same technology. This work presents information on creating a solution for the need to improve bibliographic analysis. We collected and analyzed articles from different search engines, which helped to meet the objectives determined and plot the statistical graphs.

This research, based on the systematic review of literature, is organized as follows: Section I presents the Introduction, the Background and Related Works are in section II, and section III presents the Methodology used. The results of the SLR are presented in section IV, the conclusions are in section V, and the Discussion of the research is presented in section VI.

Background and Related Work

In recent years, research has been conducted on the potential of machine learning technology, Python language, and natural language processing (NLP) techniques, which have been used in different fields including tourism, fauna, social networks, etc. from which significant results have been obtained, for example:

Tao [1] conducted research based on machine learning supported by Python and NLP, in which he demonstrated the importance of sentiment analysis in the tourism industry, achieving remarkable results.

However, many issues such as bibliographic analysis have been left unresolved within the field of education.

Bibliographic analysis includes several parts of the bibliography to be analyzed and are grouped in two: external and internal analyses. To facilitate different actions such as consultation, recovery or generation of a product that benefits the reader we must go through the process of understanding the content and form of a document.

In today's world, the literature analyses do not capture the core information in the document, which creates numerous adversities for the readers by not complying with their objectives and are also limited to other actions, such as analysis reports, concept maps or a simple extraction of information from the bibliography.

Consequently, machine learning, which is supported by other technologies and techniques such as Python and NLP, offers remarkable benefits that could contribute to current research.

According to Sharma [2], using machine learning algorithms on computer programs allows you to learn from the input data and obtain the desired output within the specific range by analyzing statistics.

Ferrario [3], defines NLP as a discipline that combines linguistics, computer science and artificial intelligence, which studies the interactions between systems and natural human language.

According to Rasool (2020), using Python for analysis statistics on the impact of heart disease helped in determining the best machine learning models to predict and diagnose heart diseases.

The authors conclude the review with recommendations for participants to enhance their understanding on the subject, which can also be used to carry out tests and interpretations of the results.

This review aims to present a systematic review approach to documents to evaluate their approach to bibliographic analysis using machine learning with Python and NLP. The SLR is used to achieve this.

Review Method

Letelier et. al [4] state that systematic reviews are clear summaries and structured information available to answer certain questions in a specific field. Because they consist of multiple articles and information sources, they represent the highest level of evidence within the hierarchy of evidence. In this research, the reviews of two different types of publications are identified as the systematic and non-systematic or narrative review, according to Beltrán, G., & Óscar, A. [5].

- The systematic review is an integrative, observational, retrospective, secondary study, in which studies evaluating the same question are combined. Statistical methods are used to enable the combination and quantitative analysis of the results obtained in each study, according to Beltrán, G., & Óscar, A. [5].
- The narrative review is a less comprehensive study compared to the systematic review. It is elaborated by experts on a topic and developed without an explicit methodology or protocol and does not specify the search strategies for the included studies, according to D. González-Bravo [6].

The present review was conducted on bibliographic analysis with machine learning, Python and NLP. We chose the systematic literature review, following the steps proposed by Letelier et. al [4], to propose an improvement for the research that is being carried out. To conduct this review, the following steps were followed: questions were posed based on the research, equations were formulated, a search was carried out on various selected search engines, exclusion criteria were applied, questions were raised on the quality of the studies, the studies were selected and classified, and finally the review and data extraction were carried out.

Research Questions

This review begins with a number of research questions that will serve as a guide for the review process. This step is useful for mapping the research on autonomous learning with machine learning, Python and NLP in the bibliographic analysis and answering the following questions:

RQ1: What are the criteria for measuring the effectiveness of machine learning with Python and NLP?
RQ2: In which areas has machine learning with Python been applied?
RQ3: In which areas have the techniques of the NLP been applied?
RQ4: What tools and libraries are used for the application of machine learning with Python and NLP?

Search Equations

The next step in the systematic review is to propose search equations according to the search terms grouped by variables (Table 1).

Table 1: Search terms grouped by variables

Search Terms	Variable
Machine Learning Solution AND Python AND Natural Language Processing	Independent Variable
CRISP-DM	Intervening Variable
Methodology/Method/Model	
Bibliographic Analysis	Dependent variable
Bibliography	

The words listed in the table above are fundamental for performing the search equation, because they accurately describe the research topic such as machine learning, Python and NLP, which encompasses a number of techniques and tools that are used in their application. The intervening variable was the CRISP-DM methodology because a methodology that includes following an order and procedures that achieve good results will be needed to carry out this research work. The dependent variable was matched with the bibliographic analysis. Table 2 shows the search equations as a result of the inclusion of these variables:

Table 2: Search equations

Source	Generic Search Equation
Springer Link	Machine learning and python and natural language processing and Bibliographic analysis
ERIC	Machine Learning AND Python AND natural language processing (AND CRISP-DM OR Methodology) AND Bibliographic Analysis
IEEE Xplore	((((("All Metadata": Machine Learning) AND "Full Text & Metadata": Python) AND "Full Text & Metadata": natural language processing) AND "Full Text & Metadata": CRISP-DM) OR "Full Text & Metadata": Methodology) AND "Full Text & Metadata": Bibliographic Analysis)
1findr	Machine Learning AND Python AND natural language (processing OR Methodology AND Bibliographic Analysis)
Science Research	Machine Learning AND Python AND natural language processing AND CRISP-DM OR Methodology AND Bibliographic Analysis
Taylor&Francis	[All: machine learning (python)] AND [All: and natural language processing] AND [All: bibliographic analysis]
Microsoft Academic	Machine Learning AND Python AND natural language processing AND CRISP-DM OR Methodology AND Bibliographic analysis
UNED	Machine Learning AND Python AND natural language processing AND CRISP-DM OR Methodology AND Bibliographic analysis
Science Direct	Machine Learning AND Python AND natural language processing AND CRISP-DM OR Methodology AND Bibliographic analysis
ACM	[All: machine learning] AND [All: python] AND [All: natural language processing] AND [All: crisp-dm] AND [All: bibliographic analysis]
ProQuest	Machine Learning AND Python AND natural language processing AND CRISP-DM OR Methodology AND Bibliographic Analysis

A. Search for documents

The search was carried out using the following equations by an extensive research, the most relevant being the direct science search source. Fig 1 shows the quantities according to each source.

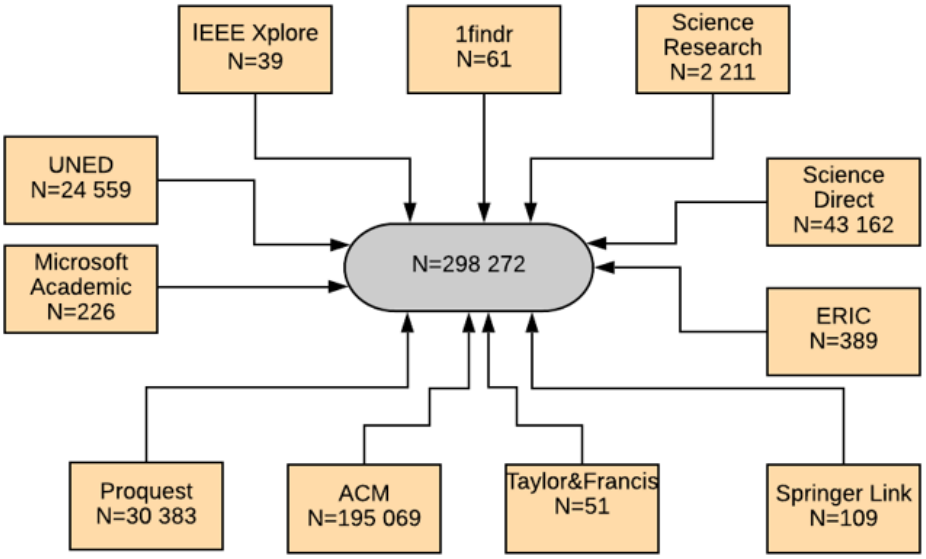

Fig. 1: Number of studies per search engine

B. *Exclusion Criteria*

The number of studies collected for this research was large; however, because there are advancements in the technological field every day, we decided to include some criteria for selecting the suitable articles. The first exclusion criterion was that the articles should not be older than six years; because a wide variety of research studies was included, the second criterion was that the results should not be articles.

Given that some search engines only allow you to review research articles by subscriptions and/or payment, the next criterion that was selected was that the articles found should not be accessible. Most of the results showed a wide variety of publication languages; for the present evaluation we chose articles in the English or Spanish.

Finally, the research that would be most helpful for this review includes the articles that deal with machine learning, Python and NLP. These applied criteria will help select research that is more oriented to the subject and thus, obtain results with evidence of the use of these techniques in bibliographic analysis (Fig 2).

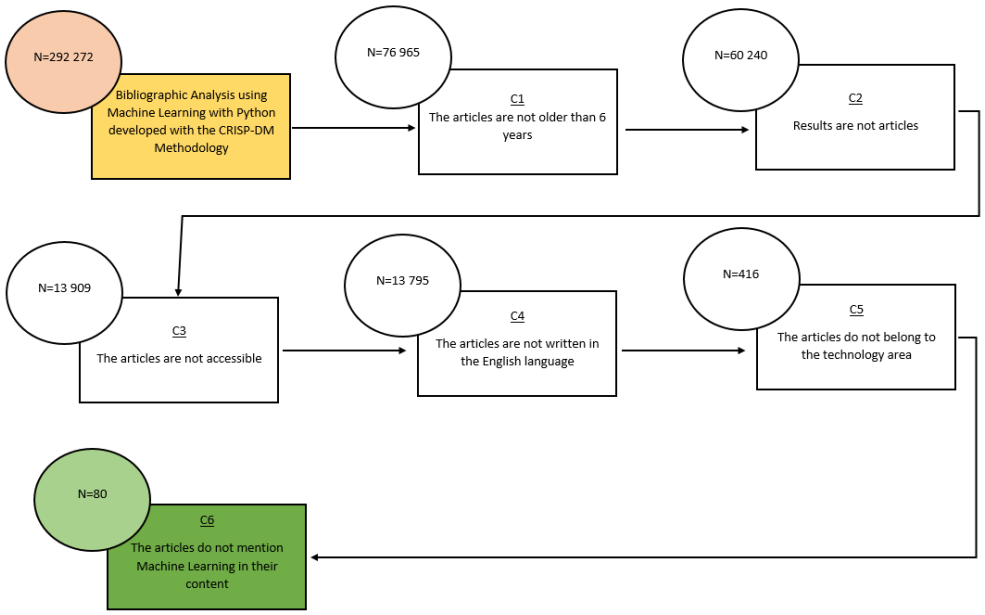

Fig. 2: Application of the exclusion criteria

C. *Study Selection*

The selection process of the studies was carried out according to the titles, which were automatically displayed using the different search engines. Those that clearly did not have anything to do with the subject (N=292 272) were excluded. Finally, the researchers applied the exclusion criteria (Fig 2) in the set of relevant studies, obtaining 80 articles, which were potentially vital for the research.

D. *Quality Assessment*

This section reviews the quality of the resulting or selected studies, which can be used to create a filter that facilitates the selection of suitable articles to answer the research questions; these reviews were conducted after applying the exclusion criteria. The selected quality criteria are presented below:

QA1: Is the purpose of the investigation clearly explained?
QA2: Does the topic belong to the fields of computer science, information systems or management?
QA3: Are the research objectives clearly presented in the document?
QA4: Can you clearly identify the results of the experiments that were carried out?
QA5: Does it adequately describe the analysis of data used in the study?
QA6: Are the results of the study clearly established and supported by the results?

It should be noted that each of the quality criteria was applied to the 80 selected articles, and each one of them complied with the above-mentioned criteria. Therefore, these 80 articles were used for the review.

E. *Data Extraction*

Data extraction was performed on the 80 selected articles, where each study was assigned a unique reference. The following information was extracted from each article: study title, source or search engine where it was found, year of publication, country, number of pages, language used in the article, type of publication, scientific article or SLR, name of publication, research methodology, author or authors, affiliation of the author (university), number of quotations, summary of the article, keywords, and sample size. All these data were used to plot graphs and create a better understanding of the studies.

Results

This section presents the results of the present SLR according to the established RQs.

RQ1: What are the criteria for measuring the effectiveness of machine learning with Python and NLP?

RQ1 aims to determine the most frequently used criteria within the selected articles and measure the effectiveness of machine learning with Python and NLP. We identified the criteria used in the studies to measure the effectiveness, which are presented in Table 3.

Table 3: Effectiveness criteria

Criteria	Amount	Percentage
Accuracy	54	53,47
Precision	35	34,65
Sensitivity	7	6,93
Specificity	5	4,95

As shown in the table, we obtained four criteria, which measure the effectiveness and precision of the models used in the articles based on machine learning to solve the problems presented in them. Additionally, many of the authors mention more than one criterion in their solutions, which is why they appear repeatedly in the articles.

As shown in Fig 3, the most common criterion is accuracy, which measures the precision and effectiveness of the classification models, that is, the fraction of prediction that the model in the article is accurate.

This criterion covers 53,47% of the selected articles. Therefore, it can be inferred that accuracy is a significant criterion that should be taken into account when working with machine learning because it indicates that your solution can certainly be effective in solving a problem. Moreover, the rest of the criteria presented are quite significant because they also present valuable information about the models.

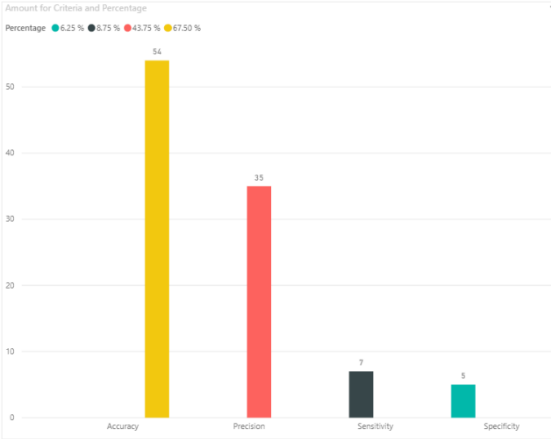

Fig. 3: Criteria efficiency

RQ2: In which areas has machine learning been applied with Python?

To answer this question, Fig 4 was used to elaborate the areas of greatest interest, which have applied machine learning with Python. These technologies are capable of solving problems in many areas, but for the present research,

the five most common fields of study were identified within the selected studies. It can be observed that the studies that are carried out with the highest frequency are in the area of literature. This field is closely related to the present research because it includes bibliographic analysis.

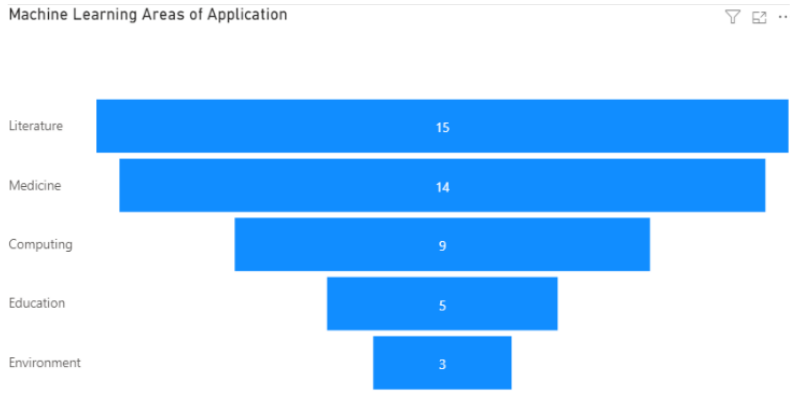

Fig. 3: Machine learning areas of application

A manual analysis was performed on the articles to determine the number of articles found within these areas and calculate their percentage relative to all the selected items.

As shown in the Table 4, Literature included a total of 15 articles (32,61%), indicating that it is one of the areas where these technologies are most applied. Thanks to these data, we can obtain information that significantly contributes to the present SLR.

Table 4: Application areas of machine learning

Area	Amount	Percentage
Computing	9	19,57
Education	5	10,87
Environment	3	6,52
Literature	15	32,61
Medicine	14	30,43

RQ3: In which areas have the techniques of the NLP been applied?

As shown in Table 5, NLP techniques are more widely used in the literature (38,24%) and computer science (26,47%) fields, because the use of these techniques has made it possible for computers to interact with the human language, resulting in computationally effective communication. It is also widely used in the field of medicine (23,53%) because the application of these techniques achieves beneficial results in identifying and discarding diseases that a mere human can not predict.

NLP is also used in the field of education because of the various techniques it incorporates. Therefore, it provides a new approach for improving learning through interactions with models that can predict and teach things that are out of the ordinary.

The present research takes into account 80 articles, which were rigorously selected to obtain results that show that this technique is widely used to solve various problems that currently demand time and money.

Table 5: NLP application areas

Area	Amount	Percentage
Computing	9	26,47
Education	3	8,82
Environment	1	2,94
Literature	13	38,24
Medicine	8	23,53

RQ4: What tools and libraries are used for the application of Machine Learning with Python and NLP?

Table 6 clearly answers the above question; the obtained results indicate that the most used tools are NLTK (31,91%) and TensorFlow (23,40%). Because they are open source, the use of these tools allows the creation and/or training of models that can be used to solve various types of uncommon and difficult problems that could only previously be solved by a human. The other tools were not widely used in this research; however, they are equally important because they are used in other fields and achieve positive results. The selected tools are vital and each one offers different functionalities, making their application significantly effective in the results obtained; they are easily accessible for use in various areas and types of research.

Table 6: Most used tools and libraries

Tools	Amount	Percentage
NLTK	15	31,91
Numpy	5	10,64
OpenNLP	2	4,26
PyTorch	5	10,64
SciPy	4	8,51
Spacy	5	10,64
TensorFlow	11	23,40

Discussion

To the best of our knowledge, this is one of the first attempts to review bibliographic analysis using machine learning with Python and NLP. In the findings, a considerable amount of empirical research on the study of the application of machine learning, Python and NLP in areas such as medicine, wildlife, tourism, education, etc. was found. Considerable attention was given to the studies that were applied in education, based on the same fact that bibliographic analysis is within this area. Additionally, few studies found replications; one of the consequences or implications caused by this research is that it gave a glimpse of the potential of these technologies and their contribution to society in different areas, more so in bibliographic analysis as well as the benefits that will be obtained.

For professionals or students who would like to take this SLR as an example, they should look for more information on the subject, because the evidence shows that the application of machine learning with Python and NLP for bibliographic analysis is not mature and that the direct application of the methods and instruments used in the studies may produce unwanted results. According to Park, D. and other authors [19], human efforts determine the quality of the results, whereas automated approaches can significantly increase the efficiency of the research efforts.

Conclusion

Presently, machine learning, Python and NLP are used by a large number of researchers from different areas, enabling the optimization of their resources in the execution of tasks. It is of utmost importance to know the benefits, results and importance of using the techniques and tools provided by Machine Learning, Python and NLP.

The present review aims to raise awareness on the use of machine learning tools and techniques, Python and NLP in bibliographic analysis, as well as make it known that these are currently the most used for solving various problems, because of their effectiveness in the results obtained in the different areas where they have been applied.

The 80 selected and reviewed articles for this review indicate that the research topic is of great interest because it is used and applied by many researchers in different studies. It should be noted that there is still a lot more to explore and discover in this field of technology.

The present review has obtained a considerable number of publications in scientific databases. However, it should be noted that it is used in different areas for the purpose of optimization and application. Currently, access to this type of information is possible owing to the variety of sources and/or existing databases.

In the literature area, publications stand out for the variety of techniques and tools applied for the development of various problems. This implies that the research is within the scientific community of informatics. In the analysis of the publications by years, it is demonstrated that the articles in which machine Learning, Python and NLP are used are current because of the advancement of technology over the years. This advancement has led to the discovery of new entities, and the tools and techniques have become more efficient and effective when providing solutions.

The use of machine learning, Python and NLP have made technology more attractive and useful because of the various solutions that they offer by incorporating automated tools and techniques.

This research concludes that it is possible to conduct bibliographical analysis with the help of these tools and techniques, because there is a lot of research on this subject that has presented satisfactory results.

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Managerial Premises for The Implementation of The Industry 4.0 Concept on The Car Assembly Technology Line

Leszek PACHOLSKI

Poznan University of Technology, Faculty of Engineering Management
Poznan, Poland
leszek.pacholski@put.poznan.pl

Abstract

The publication addresses a decision-making management problem related to the implementation of the INDUSTRY 4.0 concept in an automotive industry company. The object of research, determining their theoretical and implementation scope, is a practical case of the car assembly technology line. The subject of the research are the managerial relational premises linking the attributes of the above-mentioned implementation with the macro-environmental strategic conditions of its implementation. The methodology of the expert studies presented in this publication uses three tools: PEST analysis, brainstorming, Delphi method and the fuzzy formula of inference. The scientific purpose is quasi-taxonomic and consists in discovering (research question) the hierarchical structure of the relationship strength of the analyzed managerial premises. The research conclusions highlight the technological and organizational problems of cyber-attacks and excessive investment costs as well as the issue of reliability and stability of cyber-physical systems and processes of the INDUSTRY 4.0 concept, as well as the socio-cultural aspects of supervision over the autonomy of these systems and processes, the dangers of both privacy violations and depriving employees of employment.

Keywords: Industry 4.0, attributes of Industry 4.0, PEST analysis.

Introduction: the purpose, type, object and scope of the research

The concept of INDUSTRY 4.0 is the fourth stage of managerial technological and organizational innovations in the field of industrial production of technical products. The foundation of each of these stages are successive basic innovations constituting the technological and organizational response of production engineering and management sciences to the socio-cultural and economic-economic imperative of need. It should be noted that the above-mentioned three areas (technological-organizational, economic and socio-cultural) together with the political and legal aspect (Pacholski L., Piotrowski K., 2008) define the basic spheres of the macro-environment which has a key impact on the functioning of the manufacturing enterprise. Referred to as general segmentation of the environment (in the form of PEST analyzes) these areas also determine (through an in-depth analysis such as: BCG Matrix, ADL Matrix, McKinsey Matrix, GE Matrix) the portfolio strategy of this enterprise.

The relationships linking the attributes of the implementation of the INDUSTRY 4.0 concept with the macro-environmental conditions for its implementation, which constitute the basic expert research question and the purpose of the research presented further in this publication, can be considered the key decision-making premises of the operating strategy of a manufacturing company. The object of the expert research, determining their theoretical and implementation scope, is a practical case of a technological line of car assembly. Contemporary cars are characterized by considerable design complexity and the use of various assembly technologies. Car production is a complex process consisting of many phases and stages. This process includes: construction of the so-called sheet metal structure, technologies for sealing, painting and anti-corrosion protection of this structure, and assembly of the complete vehicle. In terms of the research type, it can be considered that this publication is a case study.

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Research subject: Industry 4.0 concept

Returning to the issue of the four basic innovations constituting the foundations of the four so-called industrial revolutions the following should be listed:

- the concept of mechanical industrialization based on the implementation of the steam engine invented by James Watt into manufacturing processes,
- the concept of production lines based on machines and electric generators, thanks to the invention of a generator by Warner Siemens (a device that converts mechanical energy into electricity),
- the concept of digitization of manufacturing processes, initiated by the creation of the first electronic, programmable computer and the continued development of software-controlled computers and the creation of the first microcontroller,
- the concept of unifying the real world of production machines with the virtual world of the Internet and information technology.

The above-mentioned four industrial revolutions appeared (as mentioned above) as a result of articulating successive socio-cultural and economic imperatives of need. The contemporary imperative of this type is a consequence of the situation in which the producer operates in the conditions of surprising and increasing turbulence and unpredictability of changes in the enterprises' environment, in various dimensions of this variability (Trzcielinski S., 2011; Kalkowska J., 2018; Pacholski L., Kalkowska J., 2019). Organizational structures for managing industrial manufacturing processes have flattened and teamwork has become the dominant form of organization (Mc Cormack K.P., Johnson W.C., 2001; Trzcieliński S., 2011; Kałkowska J., Pacholski L., 2017). In response, the industrial producer receives a whole range of concepts including: Toyota Production System, Lean Production, Flow Manufacturing, World Class Manufacturing (Schonberger R.J., 1986; Todd J.,1995; Digalwar A.K., Sangwan K.S., 2007; Murino T., et el., 2012), Agile Manufacturing (Goldman S.L., Nagel R.N. 1993; Trzcieliński S. 2011; Yauch C.A. 2011).

The integration of these concepts in the conditions of the real (automated and robotic) world of manufacturing systems requires the use of information technologies that goes beyond the organizational and technological possibilities of the first three industrial revolutions.

INDUSTRY 4.0 is a concept for the production and operation (use and operation) of technical devices based on the standards of the virtual world of Internet networks and information technologies, which combines the real world of intelligent production and operating machines with intelligent information flow systems. This concept covers the entire value chain of the above-mentioned technical devices (products) from ordering and delivering components for ongoing production to their shipment to customers and after-sales maintenance services. It is the integration of intelligent machines and systems as well as the introduction of flexible changes in production and operational processes aimed at improving the quality and efficiency of these processes. INDUSTRY 4.0 applies not only to the technologies of these processes but also to new ways of organizing and managing work as well as new roles of people in the industrial production and exploitation of technical products. The INDUSTRY 4.0 concept, on the other hand, means connecting the real world of people and production machines with the virtual world of the Internet with cyber-physical information technologies. As this concept evolves, computers are connected and communicate with each other to ultimately make decisions even without human intervention. INDUSTRY 4.0 covers the entire logistics value chain: from ordering and delivering components for ongoing production and operation to the shipment of finished products and consumable components to customers and related after-sales services. Products and components can always be identified. They even have the ability to communicate independently. The flow of production and operational information is carried out vertically: from individual products and components to the company's IT department and from the IT department to these products and components. The second direction of information flow is carried out horizontally: between the machines involved in the production process and the product operation system and the production and operation systems of the enterprise. INDUSTRY 4.0 today is not just "data digitization" but a whole technological revolution including the following eight tool concepts: System Integration, Additive Manufacturing, Big Data, Internet of Things, Autonomous Robots, Cloud Computing, Augumented Reality, Cybersecurity. The aim of this revolution is to create new (organizational and technological, economic and socio-cultural and even political) opportunities and benefits that would simply not be available without this type of cyber-IT solutions. The concept of INDUSTRY 4.0 (as assumed

by its authors) opens a new era of high automation in production. Manufacturing processes are a part of the Internet of Things where communication and collaboration between machines and humans occurs in real time.

Summing up, the following cost and efficiency benefits of the concept of INDUSTRY 4.0 should be mentioned:

- flexible and tailored to customer expectations modular production concepts,
- systemic, comprehensive and optimized real-time planning (collaboration horizontal with the use of platforms located in the cloud for production planning),
- real-time production planning (vertical integration) in order to better use production machines and increase their efficiency,
- digitization and automation of processes in order to optimize the use of resources (human and hardware) and faster operational activity
- controlling the flow of products (horizontal integration) in order to better manage inventory and optimize logistics management,
- real-time quality control based on data analysis,
- obtaining current information on deviations in the production process.

Research Method and Results

An expert study of managerial relational premises linking the attributes of the implementation of the INDUSTRY 4.0 concept with its macro-environmental conditions was carried out with the use of the following four analytical tools: PEST analysis, Brainstorming techniques, Delphi approach and Fuzzy Inference formula. The diagram of the author's method of this research is shown in Fig. 1.

The individual symbols appearing in this figure mean:

MGRS - managerial roles,
PEST - PEST analysis,
TITC - INDUSTRY 4.0 tool concepts,
SISL - systems of implementation solutions,
MECI - macro-environmental conditions of implementation,
IMAT - implementation attributes,
B - brainstorming technique,
D - Delphic approach,
F - fuzzy inference formula,
AMRP - analyzed managerial relational premises,
QTAX - quasi-taxonomic indicator

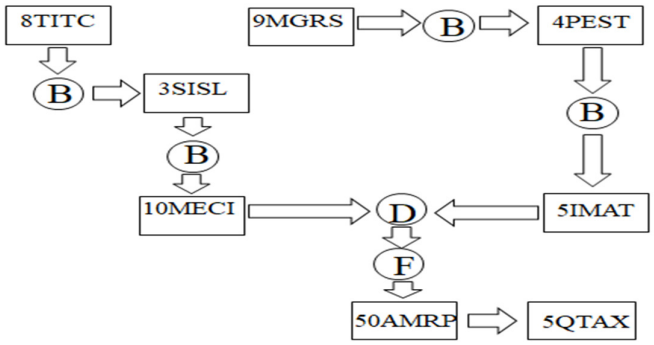

Fig. 1: Scheme of the method of researching managerial relational premises linking attributes implementation of the INDUSTRY 4.0 concept with its macro-environmental conditions (source: own study)

The aim of the research is quasi-taxonomic and consists in discovering (the research question) the hierarchical structure of the relationship strength of premises (AMRP) linking individual attributes (IMAT) of the implementation of the INDUSTRY 4.0 concept with its macro-environmental conditions (MECI).

The resulting relational premises linking the implementation attributes of the INDUSTRY 4.0 concept with its macro-environmental premises were developed based on the opinion of a team of twelve experts. The seven experts are mainly industrial practitioners employed in the surveyed car manufacturing company and familiar with the INDUSTRY 4.0 concept. These experts represented the following managerial specialties: enterprise management, production engineering, logistics, marketing, human resources management, automation and robotics, IT and telecommunications. Five other experts represented the university knowledge in the field of INDUSTRY 4.0 in the following specialties: management engineering, economics, social sciences, automation and robotics, as well as IT and telecommunications.

The classic brainstorming technique was used in the research, the purpose of which was to determine the connections between nine industrial managerial roles (9MGRS – see fig.1) and four macro-environmental categories of determinants for the implementation of the INDUSTRY 4.0 concept (4PEST – see fig.1). Managerial roles were formulated as follows: leader - representative, coordinator (liaison) of activities, counteracting disturbances (conflicts), observer following news, promoter of changes and news, explaining spokesman, entrepreneur - innovator, resource administrator, negotiator towards suppliers and customers. The distinguished categories of macro-environmental conditions included (in accordance with the PEST analysis) the following premises: economic, socio-cultural, technological and organizational, and political and legal.

The same classic brainstorming technique was used to investigate the connections between eight tool concepts of INDUSTRY 4.0 implementation (8TITC – see fig.1) with three technological and organizational variants of the industrial implementation of this concept (3 SISL – see fig. 1).

The eight tool concepts are: System Integration, Additive Manufacturing, Big Data, Internet of Things, Autonomous Robots, Cloud Computing, Augumented Reality, Cybersecurity.

On the other hand, three variants of industrial implementation are described as follows (Pacholski L., Kalkowska J., 2019):

- Implementation of high volumes of car production (with a cost level lower than the competition) by fully robotic, dedicated production lines with common picking modules, using digital tool technologies of the INDUSTRY 4.0 concept,
- Implementation of short, personalized series of manufactured cars (the so-called "mass individualization" of production processes), through highly individualized, robotic, universal production cells (having the value of frequent changeovers), using digital tool technologies of the INDUSTRY 4.0 concept,
- Implementation of the process of manual production of cars with the highest unit value, manufactured on the individual order of the client, by top-class specialists using digital tool technologies of the INDUSTRY 4.0 concept in order to improve the organization of production processes and increase the "ergonomics" of human work.

The results of the research for the first of the above-mentioned applications of the brainstorming technique are shown in a matrix form in Fig. 2.

Nine industrial managerial roles	Four categories of macro-environmental determinants of implementation			
	Economic	Socio-cultural	Technological and organizational	Political and legal
Leader - Representative		X	X	X
Coordinator (liaison) of activities,	X		X	
Counteracting disturbances (conflicts),		X	X	
Observer following news	X		X	X
Promoter of changes and news		X	X	X
Explaining Spokesman		X		X
Entrepreneur - Innovator	X		X	X
Resource Administrator	X		X	
Negotiator towards suppliers and customers	X	X	X	

Fig. 2: The results of the research: Matrix of connections between nine managerial roles and four categories macro-environmental conditions for the implementation of the INDUSTRY 4.0 concept (source: own study)

Using the same technique to test the connections between eight tool concepts of the INDUSTRY 4.0 implementation with three technological and organizational varieties of the industrial implementation of this concept has been signaled, regardless of the business conditions of the selected production variant cars (Shrama M., Kodali R., 2008) similar to the matrix presented in Fig. 2, the dominance of organizational and technological premises.

In the next stage of the research, the experts were required to distinguish (based on the results of the previous stage) ten managerial premises for the implementation of the INDUSTRY 4.0 concept and five attributes of this implementation. These premises and attributes were determined using the brainstorming technique. The results of the research were ten managerial premises (10MECI – see fig.1) for the implementation of the INDUSTRY 4.0 concept (Table 1) and five attributes (5IMAT – see fig. 1) of this implementation (table 2).

Table 1: The results of the research: Ten managerial premises for the implementation of the INDUSTRY 4.0 concept

The managerial premises for the implementation of the INDUSTRY 4.0 concept	
1	The excessive investment costs of the implementation of the INDUSTRY 4.0 concept
2	The difficult adaptation of the company's current business model to the requirements of the INDUSTRY 4.0 concept
3	The social distrust in cyber-computer supervision over the threats of violating privacy, freedom and cultural identity
4	The social problem of threats, in the context of the implementation of the INDUSTRY 4.0 concept, loss of jobs by people who previously performed work and coordination activities
5	The functional and competence redundancy of the corporate IT department in connection with the implementation of the INDUSTRY 4.0 concept
6	The threat of cyber-attacks and the protection of the company's knowledge resources
7	The difficulty of obtaining the reliability and stability of cyber-systems necessary for time-critical computer processing
8	The need to constantly maintain the integrity of cyber-systems and processes of product manufacturing and operation
9	The political determinants of professional legislation with regard to the implementation

	of the INDUSTRY 4.0 concept
10	The legislative and implementation complexity of standards and certification of the implementation requirements of the INDUSTRY 4.0 concept

(source: own study)

Table 2: The results of the research: Five attributes of the implementation of the INDUSTRY 4.0 concept

The attributes of the implementation of the INDUSTRY 4.0 concept	
1	The cyber-computerization of product manufacturing and operation processes, information and decision-making interoperability and autonomy of the mentioned processes, functionality and reliability of these processes and their integration and logistic flexibility
2	The information and decision-making inter-operability and autonomy of product manufacturing and operation processes, functionality and reliability of these processes
3	The functionality and reliability of the processes of production and exploitation of products
4	The integrity and logistic flexibility of the processes of production and exploitation of products
5	The marketing personalization of the processes of production and exploitation of products

(source: own study)

For the purposes of the research on managerial relational premises (50AMRP – see fig. 1) linking ten managerial conditions of the implementation (10MECI – see fig.1) of the INDUSTRY 4.0 concept with five attributes (5IMAT – see fig. 1) of this implementation, four degrees of Delphi expert assessment of the strength of relations (five-level numerical scale from 1 to 5) were adopted for fifty of their potential variants (Trocki M., 1997).

Taking into account each of the twelve expert's opinion, it was assumed that in the next three rounds the experts narrowed the number strength of the relation. If the interquartile range and the new expert opinion was outside this new relation, its justification was expected. In this way, it was forced to move experts undecided and without adequate arguments to the majority group, i.e. to the group whose opinions are in the interquartile ranges.

As part of the fuzzy (F – see fig.1) formula of inference (Zadeh L.,1999; Pacholski L., 2007) concerned the research on managerial relational premises (50AMRP- see fig.1), it was assumed that the probability of high, medium and low strength of the relationship will be tagged (Kalkowska J., 2018):

$$p_{ai}^{h}\ ,\ p_{ai}^{m}\ \mathrm{i}\ p_{ai}^{l}$$

The determination of the above probabilities was entrusted to the aforementioned twelve experts. The probability boundary conditions were defined as follows:

$$pa_i^h + pa_i^m + pa_i^l = 1$$
$$pa_i^h \geq 0;\ pa_i^m \geq 0;\ pa_i^l \geq 0\ , \qquad i \in 1, n;$$

A five-level linguistic scale of expert assessments was then proposed.
Moreover, the linguistic variable z was introduced to describe the strength of the analyzed relations and the fuzzy scale (table 3).

Table 3: Recommended fuzzy scale for the linguistic variable z.

#	Rating of 12 experts	Scale
1	no relation	0<z<0,333
2	relationship strength slight	0,167≤z<0,5
3	indirect relation	0,333≤z<0,667
4	strength of the relation significant	0,5≤z<0,833
5	dominant relation	0,667≤z≤1

(source: own study)

The designation d_j was further introduced as the result of the j-th expert's assessment,
where: ($d_j \in 1, 2, 3, 4, 5$).
According to the fuzzy set theory, the membership of the set N was expressed by the membership function for the interval [0,1] of the form: $\mu_N(x)$
Each result of the d_j expert assessment was assigned to the following five fuzzy sets:

$N_1 = \{(\beta_1, \mu_N(\beta_1)), (\beta_2, \mu_N(\beta_2)), (\beta_3, \mu_N(\beta_3))\}$, if $d_j = 1$;
.
.
.
$N_5 = \{(\beta_5, \mu_N(\beta_5)), (\beta_6, \mu_N(\beta_6)), (\beta_7, \mu_N(\beta_7))\}$, if $d_j = 5$;

for j = 1, 2, 3, .., E; where: E = 12 is the number of experts assessing the relationship.

Then, the following distribution (normalized fuzzy set - table 4) of the scale of relational premises (AMRP – see fig. 1), linking ten managerial conditions of the implementation (MECI – see fig.1) of the INDUSTRY 4.0 concept with five attributes (IMAT – see fig. 1) of this implementation, was taken into account:
• (0, 0.333) - insignificant relational premise,
• (0.333, 0.667) - relatively significant relational premise,
• (0.667, 1.0) - a very important relational premise.

Table 4: Normalized fuzzy set for three variants of relational premises (low, medium and very significant) linking ten managerial conditions for the implementation of the INDUSTRY 4.0 concept with five attributes of this implementation

Type of relational premises	Fuzzy set				
	N_1	**N_2**	**N_3**	**N_4**	**N_5**
Premise insignificant	*0; 0,5*	*0; 0,0*	*0; 0,0*	*0; 0,0*	*0; 0,0*
	0,167; 1,0	*0,167; 0,5*	*0,167; 0,0*	*0,167; 0,0*	*0,167; 0,0*
	0,333; 0,5	*0,333; 1,0*	*0,333; 0,5*	*0,333; 0,0*	*0,333; 0,0*
Premise medium significant	*0,333; 0,5*	*0,333; 1,0*	*0,333; 0,5*	*0,333; 0,0*	*0,333; 0,0*
	0,5; 0,0	0,5; 0,5	0,5; 1,0	0,5; 0,5	0,5; 0,0
	0,333; 0,0	0,333; 0,0	0,333; 0,5	0,333; 1,0	0,333; 0,5
Premise very significant	0,333; 0,0	0,333; 0,0	0,333; 0,5	0,333; 1,0	0,333; 0,5
	0,167; 0,0	0,167; 0,0	0,167; 0,0	0,167; 0,5	0,167; 1,0
	1,0; 0,0	1,0; 0,0	1,0; 0,0	1,0; 0,0	1,0; 0,5

(source: own study based on: Kalkowska J., 2018)

Then, f_{sf} was introduced as an element of the fuzzy set s and m_{sf} as a membership function for the corresponding element of fuzzy sets presented in table 4 and the probabilities of the generalized evaluation of twelve experts were calculated (in two steps) as follows:

• Calculation of the average P_i probability score (where: i = 1, 2, 3) reflecting the frequency of selection made by the experts:

$$P_1 = \sum_{f=1}^{3} f_{1f} m_{1f} \quad P_2 = \sum_{f=3}^{5} f_{2f} m_{2f} \quad P_3 = \sum_{f=5}^{7} f_{3f} m_{3f}$$

• Calculation of $\mathbf{p_i}$ (where: i = 1, 2, 3) corresponds to the probability of significance of the relation:

$$p_i = P_i \Big/ \sum_{i=1}^{3} P_i$$

The results of the research, based on the fuzzy formula of inference and concerning the relational premises (AMRP – see fig. 1) linking the ten managerial conditions of the implementation (MECI – see fig. 1) of the INDUSTRY 4.0 concept with the five attributes (IMAT – see fig. 1) of this implementation are shown in Table 5.

Table 5: The results of the research: Numerical values of relational premises linking ten managerial conditions of implementation of the INDUSTRY 4.0 concept with five attributes of this implementation

	Cyber-computing of Processes	Information &Decision-making Inter-operability	Functionality & Product Reliability	Logistic Integration &Flexibility	Marketing Personalization	Quasi-Taxonomic Indicator
Excessive Investment Cost	0,833	0,833	0,583	0,714	0,714	3,7
Difficult Adjustment of the Business Model	0,500	0,833	0,714	0,583	0,500	3,1
Violation of Privacy, Freedom and Cultural Identity	0,833	0,500	0,583	0,583	0,714	3,2
Threats of Job Loss	0,833	0,500	0,583	0,583	0,583	3,1
Functional & Competence Redundancy of the IT Department	0,500	0,500	0,714	0,583	0,714	3,0
Threat of Cyber- attacks & Protection of Knowledge Resources	0,833	0,833	0,833	0,714	0,500	3,7
Reliability & Stability of Cyber-systems	0,714	0,833	0,833	0,714	0,500	3,6
Constantly Maintaining System Integrity Cyber-physical	0,500	0,833	0,833	0,583	0,714	3,5
Political Conditions of Professional Legislation	0,833	0,500	0,500	0,500	0,833	3,2
Legislative & Implementation Complexity of Standards and Certification of Requirements	0,583	0,500	0,500	0,714	0,714	3,0

(source: own study)

Conclusions

The expert study studies presented in this publication (see fig. 1 - scheme of the method of researching) using: PEST analysis, the brainstorming technique, the Delphi approach and the fuzzy formula of inference, led to the formulation of fifty relational managerial premises linking the macro-environmental conditions of the implementation (10MECI – see fig. 1) of the INDUSTRY 4.0 concept with five attributes (5IMAT – see fig. 1) of this implementation. Numerically expressed in the probability of significance of each of these relational premises can be the starting point for an unsupervised hierarchical classification of their structure. Discovering knowledge about this type of structure is quasi-taxonomic. In addition to its cognitive value, it can support managerial implementation decisions in industrial practice.

The research was conducted in the first half of 2020 using the eMeeting computer application. The source of research funding was the grant of the Faculty of Engineering Management at the Poznan University of Technology entitled: ""Management in Industry 4.0".

According to the criterion of the highest numerical probabilities of the significance of managerial relational premises (0.833 and 0.714 - see Table 5) five levels of the most important twenty-six management premises for the implementation of the INDUSTRY 4.0 concept can be distinguished. These levels were determined by preferring twenty-six most important managerial premises (out of a potential fifty). The basis for scheduling the above-mentioned five levels was the so-called Quasi-Taxonomic Indicator (see - Table 5). A quasi-taxonomy (5QTAX – see fig. 1) developed in this way (starting with the premises with the highest probability of significance) includes:

1) Level one (Quasi-Taxonomic Indicator 3.7), which includes:

    - Four relational premises linking the managerial problem of the threat of cyber-attacks and the protection of the company's knowledge resources with the following attributes of the INDUSTRY 4.0 concept: cyber-computerization of product manufacturing and operation processes, information and decision-making interoperability and autonomy of the mentioned processes, functionality and reliability of these processes and their integration and logistic flexibility.
    - Four relational premises linking the managerial problem of excessive investment costs of the implementation of the INDUSTRY 4.0 concept in the context of its two above-mentioned attributes: cyber-computerization of product manufacturing and operation processes, and information and decision-making interoperability and autonomy of these processes, as well as in the context of the following two implementation attributes: logistic integrity and flexibility of processes and their marketing personalization.
2) Level two (Quasi-Taxonomic Indicators 3.5 and 3.6), which includes:
    - Four relational premises linking the managerial problem of the difficulty of obtaining the reliability and stability of cyber-systems necessary for time-critical computer processing with the following attributes of the INDUSTRY 4.0 concept: cyber-computerization of product manufacturing and operation processes, information and decision-making interoperability and autonomy of the mentioned processes, functionality and the reliability of these processes and their integration and logistic flexibility.
    - Three relational premises linking the managerial problem of the need to constantly maintain the integrity of cyber-systems and processes of product manufacturing and operation with the following attributes of the INDUSTRY 4.0 concept: information and decision-making inter-operability and autonomy of product manufacturing and operation processes, functionality and reliability of these processes and their marketing personalization .
3) Level three (Quasi-Taxonomic Indicator 3.2), which includes:
    - Two relational premises linking the managerial problem of political determinants of professional legislation with regard to the implementation of the INDUSTRY 4.0 concept with its following attributes: cyber-computerization of product manufacturing and operation processes and their marketing personalization.
    - Two relational premises linking the managerial problem of social distrust in cyber-computer supervision over the threats of violating privacy, freedom and cultural identity. These relations mainly concern two attributes of the INDUSTRY 4.0 concept: cyber-computerization of the processes of production and operation of products and their marketing personalization.
4) Level four (Quasi-Taxonomic Indicator 3.1), which includes:

- Two relational premises linking the managerial problem of the difficult adaptation of the company's current business model to the requirements of the INDUSTRY 4.0 concept. These relations mainly concern two attributes of this concept: information and decision-making inter-operability and autonomy of the processes of production and operation of products, as well as the functionality and reliability of these processes.
- Two relational premises linking the managerial social problem of threats, in the context of the implementation of the INDUSTRY 4.0 concept, loss of jobs by people who previously performed work and coordination activities. These relations mainly concern the cyber-computerization of the processes of production and exploitation of products as well as the information and decision-making interoperability and autonomy of the mentioned processes.

5) The fifth level (Quasi-Taxonomic Indicator 3.0), which includes:
   - Two relational premises linking the managerial problem of legislative and implementation complexity of standards and certification of the implementation requirements of the INDUSTRY 4.0 concept. These relations mainly concern the integrity and logistic flexibility of the processes of production and operation of products as well as their marketing personalization.
   - Two relational premises linking the management problem of functional and competence redundancy of the corporate IT department in connection with the implementation of the INDUSTRY 4.0 concept. These relations mainly concern two attributes of this implementation: functionality and reliability of the processes of production and exploitation of products and their marketing personalization.

As part of the general conclusion it should be emphasized that the decision-making management problem regarding the premises for the implementation of the INDUSTRY 4.0 concept in an automotive industry enterprise is primarily related to the macro-environmental technological and organizational conditions.

Within twenty-six most important relations (the dominant relation and the significant relation) half of them (thirteen) belong to this range of premises for implementation. These conditions include the following three conditions:

- the threat of cyber-attacks and protection of the enterprises' knowledge resources,
- difficulty in obtaining the reliability and stability of cyber-systems necessary for time-critical computer processing,
- the need to constantly maintain the integrity of cyber-systems and product manufacturing and operation processes.

The six most important relations concern the premises for the implementation of the INDUSTRY 4.0 concept related to two macro-environmental economic conditions (excessive investment costs of implementation and the difficulty of adapting the enterprises' current business model to the requirements of the INDUSTRY 4.0 concept implementation).

The four most important reports concern the premises for the implementation of the INDUSTRY 4.0 concept related to two macro-environmental political and legal conditions (the problem of political conditions of professional legislation in the field of the implementation of the INDUSTRY 4.0 concept and the legislative and implementation complexity of standards and certification of this implementation).

The three most important accounts concern the premises for the implementation of the INDUSTRY 4.0 concept related to two macro-environmental socio-cultural conditions (lack of social trust in cyber-computer supervision over the threats of violating privacy, freedom and cultural identity and the risk of losing job by people who previously performed work and coordination activities) .

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A Study on the Methods of Planning, Organizing and Controlling Maintenance: A Case Study of Furniture Manufacturing Organization

Faris Saeed Alrowahi

Abu Dhabi School of Management, Abu Dhabi, UAE
adsm-213525@adsm.ac.ae

Dr. Muhammad Usman Tariq

Abu Dhabi School of Management, Abu Dhabi, UAE
Usmankazi100@gmail.com

Abstract

The preparation and organizing of task orders is the core of a well-functioning repair company. Many such structures ought to operate correctly to prepare and schedule for repairs. More notably, routine repair machinery reviews, professional files, such as inventory reports, job order background, and regular task schedules. Maintenance repair component stores will perform well. The preparation and organizing of task orders is the nucleus of a well-functioning maintenance company. Many other structures will function well with repair preparation and scheduling. Most notably, routine repair machinery checks, technological records, including supplies bills, job order background, and regular job plans. Maintenance repair parts stores will operate well. An inventory management framework for each organization is necessary to meet client necessities in a convenient and savvy way. The determination and execution of an inventory management framework for the management of each organization are significant. In this article, we will dissect the most utilized inventory management instruments and actualize the case management framework dependent on accurate information from furniture organizations. At last, we will contrast the inventory management framework executed and the current framework and get the outcomes.

Keywords: Maintenance, Operations Management, Operations Planning, Supply Methods.

Introduction

Organizations may imply any organization or corporation, or it may indicate the method of arranging anything (Posch & Garaus, 2019; Mohammadi et al. 2020). The maintenance manager needs to ensure that maintenance is performed correctly and keep everybody satisfied. To accomplish effective results, construction administrators will coordinate operations to their divisions to ensure they can fulfill customers' demands and goals. Only one person of one agency may hold repair organizations (Hartini et al. 2020). Weak management practices, such as job preparation, can result in lousy maintenance. To achieve their aim, maintenance managers are necessary to enforce the management role in departments. There are four management roles that schedule, coordinate, direct, and control. A successful organization is essential to ensure that workers function appropriately. Maintenance workers need to know what research has been accepted, which parts need come, and where parts are stored to maintain things going smoothly. It is necessary to monitor who served on repairs after the job (Seadon & Tookey, 2019).

Maintenance is a blend of both technological and administrative steps to preserve and rebuild it to the degree possible. Support is a work that repairs all aspects of the building and its contents according to the norm. Operation, rectification, and repair are different maintenance elements. Research is done daily or even on a day-to-day basis. Correction function typically happens early in the building and may reduce repair costs (Milana et al. 2017). Replacement testing is undertaken to rebuild objects or structures after a functional breakdown. Subdivides repair into two unplanned operating schemes. Anticipated maintenance involves scheduled preventive maintenance and anticipated corrective maintenance of different meanings. Scheduled preventive maintenance means work carried out to stop the deterioration of objects or equipment within the expected life of the installation when conducting planned corrective maintenance (Stephan & Athanassiadis, 2018). Support can be seen to have value for investment, and multiple maintenance programs may be

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enhanced by better supervision. Maintenance will at least be tested at reduced costs by requiring more cash if it is not held next (Kärkkäinen & Pirkkalainen, 2020).

Planning is the mechanism by which the planner plans about the future and steps to make the potential decision. At the preparation point, maintenance managers usually establish or schedule the company's goal to ensure the tenants' happiness. During the planning process, the Maintenance Manager will also plan to achieve the objective, such as to provide a minimum service for the tenant's property. According to the planning horizon, the development process may be split into three primary stages: Long-range, Medium-range, and Short-range preparation (Ngadiman et al. 2020).

Ventures that actualize improved anticipating frameworks to make the manufacturing arranging process progressively effective. Because of this errand's multifaceted nature, organizations decide an extraordinary unit to complete estimating undertakings utilizing factual programming frameworks. In this day and age, organizations contend intently and improve their procedures by making flexible chain management as productive as could reasonably be expected (Alfares & Ghaithan, 2019; Mikulskiene & Vedluga, 2019). The mechanical part needs to settle on anticipating choices, considering vulnerabilities that can influence generally speaking creation. For instance, a diminishing in advertises interest for a specific item over some time could without much of a stretch adjust the estimate. Getting ready for material prerequisites depends on choices to estimate conveyance groups varying for a restricted timeframe. On the off chance that the requirements are known over a period skyline, a static monetary-sized model can produce down to earth and ideal arrangements (Geunes, 2018). Organizations apply EOQ models to decide the practical request parcel's size to diminish requesting and holding costs. Likewise, the conservative production amount (EPQ) is utilized to limit the expense of setting up assembling, and completed items by deciding the size of the monetarily fabricated bunch (Cunha, et al. 2018).

Throughout the years, scientists have utilized various techniques to gauge the presentation of weighing strategies in different time arrangement dependent on the root mean square blunder (MSE), the heart says square mistake (RMSE), the mean total deviation (MAD), and the mean absolute error (MAE). It means a complete blunder in percentage (MAPE) (Murali, & Prabukarthi, 2020). As it may, every technique has its cutoff points and should be known to the client before gauging. This report comprises a contextual analysis of an arranged furniture producer.

Research Questions

- To investigate the more efficient inventory management model
- To examine the different methods of planning, organizing, and controlling the maintenance of the company.

Literature Review

Security building is an advantage that individuals choose to use for housing or jobs. It is necessary to repair the property and guarantee that the house's worth is not depreciated (Shaw et al. 2020). British guidelines (8210) describe a home as an asset that must be maintained not to devalue the property (Biswas & Sarker, 2020). As an owner or occupant, we have to understand that building is a valuable asset that we should keep in good shape to deter any damaging or failing impact (Frick et al. 2020). Any disruption to the structure will be achieved by repairs to prevent serious impact to the house. The minor harm would need less money than severe damage. The owner or renters will then call the repair firm to do construction work on their home (Li et al. 2020).

Maintenance preparation and Organizing are styles of management strategies that coordinate the maintenance staff. Development and planning is a systematic method of using operational tools to reduce productivity and time (Aljazzar & Gurtu, 2019). The repair program is thriving as attempts are taken to remove the source of loss of output due to the machinery's malfunction or to optimize machine performance. Richard also believes that proper management and preparation can accomplish the organization's target (Eybers & Mayet, 2020). The most effective approach to achieve this aim is to prepare appropriate scheduling and development. It can continue to minimize repair expenses when the research is planned (Winarso & Jufriyanto, 2020). Therefore, it would increase maintenance workers' usage by maintenance preparation and scheduling and reduce delays and interruptions. By employing the right techniques and designating professional employees, repair jobs' efficiency may be increased (Azizi, 2019). The standard of repair jobs can be provided by efficient preparation and Organizing by following the right approaches, processes, and appointing the most skilled workforces (Salehzadeh et al. 2020.; Shahbazi & Jönbrink, 2020).

It could be inferred that it is necessary to coordinate maintenance and ensure that maintenance work is completed correctly. Adequate preparation provides the safest and most productive support (Bokrantz et al. 2020). The construction manager appoints the contractor management or direct labor to perform repair service. Research completed by the contractor or direct worker shall be compensated by the maintenance manager, as defined in the contract signed by all parties (Abu et al. 2019). Maintenance research is performed based on preparation designed by the boss. The schedule's management comprises three simple program maintenance levels: long-range planning, medium-range planning, and short-range planning. Once the development has been developed, the activities performed are divided into different maintenance categories, including correction, preventive, and modificatory maintenance. To avoid building deterioration, proactive maintenance should be performed according to the plan. Minor service is usually offered either regular or monthly (Chiputyani, 2019). New activities will be conducted quarterly. The boss will check to ensure the job that has not been done in compliance with the contract due to the rework will take time. Finally, the repair manager is liable for maintaining information on the tenants' properties quickly to operate by repairing the contractor. Active contact also promoted cooperation between consumers and contractors as in the future, and they would need each other (Malik & Kim, 2020).

Yaghin & Darvishi (2020) conducted a study to find how vulnerabilities regarding weakness and absence of information or epistemic vulnerability can be displayed with requirements and fluffy coefficients. This paper proposed another fuzzy programming scientific model that offers a potential demonstrating approach that can be tried with a vehicle seat assembly device and contrasted with other fluffy programming numerical methodologies. The proposed model is valuable for deciding the essential production plan, necessities arranging, inventory, request accumulation, and limit levels for a specific production plan. This work's significant trait is the proposed model, which considers the vulnerabilities with the absence of information in the information and the dubiousness that exists all through the production arranging (Arani & Torabi, 2018). Even though the analysts were chipping away at these two kinds of vulnerability, nobody took a gander at them simultaneously (Das & Edalatpanah, 2020).

There is an" IVB (coordinated merchant purchaser)" framework in which the purchaser's interest rate was consistent, and the maker needed to deliver a similar inventory mentioned by the purchaser. In any case, this model isn't appropriate if the development cost of the producer's production is more noteworthy than the expense of the purchaser's organization (Koch, 2020). As it may, numerous analysts have assessed and created IVB frameworks to be ideal for a solitary provider and purchaser issue. Another model that incorporates crude material gracefully and assembling design is classified" IPP (Integrated Procurement-Production)," which is responsible for upgrading clump sizes for a reasonable conveyance production framework on schedule (Khemri et al. 2017).

There are ideal rules for cluster sizes and crude material requests for production frameworks with a conveyance framework at explicit stretches and on-demand. There was no recognition of the PPI framework thinking about the purchaser's structure amount and capacity costs. He proposed a request essential financial parcel size (JELS) for the maker's crude materials, production part, and application from the purchaser than IVB and IPP frameworks dependent on a coordinated inventory control model (Vicente et al. 2020; Marchi et al. 2020).

Since request determining is a fundamental arranging step, most organizations use PC supported estimating frameworks to make early conjectures and make assessment alterations in later stages. It was analyzed whether evaluative acclimations to anticipation make it increasingly proficient and improve precision. More than 60,000 gauge information was gathered from four organizations in the flexible chain. They found that the more significant changes brought about a more normal improvement in exactness than the littler changes. Moreover, positive alterations (upward modification of conjectures) were less viable in improving precision than negative changes (Bertram et al. 2019).

A contextual investigation was distributed about techniques for altering occasional interest for stock at a substantial vehicle parts vendor. The basic methodology has been created to recognize occasional modifications utilizing an added substance deterioration process that can bring about a noteworthy decrease in estimate blunders and interests in wellbeing activities (Petropoulos et al. 2019). The organization was not intrigued by the outline estimate mistakes found in experimental examinations. Notwithstanding, they dissected the impacts of occasional alterations on inventory execution. The creators assessed the worldwide MAD of conjecture mistakes at any dispersion place, and any reduction in the MAD would diminish interests in security activities without influencing client assistance (Djunaidi et al. 2019).

Methodology

Company Profile

Al Tawan Manufacture LLC is specialized in stylish, sleek, and fashionable furniture and heavy furniture. Our broad range of products with continuous innovation through R&D are office chairs, sofas, multifunctional seating solutions, auditorium seats, Airport Benches.

Al Tawan Furniture Manufacturing LLC also provides its consumers with a wide variety of options, including personalizing unique leather and PVC on chairs and sofas. Our consultants can also evaluate and provide the right choices if our clients have a case that requires custody.

The maker of the highest price managed chairs and sofas is Al Tawan Furniture Manufacturing LLC. The services and amenities include. Experienced Office of science and technology. Specialized Quality Control equipment. More than 200 employees. State of Art Inventory and Management. State of Art Engineering Manufacturing Zone. Whatever the work, we have the equipment, experience, and capacity to produce the goods on time. Our varied capabilities help us distribute products locally and globally. The organization has actualized a procedure arranged quality management framework dependent on the new DIN EN ISO 9001: 2000 norm. It offers ergonomic furniture for the "school of things to come," including adaptable and portable seats. The company works for 250 days a year.

Data Analysis

Time Distribution

The time between sending the request to the purchaser and accepting the Furniture Company store's material is two months. The two months are partitioned as follows.

- The first week covers rates negotiations and finalization of material details.
- The remaining time is allocated for
  - Purchase of raw material
  - Manufacturing
  - Quality Assurance
  - Clearances from Ports

Backup Keeping

There is always a backup of material to cater to urgent orders and incorporate customized demands of the clients even after their order has been received.

Inventory Framework

The company is using a pipeline system to keep up its inventory.

The included items will be

- Chairs for classrooms
- Chairs without armrest
- Chairs for the waiting area
- Revolving Chairs
- Front desks

The gauge was utilized as a contribution to these models. Various sorts of estimating strategies have been used, in particular, two weighted moving midpoints, three weighted moving midpoints, exponential smoothing, and double exponential smoothing. The last two techniques were built utilizing various estimations of the consistent smoothing α. The prognostic outcomes were assessed using regular exactness measures: MAD, MSE and

MAPE. The most exact strategy was relegated to every item dependent on exactness estimations. The aftereffects of the exactness assessment of every article are introduced as follows:

Safety Stock

The company will keep a 15% safety stock of total inventory.

Suggested Models

The following two models are developed.

- "Material Requirement Planning (MRP)
- Economic Order Quantity system (EOQ)"

Table 1:the accuracy measures for chairs without armrest.

Accuracy Measure/Method	Smoothing Constant	Double Exponential Smoothing	Exponential Smoothing	Weighted MA(3)	Weighted MA(2)
MAPE	Alpha (α) = 0.12	32.432	29.7	25.272	24.584
MAD	Beta (β) = 0.16	391.465	388.011	324.644	353.578
MSE		285141.746	320323.126	253638.732	304579.022
Accuracy Measure/Method	Smoothing Constant	Double Exponential Smoothing	Exponential Smoothing	Weighted MA(3)	Weighted MA(2)
MSE	Alpha (α) = 0.15	302051.428	320535.475	253638.732	304579.022
MAPE	Beta (β) = 0.15	36.391	31.541	25.272	24.584
MAD		403.6764	392.694	324.644	353.578
Accuracy Measure/Method	Smoothing Constant	Double Exponential Smoothing	Exponential Smoothing	Weighted MA(3)	Weighted MA(2)
MSE	Alpha (α) = 0.2	319158.8494	325571.985	253638.732	304579.0228
MAD	Beta (β) = 0.15	416.911	399.1	324.644	353.578
MAPE		38.083	33.269	25.272	24.584
Accuracy Measure/Method	Smoothing Constant	Double Exponential Smoothing	Exponential Smoothing	Weighted MA(3)	Weighted MA(2)
MSE	Alpha (α) = 0.3	354062.144	343327.759	253638.732	304579.0228
MAPE	Beta (β) = 0.15	41.5	36.64	25.272	24.584
MAD		444.685	417.505	324.644	324.644

Table 2:Current demand for Chairs without armrest

Component\Month	1	2	3	4	5	6	7	8	9	10	11
Chairs without an armrest steel frame	1242	1291	848	668	1830	734	2452	1262	1200	1000	878
Rear glide right	1242	1291	848	668	1830	734	2452	1262	1200	1000	878
Front glide right	1242	1291	848	668	1830	734	2452	1262	1200	1000	878
Front glide left	2484	2506	1696	1336	1830	1468	4904	2524	2400	2000	1756
Fixing rod right	1242	1291	848	668	1830	734	2452	1262	1200	1000	878
Fixing rod left	1242	1291	848	668	1830	734	2452	1262	1200	1000	878
Shell	1242	1291	848	668	1830	734	2452	1262	1200	1000	878

Forecast demand for Chairs without armrest will be determined through formula "((Demand for period 1) + (2*Demand for period two) + (3*Demand for period 3))/6"
EOQ Forecast
The formula for calculation holding cost is
H= Unit Price * 10.73%
Similarly, Q will be calculated through a formula.
Q*= ((2DS)/H)) ^0.5

Table 3: Forecast of EoQ

Annual				Setup	Unit Price		
Demand (D)	**Qty / Unit**	**Holding Cost**	**Material Description**	**Cost**	**(AED)**	**Q***	**Code**
11914	1	4.507	Chairs without armrest steel frame	137	42	851.109	SFG/
11914	1	0.258	Rear glide right	137	2	3560.44	PNA/0009
11914	1	0.258	Rear glide left	137	2	3560.44	PNA/0008
23829	2	0.251	Front glide	137	2	5099.37	PNA/0007
11914	1	0.172	Fixing rod right 5, 6	137	2	4360.64	PNA/0002
11914	1	0.172	Fixing rod left 5, 6	137	2	4360.64	PNA/0001
11914	1	7.311	Shell g5, 6	137	68	668.203	PNS/0001

MRP Calculations

Table 4: MRP Calculations

Month	Nov	Oct	Sep	Aug	July	Jun	May	Apr	Mar	Feb	Jan
Planned Deliveries	851	851	851	851	851	851	851	851	851	851	851
Net Requirements	1108	1108	1108	1108	1105	1113	1107	1080	1200	1000	878
Planned Order Release (EOQ)			851	851	851	851	851	851	851	851	851
Time Phased Net Requirements			1108	1108	1108	1108	1105	1113	1107	1080	1200
Ending Inventory	-2553	-2296	-2040	-1783	-1526	-1271	-1009	-754	-525	-176	-27

Model Analysis

The correlation makes it understood to the leader to pick the best model that guarantees better control of the inventory framework.

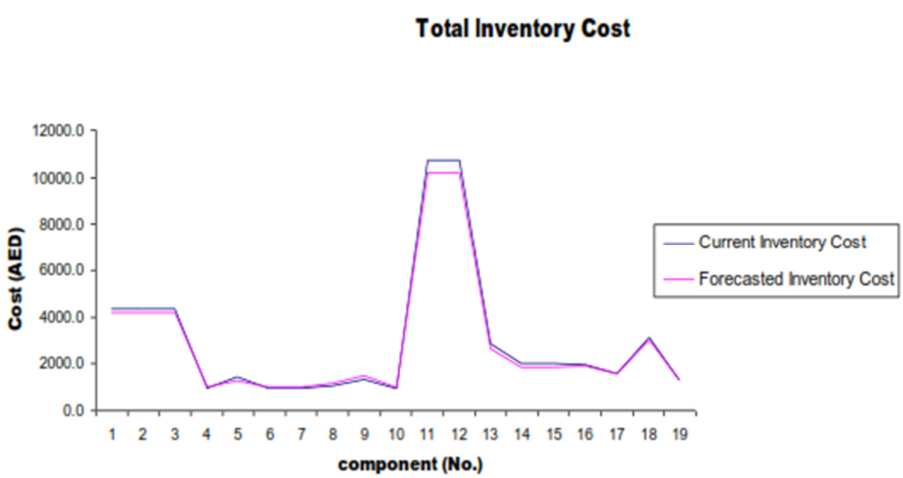

Figure 1: Total Inventory Cost through EOQ Model

"Current Cost = 57039.2 AED Forecasted Cost = 55154 AED Percentage Reduced = 3.3%"

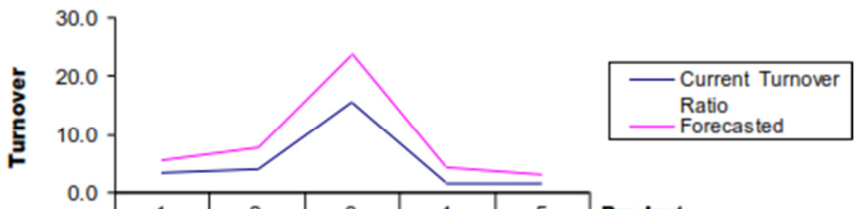

	1	2	3	4	5
Current Turnover Ratio	3.5	4.2	15.4	1.5	1.4
Forecasted Turnover Ratio	5.7	7.8	23.9	4.3	3.0

Figure 2:" Inventory Turn-Over of Products"

The turnover of every item was improved in the wake of diminishing the amount requested by executing the EOQ.

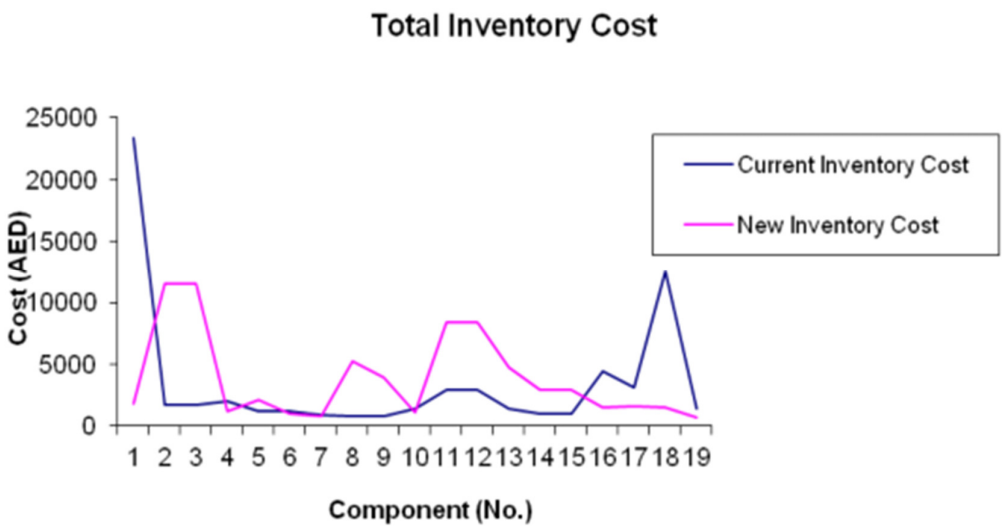

Figure 3: Total Inventory Cost through MRP Method

Current Cost = 57039.2 AED; Forecasted Cost = 71224 AED; Percentage Increased = 24.9%"

Reasonable inventory control affects any part of the company, from production costs to efficiently and timely order fulfillment. Unfortunately, resource accounting is a complicated corporate operation by hand. It takes time, and if ever makes a mistake, it can have consequences for months or years that negatively impact the company.

Minimize charges for housing

Every program for material control worth its salt will provide measurements of the essential quantity of economic order (EOQ). By comparing the costs of processing goods against shipping items, EOQ lets find the most cost-effective approach for buying new products. It can be achieved remotely through warehouse tracking tools to raise the warehousing costs and conserve capital.

Reduce Damages

Goods not delivered are simply liabilities to the business — have invested the money on the products now, so one can not reclaim the costs from selling the items. The program for inventory management helps reduce this possibility, as specific approaches provide a prediction. It involves monitoring the number of units sold and predicting the number of units would sell in the future. Also, for an automatic, computerized method, 100 percent prediction is not reliable. Having inventory tracking tools to measure you's details lso a lot more accurate than attempting to smash figures.

Enhance Product selection

Most stock control methods, as we have already described, provide analysis and automatic reorder protocols. It raises the likelihood that when consumers order something, one will have plenty of the commodity in store, which boosts customers' odds of discovering similar products (in scale, color, or other preferences).

Increase consistency of order

Many stock storage systems do provide inventory operations. It lets one retain a structured warehouse that eliminates the possibility of quickly moving fresh inventories into a random location, ignoring that they are there and losing control of the stock. It also lets warehouse workers select products with greater accuracy for consumer orders, ensuring that the company receives what they have requested.

Role of Operations

Attaining operational performance relies on management's willingness to recognize company goals, execute a strategic strategy, and promote the enterprise's approach. Assess the success of the market operations towards expected outcomes. Benchmarking and controlling the activities continuously reduce inefficiencies, such as raw material constraints, surplus supply, or inadequate workforce. For starters, one may assess the productivity of the manufacturing processes by tracking the activities against the output standards – from purchasing raw materials to the delivery of finished products, through controlling or running a small generating business. Some organizations delegate internal auditors and quality managers the task of managing the safety and performance of operations.

Operations area

Operations are the daily operations of the company that generate unique value and achieve core goals. Services perform distinctive functions that lead to the organization's overall performance. The Merriam-Webster dictionary defines an activity as "the execution of a realistic job or something that requires the practical implementation of concepts or procedures."

Resources

Resources are mainly the capital, workforce, machinery, and material components that are needed for growth. The managerial position helps to define and prepare the tools needed to achieve business objectives. The balancing of the capital and development goals would allow improving organizational performance. It is because one can control the operations' speed, efficiency, consistency, and versatility.

Efficiency

Ability implies the capacity to execute activities according to the appropriate levels of quality and quantity. Operations help to analyze and quantify resource’s technological and manufacturing ability. While it is a positive idea to have enough workers, one cannot afford to neglect such employees' ability to execute the tasks given to them—equally significant considerations such as expertise, technical knowledge, college backgrounds, and workplace abilities.

Production Output

Operational efficiency restricts production capacity and employee results, whether calculated in calls, orders filled or production units. Only when the company is responsive to the customers' needs and adaptable will achieve

excellent output efficiency. Consumer experience management operating processes are necessary to improve the client's orders and maximize production.

Recommendations

Focus on Growth – The business will strive to develop its operations, facilities, or goods incrementally. It involves changing the way one handle stuff on-the-go rather than making one-off improvements.
Creating a philosophy of change is the store staff, which is more frequently than not an authority in organizational practices rather than the managers. It will be everybody's duty in the organization (not just the operational management team) to change regularly.

Conclusion

In this article, we attempt to make an economic inventory management framework for a furniture producing organization in the wake of looking into a genuine contextual investigation. The proposed gauging strategy can create ideal inventory-related arrangements and can diminish requesting expenses and support costs. The EOQ and MRP determined for different segments recognized powerful cost investment funds for the anticipating procedure. Proper advancement strategies with probabilistic determining techniques might be helpful for future investigations.

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Public Procurement Fraud Occurrences: An Analysis of Fraud Triangle Elements Among Public Sector Officers in Malaysia

Nur Alia Fateha MOHD FAUDZI

Bank Kerjasama Rakyat, Menara 1, Menara Kembar Bank Rakyat, No 33,
Jalan Rakyat, KL Sentral, 50470 Kuala Lumpur
nuraliamohdfaudzi@gmail.com

Razana Juhaida JOHARI

Faculty of Accountancy, Universiti Teknologi MARA (UiTM) Shah Alam, 40450
Shah Alam, Selangor, Malaysia
Corresponding email: razana@uitm.edu.my

Sharifah Nazatul Faiza SYED MUSTAPHA NAZRI

Faculty of Accountancy, Universiti Teknologi MARA (UiTM) Shah Alam, 40450
Shah Alam, Selangor, Malaysia
shari744@uitm.edu.my

Abstract

Recently, the issues of procurement fraud involving public sector officials and prosecution actions that have been taken on these perpetrators officials have been widely reported by the news. Issues such as bribery and corruption in the public sector in Malaysia can be the principal concern, impacting the quality and performance of the entire procurement process and resulting in large-scale wasting of public funds. Therefore, this study is carried out to examine the determinants of public procurement fraud occurrences among public sector officers in Malaysia. The data were collected through the distribution of questionnaire to the 25 ministries in Malaysia government and being processed using Statistical Package for Social Science (SPSS) software version 25. The findings of this study revealed a significant positive effect of opportunity and rationalization on the procurement fraud occurrences. The findings provide meaningful information from both theoretical and practical aspects to be used by the government and administration sector, ministries and academia. Limitations of the study and recommendations for future researches are also discussed.

Keywords: Public Procurement, Procurement Fraud Occurrences, Pressure, Opportunity, Rationalization, Workplace Spirituality

Introduction

National Fraud Authority recognized procurement fraud as a complex problem as it covers a wide range of illegal activities from bid rigging during the pre-contract award phase through to false invoicing in the post-contract award phase. It can be perpetrated by those inside and outside an organization. It is claimed that bribery in public procurement remains a problem due to individuals or agencies mixing personal interest in delivering their work such as undocumented supplementary fees or bribes for public deals and favouritism of related companies and people when determining policies and contracts (Pricewaterhouse Coopers, 2018).

Therefore, public procurement is claimed to be among the government activities that is most vulnerable to corruption and covers a wide range of illegal activities (Bernama, 2017). The procurement fraud issues have prompted the public

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to review government's expenditure (Hui, Othman, Omar, Rahman, and Haron, 2011) and have led to public criticism on the public sector agencies. It is claimed that the officers are jeopardizing the interest of the society (Johari, Ida Rosnidah, Ahmad Nasfy and Sayed Hussin, 2020).

Auditor General's report has continuously revealed deceptive actions in Malaysia's public sector organizations that occurred in development project, equipment procurement and development project's failure. Buor (2019) noted that procurement fraud is due to the officer's lack of knowledge and misunderstanding of the rules and regulations relating to the procurement of project management transport services. From the auditor's work as being reported in the Auditor General Reports, there were many incidences where the public officials have failed to comply with procurement laws that should be followed by all the procurement officers. Earlier than that, a study conducted by Seng (2018) revealed that public sector officers are lacking in delivering their roles and responsibility to effectively discharge their function.

Therefore, by taking into account this issue, this current study is conducted to contribute to literature on the influence of fraud triangle elements that represent the individual factors of the public sector officers i.e. pressure, opportunity and rationalization, on the procurement fraud occurrences among the public sector officials in Malaysia. This study is expected to contribute to the Government of Malaysia with the knowledge in defining the factors that can contribute to corruption occurrences related to procurement fraud among Malaysian public sector officers. The Government may use the findings to enhance the current practices that might mitigate this type of corruption occurrences among Malaysian public sector officers as one of the strategic planning to combat this issue.

Literature Review and Hypothesis Development

Pressure and procurement fraud occurrences

Kassem and Higson (2012) defined pressure to commit fraud as "the source of heat for the fire" but they believed the presence of these pressures in someone's life does not mean he or she will commit fraud as there are other factors that contribute to it. However, Hui et al.'s (2011) study found that as a developing country, Malaysia has been subjected to considerable amount of pressure to agree on multilateral disciplines that limit the ability of domestic enterprises or crony to discrimination when allocating state contracts. Procurement fraud occurrences in government agencies involve corrupted public officials by tampering the tender processes and putting artificial pressure on other bidders in order to ensure their close friends or relative tender would secure the contract being awarded and benefit from it (Seng, 2018). This is the most often fraud that occurs to benefit the tender and public sector officials.

In Malaysia, bribery is the key source of government procurement programs, and political control is one factor that creates the opportunities for fraud (Othman, Shafie, Zakimi, and Hamid, 2014). In their study, they claimed that political and economic interests and power relations can also contribute to pressure from the procurement officer to deviate from the standards of transparency and accountability in procurement. Pressure imposed on public sector officer is high due to abuse of power, political interferences and personal needs; hence, pressure has been identified as a factor that can influence procurement fraud occurrences in the government and administration sector. Thus, from the above discussion, below hypothesis is developed:

H1: Pressure is positively significant in influencing the procurement fraud occurrences of Malaysian public sector officers.

Opportunity and procurement fraud occurrences

While there are thousands of ways to commit fraud, opportunity is one of the factors that contribute to procurement fraud occurrences in Malaysia. Kazemian, Said, Nia, and Vakilifard (2018) defined opportunity as an open door for solving a non-sharable problem in secret by violating a trust. Opportunity arises when the perpetrators sees a way to use their position of trust to solve the financial problem, knowing they are unlikely to be caught (Kassem and Higson, 2012). Fraud and corruption in Malaysian public procurement are associated with the opportunity and economic institutions in distributing public resources and it is highlighted in Azmi and Rahman (2015). Any loophole in the public procurement procedure creates an opportunity that can contribute to the procurement fraud occurrences in Malaysian public sector. While there are thousands of ways to perpetrate procurement fraud, Greer's example illustrates that opportunity is one of the drivers behind fraud (Albrecht, O., Albrecht and Zimbelman, 2016).

Previous studies have shown that opportunity to commit fraud, conceal it, or avoid being punished is one of the reasons people do fraud (e.g., Albrecht et al., 2016; Haron, Mohamed, Omar and Jomitin, 2013; Hui et al., 2011). There are at least six major factors that increase opportunities for individuals to commit fraud within an agency which are lack of supervision that prevents or detects fraudulent behaviour, inability to judge quality of performance during procuring, failure to discipline public officials, lack of access to information from procurer, ignorance, apathy and incapacity, and lack of audit trail (Albrecht et al., 2016) in procurement fraud occurrences.

This is in line with the studies from Seng (2018), Kazemian et al. (2018) and Jones (2013) where they mentioned that opportunity may generally be caused by the weaknesses in the internal control system such as lack of adequate needs assessment and market analysis, poor procurement planning and development specification, failure to oblige with the rules on procurement procedure, non-transparency and decentralization of notice public procurement, opaque evaluation and decision making and lack of external oversight mechanism. Thus, from the above discussion, below hypothesis is developed:

H1: Opportunity is positively significant in influencing the procurement fraud occurrences of Malaysian public sector officers

Rationalization and procurement fraud occurrences

Albrecht et al. (2016) found that most perpetrators rationalize the dishonest acts in order not to feel guilty and this same sort of rationalization often allows fraud occurrences. Usually, fraud involves lying to someone else and it will also involve fraud perpetrators to lie to themselves as what they are doing is justifiable. This is like whenever public procurement officials are involved with procurement fraud occurrences, they will rationalize by tricking themselves to do such act. Having rationalization with procurement fraud occurrences is like having a denial and unable to accept the reality of the occurrences.

Fraudulent activities that occurred in public procurement were also being influenced by rationalization of the officials in discharging their functions. A survey that was conducted by the Pricewaterhouse Coopers in 2018 revealed that 39% of the respondents agreed that rationalization is the third driver behind fraudulent activities after opportunities and pressures. This indicates that procurement fraud occurrences in the government and administration sector were inclined by the ability to rationalize or justify the public officials' action. The rationalization used by these officials is relevant and necessary to neutralize the view that the conduct was criminal or even improper.

In the government context, rationalization could happen when there is no procedure in place for punishment for fraudulent activities during extensive period or overriding of controls by management and officers on grounds of urgent need that makes public sector officers perform inferential judgement since they assume it is acceptable to do fraud as long as there is a solid reason behind it. Therefore, from the above discussion, below hypothesis is developed:

H1: Rationalization is positively significant in influencing the procurement fraud occurrences of Malaysian public sector officers

Research Methodology

Sampling and data collection

The target population chosen was the federal ministry in Malaysian public sector. As for the sample, based on the Ministry Website, there are a total of 300 public sector officers involved in the procurement process at 25 ministries in the federal level of Malaysia's government. Based on the formula proposed by Tabachnick and Fidell (2007) and the three independent variables used in this study, the required minimum number of sample size amounted to 82 respondents. Particularly, the total respondents for this study are 157 public sector officers which are more than the required minimum sample size for this study.

The questionnaire was sent to the head of division of each ministry through e-mail by using Google Doc application and hardcopy as well. Three weeks after the initial sending through the e-mail and hardcopy, a follow-up was made through phone call and reminder emails were also sent to each head of division in the ministries. From the 300 questionnaires sent out, 157 respondents replied that represented a response rate of 52.3 per cent. After the data cleaning process, all the responses were fit and used in this study.

Measurement of variables

This study used eight items to measure procurement fraud occurrences, pressure and opportunity while for rationalization used four items. The items of the variables were adapted from several authors such as Hui et al. (2011), Said et al. (2017) and Kassem and Higson (2012). All the variables under study used a five-point Likert-type rating scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Findings and Discussions

Demographic Information

Demographic information is the descriptive data which is used to explain the characteristics of the sample. In the last section of the questionnaire, the respondents were asked about their demographic information which includes gender, race, age, highest academic qualification, job position, job function, grade and working experience with current position. 157 out of 300 respondents have completed the survey. 50.3% of the respondents or 79 out of 157 respondents were female while another 78 respondents were male. For age group, the major respondents who filled in this survey fell in the category of 31 to 40 years old which comprised of 59.9% from the total respondents and the lowest percentage comes from age 51 years and above with only 1.9%. For highest academic qualification, majority of the respondents have acquired at least a bachelor's degree which comprises of 45.9% while the remaining comes from SPM, Master, Diploma and STPM level with 22.9%, 14%, 11.5% and 5.7% respectively. Meanwhile, for job position, majority of the respondents were in management and professional position with 55.4% or 87 respondents whereby they were responsible in managing and making decision for their departments.

For the job function in the organization, 59.9% or 94 respondents come from the administrative department, 14.6% or 23 respondents from others function involved in procurement, 13.4% or 21 respondents from accounting and finance department, 10.2% or 16 respondent's development and infrastructure and the rest 1.9% or 3 respondents from law and enforcement. The last questions were about the respondent's working experience with current position. About 33.7% of the respondents have been working for more than 5 years in their current position while 23.6% of the respondents have been working between 11 to 15 years. 22.9% of the respondents have indicated that they served in their current position for less than 3 years. From the analysis on the respondent's profile of this study, it indicated that the respondents have much experience in relation to the public sector procurement process; thus, they are able to provide valid responses on corruption occurrences in Malaysian public sector.

Descriptive Analysis

Referring to the table 1, the highest mean score for procurement fraud occurrences was question PFO3 with a mean of 3.36 and standard deviation which equaled to 1.057 while the lowest mean score was question PFO5 with a mean

score of 2.41 and standard deviation of 1.068. This indicates that the respondents for this study agreed that there were several situations of procurement fraud that happened in the ministries or departments. Most respondents agreed that officials received gifts from their contractors. Nevertheless, they appear to believe that invoices have been received, but the goods or services have not been made.

Table 1: Descriptive Statistics on Procurement Fraud Occurrences

Questions	N	Minimum	Maximum	Mean	SD
PFO1	157	1.00	5.00	4.5361	.62854
PFO2	157	1.00	5.00	4.0773	.46561
PFO3	157	1.00	5.00	4.2887	.52815
PFO4	157	1.00	5.00	4.2577	.54399
PFO5	157	1.00	5.00	4.5412	.60297
PFO6	157	1.00	5.00	4.2629	.65812
PFO7	157	1.00	5.00	4.1289	.80084
PFO8	157	1.00	5.00	4.0670	.80840

Normality Test

In this study, skewness and kurtosis tests were used as indicators to test the assumption of normal distribution. The results in this study showed that skewness and kurtosis values for all the variables were in the range of -1.112 to 1.674 (Table 2). The values of skewness and kurtosis in the range of -2 to +2 are considered as normal distribution. This indicates that the mean scores for procurement fraud occurrences, pressure, opportunity, and rationalization were normally distributed.

Table 2: Normality test of sample distribution

Variables	N Statistic	Skewness Statistic	Kurtosis Statistic
Procurement Fraud Occurrences	157	-0.182	0.023
Pressure	157	-1.271	1.674
Opportunity	157	-0.690	-0.686
Rationalization	157	-0.470	-1.040

Validity Test

In order to test the validity of the instrument, this study uses factor analysis method. Based on the results of factor analysis, all variables show the value of Kaiser-Meyer Olkin is greater than .6, in which the minimum requirement needed for the data to be considered as fit for further analysis. Hence, all variables were adequate to be used in this study.

Table 3: Factor Analysis

	Procurement Fraud Occurrences	Pressure	Opportunity	Rationalization
KMO Measure of Sampling Adequacy	0.787	.746	.769	.706
Barlett's Test of Sphericity -Approx. Chi-Square	457.585	648.872	742.226	367.182
Sig	.000	.000	.000	.000

Reliability Test

The Cronbach's alpha value is used to test the reliability of the instrument used in this study for the purpose of this study. The reliability of the data is shown in Table 4. The Cronbach's alpha for procurement fraud occurrences was 0.835 while pressure was 0.851, opportunity was 0.755, and rationalization was 0.810. From the table above, most of the variables contributed positively to overall reliability since all the Cronbach's alpha was higher than 0.70.

Table 4*: Reliability test*

Variable	Number of Items	Cronbach's alpha value
Procurement Fraud Occurrences	8	0.835
Pressure	8	0.851
Opportunity	8	0.755
Rationalization	4	0.810

Correlation Analysis

Table 5 presents the correlation between procurement fraud occurrences with pressure, opportunity, rationalization and workplace spirituality. The Pearson correlation showed that there was moderate relationship between pressure and procurement fraud occurrences since Pearson correlation score was at 0.402 and significant at 0.000 (less than 0.01 levels). The correlation between opportunity and procurement fraud occurrences showed a strong relationship since Pearson correlation score was at 0.536 and significant at 0.000 (less than 0.01). In addition, the correlation between rationalization and procurement fraud occurrences also showed a strong relationship since Pearson correlation score was 0.529 and significant at 0.000 (less than 0.01 levels).

Table 5: Pearson' Correlation

Variables	PFO	P	O	R
Procurement Fraud Occurrences (PFO)	1			
Pressures (P)	0.402**	1		
	0.000			
Opportunity (O)	0.536**	0.451**	1	
	0.000	0.000		
Rationalization (R)	0.529**	0.587**	0.563**	1
	0.000	0.000	0.000	

**Correlation is significant at 0.05 level (2-tailed)*
***Correlation is significant at 0.01 level (2-tailed)*

Multi-Collinearity Analysis

Table 6 below shows that all independent variables were below 10 when the VIF was between 1.091 and 1.920. This highlighted that the variables were suited to predict the independent variables and the variables were not biased. Besides, we can see that the tolerance for all independent variables fell within the range of 0.2 and 0.9 since the table above shows that tolerance values for variables in this study were from 0.521 to 0.916. This indicates that there is no potential problem of multi-collinearity in these variables. It can be simplified that this study is in a good motion as the model has good fit. Thus, the study may proceed to run multiple regression test.

Table 6: Multicollinearity Analysis

Variables	VIF	Tolerance (1/VIF)
Pressure	1.582	0.632
Opportunity	1.517	0.659
Rationalization	1.920	0.521

Multiple Regression Analysis

Table 7 reveals the overall analysis for this study. The R^2 value was at 0.389 and it indicated that 38.9 per cent of the procurement fraud occurrences were explained by pressure, opportunity, and rationalization in Malaysian public sector. The R^2 adjusted compares the explanatory power of regression models that contain different number of predictors. Considering the sample size and number of independent variables, the adjusted R^2 indicated that 37.3 per cent of the variations in procurement fraud occurrences were explained by the variations in pressure, opportunity, rationalization and workplace spirituality.

Meanwhile, pressure variable suggested a positive relationship with procurement fraud occurrences. However, the pressure's p-value was at 0.263 which was more than 0.05 with t= 1.124. Therefore, H1 was not supported since there was no significant relationship between pressure and procurement fraud occurrences. The second variable of opportunity indicated a significant positive relationship with procurement fraud occurrences since the p-value for opportunity was at 0.000 which was lesser than 0.05 with t= 4.162. Thus, H2 was supported. Finally, there was also a significant positive relationship between rationalization and procurement fraud occurrences with t= 3.838 and p-value at 0.000 which was less than 0.05. As a result, H3 was supported.

Table 7: Regression Analysis

Model	Standardize Coefficient (Beta)	Std. Error	t-statistic	Sig.
(Constant)			4.511	0.000
Pressure	0.090	0.299	1.124	0.263
Opportunity	0.325	0.080	4.162	0.000*
Rationalization	0.337	0.088	3.838	0.000*
	R = .624a R^2 = .389 Adjusted R^2 = .373 F-statistic (p-value) = 24.217 (0.000) *Significance at $p < 0.05$			

Discussion of Findings

This study was conducted to examine the relationships between pressure, opportunity, and rationalization with procurement fraud occurrences among the Malaysian public sector officers. From this study, majority of the respondents are working in the service with grade 41 and above, in which they are responsible in making decision in their organization. For academic qualifications, most of the respondents are degree holders that indicate 45.9 per cent. In terms of experience in working as public servant and being involved in the procurement process, most of the respondents (59.9 %) are doing administrative work on procurement process. This indicates that their experience in public procurement process could help them in answering the questionnaire of this study.

Hypothesis H1 anticipates a positive significant relationship between pressure and procurement fraud occurrences among Malaysian public sector officers. From the analysis conducted, it is found that pressure does not have a significant relationship with procurement fraud occurrences. This indicates that pressure has no influence on procurement fraud occurrences among the public sector officers in Malaysia. This finding is not consistent with previous studies conducted by Matthew et al. (2013) and Rustiarini (2019) as their results showed that pressure does influence an individual to commit fraud. Their findings agreed with Kazemian et al. (2018) on the fact that pressure

is imposed to an individual to commit procurement fraud and/or corruption which can be resulted out of financial need, emotional, or job performance.

However, the result of this current study is consistent with previous study conducted in Malaysia, by Said et al. (2017) who found that the existence of pressure does not influence the public sector officers to commit fraud. This finding also supports previous studies that have been conducted by Aprilia (2017), Faradiza (2017) and Handayani, (2018) which showed external pressure does not influence an individual to commit financial fraud. In addition, this current finding can also be used to decline the perception that public sector officers are being pressured by political power as what has been found in (Othman et al., 2014).

The second hypothesis, H2, examined the positive significant relationship between opportunity and procurement fraud occurrences among Malaysian public sector officers. From the analysis, it is found that opportunity has significant positive relationship with procurement fraud occurrences. Therefore, it is established that the existence of opportunities in Malaysian public sector administration is able to influence procurement fraud occurrences. This finding is consistent with the previous study by Kassem and Higson (2012) as they claimed that higher opportunities existed in an organization resulted to higher risk of procurement fraud occurrences. Nevertheless, the finding from a study by (Othman et al., 2015) was also in line with this finding and this explains that lack of control that prevents and/or detects fraudulent behaviour, inability to judge quality of performance and lack of audit trail could influence public sector officials to be involved in procurement fraud occurrences. Lack of implementation in procurement process and procedure could also contribute towards procurement fraud occurrences which is considered as an opportunity to commit fraud (Ismail et al., 2018). All of these are stimulants in opportunity that could influence public sector officials in Malaysia to be involved with procurement fraud occurrences.

The third hypothesis, H3, examines the positive significant relationship between rationalization and procurement fraud occurrences among Malaysian public sector officers. From the analysis, it is found that rationalization has significant positive relationship with procurement fraud occurrences. This finding shows that an individual with high rationalization or an individual who has the ability to rationalize or justify his or her fraudulent behaviour could influence them to be involved in procurement fraud occurrences. A study conducted by Association of Certified Fraud Examiners (2014) and Said, Alam, Karim and Johari (2018) could be used to justify this finding as it is claimed that a person with the ability to reinterpret or justify his or her wrongdoings and fraudulent actions as morally accepted would sometimes claim it as if he or she is the victim of the situation.

Conclusion

This study proves the significant relationship between opportunity and rationalization on procurement fraud occurrences among the Malaysian public sector officers. Thus, the results of this study could give a better understanding of Malaysian public sector in understanding the individual factors that can contribute towards procurement fraud occurrences. From the discussion on the above findings, it can be concluded that two elements of fraud triangle theory, i.e. opportunity and rationalization, are able to support previous empirical studies as two significant factors that could influence the public sector officials to participate in procurement fraud occurrences. However, it is not so for the element of pressure. In this sense, the Malaysian public sector should be able to explore the fundamental causes of the problem and be able to define the policies of an individual's conduct in the battle procurement fraud occurrences. In the meantime, this report will lead to strengthening the procurement process and preventing fraud occurrences.

Nevertheless, this study is carried out with certain limitation that could provide for future research to be conducted. This study only examined three variables in assessing procurement fraud occurrences in public sector which are pressure, opportunity and rationalization. Meanwhile, in the real world, procurement fraud occurrences in public sector could be affected by other related variables such as managerial performance, leadership quality, and social factor of officers like knowledge of the officer etc.

Future studies should take these factors into account to determine the most influential factor on procurement fraud occurrences and the factors should be narrowed down more specifically to cover more aspects of procurement fraud. In addition, future study could apply the most relevant and suitable theory that can best explain procurement fraud occurrences in the context of Malaysian public sector. Nowadays, the theory of fraud triangle has been turned into diamonds, hexagonal and more due to other factors that significantly influence fraud occurrences such as what has

been proven in this study through the element of workplace spirituality. The potential study is therefore welcome to explore the latest model, the scope and new areas of procurement fraud that could improve and cover the area of study accurately.

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Percepción Ciudadana Sobre La Vigilancia Estatal Bajo La Pandemia Covid-19 En La Ciudad De Bogotá

Andersson Hernando LIZARAZO GUERRERO

Corporación Universitaria Minuto de Dios, Bogotá Colombia,
alizarazogu@uniminuto.edu.co

John Fredy SÁNCHEZ MOJICA

Corporación Universitaria Minuto de Dios, Bogotá Colombia,
John.sanchez@uniminuto.edu.co

Abstract

El presente documento hace referencia a los resultados iniciales de una investigación sobre las practicas ciudadanas y la vigilancia estatal en la ciudad de Bogotá durante los meses de marzo a octubre del año 2020. Para el propósito de una investigación de corto plazo y en un proceso cambiante e incierto como el que se presenta bajo la pandemia se utilizó una metodología mixta de investigación, la cual permitió mayor flexibilidad desde sus técnicas su validación. Específicamente para este texto, se toma como fuente la primera fase de la encuesta de percepción realizada a un total de 325 personas de la ciudad de Bogotá. En este sentido se evidenció un incremento constante, en los meses abordados, de las medidas de la legitimación de la fuerza policiva y el uso del miedo para buscar su acatamiento, así mismo mientras las medidas crecían también se incrementaba el descontento ciudadano el cual propicio una cada vez más lejana corresponsabilidad ciudadanía – Estado, la cual desde reflexiones científicas es la opción más eficaz para el control de la pandemia.

Palabras clave: Vigilancia Estatal, Control Social, Prácticas Ciudadanas, COVID-19, Bogotá.

Introducción

El año 2020 se encontró con una difícil situación a nivel mundial, el avance de una pandemia nacida en China pero que rápidamente recorrió un mundo hiperconectado. Ante esta difícil situación, cientos de países se encontraron en cuarentena, Colombia y su ciudad más importante Bogotá no estuvo exenta de estas particularidades, la cual se sumió en una serie de medidas estatales para confinar a las personas en sus hogares bajo el lema "quédate en casa". Muchas de estas medidas fueron celebradas por la ciudadanía, la población necesitaba del estado y exigía medidas drásticas para mitigar el avance del virus.

Es en ese panorama en que nace la investigación que de su primera fase espera entregar resultados para este documento, la cual pretende indagar por ¿Cuáles fueron las prácticas ciudadanas que se presentaron durante la cuarenta por el virus COVID-19 en la ciudad de Bogotá y que enseñanza pueden dejar en cuanto a las estrategias de vigilancia estatal o empoderamiento ciudadano?

De este modo, este documento estará estructurado de la siguiente forma, en un primer momento se describirán brevemente la metodología y se detallarán los instrumentos y técnicas relevantes utilizados para los propósitos de este texto. Luego, se reflexionará en la discusión desde la revisión bibliográfica sobre el tema y su relación con la situación objetivo. En seguida, se entregará una reflexión sobre los resultados obtenidos desde la óptica particular de los propósitos específicos de este documento, para, por último, conferir una suerte de conclusiones.

Metodología

El proyecto al ser una investigación de corto alcance y en vista de las particularidades mismas de la pandemia para la obtención de las muestras, la validez de los resultados, lo contingente de la situación, el cambio constante de las

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medidas y el avance imprevisible en muchos casos de las dinámicas a analizar, se plantea que metodológicamente la mejor apuesta está relacionada con un modelo de investigación mixta que en palabras de Tashakkori y Teddlie (2003) genera una tercera fuerza dentro de los paradigmas de la investigación, puesto que existe una mejor comprensión del objetivo de estudio desde la combinación de paradigmas, así mismo, se referencia la relevancia de la triangulación que traen este tipo de metodologías para la investigación y el desarrollo del conocimiento, dota de solidez y robustez a las investigaciones.

De este modo, la investigación basó sus análisis desde una metodología mixta específicamente un modelo de estatus dominante que en palabras de Johnson y Onwuegbuzie (2004), Onwuegbuzie y Leech (2006), propende por la concordancia entre metodología y objetivos de la investigación, en donde según los intereses del proponente y las necesidades de la investigación se prioriza uno de los enfoques el cuantitativo o el cualitativo, siendo así, esta investigación estará regida metodológicamente por un modelo cualitativo con tintes cuantitativos que la dotaran de solidez, en palabras de Bericat (1998), se propenderá por la complementariedad y la triangulación en el análisis de los resultados, esto indica que existen instrumentos pensados para objetivos determinados de la investigación, pero también resulta que para las conclusiones generales se trianguló la información recabada desde las diversas técnicas o instrumentos utilizados.

Siendo así, la metodología se expuso en 4 fases de implementación de la investigación:

1. Diseño de la implementación investigativa. Revisión bibliográfica extensa sobre las temáticas o categorías principales de la investigación, se realizó una base de datos para compilar la información con la cual se nutrió los marcos conceptuales que guiaron la investigación pero que al mismo tiempo resultaran faros para el presente documento. Así mismo en esta fase se formularon los formatos de recolección de información y su postulación a pares evaluadores para su respectiva validación.
2. Revisión documental en dos aspectos; en primera medida sobre los marcos normativos en cuanto a las medidas estatales determinadas a nivel nacional y a nivel distrital para la contención de la pandemia, se revisaron solo aquellas que estaban relacionados con unas categorías específicas y con antelación escogidas a partir del análisis documental y la revisión empírica de la situación, estas categorías fueron: vigilancia estatal y control social – Prácticas ciudadanas - Solidaridad. Los resultados del análisis de los documentos normativos se consignaron en una matriz de retención documental normativa. Esta resultará de vital importancia para este documento ya que muchos de los análisis y las reflexiones en este escrito estarán derivadas de este análisis documental.
3. Implementación de los instrumentos de recolección encuestas (385) y entrevistas (10) a ciudadanos de la ciudad de Bogotá.
4. Proceso de análisis de la información, puesto que desde su triangulación se espera entregar una propuesta, que pueda servir como base para la implementación de políticas públicas en relación a la temática de la investigación.

A continuación, la tabla No. 1 resume los instrumentos utilizados, su alcance y los objetivos a los que está determinado cada uno de las técnicas de recolección de información, a partir de esta tabla se puede visualizar la trazabilidad operativa de los instrumentos dentro de la investigación.

Tabla 1: Instrumentos de investigación. Fuente: elaboración propia

Instrumento	Muestra	Objetivo
Matriz de retención bibliográfica	40 títulos en la base de datos	Implementación teórico – conceptual
Matriz de retención normativa	50 títulos	Evaluar las estrategias de vigilancia estatal y el empoderamiento ciudadano en las prácticas de la población de la ciudad de Bogotá durante la cuarentena por el COVID – 19.
Encuestas a ciudadanía	(No 385) Habitantes Bogotá 7.181.469 Nivel de confianza 95% Margen de error 5% Muestra 385	Caracterizar las prácticas ciudadanas que expresaron los habitantes de Bogotá durante la cuarentena por la pandemia COVID-19.

Entrevistas	10	Instrumento puente para la triangulación y de este modo Interpretar las prácticas ciudadanas que se presentaron durante la cuarenta por el virus COVID-19 en la ciudad de Bogotá y las enseñanzas que dichas prácticas pueden generar en cuanto a las estrategias de vigilancia estatal o empoderamiento ciudadano

Vigilancia Estatal Y Control Social (Discusión)

Simone Veil (citado por Surian, 2020) hace noventa años advirtió que cuando reinan de manera universal las nociones de nación, seguridad, orden y autoridad, ya no tiene que ver con responder a situaciones particulares, sino que se trata de promover ideales que favorecen la construcción de una cultura de guerra. Por ello es muy importante reflexionar con respecto al discurso estatal que ha surgido ante esta emergencia sanitaria, que tienen que ver con estas nociones, donde incluso Emmanuel Macron, el presidente de Francia, ha indicado explícitamente que "estamos en guerra" "es una guerra sanitaria".

En coherencia con estos discursos, se ha dado una rápida militarización de la pandemia, lo que masifica una reacción de miedo paralizante y promueve el apoyo social a otras agresiones (Gil, 2020). Sin embargo, no es la única manera que se ha puesto en juego para enfrentar la pandemia, por ejemplo, se ha dado una paradoja entre lo público y lo privado, es así como el poder público promueve estrategias como la de *#quedateencasa* en la que se promueve un discurso de territorialización y del estado de sitio; simbólicamente esto tiene unos efectos de fractura, dado que se empiezan a relacionar los espacios privados como seguros, mientras que los públicos se ven como inseguros e ilegítimos (Surian, 2020). "Esto lleva a traducir la medida de precaución "mantenerse alejado el uno del otro" en lugar de una comprensión profunda de las responsabilidades individuales y colectivas en las relaciones cotidianas– en miradas policiales hacia el espacio público" (Surian, 2020, p.3).

En Latinoamérica, ante el virus "el militarismo crece en la región como espectro que vuelve a proyectarse sobre las sociedades, las resistencias y los grupos más oprimidos" (Vommaro, 2020, p.3). Se instauraron en primera medida los estados de sitio antes que medidas preventivas o de fortalecimiento a la salud pública; lo cual es una estrategia altamente cuestionable, dado que antes de que el virus llegara a la región se estaban desarrollando diversas movilizaciones y manifestaciones callejeras contra los gobiernos y sus políticas. De esta manera, la militarización, con excusa del virus, ha servido para disipar estas expresiones y resistencias sociales; a modo de ejemplo, está el gobierno chileno que dirigió más recursos al reequipamiento de los carabineros (con fines represivos) en vez de al sistema de salud (Vommaro, 2020).

Para Blanco, Gomà y Nel·lo (2020), se han presentado principalmente dos escenarios ante esta pandemia: por un lado, el de los poderes estatales fuertes, con un discurso predominante de protección y seguridad, en el que se presenta rechazo a la diversidad y el cierre de fronteras, aquí se da un fortalecimiento de los autoritarismos, el declive de los derechos individuales y sociales, así como el debilitamiento de la confianza social. Por otro lado, se da la posibilidad a un escenario más alentador de solidaridad, en el que se da cuenta de la importancia de un Estado de Bienestar, donde los servicios públicos son bienes comunes, se cuestiona nuestra relación con el medio ambiente, se promueven y distribuyen equitativamente los cuidados.

La vigilancia y el control por parte de los estados hacia sus ciudadanos ha sido un tema de análisis recurrente por parte de diversas disciplinas sociales, que toma mayor relevancia en medio de esta pandemia y que requiere de una mayor reflexión, puesto que como lo señala Sánchez (2020) "los estados en esta pandemia han tenido el poder de limitar los derechos individuales en defensa de la salud colectiva" (p.117), a través de diversas estrategias policivas. Estas medidas pueden llegar a ser de control extremo, lo que pone en conflicto la protección de la salud y la privacidad de las personas (Surian, 2020).

Las ciencias sociales se han interesado constantemente en el asunto, por lo cual, realizar un rastreo de estado del arte sobre este se hace una tarea bastante compleja. En este sentido, para los propósitos de la investigación el análisis se basará en dos tipos de fuentes; primero, se indagarán aportes de tesis de maestrías y doctorados en los repositorios institucionales de las universidades nacionales, luego se consultarán los análisis investigativos más relevantes a nivel mundial sobre la temática.

Siendo así, con relación a la indagación de los repositorios se encuentra que, existe un amplio repertorio de investigaciones en torno a la vigilancia y la biopolitica del cuerpo, se hallaron varios estudios desde diversas disciplinas como la pedagogía, la sociología, la psicología, etc., que dan cuenta de reflexiones de la vigilancia y el control de los cuerpos en las sociedades, ejemplos de este tipo de reflexiones las encontramos en Melo (2018), Carniglia (2015) y Tarantino (2017). En este tipo de reflexiones se privilegia el análisis de la vigilancia estatal y el control que se ejerce desde el poder gubernamental en la concepción, configuración, reconfiguración, dominio, entre otros del cuerpo de los ciudadanos.

La dimensión biopolítica y de vigilancia por parte del Estado se ha visibilizado notablemente ante el COVID-19, lo cual puede favorecer el autoritarismo. Surian (2020) menciona como estas dimensiones se evidencian en algunas acciones recientes de los Estados que se justifican como maneras válidas para hacer frente a la emergencia sanitaria, por ejemplo, se encuentra la georreferenciación, en la que se realiza un control y vigilancia de la movilidad de los ciudadanos a través de la ubicación de sus celulares; y el reconocimiento biométrico, en el que se reconoce a las personas por características únicas como la huella digital. Estas estrategias pueden ser sumamente peligrosas si se mantienen en el tiempo, son las bases para ejercer un régimen totalitario basado en la vigilancia continua de su población, la cual ya no tendría privacidad (Surian, 2020)

Por otro lado, se encuentran investigaciones que dan cuenta de estudios sobre el control de las sociedades en general y del papel de las políticas públicas en el control y la vigilancia estatal. Reflexiones como las de: Cabanso (2013), Pinzón (2000), Chaparro y Galindo (2009), Gacharna (2014), Huertas y Villa (2006) dan cuenta de estudios sobre las dinámicas propias de los Estados nacionales y su relación con la población.

Estos son estudios que dan cuenta de la interrelación del Estado con sus ciudadanos a partir de los entes de control, por un lado, desde las investigaciones constitucionales o del derecho, o desde los dispositivos de control y vigilancia creados para tales efectos como los son las reflexiones desde la sociología, la historia, la antropología o las mismas ciencias de la salud.

Son proyectos investigativos que como se evidencia desde diversos enfoques disciplinares dan cuenta de análisis del papel del gubernamental como fuente de control y vigilancia de la sociedad y se analizan estas prácticas, desde sus causas hasta sus consecuencias, lo cual resulta de vital importancia para los propósitos investigativos del presente proyecto, puesto que son investigaciones que dan evidencian de la puesta en marcha en muchos casos de la política pública en pro de la vigilancia y el control estatal sobre las poblaciones de un determinado territorio.

En el caso particular del presente proyecto, se intentará dilucidar las practicas subyacentes a las políticas emprendidas bajo la pandemia COVID -19 y el control gubernamental derivado de ellas. También es interesante el análisis histórico del papel del Estado en diversos contextos de contingencia que se hace en algunas de estas reflexiones para determinar así una ruta de análisis y un marco referente para la presente investigación.

En cuanto a las investigaciones relevantes a nivel mundial, podemos encontrar dos visiones importantes en cuanto a la temática, por un lado, se encuentran los análisis que determinan un mayor control estatal desde lo que se denomina vigilancia estatal, o lo que se ha venido denominando el pensamiento acerca de la vigilancia contemporánea anglosajona: David Lyon (1999), Mark Poster (1987) y Reg Whitaker (1999). En ellos subyace la pregunta acerca de si la vigilancia contemporánea constituye una intensificación, un quiebre o una simple continuación de lo que desarrolló Foucault. En la medida en que el fenómeno de la vigilancia más palpable hoy en día es el de su multiplicación tecnológica, se corre el riesgo de confundir el aspecto técnico con el aspecto social de la cuestión. En este tipo de análisis se reflexiona sobre las sociedades modernas y el control estatal dentro de las sociedades de la información contemporánea.

Las otras reflexiones están basadas en las teorías foucultianas de biopoder y de disciplinamiento de las sociedades, el mismo autor decreta una serie de dispositivos sobre los cuales gira el poder y la vigilancia de los cuerpos y de las sociedades. Dentro de este paradigma de análisis son diversos y bastos, diversas disciplinas han utilizado este paradigma para hacer sus reflexiones, la pedagogía, la psicología, la economía y así diversas disciplinas han realizado aportes numerosos a este tópico del pensamiento social. En torno a la disciplina sociología, se pueden retomar los análisis de Marx (2005) y Arteaga (2006), quienes determinan el papel de la disciplina en la configuración de las sociedades y en el aparto de control de las sociedades.

Desde la postura sociológica, Gil (2020) realiza su lectura sobre el manejo que la clase dominante ha dado a esta emergencia sanitaria, quienes mediante su discurso han cargado de mayor responsabilidad a los ciudadanos de la salida de esta crisis, argumentando que es importante la responsabilidad individual de estos para no colapsar los

sistemas de salud, mientras ocultan que el problema es estructural, un desfinanciamiento y la privatización progresiva del sistema de salud en general (escases de trabajadores, recursos, infraestructura, mantenimiento e investigación) que ha favorecido que la crisis se agudice.

Por último, es de resaltar que estas últimas reflexiones que podríamos denominar de disciplinamiento tienen una diferencia con las concepciones de las sociedades de control, en cuanto determinan estas últimas una vigilancia sin encierro y sin disciplinamiento, esto es de relevancia para la investigación, puesto que para los propósitos del proyecto investigativo resultará importante retomar los postulados de las dos visiones, es decir, la pandemia ha reconfigurado de tal manera el pensamiento social sobre la temática que sería imposible hacer un análisis social de las categorías que se piensan reflexionar tomando un bando u otro en cuanto al tema de vigilancia y control de las sociedades, puesto que las medidas tomadas por los gobiernos estatales se encuentran en las fronteras de las dos teorías, razón por la cual la investigación retomara de cada uno las reflexiones que resulten de interés.

Encuesta Percepción Ciudadana. (Resultados)

La encuesta realizada se dividió en tres fases la primera sobre la que gira este documento entregó algunos resultados de interés para la reflexión sobre la pandemia COVID-19, en especial esta primera fase pretende mirar las percepciones sobre las medidas estatales ante la pandemia por la ciudadanía Bogotana. se realizó por medios virtuales: redes sociales, correos electrónicos masivos etc. Para ello se contó con los registros poblacionales de la ciudad de Bogotá DANE 2018 la cual calcula un total de 7.181.469 habitantes para la ciudad de Bogotá. En este sentido:

Habitantes Bogotá 7.181.469
Nivel de confianza 95%
Margen de error 5%
Muestra 325

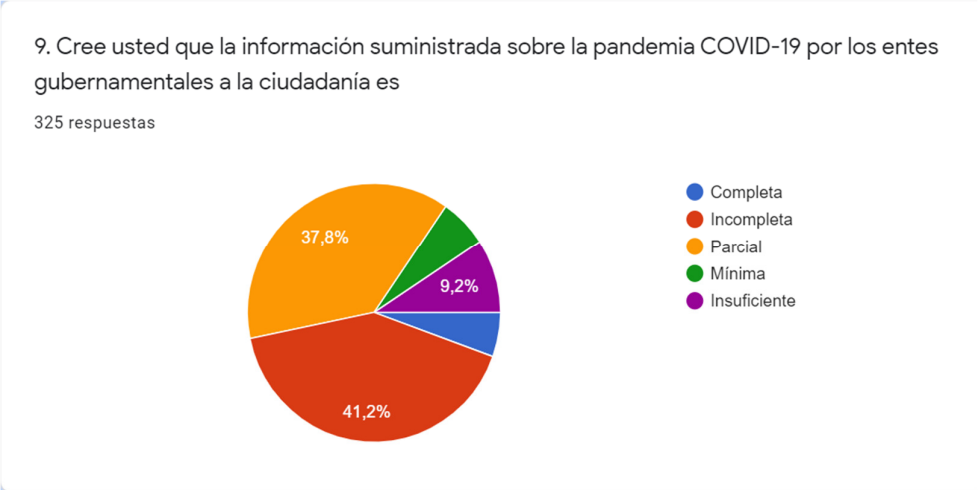

Grafico 1: Información de los entes gubernamentales. Fuente Propia.

En este grafico evidenciamos que la ciudadanía se encuentra bastante escéptica ante la información que es suministrada por los entes gubernamentales esto tiene repercusiones en cuanto a las posibles razones del escepticismo, pero también en cuanto a las medidas gubernamentales y el acatamiento de las mismas por la ciudadanía.

En cuanto a la primera situación, lo que reflejó el análisis documental y empírico de la pandemia tiene que ver con un desgaste por la ciudadanía ante la información recibida, la cantidad de información que era entregada por el gobierno nacional a diario por un programa, o desde los medios masivos de comunicación, que hacían replicas constantes de los mismos, en la mayoría de los casos propicio contradicciones y desacuerdos, esto generó con el pasar de los días un desgaste en la población ante la multitud de las medidas.

Por otro lado, esto evidencia una repercusión en las mismas prácticas ciudadanas de los pobladores de Bogotá, puesto que al tener este escepticismo sobre la información recibida el acatamiento a la normas y decretos entregados por los entes gubernamentales se veía afectado, en este sentido el Estado debió por un lado, hacer un mejor trabajo en cuanto a la trasparencia de la información y por otro lado, generar medidas comunicativas más amenas y menos bastas, es

decir sintetizar la información y entregar dicha información al ser corroborada y verificada, del mismo modo, las medidas y la información entregada se entiende que cambia constantemente, la pandemia es una novedad y la situación así lo plantea, pero mitigar este escepticismo se podría lograr ante medidas más claras y. menos cambiantes, puesto que los ciudadanos fueron desgastándose ante este tipo de particularidades, así lo evidencia esta pregunta donde el 42.1% de los encuestados encuentran como incompleta la información entregada por los entes gubernamentales, el 37.8% la encuentra parcial, y un 9.2% la encuentra insuficiente, sumando dichas respuesta evidenciamos que el 89.1% de los encuestados desconfían de las información entregada por el gobierno, situación gravísima en un pandemia, donde como se ha postulado desde diversos autores y voces académicas el trabajo mancomunado entre el estado y la ciudadanía es muy importante. Schor-Landman (2020) indica que es una responsabilidad compartida en la que se pone en juego la convivencia social por parte de los ciudadanos con los valores sociales, éticos y solidarios que implica, mientras el Estado es el encargado de las políticas públicas que garantizan los derechos ciudadanos. Pero esta corresponsabilidad necesaria para mitigar los efectos sociales, económicos y en la salud de la pandemia requiere de una confianza mutua la cual según se muestra en esta encuesta no es una realidad.

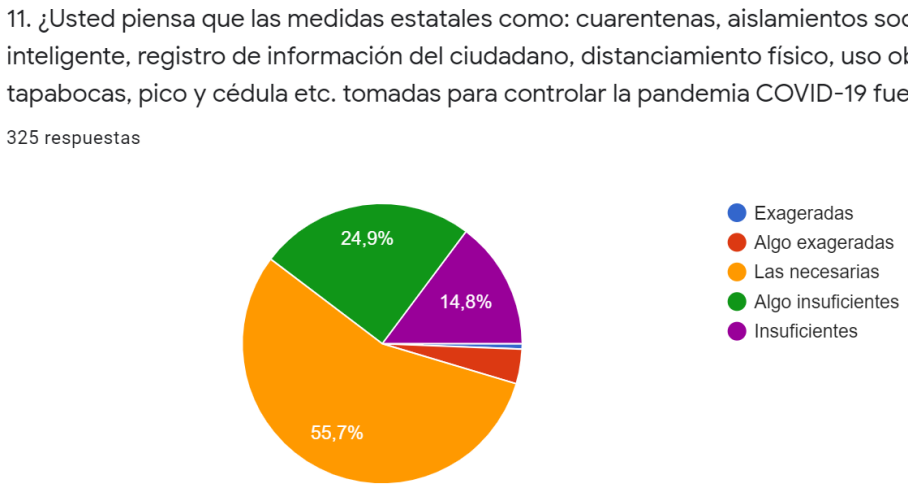

Gráfico 2: Medidas estatales. Fuente. Propia.

En cuanto a esta pregunta la postura de los ciudadanos de Bogotá encuestados está reflejada hacia dos actitudes; por un lado, un 55.7% encuentra las medidas tomadas como las necesarias, es decir están de acuerdo con las medidas tomadas por más que puedan sentir que la información no es la mejor, o que el acceso a ella no es el adecuado, parece percibirse un sentimiento de conformidad con las medidas tomadas por entes Estatales ante la pandemia.

Esta particularidad resulta interesante en cuanto a los análisis tradicionales de la vigilancia Estatal y el control social desde las ciencias sociales; por primera vez en la historia resiente la población misma fue quien solicito medidas que mitigaban sus derechos de circulación, de privacidad, etc. Estas cuestiones dan cuenta de las características mismas de la pandemia, pero reflejan un aspecto social de interés, puesto que, los controles sociales, los estados de sitio, la vigilancia sobre la circulación de la personas etc, tradicionalmente eran el reflejo de Estados totalitarios, y el análisis se basaba o desde una dirección directa del Estado hacia estas medidas como los casos ya reseñados o desde análisis como los foucultianos en donde la vigilancia y el control se soportaba de forma indirecta sobre los ciudadanos. En cualquiera de los casos, los ciudadanos objeto del control y vigilancia, o no estaban conformes con dichas medidas, o ni siquiera se hallaban plenamente conscientes de la situación, es por ello que resulta interesante determinar las implicaciones sociales, políticas y culturales que estas posturas hacía el control social desde la ciudadanía pueden generar, es claro que este tipo de análisis desbordan los propósitos de esta ponencia pero si es un punto a tener en cuenta a futuro cuando se consoliden reflexiones de más larga data sobre la pandemia y sus implicaciones.

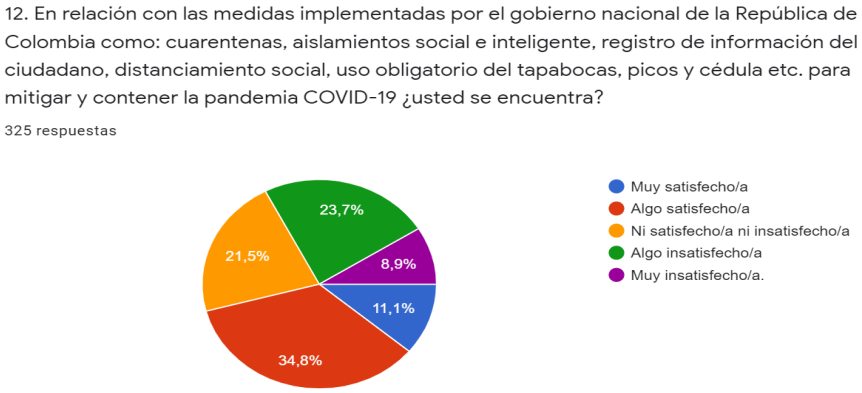

Gráfico 3: Percepción medidas gobierno nacional Colombia. Fuente. Propia.

La distribución del grafico 3 demuestra que en relación a esta pregunta no se encuentra un patrón generalizable en las respuestas, es decir existe una dispersión en las respuestas en cuanto la percepción sobre las medidas Estatales tomadas por el gobierno nacional. A partir de lo dicho, los resultados demuestran que existe una leve tendencia hacia la aprobación de las medidas Estatales tomadas por el gobierno nacional en la pandemia, un 45.9% de los ciudadanos consultados viran su mirada hacia estar muy satisfechos o algo satisfechos con las medidas tomadas por el gobierno nacional. Esto puede verse bajo la luz de la misma exigencia de la ciudadanía de los confinamientos y las medidas drásticas en pro de mitigar el impacto de la pandemia a nivel salud. Queda por determinar esto como se evidencia en el acatamiento a la mayoría de las normas más restrictivas tomadas bajo la pandemia por la ciudadanía. Por último, es de rescatar que 3 de 10 respuestas se encuentran en desaprobación de las medidas sería importante reflexionar el porqué de estas razones, y así mismo en próximos estudios comparar los resultados en el tiempo para dar cuenta de cambios significativos.

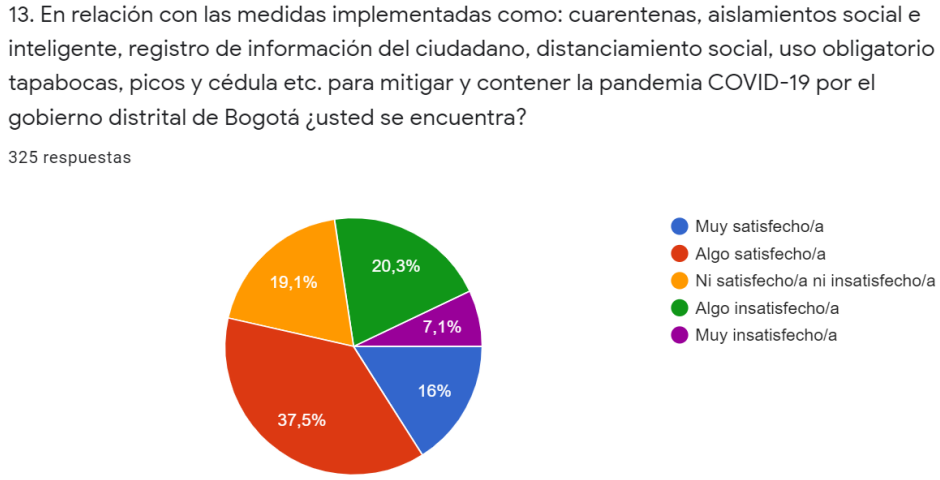

Gráfico 4: Percepción medidas gobierno distrital Bogotá. Fuente. Propia.

Esta pregunta se formuló con dos propósitos; uno en razón a que muchas medidas se tomaron antes en Bogotá que el resto del país y muchas de estas se decretaron diferencialmente en Bogotá que en otras ciudades o municipios de la nación; en segunda medida, por interés de algún tipo de análisis político a la situación, la pandemia se politizó en Colombia como en muchos de los países y una de las fórmulas más evidentes de dicha hipótesis, está en relación a las dinámicas entre el presidente de la república y la alcaldesa de Bogotá, quienes en constantes ocasiones tuvieron diferencias notables, que se fueron sumando en los medios de comunicación como una lucha de fuerza políticas con miras de las elecciones presidenciales 2022.

En este sentido se evidencia un leve pero evidente favorecimiento a las medidas tomadas desde el gobierno distrital, según la gráfica 4, un total de 53.3% de los ciudadanos consultados aprueban las medidas tomadas bajo la alcaldía de la ciudad de Bogotá para controla y mitigar los efectos de la pandemia, mientras que en la gráfica 3 el favorecimiento es de 45.9% al gobierno nacional.

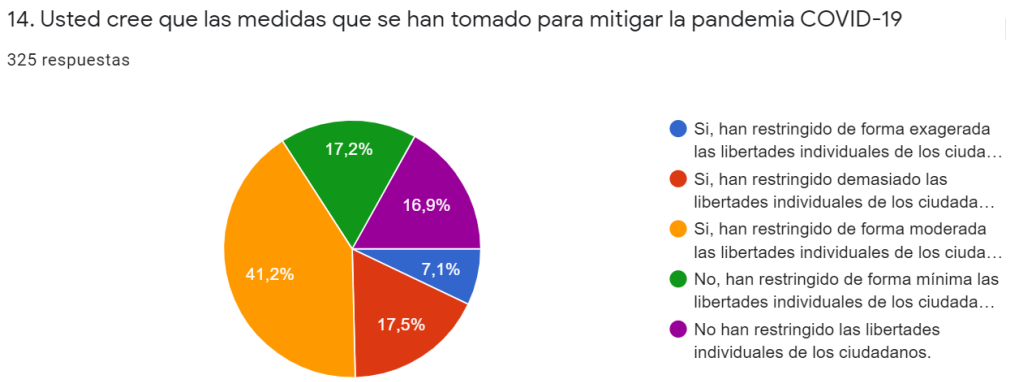

Gráfico 5: Percepción libertades individuales y medidas. Fuente. Propia.

Con esta pregunta se buscaba indagar por las libertades que los ciudadanos han perdido o han visto reducidas durante la pandemia, en este sentido las respuestas indican lo que la encuesta ha venido dilucidando en relación a las medidas Estatales tomadas y su consentimiento por parte de la población bogotana; un 41.2% ve como las medidas han restringido de forma moderada las libertades de las personas, pero en la realidad es que las libertades individuales durante la pandemia se han visto reducidas considerablemente, la organización de naciones unidas ha llamado la atención de como en algunos países, muchas de estas medidas rayan en la vulneración de los derechos humanos, y recalcan la necesidad de que sean medidas transitorias, en este sentido se piensa que las respuestas giran en torno no tanto a identificar las medidas como restrictivas, puesto que en la realidad lo son, sino que las personas consultadas respondieron de forma afirmativa consintiendo dichos decretos que restringen las libertades individuales de los ciudadanos durante la pandemia.

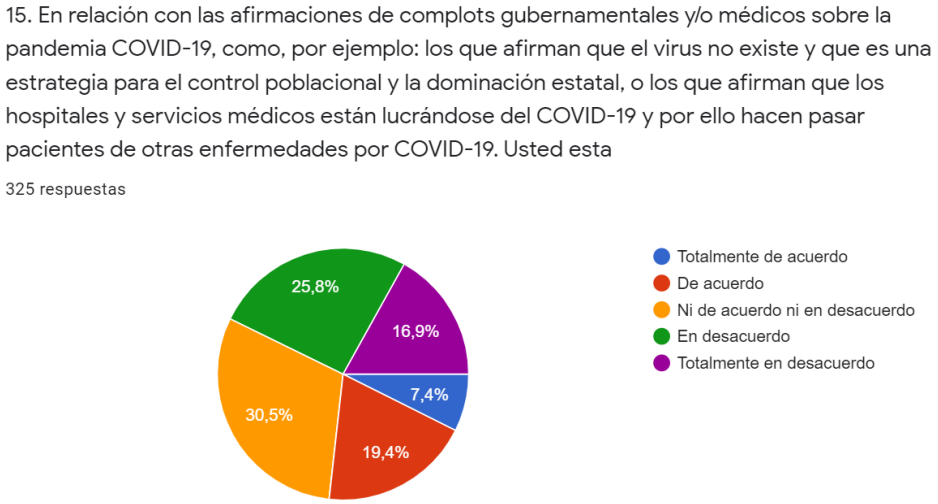

Gráfico 6: Percepción Complots y Fake News covid-19. Fuente. Propia.

En este sentido con el grafico 6 se evidencia un hecho particular la mayoría de las personas están en desacuerdo con este tipo de afirmaciones 46.7% de los ciudadanos, en contraposición a un 26.8% de los encuestados aprueban dichas afirmaciones, esto deja ver el sentido amplio de los rumores, puesto que es constante escuchar afirmaciones sobre que las personas no creen en la pandemia, etc, lo que en realidad se evidencia desde esta encuesta es que en la ciudad de Bogotá la mayoría de los ciudadanos están conscientes de la problemática, dan por entendido que muchas de estas afirmaciones no hacen parte de la realidad y que por ello las medidas de precaución y demás son totalmente necesarias. Queda por determinar los rumores, el papel del voz a voz y de los medios de comunicación en pro de afirmar que las personas no usan el tapabocas, que las personas no acatan las medidas, que los ciudadanos no creen que exista el virus etc. de igual modo, es importante resaltar como este tipo de creencias erróneas sobre el acatamiento de las normas sobre creencias infundadas y demás generan desconfianza social, propician espacios de incultura ciudadana y nuevamente no propician un vínculo entre Estado y ciudadanía.

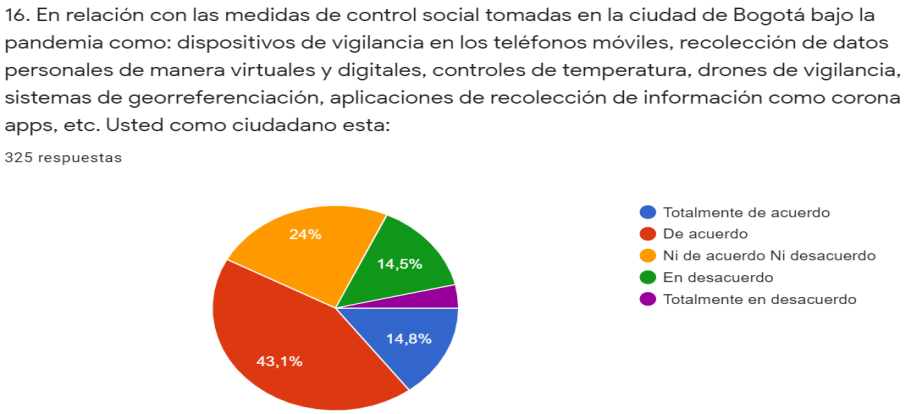

Gráfico 7: Percepción medidas de control social Bogotá. Fuente. Propia.

El grafico 7 demuestra la exigencia de la ciudadanía de controles de vigilancia, la nación entrego muchas de sus facultades y libertades al estado sin reparo alguno, la pandemia genero una necesidad cuasi paternal del estado, el 43.1% de los ciudadanos encuestados de Bogotá están de acuerdo con las medidas que vigilancias extremas tomadas para controlar la libre circulación, indicadores de salud, etc de las personas en la ciudad. La ciudadanía entrego su accionar ante las medidas Estatales, estas dinámicas propias deben revisarse a la luz de la cultura y el empoderamiento ciudadano y las prácticas mismas que esto pueda generar, puesto que es evidente que muchas medidas tomadas paulatinamente han venido no siendo acatadas por la ciudadanía, lo que puede ser resultado en mayor o menor medida de este tipo de estados paternalistas, en donde el accionar ciudadano queda subyugado a infantilismos y decisiones no adecuadas, un estado menos paternalista y una ciudadanía más empoderada podría generar mejores resultados ante las normas de bioseguridad necesarias para el control de la ciudadanía.

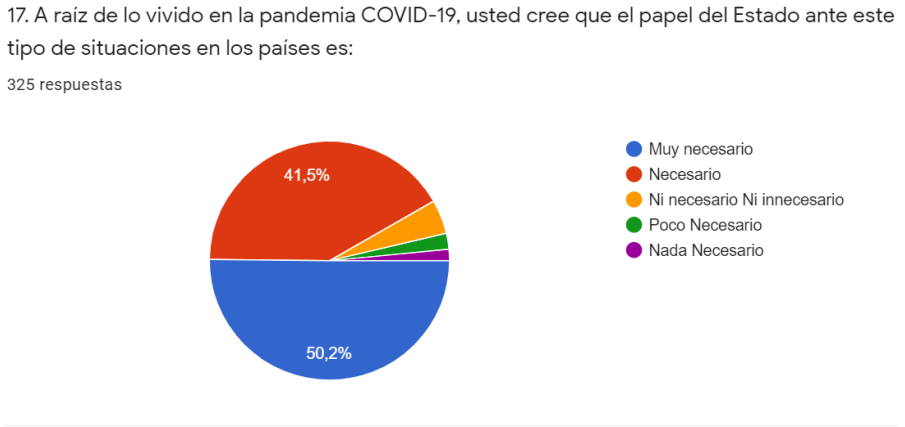

Gráfico 8: Papel del estado en la pandemia. Fuente. Propia.

Durante décadas cientos de voces desde la más recalcitrante derecha neoliberal, desde voces políticas y hasta académicas liberales se han evidenciado y promulgado exigencias del fin del Estado, y las mismas dificultades que un estado poderoso representa (estados autoritarios – burocratización – corrupción etc). La pandemia acalló o por lo menos mitigó este tipo de reflexiones, puesto que evidenció la necesidad ante situaciones tan particulares y de emergencia como la pandemia COVID-19 de un estado sólido. En este punto es importante resaltar que cuando se habla de solido no se quiere decir de un estado todo poderoso, sino de un Estado que sea escuchado, un Estado que sea soberano, un Estado que respete los derechos humanos y la democracia y que dote de corresponsabilidad a sus ciudadanos desde prácticas transparentes.

El resultado del grafico 8 evidencia que la ciudadanía en un 50.2% percibe como muy necesario el papel del Estado durante la pandemia, es decir, el mercado solo cayó por su peso, las mismas medidas ciudadanas fueron relegadas ante un Estado que debía ser el salvador ante la situación particular que represento la pandemia; en este sentido, es relevante el nuevo papel protagónico que el Estado ha asumido en la vida de los países y de la ciudadanía y las implicaciones que esto va tener en las dinámicas económicas posteriores a la pandemia y en los análisis sociopolíticos en relación al Estado a nivel mundial.

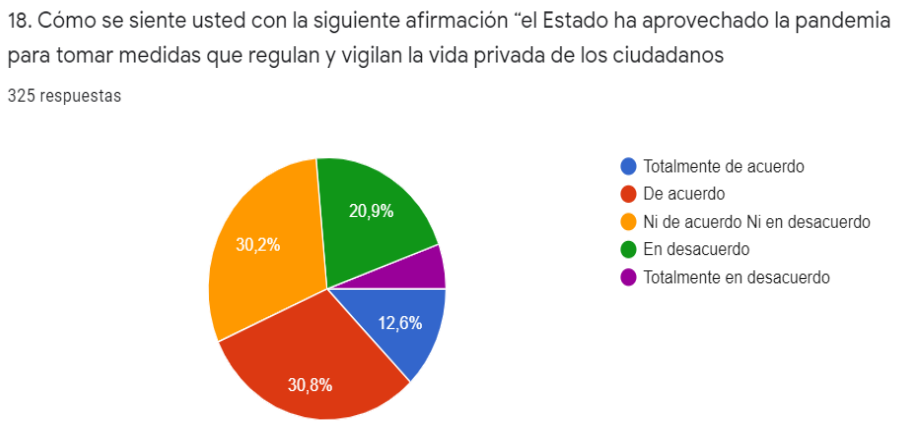

Gráfico 9: Medidas estatales y vida privada. Fuente. Propia.

La constitución colombiana, los Derechos Humanos y diversos organismos multilaterales han defendido el derecho a la vida privada de los ciudadanos, y cuando se habla de ello se hace referencia a la privacidad; al manejo de los datos personales; a las libertades individuales; todas estas mitigadas, reducidas, o coartadas durante la pandemia por las mismas particularidades del virus. En ese sentido gira la pregunta del gráfico 9, en donde se evidencia que el 30.8% de las personas encuentran de acuerdo con ver coartadas sus libertades y derechos a la privacidad por la pandemia, lo que se evidencia con el siguiente resultado es que, aunque saben que sus derechos fueron coartados dan su consentimiento a ello, el 30.2% de los ciudadanos dan cuenta de lo dicho.

Conclusiones

Las medidas tomadas bajo la pandemia por el gobierno nacional de Colombia y la ciudad de Bogotá evidencian bajo la normatividad analizada un incremento hacia acciones de control y vigilancia policiva cada vez más contundente, para ello utilizan el miedo como soporte y los medios de comunicación como agentes de emisión para este propósito; quizás medidas encaminadas hacia el empoderamiento ciudadano y con propósitos más claros, conocidos y reafirmados desde la cultura y las practicas ciudadanas podría generan mayores impactos a la pandemia y propiciar controles menos restrictivos.

Así mismo, se evidencia una sumisión ciudadana a un Estado cuasi paternalista, asumiéndose así ciudadanías frágiles que no ayudan a empoderan procesos de corresponsabilidad tan necesarios bajo las mismas dinámicas y exigencias de la pandemia COVID-19. Por ello deberían buscarse medidas menos punitivas y menos paternalistas que busquen por otro lado un mayor empoderamiento ciudadano no desde el discurso sino desde las mismas prácticas ciudadanas. Un aspecto que ha cobrado relevancia en el marco de la pandemia y las medidas implementadas en la crisis sanitaria, corresponde al cierre temporal de diversos sectores económicos, dando paso a el asentamiento de una crisis económica en alza, que aunque no se toma como tema central del proceso de investigación aquí plasmado, es un factor que necesariamente tendrá implicaciones en las prácticas ciudadanas, su relacionamiento con las instituciones y las percepciones que emergen frente a la pandemia y su manejo desde la gubernamentabilidad.

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Sustainable Development Strategies of China's Transportation Industry Under the Background of COVID-19

Jun MA
Ural Federal University, Ekaterinburg, Russia, ma_dreama@hotmail.com

Igor A. MAYBUROV
Ural Federal University, Ekaterinburg, Russia, mayburov.home@gmail.com

Abstract

At the beginning of 2020, the "black swan" of COVID-19 began to wreak havoc in our country and globally, bringing a huge impact to people's lives. At present, the epidemic situation in my country has been clearly controlled, but its impact on economic growth has already appeared. As one of the industries most affected by the epidemic, the transportation industry will face huge challenges in the short term, but there is still room for sustainable development in the long term. Reduce or even completely eliminate the negative impact of COVID-19. This article analyzes and predicts the impact of COVID-19 on traffic from two aspects: road transportation and road construction and proposes countermeasures to ensure sustainable development. In order to ensure sustainable development, while seeking national policy support to resolve investment and financing difficulties, highway companies must take the initiative to turn the epidemic crisis into an opportunity for reform, reduce costs and increase efficiency, explore multiple channels of financing, and let the company pass the difficult period smoothly.

Keywords: COVID-19, transportation, road construction, sustainable development, strategy.

Introduction

In January 2020, COVID-19 occurred in 31 provinces (autonomous regions and municipalities) across the country, and all provinces across the country have successively launched first-level response plans, and the nationwide COVID-19 prevention and control campaign has been fully launched (Xinhua News Agency, 2020). The continuous escalation of the epidemic will have a significant impact on transportation, especially the toll highway industry in the short term. It is worth noting that after the State Council's notice on the national toll road exemption from vehicle tolls during the epidemic prevention and control period, the toll highway operating companies are facing a cliff-like decline in revenue, a significant reduction in operating cash flow, and steep pressure on debt service. Increasing a series of challenges and pressure on solvency will indirectly drag the expressway investment industry. Under this circumstance, it is worth thinking and paying attention to how transportation operations should comply with policies and external conditions and determine the focus of current operations and management with the goal of sustainable development.

Literature Review

COVID-19 is a major challenge to the world economy（Esin, 2020）, with international supply shocks and declining

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GDP growth in many OECD countries (Welfens, 2020). Affected by COVID-19, countries around the world have implemented a series of measures, including border blockade and social distancing, in order to control the outbreak (H. Lau et al., 2020). Research shows that COVID-19 affects both financial markets (Al-Thaqeb et al., 2020) and the national economy (Banks, J.et al., 2020).

Many experts and scholars have carried out relevant research on the relationship among the epidemic, transportation, road construction, and fiscal revenue. Mayburov (2017, 2018) substantiates that the relationship between traffic taxes and road construction, studied the sources of government funding for highways, and analyzed the possibility of increasing the fiscal and regulatory importance of transportation taxes and charges. Michail (2020) analyzed the impact of Covid-19 on shipping. Aloi et al. (2020) investigated the impact of COVID-19 on urban traffic and pointed out that overall travel dropped by 76%, especially in public transportation users, which dropped by 93%. Ivanov (2020) proposed a simulation of the impact of the outbreak on global transportation, supply chains and COVID-19. Wenhua and Liang (2003) analyzed the negative impact of SARS on different modes of transportation in my country. Guobing (2020) suggested reducing the impact of COVID-19 on China's foreign trade and employment by stabilizing the global supply chain and using fiscal and tax measures to reduce costs. Liu et al. (2020) draw on the experience of the United Nations, the United States, the European Union, the United Kingdom and Japan on the construction of resilient transportation systems and traffic emergency support, and comb out the main points of the system resilience analysis of China's transportation industry.

However, although studies on the transportation supply chain have been conducted in the literature, no attempt has been made to test the impact of COVID-19 on road traffic. Therefore, this article analyzes and predicts the impact of COVID-19 on traffic from two aspects: road transportation and road construction, which is very necessary.

Methodology

To study the impact of COVID-19 on road transportation, this article is based on relevant theories of transportation economics (Small. 2007), econometrics (Pesaran. 1990) and other disciplines, this article uses retrospective analysis to collect data from government reports, the State Administration of Taxation and the Ministry of Transport to analyze the impact of COVID-19 on road transportation. According to statistics, from January to July, the country completed a total of 4.85 billion commercial passengers, a year-on-year decrease of 52.9%. Among them, commercial passenger traffic on roads fell by 53.2%. Among them, in July, a total of 890 million commercial passenger traffic was completed nationwide, which recovered to 58.0% of the same period last year, and the degree of recovery increased by 1.7 percentage points compared with June (Fig. 1.). From January to July, the investment in fixed assets in transportation completed 1.8 trillion Yuan, an increase of 9.4% year-on-year, and the growth rate was 3.4% faster than that in the first half of the year. Among them, 345.8 billion Yuan was completed in July, an increase of 26.7% year-on-year. Among them, the completed highway investment was 1272.2 billion Yuan, a year-on-year increase of 11.3% (Government public information 2020).

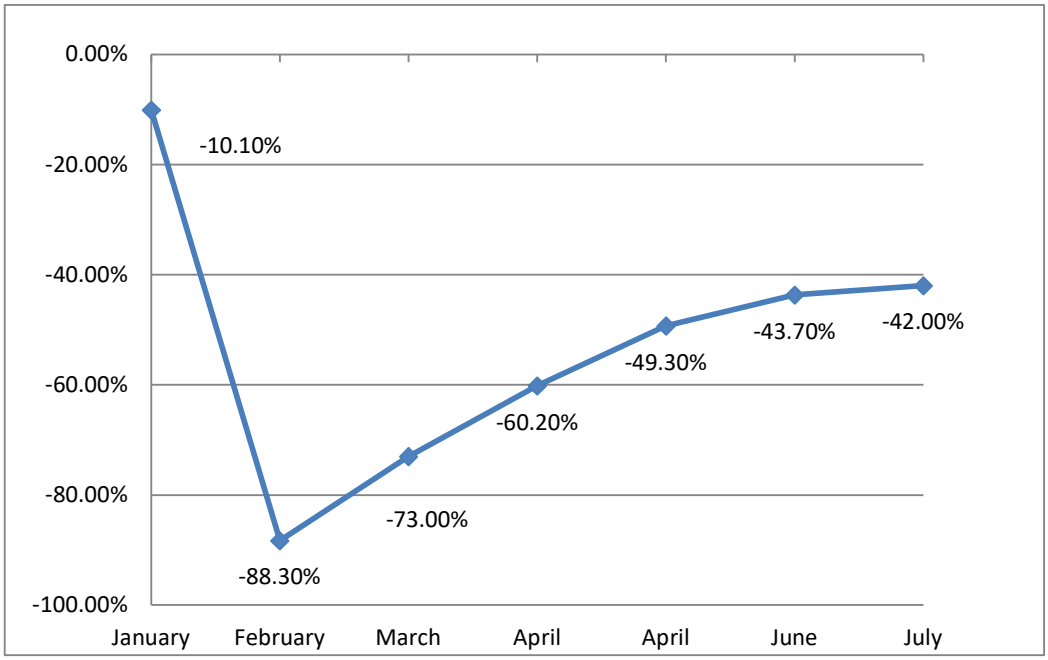

Fig. 1: Year-on-year growth rate of commercial passenger traffic from January to July 2020

Source: According to the author

This article uses a combination of theory and empirical methods to select road passenger volume, freight volume, government bonds, transportation fixed asset investment and other indicators that represent the entire industry; in data processing, comparative analysis is used to compare 2019 road transportation data Analyze the impact of COVID-19 on road transportation from two aspects: road transportation and road construction, and put forward corresponding measures, and put forward strategic suggestions for sustainable development.

Research

The Impact of COVID-19 on Road Traffic

In terms of road transportation, the impact of COVID-19 on the transportation industry is huge. According to the "2019 Toll Road Statistics Bulletin", the national toll road toll revenue and expenditure gap in 2019 reached 402.65 billion Yuan. Affected by the epidemic, it is expected that the revenue and expenditure gap of expressway operating companies in 2020 will further expand. Factors such as traffic control measures, the extension of the Spring Festival holiday, and delays in the resumption of work have led to a significant drop in national transportation volume in the short term. From January 10 to February 18 (40 days before and after the Spring Festival), the total number of passengers sent on national roads decreased by 50.8% year-on-year, and the national road freight volume in February decreased by about 51% compared with the previous year (Table 1, Table 2). Wu Chungeng, Director of the Policy Research Office of the Ministry of Transport, said that in the first quarter, 1.85 billion passenger traffic was completed, a year-on-year decrease of 58.4%. In the first quarter, 7.82 billion tons of commercial freight was completed, a year-on-year decrease of 18.4%.

Table 1: National highway passenger traffic during the Spring Festival 2016-2020

Year	2016	2017	2018	2019	2020
Passenger volume (100 million passengers)	24.95	25.21	24.8	24.6	12.11

Source: According to the author

Table 2: National highway freight transport volume in February from 2016-2020

Year	2016	2017	2018	2019	2020
Freight volume (10,000 tons)	144399	179276	167206	167329	82736

Source: According to the author

Anti-epidemic policies continue to increase, resulting in a sharp drop in toll revenue. After the State Council's notice on the national toll road exemption from vehicle tolls during the epidemic prevention and control period (from February 17 to May 5) was issued, toll highway operating companies are facing a cliff-like decline in revenue, and preliminary statistics are used to reduce tolls nationwide every day About 1.5 billion Yuan. On the basis that the original gap has not been effectively suppressed, toll revenue in the first half of 2020 is likely to decline in a precipitous manner.

In terms of highway construction, highway construction funds are an important factor affecting and restricting highway construction. Since 2018, the growth of investment in highway construction has declined, to a certain extent due to the shortage of construction funds. The sources of funds for highway construction under the current system include financial funds invested by governments at all levels in highway construction projects, and construction funds raised by project entities in accordance with market-oriented operations. Important sources of fiscal funds for highway construction include vehicle purchase tax funds and local government bond funds. Local government bond funds are mainly toll road special bond funds.

After falling for two consecutive years in 2015 and 2016, 2017 ushered in a new increase in vehicle purchase tax revenue. In the whole year, 328.67 billion Yuan of vehicle purchase tax was collected, a year-on-year increase of 22.7%. However, the growth rate continued to decline in 2018. The growth rates in 2018 and 2019 were 5.2% and 1.3%, respectively. Including the impact of the epidemic, the outlook for automobile sales in 2020 is uncertain; vehicle purchase tax revenue may further decline; the arrangement of special funds for vehicle purchase tax for road construction is not optimistic, and it may be a certain degree of investment in speeding up road construction Have an adverse effect.

In recent years, the central government has still paid great attention to infrastructure construction and still regards it as an important support point for stimulating national economic growth. The Ministry of Finance has issued a total of 1,848 billion Yuan in 2020 local government debt limits on November 27, 2019 and February 11, 2020, of which the general debt limit is 558 billion Yuan and the special debt limit is 1.290 billion Yuan. The purpose is to implement debt funds into specific projects as soon as possible, form an effective pull on the economy as soon as possible, and drive effective investment support to make up for shortcomings and expand domestic demand. In January 2020, 714.8 billion Yuan of special bonds have been issued nationwide. The adverse impact of the epidemic

on the development of the national economy further reflects the necessity of this fiscal policy to stimulate economic growth. Therefore, it can be expected that the general bond funds invested in general road construction projects and the toll road special bond funds invested in government toll road construction projects will have a significant increase over 2019, effectively promoting the rapid development of road construction.

An important measure for the development of road construction in accordance with the market-oriented direction is to continue the pace of cooperation between the government and social capital in accordance with the policy guidelines of the State Council, the Ministry of Finance and the Ministry of Transport. The Ministry of Finance has carried out a new upgrade and transformation of the national Public-Private Partnership comprehensive information platform (Ministry of Finance, 2020). The launch of the new platform indicates that standardized management has achieved new results and will continue to make new progress in infrastructure construction. The user payment mechanism is the payment mechanism of the Public-Private Partnership model that is mainly advocated by the Ministry of Finance and is sustainable and does not increase government debt. If the Public-Private Partnership adopts a user-paid mechanism, it means that it is developing a commercial toll road. And some policy changes caused by COVID-19 may cast a shadow on the public-private partnership on the highway to further promote the user payment mechanism.

The prevention and control of the epidemic has prevented travel, and the traffic flow of highways across the country has significantly declined. The prevention and control measures of suspending some passenger transportation and exempting tolls undoubtedly have a serious impact on the operational performance of the project company. The direct impact is the loss of project revenue, the increase in costs, and the sharp decrease in revenue, and the project company may face financial difficulties; the indirect impact is the increase in the financing cost of subsequent projects in the expressway industry, and the reduction of project service quality and efficiency.

During the period of COVID-19 prevention and control, the national toll roads are exempted from vehicle tolls. This is a major decision made by the Chinese government for the public interest. It is necessary to correctly handle the relationship between social public interests and safeguarding the legitimate rights and interests of highway investors and operators in accordance with relevant laws and regulations and promote the sustainable development of highway construction and management.

Related Suggestions

It is recommended that the cash flow of the transportation service industry comprehensively consider factors such as the amount of toll free, the net cash flow of operating activities during the extended toll period, time, and discount rate when calculating the toll period that should be extended. The net cash flow that can be obtained in the future by extending the charging period, its discounted value should not be lower than the free toll.

It is recommended that the principal of loans for the transportation service industry be postponed for one year and returned. The interest of the amount of interest-bearing debt (including equity financing) within the toll-free period will be postponed according to the free period, and the final interest will be paid off. At the same time, it is recommended that the rigid expenditures for operation and maintenance within the free pass period should be funded by the government in the form of special bonds.

At present, the country has appropriately increased the effective supply of the financial supply side through a series of quantitative easing monetary policies such as structural RRR cuts. Depending on the progress of the epidemic, the number of RRR cuts may be appropriately increased or the time window for RRR cuts may be advanced. But relying on monetary policy alone is not enough. In the next step, the government should make full use of fiscal

policies such as fiscal deficits and structural fiscal and taxation to stimulate the rapid release of demand, so as to fully hedge the negative impact of the epidemic.

The current epidemic has rapidly escalated into a major global public health event, which has had a serious impact on the development and layout of the global industrial chain. Only when all countries can work together can the epidemic be effectively contained in the short to medium term.

Conclusion and Future Research

COVID-19 has caused a great impact on the global economy. China has adopted a unified deployment of prevention and control methods, and the whole country has jointly resisted. It is a foregone conclusion that COVID-19 will have a greater negative impact on road passenger and cargo transportation in 2020. At the same time, fiscal policies such as increasing fiscal expenditures, lowering corporate income tax rates, personal income tax rates, and value-added tax rates are effective in mitigating the economic impact of the epidemic. Road transportation is an important link in the development of the national economy and an important guarantee for the national economy and people's livelihood. During the epidemic, toll free on expressways is also a social responsibility of toll road owners. To ensure sustainable development, highway companies seek national policy support in resolving investment and financing difficulties. While making good use of the government’s various preferential support policies, they must also take the initiative to turn the epidemic crisis into an opportunity for reform, and make risk prediction and Plan, reduce costs and increase efficiency, explore multiple channels of financing, and actively carry out business expansion and transformation, so that the company can smoothly pass difficult times, minimize losses as much as possible, and finally achieve sustainable development. This research helps to understand the current situation of China's road transportation under the epidemic situation, know the problems it faces, and take necessary measures according to corresponding strategies.

The sudden COVID-19 epidemic has provided a valuable example for the study and practice of how to adhere to the sustainable development strategy of transportation in the context of major public health emergencies. Review the transportation response strategies during the entire process of the outbreak, analyze and predict the impact of the epidemic on traffic from the two aspects of road transportation and highway construction, and improve the transportation response system for major public health emergencies. It is of great value to guide the formulation of policies for the prevention and control of specific epidemics, and to use taxation policies to help the sustainable development of transportation under major public health emergencies.

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Food Waste Management – Czech Regional Case Study

Eva LUKÁŠKOVÁ

Department of Gastronomy and Hospitality, College of Business and Hotel Management,

Bosonožská 9, 625 00 Brno, lukaskova@hotskolabrno.cz

Zdeněk MÁLEK

Department of Tourism, College of Business and Hotel Management, Bosonožská 9, 625 00 Brno, malek@hotskolabrno.cz

Kateřina PITROVÁ

Department of Environmental Security, Faculty of Logistics and Crisis Management,

Tomas Bata University in Zlín, Nám T. G. Masaryka 5555, 760 01 Zlín, pitrova@utb.cz

Helena VELICHOVÁ

Department of Gastronomy and Hospitality, College of Business and Hotel Management, Bosonožská 9, 625 00 Brno, velichova@hotskolabrno.cz

Tomáš JEŘÁBEK

Department of Economics and Management, College of Business and Hotel Management, Bosonožská 9, 625 00 Brno, jerabek@hotskolabrno.cz

Abstract

The article addresses the current issue of food waste. The issue of food waste is closely related to food security and food self-sufficiency and, of course, to the economic approach of households to food. The article presents the results of a case study of food waste in a selected region of the Czech Republic. A questionnaire survey and a specific survey of households were used to determine the actual amount of food waste and the amount of financial losses that are associated with this waste.

Keywords: Food Security, Food Sufficiency, Food Waste, Household.

Introduction

The year 2020 has been marked by the fight against the COVID-19 pandemic. However, the current pandemic has given rise to other problems or emphasized the need to solve them (e.g. the issue of food and water supply in crisis situations) (Safarik et al., 2015) (Strohmandl et al., 2015). Food self-sufficiency and economic access to food are very closely linked to food waste, which is typical not only for developed countries, and global food production is estimated to be close to one third. The agricultural area where food is grown "for nobody" is larger than Europe (Hoering, 2014). With the total annual loss, spoilage or discard of food is equivalent to 1.3 billion tonnes of food. In the most basic foodstuffs, as rice, wheat and other cereals, losses are around 30% up to 286 million tonnes of cereal products. This is 5% more for fish than for cereals (35%). Up to 8% of fish caught are thrown back into the sea, when in many cases the fish are already dead, dying or otherwise damaged. Fruit and vegetable losses account for approximately 40-50%. Up to half the world fruit and vegetable production is discarded. Losses for dairy products, meat and oilseeds are around 20%. In Europe, up to 29 million tonnes of dairy products are discarded or otherwise degraded each year. In terms of meat, of the 263 million tonnes produced globally, up to 20% is devalued or discarded. For oilseeds, global waste is 2% higher than for meat (Food Loss and Waste Facts, © 2015, Zábojníková, 2020).

Food waste can be defined as a reduction in the amount of food quality due to the decisions and actions of retailers, food service providers and consumers (Food Loss and Food Waste, © 2020). Food waste is part of food loss and refers to the disposal or non-food use of safe and nutritious food intended for human consumption, which takes place throughout the food chain from primary production to final consumption in the household (Storup et al., 2016,

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Zábojníková, 2020). Food losses already occur in the primary sector - in agriculture (e.g. premature harvest, standards of aesthetic appearance of food) (Bremsová et al., 2016). Furthermore, there is a further selection of food due to the standards of traders, in the processing of raw materials for the final treatment of the product or in their packaging. Food losses occur during transport and storage (Gustavsson et al., 2011). End-of-chain food losses - the treatment of food retailers and the behaviour of final consumers - are referred to as food waste. The largest producers of food waste include direct food stores and supermarkets and households (Parfitt et al., 2010).

Food Waste – A Case Study

In the Czech Republic, up to 829,851 tonnes of food are devalued annually, which is about 81 kg per person. The highest share of food waste is in the process of food production 44%, followed by households 31%, gastronomic establishments account for 15% of waste and retail chains 11%. Thus, 254,000 tonnes of food are thrown away in households every year, which is approximately 25 kg per person per year. Fruit and vegetables are wasted the most 27%, beverages 17%, pastries 11%, leftovers of ready-made uneaten meals 10%, milk and dairy products 10%, meat 7%. Nevertheless, the Czech Republic is the 5th EU country that wastes the least food (Ministry of the Environment of the Czech Republic, 2017). One of the key steps in recent years to reduce food waste is the approval of an amendment to the Food and Tobacco Products Act, which requires stores with an area of more than 400 m2 to donate food that they are no longer allowed to sell (e.g. due to poor labelling, or imperfect packaging) to food banks (Zábojníková, 2020).

Based on the above data, a survey was conducted in households in the district of Břeclav, focusing on the issue of food waste. The research in the form of a questionnaire survey took place in February 2020, data were collected from 420 respondents. Based on the statistical evaluation of the survey results, food waste was also measured in selected households (households formed a deliberately inhomogeneous group). The measurement lasted for 14 days, households recorded food waste in a unified form, and the total financial loss resulting from waste generation was also evaluated. The aim was to verify whether the respondents in the questionnaire survey are able to correctly estimate the amount of food waste that their household generates and also the financial loss of the household caused by it. Below there are selected results of a questionnaire survey and the main results of measuring food waste in selected households (Hubálková, 2020).

Within the shopping behaviour of respondents, the following summary of selected results can be given: More than 61% of respondents shop 2-3 times a week, a total of 69% of respondents stock. 77% of respondents check the date of minimum durability and use-by date. There were no statistically significant differences between gender, age and educational attainment in the given responses. 55% of respondents estimated the production of food waste per month at less than a kilogram, 42% between 1-5 kg, and 77% estimated the amount of financial losses due to food disposal at less than 20 Euros per month.

When identifying the main reasons for food disposal, the largest number of responses was selected in the category of spoilage, hardening or other deterioration (292 responses). An overview of the reasons for food discards and the frequency of respondents' answers is given in Table 1.

Table 1: Sources and processing of food waste of respondents

	Number of respondents	Percentage share
Reasons for throwing food away (multiple answers possible)		
Leftovers of ready - made uneaten meals	262	62,4%
Spoiled, hardened, devalued food	292	69,5%
Expired food	160	38,1%
Too much food purchased	19	4,5%
Improper food storage	49	11,7%
Food is not thrown away	51	12,1%
Food waste management		
Further processing	97	23,1%
Animal feed	126	30,0%

Composting	76	18,1%
Mixed waste	121	28,8%

From the results of the questionnaire survey, there were found subjective estimates and opinions of selected people and their households regarding food waste. For a more accurate and in-depth analysis of the specific amount of food waste in some households, the method of measuring food waste was chosen by analysing the form in which specific data were incorporated, the measurement took place in households for 14 days. The form contained data for accurate measurement of food waste, which was divided into types A to G. Food waste A included bread and cereals, B fresh fruit and vegetables, C meat and smoked meat products, D milk and dairy products, type E canned food and F snacks (chocolate and non-chocolate confectionery). A summary of the results of the household survey is given below in graphical terms.

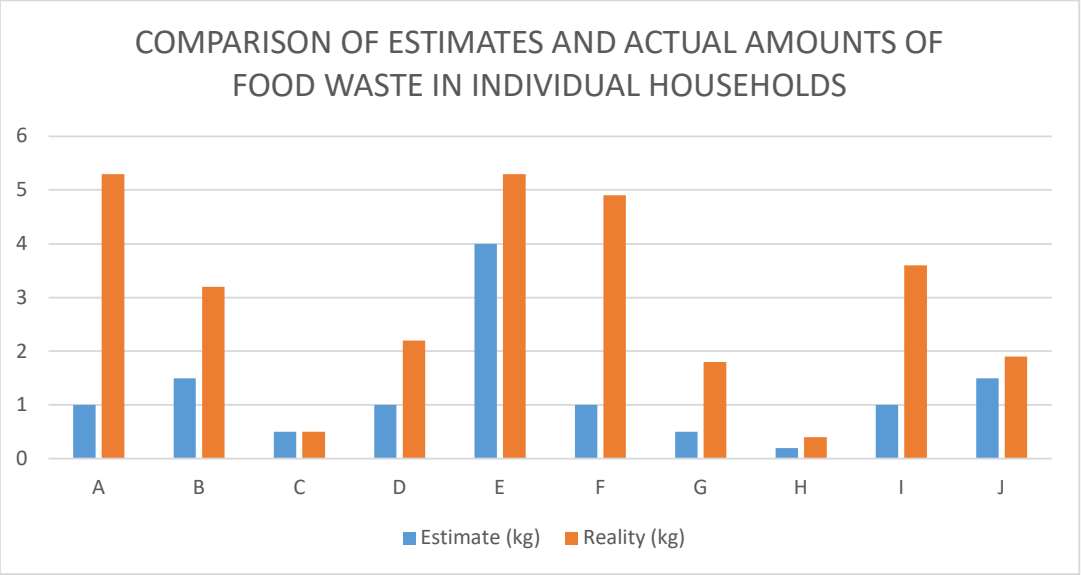

Fig. 1: Comparison of estimates and actual amounts of food waste

The results showed that the initial estimate of the selected respondents does not match the actual amount of food waste. The actual amount of discarded food is always higher than estimated, on average the amount of real food waste is 2-3 times higher. In line with the finding, the estimate of the financial loss and its actual amount vary considerably. It is shown graphically in Figure 2.

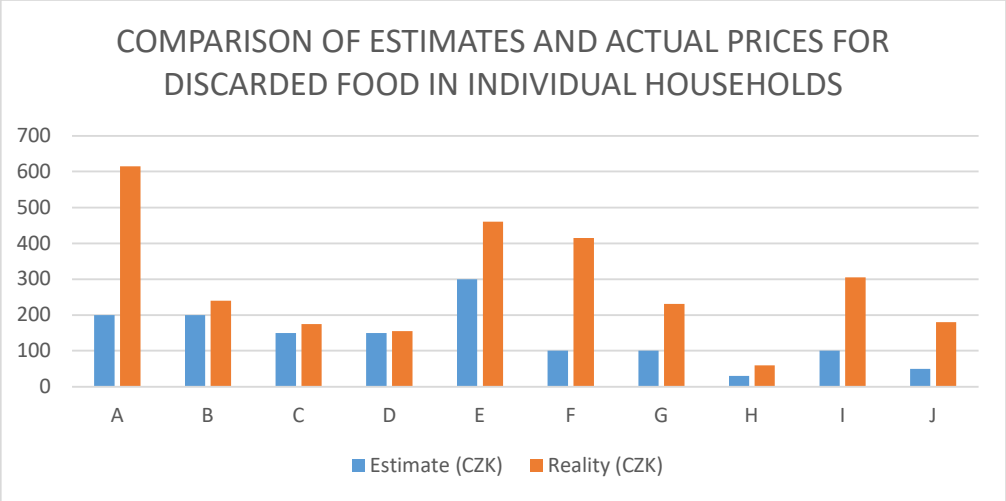

Fig. 2: Comparison of estimates and actual prices for discarded food

The financial expression of losses for food waste produced was estimated a little more accurately, however, in all cases the actual values were underestimated. In the worst case, the price estimate for discarded food was four times underestimated. The financial loss per month ranged from 12 to 47 Euros in households.

A total of 29.9 kg of food was thrown away in the monitored households during the experiment. Figure 3 shows the percentage share of individual food groups in the total volume of discarded food for a fortnight of measurement.

Households threw the most vegetables and fruits. The percentage of vegetables and fruits in the total amount of food waste corresponds to 31%. The second most discarded type of food were the leftovers of ready-made uneaten meals, which accounted for 28% of the total. Cereal products, most often spoiled bread, accounted for 18% of food waste. Meat products and sausages accounted for 11% of the volume of discarded food, dairy products for 9%. Sweets and other delicacies, which accounted for 3% of the volume of waste, were the least discarded, and no canned and cooked products were thrown away in households during the entire fourteen-day measurement period (Hubálková, 2020).

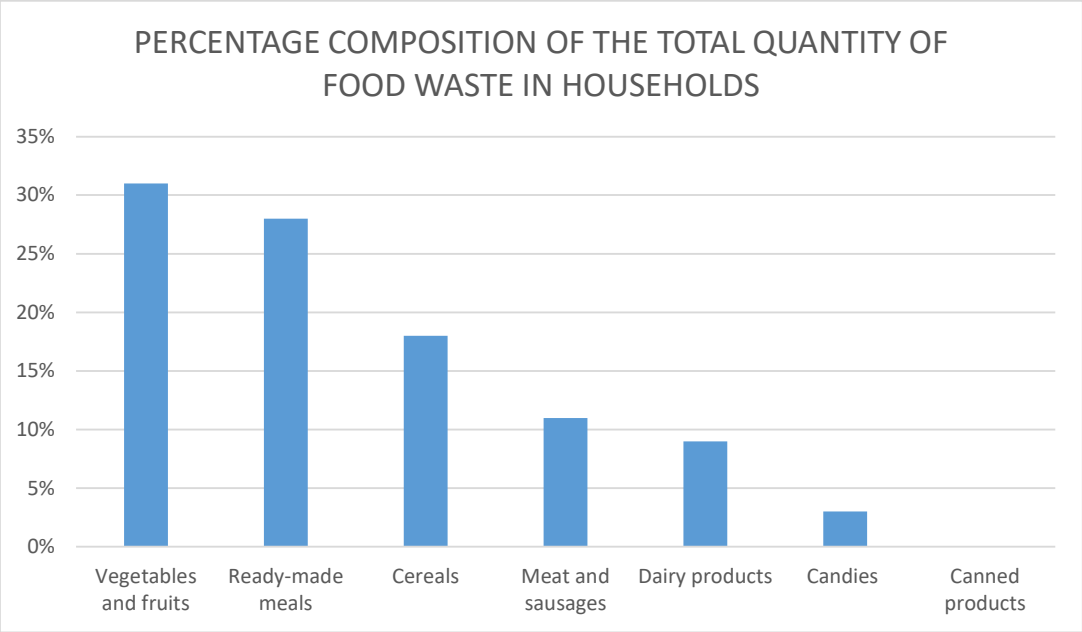

Fig 3. Composition of the total volume of discarded food

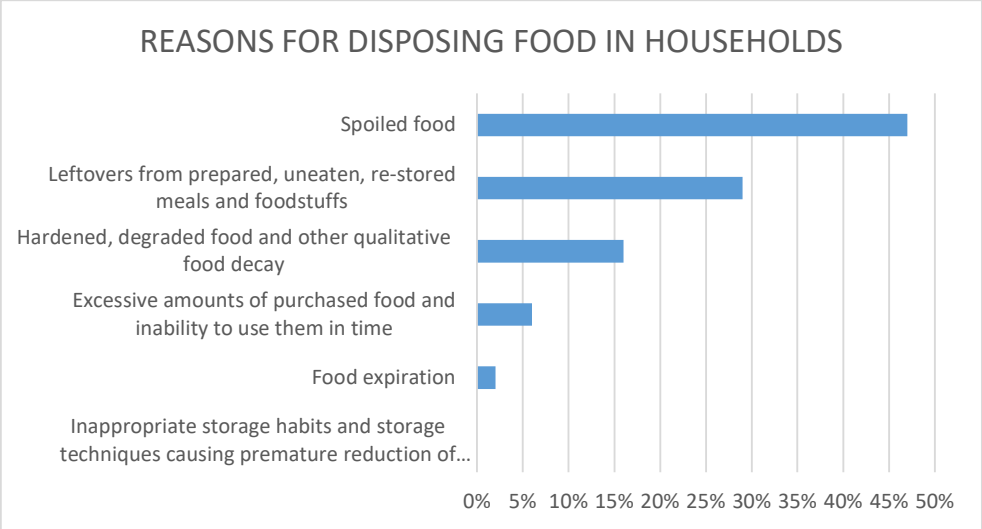

Fig. 4: Reasons for disposing food by households

The figure of reasons for disposing food in households shows that people most often threw away food due to spoilage, in as many as 47% of cases. The most common were fruits and vegetables and dairy products. The second largest

share in the amount of food that was thrown away during the fourteen-day measurement period were ready-made food leftovers. This was followed by hardened or otherwise degraded food, where the most common discarded commodity was bread and other cereal products. On the contrary, none of the participants selected the possibility of error in food storage techniques, although in some cases the underestimation of the factor was obvious.

Conclusion

The issue of food waste is a very important and current topic. There is a number of negative consequences of wasting food. Food waste has a profound impact on the environment. It is clear that food waste aggravates the already very negative way of treating the soil. Agriculture is deeply loaded; a considerable amount of chemicals gets into the soil and at the same time its fund is depleted. According to UN statistics, on average up to a third of the food produced is discarded. This equates to up to 1.3 billion tons of food. This food waste is also a waste of water resources. Hundreds to thousands of litres of water are needed to grow any crop, which is unnecessarily and irretrievably lost as a result of the food being thrown away. This corresponds to about a quarter of the total volume of water consumed in agriculture. Discarded food accounts for about 8 percent of greenhouse gas emissions worldwide. Wasting food means wasting resources (Glopolis, 2014).

In addition to environmental impacts, it is also possible to talk about significant economic impacts, estimated at up to 770 Euros per household per year. However, food waste is also an ethical problem, as on the one hand millions of tonnes of food are thrown away, on the other hand there are 870 million starving people in the world (Glopolis, 2014).

There are several options for reducing food waste, and it should be noted that there is a need to focus significantly on reducing food waste at the household level, i.e. at the microeconomic level. According to the FAO, key activities to reduce waste include, for example, raising awareness of the problem, redistributing food from unnecessary to needy, using food that is unfit for human consumption as animal feed, giving more space and importance of composting bio-waste. (FAO, 2013, European Court of Auditors, 2016). There are several pieces of advice and recommendations for households (individuals) in the field of food waste reduction, including, for example, planning purchases and creating a diet for the household for the week; monitoring of consumption date and minimum durability, financial planning; proper food storage; processing of leftover food instead of discarding it, freezing food, which is approaching the expire date and the date of minimum durability, and making home compost.

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Through Strategy to Sustainability Development

RADOSLAV JANKAL
University of Zilina, Zilina, Slovak Republic, radoslav.jankal@fri.uniza.sk

Miriam JANKALOVA
University of Zilina, Zilina, Slovak Republic, miriam.jankalova@fpedas.uniza.sk

Abstract

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). The aim of the article is to emphasize the need of incorporating the sustainability into the strategic management process. The article is based on information gathered through extensive literature review (research publications, research studies) using internet and research databases. The sustainable strategy must support companies' goals, creates values not only for company, but also for stakeholders/society without compromising the ability of future generations to meet their own needs. It is important that sustainability is incorporating into the strategic management process from the beginning

Keywords: Strategy, Sustainability, Strategic Management, Sustainable Development.

Introduction

In recent years, a growing number of companies around the world voluntarily adopt and implement a broad range of sustainability practices as a response to emerging challenges and stakeholder expectations across the Environmental, Social and Governance (ESG) domains. In doing so, they try to integrate sustainability into their strategy, business models, and organizational processes and structures (Eccles et al., 2014; Ioannou & Serafeim, 2019).

The term *sustainability* covers environmental issues, wider corporate social responsibility (CSR), the long-term continuity, and economic survival of business (Scottish Enterprise, 2011). One of the best known and used definition of sustainable development was first introduced in 1987 in the Report of the World Commission on Environment and Development: Our Common Future (World Commission on Environment and Development, 1987): *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*.

It contains within it two key concepts (World Commission on Environment and Development, 1987):

- the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given,

- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

By now most companies have sustainability programs. They're cutting carbon emissions, reducing waste, and otherwise enhancing operational efficiency. But a mishmash of sustainability tactics does not add up to a sustainable strategy. To endure, a strategy must address the interests of all stakeholders: investors, employees, customers, governments, non-governmental organizations, and society at large. To do that, it has to increase shareholder value while at the same time improving the company's performance on environmental, social, and governance dimensions (Eccles & Serafeim, 2013).

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The aim of the article is to emphasize the need of incorporating the sustainability into the strategic management process. The paper is based on information gathered through extensive literature review (research publications, research studies, documents about the strategic management and sustainability) using internet and research databases (Scopus, WoS, Google Scholar).

Theoretical background about strategy and Strategic Management

Fleisher and Bensoussan (2003) understand strategic management as a way of conducting the organization that has as its ultimate objective the development of values, managerial capabilities, organizational responsibilities, and administrative system that link strategic and operational decision making, at all hierarchical levels, and across all lines of authority. According to Dess, Lumpkin and Taylor (2004) strategic management consists of the analysis, decisions and actions an organization undertakes in order to create and sustain competitive advantage.

They have defined four key attributes of strategic management (Dess et al., 2004):

- Directs the organization toward overall goals and objectives,
- Involves the inclusion of multiple stakeholders in decision making,
- Needs to incorporate short-term and long-term perspectives,
- Recognizes trade-offs between efficiency (doing things right) and effectiveness (doing the right thing).

The strategy reflects one of the key manifestations of strategic management, which is to focus on longer-term vision of development activities and managing social and societal system. The business strategy is a relatively independent planning category, which is based on precise knowledge of the conditions (based on the analyses carried out), a clearly formulated vision, mission and objectives of the company and creates a suitable starting point for subsequent tactics and more specific activities of the management process. The business strategy represents a certain concept of its behaviour set for a longer time horizon.

According to David (2011) strategies are the means by which long-term objectives will be achieved. Business strategies may include geographic expansion, diversification, acquisition, product development, market penetration, retrenchment, divestiture, liquidation, and joint ventures. Strategies are potential actions that require top management decisions and large amounts of the company's resources. In addition, strategies affect a company's long-term prosperity, and thus are future-oriented. Strategies have multifunctional or multidivisional consequences and require consideration of both the external and internal factors facing the company (David, 2011).

Sustainable Strategy

Since a sustainable strategy is about integrating financial and nonfinancial performance, the inevitable consequence of this is that a company should report on how well it is doing this in an integrated way (Eccles & Krzus, 2010). By building sustainable strategies, the world's most influential and innovative companies can pave the way to a sustainable society, one that meets the needs of the current generation without sacrificing those of generations to come (Eccles & Serafeim, 2013). For a comprehensive corporate sustainability strategy, it is necessary to consider all dimensions (economic, ecological and social), their impacts and their interrelations (Baumgartner & Ebner, 2010).

Baumgartner and Korhonen (2010) discussed in their paper three central dimensions of strategic thinking derived from the mainstream of strategic management literature and the relevance of these dimensions when addressing the problem of reductionism. To evaluate sustainability performance from a strategic perspective following three dimensions are helpful: strategy content, strategy process and strategy context (Baumgartner & Korhonen, 2010; Baumgartner, 2012):

- ***Strategy Content*** - This dimension secures that the framework, approach or project in question contributes to sustainability. What is the substance and the added value in light of sustainable development? Focusing on

strategy content means that one seeks to avoid pitfalls; one is clear about the contribution attempted. The strategy content is the substance of the constructed framework, approach or project. To substantiate the content the framework for strategic sustainable development is a suitable approach the measure especially the environmental dimension. For the social dimension the ISO 26000 guidance document on social responsibility provides a comprehensive overview.

- ***Strategy Process*** - Strategy process outlines the way in which the entire strategy of the framework, approach or project in question is formulated and constructed to achieve the intended content and purpose. It is important to include all primary stakeholders, e.g. the managers, the tool developers or designers and the actors who implement the approach in practice. Primary stakeholders should all be aware of the expected outcome of the project and they should have a system understanding/awareness, not only understanding of their own subsystems or isolated system components. From system understanding it should follow that actors know how to act and when to act to contribute to the desired outcomes in the system under focus.

- ***Strategy Context*** - The dimension of strategy context is about the perception of the secondary stakeholders. It is also important to acknowledge the overall environment of the work in question, which always includes the larger socio-economic environment, i.e. the cultural context, the political context, the regulatory context and the market context under which the work must be performed.

Baumgartner (2009) and Baumgartner and Ebner (2010) discussed in their papers following Corporate Sustainability Strategies:

- ***Introverted*** – risk mitigation strategy: An introverted strategy is characterized by one central question: Is the action for sustainable development necessary and useful for the company? The focus of all activities is the compliance with legal and other external standards concerning environmental and social aspects in order to avoid risks for the company. The pressure for this strategy emanates from outside the company, but the action is mainly internally oriented, therefore it is named “introverted”. Action will only be taken if standards force an organizational answer.

- ***Extroverted*** – legitimating strategy: An extroverted strategy focuses on the external relationship of a company. The focus is on public acceptance and the so-called “license to operate and grow”. Stakeholders are informed about all relevant activities in order to generate a trustful relationship. These companies create ambitious environmental programs, but effort and progress in the light of the sustainability principles can be still minimal. In many cases there seems to be more ‘green’ communication than real activeness. This strategy aims to create new market opportunities in the light of sustainable development, including elements of the conservative and visionary strategies.

- ***Conservative*** – efficiency strategy: A conservative strategy focuses on eco-efficiency. Products and services are provided with low costs and low consumption of materials and energy. Emissions and waste are avoided. Efficient production processes lead to competitive advantages while environmental impacts are reduced. Frequently cleaner production activities are aligned with a conservative strategy. Opportunities due to integration of sustainable development are detected systematically. As the actions and measures of this strategy are usually within the company, this has a strong internal orientation.

- ***Visionary*** – holistic sustainability strategy: A visionary strategy focuses on sustainability issues within all business activities. Sustainable development is incorporated in vision and strategy. Competitive advantages are derived from differentiation and innovation, offering customers and stakeholders unique advantages. Visionary strategies occur in two different forms: in a conventional way and in a systemic way. Conventional visionary strategies are based on market opportunities in an opportunistic manner. As long as sustainability issues lead to market advantages, they are part of the strategic management of conventional visionary oriented companies. So, the focus is outside in; inputs for the strategy formulation are derived from the market perspective. Systemic visionary strategies combine this view with an inside-out perspective; the marked based view is supplemented with a resource-based view and sustainable development is deep seated in the normative level of the company.

Visionary strategies have a very strong orientation on sustainable development; the entire organization is committed to this. There is of course the risk of market acceptance. Chances of the systemic type are higher due to the integrated view of sustainable development than the visionary conventional type. The evaluation of these strategies shows different levels of sustainability orientation, so they could be seen as different stages of corporate development towards sustainability: the weakest sustainability strategy would be the introverted, the strongest the visionary strategy; conservative and extroverted strategies are middle stages (Baumgartner, 2009).

Integrating sustainability principles into businesses

According to a McKinsey survey from 2011, many companies are actively integrating sustainability principles into their businesses and they are doing so by pursuing goals that go far beyond earlier concern for reputation management - for example, saving energy, developing green products, and retaining and motivating employees, all of which help companies capture value through growth and return on capital (Bonini & Görner, 2011).

Part of the survey was also to clarify how the companies integrating sustainability across business processes. For example, respondents indicated into which business processes sustainability was integrated: 67% mentioned the option "mission and values", for example "corporate culture" chose up to 59% and "strategic planning" chose up to 57%. In the last two places with the lowest number of respondents were the options "supply chain management" and "budgeting process" (Bonini & Görner, 2011).

McKinsey survey from 2017 asked how integrated sustainability is into 11 core business functions, and respondents indicate that integration into "strategic planning" is the most common (44%) (Bové et al., 2017).

Sustainability has long been on the agenda at many companies, but for decades their environmental, social, and governance activities have been disconnected from core strategy. Most still take a fragmented, reactive approach - launching ad hoc initiatives to enhance their "green" credentials, to comply with regulations, or to deal with emergencies - rather than treating sustainability as an issue with a direct impact on business results (Bonini & Görner, 2011).

Recommendations and conclusion

Sustainability cannot be implemented as a stand-alone activity, e.g. with the fact that the company focuses only on areas that are positively perceived in the eyes of stakeholders. E.g. it focuses only on philanthropic activities and ignores others. Sustainability must be an integral and inseparable part of business. We agree with the Peter White (2009) that the key is to build sustainability into the business, rather than present it as an additional activity; to have it owned by the business rather than by a corporate ''CSR group''.

Therefore, it is important that *sustainability* is incorporating into the *strategic management process* from the beginning. Therefore, in the next section, there will be recommendations on how to proceed.

The initial step is to define a vision, mission, purpose, values and principles (can be compared to human DNA) (Figure 1). These elements must already *reflect* and take into account *sustainability*, as they lead to the formulation of goals that will help company on the path to sustainability. An important part of this step is also to *define the stakeholders* with whom dialogue is needed and can also help companies on the path to sustainability. It is important for companies to incorporate sustainability also in the *goals* (Figure 2) they are pursuing. The process of setting goals is very important, because it lays the grounds for the future position of the company and sets the direction of all efforts in the company.

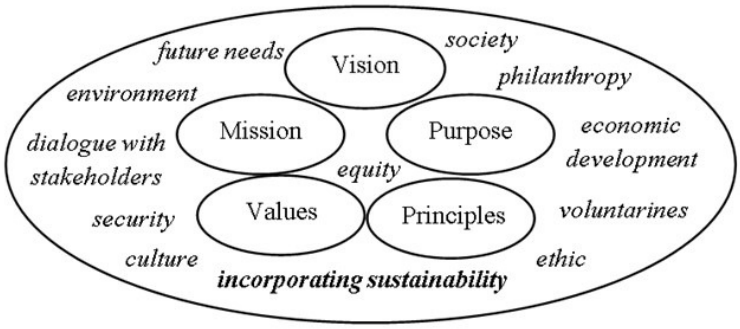

Fig. 1: Business DNA

Fig. 2: Sustainable SMART Goals

To ensure that the company's commitment to sustainability permeates the entire organization, *the goal-setting process* must be extended into the *development of functional strategies*. Furthermore, sustainability goals should cascade throughout the organization so that they are included in individual employee performance plans. If a company's sustainability efforts are to provide long-term value to both the company and society, sustainability must be integrated into the company's strategy in a way that complements the company's goals and overall mission. (Galpin et al., 2015)
The *analysis of the current situation* is also *focused on sustainability*, where it is important to identify internal areas that have an impact on sustainability, as well as external opportunities that can be focused on. Companies that have been involved in sustainability for a long time and are successful in doing so can be an inspiration (see White, 2019; Galpin et al., 2015).

Management needs to develop and evaluate strategic alternatives and then select strategies that are compatible at each level and that allow the company to best capitalize on its strengths and opportunities (Hittmár & Jankal, 2015).

Many types of strategies appear in the literature (Barney & Hesterly, 2018; David, 2011; David, 2017; Dess et al., 2004; Fleisher & Bensoussan, 2003; Hittmár et al., 2014; Hittmár & Jankal, 2013; Lendel et al., 2015; Pettinger, 2004; Strenitzerová, 2005). Regarding sustainability strategies, the third part of the paper characterizes 4 types of *corporate sustainability strategies*. The weakest sustainability strategy would be the introverted, the strongest the visionary strategy (see part 3 - sustainable strategy).

The sustainable strategy must support companies' goals, creates values not only for company, but also for stakeholders/society without compromising the ability of future generations to meet their own needs.

But do not overlook the fact that even the best strategy when implemented poorly, may cause more harm than good. One of the most important tasks for a manager, entrepreneur or business owner there is a need to start working with good ideas for the future and then at the stage of its own functioning know how to manage their activities (Hittmár & Jankal, 2015).

Integrating sustainability into strategic initiatives is especially important because these issues play out over the long term. It's easier for companies where they are core concerns to understand trends and make strategic bets in advance of consumer preferences, stakeholder pressure, or regulation. The choice for companies today is not if, but how, they should manage their sustainability activities. Companies can choose to see this agenda as a necessary evil - a matter of compliance or a risk to be managed while they get on with the business of business - or they can think of it as a novel way to open up new business opportunities while creating value for society. (Bonini & Görner, 2011).
The best formulated and best implemented strategies become obsolete as a company's external and internal environments change. It is essential, therefore, that strategists systematically review, evaluate, and control the execution of strategies (David 2011).

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Senior as A User of Modern IT Technologies in Tourism

Agnieszka SAWINSKA

University of Szczecin, Szczecin, Poland
agnieszka.sawinska@usz.edu.pl

Anna GARDZINSKA

University of Szczecin, Szczecin, Poland
anna.gardzinska@usz.edu.pl

Abstract

The contemporary tourism market is characterized by the dynamic development of internet solutions and the growing share of seniors (60+ people) in the group of tourists. Therefore, the purpose of the article was to indicate the main socio-demographic factors conditioning access to modern information technologies and making a comparison between the use of tools dedicated to tourism by people over 60 years old and younger. In the introduction to the article, based on desk research and critical literature analysis presents considerations on the use of the Internet by seniors, which focus on the concept of digital divide, and points to arguments showing the growing potential of seniors in the European tourism market. The main body is based on statistical analysis of data obtained from the survey conducted in 2019 on a group of 1067 inhabitants of the Zachodniopomorskie province (Poland). Using the Pearson chi independence test ^{2}, the Mann-Whitney U test, and the Kruskal-Wallis test, it was confirmed that the relationship between the age and access to a computer and the Internet is significant. In addition, it was found that features such as place of residence and education are statistically significant, although their strength is weakening. Detailed analyses have shown differences in the use of modern solutions between seniors and younger groups, which proves still existing digital division of these groups. It was stated that actions leading to digital inclusion of seniors are necessary, which will reduce the differences in access to tourist services. It should be emphasized that despite the local nature of the case study, the considerations and conclusions carried out may be useful in a global context.

Keywords: Senior, Modern Information Technologies, Internet, Digital Divide, Tourist Activity of Seniors.

Introduction

Modern information technologies based on the use of the Internet play a special role in the functioning of modern economy. One of the markets affected by rapid increase in their use is the tourism market. This sector is characterized by the development of online booking platforms, which are an increasingly important distribution channel for tourist services and supporting traditional forms of sales. The Internet is also an important source of tourist information. The use of modern technological solutions in tourism most often refers to younger generations of users, which naturally is associated with the characteristics and IT skills of younger people. Among the trends that will affect the functioning of the tourism market in the near future, there are demographic changes manifesting in the aging of the European society. The tourism market is already experiencing an increase in tourist activity of the elderly (who are most often referred to as people over 60 years old). Seniors, whose number is constantly increasing, are becoming an important group of consumers of many services, which tourist companies can no longer ignore.

The combination of these two mega trends (development of modern information technologies and aging of European society) has become a premise to ask whether seniors as a promising segment of the tourism market use modern solutions dedicated to tourism and whether this group should be considered digitally divided? The answer to these questions was defined as the main goal of the article.

The background for the conducted research is theoretical and empirical considerations regarding the problems of a senior as an Internet user and arguments indicating the potential of senior citizens as a growing segment of the tourism market.

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The main goal was implemented through achieving the following partial goals:

(1) An indication of the main socio-demographic factors conditioning access to a computer and the Internet,
(2) The characteristics of the use of modern information technologies dedicated to tourism by 60+ people compared to other age groups.

The empirical part of the article is based on surveys conducted in the third quarter of 2019 among 1067 people, residents of Zachodniopomorskie province in Poland.

Senior as an Internet user

A review of the literature on the use of the Internet by seniors shows that most often these considerations focus on issues related to social and digital divide of older people (Inglot-Brzęk, 2011; Batorski, 2009, Szmigielska and all, 2012; Łukaszewicz, 2016).

Social exclusion, which can be considered as a superior concept in relation to the concept of digital divide, refers to situations in which individuals are deprived of the possibility of full participation in the society (Inglot-Brzęk, 2011, p. 375). This can lead to economic (both in the sphere of production, participation in the labour market and consumption), political (limitation of active participation in political life) and social (poor participation in the life of the local community, limiting the possibilities of social relations) exclusion. Szarfenberg (after: Majer 2013, p. 107), referring to the problems of participation in social or collective life, points out that the condition of exclusion is the fact that the individual remains a member of the local community and, despite his or her will, cannot participate in normal social activities for reasons that are out of his or her control.

The concept of digital divide is associated with modern technologies, especially the Internet. J. van Dijk (2010, p. 248) defines digital divide as a stratification of those who have access to computers and the Internet, and those who do not have such an access. In turn, Polańska (2016, pp. 239, 242) and other authors (Batorski, 2009ab; Popiołek, 2013) indicate that the division into those who have access to the Internet (along with the necessary computer equipment) and those who do not have it, does not illustrate the complexity of digital divide. It is necessary to take into account unequal access to the Internet combined with the ability to use the Internet, which is referred to as the "digital division". It means inequalities in access to the Internet, varying intensity of its use, unequal degree of knowledge about how to search for information, unequal quality of connection and social support, helping in using the Internet, as well as inequalities in the ability to assess the quality and diversity of the use of network" (Batotski, 2009a, pp. 2-4; Inglot-Brzęk, 2011, p. 375).

The phenomenon of social exclusion is therefore a complex one. The levels of digital and social exclusion include (Widawska, Wysocka and Wieczorek, 2014, p. 12):

- motivation to use new technologies,
- physical access (having a computer, Internet access),
- skills (strategic, information, operational),
- different ways of using the Internet).

In turn, Batorski (2009b, p. 225) emphasizes that digital divide is more than just a digital divide and stresses that it is not only about differences in access, skills or ways of using but, most of all, it is about the ones that lead to social and economic exclusion.

It is specified that digital divide affects people in the sphere of social exclusion or marginalization as well as those who are unable, despite the possibility, to take advantage of current development of information technologies. In other words, digital divide therefore refers to the possibility of regular access to digital and information technologies and to having digital competences that allow the use digital goods in an effective manner (Łukaszewicz, 2016, p. 86).

As Łukaszewicz (2016, p. 86) points out, digital divide of the elderly can be seen on two levels. The first concerns the lack of access to the Internet and equipment enabling the use of this medium, the second is the lack of skills to use them, i.e. digital competences. This author also claims that currently, most often, exclusion occurs in the second plane (Łukaszewicz, 2016, p. 86).

As pointed out by Batorski (2009b, p. 236), definitely, the largest differences in the use of the Internet are related to age and education. In 2009, the vast majority of young people (87% of people aged 16-24) and very few older people (6% aged 65 and older) used the Internet. The inter-generational digital division is very strong and durable, although according to the Social Diagnosis (2015, p. 383), 97.5% of people aged 16-24 and 17.9% of people over 65 already used the Internet (taking 60+ people already included, it was 58.7%). This means a lot of progress.

In turn, according to the latest research of the Central Statistical Office of Poland (2020, p. 15.68), the percentage of people using computers is increasing from year to year in the elderly population of Poland. In 2018, 31.7% of people aged 65-74 used computers, which means an increase of 2.5 percentage points per year. People at this age are increasingly using computers regularly (i.e. at least once a week), however, the percentage of regular users in the analysed age range is still lower compared to younger people. In 2018, 29.8% of people of this age regularly connected to the Internet, and 19.4% of people aged 65-74 used computers every day or almost every day. Over a half of people aged 65-74 have never used a computer. In 2018, the share of these people was 59.7% (compared to 62.1% in 2017). This ratio was similar for both women and men. The percentage of people not using a computer varied depending on the level of education. The largest number of people who have never used a computer was in the group of older people with primary and lower secondary education (91.3%) (GUS, 2020, p. 15.68).

Also Niehaves and Plattfaut (2014) emphasize that age is still an important factor determining the use of the Internet, while emphasizing that the elderly are not a homogeneous group. Research conducted in Switzerland (Friemel, 2014) also confirms that Internet use is strongly distorted in the seniors group, which leads to the partial exclusion of older seniors (70+).

According to Szmigielska and co-authors (2014, p. 143), financial and technical limitations were indicated as the main reason for not using the Internet for a long time, i.e. no computer at home, no Internet access due to high costs or technical problems. Nowadays, attention is paid to factors such as: lack of motivation, beliefs and competence barriers in the use of the Internet by seniors (Hejduk, 2016, p. 75). The lack of knowledge as to the possibility of using modern information technologies or the lack of trust in this medium is also emphasized. The generally accepted and stereotypical opinion that older people are more willing than young people to accept new technological solutions should be added to these conditions. As Damodaran, Olphert and Phipps (2013) emphasize older people value very highly the benefits and independence that computer use gives them, and they are often exceptionally tenacious in trying to remain digitally connected.

It should be emphasized that disproportions in access to the Internet can lead to many negative social phenomena, because as the importance of modern information technologies in various areas of life increases, those who do not use them will be increasingly excluded (Hejduk, 2016, p. 74). Tourism is also such a field, which today is characterized by a high degree of use of modern information technologies during the preparation and organization of travels. The consequence of digital divide is unequal access to information. Therefore, digital divide generates the phenomenon of information exclusion (Popiołek, 2013, p. 311). In the case of the tourism sector, this can be very important, because tourist information (both about natural values, anthropogenic values or development of tourism) is considered the basic need conditioning tourism. Limited access to information provided on the Internet or booking systems may therefore deepen the marginalization of seniors as potential tourists.

As Trzcińska-Król (2018, p. 52) indicates, in order to find their place in the information society, seniors must master IT and media skills and competences that enable them to use modern IT solutions. Education, computer and internet training as well as non-institutional support play a key role. Friemel (2014) points out that the use of the Internet by seniors is influenced by the social context, namely encouragement and help from family and friends.

The literature also recognizes the fact that the use of information technology by seniors can bring a number positive effects for this group of society. Information technology allows seniors to remain independent for longer, facilitates access to services and information, which undoubtedly improves the quality of their lives (Niehaves and Plattfaut, 2014; McMurtrey and all, 2008). However, as McMurtrey and all (2008, p. 121) rightly points out, IT products should be designed in a senior-friendly way. Niehaves and Plattfaut (2014) emphasize that research should be conducted on the acceptance of technology, especially the adoption of the Internet by older people. One should agree with Damodaran, Olphert and Phipps (2013) that taking steps to digital inclusion of seniors will benefit not only the elderly, but also the economy and society.

Senior as a Promising Segment of the Tourism Market

The main prerequisites for treating seniors as a promising segment of the tourism market include, first and foremost, the aging of European society, the growing share of 60+ people in the structure of travellers, and changes in the lifestyle of contemporary seniors.

Aging of society is visible throughout the European Union. However, this process is spatially diverse. The median age of EU residents in 2018 was approximately 43 years and is almost 4 years higher than in 2004. The average age of Polish residents also increased during this time by more than 4 years to about 40 years. In all countries (except Luxembourg and Cyprus), currently, people in working age fall into more people in post-working age than in 2004. In most countries, also in Poland, the burden of older people on people in working age is greater than the burden of children. This is a fundamental change compared to 2004, when this relation was usually the opposite (Poland in the European Union. A statistical portrait, GUS, 2019, p. 21)

The aging process of Polish society should be considered advanced. At the end of 2018, people aged 60 and over accounted for almost 25% of the total population in Poland, while in 2010 this indicator was at the level of 19.6%. The structure of older people was dominated by relatively young people (in the age group 60-64), the share of other groups was lower with the increase in age. According to the CSO forecast, the population aged 60 and more in Poland in 2030 will reach the level of 10.8 million people, and in 2050 - 13.7 million. In 2050, the population of this age will constitute about 40% of the population (GUS, 2020, p. 13).

The growing share of older people in the structure of European society translates into the growing share of older people in tourism consumption. According to Eurostat the data presented in Table 1, people aged 65 constitute an increasing share of the population in tourist trips in countries where the aging process is becoming more and more advanced. For example, in Poland in 2012 this share was just over 14%, and in 2018 it was almost 31%. In turn, in countries where the aging process began earlier, as in Germany, for example, this share is still high, although in 2018 compared to 2012 a decrease by over 3 percentage points was recorded.

Table 1:1 The share of% 65+ in the population of residents of selected EU countries in national tourist travels

	2012	2014	2016	2018	**change 2018/2012**
European Union - 27 countries (from 2020)	25.37	25.48	26.64	26.85	**1.48**
Belgium	5.2	2.77	6.32	8.12	**2.92**
Bulgaria	7.14	9.44	7.13	10.95	**3.81**
Czechia	41.24	48.7	45.15	39.61	**-1.63**
Denmark	15.18	21.83	18.39	26.84	**11.66**
Germany	23.25	22.5	23.97	20.08	**-3.17**
Estonia	16.45	23.29	20.26	23.24	**6.79**
Ireland	21.49	17.41	19.2	15.8	**-5.69**
Greece	20.91	21.44	19.51	24.93	**4.02**
Spain	34.44	35.23	36.35	37.98	**3.54**
France	45.34	41.9	43.28	42.35	**-2.99**
Croatia	14.75	22.7	14.84	13.66	**-1.09**
Italy	19.55	18.41	18.68	20.5	**0.95**
Cyprus	28.98	16.14	20.47	20.27	**-8.71**
Latvia	23.51	14.14	16.17	24.42	**0.91**
Lithuania	18.69	19.72	18.39	19.73	**1.04**
Luxembourg	1.77	0.24	:	:	**:**
Hungary	29.25	28.35	27.31	29.65	**0.40**

Malta	10.26	9.9	10.93	9.07	**-1.19**
Netherlands	24.7	26.57	26.33	23.58	**-1.12**
Austria	16.17	18.25	16.44	18.43	**2.26**
Poland	14.21	27.13	29.87	30.76	**16.55**
Portugal	22.62	14.33	26.5	26.01	**3.39**
Romania	11.8	12.25	11.28	11.75	**-0.05**
Slovenia	13.47	13.77	15.5	15.33	**1.86**
Slovakia	16.71	23.14	26.25	39.03	**22.32**
Finland	36.01	39.09	33.36	38	**1.99**
Sweden	:	22.13	27.64	22.97	**:**

Source: Own study based on Eurostat statistics (https://ec.europa.eu/eurostat/web/tourism/data/database, tour_dem, access date March 1, 2020)

The age structure of the inhabitants of the West Pomeranian Voivodeship, adopted later as a case study, also confirms the advanced process of aging of the society. In 2008, the inhabitants aged 60+ accounted for 17.4% of the total population of the voivodship. In 2018, this share was almost 26% (Central Statistical Office). Taking into account the trends indicated in Table 1, despite the lack of detailed statistical data on the tourist consumption of seniors in the West Pomeranian Voivodeship, it should be concluded that the share of older people in tourist consumption is also increasing and in line with the trends.

The survey "Tourist activity of the elderly in Poland" carried out in 2018 on behalf of the Ministry of Sport and Tourism on a group of 1500 people showed that the share of people over 55 years old who participated in at least one tourist trip in the last 12 months was 62 %. Greater participation in trips was observed among people living in the city. 38% of respondents have not travelled in the last 12 months, and 36% of respondents said they were not planning it. The most common reason for resigning from travel was poor health - this reason was indicated by 40% of people who did not travel in the last year and 44% of people who do not plan to travel. Most domestic trips were organized on their own (79%). Foreign trips were organized to a similar extent by a travel agency (43%) as well as on their own (42%). The same percentage of respondents went on domestic and foreign trips organized by family or friends (14% each) (Tourist activity ..., 2019, p. 4,7).

Treating the changes in the lifestyle of seniors as a premise for treating this group as a promising segment of the tourism market, it is worth paying attention to the new face of a modern senior emphasized in literature. As emphasized by Kociszewski (2016), citing other authors (Bondos, 2012, p. 32; Jurek, 2013, p. 32, Błędowski 2012), the qualitative evolution of the senior client model is currently taking place. The traditional perception of the senior as full of pragmatism, the desire to save and reluctant to technological novelties and with great restrictions gives way to a group of new consumers - seniors who are well-versed in the market economy and enjoy satisfaction from the consumer lifestyle, have many interests and are in a much better financial situation. These changes are also accompanied by new roles played by older people, a clearer sense of subjectivity and greater activity, including on the tourism level (Kociszewski, 2016, p. 228).

To sum up, the growing number of older consumers contributes to the increase in demand for various types of services, including tourist services. Bearing in mind the growing importance of modern information technologies in the organization of tourist trips and the fact that the Internet creates many new opportunities to associate tourism services which are distant in time and space with the individual needs of tourist recipients, it allows pricing, taking advantage of promotions, choosing a convenient date and other conditions. It is therefore necessary not only to adapt existing services to the needs of these consumer groups, but also to adapt distribution channels to the needs of seniors. Lack of actions aimed at levelling the differences in access to modern IT systems may lead to widening inequalities between generations in access to tourist services /discrimination of seniors on the tourism market.

Materials and Methods

In order to verify the main purpose of the work, the results of a survey conducted on a group of 1067 respondents, residents of the West Pomeranian Voivodeship, were used. The survey questionnaire was developed by a team of experts in the field of tourism and spatial planning at the University of Szczecin. The actual research was commissioned to an experienced research company with a reliable database. The research technique CATI (Computer Assisted Telephone Interview) was used. This method is increasingly used in the social sciences (Alen

and all, 2014; Huh and Pork (2010). This method consists in conducting a telephone conversation with the respondent while the telequestioner enters the respondent's answers to the online survey form.

The choice of the method was dictated by the low cost of carrying out such studies, the speed of obtaining information and the need for information of a general nature. Bearing in mind the limitations of the CATI method, the questionnaire was constructed in a way that allowed it to be filled once. The database from which the respondents were drawn was reliable and the quota selection corresponded with the structure of the inhabitants of the West Pomeranian province (sex, age, place of residence). In order to assure representativeness of sample, the stratified sampling was assumed. A sample was reflected the size of general population of habitants of Zachodniopomorskie province in a particular age, gender and the structure of residence. The sample was assumed as min. 1067 people (maximal permissible error of estimation 3%, confidence level 0,95).

As the attributes differentiating the availability of modern information technologies in tourism, apart from age and gender, the place of residence was also determined, which is dictated by the fact that in countries there are still differences in access to the Internet in urban and rural areas (Budziewicz-Guzlecka, 2019, p. 217; Lisha Ye and Huiqin Yang, 2020).

The test results were subjected to statistical verification. Due to the fact that the survey primarily has qualitative questions, the Pearson chi independence test ^{2}, Mann-Whitney U test, and Kruskal-Wallis test were used to determine the statistical significance of relationships between the variables. The analysis assumed the significance level of $\alpha = 0.05$. However, the V-Cramer coefficient and the contingency coefficient were used to test the strength of the relationship (Francuz, Mackiewicz, 2007, pp. 411-420).

Results

Main socio-demographic factors conditioning access to a computer and the Internet

Statistical analysis was performed in order to indicate the main socio-demographic factors conditioning access to modern Internet-based information technologies. For this purpose, the Pearson chi independence test was used, which verifies the alternative hypothesis that there is a significant relationship between the two variables. In addition, the V-Cramer coefficient was calculated for each significant relationship, and the contingency coefficient for four-field tables. In addition, to confirm the results obtained with the chi^2 test and to determine the direction of the relationship between the variables (coefficient V, informs only about the strength of the relationship), the following tests were used: Mann-Whitney and Kruskal-Wallis tests. Tables 2-9 present only statistically significant relationships.

One of the factors determining the availability of devices connected to the Internet is gender. Pearson Chi^2 test showed that there was a statistically significant relationship between these variables (Table 2). However, a contingency coefficient of 0.061 was obtained, which indicates a very weak strength of this relationship.

Table 2: Availability of a computer or other device with Internet access by gender

M1. Gender	**Q. Is there a computer or other device with Internet access in your household?**		**Chi^2**	**p**
	No	**Yes**		
Woman	22.60%	77.40%	3.961029	p=.04657
Man	17.70%	82.30%		

Source: Own study

Table 3: Mann-Whitney U test - availability of a computer or other device with access to the Internet by gender

Variable	Mann-Whitney U test (corrected for continuity) In relation to variable: M1. Gender The marked results are significant with p <.05000			
	Sum of ranks woman	Sum of ranks man	With corrections	p
Q. Is there a computer or other device with Internet access in your household?	288338.5	281439.5	-1.98916	0.046685

Source: Own study

Analysing the results of the U Test (Table 3), it can be seen that women's access to a computer and the Internet is slightly higher than for men. This is indicated by the higher sum of ranks in women. This is a surprising result, because from the analysis of Table 2 one could draw a completely opposite conclusion.

Attention should be paid to the results regarding the relationship between access to the computer and the Internet, and age (Table 4). In this case, the highest value of the V-Cramer's coefficient (0.615) was obtained, which indicates a very strong relationship between these features. Against the background of previously presented statistics of the CSO, this is not a surprise. Older people (60+) have less internet access than young people (18-39). This may be due to a lack of need or lack of skills, or lack of resources (urgent needs).

Table 4: Availability of a computer or other device with Internet access by gender

M2. Age	Q. Is there a computer or other device with Internet access in your household?		Chi^2	p
	No	Yes		
18 - 39	1.54%	98.46%	404.0364	p = 0.0000
40 - 59	6.07%	93.93%		
60 and more	56.93%	43.07%		

Source: Own study

The confirmation of these observations is the test statistics in the Kruskal-Wallis's test, which is highly significant (p = 0.000). Therefore, it can be concluded that the availability of computers and the Internet for different age groups differed significantly from each other. The Kruskal-Wallis test is basically an analysis of variance carried out at ranks. The sum of ranks shown in Table 5 indicate that the higher its value (I have access to a computer and the Internet) in the 18-39 age category, the lower the sum of the ranks (I don't have a computer and Internet access) for age 60 and more. In this case, analysing the average ranks, the conclusion is identical.

Table 5: Kruskal-Wallis test - availability of a computer or other device with Internet access based on age

Dependent: Q Is there a computer or other device with Internet access in your household?	ANOVA of Kruskal-Wallis rank; Independent (grouping) variable: M2. Age Kruskal-Wallis test: H (2, N= 1067) =403.6578 p = 0.000			
	Code	N valid	Sum of ranks	Average rank
18 - 39	1	389	246537.0	633.7712
40 - 59	2	346	210928.5	609.6199
60 and more	3	332	112312.5	338.2907

Source: Own study

The respondents were also asked if a person aged 18 or less lives with them. As it might be expected, the relationship between the answers to this question and access to a computer and the Internet was statistically

significant. Both the chi^2 test and the Mann-Whitney U test confirmed this relationship. However, as in the case of the gender variable, the contingency coefficient assumed a fairly low value of 0.079. Nevertheless, one may risk the statement that such accessibility is easier where the elderly live with people aged 18 and younger. The direction of this relation in the results of the U test appeared very clearly (Table 6). A much higher sum of ranks was obtained for the answer "yes, a child of 18 and less lives with me".

Table 6: Availability of a computer or other device with Internet access against the background of living with a person in the age of 18 or younger

Variable	Mann-Whitney U test (corrected for continuity) In relation to variable: M3.1. Does children under also live in the household? The marked results are significant with p <,05000			
	Sum of ranks Yes	Sum of ranks No	With corrections	p
Q. Is there a computer or other device with Internet access in your household?	348560.0	221218.0	2.599373	0.009340

Source: Own study

Equally interesting are the results of the analysis of the relationship between the availability of the computer and the Internet and the place of residence. It has been hypothesized that this accessibility will increase as the population of the inhabited city increases. This means that it will be the smallest in the villages and the largest in large cities. Meanwhile, the analysis of both the contingency table and the sum of ranks from the Kruskal-Wallis test indicates that we have the highest availability both in large cities and in the village. The V-Cramer coefficient obtained for this compound was 0.2556, which indicates a moderate relationship.

Table 7: Availability of a computer or other device with Internet access against the background of the place of residence

M4. Place of residence	Q. Is there a computer or other device with Internet access in your household?		Chi^2	p
	No	Yes		
1. village	31.04%	68.96%	70,28592	p=,00000
2. town up to 19999 inhabitants	29.05%	70.95%		
3. city with 20,000 to 99,999 inhabitants	11.39%	88.61%		
4. city with 100,000 to 499,999 inhabitants	8.75%	91.25%		

Source: Own study

The observation mentioned above is confirmed with the analysis for this relation presented in Table 8. The reason for this may be the fact that the survey could have been conducted mainly among residents of the metropolitan area (e.g. Szczecin), where access to the Internet and modern technologies is generally higher than in communes distant from this centre or located on the periphery of the province. On the other hand, the villages within it are basically villages by name only.

Table 8: Kruskal-Wallis test - availability of a computer or other device with Internet access based on age

Dependent: Is there a computer or other device with Internet access in your household?	ANOVA of Kruskal-Wallis rank; Independent (grouping) variable: M4. Place of residence Kruskal-Wallis test: H (3, N= 1067) =70.22005 p =,0000			
	Code	N valid	Total ranks	Average rank
1. village	1	335	159586.0	476.3761
2. town up to 19999 inhabitants	2	210	102276.5	487.0310
3. city with 20,000 to 99,999 inhabitants	3	202	117413.5	581.2550
4. city with 100,000 to 499,999 inhabitants	4	320	190502.0	595.3188

Source: Own study
**two highest sums of ranks have been underlined*

Another statistically significant relationship, although not showing significant strength (V-Cramer = 0.094), is the relationship between access to modern technologies and education.

Table 9: Kruskal-Wallis test - availability of a computer or other device with Internet access in relation to education

Q. Is there a computer or other device with Internet access in your household?	ANOVA of Kruskal-Wallis rank; Independent (grouping) variable: M5. Education Kruskal-Wallis test: H (3, N = 1067) = 9.569447 p =,0226			
	Code	N valid	Sum of ranks	Average rank
1. Primary	1	18	11022.5	612.3611
2. Basic vocational	2	67	35545.0	530.5224
3. Secondary	3	384	195845.5	510.0143
4. Higher	4	598	327365.0	547.4331

Source: Own study

Despite the very weak relationship, it can be stated that accessibility increases with the increase in education, which is very clearly illustrated in the sums of ranks in Table 9.

60+ The characteristics of the use of modern information technologies dedicated to tourism by 60+ people compared to other age groups

The results of the research presented earlier confirmed the significant relationship between age and access to a computer with Internet access, which, according to the authors, translates into access to modern information technologies dedicated to tourism. The collected empirical material allowed describing the diversity in access to modern information technologies depending on the age group of respondents, which was a partial goal of the discussion. As already mentioned, 1067 people took part in the study. The research group was diversified in terms of age, however the distribution turned out to be fairly even - 36.5% of the respondents were people aged 18-39, 32.4% were forty and fifty years old, while the percentage of the oldest (60+) people is 31.1%.

79.8% of respondents had a computer or other device with Internet access in their household. This percentage drops significantly in the oldest group - only 43.1% of seniors declared having this type of device in their home. The opposite situation was noted in the youngest group of respondents - in this case almost every respondent (98.5%) has a computer or device with Internet access (Fig. 1)

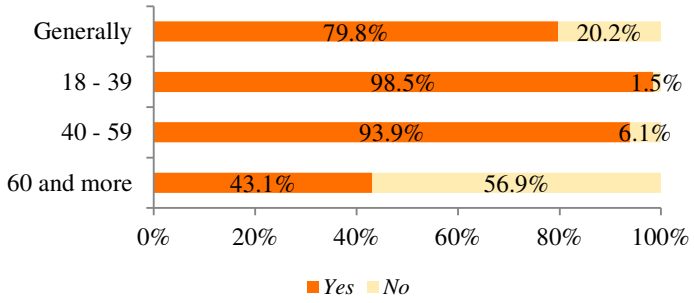

Figure 1: Internet access in households in particular age groups

Source: Own study

Respondents were asked about the frequency with which they use the Internet for the following purposes related to tourist activity: purchase of trips, accommodation booking, purchase of transport tickets (air, bus, train), purchase of tickets for events or searching for information on tourist attractions.

When booking accommodation via the Internet, the differences in the frequency chosen by seniors compared to people younger than them should be considered very large. As can be seen from figure 2, in the case of people over 60 years old, only slightly more than 30% of them answered that they always do it or sometimes, and in the case of people aged 40-59 it was almost 66%.

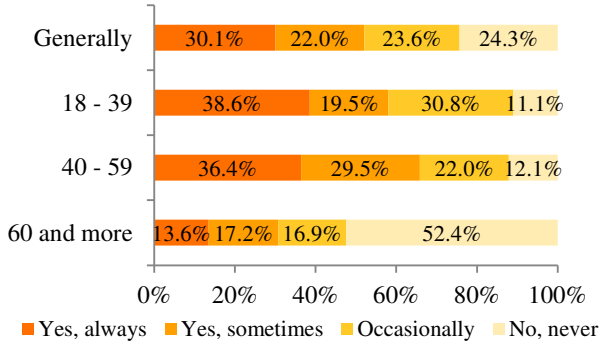

Figure 1: Frequency of booking accommodation via the Internet in individual age groups

Source: Own study

When it comes to buying travel packages over the Internet, nearly 41% of seniors have never done it (Figure 3). The difference between seniors and younger people is no longer as high as for accommodation booking, as it is 11.2 percentage points between people aged 40-59 and 9.1 percentage points compared to people from the youngest group of respondents. This may be due to the fact that younger people increasingly prefer to organize tourist trips on their own.

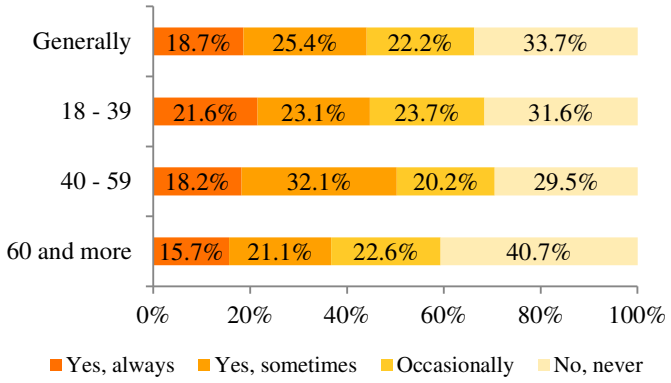

Figure 3: Frequency of booking accommodation via the Internet in individual age groups

Source: Own study

For people over 60 years old, booking a car via the Internet should be emphasized. Despite the fact that only nearly 13% of seniors replied that they always do it via the Internet, which was close to the values calculated for younger people, only 32.5% said that they never do it. In the case of respondents in the 40-59 age group, as many as 72% of respondents answered that they never book a car via the Internet. The reasons for this can be seen in the fact that younger people travel more often in their own cars or other means of transport.

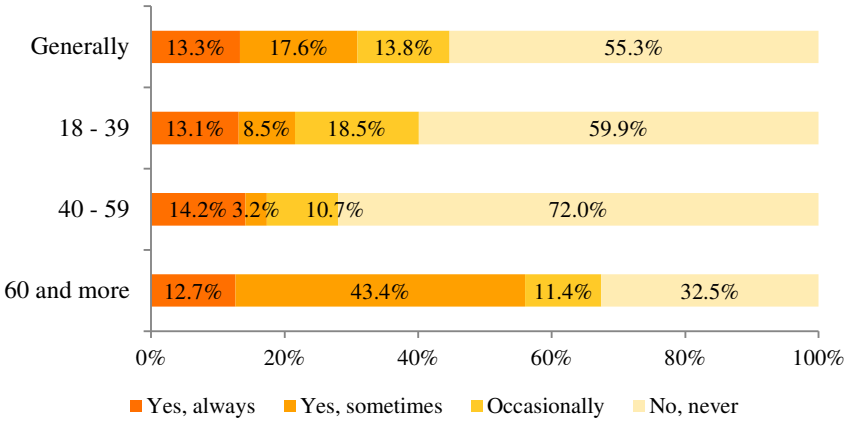

Figure 4: The frequency of booking a car via the Internet in individual age groups

Source: Own study

For older people, the Internet is also less often used to buy tickets for various events. Only less than 7% of respondents aged 60+ make such reservations "always", and nearly 50% replied that they do not do it at all. In the case of respondents aged 18-39, as much as 44% declared that this is the way they always buy such tickets.

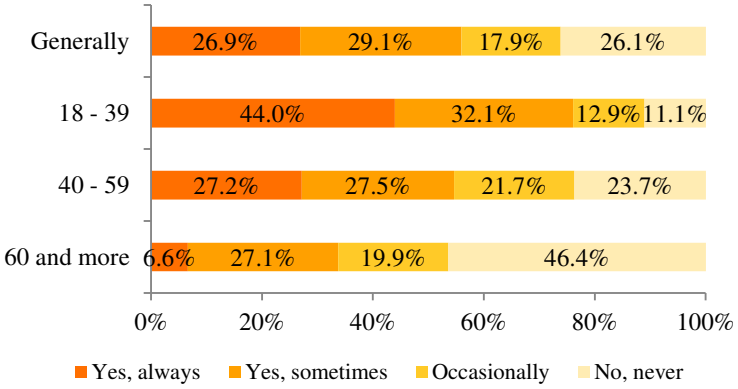

Figure 5: Frequency of purchasing tickets for events (cultural, sporting) via the Internet in individual age groups

Source: Own study

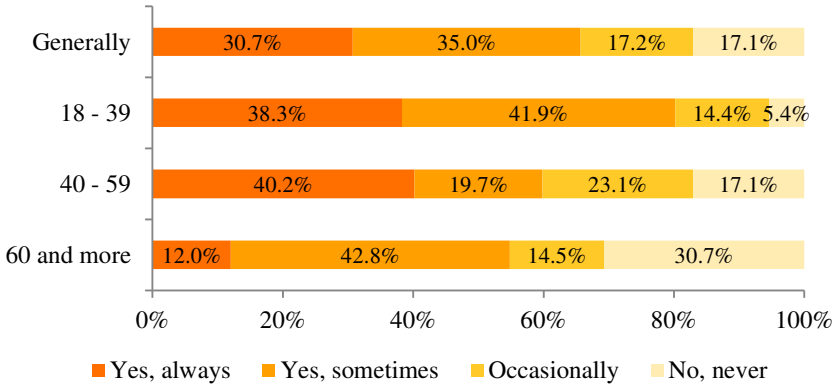

Figure 6: Frequency of searching for information on tourist attractions on the Internet in particular age groups

Source: Own study

Based on the analysis of the conducted surveys, it can be concluded that for all age groups the Internet is a source of searching for information on tourist offer or tourist attractions. Most often, however, people under the age of 60 search for information in this way. About 40% of them replied that they always use the Internet when searching for such information. In the case of seniors, 12% answered definitely yes and over 42% said yes, but sometimes. (Fig. 6)

Summary

The results of the research and literature analyzes confirmed that age is the most important socio-demographic factor determining the availability of modern information technologies in tourism, based on the Internet. (Niemczyk, 2016; Niehaves and Plattfaut, 2014; Abbey and Hyde, 2009; Friemel, 2014).

Furthermore, noteworthy is the fact that the availability of modern information technologies is influenced by the presence in the household of persons under 18 years old. It allows to recognize that thanks to the integration of generations, the degree of digital divide of seniors may decrease. The research has shown that internet access is less and less dependent on the place of residence. This may result from actions taken in Poland and other EU countries aimed at compensating for differences in Internet access in cities and in rural areas. This does not mean, however, that the opportunities offered by digitization of the village were equally used by both younger and older residents. The valuable information is that the research showed a weak relationship (although statistically significant) between the accessibility and education of the inhabitants of Zachodniopomorskie province. The reason for this situation may be the fact that in Poland the level of education will start to rise, and generations that exceed the threshold of 60 are more and more educated than it was years ago. Therefore, the strength of this relationship may weaken further in the following years. A detailed analysis of the frequency of using modern internet solutions dedicated to potential tourists, showed differences between people 60+ and younger groups. The biggest differences concerned booking accommodation. Seniors have done this much less frequently than younger people. On the other hand, when buying tourist packages via the Internet, the differences between younger respondents and older ones were not very high. This does not necessarily mean that seniors make better use of such purchases in this respect, and it may be the result of younger tourists preferring independent organization of tourist trips. Seniors definitely less often than other respondents, use online methods of booking tickets for various types of cultural or sporting events.

The differences presented, the results of own research and a review of secondary sources allow to state that seniors are still a group affected by digital divide, which also translates into their lower availability of information technologies dedicated to tourism, facilitating planning and organization of tourist trips. Undertaking actions aimed at levelling inequalities in access to modern information technologies concerns a number of entities, both entrepreneurs and local governments, or central organizations. These activities should aim to improve the digital competence of seniors. The digital inclusion of seniors can in fact bring many positive effects. Improving the digital skills of older people can translate into increased motivation and willingness to use modern solutions dedicated to tourism. One should agree with Batorski (2009a, 2009b) that the Internet may become a source of equal opportunities if it is used by particularly vulnerable people, otherwise it may perpetuate old inequalities or contribute to new ones. In the face of the growing importance of modern technologies in tourism, the lack of

activities conducive to digital inclusion of seniors may contribute to widening the inequalities in tourism accessibility. Digital divide may aggravate inequalities in tourism activity.

It should be emphasized that the considerations and studies carried out do not fully cover the topic. Although the research did not show significant differences in the group of seniors, it is worth emphasizing that this segment is heterogeneous. There is a gap in world literature regarding the use of modern information technologies by the elderly, which is also pointed out Niehaves and Plattfaut (2014).This creates a premise for further research among seniors. It is postulated to perform analyses regarding the motives for (not) using modern IT solutions, knowledge about the possibilities of using modern technologies in tourism, and acceptance of introduced innovations. In addition to research related to demand, it is worth looking at solutions of the tourism industry in terms of their functionality and usability for seniors. Finding solutions to bridge the digital divide among seniors will not only benefit the elderly, but will also contribute to socio-economic development.

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Accessibility of Tourism and Leisure Services as an Attribute of an Urban Space

Beata MEYER
University of Szczecin, Faculty of Economics, Finance and Management, Institute of Spatial Management and Socio-Economic Geography, Department of Spatial Management, Szczecin, Poland
beata.meyer@usz.edu.pl

Abstract

The contemporary lifestyle contributes to a much higher level of both indoor and outdoor recreational activities. Despite a progressive increase in the number of people participating in tourism and recreation, there is a clear difference in the spatial accessibility of this type of services. Rural residents seem to use tourist and recreational services to a lesser extent than urban residents. The aim of this paper was to compare and evaluate the availability of tourist and recreational services in urban and rural areas, based on the example of the West Pomeranian Voivodeship (Poland). The terms "availability" and "accessibility" are used interchangeably throughout the paper, as it deals with the issue of tourism and leisure activities existing (being available) in different areas as well as whether they are easy to participate in (accessible) for the areas' residents. Computer-aided telephone interviews (CATI) and the non-parametric correlation method (Spearman's rank order correlation) were used in the study. The conducted research has shown that in the West Pomeranian Voivodeship the availability of recreational services in urban areas is much higher than in rural areas, while the availability of tourist services does not show significant differences in urban and rural areas (these results require a wider multi-factor analysis). However, on the basis of the conducted research it can be assumed that the availability of recreational services is an attribute of an urban space.

Keywords: urban space, tourism, leisure, West Pomeranian Voivodeship (Poland).

Introduction

Changes in preferred lifestyles which promote, i.a. healthy, environmentally friendly and active behaviours, contribute to the evolution of leisure activities, thus increasing the importance of both indoor and outdoor active recreation. The growing number of tourists and their travels are also a result of the recognition of traveling as an element of modern life and, to some extent, a determinant of life status. Despite the increase in the number of people participating in tourism and recreation, a clear difference in the spatial accessibility of this type of services is visible. Rural areas, despite the fact that they have the potential for development of the infrastructure and recreational services, are often deprived of them, the inhabitants of these areas also use tourist services much less frequently. Privileged areas, i.e. urban areas fulfilling many diversified functions, also those ensuring a high quality of life for the inhabitants, are nowadays becoming dominant. Among them, services providing satisfactory use of free time, related to tourism and recreation, are of significant importance. The aim of this paper is to compare and evaluate the accessibility of tourist and recreational services in urban and rural areas, based on the example of the West Pomeranian Voivodeship.

The dynamic development of urban areas in the 21st century is strongly connected with the process of globalisation (Koutrit, Nijkamp and Partridge, 2015; Spooner, 2015; Haggag, 2004; Maik, 2003; Nijkamp & Koutrit, 2013; Clark, 1967; Szmytke, 2013; Elmqvist et al., 2018), and one of its consequences is the deepening diversification of urban areas, visible also in their nomenclature. Cities, metropolises, metropolitan areas, urban agglomerations, conurbations, big cities or urban areas are defined in various ways, most often depending on the purpose of the study, using legal, demographic, functional, physiographic or economic attributes (Hall and Pfeiffer, 2013; Gregory, Johnston, Pratt, Watts and Whatmore, 2009; Ben Amer, 2016; Dijkstra and Poelman, 2012; Dijkstra, Poelman and Veneri, 2019). For the purpose of this study which aims only at providing a general distinction between urban (including metropolitan) and rural areas, a legal criterion was adopted, which states that in Poland rural areas are any terrains outside the administrative boundaries of towns and cities (The Act of 29 August 2003 on official names of localities and physiographic objects.). Referring to any areas that are not rural areas, this paper will alternatively use the terms 'urban area', 'urbanised area' and 'urbanised areas'.

The development of urban areas, which can be observed on many levels, becomes a key determinant of development opportunities in all regions, regardless of their current level of advancement. The number of urbanised areas is

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increasing, and so is the total urban population and the space taken up by cities (also as a result of the 'urban sprawl'). Apart from the size (in terms of population and surface area), urbanised areas are distinguished by an increasingly wider spectrum of functions (endogenous and exogenous), greater concentration of capital and new technologies, the number and level of services provided (mainly of a higher level) and growing impacts on the environment in global and/or local terms. In the context of creating a 'network of cities' in a global system, a loosening of ties with the immediate environment for close cooperation and exchange of diversified goods and services with similar entities is observed. Progressive qualitative and quantitative urbanisation intensifies the phenomenon of competition between urban areas, whose attractiveness is nowadays mainly related to (Kolko, Glaeser, and Saiz, 2000):

- The multiplicity and diversity of available goods and services, of both global and local character,
- Aesthetics of the surroundings and comfort of life, including climate, weather, clean environment, location, attractiveness of the area,
- Availability and quality of public goods (one of the consequences is the level of security),
- Ease of movement within the urban area, determining access to consumer goods.

Contemporary urban areas are multifunctional spaces that provide an environment for diverse human activities. Many elements forming a system of mutual connections and relations, attractive for both permanent and incidental users, are combined within an urban space (Gorzelak, 2008). The most important determinants of urban development are factors such as living conditions, aesthetics of the environment or attractiveness for tourists, reducing the importance of such factors as: infrastructure, land rent or agglomeration benefits (Bontje and Musterd, 2009). This is a reflection of the contemporary trend of creating XXQ cities (XXQuality), i.e. offering quality of life at the highest possible level, which is directly related to the character and quality of the city space (Nijkamp, 2008). The overriding goal of an urban system should be the maximum optimisation of all its elements leading to the highest possible quality of well-being, life and work in urban areas.

Changes in the preferred way of life mainly concern the increase in leisure time and changes in the preferred types of activities, with a particular emphasis on healthy and pro-ecological behaviours (Meyer, 2015). This increases the importance of tourism and recreation for quality of life assessment, especially in urban areas, the development of which has so far taken little account of the needs of inhabitants related to the standard of living in the city. Tourism and recreation create various possibilities of undertaking leisure time activities (in the long and short term) important from the point of view of functioning of both individuals and entire communities. Tourist services such as: organisation and sale of tourist events, tourist information, travel counselling and agency services, tourist guidance and piloting, tourist transport, accommodation and catering services, etc., enable implementation of leisure time activities outside the place of permanent residence. Recreation, understood most often as an activity undertaken by people voluntarily in their free time (i.e. also during tourist trips), may take place on a daily basis in the area of permanent residence. Recreational spaces are created, the nature of which allows to distinguish between open space (outdoor activity) and closed space (indoor activity), and within their framework it is possible to distinguish spaces occupied by specific types of recreational activities (e.g. swimming, dancing, walking). Moreover, each type of space may represent a formal space (organised and/or paid activities) or an informal one (free-of-charge activities, carried out in an individual way) (Meyer and Niezgoda, 2018). Recreational spaces are often located in close proximity to places of residence, and the form of their development affects the aesthetics of the environment.

Tourism and recreation services not only enrich the service offer available in urban areas, contributing to improvement of their competitive position, but also enhance the quality of life of the inhabitants, shaping important aspects of modern lifestyles. The growing importance of tourist and recreation services among factors contributing to the quality of life and as a sector of the economy, together with their growing concentration in urban areas, makes them one of the most important attributes of an urban space.

Materials and Methods

The West Pomeranian Voivodeship is situated in the Baltic Region (Klemeshev, Korneevets, Palmowski, Fedorov and Studzieniecki, 2017), in the north-western part of Poland. It has an area of almost 23,000 km^2 and is inhabited by 1.7 million people, which is about 4.5% of the population of Poland. The West Pomeranian Voivodeship is characterised by a small predominance of women (51.4%) over men (48.6%). In the urban areas the prevalence is even greater (52.3%), while in the rural areas women are slightly less numerous than men (49.6%). The urbanisation rate in the West Pomeranian Voivodeship (68.5%) is one of the highest in Poland (60.5%), next to Śląskie and Dolnośląskie Voivodeships. The high urbanisation rate results from a fairly evenly distributed network of cities and low population density of the average village (http://eregion.wzp.pl/wskaznik/wskaznik-urbanizacji). In 2018, there were 3,081 localities in the voivodeship, including 66 towns and cities and 3,015 villages. The West Pomeranian Voivodeship is dominated by small towns with a population of 2000 - 5000 (there are 27 of them), only in two cities

the population exceeds 100,000 inhabitants (Szczecin and Koszalin). In terms of population density, the West Pomeranian Voivodeship is one with the lowest population density in Poland (75 persons/km^2, while the country average is 123 persons/km^2), next to the Warmińsko-Mazurskie, Podlaskie and Lubuskie Voivodeships.
In order to determine the differences in the availability of tourist and recreation services between the urbanised and rural areas in the West Pomeranian Voivodeship, computer-aided telephone interviews (CATI) were used. The questionnaire included 12 closed and semi-open questions of a cyclical and disjunctive nature, aimed at learning the respondents' opinions on the accessibility of tourist and recreation services, and also 8 demographic questions.

The following formula was used to calculate the minimum sample size:

$$n = \frac{u_\alpha^2}{4d^2}$$

where:

d - maximum estimation error allowed - accepted at the level of ± 3%;
u_α^2– value read from the distribution tables of the normal distribution for the significance level □□□□□□□□
The minimum sample size was 1067 people.

The study covered 1067 persons living in the West Pomeranian Voivodeship, of whom: 31.4% lived in rural areas and 68.6% in urban areas; 51.8% of the respondents were women, 48.2% were men.
The non-parametric correlation method (Spearman's rank order correlation) was applied in the study, which allowed for the identification of statistical relevance of the correlations as well as the determination of their intensity and direction.

Diversification of accessibility to tourist and recreation services in the West Pomeranian Voivodeship

The use of tourist services is associated primarily with tourist travel and related services such as accommodation, catering, tour guiding or use of tourist attractions. According to the Polish Centre for Public Opinion Research, in 2018 60% of Poles went abroad for tourism purposes for at least 2 days. They were mainly urban residents - 59% of the town dwellers from towns with fewer than 20,000 inhabitants, and 81% of the city dwellers from cities with at least 0.5 million inhabitants. In the group of rural residents, 44% of the people travelled. In the following year, almost 64% of Poles were planning to go on a tourist trip, including 90% of those who travelled in 2019 and 27% of those who did not.

A detailed multi-dimensional analysis confirms that tourist trips are an element of the lifestyle of well-educated, wealthier Poles, most often those living in cities. Taking such trips is much less frequent among rural residents, especially family farm owners and their family members.

However, tourist services are also provided in the place of residence of a potential tourist and most often they are a precondition for taking a trip. Due to the objective of the study, which was to determine the diversification of accessibility of tourist and recreational services in urban and rural areas, other determinants of tourist trips, such as leisure time, economic situation, health condition and the like, were deliberately omitted. Services that consist in organising tourist events, sale (or agency sale) of tourist packages and selected tourist services, booking and sale of transport services, tickets for cultural and sports events, tourist insurance, as well as travel counselling, agency and tourist information services are provided mainly in tourist offices (both in-store and online).

One visit to a travel agency per year was declared by 15% of the rural population (RP) and 25% of the urban population (UP), among whom the inhabitants of the smallest urban units (up to 20,000 inhabitants) chose this possibility most often (30%). Visiting a tourist office twice a year was the choice made by almost 7% of RP and about 11% of UP, and 3-4 times a year by ca. 15% of RP and ca. 6.5% of UP. 60% of RP and 53% of UP declared that they had never been to a travel agency and had never availed themselves of its tourist offer. Among other respondents, 18.5% of RP and 26.5% of UP indicated that they bought services from a travel agency once a year. Buying the largest number of tourist products in a travel agency (more than 3 during the year) was declared by approx. 15% of RP and approx. 7.5% of UP.

Residents of the rural and urban areas used the tourist information services similarly, about 43% declared that they did not use them at all, and about 20% indicated that they used them once a year. Among the city dwellers, tourist information services were the least used in medium cities (from 20,000 to 100,000 inhabitants), 13% indicated one-

off use of such services, while 53% did not use them at all. This group of city dwellers was also the least likely to visit tourist offices and buy their services.

Tourist services may also be provided by entities other than tourist offices. Tourist events are organised by schools, parishes or associations. Approx. 52.5% of RP and 47.5% of UP availed themselves of this type of offer, and over 30% of RP used them more than once a year, i.e. more often than any services of professional tour operators (travel agencies). Among UP, there was a clear tendency that the larger the city, the less often the residents used this type of offer.

Tickets for means of transport related to tourist travel were purchased by approx. 56% of RP and almost 70% of UP, while over 20% of the inhabitants of the largest cities bought them more often than four times a year.

Summing up the responses concerning the use of particular tourist services, it was found that about 14% of the respondents used all the services listed in the questionnaire, which accounted for about 8% of RP and 16.5% of UP. The remaining persons stated that the main reason for refraining from using tourist services in the place of residence was organising trips on their own (this response was chosen mainly by the inhabitants of the largest cities, and villages), lack of need to use such services and lack of time, and financial reasons (mainly RP). Both the inhabitants of the rural and urban areas did not indicate the lack of entities providing such services as the main reason for not using tourist services in their place of residence.

Tourist services were available not only in the form of in-store offers, but also online. Over 69% of RP and 85% of UP declared that they had a computer or another device with internet access in their households, and about 18.5% of RP and UP always bought tourist services in this way. 40% of RP and 31% of UP never bought tourist products via the internet, the others used this method occasionally. Cars were hired online much more often by rural inhabitants (51%) than by city dwellers (42%), also tickets for means of transport connected with travel were purchased by most of the respondents living in rural areas and cities (65% of RP and 78% of UP). Tourist information was always sought on the internet by 19% of RP and 27% of UP, and this source of information was most frequently used by the inhabitants of the largest cities (41%).

The assessment of availability of recreational services (Table 1), understood as the possibility of practicing a specific form of recreation in the place of residence (availability of an appropriate infrastructure, distance to it, opening hours) is definitely different among the inhabitants of the rural and urban areas of the West Pomeranian Voivodeship. Residents of the rural areas assessed the availability of most forms of recreation as very poor (usually over 20% of such responses), while among the urban residents this opinion was shared by fewer than 5% of the surveyed. UP rated the availability of cultural services in the form of theatre as the worst (12.2% of very bad ratings, and 19.5% of the smallest towns) and indoor swimming pools (about 10% of very bad ratings). The availability of gyms/fitness clubs was assessed as very bad by one-third of RP, and 25% of them thought the access to outdoor gyms was very bad, too. Over 20% of RP also considered the availability of an indoor swimming pool, organised sports and recreation activities, cinema and theatre as very bad. This was related to the declared lack of such facilities/ an appropriate offer in the place of residence of the respondents. The best opinion of the inhabitants of the urban and rural areas was given for the availability of an outdoor park and gym (very good opinion in both cases was given by approx. 43% of UP and approx. 23% of RP), of pitches and bicycle paths (approx. 38% of UP and 23% of RP). UP also rated very highly the access to cinemas (39%) and gyms/ fitness clubs (37%). The conditions of using the recreational services (access, parking lots, marking, cleanliness and equipment of facilities) were assessed as average by both groups of respondents. However, the main factor limiting the participation in recreation activities by RP was the distance to the recreational facilities (almost 26%, UP below 4%), while for UP it was lack of time (17.3% UP, 12.5% RP). For UP the limiting factor was also the health condition (10.7%, RP 1.8%), especially in the smallest towns (19.7%).

Table1: Assessment of availability of recreational services by urban and rural population in the West Pomeranian Voivodeship

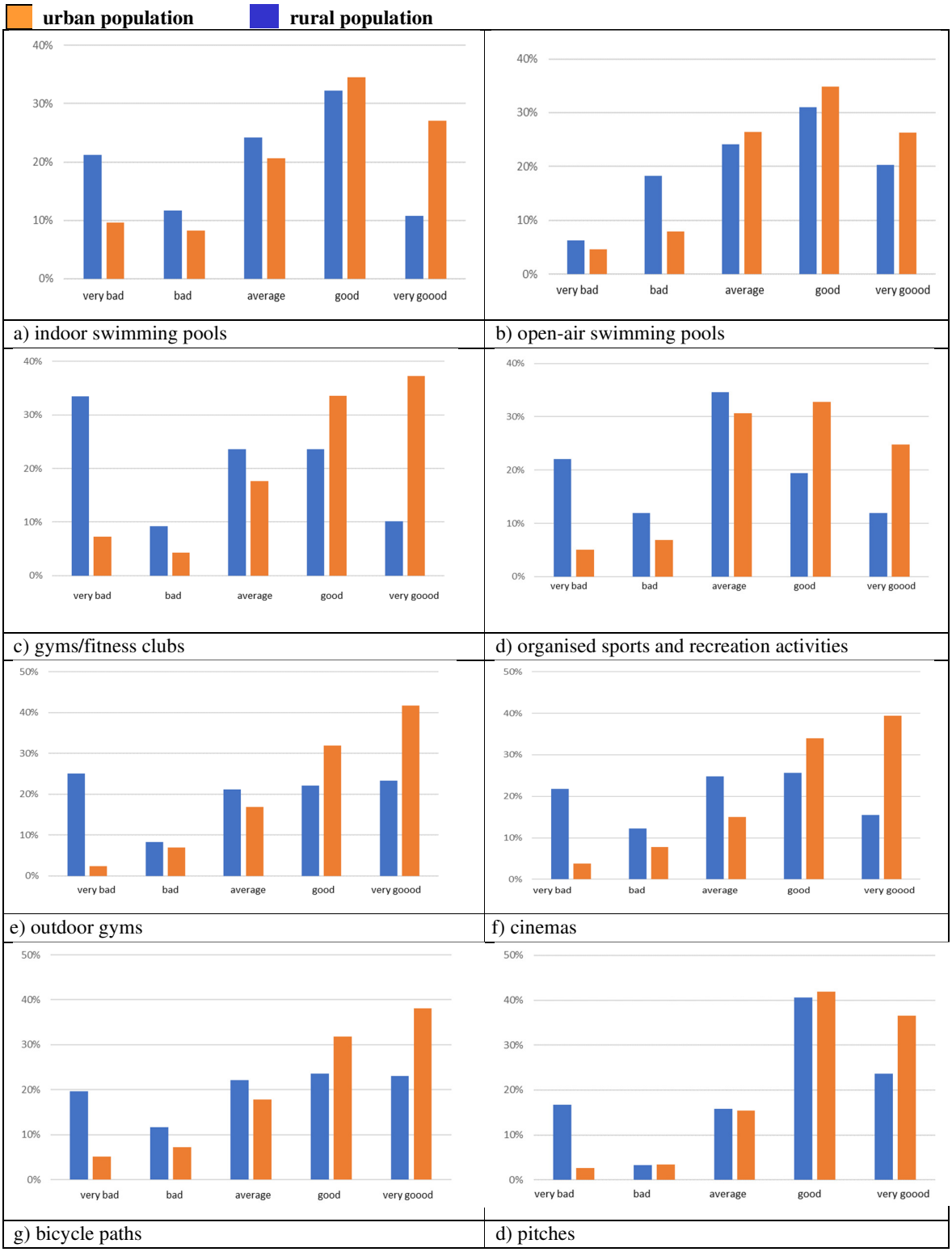

Source: own elaboration

The presented relations were additionally confirmed using the non-parametric correlation method (Spearman's rank order correlation), selected due to the presence of qualitative and quantitative variables in the study, indicating a monotonic relationship for any distribution of variables. Apart from statistically insignificant (apparent) correlations,

positive and negative correlations of different intensity were found. It was confirmed, among other things, that the use of tourist information services was not determined by the place of residence, and the assessment of availability of facilities such as a cinema, theatre, performance halls, or organised sports activities was highly dependent on the place of residence.

Conclusion

The presented research results allow us to conclude that the West Pomeranian Voivodeship is characterised by a clear difference in the availability of recreational services in urban and rural areas. One-fifth of the rural population assessed the availability of all forms of recreation as very bad and at the same time they declared that a long distance from the place of residence was the main factor limiting their participation in recreation activities. On the other hand, over ¼ of inhabitants of the urban areas assessed the availability of all forms of recreation as very good, and lack of time was for them the main factor limiting their recreational activity. For both analysed groups, other factors (e.g. prices of services, health condition, opening hours) did not constitute a significant limitation for using recreation facilities. In the case of tourist services, the results of the study did not show any significant differences in their availability in the urban and rural areas, and they were so diverse that they require a wider multi-factor analysis which may make it possible to find links between different factors influencing the availability of tourist services in the studied areas.
However, on the basis of the conducted research it can be stated that the availability of recreational services in the urban areas was much more extensive than in the rural areas. Their particularly positive evaluation by the respondents may confirm the fact that the contemporary lifestyle promoting recreational activity clearly influences the development of the possibility of implementing such activity in urban areas, and the availability of recreational services is one of the main attributes of an urban space.

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Machine Learning for Text Analysis: A Systematic Review

Mayte MODESTO-JAVIER
Universidad Autónoma del Perú, Lima, Perú,
cmodestoj@autonoma.edu.pe

Smart VELÁSQUEZ-TAMAYO
Universidad Autónoma del Perú, Lima, Perú,
svelasquezt@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Señor de Sipán S.A.C., Chiclayo, Perú,
jgamboa65@hotmail.com

Guillermo PAUCAR-CARLOS
Universidad Nacional de San Antonio Abad del Cusco, Cusco, Perú,
guillermo.paucar@unsaac.edu.pe

Juan GAMARRA-MORENO
Universidad Nacional Mayor de San Marcos, Lima, Perú,
jgamarram@unmsm.edu.pe

Fernando SINCHE CRISPÍN
Universidad Nacional de Huancavelica, Huancavelica, Perú
fernasinchec@gmail.com

Abstract

Text analysis is a fundamental tool in the development of education. However, UNESCO figures indicate that the majority of children have comprehension difficulties, which can result in reasoning problems, difficulty in understanding the theory, and gaining knowledge. This article presents a systematic review of the literature (SRL) regarding text analysis and the use of machine learning (ML) to improve this process. The results indicate that ML learning techniques are effective in the improvement of text analysis.

Keywords*:* Machine Learning, Text Analysis, Natural Language Processing, Systematic Literature Review.

Introduction

Text analysis is one of the most important activities when reading as it enables the understanding of the message that a certain text conveys. However, it is frequently hindered due to the lack of a good reading habit. According to UNESCO figures (UNESCO, 2019), six out of every ten children do not reach the minimum comprehension levels, which is alarming as this can seriously affect children's development. Studies have shown that the use of machine learning (ML) techniques can improve the text analysis process. Furthermore, studies indicate that the use of natural language processing (NLP) enables the analysis of different text fragments by ML techniques. Therefore, in this study, we aim to demonstrate the effectiveness of ML techniques to improve text analysis. The rest of the article is organized as follows: Section II describes the background and related works. Section III details the methodology used to elaborate the systematic literature review (SLR), Section IV shows the results obtained to answer the research questions posed, and Section V reports the discussion and future work.

Background and Related Work

In recent years, ML has been used in researches in different areas [60]. In the field of text analysis, it is used to

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analyze keywords and quotations [20]. Combined with NLP, which focuses mainly on identifying the text, ML helps in extracting information and summarizing documents [23].

One of the topics investigated in ML is the analysis of feelings, which is applied in different areas such as marketing, politics, and news analysis, enabling the extraction of the point of view through the text [22] [54]. Gamal [16] stated that sentimental analysis uses ML algorithms to extract relevant information and classify opinions as positive or negative, and it solves problems through techniques for data processing in websites, blogs, and social networks [40][38]. This process also applies NLP for textual linking, which allows text comprehension and the organization of syntactic relations [24][37][66]. In NLP, the human understanding of the language depends on the target language [4][6][10], and it focuses on learning each word or phrase for the training [69].

Budhiraja & Wizard [9] indicated that reading large quantities of documents is time-consuming; however, the use of ML enables reading at a higher speed with the required accuracy [68] and assists in the classification of the text [35]. From the above, it can be concluded that text analysis has only been applied to the evaluation of fragments or short texts. Hence, in this SRL we will focus on applying ML techniques to analyze texts from documents, books, among others, thus helping readers to improve their analysis.

Review Method

The SRL is composed of studies of a particular subject with summarized information (Manterola et al., 2013) aiming to collect data for a research (Garcia-Peñalvo, 2020). In addition, a good practice of analysis is important to obtain better evidence (Óscar A. & Beltrán G, 2005).

- The SRL guarantees validity and accuracy of the study performed, and quality and reliability of the results obtained (Manterola et al., 2013);
- It uses observational design and major preparatory studies (Garcia-Peñalvo, 2020);
- In quantitative studies, meta-analysis can be used for better results (Óscar A. & Beltrán G, 2005).

This article was based on the SRL of ML. The research questions, sources of search, search equation, exclusion criteria, quality criteria, selected studies, and findings are presented as follows.

Research Questions

The review starts by the formulation of the research questions, which will be the basis of the search for studies on ML techniques in text analysis. Thus, the following questions were proposed:

RQ1: *What are the criteria for measuring the effectiveness of ML developed by means of NLP in the improvement of text analysis?*
RQ2: *Who are the most active authors in the area?*
RQ3: *In which areas has ML been applied?*
RQ4: *What type of computer support have ML techniques provided?*
RQ5: *Which ML tools have been used with text analysis?*

Data Sources and Search Strategy

In this study, ten different search engines were used for the review of articles in journals and conferences, as shown in Table 1.

Table 1: Manual Search Sources

Search Sources
ProQuest
Science Direct
IEEE Xplore
Taylor & Francis Online
DOAJ
ERIC
IOP

EBSCOhost
Scopus
Wiley Online Library

The search was automatically performed in the search engines using search terms grouped by variables, as shown in Table 2.

Table 2: Search terms

Search Terms	Description
Machine Learning	Independent Variable
CRISP-DM (Cross Industry Standard Process for Data Mining)	Intervening Variable
Methodology Method Model	
Text Analysis	Dependent Variable

CRISP-DM is the intervening variable that provides an orderly research and text analysis. The search terms resulted in equations for each source, which are shown in Table 3.

Table 3: Source and Equation

Source	Search string
ProQuest	(machine learning) AND (crisp-dm OR methodology OR model OR method) AND (text analysis)
Science Direct	"machine learning" AND (crisp-dm OR methodology OR method OR model) AND ("text Analysis")
IEEE Xplore	((((("Full Text & Metadata": machine learning") AND "Full Text & Metadata": "text analysis") AND "Full Text & Metadata": crisp-dm*) OR "Full Text & Metadata": Methodology) OR "Full Text & Metadata": Method) OR "Full Text & Metadata": model)
Taylor & Francis Online	[All: "machine learning"] AND [[All: crisp-dm] OR [All: methodology] OR [All: method] OR [All: model]] AND [All: "text analysis"]
DOAJ	machine learning AND (crisp-dm OR methodology OR method OR model) AND text Analysis
ERIC	"machine learning" AND (crisp-dm OR methodology OR method OR model) AND "text Analysis"
IOP	machine learning AND (crisp-dm OR methodology OR method OR model) AND text Analysis
EBSCOhost	TX machine learning AND TX (crisp-dm OR TX methodology OR TX method OR TX model) AND TX text analysis
Scopus	ALL ("machine learning" AND (crisp-dm OR methodology OR method OR model) AND "text Analysis")
Wiley Online Library	"machine learning" anywhere and "crisp-dm OR methodology OR method OR model" anywhere and "text analysis" anywhere

Identified Studies

A large number of documents were found using the search performed in the search engines. The largest number was reported by Ebscohost followed by ProQuest. The specific numbers for each search engine are shown in Fig 1.

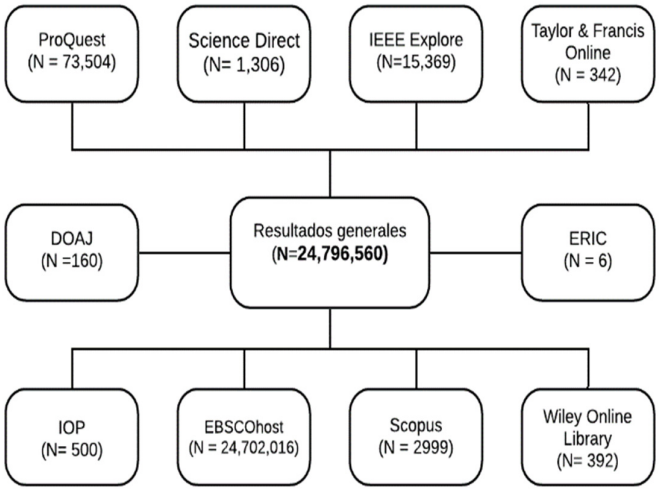

Fig. 1: Results by source

Exclusion Criteria

Due to the extensive volume of information found, exclusion criteria were chosen. The first was to exclude articles that are more than three years old because this study topic is rapidly evolving. Second, information languages were selected (English or Spanish), excluding the other works. Subsequently, articles not related to technology and those that do not apply ML were excluded. In sequence, works that do not use algorithms or predictive methods, which are fundamental to this research, were excluded.

In addition, articles containing qualitative data, articles that do not conduct experimentation fundamental to the predictive methods, and studies with samples smaller than 30 were also excluded.

Study Selection

A total of 24769560 results were found with the use of search equations. The first five exclusion criteria were sequentially applied. The last two criteria were grouped. The final result was 80 items, as shown in detail in Fig 2 and Table 4.

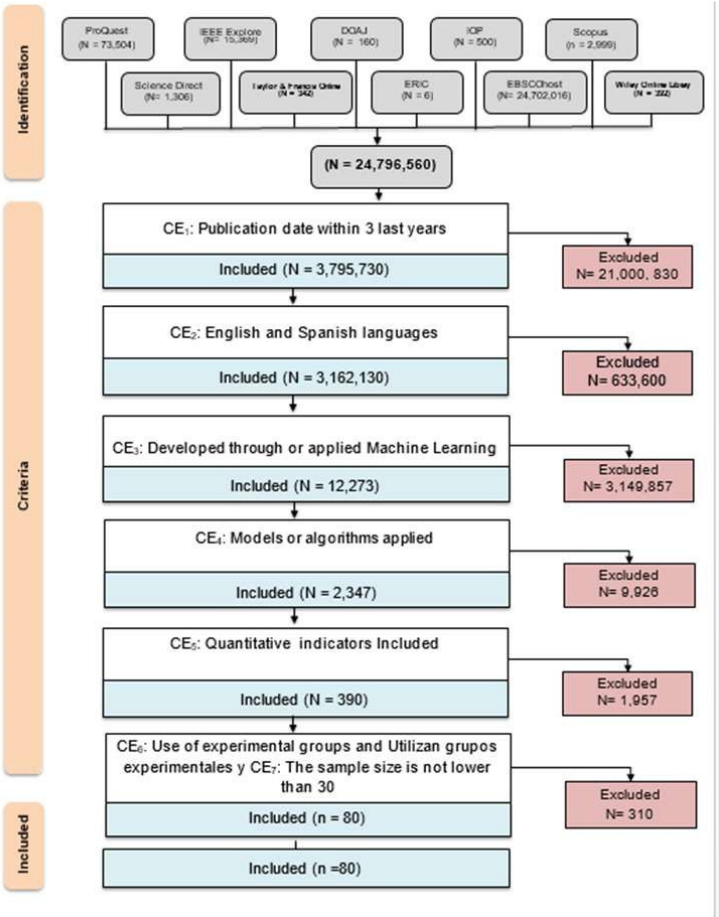

Fig. 2: Study selection process

Table 4: Study selection process

Source	Search chain	N° of base result	N° of excluded results 1st filter (criterion 1, 2 and 3)	N° of excluded results 2nd filter (criterion 4 and 5)	N° of excluded results 3rd filter (criterion 6 and 7)
ProQuest	(machine learning) AND (crisp-dm OR Methodology OR model OR method) AND (text analysis)	**73504**	3309	36	**11**
Science Direct	"machine learning" AND (crisp-dm OR methodology OR method OR model) AND ("text Analysis")	**1306**	21	10	**5**
IEEE Explore	((((("Full Text & Metadata":"machine learning") AND "Full Text & Metadata":"text analysis") AND "Full Text & Metadata":crisp-dm*) OR "Full Text & Metadata":Methodology) OR "Full Text & Metadata":Method) OR "Full Text & Metadata":model)	**15369**	381	14	**9**

Taylor & Francis Online	[All: "machine learning"] AND [[All: crisp-dm] OR [All: methodology] OR [All: method] OR [All: model]] AND [All: "text analysis"]	**308**	44	20	**6**
DOAJ	machine learning AND (crisp-dm OR methodology OR method OR model) AND text Analysis	**160**	21	16	**5**
ERIC	"machine learning" AND (crisp-dm OR methodology OR method OR model) AND "text Analysis"	**6**	2	2	**2**
IOP	machine learning AND (crisp-dm OR methodology OR method OR model) AND text Analysis	**500**	275	96	**7**
EBSCOhost	TX machine learning AND TX (crisp-dm OR TX methodology OR TX method OR TX model) AND TX text analysis	**24702016**	8067	157	**12**
Scopus	ALL ("machine learning" AND (crisp-dm OR methodology OR method OR model) AND "text Analysis")	**2999**	114	25	**16**
Wiley Online Library	"machine learning" anywhere and "crisp-dm OR methodology OR method OR model" anywhere and "text analysis" anywhere	**392**	39	14	**7**
	Total	**24796560**	**12273**	**390**	**80**

Quality Assessment

In this step, the quality criteria were formulated and applied, as follows:

QA1: The findings of the investigation are clearly explained.
QA2: The research methodology is clearly explained.
QA3: Research objectives are clearly identified in the document.
QA4: Results are clearly identified and reported from the experiments performed.

The review of the quality criteria was done after the exclusion criteria, and it helped in filtering the selected items to choose the most relevant for the research. All 80 articles met the four quality assessment criteria.

Study Classification

The 80 selected articles were sorted by a search source using the Zotero tool to store the items, as shown in Fig 3.

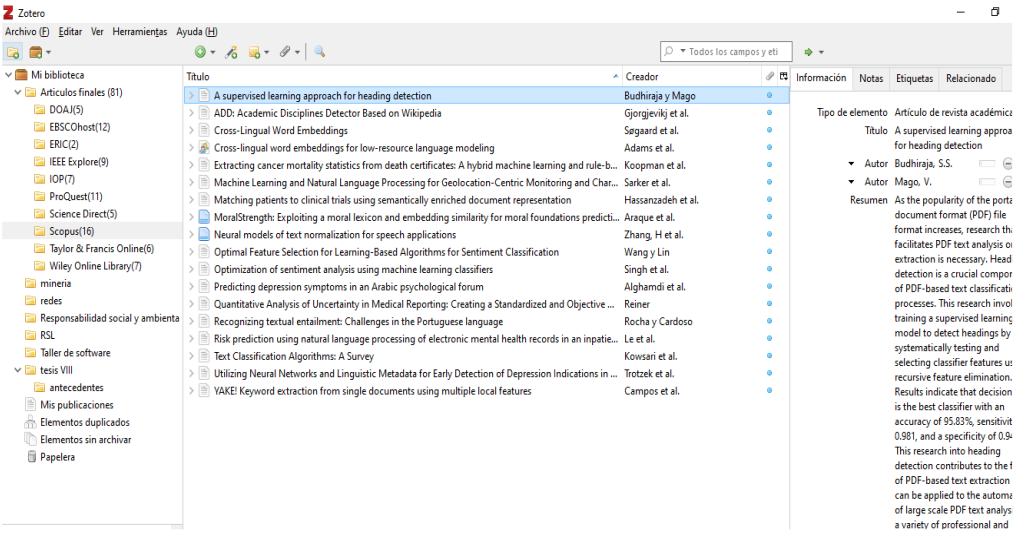

Fig. 3: Reports in Zotero

Study Review

A manual review of the selected articles was performed, assessing whether each study contributed to answering the research questions and analyzing the relationship between the variables to determine if the articles were suitable for research. Then, the most relevant data from each article was extracted.

Synthesis of findings

The selection process (Fig 2) resulted in 80 studies, which were extracted and analyzed. Fig 4 shows the number of studies found per year and their source.

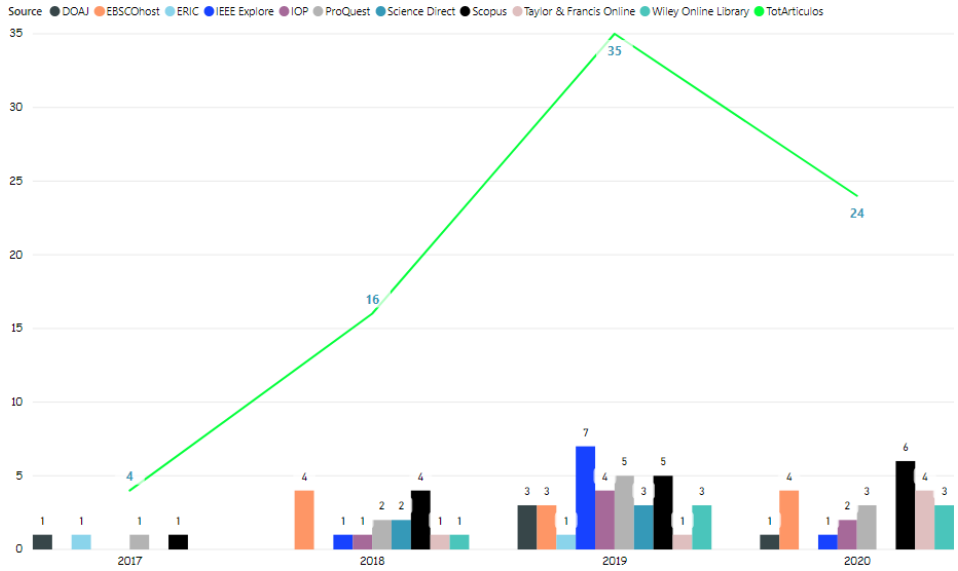

Fig. 4: Articles by year and source

18.99% of the articles were published in the US, followed by 15.1% in China, as shown in Fig 5.

Fig. 5: Map of items by country

Results and Discussion

RQ1: *What are the criteria for measuring the effectiveness of ML developed by means of NLP in the improvement of text analysis?*

Accuracy, precision, sensitivity, and specificity were the criteria found in the articles analyzed, as shown in Table 5.

Table 1: ML effectiveness criteria using NLP in text analysis

Idea	Reference	Total	Percentage
Accuracy	[2], [3], [4], [6], [7], [9], [10], [11], [14], [15], [16], [17], [19], [21], [22], [23], [24], [25], [26], [28], [29], [30], [32], [33], [34], [35], [36], [40], [41], [44], [45], [47], [48], [49], [50], [51], [52], [53], [55], [57], [59], [60], [61], [62], [64], [65], [66], [68], [69], [71], [73], [74], [75], [76], [78], [80]	56	50.90%
Precision	[2], [3], [4], [8], [9], [10], [11], [13], [15], [16], [17], [21], [22], [25], [27], [28], [30], [32], [37], [39], [40], [42], [43], [47], [48], [49], [51], [56], [57] [64], [66], [67], [68], [70], [73], [76]	36	32.72%
Sensitivity	[8], [9], [12], [17], [28][40], [44], [47], [59], [75]	10	9.09%
Specificity	[9], [12], [17], [27], [28], [31], [44], [47], [63]	9	8.18%

Accuracy was the most mentioned criterion for the effectiveness of ML on text analysis, followed by precision.

RQ2: Who are the most cited authors in the area?

The authors that have been generating and publishing the most literature regarding the study topic are shown in Fig 6.

N° of Quotes per Author and Range of the N° of Quotes

Authors	<5	≥15	≥5 and <15	Total
Adams O, Makarucha A, Neubig G, Bird S, Cohn T		63		63
Salawu Semiu He, Yulan Lumsden Joanna		48		48
Marcello Benedetti, Erika Lloyd, Stefan Sack, Mattia Fiorenti...		38		38
Daniel W. Otter, Julian R. Medina, Jugal K. Kalita		32		32
Tellez Eric S, Moctezuma Daniela, Miranda-Jímenez Sabino,...		31		31
Trotzek M, Koitka S, Friedrich, C.M		23		23
Zhang Hr, Sproat R, Ng A.H., Stahlberg, F, Peng X, Gorman ...		16		16
Sboev A, Moloshnikov I, Gudovskikh, D, Selivanov, A, Rybk...			14	14
H. M. Keerthi Kumar, B. S. Harish, H. K. Darshan			12	12
Sampo Pyysalo, Simon Baker, Imran Ali, Stefan Haselwimm...			12	12
Total	63	251	154	468

Fig. 6: Most cited authors

We found a large number of authors who were cited in various research articles on ML and are active in the area.

RQ3: *In which areas has ML been applied?*

ML has a good reception in several areas, as show in Table 6.

Table 6: Areas that applied ML

Area	Reference	Total	Percentage
Education	[4], [9], [12], [14], [15], [24], [27], [35], [36], [37], [38], [40], [44], [48], [49], [50], [55], [57], [59], [60], [64], [65], [71], [75], [77], [79]	26	21.31%
Literature	[2], [3], [4], [5], [6], [7], [9], [13], [14], [15], [18], [20], [21], [22], [25], [26], [27], [30], [31], [35], [36], [37], [38], [39], [44], [45], [46], [47], [48], [51], [52], [53], [55], [59], [60], [61], [62], [63], [64], [65], [66], [68], [70], [74], [75], [76], [77], [78], [79]	49	40.16%
Medicine	[14], [17], [27], [28], [38], [50], [70], [80]	8	6.56%
Linguistics	[1], [2], [4], [6], [7], [10], [11], [13], [14], [16], [23], [24], [25], [31], [32], [36], [37], [38], [40], [42], [46], [47], [48], [49], [51], [52], [56], [59], [61], [62], [63], [64], [67], [68], [72], [74] [77], [78], [80]	39	31.97%

In recent years, several advancements have been made in ML technology, which have been applied to different areas. In our research, we found that most articles belonged to literature and linguistics, followed by education. ML is used to measure satisfaction and to analyze feelings through text. In the area of medicine, ML is used to identify diseases by the analysis of patterns or to analyze clinical trials, which is also performed by text analysis. Thus, ML is applied in different areas with positive impacts.

RQ4: *What type of computer support have ML techniques provided?*

In Table 7, some ML techniques are listed.

Table 75: ML Computer Support

Computer Support	Reference	Total	Percentage
NLTK	[16], [20], [24], [32], [40], [60], [63], [67]	8	18.60%
Numpy	[22],[60]	2	4.65%
SciPy	[22],[57], [60]	3	6.98%
Py Torch	[24]	1	2.33%
Sklearn	[9],[16], [19],[68]	4	9.30%
openNLP	[10],[16], [17], [18], [21],[23], [24], [28], [35], [36], [37], [38], [43], [47], [49], [50], [53], [56], [60], [61], [63], [67], [70], [71], [74]	25	58.14%

There are different computer platforms for the use of ML. OpenNLP and NLTK, through the use of NLT tools allow sentence analysis and tokenization, which is very feasible and recommended in this type of study. In contrast, to analyze vectors, we recommend using Sklearn along with Numpy and Scipy, which allows the analysis of Support Vector Machines (SVM).

RQ5: *Which machine learning tools have been used with text analysis?*

Table 8 presents the tools that have been used for text analysis through ML (Ali et al., 2020).

Table 8: ML tools in text analysis

Tools	Reference	Total	Percentage
NLP	[1], [2], [3], [4], [6], [7], [8], [9], [10], [11], [13], [15], [17], [18], [19], [21], [23], [24], [27], [28], [31], [35], [36], [37], [38], [40], [42], [43], [47], [49], [50], [51], [53], [56], [60], [61], [62], [63], [66], [67], [69], [70], [71], [74], [76], [79], [80]	47	38.52%
N-grams	[1], [4], [7], [8], [10], [11], [15], [22], [24], [26], [31], [40], [42], [48], [52], [55], [57], [59], [63], [64], [70], [77]	22	18.03%
LSTM	[1], [6], [13], [15], [23], [27], [30], [33], [35], [41], [59], [66], [67], [76], [78]	15	12.30%

Word2vec	[1], [5], [11], [22, [23], [27], [37], [42], [56], [59], [66], [74]	12	9.84%
Computationa l linguistics	[2], [6], [11], [13], [16], [23], [31], [32], [36], [37], [38], [40], [47], [48], [49], [56], [61], [62], [64], [67], [72], [74], [77], [78], [79], [80]	26	21.31%

All the tools are used to analyze the text in large amounts of data, but the most used and recommended tool for text analysis is NLP because this tool allows training of a large amount of data and can be used in conjunction with the other tools. Therefore, NLP is recommended for the analysis of text as it has more methods to perform this process.

Conclusion and Future Work

In this study, 24, 796, 560 articles were selected and later reduced to 80 items after applying exclusion criteria. These articles were approved by the established quality evaluation criteria. The rigorous review of the articles enabled us to appropriately and efficiently respond to the research questions posed. Hence, we conclude that ML can assist and facilitate the analysis of all types of reading. Thus, several people that face difficulties with text analysis will be able to do it easily and rapidly using ML. This would have been unimaginable a few years ago, but today it is a reality. Thanks to the ML effectiveness criteria, it is possible to reach a point of less analysis in a number of items, which are found in different recognized sources and with a long list of recognized and important authors. ML has been used in several different areas and most articles are from the fields of literature and linguistics, followed by education. In these fields, ML assists in measuring satisfaction and analysis of feelings through the text. In medicine, it provides considerable support in the analysis of clinical trials. Different methods have been used, and NLP is one of the most used to perform training in ML, but it requires computer support and tools. Currently, Peru is on the 64th place in the world text analysis ranking. An improvement could be made with the conjunction of efforts of research groups, educational institutions, and providers, to achieve a society with a higher intellectual quotient and to be able to become a developed country.

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Modeling Expenditure on Services for The Visegrad Group Countries

Mateusz JANKIEWICZ
Nicolaus Copernicus University, Toruń, Poland
m.jankiewicz@umk.pl

Michał Bernard PIETRZAK
Nicolaus Copernicus University, Toruń, Poland
pietrzak@umk.pl

Elżbieta SZULC
Nicolaus Copernicus University, Toruń, Poland
eszulc@umk.pl

Abstract

The paper concerns the expenditure on services in the Visegrad Group countries. The aim is to analyze the differentiation in the level of these expenses in the period of 1995-2016. In the study, the Working-Leser model extended to quadratic form by Blundell, Pashardes and Weber (1993) was used. The choice of this form of the model was dictated by the possibility of indicating on its basis the level of disposable income at which services change their character from a higher-order good to a basic good. Based on the model estimation results, the income elasticity of demand for services for each country from the Visegrad Group was calculated. Assessment of the formation of the income elasticity value over time allowed to proceed with the analysis of changes in the nature of services in each country. In addition, this paper deals with the problem of the unification of the nature of goods connected with services in the analyzed countries. The σ-convergence concept was used to assess the unification process. The analysis of the coefficient of variation of the income elasticity of demand for the considered category of goods over time allowed to estimate the degree of uniformity. The downward trend in the variation coefficient shows that the value of elasticity is becoming more uniform among countries, and consequently the nature of services is becoming similar.

Keywords: Household Expenditure on Services, Income Elasticity of Demand, Process of Unifying the Nature of Services.

Introduction

Currently the economic development of countries is a very dynamic process. Determinants of the development include, first of all, the progressive process of globalization, financialization and digitization of economies (Balcerzak, Pietrzak, 2017a; Pietrzak, Ziemkiewicz, 2018a, 2018b; Bilan et al., 2019; Shkolnyk et al., 2019; Sánchez-López et al., 2019), as well as the degree of their openness (Pietrzak, Łapińska, 2015; Łapinska, 2016). Additionally, the factors determining the development of economies are: level of competitivess, innovations, investments, situation on the labor market (Balcerzak, 2015; Cheba, 2015; Cheba, Szopik-Depczyńska 2017; Pietrzak et al., 2017; Bieszk-Stolorz, Dmytrów , 2019; Dmytrów, Bieszk-Stolorz, 2019; Kijek, Matras-Bolibok, 2019, Balcerzak, 2020) and the standard of living of the society. The improving the economic situation of states is also reflected in the shaping of the level and consumption structure of the society (Horáková, 2015; Balcerzak, 2016; Šoltés, Nováková, 2016, Balcerzak, Pietrzak, 2017b; Simionescu et al., 2017, 2018; Miłek, 2018; Nowak, 2018; Pietrzak, 2019; Kuc-Czarnecka et al., 2020; Jankiewicz 2020a; Pietrzak, 2020). The society of well-developed economies is able to consume more goods and services than the others because of better living conditions. The reason for this is the differences in the level of disposable income of households, which is the main determinant of consumer decisions (Gavurova et al., 2017; Głodowska, 2017; Tvaronavičienė, Gatautis, 2017; Jankiewicz, 2018a, 2018b). Moreover, consumption in such economies is more diverse than that of people in less developed countries. Along with the improvement of the economic conditions of countries, and at the same time the standard of living of the society, households begin to spend more and more of their income on services. Such a trend in the literature is called the servicisation of consumption (Grzega 2005; Radziukiewicz, 2012). With time, when households reach a certain level of income, in many of them services from a higher-order good become a necessity good. Some researchers point to the process of

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servicisation of consumption as the one that favors the development of sustainable consumption by, among others, replacing private transport with public transport services, which reduces air pollution and slows down environmental degradation (Filipiak, 2018).

Changes in household consumption are also associated with the process of economic and social convergence (Dall'Erba, Le Gallo, 2008; Kuc 2017a, 2017b) taking place among the economies. These processes cause the leveling of disposable income of households (Pietrzak, 2020), which leads to a convergence of the level and structures of household consumption. The unification of the households consumption structures should be followed by the standardization of the nature of the goods consumed. Therefore, this analysis covers the changes over time in the nature of goods such as services as well as its unification among households in the Visegrad Group countries (V4). In this research the level of household expenditure on services in the years 1995-2016 was analyzed. The nature of the goods can be assessed using the elasticity measure, relating to changes in the level of consumer spending caused by changes in disposable income, i.e. the income elasticity of demand. The downward trend in the coefficient of variation shows that the value of income elasticity of demand is becoming more uniform among countries, and consequently the nature of services is becoming similar. The study used the quadratic Working- Leser model proposed by Blundell, Pashardes and Weber (1993).

Data

The data was taken from the database of the European Statistical Office (EUROSTAT). The study was based on information about the level of household expenditure on services per capita (Y) and the values of gross disposable income of households per capita (X). Table 1 shows the values of variables Y and X in selected years of the study, while Figure 1 shows the evolution of these values over time. The highest level of disposable income per capita in 1995 was noted in households in the Czech Republic (EUR 2478.33), and the lowest level was observed in households in Slovakia (EUR 1716.14). Moreover, values of the variable X in Hungary (EUR 2252.27) exceeded the values for Polish households (EUR 2020.55). The dynamic economic development of Slovakia meant that in 2016 the disposable income of households (EUR 8,889.19) even exceeded there the disposable income of the Czech society (EUR 8785.33), while the relatively faster economic growth in Poland than in Hungary caused that in the last period of the study it was households in Hungary which were characterized by the lowest level of disposable income per capita (EUR 6592.96). Despite the lower level of disposable income, in 1995, households in Slovakia spent more on services (EUR 681.51) than the polish ones (EUR 552.50). A similar situation occurred in 2016, when the poorer Hungarian society spent more on services (EUR 2640.49) than the Polish one (EUR 2582.22).

Table 1: V4 households' expenditure on services and disposable incomes in selected years

Level of services expenditure per capita (Y)						
Country	**1995**		**2008**	**2009**		**2016**
Czech Republic	826.53		3438.25	3263.40		3610.16
Hungary	735.03	…	2402.57	2217.21	...	2640.49
Poland	552.50		2384.20	2059.41		2582.22
Slovakia	681.51		3090.05	3129.42		3651.19
Households' disposable income per capita (X)						
Country	**1995**		**2008**	**2009**		**2016**
Czech Republic	2478.33		8241.86	7941.08		8785.33
Hungary	2252.27	…	6093.73	5480.92	…	6592.96
Poland	2020.55		5942.70	5240.60		6797.39
Slovakia	1716.14		7171.60	7527.50		8889.19

The trends in the shaping of the analyzed processes are very similar in all Visegrad Group countries in 1995–2016. In the years 1995–2008, there was a dynamic, permanent increase in both disposable income and the amount of expenses on services in the Visegrad Group countries, except for Poland where in 2002 and 2003 (just before joining the European Union) there was a temporary recession. Mainly due to the financial crisis, in 2009 the mentioned upward trend in the Czech Republic, Poland and Hungary collapsed. The slowdown in economic growth was accompanied by declines in the value of disposable income and the amount of expenditure on services. In the Czech Republic, there was a decrease from EUR 3439.25 to EUR 3263.40, while in Poland and Hungary, respectively, from

EUR 2384.20 to EUR 2059.41 and from EUR 2402.57 to EUR 2217.21. In Slovakia, there was only a slight slowdown in the upward trend in the value of the analyzed processes, however, Slovak households did not experience a decrease in the amount of disposable income, which did not induce them to give up the current level of consumption of services.

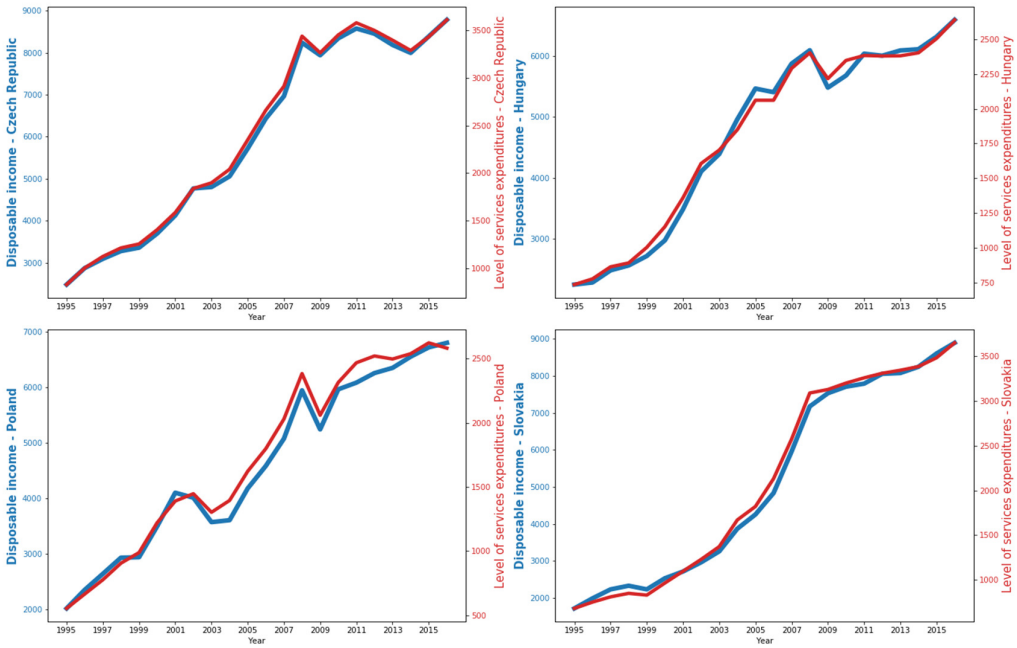

Fig .1: Changes in the level of expenditure of V4 households on services and of disposable income per capita in the years 1995 – 2016

Methodology

The basic tool used in our study was the econometric model of demand by Blundell, Pashardes and Weber (1993), in which the level of household expenditure depends only on their disposable income. This model is an extended quadratic version of the model known as the Working-Leser model (Working, 1943; Leser, 1963). Its advantage is the possibility of determining the disposable income threshold, at which the good ceases to be of a higher-order nature and becomes the basic good. The model is described by the following formula:

$$Y_t = \alpha_0 + \alpha_1 lnX_t + \alpha_2 (lnX_t)^2 + \varepsilon_t, \qquad (1)$$

where: Y_t denotes the level of household expenditure on services per capita over time t, X_t means household disposable income per capita over time t, ε_t is a random component of the model, $\alpha_0, \alpha_1, \alpha_2$ stand for structural parameters of the model. For verification of the estimated models, the standard statistical techniques, such as t-statistics, Jarque-Bera normality test and White homogeneity test were used.

In the second stage of the analysis the income demand elasticity coefficient, determined on the basis of model (1) estimates, was used. This coefficient informs about the percentage increase of expenditures on the considered good (or group of goods) caused by a 1% increase in disposable income. The demand elasticity determined for the model (1), is expressed by the formula:

$$IE = \frac{\partial Y}{\partial X} \cdot \frac{X}{Y} = \frac{a_1 + 2a_2 \cdot lnX}{a_0 + a_1 \cdot lnX + a_2 \cdot (lnX)^2}, \qquad (2)$$

where: IE stands for income elasticity, Y, X – as above, a_0, a_1, a_2 – estimates of model (1) parameters. It should be noted, that the value of the income elasticity of demand, calculated on the basis of the Blundell, Pashardes and Weber demand model, depends on the value of disposable income, which means that households, differing in the value of this demand determinant, show different behavior in the case of its 1% increase. If $IE > 1$, then the good (or group of goods) is of the nature of a higher order good, otherwise ($IE < 1$) the good (or group of goods) is the primary good.

The next stage of the analysis concerns the process of unifying the nature of services within the V4 countries. For this purpose, the σ-convergence concept was used. In this approach, changes in the coefficient of variability of income elasticity of demand over time, determined by the formula:

$$V_{IE,t} = \frac{S_{IE,t}}{\overline{IE_t}}, \quad (3)$$

where: $V_{IE,t}$ – coefficient of volatility of income elasticity of demand over time t, $S_{IE,t}$ – standard deviation of income elasticity of demand in the group of V4 countries over time t, $\overline{IE_t}$ – average value of income elasticity of demand over time t, were analyzed.

Finally, the trend-autoregressive model describing the changes of the $V_{IE,t}$ coefficient over time was estimated. A significant, decreasing tendency in the value of the coefficient of variation over time will testify to the unification of the nature of services in households of the Visegrad Group countries. In order to verify the model, the Breusch - Godfrey test for the residual autocorrelation was used as well.

Empirical Results

First, the models of household demand for services in the Visegrad Group countries were estimated. The estimation was made on the basis of the data from the period of 1995–2016. The borderline significance level adopted in the study is 5%. Table 2 presents the results of the estimation and verification of these models. The structural parameters α_1 and α_2 of the models for each country are statistically significant. Thus, we are dealing with a statistically significant parabolic influence of disposable income on the level of household expenditure for services. The determination coefficient R2 for each of the models takes the value of 0.99, therefore the models explain to a very large extent the development of household demand for services. Moreover, the results of the White and Jarque-Bera tests indicate, respectively, the homogeneity of the model residuals and the normality of distribution of the residuals. In light of all the tests used, the obtained empirical models were of high quality. They can be considered as describing the demand for services reported by households in the V4 countries very well.

Table 2: Results of estimation and verification of the models of demand for services in the Visegrad Group countries

Czech Republic			**Hungary**		
Parameter	**Estimate**	**p-value**	**Parameter**	**Estimate**	**p-value**
α_0	52298.98	~0.00	α_0	35024.00	~0,00
α_1	-14138.44	~0.00	α_1	-9819.3	~0,00
α_2	966.67	~0.00	α_2	697.204	~0,00
R^2	0.99		**R^2**	0.99	
F - test	17315.75 (~0.00)		**F - test**	1633.95 (~0.00)	
JB test	2.05 (0.36)		**JB test**	1.83 (0.40)	
White test	1.53 (0.82)		**White test**	6.04 (0.20)	
Poland			**Slovakia**		
Parameter	**Estimate**	**p-value**	**Parameter**	**Estimate**	**p-value**
α_0	30908.90	~0.00	α_0	31570.70	~0.00
α_1	-8981.61	~0.00	α_1	-9058.70	~0.00
α_2	655.22	~0.00	α_2	658.20	~0.00
R^2	0.99		**R^2**	0.99	
F - test	1372.04 (~0.00)		**F - test**	10860.55 (~0.00)	
JB test	1.86 (0.39)		**JB test**	0.95 (0.62)	
White test	3.11 (0.54)		**White test**	7.69 (0.10)	

Note: In parentheses p-value.

In the next stage of the analysis, the values of the income elasticity of demand for services in households of the V4 countries were determined. This values are presented in Table 3. This Table presents also the values of the coefficient of variation in the years 1995–2016. In the first year of the analysis, the elasticity coefficient for the Czech Republic,

Hungary and Slovakia has similar values. However, it is of a much higher value for Poland. In the next few years, the value of this ratio in Poland decreased very quickly. As a result its value in 2001 approached the value in other countries. At that time, all the countries were characterized by the most similar level of the income elasticity coefficient. Later, a slight deterioration in economic in Poland caused a decline in disposable income and the increasing the rank of services, which was reflected in the increase in the value of the coefficient of income elasticity of demand. In the following years its value was again approaching that of other countries. Since 2008, the level of income elasticity of demand in Poland, the Czech Republic and Hungary was constantly leveling off, until 2016 inclusive. Nevertheless, it had a relatively constant value. At the same time, , there was a further decline in the value of income elasticity in Slovakia (see Figure 2), which could have been caused by the lack of a collapse in the upward trend of household disposable income during the global financial crisis. In the last year of the study, this indicator in Slovakia was 0.80, which is much lower than in the Czech Republic or Hungary. In all V4 countries, the income elasticity of demand reported by households for services in the analyzed period dropped to a level below one, which means that services become daily goods and lose their character of a higher-order goods.

Table 3: Values of income elasticity of demand and values of the coefficient of variation

Year	Income elasticity (IE)				V
	Czech Republic	Hungary	Poland	Slovakia	
1995	1.15	1.23	1.96	1.22	0.24
1996	1.24	1.23	1.77	1.27	0.16
1997	1.26	1.24	1.64	1.28	0.12
1998	1.27	1.24	1.53	1.27	0.09
1999	1.27	1.24	1.53	1.28	0.09
2000	1.26	1.23	1.37	1.25	0.04
2001	1.23	1.18	1.25	1.23	0.02
2002	1.18	1.12	1.27	1.20	0.04
2003	1.18	1.10	1.35	1.17	0.08
2004	1.16	1.05	1.35	1.10	0.10
2005	1.11	1.01	1.24	1.06	0.08
2006	1.06	1.02	1.18	1.01	0.06
2007	1.03	0.98	1.11	0.93	0.07
2008	0.97	0.97	1.03	0.87	0.06
2009	0.98	1.01	1.10	0.85	0.09
2010	0.96	1.00	1.03	0.85	0.07
2011	0.95	0.97	1.02	0.84	0.07
2012	0.96	0.98	1.00	0.83	0.07
2013	0.97	0.97	1.00	0.83	0.07
2014	0.98	0.97	0.98	0.83	0.07
2015	0.96	0.96	0.97	0.81	0.07
2016	0.94	0.94	0.97	0.80	0.07

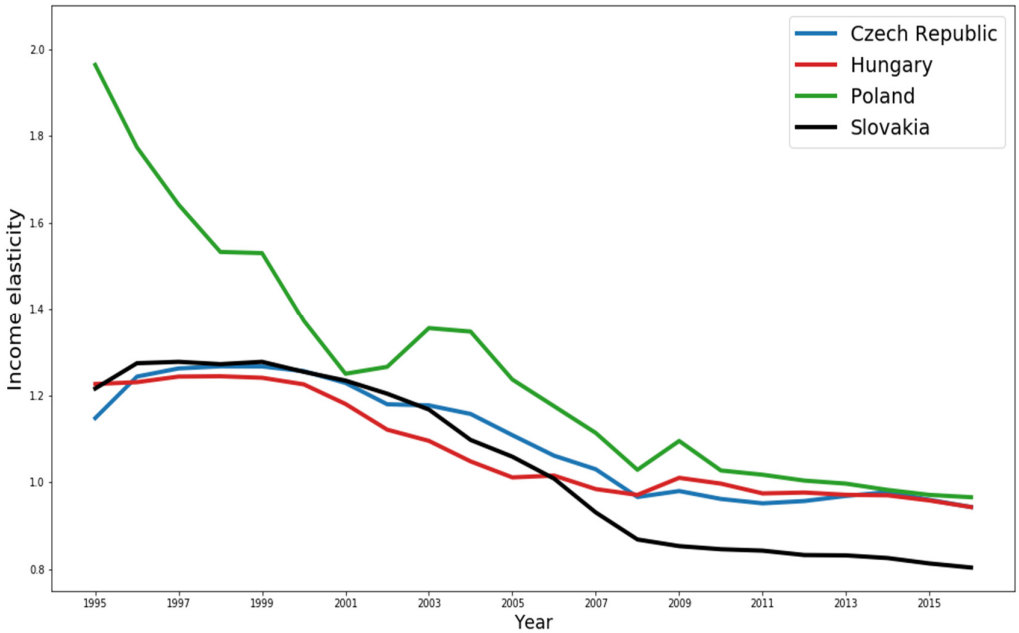

Fig. 2 : Dynamics of the income elasticity of demand for services in the V4 countries over the period 1996–2016

Figure 3 shows the development of the coefficient of variation of the income elasticity of demand for services in the V4 countries over the period 1996 – 2016. From 1995 up to 2001 there was a dynamic decrease in the value of the coefficient of variation, which was undoubtedly influenced by the approaching the value of the income elasticity of demand in Poland to those in other V4 countries, as those were at a similar level. In the next three years, we are dealing with an increase in the value of the convergence measure (so it points to divergence; see Figure 3), which was certainly caused not only by a slight economic recession in Poland, but also by the emergence of disproportions between other countries of the V4. Since the V4 economies joined the structures of the European Union, the coefficient of variation of the income elasticity of demand for services decreased again, until the financial crisis appeared, when in 2009 the convergence measure increased from 0.06 to 0.09. The observed divergence process was related with V4 countries' different dealing with the crisis –Slovakia's economy was the only one that did not experience a recession, but only a slight slowdown in development. The economic disproportions that emerged in this period also resulted in disproportions in the disposable income of households, and thus in the consumption of services by them. After 2009, the difference in the values of the income elasticity of demand for services between Slovakia and other economies of the Visegrad Group remained relatively constant. Thus, the value of the coefficient of variation did not change significantly. The indicator remained stable at around 0.07.

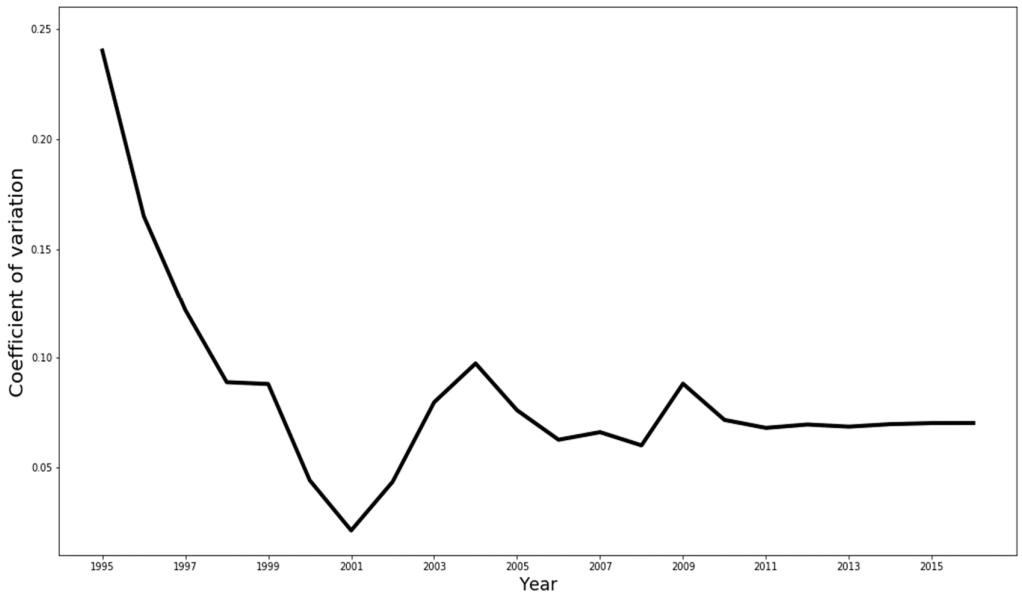

Fig. 3: Values of the coefficient of variation of the income elasticity of demand in 1995-2016

In Figure 3, two sub-periods can be distinguished in which the values of the convergence measure behave quite differently. The first period is 1995–2001 and the second covers 2002–2016.

Then, the trend-autoregressive model was estimated, wherein the threshold trend and the first-order autoregression concepts were used. The model took the form as follows:

$$V_{IE,t} = \beta_0 + \beta_1 t_1 + \beta_2 t_2 + \beta_3 V_{IE,t-1} + \varepsilon_t, \quad (4)$$

where: $V_{IE,t}$ denotes the value of the coefficient of variation of income elasticity of demand for services at the time t, t_1 and t_2 mean the time variables for the periods 1995-2001 and 2002–2016 respectively, and $V_{IE,t-1}$ stands for the lagged value of variation coefficient of income elasticity of demand for services. Table 4 shows the results of model (4) estimation and verification.

Table 4: Results of estimation and verification of the model (4)

Parameter	Estimate	p-value
β_0	0.050	~0.00
β_1	-0.017	0.01
β_2	-0.001	0.15
β_3	0.534	~0.00
R^2	0.85	
JB-test	1.64 (0.44)	
White test	7.04 (0.53)	
BG-test	0.31 (0.59)	

Note: Numbers in brackets refer to the p-value.

A negative and statistically significant value of the β_1 parameter (p-value for the t-Student test is lower than 0.05) indicates a significant decrease of the variation coefficient in the period of 1995–2001, ceteris paribus . Thus, the income elasticity of demand for services in countries considered was leveling out. Therefore, we can believe that the character of services in the V4 countries becoming similar in this period. However, in the second period, the downward trend of the considered coefficient of variation is not statistically significant. In this period, there is no clearly defined direction of changes (increase or decrease) in the value of the variation coefficient of income elasticity of demand for services. The evaluation of the β_3 parameter indicates a significant decrease in the value of the σ-

convergence measure, in relation to the previous year, ceteris paribus. The value of the determination coefficient R^2 indicates a high degree of the model fit to data. Moreover, the statistical tests for the random component confirm homogeneity, normality of distribution and lack of residual autocorrelation.

Conclusion

Changes in the economic development of the Visegrad Group countries are causing changes in the standard of living of the society, as well as in their wealth. Improving the socio-economic situation causes households to become richer and, consequently, changes in the level and structure of their consumption. In particular the level of expenditure on services is increasing. The increase in disposable income per capita of V4 households in the years 1995–2016 also resulted in an increase in their per capita expenditure on services. As V4 economies became richer, the value of the income elasticity of demand for services decreased (according to the Blundell, Pashardes and Weber demand model, down to the level below one) . Thus, the nature of services changed − from a higher-order good, over time, they became a necessity good. Moreover, the economic convergence of the Visegrad Group countries also results in the leveling up of the wealth of the society and consumption expenditure, including those for services. On the basis of the σ-convergence approach, it has been shown that this is also followed by the leveling of the value of income elasticity of demand for services, which is clearly visible in the years 1995–2001. In the following years, a horizontal trend in shaping the value of the convergence measure is observed. It is related to the economic recession in Poland in 2002-2003 and the world financial crisis in 2009, which caused a recession in the V4 countries, except Slovakia, where only a slowdown in economic growth was recorded. After the crisis, the differences in the income elasticity of demand for services between Slovakia and the other V4 countries were relatively constant, which stopped the process of convergence of the nature of services. In order for this process to continue in the economies of the Czech Republic, Hungary and Poland, there should be some impulse to develop faster than in Slovakia, which would improve the standard of living of the society. Then, the value of the income elasticity of the demand for services reported by households would decline. As a consequence, the tendency to equalize the income elasticity of demand for services in the countries under consideration would increase.

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Influence of the Choice of the Function Form on the Income Elasticity Value of Demand for Food in the Visegrad Group Countries

Mateusz JANKIEWICZ

Nicolaus Copernicus University, Toruń, Poland
m.jankiewicz@umk.pl

Abstract

The households' demand is one of the main aspects covered in economic research. The level of consumption expenditures and their structure indicate the level of economic development in country, and also resulting from it the level of households wealth. The aim of this paper is to analyze the households' food expenditures in selected European countries in the period of 1997-2016. The research is conducted for the Visegrad Group countries, which includes the Czech Republic, Hungary, Poland and Slovakia. The level and the structure of food expenditures are a good reflection of the households' wealth and show the differences between them very well. It must be noted that, independently from the level of wealth, food remains a basic commodity. The nature of this group of goods does not change over the time too. There are a lot of forms of the demand function used in the literature, which show dependence of households' expenditure, e.g. on food consumption, on the households' disposable income. In this paper five forms of demand function, including function proposed by Törnqvist and also function known as Working-Leser, are used. The obtained results allowed to indicate the differences in the use of an additional unit of disposable income in terms of food expenditure between households' in the Visegrad Group countries and the relationship of these differences with the level of an economic development of considered countries. Moreover, the differences in the income elasticities of food demand, resulting from the choice of the form of the demand function, are also presented.

Keywords: Demand Function, Household Expenditure on Food, Income Elasticity of Demand, Necessity Goods

Introduction

The consumption expenditure level and structure testifies the wealth of all economies. The households' consumption expenditures account for the majority of all consumption spending of the economy. Consumption is influenced, among others, by the social and economic development of the country (see: Cheba, 2015; Łapińska, 2016; Cheba, Szopik-Depczyńska, 2017; Kuc, 2017; Simionescu et al., 2017, 2018; Kurowska-Pysz et al. 2018; Miłek, 2018; Nowak, 2018; Simionescu et al., 2018; Cyrek, 2019; Pietrzak, 2019; Kuc-Czarnecka et al., 2020). The food expenditures are the most important part of the expenditure plan for all households around the world. Food is a group of goods that is necessary for the proper functioning of the human being. The disposable income is the greatest determinant of the level and the structure of the households' expenditure plan – including in particular food expenditures (Banks et al. 1997, Cupák et al. 2015, Jankiewicz, 2018b, 2019a). Changes in the disposable income of society and in result changes in the level and structure in households' consumption are determined by economic growth (see: Bretyn, 2013; Gavurova et al., 2017; Głodowska, 2017; Jankiewicz, 2018a, 2018c, 2019, 2020a, 2020b; Jankiewicz, Pietrzak, 2019; Pietrzak, Jankiewicz, 2019). The first law indicating the relationship between food expenditures and disposable income was formulated by Ernst Engel (Engel, 1895). He showed that the level of food expenditures grows along with the increase in disposable income of households, however their share in final consumption expenditures decreases (see also: Jankiewicz, 2018a; Jankiewicz, Pietrzak, 2019). The decrease in the share of the food expenditures in the final consumption expenditures is the result of a faster increase in total consumer spending than in food spending. Additional percentage of disposable income causes that the households' food expenditures grow by less than a percentage. The measure of percentage change of consumption expenditures due to one percent change of the level of disposable income is named an income elasticity. Many researchers deal with the subject of the consumption demand and its changes (Ishida et al., 2003; Kónya and Ohashi, 2007; Test, 2011; Piekut, 2013, 2015; Aepli, 2014; Horáková, 2015; Benda-Prokeinova and Hanova, 2016; Jovanovic, 2016; Verba, Kudinova, 2019). Income elasticity indicates the nature of consumer goods. For the necessities, the value of income elasticity is less than one, however, for the superior goods is above one. In previous research, the food is characterised as basic consumption good (Gracia and Albisu, 2001; Liu and Zhong, 2009; Hayat et al., 2016; Ulubasoglu et al., 2016) and

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in this research this regularity is confirmed. But in different studies, different methods to get the values of income elasticities are used. The differences refer to the form of the consumption function.

The aim of this research is to show that the choice of the form of the consumption function has an influence on the value of income elasticity. Food is the group of goods chosen in this study. The households' demand for food in four European countries in the years 1997-2016 is considered. These countries are the Czech Republic, Hungary, Poland and Slovakia – forming the Visegrad Group. To show the differences in the income elasticity values, five forms of the demand models are estimated.

Data

The data for this analysis are taken from European Statistical Office (EUROSTAT) database. They relate to the level of the households' food expenditures (variable Y) and household's gross disposable income per capita (variable X) in the years 1997-2016 for the Visegrad Group countries. The values of variables are obtained through own calculations. Table 1 shows the lowest and the highest values of disposable income in the Visegrad Group countries and accompanying level of food expenditures.

Table 1: Extreme values of disposable income per capita in Visegrad Group countries in the years 1997-2016 and accompanying food expenditures

Country	Lowest DI	Food exp	Highest DI	Food exp
Czech Republic	3,090.37	453.95	8,785.33	1,162.51
Hungary	2,485.33	430.54	6,592.96	905.29
Poland	2,641.79	558.41	6,797.39	1,008.30
Slovakia	2,229.96	372.20	8,889.19	1,218.10

In the Czech Republic the lowest values of disposable income (3,090.37 EUR per capita) are accompanied by food expenses about 450 EUR per capita. In this country, in the considered period, the highest value of disposable income is 8,785.33 EUR per capita and around 1,162 EUR is intended for food. In Hungary, the lowest disposable income is at the level of about 2,500 EUR per capita and the highest is slightly above 6,500 EUR per capita. These values are accompanied by food expenses 430.54 EUR and 905.29 EUR per capita, respectively. We can see the similar situation of disposable income in Poland, however, the food expenditures range between about 560 EUR and 1000 EUR per capita. In Slovakia, we can notice the biggest difference between the highest and the lowest level of disposable income (about 6,600 EUR per capita). Food expenditures shape from 372.20 EUR to 1,280.10 EUR per capita. Besides Slovakia, the extreme values of disposable income come from extreme years of analysis (1997 and 2016 respectively). Figure 1 presents the dependence of the food expenditures on the disposable income. Based on the plots in the figure 1 in all countries it can be seen that the increase in the level of food expenditures is the result of the increase in the household's disposable income. It is noticeable that the dependence between these two processes can be approximately linear, so estimation of the food demand is started with the linear form of consumption function.

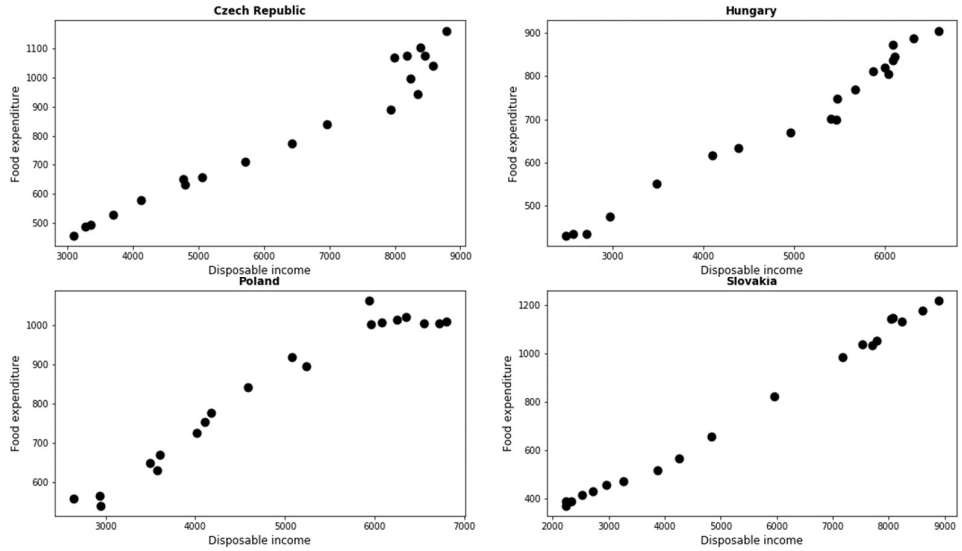

Fig. 1: Dependence of the food expenditures on the disposable income in the Visegrad Group countries

Methodology

The first step in the analysis is to estimate a few consumption demand functions for the household's food expenditures. Firstly, the linear demand model is used in the following form:

$$Y_i = \alpha_0 + \alpha_1 X_i + \varepsilon_i, \tag{1}$$

where: Y_i – level of the households' food expenditure, X_i – gross households' disposable income per capita, ε_i – random component of the model. Secondly, the next four models are estimated: double-logarithmic model (2) – first used by Engel in his research (1895), model proposed by Törnqvist in 1941 for necessities (3), known by the name Working-Leser model (4) – first used by Holbrook Working in his analysis in 1943 (also known as semi-logarithmic model) and model proposed by Prais in his article from 1952 (5). The last model is also known as Working model (Dudek et al., 2002).

$$ln(Y_i) = \alpha_0 + \alpha_1 ln(X_i) + \varepsilon_i, \tag{2}$$

$$Y_i = \frac{\alpha_0 X_i}{\alpha_1 + X_i} + \varepsilon_i, \tag{3}$$

$$Y_i = \alpha_0 + \alpha_1 ln(X_i) + \varepsilon_i, \tag{4}$$

$$ln(Y_i) = \alpha_0 + \alpha_1 \frac{1}{X_i} + \varepsilon_i, \tag{5}$$

where: Y_i, X_i, ε_i – as above.

In statistical verification tests for normality (Shapiro-Wilk test) and heteroscedasticity (Goldfeld-Quandt test) of the residual distribution are implemented. Models are compared with the Bayesian Information Criterion (BIC), which takes the following form:

$$BIC = n \cdot log\hat{\sigma}_p^2 + p \cdot logn, \quad \hat{\sigma}_p^2 = \frac{RSS}{n-p} \tag{6}$$

where: n – sample size, p – total number of parameters estimated, RSS – sum of the residuals squared. Model with the lowest value of BIC is the best fit for the empirical data.

From all models, the average income elasticities are calculated. The forms of income elasticities resulting from the forms of demand models are characterised as follows:

$$IE_1 = \frac{a_1 \cdot X}{a_0 + a_1 X}, \quad (7)$$

$$IE_2 = a_1, \quad (8)$$

$$IE_3 = \frac{a_1}{a_1 + X}, \quad (9)$$

$$IE_4 = \frac{a_1}{a_0 + a_1 lnX}, \quad (10)$$

$$IE_5 = \frac{-a_1}{X}, \quad (11)$$

where: a_0, a_1 – estimation of parameters α_0 and α_1 respectively, X- level of households' disposable income per capita. Income elasticities (7) – (11) correspond to the models (1) – (5). For most of models used in this investigation, the income elasticity depends on the households' disposable income. Richer households' spend a different part of their additional incomes for food than the poorer ones. Only for double-logarithmic model the income elasticity in constant.

Empirical Results

The first step in the analysis is the demand model estimation. Models are estimated for households' food demand in the Visegrad Group countries in the period of 1997-2016. Adopted significance level in the analysis is 5%. Table 2 shows the results of demand models estimation and verification.

Table 2: The results of demand models estimation and verification

Linear model (1)							
Country	**α_0**	**α_1**	**p-value**	**R^2**	**SW-test**	**GQ-test**	**BIC**
Czech Republic	104.554	0.112	0.000	0.958	0.538	0.000	220.641
Hungary	134.477	0.114	0.000	0.976	0.291	0.583	193.486
Poland	215.381	0.127	0.000	0.950	0.933	0.100	213.317
Slovakia	70.064	0.128	0.000	0.994	0.578	0.109	195.101
Double-logarithmic model (2)							
Country	**α_0**	**α_1**	**p-value**	**R^2**	**SW-test**	**GQ-test**	**BIC**
Czech Republic	-0.546	0.828	0.000	0.971	0.703	0.000	-52.354
Hungary	0.104	0.758	0.000	0.979	0.374	0.778	-67.692
Poland	0.392	0.747	0.000	0.965	0.578	0.603	-60.646
Slovakia	-0.752	0.861	0.000	0.988	0.114	0.861	-54.953
Törnqvist model (3)							
Country	**α_0**	**α_1**	**p-value**	**R^2**	**SW-test**	**GQ-test**	**BIC**
Czech Republic	3,689.127	22,185.685	0.000	0.979	0.113	0.004	-321.762
Hungary	2,389.306	11,762.318	0.000	0.981	0.449	0.951	-325.926
Poland	3,189.426	13,476.383	0.000	0.969	0.988	0.963	-327.657
Slovakia	3,720.171	20,510.850	0.000	0.978	0.036	0.999	-302.205
Working-Leser model (4)							
Country	**α_0**	**α_1**	**p-value**	**R^2**	**SW-test**	**GQ-test**	**BIC**
Czech Republic	-4,568.312	618.826	0.000	0.929	0.350	0.000	230.936
Hungary	-3,308.263	473.581	0.000	0.951	0.621	0.114	207.557
Poland	-4,102.842	584.429	0.000	0.966	0.382	0.299	205.776
Slovakia	-4,379.086	607.135	0.000	0.956	0.056	0.378	234.007

Working model (5)							
Country	**α_0**	**α_1**	**p-value**	**R^2**	**SW-test**	**GQ-test**	**BIC**
Czech Republic	1,655.856	-4219.836	0.000	0.938	0.094	0.000	-37.140
Hungary	1,311.457	-2940.317	0.000	0.954	0.233	0.600	-51.843
Poland	1,664.355	-3187.315	0.000	0.964	0.113	0.828	-59.819
Slovakia	1,607.571	-3506.030	0.000	0.936	0.048	0.968	-21.431

The dependence of the level of the households' food expenditures on the disposable income is statistically significant (test probability for t-Student statistic is less than 0.05) for all demand models in each of the countries. Moreover, estimate values of the parameter α_1 show that an increase in disposable income causes an increase in households' food expenditures. All of estimated models show good fit to empirical data. The coefficient of determination (R^2) is over 0.9 for all models. Based on the Shapiro-Wilk test results, we can notice that residuals of demand models have normal distribution, excluding Törnqvist model and Working model for Slovakia, where test probability is near the boundary value. In turn, an imperfection of demand models for Czech Republic is the heteroscedasticity of residuals. It is a result from Goldfeld-Quandt test (test probability is near 0, so we reject the zero hypothesis about homoscedasticity of model residuals). Finally all the models are compared with the Bayesian Information Criterion. The lowest values of considered criterion accompanied Törnqvist models. Based on this criterion, we can recognize the Törnquist models as better than the others. It is worth emphasizing that in this analysis models with lower values of BIC have higher values of R^2, but it is not a generally accepted standard. The Törnquist model has one more advantage – in this model we can find the saturation level of the households' food expenditures, characterised by estimate of parameter α_0. It is the level of expenditures that will not be exceed despite the increase in disposable income. The saturation level is the highest for the Czech Republic (3,689.13 EUR per capita) and the lowest for Hungary (2,389.31 EUR per capita). It is compatible with formation of the disposable income. Figure 2 presents the empirical and theoretical values of food expenditure based on results of the Törnqvist models.

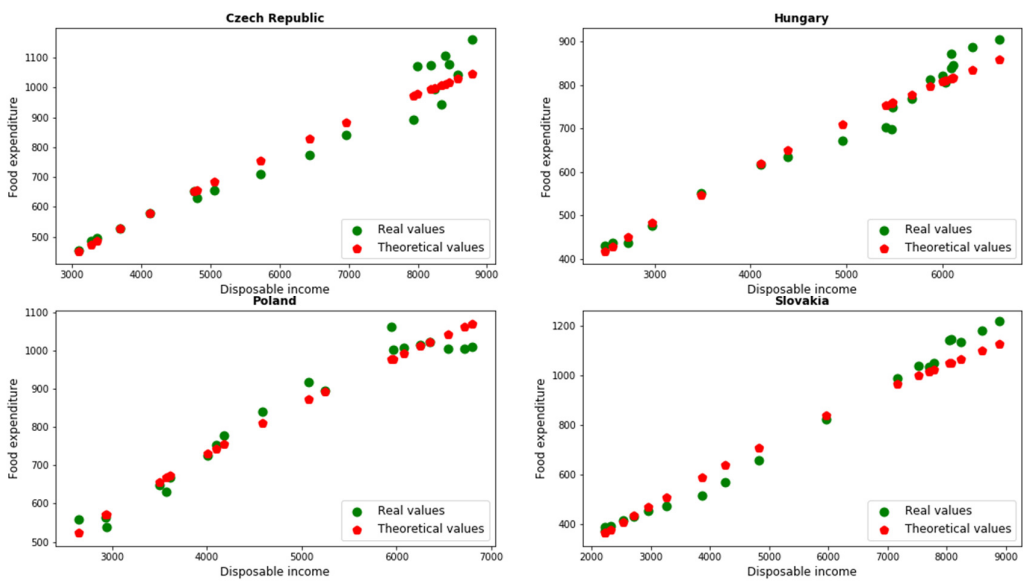

Fig. 2: Comparison of real and theoretical values of the food expenditure – Törnqvist models

Next step in the analysis assumes the comparison of average food demand elasticities values. Table 3 shows calculations of average income elasticities, according to all demand models.

Table 3: Calculations of average income elasticities for food in the years 1997-2016 for Visegrad Group countries

Country	Average income elasticities from models				
	Linear	Double logarithmic	Törnqvist	Working-Leser	Working
Czech Republic	0.858	0.828	0.783	0.846	0.762
Hungary	0.795	0.758	0.709	0.723	0.659
Poland	0.729	0.747	0.739	0.739	0.718
Slovakia	0.889	0.861	0.797	0.986	0.830

Results of the demand elasticities calculation confirm that food belongs to the group of basic goods in each of the Visegrad Group countries. Values of average income elasticities are less than 1 what means that an one percent increase in the disposable income causes less than one percent increase in food expenditures. Moreover, for the same data, estimated demand models show different values of an income elasticity. For demand in the Czech Republic this difference is about 0.096 (0.858 for linear model and 0.762 for Working model). We get the most similar values of the income elasticities of the food demand in Poland – the difference is 0.029. In this study, there is higher heterogeneity in the food demand in Hungary and Slovakia, because differences between income elasticities are even about 0.18. As Table 3 shows, the choice of the demand model form has significant impact on the final results in conducted research.

Conclusion

Households' food expenditures as a basic group in the households' spending plan are in the field of interest of many researchers. In analyses of any consumption expenditures, disposable income (as the main determinant of the consumption spending) cannot be omitted. The amount of the disposable income (and in result level of consumption) depends, among others, on macroeconomic situation of countries (Pietrzak, Łapińska, 2015; Łapinska, 2016; Tvaronavičienė, Gatautis, 2017; Rollnik-Sadowska, Dąbrowska, 2018; Dmytrów, Bieszk-Stolorz, 2019), institutional changes (Balcerzak, Pietrzak, 2016; Hadaś-Dyduch et al., 2019; Balcerzak, 2020), innovation level (Kijek, Matras-Bolibok, 2019) and digitization, financialization and globalization processes (Balcerzak, Pietrzak, 2017; Trębska, 2018; Bilan et al., 2019; Jakimowicz, Rzeczkowski, 2019; Pietrzak, Ziemkiewicz, 2018a, 2018b; Sánchez-López et al., 2019; Shkolnyk et al., 2019; Victor et al., 2019). All demand models contain a factor characterising an influence of the disposable income on expenditure level. They differ in an analytical form. Some of researchers use linear models to estimate households' demand, others use non-linear form of them. Based on the results of estimation models, income elasticities of different group of goods can be appointed. In this paper, it is showed that the model proposed by Törnquist is the best to characterize households' food demand in the Visegrad Group countries. This model shows the lowest values of Bayesian Information Criterion and the highest level of the coefficient of determination. This model is one of the few, which implies that food expenditures increase to a certain level. Calculations of income elasticities confirmed that food belongs to basic consumption goods – values of income elasticity are less than one. Moreover, food income elasticities are different for different demand models. The differences of it in the Visegrad Group countries are significant, while in each of the models, food does not change its nature of basic good.

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Factors Limiting the Improvement of Managerial Competences In High Technology Enterprises

dr hab. Gabriela Roszyk-Kowalska

PhD, DSc, prof. of the Poznań University of Economics and Business
Poznań University of Economics and Business
Poland
g.roszyk-kowalska@ue.poznan.pl

Abstract

By filling the theoretical cognitive gap, an attempt was made to clarify the definition of competences. Based on the analysis of the available literature on the subject, it was assumed that the concept of competence is understood as the general knowledge, experience, skills and attitudes, where:

- knowledge is the content preserved in the memory of a person in a managerial position, which results from the learning process;
- experience is the totality of knowledge and skills acquired on the basis of observations and own experiences of a person holding the position of a manager;
- skills constitute a manager's ability to function efficiently in an organization;
- attitudes are beliefs and behaviours towards someone or something.

In the process of acquiring competences, knowledge, experience, skills and professional attitudes complement each other, but this does not mean that they are of the same importance.
The course of the managerial work process is influenced by specific situational factors called, inter alia, conditions, determinants, indicators of the efficiency of managerial work in the process of managing an organization. These factors condition the manager's achievement of the efficiency of his/her work.
As a result of the conducted research, the factors existing both in the environment of high technology enterprises and within them, limiting the improvement of key competences of management staff in high technology enterprises, were demonstrated.

Keywords: High Technology Enterprises, Managerial Competences, Competences

Introduction

Undertaking activities aimed at identifying and assessing factors limiting the improvement of managerial competences in high technology enterprises, a critical analysis of literature on the subject was performed, which enabled the systematization of dispersed knowledge on managerial competences. Filling the theoretical cognitive gap, an attempt was made to clarify this ambiguous concept, because so far no coherent definition of 'competence' has been introduced that would be adopted by all theorists. On the basis of a critical analysis of literature on the subject, it was found that the concept of competence is understood as the totality of knowledge, experience, skills and attitudes, where: (1) knowledge is the content preserved in the memory of a person in a managerial position, which results from the learning process, (2) experience [Thomas and Cheese, 2005, pp. 24-29] is the totality of knowledge and skills acquired on the basis of observations and own experiences of a person holding the position of a manager, (3) skills constitute a manager's ability to function efficiently in an organization, (4) attitudes are beliefs and behaviours towards someone or something. Theoretical considerations allowed for the formulation of a conclusion that individual elements of competences are interrelated, and it is difficult to indicate their clear divisibility. However, such attempts were made because key competences of managers in high technology enterprises were proposed using the method of source critique and logical analysis, interview technique, questionnaire technique, the method of competent judges, comparative analyses and statistical tests of measuring relationships between variables. These competences were related to the characteristics of high technology enterprises due to the positively assessed role of this sector in stimulating socio-economic development [Roszyk-Kowalska and Kraśniak, 2020, p. 38].

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Managerial competences were selected on the basis of an analysis of literature on the subject and with the involvement of experts from the area subjected to empirical research. It was found that managerial competences differ depending on the industry [Tiruneh, Fayek, 2019, p. 3], the specificity of managerial work or the requirements set for a manager. Therefore, in economic practice it is postulated to construct key competences, i.e. those that all people in managerial positions need in order to satisfy the needs of self-realization and being active in an organization, for which they should constitute capital.

Key competences of managerial staff in high technology enterprises include entrepreneurship, creativity, knowledge management, teamwork, innovation, cooperation in relational systems, employee empowerment, R&D activity management, basing communication systems on modern IT technologies according to the level of education (supplemented with additional qualifications), seniority, key skills and key attitudes [Roszyk-Kowalska, 2018, pp. 19-22].

In the process of acquiring competences, knowledge, experience, skills and professional attitudes complement each other, but this does not mean that they are of the same importance.

The course of the managerial work process is influenced by specific situational factors called, inter alia, conditions, determinants, indicators of the efficiency of managerial work in the process of managing an organization. These factors condition the manager's achievement of the efficiency of his/her work [Kraśniak and Roszyk-Kowalska, 2019, p. 54].

As a result of the conducted research, the factors existing both in the environment of high technology enterprises and within them, limiting the improvement of key competences of management staff in high technology enterprises, were demonstrated.

Research procedure

Based on the analysis of literature on the subject and observation of the economic practice of high technology enterprises, a conclusion was formulated that the factors of change that exist both in the environment and in an organization itself are sources of limitations in the improvement of managerial competences. Therefore, a pilot study (2019) was carried out among managerial staff of all levels, asking them to indicate (open-ended questions) elements of the political and legal, economic, technological, socio-cultural, international and internal environment of an organization that had an impact on their changes in attitude and/or skills and/or experience and/or education. After listing a specific factor from a given environment, managerial staff was also asked to specify the time period when this change took place. The purpose of such a procedure was not only to identify the factors that, according to managerial staff, influenced their changes in competences, but also to "make" respondents think about this factor from the point of view of the criterion of time. Fifty-six people took part in the research, of which thirteen people were from a strategic management level, thirty people from a tactical management level and thirteen people from an operational management level (random selection).

Then, all the factors identified in individual areas of the political and legal, economic, technological, socio-cultural, international and internal environment of an organization, using the method of competent judges, were aggregated and flattened in each group to the six most important ones from the perspective of the research problem.

For this purpose, eighteen experts were appointed, including representatives of economic universities. The deliberate selection of competent experts was guided by the principle of specialization, hence people with significant scientific achievements (scientific publications in a given field) were invited to participate in the research.

Electronic means were used to communicate with the experts. Each of the experts received a list with the factors indicated by respondents in a given area (in line with the scientific achievements) and was asked to aggregate and flatten the number of factors considered by the expert to be the most important to six.

After receiving the material from the experts, research questionnaires were developed which were used during the actual surveys. In this research procedure, senior management was asked to distribute ten points among no more than five statements, depending on the extent to which they believe a factor in their environment has influenced (or influences) changes in attitude and/or skills and/or experience and/or education of people employed in the enterprise where they work at the tactical and/or operational level. In contrast, managerial staff of the tactical and operational

level was asked to distribute ten points between no more than five statements, depending on the extent to which a given factor has influenced (or influences) changes in their attitude and/or skills and/or experience and/or education (self-assessment).

After completion of the research procedure, information was obtained on the factors of the external and internal environment of an organization from 504 people.

The indicators of importance of individual factors were determined as the average indication for managerial staff of an appropriate level and given as a percentage of the maximum possible indication. For example, a value of 10 for the factor "frequent changes of the government" means that managerial staff of the strategic level gave this factor 10% of their points (Fig 1). Firstly, such a transformation allowed to compare the ratings of managerial staff of the strategic level with the ratings of lower-level managerial staff, despite significant differences in the size of the two groups, and secondly, it illustrated the differentiation of ratings of individual factors, maintaining appropriate relationships.

Results of the Research Procedure

The analysis of the received ratings shows that for managerial staff of the strategic level the most important factor is an increase in formal requirements for jobs. Instability of law follows in second place, though it is clearly less important. The remaining factors obtained significantly lower values. On the other hand, for managerial staff of the operational and technical level, the most important are integration with the European Union and an increase in formal requirements for jobs, while other factors: instability of law and frequent changes of the government received only slightly lower ratings. The ratings of lower-level managerial staff are distributed more evenly, the importance is spread over several factors, while the ratings given by managerial staff of the strategic level focus on one or two factors.

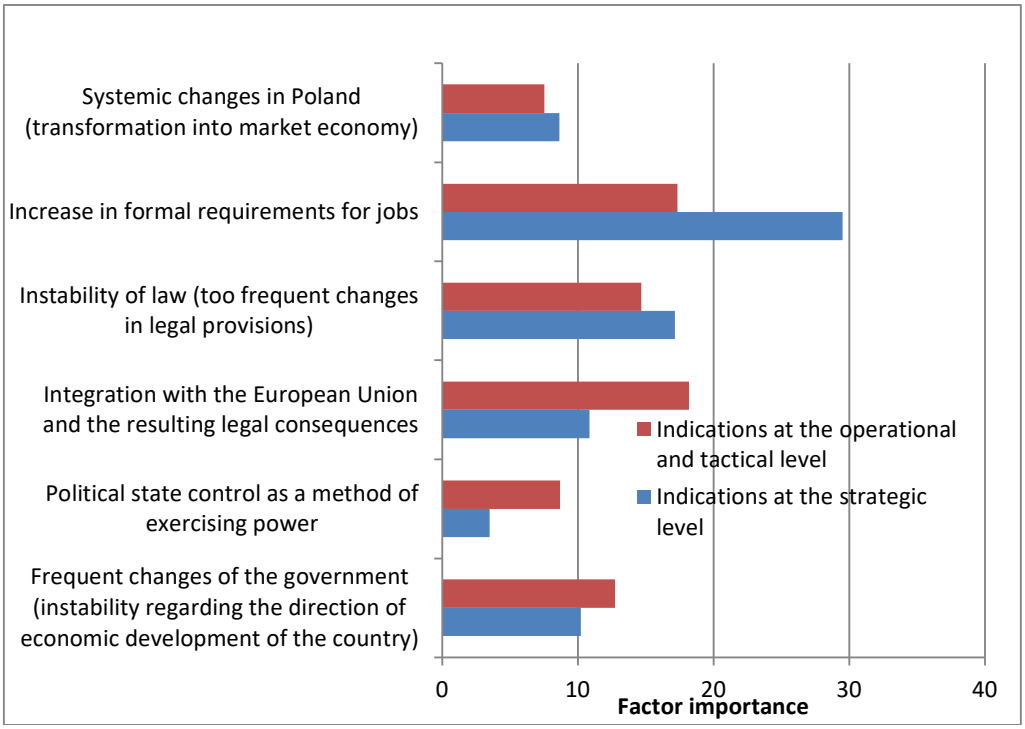

Fig. 1: The importance of factors from the political and legal environment for managerial staff of high technology enterprises

Source: own elaboration.

In order to assess the convergence of the ratings of the importance of factors, the following correlation coefficients were calculated: Spearman's rank - due to the small number of factors (six in each group) and additionally Pearson's linear correlation. The rank correlation coefficient examines the sequence dependence, so it takes into

account only the order of the factors, while it ignores the size of the difference between the indications of subsequent factors. The difference between the factor "an increase in formal requirements for jobs" that received 30% and "instability of law" with 17% importance is treated in the rank correlation coefficient in the same way as the difference between "frequent changes of the government" (10%) and "systemic changes in Poland" (9%). Pearson's linear correlation coefficient is sensitive to these differences and is therefore used here. Due to the small number of observations, it can only be treated as a supplement to the rank correlation coefficient.

Table 1: Correlation between the indications of managerial staff of the strategic level and managerial staff of the tactical and operational level in high technology enterprises in the area of factors from the political and legal environment

	Correlation coefficient	Value *p*
Spearman's rank	0.77	0.0724
Pearson's linear	0.66	0.1499

Source: own elaboration.

The value of the coefficients indicates the existence of an average relationship in the sample, which means that the indications are moderately convergent. However, this relationship is not statistically significant at the significance level of 0.05 (Spearman's correlation coefficient is significant at the significance level of 0.1).

Therefore, it should be recognized that in the area of factors from the political and legal environment, the most important factor influencing decisions on the improvement of key competences of managerial staff in high technology enterprises is an increase in formal requirements for jobs, and then instability of law (too frequent changes in legal regulations). On the other hand, for managerial staff of the tactical and operational level, the first factor influencing actions taken in the process of improving key competences of managerial staff in high technology enterprises is integration with the European Union and the resulting legal consequences, followed by an increase in formal requirements for jobs and instability of law (too frequent changes of legal provisions) in third position.

On the other hand, analysing the factors of the economic environment (Fig 2), it was shown that for managerial staff of the strategic level, the consumption rate (propensity to consume) is most important, followed by the unemployment rate and the rate of economic growth and return on capital in improving key competences of managerial staff in high technology enterprises. On the other hand, for managerial staff of the tactical and operational level, the unemployment rate is most important, followed by the consumption rate (propensity to consume) and exchange rates.

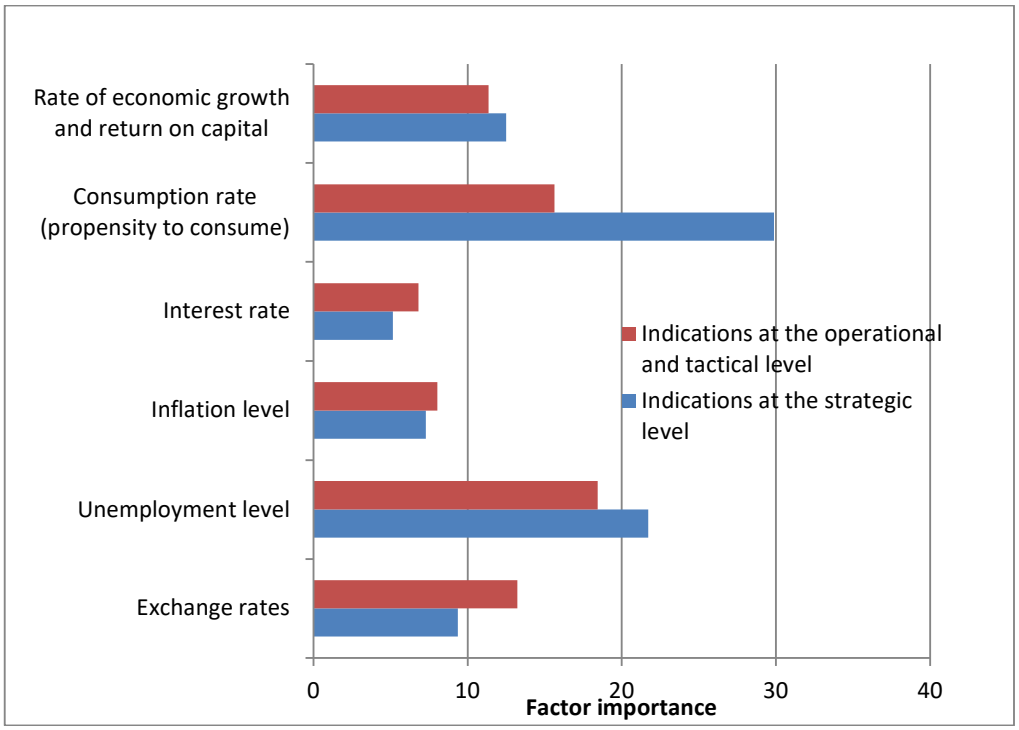

Fig. 2: The importance of factors from the economic environment for managerial staff of high technology enterprises

Source: own elaboration.

Table 2: Correlation between the indications of managerial staff of the strategic level and managerial staff of the tactical and operational level in high technology enterprises in the area of factors from the economic environment

	Correlation coefficient	Value *p*
Spearman's rank	0,89	0.0188
Pearson's linear	0,82	0.0453

Source: own elaboration.

A positive, quite strong relationship has been shown, which means that the opinions of managerial staff of the strategic, tactical and operational level are similar. It is a statistically significant relationship (at the significance level of 0.05).

Then, analysing the factors of the technological environment (Fig 3), it has been shown that for managerial staff of the strategic level, the most important factor is the development of new technologies in Poland, followed by expenditure on R&D in Poland and the share of expenditure on R&D in high technology industries and access to new technologies in improving key competences of managerial staff in high technology enterprises. On the other hand, for managerial staff of the tactical and operational level, expenditures on R&D in Poland and the share of R&D expenditures in high technology industries are most important, followed by access to new technologies and the development of new technologies in Poland.

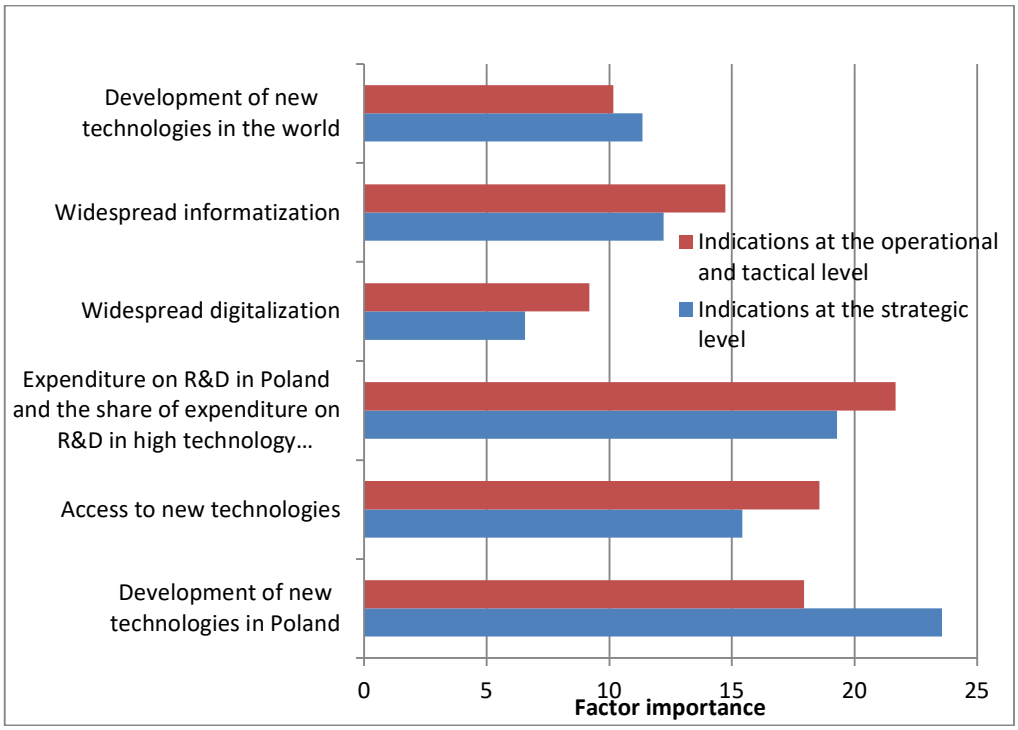

Fig. 3: The importance of factors from the technological environment for managerial staff of high technology enterprises

Source: own elaboration.

Table 3: Correlation between the indications of managerial staff of the strategic level and managerial staff of the tactical and operational level in high technology enterprises in the area of factors from the technological environment

	Correlation coefficients	Value *p*
Spearman's rank	0.83	0.0416
Pearson's linear	0.82	0.0447

Source: own elaboration.

A positive, quite strong relationship has been shown, which means that the opinions of managerial staff of the strategic, tactical and operational level are similar. It is a statistically significant relationship (at the significance level of 0.05).

Subsequently, the factors from the socio-cultural environment were analysed. In the group of these factors, mobility was the most indicated one by senior management, followed by the demand for innovative products and changes in the social structure. Therefore, it can be concluded that these factors constitute an important source of information in the implementation of the process of improving key competences of managerial staff in high technology enterprises. Meanwhile, for managerial staff working in these enterprises, the factors that determine changes in key competences are: mobility, demand for innovative products and globalization processes (Fig 4).

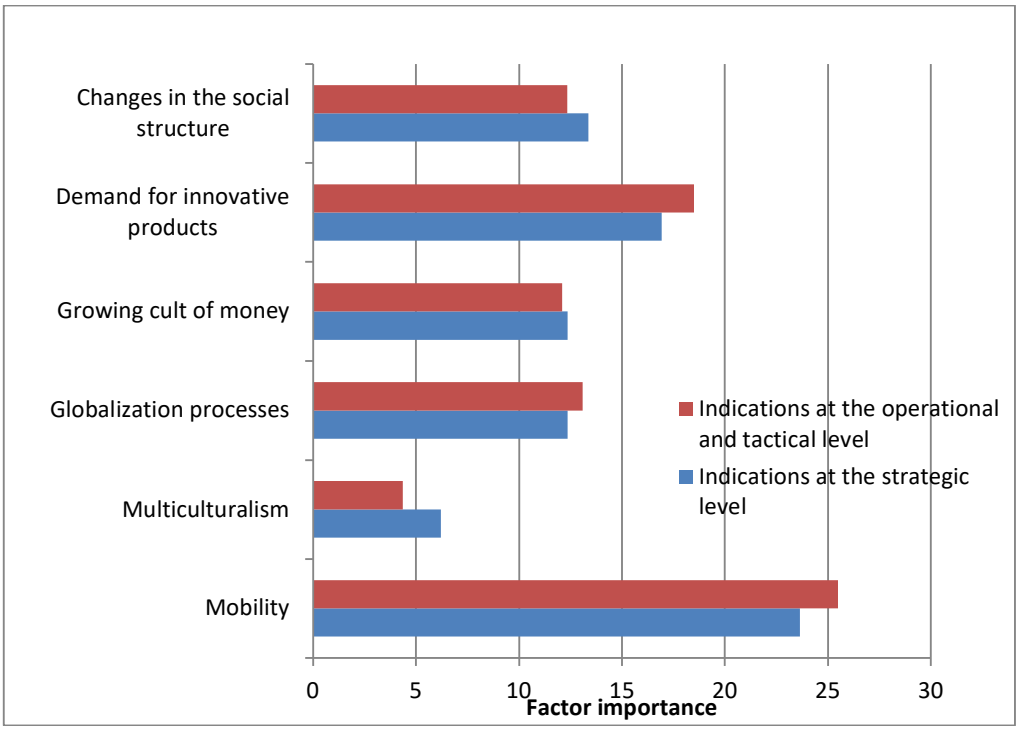

Fig. 4: The importance of factors from the socio-cultural environment for managerial staff of high technology enterprises

Source: own elaboration.

Table 4: Correlation between the indications of managerial staff of the strategic level and managerial staff of the tactical and operational level in high technology enterprises in the area of factors from the socio-cultural environment

	Correlation coefficient	Value *p*
Spearman's rank	0.87	0.0237
Pearson's linear	0.99	0.0000

Source: own elaboration.

In this case, the relationship is very strong and positive. This means the convergence of indications made by managerial staff of all management levels. The relationship is statistically significant (at the significance level of 0.05).

Moving on to the analysis of the last group of factors from the organization's environment, it was shown that among the factors from the international environment (Fig 5), the highest rated factors in the opinion of managerial staff of the strategic level include trips, contacts abroad, and the complexity and speed of changes taking place on the international market. Both these factors received the highest percentage of ratings. A slightly lower percentage (13%) was achieved by the following factors: institutional solutions adopted in other countries, economic competition, removal of legal barriers. On the other hand, for tactical and operational level managers, three factors (15%) are rated identically: global changes in the area of generational differences, meeting(s) with (a) new business partner(s) from abroad, trips and contacts abroad.

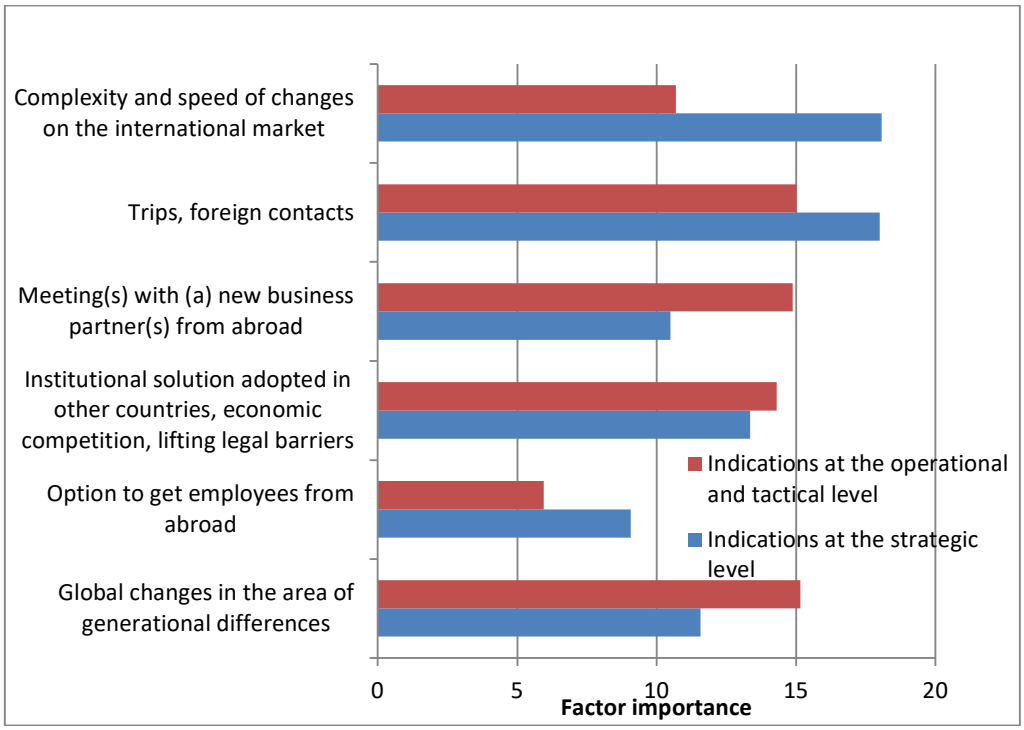

Fig. 5: The importance of factors from the international environment for managerial staff of high technology enterprises

Source: own elaboration.

Table 5: Correlation between the indications of managerial staff of the strategic level and the tactical and operational level in high technology enterprises in the area of factors from the international environment

	Correlation coefficient	Value *p*
Spearman's	0.24	0.6429
Pearson's linear	0.28	0.5952

Source: own elaboration.

Indications of senior managerial staff, middle management and managerial staff of the lowest level do not coincide. Correlation coefficients indicate an insignificant relationship (at the significance level of 0.05). This indicates that the opinions of managerial staff as to the factors from the international environment that may affect the process of improving key competences of managerial staff in high technology enterprises are divergent. Therefore, it can be assumed that the motives for action in this area may differ as to the motivation for taking action in this area, depending on the groups of managerial staff.

Significant factors influencing activities of any organization are those that are inherent in itself. The group of factors coming from inside the organization include those which, according to literature on the subject, directly affect the functioning of a given enterprise. These are the factors with the greatest potential to influence it from the point of view of people operating in a given organization. Among the internal factors of an organization, the most important (24%) in the opinion of managerial staff of the strategic level are the educational offer and the development of the organization. Changes in the financial condition of an organization constitute a slightly lower rated but quite important factor. On the other hand, for managerial staff of the tactical and operational level, the factors that may affect the process of improving key competences of managerial staff in high technology enterprises are: educational offer in a given organization, change in the financial condition of a given organization and change of job position (Fig 6).

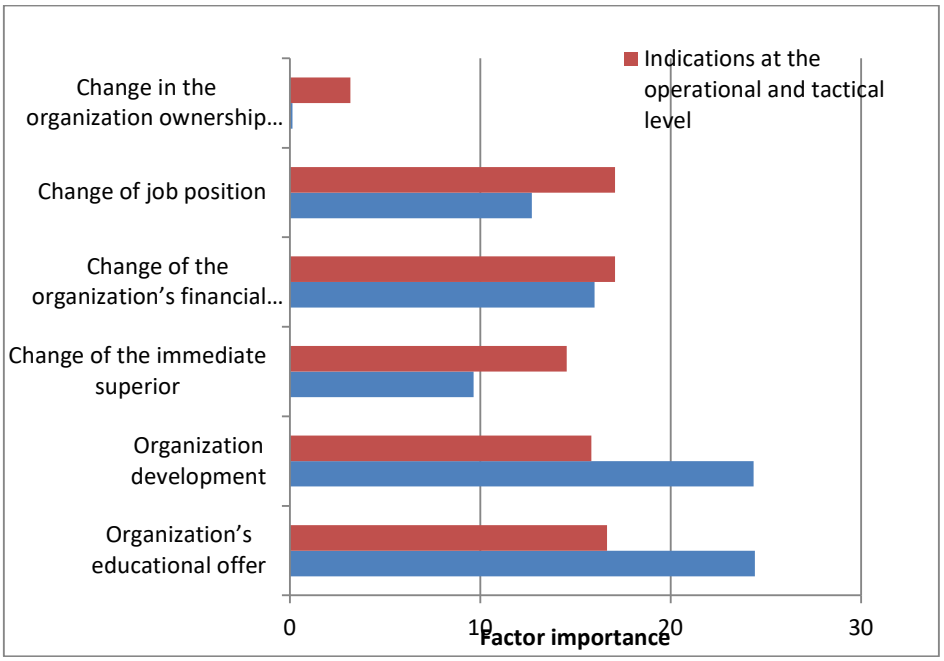

Fig. 6: The importance of internal factors for managerial staff of high technology enterprises
Source: own elaboration.

Table 6: Correlation between the indications of managerial staff of the strategic level and the managerial staff of the tactical and operational level in high technology enterprises in the area of intra-organizational factors

	Correlation coefficient	Value *p*
Spearman's rank	0.67	0.1442
Pearson's linear	0.78	0.0667

Source: own elaboration.

Indications obtained in the research are moderately similar. The correlation coefficients show a moderate correlation. However, this correlation is statistically insignificant (at the significance level of 0.05).

Conclusions

It should be acknowledged that in individual groups of factors from the environment of a given organization (political and legal, economic, technological, socio-cultural, international) and internal factors, in the research process differences were identified as to the importance of individual factors for managerial staff at the strategic level and managerial staff at the tactical and operational level. The largest statistical discrepancy occurs among the factors inherent in the international environment, then the political and legal environment, and in high technology enterprises themselves. Such a situation may lead to the conclusion that managerial staff may have different priorities in making decisions within their competences, both in the area of education, additional qualifications, experience, skills, and attitudes. Therefore, it is postulated to attempt to overcome these barriers, which may be of significant importance in the improvement of key competences of managerial staff in high technology enterprises. Therefore, the following actions should be undertaken:

- clearly and precisely define competencies (the list of competencies of managerial staff may be used to identify competency gaps [Tyrańska 2016, p. 21]) and avoid any ambiguities in this respect,
- structure the competency model to make it as easy to use as possible,
- be aware that appropriate quality standards must be applied in the development of key managerial competences.

These quality standards should assume that the structure of the process of improving key managerial competences should:

- be transparent and generally understandable,
- be suitable for an appropriate application to all personnel for which it is designed,
- take into account anticipated changes,
- be characterized by a clear separation and divisibility of components (skills and attitudes cannot overlap),
- be fair and not cause unjustified discrimination against any of the persons within its reach.

Only when employees of a given organization are aware of the purpose of the process of improving key managerial competences, and the structure of the process itself corresponds to the above-mentioned quality standards, it is possible to proceed with its implementation [Whiddett and Hollyforte 2003, p. 209]. Therefore, the following actions should be undertaken:

- involve the employees who will be affected by the actions of managerial staff in the formation of the process of improving key managerial competences;
- during the formation of the process of improving key managerial competences inform employees about what actions are taken and why on an ongoing basis;
- make sure that the process of improving key managerial competences is adequate to the planned applications and goals, and that the competences reflect the specificity of individual positions and roles [Whiddett i Hollyforte 2003, p. 210].

The choice of a method or methods of improvement should depend not only on the competence to be improved, but also on the individual learning style of a given person [Musioł-Urbańczyk 2010, p. 75].

Unfortunately, there are no shortcuts in improving key managerial competences. This process requires constant analysis, observation and formulation of conclusions. Nevertheless, there are many methods that can help any manager with this, and each has its pros and cons. In order to develop competences (especially in the short term), trainings, workshops, and courses can be used. It is postulated to choose those in which activating methods are used, such as role-playing, recording scenes with a video camera, behaviour analysis, coach's feedback, working on specific problems. This form of education does not guarantee that managers will completely master a given skill, or change their attitude, because the development of these elements of competences also requires practice, i.e. hands-on training. However, it can be a good start on their career path. The undoubted advantage of trainings, workshops, and courses is that managers receive knowledge in a given area in a nutshell, often supported by real-life examples. It is also a great opportunity to make new friends among participants, which in itself means developing relationship building skills.

It is also postulated to "nurture" organizational culture, which in high technology enterprises (from the point of view of their characteristics) should be flexibility-oriented, and therefore its attributes should include passion, power-sharing and continuity of change.

Ending

The analysis of the research procedure results shows that for managerial staff of the strategic level, the most important factors influencing changes in managerial competences should include an increase in formal requirements for jobs and the consumption rate (propensity to consume). The slightly lower rated but important factors should include development of new technologies in Poland, development of a given organization and the educational offer in high technology enterprises. On the other hand, for managerial staff of the tactical and operational level, the above-mentioned factors are important, but according to the ratings the most important factors are mobility and expenditure on R&D in Poland and the share of R&D expenditure in high technology industries. It is also worth emphasizing that the importance of the factors "change of job position" and/or "change of the immediate superior" is higher than in the ratings of managerial staff of the strategic level. The importance of factors influencing changes in managerial competencies according to managerial staff of the strategic level in comparison to managerial staff of the tactical and operational level varies, which is a reason for the conclusion that managerial staff, depending on the management level, may have different priorities in making decisions regarding changes in their competences both in the area of knowledge, experience, skills and attitudes. Therefore, an attempt was made to propose methods to overcome barriers in the process of improving key competences of managerial staff in high technology enterprises.
In conclusion, it should be emphasized that not a single person is fully competent. In such a situation, first of all, it is necessary to perform tasks related to key competences very well and to follow certain rules, which can be called the principles of competent management. This is the minimum to be expected and required of a manager. Violation

of this minimum is not only a violation of managerial duties, but also of universal ethical principles. Someone who does not want or is unable to meet this managerial minimum should not occupy a managerial position [Kietliński, Reyes and Oleksyn 2005, p. 197]. It is also worth remembering that the development of competencies is a process that should be continued throughout the entire period of holding a given position in a given company.

Acknowledgement

I started my research and scientific work at the University of Economics and Business in Poznań (former Academy of Economics in Poznań).

My research interests focus on managerial staff. Already at the stage of preparing my master's thesis, I was interested in managerial work and the role of managerial staff in organizations. Subsequently, my research interests have evolved towards key business competences.

After receiving a PhD in economics (2007), I continued my research interests in managerial staff, key competences of enterprises, intellectual capital of enterprises and high technology enterprise management.

My research work and the resulting scientific publications fall within the discipline of management science and can be attributed to the following areas:

- managerial work and the role of managerial staff in organizations (in this research area I have published 12 publications in scientific journals, seven chapters in scientific monographs and two monographs as a co-author);
- management of intellectual capital of enterprises (the most important publications in this research area include two publications in scientific journals and three chapters in scientific monographs);
- key competences of enterprises (in this research area, the most important scientific publications include seven publications in scientific journals and four chapters in scientific monographs);
- management of high technology enterprises. As part of this research area, an original monograph was created, five publications in scientific journals and three chapters in scientific monographs.

In 2018 I received a PhD, DSc degree, and since 2019 I am a professor at the University of Economics and Business in Poznań (Poland).

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L'entrepreneuriat Coopératif Feminin Au Maroc : Quelle Autonomisation Génère-T-Il Pour Les Femmes ?

Hayat SOUAQI

Doctorante à la Faculté des Sciences Juridiques, Economiques et Sociales Ain Chok, l'Université Hassan II, Casablanca, Maroc.
Laboratoire de recherche en Gestion des Compétences, de l'Innovation Entrepreneuriale, des Aspects Sociaux des Organisations et des Économies. Equipe de Recherche DEGG (Droit, Economie, Gestion et Genre)
Hayat.sou@gmail.com

Yasmina BENNIS BENNANI

Professeure à la Faculté des Sciences Juridiques, Economiques et Sociales Ain Chok, l'Université Hassan II, Casablanca, Maroc
Laboratoire de recherche en Gestion des Compétences, de l'Innovation Entrepreneuriale, des Aspects Sociaux des Organisations et des Économies. Equipe de Recherche DEGG (Droit, Economie, Gestion et Genre)
yasbenn@gmail.com

Résumé

L'entrepreneuriat social et solidaire attire, de plus en plus, les femmes et les encourage à entreprendre collectivement et solidairement. Elles y sont plus présentes que les hommes, et réussissent à grande échelle à changer leurs vies grâce au travail solidaire cadré par les coopératives. Ces dernières sont censées contribuer au développement économique des régions et générer une restitution des droits économiques, sociaux et politiques de base au profit des personnes en situation de vulnérabilité et de précarité. Ainsi, les membres de la coopérative se voient emprunter un chemin qui leur permet d'améliorer leurs conditions de vie et de devenir des personnes autonomes et créatrices de valeurs à petite et grande échelle.

Dans l'objectif d'approcher la réalité des coopératives de femmes au Maroc, nous pouvons à priori dans le cadre de cette recherche, questionner la dynamique entrepreneuriale coopérative féminine quant à sa capacité de déclencher un changement réel dans la vie des coopératrices amenant à libérer leurs pouvoirs d'agir qui contribue à leur autonomisation globale. Nous positionnons alors notre recherche dans une vision constructiviste appuyée sur une méthodologie mixte en quête d'une validité et une fiabilité de plus. Ainsi, la partie empirique sera traitée par une étude exploratoire de deux volets documentaire et qualitative, et une étude quantitative analysée par la méthode PLS.

Discipline

Economie sociale et solidaire, Entrepreneuriat coopératif féminin, Autonomisation des femmes Third Sector, Women's cooperative entrepreneurship, Empowerment

Introduction

Entreprendre collectivement et conquérir des espaces d'action socioéconomique, révèle l'ingéniosité de l'économie sociale et solidaire, les personnes dans ce cadre, entreprennent solidairement dans des domaines économiques à finalité sociale. Dans cette logique, l'économie sociale et solidaire innove en contribuant à la création de la valeur

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sociale, en œuvrant via l'entrepreneuriat solidaire pour répondre à des besoins économiques et/ ou sociaux non satisfaits par les secteurs classiques. À travers sa démarche de proximité, elle concourt à repenser et modifier l'environnement des personnes fragilisées en mobilisant parallèlement les trois sphères économiques, sociales et politiques.

La place des femmes dans ce secteur est distinguée en raison de leur forte présence par rapport aux autres types d'entrepreneuriat, au point d'en faire le constat que l'économie sociale et solidaire se féminise, par exemple en France 67% des salariés du secteur sont des femmes selon le conseil national des chambres régionales de l'économie sociale en France (2012). Au travers le monde, les femmes sont au cœur des groupes de l'économie sociale, elles s'organisent en groupement d'entraide et de soutien (exemple des pratiques populaires en Amérique latine et en Afrique). Cela leurs permet d'exercer une activité en temps partiel qui facilite la conciliation de la vie professionnelle et la vie personnelle, de partager les connaissances et les coûts, d'améliorer les compétences, et de valoriser les activités marchandes de nature domestique...etc.

A ce propos, les travaux de Favreau et Lévesque (1996), Laville (2005) et Lemaitre (2009), montrent que la mobilisation des ressources et des personnes qui s'organisent en groupe, aide à éduquer aux valeurs du travail collectif, à initier à la solidarité organisationnelle et à remodeler les relations entre les différents acteurs économiques et sociaux. L'entrepreneuriat social et solidaire incite donc, à plusieurs changements individuels et collectifs, comme la participation à la gestion des espaces publics, et le changement des comportements des personnes actives vis-à-vis d'elles-mêmes, de leurs entourages et de la communauté. Son importance et son utilité à rallier les personnes et les organisations autour d'un projet collectif de toute la société sont de toute évidence selon Salamon et Anheir (1996), en l'occurrence pour l'Afrique où la solidarité est vivifiante et constitue un patrimoine immatériel, les apports des travaux de Alphandéry, Fraisse, Ghezali (2009) et O. Ahmed (2010), affirment que ce constat été démontré par plusieurs expériences réussies dans le continent.

Dans cette dimension, les coopératives en tant qu'organisations classiques de l'économie sociale et solidaire détiennent un potentiel émancipateur, notamment en générant des innovations au niveau des pratiques de production et de gestion et en favorisant l'acquisition de l'autonomie économique, de la capacité d'agir sur l'environnement social et sociétal des adhérents.

La coopérative est admise comme un outil pertinent vers l'égalité de sexe, la lutte contre la vulnérabilité, la création de synergie collective et la croissance inclusive. Elle est ainsi l'une des domaines fondamentaux de la prise de pouvoir des femmes, dans la mesure où elle participe à leur autonomisation générale en favorisant l'acquisition de l'autonomie économique, de leur capacité d'agir sur leurs environnements sociaux et sociétaux, tout en favorisant leur accès aux espaces de la gestion publique.

Cette prise du pouvoir s'effectue par le biais d'un processus de conscience critique des réalités sociales et économiques marquant l'environnement de la personne suivant la pédagogie des opprimés de Freire, P (1968). Elle est alors d'ordre individuel et collectif, partant de la conscience dominée à une conscience libérée et mène vers l'acquisition de l'autonomie dont la démarche conjugue plusieurs dimensions, à savoir la dimension économique, socioculturelle, familiale / interpersonnelle, juridique, politique et psychologique.

Le concept de l'autonomisation s'est vu ainsi attribué une caractéristique de multidimensionnalité d'après les travaux de Malhotra, Schuler et Boender (2002) comme mentionné dans la recherche effectuée par Dohmwirth (2014), elle se construit au fil du temps grâce à l'accumulation des expériences, résulte d'un processus selon Rowlands (1995), se mesure et se constate d'après Pradhan (2003).

Cela a donné lieu à un ensemble de recherches théoriques et pratiques, de mécanismes d'accompagnement et d'instruments de mesure des différents aspects de la condition féminine au sein de l'organisation coopérative. La mise en œuvre de ces moyens et outils, est présumée être utilisée, entres autres à définir des indicateurs d'estimation et à évaluer éventuellement l'impact réelle de cette organisation solidaire de l'économie sociale sur les différents aspects de la vie (financière, sociale, sociétale et politique) de ses membres ou salariés.

Dans ce même ordre d'idée, la pertinence de notre recherche dans le présent article réside dans l'évaluation de l'impact de la coopérative de femmes sur ses membres dans un contexte marocain où on enregistre une insuffisance d'études réalisées dans ce sens. Ceci afin de pouvoir identifier les caractéristiques, voire la typologie et la dimension, de l'autonomisation que les coopératives de femmes au Maroc peuvent procurer à leurs membres.

Notre objectif est de pallier l'absence desdites études d'impact, et de contribuer à l'enrichissement de la production scientifique à ce sujet, compte tenu que, les recherches existantes sont basées sur des études de cas limitées à un nombre restreint de coopératives.

Ainsi, suite à une revue des principaux concepts en relation avec notre thématique et le contexte marocain en termes d'exclusion et de pauvreté, nous mettons en éclair la relation entre l'entrepreneuriat coopératif et la construction de l'autonomisation des femmes, pour proposer ensuite un cadre théorique détaillant la problématique et méthodologie de recherche afin d'approcher le terrain via la réalisation d'une étude exploratoire de deux volets documentaires et qualitatives, et une étude quantitative, la discussion des résultats s'ensuit pour conclure l'article tout en soulignant les perspectives de recherche futures.

L'emploi féminin et autonomisation des femmes

De l'emploi des femmes à l'entrepreneuriat féminin

Les femmes sont moins payées que les hommes et ne bénéficient pas des mêmes avantages sociaux à l'échelle mondiale, du fait de leur forte présence dans l'économie de "care" (travail domestique non rémunéré, soins aux personnes âgées, enfants…) et dans les emplois vulnérables, d'après la banque mondiale. Leur part dans le marché d'emploi est aussi en décroissance permanente, avec un taux d'activité de 47,14 en 2019 contre 51.024 en 1990. Et seulement 1,379% des chefs d'entreprises sont des femmes en 2019.

Le Forum pour le Partenariat avec l'Afrique, dans son rapport (2011) estime, que la journée de travail d'une femme africaine est en moyenne 50% plus longue que celle d'un homme. A savoir que les employées du secteur agricole ne détiennent que moins de 1 % des terres sur le continent africain, et les agricultrices africaines ne bénéficient qu'uniquement de 1% du montant des crédits alloués à l'agriculture. Ce qui impacte effectivement leur accès aux ressources, économiques, financières et naturelles (spécifiquement la terre).

D'après l'ONU (2020), le salaire moyen des femmes dans le monde est inférieur à celui des hommes de 20% (14% en Afrique du nord). Outre l'écart salarial, une disparité de détention des actifs agricoles est constatée dans toutes les régions, les femmes possèdent 20% des propriétés foncières agricoles dans les pays en développement avec un pourcentage moins de 5% dans l'Afrique du Nord et d'Asie de l'Ouest selon les données du FAO (2010). Tout en notant que les propriétés détenues par les hommes sont de taille supérieure aux celles appartenant aux femmes.

Battagliola (2001) explique que le travail des femmes s'est principalement accru dans les secteurs négligés par les hommes, et du fait qu'elles sont majoritairement salariées dans des catégories socioprofessionnelles moins valorisées, cela risque de favoriser une conjugaison entre l'emploi féminin et la fragilisation économique.

Dans ce sens, Cohen (2016), mentionne que 48 % des femmes actives sont employées dans des fonctions maintenues au bas niveau en termes de salaire et des conditions de travail, en fait, elles sont plus présentes dans quatre secteurs d'activité, à savoir : la santé et les services sociaux, l'éducation, l'administration publique et le commerce de détail, et dans le travail à temps partiel qui est devenu un terrain de la discrimination sexuelle du marché de travail par excellence. Ces conditions ont fait de l'activité des femmes dans plusieurs régions, une impérative et une quête de survie plus qu'un choix de vie ou une opportunité d'épanouissement.

La non reconnaissance de la contribution de l'économie du ''care'' exercée habituellement par les femmes et les tâches domestiques et éducatives non rémunérées et pourtant vitale pour le maintien des liens sociaux, impose, d'après Zelizer (2008), une évaluation et valorisation de la participation économique des femmes.

Ainsi, l'entrepreneuriat féminin a émergé dans le monde entier, et est devenu de plus en plus courant, car considéré comme un pilier et levier d'encouragement et de développement des activités économiques pouvant avoir des retombées positives sur les entrepreneures femmes. En effet, cette situation fragile anime la mission de plusieurs regroupements féminins dans le monde et les encourage à œuvrer pour remédier à la carence en droits économiques, sociaux et politiques élémentaires à l'instauration de la justice sociale au profit des femmes essentiellement. L'Afrique suit le flux, et dès les années quatre-vingt, l'entrepreneuriat est considéré comme source de création d'emplois et de richesses. Entreprendre donc, permet de gagner en autonomie économique qui suppose de son côté avoir accès aux différents types de ressources pour s'assurer et se défendre contre les détresses de la vie. Cette

autonomie facilite aux femmes de faire des choix essentiels dans leurs vies, de gagner un salaire plus élevé, d'effectuer des actions éclairées en matière de gestion de foyer, d'être en meilleure santé.

Ces femmes entrepreneures ne sont pas nécessairement des fondatrices d'entreprises, mais peuvent être des gestionnaires d'affaires selon l'approche canadienne. D'après Belcourt, Burke et Lee-Gosselin (1991), l'entrepreneure est la femme qui cherche l'autonomisation économique et l'épanouissement personnel en se lançant dans l'aventure de la création de son entreprise. Tandis que Lavoie (1988), considère que toute femme qui possède une entreprise ou qui participe régulièrement à sa gestion courante en assumant des risques financiers et administratifs est une entrepreneure.

L'aventure entrepreneuriale est initiée généralement grâce à plusieurs motivations, de nature complexe, fruits d'un mélange de facteurs pull et push selon Lavoie (1988). Les traits de personnalité de l'individu, l'aspect socioculturel de son entourage, ainsi que l'environnement économique et politique de la région marquent grandement cette décision et constituent une base clé de succès de la démarche entrepreneuriale.

Dans ce contexte, Kirkwood (2009) distingue un continuum de facteurs provoquant la prise de l'initiative d'entrepreneuriat :

- Désir d'indépendance : c'est le besoin d'être son propre patron ;
- Motivations économiques : le souhait de saisir une occasion d'affaire prometteuse ;
- Motivations d'emploi : liée à l'insuffisance des perspectives d'évolution dans le salariat ;
- Motivation d'ordre familial : en relation avec l'articulation entre vie familiale et vie professionnelle.

Quant aux entraves, les préoccupations des femmes entrepreneures vues d'un angle, sont communes à tous les entrepreneurs en dépit du sexe, et d'un autre angle, elles sont perçues sexuées et liées au genre féminin. En fait, Lavoie (1988) met l'accent sur le financement, le manque d'expérience en termes de tactique de gestion et le manque de formation comme étant les principales entraves devant les entrepreneures, alors que d'autres comme Alexandre (2016), Cornet et Constantinidis (2004) ont énuméré des problèmes liés au financement, à la conciliation du travail avec la vie familiale et aux faibles liens avec les réseaux.

Pour synthétiser il est important de dénoter qu'il apparait complexe d'appréhender cette réalité des femmes et de l'entrepreneuriat comme une unité monolithique, étant donné que ce phénomène est traversé par plusieurs rapports sociaux, ceux liés au diplôme et à la qualification, ainsi que l'âge, l'origine ethnique et la culture de l'environnement. Ce qui signifie que même les motivations et les contraintes sont personnalisés parfois et à étudier au cas par cas.

Au Maroc, concernant le taux d'activités des femmes, d'après les données du Haut-Commissariat au Plan (2013), le pays est en dessous de la moyenne mondiale et des niveaux enregistrés par des pays arabes comme le Qatar, le Bahreïn et le Kuweit. Selon le même établissement (2016), la contribution des femmes au marché de travail demeure faible avec un taux d'activité de 23,6% contre 71,5% pour les hommes, ce qui positionne le royaume en dessous de la moyenne des pays à revenu intermédiaire de tranche inférieure, ayant un taux d'activité des femmes qui atteint les 39%, contre 57% dans les pays à revenu intermédiaire de tranche supérieure.

Quant à l'entrepreneuriat, les femmes sont bloquées par des stéréotypes et des craintes psychologiques développées depuis le jeune âge, il s'agit des idées qui grandissent avec le temps et se transmissent par l'environnement à proximité ou lointain. Dans ce cadre, l'ONU Femmes (2013) affirme l'influence de l'environnement socioculturel et l'auto-crainte sur la perception de l'entrepreneuriat par les femmes. Aussi, à l'exception de quelques produits et services financiers et non financiers dédiés à l'action d'entrepreneuriat, les femmes entrepreneures s'orientent vers les offres standards de crédit destinées aux particuliers.

L'exclusion et la pauvreté des femmes au Maroc

L'autonomie économique des femmes est un enjeu de développement pour lutter contre la pauvreté d'après Jetté (2009). Les droits des femmes légitimes et basiques quant à la capacité d'acquérir, de vendre, de posséder ou de

louer une propriété, ou de contracter des prêts sur la base de leurs biens ou de leurs terres ne sont pas toujours accordés, surtout dans les communautés à culture qualifiant les femmes de personnes non émancipées et en besoin d'assistance. L'exclusion des femmes de l'accès aux ressources, principalement, l'éducation, l'héritage, la terre etc. entravent leur autonomisation financière. La discrimination au travail, l'exclusion des soins médicaux et de la couverture médicale sont autant des éléments qui influencent l'autonomie économique des femmes.

Ninacs (2006) mentionne dans son intervention lors d'un forum sur la sécurité du revenu et l'emploi, que les deux chercheurs, lesemann (1994) et Mercier (1995) jugent que l'exclusion sociale et la pauvreté peuvent constituer un phénomène multidimensionnel, qui dépasse la carence financière pour en toucher l'aspect psychologique des personnes, ce qui risque de causer une perte d'estime de soi, de la liberté du choix, de la dignité, ou encore l'isolement social, etc. d'après Fresno, Spencer, Zaouche-Gaudron (2005).

Une personne pauvre, ne dispose pas d'autonomie financière, ne dispose pas généralement d'un pourvoir d'action, et de communication, est une personne qui ne jouit pas de ses droits économiques et politiques. Dans notre recherche, par exclusion, nous désignons la situation subie par la personne et qui correspond à un processus qui dépasse largement la pauvreté, où les personnes combinent différentes disqualifications économiques, sociales ou politiques.

Dans le contexte marocain, les résultats de l'enquête nationale sur la consommation et les dépenses des ménages communiqués par Lahlimi Alami (2014) montre que la pauvreté est une donnée structurelle à vocation rurale. En fait, en 2016, 1,6 millions de marocains étaient encore en situation de pauvreté absolue et 4,2 millions en situation de vulnérabilité. Pour la même période, à l'échelle nationale, le taux de pauvreté monétaire est passé à 4,8 % et celui multidimensionnelle à 6 %. Quant à la vulnérabilité à la pauvreté, elle a enregistré un indice de 7,9 % en milieu urbain contre 19,4 % en milieu rural. L'incidence de la pauvreté multidimensionnelle en 2014 d'après les statistiques du HCP montre que la moitié des régions enregistrent un niveau de pauvreté supérieur à la moyenne nationale (8,2%).

Il apparait selon les résultats de la même l'enquête sur la pauvreté (2014) réalisé par le HCP, que 3,5 millions de personnes souffrent une seule pauvreté (10,3 % de la population) : 2,3 millions la pauvreté multidimensionnelle (6,8%) et 1,2 million la pauvreté monétaire (3,5%). Tandis que, 463 mille personnes (1,4% de la population) sont frappées à la fois par la pauvreté multidimensionnelle et la pauvreté monétaire. Ainsi, 3,9 millions de marocains sont en situation de pauvreté globale (monétaire et multidimensionnelle), soit un taux de 11,7% à l'échelle nationale, 3,9% en milieu urbain et 23,7% en milieu rural.

Les femmes constituent bien évidement un capital humain énorme, qui en s'activant contribue fortement dans développement économique du pays, d'où la gravité de dénuement économique et/ou sociale qu'il endurcir car il engendre une pauvreté humaine des femmes qui se transmet de génération en génération, du fait que la population féminine subit des conditions de vie économique et sociale déplorable en affichant des taux d'analphabétisme, de déscolarisation, des niveaux d'inactivité et des taux de chômage amplement plus élevés que ceux enregistrés au niveau des hommes. Ainsi, le processus d'appauvrissement s'accélère à cause de ces facteurs et subséquemment peut engendrer l'exclusion sociale à double vitesse au niveau des femmes.

D'après les données du HCP (2014), 45,1% de la population âgée au plus 25 ans ne savent encore ni lire ni écrire et le pourcentage est plus élevée chez les femmes que chez les hommes (59,1% contre 29,3% successivement). Le nombre des chômeurs a atteint 86000 personnes, en touchant le plus les jeunes et les femmes dans le milieu urbain.

Tableau n°1 : Indicateurs annuels d'activité, d'emploi par milieu de résidence (Effectifs en milliers et taux en %)

Indicateurs	Année 2015		
	Urbain	Rural	Ensemble
Activité et emploi (15 ans et plus)			
- Population en âge d'activité	15263	9702	24965
- Population active	6326	5501	11827
- Taux de féminisation de la population active	21,7	33,3	27,1

- Taux d'activité	41,4	56,7	47,4
. Selon le sexe			
Hommes	67,3	78,2	71,5
Femmes	17,4	36,6	24,8
- Population active occupée	5402	5277	10679
-Taux de féminisation des actifs occupés	19,9	34	26,8

Source : Construit par l'auteure d'après les données tirées de la note d'information du haut-commissariat au plan au sujet de la situation du marché du travail en 2015

L'accès des femmes au marché du travail demeure moyen et en dessous des attentes, d'après les données du HCP (2015), seulement 24.8 % des femmes est actif contre 71,5 % des hommes. Selon les chiffres communiqués par le même organisme en 2016 sur la tendance d'évolution des caractéristiques démographiques et socioprofessionnelles des femmes marocaines, au niveau national la présence des femmes est plus intense dans le secteur de l'agriculture, forêt et pêche avec un pourcentage dépassant 41%.

Par milieu de résidence, en 2017, les femmes dans la ville sont actives plus dans les activités non agricoles avec un pourcentage qui atteint 64,6% dans des entreprises privées non agricole, tandis qu'en compagnie, c'est dans les exploitations agricoles qu'elles exercent plus avec un taux de 92,8%.

Par professions principale, les statistiques du HCP (2016) montre que, 52,4% des marocaines occupées sont des ouvrières, 45.4% sont des cadres moyens et 35.0 % sont des cadres supérieures ou membres de professions libérales. En outre, les femmes au foyer en 2014, affichaient un taux qui embrasse 76,9% de l'ensemble des inactives.

La portion d'aides familiales est prépondérante par rapport aux autres types de fonction des occupés actifs, et ce, essentiellement chez les femmes, estimée à 49% des occupées étaient des aides familiales en 2015. Les femmes fournissent 73,7% du travail non rémunéré dans le milieu rural.

Également, il apparait que la majorité des actifs occupés (80,9%) ne bénéficient pas de couverture médicale. Chez les femmes la proportion touche à 81,6%, dont 49,9% appartient au milieu urbain et ne dispose pas de contrat de travail, en milieu rural, uniquement 8,7% des femmes actives bénéficient d'un travail dans les normes juridiques tandis que 86% œuvrent sans contrat.

C'est dans ces conditions que l'économie sociale et solidaire peut revêtir une importance extrême pour, instaurer des stratégies de développement humain et social et permettre une lutte contre la pauvreté et ainsi améliorer les conditions des femmes.

L'entrepreneuriat social coopératif et l'autonomisation des femmes, quelle intersection ?

Entreprendre en économie sociale et solidaire désigne s'organiser pour entreprendre autrement et collectivement dans la réalisation d'un projet à finalité sociale, cela consiste à adhérer à une organisation de l'économie sociale et solidaire et à s'engager dans un projet collectif.

Lévesque et Mendell, dans leur article sur l'économie sociale (2005), définissent l'entrepreneur social comme étant un entrepreneur et militant, qui combine, le bénévolat et l'engagement avec l'entrepreneuriat et la prise de risque. Draperi (2007), en traitant les fondements et les enjeux de l'économie sociale explique que l'entrepreneur social qui est engagé, associe l'autre dans sa démarche entrepreneuriale et milite pour sa cause, en conséquent, l'entreprise dans l'économie sociale et solidaire regroupe des personnes associées autour d'un projet commun qui prend l'une des formes organisationnelles classiques (selon l'approche normative francophone) du secteur à savoir la coopérative, l'association ou la mutuelle et éventuellement toute configuration à vocation sociale.

Dans une approche économique, l'entreprise en économie sociale se procure nécessairement des moyens humains, économiques et financiers, mais, sa finalité s'éloigne de la maximisation du profit et tend à service l'Homme à travers la réalisation des objectifs partagés par plusieurs personnes. Avec une gérance démocratique par des

associés intègres à sa mission, les membres ont le souci de la finalité du travail et de sa destinée. Ces entreprises sont considérées comme des moyens efficaces pour la valorisation des territoires et le développement local d'après Draperi (2007).

Sur le plan opérationnel, la coopérative est censée créer des possibilités de travail décent et productif aux membres ou usagers marginalisés et leur permet de renforcer leur puissance sur tous les niveaux. Les membres sont amenés à prendre conscience de leurs rôles et droits dans ladite organisation et bénéficient des formations techniques et/ou managériales en leadership coopératif. Cela est spécialement pertinent dans les centres où les femmes jouent habituellement le rôle des inféodés, moins influant dans leurs ménages et communautés.

En pratiquant ses principes universels de solidarité à savoir : l'adhésion volontaire, le pouvoir démocratique, la participation économique des membres, l'autonomie et indépendance et l'engagement envers le milieu, la coopérative joue le rôle d'un catalyseur de rénovation sociale en faveur de l'intégration des femmes, de la favorisation de leur inclusion sociale et économique et de l'évolution de leur statut. Elle peut résoudre plusieurs problèmes et favoriser le développement des régions comme l'a mentionné Develtere (1999).

En tant que telle, la coopérative réussit à modeler et à élaborer au fil du temps et grâce aux expériences réussies des principes et des valeurs universelles mondialement reconnus, comme le souligne les travaux de recherches de Lévesque (2001), Laville (2000), Alphandéry (2009), Guérin (2003), Ninacs (2006), Charlier (2006), Charlier et Caubergs (2007), Lemaître (2009). Elle devient alors un espace privilégié de réflexion démocratique fondée sur le principe de la solidarité, de la liberté, de l'égalité, elle implique chacun dans une action commune, et le responsabilise à la justice sociale. En défendant sa finalité ultime, servir l'Homme et améliorer ses conditions de vie, et surtout ses capacités d'agir, elle assure un espace d'éducation à l'autonomisation.

C'est ainsi que le mouvement coopératisme féminin est désigné nécessairement comme solution à l'enclavement des femmes d'après les travaux de Jones, Smith et Wills (2012), Zouhair et Lhajji (2016) et Charlier (2006).

Par ailleurs, Martin, Molina et Lafleur dans leur rapport sur le paradigme coopératif (2008), soulignent que la coopérative sert d'école pour éduquer à plusieurs valeurs humaines, une éducation qui produit un citoyen conscient apte à innover et porter un projet de société, elle en fait une école humaniste et humanisante.

Dans ce sens, la présidente de l'Alliance Coopérative Internationale à l'époque Green (2015), a indiqué que l'enquête conjointe de l'Alliance et de l'OIT révèle l'efficacité du modèle coopératif pour fournir aux femmes un moyen de valeur pour lutter contre la pauvreté et de fuir la violence et les abus. Il apparait donc, que la coopérative représente un cadre efficient pour apporter des solutions de bienêtre et d'autonomisation ; Esim (2015) cheffe de l'Unité des coopératives de l'OIT ''COOP'', rappelle que les coopératives ont une tradition de contribution à l'égalité ainsi qu'à l'autonomisation économique et sociale. En fait, 80% des réponses reçu par l'organisme de son études réalisée auprès de 600 de praticiens, coopératives et organisations civiles au travers le monde, jugent que les coopératives participent à instaurer le principe de l'égalité entre les femmes et les hommes plus que les entreprises privées et les établissements publics.

Par ailleurs, Il ressort des travaux de plusieurs chercheurs et organisations sur l'étude de l'autonomisation comme Keller et Mbwewe (1991), Batliwala (1994), PNUD (2010), Kabeer (2001) ; Malhotra et al. (2002), Alsop et Heinsohn, (2005), Ibrahim et Alkire (2007), comme mentionné par Dahoun, Manlan, Vodonou, Mongan, Mededji, Alofa (2013) dans leur working paper, que le concept va au-delà du bien-être individuel, il permet de saisir comment, elle s'attribue au niveau des individus et des organisations et produit ou augmente leurs capacités d'agir de façon autonome.

L'analyse des féministes comme Bacqué et Biewener (2012), permet de dégager que le terme de l'empowerment (dont la traduction française est l'autonomisation) comporte une dimension double, il est expressif en désignant à la fois le pouvoir à rechercher, à obtenir, à conquérir, et le processus de conscientisation qui permet d'y accéder. Ceci renvoie à la capacité d'aller vers, la capacité d'acquérir et d'en jouir, de cette force, il s'agit d'un parcours cumulatif et évolutif vers la possession de ce pouvoir. En fait, de ''à chercher à'', à ''conquérir'', chaque échelon du processus et chaque action devient une finalité en soi (possession du pouvoir) et exige d'être armé d'un pourcentage du pouvoir et de prise du risque. Cette acquisition du pouvoir, dans le cadre de la coopérative, s'effectue essentiellement par le biais d'un processus de conscience critique des réalités sociales et économiques

marquant l'environnement de la personne comme l'explique Freire (1968) dans le cadre de sa pédagogie des opprimés comme mentionné par Monteagudo (2002), ce qui mène à des changements sociaux à partir de la prise de conscience individuelle et collective des populations.

En outre, Malhotra, Schuler et Boender (2002) expliquent que l'autonomisation est caractérisée par une multidimensionnalité, comme souligné par Dohmwirth (2013), ceci se manifeste par les dimensions à impliquer et/ou qui sont impliquées dans sa démarche de construction, à savoir : la dimension économique, socioculturelle, familiale / interpersonnelle, juridique, politique et psychologique.

Cette autonomie se construit donc au fil du temps grâce à l'accumulation des expériences et résulte d'un processus comme montrée par Rowlands (1995), elle se mesure aussi et se constate d'après Pradhan (2003).

Dans ce sens, les recherches de Ninacs (2006), sur l'empowerment individuel, organisationnel et communautaire ainsi que les apports de Tilman et Grootaers (2016) dans le cadre de leur article sur l'empowerment et l'émancipation, permettent de cerner clairement l'important rôle joué par une organisation autogestionnaire dans le processus d'autonomisation. C'est au sein de cette organisation que l'empowerment individuel se développe en offrant ainsi un terrain vers la construction de l'autonomisation collective à l'aide de la coopération avec les autres, afin d'avoir une emprise plus grande sur l'environnement socioéconomique et d'aller ensuite vers l'empowerment collectif, qui permet à son tour d'acquérir le pouvoir de modifier les rapports sociaux de domination dans un sens plus équitable et de transformer les institutions vers une vision globale de l'autonomisation des communautés ou des territoires.

C'est dans ce cadre que nous apprécions la contribution des organisations de l'économie sociale et solidaire qui se révèle forte utile dans le processus d'autonomisation des personnes, en l'occurrence, les femmes en situation de vulnérabilité.

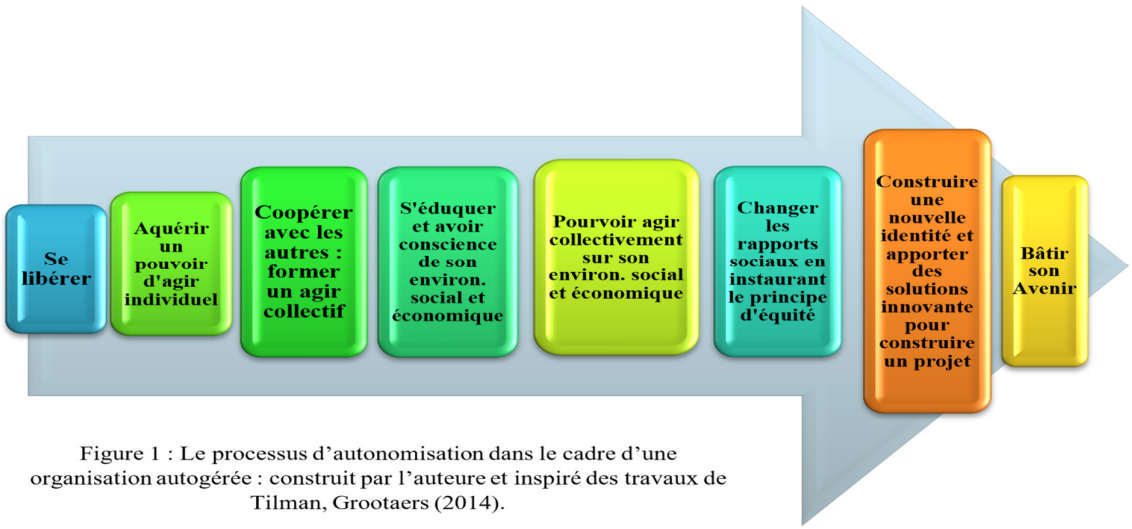

Figure 1 : Le processus d'autonomisation dans le cadre d'une organisation autogérée : construit par l'auteure et inspiré des travaux de Tilman, Grootaers (2014).

L'étude du terrain

La problématique, la pertinence et la méthodologie de notre recherche

L'organisation coopérative est contextualisée et influencée par la réalité socioéconomique, culturelle et politique de chaque pays, à cet effet, elle ne pourra pas produire les mêmes résultats partout dans le monde. Au Maroc, malgré l'envergure qu'elle a connue depuis les années 90, les études d'impact et les retombées de ce mode entrepreneurial sur le pouvoir d'agir des personnes sont insuffisantes, voire rare d'après A. Azenfar l'ancien directeur de l'office de développement de la coopération au Maroc (2016). Dans ce contexte, il devient fort

intéressant de cerner les changements réels que les coopératives marocaines provoquent dans les conditions de vie de leurs membres, en l'occurrence, les membres ou salariées femmes de la coopérative, notamment que la coopérative est plus présente dans le monde rural que dans les zones urbaines, et que la pauvreté comme déjà présenté, est à penchement rural. Corroborer donc ce phénomène suppose de poser une question centrale :

Comment la coopérative contribue à transformer ces femmes en situation de vulnérabilité économique, sociale, et sociétale en des personnes autonomes, capables d'agir sur leur entourage et territoire ?

Cet aboutissement de l'autonomisation des femmes par l'entrepreneuriat coopératif représente la variable dépendante latente de notre modèle de recherche, tandis que la coopérative représente la variable indépendante latente. Capter cette corrélation et l'analyser représente le noyau de notre étude, ceci nous permettra d'un côté, d'identifier la nature de l'autonomisation engendrée par l'entrepreneuriat coopératif et d'évaluer son niveau d'opération, et de l'autre côté, de cerner les valeurs pratiques dans la coopérative, qui influent le plus sur ce processus de conscientisation et de construction de l'autonomisation individuelle, collective et éventuellement communautaire.

A l'issu de la revue de littérature et des résultats de la recherche qualitative réalisée par l'auteure elle-même, nous déduisons que l'autonomisation globale des femmes est fondée sur quatre principales dimensions, à savoir :

- **La dimension économique** : La sécurité de revenu, l'accès à des ressources financières ou à des moyens de production et l'amélioration des conditions de vie ;
- **La dimension psychologique** : L'estime de soi, la confiance en soi, l'acquisition des connaissances, l'amélioration des compétences, la prise de conscience et la prise de décision ;
- **La dimension sociale** : L'accès aux droits (sanitaire, éducation), l'inclusion sociale, la réduction des inégalités, et le changement du comportement de l'entourage envers les femmes ;
- **La dimension sociétale** : La participation des femmes dans la gestion des espaces publics (comme la gouvernance des collectivités locales), la valorisation des territoires et la défense des intérêts des femmes dans la région.

Quand l'une des dimensions n'est pas accessible, l'autonomisation est partielle et non complète, ou elle en cours construction.

Concernant les valeurs et les principes de la coopérative constituant la valeur explicative, nous nous sommes basés essentiellement sur les principes déclarés par l'organisation représentative du mouvement coopératif français en 2010 (COOP FR) vu leur caractère synthétique. Il s'agit des valeurs qui découlent des principes universels déclarés par l'alliance coopérative internationale, avec plus de concision et de précision ce qui les rend plus facile à manipuler. A savoir : la démocratie, la solidarité, la responsabilité, la pérennité, la transparence, la proximité, rendre service.

Conséquemment et dans un souci de simplification du modèle de recherche, nous rassemblons les principes proches, et nous élimons d'autres qui n'ont pas été assez soulevé dans la recherche qualitative. Pour obtenir par la suite une liste de trois familles de variables explicatives comportant cinq principes de la coopérative, à savoir : la Démocratie et Transparence ; la Solidarité ; la Pérennité et Service.

Donc du postulat central qui consiste à ce que l'entrepreneuriat coopératif constitue un levier de développement local et individuel, et que l'organisation coopérative contribue à l'autonomisation de ses membres à différents niveaux : psychologique, social, économique et sociétal, nous détaillons cette réalité en des suppositions dérivées, à analyser par l'étude quantitative à réaliser auprès des coopératives et coopératrices :

S.1 : Les valeurs de solidarité dans la coopérative contribuent fortement à l'autonomisation des femmes coopératrices
S.2 : Les pratiques de démocratie et d'égalité sont des facteurs essentiels à l'autonomisation des coopératrices ;
S.3 : Rendre service dans et par la coopérative participe à l'autonomisation des femmes coopératrices ;
S.4 : l'acquisition d'un pouvoir économique est la principale conséquence de l'autonomisation des coopératrices ;
S.5 : L'acquisition du pouvoir psychologique est un résultat essentiel de la coopérative sur les coopératrices.

S.6 : L'acquisition d'un pouvoir sociétal par les coopératrices est un résultat essentiel de la coopérative ;
S.7 : L'acquisition d'un pouvoir d'agir social par les coopératrices est un résultat essentiel de la coopérative ;
Ainsi, la pertinence de cette étude réside dans l'estimation de l'impact économique, social, psychologique et sociétale de la coopérative de femmes sur ses membres. En effet, la finalité est d'évaluer l'autonomisation globale construite au niveau individuel, collectif et territorial par la contribution de l'organisation coopérative qui est censée théoriquement offrir un cadre propice à son aboutissement à travers ses valeurs et principes de gestion.

Ceci nous a conduit à établir le modèle structurel ci-après afin d'analyser l'intersection et les interrelations entre les valeurs de la coopérative et l'autonomisation des femmes membres. Le modèle est de type réflexif, où chaque construit comprend plusieurs items. Il décrit les liens de causes à effets entre les variables ; ces liens sont basés sur les chemins de causalité dans laquelle une variable peut avoir une influence directe ou indirecte sur une autre variable.

Le degré d'influence implique l'estimation du poids de la variable dans la construction de l'autonomisation des femmes.

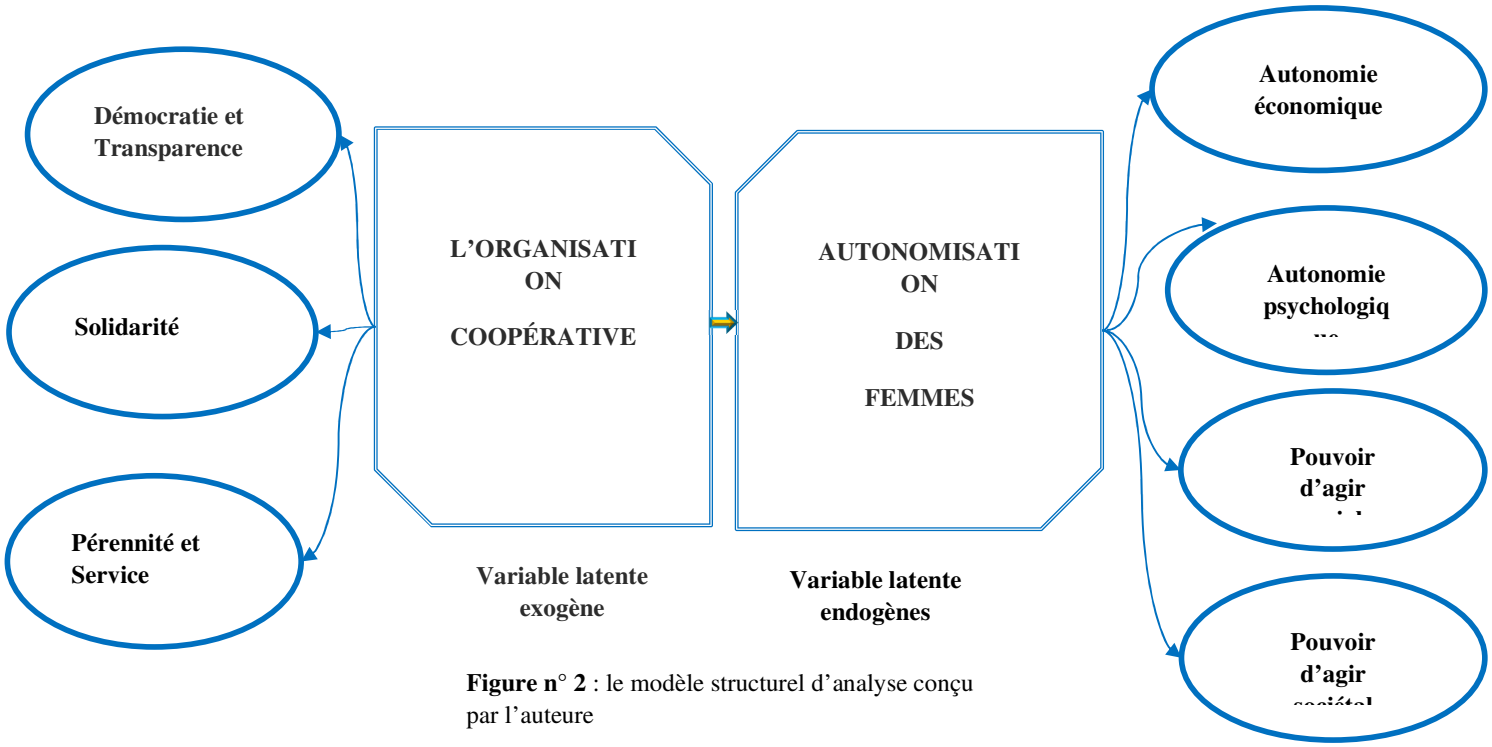

Figure n° 2 : le modèle structurel d'analyse conçu par l'auteure

Dans le sens où la recherche dans l'économie sociale et solidaire emprunte un cheminement spécial autre que celui scruté par l'orientation objective, étant considérée comme un mouvement d'entreprises originales qui offre un espace d'inspiration, d'éducation et de modélisation, menant à entreprendre un processus de changement des rapports sociaux d'après Draperi (2007), et une ''science citoyenne'' qui remet en question la séparation de l'objet du sujet dans la mesure où cette transformation résulte de la conclusion éducative et émancipatrice de cet agissement au profit de l'objet qui est aussi un acteur de changement selon Vallat (2014). Il devient problématique de positionner ces travaux qui intègrent la dimension humaine dans une démarche de recherche, puisqu'ils sont considérés complexifiant les « lois de la nature » qui règnent dans le modèle des sciences de la nature.

La réalité de l'économie sociale et solidaire qui mène à le positionner en tant qu'un travail d'ensemble qui mobilise la collectivité pour construire le projet et qui s'inscrit dans une dimension de transformation de la société à travers ses organisations, selon les travaux de Demoustier (2016), Draperi (2007, 2011), Laville (1994,1999, 2003) exige selon Vallat (2014) une science citoyenne qui remet en question la séparation de l'objet du sujet dans la mesure où cette transformation résulte de la conclusion éducative et émancipatrice de cet agissement au profit de l'objet qui est aussi un acteur de changement.

Dans cette vision, la recherche s'inscrit dans une démarche multidisciplinaire afin de constituer un tout cohérent d'après Paille (2006), ainsi, plusieurs théoriciens d'après Draperi (2007) se sont intéressés à la coopérative pour élaborer des théories générales, et ce, via l'analyse (démarche interprétativiste) des pratiques, des discours et les logiques d'action qui y règnent, comme le cas de l'économiste Thévenot et le sociologue Boltanski quand autres comme Desroche et Vienney se sont orientés vers une démarche compréhensive spéciale.

Les travaux de recherche dans ce champ disciplinaire se positionnent implicitement ou explicitement dans le cadre d'une recherche-intervention selon Argyris (1996) comme indiqué par David lors de la conférence de l'AIMS (1999), ce qui les intègre dans une dimension de socioconstructivisme d'après Draperi (2007) ou d'interprétativisme selon Paille2006).

Il convient de préciser que le positionnement éthique du chercheur comme nous y invite l'épistémologie constructiviste, et en s'inspirant de la même démarche du chercheur Ninacs (2002), dans sa vie quotidienne, l'étudiante chercheuse est loin d'être une observatrice passive de son objet de recherche. En fait, elle est militante engagée dans des associations de développement communautaire et ouvertement solidaire avec la démocratisation et la justice sociale visées par cette nouvelle économie et croit énormément à la démarche de l'empowerment que à la solidarité pour changer la réalité des défavorables au Maroc. Également l'étudiante est une femme, maman et issue de la culture d'un Maroc où les femmes sont souvent disempowered à cause de leur genre et consciente évidement des implications de l'absence de l'autonomisation sur le vécu des femmes et sur l'élargissement des fossés entre les aspirations d'égalité et la réalité économique et sociale endurée.

Notre méthodologie de travail s'inspire donc d'une perspective de constructivisme, où la tradition veut que l'approche herméneutique domine du fait qu'elle ne se limite pas à expliquer mais consiste à comprendre. Nous nous positionnons dans une posture coopérative découlant d'une vision constructiviste-transformative, nous choisissons une méthodologie de recherche axée sur une approche mixte comme proposé par Dépelteau (2002) en faisant appel à la méthode mixte d'analyse qui consiste à l'analyse et la combinaison simultanées des données qualitatives et quantitative comme le souligne Small (2011). D'après Creswell et Clark (2007), cette mobilisation combinée des données mène vers une meilleure compréhension et plus de validité qu'en se reposant sur l'une des méthodes.

Nous optons donc en premier lieu, pour une étude qualitative exploratoire à effectuer à l'aide d'une étude documentaire et une étude qualitative du terrain. La 1ère est à réaliser en explorant les bases de données de l'Office de Développement de la Coopération qui chapeaute le secteur des coopératifs et en analysant les numéros disponibles de la revue marocaine des coopératives. La 2ème est à effectuer auprès des représentants 11 établissements appartenant aux secteurs social et coopératif sous forme des entretiens individuels semi-directifs, le guide d'entretiens est organisé en trois parties traitants trois thématiques différentes mais complémentaires, il s'agit de : L'économie sociale et solidaire ; L'entrepreneuriat coopératif au féminin et l'autonomisation des femmes et les données sont à traiter par le logiciel INVIVO et à analyser manuellement à l'aide d'une grille manuelle.

Et en deuxième lieu pour une étude quantitative sur un échantillon de 100 coopératives de femmes situées dans différentes régions du Maroc (Essaouira, Oujda, El Hoceima, Casablanca, Tanger…) et actives dans différents secteurs (Artisanat, Elevage, Service, Agriculture, l'huile d'argane, les herbes aromatiques et médicinales…).

Étude Qualitative Exploratoire

La présente étude exploratoire documentaire s'est effectuée en explorant les bases de données communiquées par l'ODCO que nous avons filtrées par genre, par secteur et par localisation, et en analysant plusieurs numéros de la revue marocaine des coopératives édités par le même organisme (n°3, n°4, n°5 et n°6), puisque observer l'entrepreneuriat coopératif féminin au Maroc dans le cadre d'une étude documentaire, revient à se baser

principalement sur les données communiquées par l'Office vu le manque des données académiques dans ce sens. Cette étape a été consolidée par les données des entretiens individuels semi-directifs opérés avec 13 personnes par la chercheure elle-même avec des représentants de 11 établissements appartenant aux secteurs social et coopératif. La durée moyenne d'un entretien est de 50 min et le choix des interlocuteurs est fait par les organisations elles-mêmes.

En fait, la coopérative est la première forme des organisations appartenant à l'économie sociale et qui a profité d'un décollage fleurissant précoce au Maroc. Ce qui s'explique, par le fait que les coopératives ont été implantées par les autorités du protectorat parmi les producteurs marocains à partir de 1922 (secteur de la consommation), spécialement pour consolider les efforts de production des agriculteurs (principalement dans les filières laitière et sucrière), des artisans (1937 et 1938 respectivement) et pour des raisons politiques aussi.

Actuellement, l'économie sociale et solidaire prend le cheminement du courant francophone en adoptant une démarche statutaires (mutuelle, coopérative et association) et se définit (en l'absence d'un texte de loi cadre) comme suit d'après la stratégie de l'ESS 2010-2020: «L'économie sociale et solidaire est l'ensemble des initiatives économiques cherchant à produire des biens ou des services à consommer et à épargner autrement de manière plus respectueuse de l'Homme, de l'environnement et des territoires».

Les entreprises coopératives sont principalement présentes dans les secteurs de l'agriculture, l'artisanat et l'habitat, et enregistrent d'après les recherches de Zouhair et Lhajji (2015), une rentabilité faible en participant avec 1,5% du PIB seulement. En comparaison, l'Égypte en 2014 comptait 18000 coopératives qui servent 12 millions de membres et participent avec 7,75% du PIB.

A propos de l'emploi, la coopérative est censée favoriser la création de l'emploi et des activités génératrices de revenus avec un capital réduit. Dans cette logique, dans le Mexique par exemple, le taux de pénétration des coopératives est de l'ordre de 7.81 %, du fait que le secteur emploie 5 millions de citoyens qui sont membres de plus de 15000 coopératives (un nombre de coopérative proche de celui marocain). Sur le terrain marocain, le taux de pénétration dans notre pays s'établit à 1.424% (nombre d'adhérent coopératifs par rapport à la population totale), un taux qui reste très faible en comparaison avec celui mexicain

En effet, au Maroc, la coopérative des femmes a pris autant d'envergure avec le projet lancé par l'Organisme Allemand de Coopération Bilatérale (GTZ) en 1990 pour préserver l'arganier. L'idée était de sensibiliser la population aux dangers que représente la surexploitation de l'arganier toute en l'incitant à la préservation de leur patrimoine. Le secteur connait un essor important depuis la fin du 20ème siècle, selon la base de données arrêtées en fin d'année 2015, qui nous ont été communiquées par l'ODCO, sur un ensemble de 15.735, les coopératives de femmes sont à 2.280 unités, avec une proportion qui s'établit à 14,48%.

La réparition sectorielle des coopératives de femmes montre une concentration importante dans l'artisanat et l'agriculture avec respectivement, 43,29% et 33,46%. Quant à la branche de l'huile d'argane elle affiche 12%.

Ces coopératives jouissent d'un total des capitaux très faible qui se reflètent par un seuil qui atteint 17 012 212 Dhs, une proportion qui effleure 0.26% des capitaux mobilisés dans le secteur.

Les régions qui embrassent le plus grand nombre des coopératives féminines sont notamment la région de Laayoune-Sakia El Hamra qui chapeaute 393 coopératives, la région de Souss-Massa qui comprend 352 coopératives, les régions de Marrakech-Safi et Fès-Meknès qui enregistrent respectivement un nombre de 227 et 226 coopératives, et s'ensuivent par les régions de Tanger-Tétouan-Al Hoceima avec 216 coopératives et Guelmim-Oued Noun avec 199 coopératives.

Les femmes de la région de Souss-Massa sont très intéressées par l'entrepreneuriat coopératif, avec 352 coopératives qui siègent dans la région et qui engagent 8947 femmes coopératrices, la région se positionne au sommet (en terme d'adhérence) notamment qu'elle enregistre une différence de 4235 femmes coopératrices de la région qui vient ensuite et qui chapeaute le plus grand nombre de coopératives à savoir Drâa-Tafilalet.

L'analyse des motivations des femmes à entreprendre dans une coopérative, a révélé des caractéristiques de nature "push" liés à l'entrepreneuriat de nécessité et de la recherche d'une suffisance financière d'après les travaux de

Elghiat (2011) et Lhajji (2011). Ces femmes en se lançant dans l'aventure de création ou d'intégration d'une coopérative, sont principalement à la recherche d'une autonomie économique. Souhaitant améliorer leurs conditions de vie, elles sont poussées généralement par un manque de revenus et de ressources plutôt que par un choix libre.

La recherche d'un statut institutionnalisé de coopératrice en quête de ses avantages permettant aux adhérentes de participer à des évènements, de rencontrer d'autres personnes et de se libérer du rôle classique, est une raison qui a été soulevée fréquemment mais vient toujours après la motivation économique. Il s'agit d'une motivation sociale voire psychologique vers la recherche de l'affirmation, de l'amélioration du statut social ou de l'estime de soi d'après Zouhair (2015).

Également, ces entrepreneuses optent pour la coopérative pour valoriser des activités domestiques, améliorer la qualité des biens et des services par la combinaison des efforts ou pour diminuer les coûts de revient.

Quant aux contraintes de l'entrepreneuriat coopératif féminin, qui sont d'ailleurs générales à tout le secteur, elles touchent la sphère interne et externe.

Au niveau interne, Azenfar et Mahfoudi (2015), Bouchafra (2011), soulignent qu'elles concernent essentiellement, la faiblesse des capitaux mobilisés, la faiblesse du niveau d'instruction des coopératrices et des membres du conseil d'administration, et le taux d'analphabétisme élevé parmi les membres. Les problèmes d'ordre commercial sont aussi récurrents, particulièrement ceux de packaging, de communication, de tarification de planification des actions et de certification des produits, d'après Ennesraoui (2015).

D'autres difficultés sont aussi signalées par Bouchafra (2011), Elghiat (2011) et Bouroua (2016) comme le manque de la tenue d'une comptabilité régulière et fidèle et la mauvaise gestion de l'entité en termes d'investissement des excédents, ainsi que le manque de la culture entrepreneuriale chez les coopérateurs; à titre d'exemple 90% des coopératives d'huile d'argane et d'huile d'olive déclarent que généralement, les coopérateurs n'ont pas une mentalité d'investisseurs.

Le tissu coopératif souffre d'un manque général de formation pointue et adaptée à chaque cible et d'accompagnement technique d'après les travaux des auteurs cités ci-dessus.

Au niveau externe, les obstacles sont relatifs aux difficultés d'accès au marché, aux problèmes d'accès au financement, et à la faible structuration des coopératives en unions (3 unions seulement pour une trentaine de coopératives) selon Ennesraoui et Ezzahiri (2014), Azenfar et Mahfoudi (2015).

L'aspect informel qui caractérise l'environnement des coopératives, la faiblesse des infrastructures et l'absence d'un système social (assurance, CNSS, retraite,), dédié aux coopératives, pénalisent aussi lourdement ces projets d'entrepreneuriat et pénalisent encore la coopérative.

Concernant les effets escomptés de l'entrepreneuriat coopératif sur les membres femmes comme les indiquent Zouhair, hajji (2016) et Azenfar (2016) sont les suivants :

- L'amélioration des conditions de vie,
- L'augmentation de la confiance en soi
- La conscientisation des femmes,
- L'augmentation de la l'intelligence collective et de la créativité des femmes
- L'éducation à la citoyenneté et à l'esprit entrepreneurial,
- L'alphabétisation,
- La favorisation de l'égalité des sexes.

Ce passage sommaire sur la situation des coopératives des femmes à travers les données officielles communiquées par l'organisme tuteur du secteur coopératif a permis de constater que malgré l'évolution du

nombre des coopératives de femmes, leur croissance ne suit pas le même rythme. Le secteur souffre alors de lourdes conséquences au niveau de la pérennité et de la croissance des coopératives.

Côté terrain, l'étude qualitative ambitionne complémenter l'étude documentaire et permettre d'explorer mieux le secteur et de fournir ainsi une base pour élaborer le questionnaire de l'étude quantitative. Elle s'est réalisée avec des acteurs actifs sur le secteur social, le secteur coopératif et des acteurs civils ou privés choisis en convenance ; nous avons projeté réaliser 15 entretiens, mais quand les réponses commencèrent à se ressembler nous sommes arrêtés à 13 entretiens opérés avec des représentants de 11 établissements.

Les entretiens ont fait apparaitre que les motivations économiques sont au sommet de la liste des raisons à provoquer la décision de se lancer dans l'entrepreneuriat coopératif par les femmes. Réellement, la recherche de l'indépendance financière de la personne (cité 10 fois) est la principale raison qui oriente finalement la décision, la motivation sociale et la recherche de l'affirmation et l'amélioration du statut social (7 fois) est la deuxième raison qui motive la décision de l'entrepreneuriat coopératif. En troisième lieu c'est la motivation psychologique qui est citée 3 fois. Il s'agit principalement de la recherche d'estime, de se sentir utile et de s'épanouir.

D'autres raisons sont aussi citées, comme l'encouragement des ONG, de la famille, ainsi que la solidarité avec un proche ou un voisin ou encore l'ambition et la volonté de saisir une opportunité sur le marché.

Concernant les entraves, les plus évoquées sont ainsi signalées par ordre d'importance :

- Les stéréotypes qui confirment l'image traditionnelle des femmes,
- L'analphabétisme,
- Les engagements familiaux,
- Le manque de moyens financiers,
- Le manque de formation,
- Le manque de technicité,
- La difficulté d'entreprendre au Maroc et la mauvaise interprétation de la religion.

Les experts affirment que l'autonomisation financière est la première résultante à constater éventuellement au niveau des entrepreneurs dans le secteur coopératif, en étant évoquée 10 fois par les interrogés, suivie par l'augmentation de la confiance en soi et la conscientisation des femmes.
L'augmentation de la l'intelligence collective et de la créativité des femmes ainsi que leur éducation à la citoyenneté et à l'esprit entrepreneurial, sont des effets prévus en deuxième niveau.

Cependant l'alphabétisation, l'impact sur tout le foyer, l'augmentation de la capabilité de négociation des femmes et la favorisation du dialogue, ainsi que l'égalité des sexes et l'accès aux droits, sont des impacts que les experts prévoient réaliser en troisième niveau en étant cités respectivement 2 et 1 fois.

Les impacts sur les entrepreneures et les territoires sont ainsi estimés par les experts.

A. Sur les membres femmes

- L'amélioration des conditions de vie ;
- L'amélioration des revenus ;
- Le développement de la confiance en soi ;
- Stimule la prise de conscience des femmes ;
- Augmente la capacité de prise de décision ;
- La vulgarisation de la culture de l'entrepreneuriat coopératif ;
- L'alphabétisation, la formation et la sensibilisation.
- Facilite l'indépendance de la domination du mari ;
- Provoque des changements dans le foyer ;
- Favorise l'égalité des sexes ;
- Facilite l'accès aux droits ;

- Encourage l'activité des femmes en leurs permettant de jumeler vie professionnelle et familiale ;
- Valorise les produits fabriqués par les femmes (produits domestiques) ;

B. Sur les territoires

- La création d'une dynamique économique régionale ;
- La promotion d'un éveil économique, social et environnemental, culturel, gastronomique ;
- L'amélioration des infrastructures ;
- La création de l'emploi direct et indirect ;
- L'implication des élus et autorités publics ;
- La dynamisation du tourisme local.

En questionnant les interviewés sur la signification qu'ils donnent à l'autonomisation des femmes, plusieurs expressions ont été utilisées pour expliquer ce concept, dont notamment, la capacité à décider librement (mentionnée 8 fois), et l'indépendance financière (mentionnée 6 fois) : On peut pour dire que l'autonomisation passe inévitablement à travers une capacité financière et un accès aux droits et ressources (cités 4 fois).

Également d'autres expressions ont été évoquées, il s'agit des définitions que nous pouvons référer au champ d'acquisition du pouvoir social, comme la responsabilité, la prise de conscience et la possibilité d'influencer l'entourage.

Par ailleurs, d'après les avis des intervenants, les entraves de l'entrepreneuriat coopératif au féminin sont nombreux et ainsi soulignées par ordre d'importance :

- Les stéréotypes qui confirment l'image traditionnelle des femmes ;
- L'analphabétisme ;
- Les engagements familiaux ;
- Le manque de moyens financiers ;
- Le manque de formation ;
- Le manque de technicité ;
- La difficulté d'entreprendre au Maroc en général vu que l'environnement socioéconomique est hostile à l'entrepreneuriat ;
- La mauvaise interprétation de la religion.

Etude Quantitative

Suite à la phase exploratoire, nous entamons l'étude quantitative à effectuer auprès des coopératives à l'aide d'un questionnaire détaillant la thématique de notre recherche : l'autonomisation des femmes via l'entrepreneuriat coopératif.

L'étude quantitative comme déjà expliqué, s'inscrit dans le cadre d4analyse de la nature de l'autonomisation des femmes et son importance. Ainsi, notre souci va au-delàs de fournir des données chiffrées incontestables sur le plan expérimental, il vise d'approcher la réalité et d'explorer une grande partie des facettes du phénomène. La collecte des données s'est effectuée à l'aide d'un questionnaire qui comprend des items agrégés, que nous analyserons par le biais des méthodes statistiques.

L'association de plusieurs indicateurs permet d'évaluer des variables latentes, ce qui est facilité par la méthode d'équation structurelle qui donne la possibilité de construire des modèles incorporant plusieurs variables, cela nous permettra d'évaluer simultanément les relations entre plusieurs variables latentes endogènes et exogènes, d'où notre recours au logiciel SmartPLS comme outil d'analyse de données.

L'analyse de la conformité de notre modèle de recherche

L'analyse de la conformité de notre modèle de recherche est obtenue essentiellement à travers la vérification de la fiabilité, la cohérence interne, la validité convergente et la validité discriminante.

Le concept de validité a été formulé par Kelley (1927), qui a déclaré qu'un test est valide s'il mesure ce qu'il prétend mesurer. Il peut être défini comme la mesure dans laquelle une mesure empirique reflète adéquatement la signification réelle du concept considéré d'après Babbie (2008).

Afin de garantir la validité apparente de notre questionnaire, nous avons, demandé à deux professionnels actifs dans le secteur coopératif et à deux professeurs universitaires d'examiner et de commenter la clarté du libellé, la mise en page et le style utilisé. Les commentaires reçus nous ont aidés à rendre la formulation plus pertinente, à dépasser certaines ambiguïtés, et à travailler sur les questions dans l'objectif de les rendre compréhensibles autant que possible pour les répondants. Nous l'avons fait plusieurs fois jusqu'à ce que nous ayons la confirmation des personnes interrogées.

La validité du contenu est un type de validité non statistique comme le souligne Anastasi et Urbina (997), qui estime dans quelle mesure les divers items d'un instrument sont représentatifs du ou des construits mesurés et de leurs différentes facettes.

Deux étapes principales ont été suivies dans notre recherche, la première concernait la justification du choix de nos items par l'étude bibliographique et la deuxième consistait à justifier les choix des items par l'étude exploratoire, ce qui a permis d'identifier 79 items. Cette sélection minutieuse des éléments comme suggèrent Anastasi & Urbina (1997) et Kerlinger & Lee (2000) est la clé de la validité du contenu dans notre recherche. Les items ont été ensuite présentés dans un premier questionnaire à des experts et universitaires qui, grâce à leurs commentaires et remarques sur la couverture des dimensions pertinentes du sujet examiné par les items, nous ont guidés à un changement de la 1ère version de questionnaire pour réduire les items au nombre de 33 en quête de simplicité.

Concernant la validité du construit nommée *validité de construction*, les auteurs Campbell et Fiske (1959) ont proposé deux dimensions de validité de construction : la validité convergente et la validité discriminante.

La validité convergente est le degré de confiance que nous avons qu'un élément est bien mesuré par ses indicateurs, elle permet d'apprécier la relation de corrélation existant entre les indicateurs mesurant le même phénomène. Le critère de Fornell-Larcker (1981) a été couramment utilisé pour évaluer le degré de variance partagée entre les variables latentes du modèle. Selon ce critère, la validité convergente du modèle de mesure peut être évaluée par l'indice de variance moyenne (AVE) et la fiabilité composite (CR).

Pour établir une validité convergente acceptable, d'un côté, la variance moyenne extraite (AVE) pour chaque facteur devrait représenter 0,50 ou plus de la variance totale, telle que recommandé par Fornell & Larcker (1981), Chin (1998) et Hair &William &Barry & Rolph (2010), d'un autre côté, la valeur de la validité composite (CR) acceptable pour chaque construit devrait être 0,7 et plus d'après Fornell & Larcker (1981) et Hair &William &Barry & Rolph (2010). La fiabilité composite estime la mesure dans laquelle un ensemble d'indicateurs de construction latente partagent leur mesure d'une construction.

Dans la présente recherche, l'indicateur de l'AVE (Average Variance Extracted) est satisfait dans trois construits à savoir la solidarité (0.537), le pouvoir économique (0.540) et démocratie & égalité (0.537).

L'indicateur n'est pas satisfait au niveau de l'autonomie psychologique, le pouvoir d'agir social, rendre service et le pouvoir agir sociétal, ce qui signifie que la variance d'erreur dépasse la variance expliquée au niveau de ces construits, ils ne sont expliqués par les items qui les mesurent que à moins de 50%. Mais la fiabilité composite est supérieure à 0,7 pour tous les construits comme l'indique le tableau ci-après :

Tableau n° 2 : la fiabilité composite

	Fiabilité composite
Démocratie, égalité	**0,808**
Pouvoir agir social	**0,730**
Pouvoir agir sociétal	**0,817**
Pouvoir économique	**0,847**
Rendre service	**0,806**
Solidarité	**0,820**
Pouvoir psychologique	**0,722**

Source : Extrait du rapport SmartPLS

Puisque la fiabilité composite est supérieure à 0,7 pour tous les construits, nous pouvons confirmer que notre modèle de recherche assure une validité convergente satisfaisante. Aussi nous n'avons pas des valeurs supérieures à 0,90, car cela indiquerait que tous les éléments de construction sont sensiblement identiques selon Fornell & Larcker (1981).

Ainsi nous pouvons juger que la validité divergente est moyennement assurée dans notre modèle, ce que nous estimons satisfaisant vu qu'il s'agit d'une étude à des fins exploratoires en premier dégrée.

Concernant la validité discriminante, elle vérifie si des mesures non censées être liées ne le sont pas effectivement ; selon le système de test de Fornell-Larcker (1981), l'établissement d'une validité discriminante fait référence à une analyse appropriée de l'AVE (Average Variance Extracted). Les résultats de la figure ci-dessous indiquent qu'il n'y avait en aucun cas une corrélation entre les constructions supérieures à la racine carrée de l'AVE (diagonale principale). Cela suggère que les mesures de l'étude sont distinctes et unidimensionnelles, ce qui signifie que la validité discriminante des données du point de vue psychométrique est adéquate pour cette étude.

Tableau n° 3 : le Critère de Fornell-Larcker

	Pouvoir psychologique	Pouvoir économique	Pouvoir d'agir social	Solidarité
Pouvoir psychologique	**0,590**			
Pouvoir économique	0,025	**0,735**		
Pouvoir d'agir social	0,427	-0,023	**0,536**	
Solidarité	0,352	0,112	0,207	**0,733**

Source : Extrait du rapport SmartPLS

La validité externe concerne la viabilité des résultats et l'éventualité de généralisation dans d'autres cadres, par exemple pour des personnes, des lieux ou des moments différents. Étant donné que la présente recherche est contextualisée et s'est réalisée sur un échantillon qui comprend des coopératives de femmes appartenant à des zones géographiques caractérisées par des modes de vie différents et des cultures différentes mais qui reste limité en termes de nombre et de secteurs étudiés, nous pensons alors que les résultats ne peuvent pas être généralisés mais représentent une piste pour des prochaines recherches d'approfondissement.

La fiabilité de l'instrument est une mesure de la stabilité ou de la cohérence des résultats des tests, elle concerne la mesure dans laquelle une procédure de mesure donne les mêmes résultats lors des essais répétés comme l'indique Carmines & Zeller (1979). Un questionnaire est considéré comme fiable si nous obtenons des réponses identiques / similaires à plusieurs reprises. Bien qu'il ne puisse pas être calculé exactement, il peut être mesuré en estimant des coefficients de corrélation. L'alpha de Cronbach exprime le degré d'homogénéité d'un instrument càd la cohérence avec laquelle les items mesurent une variable. Il est la mesure la plus commune de la fiabilité,

mais d'après David Garson (2016), l'alpha de Cronbach est une mesure conservatrice qui tend à sous-estimer la fiabilité.

Le seuil d'acceptabilité de l'indice varie selon l'objectif de la recherche, pour une étude confirmatoire, il doit dépasser 0,8, ce qui est considéré comme une bonne échelle et 0,70 pour une échelle acceptable selon Nunnally (1978) et Hair, William & Barry & Rolph (2010), tandis que, pour une échelle à des fins exploratoires d'après Garson (2016) et Nias Ahmad & Mat Roni (2014) le seuil d'acceptabilité est de 0,60.

Tableau n° 4 : Indice de l'alpha de Cronbach

	Alpha de Cronbach
Pouvoir psychologique	0,534
Pouvoir économique	0,816
Démocratie, égalité	0,722
Pouvoir d'agir social	0,580
Rendre service	0,699
Solidarité	0,723
Pouvoir d'agir sociétal	0,723

Source : Extrait du rapport SmartPLS

Dans notre sujet, la limite acceptable DE l'alpha de Cronbach est satisfaite au niveau du "pouvoir économique" avec 0.816, de "la solidarité" avec 0.723, le "pouvoir d'agir sociétal" avec 0,723, la "démocratie & égalité" avec 0,722 et "rendre service" avec 0,699. ET non pas au niveau du *Pouvoir psychologique et Pouvoir d'agir social* même si leurs indices sont proches du seuil d'acceptabilité (respectivement 0.534 et 0.580) dans un cadre d'exploration.

Pourtant nous pouvons utiliser la fiabilité composite (CR) plutôt que Cronbach Alpha pour confirmer la fiabilité de notre instrument de recherche, car Cronbach Alpha a été critiquée pour sa valeur limite inférieure qui sous-estime la fiabilité réelle selon Peterson & Kim (2013) et parce que l'alpha de Cronbach peut surestimer ou sous-estimer la fiabilité de l'échelle, le plus souvent c'est le dernier cas qui se présente. Pour cette raison, Garson (2016) mentionne que la fiabilité composite est préférée parmi les chercheurs dans la recherche basée sur le PLS. Dans notre cas la CR est satisfaite pour l'ensemble des construits

Afin d'évaluer le modèle structurel, nous avons opté pour le coefficient de détermination R^2, les coefficients de chemins et l'indice de colinéarité (VIF).

Le R au carré indique la proportion de la variabilité totale expliquée par le modèle, c'est ainsi que nous nous appuyons sur le seuil de 0,2 recommandé par Tenenhaus (1998) pour accepter le niveau prédictif d'une variable. En fait, dans un modèle d'équation structurelle, le coefficient de détermination R^2 n'est applicable qu'aux variables latentes endogènes, il indique dans quelle mesure toutes les variables exogènes expliquent cette variable latente endogène. La valeur R-carré (R^2) va de 0 à 1 avec 1 définit la précision prédictive parfaite. C'est une mesure qui nous indique quelle proportion de la variabilité totale est expliquée par le modèle, par exemple, une valeur de 0,6 indique que 60% de la variance de la variable endogène est expliquée par les variables latentes exogènes

Il n'existe pas de ligne directrice standard pour déterminer le niveau d'acceptation prédictive, les chercheurs ont des opinions différentes sur ce qui constitue une bonne variance du carré, Henseler (2009) a proposé une règle empirique pour les R^2 acceptables avec 0.75, 0.50 et 0.25 respectivement décrits comme substantiels, modérés

et faibles, tandis que Tenenhaus (1998) estime que les valeurs de 0.26, 0.54, 0.33 sont jugées modérées et 0.07 et 0.05 faibles, Falk et Miller (1992), comme mentionné par Maghni et Amine dans leur article 'Socialisation organisationnelle et engagement des nouvelles recrues d'une banque marocaine' en 2017, suggèrent qu'un « bon modèle » doit afficher des coefficients de détermination supérieurs à 0.1, alors que Chin (1998) considère que les coefficients structurels standardisés devraient être au minimum égaux à 0.20, et idéalement supérieurs à 0,3 pour pouvoir être considérés comme significatifs. Cohen (1988) suggère que les valeurs évaluées à 0.26, 0.13, 0,02 sont respectivement, substantielles, modérées et faible.

Pour notre modèle, nous avons obtenu les résultats suivants :

Tableau n° 5 : Coefficient de détermination R^2

	R^2
Pouvoir psychologique	0,206
Pouvoir économique	0,043
Pouvoir d'agir social	0,224
Pouvoir d'agir sociétal	0,243

Source : Extrait du rapport SmartPLS

Sachant bien que ce calcul permet une statistique de prédiction, se baser sur le coefficient de détermination R^2 seulement pour juger la qualité du modèle est insuffisant, notamment qu'il y a des mécanismes sous-jacents que notre étude (orientée à des fins exploratoires) ne va prendre en charge. L'objet ici est en relation avec la vision humaine de la personne et non pas avec un phénomène chimique neutre.

Les coefficients de chemin entre les chargements de variables devraient être analysés en termes de signe, d'ampleur et de signification algébriques comme l'indique Chin (2010). L'amplitude des coefficients de chemin montre la force des relations entre deux variables latentes, le signe (+) positif signifie un effet positif et le signe (-) montre un effet négatif. Les poids les plus proches de l'absolu 1 reflètent les chemins les plus forts et les poids les plus proches de 0 reflètent les chemins les plus faibles d'après Garson (2016).

Certains auteurs recommandent que les coefficients de cheminement doivent dépasser 0,1 ou 0,2 pour tenir compte d'un certain impact dans le modèle comme Lohmöller (1989) et Chin (1998).

Les calculs obtenus font apparaitre que la démocratie de gestion détient une relation positive avec trois autres variables exogènes à savoir l'autonomie psychologique, l'autonomie économique et le pouvoir d'agir social, alors qu'elle a une relation négative forte avec la variable ''le pouvoir d'agir sociétal'', sinon dans la sphère psychologique même si la variable démocratie et égalité a une relation positive, mais elle reste faible avec un coefficient de 0,037. La variable rendre service est liée par une relation négative avec la variable autonomie économique et positive avec la variable autonomie psychologique, le pouvoir d'agir social et le pouvoir d'agir sociétal. Le facteur solidarité détient un effet positif sur les quatre variables exogènes.

L'examen de multicolinéarité, qui permet de se prononcer sur le niveau de corrélation entre les items des variables explicatives les uns aux autres, a validé l'absence de multicolinéarité dans notre modèle.

En fait, tous les items affichent un VIF inférieur à 5 le seuil recommandé par les auteurs comme Bourbonnai (2018).

Nous avons effectué trois tests qui ont permis d'écarter les items dont la charge interne est inférieure à 0,4 comme le recommande Hulland (1999) et ce dans l'objectif d'assurer plus de fiabilité de mesure, en fait les données sont normalisées automatiquement dans SmartPLS, les chargements doivent être significatifs et varient de 0 à 1. Plus les chargements sont importants, plus le modèle de mesure est solide et fiable. C'est dans ce contexte que nous sommes amenés à écarter par exemple dans le cadre du construit pouvoir psychologique et pouvoir agir social les items traitant la fierté d'appartenance ayant une charge interne de 0.222, la prise de conscience de ses insuffisances

avec une de charge négative 0.099, les changements affectant la relation avec le mari 0.023, la participation dans la prise de décision 0.130 et la distribution des tâches familiales 0.147.

Le modèle final validé par la PLS contient 4 construits exogènes mesurés par un total de 22 items. Les variables pouvoir psychologique, pouvoir économique et pouvoir agir sociétal sont mesurées par 5 items chacune, et la variable pouvoir agir social est mesurée par 7 items. Les 3 construits endogènes sont mesurés par 13 items en total, les variables dimension solidarité, et dimension rendre service sont évaluées par 4 items chacune, tandis que celle de la dimension démocratie et égalité est évaluée par 5 items.

Sur la base de ces tests et la significativité des coefficients estimée par une procédure de bootstrap (300 réplications), nous avons pu estimer la qualité de modèle structurel afin de se prononcer sur notre problématique de recherche.

Le coefficient de chemin entre la variable démocratie, égalité et le pouvoir agir sociétal est négatif (-0,270), ainsi que le coefficient liant la variable rendre service avec le pouvoir économique (-0,095). Les autres coefficients sont positifs mais enregistrent des influences dont l'importance est variante.

Présentation de l'échantillon

Nous avons pu collecter suffisament de réponses afin d'analyser les données par l'algorithme PLS. L'administration des 104 questionnaires renseignés a été effectuée par la chercheure elle-même auprès de 104 coopératrices membres des coopératives de femmes. Généralement les questions ont été posées en arabe dialecte vu que les sondées ne maitraisent pas la langue française, et dans les régions d'Essaouira et Ain louh une vingtaine de questionnaires ont été administrés en Amazigh vu que les intéroggées ne parlent ni l'arabe ni le français, et ce toujours par la chercheure elle-même.

Sur les 100 coopératives qui composent notre échantillon, nous avons obtenu un taux de retour de 70%, ce qui représente 3,1% du nombre total des coopératives des femmes. Les questionnaires ont été renseignés par 104 membres, soit un taux de 0.27% des 37960 coopératrices marocaines. 34,28% de notre échantillon a été involontairement constitué par des coopératives appartenant au moyen atlas dans la région de Fes-Meknes, les régions de Souss-Massa et Settat-Casablanca ont été représentées chacune par 15,27 % de l'échantillon.

Parmi les coopératives interrogées, 44,28% disposent d'un local octroyé par des acteurs économiques, sociaux ou publics, tandis que 37,14% se sont orientées vers la location et 5% des coopératives questionnées ne disposent pas d'un local, et seulement 12,86% sont propriétaires d'un local. Également, 53 coopératrices parmi les 70 ne sont membres d'aucune forme de regroupement économique, ni d'union, ni de groupe d'intérêt économique ou autres. Les activités des coopératives cibles sont diverses mais sont concentrées dans cinq secteurs à savoir l'agriculture, l'artisanat, l'agroalimentaire, l'industrie cosmétique et la servuction, en tenant compte que 88% des coopératives des femmes exercent dans les secteurs d'agriculture, d'artisanat et d'argane.

Par ailleurs, le nombre des adhérents dans les coopératives étudiées varie entre 5 à 91 coopératrices, avec une moyenne de 14,64 de l'ensemble des 70 coopératives.

69,44% de l'échantillon ont un nombre d'adhérentes qui varie entre 6 et 18 membres, les coopératives à un nombre grand (au-delàs de 57 personnes) sont limitées à 3 coopératives.

Discussion des résultats

Comme nous l'avons détaillé dans le cadre théorique, la majorité des chercheurs et praticiens, tant dans l'économie sociale et solidaire, que dans le champ de l'autonomisation des femmes, ou encore dans l'entrepreneuriat coopératif. A ce point on cite, Lévesque (2001), Laville (2000), Alphandéry (2009), Guérin (2003), Ninacs (2006), Charlier (2006), Charlier & Caubergs (2007), Lemaître (2009), Defourny & Develtere (1999), Jones & Smith &Wills (2012), Zouhair & hajji (201, 2016), Ennesraoui & Ezzahiri (2014), Azenfar & Mahfoudi (2015) et Azenfar (2015, 2016), Green (2015), Esim (2015), ont abouti à la mise en valeur de l'impact positif de la coopérative sur l'amélioration des conditions de vie des personnes engagées ou bénéficiaires de l'entrepreneuriat coopératif. Cet impact concerne

essentiellement le volet économique des coopératrices, leur autonomisation et inclusion sociale, la lutter contre la pauvreté et même la promotion des territoires.

Aussi, les résultats de notre recherche permettent de valider le modèle explicatif de la construction de l'autonomisation des femmes par l'entrepreneuriat social dans le cadre des coopératives de femmes, et s'inscrivent dans une approche exploratoire du moment que les travaux sur cette thématique sont peu nombreux au Maroc.

En effet, un questionnement de recherche est étudié par l'analyse de l'importance des relations entre les variables exogènes et les variables endogènes sur le modèle, dans notre sujet, les résultats ont dévoilé des relations fortes et d'autres très faibles entre les différentes variables. Notre donnée de départ consiste à considérer la coopérative comme un espace d'autonomisation des personnes à différents niveaux et un levier de promotion des territoires et communautés. Les suppositions dérivées de ce postulat ont formé les points les liens que nous avons analysé au niveau de l'étude empirique, notamment celle quantitative.

Effectivement, **le modèle permet de constater que les valeurs et les pratiques de solidarité dans la coopérative contribuent assurément à l'autonomisation des femmes coopératrices** (décortiquée en 4 dimensions dans notre modèle de base)**.** Notre modèle a révélé que les corrélations entre la variable solidarité et les variables latentes endogènes sont positives et significatives, réellement, **les pratiques de solidarité participent à l'acquisition du pouvoir psychologique avec un coefficient de 0.269, à l'autonomie économique avec 0.182, à l'acquisition du pouvoir d'agir social à hauteur de 0.113 et à l'autonomie sociétal par 0.165. Les valeurs de solidarité expliquent donc l'acquisition de l'autonomie psychologique plus que les autres aspects de l'autonomisation.**

De cette manière la "solidarité" émerge comme un facteur clé dans la construction de l'autonomisation des femmes en favorisant leur prise de pouvoir psychologique, autrement dit, toutes les valeurs de prise de conscience, de la confiance en soi, de l'estime de soi, la prise de parole en public…sont construits à travers les pratiques de solidarité au sein de la coopérative.

D'autres travaux de recherche soulignent que la coopérative par ses valeurs universelles et pratiques de gestion participe dans le développement de la responsabilité individuelle des membres, comme Lévesque (2001), Laville (2000), Alphandéry (2009), Guérin (2003), Ninacs (2006), Zouhair et Lhajji (2016), Charlier (2006), Charlier et Caubergs (2007), Lemaître (2009), Auroi, Yépez et Castillo (2006), ceci sans distinction entre les valeurs qui caractérisent l'organisation coopérative. Par notre recherche, nous avons pu déceler dans le contexte marocain**, la principale pratique coopérative origine de cette contribution à l'autonomisation globale des femmes en influençant positivement la construction de leur autonomie psychologique.**

La participation des pratiques de démocratie & **d'égalité dans l'explication de l'autonomisation des coopératrices est moyenne voire partielle.** En fait, leur contribution est limitée à former l'autonomie économique de 0.165 et le pouvoir d'agir social à 0.138, ces résultats rejoignent les travaux de Nyssens (2001), Ghezali (2009) Zouhair et Lhajji (2016), Charlier (2006), Laville (2000), Guérin, (2003), Charlier et Caubergs (2007). Pourtant, les valeurs de démocratie & d'égalité, ne définissent l'autonomie psychologique que très faiblement avec un indicateur de 0.037, tout en ayant un impact négatif sur l'acquisition du pouvoir d'agir sociétal avec un indicateur de -0.270.

Ce résultat mène à considérer que les pratiques de l'égalité et de gestion démocratique ne sont pas associées à une implication dans la gestion du territoire et d'autonomisation de la communauté et bien évidement de la population, et se différencie des travaux d'Auroi, Yépez et Castillo (2006) qui mettent en avant l'autonomisation des femmes dans le cadre des organisations de l'économie sociale et solidaire en leur permettant un accès au pouvoir économique, social et sociétal.

Cet aboutissement, nous pousse à s'interroger sur le lien entre les pratiques de démocratie et d'égalité et le capital social. Nous pensons que ces pratiques ne sont pas bien claires dans les esprits des coopératrices, non pratiqués comme elles sont censées être faites, par méconnaissance de l'organisation coopérative et à cause de la non scolarisation de la majorité des membres, comme il a été avancé durant les entretiens réalisés avec les coopératrices, les assemblées générales et les réunions du conseil d'administration ne leurs permettent pas d'approfondir leurs connaissances sur les situations de leurs coopératives. Même en étant informées, elles ne comprennent pas la

signification et les implications de cette information et donc ne s'impliquent pas réellement mais du fait que la plupart font confiance à leurs présidentes elles votent sans hésitation sur la validation des rapports.

L'importance des liens qui relient la variable **''rendre service'' avec les variables mesurant l'autonomisation des coopératrices est forte d'après le modèle structurel,** effectivement, nous constatons que les coefficients de chemins sont positifs et significatifs avec trois construits : le pouvoir psychologique est expliqué à hauteur de 0.294, le pouvoir d'agir social est déterminé avec 0.409 et le pouvoir d'agir sociétal est défini à hauteur de 0.309. L'effet constaté sur l'acquisition du pouvoir économique est négatif et faible.

Ces résultats sont confirmés par l'indice f^2 qui permet de conclure que l'effet d'abandon du facteur ''Rendre service'' sur le ''pouvoir d'agir social'' est élevé (0.191) tandis qu'il est moyen sur le ''pouvoir d'agir sociétal'' et ''l'autonomie psychologique'' et très faible sur l'autonomie économique avec un indice f^2 qui atteint 0.008.

La corrélation faible, voire négative des coefficients du chemin qui lie la variable à expliquer **"acquisition d'un pouvoir économique" et les variables explicatives, tend à ne pas confirmer la construction de l'autonomisation économique dans l'espace coopératif comme escompté par les praticiens que nous avons interviewés ou même des travaux de recherches passés en revue.** En fait, les influences positives des valeurs explicatives sont très faibles, c'est ainsi que les pratiques de solidarité ne l'expliquent qu'à la hauteur de 0.182, la variable démocratie et égalité ne contribue qu'à hauteur de 0.165, tandis que, la variable rendre service a un impact négatif sur la constitution de l'autonomie économique de ces femmes.

Ce résultat est confirmé par le coefficient de détermination R^2 obtenu et qui signifie que l'acquisition d'une autonomie économique n'est pas expliquée par les variables explicatives (la solidarité, rendre service et démocratie & égalité) que de 043 ; un seuil considéré faible et non significatif par Cohen (1988). **Il est révélateur, d'autant plus que les travaux académiques et professionnels soulignent que l'entrepreneuriat coopératif a un effet direct et de premier plan sur la situation financière des coopérateurs comme déjà vu au niveau du cadre théorique et de l'étude qualitative**.

En analysant la situation de près pour trouver une explication, nous constatons que les statistiques descriptives montrent que le nombre des coopératrices (dans notre cible) en désaccord partiel ou total sur l'amélioration de la situation financière dans une coopérative, est important. Ainsi, **le pourcentage des femmes qui déclarent que leur revenu individuel n'a pas connu une amélioration est de 22% sachant bien que 15% sont neutres et n'ont pas exprimé une opinion, aussi, 26 % et 40% des coopératrices estiment, respectivement, que le budget du foyer et la nature des dépenses n'ont pas connu un changement après leur intégration dans une coopérative.**

Néanmoins, d'après nos observations lors de notre participation à la résolution de quelques problèmes managériaux des coopératives, nous pensons que la non constitution de l'autonomie économique dans le cadre coopératif est liée au contexte marocain plutôt qu'à une défaillance des valeurs et pratiques de la coopérative. En effet, le manque d'accès des femmes à l'éducation, à l'information et à la formation adaptée -Notons dans à ce niveau que sur 1017 membres des coopératives étudiées, 610 femmes ne sont pas scolarisées- l'absence de la culture entrepreneuriale, et la carence de formation en gestion et management sont à notre avis les principales causes den cette situation.

La majorité des coopératrices ne comprennent pas le principe de la coopérative, ce qui alourdit la tâche de la gestionnaire car par nécessité, les membres demandent à ce qu'elles soient remboursées de leur travail au fur et à mesure (payement hebdomadaire ou mensuel) même si la production n'est pas vendue. Ce qui implique une absence de fonds de roulement, absence de politique d'investissement et la situation ne s'améliore pas. Ceci s'ajoute au manque de financement et absence des solutions adaptées à ce mode entrepreneurial ce crée un cercle vicieux difficile à rompre.

Dans ce cadre, plusieurs coopératives dans la région de Souss Massa Deraa sont créées pour la forme, où le statut de coopérative cache une réalité déguisée, celle d'une entreprise où un investisseur (e) généralement un homme, un proche à la présidente, finance toutes les dépenses de la coopérative dans l'attente de tirer profit autrement. Les membres reconnaissants envers cette personne qui leur offre cet emploi ne posent pas trop de questions et se limitent être payé par kg concassé ou litre extrait (entre 30 à 45 Dh pour le kg selon la situation financière de la coopérative).

Aussi, les estimations obtenues au niveau de la corrélation entre les variables explicatives et l'acquisition d'un pouvoir psychologique affirment l'acquisition d'une **''autonomie psychologique'' comme étant un résultat essentiel de l'organisation coopérative sur les femmes coopératrices.** Autrement dit, le pouvoir psychologique est expliqué par les variables exogènes à hauteur de 0.206, et est obtenu essentiellement grâce à la variable ''rendre service'' avec un indice estimé à 0.294 et les pratiques de ''solidarité'' avec un indice estimé à 0.269, par contre, les pratiques de ''démocratie & d'égalité'' ont une faible corrélation avec l'autonomisation psychologique, ce qui les rend insignifiantes. Ce résultat tend à se rapprocher des conclusions tirées de l'étude exploratoire et des travaux réalisés par les chercheurs en économie sociale et solidaire, l'entrepreneuriat social ou l'empowerment, comme ceux de Drainville (2001), Zouhair & Lhajji (2016), Charlier (2006), Guérin (2003), de Ninacs (2006), Lemaître (2009).

Concernant l'acquisition d'un **''pouvoir sociétal'', le modèle montre que ce type d'autonomie a été expliqué par les variables exogènes à hauteur de 0.243**, ce qui représente la plus grande valeur enregistrée parmi les autres dimensions d'autonomisation. Ce résultat est obtenu grâce à la forte corrélation qui lie ''pouvoir sociétal'' à la variable 'rendre service' qui l'explique à hauteur de 0.309. L'effet de taille f^2 avec un indice moyen de 0.112 confirme ce résultat puisque l'abandon de la variable ''rendre service'' aura plus d'effet comparativement à l'abandon des autres variables explicatives ''démocratie & égalité'' et ''solidarité'' ayant enregistré respectivement des indices f^2 de 0,089 et 0,030.

Également les corrélations positives estimées entre les trois variables explicatives et **le ''pouvoir d'agir social'', permettent de confirmer l'acquisition d'un pouvoir d'agir social par les coopératrices**, en étant définie par lesdites variables à hauteur de 0.224. Ce type d'autonomie est constitué grandement grâce la variable ''rendre service'' avec un poids de 0.409.

A ce niveau, nous pouvons dire que la coopérative de femmes au Maroc offre effectivement un espace adéquat à la création et consolidation d'une capacité d'agir social au profit des coopératrices, en leur offrant l'occasion de pratiquer et de s'éduquer sur les compétences de prise de parole, d'influence, de gestion des problèmes inter-collègues entre autres.

Finalement, nous concluons que notre étude a révélé que les variables de la coopérative **expliquent l'autonomie sociétale avec 24,3%, l'autonomie psychologique à hauteur de 20,6%, et le pouvoir d'agir social avec 22,4%**. Cependant, elles n'expliquent **l'autonomie économique que faiblement avec un indice qui atteint seulement 4,3%**. En conséquence, nous pouvons dire que la coopérative contribue assurément à la détermination de l'autonomie des femmes**, mais fragilement et partiellement tant qu'elle ne satisfait pas le principal besoin des femmes membres** à savoir augmenter les revenus et améliorer les conditions de vie. En effet, elle **ne s'agit pas d'une autonomisation multidimensionnelle tant qu'elle ne couvre pas le volet économique qui est d'ailleurs la principale motivation des femmes à intégrer une coopérative.**

Les résultats de la présente étude nécessitent d'être discutés au vu d'un certain nombre de perspectives. Les données de l'étude ont été collectées auprès de 104 coopératrices membres de 70 coopératives de femmes, cependant les caractéristiques de notre échantillon tant en termes de taille qu'en termes de secteur n'autorisent pas la généralisation de nos résultats. Bien que notre objectif soit de nature exploratoire au premier degré, l'absence d'échantillonnage suivant la filière, le contexte géographique ou la taille de la coopérative peut représenter une limite au niveau de la généralisation des résultats, il serait alors intéressant en futur d'élargir l'étude sur des échantillons plus vastes et multisectoriels en vue de généraliser les résultats obtenus.

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Continuous Review Inventory Model with Service Level Constraints and Lead Time as a Decision Variable

Krzysztof DMYTRÓW

University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
e-mail: krzysztof.dmytrow@usz.edu.pl
ORCID: 0000-0001-7657-6063

Abstract

Most classical mathematical inventory management models assume that the decision-maker has full knowledge about all cost groups (ordering, holding and shortage costs), demand is normally distributed and lead time is constant. However, in real situations it is not always true. The first and most often existing limitation is that shortage cost is not known (there are situations when it is very difficult, even impossible to be reliably estimated). In such case the inventory models with service level constraints are applied. The other limitation is that lead time is not always constant. There might be two situations – lead time can be a random or decision variable. In the latter case, lead time can be decreased by bearing some additional costs. Also, the demand distribution might not be normal (or even only some parameters, not the shape of the distribution may be known). The aim of the article is comparison of results obtained for the continuous review $\langle Q, r\rangle$ inventory model for backorders case with Type I and Type II (with iterative procedure and procedure proposed by Chu et al. (2005)) service level constraints and lead time demand as a decision variable. Obtained results indicate that the lowest total inventory costs were obtained for Type II service level constraints with iterative procedure. However, simpler procedure, proposed by Chu et al. (2005) yielded results that were worse only by 2% at most.

Keywords: inventory management, continuous review inventory model, service level constraints

Introduction

When managing inventories in conditions of uncertainty or risk, the probability of not satisfying the current demand for the product should always be taken into account. In this case, it is difficult to take account of the shortages and to determine their optimal amount. However, the biggest problem is to estimate the shortage costs. There are several ways of their determination. If the criterion for division is the type of inventory, the shortage costs can be estimated and divided as follows (Chen & Krass, 2001, p. 86):

- In case of raw materials, shortage costs will be costs of production line downtime, costs of special orders or contractual penalties for failure to perform production obligations arising from contracts with contractors,
- In the case of machine and equipment spare parts, shortage costs will be costs of inactivity of machines and labour force, delays in the execution of orders, or waste of materials,
- In the case of finished products and goods, the shortage costs will be the lost income and market position.

It should be noted, however, that even knowing which group the product range under consideration belongs to, it is very often difficult, if not impossible, to estimate the shortage costs. This is because apart from measurable components of these costs (contractual penalties, costs of line downtime, loss of profits), there are also non-measurable components such as loss of company's image, or threats to health or even life of people (e.g. lack of blood or insulin stocks in the hospital).

Apart from the type of inventory, there are the two types of shortage (Hadley and Whitin, 1963):

- backorders – excess demand is not lost, but will be satisfied when the normal replenishment order arrives,
- lost sales – excess demand is lost,

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When the shortage costs can be estimated, a full cost information approach shall be used for mathematical inventory model, otherwise *service level constraints* models shall be used.

In the literature on the subject there are three ways of determining service levels (Chen & Krass, 2001, p. 126; Engelmeyer, 2016, p. 9-10):

1. α *service level* – this is the probability that stock levels at the end of any period will not fall below the critical level. It is often called *the ready rate* or *Type I service level*.
2. β *service level* – it means the expected fraction of demand satisfied from stock in any period. It is often called *the fill rate* or *Type II service level*.
3. γ *service level* – the expected ratio of cumulative demand satisfied from inventory to total cumulative demand during the delivery period and inventory review period. This measure is similar to the fill rate, but the ratio is estimated on the basis of a number of periods, not a single period. An additional difference is that the previous approach is most commonly used in continuous review models, while this approach is typical for periodic review models. It is also called the *Type II service level*.

All approaches of full cost information and service level constraints can be applied for two main groups of inventory models: continuous and periodic review (Nahmias and Olsen, 2015). Continuous review inventory model assumes that the inventory level is monitored continuously and, if the inventory position falls beneath the *reorder point* – r, replenishment order in quantity of Q units is placed. The ordered quantity arrives after the lead time (denoted by τ). Therefore, it is often called the continuous review $\langle Q, r\rangle$ inventory model. Change of the inventory level in the $\langle Q, r\rangle$ model is presented on Figure 1.

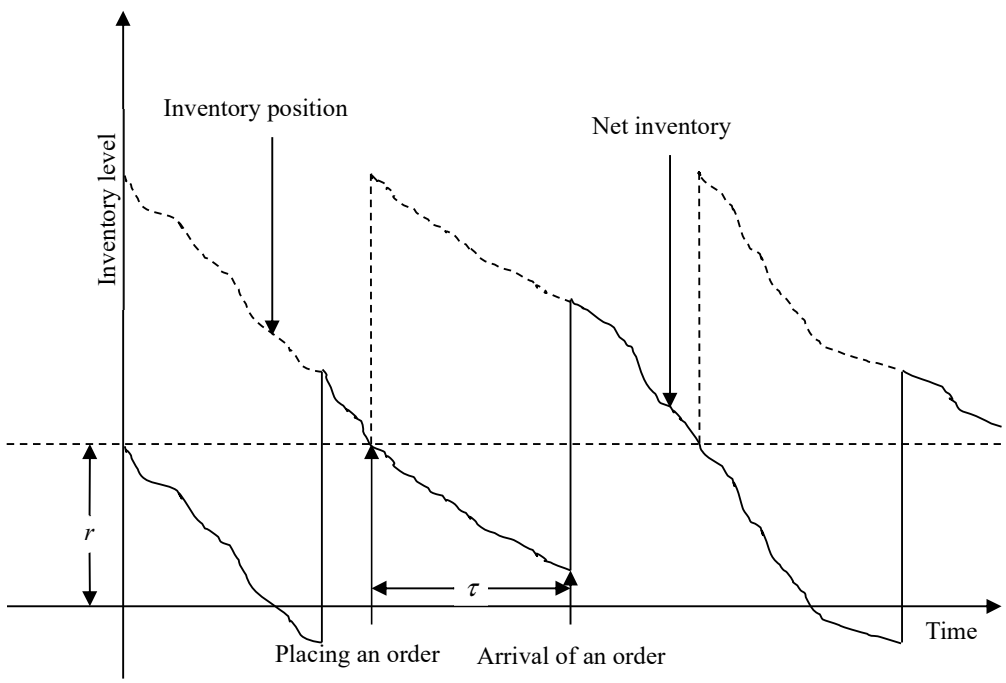

Figure 1: Inventory level in continuous review $\langle Q, r\rangle$ inventory model for backorder case.

Periodic review model, on the other hand, assumes that the inventory position is reviewed every T time units. T is called the review period. The subsequent step of the procedure can be different with respect to accepted assumptions. There are two general approaches. The first one assumes that a replenishment order is placed if the demand occurred since the last review. The order quantity is not constant – such a quantity is ordered, to raise the inventory position up to level R. Therefore, the model, based on these assumptions, is often called the *up-to-R* model, or the periodic review $\langle R, T\rangle$ inventory model. The second approach assumes that if the inventory position falls beneath the reorder point R, the quantity, raising the inventory position up to level R, is ordered. Therefore, such model is also called the periodic review $\langle r, T, R\rangle$ inventory model. Change of the inventory level in the $\langle R, T\rangle$ model is presented on Figure 2.

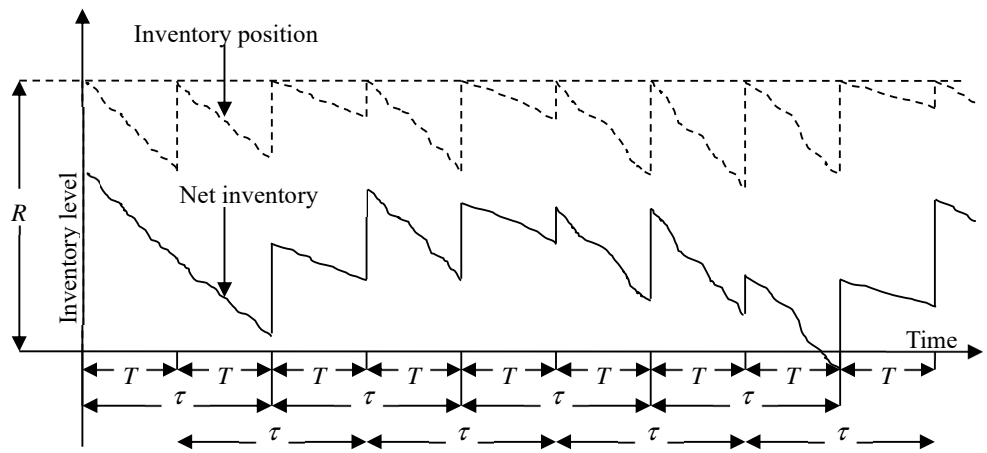

Figure 2: Inventory level in periodic review ⟨*R*, *T*⟩ inventory model for backorder case.
Source: own elaboration.

It is worth noting that the continuous review model is relatively easy to solve, while the situation for the periodic review models is much more complicated (Nahmias and Olsen, 2015). Therefore, numerical approximations for several periodic review models were proposed by Evan Porteus (Porteus, 1985).

The question arises, which model should be used in practice. Before universal access to computers, periodic review models were more commonly used, because continuous review of inventories would have been very expensive. Nowadays, when companies use ERP-like systems, continuous review of inventories do not generate additional costs. When comparing the results generated by two types of models, continuous review ones generally generate lower costs because of lower safety stocks (Hadley and Whitin, 1963). However, the main drawback of continuous review models is that every product must be considered individually, because for each of them the moment of placing a replenishment order is different. If a company sells thousands of products, such drawback makes application of continuous review models virtually impossible. The periodic review models, on the other hand, allow to make the group replenishment orders. When the inventory review is done, then all the products that need to be replenished, can be ordered. Moreover, because in the economic practice, demand for most products follows sporadic, or intermittent pattern, for such products the periodic review models are the most obvious choice (Syntetos, 2001). However, in case of single or small number of items, the continuous review model is a better choice, as it generates lower inventory level, thus lover inventory costs.

Although it is more natural that we do not have full information about the shortage costs, models with full cost information are more common. This is mainly because more advanced models with service constraints are mathematically more difficult than models with full cost information.

An additional element that often cannot be ignored in inventory models is the variability of lead time. This can be treated in two ways:

- lead time may be a random variable,
- lead time may be a decision variable.

In the first case, no specific lead time distribution is assumed, as this makes calculations very complicated. Only such parameters as the average value of the delivery time and its variance are taken into account. On the basis of these parameters, the average value and the variance of lead time demand are modified.

In the latter case, it is assumed that the lead time can be reduced at some additional cost. It is a cost of placing a supplementary order. The first model in which lead time was a decision variable was proposed by Liao & Shyu (1991). In their approach the lead time was the only decision variable – the order quantity was assumed to be predetermined. They assumed the continuous review model. Ben-Daya & Raouf (1994) extended the Liao & Shyu model by considering both lead time and order quantity as decision variables. Further extension of their model was done by Hariga & Ben-Daya (1999). They added the reorder point in the continuous review model as a decision variable and also applied assumption of lead time as decision variable to the periodic review, ⟨*R*, *T*⟩ inventory model. Both continuous and periodic review models were assumed to have full or partial demand information. Further

consideration of lead time as a decision variable can be found in works by Chu, *et al.* (2005), or Moon *et al.* (2014), for example.

The aim of the research is comparison of results generated by the continuous review ⟨*Q*, *r*⟩ inventory model in backorder case with α and β service level constraints, when lead time is a decision variable.

Notations and Model

In this paper the classical, single-product continuous review ⟨*Q*, *r*⟩ inventory model for backorder case with time as a decision variable was examined. For full cost information, the model's goal function has the following form:

$$K(Q,r,\tau) = [A + R(\tau)]\frac{D}{Q} + h\left(\frac{Q}{2} + r - \mu\right) + s\frac{D}{Q}\bar{\eta}(r) \tag{1}$$

where:

D	annual demand for product,
A	fixed ordering (setup) cost per order,
Q	order quantity (decision variable),
h	holding cost per unit per unit time,
r	reorder point (decision variable),
μ	average lead time demand,
s	shortage cost per unit per unit time,
τ	lead time,
$R(\tau)$	crashing cost related to lead time,
$\bar{\eta}(r)$	the expected amount of shortages in one replenishment cycle, calculated by means of the following equation:

$$\bar{\eta}(r) = \int_r^{\infty}(x - r)f(x)dx \tag{2}$$

where *f(x)* is probability density function of lead time demand.

The principle of the model is that the stock level is monitored continuously and when its level falls below *r*, a replenishment order of *Q* units is placed. Optimal quantities of *Q* and *r* are determined by calculating the first partial derivatives of equation (1) with respect to *Q* and *r* and equalling them to 0. After appropriate transformations, the formulae for optimal values of decision variables are as follows:

$$Q = \sqrt{\frac{2D[A+R(\tau)+s\bar{\eta}(r)]}{h}} \tag{3}$$

and:

$$F(r) = 1 - \frac{hQ}{sD} \tag{4}$$

where $F(r) = \int_0^r f(x)dx$ is the cumulative distribution function of the lead time demand at the reorder point *r*. Since both equations (3) and (4) have both values of decision variables, therefore their optimal values are obtained by a numerical procedure. The initial estimate of *Q* value is the Harris-Wilson formula $\left(Q_1 = \sqrt{\frac{2AD}{h}}\right)$. Q_1 is then substituted to formula (4) and r_1 is determined. Next, r_1 is substituted to formula (3), and the value Q_2 is obtained. Q_2 is then substituted to (4) and r_2 is obtained. The above steps are repeated until the consecutive values of *Q* and *r* converge with sufficient accuracy.

In our case, the shortage cost *s* is unknown, i.e. the above model with full cost information should be replaced by a model with service level constraints. In the case of α service level, the procedure is very simple:

- we determine *r* such that:

$$F(r) = \alpha \tag{5}$$

- the optimal order quantity is determined by the first derivative of equation (1), excluding the last component $s\frac{D}{Q}\bar{\eta}(r)$, i.e.:

$$Q = \sqrt{\frac{2D[A+R(\tau)]}{h}} \tag{6}$$

Value α is interpreted as the proportion of replenishment cycles in which no shortage occurs. It should be large enough for shortages to occur relatively rarely. Most often it takes values from 0.9 upwards.

The Type II service level (β service level) is the probability that the demand at any replenishment period is met from on-hand inventory. Thus, the probability that demand is not be met equals 1 – β. It can be written down as follows (Nahmias and Olsen, 2015):

$$\frac{\bar{\eta}(r)}{Q} \leq 1 - \beta \tag{7}$$

The fill rate must also be set at a sufficiently high level (usually above 0.9).

To solve the model given by equation (1) with β service level constraints s must be eliminated from it. This can be done by solving equation (4) to obtain the value of s:

$$s = \frac{hQ}{D[1-F(r)]} \tag{8}$$

The value calculated by means of equation (8) is often called the *imputed shortage cost*. It is then substituted to the formula for the optimal order quantity (3):

$$Q = \sqrt{\frac{2D\left\{A+R(\tau)+\frac{hQ\bar{\eta}(r)}{D[1-F(r)]}\right\}}{h}} \tag{9}$$

As Q exists on both sides of equation (9), in order to be able to solve it, we need to raise it to the second power. We obtain a quadratic function in variable Q. After several algebra operations, we obtain:

$$h[1-F(r)]Q^2 - 2h\bar{\eta}(r)Q + 2D[A+R(\tau)][1-F(r)] = 0$$

The above equation has a positive solution, given by the following formula:

$$Q = \frac{\bar{\eta}(r)}{1-F(r)} + \sqrt{\frac{2D[A+R(\tau)]}{h} + \left[\frac{\bar{\eta}(r)}{1-F(r)}\right]^2} \tag{10}$$

Equation (10) is solved simultaneously with the equation:

$$\bar{\eta}(r) = (1-\beta)Q \tag{11}$$

that we get from equation (6).

The numerical procedure for finding the optimal values of Q and r is as follows:

- give an initial value of r_1,
- determine $F(r_1)$ and $\bar{\eta}(r_1)$ from the formula (2), place it in the formula (10) and determine Q_1,
- from equation (11) we determine $\bar{\eta}(r_2)$, and from formula (2) – r_2,
- The above steps are repeated until the consecutive values of Q and r converge.

Another approach to Type II service level constraints with lead time being a decision variable has been presented in the paper [2]. The goal function is as follows:

$$K(Q,\tau) = [A+R(\tau)]\frac{D}{Q} + h\left(\frac{Q}{2} + k\sigma\sqrt{\tau}\right) \tag{12}$$

where k *is* the safety factor and σ – standard deviation of annual demand.

The limiting condition is, as in the previous model, inequality (7). For a normal distribution of lead time demand, $\bar{\eta}(r)$ can be expressed as follows (Chu et al., 2005, p. 287):

$$\bar{\eta}(r) = \sigma\sqrt{\tau}\psi(k) \tag{13}$$

where $\psi(k) = \varphi(k) - k[1-\phi(k)] > 0$, $\varphi(k)$ – probability density function and $\phi(k)$ – cumulative probability function of the standard normal distribution in k. Therefore, the constraint (7) can be rewritten as follows:

$$\frac{\sigma\sqrt{\tau}\psi(k)}{Q} \leq 1 - \beta \tag{14}$$

Determining the optimal order quantity from equation (12) is very simple, after calculating its first partial derivative relative with respect to Q and comparing it to 0.

The optimal order quantity, given by formula (6) is the minimum value of the function (12) if we do not consider the constraint (14). However, the optimal order quantity determined by formula (6) does not always satisfies the condition (14). This condition can be rewritten as follows:

$$\frac{\sigma}{1-\beta}\sqrt{\tau}\psi(k) \leq Q \tag{15}$$

If the order quantity Q obtained from formula (6) satisfies the constraint (15), then it is the optimal order size. If Q does not satisfy the condition (15), then the left-hand side of the above inequality is the optimal order quantity. Thus, the optimal order quantity is obtained as follows:

$$Q_{opt} = \max\left\{\sqrt{\frac{2D[A+R(\tau)]}{h}}; \frac{\sigma}{1-\beta}\sqrt{\tau}\psi(k)\right\} \tag{16}$$

Numerical Example

The example uses data from the paper written by Ouyang & Wu (1997). They are as follows: D = 600 units/year, A = 200 \$, h = 20 \$/unit, σ = 7 units/week, α, β = 0.985 (safety factor k = 2.432), standard lead time = 8 weeks. This period can be reduced by incurring additional costs. The appropriate data for lead time duration and lead time crashing costs are presented in Table 1:

Table 1: Lead time (τ) and crashing cost [$R(\tau)$].

i	τ (weeks)	$R(\tau)$ (\$)
0	8	0
1	6	5.6
2	4	22.4
3	3	57.4

Source: Ouyang & Wu (1997, p. 290).

Calculations were performed for every lead time duration and all three considered approaches of service level constraints:

- α service level – formulas (5) – (6),
- β service level with iterative procedure – formulas (10) – (11),
- β service level with procedure proposed by Chu et al. (2005) – formulas (13) – (16).

It was assumed that the demand was normally distributed. Results are presented in Table 2. The table shows optimal values of decision variables (Q, r), amounts of shortages ($\bar{\eta}(r)$) and total inventory costs (K).

Table 2: Optimal values of decision variables and total costs (the best results within each approach were bolded)

Parameters	**Lead time duration**			
τ	8	6	4	3
α service level				
Q	109.544	111.068	**115.516**	124.274
r	134.947	106.193	**76.569**	60.653
$\bar{\eta}(r)$	0.106	0.092	**0.072**	0.067
K (\$)	3,048.73	2,964.40	**2,921.16**	3,008.13
β service level with iterative procedure				

Q	120.649	120.928	**123.908**	131.824
r	110.881	83.984	**56.430**	42.045
$\bar{\eta}(r)$	1.810	1.814	**1.859**	1.977
K (\$)	2,577.64	2,528.25	**2,524.05**	2,640.29
β service level with procedure proposed by Chu et al. (2005)				
Q	146.464	**126.797**	115.516	124.274
r	108.785	**83.530**	59.857	44.764
$\bar{\eta}(r)$	2.197	**1.902**	1.553	1.345
K (\$)	2,618.56	**2,530.71**	2,546.98	2,690.43

Source: Own calculations based on Chu et al. (2005).

The best results (lowest total inventory costs) were obtained for lead time duration of 4 weeks (α service level and β service level with iterative procedure) or 6 weeks (β service level with procedure proposed by Chu et al. (2005)). Both approaches to the β service level generated lower total inventory costs than application of the α service level. Generally, application of the α service level constraints yielded in the lowest optimal order quantities (for lead time duration of 4 and 3 weeks they were the same as application of the β service level with procedure proposed by Chu et al. (2005)). For every lead time duration, reorder levels for α service level approach were the highest. In consequences, expected amounts of shortages were for this approach the lowest and total inventory costs – the highest. The reason for the highest total inventory costs was the highest holding costs.

When comparing the two best approaches – β service level with iterative procedure and β service level with procedure proposed by Chu et al. (2005) – for lead time duration of 8 and 6 weeks reorder levels were higher and optimal order quantities were lower for the former. When the lead time duration was 4 or 3 weeks the situation was opposite. For every lead time duration, total inventory costs for β service level with iterative procedure were lower than for β service level with procedure proposed by Chu et al. (2005), but the difference never exceeded 2%. Therefore, the easy-to-implement procedure, proposed by Chu et al. (2005), performed almost the same well as more difficult, iterative one. This was in line with similar studies carried out in this area (Geunes, Ramasesh and Hayya, 2001).

If we compare all approaches, then the best results were obtained for β service level with iterative procedure when the lead time duration was equal 4 weeks. optimal order quantity was 123.9 units. It meant that there ought to have been 4-5 replenishment orders a year (replenishment order should be placed every 76 days). Reorder level was equal 56.4 units and the expected amount of shortages was 1.86 units. Total inventory costs (ordering and holding costs) were equal 2,524.05 USD.

Conclusions

This article compares the results of using the continuous review $\langle Q, r\rangle$ inventory model for backorders with the Type I and Type II service level constraints. Better results (lower total inventory management costs) were generated by models with the Type II. Additionally, within this class of models, the results generated for the iterative procedure and the procedure proposed by Chu et al. (2005) were compared. It turned out that the expected total inventory management costs for the iterative procedure were lower than the costs obtained for the procedure proposed by Chu et al. (2005) by less than 2% at most, i.e. the benefits of using a more labour-intensive iterative method were practically insignificant.

Further research in this area will compare the results obtained for other demand distributions than the normal distribution and for different combinations of ordering and storage costs. The analysis should also be extended to the case of lost sales and the mixture of backorders and lost sales.

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Evaluation of the Effectiveness of Professional Activisation Forms in Poland – Regression Discontinuity Design

Beata BIESZK-STOLORZ
University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
E-mail: beata.bieszk-stolorz@usz.edu.pl
ORCID: 0000-0001-8086-9037

Krzysztof DMYTROW
University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
E-mail: krzysztof.dmytrow@usz.edu.pl\
ORCID: 0000-0001-7657-6063

Abstract

Expenditures connected with conducting active labour market policy force the necessity of conducting research on effectiveness of applied instruments and conducting evaluation studies. The aim of the article is to assess the impact of changes in the calculation methodology on cost and employment effectiveness of basic forms of professional activisation. These changes were introduced in 2015 and concerned two aspects: the definition of the end of participation in activisation and the definition of employment. In the analysis one of the basic counterfactual methods was used - the method of regression discontinuity design. The study was conducted on the basis of statistical data published by the Ministry of Family, Labour and Social Policy. The conducted survey did not show any significant change in the value of both effectiveness in the threshold, i.e. in 2015. The change occurred only in the slope of the regression line for cost effectiveness after 2015 for both procedures of its calculation.

Keywords: Registered Unemployment, Forms of Professional Activisation, Cost and Employment Effectiveness, Regression Discontinuity Design.

JEL code: C21, J64, J68

Introduction

The phenomenon of unemployment has a negative impact on both the national economy and the functioning of households. Therefore, governments can and should use appropriate tools to mitigate its effects and, in particular, limit its duration. Active labour market policies use various forms of support and activisation of the unemployed. The results of specific programmes cannot always be foreseen. It is therefore important to conduct research and indicate the degree of effectiveness of the tools used and to conduct evaluation studies. From the social point of view, it is important to employ as many job seekers as possible. On the other hand, from the side of institutions financing active support programmes it is necessary to assess the spending of funds. In the case of unemployment, the research may concern many aspects such as: identification of groups of people at risk of long-term unemployment, assessment of the impact of the implemented programmes on exiting unemployment and monitoring the spending of funds allocated for these purposes. These analyses are largely based on the scientific contribution of James Heckman – Nobel Prize winner in economics. In different countries, efficiency research focuses on different aspects of labour market policy. In the United States, income effects of active employment programmes are mostly studied (Heckman et al., 1999). In the European Union, on the other hand, employment effects are mainly analysed, as the main objective is to avoid high costs of long-term unemployment. Labour market research indicates that increasing unemployment benefits and extending the duration of their collection has an impact on the duration of seeking employment (Moffitt, 1985; Katz and Meyer, 1990; Hunt, 1995; Card and Levine, 2000; Hahn et al., 2001; Lalive, 2007; Bieszk-Stolorz and Markowicz, 2015b). This in turn may lead to long-term unemployment. Therefore, various programmes are introduced to increase the economic activity of people seeking employment. Due to the incurred expenses for the implementation of these programmes, there is a need to monitor them. Two basic indicators serve this purpose: cost effectiveness (expenditure from the Labour Fund per person employed as a result of the application of the programme) and employment effectiveness (percentage of persons who obtained employment after taking part in the programme). There are big concerns about the way the number of these people is determined. Under the influence of constant

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criticism, in 2015, the Ministry of Family, Labour and Social Policy changed the method of counting these indicators. It is interesting to examine whether the changes introduced have significantly influenced their values.

The aim of the article is to assess the impact of changes in the calculation methodology from 2015 on the cost and employment effectiveness of basic forms of professional activisation. The analysis uses the method of regression discontinuity design. The study was conducted based on statistical data published by the Ministry of Family, Labour and Social Policy (MPRPiPSa; MPRPiPSb).

Activisation of the Unemployed

After Poland's accession to the European Union, the scope of activities related to professional activisation of the unemployed, addressed to groups of people in a difficult situation on the labour market, increased. In 2004, the Act on employment promotion and labour market institutions was introduced (Journal of Laws of 2016, item 645). Its aim was to adjust the Polish labour market policy to the European Employment Strategy. The Act divided activities directed to the unemployed into labour market services and instruments. Labour market services included assistance in job search. It consisted of job placement, vocational counselling, professional information, assistance in active job searching and organisation of training. Professional activisation of the unemployed was related to the introduction of such labour market instruments as: intervention works, public works, professional preparation in the workplace, internships and funds for job creation. Since 2004, several dozen modifications have been made in the Act. New services and instruments of the labour market were changed, extended and introduced. The aim of these changes was to use them more effectively and to adapt them to the changing needs and socio-economic conditions. Thanks to the Act, the access to the labour market services was extended, lifelong learning programmes were promoted, and the system of unemployment benefits was modified, as well as the system of incentives for starting business activity and creating new jobs was implemented.

The registered unemployment rate in Poland in 2004-2018 was changing. In 2004 it was equal to 19% and in the following years it decreased to 9.5% (2008). Then, as a result of the global financial crisis it increased to 13.4% (2012). It remained at the same level in 2013 and then decreased to 5.8% in 2018. The number of registered unemployed people changed similarly (Table 1).

Table 1: Registered unemployment rate and number of registered unemployed persons

Year	Number of registered unemployed (thousands)	Unemployment rate (%)
2004	2999.6	19.0
2005	2773.0	17.6
2006	2309.4	14.8
2007	1746.6	11.2
2008	1473.8	9.5
2009	1892.7	12.1
2010	1954.7	12.4
2011	1982.7	12.5
2012	2136.8	13.4
2013	2157.9	13.4
2014	1825.2	11.4
2015	1563.3	9.7
2016	1335.2	8.2
2017	1081.7	6.6
2018	968.9	5.8

Numerous studies indicate the spatial diversity of unemployment in Poland (Murawska, 2016; Tatarczak and Boichuk, 2018; Woźniak-Jęchorek, 2015). This may result from the fact that the Polish labour market is strongly distorted by annual fluctuations of other macroeconomic factors (Hadas-Dyduch et al., 2016).

Catalogue of basic forms of professional activisation

The catalogue of basic forms of professional activisation is established by the minister in charge of labour. In years 2005-2018 this catalogue was changing. In 2005, it covered 7 forms: training, employment within intervention works, employment within public works, internships with employers, preparation of adults for profession in the workplace,

granting the unemployed one-off funds for financing their business activity and granting employers refunds of costs of equipment or additional equipment of the workplace for unemployed directed to those workplaces. In years 2006-2009 an eighth form was added: performing socially useful work. In 2010-2013, there were 7 forms – preparation of adults for profession in the workplace was removed from the catalogue. In the years 2014-2018, the catalogue included 6 forms – without socially useful works. Due to its ancillary nature or insignificant share in incurred expenses, in years 2005-2018 some forms of support were not included (e.g. activisation allowance, scholarships in the period of continuing education, reimbursement of travel and accommodation costs, reimbursement of social security contributions for farmers dismissed from work, training loans). In the analysed period, most people benefited from trainings and internships.

Table 2 shows the number of unemployed persons participating in the programmes and the percentage of those ending their participation and employed after the end of participation in activisation programmes in 2005-2018. In the initial period (2005-2010), this number increased and was much higher than in subsequent years. There are clear differences between the number of people participating in different activisation programmes and the number of those ending their participation and those employed after the end of participation in the programmes. In the analysed period, on average, slightly more than 92% of the newcomers ended their participation in selected forms of economic activisation, but only 59% of them found employment (Table 2). In 2011, a clear decrease in the number of unemployed people participating in the programmes is visible, as well as a large percentage of people employed after completing their participation in the programmes (over 70%) and ending their participation (over 100%). This is due to the fact that a large number of people started to participate in forms of activisation in the previous year and ended in the following one.

Table 2: Number of unemployed persons participating in activisation programmes

Year	Number of participating unemployed persons	Percentage of persons	
		ending their participation in the programmes	employed after the end of their participation in the programmes
2005	561,703	89.33%	42.29%
2006	594,262	95.54%	52.44%
2007	672,788	96.30%	55.58%
2008	652,314	93.11%	52.13%
2009	684,624	95.12%	50.61%
2010	788,674	96.27%	52.13%
2011	302,002	126.58%	70.48%
2012	428,298	88.38%	53.80%
2013	460,773	99.45%	63.00%
2014	442,187	93.29%	71.13%
2015	484,337	74.44%	56.49%
2016	450,342	81.97%	64.55%
2017	404,455	81.06%	66.45%
2018	335,644	86.44%	73.44%

Measures to assess the effectiveness of forms of professional activisation

To assess the effectiveness of the applied forms of professional activisation in Poland two basic measures are used: employment and cost effectiveness. The very concept of effectiveness is the subject of many discussions and analyses. First of all, it is a tool for measuring management effectiveness, as it allows to determine to what extent the set objectives are achieved. It describes the relation of achieved effects to incurred outlays. In economic theory, economic effectiveness is considered in two aspects. One of them is connected with the aim of maximising effectiveness, i.e. achieving the highest possible result from a certain amount of expenditure. The second one results from the pursuit of saving resources, i.e. achieving certain degree of the effect while minimising outlays (costs) (Poskart, 2014). In the case of assessing the effectiveness of the public sector, actions are taken to assess the effectiveness of the use of state policy instruments, and in particular to assess the legitimacy of further use of a given instrument and identify more effective solutions. Support programmes for the unemployed are monitored in the labour market. From the social point of view, it is important to employ the maximum number of job seekers. On the other hand, from the side of institutions financing active support programmes, it is important to assess the spending of funds in a reliable way. In order to assess the effectiveness of the implemented programmes, the cost of participation in the form of activisation and employment and cost effectiveness coefficients are determined. These figures are determined for basic forms of professional activisation.

Employment effectiveness (re-employment rate) is an indicator for determining employability after the end of participation in the programme. It is determined using a formula:

$$EE = \frac{number\ of\ persons\ employed\ after\ the\ end\ of\ participation}{number\ of\ persons\ that\ completed\ their\ participation} \cdot 100\% \quad (1)$$

Cost effectiveness (cost of re-employment) allows to assess the cost of bringing an unemployed person into employment. It is expressed by a formula:

$$CE = \frac{amount\ of\ expenditure\ from\ the\ Labour\ Fund}{number\ of\ persons\ indicated\ as\ employed} \quad (2)$$

The cost of participation in the form of activisation informs about the average cost of activisation of one person. It is calculated from the formula:

$$PC = \frac{amount\ of\ expenditure\ from\ the\ Labour\ Fund}{number\ of\ persons\ that\ participated\ in\ the\ given\ form} \quad (3)$$

In 2015, there was a change in the methodology of effectiveness calculation. This change concerned two aspects: the definition of ending participation in activisation and the definition of employment.

Before 2015, the date of completion of participation in activisation was the date of completion of participation in a given form of support (training, internships) or the date of completion of financing from the funds of the Labour Fund (public works, intervention works, socially useful works, refunding of equipment or furnishing the workplace). The provisions of the Act of 20 April 2004 on employment promotion and labour market institutions (Journal of Laws of 2016, item 645, as amended) specified the date of activisation completion as the end of the obligation period. In the case of reimbursement of costs of retrofitting or equipping a workstation, it is the period in which an employer is obliged to maintain a workstation created or retrofitted from the Labour Fund funds.

The change in the definition of employment is related to a change in the conditions under which the activated person can be considered as employed. Before 2015, a person who after the end of participation in a specific form of activisation did not register again in the poviat labour office within 3 months was considered an employed person. It could have happened that some people had lost their jobs and did not register again, and in the calculations were considered as employed. In order to avoid such situations, from 2015, it is required that an unemployed person, after participation in activisation, should work for at least 30 days within a period of 3 months and on this account (with few exceptions) social insurance contributions were paid to the Social Insurance Institution (Polish abbreviation ZUS). These changes were of particular importance in the case of subsidising business activity and refunding the costs of equipment or retrofitting the workplace. Both these forms of activisation were connected with a one-off payment of funds. At the same time, the duration of these forms is long. The assessment of employment effects after three months from the payment of funds, i.e. during the period of mandatory business activity, resulted in the employment effectiveness for both these forms being 100%, while the cost effectiveness was equal to the average amount of a subsidy or refund. The modifications made were supposed to improve the data quality.

Persons participating in a given form of activisation are understood as persons for whom the expenditure from the Labour Fund was made in a given year, regardless of the duration of activisation and repeated use of the same form of activisation.

Persons who have completed participation in a given form of activisation are those who, in the analysed year, completed participation in a given form of professional activisation financed from the Labour Fund, including persons who have completed activisation initiated in previous years.

Persons who had been employed were those who during or within 3 months from the end of their participation in a given form of activisation took up work and performed it for at least 30 days - according to the data obtained from ZUS. In such case, employment should be understood as:

- performance of work on the basis of an employment relationship, business relationship and a contract of employment;
- performing work or providing services under civil law contracts;
- conducting business activity on the basis of an entry in the register of entrepreneurs.

The study compared the efficiencies determined after the change from 2015 (new procedure) and those determined under the old regulations (old procedure). Figure 1 presents the cost of participation, cost and employment effectiveness and activisation programmes in Poland in the years 2005-2018 determined on the basis of the new and old procedure. After the introduction of a new way of defining people who took up employment from 2015, the cost of participation did not change, but the value of both efficiencies changed. The cost incurred per person employed (cost effectiveness) was still much higher than the cost per person starting to participate in the programme.

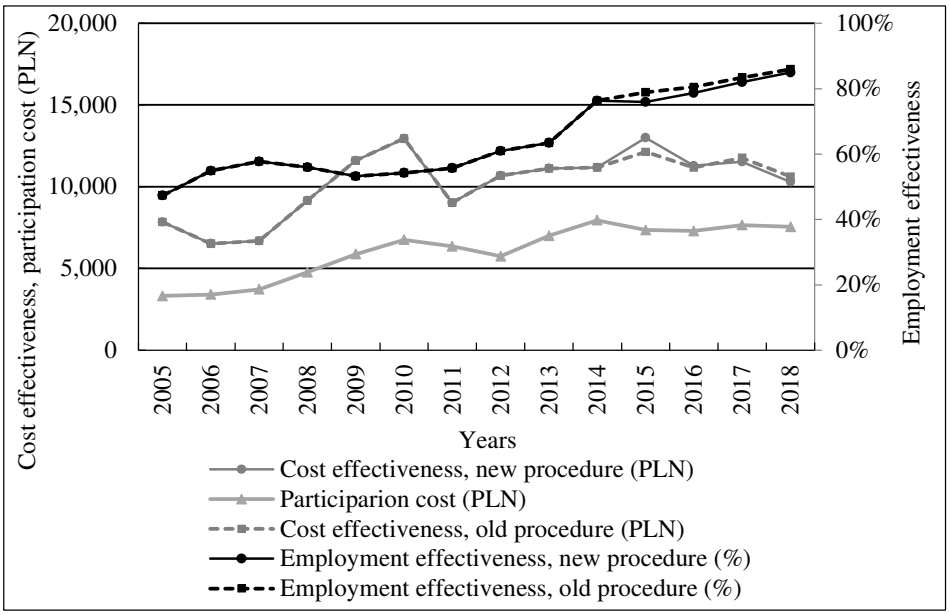

Fig. 1: Total participation cost, cost and employment effectiveness of activisation programmes in Poland

In the years 2006-2010, a large increase in cost effectiveness (from about PLN 6.5 thousand to about PLN 13 thousand) was accompanied by a relatively stable employment effectiveness at the level of about 55% (Fig. 1). In 2011, there was a significant decrease in cost effectiveness compared to the previous year from about PLN 13 thousand to about PLN 9 thousand. This was related to the correction of the general government deficit. Then, by 2015, both effectiveness showed upward trends, and after 2015, the employment effectiveness continued to increase with a decreasing value of cost effectiveness. While the increase in cost effectiveness should be seen as a negative phenomenon (from the point of view of public finances), it should be noted that at the same time the absolute difference between this effectiveness and the cost of participation has decreased. All this indicates a better use of funds for economic activisation of the unemployed in 2015-2018.

Criticism of the effectiveness measures used concerns primarily the method of determining the number of people employed after the end of participation in a selected form of activisation. The analysis conducted by the Ministry of Family, Labour and Social Policy (Polish abbreviation MRPiPS) concerned a short period, i.e. three months. The Supreme Audit Office (Polish abbreviation NIK) carried out an audit on the permanence of employment after two years from the beginning of the activisation process. In the opinion of the Supreme Audit Office, the employment effectiveness indicators set by poviat labour offices were overstated. Due to the inclusion of forms of activity with a predetermined 100% effectiveness, the phenomenon of *cream skimming*, or *cherry picking* may occur (van Thiel, Leeuw, 2002). According to the methodology adopted by NIK, employment can be considered permanent if after 2 years (or more) a person does not return to the list of unemployed people. The survey conducted according to this principle indicated that public works and internships turned out to be the least effective form of activisation. The permanence of employment in the case of business grants remained at a high, almost unchanged level. It was shown that the greatest chances of finding a permanent job were provided by new forms of support: an employment voucher and a settlement voucher. 72% of people who took advantage of these vouchers did not return to the register of the unemployed after two years from granting these forms of support. Unfortunately, these instruments were used to a small extent. Moreover, previous studies have shown that the effectiveness of forms of economic activisation in Poland is territorially diverse (Bieszk-Stolorz, Dmytrów, 2019, 2020). Studies conducted so far on the effectiveness of basic forms of professional activisation indicate that active labour market policy in Poland brings a positive effect for the labour market consisting only in temporary reduction of unemployment.

Research Methodology

In order to assess the effectiveness of the various programmes to counteract unemployment in the Member States benefiting from EU funds, the European Commission proposed counterfactual methods contained in the publication *Design and Commissioning of Counterfactual Impact Evaluations. A Practical Guidance for ESF Managing Authorities* (2012). The aim of the methods contained therein is, among other things, the assessment of the average impact effect is related to the analysis of cause and effect relations between the occurring phenomena. The basic element of the models is a random variable describing two states: impact (Y_1) and no impact (Y_0). The relationship between the observed result and hypothetical results can be presented as follows:

$$Y = dY_1 + (1 - d)Y_0 \text{ for } d\epsilon\{0, 1\} \tag{4}$$

The value of the dependent variable Y is modelled as a conditional value expected at the known realisation of the vector of observed characteristics X. The *average treatment effect* (*ATE*) is determined by the formula:

$$ATE = E(Y_1 \mid X) - E(Y_0 \mid X) \tag{5}$$

A popular method of evaluation research in this area is the *regression discontinuity design* (*RDD*).

The literature lists two types of such models: *sharp design* and *fuzzy design* (Trochim, 1984; Hahn et al., 2001). The sharp design can be used when the cut-off point (threshold) fully identifies the experimental group. If this is not the case and the individuals have yet to fulfil an additional condition, the fuzzy design must be used. In the case of a test carried out, due to the single condition set, the fuzzy model form is used.

On each side of the cut-off point X_0 (left – l, right – r), parameters for two separate regression functions are estimated (Lee and Lemieux, 2010):

$$Y = \alpha_i + f_i(X - X_0) + \varepsilon \text{ for } i \in \{l, r\} \tag{6}$$

where ε is the error term. It is assumed that it is normally distributed. The model (6) can be written as follows:

$$Y = \alpha_l + \tau\, D + f_l(X - X_0) + D[f_r(X - X_0) - f_l(X - X_0)] + \varepsilon \tag{7}$$

where: $\tau = \alpha_r - \alpha_l$. D is a binary variable. Its form depends on the position of the experimental group relative to a defined eligibility threshold X_0.

If variable D is defined as follows:

$$D = \begin{cases} 0 & \text{for } X < X_0 \\ 1 & \text{for } X \geq X_0 \end{cases} \tag{8}$$

the experimental group is defined by the condition $X \geq X_0$ and the control group by $X < X_0$.
If the functions f_l and f_r are linear, they are as follows:

$$f_i(X - X_0) = \beta_i(X - X_0) \text{ for } i \in \{l, r\} \tag{9}$$

and the model (7):

$$Y = \alpha_l + \tau\, D + \beta_l(X - X_0) + \beta D(X - X_0) + \varepsilon \tag{10}$$

where:

$\beta = \beta_r - \beta_l$.
Y – dependent variable,
X – independent variable,
X_0 – threshold,
τ – average impact effect at the threshold X_0,
D – dummy dichotomous variable.

In the model (10) the parameter τ informs about a change in the value of the Y variable when passing through the threshold. If it is positive, there is an increase in the value in the threshold, if negative – a decrease in the value of the dependent variable. Because the model (10) is a linear one, it is estimated by means of the ordinary least squares (OLS) method.

The construction of regression discontinuity design in research was first proposed by Thistlethwaite and Campbell (1960), while Lee and Lemieux (2010) stated that one of the main advantages of this approach was the possibility of presenting the results using simple charts, which significantly increases the transparency of this method. In labour market research, models of average impact are useful, among the other things, to assess the impact of unemployment benefit on the process of unemployment (Lalive, 2007; Schmieder et al., 2012), the impact of culture on the duration of unemployment (Brügger et al., 2009), the impact of activisation measures on the probability of exiting unemployment (Bieszk-Stolorz, Markowicz 2015a).

Assessment of the impact of a change in the calculation of effectiveness on their value

In 2015, the methodology of calculating employment effectiveness for basic forms of professional activisation changed and the conditions under which an activated person can be considered an employed person changed. This resulted in a change in the value of both effectiveness, while the cost of participation of the unemployed in forms of economic activisation did not change. The differences concern the value of both effectiveness in 2015-2018.

Since the change in the calculation of effectiveness took place from 2015, it was decided to take that year as the threshold in the regression discontinuity design models. The model parameters were estimated in two subgroups. The first one included actual effectiveness values, i.e. according to the new way of calculating them (new procedure). The second sub-group consisted of the efficiencies calculated according to the old rules (the old procedure). Then, using a regression discontinuity design models, it was assessed whether and to what extent a change in the way the effectiveness was calculated significantly influenced their change in the threshold.

The first stage of the study consisted of estimating cost effectiveness models. In order to preserve the monotony, the sub-periods included data from 2011-2018. Subsequent years were marked as X_i for i = 1, 2, ..., 8. In this case the threshold is $X_0 = X_5 = 5$. To estimate the difference in cost effectiveness Y_i in the threshold $X_0 = 5$ (2015) the model was used:

$$\hat{Y}_i = \alpha_l + \tau D + \beta_l (X_i - X_0) + \beta D (X_i - X_0) \tag{11}$$

where:
Y_i – cost effectiveness,
X_i – year number,
τ – average impact of the change on cost effectiveness at the threshold X_0,
$X_0 = 5$.

Dummy variable D is defined as follows:

$$D = \begin{cases} 0 & \text{for } 1 \le X_i < 5 \\ 1 & \text{for } 5 \le X_i \le 8 \end{cases} \tag{12}$$

Parameter estimates are shown in Table 3.

Table 3: Results of the estimation of parameters of the regression discontinuity design models (cost-effectiveness)

Parameter	Parameter's estimator	Standard error	*p*-value	Parameter's estimator	Standard error	*p*-value
	New procedure R^2 = 0,8542			Old procedure R^2 = 0,8016		
α_l	12,219.64	698.17	0.0001	12,219.64	673.41	0.0001
τ	488.77	845.52	0.5942	-203.41	815.54	0.8153
β_l	689.96	254.94	0.0537	689.96	245.89	0.0485
β	-1,479.89	360.53	0.0148	-1,084.45	347.75	0.0356

For the cost effectiveness calculated according to the new procedure, the following models were obtained:

$$\hat{Y}_i = 8769.84 + 689.96X_i \text{ for } D = 0 \quad (13)$$
$$\hat{Y}_i = 16658.06 - 789.93X_i \text{ for } D = 1 \quad (14)$$

For the old procedure of effectiveness calculation, the models are as follows:

$$\hat{Y}_i = 8769.84 + 689.96X_i \text{ for } D = 0 \quad (15)$$
$$\hat{Y}_i = 13988.68 - 394.49X_i \text{ for } D = 1 \quad (16)$$

Formulas (13) and (15) describe the linear model of cost effectiveness before 2015.

Formula (14) describes the linear model of cost effectiveness from 2015 onwards according to the new counting procedure.

Formula (16) describes the linear model of cost effectiveness from 2015 onwards according to the old counting procedure.

Regression discontinuity design models for cost effectiveness are shown in Figure 2.

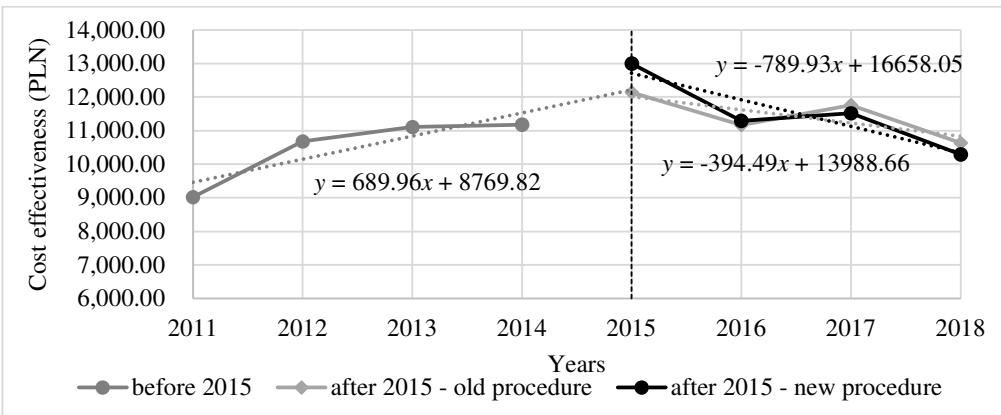

Fig. 2: The regression discontinuity design models for cost effectiveness (new and old procedure)

The estimates in Table 3 lead to the following conclusions:

- The change in the calculation method did not result in a significant jump in the cost value at the threshold, i.e. in 2015 (lack of statistical significance of the parameter τ at variable D)
- All obtained models have significant slope parameters. Signs of these parameters' estimators indicate that before 2015, cost effectiveness was increasing in subsequent years and decreasing since 2015.
- The change of calculation method has resulted in a significant change in the slope angle of the regression line since 2015 (significance of the parameter β). The estimator of this parameter has decreased, which means that the cost effectiveness calculated according to the new procedure has decreased faster than according to the old procedure.

In the second stage of the study, employment effectiveness models were estimated. Due to the monotonicity, data from the period 2009-2018 was included in the sub-periods. Subsequent years were marked as X_i for $i = 1, 2, \ldots, 8, 9, 10$. In this case the threshold (2015) was $X_0 = X_7 = 7$. To estimate the difference in employment effectiveness Y_i in the threshold $X_0 = 7$ (2015), a model (11) was used in which the dummy variable D is defined as follows:

$$D = \begin{cases} 0 & \text{for } 1 \leq X_i < 7 \\ 1 & \text{for } 7 \leq X_i \leq 10 \end{cases} \quad (17)$$

The estimators of the parameters are presented in Table 4.

Parameters τ and β for both models are statistically insignificant (at the level of $p = 0{,}05$). These are the parameters for the variables associated with the variable D, which was decided to be removed from the model (11) and a simple linear regression model was estimated:

$$\hat{Y}_i = \alpha + \beta X_i \tag{18}$$

where α, β are the parameters of the model.

All parameters are statistically significant. The following models were obtained:

- according to the new procedure:

$$\hat{Y}_i = 0.4675 + 0.0396X_i \tag{19}$$

- according to the old procedure:

$$\hat{Y}_i = 0.4624 + 0.0418X_i \tag{20}$$

The results of the estimation of model parameters (18) for the new and old procedure are shown in Table 4 and the regression line graphs in Figure 3.

Table 4: Results of the estimation of parameters of the regression discontinuity design and linear regression models (employment effectiveness)

Parameter	Parameter's estimator	Standard error	*p*-value	Parameter's estimator	Standard error	*p*-value
	New procedure			Old procedure		
Regression discontinuity design models						
α_l	0.7545	0.0294	0.0000	0.7545	0.0295	0.0000
τ	0.0038	0.0396	0.9267	0.0315	0.0397	0.4579
β_l	0.0424	0.0076	0.0014	0.0424	0.0076	0.0014
β	-0.0119	0.0160	0.4855	-0.0183	0.0161	0.2975
fit	$R^2 = 0.9558$			$R^2 = 0.9604$		
Linear regression models						
α	0.4675	0.0196	0.0000	0.4624	0.0212	0.0000
β	0.0396	0.0032	0.0000	0.0418	0.0034	0.0000
fit	$R^2 = 0.9518$			$R^2 = 0.9492$		

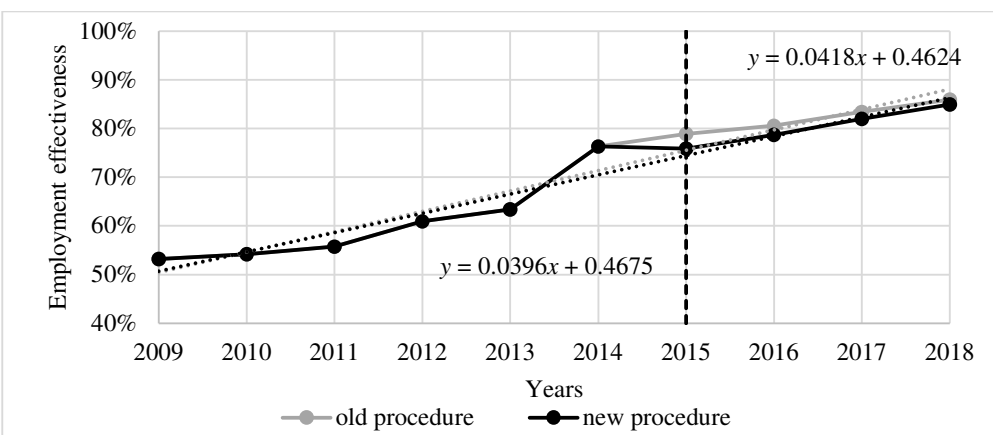

Fig. 3: The linear regression models for employment effectiveness (new and old procedure)

In order to examine whether the change in the procedure of calculating of employment effectiveness after 2015 affected the pace of its growth, a test for equality of two linear regression slope coefficients was performed. Student's-*t* test was applied. The calculated value of *t* statistics was equal 0.481. The *p*-value was equal 0.637, so there were no grounds to reject the null hypothesis that the rates of increase of employment effectiveness calculated by the two procedures did not differ significantly.

The estimates in Table 4 lead to the following conclusions:

- The changes in the method of effectiveness calculation introduced since 2015 did not result in a significant jump in the cost value at the threshold, i.e. in 2015 (lack of statistical significance of the parameter τ at variable D) and did not cause a significant change in the slope of the regression line since 2015 (no significance of the parameter β).
- Since 2009, employment effectiveness has been increasing for both the new and old method of its calculation.
- The change in the procedure of calculation of the employment effectiveness virtually did not cause any differences in its growth in the examined period (the Student's t did not show the significance of differences between the relevant slope parameters of the regression function).

Conclusions

The analysis of the effectiveness of applied economic activisation programmes for the unemployed is not an easy task. There are often objections to the definition of persons taking up employment after the end of participation in programmes. This is indicated by comments contained in the NIK report. The two-year period of employment suggested in this report as an effect of the programme seems to be correct. However, some evaluation studies require the programme to be settled in the annual period. The changes in the definition of termination of participation in activisation and the definition of employment introduced from 2015 have solved this problem only partially. This is visible in the results of the conducted survey. The new procedure for calculating the effectiveness slightly decreased the value of employment effectiveness, but the change was statistically insignificant. As far as cost effectiveness is concerned, its variability slightly increased, but the change was also statistically insignificant. What turned out to be significant was only the change in the rate of decrease in cost-effectiveness after the change in the procedure of its calculation (it was slightly faster).

The methodology used in the presented study is relatively simple and the results obtained with its help are easy to interpret. The sharp model presented in the article is suitable for the analysis of socio-economic phenomena, for which there has been a change in conditions or a change in the method of their measurement. The results obtained by using a regression discontinuity design model allow to assess whether these changes have significantly affected the further course of the studied phenomenon and whether there has been a significant change in its eligibility threshold.

The sharp form of the model applies in particular if the changes in the phenomena have their origin in a change in legislation or as a result of the introduction of new social programmes which take effect at a specific moment. An additional advantage of this method is its recommendation by the European Commission for evaluation studies.

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Propositions About Intention to Choose Entrepreneurship Career Among Millenial Generation in Indonesia

Singgih Santoso
Universitas Islam Indonesia Yogyakarta, Yogyakarta, Indonesia
Email: quicksinggihsantoso@gmail.com

Zaenal Mustafa EQ
Universitas Islam Indonesia Yogyakarta, Yogyakarta, Indonesia
Email: zet_meq@yahoo.com

Sutarno
Universitas Slamet Riyadi Surakarta, Surakarta, Indonesia
Email: sutarnowignyomartono@gmail.com

Abstract

This literature study aims at examining the variables used to predict intention to choose an entrepreneurship career and the success of the business. Attitude to entrepreneurship, family support, and competency of being an entrepreneur conceptually have roles in explaining the intention to choose an entrepreneurship career and the success of the business. The millennial generation becomes the subjects of the generation who have a unique characteristic in doing business as entrepreneurs.

Keywords: Growth Intention, Business Success, Millennial Generation.

Introduction

Business or entrepreneurship activities have already been regarded as the engine of the long-term economic growth of a nation (Romer, 1994). Increasing numbers of entrepreneurs in the economy have become a center of interest for the government, policymakers, and researchers. The interest emerges because of two reasons: Firstly, entrepreneurship accelerates economics growth (Baumol, 1990, 2004; Acs, 2006; Audretsch, 2007), and secondly, entrepreneurship decreases unemployment (Evans & Leighton, 1990; Reynolds, Storey. & Westhead 1994; Santarelli, Carree. & Verheul, 2009; Campbell, 1996; Carree & Thurik, 1996; Lee, Florida, & Acs, 2004).

Although the mainstream of researches about entrepreneurship shifted to the perspectives of economics and strategy in the period from the year 1980 until 2005, the mainstream has shifted back to the perspective of psychology, because entrepreneurship basically has or relates to a personal characteristic. Aspects of the characters become important for the individual in determining attitudes and behaviors. (Sutarman et al., 2020; Tjahjono et al. 2019, Fachrunnisa et al., 2018; Zuhaena et al., 2018)

Until now, the model which is dominant in the literature about the intention to choose an entrepreneurship career is *the Theory of Planned Behaviour* (TPB) (Ajzen, 1991). Theoretical specifications in TPB are more detailed and consistent. Moreover, there have been much researches specialized to test, enhance, and criticize TPB in many fields (Fayolle, Gailly, & Lassas-Clerc, 2006; Shook., Priem, & McGee, 2003).

Most empirical studies implementing TPB to predict entrepreneurship behavior revealed that attitude of behavior, subjective norms, and control over the behavior had a significant effect on the intention to choose an entrepreneurship career (an example is given: Autio. Keeley, Klofsten, Parker, & Hay, 2001; Fayolle et al., 2006; Gird & Bagraim, 2008; Kolvereid, 1996; Souitaris, Zerbinati, & Al-Laham, 2007; Tkachev & Kolvereid, 1999; van Gelderen, Brand, van Praag, Bodewes, Poutsma, & van Gils, 2008).

Nevertheless, some studies, for example, a study by Kolvereid and Isaksen (2006), showed that the impact of control over the behavior on the intention to choose an entrepreneurship career was not significant. Besides that, some studies only found partial support for TPB (an example is given: Liñan & Chen, 2009; Krueger et al., 2000). In those two studies, the only attitude of behavior and control over the behavior had a significant direct effect on the

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intention to choose an entrepreneurship career. Meanwhile, the effect of subjective norms on the intention to choose an entrepreneurship career was not significant. Those inconsistent results show that there is still a gap for research examining those three individual concepts of TPB, namely, an attitude of behavior, subjective norms, and control over the behavior in predicting the intention to choose an entrepreneurship career

The chance to succeed on a big scale is widely open for entrepreneurs from the millennial generation because the digital era in doing business like nowadays is very favorable for flourishing their business. Besides that, especially in Indonesia, the number of entrepreneurs from the millennial generation is quite big. A report titled Youth Entrepreneurship in Asia and the Pacific 2018 - 2019 released by Global Entrepreneurship Research Association (GERA) stated that 18,9 percent of start-up businesses in Indonesia were managed by entrepreneurs aged 18 – 34 years old (millennial generation). That number was higher than the number of start-up businesses managed by entrepreneurs aged 34 – 64 years old which only attained 16.6 percent. That number was the highest, compared to the other countries like Australia, China, India, Malaysia, Philippines, Republic of Korea, Thailand, and Vietnam.

However, it does not mean that becoming a successful entrepreneur is something easy for the millennial generation. Most start-up businesses established in Indonesia were micro-scale businesses, meaning a productive business which belongs to an individual, or an individual business entity with employees maximum of 10 people. This micro-business has the ability and characteristic of a craftsman but with less-capability in developing the business. (Bank Indonesia, 2015). This study considers the millennial generation has a unique characteristic in doing business as an entrepreneur which differs from the previous generation.

Problem Statements

- Theoretical Aspects

How is the modification of the TPB model, in this respect, the roles of attitude, family support, and competency of being an entrepreneur, in explaining the intention to choose an entrepreneurship career among the millennial generation?

- Empirical Aspects

How is the increasing intention to choose an entrepreneurship career among the millennial generation?

Model Development

This literature study aims at developing a model based on TPB in the hope that the model can be used to clarify the roles of attitude, family support, and competency of being an entrepreneur in explaining the intention to choose an entrepreneurship career and the success of the business.

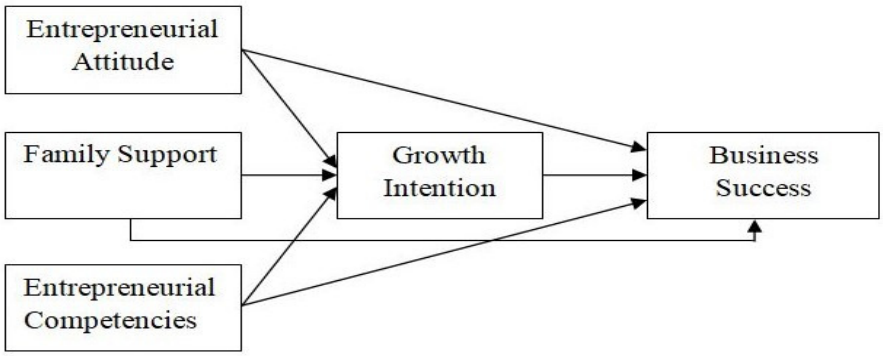

Fig. 1: Proposed Business Success Model

Proposition

1. Entrepreneurial attitude has a positive effect on growth intention as an entrepreneur among the millennial generation.
2. Family support has a positive effect on growth intention as an entrepreneur among the millennial generation.
3. Entrepreneurial competencies have a positive effect on growth intention as an entrepreneur among the millennial generation.
4. Entrepreneurial attitude has a positive effect on the success of entrepreneurial businesses among the millennial generation.

5. Family support has a positive effect on the success of entrepreneurial businesses among the millennial generation.
6. Entrepreneurial Competencies have a positive effect on the success of entrepreneurial businesses among the millennial generation.
7. Growth Intention has a positive effect on the success of entrepreneurial businesses among the millennial generation.
8. Growth intention mediates the relationship between entrepreneurial attitudes and the success of entrepreneurial businesses among the millennial generation.
9. Growth intention mediates the relationship between family support and the success of entrepreneurial businesses among the millennial generation.
10. Growth intention mediates the relationship between entrepreneurial competencies and the success of entrepreneurial businesses among the millennial generation.

This study proposes a theoretical model so that empirical investigations are also needed to examine the effect of entrepreneurial attitudes, family support, and entrepreneurial competence on growth intention and its consequences in the form of business success. Future qualitative studies may be able to reveal some further insights into the determinants of growth intention. However, even more, important are the quantitative studies that are needed to validate the model and generalize it. Furthermore, cross-cultural evaluation of the model can add useful insights.

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Selected Aspects of External Encumbrances on Poland's Banking Sector in Comparison to Banking Sectors in Other EU States

Bogdan WLODARCZYK
University of Warmia and Mazury, Olsztyn, Poland
E-mail: bogdan.wlodarczyk@uwm.edu.pl

Aleksandra OSTROWSKA
University of Warmia and Mazury, Olsztyn, Poland,
E-mail: aleksandra.ostrowska@uwm.edu.pl

Abstract

As well as imposing new encumbrances on banks, the regulations introduced in years 2015-2019 significantly altered tax burdens, contributions, and capital requirements of banks. A significant increase in taxes, charges and contributions was not without impact on the lending activities, development and profitability of the banking sector. The present article investigates selected aspects of external fiscal burdens imposed on Poland's banking sector compared to banking sectors in other EU economies. The analysis focuses on contributions due to deposit guarantees, banking tax, CIT tax, capital endowments and capital profitability. The research suggests that due to the negative impact of the latest financial crisis, the scope and magnitude of financial contributions imposed on the entities of the banking sector have increased. The imposed contributions have an adverse effect on the profitability of Poland's banking sector, which is corroborated by the deteriorating values of the ROE indicator. Poland has one of the lowest values of the ROE measure among the EU states. The profitability of the banking sector is further challenged by the persistent low interest rates, which adversely affect banks' earnings.

Keywords: banking sector, capital requirements of banks, financial encumbrances on the banking sector

Introduction

The financial crisis that started in 2008 had many negative effects in the financial and banking sectors as well as in the real economy. Its genesis was related to the inappropriate policy of central banks focused mainly on fighting inflation, too liberal policy of banks and the lack of appropriate legal provisions regulating the activity of the banking sector. Governments of many countries, primarily the American economy and European countries, have allocated large sums to rescue systemically important financial institutions exposed to the risk of bankruptcy, while increasing public debt.

The deteriorating situation of the banking sector and individual economies plunged into crisis prompted supervisory authorities to tighten the existing prudential regulations and to introduce new financial encumbrances for this sector. These activities include increasing capital requirements for banks or introducing new levies in the form of both contributions and taxes. An example is the bank tax, which has been in force for a long time in most European Union countries, and has been in force in Poland since 2016, or the growing contributions to the Bank Guarantee Fund. Their goal was, first of all, to ensure the safe operation of the banking sector in the future, and in the case of the banking tax, to ensure budget revenues for the return of funds intended for its rescue.

In the case of the Polish banking sector, it was not necessary to save the institutions operating in it, but due to their affiliation to the European banking system, they are obliged to comply with the capital requirements applicable to all European banks, and to take into account the burdens imposed by Polish law.

On the one hand, growing capital requirements force banks to increase their capital, which may lead to a reduction in lending. On the other hand, growing financial encumbrances reduce the profits accumulated by banks. As a result, these activities may adversely affect the activities conducted by banks, and thus deteriorate their profitability.

Due to the growing capital requirements and the encumbrances on the banking sector, which may have a negative impact on the activities conducted by banks, the purpose of this article is to present the most important changes

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introduced in the encumbrances on the banking sector and their impact on the profitability of Polish banks as measured by the ROE ratio. The profitability of the Polish banking sector is also presented compared to other European Union countries.

Encumbrances on the banking sector – characteristics

Banks, like other commercial enterprises, are subject to various financial charges imposed by the provisions of law. The regulatory processes intensified following the latest financial crisis and led to the introduction of new charges or the increase of the existing ones (Włodarczyk, Ostrowska, 2017, p. 1). The crisis negatively affected the banking environment and threatened the stability of the whole financial system. These burdens, however, have adverse effect on the banking business through diminishing their equity, limiting the lending activities, decreasing the business profit; if the burdens exceed a certain level, they may lead to the general deterioration of the bank's financial situation. In general, financial encumbrances imposed on banks fall into two groups. The first includes fiscal burdens, such as the corporate income tax, VAT tax, property tax and other taxes levied on banks by specific provisions of law. The second group includes other financial burdens (Cichy 2017, p. 10), such as contributions to the Bank Guarantee Fund (later: BFG). It should be noted that fiscal burdens concern all economic entities operating in the real economy, while the type and magnitude of other financial encumbrances are specific to particular groups of entities.

As far as fiscal encumbrances are concerned, the most important one is the CIT tax. According to Corporate Income Tax Act, the subject of the tax in this case is the income from capital gains and the income from other sources (Act …). The Act also includes the economic events determined as the income of legal persons. According to Article 19, the rate of this tax in Poland amounts to 19% of the tax base.[1] Other taxes include the value added tax or property taxes, which are not of interest in the present article.

Apart from fiscal contributions, banks are also obliged to pay other charges based on separate legal provisions. Every bank operating in Poland belongs to the system of deposit guarantee, supervised by BFG; banks pay compulsory contributions into the system. The manner of calculating these contributions was significantly changed in 2016. Until 2016, banks had to pay an annual contribution into an assistance fund and precautionary charges into a stability fund (since 2013). In years 2010-2015, that charge amounted to 12.5 times of the capital requirements due for exceeding the limits and breaching other norms defined in the Act; in 2016, this value reached the total amount of risk exposure. In 2017, the annual contributions to the assistance fund were replaced with quarterly contributions to the guarantee fund, and the stability fund was replaced with a compulsory restructuring fund, where mandatory charges are paid on an annual basis.[2]

Another type of fiscal encumbrances includes charges for supervision over banks. In line with the Prime Minister's Regulation on charges for covering the cost of supervision over banks issued in 2007, the rate of this charge is calculated on the annual basis as a multiplication of the percentage share of the bank in the total of balance sheet assets of all the banks in a given year and the cost incurred by banking supervision in this year, not exceeding the multiplication of the share the bank has in the total of balance sheet assets of all the banks and the amount of 0.21% of the total value of balance sheet assets of all the banks in a given calendar year. Each bank determines the quarterly deposit towards the cost of supervision in the amount of 0.00525% of the total of balance sheet assets in the month preceding the quarter for which the deposit is paid (Regulation …).[3]

One of the significant encumbrances imposed on the banking sector in Poland in 2016 through the Banking Tax Act is the so-called banking tax, or a tax on certain institutions (Witczak 2015, p. 105-106). The banking tax is a non-refundable public-private performance charged by the state and delivered by a group of financial entities (Dec, Masiukiewicz, 2013, p. 17). The banking tax is mainly precautionary in character, with the purpose of collecting funds towards future financial crises, limiting the risk taken by banks and enhancing the stability of the financial system. It may also have been introduced to expand national budget revenues (Muszyński 2017, p. 83). The motives and forms of the banking tax introduction varied between the EU member states. If the banking sector needed financial aid as a result of the crisis, then the introduction of the tax was fiscal in character to regain the funds. In other cases, when the sector did not need additional funds, the reason for the introduction of the banking tax was to secure the stability of the system through the increase of the held assets (Borowski, Jaworski, Tymoczko, 2016, p. 11). In Poland, the introduction of the tax was mainly supposed to expand the national budget revenues (Cichy 2017, p. 14; Wojciuk 2017, p. 39). The tax base for calculating the banking tax is the surplus in the asset value of the taxpayer, following from the trial balance determined on the last day of the month, based on entries in the general ledger, in accordance with the provisions of Accountancy Act of September 29, 1994 (Journal of Laws 2013, pos. 330, with later amendments 5), or the standards of accountancy practiced by the taxpayer on the basis of Art.2, par. 3 of the same Act – if the amount exceeds PLN 4 billion. The tax amounts to 0.0366% of the tax base per month.

Apart from the above encumbrances, European banks are also obliged to follow supervisory regulations CRD IV[4] and CRR[5] concerning capital requirements, which generates further cost. These regulations have been binding for every member state of the European Union since January 1, 2014. The CRR Regulation contains precautionary requirements concerning the capital, liquidity and credit risk of the banking sector institutions and investment companies. It requires that banks hold as much capital as necessary to cover unforeseen losses and remain solvent in the time of crisis. This capital is classified according to its quality and risk sensitivity and defined as Tier 1 or Tier 2 capital. The first type allows the bank to perform normal operations and provides financial liquidity; the other type allows it to satisfy the depositors and preferential creditors in a case of withdrawal of liquidity. The total amount of capital held by banking and investment institutions should amount to the minimum of 8% of risk weighted assets, of which the primary capital Tier 1 should be no less than 4.5% of the risk weighted assets. As for liquidity requirements, a financial institution should hold such an amount of liquid assets which will allow it to cover their net withdrawals for 30 days in a time of crisis. Other requirements concern financial leverage, or the relation between the bank's own capital and the total assets. Directive CRD IV in turn contains provisions on capital buffers, remuneration and financial incentives to bankers, precautionary supervision and internal management of banks. The directive specifies that every bank should have a security buffer made of the highest quality capital (Tier 1 primary capital), which should amount to 2.5% of the bank's total risk exposure and anti-cyclical capital, which could be used for crediting real economy entities in times of adverse economic conditions.[6] The tightening of capital requirements raises concerns of the decrease in lending activities, which may lead to deterioration of the banking sector profitability in the long term.

For the purposes of this research, the present article will only analyze the pivotal encumbrances imposed on the banking sector, namely the CIT, the BFG contribution, the banking tax and capital requirements.

Analysis of The Selected Encumbrances on The Banking Sector Contributions Towards Deposit Guarantees and The Banking Tax

Poland maintains a relatively high level of deposit protection as compared to other EU countries (Table 1). From this perspective, the domestic banking sector is one of the most secure banking sectors in Europe. At the end of the first year of the operation of the bank guarantee fund, the ratio of coverage for the deposits reached 1.69%, while in Italy or in Ireland it stood at 0.16%. It is worth noting, however, that Romania's (3.17%) or Norway's (2.72%) systems of deposit guarantees had a much higher ratio of coverage. The lowest values of the deposit coverage ratio were in the countries where contributions to the guarantee fund were collected *ex post*, after events which triggered payouts from the guarantee fund. In the overwhelming majority of the EU countries, including Poland, the collection is made ex ante; the funds are collected towards possible payouts in the future.

Table 1: Deposit coverage ratio and forms of collection for deposit guarantee systems in Europe (data as of 31.12.2017)

Country	Ratio of coverage %	Form of fund collection
Romania	3.17%	*Ex ante*
Norway	2.72%	*Ex ante*
Estonia	2.64%	*Ex ante*
Croatia	2.50%	*Ex ante*
Island	2.46%	*Ex ante*
Finland	2.10%	*Ex ante*
Latvia	1.83%	*Ex ante*
Sweden	1.76%	*Ex ante*
Poland	1.69%	*Ex ante*
Greece	1.45%	*Ex ante*
Czech Republic	1.34%	*Ex ante*
Portugal	1.29%	*Ex ante*
Belgium	1.17%	*Ex ante*
Malta	1.01%	*Ex ante*
Bulgaria	0.96%	*Ex ante*
United Kingdom	0.65%	*Ex ante*
Slovakia	0.63%	*Ex ante*
Luxembourg	0.51%	*Ex ante*

Lithuania	0.42%	*Ex ante*
Germany	0.40%	*Ex ante*
Hungary	0.35%	*Ex ante*
Cyprus	0.34%	*Ex ante*
France	0.33%	*Ex ante*
Spain	0.27%	*Ex ante*
Denmark	0.23%	*Ex ante*
Austria	0.22%	*Ex post*
Netherlands	0.19%	*Ex post*
Slovenia	0.18%	*Ex post*
Italy	0.16%	*Ex post*
Ireland	0.16%	*Ex post*
Liechtenstein	0.00%	*Ex post*
AVERAGE	0.59%	-

Source: own elaboration based on data by European Banking Authority: https://eba.europa.eu/

The discrepancy between EU countries in their policies of taxing and encumbering banks has also manifested itself with regard to taxes on some financial institutions (Table 2). In most countries, it was introduced as a bank tax, and in three countries as a banking charge. These countries are Belgium, Latvia and Sweden. It should be noted that in most cases the tax value was determined by the total of liabilities of the taxed entities. In Poland and Hungary, the tax base for this contribution depended on the value of assets. Bank tax was first introduced in Sweden and Hungary; Poland was the last to implement it. The annual tax rate of 0.44% in effect in Poland turned out to be the highest in all the studied countries. The final beneficiary of the bank tax/charge is, in most countries, the national budget, except for four countries were the funds go to stability funds. These countries are Belgium, Germany, Slovakia and Sweden (Mielczarek 2020, p. 127-128).

It should be stressed that taxing assets or liabilities has one serious shortcoming; it does not take into account the financial condition of these entities, or their off-balance sheet items. Besides, it may lead to a decrease in the lending activities or a desire to only engage in high-margin products. It may also cause a decline in the interest income and price inflation of banking services.

Table 2: Bank tax in selected EU countries and final beneficiaries

Country	Tax base	Annual rate (%)	Year of introduction	Final fund
Austria	Financial result	0.024-0.029	2011	National budget, stability fund (until 2017 r.)
Belgium	Liabilities	0.13231	2012	Stability fund
Cyprus	Liabilities	0.15	2011	National budget, stability fund
Finland	Risk weighted assets	0.125	2011	National budget
France	Min. capital requirement	0.222	2011	National budget
Latvia	Liabilities	0.072	2011	National budget
Netherlands	Liabilities	0.022-0.044	2012	National budget
Germany	Liabilities and derivatives	0.02-0.06	2011	Stability fund
Portugal	Liabilities and derivatives	0.01-0.085	2011	National budget
Poland	Assets	0.44	2016	National budget
Slovakia	Liabilities	0.2	2012	Stability fund
Sweden	Liabilities	0.036	2009	Stability fund
Hungary	Assets	0.15 or 0.21[1]	2010	National budget
UK	Liabilities	0.16 or 0.08[2]	2011	National budget

[1] *depending on the bank's size;* [2] *first for short term liabilities, second for long term liabilities*
Source: developed by the authors, based on: www.ibngr.pl and data by NIK report[7]

CIT tax and the effective tax rate on banks in Poland and other EU countries

During the research, the banking sector was the largest taxpayer of the corporate income tax (CIT) of all the industries in Poland.[8] In 2018 banks paid PLN 5.2 billion of CIT into the national budget. It is worth noting that the scale of burden to other large sectors of the economy was distinctly smaller and amounted to, respectively:

• PLN 2.73 bn for manufacturing sector;
• PLN 1,57 bn for commerce;
• PLN 1.56 bn for energy sector;
• PLN 1.35 bn for fuel industry.

Table 3 presents the values of CIT for the banking sector in years 2015-2018, which demonstrate a steady increase in this encumbrance, from nearly PLN 3 bn to 5.2 bn, or over 70%. As a result, despite the earned profit, the banks' competitiveness based on the capital potential has steadily declined. During the time of this study, the growing encumbrances also contributed to the declining profitability of the sector.

Table 3: CIT tax (in PLN bn), paid by the banking sector in Poland

Item	2015	2016	2017	2018
CIT tax	2.970	4.347	4.758	5.166

Source: developed by the authors, based on ZBP data.

The effective CIT tax rates varied between particular European countries, with the lowest rates in 2018 in Hungary and Montenegro, where they were only 9% (Fig. 1). A slightly higher rate of 10% CIT tax was introduced in Bulgaria. The highest rate of this tax, 35%, was valid in Malta. It is worth adding that in 2018 the average CIT rate in Europe was 19.48%, so it was slightly higher than the rate effective in Poland (19%).

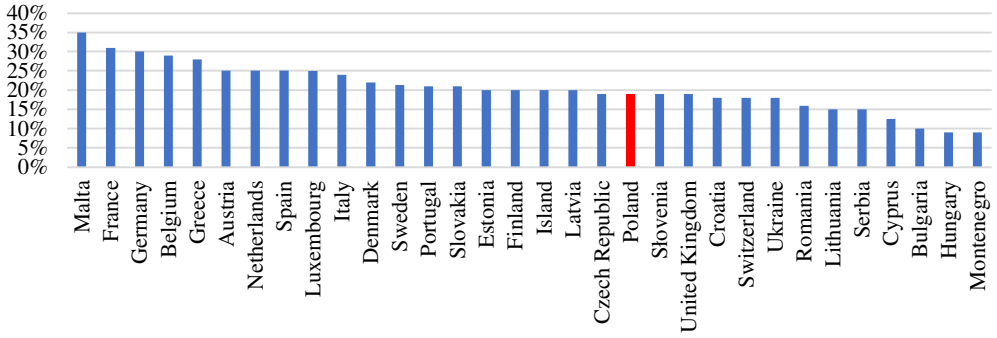

Fig. 1: CIT tax rate in Europe in 2018

Source: developed by the authors, based on KPMG data. Data effective on 31.12.2018. https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html

As the largest compulsory encumbrances of the banking sector in Poland are excluded from the so-called tax cost, it is worth investigating the effective tax rate and compare it to the situation in other European countries.

In the case of Poland's banking sector, the introduction of new encumbrances (apart from the bank tax) made the effective income tax rate increase from 18.3% to 25.9% between 2015 and 2018 (Table 4). However, if the bank tax were also included, the average effective rate would significantly increase to 48% in 2018.[9] At the same time, the average effective tax rate for banks in CEE and CESEE countries was, respectively, 16.3% and 15.3%. We can then conclude that the level of public burden imposed on banks in Poland is distinctively higher than in other countries in this part of Europe. This may threaten the competitive position of the Polish banking sector compared to the neighboring countries.

Table 4: Effective tax rate (in %) of banking sectors in Poland[10] and other European countries

Item	2015	2016	2017	2018
Poland	18.3	24.1	26.8	25.9
EU15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden, United Kingdom	26.8	32.1	27.4	25.4
CEE: Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia, Slovakia	23.8	19.8	16.9	16.3
CESEE: Albania, Belarus, Bosnia and Hercegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, Ukraine	19.6	16.4	16.2	15.3

Source: developed by the authors, based on NBP and EBC data: https://www.ecb.europa.eu/ecb/html/index.pl.html

Capital Endowment and Profitability

In years 2015-2019, own funds of Poland's banking sector tended to increase and were dominated by the highest quality capital – the primary Tier 1. Despite the surplus regulatory capital held in the Polish banking sector[11], the capital condition of most of the largest entities turned out to be less favorable than that of key banks in other European countries. In 2018, the institutions which had a comparable level of capital adequacy were PKO Bank Polski SA, mBank S.A., Bank Handlowy S.A., and Bank Pekao S.A., where CETI indicators[12] were, respectively: 17.54%,[13] 17.47%,[14] 16.8%[15] and 15.8%[16]. In other cases, the Tier 1 indicators were as follows: 14.75 in ING Bank Śląski S.A.,[17] 14.11% in Santander Bank Polska S.A.,[18] 12.89% in Bank Millennium S.A.,[19] 12.81% in Alior Bank S.A.,[20] 12.38% in BGŻ Paribas S.A.,[21] 9.0% in Getin Noble Bank S.A.[22] It is worth noting that the lowest level of the capital indicator among commercial banks was reported by Idea Bank S.A. (1.35%), whose financial problems affected the overall results of the whole banking sector.[23]

Figure 2 serves to compare the capital condition of some large banks in Poland and in other European economies. As far as foreign banks are concerned, the levels of the primary Capital Tier 1 indicators at the end of 2018 were significantly higher than the minimal capital requirements. The highest reading of this indicator was reported by National Building Society in the United Kingdom, which exceeded 30%. The second highest indicator was found in the Dutch bank ABN Amro Group NV, 17.95%.

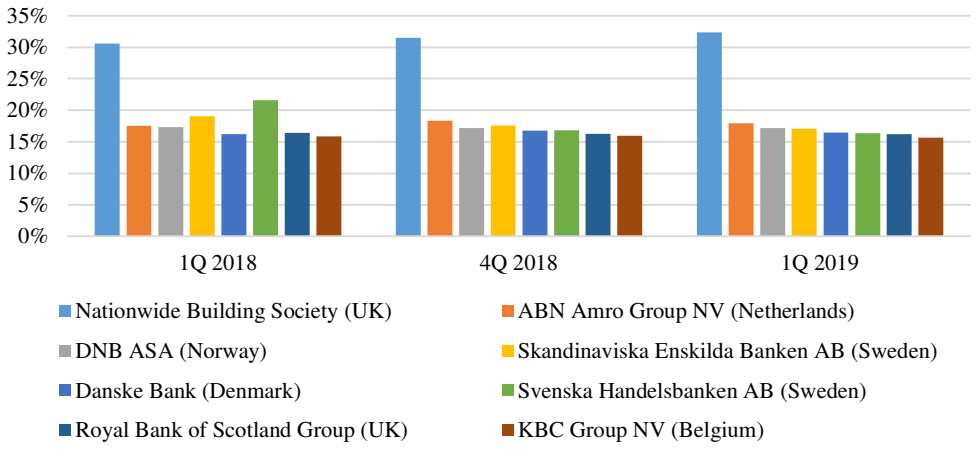

Fig. 2: Banks with the highest indicators of Primary capital Tier 1 in selected EU countries

Source: EBC, 2018, ZEB European Banking Study 2018, https://www.ebf.eu/wp-content/uploads/2018/11/ZEB-European-Banking-Study-2018.pdf

During the period covered by this study, Poland's banking sector faced a significant problem of declining capital profitability. It should be stressed that despite the persistent low interest rates, this problem was not common in the EU. Divergences in the ROE indicator for particular national banking sector were wide. In 2018, the Polish banking sector belonged to the 10 economies of the lowest return on equity in the EU. As demonstrated in Figure 3, its highest level (13.3%-14.6%) was then reported in Hungary, Romania and the Czech Republic. Among the causes of low profitability of Poland's banking sector are high financial encumbrances and higher levels of financial assets of low quality than it is in other countries. Further increase in the magnitude of encumbrances may reduce the net profit, and consequently, the profit will not cover the value of capital, which will lead to the deterioration of the banking sector's profitability measured by ROE (Report of the situation ..., p. 15).

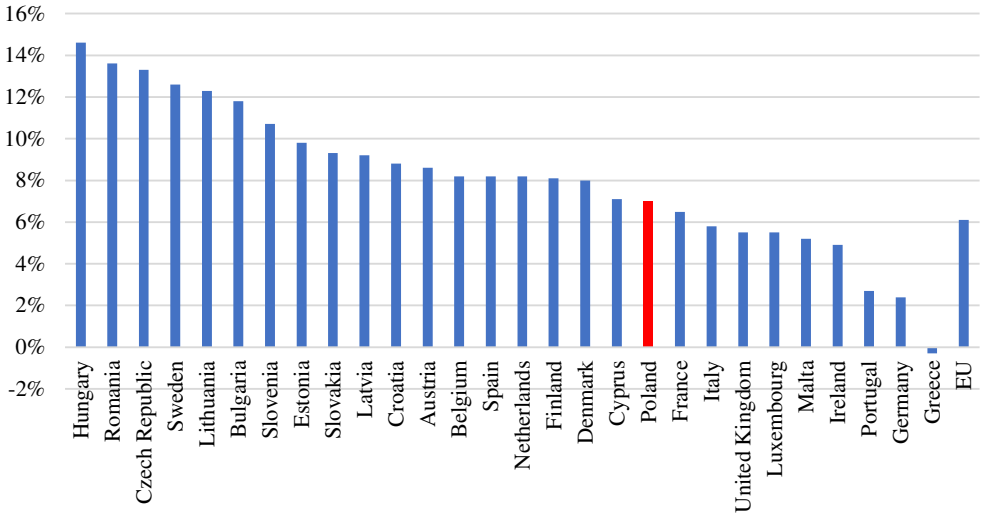

Fig. 3: Value of ROE (in %) for banking sectors in EU countries in 2018

Source: developed by the authors, based on data by European Banking Federation: https://www.ebf.eu/facts-and-figures/banking-sector-performance/#top.1

Conclusions

The measures undertaken to improve the situation of the financial sector in the form of increasing capital requirements and imposing new encumbrances were supposed to increasing its stability and to offset the consequences of emergency operations by particular countries. However, the expansion of encumbrances imposed on the banking sector has adverse effects on banking operations. It is a major factor contributing to the decline in the lending activities and deterioration of profitability of the banking sector. Poland's banking sector has to endure one of the highest financial encumbrances among the EU countries, which also leads to one of the lowest profitability indicators, which is a negative phenomenon phenomenon and raises questions about the future of this sector and its international competitiveness.

As the Polish Bank Association (ZBP) points out, apart from high financial encumbrances imposed on the banking sector, the low interest rate environment will have a adverse effect on banks' financial statements in the long term, mostly because of the diminishing interest income, which constitutes the main source of banking revenue. Furthermore, the adverse macroeconomic situation causes banks to limit their lending activities and results in the deterioration of quality of the credit already held by banks, which generates additional cost for the banking sector[24]. It should also be remembered that the costs associated with the growing encumbrances on the banking sector are borne directly by banks, but also indirectly by the entire society. The main channel of their impact on the real economy, as well as on its overall economic condition, is the weakening of lending activities. As a result, investments that may inhibit economic growth are reduced in the long term.

Therefore, there is a need to take actions that would improve the situation of both banks and their clients, which are suffering from the effects of the global deterioration in the condition of economies. Supervisory bodies and public authorities are faced with the selection of both an adequate number of regulations of the banking sector to prevent over-regulation of this sector and the size and level of its financial encumbrances.

[11] Art. 19 par. 1 of Corporate Income Tax Act
[2] https://www.bfg.pl/dla-instytucji-finansowych/skladki/oplaty-i-skladki-na-fundusze-bfg-dane-historyczne/
[3] Regulation of Prime Minister of December 27, 2007 on contributions to cover cost of bank supervision (Journal of Law 2007, No. 249, item 1855)
[4] Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC
[5] Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012
[6] https://www.consilium.europa.eu/pl/policies/banking-union/single-rulebook/capital-requirements/
[7] Supreme Audit Chamber – Report of control KBF.430.002.2018 Nr ewid.5/2018/P/17/012/KBF concerning collection of tax from some financial institutions
[8] ZBP, 21023456879019, *Polska i Europa – wyzwania i ograniczenia 2019*, ZBP, Warszawa, https://zbp.pl/getmedia/152eb124-2ccf-4f91-8bd6-65962a256fe9/Polska_Europa_2019-FINAL.
[9] NBP, 2019, *Raport o stabilności systemu finansowego. Grudzień 2019*, NBP, Warszawa, https://www.nbp.pl/systemfinansowy/rsf122019.pdf
[10] Not including the tax on some financial institutions
[11] See subchapter 4.5
[12] Capital group results have been included
[13] See annual statement for 2018, http://www.raportroczny2018.pkobp.pl.
[14] See annual statement for 2018, https://www.mbank.pl/
[15] See annual report for 2018, http://www.citibank.pl
[16] See annual report for 2018, https://www.pekao.com.pl/.
[17] See financial statement for 2018, https://www.ing.pl/
[18] See financial statement for 2018, https://bank.santander.pl/relacje-inwestorskie/sprawozdanie-finansowe/2018/sprawozdanie-finansowe-2018.html.
[19] See annual report for 2018, https://www.bankmillennium.pl/
[20] See capital adequacy and other public information of Alior Bank Capital Group S.A. as of 31.12.2018, https://www.aliorbank.pl/
[21] See capital adequacy report of BGŻ BNP Paribas S.A. Capital Group as for 31.12.2018, https://www.bnpparibas.pl/
[22] See disclosure on capital adequacy for 2018, https://www.gnb.pl/
[23] See financial statement for 2018, https://www.ideabank.pl/
[24] https://businessinsider.com.pl/finanse/zbp-wynik-sektora-bankowego-mniejszy-o-nawet-85-proc-przez-obnizki-stop-i-wyzsze/lnwrk57

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Quand la Recherche de Qualité dans l'Enseignement Passe par une Etude Statistique entre les Langues Anglaise et Française

The Research of the Teaching Quality: a Statistical Study on the Influence of the Knowledge of English on French Teaching

Yvona Vrchlabska
University of Defence, Brno, Czech Republic, yvona.vrchlabska@unob.cz

Jana Jadrna
University of Defence, Brno, Czech Republic, jana.jadrna@unob.cz

Jiri Neubauer
University of Defence, Brno, Czech Republic, jiri.neubauer@unob.cz

Abstract

The term "quality" has become an established topic and the concept of quality assurance and quality improvement is widely used at Defense University. In addition, since 2018, student success rates have become one of the criteria for university funding. The Defense Language Institute at the University of Defense is no exception when it comes to finding ways to improve the quality of the students' education. Therefore, the French lectures there asked themselves a question whether the knowledge of English could have any effect on the teaching of French. Based on the survey and the subsequent evaluation of statistical results carried by experts, the lectures came to the conclusions presented in this article. The knowledge of English positively and significantly influences the teaching of French.

Keywords *:* French, Language Teaching, Factor of Success Rate, Examination in Accordance with STANAG 6001.

Préambule

La «qualité» a toujours été un critère primordial dans l'enseignement et son amélioration constante est un souci permanent de tous les établissements en charge de l'éducation et de l'enseignement à tous les niveaux (Noha, 2015).

Parmi les moyens dont nous disposons pour améliorer la qualité de l'enseignement, le contrôle des résultats y contribue et fait d'ailleurs l'objet de l'attention de nombreux auteurs et pédagogues (citons Čechová, Neubauer and Sedlačík, 2019).

Des conseils universitaires pour l'évaluation interne de la qualité ont été créés et le Ministère en publie régulièrement les données. Depuis 2018, le taux de réussite des étudiants est même devenu un des critères de financement des écoles supérieures (Doleček, 2019).

L'Université de Défense de BRNO surveille les résultats de ses étudiants par l'intermédiaire du Conseil pour l'évaluation interne de la qualité mais aussi grâce au travail concret des personnels académiques (Čechová, Neubauer and Sedlačík, 2019).

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Qui sommes-nous?

L'Institut de formation linguistique, dans lequel on'exerce comme professeurs de français, est intégré à l'Université de Défense. Il ne fait pas exception quant à la recherche constante de solutions pour améliorer la qualité de son enseignement linguistique et il assure aussi le contrôle des résultats de ses propres étudiants à tous niveaux et dans toutes les langues enseignées. (Hrubý and Staňková, 2019; Čechová, Skybová a Koukalová, 2018; Sedlačík and Čechová, 2016).

Dans sa mission, il est chargé de l'enseignement des langues étrangères au profit des personnels militaires et civils de la Défense. On y étudie actuellement l'anglais, le français, l'allemand, le russe (aussi le tchèque au profit d'étudiants étrangers).

Outre l'enseignement proprement dit, l'Institut est aussi chargé de l'élaboration des tests qui sont établis selon les normes STANAG 6001.

L'accord NATO STANAG 6001 (STANdardization Agreement - Pour plus d'information: https://www.unob.cz/cjv/Documents/Stanag6001_FJ.pdf) est un outil de normalisation des niveaux linguistiques destiné aux Etats membres de l'OTAN afin d'en assurer l'interopérabilité. Les tests réalisés suivant ces normes ont pour objectif de «mesurer les compétences linguistiques d'une personne dans la vie courante et/ou dans un contexte spécifique bien défini»(Shohamy, 2001). Ces compétences sont mesurées indépendamment de la manière et du temps d'étude de la langue et leur évaluation repose essentiellement sur la capacité du candidat à réagir dans la langue (Hughes, 1992).

L'édition 5 du STANAG 6001 décrit en détail les niveaux de langue de 0 à 5 pour les quatre compétences que sont:

- La compréhension et l'expression orale et
- la compréhension et l'expression écrite.

Table 1 : Compétences linguistiques

NIVEAUX	Compétences linguistiques du candidat
Niveau 0	Aucune compétence
Niveau 1	Compétence de survie
Niveau 2	Compétence fonctionnelle
Niveau 3	Compétence professionnelle
Niveau 4	Compétence experte
Niveau 5	Compétence du locuteur natif.

Un nombre à quatre chiffres précédé du sigle P(profil),L(linguistique), S(standardisé) (SLP en anglais) indique le niveau du candidat dans les quatre compétences.

A titre d'exemple: PLS 3321 signifie niveau 3 en compréhension orale, niveau 3 en expression orale, niveau 2 en compréhension écrite et niveau 1 en expression écrite.

Ainsi donc, comme vous pouvez le constater, l'accord NATO STANAG 6001 régit dans son ensemble l'enseignement des langues à l'Institut de formation linguistique, la priorité pour celui-ci étant de former des personnels aptes à assurer à tous niveaux des missions internationales au sein de l'OTAN.

Pour rappel, l'anglais et le français sont les deux langues officielles de l'OTAN. Elles sont donc les plus demandées avec toutefois une nette prédominance pour l'anglais.

L'étude Statistique

Dans l'esprit de la recherche permanente pour améliorer la qualité de l'enseignement évoqué en début d'article, il nous est venue à l'idée d'étudier si la connaissance de la langue anglaise pourrait avoir une quelconque influence sur l'apprentissage de la langue française. Nous avons débuté cette étude par le recueil de données obtenues à partir d'un questionnaire de 14 questions distribué à 43 étudiants ayant tous plus ou moins de connaissances dans les deux langues. L'ensemble des données ainsi obtenues a été confié à un expert en statistiques dont le travail est décrit ci-après. Le sujet posé était: «*Est-ce que les connaissances de l'anglais peuvent influencer l'apprentissage du français?*» Pour ce spécialiste en statistique, il s'agissait donc de savoir s' il existait une corrélation entre l'étude de l'anglais et du français et de la démontrer. Pour ce faire, il a utilisé le test de corrélation de Spearman. Le principe du test est de mettre en évidence un coefficient de corrélation qui permet de préciser l'existence ou non d'une liaison entre 2 variables quantitatives et son intensité. Les calculs s'effectuent à partir de la formule de Spearman appliquée aux différentes données recueillies dans le questionnaire. Les tableaux et graphiques suivants décrivent le déroulement de cette étude.

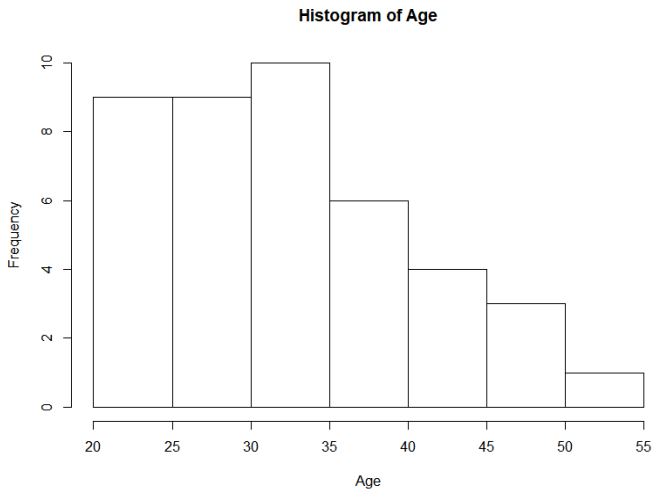

Fig. 1 : Classement selon l'âge

Le graphe ci-dessus fait apparaître le classement des personnes interrogées selon leur âge. l s'avère que les personnes âgées entre 30-35 ans ont été les plus nombreuses à répondre avec près de 24% suivie des répondants âgés entre 20-30 ans avec 21,4%, puis 9,5% pour les répondants âgés de 40-45 ans, 7,1% pour les 45-50 ans et enfin 2,4% pour les 50-55 ans.

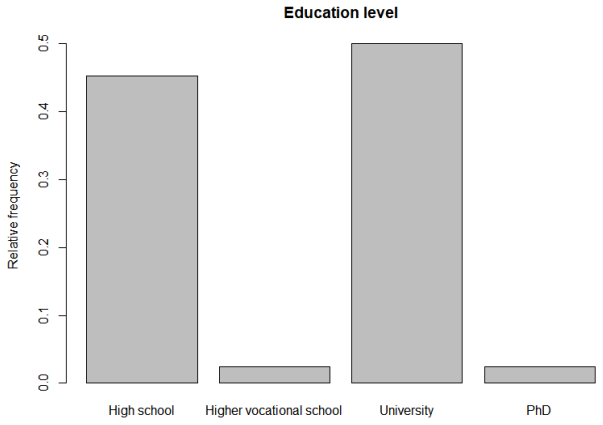

Fig. 2 : Niveau d'études

On a aussi analysé le niveau d'études suivi par les personnes interrogées. 50% d'entre elles ont étudié à l'université, 45% ont suivi des études secondaires. Les personnes ayant suivi une formation professionnelle représentent 2,4%, un pourcentage identique pour celles ayant suivi une formation continue.

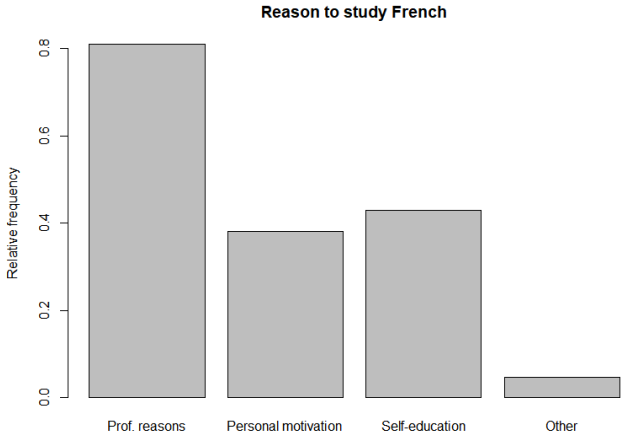

Fig. 3 : Motivations pour le français

Concernant les motivations pour étudier le français, les réponses ont été multiples mais 81% des personnes interrogées ont exprimé la raison professionnelle.

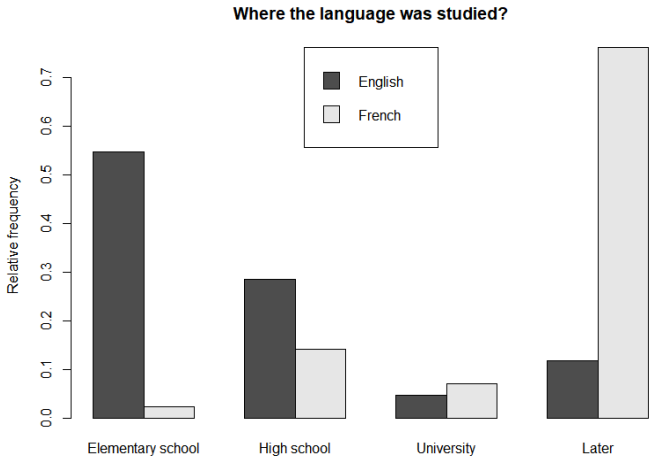

Fig. 4 : Formation des candidats

Pour ce qui est de savoir où l'anglais et le français ont été étudiés, nous constatons sur le graphique que l'anglais a été principalement étudié au cours de la formation habituelle, c'est à dire à l'école primaire puis secondaire, moins à l'université. Le français quant à lui a été étudié plus tard surtout pendant les études post-universitaires. Il ressort clairement du graphique qu'il existe une différence significative entre les lieux où les langues ont été étudiées. L'influence entre les langues est prouvée par le test $\chi 2$ (p-valeur $1{,}36 \cdot 10^{-9}$).

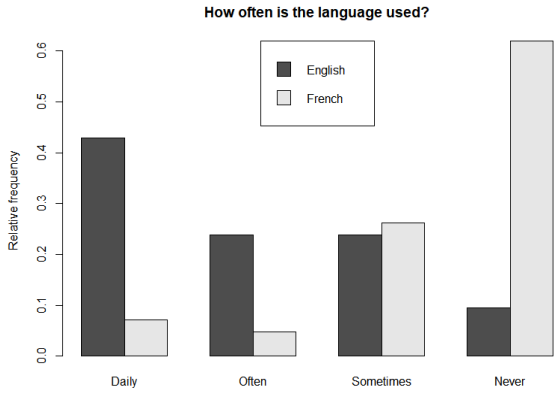

Fig. 5 : Fréquence d'utilisation des deux langues

Ce graphique montre qu'il y a une différence importante concernant la fréquence d'utilisation des deux langues. L'anglais est utilisé quotidiennement par 42,9% des personnes interrogées, souvent ou parfois par presque 24% des répondants et jamais par 9,5%. Quant au français, il est étudié probablement pour des raisons spécifiques (par exemple l'attachement à la langue etc.) mais, d'après les réponses des personnes interrogées, le français n'est presque jamais utilisé. Influence entre les deux langues prouvée par le test $\chi 2$ (p-valeur $4{,}68 \cdot 10^{-7}$).

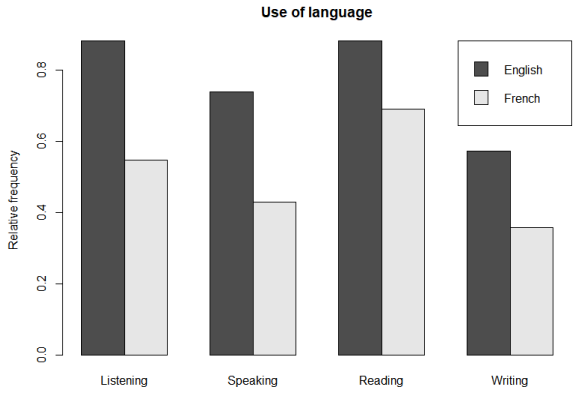

Fig. 6 : Utilisation des compétences individuelles

Ce graphique montre que le pourcentage d'utilisation des compétences individuelles est plus élevé en anglais qu'en français. Cependant, le test n'a pas prouvé cette différence (valeur de p- 0,8621). Chaque langue est utilisée de manière proportionnée et semblable.

Il existe toutefois des différences importantes entre ces deux langues qui sont dues aux critères suivants: Où, quand, comment ont-elles été étudiées et au final comment sont-elles utilisées? Le test prouve, en tout cas, que l'anglais est plus utilisé que le français.

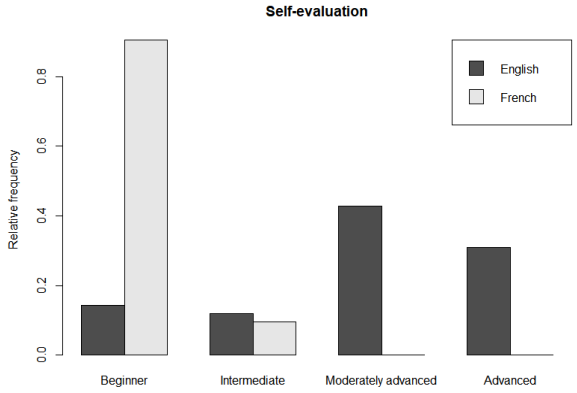

Fig. 7 : Auto-évaluation

On peut voir sur ce graphique que l'auto-évaluation en anglais est plus élevée qu'en français. Le test a prouvé la différence (valeur de p- $9.29 \cdot 10^{-12}$). L'anglais a été étudié plus longtemps donc la différence de niveau entre les langues est évidente

Table 2 : Stanag – anglais

Absolute freq.	**0**	**1**	**1+**	**2**	**2+**	**3**	**4**
Listening	1	3	0	14	4	15	1
Speaking	0	4	2	16	5	10	1
Reading	1	2	2	13	3	16	1
Writing	1	2	3	15	7	9	1
Relative freq.	**0**	**1**	**1+**	**2**	**2+**	**3**	**4**
Listening	0,026	0,079	0	0,368	0,105	0,395	0,026
Speaking	0	0,105	0,053	0,421	0,132	0,263	0,026
Reading	0,026	0,053	0,053	0,342	0,079	0,421	0,026
Writing	0,026	0,053	0,079	0,395	0,184	0,237	0,026

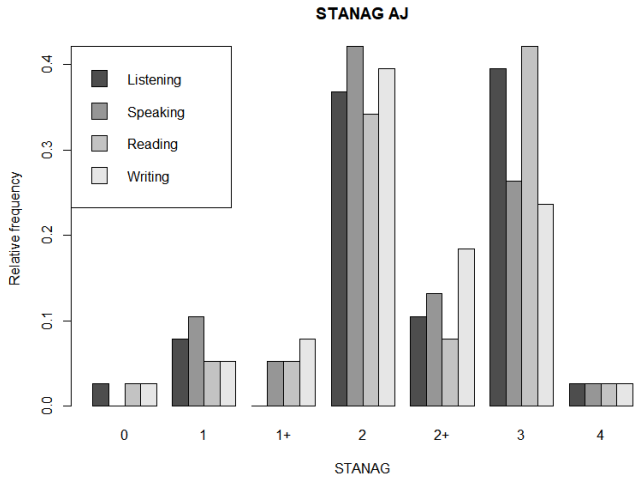

Fig. 8 : Différences à l'examen de STANAG

Ceci explique que des candidats à l'examen de STANAG anglais atteignent le niveau 4 alors que les résultats au STANAG français n'atteignent que le niveau 2.

Table 3: Stanag – français

Absolute freq.	**0**	**1**	**1+**	**2**
Listening	7	28	2	4
Speaking	0	35	3	3
Reading	6	27	3	5
Writing	0	34	4	3
Relative freq.	**0**	**1**	**1+**	**2**
Listening	0,171	0,683	0,049	0,098
Speaking	0	0,854	0,073	0,073
Reading	0,146	0,659	0,073	0,122
Writing	0	0,829	0,098	0,073

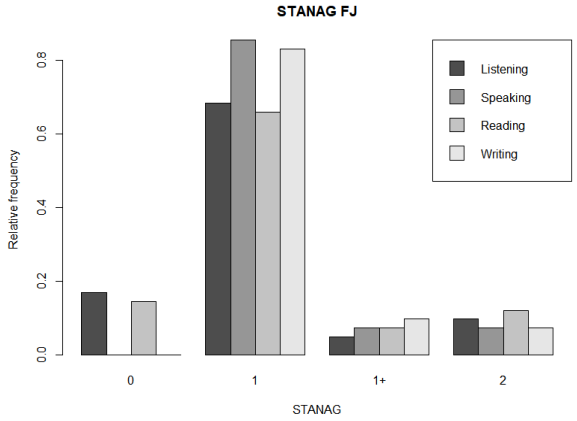

Fig. 9 : Dépendance entre les compétences individuelles

Dans notre étude, le coefficient de corrélation Spearman démontre la dépendance entre les compétences individuelles. Les valeurs statistiquement significatives de ces coefficients sont inscrites en rouge dans le tableau ci-après.

À l'exception des valeurs entre Speaking Fr et toutes les compétences en anglais, ces valeurs sont statistiquement significatives. Elles sont toutes positives, ce qui signifie qu' une valeur élevée de Stanag dans une compétence correspond à une valeur élevée dans une autre compétence. Exemple: Dans notre tableau, entre le *Listening Eng* et le *Speaking Eng*, la corrélation 0,88 est forte. De même, une valeur faible dans une compétence correspond a une valeur faible dans une autre compétence.

Le tableau et le graphique ci-dessous montrent qu'il existe toujours des corrélations plus fortes entre les compétences de chacune des langues. Par contre, les corrélations entre les compétences en anglais et en français ne sont plus aussi fortes.

Table 4

	Listening Eng.	Speaking Eng.	Reading Eng.	Writing Eng.	Listening Fr.	Speaking Fr.	Reading Fr.	Writing Fr.
Listening-Eng.	1	0,882	0,981	0,877	0,458	0,315	0,514	0,365
Speaking-Eng.	0,882	1	0,875	0,915	0,431	0,303	0,485	0,37
Reading-Eng.	0,981	0,875	1	0,872	0,458	0,301	0,509	0,348
Writing-Eng.	0,877	0,915	0,872	1	0,499	0,313	0,472	0,332
Listening-Fr.	0,458	0,431	0,458	0,499	1	0,746	0,898	0,712
Speaking-Fr.	0,315	0,303	0,301	0,313	0,746	1	0,694	0,926
Reading-Fr.	0,514	0,485	0,509	0,472	0,898	0,694	1	0,744
Writing-Fr.	0,365	0,37	0,348	0,332	0,712	0,926	0,744	1

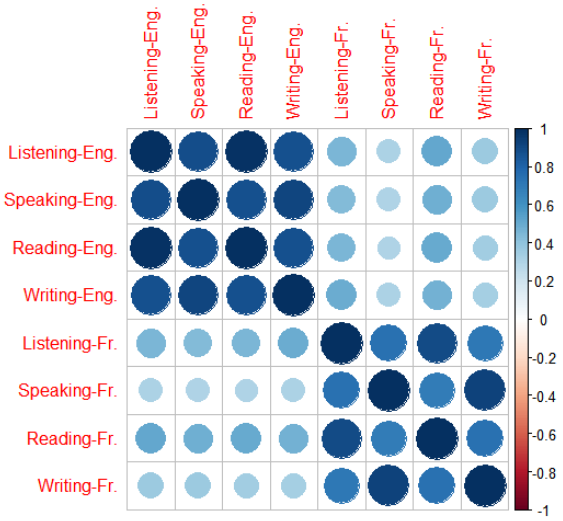

Fig. 10 : Compétences de chacune des langues

Test sur la moyenne des résultats de STANAG des 4 compétences. Le coefficient de corrélation entre la moyenne de l'anglais et du français est de 0,4926391 avec une valeur de p (marge d'erreur) de 0,001951. Cette corrélation est statistiquement très importante ce qui signifie que meilleurs sont les résultats en anglais, meilleurs ils le sont aussi en français. De même, si nous appliquons le coefficient de corrélation de Spearman pour le calcul de la médiane des résultats, il est de 0,4903766 avec une valeur de p (marge d'erreur) 0,002062. Le coefficient est un peu plus faible mais reste important ce qui permet de conclure encore une fois que plus les résultats en anglais sont bons, plus ils le sont aussi en français.

Conclusion et Commentaires

Cette étude démontre donc que l'apprentissage de l'anglais influence de façon significative l'apprentissage du français et ce, de façon positive.

Pour toutes les populations de langues slaves, cette influence est positive parce que la structure générale des phrases en langue anglaise est pratiquement identique à celle de la langue française. Ce qui veut dire que lorsqu'un étudiant

tchèque, par exemple, a compris le mécanisme de construction d'une phrase en anglais (complètement différente des langues slaves où l'ordre des sujets, verbes, compléments est moins important pour la compréhension grâce aux différents cas grammaticaux), ce même étudiant n'a plus beaucoup de difficulté pour comprendre la construction des phrases en français. Ce point est acquit et il n'a plus qu'à se concentrer sur le vocabulaire et sur la grammaire française (plus compliquée qu'en anglais).

Le dernier tableau fait ressortir un coefficient de corrélation faible entre le parlé français et toutes les 4 compétences en anglais (chiffres en noir).

Pourquoi ?

Parce que la difficulté majeure entre la langue anglaise et française est la prononciation. Le Français, en général, parle mal l'anglais à cause de la prononciation et vis et versa pour l'Anglais quand il essaie de parler français. Cette difficulté est si marquée qu'une phrase anglaise sera comprise par un français quand il la lit et très souvent incomprise quand il écoute cette même phrase lue par un anglais (et encore pire quand elle est lue par un américain). Dans une conversation entre un Français et un Anglais, il arrive bien souvent que l'anglais ne comprend pas ce que dit le Français à cause de sa prononciation même si le vocabulaire utilisé est exact.

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Transportation Systems and E-Commerce: Understanding the Relationship

Hana RABBOUCH
Université de Monastir, Laboratoire d'Algèbre, Théorie de Nombres et Analyse Non-linéaire,
Faculté des Sciences, Monastir 5019, TUNISIA,
hana.rabbouch@gmail.com

Hayet SAADAOUI
LAMETA, INRA, 2 Place Viala, Bâtiment 26, F-34060 Montpellier, France
hayet.saadaoui@iseahsb.u-kairouan.tn

Foued SAADAOUI
Department of Statistics, Faculty of Sciences, King Abdulaziz University, P.O BOX 80203,
Jeddah 21589, SAUDI ARABIA
Université de Monastir, Laboratoire d'Algèbre, Théorie de Nombres et Analyse Non-linéaire, Faculté des Sciences,
Monastir 5019, TUNISIA,
foued.saadaoui@gmail.com

Abstract

Nowadays, the digital transformation of e-commerce businesses is fraught with several challenges. Among these challenges, there are those related to the optimization of the use of transportation and logistics infrastructure and their relationship with the e-commerce sector. A better understanding of this relationship will certainly make better use of both sectors at the same time. In fact, by a digital implementation and an optimal control of the two systems, it thus becomes possible to carry out the management of the inventories or to offer an ever more precise traceability on the order, from its exit of the inventory up to on delivery to the customer. In a quest to better understand the nature of the relationship between transportation, logistics and e-commerce, a state-of-the-art study and a summary of the main surveys and approaches addressing the issue and technology realities in this framework will be explained in this paper.

Keywords: Electronic Commerce – Distribution – Environment – Traffic Management.

Introduction

E-commerce is presently being considered as one of the most important megatrends in the global economy. A recently published report by Bain & Company revealed that these markets today stand at $8.3 billion and could grow by 3.5 times by 2022. This exponential growth is due to not only the development of Information and communications technology (ICT), but also to the improvement of transportation and logistics systems. Transportation and logistics can be defined as activities seeking to optimally move and control physical flows of an entity in order to provide and manage resources corresponding to needs. In the e-commerce context, efficient transportation management enables not only to attract new customers (diverse forms of delivery and a free or low-cost shipping), but also to keep existing customers. Therefore, transportation services can be considered as the key driver of the growth of e-commerce in the case of physically transportable goods (Allen et al. (2018); Barenji et al. (2019)). The huge fleets of vehicles that today's e-commerce giants have around the world seems to prove this. Moreover, according to the figures set out in the relevant reports (Technavio Research), transportation segments held the largest e-commerce logistics market share in 2018. These statistics could also be explained by the increasing use of different modes of transport such as road, rail, air, and water. Today, the importance of transportation is continuing to grow in the e-commerce logistics process as various large and small logistics companies are still focusing on last-mile delivery.

Conversely, there are situations where e-commerce in turn contributes to transportation and logistics (see Browne (2001)). This is essentially when suppliers, from countries where e-commerce is experiencing a dynamism, can participate in the market for transport services for e-commerce and be competitive, thus creating the opportunity for

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users to draw part of the methods of electronic commerce. E-commerce can also contribute indirectly to the transportation and logistics sector. In fact, in order to obtain transportation services, e-commerce intermediaries ensure functional relationships and a balance of powers between service providers and users, and, extend collaboration between service providers and the changes in the ownership structures of transportation companies in world trade. Therefore, it seems that a bidirectional causality between e-commerce and transportation seems evident.

Nevertheless, in recent years, the perverse effects of e-commerce in relationship with transportation have begun to become more and more known around the world (Shao et al. (2016), Hidayatno et al. (2019)). In fact, the delivery of goods usually involves parallel parking and increased congestion, hazards for road users and, of course, an increase in GHG emissions and air pollution. We can thus notice that this relation transportation-e-commerce would be as beneficial for the society on some planes but unfavourable on others. The evolution of this interaction raises all sorts of questions which, particularly in developing countries, as is the case in the Middle East and North Africa (MENA) region, have important consequences for transport providers and users in the context of e-commerce (Saidi et al. (2018)).

Opportunely, information and communication technologies, including internet-based systems, are increasingly useful in transportation services, regardless of their mode. With the development of optimization and high-precision computing techniques, which effectively contributed to the emergence of several promising concepts such as those of artificial intelligence (AI), machine learning, internet of things (IoT) and smart cities, it became possible to reimagine otherwise the relationship between transportation and e-commerce. A new relationship based on the efficient concepts of forecasting and optimal planning in production and distribution can now be established (Rabbouch et al. (2019b); Rabbouch et al. (2019c); Saâdaoui et al. (2019)). These optimal choices are therefore likely to reduce the gap between supply and demand, thus leading to a minimization of unnecessary mobility and its consequences (congestion and pollution). It would therefore be even more interesting to invest supplementary in this innovative direction while trying new optimization schemes. Such models exist in fact in various fields linking transport to other sectors of commerce and service in general, such as those of international logistics, hospital logistics, business to consumer (B2C), etc.

The purpose of this paper is therefore to review the relationship between e-commerce and transportation and logistics. Based on a selection of recent works, the effect between the two sectors is examined in both directions. The main perspectives describing the structure of this relationship are thus analysed while highlighting the impact of new intelligent technologies. On these bases, the relationship between transportation/logistics and e-commerce appears quite significant as well as dynamic. The remaining of the paper is organized as follows. Section 2 reviews the freshest corpus of literature dealing with the subject. Then, sections 3 describes how transportation and logistics support the e-commerce, followed by a section outlining inversely, the impact of e-commerce on transportation and logistics systems. Section 5 reviews the sustainable e-business models for intelligent transportation systems, and section 6 is a concluding one.

Literature Review

Several studies linking modern transportation systems with the logistics of electronic commercial services have recently been carried out. The first works date back to Visser and Lanzendorf (2004) who reviewed the literature of the relationship between mobility and accessibility effects and e-commerce. These authors were able to conclude a significant relationship, especially in the short term. Later, Weltevreden and Rotem-Mindali (2009) studied the implications of business-to-consumer and customer-to-customer e-commerce for the transportation sector. Using a nationwide sample of Dutch e-shoppers, they explored the potential impacts of both types of e-commerce on personal travel and freight transport in the Netherlands. Their results indicated that personal travel in the Netherlands has only marginally decreased as a result of e-shopping, while freight transport has slightly increased. To better harmonize the production and circulation of agricultural products, Bao et al. (2012) designed and implemented an E-commerce service platform for the supply chain management of fruits and vegetables. To assess the impact of e-commerce on the urban freight system and final delivery operations, Morganti et al. (2014) focused on the deployment of alternative options to home delivery. Their work proposed a comparison between Germany and France, which, with the United Kingdom, have Europe's leading ecommerce industries.

In a somewhat special context involving geographic systems, Gessner and Snodgrass (2015) explored the potential for e-commerce transactions across the borders between Canada and the United States. Their paper examined Canada-USA bilateral programs to explore the question of whether or not participation in such programs can

actually assist small and medium sized firms in overcoming the barriers to cross-border e-commerce transactions. Xu et al. (2015) developed efficient intermodal transportation auctions that incorporate both intermodal service costs and transaction costs for the B2B e-commerce logistics problem (ELP). Their computational results showed that incorporating such costs can leads to considerable cost saving for the shipper, shipper's group and the logistics chain, as well as higher profitability for the group of third-party logistics. Shao et al. (2016) defined a new model to analyse interactions between the strategy of distribution in e-commerce firms and traffic congestion. The authors conclude that the firm's optimal distribution strategy depends on consumers' acceptance of e-commerce as well as road users' congestion costs.

Allen et al. (2018) explained the reasons behind the growth of e-commerce and the resulting effort required to meet the exacting delivery services offered by e-retailers which often lead to poor vehicle utilisation in the last-mile operation, as well as the duplication of delivery services in urban centres as competitors vie for business. Carotenuto et al. (2018) proposed a comparison of various urban distribution systems supporting e-commerce. In particular, the pros and cons of point-to-point and lockers were highlighted and the best positions to locate lockers were defined, thus allowing to efficiently reducing consumers' deviations. Janjevic et al. (2019) suggested a method for integrating collection-and-delivery points1 (CDPs) in last-mile distribution network design. The principle of their approach was based on a non-linear optimization model that includes CDP location decisions and accounts for changes in demand patterns occurring with their placement.

Also revolving around the three axes, transportation, e-commerce and geography, Lin (2019) proposed a concept framework of E-urbanism, which is applied to understand the influence of e-commerce and migration on the socio-spatial transformation of Taobao villages in China. Her work concluded that ICT infrastructure and production networks form the foundation of e-commerce development, while social networks of rural migrants are important sources of social capital in the formation of Taobao villages. Van Asch et al. (2019) investigated the cross-border e-commerce market from the airport's perspective and confirmed previous research that the competitiveness of an airport within the air cargo market mainly depends on fast delivery of e-commerce goods. By introducing the concept of average package unit, Zhao et al. (2019) developed an Average Package Difference Model to evaluate carbon dioxide (CO2) emissions to analyse and compare environmental impacts of electronic commerce and conventional retail trade in China. The study indicated that conventional retail has a higher CO2 emission than that of electronic commerce.

In a similar comparative way, Hu et al. (2019) described expected marginal revenue and reserved slots of scattered customers under the e-commerce environment and traditional environment respectively at first. According to their result, it comes to the conclusion that the e-commerce has good predicting effect, and that the total revenue of liner company under the e-commerce environment is greater than under the traditional environment. Barenji et al. (2019) proposed a dynamic scheduling and real-time control architecture based on a multi-agent technology for e-commerce logistics parks, which helped in addressing existing gaps in the current real-time scheduling and control systems. Hidayatno et al. (2019) developed a causal loop diagram as model conceptualization for analyzing the CO2 emissions generated through urban freight volume in urban freight landscape with particular emphasis on e-commerce activities such as delivery frequency, packaging volume, and their variables interdependency. In relationship with the works cited above, in particular that of Zhao et al. (2019), it is important to underline the importance of optimal management of transportation and logistics infrastructures in the e-commerce sector in order to better control emissions levels. It is under this framework that the model developed by Hidayatno et al. (2019) could have a great importance. Finally, Lafkihi et al. (2019) provided a literature review of freight transportation service procurement and investigated the opportunities and challenges regarding transportation organization and procurement mechanism design in the context of e-commerce. This work also adds significant value to the transport-e-commerce relationship, thus allowing a better understanding of the state of the art as well as outlining new perspectives in this matter.

Unlike the number of studies dealing with the topic in northern countries, the number of studies focusing on the MENA region remains very limited in terms of both quantity and quality. Pons et al. (2003) had already highlighted the lack of development of the transport sector as one of the essential factors preventing the effective implementation of intraregional trade initiatives in MENA zone. In the context of a study of investment opportunities and challenges in the field of e-commerce in the MENA region, Sanyal et al. (2016) tried to define the

[1] Collection and delivery points are a network of services points where operators pool and deliver their consignees' parcels, and consignees pay, collect and return their parcel (Yuen et al., 2018).

few main logistical factors that could be used to promote e-commerce in this area. Also in the MENA region, Roberson wondered what are the opportunities for logistics providers as the Middle East e-commerce market grows. His technical report was carried out under the aegis of Aramex company, one of the largest courier and logistics providers in the region. This company is known for its interest on e-commerce as part of its overall business strategy and is considered a leader in logistics and transportation solutions to aid in the growth of e-commerce. Alberti-Alhtaybat et al. (2019) also treated the global logistics player Aramex and how it deals with disruptive technologies, in particular, on the unique business model that the organization has adopted and that allows disruption to be managed through collaborative knowledge management. Their study has mainly focused on the B2C, as this is where we need to improve, especially as e-commerce is expected to grow significantly in our core markets, MENA and South-East Asia.

Transportation and Logistics Supporting E-Commerce

E-commerce is the monetary exchange of goods, services or information via computer networks, including the Internet. Recent studies projected that the worldwide retail e-commerce sales will touch a new high by 2021. E-commerce businesses should anticipate a 265% growth rate, from $1.3 trillion in 2014 to $4.9 trillion in 2021. This illustrates a future of steady upward trend with no signs of decline (Figure 1). In terms of regional e-commerce sales share distribution, the main development between 2017 and the forecast for 2021 is that Asia Pacific's regional share will increase to reach two-thirds of global e-commerce, while North America and Western Europe's share shall decrease accordingly. This is a continuation of the trend seen between 2010 and 2017 (Figure 2). At the same time, a monotonous growth was recorded during the same period in the global transportation and logistics sector (Figure 3). Furthermore, the share of logistics devoted to e-commerce will also know the same fate according to other statistical studies (Figure 4). While e-commerce has had a significant impact on transportation services, its expansion is increasingly dependent on the ability of transportation and logistics services to deliver goods ordered over the internet in a timely routine. Some observers believe (Li and Fan (2014)) that current services are not fully responsive to the needs of e-commerce and that this problem is likely to increase as the volume of e-commerce grows. The demand for transportation generated by e-commerce has increased very rapidly, but it has not been accompanied by a corresponding growth in the supply of transport services and supporting logistical services. Such a state of affairs has been attributed to a few factors, such as the order processing needs and logistical means of e-commerce, which differ greatly from those of the traditional trade serving industrial supply chains. Traditional trade is characterized by the movement of large quantities of goods. These are assembled in load units that can be tracked or localized. In addition, industrial supply chains typically involve a few large buyers and a limited number of suppliers; the resultant transport demand is therefore relatively predictable. On the other hand, in e-commerce, buyers' orders are often the subject of numerous and small shipments, whose origins and destinations are widely dispersed. The corresponding transport demand is quite unpredictable because it stems from orders placed by a large number of buyers. The main challenge is to manage the entire order fulfilment system to meet customer expectations while controlling inventory and transportation costs.

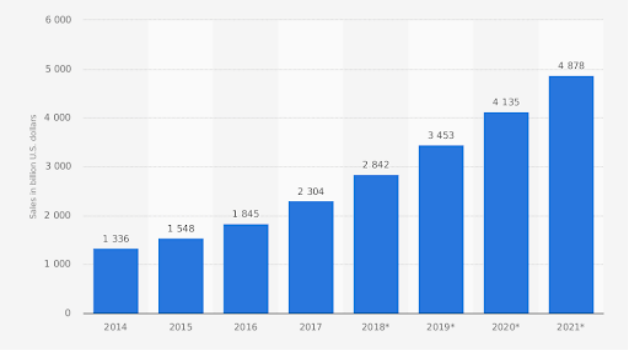

Fig. 1: Retail e-commerce sales worldwide from 2014 to 2021

Source: Statista 2018.

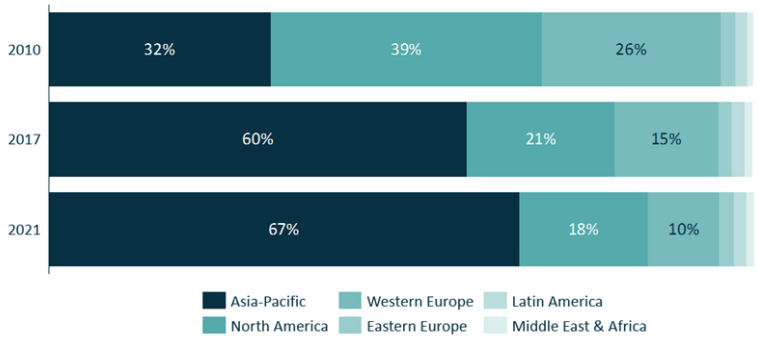

Fig. 2: Regional e-commerce sales share of global e-commerce.

Source: International Post Corporation (IPC).

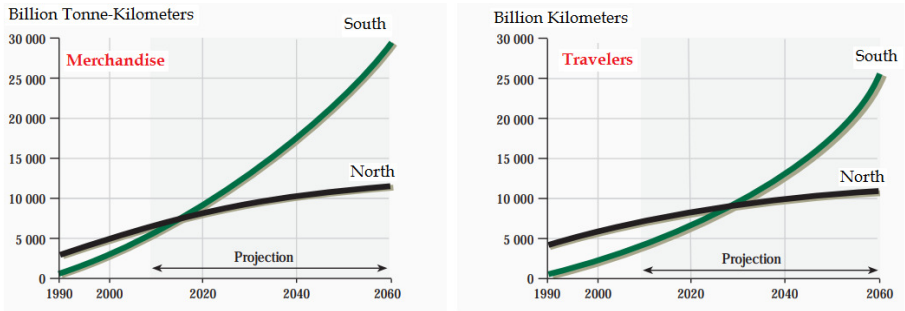

Fig. 3: Global forecast of road transportation demand

Source: Cartografare il presente.

Moreover, retailers operating solely online are most often without the logistical infrastructure and experience to handle electronic transactions. They need to reorganize their internal procedures, structures and modes of communication according to the requirements of a digital environment. This involves the introduction of new forms of resource sharing with different partners and the establishment of information on sales to wholesalers, shippers, manufacturers, designers, and even suppliers of raw materials. Finally, warehouses and other traditional logistics facilities are not suitable for retail e-commerce. In general, e-commerce-specific distribution networks now consist of multiple, small distribution centers across the country, or an execution or shipping contractor with access to a network of centers, distribution on a continental scale. A limited quantity of products is stored in these centers, which are frequently replenished.

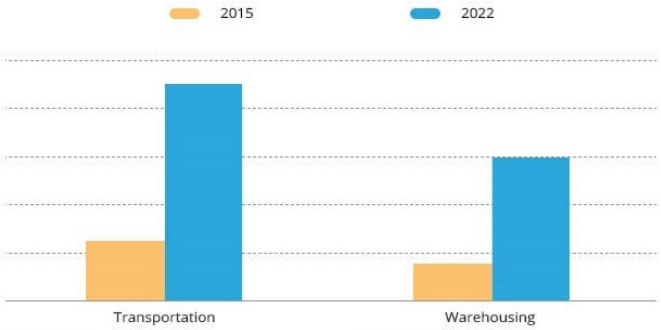

Fig. 4: Global e-commerce logistics market by service type

Source: Research and Markets (2017).

On the other hand, another dimension of such a relationship that deserves to be considered more widely is that relating intelligent transportation to e-commerce. Intelligent Transport Systems (ITS) corresponds to transportation systems that apply advanced information systems for strengthening transportation and logistics, presenting a paradigm shift in the transportation field. With the ability of e-commerce to perform global trading transactions over open networks and deliver products and services, in which geographical boundaries lose their meaning, is

creating a paradigm shift in commerce. Intelligent Information and Communication Technologies (IICTs) is the combining element in ITS and e-commerce. In fact, the emergence of intelligence technology has given businesses a competitive edge and is available to developers or businesses of any size or budget. According to some recent studies published by TechRepublic, more than 60 percent of businesses used AI tools in some form in 2017, a significant increase from 38 percent in 2016. Of those businesses, 77 percent say they use AI to improve their marketing and sales processes. Using intelligent transportation in e-commerce strategy can be as simple as trying out a standard AI tool that suggests products to customers and generates email recommendations through machine learning.

In fact, the utility of intelligent transportation systems in e-commerce cannot be undermined. Packing, Storing, shipping and tracking of thousands of goods from web retailers have become a successful business for express shippers, transportation companies and traditional postal departments. Shipment tracking was the first communicating internet application to find a market in freight transportation. Today, this is just one of many applications available on internet. Other applications include programs covering customs clearance, bookings, insurance claims etc. A recent study quantifying the usage for internet for business-to-business (B2B) applications revealed that for some carriers, great parts of their interactions with customers are now carried out online (see Krishnaswamy (2002)). In another survey conducted by DHL (Dalsey, Hillblom and Lynn) International GmbH, it was found that e-commerce would be the primary driver of growth in their industry.

Krishnaswamy (2002) emphasizes the relevance of ITS to e-commerce as follows: products and services ordered over the internet require more delivery trucks on the road to homes and businesses. ITS deployment streamlines the complex, large-scale freight handling and service delivery systems and increases efficiencies in transportation infrastructure maintenance. There could be important advantages from integrating ITS and e-commerce. This could apply to multi-modal transport; including rail/road interfaces, port operations, as well as line-haul operations. Similarly, integrating ITS and e-commerce could improve supply chain management by providing useful tools for real time scheduling of operations. Improving information flows over the internet about movement of goods facilitate tracking of goods on its entire route. Organisations could move towards virtual integration, where they create and compete through extended, integrated supply chains (Krishnaswamy (2002)). Furthermore, ITS could contribute to the B2B integration. B2B is known as one of the massive strategic trends in industrial sectors. In the recent decades, many organisations are moving from internal application integration towards integration between business partners. B2B provides links between an organisation's key systems and the applications of its trading partners, customers and suppliers. This allows corporations to work with their associates, outsource manufacturing, work with third-party logistics providers and link with their customers. Some analysts predict that B2B integration would give birth to the long-heralded notion of the virtual corporation (Krishnaswamy (2002)).

However, the potential benefits identified by previous research, there is a remarkable lack of a robust ITS-based e-Business cases. Although the necessary technology exists and the internet provides opportunities for more cost effective integration of systems and services, many e-commerce enterprises are not sustainable and great ideas do not develop further. Many applications are still too expensive to purchase and install, they require substantial upfront investments and the returns will take many years to materialize. This leads us to the conclusion that much greater efforts should be made, both theoretically (research and studies) and professionally (investments) in order to take advantage of the two technologies, that of ITS as well as that of e-commerce. In the near future, it would be interesting to better integrate modern optimization strategies (Rabbouch et al. (2018); Rabbouch et al. (2019a)) within these intelligent systems connecting ITS to e-commerce in order to better adjust this relationship, and therefore, allow better exploration and knowledge of the opportunities of existing investments. It should also be mentioned that the development of such systems in the context of smart cities would also be of great interest (Rabbouch et al. (2019a); Rabbouch et al. (2019b); Rabbouch et al. (2019c); Saâdaoui et al. (2019)).

Impact of E-Commerce on Transportation and Logistics Systems

In this section, the impact of e-commerce on the sectors directly related to transportation infrastructure is emphasized. In fact, given the dynamic evolution of e-commerce all over the world, E-commerce is expected to have a significant and varying impact on transportation systems. On this assumption, the demand for transportation services is obviously expected to increase. In the literature, only a few works have examined the question over the two past decades. Despite this, the main analyzes in this context were rather qualitative. Without confirming his hypothesis, Stiller (2003) explained theoretically how e-commerce can lead to the growth in the average distance travelled. In one of the rare empirical works, Lenz (2003) proved only slight reductions of total shopping transportation has been caused by e-commerce consumers. Basbas (2006) attempted to identify the advantages and disadvantages of e-commerce in regards to freight transport and person trips. Mindali and Weltevreden (2013)

reviewed the main conceptual and quantitative studies on the implications of b2c e-commerce on mobility, and recently, Muralidharan (2018) attempted to analyze the impact of e-commerce on the parcel carriers in the EU and the US.

Let us focus on the following scenario, which can help understanding the impact of e-commerce on transportation and logistics systems. In this illustration, we consider the example of new, casual, non-business buyers, and far less informed than commercial shippers, leading carriers to introduce a range of online consumer-oriented supply chains characterized by higher volumes, origin and destination of goods and better adjustment capacity. Since consumers demand delivery within 24 hours, or even the same day, suppliers in the electronics industry, regardless of the size of their business, will have to keep significant quantities of goods not only in their own premises, but also in distribution centers across the country. Such a shift will reverse the trend of inventory reduction that has contributed in recent years to lowering costs for firms in industrialized countries. Companies will need to revise their distribution networks and it will be more efficient and cost-effective to deliver products to consumers than ever before, hence the need to expand infrastructure.

At another level, the supply chain comes with all kinds of activities: ordering, billing, representation, warehousing, shipping, insurance, customs clearance, distribution, wholesale and retail. The execution of these activities involves multiple interlocutors, who must exchange information and pay their respective services. Overall, these activities correspond to complex links between different companies and involve the exchange of various types of information. The ability to communicate information online allows service providers and shippers to share information and data in real-time and thereby collaborate in the planning of the activities in question. In addition, having easy access to information gives shippers, including small companies, more leverage in defining their needs and negotiating with service providers. The ability to effectively share information will be a critical factor in the survival of transportation and logistics service providers in the global marketplace.

The online services offered by these providers via the Internet will enable a shipper to enter an order into its resource planning system that will be automatically transmitted to the carrier via the carrier's transportation management system services. The system will determine and confirm the price, acknowledge receipt of the order, send the appropriate messages for the handling of the goods, notify the carrier and the consignees, acknowledge receipt of the carrier's invoice and pay for it, all automatically. By accessing a single website, the shipper will obtain a personalized overview of all goods in transit, inquire about the status of the shipment, consult exception reports, organize the pick-up of goods and inform its service of the purchase of the free real price of goods in circulation around the world.

E-commerce also helps reducing the role of freight forwarders and other traditional intermediaries. However, some of these intermediaries having adopted new operating methods (e.g. value-added logistics services), their services continue to be the subject of a request. Through the Internet, intermediaries can more easily access chargers and carriers, enabling them to provide integrated door-to-door services. In addition, it seems interesting to use intermediaries such as freight forwarders because of their experience and specialized knowledge in various fields (transport, storage, packaging, letter of credit formalities, customs issues, import licenses, etc.). Even if a particular shipper can obtain the information on the Internet, the range of services a freight forwarder can offer a value-added service that shippers remain ready to buy.

Visser and Lanzendorf (2004) was among the first works to review the literature of relationship between mobility and accessibility effects and e-commerce. The main questions they addressed was how e-commerce affects (a) individual activity patterns and travel behavior, (b) freight transport and logistic decisions of firms, and (c) the location decisions of households and firms. The review showed that the short-term mobility effects of B2C are relatively strong, and that an increase in both individual travel and freight transport can be expected. The long-term changes for physical accessibility and mobility, in contrast, was less clear and harder to deal with, due to the complex relationships, data problems, time lags and methodological attribution problems. A summary diagram (Figure 5) was proposed by Visser and Lanzendorf (2004) on the effects of B2C e-commerce for various aspects of freight transportation, particularly size, composition, duration, frequency, modality and spatial patterns, taking into account a variety of mechanisms:

- Size and quality of consumer demand
- Distribution systems
- Responses in the logistic and transport sector
- Location behaviour of firms in this sector.

In the diagram, the signs (+ and -) above arteries mean the nature of the relationship (contribution of e-commerce) be it positive or negative, respectively.

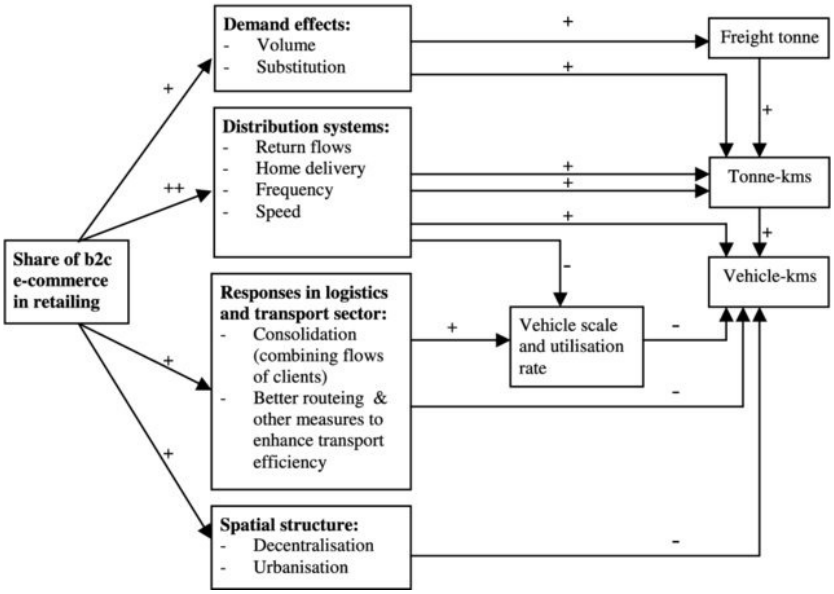

Fig. 5: Effects of B2C e-commerce on freight transportation.

Source: Visser and Lanzendorf (2004).

We finish this section with a reasonable evaluation of the future of transportation sector in relation with e-commerce. The recently presented analysis by Prince (1998) concluded that the long-term prospect of developing a transportation stock market remains intriguing and we may see further attempts towards this direction in the future. Nevertheless, a number of regulatory issues must be resolved for this development to take a serious turn. Information is known as to be an essential part of the supply chain and will continue to drive change in the transportation and logistics markets. According to the same author, e-commerce will be a major element in this transition. Due to e-commerce, an expected market shake awaits the transportation industry. The number of transportation and logistics e-commerce products is increasing daily. Despite their success in attracting venture capital, most will succumb to the handful of survivors who, in turn, will be absorbed by mergers and acquisitions. And while many B2B sites claim to eliminate the need for intermediaries, many become fully-fledged intermediaries.

Sustainable e-Business Models for ITS

The principal challenge for an intelligent transportation and logistics company is to beneficiate from the opportunities offered by new digital technologies. According to a 2016 study conducted by startup Freightos, 86% of logistics decision makers acknowledge that technology is the best way to increase efficiency and keep costs under control. Although the ITS technology has known an important evolution the last years, several other examples of products and services in the ITS industry could be integrated with, or make use of digital technologies. Despite all that, the opportunities offered by IICTs have remained little exploited. In the following, we present according to Giannoutakis et al. (2011) few examples of ITS technologies, where the internet could create further business opportunities.

Advanced Traveler Information Systems (ATIS): These systems provide personalized information to the user, such as traffic state, route selection, options of public transport, destination and warning messages for potential dangers (Rabbouch et al. (2017), Singh and Kumar (2010), Yang and Huang (2004)). Many of them are geographically based and operate online. They offer an tremendous opportunity for e-Business model development, through for instance, offering information on products of third parties, or even operating as platforms for added services, such as reporting defects on the road and updating online information about routes (Giannoutakis (2011)). They could also include tourist guide information for popular sites, such as suggestions for car rental and online hotel booking.

Public Transportation Service (PTS): This service represents one of the domains where intelligent transportation systems have already largely progressed and are today revolutionizing classical transportation services (Vanajakshi et al. (2009) and Velastin et al. (2004)). Extensively used examples of ITS are passenger information systems at train stations and bus stops, embedded surveillance cameras, online bookings and robotic payment systems. Further developments can be anticipated in the near future, for example, implementing other internet-based technologies on public transportation, such as improvements in the integration of traveler information with mobile technology and enforcement of Wi-Fi networks, which could create new business opportunities for third parties.

Electronic Payment Systems (EPS). EPS (also known as Electronic Toll Collection) is a promising and growing field where e-commerce can eventually dominate. (Chen et al. (2007), Odeck and Welde (2010)). This equipment allows assessing jamming automatically, by recognizing vehicles' registration numbers. Neither have the drivers to stop at toll courts, nor are officials required to collect the tolls. Private companies or public authorities could enable, via internet, prepayment of tolls, or even discounts, for frequently used route sections, by letting road users to create accounts through their websites. EPS could also be used as helpful mechanism for tracking down vehicles linked to prohibited activities and assist law application.

Electric Vehicles (EV): The increasing ecological concerns recent years has led to the growing interest on hybrid and electric automobiles (Yang (2010)). Numerical intelligent technologies are expected to contribute to the formation of online business for this category of vehicles, for example by providing online information about charging poles, or, by selling online credit for vehicle charging on a pay-as-you-go basis with a registered smartcard.

Conclusion

E-commerce is nowadays one of the most important and fastest-growing aspects of today's retail landscape. Within this rising sector, cost and efficiency management revolves mainly around how well the transportation and logistics industry manages the same factors. Indeed, an extensive logistics network is critical for ensuring smooth delivery of the goods in the e-commerce industry for order fulfilment. The transportation and logistics sector represents a leg of this process, which several companies choose to complete with their in-house logistics and transportation facilities. Accordingly, the aspect of transportation and logistics is an indispensable column of the e-commerce ecosystem especially in the ones that involve tangible goods. This fact is reviewed throughout this paper in both directions, that is, how transportation and logistics influence e-commerce, and vice versa. We also focus on the incorporation of new smart object technologies on the quality of e-commercial service in relation with smart transportation. In this area, the practices of the major players, such as Amazon or FedEx, are linked to the expectations of consumers who are increasingly large. For example, you want to be able to receive your order the same day or you can benefit from greater flexibility in returning goods. The intelligent logistics aspect of e-commerce therefore already plays a key role, which will undoubtedly become even more important in the future. Furthermore, the paper not only emphasizes the positive effects on the society, but also detrimental ones, in particular on the environment. The role of intelligent technologies is also highlighted in this context by showing, referring to a set of recent works, the potential impact of integrating these techniques on the reduction of the damaging effects of e-commerce in relation to transportation and logistics. Nevertheless, all that has been highlighted above about the relationship between transportation systems and e-commerce is expected to evolve over time, especially with the occurrence of many global crises, such as the case of the current health situation. Therefore, it would be interesting in the near future to deeply study this change in the current context of the COVID-19 pandemic. Noteworthy that the availability of considerable amounts of data may be necessary for allowing a robust statistical modeling.

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An Estimation of Buyer Fatigue by Examination Energy Consumed in The Purchase Process

Dmytro PRUNENKO
DSc, Associate Professor; Department of Transport System and Logistics
O. M. Beketov National University of Urban Economy in Kharkiv
Ukraine
prunenkod@rambler.ru

Iryna BALANDINA
PhD, Associate Professor; Department of Tourism and Hospitality
O. M. Beketov National University of Urban Economy in Kharkiv
Ukraine
Irinabalandina2511@gmail.com

Iryna POLCHANINOVA
PhD, Associate Professor; Department of Tourism and Hospitality
O. M. Beketov National University of Urban Economy in Kharkiv
Ukraine
ira.polchanin@gmail.com

Mykola PYSAREVSKYI
PhD, Vice-dean of Faculty of International Economic Relations
and Tourism Business
V. N. Karazin Kharkiv National University
pisarevskiy@karazin.ua

Iryna PYSAREVA
PhD, Associate Professor; Department of Tourism and Hospitality
. M. Beketov National University of Urban Economy in Kharkiv
irinapisareva@kname.edu.ua

Olha RADIONOVA
PhD, Associate Professor; Department of Tourism and Hospitality
. M. Beketov National University of Urban Economy in Kharkiv
radionovaolga.mail@gmail.com

Andrii GALKIN
DSc, Associate Professor; Department of Transport System And Logistics
O. M. Beketov National University of Urban Economy in Kharkiv
Ukraine
galkin.tsl@gmail.com

Abstract

Consumer in the process of purchases requires new system approaches to measure fatigue. Neuromarketing is an innovative direction to improve the effectiveness of the company's marketing communications (primarily merchandising and advertising), by influencing the behaviour of a person as a potential buyer, taking into account the neurophysiological features of the process of making a purchase decision. The study of buyer fatigue by examination energy consumed in the monitoring purchase process and the development of recommendations for improving the activities of retailer to reducing the fatigue on their basis is an actual topic of research that is not fully

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disclosed. The research is aimed at assessing the impact of the elements of the process of purchases on the buyer fatigue at urban retailers. An experimental designed method to estimate the effect of the shopping environment on energy fatigue consumed in purchase process is presented. The result can improve the quality of shopping services on decreasing average fatigue level (energy cost) in store

Keywords: Energy, Buyer, Total Energy Expenditure, behavior, marketing.

JEL Classification: M31, M39, C93, D19, L69

Introduction

Market relations in Ukraine are constantly evolving, which greatly contributes to the development of trade services (Galkin, Dolia, Davidich, 2017). On the other hand, competition between trade organizations and supply systems is growing. The sharp increase in the number of retail outlets with different quality of service and price ranking means that supply systems must adapt to changing demand conditions (Ibrahim, McGoldrick, 2017). In such conditions, the analysis of the consumer market and the identification of the service area of the trading company is one of the forms of improving the efficiency of trade organizations.

The problem of distribution of demand between retail has been considered by many scholars from different points of view. The growing competition between logistics systems and technologies for the promotion of goods forces to look for new opportunities to improve their operation, taking into consideration buyers (Halkin, 2018). Consideration of the functioning of the system at the stage "Shop" - "Household" allows you to take into attention factors that have not been considered in the current models and methods.

The problem of the quality of shopping services constantly worries buyers and sellers because of quite natural causes (Birkin, Clarke, Clarke, 2017). The growth of material well-being of people causes the raise of their cultural level, which leads to the desire to buy quality products at a high level of service. Many factors influence buyer in the shopping process (socio-cultural, personal, psychological factors, situational influence, marketing influence), each of which may have a decisive influence on the magnitude and timing of fatigue (Kotler, Dubois, (2009) and as a result the buyer will make a purchase or not. Consumer studies attempt to understand the decision-making processes (Scott, 2017), etc. But those methods provide not full information on consumer's fatigue (Lemon, Verhoef, 2016). Consumer in the process of purchases requires new system approaches to measure fatigue. Neuromarketing is an innovative direction to improve the effectiveness of the company's marketing communications (primarily merchandising and advertising), by influencing the behaviour of a person as a potential buyer, taking into account the neurophysiological features of the process of making a purchase decision (Galkin et al, 2020). The study of buyer fatigue by examination energy consumed in the monitoring purchase process and the development of recommendations for improving the activities of retailer to reducing the fatigue on their basis is an actual topic of research that is not fully disclosed.

Purpose of the article: The aim of the research is to developed method to assess the fatigue of the buyer visiting any retailer according calories spend in purchase process.

Methods of Research

Methods for determining the number of calories consumed

The number of calories a person spends in different activities is a function that depends on the sex of the person, his age, weight and type of activity performed by the person (Lincoln, 1972).The process of consuming the goods is closely linked to the concept of the process of consumption. The cost of actions in the process of consumption of goods:

$$E^{cn} = \sum_{p=1}^{P} E_p = E_{\omega}^{prep} + E'^{movm}_{\omega j} + E_j^{TS} + E''^{movm}_{j\omega} + E_{\omega}^{aftsell}, \quad (1)$$

where E_{ω}^{prep} – the value of energy consumption of the end-consumer at the preparatory stage of consumption, preceding the purchase, kJ (kcal); $E'^{movm}_{\omega j}$ – the value of energy consumption of the end-consumer when travelling from the zone ω to the retailer *j*, kJ (kcal); E_j^{TS} – the value of energy consumption of the consumer during the shopping service in the *j*-th retailer, kJ (kcal); $E''^{movm}_{j\omega}$ – the value of energy costs in the delivery of the goods from

the *j*-th retailer to zones ω destination, kJ (kcal); $E_{\omega}^{aftsell}$ – the value of energy consumption of the end-consumer at the after-sales consumption, kJ (kcal).

The preliminary stage of consumption, which precedes the purchase itself, includes the following elements: awareness of product needs, information seeking and alternative valuation. In practice, this stage is related to the list of goods and their quantity, possible places of purchase, possible ways of purchase (store, Internet, etc.). The choice of product depends on the amount of time spent on the purchase. Choosing a purchase method determines the following elements of the process of consumption of material flow. So, when choosing shopping through a store, the consumer in the first stage needs to go or get to him. The consumer chooses a way of moving: on public or individual, if it is available, of transport. Depending on the type of transport chosen, the consumer determines the routes, the parameters of which affect the time of movement from the sending area to the store. The authors of the study made it clear that the age of consumers and their individual characteristics, which are determined by the type of the nervous system, are strongly influenced by the choice of the mode of transport and the route of the route. After arriving at the store, the consumer spends some time in a store, which is spent on the choice and purchase of goods (trade service). After that, the end-consumer needs to return to his destination (home, work, etc.) and deliver his goods. When choosing an online shopping method, such items are missing. The final stage is after-sales consumption, which may include the assessment of the results of the purchase, direct use or consumption (eg, cooking) and deprivation of the used goods.

To estimate consumption of end users, it is advisable to use experimental methods based on the collection of real-time information. These include the use of electronic watch Smart (Galkin et al., 2018), which calculates the number of meters travelled, time spent, and calories at different stages of the purchase process. This will make it possible to more accurately assess these parameters, comparing them with theoretical methods.

Estimation of the monetary costs of end-consumer fatigue

Estimation of fatigue is carried out on the indicator of energy cost of movement. This value characterizes the direction of the energy regulation channels in the human body (Drewnowski, 2011). For any consumer activity, energy is consumed (Kidwell, Hardesty, Childers, 2008). The amount of energy expended depends on the amount of effort spent on one or another element of the consumption process. Estimation of the amount of energy expended is carried out in various ways, among which one can distinguish: cost of action (Keytel, et. al., 2005), pulse based on built-in sensors (Baevskii, 2002), etc.

Determining the cost estimate of the energy costs of the human body in the purchasing process is based on the analysis of the required amount of calories for human existence (Postanova K. M. U., 2000). According to the normative documents, the daily consumption of calories for normal functioning is 2790.8 kcal (Monsivais, et. al., 2013). But this value may depend on gender, age, physical activity of a person. Difficulty valuation calorie value is 1 kcal different due to different levels of income, the cost structure of the budget and human households, as well as different value of the products and their usefulness to humans (Halkin, et. al, 2019).

The cost of 1 kcal is determined based on different incomes of citizens, the structure of expenditures of one person's budget and households' budget, as well as the different cost of the products themselves and their usefulness to humans. American and British scientists in medicine have achieved great success in these studies in creating diets and proper healthy eating. Their research indicates that «healthy» food costs three times more than «unhealthy» food, as a result of which the price gap between them increases. The study looked at nearly 100 popular food items, which were determined according to government criteria as healthy or not. The results indicate that 1,000 calories of «healthy» food, such as meat, salmon, yogurt and tomatoes, cost an average of £ 7.49 in 2012 (Drewnowski, Darmon, 2005). Calorie intake of less healthy foods, such as pizza, beef cutlets, and donuts, was cheaper by an average of £ 2.50. The gap between the two categories of food is £ 4.99. In 2002, this gap was £ 3.88. The average increase in the cost of «healthy» food was £ 1.84 per 1,000 calories over the decade, while the cost of «unhealthy» food increased by only 73 pennies (Monsivais, Drewnowski, 2007).

The choice of food is based on taste, cost and convenience, and, to a lesser extent, health and variety. Taste refers to the sensory appeal of products such as taste, aroma and texture. The concepts of taste and energy density are intertwined, because most high-calorie foods are usually the most delicious and vice versa. The energy density of products is defined as energy per unit mass or volume (kcal/100 g or MJ/kg) (Ainsworth, et al, 2011).

The choice of consumer products affects the cost of calories consumed by a person (Ainsworth, 2013). Existing methods for determining the required number of calories are based on diets and human consumption (Blaydes, Kayser, 2011).

Studies show that highly developed countries such as the United States and the United Kingdom have higher absolute food expenditures, but the share of household consumption spent on home-cooked food is low – less than 10%. In Kenya and other low-income countries, the share of consumer spending devoted to homemade food can be as high as 50%. Per capita calorie consumption data show an inverse relationship. In 2015, per capita calorie consumption in the United States was at a high level of 3,639 calories per day, while Kenya had only 2,189 calories (Dąbrowska, 2011).

The cost of human energy cosumed is proposed to be determined by dependence:

$$S_{KCal}^{cn} = \frac{\sum_{1}^{M}(Q_{\omega} \cdot P_{ціна})}{ALF \cdot T_{cons}}, \tag{2}$$

where Q_{ω} – an individual need for a material flow of 1 resident for a period of time living ω-th zone for the analysed period, for normal functioning of the organism, kg / inhabitant (unit / inhabitant); $P_{ціна}$ – material flow price, UAH / kg (unit / inhabitant); *ALF* – daily energy norm of the person (consumer), kcal; T_{cons} – time consumption of good, days.

Determination of the value of energy costs can be found by the formula:

$$\Theta_{3}^{ij} = E_{\omega j}^{cn} \cdot S_{KCal}^{cn}, \tag{3}$$

where $E_{\omega j}^{cn}$ – energy consumption of the consumer in the process of development of material flow, kcal; S_{KCal}^{cn} – cost of one calorie, UAH / kcal

People with different incomes and cost structure may have completely different probabilities of choosing retailer. The regularity of the impact of end-consumer flows living in different zones show differ demand at store.

Results

In order to find the initial values of the parameters of end-consumers and retailer, natural studies were conducted. The studies use a two-stage methodology for determining the relevant geographic retail market (Halkin, 2020): distance, the non-linearity factor, slope factor, etc., fig. 1.

Figure 1 – Trading area:

1,…11 – zones; A,..,O – stores.

The research was in visiting retailer via end-consumers in the service area and monitoring the selected indicator: the number of calories consumed for a one-time visit to a retailer. For all consumers, a single set of goods (consumer basket) was selected. In general, 27 people (women and men) aged 19-65 participated in the study. The received data are presented in the table 1.

Table 1: Total energy costs when walking from the store

Grocery	District №, kcal										
	1	2	3	4	5	6	7	8	9	10	11
A	198,9	65,1	84,8	198,3	230,8	162,2	155,5	281,9	374,5	357,5	374,5
B	183,2	135,2	165,2	253,2	200,4	159,3	186,4	282,1	390,7	373,9	396,6
C	111,3	138,1	183,4	260,8	189,7	111,9	175,0	221,7	339,0	335,2	370,3
D	216,0	175,5	163,8	178,6	172,9	81,3	53,7	173,5	264,4	232,4	253,5
E	306,3	221,4	160,7	98,5	281,0	191,2	102,7	267,8	344,5	278,0	256,3
F	254,2	226,1	213,0	212,2	184,7	111,1	106,1	141,5	225,9	191,3	221,7
G	231,1	259,6	272,0	284,8	128,5	117,7	146,0	124,6	232,1	214,1	254,2
H	247,6	268,9	280,2	285,6	161,6	132,5	174,8	60,7	185,2	196,2	241,4
I	219,9	285,8	311,0	317,7	133,5	154,7	205,7	26,4	151,8	193,1	244,6
J	395,0	425,4	424,7	391,6	278,2	287,0	312,5	178,2	56,8	125,9	201,7

Assessing the utility of retailer presented via O-D matrix of generalized cost of end-consumers (17). The generalized costs calculated on models (2-21), results of calculations are given in Tab. 2.

Table 2: Monetary expression of the energy (fatigue) spent on purchases, UAH

Grocery	Zone										
	1	2	3	4	5	6	7	8	9	10	11
A	2,97	0,97	1,27	2,96	3,45	2,42	2,32	4,21	5,59	5,34	5,60
B	2,61	1,92	2,35	3,60	2,85	2,27	2,65	4,01	5,56	5,32	5,64
C	1,59	1,98	2,63	3,74	2,72	1,60	2,51	3,18	4,86	4,80	5,31
D	3,23	2,62	2,45	2,67	2,58	1,22	0,80	2,59	3,95	3,47	3,79
E	3,96	2,86	2,08	1,27	3,63	2,47	1,33	3,46	4,45	3,59	3,31
F	3,62	3,22	3,03	3,02	2,63	1,58	1,51	2,01	3,21	2,72	3,15
G	3,40	3,82	4,00	4,19	1,89	1,73	2,15	1,83	3,41	3,15	3,74
H	3,20	3,48	3,62	3,69	2,09	1,71	2,26	0,78	2,39	2,54	3,12
I	3,13	4,07	4,42	4,52	1,90	2,20	2,93	0,37	2,16	2,75	3,48
J	5,62	6,05	6,04	5,57	3,96	4,08	4,44	2,53	0,81	1,79	2,87

Attractiveness of visiting retailer:

• A higher size of retailer, slope factor, none linearity factor, distance to retailer, higher income of the end-consumers causes a higher value of cost associated with purchase;

• Lower level of fatigue (calorie spend) of the end-consumers ensure small size of retailer, slope factor, none linearity factor, distance to retailer and low income of end-consumers. Therefore, if the end-consumers what to lose they should choose vice versa retailers with higher value of named parameters;

• The presence of a large number of end-consumers increase attractiveness of any retailers in this zone;

• Retailer D and G will have the highest value of probability of visiting, retailer B – the lowest, due to high generalized costs in them;

• Number and assortment of goods and prices, ultimately the choice of retailer.

This research provides further explanation of attractiveness methods of visiting retailer. The regression models that describe the time and energy of the end-consumers in and out of retailers were obtained. In contrast to the existing approach to planning and evaluating the generalize costs based on the subjective opinions, our method is based on the real purchase process calculation in particular zone. The presented factors' variation range covers typical residential zone for Ukrainian town. The proposed approach can be applied to any other town, extending the variation range.

Conclusions

The approach to estimation of the (fatigue) energy costs of end-consumers of visiting the retailers was presented for the first time. For the first the energy costs (fatigue) in monetary formed was determined in dependence of purchase process parameters. Developed model can be used for macro and micro simulation of residential zones and assessing probability of visiting retailers.

The calculated and experimental value of energy costs can be found to any retailer. According to it level of fatigue can be assumed and compare to the competitors in trading zone. Existing retailer selection methods rarely explore online monitoring of fatigue in purchase process and have never used energy consumption as a rating criterion. The Huff model (1963) underlies this study. The ability to use the inverse level of emotional shift, as a utility, presents new opportunities to apply Huff models. The proposed method can stand like additional factor in Scott, (2017); Oruc, Tihi, (2012); Nakaya, T., et al, (2007). and other models as one of the variables. The buyer compensates for the low value of one factor (attribute) by a higher value of another. Using real-time monitoring of buyer energy consumed in the purchase process provides greater opportunities for assessing the level of quality of shopping services and more accurate results.

The result can improve the quality of trade services by creating conditions conducive to a more favourable environment for shopping, planning sales areas, retailer, sales analysis, advertising and analysis customer behaviour. A method can estimate the level of fatigue of the buyer during its visit to any retailer. Also, the average fatigue level of retailer can be found. The improved model leaves quite a lot of freedom to describe utility. The scheme does not prohibit the use fatigue as an average estimate, or its total value for all residents of the zone. Often, the utility refers to the distribution of visits or distribution of retail outlets by the criterion of maximum importance for the consumer.

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Impact Factors Influencing Budgetary Savings in Public Procurements in Ukraine

Nataliia TKACHENKO
Associate Professor, University of Banking, Kyiv, Ukraine
E-mail: ivan99@ukr.net

Alexander Baranovsky
Professor, Vice-Rector for Research, University of Banking, Kyiv, Ukraine
E-mail: bai@ubs.edu.ua

Oksana POLINKEVYCH,
Professor, Lesya Ukrainka Eastern European National University, Lutsk, Ukraine,
E-mail: Oksana.Polinkevych@eenu.edu.ua

Natallia CHYZH
Associate Professor, Lutsk National Technical University, Lutsk, Ukraine
E-mail: n.chuzh@lntu.edu.ua

Kateryna Bogatyrova
Associate Professor, Kyiv National University of Trade and Economics, Kyiv, Ukraine,
E-mail: bogatyriova@ukr.net

Iryna Zelenitsa
Senior Lecturer, Kyiv National University of Trade and Economics, Kyiv, Ukraine,
E-mail: zelenitsa@ukr.net

Abstract

One of the main functions of the state is the purchase of goods, works and services to meet public needs. More than 30 thousand tender organizers are undertaking procurement activities in Ukraine in the public sector of the economy. The annual volume of public procurements in 2018 amounts to more than 300 billion UAH (8.5% of Ukraine's GDP). The aim of the study is to identify the factors that affect real budgetary savings of public procurements. Using the method of economic and statistical analysis, the influence of intensity of competition and expected procurement value on the amount of budgetary savings has been investigated and the factors that reduce public procurements efficiency have been identified. The hypothesis of the study is that the value of budgetary savings in public procurements cannot be determined as the difference between the expected and the actual value of the purchase in the absence of a common methodology for determining the expected value of the purchase. It is proved that the lack of automatic price monitoring in the electronic system ProZorro, low level of competition in the tenders, significant losses due to the violation of the law by the customer and the improper performance of the economic and legal relations by the entities of the procurement contract are negative factors that influence the efficiency of public procurements. In the age of digital transformation, the determination of fair purchase value is determined automatically, which prevents the buyers from purchasing products at inflated prices and hereby report on achieving economy.

Keywords: Public Procurements, Public Tenders, Intensity of Competition, Budgetary Savings.

JEL Classification: H57, M 20

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Introduction

The deficit of the state budget requires the government to take measures to improve the efficiency and effectiveness of the use of the budget funds. Public administration bodies are consumers of goods, works and services thereby affect the private sector through the public procurements mechanism. The public procurements mechanism stipulates that spending units and recipients of budgeting funds use taxpayers' money publicly to implement government programs within the framework of the state's economic policy. The development or restriction of competition depends on the budget performance. Intense competition of suppliers for government contracts leads to cutting of purchase prices and budgetary savinthegs. Inefficiency of public procurements lead to overspending of public funds, which means disrespect of taxpayers and cost overruns. excessive expence.

The main task of public procurements is to create favorable conditions for competition of market relations participants in the field of production, supply, provision of services and construction.

Literature Review

Procurements in the public sector are considered as the part of aggregate government expenditures that affect aggregate demand and economic growth. Public procurements are the components of the economic reform and government development program and they are aimed at reducing of public spending by achieving efficiency and cost-cutting of public finances as evidenced by the experience of the EU (Tkachenko, 2016), (Tkachenko et al, 2020), (Baranovsky et al, 2020) and other countries.

Significant budgetary savings can be achieved through public spending reform at «more at less cost» principle, notes Piontkivska (2016), and states that the greatest economy can be achieved through increased transparency of public procurements in the ProZorro electronic system.

Kindzerskyi (2015, p. 7) considers that the regulatory influence of public procurements to solve social and economic problems in Ukraine is destructive and disincentive.

The positive influence of public procurements on the development of the national economy can be achieved by giving preference to domestic producers, which will stimulate national production and employment through receiving state order and increase the efficiency of public procurements (Huzhva, 2018), (Halasiuk, 2018), (Mustafina, 2018).

The active position of the Ministry of Economic Development and Trade of Ukraine, Public Organization Transparency International Ukraine, the Center for Excellence in Procurement is to prevent discrimination on a national feature in public procurements, as preferences for domestic producers are violation of international agreements, a corruption factor in confirmation of goods localization and they don't provide competition of production in the domestic market and there are no incentives to compete for price and quality (Romaniuk, 2017).

The EU project «Harmonization of the Public Procurement System in Ukraine with EU Standards» (The EU…, 2013) states that electronic auctions in the EU are not aimed at solving corruption problems and significant reducing of the procurement price, but they are a significant factor of higher transparency, reduction of operating costs of customers and suppliers, easier management of the procurement process through their automatization.

We agree with the conclusions of scientists (Shapoval et al., 2017) that intense competition in tenders leads to lower prices. But according to the ProZorro electronic system, intensity of competition in competitive procurements is only 2.7 participants, by contrast to 5.4 in the EU (Costantino et al., 2012).

According to Stepaniuk (2017), the overestimated purchase value does not increase competition, but has negative consequences. Thus, public procurement depends on the presence of stimulus factors (positive impact) and deterrent factors (negative impact) (Khovrak et al., 2015).

In today's scientific environment, an understanding of the importance of transparent and efficient public procurement has emerged as it is capable of providing economic growth (Kaigorodova et al., 2018), development of social responsibility (Kaigorodova et al, 2017; Khoma et. al., 2018; Koziuk et. al., 2019; Trynchuk et. al., 2019; Trunina & Khovrak, 2019; Glonti et. al., 2020) and reduce the risks (Pyrkova et al., 2018).

The conditions for achieving budgetary savings in public procurements are the use of analytical tools to determine the expected fair value of the procurements, the high intensity of competition, the reduction of financial loss risks due to violation of legislation by the customer.

Aims and Methods

The purpose of the study is to identify the factors that affect the real budgetary savings of public procurements. A method of economic and statistical analysis was applied to achieve this goal, which made it possible to compare the amount of budgetary savings depending on the expected value of the purchase, the level of competition at the tenders and the execution of procurement contracts. According to the ProZorro electronic system, the structure of budgetary savings in public procurements has been analyzed, depending on the intensity of competition, the expected value of the procurement and procurement methods. The correlation dependence of the amount of budgetary savings on the influencing factors has been investigated.

Data Analysis and Results

According to the data of the ProZorro electronic system, budgetary savings in public procurements in 2019 amount to UAH 34,85 billion, which make up 3,35% of the expected value of the procurement. Depending on the intensity of competition, relative budgetary savings increase from 0.1 to 10,9% (Fig. 1).

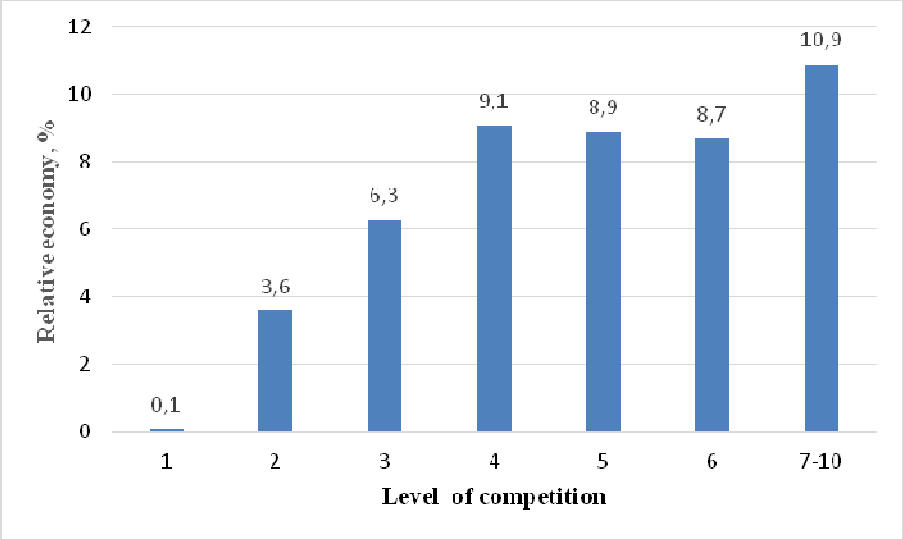

Figure 1: Value of the relative budgetary savings, depending on the intensity of competition
Source: calculated according to the data of analytics module (Competition, 2020)

The highest level of competition for completed competitive procurements is observed in the open public tenders with publication in English (2.82), although the level of competition and the share of completed procurements are quite low (Table 1).

Table 1: Relative budgetary savings in public procurements in 2019, depending on the competitive procurement method, the share of completed procurements and the level of competition

Competitive methods of procurements	Relative economy of completed procurements, %	Share of completed procurements of value, %	Level of competition
Public tenders	8,3	59,1	2,74
Public tenders with publication in English	8,6	43,9	2,93
Below-threshold procurements	11,4	63,3	2,12
Negotiating procedure for defence needs	4,4	65,2	2,40

Source: calculated according to the data of analytics module (Competition, 2020)

The data in Table 1 indicate that the high level of budgetary savings (more than 5%) was achieved not because of the high intensity of competition, but because of the high expected cost of procurement. The hypothesis was checked on the example of the procurement of gasoline A-92 (Table. 2).

The results of the study confirmed that the high level of intensity of competition produces different result of the economy. In addition, the amount of budgetary savings, which is defined as the difference between the actual and the expected purchase value, does not reflect the real economy. Thus, the inflated price for gasoline (UAH 28.63 per liter) is characterized by a high 20% rate of budgetary savings. Four procurements at lower prices showed lower budgetary savings in the amount of 3-9%. The excessive expected procurement value has led to overpricing of the actual purchase price in comparison to the prices of other purchases. Thus, the hypothesis that budgetary savings in public procurements do not reflect real economy is confirmed.

Table 2: Results of the tender for the procurement of gasoline A-92 in 2019

Tender identifier	Intensity of competition	Actual price per litre, UAH	Relative economy
UA-2019-09-06-000759-b	3	24,58	29
UA-2019-08-28-000186-c	3	27,59	3
UA-2019-08-23-000080-a	2	24,80	6
UA-2019-09-04-000381-a	2	25,66	3
UA-2019-09-06-002098-b	4	25,41	9
UA-2019-08-19-000405-b	4	28,63	20

Source: own researches based on the data (ProZorro, 2020) and (Bi.prozorro, 2020)

Table 3 presents the structure of budgetary savings in competitive public procurements during 2018.

Table 3: Structure of the budgetary savings in public procurements in 2019

% of economy	Share of competitive procurement procedures, %
from 0 to 1	44,6
1-5	15,1
6-10	5,1
11-20	5,2
21-30	2,6
31-50	1,9
51 and more	0,6
Total budgetary savings in competitive procurement procedures	75,1

Source: calculated according to the data of professional analytics module (Bi.prozorro, 2020)

The data in Table 3 indicate that 45% of public procurements are carried out without budgetary savings.

We suppose this is due to the low level of competition and the significant share of non-competitive procurements by customers.

66% of procurements are characterized by low level of competition (1-2 tenderers), which are presented in Fig. 2.

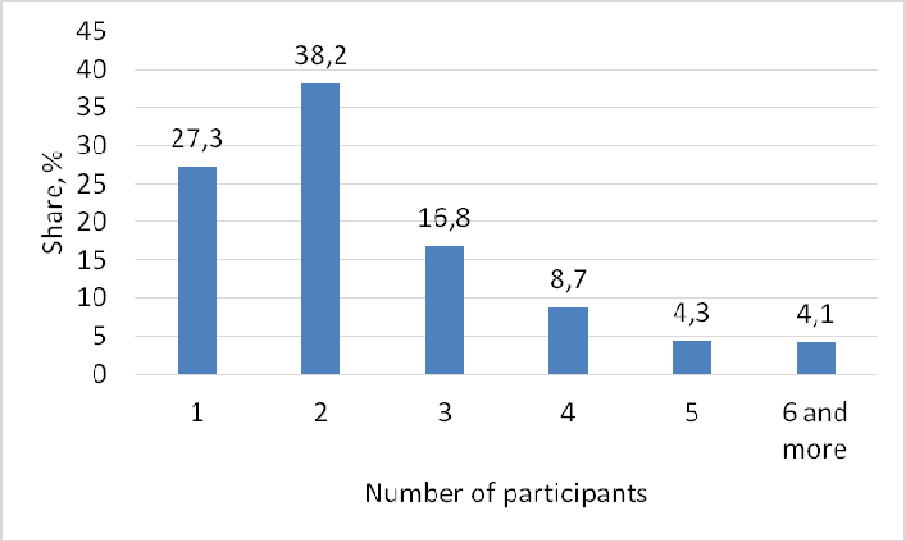

Figure 2: Structure of the level of competition in completed competitive procurements in 2019, %
Source: calculated according to the data of analytics module (Competition, 2020)

The analysis of the budgetary savings structure in the process of public procurements according to the ProZorro electronic system has showed that budgetary savings are achieved in four stages of procurements:

1) consideration of a proposal;
2) intention to conclude a contract;
3) suspension of a procurement by appeal;
4) completion of a procurement (signing of the contract).

The structure of budgetary savings at different stages of the procurement process in 2019 is presented in Fig. 3.

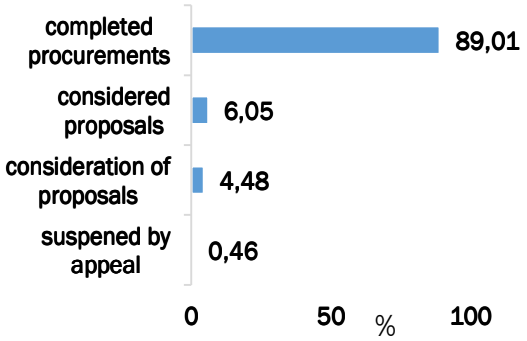

Figure 3: Structure of the budgetary savings at different stages of the procurement process in 2019, %
Source: calculated according to the data of analytics module (Bi.prozorro, 2020)

89% of the budgetary savings in 2019 are achieved at the stage of completion of the procurement, when the contract was concluded and published, the other 11% budgetary savings are reached at the stage of proposals consideration and suspened by appeal. The factors of reducing the value of the budgetary savings at different stages of public procurements are reviewed in Table 4. In our opinion, the value of the budgetary savings cannot be determined at the stages of consideration of the proposal, acceptance and appeal, since these stages are characterized by the incompleteness of the procurement. Procurements stopped by appeal are losses and are not cost-effective.

Table 4: Factors of reducing the size of budgetary savings at different stages of public procurements

№	Stages of public procurement	Stage description	Factors that distort economy value
1	Completed procurement	As a result of a tender, a contract was concluded and published between a customer and a winner participant.	1. Expected value of a procurement is excessive and, as a consequence, an actual procurement value is overestimated at a low competition rate. 2. Non-compliance with the terms of a contract or conclusion of additional agreements with price increase.
2	Consideration of a proposal	Documentary confirmation of a tenderer's compliance with the requirements specified in the tender documentation are verified.	A participant with an economically advantageous price may be disqualified for formal reasons.
3	Acceptance	A customer declares the information about the intention to conclude the contract.	1. The decision of a customer to accept an offer may be appealed in a benefit for other participants. 2. Refusal of a winner participant to conclude the contract.
4	Procurement stopped by an appeal	The Appellate Body has found a violation and a procurement is stopped until the customer takes measures to remove violations.	Losses due to a violation of the legislation by the customer that cannot be identified as budgetary savings.

Source: compiled by the authors

According to the ProZorro electronic system during 2019 1.1 million contracts were concluded in the value of UAH 1759 billion, 7% of contracts were broken (in 2018 - 12%); in 19% of contracts value changes were made (in 2018 - 21%) (Table 5). The largest number of canceled contracts are on the results of the procurement:

- of real estate services (71%);
- of additional and support transport services (38%);
- of education and training services (23%).

According to the data in Table 5, the level of competition on tenders is 2.3 participants per tender, including disqualification (1.4), the level of competition is reduced to 0.9 participants per tender.

Table 5: Indicators of the factors of reducing budgetary savings at the stages of public procurements in 2019

№	Factors of reducing budgetary savings	Indicator
1	Low intensity of competition in tenders	2,3
2	Share of unsuccessful procurements for cost, %	34
3	Share of contracts with changes for value, %	19,0
4	Share of canceled contracts, %	7,0

Source: calculated according to the data of analytics module (Bi.prozorro, 2020) and (Competition, 2020)

According to the study results of fuel procurements made by the Center for Excellence in Procurement of the Kyiv School of Economics, it was discovered that the share of additional agreements with price increase was higher, where there was the greatest economy and competition. Every sixth above threshold competitive procurement procedure changes the contract value. The study concludes that budgetary savings would be insignificant (excluding the corruption factor) in holding a new tender instead of signing an additional agreement (Hrybanovskyi & Memetova, 2017).

During the study we have come to the conclusion that when performing below-threshold purchases of standard products, it is more cost-effective to purchase via electronic catalogs with a description of goods on condition that the level of competition is high, instead of a tender with 1-2 participants. Procurement via electronic catalogs is widely used in the EU as a simplified way of purchasing.

Thus, the hypothesis is confirmed that the budgetary savings in public procurements do not reflect real economy, the economy indicator is false due to the overestimation of the expected value of the purchase and, as a consequence, the actual value of the purchase, the low level of competition in the tenders, the neglect of changes in the contract value. In fact, the difference between the expected and actual purchase price does not show the economy but the level of disbursement.

The results of our research have led us to conclude that the main factors influencing budgetary savings value are the level of intensity of competition and the expected cost of purchase (Table 6, Fig. 4). Real budgetary savings are achieved through highly competitive tenders and through centralization (consolidation) of procurements due to their economies of scale.

Table 6: The calculated coefficient of correlation between factor Xi and budgetary savings

№	Factor Xi	Correlation coefficient	Characteristics of strength and direction of relationship *
1	Intensity of competition	0,91	very strong direct relationship
2	Expected procurement price	0,71	strong direct relationship

**- characteristics of strength of relationship are made according to the Chaddock scale*
Source: own calculations

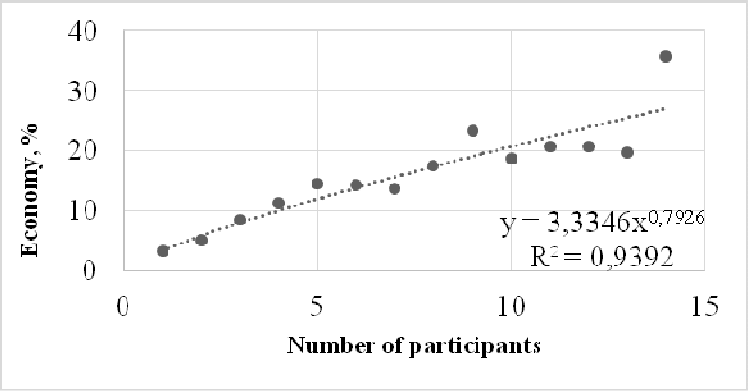

Figure 4: Dependence of the budgetary savings on the number of participants
Source: own calculations

In our opinion the methodology for determining the budgetary savings should be based on the automatic estimation of the average price on the results of completed competitive tenders. The automatic estimated purchase value can be determined by the following methods: the average price of at least three suppliers over the past period in a given region with account of the inflation index.

Conclusion

One of the important issues in the development of public procurements is ensuring of the efficient and effective use of the public funds in procurement. The urgency of the problem is confirmed by the statutory requirement of procurement on the principle of maximum economy and efficiency. The main indicators of public procurements efficiency are the budgetary savings as a result of competition, the level of the intensity competition, the share of completed procurements and the share of concluded contracts. Provoding maximum budgetary savings as the principle of public procurement is possible under conditions of high competition, centralization of the purchase of simple goods and fulfillment of the contract conditions.

The main factors of reducing budgetary savings in public procurements are the over-estimated purchase value and, as a consequence, the over-actual cost of procurement at low competition; failure to comply with the terms of the contract or the conclusion of additional agreements with price increases; disqualification of a participant with cost-

effective price for formal reasons; appeal of the procurement procedure; refusal of a winner participant to conclude the contract; losses due to violation of the legislation by the customer that cannot be identified as budgetary savings.

It is necessary to introduce an automatic price monitoring of the results of completed competitive procurements to determine the value of real budgetary savings in public procurements.

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Investigation of High Potential Staff in the Small Business Company

Elena LYSENKO

Ural Federal University named after the first President of Russia B.N.Yeltsin, Yekaterinburg, Russian Federation, e.v.lysenko@urfu.ru

Maria Guadalupe PEREZ LOPEZ

UPAEP, Puebla, Mexico, garachaj@yandex.ru

Abstract

Nowadays being of High Potential employees is the extremely important need in the modern organization of different areas of activity, size and form of ownership. Article is devoted to analyses of relation to phenomenon of "Hi-Po personnel" in the small metal trade company, Russian Federation. Methodology of research, provided by the order of top-manager/owner of company cover qualitative methods – two author's sociological survey, in which managers and key employees took part. The main evaluated parameters from both sides of stakeholders were availability and readiness to become a high potential employee (1); availability of a HiPo assessment system (2); need for HiPo development management (3). Findings of comparative analyses showed differentiation of opinions between staff and leaders in the almost criteria. Novelty of research consists in aspiration to discover opportunity to share talent-management technology on the company of small business, which usually is complicated because of little scale of activity.

Keywords: Human Resources Management, High Potential Staff, Talent-Management, Well-Being on Working Place

Introduction

The need for high-potential personnel is growing every day. Today, the organization wins in the competition most often due to high-quality human resources with high development potential. High-potential personnel retention activities cover organizations regardless of ownership, size, and scope of activity. Despite the fact that most often large companies are engaged in building systems for evaluating and developing the potential of employees, a number of questions arise:

- Do small businesses need employees with high potential?
- Is small business interested in developing the potential of employees to strengthen its market position and attractiveness?
- What should be the system for evaluating and developing potential and how specific is it for small companies?

Our research is devoted to the answers to these questions.

HiPo as a Conception and an organizational strategy

Theoretical frameworks of research are based on some important ideas:

1) Burke L. (1997)*:* HiPo as a leaders who contribute in the company more than other employees.
2) Waal A.D. (2010); Adams, D. (2011)**:** there are a number of universal HiPo competencies, such as ability to adapt to changes; a long-term orientation; constantly improving capabilities; high Intelligence; leadership ability ; good interpersonal skills etc.
3) Derr, C., Jones, C. & Toomey, E.L. (1988)*:* the company can count on their stamina and their willingness to make the necessary personal sacrifices to continue in their fast-paced career paths.
4) Aon Hewitt (2013)*:* investing in a high potential program provides greater benefits and profits to the company.
5) Fedorova, A. (2020): toxic leadership is a significant obstacle to the development of employees ' potential.

We can conclude: HiPo conception is the organizational strategy.

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HiPo Models

Modeling of HiPo conception as organizational strategy is crucially important because models help companies to know how to develop high potential employees as organizational resource. There are some interesting and productive Models of High Potential, describing different characteristics of it.

1) ***Burke L. (1007)*** *proposes 3-steps model.* This is a complex model based on clear imagine about expected results of HiPo development.

Figure 1: HiPo Model by L.Burke (1997)

PDI Ninth House (2013): The High Potential Integrated Road Map Model.

The High Potential Integrated Road Model it's a cycle framework which integrate the systems that comprise an effective high potential talent. It contains four elements that make to ensure the organization with leadership and talent. (Fig. 2)

Figure 2: PDI Ninth House (2013): The High Potential Integrated Road Map Model

According to this approach, it is proposed HiPo Model, where two extremely important processes: organizational management and human resources management are combined, that should be provided across key HRM-elements, such as staff planning, staff attractive, staff keeping, staff evaluation and staff developing. (Fig. 3)

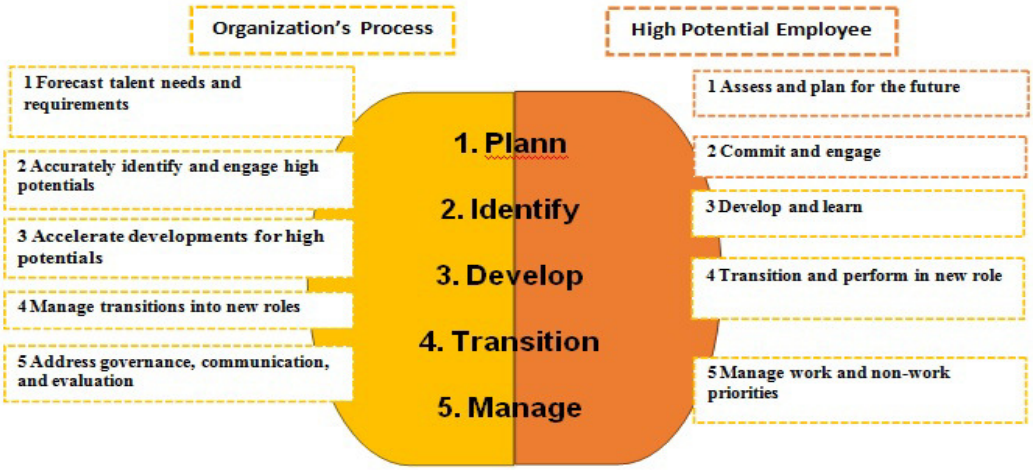

Figure 3: PDI Ninth House HiPo Model

Church A. (2016): Leadership Potential Blueprint

This HiPo Model was developed by the Dr. Allan Church, PepsiCo´s Senior Vice President. Model identifies and develops HiPo in organizations. This outlines three blocks, the first one it is the "Foundational" which involve inherit characteristics of a person like personality and cognitive abilities. "Growth" dimension it´s about the capability which an employee has to learn and motivate itself and their peers; finally, the "Career" dimension that form the basis of how employees developed their leadership capability throughout their careers. Performance and Cultural fit also play important roles in employees with long term career trajectories. (Fig. 4)

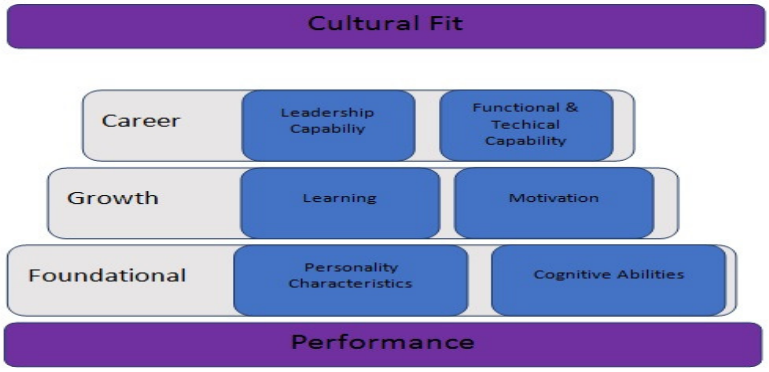

Figure 4: Church A. (2016): Leadership Potential Model

Methodology

Base of Research

A small trade company E-l Ltd., located and operated on the market of Yekaterinburg, Russian Federation, was chosen as the base of the research.

Initially the company specialized in the sales of ferrous and stainless metal, and also provided services of cutting and delivery; now Ltd. E-l - is dynamically developing company (in 2010) in the metal and engineering market. According to the value and the role of the International division of labor, it is categorized as a "Small business".
E-l Ltd. specializes in two directions:

- Main activity: Shipping black, stainless steel and non-ferrous metal, a variety of special steels and alloys that is in stock in a warehouse in Yekaterinburg, as well as to order from manufacturers;
- A wide range of metal products is always in stock: metal (armature, circle, square, angles, channels, beams, hexagon, wire rod, wire, strip, channel bent), plates (hot rolled, cold rolled, low-alloyed, expanded metal, corrugated, steel sheet, galvanized, stainless steel), pipe (profile, electric welding, hot-rolled, cold-rolled) and

other types of steel. Organizational structure is presented on the Fig. 5.

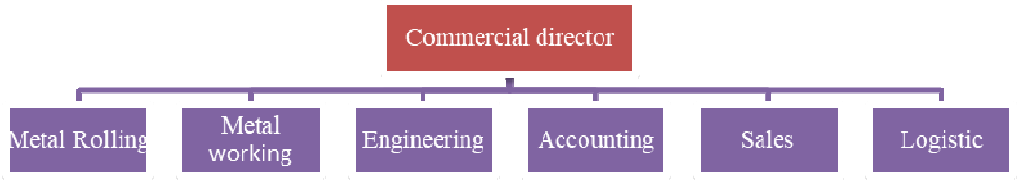

Figure 5: Organogram of Company (Source: own research, 2019)

Respondents

Respondents of research were managers and key employees on the Job position "saler-manager", because their activity is the main source of profitability of company.

Table 1: Demographic data of respondents (Source: own research, 2019

Age	Sex	Status	Study grade	Antiquity, years
26	Female	Single	Preparatory	2
-	Female	Married	University	5
-	Female	Single	University	7.5
29	Female	Married	University	5
27	Female	Married	College	6
34	Male	Single	University	1
39	Male	Married	University	4
33	Female	Married	University	3
23	Female	Married	College	0.1
31	Female	Married	University	1
24	Male	Single	University	2.5
27	Female	Married	College	5
-	Female	Single	College	1.5
31	Female	Single	University	4.2

Describing of research

Study was provided in 2019 by the order of top-manager/owner of the small metal trade company, operated in the Ural Federal district, Russian Federation.

General purpose - to analyze of relation to phenomenon of "Hi-Po personnel" and to observe being in demand the HiPo assessment system in the Company.

Methodology of research – Qualitative methods. ***Instruments*** – two author's sociological survey.
The main evaluated parameters from both sides of stakeholders:

1) Availability and readiness to become a High Potential employee;
2) Availability of a HiPo assessment system;
3) Need for HiPo development management.

Findings: Comparative Analyses

In the course of the study, a comparative analysis of the opinions of managers and employees according to the criteria identified in the Toolkit was carried out.

Availability and readiness to become a High Potential employee

Despite the fact that the company has a large number of HiPo-level personnel, the level of realization of this potential is very low. (See p. 1.2. in the Table 2)

Table 2: Availability and readiness to become a High Potential employee

N	Comparison Parameters	Employees, %	Managers, %
1 Availability and readiness to become a High Potential employee			
1.1	HiPo staff presence in the Company	87.5	100
1.2	**Level of HiPo realization**	**25**	**33**
1.3	Readiness to become a High Potential employee	87.5	66

(Source: own research, 2019)

Availability of a HiPo Assessment System

While managers claim that there is a HiPo rating system in the company, employees deny that there is One. (Table 3)

Table 3: Availability of a HiPo assessment system

N	Comparison Parameters	Employees, %	Managers, %
2 Availability of a HiPo assessment system			
2.1	The importance of identifying High Potential	100	66
2.2	**Availability of a HiPo assessment system**	**0**	**66**
2.3	**Clarity of applied HiPo assessment criteria**	**25**	**66**
2.4	**Relationship of HiPo assessment with indicators of the competence model**	**25**	**100**
2.5	Using HR metrics to assess High Potential	50	66
2.6	**Adequacy of HiPo assessment**	**25**	**100**

(Source: own research, 2019)

Need for HiPo Development Management

Employees need to design a Hippo rating system more than managers do. (Table 4)

Table 4: Need for HiPo development management (Source: own research, 2019)

N	Comparison Parameters	Employees, %	Managers, %
3 Need for HiPo development management			
3.1	Need for company support in HiPo development	**62.5**	**66**
3.2	Need for a special HiPo development program	**87.5**	**66**
3.3	Benefits of evaluating the HiPo for improving employee well being in the workplace	**87.5**	**66**
3.4	Impact of HiPo assessment on the organizational environment and effectiveness of the organization	**75**	**100**

Discussion and Conclusion

Findings of comparative analyses showed:

a) differentiation of opinions between staff and leaders in the almost criteria;
b) lack of a unified system for evaluating the potential of employees;
c) there is a higher demand for potential assessment among staff than among managers, and a desire to implement it in the company.

The cornerstone to an organization´s growth it's the implementation of a high potential strategy, this step allows the company to be competitive and prepare for various situations that arise in the future. Each organization should create its own concept of working with high-potential personnel, which should correspond to the mission and values, goals and objectives etc. Process of constructing of HiPo assessment system should be complex and concern all stakeholders of company: employees and managers/employers. Another of the advantages of having a high potential program in the company is that it can increase the perception of fairness and impartiality within organization, this help to reduce the turnover and the drop out.

Acknowledgements

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HR-Brand Development: Case of International Company Operated on the Local Market in Russian Federation[1]

Elena LYSENKO

Ural Federal University named after the first President of Russia B.N.Yeltsin, Yekaterinburg, Russian Federation
e.v.lysenko@urfu.ru

Laura TELLEZ GANYA

UPAEP, Puebla, Mexico
lau.tellez@outlook.com

Abstract

The combination of the strategies of Human Resources and Marketing have originated a new tendency called Employer Branding or HR-branding, which has enhanced the image of many companies around the world as good employers, allowing them to attract and retain the talented personnel that each one of these companies needs to reach its objectives. The aim of this research was to evaluate of HR-brand and to define factors which influence on the expectations of the internal customers and the future workforce helping to attract and save talented employees as human resources in the international company operated on regional (the Ural) market of Russia. Methodology of investigation included author's quantitative methods, applying to key groups of potential and real staff, among them there are employees of all Departments (150 persons) and senior students of federal university (70 persons). During research it is discovered that company has established basic employer branding strategies, however, findings on the base of comparative analyses of respondent's opinions showed a differentiation in preferable advantages of HR-brand between potential and real staff. As the main recommendation special HR-branding campaign was proposed for developing of brand of employer. Employer branding should be part of the organizational philosophy to achieve three main objectives: reduce turnover, increase attractiveness of company and improve engagement levels/staff well-being.

Keywords: human resources management, HR-branding/Employer branding, international company

Introduction

Theoretical Frameworks

The combination of the strategies of Human Resources and Marketing have originated a new tendency called Employer Branding or HR-branding, which has enhanced the image of many companies around the world as good employers, allowing them to attract and retain the talented personnel that each one of these companies needs to reach their objectives.

Theoretical frameworks of this research are based on 2 main blocks of ideologemes.

Block 1: HR-branding as a strategy of competitiveness

1) *Jenner&Taylor (2005)*: organizations' efforts to communicate to internal and external audiences what makes it both desirable and different as an employer.
2) *Lievens&Slaughter (2016)*: an employer image is made up of specific attributes that an individual associates with the organization as a place to work. There are 2 attributes of this: functional as objective and material and symbolic as subjective and non-material.

[1] Previous version of this research was presented at SIBR 2020 (Seoul) Conference on Interdisciplinary Business and Economics Research, 5th - 6th June 2020, Seoul, Korea

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3) *University of Alicante:* the establishment of the employer branding strategy meets two very clear objectives:
1st - Position brand as a good employer;
2nd - Attract talent to the organization and retain loyalty to employees.
4) *Acebedo (IEBS Business School, 2015)* about consequences of using HR-branding as a strategy: agile of recruitment, reduction in costs, increase in productivity.

Block 2: EVP and algorithm of HR-branding

1) *Goncer (2014)*: importance of Employee Value Proposition (EVP) as a key element of HR-branding, because EVP accumulate mission, vision and values of company and all organizational processes, including team-management, mode of work etc.
2) *Fedorova et al. (2016. 2017, 2018):* changing of expectations of new generations in consumption, work, and business become the basis of a psychological contract between an employee and an employer and are an intangible asset of the HR-brand.
3) *Peyron (2016) (Employer Branding Academy*): algorithm of HR-branding – 9 steps: Understand the business needs, define the target, understand the target, optimize the EVP, establish objectives and indicators, develop the creative strategy, choose optimum communication channels, design an annual plan, execute the strategy and follow up.

Research of HR-Brand of International Company

Base of Research

***Base of research*:** International Company operated on local market – Leroy Merlin.

Region: The Ural Federal District, Russian Federation

***Background of the Company*:** The Company is an organization of French origin that belongs to the home construction and decoration sector. With almost 100 years of history, the company has presence in 12 countries and almost 400 stores. In 2007 the company joined Grupo Adeo is currently conformed by 24 companies in 12 countries with a total of 62,000 employees, becoming the first French group and the second European in the international market for construction and decoration. The beginning of activities in Russian territory was in 2004. In just 13 years the company has opened 60 stores in 25 regions of the country and according to its strategy of development in the next 5 years the number of stores will be more than double, since they are planning to open 140 new stores.

Describing of Research

Study was provided in 2019.

General purpose - to observe Leroy Merlin Company's HR-Brand and to design HR-branding program, focused on the peculiarity of local staff needs to attract new leaders and talents.

Methodology of research – desk and field with mix of qualitative and qualitative tools.

Program of research is presented in the Table 1.

Table 1: Program of research (Source: own research, 2019)

Stage	Aim	Type	Tools	Sources/Respondents
1st	HR-brand evaluation in social media	Desk study	Content-analysis	Web site of company Social media used by Company
2nd	Evaluation of HR-brand of Company in external and internal environment	Field study	Questionnaire for potential employees	Senior students of University as external clients (70 persons)
			Questionnaire for employees of Leroy Merlin company	Employees on different job positions as internal clients (150 persons)

Findings

HR-brand evaluation in social media

Comparative characteristics of social media used by Leroy Merlin Company are presented in the table 2.

Table 2: Evaluation of social media where Leroy Merlin Company is presented

Employment web site	YouTube	Other
Good practices		
• exclusive website for potential customers • application form to vacancies directly in the employment website • story telling about success of some executives • information about factors, identified as EVP: professional development and training	• location of corporate culture's videos and social development	• using photographs of employees rather than models • publication of internal marketing strategies and vacancies • specific Instagram account for the store in Yekaterinburg
Practices to improve		
• vacancy publications are not standardized • there is no section to upload professional information, so they are not generating portfolio • it is not possible to identify the profile of the desired employee	• in the videos, leaders are not presented as brand ambassadors • there are the sections such as construction of country houses, electrician with your own hands, among others, but no section dedicated to organizational development and career growth	• the Instagram account does not have a defined strategy

(Source: own research, 2019)

The results show that the company is not sufficiently active in social media, which are currently the most preferred sources of job search and employment.

Evaluation of HR-brand by potential employees (external clients)

A) Ranking of preferable aspects for the choice any organization as employer is presented on the Fig. 1.

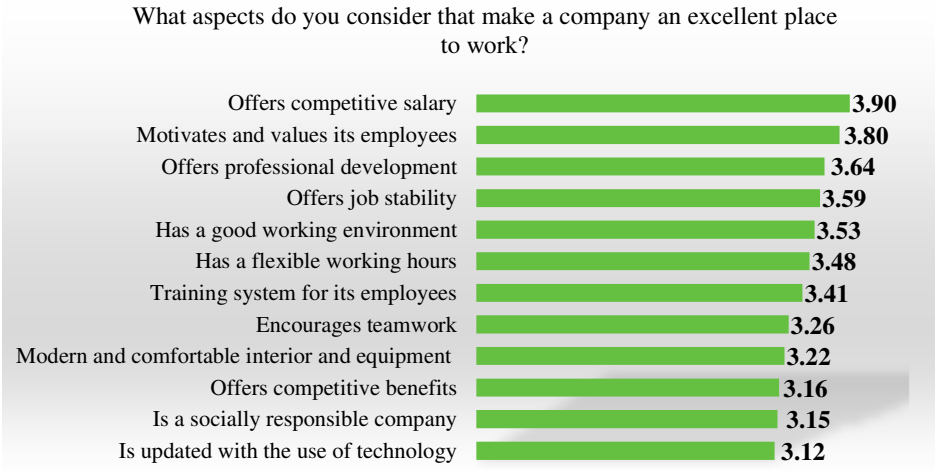

Fig. 1: Preferable aspects for the choice any organization as employer

(Source: own research, 2019)

B) Recognition of the Leroy Merlin Company as a regional employer is terrific high. (Fig. 2)

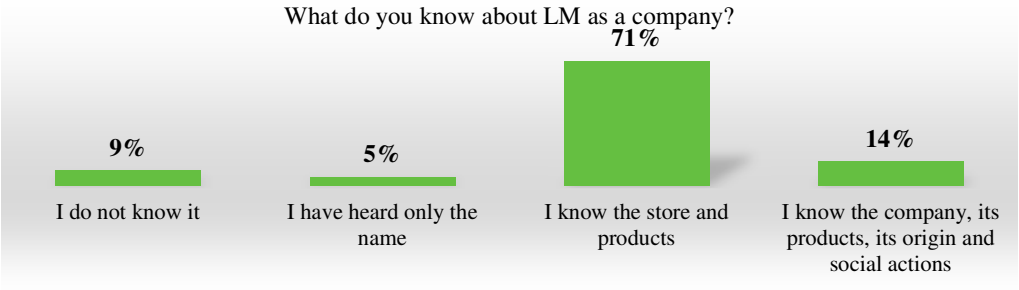

Fig. 2: The company's popularity in the labor market (Source: own research, 2019)

C) Meanwhile, almost potential employees do not consider Leroy Merlin Company as a place for work in future (Fig. 3)

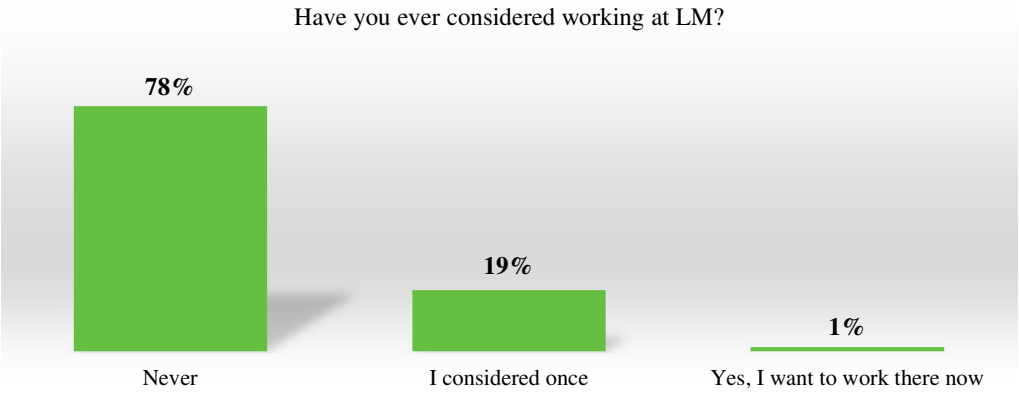

Fig. 3. (Source: own research, 2019)

Results of evaluation of Leroy Merlin Company's HR-brand by potential employees' show that despite the wide popularity of the company in the local market and a positive assessment of its brand, potential employees do not seek to choose it as an employer.

Evaluation of HR-brand by employees (internal clients)

A) Stability, salary and professional development is the main reasons of choice for staff of Leroy Merlin Company for working. (Fig. 4)

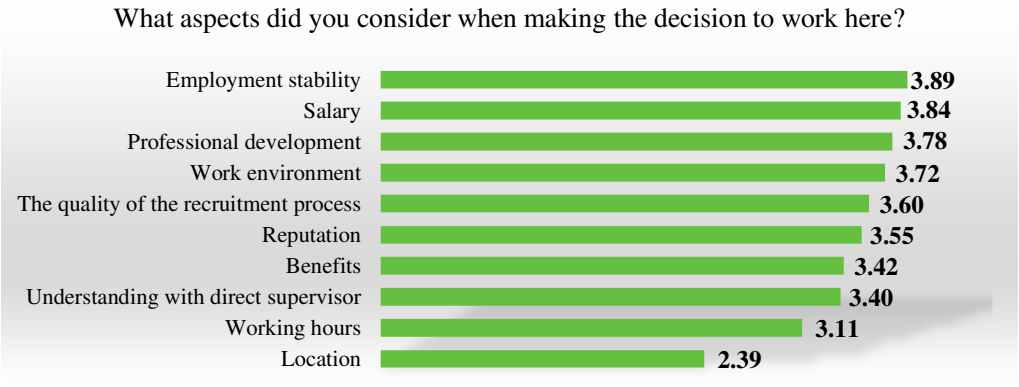

Fig. 4: The main reasons of choice for staff Leroy Merlin Company for working.
(Source: own research, 2019)

B) A significant preponderance of the employer's strengths and weaknesses indicates a strong internal Leroy Merlin Company's HR-brand (Fig. 5)

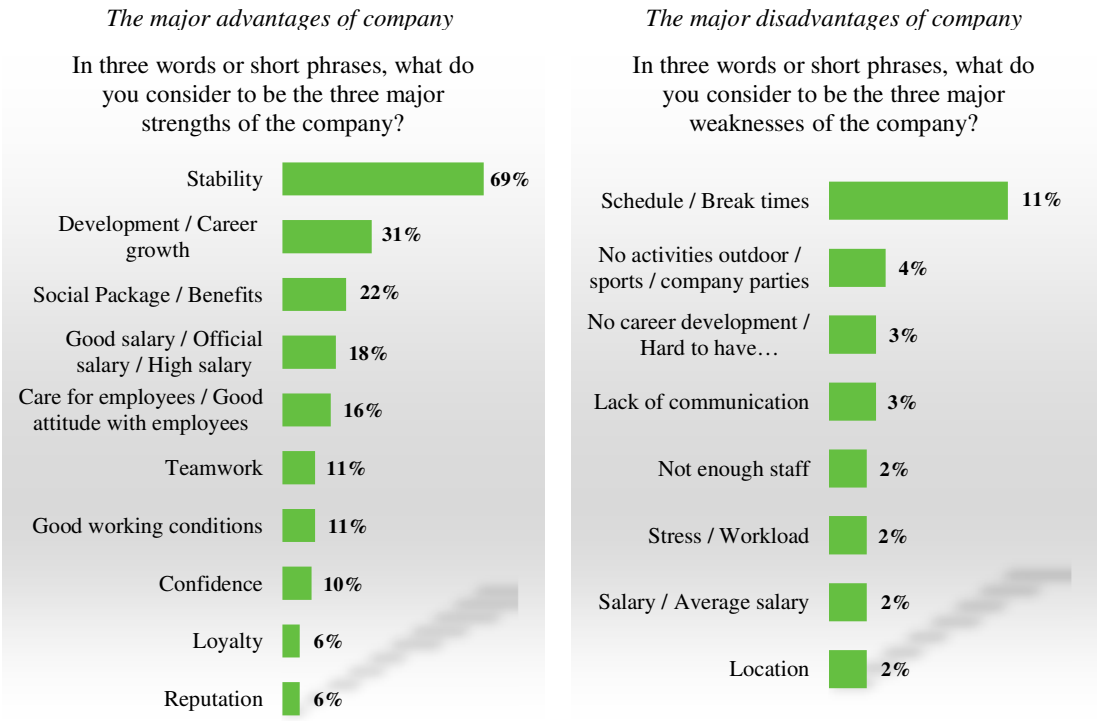

Fig. 5: The major advantages and disadvantages of Company

(Source: own research, 2019)

C) The company is interested in developing involvement and uses various ways to develop. (Fig. 6)

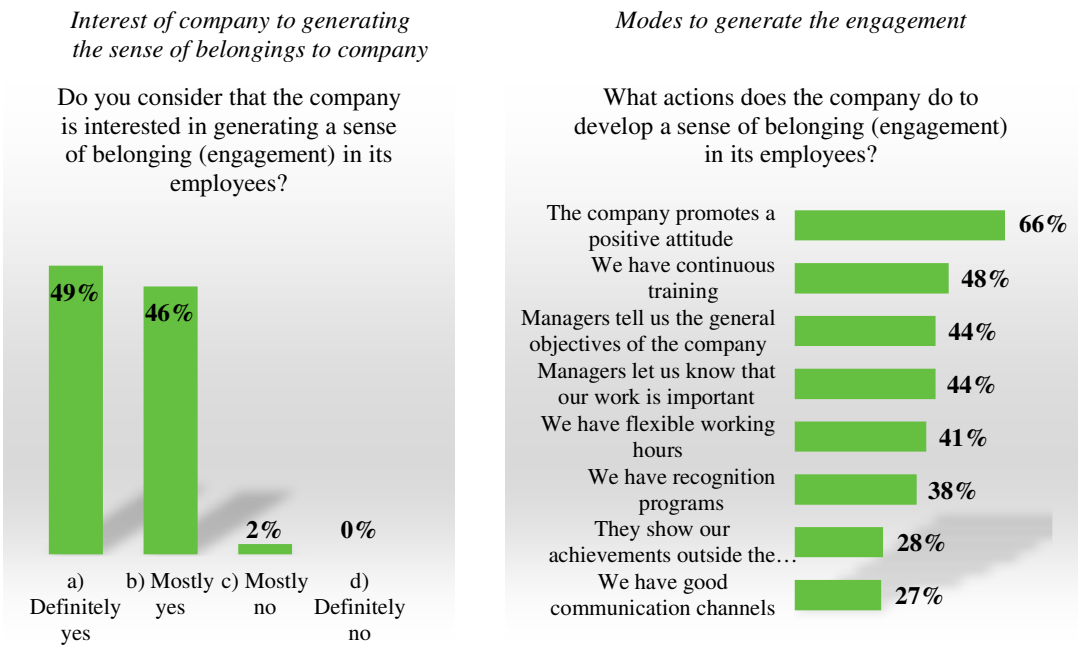

Fig. 6: The company's interest in developing of engagement and its methods

(Source: own research, 2019)

D) As result almost employees are committed to company and consider company as a the best place to work (Fig. 7)

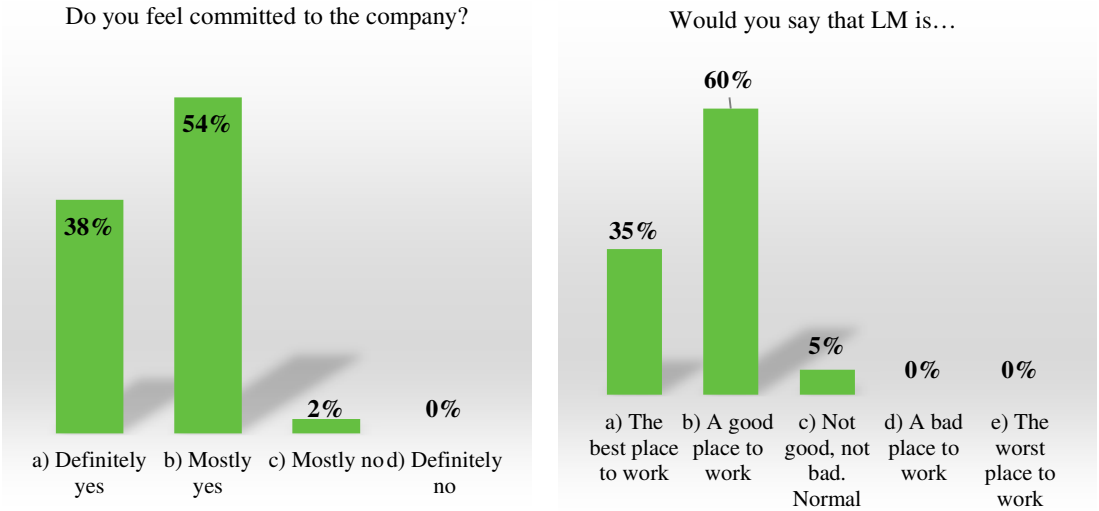

Fig. 7: Staff engagement and evaluation Company as the best place to work.
(Source: own research, 2019)

E) Comparison of student's and employees' opinion concerning of choice of working place shows that the features that the students identify in a company that distinguishes itself as a great employer, coincide with the strengths of the analyzed enterprise. (Table 3)

Table 3: Comparison of student's and employees' opinion concerning of choice of working place

Senior students		Employees	
What aspects do you consider that make a company an excellent place to work?		In three words or short phrases, what do you consider to be the three major strengths of the company?	
Offers of competitive salary	3.90	Stability	69%
Motivates and values its employees	3.80	Development / Career growth	31%
Offers professional development	3.64	Social Package / Benefits	22%
Offers job stability	3.59	Good salary/Official salary/High salary	18%

(Source: own research, 2019)

The difference is that students believe that a good employer motivates and values their employees, but this feature was not mentioned by employees as strength of the company. Instead of this variable, they chose the benefit package as one of its strengths.

Conclusion

The opinion of students as the future workforce and external clients and the employees' feedback as the real work force and internal clients is the most valuable and important information to develop Leroy Merlin Company's HR-brand. The discoveries opened in this research are the basis for the establishment of activities and strategies that will help to position this store located in Yekaterinburg as a major employer in the region. So we propose to design the special employer branding campaign to help Leroy Merlin Company to win in the competitive struggle by improving of external and internal brand of employer. Algorithm of HR-brand campaign is presented in the table 4.

Table 4: Algorithm of HR-brand campaign

Steps	Title	Content
1	Setting	***Defining of Strategy of changing:*** Goal setting Focus on external and internal labor markets EPV Key Performance Indicators (KPI)
2	Design	***Strategy of Involvement:*** Recruiting 2.0 Adaptation Benefits Professional development Training Motivation
3	Implementing	***Strategy of Realization:*** Digital Marketing Brand ambassadors Referrals

(Source: own research, 2019)

Employer branding is a strategy with start date but without a final date. Since over time, employer branding should be part of the organizational philosophy to achieve three main objectives: reduce turnover, increase attractiveness of company and improve engagement levels/staff well-being.

Acknowledgement

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Physician Staffing of Slovakia`s Healthcare system in the Context of Physicians' Emigration

Magdalena TUPA

Alexander Dubcek University in Trencin, Faculty of Social and Economic Relations, Trencin, Slovakia
E-mail: spisiakovam@gmail.com, magdalena.tupa@tnuni.sk

Sergej VOJTOVIC

Alexander Dubcek University in Trencin, Faculty of Social and Economic Relations, Trencin, Slovakia
E-mail: sergej.vojtovic@tnuni.sk

Abstract

The trend of physicians moving abroad for more favorable conditions of employment is significantly increasing. These physicians constitute a group of highly qualified emigrants, motivated by dissatisfaction with working conditions, the state of healthcare in Slovakia, relatively low salaries, and other push factors. Facilities in the country's healthcare system suffer from their shortage, which is reflected in the negative development of several indicators assessing healthcare and the health status of the population. The main aim of the study is to determine the effects of the departure of physicians from Slovakia on the sustainability of the healthcare system in the country. The analysis of the labor market in the sector of healthcare and social assistance, specifically physicians, has been conducted using mathematical-statistical analysis of data obtained from national and international statistical databases. The analysis of the labor market has been carried out using time series. Regression and correlation analyses with statistical significance testing were used to determine the parameters of the regression function. The trend shows a negative development in regards to the state and sustainability of staffing of Slovak healthcare system. The falling number of physicians of productive age is accompanied by the growing number of physician visits, due to the negative demographic development and the stagnating indicator of healthy life expectancy. This increases the demand for healthcare services; the demand which cannot be met in the conditions of the declining number of healthcare professionals due to their emigrating abroad for work.

Keywords: Physicians, Working Conditions, Emigration, Sustainability.

Introduction

The functioning of the healthcare system in the country is dependent on the adequacy of its staffing, its financial, material, technical and technological equipment, and also on the degree of institutionalization, access to innovations, scientific infrastructure and other factors. Healthcare is a sector in which value added is created mainly by workers, which is a result of the sector's low capital intensity and the high share of wages in GDP (Statistical Yearbook, 2018). Therefore, the state of healthcare in countries as well as the state of health of their population is largely dependent on both the quality and the required number of medical staff. This study looks into and evaluates the adequacy of staffing levels – specifically when it comes to the physicians - in medical facilities in the Slovak Republic. The current global shortage of health workers is adversely affecting healthcare systems in almost every country in the world. The efforts of the International Council of Nurses (ICN) in 2006 resulted in an extensive analysis and informing the professional and lay public about the shortage of health workers in the world labor market and the possibilities of how to deal with the situation (Judith, 2006).

Labor market demand for physicians in high-income countries (Rosling, et al., 2020) against the backdrop of positive economic, political and social changes has forced EU countries to accept immigration from both EU candidate countries and non-EU countries (Ognyanova, et al., 2014). Therefore, steps are being taken to attract needed professionals from abroad (Conclusions ..., 2011; Buchan, 2015). Despite transitional measures in the liberalization of labor markets in the member states of the European Union (Favell, 2014, Bradby, 2014; Buchan, at all, 2014;

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Srovnalikova, Ditkus, 2016; Kordos, Krajnakova, 2018), the entry of physicians into the labor markets of all countries was administratively simplified (Drinkwater, et al., 2009). "Marketing" activities, the so called push factors of the labor market of developed countries (Kroezen, et al, 2015), attracted the attention of physicians from Central and Eastern Europe, as well as from other developing countries in Asia and Africa (labor market entry was more administratively demanding for physicians from these countries when compared with EU candidate countries). Emigrating to work as a physician abroad has become so attractive to potential migrants that they have been willing to invest time and money in their retraining (1st and 2nd attestations) in order to enter the labor market in the destination country and increase the benefits of their migration (Clark et al., 2002; Bahna, 2011). The aim of creating a single European platform for education and recognition of qualifications was to ensure greater flexibility in the labor market, liberalize services, labor mobility and facilitate administrative procedures (Directive, 2005).

It follows that the current and projected shortage of health workers in EU countries, global competition for physicians and current economic pressures are important reasons why it is necessary to analyze the migration of all health workers and examine its effects on the healthcare systems of individual EU countries (Glinos, 2012). In the Slovak Republic, this issue has become a focus of increased attention only in recent years. Available assessments of the current situation are presented by representatives of political and public authorities, but as such they cannot be viewed as a qualified analysis with results. The adopted solutions are non-systemic and barely follow examples of measures adopted in neighboring countries; measures that often failed to have positive results. While the latest findings published by the Slovak Medical Chamber are processed more thoroughly, they only evaluate the state of the healthcare system in the Slovak Republic and process data on the migration of healthcare workers from available sources. Their research faces serious limitations because there are no databases of migrant health workers. Emigrants in general, including emigrating health workers, are not obliged to report their leaving abroad for work. The only source that at least partially reflects the emigration of physicians is the number of applications for recognition of qualifications, however, even this has become irrelevant as a result of measures to approximate the EU's recognition systems in education that have been in effect since 2013. Analyses in this area are also carried out by some of the Think-tank institutions, but their analyses also focus only on the evaluation of the current situation.

Goal

The main goal of the study was to determine what is the impact of the departure of physicians from Slovakia on the sustainability of the healthcare system in the country. Based on this, a number of research tasks were identified, which, in our opinion, should contribute to the realization of the set goal:

- to determine the current state of staffing of healthcare system facilities in the SR by physicians;
- to evaluate pull and push factors that influence the motives and decisions of physicians to move abroad for work;
- to determine trends in the emigration for work of employees of Slovak healthcare and social assistance system;
- to prepare a forecast of changes in the number of physicians in healthcare facilities in SR;
- to define the current need of Slovak healthcare facilities for medical staff.

Current state of staffing of healthcare institutions in the Slovak Republic by physicians

In 2018, 19 178 nurses worked in healthcare facilities, which was a decrease of 1.6% when compared with 2000 (Table 1). Compared with the base year 2000, we can observe a decrease in the number of employees in each of the analyzed years. The most significant decrease occurred in 2003, 2004 and 2005.

Table 1 : Development of staffing of Slovak healthcare facilities by physicians (2000 – 2018)

	Number of physicians	chain index	base index	Physicians of productive age		Physicians of post-productive age	
				number	%	number	%
2000	19894			18719	94.09370	1726	8.67598
2001	19489	0.97964	0.97964	18005	92.38545	1484	7.61455
2002	19205	0.98543	0.96537	17627	91.78339	1578	8.21661
2003	16211	0.84410	0.81487	14793	91.25285	1418	8.74715
2004	16707	1.03060	0.83980	14957	89.52535	1750	10.47465
2005	16318	0.97672	0.82025	14466	88.65057	1852	11.34943
2006	17040	1.04425	0.85654	14984	87.93427	2056	12.06573
2007	18219	1.06919	0.91580	15797	86.70619	2422	13.29381

2008	18121	0.99462	0.91088	15515	85.61890	2606	14.38110
2009	17798	0.98218	0.89464	15033	84.46455	2765	15.53545
2010	18110	1.01753	0.91032	15090	83.32413	3020	16.67587
2011	17849	0.98559	0.89721	14709	82.40798	3140	17.59202
2012	18193	1.01927	0.91450	14661	80.58594	3532	19.41406
2013	18355	1.00890	0.92264	14476	78.86679	3879	21.13321
2014	18574	1.01193	0.93365	14288	76.92473	4286	23.07527
2015	18719	1.00781	0.94094	14118	75.42070	4601	24.57930
2016	18864	1.00775	0.94823	13985	74.13592	4879	25.86408
2017	18608	0.98643	0.93536	13653	73.37167	4955	26.62833
2018	19178	1.03063	0.98404	14054	73.28189	5124	26.71811

Source: authors' own calculations according to data NCZI: Medical yearbook 2000 - 2017

According to the latest available OECD data, all V4 countries have significantly lower numbers of physicians per 1000 inhabitants than the original EU member countries (Table 2). The development of the number of physicians in the V4 countries is relatively stable. The events before and after the Slovak Republic joined the EU caused a slight oscillation. The most significant decrease was recorded in 2009.

Table 2 Comparison of the development of the number of physicians per 1000 inhabitants in selected countries (2000 – 2016)

	SK	CZ	HU	PL	AT	DE
2000	3.23	3.37	2.68	2.22	3.85	3.25
2001	3.22	3.45	2.89	2.27	3.96	3.29
2002	3.2	3.51	3.19	2.3	4.03	3.32
2003	3.05	3.53	3.25	2.43	4.11	3.35
2004	3.15	3.52	3.34	2.29	4.2	3.37
2005	3.03*	3.56	2.78	2.14	4.32	3.4
2006	3.16	3.57	3.04	2.18	4.45	3.44
2007	3.37	3.57	2.8	2.19	4.45	3.49
2008	3.15	3.56	3.09	2.16	4.6	3.54
2009	2.87	3.58	3.02	2.17	4.69	3.62
2010	3.33	3.6	2.87	2.19	4.8	3.71
2011	3.3	3.64	2.98	2.21	4.84	3.88
2012	3.36	3.67	3.09	2.23	4.9	3.95
2013	3.39	3.69	3.21	2.24	4.99	4.04
2014	3.43	3.69	3.32	2.31	5.05	4.11
2015	3.45	3.72	3.1	2.33	5.09	4.14
2016	-	-	3.21	2.42	5.13	4.19

Source: OECD (2019)

A more detailed analysis of the age structure (Table 3) found that almost 27% of physicians were of retirement age. If they stopped practicing medicine, then the Slovak Republic would have 2.58 physicians per 1000 inhabitants, which would be the lowest number among EU countries. We see a slight increase in the number of physicians in 2018, but this number still did not reach the level of the base year 2000. Population growth in the country by almost 1%, population aging, stagnation of the healthy life expectancy increase demand for health services provided by physicians, whose numbers remain insufficient, as they were decreasing until 2018.

Table 3: Development of physician staffing levels in healthcare facilities in the period 2000 – 2018, according to age categories

	Physicians/ Total	20 - 29	30 - 39	40 - 49	50 - 59	60 - 64	65 +
2000	19894	3139	4022	7030	4528	1098	628
2001	19489	2379	4155	6390	5081	917	567
2002	19205	1942	4286	5949	5450	1034	544
2003	16211	1477	3957	4687	4672	962	456
2004	16707	1336	4145	4428	5048	1179	571
2005*	16318	1207	3970	4009	5280	1198	654
2006	17040	1402	4191	3862	5529	1321	735
2007	18219	1597	4361	4031	5808	1497	925
2008	18121	1816	4142	3881	5676	1563	1043
2009	17798	1794	4003	3753	5483	1591	1174
2010	18110	2065	3908	3844	5273	1755	1265
2011	17849	2091	3594	3968	5056	1842	1298
2012	18193	2128	3501	4188	4844	2083	1449
2013	18355	2180	3479	4397	4420	2247	1632
2014	18574	2076	3613	4496	4103	2498	1788
2015	18719	2067	3736	4491	3824	2653	1948
2016	18864	2093	3808	4502	3582	2702	2177
2017	18608	2094	3834	4376	3349	2588	2367
2018	19178	2196	4035	4425	3398	2404	2720

Source: NCZI: Medical yearbook 2000 – 2017

We cannot look for the reasons for this condition in the decline in interest in studying medicine, because more than 1,000 medical students complete their studies every year. However, graduates often emigrate abroad to work, as evidenced by surveys of medical faculties. According to the dean of the Faculty of Medicine, 8 out of 10 graduates are considering leaving Slovakia and working as a physician abroad. This is evidenced by short-term emigration statistics according to the results of the labor force sample survey in individual quarters (Table 4), broken down by sector (Health and social work) and more precisely national statistics in the target countries (especially Austria, Germany, Switzerland and the United Kingdom).

Based on the above information, we have created a prognosis of the development of the number of physicians of post-productive age working in healthcare facilities in the Slovak Republic until 2022 (Fig. 1). The prognosis suggests that in 2022, there will be 6,469 physicians of retiring age working in the country, with a lower confidence limit of 5,389 and an upper confidence limit of 7,550 people.

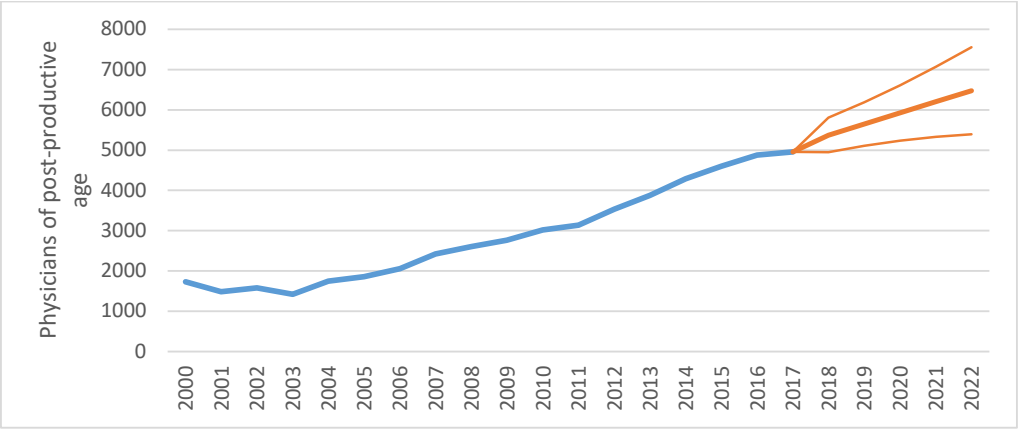

Fig. 1: Prognosis of the development of the number of physicians in the post-productive age in Slovakia until 2022

Source: Authors' own calculations

Based on the current setup of the healthcare system, we can assume a negative development with a prediction at the upper limit. This is indicated by the development of employment in this profession in recent years by age, the financing of healthcare system, and the demographic development of the population and its health status.

Mothodology and Data

We have determined the current state of staffing of healthcare facilities in the Slovak Republic by physicians by analyzing time series in the period 2000 to 2018 in the form of basic and growth indices, and comparing the indicator of the number of nurses per 1000 inhabitants in selected countries. The source of information about the subjective motives for the emigration of physicians was authors' own empirical research. We contacted 218 physicians who have worked or worked abroad for at least one year. Respondents filled out the questionnaire online and were contacted via social networks in the period from January 2018 to May 2018. The aim of the questionnaire was to determine the reasons and motives of physicians for going abroad to work, as well as their plans for the future, i.e. permanent migration, re-emigration or return migration. For the purposes of this study, information on the motives for the emigration of physicians to work abroad was selected from the questionnaire. The relationship between the number of physicians working in healthcare facilities in Slovakia and the short-term emigration of health and social care workers was determined using correlation and regression analysis (regression, correlation coefficient, coefficient of determination, ANOVA) at the significance level $\alpha = 0.05$. Based on these analyses, a forecast of the development of the number of physicians for 5 years was prepared, which was based on the time series of the development of this indicator in the period 2000 - 2018. A certain problem in measuring the intensity and the extent of migration of health professionals was the absence of available statistical data (Dussault et al, 2009; Hardy, J. et al. 2016).

The Slovak Republic lacks reliable data on the number of health workers who have gone abroad to work and on their work activity abroad. It is possible to use data from the Ministry of Health of the Slovak Republic, which records applications for the issuance of a certificate of equivalence of education for the purpose of practicing the medical profession abroad, but only until 2013. Since 2013, based on the so-called system of automatic recognition of education between EU Member States, we can no longer consider these data to be relevant. We obtained further information on the number of physicians and the conditions of their work abroad from the data of the National Center for Health Information, the Slovak Medical Chamber and the Slovak Chamber of Nurses and Midwives. A general overview of the migration of health professionals was provided by OECD statistics, namely the topic of health and subsequently Health Statistics for the relevant years, as well as the WHO. However, detailed information is published with a time delay of two to three years. The reports published by the Institute for Economic and Social Reforms (INEKO) of Slovakia and by the Slovak Medical Chamber also provided a general view of the issue.

Empirical Analysis

Causes and motives behind the emigration of physicians for work abroad

According to migration theories (Massey, et al. 1994; Ravenstein, 1889, Palát, 2015), generally motivating factors are low wages, unsatisfactory working conditions (legislative working hours, workload, insufficient equipment, etc.),

geographical proximity of countries with significant pull factors, providing opportunities to acquire skills in the exercise of the profession and more.

The assumption of low wages, healthcare expenditures as a share of GDP, workload (number of physician visits and the number of people in post-productive age) is verified using selected statistical data listed in Table 4. We determine the dependence of individual indicators through correlation analysis in the period 2000 – 2018, whose results are presented in the correlation matrix in Table 5.

Table 4 : Development of selected indicators of the state of healthcare in the Slovak Republic

Year	Short-term emigration in thousands		Number of people of post-productive age in thousands	Healthcare expenditures as a share of GDP (%)	Number of physician visits per year	Number of physicians in persons	Average salary of physicians in €
	Total	Healthcare and social work					
2009	131.7	13.3	665.1	7.9	11.5	17798	1506
2010	124.7	13.5	672.7	7.7	11.5	18110	1569
2011	114.6	16.6	690.7	7.4	10.9	17849	1583
2012	123	16.5	710.2	7.6	11.1	18193	1897
2013	134.2	22.7	733.1	7.5	11.0	18355	2003
2014	136.2	27.1	756.9	6.9	11.2	18574	2135
2015	160.6	35.8	783.9	6.8	11.3	18719	2316
2016	153.5	37.1	814.7	7.0	11.4	18864	2438
2017	149.8	35.3	844.9	6.8	10.9	18608	2514
2018	137.7	25.6	874.3	6.7	10.9	19178	2650

Source: ŠÚ SR: The results of the labor force sample survey in 4. quarter 2009 – 2018.

The correlation matrix shows high dependence between the development of the number of physicians, the level of wages and short-term emigration in the health and social care sector. The indicators of the number of people of post-productive age, short-term emigration in the healthcare sector, the number of physicians, the level of physicians ' wages and healthcare expenditures show a weak correlation. This means that the more people of post-productive age, the smaller share of GDP goes to healthcare. Despite the growth of absolute indicators of healthcare financing, the number of physicians is decreasing.

Another interesting result is the high degree of dependence between the average salary of physicians and short-term emigration. Despite wage growth, the number of emigrants in the health and social assistance sector is continuously increasing. This can be explained by the development of the average wage in the national economy, which more or less copies the development of the average wage of physicians. At the same time, more demanding working conditions (confirmed by empirical research), a high number of physician visits, insufficiently equipped hospitals, night shifts and working on weekends, bureaucracy, etc., are other push factors that encourage physicians to work abroad. As their shortage is also an acute problem in other countries of the European Union, the level of wages of physicians in the target countries, the equipment of medical facilities, and more are also important factors for emigration.

Table 5: Correlation matrix of selected indicators of the state of healthcare in the SR

	Short-term migration		People of post-productive age	Healthcare expenditures as a share of GDP	Number of physician visits	Number of physicians	Salaries
	Total	Healthcare					
Short-term migration total	x						
Short-term migration – Health and social care	0.904605	x					
People of post-productive age	0.685005	0.812460	x				
Healthcare expenditures as a share of GDP	-0.679575	-0.850661	-0.906292	x			
Number of physician visits	0.153431	-0.150001	-0.443088	0.41351	x		
Number of physicians	0.699215	0.775573	0.929257	-0.87023	-0.24044	x	
Salaries	0.745999	0.857789	0.983173	-0.90447	-0.38407	0.95375	x

Source: Authors' own calculations

Trends in the migration of Slovak physicians to work abroad

Regression analysis was used to determine the relationship between the number of physicians in healthcare facilities and the short-term migration of health professionals in the period 2009 – 2018. The number of physicians is an independent variable X and the number of short-term emigrants is a dependent variable Y due to the fact that the number of physicians working in Slovakia impacts the number of emigrated health workers. With the increase in workload and deteriorating working conditions, physicians' dissatisfaction and tendency to emigrate are growing.

Table 6: Regression analysis of the number of physicians in the SR and short-term emigrants

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	372.88898	84.46941	4.41449	0.00310	173.15058	572.62739
X Variable 1	-0.01105	0.00268	-4.12891	0.00441	-0.01737	-0.00472

Source: Authors' own calculations

The regression function has the form y = 372.889 - 0.01105x. The regression function shows that if the number of physicians entering the healthcare sector were zero, the departure of healthcare professionals for work abroad would increase by almost 373 persons per year (Intercept value - b0). As the number of physicians increases by one, the number of emigrated healthcare workers decreases by 0.01105 (X variable value 1). P-values express the significance of the locating constant and the regression coefficient. The P-value for the locating constant is 0.0031 <0.05, and for the regression coefficient it is 0.00441 <0.05, which confirms the statistical significance of the coefficient and the locating constant. The values of the 95% confidence interval for b0 and b1 express that if one physician is added to the health and social care system in Slovakia, the number of emigrated health workers will decrease with a 95% probability from 0.01737 to 0.00472.

Table 7: Correlation factor and determination factor - indicators of dependence between the number of physicians and short-term emigrants

Regression Statistics	
Multiple R	0.775573
R Square	0.601514
Adjusted R Square	0.551703
Standard Error	6.260777
Observations	10

Source: Authors' own calculations

Multiple R (correlation coefficient) is 0.776, which indicates a weak correlation between the number of physicians working in healthcare facilities in the Slovak Republic and the short-term migration of health professionals. The coefficient of determination (R Square) shows that we have explained 60.15% of the dependent variable of short-term emigration of workers in the examined sector, the other part represents unexplained variation.

Table 8: Statistical significance of dependence between the number of physicians in the healthcare sector and those working abroad short-time

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	473.3464	473.3464	12.07599	0.00838
Residual	8	313.5786	39.19733		
Total	9	786.925			

Source: Authors' own calculations

Table 8 shows the explained (regression), the unexplained (residual) and the total variation. SS is the sum of squares, df - the degree of freedom and MS - mean squares. The F test was used to evaluate the analysis of variance. Since the significance of F is less than the level of significance α (0.00838 <0.05), this means that the greater the number of physicians in healthcare facilities in Slovakia, the more of them decide to emigrate to work abroad. The model is also statistically significant based on the F test and was chosen correctly.

Discussion of Results and Conclusion

Based on the conducted analysis in the period 2000 – 2018, we determined that medical facilities in the Slovak Republic are severely understaffed. The trends in the development of the number of physicians by age in the healthcare system show that the situation will only continue to deteriorate as a result of their retirement. The entry of newly qualified physicians into healthcare system would be sufficient only in case, if all graduates of medical universities and faculties in Slovakia would find employment there as well. However, the situation is worsening due to the emigration of Slovak graduates to work abroad and also due to a relatively high share of foreign students who study medicine at Slovak universities and who subsequently go back to their home countries. The situation is exacerbated by the emigration of physicians immediately after graduation, as evidenced by the intentions to emigrate expressed by the students. The results point out strengthening push factors that drive them out of the Slovak healthcare labor market. These push factors are accompanied by pull factors, which have been set by the target countries as part of their migration policies to attract qualified health personnel, a shortage of which has been evident in Western European countries for several decades (Pichlhöfer, Maier, 2015; Kovacheva, Grewe, 2015; Skills, 2017).

Multiple studies suggest that the shortage of healthcare professionals is a global problem (Oulton, 2006; Kingma, 2008). Through correlation analysis in the period 2009 – 2018, we confirmed the assumptions about the negative development of the number of physicians in Slovakia, which impacts the health of the population. There is a strong correlation dependence between indicators of the number of practicing physicians in Slovakia and short-term workers abroad. The regression analysis confirmed that the more people of post-productive age living in Slovakia, the fewer physicians are practicing medicine in Slovakia. Therefore, the departure of physicians to work abroad may jeopardize the very safety of the national health system (Watson, 2011). The share of GDP allocated to healthcare expenditures also has a high impact on the studied indicators. Countries with underfunded healthcare systems and low wages experience the negative impact of healthcare worker migration on the state of their healthcare (Dussault, Franceschini,

2006). In relation to the escalating tensions on the labor market in the healthcare sector (Health, 2016) and deteriorating working conditions of physicians, we can expect a negative development of physician staffing in healthcare facilities in Slovakia, especially in case of physicians of post-productive age, with the expected development leaning towards the upper – more negative – limit of the presented prognosis.

Conclusion

The shortage of workers in the healthcare sector has far-reaching consequences, as witnessed on a daily basis by people seeking treatment in GP and outpatient clinics, hospitals and other facilities that provide healthcare. In addition, the negative impact of such shortage is felt by the physicians themselves, who must perform an exceedingly demanding work in the conditions of a poorly set system. Work in outpatient clinics, twelve-hour shifts and night shifts in hospitals, overtime, working over weekends, growing number of patients in hospitals contribute to the fact that the job of a practicing physician is physically and mentally demanding, with a high degree of responsibility, often accompanied by stress, burnout and other negative phenomena.

Systematic quantitative and qualitative research of this topic would help us to understand not only the consequences but also the causes and motives behind the emigration of physicians leaving the Slovak Republic to work abroad, and thus to some extent influence the migration process of healthcare professionals according to the needs of the labor market in this sector and sustainability of healthcare system staffing. Building upon the analysis of the number of physicians by the age categories, we used mathematical recalculations to determine the actual state of staffing of medical facilities by physicians and defined their current shortage.

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Methods of Forming Professional Communicative Competence of Future Non-Language Specialists

Oleh LAZARIEV
Uman National University of Horticulture, Uman, Ukraine, cool_oleh333@i.ua

Yuliia FERNOS
Uman National University of Horticulture, Uman, Ukraine, fernosyulia@gmail.com

Svitlana KARYCHKOVSKA

Uman National University of Horticulture, Uman, Ukraine, karychkovska@gmail.com

Vasyl KARYCHKOVSKYI

Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, vkarychkovskyi@gmail.com

Svitlana MASLOVATA

Uman National University of Horticulture, Uman, Ukraine, svetlana_maslovataya@meta.ua

Halyna OSIPCHUK

Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, 130975@ukr.net

Abstract

Changing the general requirements for the level of training of specialists in higher education establishments requires the introduction of the new methods of work and improvement of traditional ones. The main goal of the study was determined by the need to motivate students while teaching a language, taking into account the principle of individualization of learning, and, most importantly, the need to co-organize work in an interdisciplinary space of requirements for the future non-language specialists to reach the level of professional communicative competence. The concept of "professionally oriented communication" in practice was reduced to the ability to compose a monologue statement and conduct a dialogue within the framework of the topics defined in the curriculum of a foreign language for professional purposes course. Purposeful work on the form of organization of communication, which is always a characteristic feature of professional communication of a specialist, was not singled out as a separate educational goal and was not subject to formation during training speciality language. Among the forms and methods of work, the most significant were those that allow you to create an actual motivation for professional communication and develop the mental and cognitive abilities of students, for example, problem solving tasks. Based on the analysis of the methodological literature, and also, based on the identified shortcomings in the level of proficiency of future specialists in professional communication skills and abilities, we put forward a hypothesis that the targeted training of professional communication skills can be included in the curriculum of a course of English for specific purposes (ESP).

Keywords: non-language specialist, English for specific purposes (ESP), professionally oriented communication, communicative competence.

Introduction

Today the current state is determined not only by the specifics of institutions of higher education, but also by modern requirements for specialist training, which involves reviewing methods and techniques of training, shifting the emphasis to practical training and the ability to be well-versed in professional activities under changing

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conditions. Enhancing the level of professionalism of future specialists involves the appropriate organization of classes within a multidisciplinary approach. As indicated by an analysis of specialized pedagogical and methodological literature professional communication skills are the essence of the professional activities of future specialists and can be included in the goals and objectives of the language training program. As studies have shown, positive results in implementing the tasks of the interdisciplinary space can be achieved when the professional communication skills and abilities are allocated as the main unit of content in the course program.

Professional communicative competence is the basis of a specialist activity. The specificity of professional-oriented communication is that it is strictly regulated and is always achieved in a problematic situation. In addition, speech interaction communicators are not free to choose the means: the positions occupied by the participants of speech interaction are defined by a fixed procedure and involve the use of clearly defined patterns of speech actions and methods of verbal expression. The analysis of the special literature allowed allocating the complex of the competences that are the essence of professional communicative competence.

This general didactic problem has been studied by the scientists for many years (Abulkhanova-Slavskaya, 1989; Kudryavtsev, 1986; Lerner, 1973; Makhmutov, 1975; Maksimova, 1981; Matyushkin, 1972; Okon, 1968; Passov, 1983; Rakitin, 1973; Safonova, 1980; Skatkin, 1971; Tsvetkova, 1971; Vaysburg, 1973; Vysotskaya, 1974).

Results of the Research

Today the advantages of competence and problem-based approaches are obvious, they have been experimentally reasoned for many times in numerous studies that have shown that the competence approach in learning promotes the development of intellectual, speech and thinking, as well as creative self-realization of students. The scientist Z. M. Tsvietkova notes that "in order to ensure the proper development of thinking in the language institutions, it is necessary to make the process of language learning more independent and more problematic" (Tsvetkova, 1971: 339). It is obvious that the specificity of language as a subject requires appropriate adaptation of the general didactic method, the essence of which is to find ways to solve problems of various degrees of complexity based on previously acquired experience.

In the methodological literature, the concepts of "problem task" and "problem situation" are considered as fundamentally different terms, because they denote different psychological realities. A. N. Leontiev (Leontev, 1959: 232) defined the task as "a goal defined in certain conditions", the problem in didactics is defined as an arisen or posed to the subject question, the answer to which no one knows and requires a creative search. As a rule the problem contains contradictions, the overcoming of which is, on the one hand, connected with difficulties of its decision, mobilization of cognitive activity and mental processes, inclusion of elements of creative, search, mental and speech activity, and on the other hand, with mastering of new knowledge and methods of obtaining them (Eiger & Rappoport, 1992).

It is important to note that the problem task is the type of task that assumes that the student must find the optimal single correct answer. In this case, the student relies on theoretical and practical knowledge that has been obtained previously. Therefore, the use of problem tasks in the methodology of language teaching allows developing the mental abilities of students and updating the previously learned theoretical and practical material.

Unlike a problem task, a problem situation presupposes the presence of several possible ways to solve it, as well as the active involvement of the student in the process of finding an answer to the question posed in the problem task. The use of competency-based and problem-based approaches is a reorientation of the learning process from teaching to learning. Thus, A. E. Melnyk (1976) characterizes the specifics of the problem situation as follows: "In order to create a problematic situation, the student must be faced with the need to complete a task (theoretical, practical) in which the knowledge to be learned will take the place of the unknown. The unknown is always characterized by a certain degree of generalization. The problem situation is characterized by the degree of complexity of the unknown to be learned. The main indicator of the degree of complexity is the level of generalization of the revealed unknown, and the degree of generalization that the student must achieve in the process of identifying new knowledge in a problem situation. The indicator of generalization thus becomes an indicator of the problem situation, i.e. an indicator that characterizes the student capabilities (creative abilities and the level of knowledge, skills and abilities achieved by him) ... (Melnyk, 1976: 37).

However, the statement of problem tasks does not provide or lead to the emergence of problem situations. Psychologists emphasize that the problem situation is always included in the conditions of theoretical or practical activities and arises only in the process of solving the problem by the students themselves.

Modern training programs provide, as a rule, a selection of typical problematic situations. The use of typical situations in learning has become so widespread that it was separated out into the approach called "the method of concrete situations". The essence of this situation is that in contrast to the problem, which involves finding a solution based on the described initial conditions and in accordance with a certain method of finding the correct answer, in this situation, questions can be asked and solutions can be given. But “the most important thing is that each student seeks his own answer to the posed questions, and each decision set out in the situation may have different assessment and can be differently interpreted by the students involved in the discussion of the situation. A specific situation is not an example of the right or wrong decision or behavior. It is a concrete example for discussion. Therefore, a specific situation does not live by itself without a group discussion process. Even if the text of a specific situation or additional information hidden from students, but known to the teacher, contains an answer that shows how life has solved the problem, the discussion that took place in the process and conclusions which students will do for themselves as a result of the discussion will be the answer to a specific situation in the learning process” (Vikhanskiy, 1997: 21).

Obviously, in the process of learning communication skills (reading, writing, comprehension and speaking), the goal of a teacher is to organize student speech activities in such a way as to create conditions for the implementation of the speech problem. This methodological task was formulated by A. A. Leontiev in the article "Mental processes in the foreign language learning " (Leontev, 1975: 75), in which he stressed the need to "subordinate the methodology of teaching foreign language communication" to "the system of interrelated problems, which act as a chain of tasks that gradually become more complicated ..., these tasks should permeate all aspects of learning and all used methods should be aimed at stimulating creative activity… and minimizing mechanical, meaningless operations. Ideally, the use of problem situations in the process of teaching communication skills activates not only the intellectual abilities of students in the broadest sense of the word, but also allows you to organize classrooms so that the process of communication skills is carried out taking into account student cognitive motives and modern programs of specialist training.

The specificity of language teaching limits the use of competency and problem-based approaches, forcing the use of a combination of numerous methods. That is, the adequacy of a specific method application is always determined by the focus of a particular stage of learning on the development of language, speech or communication skills. The analysis of the existing classifications of teaching methods showed that the course programs can use two types of methods: deliberately practical methods and combined ones.

Thinking plays a leading role in the process of mastering foreign language communication, so researchers emphasize the need to take into account the principle of consciousness and communication, i.e. the need to organize learning so as to create conditions for students to understand language factors and create adequate ways to apply the material.

Thus, during the course development it is necessary to take into account that it was built in a certain sequence of methods: acquisition of knowledge – theoretical and cognitive method; development of language skills and abilities – communicative method; development of professional communicative skills – problem method, formation of professional communicative competence – competence method.

During the educational process, a large place should be given to the activity of students during the acquisition of lexical and grammatical material, as conscious assimilation of language phenomena is achieved if students actively and not passively master the educational (theoretical, linguistic, speech) material and operate it in independent professionally oriented speech. Focus on solving problems and problem situations is inextricably linked with the development of cognitive abilities of students, with the activation of their speech and thinking activities, so all teaching methods and techniques are focused on stimulating mental and creative activity, using a system consistently built according to task complexity. Solving problems and situations requires the activation of previously formed knowledge and skills of students and the development of new ones. When using combined, problem-solving methods, the issue of continuity in the formation of knowledge and lexical and grammatical skills is solved. In addition, the use of special types of work in problem-based learning allows to solve the problem of

developing professional skills and abilities, which is the part of the development of communicative competence of the language studied (Slesareva, 1980: 159).

It is obvious that work with problem situations is aimed at the development of professional communication skills, it is the final stage in the algorithm of the thematic series work. Therefore, the degree of complexity and the set of possible solutions to the problems depend on how effectively the work on the development of language and speech competencies was organized.

In the methodological literature, the question of what types of tasks can be considered "already problematic" and which only preparatory, is solved ambiguously. The same diversity of opinions is observed in the proposed classifications of problem tasks and problem situations. In this regard, the list of requirements proposed by A. P. Babenko seems interesting, which must basically meet the tasks included in a series of problem situations: "tasks that determine the motivational nature of student speech; tasks that determine the purposefulness of student speech; tasks that focus students on emotional and personal speech; tasks that focus the speaker on the listener" (Babenko, 1968).

In this theoretical study, the proposed list can be taken as a basis, despite the fact that the wording of the above requirements is broadly construed and allows the widest content. The advantages of such a list are that it allows you to distribute and typologize problematic tasks and situations in accordance with the stages of work on a thematic series, ensuring the controllability of the educational process, providing it with a cognitive and searching nature, creating conditions for the active involvement of students in work in each lesson. The algorithm of work on the thematic series involves a gradual increase in the complexity of problem tasks, the complexity of professional-oriented communicative tasks.

Each thematic series contains a set of problem tasks and a set of specific typical situations, which allows to activate both professional knowledge of students and develop professional communication skills, i.e. the ability to assess their own position, the position of the interlocutor and the purpose of communication; ability to formulate and justify their own position; ability to oppose (ask questions, influence the arguments of the addressee, supplement the interlocutor's statement or object to his ideas); the ability to reach a common conclusion. Thus, based on the theoretical foundations of the study, it is possible to develop a methodological system for the formation of professional communicative competence of the future specialist in the field of agriculture.

The main characteristics of this methodology are:

1) application of the communicative method within the framework of problem and competence approaches in the process of learning a foreign language for specific purposes;
2) combination of two methodological tasks in the educational process: improving language competence and the formation of professional communicative competence;
3) formation of the actual motivation of professional communication in the process of teaching ESP;
4) activities for the purposeful formation of professional communication skills and abilities are determined as a learning objective;
5) gradual formation of professional communicative skills and abilities, which involves a gradual increase in the complexity of problem tasks and the complexity of professional communication tasks;
6) focus on practical training, which involves the use of modern forms and methods of training that ensure readiness for effective performance of professional activities.

The process of forming professional communicative competence can be divided into three stages, each of which has its own tasks, methods, process content and control of results. At the preparatory stage, it is necessary to organize activities aimed at improving language competence and at developing the ability to construct statements based on a model form. At the next stage it is necessary to organize systematic activities for the formation of the ability to evaluate and maintain their own position, the ability to evaluate the position of the interlocutor in communication, the ability to oppose. At the final stage, it is advisable to conduct targeted activities to improve the skills that are formed in the previous stages, as well as work on the formation of the ability to participate in collective cooperation and reach a common conclusion (Graboy, 2002).

The basis for the formation of professional communicative competence is made up of problematic and competence-based approaches, which makes it possible to single out the technological components of the process of forming professional communication skills, methods and techniques of intellectual work. Adequate forms of work that gradually form professional communication skills are: problem solving, analysis of specific typical situations, business game.

The developed methodology for the formation of professional communicative competence assumes: selection of content, identification of stages, determination of methods and techniques of work and criteria for assessing the formation of professional communication skills at each stage. The most important source for the development and improvement of professional communicative competence is the organization of a systematic and purposeful work on improvement of language competence and the formation of key skills: build statements according to a given pattern, evaluate and maintain one's position, evaluate and fix the position of the interlocutor, oppose, participate in collective work and reach a common conclusion.

The experimental educational study was intended to test and compare the level of professional communication skills and abilities of the students in the experimental groups with the level of the students in all other groups. The hypothesis is considered proven if the level of proficiency in professional communication skills and abilities of the students of the experimental groups meet the requirements of the experimental training program, and also if the level of language competence (mastering the lexical and grammatical material of the thematic series) is not lower than the level of students in control groups, which are assessed by the same parameter

Dynamics of the formation of professional communicative competence

Table 1: Language competence

	Levels, %		
Stages	**High**	**Sufficient**	**Insufficient**
Experimental group			
Entry	22	29	49
Intermediate	40	46	14
Final	49	38	13
Control group			
Entry	23	37	40
Intermediate	39	33	28
Final	34	38	28

Table 2: Ability to evaluate the position of the interlocutor

Stages	**Levels, %**		
	High	**Sufficient**	**Insufficient**
Experimental group			
Entry	27	36	37
Intermediate	34	38	28
Final	45	35	20
Control group			
Entry	26	37	37
Intermediate	32	34	34
Final	40	36	24

Table 3: Ability to evaluate and maintain personal position in communication

Stages	Levels, %		
	High	Sufficient	Insufficient
Experimental group			
Entry	**27**	29	44
Intermediate	**28**	35	37
Final	**45**	31	24
Control group			
Entry	25	38	37
Intermediate	29	35	36
Final	35	31	34

Table 4: Ability to oppose

Stages	Levels, %		
	High	Sufficient	Insufficient
Experimental group			
Entry	27	34	39
Intermediate	33	36	31
Final	44	34	22
Control group			
Entry	27	36	37
Intermediate	33	34	33
Final	40	36	24

Diagnostics of the formation and improvement of professional communicative competence of students, as well as the results of educational activities of students from the experimental groups showed a number of positive changes. Thus, at the second stage, most students of the experimental groups showed the ability to record, argue and maintain their own position in the process of professionally oriented communication, the ability to formulate clear conclusions, communicate using given expression, oppose etc. Also, the analysis of the data obtained shows that the indicators of the ability to assess the position of the interlocutor or opponent in communication and the ability to oppose coincide.

Conclusion

Thus, having worked out the methods of forming professional communicative competence of students in the process of teaching ESP, one shoul focuse on the solution of an important research task, such as identifying ways to improve the process of forming professional communicative skills of students. The conditions affecting the efficiency of the process have been identified and confirmed: the use of problem and competence-based approaches in teaching, as well as purposeful activities to improve language competence; reliance on pre-formed linguistic competence; gradual formation of professional communicative skills and abilities; organization of a purposeful, controlled, systemic process of forming professional communication skills and abilities; modern approaches to the content and techniques of training and the formation of professional communicative competence of the future

specialists. In general, the study revealed positive trends in the development of students' professional communication skills in the process of learning ESP, which indicates the need for further development of the problem, both at the theoretical and practical levels. Further research is also required to develop a methodological support for the formation of professional communicative competence based on the language of the specialty in non-languageeducational establishments.

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Barriers to And Facilitators of Scientific Productivity: A Case Study from Polish Technical University

Magdalena SZUFLITA-ZURAWSKA

Gdansk University of Technology, Gdansk, Poland
magdalena.szuflita@pg.edu.pl

Beata A. BASINSKA

Gdansk University of Technology, Gdansk,Poland
beata.basinska@pg.edu.pl

Krzysztof LEJA
Gdansk University of Technology, Gdansk, Poland
krzysztof.leja@pg.edu.pl

Abstract

Scientific productivity plays an essential role in the creation of innovation and it stimulates social and economic growth. This study aimed to identify the barriers to and facilitators of scientific productivity in engineering and technology field, as perceived from the perspective of academic managers. Along with quality approach, the study relied on semi-structured interviews with managing bodies, i.e. seven deans and deputy deans from four faculties representing scientific field of engineering and technology. A single case study of Polish technical university was analysed in accordance with Braun and Clark's six-step framework and coded in NVivo software. Findings fell into four themes: scientific publication, recognition, funding research, and collaboration. The results revealed more barriers than facilitators in terms of acceleration of and motivation for research productivity. Most of them related to human, financial, organisational, structural resources, and organizational culture. The novelty of our study lies in the insights into the middle management of universities in the scientific field of engineering and technology in light of the Positive Organisational Scholarship framework.

Keywords: Scientific Productivity; Job Resources; Management; Positive Organisational Scholarship.

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Introduction

The core mission of universities (apart from education and building relations with business and society) is research (Cooper 2011; Scott 2006). Higher education institutions (HEIs) endeavour to enhance research productivity by ensuring a high quality of scientific research and accountability of research funding obtained (Aprile et al. 2020). For scholars, research productivity is an ongoing process that might have a positive impact on the university and individual performance (Edgar & Geare 2013). Thus, identification of the determinants that hinder and facilitate the improvement of scientific productivity is crucial for universities in terms of boosting their status and achieving recognition in the academic environment. The novelty of our study lies in the insights into the middle management of universities in the scientific field of engineering and technology.

Scientific Productivity

Scientific productivity might be defined in a narrow, quantity approach as the number of peer-reviewed scientific publications such as scholarly articles and conference proceedings per researchers (e.g. Teodorescu 2000). However, a more extended definition of scientific productivity, which combines quantity and quality approach, has also been the basis of research. Scientific productivity involves carrying out quality research, including publishing

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academic papers in reputable international journals and citing these papers, acquiring research grants or external funding, and collaborating in scientific teams (Kwiek 2018). Findings of the existing studies have confirmed that the most productive academic scholars belong to research-oriented groups involved in international activities (Kwiek 2015).

Polish higher education system has been developing very dynamically over recent years. One of the essential changes in the scholarly communication in Poland is a move into a more balanced combination of quantity and quality research evaluation of scientific units, carried out every four years. Recent policy reform, called 'the Constitution for Science', transformed the regulations concerning evaluation and introduced new rules for the evaluation of the quality of scientific research at the level of individual disciplines. The new system takes into account the following three groups of achievements, i.e. scientific publications and patents, economic effects of research and development works, and assessment of the impact of scientific activity on the functioning of society and economy. The new approach is similar to other international assessment systems, such as the United Kingdom's Research Excellent Framework (Korytkowski & Kulczycki 2019). Based on the evaluation results, scientific units are assigned a category that determines the rights of the University to conduct graduate and doctoral schools, award degrees and titles in individual disciplines, and specifies the number of subsidies from the government budget.

In terms of the number of publications and the impact of field-weighted citations, Polish scientific productivity is at the average European rate (Kwiek 2019). Nevertheless, the level of international collaboration (internationally co-authored articles) has the lowest rate among other European countries (Kwiek 2020). This is an important challenge for the managing bodies of HEIs in Poland whose aim is not only to motivate the top-performers to be scientifically productive, but also to encourage those who are less productive, and, for instance, accelerate them in terms of publishing (Kwiek 2018).

Barriers to and Facilitators of Scientific Productivity

Some factors facilitate while others inhibit scientific productivity. Such factors can be analysed from the perspective of institutions and countries as well as from the point of view of researchers. The results of the existing studies have demonstrated that the main institutional barriers include teaching overload and the need to obtain funds for research, while the facilitators include the size of an institution, technical orientation, unit type, geographical location, year of founding and traditions (Kwiek 2015; Wolszczak-Derlacz 2017). It means that large old universities with the appropriate *know-how* show greater scientific productivity. Still, for most HEIs, the biggest challenge is the balance between teaching and research.

Researchers with higher academic rank are more productive than junior scholars (Horodnic & Zait 2015). Advanced researchers are excellent mentors for the new generations that start their scientific journey. However, human resources in science are currently limited by the generation gap and by the loss of top professionals to commercial organisations. Horodnic and Zait (2015) emphasise that young scholars are more oriented toward material incentives rather than inner motivations. Thus, efficient contingent rewards systems are needed to attract valuable personnel (Aguinis et al. 2013; Kyvik & Aksens 2015).

Financial and organisational resources create basic conditions for scientific productivity. For example, modern scientific tools and equipment are necessary to conduct research (Gaughan et al. 2018; Tartari et al. 2018). Structural resources are helpful for collaboration and interdisciplinary research, including research conducted in partnership with business (Abramo et al. 2017; Landry et al. 1996). Moreover, flexible organizational structures facilitate research project management and also the establishment of new teams and networks (Perkmann et al. 2013). In addition, organizational climate, number of faculty members holding PhD, and uninterrupted time for conducting research activity, significantly accelerate scientific productivity (Smeby & Try 2005). Autonomy in research activities as well as decentralised management are also beneficial. Thus, countries with diffusion-oriented research systems are more supportive of internationalisation than those with centralised research systems (Graf & Kalthaus 2018).

Moreover, innovative performance is related to international knowledge networks. Previous research has shown that both national and international collaboration increases productivity (e.g. Luukkonen et al. 1992; Kwiek 2015). Still, scientific cooperation at the international level is a time-consuming and, to a wide extent, an absorbing endeavour (Bojko et al. 2020). The size and composition of scientific networks also have an impact on scientific productivity as solid and considerable networks award greater benefits (Gaughan et al. 2018) and scientific units that are managed cooperatively may contribute to increasing research productivity (Ramsden 1994). Knowledge is also strengthened as academics move towards better-endowed institutions (Tartari et al. 2018). Organizational culture makes scholars more aware of the organizational goals and allows them to contribute to and be involved.

In summary, barriers and facilitators derive from institutional and individual factors that should be both balanced and mutually reinforcing. In line with the Positive Organisational Scholarship (Cameron 2017), positive amplification is a recipe for a positive change and at the same time, the positive approach can also result from earlier problems, difficulties, challenges and loss. Taking into consideration these premises, both the barriers and facilitators related to scientific productivity need to be simultaneously recognised.

Research Objectives and Methods

This original research aimed to identify and describe barriers to and facilitators of increasing scientific productivity in a view of academic managers within HEI, including deans and deputy deans. Two research questions have been formulated:

Q1. What are the main barriers to increasing scientific productivity in the field of engineering and technology from the perspective of academic managers?
Q2. What are the main facilitators of increasing scientific productivity in the field of engineering and technology from the perspective of academic managers?

To better understand the complexities of the barriers to and facilitators of increasing scientific productivity, we used a qualitative method (Creswell 2009). We resolved to use a case study method as a detailed examination of a single subject, event, setting or depository of documents (Yin 2003). Based on the interpretation that case study could stand by itself without comparison to other references, semi-structured interviews were chosen as the qualitative component to ensure flexibility in discussing emerging issues and encourage a more detailed description of the investigated problem. The study was conducted at one of Poland's technical universities with nine faculties (six faculties represent the field of engineering and technology sciences). Managing bodies, i.e. seven deans and deputy deans from four faculties representing six leading scientific fields of engineering and technology (Table 1), were invited to the interview. Deans are regarded as middle-level executive positions and central administrators in charge of a faculty within the university. They could be described as strategists and tacticians that have responsibilities to the board on the matters of the scientific and teaching program as well as planning and implementation (Boyko & Jones 2010).

Table 1: The faculty and participant characteristics

Faculty	Main Disciplines at the Faculty*	Respondents' position	Code
1	Civil engineering / Environmental engineering	Dean and Deputy Dean	A1, A2
2	Electronic engineering / Information engineering	Dean and Deputy Dean	A5, A7
3	Electrical engineering	Deputy Dean	A6
4	Mechanical engineering	Dean and Deputy Dean	A3, A4

*Note. * Scientific disciplines in line with the Organisation for Economic Co-operation and Development (OECD) Fields of Science and Technology Classification*

Subsequently, we applied a thematic analysis which is widely used in qualitative research for analysing data (Creswell 2009). The main goal of thematic analysis is to identify the themes or patterns that are most important for the study. We our thematic analysis in a deductive way, in which we divided data and linked various aspects of data to different themes. According to Braun and Clarke (2006), the six steps for preparing thematic analysis are as follows: familiarising oneself with the data, generating initial codes, searching for the themes, involved reviewing the themes, defining and naming themes and producing a report. NViVo software for coding and analysis of data was applied. Two main categories of barriers and facilitators of scientific productivity were used as the initial codes that were later divided into four themes to present our research results: theme 1 (publications), theme 2 (recognition), theme 3 (collaborations), and theme 4 (funds).

Results

Barriers to scientific productivity

Theme 1 revolved around the number and quality of peer-reviewed publications in valuable scientific journals. Repeated rejections and failures in terms of article publishing were identified as the main barrier within the publication theme. A1 stressed: *"The repeated failure to publish articles in high-scoring journals is discouraging. Many people come back and say: it will not work; nobody takes it (…); it is a clique, and I do not have any friends there…(…); I do not want to try anymore"*. The frequency of such situations creates an important mental barrier and undermines credibility among researchers. The interviewees also highlighted that it is very hard to achieve a "breakthrough", even with very good publications. The next barrier is the "scoring system" (a specific national system of evaluation of publications), which reflects, for example, the extension of academic contracts. Researchers who fail to deliver a required number of scored publications might struggle to renew their contracts or even be transferred to teaching positions. Besides, the respondents mentioned expensive conference fees, the small number of high-impact factor journals and ineffective publishing in most influential journals. To summarise, the common factor apart from engineering and technology disciplines in terms of publication barriers was inefficiency in being published that was contingent upon mental and financial hindrances.

Theme 2 focused on reputation and recognition in professional life that can be contributed by several factors, such as the number of citations, the Hirsch index or membership in scientific committees. The main barrier to gaining recognition was the inability to publish an article in a high impact journal, especially in the case of new researchers who are only beginning to build their reputation. Some interviewees (A5 and A7) highlighted the difficulty in achieving professional recognition without a proper scientific workshop and appropriate scientific skills. Also, prestige is based on the membership in scientific committees that invite scientists with significant achievements. A6 pointed out: "*The perception of scientists is also created by an external environment. This is, for example, the selection of individual researchers to serve as members of the Polish Academy of Science"*. Another barrier was a lack of knowledge regarding scientific culture at the best universities around the world. A1 stressed: *"Researchers do not know the scientific environment at the most prestigious universities which are focused on innovations. So, in their opinion, the article is not a goal in itself…"*. Furthermore, respondents see another barrier in high fees for open access publications. In a world in which citations are the new currency, open access papers help scholars gain recognition. Thus, in terms of recognition, in the disciplines of engineering and technology, lack of knowledge of scientific culture, insufficient competencies of young researchers and financial hindrances were reported.

Theme 3 concerned collaboration among scientists which is important for scientific productivity because complex projects need teams with different competencies and resources. The barriers were centred around the methods used in the research process. Research usually takes a long time and requires proper equipment and tools that are expensive and difficult to acquire. The need to purchase appropriate equipment to conduct highly advanced research clashes against insufficient financial sources. Other obstacles were related to the inability to manage teams and the project by project managers. Some of them are overwhelmed by grant management activities and procedures. As A4 claimed, "*There is a risk that the proposed changes will not be implemented and will remain a mere theoretical framework"*. Thus, in the engineering and technology disciplines, lack of funding for technical equipment and tools, poor work organization and insufficient team management skills were considered the biggest barrier to scientific productivity with regard to scientific collaboration.

Theme 4 concerned the acquisition of funds. To strengthen scientific productivity, researchers must focus on applying for grants or, depending on the discipline, patenting inventions. The main barriers to obtaining funds were associated with an ineffective model of work organisation. For example, at the beginning of the grant application process, researchers encounter problems at the administrative level. Another problem mentioned was a scientific cycle that requires talented and highly specialised staff. Due to the generation gap and rather low salaries at Polish universities, professionals are often employed by the business sector and lack the time or opportunity to work on scientific projects. Some respondents (e.g. A4) indicated that academics had numerous difficulties in gaining funds for research because experiments are very expensive and the grants obtained are not sufficient to cover all expenditures. The next barrier is a lack of publications and citations in high impact journals, which are required for grant competitions. According to A4, "*If someone does not have an impressive bibliometric indicator, then, frankly speaking, there is no chance to get funds for research. (…) In the majority of grant contests, the scientific publication background and recognition of the leader in the basic evaluation criterion and an indicator of success"*. In the current competitive academic milieu, interviewees drew attention to the barriers posed by difficulties in getting funds from the industry. To some extent, this might be linked to scientific and business discrepancies in terms of project objectives. Business wants to focus only on profit, however, such an objective is unacceptable in

the scientific community. To conclude, in terms of acquiring funds in engineering and technology field human, organizational and financial barriers as well as cooperation with business and industry were identified as barriers.

Facilitators of Scientific Productivity

Despite numerous obstacles to increasing scientific productivity, the interviewees also identified several facilitators. Theme 1 focused on managerial practices that facilitate an increasing number of publications in the engineering and technology disciplines. Firstly, article translation and proofreading can be refunded. It is supportive for non-native English speakers. Researchers who publish in open access journals can count on additional surcharge payments to cover the article processing charges. Moreover, researchers who succeed in publishing in the most influential journals can receive monetary rewards from their faculties. As A7 claimed: "*I pay extra. When a young researcher comes to me and says that his publication is accepted but he has to pay… that's fifty-fifty. Department needs to pay half, and I will pay half as well"*. Furthermore, suitable assistance is assured in terms of patenting inventions. Thus, in the engineering and technology disciplines, support for additional services such as proofreading and monetary rewarding were the most popular facilitators for scientific publication.

Theme 2 concerned recognition by providing compelling metrics. The interviewees stressed that the most significant facilitator was financial support. Funds could be used for open access fees or the attendance at scientific events. Some respondents also introduced progressive evaluation systems based on publication points and records. Such systems help to monitor scientific achievements and support the career path planning: "*So, we simply define at what point the employee is, and after that, let's say, possible tips are prepared. We inform them, for example, that they should speed up in certain activities, and we highlight those activities to them…"* (A6). In sum, the practices related to financial resources and human resources were indicated as the most useful facilitators in terms of gaining recognition.

Theme 3 revolved around collaboration among researchers, scientific teams and institutions, that is one of the features common for all scientific disciplines. Respondents indicated that their main facilities for academics included openness to interdisciplinary collaboration and a lack of restrictions when it comes to establishing scientific teams. For example, A1 highlighted: *"We explicitly support the creation of research teams of various sizes. I am trying to convince adjuncts who recently got their PhD to treat themselves like they would be treated in the United States: like assistant professors. As an assistant professor, you are responsible for all programs you have implemented and for what you want to do in the future"*. The interviews pointed out that interdisciplinary cooperation is crucial for complicated and extensive research at the national and international level. It was supported by A3: "*Later, they build scientific teams to solve various problems, so they know that somewhere there is someone who is doing similar research, and then we can make such contact, and this has a positive impact"*. Furthermore, to succeed in this area, interviewees argued, additional financial support is necessary. Specifically, funding for the attendance in conferences, seminars or workshops was one of the facilitators of productivity. In sum, all interviewees agreed that financial resources, autonomy and openness to interdisciplinary collaboration are important.

Theme 4 alluded to several factors in our study of possible facilitators for obtaining funds. Some respondents (A1 and A2) stressed that scholars can apply for one or two years of dean's grants that could help them in their scientific career. Those grants can be spent on personal development to support the earning of research grants in the future. Other interviewees (A3 and A4) also mentioned statutory subsidies that scholars can also receive to support their research. Other respondents (A5, A6, and A7) stressed that every project that requires additional funding not covered by grants to be completed will obtain financial support. In sum, faculties' managers indicated that financial and structural resources help acquire funds. Another noticeable facilitator is an increasingly flexible administrative structure and supportive administrative units. The interviewees highlighted: *"We have set up an office to support projects. Admittedly, this is just a beginning (…), and I think, in the future, we will develop the structure and additional services offered by this office to contribute successfully, [offering] essential help during the writing process, as well as during implementations and the managing process"* (A2). In the absence of such an office, employees can use the relevant central office to acquire funds.

Discussion

In summary, the results of this study demonstrate that scientific productivity centres on four main themes that define the main academic activities: research publications, recognition, collaboration and funding. As shown on the example of the Polish technical university, the critical factors enhancing scientific productivity are human, financial, organisational, structural resources and organizational culture. From the perspective of management

bodies, the key challenges in achieving scientific productivity are scholars' attitude and capabilities to perform research as well as the organisation and provision of appropriate resources. Our findings reveal that there are more barriers than facilitators in terms of increasing scientific productivity. The identified facilitators are mainly associated with financial, organisational and structural support, while the barriers are related to human resources financial, organisational and structural hindrances that restrict scientific productivity in engineering and technology research. Thus, only coherent actions that comprehensively address publications, recognition, collaboration and funding activities may bring measurable and noticeable effects in terms of scientific productivity. The barriers to and facilitators of scientific productivity from the perspective of middle-level managers are presented in Table 2.

Table 2: Barriers to and facilitators of scientific productivity – summary of findings.

Resources	Barriers	Facilitators
Human	• Scientific skills • Gaining and maintaining talented personnel • Mental attitude to coping with defeat • Work under pressure to publish scientific findings • Individual recognition	• Support for competencies development • Monetary esteem • Openness to interdisciplinary research
Financial	• Expensive conference fee, APC in Open Access journals • Cost of conducting research	• Funding APC in Open Access journals • Internal funding: grants and additional subsidies for grants awarded
Organizational and structural	• Work organization • Leadership and team management • Teaching overload • Equipment and tools • Red tape	• Flexible organizational structure • Administrative support
Culture	• Scientific culture • Know-how and scholarly communication practices • Collaboration with business and industry	• Organizational openness to interdisciplinary research • Human resources practices

The results of our study demonstrate that human resources are important hindrances in the pursuit of research productivity. Mental barriers (e.g. coping with repeated failures due to rejection of the paper) can be reduced through training, mentoring and engaging leadership on the level of a team, unit and faculty. When dealing with scientific productivity at the individual level, it is vital to analyse psychological factors, such as the ability to set goals, emotions, and the ability to cope with failure (Araújo et al. 2017). However, due to the generation gap and competitive conditions offered by commercial organisations, it is becoming more and more difficult to attract and retain talented employees. Kyvik and Aksens (2015) highlighted that the new generation of academics is better qualified, more collaborative, better funded, supported by better research conditions and supported by contingent rewards systems. Thus, young scholars are more oriented toward material incentives rather than intrinsic motivation and the need for recognition within the scientific community (Horodnic & Zait 2015). It is, therefore, no surprise that monetary rewards or cash-peer-publication reward policies for highlighted papers published in recognised reference databases are commonly applied (Aguinis et al. 2013).

Financial barriers affect the process of scientific productivity directly and indirectly. There are proofreading costs, expensive conference fees and article processing charges for open access journals. However, financial resources support the scientific skills of scholars and their development. On the input side, some financial and organizational resources, tools and equipment are needed (Gaughan et al. 2018; Tartari et al. 2018). On the output side, universities can thrive through the circulation of ideas and learning (Bikard et al. 2015). There is a specific balance of costs and gains for both parties, scholars and academics managers.

Structural resources are important for establishing new teams and organising interdisciplinary research. Flexible structures are necessary for leaders to support and manage their teams. Managers can adapt organisational structures to involve new teams and ideas and to decide how scholars should divide time between teaching and research (Perkmann et al. 2013). Moreover, modern and efficient leadership is also needed. Engaging leaders can use enthusiasm to inspire workers to follow their plans and visions, strengthen by delegating responsibility and challenging tasks, empower by learning and sharing knowledge and, finally, connect by supporting collaboration among team members (Schaufeli 2015).

International collaboration supports the exchange of mental and technological resources; however, there are costs of coordination and allocation among individuals. International networks can enhance creative ideas and innovative knowledge, especially in better-endowed HEIs with strong scientific culture and traditions (Kwiek 2015; Wolszczak-Derlacz 2017). Thus, they contribute to an increase in scientific productivity. Individual talents and competencies are located in scientific teams and build recognition for institutions and countries, while academic managers create conditions and provide resources for innovative ideas. Thus, a reciprocal effect exists between scholars' needs and institutional resources.

Our study has some shortcomings. We conducted a qualitative study in one of the biggest technical universities in Poland. The case study is based on specific institutional and regional conditions. Around the whole university structure, we engaged four from six technical and engineering faculties.

Conclusion

As members of the academic community, scientists are obligated to perform collaborative research, apply for research grants and other funding, disseminate scientific results through publications and build their own and institutional recognition within a higher education system in which these four themes are interconnected and mutually reinforcing. Our findings indicate that there are more barriers than supportive resources to scientific productivity that both focus on human, organizational, structural and financial resources and organizational culture. In line with a message from the Positive Organisational Scholarship (Cameron 2017), academic managers need to learn how to convert barriers into strengths and treat them as challenges instead of hindrances. The agenda for future research indicates that by linking the positive and negative sides, a more complex view on scientific productivity can be achieved.

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The Contemporary Dimension of Globalization and Local Security – Conclusions from The Research

Piotr MAŚLOCH

War Studies University, Warsaw, Poland
E-mail: p.masloch@akademia.mil.pl

Abstract

The article deals with the problems of the contemporary, new globalization of the 21st century and presents the results of own research on the sense of security in the local dimension. The active participation of local communities in these processes are an important element in ensuring the internal security of the state in the conditions of globalization. In this approach, localism (regionalism) is a tendency consisting in the striving of local (regional) communities to achieve a high degree of self-determination. Localism and regionalism are now becoming global phenomena, which means they are not the opposite of globalization. On the contrary – these processes are treated as a supplement and/or modification of the internationalization of the economy.

Keywords: Globalization, Economy, Security, Local Security, COVID 19

Introduction

The modern nation state seems to be well prepared for the contemporary needs of responsibility and active and effective participation in political life. Therefore, in the policy of the European Union, the state represented by the central government still remains the main entity, despite the growing importance of lower levels of public authority and private entities, including transnational corporations. On the other hand, in the modern world, localisms and regionalisms are reviving, separating moods and striving for greater autonomy are intensifying. Due to all these factors, local and regional conditions play an important role more than ever in the process of ensuring internal security. It should be borne in mind that, depending on the problem raised (identified threat), defining the local or regional level may be understood differently. Local government units and the communities living in them will play a special role in guaranteeing and maintaining an appropriate level of national security. It is their commitment, competence, awareness, ability to build broadly understood networks of mutual connections and the sense of patriotism and historically shaped national identity that will largely determine the level of citizens' security.

Subject and Scope of Research

Research on the problems described above was carried out using the interview and survey method. Surveys, like most inquiry methods, are not perfect. Information obtained in this way is not always consistent with the actual state of affairs, and is tainted with the subjectivism of respondents answering the questionnaire questions. Therefore, when interpreting the information received, moderation and common sense is recommended, consisting in inhibiting the tendency to make quick generalizations. It should be pointed out, however, that the number of surveyed enterprises, in the case of high convergence of responses, indicates their similarity in the analysed areas, which allows for the formulation of credible conclusions.

Information constituting the basis for formulating conclusions can be ranked according to their importance. The information obtained through a questionnaire survey, which allowed to determine the correctness of events in relation to actual processes carried out in the city and municipality, is of the greatest value.

Apart from showing the phenomena taking place in the regions, an attempt was made to outline what will constitute the fundamental trends in their functioning in the coming years. On the basis of the conducted research, it should be assumed that the nearest future for local communities is, above all, further strengthening of the competitiveness of regions, development of civil society and activities for local security.

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The studies were conducted in 2018 (pilot study) and in 2019 (actual studies and their modification). Therefore, it should be emphasized that the research process did not take into account the conditions and threats resulting from the COVID-19 pandemic, which means that the presented research results may constitute the basis for the preparation and carrying out further works related to the need to redefine the threats affecting the level of security at the local level.

According to the study carried out in Sulejówek, improving the safety of residents is one of the basic tasks of local government units. Local authorities undertake a number of actions, both direct and intervention. The increase in the level of safety of the inhabitants is influenced by a number of comprehensive activities of the local government, the aim of which is to limit indirect causes posing specific threats to the inhabitants of the region. Such activities include, among others, activities related to the prevention of terrorism, fire protection and flood protection, activities in the field of education, upbringing, health protection, economic development, counteracting unemployment, drug addiction, alcoholism and violence in families. All these elements, seemingly not very related to each other, create a coherent safety system for local communities. The individual levels of local self-government differ significantly from each other, especially in terms of tasks and competences in the field of security and public order protection. The voivode ship self-government was assigned only general responsibility for matters related to the performance of tasks related to public safety. The scope of activities of poviat self-governments includes public order, safety of citizens, flood protection, fire protection and prevention of other extraordinary threats to human life and health and the environment.

Research procedure and conclusions

Based on the interview, it can be concluded that the local authorities, when exercising power in the city and municipality of Sulejówek, are aware of the fact that they bear full responsibility for the proper and effective performance of the state's functions, primarily in the sphere of internal security, peace and public order, law, as well as in emergencies such as natural disasters, social disorders, internal crisis.

In the opinion of the deputy mayor, the city and the municipality are well prepared to respond to the following types of threats:

1. natural disasters (e.g. floods),
2. crises in energy supplies,
3. ensuring internal security (police effectiveness),
4. fires,
5. construction disasters.

At the same time, it was acknowledged that in the case of threats such as terrorism, bio-terrorism or large-scale epidemiological infections, they would not be able to ensure security on their own, using forces and resources at their disposal. It is also worth noting that being aware of the existence of such threats, local authorities do not think that these events could apply to their region – this applies to both terrorism and the phenomenon of illegal immigration plaguing modern Europe.

Entrepreneurs were the next group of the local community subject to research. Here, the obtained results should be considered and interpreted in two ways. The first problem raised in the research concerned the scope and methods of internationalization of the activities of enterprises deriving from contemporary globalization processes. An enterprise, wishing to internationalize its activities, must apply a specific strategy of entering foreign markets, which should include, among others, setting goals, establishing forms of internationalization and possible restrictions in their application, and making a decision on the choice of the form ensuring the highest degree of achievement of the assumed goals. The main directions of internationalization of the activities of Polish enterprises have been determined on the basis of the conducted survey, the issues of which focus on the directions of internationalization of the activities of enterprises in the region.

The process of economic globalization is a fact. Its consequences have an extremely significant impact on both the functioning of enterprises and the perception of their safety in the local environment. Progressive globalization, by creating new conditions for competition, prompts enterprises to introduce specific changes in the scope of their functioning. So that enterprises can change and adapt their activities and structure to the conditions of globalizing economies (taking into account the related dangers), they must first of all precisely determine which manifestations of globalization initiated the process of introducing changes. Based on the results of own empirical research, it can be concluded that various manifestations of globalization with varying intensity influence the taking of actions in the field of organization management and its functioning. Representatives of management staff assessed the impact of

the proposed manifestations of globalization on undertaking or not undertaking specific changes in management on the following scale:

- +2 – strong influence stimulating making changes,
- +1 – significant impact stimulating taking of changes,
- 0 – no influence.

The replies thus obtained from a sample of 104 companies are presented in table 1.

Table 1: Manifestations of globalization influencing changes in management and functioning of enterprises

factor (manifestation) of globalization	impact assessment
I	II
1. progressive concentration of capital on a global scale	**192**
2. fast, less and less limited flow of information	**184**
3. development of modern information technologies (cybertechnologies)	**182**
4. increased importance of company and brand awareness	**176**
5. growing importance of relationships with suppliers and customers	**174**
6. unification of consumption patterns and lifestyles	**174**
7. growing importance of standardized after-sales services	**172**
8. development and dissemination of new products	**172**
9. development and dissemination of modern telecommunications technologies	**170**
10. dissemination of management concepts and methods on a global scale	**170**
11. development of smart management support systems	**156**
12. development of modern manufacturing technologies and their unification	**112**
13. increasing obligatory nature of international product quality standards	**64**
14. growing importance of the use of standardized quality management procedures	**62**
15. less and less restrictions on the international movement of goods and services	**9**
16. a trend towards displacement of production	**6**
17. marginalization of nation states	**5**
18. dissemination of a market economy	**4**
19. collapse of unprofitable plants and industries	**3**
20. growing, less and less restricted flow of capital	
21. dissemination of foreign direct investment	**3**
22. government incentives for foreign investors	**3**
23. less and less restricted movement of labour	**3**
24. other (what?)	

The data presented in Table 1 suggest that in the surveyed enterprises, the impact of individual manifestations of globalization on their functioning and management process was quite clearly differentiated. On the basis of the analysis of the collected responses, it should be stated that particular attention was paid to factors related to the progressive concentration of capital on a global scale, the fast, less and less limited flow of information and the development of modern information technologies (indications above 182 points). These phenomena, with the greatest force influencing and shaping the management process in the surveyed enterprises, are also perceived as those that significantly shape the future of enterprises by forcing them to introduce changes that allow them to function in the local environment and to undertake a competitive fight on the global market.

Relatively high rated issues related to the increased importance of company and brand awareness, the growing importance of relationships with suppliers and customers, the unification of consumption patterns and lifestyles, the

growing importance of standardized after-sales services, the development and dissemination of new products, the development and dissemination of modern telecommunications technologies, dissemination of modern management concepts and methods, and developing smart management support systems (indications from 150 to 180 points). The above symptoms of globalization, although they affect the processes taking place in enterprises less strongly than those analysed earlier, significantly indicate the direction of further changes in these organizations. As can be seen from the nature of the factors listed in points 4-11 in Table 5, most of them concern issues and problems solved on a global scale, which at the same time allows us to conclude that the activity of enterprises, even local ones, will, under the conditions of globalization, aim at unifying their activities.

The next group includes those manifestations of globalization, the average readings of which are in the range of 62-148 points and seem to exert a significant influence on some behaviours of individual organizations. These include: the development of modern manufacturing technologies and their unification, the growing obligatory nature of international product quality standards and the growing importance of using standardized quality management procedures.

On the other hand, the fourth group of factors consists of those that have a negligible impact on the current activities of the surveyed enterprises (the average strength of the impact is below 10 points).

It should also be emphasized that an important phenomenon characteristic of the surveyed enterprises is, after all, the positive assessment of the impact of all the proposed manifestations of globalization on their functioning, because it is these manifestations that have become the main stimulus forcing the continuation of changes initiated earlier, resulting from the development of globalization understood in a modern way.

Using a similar method, consisting in indicating the strength of the impact of previously identified threats, their impact on the sense of security in the local dimension was examined. In the part of the study devoted to safety (the impact of factors on the sense of security), a scale analogous to the previous part of the study was used:

- +2 – strong influence of a potential threat,
- +1 – significant impact of a potential threat,
- 0 – no impact (no threat).The results of the conducted tests are presented in Table 2.

Table 2: Threats determining the sense of security of enterprises in the local dimension

the type of threat	impact assessment
I	II
1. Cybercrime	**202**
2. Sense of internal security (effectiveness of the police and services)	**194**
3. Demography (lack of qualified staff)	**188**
4. Stability of law, including cooperation with local government	**180**
5. Technical threats (use of outdated technologies, too fast development of modern technologies in the world)	**156**
6. Fires (fire protection)	**156**
7. Transnational economic crises	**152**
8. Economic threats resulting from globalization (increased importance of international competition)	**150**
9. Illegal immigration	**142**
10. Terrorism	**22**
11. Socio-cultural threats (the role of the local environment in shaping the environment closer to the enterprise)	**20**
12. Political crises	**12**
13. Crises in the supply of energy, semi-finished products, strategic supplies	**8**
14. Natural disasters	**6**
15. Geographic threats (lack of natural environmental resources)	**6**
16. Ecology (destabilization of the ecological system)	**5**
17. Construction disasters	**4**
18. Others (what?)	

The results presented in Table 2 allow to group individual areas shaping the sense of local security in enterprises depending on the strength of the impact of selected threats on their functioning. Thus, the potential threats with the highest sensitivity to security in enterprises include factors with indications above 150 points, i.e. cybercrime, sense of internal security (effectiveness of the police and services), demographic problems (lack of qualified staff), sense of legal stability, including cooperation with local government, technical threats (use of obsolete technologies, too fast development of modern technologies in the world), fires (fire protection), transnational economic crises, economic threats resulting from globalization (increasing importance of international competition) and problems resulting from illegal immigration (F. Ogigau – Neamtiu, 2016, S. McClure, J. Scambray, 2012, J. Michalczyk, 2014). Threats with indications below 22 points are on the opposite side, among others: terrorism, social and cultural threats (the role of the local environment in shaping the environment closer to the enterprise), political crises, crises in the supply of energy, semi-finished products, strategic supplies, natural disasters, geographic threats (lack of natural environmental resources), ecology (destabilization of the ecological system), construction disasters.

It should be emphasized that the surveyed organizations define the aspects related to economy, law (legal stability), security at the local level and cooperation with local government as the basic factor of their safe functioning. They very clearly emphasize the problem of the so-called illegal immigration, which does not yet affect them, but expresses specific concerns about this phenomenon. In turn, such issues as terrorism, politics or natural disasters and ecology do not seem to affect – according to the respondents – the activity of enterprises in the region. This belief can be explained by the fact that the acts of terror are happening "out there", not in the region, hence the low impact of this factor on the respondents' sense of security. The situation is similar in the case of natural disasters and matters related to ecology – the lack of direct events and their impact on enterprises results in ignoring these factors. In both cases, it is necessary to focus on education and promotion of pro-ecological attitudes – such activities should be included in the region's development strategy and should be a natural element of functioning of both the region and the enterprises operating in it.

In this part of the survey, the respondents were also asked about the assessment of the degree of security in selected risk areas by local authorities. The obtained results are presented in Table 3.

Table 3: Level of safety performance by local authorities (selected factors)

the type of threat	average rating of the respondents
I	II
1. socio-cultural threats (the role of local authorities in shaping the environment closer to the enterprise)	**4,94**
2. natural disasters - the role of local authorities in eliminating the effects of natural disasters, ecology	**3,04**
3. counteracting crises in the supply of energy, semi-finished products, strategic supplies - cooperation of local authorities with enterprises	**3,96**
4. terrorism - the level of security in the region, information policy of local authorities	**4,86**
5. illegal immigration as a social problem - information policy of local authorities	**3,94**
6. local political crises and counteracting them	**3,94**
7. sense of internal security (effectiveness of the police and services).	**4,94**
8. legal stability, including cooperation with local self-government	**4,01**
9. others (what?)	

As can be seen from the assessments in Table 3, the activities of local authorities in terms of ensuring safety are assessed at a high level. The only deviation from high ratings is the definition of the role of local authorities in preventing natural disasters. According to the information obtained from respondents, a relatively low assessment of the authorities' action in this area results from the fact that the region has not experienced any natural disaster so far, hence it is not possible to make an unambiguous assessment in this regard. The issue of terrorism and politics as factors shaping the sense of local security should be left as an open problem for further research and discussion. On the one hand, they indicate a low impact of these conditions on the sense of security, on the other hand, they rate the actions of local authorities in this respect relatively high.

When attempting to correlate the data contained in the above tables, it should be noted that one of the basic factors guaranteeing safety at the local level is – according to the respondents – the sense of internal security (effectiveness of the police and services). When answering the question about ensuring safety by local authorities, the respondents rated this issue at an average level of 4.94 (on a scale from 2 to 5). Other factors shaping local safety, indicated as important, and being the responsibility of local authorities, are assessed at a Satisfactory level (scored above 3.51), which allows us to believe that the authorities of Sulejówek are properly implementing their tasks, shaping the region's security policy in a rational and thoughtful way.

As a determinant of contemporary security problems, it is worth citing selected elements of the EU security strategy, in which the key threats are [http://ec.europa.eu/news/]:

1. terrorism in all its forms, characterized by an absolute disregard for human life and democratic values; its global reach, catastrophic effects, ability to attract adepts thanks to radicalization and Internet propaganda, and various sources of funding make it a significant and constantly evolving threat to the security of states and regions;
2. intensification of organized crime; it manifests itself in multiple forms across national borders whenever it can bring maximum financial gains with minimum risk, such as drug trafficking, economic crime, human trafficking, human smuggling, arms trafficking, sexual exploitation of minors and child pornography, aggressive crime, money laundering and document forgery; moreover, in the form of corruption, it threatens the foundations of the democratic system and the rule of law;
3. cybercrime is a global, technical, cross-border and anonymous threat to information systems;
4. uncontrolled influx of illegal immigrants;
5. cross-border crime, such as petty crime and crime against property;
6. violence, such as among young people or hooliganism at sports events, increases the damage already caused by crime and is destructive to the functioning of modern society;
7. natural and anthropogenic disasters, such as: fires, forests, earthquakes, floods, storms, droughts, energy failures and major failures of information and communication systems significantly threaten the sense of security of modern society.

It seems that the presented catalogue of threats may be a valuable source of information in the work on a similar document, but concerning the level of regions in Poland. It should also be noted that the surveyed entrepreneurs are aware of the existing global threats that seem to coincide with those presented above.

It is worth emphasizing that there are currently no comprehensive studies and research in this area. Therefore, a discussion should begin on how to shape the security policy at various levels of local authorities and how these activities should be coordinated with the broadly understood state security (both in military and other aspects, e.g. economy, ecology, cybersecurity, illegal immigration, human trafficking and others).

Conclusions

The socio-economic reality in the period of dynamic changes in the world at the turn of the 20th and 21st centuries is an interesting and still little research area of analysis and prompts for various assessments and reflections. The considerations, publications and opinions contained in this publication are subordinated to its general goal, i.e. identifying the conditions of functioning of modern organizations (enterprises), analysing the process of managing them and the sense of security at the local level as a result of the ongoing changes in the international economy and globalization. The aim of research formulated in this way refers to the most important challenge for contemporary local communities, which is quick adaptation to the conditions of the new global reality.

Particular aspects of the relationship between governance, security, transformation and globalization are presented in the study in accordance with the current state of knowledge. This does not mean, however, that all questionable issues have been resolved. The nature of the processes of dynamic changes taking place in the global economy makes these phenomena so complicated, unpredictable and multithreaded that it is not easy to clearly determine how they will develop even in the near future. It is also difficult to indicate whether and when the measures taken to adjust the functioning of enterprises to the requirements of modern globalization will be completed.

The empirical part of the study is entirely devoted to an attempt to assess how contemporary, dynamically changing processes of globalization affect the management of the organization and the adaptation activities undertaken in terms of shaping security at the local level. The results of the presented research justify the conclusion that Polish enterprises relatively quickly began to notice specific manifestations (factors) of globalization shaping the aforementioned local security, being aware of the need to adapt individual areas of their activities to the new international situation. The

obtained empirical information also proves that the surveyed organizations correctly perceive the current and future conditions of their activities resulting from globalization, and therefore they are aware of the need to continue to undertake specific adaptation measures.

The research procedure used and presented above also allowed for a positive verification of the assumption regarding the dependence of the intensity of threats and the subjective sense of security in the regions on global factors that interpenetrate and complement each other.

Both the applied research procedure and the layout of the study allowed for the presentation of views on the issues discussed, which were later verified by empirical research. The following final conclusions can be drawn from the conducted research and analyses:

1. It is very difficult nowadays, due to the multiplicity of connections with the theory of enterprise management, as well as the large number of diverse, sometimes very different concepts, to clearly present and describe the phenomenon of globalization, management and local security. In this respect, this study is an attempt to show various opinions on this subject contained in the literature on the subject.
2. The analyses carried out in the paper, supported by the results of empirical research, provide a basis for the conclusion that the problem of local security is an extremely complex issue. For this reason, it is probably impossible to present all possible conditions shaping the course of the process of building a sense of security (and actually ensuring it), due to the changeability of the global reality in which the contemporary organization functions.
3. On the basis of the obtained research results, it should be stated that in the latest period of the development of globalization processes, three basic stages can be distinguished in terms of the sense of local security. The first stage, lasting until 1995, is first of all a surprise with the new geopolitical situation and the belief that globalization will solve all the world's problems so far. It was naively thought that the end of the Cold War and the collapse of the Soviet Union would open the way to harmonious and peaceful cooperation between individual countries in the world. The second stage, lasting from 1996 to 2001 (attacks on the World Trade Centre) was a period in which theories of the harmonious development of the world were consolidates and there were no indications that they would be negatively verified. And finally, the third period, lasting from 2001 to the present – is the time when more and more democratic states are reflecting on the desired direction of democratic development, it is finally surprise with such global phenomena as terrorism or illegal immigration.
4. There is a relatively high convergence of opinions and assessments in the surveyed organizations regarding the causes of individual phenomena resulting from globalization, and having a direct impact on the way they are managed.
5. As can be seen from the theoretical considerations supported by the empirical part, it is the processes of globalization that forced (and enforce) changes both in the interior and the environment of individual organizations. Projects in this area, undergoing constant modifications, are still implemented, but today they should be treated as a result of ongoing changes in the world. However, this does not mean that the process of changes is no longer relevant for Polish organizations. This phenomenon is important as it may contribute to building security at the local level. Continuing to undertake new adaptation measures does not guarantee success, but it allows for quick changes through the skilful use of emerging opportunities, while avoiding threats in the process of building the security of the region.

This study deals with an important and, at the same time, not systematically ordered problem of analysing the impact of globalization on the management of the organization and security of the region. We still do not know if and how local governments are prepared in the event of emergencies resulting from unexpected changes in the global world, resulting from the ever-new challenges of the 21st century.

Summarizing all the presented considerations, it should be emphasized once again that due to the dynamics of changes and the development of the pandemic, the report is only the basis for further research and studies on local security in the aspect of dynamically developing globalization processes.

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Portfolio Choice with A Fundamental Criterion – An Algorithm and Practical Application

Paweł KLIBER

Poznań University of Economics and Business, Poland
E-mail: p.kliber@ue.poznan.pl

Anna RUTKOWSKA-ZIARKO

University of Warmia and Mazury in Olsztyn, Poland
E-mail: aniarek@uwm.edu.pl, aniarziarko@gmail.com
corresponding author

Abstract

Classical models for the construction of an investment portfolio do not account for fundamental values of companies considered. In our approach, we extend the portfolio choice by adding a new criterion connected with the fundamental values of companies to the classical criteria of expected return and risk. It is assumed that an investor selects stocks according to their attractiveness, measured by some indicators of economic and financial situation of companies. In this approach, portfolios are assessed according to three criteria: their expected returns, risk (measured by variance of returns) and economic situation of the companies (measured by some indicators). In this article, we consider the book value to price ratio as a measure of the fundamental value of a company. We discuss an algorithm for constructing portfolios with this fundamental value criterion based on analytical solutions for relevant optimization problems. In the optimization problem, we consider minimizing variance with constrains on expected return and attractiveness of investment. We also present empirical examples of calculating effective portfolios of stocks listed on the Warsaw Stock Exchange and compare their performance with effective portfolios built according to the classical Markowitz approach. By adding an additional criterion of the book to market value, we received portfolios with a higher average realized rate of return compared with the classical Markowitz model. Thus, it can be useful for investors in the capital market to incorporate an additional criterion connected with fundamental values of companies when preparing a model of stock returns.

Keywords: Portfolio Analysis, Multicriterial Choice, Fundamental Analysis, Book to Market Ratio.

Introduction

Classical methods for selecting an investment portfolio, developed by Markowitz (1952, 1959) and Sharpe (1963), take into account only the market performance of companies, measured with changes in their prices. In the classical model, potential portfolios of investment are evaluated according to two criteria: expected return (which describes the potential level of profitability from an investment) and risk. The first criterion is measured with the expected rate of return and the second one - with the variance or standard deviation of returns. No other criteria are considered that might give some additional information about the financial standing and prospects of a company that could influence prices of its shares.

In recent years, however, there has been a growing interest in portfolio analysis methods with alternative ways of constructing portfolios. The article by Kolm, Tütüncü and Fabozzi (2014) contains a review of major developments in the portfolio theory since it its origin, and the book by Doumpos and Zopounidis (2014) draws attention to multicriteria methods used in this field. Most innovations depend on using some criteria of risk other than variance or standard deviation of returns, for example semi-variance or conditional value at risk. The article by Fabozzi, Focardi and Jonas (2007) presents a variety of risk measures that are currently used in the practice of portfolio investments. In other approaches, some characteristics of the distribution of returns on assets are used as additional criteria for evaluating

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portfolio performance. Examples of such characteristics can be skewness or kurtosis. Expanded portfolio analysis is presented by Briec, Kerstens and Jokund (2007) or Rodríguez, Luque and González (2011).

There are several studies which include criteria not based on returns on assets. There is a branch of the literature which takes into account ethical, social or environmental criteria in portfolio construction, for example the so-called socially responsible investments approach described in Steuer, Qi and Hirschberger (2007). The articles by Ballestero et al. (2012) and Bilbao-Terol et al. (2013) are a few more examples illustrating this approach.

Lo, Petrov and Wierzbicki (2003) considered liquidity of stocks as an additional criterion in the portfolio construction process. There are only a few papers which also take into consideration fundamental values of companies. Xidonas, Mavrotas and Psarras (2010) considered the sum of dividends paid by companies. Jacobs and Levy (2013) took into account the risk associated with leverage. The utility function of an investor includes the costs of margin calls, which can force borrowers to liquidate securities at adverse prices due to their illiquidity, losses exceeding the capital invested, and the possibility of bankruptcy.

In accordance with the theoretical concept and empirical research (Fama and French 1992, 2015, 2017; Lam 2002; Zaremba, Czapkiewicz 2017), fundamental factors are important in shaping returns on capital markets. Therefore, it seems rational to include them in a stock portfolio model. The current extensive research on the main financial markets of Eastern Europe has corroborated significant impact of fundamental information concerning companies on their rates of returns. This has also been found to hold true for the book to market ratio as an indicator of the financial standing of companies. The research sample included five countries: the Czech Republic, Hungary, Poland, Russia, and Turkey (Zaremba, Czapkiewicz 2017).

There have been several attempts to combine a portfolio analysis with the fundamental analysis of companies from the Polish stock markets. Tarczyński (2002) developed a synthetic measure to evaluate the economic and financial standing of a company, which he called the taxonomic measure of attractiveness of investment (TMAI), and to apply this measure as an additional criterion in the evaluation of possible portfolios. The portfolio constructed with the use of TMAI was called a fundamental portfolio. The analytical solution of this model was given by Kliber and Rutkowska- Ziarko (2018). This model has been modified in recent years, for example by substituting variance with semi-variance as a risk measure (Rutkowska-Ziarko and Garsztka 2014). In Rutkowska-Ziarko (2013), the Mahalanobis distance was used to determine the TMAI due to possible correlation between diagnostic financial variables. Another method was proposed by Pośpiech (2019) in the research on financial ratios, and market indicators were applied to guide the initial selection of companies. Afterwards, the classical Markowitz portfolio optimization was used.

In this article, we propose an approach in which the book to market ratio (BM) serves as a measure of the current pricing of companies in a portfolio by the capital market. We present a simple algorithm for constructing a fundamental portfolio with the book to market ratio as an additional criterion for evaluating portfolios. The algorithm is based on analytical solutions of optimization problems. In the empirical part, we verify this method by computing fundamental portfolios of the stocks traded on the Warsaw Stock Exchange. We evaluated both the mathematical side of the proposed model and its usefulness for investors. To this end, we constructed a large number of portfolios (using both classical approach and our propositions) and compared their realized rates of returns.

The article is organized as follows. After this introduction, we present in section 2 our proposal of extending the classical portfolio theory with an additional, fundamental criterion. Section 3 provides an analytical solution to the problems connected with computing fundamental portfolios and an algorithm for constructing such portfolios. Section 4 contains empirical examples from the Warsaw Stock Exchange, and section 5 concludes the research.

Portfolio problem with the book to market ratio criterion

In the article, we use generalization of the classical Markowitz model of portfolio optimization (cf. Markowitz 1952 and Markowitz 1959). We consider an investor who tries to determine optimal composition of his portfolio. Let us assume that there are n risky assets with random rates of returns $R_1, \ldots, R_n$. Let μ_i be an expected return of asset i: $\mu_i = E[R_i]$. By cov_{ij} we denote covariance between the asset i and j, $cov_{ij} = \mathrm{cov}(R_i, R_j)$. By x_i we denote the proportion of wealth invested in asset i. As in the classical Markowitz model, an investor evaluates a portfolio according to criteria of expected rate of return and risk. The expected return equals

$$\mu_P = \sum_{i=1}^{n} x_i \mu_i \tag{1}$$

and the risk is measured by the variance of return from the portfolio, which equals

$$\sigma_P^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} x_i x_j cov_{ij} \ . \quad (2)$$

The expected return and the variance of return of the portfolio's components are estimated on the basis of historical returns of the companies' shares. Thus, the problem of portfolio selection relies entirely on the past market data. In our approach, we combine this classical approach to estimating future market performance with the fundamental analysis. It augments the Markowitz model with a third criterion, which describes financial and economic standing of companies whose shares are in the portfolio.

Market multiples are financial indicators that compare given accounting values per share with the market price of this share. It was found that a market multiple can be used to find more attractive companies for investors on the Warsaw Stock Exchange (Rutkowska–Ziarko, Gęstwicki, Williamson, 2015). On other hand, selecting underpriced companies is not enough for building an effective portfolio. Markowski and Rutkowska-Ziarko (2011) have found that a Markowiz portfolio outperforms simple diversification for Polish capital market. Thus, it is important to combine the Markowitz model with information about the current value of a market multiple. Loughran and Wellman (2011) analyzed a broad sample of non-financial firms from NYSE, AMEX, NASDAQ. They found that companies with low levels of market multiples appeared to have higher stock returns than companies with high levels of market multiples.

As for the book to market ratio (BM), the price of one ordinary share is related to the company's book value, calculated per one ordinary share. Therefore, this market multiple represents the firm's book value relative to its market value:

$$BM = \frac{book\ value\ of\ the\ company}{market\ value\ of\ the\ company} = \frac{book\ value\ per\ share}{price\ of\ the\ share}.$$

A positive relationship between the book to market ratio and average returns was described by Rosenberg, Reid and Lanstein (1985). This relationship was also proved for Japanese stocks (Chan, Hamao, and Lakonishok 1991). Based on this research, Fama and French (1992) suggested that book to market would be a significant factor describing the variability of stock returns. They proposed a three-factor model, which explains the returns on capital market with three factors: excess rate of return relative to the market portfolio, company's size and book to market ratio. This model was positively verified on a sample of US stocks.

As in the case of all market multiples, the book to market ratio is an additive measure. If we denote the book to market ratio of stock i by BM_i, then the value of this measure for the whole portfolio is given by the following formula:

$$BM_P = \sum_{i=1}^{n} x_i BM_i. \quad (3)$$

With the introduction of BM_P, we have three criteria for assessing an investment: expected return, risk and fundamental value. One of the methods for obtaining a portfolio which is efficient with respect to all three criteria is to solve a problem of minimizing the variance of a portfolio with constrains on the two other criteria. This leads to the following optimization problem:

$$minimize \sum_{i=1}^{n} \sum_{j=1}^{n} x_i x_j cov_{ij} \quad (4)$$

with respect to

$$\sum_{i=1}^{n} x_i \mu_i \geq \gamma \quad (5)$$

and

$$\sum_{i=1}^{n} x_i BM_i \geq BM_\gamma, \quad (6)$$

where γ is the target rate of return and BM_γ is the required by the investor minimal book value for one monetary unit of the total invested wealth. Of course, there is an additional condition that $\sum_{i=1}^{n} x_i = 1$.

The analytical solution of the portfolio problem

Let Σ be a covariance matrix of returns, i.e.

$$\Sigma = \begin{bmatrix} cov_{11} & \cdots & cov_{1n} \\ \vdots & \ddots & \vdots \\ cov_{1n} & \cdots & cov_{nn} \end{bmatrix}.$$

Define the following vectors: $\mu = (\mu_1, \dots, \mu_n)^T$, $z = (BM_1, \dots, BM_n)^T$ and let e be a column vector of length n: $e = (1, \dots, 1)^T$. Using the vector notation, the optimization problem (4)-(6) can be expressed as follows:

$$minimize\ \frac{1}{2} x^T \Sigma x \tag{7}$$

with respect to

$$x^T e = 1, \tag{8}$$

$$x^T \mu \geq \gamma \tag{9}$$

and

$$x^T z \geq BM_\gamma. \tag{10}$$

The Kuhn-Tucker conditions for the problem (7)-(9) are as follows

$$\Sigma x = \lambda_1 e + \lambda_2 \mu + \lambda_3 z, \tag{11}$$

where $\lambda_2, \lambda_3 \geq 0$, with the complementary conditions

$$\lambda_2 (x^T \mu - \gamma) = 0, \tag{12}$$

$$\lambda_3 \left(x^T z - EP_\gamma\right) = 0. \tag{13}$$

Assuming that the covariance matrix is nondegenerate (as it is done in practice), it follows from equation (11) that the solution has the following form:

$$x = \lambda_1 \Sigma^{-1} e + \lambda_2 \Sigma^{-1} \mu + \lambda_3 \Sigma^{-1} z. \tag{14}$$

We have to consider several cases. To simplify the notation, we define the following symbols. Let

$$g_{11} = e^T v^1, g_{12} = e^T v^2, g_{13} = e^T v^3, g_{22} = \mu^T v^2, \tag{15}$$

$$g_{23} = \mu^T v^3, g_{33} = z^T v^3,$$

where:

$$v^1 = \Sigma^{-1} e, \quad v^2 = \Sigma^{-1} \mu, \quad v^3 = \Sigma^{-1} z. \tag{16}$$

Firstly, assume that $\lambda_2 = \lambda_3 = 0$. From complimentary conditions (12) and (13) it emerges that only condition (8) must be satisfied as equality. By inserting solution (11) with $\lambda_2 = \lambda_3 = 0$ into (8), we obtain the solution

$$\tilde{x}^1 = \frac{1}{g_{11}} \Sigma^{-1} e. \tag{17}$$

The minimal variance in this case equals

$$\sigma_1^2 = \frac{1}{g_{11}^2}. \tag{18}$$

In a case when $\lambda_2 > 0$, $\lambda_3 = 0$, the optimal solution condition (8) is fulfilled and condition (9) holds as an equation, which gives a set of equations:

$$\lambda_1 g_{11} + \lambda_2 g_{12} = 1, \tag{19}$$

$$\lambda_1 g_{12} + \lambda_2 g_{22} = \gamma. \tag{20}$$

After some transformations, one can write the solution of this system as

$$\tilde{x}^{12} = (1 - \alpha_{12})\, \tilde{x}^{1} + \alpha_{12} \frac{v^2}{g_{12}}, \tag{21}$$

where

$$\alpha_{12} = \frac{g_{12}(\gamma g_{11} - g_{12})}{g_{11} g_{22} - g_{12}^2}. \tag{22}$$

The variance of the portfolio in this solution equals $\sigma_{12}^2 = \sigma_1^2 + \Delta\sigma_{12}^2$, where

$$\Delta\sigma_{12}^2 = \frac{(\gamma g_{11} - g_{12})^2}{g_{11}}. \tag{23}$$

The case $\lambda_2 = 0, \lambda_3 > 0$ is analogous to the last one. The optimal solution satisfies conditions (8) and (10) as equations. The solution can be expressed as:

$$\tilde{x}^{13} = (1 - \alpha_{13})\, \tilde{x}^{1} + \alpha_{13} \frac{v^3}{g_{13}}, \tag{24}$$

where:

$$\alpha_{13} = \frac{g_{13}(EP_\gamma g_{11} - g_{13})}{g_{11} g_{33} - g_{13}^2}. \tag{25}$$

The growth of variance when switching from $\tilde{x}^1$ to $\tilde{x}^{13}$ equals:

$$\Delta\sigma_{13}^2 = \frac{\left(EP_\gamma g_{11} - g_{13}\right)^2}{g_{11}}. \tag{26}$$

The last case is when $\lambda_2 > 0, \lambda_3 > 0$. In this case, all conditions (8)-(10) must be fulfilled as equalities, which brings us to the following set of equations:

$$\lambda G = a, \tag{27}$$

where λ is the vector of multipliers $\lambda = (\lambda_1, \lambda_2, \lambda_3)^T$, $a = \left(1, \gamma, BM_\gamma\right)^T$ and matrix G is

$$G = \begin{bmatrix} g_{11} & g_{12} & g_{13} \\ g_{12} & g_{22} & g_{23} \\ g_{13} & g_{23} & g_{33} \end{bmatrix}.$$

The optimal solution to the problem (4)-(7) with all conditions fulfilled as equation can be expressed as follows:

$$\tilde{x}^{123} = \lambda_1 v^1 + \lambda_2 v^2 + \lambda_3 v^3, \text{ where } \qquad \lambda = G^{-1} a. \tag{28}$$

These derivations lead to the following algorithm for finding the optimal solution of the problem (4)-(6):

1. Compute vector $\tilde{x}^1$ and check if it fulfills conditions (5) and (6). If so, this is the optimal solution.
2. Otherwise, calculate $\Delta\sigma_{12}^2$ and $\Delta\sigma_{13}^2$. Choose the smaller value: let it be $\Delta\sigma_{1k}^2$.

Compute vector $\tilde{x}^{1k}$ and check if it fulfills conditions (5) and (6). If so, this is the optimal solution. Otherwise the optimal solution is vector $\tilde{x}^{123}$.

Empirical Results

In order to present computations of effective portfolios according to the augmented approach, we considered portfolios of the stock of 20 largest and most liquid companies listed on the Warsaw Stock Exchange. The sample includes all WIG20 companies. The computations are based on quarterly returns calculated on daily closing prices in the period starting from the beginning of August 2013 and ending on 7 February 2020. Returns were computed as relative increases in prices according to the formula:

$$r_{it} = \frac{P_{it+s} - P_{it}}{P_{it}} \cdot 100\% \,,$$

where r_{it} is the rate of return on security i at time t, s is the length of investment horizon (in our case one month) expressed in days and P_{it} is the quoted price of security i at time t.

Financial indicators for each company were calculated based on quarterly financial reports for the years from 2012 to 2018. For each company in the sample, we computed the book to market ratio for all trading days. The expected return and standard deviations were calculated based on time series of returns.

Firstly, we considered possible effective portfolios which can be created on the last day of the considered period. It is worth noticing that we took into account about 1700 trading days in which portfolios were created. In every time unit, four types of portfolios were built, and their realized returns were calculated. The aim was to evaluate the practical usefulness of the proposed method for investors in the Polish capital market. To make these computations, we developed a specialized software application in R package, which allowed us to solve optimization problems, create several thousands of optimal portfolios, and compare their performance.

Table 1 contains information concerning estimations of the expected return, risk and book to market ratio for all companies as of 7 February 2020. It is only an example of one trading day from the 1700 days included in our research. Characteristics of rates of return (i.e. expected return and standard deviation) were estimated based on the last 400 returns. Book to market ratios were calculated on the basis of closing prices on the last trading day. To calculate book to market ratio for each day in which portfolio was created we used the latest possible information concerning book value of the company (i.e. from the latest quarterly statement), the current number of stocks in the market and the closing price of the stock in the previous trading day.

Table 1: Mean return, risk and book to market ratio (BM)

Company	Mean (%)	Standard deviation (%)	BM
ACP	2.80	6.25	0.89
ATT	-1.49	14.70	1.76
BDX	2.07	11.87	0.13
CAR	-0.37	7.95	0.42
CCC	-4.38	12.42	0.26
CDR	4.11	11.06	0.03
CIE	-2.17	10.43	0.66
CMR	2.24	6.92	0.51
CPS	1.06	6.07	0.63
ENA	-1.04	11.51	4.02
EUR	-0.17	10.69	0.37
GTC	0.57	5.52	0.96
KER	-0.13	7.09	0.29
KGH	0.77	8.93	0.97
KTY	0.26	7.53	0.18
LPP	-0.09	7.05	0.19
LTS	2.59	8.65	0.70
PGE	-1.04	10.56	3.13
PGN	-1.84	7.93	1.34
PKN	0.25	8.76	0.97

Source: own calculations

The BM of the companies under research varied from 0.03 to 4.02. The lowest value, 0.03, was for company CD Project S.A. (CDR). This is a software company producing computer games with a small amount of own assets. Its book to market ratio decreased from 0.22 in 2012 to 0.03 in 2020, mainly due to an exceptional increase in its stock prices.

The book to market ratios of the companies were negatively correlated with the mean returns (correlation coefficient -0.288) and positively correlated with standard deviation of returns (correlation coefficient 0.291). There was a negative correlation between the mean return and risk measured with variance (correlation coefficient -0.360).

The problem of portfolio choice in this situation is a trade-off between risk and the two other criteria. We seek a portfolio which minimizes risk. However, low-risk portfolios tend to have lower expected return. On the other hand, if we assume higher requirements on the mean return of a portfolio, the solution will have a lower book to market ratio. Figure 1 depicts the efficient frontier for the three-criteria portfolio choice. Each point in the graph represents a solution to problem (4)-(6) for a different combination of the required expected return and required level of BM.

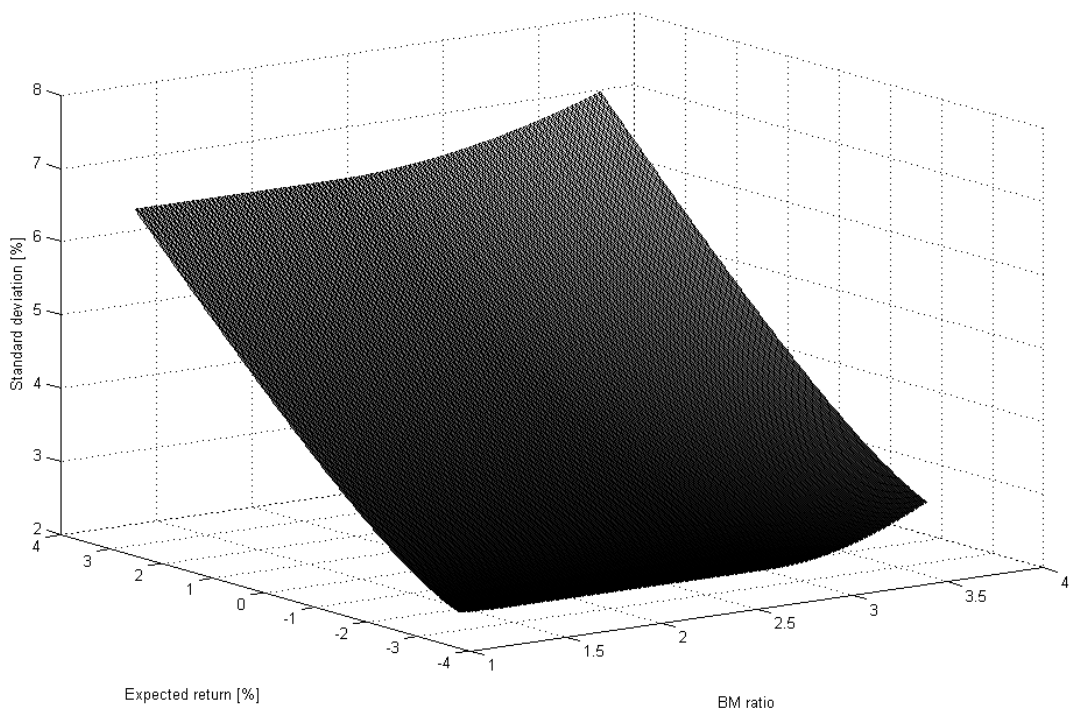

Source: own study

Figure 1: Effective frontier for the portfolio problem with three criteria

In order to analyze the impact of fundamental values of companies in which one is willing to invest on the trade-off between expected return and risk, we determined the shape of efficient frontiers for various values of the required BV ratio. Using the algorithm proposed in section 3, we calculated effective portfolios for BM_{γ} at the levels of 1.23, 1.90, 2.56 and 3.23. The results are depicted in Figure 2. The graph shows that higher levels of required the book to market ratio move the effective frontier upwards. The restriction connected with the BM ratio is less important for lower levels of the required BM ratio, as the required profitability of expected return grows, and it does not apply to the highest levels of the expected rate of return.

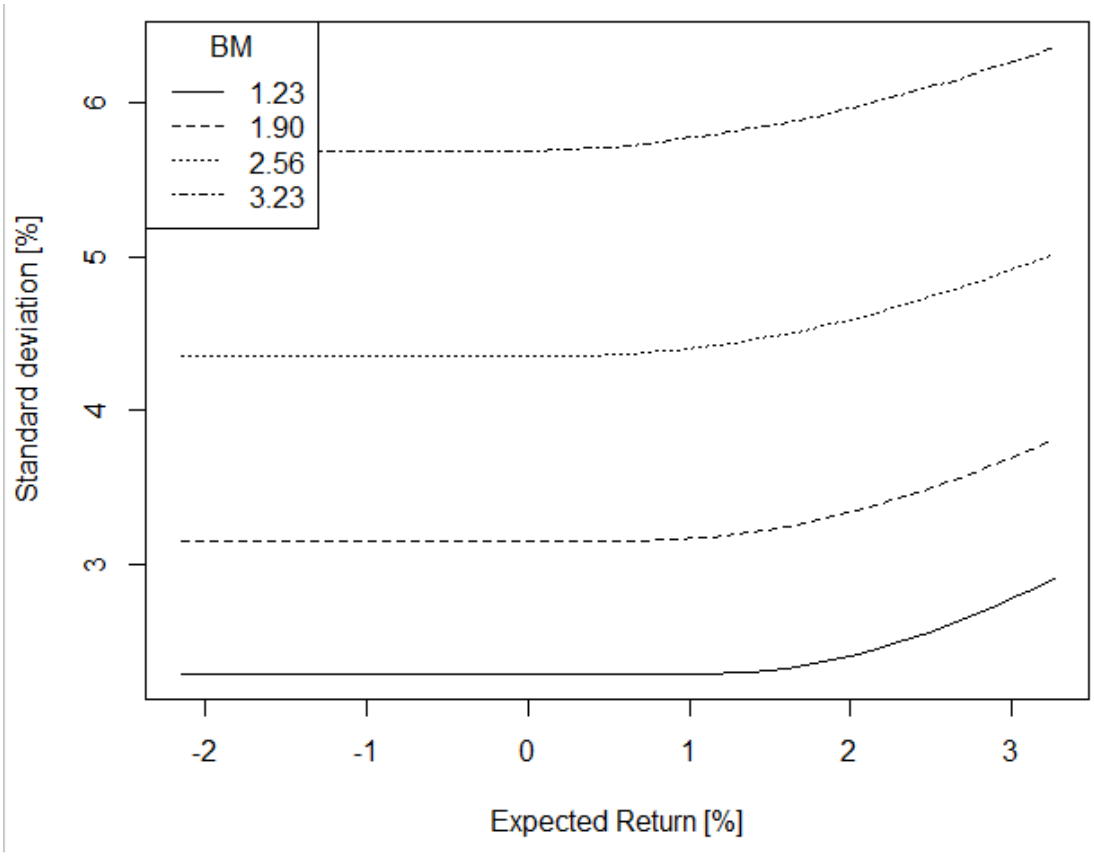

Figure 2: Effective frontiers for different values of the book to market ratio

Source: own study

In order to compare the investments according to the fundamental method (i.e. with the book to market ratio as the third criterion) with ones derived in line with the classical approach, we performed the following calculations. We calculated several portfolios using both methods. Data for portfolio calculations were estimated based on a moving frame of the length of 400 trading days. The first frame started on 2013-04-03 and the last one began on 2020-02-05. There were 1705 frames in total. For each frame, we estimated all parameters required in both investment problems. Then, we considered investments for one moth starting on the next trading day. In each case, we considered four portfolios. The first one was the solution of a classical problem with the required rate of return equal to expected rates of return of all stock. The next three were solutions of the problem including the fundamental criterion with the same required rate of return and values of the book to market ratio equal 1.28, 2.12 and 2.97, respectively. The numbers are 30%, 50% and 70% percentiles of the observed book to market values of the considered stocks. In each case, we assumed that the expected return of the portfolio should be equal to the actual mean return of the stocks in the portfolio. Then, we checked calculated realized returns for each of these portfolios.

For each kind of portfolio, we calculated the mean return, standard deviation and cumulated return from the whole period of our study. Besides, we verified the percentage of cases in which return from a specific portfolio exceed returns from the classical portfolio. The results were presented in Table 2. Portfolio P1 is the classical Markovitz portfolio with minimal variation (under the condition that the expected value is equal to the observed mean return). Portfolios P2, P3 and P4 were constructed with the additional restriction on values of the book to market ratio (1.28, 2.12 and 2.97, respectively)

It transpires from all cases that the results from the portfolios with the BM criterion had higher mean returns and lower risk. In two of them, the cumulated return values were higher.

Table 2: The results (ex post, realized returns)

Portfolio	Mean return	Std	Exceedings	Cum. return
P1	1.05	6.21	0	1.55
P2	1.35	6.71	55.52%	1.95
P3	1.19	9.55	51.58%	1.67
P4	1.11	13.49	51.04%	1.32

Source: own calculations

Conclusions

In the paper, we propose an algorithm for constructing a portfolio of assets where three criteria are considered: potential profitability of the investment (measured with expected return), risk (measured with variance of returns) and economic situation of companies in the portfolio (given by the book to market ratio). The algorithm for finding effective portfolios inclusive of all the three criteria is based on analytical solutions of optimization problems. We have demonstrated that the algorithm is effective and allows one to construct efficient portfolios with minimal computational effort.

The proposed algorithm enabled us to determine the effective frontier (i.e. the tradeoff between expected return and risk) for several levels of requirements concerning fundamental values of companies whose stocks are in a portfolio. The empirical research results for the major companies traded on the Warsaw Stock Exchange reveal that inclusion of the book to market ratio as an additional criterion in creating a portfolio can lead to better performance.

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Prospects for Improving A Credit Mechanism in The Agricultural Sector of The Ukraine Economy

Serge KOLOTUKHA
Ph. D. in Economics, Associate Professor of the Department of Finance, Banking and Insurance Uman National University of Horticulture, Ukraine
E-mail: sergey.kolotukha@gmail.com

Nataliia GVOZDEJ
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University, Ukraine
E-mail: gvozdej@ukr.net

Liudmyla CHVERTKO
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University, Ukraine
E-mail:luda_um@ukr.net

Tetiana KORNIIENKO
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University, Ukraine
E-mail: kornienkoto@ukr.net

Oksana VINNYTSKA
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University, Ukraine
E -mail: vinnytska.oksana@ukr.net

Abstract

The necessity of optimization of financial and credit support for the development of the agro-industrial sector of the economy has been substantiated. The ways of activating bank lending to agricultural enterprises by improving the mechanism for determining interest rates for loans, introducing mortgage lending in agriculture, using credit incentives for the rational use of land and insuring credit risks. The expediency of improving the mechanism of state support for agricultural producers has been determined both through budget financing of national programs and through lending from the budget. The assessment of the current state of state financial assistance to the subjects of agricultural production is carried out, measures are proposed to improve the existing mechanisms of financial and credit support and stabilize the situation in the agricultural sector of the economy.

Keywords*:* Agriculture, Agricultural Producers, Financial Support, Credit Support, Credit Relations, Mortgage Crediting, Land Bank, Credit Risk, Risk Insurance.

Introduction

A study of the financial support of agricultural enterprises shows that these enterprises operate at the expense of their own resources, which today are significant in terms of share, but insufficient for self-financing. This leads to the development of both banking and partner forms of crediting. Bank crediting does not play a significant role in the development of the agricultural sector, although currently there are positive trends in the growth of crediting volumes by domestic commercial banks, including in terms of credit on easy terms.

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Analysis of recent research and publications

Issues of financial-and-credit support of agricultural producers, both theoretical and practical directions, are considered in the works of many scientists, in particular, such scholars-economists as: Yu. Ya. Luzan [3], Yu. O. Lupenko [2], O. V. Khodakivska, V.Ya. Mesel-Veseliak [2], D. O. Plekhanov [4], P. T. Sabluk, M. M. Fedorov, well-known foreign scientists and many other domestic scientists.

However, many aspects of this important problem require further in-depth researches with the aim to find ways to improve the financial-and-credit mechanism in the context of the market and the development of various forms of economic relations.

Objectives statement

The purpose of this publication is to study the prospects for the implementation of new forms of credit relations for the enterprises of the agricultural sector of the economy and to outline the main directions of their improvement in the context of modern conditions.

Presentation of basic material of the research

Summarizing the difficulties in the way of the agricultural sector, we note that this is essentially a manifestation of the following risks, which can be figuratively divided into three groups:

1. Social-and-political and structural-and-economic – incompleteness of the legal framework, cautious anti-inflationary agricultural policy, relatively small amounts of state investment in the sphere of the agro-industrial complex; imperfection of the mechanism of state regulation of the industry; low payment discipline in the relations between business entities; undercapitalization of the banking system and insufficient level of protection of creditors' rights, for example, in terms of «blurring» of the terms of circulation of recovery of the debtor's property in the legislation.
2. Risks of sectoral nature – weak justification and low budget and economic efficiency of the majority of the investment projects in the sphere of the agro-industrial complex, shortage of energy raw materials and skilled manpower, high level of competition from foreign producers, a significant (more than 60%) degree of «dependence» of the agriculture sector from the capabilities and resources of personal subsidiary husbandry.
3. Risks of financial-and-credit nature, low level of the development of the financial market, imperfect infrastructure of the credit system serving the agricultural sector, non-defined strategy of the development of credit provision of production subjects.

Mentioned negative factors are essentially interrelated. It seems that the strategic planning of the development of the agro-industrial sector, implemented on the vector «state – banking sector – agricultural producers» are interrelated with risk and motivational components of business policy of each of the participants in the support system of agro-industrial complex.

The main provisions and measures to stabilize the situation in the agricultural sector of the economy in modern conditions and change of the motivational component of the investment activity of banks in this market segment require the conducting of the following actions:

- to develop a long-term program for the development of the agricultural sector in the context of modern conditions;
- to determine the financial priorities of domestic agricultural producers;
- to ensure the quality of economic growth of all strategic industries (and agriculture is one of them) to the growth of basic economic parameters. To continue positive innovations in terms of defining national priorities in the development of the State Budget of the country;
- to develop and ensure the support of the profitability of the agricultural sector at the appropriate level. Based on this, the development and implementation of a balanced system of income insurance of agricultural producers is seen as promising;
- to determine in the tax legislation the norms that give the right to receive benefits to business entities that invest a certain amount of their income in the agricultural sector of the economy;
- to strengthen customs control over the import of foreign food raw materials;
- to estimate the probability of benefits from the reduction (minimization or differentiation of rates) of bank income tax – from income sent to crediting the enterprises of the agricultural sector of the economy;

- to ensure a practical possibility of establishing at the level of the Government of Ukraine the so-called «limits of usury» (widely used in the United States) to prevent excessive overpricing of supply rates by commercial banks;
- to develop the structure of a specialized agricultural bank on the basis of a universal credit institution (according to the type used in the western practice) of the development bank;
- to develop the following programs of credit support for agricultural producers:

a) crediting for the purchase of mineral fertilizers; fodders, purchase of fuels and lubricants, veterinary drugs, to pay for the insurance of future harvests – up to 12-15 months in the form of overdraft, one-time issuance or credit line;

b) medium-term crediting (up to 5 years) of needs in agricultural machinery, freight transport, production equipment, in order to modernize fixed assets, the creation of production for processing agricultural products;

c) credits for the purchase of breeding stock on its security, for new construction works, for the creation of production facilities of agricultural enterprises (in particular, for building of livestock complexes) on the terms of long-term financing (up to 8 years).

The development of mortgage relations in agriculture in modern conditions is of great importance because of the need to attract additional investment in the agro-industrial complex in order to revive agricultural enterprises of various forms of ownership. The low quality of mortgage security limits the access of agricultural enterprises to credit resources and increases the credit risks of banks. In this regard, the formation of the land market is, in our opinion, a priority, the solution of which will launch a mechanism of mortgage crediting in agriculture, where the agricultural land will be mortgage, which will help to attract investment credits.

The use of mortgage mechanisms allows business entities to:

- get a credit for buying a plot of land and start own business using it;
- expand the existing economy through the purchase of new real estate, including new plots of land, buildings, structures;
- renew working capital.

The current state of the development of credit relations is characterized by the process of finding new forms of credit security of the agricultural sector of the economy in relation to new economic conditions. The change in the economic environment causes a change in credit relations in the agricultural sector of the economy.

However, there is no consensus on the optimal amount of credit resources to the volume of gross agricultural output.

To do this, it is necessary to determine the minimum (although it is not significant enough) and the maximum limit of crediting, which directly affects the level of creditworthiness of enterprises. In our opinion, the amount of credits raised by agricultural enterprises should not exceed 40% of the gross agricultural output. Exceeding this limit can disrupt the cycle of the reproduction process and increase the risk of credit default.

In the process of developing market relations, it is advisable for banks to improve the mechanism for determining interest rates on credit. The size of interest rates should be related to the technological features of agricultural production performance and the period of receipt of revenue from sold products (especially crop products).

In our opinion, the introduction of a regression scale mechanism for determining the discount rate of a commercial bank for the use of credit taking into account the growth of profits is worth noticing. The essence of it is that each subsequent increase in income lowers the credit rate, which will increase the efficiency of production of the agricultural enterprises.

The size of the interest rate on credit for agricultural enterprises should be tied to the term of their providing, which is directly related to the peculiarities of agricultural production. Thus, credit rates in the I and II quarters should be lower than rates in the III and IV quarters. This will force enterprises to be more responsible to their financial resources.

In addition, it is advisable to attract a credit support mechanism in the context of developing a state food security strategy. Thus, agricultural enterprises selling their products on the domestic market should use credit benefits (for example, lower interest rates). Consequently, the country partially compensates financial losses of enterprises and stimulates the development of the domestic market.

One of the important steps towards the development of the land market is the creation of the State Joint-Stock Land (Mortgage) Bank with an appropriate system of banks in the regions, which should provide the following types of banking services to the enterprises of the agricultural sector:

- investment and credit servicing of commodity producers of the agro-industrial complex, including mortgage crediting of the agricultural commodity producers secured by plots of land and property;
- redemption of pledged property and land by insolvent debtors from commercial banks;
- trust management of property and land and funds of insolvent agricultural enterprises;
- implementation of leasing and factoring operations for agricultural producers;
- insurance of property, life and financial risks in rural areas;
- commission transactions with goods, property and land;
- provision of services for accounting, auditing and analysis of enterprise activity and development of investment plans and business projects;
- servicing of foreign economic operations of commodity producers of the agro-industrial complex;
- carrying out other banking operations;
- performance of functions of the methodical center on rendering of consulting services to the enterprises of the agro-industrial complex, credit unions and newly created cooperative banks which serve this branch.

Throughout the civilized world, land is collateral for long-term, cheap credits for the agricultural sector. The land fund of Ukraine has 33 million hectares of arable land, and its value, according to scientists, is 140-300 billion hryvnias. Thus, long-term credits for land mortgages of 100-200 billion can be attracted to the agricultural sector of the economy. Thuswise, Ukraine has all the prerequisites for the creation and effective development of land banks.

The task of the state is to develop a credit policy taking into account the interests of each business entity in accordance with their economic status, social significance and development strategy.

In recent years, Ukrainian land has been used in complete disregard of the physical law of return of nutrients, which has led to agricultural instability, reduced agricultural efficiency, especially in years when natural disasters are increasingly common. Yield loss on poorly eroded soil is 20%, moderately eroded soil – 40%, heavily eroded soil – 60%. The annual total losses of the state amount to 12.76 billion UAH, and the loss of net profit – 7.4 billion UAH [1].

The normative documents of the state should provide for the provision of credit benefits for the rational use of land. Improving the efficiency of land use of the state is the basis of its food security and the basis of a favourable competitive environment after Ukraine's accession to the WTO. However, the legislation does not provide credit benefits in terms of regulatory and legal support for economic incentives of the rational use and protection of land.

In modern conditions, the issue of production of environmentally friendly agricultural products is acute, which is also relevant in European integration processes. This requires improvement and financial-and-credit mechanism of the agricultural sector of the economy. First of all, it is necessary to revise the pricing and customs policy, tax legislation, as well as to introduce a preferential crediting regime. The essential content of the credit is manifested through its functional significance. Researchers have presented a wide range of credit functions which are the subject of scientific discussions. This is due to the fact that, there is no consensus among scientists in understanding the role of credit in modern conditions. Some understand it as the most important tasks of the credit, others present it as a specific relationship with the economic environment, which in essence does not consider the role of credit as an important factor in the economic development. In addition, the economic category of «credit» manifests itself in various forms, which is reflected in its functions.

Based on these positions, we offer to supplement the value of credit in modern conditions with the following functions.

The function of providing with financial resources. Credit in a market economy is an elastic mechanism for the transfer of capital from one sector of the economy to another to achieve certain rates of profit-earning, which allows to overcome the limitations of individual capital and to achieve a balance in the formation of financial resources. This is very important, because the lack of financial resources and loss of time to find new sources of their formation has a negative impact on the profitability of agricultural enterprises.

Information-and-analytical function of credit. The category of credit, its size, objects of crediting, terms of granting give the chance to estimate by the society of level of economic development of separate subject of business activity and the state as a whole. In addition, information about the state of credit relations is a valuable object of analytical

researches, which will help to determine the positive and negative factors of these relations and to define the strategy for their development.

Agricultural production is a risky industry, which causes the necessity of the market development of the insurance services.

The concept of financial risk is not unambiguous in the interpretation of experts and scholars. In a narrow sense, it is just credit risks

Credit risk is connected with the possibility of non-fulfillment of the financial obligations by the entity before the investor in the result of using an internal loan to finance its activity. Credit risk arises in the process of business cooperation of the enterprise with its creditors:

1) with a bank and other financial institutions;
2) with contractors – suppliers and intermediaries;
3) with shareholders.

The variety of types of credit operations determines the features and reasons of credit risk appearing:

1) bad faith of the borrower who received a credit;
2) deterioration of the competitive state of a particular entity that received a commercial or bank credit;
3) unfavourable economic situation;
4) incompetence of the company's management;
5) non-fulfillment of the obligations by the counterparties before the borrower;
6) imperfection of the regulatory framework;
7) financial-and-economic instability of the state.

Risk insurance of credit default is a delcredit form of insurance relations organization, where the banks, investors and other creditors play simultaneously the role of insurants and insured ones, and the insurance relationship is limited by the relationship between two parties – the insurer and the insured.

The liability of the insurance institution arises when the insured has not received the amount stipulated in the credit agreement within, as a rule, 20 days after the due date of payment under the credit agreement or the deadline set by the bank if the borrower fails to comply with the credit agreement. The insurance contract sets the limit of the insurer's liability. It can be in the amount from 50 to 90% of the unrecovered credit. The rest of the risk remains the responsibility of the insured. The division of risk between the insurer and the insured is established in order not to reduce the bank's liability for the credits provided by it. When insuring, the bank must carefully check the paying capacity of the borrower, his financial condition.

If individual credits are insured, the insurance contract is concluded for the period of using the credit. The amount of insurance is set in proportion to the percentage of the insurer's liability specified in the insurance contract, based on the total amount of debt (including interest on the credit usage), which is subject to repayment under the terms of the credit agreement.

The agreement is concluded on the basis of a written application of the bank in the form prescribed by the insurer, the copies of the credit agreement together with all documents submitted for pre-contractual examination.

The insurer is obliged to pay the insurance indemnity within three banking days after the end of 20 working days and after the expiration of the insurance contract.

Another common type of bank credit insurance is borrowers' liability insurance for credits nonredemption, under which the insurer is the debtor, insuring received credit in favour of his credit provider. That is, sort of fulfilling of the financial obligations given by the debtor to cover the damage caused to his credit provider is insured. This is a type of classic (mortgage) insurance.

We suggest that some credit agreements be signed by counterparties that cooperate with agricultural producers and affect the results of their activity. Agricultural enterprises may file financial claims (if justified) against their counterparties for reimbursement of interest for the credit usage and share the responsibility in case of imposition of sanctions in case of non-fulfillment of their obligations before the credit providers. This will force counterparties in the agricultural sector of economy to fulfill their obligations more responsibly and reduce the credit exposure on agricultural producers.

The state can influence the development of agricultural production through direct participation – through budget financing of national-level programs and for the account of crediting from the budget costs, thus carrying out intersectoral redistribution of financial resources and stimulating certain types of activity in accordance with the specific purpose of financial (credit) policy. Herewith, state crediting is an important regulatory tool [2].

There is a noticeable difference between budget and bank crediting. Thus, bank credits are directed mainly in the field of agricultural production, where relatively higher income is provided with a corresponding repayment period. Budget credits are usually granted on preferential conditions at terms and interest rates in order to create conditions for the development of agricultural production of the relevant territory or increase the production of certain goods. They are a means of supporting of vital economic structures in the case of financial problems, their special position in the market, the bankruptcy of which leads to a deterioration of the economic situation in the state as a whole. At the same time, budget crediting should be temporary, used to stimulate the development of production in promising areas, and not turn into a long-term policy of redistribution of the financial resources in favour of individual entities of agricultural production [3].

Budget crediting is usually actively used during the downturn of the business activity and is an important tool of countercyclical policy. The volume of government loans in the domestic market decreases when production activity returns to its normal rhythm. Budget crediting is characterized by greater flexibility and efficiency compared to direct budget financing [4]. However, the state must be financially stable for conducting of budget crediting. Specific items of budget crediting for each industry in accordance with the development strategy should be provided in the state budget. This is especially important for small and medium-sized enterprises.

The report of the Ministry of Economy on the new model of state support of the agro-industrial complex states: in 2019, agricultural producers used 4.34 billion UAH of state support. In total, 1 667 business entities and 230 025 individuals, about 10 000 farmers and 2 agricultural cooperatives received state support.

State support was provided in six separate directions:

1) cheapening of credits;
2) support for the development of farms;
3) support for the development of horticulture, berry growing, viticulture and hop growing;
4) providing credits to farms;
5) support for the development of the livestock industry;
6) cheapening of agricultural machinery and equipment.

This allowed to purchase 6262 heads of cattle, 781 heads of sheep, 5532 heads of pigs and 257900 doses of reproductive material, partially recompense the cost of 49 livestock objects and 61 facilities for storage and processing of grain, to plant 3897 hectares of fruit-and-berry plantations, 246 hectares of vineyards and 9 hectares of hop gardens, to build 5 refrigerators with controlled atmosphere (CA) with a capacity of 8.5 thousand tons, 1 facility for freezing fruit-and-berry products, to purchase 5 lines of commodity processing of fruits, 3 mechanisms for hop granulation and 1 automated line for drying fruits, etc. In addition, 9 502 agricultural producers purchased 25 065 units of equipment, 426 enterprises attracted preferential credits.

The Law on the State Budget 2020 contains fewer state programs than year. Most of the funds were allocated to support producers operating in the livestock sector, farming and to reduce the cost of credits by compensating the bank's interest rate (Table 1).

Table 1: Directions of financial support of the enterprises of the agro-industrial complex for 2020, thousand UAH

Directions of financial support of the enterprises of the agro-industrial complex	The amount of expenses	The amount of expenses %
State support for the development of animal husbandry and processing of agricultural products	1 000	10%
Financial support for the development of farms	380	3,8%
Partial compensation for the cost of agricultural machinery and equipment of domestic production	1 000	10%
Financial support for activities in the agro-industrial complex by	1 200	12%

reducing the cost of credits		
Financial support for the development of horticulture, viticulture and hop-growing	400	4%
Provision of additional financial support to family farms through the mechanism of additional payment in favour of insured persons – members/head of the family farm of a single contribution to the obligatory state social insurance	20 000	20%

Source: [5].

The Ministry for Development of Economy, Trade and Agriculture of Ukraine distributes funds under this program. It will be recalled that currently this Ministry ensures the formation and implementation of state agricultural policy.

The procedures for providing funds for each area of state support are approved, which contain a mechanism for receiving budget funds and a list of conditions under which agricultural producers can apply for state aid.

The general conditions of almost all areas are that the following agricultural producers cannot count on state aid:

- those which have arrears of taxes and fees;
- those which have been declared bankrupt or in respect of whom a bankruptcy case has been initiated;
- which are in the process of liquidation;
- in which the facts of illegal receiving and/or misuse of budget funds were previously revealed [5].

Thus, the features of the following risks while summarizing the difficulties in the way of the agricultural sector can be noted:

1. Social-and-political and structural-and-economic – incompleteness of the legal framework, cautious anti-inflationary agricultural policy, relatively small amounts of state investment in the sphere of the agro-industrial complex; imperfection of the mechanism of state regulation of the industry; low payment discipline in the relations between business entities; undercapitalization of the banking system and insufficient level of protection of creditors' rights.
2. Risks of sectoral nature – weak justification and low budget and – economic efficiency of the majority of the investment projects in the sphere of the agro-industrial complex.
3. Risks of financial-and-credit nature – low level of the development of the financial market, imperfect infrastructure of the credit system serving the agricultural sector, non-defined strategy of the development of credit provision of production subjects. The main measures on stabilization the situation in the agricultural sector of the economy in modern conditions require the conducting of the following actions:

- to develop a long-term program for the development of the agricultural sector in the context of modern conditions;
- to determine the financial priorities of domestic agricultural producers;
- to ensure the quality of economic growth of all strategic industries (and agriculture is one of them) to the growth of basic economic parameters;
- to develop and ensure the support of the profitability of the agricultural sector at the appropriate level. Based on this, the development and implementation of a balanced system of income insurance of agricultural producers is seen as promising;
- to determine in the tax legislation the norms that give the right to receive benefits to business entities that invest a certain amount of their income in the agricultural sector of the economy;
- to strengthen customs control over the import of foreign food raw materials;
- to estimate the probability of benefits from the reduction (minimization or differentiation of rates) of bank income tax – from income sent to crediting the enterprises of the agricultural sector of the economy;
- to ensure a practical possibility of establishing at the level of the Government of Ukraine the so-called «limits of usury» to prevent excessive overpricing of supply rates by commercial banks;
- to develop the structure of a specialized agricultural bank and to work out the strategy of its development in accordance with modern conditions.

Conclusions

Thus, at the present stage of the agrarian reform, the formation of the domestic system of agricultural lending, taking into account the specifics and objective conditions of the industry, is carried out with state support. The state policy on credit provision of the agricultural sector in every possible way contributes to the development of the financial market in the countryside. It is carried out through improved legislative protection and the establishment of elements of temporary financial support. The continuation of the policy in the chosen tension for the ability to assimilate the original shortcomings is a reliable guarantee of an increase in financial flows to agriculture in subsequent years.

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Familiness in Intra-organizational Relations and the Personnel Policy in Family Businesses

Joanna LERCHE

Czestochowa University of Technology, Poland
joanna.lerche@pcz.pl

Anna LEMAŃSKA-MAJDZIK

Czestochowa University of Technology, Poland
anna.lemanska-majdzik@pcz.pl

Abstract

Properly developed relationships are one of the elements that determine development opportunities of enterprises. Familiness resulting from the specificity, characteristics and values held in family businesses affects the shape of intra-organizational relationality as well as building working atmosphere. The management of intra-organizational relations is an intangible resource of the organization of particular strategic value. Therefore, the attention should be drawn to the significance of relational capital and its impact on the ability to manage human resources as well as organizational culture in family businesses. The objective of the article is to examine the impact of the family nature of the enterprise on building intra-organizational relations. During the analysis the attention has been paid to selected aspects of the personnel policy, including organizational culture of the enterprise, working atmosphere, stabilization and professional development as well as motivation of employees hired. The research conducted on Polish workers of family businesses in the second half of 2020 allowed for responding to the formulated research question. The research results confirmed that the basis for building positive intra-organizational relations is working atmosphere. The concern of employers for positive relationships with employees often brings a range of benefits, and the values associated with the family as well as characteristics such as trust, loyalty, tradition, enhance a sense of bond and identity of hired employees.

Keywords: Intra-Organizational Relations, Personnel Policy, Management of Family Businesses, Family Company

Introduction

Family businesses belong to the group of enterprises the specificity of which allows for the isolation of particular features that are characteristic of this type of organizations. These properties may include, among others, a high level of interdependence between the family and the enterprise, different organizational culture based on loyalty and trust in relation to employees, independence and care for positive relationships with the company's stakeholders. In turn, these characteristics allow for distinguishing family businesses against the background of non-family organizations.

In the article, an attempt has been made to identify the relationships within family organizations in the context of the personnel policy by determining the factors affecting job satisfaction and working atmosphere. Changes in the labor market cause that enterprises, not only family businesses, encounter different problems, among others, recruitment, employee retention and outflow, or talent acquisition. Therefore, it becomes relevant to build and maintain positive intra-organizational relations between employees and owners or individuals responsible for managing the team in the organization. Therefore, the objective of the article is to examine the impact of the family nature of the enterprise on building intra-organizational relations. During the analysis, the attention has been drawn to selected aspects of the personnel policy, including organizational culture of the enterprise, working atmosphere, stabilization, professional development and motivation of employees hired.

The employees of the production family businesses from the Opole region took part in the study. The enterprises were selected to meet the criteria resulting from the definition of the family business. The research was carried out in the second half of 2020 on the sample of 50 employees of the production family businesses (it was a pilot study). The

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study used an original questionnaire. The collected results were analyzed using descriptive statistics with the use of a 5-point Likert scale.

Intra-Organizational Relations in Family Businesses

Establishing and maintaining lasting relationships and market relations is the essence of the functioning of each organization. Relational capital is undoubtedly a unique resource which, from the point of view of the theory of organizational resources, determines competitive advantage of the enterprise (Roman, Blomqvist, 2008). It is increasingly pinpointed that intellectual capital is the factor conditioning market advantage (Bontis, 1998). Stewart (1997) defines intellectual capital as the intellectual material of the organization, thus, it is knowledge, information, intellectual property, experience, which determines the creation of its wealth. The literature review indicates that it is possible to distinguish three components of intellectual capital, namely (Mani, Lakhal, 2015; Bombiak, 2016, p. 98):

- organizational capital, including the issues enhancing the performance of employees through technologies, organizational culture, management concepts, procedures and databases,
- human capital, understood as participants in the organization and their physical characteristics, intellectual ones, predispositions, skills, which enable the development and functioning of individual units,
- relational capital, defined as interrelationships of the organization with stakeholders, consisting of customers, suppliers, agreements with trading partners, investors, banks, public institutions etc.

Initially, relational capital was identified only with the area related to customers service. Nowadays, however, this category is perceived more extensively, and it includes relationships with all internal and external stakeholders of the organization (Cucculelli, Peruzzi, Zazzaro, 2019). Thus, relational capital can be defined as a whole of relations between the enterprise and stakeholders, which are based on mutual impact, trust and interdependence (Danielak, 2012, p. 16; Daspit, Long, 2014). The basis for the creation and management of relationships is the ability to cooperate. This ability, in the opinion of Kwiecień (2018, p. 94), builds a specific intra-organizational mechanism, which enables access to external knowledge and shapes relationships with the actors of the company's environment. When considering the structure of relational capital and its internal and external division, it can be concluded that intra-organizational relations are created by stakeholders who constitute the organization, thus both employees and managers, and their quality depends on the ability to create the atmosphere of mutual trust. It should be pinpointed that, nowadays, the advantage is gained by the company in which relational capital is value added in the long term. This enables the acquisition of basic resources such as: financial, physical, information or human resources, and creates the basis for unique resources, such as intellectual capital (Kohtamäki, Vesalainen, Henneberg, Naudé, Ventresca, 2012; Bombiak, 2016, p. 99).

The market value of the enterprise and its growth are perceived in terms of the company's success. Creating the value of the organization, regardless of its type, is based on the isolation and control of factors creating value (Carey, Lawson, Krause, 2011). Nowadays, taking into account the need for constant adaptation to the environmental conditions, it becomes necessary to share functions within the enterprise. The growing needs and attitudes of customers require specific competences and relevant relationships from employees. Establishing relationships is therefore a means to achieve the objective in each area of the activity of the organization in terms of creating its value, intra-organizational cooperation, use of common potential and achievement of mutual benefits (Kwiecień, 2018, pp. 99-100). Thus, it can be concluded that internal and external relations are intangible assets of particular strategic value. They include the characteristics such as: rareness, difficulty in purchasing and selling, difficulty in replacing. The value of relations is, in turn, inextricably linked to a specific entity, place and time (Eschner, 2017, p.137; Niazi, 2017).

The specificity of intra-organizational relations affects not only the atmosphere within the company but also the quality of external relations (Okręglicka, Havierniková, Mynarzová, Lemańska-Majdzik 2017). Internal relations in family businesses reflect interpersonal relations between employees, superiors and subordinates as well as the relationships between family members managing the company (Fig. 1).

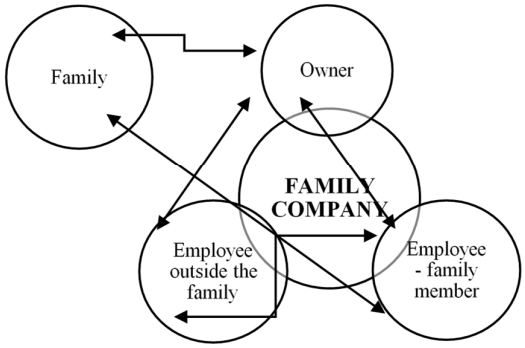

Fig. 1: Relationships within the group of stakeholders of the family business
Source: Own study

The key role in creating intra-organizational relations is played by interpersonal bonds created between participants (Hanson, Hessel, Danes, 2019). Taking into account the fact that most family businesses are companies from the SME sector with the participation of family social capital, the feature of familiness in the process of creating interpersonal bonds seems to be particularly important. It turns out that external relations of family organizations are not built by the company but the employees representing it (Eschner 2017, pp. 137-149).

The literature review indicates that the fact that employees are satisfied with their job becomes particularly important in the organization. Employees' job satisfaction affects the functioning of enterprises, their competitiveness and profitability, and a high level of employees' satisfaction may be a critical factor influencing the success of the entire organization. According to Vorina, Simonić, Vlasova (2017), only satisfied employees are able to maintain the pace dictated by the modern labor market. The awareness of this fact among organizations is growing, and the level of job satisfaction is related to individual emotional state of each employee, which is expressed in profit and has an impact on the development and performance of the company. Job satisfaction may include different points of view such as development opportunities, working conditions, remuneration, or building positive relationships within the company. Proper development of relationships between the participants of the organization provides therefore an opportunity to access intellectual resources of employees and determines the ability and efficiency of the use of other resources (Daspit, Long 2014). Properly shaped intra-organizational relations are the factors conditioning access to knowledge, its creation and exchange, which, in turn, is the basis for the functioning in the knowledge-based economy. Involvement in the creation of positive relationships is translated into long-term sustainable relationships with external stakeholders based on cooperation and trust. On the other hand, inappropriate relationships between employees, negative atmosphere, lack of cooperation may result in the loss of commitment and, consequently, the loss of relationships with customers. Owners, managers, employees are therefore the group which initiates and implements all business processes in the organization. It can be concluded that this group is the main source of the generally understood relational capital (Rajennd et al., 2015; Bombiak, 2016, p. 100). It is indicated that family businesses are a particular group of organizations, also due to the fact that they assume greater responsibility for groups of stakeholders. This responsibility is visible in striving to maintain the stability of the company in the long-time perspective, even at the expense of high profits that can be achieved in the short-term and for the sake of building internal and external relations (Eschner 2017, p. 142).

As observed by Safin (2007), the dimension and image of family businesses is created using a range of characteristics assigned to this type of organizations. International research into family businesses allowed for the implementation of the term of "familiness", which specifies the uniqueness of this group of companies, at the same time, determining specific factors distinguishing this group (Leszczewska 2015, p. 124). Habbershon, Williams and MacMillan (2003) emphasize that, in a situation when the family is involved in the company, a package of specific resources and opportunities is created, referred to as "familiness", which may possibly create competitive advantages. The otherness of family businesses (Chua, Chrisman, Sharma 1999; Więcek-Janka 2013; Hernández-Linares, Sarkar, López-Fernández 2017) results from the characteristics that are assigned exclusively to this type of organizations. In turn, Malara (2006, p. 34) pinpointed that the characteristics distinguishing family businesses from other companies, in particular, include:

- interdependence of the business and the family,
- use of financial, intellectual and personal resources of the family,
- succession and succession strategy,
- family organization culture.

The specificity of internal relations in family businesses combines traditional employee-employer relationships as well as employee-employee relationships with relationships between family members and relationships of family members with non-family employees (compare Fig. 1). This complexity makes it possible, in the context of family businesses, to talk about a different atmosphere and climate within the company, using terms such as: familiness, trust, cohesion, involvement, enthusiasm. In non-family businesses, working atmosphere is specified as formalized and business-oriented (Tab. 1) (Eschner 207, p. 144).

Table 1: Working atmosphere in family and non-family businesses

Family businesses	Non-family businesses
✓ familiness, ✓ trust, ✓ cohesion, ✓ involvement, ✓ commitment, ✓ enthusiasm, ✓ informality,	✓ business goal orientation, ✓ formality, ✓ contractual agreements, ✓ distance,

Source: Own study based on I. Eschner 2017, p. 144

The destructive impact on building intra-organizational relations, both in family and non-family businesses, is exerted by unfair decision-making by managers. Undoubtedly, this leads to conflicts. In family businesses, a sense of injustice may be additionally enhanced by too excessive impact of the family and privileged treatment of employees being family members. The family business is also particularly prone to interpersonal conflicts. They result from strong ties between family members. Negative atmosphere between family members has a destabilizing effect on the work of employees and the condition of the enterprise. Family problems become the company's problems and vice versa (Eschner 2017, p. 146).

The process of building trust among employees requires a lot of effort since it cannot be bought through an increase in wages or special social benefits. In turn, the effect of positive relationships built on trust translates into positive relationships with customers and contractors and an increase in the attractiveness of the company in the labor market. Kwiecień (2018, pp. 134-136) indicates that the level of loyalty within the organization is, among others, affected by:

- creating the common vision and the way of the company's operation by employees, which requires the adoption of common objectives, a similar system of work and acceptance of the adopted standards for evaluating and rewarding work,
- emphasizing and indicating the behavior building trust through active listening, expressing own opinion by employees, introducing the habit of joint integration meetings, at which the company's matters are discussed,
- joint meetings providing opportunities to establish a conversation, which may be a sign of kindness and support.

The employee-employer relationship becomes an essential success factor and contributes to the effective and efficient functioning of the enterprise. The closeness of relations with the personnel affects the ease of motivation and is the basis for the reliable performance of the duties assigned (Xesha, Iwu, Slabbert, Nduna 2014).

The Personnel Policy in The Organization

The personnel policy has evolved considerably in the organization's activities over the past several decades. This has been affected by, among others, changes in the economy and the environment of the organization. Knowledge, information and specialization have become the dominant values. Intellectual capital, including human capital, in the knowledge-based economy has gained great importance and has an impact on the functioning of all enterprises. The man possessing knowledge, capable of creativity and entrepreneurship, creating innovation, oriented to development and expansion of the possessed knowledge in the place of employment has become the determinant of development (Huk 2013, p. 215; Kanten, Kanten, Gurlek 2015). Undoubtedly, one of the benefits resulting from the achievement of competitive advantage based on appropriate HR management is difficulty in duplicating it by competitors. The personnel strategy and policy of the enterprise is a unique combination of standards, personalities, skills and organizational culture. It should be pinpointed that the learning process in the organization may bring some new observations for the creators of business strategies since science performed by the organization may affect and shape market needs. Greater knowledge, which results from the learning process and market knowledge undoubtedly influences the level of competitiveness of learning enterprises (Kuşcua, Yener,

Gurbuz 2015). In Figure 2, it is pinpointed that the personnel strategy is additionally conditioned by the elements such as the labor market and economic conditions, i.e. the conditions of the business environment.

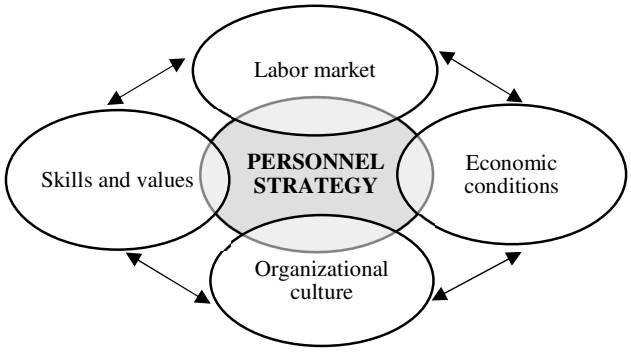

Fig. 2: Determinants of the company's personnel strategy.
Source: Own study based on (Kugiel 2013, p. 76).

Personnel, as a strategic resource of the organization, is capable of learning as well as developing their potential. Hence, the personnel policy is a set of methods that the organization intends to use in HR management. The basic functions in the area of personnel management are (Lemańska-Majdzik, Sipa 2015):

- employment planning, i.e. preparation of activities and determination of future staff needs,
- organization of personnel i.e. use of the potential of employees for the efficiency of the company's performance, it is associated both with recruitment and appropriate staff selection as well as their adaptation, integration and improvement,
- employee motivation, which is directly linked to the remuneration system and social relations in the workplace,
- control of employees and their activities in order to accomplish the objective.

The enterprise, acquiring and analyzing the collected information on human capital, both inside and outside the organization, brings about that the people managing the personnel policy not only improve the quality of decisions taken but also allow stakeholders to make more accurate assessment of the long-term performance of the enterprise. An important element of shaping the appropriate personnel policy is undoubtedly organizational culture (Hanson, Hessel, Danes 2019; Lemańska-Majdzik 2019b), defined as a set of standards, values and cultural patterns, developed and widespread in the given social community (Nahapiet, Ghoshal 1998). Organizational culture in the case of family businesses affects the company's propensity to support and sustain entrepreneurship in the short-time perspective and over generations (Habbershon, Nordquist, Zellweger 2010). When analyzing literature, one may indicate the components of organizational culture of family businesses, which may include (Sułkowski 2013; Fletcher, Melin, Gimeno 2012):

- values,
- basic assumptions,
- organizational standards,
- communication methods,
- rituals and symbols,
- adopted habits and customs,
- cultural patterns and artefacts,
- sub-cultures.

It should be emphasized that the implementation of the personnel policy is becoming an inseparable element of achieving success (Munns, Bjeirmi 1996) by economic entities functioning in the realities of the economy and is closely linked to the company's strategy. This relationship can be seen in particular in companies that have achieved a high market position. It should be pinpointed that an increasing number of enterprises are aware of the need to invest in human capital, and employees with the highest qualifications and skills may be the pillar of competitive advantage (Kugiel 2013, pp. 75-76). Therefore, the overall strategy of the company should be integrated with the personnel strategy which is affected by the labor market, skills and values, economic conditions and organizational culture (compare Fig. 2).

Research Methodology

The main objective is to examine the impact of the family nature of the company on building intra-organizational relations. During the analysis, the attention has been drawn to selected aspects of the personnel policy, including the company's organizational culture, working atmosphere, stabilization and professional development and employees' motivation.

In relation to the above and on the basis of the conducted literature review, the following research questions have been formulated:

1. Does the family nature of the company shape working atmosphere?
2. Do the values associated with the family positively affect working atmosphere?
3. Does working in the family business have a positive impact on a sense of bond and identity with the organization?
4. Do conflicts between working family members influence working atmosphere?
5. Does employment in the family business have a positive impact on a sense of professional stabilization of non-family employees?
6. Does employment in the family business positively affect the professional development of non-family employees?

The employees of the production family businesses from the Opole region took part in the study. The sample selection was deliberate. The enterprises were selected to meet the criteria resulting from the definition of the family business[1]. The research was carried out in the second half of 2020 on the sample of 50 employees of the production family businesses (it was a pilot study). In order to obtain the research results, the authors' survey questionnaire was developed. The study used an original questionnaire. The research survey consisted of 13 research questions. In order to obtain reliable research results and to limit the impact of owners or managers of family businesses on the respondents, the survey was conducted anonymously. The collected results were subjected to the analysis and interpretation. During the analysis of the impact of the family nature of the company on intra-organizational relations, the 5-point Likert scale was used. The collected results were analyzed using descriptive statistics.

Research Results and Discussion

The basis and the effect of building positive internal relations in the company is appropriate working atmosphere. It consists of all the factors that determine positive relationships between employees and the company owners (Baykal 2018). The results of the research conducted on a group of family businesses have indicated that the family nature of the enterprise and the values associated with the family such as tradition, trust, loyalty and interpersonal bonds are definitely of great importance for building working atmosphere. It turns out that as much as 76% of the respondents think that the family nature of the enterprise has a positive impact on working atmosphere, including 44% of the respondents who definitely agree with that. Only 8% of the respondents declare that the family nature of the enterprise does not affect working atmosphere. Moreover, it turns out that as much as 86% of the employees under research admitted that the values characterizing family businesses have a significant impact on the aura and relations within the enterprise, and only 2% of the respondents do not agree with that. The research has shown that the respondents declare attaching great importance to creating this positive atmosphere. Various solutions favorable for building positive intra-organizational relations are used in enterprises, e.g. organizing joint integration meetings or trips. In the analyzed family businesses, 40% of the respondents have declared that organized joint activities in the company are definitely of great importance, for 24% - of rather great importance, whereas for 14% of the respondents, they are of no importance. However, 22% of the respondents are indifferent to meetings organized by business owners (Fig. 3).

[1] A family business is an enterprise defined as an economic entity in which the control of ownership or organization management remains in the hands of the family and more than one family member is involved in its operation (Marjański, Sułkowski 2009, p. 16).

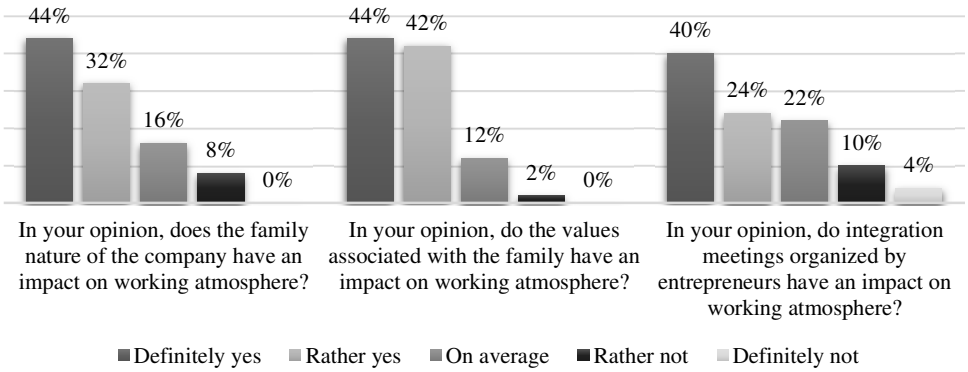

Fig. 3: Working atmosphere in the family business

Source: Own study

On the basis of the conducted research, it turns out that as much as 54% of the respondents are able to give up some of the remuneration and benefits in the event of a financially difficult situation in their company. For 32% of the respondents, however, it does not really matter. As much as 80% of the employees of the family businesses in question declare that they are a part of the company, only for 10% the parent entity is not particularly important. It turns out that the vast majority, since as much as 92% of those employed in family businesses, may count on the support of the employer, in turn, 6% declare that there is no such support. It follows that a sense of bond between the employer and employees is so strong that the head of the company provides the support in difficult life moments when help is needed. As pointed out by the respondents, contacts with company owners mostly do not go beyond organizational boundaries of the enterprise (24% - rather not, 28% - definitely not), and positive relationships within the organization, as evidenced by the research results, remain irrelevant in the event of crisis situations in the company (Fig. 4).

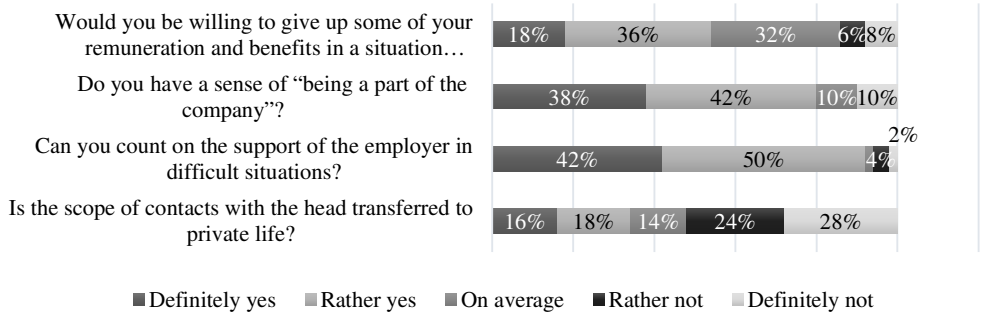

Fig. 4: A sense of bond and identity with the family business.

Source: Own study

The family nature of the enterprise and conflicts accompanying working family members may be a source of difficulties in maintaining the appropriate atmosphere, and thus positive relationships within the organization. The respondents notice the negative impact of family conflicts on the relationships in their company. As much as 48% of the employees believe that conflicts affect working atmosphere. Frictions between family members lead to the disappearance of the previous family atmosphere both between family members and between them and hired workers. It turns out that 40% of the respondents observe the occurrence of family conflicts in the workplace, in turn, 38% of the respondents do not notice conflicts between working family members. More than half of those questioned (52%) also have noticed differences and have a sense of injustice when development decisions are made in relation to family and non-family employees (Fig. 5).

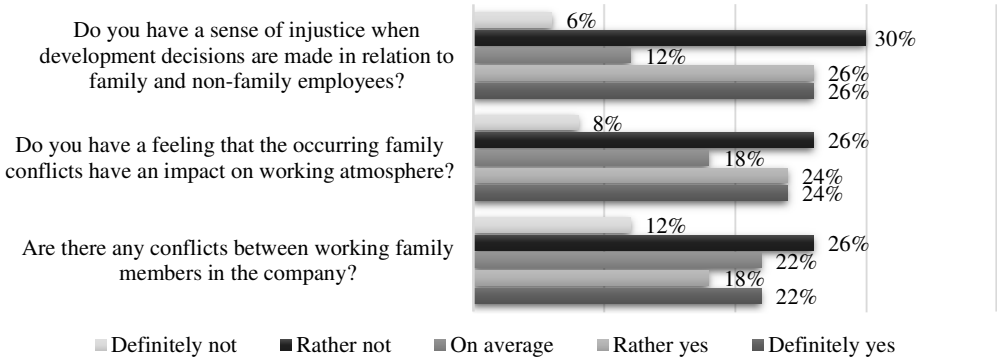

Fig. 5: The impact of conflicts on intra-organizational relations.

Source: Own study

Contemporary organizations must be aware that an effective employee motivation system determines the success of the entire company. It is worth pinpointing that managing the subordinates requires an individual approach to each of them, thus taking into account the need for a sense of value in the company. The conducted research indicates that the largest impact on job satisfaction and employee motivation is exerted by an increase in the rate of remuneration (52% of indications). An equally important factor affecting satisfaction is positive working atmosphere, indicated by 32% of those questioned. For the others, an important incentive element is development training (6% of indications) as well as additional non-wage benefits such as multisport vouchers, private medical care etc. (6% of indications). Only for 4% of the respondents, clear rules for promotion are an important motivation factor (Fig. 6).

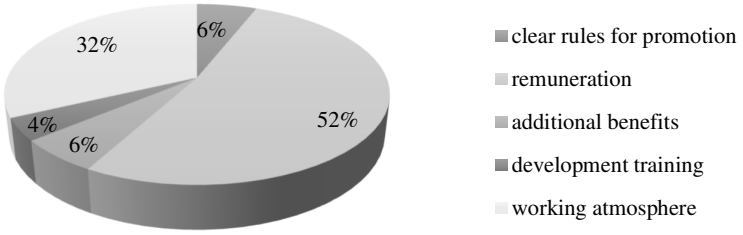

Fig. 6: The factors affecting job satisfaction and employee motivation in family businesses

Source: Own study

Taking into account the specificity of family businesses, the approach to the issue of motivation ought to be considered while taking into account the division into company owners, family members being potential successors and non-family employees (Sundaramurthy, Kreiner 2008). Working in the family business primarily provides a sense of employment stability. It turns out that as much as 86% of the employees feel safe working in the organization with the family nature. Despite the fact that some of family businesses provide their employees with opportunities to develop and meet their professional aspirations, which has been pointed out by 48% of the respondents, 40% of employees do not have such an opportunity and 12% claim that companies approach the issue of the development of their employees on an average level. It should be emphasized that each of the parties indicated above is driven by various needs and stimuli affecting job satisfaction. For some, the actions taken may have a motivating impact, in turn, for others, on the contrary - demotivating. Unfortunately, more than half of those questioned (52% of indications) experience a sense of injustice in relation to working family members (Fig. 7).

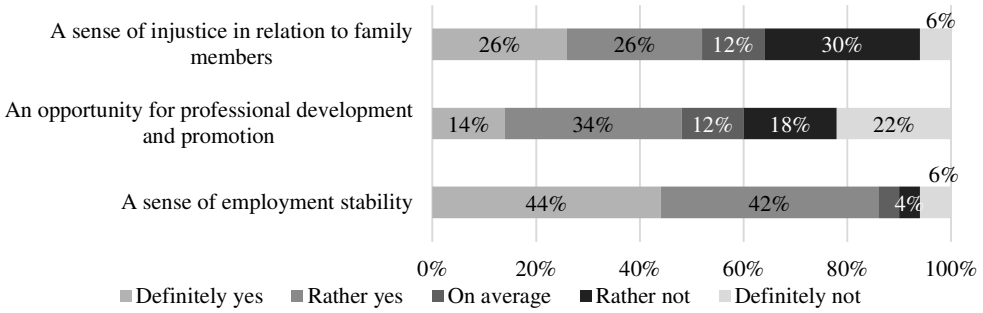

Fig. 7: Professional development and a sense of stability

Source: Own study

Conclusions

Summing up, the challenges that contemporary family businesses need to face force to search for increasingly new, more effective management methods (Neckebrouck et al. 2017). The presented analysis of the impact of internal relations on the employment policy in family businesses is an integral part of the process of employee relationship management. The study was a pilot study, so the analysis shows preliminary conclusions. The empirical studies carried out on a group of employees of family businesses have been to examine the impact of the family nature of the enterprise on building intra-organizational relations. The own research conducted on a group of employees of the selected family businesses running their activities in the area of Poland has allowed for responding to the formulated research questions:

1. Yes, the family nature of the company shapes working atmosphere.
2. Yes, the values associated with the family have a positive impact on working atmosphere.
3. Yes, working in the family business positively affects a sense of bond and identity with the organization.
4. No, conflicts between working family members do not have an impact on working atmosphere.
5. Yes, employment in the family business positively affects a sense of professional stabilization of non-family employees.
6. No, in the opinion of employees, employment in the family business does not have a positive impact on the development of non-family employees.

The conducted research indicates that the employer builds relationships with employees in a conscious and planned manner and thus derives a range of specific, although not always easy to measure, benefits. The most important ones include the emotional involvement of employees, resulting in the high quality of their labor, a sense of bond, and the resulting high value of human capital translates into the value of the organization. It can be noted that the above benefits are related to familiness and specific features of family businesses. Both employees and company owners are an important link in the process of building relations within the organization and these relations affect working atmosphere thus determining the contentment and satisfaction of employees.

The research, the results of which have been presented in the article, has its constraints, which may include a low number of employees of the family businesses questioned or the lack of the use of statistical analysis. On the other hand, the considerations discussed in this article do not exhaust the subject matter. They are in fact the contribution to the extension of the research and continuation of the considerations on intra-organizational relations in the area of literature and empirical research Conducting the research on a larger population will allow for the use of appropriate statistical methods and drawing conclusions related to the whole population of employees of family businesses.

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A Generative Adversarial Approach to ECG Synthesis and Denoising

Karol ANTCZAK

Institute of Computer and Information Systems
Military University of Technology
Warsaw, Poland
karol.antczak@wat.edu.pl

Abstract

Generative Adversarial Networks (GAN) are known to produce synthetic data that are difficult to discern from real ones by humans. In this paper, we present an approach to use GAN to produce realistically looking ECG signals. We utilize them to train and evaluate a denoising autoencoder that achieves state-of-the-art filtering quality for ECG signals. It is demonstrated that generated data improves the denoiser performance compared to the model trained on real data only. We also investigate an effect of transfer learning by reusing trained discriminator network for the denoising model.

Keywords: Generative Adversarial Networks, Denoising Autoencoders, ECG Signal Denoising.

Introduction

Measurement of electrical activity of the heart plays a basic role in modern diagnostics. Of multiple electrophysiological parameters of the heart, one of the most informative is the change in voltage over time caused by depolarization and repolarization of the heart muscle. A process that produces a graphical representation of it is known as electrocardiography, while the representation itself – an electrocardiogram (ECG). There are several characteristic entities that can be identified on ECG: QRS complex and P, T and U waves – each associated with specific phenomena occurring during the single cardiac cycle (see Fig. 1). Analysis of these entities associated with the knowledge of electrocardiogram scale allows, among other things, to calculate heart rate and to detect rhythm abnormalities such as atrial fibrillation, atrial flutter, cardiac arrhythmia, sinus tachycardia and sinus bradycardia. Shape analysis allows to detect another group of diseases; for example, axis deviation of QRS complex is a symptom of ventricular hypertrophy, anterior and posterior fascicular block and others.

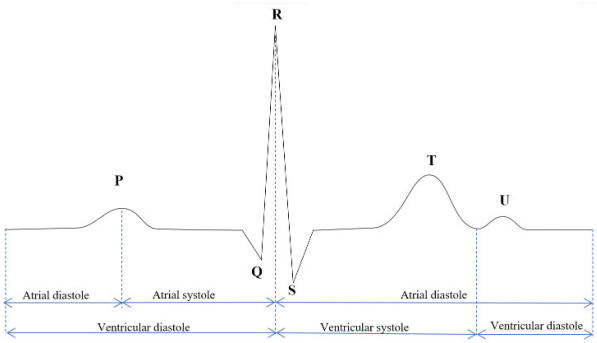

Fig. 1: Anatomy of ECG cycle.

In order to maximize the diagnostic value of ECG, it should contain only diagnostically relevant components. However, the real ECG contains a noise caused by multiple factors (Velayudhan and Peter, 2016). The most

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common are baseline wander, motion artifacts, electromyography (EMG) noise and power line interference. Furthermore, characteristic frequencies of noises often overlap with the frequency of the useful components of ECG. This makes filtering the signal a challenging task. A number of methods were developed over years, designed mostly for filtering specific kinds of noise (Joshi, Vatti and Tornekar, 2013; Velayudhan and Peter, 2016). Examples include bandpass/notch filters (used primarily to remove power line interference), wavelet transform-based methods (applied for motion artifacts and EMG removal) and empirical mode decomposition (preferred for filtering out baseline wandering noise).

In the twenty-first century, apart from classical filtering methods, techniques based on artificial neural networks also appeared. One of the first applications was presented by (Moein, 2010). It was a multi-layer perceptron trained to imitate low-pass Kalman filter. Since then, the development of deep learning and greater availability of training data (in a form of medical databases) have allowed to use more advanced models. The temporal nature of ECG signal makes it a natural candidate for processing using recurrent neural networks A 2018 research have investigated Long Short-Term Memory (LSTM) -based network for the purpose of denoising, outperforming classical filters in case of heavily noised signal (Antczak, 2019a). Single-layer LSTM networks were also explored for ECG classification (Boussaa *et al.*, 2016). Nonetheless, it seems that recurrent models have recently fallen out of favor in the area of sequence processing, being outperformed by convolution-based networks (Gehring *et al.*, 2017), (Vaswani *et al.*, 2017). More recently, a convolutional neural network has been presented for denoising of fetal ECG (Fotiadou *et al.*, 2019), reporting an increase in correlation coefficient between original and corrupted signal from 0.6 to 0.8 .

Proposed Approach

We introduce a deep model for ECG denoising, trained with the help of artificial signals generated by GAN. To achieve this, we build several auxiliary neural models. First, we use real ECG data to train 2D convolutional network that operates on time-frequency representations of signals to classify them according to the diagnostic group. This allows us to compute an equivalent of Inception score which expresses a level of data 'realism' that correlates well with human perception. Next, we train Wasserstein GAN operating in time-domain to produce artificial data that achieve possibly high Inception score. Generated artificial data are then processed using parametric model of noise. Finally, we train a denoising convolutional autoencoder that reconstructs initial, noise-free signal based on noisy input in time-domain. We evaluate it using both artificial and real data and various performance metrics. In summary, our approach for the development of the denoising model includes following steps:

1. Train the Inception network for evaluation of ECG signal quality.
2. Train the GAN for generating artificial ECG signals, using Inception score for selecting the best model.
3. Generate signal dataset with GAN and process it using the parametric noise model.
4. Train the denoising autoencoder using pairs of noised and clear signals.

Related Research

Generative Adversarial Networks (GAN) are deep learning models that produce artificial data imitating their real-life counterparts (Goodfellow *et al.*, 2014). They consist of a pair of networks, called generator and discriminator, respectively, that learn by playing a competitive minimax game. The generator produces data that is evaluated by the discriminator, along with samples of real data. The discriminator tries to determine which samples are generated and which are real, while the generator tries to fool it by producing more and more realistic samples. It has been shown that such game has (theoretically) a non-dominated solution which minimizes Jensen-Shannon divergence between generated and real data (Goodfellow *et al.*, 2014). However, "vanilla" GANs have several issues, the most vital being the mode collapse (i.e. reduction of the output data diversity) and long convergence time. Both of these problems were partially resolved by models such as Wasserstein GAN (Martin Arjovsky and Bottou, 2017) that minimizes smoother Wasserstein-1 distance rather than J-S divergence. This requires the objective function to obey 1-Lipschitz constraint, which is originally enforced by weight clipping. Guljarani et al. have shown a more efficient constraint in a form of gradient penalty, resulting in WGAN-GP model (Gulrajani *et al.*, 2017).

It should be noted the development of generative models is driven mostly by advances in visual data generation. It is due to relative ease of qualitative evaluation of such data – either by humans or by using special metrics, such as Inception score (Salimans *et al.*, 2016). A recent approach, WaveGAN, has shown that it is possible to produce realistic audio data with GAN (Donahue, McAuley and Puckette, 2019). In this case, the data is evaluated both by humans (and a cat) as well as the Inception score obtained by training the audio classification model operating on spectrograms of audio samples. Additionally, WaveGAN utilizes a specific regularization technique for

discriminator, called phase shuffle, which performs random phase perturbation of activations of 1D convolutional layers.

Generative Model

A. GAN Architecture

Proposed GAN architecture for generation of ECG signals (which we call ECG-GAN) is inspired by WaveGAN model by (Donahue, McAuley and Puckette, 2019). We train the generative model using Wasserstein GAN with Gradient Penalty variant (WGAN-GP). As real input, we use ECG signals from PTB-XL database (Wagner *et al.*, 2020). The database contains over 21k samples 10s length each, sampled at 500 Hz, available for each of 12 diagnostic leads, along with rich metadata. For generative training we use signals from aVL lead only, due to its diagnostic significance as well as to reduce dataset complexity. Signals are scaled independently to $[-1,1]$ range. Each signal consists of 5k data points. The generator network input is 1D random vector of z length with each element sampled from normal distribution. This latent vector is mapped onto dense linear layer followed by several layers of transposed convolution with leaky ReLU activation and exponentially decaying number of filters. After the last convolution, we crop the output symmetrically at both ends to 5k width and process it by the hyperbolic tangent function. Apart from the necessity of having output of specific length, cropping allows the network to generate signal before and after effective range, which minimizes signal distortions caused by padding. In all but last convolution we use batch normalization as a regularization mechanism. The critic network is made of several convolution block with ReLU activation and exponentially increasing number of filters. The last layer maps the signal into a single linear output, to produce unbounded critic score. Since batch normalization is unadvised for a critic network due to batch correlation phenomenon (Gulrajani *et al.*, 2017), we use the phase shuffle, as suggested by (Donahue, McAuley and Puckette, 2019), instead. We train networks to minimize Wasserstein distance using batches of size 64. For both networks we use Adam optimizer, with 5 critic updates per each generator update.

B. Evaluation of Generative Model

Qualitative evaluation of samples produced by generative models is preferably done by human judges, since quantitative metrics are known to be largely uncorrelated to subjective evaluation (Theis, Oord and Bethge, 2016). Qualitative analysis is associated, as one may expect, with many difficulties, both logistic and financial. There is, however, a widely used metric known as Inception score, that uses pretrained Inception neural network model (Salimans *et al.*, 2016) to provide an evaluation highly correlated to human evaluation. Given input dataset x, and model output y, it is defined as $\exp(\mathbb{E}_x \mathbf{KL}(p(y|\boldsymbol{x}) \parallel p(y))$, where **KL** is Kullback-Leibler divergence**.** Samples that represent meaningful objects should have conditional label distribution $p(y|\boldsymbol{x})$ similar to marginal distribution $p(y)$. Despite known shortcomings (Barratt and Sharma, 2018), Inception score remains a popular choice of evaluation metric for visual generative models. An analogous model was then proposed for adversarial audio synthesis (Donahue, McAuley and Puckette, 2019), using classifier trained on spectrograms of audio samples. We propose a similar model, trained on spectrograms of ECG signals. We also argue that Inception score is more suitable here than in, for example, image analysis, since human brain (especially visual and auditory cortices) has evolved to analyze "natural" data representing real objects rather than "unnatural" ones such as ECG. Therefore, it is more difficult to generate obviously fake examples that would obtain high Inception score anyway (Barratt and Sharma, 2018).

Our "Inception-like" classifier is a 2D convolutional network operating on 64x64 spectrograms. Each spectrogram is produced by performing short-time Fourier Transform on 1024 data points and mapping resulting spectrogram onto Mel scale. While Mel scale is mostly known for its application for audio data, it is also used for ECG signal preprocessing for neural networks (Boussaa *et al.*, 2016; Taherisadr *et al.*, 2018). Resulting spectra are normalized to zero mean and unit variance, clipped to 3 standard deviations and rescaled to $[-1,1]$ range. Each spectrogram has 0 to 5 output labels assigned, indicating diagnostic classes from PTB-XL. We end the classifier network with sigmoid activation and train it using binary crossentropy loss, effectively turning single multilabel classification problem into a set of binary classification tasks. The network is trained for 100 epochs with Adam optimizer and batch size 64. We validate the model after each epoch and save the one with the lowest validation loss. The final model achieves mean average precision 0.63 and mean average recall 0.41 for validation set. To obtain Inception score, we first get the output of the network for dataset $\boldsymbol{x}$ and calculate $p(y|\boldsymbol{x})$ by summing up probabilities $p(y_i|\boldsymbol{x})$ for each label and normalizing the sum to 1. Then we calculate the score using the Inception equation.

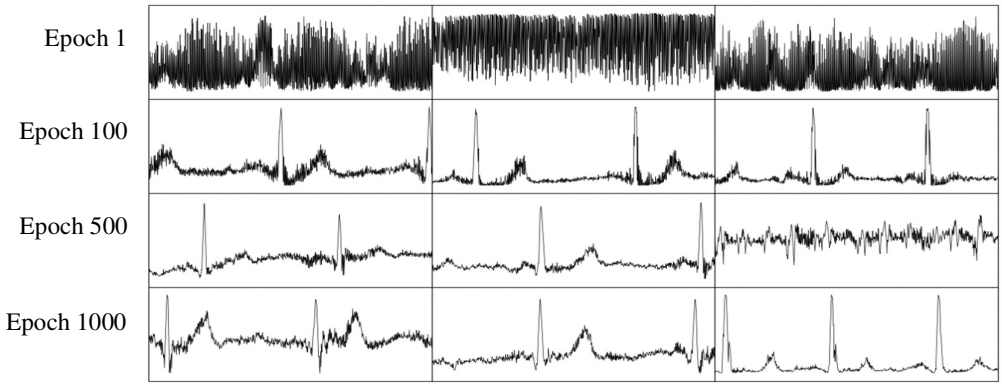

Fig. 3: Samples of ECG signal generated by ECG-GAN during various stages of training. Each column shows samples generated using the same latent vector z. Visible are first 1024 data points of each signal. Vertical axes are limited to [-1,1] range.

In addition to the Inception score, we use two additional metrics to verify whether the model result is not degenerated to one of pathological cases. The first metric, $|D|_{\text{self}}$, measures average Euclidean distance between the signal and its nearest neighbor. Low value would indicate that the model generates very similar samples, experiencing mode collapse. Another metrics $|D|_{\text{train}}$, measures average distance between signals and their closest neighbors in the training set. Low value is a symptom of model overfitting – the model learned to reproduce samples from the training set, unable to produce novel ones.

Denoising Model

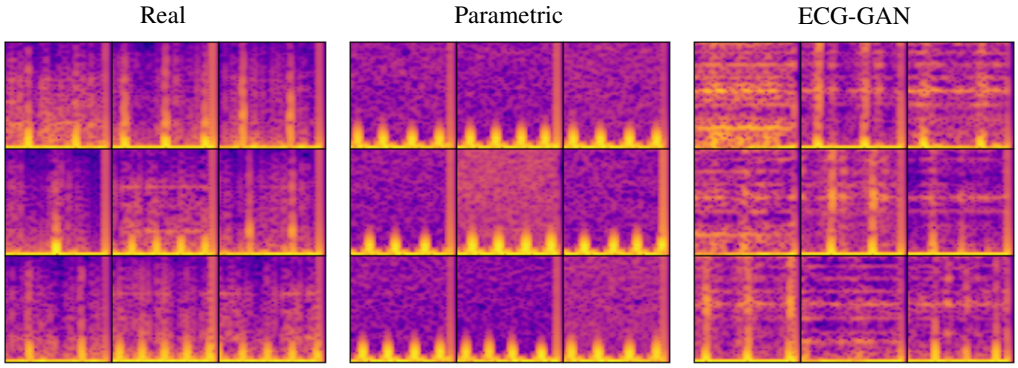

Fig. 2: Random samples of spectrograms of various ECG datasets. Horizontal axes represent time, while vertical axes represent frequency (on the Mel scale). Each spectrogram represents a full-length signal (5000 data points).

A. Denoising model architecture

Proposed denoising model is a deep denoising autoencoder (DAE) (Goodfellow, Bengio and Courville, 2016) operating in time-domain. It consists of two blocks – encoder and decoder – connected together. The encoding block consists of 4 convolution layers with increasing number of filters. It is followed by the decoding block of 4 transposed convolution layers. The output is cropped to match the input signal length. Each layer has leaky ReLU activation. The baseline model uses no regularization. The detailed description of the model can be found in Table 6. Architecture of the encoder block is almost the same as the critic model (apart from the phase shuffle and the last convolutional and dense layers), allowing us to experiment with transfer learning by using pretrained critic layers as the encoder.

We train the denoising neural network in time-domain to reconstruct initial signal, given signal with added artificial noise with strength $\gamma = 1$. The baseline model is trained using a mix of real (17k samples) and synthetic (100k) signals. Models are evaluated independently on real (2k) and synthetic (100k) test datasets. We use Adam optimizer with MSE loss and hyperparameter values the same as during generative model training. Models are validated after each epoch and the one with the best validation loss is used for evaluation.

B. Noise Model

Typically, denoising autoencoders use simple noise models, like salt-an-pepper noise, additive white gaussian noise or black (masking) noise (Vincent *et al.*, 2010). They are applied to the input signal while the autoencoder learns to reconstruct the original signal by finding a certain hidden representation. This hidden representation should encapsulate useful structural features of the data. However, we argue that in case of ECG signal, the specificity and complexity of the noise should be also considered during signal reconstruction. Therefore, we propose to use a more sophisticated noise model, based on distortions present in real ECG. There are multiple known sources of noise in real ECG signal (Velayudhan and Peter, 2016), each having a specific frequency and power range. Our noise model is a parametric one that takes into account three of the most common noise sources, namely, baseline wander (a_w), motion artifacts (a_m) and power line interference (a_p), multiplied by strength parameter γ:

$$x_{noised}(t) = x(t) + \gamma(a_w(t) + a_m(t) + a_p(t))$$

Baseline wander (Kaur, Singh and Seema, 2011) is a low-frequency component, with usual frequency up to 0.6 Hz, caused mainly by respiration. We model it as a sine function with random frequency sampled uniformly from 0-0.5 Hz range and amplitude sampled randomly from 0-0.3 range (assuming that the initial signal has -1 to 1 amplitude). The motion artifact component is caused by variation of electrode capacitor due to body motion. It covers a wide range of frequencies (0.5 to 120 Hz) overlapping with the usable spectrum of ECG signal. We model it by the modulated chirp signal, i.e. sinusoidal waveform with increasing frequency and amplitude modulated by another sine wave (Serteyn *et al.*, 2013). The power line interference is produced by differences in electrode impedances as well as stray currents through the patient and the cables. It mostly has a frequency equal to that of electrical system in given country, therefore we model it as a sine waveform with 50 Hz, which is the standard frequency in most countries. The amplitude of this component is 0-0.1 of the source signal amplitude.

C. Evaluation of denoising models

When evaluating filtering methods, one should take into consideration a purpose of filtering. Therefore, we use three unrelated metrics to evaluate denoising models. The first one is mean squared error (MSE) which is the most general method and is also used as a loss function during the training of neural networks. The second metric is signal-to-noise ratio, which allows to measure a relative strength of the recovered signal to the noise. The third metric reflects the quality of the ECG signal from the diagnostic point of view. One of the most essential diagnostic activities for time-domain ECG analysis is identification of QRS complexes, which serve as a basis to determine heart rate variability. We therefore introduce δ_{HR} metric, defined as the mean absolute error of the heart rate (HR) value between noise-free and denoised signal. The heart rate is calculated as the reciprocal of average length of the cardiac cycle, which, in turn, is calculated as the distance (in seconds) between neighboring QRS peaks. For QRS detection, we use an open-source QRS detector developed by Sznajder and Łukowska (Sznajder and Łukowska, 2017) . It is based on Pan-Tompkins algorithm (Pan and Tompkins, 1985) which is one of the most common algorithms used for this purpose. Signal amplitudes were scaled to the detector operational range.

Experimental setup

In the first phase of the experiment we train and evaluate ECG -GAN model by calculating Inception score as well as $|D|_{\text{self}}$ and $|D|_{\text{train}}$ metrics. We compare the proposed model with the reference parametric model of ECG signal introduced by (McSharry *et al.*, 2003). It is a dynamical model that incorporates various morphological parameters (such as heart rate or PQRST points locations) as well as the measurement process details (like sampling frequency or measurement noise). According to authors, the quality of the model allows it to be used as a benchmark for biomedical signal processing techniques. In addition to the proposed and reference models, we calculate metrics for training and test dataset as well to obtain a reference point. The total training length of ECG-GAN is 1k epochs, which takes around 3 days on a machine with Intel Xeon E5-2640 CPU and Nvidia Tesla K20m GPU.

During the second phase, we train and evaluate denoising models. We use two reference methods, namely the bandpass filter and the wavelet filter. The bandpass filter consists of high- and low- pass filters that cut out frequencies outside of 0.05-30 Hz range. The wavelet filter uses Undecimated Wavelet Transform to decompose the signal. As a mother wavelet we use D6 wavelet from Daubechies family. Its shape is similar to QRS component, making it a viable choice for ECG signal filtering. We also perform a series of experiments by modifying the baseline denoising model. We train models with various amounts of synthetic data as well as combined synthetic + real data. This allows us to verify whether using the data from the generative model has positive effect on the denoising model. We also investigate whether the impact of synthetic data can be substituted with regularization, by training networks with phase shuffle added before each convolution in encoding block.

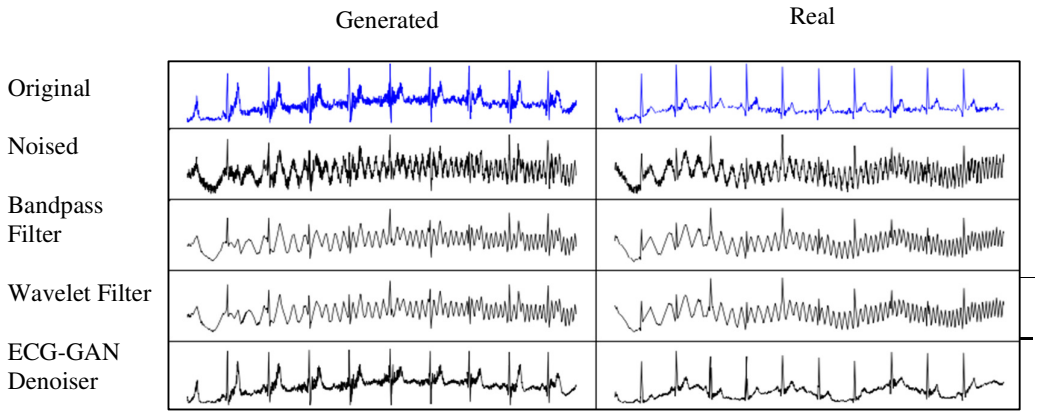

Fig. 4: Comparison of filtering methods. Left column contains results for synthetic signal generated with ECG-GAN, while right column – a real one.

Finally, we use the pretrained critic network as an encoder block of the denoiser to check whether the model will be able to transfer features learned during GAN training to the new task.

Results

- ***Quality of Generative Model***

Visual examples of signals generated by ECG-GAN are presented in Appendix C. Quantitative results of datasets comparison are presented in Table 1. Signals generated by ECG-GAN obtained much higher score than parametric model, while being largely unrelated to the training set, as indicated by high $|D|_{\text{train}}$ value. An informal human analysis was performed, which confirms these results. Synthetic signals had a wider frequency range compared to parametric data, which lack spectral variability, as seen in spectrograms in Fig. 2. One can also easily identify characteristic elements of ECG on generated data, such as QRS complex as well as P and T waves.

- ***Quality of denoising models***

The collected results are shown in Table 2. Proposed denoising model (ECG-GAN Denoiser) outperformed reference methods on both generated and real test sets in terms of each metric. Interestingly, networks trained

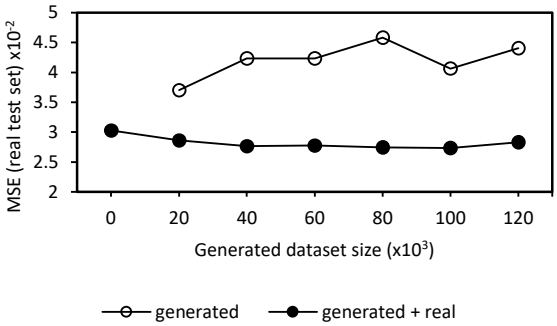

Fig. 5:Denoising model performance for various

exclusively on real or synthetic data (rows 6 and 8, respectively) performed worse than the network trained on mixed data. A more detailed analysis of impact of synthetic training dataset on test set performance can be seen

Table 2: ECG denoising results for various methods. In case of S/N, the higher value is better. For MSE and δ_{HR} – the lower, the better. The (none) row contains metrics for noisy signal without any filtering.

	Performance (generated test set)			**Performance (real test set)**		
Denoising method	MSE	S/N	δ_{HR}[Hz]	MSE	S/N	δ_{HR}[Hz]
(none)	0.139	3.243	0.911	0.127	2.332	0.912
Bandpass filter	0.141	3.185	0.846	0.122	2.532	0.789
Wavelet filter	0.141	3.183	0.850	0.123	2.516	0.805
ECG-GAN Denoiser	0.018	11.459	0.444	0.028	8.185	0.355
ECG-GAN Denoiser (phase shuffle)	0.017	11.735	0.450	0.026	8.395	0.349
ECG-GAN Denoiser (real data)	0.041	7.963	0.541	0.031	7.730	0.448
ECG-GAN Denoiser (real data + PS)	0.038	8.293	0.609	0.027	8.260	0.535
ECG-GAN Denoiser (generated data)	0.028	9.559	0.570	0.040	6.778	0.554
ECG-GAN Denoiser (pretrained)	0.038	8.587	0.727	0.047	6.100	0.627

in Fig. 5. Mixing real dataset with generated data helps to minimize drawbacks of both. Regularization in a form of phase shuffle improves performance of real data -trained network. Nevertheless, the effect of generated data is more profound than simple regularization. By combining the phase shuffle with the baseline model, we achieve the best performance for real signals. Nevertheless, we do not observe a significant beneficial effect of reusing the pretrained critic network in denoising model.

Conclusions

We have presented a deep model for ECG signal denoising, trained with the help of GAN. We have thereby demonstrated that generative adversarial models can serve as a powerful data augmentation technique that improves both the quality and the quantity of the dataset. Moreover, the effect of generated data goes beyond the simple regularization, which is the case for simple data transformations (Antczak, 2019b).

Generative model presented in this paper, despite producing "good enough" training data, is quite simple and lacks more advanced features that can be found in modern GANs for image generation. One of the most promising directions is a "style transfer" technique that provides control over stochastic variation of generated data (Karras, Laine and Aila, 2019). This would allow, for example, to generate a signal from the specific lead. We notice that our Inception network returns low scores compared to image classifiers with similar number of output labels. This is due to the fact that only a single lead (aVL) is used for the classifier training. Models that utilize data from all 12 leads available in PTB-XL database are known to achieve much higher precision and recall (Strodthoff *et al.*, 2020). A more accurate classifier would return a more credible Inception score. Similarly, it is reasonable to expect that the performance of the denoising model would benefit from data from multiple leads.

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A Networks Architecture

Table 3: ECG-GAN Generator architecture.

Layer	Kernel Size	Output Shape
Input $z \sim \text{Uniform}(-1,1)$		$(n, 100)$
Dense	$(100, 128d)$	$(n, 128d)$
Reshape		$(n, 8, 16d)$
Trans Conv1D (stride=4)	$(25, 16d, 8d)$	$(n, 32, 8d)$
Batch Norm		$(n, 32, 8d)$
LReLU ($\alpha = 0.2$)		$(n, 32, 8d)$
Trans Conv1D (stride=4)	$(25, 8d, 4d)$	$(n, 128, 4d)$
Batch Norm		$(n, 128, 4d)$
LReLU ($\alpha = 0.2$)		$(n, 128, 4d)$
Trans Conv1D (stride=4)	$(25, 4d, 2d)$	$(n, 512, 2d)$
Batch Norm		$(n, 512, 2d)$
LReLU ($\alpha = 0.2$)		$(n, 512, 2d)$
Trans Conv1D (stride=4)	$(25, 2d, d)$	$(n, 2048, d)$
Batch Norm		$(n, 2048, d)$
LReLU ($\alpha = 0.2$)		$(n, 2048, d)$
Trans Conv1D (stride=4)	$(25, d, 1)$	$(n, 8192, 1)$
Cropping		$(n, 5000, 1)$
Tanh		$(n, 5000, 1)$

Table 4: ECG-GAN Inception architecture.

Layer	Kernel Size	Output Shape
Input		$(n, 64, 64, 1)$
Conv2D (stride=2)	$(3, 3, 1, 64)$	$(n, 32, 32, 64)$
Batch Norm		$(n, 32, 32, 64)$
ReLU		$(n, 32, 32, 64)$
MaxPool2D (stride=2)		$(n, 16, 16, 64)$
Conv2D (stride=2)	$(3, 3, 64, 64)$	$(n, 8, 8, 64)$
Batch Norm		$(n, 8, 8, 64)$
ReLU		$(n, 8, 8, 64)$
MaxPool2D (stride=2)		$(n, 4, 4, 64)$
Conv2D (stride=2)	$(3, 3, 64, 64)$	$(n, 2, 2, 64)$
Batch Norm		$(n, 2, 2, 64)$
ReLU		$(n, 2, 2, 64)$
MaxPool2D (stride=2)		$(n, 1, 1, 64)$
Reshape		$(n, 64)$
Dense	$(64, 5)$	$(n, 5)$
Sigmoid		$(n, 5)$

Table 5: ECG-GAN Critic architecture.

Layer	Kernel Size	Output Shape
Input		$(n, 5000, 1)$
Conv1D (stride=4)	$(25, 1, 1)$	$(n, 1250, 1)$
Phase Shuffle		$(n, 1250, 1)$
LReLU ($\alpha = 0.2$)		$(n, 1250, 1)$
Conv1D (stride=4)	$(25, 1, d)$	$(n, 313, d)$
Phase Shuffle		$(n, 313, d)$
LReLU ($\alpha = 0.2$)		$(n, 313, d)$
Conv1D (stride=4)	$(25, d, 2d)$	$(n, 79, 2d)$
Phase Shuffle		$(n, 79, 2d)$
LReLU ($\alpha = 0.2$)		$(n, 79, 2d)$
Conv1D (stride=4)	$(25, 2d, 4d)$	$(n, 20, 4d)$
Phase Shuffle		$(n, 20, 4d)$
LReLU ($\alpha = 0.2$)		$(n, 20, 4d)$
Conv1D (stride=4)	$(25, 4d, 8d)$	$(n, 5, 8d)$
Phase Shuffle		$(n, 5, 8d)$
LReLU ($\alpha = 0.2$)		$(n, 5, 8d)$
Reshape		$(n, 40d)$
Dense	$(40d, 1)$	$(n, 1)$

Table 6. ECG-GAN Denoiser architecture.

Layer	Kernel Size	Output Shape
Input		$(n, 5000, 1)$
Conv1D (stride=4)	$(25, 1, 1)$	$(n, 1250, 1)$
LReLU ($\alpha = 0.2$)		$(n, 1250, 1)$
Conv1D (stride=4)	$(25, 1, d)$	$(n, 313, d)$
LReLU ($\alpha = 0.2$)		$(n, 313, d)$
Conv1D (stride=4)	$(25, d, 2d)$	$(n, 79, 2d)$
LReLU ($\alpha = 0.2$)		$(n, 79, 2d)$
Conv1D (stride=4)	$(25, 2d, 4d)$	$(n, 20, 4d)$
LReLU ($\alpha = 0.2$)		$(n, 20, 4d)$
Trans Conv1D (stride=4)	$(25, 4d, 4d)$	$(n, 80, 4d)$
LReLU ($\alpha = 0.2$)		$(n, 80, 4d)$
Trans Conv1D (stride=4)	$(25, 4d, 2d)$	$(n, 320, 2d)$
LReLU ($\alpha = 0.2$)		$(n, 320, 2d)$
Trans Conv1D (stride=4)	$(25, 2d, d)$	$(n, 1280, d)$
LReLU ($\alpha = 0.2$)		$(n, 1280, d)$
Trans Conv1D (stride=4)	$(25, d, 1)$	$(n, 5120, 1)$
LReLU ($\alpha = 0.2$)		$(n, 5120, 1)$
Cropping		$(n, 5000, 1)$
Tanh		$(n, 5000, 1)$

B Training hyperparameters

Table 7. Training hyperparameters.

Hyperparameter	Value
Batch size (n)	64
Model dimensionality (d)	16
Gradient penalty (λ)	10
C updates per G update	5
Phase shuffle	2
Adam learning rate (α)	1e-4
Adam 1st moment decay (β_1)	0.9
Adam 2nd moment decay (β_2)	0.999

C Examples of generated signals

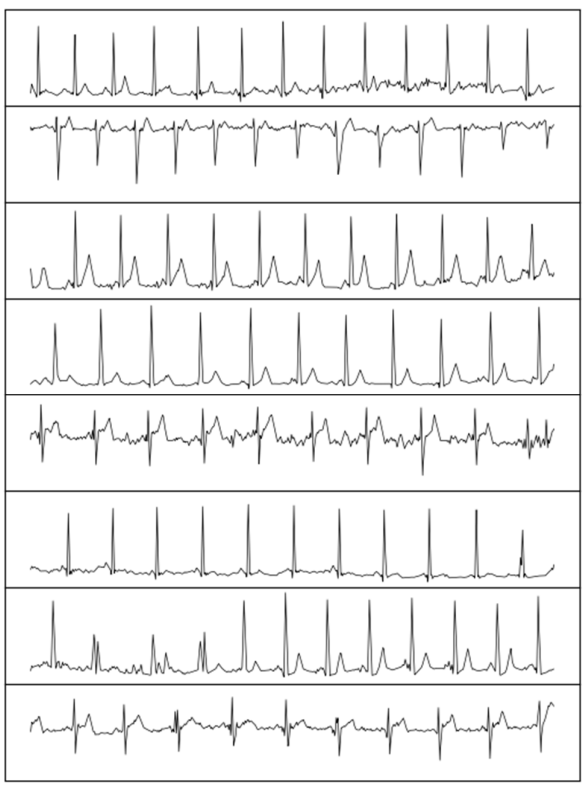

Fig. 6: Examples of signals generated by ECG-GAN. Each sample represents 10 seconds of simulated heart activity. For better visibility, signals are processed with lowpass filter to cut out >30Hz noise.

Cloud Opportunity and Business Skill Deficits

Brian CUSACK

AUT University, Auckland, New Zealand
brian.cusack@aut.ac.nz

Adekemi ADEDOKUN

AUT University, Auckland, New Zealand
adekemi.adedokun@aut.ac.nz

Abstract

Cloud computing (cloud) has offered cost effective business opportunities by providing flexible and on- demand IT services supply. Businesses are offered the opportunity to purchase the IT services (computing, storage, software, etc.) as required rather than retaining traditional IT assets and infrastructures. The realization of value from the opportunity has been challenging for enterprises disentangling from former IT services supply arrangements, and all businesses in gaining the necessary skill sets for optimal use. The design optimisation for cloud service use has complex new value chains and business models that require new skills and knowledge for successful performance. In this research, we asked: What are the impacts of cloud computing on the required business IT skill sets? A sample of 20 industry consultants were interviewed and the data thematically analysed in NVIVO to answer the research question. It was found that some skill sets have become irrelevant to business performance and other new ones are in demand. Skills deficits were particularly apparent in the security area where privacy and data protection are a concern. It also reflected the challenges and changing nature of cloud security that requires new knowledge and techniques.

Keywords: Cloud Opportunity, Business Skills, Disruption, Disintermediation.

Introduction

Cloud is an evolving technology that is disrupting established computing and business information services. It is replacing many supply models with an on-demand generic system that is causing radical change to the way Business Information System (BIS) services are perceived and procured. The revolution is causing disruption that impacts across every sector, from the breaking up of tradition business value chains and creating new business models, to creating new business skill sets, and changing the stakeholders' ecosystem. Studies (Youseff, Butrico, and Da Silva, 2008; Armbrust et al., 2010; Jadeja and Modi, 2012) have analyzed the benefits and limitations of cloud. In addition, many studies exist on exploring the factors affecting the adoption or resistance to cloud services in organizations (Khan and Malluhi, 2010). These studies identify the biggest challenge or limitation to adoption is security and privacy concerns. From the perspective of the business model, some studies have investigated the role of value networks in cloud computing and for cloud business models (Clohesy 2016; Frank, 2012; Hedman and Xiao, 2016; Krikos, 2010; Marston, Li, Bandyopadhyay, Zhang, and Ghalsasi, 2011). Another notable concern when adopting cloud technology is the lack of expertise for maximising the potential benefits of the technology, and for optimising the positive and negative risks associated. Cloud computing is transforming the way Information Technology (IT) services are accessed and provided for business purposes. However, the opportunity to create cloud business value has few guidelines or proven risk treatment strategies. Cloud is changing the traditional IT roles and the skills required for success. This research is specifically concerned with the business skill sets required for maximising the potential benefits from the cloud technology opportunity.

It has been argued that the advances in cloud computing is as much dependent on the organization structures and processes as it is with technology (Fellows, 2008). The adoption of cloud services involves a redefinition of existing business service skill sets by the creation of new requirements and termination of the old. There are two aspects in a technology shift (Avram, 2014, p. 533). The first is concerned with acquiring new skill sets to deploy the technology in the context of solving a business problem, and the second is how the technology will change business structures. For example, system support skills diminish in scope when cloud applications come with their own support, and the

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function changes to exclusive co-ordination and communication skill sets. Subsequently, the business restructures to discontinue internal IT hardware and software support services and concentrates on on-demand service supply to match the business processes. Consequently, the IT service supply becomes an information management task and the business design a BIS architecture. The radical redesign leaves a trust and a skills gap for business processes to adapt and to fill. One of the major challenges is finding those in the business who can and will change to meet the new challenges. A skills deficit inhibits beneficial returns on the new business opportunities. Yeboah-Boateng and Essandoh (2014, p.14) in their studies noted that the shortage of internal knowledge and expertise are rated as the biggest limitations to cloud revenue gains, especially amongst Small and Medium Enterprises (SMEs). In this paper, we briefly explore the theoretical background to cloud service transition, define a research methodology, and then report the findings to answer the research question: What are the impacts of cloud computing on the required business IT skill sets?

Theoretical Background

The concept of disruptive technology or innovation was first introduced by Clayton Christensen (Christiansen, 1997). According to Christiansen, disruptive technologies are innovations that interrupts the prevailing order of things in a particular industry. These innovations occur less frequently, and are likely to be cheap, simple and easy to use. Also, they have the tendency to alter the market dynamics and nature of competition which may result in the failure of established businesses. Christiansen further identified two criteria to define a disruptive technology (Christensen, 2002). First, a disruptive technology should enable less skilled or less-wealthy customer's access to what only the skilled or intermediary customers could do. Secondly, it should meet the demands of low-level customers who only require limited functionality of existing products in the market. This business model is expected to enable the disruptive innovator to realize attractive profits that are unattractive to the current innovators. Cloud shows the features of disruption and it proffers improvement in terms of performance, convenience, price, and flexibility to meet and exceed the market demands (Krikos, 2010, p. 23). Businesses now have access to computing resources that previously appeared impossible cost-wise (Krikos, 2010, p. 24). Moreover, the low-cost utility pricing model of cloud computing enables vendors to target those customers that were initially unable access such resources and services. Christiansen's disruptive theory is based on the idea that existing companies aim to satisfy and respond to their current customers but fail to commit to new technologies and eventually end up losing to the newcomers whose businesses are built around the new trending technology. Cloud has been referred to as a disruptive technology as it exhibits all these characteristics (Sultan, 2012, p. 167).

The cloud computing opportunity from the vendor's perspective also means disruption to revenue streams and value chains (Hedman and Xiao, 2016, p. 3990). The cloud business model removes the need for separate maintenance and licence fees, hence simplifying the complexities involved in software releases, patch management, and human maintenance service between the service provider and the business (Krikos, 2010, p. 29). However, this source of revenue normally accounts for two-thirds of a major software business income (Cusumano, 2010, p. 29). Also, the one-third of the service revenue was generated from customizing software and patch migration and this is eliminated (Cusumano, 2010, p. 29). Furthermore, the traditional software delivery model to end customers usually involved several layers of businesses, however, the mediators are eliminated as cloud provides software solutions remotely and directly as a service (Boillat and Legner, 2013, p. 49; Hedman and Xiao, 2016, p. 3991). Cloud is also changing the stakeholder ecosystem. The traditional IT service provision system consists of two stakeholders which are the consumer and the provider, however, cloud is changing these roles as well as introducing new enablers to service a provisioning ecosystem (Marston et al., 2011, p. 182). There are now three entities in the cloud ecosystem: Cloud service users (CSU), Cloud service providers (CSP), and Cloud service partners (CSN). Disintermediation and new entities eliminate the need for a middle layer for business transactions. The cloud business model is changing the structure of the software and IT service industries. Software and services are being delivered directly to the end users and disintermediating various software vendor partners such as Value-added-Resellers (VAR) who act as consultants, mediators and retailers for distribution of the products (Hedman and Xiao, 2016, p. 3991). With cloud service infusion, the need for this kind of partnership is eliminated and replaced by a triangulated flat structure. The cloud disruptive model is displacing some businesses while others are benefitting from the changes (IBM, 2010, p. 3).

Cloud introduces new threats to established business models and disrupts traditional value chains. Therefore, it is critical the skill groups are available to thoroughly analyse the cloud opportunity to meet a business need before adoption (Frank, 2012). The success or failure of a business is dependent on understanding the new ecosystem of competing risks and opportunities before purchase commitments are made. These are the new skills required for effective business delivery. In the past IT services were about the technical capability to do the business work and the cost-benefits of the solutions provided. With cloud the emphasis has shifted towards thinking out the best combination of IT service choices for the highest value business deliverables. The opportunity to explore and test business ideas has been made possible by the removing the constraints of in house IT capability and the cost efficient purchase of on-demand services. This business opportunity has removed the cost of purchasing hardware and software, its depreciation and retirement costs, and the cost of retaining expensive high-end IT skill groups. IT procurement

advisors are now required to optimise the purchase of on-demand services to match the business requirement, and compute the economic value from changing service suppliers. These are business optimisation skills for business project design, service procurement, and market thinking. Figure 1 summarises the literature analysis of the transformation in IT skills before and after cloud. The roles are changing from doing the actual technical jobs to thinking of innovative ways to maximize the available technology for optimal business benefits. The concept has shifted from an "IT support business" to "IT empowered business". The traditional skill requirements have shifted away from doing processes that are supported by IT, and toward enabling business thinking by providing seamless IT opportunity for the business plans. Cloud provides the freedom to choose quantities, qualities and the scope of services as required, but the skill and capability to do this effectively is a gap in current practice.

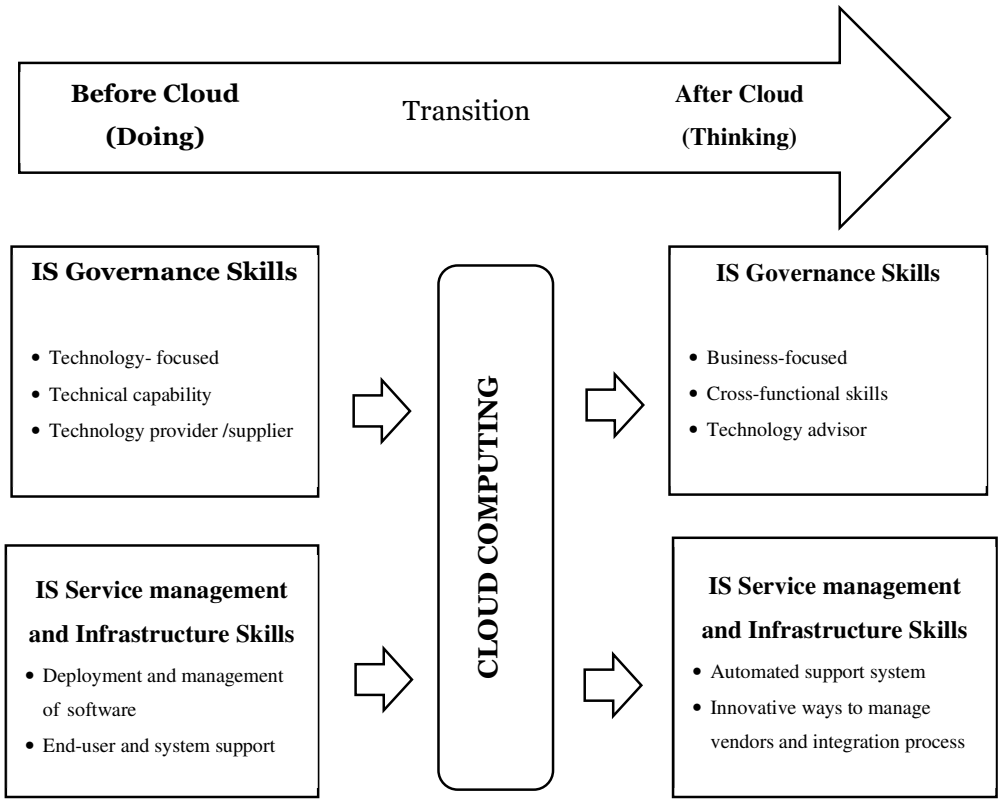

Fig. 1: Skills and knowledge transitioning

Research Methodology

Qualitative research is an interpretive-based method which seeks to understand the way other's conceptualized events and concepts (Kaplan and Duchon, 1988, p. 572; Creswell and Miller, 2000, p. 125). Qualitative research tends to focus on how or what questions, which enables the researcher to explore in depth a specific context and observe the situation. When textual data are quantified, the aim of understanding a context from the participant's view is lost (Kaplan and Maxwell, 1994). Hence, this makes a qualitative approach suitable for exploring opinions and perceptions of change. A two phase approach was adopted in this study. First a pilot survey of industry experts was conducted through Survey Monkey to confirm the relevancy of the questions, and then semi-structured interviews were conducted with 20 selected participants. An important consideration in qualitative research is determining the sample size. The qualitative sample size is calculated by contextual considerations and the number of participants that will be needed to attain saturation (Glaser et al., 1968, p. 61; Turner-Bowker et al., 2018, p. 842). Saturation emerges when no more data are being found or repetition is occurring. Hence, a purposeful sampling size method will be used to suit the requirements of the study.

For this study, data was collected through a purposive, semi-structured, industry-based interview method after the questions and topics of interest were confirmed relevant in the pilot study. The participants were industry experts and selected based on their expert knowledge and experience working in traditional IT service environments as well as working in the cloud environment. Selecting participants for qualitative research cannot be random, as it has to be

chosen based on the interest of the researcher (Stake, 2005). The questions for the interview were prepared ahead of time by using the pilot study feedback. The respondents were probed to elaborate on their responses further, when and where needed. The interview time varied between 30 minutes to one hour, depending on the respondent's disposition. The sample was limited to participants with background expert knowledge who have experience in IT services roles for at least five years and had at least two years' experience working in a cloud environment (see Table 1). An expert interview is concerned about the participant's knowledge and experiences as a result of their actions, roles, responsibilities, or obligations within a specific organization or institution (Littig and Vienna, 2013). Expert interview provides insights into background information, such as expert knowledge and descriptions of processes (Harrell and Bradley, 2009, p. 24). Also, expert interviews are a more efficient and concentrated way of gathering quality data than using observation and surveys (Bogner et al., 2009, p. 3). An expert in this sense is a person with insight in aggregated or specific knowledge (Van Audenhove, 2007, p. 5). Furthermore, one the strengths of Interview methods is that it gives voice to common people, which allows them to present their life situations in their own words freely, and provide personal interaction between the researcher and their subjects (Kvale, 2006, p. 481).

Table 1: Interview Participants

Interview participants	Job title	Years of experience	Years in current position	Cloud service or environment deployed	Years using cloud services?
P01	Audit Manager, Technology	10+ years	0-3years	AWS and Azure (PaaS, IaaS, SaaS)	0-3years
P02	IT Audit Manager	3-6years	0-3years	IaaS, SaaS	5+ years
P03	Internal Auditor	7-10years	0-3years	SaaS	5+ years
P04	Audit Manager	0-3years	0-3years	Microsoft Azure	0-3years
P05	Network Engineer	10+ years	0-3years	AWS	0-3years
P06	Intermediate Developer	0-3years	0-3years	AWS	0-3years
P07	AWS Specialist	3-6years	0-3years	Public Cloud	0-3years
P08	Cloud Engineer	10+ years	0-3years	Private Cloud	0-3years
P09	Information Security Analyst	0-3years	0-3years	AWS / Azure	0-3years
P10	Audit Manager	3-6years	0-3years	Sharepoint	3-5years
P11	IT manager	10+ years	7-10years	IaaS, PaaS, SaaS	3-5years
P12	Senior Systems Administrator	7-10years	0-3years	Iaas SaaS	0-3years
P13	Cloud Security Advisor	3-6years	3-6years	Hybrid	3-5years
P14	Solution Specialist - Security Architecture	0-3years	0-3years	Both Microsoft Azure and Amazon Wed Services	0-3years
P15	Chief Technology Officer	10+ years	0-3years	AWS Serverless	0-3years
P16	IT Consultant	3-6years	0-3years	Azure / AWS	0-3years
P17	Site Reliability Engineer	0-3years	0-3years	Openstack, Vcenter, Hyper-V	3-5years
P18	senior security risk analyst	7-10years	0-3years	software as a service	5+ years
P19	IT platform manager	7-10 years	0-3years	Azure / AWS	0-3years
P20	Lecturer	10+	0-3	Azure and AWS	0-3

Findings

The Pilot study provided feedback on the questions and the relevancy of the assumptions the researcher planned to explore. There was 100% agreement that cloud is causing significant changes in business IT skill requirements, confirming the researcher hunch that this is a relevant area for research. However, other questions teasing the strength

of the cloud impact divided opinion. There was split opinion but agreement that the skills requirement has changed and not all traditional skills are redundant. There was also a significant group of respondents indicating that they were not sure about the new skills requirements on account of the evolving and changing work environment. The indication is that new and old skills are required for success when taking up the cloud opportunities. Hence, the researcher was assured that the relationship between cloud changes and new skills was a problem, and part of industry consciousness but that there is divided opinion on several issues regarding the features of the required skills for cloud (see Table 2).

Table 2: Pilot Study Responses

Question	Yes	No	Not Sure
Are new skills required to cope in the cloud environment?	89%	11%	0%
Does the type of cloud determine the business skills required?	78%	12%	0%
Is cloud causing significant change in IT skill requirements?	100%	0%	0%
Are some skills now irrelevant in cloud?	33%	45%	22%
Are traditional skills still efficient in cloud?	67%	22%	11%

The 20 interviews were noded and coded, and thematically analyses using the NVIVO software. The codes were systematically reviewed, modified, and categorized into broader themes for extended meanings. The review resulted in merging, renaming, and clustering of nodes into related categories. The emerging ideas were reconstructed into a broader hierarchical themes known as tree nodes. For example, grouping skills together as essential skills required to work with cloud computing technology. A total of six descriptive themes emerged, of which four related to skills. The first theme that emerged is the important skills required to cope in the cloud environment. This theme is in line with the research question, which seeks to elucidate the important skills required by business professionals to use cloud business opportunities. The skills categorize into technical and non-technical skills (see Figure 2). The tree nodes confirm the earlier literature review that showed cloud adoption inhibitors in privacy and security concerns. The analysis shows a dominant and detailed expression of security features but lessor concern for basic IT business skills. The non-technical nodes are also populated with listed business skills for cloud value generation.

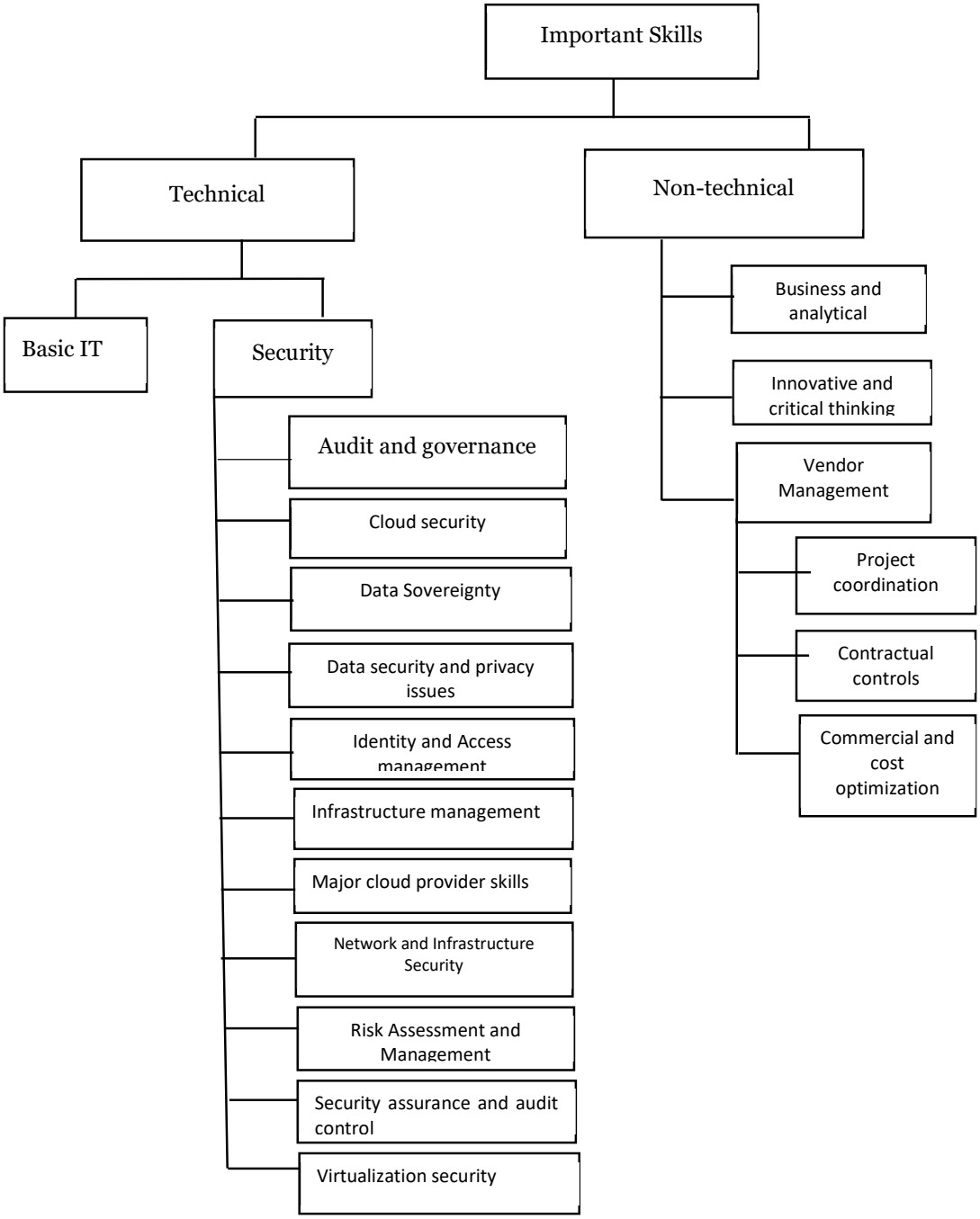

Figure 2: Codes for the Skills Theme

The first subtheme in the technical skills category is basic IT skills. Participants believe the basic IT skills are still important and fundamental in working in a cloud environment. Overall, there was an emphasis on programming skills for application building and managing in this category. The participants noted that as a rise in automation and outsourcing, where there is going to be a rise in the need for programmers in the future. Other skills included in this category are service and traffic management. For example, participant 12 and 14 noted that: "well, I still think the core skills of IT is still needed in terms of you know, in terms of scripting, patching, and all those kind of things." However, the second subtheme of security had many more entries. Security is an all-encompassing word used by the participants throughout data collection. There is a large focus on risk assessment and management risk assessment and management skills in the security category. An overarching skill requirement by most of the respondents is for skills around risk assessment and leadership in the cloud environment. Cloud technology increases the attack surface

and makes risk management a difficult task to achieve. The following excerpts illustrate some of the participant's views on the need for risk management skills. “Significantly increased the need for formal risk management training”, “You still have to have a full-stack understanding in order to assess risks exposed, maybe at not at quite the depth on physical security aspects but this still comes into play for the consumers of the cloud service and the devices that they use. The data is still held somewhere in something that has a level of risk that you need to understand.” “This is one area where most change will take place. A much larger amount of data will be travelling out of our network boundaries, mobile apps are on the increase, and people are working from a remote location. Securing our data will become increasingly more difficult.” “the most important skills you’ll have is access management is very important in this area”. Cloud services, especially data storage, are breaking the traditional geopolitical barriers of data privacy, and so skills around understanding legal requirements and compliance of data to enforce global data privacy are necessary. Other skills identified in the security category are information security governance and audit controls, virtualization security, and network and infrastructure. Network and infrastructure security skills are stated to be essential to protect and manage the organization’s cloud infrastructure.

Non-technical business skills were also critical for using cloud opportunities. Skills that emerged in this category are business analytical, innovative and critical thinking, and vendor management skills. “cloud technology is requiring new thinking patterns and is currently lacking people with critical thinking that can cover those domains.” There is a shift in IT professionals focusing on business and analytical skills. Innovative and creative thinking is necessary for professionals to view and address security in light of cloud technology. Participant P01 noted that:

> “As a general rule though for ALL staff, developing a new thinking pattern is absolutely critical. Incorporating all the key areas of thinking is important to deliver a secure product. Too often, it's a "just make it work" mentality that leads to issues in Security, gaps in risk controls, and over-provisioned environments. As an example, trying to educate teams to ensure they understand THEY own the risk for their systems and not the risk teams have been a huge challenge. It requires a shift in thinking to really take accountability for what they build”.

Also mentioned were vendor management skills where there is an emphasis on commercial and cost management, contract negotiations, controls, and project coordination/management (PO7).

> “A lot of organizations now are creating teams around managing their cost in the cloud, because most of the cloud services they charge you per hour of using the services, some even charge you per minute. There’s a high probability that some services are in use but not in use, and you just deploy them, nobody is using them, and they are incurring the cost for you. So, if you learn to manage those commercial aspects of cloud is another good skill”

Discussion

The data analysis showed that there is a clear perception that the required IT skills for successful business practice have changed as a result of the cloud impact. There was however less certainty as to the required new skills and which previous ones have become irrelevant. The strong advocacy was for a basic set of IT business skills and a demand for security skills for the cloud. There was a sense of uncertainty in the responses that reflected the unfolding nature of cloud impact and the belief that many skills could be transformed or adapted to be effective in the new cloud context. Figure 2 identified sets of technical and non-technical skills required for taking cloud business opportunities. These findings confirm previous literature reports of cloud impacts on skill requirements. The respondents also noted the deficits in different skills areas created by the cloud impact. These skills deficits were particularly apparent in the security area where privacy and data protection are a concern. It also reflected the challenges and changing nature of cloud security that requires new knowledge and techniques. There was a strong belief that current skills can be used but uncertainty as to the effect. The apparent lack of knowledge for the actual skill requirement suggests that some of the beliefs are wishful and may cover the need for a far greater acquisition of skills knowledge for effective cloud security. Current risk exposure levels in the cloud are driving demand for new skills and the requirement for more effective risk treatments.

Cloud has impacted both business and IT staff skills requirements. Cloud has introduced IT utility for all staff and can no longer be segregated into a supply department. Business professionals are expected to be competent with a sufficient technical understanding to work with cloud technology and use it as an integrated element in the business function. This has meant that IT staff have had to improve their non-technical skills and business managers their IT technical skills. Both of these transition impacts are required for employment and the successful utilization of cloud services. The IT staff need to acquire appreciative business skills of critical thinking, production and management, people management, emotional intelligence, judgment, knowledge negotiation, and cognitive flexibility. The business staff have to add systems knowledge, device management, security consciousness, techno-logics, application

management, and work systems knowledge to the daily skill set. All staff require soft or the intangible skills such as communication and interpersonal skills, project management, contractual control, and operations management. Cloud requires a new strategy to reimagine the assimilation of IT and business requirements to successfully maximize the cloud business opportunity and to achieve a competitive advantage return. The impact of disruptive technologies can be turned to success or destroy a business. Filling skills deficits is crucial for transition into successful business outcomes.

The skill requirements for BIS participants in the Cloud environment are often portrayed as a reduction of IT skill and an increase in business management skills. This research shows that respondents see the impact of cloud as being a two way effect. There is a reduction in IT skill requirements in terms of volume and scope, but equally there is a demand for business managers to increase their IT skills uptake and understanding of technical thinking. The former sharp segregation between IT and business skill sets is diminished by the cloud impact, and cross domain skills and competences are required. Cloud is displacing many of the traditional skills supply assumptions but also giving new and evolving opportunity for innovation. Cloud provides cost-efficient opportunities for businesses by offering a variety of dynamic, scalable, and shared services. To maximise the business benefits, skill groups are required that represent strength in either domain but more strongly assimilate IT and business requirements. Demand for business-related skills, organizational skills, service-related skills, communication skills, and security skills are required by all staff. This means that previous areas of specialisation have to be shared and fairly distributed as generic skill sets. Security skills and service-related skills are ranked as the core of a business skill set required in the cloud.

Conclusion

Cloud is a pervasive technology that has the capability to supply all BIS services. In this paper, a survey and interviews with experts were used to identify industry perceptions of cloud impacts and the impact on the required new business skill sets. The data showed uncertainty as to the precise skill sets required for successful business practice but there was agreement that cloud has changed the requirements. The ambiguous state reflects the current state of flux where there are degrees of cloud use from little to 100%, and knowledge gaps in current business adoption. The skills deficits were particularly apparent in the security area where privacy and data protection are of concern. It also reflected the challenges and changing nature of cloud security that requires new knowledge and techniques. The skills impact is often portrayed as an IT loss and a business gain. This research shows that there are impacts from cloud in both technical and non-technical skill sets that affect the whole business. Further research is required into the strategies for maximising Cloud benefits and minimising the drag factors that erode trust.

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Security of Space and Critical Infrastructures

Olga BUCOVEȚCHI

University „Politehnica" of Bucharest, Romania
olga.bucovetchi@upb.ro

Ulpia Elena BOTEZATU

University „Politehnica" of Bucharest & Romanian Space Agency, Bucharest, Romania
ulpia.botezatu@rosa.ro

Radu D. STANCIU

University „Politehnica" of Bucharest, Romania,
radu.stanciu@upb.ro

Abstract

The current paper looks at threats, risks and vulnerabilities from outer space and aims at establishing the interdependencies of space critical infrastructures to other critical systems, technologies and services. It first defines what security from and of space means, and it continues by bringing into discussion the threats associated to the concept of 'space situational awareness', i.e. solar weather, near-Earth objects and space debris. The paper continues with presenting the risks and vulnerabilities, as well as interdependencies by other sectors of critical infrastructure. Finally, the paper draws conclusions highlighting the areas that need to be addressed differently, highlighting the importance of approaching critical infrastructure protection from the above.

Keywords: Security of Space, Space Situational Awareness, Threats, Critical Infrastructure Protection, System of Systems

Introduction

The current paper looks at threats, risks and vulnerabilities from outer space and aims at establishing the interdependencies of space critical infrastructures to other critical systems, technologies and services. With growing interests for owning and operating assets in space, the international space context is changing fast — global competition is increasing with new entrants bringing new ambitions in space. Space activities are evolving to rather commercial with increased involvement of the private sector. In addition to market forces, major technological shifts, such as digitalisation, miniaturisation, artificial intelligence or reusable launchers, are changing the traditional business models in the space sector. Thus, the cost of accessing and using space is decreasing and access to space technologies and services becomes commonplace.

However, despite of growing business opportunities stemming from the above mentioned changes, the outer space infrastructures and services cannot act as any other ground-based infrastructural sector. The outer space environment changes the rules of protection and this article therefore attempts to compare and contrast these differences, in order to create a better understanding and consequently, a better way of approaching the protection of space critical infrastructures.

Space is no more than 100 km away from every point or person on Earth. Moreover, space technology greatly improves many aspects of our lives and we are starting to rely on it more and more each day. More than 1,000 active satellites currently provide a whole host of services that improve our world in many ways – from the navigational tools in our cars to the daily weather forecast. At the same time, they represent our collective vulnerability in case of intentional or natural disruption.

Simultaneously, the world's urban population is now growing by 60 million persons per year. By 2030, nearly 5 billion (61%) of the world's 8.1 billion people will live in cities. (UNESCO, 2020) Thus cities are increasingly

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populated and always in motion, complexifying the existing networks of utilities that support modern lifestyle. The nexus between urbanization, rising living standards and technological progress raises critical questions on the extent of possible protection of population, forcing researchers and decision-makers to innovate at a much faster pace.

Critical space infrastructures represent the complex interlinkage between space and ground-based technologies that help vital services such as telecommunication or positioning, navigation and timing to function. Based on their location, space infrastructures can be divided into two segments: space and ground segments. The latter includes launch facilities, mission control centres and transmission and reception stations. The uplink sector covers activities that lead to the development of space infrastructure, such as R&D, production of satellites and launchers as well as the deployment of such infrastructure. The downstream sector primarily relates to the commercial activities based on the use of data provided by space infrastructure, such as broadcasting, communication, navigation and Earth Observation. (European Investment Bank, 2019)

Having said these, the paper first looks at the meaning of 'security of space' and continues by bringing into discussion the threats associated to the concept of 'space situational awareness', i.e. solar weather, near-Earth objects and space debris. It then, separate specific threats, risks and vulnerabilities that space critical infrastructures face. Finally, the paper draws conclusions highlighting the areas that need to be addressed differently, highlighting the importance of approaching critical infrastructure protection from the above.

Security from space vs. Security of space

Space-based assets and systems are critical to ensuring security on Earth (security from space). At the same time, these assets need to be protected in the difficult environment of outer space (security of space). (EC, 2020) This section quickly presents the distinction between these two approaches when discussing the topic of space and security.

In Europe, space-based systems are making an increasingly important contribution to security and to the EU's Common Security and Defense Policy (European External Action Service, 2020). We constantly face evolving security threats that are less visible, and less predictable than before. To deal with them, it needs the best affordable capabilities for autonomous political assessment, sound decision-making, prevention policies, and effective action. Space assets provide a significant contribution to confronting these threats through their global monitoring, communication, and positioning capabilities.

This is why space-based products and services that rely on satellites, must be monitored and protected against threats to ensure a safe and uninterrupted service. At the same time, people on Earth must be also be protected against space hazards such as asteroid strikes ('security of space'). Being informed about the situation in space is referred to as Space Situational Awareness (SSA). It covers three main themes: Space debris (SST), Space weather phenomena, and Near-Earth Objects (NEOs).

Risks, vulnerabilities and interdependencies of critical space infrastructures

This section attempts to explain, with reference to other critical sectors, the pivotal importance of critical space infrastructures for the functioning of society by highlighting the complex interdependencies between these systems and the other sectors of critical infrastructures. The section defines dependency as a linkage or connection between two infrastructures, through which the state of one infrastructure influences or is correlated to the state of the other. Furthermore, interdependency represents a bidirectional relationship between two infrastructures, through which the state of each infrastructure influences or is correlated to the state of the other infrastructure. More generally, two infrastructures are interdependent when each is dependent on the other. (Bucovetchi, O & Simion, CP, 2015)

With regards to areas of interdependencies between space critical infrastructures and terrestrial critical infrastructures, the following section looks at how dependent are vital functions to space technologies and services. (Coman, M., & Badea, D., 2019)

Firstly, the energy infrastructure (electricity, petroleum and natural gas) represents one of the most important sectors in our society, on which we depend for our current lifestyle. Without a stable energy supply, many other vital sectors are threatened, such as healthcare, finances, transportation and food supply, among others.

Energy infrastructure is increasingly reliant on space technologies such as GNSS for the monitoring of activities, as well as for the surveillance of smart grids. Intelligent electricity distribution is a complex technology requiring advanced interoperability mechanisms and precise environmental monitoring, to be provided through GNSS. Furthermore, GNSS can be used in hydropower generation for the monitoring of water reservoirs and water flows, as well as to estimate characteristics of particular resources of energy, e.g. the winds. Remote sensing and weather

satellites can be used for monitoring environmental conditions of a particular urban area, e.g. 2003 power blackout along the US East coast.

In the case of chemical and nuclear industry, space critical infrastructures are indirectly connected to these critical areas. In case of failure therefore, it indirectly affects interconnected to other critical sectors, such as energy supply, health services, transport of radioactive materials, ICT, defence, public order and national security, as well as food and water supply.

In terms of agriculture, space-based technology constitutes and enables of "precision agriculture" or "smart farming", allowing producers to improve economic, environmental and societal challenges of food production. (Gebbers & Adamchuk, 2010)

One important dimension of 'precision agriculture' is GNSS-based automatic guidance of agricultural machinery. Furthermore, telemetry has improved livestock management and specialty crop production systems. The Earth Observation satellites provide radar, optical and thermal imagery, which can offer considerable data in a repeatable manner of crops. These include useful information on crop growing conditions (water, carbon and nitrogen cycles), in addition to serving as crop inventory and watershed level planning. Thus, data from several satellite platforms can be collected and analysed with the aim of improving soil productivity.

The finance sector is a vital component of any nation-state, thus any natural or man-made disaster makes not only this sector vulnerable, but also society at large. With regards to the connection between the finance infrastructure and critical space infrastructures, it is important to mark a direct and an indirect dependency. The former refers to physically connected databases and processes in which an interruption of services due to power supply failures leads to parts of the system becoming inoperable. Furthermore, failures in communication satellites may also lead to errors in the financial system. Similarly, a disabled global navigation system may impede the global synchronization system, causing delays on the financial markets and severe losses in terms of operational capacity of the financial infrastructure.

Indirect impact might be produced by space-based services that are not used directly by the constellation of finance systems, such as the data collected by Earth observation satellites that might be used for making financial decisions by insurance companies. Furthermore, the finance sector as a vital sector for society, takes into account early warning signs offered by critical space infrastructures. (EC, 2014)

The impact of interrupted space critical infrastructure on both the central administration and on defence and national security infrastructures account for a variety of buildings, many of which are of public use, as well as for a wide range of activities, including business, commercial transactions, administrative or recreational. In addition, the public administration infrastructure contains electronic elements of identification, databases, access control systems and CCTVs, as well as services such as the Postal Services. Satellites provide tracking of services, imagery of various fields of operational processes, but also information on a country's strategic logistics: transport vehicles, strategic sites, information and telecommunication networks, information on the population regarding their identifications, personal data and many more. Thus in case of central administration infrastructure, space critical infrastructure is pivotal.

Remote sensing makes it possible to collect data on dangerous and inaccessible areas, as well as on border areas the defence and national security systems. Satellites are fundamental for border control, but also services like GNSS for tracking vehicles and suspects, or for rescue operations.

The transport infrastructure is critical to the mobility of resources and people in a connected world. Transport infrastructures are increasingly complex and integrated with applications that attempt to solve problems of flow, coordination and control, space technologies are pivotal in providing a basis for competitive transportation. The main space applications used in this sector are navigation and positioning infrastructures, as well as weather monitoring and telecommunication.

GNSS service is vital to aviation, maritime, railways and road transportation that offers coordination and efficiency of logistics (e.g. distribution of containers in port). Furthermore, in the air industry, GNSS services are important for congestion in air traffic or passenger and luggage related operations. In case of maritime transportation, the GNSS offers the fastest and the most accurate path for navigation, thus increasing the efficiency of transport and the safety of the trip. For busy seaports, space infrastructures are helpful in coordinating large vessels in narrow spaces, as well as automated container placement, pick-up and the transfer of goods. In the case of road transportation, GNSS is useful for highway surveillance, as well as for the location of vehicles and in emergency operations. Equally

important, railway transportation use GNSS to track movement of locomotives but also in controlling delays and for reducing operating costs by automatically adjusting train speed and re-route traffic.

Finally, it is important to mention the complex interdependencies between space technologies and transport infrastructures, which are directly or indirectly affecting and affected by other critical sectors. This includes the role of telecommunication infrastructures, the close relationship between transportation and energy sector, as well as food and health, particularly in disease outbreaks and their spreading across geographical space. (Georgescu, A & Bucovetchi, O, 2017)

The communication satellites become indispensable for economic, social and cultural development, and for the safety and security of communities. For the transmission of a complex universe of services of telecommunication and internet, there is another complex interconnected constellation of satellites, wireless and wired service providers that depend on each other's services and technologies. Bringing TV and radio content closer to communities that are otherwise disconnected from landlines and other terrestrial networks represent another aspect of spatial technologies.

For communication applications, synchronization is pivotal, for instance, mobile telephony and data networks use GNSS to keep in a synchronized state, while digital broadband radio uses GPS to ensure that the bits from all radio stations arrive coordinated at receivers and with a minimum of delay.

The water supply sector is very vulnerable to events ranging from contamination with deadly agents to cyber-attacks, which may cause many human illnesses or losses. It is also a pivotal sector, especially for energy critical infrastructures and the nuclear industry, not to mention the security of citizens.

With regards to space critical infrastructure, communication satellites might be used for communications. Additionally, EO satellites might be used for water supply, flood control reservoirs, flood predictions, as well as reserves for drinking water. Indirectly, it affects the food supply sector by providing information that is vital to the survival of a nation.

In the food supply sector, space infrastructures are vital mostly for the production phase, i.e. precision agriculture. Due to GNSS farmers can monitor their crops, or monitor animals or aquaculture crops. Work can be done even in adverse conditions like rain, dust, or fog, when visibility is low, due to GPS. Precision agriculture means also a rational and needs-oriented distribution of fertilizers, pesticides and a better control of the dispersion of these substances. Space technologies can provide accurate maps of areas – with precise information on crops, road infrastructure, and irrigation systems. Moreover, it can provide data on dangers to animals, like outbreaks of diseases caused by particular viruses.

The field of healthcare is critical for the wellbeing of a society through its role in infectious disease outbreaks and in case of natural disasters. While individual assets are managed locally, the networks of health facilities is highly dependent on other infrastructures such as ICT, administrative infrastructures, defence and national security, energy, food supply, water and transportation.

As a consequence, there are interactions between these critical sectors and space critical infrastructures. These relate to the role of GNSS and GIS for disaster management, as well as for detecting pollution in air, water or soil. Furthermore, space technologies are pivotal in monitoring disease propagation, in case of outbreaks. In case of disasters, correlated data between police, fire and medical teams can help save lives by using localisation provided by GPS and thus ensuring a quick response.

Telemedicine enabled by communication satellites and GIS provides new ways to improve human health. Two-way communications technology, multimedia and computer networks enables healthcare to be delivered remotely in low-resources environments. Thus, the expertise, as opposed to people, is being transferred – medical staff can perform tele-consultations, tele-diagnostics and can provide remote training to share their medical expertise.

Hand-held devices such as ultrasound smartphones can be used to provide real-time imaging from battlefields to trauma surgeons halfway around the world. People in remote areas can be tested for HIV and their results synchronized with central healthcare records (Anon., n.d.) Finally, with the help of these technologies, non-transportable patients can be monitored from a distance, providing their doctor with virtual access to their health records and vital signs.

Space products aid integration of medical data with environmental factors, thus helping the early warning of outbreaks of diseases. Integration of hospital admission records and police reports that generate multi-variable interactive GIS maps are helpful to both healthcare professionals and policy-makers to better understand the distribution of health

and disease. Technologies and materials that were initially developed for space applications have been transferred into medical practice. These include programmable pacemakers, micro-transmitters to monitor the foetus inside the womb, laser angioplasty, fiber-optic catheters and light-emitting diodes to be used in brain surgery. Technologies from the Hubble Space Telescope have been applied to digital mammography biopsy techniques.

Another important area in the field of healthcare is represented by tele-epidemiology – the science of studying the propagation of human and animal diseases, based on space technologies. Tele-epidemiology combines data sets from multidisciplinary areas (physical factors such as temperature or humidity, biological readings, health data, socioeconomic data, etc.) with satellite observation data (climatological, environ- mental, land use, etc.). This allows us to analyze the mechanisms of emergence, propagation and transmission of infectious diseases, first, by investigating the "climate - environment - health" relationships, and second, by updating the links that exist between infectious diseases and the environment in which they develop, all with the help of space technology. The ultimate objective is to provide public health stakeholders with tools, risk maps for instance, allowing them to monitor and anticipate epidemics. Space-based applications of tele-epidemiology extend to health surveillance and health emergency response.

Space-based technology has been successfully used to increase access to education in remote, rural and poor communities with limited infrastructure development. Among these important initiatives are the development of distance learning platforms that provide access to courses and materials, in addition to facilitating communication among peers who otherwise cannot meet in person. In the Democratic Republic of Congo, radio stations in rural areas broadcast educational programs to farmers in their local language. Likewise, in rural Australia, satellite services are used to bring learning opportunities to remote communities.

Conclusions

This article reviewed the concept of 'security of space' exemplifying the difficult environment of outer space and its importance for the resilience of critical space infrastructures. It then attempted to highlight various areas of interdependency between space and other critical infrastructural sectors, such as energy, water and food, telecommunications, and others.

The society takes many times technological developments as granted, such as the case of PNT or GNSS services. However, failure of such services highlights enormous societal failures in terms of critical services such as healthcare or governmental communications. In case of a collapse in the realm of space critical infrastructures, operations will be reduced in efficiency, "airlines would have to revert to legacy systems and procedures that waste expensive jet fuel on inefficient routes. Cargo vessels entering harbors would slow to a crawl to ensure safety or they might not be allowed dock at all. Container cranes at ports would revert to cumbersome manual operations. Logistical supply-chain management systems would lose or degrade their ability to track the flow of parts to their factories and products from warehouses. Construction and mining projects would become delayed as expensive manual labor replaced systems used to auto- mate surveying, re-grading, earth moving and asset tracking. Farmers would lose the ability to operate twenty-four hours a day using automated machinery and as a result, they may not be able to harvest all their crops before they spoil in the field". (George Marshall Institute for Security Studies, 2012)

Moreover, losing access to remote sensing satellites for one day might be vital for border controls and for news media reporting in case of a major event like an earthquake, tsunami, forest fire or other natural disaster occurring in that particular day. The ability to provide imagery of that major event and thus to assess the damage would be impeded and the relief efforts would be severely hampered.

In conclusion, when discussing the importance and the resilience of critical infrastructures, it is important to note that some threats cannot be tackled in a traditional manner. Due to complex interconnections, events such as solar weather or asteroids attracted to gravitational field could affect and interrupt the critical services provided.

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Legal and Financial Analysis of The Consequences of Using Special Drawing Rights as Administrative Monetary Penalties Levied in Connection to Marine Pollution Prevention from Ships

Wojciech BOZEK

University of Szczecin, Szczecin, Poland
wojciech.bozek@usz.edu.pl

Abstract

There are many barriers to using the Special Drawing Rights (SDR) as the leading means of settling international accounts within the global currency system. Despite that, SDRs are a universal and flexible accounting unit used in many areas of international and national legal order, including the law of the sea. The author's research focuses on the application of the SDR of the International Monetary Fund (IMF) when to value of administrative penalties for the violation of international and national law. In the author's opinion, the role of SDR in the area of maritime law is not marginal. The conducted legal analysis of the normative material reveals that monetary penalties should, first and foremost, have a preventive, repressive and educational role. Furthermore, from the point of view of the participants of administrative proceedings, some of the legal solutions have not been clearly and exhaustively defined by the legislator. However, analysis of statistical data proves that the fluctuations of foreign currencies on the global market will affect the severity monetary penalty imposed on the perpetrator of administrative tort, and thus affect the extent of repressive, preventive and education effect on the penalized party. Moreover, this will also affect the government revenue and the fulfillment of the fiscal function through these sanctions. Consequently, this leads to a conclusion that monetary penalties of the same amounts, but imposed at a different time may in fact have different impact, both in terms of the penalty's basic and accessory roles. Such a situation will be caused by objective factors, regardless of the authority imposing monetary sanctions, as well specific circumstances of the case (type, extent of infringement, factual reasons concerning the fined party). The paper relies on statistical research method and analysis of legal acts and case law, and the method of interpretation of applicable law. The methods were used to evaluate the foreign and Polish legal order and opinions expressed in reference books and case law, and to analyze statistical data. Therefore, the conclusions reached have theoretical and practical implications.

Keywords: Special Drawing Rights, Maritime Law, Administrative Monetary Penalties.

Introduction

Monetary penalties are a universal instrument used in different legal orders to discipline entities which have violated applicable laws (Pache 1994, p. 214, Weigend 1994, p. 105, Genevois 1987, p. 671, Andrijauskaitė 2019, https://wp.me/p7wtYD-dw). Financial sanctions discussed herein are different from criminal sanctions. They serve different purposes, their primary function being retributive punishment of the perpetrator by an administrative body. Such sanctions should not only deter the perpetrator from perpetrating the same offence in the future, but also have a preventive and educational effect on other entities (cf. Teitgen-Colly 2017, p. 7, Huteau 2015, p. 230). Because of the financial nature of these sanctions, they may also contribute to public income, although this is not their major role.

The paper focuses on monetary penalties constituting revenue of state budget and determined in SDR. To ensure that the paper has both theoretical and practical significance, the author focused on the monetary penalties defined in the Act of 16 March 1995 on prevention of maritime pollution form ships (consolidated text: Journal of Laws 2017 item 2000 as amended, further: Act of 16 March 1995) and applicable over the 2014-2019 (November) period. Such approach was feasible thanks to the data provided by the Maritime Office in Gdynia on the basis of the right of access to public information.

Special Drawing Rights and their significance

Pursuant to the Agreement of the International Monetary Fund of 22 July 1944 (M.P. 2010, No 36, item 501, as amended) the unit of account in the form of the Special Drawing Rights (SDR) was created as an international reserve asset in order to supplement other reserve assets of member states of the International Monetary Fund (IMF), should

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such need arise. This solution is quite significant as means to ensure international liquidity and prevent crises in the international currency system (Clark, Polak 2002, p 17–23, Alessandrini, Fratianni 2009, p. 15-19). SDRs are units of accounts of the IMF used to settle transactions with the IMF, but they also function as reserve assets which may be used by a member state to purchase freely usable currencies (Gąsiorowski, Grotte, Frankiewicz, Życieńska, Walasik 2013, p. 47-48). Since SDR is the main unit of account in the IMF, it is used as the basis for calculating the size of loans, loan fees and interest rates, but it is also used in operations and transactions between IMF and member states, and monetary institutions prescribed by the IMF (such as the European Central Bank, International Bank for Reconstruction and Development, or the International Settlement Bank). SDRs also play a significant role in the drawing of the IMF's budget and the member country's share in IMF quotas (Dudziński, Nakonieczna-Kisiel 2006, p. 133). The value of SDR is based on a basket comprising five currencies, i.e. the US dollar, euro, Chinese renminbi (from 1 October 2016), Japanese yen and pound sterling, and so the basket includes only the currencies which are used for payments for international transactions, which is meant to increase the global liquidity of international finance. It must be noted that the inclusion of Chinese renminbi proves that SDR is being adjusted to current market circumstances and the need to increase global financial security (cf. Angeloni, Bénassy-Quéré, Carton, Darvas, Destais, Pisani-Ferry, Sapir, Vallée 2011, p. 36-37, 84). However, this does not alter the fact that not many transactions on the international market are conducted in SDRs (Prasad 2016, p. A11).

An important advantage of SDR is its flexibility, brought about by the fact that the SDR basket is reviewed every five years (or sooner). It is a sensible and desired practice, but it also increases the adequacy of SDR which in turn ensures its long-term value in international law. SDR should reflect the relative importance of currencies in commercial and financial systems. Actual weights of currencies included in the SDR basket change as Exchange rates between basket-member currencies fluctuate, and thus the SDR's value is calculated daily on the basis of exchange rates quoted on a given day. And so, it is dynamic. The importance of SDR is also reflected in the fact that the SDR interest rate (SDRi) provides the basis for calculating the interest rate charged to borrowing members for non-concessional loans and interest rate paid to IMF members for the use of their resources for non-concessional IMF loans (IMF 2009, Special Drawing Rights (SDRs)).

At the same time, we should note that in practice, there are factors that limit the role of SDR and affect its application as an international currency. They may be of internal and external nature. Internal limiting factors include, i.a., limited possibility of using it in the sphere of private law (there have been some ineffective attempts at making SDRs basic reserve assets in the international currency system and using them in private markets) and in the sphere of public law, and the limitation of SDR creation. Important external factors include, i.a., development trends of the international monetary system (Skopiec 2015, p. 90-91; Gąsiorowski, Frankiewicz, Grotte, Życieńska 2012, p. 37).

It might be concluded that from the international perspective, the future potential of the SDR depends on specific measures that would need to be taken to give the IMF the power to use the SDR much more flexibly and as needed by global economy. Only then the SDR would become a real alternative to internationally used currencies (Singh 2016, https://www.brookings.edu/blog/future-development/2016/04/19/reforming-the-international-monetary-system/).

The use of SDR in the prevention of marine pollution by ships

In the Polish legal order, SDR is a commonly used unit of account. These are the units used to, i.a., determine monetary penalties for violation of the provisions of administrative law in place. The Polish legislator used SDR in several legal acts, including the broadly understood maritime law (admiralty law). Besides the Act of 16 March 1995 (art. 36-36c), the maritime law encompasses the following acts, i.a: the Maritime Code of 18 September 2001 (art. 280, consolidated text: Journal of Laws 2018, item 2175, as amended); the Act of 21 March 1991 on marine areas of the Republic of Poland and maritime administration (art. 37-37c and art. 55-55c, consolidated text: Journal of Laws 2019, item 2169, as amended.), and the Act of 18 August 2011 on marine safety (art. 126-art. 128 consolidated text: Journal of Laws 2020, item 680, as amended). The above regulations which make reference to the SDR are only exemplary, as the SDR is used in many other legal acts concerning, e.g. nuclear law (Nuclear law of 29 November 2000 (consolidated text: Journal of Laws 2019, item 1792, as amended) and aviation law (Aviation law of 3 July 2002, consolidated text: Journal of Laws 2019, item 1580)).

SDRs are much more than just units of account in which monetary penalties are calculated. The solutions adopted by the Act of 16 march 1995 prove that SDR is used in many ways, not only to govern liabilities, but also to regulate legal relationships in maritime law in its broad sense. SDR is used to calculate tariff units for the issuing of port security documents. The PLN value of a tariff unit is the equivalent of 0.2 SDR, and in the Polish legal order it is calculated according to the previous week's average exchange rate quoted by the National Bank of Poland. This conversion rate is used to determine the fees for, i.a., issuing of documents, diplomas, certificates, deep diver logbooks

(Act of 17 October 2017 on underwater works, consolidated text: Journal of Laws 2020, item 397, as amended). The globally universal nature of SDRs stems from the fact that in maritime legislation they have become the standard unit of account for setting limits liability. For ships with a gross tonnage below 300, the liability limit is 200,000 SDR for claims arising out of personal injury, disturbance of health or death. For other claims the limit is 100,000 SDR. This is how Polish regulations are adjusted to international standards and legislation, i.a., the Convention on limitation of liability for maritime claims concluded in London on 19 November 1976 (Journal of Laws 1986, No 35, item 175, as amended).

As it comes to Polish economy in recent years, it can be said that the value of SDR shows relatively small variance even at times when global markets were very volatile (www.imf.org/external/np/fin/data/param_rms_mth.aspx (access: 24.08.2020) and www.money.pl/pieniadze/nbparch/srednie/?symbol=XDR (access: 24.08.2020).

To systematize the issues analyzed in the further part of this paper, administrative torts which are the basis for calculating monetary penalties in SDRs have been presented synthetically in Table 1. The analysis of the normative material leads to a conclusion that the primary function of penalties is their preventive (disciplinary) and repressive functions, educational, informative, motivational and also fiscal functions (Przybysz 2011, p. 170-172). Some of these functions are primary (fundamental), as e.g. the preventive and repressive functions, and some are supplementary (auxiliary), e.g. the fiscal function. Monetary penalty should be proportional and adequate to the irregularities identified, i.e. effective and having a deterrent effect, therefore the limits of sanctions set by the law are important, and so is the measure of penalty used in a given case (cf. judgment of the Supreme Administrative Court of 01.12.2016., II GSK 1249/15, Legalis No 1577541). The adopted method for calculating monetary fines with reference to SDR requires a disclosure of data necessary to determine the SDR to PLN conversion rate. For obvious reasons, the latter initiates the need to stipulate how the penalty will be calculated in a strictly mathematical sense. It should be underlined here that in the case law of Polish administrative courts there is no comprehensive explanation of the mathematical equations used for these calculations, which often is voiced as an objection of the party challenging the ruling and its substantiation. However, the fact that the method of conversion of SDR to PLN is not stated in the law is not treated as circumstances affecting the ruling and does not constitute grounds for revoking the administrative court's decision or to dismiss the case (cf. judgment of the Provincial Administrative Court of 04.03.2015., VII SA/Wa 1741/14).

Table 1: Application of the SDR in the Act of 16 March 1995 on prevention of pollution from ships

Sectioning level of the legal act	Tort perpetrator	Size of monetary penalty	Example of administrative tort
art. 36 para. 1	shipowner	**equivalent of up to SDR 1,000,000**	sea pollution of the Polish marine area of the Baltic Sea caused by the ship's day to day shipping operations or dumping of waste or other substances
art. 36 para. 2	shipowner affiliated to Poland	**equivalent of up to SDR 1,000,000**	sea pollution outsider the Polish Marine area of the Baltic Sea caused by the ship's day to day shipping operations or dumping of waste or other substances without a required permit or against the terms stipulated therein
art. 36a	shipowner who does not perform obligations set by the law or who violates bans imposed by the law	**up to SDR 50,000**	carriage of dangerous or polluting goods without due information about the type of cargo, intended route and time of passage, and the safety conditions of the ship; use of installations or devices that contain controlled substances in a way that does not prevent emission of controlled substances to the environment; shipping operations that cause the emission of ozone-depleting substances, nitric oxide, greenhouse gases with fluorine

art. 36aa para. 1-2, 3a, 4	shipowner	**up to SDR 600,000**	the use of fuel exceeding sulphur limits; carriage of fuel oil, in breach of the MARPOL Convention, for combustion purposes for propulsion or operation on board a ship that does not meet the sulphur content limits of fuel oil; operating a ship without a valid Inventory or heading towards recycling facilities which are not included in the European List of ship recycling facilities
art. 36aa para. 3	shipowner	**up to SDR 100,000**	failure to provide the results of tests of emission reduction methods in accordance with the Act
art. 36aa para. 5, 6, 36c,	shipowner	**up to SDR 50,000**	failure to monitor CO2 emissions using the method prescribed in art.8 Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC (OJ L 123, 19.5.2015, p. 55, hereinafter: Regulation 2015/757), failure to fulfill the obligations concerning collection and reporting of ship fuel oil consumption data in accordance with regulation 22A Annex VI MARPOL; failure to provide information on dangerous or polluting goods loaded onto the ship for transport
art. 36b	shipper	**up to SDR 50,000**	failure to meet the obligation with regard to making dangerous or polluting goods ready for loading and transport by the ship without notifying the captain and presenting him with a Dangerous Goods Declaration
art. 36c	supplier	**up to SDR 50,000**	failure to notify prior to the first delivery (the head of the maritime office competent for the place of delivery) about fuel supply operations in Polish marine areas
art. 37a	everyone	**up to SDR 50,000**	failure to comply with provisions of the Regulation (EC) No 783/2003 of the European Parliament and of the Council on the prohibition of organotin compounds on ships and Commission Regulation (EC) No 536/2008 of 13 June 2008 giving effect to Art. 6(3) and article 7 of Regulation (EC) No 536/2003 of the European Parliament and of the Council on the prohibition of organotin compounds on ships and amending that Regulation
art. 37b	shipowner or ship's captain	**up to SDR 200,000**	failure to comply with the terms and conditions of the permit granted to the ship moving between specified ports or places or a ship that is operated only between specified port or places
art. 37c	port or marina administrator, or an entity conducting operations and using the quay within the area of the port or marina	**up to SDR 50,000**	failure to comply with the obligations to draw new or update existing pollution prevention plans and pollution emergency plans regarding port waters

Source: Author's own study based on the Act of 16 March 1995.

The purpose of monetary penalties referred to in Fable 1 is to eliminate the negative effects for human life and health, and for the environment caused by operations of ships at sea and harmonize the Polish legal order with the provisions of international law, including:

1) Commission Implementing Decision (EU) 2015/253 of 16 February 2015 laying down the rules concerning the sampling and reporting under Council Directive 1999/32/EC as regards the sulphur content of marine fuels *(*OJ L 41, 17.2.2015),
2) Resolution 380(94) of 21 November 2014 amending Regulation 2, Chapter VI of the International Convention for the Safety of Life at Sea concluded in London on 1 November 1974 (Journal of Laws 1984, item 320 and 321, and 1986, item 177),
3) Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning *(*OJ L 257, 28.8.2014, p. 135).
The regulatory solutions adopted in the Act of 16 March 1995 were also affected by: the Regulation (EU) 1257/2013 of the European Parliament and of the Council on ship recycling, and amending the Regulation (EC) No 1013/2006 and the Directive 2009/16/EC (OJL 330, 10.12.2013, p.1) and the Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC *(*OJ L 123, 19.5.2015, p. 55, as amended).

Analysis of the effect of monetary penalties imposed pursuant to the Act of 16 March 1995

As already established, the application of the SDR in determining the size of a monetary penalty has impact on the financial situation of the entity fined, as well as on the government budget. Therefore, it is essential to strive to ensure that the substantive proceedings are objective and independent.

Throughout the analyzed period, annual government revenue collected from the total monetary penalties imposed by the Director of the Maritime Office in Gdynia was PLN 158,600 (in 2016), whereas maximum sanction imposed in any individual case was SDR 25,000, which is ca. PLN 136,600.

Thus, in the cases discussed, the exchange rate of PLN to SDR has relative significance and impacts the degree of the sanction's repressiveness experienced by the entity fined.

Table 2 implies that the application of a monetary penalty of SDR 2,000 in each of the aforementioned instances would generate a difference of ca. PLN 1,630 between the highest and lowest amount of the sanction. However, the provisions of the subject Act do not specify which exchange rate date should be used for the conversion, i.e. should it be the date of violation, date of decision or the date when the decision became final, or some other date. From the perspective of the entity fined, the varying economic burden of the penalty imposed at different times may raise reasonable doubts. For example, if one is to consider the highest penalty ruled in 2014-2019 (SDR 25,000 in 2016), the difference between the lowest and highest exchange rate of SDR to PLN (Table 2) would be over PLN 20,360.

To recapitulate, the above points to the conclusion that the severity of a monetary penalty in the above cases was dependent on non-statutory assumptions. Monetary penalties should be weighted according to the severity of the violation, the repeatability of violations and also revenue gains. However, the actual severity of the said sanction may be more than intended in result of the fluctuating SDR to PLN exchange rates. It is obvious that administrative bodies have no impact on the factors affecting foreign exchange rates, including the foreign currency to PLN rate. Nevertheless, a normative regulation of the principle which – considering the repressive nature of monetary penalties as regulatory enforcement tools – would determine the one, objective way of setting the SDR to PLN exchange rate is necessary. In the author's opinion, it would be reasonable to consider the date of violation as the reference point for the conversion, rather than referring to the date of decision or another date. Such a solution would ensure objectivity since the date of the decision actually depends on the administrative body (director of maritime office), who will try to maximize the government revenue.

Table 2: Monetary penalties levied on the basis of the Act of 16 March 1995, including SDR and PLN, and the sum total of monetary penalties levied in a given year

The Act of 16 March 1995					
Inspectorate of Marine Environment Protection, Maritime Office in Gdynia					
Year	Sum total of monetary penalties levied	Legal basis	SDR	PLN	Average conversion rate PLN to SDR
2014	11,105.12	art. 36aa para. 1	2,200.00	10,359.90	4.7090
		art. 36(1)	150.00	745.22	4.9681
2016	158,455.30	art. 36aa para. 1	2,000.00	10,815.60	5.4078
		art. 36aa para. 1	2,000.00	11,047.20	5.5236
		art. 36aa para. 1	25,000.00	136,592.50	5.4637
2017	123,044.72	art. 36aa para. 1	1,200.00	6,465.12	5.3876
		art. 36aa para. 1	2,000.00	10,271.00	5.1355
		art. 36aa para. 1	5,000.00	25,419.00	5.0838
		art. 36aa para. 1	16,000.00	80,889.60	5.0556
2018	80,472.23	art. 36aa para. 1	2,000.00	10,350.02	5.1750
		art. 36aa para. 1	5,500.00	28,354.15	5.1553
		art. 36aa para. 1	3,000.00	15,667.20	5.2224
		art. 36 (1)	100.00	492.86	4.9286
		art. 36 (1)	5,000.00	25,608.00	5.1216
2019	15,937.80	art. 36aa para. 1	3,000.00	15,937.80	5.3126

Source: author's own study based on the data obtained from the Maritime Office in Gdynia, following an application for access to public information.

Conclusion

The solutions adopted in Polish maritime law make many references to the SDR. As units of account, SDR should be appreciated for meeting the criteria of neutrality (lower vulnerability to macroeconomic fluctuations) and flexibility which is manifested in the fact that i.a., it is based on transparent, comprehensible and appropriate valuation methodology based on a basket of major freely usable currencies. This is also important from the perspective of monetary penalties discussed in this paper, as they can be imposed on both domestic and foreign entities (natural persons, legal persons and non-corporate entities).

In practice, the method and formula used for calculating the SDR conversion rate makes it a commonly recognized and relatively stable unit of account, which is why it is used for setting limits on liability in many international agreements (Ntovas 2010, p.9), and in administrative procedure followed in the subject sanctions. The equivalence of a monetary penalty expressed in the SDR can be freely conversed into PLN, which, however, does not mean that its value is not subject to fluctuations. Differences in exchange rates at different times affect the financial situation of the entity fined with an administrative monetary penalty, and also, affect the government revenue.

The primary function of monetary penalties analyzed in this paper is to act as preventive and disciplinary measures, while they are not enormously important in fiscal terms for the state budget. In contrast, from the point of view of an entity fined, the date selected to be the SDR to PLN exchange date may have a significant impact on the entity's financial situation. To resolve doubts that arise in this context, it is necessary to initiate law-making actions which will ensure that the amount of monetary penalty is beyond the control of the administrative body. Only then the objectivity of decisions on monetary penalties issued in administrative proceedings will be guaranteed.

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Stimulating the Economy's Innovative Potential by Means of EU Funds

Ewa MILCZAREK

University of Szczecin, Institute of Legal Studies, Szczecin, Poland
ewa.milczarek@usz.edu.pl
ORCID 0000-0003-0726-0959

Abstract

Global competition forces a pursuit to increase the economy's innovative potential in order to compete on the market increasingly determined by new technologies. The EU economy also needs to meet these challenges. EU funds are one of the tools adopted by the European Union to achieve this goal.
The paper's research goal is to analyse the EU's impact on the economy by means of EU funds in terms of stimulating innovation. Since law and economy meet in the analysis of the discussed issues, methodological eclecticism has been applied by anchoring the research in the economic analysis of law. The paper discusses the legal framework of development of innovation and economic tools that implement the assumptions of the company's innovation enhancing policy.
The study's outcome involves a conclusion on whether the tools (aid funds) effectively contribute to boosting innovation of the EU economy. The analysis allows a statement that the EU policy has a positive impact on innovation of the economy, which is confirmed by comparative research of other economic areas. The said funds have led to increased performance in countries with a developed R+D sector and also in countries with a primary low share of innovation in the economy.

Keywords: European funds; innovative economy; research and development; knowledge-based economy

Introduction

Innovative activity is a key tool in states' economic development. Investment in the R+D sphere creates a basis for long-term development and also builds the economy's competitive position. The European Union, wanting to face the growing competition, supports the development of innovation by means of aid funds.

The paper's research goal is to analyse the EU's impact on the economy by means of EU funds with regard to stimulating innovation. The result of the study is a conclusion on whether this tool effectively contributes to boosting innovation of EU economy.

Innovation in The Economy

The term "innovation" was coined in the 1930s by J. A. Schumpeter [Schumpeter 1939, p. 84] who identified by these five cases where innovation occurs [Wiśniewska p.10]:

- Creating a new product,
- Applying a new methodology, production method,
- Creating a new market,
- Obtaining previously unknown raw materials,
- Reorganizing a specific branch of economy.

In the 1990s, the paradigm of the knowledge-based economy was put forth to draw attention to the characteristics of the modern economy, increasingly benefiting from knowledge capital, and such knowledge being the source of all novelties in the market [Lemanowicz 2015, p. 61]. The theory of endogenous economic growth is its expression, which emphasizes the significance of technological changes and knowledge as sources of competitive advantage of

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companies, regions and national economies [Romer; Lucas]. One of the theory's elements is knowledge-based economy, in which knowledge and learning are key production factors [Lundvall]. A knowledge society, as a new social model, is determined in this approach by innovative activity, the sector of highly-technological companies, scientific progress and creative human capital [Kleiber, p. 8].

In developed economies, the driving force of development involves innovation based on three pillars: research and development (R+D), knowledge and education. Many OECD reports and publications emphasize that in the situation of a world crisis, innovation is a key economic and social factor of development of states [Przyborowska, p. 90].

European Union's Innovation Policy

The innovation policy is one of the elements of economic policy. The legal basis of EU's general industrial policy is Article 173 of the Treaty on the Functioning of the European Union (TFEU), according to which "The Union and the Member States shall ensure that the conditions necessary for the competitiveness of the Union's industry exist". The legal basis of the EU policy in terms of research and technological progress is provided in Articles 179-190 TFEU. The innovation policy strives to create an effective system of combining science, business, administration and market, that is such which will ensure quick implementation of innovations that enhance the economy's competitiveness and improved quality of community life. Its aim is to support innovative activity on various levels of economy, thus aiding the process of introduction of new products, services, technological processes or management techniques and of capturing new markets, as well as to help ensure access to sources of innovation [Okoń-Horodyńska, p. 239].

Activities intended to enhance the level of innovation have been carried out since the second half of the 1990s [EC, 1995]. The innovation policy is linked with other fields of EU activity, including most of all those concerning employment, competitiveness, environment, industry and energy. The pursuit of the innovation policy is to transform research results into new better services and products in order to maintain competitiveness of the EU on the world market and to improve the quality of life of European citizens.

The axis for the development of innovation in the EU is the "Innovation Union" - one of seven flagship initiatives provided for under the Europe 2020 strategy [EC, 2010] for creating smart, sustainable and inclusive economy. The aim of the Innovation Union is to create a single European Union innovation market which will attract innovative companies. For this purpose, introduction of various measures in terms of patent protection, standardization, public procurement and smart regulation was proposed. The Innovation Union also assumes striving to stimulate investment in the private sector and i.a. increasing European venture capital investment. The axis for the activities involves:

- transforming Europe into a world-class research centre;
- removing barriers on the path to innovation, such as costly patent procedures, market dispersion, sluggish development of norms and shortage of qualified staff, which at the moment make it impossible to introduce ideas into the market quickly;
- revolutionizing methods of cooperation of the public and private sector, especially by implementing innovation partnerships between EU institutions, national and regional authorities and companies.

These activities will be continued and developed in the further 2030 perspective [EC, 2019].

The EU innovation policy is implemented at the pan-national, national and regional level. The actors that have significant influence over the development of innovation belong to the sector of private companies. Admittedly, companies can indeed obtain funding from market instruments [Zembura], but the short grace period, credit costs and the need to secure the credit impede the use of this possibility by small and medium-sized enterprises. Entrepreneurs' hindered access to external funding is one of the most important problems of development of innovation of economies. The solutions that may facilitate the actors' conduct of R+D works involve public aid, thus support provided by the state or coming from state funds [Jabłońska]. Activities that aim to improve the conditions of financing research and innovation and access to them, in order to facilitate the transposition of innovative ideas onto real products and services, are carried out by means of various aid funds.

The EU law lacks a legal definition of the concept of aid funds. It needs to be noted that the funds constitute financial instruments, brought to life permanently or temporarily, by means of which direct financing and implementation of the aim set out in Article 174 TFEU "to promote the Union's overall harmonious development" by "actions leading to the strengthening of its economic, social and territorial cohesion" takes place in collaboration with the EC and the Member States [Świstak, p. 213].

There are many kinds of innovation. EU funds support four main areas of innovation [Żukowska, Pindelski, p.7]:

1. product innovation - the term accommodates all changes involving improvement of a product already manufactured by the company or at the start of production of another innovative product;
2. process (technological) innovation - involves a change in the methods of service delivery or production applied by a company,
3. organisational innovation - involves implementation of a new organisational method in the firm's business practices,
4. marketing innovation - involves the implementation of a new promotion method involving significant changes in product design, its packaging, advertising or business model.

The three most important groups of recipients of innovation measures include: entrepreneurs (often in collaboration with other actors), research institutions and individual researchers.

Globalization has resulted in the possibility to observe a change in the directions of approaches to innovation policy. It has become a rule to cease direct support to those phases of development of technology which are close to the commercialisation phase. Greater importance is attributed to financing basic research, often in the context of cooperation between entrepreneurs and research and academic institutions [Smith, p. 99-109]

Individual EU countries and regions are strongly differentiated in terms of economic development [Campo, Monteiro, Soares]. The EU policy must be adequate to the specific nature of given regions by selecting its tools, such as EU funds, appropriately. Financing programmes are thus available at various levels of fund size and purpose, allowing access for stakeholders of a different developmental potential. EU's biggest programme for scholarly research and innovation is Horizon 2020 [Regulation (EU) No 1291/2013]. In 2014-2020 the layouts came to EUR 77 billion. The funds are also available at the national level (in Poland, the Smart Growth Operational Programme) and at the regional level (Regional Operational Programmes). The EU has also prepared an offer of earmarked funds, for example the Innovation Fund was established in Article 10a(8) of the Directive 2003/87/EC1 in order to support innovation in low-emission technologies in all Member States.

Funds' Impact on Stimulating Innovation

The development of innovation in companies leads to enhanced profitability of their activity and to profit multiplication. Therefore, is encouragement to take up such activities really necessary? The problem in implementing innovative solutions involves high costs of developing and introducing them. This results from the very specific nature of this sector, which is based on cooperation with research units and specialists and new solutions. First profits from the R+D activity appear on average 2.57 years after the implementation of results, where majority of respondents pointed out that the maximum time they are ready to accept for the return on investment in R+D is 3 years [Tylman, p. 6]. Given the above, large enterprises have the greatest possibilities to tackle the financial requirements of such projects. Creating financial opportunities for small and medium-sized enterprises as well as star-ups is necessary for them to able to undertake such activities.

The analysis of the greatest motivators for entrepreneurs to develop R+D activity shows that they include the possibility of obtaining subsidies or tax reliefs on account of conducting R+D works and greater flexibility and dynamics of operation of academic and research centres. Entrepreneurs, when deciding to implement an R+D project, mostly take into account the likelihood of success and project costs [Tylman 2015, p.7]. The problem of accelerating processes that increase innovation and competitiveness of the economy will not be solved by a market mechanism alone. The EU and its Member States must be active not only by co-financing but also conducting research, especially in the area of basic research which might prove too risky for private actors.

Therefore, the UE policy for stimulating an innovative market by funds is right and corresponds to the real needs of the market. The effects of the EU's current activity, including definitely the impact of aid funds, is reflected in the 2020 European Innovation Scoreboard [Hollanders, Es-Sadki, Merkelbach, Khalilov]. The EU's result in this field has improved every year for five years now. Once again European innovations surpassed the achievements of the United States. However, the EU still stays behind Japan and South Korea in this respect, while China is catching up quickly. Since 2012, the EU's innovation-related performance has risen by 8.9% on average. Since 2011 innovation-related performance has improved in 25 EU Member States. The greatest increase was noted in Lithuania, Malta, Latvia, Portugal and Greece. The most important identifier of investigating the national research and development activity is the so-called GERD indicator which shows national gross expenditure on R+D. The example of Poland clearly demonstrates the trend of the GERD indicator rising in the last decade [Kwiecień p.145]. Development is based both of R+D and SME, that is two areas which most affect the level of competitiveness of the economy and the creation of long-term economic growth. Reports clearly show that the development of innovation centres is also

advancing in countries with weaker economies. EU cohesion policy funds are the main driving force of innovation and sustainable development.

In order to improve the pace of increase of R+D expenditure changes in legislation are necessary, which will make it easier for companies to obtain funds, since the not very attractive tax incentives available in recent years were rarely used (enterprises were uncertain as to what expenses qualify under them), while universities are still learning to cooperate with the enterprises sector [Marciniak].

Summary

The EU's policy on innovation is complex and multifaceted. Implementing and steering it requires clear specification of goals and preparation of a number of instruments that serve its implementation in complex institutional surroundings. Global competition forces a pursuit to increase the EU economy's innovation capacity in order to compete on the market that is increasingly determined by new technologies. Already today, thanks to the EU policy, innovations have an increasing share in the economy. They bring benefits to all citizens, consumers and employees alike. They are key to the creation of better work places, development of an ecological society and improved quality of life as well as to the preservation of the EU's competitiveness on the global market. The innovation policy is a link between a policy on research and technological progress and an industrial policy, and it allows the creation of conditions that encourage the introduction of ideas to the market.

At the moment, Europe, home to as little as 7% of the world population, generates 20% of world investment in scientific research and development, publishes one third of all high class scholarly publications and takes a dominant position in the world in the following industry sectors: pharmaceutics, chemicals, mechanical engineering and fashion [Report no. 40/2018, p. 4]. Such a high level of innovation in the economy was achieved thanks to the EU policy and relevant allocation of EU funds. Thus, EU funds productively affect the increase of innovation of the EU economy. The next, 2021-2027, perspective assumes continuation of the existing innovation policy and increasing resources for innovative activity. Even Horizon Europe (continuator of Horizon 2020), the next EU programme in terms of scientific research and innovation, will be supplied with a EUR 100 billion budget.

Therefore, one needs to remember that the EU must respond flexibly to the changing nature of market trends so that the successfully conducted policy keeps up its high level of efficiency. A correct structure of mechanisms of support that takes into account market needs, should still positively affect the increase of involvement of private operators in financing R+D works and should translate into implementation of the outlined outcomes.

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Impact of Television Health Programmes: Women Resident at The Bells Community, Ota In Focus

Bukola OLOWOLADE, Dr. Olusola OYERO and Tayo ADIGBOLUJA
Covenant University, Ota, Ogun State, Nigeria.
E-mail: bukolaolowolade@gmail.com

Abstract

Health is of utmost importance to the development of individuals, community, state and any nation at large. The study explored the impact of Television Health Programmes on women resident at The Bells Community, Ota, Ogun State, focusing on health programmes on AIT. This is an empirical study and the essence of this study is to be able to generate information or statistics that would be useful for areas or sectors in Nigerian that deals with health. In gathering these information or statistics, questionnaire was used. 60 copies of questionnaires were used to gather information from women who are resident in The Bells Community. The study found that only a few women in that community actually watch television programmes. It concluded the health programmes on AIT should be made more interesting and fascinating for women who would invariably call other women's attention to the programmes.

Keywords: Impact, Television Health programmes, Women.

Introduction

In spite of the leading and expansive role played by the internet in today's world, several reports on mass media still aver that television is the most popular source of health information (Burzyńska, Binkowska-Bury, & Januszewicz, 2015). For every individual, and society at large, health is a major concern (Meti, 2014). In order for an individual, society or nation to achieve its targeted goal, health is a necessity (Meti, 2014). There have been several records of ill health and even deaths of men, women and children over the years in Nigeria. And while some of these are due to lack of facilities in our health care centers, some are actually due to lack of knowledge on how to keep a sustainable health and many other reasons. Therefore, there is the need for people to be enlightened through reachable means.

Regardless of the obvious physical, social and biological differences that exist between men and women, the entirety of women health is different from that of their male counterparts (Basdevant, Craplet, & Guy-Grand, 1993). Recent health care studies about women seek to promote an understanding of both biological and psychosocial factors that affect women health initiatives. This is inclusive of training of health care providers. More importantly, a vital role is played by the media through the social responsibility angle. It can be logically argued that the television is the most all-encompassing mass medium as it possesses the ability to combine sound and pictures. In addition, no skills are required to watch television (Meti, 2014).

However, the main crux of this study is to examine the extent to which the media is influencing women resident at The Bells Community, Ota, Ogun State. As far as the health awareness is concerned, everybody needs proper education and concern for their personal health status. Though educating facilities and various media, which are the tools of awareness, health institutions in the both the Government and public sector have grown considerably, but general public is not much accustomed to utilize them for their cause.

Sango-Ota area of Ogun state is under Ifo local government area of the state and one of the most populous areas in the local government area, with The Bells community being one of the busiest communities present therein, owing to the presence of The Bells University in that locale. The researcher chose to study and analyzed the television viewing habits

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of health programmes on AIT by women in the Bells Community. This study focuses on the impact television health programmes have on women, including pregnant women in The Bells Community, Ota, Ogun State. For this study, the television station being examined is African Independent Television- AIT. AIT was selected for this study based on its popularity and accessibility within the locale which the study focuses on. Once the name of the station is mentioned, lots of persons are familiar with it and would be able to provide their own opinions about the topic. Also, the television station has a fair number of health programmes broadcasted over its network, which was considered adequate for this study.

Research Questions

1. To what extent do The Bells Community women watch health programmes on AIT?
2. Do the health programmes on AIT meet the needs of the women in The Bells Community?

Theoretical Framework

The theoretical framework used for this study is the Social Responsibility Theory. The Social Responsibility Theory originated from the United States of America in 1947 to re-examine the concept of press freedom. It argues that the press has a responsibility to the public. Onyeka Uwakwe (2003) says that the theory must at all times tell the truth and abide by media ethical measures (Uwakwe, 2003).

This theory according to Siebert et al. (1956), Kunczick (1988) and McQuail (1987) postulates six specific functions for the press. These functions are:

1. To serve the political system by making information discussion and consideration of public affairs generally accessible.
2. **To inform the public to enable it to take self-determined action.**
3. To protect the rights of the individual by acting as watchdog over the government
4. To serve the economic system: for instance, by bringing together buyers and sellers through the medium of advertising.
5. To provide “good” entertainment whatever “good” may mean in the culture at any point in time.
6. To preserve financial autonomy in order not to become dependent on special interests and influences.

The relevance of the theory to this study is hinged on the responsibility of the media to provide relevant information to the people, where necessary, which in this case is in the area of health. It is the responsibility of the media to inform the public to enable it take self-determined action. In relevance to this therefore, the media (television) is responsible for educating women on health matters or health related matters so as to enable them make informed decisions about their health.

Literature Review

A very powerful tool which can be employed in raising public awareness on issues that pertain to health and have been drawn up as a feature influencing several health behaviours are the mass media (Primack, 2004). According to Ullah, et. al (2014), television plays a critical role in our daily lives, having both positive and negative impacts. In situations where the radio is of limited impact, television has been found to be effective (Akinfeleye, 2003). In addition, at the foundational stage of television in Nigeria, the main purpose it was set to serve was education (Akinfelelye, 2003). The author however notes that in today’s world, television is being employed as a tool for national development and citizen mobilization in for developmental purposes such as family planning, primary health care, and many more.

In the Kurdish region, television, and particularly, the commercialization and Westernization of television in the Kurdistan Region has produced a new outlook for the Kurdish women which is redefining the way she looks at the world and at herself (Nazakat (2011). Today, these women view foreign mass media content, comparing their lives with what obtains

on the screens as witnessed in the films and soaps of international television productions. But this is not all. According to Bernsten & Hansen (2006), the Mass Media can help enhance capability and provide people with information they need to learn about health and where to seek services. In addition, the mass media can also serve as a vehicle through which one can overcome shame, stigma, discrimination as well as raise awareness and public and financial commitment to the issue.

Television Health Messages

This can take the form of soap operas, jingles, drama series, talk shows, campaigns, and magazine format. An example of where television has been used for health educational purposes is the largest global HIV and AIDS campaign, covering one hundred and sixty six countries- MTV's 'Staying Alive'. Since the year 2004, its campaign has been supported by UNFPA, UNAIDS, the World Bank, Family Health International and the Kaiser Family Foundation focused on girls and women (Bernstein & Hansen, 2006). In December 2009 as well, a leading social media enterprise in Nigeria known as Communicating for Change also launched three short films: ***Too Young, Too Far***, and ***Too Late***. The films were centered around maternal mortality in Nigeria, and were launched at the Silverbird Galleria Cinema in Lagos. The short film took a look at the life threatening situation of being pregnant in Nigeria (CFC, 2009). According to the CFC (2009), the Maternal Health Channel television in Ghana was established in the hopes of raising awareness and boosting maternal health across Ghana. The show comes in three parts; drama, documentary and discussion. Shirley Biagi in his book "Media Impact: an introduction to Mass Media" stated that the mass media actively influence society, they also mirror it. According to Gaziano and Horowitz (2001) this can be achieved through the media function of informing and education. Journalists should not underestimate their role in communicating health information to the public. Written materials such as fact sheets, print advertisements, and posters can be used to disseminate health information.

Methodology

The study was descriptive and women within the ages of 18- 50 in The Bells Community area of Sango Ota, Ogun State formed the population of study. The population of residents of The Bells community (excluding students of The Bells University) is estimated to be about 180 persons, with 32 per cent of the population being women within the ages of 18-50. 60 copies of questionnaire were administered that were distributed in The Bells Community, 56 copies were returned, but only 39 copies were valid. A total number of 39 copies of questionnaire were analyzed and descriptive statistics was used in the analysis. The result of the questionnaire analyzed were presented using tables, percentages and charts.

Presentation of Results

RQ 1: To what extent do The Bells Community women watch health programmes on AIT?

Table 1 below shows that business persons were the most represented with3 9% followed by students with 23%,employee with 17%, others with 13%, while the least were women who are artisans 8%. Occupation of the total respondents from The Bells Community probably affects their pattern of watching health programmes on AIT as 39% of respondents are business women and who run their own business and can decided at their own time to watch television. These sets of people have little time to watch television.

Table 1: Respondents' Occupation

Occupation	Frequency	Percent (%)
Student	9	23.0
Business Person	15	39.0
Artisan	3	8.0

Employee	7	17.0
Others	5	13.0
Total	39	100.0

Table 2 below shows that secondary school degree holders have the highest number of education, followed by OND/NCE holders, University degree holders, those with no education, others and then primary school degree holders. This implies that the highest numbers of those in business are secondary school degree holders.

Table 2: Respondents' Highest Level of Education

Occupation	Frequency	Percent (%)
None	3	8.0
Primary	1	3.0
Secondary	16	41.0
OND/NCE	9	23.0
University	7	17.0
Others	3	8.0
Total	39	100.0

Findings from this research question showed that only few of the respondents actually watch health programmes on AIT. This is in line with Daramola (2005)'s study who notes that television ranks the highest in terms of entertainment media while teaching new value system. Yahaya, Fadairo and Ogundele (2009) in their study on Attitude and the Effects of Health-based Entertainment-Education Strategies on the Knowledge and Behavior of Women in Lagos State reported that information, entertainment and education are very important to women. Therefore, health communicators should always include some elements of information, education and entertainment in their health and other development messages targeted at women in order to get their attention. Their study concluded that women in Lagos experienced a serious improvement in knowledge and a positive change in their health behavior from watching and listening to various health programmes on Entertainment, Education channels.

RQ2: Do the health programmes on AIT meet the needs of the women in The Bells Community?

Fig. 1: Do the women in The Bells Community learn from health programmes on AIT?

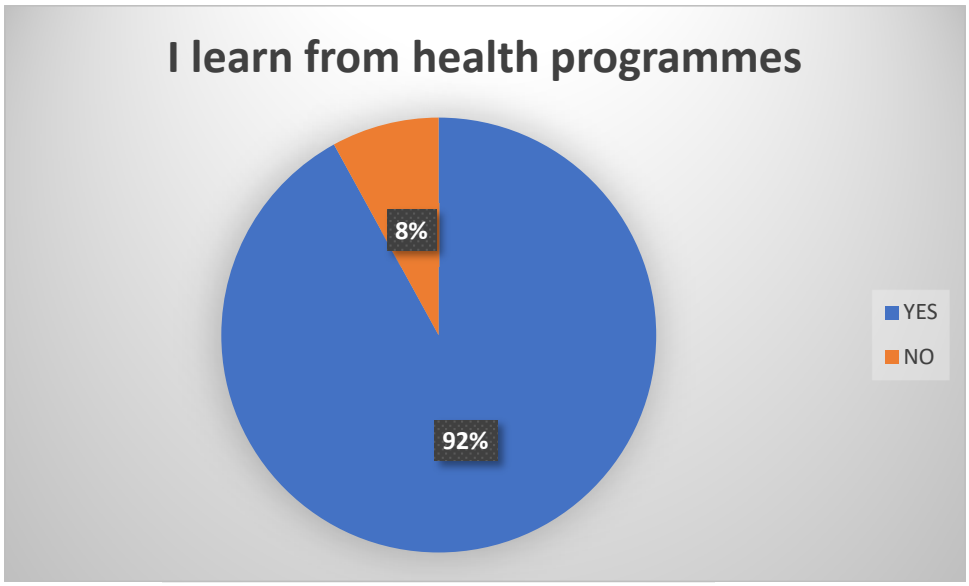

Fig. 2: shows from a general point of view that most of the women learn from health programmes on AIT.

Fig. 2: Extent to which health programmes increase their knowledge bank

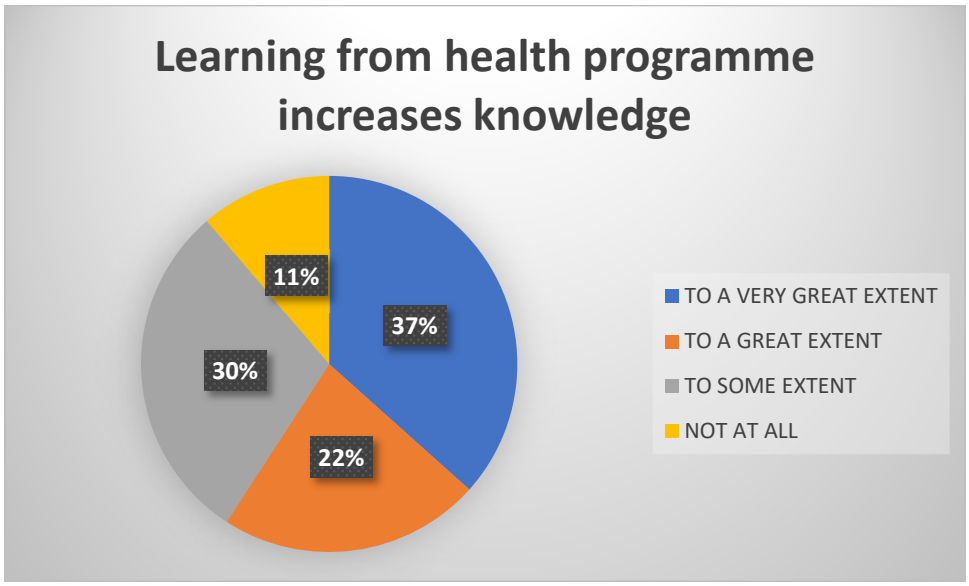

Fig. 2 reveals that 37% of the respondents state that the health programmes on AIT increased their knowledge on health matters to a very great extent, 22% say the health programmes on AIT increased their knowledge on health matters to a great extent, 30% and 11% say that the health programmes on AIT increased their knowledge on health matters to some extent and not at all, respectively.

Fig. 3: Extent to which Health Programmes on AIT meet their health needs

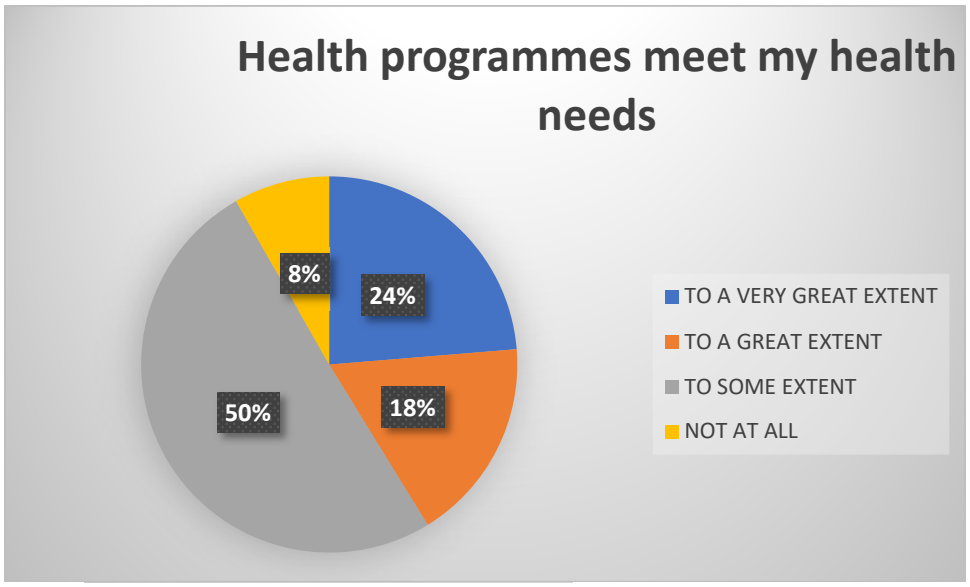

Fig. 3 reveals the extent to which health programmes on AIT meets the health needs of women in The Bells Community. According to the results, 24% of the respondents agree that the health programmes on AIT meet their health needs to a very great extent, 18%, to a great extent, 50%, to some extent and 18% say that the health programmes on AIT have not met their health needs in any way.

Conclusion

This paper examined the Impact of AIT Television programmes on Women's Health in The Bells Community. The study set out to find out the extent to which existing health programmes on AIT had an impact on women's health. Based on the findings, the study concluded that AIT Television health programmes have a moderate impact on women's health in The Bells Community. This is so because the respondents were not fully aware of the health programmes on AIT. However, majority of the respondents says that their health knowledge based on the health programmes on AIT has increased.

Recommendations

This study recommends that:

- Health programmes on AIT should be integrated into other programmes, particularly programmes that have high catchment. This would help increase the level of persons that watch health programmes.
- More health programmes should be produced on AIT. The station can work this out together with the Ministry of health. By doing this there would be more programmes on air, of more quality and more lives would be saved in The Bells Community and in Nigeria as a whole.
- The government should encourage of health programmes on AIT so as to increase the knowledge levels of women in The Bells Community and other viewers of this station. This encouragement can be achieved by either the federal or the state government through sponsorship of such health programmes.

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Application of A Synthetic Measure to Assess the Financial Condition of a Company – The Dynamic Approach

Ewa ZDUNEK-ROSA

Nicolaus Copernicus University in Toruń, Toruń, Poland

E-mail: ezdunek@umk.pl

Abstract

Motivation: The assessment of the company's financial condition is based on financial indicators that describe various aspects of the business entity's operations. Conclusions drawn from the analysis of individual indicators may be contradictory. Therefore, the ratio analysis should be supplemented with additional analytical tools, which will allow for a synthetic assessment of the company's financial condition. **Aim:** The aim of the article is to propose a method for a comprehensive assessment of the company's financial situation. To assess the financial condition, the ratio analysis and one of the methods of multivariate comparative analysis (MCA) were used, *i.e.,* a synthetic measure was constructed. **Results:** The results of the study are presented based on the example of a company representing the chemical industry – the AZOTY SA company. The article uses a dynamic approach, which allowed to observe the shaping of the financial situation of the economic entity over time.

Keywords: Financial Condition, Complex Phenomenon, Diagnostic Variable, Synthetic Measure (Variable), Zeroed Unitarisation Method (ZUM)

Introduction

Complex phenomena are phenomena that are described by at least two characteristics that may have different names and different ranges of variability (Kukuła, 2000, p. 7). These phenomena are the subject of research of multivariate comparative analysis (MCA), also known as statistical comparative analysis (SCA) or multivariate statistical analysis (MSA). Multidimensional methods, allowing the analysis of complex phenomena, are used in many areas, such as, for instance, macro- and microeconomics, marketing, finance and banking, ecology, education, tourism, medicine, demography, and in many others (Kukuła, 2000, pp. 22-32).

In finance and banking, the financial condition of an enterprise serves as an example of a complex phenomenon. The assessment of the financial situation of a given entity consists of the assessment of various areas of the company's activity, such as financial liquidity, operational efficiency, degree of debt, or profitability. The ratio analysis, using financial ratios calculated on the basis of financial statements, allows to evaluate each of these areas separately (Sierpińska, 2004, pp. 144-145). In practice, it often happens that financial indicators characterizing particular aspects of an economic entity's activity provide contradictory information about its financial situation. Therefore, it is advisable to look for methods that allow the assessment of the company's financial condition in a synthetic manner. In the subject literature, many different methods of assessing the company's financial situation have been proposed (Siemińska, 2002). It is also worth mentioning the methods for predicting the risk of bankruptcy of enterprises, which are based on the assessment of the financial condition of an economic entity. The application of these methods in business practice is discussed in many studies (Lee *et al.*, 1996; Hadasik, 1998; Ravi Kumar & Ravi, 2007; Swiderski *et al.*, 2012; Huterska & Zdunek-Rosa, 2016; Łapińska *et al.*, 2018; Zdunek-Rosa & Huterska, 2018, Hosaka, 2019).

The aim of the article is to present a synthetic measure to be applied in the assessment of the company's financial condition over time (*i.e.,* in dynamic terms).

The article presents a dynamic approach to the problem of assessing the financial condition of an enterprise using a multivariate comparative analysis. The dynamic approach allows to assess the direction of changes of the examined

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complex phenomenon, and thus allows to notice whether the financial condition of an economic entity improves or worsens during the period covered by the study.

Research Material and Methodology

The article uses financial ratios describing the financial situation of the AZOTY SA company in the period from Q2 2008 to Q1 2020 (48 quarterly data in total). The data are derived from the www.biznesradar.pl website.

In this study, in order to assess the financial condition of the company, an index analysis was used and one of the methods of multivariate comparative analysis (MCA) and thus a synthetic measure was constructed.

The methods of multivariate comparative analysis (MCA) are also used to analyse the dynamics of complex phenomena. The concept of a complex phenomenon is closely related to the concept of a diagnostic variable and a synthetic (aggregate) variable. Diagnostic variables are variables describing the complex phenomenon examined, while a synthetic variable is 'a variable that, based on a set of standardized diagnostic variables, determines in a quantitative manner the level (the degree of development) of the considered phenomenon in the examined objects' (Kukuła, 2000, p. 21). A synthetic measure is a unitless quantity.

The selection of diagnostic variables is based on content-related and formal criteria (Ostasiewicz, 1999, p. 116; Kukuła, 2000, p. 47; Panek & Zwierzchowski, 2013, p. 18). The basic substantive criterion is the importance of a given variable in the description of the examined complex phenomenon (*e.g.*, according to experts' opinion). The formal criteria include the degree of variability and correlation of diagnostic characteristics. Variables that qualify for the set of diagnostic variables, in addition to having a significant impact on the examined complex phenomenon, should also be characterized by a high degree of differentiation and should be weakly correlated with each other (then they do not duplicate the information conveyed by other variables).

In the next step, the diagnostic variables are identified, *i.e.,* the nature of the impact of individual variables on the complex phenomenon is determined. In practice, this means dividing the set of diagnostic variables into the following three subsets: variables-stimulants (S), variables-destimulants (D), and variables-nominants (N).

Next, the diagnostic variables are normalized. Normalization aims to bring the values of individual variables to comparability (by getting rid of the units of measure and unifying the ranges of values assumed by the diagnostic characteristics) (Walesiak, 2016, p. 17).

In the article, in order to normalize the values of individual financial ratios, the zero unitarisation method (ZUM) was used. The advantage of this method is that it meets all of the postulates for the methods of normalizing diagnostic variables (Kukuła, 2000, p. 81) - it also allows the transformation of variables taking not only positive values, but also zero or negative values. In studies of the financial situation of enterprises, profitability indicators based on various levels of financial result (*e.g.*, operating profit, gross profit, net profit, *etc.*) may assume values from the set of real numbers ($x_{ij} \in R$). Variables normalized with the use of ZUM have a fixed range of values (contained within the range [0; 1]). The zeroed unitarisation method also allows the conversion of destimulants and nominants into stimulants. It is extremely important due to the fact that among the variables describing the financial condition of companies are financial indicators that are stimulants (*e.g.*, profitability ratios), destimulants (*e.g.*, debt ratios), and also nominators (*e.g.*, liquidity ratios).

The zeroed unitarisation method is based on the following stimulant evaluation formula:

$$z_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}, \text{ for } \max_i x_{ij} \neq \min_i x_{ij}, \quad X_j \in S, \qquad [1]$$

In the case of a destimulant, the normalizing formula is given by the formula below:

$$z_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}, \quad X_j \in D, \qquad [2]$$

The formula to transform the nominant into a stimulant is as follows:

$$z_{ij} = \begin{cases} \frac{x_{ij} - \min_i x_{ij}}{c_{0j} - \min_i x_{ij}} & for\ x_{ij} \le c_{0j} \\ \frac{x_{ij} - \max_i x_{ij}}{c_{0j} - \max_i x_{ij}} & for\ x_{ij} > c_{0j} \end{cases}, \quad X_j \in N, \qquad [3]$$

where:

c_{0j} – the nominal value of the variable X_j.

In the case of nominants with a range of nominal values $[c_{1j}; c_{2j}]$, the normalizing formula is:

$$z_{ij} = \begin{cases} \frac{x_{ij} - \min_i x_{ij}}{c_{1j} - \min_i x_{ij}} & for\ x_{ij} < c_{1j} \\ 1 & for\ c_{1j} \le x_{ij} \le c_{2j}, \quad X_j \in N. \\ \frac{x_{ij} - \max_i x_{ij}}{c_{2j} - \max_i x_{ij}} & for\ x_{ij} > c_{2j} \end{cases} \qquad [4]$$

As already mentioned, when using ZUM, the normalised variable Z_j always takes a value contained in the range [0; 1], while the original variable X_j can take any value.

Subsequently, a synthetic measure was constructed describing the financial condition of the enterprise in particular quarters of the period analysed. The article uses the following formula that aggregates normalized diagnostic variables:

$$Q_i = \frac{1}{k} \sum_{j=1}^{k} z_{ij} \qquad (i = 1,2, \dots, n), \qquad [5]$$

where:

k – the number of diagnostic variables (here: financial ratios),

n – the number of objects (here: time units, *i.e.,* quarters).

The above formula is classified as additive and patternless aggregate functions (Ostasiewicz, 1999, p. 119; Kukuła, 2000, p. 72). Formula [5] does not take into account weights, *i.e.*, it assumes that all diagnostic characteristics describing the examined complex phenomenon are of equal importance. When ZUM is used to normalize diagnostic variables, the above aggregation function allows to obtain a value of a synthetic variable contained in the range [0; 1]. The enterprise's financial condition is better, when the synthetic measure takes a value closer to one.

Findings

For the purposes of the study of the economic situation of the AZOTY SA company, 15 financial ratios were considered, characterizing four basic areas of the company's operations, *i.e.*, liquidity, debt, profitability, and operational efficiency. Four liquidity ratios were selected for the study (2nd degree coverage ratio, current liquidity, quick liquidity, and cash liquidity), four debt ratios (general debt, equity debt, long-term debt, and durability of the financing structure), four profitability ratios (return on equity - ROE, return on assets - ROA, operating profit margin, and net profit margin) and three performance ratios (receivables cycle, liabilities cycle, and inventory cycle). The financial ratios indicated above were selected on the basis of substantive criteria and they constitute a set of potential diagnostic variables.

In the next step, the fulfilment of formal (statistical) criteria was checked, *i.e.,* the potential diagnostic variables were analysed in terms of the degree of differentiation and correlation between individual variables. To assess the degree of differentiation of the variables, the coefficient of variation (V_j) and the coefficient of the relative amplitude of fluctuations (W_j) were calculated (Kukuła, 2000, p. 49). The article assumes a limit value of the coefficient of variation at the level of 10% and a limit value of the coefficient of relative amplitude of fluctuations at the level of 1.3. If the following conditions are simultaneously met:

$$0 \le V_j \le 10\% \ \ (j = 1,2, \dots, p) \qquad [6]$$

and

$$1 \leq W_j \leq 1{,}3 \quad (j = 1,2,\dots,p), \qquad [7]$$

where:

p – the number of potential diagnostic variables (here: financial ratios),

the variable X_j is eliminated from the set of diagnostic variables. In this article, all of the proposed diagnostic variables turned out to be sufficiently differentiated.

Subsequently, Pearson's linear correlation coefficients between individual pairs of potential diagnostic variables were calculated. Based on the indications of the correlation matrix, seven financial ratios were eliminated.

Finally, eight diagnostic variables were used to build the synthetic measure: ROA, long-term debt, durability of the financing structure, 2nd degree coverage ratio, cash liquidity, receivables cycle, liabilities cycle, and inventory cycle. Table 1 presents a list of the diagnostic variables accepted for the study, along with the determination of their nature (*i.e.*, the impact on the company's financial situation).

Table 1: List of the diagnostic variables after taking into account substantive and formal criteria

Ratio category	Ratio	Nature of the diagnostic variable
Profitability	ROA	stimulant
Indebtedness	Long-term debt	destimulant
	Durability of the financing structure	stimulant
Liquidity	2nd degree coverage ratio	stimulant
	Cash liquidity	nominant (0.2*)
Operational efficiency	Receivables cycle	destimulant
	Liabilities cycle	stimulant
	Inventory cycle	destimulant

** denotes the nominal value of the diagnostic variable, i.e., the value of the variable for which the level of the complex phenomenon is the highest.*

Source: own study.

After determining the nature of individual diagnostic variables (see Table 1), their values were normalized using the zeroed unitarisation method (ZUM).

The last stage of the construction of the synthetic measure included the selection of an appropriate formula for aggregating the normalized variables and the calculation of the value of the synthetic variable for individual quarters of the period analysed.

Figure 1 presents the dynamics of the financial condition - described by a synthetic measure - of the AZOTY SA company in the subsequent quarters of the period analysed. The values of the synthetic variable are normalized in the interval [0; 1]. The closer the value of this measure is to one, the higher the level of the complex phenomenon is (here it means that the financial condition of the company is better).

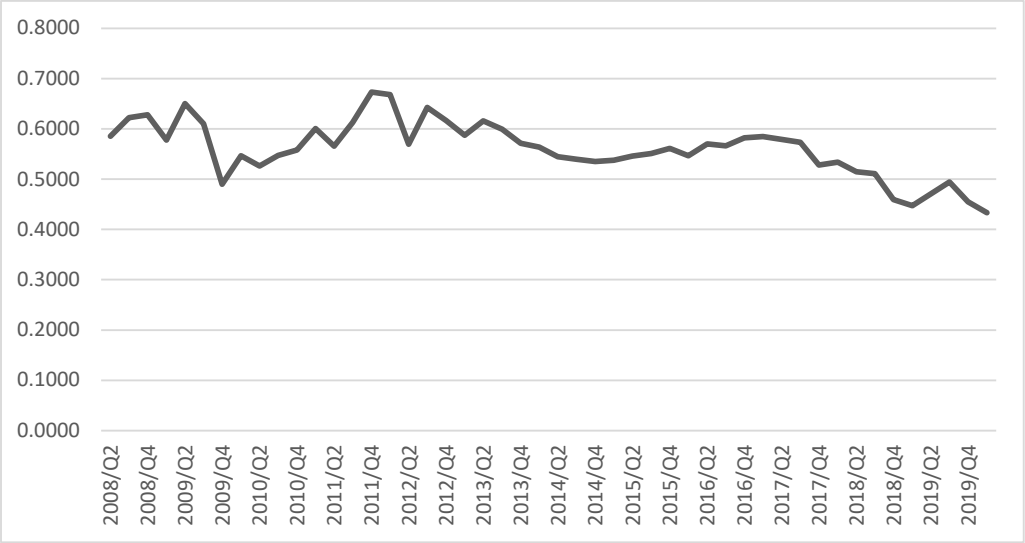

Fig. 1: Values of the synthetic measure for the AZOTY SA company in the period from the 2nd quarter of 2008 to the 1st quarter of 2020

Source: own study.

In the period analysed, the synthetic variable took values contained in the range [0.4332; 0.6731]. The AZOTY SA company had the worst financial situation in the last period, *i.e.,* in the 1st quarter of 2020, and the best - in the 4th quarter of 2011. The average quarterly value of the synthetic measure in the examined period was 0.5603. The analysis of the formation of the synthetic variable shows that the company's condition in the period covered by the study was subject to relatively small fluctuations (the variation coefficient amounted to 9.76%).

Summary

In this study, the financial condition of the company is presented using the ratio analysis and the synthetic variable, which is a tool for multivariate comparative analysis (MCA).

The conducted analysis showed great usefulness of the presented methods for the assessment of the financial condition of the enterprise. It is worth emphasizing that the use of a synthetic measure allows the assessment of the financial condition of an economic entity over time (the dynamic approach). The next step may be to develop a model of the internal structure of the analysed process and to determine the financial condition forecast for subsequent units of time. Based on this method, it is also possible to compare the financial condition of companies representing, for instance, a specific industry.

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Universal and Regional Standards for International Legal Protection of Refugees- De Lege Lata And De Lege Ferenda Evaluation

Agata SZWED

University of Szczecin, Szczecin, Poland
agata.szwed@usz.edu.pl

Abstract

The aim of the article is to analyse and evaluate international legal protection of refugees at the universal and regional level, and on this basis to provide *de lege lata* comments and *de lege ferenda* postulates within the discussed scope. The hypothesis framed at the beginning of the article is a conclusion that the current standards for international legal protection of refugees do not ensure sufficiently effective protection to them. The key concept resulting from the subject of the paper is defined, followed by basic legal acts that create the standards for refugee protection, and then their evaluation is made. The analysis allows for the formulation and justification of conclusions regarding possible future changes in the applicable legislation. Two basic methods of legal science are employed in the article: dogmatic research method and legal comparison method. It can be concluded on the grounds of the conducted research that neither universal nor regional standards of refugee protection are sufficiently effective instruments for respecting the fundamental rights and freedoms of this group of people. The main drawbacks are that the Convention Relating to the Status of Refugees has not been adapted to the current global migration situation. The limitations of acts at regional levels and their often non-binding nature make it difficult to introduce uniform international procedures. The changes suggested in the article help to strengthen the level of protection of refugees and make an attempt to alleviate any negative effects in terms of the phenomenon of displaced persons.

Keywords: Refugees, International Refugee Law, International Law.

Introduction

The current largest proportion of forcibly displaced persons since World War II, comprising 79.5 million people, including 26 million refugees (UNHCR, 2020a), dictated the need to adapt the acts hitherto in force which compose international refugee law to the changing geopolitical situation. This migration crisis takes place not only in Europe, but also all over the world, since over two thirds of refugees come from merely 5 countries: Syria, Venezuela, Afghanistan, South Sudan and Myanmar (thus it comprises: the American, Asian and African continents). The aim of the article is to analyse and evaluate international legal protection of refugees at the universal and regional level, and on this basis to provide *de lege lata* comments and *de lege ferenda* postulates within the discussed scope. The hypothesis framed at the beginning of the article is a conclusion that the current standards for international legal protection of refugees do not ensure sufficiently effective protection to them, consisting in efficacious guarantee of fundamental human rights and freedoms. The term "standards for refugee protection" is understood in this article as the model of conduct adopted by a given entity (states-parties to relevant international agreements included in international refugee law, UNHCR or UNRWA office, as well as states-parties to multi- and bilateral international agreements concerning refugees) for the legal protection of refugees, and in particular to ensure fundamental human rights and freedoms for them. Depending on whether the activity within the discussed scope takes place at the universal or regional level (usually defined territorially in relation to continents) - it is possible to speak of universal or regional standards for international legal protection of refugees.

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The conducted research will allow for the formulation and justification of conclusions regarding possible future changes in the current international legislation. The method of dogmatic research (examination of applicable law; the area of dogmatic-legal analysis will be limited to international legal acts related to the subject of the article) and the method of comparative law studies (examination of the similarities and differences in the mutual influence of legal acts constituting particular branches of international law) were adopted as the research methods.

Universal standards for refugee protection

Although the phenomenon of refugeeism has been known to mankind since the dawn of history, the legal and international protection of refugees has been functioning in the international community since the interwar period. Since then, it has undergone considerable evolution, consisting primarily in the development of actions undertaken by state authorities. They are grounded on international legal acts strengthening the establishment and enforcement of fundamental human rights and freedoms in relation to refugees. The universal standard for refugee protection is based on particular acts of international law operating at the universal level and included in international refugee law - i.e. Convention Relating to the Status of Refugees of 1951 (Geneva Convention) and the Protocol relating to the Status of Refugees of 1967 (New York Protocol) which modifies its provisions, as well as the Statute of the Office of the United Nations High Commissioner for Refugees (Statute UNHCR). The universal standard for refugee protection is also complemented by the activity of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), which, despite offering assistance to people from a specific region, has its source in the General Assembly of the United Nations (UNGA). The evaluation of the functioning of the universal standard for refugee protection comprises the studies listed below.

Geneva Convention and New York Protocol

The entirety of the universal standard for refugee protection was created around the analysis and interpretation of the definition of the term refugee from the Geneva Convention. The need for international protection emerges when an individual is outside his country of nationality and is unable to return there owing to threats. The threats that cause the need for international protection under the Geneva Convention include persecution on account of race, religion, nationality, membership of a particular social group or political opinion, although this catalogue does not exhaust all situations that force people to leave their current place of residence. International protection replaces domestic protection as the refugee's country of origin is unable or unwilling to provide it to that person. It should be taken into account that historically, at the time the Geneva Convention was signed, the objectives of protection were to prevent forced repatriation - resulting from border changes as a result of world wars - and to facilitate repatriation when it was possible and desirable (cf. p. 2d of the UNHCR Statute of the Office). These voluntary repatriations did not turn out to be a sufficient means to fully resolve the refugee issue, and what is more - those who remained abroad did not integrate quickly and effectively through naturalisation with the host society (Skran, Daughtry 2007, p. 27). In view of the above and taking into account the fact that forced repatriations, similar to those in Europe after World War I and II, do not rather occur anymore, it has become necessary to develop and provide refugees with temporary legal protection. At present, the standards for protection concentrate on its objective, which is to ensure or restore refugees' dignity, their sense of security and fundamental human rights. The scope of protection granted to refugees under the Geneva Convention and the New York Protocol is very broad and varied. It includes the guarantee of the rights of the first, second and third generation of human rights, in a form significantly expanded in comparison with the Universal Declaration of Human Rights of 1948 adopted 3 years earlier. Making access to particular rights equal (in the same way as citizens or other foreigners), including the freedom of religious practice, the right to free access to courts, the right to care and social services, rights in the field of labour legislation and social security - betokens a high level of universal standard for protection. It is exactly this equalization of refugee rights with the catalogue of rights held by citizens or other foreigners that over the years has turned out to be one of the most problematic consequences of adopting the convention and granting refugee status. The states have elaborated a broader catalogue of forms of granting international protection, going far beyond the classification used right after World War II: refugee/asylum seeker/repatriate/foreigner. The concept of axiological legal differentiation of citizens and foreigners and the resulting differences significantly affect the method of selecting the form of protection granted to foreigners, and thus the

standard for protection of these people. The protection granted to refugees under the Geneva Convention and the New York Protocol seems to be one of the most far-reaching and imposing a wide range of positive obligations on states to provide refugees with a universal standard for protection.

A significant drawback of the provisions of the Geneva Convention is that it regulates the subject of its protection very restrictively. The threats that cause the need for international protection under this convention include persecution on account of race, religion, nationality, membership of a particular social group or political opinion, although this catalogue does not exhaust all situations that force people to leave their current place of residence (which may also include threats to life, security or freedom owing to generalized violence, external aggression, occupation, foreign domination, internal conflicts, massive violations of human rights, serious ecological disasters or other circumstances which seriously disturb public order). Therefore, the development of the refugee law at regional levels should be positively evaluated, as they have significantly broadened the definition of the term refugee and, consequently, have extended protection to a greater number of people.

The lack of a special international court to handle individual complaints related to violations of the provisions of the Geneva Convention only should be interpreted as a significant gap which needs to be bridged. The activity of such a court would contribute to the harmonisation of the interpretation and application of the Geneva Convention, as well as to the increase of efficiency and implementation of its provisions. It would also eliminate the dichotomy of the established line of judicial decisions in refugee cases noticeable at the level of regional courts. However, the establishment of a body that examines the provisions of the Geneva Convention in an impartial and independent manner would require general consent of states, but reaching a consensus on the issue of refugeeism, which triggers so many political, social and economic controversies and with a great number of international jurisdictional bodies that already operate, seems to be unlikely in the current geopolitical situation.

UNHCR

The UNHCR has been entrusted with the responsibility for the application of the provisions of both the Geneva Convention and the New York Protocol (Article 35 of the Geneva Convention and Article 2 of the New York Protocol). UNHCR was established in order to provide international protection to refugees under the auspices of the United Nations, to seek permanent solutions for their problems and to assist governments and non-governmental organizations in carrying out the voluntary repatriation and assimilation of refugees (p. 1 of the UNHCR Statute). The essence of UNHCR has been given by virtue of the provisions of the UN, so the character of its work and the protection offered should be completely non-political and humanitarian (p. 2 of the UNHCR Statute). During almost 70 years of its activity, UNHCR has granted protection to hundreds of millions of people. Over the years, it has developed its activities, most importantly - towards covering more people than just those eligible for protection under the Geneva Convention. The Office has significantly extended the circle of persons to whom it has started to provide protection - it is now doing so not only to victims of persecution, but also to people who are unable to return to the territory of their own country owing to the threats to their life, physical integrity or freedom (see UNHCR 2016). The transference of competences that coordinate the application of the two most important legal acts constituting the foundations of international refugee law to an external, independent body should be assessed positively. It was the role of UNHCR in the form of an initiator and coordinator of the international community's activity in order to deal with the problem of refugees that had a significant impact on the functioning of the entire legal scholarship of international refugee law, on the creation of provisions on the protection of refugees in internal legislations, on the practice of applying the definition of a refugee and the catalogue of his rights under the Geneva Convention by public administration bodies, and consequently on national judicial decisions concerning refugee cases (Gilbert, 2016, pp. 623-636). The informative and popularizing function of the office made it possible to create the main world discussion forum on mass resettlement of people, and thus it became a key tool for establishing intergovernmental cooperation and cooperation between non-governmental organizations. UNHCR thereby developed aid to refugees far beyond the sole monitoring of compliance with the Geneva Convention.

UNRWA

In the case of the second UN organization, UNRWA, the nature of its protection should be depoliticized and humanitarian, aimed at helping refugees as victims of the Israeli-Palestinian conflict. UNRWA is the only agency set up by the UNGA with a separate refugee protection mandate from that of UNHCR, and which focuses on providing protection to persons affected by a specific armed conflict in a territorially defined location. Today around 5.5 million Palestinians are protected by UNRWA, which operates in Syria, Lebanon, Jordan, the Gaza Strip and the West Bank (UNRWA, 2020, pp. 11-21).

Primarily, the agency's protection was granted to persons residing in Palestine from June 1, 1946 to May 15, 1948, who suffered in the 1948 war. Currently, it is provided not only to persons who have been granted refugee status through an individualized procedure, but also to the heirs of such persons, in a hereditary way. Furthermore, protection by UNRWA may also be obtained by persons who were willing to suffer a considerable loss for reasons related to the 1948 conflict in Palestine and by their family members (Sekulow, 2018). UNRWA does not consent both to the definition of the term refugee and the method of protection regulated by the Geneva Convention. UNRWA offers protection to strictly defined persons who come from a strictly defined territory, which can be perceived significant narrowing in the level of provided services in comparison with UNHCR. The high cost of financing UNRWA operations (around 1 billion dollars annually) and, in a sense, the escalation of the Israeli-Palestinian conflict meet with strong criticism. UNRWA was by definition supposed to be an agency established temporarily, but its mandate has been prolonged every few years since the mid-twentieth century on the grounds of the UNGA resolution. Despite criticism, for nearly 70 years it has been continuously providing basic services to Palestinian refugees and working to stabilise the situation of people covered by the mandate in the region.

Regional standards for refugee protection

Regional standards for the protection of refugees will be decoded from specific international texts with a regional scope - focusing primarily on the analysis and evaluation of the impact of the activities of international organizations in this area. The legal bases for regional cooperation concerning refugee protection emerged chronologically after the Geneva Convention. The Convention is therefore a starting point for these bases, which has been systematically developed at regional levels.

European Level

The European standard for the protection of refugees is concentrated on the activities of the European Union (EU). Granting the appropriate status to every third-country national standing in need of international protection in one of the Member States is moulded by the EU's asylum policy. The asylum policy of the EU is conducted within the area of freedom, security and justice, and thus lies within the shared competence between the EU and the Member States (Article 4 of the Treaty on the Functioning of the European Union (TFEU)). The legal bases for the functioning of asylum policy within the EU are founded in primary legislation in Article 67(2), Article 78 and Article 80 TFEU and Article 18 of the Charter of Fundamental Rights. The objective of this policy was to grant the appropriate status to every third-country national standing in need of international protection and to ensure compliance with the principle of non-refoulement. EU secondary legislation includes a number of directives and regulations, in particular: Directive 2011/95/EU of the European Parliament and of the Council of 13 December 2011 on standards for the qualification of third-country nationals or stateless persons as beneficiaries of international protection, for a uniform status for refugees or for persons eligible for subsidiary protection, and for the content of the protection granted (qualification directive), Regulation (EU) No 604/2013 of the European Parliament and of the Council of 26 June 2013 establishing the criteria and mechanisms for determining the Member State responsible for examining an application for international protection lodged in one of the Member States by a third-country national or a stateless person (Dublin III regulation), Directive 2013/32/EU of the European Parliament and of the Council of 26 June 2013 on common procedures for granting and withdrawing international protection. The aforementioned legal acts have set the standard of protection for refugees in the EU Member States and constitute the basis of procedures related to the admission of persons applying for EU aid. It

was reinforced by virtue of the qualification directive that the recognition of refugee status is a declaratory act, and at the same time the provisions of the Geneva Convention were confirmed (and developed). The scope of international protection guaranteed by the directive includes: protection from refoulement, access to information on rights and obligations in a language understood by a refugee, maintaining family unity, residence permit, providing travel documents, access to employment and education, access to procedures for recognition of qualifications, social welfare and healthcare, access to accommodation, freedom of movement, access to integration facilities and assistance in voluntary repatriation. The Dublin III Regulation laid down mechanisms and criteria for determining the Member State responsible for examining an application for international protection - the first Member State in which the application for international protection was lodged shall be responsible for examining it. It is evident that lodging an application for international protection only in the first safe country safeguards that those persons` stay will not be classified as illegal. The rest of legal acts contributed to determining common procedures for granting international protection and the regulation of the conditions of the stay of applicants for international protection in a given Member State pending the examination of the application. The Court of Justice of the European Union exercises judicial control over compliance with the provisions resulting from the acts forming the common asylum policy.

African Level

Africa is a continent that is a source of escape rather than a destination for persons who were forced to leave their current place of residence. Large population movements in Africa, resulting from numerous wars in colonial and post-colonial times, caused intense activity of states and institutionalisation in the area of asylum policy. At the African level, the protection of refugees is first and foremost carried into effect by the African Union through the implementation of the provisions of the 1969 Convention governing the specific aspects of refugee problems in Africa. This convention significantly broadened the definition of the term refugee resulting from the Geneva Convention, and thereby contributed to the protection of a greater number of people - i.e. not only victims of persecution, but also victims of external aggression, occupation, domination or events seriously disturbing public order in either part or the whole of the country of origin. The catalogue of rights granted to refugees is generally narrower than that granted by the Geneva Convention or the qualification directive. The protection of refugees in Africa has been strengthened by the adoption of regional international documents in the area of human rights: the African Charter on Human and Peoples' Rights of 1981, the African Charter on the Rights and Welfare of the Child of 1990 (Article 23 – Refugee Children) and the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (Article 4(2)(k)). Adjudication on human rights on the African continent has been entrusted to the African Court on Human and Peoples' Rights, as well as to a quasi-judicial authority such as the African Commission on Human and Peoples' Rights. International judicial protection of refugees is carried into effect in a derivative manner - as in Europe - by breaching provisions established by an agreement generally included into human rights, and not by an agreement strictly regulating refugee legislation.

American Level

At the American level, not even one binding international agreement concentrating on the issue of refugeeism has been signed. Such a standard has been developed by the activity of the Organization of American States. It is grounded on the adoption of a series of non-binding resolutions, exhorting only to the signing of the Geneva Convention and the New York Protocol (without indicating the catalogue of refugee rights or obligations, or the procedures for their admission). When trying to indicate the standard of refugee protection in North and South America, one may only underline the safeguards created by the American Convention on Human Rights of 1969 - as a convention included in the branch of international human rights law - and the application of judicial control of its provisions in the form of the Inter-American Court of Human Rights. Undoubtedly, a certain standard of treatment of refugees on both American continents is set by the Cartagena Declaration on Refugees of 1984, the provisions of which were incorporated by several of its states-parties (UNHCR, 2014, p. 2). It is worth emphasizing that this declaration prompts observance of the right to asylum and the principle of non-refoulment.

Asian Level

Two factors render the protection of refugees at the Asian level difficult: Asia is the only continent in which there is no single international organisation associating all countries, and more than half of them is not a party to the Geneva Convention or the New York Protocol. The elaboration and implementation of refugee treatment standards are therefore based first and foremost on national regulations or on the regulations of bi- and multilateral international agreements. The particularism of the sources of refugee protection in Asia precludes indication of uniform regional legislation in this scope. In the case of the Asian continent, the lack of an organization which would associate all states also hinders the adoption of any regional human rights convention, the observance of which could be controlled by an international judicial authority (as is the case in Europe or even in Africa). This situation in principle also impedes precise indication of the rights and freedoms that refugees could demand. The protection of refugees therefore remains first and foremost at the level of national legislation. Diverse regulations in this area complicate cooperation of states with specialised UN agencies.

Arab level

Unfortunately, the Arab Convention on Regulating Status of Refugees in the Arab Countries of 1994 adopted by this organisation has never entered into force. Therefore, the 2004 Arab Charter of Human Rights remains the only international document in this respect. There is no international court in the Arab region that ensures proper observance of the LAS' activity or even one convention on human rights. Due to the lack of judicial control in this scope, the protection of human rights - including refugees - remains only illusory. In practice, the UNRWA mandate has become the only real form of protection in the Arab region.

Summing up the regional standards for the protection of refugees, one might say that they are based first and foremost on the adoption and promotion of the provisions of the Geneva Convention and the New York Protocol, as well as conventions and declarations in the area of generally understood international human rights law. The determinant of the standard of protection on particular continents involves the needs caused by historical mass movements of the population, and therefore the development of a standard of protection adequate to a given existing situation. As a result, there are differences between the standard of treatment of refugees in Europe (mainly grounded on binding documents, strictly related to the provisions of the Geneva Convention and the New York Protocol), in Africa (binding and non-binding documents), America and Asia (non-binding documents, high particularism of protection agreements concerning refugees) and Arab states (a binding convention, but deprived of judicial control, and thus de facto no real legal protection of refugees). The influx of refugees on particular continents is not spread evenly. According to UNHCR statistics, among the 24 million refugees, 27.3% are in Europe, 26.4% in Africa, 17.8% in North and South America, 17.4% in Asia and 11% in the Arab region (UNHCR, 2020b, p. 19). More than half of the registered refugees are therefore located in Europe and Africa, which is why the most advanced binding state cooperation in the form of refugee protection occurs in these areas. Thus, the differences in the standard of refugee protection depend on the legal character of the acts adopted in this regard, and consequently on the manner of their enforcement and establishing judicial control over them in the form of not only national but also international tribunals. States have obligations towards refugees resulting not only from documents classified as international refugee law, but also from international human rights law, international humanitarian law and the so-called general international law in the form of, above all, respecting the principle of non-refoulment, treated in the legal writings as customary law.

Conclusion

The conducted research allowed confirmation of the initial hypothesis framed at the beginning. The hitherto existing legal regulations on the international legal protection of refugees do not constitute an exhaustive and sufficient catalogue of instruments for the protection of this group of persons, as evidenced by, for example, the statistics and the scale of the problem of refugeeism in the world. States and international organisations are encouraged to cooperate closer in order to take into account all the needs of refugees, to guarantee them their status on humanitarian grounds (regardless of the reason for changing the country of their previous stay) and to effectively hold accountable the states

that contribute to the development of the refugeeism issue. The universal standard of refugee protection - founded on the Geneva Convention and the New York Protocol and the activities of UNHCR and UNRWA - undoubtedly affected the functioning of both regional and national legal bases of the protection in question. The development of regional cooperation between states and adoption of binding refugee documents, (where they are still in short supply, especially in the American, Asian and Arab regions) is turning out to be the most urgent need to secure the refugee situation. Currently, the protection of refugees focuses on safeguarding and efficient observance of human rights, but it works best when it is in line with the values approved by international law - such as peace, state security and international security, and promotion of sustainable development. If the preservation of these values took precedence over the particularistic aspirations of state authorities, it would prevent the generation of a wave of millions of refugees around the world.

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Female Directors on Board and Corporate Social Performance of Listed Deposit Money Banks in Nigeria

Olusola Esther IGBEKOYI

Adekunle Ajasin University, Akungba Akoko, Ondo State, Nigeria
olusola.igbekoyi@aaua.edu.ng

Ayodele Samson ADESINA

Ahmadu Bello University, Zaria, Kaduna State, Nigeria., Ayodeleadesina7@gmail.com

Adesanmi Timothy ADEGBAYIBI

Adekunle Ajasin University, Akungba Akoko, Ondo State, Nigeria, adesanmi.adegbayibi@aaua.edu.ng

Abstract

This paper examined the influence of female directors on boards on corporate social performance of listed deposit money banks (DMBs) in Nigeria. This was done to assess the attributes of the female directors (composition, expertise, independence) to determine whether they significantly contribute to decisions that relates to corporate social responsibility expenditure. The study comprises of 14 banks listed on the Nigerian Stock Exchange as at 31st December 2018. A sample size of 10 banks was selected using the Purposive Sampling Technique. Data were obtained from published annual reports of selected banks for 2010 to 2018. Descriptive statistics and Feasible Generalized Least Square regression (FGLS) were used to analyse data collected. The findings revealed that female board composition, female board expertise and female board independence had a statistically significant positive effect on corporate social responsibility expenditure. The study concludes that the presence of women is significant in a board. However, the financial as well as social and environmental expertise of the women coupled with a working environment that will promote independence of the women is also paramount. It is therefore recommended that banks should not limit its focus to female representation on the boards alone, but should ensure that the quality of women selected is considered to promote better social performance.

Keywords: Female board composition, female board expertise, female board independence, corporate social performance.

Introduction

Corporate social performance became pronounced in the academic and professional domain after the agitation for global best business practices in line with the sustainability campaign and green initiatives. The agitations were driven towards compelling companies to have a human face in their daily activities by engaging in business activities that will preserve the social state of the human and the naturalness of the environment. These arguments were centered on the sustainability theory, green accounting among others. The corporate social performance aspect of this theory centered mostly on corporate social responsibility (CSR) as well as other non- financial parameters for evaluation of company performance. The adoption of the philosophy of corporate social performance depends largely on the ideologies of the top management of each company, particularly the board. This is because all activities of a company in terms of management, policies, strategies and vision, centers around the decision taken at the board. If there is a deficiency in the board, it will flow down to the day to day activities of the company which will have a negative ripple effect on the economy. It is based on these premise that various studies were conducted to determine how various board dynamics influence corporate social responsibility of firms.

The findings of previous studies revealed that dynamics such as board attributes, ownership structure, board citizenship, among others are some of the factors that influence social performance of firms. From the analysis of the previous studies conducted on board attributes, most studies found a statistically significant relationship between

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female gender and social performance of the firms (Dienes and Velte, 2016; Betz, O'connell, & Shepard, 2013; Ciocirlan & Pettersson, 2012). From the various assertions, it will be logical to opine that the presence of women on corporate board increases social welfare activity, and thereby improve on the quality of their CSR performance.

In as much as this holds true, the circumstance surrounding the women on the board will determine the extent that they will contribute to the quality of the company. Firstly, the composition of the female on the board; the activities of a board in decisions and reaching consensus dwell on numbers. The consensus is reached based on the number of votes. If the men on the board outnumbers the women there is no likelihood that they will work to benefit the company because they have been limited by the deficiency of their numbers (Konrad, Kramer & Erkut, 2008). This therefore imply that it is not enough to have women on the boards, the number of women on such board is noteworthy. The editorial board of Business day (2020) stated that according to the report of Mckinsey global institute, it was observed that the progress towards gender equality have stalled and Africa women lag behind their sisters in most other regions.

Secondly, the expertise of the female in the board is not limited to educational background, but also the CSR related managerial experience that will add value to the CSR drive of the management (Yusoff,2010). Most studies focused on the accounting and financial knowledge of the female directors as embedded in their educational background; the recent evolution in the economic environment, is an indication that much more is expected to maximize the worth of a director. Thirdly, the independence of the female on board; submissions of various studies showed that board independence significantly influences board effectiveness and control of agency cost (Patelli & Prencipe, 2007; Michelon & Parbonetti, 2012). The female gender is caught in the web of independence deficiencies because of their insecurity perspectives and high subjection to the male gender across all spheres of life. Most women in Nigeria due to financial incapabilities and political power, found seats on companies' boards with the help of their male counterparts and as such their decision are usually subjective.

Although most studies have upheld the significance of women on CSR, but based on the forgoing, it is evident that it is not enough to have women on the boards as proposed by previous studies, but there is need to x-ray the attributes of the women on the board of directors to determine whether they significantly contribute to decision making, especially as it relates to social performance. This study focusses specifically on the boards of the listed Nigerian deposit money banks because it is one of the sectors that has significant contribution to the capitalization of the Nigerian stock market.

The broad objective of this study is to examine female directors on board and corporate social performance. The study focused on three key component of female board members traits; these includes, female directors board composition, female directors' expertise, and female directors' independence.

The paper is structured into five separate headings and other subheads; these covers the introductory aspect of the study, review of literatures and hypotheses development to clarify concepts, show interactions between variables in line with previous studies. The third heading is the explanation of data and methods used in the study. The analysis and discussion of findings is explained in the fourth heading and finally, the conclusion and recommendations are outlined in the fifth heading.

Literature Review and Hypotheses Development

The definition of CSP centered mostly around the definitions in line with Wood's CSP model. Wood (1991) define CSP as "a business organization's configuration of principles of social responsibility, processes of social responsibility and policies, programs and observable outcomes as it relates to the firms' societal relationships". Jiang and Yang (2015) also stated that CSP can be evaluated by assessing the social responsiveness processes of the firm to determine how it influences their policies and action plans regarding its actualization. From the definitions it is obvious that CSP has to do with the firms developing a process that will promote their interactions with stakeholders to ensure an outcome that will be sustainable. This therefore imply that CSP cannot be discussed in isolation of corporate social responsibility (CSR) in interacting with stakeholders, the firms must ensure an outcome that will positively impact the social and environmental aspects, which depends largely on CSR activities of the firm (Odetayo, Adeyemi & Sajuyigbe, 2014). This study measured CSP as the total CSR expenditure of a company on its host communities and other philanthropic spending in a given year.

CSR activities of an organization stems from the policies and ideologies of the firm which can be driven by the philosophy of the owners of the company which is actualized by the organs of the company which comprises of the board of directors and management. This development made the activities of the board a relevant aspect in the discus of CSP and CSR. The strategic role of the board involves approving, monitoring, and reviewing strategies at one end, to a leadership role of establishing the goals, values and setting direction at the other end (Ingley & Vander Walt,

2001). This therefore imply that the value attributed to a company in terms of its business practices, depends largely on the caliber of individuals that are seated on their boards (Daily, Dalton & Cannella, 2003). This study also shares the views of previous authors in this direction, by x-raying the individual traits of the female on the boards to reveal the value they add to the company CSR practises from three focal perspectives, which are; composition, expertise and independence.

Theoretical Underpinning

This study is based on the assumptions of the agency, stakeholders and gender socialization theories. It is necessary to hinge this study on a combination of theories because of the peculiarity of the study; and the fact that the component of the study is independently and jointly related. The agency theory, as developed by Jensen (1976) assume that the relationship in a company is likened to principal and agent, where the principal is the owner (provider of capital) while the directors are likened to agents that perform duties according to the mandate of the owners. Here, the directors are expected by statue to perform their duties solely in the interest of the owners. The theory however stated that because of conflict of interest, agency problem arises when the agent pursues his personal interest at the detriment of the interest of the principal which usually leads to the owners incurring agency cost (Sundaram & Inkpen, 2004). This theory applies to this study because the board of directors are the agents that perform a strategic role that involves approving, monitoring, and reviewing strategies at one end, to a leadership role of establishing the goals, values and setting direction at the other end (Ingley, Van der Walt, 2001). This therefore imply that the value attributed to a company in terms of its business practices, and the extent of agency cost they will incur, depends largely on the caliber of individuals that are seated on their boards (Daily, Dalton & Cannella, 2003).

The stakeholder theory developed by Freeman (1984) is a theoretical perspective that argue that companies should look beyond the relationships that exists between owners and managers and consider other individuals or groups that may be affected by the activities of the firm which translates them into stakeholders (Freeman & McVea, 2001). The stakeholder theory birthed the corporate social responsibility practices of firms globally and it has become a yardstick for performance evaluation of companies despite the fact that it is regarded as a philanthropic and voluntary action. The significance of this concept in the evaluation and valuation of firms have made it become part of companies' strategic plan; which is part of the mandate of the board of directors. This study therefore predicts that the extent of corporate social performance of a firm is largely determined by the attributes of its board members. The issue of attributes made the injection of the gender socialization theory necessary. Silic-Micanovic (1997) define gender socialization as the process where human in the course of their social interactions are moulded and shaped in culturally appropriate image of femaleness and maleness. The ideologies of gender socialization emanated from the family system where a child is introduced to the world and the expectation of their gender demands (McHale, Updegraft, Helms-Erikson & Crouter, 2001). The study therefore speculates that the peculiarities of the moulding of the female gender can have a significant influence on their relationship with the principal as agents, as well as their relationship with other individuals as stakeholders.

Female board composition and Corporate social performance

Bhagat and Black (2002) describe board composition as a reflection of various levels of heterogeneity. Based on the agency theory and resource dependency theory and the corporate governance literatures, board composition is measured as the ratio of non-executive to executive board members and the number of directors on a firm's board. This study however modified the measurement by narrowing it down to the female on the board based on the objective of this study. Female board composition is therefore measured in the context of this study as the number of women on company boards in proportion to the total number of directors on the board.

Most studies conducted in developed and developing countries including Nigeria (Pucheta-Martinez, Bel-Oms & Olcina-Sempre, 2018; Cook & Glass, 2017; Deschenes, Roubacar, Prud'hommie and Ouedraogo, 2015; Garba & Abubakar, 2014); confirmed that the number of women on board significantly affect their social responsibility practices. Other studies conducted on non-financial evaluation also revealed that women as part of board of directors has significant impact on corporate philanthropy of firms (Valls, Martinez, Rambaud & Parra-Oller. 2019; Fodio & Oba, 2012). Studies conducted by Stephenson (2004) and Fernandez-feijoo *et.al* (2012) also assert that boards with more women has significant effect on CSR disclosure. Stephenson (2004) however made a clause to his findings that it was boards that had up to three women on its board that had significant effect.

There was divergent submission in the study conducted by Colakoglu, Eryilmaz and Martinez-Ferrero (2020) after enquiring into the antecedents of board diversity on corporate social responsibility using the biggest Turkish companies as focus. It was found that the ratio of female and foreign board members does not have any significant

effect on CSR performance. This finding shows a drift from the normal trend regarding female directors on board. Similarly, in a study conducted on U.S firms, Manita, Bruna, Dang & Houati (2018) they also affirmed that there is no significant relationship between gender diversity and environmental, social and governance. Kyaw, Olugbode and Petracci (2017) in a study conducted on CSR across industries and countries, found that although there is a positive effect between gender diversity and CSR across industries, but the effect is more pronounced for firms in emerging markets. The inconclusiveness of findings and scepticism that still exists on yielding to policy of increasing the number of female directors on board in developing countries, including Nigeria has further increased the uncertainties. Based on these, it is therefore hypothesized that:

H_{o1}: *Female board composition does not significantly affect corporate social performance of listed DMBs in Nigeria*

Female Director Expertise and Corporate social performance

Stakeholders are more interested in a board that comprise of members that have skills, attributes and dynamics to respond to changes in business models (Barka & Dardour, 2015). Although education has ability to drive the value system and perspectives of an individual, the degree of exposure and experiences is also required to address peculiar situations such as social and environmental concerns. Although the previous studies have measured expertise of directors on the accounting and financial knowledge of the directors (Yusoff, 2010; Dienes & Velte, 2016); this study however make a leap to incorporate the social and environmental works experience of the female on the boards. The measurement is done using dummy variable of 1 and 0. If the company board have up to 3 female directors that meet the criteria of accounting or finance experience with 8years environmental and social works experience, it is allotted 1, if not, 0.

Board expertise has been upheld in previous studies as one of the characteristics of board members that affect performance. Yusoff (2010) found in a study conducted on Malaysian board that knowledge and educational qualifications are vital components that determine the effectiveness of the boards. Harjoto, Laksmana and Yang (2019); Dienes and Velte (2016); and Yusoff and Amrstrong (2012) also supported the position in various studies conducted as stated that financial expertise is the most required skill required of board members to influence CSR performance. Jizi, Salama, Dixon and Stratling (2014) however revealed that board members financial knowhow was indifferent to CSR reporting. The submissions on the significance of educational and financial expertise on CSP from previous studies seem inconclusive. Also, the submission of Jizi *et.al* (2014) is an indication that the knowledge of the female director regarding social and environmental issues should also be considered alongside the educational and financial expertise. This assertion is based on the premise that financial expertise only is inadequate to influence CSR reporting. The hypothesis is stated thus:

H_{o2}: *Female Director Expertise does not affect corporate social performance of listed DMBs in Nigeria*

Female Director Independence and Corporate social performance

The ideology of board independence in the code of corporate governance is a call for majority of the board members to be independent from the company. It is however submitted that mere compliance with the code is not enough if the board members fail to maximize their independence effectively (Sharifah, Syahrina & Julizaerma, 2016). The female gender has lots of peculiarity when it relates to socialization and interaction with people. This peculiarity is well explained in the gender socialization theory, which is the process where individuals are taught how to socially behave in accordance with their assigned gender which is assigned at birth based on their biological sex. This psychological underpinning calls for need to examine the female directors on boards to ensure that their independence can have significant influence on company social performance. Board independence is mostly measured in terms of the proportion of non-executive directors to total directors on the board (Das, Dixon and Michael, 2015). So, in a bid to assess the level of independence of the female on board, this study measured female director independence as the percentage of female non-executive directors in the total non-executive directors sitting on a company board. Where the percentage is above 25% FDE = 1, otherwise, FDE = 0

According to previous studies, a positive relationship exists between board independence and corporate social performance (García-Sánchez & Martinez-Ferrero, 2018; Mallin, Michelon & Raggi, 2013; Jo & Harjoto, 2012). There was a clause in the study conducted by Ortas, Alvarez & Zubeltzu (2017) on the effect of firm board independence on corporate performance using the meta- analytic approach. The study revealed that there is a positive association between board independence and CSP but it is stronger in civil law countries; and the strength of the influence varies significantly in different market condition. Leung, Richardson & Jaggi (2014) studied board independence and firm performance with relation to family ownership concentration in Hong Kong. It was found that board independence does not have association with firm performance in family firms, but have positive relationship

with non-family firms. Fitriya, Fauzi & Locke (2012) showed that there was a negative and significant association between non-executive directors and firm performance. Michelon and Parbonetti (2012) also found that there is no relationship between independent directors and CSR disclosure among US and European firms. The study conducted by Ponnu & Karthigeyan (2010) in Malaysian listed firms, however found that there was no association between the variables. The inconsistencies in the submission regarding board independence is an indication that there are underlining factors that determine the independence of directors. The hypothesis is therefore stated as

H_{o3}: there is no significant association between female board independence and corporate social performance of listed DMBs in Nigeria

Data and Methods

Ex-post facto research design was applied to examine how female directors on board influence the corporate social performance of listed deposit money banks in Nigeria. The study selected a sample size of 10 out of the population of 14 listed deposit money banks as at 31st December 2018 using the Purposive Sampling Technique to purposively select banks that have not merged or discontinued operation during the period of the study. Data were obtained from published annual reports of selected DMBs for 2010 to 2018. The base year of 2010 was selected because of the visibility of the drive for gender equality, as well as social responsibility of Nigerian firms at that time (UNPD, 2010; Ifemeje & Ikpeze, 2012; Daubry, 2020). This is also the rising moments for banks in Nigeria after the global recession period. Data were analysed using descriptive statistics and panel regression analysis. The descriptive statistics shows the mean, standard deviation, minimum and maximum values including observations; tests were also conducted to determine the viability and reliability of data gathered before regression was done. The Hausman test helped to decide on the model that fits for interpretation between the fixed and random effects models.

The model of this study was specified to show the nexus between variables in line with similar studies that were carried out in the study area. This study focussed on the diversity of the female on the board only; The study modified models stated in studies conducted by Colakoglu, Eryilmaz & Martínez-Ferrero, 2020; Gennari, 2016; Fodio & Oba, 2012) to incorporating only the dynamics of female directors on board in line with agency, stakeholders and gender socialization theories. The model is stated thus;

Functional model:

CSP =*f*(FBC, FDE, FDI)
Operational Model
$CSRExp_{it} = \beta_0 + \beta_1 FBC_{it} + \beta_2 FDE_{it} + \beta_3 FDI_{it} + U_{it}$ ……*equation 1*
Where:
CSP = Corporate social performance
CSRExp = Corporate social responsibility expenditure
β_0 = Intercept
β_1- β_3 = Coefficient of the independent variables
FBC = Female board composition
FDE = Female director expertise
FDI =Female director independence
μ = Error term of firm
$_{it}$ = 'i' in period 't'
The *a priori* expectation based on literatures reviewed and theories are as follows, $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0$.

Data Analysis and Discussion of findings

Descriptive Statistics

The descriptive statistics result in table 1 shows that on average, listed banks spend a total of ₦398m on CSR expenditure; with a maximum of ₦307m and a minimum of ₦774,000. The outcome of the descriptive statistics indicates that on average firms in the deposit money banks have a 17.2% of female representation on the board with a minimum of no female representation on the board and a maximum of 38% female representation on the board of directors. These statistics indicate that the female gender is still marginalized on the boards. The maximum of 38% is an indication that the female on the board cannot have a strong voting power when issues are discussed on the boards. On the average, the proportion of the female directors on board is significantly below 20%. This presentation therefore

imply that a woman cannot perform on the board in terms of voting right without the contribution of their male counterparts.

Furthermore, the descriptive statistics result shows that female directors with accounting expertise and social and environmental works experience are represented on some boards which is measured by 1 while some board have no female with such expertise on the board which is represented by 0. The mix in the observation is an indication that not all board of deposit money banks in Nigeria have female with accounting and financial knowledge coupled with social and environmental works experience. Also, the result show that some board have female independent directors who comprise of 25% of the entire board which is represented by 1 and that some board have do not female independent directors who comprise of 25% of the entire board which is represented by 0.

Table 1: Summary of Descriptive Statistics

Variables	Observations	Mean	Std.Dev.	Minimum	Maximum
CSRExp	90	3.98e+08	4.90e+07	774000	3.07e+09
FBC	90	.1723333	.057	0	.38
FDE	90	.7222222	.4504125	0	1
FDI	90	.5854444	.3991709	0	1

Source: Authors' Computation using STATA13, (2020).

Correlation

The correlation matrix shows the relationship between variables. The result also shows the relationship that exists between the independent variables and further shows symptoms of multi-collinearity if any. The result obtained shows that there exists a relationship between the dependent variable and the independent variables which signifies that the independent variables can affect the dependent variables. The independent variables are also associated with female board composition and female director expertise having a strong relationship (0.7325) which might imply issue of multi-collinearity. The symptom of multicollinearity may be because the FDE and FDI are indicator variables that represent categorical variables that have two categories. However, issue of multi-collinearity will be determined using Variance Inflation Factor (VIF). The VIF result show a mean of 1.96 and all of the individual variables have values less than the threshold of 10. This imply that it is safe to retain the variables as they cannot affect the outcome of the regression result.

Table 2: Correlation Matrix

	LogCSR	FBC	FDE	FDI
CSREXP	1.0000			
FBC	-0.1555	1.0000		
FDE	-0.2576	0.7325	1.0000	
FDI	-0.2816	0.4692	0.4772	1.00000

Source: Authors Computation using STATA, (2020).

Results and Discussions

The Feasible Generalized Least Square regression (FGLS) was used for interpretation of tested hypotheses after conducting all relevant tests as shown in table 3. After conducting the Hausman test to determine the best model to interpret between the fixed effect and random effect model, the test result showed that the random effect is the most appropriate. However, the Breauch Pagan Langangier Multiplier (LM) Test conducted to determine the most appropriate between the random effect model and the pooled OLS, showed a significant LM test result (0.000) which signifies that the random effect model should be interpreted. However, the significant result of the Breauch Pagan Langangier Multiplier (LM) Test is an indication of the presence of heteroskedasticity which made the result invalid and as such a need to correct for heteroskedasticity. This heteroskedasticity can be corrected by running and interpreting the Generalized Least Square or the Feasible Generalized Least Square result. The Feasible Generalized Least Square result was however selected in this study because the Cross-Sectionals in the data outweighs the time series.

The model of the study is statistically significant at 5% which is indicated by a Prob >; F value of 0.016 and a Wald Chi^2 of 15.27. This clearly indicate that female directors on board jointly has a significant effect on CSR expenditure. It was revealed from the result obtained that having more female representatives on the board of directors have a positive effect on CSR expenditure and this is statistically significant at 5%. The finding of this study corroborates previous studies conducted in various countries including Nigeria (Garba & Abubakar, 2014; Deschenes, Roubacar, Prud'hommie & Ouedraogo, 2015; Gennari, 2016; Cook & Glass, 2017; Pucheta-Martinez, Bel-Oms, & Olcina-Sempre, 2018) where they all submitted that the presence of women on board has a significant effect on corporate social performance. The outcome of this study therefore implies that the presence of female on board of directors of listed deposit money banks in Nigeria can influence their corporate social performance especially their corporate social responsibility expenditures.

The analysis of the individual component of the traits of the female on board and corporate social performance using the coefficient, Z-score and P-value as a basis of judgment; it was revealed that female board composition (FBC) had co-eff of 1.25; Z-score 2.20; P=0.028<0.05. This result indicates that FBC has a positively significant effect on corporate social responsibility expenditure of listed banks. The study posit that it is not enough for women to be on board, but the number of women on the board should also be considered. This is corroborated in the findings of (Kyaw, Olugbode & Petracci, 2017; Roubacar, Prud'hommie & Ouedraogo, 2015; Gupta, Lam, Sami & Zhou, 2014; Stephenson, 2004) as stated that the positive effect between gender diversity and CSR evident in other countries and is more pronounced in firms in emerging markets. Although the descriptive statistics revealed that the percentage of women on the boards of listed banks in Nigeria on the average is about 17.2%, the regression result still indicate that they are significant. The literary explanation to that is that the women have high potential of influencing the male gender on the boards to follow their bidding on issues that relates to CSP. This result therefore indicate that the null hypothesis earlier stated that female board composition does not significantly affect corporate social performance of listed DMBs in Nigeria will be rejected

The result also shows that female director expertise (FDE) has co-eff of 5.19; Z-score 2.57; P=0.01 has a positive significant on CSR expenditure. This result point to the fact that the financial as well as social and environmental works experience significantly affect CSP. This implies that an increase in the number of female directors with more years of experience on social and environmental works in addition to the accounting and finance knowledge tend to push CSR spending high. The argument for the wings of expertise to be widened beyond accounting and finance knowledge has been further buttressed by the finding of this study in Nigerian listed DMBs. Although most studies conducted on female board expertise were limited to the accounting knowledge; and their findings showed a positive relationship (Yusoff & Amrstrong, 2012; Dienes & Velte, 2016; Harjoto, Laksmana & Yang 2019). This study however attempts to include the social and environmental works experience. The finding conforms with Jizi *et.al* (2014) as stated that the knowledge of the female director regarding social and environmental issues should also be considered alongside the educational and financial expertise. This therefore imply that the null hypothesis stated that female director expertise does not affect corporate social performance of listed DMBs in Nigeria will be rejected.

Furthermore, the result obtained regarding female director independence showed that female directors independence (FDI) (co-eff 4.35; z- score 2.49; P=0.013<0.05) have a positive significant effect on CSR expenditure. This finding further supports the previous studies as stated that the effectiveness of the board is largely dependent on their level of independence (Ortas, Alvarez & Zubeltzu, 2017; Mallin, Michelon & Raggi, 2013). It can therefore be inferred that in the case of female on board of directors, the assumption of the gender socialization theory that individuals are taught how to socially behave in accordance with their assigned gender which is assigned at birth based on their biological sex does not hold in the boards.

Although the findings of Fitriya, Fauzi and Locke (2012); Michelon and Parbonetti (2012); Ponnu and Karthigeyan (2010) contradicts the finding of this study as stated that a negative or indifferent relationship existed between female gender independence and corporate social performance This assertion does not however hold in the case of the listed DMBs in Nigeria as it is evident that the independent female directors are seen to be independent of the executive directors and act in the interest of the organization at all time while keeping stakeholders satisfied. As such, the null hypothesis which states that there is no significant association between female board independence and corporate social performance of listed DMBs in Nigeria is rejected.

Table 3: Result showing effect of Female Directors on CSP of listed DMBs in Nigeria

DV=CSREXP Multivariate Analysis – Feasible Generalized Least Square regression (FGLS)					
Variables	Coefficient	z-score	P>|z|	Model summary	
\C	5.53e+08	3.89	0.000		
FBC	1.25e+08	2.20	0.028**	Number of observations	90
FDE	5.19e+08	2.57	0.010*	R-Square	0.6013
FDI	4.35e+08	2.49	0.013**	Prob> F	0.016
				Wald chi^2	15.27
				Mean VIF	1.96
				Hausman test	0.8918
				Woodbridge test	0.0840
				LMtest[b]Prob> F	0.000
				Swilktest[c]Prob>z	0.000
				Hettest	0.000

*Note: * and ** represents 1% and 5% levels of significance respectively*
Source: Authors' Computation (2020)

Policy Implication of the findings

The findings of this study have further confirmed the significance of the female gender in the board of deposit money banks in Nigeria; as it reflected in most developed and developing countries. In the past, the female gender has suffered neglect and discrimination majorly because of the weakness attributed to the gender which has relegated them to the rare positions in administration. There have been various agitations for a gender inclusion method of governance in the private and public sector. These agitations have birthed various submissions and arguments. One of the schools of thought is the SDG-5 goals developed by the United Nations; which one of their goal is to urgently eliminate the factors that promotes discrimination of women and maximize their rights in the private and public sector (UN Women, 2020). This drive includes the change of laws and legislations that discriminate against women. Despite the position of the law, the female gender has continued to make significant positive impact in company administration. This therefore imply that the call for female inclusion is not sentimental but a wake-up gaol for owners of companies to maximize the exposed significance of the female gender.

Corporate social responsibility has become an issue of global discuss; any company that wants to be recognized and valued high must embrace the ideologies of CSR and integrate it into their strategic plan. This is because CSR activities of firms have become one of the performance evaluation criteria and yardstick for acceptability in the global market. The female gender exhibit all the traits needed to achieve impactful CSR because of the empathetic nature of the female gender; considering the philanthropic nature of CSR, the female gender is the most suitable class that can help companies achieve desired goals in this regard. It is therefore logical for companies to leverage on the laws that promotes gender equality to include more female in their companies' board of directors.

Conclusion and Recommendations

The study attempts to provide an in-depth understanding on the effect of female directors on board on corporate social performance of DMBs in Nigeria. Although previous studies have upheld the significance of female gender to firm performance and social performances when studying board diversity; there is need to x-ray the quality of the females to determine if they possess attributes that can influence the strength of corporate social performance in the boards that they occupy. The corporate social performance of DMBs is measured based on the corporate social responsibility expenditure (CSRexp). The study found that female directors on board jointly has significant effect on CSRexp.

Individually, the results revealed that female board composition, female director expertise and female director independence have positive and statistically significant effect on CSRexp. Based on these findings the study therefore concludes that the presence of female on board has significant influence on the CSR activities of a firm; however the number alone might not achieve desired result without considering the financial, social and environmental knowledge of the female director; as well as ensuring that they operate in an environment that is devoid of bias and undue pressure that can threaten independence.

The study there recommends that;

i. The proportion number of females on boards of Nigerian DMBs should be increased in line with the proposition of codes of corporate governance of some other countries. This is because if there are more women on the boards it will lead to better performance and improved connection with stakeholders

ii. Expertise of the female directors should not be limited to their accounting and financial knowledge as posited in previous studies, but the level of experience and skills acquired on social and environmental issues should also be considered alongside. This will help companies to able to harness the full potential of the women and enhance productivity.

iii. Deposit Money Banks in Nigeria still need to continue to ensure that policies are put in place to protect the female directors from social, cultural or political factors that can adversely influence the independence of the women on the board.

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The Assessment of Factors and Forecast of Labor Productivity in The Manufacturing Industry of The Tambov Oblast

Elena Yurina
Doctor of Economics, Professor Vice-rector for scientific work Tambov State University named after G. Derzhavin, Tambov, Russia
E-mail: science@tsutmb.ru

Alexander Kostylev
PhD in Economics, Associate Professor, Department of Personnel Management, Tambov State University named after G. Derzhavin, Tambov, Russia
E-mail: drr-drr@mail.ru

Yana Kulikova
Candidate of Pedagogical Sciences, Associate Professor Department of Personnel Management, Tambov State University named after G. Derzhavin, Tambov, Russia
E-mail: kulikowa-ya2014@yandex.ru

Tatiana Cheremisina
PhD in Economics, Associate Professor, Department of Accounting and Tax Control Tambov State University named after G. Derzhavin, Tambov, Russia
E-mail: t_cheremisina@mail.ru

Abstract

The article discusses labor productivity indicators in the manufacturing industry of the Tambov Oblast. The study identifies the factors that affect labor productivity and conducts a correlation analysis. As a result of the analysis, the determining factor is defined – demographic. The forecast of labor productivity in the Tambov Oblast for the period up to 2024 is made using the method of time-series extrapolation.

Keywords: Correlation Analysis, Labor Productivity, Regional Management.

Introduction

Research on the issue of increasing labor productivity has become particularly relevant since the beginning of the implementation of national projects in the Russian Federation aimed at technological and economic growth of the country's economy. Let's consider the main indicators that characterize labor productivity in the regional context. The main statistical indicator that characterizes labor productivity is the labor productivity index for the region's economy. In general, it is calculated as the quotient of the division of the indices of the physical volume of Gross Regional Product (GRP) and changes in total labor costs. The GRP physical volume index is calculated based on the absolute values of this indicator in constant prices.

Indices of changes in total labor costs are determined on the basis of labor costs for all types of work, including additional work and production of goods for own consumption. The methodology for calculating this indicator was approved by Rosstat Order No. 274 of April 28, 2018.

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Table 1: Labor productivity index in the Central Federal District regions

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Russian Federation	104,8	95,9	103,2	103,8	103,8	102,1	100,8	98,7	100,1	102,1	102,8
Central Federal District											
Belgorod Oblast	111,3	102,1	110,0	110,4	105,4	102,9	102,8	103,2	102,3	103,0	102,8
Bryansk Oblast	105,9	95,3	105,3	110,3	109,1	103,0	106,4	104,3	101,4	105,7	104,7
Vladimir Oblast	101,0	95,6	106,4	102,8	102,6	101,7	101,3	98,7	102,6	101,5	101,0
Voronezh Oblast	107,6	98,2	101,7	111,4	109,1	102,4	106,3	101,0	101,4	102,4	102,6
Ivanovo Oblast	99,7	97,7	100,6	98,5	94,4	106,5	91,8	102,6	98,4	97,3	102,1
Kaluga Oblast	116,7	95,2	111,4	113,1	109,8	98,1	105,1	96,0	101,7	107,4	102,8
Kostroma Oblast	104,0	94,3	105,0	104,9	105,6	104,0	102,5	100,2	98,3	103,6	101,4
Kursk Oblast	103,0	98,5	102,0	107,6	104,4	106,0	105,0	103,2	103,3	102,6	104,2
Lipetsk Oblast	103,1	95,0	104,0	103,8	100,6	103,6	105,4	101,3	101,5	101,4	101,9
Moscow Oblast	106,0	96,7	107,2	107,0	105,1	101,9	99,5	103,1	101,5	100,5	103,6
Oryol Oblast	106,1	90,8	104,9	112,3	103,8	102,0	102,1	104,0	99,7	101,3	102,5
Ryazan Oblast	104,0	97,1	103,9	108,3	104,9	102,6	100,3	98,9	98,8	99,3	102,8
Smolensk Oblast	107,8	96,5	106,3	104,7	104,5	105,0	102,0	100,1	100,4	104,3	106,2
Tambov Oblast	105,5	101,0	96,7	111,9	108,6	110,3	106,9	107,0	96,8	102,4	104,1
Tver Oblast	107,4	93,3	104,7	105,9	101,1	101,5	99,0	99,9	104,0	101,0	104,1
Tula Oblast	106,5	97,4	100,0	105,2	102,9	105,4	107,5	106,6	105,0	103,4	104,0
Yaroslavl Oblast	101,2	94,0	104,5	107,8	104,7	103,8	102,8	101,3	101,8	102,5	102,9
Moscow	105,3	93,2	101,2	101,7	101,7	100,3	99,6	98,4	100,0	101,6	101,7

As we can see from the data in Table 1, the labor productivity index in the Tambov Oblast shows ambiguous dynamics, one of the possible reasons for this is the agricultural and industrial bias of the region's economy. In agriculture, the volume of production depends not only on the efforts of the enterprises themselves, but also on the influence of natural factors. So you can see that the dry year 2010 led to a decrease in this indicator by more than 6 points, and in 2011 there was a significant increase in it, partly due to the influence of external factors. Among the regions of the Central Federal District, the Tambov Oblast, according to data for 2018, is on the 4th place, which can not be considered a positive phenomenon in the economic system of the region.

A new indicator, taking into account the implementation of the national project “Labor Productivity and Employment Support”, is the indicator of labor productivity in the basic non-resource sectors of the economy, determined as a percentage. The index of labor productivity in the basic non-resource sectors of the economy is calculated as the quotient of the index of physical volume of output of goods and services in year t relative to year t-

1 to index of time worked in year t relative to year t-1. Basic non-resource sectors of the economy are defined as a set of products of similar types of activities that are part of the basic non-resource industries created by production units. The methodology for calculating this indicator was approved by the Decree of the Government of the Russian Federation No. 915 of July 17, 2019. The indicator for 2019 is calculated in relation to 2017.

Table 2: Labor productivity in basic non-resource sectors of the economy (2019, percentage) by regions of the Central Federal District

	The value of the indicator for the year
Central Federal District	113
Moscow Oblast	122,1
Bryansk Oblast	115,4
Kursk Oblast	114
Smolensk Oblast	113
Moscow	111,5
Kaluga Oblast	110,5
Vladimir Oblast	110,4
Oryol Oblast	109,9
Ryazan Oblast	109,9
Tambov Oblast	109
Belgorod Oblast	108,7
Ivanovo Oblast	107,7
Kostroma Oblast	106,9
Tula Oblast	106,8
Yaroslavl Oblast	106,4
Tver Oblast	106,2
Voronezh Oblast	102,2
Lipetsk Oblast	100

It should be noted that this indicator is included in the group of indicators for the performance assessment of senior officials (heads of higher executive bodies of state power) of the constituents of the Russian Federation and executive authorities of subjects of the Russian Federation. The Tambov Oblast is on the 10th place in the Central Federal District with an indicator of 109%, but the indicator is lower to the average value for the Central Federal District.

Materials and Methods

To analyze labor productivity in the Tambov Oblast, it is necessary to evaluate the main indicators that affect labor productivity. Within the framework of this study, the manufacturing industry was chosen as a model. It should be noted that statistical data in the context of basic non-resource industries are not divided by the State Statistics Service and are not placed in its structure. In this regard, the work analyzes labor productivity for the manufacturing industry in general.

The main indicators that affect the labor productivity of the Tambov Oblast in the manufacturing industry are presented in Table 3.

Table 3: The main indicators affecting labor productivity in the manufacturing industry of the Tambov Oblast in 2005-2018

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018
Volume of shipped goods of own production, works and services performed by own forces, million rubles in actual prices	23070,2	50412,8	80490	83331	89453	100852	122324,8	137364,2	134328,6	162991,2
Industrial production indices, percent of the previous year	104,0	104,6	117,3	115,5	108,0	108,9	105,4	103,5	111,2	116,5
Average number of employees, thousand people	63,6	51,2	50,5	51,0	51,9	51,2	49,9	49,5	45,5	49,6
Average monthly nominal gross payroll of employees, rubles	5297,2	12769,4	14318,3	16524,7	18638,3	21195,1	22863,3	24223,5	26797,0	27807,3
Share of domestic research and development expenditures in the gross regional product, %	No data	0,56	0,53	0,47	0,61	0,80	0,69	0,56	0,36	No data
Share of products of high-tech and knowledge-intensive industries in the gross regional product, %	No data	17,3	17,6	17,2	17,5	15,5	17,7	17,2	No data	No data

In general, labor productivity can be represented by the formula (1):

$$\frac{\text{Volume of shipped goods of own production,works and services performed by own forces}}{\text{Average number of employees}} \quad (1)$$

Based on this, we can say that in 2017 in the manufacturing industry it amounted to 2952,3 thousand rubles, and in 2018 – 3286.1 thousand rubles.

Let's determine the extent to which the following factors affect labor productivity:

- average monthly nominal gross payroll;
- the share of domestic research and development expenditures in the gross regional product, %;
- the share of products of high-tech and knowledge-intensive industries in the gross regional product, %. For the correlation analysis of these factors, we will compile a correlation matrix (Table 4).

A correlation matrix is a table where the correlation coefficient between the corresponding parameters is located at the intersection of the corresponding row and column.

For each pair of data, we calculate the correlation coefficient using the formula:

$$r = \frac{n*\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)*(n\sum y^2 - (\sum y)^2)}}, \text{ where}$$

y – values of the effective feature,
x – values of the factorial feature.

Table 4: Correlation analysis of labor productivity in the Tambov Oblast (correlation matrix)

	Labor productivity, thousand rubles	Average monthly nominal gross payroll of employees	Share of domestic research and development expenditures in the gross regional product, %	Share of products of high-tech and knowledge-intensive industries in the gross regional product, %
Labor productivity, thousand rubles	1			
Average monthly nominal gross payroll of employees, rubles	0,973692561	1		
Share of domestic research and development expenditures in the gross regional product, %	-0,174411579	-0,054480242	1	
Share of products of high-tech and knowledge-intensive industries in the gross regional product, %	-0,044809836	-0,232512747	-0,649605544	1

To assess the dependence of labor productivity on the amount of gross payroll, we will create a regression equation.

To calculate the parameters of the regression equation a0 and a1 we use the system of normal equations:

$$\begin{cases} na_0 + a_1 \sum x = \sum y \\ a_0 \sum x + a_1 \sum x^2 = \sum xy \end{cases}$$

Substituting the necessary values from Table 4, we get:

$$\begin{cases} 9a_0 + a_1 * 185136.9 = 19370.6 \\ a_0 * 185136.9 + a_1 * 4038589074 = 430026738.8 \end{cases}$$

Having solved the system of equations, we get the parameters for the regression equation:

a0=-668,05
a1=0,137
Let's make a linear regression equation (Y=a0+a1*X), where
Y – labor productivity,
X – gross payroll
Y= - 668,1+0,14X

Results and Discussion

The parameters of the regression equation show that other factors have a large influence (a 0=-668,1). In addition, if you increase the salary of employees by 1000 rubles, labor productivity will increase by 140 rubles.

Table 5: Calculation of labor productivity in the field of manufacturing.

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018
Volume of shipped goods of own production, works and services performed by own forces, million rubles in actual prices	23070,2	50412,8	80490,0	83331,0	89453,0	100852,0	122324,8	137364,2	134328,6	162991,2
Average number of employees, thousand people	63,6	51,2	50,5	51,0	51,9	51,2	49,9	49,5	45,5	49,6
Labour productivity	362,7	984,6	1593,9	1633,9	1723,6	1969,8	2451,4	2775,0	2952,3	3286,1

The demographic factor is chosen as the most risky factor that can influence the implementation of the national project. The population structure of the Tambov Oblast has a number of problems. Here are some statistics on the structure of employment in the Tambov Oblast according to the State Statistics Service. Data on the size of the labor force and the level of labor force participation are presented in Table 6.

Table 6: Labor force in the Tambov Oblast in 2012-2017

	2012	2013	2014	2015	2016	2017
The number of workers aged 15-72, thousand people	536,2	533,2	526,9	525,9	521,9	515,7
Labor force participation rate of the population aged 15-72, %	64,1	63,7	63,8	64,4	64,7	64,8

As can be seen from the data in Table 6, the labor force size has a clear downward trend, it has decreased by almost 4 % over 5 years. The level of labor force participation of the working-age population changes to a lesser extent. At the same time, the number of people employed in the informal sector aged 15-72 is 131 thousand, or 26,6% of the total employed population. In general, the situation does not clearly deviate from the overall picture for the Central Federal District regions, but the trend towards a reduction in the number of labor forces does not have the best effect on the efforts of regional authorities to equalize the economic situation in the region, including increasing labor productivity.

Let's make a forecast of labor productivity in the manufacturing sector, taking into account the demographic factor. To forecast labor productivity in the Tambov Oblast for the period up to 2024, we use the method of time-series extrapolation. For this purpose, a linear model was created based on a system of normal equations:

$$\begin{cases} na_0 + \sum t = \sum y \\ a_0 * \sum t + a_1 * \sum t^2 = \sum ty \end{cases}, \text{ where}$$

a0 – influence of external factors,
a1 – influence of the time factor,
y – population of the Tambov Oblast, people.
t – the time factor, t∈ [-15; 15].
Substituting data on the population of the Tambov Oblast for the last 30 years in the system, we get:
a0= -11225
a1= 1E+06 = 1000000
We get a linear equation:
y = -11325t + 1E+06R² = 0,9764
where,
y – population of the Tambov Oblast, people.
t – the time factor, t∈ [-15; 15].

The dependence shows that every year the population of the Tambov Oblast decreases by an average of 11325 people. The extrapolation of a number of population dynamics in the Tambov region is clearly shown in Figure 1.

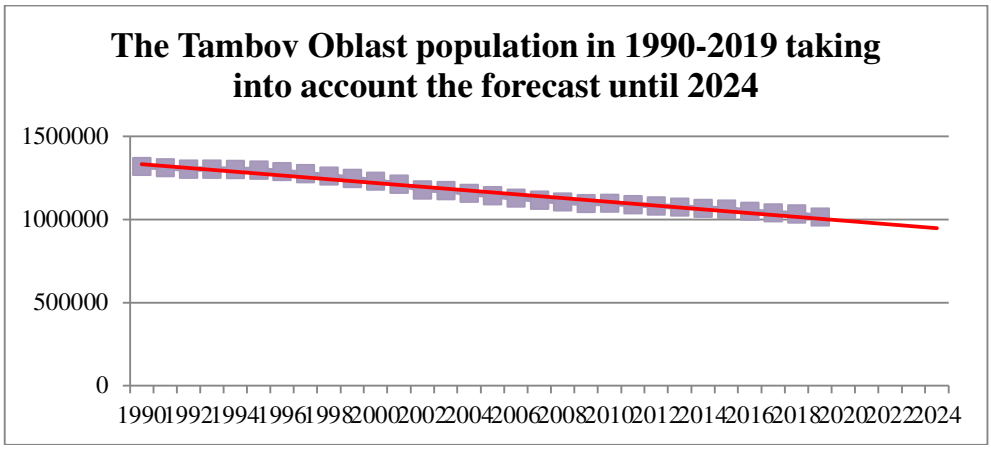

Figure 1: Forecast of the population of the Tambov Oblast by time-series extrapolation for 2020-2024, people.

The forecast of labor productivity in the manufacturing sector, depending on the population, is shown in Figure 2.

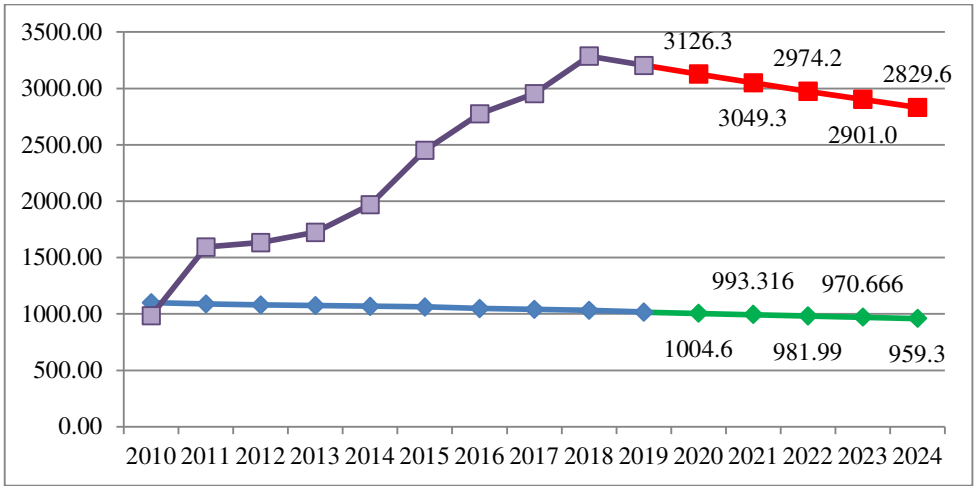

Figure 2: Dynamics and forecast of labor productivity in the Tambov Oblast in the manufacturing industry for 2010-2024, depending on the population of the region

Taking into account the demographic factor, the impact of which on labor productivity is 97,5% (r=0,987; R^2=0,975), the forecast of labor productivity until 2024 has the following values, Table 7.

Table 7: Forecast values of labor productivity in the Tambov Oblast for the period up to 2024

Year	2020	2021	2022	2023	2024
Labor productivity in the manufacturing industry of the Tambov Oblast, thousand rubles	3126,3	3049,3	2974,2	2901,0	2829,6

The forecast is based on the value of the coefficient of determination (R^2).

R^2 is the coefficient of determination showing the proportion of variation of the effective feature 'y' under the influence of the factorial feature 'x'. In this case, productivity is an effective feature, and the population of the region is a factorial feature. The forecast is made by sequentially multiplying the values of labor productivity by the coefficient of determination (for example, 3126,3*0,975=3049,3).

Recommendations

According to the correlation analysis, the average monthly nominal gross payroll (r=0,974) has the greatest impact on labor productivity in the Tambov Oblast in the manufacturing sector. The coefficient of determination is 0,949, which shows that in 94,9% of cases, changes in labor productivity are conditioned by the changes in the amount of gross payroll.

Thus, it should be noted that the employee's salary has a high significance on the labor productivity indicator. It is necessary to take this factor into account when developing and implementing programs to increase labor productivity. As a recommendation, it can be noted that enterprises receiving certain support measures should show an increase in the average salary received by employees at the end of the period.

From the data obtained, we can conclude that with the continuing reduction of the labor force and the lack of adequate measures to equalize it in the manufacturing industry, there is a tendency of reducing labor productivity. It is becoming obvious that more and more enterprises need to be included in programs to increase labor productivity and to develop new measures to support enterprises implementing programs to increase labor productivity.

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Russian Financial and Economic System Behavior Depending on Interest Rate Scenario

Valery V. SMIRNOV, Chuvash State University, Cheboksary, Russia
E-mail: walera712006@mail.ru

Nina G. GUBANOVA, Chuvash State University, Cheboksary, Russia

Natalia V. BONDARENKO, Chuvash State University, Cheboksary, Russia

Polina G. GORBUNOVA, Chuvash State University, Cheboksary, Russia

Anna N. ZAKHAROVA, Chuvash State University, Cheboksary, Russia,
E-mail: zaharova_an@mail.ru

Tamara V. TALANOVA, Chuvash State University, Cheboksary, Russia,
E-mail: tamaragoncharova@mail.ru

Abstract

The study is bases on a systematic approach applying the method of statistical analysis. The study exposess sharpening of negative behaviour of Russian financial and economic system resulting from the drop in interest rate: national currency devaluation, lower tax revenues, etc., bringing about the necessity to increase M2 and need for bigger volumes of devaluated rouble consumer loan raising GDP deflator. Positive behaviour of the Russian financial and economic system is attributed to the sustainability of the Russian Federation Central Bank replenishing its gold and foreign currency reserves and maintaining trade balance (trade surplus) increasing its strength under the conditions of decrease in world oil prices and Covid-19 pandemic. It has been found out that positive behaviour of Russian financial and economic system is reached due to the decrease in interest rate, rather than its invariably low level. The limit of positive behavior of the Russian financial and economic system depending on interest rate scenario is determined through volatility of crude oil and natural gas prices. Decreasing interest rate and simultaneous devaluation of the national currency the Central Bank maintains the structure of commodity economy strengthening the positions at the periphery of the world capitalism and maintaining the status of energy superpower, thus increasing its sustainability in relation to the drop in world oil prices.

Keywords: Capitalism, Behavior, Interest Rate, Financial and Economic System.

Introduction

Russian Financial and Economic System Behavior (RFESB) ought to be considered within the context of economic cycle and essence of money as a specific commodity, i.e. universal equivalent. RFESB is one motion comprising adverse motions – counter flows of income (resources, factors, of production, material values) and expenditures (funds).

The RFESB research rationale depending on interest rate scenario is attributed to the worldwide technique of economic growth maintenance applied by the Central Bank. On April 24, 2020 having lowered the key (interest) rate to5.5% for the first time since 2014 Central Bank of the Russian Federation (CBRF) passed over to the soft policy amid the expected slump in economy due to the crisis in the conditions of oil prices drop and Covid-19 pandemic by 0,5 percentage points.

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Due to the existing financial and economic situation in Russia experts do not expect any standard decrease in the deposit and loan interest rate following the CBRF decision. Deposits are losing their attractiveness as an instrument of profit-making savings and banks will have to increase their rates.

According to CBRF, to fight Covid-19 pandemic significant restrictive measures were introduced all over the world resulting in negative impact on economic activity in Russia. It causes considerable long-lasting disinflationary influence on the prices dynamics on the part of aggregate demand that compensates for the effect of temporal pro-inflationary factors including those attributed to the drop in oil price.

CBRF forecasts about 3.1% increase in consumer prices, for the full year inflation is expected to make 3.8-4.8% and later on to remain 4%, GDP is expected to decrease by 4-6%, recovery growth is likely to make 2.8-4.8% in 2021 and 1.5-3.5% in 2022. CDRF baseline forecast is based on the average Urals oil price of 27 USD per barrel in 2020 and its further increase to 35 and 45 USD per barrel in2021 and 2022 correspondingly.

At the same time the government does not provide the population with funds like in some other countries, but acts through loan facilities and subsidies. In these conditions CBRF lightens the debt burden decreasing interest rate. Decrease in interest rate and commentaries on this motion prerequisites and grounds points to the necessity of deeper analysis of RFESB depending on CBRF interest rate scenario.

Literature Survey

The rationale of the research into adverse motions of the financial and the economic in one depending on the interest rate scenario in the new reality is attributed to stronger manifestation of the world recession signs as well as to discrepancies in opportunities of different countries to respond to negative conditions.

Modern stage of global economy development can be characterized as permanent crisis having high risks of financial instability and real sector problems caused by highly developed countries that are ”political asylums” of speculative capital. In such conditions developing nations are vulnerable since their markets are already open but mechanisms softening the impact of fundamental reasons of financial instability have not been formed yet. Wider measures are necessary to liberate Russian financial system from dependence on foreign currencies. It is appropriate to take tough measures to ensure financial security in Russia, including reduction of capital outflow, security and control of currency reserves and state assets structure through incorporation of various foreign currencies into them aiming at providing international settlements and their protection.

Policy pursued by CBRF in the medium-term perspective has made the major part of national large enterprises curtail their economic activity, and small and medium businesses have joined shadow economy (Smirnov, V., Semenov, V., Kadyshev, E., Zakharova, A., Babaeva, A., 2019). A large share of highly capitalized and effective banks (from the point of view of operating expenditures) having a broad base of funding helps smooth a negative effect from outer shocks on crediting to the real sector of the economy.

While Russian authorities are being anxious about crediting the real sector of economy and curtailing capital outflow, highly developed countries, their financial systems are gradually passing to the negative interest rate zone, Marco Del Negro, Domenico Giannone, Marc P. Giannoni, Andrea Tambalotti show that tendency in the world real interest rate on liquid and safe assets was fluctuating around 2% for over a century but has considerably dropped for the last three decades. The decrease was a common occurrence for highly developed countries since the tendencies concerning real interest rate in different countries were similar (Negro, M.D., Giannone, D., Giannoni, M.P., Tambalotti, A., 2019).

According to Robert L. Czudaj introduction of negative interest rates, firstly, considerably reduces the expectations concerning three month interest rate on the money market as well as 10-year public bond yield. Secondly, GDP growth and inflation expectations appear under significant increasing positive influence of this nontraditional tool, i.e. negative interest rate policy effectively speeds up economic growth and overcomes deflation spiral (Czudaj, R.L., 2020). In spite of the insufficient effectiveness of the new tool, banks will keep on using it combined with taking measures to reduce banking system risks.

According to Whelsy Boungou bank risk proves to be lower in the countries where negative rates are introduced. This capacity depends on banking system characteristics of a country, to be more exact on capitalization degree and the size of the country (Boungou, W., 2020). Probability of such situation approach was estimated as low due to the current state strategy of Russian financial market development, high yield on Federal loan bonds to attract foreign investments, as well as low financial literacy of the population.

George Dotsis shows that unlike commonly found negative interconnection between investments and uncertainty, the availability of interest rate lower limit results in asymmetric effect of interest rate uncertainty when taking investment decision. At low interest rate the increase in its volatility diminishes the value of anticipation and pushes up the investments, but at high interest rate the increase in its volatility pushes up the value of anticipation and cuts down on the investments (Dotsis, G., 2020).

Divya Kirti believes that banks prefer providing floating rate loans due to their restricted ability to turn their current liabilities into long-term assets. Banks having great amount of obligation with floating rate have more capital to lend with floating rate, hold more securities with floating rate and specify softer loans with floating rate (Kirti, D., 2020).

Toni Beutler, Robert Bichsel, Adrian Bruhin и Jayson Danton find out that lowering economic capital of banks, implemented risk of interest rate scenario accounts for on average about one eighth or 30 basis points of anticipated total decrease in aggregate crediting growth in a year after nominal rate push up by one percentage point. Bank lending is mainly defined by capital of banks, but not by their liquidity (Beutler, T., Bichsel, R., Bruhin, A., Danton, J., 2020).

Jens Klose points out considerable differences between real and equilibrium real interest rate going any direction. This development is observed in respect of BRICS. For China and India monetary policy tends to be too loose during many periods stimulating economic growth, but concerning Brazil the opposite is true. In Russia and South Africa the actual real rate mainly corresponds to equilibrium, thus monetary and credit policy is neither too weak nor too tough (Klose, J., 2020).

Badiea Shaukat, Qigui Zhu и M. Ijaz Khan find out multiple inverse negative relationship of real interest rate on economic growth due to national and foreign investments, human capital, trade openness, interest rate, inflation, institutional force, political instability and corruption. The interest rate is defined from the outside in the countries with transition economy where through several channels the real interest rate may not only cause damage but also restrict the economy to maintain its corresponding transition level and to achieve higher growth rate. Politically it results in necessity to set lower interest rate which is extremely needed and useful for countries with transition/developing economy to transit quicker and achieve higher growth rate (Shaukat, B., Zhu, Q., Khan, M.I., 2019).

Jun Nagayasu finds out that the difference in interest rates does not significantly influence financial flows of developed countries. On the other hand exchange rates and political integration sequentially influence investment decisions when forming financial portfolios rather than interest rates (Nagayasu, J., 2019).

Maren Baars, Henning Cordes и Hannes Mohrschladt have found out that decrease in the interest rate does not impact risk taking on the whole. Risktaking increases significantly only if interest rate drops below zero (Baars, M., Cordes, H., Mohrschladt, H., 2020). Lending risks in the banking sector are increasing today nonlinearly regarding basic characteristics of the loan, i.e. the size, the term of the loan, interest rate.

Within this context, Irina Georgescu and Jani Kinnunen introduce the concept of possible precautionary saving as a measure of the optimal deviation of savings in the transition from a certain model to a model of probabilistic interest rate risk. The first result of the work characterizes the possible preventive savings (that is, generating additional savings) by the inequality in which a relative prudence index appears, associated with the consumer utility function. The second one compares the level of optimal savings with the level of optimal savings from a possible security model (The interest rate for saving as a possibilistic risk. Physica A: Statistical Mechanics and its Applications, 5471. Article 124460. https://doi.org/10.1016/j.physa.2020.124460). Ana Isabel Sa and Jose Jorge confirm that according to the monetary policy for deposits, central banks can influence deposits and offer loans by changing the rate. But low interest rates may disable this channel (Sa, A.I., Jorge, J., 2019).

Julio Garín, Robert Lester, Eric Sims and Jonathan Wolff have found out that if interest rates are low due to the grown preference of savings, fiscal sustainability allows increasing debt during the period of low interest rates. If interest rates are low due to the drop in production growth rate, increase in spending financed due to the deficit is impossible (Garín, J., Lester, R., Sims, E., Wolff, J., 2019).

In Russia a significant part is played by interdependence of oil price change as an external factor and unemployment as an internal factor and CBRF interest rate as a response to these changes.

Baris Kocaarslan, Mehmet Ali Soytas and Ugur Soytas are of the opinion that decrease in oil prices uncertainty results in the unemployment reduction, whereas increase in oil prices uncertainty does not have any impact. In response to the decrease in the interest rate the growth of the unemployment is observed since the influence of interest rate increase is not significant. Oil prices volatility stipulated by options as a measure of oil prices uncertainty exceeds the conditional volatility of oil prices in the unemployment forecasting (Kocaarslan, B., Soytas, M.A., Soytas, U., 2020).

Te Bao and Jichuan Zong have found out that the average price deviation ("the bubble") is considerably lower in the economies pursuing interest rate policy than in the economies without such a policy. The policy preserves its effectiveness independent of the fact whether the participants are informed of the policy aims or not (Bao, T., Zong, J., 2020).

Daisuke Ida reckons that policy based on the rules is of lower weight. Under cross check of monetary and credit policy a unique equilibrium of rational expectations can be easily achieved. However, this result is the opposite when Central bank loss function contains stabilization of interest rate and inflation (Ida, D., 2020). According to Antonio Afonso and Jose Alves, SFA increase lowers long term and short term interest rates, short term interest rates experience higher reductions at that (Afonso, A., Alves, J.,2019).
Thus, the current situation in the world economy actualizes the necessity of RFESB analysis of interest rate scenario of CBRF in Russia today (Smirnov, V., Semenov, V., Kadyshev, E., Zakharova, A., Perfilova, E., 2019) to realize expedient application of this mechanism and evaluation of its effectiveness to ensure sustainable economic growth.

Method

Descriptive statistics methods including empirical data processing, systematization, pictorial presentation in the form of graphs and tables, their quantitative description through basic statistical indices are applied to estimate RFESB depending on interest rate scenario of CBRF in present-day Russia (King, A.P., Eckersley, R.J.,2019, Brownstein, N.C., Adolfsson, A., Ackerman, M., 2019). The behavior of each variable is described by means of tables, diagrams and aggregates. Tables, diagrams and graphs are plotted by means of помощью «MS Excel», «IBM SPSS Statistics Software» (Fávero, L.P., Belfiore, P., 2019). Descriptive statistics estimates data array by statistical indicators. Statistical analysis is the method of collection, study and provision of vast store of data on data characteristics (Lazar, J., Feng, J.H., Hochheiser, H., 2017) and correlations (Schofield, 1993); correlation of spatial and time series of indicators keeping to the methodology of the research.

Analysis

RFESB analysis on CBRF interest rate scenario is carried out on the results of dynamics evaluation of Crude OIL Production; Gasoline Prices; Inflation Rate ; Gold Reserves Balance of Trade; Balance of Central Bank; Consumer Credit; RUB/USD Exchange Rate; GDP Deflator; Money Supply M2; Imports; Employment Rate; Industrial Production; Manufacturing Production; Construction Output; Capacity Utilization, according to «Trading Economics during the period of 2012 to the 1st quarter of 2020.

The analysis resulted in positive RFESB from CBRF interest rate decrease - Crude Oil Production; Gasoline Prices; Inflation Rate; Gold Reserves; Balance of Trade; Balance of Central Bank. Through the decrease in interest rate CBRF maintains the structure of raw materials economy and increases its sustainability as regards drop in world oil prices.

Negative RFESB caused by decrease in interest rate are Consumer Credit; RUB/USD Exchange Rate; GDP Deflator; Money Supply M2; Imports; Employment Rate. Through lowering interest rate CBRF devaluates the national currency reducing opportunities to purchase high-tech imports making businesses work off the books (including registration of their employees as self-employed), it also increases GDP deflator enlarging M2, in that way demand for growth in devaluated Ruble Consumer Credit.

Analysis into dynamics of Industrial Production, Manufacturing Production, Construction Output, Capacity Utilization resulted in positive RFESB caused by interest rate decrease. It should be noted that positive RFESB factors are achieved by decrease in the interest rate, rather than by its stable low indicator. A reserve of 5.5% available since 2020.04.24 is lower than that of 2015 when it was 15%.

Thus, opportunities of further CBRF economy revival due to interest rate decrease are considerably restricted.

Modeling

For modeling RFESB, we use the Cobb – Douglas function as the basis, but changing it taking into account certain priorities — the extraction of crude oil and natural gas and the interest (key) rate. It should be understood that RFESB modeling is an assessment of a single movement consisting of opposing movements - trends (approximation functions) of reciprocal flows from revenues (production of crude oil and natural gas) and expenses (interest rate).

Modeling is carried out according to the formula:

where – rate of increase in crude oil and natural gas production; – CBRF interest (key) rate; = 0.4143· – 0.1 and = -0.0189· + 0.1668 – trends (approximation functions) (figure 1), constructed according to the Federal State Statistics Service for 2014-2019 (Federal State Statistics Service. *Rosstat.* © 1999-2020. Copyright Federal State Statistics Service. https://www.gks.ru) , α and β – corresponding elasticity coefficients

Figure 1. The rates of gain of crude oil and natural gas production, interest (key) rate, %.
Source: calculated using the Cobb-Douglas function «SPSS Statistics» according to Federal State Statistics Service (Rosstat). (Access: 2020/04/29).

Modeling resulted in construction of RFESB approximating functions (figure 2) which reflect a single movement in opposite movements and indicate their significant deviations.

Figure 2. Modeling of RFESB: crude oil and natural gas production and interest (key) rate.
Source: calculated using the Cobb-Douglas function «SPSS Statistics» according to Federal State Statistics Service (Rosstat). (Access: 2020/04/29).

These deviations stipulated application of polinomial approximation functions: (1) $y = -0.0043 \cdot x^5 + 0.0734 \cdot x^4 - 0.471 \cdot x^3 + 1.3906 \cdot x^2 - 1.8426 \cdot x + 0.8541$ where $\alpha = 0.75$, $\beta = 0.25$ – dominance of growth rate of crude oil and natural gas extraction; (2) $y = -0.0007 \cdot x^5 + 0.0117 \cdot x^4 - 0.0738 \cdot x^3 + 0.2148 \cdot x^2 - 0.2816 \cdot x + 0.1296$ where $\alpha = 0.25$, $\beta = 0.75$ – dominance of CBRF interest rate.

Thus, RFESB modeling revealed the dominance of change in crude oil and natural gas prices over CBRF interest (key) rate.

Results Discussion

The situation revealed as a result of the study on the dominance of change in the price of crude oil and natural gas over interest (key) rate in RFESB should be understood as a deep dependence of Russian economy on the world consumption. Located on the periphery of world capitalism Russian economy is energy superpower ensuring sustainability of the world economy growth through the increase in external and decrease in internal consumption. Energy superpower is a state possessing large proven reserves of oil, natural gas, coal, uranium, opportunities to use renewable energy and which is a largest exporter of energy supplies, at least one of them. This is manifested by the permanent devaluation of the national currency and additional currency issue.

Against this background CBRF accounting for gold reserves and maintaining trade balance (black ink) experiences favorable anticipations. Reducing interest rate CBRF maintains the structure of Russian commodity economy and increases its sustainability when world oil prices drop.

Negative RFESB factors caused by decrease in interest rate are devaluation of the national currency and as a consequence lower opportunities to purchase high-tech imports forcing businesses to work off the books and reducing tax revenues. It results in necessity to enlarge M2 and need for vast amounts of devaluated ruble consumer credit decreasing GDP deflator.

It should be noted that positive RFESB factors are achieved by decrease in the interest rate, rather than by its stable low indicator. A reserve of 5.5% available since 2020.04.24 is lower than that of 2015 when it was 15%.

To prolong the period of positive RFESB factors CBRF has to limit the rate of interest rate cut paying more attention to verbal interventions or return to the issue of the national currency denomination by one order and a "full' kopeck. 1997.08.04 Russian President Boris Yeltsin signed a Decree on the Ruble Denomination. According to the document there was a decrease in the nominal value of the currency and one new ruble became equal to one thousand old ones. On January 1, 1998, CBRF put into circulation banknotes worth 5, 10, 50, 100 and 500 rubles, as well as coins of 1, 5, 10, 50 kopecks and 1, 2, 5 rubles.

Conclusions

As a result of the study of RFESB factors depending on interest rate scenario in contemporary Russia and in the conditions of falling world oil prices and the Covid-19 pandemic, the dependence of the Russian economy on the price of crude oil and natural gas got even more deeply exposed. Russia's positions on the periphery of world capitalism have consolidated, while retaining the status of an energy superpower that ensures the sustainable growth of the world economy by increasing external and reducing domestic consumption.

Maintaining RFESB is a necessity to justify the CBRF monetary policy. Favorable sensation of interest rate reduction is observed in CBRF as a result of successful replenishment of gold and foreign exchange reserves and maintaining the trade balance. There are sharpening negative RFESB factors , i.e. devaluation of the national currency lower tax revenues and etc., resulting in necessity to enlarge M2 and need for vast amounts of devaluated ruble consumer credit decreasing GDP deflator.

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Employability Skills Needed in the Emerging Global Job Market: Stakeholders' Perception

Gopalakrishnan SOUNDARARAJAN
Faculty, Department of Business and Accounting, Muscat College, Sultanate of Oman.
Email: soundararajan@muscatcollege.edu.om

Stephen ARO-GORDON
Faculty, Department of Business and Accounting, Muscat College, Sultanate of Oman.
Email: stephen@muscatcollege.edu.om

Anitha RAVIKUMAR
Faculty, Department of Business Studies, Higher College of Technology, Muscat, Sultanate of Oman.
Email: anitharaveekumar@gmail.com

Drishti Rupesh JESRANI
Research Assistant, Muscat College, Sultanate of Oman
Email: mishtijid@gmail.com

Abstract

In the 21st century, companies all around the world have formed a higher expectation from the labours in the market. The recruitment needs by the employers for employment have changed drastically, and are not what the used to be in the olden days. There is certain kind of attributes searched for in an employee. These are employability skills sets. Different stakeholders have different perspectives on employability skills. Employability skills are found to have no common definitions. Different researchers or authors define employability skills differently. Employability skills are basic skill sets that are required to help in maintaining and keeping the job for a longer period, these skills are usually personal attributes, achievement skills, and more, that help the employee to be successful in their career option. In this literature review, it is studied if, the perceptions of the stakeholders towards the employability skills are meet or not, and if so, what might be the possible reasons. Articles from different authors and researchers were reviewed for writing this literature review.

Following the purpose of the study, it is taken into account, the different perceptions of employability skills by employers, higher education institutions, and employees/graduates. During the study, there were different challenges found, that were met by the employee and the employers, and its respective solutions and reasoning towards it.

Keywords: Employability skills, Stakeholders, Perception

Introduction

In the growing times, globalization has affected the organizations and business, with ever-changing technology, labour market demands, and the attributes searched- in for professionals has also changed drastically (Yet-Mee Lim et.al, 2016). As the business environment is dynamic, it becomes difficult to supply products and services that will be able to sustain and attract consumers for a long period. Hence, the firms hunt for employees that can create a market where their products or services keep the consumers interested and which helps the firms to retain their competitive advantage.

The qualities that are searched in an employee in recent times are little more than just academic abilities, these qualities include oral and written communication skills, teamwork and team-building skills, multitasking, and other dynamic business skills. These skills expected from the employers while interviewing an employee are partly based on generic skills which are highly valued by prospective employers as additional attributes (Yet-Mee Lim et.al, 2016).

The growing market underlines the value of employability in education as well, with the emphasis on improving not only skills but also practical experience (Ekpoh Uduak,2015). Therefore, countries worldwide have started to invest in education, even in the rising global socio-economic challenges, which will help in generating highly self-reliant, motivated, and skilled graduates. There is a renewed focus among the youths apart from the school system in the

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advancement of practical as well as technical abilities in consideration with proficiency in the business world. Various researchers have widely discussed and defined the idea of employability. There is no definite definition for employability, different researchers defined employability differently. Employability is defined as an individual's potential for being worthy of a job; competencies, experience, and personal attributes are included as employability skills. It represents the ability of an employee to find a job, maintain a job, and switch between the job in the same business sector. (Christina Hartshorn and Leigh Sear,2005) Employability can also be termed as having organizational competency, skills relevant to work and employment, entrepreneurial skills, and communication skills relating to work (Rebecca Boden and Maria Nedeva,2010). This showcases that defining employability is dynamic and multi-dimensional, and can be hard to describe. This also means that there does not exist a centric definition for employability as it lacks measurement and consensus (Wakelin- Theron,2014).

As mentioned above that the employers expect a selected set of generic skills while hiring an employee, the stakeholders in education are apprehensive regarding young graduates and students' acquisition of skills that are work-related (ORJI and Nna Sunaday,2013). Higher education plays a key role in equipping young people for employment. It is regarded that universities act as a major role in increasing Human Capital (Ekpoh Uduak,2015). It is suggested for the Higher Education Institutions(HEI) to take initiative and responsibility to improve the education system in such a way that it exalts the employability skills in students, which will help them to get employed quicker as well as meet the demands of employers (Yet-Mee Lim et.al,2016). It should be emphasized that students who attend higher education have a variety of aspirations, perspectives, and skills that are called for a more versatile way of conveying them. Furthermore, HEIs around the world are under immense pressure to generate highly-mobile graduates with the requisite expertise, skills, and attributes to make them employable in different economic sectors of the countries (Wakelin- Theron,2014). It has been acknowledged that student employability skills can be strengthened by establishing a working relationship or interaction between schools and employers, recognizing market realities, employee and student selection, as well as adopting a modern approach to teaching and learning that emphasizes core skills and behaviors, job-seeking abilities, and a repackaged range of technical and occupational competences (ORJI and Nna Sunaday,2013). Hence, the recent trend of putting in a greater focus on a graduate with the key skillset, ensures that the Higher Education curriculum includes opportunities to improve these skills in combination to a particular subject with its specified knowledge and skills. This will create a possibility for the success of applicants in the selection process by generating 'business ready' graduates, capable of making a dynamic start and quickly adapting to change. To add on, various training programs at various universities follow different approaches, such as providing job experience, work-related training and employability skills modules, and work-related activities and even involving employers in developing and evaluation of courses. For employability skills already present in the curriculum, universities also employ a variety of programs to make them more visible to students (Sue Cranmer,2007).

Employability skills are much more important in developing countries where drop-out levels are high and opportunities for further education are slim (ORJI and Nna Sunaday,2013). The increasing unemployment rate among the graduates from the HEI is a testament to the widening gap between the university curriculum and employer needs and demands (Ekpoh Uduak,2015).

Study Objectives

This study examines the perception of employers, students, HEIs, and employees who have similar views regarding employability skills. This will help to recognize the black hole in the curriculums which can be developed and enhanced to train graduates as well as students to get and maintain their jobs in the business world. This study has been carried out on the bases of objectives:

1. To understand the different perceptions of employers, employees/graduates, and higher education institutions.
2. To identify the theories on employability skills can be practiced in real life.
3. To know how the importance of employability skills affect the practical world.

Employer Perception On Employability Skill

Though employers believe that technical expertise is important, they also require students to develop a multitude of knowledge and competencies that can be grouped into common skills and technical competencies (Yet-Mee Lim et.al, 2016).

Some employability skills are highly valued by employers such as generic skills, which are recognized by employers as well as practitioners are analytical, critical thinking, decision-making skills, interpersonal skills, oral and written communication skills, problem-solving skills, leadership skills, teamwork and teambuilding skills, and the ability to resolve conflicts and work under pressure (Ahadiat and Smith, 1994). In another research conducted by Kevin Lowden

et.al,2011, it was found that employers search for some kind of attributes, skills, and knowledge, intellectual competency that are needed for specified roles. Team working skills, problem-solving skills, self-management, knowledge of business, ICT knowledge, interpersonal and communication skills, capacity to use their own's creativity and leadership skills. In contrast to these skills, employers have emphasized the need for unique attitudes and experiences including, inspiration, perseverance, and dedication (Kevin Lowden et.al,2011). In terms of personal qualities, employers and professionals prefer students and entry-level employees, which are optimistic, responsible and competent, creative, enthusiastic, ethical, autonomous, inventive, knowledgeable, persuasive, reliable, self-confident, self-motivated, and those who showcase loyalty (Ahadiat et.al,1994). It is also found that the key attributes considered for an employee or a young graduate were trustworthiness, competency, sense for duty, optimistic behavior, and awareness of the business world for employability (Ahadiat et.al,1994). Even though employers viewed the graduates should have the ability to know when, how, and where use their theoretical knowledge in the practical world, resulting in producing higher – a level of performance (Ayiesah Ramli et.al,2010). Employers ranked more highly than technical and subject-specific skills, a range of personal qualities and core skills. It is not to disregard the importance of academic qualifications, but to underline the added value of personal attributes and core competencies (Venetia Saunders and Katherine Zuzel,2010).

In addition to this, the dynamic economic conditions and the structural global challenges faced by many employers, it has been recognized that other skills such as entrepreneurial sensitivity and cross-ethnic competency, are likely to be considered as valuable attributes for new graduate recruits. (Venetia Saunders and Katherine Zuzel,2010). Employers, as well as students, found that having work-experience, internships, and co-curricular activities as particularly helpful in improving marketable skills while at university. It was also noted in the research that though jobs required proper qualifications and degrees, these skills added to long-term employability for the young graduates (Kevin Lowden et.al,2011). Furthermore, other than generic skills, work experience, and personal attributes employers also highlighted that initiative to develop a first good impression, CV preparation, and self-presentation at job interviews are all very important. However, most students seemed to lack the ability and drive to impress during this initial process. A frequent criticism was that the graduates or early employers often do not take time and effort to design employer-oriented CV's and some employers pointed out that some candidates often showed little interest to apply to their interviews and to conduct a background search on the employer or the organization, leading to unreasonable and unrealistic expectations (Kevin Lowden et.al,2011).

To add, another perception is viewed by the employers where the HEI's could do more to introduce and address employability skills across their various courses. It was noted by the employers that the universities showed less responsiveness and participation in meeting the demands and needs of employers and the labor market (Kevin Lowden et.al,2011).

Higher Education Institution's Perception On Employability Skills

It is not just an employer's duty to bring awareness skills amongst the graduates and students. Even educators or Higher Education Institutions play an equally critical role in helping improve student employment outcomes (Song Ju et.al, 2014).

If employers are the decision-makers while recruiting, then the educators should introduce and train the graduates and students, in the field of employability skills to meet the demands of the labor market and employers. Therefore, it also necessary to know the perspective or the perception of the HEI or the educators regarding prime employability skills (Song Ju et.al, 2014). That's how education provides marketable skills and skills that are relevant to work performance, and therefore the more educated professionals, the more successful; they will be in the labor markets, both in terms of earnings and employment opportunities (Kelebogile Paadi,2014). Nevertheless, in the 21st century, education institutions need to have new educational policies and changes. Moreover, they should also search for new partnerships between the HEIs and states that will help in providing more funds and also regulate HEI. Governments have therefore called on HEIs to play a significant role in advancing the capacity to provide better support to the students and graduates, particularly from the first generation, this can be done through creative partnerships with companies, industries, and communities and to be more adaptive and versatile in consideration with the curriculum (N Wakelin- Theron,2014). Though, whether higher education institutions could or should cultivate employability skills has become a topic of debate. Researchers argued that many of the employability variables are conceptual and prescriptive; they emphasized evidence that supports current theoretical proposals on employability (N Wakelin-Theron,2014). Courses at universities are frequently academically focused and centered entirely on subject knowledge and rather than also giving attention to work-related (Ekpoh Uduak,2015). The findings done by the (Ekpoh Uduak,2015) are not particularly unexpected, since there is a general uproar of low performing students in universities. It is additionally mentioned in the study that universities do not prepare the students in the terms business environment. The university graduates are poorly prepared for the job market as there is a discrepancy between the

university opportunities and training and education regarding the demands of the business employability needs. Likewise, there is also a disparity between the skills gained by the university graduates and those needed by the labour market. It was noted that current university undergraduate programs do not provide the kind of continuous learning and basic skills to excel in their careers (Ekpoh Uduak,2015). However, the challenge remains to find the most appropriate method include employability skills in the HEIs curriculum. Even though there is a debate about whether there exists a correlation between employability skills, development, and actual employment. The survival of the higher education institutions depends on their alumni whose future employment is subjected to the procurement of certain work knowledge (N Wakelin- Theron,2014).

Universities should re-vamp their courses per the labour market as this might help the young graduates in finding and maintaining the job quicker. Having a course taught that can be applied in the practical world will also boost the confidence in the graduates for applying to work (Ekpoh Uduak,2015). Kevin Lowden et.al,2011 agreed that the growth of employability skills and attributes in HEIs must also be incorporated in the curriculum. This indicates an integrative initiative on the part of all stakeholders to develop employability skills for the students. Universities should set up career advancement or development centers to put together graduates, employers as well as alumni (Nguyen Dahn Nguyen et.al 2005). Such career- development centers function as a channel of knowledge about the real working life of workers. Such centers may host special seminars to provide employable personal attributes for students seeking jobs (Nguyen Dahn Nguyen et.al 2005). Students must be subjected to HEIs interactions that build understanding, skills, introspection, and contemplation through effective education and learning, as this improves employability. It remains a fact, that the HEIs need to invest and promote more employability development among their students. It is also noted, that there can be a notable increase in the value of higher education institutions if they are regarded as relevant to the economy and the society by being independent of the government (N Wakelin-Theron,2014). In recent times, few higher education institutions' strategies for promoting employability skills and attributes in practice include help in career decision making or search for a job, enhancement of employability skills through university programs, internships, placements, and personal developmental planning. Internships were considered helpful for the students, and due to which, placements and internships are being used by universities to give valuable work experiences to students (Kevin Lowden et.al,2011).

A research study was done by Kevin Lowden et.al,2011 found out what do the representatives from the HEIs perceive as the skills, competencies, understanding, and quality that would develop employability in graduates. There was an accord among the HEIs on the attributes and competency which supported the employability of graduates. An HEI representative highlighted the 'graduate mindset' which placed value on the 4 E's, and these are •Enterprising, •Ethical, •Engaged diligently showing interest in education and student life, •Enquiring. Another HEI representative listed qualities, credentials, and expertise for the graduate's employability, and these are • Good oral and written communication skills, • Ability to use creativity and innovativeness in their work, • Independent, • Responsible, • Potential to solve a problem with creativity, • Time Management skills, • Teamwork and Team building skills. • Aware of markets and business, • Willingness to learn, •Inspired and Enthusiastic, • Prepared to work and • Presentation skills. The educators believed that they could help the students more than just little in training and development of employability skills. It can be observed that the perceived employability skills of the educators or HEIs are alike to the employer's perception of employability.

However, the conjecture is that the graduate's chances of acquiring employment do not only depend on or concern one stakeholder but also it should involve government, HEI, industries, and even students. This is because working as a team in this will help find a viable and feasible technique and resolution to the problem if unemployment in graduates. (Ekpoh Uduak,2015).

Human capital theory suggests that education improves the efficiency of students, thereby improving work performance (Kelebogile Paadi,2014). This is because education offers, marketable skills and attributes that can be applied in the practical world hence, more highly educated graduates are, more competitive and they would be in the job market, both in terms of income and job opportunities (Yuzhuo Cai,2012).

The University of Catalonia created a learning environment in which complexities of real-world professional background in the field of communication are replicated as a virtual internship, like teamwork, problem-solving, under restricted circumstances or deadlines, customer orientation, and so on. The objective of the agency is to provide graduates, with experiences that may be faced by them in the job market in the future. TUAS Wildau in Business Informatics, holds a bachelor's degree programs, every two weeks a representative from the company provide a task to students related to present market situations, through student team meetings and evaluate the results after stipulated time given for completion of the task. Moreover, experts are invited to present a lecture or introduce new policies or practices that have entered the market (Ardiana Orrnellas.et.al,2018).

Employee/Students Perception On Employability Skills

Young graduates and early employees face a lot of problems once they enter the world of work. This is simply because they lack generic skills demanded by the employers and find it difficult to maintain their employment due to a dynamic business environment that expects the workers to adjust accordingly. Due to which, it is important to find out the differences in the importance given to employability skills by graduates and employees in regards to their perception. The literature on the importance of employability skills perceived by students is limited but also inconsistent (Alex Tymon, 2013).

Graduate employability is multidimensional and involves academic success, career management skills, and knowledge of the labour market and workplace. Despite the widespread approach in the provision of employability skills in higher education, there are still discrepancies between the graduate job performance and the employer's requirement which exists. It is noticed that the employer expectations from the graduates are been met, hence it is significant to understand and also to be aware of student's perceptions regarding the employability skills and develop them accordingly. There are several reasons why it is required to also take into account a student's as well as an employee's perception of employability. Theoretically, having effective learning involves a clear understanding regarding the importance of the content and relevant activities displayed that can be improved by having a positive order which will give an obvious outcome. In addition to this, students who place a high emphasis on what they are learning can also affect their ability to pass learned skills through various contexts, for instance from university classrooms to the workplace. Furthermore, undergraduate awareness on the significance of that prompt better use of portfolios to demonstrate skills learned in future job applications, thereby boosting job prospects. Explicit awareness of the value of employability skills, and having translucent addition in the curriculum would boost the ability of students to express their competencies to the employers. As the business environment is dynamic the students and employees need to be aware of the rising need to distinguish themselves from the rest, in the labour market (Denise Jackson,2013).

It was noted that the employees face early employment problems as they are unsuccessful to meet the appropriate employer's requirements. The reasons identified the employees failed to meet the demands required by the employers were (i) lack of ability to use theoretical knowledge in application, (ii) report writing, (iii) poor communication with others, (iv) comprehension of responsibility, (v) inability to work in a team and (vi) personal reasons. The reasons followed by the problems noted by the graduates and entry-level employee were as follows: (i) lack of cooperation between the higher education institutions and employees,(ii) disinterest in the career, (iii) choice employment,(iv) insufficient job training, (v) absence of job description, (vi) lack of proper oral and written communication skills, (vii) lack comprehension of responsibilities,(viii) temperament of the employee/graduate,(ix) job environment,(x) family background, (xi) gender discrimination and (xii) compensation. Further, it has been discussed that the graduates or students have not been properly introduced to and developed employability skills by the higher education institutions (Clarke Marilyn, 2008).

Many graduates have a powerful economic driver. They understand the importance of employability skills, and that a degree may not alone be appropriate. In recent times as there has been an increase in literacy rates all over the world, this has led to the surplus supply of graduates this makes it difficult to start for their career. This is illustrated by increasing unemployment among graduates, increased competition among the graduates, and a greater degree of uncertainty about what graduates should expect from higher education (Marie-Pierre Moreau and Carole Leathwood,2006). Due to an increase in competition between the graduates, this has also led to the change in an employer's perception and expectations in the labour market. A degree, once a perk or differentiator, is now often treated as a requirement for a career, particularly in industries that may have not have needed a degree at the entry-level in the past (Michael Tomlinson 2008). Therefore, graduates are constantly conscious of the need for specific qualifications and qualities for job progress (Alex Tymon, 2013). This can also be seen in research by Michael Tomlinson et al.,2008, where the students felt that, the degree had lost its distinguishing significance, and that there was a need to improve their employability broader. Higher education students find themselves in a competitive market, with an increasing supply of graduates joining the job force with common profiles and jobs. The difficulty confronting students is to achieve a comparative edge in a dynamic job market where workers are focus on academic qualifications.

Further, the similarity was identified between students' perceptions and literature in terms of abilities and personal qualities aligned with employability. Communication, information technology, coordination in team building and teamwork, and scheduling and organizing were the most widely mentioned abilities. The personal attributes accepted included versatility, adaptability, working hard, determination, and devotion. The personality characteristics that students considered to be important to their professions are individuality or creativity, constant learning, professionalism, self-confidence, and self-motivation (Beverley Jackling and Claude Calero,2006). In a research study, it was observed that personal abilities such as independent thinking, innovation and creativity, and versatility were

ranked as the most important skills, for development in career by the graduates and the employees (Beverley Jackling and Paul De Lange,2006). Moreover, employers suggested solutions for early employability problems faced, which were also supported by employers. This were:(i) including training as part of the curriculum, (ii) focus on written communication, (iii) development of oral and written communication, (iv) workshops and seminars for introducing problem-solving. (v) motivating in the group projects and (vi) provision of professional practical advice (Yet-Mee Lim et.al,2016). In addition to this, the graduates appeared to regard extra-curricular activity at the university and job experience rather than their degree, as adding them into their CV's is like brownie points to help in maintaining their jobs (Kevin Lowden et.al,2011).

Though there might exist a minor difference in thoughts and perception, it was gladdening to have that there appears to be a strong convergence between the employer, HEIs, and employees/graduates in their perceptions of employability skill. Furthermore, it was fortunate that the students/employee and higher education institutions are aware of the fact that there seems to be of greater importance given to employability skills in today's world.

Conclusion

Many students, graduates, employees, HEIs, and employers want higher education institutions to include employability skills in the curriculum. It can be further observed that graduates/employee reveal that workshops, seminars, job training, internships held by higher education institutions and companies helps in development in employability skills, and also benefits their job position. Many of the employees and young graduates are aware that a degree or qualification alone, may not be sufficient to maintain a job, and that with increasing competition in the labour market, it is equally important to have generic or soft skills as this will also help in better development of bio-data. Though the employees have mentioned the difficulties they face in early employability, it was also stressed by them that having enough motivation, creativity, independence, and being committed can help in maintaining the job.

Higher education institutions are seen as the middleman in helping reach a congruence that would teach the importance of employability skills that will help in increasing the opportunity for the job seeker and the job provider to match accordingly. It was emphasized that higher education institutions should update their course where the theory taught is based and used in the practical environment. Thus, this will help exalt the graduate's confidence. Universities providing internships, career development centers, etc gave positive results, as this helped to gain perception and experience on employability skills to the graduates. It was also suggested that higher education institutions should indulge themselves in partnerships, as this will help the universities to keep in touch with the labor market, and bring about changes in their curriculum accordingly.

Labour market needs are created by employers. As the business world is dynamic and there is an increase in the competition this results in to change in demands and needs by the employer. It was stated by the employers that, though having a good qualification or degree is important, the development of generic skills and the ability to apply theoretical knowledge in an application is also equally important. Employers have specified clearly on what set of employability skills do they search for in an employee, though there does not exist a common definition of employability skills. They require the employees to have technical skills as well as a broader range and concept of personal and generic attributes and skills. The literature on graduate employability discloses, that the employers and the HEIs need to work together to develop strategies that help in contributing to graduate employability.

There were also good practical practices in real-life that were identified, where it was shown how the universities have started to introduce the work environment to the students, by inviting professionals or experts and conducting virtual internships that give real-life experiences to the students and thereby, simultaneously exalting their employability skills.

This literature review has highlighted, the significance of how the employability skills in the practical world and how can be included and developed, to be introduced to the graduates. On how the universities should be able to link academic as well as employability in the curriculum. Moreover, it has identified the different perceptions of the stakeholders and, the challenges faced by the employers as well as the employee in the light of lack of employability attributes. This has also provided possible solutions to the challenges that can be overcome. All the stakeholders should work together as a team to help the future generation to support the benefits of seizing the complete skills, for personal development as well.

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Economic Security Study of The Territories of The Southern Federal District of The Russian Federation

Lyudmila V. OVESHNIKOVA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: Oveshnikova.LV@rea.ru

Elena V. SIBIRSKAYA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: Sibirskaya.EV@rea.ru

Alena A. SLEPOKUROVA
Plekhanov Russian University of Economics, Moscow, Russia
e-mail: alena_slepokurova@mail.ru

Svetlana V. KULIKOVA
MIREA – Russian Technological University, Moscow, Russia
E-mail: kulikovasv@mail.ru

Diana F. KHAKIMOVA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: Khakimova.DF@rea.ru

Abstract

The article describes and analyses the economic security of the territories of the Southern Federal District of the Russian Federation and its place in the Russian economy. State activity in the study of the subject of economic security of the region has been noted. The indicators for the study of the economic security of the territories have been grouped into four main blocks: innovation, industry, social and economic. The result is a multi-dimensional grouping of the regions of the Southern Federal District according to the parameters of the socio-economic situation of the constituent entities of the Russian Federation, broken down by these groups of economic security indicators. Interregional inequalities in the research district have been identified and a number of problems and priorities for economic development have been identified.

Keywords: economic security, gross regional product, cluster analysis, Southern Federal District (SFD), regions.

JEL Classification Codes: E7.

Introduction

In the Russian Federation, the economic security strategy is being implemented through the consolidation of efforts by federal State authorities, State authorities of the constituent entities of the Russian Federation, local government bodies, the Central Bank of the Russian Federation and civil society institutions. The functions of these institutions include ensuring economic security in order to protect national interests, implementing the strategic national priorities of the Russian Federation, monitoring and assessing the state of economic security, and formulating State policy and legal regulation in the analysis and forecasting of socio-economic development.

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Materials and Methods (materials for usage, description of the subject area, methods and techniques of research)

To assess the level of economic security, according to the Presidential Decree of May 13, 2017 № 208 "On the Strategy of Economic Security of the Russian Federation for the period until 2030", use criteria, a number of which are accumulated at the regional level. The authors have grouped the indicators by the following blocks (table 1).
The information and empirical base of the research includes legislative and regulatory documents of federal and regional significance, data of the Federal State Statistics Service for the Southern Federal District (SFD). The results of the conducted research are also based on the data obtained in the course of the authors' scientific work and conclusions (Federal State Statistics Service, 2020).

Table 1: Groups of indicators for studying the economic security of the territories of the Russian Federation

Economic block of indicators	Social block of indicators	Innovative block of indicators	Industrial block of indicators
GRP physical volume index	Unemployment rate of population aged 15-72 years by regions of the Russian Federation	Expenditures on technological innovations of organizations by type of innovation activity by regions of the Russian Federation	Production index by type of economic activity "Extraction of mineral resources" by regions of the Russian Federation
Gross regional product per capita	Number of victims of fatal industrial accidents	Advanced production technologies developed by the subjects of the Russian Federation	Index of industrial production by subjects of the Russian Federation
State debt of constituent entities of the Russian Federation and municipal debt	Level of participation in the labor force by regions of the Russian Federation	The share of products of high-tech and knowledge-intensive industries in the GRP of the constituent entity of the Russian Federation	Producer price indices for the economic activity "Production of manufactured goods" for the constituent entities of the Russian Federation as a whole in accordance with OKVED-2
GRP energy intensity	The number of people with monetary incomes is below the minimum subsistence level for Russia as a whole and for the constituent entities of the Russian Federation	Information about the use of intellectual property objects by subjects of the Russian Federation	Share of investments in fixed assets in GRP
Retail trade turnover	The share of employees of organizations with accrued wages is lower than the minimum subsistence level of the able-bodied population in Russia as a whole and in the constituent entities of the Russian Federation	Share of internal expenditures on research and development in GRP	Share of investment in machinery, equipment and vehicles in the total amount of investment in fixed capital for reconstruction and modernization, by constituent entities of the Russian Federation

The Results

A study of economic security indicators in these blocks will be carried out using the example of the Southern Federal District (UFO), which is one of the federal districts of the Russian Federation that was formed in 2000. Within the district there are 8 subjects: Republic of Adygeya, Republic of Kalmykia, Republic of Crimea, Krasnodar Krai, Astrakhan region, Volgograd region, Rostov region, Sevastopol. Before 2010 the district included

13 subjects, in January 2010 the North-Caucasian Federal District was separated from the district. Since July 2016 the Republic of Crimea and the city of federal significance Sevastopol have been included in the district. The center is Rostov-on-Don. The SFD covers an area of 447,800 square kilometers (2.61% of the RF territory). The population of the district as of January 1, 2019 is 16 454 550 people. (11.21% of the Russian Federation population).

The trends in the indicators of the economic block are presented in table 2. The volume index shows how the volume of GRP has increased (excluding the effects of price changes). In 2019, the volume of GRP of the Southern Federal District decreased by 7.8 p.p. (by 7.09%) and in 2019 it was 102.3%. In 2010, the volume of GRP of the Southern Federal District decreased by 7.8 p.p. (by 7.09%). In all subjects of the Southern Federal District, the volume index of GRP decreased in 2019 compared to 2010, except for the Astrakhan region, where the index increased by 4.2 p.p. In 2019 compared to 2018, in all subjects of the Southern Federal District, except for the Astrakhan region, the index also decreased, the highest in the Republic of Crimea (by 2.3 p.p.). In Volgograd region - the only region of the Southern Federal District - the GRP physical volume index in 2019 was less than 100%, namely, 99.2%. The gross regional product (GRP) per capita in 2019 compared to 2010 increased by 233,374.6 rubles (3.1 times) and in 2019 amounted to 347,460.4 rubles. During the period under review, the largest increase was in the Astrakhan region (4.4 times), amounting to 44,784.72 rubles, which is generally the maximum in the Southern Federal District in 2018, and to the least extent in the Republic of Crimea (since 2015 by 2.2 times) and amounted to 216 792.53 rubles. In all subjects, there is a positive trend of growth in the indicator.

Table 2: Indicators of economic security of the Southern Federal District in the context of the economic block in 2019

Russian subject	GRP per capita, rubles / person (x2)	Retail trade turnover, million rubles (x5)	GRP energy intensity, kg conv. fuel / for 10000 rubles (x4)	GRP physical volume index,% (x1)	State debt of constituent entities of the Russian Federation and municipal debt (x3)
Southern Federal District	347 460,37	3 290 219,3	174,49	101,30	426629,60
Republic of Adygea	234 548,72	95 164,4	128,62	96,20	390121,53
Republic of Kalmykia	258 607,32	21 333,1	257,33	100,35	2081220,04
Republic of Crimea	216 792,53	256 198,0	292,29	100,01	1368223,05
Krasnodar region	425 666,88	1 368 124,7	157,7	98,79	12814743,29
Astrakhan region	444 784,72	173 405,1	129,09	102,77	4939794,50
Volgograd region	323 011,58	389 565,0	165,45	101,70	9067034,12
Rostov region	340 200,11	920 765,6	275,79	101,19	20173889,58
Sevastopol	193 968,10	65 663,4	77,87	102,29	5849912,92

In 2019, compared to 2010, the volume of internal public debt of the Southern Federal District increased by 219,897,894.1 thousand rubles (19.4 times) and amounted to 231 870 832.6 thousand rubles. The volume of the external public debt of the Southern Federal District for the period under review was fully repaid, amounting to 631,064.6 thousand rubles in 2019. This is due to the fact that in 2010, the district comprised more regions, and the external debt of the Republic of North Ossetia accounted for the entire external debt of the Southern Federal District. The amount of debt owed by the municipalities of the Southern Federal District in 2019 was 29,652,170,6 thousand rubles (5.1 times) in comparison with 2010 and amounted to 36,847 753.2 thousand rubles.

GRP energy intensity is used to assess energy efficiency of national economies. In the period from 2010 to 2019, the energy intensity of all subjects of the SFD has decreased. The indicator has decreased most of all in the Republic of Crimea (by 80.69% since 2014), the lowest in the Republic of Adygeya (by 29.09% since 2014). The

highest energy intensity of GRP in 2019 is observed in Volgograd region (149.13 kg of fuel equivalent/10 thousand rubles), the lowest - in the Republic of Crimea (48.35 kg of fuel equivalent/10 thousand rubles).

Compared to 2010, retail trade turnover in 2019 increased by 2,366,220.2 million ruble (by 3.6 times). Over the reporting period, it increased most in Krasnodar Krai by 989,786.3 million ruble (3.6 times). In all subjects of the SFD, the positive trend of growth of the indicator in 2010-2019 was maintained.
Trends in the social block indicators are presented in Table 3.

Table 3: Indicators of economic security of the Southern Federal District in the context of the social block in 2019

Russian subject	Unemployment rate of population aged 15-72 years by regions of the Russian Federation (x6)	Level of participation in the labor force by regions of the Russian Federation (x8)	The number of people with monetary incomes is below the minimum subsistence level for Russia as a whole and for the constituent entities of the Russian Federation (x9)	Number of victims of fatal industrial accidents (x1)	Number of victims of fatal industrial accidents (x10)
Southern Federal District	5,50	67,00	15,17	105	6,80
Republic of Adygea	8,50	59,90	13,15	4	9,70
Republic of Kalmykia	9,40	67,30	24,94	1	9,80
Republic of Crimea	5,60	63,80	15,79	11	7,30
Krasnodar region	5,10	68,40	10,40	39	4,50
Astrakhan region	7,40	68,30	16,65	1	11,40
Volgograd region	5,50	68,00	14,17	14	6,60
Rostov region	5,00	66,80	13,49	34	9,10
Sevastopol	3,50	66,80	12,80	1	1,30

The unemployment rate of the population aged 15-72 in the Southern Federal District decreased by 1.4 percentage points between 2010 and 2019 and amounted to 5.6% in 2019. Over the period under review, the indicator decreased in all subjects of the district, the highest in the Republic of Kalmykia (by 4.8 p. p., the lowest in Volgograd region (by 0.7 p. p.). Despite this, in 2019 the highest unemployment rate was observed in the Republic of Kalmykia (9.7%), and the lowest - in Sevastopol (4.3%).

The number of fatal workplace accidents in the Southern Federal District in 2019 decreased by 132 persons compared to 2010 (55.7%) and in 2019, it was 105 persons. Six of the eight subjects from the district experienced a decline in the number of fatalities, most notably in the Rostov region and the Krasnodar region (by 23 and 22 persons, respectively, 40.4 and 36.1 %). The number of victims in Adygea increased significantly, by a factor of 4 times in 2019 compared to 2010 (by 3 persons). The highest number of victims in both 2019 and 2010 was recorded in Krasnodar Krai (39 and 67 persons, respectively). In 2010, the highest number of victims was recorded in Krasnodar Krai.

The level of labor force participation in the Southern Federal District in 2019 compared to 2010 increased by 2 p.p. and amounted to 66.8% in 2019. In all subjects, with the exception of the Republic of Adygea, the Republic of Crimea and the Sevastopol, the value of the indicator increased. In these regions, the level of labor force participation decreased by 1.7, 1.6 and 0.8 p.p., respectively. The indicator increased to the greatest extent in the Krasnodar Territory - by 4 p.p. In 2019, the lowest level of participation in the labor force strength is observed in the Republic of Adygea (60.1%), the greatest - in the Astrakhan region (68.2%).

The population with money incomes below the subsistence level in all constituent subjects of the Southern Federal District decreased in the period 2010 - 2019, with the exception of the Volgograd region, where the share of the population with money incomes below the subsistence level increased by 0.9 p.p. In 2019, the Republic of Kalmykia has the largest population with monetary incomes below the minimum subsistence level and accounts for 24.2% of the total population of the subject, while the smallest population in Krasnodar Krai accounts for 10.9% of the total population of the subject.

The share of employees with accrued wages below the minimum subsistence level of the working population in the South Federal District in 2010-2019 fell from 31.5% to 10% (by 21.5 p.p.). All regions of the district saw a decline in the indicator, with Rostov region falling the most (by 24.1 p.p.). In 2019, the Republic of Kalmykia (16.2%) recorded the highest share of workers with accrued wages below the minimum subsistence level of the able-bodied population, and Sevastopol (2.3%) - the lowest. Trends in the industrial block indicators are presented in Table 4.

Table 4: Indicators of economic security of the Southern Federal District in the context of the industrial block in 2019

Russian subject	Production index by type of economic activity "Extraction of mineral resources" by regions of the Russian Federation, (x16)	Index of industrial production by subjects of the Russian Federation, (x17)	Producer price indices for the economic activity "Production of manufactured goods" for the constituent entities of the Russian Federation as a whole in accordance with OKVED-2, (x18)	Share of investments in fixed assets in GRP, (x19)	Share of investment in machinery, equipment and vehicles in the total amount of investment in fixed capital for reconstruction and modernization, by constituent entities of the Russian Federation, (x20)
Southern Federal District	106,20	102,90	107,40	25,30	25,30
Republic of Adygea	134,10	100,50	114,40	18,55	15,00
Republic of Kalmykia	123,70	97,30	80,00	14,10	1,80
Republic of Crimea	171,10	117,40	112,10	135,28	5,80
Krasnodar region	91,00	103,20	113,70	19,76	23,50
Astrakhan region	114,30	102,60	89,50	32,66	33,50
Volgograd region	94,00	101,00	102,50	25,81	34,60
Rostov region	87,80	101,20	111,00	22,27	28,20
Sevastopol	44,70	113,40	110,80	234,13	7,70

Production index by type of economic activity "Extraction of mineral resources" increased 13.7 p.p. in the Southern Federal District in 2019 compared to 2018, and in 2011, compared to 2010, it decreased by 3.1 p.p. In 2019, the

Volgograd Region increased by 6.2 p.p. to the greatest extent compared to 2018, and decreased by 6.3 p.p. to the greatest extent in the Republic of Kalmykia.

Index of industrial production takes into account changes in the physical volume of products manufactured, as well as working hours and energy consumption. In 2019, compared to 2018, the volume of industrial production in the Southern Federal District increased by 5.7 p. p., and in 2011 compared to 2010 – by 2.5 p.p. The largest increase among entities in 2019 as compared to 2018 was in Rostov region - by 9.7 p.p., and it decreased only in the Republic of Kalmykia (by 1.3 p.p.).

Producer price index is an indicator of the average level of price changes for raw materials, materials and goods of intermediate consumption relative to the base period. In 2019, as compared to 2018, the average price level for industrial goods in the Southern Federal District increased by 10 p.p. In all subjects of the district there was a positive trend of growth of the indicator in 2019, the highest - in Sevastopol (by 20.7 p. p.).

The share of investments in fixed assets in the gross regional product of the Southern Federal Product in 2019 is 26.4%, which is 0.5 p. p. less than in 2018 and 5.6 p. p. less than in 2010. The highest share of investments in fixed assets in GRP among the subjects was recorded in the city of Sevastopol and makes 86.8%, and the lowest - in the Republic of Kalmykia and makes 14.9%.

In 2018, the share of investments in machinery, equipment, transport vehicles in the total volume of investments in fixed assets aimed at reconstruction and modernization in the Southern Federal District made 26.0%, which is 1 p.p. less than in 2017 and 3.1 p.p. less than in 2007. Among the subjects of the district the highest share of investments was recorded in the Volgograd and Astrakhan Regions (36% and 34% respectively), and the lowest - in the Republic of Kalmykia (2.2%).

Trends in the innovation block indicators are presented in Table 5.

In 2019, compared to 2010, expenditures on technological innovations of organizations in SFD increased by 28,461.7 million rubles (3.3 times) and in 2019 totaled 1,472,822.3 million rubles, up 67,837 million rubles from 2018. During the period under review, this indicator increased in all subjects of the district, the largest - in the Rostov region by 15,377.0 million rubles (by 4.7 times), the smallest - in the Republic of Kalmykia, by 9.7 million rubles. (2.1 times). In 2019, the largest and lowest expenses for companies' technological innovations were recorded in the Rostov region and the Republic of Kalmykia (19,588.4 million rubles and 11,575.5 million rubles, respectively).

The advanced production technologies developed in the period 2010 - 2019 in the Southern Federal District increased by 88 units (4.5 times) and in 2018 amounted to 113 units, which is 34 units more than in 2017. Throughout the period under review, production technologies were developed only in the Krasnodar Territory and the Rostov Region. In other subjects of the district technologies were either not developed at all (Republic of Adygeya), or were developed with variable periodicity (Astrakhan and Volgograd regions), or began to be developed in the last 2 - 3 years (Republic of Kalmykia, Republic of Crimea, Sevastopol). The largest number of developed advanced technologies in 2019 is observed in the Republic of Kalmykia (45 units), the smallest - in the Republic of Crimea (1 unit).

The share of high-tech and knowledge-intensive industries in the gross regional product in the Southern Federal District slightly increased in 2019 as compared to 2010 from 16.7% to 17.5% (by 0.8 p.p.). In 2019, the largest share of high-tech and knowledge-intensive industry products among the Southern Federal District is observed in the Republic of Crimea and Sevastopol (25.2% and 27.5%, respectively), and the smallest - in Astrakhan region and the Republic of Kalmykia (11.6% and 11.0%, respectively). These are the only regions where the share of high-tech and knowledge-intensive industry products in the gross regional product decreased over the period under review.

Intellectual property objects include inventions, utility models, industrial designs, databases, computer programs and integrated circuit typologies. In 2019, compared to 2010, the use of computer programs in the Southern Federal District increased significantly - by 152 units (5.3 times); the use of industrial designs practically did not change - it increased by 13 units. In 2019, the Southern Federal District uses inventions most (312 units), databases least of all (31 units). During the whole period under consideration, no integrated circuit typologies were used in the district.

Table 5: Indicators of economic security of the Southern Federal District in the context of the innovation block in 2019

Russian subject	Expenditures on technological innovations of organizations by type of innovation activity by regions of the Russian Federation (x11)	Advanced production technologies developed by the subjects of the Russian Federation, (x12)	The share of products of high-tech and knowledge-intensive industries in the GRP of the constituent entity of the Russian Federation (x13)	Information about the use of intellectual property objects by subjects of the Russian Federation (x14)	Share of internal expenditures on research and development in GRP (x15)
Southern Federal District	1916,03	130	16,70	998	0,45
Republic of Adygea	355,59	0	15,39	0	0,29
Republic of Kalmykia	0,00	33	11,38	0	0,08
Republic of Crimea	0,00	1	19,68	43	0,54
Krasnodar region	484,68	45	13,72	120	0,22
Astrakhan region	3,20	5	9,23	41	0,11
Volgograd region	746,94	1	17,96	281	0,43
Rostov region	325,62	20	22,21	525	0,96
Sevastopol	0,00	16	20,97	1	1,34

The share of internal expenses for research and development in the gross regional product of the Southern Federal District in 2019 is 0.46%, which is 0.01 p.p. less than in 2018 and 0.10 p.p. less than in 2010. Among the subjects of the district, the largest share of internal expenses for research and development in GRP was recorded in Sevastopol - 1.22%, and the smallest share - in the Republic of Kalmykia (0.08%). The largest share of development costs in GRP over the period under review was also observed in Rostov region - from 2010 to 2018 it was more than a percent, but in 2019 it is 0.96 percent of GRP.

For the further analysis on the considered 20 factors the matrix of pair correlation coefficients was used (the significance of coefficients was checked by the Student's criterion).

To build a regression model, the unemployment rate was chosen as a dependent variable, since from the point of view of the level of economic security of the region, the successful process of market economy formation is reflected in the employment sector. The state of the social sphere of the country is an important factor of effective economic policy. According to the matrix of paired correlation coefficients, it can be concluded that statistically significant factors affecting the unemployment rate are: number of fatalities in industrial accidents with loss of capacity to work for one working day or more, workforce participation rate, the share of population with monetary income below the minimum subsistence level, the number of intellectual property objects, production index by type of economic activity "Extraction of mineral resources" and Share of investments in fixed assets in GRP.

Test the relevance of the model parameters using the t-Student criterion. All parameters except variable x_{14} (production index by type of economic activity "Extraction of mineral resources"), are significant, since the values

of the t-statistics of these variables are greater in absolute value than the critical value $t_{кр}$= 1,890. Create a regression model based on significant indices (Table 6).

Table 6: Coefficients of parameters of the regression model

	Coefficients	t-statistics
Y- crossing	15,032	5,591
x7	-0,043	-3,955
x8	-0,120	-2,807
x9	0,152	4,261
x14	-0,005	-3,742
x19	-0,051	-10,192

The coefficient of determination is 99.32%. The quality of the regression model is good, so create a regression model based on these parameters:

$$y = 15{,}032 - 0{,}043 * x_7 - 0{,}120 * x_8 + 0{,}152 * x_9 - 0{,}005 * x_{14} - 0{,}051 * x_{19}$$

The increase in the number of victims of fatal industrial accidents with loss of capacity to work for one working day or more leads to a decrease in unemployment by 0.043 p.p. If the level of participation in labor force increases by 1 p.p., the unemployment rate decreases by 0.120 p.p. When the share of population with monetary incomes is reduced below the minimum subsistence level by 1 p.p., the unemployment rate decreases by 0.152 p.p. The growth of the number of intellectual property objects by 1 unit leads to the reduction of unemployment rate by 0.005 p.p. While increasing the share of investments in fixed capital in GRP, the unemployment rate decreases by 0.051 p.p.

To classify the regions according to the level of economic security, use the Curved Elbow method to determine the optimal number of clusters and then the Ward method to directly cluster. The elbow method revealed that the optimal number in the Southern Federal District is 2 clusters. This is largely due to the small number of subjects in the district (even taking into account the entry of the Republic of Crimea and the Sevastopol into the district in 2014) and their close proximity to each other, as well as general socio-economic and climatic trends. Thus, the regions were distributed as follows: 1 cluster - regions with high level of economic security; 2 cluster - regions with low level of economic security. The group of regions with high level of economic security included all regions of the district, except for the city. Sevastopol, which is characterized by a low level of economic security indicators (Lukovtseva A.K., 2012; Popkova, E.G., Popova, E.V., Sergi, B.S., 2018).

However, if the optimal number of 3 clusters is taken into account, it can be seen that economic security is high in the Republic of Adygeya, Republic of Kalmykia, Republic of Crimea and Astrakhan region are characterized by a high level of economic security. The average level of economic security is observed in Krasnodar Krai, Volgograd and Rostov regions. The region with a low level of economic security in 2019 is the Sevastopol (fig.1).

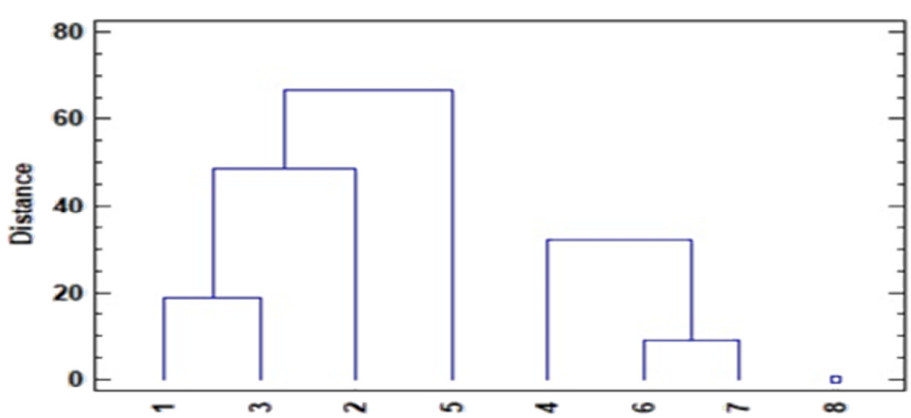

Fig. 1: Clustering regions of the Southern Federal District in 2019 into 3 clusters using the Ward method

Based on the analysis, it can be concluded that the Southern Federal District is characterized by a differentiation. In general, Krasnodar Krai, Astrakhan Region, take the leading positions. The differences in classifications are largely explained by the fact that the region includes the Republic of Crimea and the city of Sevastopol, and since 2010 additional indicators affecting economic security have been taken into account (Babanov E.A., 2020; Bogoviz, A.V., Sergi, B.S,. 2018; Popkova, E.G., Sergi, B.S., 2018).

The Conclusion

In general, the Southern Federal District has the largest number of grant-based entities, and all of its republics have depressed economies. The socio-economic situation is aggravated by the many problems that need to be solved within the framework of State support for the socio-economic development of the constituent entities of the Russian Federation and for the implementation of special federal programs, including the federal program «South of Russia». The most important aspect of the qualitative improvement of the productive forces is to make the most of the natural and socio-economic advantages of the district and, on this basis, it is necessary to develop those economic activities, which have no prerequisites or opportunities in other regions or whose development there is less. Special attention should be paid to the development of resort, recreation and agro-industrial complexes.

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Patent Landscapes as A Tool for Determining Science and Technology Priorities in Government Contracts

Elena V. SIBIRSKAYA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: Sibirskaya.EV@rea.ru

Lyudmila V. OVESHNIKOVA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: Oveshnikova.LV@rea.ru

Galina Y. GAGARINA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: galina_gagarina@mail.ru

Olga N. SIMAKHINA
Plekhanov Russian University of Economics, Moscow, Russia
E-mail: O.N.Simakhina@yandex.ru

Evgenia V. SIMONOVA
Orel State University of Economics and Trade, Orel, Russia
E-mail: jezzi@mail.ru

Abstract

Patent landscapes are a modern tool for analyzing and presenting the results of patent research using innovative visualization technologies. Work on patent landscapes - patent mapping (patent mapping) - includes statistical and intellectual analysis of patent documents in order to make a picture, reflecting the technical and legal status of technological developments in a given field of technology in a particular region or worldwide. The article provides information on the use of the patent landscape as a tool of state order planning in the Russian Federation.

Keywords: State, Intellectual Property, Problems, Innovation, Innovative Economy, Scientific Potential, State Regulation.

JEL Classification: O 34

Introduction

The patent landscape consists of a variety of analyses, including trends and areas of intensive patenting, areas of high technological competition, monopolization, open patent segments, and profiles of leading patent holders and authors of inventions. Patent landscapes can be developed for both a broad subject area and a narrow subject area. In this study, we will look at the patent landscape as a tool for public order planning.

Findings

In the course of the work, the data on completed and planned public procurement in 2019-2020 (Regulations on the State Patent Fund (2020) accompanied by contracts including provisions on the transfer of the results of intellectual activity (RIA) to the customer were analyzed, the results of which were concluded: That a refundable transfer of the results of intellectual activity to a State customer takes place as a consequence of:

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– placing a State order directly for the purpose of creating intellectual property and carrying out legally significant actions against them;

– the placement of a State order for the creation of material objects, the secondary result of which is the transfer of intellectual property rights to the customer.

At the same time, the amounts of budget funds allocated for those and other purposes are economically significant and comparable for the customer and the contractor, although their specific values can vary greatly depending on the specific industry.

Depending on the planning methods of the state order and the methods of forming the documentation, it is possible more or less effective development of budget funds by each state customer, ultimately expressed in the annual national indicator of budgetary savings, illustrating the release of significant (tens and hundreds of billions of rubles) budget funds relative to the approved budget appropriations (Order of Rospatent dated July 22, 2020).

At the same time, the contractual system allows for the use of different methods of technical evaluation of products during the placing of a State order, and the relevant procedures can be carried out both at the planning stage, and in the final stages of the procurement to review the actions and their results (figure 1).

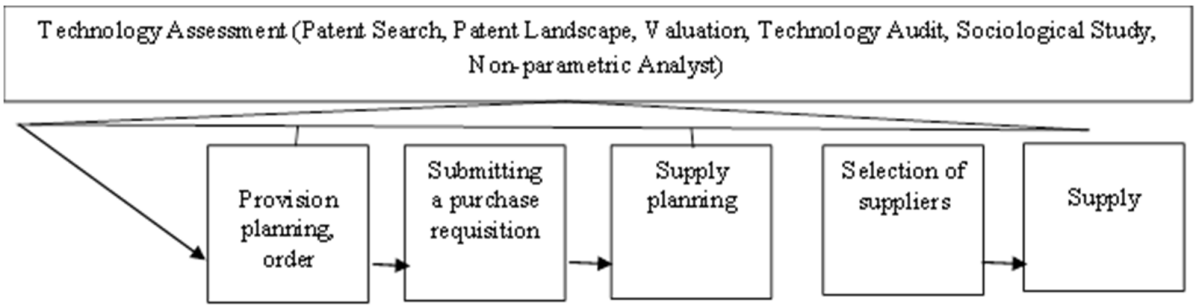

Fig. 1: Stages of government procurement

When conducting patent research for government orders, as a rule, they operate not with data on products, but with data on titles of protection based on the parameters contained only in them. WIPO's[1] Guide and Recommendations on Patent Landscapes[2] operate on «traditional» data categories, which include data from security documents, including names of authors, rights holders, dates, descriptions, formulas. Their automated analysis requires solving fundamental problems when working with information. The lack of access to the technologies for solving the mentioned problems leads to the need to maintain a staff that analyzes the values of the parameter «applicant» manually.

The development of a methodology for the use of patent landscapes in public contracting is being carried out with a view to ensuring its universality and applicability outside the sphere of public contracting without substantial modifications. Under this objective, official documentation system (ODS) provides objective, easily accessible and structured information (Order of Rospatent dated 02.07.2019 (2019); Order of Rospatent dated 10.01.2019 (2019); Order of Rospatent dated December 29, 2018 (2018); Order of Rospatent dated December 25, 2018 (2018); State standard 34.003-90 I (1990).

The Unified Information System (UIS), selected as the main ODS, and its most harmonized information part: data on actions carried out in accordance with the procedures regulated by the Law on the Contractual System, referred to in this work by the Acts are:

– a model of the economic relations that have developed in various areas in the territory of the Russian Federation, based on data on the economically sound behavior of real-world economic entities;

– an unified and publicly accessible database, published in the UIS in the public domain, accompanied by strict reporting, the violation of which entails disciplinary and administrative liability;

[1] World Intellectual Property Organization // URL: http://rosvois.ru/ (Date of referral 03.09.2020)

[2] The methodology for the development of the patent landscapes of the PHIPS Project Office // https://ww1.fips.ru/vse-zlugigi/patenty_analytics/metodologiya-razrabotki-patentnykh-patentshaftov-proektnogo--lyisafips.php (Date of referral 03.09.2020).)

– goods-oriented system: the main units of accounting in the UIS are goods and their characteristics, it is at this stage that the terms «patent landscape» and «market of public procurement» should be used. The definition of the characteristics of the goods to be procured forms the basis of control in procurement.

In order to visualize the relationships between the «patent landscape» and the «market» the geographical layer is included in the cube as a set of objective variables capable of being matched both with the place (geography) of creation of technical solutions, and with the product boundaries of the «market». The application of the patent landscape over a geographical layer in this work is used solely to demonstrate the implicit relationships of the databases already linked by the data in the objective category of geographical data, and is not an essential characteristic of the proposed methodology, meaning that all the methods presented can be performed without geographical limits.

On the other hand, it is difficult to overestimate such information as the place of origin of products and the different actions of economic systems, and the use of the geographical layer is therefore welcome.

Imagine a mechanism for comparing cubes by geographic information (Figure 2), which can be represented both as a cube face and as a column set in a database.

This illustrates the following:

– firstly, the comparison of the cubes by the «common» face, which is geographical information (geographical longitude and latitude), makes it possible to compare the other faces of the cubes with each other as basic (acts) as well as secondary legislation, including the averages described earlier, which in turn are descriptive measures;

– secondly, the diversity of different relationships can be constructed on the basis of a two-dimensional table.

Separately, the already voiced problem of ignoring the most objective data should be illustrated by the example of compiling the columns «Geographic information» (Figure 3).

When choosing parameters, the creator of the database, as well as when choosing the parameters of the RIA Database, is faced with the question of the need to store geographic information as spherical coordinates or as textual indications of state administrative divisions (for example, in the form of names of subjects of the Russian Federation).

In accordance with the principle already voiced, it is necessary to make a choice in favor of storing information in more objective data - in geographical coordinates, which, if necessary, give an idea of both the state and the element of the administrative structure of the state in which the recorded act took place, that is, it is more universal for practical application by the parameter of the Act.

It is possible to use fictions, such as storing, if accurate graphical coordinates cannot be taken into account, the geographical centers of objects, including elements of the administrative and territorial organization.

The most significant advantage is that this form of geographic data recording, even using fictions, makes it possible to calculate distances between objects without transforming them (Figure 4). This will provide quantitative data that can be used in analytical techniques, including the calculation of the average distance between factors.

On the other hand, the advantages of using objective geographic data make it possible to make an assumption about the prospects of converting the data on geographic objects contained in the ODS into more objective ones, for their comparison, for example, about the prospects of converting the data in the «customer subject» column into geographic coordinates (Figure 5).

Obtaining objective and comparable data and taking them into account in the database makes it possible to calculate statistics for the overlapping of numerous layers (creating new faces of the «Cube»), for example, if the Technological situation is superimposed on a geographical layer for solving different problems, including the assessment of the remoteness of technopolises from the factors: RIA creators and companies willing to purchase them.

Based on the results, information was obtained that industrial parks on the territory of the Novosibirsk region are concentrated in relative proximity to each other (the territory of the city of Novosibirsk, on the territory of the Novosibirsk academic town), while the consumers of the products are evenly distributed throughout the territory of the constituent entity of the subject of the Russian Federation, including those located at a considerable distance apart.

The absolute value obtained from the most distant supplier (390 km) is not in itself significant and cannot provide data to assess the Technological Situation. However, it is possible to calculate descriptive indicators, one of which is the average distance of suppliers and customers to the nearest innovation center.

After obtaining the simplest statistical indicator (trend measure) of the average distance of consumers of products from the creator of the RIA, it is possible to use it in objective (significant) economic and statistical studies and as a face of Cuba (Figure 6).

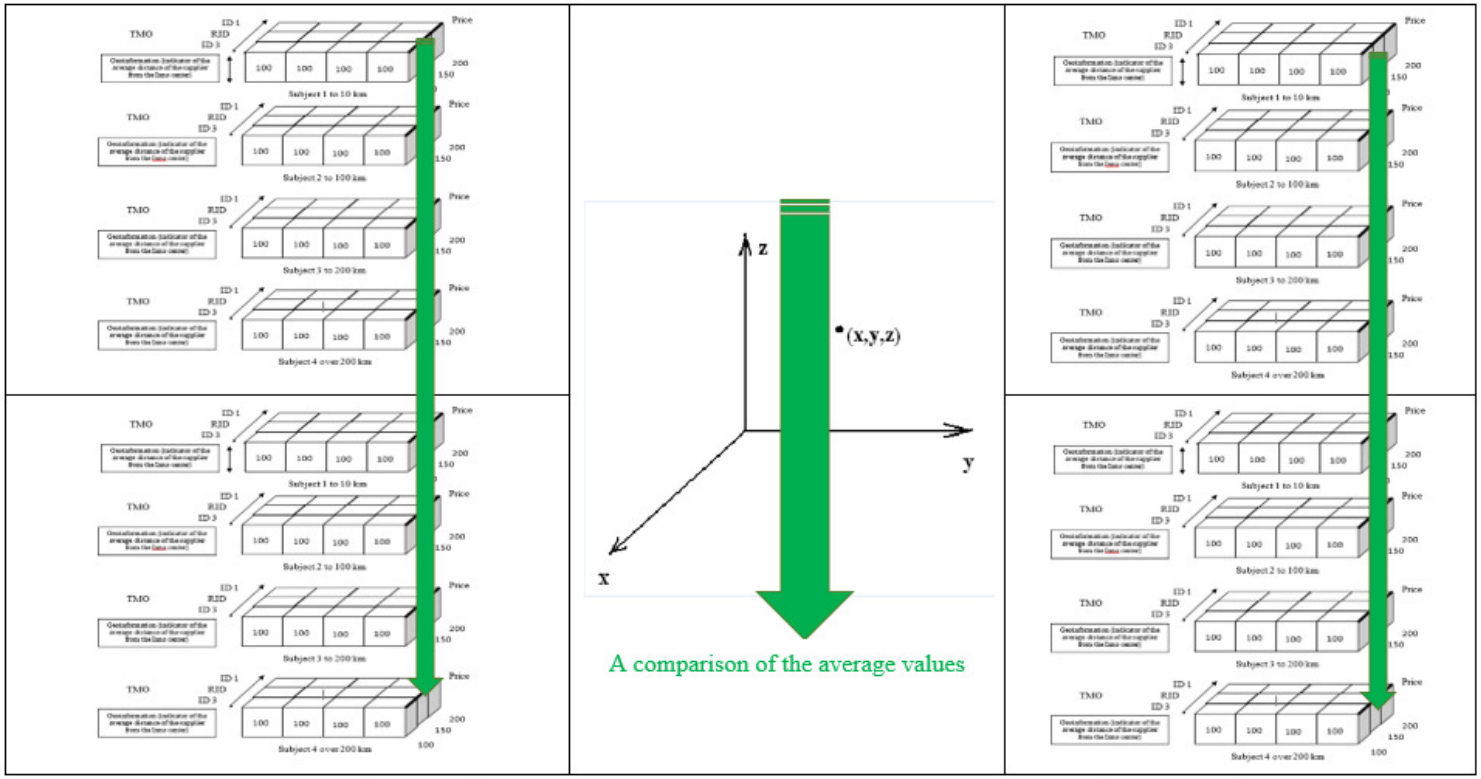

Act ID	Action	Project ID	Geoinformation						Expenditure
			x	y	z	Area	Russian Federation subject	Country	
A000001	RID achievement	A00001	$66^0 4720^0$	$93^0 4631^0$	253	Evenki district	Krasnoyarsk region	Russian Federation	100 000

Fig. 2: Relationship of TMO by geographic layer and presentation in the table

Act ID	Action	Project ID	Geoinformation						Expenditure
			x	y	z	Area	Russian Federation subject	Country	
A000001	RID achievement	A00001	$66^0 4720^0$	$93^0 4631^0$	253	Evenki district	Krasnoyarsk region	Russian Federation	100 000

Fig. 3: Obtaining new information on objective database data

Act ID	Action	Project ID	Geoinformation						Expenditure
			x	y	z	Area	Russian Federation subject	Country	
A000001	RID achievement	A00001	$66^0 4720^0$	$93^0 4631^0$	253	Evenki district	Krasnoyarsk region	Russian Federation	100 000

Fig. 4: Obtaining coordinates leads to the possibility of calculating the distance

№ contract	Supplier	INN supplier	Legal address
1583601069920000000	PJSC «Rostelecom»	7707049388	30 (building 1), Goncharnaya st., Moscow, Russia, 115172

Fig. 5: Adding the columns «Legal address» and «Coordinates» by the Individual taxpayer number

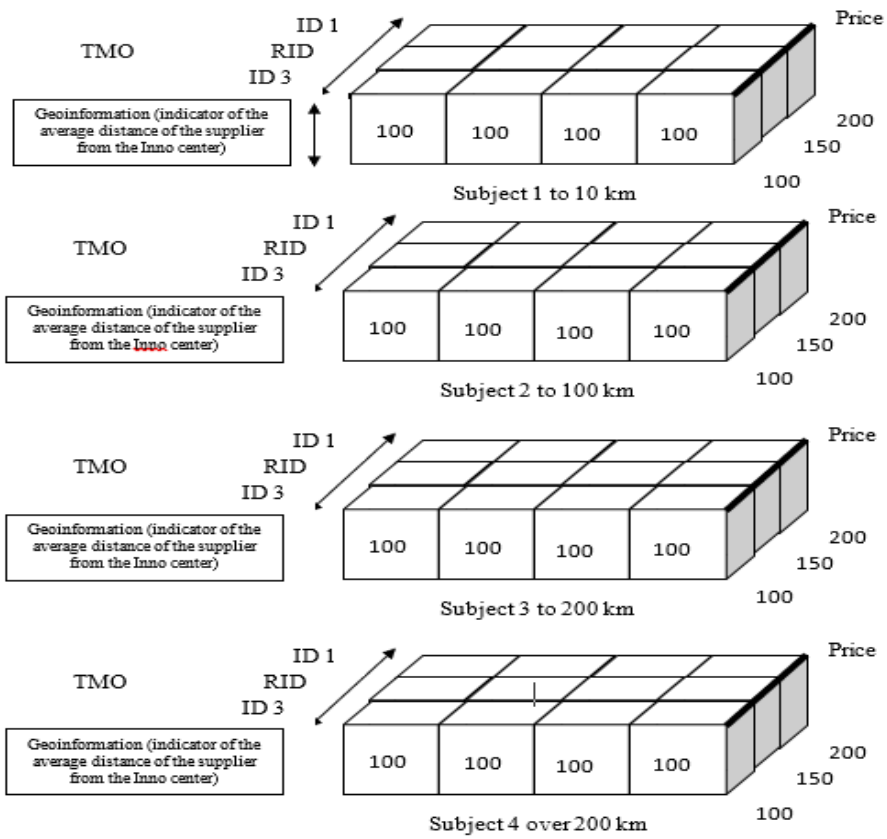

Fig. 6: Cube of interdependence of prices, TMO and geographical distance of factors

When expressed as a two-dimensional table based on average geographical distance, the indicator will be placed in the Technological model of the object (TMO) structure and used to identify the relationships included in the TMO parameters from geographical distance (Figure 7) and to construct statistical visualization (Figure 8) for use in business.

Geoinformation						
Act ID	Activity	Project ID	The average distance	Area	Russian Federation subject	P parameter TMO
A000001	REID achievement	A00001	240	Evenki district	Krasnoyarsk region	100 000
A000001	REID achievement	A00001	100	Area 1	Subject 1	110 000
A000002	REID achievement	A000001	200	Area 2	Subject 2	120 000
A000003	REID achievement	A00001	300	Area 3	Subject 3	130 000
P000001	Patenting REED	A00002	400	Area 4	Subject 4	140 000
P000002	Patenting REED	B00001	500	Area 5	Subject 5	150 000
P000003	Patenting REED	B00001	600	Area 6	Subject 6	160 000

Fig. 7: Use of measure TMO in database

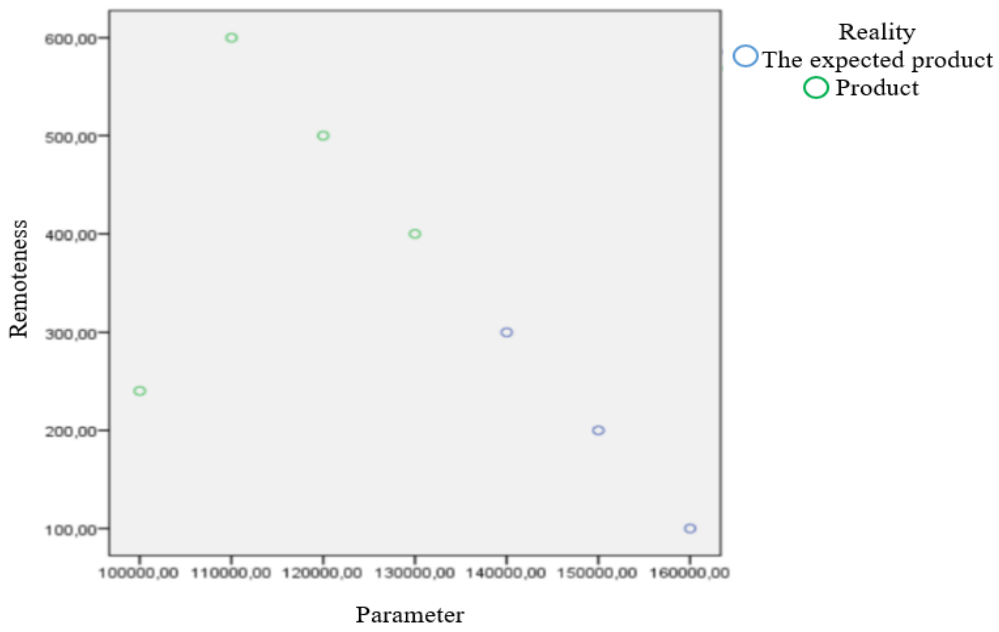

Fig. 8: Dependence of the distance on the parameter TMO

Conclusion

Patent landscapes have established themselves at the Russian and global levels as a comprehensive and multidisciplinary tool for determining scientific and technological priorities and researching the competitiveness of promising technologies, products and services intended to bring products to key markets.

The systematic and mass application of the methodology for the development of industrial and express patent landscapes presented in this article will ensure the formation of an effective infrastructure of expert and analytical support for new tools of corporate and state policy for the development of new industries and the coordination of promising technological projects, as well as the formation of fundamentally new markets and the creation of conditions for of the global technological leadership of Russia.

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Review of The Infrastructure Reconstruction Process in Cambodia

Tomasz LUKASZEWSKI

University of Szczecin, Poland
tomasz.lukaszewski@usz.edu.pl

Kerry SLATTERY

National University of Management, Phnom Penh, Cambodia
kerryslattery@num.edu.kh

Abstract

For almost thirty years Cambodia has been rebuilding and expanding the infrastructure destroyed during decades of war, and striving to improve the quality of services provided by these facilities. The success of the measures taken is a prerequisite for achievement of the strategic goals including poverty alleviation and raising the citizens living standards, as well as maintaining economic growth and ensuring further development of the country.
The article presents an assessment of progress in reconstruction across various sectors of physical infrastructure such as roads, railways, telecommunication networks, water supply facilities, irrigation systems, and electricity supply facilities made in Cambodia between years 1991-2018.
The aim of the study is to evaluate the achieved level of development of the infrastructure assets in relation to its initial state, to the objectives adopted and to the expenses incurred for this purpose.

The research used descriptive method and quantitative data obtained from documents published by public entities.

Keywords: Infrastructure, Cambodia, Development, Public Investment, Private Investment.

Introduction

Thanks to combination of factors such as stable macroeconomic, preferential export access to most developed economies, liberal trade and investment policy, the country's location in the world's fastest-growing region, low labour costs and a dynamic workforce – Cambodia is currently experiencing a period of economic development. The expansion of agriculture and acceleration of industrialization driven primarily by garment production, construction, and tourism have resulted in the country's economy growing at an impressive 7% per year since the global recession in 2008, leading to a doubling of GDP per capita from $630 to $1,300 over the last ten years.

However, despite favourable prospects, to remain competitive within the Southeast Asia region and to maintain on the path of economic progress, Cambodia needs to increase investments in physical infrastructure. Such conclusion is confirmed by numerous research papers exploring the relationship between infrastructure investments and economic growth (Aschauer, 1989; Munnell 1990, Zhao and Kanamori, 2007; Straub, S., 2008; Sahoo and Dash, 2009; Estache, Serebrisky and Wren-Lewis, 2015). The authors emphasize that infrastructure investment has positive impact on employment growth, poverty reduction, increased productivity, increased efficiency and economic competitiveness, and acts as a link between resources and factories, people and jobs and products and markets (Sahoo and Dash, 2009).

The inverse relationship was also investigated. It revealed that the lack of infrastructure not only hinders the productive capacity of the country's economy and reduces its competitiveness, but also inhibits the spread of the benefits of economic growth, which makes the development process more inclusive (Sum, 2007).

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The article focuses on the effects of the infrastructure reconstruction process in Cambodia. Its aim is to review the current state of public facilities and services in Cambodia, and compare the investment achievements with the objectives and financial expenditure incurred.

When assessing the current condition of the Cambodian infrastructure, its initial state should be taken into consideration. Cambodia for centuries relied on agriculture, and failed to develop substantial infrastructure. Then under the French Protectorate a basic structure of Phnom Penh city was founded, the port facility was built, and construction of a railway linking Phnom Penh to the Thai border began. After independence, development of the infrastructure continued. During this period construction of a national road network was initiated, including completion of a route connecting Phnom Penh to Sihanoukville, a coastal city on the Gulf of Thailand. Those two cities were also linked via a rail line. Other achievements included the construction of a large-scale sea port in Sihanoukville, and development of an airport in Phnom Penh. Then the period of civil war, the Khmer Rouge rule and the subsequent years of war began. During this period, most of the existing infrastructure was destroyed.

The structure of the article has been arranged in the following way. The most economically important infrastructural subsectors were chosen and the progress made in their development over the last 30 years was characterized. Each of the structures was presented according to the following scheme: assessment of the current state and results achieved, plans for further development and financial expenses incurred and capital investment requirements. Last section contains findings and conclusions.

Transport

Between 1991 and 2015 over 7000 km of roads and several key bridges and were the built and rehabilitated (IRITWG, 2015). Despite of the external financing and relatively large public investment on the improvement of transportation infrastructure (including roads, ports, railways and civil aviation), progress is still limited. For example, the percentage of paved roads of total roads increased from 6.3% in 2005 to 10.5% in 2015 (World Bank Group, 2017).

Today road transport is the major logistics modality in Cambodia, accounting for 65% of passengers and 70% of freight in terms of total transported volume. The country's road network extends over 52000 km, covering all major regions and consisting of 5600 km of national roads, 6600 km of provincial roads, and approximately 40300 km of tertiary roads (CDC, 2013). Their standard is unsatisfactory: by 2015 only 10 percent of Cambodia's total road and highway length was paved with asphalt, approximately 50 percent of roads were made of crushed stone, gravel, or improved earth, and the remaining were unimproved earth or little more than tracks (Sum, 2007). This is the lowest ratio among all countries in the region. The conditions of major national roads have improved in recent years, but roads in the rural areas mostly remain unpaved and lack traffic lights or roadside assistance services (Hong Kong Trade Development Council, 2017). During the rainy season, certain roads in urban and rural areas are hardly accessible or totally unpassable which often leaves some sections of the country isolated and causes subsequent economic disruption (Hong Kong Trade Development Council, 2017).

In order to modernise and extend existing road network systems, the Royal Government of Cambodia has established a long-term expressway Master Plan which proposes construction of 850 km of expressways by 2020 and establishes a 2230 km expressway network by 2040.

The Cambodian railway system is underdeveloped and cannot be considered a real logistical alternative to road transport. The rail system consists of only two lines totalling around 650 km of single railway tracks, and entails a southbound track from Phnom Penh to Sihanoukville and a northbound track from Phnom Penh to Poipet on the Cambodian-Thai border. Both lines are in poor condition, with trains operating at a speed of approximately 20 km per hour (Hong Kong Trade Development Council, 2017). A rail rehabilitation project was launched in 2006 and the southern line was completed and opened to freight operations in 2013. Since then it has been used to transport fuel, coal, cement and container shipments, and in 2016 passenger services were initiated. Reparations on the northern line still have not been completed due to resettlement problems, cost overruns, flooding and construction quality issues (Open Development Cambodia, 2015).

The rehabilitation and development of a devastated Cambodian road network was conducted and financed mostly by foreign donors. According to the IRITWG report, the total value of the National Road Improvement Projects in Cambodia 1993-2015 exceeded 3.7 billion USD. Over 73% of that investment was financed by Chinese capital, with

about 11% provided by the Asian Development Bank and the World Bank, and 6% coming from Japan. The rest was covered by Korea, Thailand, Vietnam, the United States, and private investors. In terms of financial assistance, over 72% of the capital was in the form of loans, another 5.7% was grants, and the Cambodian national budget financed less than 1%. This picture may be blurred as almost 20% of funds did not have a specified proper source. Data on investment cost (in million dollars) and length of roads built (in km) in years 1993-2015 are presented in Figure 1.

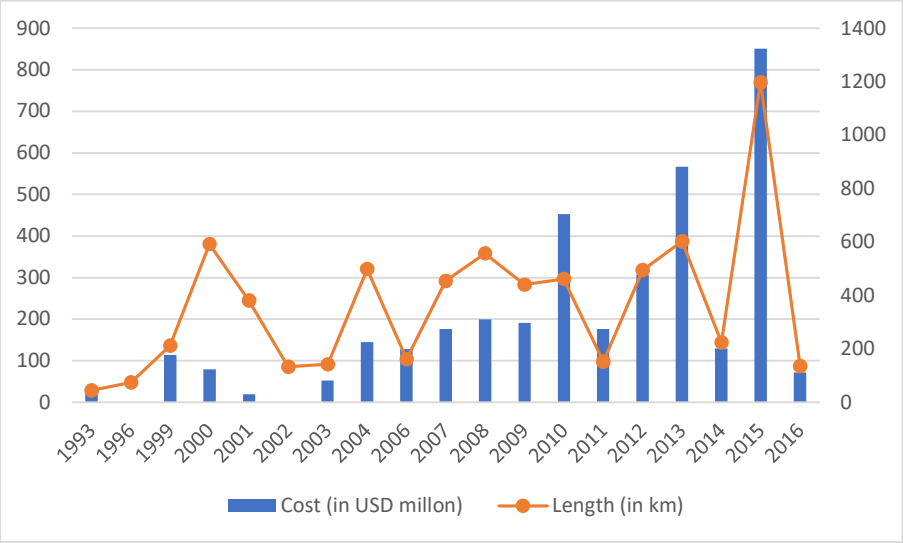

Figure 1: Cost and length of road improvement projects in Cambodia 1993-2015

The further modernisation of Cambodia's transport infrastructure will require a significant amount of investment. The expressway master plan alone is estimated to cost around 35 billion USD by 2040. Total capital expenditures in the Cambodian infrastructure sector between 2013 and 2022 are calculated to be as much as 16 billion USD (According to Economic Research Institute for ASEAN and East Asia (ERIA)). This figure is largely in line with the calculations of the Council for Development of Cambodia (CDC), with total committed investment amounting to about 7 billion USD between 2012 and 2016, or some 40% of the published total (Hong Kong Trade Development Council, 2017).

In order to attract private investors and increase their participation in building transport facilities, the government adopted the 2007 Law on Concessions. The purpose of this legislation was to move forward the implementation of privately financed projects by way of introducing various mechanisms for granting infrastructure concessions, such as Build-Operate-Transfer and Build-Own-Operate arrangements. Some examples of investments in the transport sub-sector in the form of PPP include the rehabilitation of a railway funded by the Asian Development Bank, the Australian aid agency and the Cambodian government, as well as the renovation of National Road No. 4 via a BOT arrangement with private investors AZ Group.

Electricity and Energy Systems

Electricity generation in Cambodia comes from four sources: hydropower plants, coal-fired power plants, diesel power plants and biomass. Although oil has been the major source of electricity production for more than two decades, in recent years newly opened coal and hydropower plants have completely changed the picture. Up until 2011, over 90% of the electricity was produced from heavy fuel oil and diesel generators, but in 2015 this percentage shrunk to as low as 5% with most generation coming from coal (51%) and hydropower (43%). In 2015, domestic producers generated about 4.6 GWh, which can be considered a giant leap from the 1 GWh produced in 2011 (MME & ERIA, 2016).

Even in 2019 the country still lacks an overall electricity network, and electric energy is currently supplied via 24 small isolated systems. The main provider is Electricite du Cambodge (EDC), a state-run company that owns licenses for generation, distribution and transmission of electricity in Phnom Penh and the 12 provincial cities. This public

provider is supplemented by private entities, including independent power producers in provincial towns, licensees in smaller towns, and rural electricity enterprises (Open Development Cambodia, 2017).

The efficiency of the overall system is low. Twenty-four hour supply of electricity is not assured, and the quality of electricity is not reliable. In 2013, access to distributed electricity had reached no more than 35% of households1, with significant inequalities between urban and rural areas. According to data presented by the Ministry of Industry, Mines and Energy, almost 100% of households in cities are electrified and their consumption exceeds 90% of the country's produced electricity. However, in regards to rural households, only 14% have access to the grid electricity network, and some 50% have limited access to alternative off-grid electricity sources, while around 30% have no electricity access (MIME, 2013).

Relatedly, while the amount of energy generated in Cambodia has grown enormously in recent years, the demand driven by increasing industrial production, a growing population, and higher living standards has grown even faster. The total electricity production in Cambodia was reported to be 6.18 GWh in 2015. In order to keep the demand and supply balanced the country must import electricity. In 2015 Cambodia purchased 1.54 GWh of electricity, mostly from Vietnam and Thailand. This was about 25% of the country's total supply, although it should be noted that the volume of electricity purchased from overseas has been steadily decreasing in recent years. In 2016 imports fell by almost 25% compared to 2015, and in 2017 imports were expected to fall another 20%, mostly due to the increase in domestic production from coal power plants (Open Development Cambodia, 2017).

Understanding that access to electricity is fundamental for a country's socio-economic growth, sustainability, and poverty alleviation has made the Cambodian government face the following problems in the energy sector: dependence on imported electricity, low grid coverage in rural areas, electricity shortages and power outages, and high electricity prices (Open Development Cambodia, 2017). In 2014 the government officially announced all villages would be connected to the grid by 2020, and 70% of households would have power by 2030 (WWF and IES, 2016). Achieving this objective requires expanding the distribution network by developing new high-voltage lines between Cambodia and its neighbouring countries, and building transmission lines within the country. This is an expensive process. The complete electrification of Cambodia would cost close to 1 billion USD according to the EDC (Chandara, 2016), and would require external funding.

The power and electricity sub-sector received only around 18% of the total infrastructure budget, although the overall amount of investment in the energy sector has greatly increased over the last decade. This includes bi- and multilateral donor support for transmission projects, as well as private investments in hydropower and coal power stations, mostly through Build-Operate-Transfer (BOT) arrangements. The Electricity Law adopted in 2001 encourages private entities to invest in electricity generation, transmission, and distribution infrastructure, and the foreigners who utilised this opportunity the most were the Chinese who invested over 11.5 billion USD to build hydropower dams and power transmission lines in Cambodia (Grimsditch, 2016).

Irrigation, Water and Sanitation Systems

Natural conditions in Cambodia, in particular the significant difference in precipitation between the rainy season and the dry season, make irrigation systems a key element in securing stable water supply for agriculture, which in turn is an essential factor for attaining food self-sufficiency – a national socio-economic development goal of the Cambodian government. In 2005, only 16 percent of rural households had their paddy fields irrigated, while the rest relied on rainwater which often led to lower production yields and lower incomes (Sum, 2007). However, the situation has been consistently improving and according to the National Strategic Development Plan 2014-2018 Cambodia made significant progress in rehabilitating and constructing irrigation infrastructure. From 2008 to 2013, irrigated areas expanded to 1 485 670 ha, and vulnerability to flood and drought was reduced while hydrological control improved.

The water and sanitation system in Cambodia is another infrastructure subsector characterized by large inequalities related to the access disparity between municipal and rural areas. About 94% of the urban population has access to

[1] According to Council for the Development of Cambodia the access to electricity has 22,5% of households, while National Policy, Strategy And Action Plan on Energy Efficiency in Cambodia estimates this number to be 34%.

an improved water supply, and 82% to improved sanitation, while in the rural areas only 66% have access to an improved water supply and about 25% to improved sanitation (Asian Development Bank, 2014). Based on these figures, around 4.3 million people are still without access to improved water supply and 9.4 million people lack access to improved sanitation. To address this situation the government has adopted the National Strategic Plan for Rural Water Supply, Sanitation and Hygiene (RWSSH) for the years 2014-2025 which sets goals in terms of improved access for rural and urban subsectors. Necessary investments include the replacement of existing infrastructure and the development of new facilities. According to the World Bank, the plan will require annual capital spending on infrastructure to be about 211 million USD, which is around 6.2% of the 2014 national budget and 1.4% of the total 2013 GDP. Additionally, around 24 million USD per year would be needed to finance the operation and maintenance of the current and future infrastructure (World Bank Group , 2015).

The total cost of investment of irrigation systems exceeded 560 million USD (The Royal Government of Cambodia, 2014). The water and sanitation projects (WAS) were expected to consume less than 20% of the total public infrastructure budget, however an exact estimation on the amount spent is not available. Service Delivery Assessment presented report regarding public spending on WAS subsector, based on data obtained from CDC and development partners (Service Delivery Assessment, 2015). Table 1 presents report findings on the projected average annual spending of government and development partners on water supply and sanitation projects in both rural and urban areas between 2010 and 2015. It should be highlighted that the provided funds are grossly insufficient, and the sub-sector is under-funded, with current financing not even covering O&M costs.

Table 1: Public investments in capital expenditure (million US$, annual average).

Sub-sector	Domestic government	Development partners	Total
			Recent (2010-2012)
Rural water supply	0.8	7.9	8.7
Urban water supply	2.4	24.4	26.8
Rural sanitation	0.2	1.6	1.8
Urban sanitation	0.3	5.3	5.6
Total	**3.7**	**39.2**	**42.9**
			Anticipated (2013-2015)
Rural water supply	0.9	5	5.9
Urban water supply	2.2	21.5	23.7
Rural sanitation	0.4	2.5	2.9
Urban sanitation	1.6	4.3	5.9
Total	**19.50**	**32.80**	**52.3**

Additional information on the existing and projected financial gap between expenditures and financing in the WAS subs-sector are noted in the Water and Sanitation Sector Financing Strategy for Cambodia Years 2009-2028 commissioned by the Water and Sanitation Program (WSP) (Water and Sanitation Program (WSP), 2010) and cited in (Service Delivery Assessment, 2015). Table 2 quotes a baseline scenario based on the assumption that the infrastructure is extended at the same rate as the development/population, and that coverage levels remain constant with the overall service level unchanged. Under such conditions the financial gap found in year 2009 will not be reduced until 2028.

Table 2: Expenditure needs and financing available within WAS subsector (in million USD)

	2009	2015	2020	2025	2028
Expenditure need					
O&M	107.56	123.48	137.71	152.99	162.72
Re-investments	146.35	166.47	183.72	201.73	212.17
Renovation	0.53	2.4	2.4	2.4	2.4
New investments	34.62	72.76	72.76	72.76	72.76
Financing available					
Public budget	1.925	2.79	3.92	5.24	6.25

User charges	31.58	46.33	65.61	88.73	106.4
Private financing	31.28	50.21	76.52	111.38	139.54
Grants	15.567	14.56	14.56	14.56	14.56
Loans	9.358	7.66	6.55	6.55	6.55
Financing gap	-199.35	-243.56	-229.43	-203.42	-176.75

Internet and Telecommunication

Internet usage in Cambodia has soared, and quality has significantly improved over the last few years. The percentage of the population with access to the internet has increased from 3% in 2011 to 42% in 2017 (We Are Social & Hootsuite, 2017). In absolute figures, the number of internet subscribers grew from 320000 in 2010 to over 7 million in 2017. While impressive, Cambodia is still below the global internet penetration rate of 50%. In public statements government officials have predicted that by 2020 over 80% of the population will be using the internet (Open Development Cambodia, 2015). This is possible, although further internet growth is constrained by poor infrastructure such as an absence of an extensive landline network in rural areas and insufficient electricity often resulting in blackouts (Freedom House, 2017).

On a national level, Cambodia has had to rely on the infrastructure of Vietnam and Thailand for internet access up until 2017 when the country's first undersea cable was launched by Ezecom, linking provinces with slow connections to a high-speed international network and improving 4G services nationwide. The 1300 km long cable system has a capacity of 30 Tbps, and connects Cambodia to landing stations in Malaysia and Thailand (Ezecom, 2017). Another project by the Fiber Optic Cable Network (CFOCN) is underway. It is a 25-year concession agreement with the government to build a landing station in Sihanoukville and install submarine fiber-optic telecom cables to connect to the AAE-1 cable, which links Southeast Asia with Europe. The concession agreement is based on a build-own-operate-transfer model. Within the country, internet service is provided by three major operators: Telecom Cambodia, Viettel Cambodia, and Cambodia Fiber Optica Cable Network. These interconnect with smaller networks, allowing exchanges of information through Wi-Fi, LAN lines, or other means (Freedom House, 2017). In order to offer internet to the public the ISPs have to develop their own network. As an example of this, Telecom Cambodia initiated a project of installing a 467 km fibre-optic cable connection between Sihanoukville and Kampong Cham provinces in 2017 (Report Linker, 2017). After recent consolidations, the Cambodian telecommunications market is considered competitive but saturated. In 2016 six mobile service providers served over 21.2 million mobile subscribers, with a ratio of total telephone subscribers to the country's population equal to 139% (MPTC, 2015). About 96% of Cambodians claim to own a mobile phone, with 13% of citizens claiming to use more than one phone and 25% claiming more than one mobile operator, according to a survey conducted by the Open Institute (Freedom House, 2017). The number of fixed telephone lines in Cambodia is very small, declining from 2.3% in 2014 to 1.4% in 2016 (Report Linker, 2017).

A lack of information on the amount of investments actually committed in the infrastructure sector between 2006 and 2018 inhibits the understanding of the current state of sector development and its progress. It is known that the requirements for public capital expenditure in NSDP did not exceed 3.8 billion USD. However, it is not clear to what extent this was covered by government expenses, and how much came from external funding provided by development partners. There is also no proper information regarding private investment.

Conclusions

Cambodia has undoubtedly made impressive progress since 1991 in recovering and developing devastated facilities. These results have been achieved through government measures, the involvement of private parties, and foreign aid. Unfortunately lack of information on the amount of investments actually committed in the infrastructure sector between 2006 and 2018 inhibits the understanding of the current state of sector development and its progress. It is known that the requirements for public capital expenditure in the government's strategy did not exceed 3.8 billion USD. However, it is not clear to what extent this was covered by government expenses, and how much came from external funding provided by development partners. There is also no proper information regarding private investment.

Major identified problems include: the insufficient quantity and quality of facilities compared to the public needs, the high cost and limited access to public services, the low quality of those services, the uneven deployment of

infrastructure within the regions of the country, and the unequal level of access to infrastructural services whereby access is concentrated in the urban areas which comprise only about 20% of the estimated population of 14 million.

The most urgent and important infrastructure investment needs include:

- Expanding the network expressways and improving the quality of existing roads.
- Increasing the total domestic generation of electricity to reduce dependency on imports and expanding the electricity grid within the country.
- Completing the rehabilitation of railroads and restoring train operations on the northern line.
- Rehabilitating and constructing irrigation system to expand agriculture production.
- Expanding pipeline network systems to improve access to water and sanitation.
- Connecting to the global internet network and expanding internet transfer facilities within the country.

Implementation of the above-mentioned infrastructural investments will have a significant impact on further economic development of the country.

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Financing of The Infrastructure Development in Cambodia

Tomasz LUKASZEWSKI

University of Szczecin, Poland
tomasz.lukaszewski@usz.edu.pl

Abstract

In the 1990s Cambodia was practically deprived of the infrastructure. The reconstruction and development of new physical facilities required substantial expenditures, exceeding the capabilities of a war-ravaged country lacking of money, industry, specialists and resources. To overcome an insufficiency of public financial and material assets, government had to encourage external capital to involvement in the provision of infrastructure projects.
The aim of the paper is to analyse the case of Cambodia to examine mechanisms of financing the infrastructure investments in developing countries.
The article addresses two issues. Firstly, reviews the political, regulatory and legal actions taken by the government to establish business climate conductive to investment and attractive to investors. Secondly, attempts to assess the effectiveness of those measures by analyse the structure and dynamics of capital expenditures on infrastructure development in Cambodia in 2006-2018.

The research used descriptive method and quantitative data obtained from documents published by public entities.

Keywords: Infrastructure, Cambodia, development, public investment, private investment

Introduction

After decades of civil war, the Khmer Rouge regime and subsequent years of economic sanctions Cambodia's infrastructure was in ruins. Reconstruction and development of new physical facilities such as roads, railways, telecommunication networks, water and electricity supply and other, was an organizational and financial challenge requiring incurring significant expenditures which were beyond the capacities of developing country like Cambodia.

To overcome an insufficiency of financial and material resources, governments had to encourage local and foreign entities to get involved in the provision of infrastructure projects on agreed upon terms. Such cooperation could be complementary to public investment, and serve as a special vehicle to move the country's infrastructure development forward. This can be done with regards to a series of factors such as the political and economic credibility, the existence of domestic capital markets, the establishment of clear and stable rules for land acquisition or competitive biddings, and more (Kumaraswamy and Zhang, 2001).

The main goal of the paper was to find an answers to the following questions: how infrastructure development in Cambodia in last 30 years was financed? from what sources those funds came, and how it were allocated to infrastructure sub-sectors?

The article has the following structure. Part one reviews the political, legal, regulatory and financial measures taken by the Cambodian authorities to create a business environment conducive to investment and attractive to private investors (both domestic and foreign), which is widely seen as a prerequisite for the implementation of public-private partnerships. Section two presents the sources of capital used to finance investments divided into public, private, domestic and foreign, as well as their changes in 2006-2018. The analysis of the structure and dynamics was based on data from documents issued by public entities and government agencies. Section three presents findings on how the capital investments were allocated among different sectors of the Cambodian economy, and how the funds within the infrastructure sector were distributed to subsectors and projects. Finally section four contains discusses findings and conclusions.

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The main difficulty of the paper was lack of complete, reliable information regarding various aspects of the investment in Cambodia. Most of documents were published by government agencies in Khmer only. The others were too general, too narrow or covers different time periods, which makes them difficult to compare. Often contained data that was contradictory, with figures varying depending on the presenting institution. In some cases even the same data presented by the same organisation is disparate in differing publications.

Review of political, legal and regulatory activities supporting private investments

The 1993 election led to the adoption of the new Constitution of the Kingdom of Cambodia, the establishment of the National Assembly, and the formation of the Royal Government of Cambodia (RGC). The new government outlined a long-term vision for rebuilding a country devastated by civil war and economic sanctions, and that vision included the establishment of macroeconomic fundamentals, the commencement of social development, and the alleviation of poverty. Based on this vision a National Program to Rehabilitate and Develop Cambodia (NPRD) was initiated in 1994 with a goal to achieve these objectives by 2000 (IRITWG, 2015). In the following decades the government formed and implemented several strategic plans focused on peace, demobilization, regional economic integration, and financial sector development, among others. At present the national political commitment to socioeconomic development is confirmed by two strategic documents: Rectangular Development Strategy for Growth, Employment, Equity and Efficiency (RDS) and National Strategic Development Plan 2014-2018. Those documents were adopted to support and coordinate all other plans, policies and strategies carrying out the country's transformation, and to ensure compliance with the objectives set forth in Cambodia Vision 2030 and the country's Industrial Development Policy 2015–2025.

The Rectangular Development Strategy for Growth, Employment, Equity and Efficiency is an agenda enacted by parliament in 2004 and implemented by the government to serve as a comprehensive policy framework. It named four strategic areas (rectangles): agriculture, physical infrastructure, private sector development, and human capacity-building, and it is accompanied by four priority areas for action (sides of rectangles). Phases I and II of the Strategy were implemented by 2014, and the third stage is operational at present. The Strategy establishes overall goals for each rectangle and sets out concrete results for the sides (some in the form of quantitative deliverables). It also contains proposed courses of action to be undertaken. The development of physical infrastructure was presented and detailed in Rectangle II. The outcomes are expected to be obtained through:

- the rehabilitation and construction of transport and urban infrastructure,
- the construction, maintenance, and management of irrigation infrastructure and clean water supply,
- the expansion of electricity supply coverage, the lowering of tariffs, and the strengthening of institutional mechanisms and management capacity,
- and the development of high quality information and communication technology.

The second policy document is the National Strategic Development Plan 2014-2018 which serves as a framework and road map for implementation and operationalization of the Rectangular Strategy. It outlines actions, programmes and projects laid out by government ministries and agencies, defines their priorities, and ensures they are aligned with the aims set out in the Strategy. The NSPD also specifies required means and resources, indicators, and timeframes for Strategy implementation, and identifies the mechanism of so-called Monitoring and Evaluation of the Result Framework (The Royal Government of Cambodia, 2014).

Besides political stability there is also the need for adoption of a legal framework which can help attract private entities and encourage them to establish long-term cooperation. This is an essential condition for companies considering infrastructure projects, as they are exposed to several investment risks such as unfair processes related to private investor selection, corruption, changes in laws and regulations, inefficient legal processes and legal barriers, and they therefore need appropriate legal protection. Private sector actors also expect guarantees against the risks that occur during the operational phase of the contract, like changes in legislation or taxation, forced termination of the agreement before the expiration date, expropriation of the private company without compensation, or many others. Those risks can be minimalized by ensuring transparency via the introduction of clear procedures related to the entire investment process including tendering, bidding, capital, and land acquisition. It is necessary to update the existing provisions and introduce new provisions and regulations for all fields related to private public partnership such as investment, transportation, land, infrastructure, finance, labour and others.

The Cambodian authorities issued or enacted a series of PPP-related laws including the Law on Public Procurement (2012), the Civil Code (2011), the Anti-Corruption Law (2010), the Land Law (2001) and the Law on Investment (1994, updated in 2003). The latter is of particular importance for investors, as it created the Council for the Development of Cambodia (CDC), which is the highest decision-making body responsible for private and public sector investment (Grimsditch, 2016). However, the most important provision is the Law on Concessions which is the legal basis for attraction and facilitation of infrastructure projects financed by the private sector. While it was promulgated in 2007 by the National Assembly, the Sub-Decree that would allow the Law on Concessions to be implemented has not yet been approved and implemented (CDC, 2013) (Asian Development Bank, 2012) (Ministry of Economy and Finance of Cambodia, 2016). The Law on Concessions establishes an institutional framework for developing, procuring, and implementing PPP projects. It specifies sectors for which concession contracts may be granted to private companies, and it enumerates the acceptable types of contracts. Further, it appoints The Council for Development of Cambodia as the centralized service institution responsible for the administrative coordination of investments in concession projects. This authority has the ability to provide information to potential investors regarding investment, approve compliance of investment incentives within the Law on Investment, and specify and obtain all required authorizations for the concession project on behalf of the concessionaire. The Law on Concessions imposes the following obligations on the contracting institution and the concessionaire: Competitors should be selected through international or national bidding procedures in accordance with procedures, the contracting institution must obtain approval for a final bid or a negotiated proposal, the chosen candidate must be informed within a certain amount of time, and the legal entity that will implement the concession project must be established and incorporated and must apply to the CDC for a registration certificate in accordance with the Law on Investment (CDC, 2013).

Sources of investment funding in Cambodia

Total capital investment required for the implementation of the all socio-development goals set out in the National Strategic Development Plans 2006–2018 was estimated to be 48.12 billion USD, out of which 14.25 billion USD was financed from public sources and 33.87 billion USD from private sources. Since this amount also included infrastructure investments, the following questions arise: How much of total capital investment was spent on infrastructure development? What were the sources of financing for those investments? On which projects and subsectors was money spent?

To find answers for the above-mentioned questions, financial data used as projections for preparation the NSDPs 2006-2018 have been summarized then divided into categories of financing sources: public, private, domestic, and foreign (Table 1).

Table 1: Capital investment requirements for NSDP 2006-2018 in billion USD

	2006-2010	2009-2013	2014-2018	Total 2006-2018
Total Investment requirements	6.46	15.13	26.59	48.12
Public Investment	2.38	4.28	7.59	14.25
Domestic Financed	0.78	1.01	1.87	3.66
Foreign Financed	1.60	3.23	5.72	10.59
Private Investment	4.02	10.85	19.00	33.87
Domestic Financed	2.76	7.49	11.46	21.71
Foreign Finance	1.26	3.35	7.56	12.16

The public sector expenses required for the implementation of NDSP's prioritized policies in years 2006-2018 was found to be to be 21.05 billion USD according to the Ministry of Economy and Finance. This amount includes 14.25 billion USD for public sector capital investments and an additional 6.78 billion USD to support the social sector. Public sector investments consist of two kinds: government expenditures, and funds provided by foreign development partners like the World Bank, Asian Development Bank, United Nations agencies, bilateral and multilateral donors, or NGOs. The Royal Government of Cambodia, between 2006 and 2018, had a reported allocation of 3.66 billion USD across all budgets for the ministries and agencies (by comparison, the total national budget for 2017 was around 5 billion USD). The remaining sum of public balance (10.59 billion USD) was financed from external partners in the form of grant-aids, concessional terms loans, resources from non-traditional sources and partners, new incomes from

the development of extractive sources, additional taxes, borrowing from domestic sources through financial instruments, and debt relief (The Royal Government of Cambodia, 2014).

Most of the financial burden for country development is borne by the private sector, which is also considered the driving force for creating employment, raising revenues, and contributing to economic growth and poverty reduction. It has accounted for over 70% of the total capital investment in Cambodia, while the public sector provides financing for less than 30%, including 7% of government expenditures. The Cambodian private sector is characterized by a large number of small and informal SMEs, and a few large enterprises (Ministry of Commerce, 2014). Studies conducted by the National Institute of Statistics in 2011 show that foreign companies operating in the local market are usually large, while domestic companies are small in terms of size. Over 97% of Cambodia's enterprises in the industrial sector are micro sized (employing 1-20 people), and only 1% is foreign-owned. On the other hand, 60% of large enterprises (over 100 staff) are responsible for the highest share of total production value and foreign-owned enterprises employ the largest number of people (Grimsditch, 2016). Regarding the mode of investment, it can be made directly or through various types of legal entities such as public and private limited companies, subsidiaries, branches, representative offices, or joint ventures.

Most of the statistics show data on investments *approved* by the CDC, not on investments actually implemented. The differences between those figures can be significant. As a report by the Ministry of Commerce showed, only 29% of approved FDI projects for years 2000–2012 were realized (Ministry of Commerce, 2014). Therefore, in order to analyse investment structures and dynamics, existing partial data must be used. According to estimates from the CDC, between 2009 and 2016, the *approved* investment amounted to 37.42 billion USD (Council for the Development of Cambodia (CDC)) (Sophea, 2014). Estimations of FDI given in NSDP covered period 2008-2016 but seems to be very conservative, while data presented by United Nations Conference on Trade and Development cover only period of 2014-2017. There are slight differences in figures quoted by WTB and UNCTAD.

Within this same period Cambodia attracted inflows of over 15.2 billion USD as reported by the World Trade Bank (The World Bank Data). Figure 1 presents a compilation of CDC data on approved private investment (separately domestic and foreign) along with FDI inflows recorded by the World Trade Bank. The gap between volumes of investment approved and implemented is particularly visible in years 2009-2012 when the dollarized Cambodian economy was recovering after the recession caused by the economic crisis.

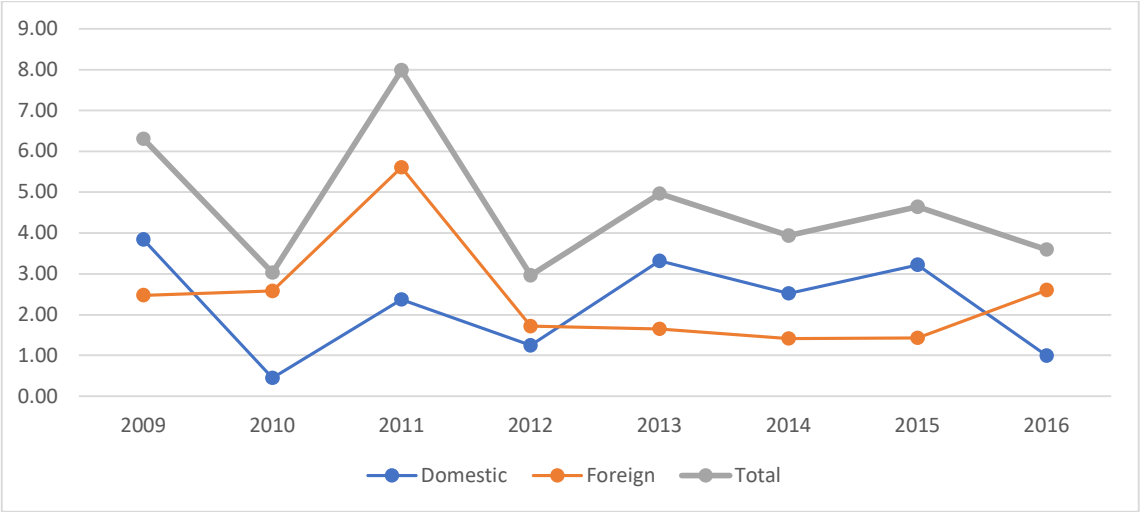

Figure 1: FDI net inflows (USD billion)

The geographical origin of approved investment shows that over 95% of capital came from Asia, of which 56% was provided by domestic entities. Among foreign players the majority of investment is Chinese, responsible for 40% of all FDI, with the second largest provider being ASEAN countries (22%), followed by Korea (10%) and Japan (7%). Aggregated shares of investments from EU countries, the US and Australia are estimated to be 19% of all FDI according to the CDC (Figure 2).

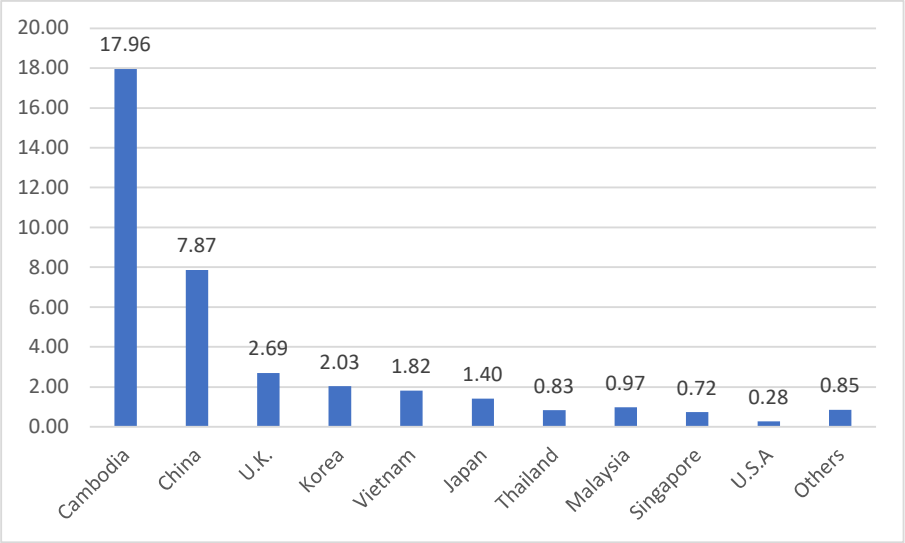

Figure 2: Capital investment by country in years 2009-2016 by CDC (in billion USD)

The Chinese have invested a total of 14.7 billion USD in Cambodia, and have additionally disbursed more than 4 billion USD of aid in the form of grants and soft loans between 1992 and 2016 (Hong Kong Trade Development Council, 2017). Chinese state-owned enterprises operate in several sectors including industrial, physical infrastructure, energy, and agriculture. Currently 10 out of 23 companies participating in the mining industry belong to Chinese owners. Chinese companies have invested more than 7.5 billion USD in hydropower plants, and about 4 billion USD in coal power plants. About 30 Chinese investment projects related to agriculture cover over 237 000 hectares of land. At the same time, Chinese private firms are focused on investing in the garment industry, services, and tourism (Chheang Vannarith, 2017).

Regarding capital inflows from South Korea, investments tend to concentrate on four main sectors: tourism, garments, agriculture, and bio-energy. ASEAN countries follow a similar pattern: Vietnam invested 85% of approved assets in agro-industry (including plantations and the processing of rubber), Thailand invested 68% in agriculture, and Malaysia mostly focused on tourism (56%), agriculture, and the garment industry (Ministry of Commerce, 2014).

Structure and dynamics of capital expenditures on infrastructure

Public and private capital investments are distributed among different sectors of the economy. The aggregation of public investment by sector based on NSDPs data (2006 – 2018) is presented in Table 2[i]

Table 1: NSDP Allocations of total investment by sector (in billion USD)

NDSP / Sector	2006-2010		2009-2013		2014-2018		Total	
	Allocation	Share	Allocation	Share	Allocation	Share	Allocation	Share
Social	1.150	33%	2.009	32%	2.428	32%	5.587	32%
Economic	0.780	22%	1.507	24%	1.821	24%	4.108	24%
Infrastructure	**0.880**	**25%**	**1.318**	**21%**	**1.593**	**21%**	**3.791**	**22%**
Services & Cross Sectoral Programmes	0.490	14%	1.318	21%	1.593	21%	3.401	20%
Unallocated	0.200	6%	0.126	2%	0.152	2%	0.478	3%
Total	3.500	100%	6.278	100%	7.587	100%	17.365	100%

Approximately 3.8 billion USD of public money was spent on infrastructure development within the period concerned. Those funds represent 22% of total public investments and their proportion does not significantly change

over the time. The distribution of foreign investment across sectors, between 2009 and 2016, based on data provided by the CDC (Council for the Development of Cambodia, 2018) (CDC, 2013)[ii] is presented in Table 3.

Table 2: Approved FDI by sector in years 2009 – 2016 (in billion USD)

	2009	2010	2011	2012	2013	2014	2015	2016	Total	Share
Agriculture	0.590	0.554	0.725	0.56	1.13	0.26	0.48	0.48	4.78	13.40%
Industries	0.958	0.946	2.869	1.49	1.11	2.84	0.92	1.19	12.31	34.51%
Infastructure	0.410	1.059	0.658	0.23	2.62	0.35	3.13	0.54	9.00	25.24%
Tourism	3.901	0.132	2.760	0.69	0.11	0.48	0.11	1.40	9.58	26.86%

Private investment flows into a range of sectors in Cambodia, but most of the committed projects are industrial (34.5%) including garment/textiles, footwear, energy, mining, food processing and others. Infrastructure with construction (25.2%) and tourism (26.9%) follow. These sectors together account for over 86% of total investments in the given years. However, it must be again noted that data on investments approved, collected by the CDC, does not mirror the information on realized investment and there is a lack of reliable data on the latter.

The final issue of concern relates to the allocation of capital investment within the infrastructure sector and its distribution to subsectors and projects. Recognising the role of physical infrastructure development as a key pillar for pursuing Cambodia's industrialization, the government decided to spend around 3.8 billion USD of public money, and the allocation of dozens of billions of private funds through direct investments and public-private partnerships between 2006 and 2018. Additionally, Cambodia received a substantial amount of foreign aid to finance infrastructure development which is not reflected in the presented statistics. Detailed information on public fund allocation within the infrastructure subsector is provided in Table 4.

Table 3: Allocations of public investment by Infrastructure subsectors (in billion USD)

NDSP / Subsectors	2006-2010		2009-2013		2014-2018		Total	
	Allocation	Share	Allocation	Share	Allocation	Share	Allocation	Share
Transportation (Roads, Ports, Rlys., Civil Aviation)	0.550	16%	0.753	12%	0.910	12%	2.213	58%
Water and Sanitation (excluding rural)	0.150	4%	0.251	4%	0.304	4%	0.704	19%
Power & Electricity	0.120	3%	0.251	4%	0.304	4%	0.674	18%
Post & Telecommunications	0.060	2%	0.063	1%	0.076	1%	0.198	5%
Total	0.880	25%	1.318	21%	1.593	21%	3.791	100%

Conclusions

As demonstrated in this paper, between 2006 and 2018 the Cambodian government earmarked 48.12 billion USD for the development projects. However, only 3.66 billion USD, which is less than 7% of this amount, was financed by the national budget, with over 44.4 billion USD expected to come from external sources both public and private. Combining this with the fact that public and government investments have been declining recently compared to previous periods, it can be seen how strongly the government's strategy for Cambodian development depends on external sources of financing.

This leads to a conclusion that an essential condition for achieving investment goals is ensuring a favourable investment environment which will encourage public and private entities to establish long-term cooperation. In this context, surprising is lack of a legal framework applicable to public-private it leads to situation where project implementation is issued on a reactive, unsolicited, and negotiated basis, rather than through proactive government preparation and competitive tendering (Asian Development Bank, 2012).

It is a common opinion that transparency of the investment process, clear legal and financial rules, political stability and low corruption levels are risk reducing factors which are especially important in the infrastructure sector where a large portion of public and private projects are financed via various types of PPP mechanisms. However, it must be noted that a lack of the above-mentioned conditions do not stop Chinese firms from making large investments in the energy sub-sector.

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[i] Investments allocated by sector according to data presented in NSDP 2006-2018 include additional funds for social sector support

[ii] However data quoted by CDC in (CDC, 2013) and (Sophea, 2014) differ by USD 1.762 billion and therefore doesn't match with those used in **Figure 1**

Digital collaboration in Higher Education: Vulnerabilities and Challenges in E-Learning During Covid-19 pandemic

Andra Diaconescu

Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara,Romania
andra.diaconescu@upt.ro

Abstract

Digital industry influences the educational environment and encourages students to get actively involved, take part but also collaborate in this major change to overcome internal and external vulnerabilities in the learning process. Academia researchers are analyzing the vulnerabilities of this new digital revolution and trying to secure the online environment in higher education. Over the years, as innovations and investments in the digital space have grown considerably, so have opportunities for universities by allowing students to learn in their rhythm. This research seeks a detailed analysis of the most important tools that support digital collaboration among students given the current situation of online education in the COVID's context-19 pandemic. The tools that support digital collaboration among students facilitate communication in the current situation, increasing the opportunities for academia to interact with as many users as possible. Educators, students and administrators of online educational platforms need a sustainable basis for adopting a change in education. For educators, the availability of a real-time understanding is needed to increase student performance. For students, receiving information about their performance relative to their peers or their progress relative to their personal goals can be motivating and encouraging.

Keywords: Digital Collaboration, Challenges, Online, Higher Education, COVID-19

Introduction

Digital technology has achieved unprecedented growth in many industry fields. Technological drivers like machine to machine communication, blockchain, cryptocurrencies have conducted to new collaboration opportunities for parties involved. Over the last years, we see mounting pressure and acceleration on the digital transformation. (Hess, et al., 2016; Ustundag, and Cevikcan, 2017; Schweer and Sahl 2017). We stay today face to face with a new connected world, where important attention is given in the usage of Internet of Things (IoT), mobility and cloud solution. Institutions are trying to adapt their infrastructure through technological solutions so they can provide better services to clients, as storing personalized information online, order prioritization, online customer service, or transactions through mobile access.

Digital technology has also created niches for the higher education system by developing the best educational platforms. Already we are seeing free and paid digital content, digital courseware, Small Private Online Courses (SPOC), and Massive Open Online Courses (MOOC). Higher education adopted the digital approach because there is an urgent need to bridge the gaps in digital literacy of individuals, and in using digital technologies for communication between individuals and institutions. Digital higher education development in developing countries in our days represents a lever that can create economic outcomes and determine new prospects for future generations. The new wave of digitalization in the current educational environment is on the rise in Europe and beyond. European countries with the highest rate of digital skills are moving away from the approach of digital education as a separate optional or compulsory subject in schools, instead integrating it transdisciplinary in the vast majority of fields of study. Widespread digitized education disseminates through various platforms give rise to new opportunities for learning and gaining new digital skills and competencies necessary for employment, education and training, self-development, and participation in society.

Reorienting universities towards digitized education impose the necessary measures to analyze digital techniques used, respectively those that support the education and training systems. Improvement initiatives in education and

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technological changes have certainly influenced the new directions in society, creating structures that have the ability to empower digitalization in industries (Diaconescu, et al., 2019). Technological changes reshape the material, human, and social dimensions and offer solutions when society is facing the biggest challenges caused by COVID-19 pandemic. The COVID-19 pandemic brings to light another national emergency. During the quarantine period, the educational system had to adapt to a new reality emphasizing the need to invest in technology, resources, training, so that each individual has access to education. Also was consider teacher training, increase their ability to transmit information and educate, keeping alive the interest of students to participate and learn from home. For an act of quality education, it will also be necessary to develop appropriate content for the online environment and distance learning (Diaconescu, et al., 2020).

Measures to prevent the emergence of new outbreaks have forced schools, universities, adult education centers and other educational institutions to suspend all face-to-face learning offerings. During pandemic COVID-19 higher education has reorienting his strategy and force universities towards digitized education by imposing necessary measures to analyze digital techniques used, those that support education and training systems. Consequently, all these changes had a remarkable influence on the educational environment, respectively it was a beneficial road to adapt the teaching/learning methods focusing on creative techniques and innovative technologies. More precisely exists a tacit cooperative acceptance from each university that recognizes these days the importance and advantages provided by digitized education. Now digitized education is transforming the way people work, learn, train, make sense of their world and have fun in a digitalized, networked and knowledge-based society. (Punie, 2007) The advantage brought by digitized education is that it disseminates timely information through various platforms and encourages students to experiment with new learning means, developing them new digital skills and competencies that are necessary for self-development but also good employment in market work.

Trough this paper the author explains the concept of collaboration in education and how its evolution will revolutionize the way students will explore practice workshops with the help of online tools. Beside the importance of collaboration in higher education between educators and students upon online platform it is shown how fragile is the online environment. Besides concerns for introducing all learning materials in the online curriculum, student enrollment, or student training and teachers, universities have also considered identifying the best cyber security systems to protect users' identities or prepare for cyber attacks. In this paper are highlighted some vulnerabilities in the online environment in higher education. Also, there are included collaboration challenges in the higher education and are explain some digital tools for develop students' skills based on projects. There are in questions information about how higher education is a valuable testing ground for the latest collaborative technology and how the use of digital solutions stimulates better collaboration for higher education and explore the many applications of technology in today's learning environment.

Digital collaboration in Higher Education

There was a time when technology was seen as an additional tool to traditional learning methods, but now technology is a vital component in education. While the term "educational technology" has existed for several decades, in recent years there have been changes in technology-based education systems that have brought a wave of change in higher education practices.

Innovative teaching approaches, such as virtual classrooms, online education and blended learning programs, have opened the door to unlimited opportunities for both students and educators. The digital transformation of education is accelerated by the rapid advancement of new technologies such as artificial intelligence, robotics, cloud computing and blockchain technologies. Like the major technological advances in the past, digital transformation affects how people live, interact, study and work. Grimoni, Belico dos Reis, and Tori (1998) describe the success of using multimedia for their existing electrical engineering on-campus students. Kondo and Ishijima (1999) presents a distance learning system for engineering education via the Internet, using multimedia technologies and mathematical tools for a course in control engineering (Ariadurai and Manohanthan 2008). Strenger et al., (2017) explain how digital, virtual and e-learning elements will allow students to strengthen their intercultural competences while working on real engineering and technical problems, in online courses where they can conduct experiments, analyze and interpret their results in international teams (Renzulli, 2015). Lieberman and Cheung (2007) discuss the development of remote-controlled laboratory exercises for their distance laser and fiber-optics engineering technology programmer. To address problems inherent in hands-on laboratories and teaching such laboratories at a distance, many institutions now use computer simulations as an inexpensive way to expose more students to the power of real laboratories without them having to incur the burden of costs associated with time and travel. Simulation software enables delivery of laboratory facilities to the front door of students' homes (Gorrell, 1992). Constant software upgrades have also resulted in aggregate improvements in distance education for engineering

students. Internet-based simulations can be used flexibly by students anytime, anywhere. According to Alhalabi et al., (2004), however, although simulations can serve important purposes, in some cases, such simulations are an inadequate substitute for real, hands-on laboratory experiences. Although simulation serves the purpose of initial experimentation, these authors opined that it cannot provide the same range of possibilities that manipulating physical material does. In some fields, such as electrical and mechanical engineering, actual experiences with real physical elements are necessary.

Coşkun et al., (2019) in their recent article describe an important part of the tasks in the preparation for Industry 4.0 is the adaption of the higher education to the requirements of this vision, in particular the engineering education. In the research paper they introduce a road map consisting of three pillars describing the changes/enhancements to be conducted in the areas of curriculum development, lab concept, and student club activities.

Digital collaboration in e-learning

In January 2018, an Action Plan for Digital Education was drafted and disseminated at the level of the European Union, which mainly considers education and training to be the best investments in the future of Europe, with an important role in creating a European identity, starting from common cultures and values. Attempts to imagine the future of education often highlight new technologies - omnipresent computing devices, flexible classroom models and innovative visual screens. The existential factor that shapes the future of higher education is something that people cannot touch or see: "great data and analysis." Undoubtedly, important analyzes and data have an important role to play in the future of higher education, especially collaboration through technology. Educators, students and administrators need a good collaboration to fortify the foundation and adopting change. For educators, the availability of a real-time understanding of student performance, including students at risk, can be a significant help in planning teaching activities. For students, receiving information about their performance in relation to their colleagues or about their progress in relation to their personal goals may be motivating and encouraging. (Siemens and Long, 2011)

Collaboration through technology changes the trajectory of traditional education as we know it. We have already seen how the Internet has radically changed the classical approach to learning in classrooms, introducing digital resources and providing a wealth of up-to-date knowledge that supports teachers and students. Through connectivity, we open up a new world of global learning: classrooms include students from all over the world, and collaboration between experts exposes valuable knowledge to provide new learning experiences. The captivating world of video creates opportunities for students not only to explore new areas with ease, but also to collaborate with others in engaging and fascinating ways.

Digital collaboration vulnerabilities in e-learning

According with the current situation presented above engineering graduates face multiple changing demands on their competencies. Engineering students must have good communication skills, collaboration, information networks, feedback and reception, teamwork, and even in some cases cultural understanding. Innovating engineering universities have become a necessity in a globalized world, especially for newly established universities looking for a more competitive market place.

Thereby taking into account the opinions of other researchers the intensity of the technological boom in education starts from the premise that today's students are the first generation of digital natives, who have grown up using technology since birth. They are also early adopters of the latest technological advances and demand access to the latest technology in everything they do. We are also seeing a growing demand for experienced technology professionals in the modern workplace. Adopting an active status through the use of the Internet and social networks or the use of smartphones and other mobile devices, modern students expect a more collaborative and interactive learning environment.

Starting from this premise, taking into account the requirements of the new generations of students, the educational institutions did their best to introduce new friendly and easily accessible interfaces for online learning. Although students' adaptation to the online environment has come naturally, it is also a vulnerable field that is at increased risk of cyber attacks. Universities and classrooms around the world have had to stop face-to-face meetings due to the COVID-19 pandemic. Shortly after the schools urgently started to move to distance learning, it was noticed that the parties involved were not prepared for the type of full-time digital education. Not all students or teachers had the necessary technology, laptops, stable internet connection, creating a general panic that students will be left behind with learning. Moreover, many educational institutions have not implemented adequate cybersecurity measures,

putting online classrooms at increased risk of cyber attacks. Or there have been several types of threats - phishing pages and emails related to online learning platforms and video conferencing applications, threats disguised as the same applications and distributed denial of service (DDoS) attacks affecting the education industry. DDoS attacks have affected the educational resources of the following online educational platforms:

- Coursera – represent an online learning platform that offers a wide range of open online courses, certificates and even diploma programs.
- Blackboard – provides a virtual learning environment in which educators can build fully digital courses or create additional activities to complete personal training.
- Google Meet – offer a video communication service, which can be used to host meetings and online classes
- Moodle – the most popular learning management system (LMS) in the world, used by educators to build online courses, host classes and create activities.
- Zoom – a highly popular online collaboration tool that provides free video conferencing capabilities.
- Google Classroom – a web service designed specifically for educators to host classes, generate assignments and track students' progress.
- edX – a provider of open online courses available to users worldwide.

The report of Kaspersky DDoS Intelligence System identify various threats in two platforms Moodle and Zoom. From January to June 2020, the platform most commonly used as a lure was Zoom, with 5% of the users that encountered various threats encountering them via files that contained the name Zoom. The second most common platform used as a lure was Moodle. By far the most common threats encountered in 2020 were downloaders and adware, which were encountered in 98.77% of the total registered infection attempts. Various classes of trojans followed adware.

Table 1: Vulnerabilities in online learning platforms / video conferencing applications

	Vulnerabilities	
Online learning platforms / video conferencing applications	Phishing risks	Users who reach these phishing pages are often tricked into clicking on URLs through which malicious programs are downloaded being tricked into entering their login details.
	Riskware	Various files, from browser bars and download managers to remote administration tools, which can perform various actions on your computer without your consent.
	AdWare	Users are assault with unwanted ads.
	Trojan (Backdoor)	Malicious files that allow cybercriminals to do everything from deleting and blocking data to interrupting computer performance.
	Exploit	Piece of code or even some data written by a hacker or malware writer that is designed to take advantage of a bug or vulnerability in an application.

Zoom is by far the most commonly used platform as bait, with 99.5% of users encountering various threats disguised under its name. This is not surprising, given that Zoom has become the most frequently used video conferencing platform by universities. By February 2020, the platform has added new users (2.22 million) compared to 2019 (1.99 million). Given its immense popularity, it is obvious that in the near future Zoom will be the favorite target for malicious actors. Being a tool powered in the online environment millions of users want to download the application, which inevitably at least one of them will meet with installers or fake configuration files.

Even knowing that vulnerabilities will increase in the next period because of continually usage of online education, the pandemic was a real test for all digital educational resources, none of which, public or private, was designed to cope with such an explosive increase in internet traffic. However, the variety of platforms and tools coordinated by IT developers have allowed everyone to continue their studies.

In the near future, universities will become dependent on their technological infrastructure, so that any resulting attacks and violations can have an even deeper impact on their operations. In addition, there is the potential for digital delivery technologies to be directly targeted, and we have already seen evidence of such attacks, such as vulnerability exploitation, phishing and denial of service, being targeted specifically at online learners and providers.

Digital collaboration challenges in e-learning

Passing the years, as the innovations and investments in the digital space have grown considerably, the opportunities for various universities to collaborate with each other have also increased. Some universities have enjoyed partnerships with the IT industry and allowed shared knowledge and good practice for online environment. Currently, the incentive demand for using the data and the digitization are at the helm of these new-age collaborations, in such a way that the intra-industry and universities partnerships complement each other forming a strong alliance. Given the evolution of the epidemiological situation at the international level and the adoption of legal restrictions to stop the spread of the Covid-19 virus, it has forced higher education institutions to switch to online platforms allowing safe educational activities. Thus, the teaching activities that require the physical presence of students in educational units and institutions have suspended, being configured in online format. Hundreds of digital education tools have been created with the purpose of giving autonomy to the student, improving the administration of academic processes, encouraging collaboration, and facilitating communication between teachers and learners. To embrace digital transformation must be considered several smart applications easy to implement. Smart applications allow task coordination between students and improves projects efficiency, responsiveness, and effectiveness. Coordinate homework tasks for students and synchronize information can be achieved by tools like Edmodo, Socrative, Projeqt, Thinglink, TED-Ed, cK-12, ClassDojo, eduClipper, Storybird, Animoto or Kahoot and offer an optimal modality for individuals to communicate with each other in every moment of the day using text, audio or even video. The advantages provided by smart applications have an important asset in improving students interaction, especially among for those geographically dispersed. In this sense different tools provide screen sharing and video chat for different discussions about the problems encountered in the project.

Table 2: Digital education tools

Digital education tools Facilitating communication between teachers and learners		
Engineering Unit Converter App	https://play.google.com/store/apps/details?id=mobile.unitconverter&hl=en	Allows students to easily do conversions and engineering calculations
Finger CAD	http://www.ngcybit.it/iTunesApp/fingercad/	This application gives students the opportunity to design anything they do using computerized CAD operations.
Simple Physics	https://jundroo.com/app/simplephysics/	Students complete various construction challenges using physics. For example, students build structures that should withstand different forces. Students earn points as they learn to use physics concepts to build sustainable structures.
Instructables	https://www.instructables.com/	A site that has teaching tools for engineering and includes projects and lesson plans for teaching engineering with fun and practical activities.
Wolfram Alpha	https://www.wolframalpha.com/	An online database of engineering materials where students and teachers can simply ask engineering questions, and the application will search the database for relevant materials that should answer the question.
Edmodo	https://new.edmodo.com/	It is a personalized educational tool and aligned with the opportunities brought by technology and the digital environment. Teachers and students are connected in a social network. Teachers can create online collaboration groups, manage and provide educational materials, measure student performance, and communicate with parents, among other functions.
Socrative	https://www.socrative.com/higher-ed/	It is a system that allows teachers to create educational exercises or games that students can solve using mobile devices, whether they are smartphones, laptops or tablets.
Thinglink	https://www.thinglink.com/	Allows educators to create interactive images with music, sounds, text and photos. It offers teachers the opportunity to create learning methodologies that arouse students' curiosity through interactive content that can expand their knowledge.
TED-Ed	https://ed.ted.com/	It is an educational platform that allows the creation of educational lessons in collaboration with teachers, students, generally people who want to expand knowledge and good ideas. This website allows the democratization of access to information, both for teachers and students, both parties having an active participation in the learning process of the others.

cK-12	https://www.ck12.org/student/	This platform has an open source interface that allows the creation and distribution of educational material via the internet, which can be modified and contains videos, audio and interactive exercises.
ClassDojo	https://student.classdojo.com/#/login	It is a tool for improving students' behavior: teachers give their students instant feedback, so that the friendly mood in the classroom is "rewarded" with points, and students have a more receptive attitude to the learning process.
eduClipper	https://explore.participate.com/educlipper	This platform allows teachers and students to share and explore references and educational materials. It also offers teachers the opportunity to organize a virtual class with their students and create a portfolio in which all the work done is stored.
Animoto	https://animoto.com/projects	Animoto is a digital tool that allows to create high quality videos in a short time and from any mobile device, inspiring students and helping to improve academic lessons. The Animoto interface is friendly and practical, allowing teachers to create audiovisual content that adapts to educational needs.

Collaboration challenges in the higher education must be overcome through linked digital tools for develop students' skills based on projects. Projects stimulates better collaboration for higher education and explore the many applications of technology in today's learning environment. For example in educational projects, a major important element that requires creativity exposure is the design project. Most of the time, students receive this task in the final years, after having thoroughly laid the theoretical foundations. However, these projects should be from day one and spread throughout the program to develop skills and encourage active learning. In the current situation, the educational system requires a creative approach regarding digital education that response to global innovative initiatives in higher education.

Discussion and conclusions

In conclusion, the key result of distance education is an increase in digital literacy for both students and teachers. This means that the forms of the learning process should become more diverse, respond to modern needs and take advantage of new technological opportunities. The new vision approved and implemented by universities towards digital education requires the necessary measures to analyze the digital techniques used, respectively those that support education and training systems.

So far are to realize the main vulnerabilities on universities at the surface. These in the next period will try to penetrate the university environment and will increase significantly in the near future. The university has many more things essential to their ability to do business that they now need to protect. The surface of attack that universities now face is multiple scales larger than they were before. Investments in some IT and security infrastructures are needed, as a starting point to allow the transition from physical to virtual. There is much more dependence on IT infrastructure, there is much more dependence on applications. There is still the availability of using online platforms, the reliability of these platforms, all those things that are not necessarily security issues, but are IT issues.

Modern challenges and global problems that require the most attention from the new generation of students will be solved by collaborating with digital tools, developing the skills to create customized learning solutions. The growing popularity of digital services in education will also contribute to the demand for cyber security. Using distance learning as a main education tool, will speed up the importance of digital security and turned from an abstract notion into a necessity in maintaining a normal learning process. Collaboration with industry must take place immediately to introduce digital security lessons for teachers so they can pass on knowledge and skills to students.

Widely digitized education, disseminated through various platforms, gives rise to new learning opportunities and offers new practices for acquiring the digital skills needed for employment, education and training, self-development and participation in society.

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Rating Universities as A Factor of Sustainable Regional Development

Irina GOLLAY
Associate Professor, Department of Applied Economics,
South Ural State University (National Research University), Chelyabinsk, Russia,
gollaiin@susu.ru

Elena LYASKOVSKAYA
Professor, Department of Applied Economics,
South Ural State University (National Research University), Chelyabinsk, Russia,
liaskovskaiaea@susu.ru

Sergey BORODIN
Associate Professor, Department of Applied Economics,
South Ural State University (National Research University), Chelyabinsk, Russia,
borodinsi@susu.ru

Evgeniya MATVIYSHINA
Associate Professor, Department of Applied Economics,
South Ural State University (National Research University), Chelyabinsk, Russia,
matviishinaem@susu.ru

Alena SHERBININA
Student of the department of applied economics, South Ural State University (National Research University),
Chelyabinsk, Russia,
shcherbininaai@susu.ru

Vladimir KOZLOV
Student of the department of system programming, South Ural State University (National Research University),
Chelyabinsk, Russia,
vlkozlov99@gmail.com

Abstract

For a short period of its existence, educational ratings have become a significant factor in evaluating the activities of universities. Nowadays they are one of the main tools in the competition of higher education institutions. The purpose of the study is to improve the methodology for building a ranking of universities by professional orientation. The object of this study was Russian higher education institutions. The subject of this study is the process of rating universities. The information base of the study is normative documents, statistical data, educational, methodological, scientific, and practical materials on the topic of the study, materials of official websites of various ratings, local regulatory acts of universities, etc. This article discusses methodological approaches to the construction of various international educational ratings, their classification is carried out, the advantages and disadvantages of various methods of rating universities are identified. Conducting the study we proceeded from the working hypothesis that the current world ratings do not take into account the specifics of the national educational systems of different countries and do not fully suit the professional orientation of certain groups of higher educational institutions. The results of the study are the proposed classification of rating methods of tertiary education institutions, a generalization of the advantages and disadvantages of individual international methods for constructing educational ratings, and the developed author's methodology for rating building by professional orientation. These results have practical use not only for specific educational institutions but also for several other interested users: entrants, students, graduates, employers, etc.

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Introduction

Recently, there has been a growing demand for transparent and objective assessment in the higher education system. The tool for this assessment is the various ratings of educational institutions. The number of such ratings has been growing steadily for the last decades. However, the scientific community is still debating on the issues of rating building: it analyzes the positive and negative consequences of applying ratings, considers various aspects of ranking the evaluated criteria, highlights the advantages and disadvantages of various rating methods, discusses methods and criteria for comparing the activities of higher education institutions, etc.

A retrospective analysis allowed us to restore the chronology of the emergence of international university rankings.

The history of university ranking dates back to the 19th century in the USA. When the Bureau of Education in the United States began to issue annual reports on educational institutions. These reports contained detailed information about universities and were aimed at classifying them according to various criteria. Later, universities began to rank based on various indicators from best to worst *(Salmi and Saroyan, n.d.)*.

The initial goal of the ratings was to determine academic performance. Such ratings were relevant for internal users (students, teachers).

Subsequently, the ranking was aimed at applicants who were going to enter a particular university.

Over time, these ratings moved beyond the national framework. Many educational ratings have gained international status and have become global. The emergence of international educational ratings is a consequence of the process of globalization and the integration of states in various fields of activity *(Daraio and Bonaccorsi, 2016)*. During this period, the participation of the institution in the ranking ceased to depend on the geographical location. A transition was made to the so-called “through” technique. It implied the search for a common denominator for different systems of university indicators and assigning them a place with the help of an integrated assessment *(Maslen, 2010)*.

It is worth noting that it was the representatives of the Asian region who were the first to publish international and world ratings, trying to unify universities around the world so that applicants and employees from anywhere in the world could choose a priority educational institution according to chosen criterion.

Based on the generalization of various international educational ratings, within the framework of this study, a classification was constructed and the advantages and disadvantages of various rating methods of higher education institutions were identified.

Classification of World Ratings

There are currently five recognized global ratings:

- “Academic Ranking of World Universities” (ARWU);
- “Times Higher Education” (THE);
- “Quacquarelli Symonds” (QS);
- "Webometrics" (WEB);
- “Performance Ranking of Scientific Papers for World Universities” (NTU Ranking).

There are also many other lesser-known ratings. Each of these is based on its unique methodology. Figure 1 shows the classification of ratings for various reasons (Fig.1).

If we consider the ratings "by type", then we can distinguish three groups. Firstly, these are ratings, where the result is the total score. For its calculation, a certain set of indicators is taken, calculated as a whole for the university. As a rule, each of these indicators is assigned its weight. Then the weighted values are calculated, which are then added up. The result is a general comprehensive assessment of a higher educational institution. This method is one of the most common.

For example, in the WEB ranking, the analysis is carried out as a whole for a higher education institution for four indicators, each of which has its weight: the number of links in the global search engines to the university's official website (25%); the number of important files posted on the official website of the university (12.5%); the number of links to the official website of the university in the Scholar search engine (12.5%); the number of unique external links to the official website and university materials in the search engines Yahoo and Exalead (50%) *(Ranking Web of Universities: Webometrics ranks 30000 institutions | Rankings updated every January and July: Universities, Webometrics, Bibliometrics, Altmetrics, 2020)*.

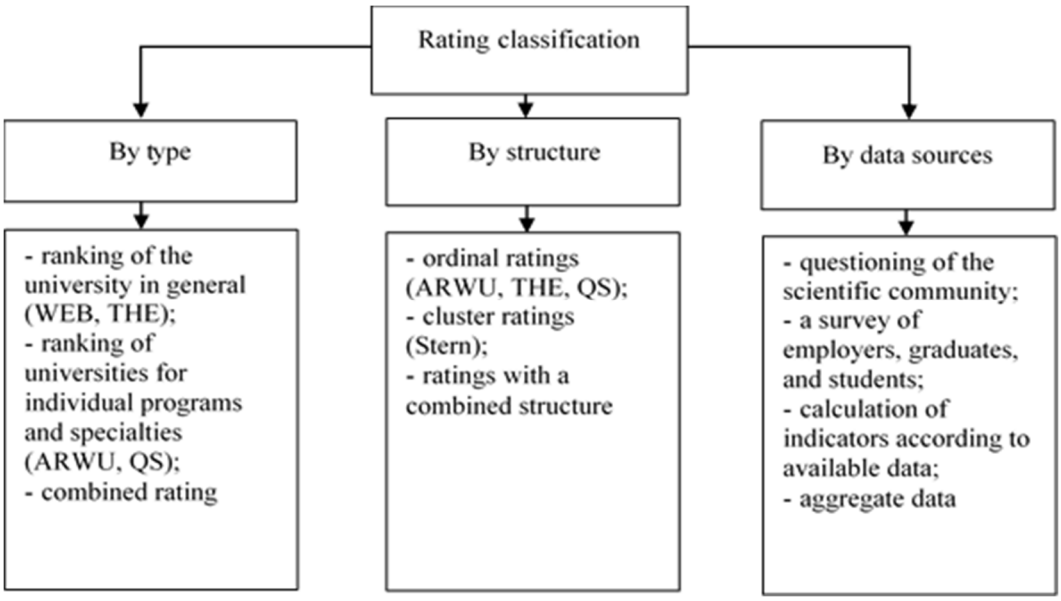

Fig. 1: Classification of university ratings

(Source: compiled by authors)

Secondly, ranking can be made according to individual training programs and specialities. Such ratings are more aimed at applicants. This allows them to determine the place of study, based on the chosen profile and future profession.

The advantage is that the curriculum can be ranked by academic degree: bachelor, master, graduate student, etc.
An example is the separate ARWU rating. In addition to the rating with a general final grade, it has the following estimates:

- in subjects;
- by industry;
- in subjects in the field of engineering *(http://5top100.ru, 2020)*.

Thirdly, there are combined ratings that integrate the characteristics of the above types. They also contain more complex techniques that cannot be grouped by common features into a single table.
Ratings are also divided by structural type.

Analyzing various international and national ratings you can notice that the data in them can be summarized in different ways. As a result, the summary list of leaders looks different: somewhere, each university is assigned its serial number (ordinal rating), and somewhere they are located in blocks of several educational institutions in each (cluster rating) *(Zhi-Yong, 2018)*. For example, the German Stern rating refers to cluster ratings and divides the universities under study into 3 groups: the best, medium, and worst *(Pinar, Milla and Stengos, 2018)*.

The combined structure combines the characteristics of the two previous species. Each university is assigned a serial number (as in the serial structure), but only the best educational institutions (for example, the first 50, 100, or 1000 places) are published in the final table. In this case, only a group of leading universities is visible to end-users.

Information for compiling ratings can be collected through surveys (questionnaires) of employers, university employees, students, etc. Often there is an aggregate collection of information to calculate the necessary indicators *(Arefyev, 2015)*.

Analysis of methods for developing ratings of tertiary institutions

Based on their considered classification of various ratings, we can conclude that the rating process is multifaceted and covers various areas of educational institutions.

As can be seen from a variety of ratings, there are many methods for constructing them. But any rating should answer for questions presented in Figure (Fig. 2).

In this case, the object of assessment is understood directly as the educational institution itself, which must be compared with other similar organizations using those indicators that are significant in a particular rating. Training programs are considered as the object of evaluation on the industry and subject ratings. Structural elements can be faculties, departments, and areas of activity of educational institutions.

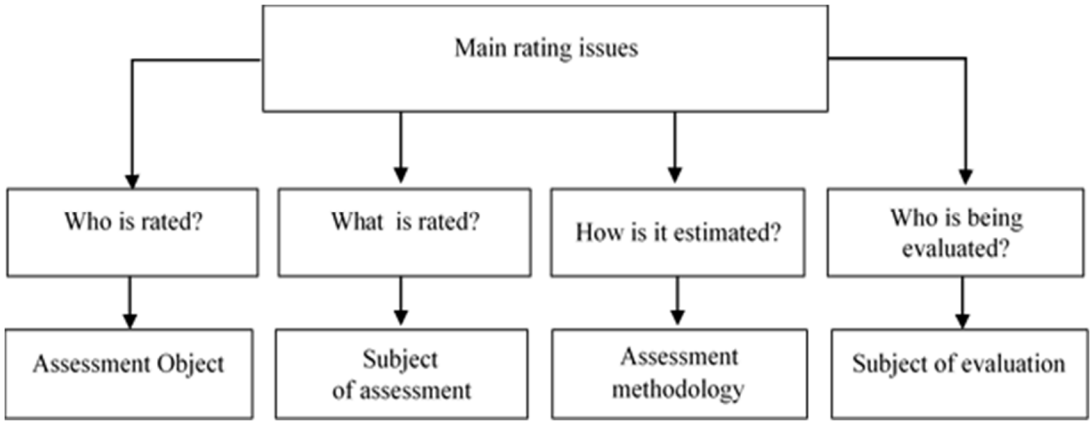

Fig. 2: Main rating issues

(Source: compiled by authors)

The subject of the assessment is the criteria and parameters by means the university is evaluated. Most often, rating developers choose the following groups of indicators: quality of education; university reputation; scientific activity; competitiveness, etc.

Based on the subject of assessment, we can conclude that the calculation of ratings is a complex and multifaceted process since everyone can interpret the indicators in different ways. For example, the quality of education may include a different range of concepts. It may also mean student performance, student-teacher ratio, or, for example, the

proportion of foreign students. All this leads to the fact that the assessment system is extensive and multi-level *(Kehm, 2013)*.
In addition to users of the rating, there are other interested parties - those who evaluate it - the subjects of evaluation. Typically, users of the rating and subjects of evaluation are closely connected. Professors, scientists, teachers, that is, the academic community; government bodies; a group of competent experts; users of the rating (students, educational institutions, employers, graduates) can be “appraisers”.

Often, rating evaluations entail not only a social function but also a financial one. Some appraisers receive money for the work performed (for example, expert communities). Usually, universities participating in the ranking pay for consulting support. Therefore, it is necessary to control cash receipts so that there are no abuses and the assessment process is as transparent and objective as possible *(Clarke, 2007)*.

Choosing an assessment methodology it is important not only to understand how to calculate indicators and evaluate the position of higher education institutions but also how to interpret the results. Various assessment tools include questionnaires and surveys; generalized indicators; private indicators; accreditation (state or social-professional), etc.

Overview of the advantages and disadvantages of the largest world university rankings

The entire world community is still arguing about the calculation correctness of the of some indicators, the feasibility of including them in the ratings, and the information content of ratings as such. There are many nuances in building ratings that is why this process has its advantages and disadvantages. Let's look at them using the example of the three most famous world educational ratings: Academic Ranking of World Universities (ARWU), Times Higher Education (THE) and Quacquarelli Symonds (QS).

The International Ranking at Shanghai Jiao Tong University - “Academic Ranking of World Universities” (ARWU) originally aimed to determine the difference between Chinese and world universities, especially in terms of research work.

This rating is focused on scientific activity and considers those universities with Nobel Prize winners, high citation, publications in certain scientific journals *(ARWU World University Rankings 2020 | Academic Ranking of World Universities, 2020)*.

Six indicators helping to determine the place in the rating are considered here:

- Alumni (the number of Nobel or Fields Prize winners among graduates);
- Award (the number of Nobel or Fields Prize winners among staff);
- HiCi (the number of authors with a high citation index);
- N&S (the number of articles published in the journal "Nature and Science");
- PUB (number of articles indexed in international scientific databases);
- PCP (integrated indicator, which is calculated per employee).

Institutes of humanities do not calculate the N&S indicator. Hence scores are distributed among other indicators otherwise there would be an advantage in the direction of technical educational institutions, which would entail an incorrect assessment of the calculation of place in the ranking.

For each indicator, the best university is identified, which is taken as a basis - it is assigned 100 points, the rest are calculated as a percentage of this maximum value.

This technique can be called into question, since the indicators of the number of laureates are long-term, decreasing by 10% after ten years. It turns out that in 2019 the graduate or employee who received the Nobel or Fields Prize in 1930 was still included in the calculation (although this criterion will have a weight of only 10% of whatever weight it would have been, received in the 2010 year).

Nowadays It is more important for employers to hire quickly adaptable well-educated graduates than to know that in the last century one of the employees of the corresponding university received a prestigious award.

Another disadvantage of this methodology of university ranking is the country where the university has been located. This factor plays an important role in ranking procedure. For example, many universities not included in the global educational space until recently had not had the notion that it was necessary to publish in certain journals to meet international standards. Also, do not forget that no matter what the leading university in a particular country is, but if there is a negative political or economic situation at a certain time, it is unlikely that applicants will want to go there to study.

Another world-famous university ranking is the Times Higher Education (THE) ranking. Today it includes over 1250 universities around the world. THE ranking is a global table including various university performance indicators. Based on the indicators selected in it, one can receive perception about the educational organization's tasks: teaching, researching, knowledge transfers, and international perspectives. Carefully calibrated performance indicators are used to creat it. That provides the most complete and balanced comparison trusted by applicants, students, teachers, employers, and the government.

The indicators of this rating are grouped into five areas:

- Teaching (training);
- Research (research);
- Citations (citations);
- Industry income (income from production activities);
- International outlook (international interaction).

Due to some limitations, experts may not include the university in the rating process. Firstly, if the university has less than a thousand publications in its scientific base over the past 5 years. It turns out that at least 200 articles should be published in the Scopus database.

Secondly, a university can be excluded from the calculation if 80% of scientific research falls on one field of knowledge. Therefore, this restriction prevents entry into the ranking of specialized universities. This can also be considered a disadvantage of this rating.

It should be noted that it is very difficult for those countries that relatively recently joined the Bologna process to compete with those universities that have operated within the framework of a single educational space since the late 90s of the 20th century. It is difficult for “newcomers” to achieve such high rates in terms of quoting the works of their employees.

Educational institutions provide data for calculating indicators according to the rating construction method themselves. Thus, the organizers relieve themselves of the responsibility to collect data, but still, selectively check their accuracy *(Rindova, Martins, Srinivas and Chandler, 2017)*.

If for some reason the university cannot provide the initial data, it is assigned an average score between the lowest value of university`s indicator for previous years and the average value of the same indicator for other universities in the current year. Thus, the organizers try to avoid too severe penalties for failure to provide data but also do not give high marks *(Smith, 2010)*. As a result, the objectivity of the assessment as a whole is decreasing.

A comparison of individual indicators of Russian universities (Fig. 3) made it possible to verify that, for example, the methods for calculating the citation rate for QS and THE ratings are different. That is why the results are diametrically opposite.

If in 2019, in THE rating, the citation rate of Tomsk Polytechnic University (TPU) is 52.3%, then in the QS rating it is only 3.3. Although it is based on the same Scopus database. This difference is since in the QS rating the value of the citation indicator is taken to one employee and in THE rating - as a whole for the university.

Since citation has been considered over the past 6 years, a big gap in value can be, for example, in TPU between 2016 and 2018. This means that in 2011 this university had a large number of publications, and when the year was dropped out of the analysis, the indicator dropped sharply.

The last of the reviewed here international ratings is the Quacquarelli Symonds (QS) rating. He is positioned as one of the main assistants to applicants when choosing to study at world universities. The purpose of this rating is to identify the best university in the areas of research, internationalization, teaching, and employment. The surveys of employers and researchers and provided by universities quantitative data are the data resources for the rating *(Bates, 2010)*.

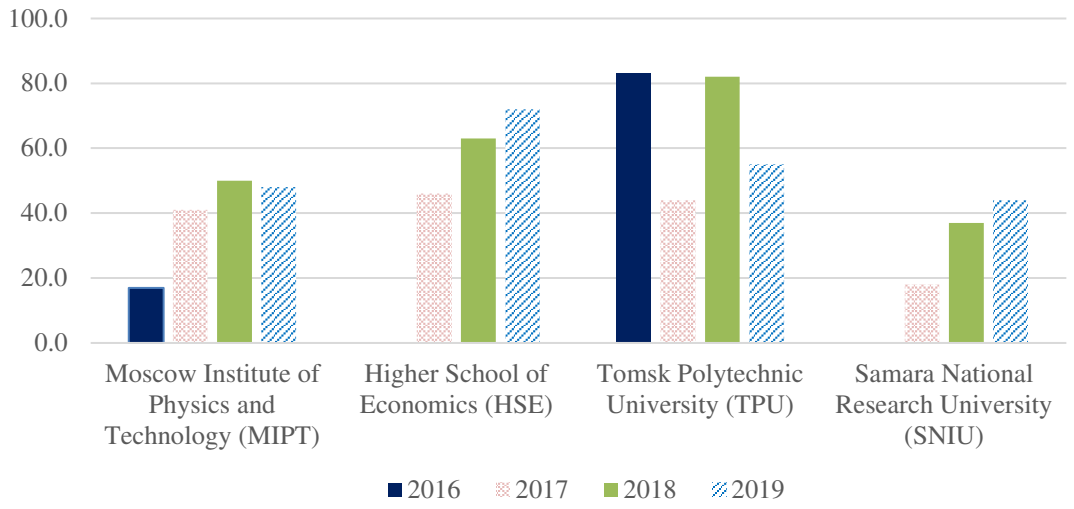

Fig. 3: Citation Index in «Times Higher Education»
(Source: compiled by authors on the basis of «Times Higher Education»)

Place in the ranking is calculated by six indicators:

- Academic reputation (academic reputation);
- Employer reputation (reputation among employers);
- Faculty/student (the ratio between the teaching staff and students);
- International faculty (share of the foreign teaching staff);
- International students (share of foreign students);
- Citations per faculty (number of citations per employee).

The highest weight in the ranking falls on the indicator of academic reputation, which is 40% of the total score. It is based on the expert opinions of over 80,000 scientists around the world. Researchers should point to those universities that are leaders in conducting studies. Experts are divided into international and local, and international have more weight (85%) than local (15%).

The disadvantage of this rating is that the weight of indicators related to research activities is extremely overrated. In this rating, the main share falls on the indicator of academic reputation, which is based on the scientific activities of universities. At the same time, students are not interviewed during the process of collecting data on universities. Perhaps this is done because students are less competent in matters of a professional orientation than the academic community.

However, in our opinion, for people choosing the place of their future education, it is important to know the opinion of graduates and students of the corresponding educational institution.

Thus, having analyzed the indicators of the three world ratings, it can be argued that they are more focused on research, the publication of articles, and attracting nonresident students and lecturers (teachers). After analyzing the indicators involved in calculating the ranking, it can be argued that most of the ratings are aimed at classical universities. Profile universities can never get to the top of the rankings. However, they can expect success in industry ratings.

The current ratings are showing the imperfection of the collection of information about educational institutions and their evaluation. Many criteria in the ratings are subjective because the results of the assessment often depend on the opinions of individual subjects surveyed, rather than specific quantitative objective indicators that can be double-checked.

It would seem that we are only talking about university ratings. However, the ranking process has become one of the main criteria for choosing universities in the global educational services market. Such significance of the ratings can be described by the words of the vice-president of IREG Observatory on Academic Ranking and Excellence Waldemar Sivinsky: "Your affairs do not go as you think, but as the public perceives them" *(Expert: Business Solutions, 2020).*

But it is worth to note that all the shortcomings revealed during the rating, rating developers try to eliminate through the transparency of calculation methods and greater openness of rating agencies.

In general, it can be noted that to create a more balanced and objective assessment of the university's place in the global educational community, it is better to consider its the results of the assessment in several ratings simultaneously.

Methods

The above analysis of international ratings is showing the ratings are not perfect. Often they do not take into account the characteristics of individual national education systems and do not consider universities in terms of professional criteria. While professional criteria are the basis for an objective assessment of universities by various groups of stakeholders - employers, applicants, their parents, etc. These contradictions predetermined significant practical interest in the chosen research topic.

Conducting the study, we proceeded from the working hypothesis that the current world ratings do not take into account the specifics of the national educational systems of different countries and do not fully suit the professional orientation of certain groups of higher educational institutions.

The purpose of the study is to improve the methodology for building a ranking of universities by professional orientation.

The object of this study was Russian higher education institutions. Each of these institutions has its list of goals and objectives assigned to them by the state and various groups of stakeholders.

The process of rating universities, trends in this area, as well as the advantages and disadvantages of rating methods, are the subject of this study.

The information base of the study was normative documents, statistical data, educational, methodological, scientific, and practical materials on the topic of the study, materials of official websites of various ratings, local regulatory acts of universities, etc.

It is assumed that the new methodology for building the ranking of universities should be based on the principles of public-professional accreditation.

Only those higher education institutions that have submitted the appropriate application should participate in the ranking. However, they can choose only a few specialities and educational programs that are planned to be checked. This factor is fundamental for forming a rating according to professional criteria. The advantage of this rating is that the expert commission includes both representatives of the academic and scientific community, as well as students and employers. This rating focuses on educational programs. This will help to generate complete and reliable information about a particular area of training at the university. It is assumed that such kind of information should be useful primarily to applicants and employers.

The structure of the final indicator of the proposed rating by professional criteria is presented in table 1.

The new rating is based on a generalized indicator, calculated as the sum of weighted ratings for each of the selected criteria.

As you can see, in the proposed rating, the main weight in the final score falls on the learning indicators (educational criteria). This is because, as noted earlier, the rating is designed more for applicants and employers.

The source of information for constructing the rating is quantitative objective data provided by those departments of universities that graduate according to the study program (profile) studied. In this case, the subjective assessment obtaining in other ratings during the survey is completely excluded.

Table 1: The structure of the developed rating

Indicator	Indicator Components	Weight
Training	The ratio of the number of entrants to the number of graduates of the department according to the relevant program (profile)	10,00 %
	The ratio of teacher rates to the number of students enrolled in the corresponding program (profile) of training	5,00 %
	Number of employed graduates by training profile	25,00 %
	The average grade for studying among students enrolled in the corresponding (profile) of training	25,00 %
	The income of the Department that produces specialists in the corresponding profile	5,00 %
Citation	Citation of the works of the Department's employees in scientific databases (Scopus, WoS, RSCI) that produce specialists in the corresponding program (profile) of training	15,00 %
Operating income	Income from the production activities of the Department that produces specialists of the corresponding profile	6,00 %
International engagement	Percentage of foreign students enrolled in the study program	3,00 %
	Percentage of foreign employees involved in the relevant training program	3,00 %
	The share of scientific publications of the Department's employees in collaboration with foreign scientists	3,00 %
Total		100,00 %

(Source: compiled by the authors)

The indicator of the entrant number ratio to the number of graduates of the department according to the corresponding training program (profile) is intended to reflect the level of demand for the department, which graduates specialists in the corresponding profile, and the demand for the corresponding educational program. The high value of this indicator would show the necessity to increase in the faculty and building up the material and technical base. If the value of the indicator is less than unity, then this may mean the unpopularity of the direction among entrants (employers), or the failure of students to complete their studies. In this case, the university should revise the educational program so that it becomes available to all students who wish to gain knowledge in the corresponding profile of training.

An indicator of the teacher rates ratio to the number of students studying according to the corresponding training program (profile) shows how much of the faculty per student. The higher the indicator, the more individualized will be training, which will affect its quality.

Choosing their future place of study, many entrants look at the demand for a profession in the labour market. To help in it can the indicator of the number of employed graduates according to the profile of training. The higher the indicator is, the more relevant and claimed the corresponding direction of training will be considered. If it is low, then university management should encourage establishment relationships with employers.

A high average mark for studying with students enrolled in the corresponding training program (profile) is intended to show the quality of education in this speciality.

The objectivity of these assessments can be checked during state accreditation of a higher educational institution or through a selective assessment of students' knowledge by independent expert commissions.

The income of the department graduating specialists in the relevant profile is directly related to the number of students and the cost of training.

To bring the proposed rating by professional criteria closer to international ratings and increase the level of recognition of the university in the international arena, the developed rating includes the citation rate of the department’s employees in scientific databases (Scopus, WoS, RSCI). However, the weight of this indicator in the final rating score is significantly lower than in the current global ratings. This is because, in some countries, which include Russia, higher education is aimed at students and entrants, and not at the scientific community.

The income from the production activities of the department, which graduates specialists of the corresponding profile, reflects the relationship between the department and those companies and enterprises that are ordering research work and projects from it on a contractual basis.

To be known about the university not only within the respective country but also abroad, the rating includes indicators related to international interaction: the share of foreign students, the share of foreign employees, and the share of scientific publications in collaboration with foreign scientists.

Thus, the indicators listed and described here are aimed at assessing the reputation of individual educational institutions for various communities: applicants and students, employers, the scientific community, foreign colleagues, etc.

Results

The results of the study are the proposed classification of rating methods of tertiary education institutions, a generalization of the advantages and disadvantages of individual international methods for constructing educational ratings, and the developed author's methodology for rating building by professional orientation. These results have practical use not only for specific educational institutions but also for many other interested users: entrants, students, graduates, employers, etc.

There are a large number of advantages inherent in the developed professional-oriented rating due to the proposed and above described the structure of the final indicator.

For an educational institution, they are as follows:

- Strengthening and improving the university position in the market of educational services as a result of improving the quality of separate educational programs;
- an increase in the level of trust in an educational organization among individual stakeholders, primarily among those to whom the rating is directed - entrants and employers;
- increasing the competitiveness of educational programs in the educational services market.

There are some key benefits for users such as entrants, students, and their parents, as well as for potential employers:
- obtaining complete and reliable information in the prioritized for them the direction;
- obtaining information on the chosen profession demands in the labour market;
- the opportunity for students after graduation to find a job through close connection and cooperation between employers and universities;

The developed rating is ultimately designed to improve the training quality in tertiary education.

Conclusion

The initial hypothesis of the study that the current world ratings do not take into account the specifics of the national educational systems of different countries and do not allow to fully take into account the professional orientation of certain groups of higher educational institutions has been generally confirmed.

At present, world rankings are aimed at identifying the best scientific environment in universities that will be recognized in Europe and English-speaking countries and become resources of key ideas for leading countries. Instead, first of all, being a guide for applicants when choosing a place of study, taking into account the quality of the educational process.

The developed and described author's rating is an integrated assessment of the quality of training of university graduates, calculated based on objective quantitative indicators of educational, research, international, financial and economic activities of universities.

World university rankings affect not only the educational sector but also the national policies of regions. In the future, the role of ratings will only grow. This is due to the following factors:

- with linking the amount of University funding to the rankings;
- with the transfer of national education systems to the Bologna process and standardization of the performance indicators system of educational institutions;
- with the formation of a universal global educational space and the need to increase the level of competitiveness of universities in the international arena.

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PMBOK And Lean Project Management: Criteria, Steps and Logic of The Project Implementation

Anna DOLINSKAIA
Senior lecturer of the Department of Industry Economics and Project Management,
South Ural State University (National Research University), Chelyabinsk, Russia,
dolinskaiaai@susu.ru

Aleksandr KOROLENKO
Senior lecturer of the Department of Industry Economics and Project Management,
South Ural State University (National Research University), Chelyabinsk, Russia
korolenkoan@susu.ru

Viktor NOVOSAD
Associate professor of the Department of Industry Economics and Project Management,
South Ural State University (National Research University), Chelyabinsk, Russia,
novosadvm@susu.ru

Anastasiya KAMALOVA
Associate professor of the Department of Industry Economics and Project Management,
South Ural State University (National Research University), Chelyabinsk, Russia,
kamalovaas@susu.ru

Abstract

The main task of the article is to determine the criteria for giving the definition of projects from the point of view of the classic approach – PMBOK and from the point of view of the philosophy of lean production. As part of the study, the phases / stages of project implementation at enterprises were analysed separately. As a conclusion, a generalized scheme of project deployment logic was prepared, and criteria similar in terms of the two directions were defined.

Keywords: Project, Project Management, Lean Manufacturing, Project Approach, A Process Improvement, Implementation Stages, Increasing Productivity.

Introduction

Lean manufacturing is considered as one of the possible methodologies for increasing productivity by building a value stream that allows organization to reduce costs. Successful implementation of lean manufacturing requires consistent and conscious action on the part of the organization's employees, led by management and leader, as well as overcoming resistance and obstacles.

The founder of the organization of the customer-oriented approach to the organization of production is LLC Toyota Manufacturing. The corporation has successfully implemented the philosophy and principles of lean manufacturing and has shown significant growth in labour productivity.

Some companies (especially small and medium-sized enterprises) experience difficulties in implementing lean manufacturing tools, dwelling on the issues of implementing principles and tools at the initial stage. Some companies, having incorrectly decided on a project for the implementation of lean manufacturing, cease to engage in implementation and become disillusioned with this philosophy. Some companies, faced with the difficulties of selecting and implementing projects in the framework of lean manufacturing, switch to the implementation of investment projects or projects to improve individual activities.

As it was revealed during the observation of several dozen companies, the most difficult for them are the very first steps - the planning and discussion stage. This article makes an attempt to compare approaches to project

implementation depending on the requirements and capabilities of the organization, as well as stages in the implementation of projects. In this article the logic of deploying projects in enterprises is formulated.

Methodology

In this study authors have conducted research on implementation of lean production projects proposed in the framework of the national program of the Russian Federation and the classical project approach (phase model based on the principles of PMBOK and IPMA standards were chosen as the most common). The main stages / phases of project implementation within the framework of two approaches were studied, the main characteristics of each stage were determined, and the relationship between the two approaches was built and analysed.

Defining a project in terms of PMBOK perspective

PMBOK reviews best practices and includes proven and effective project management methodologies. PMBOK defines a project as a temporary application of effort made to create a unique product or service. The term "temporary" means that any project has a clear beginning and a clear end. The ending (completion of the project) occurs when the objectives of the project are achieved; or it is realized that the objectives of the project will not or cannot be achieved; or the project is no longer needed and it is terminated *(PMBOK® - A Guide to Project Management Body of Knowledge, 2020)*.

According to PMBOK, project management refers to the application of knowledge, competencies, tools, and methods in project activities to meet project requirements.

The project criteria are:

• novelty (in combination of different factors);
• changes as the main content of the project;
• a specific goal, limited in time;
• a limitation of the required resources;
• the budget related to the project.

Working on a project requires a balance between different elements in the organization. PMBOK identifies ten main areas of expertise:

● integration management;
● content management;
● time management;
● cost management;
● quality management;
● human resource management;
● communications management;
● risk management;
● procurement management;
● stakeholder management.

In the PMBOK standard, 6 main defining criteria are distinguished, on the basis of which a decision of opening and implementation is made.

Defining a lean manufacturing project in terms of the national program of the Russian Federation to increase labour productivity

The national program “Labour productivity and employment support” was initiated by the Russian government *(National projects: Russia's future, 2020)*, the main goal of this program is to ensure the growth rate of labour productivity at medium and large enterprises in the basic non-resource sectors of the economy at least 5% per year by 2024. This federal program addresses the task of creating conditions for the advanced growth of labour

productivity on the basis of the principles and tools of lean production is being solved *(Passport of the national project (program) "Labour productivity and employment support" (approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects) (Minutes of December 24, 2018 N 16), 2018)*.

Lean manufacturing can be characterized as a multi-faceted manufacturing approach that includes a continuous improvement process aimed at creating a value stream for the customer.

The methodology developed to replicate best practices states that a flow / process improvement project is a project aimed at optimizing a repetitive process and solving emerging problems using lean manufacturing tools. This methodology is not supposed to launch an investment project.

The project criteria in terms of the national program are:

- mandatory presence of a process in the project;
- the process is repetitive;
- end-to-end / cross-functional / resource-intensive process;
- no ready-made solution during the planning and implementation phase;
- the project does not require significant financial expenses.

From the point of view of the national program, one of the main criteria of projects in lean manufacturing is the lack of a ready-made solution and the mandatory presence of cross-functionality.

Phases of work on a project from the point of view of the classic project approach (PMBOK)

Within the framework of the classical design approach, there are 5 main phases, which are presented in Figure 1 *(Standards, 2020)*:

- Initiating,
- Planning,
- Execution,
- Monitoring / Controlling,
- Closing.

Fig. 1: PMBOK's Five Project Phases
(Source: A guide to the project management body of knowledge (PMBOK guide), sixth edition, 2017)

The Initiation phase focuses on identifying the problem and solving it, the project in general, assessing the economic viability of the project and preliminary costing to decide if the project is feasible. At this stage, the project charter is filled in (also project application, project passport).

The planning phase focuses on planning the implementation of the solution - creating a schema to meet the business requirements that the project is aimed at. This stage includes planning the organization of the project, specification of goals, and a detailed work plan that can guarantee the implementation of the project and obtain the expected result. At this stage, a hierarchical decomposition of work is considered and prepared. It is necessary to determine the sequence of actions, to plan required resources (finance, human resources). Moreover the stage consist of quality planning, communication planning, procurement and acquisition planning, contract planning and risk management, including risk identification, qualitative and quantitative risk analysis and risk response planning.

It is worth noting that the assignment of some of these processes to this phase has certain assumptions, for example, project risk management occurs at all phases, but in the planning phase in this area of knowledge the volume of work is greater than in other phases.

The next phase is monitoring and controlling, which focuses on coordinating resources to implement the plan, monitor and control to ensure that project objectives are achieved. At this stage, project effectiveness should be measured on a regular basis to identify major deviations from the plan that could jeopardize the project's objectives and allow corrective action and even preventive action to be taken in anticipation of potential problems.

Thus, on the one hand, execution processes are highlighted, such as the leading and project management, quality assurance, acquisition, selection and development of the project team, dissemination of information about the project, request for proposals and selection of suppliers. On the other hand, monitoring and control of processes including project work, changes, volume of work, schedule, costs, quality, project team management, and project performance reporting.

The final phase focuses on closing and looking at formal project acceptance, knowledge retention and employee reintegration.

Main phases of a Process Improvement Project

Not all organizations can, or even should, apply the same set of tools for project implementation. It is often recommended that organizations should pay attention to the following aspects:

- elimination of bottlenecks,
- competitive benchmarking,
- continuous improvement programs,
- cross-functionality of workplaces,
- reduction of cycle time,
- just-in-time production / continuous flow,
- reduction in batch size,
- optimization of maintenance processes,
- usage of the new technological equipment / technologies,
- planning strategies,
- preventive maintenance,
- pulling system,
- Kanban,
- quality management programs,
- quick changeover,
- reengineering of the production process,
- safety improvement programs,
- creation of independent working groups (cells).

It should be emphasized that these tools create a system, therefore they help to eliminate a specific type of loss, and they should be applied together.

Within the framework of the methodology, enlarged stages (roadmap) are described, the sequence of implementation of which should be followed. There are 4 main phases:

1) The preparatory phase (planning and preparation), at which the team is assembled, discussion of the pilot process, over which the changes will be made, the initial diagnostics of the state of the process is carried out. Another additional goal of this stage is to conduct basic training for team members and the head of the organization, to acquaint them with the principles, philosophy of lean production. During this phase, it is desirable to prepare information posters, brochures, allowing employees to be involved in the change process.

2) The second phase, which is the main one and assumes the maximum involvement of the team, is Diagnostics and planning phase. This phase is the basis for training specialists and trainers who will replicate successful experience to other departments and / or processes in the future. Diagnostics at this stage involves a detailed analysis, timing of operations, mapping of all operations on the selected stream. As part of planning phase, action plans (with main tasks, responsible people and deadlines) are created to minimize losses and solve existing problems.

3) The implementation of improvements is highlighted in a separate phase, which involves the active implementation of the planned activities, the creation of a project office, regulations, standards and the parallel launch of additional projects throughout the enterprise.

4) The final phase is the replication of gained experience, the creation of its own lean production system in the company.

Results

The study of the phases and stages of the two different approaches has found several points of contact, but initially it was decided to analyse the criteria for defining the project in terms of the classical approach (PMBOK) and the national program approach. The results are shown in Table 1.

Table 1: Comparison of approaches to define projects in terms of the classical school (PMBOK) and the national program

Comparative characteristics	**Classical approach (PMBOK)**	**Improvement process project (the National program)**
Availability of a ready-made solution at the time of launching the project	Yes (during initiating phase)	No
Author of the project / initiator	One person / team	Team
The duration of the project	Project has a clear beginning and the end	3-6 month, but it can be prolonged
Project planning	Different level of detail (from roadmaps to network planning)	Landmark (roadmap)
Object of the project (changes)	Any spheres and processes in the organization, one-time activity	Cyclical activity (cyclical processes)
The result of the project	Creation of a unique product or service	Improvements that affect the activities of several employees or departments in the organization (cross-functionality is required)
Implementation of	One-time activity (within the project	Continuously (creating a system of continuous

changes	frames)	improvement)
Project budget	Fixed at the initial stage (and is separated from other processes and ideas)	Determined as decisions are made
Above-projects coordinators (leader or department)	Coordinator / committee depending on the level of the project	Management / representatives of the department (service) for the development of lean production
Change / development of organizational culture	Optional (depends on the specifics of the project)	Necessarily

(Source: compiled by the authors based on practical experience)

The information obtained during the research was processed and systematized in the form of a general scheme - the logic of the project implementation.

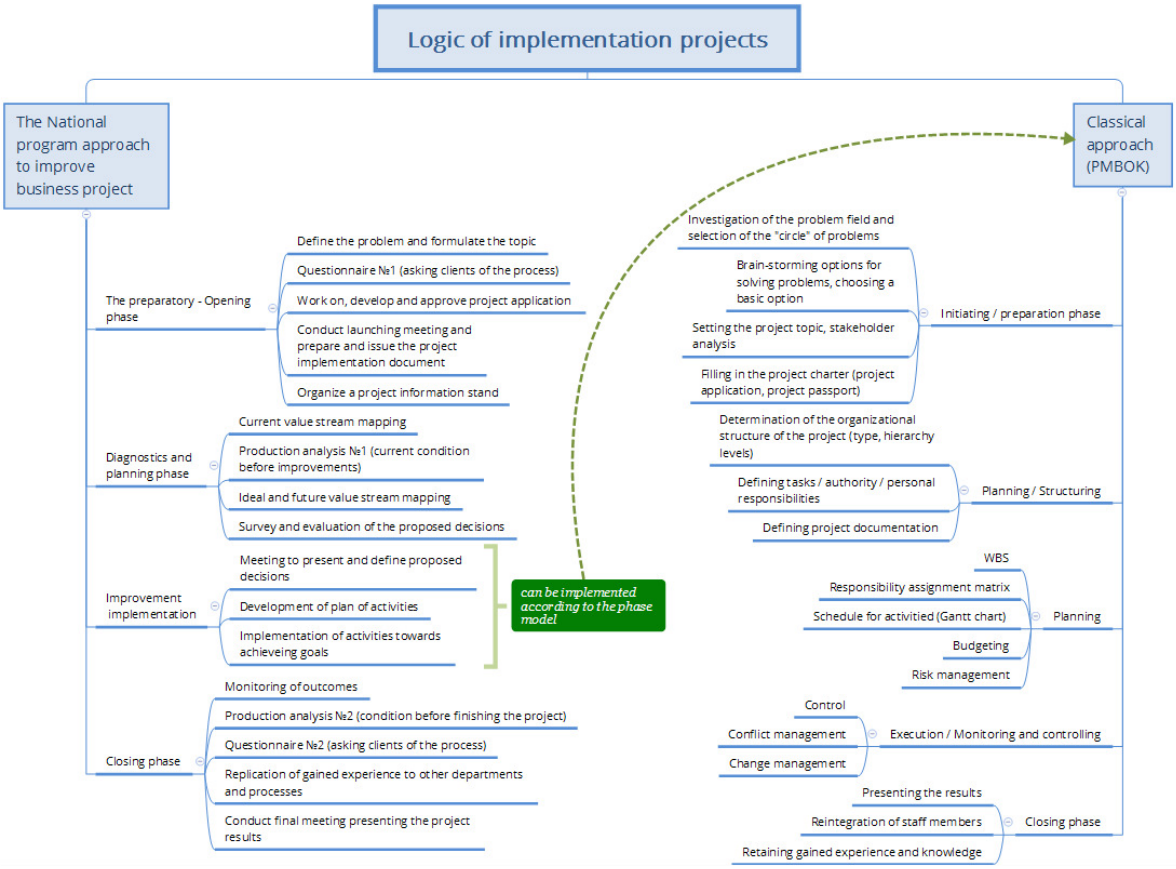

Fig. 2: The logic of the project implementation.

(Source: compiled by the authors)

Discussion

The following conclusions were made that within the framework of the strategic goal of increasing the efficiency of the enterprise, it is worthwhile at the planning stage to agree and clearly define what type of project will be implemented: a classic project and / or a project to improve the process. Table 2 shows the possible compliance between two approaches to define projects with the criteria at the first planning phase.

Table 2: Compliance with criteria at the planning stage of the project implementation

Criteria	Classical approach (PMBOK)	The national program approach for developing processes
Availability of a ready-made solution	+	-
There is a clear understanding of the timing: start and finish of the project	+	-
Strict project planning with fixed milestones	+	-
Project implementation experience can be further replicated	+/-	+
Having an idea of the detailed final result of the project at the first phase	+	-
There is a separate (better isolated) budget for the implementation of the project	+	-
Changes will affect organizational and corporate culture	- / +	+

(Source: compiled by the authors)

The above results hypothesize that a process improvement project from the point of view of the national program is a much broader concept than a project from a classical point of view (Fig. 2).

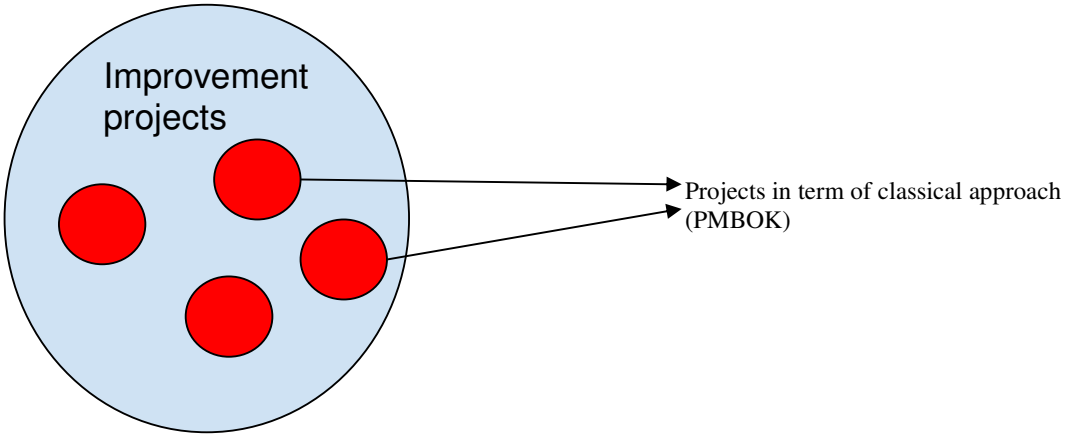

Fig. 2: Correlation of the concepts of process improvement project with the classic project definition
(Source: compiled by the authors)

A project from the point of view of lean production includes both elements of flexible approaches to project management - that is, agile (since there are no ready-made solutions initially, only an approximate roadmap is determined and an iterative principle is used), and the classic elements of project management. Thus, within the framework of the implementation of the only one project to improve the process and increase labour productivity, several separate classical projects can be implemented (if the solutions fit the "classical" project criteria). In addition, a significant role in the implementation of lean production projects is assigned to the change management block in the organization (since we are talking about the development and change of corporate culture), that is, less rigid and mechanistic (as in classical project management), but more lasting changes.

Conclusion

In this article authors identify main criteria for defining the concept of project in terms of classical approach and from the point of view of lean manufacturing theories. The gained results allow hypothesizing that in terms of lean manufacturing the concept of project is wider and can include the classical approach of giving the definition to the project.

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The Technological Development Strategy of Asian Mining and Metallurgical Companies in Industry 4.0 Conditions

Tatyana KACHALOVA
Doctor of economic science, Professor L.N. Gumilyov Eurasian national university,
South Ural State University (National Research University), Chelyabinsk, Russia,
kachalovata@susu.ru

Darya BAEVA
Associate Professor of Financial Technologies Department, South Ural State University (National Research University), Chelyabinsk, Russia,
baevada@susu.ru

Nurzhan KENZHEBEKOV
Associate Professor; Leading Researcher for Rational Solution LLP, Karaganda, Kazakhstan,
kenzhebekov@mail.ru

Lyazzat SEMBIYEVA
Doctor of economic science, Professor L.N. Gumilyov Eurasian national university,
Nur-Sultan (Astana), Kazakhstan
sembiyeva@mail.ru

Abstract

The mining and metallurgical complex and metalworking are the material and technical basis of Industry 4.0. These industries have quite significant contribution to the GDP of Asian countries, while the world metal trading has a considerable negative impact on the mining and metallurgical complex of Kazakhstan. The Republic of Kazakhstan possesses technologies for the production of a whole range of rare earth metals and elements and has its own raw materials (there are prospects for the production of tellurium, cerium, europium, lanthanum, samarium, gadolinium, yttrium and other metals, especially since many of them were produced for a long time). The country is ready to introduce modern high-tech schemes for processing and obtaining high-quality metals, allowing developing new industries, such as rare metal, radio engineering, nanotechnology, etc. Almost all metals and metal products produced in Kazakhstan are exported, and domestic demand is satisfied by imports.
Analysis and review of production volumes and trade operations in the field of metallurgy in Asia and Kazakhstan revealed the most demanded metal products in the long term perspective: pipes, hollow seamless steel tubes and profiles; carbon steel rods; corners, shaped and special profiles made of carbon steel; alloy steel rods; hollow rods for drilling from alloyed or unalloyed steel.
In our opinion, the existing innovation system is not ready for the introduction of breakthrough technologies in the near future; the transfer of technologies is difficult due to the existing counterparties: foreign investments of large transnational corporations are aimed at developing the raw material base and increasing production capacities. In this regard, state policy should be aimed primarily at the complexity and rationality of the use of natural resources. The main development directions of the mining and metallurgical complex of Kazakhstan and Asian countries are the advanced development of the mineral resource base, the creation of attractive conditions for direct investment in industries with high added value, the introduction of technical regulations and the provision of energy and transport infrastructure. This represents directions for further research.

Keywords: mining and metallurgical companies, technological paradigm, waste-free technologies, rational use of mineral resources, technological policy, industry 4.0.

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Introduction

The modern Kazakhstan economy is based on the total superiority of the extractive and processing industries. Apparently, it will not be able to compete with the more developed Asian states in terms of deeper integration into the world economic system due to insufficient development of high-tech industries, which could create the greatest added value. Current development trends in the world economy entail the need for the industrialization of the economy and innovative development. Nowadays Kazakhstani metallurgical companies operate in the context of global competition in the world market.

In general, more than a half of the world population live in Asian countries. They produced more than a third of world volume production in 2000. According to the Financial Times, this indicator will exceed 50% by 2020 *(The Asian century is set to begin, 2020)*. The economies of such large countries as China and India are indisputably significant, the economies of Singapore, Taiwan, Malaysia have already been recognized as developed, the Philippines, Indonesia, Thailand, and Vietnam are also have high development potential.

At the same time, metallurgy will continue to play an important role in the development of the Asian economy and will remain the "basic" industry that provides the formation of the latest technological paradigm.

A considerable increase of the high-tech metal products share is an important feature of the mining and metallurgical companies' development in terms of Industry 4.0, because the automotive, aviation, space and rocketry industries are the main consumers of metallurgical high stage conversion products *(Ivanter, 2018)*.

Currently, there is a considerable gap between the level of economic science development and the current situation in the real sector of the Kazakhstani economy. The current structure of the industrial sector does not meet the requirements of the developing technological paradigm. It is characterized by deep technological deformations. At the same time, the concept of "Industry 4.0" is actively developing in the world and Kazakhstani scientific community. According to the McKinsey Global Institute (MGI), more than a half of working operations in the world could be automated in the next 20 years, and the scale of this process will be comparable to the industrial revolution of the 18th – 19th centuries *(Getting the most out of Industry 4.0, 2020).*

Thus, there are many important issues at the present stage of Kazakhstan's metallurgy development. It is vital to determine the ways to increase and expand the production in terms of new technological paradigm conditions. The Kazakhstan's metallurgy has always been the flagship of the country's development and the foundation of its citizen's well-being. This is an industry that could bring foreign currency income to the state budget, which is comparable to the profit from oil production.

For its sustainable growth, it is necessary to pay priority attention to the restructuring of the national economy, the development of production on a new technological basis, the intensification of innovation activity, the transformation of all material production branches and the service sector on a modern scientific and technical foundation. At the same time, appropriate conditions for the flow of effective innovations and high rates of innovative activity must be created.

However, there is a range of specific features in metallurgy, which influences the whole investment process: the duration and complexity of production cycles; significant amounts of material, labour and financial costs. First of all, it is necessary to provide an economic justification for the proposed measures based on a comprehensive state mechanism to create a favourable investment and business climate in the metallurgical complex, to support domestic producers of metal products, to introduce high-tech innovative proposals of Kazakhstan's scientists in metallurgical production process. These factors determined the relevance of this scientific research.

The main purpose of the scientific work is to determine the priorities and methodological foundations of the technological development strategy for the Kazakhstan mining and metallurgical companies based on the modern trends in the Industry 4.0 development.

The main purpose of the mining and metallurgical companies' technological development is to create conditions for the innovative renewal of the mining and metallurgical industries, providing an increase in the products competitiveness in the range, quality and volume of supplies required by the economy of Kazakhstan and the world economy.

Thereby, the relevance of the mining and metallurgical companies foresight positioning is increasing in order to create a powerful scientific and technological base with the needs of new high-tech and modernized traditional industrial sectors that meet world standards of energy and resource conservation, environmental friendliness of production, labour productivity and provided with highly qualified labour resources.

Analysis of the Sources

The formation of the new industrialized countries in Southeast Asia such as Taiwan, South Korea, Singapore and Hong Kong, Japan's post-war reconstruction could be classified as phenomenal success of the national economic system modernization. This transformation was based on the "pursuit strategy", which provides for the development of cheaper products than those of competitors on the basis of the latest technologies. The process of rapid industrial development was accompanied by an increase in the living standards of the region's population *(Djelic and Quack, 2018)*.

It is important to note that the prerequisites of modern globalization, including the integration of countries into regional associations, the formation of powerful international organizations began to form as a result of the successful modernization of Germany, Japan and the countries of Southeast Asia, which contributed to their integration into the world economic community. Thus, the processes of modernization and globalization are interdependent *(Byun, Sung and Park, 2017)*.

In theory and practice, the neoliberal model of globalization prevails. It is based on the processes taking place in the world economy:

- the formation of a national innovation system, its liberalization at the national and international levels;
- regulation of the economy on a strict monetary basis;
- weakening of state regulation with the development of market mechanisms *(ElGindi, 2016)*.

The neoliberal model assumes that the results of globalization will be equally effectively used by both developed and developing countries, exporters and importers of international goods and services, technology developers and consumers adapting to them. In the financial aspect, the neoliberal model is associated with the fact that the free movement of capital provide the optimal distribution and use of savings in the world economy, stimulates economic growth and the spread of new technologies *(Liu and Dunford, 2016)*.
Structural shifts, which consist in changes in intersectoral, intrasectoral and macroeconomic proportions, are aimed at:

- decrease in the share of the raw materials sector of the economy due to an increase in the share of manufacturing industry;
- modernization of production, including equipment and technologies, increasing the competitiveness of products;
- increasing the efficient and rational use of natural resources;
- increasing the level of the republic's export potential through the production of science-intensive high-tech products;
- creating conditions for the development of innovative activities;
- assistance to further development of small and medium business *(Lenort, 2017), (Byun, Sung and Park, 2017)*.

According to UN study, modernization and technological change should affect job creation and income distribution. Ideally, the introduced technologies should create new jobs, improving the distribution of income in society *(Massa, 2015)*.

From the point of view of the technological changes specifics in the metallurgical industry, researchers pay attention to a number of influencing factors *(Gajdzik, 2019), (Park and Kim, 2019), (Wang, Zheng and Liu, 2016):*

1. Consolidation to the level of a global player. In this case, the value allows to save costs due to the volume of purchases from suppliers of raw materials and strengthen the position in negotiations with consumers of metal products. Chinese companies are considered primarily as new global players.

2. A vertical integration to the raw materials processing is taking place, since the availability of raw materials continues to be a vital factor, and a small or medium-sized company will not be able to buy raw materials on the free market at an affordable price.
3. Production of niche products with high added value: rails, stainless steel, auto sheet and other types of special steels.

A lot of attention is paid to environmentally friendly production in recent studies of technological modernization *(Jia, Foo, Tan and Li, 2017), (Dotsenko, Ezdina and Mudrova, 2019).*

Despite the long-term study of this problem, the utilization and processing of industrial waste is still not carried out at the proper level. Nowadays the large number of solutions is proposed, but the severity of the problem is determined by the increase of industrial waste formation and accumulation. The efforts of foreign countries are aimed primarily at preventing and minimizing waste generation, then at their recycling, secondary use and development of effective methods for final processing, neutralization and final disposal of only non-polluting waste. Undoubtedly, all these activities reduce negative impact of industrial waste on nature, but do not solve the problem of their progressive accumulation in the environment and, consequently, the growing danger of harmful substances entering the biosphere under the influence of man-made and natural processes. The variety of products that can be produced and consumed without waste with the modern development of science and technology is very limited and achievable only on a number of technological chains and only by highly profitable industries.

Methods

The minerals themselves and products of their primary processing (including metallurgical processing) make up about 80% of Kazakhstan's GDP. This determines the great importance of the mineral resource complex and its specific role in the formation of industrial policy. In this connection, the concept of Ecologically sustainable industrial development (ESID) became the methodological basis of this study.

In application for manufacturing processes ESID means reducing material and energy costs, eliminating toxic raw materials from the production process and reducing the amount and toxicity of all emissions and waste before they exit the production process.

In application for products ESID means reducing the negative impact throughout the entire product life cycle from the extraction of raw materials for its production to utilization when the product becomes waste. The concept of product life cycle or the "cradle-to-grave" principle was first proposed in the USA in 1960.

There are the following stages of the product life cycle:

1. Obtaining raw materials:

- extraction of raw materials (including energy consumption for the extraction of raw materials and emissions when receiving this energy);
- extraction of an energy source;
- processing of an energy source into energy;
- transportation of raw materials and energy.

2. Making of products:
- preparation of raw materials;
- manufacturing of products;
- recycling of packaging waste;
- industrial recycling (processing of our own waste);
- packaging and presentation;
- transportation of products;
- production of related products.

3. Use of products and disposal of waste associated with its exploitation.
4. Recycling of a product that has lost its consumer properties ("global recycling").

When assessing the "product life cycle" it is worth paying attention to the fact that in the four-stage cycle scheme, only one stage – "making of products" – refers to an industry problem. All other stages are cross-sectoral tasks. Thus, activities that are useful to the industry will not necessarily be beneficial to the economy as a whole.

At the same time, there are some methods of assessing production in developed countries. The technology that has not passed the examination for compliance with the criteria of "environmentally friendly production" has no prospects in the future in these countries. When licensing, experts compare the technology proposed for use in production with BAT ("Best available technology") as well as with BPT ("Best possible technology"). Unlike BPT, BAT has been implemented in practice and its performance is compared with the characteristics of the proposed technology *(Dotsenko, Ezdina and Mudrova, 2019)*.

These assessment methods allow to determine the overall economic effect of the transition to a low-waste (waste-free) technology, which is the sum of the effects:

- from prevention (reduction) of pollution emissions with industrial waste;
- from the preservation of usable lands;
- from an increase in the area of usable land by reclamation of disturbed areas.

In the process of human impact mineral resources are gradually transformed into final metal products. They sequentially pass through the stages of mining, treatment and enrichment, go to processing, which can consist of many successive technological stages, ending with the transformation of the ore mass into the final product.

Figure 1 clearly shows the transition of a part of mineral resources into losses and waste.

Their amount depends on the technical level of production, the perfection of used technologies, which make it possible to use the original natural raw materials in a complex and carry out further processing of intermediate semi-finished products with minimal waste; when creating and introducing techniques and technologies specially designed for economical use in the production process of basic materials and especially fuel (introduction of various economizers); when creating and introducing technology that processes by-products, waste and all kinds of secondary material resources.

In our opinion, the industrial policy of Russia and Kazakhstan should be implemented from these positions.

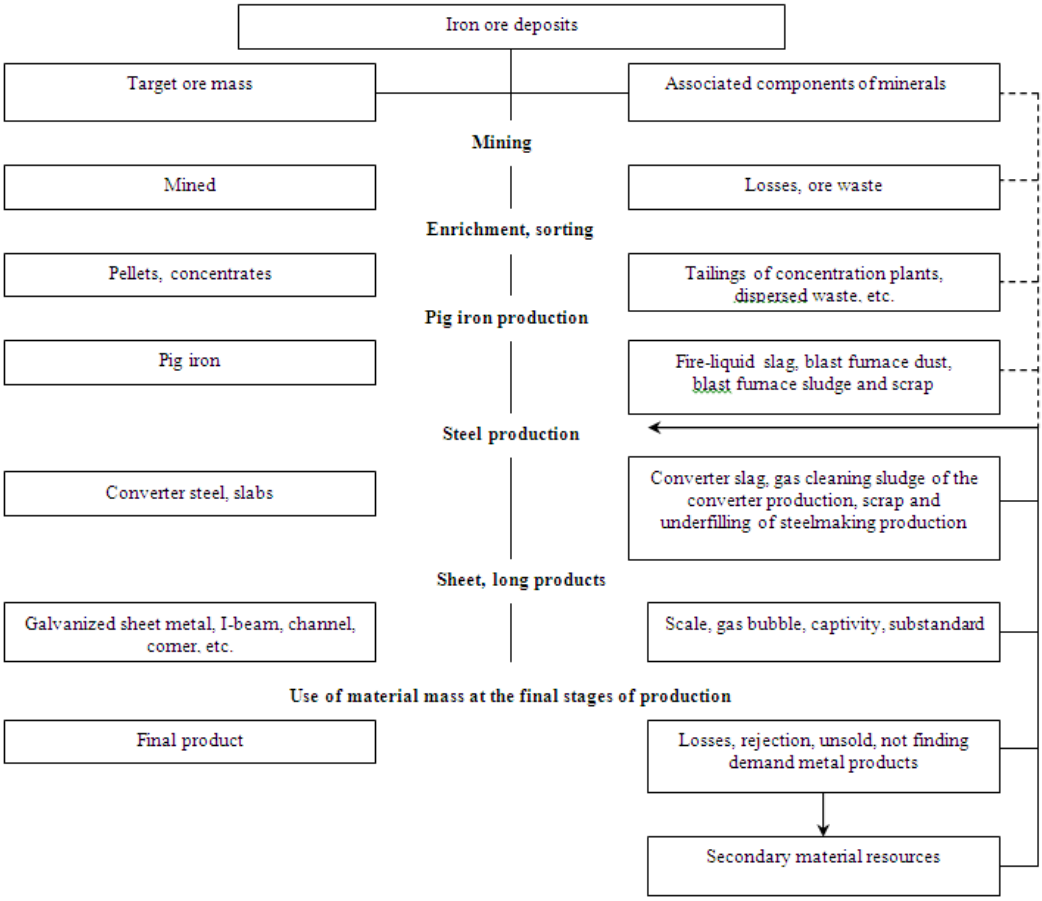

Fig. 1: The cycle of movement and use of natural resources in metallurgical production
(Source: compiled by authors)

Results

The modern period of the metallurgical industry development began in 2000 and is characterized by a stable growth of steel consumption by 8% per year. The undisputed leader in the development of the metallurgical market is China, which provides about a third of world steel consumption and more than a half of its growth (Table 1).

Table 1: Volumes of steel production in the context of individual countries

Country	2019		2018	
	Rank	million tonnes	Rank	million tonnes
China	1	996.3	1	920.0
India	2	111.2	2	109.3
Japan	3	99.3	3	104.3
United States	4	87.8	4	86.6
Russia	5	71.9	6	72.1
South Korea	6	71.4	5	72.5
Germany	7	39.7	7	42.4
Turkey	8	33.7	8	37.3
Brazil	9	32.2	9	35.4

Country	2019		2018	
	Rank	million tonnes	Rank	million tonnes
Iran	10	25.6	10	24.5
Taiwan, China	12	22.0	12	23.2
Vietnam	14	20.1	15	15.5
Indonesia	26	6.4	28	6.2
Thailand	34	4.2	26	6.4
Kazakhstan	35	4.1	37	4.0

(Source: Worldsteel | World Steel Assoctiation, 2020)

As the table shows, Asian countries are the main producers of steel and metal products. China and India have taken 1st and 2nd places respectively over the past few years, Russia is in the top 5 large steel producers, and Kazakhstan takes 35th place.

In addition, these countries are also the main exporters of metal products (Table 2). It should be noted that the metal products market is characterized by a strong cyclical nature both in the long term and throughout the year.

Table 2: Exports and import volumes of metal products

Country	Export		Import	
	thousand tonnes	share, %	thousand tonnes	Share, %
World	**457 583**	**100.0**	**444 350**	**100.0**
China	68 767	15.0	14 366	3.2
Japan	35 839	7.8	6 040	1.4
Russia	33 343	7.3	6 375	1.4
South Korea	30 056	6.6	14 928	3.4
Germany	25 999	5.7	26 584	6.0
Turkey	19 859	4.3	14 043	3.2
Italy	18 180	4.0	20 619	4.6
Belgium	17 971	3.9	14 845	3.3
Ukraine	15 083	3.3	1 582	0.4
France	14 415	3.2	14 882	3.3
Kazakhstan	1 389	0.3	421	0.1

(Source: Worldsteel | World Steel Assoctiation, 2020)

To understand the essence of the metallurgical cycle, the "producer-trader-consumer" model is usually considered. The problem of the highly cyclical nature of the metallurgical industry is primarily a consequence of the uneven dynamics of demand from consumer industries – construction, automotive sector and oil production.

The first 10 companies in the world metallurgy cover 27% of the market in terms of output, while in other industries the concentration of production is much higher (Table 3).

Table 3: Top steel-producing companies 2019

Rank	**Company**	**million tonnes**
1	ArcelorMittal	97.31
2	China Baowu Group	95.47
3	Nippon Steel Corporation	51.0
4	HBIS Group	46.56
5	POSCO	43.12

6	Shagang Group	41.10
7	Ansteel Group	39.20
8	Jianlong Group	31.19
9	Tata Steel Group	30.15
10	Shougang Group	29.34
World		1 868.8

(Source: Worldsteel | World Steel Assoctiation, 2020)

Low consolidation results in a significant market influence of suppliers and consumers on metallurgical companies. This negatively affects pricing and, ultimately, the efficiency of the metallurgical business as a whole.

One of the state's technical development indicators is the level of steel consumption. Currently, Kazakhstan lags far behind the main industrialized countries of Asia in terms of steel consumption.

In the short term, the following types of steel products are the most promising:

- alloy steel flat-rolled products;
- seamless steel pipes;
- flat-rolled products made of corrosion-resistant (stainless) steel.

All over the world, specialized high-tech enterprises are engaged in the production of stainless steel, each of which produces only a narrow segment of rolled products range. Moreover, each of these companies produces a minimum number of brands and standard sizes. This specialization combined with high-tech equipment allows to achieve the highest quality, can reduce the costs associated with stopping, reconfiguring and starting equipment and helps to increase productivity. All of these factors ensure low cost and high quality of rolled products.

The demand for the pipe industry products, as well as for the products of other basic industries, largely depends on the macroeconomic indicators of the world economy. The demand for pipes is mainly driven by three economic sectors: the oil and gas industry (which includes the transportation of oil and gas), mechanical engineering and metalworking. According to experts' forecasts, the so-called BRIC countries (Brazil, Russia, India and China) will dominate the world pipe market by 2050. The volume of world pipe production will triple by this period up to 170 million tons, 60% of which will be produced in the BRIC countries.

The main condition for the successful implementation of the industrialization policy should be an increase in the productivity of production factors and providing the competitiveness of the national economy. As mentioned earlier, the environmental friendliness of technological processes should be the main criterion for the development of new industries.

In highly developed countries, metallurgical slags, in accordance with the production and economic purpose of their use, are classified as natural resources and are fully used. At the same time, a list of production factors from the stage of liquid slags to the processing of slags in a solid state has been developed for each type of slag (blast furnace, converter, electric smelting). These factors affect their properties and determine the types of production areas where slags can be used with the greatest benefit.

Table 4 presents data from foreign full-cycle plants on the use of converter slags of traditional processing.

Table 4: Generation and use of solid waste in different countries

Solid waste type	Austria		Germany		Japan		USA		India		Kazakhstan	
	Waste generation	Use, %	Waste generation	Use, %	Waste generation	Use, %	Waste generation	Use, %	Waste generation	Use, %	Waste generation	Use, %
Blast furnace slag, kg/t of pig iron.	250-332	94-100	255	100	284-342	92-100	175-290	100	340-421	30-50	410	33.3
Dust, sludge kg/t of pig iron	6-28	80	1.5	100	9-27	100	14-17	20-40	28	0	17.4	60
Converter slag, kg/t of steel	135-187	80-100	103	96	96-155	90-100	70-170	60-100	200	25	140	3
Converter sludge, kg/t of steel	10-24	25	18	100	15-55	100	15-40	30	15	0	15.7	0
Rolling mill scale, kg / t of steel	15	100	17.5	100	35	100	6-20	100	22	100	31.2	100
Sludge from rolling mills, kg/t of steel	3-6	50	3.5	100	2-10	100	1.1	0	12	10	12.3	100
Spent refractories, kg/t of steel	3	0	-	-	2.7	100	5-50	0	11.6	40	7.3	9.8

(Source: Worldsteel | World Steel Assoctiation, 2020)

Only about 4% of slag ends up in dumps, which confirms the high interest of related industries in it. Moreover, special technologies have been developed to involve current production slag in the work.

In addition to international cooperation and agreements, developed countries have formed a regional waste management system based on sources of waste generation, including metallurgical ones. There is the National Slag Association in the USA, the Technical Association for the study of the slag's properties, their processing and application and the Special Union for blast furnace slags in France, as well as departments and laboratories of metallurgical and construction institutes and organizations, the National Slag Association in Canada, British Slag Association in England. In 1949 a special scientific and technical society was organized in Germany for a comprehensive study of the metallurgical slags properties with the aim of their subsequent use in industry and agriculture. These studies were carried out with the participation of metallurgical representatives – producers of slag and potential consumers, but under the supervision of government.

Thus, the creation of waste-free technological processes allows to solve the problem of nature protection not only technically, but also with economically reasonable costs. When implementing this approach, the waste itself as the main sources of environmental pollution will be eliminated, while more rational use of valuable and renewable natural resources will be provided.

Discussion

The state of production in the metallurgical complex of Kazakhstan is currently characterized by the following features:

- there are practically no industrial production of science-intensive, high-tech, special materials and alloys for the development of modern industries in the country;
- the required assortment of rolled and metal products for heavy machine building, shipbuilding, oil and gas, mining and metallurgical, construction, light, food and other industries is not produced;
- there is no industrial production of materials and metal products based on the up-to-date technologies such as powder metallurgy, electrometallurgy, electroplating, new foundry and chemical technologies, etc .;
- secondary resources of metals are not used enough effectively and their export abroad is carried out uncontrollably.

The main priority directions of state policy in the field of new metallurgical industries development, taking into account the rational and comprehensive use of natural resources, are:

- the formation of economic conditions for the most efficient use of secondary raw materials, energy and material saving technologies and alternative energy sources in order to ensure the rational use of mineral resources;
- slowdown in the rate of decrease in reserves of basic minerals as well as in the volume of the main types of geological exploration;
- creation of economic conditions for improving the system of ore deposits development in order to reduce the loss of minerals in the bowels and their dilution;
- accelerating the creation of high-performance equipment and fundamentally new technologies for the enrichment of mineral raw materials, the transition to deep enrichment in order to improve the quality of concentrate, agglomerate, pellets (additional costs at this stage should pay off at subsequent stages of processing in the form of saving heat, coke, fluxes, improving quality metal, etc.);
- widespread audit testing of tailings and dumps for the content of associated valuable components in them, their reassessment and, with positive results, the implementation of geological exploration with the development of feasibility studies for re-enrichment of accumulated tailings and stored rocks;
- ensuring a fuller use of the associated overburden in the country's economy;
- excess of the volume of mineral reserves reproduction (or, at least, of the main types of mineral raw materials) over the volume of their extraction. To this purpose, it is necessary to develop a system of advanced growth of reserves in a volume not less than 1.5 times higher than the volume of annual production.

It is necessary to improve the mechanism of complex state regulation in the field of extraction, processing of raw materials, the use of products from it and waste disposal in the Republic of Kazakhstan. The main task of metallurgists, economists and ecologists is to adopt the existing developments on the problem, to continue work on improving the use of raw materials, including metallurgical ones. Therefore, it is necessary to activate the work of all organizational state structures. In order to exist, develop, improve and survive in extreme conditions a control system must have a set of certain properties.

1. Integrity and separability. The system is an integral set of elements interacting with each other. It is important to note that the elements only exist in the system. Outside the system, these are only objects that have the potential ability to form a system. System elements can be of different quality, but at the same time compatible.
2. Connections. There are significant connections between the elements of the system, which, with natural necessity, determines the integrative qualities of this system. Links can be material, informational, direct, reverse, etc. The connections between the elements must be more powerful than the connections of the individual elements with the external environment, otherwise the system cannot exist.
3. Organization. The presence of system-forming factors in the elements of the system only suggests the possibility of its creation. For the emergence of a system, it is necessary to form ordered connections, i.e. a certain structure, organization of the system. The connections between the elements of the control system are ordered in a certain way, that is, the logistics system has an organization.
4. Integrative qualities. The system has integrative qualities, i.e. qualities inherent in the system as a whole, but inherent in one of its elements separately. The material resource management system has integrative qualities that are not inherent in any of the elements separately. This is the ability to deliver the right product, at the right time, in the right place, of the required quality, with minimal costs, as well as the ability to adapt to changing environmental conditions.

The assumed organizational and economic mechanism for the development of low-waste technologies in metallurgy is shown in Figure 2. The figure shows that, first of all, scientific research must be directed to the improvement and development of regulatory support in the field of the secondary resources use.

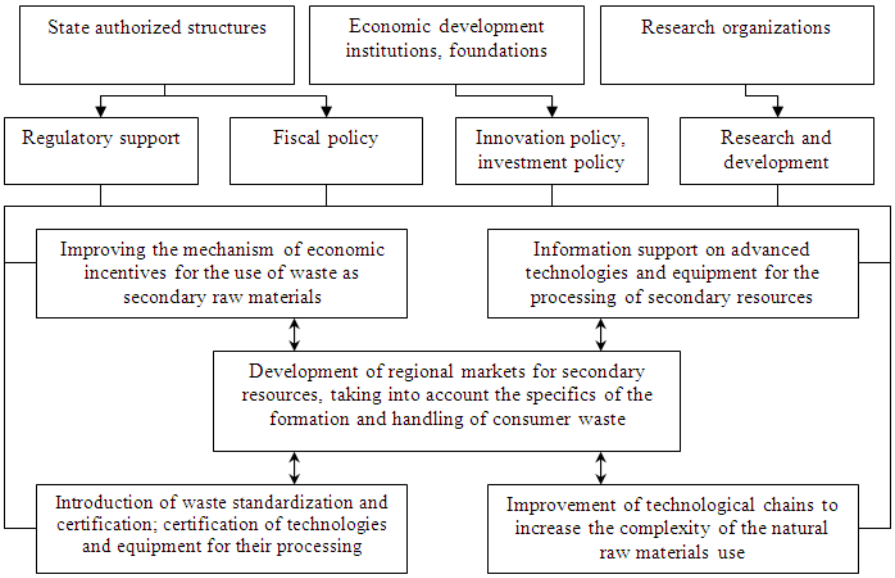

Fig. 2: Organizational and economic mechanism for stimulating new industries in the mining and metallurgical complex

(Source: compiled by authors)

Conclusion

The solution of such a difficult task as the technological development of the mining and metallurgical complex is possible through the implementation of large-scale innovative projects using the existing scientific and technical potential of an industrial company, aimed at the development and production of new, high-tech, and therefore competitive products. Undoubtedly, modernization of the main production processes in market conditions is a task for private business; however, foreign experience indicates the need for state participation in technological development processes.

In case of creating new metallurgical enterprises and reconstructing existing production facilities, it is necessary to implement waste-free and low-waste technological processes that provide the rational economical use of ore raw materials:

- involvement of gaseous, liquid and solid waste products in the processing, reduction of emissions and discharges of harmful substances with waste gases and wastewater;
- in the extraction and processing of ferrous and non-ferrous metal ores – the widespread use of large-tonnage dump solid waste from mining and processing industries as building materials, laying the mined-out space of mines, road surfaces, wall blocks, etc. instead of specially mined mineral resources;
- full processing of all blast-furnace and ferroalloy slags, as well as a significant expansion of the scale of processing of steel-making slags and non-ferrous metallurgy slags;
- drastic reduction of fresh water consumption and reduction of waste water through further development and implementation of waterless technological processes and closed water supply systems;
- increasing the efficiency of existing and emerging processes for capturing by-components from waste gases and wastewater;
- widespread introduction of dry methods for cleaning gases from dust for all types of metallurgical industries and the search for more advanced methods of waste gases cleaning;
- development and widespread implementation of highly efficient purification equipment at metallurgical enterprises, as well as devices for monitoring various parameters of environmental pollution;
- the fastest development and implementation of new progressive low-waste and waste-free processes, bearing in mind the blast-furnace and cokeless processes of steel production, powder metallurgy, autogenous

processes in non-ferrous metallurgy and other technological processes aimed at reducing emissions into the environment;
- expanding the use of microelectronics, automated control systems in metallurgy in order to save energy and materials, as well as to control and reduce waste generation.

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Recreational Potential of The Southern Urals And Improving the Quality of Life

Viktor NEMTSEV
Professor of Economics Department, Nosov Magnitogorsk State Technical University,
viktornems@gmail.com

Igor BAEV
Head of Department of Financial technologies, South Ural State University
(National Research University), Chelyabinsk, Russia,
baevia@susu.ru

Elena MELNIKOVA
Professor of Department of Accounting, analysis and audit, South Ural State University
(National Research University), Chelyabinsk, Russia,
melnikovaei@susu.ru

Pavel LIMAREV
Associate Professor of Economics Department, Nosov Magnitogorsk State Technical University,
lavrenty_p@mail.ru

Abstract

The relevance of the research is due to the need to strengthen the resource potential of the information economy of the XXI century. The contradictory development of globalization processes determines the increase in the theoretical and practical significance of the category of Quality of Life. Modern regions differ significantly in terms of natural and climatic conditions, even in the era of globalization, very different opportunities for maintaining the health of the population and recreation of economic resources can be formed. The aim of the work is to improve the methodology and tools for improving the Quality of Life based on the development of the recreational potential of a region. The prospects of improving the Quality of Life based on the formation of a recreational cluster in the region, the rational use of climatic features and unique natural resources of the Southern Urals are studied. Identified opportunities to improve the Human Development Index and Better Life Index through health promotion, increase in life expectancy. The natural and climatic conditions of the natural wealth of the region and the use of natural water resources are studied. The necessity of institutional changes in the status of specially protected territories of the region, the implementation of targeted programs within the framework of the formation of a recreational cluster is justified. Methods of situational analysis, expert assessments, modelling, statistical data, field research, and publications in the open press were used. The results obtained can be used to form regional development programs.

Keywords: Quality of Life, Regional Resources, Recreational Potential, Clusterization.

Introduction

One of the main tasks of social and economic development of the society is to maintain a high Level and Quality of Life of the population. The state of the modern economy and the contradictory development of globalization processes determine the increase in the theoretical and practical significance of the categories of Level and Quality of Life. Category The Level of Life is characterized by the degree of the population's requests satisfaction, including the level of real income, the volume and features of purchased goods and services. The category of Quality of Life is based on the assessment by an individual or a separate group of various aspects in the social, physical and intellectual sphere of their activities and is characterized by the general state of economy, demographic situation, and environmental, social, political and moral aspects. Accordingly, the Quality of Life category covers not only the physical and monetary volumes of goods and services consumed, but also people's assessment of their

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availability of products, goods and services, living conditions, employment, social guarantees, and education *(Lebedeva, 2018), (Stiglitz, Sen and Fitoussi, 2009)*.

According to many researchers, the Quality of Life category is more complete and more extensive than the Level of Life category. We can say that the category of Level of Life describes the economic component of the Quality of Life, complementing the characteristics of development and satisfaction of physical, spiritual and social needs of people. Based on this, the Quality of Life may differ significantly even in regions with the same Level of Life. At the same time, the environmental and geographical aspects of development become important, which predetermines the adjustment of the processes of globalization taking into account the regional development potential *(Stiglitz, Sen and Fitoussi, 2009)*, *(Eurostat. Final report of the expert group on quality of life indicators, 2017), (The transformation of our world: The agenda for sustainable development for the period up to 2030, 2015).*

Features of the economic and geographical location of a region today significantly affect the Quality of Life of the population. At first glance, territories that are part of financial and industrial clusters with large cities, large industrial facilities, and extensive transport infrastructure are in a better position. However, today certain advantages, in terms of Quality of Life, are also obtained in areas where there are no megacities, there are no enterprises that harm the environment, and there are fewer highways with increased volumes of car exhaust, which creates a healthier environment for people and a more comfortable living environment.

Modern regions have very different natural and climatic conditions of the population (in terms of the number of Sunny days, temperature, humidity, and availability of high-quality water resources). Accordingly, even in the era of globalization, there may be very different opportunities for maintaining public health and recreation of economic resources. The problems of Quality of Life are especially relevant in the era of the information economy of the XXI century, the key link of which is the person and his creative abilities, and are significantly complicated in the situation of the COVID-19 pandemic.

The development of a modern region (in terms of improving the Quality of Life of the population) should be based on increasing its recreational potential through the formation of effective clusters, taking into account the interests and uniqueness of a region, socio-economic and natural-climatic features. Accordingly, the purpose of this work is to research the methodology and develop tools for improving the Quality of Life based on the development of the recreational potential of a region.

Literature Review

As early as in 1970-80, the main approaches to the study of the Quality of Life – subjective, objective, and based on the expansion of human capabilities, began to be formed later, economic, philosophic-psychological, and socio-economic approaches were also formed. Today, within the framework of these approaches, in particular, the most famous developments are those of R.C.F. Aron, E.G. Animitsa, M. Argyle, V.F. Bezyazychny, A. Campbell, E. Diener, J. Forrester, J. Fourastie, J.K. Galbraith, R.E. Lucas, H. Noll, S. Oishi, A.I. Subetto, G.M. Zarakovskiy and many others *(Lebedeva, 2018), (Diener, Lucas and Oishi, 2018).* In 2009, as part of the Report of the Commission of Nobel prize laureates J.E. Stiglitz and A. Sen, as well as Professor J.P. Fitoussi on the measurement of economic development and social progress, a new integral approach to measuring the Quality of Life was proposed, integrating all previously designated, in the wake of thematically specialized and regionally differentiated interpretation of the concept of Quality of Life *(Stiglitz, Sen and Fitoussi, 2009)*.

The multidimensional nature of the Quality of Life category determines the existence of methodological problems and multiple approaches to its definition and measurement. Researchers prefer not to define the concept of Quality of Life, but study the system of factors that affect this category, noting the nonlinear dependence of the integral indicator of Quality of Life on these factors. For example, UN experts suggest using the Quality of Life Index, which takes into account a huge number of indicators integrated into factors of income, health, stability, security, family well-being, public relations, gender equality, political freedoms, climate, and employment *(Stiglitz, Sen and Fitoussi, 2009), (Diener, Lucas and Oishi, 2018)*, *(2019 Human Development Index Ranking | Human Development Reports, 2019)*. The lack of necessary statistical data makes it difficult to use this index for Russian regions. The organization for Economic Co-operation and Development (OECD) uses the Better Life Index, calculated on the basis of 23 indicators that form factors of Housing, Income, Jobs, Community, Education, Environment, Civic Engagement, Health, Life Satisfaction, Safety, Work-Life Balance *(OECD Better Life Index, n.d.)*. At the same

time, the attention of researchers is still insufficiently focused on the mechanisms and tools for improving the Quality of Life of the population through the use of the recreational potential of regions, which makes it possible to more fully and reasonably take into account the environmental and geographical aspects of development.

A number of developments by E.U. Alexeycheva, L.S. Arkhipova, D.D. Friedman, R.M. Kachalov, S.S. Kuznets, A.M. Lavrov, D.P. Norton, M.E. Porter, J.A. Schumpeter, U.A. Simagin, R.M. Solow have been devoted to the problems of economic development and increasing the potential of regions (at various times). These problems were also studied by representatives of the new wave of regional development theory M. Fudjita, A.O. Hirschman, P. Krugman, G. Myrdal, A. Venables and others. However, despite significant achievements, researchers have not paid enough attention to the study of regional development opportunities based on clustering of the region's recreational systems, which can increase its economic potential and contribute to improving the Quality of Life *(Krugman, 2002), (Porter, 1998)*.

Methods

In modern research, Quality of Life is often measured by the Level of Human Development, which is published annually in UN updates. The Human Development Index HDI aggregates several social indicators: the Life Expectancy Index LEI, the Education Index EI, and the Income Index II *(2019 Human Development Index Ranking | Human Development Reports, 2019)*:

$$HDI = \sqrt[3]{LEI \cdot EI \cdot II}\,; \tag{1}$$

$$LEI = \frac{LE - 20}{85 - 20}\,; \tag{2}$$

$$EI = \frac{MYSI - EYSI}{2}\,; \tag{3}$$

$$II = \frac{\ln(GNI_{pc}) - \ln(100)}{\ln(75000) - \ln(100)}, \tag{4}$$

where is LE – Life expectancy in years; MYSI – Mean years of schooling index; EYSI – Expected years of schooling index; GNI_{pc} – Gross National Income GNI per capita (purchasing power parity PPP), in $ US.

The availability of statistical information has predetermined the widespread use of this indicator by experts. However, this method has certain disadvantages; in particular, it can be attributed to the limited number of factors taken into account and the lack of assessment of the quality of the analysed spheres of life.

In our opinion, the initiative method of the OECD, which uses the Better Life Index, looks more preferable *(OECD Better Life Index, n.d.)*. In essence, it is an Internet platform for highlighting important areas of life with their weight coefficients, where the Better Life Index is presented for each country in the form of a diagram with 11 petals. Each of these petals illustrates the comfort of life (in a certain aspect) on a 10-point scale: Housing, Income, Jobs, Community, Education, Environment, Civic Engagement, Health, Life Satisfaction, Safety, and Work-Life Balance. In particular, in this platform, the "Work-Life Balance" indicator is estimated by the percentage of employees working overtime. The "Health" indicator shows Life expectancy. The indicator "Ecology" (Environment) is estimated as an indicator of the content of fine polluting particles PM 2.5 in the air (the national average value is 15.5 $\mu g/m^3$) and water quality. The "Community" indicator is characterized by the level of mutual assistance, reliability of relationships between people, and social support. The "Civic Engagement" indicator can be characterized by the participation of citizens in political life, in particular, the level of voter turnout during voting.

To study the recreational potential and water quality of the Southern Urals, the lake geosystem of the resort area of Kisegach was selected using the results of field research for the period 1994-2018. The estimation of changes in the transparency of water resources by the white disk in the central part of reservoirs over a multi-year period was performed to calculate changes in their trophic status by the transparency value based on the Carlson TSI index *(Nemtsev and Zakcharov, 2020)*.

In General, the work uses methods of analysis and synthesis, economic and mathematical modelling, system, situational and reflexive analysis, methods of expert assessments, surveys of respondents, statistical data and results of field research.

Results

According to the analysis of statistics (*2019 Human Development Index Ranking | Human Development Reports, 2019)*, the value HDI of the Russian Federation has grown to 0.824 from 0.691 (at the beginning of the 2000s), which corresponds to a very high level of development and provides it with 49th place in the ranking of all countries. However, the Russian indicator LE is at the level of 72.4 years, which is significantly lower than the level of other countries with a very high level of development (Norway 82.3 years, Switzerland 83.5 years, Australia 83.1 years, etc.). This indicates the potential for growth in Russian indicators LE and HDI is related to the fact that achievements in the field of national income are not yet being properly transformed into achievements in the field of public health and improving the Quality of Life (Table 1).

Table 1: Ranking of the Human Development Index for 2019

Rank	Country	Human Development Index HDI (value)	Life expectancy at birth (years) SDG3	Expected years of schooling (years) SDG 4/3	Mean years of schooling (years) SDG 4/6	Gross national income (GNI) per capita (PPP $ US) SDG 8.5
1	Norway	0.954	82.3	18.1	12.6	68.059
2	Switzerland	0.946	83.6	16.2	13.4	59.375
3	Ireland	0.942	82.1	18.8	12.5	55.660
4	Germany	0.939	81.2	17.1	14.1	46.946
4	Hog Kong, China (SAR)	0.939	84.7	16.5	12.0	60.221
6	Australia	0.938	83.3	22.1	12.7	44.097
6	Iceland	0.938	82.9	19.2	12.5	47.566
8	Sweden	0.937	82.7	18.8	12.4	47.955
9	Singapore	0.935	83.5	16.3	11.5	83.793
10	Netherlands	0.933	82.1	18.0	12.2	50.013
…	…	…	…	…	…	…
15	United States	0,920	78.9	16.3	13.4	56.140
16	Belgium	0.919	81.5	19.7	11.8	43.821
…	…	…	…	…	…	…
49	Russian Federation	0.824	72.4	15.5	12.0	25.036
50	Belarus	0.817	74.6	15.4	12.3	17.039
50	Kazakhstan	0.817	73.2	15.3	11.8	22.168
52	Bulgaria	0.816	74.9	14.8	11.8	19.646
…	…	…	…	…	…	…

(Source: 2019 Human Development Index Ranking | Human Development Reports, 2019)

The Russian Federation is also characterized by a significant regional level gap: for example, in the more prosperous Moscow and St. Petersburg, it is 0.935-0.952, and in the poorest regions (the Republic of Tuva, the Jewish Autonomous Region, and the Chechen Republic) – 0.786-0.801. The regional gap is also reflected in the imbalance of Human Potential components: if the Russian Federation as a whole has a very high Education Index EI (0.910), but the Life Expectancy Index LEI is only 0.671, the Income Index II is also relatively low (0.703), in particular, the Caucasian republics of the Russian Federation have a Life Expectancy Index LEI, but a low Education Index EI *(Rating of Russian regions by quality of life, 2019)*, *(Bobylev, Tikunov and Chereshnya, 2020)*.

Calculations using the OECD method of the Better Life Index *(OECD Better Life Index, n.d.)* for the Southern Urals region were performed for consumers and specialists of sanatorium organizations that are part of the resort area of Kisegach, which includes the Elovoye, Bolshoi Kisegach and Maly Terenkul lakes (tectonic lakes located

within the Eastern foothills of the Ilmen range). We used expert assessments, official statistics and results of systematic surveys of tourists. The results of the evaluations are presented in Table 2.

Table 2: Results of the assessment for the directions of the Better Life Index in the Southern Urals

Indicators	Rating by year, point		
	2017	2018	2019
1 Housing (Housing conditions)	4.2	4.4	4.5
2 Income	2.5	2.2	2.3
3 Jobs	7.0	7.2	7.3
4 Community	6.8	7.4	7.3
5 Education	8.1	8.4	8.4
6 Environment	2.1	2.2	2.3
7 Civic Engagement	4.8	4.8	5.2
8 Health	3.3	3.2	3.3
9 Life Satisfaction	6.5	6.5	6.5
10 Safety	6.0	6.4	6.0
11 Work-Life Balance	8.0	8.2	8.5

Analysis of the results shows that the region has a fairly high assessment of the Quality of Life in the indicators "Education" (8.1-8.4) and "Work-Life Balance" (8.0-8.5), which corresponds to the national average and the level of the UK and Belgium. Other indicators are lower than the OECD average and partially correspond to the national average *(OECD Better Life Index, n.d.), (Rating of Russian regions by quality of life, 2019), (Bobylev, Tikunov and Chereshnya, 2020), (Bobylev and Grigoryev, 2018)*.

However, the indicators "Environment" (2.1-2.3) and "Health" (3.2-3.3) are noticeably lower than the national average, which can be assessed as an urgent need for the relevant system work in the region in these areas.

The results of research on the quality of water resources in the region confirm the concerns of the above respondents and experts on the "Environment" indicator and are presented in Table 3 and Fig. 1.

Table 3: Results of field research of morphometric parameters of lake geosystems of the Southern Urals

The parameters of lake	Lake geosystem of the Kisegach resort area		
	Yelovoye	Maly Terenkul	Bolshoy Kisegach
1 Absolute level mark (Baltic system of marks), m	322.5	319.0	317.0
2 Lake mirror Area, км^2	3.25	0.98	14.90
3 Maximum depth, м	13.5	18.8	33.0
4. Average depth, м	8.1	9.0	15.4
5 Volume of water mass, million m^3	26.5	8.7	230.0

(Source: author's research based on work of Nemtsev and Zakcharov, 2020)

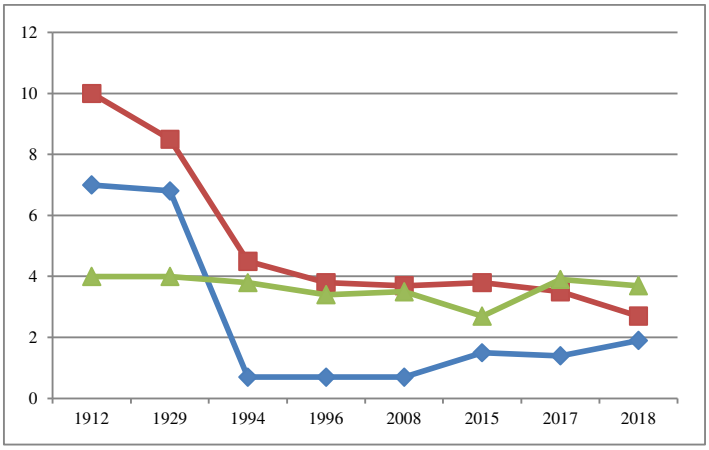

Fig. 1: Assessment of lake water transparency in July-August on the white disk, m: Bolshoy Kisegach – red, Maly Terenkul – blue, Yelovoye – green

(Source: author's research based on work of Nemtsev and Zakcharov, 2020)

As it was found in Nemtsev and Zakcharov' work, the lake geosystem under study had accumulated environmental damage by 2020, its assimilation capacity to recreational impact was significantly underestimated, and the lakes experienced a restructuring of natural hydrobiocenoses. Due to institutional and economic reasons, the impact of the recreational complex of the Southern Urals on the studied lake geosystem in 2012-2018 decreased due to a reduction in the number of service users by almost 50%, which led to a decrease in centralized water intake from lake Bolshoy Kisegach and a decrease in the discharge of wastewater into lake Tabankul (through the channel entering lake Maly Terenkul).

In the last 10-12 years, there has been deterioration in the water quality of Lake Bolshoy Kisegach in terms of transparency and an increase in the concentration of phosphorus compounds (runoff of polluted waters of Lake Maly Terenkul and an additional summer load of unorganized vacationers). The instability of the ecosystem of lake Yelovoye is increasing, which is expressed in the increase in" blooming» of water of the 3rd degree due to the uncontrolled impact of unorganized vacationers, the use of water attractions and motor vehicles in the water area. The decrease in the recreational attractiveness of the coast and water area of lakes Bolshoy Kisegach and Yelovoye is also due to the "blooming" of blue-green algae (cyanobacteria) in the month of July and August. The observed patterns in the study of water resources in the Southern Urals form a real threat of rapid depletion of the natural and recreational potential of the region *(Nemtsev and Zakcharov, 2020).*

Deliberation and Discussion

In our opinion, the OECD Internet platform illustrates the existing structure of the concept of Quality of Life quite well, and its application is also possible for regional studies using comparative and reflexive analysis. At the same time, the OECD methodology under consideration has a significant limitation due to the use of rare statistical indicators generated within the framework of OECD-initiated programs, which determines the high cost of research and the complexity of research of individual social groups. In our opinion, for scientific purposes, the lack of statistical data, deterministic and stochastic models for calculating regional indicators can sometimes be partially compensated by expert assessments and surveys of respondents, results of meta-analysis *(Limarev, Limareva, Akulova and Khakova, 2018)*. It should also be noted that all indicators that characterize the Quality of Life trends are initially equal and are not aggregated into a single common indicator. Although this approach complicates further analysis, it is quite consistent with the level of complexity, versatility and multidirection of the concept of Quality of Life. The results of calculations of the Human Development Index and Better Life Index indicators show that there are prospects for improving the Quality of Life.

Analysis of the prospects of improving the Quality of Life through the implementation of the recreational potential of the region has identified areas of development methodology and development tools improve the Quality of Life

of the region on the basis of UN and OECD indicators *(Stiglitz, Sen and Fitoussi, 2009), (Eurostat. Final report of the expert group on quality of life indicators, 2017), (The transformation of our world: The agenda for sustainable development for the period up to 2030, 2015),* (*OECD Better Life Index, n.d.)*. The study of the current values of the Human Development Index and Better Life Index indicators, as well as the peculiarities of the formation and implementation of the recreational potential of the Southern Urals, revealed the need for systematic work of the region on Quality of Life indicators. From an economic point of view, such work can be organized on the basis of the formation of a cluster that includes health resorts, medical and wellness complexes, organizations of medical and health tourism, based on the resources of business and regional authorities. This will allow us to ensure the rational use of climate features and unique natural resources of the Southern Urals at the system level (Fig. 2).

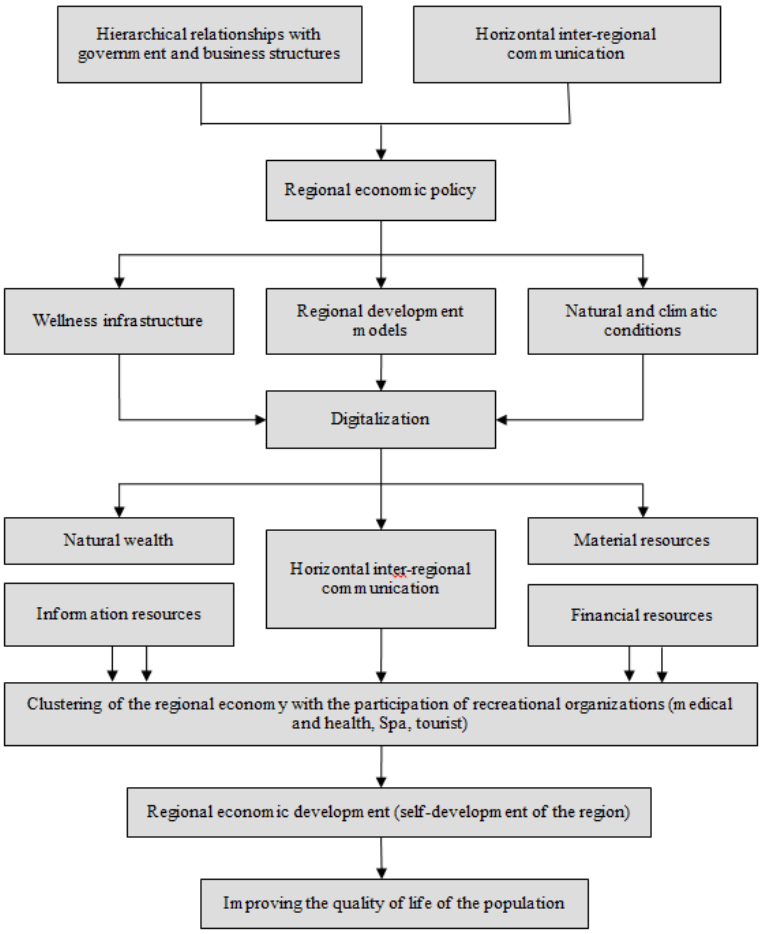

Fig. 2: Key components of the region's recreational potential development
(Source: compiled by authors)

The cluster concept is an alternative to the traditional dissipative model of regional development based on horizontal links and relationships between direct competitors with similar activities and product lines. On the contrary, the cluster model focuses on the development of vertical relations between various actors and synergetic interactions, supplemented by the attributes of a "Knowledge-based economy" *(Krugman, 2002), (Porter, 1998), (Krugman, 1996)*. Stimulating the processes of self-development of the region on the basis of the cluster approach allows more purposefully creating conditions that contribute to increasing its recreational potential.

The use of cluster forms of interaction for the purpose of economic self-development of the region and the acquisition of additional competitive advantages of organizations is quite obvious. As a rule, it increases the

efficiency and quality of services, facilitates coordination and access to qualified labour resources, relevant information, and educational centres *(Porter, 1998), (Krugman, 1996)*.

Conclusion

A study of the prospects for realizing the recreational potential of the Southern Urals and improving the Quality of Life of the population was conducted. Actual theoretical and practical aspects of the category of Quality of Life of the population are revealed. Given that modern regions may differ significantly in natural and climatic conditions, it is advisable to creatively apply the main provisions of regional development theories to improve the methodology and develop tools for improving the Quality of Life through increasing the recreational potential of regions. Even in the era of globalization, there may be very different opportunities for maintaining public health and recreating economic resources. Identified opportunities to improve the Human Development Index and Better Life Index through health promotion, the increased Life expectancy of the population in the conditions of Southern Urals. Special attention is paid to the study of its natural and climatic conditions as the natural wealth of the region and the careful use of unique natural water resources.

A comprehensive study of the Quality of Life in the Southern Urals based on indicators of the better life index was conducted. The region has a fairly high assessment of the Quality of Life in the indicators "Education" (8.1-8.4) and "Work-Life Balance" (8.0-8.5), which corresponds to the national average and the OECD average, while the other indicators are lower than the OECD average and partially correspond to the national average. At the same time, the indicators "Environment" (2.1-2.3) and "Health" (3.2-3.3) of the Southern Urals are significantly lower than the national average, which can be assessed as an urgent need for the corresponding system work of the region in these areas.

A study of the recreational potential and quality of water resources in the Southern Urals was conducted, for this purpose, the lake geosystem of the resort area of Kisegach was selected and the results of earlier field studies were used. The dynamics of deterioration of water resources in the Southern Urals is noted, which creates a real threat of rapid depletion of the natural and recreational potential of the region.

Have been defined the prospects for improving the Quality of Life of the population based on the formation of a recreational cluster of the region, including health resorts, medical and health-improving complexes, the organization of medical and health tourism, the rational use of climatic features and unique natural resources of the Southern Urals. The necessity of institutional changes in the status of specially protected territories of the region, the implementation of targeted programs within the framework of the formation of a recreational cluster is justified.

Acknowledgement

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Competence Model of Coal Mining Enterprise Managers

Svyatoslav ZAKHAROV
Head of Laboratory, Institute of efficiency and safety of mining production,
svzakharov@bk.ru

Tatyana KORKINA
Professor of State and municipal management department,
South Ural State University (National Research University), Chelyabinsk, Russia
solovevaia@susu.ru

Igor BAEV
Head of financial technology department, South Ural State University
(National Research University), Chelyabinsk, Russia,
baevia@bk.ru

Abstract

Relevance of the study is due to the need to improve competitiveness of coal mining enterprises operating in a global innovative economy. At the same time, the models of activity implemented by the management personnel of coal mining enterprises do not fully meet these conditions, which hinder the development of enterprises. To solve this problem, it is necessary to identify gaps in a leader activity structure and form a scientific and methodological base that allows them to be overcome. The purpose of the paper is to develop and substantiate a model for the activities of management personnel of a coal mining enterprise (CME), which ensures its competitiveness in a global innovative economy. The research methodology contains on competence-based and process-based approaches. To achieve the goal, methods of expert assessments, analysis, comparison, observation and synthesis were used. As the main object of research, middle managers of a coal mining enterprise were singled out.
The developed model of competencies includes two interrelated areas: theoretical (ideas and knowledge) and practical (skills and abilities), which, in turn, are divided into three more types: global, innovative and economic competencies. Approbation of the developed model showed that the largest gaps and, consequently, the reserves for growth of the quality of managerial work are associated with such competencies as ability and skill of planning, organization and monitoring results of functioning and improving the object of management, as well as knowledge of advanced technical and technological solutions. With a relatively high rate of development of the personnel ideas and knowledge in the field of advanced technical, technological and organizational solutions there are low rates of abilities and planning skills development, organization and control of functioning results and improvement of the object control, which is due to the lack of effective mechanisms for involving personnel in production and management processes.

Keywords: Competence Model, Innovation, Globalization, Manager, Coal Mining Enterprise, Intellectual And Innovative Potential, Competitiveness.

Introduction

The ability of enterprises to quickly and efficiently transform their strategy in the context of growing globalization of the economy has become one of the key success factors of ensuring sustainable competitive advantage and economic performance above the market average *(Kiehne, Ceausu, Arp and Schüler, 2017)*. Globalization of the economy is an integral characteristic of modern reality and it predetermines the need to consider a coal mining enterprise as a subject of the world market, integrated into a multi-level network of national economies. Maintaining and improving competitive positions in the global coal market is one of the strategic priorities of coal companies, since exports have higher profitability and opportunities to increase sales compared to domestic ones. According to the state statistics, over the past 25 years, the volume of exports of coal industry products in physical terms has grown 8.5 times, amounting to 205 million tons in 2019.

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The volume of Russian coal exports compared to iron ore and aluminium for the period 1994-2019 clearly reflects the emerging trend to strengthen the position of coal producers in the world market (Fig. 1).

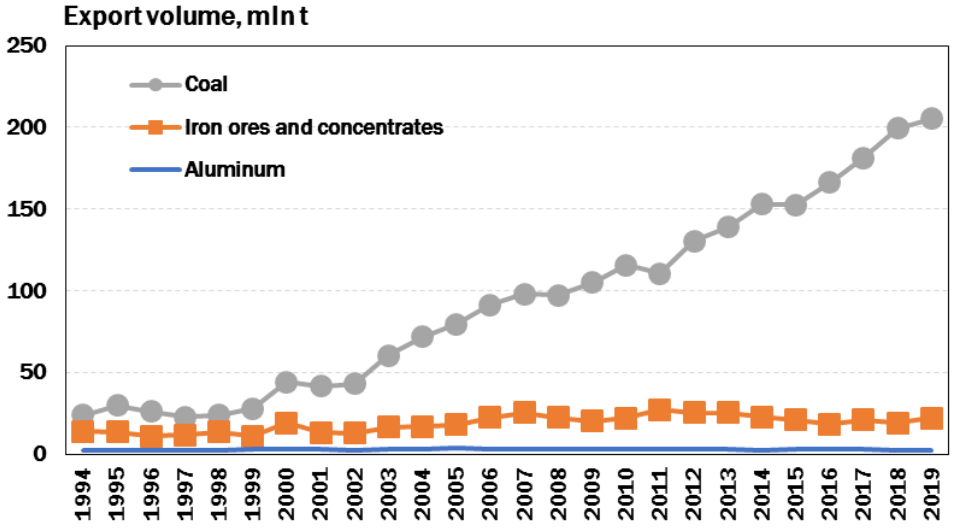

Fig. 1: Dynamics of exports of coal, iron ores and aluminium in the Russian Federation for the period 1994-2019

(Source: Federal State Statistics Service)

Over the past 5 years, the Russian Federation has been one of the world leaders in the global coal industry, ranking third in terms of coal exports after Indonesia and Australia. On the international market, Russia accounts for about 15% *(Kondratev, Popov and Kedrova, 2019)*.

The on-going integration of Russian coal mining enterprises and companies into the world economic system was reflected in the decrease in the predictability of events and the parameters of their effective functioning in the future. According to the program for the coal industry development in Russia for the period up to 2035, its state is characterized as follows:

a) dependence of coal exports on instability of conjuncture of the coal markets.
In the export direction, spot prices at Vostochny and Baltic shipment ports decreased by 7.6% and 19.8%, respectively from 2010 to 2018. In 2019-2020 the emerging trend of price reduction has sharply intensified. The fall in prices is significantly affected by t consequences of the European Union's adoption of the Paris Climate Agreements, as well as the “price war” of oil producers.

b) export-oriented development of the industry is accompanied by an increase in operating costs production.
Since 2010, the total industry average cost of mining 1 ton of coal (in nominal prices) has grown 2.6 times with inflation growing 1.7 times, and the cost of transporting coal for export. The level and predictability of long-term railway and logistics tariffs are fundamental formation of investment programs of coal companies.

c) the growth of import dependence on purchases and use of foreign equipment.
The high rate of renewal of labour tools at Russian coal mining enterprises has led to the fact that in terms of their technical and technological support, they have become comparable to mines and open-pit mines in developed foreign countries. The share of imported equipment in the industry reached 79% in 2018. At the same time, the processes of updating foreign equipment and supplying spare parts in the situation of an increase in the dollar exchange rate lead to an increase in operating costs.

External factors influencing an organization require constant changes in production processes to maintain high levels of performance over time. Accordingly, when developing management decisions of both strategic and tactical nature, it is necessary to take into account the influence of external macroeconomic factors.

Today, industries and companies with high innovative activity and effectiveness of human capital are growing at a faster pace in the world, which is reflected in the level and growth rates of intangible assets. This is due to the development of an economy based on the flow of innovations, constant organizational and technological improvement and production of products with very high added value.

Over the past several decades, the economy has experienced a post-industrial era, characterized by the dominance of knowledge and services, as well as the automation of routine operations. Now comes the era of automation, in which machines develop intelligence and start making decisions *(Barro and Davenport, 2019)*. The landscape of the global economy and its working systems are being transformed by the flourishing of information technology, digitalization and advanced technology. Many organizations, trying to adapt to these changes, but lacking flexibility, are faced to disruption of their business models, low employee engagement and ultimately it leads to their death. When the need arises to make fundamental changes in organizational design in order to become agile and adapt to new technologies, many organizations try to keep up with modern technologies and business models through a series of disparate initiatives that rarely achieve their goals. These initiatives leave the dominant hierarchical form of government intact. The current pace of technological progress is exponential, while there is practically no progress in organizational design, which leads to an increasing gap between the potential of technical solutions and the ability of staff to use it (*Pasmore, Winby, Mohrman and Vanasse, 2018).*

The modern development of Russian coal companies is largely due to technological development - updating, modernizing and increasing capacity of the equipment used, mastering new technological complexes, etc. Development of advanced equipment and technologies for production, automation and digitalization of production is not ensured by a corresponding increase in the load. So with the growth of basic production assets of the industry by 2.2 times over the period 2010-2018, coal production increased 1.4 times. As studies show, further development of coal mining enterprises by upgrading equipment and increasing the volume of tangible assets is already ineffective; it does not allow overcoming the lag behind foreign competitors in labour productivity, which is 3-5 times (*Plakitkina, 2011)*. The coal industry, according to experts, is currently at the level of the fourth technological order, and to ensure sustainable competitiveness in the world market, a transition to the sixth order is required *(Kostarev, 2019)*. In turn, the development of a new technological paradigm also determines a change in requirements for the activities of management personnel, namely development of competencies that ensure acceleration and increase in the effectiveness of the innovation process. In addition, within the framework of the existing technological structure, there are significant unused opportunities for equipment and technology, which are due to the insufficiently high quality of the management personnel activities.

Without changing the approach to the selection of main drivers for the development of Russian coal companies, the industry will not be able to develop at the rates required to ensure its investment attractiveness.

The peculiarity of innovative development of coal industry enterprises is that innovations are not implemented so much in the final product but in the working processes of mining, processing and production management. In this regard, a significant number of enterprises in the industry have developed a culture of activity that inhibits the growth of innovative activity and employee productivity. This is especially true for such a category of personnel as managers of all management levels, who are responsible for setting business goals and implementing ways to achieve them by labour collectives.

The system of labour relations that exists at many enterprises of the industry continues to orient executives towards achieving volumetric, planned physical indicators of production, rather than socio-economic ones, which determine the sustainable functioning and innovative development of an employee and a coal mining enterprise.

Globalization and innovation processes taking place in the economy are transforming the conditions for functioning of coal mining enterprises and exacerbate the need for a corresponding transformation of the internal environment, and, first of all, for changing the models of activity of management personnel.

The purpose of the paper is to develop and substantiate the model of activity of management personnel of the CME, which ensures its competitiveness in the context of the global innovative economy.

Literature Review

The global economy is understood as a system of economic relations between different states, which has a multi-level structure. It is characterized by the development of foreign economic relations with significant potential for efficiency; relatively free movement of resources and benefits between states; tougher competition for all types of resources, especially for human capital, and at the same time the ability to use any resources available in the world; formation of a global system of social and labour relations; synchronization of economic cycles in different countries.

An innovative economy is based on the knowledge that forms intangible factors of production, which allow it to continuously improve and produce high added value products *(Shavina, 2017)*.

The development of an innovative economy is characterized by a number of trends, among which, in the context of this study, intellectualization of all types of labour is of greatest importance.

Based on the above interpretations, we will understand the global innovation economy as a system of economic relations, which includes economic entities of the states of the world, which stimulates the creation and use of innovations by these entities to increase the effectiveness of their activities.

In the context of innovative development, activities of managers are considered by researchers in various aspects. It is noted that the leadership style of top managers is one of the most important factors that have a decisive influence on innovation in an organization. Research by Mokhber M., Wan Ismail W. K., Vakilbashi A. confirms a direct and positive relationship between the leadership style, which has been called "transformational", and innovation in an organization. Transformational leadership has a significant and positive relationship with both empowerment and an organizational climate that supports innovation *(Mokhber, Wan Ismail and Vakilbashi, 2015), (Jung, Chow and Wu, 2003)*.

The managers who actively engage change agents, who create and discuss change with employees, can reduce resistance to change. To do this, however, organizations need to actively support the systematic development of change management capabilities among line managers *(Buick, Blackman and Johnson, 2018)*.

Study of the impact of structural changes in the economy on managerial activity in the UK showed that during a recession, due to decrease and competitive pressure from subordinate employees, additional efforts, additional roles or hard work, implementation of tactics and strategies for saving money, application of personnel work methods aimed at maximizing value at the lowest cost are required. The recession has exponentially increased the focus on cost savings through reduced labour costs. Retention of such requirements for a long period of time leads to a decrease required.in loyalty, a feeling of injustice, professional burnout, emotional exhaustion of managers *(Harris and Ogbonna, 2020)*, which is due to the absence of changes in their models of activity and the presence of gaps with the requirements of the external environment. One of the manifestations of this situation is, on the one hand, the overload of management personnel, according to their self-assessment, with current tasks, on the other hand, a lack of understanding of the structure of activity necessary to ensure the long-term development of the object of management *(Karpov et al., 2020)*.

An organization's agility is critical to successfully adapting to today's business challenges. The development of decentralized structures with shallow hierarchies and higher levels of delegation of authority is a prerequisite for organizational flexibility. In addition, giving employees greater authority and greater responsibility is key to achieving greater employee motivation and dedication. Today's managers must act as mentors who strengthen and encourage their people to be more effective, which ultimately will have an impact on the achievement of organizational goals.

Current business practice shows that a large number of companies have traditional structures and that the lack of professional managers is one of the key factors in poor business performance. A study conducted at the Banovici coal mine, a large mining company in Bosnia and Herzegovina, showed that a high level of delegation of authority positively affects the achievement of the organization's strategic and operational goals *(Delic, Alibegovic and Derzic, 2020)*.

Activities of managers to ensure labour safety at mining enterprises are one of the factors affecting their competitiveness in the global market. Decisions made by managers, based on communication and involvement of personnel, open flow and exchange of information throughout the entire work system, are critical to ensure production safety *(Donovan, Salmon, Horberry and Lenné, 2018)*. System thinking of managers and presence of vertical integration are also key factors in reducing the risk of injuries and accidents at mining enterprises *(Donovan, Salmon, Lenné and Horberry, 2017)*.

The competency model developed for middle managers of coal enterprises in China, based on the analysis of 4 components: 1) strategy, 2) internal processes, 3) operations and 4) enterprise culture, includes the following competencies: strategic vision; analysis and assessment of the situation; implementation of a plan; customer orientation; professional skills, communication (the use of various methods of communication for accurate and clear transmission of key information, feedback, overcoming any possible communication barriers); cooperation (the desire to share knowledge, information, resources, responsibilities and achievements with others, creating a cooperative relationship based on mutual trust); team management; honesty and reliability; initiative; training and innovation (active search and use of opportunities to learn and improve their abilities, as well as the application of knowledge in labour practice); standardization (understanding the important role of standardization in a coal mine, ensuring that every job is done in accordance with standards); ensuring labour safety; quality control (understanding production processes / technological steps to achieve the desired results); cost control (generating income more than costs, actively looking for ways to reduce costs), achievement orientation (striving to do a job well and flawlessly, a tendency to accept higher standards); pressure management (maintaining high standards, no matter how difficult the tasks and staff resistance are); coordination of activities (organization and distribution of human, financial, material and other resources in accordance with goals, overcoming emerging problems, timely resolution of issues of interaction in the production process) *(Xu and Wang, 2009)*.

V.B. Artemiev, A.B. Kilin, V.A. Galkin, A.M. Makarov note that functions of the head of a coal mining enterprise are the following: finalizing the strategic concept of a specific project, forming and developing a management team, guiding the building of employee functions, organizing the development of employee functionalities with the required dynamics, insuring employees against critical errors, training managers who are able to take more responsible positions, formation of reserves to ensure stability of the system, interaction with owners and the external environment, control of activities *(Artemiev, Kilin, Galkin and Makarov, 2020)*.

S.V. Samarin, considering the competence of leaders of coal mining enterprises in relation to development of innovations, highlights the competence of responsibility, understanding the goal, understanding the strategy for achieving the goal, determining the means of achieving the goal, choosing the method of control *(Samarin, 2020)*.
As we can see from the review, researchers are looking for understanding of management activities and approaches to determining the requirements for qualifications of managers to achieve success in the modern business environment. However, an effective model of the activities of the management personnel of coal mining enterprises, which takes into account the specifics of both the global and innovative economies, is still disclosed.

Methods

The research methodology contains on competence-based and process-based approaches. A broad interpretation of the concept "competence is the described requirements for a set of ideas, knowledge, skills and abilities that allow an employee to solve a certain class of professional tasks and ensure the effectiveness of his work" *(Maslennikova and Bannikov, 2019)*. To obtain the results, the methods of expert assessments, analysis, comparison, observation and synthesis were used. As the main object of the research, middle managers of a coal mining enterprise were singled out.

Results of Development and Testing Model of Management Personnel Activity of a CME in the context of the global innovation economy

As a result of the synthesis of scientific and methodological approaches, a competence model for management personnel of a coal mining enterprise has been developed. The proposed competency model includes two interrelated areas: theoretical (ideas and knowledge) and practical (skills and abilities), which, in turn, are divided into three more types: global, innovative and economic competencies (Table 1).

Table 1: Competence model of the management personnel of a CME

Competence	Global	Innovative	Economic
Representations and knowledge	Regularities of functioning of a control object as part of the world socio-economic system (K1)	Regularities of the control object transformation (K2)	Regularities of effective transformation of resources into a product (K3)
Skills and abilities	Planning, organization and control of the results of operation of the control object at a level that meets international standards for safety, productivity and efficiency (K4)	Planning, organization and control of improvements to the management object, at a rate that ensures its competitive advantages (K5)	Planning, accounting and control of the effective distribution of limited resources for the priority tasks of the development of the management object and the consumer value of the labour of each employee (K6)

(Source: compiled by the authors)

Approbation of the proposed competence model was carried out within formation of the class system for middle management of coal mining enterprises. Using the proposed model, a set of indicators was developed to assess the competencies of personnel for each category: mining foremen, mechanics, shift and section supervisors, as well as a scale of compliance of the values of these indicators with the world and Russian standards of efficiency and quality of management in the coal industry, which is presented in Table 2.

Table 2: Scale for assessing the compliance of competencies with international and Russian standards of efficiency and quality of management at coal mining enterprises

Standard	Competencies					
	K_1	K_2	K_3	K_4	K_5	K_6
World	Improves the balance of social and economic interests of the stakeholders of an enterprise	Knows and applies the world's best forms of work organization and staff motivation	Knows and rationally applies the world's best technical and technological solutions	Systematically implements measures that lead to stable implementation of the production plan and reduce the risk of negative events	Implements the latest system improvements on its own. Can confirm improvement results with quantitative qualitative indicators	Provides a consistently high level of efficiency in the use of material and human resources
Best in Russia	Maintains a balance of social and economic interests of a company's stakeholders	Knows and applies the best in Russia forms of labour organization and staff motivation	Knows and rationally applies the best technical and technological solutions in Russia	Ensures stable execution of the plan with acceptable risk	Implements individual enhancements when needed	Provides a high level of efficiency in the use of material and human resources
Average in Russia	Allows an imbalance in the socio-economic interests of a company's	Knows and does not rationally apply the best forms of labour	Knows and does not rationally apply the best technical and technological	Ensures plan execution, but is unstable and with increased risk	Implements individual improvements in case of emergency	Provides an industry level of efficiency in the use of material and

	stakeholders	organization and staff motivation in Russia	solutions in Russia			human resources
Below average in Russia	Deteriorates the balance of social and economic interests of stakeholders of an enterprise	Doesn't know advanced forms of work organization and staff motivation	Does not know and does not apply advanced technical and technological solutions	Does not provide 100% fulfilment of a production plan	Does not participate in the implementation of improvements	Does not provide the sectorial level of efficiency in the use of material and labour resources

(Source: compiled by the authors)

Assessment of the actual level of competence of management personnel of the coal mining enterprise was carried out on the basis of a written examination, interviews with a commission of top-level managers and specialists, as well as statistical reporting on the results of the operation of the management object (site, shift, and team). A total of 225 employees of enterprises that are part of the SUEK coal company, which occupies a leading position in terms of coal production in Russia and the sixth place in the world market, were evaluated.

A graphical model for assessing the actual level of competence of a coal mining enterprises management personnel, in which the world standard is quantified at 4 points, the best Russian - 3 points, the average Russian - 2 points, below the Russian average - 1 point, is shown in Figure 2a.

As a result of the assessment, it was revealed that the actual level of competence of the management personnel at the studied coal mining enterprises in 2018 was 1.6 points. The largest gaps and, therefore, growth reserves are noted in such competencies as ability and skill of planning, organizing and monitoring the results of functioning and improving the object of management, as well as in the knowledge of advanced technical and technological solutions. This is due to the lack of understanding of global competition in the field of managerial work among a significant number of executives at the surveyed enterprises.

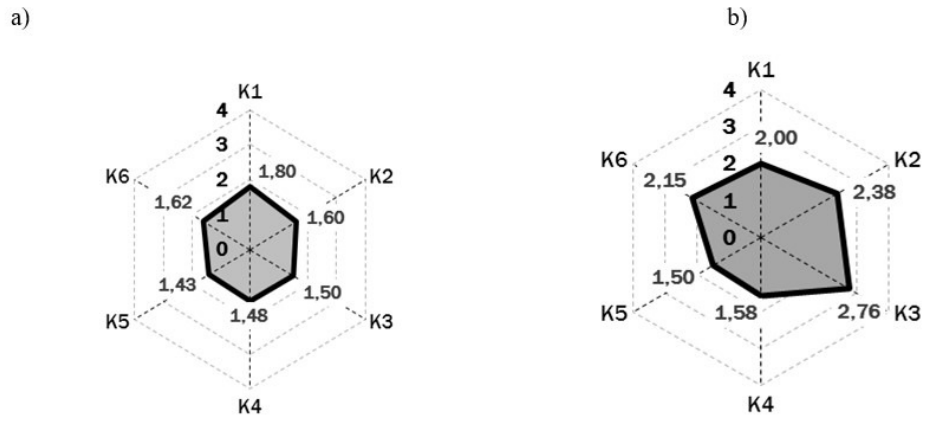

Fig. 2: Assessment of the actual level of competence of the management personnel of a CME in (a) 2018 and (b) 2019

(Source: suggested by the authors)

The purposeful work on the formation of the required competencies among the management personnel, carried out during 2019, which included the development of their ideas, knowledge, skills and abilities, is presented in Figure 3.

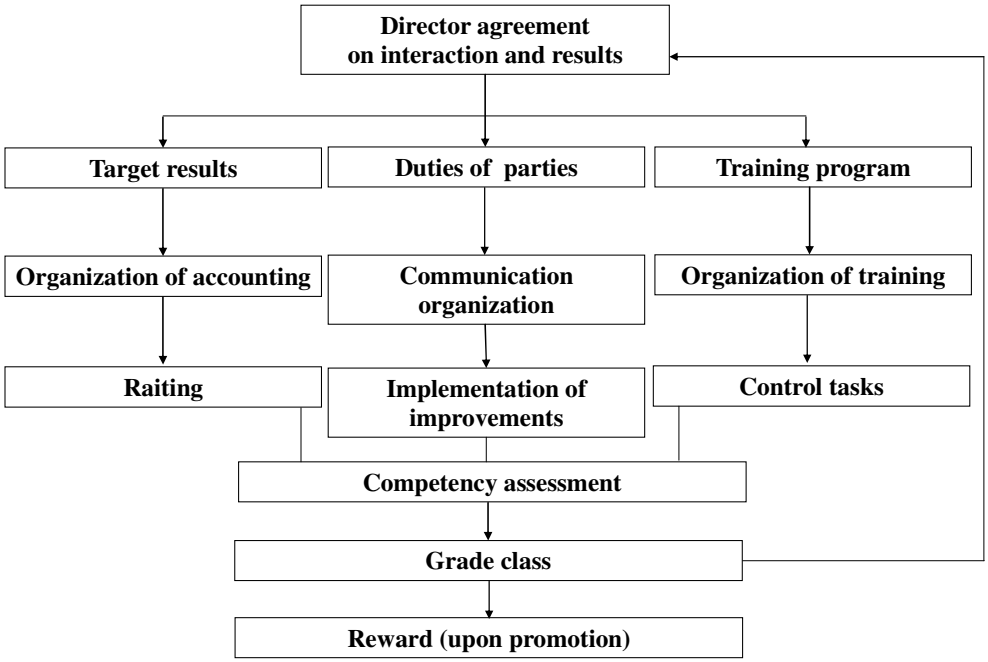

Fig. 3: Scheme of a CME management personnel competencies development cycle
(Source: suggested by the authors)

The work carried out has made it possible to significantly increase the level of competence of management personnel. At the same time, the greatest development was gained by such competencies as presentation and knowledge of advanced technical, technological and organizational solutions the least ones are the skills and abilities of planning, organizing and monitoring results of functioning and improving the object of management. Such tendencies can be caused, on the one hand, by the technology for development of intellectual and innovative potential of personnel, i.e. primary formation of ideas and knowledge, and, on the other, by the lack of effective mechanisms for using increasing intellectual and innovative potential of personnel in production and management processes of a coal mining enterprise.

Formation of appropriate mechanisms for involving managerial personnel in production and management processes of an enterprise will help reduce the gap between actual and required competencies in the global innovation economy.

Discussion

The presented model differs from the existing ones by the ability to provide a more accurate correlation between competencies of management personnel and conditions for functioning of a coal mining enterprise in a global innovative economy, which expands possibilities for increasing productivity and labour efficiency. At the same time, the developed competency model partially converges with the results of similar studies by Xu H., Wang Y., namely, it includes competencies focused on improving production safety, fulfilling a production plan and reducing costs.

Conclusions

A review of scientific and methodological literature revealed the absence of description of an effective model for activities of the management personnel of coal mining enterprises, taking into account the specifics of the global innovative economy.

The developed model of competencies includes two interrelated areas: theoretical (ideas and knowledge) and practical (skills and abilities), which, in turn, are divided into three more types: global, innovative and economic competencies.

Approbation of the developed model showed that with a relatively high rate of development of personnel perceptions and knowledge in the field of advanced technical, technological and organizational solutions, low rates of development of acquired habits and planning skills, organization and control of results of functioning and improvement of the control object still exist, which is due to the lack of effective mechanisms of personnel involvement in production processes and enterprise management.

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Transformation of The EAEU Tariff Preference System Taking into Account National Interests of The Russian Federation

Evgeniy STEPANOV
Head of Department of Customs Affairs,
South Ural State University (National Research University), Chelyabinsk, Russia,
stepanovea@susu.ru

Irina KILINA
Senior Lecturer of Department of Customs Affairs,
South Ural State University (National Research University), Chelyabinsk, Russia,
kilinaip@susu.ru

Yekaterina MALININA
Laboratory assistant of Department of Customs Affairs,
South Ural State University (National Research University), Chelyabinsk, Russia
caterina.malinina@gmail.com

Ksenia POSTAUSHKINA
Lecturer, Department of Customs Affairs,
South Ural State University (National Research University), Chelyabinsk, Russia,
postaushkinaki@susu.ru

Abstract

The article analyses the use of tariff preference systems in the global economy, explores practical aspects and provides a comparative analysis of existing tariff preference systems in the EU, USA, Canada and the EAEU. The proposed methodology for assessing tariff preferences as an instrument of customs and tariff regulation and the possibility of its flexible use in order to protect national manufacturers. The methodology was tested on the example of the Russian Federation for the period from 2016 to 2019: commodity items were identified in accordance with the FEACN EAEU, for which there is a clear predominance of imports from one or more preferential countries (commodity positions: 2602, 4001, 0202, 0303). An analysis of national production made it possible to single out 0202 and 0303 commodity items of the FEACN EAEU, tariff preferences for which affect the competitive environment for national firms against the general background of the growth of the meat and fish industry in Russia. This situation proves the need for a flexible approach to the use of the system of tariff preferences. Recommendations are proposed on adjusting the current system of tariff preferences of the EAEU taking into account the interests of national producers.

Keywords: international trade, system of tariff preferences, general system of tariff preferences, commodity position, tariff preferences, customs and tariff regulation, EAEU.

Introduction

In modern conditions, foreign trade is a strategically important factor in the economic growth of any country involved in the global economic system. Therefore, issues related to the regulation of foreign trade flows of the state are significant at the moment. The authors of the article touched upon aspects of foreign trade regulation with the help of tariff preferences. When evaluating the functionality of tariff preferences, the conceptual tasks of state regulation of foreign

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trade based on the application of customs and tariff regulation were taken into account, namely: protectionism and protection of domestic producers (reducing dependence on the import of certain goods), fiscal direction (ensuring the revenue part of the budget, due to the payment of foreign economic activity by participants customs payments), achieving a positive foreign trade balance, increasing import substitution, inflow of investments in certain sectors of the economy, etc.

Literature Review

In the economic literature, the topic of the application of tariff preferences by countries is quite widely discussed. An analysis of the work in this area allowed all the studies to be divided into two groups. The first group included studies on the content and nature of the provision of preferences. For example: S. James (2010) considers the preferential access to markets provided to most developing countries through the Generalized System of Preferences. In his view, trade preferences distort markets and impede unilateral and multilateral trade liberalization: when beneficiary countries concentrate their efforts on maintaining their preferential access, rather than becoming competitive, efforts to liberalize multilateral trade are undermined. S. Hakobyan (2013) believes that not all importers enjoy tariff preferences in the United States. His analysis shows that the utilization rate of GSP depends on the structure of production in the beneficiary countries, taking into account local components. This coefficient increases taking into account the preferential difference, export volumes and regional concentration generally and decreases with the degree of processing of goods. J. Xie, D. Zhang (2017) emphasize that with a decrease in the ad valorem tariff, the relative demand for expensive goods increases. It depends not only on the interchange ability of expensive and cheap goods, but also on the interchange ability of weak substitutes. Thus, it can be argued that general preference systems have a positive effect on the quality of products entering the EU due to reduced tariff rates. M. Gassebner and A. Gnutzmann-Mkrtchyan (2018) consider the U.S. common system of preferences as a political tool. They conclude that the probability of termination of tariff benefits for friendly US countries is low, unlike countries with which the US has political conflicts.

The second group of studies includes works devoted to the effects of providing preferences both in the economy of individual countries and in the global economy generally. In this case, each study has an applied character and is carried out on the example of individual countries. In this context, studies dedicated to the analysis of the impact of tariff preferences on the economies of countries providing preferences and countries recipients of preferences are highlighted. This is due to the fact that preferences have both positive and negative effects on the economies of both developed and developing countries. The influence of the general system of preferences on developing countries was reflected in the work of Gil-Pareja, S, R Llorca-Vivero and JA Martínez-Serrano (2014). Using the latest developments in the field of econometric analysis of the equation of gravity for the period 1960–2008, it was proved that mutual preferential trade agreements and the generalized system of preferences have a positive effect on exports from developing countries. R. Olson (2014) believes that the GSP has historically successfully promoted trade with developing countries, but in recent years trade volumes have declined. GSP changes will be able to reorient this system to better fulfil its initial task of assisting developing countries. At the same time, it is necessary to focus on increasing imports of preferential goods while reducing pressure from integration associations that impede the use of GSP. Lubinga, M.H., Ogundeji, A.A., Jordaan, H., Verschoor, A.-J. (2017) consider the impact of the GSP system on the export of fruits and vegetables from Kenya, Tanzania and Uganda to the European Union. The results of the study revealed the relationship between GSP and the export of certain commodity items from developing countries. Pallavi Kishore (2017) examined the conditions for providing tariff preferences to developing countries in the World Trade Organization from the perspective of developing countries. The author focuses on discrimination in the context of the provision of tariff preferences for certain groups of goods.

The analysis of the publication devoted to the topic of the general system of tariff preferences indicates the relevance of tariff preferences as an instrument for regulating the foreign trade of individual states, both from the beneficiary countries of tariff preferences and from the countries that provide preferences. In this connection, the urgent problem is the flexible adjustment of the national system of tariff preferences in order to ensure national state interests.

Methodology

In order to conduct a comparative analysis of international experience, the systems of tariff preferences of: the USA, the European Union (EU), Canada and the Eurasian Economic Union (EAEU), of which the Russian Federation is a member, are investigated. The results of the analysis of the application of tariff preferences are presented in Table 1, in which the following criteria are highlighted: signs of determining the recipient countries of the preference, criteria for determining the goods, the frequency of the revision of the system, regulatory acts governing the provision of preferences and some additional conditions.

Table 1: Comparative analysis of the system of tariff preferences of the EU, USA, Canada and the EAEU

The criteria	EU	USA	Canada	EAEU
Criteria for assignment to beneficiary countries	Standard GSP - low and middle income countries GSP + - low and middle income countries that support 27 international conventions EBA - UN classified countries as least developed	Developing countries - low and middle income countries Least developed countries - countries classified by the UN as least developed.	Developing countries - low and middle income countries Least developed countries - countries classified by the UN as least developed.	Developing countries - countries that are not classified by the World Bank as upper middle income and high income countries Least Developed Countries UN classified as least developed
Criteria for highlighting the list of goods	«S» - sensitive products that are considered especially important for the EU. «NS» - insensitive goods that do not have such a big impact on the country's economy.	A - preferential import of goods for all beneficiary countries; A* - preferential import of goods only for certain countries prescribed in the Harmonized System; A+ - preferential importation of goods only for least developed countries	Almost all goods, with the exception of some agricultural products, textiles, clothing, shoes and steel.	The list of preferential goods contains virtually no highly processed goods. Mainly raw materials, agricultural, food products and some semi-finished products.
Additional terms	The country is excluded from the preferential lists if the condition is met: 1) for all product groups: $\frac{Im_m}{Im_g} > 57\%$ 2) in relation to vegetable products, animal or vegetable oils, fats, waxes and mineral products: $\frac{Im_m}{Im_g} > 17{,}5\%$	The product is excluded from the preferential lists if the cost Im of this product> 50% of the total import of this product or the value Im> 190 million US dollars	If the beneficiary country cannot confirm the country of origin of the goods, it can use the tariff rate of the "Most Favored Nation".	If the volume of goods imported at the subheading level exceeds 3% in value or quantity of the total amount of the same goods imported into the customs territory of the Union, while import during the year has increased by more than 50%, the use of Tariff preference system for this product is suspended.

The criteria	EU	USA	Canada	EAEU
	3) for textiles: $\frac{Im_m}{Im_g} > 47{,}2\%$			
Number of beneficiary countries	71 countries	119 countries	154 countries	152 countries
System Review Period	4 years	Annually	2 years	3 years

(Source: compiled by the authors)

The analysis of the tariff preference systems of the EU, USA, Canada and the EAEU showed that, despite the uniform principles in the basis of preferential regimes, each country (association) has its own peculiarities associated with the tasks solved in the framework of providing trade advantages. Therefore, the conditions for the provision of preferences, lists of preferential goods and countries are different. For example, in the EU, most agricultural products are not included in the preferential lists of products; in Canada, preferences are provided for practically all products, with the exception of certain agricultural products, textiles, clothing, shoes, and steel.

A comparative analysis of the Tariff preference system of developed countries with the EAEU showed that the EU, USA and Canada use a deeper differentiation of customs duties on import from beneficiary countries than in the EAEU. In the EU and the USA, there is a gradation system for certain groups of goods to protect their economy; the EAEU, in turn, does not have such a gradation. In our opinion, the creation of such a gradation of product groups as sensitive and insensitive and the introduction of a certain import threshold would help the EAEU protect its manufacturer.

Research Methods

The purpose of this study is to assess the use of tariff preferences as a tool of customs tariff regulation and the possibility of its flexible use in order to support national producers. The study uses methods of mathematical, statistical and geographical analysis. The research technique is reduced to the following algorithm, consisting of the following steps:

1) A dynamic analysis of the quantitative composition of the beneficiary countries of the EAEU tariff preferences for the period from 1995 to 2019.
2) Analysis of the dynamics of imports into the Russian Federation of goods from preferential countries for the period from 2016 to 2019 in absolute terms and relative imports in the Russian Federation in general .
3) Allocation of commodity items that are more imported from developing or least developed countries with the provision of tariff preferences
4) Analysis of the geographical structure of imports of selected goods.
5) Assessment of the specific share of importing countries of preferential goods allocated commodity positions.
6) Analysis of the dynamics of production of selected commodity positions in the domestic market.
7) Evaluation of the possible prospects for the transformation of the EAEU tariff preferences system in order to support domestic producers.

Research Results

To analyse the breadth of coverage of the foreign trade partners of the Russian Federation with the EAEU tariff preferences system, an analysis was made of the quantitative composition of the EAEU beneficiary countries of tariff preferences for the period from 1995 to 2019 (Table 2).

Table 2: Countries-users of the tariff preferences of the Russian Federation and their dynamics for the period 1995–2019

Beneficiary countries	1995	2005	2010	2017	2018	2019
Developing	105	102	103	103	104	102
Least developed	47	51	49	48	48	49

(Source: compiled by the authors according to the site https://www.trademap.org/tradestat/Country_SelProduct_TS.aspx)

The authors revealed that most of the partners of the Russian Federation are beneficiaries of tariff preferences provided within the EAEU (151 out of 193 countries in 2019, which is more than 78%), while since 1995 the number of countries has not changed.

An analysis of the dynamics of imports into the Russian Federation of goods from preferential countries for the period from 2016 to 2019 in absolute terms and relative to imports to the Russian Federation in general (table 3) showed that most of the imports of preferential goods to the Russian Federation were from developing countries. From 2016-2019 the value of imports of goods from developing countries increased by 33.3% to $ 6,198.82 million, which is 7.24% of total imports. Also, over the period, imports from least developed countries increased by 37.1% ($ 845.64 million and 0.99% of total imports).

Table 3: The volume of imports of goods in respect of which tariff preferences are applied from 2016–2019, mln Dollars, %

Year	Imports of goods from developing countries			Import of goods from least developed countries		
	Mln dollars	% by 2016	Share in import (total)	Mln dollars	% by 2016	Share in import (total)
2016	4 650.42	100.00	6.66	616.62	100.00	0.88
2017	5 517.61	118.65	6.60	522.73	84.77	0.63
2018	5 962.88	128.22	6.56	733.78	119.00	0.81
2019	6 198.82	133.30	7.24	845.64	137.14	0.99

(Source: calculated by the authors based on statistics from the FCS of Russia)

For further research, commodity items were identified that were imported to a greater extent from developing countries with the provision of tariff preferences. The results of the study showed that the largest share of imports of preferential goods imported by developing countries over the past few years are: bananas, citrus fruits, apples and pears, soybeans, coffee and tea, palm oil, cattle meat (frozen), fish (frozen), tobacco raw materials, etc. - more than $ 800 million per year.

At the next stage of the analysis, we focused on commodity positions, the import of which is mostly carried out from preferential countries:

The calculation was carried out according to the formula:

$$Sim = \frac{Im_{ct}}{Im_t},$$

Where S_i – the share of imports of a commodity position from developing countries of the total imports of this commodity position;
Im_{ci} – volume of imports of commodity items from developing countries;
Im_t – total imports of commodity position.
As a result, 4 commodity items were identified, the import of which is mostly carried out from preferential countries: ores and concentrates (commodity position 2602); natural rubber, balat, gutta-percha, guava, chikl and similar natural resins, in primary forms or in the form of plates, sheets or strips, or tapes (commodity position 4001); frozen cattle meat (commodity position 0202); frozen fish, excluding fish fillets and other fish meat, of commodity position 0304 (commodity position 0303).

So, in 2016, 99.86% of natural rubber, balat, gutta-percha (commodity position 4001) was imported from preferential countries (in 2019 - 99.91% of all imports of this product). The second place in terms of the specific share of imports from preferential countries is occupied by citrus fruits (commodity position 0805) (2016 - 97.01%, 2019 - 99.61%). Cattle meat (commodity position 0202) also occupies a large share of deliveries - in 2016 the share was 97.06%, by 2019 the share dropped to 66.04%. For the entire analysed period, there is an increase in the share of imports of ores and concentrates (commodity position 2602) from 77.28% in 2016 to 95.89% in 2019%.

A geographical analysis of the import of each commodity item made it possible to identify the main user countries of the tariff preference system and determine their share in the volume of supply.

The main share of ore and concentrates imports is in the Republic of South Africa; in 2016 all imports were from this country, by 2019, 3 more countries were added to suppliers: Gabon, Turkey and China, while maintaining the clear dominance of South Africa. In 2019, 98% of imports came from the Republic of South Africa, followed by Gabon with a value of 1.94%, Turkey (0.02%) and China (0.01%) in third and fourth places (table 4).

Table 4: The Share of the beneficiary countries of tariff preferences for the importation of commodity position 2602 for 2016 and 2019

2016				2019			
№	**importing country**	**% in import**	**Mln dollars**	**№**	**importing country**	**% in import**	**Mln dollars**
1	RSA	100.00	56.86	1	RSA	98.04	138.84
				2	Gabon	1.94	2.75
				3	Turkey	0.02	0.02
				4	China	0.01	0.01
	total		56.86		total	100.00	141.62
% of total imports		77.28		% of total imports		95.89	

(Source: calculated by the authors based on statistics from the FCS of Russia)

In 2016 and 2019, the main country for the supply of natural rubber, balat, gutta-percha is Indonesia (69.07% and 38.16%, respectively). By 2019, the cost of deliveries increased by 20.7%, but the share of imports decreased due to an increase in deliveries from Malaysia. The second place in 2016 was taken by Vietnam 15.84%, in 2019 it fell to third place, while the value growth of imports was revealed, but the share is reduced. Malaysia took the third place - 6.48% ($ 2.97 million), by 2019, the supply of natural rubber from this country increased and amounted to $ 32.41 million, which allowed it to rise to second place (table 5) .

Table 5: The Share of the beneficiary countries of tariff preferences for the importation of heading 4001 for 2016 and 2019

2016				2019			
№	importing country	% in import	Mln dollars	№	importing country	% in import	Mln dollars
1	Indonesia	69.07	31.61	1	Indonesia	45.46	38.16
2	Vietnam	15.84	7.25	2	Vietnam	38.61	32.41
3	Malaysia	6.48	2.97	3	Malaysia	12.29	10.31
4	Thailand	5.09	2.33	4	Thailand	3.52	2.95
5	other countries	3.51	1.61	5	other countries	0.11	0.09
	total	100.00	45.77		total	100.00	83.93
% of total imports		99.86		% of total imports		99.91	

(Source: based on statistics from the Federal Customs Service of Russia)

According to the data in Table 6, it can be seen that Brazil in 2016 was in first place in imports of frozen cattle meat, its share was 63.49% ($ 282 million), by 2019 its share decreased and it fell to last place. Paraguay strengthened its position and in 2019 already took first place, its share increased, although the value of imports decreased by 19.9%. In 2016 and 2019, Colombia maintained its position, but its value of imports also fell by 42.8%.

Table 6: Percentage of beneficiary countries of tariff preferences for the import of commodity position 0202 for 2016 and 2019

2016				**2019**			
№	**importing country**	**% in import**	**Mln dollars**	**№**	**importing country**	**% in import**	**Mln dollars**
1	Brazil	63.49	282.04	1	Paraguay	64.88	117.47
2	Paraguay	33.02	146.70	2	Argentina	30.07	54.45
3	Colombia	2.07	9.20	3	Colombia	2.91	5.26
	other countries	1.42	6.30		other countries	2.14	3.87
	total	100	444.23		total	100	181.06
% of total imports		97.06		% of total imports		66.04	

(Source: calculated by the authors based on statistics from the FCS of Russia)

In 2016 and 2019, Chile accounted for the largest share of frozen fish imports. By 2019, imports of this commodity item from the beneficiary countries increased by 7 times, and Chile increased its share to 56.14% (124 million dollars) (table 7). In 2016, the share of deliveries from Peru amounted to 13.67% (4.30 million dollars). By 2019, the value of imports increased and amounted to 14.23 million dollars, but the share decreased while - 6.41%. Turkey, on the contrary, strengthened its position and in 2019 took second place with a value of 25.42 million dollars. (11.45%). In general, the number of importing countries decreased in 2019.

Table 7: Share of beneficiary countries of tariff preferences when importing commodity item 0303 for 2016 and 2019

2016				2019			
№	**importing country**	**% in import**	**Mln dollars**	**№**	**importing country**	**% in import**	**Mln dollars**
1	Chile	39.95	12.58	1	Chile	56.14	124.68
2	Peru	13.67	4.30	2	Turkey	11.45	25.42
3	Morocco	11.77	3.71	3	China	10.05	22.32
4	Ecuador	11.02	3.47	4	Argentina	8.66	19.23
5	DPRK	8.95	2.82	5	Peru	6.41	14.23
	other countries	14.65	4.61		other countries	7.30	16.21
	total	100.00	31.48		total	100.00	222.09
% of total imports		57.02		% of total imports		92.27	

(Source: calculated by the authors based on statistics from the FCS of Russia)

Thus, we can conclude that the share of imports of goods from developing countries in the total volume of imports of these goods to Russia from 2016-2019 of certain commodity items is quite high, and sometimes reaches 90%, which can create non-competitive conditions for domestic manufacturers and requires a detailed analysis of the state of the development trend of national industries.

In the framework of this study, in order to identify prospects for adjusting the EAEU tariff preferences system, the state and dynamics of the development of domestic production of meat and fish industries were studied - the two commodity positions considered were: meat of cattle, frozen (commodity position 0202); frozen fish, excluding fish fillets and other fish meat of commodity position 0304 (commodity position 0303).

It was determined that the livestock industry, along with other agricultural sectors of the Russian Federation, shows a positive trend. At the same time, there is an increase in the production of poultry, pork and beef. In 2019, total production amounted to 10.81 million tons. The main share is poultry meat - 5.05 million tons, and pork - 3.85 million tons in percentage terms, the meat market structure is as follows (Figure 1).

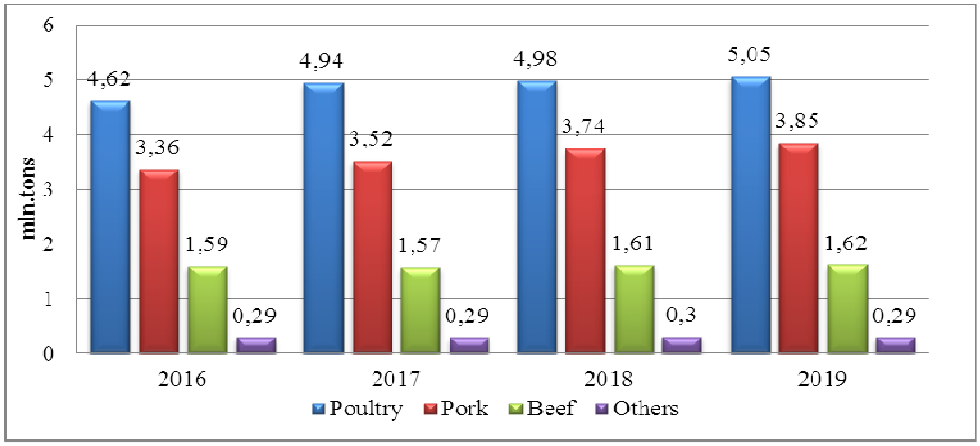

Figure 1: Dynamics of meat production in Russia for the period 2016 – 2019

(Source: calculated by the authors based on Unified interdepartmental information and statistical system data)

The authors also analysed the fish and seafood market. It was revealed that the production of fish products for the analysed period shows a positive trend (Figure 2).

Over the past 4 years, the volume of production of fish products increased by 6.9%. Positive dynamics indicate the development of this sector of agriculture. In 2019, the volume of production reached 4 310 thousand tons.

According to Rosstat, in 2019, exports of fish and crustaceans from the Russian Federation increased by 4.3% and reached $ 5.4 billion, but the volume of supplies decreased by 6.2% to 2.1 million tons.

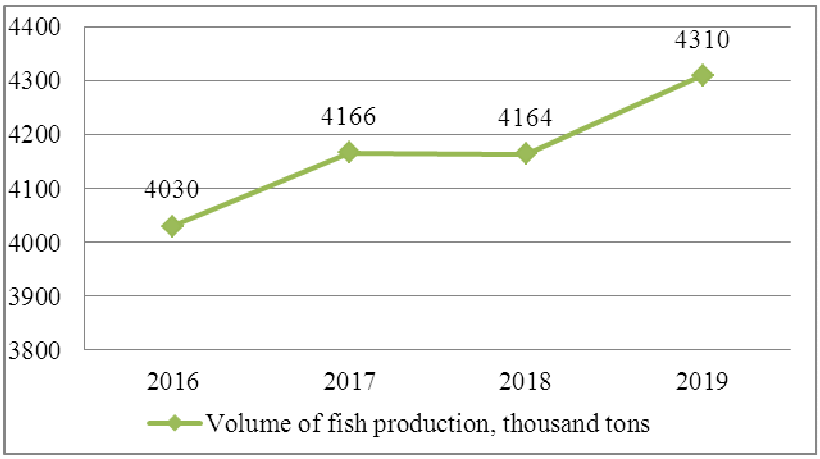

Figure 2: Dynamics of fish production in Russia for the period 2016 – 2019
(Source: calculated by the authors based on Unified interdepartmental information and statistical system data)

Thus, in connection with the positive dynamics of the production of preferential goods in the Russian Federation, the question arises of the advisability of providing tariff preferences to countries that supply more than half of the total imports of preferential countries. In this connection, a possible adjustment of the EAEU tariff preferences system was proposed with the aim of supporting the domestic producer on the basis of the gradation mechanism of the EU tariff preferences system.

Discussion

The analysis showed that for a number of commodity items there is a clear dominance of supplies from one or more countries, which may contradict the principles of fair competition. In our opinion, the experience of the EAEU tariff preference system is interesting, which provides for a more flexible adjustment of the preferential lists of goods and beneficiary countries, based on the calculation of the specific share of imports of goods from specific countries.

Based on the study of international experience in applying the system of tariff preferences and the study, the authors proposed recommendations for transforming the system of tariff preferences of the EAEU.

Firstly, it was proposed to amend the list of developing beneficiary countries. That is, to exclude countries, which, when using the GNI per capita indicator, are several times higher than that of all EAEU member countries. Of course, it is worth considering the consequences of such editing of the list of developing countries, it is possible to change the indicators of foreign trade with these countries, including political threats.

Secondly, it is necessary to amend the list of preferential goods. Creation of a system of discounts for preferential goods or exclusion from this list of sensitive goods. This system will help protect domestic producers (there will be no decrease in the competitiveness of their products) and the economy of the EAEU member states.

Thirdly, introduce a grading system for product positions for developing countries using the EAEU tariff preference system.

Monitoring on this system should be carried out annually. A country that exceeds these thresholds will be derived from the system of tariff preferences.

Our proposed gradation mechanism will allow us to track the flow of goods to the domestic market, increase payments to the federal budget from foreign trade, and pursue a more effective protectionist policy.

Our study showed that the Russian Federation is characterized by a trend towards an increase in trade with preferential countries, which generally differs from the global trend identified by R. Olson (2014). However, as in the study of Lubinga, M. H., Ogundeji, A. A., Jordaan, H., Verschoor, A.-J. (2017). In addition, we found that the system of tariff preferences promotes the import of only certain commodity items. And, in general, we agree with the opinion of S. James (2010) that preferential regimes impede the development of free trade and create additional benefits for beneficiary countries, which, in our opinion, confirm the need for flexible adjustment of the system of tariff preferences for each country in individually, taking into account the specifics of the domestic market of goods.

Conclusions

In the framework of this study, a methodology was proposed for assessing the use of tariff preferences as an instrument of customs and tariff regulation and the possibility of its flexible use in order to support national producers. The methodology was tested on the example of the current EAEU tariff preferences system, as a result of which recommendations were proposed for transforming the existing EAEU tariff preferences system. It was revealed that for a number of commodity items imported to the territory of the Russian Federation by preferences, there is a clear prevalence of suppliers from one or several countries, which creates additional competitive barriers for domestic producers (in the presence of domestic developing production), namely, meat and fish products. Recommendations on improving the EAEU tariff preferences system are aimed at changing the list of beneficiary countries, the list of preferential goods, as well as the gradation of tariff rates for developing and least developed countries depending on the saturation of the domestic market and the capacities of national producers.

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Development of Assessment Methodology of Interaction Between Customs Authorities and Participants of Foreign Economic Activity

Alexander SMEKALIN
Part-time Lecturer, Department of Customs Affairs, South Ural State University (National Research University),
Deputy Head of the Chelyabinsk Customs Post of the Chelyabinsk Customs,
alexander.smekalin@yandex.ru

Viktoria FROLOVA
Assistant, Department of Customs Affairs, South Ural State University (National Research University),
frolovava@susu.ru

Ekaterina SALIMONENKO
Senior Lecturer, Department of Customs Affairs, South Ural State University (National Research University),
salimonenkoen@susu.ru

Alyona KARDAPOLTSEVA
Senior Lecturer, Department of Customs Affairs, South Ural State University (National Research University),
kanderovaav@susu.ru

Abstract

Many problems cannot be solved without effective interaction between customs authorities and participants of foreign economic activity. In particular, this concerns the problems of accelerating customs operations when placing goods under customs procedures, the problems of simplifying customs operations, as well as exchanging information, optimizing and synchronizing the joint activities of customs authorities and participants of foreign economic activity. At the same time, as of today, there is no multi-purpose assessment methodology of interaction between customs authorities and participants of foreign economic activity, which would allow to assess the level of such interaction, as well as to identify the counteraction of the same interaction. The article considers the theoretical basis of interaction be-tween customs authorities and participants of foreign economic activity and reviews the theoretical and methodological aspects of the interaction between customs authorities and participants in foreign trade. The proposed assessment methodology of interaction between customs authorities and foreign trade participants is a set of indicators arranged in 4 groups: temporal indicators of interaction, indicators of the application of technology of electronic declaration, indicators of assessment of the level of risk of participants of foreign economic activity and overall indicators of interaction between customs authorities and participants of foreign economic activity. The methodology allows assessing the interaction and graphically representing the results obtained with the aim of identifying points of counteraction and the problem areas. To assess the effectiveness of interaction between a participant of foreign economic activity and customs authority, indicators can be considered separately or together. The approbation of the developed methodology on the example of the interaction between the participant of foreign economic activity and the customs authorities of Federal Customs Service of Russia at various levels has been carried out, practical recommendations have been given. The results of methodology approbation show its correctness, validity, and opportunity of practical application in the work of customs authorities and participants of foreign economic activity not only in the territory of the Russian Federation, but also in foreign countries with the possibility of its adaptation.

Keywords: customs authority, participant of foreign economic activity, assessment of interaction effectiveness.

Introduction

Russia's accession and participation in the World Customs Organization have led to the formation of new standards in terms of the time of customs operations, the level of paper and paperless document flow, the quality of customs services, etc. Therefore, only the established interaction between customs authorities and participants of foreign

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economic activity can provide the achievement of new indicators. A number of problems arise in the regulation of foreign trade when implementing international conventions and national concepts by the Federal Customs Service of Russia. These problems cannot be solved without effective interaction between customs authorities and participants of foreign economic activity. Interaction between customs authorities and participants of foreign economic activity takes place at various levels (customs post - participant of foreign economic activity, customs – participant of foreign economic activity, etc.) through a range of mechanisms for collaboration. Placing goods under customs procedures is one of the main areas of interaction. The implementation of this process depends on both the actions of customs authority and the actions of a participant of foreign economic activity. Changes in procedures of a customs business-process can have a critical influence on the results of customs control, efficiency and effectiveness of customs procedures. The development of analysis system and risk management, achievements in information technology and electronic data interchange, etc. create new requirements and provide opportunities for improving customs procedures. These requirements and opportunities are taken into account in customs regulation, but there is no clear approach to the assessment of interaction between customs authorities and participants of foreign economic activity in modern conditions. The efficiency level of such interaction determines the speed of customs operations when placing goods under customs procedures, as well as the effectiveness of customs control.

Literature Review

Russian scientists are actively engaged in issues related to the assessment of indicators of customs activity. A large number of works of Russian customs Academy scientists are devoted to this issue. Issues relating to interaction between customs authorities and participants of foreign economic activity have been researched by a number of Russian and foreign scientists. Russian scientists have made a huge contribution to the development of theoretical and practical problems in this area: Pogodina I. V. *(Pogodina, 2015)*, Pimenova O. V. (*Pimenova, 2019*), Makrusev V. V. *(Stoyalova and Makrusev, 2018)*, Stoyalova A. A. *(Stoyalova and Makrusev, 2018)*, Butova T. V., Dunaeva A. I., Udachin N. O. *(Butova, Dunaeva and Udachin, 2014)*, Melnikova A. I. *(Melnikova, 2020)*, Kutepova O. N. *(Smekalin and Kutepova, 2019)* and others, and foreign scientists Nebrat V., Gorin N., Didkivska L. *(Nebrat, Gorin and Didkivska, 2020),* Fedorenko R. V. *(Fedorenko, 2016)*, Gokinaeva I. A. *(Gokinaeva, 2020)*, Nenovsky N., Turcu C. *(Nenovsky and Turcu, 2012)*, Głodowska A., Pera B. *(Głodowska and Pera, 2019)*. At the same time, as of today, there is no multi-purpose assessment methodology of interaction quality between customs authorities and participants of foreign economic activity. Despite the existing publications on the subject, many aspects of interaction between customs and business are still of great interest. The vast majority of publications are devoted to the analysis of theoretical aspects of interaction between customs authorities and participants of foreign economic activity during the performance of customs control of goods transported through the customs border, usually without paying sufficient attention to practical problems. In general, the question of interaction is revealed in a fragmented way in such publications. The problem of the study is the absence of a complete, covering all aspects, methodology for interaction assessment, and inadequate methods to solve this problem in practice.

It is impossible to develop measures to improve the effectiveness of interaction between customs authorities and participants of foreign economic activity in modern conditions without analysing and assessing the positive experience of foreign countries in this regard. There are 2 main developed, tested and implemented models of interaction between business and customs, they are: the American model and the model used in the UK.

In the United States of America, the scheme of interaction between business and customs is to use the "Single window" system (the International Trade Data System in the US (ITDC)) adapted to the specific features.

Customs authority in the USA conducts customs control and makes decisions in the following way: 1) the basic level of customs control which is fully automated and centrally occurs without human intervention; 2) the auxiliary level which gives the ability to detail the basic level of control according to the recommendations of the local customs authority; the process of customs control is to conduct a thorough computer analysis of electronic information on goods imported into the United States *(Butova, Dunaeva and Udachin, 2014)*. The first selection by type of cargo is carried out using a special computer control system to sort the goods into two groups: interest-sensitive goods and less interest-sensitive goods for the state *(Nebrat, Gorin and Didkivska, 2020)*. The second selection is a repeated computer analysis of all data on imported goods, which is performed automatically at the data processing centre of the customs service of the USA.

According to most experts, the UK has the most successful experience of public-private partnership (hereinafter PPP). The decades-long struggle for the effectiveness of the public service in this country which was started by Margaret Thatcher, has led to the establishment of an effective mechanism for interaction between the State apparatus and the private sector under market conditions. Today, the United Kingdom is one of the world leaders in both the total number of projects and the number of industries where PPP is applied *(Melnikova, 2020)*. Customs regulation of foreign trade is no exception.

Methods

Today, customs and foreign trade participants interact via a telecommunications network, which is designed for information exchange within the customs service and interaction with external subscribers. The information system of Russian customs authorities is steadily developing. In the system of foreign trade regulation, relations that arise when goods and vehicles are transported across the customs border are the subjects of not only legal but also scientific research. From a scientific viewpoint, three types of relations should be emphasized: anti-interaction (counteraction), neutrality and interaction.

Improvement, development, and technical support of the customs authorities were reflected in the Comprehensive Program for the Development of the Federal Customs Service of Russia until 2020. It was established from the analysis of this Comprehensive Program in terms of the interaction between customs authorities and participants of foreign trade, that in relation to liberalization and simplification of customs procedures the following steps have been implemented: the increased use of electronic declaration, the introduction of technology of remote release, the introduction of mandatory preliminary information about the imported goods, the reduction of time of release of goods with high-degree of processing, the establishment of a minimum list of documents required for submission for customs purposes, the introduction of the institute of an authorized economic operator making it possible to release goods before submitting a customs declaration, the application of new technologies of customs payments. Therefore, the electronic declaration system is the basic mechanism for interaction between customs authorities and participants of foreign economic activity.

The system of customs payments is considered as the second mechanism of interaction. At present, the organization of customs payments collection and customs revenues generation involves a number of participants of the relations arising in the process of movement of funds from the payer to the account of the Federal Treasury. These participants are involved in the mechanism of interaction due to the operation of the Eurasian Economic Union *(Smagin, Karpushkina, Danilova and Aliukov, 2017)*. The Federal Customs Service has developed "Concept for centralizing the accounting of customs and other payments and maintaining a single personal account of a participant of foreign economic activity". This concept assumes the gradual introduction of the centralization of customs payments.

The third mechanism of interaction, in our opinion, is the organization of work on the implementation of customs policy and interaction with participants of foreign economic activity in the framework of expert advisory councils on the implementation of customs policy at regional customs offices and customs.

With the use of the electronic declaration system and the improvement of software products, a system for assessing the quality of work of customs officials has appeared *(Pogodina, 2015)*. So, today a declarant has an opportunity to assess the quality or the level of work of a customs inspector who performs customs operations relating to the release of goods declared under declaration of goods (hereinafter DG) with the help of the assessment system. The essence of this system is that a customs operations specialist, who submits a DG to a customs post, after the release of goods, is given the opportunity to assess the quality of work of the customs official who has carried out customs control and the release of goods. We believe that the results obtained through the use of this assessment system are not always objective and often one-sided. This is due to the fact that such results are brought to the attention of the evaluated customs official, which, undoubtedly, will affect the quality of interaction between this official and the declarant during subsequent customs operations in the future.

In this regard, it is possible to include a third independent "appraiser" in the specified evaluation system in order to obtain objective evaluation results and avoid conflicts of interest. For example, the Chamber of Commerce and Industry can act as such an organization. In order to achieve accurate results, the assessment could be carried out

with the division of traders into two categories: enterprises of Chamber of Commerce and Industries and others. However, at the moment this system has no practical implementation.
Customs authorities in turn use the categorization of participants of foreign economic activity, the results of which form three risk levels: low, medium and high. In this case, customs also assesses participants of foreign economic activity unilaterally.

Therefore, the current methods of assessment of interaction between customs authorities and participants of foreign economic activity do not provide fully objective results; do not allow assessing the effectiveness of interaction in a complex; they are one-sided in character.

In order to assess comprehensively interaction between customs and business, the authors have developed groups of indicators that can be used to assess the effectiveness of such interaction. The system of indicators of the effectiveness of interaction between customs authorities and participants of foreign economic activity consists of quantitative and qualitative indicators.

We will group the indicators not according to the directions (mechanisms) of interaction, but taking into account the specifics of their calculation and the nature of interaction reflection into 4 groups.

1. Time indicators of interaction. The indicators included in this group reflect the speed of customs operations and customs control and are of great interest to participants of foreign economic activity because the specified speed often determines the amount of costs of participants of foreign economic activity associated with the transportation of goods across the customs border.
2. Indicators of the use of electronic declaration technology (remote release, preliminary information, etc.). This group of indicators reflects the two-way interaction between customs authorities and participants of foreign economic activity. Such interaction takes place when declaring goods in electronic form which are located in the region of activity of the customs authority other than the place of their declaration.
3. Indicators for assessment of the risk level of a participant of foreign economic activity. The name of the group of the indicators fully explains their purpose, which is to evaluate the activity of a participant of foreign economic activity with regard to violations of the customs legislation of the Russian Federation and the law of the EAEU when interacting with customs authorities.
4. General indicators of interaction between customs authorities and participants of foreign economic activity. This group of indicators includes indicators that characterize the interaction between a participant of foreign economic activity and customs authorities at various levels (customs, regional customs authorities, the Federal Customs Service) in all other aspects.
The individual indicators included in the above-mentioned groups and their calculation formulas are presented in table 1.

To assess the effectiveness of interaction between a participant of foreign economic activity and customs authority, indicators can be considered separately to identify problematic points of contact, or indicators can be considered together.

For a comprehensive assessment of the effectiveness of interaction between a participant of foreign economic activity and customs authority, it is proposed to use an integrated indicator calculated using the formula (1).

$$I = \sum_{i=1}^{n} Wi \cdot Xi, \quad (1)$$

where *n* is the number of criteria;

Wi – importance of the indicator (the importance of the indicators of the table is estimated by expert judgment, the sum of the importance of all indicators should be equal to 100%);
Xi – the calculated value of the indicator.
If 0<I<0.3, the interaction efficiency is low.
If 0.3<I<0.6, the interaction efficiency is medium.
If 0.6<I<1, the interaction efficiency is high.

Results

The developed methodology was tested during the period from 01.01.2019 to 31.12.2019 on the example of enterprise "X", which is registered as a legal entity in the territory of the Chelyabinsk region and which carries out foreign economic activities in the area of responsibility of customs "Z". We represent the results of the practical application of the developed methodology in table 1.

Table 1: Results of the practical application of the methodology for the assessment of the interaction between customs authority «Z" and foreign economic participant "X"

N	Name of the indicator and the formula of its calculation	*Xi*, %	*Wi*, %
1. Time indicators of interaction.			
1.1.	The percentage of customs clearance time when goods are placed under the customs procedure "customs transit" (reverse indicator). $K_1 = T_1/T_{1max} \cdot 100\%$, where T_1 - the customs clearance time from the moment of registration of a DG to the moment of release of goods under a DG; T_{1max} - the maximum customs clearance time from the moment of registration of a DG to the moment of release of goods.	100.0	1.00
1.2.	The percentage of customs clearance time when finalizing the customs procedure "customs transit" (reverse indicator). $K_2 = T_2/T_{2max} \cdot 100\%$, where T_2 - the customs clearance time when finalizing the customs procedure "customs transit"; T_{2max} - the maximum customs clearance time when finalizing the customs procedure "customs transit".	97.92	1.00
…	…	…	…
1.9.	The percentage of time spent on customs clearance when placing goods under the customs procedure "export". Export customs duties are not applied to goods if types of customs control in accordance with the risk profiles are not applied (reverse indicator). $K_9 = T_9 / T_{9\,max} \cdot 100\%$, where T_9 – customs clearance time when placing goods, for which export customs duties are not applied, under the customs procedure "export"; $T_{9\,max}$ – the time limit for customs clearance when placing goods, for which export customs duties are not applied, under the customs procedure "export";	91.67	2.00
2. Indicators of application of electronic declaration technology.			
2.1.	The percentage of declarations submitted using the technology of remote release $L_1 = Q_1 / Q_{1\Sigma} \cdot 100\%$, where Q_1 - the number of declarations of goods submitted with application of technology of remote release; $Q_{1\Sigma}$ – the total number of submitted declarations of goods.	100.0	2.00
…	…	..	…
2.8.	Frequency of failures (abnormal situations) of information systems when working with customs authorities (reverse indicator) $L_8 = Q_8/T \cdot 100\%$, where Q_8 – the number of failures (abnormal situations) of information systems when working with customs authorities (reverse indicator); T – time period (a year, a quarter, a month).	50.00	2.60
3. Indicators for assessment of the risk level of a participant of foreign economic activity.			
3.1.	The percentage of offences against the customs legislation related to failures (abnormal situations) of information technology when working with customs authorities (reverse indicator). $M_1 = V_1/V_{1\Sigma} \cdot 100\%$, where V_1 – the percentage of offenses against the customs legislation related to failures (abnormal situations) of information technology when working with customs authorities;	50.00	4.00

	$V_{1\Sigma}$ – the number of failures (abnormal situations) of information systems when working with customs authorities (reverse indicator);		
…	…	…	…
3.9.	The level of achievement of the predicted value of customs payments for the quarter by a participant of foreign economic activity. $M_9 = V_{9\Sigma} / V_9 \cdot 100\%$, where $V_{9\Sigma}$ – the amount of customs payments actually paid by a participant of foreign economic activity in the reporting quarter; V_9 – the predicted value of the amount of customs payments in the reporting quarter formed by a participant of foreign economic activity and sent to customs authority.	104.0	1.00
4. General indicators of interaction between customs authorities and participants of foreign economic activity. **4.1. Interaction at the level of "customs-participant of foreign economic activity".**			
4.1.1	The level of working capital diversion (accounts receivable) to secure payment of customs duties (reverse indicator). $R_1 = S_1 / S_{1max} \cdot 100\%$, where S_1 – the working capital used to secure the payment of customs duties; S_{1max} – total working capital.	99.50	1.50
…	…	…	…
4.1.12	The percentage of working meetings and advisory councils undertaken in 1 year.	25.00	1.00
4.2. Interaction at the level of "regional customs authority - participant of foreign economic activity".			
4.2.1	The percentage of requests from a participant of foreign economic activity to regional customs authority (the Federal Customs Service) for making a preliminary decision on the classification of goods. $R_9 = S_9 / S_{9max} \cdot 100\%$, where S_9 – the number of requests from a participant of foreign economic activity to regional customs authority (the Federal Customs Service) for making a preliminary decision on the classification of goods. S_{9max} – the total number of requests from a participant of foreign economic activity to regional customs authority (the Federal Customs Service) for making a preliminary decision on the classification of goods.	3.33	2.00
…	…	…	…
4.2.5	The percentage of requests from participants of foreign economic activity (including for the purpose of removing "administrative barriers"), the result of consideration of requests. Taking into account the results of the indicator, it is possible to consider creating an electronic portal for information exchange between customs authority and a participant of foreign economic activity (reverse indicator).	100.0	2.00
4.2.6	The percentage of undertaken working meetings and advisory councils.	16.67	1.00
4.3. Interaction at the level of "Federal Customs Service -participant of foreign economic activity".			
4.3.1	The level of trust and partnership (the value of the indicator is based on the results of surveys).	51.00	1.50
4.3.2	The level of awareness of participants of foreign economic activity about opportunities in the legislation of the Eurasian Customs Union (the value of the indicator is based on the results of surveys).	60.00	2.00
4.3.3	The percentage of requests from participants of foreign economic activity (including for the purpose of removing "administrative barriers"), the result of consideration of requests. Taking into account the results of the indicator, it is possible to consider creating an electronic portal for information exchange between customs authority and a participant of foreign economic activity (reverse indicator).	100.0	2.00
4.3.4	The percentage of undertaken working meetings and advisory councils.	0.00	1.00
4.3.5	The level of use of personal office features by a participant of foreign economic activity.	19.35	2.00

(Source: compiled by the authors based on data from the Federal Customs Service, customs authority "Z" and participant of foreign economic activity "X")

The importance of each indicator is identified by the expert group, which included representatives of customs "Z" and participant of foreign economic activity "X".

$$I = \sum_{i=1}^{n} Wi \cdot Xi = 1.00 \cdot 0.01 + 0.98 \cdot 0.01 + ... + 0.00 \cdot 0.01 + 0.19 \cdot 0.02 = 0.68 \quad (2)$$

Thus, the calculation of the integrated indicator produced the value 0.68, which corresponds to a high level of interaction efficiency.

To graphically display the values of indicators and make them easier to monitor, the diagrams in figures 1 and 2 are constructed. Time indicators of interaction and indicators of application of electronic declaration technology are shown in Figure 1.

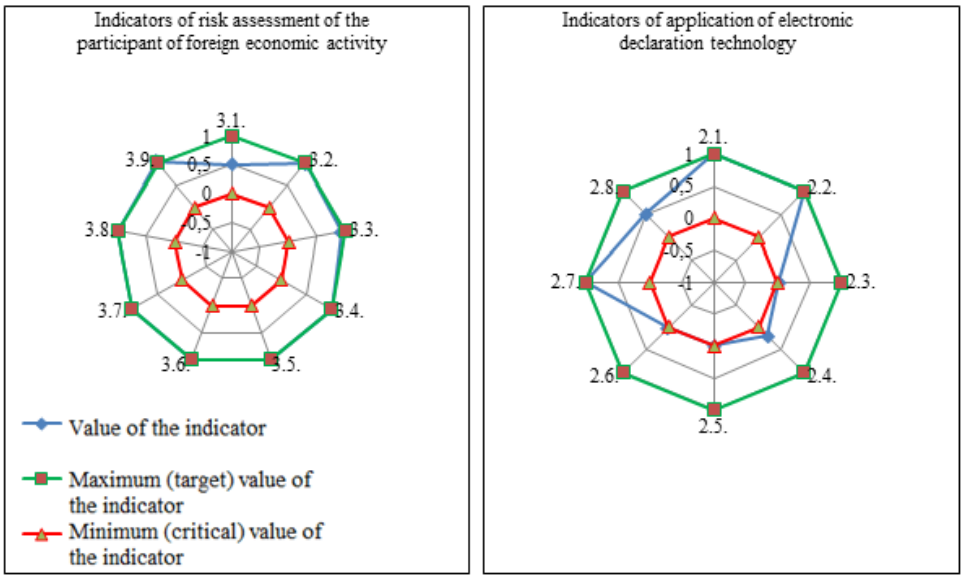

Fig. 1: Graphical representation of the values of the indicators of groups 1 and 2

(Source: Compiled by the authors based on the results of testing the developed methodology)

For correct calculation and display the values of the indicators of group 1 on the diagram, indicators 1.1- 1. 9. are converted to the reverse measurement system; group 2 - indicators 2.2., 2.8; group 3- indicators 3.1.-3.8. Indicators for risk assessment of a participant of foreign economic activity and general indicators of interaction between customs authorities and participants of foreign economic activity are shown in figure 2. To correctly calculate and display the values of the indicators in group 4 on the diagram, the indicators 4.1.1., 4.1.2., 4.1.7., 4.1.8., 4.1.11., 4.2.5., 4.3.3. are converted to the reverse measurement system.

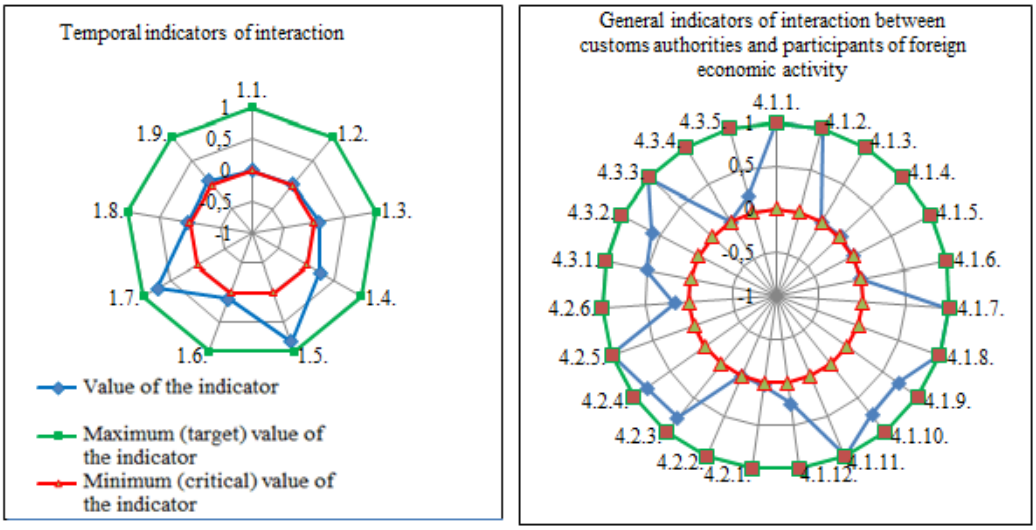

Fig. 2: Graphical representation of the values of the indicators of group 3 and 4
(Source: Compiled by the authors based on the results of testing the developed methodology)

Discussion

Only indicators 1.5. and 1.7. of group 1 reach the value "above average". These indicators reflect the speed of customs operations when placing goods under the customs procedures "release for domestic consumption" and "export" when identifying risks in accordance with the current risk profiles and applying the form of customs control "customs inspection". It is reasonable for custom "Z" to consider ways for shortening the time of actual customs inspection procedures, conducted with regards to goods declared by participant of foreign economic activity "X", taking into account the workload on customs posts of actual customs inspection procedures, as well as the results of the analysis of the time of drawing up the act of customs inspection.

Based on the values of the indicators included in group 2, we offer the following conclusions. First, there are not any interaction problems between customs "Z" and declarant "X" concerning the absence of communication between the customs authorities when using the electronic declaration system. This is a favourable factor of interaction, given the fact that other declarants who declared goods in the area of customs "Z" had such problems. Secondly, the percentage of declarations of goods that have been registered automatically, when placing goods under the customs procedure "release for domestic consumption (import)", as well as under the customs procedure "export", can be increased by analysing the reasons of non-compliance with the criteria of a declaration of goods automatic registration (illogical criteria, errors of the declarant) and bringing them to the attention of the FCS of Russia and the declarant (participant of foreign economic activity "X"). Third, the participant of foreign economic activity "X" uses all available information products to ensure uninterrupted and high-quality process of interaction with customs through electronic communication channels. Fourth, at the same time, as a result of the failure of the information system of the customs authority there was an emergency situation, which was the cause of violation of customs legislation.

In general, the values of the indicators of group 3 characterize participant of foreign economic activity "X" on the positive side. Despite the fact that the share of goods (6.66%) declared by this participant of foreign economic activity is risk goods, measures to minimize risks in various areas are mostly ineffective due to compliance with customs legislation by the participant of foreign economic activity.

General indicators of interaction between the customs authority and the participant of foreign economic activity characterize such interaction as a high-level interaction. Thus, based on the values of indicators 4.1.9 and 4.1.10, it can be concluded that the customs service promptly and fully informs about changes in customs legislation that regulate the actions of declarants. At the same time, administrative barriers do not appear in the interaction between participant of foreign economic activity "X" and customs "Z". The participant of foreign economic activity actively

participates in the discussion of problematic issues within the framework of advisory councils undertaken by customs.

Thus, based on the results of the calculation of each indicator, both the customs authority and the participant of foreign economic activity can draw appropriate conclusions and apply measures to improve the effectiveness of interaction, eliminating the risk of negative consequences. In other words, they should focus their efforts on problem areas and strengthen the values of troubling indicators. At the same time, the overall level of interaction efficiency (0.68) indicates the high quality of work of the customs authority and the law-abiding nature of the participant of foreign economic activity.

The results of the approbation of the developed methodology imply its correctness, validity, and the possibility of its practical application in the work of customs authorities and participants of foreign economic activity.

Conclusions

Therefore, the practical application of the methodology helps to improve the efficiency of interaction between customs and business, taking into account the following:

1) monitoring of the level of interaction between a participant of foreign economic activity and other customs authorities of the Russian Federation in the event of the appearance of a "new" participant of foreign economic activity in the customs area of responsibility.
2) graphical representation of the dynamics of indicators is convenient for monitoring;
3) indicators allow monitoring their current status in real time;
4) groups of indicators help to improve the effectiveness of organizational methods for managing conflicts between customs authorities and participants foreign economic activity, creating an opportunity for constructive dialogue;
5) indicators can be used to create a software product that can provide automatic or automated monitoring of the state of interaction between customs and participants of foreign economic activity.

At the same time, the methodology allows to focus on the most problematic and promising areas of interaction on time. Using the proposed methodology, it is possible to comprehensively assess the effectiveness of both customs authorities and the level of openness and reliability of enterprises engaged in foreign economic activity. The results of the methodology application will also allow the customs authorities to identify critical moments in the management of re-sources and assess the activities of certain customs authorities.

As a result of the conducted research, it can be concluded that the interaction between a customs authority and a participant of foreign economic activity needs a comprehensive assessment and regular monitoring in order to increase the level of such interaction. The developed and approved methodology can be applied to implement such work. The increase in the level of interaction efficiency can be achieved only by the joint efforts of a customs authority and a participant of foreign economic activity, which will provide resource, time, and material benefits to both subjects of interaction.

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The Analysis of Relationship Between International Shipping and World Economy

Mavlit AKHTYAMOV
Professor of management department, South Ural State University
(National Research University), akhtiamovmk@susu.ru

Natalia ZAVYALOVA
Senior lecturer of management department, South Ural State University
(National Research University),
zavialovani@susu.ru

Valery LIKHOLETOV
Professor of the economic security department, South Ural State University
(National Research University),
likholetovvv@susu.ru

Ksenia AIKHEL
Associate Professor of the Department of Applied Economics, South Ural State University
(National Research University
aikhelkv@susu.ru

Abstract

The development of the world economy is the basis and premise for the steady growth of international shipping demand. The world economy is the foundation of international shipping, because international shipping can be said to be a service industry, which serves for international trade, and international trade is an important standard to measure the world economy (Frankel, 1989). From a quantitative point of view, this paper studies the influence and interaction between international shipping and the world economy through grey correlation analysis, and the influence of the world economy on international shipping is much greater than that of international shipping on the world economy. The demand for trade promotes the demand for transportation, and shipping, as a cheap and high-volume mode of transportation, is also needed. As for the original demand of trade demand, international shipping demand is a kind of derivative demand. Therefore, the rise and fall of international trade directly determines the rise and fall of shipping industry. As one of the important industries in the development of national economy, shipping industry has guaranteed and promoted the development of international trade activities, and made global integration possible In order to promote the transformation of shipping industry, adapt to the market economy environment as soon as possible, allocate shipping resources through the market, and help the more economic and more effective operation of shipping industry, a set of economic theoretical system and a new way of thinking should be established to adapt to the characteristics of shipping industry.

Keywords: International Shipping; World Economy; Grey Relational Analysis, International Trade, Logistics, Supply Chain; Transportation.

Introduction

Global economic integration makes the world economy highly correlated with international shipping. International shipping is basically at the end of the world economy (in each node of the supply chain, enterprises only make production or supply decisions based on the demand information from their neighbouring lower-level enterprises, the unreality of demand information will increase step by step along the supply chain counter-current), and according to the bullwhip effect.

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The extreme recession of the world economy will magnify and transmit to international shipping by about ten times, reflecting the phenomena as follows: the price of freight has fallen sharply (the BDI has fallen 94% in six months *(Baltic Exchange Dry Index | 1985-2020 Data | 2021-2022 Forecast | Price | Quote, 2020)*), the demand for excess capacity has decreased, and competition has intensified the decline of profits. Before the financial crisis, the prospects of the world economy were promising, and various industries expanded excessively, including shipping industry, which also laid a huge hidden danger for the future international shipping recession.

The development situation of international shipping can be summarized as the following aspects in terms of history and the law of shipping industry itself:

First, the rise and fall of international shipping, the most important impact comes from or depends on the situation of the world economy and international trade. Secondly, it depends on the relationship between the volume of freight in the shipping market, the existing capacity and the output of new ships and the retirement of old ships. Third, it is influenced by global and regional sudden political and economic events. Of course, as an international shipping fleet, it is also subject to changes in the pattern of its own economy.

Shipping is a typical cyclical industry, which is closely related to the development of the world economy. Relevant data show that for every percentage point of global economic growth, international shipping volume will rise by 1.6%. In a sense, the rise and fall of the economy determines the growth and decline of shipping *(Michail, 2020)*. Therefore, the world economy and trade are the primary factors affecting international shipping.

Therefore, the study of international shipping and world economy, especially the linkage between them, is of great significance.

Literature Review

Grey System Theory, the full name of Grey System Theory, was proposed by Professor Deng Julong of Huazhong University of Technology in 1982. In just a few years, it has rapidly penetrated into many fields, such as economy, meteorology, ecology, water conservancy, biology, military, medicine, education, hydroelectric energy, geological exploration, transportation, process control, environmental protection and so on *(Jun and Hao, 2009)*. Its theoretical research and application research have made great progress.

Grey Relational Analysis is an important research method in the project of grey theory research. It is a systematic analysis method to measure the degree of correlation between factors according to the similarity or difference of development situation between factors. It is based on the microscopic or macroscopic geometric approximation of the sequence of behavioral factors to analyze and determine the degree of influence between factors or the contribution of factors to the main behavior. The magnitude of correlation degree is only the external expression of interaction and interaction among factors. The ranking of correlation degree can reflect the relative influence of many factors on reference factors.

Research Methods

In the past, the basic methods of factor analysis were mainly statistical methods, such as regression analysis. Although it is a more general method, most of them are only used for a few factors and are linear. For multi-factor, non-linear is difficult to deal with.

Considering the shortcomings of regression analysis method, grey system theory adopts the method of correlation analysis to make system analysis. As a system of development and change, correlation analysis is in fact a quantitative analysis of dynamic process development situation.

From a quantitative point of view, this paper will use the existing evaluation index system and the research status of correlation degree to study the interaction between international shipping and world economy by using grey correlation analysis method.

So the main research method is grey relevance degree method due to the several reasons:

Reason 1: Because there are many and complex factors reflecting international shipping and world economy, we can only analyze the main indicators with limited representation first *(Kuo, Yang and Huang, 2008)*.
Reason 2: Statistical data used for various indicators are limited, and the existing data are of large gray scale, and most of the data do not have typical probability distribution.

Therefore, the relationship between international shipping and world economy is a grey system, which can be operated by grey relational analysis.

Calculating Method

The specific calculation methods are as follows:

Selection of reference sequence $x_0(k)$.

Comparing Sequences $x_i(k)$, t = 1, 2, 3,…, n, t = 1, 2, 3,…, n (n is Number of time series).

For raw data, no quantification is performed: $x_i^{'}(k) = x_i(k) / x_1(k)$.

Seeking Reference Sequence $x_0(k)$ And comparison sequence $x_i(k)$.

Absolute difference and two-stage minimum difference and maximum difference:

$$\Delta_i(k) = \left| x_0(k) - x_i(k) \right| \quad \text{i = 1, 2, …, N} \tag{1}$$

1) Finding the Grey Relevance Coefficient $\xi_i(k) = \dfrac{\min\limits_i(\Delta_i(\min)) + \rho \max\limits_i(\Delta_i(\max))}{\Delta_i(k) + \rho \max\limits_i(\Delta_i(\max))}$

$$\min_i(\Delta_i(\min)) = \min_i(\min_k \left| x_0(k) - x_i(k) \right|)$$

$$\max_i(\Delta_i(\max)) = \max_i(\max_k \left| x_0(k) - x_i(k) \right|)$$

ρ is the resolution coefficient, It is used to improve the difference between correlation coefficients. $\rho \in [0,1]$, Usually 0.1-0.5, usually 0.5.

2) To calculate the correlation, the average value of the grey correlation coefficient is the grey correlation degree, that is: $r_i = \dfrac{1}{n} \sum_{k=1}^{n} \xi_i(k)$

Evaluation Index System

In view of the fact that there is little information on the research of thematic relevancy between international shipping and world economy, this paper mainly refers to the evaluation index system established in the relevant papers of International Shipping Centers and International Financial Centers *(Feng, 2007)*. The principal component analysis method is used to demonstrate that the index system can effectively reflect the development level of international shipping and financial centers *(Jiawen and Youtian, 2017)*.

Because of the complexity of the economic system indicators of the two, the selection process of the evaluation index system takes into account the principle of representativeness and hierarchy, and the selection of indicators that fully show the impact of the correlation between the two *(Siqi and Siqin, 2016)*. Based on the above conclusions, this paper establishes two kinds of evaluation index systems: the main factors representing the level of international shipping development and the main factors representing the level of world economic development. (Table 1)

At the same time, with the world economic gross output and the international shipping industry gross output representing the final output, the impact degree of the factors that mainly affect the world economy on the total output of the international shipping industry and the influence degree of the factors that mainly affect the shipping

industry on the total output of the world economy are analyzed respectively, so as to evaluate the relationship between international shipping and the world economy. In addition, since the gross output value of the above two industries is related to the level of international trade development, this kind of evaluation index is introduced as a reference (Table 1 presents) *(Michail, 2020)*.

Table 1: Evaluation index system

Representing the main influencing factors of the international shipping development level	**X1 total amount of sea cargo transportation**
	X2 dry bulk shipping volume
	X3 container shipping volume
	X4 crude oil shipping volume
	X5 new ship market order volume
	X6 port cargo throughput
Representing the main influencing factors of the level of world economic development	X7 World GDP
	X8 world economic growth rate
Representing the main influencing factors of the level of international trade development	X9 global trade volume growth rate
	X10 total import and export

(Source: compiled by the authors)

Selection and calculation of data

According to the current situation of the construction of international shipping center in the past five years, the first part of the evaluation index system (representing the main factors affecting the development level of international shipping) is selected to calculate the data of the construction and development of Shanghai international shipping center in the past five years *(Study on the Relevance Degree between Zhu Hui International Shipping Center and International Financial Center, 2008)*. The second and third parts of the data are calculated with reference to the relevant economic data of the WTO in the past five years *(WTO Statistics: Trade and tariff data, 2020)* and it is presented in the Table 2.

Table 2: Selection and calculation of data

International shipping index	**X1**	**X2**	**X3**	**X4**	**X5**	**X6**
Correlation	0.82	0.77	0.75	0.75	0.89	0.87
The average gray correlation between international shipping and the world economic indicator system			0.81			
World economic indicators	X7	X8				
Correlation	0.95	0.91				
Average grey correlation between world economy and international shipping indicator system			0.93			
World trade indicator	X9	X10				
Correlation	0.84 (0.98)	0.81(0.92)				
Average grey correlation between international shipping and world trade indicator system			0.82			
The average gray correlation between the world economy and the world trade indicator system			0.95			

(Source: compiled by the authors)

Results

From the calculation results of the above grey correlation degree, the following conclusions can be drawn:

1) The impact of international shipping related indicators and world economic related indicators on international trade is basically the same. Both qualitative and quantitative perspectives show that the world economy has an impact on international shipping vehicles.
It has an important impact on the world economy, and the degree of impact is similar to that of the operation of world trade.
2) The impact of the relevant indicators of world economy and World Trade on international shipping is basically the same. Both qualitative and quantitative perspectives show that the world economy has an important impact on international shipping, and the degree of impact is similar to that of the development of world trade on international shipping.
3) The impact of the world economy on international shipping is greater than that of international shipping on the world economy.

Discussion

The demand of international shipping market is derived from the demand of international trade, and the world economy is dominated by international trade. The development of world economy has the characteristics of periodic fluctuation. Therefore, to analyze the demand of shipping market, we must first analyze the international trade.

1. As a derivative of international trade, international shipping is closely related to the world economy and international trade, and also an important part of the international market. Driven by the development of trade, it is gradually interdependent with trade. It can also be said that without trade, there will be no shipping.
2. The changes of international trade in quantity, value and commodity structure will be reflected by the demand for shipping. The total demand for shipping is subject to the changing law of the development of world economy and international trade. When the world economy is in a period of rapid growth, international trade will show a corresponding trend of substantial growth *(Hummels, Lugovskyy and Skiba, 2009)*. Therefore, the overall demand for shipping is bound to grow rapidly, and the shipping market will be active and prosperous. When the world economy is in a period of stagnation and recession, the international trade will inevitably be stagnant and shrinking. At this time, the shipping market will be depressed. The law of general demand for shipping is subject to the law of change of world economy and international trade, and has certain periodicity. However, the law of shipping demand in time lags behind.
3. The international shipping market system plays a role through various market mechanisms. There is a relationship of mutual restriction, interdependence and promotion between the basic international shipping market and the relevant markets, as well as between the professional markets in the market. Through the interaction and mutual movement of price, supply and demand, competition, service and other elements, the operation of the international shipping economy is promoted.

Conclusions

From the quantitative point of view, this paper studies the interaction between international shipping and the international world economy by using the grey correlation method. The grey relational degree analysis is based on the conclusion that there is a positive linear correlation among the indexes obtained from the previous relational analysis and is simplified appropriately. The conclusion of grey correlation analysis is the same as that of qualitative analysis, and the validity of the index system is further demonstrated.

In the analysis and research of shipping demand, in order to establish the operation of shipping enterprises on a solid basis and make the objectives of the operation of the enterprises concrete, we should comprehensively consider all kinds of influencing factors in a certain range or even a larger range, and master certain laws, so as to clearly determine the direction of the operation of the enterprises. At the same time, it is also necessary to analyze and study the individual demand factors directly related to the enterprise.

The final conclusion of this paper is that there is an interactive relationship between the world economy and international shipping. Its influence degree is basically the same as that of the development of world trade, and the

influence of the world economy on international shipping is greater than that of international shipping on the world economy.

Acknowledgement

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Benefits of Implementing ERP Systems Based on The Experience of Russian Enterprises

Alena LEVINA
Head of Management department, South Ural State University (National Research University), Chelyabinsk, Russia, levinaalenab@gmail.com

Yuliya YAKUNINA
Senior Lecturer of Management department, South Ural State University (National Research University), Chelyabinsk, Russia, iakuninays@gmail.com

Aleksandr DEMCHENKO
Associate Professor of Management department, South Ural State University (National Research University), Chelyabinsk, Russia, demchenkoai@susu.ru

Yuliya BALDINA
Senior Lecturer of Management department, South Ural State University (National Research University), Chelyabinsk, Russia
baldinaya@susu.ru

Egor KORYAKOVTSEV
«State Rocket Center named after Academician V.P. Makeeva»
koryakovtsev.egor@gmail.com

Abstract

The article is devoted to the study of the advantages of ERP-systems implementation into the Russian industrial enterprise's activities. The relevance of this topic in the current economic conditions is increasing, as the pace of business development is accelerating, new technologies are being introduced, trends in the globalization of business and increased competition are clearly expressed. The increase in material, information and financial flows leads to the need to streamline and control business processes, which requires the use of appropriate information systems. The implementation of ERP systems involves a number of difficulties, the implementation process can be phased or simultaneous, it may require the restructuring of all business processes of the enterprise or fit organically into the activities of the enterprise, if the business is already mature and the processes are fine-tuned. In each case, you need to evaluate both the potential problems and the benefits of implementing ERP systems. The variety of systems presented on the market also forces the management of enterprises to use the advantages assessment and shortcomings of domestic and foreign ERPs, making a choice. Implementation of the ERP system is associated with significant costs, the need for integrated preparation for implementation, a high degree of uncertainty due to the complexity and scale of ERP, the need to predict the effect of implementation. All this confirms the relevance of the present study and determines its purpose. The purpose of the study is to identify the advantages of implementing ERP systems in the Russian industrial enterprises activities and evaluate the effectiveness of implementing the system using the example of a particular enterprise. During the study the market analysis of ERP-systems was carried out, key advantages of implementation were highlighted, approaches to evaluation of ERP-systems implementation efficiency were considered. On the example of the Russian industrial enterprise, the implementation of the ERP-system 1C: ERP Enterprise Management was tested, conclusions were made about the implementation results that have an economic and process effect.

Keywords: logistics, procurement and stock management, ERP-system, ERP advantages, effectiveness of implementing ERP-system.

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Introduction

The concept of "ERP" - Enterprise Resource Planning - was introduced by analyst Gartner Lee Wylie in 1990. The system presents an organizational strategy for integrating production and operations, labour management, funds management and asset management. It is focused on continuous optimization of enterprise resources through a specialized integrated application software package that provides a common data and process model for all areas of activity.

Enterprise Resource Planning (ERP) is a fully functional system consisting of integrated applications designed to manage daily business activities such as accounting, finance, human resources, and manufacturing. In addition, ERP systems link multiple business processes and enable data exchange between them. According to Scrutu L.E. and Lupu V. (2016), the use of ERP systems creates a joint, effective and inclusive environment among the organization's departments; helps streamline and facilitate decision-making *(Scrutu and Lupu, 2016)*.

The relationship between ERP and logistics is the agenda to this study. J. Muscatello, D. Parente, M. Swinarski (2018) talk about the connection between the implementation of ERP systems and logistics costs. ERP systems solve the problem of disparate information in the organization and coordinate mechanisms to eliminate sub optimization of the supply chain. There are a limited number of studies on the impact of ERP implementation on logistics costs. Many firms, especially manufacturers, consider ERP unnecessary if they cannot show a reduction in logistics costs. Given the share of logistics costs in GDP, it is very important to understand the impact of ERP implementation on logistics costs *(Muscatello, Parente and Swinarski, 2018)*.

As the business grows, a growing number of companies come to the conclusion that it is necessary to implement ERP systems. Therefore, it is necessary to define the implementation goals, the advantages of a particular system, and determine the effect of the implementation.

Methods

The theory and methodology of this study is based on the work of Russian and foreign authors in the field of business process automation, logistics, and integration. During the study, we used a systemic approach to the study of the problem, statistical data analysis, theory and integrated logistics methods and evaluation of the effectiveness of implementing ERP systems.

Literature Review

Market Overview

The development dynamics of the ERP market confirms the high degree of agenda on the part of the business in the development, implementation and maintenance of ERP systems.

According to R. Rake, S. Baul (2018), the global ERP software market is valued at $35.81 billion and is projected to reach $78.40 billion by 2026 *(Rake and Baul, n.d.)*. According to another global business data platform, the global enterprise resource planning (ERP) software market will grow to about $97 billion by 2023 *(Liu, 2020)*.

IT costs for enterprise software worldwide are projected to be around $503 billion in 2020. At the same time, the corporate software market in recent years has shown high growth rates, and market revenues more than doubled over the period 2009-2019 *(Liu, 2020)*.

Implementation of ERP together with new software and hardware systems and business processes can significantly change the workflow and operation *(Boudreau and Robey, 2005)*.

The data of PAC (Pierre Audoin Consultants), given in the study "Russia - IT Market 2016-2022: Market Figures - Software & IT Services" from 2018, confirm these forecasts for the Russian market *(Russian IT Services Market: Results of the Year, Forecast for the Future, 2020)*. PAC named production as the key consumer industries of IT

services in Russia in 2018 - 25.1%, the public sector - 21.4% and the banking sector - 20.9%. According to experts, this trend will continue until 2022 (Fig. 1 and Fig. 2).

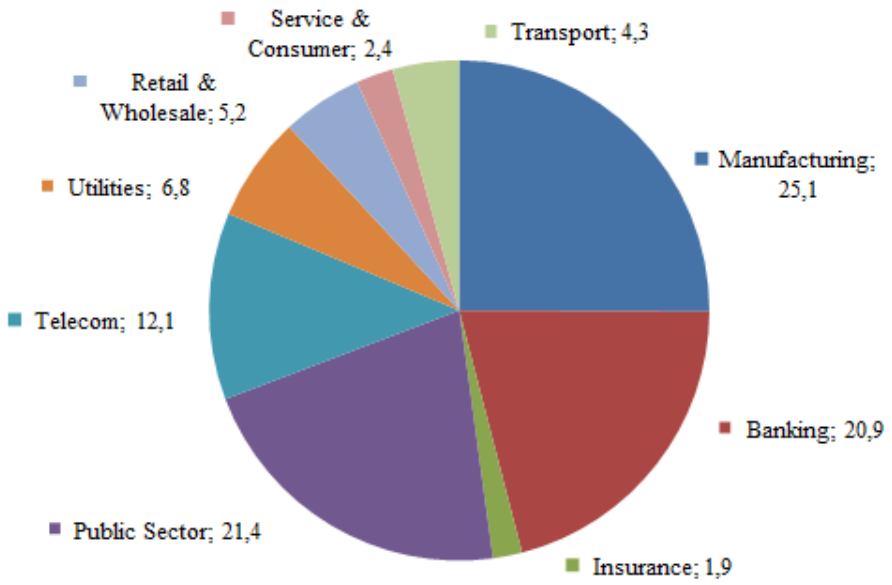

Fig. 1: Structure of the Russian IT market in industry terms according to the data of the company Pierre Audoin Consultants for 2018, %

(Source: Russian IT Services Market: Results of the Year, Forecast for the Future, 2020)

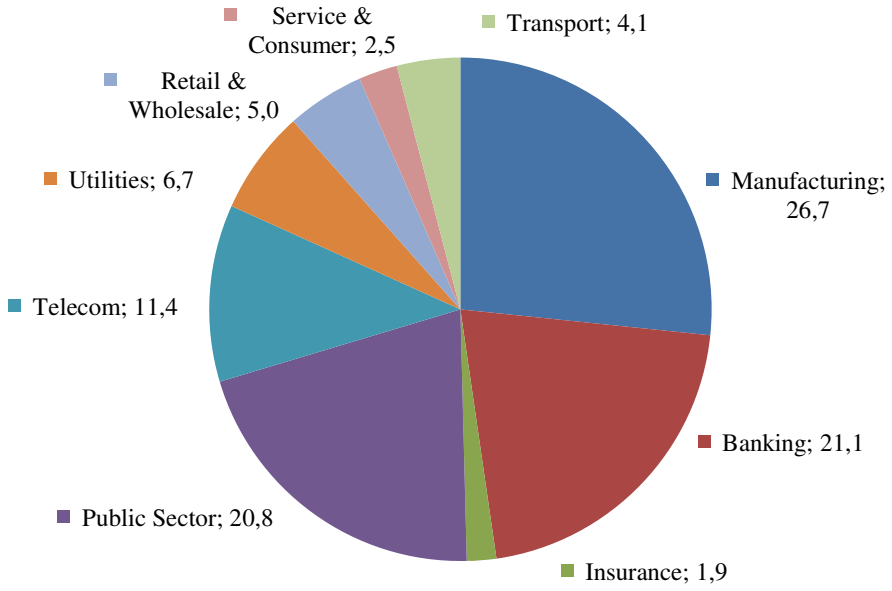

Fig. 2: Russian IT market structure in the industry section according to the data of the company Pierre Audoin Consultants forecast for 2022, %

(Source: Russian IT Services Market: Results of the Year, Forecast for the Future, 2020)

According to TAdviser, which provides statistics for the period 2005-2017 on the implementation of ERP systems, the first 5 positions are occupied by trade, engineering, construction, food and chemical industries *(Industry specificity of ERP projects in Russia, n.d.)* (Fig. 3).

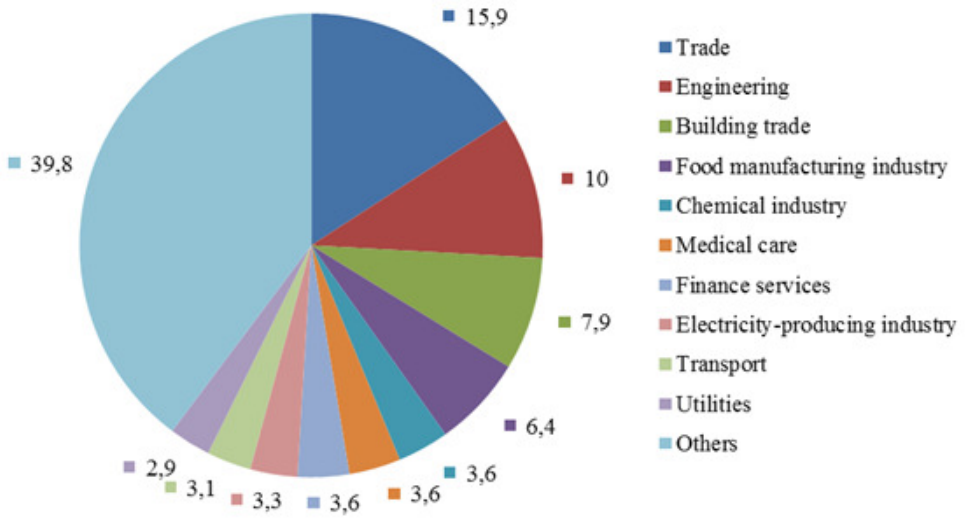

Fig. 3: Implementation of ERP systems by industry for the period from 2005 to October 2017
(Source: Industry specificity of ERP projects in Russia, n.d.)

Russian industry is still lagging behind in the level of automation from banks and telecommunications, but it is already significantly narrowing the gap with leading industries, said S. Petrov, a member of the board of Galaxy Corporation. In his opinion, the market for ERP systems will receive significant development due to an increase in the level of automation of the Russian industry.

Today, the market for ERP systems, that allow you to automate processes in the enterprise, is quite wide; it has global and local players.

According to Postnikov V.M. and Chekulina M.Yu. (2020), two main types of solutions can be distinguished: "box" solutions that can be used in small enterprises with standard work logic, the second type can be considered individual solutions for medium and large enterprises with unique features and many non-standard processes. For each case, you need to consider your own criteria, in the first case you need to pay special attention to the cost of implementation and the time frame, and in the second - to flexibility, scalability and the possibility of integration with other systems *(Postnikov and Chekulina, 2020)*.

The most popular ERP systems are shown in Figure 4 *(The most popular ERP systems and vendor leaders, n.d.)*.

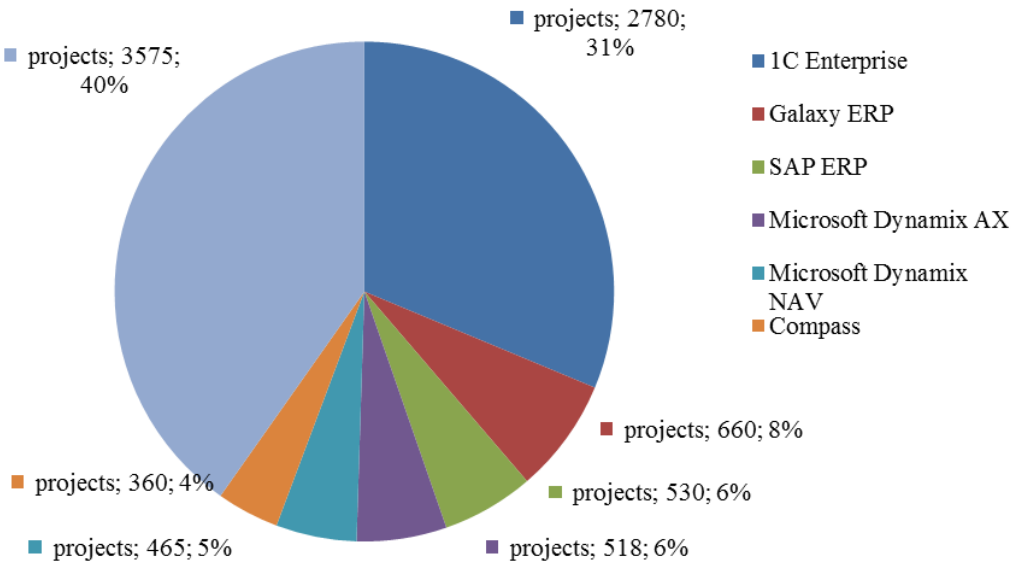

Fig. 4: Rating of ERP systems by the number of implementations according to TAdviser database data for the period from 2005 to October 2017
(Source: The most popular ERP systems and vendor leaders, n.d.)

According to the data, ERP solutions based on the 1C: Enterprise platform are most popular in Russia. The domestic software product accounts for 31% of the total number of solutions introduced from 2005 to October 2017. The second place in the ranking is occupied by "Galaxy ERP" (7.5%), the third - SAP ERP (6.0%). Outside the top three, there are 2 solutions from Microsoft: MS Dynamics AX (5.8%) and MS Dynamics NAV (5.2%) *(What Is ERP? Guide to Enterprise Resource Planning Software, 2020)*.

The study of Postnikov V.M. and Chekulina M.Yu. (2020), based on a comparison of ERP systems according to 9 criteria, also shows that the Russian system "1C: Enterprise Management 2" leads among the compared ERP systems according to given criteria. Among foreign systems, the MS Dynamics system has shown itself well. It should be understood that if you specify a different weight of criteria and compare by other parameters, then the results may differ significantly *(Postnikov and Chekulina, 2020)*.

According to Agafonova V.V., Nikolaeva A.A., Stakanova N.S. (2018), the advantages of 1C include adaptation to Russian legislation and the possibility of a fairly quick adjustment with the help of integrator companies, as well as an ergonomic interface. When implementing SAP developed under Western standards, additional costs are inevitable for the development of specific functionality under Russian standards *(Agafonova, Nikolaeva and Stakanova, 2018)*.

For the purposes of our research, we will compare the ERP systems of SAP Business One, Microsoft Dynamics NAV, 1C ERP Enterprise Management 2.0.

SAP Business One is a software solution focused on small and medium-sized enterprises that aim to optimize internal business processes, accelerate growth, and increase profits.

Microsoft Dynamics NAV is an integrated business management system that helps develop the company and increase the number of potential deals.

An easily adaptable enterprise resource management solution automates and integrates sales, purchases, operations, accounting, and inventory management in small and medium-sized companies.

1C ERP Enterprise Management 2.0 is a modern solution for building complex information systems for managing the activities of multidisciplinary enterprises.

Table 1 shows the comparative characteristics of these ERP systems.

Table 1: Comparative characteristics of ERP systems

Criterion of estimation	**1C ERP Enterprise Management 2.0**	**Microsoft Dynamics NAV**	**SAP Business One**
Target group	Small business, ИП, medium-sized and large enterprises	Small, medium-sized and large enterprises	Large corporative enterprises
Licence policy	Purchase product license (by number of workplaces) and subscription for updates/information materials.	Purchase a product license (depending on the number of jobs)	Licenses for modules are purchased (the cost depends on the number of jobs) and a maintenance subscription, the cost of which also depends on the number of jobs)
Program cost	From 360 000 rubles	From 500 000 rubles	From 550 000 rubles
Units	9	12	15
Implementation period	3 – 4 weeks	5 – 6 weeks	5 – 6 weeks
Localization	High	Medium	Medium
The period of training of employees	14 – 30 days	From 2 to 5 weeks	30 days

(Source: compiled by the authors)

Based on the results of the comparison of the three ERP systems for business, it can be concluded that SAP Business One is the most attractive ERP system in terms of technical capabilities and usability. But this system is the most expensive of the presented options and requires a long implementation time. The smallest implementation period and cost, extensive functionality, usability, integration with other systems, as well as a fairly wide target audience are inherent in the Russian 1C ERP Enterprise Management 2.0. It should also be noted that the priority of choosing domestic systems corresponds to the state program of the digital economy of Russia and the project for the development of the IT industry for 2019-2025 years.

Thus, the review of the ERP market demonstrates high growth rates, the presence of both domestic and foreign solutions in the market. The best option for the introduction of ERP-systems into the activities of Russian enterprises is 1C Enterprise management; however, the choice of an ERP-system is carried out on the basis of a multi-criterion approach, depending on the goals and objectives of the implementation.

Benefits of ERP Implementation

With the development of business applications such as CRM (Customer Relationship Management), MRP (Manufacturing Resource Planning) and PPM (Project Portfolio Management), patchwork automation began to be replaced by a full-fledged and long-term strategy for the development of information technology in enterprises. However, together with the growth of capabilities, functions, usability of software, the volume of tasks of business applications, the cost of such programs, the cost of their introduction into production, also increased. Project implementation times, technical and organizational complexity of implementation and operation have increased significantly.

According to P.I. Yaremko (2018), the main goal in the implementation of the ERP system is to dramatically accelerate and increase the mobility of the enterprise's response to market changes with a multiple reduction in company costs, which helps achieve the principles of implementation: maintaining a single data warehouse; automation of activities; Delivering as one; ensuring customer satisfaction *(Yaremko, 2018).*

Owusu-Mainu R., Twum A.D., Konadu A., Ohene-Amoako D. (2019) established that the implementation of the ERP system is accompanied by problems and difficulties associated with reconfiguration and configuration, acquisition cost, time and cost of training users of ERP systems. However, the direct and indirect benefits: efficient customer service, efficient and reliable sales and distribution mechanisms, deep understanding of corporate data, efficient inventory management and increased profitability, efficient business operations, etc., resulting from the implementation of ERP systems far outweigh the problems associated with the implementation of ERP systems *(Owusu-Mainu, Twum, Konadu and Ohene-Amoako, 2019).*

According to the researchers *(Owusu-Mainu, Twum, Konadu and Ohene-Amoako, 2019),(Oshchepkov and Lokhmatova, 2020)* ERP systems have a number of advantages:

- Increased efficiency due to automation of data collection;
- Growth through the management of increasingly complex business processes;
- Risk mitigation, better compliance;
- Promotes cooperation through improved data exchange and communication;
- Improved supply chain management;
- Helps to save business money in the long term by optimizing processes;
- Provides a unified system that can reduce IT, workforce and training costs
- Allows you to better see important component businesses, such as sales, working capital and inventory management;
- Facilitates reporting and planning with improved data and analytics.

Panorama Consulting, an international research company, presented the benefits of ERP implementation (Fig. 5) in a report "Market Overview of ERP 2017" based on a survey of 342 companies, which was conducted from March 2016 to February 2017 *(ERP Market Overview 2017, 2017).*

According to the results of the same study, 70% of companies rated the results of ERP implementation as successful, 26% - failure, 4% - difficult to say. 74% of respondents exceeded the amounts originally budgeted. The reasons for going beyond the budgeted budgets were unforeseen technical /organizational problems for 23% of respondents, for 22% - the need for additional technologies, for 20% - expansion of coverage.

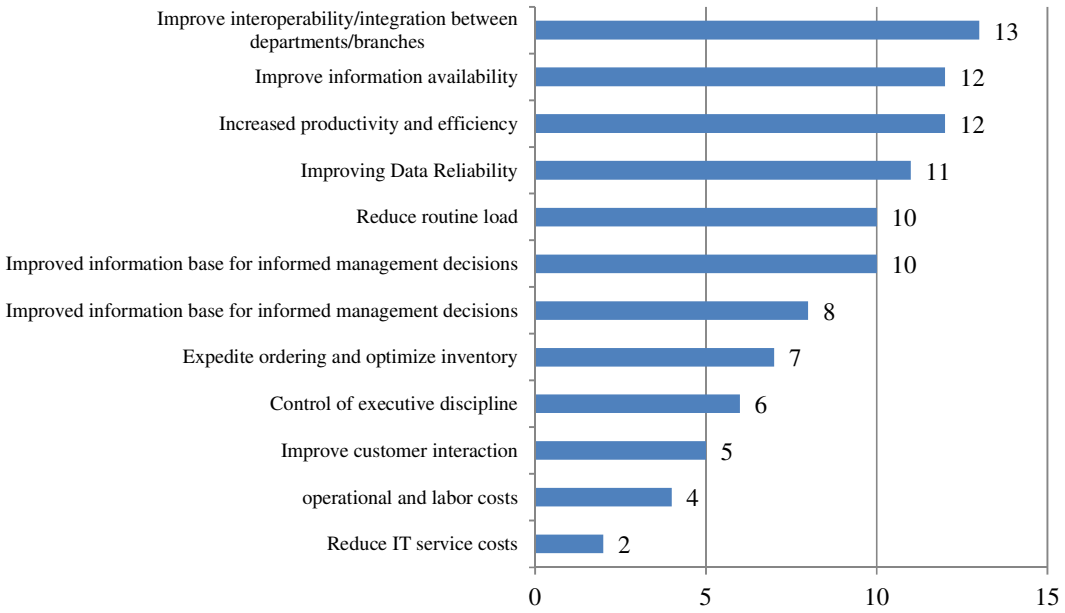

Fig. 5: Benefits of ERP implementation based on Panorama Consulting Solutions research (2017), %
(Source: ERP Market Overview 2017, 2017)

It is worth noting that expensive software of well-known manufacturers cannot always guarantee successful implementation in any business processes. Before implementing, you must always evaluate the effectiveness of this solution. To this end, various economic models and methodologies are used.

Today, there are many approaches to measuring the effectiveness of the implementation of the ERP system, and this is explained by the relative novelty of the issue, the diversity of life situations and, most importantly, the specifics of the subject of the assessment itself, because the implementation of the ERP system cannot be considered as an independent project with separate resources, cash flows and effects, and this is a project integrated into the main business of the customer and affecting the key indicators of this business *(Enterprise Management Systems (ERP) market of Russia, 2020)*. Recently, special attention has been paid to dividing the benefits associated with ERP systems into two categories: "implementation result" and "organizational results" *(Law and Ngai, 2007), (Ram and Corkindale, 2014)*.

Other experts *(Protsenko and Laikov, 2015)* systematize the approaches as follows *(How fast are enterprise resource planning (ERP) systems moving to the cloud?, 2015)*:

1. Economic component of efficiency assessment:
   - approach based on investment management methods;
   - economic analysis.
2. "Internal" or "process" component:
   - approach based on project management methods;
   - process management elements.

The potential economic effect of implementing ERP systems from the experience of the consulting company PromInfoConsult (2018) can be divided into 4 groups (Table 2).

Table 2: Economic impact of ERP systems implementation according to PromInfoConsult

Area	Measure	Average,%	Value,%
Inventory and production	Reduction of inventory	20	4-50
	Reduction in material resources	11	2-30
	Reduced production costs	12	5-50
	Lower cost of production	8	2-30
	Increase in output	29	3-150
	Productivity growth in production	14	10-20
Working capital turnover	Increase in inventory	25	7-50
	Reduction of receivables	19	8-50
Efficiency and agility	Expedite order processing	85	20-400
	Shorter lead times	26	14-75
	Reduced operational and administrative costs	20	5-50
	Profit growth	14	4-35
Work and Reporting	Reduction of work in various departments	35	10-70
	Accelerate management reporting	in 3 times	in 1,3-11 times
	Expedite regulatory reporting	in 3,1 times	in 1,4-10 times

(Source: compiled by the authors on the basis of PromInfoConsult)

In turn, the Russian leader in the field of ERP systems - 1C estimates the average effect of implementation as follows (Figure 6).

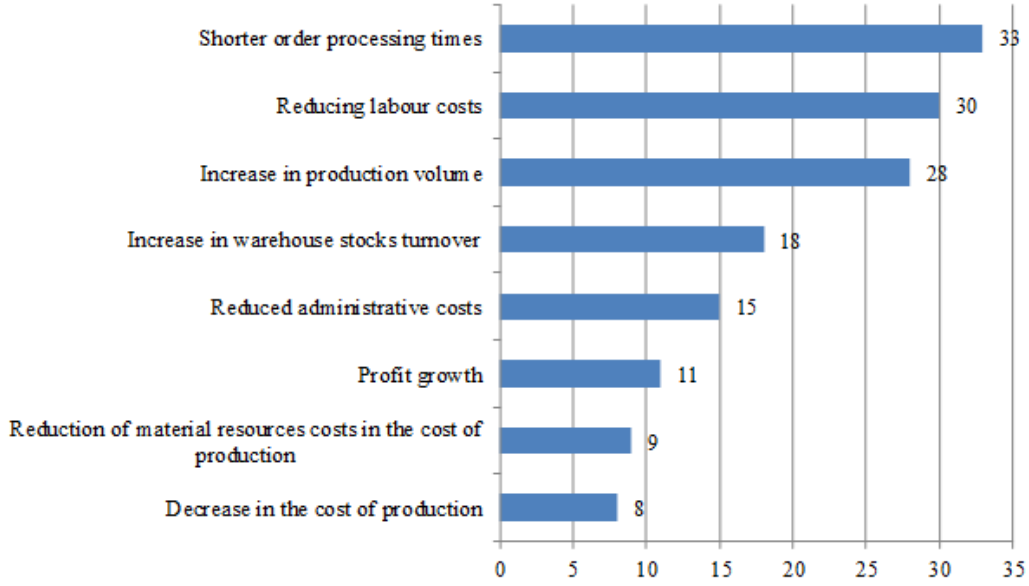

Fig. 6: Average impact of ERP systems implementation according to ERP solutions implementation project 1C, %

(Source: compiled by the authors)

These indicators include both economic and process-specific indicators. Thus, the implementation of ERP systems has both advantages and disadvantages, but most experts believe that the potential benefits significantly outweigh the disadvantages. Among the benefits of implementation are economic and process effects.

Results

We investigate the advantages of implementing the ERP system and evaluate the results of the implementation using the example of Russian production enterprises. As the subject of the study, we will take the ERP-system 1C ERP Enterprise Management as the most popular *(Agafonova, Nikolaeva and Stakanova, 2018)*, *(What Is ERP? Guide to Enterprise Resource Planning Software, 2020), (Postnikov and Chekulina, 2020)*. This system has been implemented for more than 1 million jobs, automated transport enterprises of Zheldorremmash JSC, St. Petersburg State Unitary Enterprise Passazhiavtotrans, the largest agricultural holding Russian Grain, production enterprises of AvtoVAZ OJSC, Faberlik OJSC, the largest meat processing plant in the Russian Federation, Remit, concern NPO "Aurora", the leading enterprise of the military-industrial complex of the defence industry complex JSC NPP "Salyut", Siemens Gas Turbine Technologies LLC, PJSC Gazprom Automation, production and sale of Gulliver children's clothing and others. 1C ERP Enterprise management is versatile, focused on small, medium and large enterprises.

We will conduct an assessment of the economic and process effect on the example of "UralSpetsTrans" LLC, which is engaged in the production of special-purpose transport.

The management of the enterprise is faced by the purpose - creation of the new automated control system for purchases and stocks and also the organization of the effective activity of department of supply of LLC "UralSpetsTrans" directed to formation of stocks in economically reasonable and expedient sizes.

Implementation of this system will allow to effectively solving the following tasks:

- Identify stock items that are scarce;
- Automatically identify resource items for which excess stocks have been generated and adjust the procurement plan;
- Assess the availability and structure of stockpiles;
- Calculate the need for financial resources to ensure the necessary supply of inventory in the planning period, etc.

The system calculates the required amount of funds to be invested in inventory creation by determining the requirement quantity of the individual stock types.
In the process of determining requirements, stocks can be divided into two groups:
- Production stocks;
- Finished goods stocks.

Reducing the cost of maintaining the plant's inventory is a solution to the optimization problem during their rationing. For production stocks, this task is to calculate the optimal lot size for the purchased materials.

Determining the value of the optimal size of the batch of purchased materials, at which the cost of servicing stocks will be minimal, is carried out using the known Wilson formula, as well as its modifications.

By determining the optimal values of the materials to be ordered, it will be possible to determine which items are ordered with excess or deficit, which will optimize the purchasing system and reduce warehouse costs.

Basis the purpose, the proposed to implement automated control system for purchases and stocks, is increase in efficiency of process of management of purchases in LLC "UralSpetsTrans", ensuring control of expenditure of stocks, profit mark-up of the enterprise due to cost reduction.

Based on modern examples of ERP systems implementation in industrial enterprises *(Basok and Dublin, 2011)*, it should be noted that the modern system of procurement and inventory management proposed for implementation in this enterprise can achieve the following positive results:
Optimize the batches of purchased inventory. The procurement of the required resources for the production of products according to the optimal size of the batch, allows reducing the total costs of storing stocks and fulfilling orders by an amount of 5-10%.

Rational use of stocks by having reliable information on the exact value of stocks.

Increase of liquidity and increase of turnover of reserves by 2-3% due to possibility of reduction of excess value of reserves and maintenance of their optimal value in warehouses.

Ensure optimal inventory acquisition costs by automatically comparing order execution costs at different amounts of purchased resources and determining the best option, which can contribute to saving the cost of fulfilling orders by the amount of 5-7%.

Identify scarce parts of individual stock types and select parts for which excess stocks have been generated and automatically adjust purchase orders.

Expedite the procurement process by not having to manually track inventory balances and adjust the procurement plan.

By solving these problems, it is possible to prevent production from stopping due to lack of resources and maintain the optimal amount of inventory. All these activities, with the proper implementation of an automated procurement and inventory management system, together can reduce the enterprise's variable costs by at least 5-8% by achieving the optimal value of the total inventory storage costs and fulfilment of orders.

The solution of a task of introduction of the automated control system for purchases and stocks in LLC "UralSpetsTrans" will not demand acquisition of expensive technical means, everything will function on already available equipment.

Introduction of the automated information system 1C ERP Business management on LLC "UralSpetsTrans" considerably will accelerate process of purchases, will allow to control in real time precisely warehouse stocks, avoiding their excess accumulation, will simplify process of calculation of necessary amount of the materials demanded to purchase.

You can evaluate the effectiveness of implementing an automated procurement and inventory management system 1C ERP using the economic and process component.

Table 3 shows the initial data for calculation of cost-effectiveness of the automated procurement and inventory management system 1C ERP, hereinafter referred to as NPP.

Table 3: Input Data for Calculation of Cost Effectiveness of the Automated Procurement and Inventory Management System 1C ERP

Indicator name	Unit of Measure	Key Figure Value	
		In Base Case	In New Case
Capital investments for NPP implementation	Ruble	–	430 000
Number of specialists engaged in NPP implementation	Human	–	2
Duration of NPP development	Month	–	1
Machine time consumption during NPP development	Hour	–	80
Average monthly salary of one specialist	Ruble	30 000	30 000
Average labour consumption of IVS debugging	Human – hour	1,0	0,2
The price of one hour of work at the user's organization	Ruble	170	190
Average machine time spent debugging programs per 100 commands	Hour/100	0,09	0,06
Average user consumption per 100 commands	Ruble	15,4	7,5
Investment Efficiency Ratio	Item	0,5	0,5
IVS Equipment Picking Costs	Ruble	–	140 000
Average number of typical tasks solved per year	Aim	320	320
Scope of work for one task	100 commands	–	16,5

(Source: compiled by the authors according to the site)

For the management of the LLC "UralSpetsTrans" enterprise of a key factor of making decision on introduction of system 1C ERP, the size of the net profit which remained after realization of a system is.

The effect of the implementation of the 1C ERP system in practice will be manifested not only in optimizing the salary costs of employees of the supply department and saving materials when using the system, but also in reducing the value of logistics costs that directly affect the variable costs and cost of production.

Realization of this action for optimization of purchasing logistics of LLC "UralSpetsTrans" due to reduction of logistic expenses (costs of purchase of products, transport expenses, costs of storage of stocks) is capable to improve an indicator of net profit for 3%.

The introduction of the automated ERP system on the basis of the enterprise of LLC "UralSpetsTrans" is economically justified, a more detailed calculation of the economic effect is presented in Table 4.

Table 4: Calculation of the Economic Impact of the Implementation of the Automated Procurement and Inventory Management System 1C ERP

Indicator	Value in 2019, thousand rubles
Total costs	705,2
Including:	
Capital investments for NPP implementation	430
Capital investment in software development	135,2
IVS Equipment Picking Costs	140
Net profit through implementation of 1C ERP	93 109,81
Net profit gains through cost savings	3 682,81
Total annual current cost savings	826
Overall economic impact of ERP 1C system implementation	3 803,71
Capital Investment Efficiency Ratio	1,17

(Source: compiled by the authors)

All the costs of implementing an automated procurement and inventory management system 1C ERP, are paid off by saving the current costs of the enterprise, during the first year of use of the system.

Table 5 shows the quantitative measures of the effect of the implementation of the automated 1C ERP system.

Table 5: Calculation of Project Revenue

Income item	Value
Working capital savings, thousand rubles	992,9
Economic effect due to income growth, thousand rubles.	3 803,71
Total effect of the implementation of ACS for the first year of operation, thousand rubles.	4 796,61
ROI,%	17 %
Payback period, months	10,5

(Source: compiled by the authors)

Comparison of expenses of the LLC "UralSpetsTrans" enterprise before introduction of the automated system 1C ERP is presented in Table 6.

Table 6: Comparison of expenses of the LLC "UralSpetsTrans" enterprise before introduction of system 1C ERP

Indicators	Values before changes	Values after changes	Absolute change	Relative change,%
Variable costs, thousand rubles	2 442 866	2 431 029	11 837	- 1
Costs for the purchase of materials, thousand rubles	1 294 719	1 282 882	11 837	- 1
Fixed costs, thousand rubles	997 790	997 035	755	- 0,08
Salary of staff, thousand rubles	89 158	88 403	755	- 0,85
Inventory value, thousand rubles	925270	897 512	27 758	- 3
Total costs, thousand rubles	3 440 656	3 362 218	78 438	- 2,28
Net profit, thousand rubles	89 427	93 110	-3 683	4,12
Net profit margin, %	2,59	2,7	0	4,25
Total value of assets, thousand rubles	1 099 498	1 071 740	27 758	- 2,52
Turnover of assets, thousand rubles	4,06	4,12	0,06	1,48
Return on assets, %	8,13	8,34	- 0,21	2,58
Financial leverage, %	41,68	41,47	0,21	- 0,50
Profitability of the enterprise, %	2,59	2,7	0,11	4,25

(Source: compiled by the authors)

The main parameters to change as a result of the implementation of the ERP 1C system in Table 6 are variable and fixed costs and inventory, which affects the change in the value of the current and total assets of the enterprise in question.

Changing these parameters affects the value of net profit and turnover of assets, which in turn changes the profitability of assets and the profitability of the enterprise.

Conclusions

The review of the ERP market demonstrates its high growth rates, the presence of both domestic and foreign solutions in the market. The best option for the introduction of ERP-systems into the activities of Russian enterprises is 1C Enterprise management; however, the choice of an ERP-system is carried out on the basis of a multi-criterion approach, depending on the goals and objectives of the implementation.
The implementation of ERP systems has both advantages and disadvantages, but most experts believe that the potential benefits far outweigh the disadvantages. Among the benefits of implementation are economic and process effects.

The assessment of the economic and process effect was carried out on the example of LLC "UralSpetsTrans" engaged in the production of special-purpose transport.

As a result of the implementation of the 1C ERP system, a decrease in costs, an increase in net profit, and an increase in the profitability of the enterprise were recorded.

Realization of the automated control system for purchases and stocks 1C ERP will allow to simplify and accelerate significantly process of purchases at the LLC "UralSpetsTrans" enterprise, to reduce labour input of procurement process and inventory management.

ROI amounted to 17%; the project pays off during the year, which indicates the effectiveness of this solution.

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Assessment of The Housing Market Development Level as A Condition for Ensuring Economic Security of Households

Egor GOLOVANOV
Associate Professor, Department of Economic Security, South Ural State University (National Research University), golovanoveb@susu.ru

Olga RYAZANTSEVA
Associate Professor, Department of Economic Security, South Ural State University (National Research University), riazantcevaov@susu.ru

Anna CHEREPANOVA
Senior Lecturer, Department of Economic Security, South Ural State University (National Research University), cherepanovaae@susu.ru

Marina BAZHANOVA
Associate Professor, Department of Economic Security, South Ural State University (National Research University), bazhanovami@susu.ru

Abstract

The article proves the necessity of carrying out an estimation of housing market development level as important condition for maintenance of economic safety of households. The authors have defined the essence of the state of economic security of households in modern living conditions. The article highlights the most important spheres of vital activity of households and describes in more details risks and threats that directly or indirectly influence a condition of their economic security. It is emphasized that the housing sphere is one of the most important areas, as on the one hand it is the habitat of households, and on the other hand it has a direct impact on the state of their economic security. A group of quantitative and qualitative indicators has been proposed, which, according to the authors, will allow for more clear assessment of the housing market development level for the purpose of ensuring the economic security of households regardless of the territory of residence. The proposed methodology is based on the calculation of integral indicator on the basis of a set of indicators, grouped into four areas: housing, housing services, government support to households in the housing market, the assessment of household welfare. It is shown that the calculation of the integral indicator for assessing the housing market development level will rank regions based on the development of this market as a condition of economic security of households in each region.
The developed method was tested on the example of territorial and administrative units within the Urals Federal District of Russia. The results of the study are of practical importance, as they provide an opportunity to rank the regions both in terms of their constituent areas and in terms of the complex integrated housing market development indicator. This will allow state and regional authorities to formulate more clearly the tasks of improving the current housing policy, which will undoubtedly allow households to increase their economic security by minimizing the relevant risks and threats to their life activities.

Keywords: Households, Economic Security of Households, Threats and Risks to The Economic Security of Households, Housing Market, Housing Services, Integral Assessment, Method of Analysis of Hierarchies, The Housing Market Development Level.

Introduction

Households, at the present stage, are important economic entities. Both the welfare of a single economic unit and the entire population of the country depend on the results of their activity. This is due to the fact that the behaviour of households significantly affects the labour, goods and services, financial, housing and other markets.

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In view of the great importance of the economic subject under study, there are acute issues of ensuring its economic security. Today foreign and Russian authors analyse and evaluate economic security of households from the point of view of various spheres of their functioning *(Osberg and Sharpe, 2014), (Hacker et al., 2013), (Berloffa and Modena, 2013)*. Thus the economic security of households should be considered from the point of view of having stable, well-paid work *(Beeferman, 2002), (Torgai, 2010)*, financial and non-financial assets, as well as other resources sufficient both for making large purchases and for the possibility of surviving occasional crises and subsequently ensuring high quality of life *(Golovanov, Mikhalina and Ryazantseva, 2018)*. However, by now, in addition to the approach based on the definition of the economic security of households, there is another approach that defines the economic vulnerability of a given economic subject. The authors attribute the state of economic insecurity of households to instability on the labour market, housing market, the market of medical services, pensions, underdevelopment of the insurance market *(Hacker, 2011), (Dominitz and Manski, 1997)*. Let us agree with L. Osberg, E. Sharpe (*Osberg and Sharpe, 2014)*, that economic insecurity is a state of anxiety because of the impossibility to get protection from subjectively significant potential economic losses.

Methodology for assessing the level of housing market development

The life of a household is multifaceted and directed to different spheres of society. In an enlarged form, the most important spheres of life in which households operate are social, economic, political and spiritual. In each of these areas, households face many risks and threats that directly or indirectly affect their economic security (Table 1).

Table 1: Description of main threats to household's economic security by area of activity

Areas of household activity		External threats to household's economic security	Domestic threats to household's economic security
Economic	Production area	High unemployment	Loss of basic income (loosing job)
		Low real wages	
		Growing differentiation of the population by income	
	Consumer sector	Inflation	
		Rising prices for consumer goods, durable goods and services	
	Financial sphere	Deteriorating conditions for lending to the population, including mortgage loans	Poor financial literacy of household members, including those resulting in incorrect and irrational budget allocation
			High credit dependency
			Absence of insurance reserve (savings) that would allow stabilizing unstable financial condition of a household
	Scope of legal regulation	High level of criminalization and corruption in the economic sphere	
		Preservation of a significant share of the shadow economy	
	Housing sector	Rising housing prices	Lack of own place to live.
		Growth in property maintenance costs (housing and public utilities)	Poor housing conditions and lack of opportunity to improve them
Social	Field of Education	Commercialization of education, science	Inadequate education and professional competence of household members, resulting in inability to find a decent, well-paid job
		Reducing quality and availability of education	
	Health sector	Commercialization of the health sector	Health problems of one or more household members resulting in reduced
		Reducing the quality and availability of	

Areas of household activity		External threats to household's economic security	Domestic threats to household's economic security
		health care	working capacity
	Social security sphere	Decrease in the amount of pensions granted	Placement in the care of the household of its non-working (disabled, elderly) as well as incapacitated members
		Decrease in social benefits	
	The sphere of human capital reproduction	Decrease in living standards and life expectancy	Addiction of various kinds (alcoholism, drug addiction, gambling, etc.) of one or more household members
	Ecological sphere	Deterioration of the environmental situation in the place of residence, requiring a change of residence or investment in environmental improvements	
Political		Exacerbation of the military and political situation at the place of permanent residence, including terrorist and extremist activities, political tensions in the country	
Spiritual		Rising prices for visits to places of cultural rest and, as a result, a decrease in cognitive activity, spiritual qualities and values	Inter-personal conflicts within the household caused by a clash of opposing interests, views and aspirations, resulting in economic losses to the household and, in some cases, its collapse.

(Source: compiled by the authors)

At the same time, we believe that one of the most important things in the modern world is housing, as the habitat of households. Housing is important for a person, housing needs and forms of their satisfaction are constantly changing and improving, the requirements for housing are increasing. Problems of research of the housing market are devoted to the work of such authors as K.E. Case, J.M. Quigley, R. J. Shiller, J. Wu, E. Ferrari, R. Arundel, B. Lund, J.A. Módenes, S. Kang *(Case, Quigley and Shiller, 2005), (Ferrari, 2014)*. But so far the question of assessing the housing market development level from the standpoint of economic security of households is still not sufficiently studied. In this connection, an attempt has been made to develop a toolkit for assessing this level and to test it on the example of Russian regions that are part of the Urals Federal District.

The degree of housing market development has a direct impact on the economic security of households. Thus, an increase in housing prices, an increase in the share of damaged and dilapidated housing in the total volume of the housing stock, and a decrease in the quality of housing conditions all have a negative impact, while an increase in the volume of construction, quality of housing, housing services, and improvement, on the contrary, has a positive impact on the level of households' economic security. The housing sector is extensive and has close links with many other areas, which makes it important to study its dynamics in order to identify negative trends and patterns and to be able to forecast threats and risks in the future, both within regional markets and at the federal level.

At present, addressing the problems of economic security of households, both at the national and regional levels, involves effective and sustainable development of the housing market. The housing stock is part of the national wealth, and the housing conditions of the population are part of the welfare of households. Thus, the housing security of households is one of the important factors forming their economic security.

Today the authors of numerous scientific works are engaged in research of the role of housing in the life of certain categories of households. For example, according to the report on children's health *(Breysse et al., 2004)*, it is clear that housing conditions have a direct impact on the formation and development of personality. Since about 80 per cent of children spend time indoors, it is the quality of the latter that has an impact on their health. In addition, housing conditions in which household members live, especially at an early age, also contribute to the formation and socialisation of a healthy personality. However, limited space for living has a significant impact on constructive social interaction within the household.

Household income and expenditures are also significantly affected by the ownership status of housing. Thus, households may receive additional income when renting housing. By increasing their welfare, however, if there is no housing owned by a household, it will lead to forced increase in expenses by the amount of rent.
As the second most important thing after family health, living conditions are also very important for feeling satisfied with life. However, according to the survey data, 44% of the surveyed Russians do not have any opportunity to improve their housing conditions in the next 5 years. And only 23% of respondents when answering the Russian Public Opinion Research Centre (VTsIOM) question "Are you going to improve your housing conditions (buy a place to live) in the next 5 years?" answered positively (Fig. 1) *(Database of results of surveys of Russians, 2020)*.

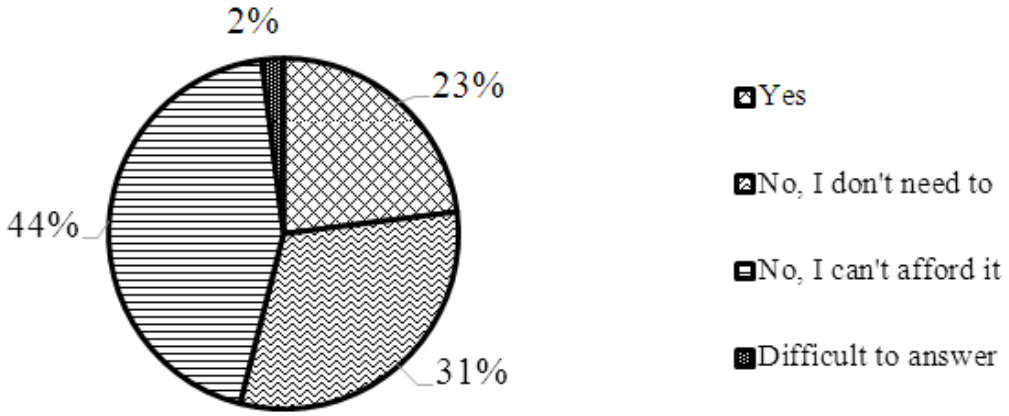

Fig. 1: Results of the survey of Russians about their intention to improve their housing conditions
(Source: Golovanov and Shaidurov, 2016)

The residential market is one of the most significant and organized segments of the real estate market, along with commercial, industrial, free land plots and special purpose real estate markets. It is the segment that characterizes the housing market that is most significant in the structure of the real estate market, since it is the segment that provides households with the opportunity to meet their needs in housing, social status and other related housing benefits and services.

The housing market is the economic relations which are formed between the subjects concerning the housing objects at their purchase and sale, transfer for rent, rent, pledge and other relations arising in the housing sphere *(Selyakhina, 2011)*. This is a complex social and economic system and interrelated structure containing a complex of mechanisms for redistribution of objects of existing and newly created housing stock and created housing services subject to influence of internal and external environment factors and based on achievement of many interests of all its participants in conditions of imperfect competition *(Golovanov and Shaidurov, 2016)*.

In accordance with the housing policy being implemented in Russia, each household and its family members, based on their needs and opportunities, have an equal right to freely acquire ownership of comfortable housing. This testifies to the fact that the State, represented by federal and local authorities, is building a legal and economic mechanism aimed at forming a developed and organized housing market.

The housing sector is a special sector of the economy in which the process of creation, operation, maintenance and replacement of retired housing stock is carried out. In general, the housing market includes the market for housing construction (design, construction, modernization, reconstruction, repair and liquidation) and the market for housing services. The latter are aimed at stable functioning of the housing stock. Figure 2 shows in aggregated form the main stages of development of processes on the housing market.

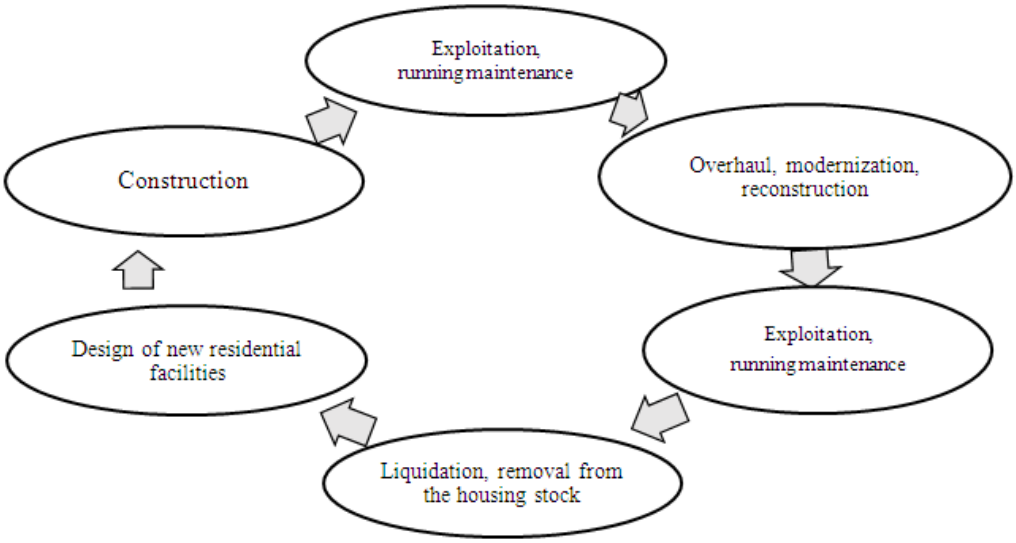

Fig. 2: Stages of development of the processes occurring in the housing market
(Source: Golovanov and Shaidurov, 2016)

When considering the issues of economic security of households in terms of their environment it is clearly depends on the development of the housing market and its accompanying spheres: the sphere of housing services, the sphere of state support for households, and the socio-economic sphere. While the volume of housing construction is increasing, along with the quality of housing and its improvement - there is an increase in the level of economic security of households, with a decrease in housing prices and provision of favourable conditions for granting housing, in particular, mortgage loans - there is also an increase in the volume of housing construction. In addition, provision of benefits and state support to families in need of housing, an increase in household incomes and many other factors can directly affect the economic security of households.

In order to assess the housing market development level from the point of view of economic security of households, an appropriate methodology was developed, which allows qualitatively and quantitatively reflect the situation on the housing market of different regions. The basis of the methodology will be the calculation of an integral indicator based on a set of indicators in the analysis of the following areas:

- Housing, which is a special sector of the economy associated with the creation, operation and replacement of housing stock. This sector is particularly important in the process of ensuring the economic security of households, due to the paramount importance of housing for everyone at all ages. In the process of household functioning, housing needs are constantly changing and improving, which can have a direct impact on its economic security, both upward and downward;
- housing services related to the maintenance of the proper technical and sanitary condition of housing and all infrastructure supporting it, including the removal of solid municipal waste, electrification, heating, water supply and drainage, gasification, landscaping, street lighting, arrangement of public space, etc.;
- sphere of state support to households in the housing market, in which the state creates a legal space for the effective development of the housing market, provides support to households in need and ensures social stability in society as a whole;
- area of assessment of household well-being, which characterizes the structure of human needs and the ability to meet them in a qualitative way. It is the indicators of this sphere that allow characterizing the measure of satisfaction of basic life needs of households.

Next, let's present the set of selected indicators, classifying them into four areas. Besides, the presented indicators have a difference in influence level (max or min). The growth of some indicators contributes to the growth of the housing market as a condition of economic security of households, while the growth of others hinders its development. In selecting the composition of indicators, emphasis was placed on those that can be obtained from open sources of information and officially published statistics. Let us summarize the selected list of indicators in Table 2.

Table 2: The system of indicators for assessing the housing market development level from the position of household's economic security

Index	Symbol	Calculation	Level of influence
Housing sector			
Residential Building Input Index	$I_{1.1}$	Ratio of residential buildings put into operation to total housing stock	max
Apartment Input Index per resident of the region	$I_{1.2}$	Ratio of apartments put into operation to the total population of the region	max
New residential building index per inhabitant	$I_{1.3}$	Ratio of residential buildings put into operation to the total population of the region	max
Price index on the primary housing market	$I_{1.4}$	Ratio of average cost of 1 sq. m. on the primary market in the current period to average cost of 1 sq. m. in the previous period	min
Average housing market price index	$I_{1.5}$	Ratio of average cost of 1 sq. m. at the secondary market in the current period to average cost of 1 sq. m. in the previous period	min
Index of existing state construction organizations	$I_{1.6}$	Ratio of number of operating state construction organizations to number of construction organizations of all forms of ownership	max
Index of private construction companies in operation	$I_{1.7}$	The ratio of the number of operating private construction organizations to the number of construction organizations of all forms of ownership	max
Mortgage Index	$I_{1.8}$	Ratio of the volume of housing mortgage loans extended to individuals to the total volume of issued housing loans	min
Housing Security Index	$I_{1.9}$	Ratio of total housing stock to total population of the region	max
Housing services sector			
Index of emergency housing in total housing stock	$I_{2.1}$	The share of emergency housing in the total housing stock	min
Index of dilapidated housing in total housing stock	$I_{2.2}$	Ratio of the area of dilapidated housing stock to total housing stock	min
Housing Improvement Index	$I_{2.3}$	Ratio of the area of well-appointed housing stock to the total area of the housing stock	max
Index of household expenses on payment for housing and utility services in total expenses	$I_{2.4}$	Ratio of monthly household expenses for housing and communal services to average monthly consumer expenses	min
Housing Overhaul Index	$I_{2.5}$	Ratio of the housing stock area with renewal performed to the total housing stock area	max
The sphere of state support for households in the housing market			
Index of families registered as being in need of housing	$I_{3.1}$	Proportion of families registered as being in need of housing in the total population	min
Index of families that have received housing and improved their living conditions	$I_{3.2}$	Ratio of number of families that received housing and improved living conditions to the total population	max
Unemployment rate	$I_{3.3}$	Ratio of the number of people recognized as unemployed and registered at the labour exchange to the sum of those employed and recognized as unemployed	min
Share of expenditures on housing in total expenditures of the consolidated budget	$I_{3.4}$	Ratio of budget expenditures under "housing" to all budget expenditures	max

Index	Symbol	Calculation	Level of influence
of the region			
Percentage of citizens who enjoy social support (benefits) in paying for housing and utilities services	$I_{3.5}$	Ratio of the number of citizens who enjoy social support (benefits) in payment for housing and utilities to the total population	min
Proportion of the consolidated budget aimed at providing citizens with social support to pay for housing and communal services	$I_{3.6}$	Ratio of consolidated budget expenditures aimed at providing citizens with social support in payment for housing and utilities to all budget expenditures	max
Index of population with incomes below the subsistence minimum	$I_{4.1}$	Proportion of population with incomes below the minimum subsistence level in the total population	min
Growth rate of average per capita income of the population	$I_{4.2}$	Ratio of average per capita income of current year to previous year	max
Nominal wage growth rate	$I_{4.3}$	Ratio of nominal salary of current year to previous year	max
Natural Gain Ratio	$I_{4.4}$	Ratio of births to deaths	max
Growth rate of pensions	$I_{4.5}$	Ratio of current year's pension to previous year's pension	max
Ratio of average per capita income to minimum subsistence level	$I_{4.6}$	Ratio of average per capita income of population in the region to monthly minimum subsistence level	max
Housing Availability Index Primary	$I_{4.7}$	Ratio of the cost of a standard apartment on the primary market to the annual income of the average family	max
Housing Availability Index secondary	$I_{4.8}$	Ratio of the value of a standard apartment on the secondary market to the annual income of the average family	Max
Mortgage debt growth rate per capita	$I_{4.9}$	Mortgage loans debt ratio per capita of the current year to the previous period	min
Mortgage debt index in the total amount of individuals' debt by region	$I_{4.10}$	Mortgage loans debt ratio per capita to total individual debt in the region	min
Index of correspondence of personal income to the inflation rate	$I_{4.11}$	Ratio of nominal wage growth/decrease index to consumer price index for the period under review	max
Dynamics of the working-age population	$I_{4.12}$	Ratio of number of able-bodied population of current year to previous period	max
Consumer Price Index	$I_{4.13}$	Indicator of changes in the value of the "fixed basket" of goods and services included in the "standard basket" of the general population.	min

(Source: compiled by the authors using databases of The Russian Federal State Statistics Service (Golovanov and Shaidurov, 2016), (Saati, 1993)

In order to obtain a comprehensive assessment of the housing market development level it is necessary to calculate an integral indicator. This indicator, all else being equal, will be the main criterion for comparing housing markets by region. Since these indicators have different units, therefore, they should be brought to a comparable form, i.e. scaled in the range from 0 to 1. At the same time, the following variant of indicators transformation should be considered:

1) in the presence of an increasing dependence between the analysed indicator I and the integral indicator, the value of the corresponding normalized indicator (In) is determined by formula 1.
2)

$$I_n = \frac{I_i - I_{min}}{I_{max} - I_{min}}, \quad (1)$$

where Ii is the actual value of the analysed indicator;
Imin - minimum value of the indicator;
Imax - maximum value of the indicator;

2) if there is a decreasing dependence between the analysed indicator I and the integral indicator, the value of the normalized indicator will be determined by the formula 2.

$$I_n = 1 - \frac{I_i - I_{min}}{I_{max} - I_{min}}, \quad (2)$$

To find the minimum and maximum values of the selected statistical indicators it is necessary to refer to the three sigma rule, on the basis of which the formulas for calculation will look like this, formulas 3 - 4:

$$I_{min} = I_{i\,av} - 3 \times \sigma, \quad (3)$$

where $I_{i_{av}}$ - the average value of the selected index for the period under study;
□ - the standard deviation of the selected index.

$$I_{max} = I_{i\,av} + 3 \times \sigma, \quad (4)$$

Calculation of the standard deviation is made according to formula 5.

$$\sigma = \sqrt{\frac{\sum (I_i - I_{i\,av})^2}{n}}, \quad (5)$$

where n is the number of years in the study period.
The next step after the normalization of individual indices is the calculation of the generalizing index for each of the areas under study using the formula 6.

$$I_{sp.\,j} = \frac{\sum I_n}{m}, \quad (6)$$

where Isp. j is the generalized index of the j sphere;
m - number of normalized indexes included in the generalized index.
The obtained values of generalizing indicators for each of the four areas are the basis for calculating the resulting complex integrated indicator of assessment of the housing market development level as a condition of economic security of households, formula 7.

$$I_{int} = \sum (I_{sp.\,j} \times k_j), \quad (7)$$

where Iint is a comprehensive integrated indicator for assessing the housing market development level from the perspective of economic security of households;
k_j is the weight of the j sphere, reflecting its importance in the integral indicator.

To determine the weight of each of the analysed spheres in the integral indicator, we suggest using the method developed by the American mathematician T.L. Saati, namely, the method of hierarchy analysis (MHA). The method is based on the evaluation of the influence of lower levels in the hierarchy on the vertex factor (weight of spheres in the integral index). Thus, the upper level is the level of development of the housing market, the intermediate level is the approval criteria, and the lower level is the results obtained on the basis of calculations of generalizing indices by spheres.

The approval criteria include the following:

- criterion A - the ability to comprehensively and adequately reflect the presence of threats and risks in the field;
- criterion B - the ability of the sphere to adapt to changing conditions under the influence of external and internal factors;
- criterion B - efficiency of data collection for the formation of indicators of the sphere;
- criterion D - the breadth of the data set on which the study is based.

The results of determining the final weights of the spheres in the integral indicator of the housing market development level used in the assessment of the Urals Federal District regions are presented in Table 3.

Table 3: Totals weight of criteria

Totals weight of criteria					
Criteria	A	B	C	D	Total weight of the sphere
Weight of criteria	0.26	0.58	0.06	0.10	–
State of household wealth	0.50	0.20	0.07	0.49	0.30
Housing sector	0.31	0.63	0.15	0.34	0.49
Housing services sector	0.11	0.11	0.46	0.06	0.12
The sphere of state support of households in the housing market	0.08	0.07	0.32	0.11	0.09
Amount					1.00

(Source: compiled by the authors using materials of Saati, 1993)

Results

The evaluation will be conducted over a ten-year period (2009-2018) using the example of the Kurgan, Sverdlovsk, Tyumen, and Chelyabinsk Regions that are part of the Urals Federal District.

The results of calculation of the integral index of the housing market development level as a condition for ensuring the economic security of households on the basis of the generalizing indexes for each sphere and the weights of these spheres, obtained on the basis of the MHA method are presented in Table 4.

Table 4: Generalizing complex integral indicator of the housing market development level

Subject.	Period									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Kurgan region	0.504	0.462	0.433	0.514	0.513	0.559	0.511	0.489	0.499	0.470
Sverdlovsk region	0.442	0.493	0.477	0.492	0.517	0.510	0.532	0.502	0.530	0.499
Tyumen region	0.482	0.484	0.484	0.529	0.520	0.508	0.544	0.506	0.510	0.447
Chelyabinsk region	0.503	0.444	0.461	0.531	0.522	0.533	0.508	0.452	0.456	0.454

(Source: compiled by the authors)

In the Urals Federal District as a whole, the most unfavourable situation was observed in 2011; the average value of the generalized integrated indicator was 0.464, which is 2% lower than in the previous year and 11% lower than the next year. In contrast, in 2014, the Federal District recorded its highest average integrated indicator value of 0.527, with a growth rate of 102% compared to the previous year.

The values of the generalized complex integral indicator of the housing market development level as a condition for ensuring the economic security of households in the regions of the Urals Federal District obtained from the calculations are summarized in Fig. 3.

Fig. 3: Generalized integrated indicator of the housing market development level as a condition for ensuring economic security of households in the regions of the Urals Federal District

(Source: compiled by the authors)

Over the whole period of the research the level of the housing market development from the point of view of economic security of households in the regions that are part of the Urals Federal District corresponds to the average level. This may indicate that the on-going regional measures aimed at the development of the housing market do not provide sufficient efficiency for its functioning. The Sverdlovsk Region has the best position among the regions of

the Urals Federal District in terms of the housing market development level as a condition for the economic security of households. First of all, this region is the only one that has positive dynamics on the whole over the period under analysis; its growth rate is 113%. Secondly, the Sverdlovsk Region had the best performance among all regions in the three years of the period under review - in 2010, 2017 and 2018.

Conclusions

In order to improve the economic security of households, scientifically sound theoretical and practical provisions have been developed, including the following:

- A new method for assessing the housing market development level as a household habitat and a condition for its economic security has been developed.
- The developed integral assessment indicator allows a comprehensive assessment of the state of development of housing markets in the regions and identification of the weakest aspects in their management by the state authorities.
- The results of a comprehensive assessment of the level of development of housing markets in the constituent entities of the Russian Federation are the basis for the rating of regions with the most favourable housing potential, which directly affects the level of economic security of households, as well as the growth of the quality of life of the population as a whole.
- The use of the results of a comprehensive assessment of the housing markets in the regions will allow the government authorities to develop measures of point impact on the redistribution of financial resources allocated for the implementation of Russia's housing policy.

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Marketing Research of Eco-Friendly Popularity Factors

Nikolai BELYAEV
Associate Professor, Department of Management, South Ural State University (National Research University),
beliaevna@susu.ru

Elena TROFIMENKO
Associate Professor, Department of Management, South Ural State University (National Research University),
trofimenkoei@susu.ru

Denis STUKALOV
Associate Professor, Department of Management, South Ural State University (National Research University),
stukalovdv@susu.ru

Ilya TSALO
Associate Professor, Department of Economic security, South Ural State University (National Research University),
tcaloim@susu.ru

Abstract

As the ecological problems are getting worse, the consumers' thoughts about the environmental protection have led to the diversification in consumer buying approach towards a green lifestyle. Therefore, companies are taking action to develop potential ecological approaches in the green market industry. Green marketing is an evolving concept of marketing that includes issues like eco-friendly products, packaging, labelling, etc. The article focuses on factors that influence consumption of eco-friendly products. Research examines how knowledge about green products of consumers effects the consumption of them. The article analyses thoughts and attitudes of Russian consumers about different characteristics of eco-friendly products, packaging and other.

Results of the survey might be used by different organizations: government structures, retailers, producers, marketing agencies and others. Using green marketing concept can help to increase products sales, attractiveness, company's income and image. For long-term and significant changes in behaviour, it is necessary to develop environmental values through education and support of green markets in the state.

Keywords: eco-friendly products, environmental marketing, green marketing, customers' behaviour.

Introduction

Green marketing is how the business satisfies their customer needs and wants without giving harm to the environment due to scarcity of resources *(Sulaiman, Jamil, Othman and Musa, 2020).*

The first definition referring to green marketing dates back to 1976, when Hennion and Kinnear emphasized that environmental marketing is associated with all marketing activities that have helped to cause environmental problems and that can serve as a means of solving environmental problems. The largest number of studies on this topic was written studies during the 1990s with a decrease since 2001. In terms of content, most of the studies are devoted to five topics: namely green communication, green consumers, recycling behaviours, macromarketing, concepts and strategies (*Dangelico and Vocalelli, 2017).*

An issue of eco-friendly marketing is close to problems of ecology, manufacturing, eco-efficiency, etc. Demand for "green" products and services helps to save the environment and satisfy the customers' needs.

Global financial crises, world economic problems that arose post-Brexit, leading to changes corporate social responsibility and managers recognize the need to operationalize green marketing throughout the organization in

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ensuring sustainable development in the work of employees, products and services *(Papadas, Avlonitis and Carrigan, 2017).*
At the same time, the experience of implementing green marketing in China shows that initiatives from government establish a favourable social environment for the implementation and development of green marketing efforts *(Zhu and Sarkis, 2016).*

Nowadays, more and more modern companies are ready to accept environmental responsibility.

Last century's accelerated demographic, technological and industrial development intensified the magnitude of human activity's effects in the environment. Green marketing allows building a bridge between what the customers want and the environmental-friendly firms. Hence, firms with green marketing try to look for specific customer needs, environmental aware customer profiles and ways of incorporating these insights into its offerings *(Simão and Lisboa, 2017).*

Green marketing is related to the industrial ecology and environmental sustainability issues such as extended producer responsibility, life cycle analyses, material usage, source flow and eco-efficiency. Business entities can make themselves green through three ways: value addition process, management systems and their products *(Kirgiz, 2016).*

The focus on green marketing among consumers and businesses has been matched by renewed academic research. There is increased academic investigation in this domain, as researchers seek answers to a number of green marketing-related issues, including identifying factors that influence consumers to behave in environmentally-responsible ways *(Bailey, Mishra and Tiamiyu, 2016).*

Literature Review

Significant changes in business environment that impact not only the activity of companies but the shift of the basic values and attitudes of the society have been observed recently. The changes within the activity of companies are expressed through the increase of competition within the dynamic market and the change of needs and expectations held by consumers and other stakeholders. It has been noticed that consumers more often prefer eco-friendly, safe and "clean" products which do not pollute the environment *(Banyte, Brazioniene and Gadeikiene, 2010).*

The topic of green marketing is up-to-date in the world scientific community. In terms of the number of studies according to the Scopus database the huge contribution was made by such authors as Polonsky M.J., Chen Y.S., Zhu Q. Sarkis J., Font X., Chang C.H., D'Souza C., Han H., Jabbour C.J.C., Peattie K., Suk, N.M.

J.M. Polonsky thinks that green marketing is not achieving its potential for improving the quality of life of consumers while improving the natural ecosystem. The failure is the result of the inability of consumers, firms and governments to adopt system-thinking, in which macro-marketing perspectives are integrated into respective micro-decisions. The previous ones are the anthropocentric views of the natural world *(Polonsky, 2011).*

Korean authors found that the factor of social responsibility plays an important role as a mediator in the effect of green marketing on a product or corporate reputation. Three factors of corporate image, product image and corporate reputation have a direct effect on purchase intentions, whereas social responsibility has an indirect effect on purchase intentions in the retail setting *(Ko, Hwang and Kim, 2013).*

By its nature, green marketing seeks to address the lack of fit between current marketing practices, and the ecological and social realities of the wider marketing environment *(Papadas, Avlonitis and Carrigan, 2017).*

Green marketing might be described as a process of marketing consumption, production and consumption of products and services occurred in a way that is safe for the environment. Changing focus on green marketing might seems costly in the short term, but has advantages in the long term.

Initiatives from government establish a favourable social environment for the implementation and development of green marketing efforts.

Lack of general agreement by marketers, consumers, activists, regulators and influencers has decelerated the enlargement of green products. Despite these problems, green marketing has carried on to earn followers, especially in the situation of increasing global worry about climate change. This worry has forced more companies to promote their dedication to mitigate their climate impacts.

Methods

In this section, the authors briefly explain the research methods used in collecting data in this research. The authors used the interview method to collect data by filling out a questionnaire on a sufficiently large sample of the market. As a part of the study Chelyabinsk, Russia was chosen as the survey territory.

The choice of the research area is not accidental. Green marketing is now less popular in Russia than in other countries. However, the Chelyabinsk region belongs to the territory of Russia with a particularly difficult ecological situation. Therefore, one of the research hypotheses is a greater demand from ecologically unstable territories of developing countries in the development of green marketing.

This study intends to be a signal for domestic market companies and international corporations working with and in developing countries. In this study, we define interview as the main method and the research tool is questionnaire. We chose 600 respondents for interview. The sample was determined to take into account an error of 5%. The confidence interval is 99%. The general population of the study area was economically active.

For the research, we define objects as:

1) influencing factors;
2) different consumer characteristics: level of awareness, sources of information, etc.
Hypothetical consumers know the concept of green marketing, prefer to buy eco-friendly products and can pay the extra charge for eco-friendly products.

Table 1 shows the basic sources of information about green marketing presented as answers in the questionnaire.

Table 1: Sources of information about green marketing

What sources of information do you use?	Response, %
Online media	31
Friends and family	18
Consultants	14
Offline media	15
Other	22

(Source: compiled by the authors)

It was found that 31% of people usually get information from different online media, 18% from family and friends, 14% from different consultants, 15% from offline media and 20% from other sources.

Table 2 shows the result to the point that plastic is the major pollution.

Table 2: Opinion about plastic as a major source of pollution

Rank your opinion about plastic as a major source of pollution	Response, %
Strongly agree	44
Agree	36
Neutral	8
Disagree	10
Strongly disagree	2

(Source: compiled by the authors)

In accordance with Table 2, 44% of people strongly agree with that, 36% just agree, 8% are neutral, 10% disagree, and only 2% of respondents strongly disagree.

One of the questions was directed to the determination of the possible alternatives to plastic bags.

Table 3: A most preferred alternative to plastic bags

What is the best alternative to plastic bags?	Response, %
Paper bags	57
Other natural-based materials	12
Biodegradable polymers	11
Other	20

(Source: compiled by the authors)

According to the Table 3, it was found that 57% of people prefer paper bags, 12% voted for other natural-based materials, 11% of respondents are ready to use to biodegradable polymer and 20% voted for other.

Table 4 shows the results of the willingness to pay for green packaging.

Table 4: Willingness to pay for green packaging

How much more would you be willing to pay for Green Packaging?	Response, %
Up to 5%	42
5-10%	31
Above 10%	2
No	25

(Source: compiled by the authors)

Following Table 4, 42% of respondents are ready to pay up to 5% of the cost for green packaging, 31% ready to pay 5-10%, besides 2% ready to pay above 10% of the cost and 25% don't want to pay anything for green packaging. The main problem is who should be responsible for reducing the amount of plastic usage.

Table 5: Activities in reducing plastic usage

Who should be more proactive in reducing plastic usage?	Response, %
Government	38
Non-government organizations	9
Retailers	16
FMCG manufacturers	11
Consumers	26

(Source: compiled by the authors)

\It was found that 38% people think that government should be more proactive in reducing plastic usage, 9% prefer non-government organizations to work on reducing plastic usage, 16% of respondents want retailers to work on it, 11% think FMCG manufacturer should do that and 26% want consumers to worry about plastic pollution by themselves.

Table 6: Advantages of using eco-friendly materials

What is the biggest advantage of using eco-friendly materials?	Response, %
Reduction of cost	6
Reduced resource consumption	12
Reduced pollution	40
Increased customer satisfaction	10
Reduced use of hazardous/non-degradable materials	32

(Source: compiled by the authors)

In accordance with Table 6: reduction of cost – option for 6% of respondents, reduced resource consumption - 12%, for reduced pollution 40% voted, increased customer satisfaction was mentioned only by 10% and reduced use of hazardous/non-degradable material is 32%.

The group of authors wonder is it possible for the term of green culture to become the famous trend in the 21st century?

Table 7: "Green Culture"

Will "Green Culture" become the most important trend in the 21st century marketing initiatives?	Response, %
Strongly Agree	22
Agree	20
Neutral	17
Disagree	25
Strongly Disagree	16

(Source: compiled by the authors)

It was found that 22% people strongly agree, 20% - agree, 17% are neutral, 25% disagree, and 16% choose strongly disagree point that "Green Culture" can become the most important trend in the 21st century marketing initiatives.

Table 8 shows the results for the question “Can green packaging increase products market value?”

Table 8: Green packaging can increase products market value

Can green packaging increase products market value?	Response, %
Strongly Agree	23
Agree	16
Neutral	22
Disagree	28
Strongly Disagree	12

(Source: compiled by the authors)

As we can see - 23% of people strongly agree, 16% agree, 22% are neutral, 28% disagree and 12% strongly disagree that green packaging can increase products market value.

Table 9: Awareness about green packaging

What can help with the popularization of green packaging?	Response, %
Government regulatory requirement	45
Increased media attention	33
Consumer public demand	15
Market competition	7

(Source: compiled by the authors)

37% of respondents think that government should pay more attention on regulations, 33% vote for media attention, 15% answers goes to consumer public demand and 7% hope on market competition (results are presented in Table 9).

Table 10: Challenges of green marketing

What are the challenges in implementing the concept of green marketing?	Response, %
Costs	22
Comparable quality	14
Raw material prices	16
Compatibility with existing systems of production, retail, etc.	27
Lack of standards	21

(Source: compiled by the authors)

As we can see 27% of respondents think that compatibility with existing systems of production, retail, etc. are the challenges, 22% worried about the costs, 21% of votes are for lack of standards, 16% answers go to raw material prices, and 14% are for a comparable quality.

Conclusion

There are several main results of this survey. Russian customers use different sources of information and support the idea that plastic is one of the most dangerous materials for an environment. They would prefer paper bags and would pay more for them. Respondents want the government to work more on ecological problems and think that using eco-friendly materials could reduce harm to the environment. But at the same, almost half of the respondents (40%) disagree or strongly disagree that green packaging can increase the market value of the products. Customers want the government to be responsible for popularization ideas of green marketing and think that implementing the concept of green marketing can cause a variety of different problems.

Results of the survey might be used by different organizations: government structures, retailers, producers, marketing agencies and others.

Using green marketing concept can help to increase products sales, attractiveness, company's income and image.
As noted in a similar study (*Young, Hwang, McDonald and Oates, 2009)*, for long-term and significant changes in behaviour, it is necessary to develop environmental values through education and support of green markets in the state.

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Factors and Conditions of Reproduction Fixed Funds of Enterprises in The Region

Elvira TAIPOVA
Department of Management, School of Economics and Management, South Ural State University (National Research University), Associate Professor, taipovaek@susu.ru

Yuri DOROSHENKO
Department of Management, School of Economics and Management, South Ural State University (National Research University), Associate Professor, doroshenkoia@susu.ru

Sergey GLUKHOV
Department of Management, School of Economics and Management,
South Ural State University (National Research University), Senior Lecturer, glukhovsv@susu.ru

Irina MAKSAKOVA
Department of Management, Department of Modern Educational Technologies, School of Economics and Management, South Ural State University (National Research University),
Associate Professor, maksakovaiv@susu.ru

Abstract

The relevance of the problem under study is due to the fact that fixed assets have an impact on the production activities of the enterprise and, as a result, on the volume of the country's GDP. The state of fixed assets of an enterprise, the quality of its products and, as a result, the profitability of its financial and economic activities, and competitive stability depend on the reproduction of fixed assets. The problem lies in the timeliness and efficiency of reproduction of the company's fixed capital. The solution to the problem depends on the competent implementation of positively influencing factors and preventing the influence of negative factors. The systematization of the factors influencing the process of reproduction of fixed assets makes it possible to build a certain model of reproduction.

For this purpose, the concept of reproduction of fixed assets is systematized, the theoretical basis of reproduction is reflected, the foundation of which is the capital of the enterprise. The study grouped the factors of both internal and external environment of the enterprise, which are important in activating the reproduction process of fixed assets. The structures, aspects of activity, which are conductors of certain factors and conditions of the reproductive process, are shown.

The practical research site is the branch enterprises of the Ural Federal District, which show the dynamics of fixed assets, their value. The features and contradictions of reproduction of fixed assets of regional enterprises, management of this reproduction are determined. Attention is drawn to the anticipation of the wear and tear of fixed assets in comparison with renovation and modernization, which leads enterprises to competitive weakness. The methodological research tools are statistical data on fixed assets of enterprises from 2013 to 2018. Data for the Ural Federal District are compared with data for the Russian Federation.

Keywords: fixed assets, reproduction of fixed assets, influencing factors, innovative approach, investment activity.

Introduction

The level of development of enterprises determines the potential of the region, its competitiveness. The development of the region is permanently accompanied by a number of serious problems, including insufficient competitiveness of manufactured products, lack of adaptation to changes in the internal and external environment, low profitability of economic entities, and their inability to cover loan obligations. The problem also manifests itself in the loading of equipment, the high cost of downtime of which ultimately reduces the financial performance of the

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enterprise. Development is constrained by the lack of innovative products and technologies, not the innovative quality of infrastructure. The depreciation of fixed assets of regional enterprises is almost 50%.

Literature Review

Reproduction of fixed assets (FA) determines the condition of fixed assets in both quantitative and qualitative terms, which reflects the investment, depreciation and tax policies of the enterprise. There are a number of factors that significantly affect the effective reproduction of FA, which require systematization, which will make it possible to create a certain reproduction model on this basis *(Lytneva et al., 2017), (Khalyapin, 2018).*

Research and solutions to the problem of reproduction of fixed assets are described in the works of I. A. Gerashchenko, B. Yagshimadova, D. V. Eremeeva, I. N. Novikova, N. M. Ligay and others *(Gerashchenko, 2018)*, *(Eremeev and Novikova, 2012), (Ligai, 2019).*

The foundation of the reproduction of fixed assets is the capital of the enterprise. As a scientific concept, it is multifaceted, diverse in essence. The classics of economic theory classify capital as a factor of production and self-increasing value, the value that brings income to the owner. At its core, capital is twofold, since it has a physical nature - if it is presented in the material form of means of production, that is, materialized - and a value one, since it reflects the value of all resources available to the enterprise. The dual nature of capital includes the objective properties of fixed assets, which are expressed in their ability to function and renew, and is determined by the laws of the circulation of capital. Thus, the process of reproduction is based on these basic properties, which are specifically manifested in their depreciation during physical wear and tear and obsolescence *(Burlakova, 2018), (Gerashchenko, 2018).*

Research Methods

The process of reproduction of fixed assets of Russian enterprises has its own scientific and methodological features, which are the subject of this study. It is expedient to develop proposals for enhancing the recovery and renewal of the FA in accordance with the current development of technology and technology.

Also, this study is aimed at identifying the directions of development of the Ural Federal District (UFD) according to the state of the state fund of enterprises in the district and at determining the factors and conditions necessary for reproduction.

Based on the purpose, the object of the study is the features and contradictions of the reproduction of the production facilities of the enterprises of the region, and the subject is the management of the process of reproduction of the production facilities and the organizational and economic relations changing at the enterprise.

Methodologically, the study is based on the provisions of the science of economic theory, on the works of domestic and foreign scientists-economists dealing with the problems of using regional fixed assets and their reproduction. Also involved are legislative documents and regulatory and methodological materials on the research topic.

Results and Discussion

The rate of reproduction of fixed capital determines the quality and volume of products, which, in turn, contributes to its competitiveness, and the latter indicates the high potential of the enterprise and the worthy position of its region in the economic community. There are certain factors that, in specific economic sectors and sectors, affect the effective reproduction of fixed assets, that is, their restoration, renewal and expansion, as well as the formation of a system for their best use. This is possible when carrying out activities for the competent management of investment resources *(Carlos and Franco, 2020)*, *(Khalyapin, 2018).*

The following factors influence the reproduction of fixed assets of the Ural Federal District enterprises:

- whether the enterprise has a need for production facilities;
- composition and structure of FA;

- methods of assessment and revaluation of FA;
- depreciation rate;
- wear of the FA;
- scientific and technological progress;
- update forms;
- inflationary rates;
- investment activity of enterprises;
- availability of funding sources;
- availability and effective functioning of the legal and regulatory framework *(Budzyńska, 2018), (Burlakova, 2018), (Sokolitsyn and Ivanov, 2020), (Ligai, 2019), (Mirolyubov, 2008).*

The profit reinvested by the enterprise, as well as borrowed funds and targeted financing, are directed to the qualitative and quantitative growth of the fixed assets of economic agents *(Mandala and Sirisetti, 2019)*. The success of the functioning of an individual enterprise, a specific industry and the economy as a whole depends on the positive dynamics of such events. In case of negative results, an analysis is required at all stages, which will make it possible to understand the reasons and in the future to eliminate the negative consequences.

With the help of the official statistical reporting *(Investments in Russia, 2018), (Regions of Russia. Socio-economic indicators, 2018)*, we will reveal the dynamics of the value of fixed assets of enterprises in the Russian Federation as a whole and in the Urals Federal District separately. So, according to table 1, the cost of the fixed assets of enterprises of the Russian Federation and the regions of the Ural Federal District for six years is traced.

Table 1: Cost of fixed assets of enterprises in a comparative assessment (at full book value at the end of the year), billion rubles

Region	2013 year	2014 year	2015 year	2016 year	2017 year	2018 year	Place occupied in RF (up to 2018)
Russian Federation	121 268.9	133 521.5	147 429.7	160 725.3	183 403.7	194 649.5	
Ural Federal District	22 295.4	23 584.5	26 776.9	28 902.3	33 650.8	35 953.4	2
Kurgan region	574.2	617.5	619.8	650.9	693.6	726.0	61
Sverdlovsk region	3 665.8	3 949.2	4 711.9	5 157.4	6 086.9	6 177.9	6
Tyumen region	16 041.0	16 856.8	19 036.9	20 471.3	23 947.9	26 000.9	
including:							
Khanty-Mansi Autonomous Okrug - Ugra	7 953.3	8 618.0	9 546.2	10 275.5	11 654.2	12 543.0	2
Yamalo-Nenets Autonomous District	6 737.2	6 694.0	7 827.6	8 387.7	10 219.2	11 279.8	3
Tyumen region without autonomous regions	0.0	1 544.8	1 663.1	1 808.1	2 074.6	2 178.0	26
Chelyabinsk region	2 014.3	2 161.0	2 408.3	2 622.7	2 922.4	3 048.7	16

(Source: Regions of Russia. Socio-economic indicators, 2018)

The data in the table show an increase in the value of fixed assets of enterprises: over six years, from the end of 2013 to the end of 2018, the value of fixed assets in the Russian Federation increased by 73,380.6 billion rubles, in the Urals Federal District - by 13,658 billion rubles. The average annual rate of growth in the value of fixed assets was 9%. This pace contradicts the pace of development of the Russian economy as a whole. Fixed assets need to be

analyzed by considering their structure, physical condition, sources and amounts of funding. Let us present the dynamics of the real growth of fixed assets (table 2).

Table 2: Dynamics of real growth of fixed assets in the Russian Federation and the Ural Federal District, 2013-2018

Index	2013 year	2014 year	2015 year	2016 year	2017 year	2018 year
Russian Federation						
Growth over the previous year,%	112.28	110.1	110.42	109.02	114.11	106.13
Growth versus base year 2013,%	–	110.1	121.57	132.54	151.24	160.51
Average annual growth rate, RUB bln	14 676.12					
Average annual growth rate,%	9.01					
Ural federal district						
Growth over the previous year,%	114.72	105.78	113.54	107.94	116.43	106.84
Growth versus base year 2013,%	–	105.78	120.1	129.63	150.93	161.26
Average annual growth rate, RUB bln	2731.6					
Average annual growth rate,%	9.05					

(Source: Investments in Russia, 2018)

The picture of the FA growth is not optimistic, it has a somewhat abrupt tendency. The reason for the low growth of fixed assets is weak investment activity, which is explained by the existing problems in the macro- and microeconomics of the Russian Federation *(Khalyapin, 2018).* Further, in Table 3, we present the structure of the FA according to the areas of activity of enterprises of the Ural Federal District.

Table 3: The presence of FA at the enterprises of the Ural Federal District, different by type of economic activity, 2013-2018

Type of industry activity of enterprises	% to the total by years					
	2013	2014	2015	2016	2017	2018
Mining	42.05	40.24	39.06	37.27	41.01	37.61
Manufacturing production	10.78	9.65	10.12	10.74	7.63	6.83
Wholesale and retail trade; repair of vehicles, motorcycles, household goods and personal items	1.21	1.15	1.29	1.32	1.23	1.13
Electricity, gas and water production, distribution	6.76	6.82	6.85	6.63	6.70	6.18
Agriculture, forestry, hunting, fishing and fish farming	1.22	1.12	1.21	1.20	1.28	1.20
Building	0.97	1.01	1.30	1.14	1.28	1.25
Transport and communication	37.01	40.01	40.17	41.70	40.87	45.80
Total	100.0	100.0	100.0	100.0	100.0	100.0

(Source: Regions of Russia. Socio-economic indicators, 2018)

Table 3 shows that FA are more equipped with mining enterprises, as well as transport and communications. Manufacturing enterprises, electricity, gas and water production have a significant share. This suggests that the growth of fixed assets at the enterprises of these industries has a positive trend. But at construction enterprises, wholesale and retail trade, repair services, as well as in agricultural organizations, the volume of fixed assets is a little more than 1% of the total number of fixed assets available for years, and this number is decreasing. Behind such a situation for the country is the threat of loss of economic security, which is strange for the Russian Federation, which exports agricultural products in large volumes *(Mirolyubov, 2008).*

Consider the formatting objects according to the intensity of their input *(Khalyapin, 2018).* Table 4 shows the percentage of the introduction of FA at the enterprises of the Ural Federal District of the already named types of economic activity.

Table 4: Commissioning of the FA at the enterprises of the Ural Federal District, structured by types of economic activity, 2013–2018

Type of industry activity of enterprises	% of total fixed assets volume, by years					
	2013	2014	2015	2016	2017	2018
Mining	62.4	55.0	57.5	50.6	54.1	53.6
Manufacturing production	12.9	13.0	12.8	15.7	14.1	14.0
Wholesale and retail trade; repair of vehicles, motorcycles, household goods and personal items	1.4	1.5	1.7	3.2	1.4	1.3
Electricity, gas and water production, distribution	8.2	10.6	9.6	9.8	9.1	8.9
Agriculture, forestry, hunting, fishing and fish farming	1.7	1.5	1.9	1.8	1.9	1.7
Building	1.0	1.2	1.3	2.1	1.5	1.6
Transport and communication	12.4	17.2	15.2	16.8	17.9	18.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

(Source: Investments in Russia, 2018)

These tables show the absence of a smooth growth in the commissioning of fixed assets at enterprises, regardless of their specialization. The average percentage of FA introduction is higher (55.5) – at mining enterprises; at transport and communications enterprises, it is 16.4; at manufacturing enterprises – 13.8%; at the enterprises of production and distribution of electricity, gas and water – 9.4; at enterprises of the other three sectors of the economy, the average percentage of commissioning of fixed assets is from 1.5 to 1.8. Construction enterprises show the lowest average percentage of commissioning of fixed assets – 1.5.

Next, we will reflect the assessment of the state of the FA, which is formed by the indicators of their wear. The modern manufacturability of production facilities directly affects the quality of products and production costs, which are the main factors of the competitiveness of enterprises *(Avduevskaia, Kuporov and Chepikova, 2018)*. Indicators of the degree of depreciation of fixed assets of sectoral enterprises of the Ural Federal District are shown in Table 5.

Table 5: Depreciation of fixed assets of enterprises by industry attribution in the Ural Federal District, 2013–2018

Industry relevance	%, year					
	2013	2014	2015	2016	2017	2018
Mining	63.3	61.6	61.1	61.2	59.0	56.1
Manufacturing production	49.7	48.2	47.0	44.0	43.3	39.8
Wholesale and retail trade; repair of vehicles, motorcycles, household goods and personal items	70.2	71.7	70.6	68.4	68.5	66.6
Electricity, gas and water production, distribution	39.8	37.4	40.6	40.4	44.3	46.1
Agriculture, forestry, hunting, fishing and fish farming	36.0	36.1	33.7	33.5	34.1	35.3
Building	59.0	47.1	45.6	52.9	52.6	48.9
Transport and communication	44.9	45.2	48.6	47.3	47.6	44.4
Depreciation of fixed assets on average in the Russian Federation, total	61.7	61.8	61.3	60.4	59.3	57.5

(Source: Regions of Russia. Socio-economic indicators, 2018)

The table shows that, in aggregate, the depreciation of fixed assets in the Ural Federal District annually ranges from 48 to 52%, which is on average 10% lower than in the Russian Federation as a whole. A high degree of depreciation of the processing plant in the Urals Federal District is observed in the industry of wholesale and retail trade, repair of vehicles, etc. and in the mining industry. The depreciation rate in these industries decreased by 2018, but is nevertheless high. At the enterprises of wholesale and retail trade, repairs, it is higher than in the Russian Federation as a whole.

The high degree of depreciation of the fixed assets of enterprises of all sectoral areas is explained by the fact that the bulk of the funds was acquired in the Soviet economy, that is, before 1991. This suggests that the investment activities of enterprises, especially low-profit sectors, require the involvement of the state, otherwise the economic potential of the sectoral economy will be lost *(Budzyńska, 2018)*. The weak, pitching dynamics of the reproduction of fixed assets of industrial enterprises both in the Russian Federation and in the Ural Federal District is explained by the influence of a number of negative external factors. These include *(Avduevskaia, Kuporov and Chepikova, 2018), (Hammami, 2019)*:

a) price disparity,
b) inflationary waves,
c) a small amount of investment.

Features of reproduction of fixed assets of an enterprise are as follows:

- Reproduction of FA is stimulated by the enterprise's need for them.
- Timely and effective renewal of fixed assets is possible only if there are funding sources.
- The duration of the turnover of the enterprise's fixed assets depends on the degree of their wear.
- The decision to replace (update) FA also depends on the degree of their wear.
- The size of the reproducible potential of the enterprise depends on the form of updating the FA.
- Manufacturability, quality of refurbishment of the plant depends on the stage of scientific and technological progress, on the level of innovations introduced into production.
- The regulation of the process of reproduction of the FA should be strictly based on the regulatory and legal provisions that are relevant for the current moment.
- Inflation has a negative effect on the reproduction of fixed assets, since the growth in prices for fixed assets lags behind depreciation charges; as a result of the inflationary effect, amortization accumulations are not enough to replace the retiring fixed assets *(Burlakova, 2018), (Miyazawa and Ogawa, 2019)*.

Any modern enterprise is considered as a socio-economic and ecological system, as it fulfills social, economic and environmental tasks and at the same time is under the influence of factors of the same name. These factors affect the process of reproduction of fixed assets. It is necessary to systematize the factors and conditions on which the efficiency of the process of reproduction of fixed assets depends. A factor is a reason, a driving force of a process, which determines its features or individual details. Conditions are created by the external environment of the enterprise and facilitate the execution of the event. In order for the management of the production facility reproduction to be effective, at the zero stage it is necessary to establish the factors (conditions) on which the renewal efficiency depends *(Sokolitsyn and Ivanov, 2020), (Gerashchenko, 2018).*

Analysis of literary sources on the theory and practice of reproduction of fixed assets made it possible to determine the main conditions for the implementation of this process. Two groups of factors are formed: 1) internal, created in the structures (departments, services) of the enterprise; 2) external, created in external macrostructures (bodies, departments), which are the environment of the enterprise. In the proposed classification of factors, there are control (subjective) and controlled (object) factors, as well as direct factors - directly affecting the management of the reproduction process - and indirect factors - indirectly influencing *(Miyazawa and Ogawa, 2019)*.

Controlling (subjective) factors are associated with the control system of the production facility reproduction. In the internal environment, they are formed by the management of the enterprise, in the external environment - by state authorities. Controlled (object) factors are associated with the process of reproduction of the FA as an object of control and exist only within the enterprise.

We classify the main internal (Figure 1) and external factors (Figure 2) that affect the reproduction process of the enterprise's production facility. These classifications cover all aspects of management of reproduction of the production facility, make it possible to determine the vectors of improvement.

So, internal organizational and managerial factors are manifested in the methods of making managerial decisions, production and technological - in the states of the technological equipment of the enterprise, financial and economic - in the investment policy of the enterprise, natural and ecological - in the ecology of technological equipment, etc. In the group of external territorial and industrial factors are manifested, for example, in the specifics of the industry, infrastructural - through the logistics system, legislative and regulatory - through laws in the field of the reproduction process, political - in sanctions regimes, macroeconomic - through the level of the refinancing rate, competitive - in the behavior of competitors and consumers, etc *(Lambrinoudakis, Skiadopoulos and Gkionis, 2019), (Ligai, 2019)*.

When considering all the factors and conditions of reproduction of FA, the leading role belongs to new technologies, their availability. The latest technologies determine the composition and functionality of the required equipment. In the long term, the company develops innovative products that further acquire competitiveness and commercial value.

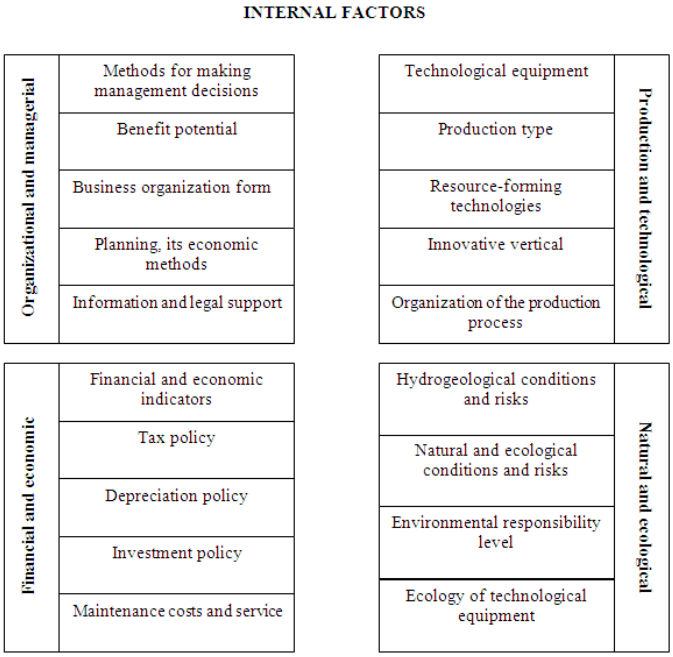

Fig. 1: Classification of internal factors that have the power to influence reproduction fixed assets of the enterprise

(Source: Ligai, 2019)

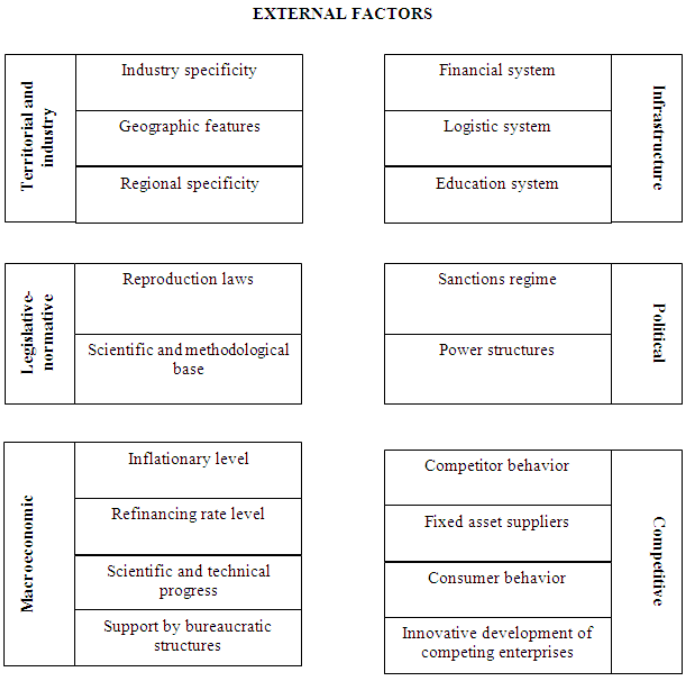

Fig. 2: Classification of external factors that have the power to influence reproduction fixed assets of the enterprise

(Source: Ligai, 2019)

In addition to the factors that are systemic and have a positive effect on the reproduction of FA, there are factors that negatively affect and restrain reproduction processes *(Avduevskaia, Kuporov and Chepikova, 2018)*. These include:

- Expensive bank loans.
- Unstable financial condition of the enterprise.
- The working capital of the enterprise is forced to replenish at the expense of depreciation, which in the future reduces the potential for renewal of the fixed assets.
- Domestic production does not provide enterprises with the required equipment, either quantitatively or qualitatively.
- Importation of imported equipment with high customs duties.
- High level of accounts receivable.
- The company is under pressure from a high tax burden.
- Energy resources are expensive.
- Large accumulation of unsold products in warehouses.
    - Sale prices for finished products are limited *(Hammami, 2019),*(Lambrinoudakis, Skiadopoulos and Gkionis, 2019).

Conclusions

For each enterprise, for its competitiveness, the policy in the field of reproduction of fixed assets is of great importance. The qualitative and quantitative characteristics of the FA depend on the literacy of policy making.

Reproduction (updating) of fixed assets should be a continuous process, the content of which consists in the acquisition or development of new technologies, modernization and overhaul of the used fixed assets. Reproduction of production facilities is vital for an enterprise, since modern, high-quality production facilities are a basic platform for creating competitive products, goods with growing demand.

In the article, the analysis is given to the Ural Federal District, which in the Russian Federation takes the eighth place in terms of the degree of depreciation of fixed assets of enterprises. The rate of growth of private equity enterprises is the leading factor in the growth of national welfare, but it is low in the Urals Federal District. In this regard, there is a threat of loss of the overall economic security of the region. The reason for the low growth rate of fixed assets of enterprises in the region is associated with the lack of their own investment funds and with a high risk of attracting third-party investments. It is required to work out investment mechanisms both within the state, the region, and within the private sector of the economy.

The goal of market actors is to be competitive. For this to be realized, a modern enterprise must be innovative, capable of creating and mastering innovations, and have innovative potential. Taking into account such features of the enterprise, based on the analysis of the main factors and conditions, it is subsequently necessary to build a comprehensive model for managing the reproduction of fixed assets, or fixed capital. The model should take into account the influencing innovative factors, the direct process of reproduction of the production facility and the efficiency of using the production facility in the production of products and in the sphere of circulation.

It should be noted that the quality of fixed assets depends on the speed of their renewal, contributes to the efficiency of their use. The efficiency and dynamism of the FA are determined by the degree of innovation activity of the enterprise, the level and quality of innovation implementation. Modern, innovative processing plants create a high level of technical and technological equipment of the enterprise.

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Gerontomarketing On the Russian Banking Services Market: Problems and Prospects

Julia ASTASHOVA
Associate professor of the department of management, South Ural State University (National Research University), Julia_asta@mail.ru

Antonina UKHOVA
Assistant professor at the department of management, South Ural State University (National Research University), ukhovaai@susu.ru

Yana DOBRYNINA
Associate professor of the department of management, South Ural State University (National Research University), dobryninays@susu.ru

Sergey KALENTEEV
Assistant professor at the department of management, South Ural State University (National Research University), kalenteevsv@susu.ru

Abstract

The study, the results of which are presented in the paper, is aimed at studying the practice of spreading gerontomarketing in the Russian banking market. The banking services market, along with the leisure market and the medical services market, according to the authors' hypothesis, due to their significant contribution to the implementation of the strategy of active aging, have a high potential for gerontological orientation.
The article presents the results of a study of the banking services sector from the standpoint of the practice of using gerontomarketing tools: the main trends in the development of the market are outlined, leaders in the market for working with the gerontosegment are identified, the problems of using gerontomarketing in the practice of Russian banks are systematized. The research results can be used in the development strategies for both individual banks and the banking sector as a whole.

Keywords: Gerontomarketing, Banking Services Market, Market Gerontological Orientation

Introduction

In the context of demographic aging of the population, economic development cannot ignore the ever-growing role of the elderly population. Creation of conditions for a full life in old age, which corresponds to the strategy of "Active Longevity", involves the development of market segments focused on the needs of older citizens. These tasks are relevant not only for society and the government, but also for business. Attracting a segment of older consumers opens up new opportunities for business growth and development. However, in practice, dealing with older consumers is not always smooth. Interaction with consumers of the older age group requires special marketing approaches, which are scientifically reflected in the concept of gerontomarketing. Considering different consumer markets, we can conclude that the spread of the practical aspects of gerontomarketing is uneven: the potential for gerontological focus of markets varies significantly [Eppler-Hattab, 2020; Andrew Achenbaum, W.,2015; Blanchard, 2004; Butler, 1996]. We can also talk about the specificity of the practical approaches of gerontomarketing in different markets: attracting older consumers in different segments of the consumer market requires business efforts of different intensity.

In our opinion, one of the markets with a high potential for being geriatric is the banking services market. It should be noted that the Russian banking market as a whole is not yet sufficiently responsive to changes in the age structure of consumers.

The purpose of this paper is to study the specifics and practice of using gerontomarketing tools in the Russian banking market.

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Methods and the Study organization

As a methodological basis for the study, we used works on the concept of gerontomarketing, the initial provisions of which were formulated by representatives of the German scientific school of marketing [Hilbert, 2000; Pott, 2004; Kaib, 2008; Nufer, 2010], as well as studies carried out by representatives of the Russian scientific school of marketing [Bagiev, 2012; Solovyova 2013; Khobotova, 2014], who, in view of the specifics of the Russian conditions, pay more attention to the problems of market formation and the practical aspects of using various gerontomarketing tools.

Also, as a methodological basis for the study, the materials of the Central Bank of the Russian Federation were used on monitoring the availability of financial products and services. Since 2015, the Central Bank of the Russian Federation has been assessing financial accessibility, including for senior citizens. The Russian Federation has developed a strategy until 2020 to increase financial accessibility. In general, some of the tasks of government policy in this area correlate with the tasks of gerontomarketing in the banking market. According to the approach of the Central Bank of the Russian Federation, financial accessibility, in addition to physical access, which is understood as the proximity of infrastructure, also includes price, assortment and mental accessibility. The specified parameters of accessibility should be taken into account when assessing the gerontological orientation of the banking market and be reflected in the strategies of gerontomarketing of banking organizations.

This study is also based on the original authors' method of marketing assessment of the gerontological orientation of consumer markets. According to the authors' approach, the level of gerontological orientation is assessed by three criteria:

- age limits of the target audience,
- taking into account the specifics of the requirements of older consumers in the development of goods and services,
- strategic focus of the company in interaction with older consumers [Astashova, 2018].

According to the methodology, the following 4 levels of gerontological orientation of organizations can be distinguished on the market:

- 0 level (ignoring),
- 1 level (neutral),
- 2 level (intuitive),
- 3 level (conscious).

Taking into account the specifics of the banking market, this methodology needs minor modification in terms of alignment with the model of financial accessibility of the Central Bank of the Russian Federation.

The research information base was formed on the basis of secondary information: analysis of official sources of the Central Bank of the Russian Federation, official websites of banking organizations, analytical reports of independent agencies. The research applied the methods of statistical data analysis, and the nonformalized desk methods of marketing research.

Results and Discussion

In recent years, the Russian banking market has seen a downward trend in the number of banking organizations, which is due to the policy of the Bank of Russia. The process of rehabilitating the banking system was implemented mainly through the mechanism of license revocation by the regulator due to poor financial condition and violations of legal requirements. The number of valid licenses was also reduced due to bank mergers, as well as voluntary refusals of credit institutions to continue their activities.

According to the INTERFAX agency, 77 banks ceased their activities in 2018 alone. If in July 2013 there were 894 banks in Russia, then by the beginning of 2019 there were 440 of them. Almost half of the banks that left the financial market over the last five years were left without licenses in 2015 and 2016 (102 and 106, respectively).

According to experts, the process of reducing the number of market participants in the coming years will continue in a milder form - approximately 5-7% of banks a year will leave the market for one reason or another. Thus, it can be expected that by 2024 there will be approximately another 100 fewer banks operating in the Russian Federation.

From the point of view of the methodology for assessing financial accessibility, infrastructure is one of the important components, while it is characterized primarily by the ability to receive financial services through physical access points. Physical access is also very important for older consumers who find it difficult to switch to remote service systems.

It should be noted that banking organizations on the territory of the Russian Federation are located unevenly (Fig. 1).

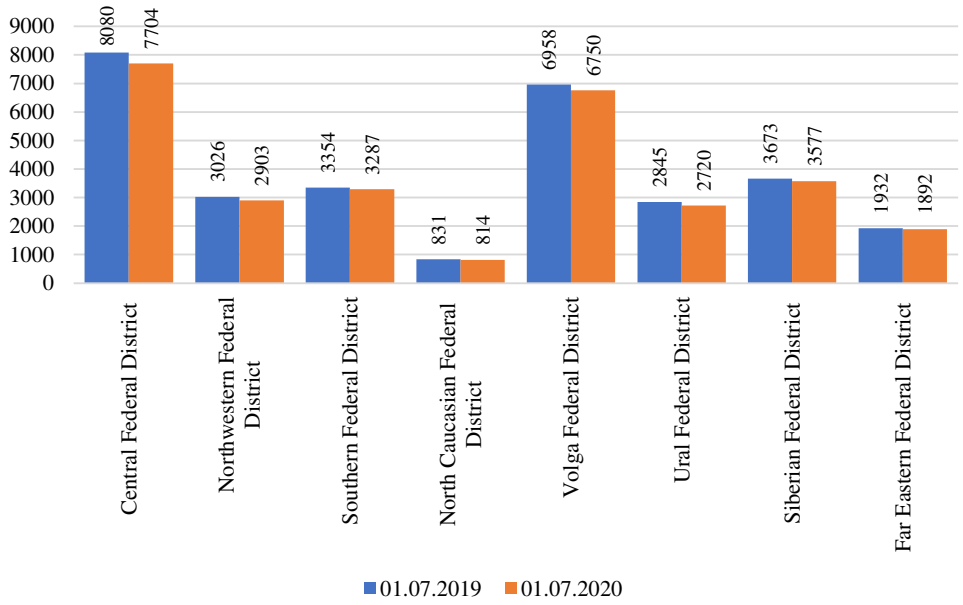

Fig. 1: The number of operating credit institutions, separate and internal structural divisions of operating credit institutions (branches) in the territorial context, as of 01.07.2019 and 01.07.2020 (Compiled by the authors based on the official statistics of the Bank of Russia: http://www.cbr.ru/statistics/bank_sector/lic/)

Per 1 million people of the adult population, most of units of operating credit institutions are in the Far Eastern Federal District (307), the least in the North Caucasian Federal District (115), where the value of the indicator was more than two times lagging behind the national average (268). The smallest number of units of operating credit institutions per 100 thousand km2 falls on two federal districts – the Far Eastern Federal District and the Siberian Federal District (28 and 86, respectively). The highest density of units of operating credit institutions is in the Central Federal District (1274), where the average Russian value was exceeded by more than 6 times (183).

Thus, in the Russian Federation there is a problem of the availability of banking services in remote, sparsely populated or hard-to-reach areas, which is taken into account in the strategy for increasing financial accessibility until 2020. It is important to note that the development of digital products and services (remote banking, e-money transfer services), as well as the development of digital channels for customer service (such as mobile access) are identified as measures to solve this problem, which, while increasing accessibility, also contributes to reducing products and services costs. Nevertheless, taking into account the prospects for the development of digital technologies, it should be noted that when working with elderly clients, banks need to make additional efforts to educate them.

When assessing the level of gerontological orientation of banks, in particular when assessing the criterion “age limits of the target audience”, the following feature of the banking services market was revealed: when providing lending services, all market participants set the upper age limit for access to the service, which on average in the

market is set at a level of 65 to 70 years at the time of loan repayment. From the point of view of gerontomarketing, limiting clients' access to services based on age is buying ageism and indicates a zero level of gerontological focus of the company. Nevertheless, in the consumer lending market, the bank's gerontological focus is more characterized by the upper limit of age restriction. While small banks set the service access limit at 60 years, the market leaders significantly expand the opportunities for older clients (at the time of the survey, the upper limit for Sovcombank clients was set at 85 years). Thus, when assessing a bank's gerontological orientation, it is advisable to separate the gerontological orientation in the deposit market and the lending market, since the same bank can offer special conditions for pension deposits, but at the same time significantly limit the access of older clients to lending. The analysis of the criterion "taking into account the specifics of the requirements of older consumers in the development of goods and services" showed that there is a wide range of forms of gerontological orientation of banking products on the Russian banking market. From the point of view of financial accessibility, the offers of banks for elderly clients can be attributed to both price, assortment, and mental accessibility, as shown in Table 1.

Table 1: Taking into account the requirements of elder consumers in the Russian market of banking services

Components of financial accessibility according to the methodology of the Bank of the Russian Federation	Examples of products and services with high gerontological orientation in the Russian banking market
Price accessibility	Increased rate on deposits for pensioners (from 0.1 to 3.4%) Decrease in interest rates on loans (0.1%)
Assortment accessibility	Pension debit cards Special deposits for retirees Special loans for retirees Special complex programs: Free round-the-clock service "LINE OF CARE" for elderly clients (Post Bank) PRIVILEGE OF TIME program (Rosbank) Respectful program (FC Otkritie) Bonus program "Heat", Service "Good health" (Eastern Express Bank)
Mental accessibility	Financial literacy events (lectures, seminars, master classes, etc.), information and educational campaigns: the "Older Generation" project, the website Active Age (АктивныйВозраст.рф), the webinar "The budget of a modern pensioner. Financial literacy" (Sberbank) Joint target program with the Pension Fund of Russia for the training of pensioners (Post Bank)

(Source: compiled by the authors)

When assessing the strategic actions of banks in relation to interaction with older consumers, criteria such as the presence of a special section on the bank's website, the focus of advertising messages, and the presence of publications in the media were considered.

Taking into account the above, we conducted a study to assess the level of gerontological orientation of banking organizations, the results of which are presented in Fig. 2.

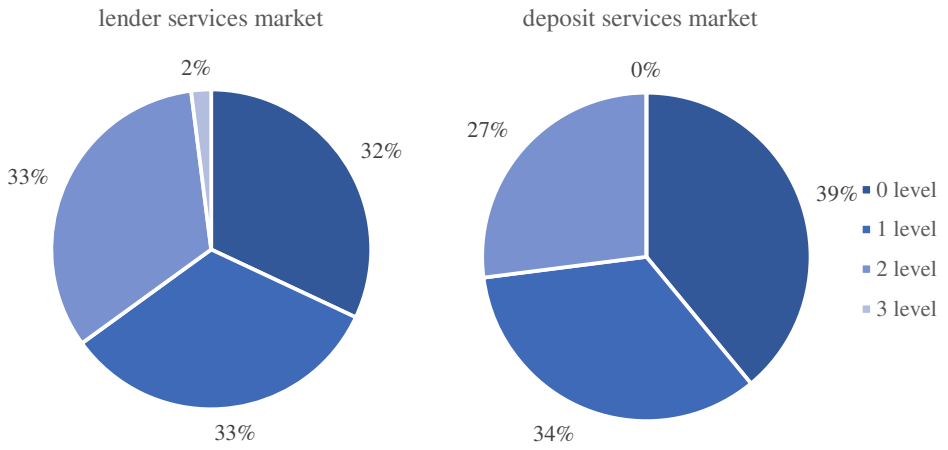

Fig. 2: Results of assessing the level of gerontological orientation of banks in the Russian market
(Source: compiled by the authors)

As can be seen from the data in Fig. 2, the gerontological orientation of banks in the lending services market is much lower, which, as already mentioned above, is due to the presence of age restrictions on access to services. Almost a third of banks significantly limit the age of borrowers at the level of 60-65 years at the time of loan repayment, which made it possible to assess their level of gerontological orientation as zero. This is undoubtedly a significant problem and limits the possibilities of using gerontomarketing in the market. However, it is important to note the trend towards a gradual decrease in age restrictions that market leaders are demonstrating.

Conclusions

Thus, the results of the study allow us to conclude that Russian banks in general quite actively use gerontomarketing tools, many banks have introduced measures to increase the assortment and price availability of banking services for elderly consumers, and there is a fairly high level of gerontological orientation of banks in the deposit market. Against the background of positive trends, one can single out the most acute problems limiting the effectiveness of gerontomarecking: a low level of gerontological orientation of banks in the lending services market, due to the practice of age restrictions, a limited range of measures to increase the mental accessibility of banking services, which is especially acute against the background of the development of digital banking services.

Acknowledgements

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Regional Response to Crisis Situations: Identification of Hysteresis Processes

Irina DANILOVA

Professor of economic theory, regional economics, state and municipal government department, South Ural State University (National Research University), danilovaiv@susu.ru

Irina SAVELYEVA

Professor of department Accounting, Analysis and Audit, South Ural State University (National Research University), savelevaip@susu.ru

Natalya PRAVDINA

Associate professor of the Industry Economics and Project Management Department, South Ural State University (National Research University), pravdinanv@susu.ru

Aleksandr REZEPIN

Associate professor of economic theory, regional economics, state and municipal government department, South Ural State University (National Research University), avrezepin@susu.ru

Abstract

The shocks in the economies of developing countries in recent years associated with the impact of the global crisis of 2008-2009, internal macro-economic situations, and in the Russian Federation of sanctions and anti-sanctions in 2013-2014, cause increased attention to the stability and shock resistance of the economies of countries and regions. The article presents one of the methods for assessing the known fact of memory about shocks, violations, crises, which is considered as a property of unique adaptability to force majeure situations that stimulate the aggregation of reserves of stability and resistance of the economy to destructive factors. On the example of the monospecialized regions of the Russian Federation of the same type in the main industry, depending on the world market conditions, an assessment of the presence of the hysteresis phenomenon was carried out. The differences between the two crisis periods of 2007-2008 and 2013-2014 are detailed from the standpoint of the duration and speed of phase processes (decline, recovery, and growth), the depth of the fall, the variability of parameters in terms of the "index of industrial production". The identification and assessment of hysteresis allows us to expand our understanding of the adaptability of the economy of the Russian Federation and supporting regions, to focus on the uniqueness of development paths, comparative advantages of economic efficiency and the specifics of structural reactions.

The article provides an overview of approaches to the analysis and assessment of region resilience and the peculiarities of its implementation in developing countries, to which the Russian Federation be-longs. The author's approach to the assessment is presented on the example of four regions of Russia. The study was carried out on the example of regions with similar sectoral structure as the most significant factor influencing impact resistance to crises and shocks.

Keywords: Resilience, Impact Resistance, Economic Hysteresis, Regional Economic Development, Regional Reactions to Shock.

Introduction

The problems of regional resilience ensuring are formulated by the UN as a universal course for developed and developing countries in connection with the formation of a global economic space, different shock impulses that destabilize the world economy, increasing connectedness in the financial and monetary sphere and the intercountry

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movement of factors, goods, services. In our opinion, the concept of region resilience has different shades, is often replaced by terms that are close in meaning, depending on the specific task of the researchers.

The economies of developed countries have a strong mechanism of market self-regulation and institutional security. In this context, the risk of economic destruction or serious shocks is minimal. The object of the research is the problem of increasing the economy resilience as the ability to preserve the existing development model in the long term based on strengthening the infrastructure framework, reducing the frictions of the market mechanism and neutralizing external effects induced by shocks (including in the social and environmental spheres).

Literature Review

The term resilience is imported from engineering and environmental sciences to economics *(Fröhlich and Hassink, 2018)*. The meaning of the term is concretized depending on the subject areas of analysis (ecology and urban studies; economic development and crisis management; engineering), and the approaches differ accordingly. So, R. Martin *(Martin, 2011)* identifies three fundamental characteristics of resilience: the ability of the system to return to an equilibrium state after a shock; ability to resist shock; ability to adapt after shock. In terms of the economy of regions with high heterogeneity, regional resilience is interpreted as the ability of the economic system to withstand external and internal economic shocks and mitigate their consequences *(Korobitsin, 2016)*. Resilience presupposes not only higher adaptability, but also “institutionally coordinated”, “intersectoral” and “multiscalar” adaptation, contributing to regional structural changes *(Hu and Hassink, 2017)*.

For countries with a young history and an insufficiently strong system of the market mechanism (from the standpoint of scale, socio-economic efficiency, institutional support, etc.), operating in a regime of permanent instability, the analysis of the derived characteristics of resilience is of greatest relevance - this is "shock resistance" and "elasticity". Resilience is often described as “elasticity”, “endurance”, “vitality”, as well as “stress resistance”, which, according to A. Romanova *(Romanova, 2017)*, is the ability to recover from an adverse event. In general, the shock resistance of the economy lies in the presence of properties that exclude limit significant damage and destructive consequences.

Close to resilience, the term "elasticity" is defined as the ability to return, restorability to the initial parameters when the destabilizing factor is removed, that is, in this case, attention is focused on the return process in response to a shock impulse. At the same time, if impact resistance does not necessarily imply a return to the original trend line; then elasticity is a return to the original parameters, the ability to consolidate the current situation. E. Hill *(Hill and Clair, 2011)* draws attention to the quantitative criterion of elasticity, namely: if in a year the growth rate of the economy's output differs by more than 2% compared with the average annual in the previous period, it is not elastic. The applied aspect of the analysis of the shock resistance and vulnerability of the regions of the Russian Federation is:

a) in determining the current intensity of the reaction of regions, their vulnerability,
b) in measuring and systematizing factors that affect the degree of shock resistance and elasticity,
c) in the development of a mechanism for "internalization" (mobilization) of internal forces of the economy to exclude long-term stagnation.

Note that Vulnerability is interpreted as a characteristic of potential negative consequences of a shock (economic, natural, technogenic, etc.) *(Modica, Reggiani and Nijkamp, 2018).*

The study of post-shock reactions regardless of the nuances of meaning (elasticity, receptivity, impact resistance) involves the analysis of the following problems:

1. characterization of the specifics of phase changes;
2. allocation of factors that reduce adverse effects;
3. determination of the reasons for the heterogeneous reaction for a comparative assessment of the advantages of individual territories.

1. The specificity of phase transitions is highlighted in the works of R. Martin *(Martin, Sunley and Tyler, 2015)*, as the presence of four qualitatively different stages: resistance to shock (the level of sensitivity or intensity of the

reaction of the regional economy to the recession); recovery (the speed and intensity of the recovery of the regional economy after the recession); reorientation (the degree of reorientation and adaptation of the regional economy in response to the shock); renewal (the degree of renewal of the growth path of the regional economy, return to the previous path, or a hysteresis shift to a new path).

2. Among the factors that increase resilience to shocks are the following:

1) the scale of the economy and the effectiveness of built-in stabilizers,
2) the level of trade openness and export specialization;
3) the level of industrialism, diversification, vertical and horizontal connectivity of industries;
4) investment in knowledge and human capital,
5) innovation,
6) growth rates preceding the impact (initial state);
7) the business sector and management models, the degree of urbanization;
8) institutional support.

These factors ensure the strength and speed of economic recovery and adaptation; diversification due to different synchronicity of reaction to shock, the risk of significant consequences *(Martin, Sunley and Tyler, 2015), (Cainelli, Ganau and Modica, 2018), (Hill and Clair, 2011), (Brakman, Garretsen and van Marrewijk, 2015)*.

3. Different economic systems react differently to shocks; there is an asymmetry of their influence in the territorial aspect *(Modica, Reggiani and Nijkamp, 2018)*. In this aspect, it is essential to study the processes of hysteresis of the economy and regions.

Hysteresis is a reaction to shocks, disturbances, crises, which is determined both by the initial state of the system (resources, production processes, results), and by the specifics of the previous development *(Simmie and Martin, 2010)*. This is manifested: a) in the differences in phases in the path of overcoming the crisis of homogeneous regions; b) a variety of structural shifts and patterns of trend lines for regions of the same type in response to shocks and crises, c) differences in the degree of stability and a variety of economic consequences. The practical significance of the assessment of hysteresis lies in the fact that the identification of differences in territories makes it possible to adjust adequate support of both a preventive nature and anti-crisis measures. Thus, the use of the regional hysteresis index (RHI) is used to analyse the territories in the distribution of funds in order to balance the reduction of the differentiation of socio-economic development *(Botzoris and Koudoumakis, 2013)*. The final RHI index is calculated on the basis of group indices from 71 indicators; a hysteresis index value of more than 100 corresponds to a high level, respectively, a high need for funds.

To identify the processes of hysteresis, it is important:

1) determination of indicators of its manifestations (amplitude, time period of decline, recovery, growth, rate of each stage) *(Korobitsin, 2016), (Brakman, Garretsen and van Marrewijk, 2015)*, the scale and depth of shock, the number of stages of short-term decreases over the intercrisis period;
2) determination of the availability of adaptive abilities to shocks, based on "local reactions to economic shocks between different crises" *(Martin, Sunley and Tyler, 2015);*
3) (Korobitsin, 2016) determination of the presence or absence of a break in the development trend, that is, the determination of the path by the previous development; 4) identification of factors that deter-mine territorial diversity.

The effects of hysteresis, from the point of view of the authors, are of scientific interest, since they provide information on the susceptibility of the regional economy to shocks; allow assessing the stabilization potential and risks during the period of unfavourable shocks (size of the territory, quality of human potential, transport distance, specificity of the industry structure, etc. *(Angeon and Bates, 2014)*).

Theory and Methods

Regional policy to reduce susceptibility is focused on the ability to predict economic factors resistant to shock, to adequately assess the adaptive capacity of the economy for recovery, knowledge of the degree of elasticity and threshold indicators of vulnerability.

The toolkit for assessing resilience, impact resistance is diverse:

a) the system of private indicators of changes in social, economic, environmental parameters (methodology of the UN Commission on Sustainable Development, World Bank Development Indicators and others) *(Korchagina, 2012)*;
b) an assessment of qualitative indicators such as a measure of resilience and the time it took to recover to the pre-crisis level *(Korobitsin, 2016)*;
c) calculation of the NVRI (Net Vulnerability Resilience Index) *(Angeon and Bates, 2014)*;
d) assessment of the relationship between resilience and its determining factors based on the construction and assessment of regression models *(Cainelli, Ganau and Modica, 2018), (Brakman, Garretsen and van Marrewijk, 2015).*
At the stage of preliminary analysis of the problem and determination of the presence of hysteresis processes in the regions of the Russian Federation, it is logical to assess the current situation in the past, as the accumulated result of the modern reaction to shock.
The methodological tools of the authors included the following stages:
1) determination of the stability of industrial production trends in regions and the presence of a long-term memory effect, when subsequent values are highly dependent on the previous values, which is implemented based on the application of fractal data analysis for the period 2000-2019;
2) detailing the process of reaction to shock: identifying differences in the amplitude, duration, speed, depth of decrease / recovery / growth of economic indicators during the crisis events in the Russian Federation in 2007-2008 and 2013-2014 on the example of regions of the same type (monospecialized with high export dependence). The depth of the fall was defined as the percentage of industrial production decline in comparison with the value on the eve of the decline stage, taken as 100%; under the speed of decline and the rate of rise, the average value of the decline / growth of industrial production is taken as a percentage per month compared to the value of industrial production on the eve of the stage of decline / growth, taken as 100%. The criteria for differentiation when analysing the response to crises are defined as follows: decline - negative growth, recovery - reaching the value of industrial production before the stage of decline, growth - exceeding the indicator in comparison with the pre-crisis value;
3) calculation of differences in variability and ordering of processes in the analysed regions in the context of crisis periods, as an extension of information about the processes of evolutionary adaptability to shock situations of the relative index of entropy and coefficient of variation. In our case, entropy measures the disorder of the change in parameters, indirectly testifies to the spontaneity of processes in the economy, including crisis and post-crisis adaptation. To compare regional reactions, the relative entropy index *(Fedorova, 2016)* was used:

$$E = \frac{1}{n}\sum_{i=1}^{n} \ln \frac{1}{Y_i}, \qquad (1)$$

where Yi is the seasonally adjusted industrial production index for the i-th period.

To assess the variability of the variation series of data in the context of two crisis periods, the variation coefficient was used.

Assessment of the dynamic characteristics of the system assumes the presence of a significant number of observations and a long time series of the studied indicators, which justifies the use of monthly statistics. However, most socio-economic indicators contain a pronounced seasonal component, reflecting the regular changes in its values throughout the year. To exclude the seasonal component of the time series, it is proposed to use the Hodrick-Prescott filter *(Hodrick and Prescott, 1997)*, which allows to decompose the dynamics of socio-economic indicators into a trend and deviations from it (in logarithms):

$$y_t = y_t^g + y_t^c, \qquad (2)$$

Where y_t – actual value of the indicator;
y_t^g – the trend value defined by the filter;
y_t^c – deviation from trend value.

The task of the filter is to minimize the sum of the squares of the deviations under the restriction that the sum of the squares of fluctuations in the growth rates from period to period will not be very large, i.e. the trend is quite smooth. This problem is formulated as follows:

$$\min \sum_{t=0}^{\infty}(y_t^c)^2 + \lambda \sum_{t=0}^{\infty}\left[\left(y_{t+1}^g - y_t^g\right) - \left(y_t^g - y_{t-1}^g\right)\right]^2, \quad (3)$$

where λ – equalization coefficient; the higher λ, the closer the trend is to linear.

For the initial assessment of the stability of the dynamics of regional development as a whole, the identification of the random and fractal nature of the time series of development parameters, as well as the formation of a conclusion about the presence of a long-term memory of the development of economic processes, the use of fractal analysis is justified. The Rescaled Range method (RS analysis) was first proposed by H. Hurst and developed in the works of E.E. Peters *(Peters, 2009)*, B. Mandelbrot *(Mandelbrot and Hudson, 2008)*.

The stages of RS analysis implemented in the article:

1. The logarithmic ratios of the values of the original series S_t are calculated:

$$N_t = \ln \frac{S_t}{S_{t-1}}. \quad (4)$$

2. The series *N* is divided into *A* contiguous periods of length *n*, where *n* is the smallest proper divisor of *N*, not less than 10. Let's designate each period as I_a, where $a = 1, 2, \dots, A$. Let's determine for each I_a the average value:

$$E(I_a) = \frac{1}{n}\sum_{k=1}^{n} N_{k,a}. \quad (5)$$

3. The accumulated deviations of the logarithmic ratios from the mean for each period I_a are calculated:

$$X_{k,a} = \sum_{i=1}^{k}\left(N_{i,a} - E(I_a)\right). \quad (6)$$

4. The normalized ranges within each period are determined:

$$R_{I_a} = \max\left(X_{k,a}\right) - \min\left(X_{k,a}\right). \quad (7)$$

5. Standard deviations for each period $I_a$are calculated:

$$S_{I_a} = \sqrt{\frac{1}{n}\sum_{k=1}^{n}\left(N_{k,a} - E(I_a)\right)^2}. \quad (8)$$

6. For each period, the ratio of the normalized range to the standard deviation is found and the average value for periods of length n:

$$\frac{R}{S(n)} = \frac{\sum_{a=1}^{A}\frac{R}{S(A)}}{A}. \quad (9)$$

7. Steps 2–6 are repeated for large values of *n* until $n \leq N/2$.
8. A graph of the dependence of $\log(R/S(n))$ from $\log(n)$ is plotted and using the method of least squares regression is found in the form $\log(R/S(n)) = H \cdot \log(R/S(n)) + c$, where *H* is the Hurst exponent.

Further, the results obtained are checked for significance. For this, the hypothesis that the analysed structure is normally distributed is tested. R/S are random variables, normally distributed, then we can assume that H is also normally distributed. The asymptotic limit for an independent process is the Hurst exponent equal to 0.5.

The value of the Hurst exponent can be interpreted as follows:

$0 < H < 0{,}5$ is an antipersistent time series, that is, a series in which the so-called "return to the mean" occurs: if the system grows in a certain period, then a decline should be expected in the next period. The system changes faster than random, it is characterized by frequent, but small changes. The time series is a fractal with a negative reaction.

$H = 0{,}5$ - the time series is stochastic.

$0{,}5 < H < 1$ - persistent time series, characterized by the stability of trends and the effect of long-term memory: subsequent indicators strongly depend on the previous values. Time series is a fractal with a positive reaction.
With a small number of observations N, the Hurst exponent tends to evaluate them as persistent (having trends) even on random series. A.A. Enis and E.G. Lloyd *(Anis and Lloyd, 1976)*, E.E. Peters *(Peters, 2009)* suggested using the following expected indicators R/S:

$$E(R/S) = (n \cdot \pi/2)^{-0{,}5} \times \sum_{r=1}^{n-1} \sqrt{(n-r)/r}, \quad (10)$$

where n – number of observations, r – whole numbers from 1 to $n-1$.
For $n < 20$ the following formula is used:

$$E(R/S) = (n-0{,}5)/n \times (n \cdot \pi/2)^{-0{,}5} \times \sum_{r=1}^{n-1} \sqrt{(n-r)/r}\ . \quad (11)$$

The significance of the obtained Hurst exponent is checked by assessing the number of variances by which H differs from $E(H)$. The expected variance will be as follows: $D(H) = 1/N$, where N is the number of observations in the sample. Sample statistics:

$$Z = \frac{|E(H)-H|}{D(H)}. \quad (12)$$

The result is considered significant if $Z > 2$. Otherwise, the hypothesis about the normal distribution of the system is not rejected; the structure is random and has a normal distribution law.

Results

Approbation of the proposed approaches and conclusions on the resilient development of the regions of the Russian Federation were carried out on the example of four monospecialized territorial areas (Chelyabinsk, Lipetsk and Vologda regions, Krasnoyarsk Territory), which have a similar sectoral structure with specialization in the manufacturing industry of the metallurgical profile, the same type of dependence of exports on the world market of ferrous metals. The information base of the research was made up of statistical data and reference materials of the Federal State Statistics Service, statistical collections “Regions of Russia. Socio-economic indicators” and the Unified Interdepartmental Information and Statistical System (EMISS) *(Russia regions. Social and economic indicators, n.d.), (Unified Interdepartmental Information and Statistical System (EMISS), n.d.).*

The basic indicator for assessing the trend and the manifestation of the reaction to shock is the production index (operational data) for the collective qualification group of types of economic activity "Industry" (large, medium and small organizations) during 2000-2019 due to the specifics of official statistics and the availability of regular data. The value 100 corresponds to the volume of industrial production in January 2000. To exclude the seasonal component and equalize the influence of random factors, the time series was levelled using the Hodrick-Prescott filter method (the value of the equalization coefficient $\lambda = 100$).

The dynamics of industrial production (a fragment for the example of two regions is shown in Figs. 1 and 2) allows us to see the differences in the pattern of the trend of shock and post-shock reactions in the Lipetsk and Vologda regions. Attention is drawn to the similarity of the reaction in 2007-2008 (significant decline) and a very different response to the crisis of 2013-2014: the upward growth of the Vologda region and the emergence of a kind of "plateau" in the Lipetsk region.

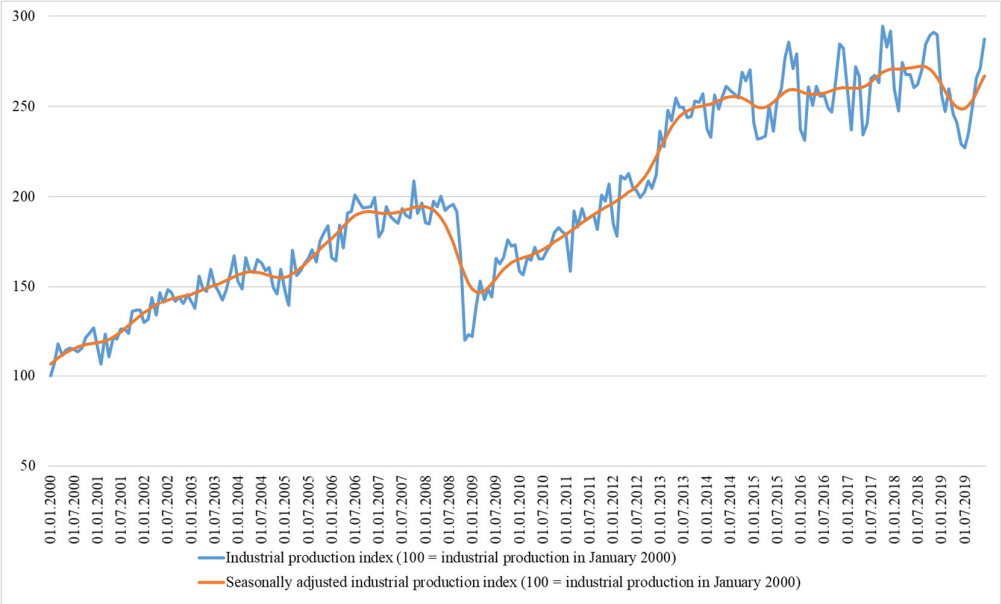

Fig. 1: Dynamics of industrial production in the Lipetsk region

(Source: compiled by the authors)

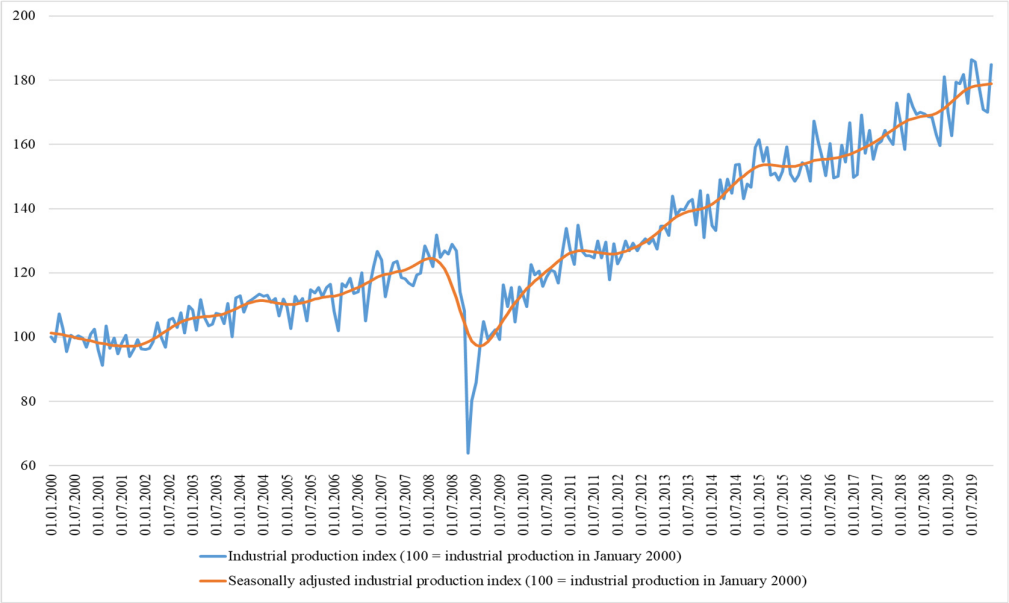

Fig. 2: Dynamics of industrial production in the Vologda region

(Source: compiled by the authors)

The results of a fractal analysis of the seasonally adjusted industrial production index for the period 2000–2019 are presented in Table 1. The Hurst exponent for all regions exceeds the asymptotic limit equal to 0.5 and the expected value of the indicator, determined based on the sample length, is 0.6261, which indicates the persistent nature of the time series. According to the results of the significance test, the Hurst indices for all regions are significant; the hypothesis of the normal distribution of the system is refuted.

Table 1: Results of fractal analysis of the dynamics of industrial production

Region	Hurst exponent H	Time series characteristic	The expected value of the Hurst exponent $E(R/S)$	Sample statistics Z	Significance
Russian Federation	0,8875	Persistent	0,6261	62,7	significant
Krasnoyarsk Territory	0,8952	Persistent		64,6	significant
Vologda region	0,8175	Persistent		45,9	significant
Lipetsk region	0,9309	Persistent		73,2	significant
Chelyabinsk region	0,8227	Persistent		47,2	significant

(Source: compiled by the authors)

The data show the stability of industrial production trends and the presence of the effect of long-term memory, when subsequent values are highly dependent on the previous ones. It should be borne in mind that persistent systems are able to maintain the previous state both in the case of the influence of factors that inhibit development, and in the case of the influence of accelerating factors. In the analysed sample of regions, the highest persistence value is observed in the Lipetsk region, the lowest - in the Vologda region.

At the same time, a detailed analysis of the passage of crises and post-crisis recovery showed a rather high variability of the situation in the context of the phases of the passage of shock processes. In Fig. 3 there is a diagram that allows visualizing the periods, frequency and duration of the processes of de-cline and recovery in the analysed regions.

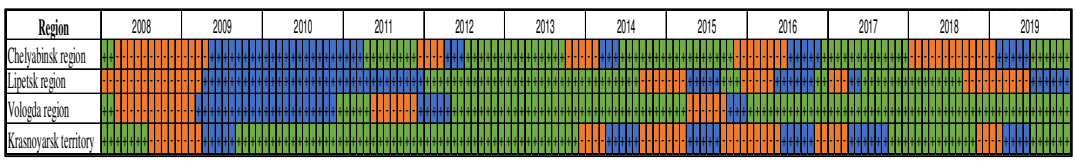

-	- period of decline in industrial production
+	- period of recovery in industrial production
+	- period of industry production growth

Fig. 3: Comparative colour-graphic diagram of industrial production dynamics
(Source: compiled by the authors)

Obvious is a fairly synchronous entry into the crisis of 2008-2009 and absolute asynchrony and a high frequency of periods of slowdown in growth rates at the stage of the second crisis and post-crisis processes in 2013-2014. This makes us talk about the presence of its own unique background for each region, specific adaptability, and unrepeatable processes of change that provoked the first stage and influenced the absolute diversity of the pattern of the second crisis. It is noteworthy that the number of reduction stages reached a maximum of 2 in the first, and 5 in the second period in the group of analysed regions.

Depths of fall, speed of decline and ascent, as well as spread in months are shown in Fig. 4.

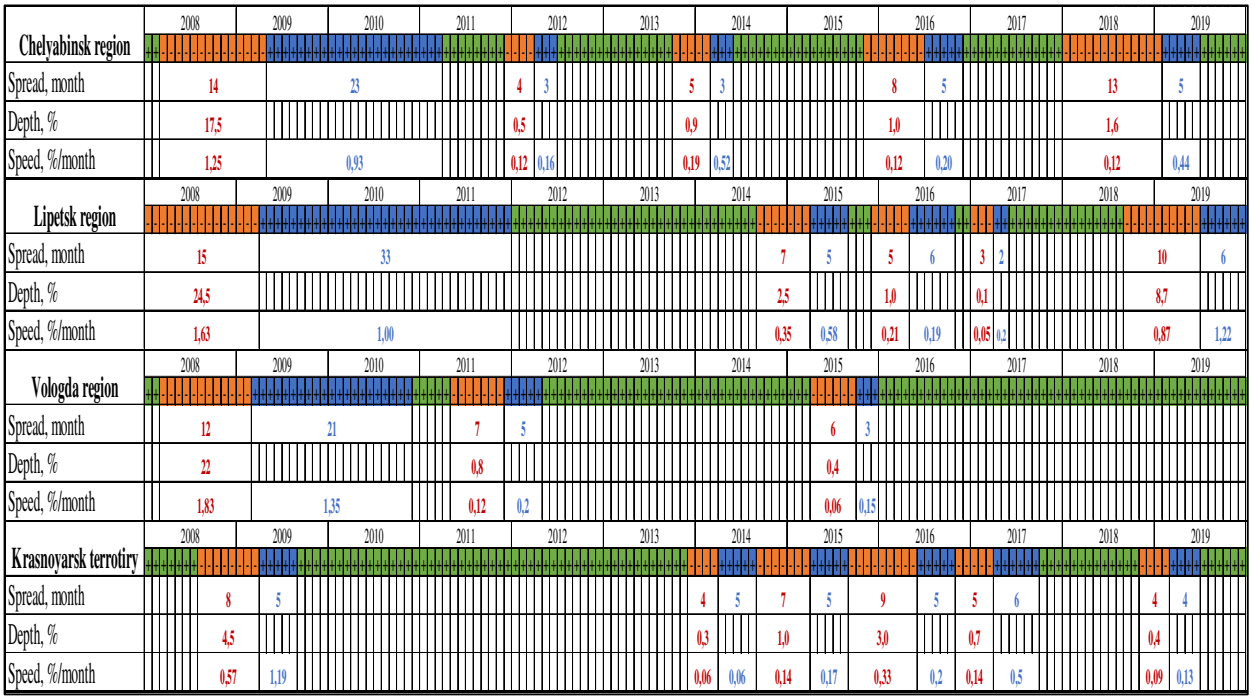

Fig. 4: Summary characteristics of the dynamics of industrial production

(Source: compiled by the authors)

To detail the situation, the periods are analysed separately. To determine the phase characteristics, the parameters of the duration, speed and depth of the crisis fall are highlighted (Table 2).

Table 2: Characteristics of the dynamics of industrial production in 2008–2012 (Period I)

Region	Number of decline stages	Total duration of stages, month */rank**					Period of recovery and growth	The total value of the decline in production, %	Average chronological speed, %	
		decline	rank	recovery	growth	rank			decline	recovery
Chelyabinsk region	2	18 (30%)	3	26 (43%)	16 (27%)	2	42	18,0	1,00	0,84
Lipetsk region	1	15 (25%)	2	33 (55%)	12 (20%)	4	45	24,5	1,63	1,00
Vologda region	2	19 (32%)	4	26 (43%)	15 (25%)	3	41	22,8	1,20	1,13
Krasnoyarsk territory	1	8 (13%)	1	5 (8%)	47 (78%)	1	52	4,5	0,57	1,19

(Source: compiled by the authors)
** The proportion of the period in each stage is shown in brackets.*
*** Rank 1 – the best indicators. 4 – the worst.*
Light grey shading is the best and dark grey is the worst.

Attention is drawn to the presence of two regions with the most unfavourable indicators: the Vologda region and the Lipetsk region. If we evaluate the total value of the decline in production as the main feature, then a drop by 20 to 25% is a serious test for the economy, with the highest rate of decline. At the same time, the stability of all regions forces us to pay attention to the factors of these regions, which make it possible to "take the blow" of the shock. Comparison with the period 2013–2019 allows us to see changes in the adaptation of the regional economy (Table 3).

Table 3: Characteristics of the dynamics of industrial production in 2013–2019 (Period II)

Region	Number of reduction stages	Total duration of stages, month */rank**					Period of recovery and growth	The total value of the decline in production, %	Average chronological speed, %	
		decline	rank	recovery	growth	decline			decline	recovery
Chelyabinsk region	3	26 (31%)	3	13 (15%)	43 (51%)	2	56	3,5	0,13	0,37
Lipetsk region	4	25 (30%)	2	19 (22%)	40 (48%)	3	59	12,4	0,50	0,61
Vologda region	1	6 (7%)	1	3 (4%)	75 (89%)	1	78	0,4	0,06	0,15
Krasnoyarsk territory	5	29 (35%)	4	25 (30%)	30 (35%)	4	55	5,3	0,18	0,23

(Source: compiled by the authors)

* The proportion of the period in each stage is shown in brackets.
** Rank 1 – the best indicators. 4 – the worst.
Light grey shading is the best and dark grey is the worst.

The unequal value of periods I and II is obvious, both in the duration of the recovery and growth phases, and in the depth of fall and the speed of passing the stages:

1) in all analysed regions, the rate of decline is greater in the first period, and the rate of recovery - in the second, which may be due to the fact that economists consider the first crisis to be deeper due to the scale of coverage of industries;

2) it is obvious that in each period there are regions (in I - Krasnoyarsk Territory and in II Vologda and Lipetsk regions) with a maximum period of recovery and growth, a minimum rate of decline and a maximum rate of recovery. At the same time, the Lipetsk region again has a greater depth of fall (2 times less than in the previous period), while in the Vologda region the crisis decline is close to zero, the Krasnoyarsk Territory remained practically at the same level, and the Chelyabinsk region decreased by 6 times. This makes us talk about the special stability of the region's economy to such successive crisis strikes, which is confirmed by calculations of the persistence indicator: the Lipetsk region has the highest. The depth of the fall, in the opinion of the authors, is associated either with the slowness of the formation of adaptive prerequisites in the economy, or with active transformational changes (which is confirmed by the leadership of the region in most innovative projects; it is known that reforms reduce the speed of other economic processes). As a hypothesis about the reasons for the unfavourable situation in the Krasnoyarsk Territory from the standpoint of the passage of the 2013-2014 crises it is possible to make an assumption about the presence of sectoral changes in the first period, which worsened all indicators, and in the second period. At the same time, the profound impact on the Lipetsk region in terms of the depth of the fall and the rate of dumping of production volumes, on the contrary, makes us assume the stability of processes in the economy and its structure.

3) Some regions are actively transforming, which may be evidenced by an increase in the frequency of short-term discharges, or vice versa - there is an internal adaptation of the economy. Of course, the nature of shocks is different, but since all regions are of the same profile and mono-specialization, when comparing the phase characteristics of crises, a rather similar reaction (in frequency, depth and speed) was observed. In the first crisis period, the recovery stage is longer than growth (with the exception of the Krasnoyarsk Territory), and in the second, growth is noticeably longer, again this indicates a certain adaptive function. The total value of the depth of the fall in the second stage is much less than the first, but the duration (the total amount of short-term discharges) is longer.

To understand the variability and orderliness of economic processes in the context of the analysed crisis and post-crisis stages, an assessment of the indicators of entropy and variation was carried out.

Table 4: Entropy and Variation in Industrial Production Index with Seasonality

Region	Relative index of entropy for the period 2008-2012	Relative index of entropy for the period 2013-2019	Variation coefficient for the period 2008-2012	Variation coefficient for the period 2013-2019
Chelyabinsk region	-721,08	-1045,72	7,47	11,30
Lipetsk region	-932,61	-1425,86	10,83	3,64
Vologda region	-567,38	-795,97	8,89	7,76
Krasnoyarsk territory	-740,67	-1032,29	13,50	3,47

(Source: compiled by the authors)

The entropy index in the second period of the crisis increased significantly, which hypothetically may show, other things being equal, on the one hand, the activation of internal processes to strengthen adaptive functions, the activity of innovative changes, structural restructuring and processes of diversification or strengthening of specialization. On the other hand, there is a higher disorder, which is confirmed by frequent drops in production rates. To strengthen the argumentation, Table 5 shows indicators of changes in economic efficiency for 2000 – 2019*.

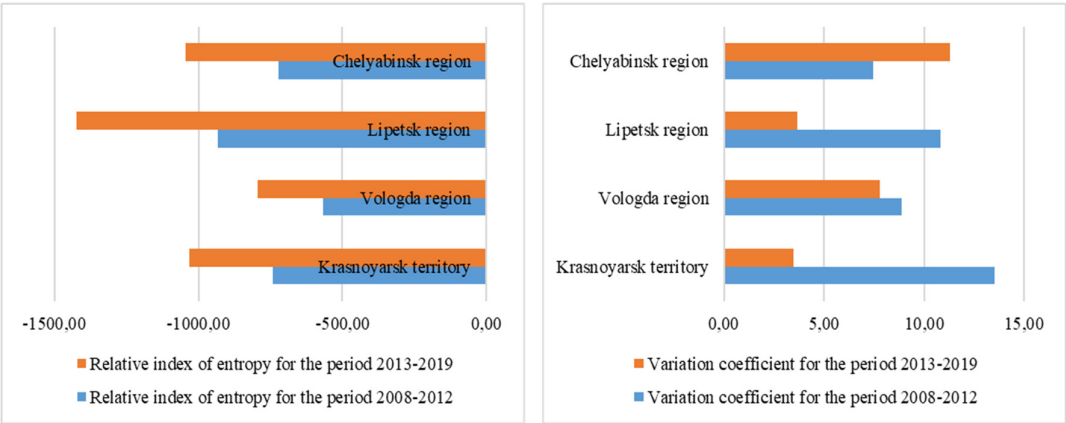

Fig. 5: Coefficients of relative entropy and variation in the context of crisis periods for monospecialized regions of the Russian Federation

(Source: compiled by the authors)

Table 5: Changes in the economic parameters of mono-specialized regions in the context of crisis processes and post-crisis reactions

Parameters/ regions		Period I						Period II				
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Herfindahl-Hirschman Index	Chelyabinsk region	2156,5	2027,9	1684,0	1823,4	1801,4	1771,8	1521,2	1652,2	1777,6	1748,8	1627,1
	Lipetsk region	3033,7	3084,1	2233,1	2147,0	1980,4	1613,1	1674,8	2118,5	2143,7	2229,1	1966,3
	Vologda region	2471,7	2801,3	1822,2	1937,9	2122,6	1856,6	1697,1	1814,6	2075,3	1963,0	1917,2
	Krasnoyarsk territory	2789,0	1835,1	1479,3	1980,2	1740,4	1484,8	1428,2	1557,3	1681,4	1645,6	1643,7
Return on investment in manufacturing industry, %	Chelyabinsk region	637,0	430,7	290,9	416,5	442,5	579,1	506,7	691,4	768,8	759,7	701,3
	Lipetsk region	477,2	416,6	305,5	328,0	276,9	369,8	501,7	1070,3	791,9	656,5	442,8
	Vologda region	645,7	764,4	548,1	638,0	575,6	539,8	476,2	575,9	504,1	411,2	451,4
	Krasnoyarsk territory	1402,0	761,7	823,5	859,0	697,7	415,8	405,4	549,4	528,7	502,5	729,2
Return on Assets in manufacturing industry, %	Chelyabinsk region	21,5	5,3	5,3	6,6	1,2	3,7	-5,1	1,4	7,0	11,4	9,8
	Lipetsk region	21,0	23,5	6,8	8,7	7,2	5,3	-0,6	3,5	8,9	8,3	16,7
	Vologda region	15,8	14,8	1,7	-3,9	2,9	5,2	2,5	-5,7	10,0	20,7	25,5
	Krasnoyarsk territory	28,8	-3,9	14,2	18,1	15,3	11,0	9,2	6,8	12,8	19,7	15,5
The share of innovative goods in the volume of industrial goods, %	Chelyabinsk region	2,9	4,6	2,6	2,4	3,0	5,9	8,0	4,6	5,2	3,4	7,2
	Lipetsk region	3,6	4,7	12,5	9,8	9,9	10,9	13,3	13,6	12,3	10,5	9,3
	Vologda region	7,5	6,2	2,6	1,6	3,7	4,7	4,4	18,6	21,6	4,3	2,9
	Krasnoyarsk territory	2,0	1,6	0,6	0,5	1,1	3,4	5,1	4,0	4,0	4,1	3,3

(Source: compiled by the authors Calculated by the authors according to the data of the Federal State Statistics Service (Regions of Russia. Socio-economic indicators) - URL: https://www.gks.ru/folder/210/document/13204).*

The minimum indicators of the variation series are highlighted with dark grey.

Highlighted with dark grey shading shows the lowest values of indicators, with light grey shading - the maximum of the pre-crisis 2007, which was not achieved in a number of regions and indicators in the subsequent 2017. Many low values of indicators are localized in 2009-2010, which relate to the second and third years of the crisis. At the same time, the second period is characterized by a fairly quick reaction already in 2013 and a synchronous transition to a phase of decline: indicators of return on investment and return on assets (compared to 2012). One gets the impression that the first crisis gave impulse to innovations, which in 2013 reached their maximum indicators in all regions. Note that both the first and second crisis situations caused a sharp increase in diversification in the regions, Herfindahl-Hirschman Index reached a minimum in 2009; the subsequent increase in concentration was again interrupted by the second crisis situation.

Conclusion

Thus, the analysis made it possible to confirm the presence of hysteresis processes in the economy of open monospecialized regions, their different impact resistance to crisis processes, the presence of unique economic advantages of adaptation to shock situations and the originality of phase reactions. Resistance to shocks is manifested in: 1) speed of return; 2) the scale and depth of the socio-economic consequences of the shock; 3) the presence of factors capable of reorganization and modernization (often associated with a change in the economic efficiency of a business, including investments, assets, diversification of the industry structure, activity of innovative industries); 4) budgetary resources and program measures of regional authorities to adapt to shock

events. Analysis of regional shock resistance allows anticipating, preparing and reducing the costs of recovery, form individual development path.

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Methods for Assessing the Effectiveness of Russian Regional Transport and Logistic Systems of Road Freight

Georgiy GREYZ
Department of Management, School of Economics and Management, South Ural State University, Chelyabinsk, Russian Federation, ggreyz09@mail.ru

Julia KUZMENKO
Department of Management, School of Economics and Management, South Ural State University, Chelyabinsk, Russian Federation, julia.kyzmenko@gmail.com

Tatyana KONOVALOVA
Department of Management, School of Economics and Management, South Ural State University, Chelyabinsk, Russian Federation, konovalova02@mail.ru

Irina SMIRNOVA
Department of Management, School of Economics and Management, South Ural State University, Chelyabinsk, Russian Federation, irsmi50@yandex.ru

Ruslan TURLAEV
South Ural State University, Chelyabinsk, Russian Federation
turlaevruslan@gmail.com

Abstract

The article deals with the analytical methods for performance evaluation of regional transport and logistics systems of trucking. To evaluate the functioning of regional transport and logistics systems, 4 groups of key indicators are applied: 1. Geopolitical indicators 2. Economic indicators 3. Infrastructure indicators 4. Logistic indicators. These methods provide an integral evaluation (rating) for each group of indicators on the basis of individual indicators. The mathematical methods of the fuzzy set theory are proposed for the integral evaluation of the transport and logistics systems performance. These methods provide adequate evaluation of heterogeneous information about the condition of transport and logistics systems. The analytical methods make it possible to obtain a comparative performance evaluation of various transport and logistics systems.

Keywords: Logistics, Regional Transport and Logistics Systems, Trucking, Key Performance Indicators Groups, Performance Evaluation Methods, Fuzzy Sets Theory.

Introduction

Nowadays, generally accepted approaches to performance evaluation of regional transport and logistics systems of trucking have not been developed in logistics. There is currently no ready-made set of groups of key logistics performance indicators and their corresponding criteria (indicators) suitable for performance evaluation of regional transport and logistics systems of trucking.

As a result, no consistent conceptual approaches to performance evaluation of transport and logistics systems, including regional transport and logistics systems of trucking (RTLS) have been developed yet. The problems of performance evaluation of transport and logistics systems on the basis of integral rather than particular criteria cannot be considered solved either. The development of such methods (algorithm) can become not only a measure for performance evaluation in logistics, but also an effective tool for the development of transport systems, a guideline in choosing the directions for their improvement.

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Finding of The Main Groups of Key Indicators for Performance Evaluation of Regional Transport and Logistics Systems of Trucking

Based on the analysis of previous research works the authors propose to evaluate the performance of RTLS functioning of trucking with a set of the following groups of key indicators.1. Geopolitical indicators 2. Economic indicators 3. Infrastructure indicators 4. Logistic indicators

1. Geopolitical indicators
The geopolitical indicators of the region's highways are to be estimated by the TE1 indicator, which takes into account the importance of highways and their financing conditions.

$$\mathrm{TE1} = \sum(L_{EHW} + L_{FHW})/\sum L_{THW}, \quad (1)$$

where L_{EHW} – length of European routes highways; L_{FYW} – length of federal highways; $\sum L_{THW}$ – total length of regional highways.
The category of highways is to be evaluated by the indicator TE 2. TE2 is the ratio of the length of category 1 highways (1A + 1B + 1C) to the total length of the regional highways:

$$\mathrm{TE\ 2} = \sum(L_{1\mathrm{A}} + L_{1\mathrm{B}} + L_{1C})/\sum L_{THW}, \quad (2)$$

where $L_{1\mathrm{A}}$, L_{1B}, $L_{1\mathrm{C}}$ – length of category 1A highways (motorways, 1B (express roads), 1C (the road of common type with no less than 4 lines and a median strip).
The overall geopolitical indicator (GI) for the regional roads evaluation can be found as the sum of the TE1 and TE2 indicators. To enhance the significance of the TE2 indicator in relation to the TE1 indicator, we introduce weight numbers of 0.6 and 0.4 and perform standardization to bring the value of this indicator to the range [0;1]

$$\mathrm{GI} = (0{,}4 * \mathrm{TE\ 1} + 0{,}6 * \mathrm{T}E\ 2)/(\mathrm{TE\ 1}_{max} + \mathrm{TE\ 2}_{max}) \quad (3)$$

Taking into account that the maximum values of TE1 and TE2 are equal to 1, the expression (3) acquires the form:

$$\mathrm{GI} = (0{,}4 * \mathrm{TE1} + 0{,}6 * \mathrm{TE2})/2 \quad (4)$$

2. The group of economic indicators of RTLS trucking performance

As previously noted, nowadays there is no consensus on common criteria and indicators for performance evaluation of regional transport and logistics systems of trucking. The authors consider that it is associated, first of all, with the specific character of performance evaluating of RTLS and the methods of its measurement. In addition, this evaluation is carried out within the framework of various methods (methodologies), which inevitably affects the final results.

Taking into account these circumstances, it was decided to use the indicators given in the relevant sections of the federal and regional statistics reports as the main economic indicators. Let us consider the generally accepted statistical indicators characterizing trucking:

1. The road freight turnover of all types of companies, mln.t-km
2. The volume of transported goods - total, thousands tons
3. The turnover of organizations by the type of economic activity (transportation and storage)
4. Gross value added by type of economic activity (at current basic prices, million rubles)
5. The ratio of the RTLS freight turnover dynamics to the freight turnover in the Russian Federation (or the federal district) dynamics.
The integral rating for the group of economic indicators of regional transport and logistics systems of trucking performance can be calculated according to the following algorithm:
1. We determine the values for the indicators included in the group of economic indicators of regional transport and logistics systems of trucking performance, and introduce the following designations:

I_1^{EIj} – road freight turnover of all types of companies; I_2^{EIj} – the volume of transported goods; I_3^{EIj} – the turnover of organizations by the type of economic activity (transportation and storage); I_4^{EIj} – gross value added by type of economic activity (transportation and storage) at current basic prices; I_5^{EIj} – the ratio of the RTLS freight turnover dynamics to the freight turnover in the Russian Federation (or the federal district) dynamics;
j – the reference number of region's transport and logistics system of trucking evaluated by a comparative performance analysis.
2. Individual ratings R_i^{EIj} for each I_i^{EIj} indicator are calculated as follows:

$$R_i^{EIj} = \frac{I_i^{EIj}}{I_{i\,max}^{EIm}} * d_i^{EIj}, \tag{5}$$

where $I_{i\,max}^{EIm}$ – the maximum value of the *i*-th economic indicator among the regional transport and logistics systems of trucking, evaluated by comparative analysis of performance (the designation corresponds to the transport and logistics system with the reference number *m*); d_i^{EIj} – dynamics of I_i^{EIj} indicator, which is calculated as the ratio of I_i^{EIj} indicator in the current period to the same indicator of the base period.
3. The integral rating of the group of economic indicators of the performance of the j-th regional transport and logistics system of trucking R_{EI}^j is calculated as follows:

$$R_{EI}^j = \sum_{i=1}^{n} k_i * R_i^{EIj} \tag{7}$$

where R_i^{EIj} – rating value of *i*- indicator; k_i – weight of *i*-th indicator; *n* – total number of R_i^{EIj} indicators.
The weighted values of the k_i indicators can be obtained using a matrix of paired comparisons, implying a pairwise comparison of the importance of each indicator with other indicators of this group or using another method.
3. The group of infrastructural indicators of RTLS of trucking
Keeping the approach provided in the subsection devoted to the choosing of economic indicators, we will focus on infrastructure indicators, the basis for their calculating can be found in the reports of federal and regional statistics.
1. Evaluating the level of the area transport infrastructure development is carried out with various coefficients. Engel's coefficient and its modifications, such as Goltz's, Uspensky's and Vasilevsky's coefficients are mostly used to evaluate such an element of transport infrastructure as a communication route. These indicators do not exhaust the quantitative evaluation of such a complex concept as transport infrastructure. Taking into account the availability of the initial data for the calculation of these coefficients, we will take Goltz's, Uspensky's and Vasilevsky's coefficients as indicators of the transport infrastructure of regional transport and logistics systems of trucking, *(Amirov and Amirov, 2012).*

$$\text{Goltz's coefficient: } d_G = \frac{L}{S*N}, \tag{8}$$

where *L* – total length of roads; *S* – area; *N* – number of settlements.

$$\text{Uspensky's coefficient: } d_U = \frac{L}{S*H*t}, \tag{9}$$

where *H* - population size; *t* – total weight of goods transported over the territory.

$$\text{Vasilevsky's coefficient: } d_V = \frac{L}{\sqrt[3]{S*H*Q}}, \tag{10}$$

where Q – total weight of produced goods.

The integral rating for the group of infrastructure indicators is calculated according to the algorithm used for the integral rating for the group of economic indicators.

4. The group of logistic indicators of regional transport and logistics systems of trucking
A number of indicators, mentioned in various publications directly or indirectly as logistic, are not the same according to their content. Based on the analysis of available materials and the availability of indicators or data for

their calculation, the authors believe that the category of logistic indicators of regional transport and logistics systems of trucking should include:

1. The average time of transportation of one ton of cargo, days / tons (days / thousands of tons). This indicator with a sufficient degree of conventionality can be calculated as:

$$t_{goods} = \frac{365}{Q}, \tag{11}$$

where Q – total volume of transported cargo on the RTLS territory, tons (thousands of tons).
In terms of its content, this indicator is the single cycle time of goods traffic through the RTLS and can serve as a characteristic of the traffic performance. Naturally, the shorter the single-cycle time is, the more efficiently the goods traffic is organized.

2. Motorways crossing the state border. This indicator can take only two values: 1 - if such an intersection exists on the territory of the transport and logistics system and 0 - if there is no such intersection.
In addition to these indicators, classified by specialists as logistic, the authors propose to use the following additional indicators, the calculation of which is possible on the basis of publicly available statistics.

3. Traffic burden. According to the author, "traffic burden" as an indicator from the list of characteristics of various routes of communication is attributed to logistic. As a rule, the traffic burden is the amount (mass) of goods passing through a certain section of the road per unit of time. With regard to the regional transport and logistics system of trucking, this indicator is proposed to be calculated as follows:

$$G = \frac{Q}{L}, \tag{12}$$

where L – total length of goods traffic, ths.km.
In its turn, the value of the transportation length L can be calculated on the basis of public data by dividing the freight turnover of road transport by the volume of goods transported on the territory of the RTLS. Taking this approach into account, the expression (G) is the following:

$$G = \frac{Q^2}{Q_L}, \tag{13}$$

where Q_L – road freight turnover, thousands tons*km.
4. Average length of transportation of one ton of cargo, km. This indicator can be calculated in accordance with the expression (L5):

$$l_{car} = \frac{Q_L}{Q} \tag{14}$$

5. Completeness of regional transport network usage, %

$$\alpha = \frac{l_{car}}{L_0} * 100\%, \tag{15}$$

where L_0 – total length of federal roads, km.

The integral rating for a group of logistic indicators is calculated according to the algorithm used to calculate the integral rating for groups of economic and infrastructural indicators.

Methods for Performance Evaluation of Regional Transport and Logistics Systems of Trucking Based on The Transfer of Tools of The Fuzzy Set Theory

There is such a situation in different spheres of activity and scientific research when it is necessary to make decisions in the absence of certain information. The solution of such problems became possible with the fuzzy set theory, the foundations of which were laid in 1965 *(Zadeh, 1965)*. This theory has been applied in control systems

for complex technological processes, as well as in many other areas. *(Altunin and Semukhin, 2002), (Kuchin, 1987), (Borisov, Kruglov and Fedulov, 2007), (Peeva and Kyosev, 2006) et al.*

In this situation, when evaluating the performance of the regional transport and logistics systems of trucking on the basis of the proposed system of indicators, the initial information for calculations can also be considered, to a certain extent, as fuzzy information. Fuzziness in this case is developed by not quite definite numerical values of the selected indicators, the ratio (weight) of the influence on the performance of individual groups of the selected indicators. It is the relative strength of influence on the performance of regional transport and logistics systems of geopolitical, economic, infrastructural and logistic factors that creates a certain ambiguity in performance evaluation. The region and a number of other circumstances affect the weights of the influence of various groups of indicators. They can vary within a certain range with unclear boundaries. In addition, finding of "clear" values of individual indicators is not always possible, and in such cases it is possible to use their probable values, which can also lead to ambiguity.

Fuzziness of the influence weights of individual groups of indicators and fuzzy (probabilistic) values of some indicators provide adequate use of the fuzzy set theory in the system for performance evaluation of regional transport and logistics systems of trucking. In our opinion within the framework of the developed system for performance evaluation of regional transport and logistics systems the fuzzy set theory allows to adequately take into account a variety of information characterizing the indicators of transport and logistics systems and represent it in the form of membership functions.

Let us consider the opportunities of the fuzzy set theory application stated in *(Greyz, 2015), (Ukhobotov, 2011).* 1. Calculating of the sub direct image of a fuzzy set. With regard to the tasks of this study, the problem can be presented as follows: a) there is a set of certain objects (regional transport and logistics systems of trucking) that have b) a set of certain characteristics (indicators) and to evaluate these objects c) there is a group of relevant criteria (criteria set of attributes (indicators)). The result is the identification of an object that, in terms of a set of properties, most closely matches the criteria set.

The statement and designation of the symbols of this problem will be performed similar to the problem given in *(Greyz, 2015)*, and we will obtain its solution in matrix form:

$$\left(p_1, p_{2,} \dots p_{i,} \dots, p_n\right) \blacklozenge \begin{bmatrix} r_{11} & r_{12} & \dots r_{1j} \dots & r_{1m} \\ r_{21} & r_{22} & \dots r_{2j} \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{i1} & r_{i2} & \dots r_{ij} \dots & r_{im} \\ \dots & \dots & \dots & \dots \\ r_{n1} & r_{n2} & \dots r_{nj} \dots & r_{nm} \end{bmatrix} = \left(q_1, q_2, \dots, q_j, \dots q_m\right) \qquad (16)$$

where $p_1, p_{2,} \dots p_{i,} \dots, p_n$ – fuzzy values of features $x_1, x_{2,} \dots x_{i,} \dots, x_n$ in criterial set, $r_{11} \dots r_{nm}$ – elements of matrix R , which present fuzzy values of features x for elements y (economic entities) ; $q_1, q_2, \dots, q_m -$ degrees of membership of elements $y_1, y_2, \dots, y_m$ in the image of fuzzy set A, which can be interpreted as a degree of conformity of the complex of economical entities' properties with the present criterial set of values of these features; n – number of features x; m – number of elements y (economic entities).
Solutions of expression (1) in the coordinate form are the following expressions:

$$\begin{gathered} min\ ((p_1 \blacksquare r_{11});\ (p_2 \blacksquare r_{21}); \dots \left(p_i \blacksquare r_{j1}\right);\ \dots (p_n \blacksquare r_{n1})) = q_1 \\ min\ ((p_1 \blacksquare r_{1m});\ (p_2 \blacksquare r_{2m}); \dots \left(p_i \blacksquare r_{jm}\right);\ \dots (p_n \blacksquare r_{nm})) = q_m \end{gathered} \qquad (17)$$

The so-called cut-off operation (■), can be presented as follows:

$$\mathrm{p} \blacksquare \mathrm{r} = \begin{cases} 1 \text{ when } \mathrm{p} \le \mathrm{r} \\ \mathrm{r} \text{ when } \mathrm{p} > r \end{cases} \qquad (18)$$

The larger q value (potential range of values [0;1]) is, the larger the compliance of the economic entity with the present criterial set of features is.

Thus, the complex indicator of compliance of the economic entity with the criterion set q can be considered as an integral indicator of the performance of the regional transport and logistics system of trucking.

To illustrate the application of the proposed methods, let us consider a conditional example of comparing several regional transport and logistics systems of trucking. We take the following values of the criterion set of features: $\{(x_1 \mid 1{,}0);\ (x_2 \mid 1{,}0); (x_3 \mid 1{,}0); (x_4 \mid 1{,}0)\}$.

Let us find out the degree of compliance of $q_1 - q_4$ of the complex of features for economic entities $y_1 - y_5$ to a given criterial set of values of these features $p_1 - p_6$ based on the tools of the problem "finding a sub direct image of a fuzzy set" (formulae (16); (17); (18):

$$(1{,}0;\ 1{,}0;\ 1{,}0;\ 1{,}0) \blacktriangleleft \begin{array}{c} \text{Transport and logistics systems №} \\ \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} 0{,}96 & 0{,}34 & 0{,}66 & 0{,}45 & 0{,}44 \\ 0{,}85 & 0{,}60 & 0{,}63 & 0{,}96 & 0{,}60 \\ 0{,}64 & 0{,}50 & 0{,}52 & 0{,}69 & 0{,}50 \\ 0{,}96 & 0{,}62 & 0{,}52 & 0{,}18 & 0{,}29 \end{bmatrix} \end{array} = (0{,}64;\ 0{,}34;\ 0{,}52;\ 0{,}18;\ 0{,}29)$$

The degree of compliance with the specified criteria equals to: $q_1 = 0{,}64; q_2 = 0{,}34;\ q_3 = 0{,}52; q_4 = 0{,}18; q_5 = 0{,}29$. Interpretation of these results shows that the evaluated economic entities (regional transport and logistics systems) can be arranged in the following way (as the performance decreases): №1 → №3 → №2 → №5 → №4.

Conclusions

Thus, the proposed analytical methods give an integral quantitative performance evaluation of regional transport and logistics systems of trucking. The methods are based on the calculation of key indicators, divided into four groups: Geopolitical indicators, Economic indicators, Infrastructure indicators and Logistic indicators. A distinctive feature of the methods is that it is able to obtain an integrated evaluation of the effectiveness for each assessed regional transport and logistics system using the particular heterogeneous indicators of various groups. The mathematical apparatus of the fuzzy set theory provides such an integral evaluation. It adequately evaluates heterogeneous information about the condition of transport and logistics systems. In particular, the methods use the toolkit for applying the fuzzy set theory such as "definition of a sub direct image of a fuzzy set", which defines a transport and logistics system that, in terms of a set of properties, most closely matches the selected criterial set of features and therefore has a better performance.

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Analysis of the Influence of Economic Factors on Labor Productivity

Sergei ALIUKOV
South Ural State University (National Research University), Chelyabinsk, Russia,
alysergey@gmail.com

Anatoliy ALABUGIN
South Ural State University (National Research University), Chelyabinsk, Russia
alabugin.aa@mail.ru

Natalia TIKHONOVA
South Ural State University (National Research University), Chelyabinsk, Russia,
nvtikhonova@susu.ru

Abstract

The assessment of the impact of various economic indicators on labor productivity in the conditions of the transition of systems from industrial conditions of the 1st-3rd order of the economy to the 4th and subsequent levels of development of society in the post-industrial knowledge economy. The most significant indicators were identified using multiple regression analysis. The possibility of increasing the controllability of the speed of transformations of systems in the conditions of transformation processes is determined. The tasks of implementing the methods in the strategy of highly efficient transformations and the formed control mechanism for increasing the speed of transformations are solved. The analysis of the factors considered made it possible to switch from multiple regression analysis to fuzzy modeling methods that allow making forecasts of labor productivity values for specific industrial enterprises. The main indicator of labor productivity is the output per employee. The results of the study allow us to assess the possibilities of a controlled reduction of uncertainty in the implementation of high-tech innovative transformations, increasing the efficiency and speed of system transformations.

Keywords: productivity, speed and efficiency of transformations; factors; transformation of economic structures.

Introduction

The relevance of taking into account the factors of transformation of the organizational and technological structures of the economy follows from the constant increase in their importance in the period 2000-2050. The needs of the development of society on a post-industrial basis are not met in the conditions of the 1-3rd organizational and technological structures, since evolutionary processes prevail, characterized by a relatively low speed. It is necessary to improve methods for assessing and increasing the rate of innovative transformations of systems during the transition to the 4th order, a sharp increase in labor productivity. At the same time, scaling of the achieved levels of innovativeness of transformations of the types of activity of systems and management methods is ensured. Revolutionary processes of high-speed innovative transformations of the material type (the term "high-tech" is common in world practice) are necessary in the transition to the 5th and, especially, 6th economic structures. The significance of the increase in speed is determined by the lag in the growth of innovative capabilities of low-tech equipment in comparison with the rapid development of the unique needs of society. At the same time, there are innovative technological principles that determine the emergence of new production relations, technology for the formation of social consciousness. The increasing strategic gaps of these factors-challenges with their application in practice lead to an imbalance. This determines the purpose of the study as improving methods for assessing and regulating the rate of processes of innovative transformations of objects of activity according to the factors-challenges of transformation of structures for the transition from 3-4 to 5-6 economic structures, methods of increasing labor productivity. It is advisable to use the method of combining models and technologies.

Proposals are known for assessing the degree of development of an object by factors of innovation transformation. M.G. Delyagin proposes to define it by the levels of the technological pyramid. In the period 2014-20, there was an

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increase in the number of publications on the relationship between the rate of emergence of new business models and the sustainability of development (Reefke, et al., 2013; Alt, et al., 2014; Seelos, 2014). For many organizations, existing profit-driven business models are a major obstacle to achieving sustainability. Such models of market behavior were quite effective in the processes of evolutionary transformations. However, in the context of a relatively rapid transition to a knowledge economy, profit orientation is insufficient. W. Stubbs and C. Cocklin outlined a number of normative principles of organizational development that form the "ideal type" of a business model focused on sustainability. The choice of a method for combining high-tech, tech-hume and foresight technologies for innovative transformations necessitates assessing the relationship between spatio-temporal and speed parameters of the direction of their impact on the long-term sustainability of the development of system objects, increasing labor productivity at industrial enterprises. Improving the theory in accordance with the stated purpose of the study requires a theoretical model and methodology for managing high-tech innovations, assessing the factors affecting productivity. This is confirmed by the well-known methodological proposals of P.F. Drucker], I.K. Adizes, models of spiral dynamics by K. Graves, F. Laloux. The openness of subjects and objects to the new provides in developed countries up to 80% of its growth (Aganbegyan, 2017). Consequently, the main in these complexes should be personnel receptive to innovations, as the basis for increasing labor productivity. This corresponds to the model of the spiral dynamics of "turquoise enterprises" identified in the studies of F. Laloux and B. Robertson and technology-hume technologies. According to Acad. A.G., investments in such capital should grow at an outstripping rate of 8-10% per year. Such methods should be included in separate stages of theoretical models and methodologies of the integration-balancing type of management.

Regression Analysis

Seventeen enterprises in Chelyabinsk and the Chelyabinsk region (Russia) collected data for economic indicators. These indicators and their designations are shown in Table 1.

Table 1: initial indicators

X1	Production per employee, thousand rubles
X2	Share of workers employed at machines and mechanisms,%
X3	The share of workers employed manually outside machines and mechanisms,%
X4	Staff turnover rate
X5	Shift rate for all workers
X6	The share of profile products in the total volume of products,%
X7	Share of purchased products and semi-finished products in production costs,%
X8	Share of specialists and employees in the total number of employees,%
X9	Capital-labor ratio per worker, thousand rubles
X10	Potential electrical equipment, kW
X11	The share of machines in technological equipment

(Source: compiled by the authors)

The collected values for the selected indicators are given in Table 2.

Table 2: initial data

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
70,02	36,75	33,07	11,00	1,45	94,36	1,75	12,80	84,32	22,27	31,23
62,68	42,30	34,73	12,00	1,27	90,74	6,72	17,44	111,53	32,22	30,76
61,51	34,33	39,32	11,00	1,36	96,30	7,50	15,50	79,73	15,50	40,00
52,75	33,29	37,50	16,00	1,44	95,20	2,30	13,10	64,71	12,30	40,20
54,96	31,62	32,20	18,00	1,29	96,10	,20	15,30	104,23	16,40	30,20
50,22	41,78	28,70	25,00	1,56	92,20	10,30	18,10	85,53	27,80	22,40
61,49	43,35	23,60	22,00	1,17	95,30	7,50	16,00	92,29	27,80	11,10
84,74	39,40	29,60	12,00	1,47	95,50	8,90	12,70	101,37	22,60	61,20

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
78,23	41,00	25,30	17,00	1,44	96,30	12,40	12,90	105,71	21,90	34,10
67,92	39,90	17,90	26,00	1,52	91,10	6,80	14,40	170,44	27,80	52,40
89,67	42,30	29,30	13,00	1,62	94,50	3,70	14,40	143,57	23,50	48,50
54,69	24,10	26,10	20,00	1,46	92,30	7,90	15,50	92,78	11,40	81,90
63,27	33,22	31,50	21,00	1,76	92,70	5,20	13,50	70,96	18,40	62,20
82,05	39,60	19,70	19,00	1,52	96,20	1,20	13,20	160,64	27,10	62,20
55,30	27,70	30,70	25,00	1,57	92,90	7,60	16,40	134,68	23,40	51,80
39,66	37,19	28,70	17,00	1,47	85,20	,10	15,60	177,38	22,70	44,20
50,52	22,63	31,20	24,00	1,37	94,60	2,50	18,10	200,12	17,90	73,20

(Source: compiled by the authors)

Let's carry out multiple regression analysis. As a dependent variable, we take the output per employee, thousand rubles. High R and R-squared values (Table 3) indicate a high adequacy of the regression model.

Table 3: summary table

R	R-squared	Adjusted R-squared	Std. estimation error
0,974	0,949	9,864	5,07017

(Source: compiled by the authors)

Table 4 summarizes the results of multiple regression analysis. First of all, we are interested in standardized coefficients, since they are scaled down and can be compared. An analysis of these ratios shows that the greatest impact on performance, and a negative one, is the staff turnover rate. Further, in decreasing order of importance, there are the share of specialized products in the total volume of production (positive effect), the share of workers employed manually not with machines and mechanisms (negative effect), the shift ratio for all workers (positive effect), and so on.

Table 4: coefficients of the regression model

Factors	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	Beta		
share of workers employed with machines and mechanisms,%	-0,049	0,604	-0,022	-0,081	0,938
share of workers employed manually outside machines and mechanisms,%	-1,158	0,635	-0,467	-1,824	0,118
staff turnover rate	-1,831	0,632	-0,680	-2,896	0,027
shift ratio for all workers	34,629	15,572	0,348	2,224	0,068
share of profile products in the total volume of products,%	2,946	0,563	0,596	5,233	0,002
share of purchased products and semi-finished products in production costs,%	0,267	0,458	0,071	0,582	0,582
share of specialists and employees in the total number of employees,%	-0,911	1,406	-0,117	-0,648	0,541
capital-labor ratio per worker, thousand rubles	0,058	0,056	0,171	1,036	0,340
potential electrical equipment, kW	0,751	0,451	0,319	1,667	0,146
share of machines in technological equipment	0,005	0,188	0,006	0,025	0,981

(Source: compiled by the authors)

The constructed regression model allows making predictions. As an example, consider an enterprise for which the independent variables have the following values: the share of workers employed in machinery and equipment,% = 20.00; the share of workers employed manually not with machines and mechanisms,% = 28.00; staff turnover rate = 13.00; shift ratio for all workers = 1.50; share of profile products in the total volume of products,% = 90.00; share of purchased products and semi-finished products in production costs,% = 5.30; the share of specialists and employees in the total number of employees,% = 15.00; capital-labor ratio per worker, thousand rubles = 150.00; potential electrical equipment, kW = 21.00; the share of machines in technological equipment = 64.00. Then the predicted value for production per employee will be 67.5 thousand rubles.

Fuzzy Modeling Method

Fuzzy modeling will be carried out on the basis of the Fuzzy TECH 5.81 d Professional software package. As the output variable Output, as in the case of regression analysis, we will take the output per employee, thousand rubles. We divide the values of this variable within (30; 100) into five gradations: very low values (low); low (low); medium (medium); high (high) and very high (very high).

As output variables, we will take the first three independent variables with the greatest influence on the dependent variable: the percentage of staff turnover (Input1) within (9; 30), the share of profile products in the total volume of production (Input2) within (79; 100) and the share of workers , occupied manually not with machines and mechanisms (Input3) within the limits (10; 40). We divide each of these variables into three grades (low, medium, high).

The block diagram of the fuzzy logic model is shown in Fig. 1.

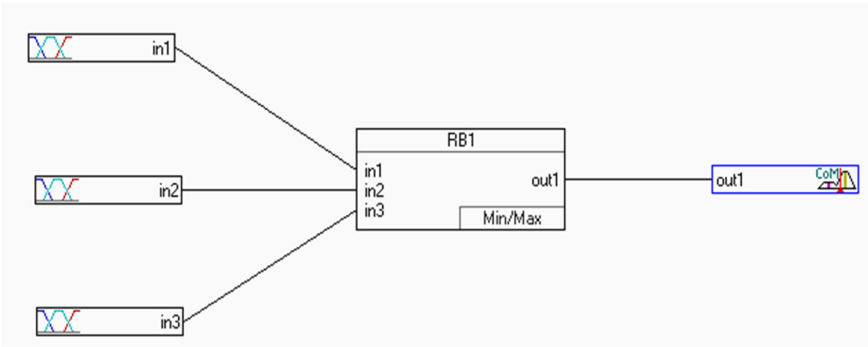

Fig. 1: Block diagram of the fuzzy logic model

(Source: compiled by the authors)

The distribution law graph for the Output variable is shown in Fig. 2. Input variables have similar distribution laws (with only three gradations).

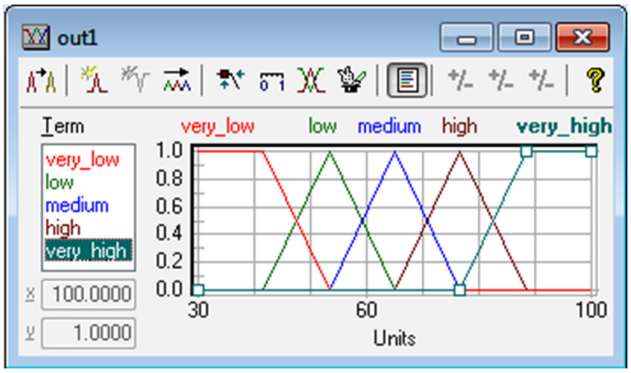

Fig. 2: The distribution law for the variable Output
(Source: compiled by the authors)

The relationships between the dependent and independent variables are shown in Fig.3.

#	IF in1	in2	in3	THEN out1
1	low	low	low	medium
2	low	low	medium	low
3	low	low	high	low
4	low	medium	low	high
5	low	medium	medium	medium
6	low	medium	high	medium
7	low	high	low	very_high
8	low	high	medium	high
9	low	high	high	medium
10	medium	low	low	low
11	medium	low	medium	very_low
12	medium	low	high	very_low
13	medium	medium	low	medium
14	medium	medium	medium	medium
15	medium	medium	high	low
16	medium	high	low	high
17	medium	high	medium	medium
18	medium	high	high	medium
19	high	low	low	low
20	high	low	medium	very_low
21	high	low	high	very_low
22	high	medium	low	medium
23	high	medium	medium	low
24	high	medium	high	very_low
25	high	high	low	medium
26	high	high	medium	medium
27	high	high	high	low

Fig. 3: The relationships between the dependent and independent variables
(Source: compiled by the authors)

The created fuzzy logic model allows you to make a prediction for the performance of a particular enterprise. So for the same values of independent variables (in this case, we are limited to three variables), as in the case of multiple regression analysis, we get Output = 65 (Fig.4). Recall that the regression model gave a value of 67.5. The error of the result obtained using the fuzzy logic model does not exceed 4 percent. However, in the case of using a fuzzy logic model for forecasting, we only need to use 3 independent variables, while in the case of regression analysis, we used 10 independent variables.

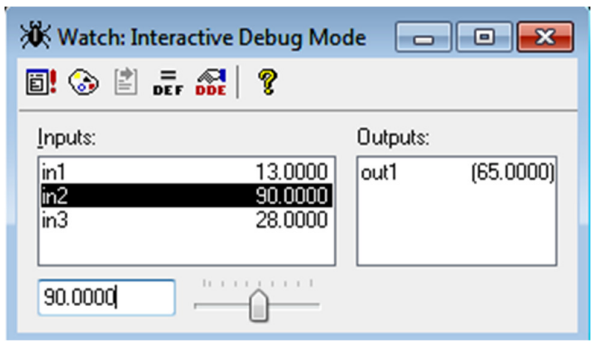

Fig. 4: The predicted value of the Output variable

(Source: compiled by the authors)

Fig. 5,6,7 show 3D graphs of the functions Output (Input1, Input2); Output (Input1, Input3); Output (Input2, Input3) respectively.

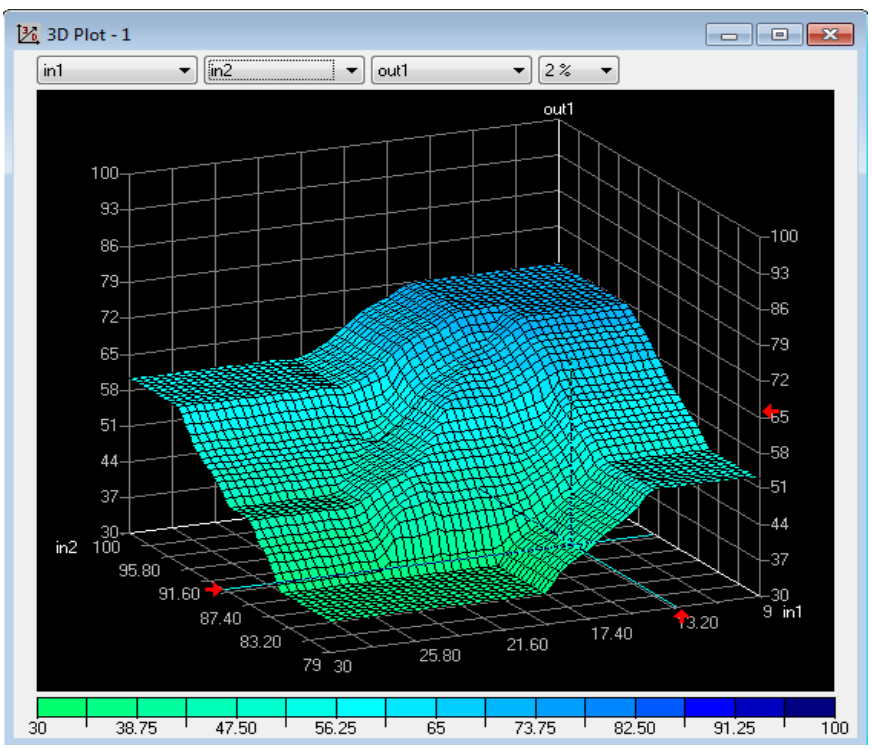

Fig.5: The graph of the functions Output (Input1, Input2)

(Source: compiled by the authors)

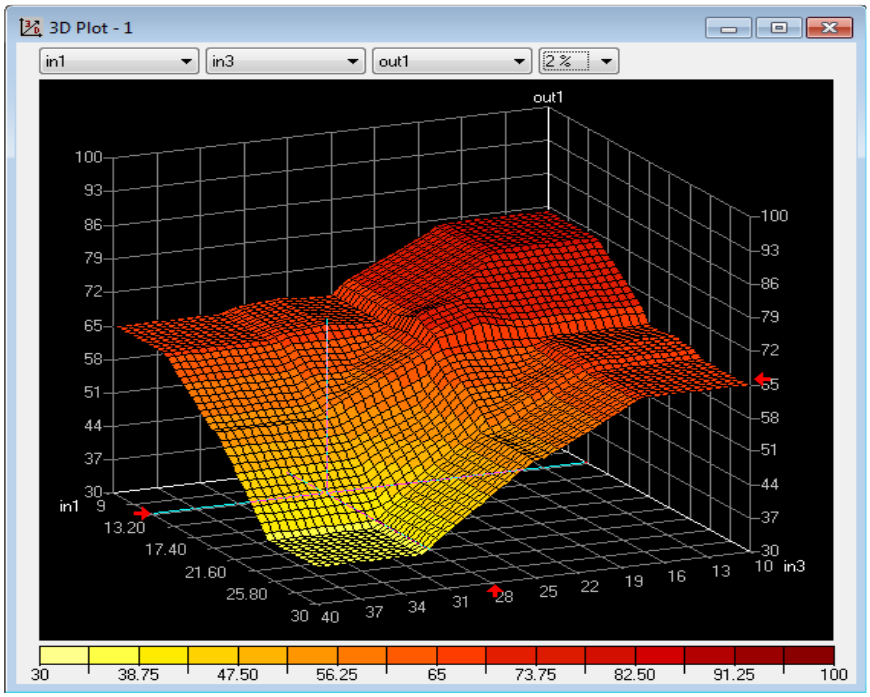

Fig. 6: The graph of the functions Output (Input1, Input3)

(Source: compiled by the authors)

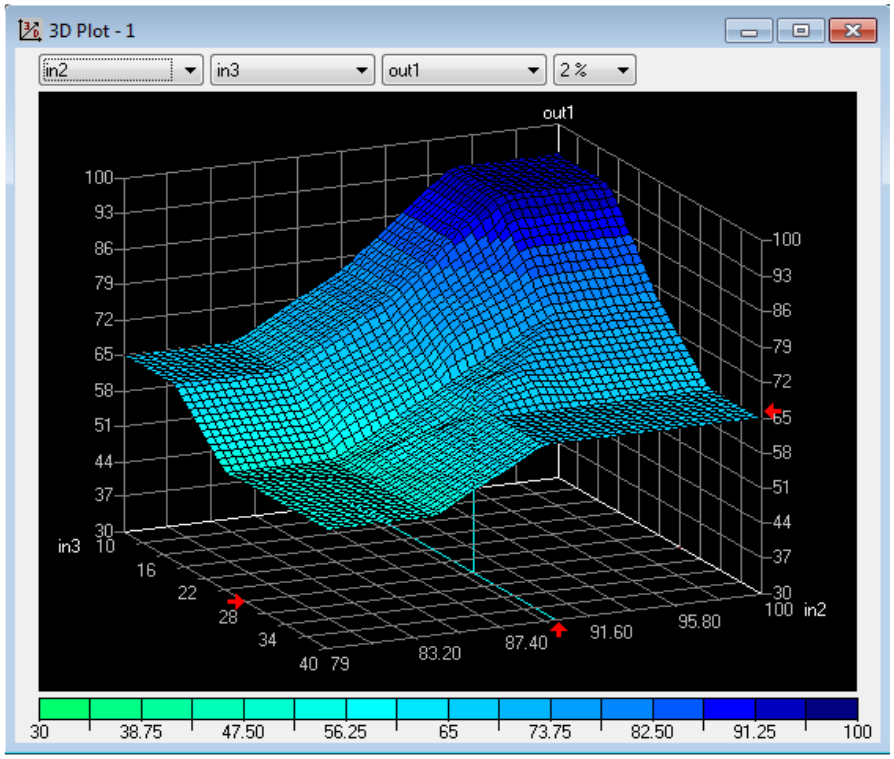

Fig. 7: The graph of the functions Output (Input2, Input3)

(Source: compiled by the authors)

Results and Discussion

As a result of the analysis, it was revealed that the staff turnover rate influences labor productivity to the greatest extent. Therefore, in order to increase productivity, it is necessary, first of all, to reduce the percentage of staff turnover. This can be done by raising wages, but not only. It is important to create a comfortable environment at the enterprise, to provide favorable conditions for career growth, good working conditions. There are other opportunities to reduce employee turnover.

The second most important factor affecting performance is the share of profile products in the total volume of products. Therefore, to increase productivity, one should concentrate on the production of specialized products, trying not to scatter assets for the production of a wide variety of other types of products.

The third significant opportunity to increase productivity is the reduction of manual labor outside of machines and mechanisms. This fact is quite obvious, but, as the results of this study have shown, this possibility is not paramount.

It should be borne in mind that the choice of the most significant factors in terms of increasing productivity was carried out from a set of initial variables. At the same time, it is possible to add some other variables to the original list.

Conclusion

In the article, based on the analysis of the initial data, two mathematical models were created that describe economic processes associated with an increase in labor productivity in industrial enterprises. The first model represents multiple regression. This model identified the most important causes affecting performance. With the help of this model, the three most important reasons were identified, which led to the creation of a second model based on fuzzy logic. Both models allow making forecasts of labor productivity values. The considered examples of the forecasts made for both models showed good convergence of the results. The calculation error did not exceed a few percent, which confirms the reliability of the results of the study.

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Eustress And Academic Staff Performance in Nigeria: A Conceptual Approach

Adeshola PETER
Landmark University, Omu Aran, Nigeria, adeshola.peter@covenantuniversity.edu.ng

Anthonia ADENIJI (Ph.D)
Covenant University, Ota, Nigeria, anthonia.adeniji@covenantuniversity.edu.ng

Kehinde OLADELE (Ph.D)
Covenant University, Ota, Nigeria, oladele.kehinde@covenantuniversity.edu.ng

Fred PETER (Ph.D)
Landmark University, Omu Aran, Nigeria, fred.peter@covenantuniversity.edu.ng

Maxwell OLOKUNDUN (Ph.D)
Covenant University, Ota, Nigeria, maxwell.olokundun@covenantuniversity.edu.ng

Adenike ADEGUN
Landmark University, Omu Aran, Nigeria, adegun.adenike@lmu.edu.ng

Abstract

This study explored the relationship between eustress and academic staff performance in a tertiary institution. The physical and psychological demands of workers at the tertiary level of education make them more vulnerable to high levels of stress. However, researchers have proved eustress is capable of motivating individual employees to perform well and work with interest. Therefore, this study proposed a conceptual model showing the link between eustress and academic staff performance. As a result of the conceptual model proposed, the study suggests that being optimistic and maintaining a positive perception towards work demands will increase their chances of responding positively to stressors and experiencing eustress leading to enhanced performance among academic staff in tertiary institutions.

Keywords: Eustress, Performance, Conceptual Model, Academic Staff .

Introduction

In today's dynamic work environment, employees work for longer hours, as the increasing demand of responsibilities requires them to apply themselves vigorously to work to meet the rising expectations about work performance (Mark & Smith, 2012). Any change in the processes of workflow, daily routine, and the way we do things induces a form of stress. Akinmayowa and Kadiri, (2016) asserted that the job of a university lecturer is very important and offers a variety of activities such as; social interaction, scholarly inquiry, and they are also expected to positively shape the future of their students.

Eustress is viewed as a valid concept that facilitates the development of a positive emotional state, enhances employee ability to make more novel connections and associations between ideas and creativity thereby improving productivity (Majdi, Purwanto & Sunawan, 2019).Therefore, Musrrat (2013), Ahlam and Hassan (2012), Agbu and Olubiyi (2011) and Reda and Rania (2016) have advocated a more robust and holistic approach in exploring the negative and positive stress to gain subjective lecturers reports of stress and coping mechanisms resulting in a fuller picture on academic staff stress with future recommendations grounded in research. Much of the traditional research on academic staff stress have focused mainly on negative stress which is considered harmful to employees' overall wellbeing (Anthony, 2015; Figen & Tatjana, 2015; Akanji, 2013; Mark & Smith, 2012). It is against this backdrop,

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that this study seeks to propose a conceptual model showing the link between eustress and the performance of academic staff in tertiary institutions in Nigeria.

Statement of the Research Problem

Teaching effectiveness of faculty is one of the most critical areas that need to be considered. The success of the students depends to a great extent on how well the teachers have trained them (Agsalud, 2017). Eustress as a concept has received very little treatment in the literature. As Mesler (1996) stated, there are relatively few studies, and no adequate models, proposing the concept of eustress and its associated regenerative qualities. Indoo and Ajeya (2012) as well as Pama, Dulla and De-leon (2013) conducted a study to understand the correlation between emotional intelligence and teaching effectiveness of faculty members at medical and engineering colleges of Uttar Pradesh, India. However, there is a need to establish a conceptual relationship between work routine management and the teaching effectiveness of academic staff in tertiary institutions, particularly in Nigeria.

Journal publication is regarded as a vital and indispensable activity for all academic staff and the institution. They are efforts geared at extending the frontiers of knowledge and breaking new ground and essential components of an academic career (Sarah, 2015). The core of any University's charitable mission is the creation of new knowledge and understanding for public benefit (Karpov, 2018). Hence, there is a need to determine the conceptual linkage between meeting research requirements and the research output of academic staff in tertiary institutions in the Nigerian context.

Methodology

This paper adopted conceptual analysis as a research method. Analytical method often focus on defining the concepts in order to have required and adequate conditions for the application of the concepts. The critiques of this analytic method are mostly based on a critique of definitions. However, conceptual analysis is largely considered a beneficial method of inquiry mostly when the aim is to analyse concepts into their component parts in order to gain knowledge or a better understanding of a particular logical issue in which the concepts are involved and the relationships proposed between the concepts (Boston-Kemple, 2012). Therefore, this paper analysed the concepts of eustress and the performance of academic staff in order have a better understanding and knowledge of the concepts and the proposed relationships between the concepts in Nigeria tertiary institutions.

Literature Review

Concept of Eustress

Eustress is an insufficiently explored phenomenon. As the examination of the PubMed database illustrates, very few analyses of stress attend to the concept of eustress. In some models of stress, eustress is included only as a lack of negative effects (Kupriyanov & Zhdanov, 2014). Eustress is connected to Selye's work in formulation of general adaptation syndrome and emphasised the adaptive nature of the reaction to stress (Kupriyanov & Zhdanov, 2014). Quick, Wright, Adkins, Nelson, and Quick (2013) identified eustress as a healthy, positive and constructive results of a stressful event and stress response. Thus, eustress is considered the result of the body's positive response to a stressor.

Actually, there are three kinds of stress according to Keller (2013) and they are: Eustress, Neustress, and Distress. Eustress is a good stress and it arises in any situation or circumstance that a person finds motivating or inspiring. Preparing for marriage might be an example of eustress; meeting a movie star or a professional athlete including preparing an article for publication may also be a type of eustress. Usually, situations that are classified as eustress are enjoyable and for this reason are not considered to be a threat. Neustress describes sensory stimuli that have no consequential effect; it is considered neither good nor bad. News of an earthquake in a remote corner of the world might fall into this category. The third type of stress, distress, is considered bad and often is abbreviated simply as stress. Lovallo (2015) defined distress as an aversive, negative state in which coping and adaptation processes fail to return an organism to physiological and/or psychological homeostasis. There are two kinds of distress namely

acute stress which surfaces quite intensely and disappears quickly and chronic stress which may not appear quite so intense yet seems to linger for prolonged periods of time (e.g hours, days, weeks, or months).

Work Routine Management

Work routine management implies analyzing and developing action plans capable of ensuring daily outcomes. This basically involves daily management of time and tasks. Work routine management is essential to professionals to solve the day-to-day problems and minimize the strain that results from overwork and to ensure the continuous improvement of the organization (Falconi, 2018). Work routine management is important to employees and employers. Practices such as having a to-do-list and proper management of time schedule can affect employees' ability to achieve their business goals (Lambert and Henly, 2010). Teaching makes up only a part of the tasks of an academic staff, they are usually involved in research to a substantial degree and they have management tasks as well. The daily combination of these diverse tasks is an important cause of job stress and strain (Toon, Paul & Ingrid, 2001).

Teaching Effectiveness

According to Popoola and Haliso (2009), teaching effectiveness is seen as the ability of a teacher to inculcate knowledge and skills in students, as well as change their behaviour for better living. Also, Adam (1993) and Ismaila (1999) noted that teachers' knowledge of subject matter, skill proficiency and resourcefulness could be linked to institution effectiveness, teacher effectiveness and students' academic performance. In other words, one of the requirements for teaching effectiveness is improved knowledge of subject matter acquired through research, use of library information resources and services.

Research-intensive universities are increasingly challenged by the globalisation of research, international competition on innovation and the impact of international ranking mostly based on scientific performance (Hazellkorn, 2008). They have consistently placed research at the very core of their activities. They have hired high-level lecturers and offered a wide range of scholarship activities and lab research opportunities, thereby minimising the teaching process. The purpose of the teaching delivered is scarcely an issue and remains on the margins of academics" thoughts. Yet new pressures are challenging these universities, forcing them to take a closer look at the concept of quality teaching and to contemplate institutional support to step up the quality of the faculty and curricula (Fabrice, 2010).

Meeting Research Requirement

Academic staff have the primary duties of teaching, learning, research and community service (Altbach & Knight, 2007). They are required to show evidence of publication output for their appointment, promotions and career development. This is a major distinguishing characteristic for academic staff (Perkmann & Walsh, 2007). Publication is a vital and indispensable activity for all academic staff and the institution. They are efforts geared at extending the frontiers of knowledge and breaking new ground (Sarah, 2015). Producing regular publications is a requirement and essential component of an academic career. The core of any University's charitable mission is the creation of new knowledge and understanding for public benefit (Marginson, 2011). As stated by Danielson (2011) academia is part of a broad public conversation and individuals have a responsibility to effectively communicate the results of their enquiries as a way of advancing their subject areas and enhancing society and the economy. The reputation and prestige of the individual academic and their institution relies on publications.

Conceptual Linkages

Work Routine Management and Teaching Effectiveness

Lecturers are considered one of the major key elements in higher institution of learning. They are saddled with the responsibility of ensuring teaching effectiveness, publication, mentoring, leadership and maintaining a positive learning environment in the classroom. Although the ability of academic staff to create a positive classroom climate may not eliminate behaviour problems, but it establishes the environmental context that is vital for the attainment of

emotional, social and cognitive developmental outcomes. Studies have indicated that classroom organisation and management skills have significant impact on positive educational outcomes (Ingersoll & Smith, 2003).

However, in Nigeria context, lecturers, particularly in government universities work in a very harsh condition (Archibong, et al., 2010). This implied that most lecturers in Nigeria struggle on regular basis to teach in classrooms that are overcrowded, use obsolete facilities which affect rigorous research activities, terrible working condition just to mention a few. In addition, the slogan 'publish or perish syndrome' is considered a major stressor. There is enormous pressure put on lecturers particularly those at the lower cadre to write and publish many articles in order to meet up with promotion requirements (Akinmayowa & Kadiri, 2016). However, having a positive mindset and the effective daily management of time and tasks is expected to enable academic staff to be able to cope with stressors and experience a positive stress as aganst the negative consequences of stress.

Meeting Research Requirement and Research Output

Meeting research requirements empowers academia in many ways. It raises profiles amongst peers, exposes arguments to critique which sharpen ideas, and puts findings into the public realm where potential users and beneficiaries will notice them and qualifies them for promotion and appointments amongst others (Attama, 2013). Publication productivity is expressed by the number of papers published by a selected unit in a given time (Sudhier & Abhila, 2011). In a study carried out on librarians' publication output, Ogbomo (2010) found that too much demand of daily work routine, rating of journal titles, weak/poor research orientation, unavailability of resources, lack of academic freedom and lack of interest contributes to the pressure of meeting publication requirement. However, adopting coping strategies such as being positive, having a locus of control, seeking for social support, anticipating a positive event when working at meeting up publication demand may foster eustress experience by academic staff.

Conceptual Framework

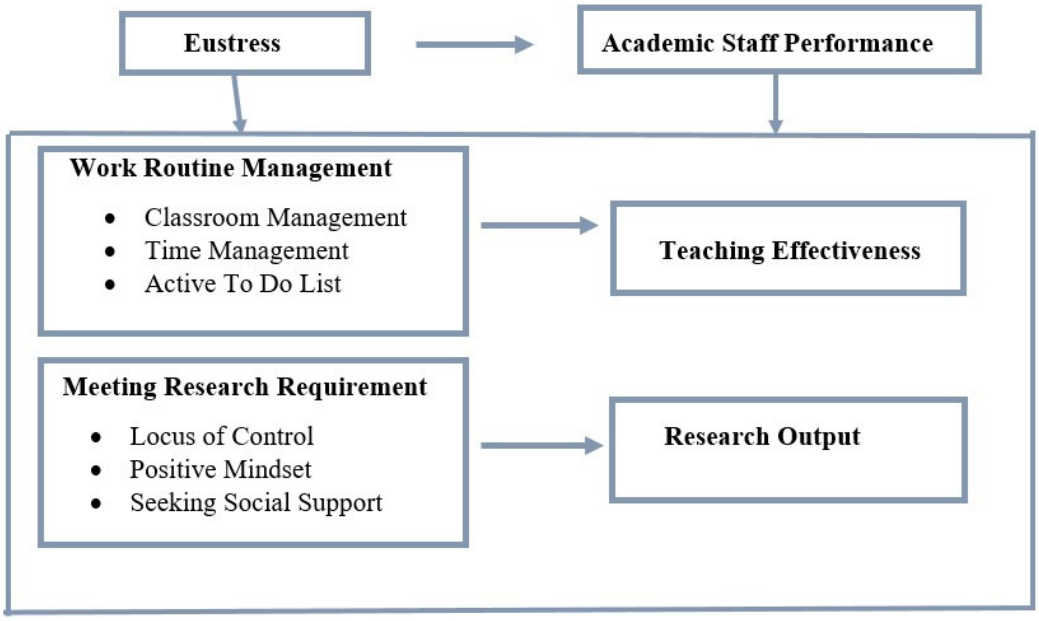

Figure 1: A Conceptual Model on the Relationship between Eustress and Performance of Academic Staff

Source: Adapted from Lambert and Henly (2010), Archibong (2010), Fabrice (2010) and Georgiou, Sharma and Ling (2017)

The conceptual model of this study proposed in Fig. 1 above shows the relationship between eustress and academic staff performance. The model has components comprising eustress (work routine management and meeting research requirement) and academic staff performance (teaching effectiveness and research output). Therefore, two relationships as regards eustress and performance of academic staff was developed based on the conceptual model. They are stated as follows:

i) Work routine management motivates the teaching effectiveness of academic staff in tertiary institutions.
ii) Meeting research requirements enhances the research output of academic staff in tertiary institutions.

In this conceptual model, work routine management is said to motivate the teaching effectiveness of academic staff in tertiary institutions. Academic staff scheduling their practices, engaging in time and classroom management, having a to do list, delegating overwhelming task when necessary, preparing and scheduling classes well in advance will foster effective work routine management among all the highly demanding daily work schedule. The development of internal locus of control and increase in skills to match the daily work demand especially when there are impromptu tasks will enhance the teaching effectiveness of academic staff in tertiary institutions.

From the model proposed above, meeting research requirement enhances the research output of academic staff in tertiary institutions. Maintaining a positive mindset, having locus of control, seeking social support and being optimistic while working hard to meet publication requirement will help to regulate their feelings when experiencing stress and enhance their research output. When academic staff anticipate for positive events such as promotions, research grants, scholarship, international recognition, collaborations that results from meeting publication requirements, they will be able to boost their coping strategy and enable them experience eustress. This will bring about increase in research output of academic staff in tertiary institutions.

Discussion

Organisations as well as institutions cannot afford anything lesser than a high performance organisation to survive in these competitive times. Enhancing performance in an institution requires understanding what factors influence performance. To this end, this study proposed that the effective management of the numerous work routine required of an academic staff as well as developing a positive emotional state will enhance their ability to make more novel connections and associations between ideas, this is one of the foundational skills for insight and creativity that will improve teaching effectiveness. This aligns with the work of Finelli, Richardson and Daly (2013) supported by Granito and Santana (2016) which showed that factors such as mentor guide, curriculum flexibility, physical classroom management, access to information about effective teaching practices, passion and confidence for teaching, university culture amongst others motivate the adoption of effective teaching among academic staff in tertiary institutions.

Research output is very important not only to academic staff but to institutions in general. Contemporarily, there has been much emphasis on publications and research output by institutions that yearns for high performance rating. Research output is the primary unit by which educational programmes are judged and it is one of the major determinants of academic staff productivity as it is tied to promotion and other academic rewards. This study therefore proposed from the foregoing that developing a positive perception and meeting publication requirement will boost research output of academic staff in tertiary institutions. This validates the work of Attama (2013) supported by Parameshwar and Patil (2009) and Agaba (2010) who examined the effect of academic staff engagement of library resources and their publication output. This implies that meeting publication requirement through utilization of library resources, research cluster activities, conferences etc has a significant positive influence on the research output of academic staff in higher institutions.

Policy Implications

It is important for the management of Nigerian institutions to set-up policies and programs that encourage academic staff to develop an internal locus of control, a high level of self-control and increase their skill level to match new challenges in managing their daily work routine. This will foster effective teaching among academic staff in tertiary institutions.

The policymakers in Nigerian Universities should situate policies and develop programs that enlightened academic staff to anticipate positive events (such as promotion, grants, recognition etc) while working to meet publication

requirements. This will help them develop a positive emotional state that will facilitate a more adaptive cognitive response towards any given assignment

Mindset is a significant factor in determining distress versus eustress. To help academic staff develop a positive perception towards all that is required towards a robust research output, the management of Nigerian Universities should form policies that encourage academic staff to be optimistic and have a positive mindset. This will increase their chances of experiencing eustress and positively respond to stressors.

Policymakers of Nigerian Institutions should set up an advisory service to urge academic staff to develop positive emotions which will help faculty regulate their feelings when experiencing stress. Positive emotions boost friendships, improve coping strategies, and boost psychological resilience, all of which can buffer against the negative mental and physical consequences of stress.

Conclusions and Implications for the Study

The goal of this study was to propose a conceptual model showing the relationship between eustress and academic staff performance in tertiary institutions. It is important to note that eustress has become a crucial point of emphasis because of its dynamic influeuce on an individual's job performance and their wellbeing including that of the organization as a whole. Researchers have proven eustress as another type of stress which is good stress that motivates individuals to perform well and work with interest. Hence, this study proposed a conceptual model to show that eustress has a positive relationship with the performance of lecturers at the tertiary level.

Based on the conceptual model proposed, this study suggests that effective management of work routine, maintaining a positive mindset towards all of the numerous work demands, anticipating a positive event such as research output, promotion, recognition, international collaborations, grants/scholarships, which are mostly the outcome of meeting publication requirements will enhance performance among academic staff in tertiary institutions. Also, being optimistic and improving their skill level to match new challenges will help improve their coping strategies and increase their chances of experiencing eustress and positively responding to stressors as against the negative mental and physical consequences of stress.

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Educational Digital Technologies Development while Covid-19 pandemic

Tatiana M. TATARNIKOVA
Russian State Hydrometeorological University, Saint Petersburg, Russia
t.tatarnikova.00@mail.ru

Valery M. ABRAMOV*
Russian State Hydrometeorological University, Saint Petersburg, Russia
val.abramov@mail.ru

Eugene P. ISTOMIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
eug.istom@mail.ru

Evgeniy A. BAIKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
e.baykov.00@mail.ru

Vladimir A. BOLSHAKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vl.boll@mail.ru

Ekaterina M. KORINETS
Russian State Hydrometeorological University, Saint Petersburg, Russia
katt.korr@mail.ru

Tatiana V. VEKSHINA
Russian State Hydrometeorological University, Saint Petersburg, Russia
tat.vekk@mail.ru

Ernest R. ESTRIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
ern.estrin@mail.ru

Abstract

In article, we describe the development results of educational digital technologies (EDT) adapted to Covid-19 pandemic conditions. In studies, we used methods of data bases constructing within digital educational platforms, web-technologies and virtual reality tools. While Covid-19 pandemic, we have to work on digital transformation of university education, including creation of new concepts for obtaining and presenting didactical materials. We propose to use digital educational platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. We propose to use Google Classroom, as essential digital educational platform. Recently, we use remote sensing databases for educational purposes within geo-information management disciplines. We consider the issues of digital content creation within university education, essentially in practical training. We present the enlarged groups of didactical works in this area. For data exchange and preliminary discussion while research, was used platform https://www.researchgate.net/profile/Valery_Abramov2/.

Keywords: Educational Technologies, Digital Transformation, Covid-19 Pandemic, Environmental Economics

Introduction

Last year, the Covid-19 pandemic shocks the global economy, including education at university level (UL). Note, this pandemic shock matched the time with Industry 4.0 period, during which a lot of enterprises plan and implement wide spectrum of information technologies (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019),

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(Lukyanov, 2019), (Sikarev, 2020), (Trunin, 2019). Industry 4.0 leads to serious technological changes in natural risk management (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new educational technologies, especially for UL (Averkiev, 2020), (Estrin, 2020), (Popov, 2019), (Tatarenko, 2020).

In the article, the authors describe the development results of educational digital technologies (EDT) at UL while Covid-19 pandemic in geo-information management area (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), within environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). Significant attention in the implementation of such industrial projects should be paid to geo-information support systems (GISS) of natural risk management (NRM) in the context of climate change (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). The educational technologies, discussed in this article, take all above mentioned factors into account.

Methods and Data

In research, we used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. Also, we used big data technologies (Popova, 2019), (Yaily, 2019) From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bidenko, 2019). While study, we used data bases and tools of geo-information digital online platforms (GIDOPs) Earth (Sanina, 2020), (Vekshina, 2020) and EOS, including its Land Viewer (LV) product (Bolshakov, 2020), (Prostakevich, 2020).

Results

In research, we developed educational digital technologies (EDT) adapted to Covid-19 pandemic conditions. We gave preference to the use of digital educational platforms (DEP) that integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services (Popov, 2019). As DEP in our work, we used Google Classroom. Its main advantages are ease of use, universal access, flexible feedback system and its free of charge. This DEP usage eliminates a system administrator because of Google servers implementing, and also a content Manager because each teacher is responsible for the content of his course (Popov, 2019).

While development of digital content, we used the decomposition as a technique in the preparation of the methodological basis. In figure 1, we present the enlarged groups of didactic works, oriented on practical purposes

1) problem statement;
2) field works on data collection;
3) processing and analysis of the data;
4) preparation of geographical information system (GIS) layers and creating digital geo-information products within geo-information support and decision aids;
decision-making.

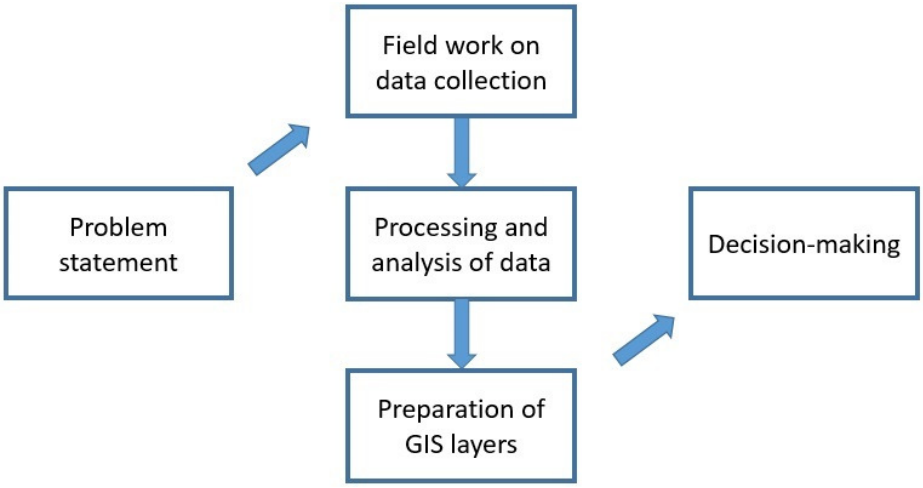

Figure1: Enlarged groups of didactic works, oriented on practical purposes

While our work, we developed digital content of practical works within UL in the field of geo-information management disciplines while Covid-19 pandemic for all above-mentioned groups (figure1), using freely distributed recording program CamStudio, a microphone and a camera to record the lecturer's explaining the individual sections.

As essential DEP in the field of geo-information management disciplines while Covid-19 pandemic, we propose to use DOP EOS eos.com, including its product LandViewer (LV) https://eos.com/lv/, that provides efficient tools for searching, processing, and analyzing large amounts of satellite data from the Landsat-8 and Sentinel-2 satellite systems. Usage of DOP EOS allows to find and use satellite images of chosen areas with for training purposes, to determine the location of these areas and to assess their main spatial characteristics (linear and area dimensions), which are the main initial parameters for creation decision aids while geo-information support for environmental economics.

Let's go to examples. In figures 2-4, we show the sequential training operations performed by student in online educational regime for the port of Pevek, the largest Russian port in East Siberian Sea. In figure 2, there is space image on 5th June 2020 (general view by DOP EOS LandViewer) visualized with Natural Colors Application of LandViewer. In figure 3, there is the same as in figure 1, space image, visualized with Atmospheric Removal Application of LandViewer.

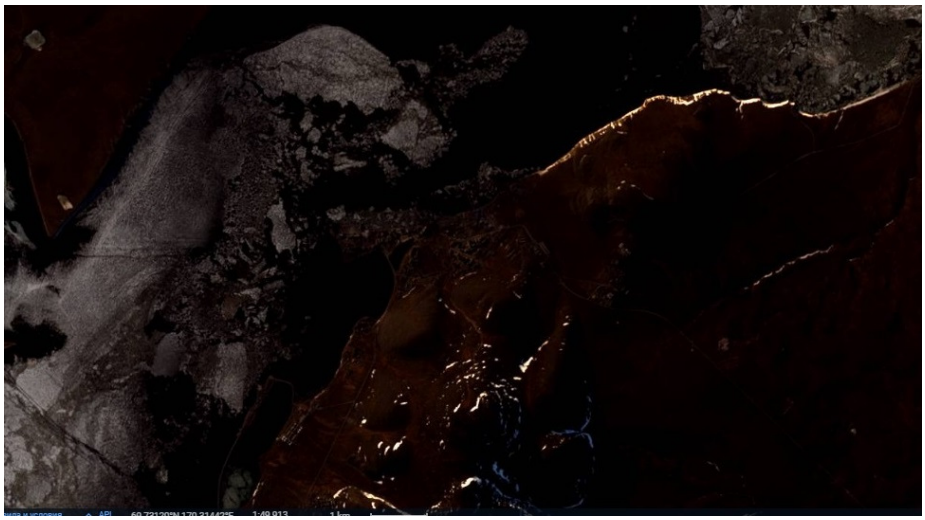

Figure 2: Port of Pevek space image (Natural Colors Application) on 5th June 2020 (general view by DOP EOS LandViewer)

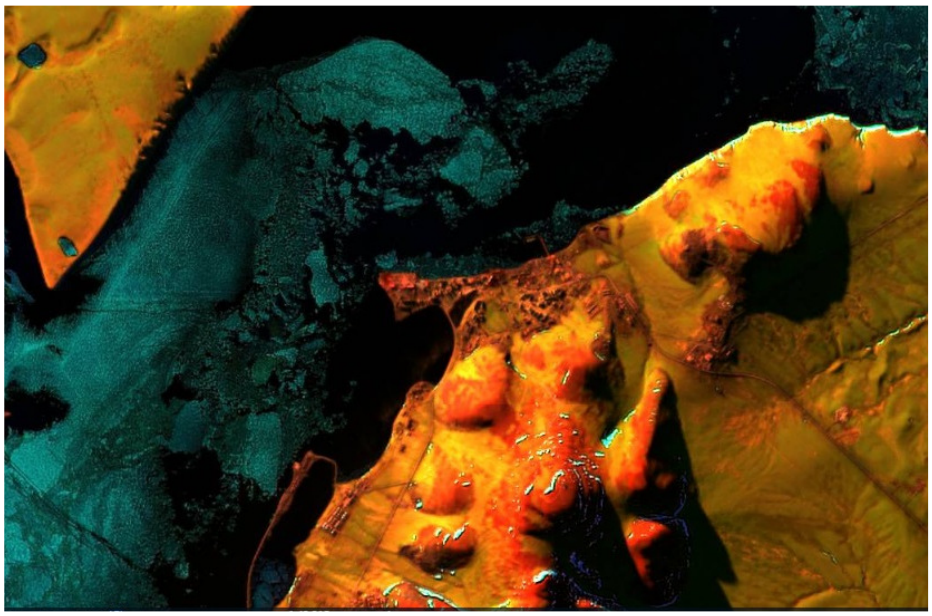

Figure 3: Port of Pevek space image (Atmospheric Removal Application) on 5th June 2020

In figure 4 and 5 are Port of Pevek space images on 16th August 2020.

Figure 4. Port of Pevek space image (Natural Colors Application) on 16th August 2020

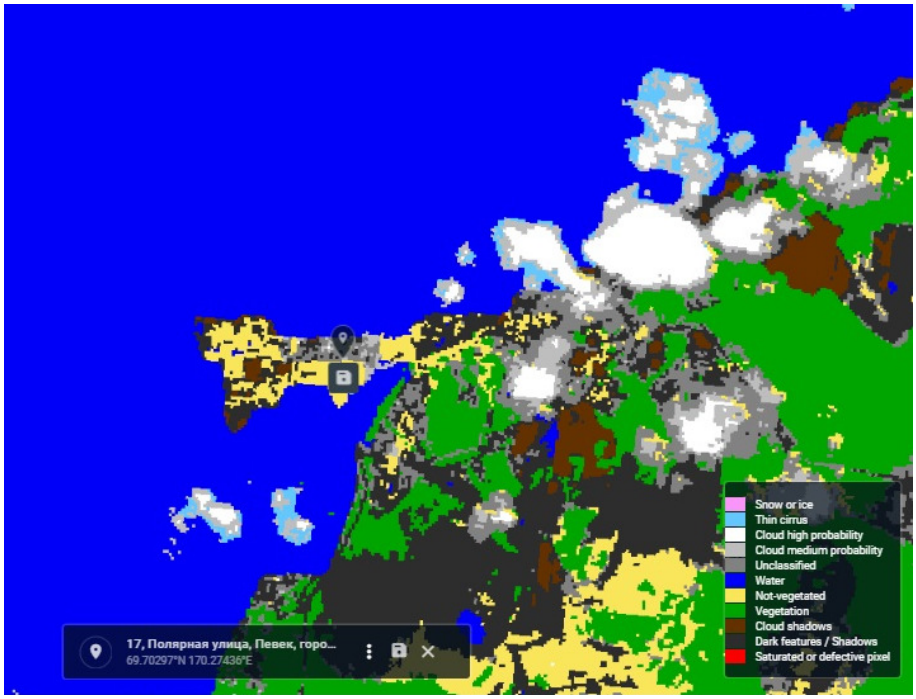

Figure 5: Port of Pevek space image (Scene Classification Application) on 16th August 2020

Figure 4 and 5 can be used for town Pevek and surrounding territory space characterization for geo-information management purposes. Note, that decoding of above mentioned images was not goal of this article. As essential result, we propose the usage of DOP EOS tools as EDT at UL for geo-information management disciplines while Covid-19 pandemic.

Discussion

The essential task of EDT at UL for geo-information management disciplines while Covid-19 pandemic is to teach students the practical aspects of work with DOP EOS tools, which requires a developed learning base in special geo-information systems (GIS). In Covid-19 pandemic conditions, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies (Popov, 2019), that can reduce total cost of learning process. Results of study can be useful for goals of geo-information management to large space-distributed projects, including emergency management, within the environmental economy while climate change.

Conclusion

In article, we describe the development results of educational digital technologies (EDT) adapted to Covid-19 pandemic conditions. In studies, we used methods of data bases constructing within digital educational platforms, web-technologies and virtual reality tools. While Covid-19 pandemic, we have to work on digital transformation of university education, including creation of new concepts for obtaining and presenting didactical materials. We propose to use digital educational platforms (DEPs), which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. We propose to use Google Classroom, as essential DEP. We consider the issues of digital content creation within university education, essentially in practical training. We present the enlarged groups of didactical works in this area. As essential result, we propose the usage of DOP EOS tools as EDT at UL for geo-information management disciplines while Covid-19 pandemic. The research results presented in this article has significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state environmental control bodies.

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The platform https://www.researchgate.net/profile/Valery_Abramov2/ gave us excellent opportunities for preliminary discussion and data exchange while this research.

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Implications for Global Financial System from Big Tech Companies

Tomasz DZIAWGO

SGH Warsaw School of Economics – Banking Institute, Warsaw, Poland
tdziaw@sgh.waw.pl

Abstract

For years, the largest Big Tech companies such as: Amazon, Apple, Facebook or Google have been trying to get a foothold in the financial sector. The main reasons behind entering this sector are: revenue diversification, access to vast amount of customer data, increasing customer loyalty and volume as well as complementing their core services. Younger generation, which is very familiar with digital solutions, shows significant interest for the potential switch to Big Tech companies in order to use particular financial services. Big Tech companies have already started to enter the financial sector, most notably in payments and asset management. Long-term trends could also be beneficial for Big Tech, since financial sector has been undergoing through digital transformation and bank online usage significantly increased, which were only accelerated by COVID-19 outbreak. Moreover, Big Tech companies outperform banks in terms of financial performance after COVID-19. The research paper aims to test two hypotheses, which are as follows:

- Big Tech companies have significant potential to dominate global financial system.
- COVID-19 strengthened Big Tech global position and weakened biggest players in the banking industry financially

For the purpose of the paper, the following methods have been applied: critical analysis of literature and research papers, descriptive method and comparative analysis of presented data.

Keywords: Big Tech, Payments, Banking, Digital
JEL: E42, G21, O14

Introduction

In July 2020 in The United States Congress, testimonies from Chief Executive Officers of the biggest technology companies: Amazon, Apple, Google and Facebook were given. During the opening speech, Mr. David Cicilline – Commercial and Administrative Law Subcommittee Chair, stated that "Any single action by any one of these companies can affect hundreds of millions of us in profound and lasting ways" (Kang C., McCabe D., 2020). In spite of the fact that the hearing concerned mainly tech antitrust and consumer data usage, there are concerns whether massive customer base, significant financial resources and brand recognition, could enable Big Tech companies to become significant players on financial services market overnight. Big Tech companies are among the most influential and the largest business entities in the world. They have been rapidly growing since their establishment (only since Jan 2010 to Dec 2019 the average growth for these 5 companies was ~22% CAGR) (Richter F., A, 2019). However, after COVID-19 outbreak, both global impact and financial results of Big Tech companies significantly increased. According to Fortune 500 list, Microsoft, Apple, Amazon, Alphabet (Google parent company) and Facebook occupy top 5 places in the global ranking in terms of market value (Fortune 500, 2020). With such powerful position and large financial resources, they seek other business opportunities to dominate other markets and one of which is financial sector. Because of heavy digitization process, cultural shift and changing customer expectations, banks often partner with smaller Fin Tech players to help them address these challenges. Only in 2016 over 40% of banks were engaged in join partnership with Fin Tech companies (PwC, 2016). Since Big Tech companies have both financial resources and high degree of innovation, they could enter banking sector right away without collaborating with any other players.

Research Methodology, Process and Hypothesis

The research paper aims to test two hypotheses, which are as follows:

- Big Tech companies have significant potential to dominate global financial system.

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- COVID-19 strengthened Big Tech global position and weakened biggest players in the banking industry financially

For the purpose of the paper, the following methods have been applied: critical analysis of literature and research papers as well as descriptive method and comparative analysis of presented data. Content analysis was aimed at defining Big Tech and presenting largest Big Tech companies, afterwards, Big Tech activity in financial market was depicted and analyzed. Later on, COVID-19 impact on both banking sector and key Big Tech players was presented. Lastly, conclusions regarding tested hypotheses were made.

Big Tech – Definition and Significance

According to Capgemini, Big Tech companies are technology giants dominating their respective markets due to: market understanding, wide customer data access, ability to deliver "delight-inducing" products and services etc.(Capgemini, 2020). Big Tech mainly benefits from obtaining and analysing vast customer data, which they use to enter additional business lines, including financial services. However Big Tech offering in financial services differs with regard to country economy development. In advanced economies, offering is rather narrow and complementing services offered by key players from the banking sector, while in developing countries Big Tech provide much more services (lending, asset management, insurance). This difference occurs not only due to financial development differences, but also due to differences in regulations (Financial Stability Board, 2019). The key difference between Fin Tech and Big Tech is that Fin Tech company specializes in financial services, while Big Tech company offers financial services among other services – therefore financial services is not its' core activity (Ślązak E., 2019). As of 2019, among key Big Tech players, revenue from financial services amounted to ~11% of total revenue.

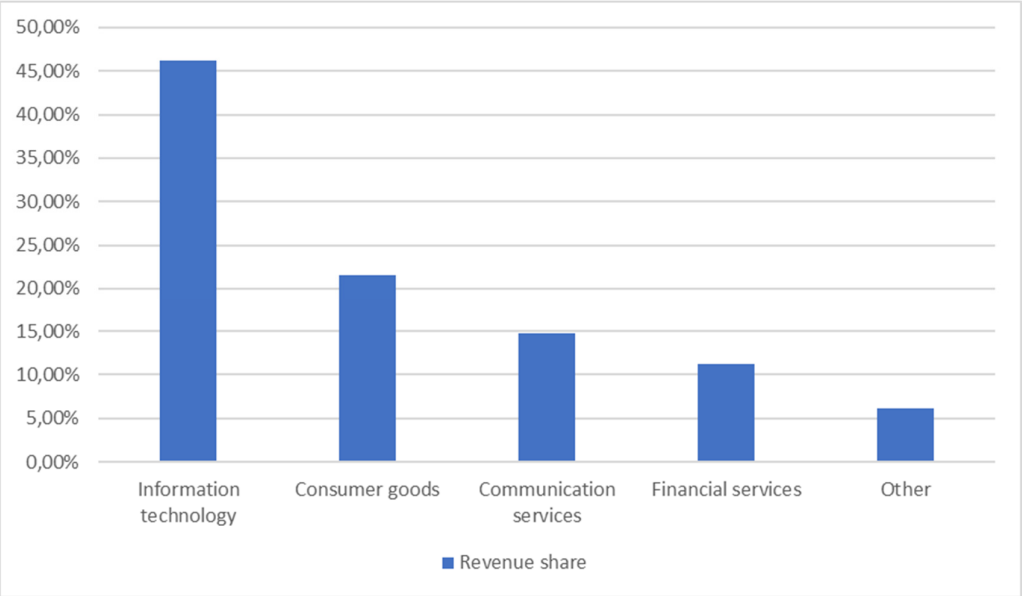

Chart 1: Total Big Tech revenue breakdown

Source: BIS, Big Tech in finance: Opportunities and risks, 2019.

Key Big Tech players worldwide are often classified as "GAFA" (Google, Amazon, Facebook, Apple), "FAANG" (Facebook, Amazon, Apple, Netflix, Google) or "GAFAM" (Google, Amazon, Facebook, Apple, Microsoft) (Wigglesworth R., 2020). Performance and dominance of the largest Big Tech players on their respective markets have been staggering. Amazon currently has ~38% of e-commerce market share in USA (second player being Walmart with 6% of market share) (Semuels A., 2020). COVID-19 outbreak further helped Amazon, when consumer spending increased by ~60% only between May and July. Facebook's applications (Facebook, Instagram, Messenger, WhatsApp) are being used by ~3 billion users and Facebook itself is the leading social media platform with ~60% internet users (Ghaffary S, 2020, Mohsin M., 2020). Apple has ~32% share of global smartphone revenue and ~66% share of global smartphone profit, in spite of selling only ~15% of global smartphones (Lovehoy B., 2020). It also became the first US-based company valued at USD 1 trillion in August 2018 and also the first US-based company valued at USD 2 trillion in August 2020 (Reinicke C., 2020).

Big Tech Activity in Financial Services Market

Big Tech are particularly interested in financial services market due to the following reasons:

1) Revenue diversification – Big Tech can add or develop significant segment of the overall revenue (Tencent revenue from payments, already accounts for ~28% of total revenue) (Axon S., 2020).
2) Access to vast amount of customer data – since data is often called as "new currency", possibility of obtaining data that previously was available exclusively for banks, might be particularly attractive. Due to large financial resources of Big Tech, they could offer several financial services even at a loss, only to extract more data from clients regarding eg. purchase value, time of purchase, personal preferences on additional services etc. Big Tech opportunities from already existing customer base are significant (Global Business Intelligence, 2020; Kunz P., 2019).
3) Complementing core services – integration of financial services with already existing services could enhance overall customer experience, thus increasing overall revenue (Financial Stability Board, 2019).
4) Increasing customer loyalty and volume – with increased convenience and possibility of having all necessary features in one platform/ app, client retention, loyalty and volume would significantly increase. WeChat is named "the super app" or "app for everything", since apart from messaging and calling, clients can buy goods and services, transfer money, pay bills, access public services, book flight tickets and many more (OPSoftware, 2020).

In order to make a presence on the banking sector, Big Tech companies not only need to have large client base and significant digital experience, but also high level of trust by potential customers. According to the study conducted by Bain & Company - PayPal and Amazon have similar trust level as banks in general in USA (Chart 2). In this study, respondents had to classify depicted banks and Big Tech from 1 to 9 on the basis of trust - 1 indicates the highest trust, while 9 indicates the lowest trust.

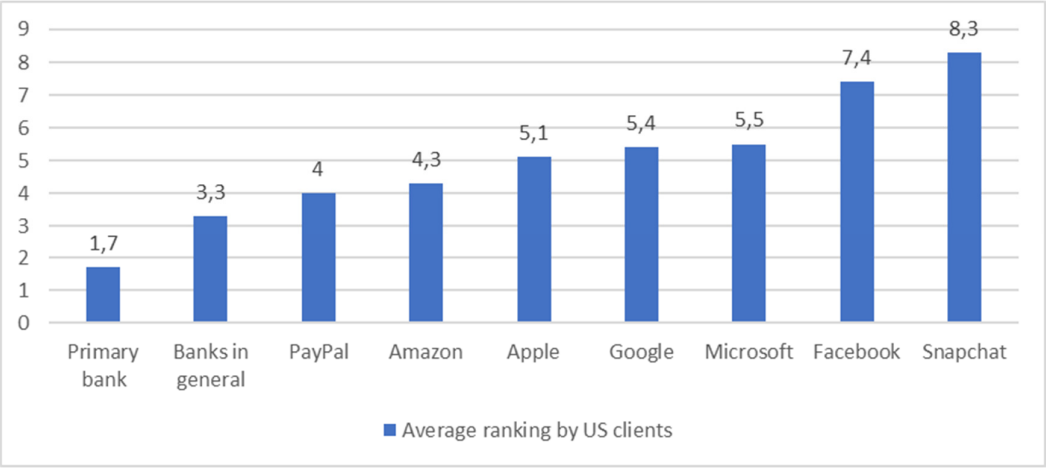

Chart 2: Customers trust in Big Tech and banks in USA

Source: Burns M., du Toit G., Evolving the Customer Experience in Banking, Bain & Company, 2017.

Moreover, Big Tech are likely to attract younger clients to purchase financial products from them. In USA - 73% potential clients aged from 18 to 34, are willing to purchase financial products from tech companies, followed by 61% interested in purchasing that are aged 35-54 and 42% interested in purchasing that are aged 55 or older (Marous J., 2017). With increased familiarity with digital, the demand for financial products offered by tech companies is expected to grow. What is more, after COVID-19 global outbreak, in USA there has been significant rise in giving away personal data. Over 53% Americans feel comfortable in making personal data available if it is for the good of society and not sharing is often considered as "selfish" (EY, 2020).

What is more, younger generations have higher likelihood to switch financial services provider from bank to Big Tech, as presented in table 1. From selected Big Tech companies, Amazon poses the biggest threat to traditional banks, since 25% of millennials are willing to switch to this company for financial services. This high level of

likelihood to switch for Big Tech companies occurs in spite of the fact that they are involved in large investigations concerning privacy, security and anti-competitive practices. Therefore, financial security of capital flow in Big Tech companies may not be fully safe as well (Feiner L., Graham M., Levy A., Palmer A., Rodriguez S., Rosoff M., 2020).

Table 1: Likelihood to switch to Big Tech if offered financial services

Company name	Millennials (1981-1996)	Generation X (1965-1980)	Baby boomers (1946-1964)
Amazon	25%	15%	5%
PayPal	21%	15%	4%
Apple	21%	12%	4%
Google	20%	12%	2%
Facebook	10%	6%	1%

Source: Cocheo S., Biggest Threats to Banking in 2019: Fees, Lousy Tech and Digital Disruption, The Financial Brand, 2019.

Furthermore, customers are increasingly likely to adopt banking services from non-traditional players (Non-traditional players referring to Big Tech and challenger banks). The main reasons for potential switch are presented in Table 2.

Table 2: Reasons behind choosing non-traditional player in banking sector

Reason	*% respondents*
Low-cost offering	70%
Ease of use	68%
Faster service	54%
Better features	39%
Personalized products	39%

Source: BIS, Big Tech in finance: Opportunities and risks, 2019.

Customers much prefer to conduct basic transactions via digital, therefore the most promising financial channels for Big Tech to enter, are routine products/ services such as deposits and payments (Chart 3) (Burns M., du Toit G, 2017).

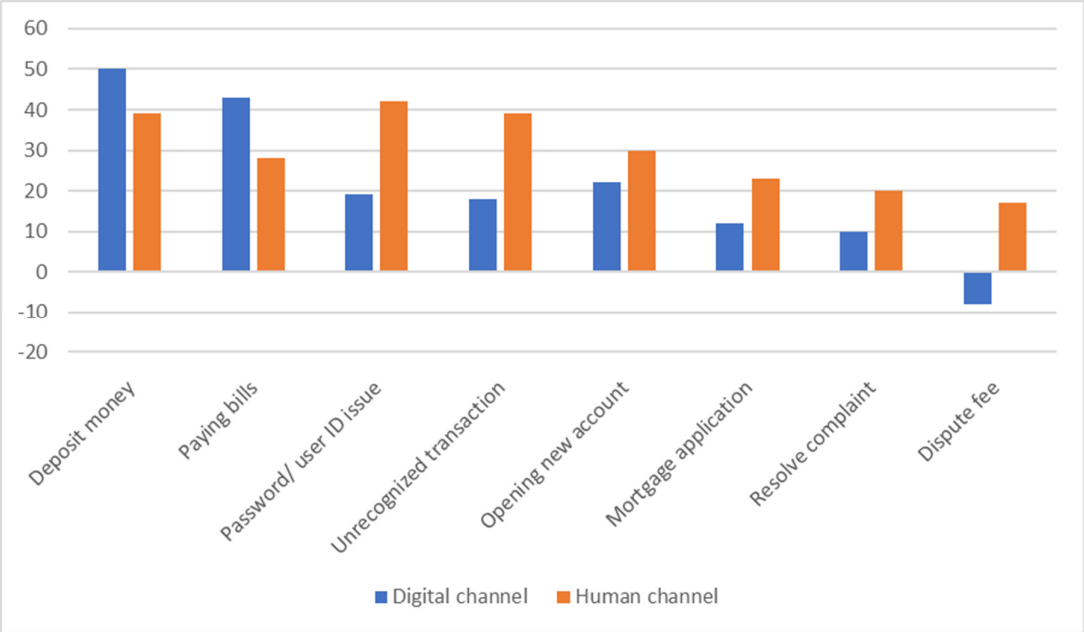

Chart 3: Products/ services preference to perform either via digital channel or human channel

Source: Burns M., du Toit G., Evolving the Customer Experience in Banking, Bain & Company, 2017.

Apart from payments and deposits, Big Tech companies increased their activity in asset management, insurance and granting loans. Particularly, asset management is considered as a great opportunity for Big Tech companies, due to following reasons:

- steady industry growth (~14% YoY within 5 years),
- high average operating margins (~37%),
- lower regulatory requirements than in banking sector,
- favourable socio-demographic trends (growing middle class, increased life expectancy) (RBC Capital Markets 2020; Wittrock C., 2019).

The biggest Big Tech companies disrupting the banking sector are either US-based or China-based and are entering financial industry by following actions:

1) Amazon – allowing clients to deposit cash without a fee in Amazon Cash, grants credits to Small and Medium Enterprises (SMEs) and provided over USD 5 billion between 2011 to 2019 (CB Insights, 2020). Its' payment service Amazon Pay reached 33 million clients in 170 countries and transaction volume doubled from 2015 to 2017.
2) Apple – Apple Pay was launched in 2014 and it was used in ~10 billion transactions by ~400 million customers within 2014-2019. It also announced partnership with Goldman Sachs to launch credit card.
3) Google – launched Android Pay (later Google Pay) in 2015 and expanded to 17 countries in 2019.
4) Facebook – planning to launch Libra – global cryptocurrency and payment infrastructure and established payment platform Facebook Pay. Facebook is also launching Facebook Financial in 2020 – group that will be in charge of future payments and e-commerce projects (Levy S., Barber G., 2019; PYMNTS, 2020).
5) Ant Financial - launched Alipay, which became the largest mobile payments platform in 2014 (Anjulu S., 2020). Established Yu'e Bao money market fund became the biggest money market fund in the world, having USD ~168 billion Asset Under Management in 2018. Also set up Ant Marketplace platform with 180 million users in 2019.
6) Tencent – WeChat Pay established first QR code and app wallet payment in 2013 and accounted for ~40% of mobile payment market in China in 2018 (Capgemini, 2020).

COVID-19 impact on Big Tech and Banking Sector

According to Accenture, after COVID-19 outbreak, the banking sector experienced significant changes, such as: large decrease in cash usage (~60% drop in ATM cash withdrawal and ~75% interviewed clients planning to use less cash after pandemic), e-commerce adoption (~25% of interviewed clients made first online grocery purchase during pandemic), heavy online banking usage (~73% interviewed clients have been regularly doing transactions online with ~21% of them being first-time online users), contactless usage (~66% transactions in Mastercard have been contactless), significant technology adoption (large increase in digital tools usage and group-collaboration programs), urge to pursue contactless payments (38% respondents of the opinion that contactless payments are the future of payments) as well as social distancing (Finextra, 2020; Mercury, 2020; Kekevi S, 2020).

However, such trends were occurring before the pandemic as well. According to Deloitte, using banking services online was varying from ~40% to ~60% of total usage, while pandemic due to pandemic numbers increased from ~50% to ~70% (Deloitte, 2020). The usage of complex digital banking services, such as robo-advisory, has been on the rise as well (Dziawgo T., 2018). Moreover, number of non-cash transactions as well as their value have been increasing ~10% CAGR globally between 2013-17 (Capgemini, 2019). Therefore, it may be concluded that COVID-19 pandemic further fastens trends that have been already ongoing in the banking industry. What is more, banks experienced increase in market capitalization between Q1 2020 and Q2 2020. Considering one quarter period, combined market capitalization for top 25 banks worldwide increased from USD 2.601 trillion to USD 2.71 trillion. However banks lost significantly in market capitalization between Q2 2019 and Q2 2020. Considering one year period, combined market capitalization for top 25 banks worldwide dropped from USD ~3.5 trillion to USD 2.71 trillion. It accounted for ~23% loss in market capitalization (GlobalData, 2019). What is more, not only COVID-19 had significant impact on the financial situation of the banking sector, but banks also need to take into account numerous global and national regulations, while performing operations (Koleśnik J., 2018; Koleśnik J., Zaleska M., 2018). In case of failing to comply to such regulations, banks could take reputational damage (Niedziółka P., 2020).

Meanwhile during COVID-19, GAFA companies have been having great financial performance. GAFA earned over USD 28 billion in Q2 2020, crossed USD 5 trillion in market capitalization and constitute for over 20% of S&P 500 index (Owen C., 2020.). Amazon's quarterly revenue amounted to USD 88.9 billion, which is ~40% increase in comparison to previous year, Apple's sales revenue increased by ~11%.

To further emphasize COVID-19 impact on both markets, the analysis of key players in both sectors in US market was conducted. Top 5 banks as well as top 5 Big Tech companies in North America by the ranks of market

capitalization in Q2 2020 were considered, which are: JP Morgan, Citigroup, Wells Fargo, Royal Bank of Canada and Bank of America (banks) as well as Microsoft, Google, Apple, Amazon, Facebook (Big Tech companies). The analysis aims at depicting performance of Big Tech and Banking sector in: market capitalization, revenue and net income. The outcome of the analysis was shown in Chart 4, Chart 5 and Chart 6.

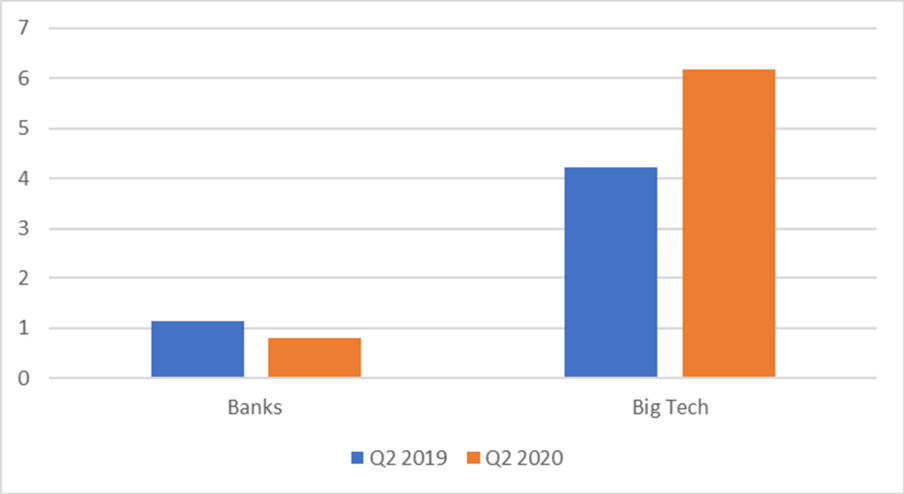

Chart 4: Market capitalization analysis between banks and Big Tech companies (USD trillion)

Source: Own elaboration based on Macrotrends and GlobalData (accessed: 12th September 2020).

Top 5 banks' market capitalization decreased from USD ~1.13 trillion to USD ~0.8 trillion, which accounted for ~29% drop. On the other hand, Big Tech companies' market capitalization increased from USD ~4.2 trillion to USD ~6.2 trillion, accounting for ~46% growth.

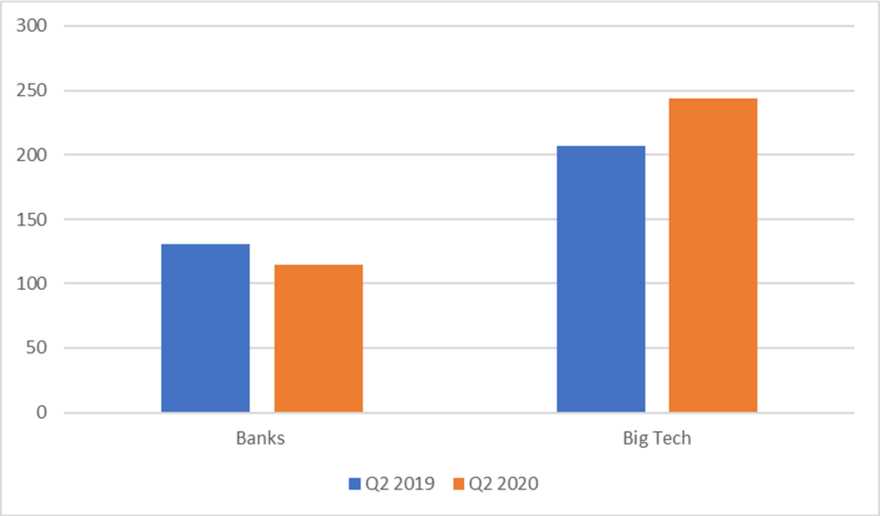

Chart 5: Revenue analysis between banks and Big Tech companies (USD billion)

Source: Own elaboration based on Macrotrends (accessed: 12th September 2020).

Top 5 banks' revenue decreased from USD ~130 billion to USD ~113 billion, which accounted for ~13% drop. On the other hand, Big Tech companies' revenue increased from USD ~206 billion to USD ~244 billion, accounting for ~18% growth.

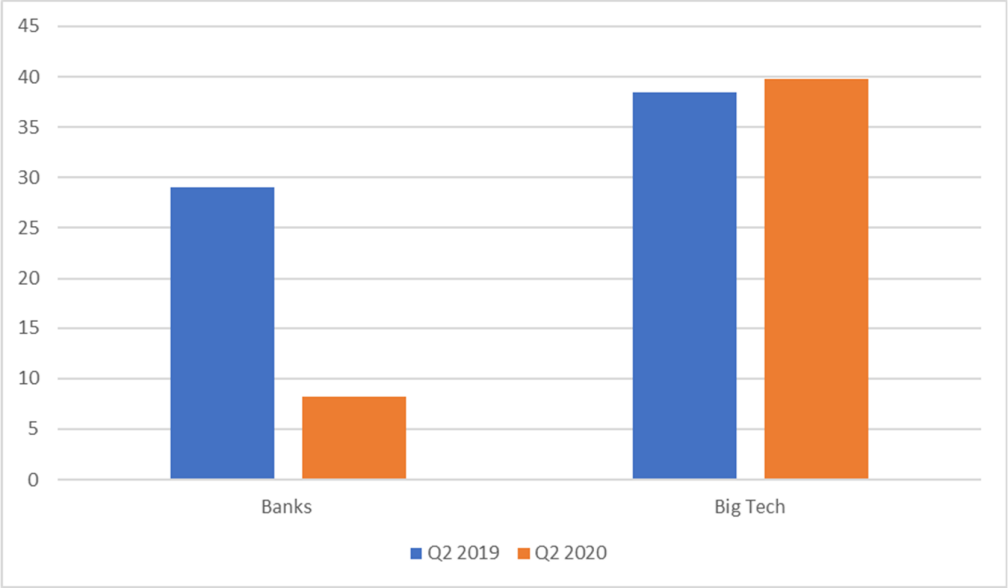

Chart 6: Net income analysis between banks and Big Tech companies (USD billion)
Source: Own elaboration based on Macrotrends (accessed: 12th September 2020).

Top 5 banks' net income decreased from USD ~29 billion to USD ~8.2 billion, which accounted for ~72% drop. On the other hand, Big Tech companies' net income increased from USD ~38 billion to USD ~40 billion, accounting for ~4% growth.

Future Outcomes and Conclusions

The research paper aimed to test two hypotheses, which are as follows:

- Big Tech companies have significant potential to dominate global financial system.
- COVID-19 strengthened Big Tech global position and weakened biggest players in the banking industry financially

After using the following methods: critical analysis of literature and research papers, descriptive method and comparative analysis of presented data, both of the hypotheses can be proven positively. Big Tech companies are more than capable in disrupting global financial system in order to diversify their revenue, get access to large volumes of customer data, increase customer volume and loyalty as well as complementing core services. They have large financial resources, astonishing market valuation and great financial performance even during COVID-19 outbreak. Because of those, it may have negative implication on society and economy, in a sense that it could pose a significant threat to national economies. Big Tech dominant position could negatively impact growth of domestic market players and therefore market competition. What is more, increasingly more potential clients are willing to trust these companies with their financials, with PayPal and Amazon having similar trust levels as banks in general. That is especially visible in younger generation, which has higher likelihood to switch to Big Tech due to: low-cost offering, ease of use, faster service, better features or personalized products. Although Big Tech companies have already started to enter financial sector – payments and asset management particularly – likelihood to increase their presence during and after COVID-19 could be higher. Long term trends in the financial sector could be beneficial for Big Tech, since it has been significant drop in cash usage, increase in digital transactions, lesser withdrawals from ATM machines or urge to pursue contactless payments. Big Tech companies outperform banks in market capitalization, revenue and net income, showing that they are not only not affected by COVID-19, but they can benefit from it by leveraging their digital presence and customer data. What is more they do not have to be concerned about heavy global and national regulations that banks have to comply with? On the basis of presented data as well as methods applied in the article, the further presence of Big Tech in financial sector is to be expected.

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A Systematic Review on Hotel Reservation Management using Mobile Applications

Miguel QUIROZ-CERVERA
Universidad Autónoma del Perú, Lima, Perú
miguecon66@gmail.com

Daniel YAÑEZ-AGURTO
Universidad Autónoma del Perú, Lima, Perú
yanez.31.12.98@gmail.com

Javier GAMBOA-CRUZADO
Universidad Nacional Mayor de San Marcos, Lima, Perú
jgamboa65@hotmail.com

Alfonso ROMERO BAYLÓN
Universidad Nacional Mayor de San Marcos, Lima, Perú
arombay@yahoo.es

Waldy GRANDEZ PIZARRO
Universidad de San Martin de Porres, Lima, Perú
wgrandezp@usmp.pe

Roger CHANDUVÍ CALDERÓN
Universidad Señor de Sipán S.A.C., Lima, Perú
rchanduvi@crece.uss.edu.pe

Abstract

Today's information systems have become one of the most vital resources for organizations in the hotel sector, especially with the COVID-19 situation, which limits the functionality of these organizations. Harnessing information systems allows the continuous modernization of strategies, operations, and service levels, to meet the high competitiveness of the market, improve productivity, and increase customer satisfaction. Because the managers of these organizations are aware of the benefits of controlling information, which include achieving better results and attracting the attention of clients, we carried out a case study for companies in the hotel sector that are seeking to improve their reservation management system. An exhaustive systematic review of the literature from studies published between 2016 and 2020 was carried out. These studies were extracted from several reliable academic sources, and a total of 81 articles were selected. This study has led to the identification of suggestive results that demonstrate the competitive advantage of using agile methodologies for mobile applications in different companies of the hotel sector.

Keywords: Booking Management; Hotel; Mobile Applications; SCRUM; Agile Methodology; Systematic Review.

Introduction

Owing to the increase in tourists, the hotel sector has become a typically engaged business sector with most hotel companies receiving a massive influx of customers, which poses the challenge of developing a management system for room reservations. However, if properly harnessed, the study of reservation management systems via mobile applications can help guests and travelers because it will facilitate and reduce the time it takes to find a place to spend the night while considering their needs and preferences. Consequently, the study of reservation management systems helps to avoid setbacks or events that could make it difficult for customers to scout a proper resting place.

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Despite the results obtained from years of research efforts, several relevant studies reveal that comprehensive and systematic review of studies on reservation management systems using mobile applications do not exist. Given the specialty of this research topic and the diversity of theoretical conventions related to the study of reservation management using mobile applications, it is important to map out published studies, summarize, and integrate their results, as well as identify opportunities for future research.

In this article, we report the results of a systematic review of studies published between 2016 and 2020, which addressed the challenges related to stockpile management using mobile applications based on different methodologies. We identify and summarize the major topics investigated in these studies, including the research method. In addition, we tried to integrate the results obtained by mobile phone and other applications, although this integration was not always possible owing to the differences between studies.

This study not only added an empirical analysis to study on reservation management using mobile applications, but it also expanded existing literature by validating a research model that integrates the evaluation of journals that publish articles, which earmarks the value of commitment. Instead of serving as a middleman, the mobile application is seen as one of the indispensable actors involved in creating value by respecting the services it offers. Therefore, it is important that companies in the hotel sector begin to take more advantage of new emerging technologies, as this would define their success in the face of a more competitive world, where competition is steadily increasing.

Therefore, it is clear that the use and development of mobile applications plays an important role in stock management in various areas. Most methodologies are based on the development of a mobile application with these methods pointing to optimal performances, which address different challenges related to one or several processes. Owing to the increasing demand for more efficient and accurate techniques compatible with a work environment, there is a scope for these requirements.

This paper is organized as follows: Section I presents an introduction to the research. In Section II, we discuss the background and important concepts related to the topic. In Section III, we present the methodology used for the research, such as the formulation of questions, objectives, statistical analysis plan, search equations, studies identified, exclusion criteria, classification, and detailed review of the study. In Section IV, we demonstrate the results by answering research questions according to the methodology using statistical analysis and interpreting the studies. In Section V, we discuss the research implications of our findings and the limitations of this systematic review. Finally, in Section VI, we present the conclusions of this research and the direction for future work.

Background and Related Works

According to Langelund (2018), mobile phones have become a requirement for any travel experience, and Wang adds that it provides functionality throughout the entire travel life cycle. This is similar in the context of business travel, although the use of these applications by travelers will often depend on the specifications of their company's mobile phone. Approximately 24% of the companies that manage travel tools stated that they plan to implement and manage the use of mobile tools. The increased use of mobile tools means that more travelers can utilize them.

Talantis et al (2020) suggested that such applications are used in almost all commercial contexts, including the hospitality industry. As the global trend tends towards an "all-mobile" society, modern consumers use mobile applications to make hotel and restaurant reservations, read reviews, and participate in corporate point-of-sale systems. Mobile applications for hotels are becoming increasingly user-friendly, offering desirable features that enhance customer experience in terms of convenience. A study by Phocus Wright (2014) examined the evolution of mobile applications from simple information providers to a more value-added model, which includes context awareness, personalization, and supports individual behavior. Regarding travel and tourism, the results of a study conducted in 2015 by Cornell University show that consumers utilize or are willing to utilize mobile devices at all stages of their travel. The study also suggests that most users are willing to download travel-specific applications.

Chuang et al. (2019) mentioned that consumers are willing to spend the most time on 'travel' applications; mobile guidance services provided in these applications have become increasingly important. Mobile guidance applications allow travelers to preview and experience itineraries before they reach their destination; travelers can use their smartphones to complete this action irrespective of their location. A mobile guidance system that integrates travel information and mapping would provide users with route planning for famous places, latest news, event information, including comprehensive data on food, accommodation, transportation, and recreation.

In a research study by Chuang et al. (2019), it was noted that with all the recent research and startling statistics surrounding the adoption and use of mobile applications, organizations in all industries employed mobile applications and other technological innovations to maintain their competitive advantage. Wu et al. (2018) suggests that mobile business solutions transformed the values of tourism and customer relationship management in e-tourism. Regarding the characteristics of mobile technologies that provide location-based services and more dynamic interactions between customers and providers, 'Satisfaction gained from computers may differ from that gained from books'. However, previous e-tourism literature identify functionality, usability, and perceived value as important dimensions for booking a hotel online. In addition, studies rarely agree on the direct or indirect influence of service quality variables (functionality and usability) on online booking satisfaction.

Mobile software development faces exceptional limitations and requirements. R. Altabeb et al. (2018) mentioned that conventional software development methodologies are not suitable for developing mobile applications. Therefore, there is a need to apply appropriate methods to address the challenges faced during the development of mobile applications. One of these challenges is the challenge posed by multiple platforms. Developers are always planning and concerned about the compatibility of their application with mobile operating systems, such as IOS, Android, Windows Mobile, and BlackBerry. Additional challenges include the time to market, limited user interface, power consumption, processor efficiency, memory performance, and intermittent network connection.

Methods and Materials

In this study, a systematic investigation was carried out on reservation management systems using mobile applications. Kitchenham et al. (2004) defined the objective of collecting evidence that can be used to guide research and practice. Therefore, this review is considered part of the evidence-based software engineering effort.

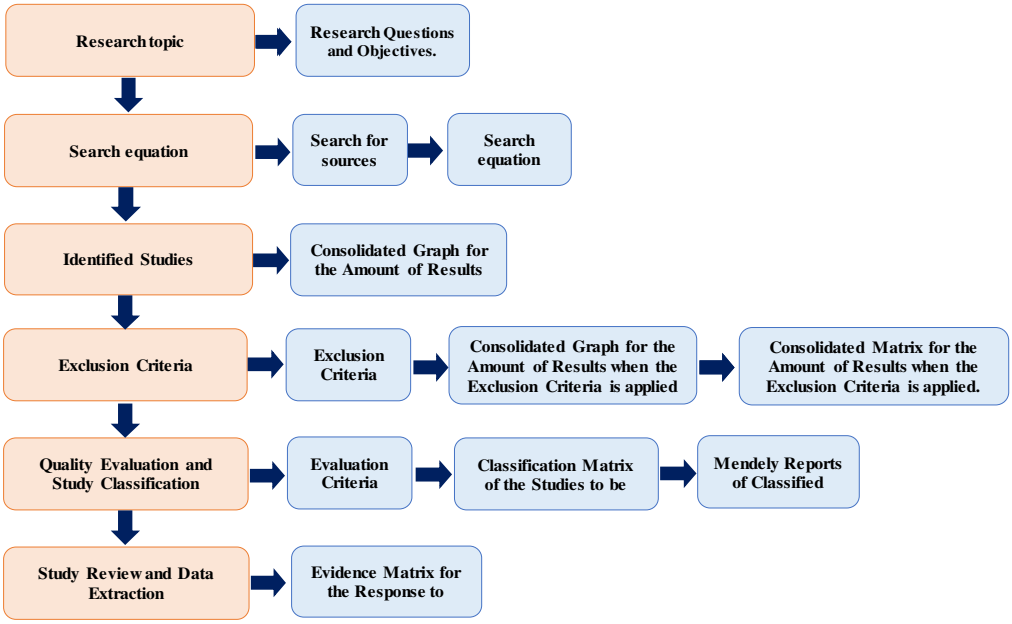

Fig.1: Systematic literature review methodology

Screening Questions

Research Questions

The systematic review used to assess the effectiveness of mobile applications is described as a means to improve room reservation management. The problems to be answered by this research are presented in Table 1.

Table 1: Research Questions

Questions	Motivation
RQ1: What are the criteria for measuring the overall effectiveness of a mobile application?	Determine the criteria for measuring the overall effectiveness of a mobile application.
RQ2: Who are the most active authors in the area?	Define the most active authors in the area.
RQ3: What means of publication represent the main objectives of research production in the area?	To understand the publication means that represent the main objectives of research production in the area.
RQ4: In what areas have mobile systems been applied?	Describe the areas in which mobile systems have been applied.
RQ5: What methodologies are being used to develop mobile applications?	Determine what methodologies are being used to develop mobile applications.

Search Equation

Search Sources

For the systematic review of the literature, we obtained information from 10 search sources, applied the search terms, and formulated the following search equations:

- Google Academic
- IEEE Xplore
- Springer Link
- Science Direct
- Microsoft Academic
- AMC Digital Library
- Taylor & Francis
- Scopus
- EBSCOhost
- ProQuest

Search Terms

To establish the logical relationships that will be given, the word terms or exact set of words that we will use to perform our search equations are established in a clear and precise way, by taking into account our variables: independent, dependent, and intervening.

Table 2: Search Terms

English	English	Description
Applications/Mobile	Applications/Mobile	Independent
Management/Booking	Reservation/Management	Dependent
SCRUM (Methodology/Method/Model)	SCRUM (Methodology/Method/ Model)	Speaker

Search Equations

The search equations, which were used in this research when applying the terms and conditions for each of the sources are presented in Table 3.

Table 3: Search Equations

Source	Search Formula
Google Academic	(mobiles applications AND Reservation Management AND SCRUM AND (Methodology OR Method OR Model)
	(application AND Reservation Management AND Scrum)
IEEE Xplore	((((("All Metadata": Applications) OR "All Metadata": Reservation) AND "All Metadata": Scrum Methodology) OR "All Metadata": Scrum Model) OR "All Metadata": Scrum Method))
	(((("All Metadata": Mobiles Applications) OR "All Metadata": Reservation) OR "All Metadata": Management) AND "All Metadata": Scrum))
Springer	'Mobile application AND Management AND (Scrum AND (Methodology OR model OR method))'
	Applications AND Management AND (Scrum AND (Methodology OR model OR method))'
Science Direct	(Application AND Management AND SCRUM AND (Methodology OR Method OR Model))
	(Mobile application AND Management AND SCRUM AND (Methodology OR Method OR Model))
Microsoft Academic	(Mobile application AND Management AND SCRUM AND (Methodology OR Method OR Model))
	(Application AND Management AND SCRUM AND (Methodology OR Method OR Model))
AMC Digital Library	(mobiles applications AND Reservation Management AND SCRUM AND (Methodology OR Method OR Model)
	(application AND Reservation Management AND Scrum)
Taylor & Francis Online	Application AND (Reservation OR management) AND scrum NEAR (methodology OR model OR method)
	(Mobile NEAR Application) AND reservation OR scrum NEAR (methodology OR model OR method)
Scopus	ALL ("Mobile application") AND ALL ("Hotel management") AND ALL ("Methodology" OR "Method" OR "Model")
	ALL ("mobile app") AND ALL ("reserve") AND ALL ("management") AND ALL ("Methodology" OR "Method" OR "Model")
EBSCOhost	TX mobile application AND TX reserves AND TX management AND TX (Methodology or Method or Model)
	TX mobile application AND TX reserves AND TX management AND TX SCRUM AND TX (Methodology or Method or Model)
ProQuest	Noft (mobile application) AND noft (reservation) AND noft (management) AND noft (Methodology OR Method OR Model)
	Noft (mobile application) AND noft (management) AND noft (SCRUM) AND noft (Methodology OR Method OR Model)

Identified Studies

Consolidated Number of Results by Source

As can be observed in Fig. 2, "N" represents the total number of articles discovered through the search equations provided by 10 sources, in which a total result was given, where (N = 20 814) articles were published in 10 sources.

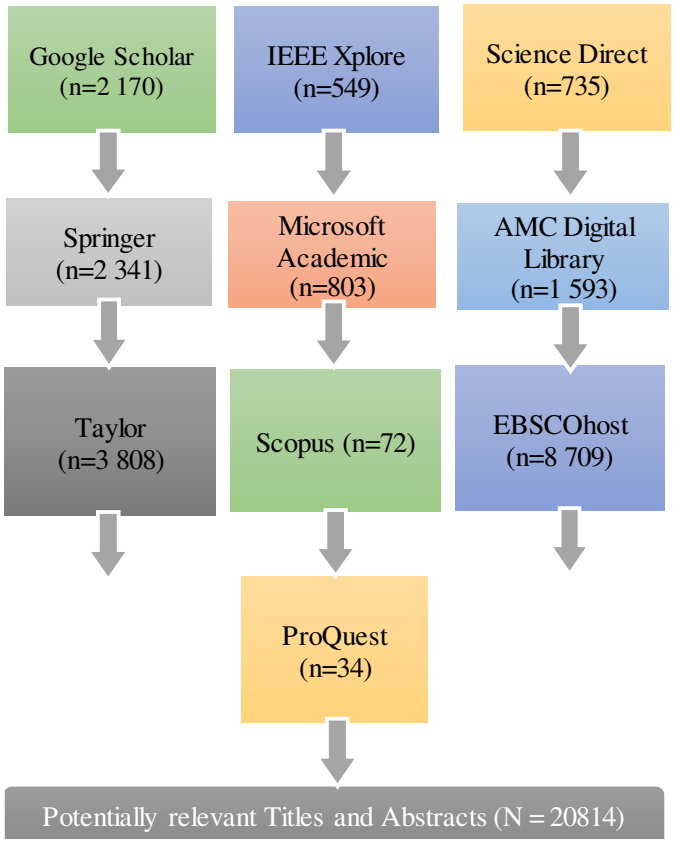

Fig.2: Consolidated Number of Results by Source

Deferral Criteria

Exclusion Criteria

A list of exclusion criteria was drawn up to avoid selection bias and to apply the criteria rigorously. These criteria depend on the objectives of the research for which 6 exclusion criteria were defined.

Table 4: Exclusion Criteria

N°	Description	Does it work?
EC1	The items are not older than 4 years OR	✓
EC2	The articles are not Articles OR	✓
EC3	Articles are not written in English OR Spanish OR	✓
EC4	The articles do not have a title or keywords related to our criteria OR	✓
EC5	Articles do not have an Abstract related to our criteria OR	✓
EC6	The articles do not propose a solution compatible with the OR	✓

Consolidated Number of Results when Applying Exclusionary Criteria

As can be observed in Fig. 3, the articles discovered via the search equations and their logical relationships with 10 sources provided a result, where N was equal to 20 814 articles, however, not all of these articles were potentially relevant to our study. By applying the exclusion criteria successively, the number of articles decreased according to the criteria, and our sample articles were left with just 81 articles that were relevant to our topic.

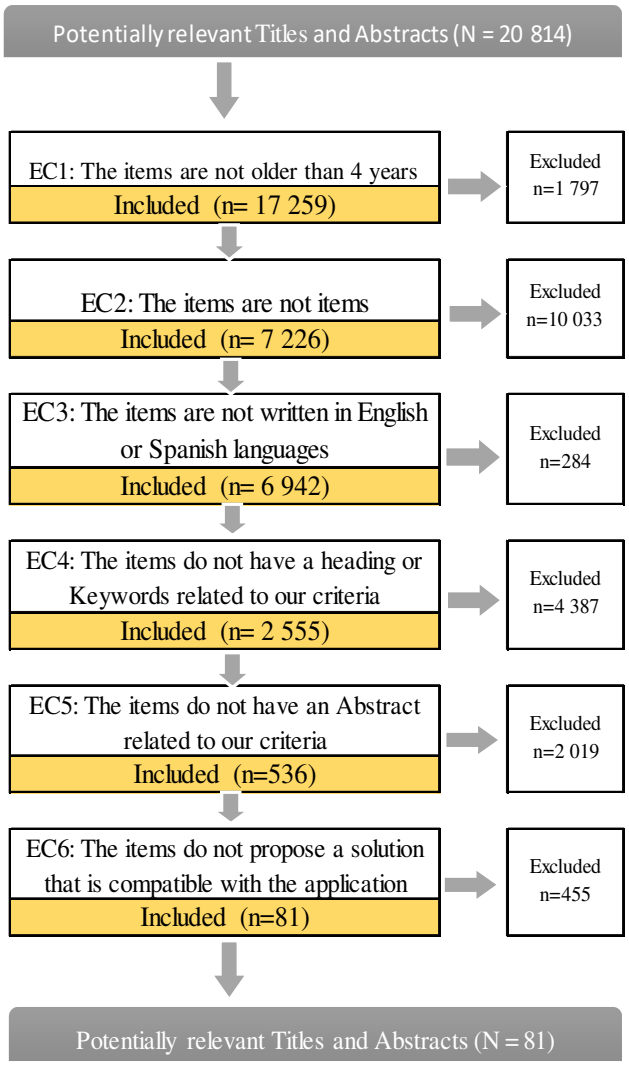

Fig.3: Consolidated Number of Results when Applying Exclusionary Criteria

Quality Evaluation Criteria

Table 5: Quality Evaluation Criteria

N°	Description	Does it work?
QA1	Does the article have a well-organized and explained structure?	✓
QA2	Is the article relevant to our investigation?	✓
QA3	Are the bibliographic sources reliable?	✓
QA4	Is the purpose of the research clearly explained in the article?	✓
QA5	Are the research findings clearly explained in the article?	✓
QA6	Is the item not duplicated by another item?	✓

After applying the six quality criteria to the 81 articles selected for the study, they all met the quality criteria, which ensures that they will provide the information required for the development of this study. References to these studies are included in Appendix A at the end of the document (i.e., [1], [2], ..., [81]).

Classification of Studies

Reports with Mendely from the Classified Studies

We classified 81 articles in a matrix with their Document title, Year, Research Methodology, and Authors to validate our final studies in more detail, which we will work with to conduct this study.

We decided to adopt Mendeley, in which the 81 articles were divided into two folders: Spanish and English. In each folder there is a subfolder with the name of each font that we have used for this research, in which the amount of articles is detailed by font.

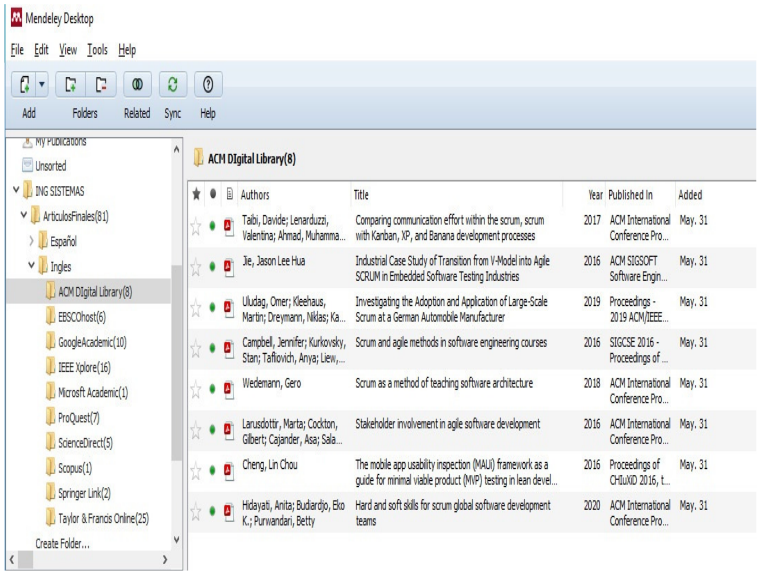

Fig.4: Report with Mendely

Results

Summary of Studies

In Fig. 5, you can see that the most used words in this research are Scrum, Mobile, Agile, Application, and Development.

Fig.5: Word clouds by article title

Figure 6 shows that the USA has the most cited items, followed by India, which ranges from 15 to more citations used in the items. It should also be noted that Ecuador has an average number of articles with more than 15 citations.

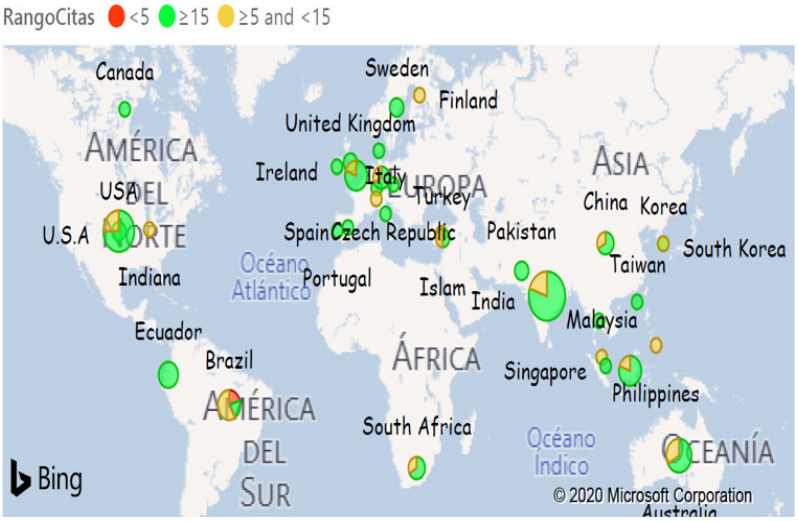

Fig.6: Items and Range of Quotations by Country

A. Response to RQ

RQ1: What are the criteria for measuring the overall effectiveness of a mobile application?

Based on the literature review, there are metrics for measuring the overall effectiveness of mobile applications, as presented in Table 6:

Table 6: Criteria for measuring the overall effectiveness of a mobile application

N°	Effectiveness Criteria	References	Total Items
1	Agility	[1] [3] [4] [5] [8] [10] [11] [12] [14] [15] [17] [18] [19] [20] [21] [23] [26] [29] [31] [32] [33] [35] [36] [37] [38] [40] [41] [42] [43] [45] [46] [47] [48] [49] [51] [52] [53] [57] [58] [59] [60] [62] [63] [64] [65] [66] [67] [71] [72] [73] [75] [77] [79]	54 (67%)
2	Cost	[3] [10] [19] [23] [32] [36] [37] [40] [45] [51] [54] [55] [57] [61] [62] [65] [75] [77] [81]	19 (23%)
3	Request	[1] [3] [14] [16] [19] [20] [21] [22] [24] [25] [26] [27] [29] [32] [34] [43] [45] [46] [48] [50] [51] [55] [57] [58] [61] [64] [69] [74] [78] [79] [81]	31(38%)
4	Response Time	[22] [41]	2 (2%)

The criteria for measuring effectiveness are Agility, Cost, Requests, and Response Time. A mobile application needs a development based on agile methodologies, where agility could be found in 54 articles [1]. The adoption of the agile method has evolved from a decision between particular agile methodologies into a more complex and adaptive process, in which the various agile practices are combined and recombined when necessary, as well as adapted to each organization and their needs and contexts [40]. Unlike traditional methods, agile approaches provide high quality software continuously and consistently while minimizing project costs [32]. The booking management system is based on the ease of administering spaces and reservations, for which it is necessary to register requests with a click [20]. It is necessary to measure the response time of the mobile application in the data center for a request [22]. The effectiveness criterion mostly used by researchers is Agile with a total of 54 articles, which is 67% of 81 articles reviewed. However, the Response Time is the lowest with only 2 (2%).

RQ2: Who are the most active authors in the area?

The top five authors out of 81 articles per reference number can be observed from graphs 7 and 8.

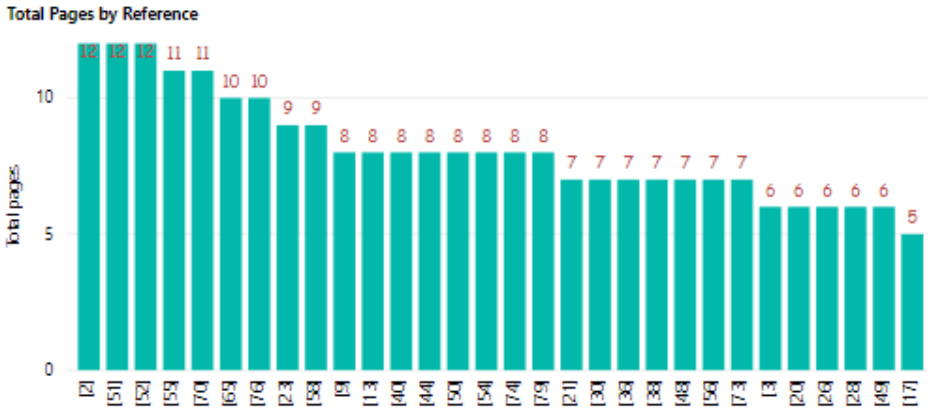

Fig. 7: Autores más Activos en el Área 1

Title Info	N°PgsRQ1	N°PgsRQ2	N°PgsRQ3	N°PgsRQ4	N°PgsRQ5	N°PgsRQ6	N°PgsRQ7	N°PgsRQ8	Total
[2] Combined individual scrummaging kinetics ...	3	1	2	1	3	2	0	0	12
[51] Agile operational research ([Año])	2	1	2	1	0	6	0	0	12
[52] An Analysis of Theories Supporting Agile S...	3	1	2	1	3	2	0	0	12
[55] Gendered mobilities in the making: moving...	1	1	2	1	1	2	3	0	11
[70] Conference mobile application: Participant ...	0	1	2	1	3	0	4	0	11
[65] Challenges and Solutions for Manufacturer...	2	1	2	1	0	4	0	0	10
[76] Scrum: Enhancing Student Team Organizati...	3	1	2	1	1	2	0	0	10
[23] Challenges and facilitators practices for kn...	3	1	2	1	1	1	0	0	9
[58] 3D visualization in booking systems ([Año])	2	1	1	1	2	1	1	0	9
[13] A current travel model: smart tour on mobi...	0	1	2	1	2	1	1	0	8
[40] Agile Methodologies: Organizational Adop...	1	1	2	1	0	3	0	0	8
[44] Perceptual-cognitive expertise when refere...	1	1	2	1	1	0	2	0	8
[50] Using web and mobile technology to motiv...	0	1	2	1	4	0	0	0	8
Total	43	79	82	75	41	81	29	0	430

Fig.8: Most Active Authors in Area 2

The articles that contributed the most to our research with the resolution of the RQs are [2], [51], [52], [55] and [70]. Where [2], [51], [52], provided us a total of 12 pages that answer the RQs while[55] and [70] give us a total of 11 pages. With this, we can identify the authors who are active in this study area, and those who helped to answer our questions.

Authors	<5	≥15	≥5 and <15	Total
Kaur, A., & Kaur, K.		93		93
Ozturk, A. B., Nusair, K., Okumus, F., & Singh, D.		87		87
Mele Wheaton, Nicole M. Ardoin, Carter Hunt, Janel S. Sch...		85		85
Griol, D., Molina, J. M., & Callejas, Z.		84		84
Sea Talantisa , Yeon Ho Shinb , and Kimberly Severtb		69		69
Sujin Yang & Yun Jung Lee		69		69
R Altaleb, A., & M Gravell, A.		64		64
Nancy Cook & David Butz		63		63
H. Wu, J. (Snow), Law, R., & Liu, J.		61		61
Total	4	2250	213	2467

Fig. 9: No. of Quotations per Author and their Range

Fig. 9 also shows the authors with the highest number of citations. Kaur, A, the first author has a total of 93 citations, whereas Sea Talantisa, the fifth author, has a total of 69 citations.

RQ3: What means of publication represent the main objectives of research production in the area?

As can be observed in graph 10, we consider the number of citations and the means of publishing these articles.

Publication Name	<5	≥15	≥5 and <15	Total
Department of Computer Science and Engineering		7	1	8
Archives of Suicide Research		1		1
ASEE Annual Conference and Exposition			1	1
Central Connecticut State University			1	1
Chair for Informatics		1		1
Communication Teacher		1		1
Computer and Information Sciences		1		1
Computer Game Programming		1		1
Computer Science and Software Engineering		1		1
Total	1	58	22	81

Fig. 10: Publishing Media with more Production in the Area

The publication with more production in the area was that of the Department of Computer Science and Engineering, which stood out with eight published articles, of which seven of them had more than 15 dates and the other one had less than 15 dates.

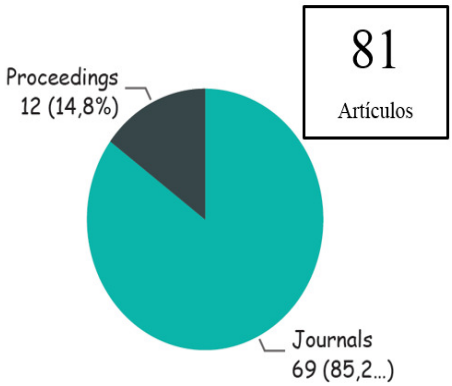

Fig. 11: Number of Articles by Type of Publication

Furthermore, we can observe that 85.2% represents Journals, whereas 14.8% represents Proceedings found in this systematic review with a total of 81 articles.

RQ4: In what areas have mobile systems been applied?

Table 7 shows that five areas were found in this systematic review.

Table 7: Areas of Mobile Applications

N°	Areas of Mobile Applications	References	Total Items
1	Events	[2] [3] [6] [7] [9] [11] [16] [22] [31] [43] [46] [52] [55] [57] [58] [59] [60] [70] [74] [78] [81]	21(26%)
2	Hotel	[13] [16] [20] [25] [28] [61] [70] [80]	8 (10%)
3	Medicine	[13] [39]	2 (2%)
4	Software	[1] [3] [4] [5] [10] [11] [12] [13] [14] [15] [17] [18] [19] [20] [21] [22] [23] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [51] [52] [53] [57] [58] [59] [60] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [81]	66 (81%)
5	Sport	[2] [9] [20] [21] [30] [31] [44] [74] [78]	9 (11%)

Mobile applications for events are one of those technological advances that have experienced exponential growth in the last decade [70]. As the trend for everything mobile grows, modern consumers use mobile applications to make hotel and restaurant reservations, read reviews, and engage in business [70]. However, for effective application, medical researchers need an understanding of system development and design [39]. Agile principles value working software over documentation and are intended to be adaptive and responsive to changing situations [81]. To improve service and control, mobile applications in sports centers are used to make bookings [21]. Software is the area with the most items found with 66 (81%) and the least Medicine with only 2 (2%).

RQ5: What methodologies are being used to develop mobile applications?

Many methodologies could be observed when performing different types of applications or systems, but the most relevant and used are presented in Table 8.

Table 8: Most Used Methodologies with Mobile Applications

N°	Types of Methodologies	References	Total Items
1	Banana	[79]	1 (1%)
2	Kanban	[8] [14] [18] [20] [23] [32] [40] [48] [51] [58] [59] [72] [75] [79]	14 (17%)
4	Scrum	[1] [2] [3] [4] [5] [7] [8] [9] [10] [11] [12] [14] [15] [17] [18] [19] [20] [21] [22] [23] [26] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [51] [52] [57] [58] [59] [60] [62] [63] [64] [65] [66] [67] [71] [72] [73] [75] [76] [77] [78] [79]	59 (73%)
5	XP	[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [63] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [70] [71] [72] [73] [74] [75] [76] [77] [79] [80] [81]	79 (98%)

Banana, Kanban, Scrum, and XP occupied the top 4. The first and least used was Banana with 1 (1%) item, a term used among practitioners to describe processes that produce immature products, which have to "ripen" after being sent to the customer, as in real bananas [79]. Another method that was widely observed was Kanban, which is a method for evolving, increasing the process, and identifying workflow problems [75]. Scrum was also one of the most encountered when reviewing the study. Scrum covers almost any type of project and works with the fundamental principle of agile methodologies [21]. Finally, XP was positioned as the most used methodology for the different research topics. Many authors use it because it is an evidence-based methodology and one of the most popular, as it is mentioned in 79 (98%) articles of the 81 found in the research [79], the lowest being Banana with 1 (1%) article.

Discussion

To the extent that it has been researched, this study is the first attempt to systematically review the literature on research related to hotel reservation management using mobile applications. The results obtained show a high concentration of empirical research on the study of mobile applications within the hotel sector. The other research questions received less attention. Additionally, no empirical replications were found. One of the contributions of this study to the research community is that it can guide future research, and influence the practice of mobile applications applied to the hotel sector.

For business professionals, the direct application of the results presented in the studies must be done carefully using some of the methodologies developed (Scrum, Kanban, XP, Banana). Evidence suggests that this field of research is not mature and that the direct application of the methods and instruments used may not produce the desired effects required to develop a mobile application for the hotel sector. In particular, according to Mitch Bott & Bryan Mesmer, the transition between the models and the real-life system requires development, therefore, testing the process in a pilot program will prove vital [52]. Furthermore, to assess the possibility of generalizing the results in the context of other possible environments, it is necessary to conduct a careful analysis of the environment in which the study was conducted.

Conclusions and Future Works

In conclusion, this study adopted systematic literature review (SLR), which is a repetitive process that combines all existing literature on a specific topic or research question. The goal of the SLR is to address problems by identifying, assessing, and integrating the findings of all relevant high-quality studies that address two or more research questions.

This method determines the progress of current studies on the use of mobile applications. Considering 81 articles, four criteria were determined to measure the overall effectiveness of a mobile application. The most widely used criterion is "Agility," which was used to evaluate its overall effectiveness. The study obtained a total of 81 articles between Journals and Conference Proceedings. In addition, it was determined that the most relevant studies present between 11 and 12 pages helped answer the largest number of RQs, being the publication medium of the Computer Science and Engineering Department, which had the highest production in the area of mobile applications. Five areas were evaluated to measure the use of mobile applications, with "Software" as the most utilized area. Next, the methodologies that are mostly used for the development of a mobile application were evaluated; the most with Scrum and XP being the most used. The definitions required to refer to mobile application are Application Development, Software Application, Mobile apps, and Apps. This research has some limitations. First, it does not explain the development of a mobile application in detail. However, it does explain the use, purpose, and application methods of mobile applications in different aspects already mentioned. Therefore, to ensure that the results are as expected and help researchers in general, future research should consider the development of a mobile application and better understand the SLR methodology.

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Apendice A

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Personnel Competences of a Company in Industry 4.0

Dariusz NOWAK

PhD, Assoc. Prof. at PUEB
Poznań University of Economics and Business, Poland
dariusz.nowak@ue.poznan.pl

Beata SKOWRON-MIELNIK

PhD, Assoc. Prof. at PUEB
Poznań University of Economics and Business, Poland
beata.skowron-mielnik@ue.poznan.pl

Abstract

The aim of this article is to identify and assess key company competences in terms of Industry 4.0 and related challenges. In particular, it seeks to find out what personnel attributes a company should have to be able to effectively compete in a world of advanced technological strategies developed as a natural consequence of technological progress, development of production means, growing awareness and requirements of consumers, and innovation. These elements are indicated as extremely significant in the transformation of industry, reflected in the digitization of production, automation, and production plants combined into coherent and comprehensive chains based on automatic information exchange. While posing a challenge for companies, these phenomena also allow them to achieve greater results in contemporary world. Due to the multidimensional and multifaceted nature of the discussed problem, factor analysis (Principal Component Analysis) was adopted as the basic research method. This empirical study allowed us to identify areas of key personnel competences of a company, with their value, cognitive load, and impact. They were classified in six categories: professionalism, internal relations, professional preparation, risk, employees, and contractors/clients, they constitute a common ground for the company's operations that should be invested in, developed, and customer service.

Keywords: Key competences, Industry 4.0, personnel competences of the organization

Introduction

One of the most important developments that will continue to determine the operations of enterprises in the nearest future is the revolution inspired by the ongoing technological progress and known as Industry 4.0. In this concept, future development is based on digitization and automation, processual and organizational innovations, the Internet of Things, and servitization employed by production companies, which eventually lead to vertically and horizontally integrated production systems (Thoben et al., 2016). In particular, changes will be observed in fields, such as big data analysis and processing, augmented reality, 3D printing, computing, public cloud, cybersecurity, mobile industrial robots, simulation, horizontal and vertical software integration, and the Internet of Everything and its use in industry (Report 2017). Seeking to incorporate these changes, companies will face a number of challenges, including the need to reconfigure their goals, technical and technological qualities, relations with stakeholders, as well as their tangible, financial and human resources (HR). The latter are of particular importance, and must be considered through the prism of competences related to experience, skills, knowledge, culture, professionalism, etc. The current competences, based on traditional models of company management, will be subject to evolutionary changes. The new, augmented reality will enforce a new approach to tasks, internal and external relations, ethics, environment, resource management, etc. While Polish enterprises are not yet prepared for such changes, they are aware of the need to modify their long-term assumptions. This article focuses on

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identifying personnel competences that may prove significant for organizational changes triggered by Industry 4.0.

Theoretical Background

The first assumptions regarding Industry 4.0, referred to as the Fourth Industrial Revolution in the literature (Stadnicka et al., 2017; Schwab, 2016), were proposed in Germany in 2011 with respect to the economic policy of the state that should be based on advanced technological strategies (Pereira and Romero, 2017; Hermann et al., 2015). The concept of Industry 4.0 includes a set of assumptions that, on the one hand, constitute a kind of challenge, but on the other hand, will allow companies to achieve great results in the future. They include as follows: cybersystems, Internet of Things, Internet of Services, robotics, Big Data, cloud computing, and augmented reality (AR). Other hallmarks of this industrial revolution also include complexity, interoperability, virtualization, decentralization of decisions, real-time capabilities, service orientation, and modularity (Ibarra, 2017). Investments in these components will contribute to the development of smarter production processes based on machines and production modules that are able to communicate with each other, creating an intelligent production environment (Pereira and Romero, 2017; Sommer, 2015). They provide a framework for the total automation and digitization of production and services, with increased application of electronics and IT (Almada-Lobo, 2016; Roblek et al., 2016; Report, 2017; Vaidya et al., 2018). According to Stock and Seliger (2016), challenges related to Industry 4.0 concern also other areas, such as equipment, workforce, organization, processes, and products.

The emerging changes result in building completely new relationships with clients, a possibility to produce new products and services, and create a new environment for collaborations, all of which contributes to the implementation of a new business model (Ibarra, 2017). This model requires adjustments in terms of standardization, work organization, availability of skilled employees and their competences, research investments, professional development, and legal framework (Thoben et al., 2017; Maslarić et al., 2016). Those related to the HR are of particular importance, as technical growth induces workforce restructuring (Kane et al., 2015). On the one hand, skills and competences of increasing levels will be required, but on the other, increased efficiency enabled by smart technologies may result in technological unemployment (Hungerland et al., 2015). In addition, Industry 4.0 introduces new types of interaction between operators (humans) and machines, which requires a specific coexistence of humans and robots, or transformation of the current workforce in the industry, to meet the changing needs and ensure the increasing variability of production (Pereira and Romero, 2017). With the ongoing nature of technological development, according to the concept of Industry 4.0, human capital will provide a link between technology and reality. Regardless of the size of the organization, human capital is argued to be the most important part of the intellectual capital (Gorustowicz, 2019). Human resources should possess unique skills, experience, qualifications, and expertise that will distinguish them from the competition (Moczydłowska, 2012). Personnel in Industry 4.0 must therefore have specific competences, both hard and soft. The former are associated with production processes and expert knowledge necessary to implement them, while the latter have an effect on the implementation of tasks, interpersonal relations, cooperation, and collaboration (Gorustowicz, 2019). They constitute new employee competences, around which respective HR processes should be developed to build the necessary competences of a company with respect to acquiring, managing, and retaining employees in the conditions of Industry 4.0.

Competences are typically defined as 'the scope of knowledge and skills, professionalism, expertise' (Kopaliński, 2006, p. 406). In practice, they are associated with synonymous terms, such as professionalism, expertness, craftsmanship, proficiency, experience, mastery, faculty, reliability, talent, etc. At the level of the organization, they should be considered in a broader context of skills as the resultant of a set of different qualities of an organization (Rokita, 2005). According to Siwak (2015), company competences comprise management competences of the company owners, employees, and associates, which altogether form the human resources of a given entity. It may therefore be said that the concept of competences covers the following aspects (Kossowska and Sołtysińska, 2002):

- Mastering the knowledge of a given field;

- Skills defined as procedural knowledge;
- Attitude of willingness and readiness to use this knowledge.

In more personalized terms, these qualities are often extended to include personal characteristics, mentality, disposition, individuality, character (Whiddett and Hollyforde, 2003), competences of the company owner and employees, and organizational memory and knowledge (Sigismund et al., 2011). The thus defined competence often appears in combination with another term to specify its meaning, such as court competence, key competence, linguistic competence, personal competence, social competence, etc. According to Coulson-Thomas (2009), the identified competences should be grouped as: personality traits, awareness of business environment, sense of responsibility, vision and strategic perspectives, knowledge of corporate governance and its requirements, understanding of the structure and principles of top management, teamwork, decision-making skills, corporate experience, ethics, and respect for other values.

The biggest challenge in implementing the ideas of Industry 4.0 in Poland is the fact that due to the extremely short period of economic modernization this country is faced with three coinciding waves of revolution: the still visible relics of the second industrial revolution, the third revolution, which is the reality of most organizations, and now the fourth revolution (Kaczmarek-Kurczak, 2020). Consequently, brining enterprises to the next level of Industry 4.0 is a truly difficult task, and to ensure the coherence of company operations it is essential to make people see and think of certain situations in a similar way. This should translate into consistent decisions and help managers work with their employees more closely, and therefore develop common patterns of thinking. Management competences and employees' competences are included in the key competences of the organization, influencing its development and value for stakeholders (Siwak, 2015). In general, core competencies have been seen as capabilities held by people within a firm that, when applied through corporate operational processes to create products and services, make a critical contribution to corporate competitiveness (Edgar i Lockwood, 2011). All of this prompts the following research question: What personnel competences, in terms of ensuring the necessary human resources and processes, are needed for a company to enter the realm of Industry 4.0?

Research Method

An empirical study was conducted in the first half of 2020 to identify key personnel competences as part of broader observations of the knowledge, awareness, and approach of Polish entrepreneurs to changes related to Industry 4.0. Because of the nature of the studied problem, quantitative methods were applied with a multidimensional comparative analysis. The analysis was based on a questionnaire consisting of two parts. The first part, metrical, contained questions about the number of employees, company's profile, sales markets, strategy, and legal form, which provided for a complete characterization of the sample. The second part offered a list of competences (Figure 1) based on the literature research (Coulson-Thomas, 2014), interviews, consultations with business representatives, and own analyses. The competences were assessed by the respondents on a 5-point Likert scale, where 1 denoted a competence that was insignificant for the company in the context of Industry 4.0 challenges, and 5 – a competence of extremely high significance. The collected empirical material was coded and converted into numerical data for detailed analyses of the studied population. The adopted scale allowed us to determine the strength and direction of the impact of each variable by calculating the arithmetic mean and determining the so-called significance coefficient N.

Due to the multidimensional and multifaceted nature of the discussed problem, factor analysis (specifically, Principal Component Analysis, PCA) was adopted as the basic research method. The decisive factor for choosing this procedure was the individualized and subjective characters of most responses. This method is used in situations where a given phenomenon is studied using a series of possibly interdependent variables. This type of analysis allowed us to eliminate insignificant variables, stemming from the original study, the effect and significance of which were difficult to determine in the initial period. Factor analysis is a set of methods as a result of which many initial variables are reduced to several mutually independent main factors. The procedure consists of several steps. Firstly, a square matrix of correlation coefficients between the initial variables is developed. Secondly, highly correlated groups of variables are identified. A strong correlation means that the

same information is repeated in some characteristics, which contributes to the distortion of the output data. In this study, the Spearman's rank correlation coefficient was used which determines the level of linear relationship between random variables. Thirdly, a factor loadings matrix is created which includes information on the value of correlation coefficients of all initial variables reflected in each of the main factors. Next, the matrix is subjected to the varimax rotation, which allows us to maximize the variance of the factor loadings for each identified main factor. As a result, a new matrix is obtained which contains information about the value of the correlation coefficient between the individual initial variables and a given main factor. Theoretically, the number of the main factors may be one less than the number of the variables, which however would be pointless from the research point of view. Therefore, the essential characteristics must be verified using one of the techniques: Cattell's scree test or the Kaiser criterion. In practice, both methods are used together: first the scree test is conducted which is then verified using the Kaiser rule. Eventually, all factors on the scree plot before the selection point ("the elbow"), for which the eigenvalues exceed 1, are admitted for further analysis. This procedure ensures the basis for the logical interpretation, which is the last step in the factor analysis. It provides for a broad and thorough explanation from the point of view of new socio-economic categories, as defined by the main factors, and the organization of the factors in the orthogonal spaces. Calculations were carried out in Statistica StatSoft 13.3, using descriptive statistics, correlations, and multivariate analyses.

Non-probability purposive sampling was applied to select typical subjects for the study. The basic criterion was the type of business, industrial activity or provision of industrial services, as verified against NACE Rev. 2[1]. The questionnaire was sent to 500 companies operating on the Polish market, with 176 sending the forms back, of which 159 (32%) were admitted for further analysis. The remaining forms were rejected as non-compliant or incomplete. The detailed characteristics of the sample are presented in Table 1. All companies participating in the study came across the issues related to Industry 4.0 in their core activity.

Table 1: Characteristics of the enterprises according to the adopted criteria

No.	Characteristic	No. of indications N=159	Share (in %)
	Enterprises		
1.	Small	78	49.1
2.	Medium	67	42.1
3.	Big	14	8.8
	Respondent		
1.	Owner/chairman	57	35.8
2.	Director / manager	15	9.4
3.	Specialist	87	54.7
	Year of foundation		
1.	Until 1990	41	25.8
2.	1991-2000	48	30.2
3.	2001-2010	31	19.5
4.	After 2010	39	24.5
	Business profile[1]		
1.	Production	53	33.3
2.	Production services	106	66.7
	Legal form		
1.	Enterprises of natural person	22	13.8
2.	Limited liability company	94	59.1
3.	General partnership	8	5.0
4.	Public limited company	27	17.0

[1] Industrial processing covers industries with codes 15 to 37.

5.	Partnership	5	3.1
6.	Other forms	3	1.9
Market[1]			
1.	Local market	80	50.3
2.	Regional market	75	47.2
3.	Domestic market	103	64.8
4.	International market	75	47.2
5.	Global market	21	13.2
Basic strategy (the company could indicate more than one option)			
1.	Quality strategy	74	46.5
2.	Price strategy (cost leadership)	89	56.0
3.	Differentiated strategy - depending on the supported regions, businesses	21	13.2
4.	Niche strategy	15	9.4
5.	Mixed strategy (average quality for average price)	9	5.7
6.	Lack of strategy	13	8.2
7.	Strategy of imitators	41	25.8

Source: own study.

Results

The analysis revealed that the significance coefficient N of all examined variables ranged from 3.1 to 3.9. From the respondents' point of view, experience acquired at work proved to be particularly important. It gave employees the ability to perform tasks assigned to a given function, properly and correctly, without the need for consultation or supervision of the line manager. It also translated into employees' efficiency, commitment, and approach to work, which is generally reflected in the company's improved performance, trouble-free execution of the plan, reduction in production shortages, etc. According to the respondents, the next four competences were nearly just as important (significance coefficient = 3.8). The first one concerned the relationship between employees and management. The high value of this competence was confirmed by other observations, which emphasized the importance of communication, partnership, and information flow in the process of the company's adaptation to new conditions. Moreover, focusing on relationships seems to provide all employees with equal development opportunities and assessment measures, increasing employees' self-esteem and awareness of directions in the company's development. Conflicts, antagonisms, or confrontations tend to do the opposite, prompting the destruction of the entire system. The next two competences, for which the significance coefficient was 3.8, may be considered jointly, because they related to teamwork skills and partnership relations among employees. They are compatible and contain a similar information loading; after all, without proper relations there is no teamwork. In accordance with the idea contained in the variables, employees should be entrusted with tasks consistent with their competences, skills, and qualifications, and should be provided comprehensive assistance in case of complications or problems. This is because teamwork is based on collaboration, joint performance of tasks, mutual help, and facing consequences for the achieved results as a collective. The last competence that proved significant was openness and flexibility to user requirements. A company that wants to be active on the market, particularly in light of the Industry 4.0 challenges, must take into account demands, suggestions, proposals, and even requirements of its clients/contractors. Ultimately, the success of the organization depends on them. Detailed distribution of all responses is presented in Chart 1.

Out of five competences with the highest significance coefficient N, four related to the company's internal conditions, and only one to its relations with the market. However, the rather small spread of the obtained results makes it impossible to conduct a detailed analysis and identify the advantages clearly indicative of the company's position in the face of Industry 4.0. The process of identifying and assessing the personnel competences that are of key importance in terms of current changes is very complex and time-consuming, and is not always reflected in the economic reality. This problem can be solved by the reduction of initial variables and assigning them appropriate ranks (dimensions).

To this end, factor analysis was used to simplify the initially complex structure into a simpler one (with the use of factors). In accordance with the procedure, a correlation matrix was created, which was then subjected to further analysis. As a result, a large number of variables were found to reveal a high correlation with other variables. In practice, correlation between two variables is assumed to be not clear for $r_{xy} \leq 0.3$, moderate for $0.3 < r_{xy} \leq 0.5$, and clear for $r_{xy} > 0.5$ (Ignatczyk and Chromińska, 2004, p. 170).

Analyzing the data in the matrix (Table 2), a particular degree of correlation was found between the following variables:

- Strategic goals and tasks for individual work cells (0.54), and the company's attitude to employee motivation (0.53);
- Specific tasks and responsibility (0.65), and employees' qualifications (0.51);
- Responsibility and employees' skills in the use of technology (0.6);
- Qualifications and experience of managers, and qualifications and experience of employees (0.7), and experience acquired at work (0.51);
- Training, including internal training, with both individual and group learning (0.57), and employees' commitment (0.5);
- Procedures and programs, and motivation (0.59);
- Motivation and structure (0.6), learning process (0.51), commitment (0.51), work culture (0.5), and knowledge (0.53);
- Learning process and commitment (0.65), culture (0.55), and knowledge (0.6);
- Commitment and culture (0.62), and knowledge (0.59);
- Relations between employees and management, and teamwork skills (0.62);
- Teamwork and partnership relations among employees (0.59);
- Customer service and openness, and flexibility to user requirements (0.57);
- Standards and principles of management, and approach to conflicts (0.66).

Figure 1: Distribution of responses assessing the significance of personnel competences (percentage of companies).

Source: own study.

Table 2: Correlation matrix between input variables of personnel competences

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.
1.	1.00																										
2.	**0.54**	1.00																									
3.	**0.50**	**0.65**	1.00																								
4.	0.49	0.40	**0.60**	1.00																							
5.	0.41	0.45	0.33	0.44	1.00																						
6.	0.42	**0.51**	0.34	0.43	**0.70**	1.00																					
7.	0.36	0.30	0.33	0.29	**0.50**	0.44	1.00																				
8.	0.43	0.39	0.38	0.31	0.32	0.30	0.45	1.00																			
9.	0.43	0.37	0.43	0.34	0.13	0.20	0.25	0.45	1.00																		
10.	**0.53**	0.39	0.35	0.34	0.28	0.28	0.29	0.39	**0.59**	1.00																	
11.	0.39	0.27	0.29	0.29	0.22	0.23	0.28	0.37	0.49	**0.60**	1.00																
12.	0.42	0.35	0.32	0.26	0.32	0.38	0.35	**0.57**	0.42	0.48	0.41	1.00															
13.	0.44	0.39	0.35	0.27	0.36	0.40	0.37	**0.50**	0.46	**0.51**	**0.51**	**0.65**	1.00														
14.	0.46	0.46	0.40	0.34	0.34	0.37	0.34	0.44	0.37	**0.51**	0.35	**0.55**	**0.62**	1.00													
15.	0.47	0.32	0.34	0.33	0.25	0.30	0.30	**0.63**	0.42	**0.53**	0.46	**0.60**	**0.59**	**0.57**	1.00												
16.	0.46	0.20	0.20	0.24	0.25	0.14	0.20	0.32	0.16	0.36	0.40	0.32	0.38	0.35	0.35	1.00											
17.	0.43	0.30	0.23	0.15	0.35	0.27	0.28	0.35	0.20	0.32	0.39	0.32	0.37	0.41	0.32	**0.62**	1.00										
18.	0.29	0.25	0.22	0.25	0.39	0.31	0.23	0.20	0.10	0.29	0.26	0.30	0.27	0.40	0.25	0.47	0.45	1.00									
19.	0.34	0.30	0.23	0.18	0.28	0.26	0.10	0.22	0.20	0.32	0.42	0.29	0.33	0.38	0.32	0.48	**0.59**	**0.52**	1.00								
20.	0.28	0.33	0.33	0.34	0.25	0.22	0.24	0.31	0.26	0.28	0.25	0.32	0.31	0.37	0.32	0.31	0.30	0.44	0.45	1.00							
21.	0.19	0.26	0.25	0.17	0.29	0.37	0.19	0.23	0.18	0.23	0.22	0.32	0.35	0.39	0.30	0.31	0.39	**0.55**	0.36	0.43	1.00						
22.	0.28	0.25	0.27	0.23	0.29	0.26	0.31	0.31	0.22	0.25	0.18	0.35	0.30	0.32	0.30	0.35	0.37	0.40	0.26	0.44	**0.57**	1.00					
23.	0.41	0.36	0.36	0.37	0.32	0.28	0.32	0.39	0.36	0.44	0.33	0.45	0.39	**0.54**	0.41	0.38	0.40	0.41	0.37	0.37	0.35	**0.54**	1.00				
24.	0.37	0.29	0.32	0.37	0.34	0.36	0.28	0.31	0.29	0.41	0.28	0.38	0.40	0.41	0.36	0.43	0.35	0.29	0.28	0.29	0.34	0.40	**0.66**	1.00			
25.	0.14	0.25	0.22	0.33	0.28	0.32	0.28	0.35	0.15	0.16	0.11	0.18	0.25	0.28	0.23	0.09	0.13	0.10	0.10	0.27	0.14	0.19	0.23	0.30	1.00		
26.	0.39	0.34	0.34	0.25	0.26	0.24	0.27	0.34	0.29	0.36	0.27	0.27	0.28	0.33	0.30	0.19	0.26	0.20	0.21	0.31	0.16	0.23	0.24	0.26	**0.50**	1.00	
27.	0.28	0.35	0.31	0.32	0.45	0.30	0.24	0.27	0.24	0.39	0.36	0.39	0.33	0.40	0.23	0.27	0.35	0.35	0.29	0.27	0.25	0.28	0.42	0.27	0.37	0.48	1.00

Variables were numbered as shown in Figure 1.
Marked correlation coefficients are significant, with p <0.05000.
Source: own study.

Strong and moderate correlation means that the information contained in individual variables is repeated many times, which points to a hidden structure between the principal components that affects individual competences. Using factor analysis, many initial variables could be reduced to several factors containing a "synthesis" of information derived from the respective dimensions. These factors carry both a large amount of information from the initial variables and some new information.

Table 3: The eigenvalues of factors obtained in the factor analysis

Factor	F_1	F_2	F_3	F_4	F_5	F_6	…	F_n
Eigenvalues	11.3	1.9	1.7	1.2	1.1	1.0	…	27
% of variance	41.8	7.0	6.2	4.5	4.2	3.7	…	100
Cumulative eigenvalues	11.3	13.2	14.9	16.1	17.2	18.2	…	
Cumulative % of variance	41.8	48.9	55.1	59.6	63.8	67.6	…	100

Source: own analysis.

Based on the analysis of the results presented in Table 3, six factors containing the cumulative information for which the eigenvalue exceeded 1, were admitted for further work. The first factor explained nearly 42%, the second 7%, the third more than 6%, and the others (altogether) 12.4%, of total variance. Altogether, the six factors explained over 67% of the studied phenomenon, while the remaining 21 factors approximately 33%. The analysis of the remaining factors could therefore be assumed to be redundant. In order to confirm their correct selection, the six factors were verified using Cattell's scree test for the graphic determination of the selection point ("the elbow"). The elbow is where the eigenvalues seem to level off, rendering the remaining factors (to the right of this point) the "scree" and thus hardly significant.

As a result of the transformation of the primary correlation matrix, a factor loading matrix was obtained, which was subjected to the varimax rotation. In accordance with the PCA method, the subsequent factors were responsible for a smaller and smaller range of variance. This procedure made it possible to reduce initial variables (included in the analysis) to a group of six factors that characterized the studied phenomenon to a high degree. Variables were assumed to be significant for loading values (correlations) above 0.65. The rotated factor loadings are presented in Table 4.

Table 4: Factor loading matrix after rotation.

Initial variables	Factor loadings after rotation					
	Factor					
	1	2	3	4	5	6
27. Employees' knowledge of strategic goals	0.37	0.39	0.18	0.61	0.05	0.09
26. Precisely defined tasks for work cells	0.23	0.22	0.45	0.59	0.14	0.10
25. Precisely defined responsibility	0.19	0.12	0.20	**0.74**	0.11	0.21
24. Matching skills to technology	0.09	0.08	0.23	**0.73**	0.18	0.25
23. Qualifications and experience of managers	0.13	0.23	**0.77**	0.24	0.20	0.18
22. Qualifications and experience of employees	0.23	0.06	**0.80**	0.27	0.10	0.19
21. Experience acquired at work	0.35	0.02	0.48	0.28	0.19	0.22
20. External and internal training	**0.68**	0.07	0.17	0.20	0.25	0.19
19. Procedures and programs	0.62	0.14	-0.07	0.45	0.15	0.05
18. Focus on motivation to work	0.57	0.46	0.02	0.33	0.19	0.05
17. Structure that enables communication	0.51	0.59	0.05	0.24	0.12	-0.04
16. Learning process (individual and group)	**0.71**	0.13	0.28	0.04	0.10	0.24
15. Committed and competent employees	**0.71**	0.23	0.31	0.10	0.06	0.17
14. High work culture	0.55	0.24	0.31	0.13	0.15	0.35
13. Developing employee knowledge	**0.78**	0.15	0.05	0.10	0.09	0.23
12. Relations between employees and management	0.22	**0.66**	-0.00	0.18	0.01	0.37
11. Teamwork skills	0.22	**0.68**	0.20	0.11	0.10	0.36
10. Partnership relations with clients and suppliers	0.02	0.55	0.37	0.04	0.04	0.52
9. Partnership relations among employees	0.18	**0.71**	0.14	0.15	0.05	0.34
8. Partnership relations with other stakeholders	0.15	0.29	0.06	0.20	0.22	0.55
7. Manner and methods of customer service	0.14	0.29	0.36	-0.03	-0.03	**0.67**
6. Openness and flexibility to user requirements	0.16	0.18	0.13	0.14	0.11	**0.73**
5. Management values and standards (ethics)	0.34	0.19	0.10	0.34	0.12	0.60
4. Conflict management skills	0.32	0.08	0.09	0.32	0.15	0.57

3. Engineering staff	0.15	-0.19	0.18	0.11	**0.77**	0.24
2. Employees in non-managerial positions	0.23	0.24	0.05	0.20	**0.79**	0.05
1. Possessed HR – management	0.19	0.44	0.30	0.10	0.59	0.09

Loadings marked for values above 0.65.
Source: own analysis.

The first factor, in which a significant amount of information was cumulated, was described by four initial variables. The company's activity in the field of developing employee knowledge had the highest value (0.78), with which two more were connected: the learning process (both individual and group), and employee commitment to the performance of the assigned tasks. This factor was also influenced, to a slightly lesser extent, by training courses and various forms of additional education. As this factor is mainly related to skills and experience, it was labeled "professionalism".

The second factor was characterized by three variables, the most important of which were partnership relations among employees (0.71). Ability to work in a team (0.68), and relations between employees and management (0.66) were directly related to it. This factor referred to cooperation, collaboration, and the ability to perform tasks together, and was therefore named "internal relations".

Table 5: Factors determining personnel competences in Industry 4.0 – summary

Factor					
F1	F2	F3	F4	F5	F6
Professionalism	Internal relations	Professional preparation	Risk	Employees	Customer service
Developing employee knowledge Committed and competent employees Learning process (individual and group) External and internal training	Partnership relations among employees Teamwork skills Relations between employees and management	Qualifications and experience of employees Qualifications and experience of managers	Precisely defined responsibility Matching skills to technology	Employees in non-managerial positions Engineering staff	Openness and flexibility to user requirements Manner and methods of customer service
% of variance: 11.3	1.9	1.7	1.2	1.1	1
Cumulative %: 11.3	13.2	14.9	16.1	17.2	18.2

Source: own study.

The next, third factor gathered information from two initial variables related to qualifications of both management (0.77) and employees (0.8). It should be noted that qualifications and skills of employees, which translate into the company's operational activity, had a slightly greater impact here. This factor was identified as "professional preparation".

The fourth factor was related to the risk faced by employees in the ongoing performance of tasks. It was described by two initial variables: responsibility for implemented actions (0.74), and proper allocation of tasks and ability to operate technical equipment at a specific workplace (0.73). This factor has a significant effect on the company's operational activity, achievement of goals, asset productivity, and work efficiency.

The next two factors proved to be slightly less important. The fifth factor concerned employees as characterized by employees in non-managerial positions (0.79), and engineering staff (0.77). In particular, the ratio of the number of technical workers to that of production workers seems important. The more complicated is the production process or equipment requiring specific qualifications, the lower this ratio should be. The sixth factor was related to customer service, with all its procedures, requirements, terms of cooperation, etc. It contained

information derived from two initial variables, i.e. openness and flexibility in relations with contractors (0.73), and the manner and methods of service (0.67). A summary of all factors is presented in Table 5.

Conclusion

Focusing on key competences is a strategic and tactical approach of a company to changes triggered by the current industrial revolution. Their proper recognition and use contribute to continuous development, implementation of adopted strategies, prompt response to contractors' new demands, flexibility of response to changes in the environment, and preparation for crisis situations, conflicts or misunderstandings.

Unfortunately, it is not an easy task to define and diagnose the most significant assets, strengths, and values. It requires the involvement of all employees, both at the managerial and basic level, along with the identification of key resources, activities, functions, even relationships that make a given organization unique.

This empirical study allowed us to identify areas of key personnel competences of a company, with their value, cognitive load, and impact. Classified in six categories, professionalism, internal relations, professional preparation, risk, employees, and contractors/clients, they constitute a common ground for the company's operations that should be invested in, developed, and improved. If a company does not have any of the indicated categories, does not develop them evenly, or they are very weak, its corresponding competences are marginal and have a limited impact on the company's competitive position. Correct identification of key competences and their innovative use provide for the company's sustainable development and better preparation for changes related to the industrial revolution, which ultimately is reflected in a better competitive position.

Naturally, this study is not without limitations. It focuses on Polish companies where, firstly, approach to issues related to Industry 4.0 is relatively weak, and secondly, most entrepreneurs, particularly those from the sector of micro and small enterprises, do not diagnose the current changes, relying in their business operations on traditional methods and values.

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Facility Management Platform Sensors Monitoring for Improving Workplace Services

Ioana UDREA

University POLITEHNICA of Bucharest, Faculty of Mechanical Engineering and Mechatronics, Department of Precision Mechanics and Mechatronics, 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania
Email: udreaioana@yahoo.com, ioana.udrea@upb.ro

Valeru Friedemann KRAUS

ASC-Romania, 9 Stefan Marinescu Street, District 6, 060121, Bucharest, Romania
Email: vali@asc-ro.com

Alina POPESCU-CUTA

University POLITEHNICA of Bucharest, Faculty of Mechanical Engineering and Mechatronics, Department of Precision Mechanics and Mechatronics, 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania
Email: alina_popescu2704@yahoo.com

Abstract

The aim of this paper is to develop an advanced sensor monitoring system and to corelate it with a Facility Management (FM) enterprise platform in order to support the facilities managers to make decisions regarding the use of space or the cancellation of reservations. For this purpose, a system of sensors consisting of two infrared sensors working in pairs and a sensor that measures the light intensity was developed and ARCHIBUS was chosen as the FM platform. The results received from the sensor system were correlated with the data and the reports from the FM application, having as central element the analysis of real number of participants vs planned number of participants. Various reports made in ARCHIBUS application that use the data received from the sensors are discussed and their practical utilities are listed. The sensor system is cheap, and its scalability allows the management of an unlimited number of objectives.

Keywords: FM Software, People Counting, Sensor System, Rooms Reservation.

Introduction

IoT is a rapidly expanding technology that enables devices to communicate without human intervention. In the last period the number of applications that make use of the IoT has increased dramatically and it spans areas from business and manufacturing to home, health care, and knowledge management (Nord et al. 2019). Over time, the IoT is expected to have significant home and business applications, to contribute to the quality of life and to grow the world's economy (Al-Fuqaha et al. 2015). One aspect to consider in IoT systems is how to communicate with the sensors, how they transmit data. Among the most used technologies are RFID and sensor networks, they are considered the fastest growing information and communication technologies (Gubbi et. al 2013).

According to the definition given by the International Facility Management Association (IFMA), FM is a profession that includes several disciplines helping to ensure the functionality of the built environment by integrating people, space, processes, and technology (EuroFM 2019). In accordance with the European standard (EN 15221-1 2006), FM is the integration of processes in an organization in order to maintain and develop the services it provides and to effectively improve the primary activity of the organization. A wide variety of commercial software applications are available on the market to meet FM requirements.

In the field of Facility Management (FM), the impact of IoT is growing and IoT is playing an important role in improving FM services. Although there is a lot of data, the use of sensor data recording in FM is much lower. Recently, great attention has been paid to the potential to expand the applicability of major digital technologies,

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such as BIM, RFID, GIS, and real-time data capture. They can be used to capture, transfer and store big data information throughout the life cycle of the building, including the maintenance and operation of the building. Consequently, a large number of innovative approaches have been implemented in recent years (Chen et al. 2015). Among the countless aspects related to the building and especially to BIM, such as heat transfer and its simulation (Natephra et al. 2018, Pop et al. 2018), building ventilation (Sporr et al. 2019, Guitar 2018), air quality interior (Diodiu and Dogeanu 2016), the counting of the number of people (Ye 2010, Gerland and McDonald 2016), has a very big impact in FM and in its various areas.

In this context, this project aims to use an FM application and integrate it with data received from sensors by cable or Wi-Fi, thus monitoring the number of people occupying a certain room, such as a meeting room which have a continuous variability of the occupancy level throughout the day.

Following the data provided by the sensors, the variation of the real number of people counted in a meeting room will be compared with the reservations made in the FM application for that room. Using the results obtained, it will be possible to make decisions regarding the use of space or the cancellation of reservations. Similar research on the most efficient use of space in terms of the actual number of people has been done in buildings in the Australian health system (McNabb 2018).

A classification of different people counting technologies is made according to the generation to which the measurement system belongs (Sruthi 2019). Thus, we have first generation technologies (infrared beam counters), second generation (thermal counters) and third generation technologies (video & Wi-Fi counters).

Knowing that in the meeting rooms, participants from outside the company can come regularly and they may not want to be equipped with RFID cards, this technology will not be considered. The current legislation in Romania (Law192 2019) (here are located the meeting rooms in the customer's buildings that will be monitored) does not allow the use of video cameras in institutions, for this reason the people counting method with the help of video cameras will not be used. Due to the fact that thermal cameras are expensive, and the cheapest ones do not offer a sufficient resolution for the precise people counting, this solution will not be used either. Taking into account the above and the fact that people counting using infrared sensors is the most used method, it will be chosen for the study in this paper. A system consisting of 2 infrared sensors will be used, mounted on either side of the wall at the entrance to a meeting room.

This study presents a Proof of Concept (POC) project, which involves the installation in one of the customer's buildings, in two meeting rooms, of a sensor system to monitor the presence in two meeting rooms. In addition, the light intensity will be monitored in the two rooms. The customer facility management application will be modified so that it receives the data resulting from the measurements made by the sensors and uses them in completing and improving the already existing reports.

Due to the fact that the requirements were few and clear, without the risk of being modified during the project, the waterfall methodology was chosen instead of agile. Moreover, because it was a new type of project that required some research and had to be well documented, the waterfall methodology was the most appropriate.

Requirement Model was conceived in the classical structure, as being composed of *Business Requirements, Stakeholder Requirements*, and *Solution Requirements*, see fig. 1. For each category, the corresponding requirements or the subcategories that compose it have been defined, after which the requirements for the subcategories have been defined and so on. Both *Requirement Model* and other models being part of this project: *Data Model, User Interface Model* and *Deployment View* (or hardware architecture) were made using *Enterprise Architect* software (EA 2016).

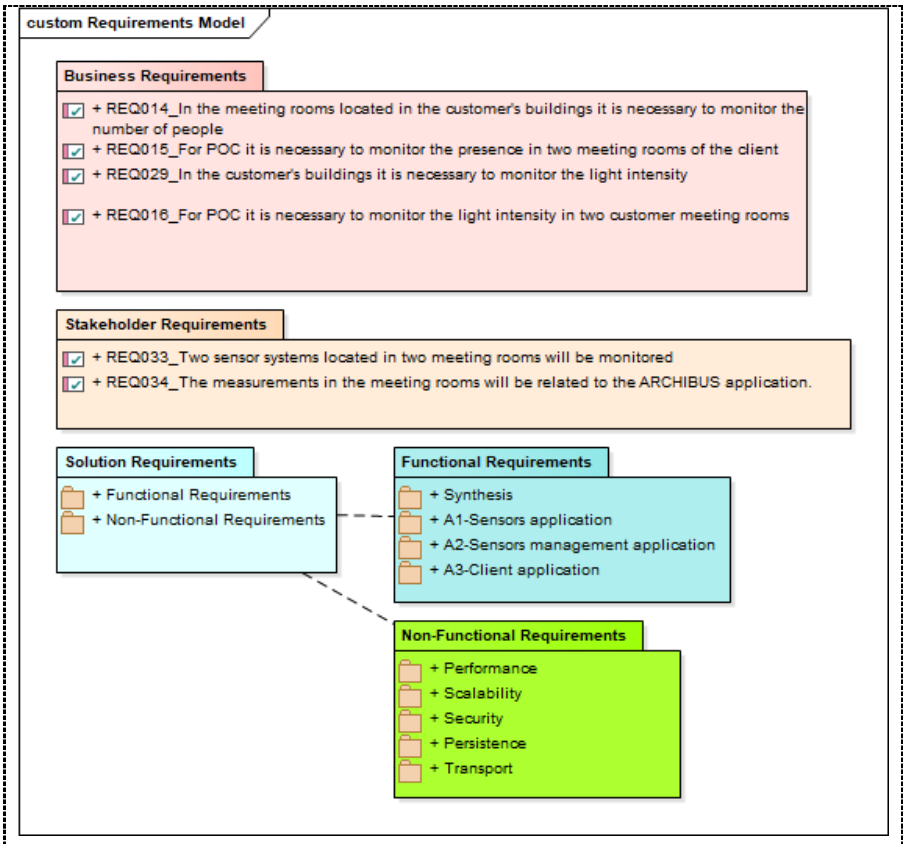

Figure 1: Requirement Model, made with *Enterprise Architect* software

From the POC, only the development part is presented, respectively the realization of the sensor system, the data transmission to the application and its customization, less the installation of the sensors at the customer's location and the deployment of the customized application on the production server.

Hardware Solution

Sensor System Description

The sensor system used in this study is composed of a Raspberry Pi board, a multiplexing connection board and three sensors: a pair of two identical PIR Motion Sensors (PIR 2020) and Digital Proximity and Ambient Light Sensor (APDS-9930 2020). PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and do not wear out. For that reason, they are commonly found in appliances and gadgets used in homes or businesses. Digital Proximity and Ambient Light Sensor, APDS-9930 provides digital ambient light sensing (ALS), IR LED, and a complete proximity detection system in a single 8 pin package. The ALS provides a photopic response to light intensity in very low light condition or behind a dark faceplate.

The Raspberry Pi used is a Model 4, B (Raspberry Pi4 2019). It is a credit-card-sized single-board computer. The CPU on the board is an ARM v8 processor with 1.5 GHz speed. It has a variety of interfacing peripherals, including 2 USB 3.0 ports, 2 USB 2.0 ports, 2 micro-HDMI ports, 4 GB RAM, Micro-SD Card storage and 40 pin GPIO header. For GPIO port expansion a multiplexing connection board is used.

Two monitors, keyboard, and mouse can be connected to Raspberry Pi through micro-HDMI and USB connectors and it can be used like a desktop computer. It supports a number of operating systems including a Debian-based Linux distro, Raspbian, which is used in our design. Raspberry Pi can be connected to a local area network through Ethernet cable or USB Wi-Fi adapter, and then it can be accessed through SSH remote login.

Additionally, the Raspberry Pi is equipped with a housing and a 5V fan, see fig. 2.

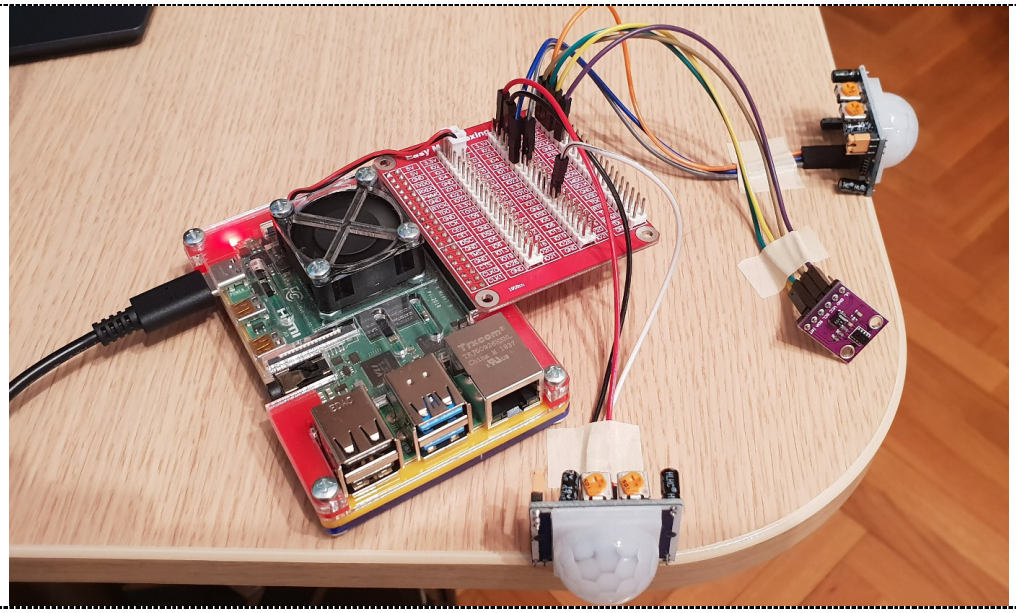

Figure 2:Sensor system: Raspberry PI board, 2 PIR sensors and an ambient light sensor

Deployments and the Entire Hardware Solution

In fig. 3, it is presented a complete hardware solution, including Sensor's solution. Currently, the system is made in the Local Area Network (LAN), but the solution also allows Wi-Fi connection.

As shown in the figure, the hardware sensor's system is composed of two PIR sensors, an ambient light sensor, and Raspberry Pi device, including physical interfaces (it supports both wire and wireless connection). The schematic representation in the image wants to show that the light intensity sensor is mounted on (or very close to) the Raspberry Pi Printed Circuit Board (PCB) and their assembly is considered to be *DETECTION SYSTEM*. The two PIR pair sensors are located further away from the Raspberry Pi PCB. In the customer's meeting room, they will be mounted next to the access door, on either side of the wall of which the door is part.

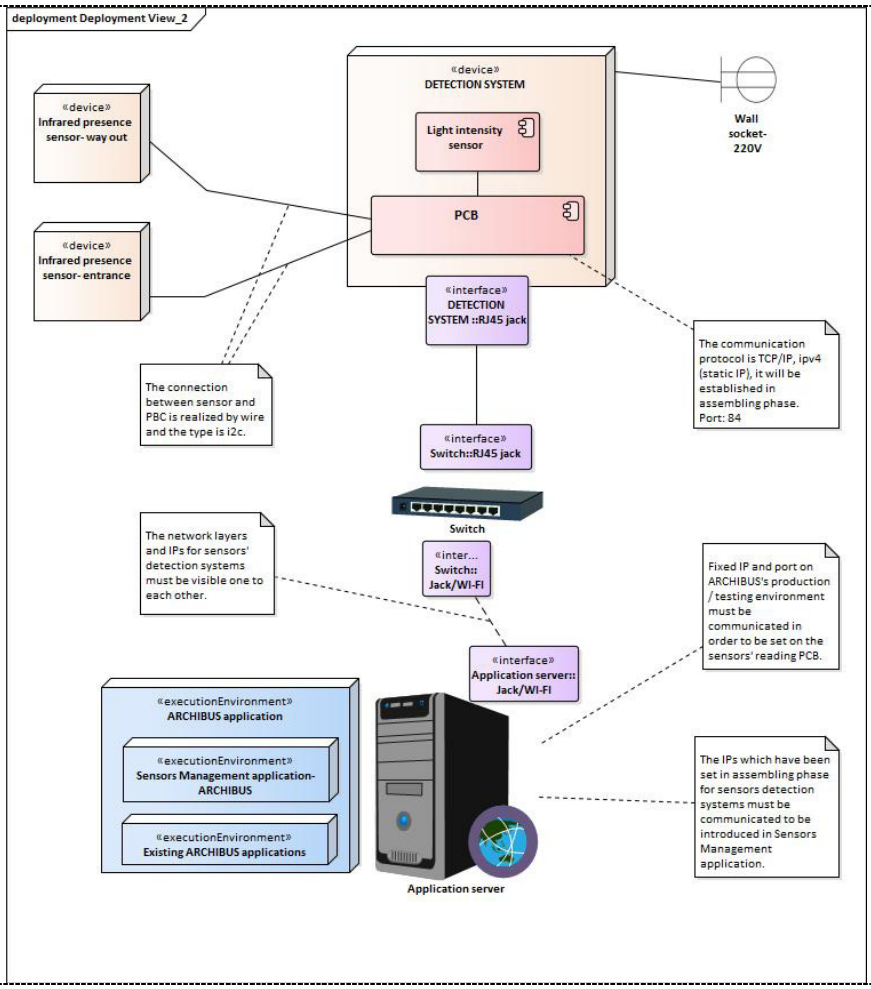

Figure 3: The hardware architecture of the sensor monitoring solution

The physical system is also scalable, so it can be allowed to connect any number of sensor systems.

The application server can also be connected wire and wireless in LAN. Although the figure of the hardware solution is represented schematically and the ARCHIBUS application (as "execution environment") to highlight that in addition to the existing application, was added the new sensor monitoring application, both now representing a whole, called ARCHIBUS application.

As can be seen from fig. 3, in the network layer, care must be taken when communicating and establishing data transmission protocols and other details, to successfully connect all devices in the network.

Software Solution Conception and Implementation

The solution for the ARCHIBUS integration software will be modularly designed and will be composed of three sub-solutions (applications), see fig. 4. In this structure any module could be replaced, for example another physical sensor system could be used and, why not, another application instead of ARCHIBUS (A3-Client Application). This solution was conceived on the occasion of the realization in ARCHIBUS of a monitoring and management system of indoor climate parameters (Kraus and Udrea).

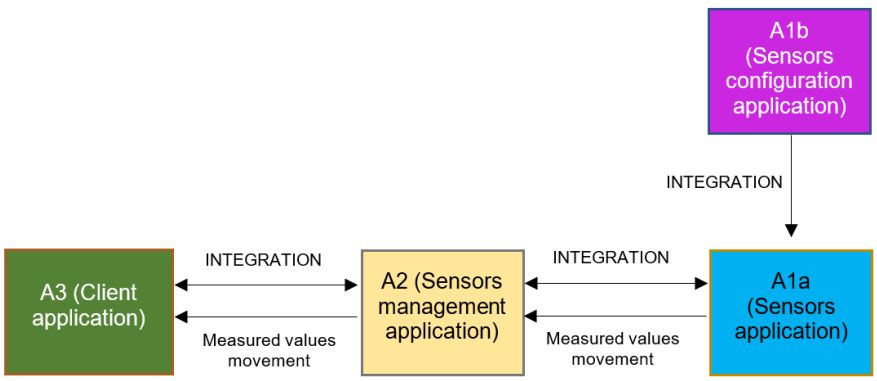

Figure 4: The connections between applications

A1 represents the sensor's solution, it is composed of A1b (Sensors configuration application) - the applications of the sensors on their Printed Circuit Board (PCB) and A1a (Sensor application). Next is A2 (Sensors management application), it is a specific application for this sensor monitoring project. As can be seen from the image, it is integrated with both A1 and A3 applications. For this, A2 contains two APIs. This application was developed to ensure the independence of the A3 application from the sensor's solution. Through the configurations of the A2 application (A2 depending on the sensor's solution), it is possible that the A3 application remains unchanged regardless of the sensor system used. The A3 application (Client application) is the final application, which contains the front-end part, meaning the interaction with the user. Here the data are used effectively, and the various reports are made. In this work A3 is ARCHIBUS.

In this paper, the API of the A1a application (Sensors application) directly provides the value of people count and various network and Raspberry Pi board features. It also provides functions for resetting and modifying some features, including people count.

A SOAP web-service has been created, with the help of which data is read and transmitted to the Sensors application. Other details about the realization of the applications A1 and A2 will not be presented in this paper. Regarding the customization of the A3 application, only the main reports made will be presented. The chosen hardware solution was also be presented.

Rooms Reservation in ARCHIBUS

A wide variety of commercial software applications, including (ARCHIBUS 2015), (BIM 360 2020), (EcoDomus 2020), (ONUMA 2020), (QFM 2020) and (TRIRIGA 2020), are available on the market to meet the requirements of FM (Wong 2018).

The chosen FM software is ARCHIBUS, it is an enterprise application that provides a holistic approach to facility and infrastructure management throughout the entire life cycle of the building. It is made up of several integrated modules, allowing applications to have the same work environment and a common database. ARCHIBUS, a multilayer, 100% web application. Client layer provides intuitive web interfaces in which users can enter and view data as well as numerous reports. At application layer, ARCHIBUS can work on a Tomcat, WebLogic or other application server. For integration, many web services are developed at the application level. Back-end application development is done in java programming language. Regarding the database level (DB), the application allows the use of several types of databases. In this study, ARCHIBUS software is deployed on a WebLogic server running on Linux OS (Operating System) and the database used is Oracle. In terms of business, ARCHIBUS is composed of several modules, each module having certain applications. ARCHIBUS module *Workplace Services* consist of three applications. One of them, the application named *Reservation*, deals with planning reservation (usually for meetings) for different rooms, it is an integrated solution for scheduling shared space and associated amenities. A room reservation takes into account all the elements that can interact with these reservations, such as the time interval of the reservation, the participants in a certain meeting, the possible recurrence of the reservation and others. Fig. 5 shows the screen in which the room reservation is created.

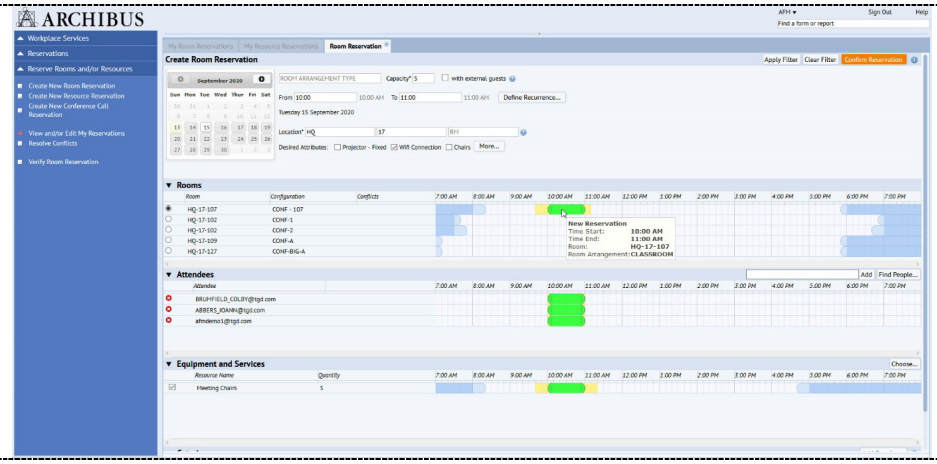

Figure 5: Creating a room reservation in ARCHIBUS

ARCHIBUS Modules Improvement

People count, provided by the *Sensors application*, represent the real number of participants in a meeting. Determining the real start and end time of the meeting, by means of the people count is done using the rules in table 1.

Table 1: Determining *Real Time Start* and *Real Time End* for a meeting.

Determining the *Real Time Start* of the meeting
Rule 1 The latest value for "people count", registered before the start time of the reservation is searched. If the registration is found and the value for "people count" is greater than or equal to 1 then it is considered that the meeting started at the scheduled time. If no record is found that satisfies the above conditions or if the record is found but the measured value is 0 then check rule 2. **Rule 2** The oldest non-zero value for "people count", registered during the booking interval is searched. If the registration is found, then it is considered that the meeting started at the time of registration (This means that the meeting started late).
Determining the *Real Time End* of the meeting
Rule 3 The latest value for "people count", registered during the booking period is searched. If such a record is found and the measured value is 0 then it is considered that the session ended at the time of registration (It means that the session ended before the scheduled time). If the record is found and the measured value is greater than or equal to 1 then the session is considered to have ended at the scheduled time. If no record is found, then rule 4 applies.

Rule 4

The first record to the left of the record range, where the value "people count" is greater than or equal to 0 is determined. If such a record exists and its value is greater than or equal to 1 then the meeting ended with the end of the reservation. If we do not have registration or we have registration and the value for "people count" is equal to 0, then it is considered that the meeting did not take place.

The existing standard report, *Room Reservations*, which represents the list of reservations, can be filtered by various attributes. The report has been modified by adding the following information (columns in the report): *Real Time Start, Real Time End, Maximum Number of Participants*, see. fig 5.

Considering that not all the meeting rooms are equipped with people count monitoring sensors, a report was made in which to be displayed only the sessions during which readings were made with the sensors. Because it is similar to the *Room Reservations* report, differing only in the filtering of the displayed results, it is no longer presented in this paper.

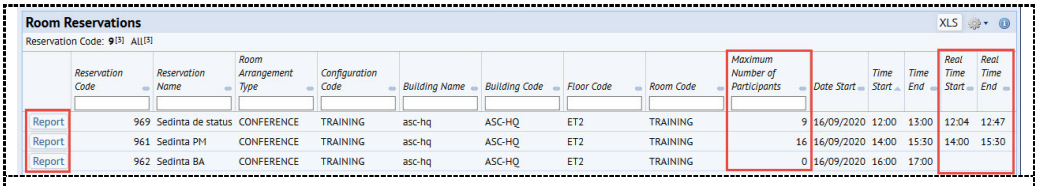

Room Reservations

Reservation Code: 9[3] All[3]

	Reservation Code	Reservation Name	Room Arrangement Type	Configuration Code	Building Name	Building Code	Floor Code	Room Code	Maximum Number of Participants	Date Start	Time Start	Time End	Real Time Start	Real Time End
Report	969	Sedinta de status	CONFERENCE	TRAINING	asc-hq	ASC-HQ	ET2	TRAINING	9	16/09/2020	12:00	13:00	12:04	12:47
Report	961	Sedinta PM	CONFERENCE	TRAINING	asc-hq	ASC-HQ	ET2	TRAINING	16	16/09/2020	14:00	15:30	14:00	15:30
Report	962	Sedinta BA	CONFERENCE	TRAINING	asc-hq	ASC-HQ	ET2	TRAINING	0	16/09/2020	16:00	17:00		

Figure 6: New items added to the *Room Reservation* report, attributes: *Real Time Start, Real Time End*, and *Maximum Number of Participants* and the *Report* button.

The screen shown in fig. 6 is just one of the screens improved for this POC. There are also new developed screens for communication with A1a (Sensors application), screens for viewing the data sent by the sensors, for centralizing and systematizing them in accordance with the way ARCHIBUS manages its data.

In order for the application not to display too much information related to the past meetings, the data are archived (they are entered in the corresponding tables in the database and can be viewed only in the special screen created for archived measurements). For the database not to contain too much data, after a certain period the data are deleted from here as well.

Reports developed in ARCHIBUS

People Presence by Room

The first graphical report developed in the application displays the recorded values of the people count in a certain room. This report has nothing to do with any meeting in that room. Regarding the choice of the room, the following mandatory filters must be applied: *Building Code, Floor Code, Room Code, Date Measured - From / To,* and *Time Measured - From / To,* see fig. 7.

With broken line in the figure is represented people count and with continuous line the capacity of that room. The corresponding value of people count appears at the inflection points of the broken curve.

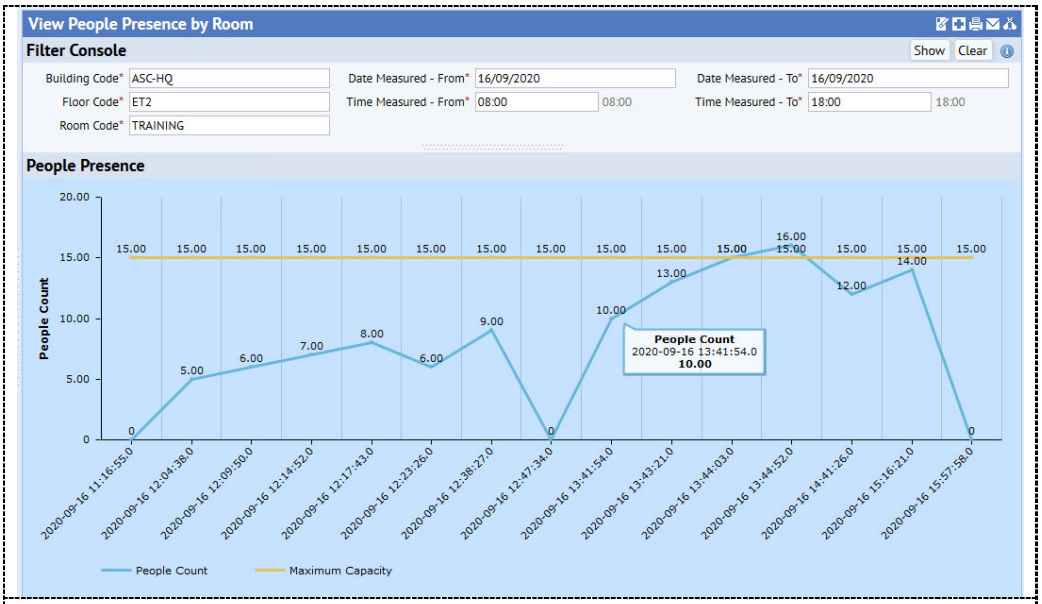

Figure 7: People count and room capacity for a certain room and time interval

Light Intensity by Room

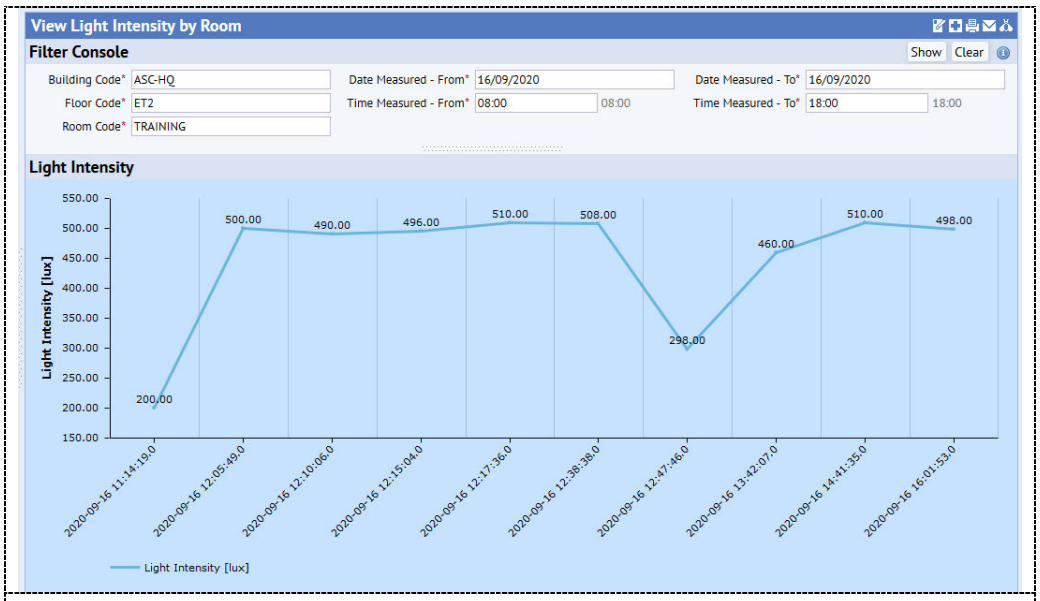

Figure 8: Light intensity for a certain room and time interval

The next report developed in the application is the light intensity in a certain room, see fig. 8. Regarding the choice of the room, the same filters as in the case of displaying people count by room must be applied.

The sensor measures the light intensity and it is observed that its values are almost in the range (200, 500), recommended values for large size offices and libraries reading lounges, according to (IESNA 2000). Considering that in the displayed interval (8:00, 18:00) there is natural light, it can be assumed that the variations of light intensity appeared due to the closing and opening of the blinds.

Real number of participants vs planned number of participants

The graphs shown in fig. 9 are examples of application of the rules for determining the real number of participants in a meeting, algorithm presented in table 1. Two cases are shown, a) when *Planned Time Start* and *Planned Time End* are the same as *Real Time Start*, respectively *Real Time End* and case b) when *Start* and *End* times are different (the planned meeting interval differs from the real one).

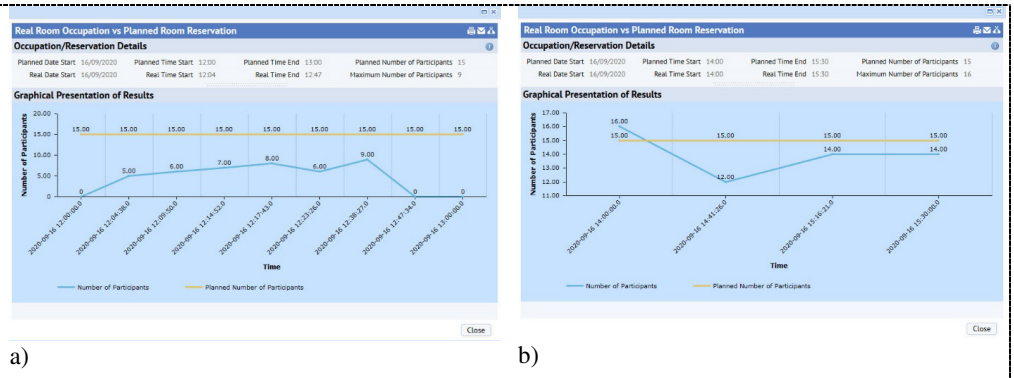

a) b)

Figure 9: Real number of participants vs planned number of participants: a) planned meeting interval same as real meeting interval; b) planned meeting interval differs from real meeting interval

In fig. 9, a) it is observed a real number of 16 people at the meeting start (*Planned Date* and *Time Start*), which means that there is a registration of people count greater than or equal to 1 before the start time of the reservation. According to rule 1 of table 1, it is considered that the session started at the scheduled time so *Real Time Start* is equal to *Planned Time Start*. Regarding the end of the reservation, it is found that the most recent value for "people count", registered in the reservation interval is greater than or equal to 1. According to rule 3 of table 1, it is considered that the meeting ended at the scheduled time, so *Real Time End* is equal to *Planned Time End*.

In fig. 9, b) it is observed a real number of 0 people at the meeting start. According to rule 1 in table 1 we need to check rule 2. This says to look for the oldest non-zero value for "people count", recorded during the booking period. We search for it and find the value of 5 so we consider that the session started at the time of registration, which means that *Real Time Start* is 12:04. Regarding the end of the reservation, according to rule 3 of table 1, one must search for the latest value for "people count", registered during the booking period. It is found and it has the value 0 so the meeting ended at the time of recording, so *Real Time End* is 12:47.

Conclusions

Following the analysis of the current state, it results the increase of the number of IoT systems as well as the need to implement them in FM applications. It is found useful to develop a system of sensors used to count people and measure light intensity and its correlation with the module that deals with the reservation of rooms in a FM application, type enterprise. To determine the number of people participating in a meeting, a pair of two PIR infrared sensors is used, the sensors are mounted on either side of the access door in the meeting room.

The applications of the sensor system implemented in ARCHIBUS software can be multitudinous. Both comparisons can be made between the actual occupancy rate of the rooms and the planned one as well as between the actual occupancy rate and the capacity of the respective room. As sufficient data is collected, it will be seen what percentage of the capacity of the rooms is actually used, it will be possible to make statistical calculations that will estimate the occupancy rate of the rooms in the future and the related costs. Another utility of the developed sensor system could be the cancellation of a reservation if a meeting planned in a room is found not to have started. Then that reservation could be canceled, the room being available in case someone else wants it.

The light intensity can be correlated with meetings and people count and if desired one can give alerts such as, if while there is no external natural light the light intensity values show that the light is on but there are no people in the room, or if the light stays on outside office hours, and any other notifications criteria.

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Risk Analysis Report as The Key Source for Ensuring Continuity of Production Processes

Jarosław NAPIÓRKOWSKI

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jaroslaw.napiorkowski@wat.edu.pl

Jerzy STANIK

Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Abstract

The paper is oriented to methodological aspects of reporting the results of risk analysis in order to ensure the continuity of production processes. Its essence is to present the most important, current, and useful research issues and activities for the above. The reporting of outcomes from the risk analysis is understood as integrated notification on all limitations, uncertainties, assumptions, instability of legal regulations, and various areas of risk factors and their impact on the assessment of the security level of the production process. Performed literature studies allow the authors to notice a research gap in the form of a lack of effective research on improving current reporting systems, searching for and identifying sources of cyber threats, identifying threats and vulnerabilities, selecting the method of risk estimation, evaluation, and valuation in relation to ensuring the continuity of production processes. The paper describes the theoretical background and the methodology of developing a risk analysis report for the purpose of ensuring the continuity of production processes as a result of literature studies and own research. The scope of the article covers the following issues: the concept of the production process and its risk, business continuity management (BCMP) with traditional and author's approach. The key outcome presented within the paper is the proposition of an integrated risk analysis report as a key element in ensuring the continuity of the production process.

Keywords: risk, analysis and risk assessment, risk reporting, Business Impact Analysis (BIA).

Introduction

Nowadays, the concept of Business Continuity Management and ongoing improvement of production processes is growing in popularity. Currently, it would be impossible for any manger to imagine the idea of the company development without continuous improvement of its processes, as it is obvious that “those who do not evolve are left behind”. The recently developed risk reporting principles and tools show how to implement the process of integrated risk reporting and how to efficiently use it as the main source of Business Continuity Management of the production processes.

This paper attempts to introduce the most important, current, and useful issues regarding the construction and content of the risk analysis report in the context of ensuring the continuity of production processes. The following considerations were based on the authors' research, practice, and professional experience in the field of ICT security as mentioned by Ng et al (2020), Ranganathan (2012), Robyns et al (2017), Strohmeier (2016). The research results and authors' experiences presented in the article refer in particular to the conditions and specificity of the method of reporting the results of the risk analysis and estimation process. However, many of the issues and conclusions presented in this paper will give valuable general guidelines for the broadly understood security of the continuity of production processes. The current trends in reporting the results of the risk analysis process require the preparation of integrated reports. They should be covering a wide range of numerical, financial information required by law, as well as voluntary information (covering both historical and prospective periods) for all types of risk. The method of presenting reports and their availability is also changing. The vast majority of reports are electronic.

Modern integrated reporting systems impose stricter demands with respect to the level of maturity in reporting on the risk (Fig.1).

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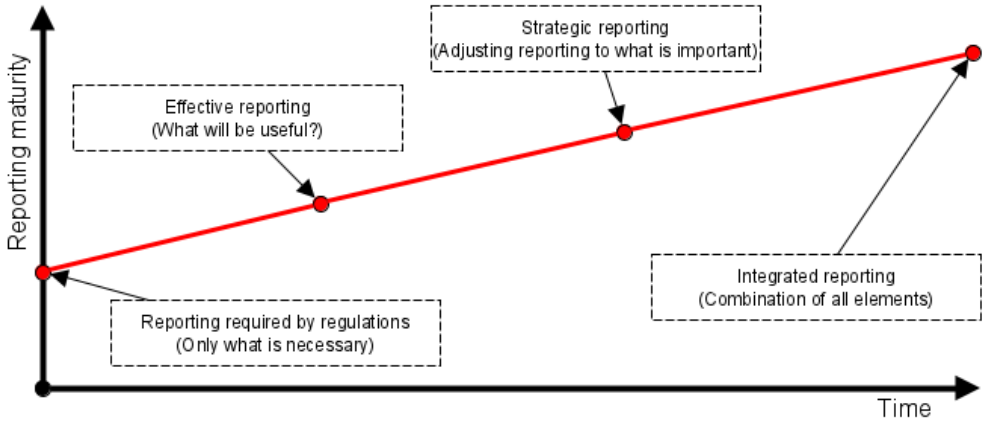

Fig. 1: Illustration of the level of maturity in reporting

Own elaboration based on Zawiła-Niedźwiecki (2007)

Accordingly to the above, the Risk Analysis Report (RAR) is a source of the integrated knowledge on the results of risk analysis and assessment. The goal of the RAR objectively reports the outcomes from the risk analysis related to all of the limitations, uncertainties, assumptions, instability of legal regulations, and various areas of risk factors and their impact on the assessment of the secutity level of the production process.

As the novelty in the proposed approach in relation to traditional risk analysis reports one can find:

1) the use of integrated reports as a new paradigm for reporting on risk analysis and risk assessment;
2) demonstrating the need to include in the construction of the RAR the results from the review of interdisciplinary sources containing assessments of cyber threats to production environments and the achievements contained in European and international normative documents.

Security engineering of production process continuity, as well as risk assessment, are increasingly important issues in the research and practice. At the same time, the importance of identified needs and directions of activities aimed at increasing the quality of RAR is still growing.

Theoretical Background

The Concept of a Production Process

Figure 2 shows a general model of the production system, which allows to understand how it functions and which role the production processes play in such system. When analyzing the above-mentioned model, it may be observed that the production system constitutes a set of elements with specific links (relations). The relations allow smooth flow of the materials and semi-products at all stages of the production process. The fact that such relations exist and have been properly defined is very important for the entire company, as it affects both the costs and completion time of the production process. The point is to detect and eliminate all redundant operations that do not raise the value of the product.

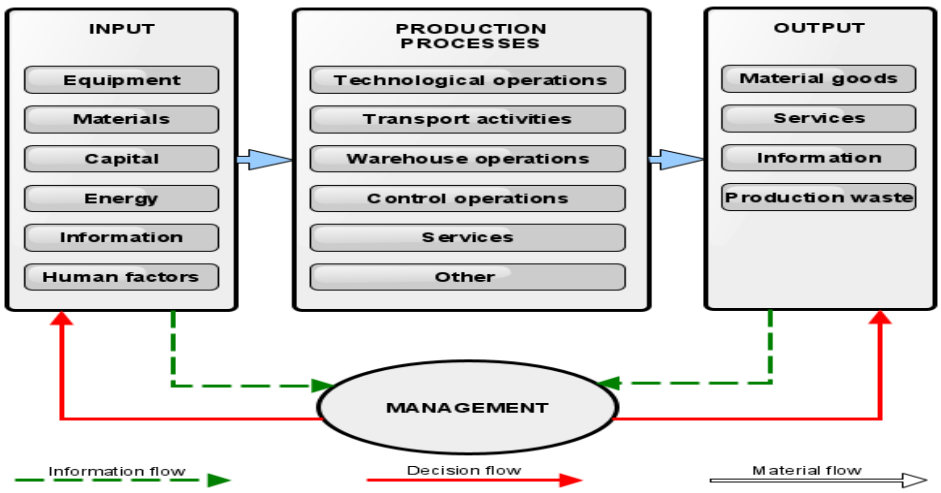

Fig. 2: Simplified model of the production system

Specialist publications and available resources include many definitions and terms used to describe the production process e.g. Feng et al (2016), Gołąb et al (2010), ISO 22301:2012, Liu (2016), Orzeł (2012) and Yin (2013).

For the purposes hereof, the following definition of the production process has been adopted from Orzeł (2012). The "production process (process of production) is the entirety of phenomena and deliberate actions that gradually change the object of work if subjected to such phenomena and actions. As the actions accumulate, the aforesaid object obtains features making it closer and similar to the desired outcome product. The production process is considered completed when all the necessary elements have been achieved".

Following by Davidson (2010) or Zawiła-Niedźwiecki (2007) the production process consists of the following elements:

- means of work, which include production machines and devices,
- human work performed by people using means of production,
- energy that sets in motion means of work.

The organization chart of the production process in a model industrial establishment is shown in Fig. 3.

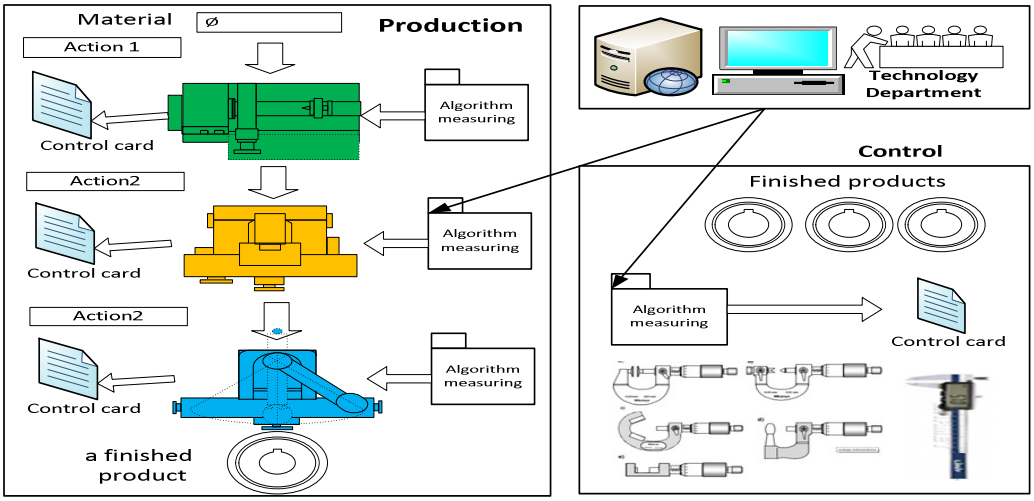

Fig. 3: Organization chart of the production process

The prerequisite for smooth functioning of the production process is a flow of persons, materials, information and energy factors. The production processes may differ depending, among other things, on the applied technology.

The main characteristic of the production process is the continuity of its course or operations. To state that the production process is continuous, it is necessary to obtain the continuity related to the subject of work, object of work and means of work. The requirement of continuity may refer to each of the three factors, individually or in total. The continuity of the object of work means that once introduced to the production process, the object of work should be constantly in motion. The continuity of the means of work implies that they should be constantly used to perform production activities/tasks. However, business continuity with respect to operators - i.e. persons - is treated differently. In this case, the willingness to maintain the continuity of work of a person means that the human work should be used to the maximum, while reducing the production costs per unit.

Every production process should have a business continuity plan. The Business Continuity Management (BCM) is a comprehensive business approach that includes strategies, standards and procedures aimed at ensuring that a certain level of operations will be maintained or quickly restored even in case of failure. The purpose of the procedure is to mitigate operational, financial, legal, reputational and other losses caused by such failure. The generalized BCM model is shown in Fig. 4.

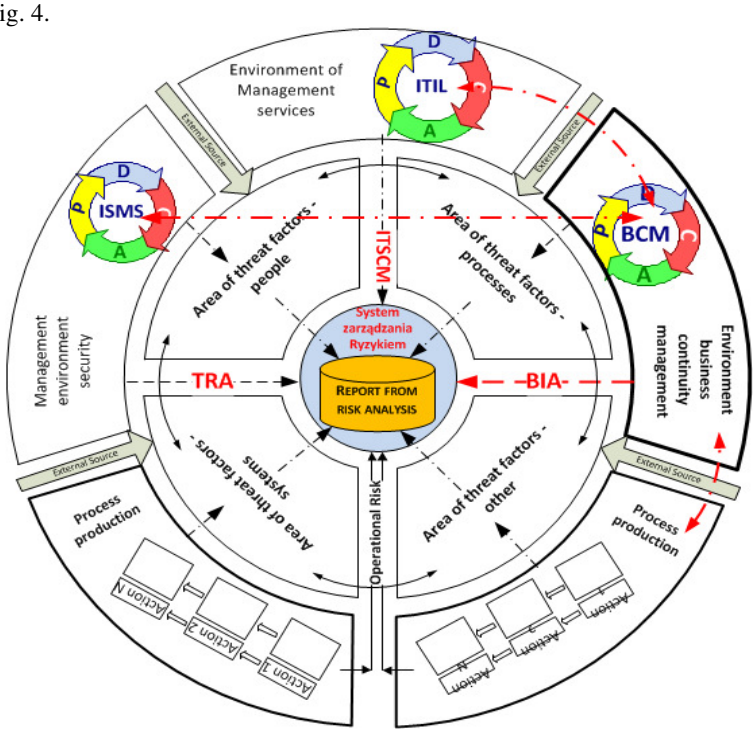

Fig. 4: Generalized BCM model

Risk Factors of The Production Process

It should be stressed that there is no single definition of risk. The adoption of a neutral concept of risk, according to which it is both an opportunity and a threat, is too general. To specify the analyzed concept with respect to the production processes or production systems, it is essential to assume that the process risk should cover a wide range of risk factor related to the following:

- knowledge and responsibility of managers supervising the course of the production process,
- quality of the documentation of the production system,
- consistency, transparency and compliance with the operational procedures,
- frauds, provisions of law, external events, including natural disasters having impact on the production process.

The characteristics of the production process risk are the following:

- it is impossible to completely eliminate the source of such risk,
- the risk is multidimensional and concerns all activities and operations distinguished in the production process,
- by reducing one type of risk, the exposure to other risks may be higher,
- the risk measurement and analysis are more difficult,
- the more complex the production process, the higher level of risk,
- the risk is not taken to derive benefits.

Such a wide range of risks caused by factors identified as the risk of the production process raises interest of both practitioners and theoreticians dealing with risk management in the production system. In line with the above concept, the following categories of the risk factors may be distinguished:

- processes - the losses incurred due to errors in the implemented procedures, insufficient number of the existing procedures or lack thereof; the losses in this category are not the result of deliberate actions, but may be the consequence of human error or non-compliance with the mandatory procedures,
- people - all voluntary or involuntary actions of former or present employees to the detriment of their employer,
- systems - the losses incurred due to failures of ICT and IT systems, including software; the losses in this category are not the result of deliberate actions,
- technologies - all failures of ICT or IT systems, interruption of technological process,
- external events - the losses caused by external factors affecting the production process or production system; the losses may be caused by both natural disasters (flood, earthquake, etc.) and activities of third parties (act of vandalism, riot, etc.),
- other - certain activities of the regulatory agencies, e.g. amendment to the laws to decrease business continuity of a company on specific markets, other factors that may potentially cause the destruction of assets connected with the production process.

Methodology

Traditional Approach Described on The Basis of Literature

The Business Continuity Management Program (BCMP) for the production processes is a set of principles, rules, procedures and instructions, in compliance with which a company manages its operations. As mentioned by Gawlik (2013) their purpose is to provide the stakeholders and regulatory bodies with access to critical production processes in case of emergency. The purpose of the BCMP is ensure that each production process, production system or organization can efficiently react to threats, such as natural disasters or infringement of sensitive data, and protect business interests of the organization.

The BCMP is not implemented only at the time of occurrence of a sudden event causing disruption of the process or company operations, but refers to all activities performed on a daily basis. Its goal is to mitigate the risk of incidents and emergency situations and to maintain readiness if such situations do actually occur. The above-mentioned issues are closely related to the identification of internal risks and external factors affecting the production system or the whole organization.

In the majority of empirical studies, popular science and educational publications, on the Internet and in daily life, the scope of the BCMP usually comes down to the implementation of the following set of processes/tasks (Fig. 5):

1. Business Impact Analysis (BIA)
2. General risk analysis,
3. Building of Survival Strategy:
   - Development of Minimum Acceptable Configuration,
   - Analysis of available and missing solutions,
   - Development of Survival Strategy (selected solutions, schedule, budget),
   - Development of emergency and recovery procedures,
   - Test and update of the Plan,
4. Implementation of the Business Continuity Plan (raising awareness among employees, audit, training schedule, etc.)

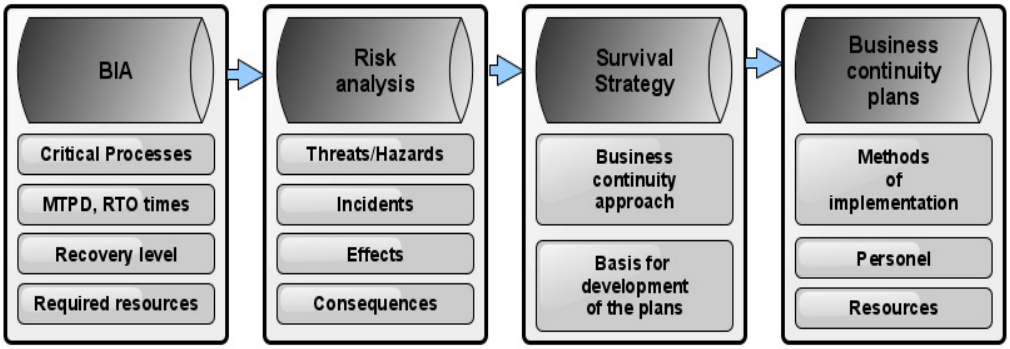

Figure 5: Stages of the Business Continuity Management Program of the production processes – traditional approach

In the traditional approach, the following statements or assertions may be often made:

1. Once the business continuity plans are ready, the organization is resistant to any disruptions.
2. The plans preceded by the BIA are adequate to actual risks, therefore, they may be considered efficient.
3. The organizations, which protect their production processes in such a manner, may openly admit that they manage their business continuity well.

Is the BIA the only and sufficient analysis that needs to be performed and is it possible to build an efficient Business Continuity Management Program (BCMP) for the production processes on the basis of the results of such analysis? A separate topic is the implementation of plans, raising awareness among workers, co-workers and other interested parties.

If the organization wants to treat the Business Continuity Management of the production processes seriously, it should modify its traditional approach by adding the following processes/tasks:

1. Risk Operating Plan (ROP),
2. Threat and Risk Assessment (TRA),
3. IT Services Continuity Management (ITSCM) Risk Analysis,
4. development work on the BCP - designation of areas in the production system, where disruptions could cause the most serious losses; such areas should be the production processes and products or services offered through such processes.

The above-described approach is reasonable only in the context of the already determined threats and properly conducted actual risk analysis. The BCMP including the aforesaid tasks is described in the following sub-chapter.

Modified approach based on own research

The Business Continuity Management Program does not like stagnation and routine. Something must always be happening and the company must be ready to react quickly. The more carefully it analyzes various types of risks and threats, the easier and more efficiently it can prepare its production processes. In case of the Business Continuity Management Program for the production processes, it is important to stay alert and carefully follow all risk analyses conducted in the organization. Other sources of valuable and helpful information are as follows:

- analyses in the field of operational risk – they validate and supplement the BIA with the information on types of process risks and their impact on the continuity of services and processes,
- analyses in the field of environmental risk – they constitute an integral part of risk analyses in the company and include the information derived from the analyses of impact on people of various chemical substances and compounds produced, used and released into the environment,
- risk analyses as part of recovery and resolution directive (RRD), i.e. plans of repair, restructuring and well-organized liquidation – they constitute the source of information on the activities planned within the liquidity and capital area, which may significantly affect the technical and organizational solutions in the company as far as business continuity is concerned,

- analyses of information security and protection of sensitive data – they may constitute a good starting or validation point for analyzing different types of the ITSCM risk,
- tests and analyses of IT system security (including "cyber" vulnerability) – the perfect complement for the TRA and ITSCM.

The above-mentioned analyses constitute the fundamental elements of the Risk Analysis Report (RAR), which are usually performed in companies, even though not always as part of the Business Continuity Management Program. Therefore, the Risk Analysis Report is the key source of information that may and should be used for the implementation of the BCMP with respect to the production processes.

With the above in mind, the authors propose the following scope of the BCMP for the production processes (Fig. 6).

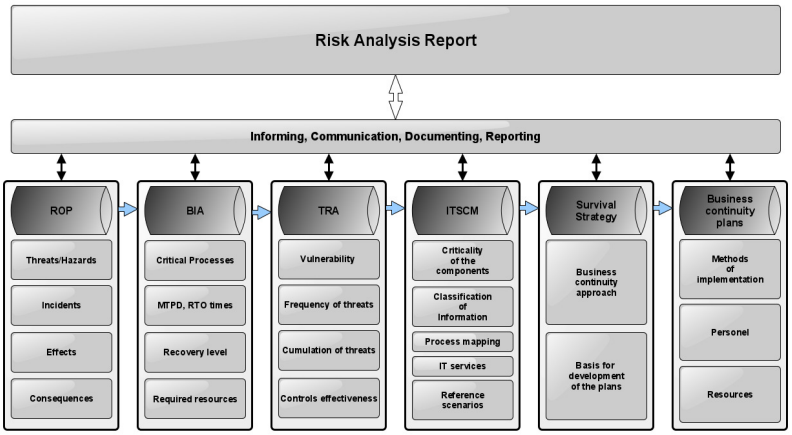

Fig. 6: Stages of the Business Continuity Management Program for the production processes – original approach

Risk Operating Plan (ROP)

The analysis of operational risk is the basis for the Business Continuity Management Program for the production processes. As Grzelak (2017) mentioned the Risk Operating Plan (ROP) refers to the risk of potential loss due to maladjustment or unreliability of internal processes, inadequate procedures, human actions, system operations or external events. The operational risk also includes legal risk and reputational risk caused by an operational event.

The main purpose of the operational risk analysis with respect to the production processes is to determine the level of existing risk and possibilities of its reduction. It is relatively easy to define basic sources of such risk, but to clarify the issue in more detail seems rather challenging. The difficulty is to show different types of the production process risk in order to highlight their relations, give them weight and refer them to particular areas of operations of the production system. The methods for assessing and measuring the operational risk of the production process are different than the methods used in case of other types of risks.

A multi-faceted nature of the operational risk and difficult to assess impact on the level of income earned significantly hinder consistent measurement of such level. The losses incurred due to the operational risk seldom reflect central distribution trends, they usually occur at the "end" of such distribution, showing abnormal behaviors and situations. Some types of the operational risk, such as fraud or failure of IT system are measurable, but it is difficult to assess the level of a significant sub-area of the operational risk due to insufficient or missing historic empirical data. In practice, there are several concepts related to the measurement of the operational risk of the production process, namely:

- a volume-based approach, according to which the exposure of the production process to the operational risk is a function that includes all areas of operations of the production system; the approach is used in case of actions based on large number of uniform operations/activities of the production process;

- an approach based on qualitative risk self-assessment, including subjective assessment of all types of operations of the production process by experts, which is aimed at estimating the probability and seriousness of losses in the production process;
- an approach based on quantitative techniques, which are used for the purpose of capital provisions for potential operational losses.

The operational risk is identified on the basis of:

- internal sources, including: operational events, own risk self-assessment, assessment of processes in the process lines, assessment of high-risk products,
- external sources, including: external database of events in the field of operational risk, external studies.

The organization makes the actual assessment of threats related to the operational risks, based on:

- how the key risk indicators are developed,
- the analysis of operational events.

Business Impact Analysis

The fundamental element of the Business Continuity Management Program is the Business Impact Analysis (BIA), during which critical processes and resources necessary to maintain or renew the production processes are identified and the results of survival of such processes - determined. The key processes implemented as part of the production system constitute the basis of the BIA.

In this article, the BIA is the analysis of the production processes, allowing to determine the impact of potential serious disruption or interruption on the production system or organization. The purpose of the BIA is to identify threats (risks) in the context of the production processes, including methods for preventing potential threats. As part of the BIA, key ratios - Recovery Time Objective (RTO) and Recovery Point Objective (RPO) - are defined and Minimum Acceptable Configuration (MAC) is implemented for the production processes - see Alasas(2017).

The following elements should be included in the Risk Analysis Report:

- list of critical production processes, including a list of resources essential for resuming such processes (technical/IT, organizational, logistic, human resources, etc.);
- list of potential financial and non-financial losses in case of interruption of critical processes;
- Recovery Time Objective (RTO) and Recovery Point Objective (RPO);
- relation of the criticality of the production processes as part of the analyzed production system and with respect to the criticality of such processes or within the entire organization.

The BIA related to the Business Continuity Management of the production processes is just a “start-up kit” including the information necessary to develop the business continuity plan. However, the aforementioned kit quickly proves insufficient to determine that the plan will meet the company’s expectations and ensure its business continuity that represents the required minimum.

Threat and Risk Assessment (TRA)

Theoretically, on the basis of the BIA, it is possible to develop a general/universal strategy/plan of procedure in an emergency situation, regardless of its source and character - but the question is whether such strategy will be justified in economic, organizational and technical terms? At this stage of the Business Continuity Management Program for the production processes, it is worth performing or using (if the organization implemented the operational risk management process) the Threat and Risk Assessment (TRA). The TRA is fully integrated with the System Development Life Cycle (SDLC), which is similar to the lifecycle of the production process and analogous to the lifecycle of the security system of the production process and IT system supporting such process. The TRA method has been extended by introduction of new elements used to report on the production process risk. As part of the TRA method, the risk to security of IT technologies/systems is also assessed. The only aspect distinguishing this method from other methods is the introduction of the following elements to the analysis of the production process risk: value of vulnerability, seriousness of risk, accumulation of risks, efficiency of technical and organizational security measures.

The purpose of the TRA analysis is to identify the risks that are so serious that they should be taken into account and so probable that they may actually occur at a specific time. What is difficult in such analysis is the scope and diversity

of external and internal conditions, which should be considered (climatic, urban, infrastructural factors, organizational culture, applied technology, vulnerability, etc.). Therefore, it is worth checking, among other thing, whether such data have already been included in the Risk Analysis Report of the company. The above-mentioned scope of information regarding the post-production processes and knowledge of the analyzed production system and its environment are not yet sufficient to develop a good strategy for business continuity management and to feel safe. Information technology constitutes an integral part of the majority of modern production processes, both small and large, thus, any failure of the IT process, system or infrastructure may lead to substantial losses. Therefore, it is crucial to analyze the risk of IT Services Continuity Management (ITSCM). The ITSCM Risk Analysis based on the ITIL standard is usually performed in IT companies and departments as a procedure independent of the "business" risk assessment expressed in the form of the BIA/TRA.

ITSCM Risk Analysis

Once the BIA and/or analysis of different types of risks and threats is completed, it is necessary to develop specifications for the IT Department, which will identify all requirements and expectations related to the recovery and availability of IT systems and other resources in case of failure. The IT Department usually performs the so-called gap analysis between business expectations and real (currently available) RTO/RPO parameters. The result of such analysis is not only the list of discrepancies, but also the cost estimate of potential investments into the IT infrastructure, which may help to eliminate such discrepancies. It is a good time to conduct the ITSCM Risk Analysis, which allows to determine the criticality of the IT system or components of its infrastructure, helps to classify the data and information processed by a given system and to map the production processes and business functions implemented in a given IT system for the production process, and defines who renders which IT services for a given process. The last element of the ITSCM Risk Analysis is the analysis of risks and their potential impact on the selected production process supported by a given IT system. On the basis of the aforesaid analysis, it is possible to validate the previously prepared scenarios in case of IT failure and to verify appropriate solutions in the field of redundancy of infrastructure and mechanisms for creating back-up copies. By executing the above-mentioned tasks, it is possible to determine:

- the criticality of the production processes and resources needed to recover them,
- the criticality of IT systems supporting the production processes, including data processed by such systems,
- grid of dependency between the production processes, processed data, IT services and infrastructure.

Development work on the BCP

Another step in the BCM process is to develop the Business Continuity Plan (BCP). The BCP should be easy to implement and maintain so that all its recipients may understand it without any problems. The plan should also describe in detail the rules of procedure aimed at maximally limiting business interruption and clearly defining the situations, in which the emergency procedures should be initiated. It is especially important in terms of emergency management to explicitly determine the tasks and responsibilities of the production process owner and key personnel (including members of the crisis management center, persons responsible for the disaster recovery center and operations personnel) as well as to indicate persons responsible for initiating emergency procedures. The employees responsible for tasks included in the adopted plans should be appropriately trained in the field of emergency procedure in case of any disruptions in the production process.

When developing the business continuity plan, it is also important to specify the rules of communication between entities and prepare templates of notifications. It should be also remembered to design appropriate control procedures regarding BCM, BCP and DRP.

Disaster Recovery Plan (DRP)

It is also important to establish appropriate procedures in case of the necessity to recover business after disaster. Due to the fact that many important production processes are implemented via IT systems, special attention should be paid to careful development of the Disaster Recovery Plans (DRP) for such systems.

The Disaster Recovery Plan is usually focused on providing alternative processes and resources necessary for the proper operations of the production system. The implementation of the DRP should reduce the time necessary to restore the possibility of the functioning of the production process as well as all costs connected therewith.

Appropriate planning should mitigate the risk and effects of the most serious disasters. The disaster refers to any failure that causes the interruption of all critical IT systems for some period of time and has negative impact on the operations of the production process. It should be stressed that while the DRP is aimed at recovering the IT systems in the shortest time possible, the BCP should ensure resilience of the critical production process to all emergency situations in the long run, i.e. before the disaster, during disruptions and upon termination of unfavorable events. When developing the strategy for recovery of IT systems, the following elements should be taken into consideration: criticality level of the production process and supporting applications, cost of interruption and recovery of business, time necessary to recover business, functional and informational security of the production process.

The creation of the DRPs is closely connected with the back-up copies. The back-up copies should be stored in the primary location to ensure easy access thereto in case of events making it impossible for the bank to conduct its activities in such a location, and in an external location, if the activities must be continued outside the primary location, i.e. backup site.

Testing of the BCP

To verify the efficiency of the Business Continuity Plan, the organization should carry out the following periodic tests. Undoubtedly, one of the benefits of such tests is the possibility of assessment whether the production process is ready for actions to be undertaken in case of emergency and the opportunity to raise awareness in that respect among employees. Due to the limited resources, the practical tests usually cover only single procedures or applications and systems for the selected elements of the production system. Nevertheless, it should be checked whether the tests include appropriate – i.e. important for the operations of the production system – production processes, IT systems or organizational units of the production system. In case of preparing full tests, their implementation should be planned and executed very carefully to mitigate the risk of disruption of the normal operations of the production system or the organization.

Verification and update of the BCP

As part of the Business Continuity Management process, the subject of the production process should also periodically verify and update the Business Continuity Plan in accordance with the changes in the production system (e.g. change of risk profile and organizational structure or IT infrastructure) and its environment (including the risk related to the fact that another entity was entrusted with the performance of some activities), which change the risk factors or hierarchy of particular threats having impact on the functioning of the whole production process. The issues related to the Business Continuity Plans and emergency plans as well as those concerning Business Continuity Management, including guidelines on the preparation of the Business Continuity Plans, have been addressed in the international standards (BS 25999-1:2006, BS 25999-2:2007, ISO 31000:2012, ISO/IEC 24762) and publications like Bagiński et al (2011), Kaczmarek (2008), Sawalha et al (2012), Urbancova et al (2013) and Venclova et al (2012).

Work Results

The authors of the article suggest the use of integrated reports as the new paradigm of reporting on the risk analysis and assessment. The document should be formal, without using colloquialisms, abbreviations and words that may be unclear to the recipient. The text of the report should be precise, complete, unbiased and objective. Therefore, it is not enough to prepare and publish only traditional risk reports or registers including solely historical data or information about the risks and probability of their occurrence or materialization.

ISO 31000 also includes a few important conditions for implementing the risk reporting process and the effects of management of such process. By the ISO 22301:2012 the above-mentioned conditions are the following:

1. ensure that the risk management process is efficient,
2. ensure that the risk management process continuously support the activity of the organization,
3. implementation of the selected procedure options in terms of planning the risk management process,
4. monitoring of the results and reviews,
5. ensure ongoing communication with external and internal stakeholders,
6. ensure efficient corporate governance,
7. ensure compliance with legal requirements, regulations and corporate governance,
8. support and encouragement to assume accountability and risk ownership.

The following conditions may be added to the above list: establishment of goodwill of the organization, building of reputation, raising of capital. The risk reporting process may be implemented in different ways: periodic written reports, oral reports, periodic reporting on goals and tasks, on an ongoing basis. It is important that the information included in the risk reports was in the form of integrated reports and used while making managerial decisions. The integrated reporting process is aimed at eliminating information gaps (Fig.7).

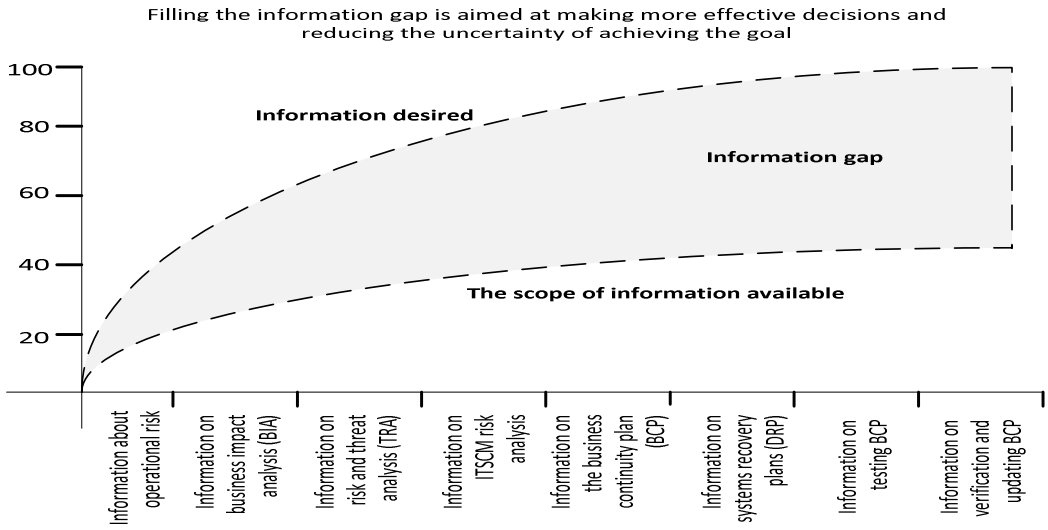

Fig.7: Information gap versus Business Continuity Management of the production process

Table 1 includes the characteristics of the principles of risk management, whose application may contribute to significant reduction of the information gap.

Table 1: Principles of risk reporting to ensure Business Continuity Management of the production process. Source: own elaboration based on ISO 31000:2012. Principles and Guidelines on Implementation p.10-12]

Principle	Description
Content	The report must include key information about the risk: internal and external sources, short description, frequency, seriousness, financial and non-financial threats, assessed consequences, etc.
Accuracy	The information in the risk report should be provided in a clear and concise m□□□er; the reports should be comprehe□sible □□d helpful i□decisio□ making, the proportion between the data, analysis, interpretations and qualitative explanations should be adequate
Comprehensiveness	The risk report should cover □ll □re□s of m□teri□l risks i□the org□□i□□tio□; the specificity and scope of the report should be in compliance with the size and complexity of the organization and is risk profile
Frequency	The required frequency of publications and updates should reflect the needs of recipients, type of risk and its changes as well as the significance of the report in terms of appropriate risk management for the purpose of efficient decision-making process.
Distribution	The report should be distributed to relevant and interested parties and include the information that may be important for the recipients, while ensuring basic security attributes (e.g. confidentiality).
Relations	The report should present the risk of the production process/enterprise and relations between the reported elements in a consistent and comprehensive manner.

Conclusion

One of the basic elements of efficient Business Continuity Management of the production processes is appropriate risk management and maintenance of acceptable level of functional and information security. The increasing prescriptive and legal requirements regarding the production processes or production systems force the stakeholders/operators who use such production processes or production systems to undertake certain actions aimed at eliminating or mitigating the risk to business continuity. The standards on business continuity, functional security, quality or risk, e.g.: PN-EN ISO 9001:2015-10, PN-EN ISO 27000:2013-10 or PN-ISO 31000:2012 do not include any specific requirements on the methodology of risk assessment, methods of risk identification and analysis or integrated reporting on risk effects. What is more, there are not any formal requirements regarding the reporting, documentation, information or communication about the risk within the risk management system or business continuity system. Therefore, every organization should adopt their own solutions provided that they are efficient and user-friendly.

Considering the above, the authors propose the use of integrated reports as a new paradigm for reporting on risk analysis and risk assessment. It can be an approach that will encourage organizations to comprehensively oversee the threats and vulnerabilities of the production system. However, its implementation requires the use of an appropriate methodology and the involvement of an interdisciplinary team of specialists with appropriate competences. Therefore, the development of this type of reports and their practical use in managing the continuity of the production system operation is a great challenge for the organization today. The attempt to bring closer the current understanding and definition of the risk analysis report for the purposes of the safety of the continuity of production processes leads to further questions and conclusions. The key issue is to determine for whom and for what purpose the integrated risk reports might be useful? While the research, it was found that currently RAR is the most widely used in the area of ??information security. It is understood by the authors as the use of active and passive organizational and technical safeguards. This area is commonly implemented in practice in various types of organizations and is often supported by numerous predefined reports and tools for their preparation. However, in the area of ??activities related to ensuring the continuity of the operation of production systems, there is still a certain gap. Currently, RAR is used intensively in practice for the functional safety of these systems. However, its much wider use than the current use can be expected. Especially in situations where functional, information and business continuity safety of production systems are treated as one research aspect. Dedicated solutions in this area are already implemented not only for the design of the safety system in the production system, but also for the ongoing management of its resources. The conducted research shows that these solutions are still not widely used on a large scale. It can be expected that in the future, the use of RAR for the purposes of ensuring the safety of the continuity of production processes will be greater than today. The new possibilities resulting from the use of RAR allow both to maintain the required level of safety in production systems and to reduce the cost of their maintenance. Business continuity safety engineering of production processes, as well as risk assessment are increasingly important areas in research and practice of production safety. The growing needs focused on the supervision of threats and vulnerabilities of the production system are the reason for increasing the quality requirements for RAR. Above shows that there is still a great potential for the development of the concepts proposed in this article through further scientific research as well as their practical implementation in production systems.

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The Security System as A Key Element of The Production System

Jarosław NAPIÓRKOWSKI
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jaroslaw.napiorkowski@wat.edu.pl

Jerzy STANIK
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Henryk POPIEL
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, henryk.popiel@wat.edu.pl

Abstract

The article presents the concept (generalized model) of the safety system for the purposes of maintaining or measuring the required level of safety of the production system. The basic elements of the model were highlighted and characterized from the point of view of controlling risk levels in functional and information security. The proposed concept of measuring the quality and state of safety, takes into account the impact of such factors as: the level of risk of internal and external threats to the basic elements of the production system, changes in the operating conditions of both production processes and computer systems supporting these processes, the vulnerability of technical and organizational security mechanisms.

Keywords: Security, Production System, Safety Management System.

Introduction

Safe production is the basis for a standardized flow of quality assurance, reliability and safety. A lot of factors/elements have an impact on the level of quality, reliability and maintaining safety and continuity of production processes. Security problems in various areas of the production company are a very important element affecting the proper functionality of the production system. Evolving global legislation has also changed the approach to production systems or processes by emphasizing quality and safety of production. The goal of this approach is to maintain the level of potential hazards to which sensitive resources are exposed, including man and his environment at an acceptable level for a production process or system.

Along with the dynamic development of the production system, the approach to measuring its quality and safety is constantly changing. Such conclusions are drawn by authors such as Auersch (2014), Belekoukias et al (2014), Shin et al(2014), Sousa et al (2014) and Teizer et al (2013). Enterprises see a great opportunity in the application of integrated quality and safety systems. For many years, manufacturing companies dealt with the security problems of the technical safety of machines and devices operating individually. In the modern era, security issues go much deeper. The development of industry has caused that modern enterprises perceive new threats related to the security of information transmission, the use of cloud computing and the possibility of a cyber-attack in the sphere of IT cybersecurity.

Safety in production should be assessed by several parameters, e.g. safety level, technical failure rate, percentage of failure due to environmental disasters, the number of accidents during transport and storage of hazardous materials, the number of sabotage and terrorist attacks, the number of unrest social., etc. Maintaining proper working conditions of the production system requires entities to act in production processes to limit the risks and vulnerabilities that may occur during their operation to the maximum. Rationality in security management can be achieved when an effective security system enabling the measurement of a state or level of security is implemented.

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The main goal of the paper is to present a new generalized security system model for the measurement of the state of reliability and information security in the production system developed over the research. This should be considered in two aspects: cognitive and practical. The cognitive aspect leads to an understanding of the essence of security in production systems and information security management systems. It also allows for the determination of the theoretical foundations enabling the creation of mathematical models for the measurement of the state of reliability and safety of the basic elements of the production system (e.g. key production processes or sensitive information resources). The practical aspect is focused on developing a procedure, method, or methodology for maintaining the required level of current reliability and the expected safety level of the production system.

The paper consists of two main parts. The first, theoretical part, describes the production system and the factors influencing its safety. The second part, which is empirical in nature, describes the concept of a safety system model for measuring the level of threats in the production system. The second part consists of several subsections describing the practical use of the proposed general quality function of the functioning of the production system to measure the state of reliability and safety of its basic elements. The article contains not only a theoretical and empirical synthesis of the problem of the impact of threats on the level of security of the production system but also constitutes a new diagnosis of the discussed issue.

The theoretical and empirical methods were used in the research. As part of theoretical methods, the following were used: abstraction, generalization, desk research (including world literature, the state of knowledge and industrial applications), systems analysis, morphological method, and inference. Methods used in the empirical part of the research was: the method of a diagnostic survey and the expert interview technique, the method of document analysis with the use of qualitative and quantitative techniques, and the method of critical analysis using the technique of qualitative analysis.

The production system and factors affecting its security

The Production System and Manufacturing Process

The production system is a deliberately designed and organized material, energy and information system operated by man and used to produce specific products (products or services) to meet the needs of consumers. The generalized model of the production system is shown in Fig. 1.

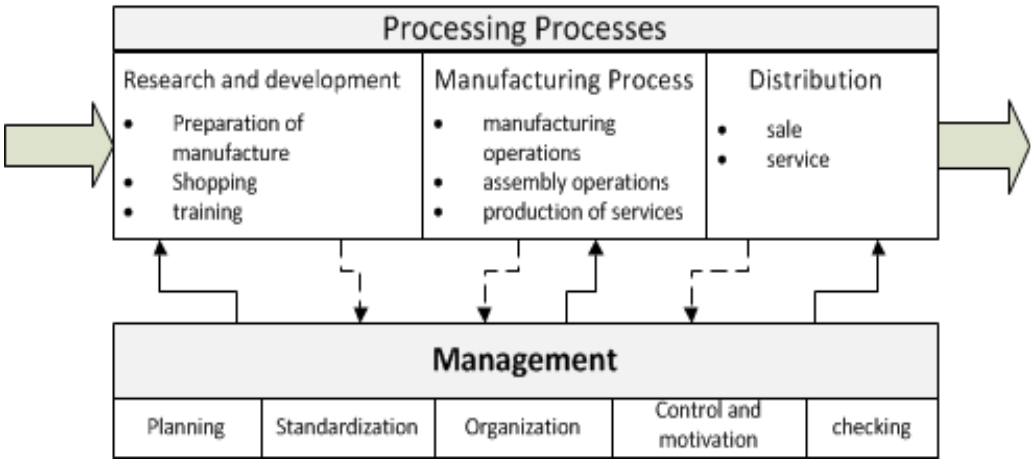

Fig. 1: Generalized model of the production system

The following production relationships are distinguished in the production system (Table1)

Table 1: Production relations

Type	Characteristic
material	delivery synchronization, provision of means of transport, storage and retrieval of materials, reduction of transport and storage losses.
energy	ensuring the supply of energy factors, neutralizing wastewater and utilizing gaseous and solid waste, measuring consumption and automatically changing the intensity of energy factor streams.
information	selection of information from the point of view of management goals, design of information connections relevant to logistics requirements, selection of equipment and software in accordance with the requirements of the information process.

From the point of view of the production system, the production process is called the transformation process, i.e. the transformation of the input vector into the output vector. The structure of the production process is illustrated in Fig. 2.The structure of the process is understood as its internal structure, i.e. the components and relations of relations between the elements.

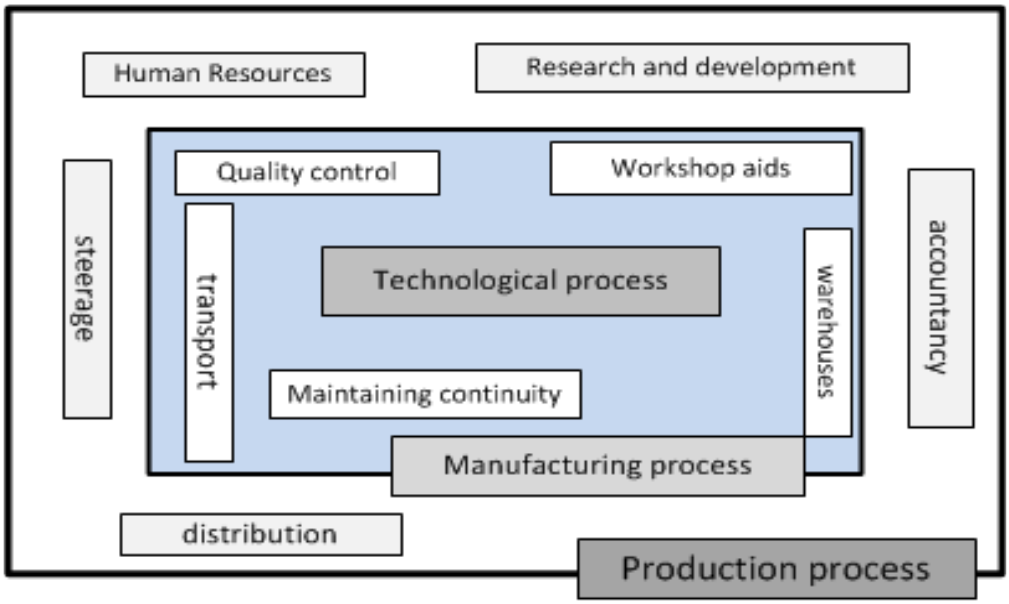

Fig. 2: Structure of the production process

The production process is an organized set of activities coordinating the course of material, information and energy streams during the implementation of a technological process. Manufacturing process - it is a set of activities occurring during the production of the final product, taking into account the work of machines and people. Technological process - this is the main part of the production system, which involves a change in shapes, physicochemical properties, the external appearance of the processed material or a permanent change in the mutual position of individual parts included in the manufactured product, i.e. assembly of components and products.

Problems/threats affecting the security of the production system

When using production system objects, there are various unforeseen events that we generally call problems. Following by Xing et al (2013) or Wang et al (2013) the problem is a task that we cannot solve with the help of known patterns (our knowledge).

Regarding the production system, the set of problems can be classified, according to the method of their recognition, into the following groups (Table2):

Table 2: Classification of problems

Group name	Problem	Type of Analysis
Technical	- Shaping and recognition of operational features; - Consumption and recovery of functional resources; - Selection of technology and technical means of exploitation;	Loss Analysis Damage Analysis Security Analysis
Organizational	- Organizing and improving operational structures; - Harmonizing duties, powers and responsibilities; - Determining the scope and principles of operational information flow;	Relationship Analysis Conflict Analysis Event Analysis
Management	- Identifying the object as an object of operation; - Selection of indicators and operational characteristics; - Assessments and operational decisions;	Analysis of phenomena Variation Analysis Value Analysis
Other	- Recognizing the threat factors and operating costs; - Identifying threat factors and the level of security, - Identifying threat factors and business continuity levels	Reliability Analysis Risk Analysis Business Impact Analysis

The sources of the above-mentioned problems are usually hazards or threat factors, also known as risk factors, originating from various environments and the environment of the production system. Threats in production systems occur not only in the production processes themselves, but also are closely related to the organization of work and technologies and relate to the economic, human and technical sphere - such examples can be found in the articles or books written by Brosnam et al (2020), Fertsh (2011) and Syvantek et al (2016). Such a wide range of threats caused by factors identified as the risk of the production process causes interest both by practitioners and theoreticians of risk management in the production system.

According to this concept, the following categories of risk factors can be distinguished:

- processes - a category of losses incurred as a result of errors in accepted procedures, insufficient number of existing procedures or lack thereof; losses in this category are not the result of deliberate actions; may be the result of human errors or non-compliance with applicable procedures,
- people - the source of this type of risk is intentional or unintentional actions or current employees to the detriment of the employer,
- systems - refers to losses incurred as a result of failure of telecommunications and IT systems, including software; losses in this category are not the result of deliberate actions,
- technologies - refers to IT or telecommunication system failures, interruption of the technological process,
- external events - refers to losses that occur as a result of impact on the production process or production system of external factors; they can be both losses caused by natural disasters (flood, earthquake, etc.), but also by the activities of third parties (acts of vandalism, effects of unrest etc.).

Threats in production processes force making decisions regarding the use of effective production system security systems (PSSS). According to Baker et al (2008) or Vanderhoeven et al (2017) the main tasks of PSSS relate primarily to the principles of operation of the production system facilities, safety risk and compliance of work with the relevant norms, standards and regulations.

An important element of PSSS is a set of properly designed and then implemented protective processes of an active and passive nature. The existence of these protective processes allows achieving the intended economic effects along with attention to the safety of significant resources of the production process. The production process safety system forces the protection processes to be constantly improved, which usually results in increasing quality and safety (functional and information) as well as more effective work. This is indicated by the results of the research presented

in works by Jingfeng et al (2018), Rut and Kulińska (2011) or Słowiński (2007). The biggest threat to production processes is leaving them unattended, i.e. not taking any actions aimed at continuous improvement.

In yours works Jingfeng et al (2018) and Pietrzak (2002) mentioned that continuous improvement not only affects the security of the production process resources, but also the security of the entire organization. Activities including the analysis and assessment of hazards and the implementation of simple actions aimed at securing process resources, allow the elimination of the largest threats and the proper functioning of the production system in the enterprise.

Model of the security system for measuring the level of threats in the production system

In specialist publications and available sources, especially online, one can find many examples of classification of models of production process resource security systems, among which models based on technical risk, understood as the product of the probability of occurrence of a given phenomenon, scale of losses (magnitude of adverse effects) and exposure (the frequency of exposing an employee to dangerous situations).

In articles such Alkhadim et al (2018), Bastien (2010) or Nord (2014) several safety measurement models can be found, ranging from simple to developed models to the most complex ones.

These models were presented in different ways, namely how:

- numerical models written using mathematical formulas - see Zikmund et al (1977),
- graphic models saved in the form of drawings, diagrams or constructed on the basis of aggregates (lists) of questions, or constructed on the basis of matrices, tables, maps,
- integrated models (combined, mixed) - resulting from the combination of numerical models or graphic models.

Unfortunately, these models usually overlook the problem of the multi-faceted nature of criteria for assessing quality or risk of threats, and the use of data collection methods for measuring security levels. Only a few publications propose the use of multi-faceted models based on sets of assessment criteria and elements of good practices in the field of data collection for acquiring knowledge needed to conduct risk analysis and assessment.

The analysis of the possibility of using adequate models of the security system, good practices and the principles of a risk-based approach for the purposes of measuring the level of risk has not yet been the subject of detailed and separate studies.

Holistic approach based on concept that includes of measuring the quality and state of safety, takes into account the impact of such factors as the level of risk of internal and external threats to the basic elements of the production system seems to by good proposal for organizations wanting to have a properly constructed security system.

The security system model for measuring the quality or risk level of production system hazards was defined using the following expression:

$$\mathrm{MBSI} = < \{GR_i\}, \{PO_j\}, \{ZZ_k\}, \{K_m\}, \{F_n\}, \mathrm{F}^C, \mathrm{SPJ} >, \tag{1}$$

where:

- $\{GR_i\}$ - set of components of the production system; a set of key functional groups forming the structure of the production process/system, subject to protection and constituting the basis for determining the quality of the functioning of the production system (it is a set of the most important policies, procedures and practices including human resources and technical resources),
- $\{PO_j\}$ - a set of active or passive protective processes,
- $\{ZZ_k\}$ - a set of technical or organizational security features,
- $\{K_m\}$ - set of criteria for assessing the quality of production system functioning,, m $\in \mathbb{M}^{SI}$,
- $\{F_n\}$ - set of file identification functions: $\{PO_j\}, \{ZZ_k\}, \{K_m\}$,
- F^C - general function of the quality of the production system functioning determined on the set $\{K_m\}$, wherein: $\mathrm{F}^{SI} = f(U_i) \rightarrow R$,
- SPJ - method of measuring the quality of production system functioning.

A schematic illustration of the production system from the point of view of controlling its level of quality and safety is shown in Fig. 3. This figure identifies two important elements: the production system security system and the basic components of the production system.

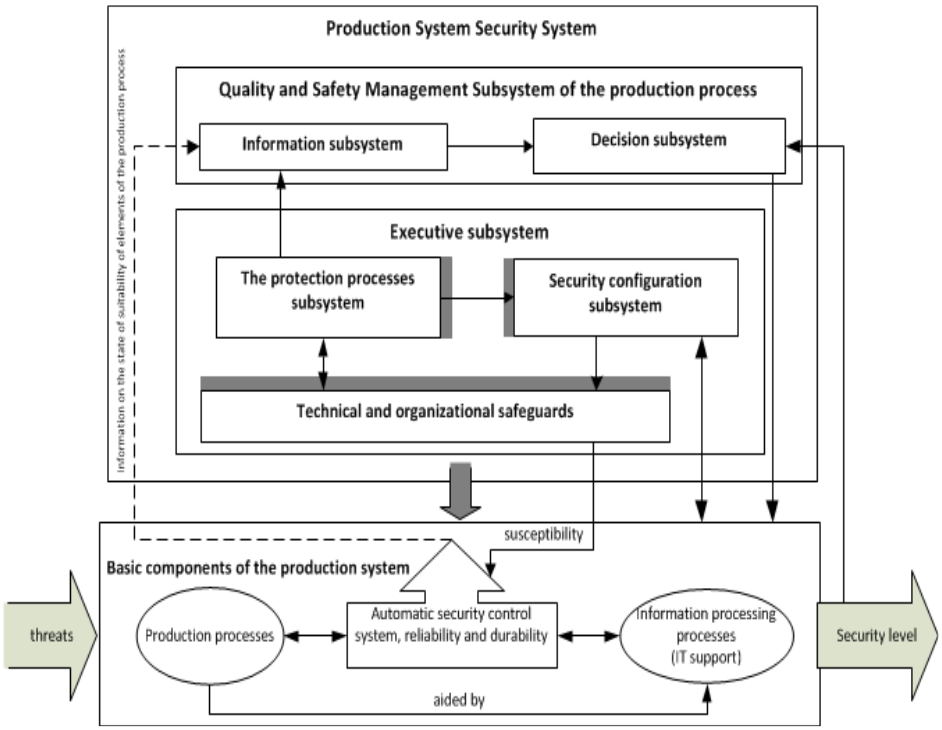

Fig. 3: Production system from the viewpoint of controlling its level of quality and safety

Characteristics of the components of the production system

Characteristics of the production process

Production is a very broad term that can be understood in several ways. For us, the most important will be three of them; in the field of efficient operation science (praxeological approach), in the field of security science (approach in the aspect of security engineering) and in the field of management.

Kotarbiński (2003) mentioned that praxeological model of action is based on the so-called chain of action. In the production process there are many chains of activity linked to each other by specific spatial, functional, chronological and other relationships.

From the point of view of the implementation of the production process, the situation will be fully determined if the following components of the action are known - subsets of the set $\{GR_i\}$ [Fig. 4]. This approach is presented by Rut and Kulińska (2011) or Słowiński (2007).

$$\{GR_i\} = GR^{CM} \cup GR^{DT} \cup GR^{APP} \cup GR^{OT}, \tag{2}$$

where:

- GR^{CM} - Material factors: perpetrator, entity, user (who does it?), technical means - technical object (what does it do?), Method of proceeding (how does it do it?), object of action (from what, what does it affect?),
- GR^{DT} - Technical activities: processing, transporting, controlling, etc.,
- GR^{APP} - Aspects of ordering processes: technology, organization, economics, etc.,
- GR^{OT} - Environment: conditions (under what circumstances?), result (what was achieved or what was done?).

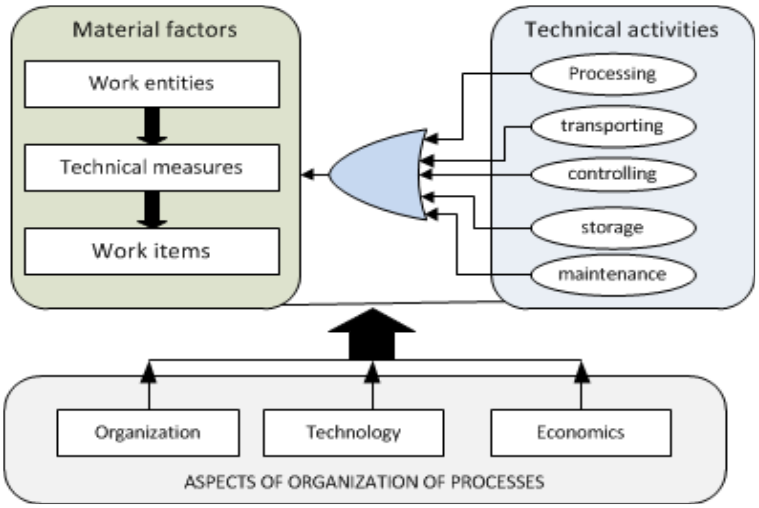

Fig. 4: Components of the production process

Characteristics of the automatic reliability control system

It is assumed that the SBSP class under consideration is equipped with automatic reliability control systems and a software control and diagnostic team that detects all types of production system emergency situations. To uniquely identify the situation, the SBSP executive subsystem uses the following identification functions:

- a set of effective protective processes, in relation to the set of current functional elements of the production process

$$\mathrm{F}_{po} : \{GR_i\} \longrightarrow 2^{PO}; \mathrm{F}_{po}(GR_i) = \widehat{PO}; \widehat{PO} \subseteq PO, \quad (3)$$

- a set of technical and organizational security features that create current security configurations in individual security processes

$$\mathrm{F}_{zz} : \{PO_j\} \longrightarrow 2^{ZZ}; \mathrm{F}_{zz}(PO_j) = \widehat{ZZ}; \widehat{ZZ} \subseteq ZZ. \quad (4)$$

In addition, it is assumed that for every" $< \widehat{GR}_i, \widehat{ZG}_i, \widehat{ZZ}_i >$, at the design stage of the security system, a set of $\{K_m\}$criteria for assessing the quality of the production system functioning was determined, according to the following rule

$$\mathcal{R} : < \widehat{GR}_i, \widehat{ZG}_j, \widehat{ZZ}_k > \longrightarrow 2^K ; \mathcal{R}\left(GR_i, ZG_j, ZZ_k\right) = K; K \subseteq \{K_m\}. \quad (5)$$

Characteristics of the components of the production system security system

The basic elements of the production system security system are:

- the production system security management subsystem,
- the executive subsystem.

The main task of the production system security management subsystem is maintaining the required level of production system security. This goal can be achieved through ongoing control of the performance of the executive subsystem. This control boils down to activating appropriate sets of protective processes, safety configurations and safety mechanisms that ensure the achievement of the required level of production safety.

In order to create the possibility of compensating for the loss of the required level of safety by the production system, it is required to specify at the design stage of the production system a set of permissible protective processes, a set of safety configurations and a set of safety mechanisms, whose appointment/initiation, by persons from the production safety team, may determine, ensure achievement of an acceptable level of production system security.

The protective process is understood as a set of actions aimed at ensuring the functionality, continuity of operations and integrity of production processes in order to prevent threats, vulnerabilities, risks or vulnerabilities and to limit

and neutralize their effects and to quickly restore this process in the event of a breakdown and other events disrupting its proper functioning.

The term security configuration is understood as a properly designed and implemented set of security mechanisms with well-defined security functions. Each safety function is precisely performed in strictly defined conditions of real threat, vulnerability and a specific time in the production system environment.

The forms of security that can be applied to the resources of the production process can be divided into three basic categories: physical, organizational, technical and hardware. Security of a physical nature consists of:

- control of the right of access to production process facilities and computer systems supporting them, especially to places where the most valuable technical devices, information resources, security copies, etc. are stored,
- introduction of monitoring and security systems,
- functioning of fire protection systems,
- limiting fraud through effective supervision,
- increased response to new threats arising as a result of technological changes.

The term security zone is associated with the term physical protection. It is a separate area of the enterprise's production system, which stores information, data and materials of strategic importance for the functioning of the production process.

Organizational methods and safeguards play a major role in the production system security process. The organizational tasks of protection include:

- developing procedures for the safe operation of the production system,
- developing specific procedures for computer system users,
- implementation of a security policy in a manufacturing company,
- IT systems purchasing policy in terms of information resource security,
- training employees in the proper operation of systems, including quality and safety elements.

The last factor affecting the security of the production system are technical - hardware and software measures. Modern production systems are equipped with the latest IT transmission technologies, such as: wired and wireless computer networks or other remote access technologies. Therefore, they pose the greatest threat to the resources of the production process. Security methods related to computer systems, data transmission, etc. include: use of information encoding and encryption, use of virtual private networks and granting rights to individual information resources; identification; authorization, etc., using a firewall. The main task of a firewall is to protect the internal network of the enterprise against unauthorized interference from outside.

General function of the quality of production system functioning

The general function of the quality of the production system functioning determined on the set $\{K_m\}$ has the form

$$\mathrm{F}^{SP}: \{K_m\} \rightarrow R\ ;\ f(K_m) = \ \mathcal{v};\ \mathcal{v} \in \mathbb{R}. \tag{6}$$

The set of $\{K_m\}$ criteria can be decomposed into various subsets depending on the adopted context of the production process or the adopted aspects allowing insight into the concept of production system security.

In this study, two types of quality criteria/indicators/safety status of the production process have been adopted: "performance criteria - $\{K_m^R\}$ " and "performance criteria - $\{K_m^D\}$" (Table3).

The criteria / result indicators are intended to assist in assessing whether safety-related activities lead to the intended results and whether such measures actually lead to a lower likelihood of accidents and/or milder consequences of accidents for people, process, environment and/or property. They are based on responses, are designed to measure the impact of actions taken to manage safety, and are similar to what is called 'result indicators' in other documents. Result criteria often reflect a change in safety over time, or a poor safety condition. Thus, the result indicators say whether the expected results were achieved (or whether the expected safety result was not achieved). However, unlike performance indicators, they do not say why the result was achieved or not.

Table 3: Sample indicators of quality and safety of the production system

Group name $\{K_m\}$	Examples of result indicators within the group - $\{K_m^R\}$	Examples of indicators of activities within the group - $\{K_m^D\}$	Measuring system
Policies, staff and general security management	1. The degree to which employees (contractors and others) act in accordance with the Security Policy 2. The extent to which security objectives have been achieved 3. The degree to which key risk assessment findings are communicated and known to employees	1. Does the Security Policy clearly state that security is a priority for the company? 2. Does management show an active commitment to safety-related activities? 3. Is there a security system?	Descriptive measurement systems: simple sums, interest, compound; Threshold measuring systems: single threshold system, multiple threshold system; Trend metering systems: simple trend, indexed for variable, indexed for data set; The range of each result indicator after normalization may take a value from 1 to 10, while for the indicator of actions 0 or 1
. General Procedures	1. The extent to which hazard identification and risk assessment are used to create relevant policies, procedures and practices regarding those threats. 2. The extent to which key information is documented and available. 3. Number of incidents resulting from inadequate change management	1. Are there procedures for systematic hazard identification and risk assessment? 2. Is there a document control system? 3. Does this system ensure that documentation is forwarded as it should be?	
Technical issues	1. The degree to which the project meets current codes and standards 2. The degree to which the plant's design, technology and construction are consistent with current standards, codes of conduct and guidelines 3. Number of incidents due to minor maintenance	1. Are there procedures for taking risk assessments, including aspects of internal security, at an early stage of the research and development process? 2. Is there a procedure to modify internal standards, including review and formal approval?	
Preparedness and response to crisis situations	1. Degree of testing the internal plan (for any test plans). 2. The degree to which enterprises support each other in responding or exercising 3. The extent to which incidents (failures and dangerous situations) are investigated in accordance with established procedures.	1. Is there an adequate internal emergency preparedness plan 2. Is the incident reporting system regularly reviewed to ensure it is functioning as expected 3. Is the incident analysis supplemented by an analysis of potential problems in similar situations in other parts of the enterprise	

The criteria/performance indicators are intended to help determine if enterprises/organizations are taking actions that are thought to be necessary to reduce the risk. Activity indicators give guidelines for activities and are similar to what is referred to in other documents as "leading indicators". Performance indicators often measure the state of safety by level of tolerance, which shows deviations from the expected state of safety at a particular moment. Action indicators used in this way emphasize the need for action to increase the effectiveness of critical safety measures when the tolerance level is exceeded.

The combination of result indicators and activities provides two perspectives on whether the basic elements of PSSS (such as policies, procedures, practices, personal resources and technical resources) from the perspective of the overarching feature, which is the quality of the production process, are useful and operate as they should.

Defining result and activity indicators and related metering systems is a recurring process for each PSSS quality attribute.

Method of measuring the quality of the information system functioning

Having defined and determined values of indicators in relation to the set of $\{K_m\}$ criteria for assessing the quality of production system functioning, we can finally introduce a definition of partial and total level of safety of the production process. Partial level of security is associated with a specific quality criterion and is defined by means of a vector $\vec{v}_m$.

The vector $\vec{v}_m$ is a linear combination of the set of indicators $w_k \in W_B^m$ with the coefficients β_k reflecting the importance or contribution of this indicator in the quality of the production process from the point of view of the m - th criterion K_m, described as follows

$$\vec{v}_m = \sum_{k=\overline{1,W_B^m}} w_k * \beta_k \,. \tag{7}$$

The total level of quality / safety of the production process can be expressed as a weighted vector $\vec{\mathcal{V}}_m$ in the form

$$\vec{\mathcal{V}}_m = \vec{\mathcal{V}}_m \otimes \vec{\mathcal{P}}_i \,, \tag{8}$$

where:

$\vec{\mathcal{V}}_m$ - vector of this quality criterion of the production process,

$\vec{\mathcal{P}}_i$ - coordinate validity vector $\vec{\mathcal{V}}_m$, wherein

$$\vec{\mathcal{P}}_i = \left[p_{q,v}\right]_{QxV} \,;\ \wedge q \in Q \ \ and\ v \in V\ p_{q,v} \geq 0{,}1;\ \sum_q^Q \sum_v^V p_{q,v} = \overline{W_B^m}. \tag{9}$$

The constraint defined by formula (7) guarantees that each of the set of indicators $w_k \in W_B^m$ in size $\overline{W_B^m}$ has a non-zero effect on the final level for m - this quality criterion, m ∈ $\mathbb{M}$.

Partial quality of the production process, in reference to K_m is the number $v_m \in \mathbb{V}$ equal to the length of the vector $\vec{\mathcal{V}}_m$ which is a weighted vector of indicators describing the m-quality criterion, m ∈ $\mathbb{M}$.

$$v_m = \|\vec{\mathcal{V}}_m\|. \tag{10}$$

Having defined and defined partial assessments of the level of safety of the production process, we can finally determine the level of system risk as a vector module

$$\vec{\mathcal{V}} = \sqrt[2]{\mathcal{V}_1^2 + \mathcal{V}_2^2 +, \dots, \mathcal{V}_m^2} \,. \tag{11}$$

An example legend for assessing the significance of risk $|\vec{\mathcal{V}}|$ is cited in Table 4.

Table 2: Assessing the significance of risk

Level	Points	Description
acceptable	1-16	this low, insignificant risk, which may cause short-term, slight disturbances in the organization's activity, is the lowest risk for achieving the goals and tasks of the production system / organization; no additional risk prevention measures are required; the risk is subject to monitoring and supervision over implemented control and security mechanisms
conditionally acceptable	17-36	this is medium risk, which causes medium disruption in the operation of the production system / organization, requires monitoring and taking possible actions to minimize the risk, probability and / or effects of its occurrence
material	37-60	this is a high risk that causes disturbances in the operation of the production system / organization, requires special monitoring; may require the use of additional control and safeguard mechanisms or the preparation of new internal regulations and the taking of actions of the so-called risk response to reduce the risk to an acceptable level

critical	61–100	this is a very high risk that is characterized by a high probability of it materializing; it poses the highest threats to achieving the objectives and tasks of the production system / organization, it absolutely requires taking additional actions to minimize the likelihood or effects of its occurrence, develop methods of so-called risk response and implement safety mechanisms, and continuous monitoring

Summary

The security of the production system is a state but also a process that allows normal development of production - the successful implementation of all production processes. This condition is usually obtained as a result of organized protection - a system protecting the production process - against all internal and external threats.

One of the basic guarantors of security is a properly constructed security system, based on properly selected security mechanisms that create appropriate security configurations. Ensuring safety in relation to the production process depends primarily on the nature, size and intensity of threats and vulnerability for key objects of this process. Ensuring the safety of the production system requires consideration of a wide range of threats, factors or events of their variability, specifics and the effects of their potential occurrence.

Emerging threats in a changing security environment force the improvement of functioning security systems, their reconstruction and even the creation of new systems. The ubiquity of security threats, their interpenetration and diversity also causes the need to rebuild thinking about security, which should take into account the risk of their occurrence and pre-emptive actions preventing their appearance and eliminating the negative effects of their occurrence, and ultimately reducing these effects to a minimum.

This work is one of many attempts to solve the extremely important problem of modern production, which is to ensure its quality and safety. This issue is particularly important due to the increasing level of threat threats, especially since they lead to serious material losses, theft or loss collected data.

The sphere of managing the safety of production processes will undoubtedly gain in importance. Pereira et al (2017) mention that its interdisciplinary, multidimensional nature requires appropriate methods, methodologies and practices to ensure an acceptable level of security. The choice of management methodologies and practices is very large, which can be a challenge in choosing the production system most relevant to the specificity and mission.

This situation also implies the need for appropriate organizational competences and specialists with interdisciplinary knowledge and skills to use these methods or methodologies and their selection and adjustment to the configuration of the production safety management system. The subject of further research in this area may relate to detailed criteria for the selection of safety models for the purpose of measuring the state of safety and its maintenance at an acceptable level.

A methodical approach to the security of production systems should take into account: critical functionalities; the resources allowing their operating; threats to which resources are vulnerable and safeguards against identified threats. This will better meet the needs of the community dependent on the services provided by production systems. The above allows to point out three main directions of development of security of production systems can be indicated:

1. A change in the approach to the design of security systems in production systems resulting from the need to include such new elements in security management (e.g. cyber environment, cyberspace, cyberthreats, cybersecurity), and the introduction the growing number of new technical elements (e.g. IT systems, industrial robots) in the production sphere for the implementation of information, and technological or operational processes.
2. Trends in the development of computer science and robotics in conjunction with the evolution of machines and technological devices, as well as control systems for production processes allows to forecast that in the coming years the substance of the production systems (and the role of man in the production process) will change significantly. As a result, the safety measurement models for these systems will also have to change.
3. The implementation of the Internet of Things (IoT) concept in production processes generates a significant impact on the security of the production system as a whole. IoT security issues should be solved not only by technological methods. One should also strive to increase the awareness of the users of the production system. There is also a necessity to develop industry standards. These should be based on the best practices, and allows reducing the level of risk to an acceptable level.

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Financial Analysis as Part of The Process of Determining the Value of The Company

Jana KUROTOVÁ

Faculty of Operation and Economics of Transport and Communications, University of Žilina, Department of Communications, Univerzitná 1, 010 26 Žilina, Slovakia jana.kurotova@fpedas.uniza.sk

Miriam JANKALOVÁ

Faculty of Operation and Economics of Transport and Communications, University of Žilina, Department of Communications, Univerzitná 1, 010 26 Žilina, Slovakia
miriam.jankalova@fpedas.uniza.sk

Veronika KUČMOVÁ

Faculty of Operation and Economics of Transport and Communications, University of Žilina, Department of Communications, Univerzitná 1, 010 26 Žilina, Slovakia
kucmova4@stud.uniza.sk

Abstract

The present is characterized by the fact that companies are increasingly interested in finding out what is their value. In most cases, the issue is addressed by experts or expert organizations who, according to the individual steps of the prescribed process, try to determine the value of the company or its individual parts. The aim of this article is to perform a financial analysis of a selected company. Financial analysis is part of the process of determining the value of a company. The article performed a vertical and horizontal analysis, which forms part of the financial analysis. The input data used to achieve the results were drawn mainly from the financial statements of the selected company. The paper provides an overview of the financial situation of the selected company through analyses, whether vertical or horizontal, but also provides information on the financial health of the company through ratio indicators.

Keywords: Process, Financial Analysis, Value, Company.

Introduction

Kurotová and Hoštáková state in their study (2019) that the issue of determining the value of property and companies has become an important and difficult part of the activities of experts - individuals, as well as expert organizations. The process of determining the value of the company itself is considered a complex discipline, which focuses on gaining knowledge about the company from various areas such as corporate accounting, macroeconomic analysis, financial analysis, and marketing.

Boutillier and Uzunidis (2014) claim that the word value is used in economics synonymously with the word price. For the economist, the theory of value is the theory of pricing or theory of exchange value. In the field of formal economic theory, the synonymous term price and value is used. For this reason, it is not necessary to explicitly define the word value. Krabec states in his study (2007) that the value can be defined as a utility that is recognized by the market and is not taken as a pure physical condition. In the book by Jakubec and Kardoš (2016) and Krabec in his research study (2009) these authors states that the concept of value can exist without significant change and is based on theoretical evaluation. The said assessment is based on a comparison of utility and arbitrage, which is performed primarily by the person interested in investing or the authorized person who performs the assessment. This process is performed exclusively for goods of the company that are available. In conclusion, it can be noted that the value therefore represents an approximate figure based on objective fact.

Jakubec and Kardoš (2016), Murphy (2020) and Borad (2019) mentioned that the value of a company is widely used as a more comprehensive alternative to market capitalization. In determining the value of the company, in addition to market capitalization, the company's short-term and long-term debts and cash available to the company are also

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considered. By omitting many important factors that affect and enter the value of a company, market capitalization fails to correctly determine the value of a company. Based on the above, we can say that the value of the company is more informative than market capitalization because the final value of the company includes many other factors that affect the result. The resulting value of the company plays an important position for investors who want to know what the real value of a company is. In conclusion, McClure (2020) in his research study says that the value of the company represents a theoretical price. The theoretical price represents the amount of funds for which it is possible to buy and sell a company.

Jankalová and Kurotová (2020) and Harumová (2008) mentioned that there is a basic procedure for determining the value of a company that experts follow, although it may vary from step to step. This is because there are no rules that experts must follow and because each expert has their own acquired knowledge and skills. Experts' own acquired knowledge and skills can be used for the specified purpose of determining the value of the company or its individual components of assets. However, the procedure should include the basic steps of compiling a financial and strategic analysis, a financial plan and, finally, carrying out an evaluation of achieved results for the purpose of the entire valuation of a company.

The following figure shows the step-by-step process of determining the value of a company.

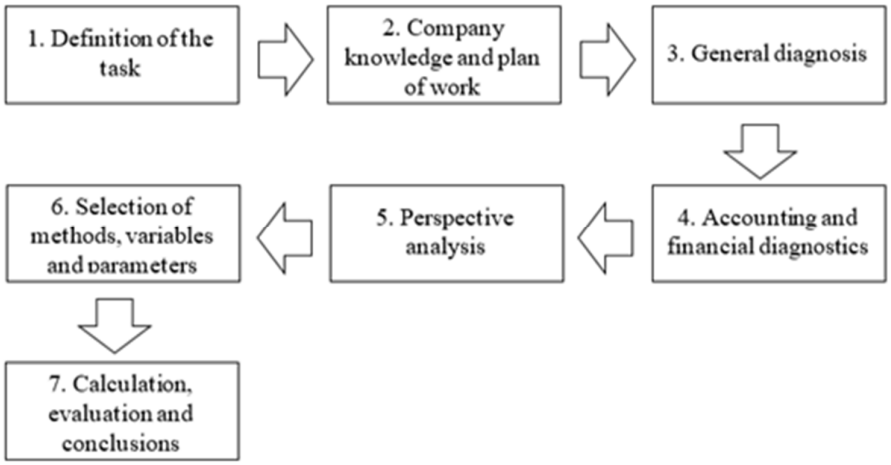

Fig. 1: The process of determining the value of a company

In the following section, we define the individual steps of the process of determining the value of the company. Kurotová and Hoštáková (2019) and the author Mařík (2011) describe the individual steps according to a study.

1st step: ***Definition of the task*** - in this step, the client informs the expert or expert organization, what is the aim of determining the value of the company. In addition to setting a aim, the expert is required to set up a working group to participate in the process of determination of company's value.

2nd step: ***Company knowledge and plan of work*** - this step is based on a thorough knowledge of the evaluated company. Determining the value of a company is an activity that cannot be done directly from the table, and it is important that the expert and his work team become thoroughly acquainted with the company. In addition to getting to know the company, another important step is to design a work plan, which lists the individual activities that will be performed and at the same time each task is assigned to a team member.

3rd step: ***General diagnosis*** - after obtaining the necessary information about the company, the expert and his working group must choose the appropriate approach, which is going to be used in the process of determining the value of the company. In this step, it is equally important to define the areas that the work team will focus on.

4th step: ***Accounting and financial diagnostics*** - in this step, the work team analyses the company's accounting and at the same time performs a financial analysis of the company. The focus of the work team is on the horizontal and vertical analysis. It is important to verify all the information that the expert and his team receive from the company and find out if it is true.

5th step: ***Perspective analysis*** - when determining the value of the company, it is good to start from the business plan in which the aims and visions of the evaluated company are written. It is also appropriate to consider the opinion of company managers and their perception of the company in the future.

6th step: ***Selection of methods, variables and parameters*** - after obtaining the necessary information, the work team proceeds to the choice of method, which will be used to determine the value of the company. The choice of method depends on the reason why the value is determined. Asset methods are used mainly in those cases where the company enters liquidation and the owners of the company need to determine the value of the company in order to achieve a fair distribution of the company's assets. The group of income methods is used mainly in those cases where there is an entity that would like to enter the company and wants to become part of it.

7th step: ***Calculation, evaluation and conclusions*** - in the last step, the value of the company or its individual parts and its assets is determined. In this step, the work team together with the expert obtain the final value of the company and provide the results to the customer in the form of an expert opinion. In addition to the set value, the expert and his team also state their opinion on the achieved result and at the same time provide valuable advice and steps that the company should take if it wants to increase its value, respectively if it wants to maintain its value.

To fulfil the aim of the article, we will focus on the fourth step of the process of determining the value of the company, namely financial analysis. Financial analysis must be taken as an important step in the process of determining the value of the company, because the main aim of valuing the company is to identify the key areas of business that generate value for the company. In the financial analysis, it is possible to see which parts of the company bring benefits to the evaluated company.

Methodology

The aim of the paper is to perform a financial analysis of a selected company. To fulfil the aim, it was necessary to theoretically define the issue of determining the value of the company. In order to be able to perform a financial analysis, which is divided into vertical and horizontal analysis, it was necessary to have input data which are publicly available through financial statements register – http://www.registeruz.sk/. The individual input data used in the financial analysis come from the financial statements of the selected company, which acts as a transnational distributor of electronic components for industrial production. The financial statements that we used in the financial analysis are for the years 2017, 2018 and 2019. The methods used in the present article are information collection method, synthesis method, deduction method, secondary research and analysis.

Results

The financial analysis was carried out in two steps. In the first step, a horizontal analysis was performed and in the second step, we focused on the vertical analysis.

Horizontal Analysis

Through the horizontal analysis, we focused first on the analysis of the assets of the selected company. We analysed selected assets of the company such as long-term intangible assets, long-term tangible assets, inventories, short-term receivables and financial accounts. The following table shows the analysed assets of the company.

Table 1: Basis for horizontal analysis of company assets

Company assets	Year		
	2019	**2018**	**2017**
Intangible assets	64 210	64 210	64 210
Tangible fixed assets	1 216 687	885 402	923 213
Stocks	3 844 552	3 964 938	3 578 944
Short - term receivables	732 617	914 085	1 104 945
Financial accounts	420 447	189 032	497 292

Table 2: Horizontal analysis of company assets

Company assets	2019 / 2018		2018 / 2017		Index		Growth rate	
	ABS	%	ABS	%	2019 / 2018	2018 / 2017	2019 / 2018	2018 / 2017
Intangible assets	0	0	0	0	0	0	0	0
Tangible fixed assets	331 285	37,42	-37 811	-4,10	1,37	0,96	137	96
Stocks	-120 386	-3,04	385 994	10,79	0,97	1,11	97	111
Short - term receivables	-181 468	-19,85	-190 860	-17,27	0,80	0,83	80	83
Financial accounts	231 415	122,42	-308 260	-61,99	2,22	0,38	222	38

The horizontal analysis of the company's assets from 2019, 2018 and 2017 shows that long-term intangible assets have not changed in the last three years. From the item tangible fixed assets, it can be said that its value increased by 331 285 € in 2019 compared to 2018, and in 2017 it was higher by 37 811 € compared to 2018. The values of tangible fixed assets are fluctuating. The index of tangible fixed assets represents the value of 1.37, which means that the value of tangible assets in 2019 reached 1.37 times the value from 2018, which represents an increase of 37.42%. Inventories in 2019 decreased by 10 386 € compared to 2018. The index in 2019 multiplied by 0.97, which means that the value decreased by 3.04% compared to 2018. The value of the short-term receivables item in 2019 was 732 617 € which means that it was lower by 181 468 € compared to 2018. Also, the value in 2018 was lower by 190 860 € compared to 2017. This means that short-term receivables are declining. The index in 2019 was 0.80 times higher than in 2018, which means that the value decreased by 19.85% compared to 2018. In the financial accounts we can observe that the year 2018 had the lowest value compared to 2019 and 2017. In 2019 the financial accounts were higher by 231 415 € compared to 2018. The index in 2019 was 2.22, which is a multiple compared to 2018. The value is thus increased by 122.42%.

After the implementation of the horizontal analysis of the company's assets, we switched to the analysis of selected liabilities of the company. We analysed selected liabilities of the company as equity and liabilities. The following table shows the analysed liabilities of the company.

Table 3: Basis for horizontal analysis of company liabilities

Liabilities of the company	Year		
	2019	2018	2017
Equity	3 019 361	2 607 523	2 273 907
Commitments	3 224 642	3 382 080	3 869 075

Table 4: Horizontal analysis of company liabilities

Liabilities of the company	2019 / 2018		2018 / 2017		Index		Growth rate	
	ABS	%	ABS	%	2019 / 2018	2018 / 2017	2019 / 2018	2018 / 2017
Equity	411 838	15,79	333 616	14,67	1,16	1,15	0,95	0,87
Commitments	-157 438	-4,66	-486 995	-12,59	116	115	95	87

The horizontal analysis of the company's liabilities from 2019, 2018 and 2017 shows that equity was the highest in 2019 and has been growing since 2017. Equity increased its value by 411 838 € compared to 2018. The index in 2019 had value 1.16, which means that in comparison with year 2018 it increased its value by 15.79%. Liabilities have a declining character, which means that they reached the highest value in 2017 at 3 869 075 € and the lowest in 2019 at 3 224 642 €. Liabilities have an index of 0.95, which means that the value in 2019 increased by 0.95. So, the value in 2019 decreased by 4.66% compared to 2018.

Vertical Analysis

We performed a vertical analysis for the company's assets and for the company's liabilities. The vertical analysis of assets consists of balance sheet items - long-term intangible assets, long-term tangible assets, inventories, short-term receivables and financial accounts. The vertical analysis of liabilities consists of balance sheet items - equity and liabilities.

Table 5: Vertical analysis of company assets

Company assets	Year			Total assets		
	2019	2018	2017	2019	2018	2017
				6 245 903	5 989 603	6 142 982
Intangible assets	64 210	64 210	64 210	1,03	1,07	1,05
Tangible fixed assets	1 216 687	885 402	923 213	19,48	14,78	15,03
Stocks	3 844 552	3 964 938	3 578 944	61,55	66,20	58,26
Short - term receivables	732 617	914 085	1 104 945	11,73	15,26	17,99
Financial accounts	420 447	189 032	497 292	6,73	3,16	8,10

In 2017, intangible fixed assets accounted for 1.05% of the company's total assets, in 2018 for 1.07% and in 2019 for 1.03% of the company's total assets. Tangible fixed assets in 2017 represented 15.03%, in 2018 14.78% and in 2019 19.48% of the company's total assets. Inventories represent 58.26% in 2017, in 2018, they represent 66.20% and in 2019, they represent 61.55% of the company's total assets. Short-term receivables represented 17.99% of the company's total assets in 2017, in 2018, they represented 15.26% and in 2019, they represented 11.73% of the company's total assets. Financial accounts accounted for 8.10% in 2017, 3.16% in 2018 and 6.73% of the company's total assets in 2019.

Table 6: Vertical analysis of the company's liabilities

Liabilities of the company	Year			Liabilities and Equity together		
	2019	2018	2017	2019	2018	2017
				6 245 903	5 989 603	6 142 982
Equity	3 019 361	2 607 523	2 273 907	48,34	43,53	37,02
Commitments	3 224 642	3 382 080	3 869 075	51,63	56,47	62,98

In 2017, equity represented 37.02% of total liabilities, in 2018, it represented 43.53% and in 2019, it represented 48.34% of total assets. Liabilities in 2017 represented 62.98% of total assets, in 2018, they represented 56.47% and in 2019, they represented 51.63% of total assets.

As part of the vertical analysis, an analysis of ratios was performed. We focused on the analysis of liquidity, activity, indebtedness and profitability indicators.

Table 7: Company liquidity analysis

	2019	2018	2017	2019 / 2018		2018 / 2017	
				coefficient	%	coefficient	%
Level I liquidity	0,269	0,105	0,278	0,164	155,739	-0,173	155,739
Level II liquidity	0,737	0,613	0,897	0,124	20,186	-0,284	20,186
Level III liquidity	3,257	2,817	2,901	0,440	15,632	-0,084	15,632

Level I liquidity should range from 0.2 to 0.6. The liquidity analysis shows that 2019 and 2017 meet these criteria. The year 2018 with a value of 0.105 is below the set value of 0.2. There may be a problem in repaying liabilities. Level II liquidity should in turn range from 1.0 to 1.5. The analysis shows that all three years are below the set value. Short-term liabilities should not exceed the value of financial accounts and short-term receivables. In this case, the commitments exceed these indicators each year. Level III liquidity should be in the range of 2 to 2.5. In all three years, the value is higher than 2.5. Inventories make up the largest part of current assets and are the main reason for the high value of liquidity.

For the activity indicator, we focused on two selected years (2018 and 2019) in order to be able to calculate the individual indicators falling within the company's activity.

Table 8: Analysis of company activity

	2019	2018	2019 / 2018	
			coefficient	%
Turnover of assets	2,955	2,934	0,021	0,717
Turnover of fixed assets	17,200	19,681	-2,482	-12,609
Inventory turnover	4,630	4,718	-0,089	-1,883
Inventory turnover time	77,760	76,296	1,464	1,919
Turnover of receivables	21,956	17,630	4,326	24,537
Receivables turnover time	16,396	20,420	-4,023	-19,703

The turnover of total assets shows how intensively the company uses the total assets of the company. The higher the value of a given indicator, the more advantageous it is for the company. The company's values are high, which means that the assets in sales for 2019 and 2018 turned 2.9 times. Inventory turnover indicates the number of turnovers i.e. how many times the inventory is converted into other current assets until the sale of products and the new purchase of inventory. In 2019, inventory rotated 4.6 times and in 2017 4.7 times. Inventory turnover time expresses how long stocks are tied up in a company before they are consumed or sold. In 2019, stocks are tied for 77 days before they are consumed, and in 2018, 76 days. Receivables turnover time shows the number of days for which receivables are repaid in the company on average. In 2019, on average, receivables are repaid in 16 days and in 2018 in 20 days.

The following table shows the achieved values that were achieved when calculating the debt ratio.

Table 10: Company indebtedness analysis

	2019	2018	2017	2019 / 2018		2018 / 2017	
				coefficient	%	coefficient	%
Total indebtedness	51,66	129,54	62,98	-77,88	-60,12	66,55	105,67
Long-term debt	26,61	60,63	33,91	-34,02	-56,12	26,72	78,79
Short-term debt	25,05	68,91	29,07	-43,86	-63,64	39,84	137,01
Self - financing ratio	8,56	99,87	37,02	-91,31	-91,43	62,85	169,80
Interest coverage ratio	42,46	34,77	15,09	7,69	22,11	19,68	130,36

Total indebtedness expresses how foreign sources contribute to the financing of the company. The financing of the company's assets by foreign sources has a fluctuating character. In 2018, the assets were mostly financed by foreign sources, up to 129.54%. The least was the property financed in 2019, namely 51.66%. The values of long-term and short-term indebtedness are approximately the same. The highest indebtedness was reached in 2018, where long-term indebtedness was 60.63% and short-term indebtedness 68.91%. In recent years, short-term and long-term indebtedness has ranged from 25% to 33%. The self-financing ratio shows the highest value in 2018 where it increased to 99.87%, which is 91.33% more than in 2019. In 2019, it shows excellent results, where the assets were financed by own resources to 8.56%. The interest coverage ratio refers to the ability to repay interest expense. The values in

the table for the analysed periods have an increasing character. The lowest value was in 2017 at 15.09%. The company reached its highest value in 2019, namely 42.46%.

The last indicator we analysed was the profitability of the company. Table 10 shows the values obtained, which we calculated using data obtained from the company's financial statements.

Table 11: Analysis of company's profitability

	2019	2018	2017	2019 / 2018		2018 / 2017	
				coefficient	%	coefficient	%
ROE	13,64	12,79	16,69	0,85	6,61	-3,89	-23,34
ROA	6,59	5,57	6,18	1,02	18,38	-0,61	-9,84
ROS	3,18	1,89	2,24	1,28	67,85	-0,34	-15,27
ROI	6,80	5,83	6,74	0,97	16,57	-0,91	-13,48

The return on equity indicator expresses how the company values its equity. The lowest value was in 2018 at 12.79%. The highest value was in 2017, where the return on equity is 16.69%. Otherwise, the values are not so different and range from 13% to 16%. The return on total assets reflects the return on the total capital of the company's assets. The lowest level was in 2018 at 5.57%. Otherwise, no large differences are noted. Profitability of sales describes the dependence of profit and sales. Again, in all three years, the profitability of sales is without major differences. The smallest was in 2018 at 1.89%, which shows that the company produced revenues of 1.89 euros of profit per 1 euro. Return on capital also ranges from 5% to 8%. The highest value was in 2018 at 6.8%.

Conclusions

The aim of the presented paper was to perform a financial analysis of the company, which is part of the process of determining the value of the company. The importance of determining the value of the company is growing over time. Value-creating companies are considered healthier and involved in building the economy. These companies offer more opportunities for individuals.

This stimulus therefore encourages companies to constantly improve and work to increase their value. Company also tries to create suitable conditions for the entry of a new investor into their environment with their thorough approach aimed at increasing their overall value. In addition to building the economy and creating opportunities for individuals, companies are currently focusing on sustainability, which is seen as a key point in creation of a business strategy. Sustainability is a factor that should be the subject of further research in other articles devoted to the researched issue. This factor should therefore be examined, as it can significantly affect the very basis of a company's value.

From the whole process of determining the value of the company, we focused on the implementation of the fourth step, which is the diagnosis of accounting and finance. In this step of the process of determining the value of the company, a financial analysis is performed. Through the results of the financial analysis, the expert or expert organization, together with his work team, can recommend to the client which individual areas in the company bring profit to the company and are key areas of interest for the company. From the point of view of sustainability, the financial analysis of the company serves as a source of information, which can be used as a base in finding out how the company contributes to the main focus areas of sustainability – the support of economic, environmental and social areas.

From the results obtained from the financial analysis, which in a suitable way provide the company with an overview of its financial health, we can conclude that the property binds a large amount of funds in warehouses, which are crucial for it. The company also ties a large amount of finances to the company's long-term tangible assets. However, this item considers and works only with those data on tangible fixed assets, which also participate in company activities and through these assets, the company makes a profit. From the point of view of financial health, it can be stated that the company has more liabilities than receivables and it would be more advantageous for it to reduce its liabilities at least to the level of receivables. From the data used in the analysis, we can see that the company's liabilities are increasing from year to year. The gradual increase in the liabilities and overall liabilities of the company has a negative impact on the resulting value of the company. Again – the company should try to reduce its liabilities and it should try to focus on the assets of the company, so that it is more satisfied with the determined value of the company or its individual parts of assets. Based on the data available in the financial statements of the selected company, we cannot say what the business strategy of the company is and therefore we do not know how to set recommendations for the reduction of the company's liabilities.

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A Conceptual Model of a Mobile Application to Support Paralyzed Stroke Patient Care at Home

Iustina-Cristina COSTEA-MARCU

University Politehnica of Bucharest, Bucharest, Romania
costeamarcuiustina@gmail.com

Gheorghe MILITARU

University Politehnica of Bucharest, Bucharest, Romania
ghmilitaru.militaru@gmail.com

Cristina-Petronela SIMION

University Politehnica of Bucharest, Bucharest, Romania
cristinas_upb@yahoo.com

Corina-Ionela DUMITRESCU

University Politehnica of Bucharest, Bucharest, Romania
cordumitrescu@yahoo.com

Abstract

There are a lot of people that after having suffered a cerebrovascular accident (CVA) remain incapacitated and bed bound, presenting different types of plegia. These people require constant assistance from either a relative or a special care worker. This paper proposes an application that will aid those who assume the responsibility of taking care of a paralyzed person that just went through a CVA. The caretaker will have access to information pertaining to different categories – both medical and therapeutical, but also information regarding the rights and facilities of those diagnosed with different forms of plegia. Moreover, in some cases the caretaker may request further information or even ask for a consult that will be given at the patient's location. This leads to having the great advantage of avoiding superfluous calls to the National Ambulance Service. The chosen methodology uses indirect research for the references study and direct research through interviews with people that have taken care of paralyzed CVA patients.

Keywords: Medical Application, Healthcare, Stroke, Homecare, Plegia.

Introduction

The cerebrovascular accident (CVA) occurs when a part of the brain has interrupted or reduced blood flow and the brain's cells begin to die. The cells from the affected area control a particular part of the body, thus leading to partial paresis, frailness, numbness and even paralysis. The cerebrovascular accident (CVA) is the second main cause of death worldwide (2).

We propose a mobile application that centers on medical care and has 2 main purposes: minimizing the excessive use of the available ambulance services and creating a platform which easily gives access to rapid, organized and useful information for patients diagnosed with CVA. While one can find plenty of data on the internet, it is not well organized and does not have verified integrity. This leads for example to a lot of wasted time searching for the documents needed in order to make the patient's handicap file.

Through the proposed application, the patient has structured in a very clear way a good amount of information which will be very useful when taking care of the patient at its bedside. It is understandable that a medic or a nurse, from any given hospital, would not have the necessary time to explain to every person that will take care of a paralyzed patient, all the effects, symptoms and complications which can occur after a cerebrovascular accident or

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its prescribed medication. We believe that through the proposed application, the custodian/caretaker/relatives of the patient will be able to get the information they need about the disease's effects and treatment in a fast and sure way. The internet provides a lot of information which most of the time is presented in a chaotic way. It mostly requires a lot of wasted time allocated only for searching and one can always find outdated data or false information (for example when compiling documents for the disability form).

In Romania there are a lot of non-governmental organizations which offer services for those that require being taken care of at home. These services are settled through the National Health Insurance House. In this paper, I will focus on people that have been bedbound by a vascular accident. The NGO's can obtain the application which I am proposing, in order to facilitate the wellbeing and care of the patient but also the communication with his or her caretaker.

State of the Art

There are a lot of e-health applications designed especially for home usage and they target a vast range of diseases and treatments. In his article, Ding H. et. Al (2012), proposes a mobile application for those diagnosed with Chronic Obstructive Pulmonary Disease and it is meant to ameliorate the quality of life and reduce the costs for the treatment.

Holonec R. et. Al (2018) proposes an application for monitoring an epileptic episode and it is based on measured parameters using a bracelet with sensors which connect to an Arduino board (4). This would turn out to be very useful if implemented in the following proposed application.

Frieder Wittmann et. al (2016), completed a group research carried out on 11 hemiplegic patients and it lasted 6 weeks. These patients were taken care of at home through the use of a virtual reality system. The authors of the article confirm the fact that you can monitor daily the training of each patient and that at the same time you can also personalize the difficulty of the therapeutical workout programs, by using the home therapy portable system which is based on sensors. (7)

Application Description

The application can be useful to those that are taking care of their relatives (parents, grandparents, etc.) which have been put to bed after they had a CVA. We are taking into consideration the analysis of people that have been diagnosed with different types of plegia and also require constant care and support from another person throughout their daily activities. After a CVA there can be multiple kinds of strokes: monoplegia (when there is only one limb that is affected, be it leg or hand), hemiplegia (when both a hand and a leg are affected and are situated on the same side, leaving half of the body impaired), paraplegia (which concerns both legs), tetraplegia (when both hands and both legs have been affected).

Such an application is very advantageous because the ambulance department in Romania is more than often very busy and through the application, less urgent problems can be solved and impractical calls can be avoided; of course this also comes in favor of the patient. For example, concerning CVA patients, a common symptom is very powerful pain in the limbs that suffered paralysis. By utilizing the application, the users can find out what painkillers to administer the patient or the types of massage which can benefit the affected limbs. They can find out these types of necessary information directly through the application or they can contact a medic or a nurse to further investigate the problem (both being connected to the application). This saves the time and resources of the ambulance department and the patient gets treated much faster.

A CVA patient has a number of rights and benefits given from the government, as follows: disability certificate, home assistance, certain medical equipment like ambulatory medical devices, orthotic devices or urinary devices (for those patients that also develop a neurogenic bladder syndrome).

In order to obtain the handicap certificate, one needs to make a file which includes multiple documents (the standard application, the Identity Card, an objective neurological report (description and staging of the disease, specification of travel) + muscle strength assessment scales (MRCS or MSF) and scales for assessing autonomy and functionality (ADL, Barthel Index), original; Copies of interpreting imaging investigations: CT, MRI, etc.; Copies of hospital discharge tickets; standard medical letter, completed by the family doctor, original; employee certificate; copy of disability pension decision + copy of recent pension slip; copy of old age pension decision + copy of recent pension slip; copy of pension successor decision + copy of recent pension slip. This entire string of data can be too much raw and unexplained information for a lot of people. The application would take that into consideration and identify and explain each necessary document, what it is, what it looks like, where to find it etc..

R. Perrain et. al (2018), mentions in his paper that at a 3 month evaluation of those diagnosed with CVA, 80% of those patients suffer from depression. (6) The patient may present sleeping disorders or in some cases different forms of anxiety attacks. By using the app, the caretaker cannot only be informed that anxiety may manifest, but also find out what are the signs, how to help prevent it and most importantly how to act in case his or her patient actually goes through an anxiety attack. And of course, if it is too much, the caretaker can always call a specialist who will monitor the progression and medication of the patient.

Bedsores are very dangerous if not treated on time. The application gives advice and clear instructions on how to prevent and treat bedsores and in the case of severe bedsores a professional can be called.

Epileptic seizures can appear because of the electrical changes that happen at the brain's level after a vascular accident. There is a high chance that the patient may present ulterior convulsions as a result of cerebrovascular lesions (1),(5). It happens many times that the caretaker may not know how an epileptic episode manifests (considering that the patient is bound to bed, the symptoms are less visible than in a non CVA patient, the main difference being that the chaotic movement is not that active and obvious). Some may even confuse an epileptic episode with another vascular accident, which leads to delayed treatment and so on. This is why we propose that the application offers more information and support in this matter. The user is presented with the fact that the convalescent may have these types of episodes, how they will manifest, what types of seizures there are, how you can act in case it is a mild attack, what are the preceding symptoms for an epileptic seizure. But the user is also presented with the possibility of rapidly calling a specialist in case of a more serious and dangerous case.

Scenarios

We are considering that at the hospital release, the doctor recommends the patient's caretaker to use the app in order to better understand some of the disease's aspects, what problems may occur and how they can be managed. The user installs the application, goes through all the given information (how the anxiety attacks manifest, how an epileptic episode manifests and how to act, what types of pain may appear and how they can be ameliorated, etc.)

Case 1. The first thing that the user does is to draw up the disabled certificate file. The application gives him all the required information – he must obtain the documents: standard application, identity card, objective neurological report, copies of interpretation of imaging investigations: CT, MRI, etc .; Copies of hospital discharge tickets; standard medical letter, Copy of disability pension decision + copy of recent pension slip. At the same time, depending on the sector in which the patient resides, the application will also suggest the right address for the file's submission. After this the patient needs to be transported to the handicap evaluation commission. The caretaker/ relatives may also call through the application in order to arrange the patient's transport to the previously mentioned center in order to finalize the disability file. In the end, after obtaining the disability certificate, steps are taken in order to obtain the disability pension.

Case 2. The caretaker has gone through all the information presented in the application regarding some manifestations and treatments of some symptoms. The data has been clear and presented in both text and video format. We assume that the patient has an epileptic seizure. The caretaker knows how this seizure manifests, he remains calm and applies the maneuvers he learned earlier through the application. Being the first epileptic episode he will also call for a professional checkup.

Case 3. The patient has very strong pain in both paralyzed limbs. The patient's daughter applies the different types of massage suggested by the application but the pain persists and the patient becomes more agitated. The daughter chooses to consult a specialist available through the application. After talking and being presented with the situation, the consultant prescribes some sedatives that will be injected.

Conclusion

Even though nowadays people usually opt for taking care of their relatives and loved ones through professional institutions (nursing homes, care homes), there are still a lot of people that for various reasons (for example, especially in Romania, maybe a lot of people cannot even afford the choice of a nursing home on a financial level, or maybe they do not want to part with the patient leaving them little choice but to care for them themselves) they choose to take care of their parents, grandparents etc. from home.

Implementing the application would mean facilitating the care taking of the patient at home, both for preventing the occurrence of some complications but also for knowing how to act in different situations. The application is easy to use and offers information regarding more problems which can appear on a patient that went through a CVA and is now bedbound. Moreover, the application provides nonstop assistance, giving the caretaker the chance to ask for

professional advice in some cases. This leads to a safer and faster application of treatment to the patient and avoids swamping the ambulance department.

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Development of Maintenance Systems in Polish Enterprises in the Context of Industry 4.0

Edmund PAWLOWSKI

Poznan University of Technology, Faculty of Management Engineering, Poznan, Poland
Edmund.pawlowski@put.poznan.pl,

Abstract

One of the important subsystems of every industrial enterprise is the maintenance system. While the development of industry began as early as in the eighteenth century, significant changes in maintenance systems occurred only after World War II. New technical, organizational and informational concepts for maintaining the technical efficiency of machinery and equipment have appeared, known as Preventive Maintenance, Condition Based Maintenance, Total Productive Maintenance, Predictive Maintenance. The research aim of this article is to check to what extent the maintenance systems used in Polish enterprises are adapted to the conditions of Industry 4.0. The questionnaire survey conducted in 2020 in 100 industrial enterprises showed that the latest maintenance systems, i.e. TPM and Predictive Maintenance are known and partly used in 19% of the surveyed enterprises, but only in two enterprises are fully implemented and prepared to the conditions of Industry 4.0.

Keywords: Industry 4.0, Maintenance systems.

Introduction

The concept of Industry 4.0 was introduced in Germany only nine years ago and is already widely used not only in the scientific literature but also in industrial practice. The first scientific publication appeared in 2012, more than 100 in 2014, more than 1200 in 2017 (Krdzalic et al (2019)) and 3813 in 2019 (according to the Scopus database). In 2016 industrial sectors planned to commit US$907 bn. p.a. to Industry 4.0 – around 5% of revenue p.a. A major focus of these investments on digital technologies like sensors or connectivity devices and on software and applications like manufacturing execution systems (2016 Global Industry 4.0 Survey). In 2019 at the Faculty of Management Engineering of the Poznań University of Technology a long-term research project "Management in Industry 4.0 (No: 11/145/SBAD/2952)" was launched. The subjects of the research are:

1. Changes in company paradigms
2. Base and development technologies Enterprise 4.0
3. Reactivity of the Enterprise 4.0
4. Agile Systems
5. Management of processes and resources of Enterprise 4.0.

The aim of the research is:

1. Developing mechanisms of the paradigm shift in the enterprise
2. Development of management methods and tools in Industry 4.0
3. Development of the opportunity theory.

This article is a presentation of the past research results of maintenance systems in industrial enterprises in Poland in the context of Industry 4.

Research problem and research aim

Maintenance systems have changed under the influence of many factors including main changes caused by successive industrial revolutions. Comparison of industrial and maintenance system development trends leads to the following questions:

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1. Whether and how industrial development influenced changes in maintenance systems.
2. What are the current development trends in maintenance systems.

The asked questions have two scopes: global and local. Industrial revolutions had different characteristics in different parts of the world. The scope of this research, including empirical research, in particular, is limited to the situation of industrial development in Poland. The main objective of the research is as follows: to what extent the maintenance systems in Poland are adapted to the support of Industry 4.0 and what factors have a positive or negative impact on the development of these systems.

Literature Review

Industry 4.0 in the context of industrial revolutions

The scientific and technical revolutions and later the IT and social revolutions were an important context for four consecutive industrial revolutions. Industrial revolutions formed a logical sequence described in the literature under the names of Industry 1, 2, 3, 4. Steam machines and mechanical looms invented in the 18th century initiated the first industrial revolution (Industry 1.0). It is commonly called the Industrial Revolution, but it was not yet industry. It was dominated by the quantitative division of labour, typical of crafts and manufactures. Industrial forms of production based on the qualitative division of labour and specialization of workers appeared only in the second half of the 19th century. The second industrial revolution (Industry 2.0) was at the beginning of the twentieth century with production/assembly lines up to several kilometers long and annual production volumes in millions of units of the same product. The dominance of the effect of production scale and minimization of the unit cost was possible and typical for the manufacturer's market. As a result of the price reduction, the product was available to a large number of consumers and socially acceptable. However, the market would have been saturated quickly if it had not been for the First and Second World Wars. The shift of industry to war production and the war damage to the industrial infrastructure sustained the producer's market. The relative balance of demand and supply emerged only in the 1960s. Customer pressure to diversify products, shorten delivery times and customize service resulted in a new competitive situation in the market. The market was expanding, the global market appeared but at the same time, the tendency to customize products was growing. The answer to these market challenges was Industry 3.0 started in the 1970s and 1980s. New production systems, new marketing systems and new organizational systems supported by the development of electronics, telecommunications and information technology appeared. The aim of the development was increased customization with costs comparable to those of mass production. The production systems were developed in other forms of production automation and robotization, flexible production systems (FMS), computer-aided systems: product design (CAD), technology design (CAM) and their integration (CAD/CAM), production management systems (MRP) and integrated enterprise management systems (ERP, CIM). There was a revolution in organizational structures and enterprise management systems. A new trend emerged in the organizational structures of enterprises - the so-called external organizational architectures: network, virtual and fractal structures (Pawlowski (2009)). Enterprises were becoming open, the boundaries between the company and its environment were blurred. For the purposes of contract execution, one-time or repeatable cooperation networks are created in which external companies and individuals, communicating by means of modern IT means, are elements. The development of nanotechnology resulted in even faster development of IT and robotics. The above-discussed trends typical for Industry 3.0 are still valid today and some researchers believe that the present day is still the third level of the industrial revolution (Geissbauer et al (2016)). On the other hand, the year 2011 is conventionally assumed to be the beginning of Industry 4.0. The concept of Industry 4.0 refers to the combined application of previously known innovations in digital technologies such as robotics and artificial intelligence; sensors; cloud computing; the Internet of Things; data capture and analytics; digital fabrication; smart phones and mobile devices, and the embedding of all these elements in an interoperable global value chain, shared by many companies from many countries (Geissbauer et al (2016), Mrugalska et al (2020), Wyrwicka et al (2017)). Only two years ago, Industry 4.0 was considered the future, today it is a widely accepted reality that changes the way companies operate and affects almost every industry around the world (Jasiulewicz-Kaczmarek et al (2020), Krdzalic et al (2019). In 2015, PwC surveyed more than 2,000 companies from 26 countries in the industrial production sectors. Adoption of Industry 4.0 measured as the advanced level of digitization and integration in operations, supply chain and other activities was 32% of the surveyed companies. At that time it was expected that in 2020 this level will reach 72% of enterprises (2016 Global Industry 4.0 Survey).

Maintenance Development

Maintenance of machines and equipment is an integral part of any production system. The development of the industry entailed changes in maintenance systems but important innovations in maintenance appeared relatively

late, only in the 1950s. Until then, machines and equipment were repaired according to the principle: it's broken so repair it. This model is called Reactive or Corrective Maintenance. The logic of further development is shown in the literature in 3 or 4 phases. The three-level maintenance system development model includes (Jasiulewicz - Kaczmarek (2005), Legutko (2009), Moubray (1996), Piersiala and (2005)):

I. The period of reactive maintenance.
II. The period of preventive maintenance – planned and preventive repairs.
III. The period of predictive-proactive maintenance – preventive inspections, technical condition monitoring, the participation of the machine operators in the operation maintenance, RCM, TPM, 5S, operator's own inspections.
The four-level development model includes (Jasiulewicz-Kaczmarek (2020)): Reactive (Maintenance 1.0 – M1.0), Preventive (Maintenance 2.0 – M2.0), Condition based (Maintenance 3.0 – M3.0), Predictive and Prescriptive (Maintenance 4.0 – M4.0).

A comprehensive look at changes in maintenance systems leads to the separation of three aspects of development:

1. Approach to the way of failure prevention (a/ none b/ scheduled, c/ based on the diagnosis of the machine condition).

2. Maintenance organization (a/ specialized services to receive maintenance, b/ combined - maintenance and production services (machine operators).
3. The purpose of the maintenance system (a/ reliability of machines and equipment, b/ productivity of the entire production system).

Considering these three aspects, the following typology of Maintenance Systems can be proposed:

M1 – Corrective Maintenance - where repair tasks were initiated after a failure.

M2- Preventive Maintenance: where repair tasks are generated by anticipating the technical condition of machines and equipment. There are two varieties here:

M2.1. Planned Preventive Maintenance –where the dates and scope of maintenance and repair activities are planned in advance in the form of so-called repair cycles. The cycle (6, 9, 12 repairs) includes service, current repairs, medium repairs and overhauls. Each of these overhauls and repairs has an established range of activities and machine parts to be replaced.

M.2.2. Condition Based Maintenance –where the anticipation of the machine's condition and the necessary repairs is based on the examination of the machine parameters such as vibration, temperature, electrical parameters, etc.

3. M3 - Total Maintenance. There are two varieties of it:

M3.1. Total Preventive Maintenance – it is a comprehensive approach to maintenance assuming the use of all available preventive tools aimed at full maintenance of machinery and equipment efficiency, and the inclusion of production machine operators in the review and diagnosis processes.

M.3.2. Total Productive Maintenance- is a higher form of the previous system. The aim is not only to maintain the technical efficiency of the machines but to maximize the use of the production assets. In practice, this means that machines and equipment are not available for repair services during the period of their disposal for production (repair works are carried out e.g. on holidays). The efficiency and utilization indicators of O.E.E. (Overall Equipment Efficiency) machines and equipment are calculated and monitored on an ongoing basis. The machine used for production should run at all times, at maximum speed and without production shortages. It is necessary to make thorough use of preventive methods (PM) throughout the life cycle of machines and equipment. Implementation and maintenance of the system is carried out simultaneously by many different organizational units of the company (production preparation, production units, and technical service - repair). The system requires the involvement of all employees, from the chief executive to the machine operators in the production system (Nakajima (1988), Pawlowski et al (2005)).

M4. Predictive Maintenance –a system dedicated to Industry 4.0. This model uses the latest Condition Based Maintenance tools to take preventive action in the event of machine or process performance deterioration in order to prevent failures. The development is directed towards intelligent machines and robots that are equipped with a

network of sensors and relays that communicate with each other and with the service. By using Big Data Analytics and the Industrial Internet of Things (IIoT) it is possible to remotely control machine parameters and outsource maintenance over long distances (Kans M. and Galar (2016)).

The models of maintenance systems presented above are still used today. Their applications can vary from country to country, in different industrial sectors. The analysis of the subject literature on the applications of maintenance systems in Poland shows that the research are mainly case studies for individual companies. Such studies concerned in particular: TPM system implementations (Duplaga and Stadnicka (2009), Switek (2017)), applications of OEE efficiency measurement systems (Drozyner and Jasiulewicz-Kaczmarek (2017), Krason (2016), Wirkus and Kufel (2014)), applications of PAMCO efficiency measurement system (Ingaldi (2016), Kardas E (2012), Borkowski (2011)). The question is still open about the state of implementation of modern methods of maintenance on the scale of the whole Poland, and what is the degree of modernity of these systems in the context of industry 4.0.

The Research

Methodology

In search of answers to the previously asked questions, a questionnaire survey was conducted in January 2020. The research covered 100 industrial companies (including 40 large companies and 60 medium-sized companies). Small companies were not included in the research because pilot studies showed a lack of knowledge and a marginal level of application of modern maintenance systems in these companies. The surveyed companies are located in 16 regions of Poland and cover 19 industrial sectors such as food, chemical, pharmaceutical, furniture, machinery and equipment manufacturing, automotive, electrical and electronic industries. The respondents were middle and senior managers managing engineering and production. Respondents answered questions on a scale of 1-5 (Likert), and a scale of 0-1. The data collected was processed using the Sperman's rank correlation test. Statistica 13.1 software was used to perform statistical calculations. The analysis of Sperman's ranks was performed with the assumption of significance level $p<0.05000$.

The questionnaire consisted of 9 blocks of questions:

B1. Identification of company size and industrial sector
B2. Changes in the macroenvironment and their impact on business
B3. Changes in industrial manufacturing paradigms
B4. Changes in manufacturing technology
B5. ICT (Information and Communication Technologies) Changes
B6. Changes in the human capital
B7. Changes in the Maintenance Systems
B8. Agility - using opportunity analysis
B9. Company's metric (company age, turnover).
Essential questions about the applied maintenance systems are contained in block 7. Block consists of 5 questions:

Q13. What maintenance systems are used in your company?

1. Corrective Maintenance
2. Planned Preventive Maintenance
3. Total Preventive Maintenance
4. Total Productive Maintenance
5. Predictive Maintenance

Q14. Which part of the machines is being overhauled according to the Planned Preventive Maintenance system?
1. All of them (100%)
2. Almost all of them (75%)
3. Half of them (50%)
4. Only some, less important (25%)

Q15. Which part of the machines is being overhauled according to the Total Preventive Maintenance system? (answers on the same scale as question 14).

Q16. Which part of the machines is being overhauled according to the Total Productive Maintenance system? (answers on the same scale as question 14).
Q17. Which part of the machines is being overhauled according to the Predictive Maintenance system? (answers on the same scale as question 14).
The answers to these questions will indicate the scope of application of individual maintenance systems. The second part of the analysis was a search for correlation of questions Q13 - Q17 with questions of other question blocks.

The Results

The scope of application of individual maintenance systems is shown in Diagram 1. Most companies use several systems in parallel. The high level of application of Reactive Maintenance (more than 50 % of the companies surveyed, both medium-sized and large) is surprising. The most frequently used system is Planned Preventive Maintenance (77 % of large companies and 62 % of medium-sized companies). Total Preventive Maintenance is used by 66% of large companies and 54% of medium-sized companies. Modern systems are used twice as often by large companies as by medium-sized companies (Total Productive Maintenance - 46% large companies and 26% medium-sized companies, and Predictive Maintenance - 29% large and 14% medium-sized companies). In summary, more than half of the companies still use the archaic Reactive Maintenance system but at the same time, almost half of the large companies use the modern Total Productive Maintenance system. The latest digital technology-based systems, Predictive Maintenance, are already known and used in approximately 30 % of large companies.

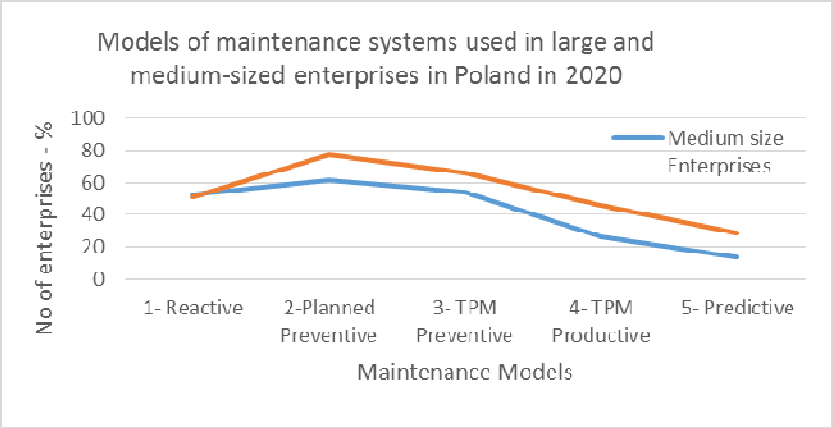

Fig. 1: Models of maintenance systems used in Large and Medium Sized enterprises in Poland in 2020

When analyzing correlations between the use of maintenance systems and other aspects of the development of Industry 4.0, we selected those relationships where the Sperman correlation index showed statistically significant values, i.e. $r_s > 0.20$. Correlation relationships were recorded in five areas:

1. Changes in macro-environment and maintenance systems (Table 1).

a/ A positive relationship between the benefits of changes for business in the political and legal sphere and the application of modern maintenance models. The more beneficial conditions the more applications – Total Productive M. (r_s= 0,25) and Predictive M. (r_s =0,32)
b/ A positive relationship between the benefits of business changes in the economic sphere and the application of Total Preventive M. The more beneficial economic conditions the more machines overhauled in this system (r_s =0,33)
c/ A positive relationship between the advantages of social change for business and the use of Predictive M. The more beneficial conditions the more often Predictive Maintenance is used. (r_s =0,30)

Table 1: Changes in macro environment (1 – Negative; 5 - Positive) versus Maintenance Systems

	Political and Legal Changes	Changes in the Economic Sphere	Changes in the Social Sphere
Implementation of TPM - Productive System	r_s= 0,25		
Implementation of Predictive System	r_s= 0,32		r_s= 0,30
Increased number of machines repaired in TPM - Preventive System		r_s= 0,33	

2. Implementation of modern management methods and concepts vs. Maintenance systems (Table 2.)

a/ Continuous Improvement. The implementation level correlated positively with the use of models - Total Preventive M. (r_s = 0.27) and the use of the Predictive Maintenance model (r_s = 0,26)
b/ Empowerment. Negatively correlated with the Reactive M model. (r_s = -0,38). The higher the level of implementation of this method the lower the application of the Reactive M model. The method positively correlated with the Total Productive M model. (r_s = 0,22)

c/ Just in Time. Positively correlated with the Predictive M model. (r_s = 0,27)
d/ Outsourcing. Positively correlated with the Predictive M model. (r_s = 0,26)
e/ Supply Chain Management. Positively correlated with Predictive M. (r_s = 0,24), however, it is also positively correlated with the number of machines serviced in the Total Preventive M. model. (r_s = 0,44)
f/ Learning Culture. Negatively correlated with the Reactive M model. (r_s = -0,21). Positively correlated with the Total Preventive M model. (r_s = 0,36) and using the Predictive M. model. (r_s = 0,22). Positively correlated with the increase in the number of machines serviced according to the Total Preventive M. model. (r_s = 0,43), Total Productive M. (r_s = 0,52) and according to the Predictive M. model. (r_s = 0,52).

Table 2: Implementation of management methods (1 - None, 5 - Full implementation) versus Maintenance Systems

	Continuous improvement	**Empowerment**	**Just in Time**	**Outsourcing**	**Supply Chain Mgmt.**	**Learning Culture**
Implementation of Reactive System	r_s= 0,27	r_s= -0,38				r_s= -0,21
Implementation of Planned Preventive System						r_s= 0,36
Implementation of TPM - Preventive System						
Implementation of TPM - Productive System		r_s= 0,22				
Implementation of Predictive System	r_s= 0,26		r_s= 0,27	r_s= 0,26	r_s= 0,24	r_s= 0,22
Increased number of machines repaired in TPM - Preventive System					r_s= 0,44	r_s= 0,43

Increased number of machines repaired in TPM - Productive System						r_s= 0,52
Increased number of machines repaired in Predictive System						r_s= 0,52

3. Types of machines used in the company and Maintenance (Table 3)
a/ Single-purpose machines (non-universal). Their use is positively correlated with the Reactive M model. (r_s = 0.23) and the Predictive M. model (r_s = 0,20).
b/ Universal, traditional machines. Their use is positively correlated with the Reactive M. model (r_s = 0.34) and Total Productive M. (r_s = 0,21).
c/ Numerically or computer-controlled machines. Their application positively correlated with the Planned Preventive M model. (r_s = 0,44)
d/ Manipulators. Positively correlated with the Predictive M. model (r_s = 0,25)
e/ Robots. No correlation at a statistically significant level

Table 3: Types of machines used in the enterprise versus Maintenance Systems

	Single-purpose machines	**Universal machines**	**CNC machines**	**Manipulators**	**Robots**
Implementation of Reactive System	r_s= 0,23	r_s= 0,34			
Implementation of Planned Preventive System			r_s= 0,44		
Implementation of TPM - Preventive System					
Implementation of TPM - Productive System		r_s= 0,21			
Implementation of Predictive System	r_s= 0,20			r_s= 0,25	
Increased number of machines repaired in TPM - Preventive System					
Increased number of machines repaired in TPM - Productive System					
Increased number of machines repaired in Predictive System					

4. Level of production automation and Maintenance (Table 4)
a/ Positively correlated with the Total Preventive M. model (r_s = 0,28) and with the Predictive M. model (r_s = 0,31)

Table 4: Level of production automation (1 – None, 5 - Full) versus Maintenance Systems

	Level of production automation
Implementation of Reactive System	
Implementation of Planned Preventive System	
Implementation of TPM - Preventive System	r_s= 0,28
Implementation of TPM - Productive System	
Implementation of Predictive System	r_s= 0,31

5. The extent to which the executive competencies of employees are important for the development of the company and Maintenance (Table 5).
a/ Narrow specialization of employees positively correlated with the use of Total Preventive M. model (r_s = 0.26), Total Productive M. (r_s = 0.20) and with the Predictive M. model (r_s = 0,30)
b/ Openness to changes in the way and place of work positively correlated with the use of Total Preventive M. model (r_s = 0.24), and Total Productive M. (r_s = 0.20)

Table 5: The degree to which executive competences of employees are important for the development of the company versus Maintenance Systems

	Narrow employee specialization	**Openness to changes in the way and place of work**
Implementation of Reactive System		
Implementation of Planned Preventive System		
Implementation of TPM - Preventive System	r_s= 0,26	r_s= 0,24
Implementation of TPM - Productive System	r_s= 0,20	
Implementation of Predictive System	r_s= 0,30	r_s= 0,20
Increased number of machines repaired in TPM - Preventive System		
Increased number of machines repaired in TPM - Productive System		
Increased number of machines repaired in Predictive System		

The latest systems based on digital technology - Predictive Maintenance - are already known and used in approx. 30% of large companies and 14% of medium-sized companies, which is 19% for the entire group of companies surveyed. Of these 19 companies, however, only two used Predictive M. and Total Productive M. in parallel. The remaining 17 companies also used other systems to varying degrees of which as many as 9 companies used Reactive Maintenance

Discussion and Conclusions

Maintenance systems dedicated to Industry 4.0 are mainly Predictive Maintenance supported by Total Productive Maintenance. A questionnaire survey conducted in Poland on a sample of 100 companies showed that 19 % of the companies are familiar with and use Predictive Maintenance but only two companies use this system together with Total Productive Maintenance as the only methodological basis for maintenance. The other 17 companies use different systems in parallel of which as many as 9 of these 17 companies use the most primitive Reactive Maintenance system. The priorities of the importance and production reliability of machines and equipment as well as economic considerations make it necessary to differentiate maintenance system applications. However, in the development of Industry 4.0, application trends for old systems are marginal. This means that the level of

adjustment of maintenance systems to the conditions of Industry 4.0 in Poland is very low. Similar conclusions can be found in the research of Trzcielinski (2020). The level of knowledge of modern maintenance systems is noticeable but the level of application is still at the initial stage of development. By analyzing the correlations between the use of Predictive Maintenance and Total Productive Maintenance systems and other context variables, it is possible to point out the following:

- positive correlations with changes in the political, legal and social macroenvironment,
- positive correlations with the implementation of modern management methods and techniques (Continuous improvement, Empowerment, Just in Time, Outsourcing, Supply Chain Management, Learning Culture),
- positive correlations with the types of machines and equipment used in the company (Single-purpose machines, Universal machines, Manipulators)
- positive correlations with narrow employee specialization,
- positive correlations with the level of production automation,

This research has its limitations. The most important are acceptable but low correlation levels. The research was carried out at one point in the time and needs to be repeated in the following years to establish trends in change. It also seems reasonable to carry out the research in a Case Study mode for selected companies qualified to Pioneer 4.0 and Industry 4.0.

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Design and Development of An Automatic Wiping Board System

NUȚĂ Andrei-Bogdan

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, andrei.bogdan12@gmail.com

ULMEANU Mihaela-Elena

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CE Building, District 6, Bucharest, Romania, mihaela.ulmeanu@upb.ro

DOICIN Cristian-Vasile

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, cristian.doicin@upb.ro

Abstract

This research is mainly addressed to educational institutions of any level, whether it is a gymnasium, high school or a higher education institution, and it aims to modernize the current and future learning environment by offering an easily implementable solution for wiping board systems. The current research paper proposes a project which focuses on improving the quality of the classes and presentations through offering additional value and designing a more convenient learning environment for both students and teachers. The proposed concept product has been designed to be reproduced in any circumstance by a person or a team that has background knowledge in mechanics, mechatronics, additive technologies and electronics. This system was built based on the analysis of several criteria such as: ease of maintenance, appearance attractiveness, functionality of the writing/ wiping surface. Three main requirements of the wiping surface were to facilitate the board to be watered and to ease the movements along it, and to allow remote control. The criteria were included in a questionnaire which targeted at relevant respondents in order to collect data, to receive feedback and to analyse the competitive products. The products' components were selected from the market in order to have the most diversified functions and to meet various needs such as internet connection or the possibility of moving or changing the writing instrument. Based on these functions, multiple sets of tables have been prepared to analyse the factors that have the greatest impact; two relevant analyses are represented by Quality function deployment and conceptual analysis. These analyses ensured the development of an optimal product concept which can be effectively used both as a stand-alone product and as a learning environment for students as it represents an example of mechatronics, electronics and additive technologies.

Keywords: Automatic Wiping Board, Conceptual Design, Learning Objectives, Learning Environment.

Introduction

Nowadays making products that improve teaching is not an easy task. The audience is more and more connected to virtual life through their personal devices. In order to capture their attention, new systems must be developed which can ensure added value for potential customers. According to OECD (2018), future-ready students will need both broad and specialised knowledge, competence acquisition involving the mobilisation of knowledge, skills, attitudes and values to meet complex demands. Recent studies done by Bushweller K. (2020) show that more interest is being shown in highly technological learning environments and the audience develops faster an analytical thinking in this environment rather than in a classical one. From this perspective, even a small technological improvement brings added value in the teaching process. The institutions which still practice the classic and traditional type of teaching are in a race for technological improvements, especially in the current socio-economical context. Amongst some of the most used tools in classrooms are the communication boards, be they traditional chalkboards, flip charts or even smart boards. There is a significant progress from the traditional chalk boards in the market to marker boards which are equipped with various supports to put the accessories of the board, mobile boards or even boards that can connect

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to the internet or can project various images and videos. Given the above, the current proposal is to introduce a system of automatic wiping of the boards; the system can be of various types, whether classic or with a marker. This system has an easily understandable operating principle which can be applied anywhere, it has low costs of construction, installation and maintenance and it can be customised. The proposed project is reproducible, and it can be used both as a tool and as an educational model. Students can study this project which can enable them to learn the principles of mechanical and electronic operation. This methodology of a smart board system can transform a classic board into a board with the function of automatic erasure with or without remote control. The knowledge needed to advance the understanding of the project and its development spans not only a broad and diverse range of disciplines, but also various fields such as mechanics, mechatronics, electronics, assembly techniques, additive technologies - 3D printing, design and simulation in various 3D software, programming (IT) and economics.

In this context, the current research focuses on delivering a product concept with the main objective of achieving a universal system for improving the quality of teaching. In terms of efficiency and simplification of the working model, these improvements will design a more convenient teaching process due to the fact it does not require any manual wiping of boards. The product design and development of automatic wiping board system was developed and implemented as a project within the POLITEHNICA University of Bucharest, Romania and it aims to be distributed nationally mainly in rural and disadvantaged areas where such a solution would bring more technologies in the classrooms and would significantly improve the quality of teaching. The main contributions of the authors to the current state of knowledge can be summarised, as follows: deployment of a comprehensive benchmarking analysis for the construction of technical specifications for automatic wiping board systems; development of a metrics – requirements matrix for an automatic wiping board system; function definition and Quality Function Deployment (QFD); Theory of the Resolution of Invention-Related tasks (TRIZ) method and Analytical Hierarchy Process (AHP) implementation for an innovative concept; detailed design concept presentation for an automatic wiping board system.

Study background and Methods

Concept development started with the definition and establishment of a specifications set which derived from an in-depth analysis. The main approach of the project was initially to establish the set of needs that this system is supposed to solve after its implementation. The most important advantage of the system is related with the need to have a proper hygiene. This issue affects both teachers and students after they manually wipe a board. Regardless of the writing instrument, the hands remain dirty and this is a completely unhygienic effect that must be eliminated, especially in the current socio-economic context of the COVID-19 outbreak. Another important need consists in the qualitative importance that is brought by a pleasant appearance of the board. This avoids the impression of a clogged environment and it eliminates the risk of having dirty and incorrectly erased boards which leads to the certainty that the information written on the board is readable.

Considering the Romanian educational system, one hour of class lasts 60 minutes, of which 50 minutes of teaching and 10 minutes of break. Based on this, it can be easily noticed the need to use the time as efficiently as possible whether it is learning time or break. By a correct programming, a short wiping time can be obtained, which will make the duration of 60 minutes to reach the full potential.

The system also addresses the need to keep students' attention. Usually, while a speaker or teacher wipes the board, the audience tends to be distracted by various disruptive factors for a few minutes. Therefore, while the system performs its own pre-set function, the teacher can continue to talk to the students and maintain their attention. Finally, everyone needs comfort and technology. Today's students are extremely connected to technology. A system that needs only a simple command to perform a boring and disliked function will be extremely well embraced as it proves its usefulness and promote interactive learning environments.

The basic assumption is that technological tools will become increasingly significant and much more complex in the following period. The fact that educational institutions do have the opportunity and the freedom to support a good teaching environment is encouraging. As institutions design their own operating models, they manage to move towards more technological approaches. This scenario emphasizes the importance to develop this kind of technological system meant to become a tool which supports complex and interactive learning within a dynamic environment.

Figure 1 highlights the elements that enter the designed system, the content of the system and what it obtains after its implementation. The inputs are set as: necessary materials, type of sheet already existing or to be mounted, the documentation that had to be followed to assemble the system and of course the analysis of current space and cost limitations. The system itself is very simple, it only fulfils the function of automatic erasing plus its accessories that

can vary depending on the desire to implement (eg. remote control, sponge, writing tools holders etc.). The benefits of using the automatic wiping board are considered the system outputs.

Based on the IN-OUT diagram several product design and development tools were selected and used in order to obtain the optimum concept for an automatic wiping board system. Ulrich K.T. and Eppinger S.D. (2012) discuss in their research the advantages of using the specifications table, the metrics – requirements matrix and the function hierarchisation within the first stages of product development. Quality Function Deployment (QFD), the Theory of the Resolution of Invention-Related tasks (TRIZ) and the Analytical Hierarchy Process (AHP) were also used to analyse a variety of features within the optimum concept that was developed.

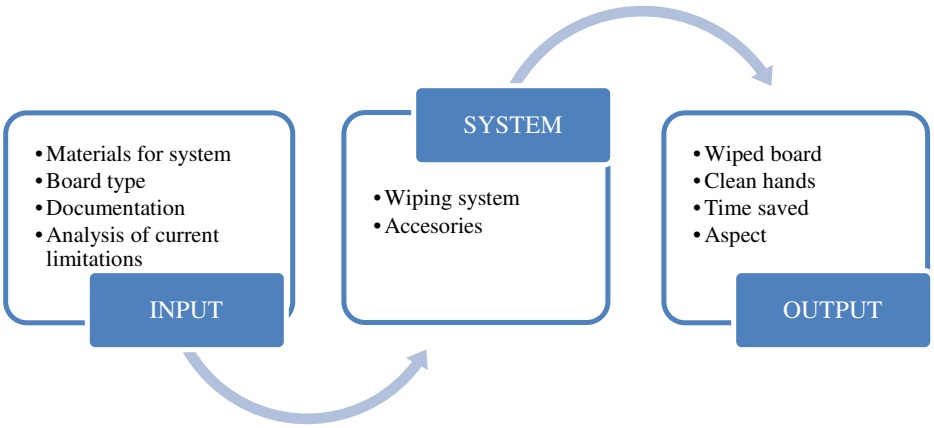

Fig. 1: IN-OUT Diagram for an automatic wiping board system

Results and Discussions

Several competitor products were analysed to fundament the development process. Benchmarking revealed that most of them had similar added value and functions. The first product analysed was the "Optima chalk school board", hereinafter referred to as Board 1. This is a simple board, with a very widespread model in educational institutions and on which the proposed automatic wiping system can be mounted, having as the only change the removal of the current accessory holder. Next, the "Accenta magnetic board" was analysed, hereinafter referred to as Board 2. This is a board which uses a marker as a writing tool. The next product analysed is the "Multifunctional Magnetoplan board", hereinafter referred to as Board 3. This is also a board with marker, which is mounted on a support and has as a special feature the possibility of movement. It does not fit on the list of boards compatible with the automatic wiping system but brings into question a new function, that of movement. The fourth and last product analysed was the "Smart Board interactive whiteboard", hereinafter referred to as Board 4. This is the most complex system on the market, which consists of several components each with different functions, that complement each other in a complete learning environment. In addition to the writing function, this board also performs a variety of functions such as active video projector. More precisely, it allows projection of images and enables direct writing on top of them. It has a sound system that allows active learning and can connect to the internet via *wifi* or cable connection and other devices such as laptop or mobile to share images and videos. Among all these added technologies, there is no automatic wiping function, so to wipe what we have drawn or written on the board we must use a magnetic sponge in the classic way. The system proposed in the current research can also be adapted for such a smart board.

Data collected for each product was summarised in Table 1, where the technical specifications of the component products are presented. The columns of the table correspond to the identified competitive products and the rows represent the main technical specifications (metrics). The values of the metrics are inserted down the column of each competitive product. Measuring units are also specified for each metric. These metrics will continue to be used to design and manufacture the product concept. Metrics that are directly related to customer needs are the most important. The metrics were chosen based on the capabilities identified following the analysis of competitive products and the possibility of implementing the automatic erasure system was considered. Ideally, one requirement is expressed through one metric. This is not always valid. For example, "the board should be easy to wipe", which can be primarily interpreted with the type of surface of the board, like glass. But serious consideration should be given to the technical characteristics of the glass sheet, namely: sensitive to impact; upon breakage the maintenance is very expensive and requires skilled operators. Thus, to highlight this feature the following metrics were used: "Dimensions", "Writing tool", "Colour", "Wiping tool", "Special treatments". Usually, metrics are measured using

conventional units such as kilogram, second, millimetres, etc. If metrics cannot be evaluated based on those, the values can be expressed with decisions like yes/no or pass/no pass.

Table 1: Technical specifications for an automatic wiping board system

Nr.	Metrics	Units	Competing products			
			Board 1	Board 2	Board 3	Board 4
1	Dimensions	[cm]	100x200	120x180	90x120	169.20 x 128.40
2	Writing tool	Class	Chalk	Marker	Marker	Special tools
3	Colour	Colour	Black	White	White	White
4	Wiping tool	Class	Sponge	Sponge	Sponge	Special tools
5	Mobility	Yes/No	No	No	Yes	Yes
6	Accessories	No. of accessories	No	No	1	4-6
7	Manual	Yes/No	No	No	No	Yes
8	Special treatments	No. of treatments	No	No	No	2
9	Guarantee	Years	1	1	1	3
10	Thickness	[cm]	1.7	1.7	1.7	2
11	Price	Eur	70	80	85	600
12	Touchscreen	No. of fingers	No	No	No	2/4/6/10
13	Text Speech	Languages	No	No	No	English, French, German
14	Connection interface	No. of connections	No	No	No	5
15	Certifications	Type	No	No	No	EMC Directive 2004, CE, FCC, RoHS, ISO 9001, ISO 14001
16	Table surface	Material	Plastic	Plastic	Plastic	Ceramic-steel (E3) / Pre-painted Steel
17	Material	Type	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
18	Aspect	Type	Normal	Normal	Normal	Modern

An important stage of product design and development process is the determination of the specification's objective of the product for which the market success is possible. The concept design of the products is made based on these metrics that are determined based on the specifications of the competing products.

A correspondence between each primary requirement and the measurable metrics was performed to determine the specifications' scope. A simple requirements-metrics matrix was constructed by adding on the column, the metrics and for the rows, the requirements. The matrix is presented in Table 2 and it simplifies the identification of the values and of primary requirements they characterize.

Table 2: Metrics – Requirements Matrix for an automatic wiping board system

Requirements		Metrics																	
		Dimensions	Writing tool	Colour	Wiping tool	Mobility	Accessories	Manual	Special treatments	Guarantee	Thickness	Price	Touchscreen	Text Speech	Connection interface	Certifications	Table surface	Material	Aspect
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Wipe board efficiently		●		●		●		●								●	●	
2	It can be used by both students and teachers	●				●		●					●	●					
3	To be able to mount any type of sponge	●			●		●	●			●							●	
4	The system does not allow to damage people					●		●					●		●				
5	The system can be remote controlled						●							●					
6	The system does not allow people to be in contact with electrical components							●							●				
7	The system can be used for a long time								●	●						●		●	●
8	The system is made of durable materials									●		●						●	
9	The system resist to mechanical action					●			●										
10	The system need to look good			●			●											●	●
11	The system is colored			●															●
12	The system is silent in operation					●												●	
13	The system can be mount on all types of boards	●										●							
14	The system is an electrical product					●	●						●	●					

Based on these metrics and characteristics, a questionnaire was conducted which was addressed to 100 people, students and teachers at University POLITEHNICA of Bucharest (UPB). Results were analysed and interpreted, and Table 3 was put together for the identification of the most important product functions. Next, the weaknesses and strengths of the proposed concepts were identified using QFD. According to Nadiye O.E. and Omid A. (2018) QFD is a method created in Japan beginning in 1966 to help transform the customer needs into engineering characteristics for a product. Akao Y. (1994), the original developer of the method, described QFD as a "method to transform qualitative user demands into quantitative parameters, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process". He used his work in quality assurance and quality control points with function deployment for value engineering.

Table 3: Functions and effects

No.	Function name	Possible effects
F1	Allow the board to be wet	Damage to electrical parts
F2	To allow movement along the board	Collisions
F3	Instructions for maintenance and use	Misunderstanding the instructions
F4	Allow adjustment of pressing force on the board	Breaking components
F5	To indicate when force must be increased	Increase force too much
F6	Allow remote control	Hacking
F7	Has aesthetics appearance/ Industrial Design	Rising the price
F9	Allow the device to be used for predeterminate duration	Use in excess
F10	Allows easy maintenance	Improper maintenance

Based on the ten key functions previously identified, a QFD matrix (Figure 2) was deployed by the authors to identify weaknesses and strengths of the proposed concept.

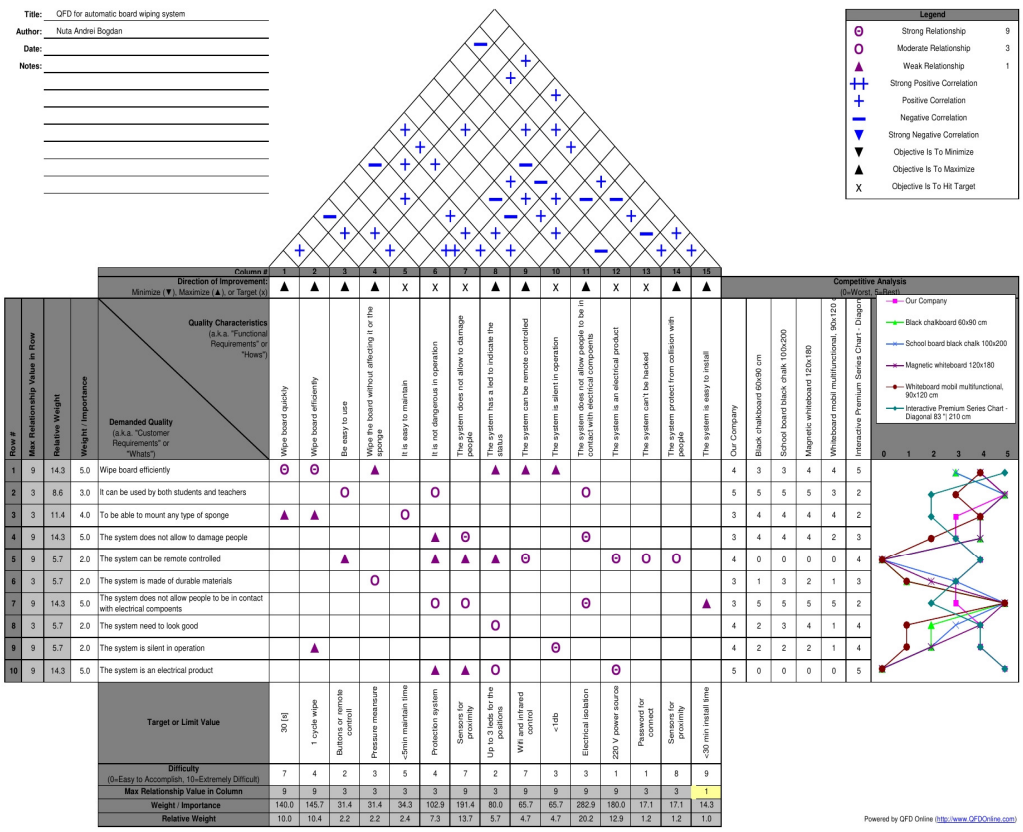

Fig. 2 : Quality function deployment (QFD) for an automatic wiping board system

One of the main identified issues was the decrease in thickness of the classic sheets to obtain a set of advantages, including weight reduction and easier handling, plus the fact that a smaller amount of material used brings after itself and a lower cost and an advantage for the environment. The following question was considered: “How could the thickness of the board be reduced safely, while maintaining optimum functionality?” Of course, this change also had negative effects such as a decrease in pressure resistance and durability. To solve this problem the TRIZ method was implemented further. According with Gadd K. (2011) TRIZ or the "theory of the resolution of invention-related tasks" is "a problem-solving, analysis and forecasting tool derived from the study of patterns of invention in the global patent literature". It was developed by the Soviet inventor and science-fiction author Altshuller G. (1999) and his colleagues, beginning in 1946. More specifically, a list of 39 parameters was used for solving the problems. Three main parameters were assigned to solve the considered problem in designing the automatic wiping board system (Figure 3).

List of 39 parameters

Weight of moving object	Power
Weight of stationary object	Loss of Energy
Length of moving object	Loss of substance
Length of stationary object	Loss of Information
Area of moving object	Loss of Time
Area of stationary object	Quantity of substance/the matter
Volume of moving object	Reliability
Volume of stationary object	Measurement accuracy
Speed	Manufacturing precision
Force (Intensity)	Object-affected harmful factors
Stress or pressure	Object-generated harmful factors
Shape	Ease of manufacture
Stability of the object's composition	Ease of operation
Strength	Ease of repair
Duration of action of moving object	Adaptability or versatility
Duration of action by stationary object	Device complexity
Temperature	Difficulty of detecting and measuring
Illumination intensity	Extent of automation
Use of energy by moving object	Productivity
Use of energy by stationary object	

Fig. 3 : List of 39 TRIZ parameters an automatic wiping board system

Given that in the proposed concept the board is a stationary object and the aim is to decrease the thickness on the entire surface, the first chosen parameter was "Length of stationary object" followed by the two effects and their parameters, "Stress or pressure" and "Strength". Based on the matrix of contradictions, the relevant principles for solving the problem were obtained (Figure 4).

So as it can be observed in Figure 4, the relevant principles are: 14 - Spheroidicity, Curvilinearity (it is the first because it is present twice), 1 - Segmentation, 15 - Dynamicity, Optimization, 26 - Copying, 28 - Replacement of a mechanical system with 'fields' and 35 - Transformation of the physical and chemical states of an object, parameter change, changing properties.

Following the analysis and identification of the solutions, the following were chosen as relevant principles 14 - Spheroidicity, Curvilinearity and 1 - Segmentation. Principle 14 proposes the addition of a radius on the surface of the sheet, which increased the resistance to pressure and shock, and the second principle proposes the segmentation of the sheet into several components. The principles can also be combined. This, the idea of segmentation and the addition of sphericity on each segmented surface is considered for analysis. Other solutions proposed under the analysis and other relevant principles are: fixing the board to several support points; change material or add reinforcements to gain better resistance; change usage parameters, such as writing or deleting tools; clean the board with a liquid to reduce friction and pressure. This is how all the problems that arose during the development process were solved.

The following step in the development process involved the design of 4 system concepts, each with its own characteristics. The four concepts were analysed by method Analytic Hierarchy Process (AHP) as per the methodology described by Joyce A. (1989) (Table 4).

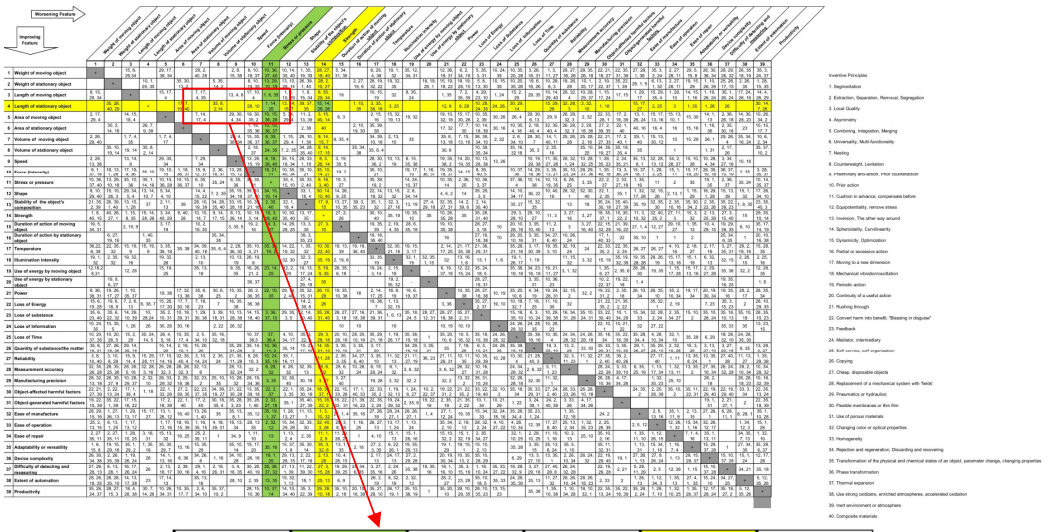

17, 10, 4	1, 8, 35	1, 8, 10, 29	1, 8, 15, 34	8, 35, 29, 34	19
28, 10	1, 14, 35	13, 14, 15, 7	39, 37, 35	15, 14, 28, 26	6, 3
19, 30, 35, 2	10, 15, 36, 28	5, 34, 29, 4	11, 2, 13, 39	3, 15, 40, 14	

Fig. 4: Contradictions matrix & relevant principles applied for an automatic wiping board system

Table 4: AHP Decision table

Decision criterion	Weight	Concept C1	Concept C2	Concept C3	Concept C4
Simplicity of operation	0.210	0.231	0.231	0.231	0.307
Ease of use	0.073	0.250	0.125	0.375	0.250
Reliability	0.210	0.333	0.222	0.222	0.222
Design and ergonomics	0.127	0.182	0.182	0.273	0.363
Universality	0.031	0.250	0.250	0.250	0.250
Ease of manufacturing	0.128	0.250	0.167	0.167	0.167
Cost	0.220	0.250	0.250	0.350	0.200
Total		0.254	0.210	0.244	0.230

According with Saaty, T.L., Vargas, L.G. (1991) the analytic hierarchy process (AHP) is an arranged technique for organizing and analysing complex decisions, based on two basic disciplines mathematics and psychology. It was developed by Thomas L. Saaty in the 1970s who partnered with Ernest Forman to develop Expert Choice in 1983 and has been extensively studied and refined since then. It represents a safe approach to decision making.

Following the AHP analysis the highest output was obtained by concept 1, hereinafter referred to as concept C1. This concept proposes as a solution for the automatic wiping of the board, a single sponge, placed longitudinally on the board, to execute one or more left-right movements. This solution was chosen as optimum, as it can be mounted on any type and size of board sheet only by adapting the dimensions of the sponge supports. The system also contains a sponge pressure sensor to indicate if the pressure is too high/ low, thus, the risk of damage to the elements can be avoided. In addition, there is a proximity sensor, which senses if someone or something is in the path of the sponge and stops it to avoid collisions and subsequent injuries to people.

All these elements are embedded in subsystems to perform their functions, as it can be seen in Figure 4. The presented detailed design concept was modelled assembled using Solid Works, in order to test the functionality and fit of all components, previous to a physical prototype. Component 2 represents the main board, the central element of the

system. This concept contains a single motor mounted at the bottom so that the long shaft 1 ensures the transmission of the rotation in the upper gears as well. Components 3, 4, 6, 7, 13 and 15 are the fixed elements of the system, which support the other smaller elements. Parts 8, 11, 12 are supports and guides for the sponge and the sponge long shaft. Some of these elements are designed to be in motion during operation. Components 5, 9, 10, 14 are mobile elements that ensure the transmission of motion and the transformation of rotational motion into translational motion.

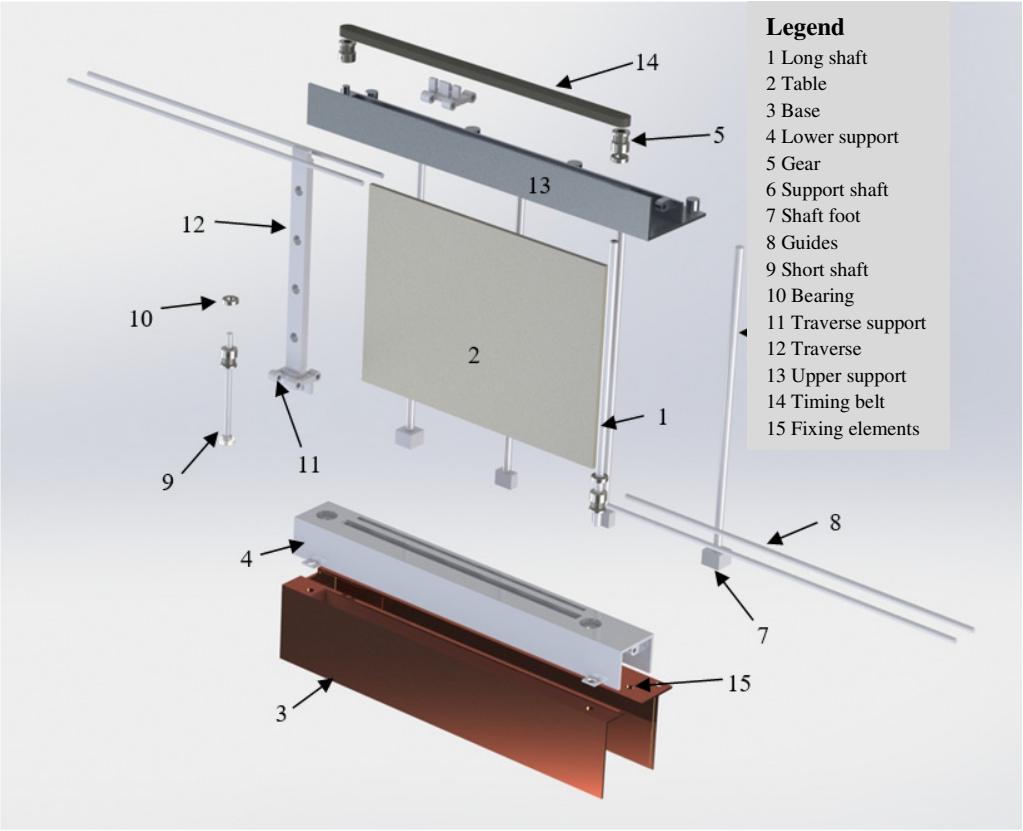

Fig. 4: Detailed Design Concept for an automatic wiping board system

Conclusions

Current research includes the design and development of an automatic wiping erasing system in a product that can be used on its own or as a learning environment for students. A variety of methods have been used to help think and develop the proposed system. The methods involve a thorough benchmarking analysis, namely several boards and intelligent boards systems for schools. Their functions, their applications and the improvement mode were analysed by adding the automatic wiping function. Following these analyses, it was also noticed that not even the most performant current boards have such an automatic wiping function implemented. Thus, the ability to introduce a function that solves the problems of comfort, hygiene and attention of students would potentially increase the quality of the learning environment, the desire of the beneficiaries either pupils or students to get involved in the learning process. In this regard, a list was elaborated with the main functions that the new system should fulfil in order to address the consumers' needs. The ten identified functions were analysed using the QFD, TRIZ and AHP methods. The optimum developed concept - C1, was the one which fulfilled the identified functions, by using a single sponge and performing translational movements along the board, having integrated safety elements. The design of this concept has been detailed using 3D design software programs to highlight the elements need for each function. Future developments of include analyses to add more universal functions, increasing the reproducibility of both mechanical and software subsystems. Authors also considered the development of a mobile or computer application with which the system can be accessed remotely and through which the product could perform, for example, a general deletion of the available board.

Acknowledgment

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Model to Evaluate Customer Satisfaction During the Product Life Cycle

Ioana Alina MITRACHE
University POLITEHNICA Bucharest, Romania
mitrache_ioana@yahoo.com

Irina SEVERIN
University POLITEHNICA Bucharest, Romania
irina.severin@upb.ro

Elena LASCU
University POLITEHNICA Bucharest, Romania
elena_lascu91@yahoo.com

Florin STINGA
University POLITEHNICA Bucharest, Romania
florin.stinga20@gmail.com

Abstract

According to the market evolution, the biggest companies express the desire to create quality through satisfaction, while building a management of a real customer culture that use customer satisfaction inside the business model.
The case study presents how the customer satisfaction level influences the developing of a new product through his life cycle, in an Automotive Company proposing a model of evaluation. The purpose of the article is to highlight the influence of the customer satisfaction on each step necessary for product developing by choosing appropriate methods for customer satisfaction evaluation. Following the four stages of the product life cycle chosen as reference: Exploring, Development, Launching and Post-Launching, through the proposed model, it will be revealed how the customer decides starting from the beginning the segment and the main characteristics for a new vehicle. The model may be extended to other industries.

Keywords: Customer Satisfaction Level, Customer Feedback, Survey Methodology.

Introduction

In the last years in order to keep their position on the market, the companies tried to become more innovative and more in line with the customer needs, considering as it is documented in Mortara, 2009 and Wang, Zhao, Voss, 2016, that the customers are the key for innovative ideas.

The importance of the relation between profitability and customer satisfaction is quite debated in specialized articles (Heskett et al., 1997) having the roots in the studies for the integration of marketing and accounting (Simmonds, 1970, 1982, 1986; Wilson, 1981, 1999), but becoming more relevant today, when researchers began to consider it as a key factor in cost management. (McNair et al., 2001).

As Bill Gates said, "Your most unhappy customers are your free source of learning," the most dissatisfied customers are like a gold mine for producers, giving us that guidance on ideal products.

Although the concept has begun to grow in recent years, there are industries that are still quite poorly developed in terms of customer satisfaction, such as the service industry, as they do not have physically and well-defined a production that can cause dissatisfaction and generate costs (Caru` and Cugini, 1999; Gro¨nroos, 2000). Finally, the conclusion is the same “the quality of products/services generates, in fact, the customer satisfaction” [Silvestri, C. (2014)].

In order to control the high costs needed for developing a new vehicle, the case study proposes a model of evaluation in which the customer satisfaction is the core of business model.

A new project in terms of vehicle represent hard work in order to design, develop and test it. However, it does not start from a zero plan, without experiences and feedback from customers, contrary is gathering around everything that is related to improvement in terms of quality and reliability, as well as features that have brought a maximum level of customer satisfaction.

The study proposes a clear visibility for the link between customer satisfaction and product lifecycle key processes, contributing positively to the actual situation which shows that despite of the design community struggle among the years, to set design and quality improvement targets, is still no well-established approach to link customer satisfaction targets to vehicle-level targets, according Yadav, O. P., & Goel, P. S. (2008). Further in the study it will be taken into consideration the two types of mandatory information, the direct one provided directly by the final customer and the internal one cumulated from inside studies and analysis based on figures and costs.

Main paper objectives are to highlight for each step the contribution of customers through specific type of surveys and to offer an example of the multitude of information received during survey exploration.

The study's purpose is to bring a new perspective of customer satisfaction evaluation impact, walking step by step in new products development, using the survey balance as main type of input.

Experimental Approach

For the experimental side it was documented the applicability of the proposed model through the stages of the life cycle development for a new vehicle and how the customer feedback impacts each stage from figure 1 chronology. In order to make this possible it was used data from public database of the Romanian vehicle registration service in the period 2018-2019 and selected different type of surveys, chosen efficiently according to the automotive customer satisfaction experience.

All the information used as input in the model development had the purpose to highlight the customer influence in the creation of a new product, starting from planning and exploring and continuing with design and development, manufacturing and validation, performance measuring and improvement- launching step, serial life and after-sales-post-launching support.

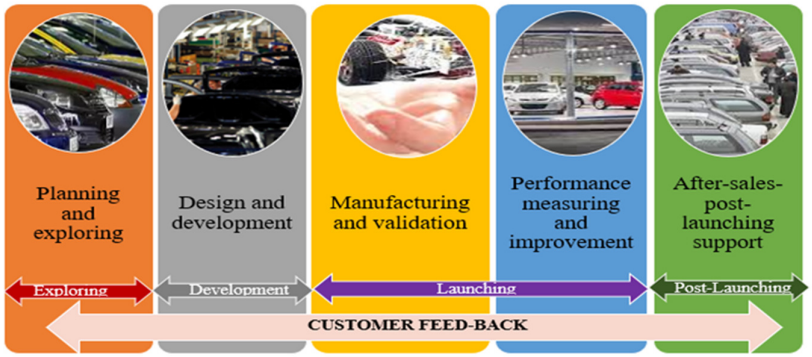

Fig. 1: Product life cycle steps

Results and Comments

The five steps of a new product life cycle which are highlighted in the figure 1, are grouped in 4 major categories as Exploring, Development, Launching and Post-Launching. Each category will be described individually, keeping as priority the impact of customer satisfaction.

Planning and Exploring

First step in planning a new product is to explore the market needs and to establish the type of the vehicle which will be developed.

In this stage, different certain market studies and data research are considered; these will contribute in identifying and selecting the vehicle model and the relevant segment proposed for this study.

The input needed in the selection process was the analysis of the Romanian market trend and the perspective from automotive field. According to this data, the trend for new vehicles purchased is a positive one and the volume of cars sold shows a considerably increasing from one year to another. This trend can be observed by comparing the sales volumes from 2018 (figure 2) versus 2019 (figure 3). The data used in both figures, are extracted from the public database of the Romanian vehicle registration service in the period 2018-2019, timeslot which will be used also in exploring the market, for having a first visibility related to the preferences of brands sold in Romania.

Thus, in the first phase we identify the preferences of Romanian customers in terms of brand for vehicles purchased in 2018-2019 in order to have a consistent sample and in the second phase we follow their distribution by segments. The top sales by brand in Romania in 2018 is described in figure 2.

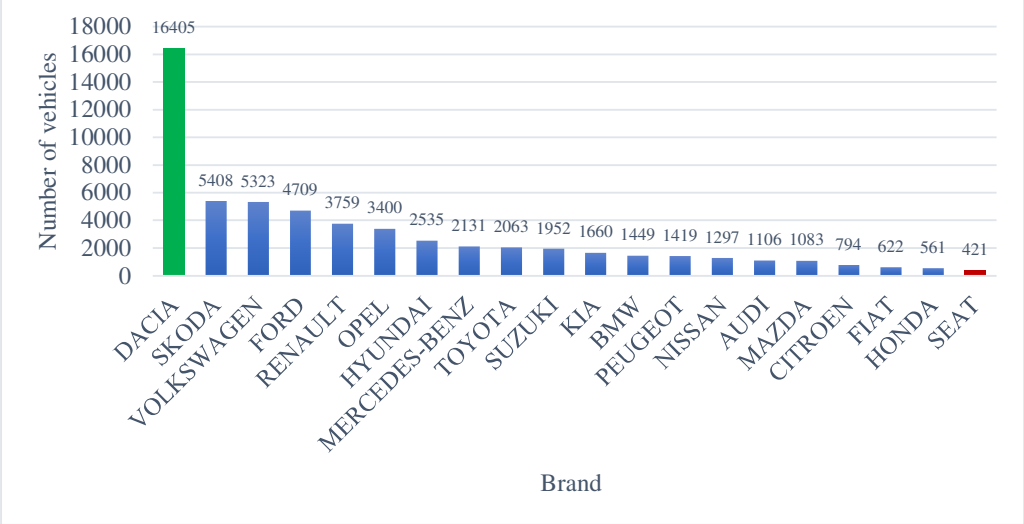

Figure 2: TOP 20 Brand Vehicles sold in 2018.

In this ranking Dacia is TOP 1 sales for 2018 with a number of 16.405 sold vehicle, and the brand with the lowest sales volume is Seat with a number of 421 sold vehicle. Basically, the market trend for 2018 was a positive one for the Dacia brand.

The TOP of brand vehicles sold between January and July 2019 from Romania is described in fig.3.

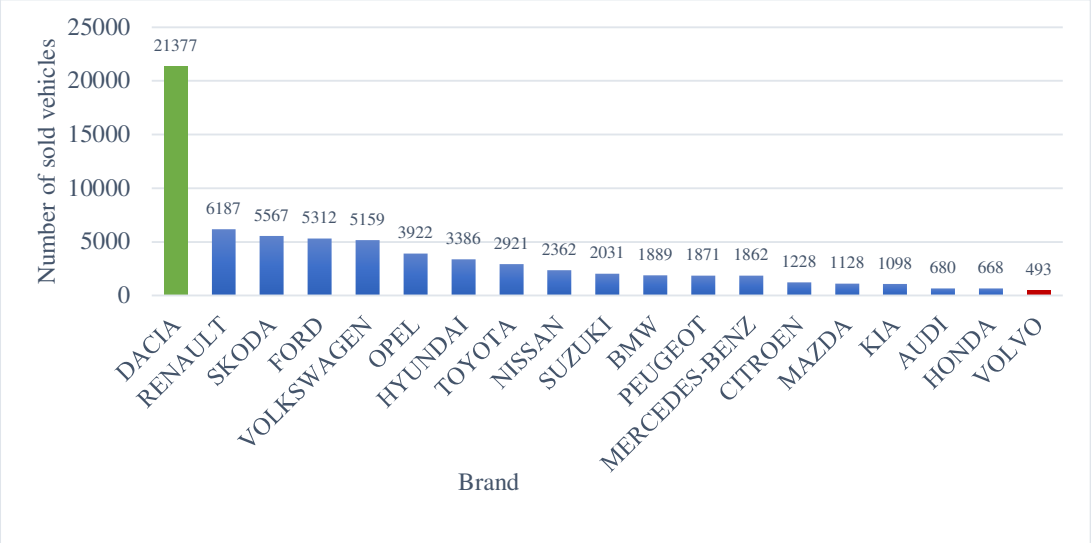

Figure 3: TOP 20 Brand Vehicles sold between January and July 2019

From this TOP 20, one may conclude that Top 1 sales in 2019 remains Dacia with a sales volume of 21,377 sold vehicles, and the Brand with the lowest sales volume this time is Volvo, registering a number of 493 sold vehicles.

Considering that the sales volume until the middle of 2019 is already 30% higher than the sales volume in 2018, one can anticipate basing on the actual trend that by the end of 2019 the volume of sales will double.

The next necessary step in our analysis is the study of customer behavior as well as customer segmentation according to his needs, and for this one may consider the best-selling segment of the Dacia range of vehicles. By studying the preferred segment of customers, we can see both their needs and most target customers.

The same source of information is used, the basis of the Romanian registration service, detailed on the model sold (fig.4).

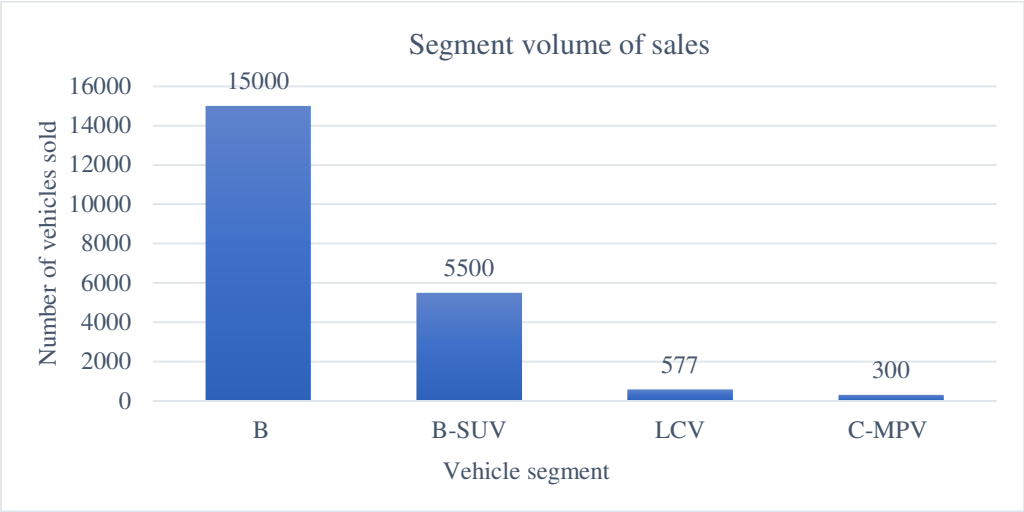

Figure 4: Volume of sales on segment from 2019

The definition of the above segments is the following one:
1. Segment B- multipurpose vehicle, with similar dimensions comparing compact vehicles, they are the so-called "city" cars.

2. Segment B-SUV- "compact commercial vehicle" or "compact SUV", represent the part of "small sport utility vehicles"
3. C-MPV segment - "multi-purpose vehicle" is the translation of the compact multifunctional vehicle.
4. LCV segment - "light commercial vehicle" represent the segment of light commercial vehicles.

According to Figure 4, the Top 1 in sales per segment is the B segment, with a number of 15,000 sold vehicles in 2019. The result of the ranking highlights the profile and the needs of the customer orientated for a multipurpose car with compact urban dimensions.

In the analysis of the client's profile as well as his preferences, we will use the NCBS survey (New Car Buyer Survey) applied on generic example using as a sample a number of 500 responses.

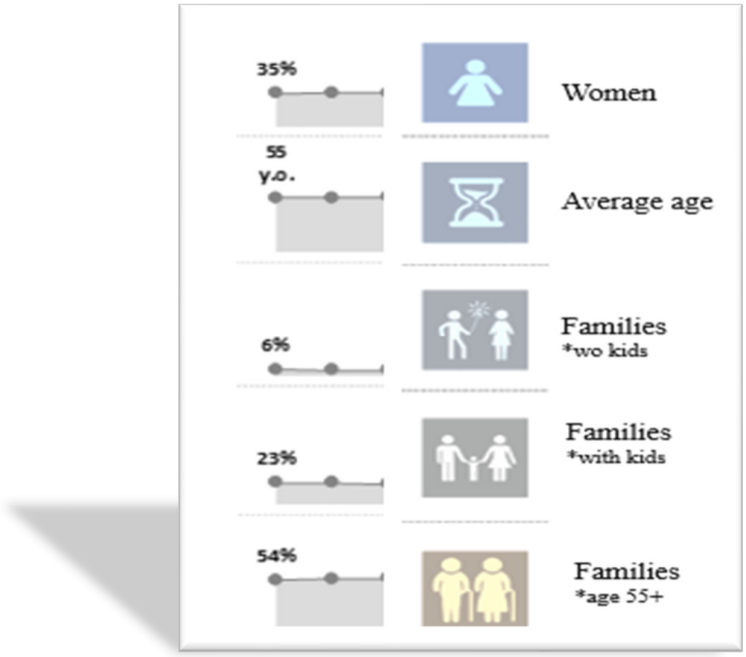

Figure 5: Customer profile

From 500 respondents surveyed, we conclude that the customer profile outlines 70% of male customers, with an average age of 55 years old, a senior family, which explains the lack of interest for family cars, for example segment C -MPV.

After establishing the customer profile, we go further in studying his preferences.

According to Figure 6, customers are attracted firstly by the price of the car, followed by its appearance and design, manufacturer loyalty and equipment level, which leads us to analyze a "low cost" vehicle with an improved design and a level equipment to justify the framing price.

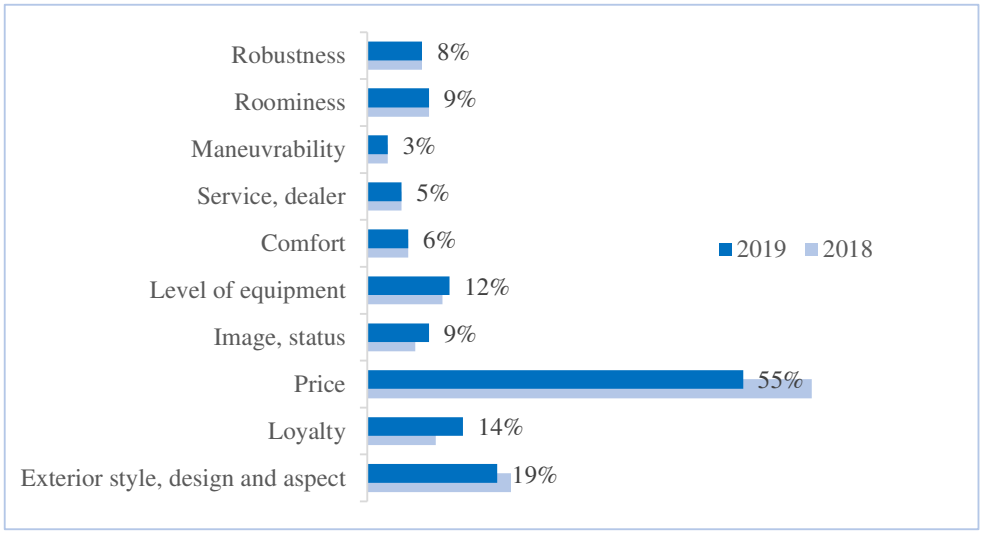

Figure 6: Customer preferences in 2018 and 2019, for B segment.

Design and Development

In order to design and develop a vehicle prototype, several aspects must be considered. First, we will refer to its existence in the factory, if we aim to launch a new version of an already existing product or if the existing products contain components similar to the product we will develop.

Most car manufacturers use at least 40% components of existing cars, avoiding a complex diversity of components and saving resources with a new portfolio of suppliers.

Considering the conclusion from the exploration phase, we will turn our attention to an already existing vehicle, following a modification of it with a maximum 50% of the components. For the choice of common parts, which we will reuse on the new model, we will take into account costs and production capacity, the potential of suppliers to increase production volumes, the feedback of customers on vehicle reliability and durability over time, as well as the technical progress and product evolution that require a mandatory improvement of those components, including legislative regulations (Herron and Braiden, 2006).

In identifying the customers feedback, we will apply in the first part the DVS survey (durability vehicle survey), for vehicles driven for 36 months. The questionnaire was sent to a number of 400 customers owners of the previous vehicle model and based on their feedback we will see which are the components that will be maintained on the future model. Thus, we will start with a list of performances that have the biggest N % (number of issues per hundred), the specific unit of measurement of this type of investigation.

According to the graph in Figure 7, the most common problems are reported on Ergonomics performances, but in our case we are interested in the return on reliability and we will consider only the performance from position 2 "Appearance and durability", in order to analyze and identify customer effects with the biggest impact over time.
According to customer feedback, we note that the main components or accessories that will be improved in the next project are the quality of paint, carpet material, materials used inside the car, exterior seals on windows and body, and the usage of a protective layer for underbody components.

Being in the phase in which we have identified what we keep and what we improve on the new vehicle model and with the aim of creating a low-cost car, we will move on to the next stage of the cycle, namely "manufacturing and validation of the new vehicle ".

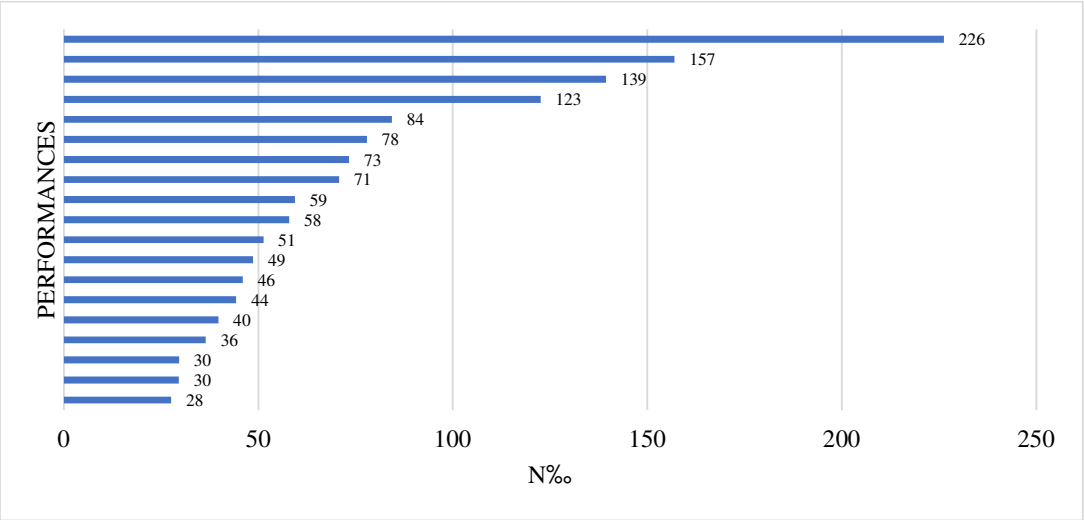

Figure 7: Top 20 Performances with high number of issues, N%

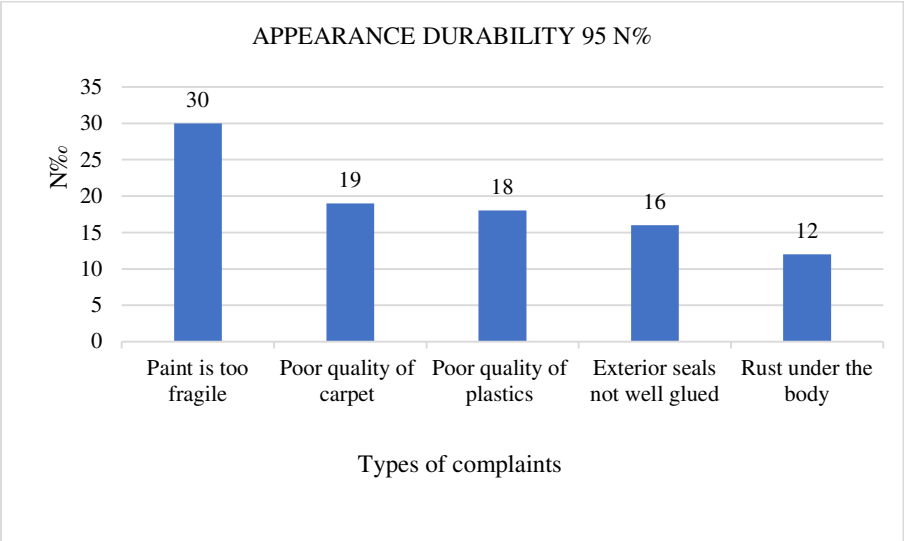

Figure 8: Customer complaints on" Appearance and durability"

Manufacturing and validation, performance measuring and improvement

Using the input received from the customer in the previous phases, the car reaches the manufacturing stage, largely meeting the customers' conditions. These conditions cannot be met 100%, as priority will be given to legislative regulations and to the costs necessary for improvements.

In order to verify, validate and measure the performance of the new vehicle before reaching the customer, a series of internal evaluation methods can be applied, such as customer satisfaction fleets and technical validation fleets before launch, which will take place in the same time.

The customer satisfaction fleet is addressed to internal customers, employees and runs in order to capture the first feedback for prototype cars.

These fleets can often capture commonalities that can be found in external customer surveys, but the general perception of a user paying for a good is different from that of one who will not pay.

For our study we will use 10 prototype vehicles that will run internally as employee trips for various professional purposes. The target is to have completed at the end of the study, a minimum number of 200 questionnaires. Which means that each vehicle will be driven by at least 20 people.

Table 1: Resume of the customer satisfaction fleet

COUNTRY	NUMBER OF INTERNAL CUSTOMERS	NUMBERS OF QUESTIONARES	TIMELINE	GLOBAL SATISFACTION	PERCEIVED QUALITY
ROMANIA	**80**	**210**	**January, February, March 2019**	**9**	**7**

satisfaction, and those below 6 represent minimum satisfaction.

The evaluations between 6 and 8 were for the following services:

-evaluation of global quality
-global evaluation for the external appearance
-global assessment for seats on 2nd row
-global evaluation for engine and transmission
-global evaluation of the navigation system.
The ratings > 8 were for the following services:
-global evaluation for the external appearance
-global evaluation of the seats
-global evaluation of storage spaces
-global assessment for driving ergonomics and safety
-global evaluation for dynamics
-global evaluation for the audio system
-global evaluation of internal systems and software
-global evaluation of the systems responsible for thermal comfort

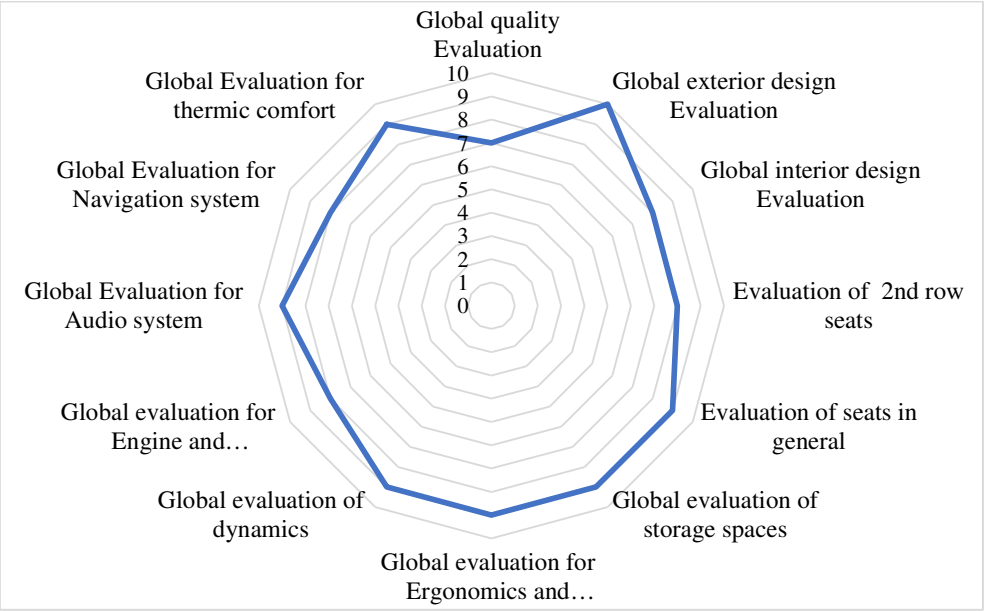

Figure 9: Radar chart for global evaluation of the prototype vehicle

After validating the vehicle model and improving performance related to problems following the technical validation fleet and customer satisfaction fleets, the vehicle is ready for launch.

Serial life and after-sales-post-launching support

After the launch of the new model, the first customer feedbacks will be identified, which will be registered through several types of surveys. The first type of input is received from incidents alerts, which are registered directly in the service when functionality problems occur. The next type of surveys applied in the same time, are the "Quick Track" type surveys - which are applied after a month of running to the client. The most complex surveys that have information related to Our competitors in the B segment, which also provide a wealth of information on customer dissatisfaction, are NVS surveys (new vehicle survey) for a 3-month turnover.

The quick track survey type will be applied for a generic example with a sample of 50 clients as shown in Table 2.

Table 2: Quick Track results

	Category	Quick TRACK Romania
Demographics	**Average age**	**50**
	Engine type	**70%Diesel 30% Essence**
	Previous car owned	**75% B 25% A**
Results	**Global satisfaction**	**9**
	Global quality	**9**
	Repurchase intention	**97%**
	Recommendation rate	**98%**
	Number of complaints	**100**

As can be seen in Table 2, customers prefer diesel cars; a good level of satisfaction and overall quality are recorded, 98% of them would recommend it and 97% would like to repurchase it.

After the socio-demographic details and the global results obtained, the issues reported by the clients will be further investigated, as follows in figure 10.

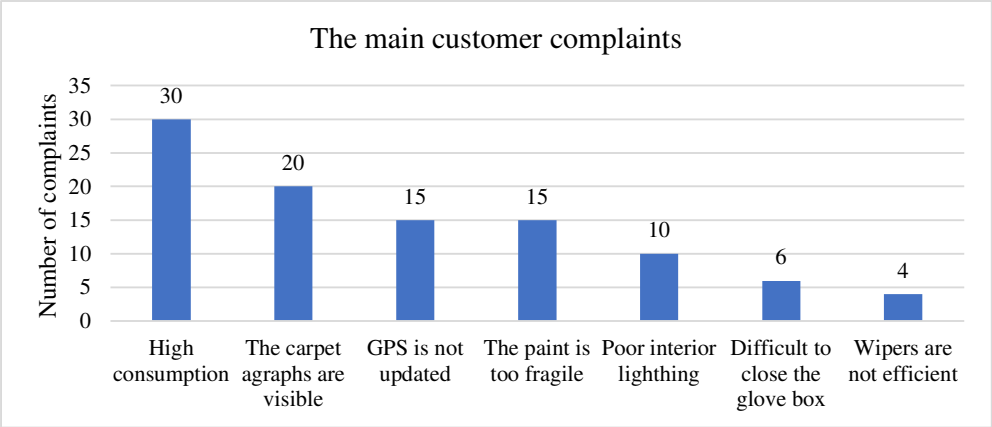

Figure 10: Customer complaints recorded in Quick track survey

The issues reported by the client in the surveys are shared in specific committees in order to decide their treatment. Not all the issues can be solved, the one with high priority are those related to quality and safety, those which are not representing a risk for customer and also are not having a big impact in the brand image are kept under surveillance, but no actions are taken for their solving.

In order to have a visibility on the current status of the complaints for our generic example we will create a global situation considering the level of coverage (fig.11).

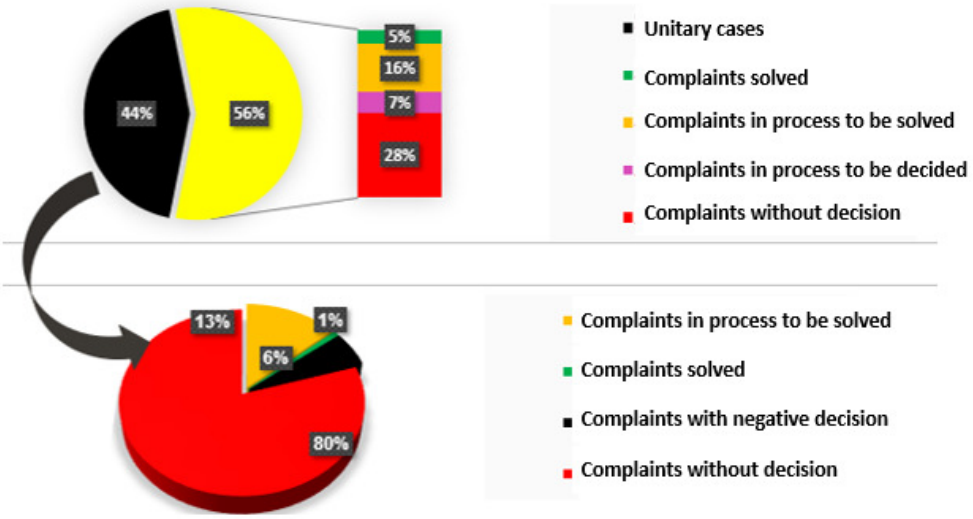

Figure 11: Level of coverage for customer complaints

According to figure 11 we can see that there are many complaints unitary cases (single cases), for which no specific actions for improvement can be made.

The complaints without decision which represent 28% at the time of the study will be documented in the specific satisfaction committees, in order to be decided if will be solved or not.

The customer feedback is very important in the improvement of the vehicle model, as well as in the proposal of derived versions in the following years.

In order to keep these inputs constant as customer dissatisfaction or complaints, the NVS and DVS surveys can be applied constantly, during the entire life of the product, for 3 months in service to the customer if a feedback for new vehicles is needed or for 36 months in service, for durability and reliability feedback, as was done in step 2 in identifying the main performance that are considered poor by clients.

Conclusion

The paper proposes a model for customer satisfaction evaluation, created from personal perspective, using the public database of the Romanian vehicle registration service in the period 2018-2019 and the potential output that can be obtain from market competitor benchmarking and from internal evaluation.

The client is the one who guides from the beginning according to his needs the development of the entire product lifecycle process. Considering all the information gathers through the entire process it is sketched the framework of the vehicle behavior in the customer perspective.

The results confirm the research paper written by Yadav, O. P., & Goel, P. S. (2008), showing that the client's needs, company's policies, and regulatory requirements are integrated together in order to identify the potential improvement opportunities which will be reflected in the vehicle attributes.

The purpose of the study was achieved bringing in the light, through the model, how the customers decide the development of a new product made on their requirements. For each selected category, Exploring, Development, Launching and Post-Launching, the most efficient type of surveys were chosen based on the author experience with evaluation of the client satisfaction in automotive industry, in order to have lower costs and a better time application. The variety of customer satisfaction surveys in automotive industry it is vast, but each company should choose wisely the specific ones in order to maintain the focus on increasing customer satisfaction using efficient the resources and increasing their profitability.

The model may be transferred and adapted for other industries, as customer satisfaction sustains the business core irrespective the field of activity.

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Using IOT Technologies by Medical Staff for Their Patients

Dragos Nicolae NICOLAU

[1]National Institute for Research and Development in Informatics, Bucharest, Romania
dragos.nicolau@ici.ro

Alin ZAMFIROIU

[1]National Institute for Research and Development in Informatics,
[2]Bucharest University of Economic Studies, Romania
Bucharest, Romania, alin.zamfiroiu@ici.ro

Abstract

As we all know, health is the most precious gift in the life of every human being, but it must be permanently preserved and protected and which once lost is difficult to recover. But this can be easily avoided or remedied, as medicine jumps to our aid.
Medicine is the branch of biological sciences that aims to analyze the human body and find solutions to diseases that can affect people's lives.
In recent years, the spread and diversification of sensors and devices with the ability to connect to the Internet and beyond, have led to the transformation of the Internet of Things (IoT) into an essential component in most areas and also in the eHealth domain. This paper aims to address the subject of the Internet of Health Things (IoHT) and to provide an overview of its applicability as a substitute for permanent care by a knowledgeable patient.
In the future, a fairly significant evolution of technology in the medical field is expected, as much better applications will appear than those already on the market, applications that will be very helpful to both doctors and nurses, one of which is the one that allows remote patient monitoring.

Keywords: IOT, medical, healthcare, patients, solution, eHealth.

Introduction

Medicine occupies an important place in our lives (Ho, et al, 2020), having the role of analyzing, discovering the human body and finding remedies and solutions designed to restore human health. However, in order for medicine to fulfill its mission, modern technologies are needed that can allow the faster detection and treatment of diseases that occur, in many cases people's lives depending on these technologies. Systems must be developed that coagulate these technologies and contribute to the improvement of medical systems (Lebedev, et al, 2020), (Misra,and Bisui, 2018).

First, doctors will be able to manage their appointments more easily, have access to patient information much faster: tests, prescriptions, diagnoses, previous consultations, and use modern devices to monitor and obtain health data. their patients.

In addition, patients also benefit from several facilities: they can schedule their next visits to the doctor, they can receive their tests and prescriptions directly, without having to go to the clinic to pick them up, they have the option to be information about what medications to take and at what time, they have the opportunity to contact the doctor, directly from the application, in case of emergency(Sánchez-Zaballos and Mosteiro-Díaz, 2020).

It is expected that in a few years mobile applications will be introduced on the market, which, in particular, will be used for emergency medicine as is the current situation. These are intended for nurses, who can vocally complete patient and resident files, they have the opportunity to report their activity via a smartphone.

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If we talk about sensors, this concept is not very common in hospitals, because modern devices with sensors are available at quite high prices. We hope that, in time, we will also benefit from modern technologies that allow us to measure our blood sugar, blood pressure and heart rate in real time, without having to go to the clinic or hospital, a sensor. and a smartphone dealing with this (Matarazzo, et al, 2017), (Li and Trocan, 2019,).

The next chapter "Related work" will presents the studies existing inn other papers and the way how they solved this problem of eHealth using the sensors and IoHT. The next chapter named "Proposed Solution Implementation" presents our solution architecture and the modules of this implementation. The paper ends with the conclusions and a list of references.

Related Work

The year 2017 brought an extraordinary innovation in the world of medicine, being marked by the appearance of the first digital pill (Belluck, 2017). It is used to treat schizophrenia and depression in adults. The pill works according to the following principle: when it comes in contact with stomach acid it sends an electrical signal, and the medical staff is thus alerted, via their smartphones, if the pill has been swallowed. Thus, they will be informed whether or not the patient follows the prescription prescribed by them.

Another breakthrough in the world of medical technology is the "GPhone", a small device built into the phone's case that can measure blood sugar (Bandodkar et al, 2018). It was created by researchers at the University of San Diego in the United States, the first information about this wonder device was published in January 2018. "GPhone" works according to the following principle: initially a blood sample is placed on a support disposable placed on a small sensor, and then the results are transmitted via Bluetooth technology to the Android application. The device does not require batteries or power, as it is charged directly to the phone battery. This innovative discovery has proven to be very helpful for people with diabetes, as they can measure their blood sugar easily and quickly at any time.

A mobile application that could become a real innovation in the medical field is "BiliScreen". This is done by scientists at the University of Washington in the United States (Mariakakis et al, 2017). The application is based on a brilliant idea: with just one selfie taken with their own phone, users can find out whether or not they are prone to pancreatic cancer.

When it comes to heart rate and blood pressure, people should be very careful about what devices or applications they use to measure it. Today, there are many mobile applications that do this, but we never know if they work properly or not, they only provide indicative results. "Instant Heart Rate" (Ishikawa et al., 2017), "Cardiograph" and many others are free, easy to download applications that measure the pulse through the phone's camera, in this case the results obtained depending a lot on the position and force with which finger press on the camera (Adhikari et al, 2014).

Analyzing the technological progress made in the field of medicine, more and more people are starting to test and use new devices and applications to determine their blood sugar level, temperature and many other information related to their health, it is clear that, our lives change day by day (Gjellebæk, et al, 2020). However, there are conflicting views on the safety of new technologies. Application developers claim that they offer a fairly small margin of error of about 5-10%, while more conservative people do not give them much confidence. Physicians should take full advantage of the new technologies that have emerged in the field of medicine, as they help them to make diagnoses and treatment for their treatment much easier. The importance of Internet of Things applications and sensors in our lives should be emphasized, stating that through them, people have the opportunity to detect health problems in advance and to learn more about the human body.

Proposed Solution Implementation

In this chapter we present the functionality of a platform whose architecture consists of three major layers: (a) data collection, (b) data storing (c) data processing and using.

Data collection level relies mainly on two types of sensors – medical and environmental; data read from them is sent to the processing device.

Data storing level relies on decoding, structuring and writing modules (in NoSQL databases).

Data processing level relies on outsourcing services. This layer provides means for taking medical decision such as: (a) prescribing drugs or providing suggestions to patients, (b) providing advice based on medical evolution, (c) informing physicians and caregivers on the level of urgency and (d) general remote monitoring.

The platform basically includes 5 functional components (1 hardware and 4 software):

- The equipment for patient medical data collection: RaspberryPi device (mini-computer that runs the Raspbian-Linux miniature system) to which the medical data acquisition card (through an appropriate physical interface) and the wireless transmission interface (sending data to a server) are connected.
- The C++ application that cyclically gathers, encrypts and sends collected data.
- a Cloud-resident Web service designed to decode medical data (that has just been transmitted online), to structure and store them into a NoSQL database.
- a Cloud resident Web service intended to send back to any remote user - that makes a http request - the medical data of a particular patient, harvested within a certain time frame. It can perform various analysis of data.
- a Cloud resident Web Application that, when requested by the remote client application (this latter can be a Web browser or dedicated mobile / desktop application) asks the Web service from above to process and gather data of interest.

Figure 1 bellow suggests the overview of the structure of the IoT System.

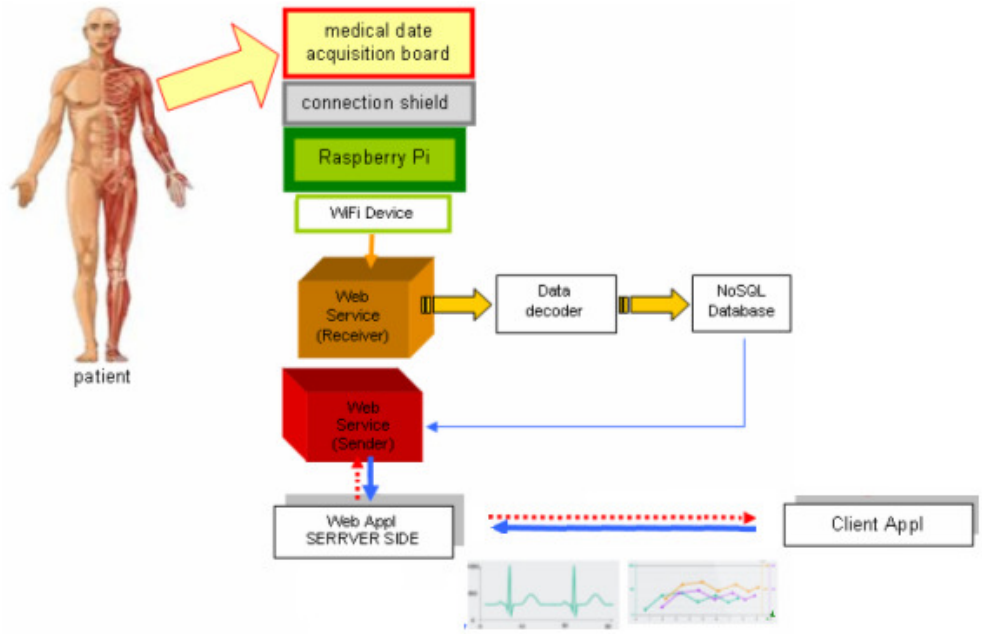

Fig. 1: Structure of the IoT system (Alexandru et al, 2018)

The data collecting and transmitting equipment comprises:

- the e-Health Sensor Platform V2.0 for Arduino and Raspberry Pi - able to perform biometric and medical applications where body monitoring is needed by using 10 different sensors such as: pulse, oxygen in blood (SPO2), body temperature, electrocardiogram (ECG), galvanic skin response (GSR - sweating), muscle/electromyography sensor (EMG) etc.
- the Raspberry Pi to Arduino Shields Connection Bridge - compatible with Raspberry Pi 2 Model B; allows for the connection of any compatible card (e.g., e-Health 2.0); it is delivered along with the arduPi API library (arduPi.h and arduPi.cpp) to be used as the interface (at design time) between various data acquisition boards and the C++ beneficiary application.
- Raspberry Pi 2 - minicomputer running Raspbian O.S. (miniature Linux for IoT app)
- WiFi Module On chip RN-171 - enables the remote wireless transmission of collected data.

The data collecting application (hosted by the Raspbian-Linux) runs an infinite loop that executes medical (physiological) data readings by calling the C++ APIs pertaining to the medical equipment. The example below illustrates how the function attached to the thread reads the medical data.

```
setupPulsOximeter(6);
eHealth.initPositionSensor();
. . .
while(true)
{
        . . .
        delay(100); // msec between cicles of data refreshing
        int strikes = eHealth.getBPM();
        int oxsat = eHealth.getOxygenSaturation();
        float temp = eHealth.getTemperature();
        float cond = eHealth.getSkinConductance();
        float res = eHealth.getSkinResistance();
        float condVol = eHealth.getSkinConductanceVoltage();
        float ECG = eHealth.getECG();
        int EMG = eHealth.getEMG();
        uint8_t bodyPos = eHealth.getBodyPosition();
        . . .
}
```

Figure 2 bellow suggests how medical data (that is reals, integers or long integers) are being read through function calls, then encrypted, then encapsulated in the POST Request and finally sent to the Web Service running under a virtual image inside the Cloud unit.

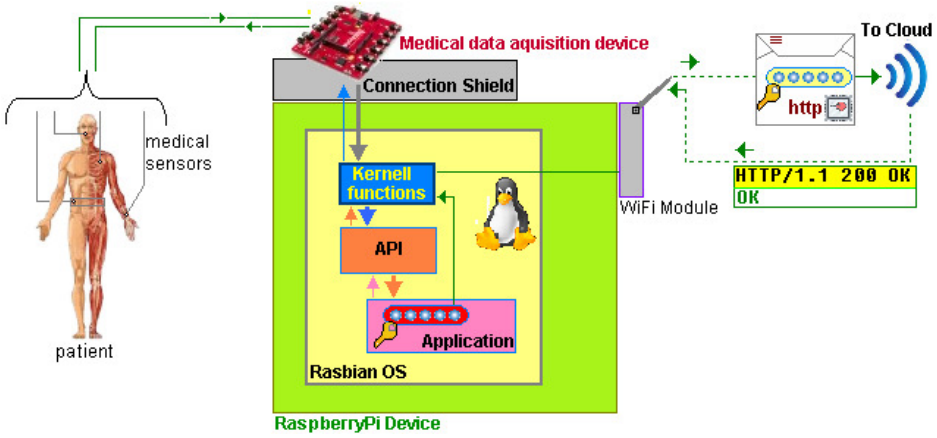

Fig. 2: Medical data collecting and transmitting (Alexandru et al, 2018)

The Service Oriented Architecture mechanism comprises:

- The Web Service-Receiver; it decodes incoming data, then it organizes the resulting data (containing patient ID and the list with all medical parameters, each one being associated with a certain time) and finally it writes resulting structure inside the MongoDB Database.
- The MongoDB Database (NoSQL family), delivers rapid responses both at writing and querying data and can be splitted. The figure bellow suggests how medical data, after having been arrived successfully in the Cloud and decrypted, are memorized in the database; the image will show the equivalent of a classic record: the strings on the left of the ":" character are the "fields" and the strings / numbers on the right are

the “values”. The possibility of memorizing structure-like values is suggested by the value mapped to the “Heart” or “Skin” fields.


```
{
    "_id" : ObjectId("5aa78e996dfa030b28673c57"),
    "PatientID" : "01A2-57QW-3E78-FFB2",
    "Time" : "2017-03-05@16:21:48",
    "EMG" : 290.0,
    "Heart" :
    {
        "Beat" : 64.0,
        "ElectroCardio" : 2.052786
    },
    "O2Level" : 95.0,
    "Skin" :
    {
        "Voltage" : 0.513,
        "Resistance" : 75320.0
    },
    "Temperature" : 35.9
}
```


Fig. 3: Decrypted data

- the Web-Service (Inference Engine). It processes data, yielding graphs of evolution, statistic charts, analysis of critical values etc. It sends processed data to the requesting application. It is written in C#. The next code sample will exemplify creating, filling and sending a bitmap as a HTTP response.

```
// allocate Bitmap and Graphic tools in memory, ON THE SERVER !
int width = 400; int height = 300;
Bitmap bmp = new Bitmap(width, height, PixelFormat.Format24bppRgb);
Graphics g = Graphics.FromImage(bmp);

// . . .  calls to g.DrawRectangle(),g.FillRectangle() and g.DrawLine() etc
// . . .

// Send resultant Picture to client
Response.ContentType = "image/bmp";
Response.Clear();Response.BufferOutput = true;
bmp.Save(Response.OutputStream, ImageFormat.Jpeg);
Response.Flush();
```

In Figure 4 we have the conceptual representation of such response:

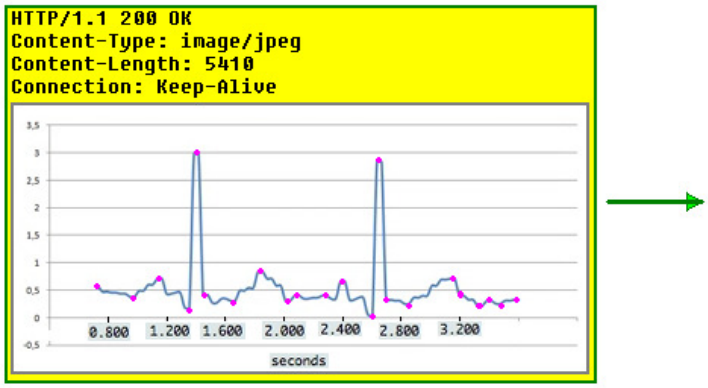

Fig. 4: Conceptual representation of HTTP response

- The Web-Application. It serves requests from remote clients by dialoging with de Web Service acting as a receiver (the one mentioned above).

The Web Services and the Web Application run under a virtual image of Windows 7 inside the Cloud unit, itself governed by a “supreme” Windows Server 2012.

Conclusions

We believe that the entire proposed system can be used in a medical clinic, being very helpful to both management and medical staff, providing facilities that could significantly facilitate their work. The aim of the paper is to integrate technology in all activities in the medical field, eliminating the traditional way in which analyzes are performed today.

The proposed solutions have important advantages over traditional solutions for patient monitoring and assistance activities, namely:

- implements, integrates and improves existing IoT technologies;
- create a minimally invasive environment on the patient, reduce costs;
- helps to increase life expectancy and chances of survival.

The integrated approach of IoT and Cloud technologies in the monitoring of physiological and environmental parameters and the development of predictive models of population health on the basis of the collected data allows the development of innovative personalized assistance services For the future, we aim to continue the development of new systems, introducing new features and trying to make more medical devices based on sensors that can be used instead of traditional ones, thus spreading the idea of technology evolution in the medical field.

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Industry 4.0 Basic Knowledge Transfer

Miroslav MALAGA
University of West Bohemia, Pilsen, Czech Republic
malaga@kpv.zcu.cz

Tomáš BROUM
University of West Bohemia, Pilsen, Czech Republic
broum@kpv.zcu.cz

Zdeněk ULRYCH
University of West Bohemia, Pilsen, Czech Republic
ulrychz@kpv.zcu.cz

Abstract

The article concentrates on Industry 4.0 knowledge transfer to employees who will work with Industry 4.0 technologies. The knowledge transfer starts with an introduction to Industry 4.0 technologies with the aim of motivating the employees to work within the concept. The article focuses on collaborative robots (cobots) and automated guided vehicles (AGVs). After the introduction, the employees learn to build and operate Fischertechnik STEM Kit models. The employees use the models first to understand the principles of individual components relevant to Industry 4.0 and then how to program the models. In the last part there is an explanation and practical examples of programming Industry 4.0 technologies (Collaborative robot and AGV). The article also describes the equipment in specialized laboratories where Industry 4.0 knowledge transfer can take place.

Keywords: Industry 4.0, Collaborative robots, Fischertechnik, AGV, Programming.

Introduction

One of the most popular topics in recent times is the concept of Industry 4.0, its principles, the implementation of different levels and the management of transitions between the levels in manufacturing companies. The goal is most often to achieve complete fulfilment of this concept according to current technical and technological possibilities. From the point of view of employees, sociologists and governments, there is often talk of the need for job security and the fear of rising unemployment, this is mentioned by Basl (2017). A frequently mentioned measure is unconditional income, reorientation of these employees to services, etc. Here, however, it must be said that even in companies operating on the principles of Industry 4.0, employees are and will continue to be needed in the future. This means employees who know the company, the production of goods and related services, technologies used and technical equipment, production processes, etc. These employees are in companies now and their knowledge is adequate for the current state of the manufacturing company. With the advent of Industry 4.0 there is a need not to eliminate these people, but to start training them in accordance with the needs of developing and implementing the principles of Industry 4.0. If the company is just beginning a gradual transition to the principles of Industry 4.0, it is necessary to first train employees and only then begin to make gradual structural, procedural, technical and technological changes. Here it can simply be stated that this procedure cannot be otherwise, because if so, it would achieve a state where the company is at least technically and technologically able to operate on the principles of Industry 4.0, but there would be no one who would be able to maintain it and keep it alive (in the sense of production). With regard to the content of Industry 4.0, it will be necessary for almost all employees of such manufacturing companies, in addition to their specializations, to have a cross-sectional orientation in such fields as reading, processing, storage and exchange of data, IT security, programming and scripting, basics of robotics, advanced data processing, simulation and visualization, etc. It was mentioned by Horejsi et al (2020). This knowledge needs to be passed on to key employees, maintained and especially further developed adequately to the needs of the company and its development of Industry 4.0 (in this case key personnel in terms of employees needed for the smooth running of the manufacturing company after its transition to Industry 4.0).

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Fischertechnik STEM Kit

The version used at our department (Fishertechnik education - STEM Engineering) is a polytechnic kit enabling the construction of the skeleton of models from building blocks and mechanical components (including gearboxes, gears, etc.), power components (electric motors, valves, compressors, USB camera, optical colour sensor, light modules, etc.) and components for data collection/evaluation (e.g. NTC resistor for temperature measurement). If necessary, the kit can be expanded with additional mechanical and power components and sensors. The programmable control unit is used to activate and control the models, and the creation of control programs primarily takes place in the ROBO Pro development environment, where it is programmed by creating flowcharts in the form of assembling programming blocks. If necessary, the control code can also be programmed in C/C++ mentioned on Fischertechnik GitHub (2020) or Python mentioned online on https://cfw/ftcommunity.de (2020). The BBC micro: bit can also be used as a control unit mentioned by ReiVilo's Fischertechnik Corner (2020). Models of an automated warehouse, automated product sorting, robotic arms, and an AGV (automated guided vehicle) can be assembled from the kit only according to the supplied instructions, mentioned by Fischertechnik STEM Engineering (2020).

The control unit is a small computer with performance comparable with mobile phones from 2008. It has parameters mentioned by Fischertechnik TXT Controller specification (2020) as a dual processor ARM Cortex A8 (32bit, 500mHZ), 128 MB RAM and 64 MB flash memory. The flash memory can be extended by a Micro SD card up to 32GB. The control unit has its own coloured 2.4"touch screen with resolution 320x240 and a speaker. Communication with the control unit, or between control units, can be via USB cable, infra-port, Bluetooth or Wi-Fi. This means the models can communicate together, or can be controlled by mobile phone, notebook/tablet/PC, TV remote, etc. A Linux based operating system runs in this unit and it offers 8 universal inputs, 4 digital counting inputs and 4 motor outputs which can be used as 8 outputs for LEDs, bulbs, etc. The kit includes a battery set which provides the power supply. It contains a NiMH 8.4V/1800mAh battery and a charger. This battery supplies energy to all parts of the model and to the control unit. A mains adapter can be purchased separately.

Industry 4.0 Technologies (Cobot, AGV)

The Department of Industrial Engineering and Management not only has models from Fishertechnik, but also real industrial solutions - a collaborative robot (cobot) and an automated guided vehicle (AGV) located in the special Industry 4.0 laboratory.

The cobot is a CR-7iA/L type with R-30iB Mate controller and is produced by FANUC. It is a collaborative robot, so it can cooperate with human operators without the special protective equipment required by classical industrial robots (cages, etc.) It was mentioned by Broum and Simon (2019). It is equipped with force sensors that detect potential collisions with objects and stops the cobot when the risk of a collision occurs. It is also equipped with passive safety elements (rounded edges, etc.), mentioned by Broum and Simon (2020). The CR-7iA/L is a relatively small cobot, able to move weights up to 7 kg, with a maximum theoretical speed of 1000 mm/s. The maximum reach is 911 mm. The cobot basic joint working range is 370° with repeatability: ± 0.018 mm. It is driven by an AC servo. It was specified in Small Collaborative Robot (2020). It is also equipped with an iRVision camera system that enables it to identify objects – their position and also colour. The cobot complies with ISO standards and the EC Machinery Directive, mentioned by Poor and Basl (2019), and is shown on the following figure.

Fig. 1: Cobot ang AGV in the laboratory

The cobot is also provided with software as an off-line tool to set up the cobot directly from a personal computer. The workplace and the cobot can be simulated in 3D and a program can be created that can be transferred to the cobot. It was mentioned by Trojan et al (2019). It is also possible to program the cobot directly using the R-30iB Mate controller which has the advantage of allowing the positioning of the cobot's arm manually and saving having to position it in the program.

The AGV located in the laboratory is a 'Weasel' from Schaefer. It can transport up to 35 kg and its maximum speed is 1 m/s. The minimum turning radius is 600 mm. It is battery driven with the possibility to run up to 12 hours on one battery charge. It is a one direction AGV that follows its trajectory using optical sensors. It needs a black line on a white background which it follows. Commands are given to the AGV in two ways, either by RFID tags next to the path of the AGV that it reads and executes, or by radio signals with the potential of tracking the current AGV location. It was mentioned by WEASEL (2020).

The basic idea demonstrated in the Industry 4.0 laboratory is that the cobot fills a rectangular plastic pallet with 20 positions for metal cylinders – each position has one of four possible colours (yellow, green, red, blue). Metal cylinders (with the same colours) are in a magazine next to the cobot. The AGV brings the empty pallet to the cobot, then the cobot puts the pallet onto a conveyor belt that delivers the pallet to a suitable location for the cobot. The pallet is photographed by the cobot's iRVision camera system to identify the colours of the metal cylinders and their locations on the pallet. The cobot then fills the pallet with metal cylinders of the right colours in the right places. Then the cobot can empty the pallet or the pallet is sent to the manual workplace where a human operator empties the pallet, depending on which program is running. The last part is sending the empty pallet by conveyor belt to the AGV. The AGV can then deliver the empty pallet again to the cobot and the cycle starts from the beginning. It was mentioned by Poor et al (2019).

Employee training related to Industry 4.0

This chapter concentrates on employee training at the Department of Industrial Engineering and Management using the technologies described above. Employee training will be carried out in the following steps:

- Introduction to Industry 4.0 Technologies (Cobot, AGV)
- Fischertechnik STEM Kit – assembly, programming
- Industry 4.0 Technologies (Cobot, AGV) – programming

Introduction to Industry 4.0 Technologies (Cobot, AGV)

The first part, Introduction to Industry 4.0 Technologies (Cobot, AGV), concentrates on basic information about the technologies of Industry 4.0 in general on the one hand, and on the other hand specifically on the technologies used in the laboratory. The target is to clarify the information about Industry 4.0, showing employees the potential of

Industry 4.0 and its technologies, eliminating any fears and doubts about Industry 4.0 technologies and in total motivate the employees to use Industry 4.0 technologies.

Fischertechnik STEM Kit –assembly, programming

Fischertechnik STEM Engineering kits are used in the second part. This part focuses on understanding the principles of operating individual power components such as electric motors, compressors, solenoid valves, phototransistors, light emitting elements, thermal sensors, analogue colour sensors, cameras, etc. After learning the principles of operating these items and introducing their possible uses, we move on to programming simple models. Due to the employees' differing knowledge of programming, the ROBO Pro development tool is used. This IDE enables programs to be developed by composing graphic elements (similar to today's very popular 'Scratch' for children). The advantage is the speed and especially the clarity of the creation of control programs even for employees who are not familiar with programming. We give as an example one of the first, absolutely basic models demonstrating the use of an optical colour sensor and LED, where the goal is the recognition of the colour of a sheet of paper colour. Other practical examples are e.g. item detection with a camera, hand dryer, synchronized indicators using step motors, wind power plant, etc. mentioned by Malaga, M. and Ulrych Z., 2020. More complex examples used are Fischertechnik models such as AGV, Automated warehouse, Robotic arm, and the Item colour sorting robot. Work with the models is done in a maximum of 6 teams with a maximum of 6 employees in each team in the laboratory in the Department of Industrial Engineering and Management. The laboratory is equipped with components relevant to the models used. Every team has a laptop, a big screen and their own Fischertechnik STEM kit.

The connection of the components for the colour detecting model is shown in the following figure. An optical colour sensor is connected to the I1 and + 9V input, a light bulb with a red cover is connected to the O1/O2 output (M1), and a light bulb with a green cover is connected to the O3/O4 (M2) output.

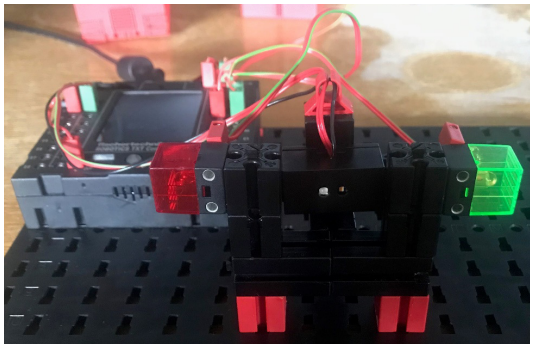

Fig. 2: Basic Fischertechnik colour sensor model

How we want the colour controller to behave:

1. When green paper is loaded, the green light turns on.
2. When red paper is loaded, the red light turns on.
3. When paper is not loaded, or paper other than red or green is loaded, nothing happens and the model waits for another piece of paper to be loaded.
4. The program will be in a cycle so that the colour evaluation takes place continuously.

The optical colour sensor returns a number that matches the colour of the object presented to it. The first task is to find out what numbers the sensor reads for red and green sheets of paper. A good way is to create a very simple program that will only print the number read from the sensor and we use it for calibration in the final control program. The program for displaying the read data by an optical colour sensor is shown in the following figure.

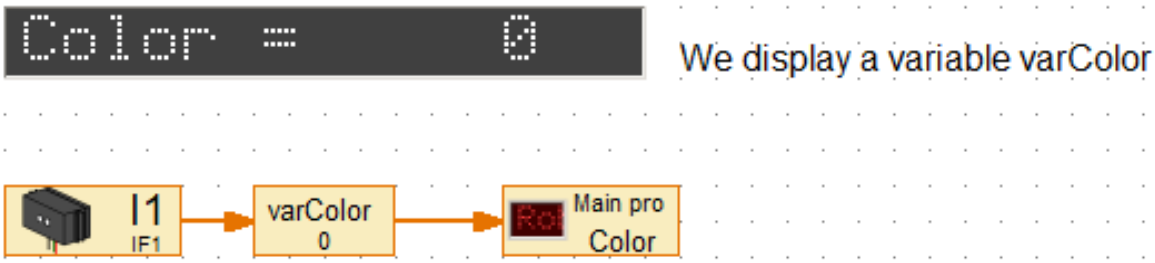

Fig. 3: Colour variable display in RoboPro IDE by Fischertechnik

In this particular case, under given lighting conditions, the optical sensor returns a value of about 237 for red colour and a value of about 325 for green colour. With values fluctuating approximately ± 50.

If we know the approximate values for both colours, we can use the following sorting algorithm:

1. When reading the values using the optical sensor in the interval (0, 200), we do nothing and we further evaluate the read colour. These values do not correspond to the colours we are evaluating.
2. When reading the values with the optical sensor in the interval (200, 270), we evaluate it as red and turn on the red-light bulb for 1 second. Lighting for 1s is sufficient. When the coloured sheet is removed, the light bulb will go out within 1 second at the latest, which is a sufficiently fast reaction of the system for us.
3. When reading the values with the optical sensor in the interval (270, 350), it is evaluated as green and the green light bulb is turned on for 1 second.
4. When reading the values with the optical sensor 350+, we do nothing and we further evaluate the read colour. These values do not correspond to the colours we are evaluating.

The whole program is shown in the following illustration. We left the display of the read colour by the optical sensor as a part of it. While the program is running, we can check on the computer monitor what values the optical sensor is reading.

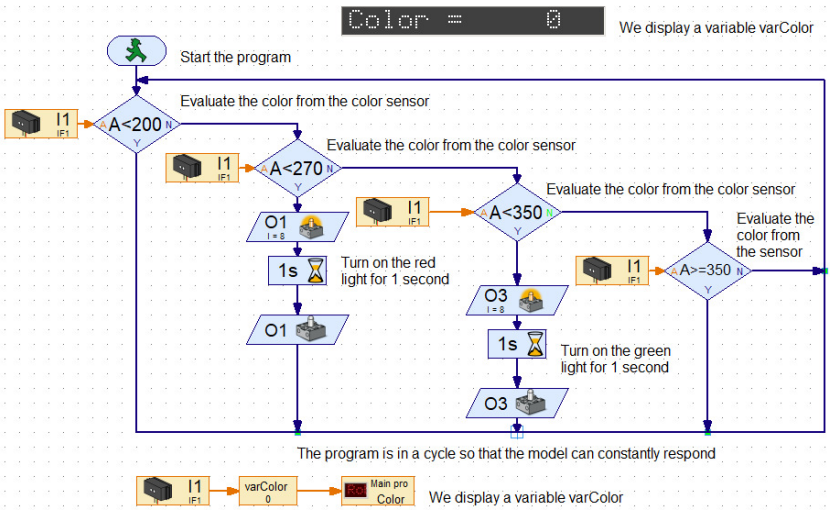

Fig. 4: Final colour reader program in RoboPro IDE by Fischertechnik

Industry 4.0 Technologies (Cobot, AGV) – programming

In the part of training related to the Fischertechnik STEM Kit (assembly, programming) the employees acquire practical knowledge and experience of programming and assembly. This knowledge makes the programming of industrially used Industry 4.0 technologies significantly easier. The programming concentrates first on a cobot and later on an AGV, both in the laboratory.

The programming of the cobot can be performed in two ways – graphically, or writing the code of the program directly. The graphical part is easier to understand, and this part is the one that the employees start with. In the beginning the cobot, its specification and environment is explained. Then there is an explanation of the user interface. The cobot from FANUC can be programmed by iPendant (a device with a touchscreen and keyboard - directly connected to the cobot) and by specialized SW (in this case ROBOGUIDE) running on a personal computer (the data needs to be exported afterwards). Using iPendant is the first part of the graphical programming training, and the employee is guided by a graphical interface and creates a program step by step. They directly see the impact of each program step on the cobot and can perform this step on the real robot. The advantage is that the cobot arm can be moved manually to the positions needed and these positions can be saved in the program. The graphical programming in the PC using ROBOGUIDE SW is very similar. The SW uses a 3D model of the cobot and a model of the iPendant, and you can perform basically very similar activities virtually, and finally export the data to the real cobot. It is intended that the employees will try both modes with the programming of the application concentrated on moving the laboratory's metal cylinders.

The second part of cobot programming concentrates on coding the program itself firstly by iPendant, secondly by PC, which is shown in the following figure. The main advantage of coding is that complex programs can be created more clearly, faster and in a more organized way, however, the graphical (visual) part is missing. The employee also needs to know this part if they are programming because, for example they may be asked to merely modify an existing program and it would be counterproductive to program it again from the beginning. The programming training in this case starts with basic commands and easy programs to show their functions and ends with the application of moving the metal cylinders to the pallets in the laboratory as described in the previous chapter. The collaborative setting of the positions can also be used (setting the positions by hand and saving the position by pressing the button to save the position).

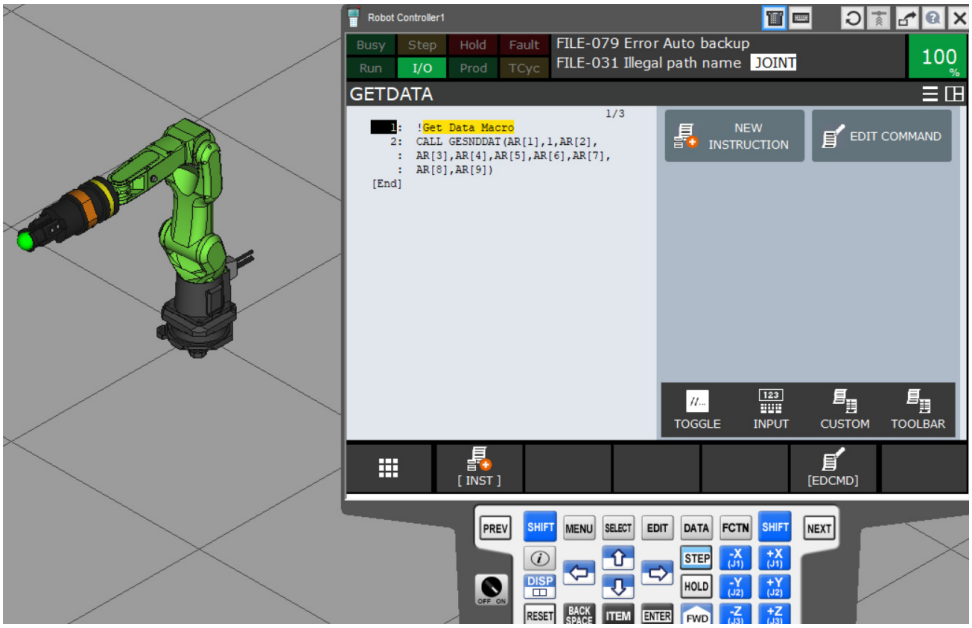

Fig. 5: Cobot programming by PC

The last part of programming Industry 4.0 technologies concentrates on AGV programming, which is easier than cobot programming. The AGV can be programmed manually by using the black line to guide its path and by positioning RFID tags where special commands for the AGV need to be performed (for example: waiting for a button to be pressed, decreasing the speed of the AGV). The second part of AGV programming concentrates on specialized SW programming using Wi-Fi to communicate with the AGV. The AGV is tracked by Wi-Fi and simple commands can be send to it by Wi-Fi directly or automatically. The training is planned so that the employees first create a track using a black line in the laboratory with the RFID tags and then they connect the AGV to the Wi-Fi to program it.

Conclusion

The paper describes a possible approach to employee training about the Industry 4.0 concept. This training consists of 3 main parts, namely motivation, understanding the basic principles and basics of programming and finally working on a large collaborative robot. Motivation of the employees is supported by demonstrating a collaborative robot at work and a demonstration of the interesting tasks which a collaborative robot can perform. The basics of theoretical knowledge, i.e. the possibility of using sensors and power elements, including the basics of programming them, is supported by working with the robotic STEM kit Fishertechnik education - STEM Engineering kit. Finally, the employees go back to the collaborative robot where they learn how to work with it using the basics they acquired in the previous step. This will greatly simplify the beginnings of working with a real collaborative robot.

Acknowledgements

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Arrhythmia Classification: A Review of Machine Learning-based Techniques for Electrocardiogram Signals using Wearable Technologies for the Elderly

Elena A. PARASCHIV
National Institute for Research and Development in Informatics, Bucharest, Romania

elena.paraschiv@ici.ro

Abstract

The electrocardiogram (ECG) is one of the most important medical exams that could display, in form of a trace on a paper, the electrical activity of the heart. Different wearable technologies have been lately developed to monitor and transmit the ECG or other medical parameters of a patient to the medical professionals and are integrated into smartwatches or bracelets in order to be easily used by all types of patients, including the elderly. As they are more exposed to cardiovascular diseases, machine learning-based methods have been implemented, throughout the time, to better and faster classify ECG signals into normal or arrhythmia-related for a quick and correct response. Considering the fact that atrial fibrillation is the most known arrhythmia that could increase the risk of strokes and heart failures, an early detection and prevention can be vital, especially for an elder patient. Therefore, the aim of this article is to present some of the most recent methods of collecting the ECG signals using wearable devices and different machine learning-based techniques used for arrhythmia classification. Moreover, there are highlighted some methods meant to be used for the ECG data acquisition in the ongoing project, entitled "RO-SmartAgeing", which aims to monitor and evaluate the daily activities and medical parameters of an elder patient.

Keywords: Cardiac Arrhythmia, Electrocardiogram, Machine Learning, Wearable Devices.

Introduction

The electrical activity generated by the heart can be easily measured with the electrocardiogram (ECG), a non-invasive and painless medical investigation. Electrical impulses generated by the specialized cells are spread through the heart muscle and can be detected using a machine which shows the ECG signals as a trace on a paper (Jambukia et al., 2015). Thus, any heart abnormalities or irregularities can be detected based on the ECG, including cardiac arrhythmias (ventricular tachycardia, atrial fibrillation, ventricular fibrillation etc.).

Cardiac arrhythmias appear when electrical impulses do not work properly and can cause irregular beats, leading the heart to beat too fast or too slow. As not all of these cardiovascular diseases present certain risks, there are some types of arrhythmias such as atrial fibrillation that is known as the main cause of acute stroke or ventricular tachycardia which can lead to shock or sudden cardiac death.

A normal ECG has a specific shape whereas irregularities on the ECG are being interpreted by doctors as one of the different types of arrhythmias. An early detection of these cardiovascular diseases is very important as it can provide a suitable treatment and can save people's lives. Moreover, considering the fact that most of the elder people are very vulnerable to certain cardiovascular diseases, it is vital to daily monitor their heart activity in order to prevent heart strokes or even death.

That is why, a lot of wearable monitoring devices have been recently developed and can detect changes in one patient's ECG, sending a trigger if the patient is experiencing some problems. The data collected from these wearable devices can further help in building machine learning algorithms for cardiovascular diseases classification in order to faster detect and prevent most of the heart failures.

This is planned to be implemented in the context of RO-SmartAgeing (Ianculescu et al., 2019), a project which aims to monitor and evaluate an elder patient's health. It is being developed a cardiac kit that uses sensors to collect cardiac data (for ECG and pulse). Thus, many heart abnormalities can be early detected in order to prevent any strokes or even cardiac death. Furthermore, the collected data is then being processed and automatically classified as normal or related to a cardiovascular disease based on machine learning and deep learning algorithms.

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Therefore, the aim of this paper is structured as to present a review of recent wearable technologies, machine learning and deep learning methods for ECG signals data acquisition and classification in order to early detect cardiac arrhythmias. Furthermore, this paper also presents the methods meant to be used in RO-SmartAgeing project for the collection of an elder patient's ECG.

Electrocardiograms & Arrhythmias

As it is generally known, every beat causes an electrical impulse to be transmitted and to travel through the heart, forming a wave which makes the muscle to shrink and to pump blood. Thus, an ECG is a graphic representation of the electrical events in a cardiac cycle and it represents an essential diagnostic tool for cardiac arrhythmia detection.

A normal heartbeat on an ECG, presented in Figure 1, shows the timing of the atria and ventricles. The upper chambers (right and left atria) forms the first wave, called the "P wave" on the ECG, when the impulse goes from the top to the bottom chambers. The "PR interval" is represented by the time in which an electrical impulse moves from the atria to the ventricle, whereas the "QRS complex" is formed based on the bottom chambers (right and left ventricles) and it corresponds to the depolarization of the right and left ventricles. The "T wave" corresponds to the ventricular repolarization and the "ST segment" represents the time between ventricles' depolarization and repolarization, as in the ventricular contraction.

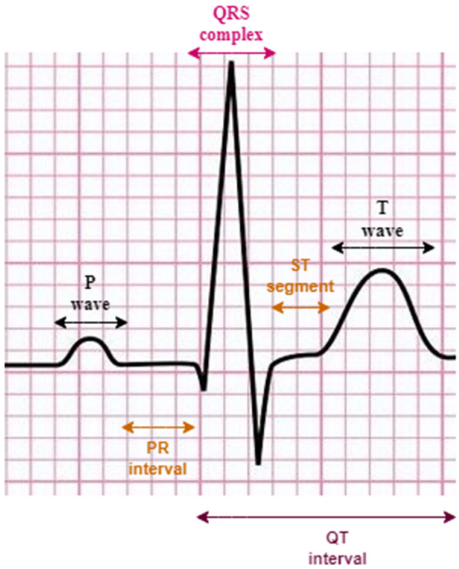

Fig. 1: A normal ECG

Source: adapted from (Rajkumar et al., 2019)

An ECG is usually done in order to measure if the electrical activity is normal, fast, slow or if it has irregularities and, based on measuring the amount of electrical activity that goes through the heart muscle, the cardiologist can find if some parts of the heart are too large or too overweighed. So, it is an important tool for cardiovascular diseases detection.

According to the World Health Organization, cardiovascular diseases represent the first cause of death all over the world (approximately 17.9 million of people died in 2016, which represent approximately 31% of all global deaths) (World Health Organization, 2016). Most of them are caused by different risk factors, such as the use of tobacco or alcohol, obesity, the lack of physical activity or unhealthy diets and an early detection and prevention of such diseases are mandatory for a patient's life.

When it comes to irregularities in the heartbeats rate or rhythm, arrhythmias are the most representative family of cardiac distortions (Zheng et al., 2020). Different manifestations, such as slow or fast heartbeats, may appear and are represented by sinus bradycardia (low heart rate) and atrial tachycardia (fast heart rate). Moreover, an abnormal rhythm with absent or deformed wave segments and intervals can be diagnosed as premature ventricular contraction, but the most common and risky type of arrhythmia is represented by atrial fibrillation, cardiac disorder frequently met in elder patients (75-85 years old). This can lead to a 5-fold increase in the risk of stroke and a 3-fold increase in the incidence of heart failure. Atrial fibrillation, presented in Figure 2. (the absence of the "P" wave) influences the increase of blood in the atria and forms blood clots which can lead to heart strokes or to heart failures due to the overworking the heart muscle.

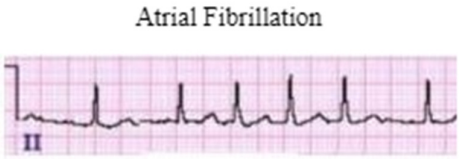

Fig. 2: The example of an ECG with atrial fibrillation

An arrhythmia represents a challenging situation, especially for the elderly, but an early detection and prevention can be life saving for most of the people. That is why, throughout the time, researchers have developed different wearable devices and computer aided diagnosis-based methods and techniques.

Wearable devices for arrhythmia detection

With the continuous development of different wearable technologies, ECG monitoring have started to become very important as it can provide an early detection of certain cardiovascular diseases, thus helping and preventing serious cardiac damages. Such sensors help both medical professionals and patients as it reduces the healthcare services costs and improves the quality of life.

The automatization of ECG analysis has recently become an essential part of any Internet of Things (IoT)-based healthcare monitoring device as it assumes the implementation of different algorithms that are embedded in wearable devices.

An interesting device is presented in (Chun et al., 2016) and it includes two electrodes. One of them is in contact with a finger on one hand and the other is placed on the wrist of the second hand. The pre-processing of the ECG signals contains a bandpass Butterworth filter with order 14. The features were investigated using Short Time Fourier Transform and a user authentication system was developed. A Euclidean distance for wearable devices has been proposed that has the property of not being able to give the access to others' ECG information.

Another solution is developed in (Azariadi et al., 2016) and it provides the implementation of an IoT-based embedded platform. The proposed algorithm is formed based on a wearable ECG diagnosis device that can monitor the electrical activity of a patient for 24 hours. The ECG analysis is performed using Discrete Wavelet Transform and Support Vector Machine for classification, which achieved an accuracy of 98.9%. This device and the embedded platform could be further used in heart activity monitoring.

Lately, more and more wearable technologies for the heart health monitoring have been developed on a lot of smartwatches. One of these, used in the RO-SmartAgeing project, for the early detection of arrhythmia in the elder patients, is the Withings Move ECG. It corresponds to a non-invasive way of acquiring ECG signals and it is able to diagnose different heart issues, such as arrhythmias (especially atrial fibrillation). The ECG measurement on the Withings smartwatch is made possible due to two electrodes placed on the back of the watch case and an electrode on the metallic ring bezel. When the button is pressed and the hand is placed on the ring electrode, the Withings Move ECG smartwatch begins to record the heart's electrical activity of the patient.

Thus, rather than placing electrodes on skin, more and more people incline to use such devices for a daily monitoring of the heart as it can early predict certain disorders and are more user-friendly through the easy to use mobile applications.

Machine Learning & Deep Learning for Arrhythmia Classification

The ECG databases that have been proposed during the past decade have been used for the development of different approaches and techniques based on machine learning and deep learning for ECG arrhythmia classification. The importance of this classification is more and more highlighted as a lot of medical applications have been developed consider that the analysis and classification of ECG data collected from different wearable devices are essential tasks.

Machine Learning and Deep Learning have recently become very successful in image classification, signal processing and speech recognition tasks and they are continuously rising as the technology has started to improve in terms of healthcare and clinical practices.

A method was proposed in (Alfaras et al., 2019) and it presents a machine learning technique related to a supervised learning principle for Recurrent Neural Networks (RNNs), known as Echo State Networks (ESN). A recurrent neural network is a type of artificial neural network, frequently used in speech recognition and natural language processing. It is suited to process time-series data and to recognize sequential characteristics and, based on the resulted patterns, it predicts the next scenarios. The developed idea is based on driving a random and large RNN with the input signal

and combining the requested output signal by a trainable linear combination of all the response signals. The classifier assumes a feature processing that needs a single ECG lead and the final results can be aligned with the data collected from heart-monitoring wearable devices and sensors. The MIT-BIH Arrhythmia Database (MIT-BIH AR) (Moody et al., 2001) and the AHA Database (Goldberger et al., 2000) were used for the evaluation of the proposed classifier. The MIT-BIH Arrhythmia database, publicly available at *PhysioNet*, is known to be used in different machine learning and deep learning algorithms. As it consists of 2 channels of ECG data, the method only uses the first one. It was obtained a sensitivity of 92.7% for the MIT-BIH AR database, using the single lead II and a sensitivity of 95.7% using the lead V1'. They concluded that the ESN method is suited for long-term recordings and large databases and they also checked the timing of the classification algorithm on CPU and GPU, the last one offering a faster computing than 11 hours for the CPU.

Another classification approach was implemented in (Singh et al. 2019) for four different types of arrhythmias based on the MIT-BIH Database and machine learning techniques. The data was first pre-processed as it might have contained noises (wandering noises, respiratory muscle noises etc.) using mean-shift and an average filter (with kernel size = 10). The detection of heartbeats is developed using three features: amplitude, area with non-overlapped sliding window and area with overlapped sliding window and the classification part is implemented using five classifiers (Support Vector Machine, Decision Tree, Random Forest, Naïve Bayes and Artificial Neural Network). The results suggested that the Artificial Neural Networks with pre-amplitude features provide the best results with an accuracy of 99.59% and Support Vector Machine with non-overlapping sliding window features performed an accuracy of 98.97%. They also suggest the development of a comprehensive module that could be used for mobile.

The automatic diagnosis of heart disease is also emphasized in (Huang et al., 2019) using the MIT-BIH Arrhythmia Database and the implementation is represented in Figure 3. The method proposed an ECG arrhythmia classification using two-dimensional (2D) deep convolutional neural network (CNN) receiving as input the spectrograms of the five arrhythmia types being transformed from the time domain signals of ECG with the help of Short-Time Fourier Transform (STFT). The STFT is derived from the discrete Fourier transform and is designed to explore instantaneous frequencies and amplitudes of localized waves with characteristics that vary over time. The ECG signals are converted into time domain and are represented as spectrograms in time-frequency. The proposed neural network includes three Convolutional layers, followed by three MaxPooling layers. The averaged accuracy was 99.00% and they also compared the model to a 1D-CNN model and with other existing techniques concluding that the method of classifying the ECG spectrograms without any pre-processing can achieve good performances.

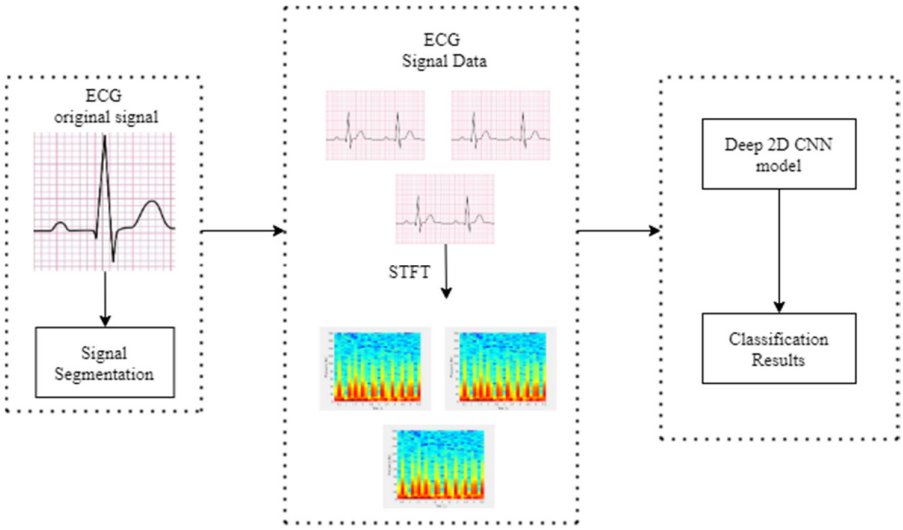

Fig. 3: The proposed 2D-CNN for arrhythmia classification

Source: adapted from (Huang et al., 2019)

Arrhythmias are also detected using deep learning in (Işın et al. 2017). A general image dataset is used for training in order to automatically classify the patient's ECG into the corresponding cardiac condition. After pre-processing the data, the method assumed the detection of QRS complexes as they are the most representative for the ventricular activity. Consequently, for feature extraction, a transferred deep convolutional neural network, called AlexNet, is being used and the features represent the input for a simple back propagation neural network. The main idea of the method is to develop a deep learning technique which can accurately classify three conditions of ECG waveform selected from the MIT-BIH arrhythmia database. Therefore, this deep learning implementation for feature extractions

combined with a simple back propagation neural network obtained a recognition rate of 98.51% and a testing accuracy of 92% making it possible for this technique to be further used as an accurate application.

RO-SmartAgeing: Electrocardiogram Data Acquisition

In the context of the "Non-invasive monitoring and health assessment of the elderly in a smart environment (RO-SmartAgeing)" ongoing project designed to monitor and support the active life of elder patients at home, early detection and prevention of age-related conditions and dysfunctionalities can improve their health, helping them to have a normal and active life.

Being an IoT-based project, RO-SmartAgeing aims to collect all the medical and ambient data through wearable devices or sensors and send them to a Cloud where they can be visualized by the doctor or alert the medical professionals if there are any abnormalities. At the same time, all the data collected is meant to be processed and used in different predictive models for a faster classification and prediction of medical conditions. Thus, considering the fact that the elderly is more exposed to heart failures or strokes, it is necessary to daily monitor the cardiac activity in order to prevent certain heart abnormalities.

The electrical activity of the heart will be monitored with the AD8232 sensor, compatible with Arduino, a single-board microcontroller or Raspberry Pi module. The single-lead, heart monitor device, AD8232, is able to extract, amplify and filter small and noisy biopotentials signals.

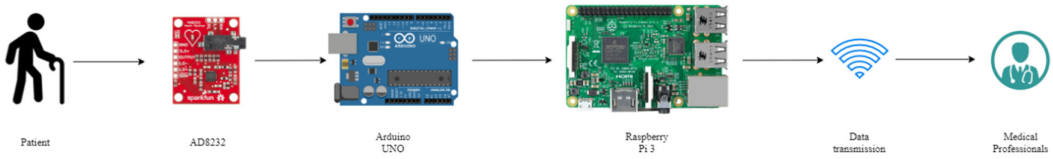

Fig. 4: ECG data acquisition

Three electrodes are placed on the patient's body to gather the electrical signals, as it is represented in Figure 4, and send them to the cardiac monitor. The data is then transmitted to the Arduino board which is connected to a single-board computer, named Raspberry Pi which has built in WiFi for a better and faster transmission of the data to be visualized by medical professionals. In case of an emergency, the system is also developed to send alarms to the doctor, as shown in Figure 4.

It is important to place the electrodes closer to the heart in order to achieve better measurements, two of them being placed on the forearms and the last one on the leg, as it can be seen in following figure.

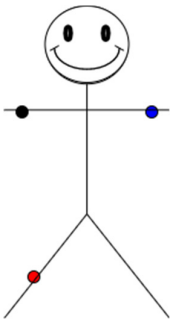

Electrode Color	Signal
Black	**RA (Right Arm)**
Blue	**LA (Left Arm)**
Red	**RL (Right Leg**

Fig. 5: The Electrodes placement

Conclusion and Future Work

As the continuous increasing of technology has started to gain territory in most of the fields, the healthcare system has also become more and more technologized through the development of different wearable devices or machine learning and deep learning algorithms. Considering the fact that the elderly is the most vulnerable, especially to cardiovascular diseases, nowadays, an early detection and prevention of them is mandatory. Arrhythmias are considered to be the most severe cardiovascular diseases as they can influence the appearance of strokes and heart failures, leading to different heart problems or even cardiac death. That is why, wearable technologies for ECG and heart pulse, as well as machine learning-based techniques for arrhythmia classification, have lately gained a lot of attention as they can help to early detect the occurrence of any irregularities on the ECG and, eventually, transmit a trigger to the medical professionals in case of an emergency.

This paper has presented a review of the wearable devices recently developed for ECG data acquisition, some machine learning and deep learning methods used for arrhythmia classification and the technique meant to be implemented in the ongoing project, RO-SmartAgeing, for collecting ECG signals from elder patients. Therefore, the collected data can be further used in the development of different machine learning algorithms for an automatic classification of arrhythmias, thus helping patients to early detect and prevent this disease.

Acknowledgement

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Identification and Assesment of Risk Factor for Large-scale Running Events from the Organizers' Perspective. Marathon Case Study

Jacek ŁUCZAK
Poznań University of Economics and Business in Poznan, Poznań, al. Niepodległości 10, 61-875 Poznań, Poland
E-mail: jacek.luczak@ue.poznan.pl;

Małgorzata MIŚNIAKIEWICZ
Cracow University of Economics, College of Management and Quality, Department of Food Product Quality, Krakow, Poland
E-mail: malgorzata.misniakiewicz@uek.krakow.pl

Jose M. SAAVEDRA
Physical Activity, Physical Education, Sport and Health (PAPESH) Research Centre, Sports Science Department, School of Social Sciences, Reykjavik University, Reykjavik, Iceland
E-mail: saavedra@ru.is

Abstract

Marathon is one of the fastest growing sports disciplines and it generally boasts a large number of participants from around the world. As the organization and management of large-scale running events poses a real challenge, risk evaluation should always precede the decision-making regarding the safety and precautionary measures. The purpose of the research was to identify and assess the risk factors of large-scale running events on the example of marathons organized in Poland. Fourteen of the largest marathons held in 2017 in Poland were considered in the study. Fifteen experts were questioned using the Delphi method to carry out the multistage identification of risk factors for organization of a large-scale run, while 31 practitioners - the representatives of marathon organizing teams - conducted the risk assessment. Considering the effect and likelihood of the appearance of an adverse event, the most important turned out to be risks related to the financing of marathons, organization issues, including the event start date, the acceptance of the local community, the organization of the finish line, delayed start, cyber security, disclosure of personal data and problems with the measurement of time. The obtained results may serve as reliable input data for the efficient risk management of sporting events (runs in particular). Professional risk management, based on the risk factors database worked out as a result of the research, may become a starting point to provide the highest possible level of safety and satisfaction for all the stakeholders involved in the event.

Keywords: Risk Management, Risk Factors for Marathons, ISO 31000, Safety, Satisfaction.

Introduction

Recreational running as one of the most accessible forms of exercise is not only a physical activity that contributes to a preventive health action, but a widely practiced sport (Petridis, 2015).

The popularity of running arrived in Poland with a certain delay - in the West it was already popular in the 1970s, whereas it appeared in Poland at the beginning of the 21st century. Approximately 20% of the adult population of Poles is now practicing recreational running, which is the highest percentage in Central and Eastern Europe (Poland Runs, National Runners Survey, 2014). Most runners, within less than a year after the start of regular training, begin to passively and eventually actively participate in mass running events (Dzięgiel & Lubowiecki-Vikuk, 2013; Petridis, 2015). Interestingly, the runners rarely choose to take part in one or two marathons a year. They often participate in a few or even several large-scale running events in the course of a year (Hitchings & Latham, 2017).

Large-scale running events arouse a lot of emotions and are associated with great expectations of the organizers, participants, spectators and sponsors. Engaging large funds also carries a lot of uncertainty in many organizational aspects (Fuller & Drawer, 2004; Leopkey & Parent, 2009). Their complexity results from legal and formal

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requirements as well as the fact that each event and even each subsequent edition is different, which limits the possibility of using standard solutions. The specificity of a running event also results from the limited possibility to introduce changes during its duration, which excludes the improvement of the plan during its implementation. The diversity of the number of participants and their sporting level, as well as limited time and date of the event should also be taken into account (Scheerder, Breedveld & Borgers, 2015). All of that explains why professional management of sporting events is a necessary element to carry out the project, such as organizing a running, effectively.

Participants of marathons, in addition to professional runners, are more often amateurs. An ever-increasing amateur participation in marathons driven by the will to compete, test themselves, experience something new and extreme also creates a certain risk, which is now becoming ever important and hard to control. 'When the person is inexperienced, it is likely they do not understand the potential risk that may be presented during the competition' (Miller, Pauline & Wendt, 2013, p. 18). The acceptance of the risk of the event may be the result of ignorance of the actual levels of risk involved (Fuller & Drawer, 2004). Therefore, the sporting event managers have a major responsibility for identifying and managing the risk associated with the running event. Risk management becomes crucial when the participation in a sporting event, such as a long-distance run, requires neither a certain level of experience, nor a medical certificate of good health to enter it.

Although large-scale sporting event risk management policies have been analysed and discussed in general, little research has been conducted regarding risk management in running events (Miller, Pauline & Wendt, 2013; Moyle, Kennelly & Lamont, 2014). That is why, an answer to the following research question has been sought: How can the organizers of running events ensure a safe and satisfying environment for the participants (mostly amateurs) and manage the risk for a long-distance run professionally The long-term goal of the research was to add to the evolving industry of large–scale running events in Central and Eastern Europe the knowledge about practical aspects of risk management, so the records of risk as identified by the experts and verified by the practitioners could be mitigated and controlled.

Research problem in the context of literature

Risk can be treated as a threat of 'any future incident that will negatively influence the event' (Bowdin et al., 2006, p. 318), or neutrally as a tool useful to 'minimize liabilities and maximize opportunities" (Silvers, 2008, p. 22). It is worth emphasizing that the word risk comes from the Latin word 'riscore', meaning - dare, which means that it should be perceived as a conscious choice, not a necessity. However, it should also be noted that risk is often not fully realized (Appenzeller, 2005; Boo & Gu, 2010). Running events' organizers carry risks that are both known and unknown to the administrator. While running event directors have the responsibility to provide the safest conditions possible, participants have an equally important responsibility to ensure their own physical readiness to undertake such activity (Boo & Gu, 2010; Fuller & Drawer, 2004).

Sport events are carried out in conditions of uncertainty, which is built by internal and external factors (DSDM Consortium, 2010); however, there is no unambiguity as to the relation between risk and uncertainty. It happens that both terms are used interchangeably, but it can also be stated that the uncertainty in the shorter periods takes the form of risk, or that 'the risk is a specific uncertainty' (DSDM Consortium, 2010, p.12). The ISO 31000 standard defines the risk as the effect of uncertainty in pursuing a set goal (ISO 31000, 2018) and draws attention to the management of diversified risk. The standard also emphasizes the need for an individual approach to the definition adjustment as well as to the consideration of specific needs. Risk management includes the context determination, risk assessment (including risk identification, analysis and evaluation) and risk treatment (ISO 31000, 2018).

In the literature on the event organization, risk management is often referred to as an action that aims at controlling the impact of unforeseen issues or accidents that take place within an event; thus, it is a proactive process (Ammon & Brown, 2007; Hanstad, 2012; Leopkey & Parent, 2009).

It is indicated that risk management in large-scale sporting events is becoming increasingly important and should be explored from different perspectives, as the holistic approach is recommended (Moyle et al., 2014; Leopkey & Parent, 2009; Emery, 2010). However, governing bodies are the authorities of major responsibility for identifying and managing the risks associated with the event (Fuller & Drawer, 2004). In Europe the problem of the organization of large-scale running events and their risk assessment was rarely analyzed (Miśniakiewicz & Łuczak 2014; Kose, Argan & Argan, 2011). Most papers on events risk management and reports on sport event risk come, however, from the US, Canada and Australia (Appenzeller, 2005; Nohr, 2009; Leopkey & Parent, 2009; Matheson, 2006).

Various studies have been conducted in the field of sport and sporting event risk management. The researchers have usually centered their interest around security and crowd control (Appenzeller, 2005; Giulianotti & Klauser, 2010; Zoltak, 2001), injuries (Fuller & Drawer, 2004; Hespanhol, Pena Costa & Lopes, 2013), facility management (Preuss, 2007), effect of terrorism (Giulianotti & Klauser, 2010; Toohey & Taylor, 2008), actual losses caused by an event (Crompton, 1995) and lack of organizational planning (Getz, 2002). Special attention was paid to an overall impact of a sporting event on stakeholders (Leopkey & Parent, 2009) and risk management strategies by stakeholders, as well as on practices (manager profile, skills required and critical success factors) in sporting events (Emery, 2010). Different perspectives have been taken into account within risk management – the stakeholders in general (Leopkey & Parent, 2009) and participants in particular (Hanstad, 2012; Fuller & Drawer, 2004). Sporting event managers' attitude, beliefs and constraints have been analyzed (Reid & Ritchie, 2011).

Furthermore, risk issue categories by stakeholder groups have been identified (Leopkey & Parent, 2009). The study provided the list of 15 risk issue categories important when dealing with risk management in sporting events: environmental, financial, human resources, infrastructure, interdependence, legacy, media, operations, organizing, participation, political, relationship, visibility and human resources. It was a starting point for the research on the assessment of risk management in large-scale running events.

Until now, the researchers were mostly focused on sporting events of international importance that were considered in the social, economic, promotional or planning context (Boo & Gu, 2010; Toohey & Taylor, 2008). There are few studies on events carried out for amateurs (i.e. Miśniakiewicz & Łuczak 2014). The intention of the authors was to fill this gap. In the light of critical evaluations of the legitimacy of the organization of mega events - debatable social and financial benefits that most often demonstrate the legitimacy of their organization (Crompton, 1995; Preuss, 2007) it can be concluded that the smaller sporting events of national and local importance will be those that shall gain popularity in the future (Matheson, 2006).

Methods

The paper bases on the preparatory research (1) conducted in 2017 and the main research (2) conducted in 2017-2018. They aimed at identifying risk factors and estimating the risk related to organizing marathons (Table 1).

Table 1. Characteristics of the preparatory and the main study

	Preparatory research	Main research
Research method, conducted analyses	Delphi method	Reliability analysis, risk assessment; cluster analysis, factor analysis
Research tool	Discussed questionnaire	Questionnaire
Size of population sample	15 experts	31 representatives of 14 marathons
Duration of research	2017	2017-2018
Research objective	Identification and grouping of risk factors related to organizing marathons. Preparation of the proper research	Risk assessment and analysis in reference to organizing marathons
IT tools, form of research realization	E-mail contact, meetings	e-risk app

Source: own research.

Within the preparatory research the Delphi method (Thangaratinam & Redman, 2005) was applied. The research involved fifteen experts in organizing long-distance runs. They were experienced participants (5), marathons organizers (5) and researchers in the areas of sports and project management (5).

The authors prepared a list of risk factors on the basis of the relevant professional literature (Leopkey & Parent, 2009), own experience and legal requirements in Poland and grouped them with the use of the Ishikawa diagram. The list of factors arranged in this form was sent via Internet to research participants, who shared their remarks, i.e. confirmed the validity of the included risk factors or considered them inadequate. They also proposed other factors and additional risk factor groups. After having taken participants' remarks into account, the material was sent again several times. The remarks were exchanged a few times (5-9) with most experts, which led to the modification of the factor list. These actions amounted to the basis of the research questionnaire

Reliability analysis (Cronbach, 1951; Peterson, 1994) of questionnaire was applied with the use of the Cronbach's

alpha statistics to confirm the adequacy of the applied research instrument (Peterson, 1994). The Cronbach's alpha statistics result reached the level of 0.933 (21 positions). According to the classical interpretation the coefficient should have the minimum value of 0.6, whereas the preferable value of the coefficient is approx. 0.9. Thus, the internal cohesion of the research instrument was confirmed.

Within the main research agreed risk factors were evaluated on the scale ranging from 1 to 4, according to their significance (impact) and probability of occurrence (Table 2).

Table 2: Characteristics of selected values in the proper research.

Scale	Probability		Impact	
1	Marginal and low (0-30%)	• Risk will not occur or will occur occasionally • Expected number of occurrences within a period: fewer than 1 time in 5 editions.	Insignificant	Difficulty in realizing a sporting event, which influences its course and objective realization in an insignificant way
2	Medium (31-60%)	• Risk occurrence is real, but does not exceed 60%. • 1 occurrence in the last two editions.	Medium	Clear and tangible impact on the organization and the course of a sporting event as well as objective realization
3	High (61-80%)	• There are rational premises that the risk will materialize. • It occurred once in the last edition.	Large	Significant impact on the organization and the course of a sporting event as well as the realization of objectives, including the ones related to health, large impact on an event's reputation
4	Very high (81-100%)	• There are rational premises that the risk will almost surely materialize. • In the last edition it occurred at least 2 times.	Very significant	Related to health and life of participants, the necessity to terminate the event, no objectives are achieved.

Source: own study based on ISO 31000.

The research was supported by the IT tool e-risk (e-risk.pl). It allows for multi-dimensional configurability in reference to the methodology and risk factors. Moreover, it enables the full control of the activity of research participants. Three experienced representatives of selected marathons carried out the risk assessment. All fourteen analysed marathons were city runs held on flat or moderate terrain in Poland. Therefore, the events were similar in many aspects, e.g. climate conditions, participant profile, the declared standard of organization, legal regulations relevant to the organization process.

Research Results

The research resulted in approving 75 risk factors divided into nine groups: Safety (1), Budget and finance (2), Information (3), Comfort and satisfaction of participants (4), Organization (5), Start package (6), Recovery and energy support (7), Reputation (8), Environment and force majeure (9). Within each factor group, more specific risk factors were further indicated (Table 3).

Table 3: Groups and risk factors – the result of the preparatory research

Group 1. Safety	Group 2. Budget and finance	Group 3. Information
1.1. A serious accident on the route 1.2. An intrusion of a third party onto the running route 1.3. A participant of insufficient	2.1. Insufficient income from participant fees 2.2. Insufficient funding from sponsors 2.3. Insolvency	3.1. Obsolete news on the website 3.2. Lack of/insufficient contact with potential participant 3.3. Insufficient promotion/information on

health condition 1.4. A collision between people, people and objects, etc. on the running route 1.5. A terrorist attack 1.6. Intentional pollution/spoilage of food/beverages available along the route/in the finish zone 1.7. Insufficient medical support	2.4. Lack of profit at the planned level 2.5. Time overlapping with another rival event 2.6. Large participation fee	external web sites 3.4. Unintended disclosure of personal data 3.5. Personal data theft 3.6. A cyber attack - modification, blocking of the website 3.7. Lack of a clear, interactive map of the route 3.8. Lack of early information about the result
Group 4. Comfort and satisfaction of participants	Group 5. Organization	Group 6. Start package and medal
4.1. Lack of free accommodation 4.2. Poor organization of the deposit office 4.3. Difficulty in reaching the start of the marathon 4.4. Lack of parking space near the start 4.5. Inability to receive start packages on the day of competition 4.6. Mass start (not in waves) 4.7. An inappropriately narrow route, narrows 4.8. Lack of/unclear information about the covered distance 4.9. An unattractive route 4.10. An unattractive export, a poorly-located expo 4.11. Lack of access to showers after the competition	5.1. Inappropriate running route identification 5.2. Insufficient access to toilets 5.3. Unattractive catering at the finish 5.4. Impossibility of gathering spectators in the start and finish zones 5.5. Inappropriate organization of the run - jams after the start 5.6. Inappropriate organization of the finish 5.7. Lack of the appropriate atmosphere during the event 5.8. Problems related to organization, time of the event etc. with the local community and the administration 5.9. Delayed start 5.10. A smaller than usual number of nutrition points 5.11. Inappropriate organization of nutrition points 5.12. An insufficient number of volunteers 5.13. Lack of volunteers' engagement 5.14. Faulty time measurement 5.15. Lack of established procedures 5.16. Limited human resources 5.17. Incompatibility of the running route capacity with the number of participants	6.1. An unattractive start package 6.2. An unattractive design of the medal 6.3. An insufficient number of medals 6.4. An insufficient number of start packages
Group 7. Recovery and energy support	Group 8. Reputation	Group 9. Environment and force majeure
7.1. Lack of access to massage in the finish zone 7.2. Lack of appropriate hydration of participants 7.3. An insufficient amount of water at recovery points 7.4. An insufficient number isotonic drinks at recovery points 7.5. An insufficient number of	8.1. Unfavorable media information on the national scale 8.2. Unfavorable media information on the local scale 8.3. Lack of information about the event in the national media 8.4. Lack of information about the event in the local media 8.5. An insufficient number of	9.1. Downpour 9.2. Strong wind 9.3. An overly low temperature 9.4. An overly high temperature 9.5. Difficult conditions of the running route 9.6. Traffic in the direct vicinity of the event 9.7. Force majeure

energy gels, fruit etc. at recovery points 7.6. Random choice of nutritional products at recovery points and the finish 7.7. Low health quality of the offered nutritional and recovery products 7.8. Lack of nutritional awareness of participants 7.9. Lack of nutritionists' support 7.10. Lack of/insufficient number of cooling points along the route	participants 8.6. A rival local event	

Source: own research.

Experts emphasized the importance of factors related to the physical safety of participants and organization. They also stressed risks linked with accidents on the route, bad health condition of participants, as well as terrorist and bioterrorist threats. Furthermore, personal data protection, especially compliance with GDPR, turned out to be significant. Experts clearly recognized the risk related to not assuring participant satisfaction – in the questionnaire they took account of issues linked with start packages, start organization, route attractiveness and deposit organization. Finally, the risk factors resulting from the preparatory research were used in the risk assessment conducted in the main research.

The average values of risk factors were calculated considering the ones of the highest risk and the largest frequency. Five groups of risk factors were distinguished:

- The most significant (15) – the average value from 5.10 to 6.23,
- Less significant (21) – the average value from 4.14 to 4.94,
- Neutral (18) – the average value from 3.14 to 3.90,
- Of little significance (9) – the average value from 2.48 to 2.95,
- Insignificant (13) – the average value from 1.33 to 2.24.

Respondents indicated the risk related to financing a marathon as the most significant one (insufficient income, profit at an unsatisfactory level, insolvency), followed by: organization (limited human resources, inappropriate organization, delayed start, incompatibility of the running route capacity with the number of participants), safety issues related to terrorist threats, cyber safety and participant's health condition (Table 4).

Table 4: The most significant and the less significant risk factors of organizing a marathon

Code	The most significant risk factor	Average	Range	Standard deviation
2.2.	Insufficient funding from sponsors	6.23	7.53	2.50
5.16.	Limited human resources	6.03	5.00	1.56
5.8.	Problems related to organization	6.01	7.50	2.35
9.7.	Force majeure	5.97	6.00	1.96
2.5.	Time overlapping with another rival event	5.93	3.00	0.92
5.6.	Inappropriate organization of the finish	5.92	6.00	1.67
3.4.	Unintended disclosure of personal data	5.79	6.75	2.39
5.14	Faulty time measurement	5.77	7.50	2.55
2.1.	Insufficient income from participant fees	5.71	5.89	1.86
6.3.	An insufficient number of medals	5.71	4.50	1.45
2.4.	Lack of profit at the planned level	5.27	7.00	2.13
3.6.	A cyber attack – modification, blocking of the website	5.26	6.75	2.34
5.9.	Delayed start	5.26	3.44	1.00
5.17.	Incompatibility of the running route capacity and n° participants	5.17	5.50	1.69
2.3.	Insolvency	5.10	7.78	2.69

Code	Less significant risk factor	Average	Range	Standard deviation
6.1.	An unattractive start package	4.94	4.50	1.54
8.1.	Unfavorable media information on the national scale	4.85	6.50	1.74
4.5.	Inability to receive start packages on the day of competition	4.79	6.89	1.99
5.13.	Lack of volunteers' engagement	4.69	3.25	0.99
5.5.	Inappropriate organization of the run – jams after the start	4.68	3.67	1.05
9.1.	Downpour	4.68	4.75	1.48
3.5.	Personal data theft	4.61	4.00	1.39
8.5.	An insufficient number of participants (too little interest)	4.56	6.00	1.79
3.3.	Insufficient promotion/information on external websites	4.53	4.25	1.40
4.7.	An inappropriately narrow route, narrows	4.51	4.50	1.57
5.1.	Inappropriate running route identification	4.41	5.00	1.74
5.12.	An insufficient number of volunteers	4.40	4.50	1.45
9.4.	An overly high temperature	4.37	5.25	1.64
1.1	A serious accident on the route	4.36	3.25	1.14
7.3.	An insufficient amount of water at recovery points	4.35	5.00	1.72
1.2	An intrusion of a third party onto the running route	4.23	3.75	1.21
4.3.	Difficulty in reaching the start of the marathon	4.19	5.00	1.89
4.2.	Poor organization of the deposit office	4.17	2.50	0.92
8.6.	A rival local event	4.16	8.00	2.36
1.5.	A terrorist attack (an explosion, shooting, ramming)	4.15	6.00	1.89
1.7.	Insufficient medical support	4.14	5.50	1.55

Source: own research.

These findings may be found useful when focusing on specific factors and making organizational decisions. It can be observed that problems with funding and organization (limited human resources) are important. For participants and spectators likewise, it is a big festival; however, cyclical events disorganize the life of the local community. What is more, the substantial number of events and the season "limited" by the calendar often lead to a decrease in the number of participants due to rival marathons organized at the same or similar time. It is worth noting that the importance of threats to the safety of participants and viewers, the risk of a terrorist attack, and the need to protect personal data are increasing nowadays (Lamont & Kennelly, 2012; Toohey & Taylor, 2008) as suggested by the obtained results.

Conclusions

The presented research has pioneered the systematic and methodological risk assessment of organizing large-scale running events on the example of marathons held in Poland. It may become a starting point for conducting further studies in reference to risk analysis and taking mitigation actions as well as examining their efficiency.

As a result, a database of risk factors (75) was developed regarding the organization of long-distance runs (marathons) and they were divided into separate groups (Security, Budget and Finances, Information, Comfort and Satisfaction of Participants, Organization, Starter Pack and Medal, Regeneration and Energy Support, Reputation, Environment and Force Majeure).

After assessing the risk, taking into account the effect and the likelihood of a given factor, 5 groups of risk factors were identified (the most important, less important, neutral, not important and insignificant). The most important factors are related to the financing of marathons, organization issues, including the start date, the acceptance of the local community, the organization of the finish line, delayed start, cyber security, disclosure of personal data, problems with the measurement of time.

The research resulted in obtaining unequivocal data of risks on which mitigation actions should be centered. The risks are related to assuring funding for marathons, physical safety and personal data protection. The substantial number of marathons (and other sporting events) makes it extremely difficult to find such an event date that does not overlap with other runs and is favorable in the context of weather conditions. The most significant factors included threats leading to accidents on the route, which call for security measures, but also generally point to an insufficient number or lack of security service's engagement.

The research findings have led to the development of the elementary database of risk factors and the verification of the applied methodology (including the e-risk application). Moreover, the research may serve as a methodological source for any marathon organizer.

The emerging industry of large-scale running events, as the example of Poland shows, needs a mature approach to risk management. Although the "consideration of risk only from the perspective of event organizers is myopic" (Moyle et al., 2014, p. 102), there must be something to start with, as the organizers should "expect the best and prepare for the worst" (Moyle et al., 2014, pp.102-103). The risk assessment of marathons from the organizers' point of view seems to be a step in the right direction. Taking into account the perspective of a large-scale running event organizer, the analysis and evaluation of risks associated with the organization and execution can help to develop more effective ways to minimize these threats. The most significant risks that should always be appraised by the management system were indicated in the study. If duly considered, they surely increase the security of mass participation races and the level of confidence of both organizers and participants.

Disclosure Statement

The authors reported no potential conflict of interest.

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Study on Start-Ups in Romania

Cristina Elena BIGIOI

Politehnica University of Bucharest, Bucharest, Romania
cristina.dumitru@upb.ro

Mirabela Andreea BUDULAN

Politehnica University of Bucharest, Bucharest, Romania
budulan_a@yahoo.com

Abstract

Entrepreneurs are the ones who are the basis of the economy. Through their activity, they allow the development of transactions, create products and services, and offer them to consumers internationally. At the same time, the activity of the commercial companies ensures the incomes necessary for the functioning of the state.

A challenge for entrepreneurs is to ensure the financing of the company's activity.

The state offers the possibility to some companies to benefit in certain conditions from the necessary funds for carrying out the activity. The present study follows the evolution of some companies that benefited from such funds in the first edition of Start-Up Nation held in Romania. The study of the 25 companies shows that many entrepreneurs relied on this financing to run the business, and only a few understood that the success of the business does not consist only in this money (which are few anyway). These funds allowed the purchase of equipment, they were a plus, but the success of the company did not depend on them.

Keywords: Entrepreneurship, Performance, Evolution, Non-Reimbursable Funds

Introduction

Entrepreneurs are people who use the knowledge they have in order to develop a business. Through the activity carried out, they allow the creation and delivery of goods and services to the other participants in the economy. At the same time, they allow job creation. These jobs created and the activity carried out involve debts with various taxes (profit / income tax, VAT, salary tax, other salary taxes). These taxes represent state tax revenues. Thus, a company supports the functioning and development of the economy.

For entrepreneurs, a very important role is played by education, both formal and informal. This education must be continuous.

A crucial role in the life of a company has the financial resources that ensure the continuous development of the activity. The absence of a positive cash flow makes the activity difficult.

According to the study conducted by Ernst & Young (2019), 1 in 2 Romanian startups has been on the market for less than 12 months and 7 out of 10 founders are at the first established company. Approximately one third of startups fail to reach the second year of activity according to data collected in the three editions of the Barometer.

The most important criterion in evaluating the start-up result was considered by 72% of the respondents of the study conducted by E&Y, the financial criterion (profit, turnover).

The mentality and the fear of failure occupy the first place in the top of the most important obstacles for those who want to start and develop a business in Romania. Compared to the previous edition, there is a decrease in the

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importance of access to finance (7% considered it the most important obstacle), but this does not mean that this premise has been solved or improved at national level.

The financing sources of an entrepreneur in starting the startup are:

- Own funds
- European funds
- Non-reimbursable financing from the Romanian state or other institutions
- Family and friends
- Sponsorship
- Angel investor
- Bank credit
- Other source (grants, supplier credit, crowdfunding, etc.)

A possible source of financing is the structural funds, the subsidies received under certain conditions. It is true that most of the time the amounts received from this source are not enough, but they can boost the development of the business if the entrepreneurs know exactly how to use them.

According to the study conducted by E&Y, a significant increase in the share of state funding can be observed (Fig. 1).

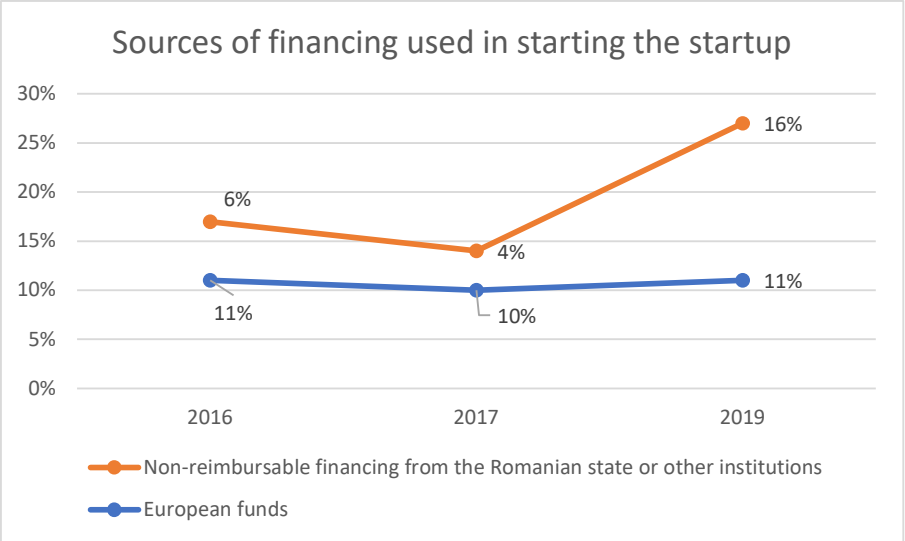

Fig. 1: Sources of financing used in starting the startup

Source: Own processing of the data extracted from study of E&Y

Government programs and European funds remain at the top of start-up options as a source of funding for the next 12 months, with significant increases over previous years. (Fig.2)

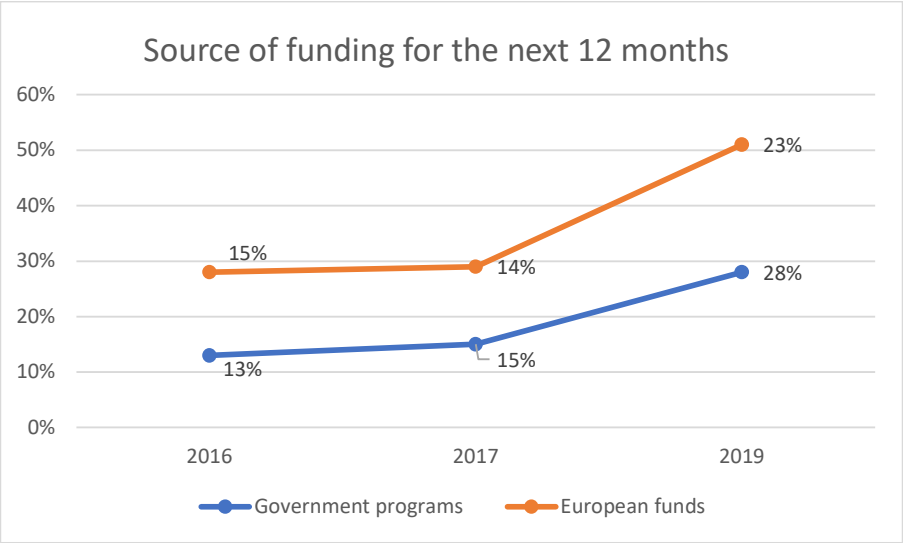

Fig. 2: Source of funding for next years

Source: Own processing of the data extracted from study of E&Y

71% of entrepreneurs consider that the funds offered by the Romanian state within the specific programs for SMEs are the form of financing that would have a very big impact in supporting business initiatives. European funds are a second important source of funding for the development of long-term entrepreneurship in Romania, say 58% of survey respondents.

In the present study we considered the Start-Up Nation financing program carried out in Romania, more precisely its first edition, the one from 2017.

The non-reimbursable funds possibly to be won were in the amount of 44,000 euros (200,000 lei). One of the conditions was that the companies should employ at least 2 full-time people, at the time of the statement of the state aid, and to keep those employees for at least 3 years.

Literature Review

Panigrahi and Joshi (2016) studied entrepreneurship education in India and identified the following challenges for it: cultural barriers, long time to open a business (89 days), high costs, incomplete entrepreneurial education, lack of a standard framework, dependence on government.

Farayibi (2016) proved the role of entrepreneurs in economic growth in Nigeria. Increases in entrepreneurial financing (through loans to SMEs) have significant effect on economic growth.

Gregova and Dengoy (2016) analyzed the impact of startups on the Slovak economy. The analysis led to the conclusion that the development of startups will have an important role for the development of the Slovak economy and its economic recovery.

Yusuf (2017) find a significant positive influence of entrepreneurship eduction, technologu and globalisation on performance of SMEs in Nigeria. It was also concluded that is very important to continously acquire newer entrepreneurial skills.

Nicolae and Bigioi (2017) identified a weak interest of human resources in Romania for training. The percentage of those who are concerned about lifelong learning is only 1.3% (in 2015), compared to the European average of 10.7% (EU). The interest to become an entrepreneur is great among young graduates in Romania, but the difficulties encountered for this purpose are too little taken into account.

According to a study conducted by European Central Bank (2019) during April-November 2019, access to financing sources is considered the least important obstacle. Concerns about access to finance remained higher for SMEs as a whole than for large companies. . Banks remained the most relevant source of finance. The same study conducted between Oct 2019-March 2020 shows that SMEs expect a sharp deterioration in access to bank loans, due to the international pandemic of covid-19.

Vrincut and Irimia (2018) studied the role of banks in the Start-up Nation program. The study provides a critical perspective on the issues faced by participants in this program in 2017, especially those related to the quality of banking services. It also emphasizes the role of the strategic vector of the quality of banking services in the context of their involvement in national development.

Research Methodology

In 2017, the first edition of the Start-up Nation program was launched in Romania by the Ministry of Business, Trade and Entrepreneurship.

The goal of the program was to support 10,000 beneficiaries, to stimulate the development of small and medium-sized enterprises. The target results pursued refer to: new jobs created, disadvantaged people, graduates and unemployed inserted into the labor market, investments in new and innovative technologies. The interest was very high, so that over 3000 companies obtained the maximum score in the evaluation stage of the proposed project.

Through this study we want to analyze the evolution of 25 companies that were accepted and agreed to benefit from grants related to this program. The analyzed period refers to the financial years 2017, 2018 and 2019.

The research was conducted in the following stages:

- the data was selected
- the data was been grouped according to specific objectives
- the data was processed
- the results were centralized
- the results were analyzed and interpreted
- the conclusions were drawn.

The methods by which this analysis was performed, were: investigation, identification and interpretation.

The companies that were accepted to benefit from these subsidies were published on the website www.fonduri-structurale.ro and was created by the Department of Entrepreneurship and Programs for SMEs. From these companies, we selected 25 based on the following algorithm: the list in PDF format had 249 pages with the winning companies. We selected the first company on each page, resulting 25 companies that will be included in this study.

The financial data were collected from the website www.mfinante.ro, data that are included in the financial statements submitted by the company according to the legislative requirements.

Results of the Study

14 companies among those included in the study have as object of activity the production of various goods. The others have as object various other activities: general mechanics operations, dental assistance, software development, photographic activities, engineering and consulting activities, fitness center, restaurant, travel agency (Fig. 3).

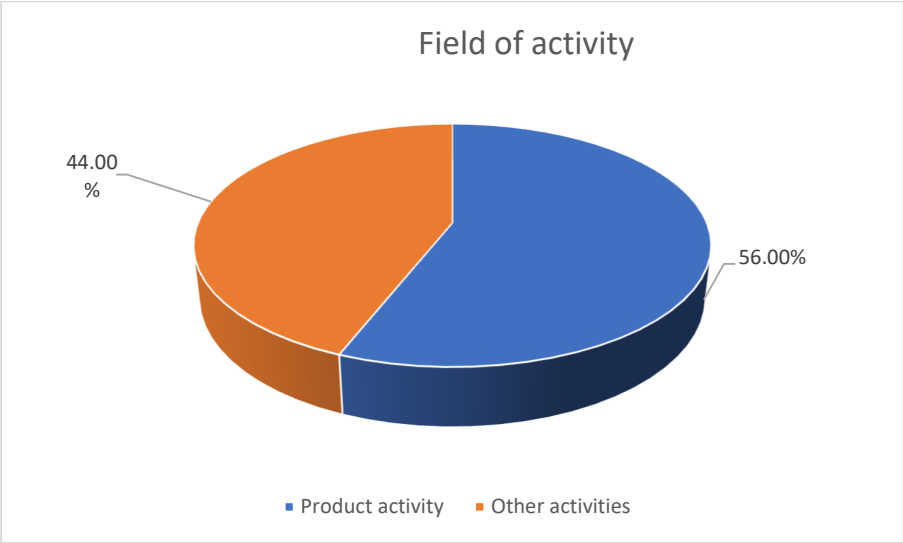

Fig. 3 : Activity of the companies

Source: own processing based on the extracted data

I marked each company with Si, where i ={1; 25}.

The companies were established in 2017. Given that the financing contracts were signed at the end of the year, most companies (16) did not carry out activity this year, probably waiting for financing in order to start the activity.

The first company to be studied is notable, which, although it was also founded in 2017, managed to make a profit from the first year. Moreover, it was the only one that had a growing profit from year to year, and values much higher than the next ranked.

8 companies out of the 25 failed to make a profit in any of the 3 years studied.

The evolution of the profit for the 3 years taken into account was as follows (Fig. 4)

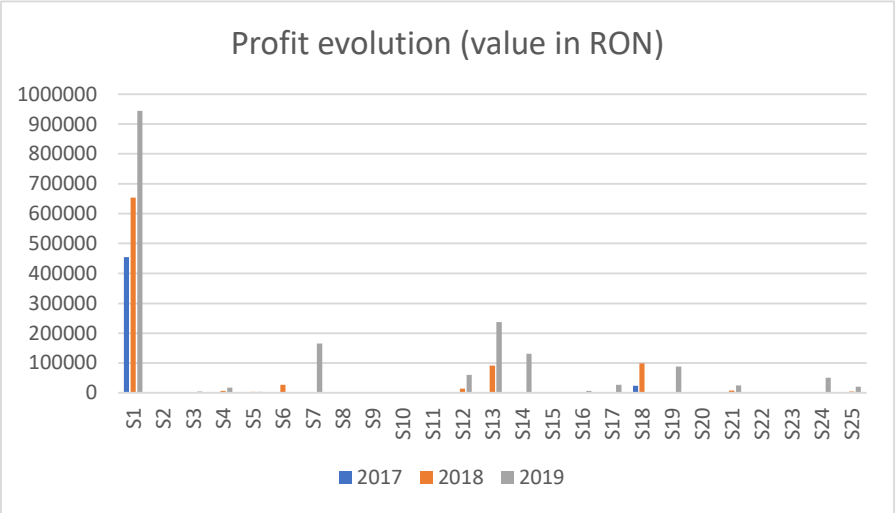

Graph 4: Profit- evolution

Source: own processing based on the extracted data

In 2018, only one company has no employees, and in 2019 the number of these companies is 3. The first company also has the largest number of employees and maintains it in 2018 and 2019 (49 employees).(Fig. 5)

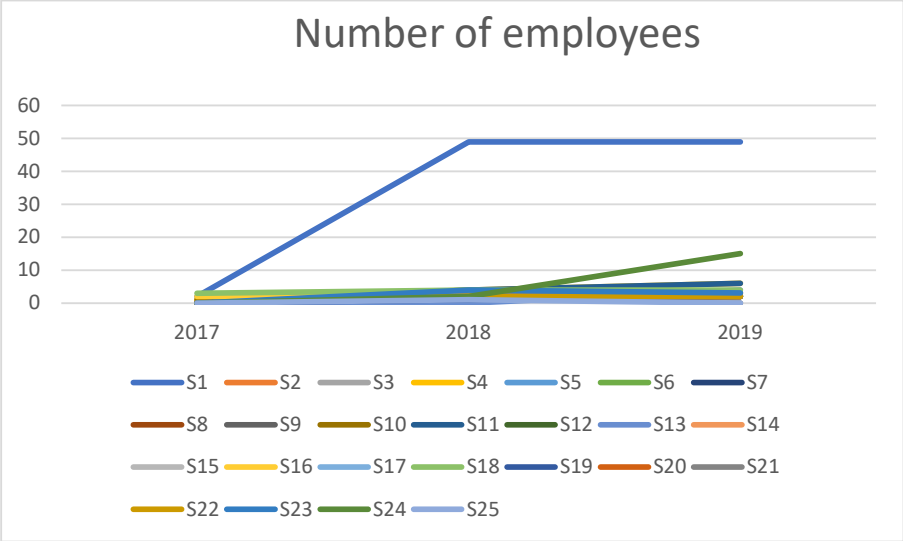

Fig. 5: Number of employees

Source: own processing based on the extracted data

9 companies achieved turnover in the first year (that of establishment). 80% of the companies registered an increase in turnover in the period 2018-2019 (Fig. 6).

The first company S1 also stands out from the point of view of this criterion.

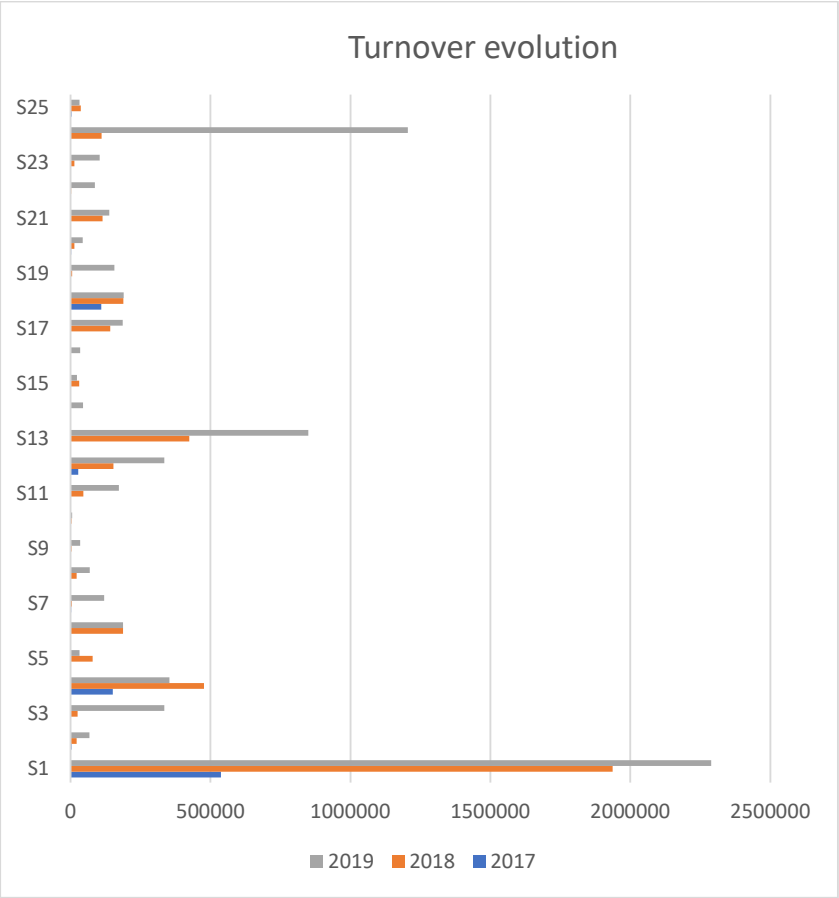

Fig. 6: Turnover evolution

Source: own processing based on the extracted data

Return on equity (ROE) is a measure of financial performance calculated by dividing net income by shareholders' equity. ROE is considered a measure of how effectively management is using a company's assets to create profits.

ROE= Net income/ Shareholders' equity.

Most investment books recommend an ROE of at least 15%.

14 companies did not register a profit in 2019, which is why ROE cannot be calculated.

For the other companies, the first company S1 stands out, which managed to have an ROE of 99.9% and to maintain it for the analyzed period.

4 companies had a loss in the first 2 years, and in 2019 they register an ROE over 99% (companies S7, S14, S19 and S24) due to the profit obtained this year which covers the previous losses. (Fig. 7)

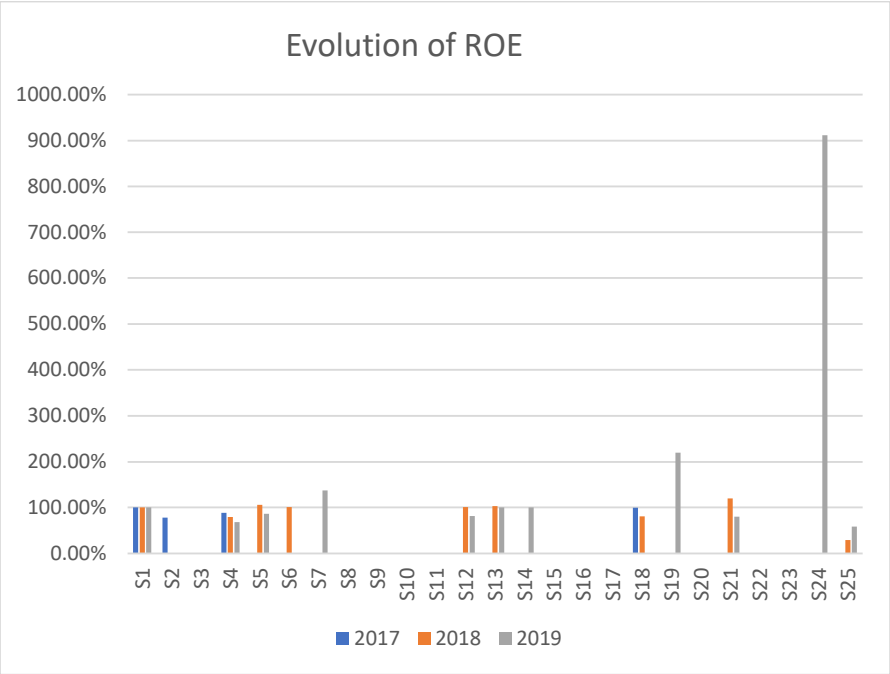

Fig. 7: Evolution of ROE

Source: own processing based on the extracted data

Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings. The ROA figure gives investors an idea of how effective the company is in converting the money it invests into net income. The higher the ROA number, the better, because the company is earning more money on less investment.

ROA= Net income/ Total assets

Only two companies have ROA values registered for each of the 3 years. S1 has ROA values over 49% in the 3 years, and S4 has very low values of the indicator (below 10%). 8 companies cannot determine ROA in any year (Fig. 8).

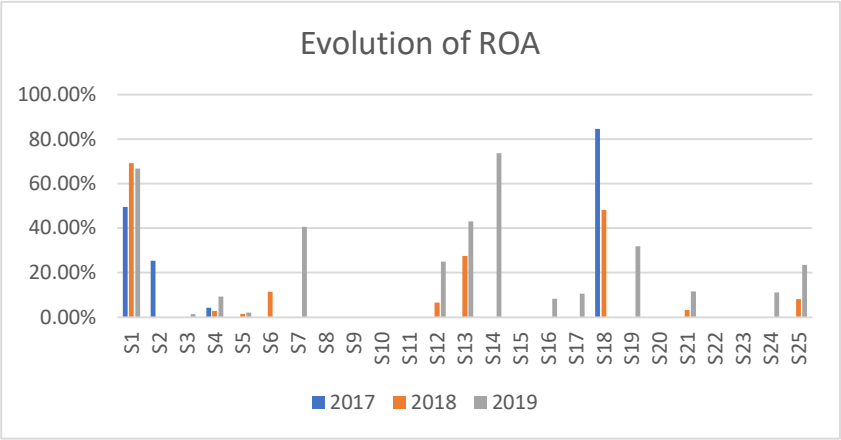

Fig. 8: Evolution of ROA

Source: own processing based on the extracted data

The total debt ratio divides the total liabilities with the total assets. It shows the proportion of the assets that are financed with debt.

Total debt ratio =Total liabilities/ Total assets.

It is generally considered that a degree of indebtedness of less than 60% is very good and reflects a long-term balance between internal and external sources of financing.

Evolution of level of indebtedness is represented in Fig. 9.

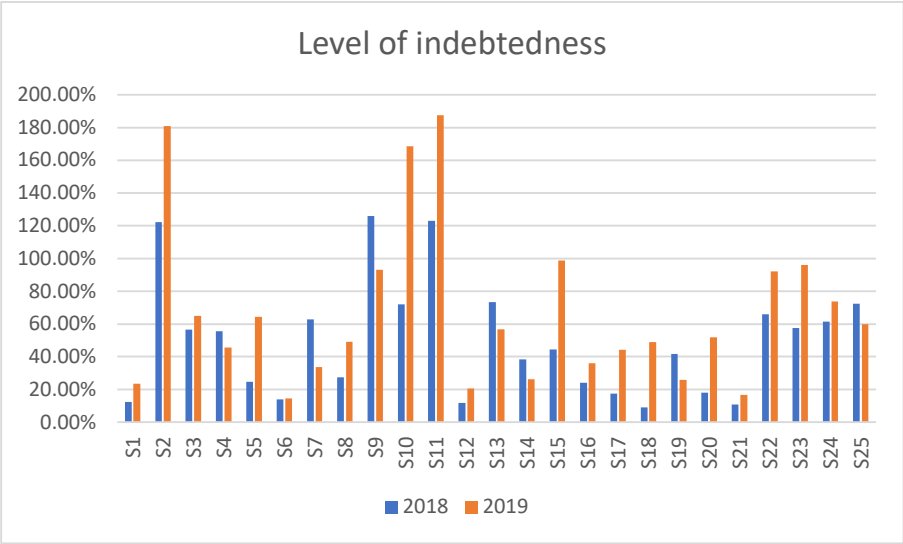

Fig. 9: Evolution of indebtedness

Source: own processing based on the extracted data

We analyzed the degree of indebtedness for two years 2018 and 2019, after receiving the financing. 3 companies have a degree of indebtedness over 100%. Two hold the pointer over this ceiling. 48% of companies have a degree of indebtedness below 50%.(Table no 1)

Table 1: Number of companies and total debt ratio

	2018	**2019**
Total debt ratio <50%	13	12
Total debt ratio 50-100%	9	10
Total debt ratio >100%	3	3

Source: own processing based on the extracted data

We defined the function F(i)
F(i)= fi1+fi2+fi3+fi4+fi5,
i={1;25}

fi1=1 if the profit increases

fi2=1 if the the company i makes a profit in both years 2018 and 2019

fi3=1 if ROA in 2019 >20%

fi4=1 if ROE in 2019 >15%
f
i5=1 if total ratio debt is <60%

The commercial companies subjected to the study obtained the following values for the F function (Fig. 10).

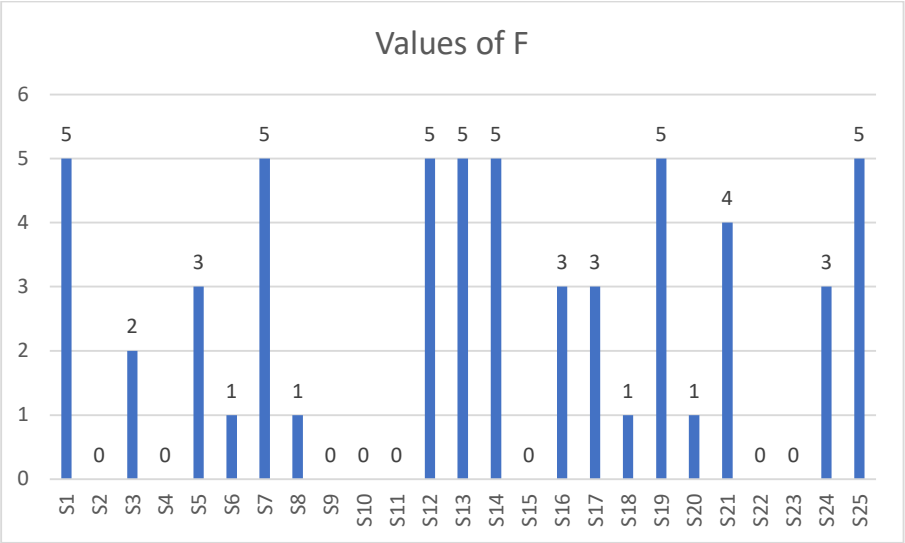

Fig. 10: Value of function F

Source: own processing based on the extracted data

8 commercial companies obtained the value 0. 7 commercial companies (28%) obtained the maximum value of the function F.

Conclusions

The interest to open a start-up is growing in Romania. However, the sources of financing for development are too little considered.

The Start-up Nation 2017 program was a possible source of funding that could stimulate the activity of the beneficiary company. The study of the 25 companies shows that many entrepreneurs relied on this financing to run the business, and only a few understood that the success of the business does not consist only in this money (which are few anyway). These funds allowed the purchase of equipment, they were a plus, but the success of the company did not depend on them.

Only one company stood out; it made a profit in all 3 years, even in the first year of activity. Moreover, it was the only one that had a growing profit from year to year. 8 companies out of the 25 failed to make a profit in any of the 3 years studied.

80% of the companies registered an increase in turnover in the period 2018-2019.

14 companies do not have financial performance (according to ROE indicator)

Most companies do not use its assets efficiently to generate earnings.

48% of companies have a degree of indebtedness below 50%.

7 companies increase their profitability in the last two years, use assets efficiently to generate earnings, have financial performance and have a low degree of indebtedness. We can conclude that they used the granted financing efficiently.

For a better overview, the study can be improved by following the indicators over a longer period of time and by including several beneficiary companies in the study.

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Implementation of FMEA to Risk at Workstation Analysis

Roma MARCZEWSKA-KUŹMA

Faculty of Engineering Management, Poznan University of Technology, Poznan, Poland
roma.marczewska-kuzma@put.poznan.pl

Abstract

The paper presents arguments according to which the application of the FMEA method to an in-depth risk analysis for a selected workplace - a bottling line operator, allows to identify significant potential threats against which preventive measures should be introduced. These measures should not be limited only to the use of personal protective equipment, but also apply to technical and organizational solutions. The performed occupational risk analysis allows for the introduction of solutions improving risk management in the examined enterprise, and the implementation of the suggested corrective actions will increase the safety level and awareness of operators.

Keywords*:* Risk Analysis, Professional Risk Assessment, Identification of Threats, Risk Assessment.

Introduction

Along with the development of industry, mechanization and automation of production processes, a demand for innovative solutions related to broadly understood management emerged in industrial plants. The consequence of changes related to the way work is carried out and to the equipment of workplaces is a new approach to the issues of occupational health and safety, and above all, the need to systematize activities undertaken in this area. Such actions, implemented as procedures of conduct, require the enterprise to set specific strategic goals, which should have a specific time horizon for their implementation. "Managing risk is iterative and assists organizations in setting strategy, achieving objectives and making informed decisions " (Řeháček, 2019). In order for the company to be able to effectively implement and maintain a safety policy, it should set itself goals, i.e. improve the comfort of work at each position, reduce or eliminate all identified threats at work, prevent accidents at work and reduce economic losses and staff fluctuation caused by employee absenteeism (Marczewska-Kuźma, Mazur, 2015).

The aim of the article is to indicate the possibility of using the FMEA method for an in-depth risk analysis for a selected workplace - a bottling line operator. The use of the FMEA method allows identifying significant potential threats in the implementation of processes, against which preventive actions should be introduced despite the acceptable risk value in relation to their occurrence, obtained in the Risk 20 method or their omission in the analysis with this method. Appropriately, selected preventive actions should ensure the reduction of the employee's exposure to various types of factors that hinder work, disorganize it or may cause an accident.

The article is structured as follows: In the first part, the definitions related to the topic of the article are presented, the basic legal requirements, which imply the need to ensure safe working conditions for the employee, the standard methods used to assess occupational risk are indicated, and the need for an in-depth risk analysis for workplaces is justified.

The second part presents the methodology of the conducted research, then presents the research results and their interpretations. Discrepancies in the results of occupational risk assessment for the position of the pouring line operator carried out using the Risk Score method and the FMEA method were indicated. Preventive measures have been suggested for the selected threats, or rather their causes.

Literature Background

Every company constantly makes decisions related to, among others with human resources management, technical equipment, or technology of performed works. The implementation of these decisions takes place in the internal

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environment of the company, however, being aware of their impact on the company's environment, i.e. external stakeholders. This influence plays a key role in the success of the company's operations, increasing the brand's prestige or building one's own culture and identity.

The organization, associations, micro and macro enterprises in each sphere of their activity are subject to obligatory provisions contained in superior acts, i.e. laws, regulations, normative acts. The most important of them is the Constitution of the Republic of Poland in force in Poland, established on April 2, 1997 by the National Assembly. Due to Poland's membership in the European Community and the adoption of the principles of Directive 89/391 / EEC, it has become necessary to mention the issue of occupational health and safety in the most important decree. The answer was article 66^1 saying that (...) "Everyone has the right to safe and hygienic working conditions, and the manner of exercising this right and the obligations of the employer are specified in the law" (Article 66^1 of the Constitution of the Republic of Poland of April 2, 1997). "Nowadays, business environment forces enterprises to search constantly for the new opportunities and chances in order to fulfill the customers' demands as well as being more competitive.Providing the safe and ergonomic environment at the workplace is one of the basic task of employer" (Mrugalska, et al., 2020)

With regard to enterprises with an implemented occupational health and safety management system, the target group of stakeholders consists of all employees whose involvement in process activities is a key condition for achieving the intended goals. A separate group of stakeholders is made up of institutions operating within the Polish labour protection system, such as the minister responsible for labour and other ministers establishing the provisions of law on safety and health protection at work, and the relevant supervisory and control bodies over working conditions.

The interested party should therefore be understood as "a person or organization that may influence, be influenced by decisions or actions, or which sees itself as being influenced by decisions or actions" (ISO 45001: 2018 Occupational health and safety management systems - Requirements with guidance for use).

An effective occupational safety management system should be based on the full integration of the newly applicable ISO 45001: 2018 standard with other standards in this group, i.e. ISO 9001: 2015 related to the quality management system and ISO 14001: 2015 regarding environmental management (Pratikno, Kusnadi, 2020). The strategic goal of the operation of each company is to maintain a designated market position, which consequently leads to profit maximization and loss minimization. Therefore, it is necessary to build synergies between occupational safety and health and productivity (Leppink, 2015).

This modern approach to solving potential production, economic or social problems is an integral part of the company's management. In the context of occupational safety, the main goal is to prevent accidents that could lead to serious losses, having a direct impact on the financial result, defined in the USA as *loss prevention*.

Over the years of changes in Polish regulations on occupational health and safety and their adaptation to European standards, many companies have lowered the accident rate, which proves they implemented conscious management of the company and benefited from improving the qualifications of all employees, as well as reliable analyses of occupational risk.

Occupational risk is defined in various ways in the literature, e.g., "the combination of the probability of a work-related hazardous event (s) or exposure (exposures) and the severity of the injury and health conditions that may be caused by the event (s).) or exposure (s)" (ISO 4500: 2018, p. 15).

Another definition used in Poland comes from the regulation of the Minister of Labour and Social Policy of September 26, 1997 on general health and safety regulations, as amended rev .: "Occupational risk is the probability of the occurrence of undesirable events related to the work performed, resulting in losses, in particular the occurrence of adverse health effects in employees as a result of occupational hazards occurring in the work environment or the manner of performing work" (Journal of Laws 11.173.1034 § 1).

The main goal of the occupational risk assessment is to determine the measures that must be applied by the enterprise to ensure compliance with the requirements of health and work protection law, and to minimize the number of potential injuries that may be suffered by employees and their severity. "Risk assessments should be recognized as integral to systemic efforts to improve occupational safety. To enhance the effectiveness of actions taken, affecting the minimization of onerous employment must be applied ergonomic criteria underlying the pro-humanistic approach organizations, consistent with modern principles of social responsibility. Risks should also be assessed with the use of proper risk management tools so as to ensure continuous improvements in that process" (Gorny, Sadlowska-Wrzesinska, 2016).

It is also important that the risk assessment must also include those who may be exposed to it during their stay in the enterprise. The stages of risk assessment are (Hughes, Ferrett, 2007):

1. Finding threats.
2. Identify which can cause an injury and how it can occur.
3. Assessing the risk and deciding whether to introduce solutions to reduce the risk, and if so, what.
4. Record any significant risks found.
5. Review and monitor risk assessments made and repeat them if necessary.

The risk assessment process can be easily divided into six segments, i.e.

1. Hazards identification.
2. Identification of people at risk.
3. Assess the level of risk.
4. Developing preventive solutions.
5. Writing the occupational risk assessment card.
6. Continuous risk control, assessment and updating.

In the process of the level of risk assessment, the team may notice that corrective actions have already been taken, hence what to do to minimize residual risk should be considered. The aim of the assessment is to achieve the lowest possible risk as possible. "The key benefit of this process is the documentation of existing risks and the knowledge and ability it provides to the project team to anticipate events" (Řeháček, 2017). There are two types of risk assessment methods (Romanowska-Słomka, Słomka, 2008):

- Quantitative, consisting in measuring the risk by determining its probability and severity of consequences resulting from its occurrence and assigning a numerical value to the risk. These methods are used in the petrochemical, aviation and maintenance industries.
- Qualitative - methods used more often, based on the visual judgment of the process team. The result is a risk assessment as low, medium, high. The consequence is to identify the actions that must be taken because of the assessment.

The next step is to suggest corrective actions (Hughes, Ferret, 2009):

- creating workstations and processes allowing to avoid risk,
- assessing the risk that cannot be avoided,
- removing the risk source,
- designing workstations tailored to the employee, selecting work methods, work equipment, designing processes in such a way as to avoid monotony,
- adjusting workstations to technical progress,
- substituting hazardous substances, tools with those causing less exposure,
- developing a policy focused on prevention, focusing on technology, work organization, working conditions,
- suggesting collective protective measures, with priority over the use of personal protective measures,
- giving appropriate instructions to employees.

The list above covers the examples of corrective actions that can be taken to mitigate risks.
Whereas typical methods used in occupational risk analysis include:

- ALARP- As Low as Reasonably Practicable/Achievable - the method refers to a sceptical approach and the use of common sense when introducing solutions aimed at reducing the level of occupational risk. The assumptions for the application of this method describe the approach to incurring expenses that the enterprise makes in order to achieve an acceptable risk. It should be noted that the amount of enterprise expenditure in order to achieve a tolerable risk level must be economically justified (Bedford, 2014),
- PHA - Preliminary Hazard Assessment is a preliminary hazard analysis carried out with the use of a matrix. The two most common values of the probability of an event and the severity of the consequences are used to estimate the risk. The result is the quotient of these elements. Using the method, it is necessary to define the boundaries of the object being assessed, define the hazards, and estimate the effects and probabilities of the event (Ostrom, Wilhelmsen, 2019),
- JASA - Job Safety Analysis is one of the qualitative methods. The assumptions for the use of the analysis refer to hazardous events and situations, as well as threats that employees may encounter in the course of

their work. The mathematical probability of the consequences of an event is defined as the sum of the frequency of threats, the probability of an event, and the possibility of avoiding or limiting harm (Ostrom, Wilhelmsen, 2019),

- Risk Score is one of the most frequently used methods of occupational risk assessment in enterprises, it is characterized as qualitative and quantitative method. Its main goal is to determine material or human losses resulting from a given event, which leads to the estimation of the risk associated with the occurrence of adverse events. The value of the risk index is calculated as the quotient of the probability of a threat, the effect of the occurring threat and the time spent in exposure to a given factor (Oestrum, Wilhelmsen, 2019).

In the company under research, the occupational risk assessment is carried out using the Risk Score method.
An in-depth risk analysis for the bottling line operator's workstation was performed using the FMEA method. The military standard MIL-P 1629 - Procedure for Performing a Failure Mode, Effects and Criticality Analysis, developed and published in the United States in November 1949, can be considered the first publication that comprehensively covered the analytical issues presented in the FMEA (Braglia, Rosalina, 2007). The most recognized use of the FMEA instruments was the Apollo project, conducted in the 1960s in the United States. Then, the FMEA method was being implemented in various industries, in particular in the automotive industry, where the Ford Motor Company (1970s) can be considered the precursor of the application of the discussed methodology (Teng et al., 2012).

Hamrol points out that the FMEA method implemented for processes - PFMEA (Process Failure Mode and Effects Analyzes) concerns the processes of manufacturing products and their parts or assemblies, as well as the processes of use or servicing, including service provision processes. The purpose of using the method should be to indicate factors that may hinder the fulfilment of the requirements contained in the product or service specification, or hinder the course of the process. Due to the universality and flexibility of the method, it is possible to apply it to the analysis of threats in service processes, software development and logistics concepts" (Hamrol, 2005).

Activities implemented within FMEA method should be divided into three coherent processes, i.e. the preparation process, the analytical process and the improvement process.

Research Framework

Until now, the analysis and assessment of occupational risk in the surveyed enterprise was made solely with the Risk Score method. The characteristics of the workstation, requirements, activities performed by people employed in the position were outlined; tools, machines and chemicals used for work were compiled. The methods and rules of performing work were also determined, and then the risks that accompany its performance were assumed. Risk assessment was performed by assigning numerical values to individual values, such as probability, exposure or severity of consequences, determined for the Risk Score method, in order to estimate the risk size. Then, depending on the risk value score, corrective actions were suggested. Documents were reviewed annually to update the occupational risk assessment.

In order to conduct risk analysis using the pro-quality FMEA method, data was collected in September and November 2019. In-house occupational risk assessments results were collected; Records were made of the observations of the working day and free interviews with the bottling line operators. Observations were applied consisting in daily inspections of the areas of workplaces during the performance of typical tasks. Data contained in documents, such as occupational risk assessment or auxiliary records of the analysis of threats at the workplace, was subjected to secondary analysis.

Then, the FMEA method was used to carry out an in-depth analysis of the causes and effects of potential hazards occurring at the bottling line operator's position. As the method's name suggests, it can be used to identify potential faults and their causes. The research used a data system typical for process analysis - it was assumed to identify threats to the employee, their effects and causes by assigning data to individual activities performed at the workplace. As a result of the analysis, the accompanying hazards and their causes were assigned to the successive activities. The risk level was determined using the formula:

$$R = P * I * D$$

where:

R – risk level,
P – probability of risk cause appearance,
I – importance of risk consequences for employees
D – detectability rate.

Then, corrective actions were suggested and the risk level was re-estimated after introducing these solutions to improve the examined process. Summarizing the research results, the conclusions were compared with those developed on the basis of the Risk Score method.

Research Results

Based on internal documents of the surveyed company, the characteristics of the bottling line operator's workplace were developed. There are four men employed in this position. The basic task of the operator is to carry out work on the operation of production installations located in a closed facility - the production hall. The work is performed in a single shift mode, during eight hours with one break of 30 minutes. The predominant scope of work requires physical effort, defined as dynamic. The activities performed by the bottling line operator include:

1. Preparation for work - incl. changing into work clothes.
2. Operations on bottling lines.
   - The phase of preparing the line for filling the packaging - supplying the appropriate product (connecting the hose to the appropriate tank), preparing the cartons and packaging into which the product will be poured, setting the line for the type of packaging to be poured, placing empty packaging on the conveyor,
   - Filling - constant supervision of pouring: weight control, visual inspection of packaging, adding corks to containers, transporting empty packages and cartons, pallets to ready cartons, visual control of the pneumatic capping machine (foil welding, twisting) and printing,
   - Finished product phase - packing full containers in cardboard, sealing with tape, labelling the cardboard, wrapping pallets with cardboard boxes with foil, transporting ready pallets to the warehouse by means of forklift trucks.
3. Service of the filling line directly from the tanks:
   - Visual inspection of the product,
   - Taking the hose out of the pumping station, connecting it to the tank valve,
4. Preparation of containers:
   - Container condition control: drain valve, tightness, cleanliness,
   - If necessary, drying the container,
   - Sealing the drain valve on command,
5. Other activities:
   - Checking the technical condition of machines and devices,
   - Cleaning works in the hall and outside,
   - Removing oil from the floor,
   - Interchangeable hose between the tanker's chambers.

The following measures are used at the described workstation: hand pallet trucks, wrappers, crusher, sealer, scanner, hoses, hand tools, raw materials for production: pallets, plastic, metal and paper packaging, adhesive tapes, degreasers.

The employee is provided with access to personal protective equipment, i.e. a protective helmet, work shoes with a reinforced toe cap and non-slip sole, protective gloves, protective gloves resistant to chemicals, protective glasses, protective helmets, work hat, harness for work at height.

In the Table 1, data on general hygienic working conditions at the described workstation is described.

Table 1: General hygienic working conditions at the bottling line operator workstation

General hygienic working conditions at the workstation	
Location of the workplace	warehouse, production
Workplace lighting	natural and artificial, in line with the standard
Type of ventilation of rooms and workstations	natural (open space), gravitational and mechanical ventilation

Source: Gwiazda S. (2020), research results included in Master Thesis supervised by R.Marczewska-Kuźma

According to the data obtained in the company on lighting (table 1), the assessment of the compliance of electric lighting with the standards took place 6 years ago. The provision "compliant with the norm" may therefore be controversial, as not exactly currently valid.

In the working environment, noise control from works carried out in the production hall and from forklifts moving around the room is defined as the multiplicity of NDN 0.21-LEX, 8h [dB] = 74.1 ± 1.2 dB. Therefore, the permissible value of the employee's daily exposure to noise is not exceeded.

It was found that work as a filling line operator should not be performed by sight, hearing and speech impediments, heart defects, and musculoskeletal disorders.

Table 2 presents the lists of threats to their sources and the effects characteristic for the bottler operator, prepared in the enterprise for the need to conduct risk analysis by the means of the Risk Score method.

Table 2: Risk score method after using personal protective equipment (PPE) and others

No	Threat	Source	Process/workstation	Consequences	PPE*/others	Risk according to Risk Score
1.	Collision of human and moving vehicle	communication traffic	In-house area	Injury, disability, death	reflective elements on clothing	**low**
2.	Changeable weather conditions	Weather conditions	Outside the halls	fainting sunstroke colds frostbite absenteeism	protective clothing hot / cold drinks	**acceptable**
3.	contact with material factor	Tools, machines, installations	Tool manipulation, operation of machines and devices, repair work	injuries: cuts, impact, contusions, crushing, others. absenteeism disability death	protective gloves protective helmet	**low**
4.	Fall from a height	Platforms, ladders	Moving around, staying on the tank of the tanker	limb fracture, dislocations, bruise, disability, death	PPE against falls protective helmet	**low**
5.	contact with chemical factor	chemicals for equipment maintenance	production	skin dryness or cracking, eye irritation, irritating effect on the respiratory system and mucous membranes.	chemical resistant gloves, goggles protective hand cream (degreaser) if recommended	**acceptable**
6.	Contact with thermal factor	Hot surfaces, hot liquids	Production, kitchen	thermal burns	Work gloves	**low**
7.	Injuries, a fall on the same level, a fall down the stairs, a slippage.	Slippery surface	Moving around the production area, warehouse, outside, around the premises in the office	bruises, dislocations, fractures	Non-slip work shoes	**low**

Source: Company's records

According to the data presented in Table 2, the level of risk for seven identified hazards at the operator's position after the application of personal protective equipment and other additional solutions is treated in the company as low or acceptable risk level.

In the Table 3 the risks arising from the subsequent stages of activities that are performed at the bottling operator's station were analysed, their causes were identified, and the risk before and after the implementation of corrective actions was estimated.

Table 3: Risk analysis on the bottling operator's station performed using the FMEA method

Stage of the process	Threat	D2	Consequence	I3	Cause	P1	Control method	R1	Corrective action	Responsible	P2	D2	I2	R2
Changing into work clothes Meeting with the manager and adopting a daily work plan	Work in unfastened work wear	2	Breaking	6	No artwork of correctly dressed employee	5	Visual inspection of the employee's clothing	5x2x6=60	Implementation of information in a graphic form presenting the appearance of a properly dressed employee	Area manager,	2	2	6	24
			crushing	6				5X2X6=60			2	2	6	24
			straining	6				5X2X6=60			2	2	6	24
	Separation of work during the morning check-in, without its schedule	5	stress	6	Misinterpretation of the information provided	8	Review of the effects of the work done	8x5x6=240	Introduce a check-in plan and follow it during its implementation	Area manager,	5	3	6	90
Bottling line service Line preparation phase - feeding the appropriate oil (connecting the hose to the appropriate tank)	Hose operation without personal protective equipment	3	abrasion	5	Low employee awareness	5	Supervision by management in the course of work by the employee	5x3x6=90	Introduction of a bonus system depending on the use of personal protective equipment (control)	Area manager, Plant director	4	3	6	72
			cutting	6				5x3x6=90			4	3	6	72
			eczema	6				5x3x6=90			4	3	6	72
			allergy	6				5x3x6=90			4	3	6	72
Visual inspection of packages	Incorrect evaluation of the packaging	4	stress	6	Psycho-neurological workload associated with decision-making	4	Visual inspection during work performed by the employee	4x4x6=96	Introduction of double packaging control - poka-yoke	Conducting packaging control using a poka-yoke	2	4	7	56
			tension	5				4x4x5=80			2	4	6	48
Finished product phase - packing full containers in cardboard, sealing with tape, labelling the carton, wrapping pallets with cartons	Failure to comply with the standards for lifting and carrying goods	4	Muscles pains	5	Dynamic load	5	Supervision by management during the performance of work by employees	5x4x5=120	Interchangeability of performed tasks	OHS staff Area manager,	3	4	5	60
			Muscle-skeletal disorders	8				5x4x8=160			3	4	8	144
Finished product phase - packing full containers in cardboard, sealing with tape, labelling the carton, wrapping pallets with cartons	Not using personal protective equipment	3	abrasion	6	Low employee awareness	5	Visual inspection during work performed by the employee	5x3x6=90	Introducing penalties for cutting premiums for failure to apply individual protection measures	OHS staff Area manager,	3	3	6	90
			wounds	6				5x3x6=90			3	3	6	90
			cutting	6				5x3x6=90			3	3	6	90
Operation of the filling line directly from the tanker - preparation phase, activities performed outside the hall Taking oil samples from the tanker, control	Incorrect sample collection and evaluation	4	stress	6	Psychoneurotic load	5	Visual inspection for samples	5x4x6=120	Introduction of laboratory control	Area manager, Lab technician	2	4	6	48
			tension	5				5x4x5=100			2	4	5	40

Source: Gwiazda S. (2020), research results included in Master Thesis supervised by R. Marczewska-Kuźma

Table 3: (cont.) Risk analysis on the bottling operator's station performed using the FMEA method

Stage of the process	Threat	D2	Consequence	I3	Cause	P1	Control method	R1	Corrective action	Responsible	P2	D2	I2	R2
Removal of the hose from the pumping station, connection to the cistern's valve and a detachable hose between the cistern's chambers	Moving loads that exceed the lifting standards	4	muscle aches	5	No instructions in this regard	5	Supervision by management in the course of work by the employee	5x4x5=100	Performing work by two people, in accordance with the workplace instructions	Area manager	4	4	5	80
Preparation of containers: Container condition (drain valve, tightness, cleanliness)	Working with chemicals without personal protective equipment	5	eczema	6	Low awareness of the effect of contact with chemical substances in employees	7	Visual inspection during work performed by the employee	7x5x6=210	Introducing penalties for cutting bonuses for failure to use personal protective equipment, training	Plant director,	3	5	6	90
			allergy	6				7x5x6=210		Maintenance Manager	3	5	6	90
Cleaning works, Checking the technical condition of machines and devices, Cleaning works in the hall and outside	Work in changing weather conditions without appropriate clothing	3	cold	5	Rush	6	Supervision by management in the course of work by the employee	6x3x5=90	Introducing work wear points near the hall exits, training on the importance of concentration, safety training in the performance of maintenance works	Area manager	4	3	5	60
			fainting	6	Low employee awareness	2		6x3x6=108			4	3	6	72
								2x3x5=30		OHS staff	2	3	5	30
								2x3x6=36			2	3	6	42
	Work at height without appropriate safeguards	2	breakings	6	Low employee awareness	4	Visual inspection for samples	4x2x6=48	Management supervision, awareness-raising training, employees	Area manager	2	2	6	24
			contusions	6				4x2x6=48		HR employee	2	2	6	24
			extensive injuries	7				4x2x7=56		OHS employee	2	2	7	28
	Work in exposure to dust and chemicals while performing duties without personal protective equipment	3	allergy	6	Low employee awareness	5	Supervision by management in the course of work by the employee	5x3x6= 90	Management supervision, awareness-raising training, employees	Area manager HR employee OHS employee	3	3	6	54
			headaches	5				5x3x5= 75			3	3	6	54
	Contact with sharp and protruding elements while performing duties without personal protective equipment	3	cutting	6	Low employee awareness	5		5x3x6=90	Management supervision, awareness-raising training, employees	Area manager HR employee OHS employee	4	2	6	54
			contusions	6		5		5x3x6=90			4	2	6	54

Source: Gwiazda S. (2020), research results included in Master Thesis supervised by R. Marczewska-Kuźma

Carrying out the occupational risk analysis for a bottling line employee using the FMEA method, the stages of typical activities performed in this position were implemented. In relation to this aspect, potential threats that may occur at the workplace were assigned, and then possible causes of these threats and the effects of threats were identified. After determining the risk level of R1, improvement actions were proposed, taking into account the recalculation of the risk level denoted as R2.

Discussion

An important problem in operating the bottling line is the monotony and repetitiveness of the tasks performed, as a result of which there is a distraction and lack of due attention during the preparation and positioning of packages, and also during the continuation of the process. The consequences include injuries, muscle pain and joint problems resulting from maintaining the same posture for a long time. The main causes of monotony and repetitiveness are the way the bottling process is implemented, requiring the employee to perform the same activities in the same position, resulting from the lack of process automation and investment in technology development. As part of the corrective actions, it was suggested to pay more attention to the interchangeability of tasks.

Another significant problem is the misinterpretation of data provided by management. As part of the corrective actions, the participation of employees in the morning briefing was suggested, which will take place according to a previously agreed plan.

Low awareness of contact with chemical substances has also been classified as high-risk hazards. The following corrective actions were recommended: a bonus system dependent on the use of protective measures and training to increase the awareness of working with chemical substances. Unfortunately, the chemical substances used in the company cannot be replaced with other, safer ones, because they are part of the product. At the moment, it is not possible to fully automate the process limiting the employee's contact with the substances in question. In order for the training to bring the intended results, it is necessary to ensure prevention in the field of machine inspections, easy access to the safety data sheets of chemical substances, awareness of the effects of chemical substances on humans by both the operator and the management, control of the use of personal protective equipment.

The operator's job also involves visual assessment of the product. The operator's decision-making may result in psycho-nerve stress and errors in the controls performed. As part of the corrective actions, laboratory product controls were proposed as part of quality assurance.

Important stages of the work are all maintenance and cleaning works, work at height, work related to wrapping and labelling the product. In this scope of tasks, attention was drawn to the lack of use of personal protective equipment and recommended management supervision, bonus systems dependent on the use of personal protective equipment, or training to raise employee awareness.

The results of the FMEA analysis, due to the evaluation following the steps of the process, often direct the analyst to introduce technical solutions. The following technical solutions were suggested to introduce: points with work clothes at the hall exits to minimize exposure to work in changing weather conditions without appropriate clothing, laboratory control of the product, introduction of poka-yoke control for packaging.

As a result of the FMEA analysis, organizational solutions were also proposed, including conducting checks in accordance with the scheduled schedule and ensuring that all necessary procedures are available.

Conclusion

As a result of the literature analysis and the research results presented in the research part of the article, the following conclusions were defined:

1. The FMEA analysis due to the process approach allows for directing the team to consider a greater number of threats than the classic occupational risk assessment - Risk Score.
2. The analysis with the use of the pro-quality method applied can be considered more detailed due to the results of the risk value, before and after the assumed implementation of solutions. Different values are assigned to different causes and effects for a given threat, which allows for a more precise definition of how to prepare preventive actions.
4. Risk analysis with the use of FMEA, due to the process approach, more often forces the suggestion of technical and organizational solutions, where the classic analysis often focuses on corrective actions concerning the use of personal protective equipment.

6. According to the FMEA, the key problems related to the risks analysed at workplaces include misinterpretation of the transmitted data, low awareness of staff about the effects of contact with chemical substances, monotony and monotype of the performed tasks.
7. As a result of the risk assessment using the Risk Score, the following were indicated as key threats:
human collisions with a moving vehicle, fire and contact with a material factor.
The conducted in-depth analysis of the occupational risk for the position of the bottling line operator will allow the improvement of risk management in the examined enterprise, and the implementation of the suggested corrective actions will increase the level of safety and operator awareness.

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A Review of Project Managers' Competencies for Project Success in the Construction Industry: A Systematic Review

Seraj Khaled ABUZBIDA
School of Civil Engineering, Faculty Engineering, University Teknologi Malaysia, Johor, Malaysia
siragabo73@gmail.com

Aminah Md YUSOF
School of Civil Engineering, Faculty Engineering, University Teknologi Malaysia, Johor, Malaysia
aminahyusof@utm.my

Nur IzieAdiana ABIDIN
School of Civil Engineering, Faculty Engineering, University Teknologi Malaysia, Johor, Malaysia
izieadiana@utm.my

Abstract

Given the incessant number of project failures in the construction industry in both developed and developing nations alike, it becomes increasingly important to examine the literature to determine possible factors that can be accounted for the massive project failures in construction projects. A review of the literature revealed that majorly a lack of competence by project managers was a crucial factor in determining construction projects success or failures. Over the last decade, a large number of studies have been carried out on project managers' competencies, however systematic literature reviews (SLR) are still scare in this area. Hence, the purpose of this paper was to conduct a systematic literature review to determine firstly the critical success factors for construction projects as well as identify what project managers' competencies were associated with project success in the construction industry. A synthesis of the findings in the SLR revealed several project managers competencies of which communication, commitment, experience and leadership were considered the most critical competencies for project success. The review revealed that there is a lack of empirical studies establishing the relationship between project managers' characteristics (i.e., their competencies, experience in managing projects as well as their adherence to the critical success factors) and project success, which can be avenues for more empirical investigations in the future.

Keywords: Project Manager Competency, Critical Success Factors, Project Success. Construction projects.

Introduction

The construction industry is a complex sector of the economy that is characterized by a wide range of stakeholders and has wide-ranging associations with other activities such as production, material use, energy, finance, labour, instrumentation and so on (Osei 2013). Construction activities are constantly evolving due to the changing dynamics of technology and the business landscape, and as a result, more complex construction projects are now being undertaken than ever (Abouen et al. 2014, Anantatmula 2010). With the complexity of construction projects now evident, the challenges that come with such complexity are also now more apparent (Omran 2015, Abouen et al. 2014). Notwithstanding, project managers and stakeholders are still expected to deliver projects successfully according to the specific requirements that bounds such project. Traditionally, project performance, as well as success, have been evaluated by some criteria that include delivering a project within schedule, within budgetary constraints (cost) and with the expected quality (Gerges 2015). Several scholars in the field of project management acknowledge the importance and critical role of project managers' competencies in determining a project's performance or outcome (Ahmadabadi and Heravi 2019, He et al. 2019). In the words of Ahmed and Philbin (2020), project managers' competencies have been cited as a critical success factor for determining the success or failure of a project. This thus implies the indispensable role of project managers' competency and its influences on project success. Ahmed and Philbin (2020), asserts that competence is an area of work, competency, on the other hand, is the behaviour supporting an area of work while competencies are the attributes underpinning a behaviour.

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Competencies according to Garman and Johnson (2006) are characteristics of employees with behavioural implications that are thought to be associated with the successful performance of their jobs. Similarly, Draganidis and Mentzas (2006) define competencies as a combination of tacit and explicit knowledge, behaviour and skills that gives an individual the potential for effectiveness in task performance. In the context of project management, competencies are defined as a cluster of related knowledge, attitudes, skills, and other personal characteristics that affect a major part of one's job; correlates with performance on the job; can be measured against well-accepted standards; can be improved through training and development (Project Management Institute 2013). Crawford and Turner (2007) assert that the competencies of project management personnel are closely related to project success. Howbeit their close relationship, research (Ahadzie et al. 2009, de Carvalho et al. 2015, Tabassi et al. 2016) has shown that although project managers' competencies may directly or indirectly influence project success, the later is essentially different from project managers competencies and the criteria upon which both concepts are based may also be different (Nixon et al. 2012, Ahmed and Philbin 2020).

Attaining project success is ultimately the goal of every construction project. Abdullah and Ramly (2006) stated that defining project success is quite illusive. Several authors have attempted to define project success, but the concept of project success remains quite unclear. Ika (2009) also affirmed that project success is particularly difficult to define, given that the criteria used to define this concept is dependent on those selected by the project team or stakeholders. Traditionally, in project management, project success is measured against performance criteria such as cost, time, scope and quality; whereas in the present era, project success is measured against the overall goals of the project-which may include in addition to the performance criteria (cost, schedule, scope and quality), the end user's satisfaction, the strategic aims of the client, profits to the stakeholders and project staff, among others (Ika 2009).

Given that fundamental differences exist between project managers competencies and project success, although the former may be a direct or indirect antecedent to the latter, critical questions such as what are the critical success factors for construction projects? What specific project managers' competencies are associated with project success? How do the competencies required for project success differ from the critical success factors for project success? To answer these questions empirically would at a starting point require an in-depth analysis of the literature to determine exactly what has been done regarding the project managers competencies that are associated with project success. A literature review is an important tool for researchers to manage the diversity of knowledge emanating from academic research. A systematic literature review (SLR) on the other hand differs from traditional literature reviews since SLRs adopt a scientific, transparent and repeatable process to mitigate bias and provide an audit trail for the conclusions of the study (Ahmed and Philbin 2020). According to Klassen et al. (1998), "a systematic literature review is "a review in which a comprehensive search for relevant studies on a specific topic, and those identified are then appraised and synthesized according to a pre-determined explicit method". This enables the collection of existing data relative to a topic that allows for objective, comprehensive, and transparent integration and synthesis of research findings. Given that Ahmed and Philbin (2020) asserted that systematic literature review is limited especially with studies on project managers' competencies that influence project success, it is particularly important to explore from an SLR point of view the topic of project managers' competencies affecting project success. To guide the systematic literature review, the following guiding questions are put forward, they include;

1. What critical success factors underscore construction projects in the project management literature?
2. What are the project managers' competencies associated with project success in the construction industry in the literature?
3. Based on a synthesis of the literature, what empirical research pathways regarding the competencies required for project success in the construction industry can be explored?

Methods

Research Approach

A Systematic Literature Review approach was used in this paper. The systematic literature review provides an organized and systematic procedure for critically analyzing research papers (Petticrew and Roberts 2008, Pickering and Byrne 2014). Similarly, Klassen et al. (1998) stated that SLR is a review in which a comprehensive search for relevant studies on a specific topic, and those identified are then appraised and synthesized according to a pre-determined explicit method. Furthermore, Evans et al. (2017) explain that a systematic review process enables researchers to utilise transparent review procedures to source for, evaluate, analyse and synthesise the results of relevant research well in advance to ensure that the process can be repeated and replicated. The SLR approach was used in this review as a systematic tool to analyse and critically evaluate the project manager literature to ascertain

firstly what the literature considers critical success factors for construction projects as well as evaluate the project managers competencies that are directly or indirectly associated with project success in the construction industry. Based on the analysis of the literature, the researchers proceeded to synthesize some research pathways that can be validated using empirical research methods.

Searched Keywords

Published research articles investigating project manager's competencies, critical success factors for construction projects and related areas were searched from different databases. The researchers utilized Padalkar and Gopinath (2016) approach in searching for relevant materials for the review. However, the focus of the search was limited to titles and abstracts of articles published in the project management literature in the last decade. This was done to ensure that the articles contained a sufficient level of detail on project management and associated project managers' competencies as well as critical success factors. de Araújo et al. (2017) suggested that in executing the SLR, an initial search using adequate keywords should be performed to gain a sense of the output generated by such keywords. Hence following de Araújo et al. (2017) recommendations a search was performed through various databases using the following keywords and combined with Boolean Operators where necessary. The keywords include: "Project manager competencies", "Project Success", "Project manager competencies" AND "Project Success", "Project Success" AND "Construction".

Article Sources

The researchers took cognisance of the fact that the topic of Project Managers' Competencies and Project Success is not particularly new; hence ensured that databases with majorly vast research articles and exposure were used to source for studies that were used as data sources for the SLR. The Scopus database is the largest in the scientific community for academic literature. Hence was selected as a source for articles in this review. The second-largest database is the web of science. The web of science was also selected as an article source for the SLR. The researcher employed the use of the two largest research databases in order to gain access to the plethora of studies encompassing project managers' competencies and project success.

Research Design

Research papers were first identified using the following keywords (1) project manager competency, (2) project success, (3) critical success factors, (4) project manager competency and project success, (5) project success and construction. Doing this allowed the researchers to reach the needed coverage of project managers competency and project success. Figure 1 shows the systematic review flowchart for the study. Identified studies using the above keywords were then limited by the field of study as shown in Figure 1.

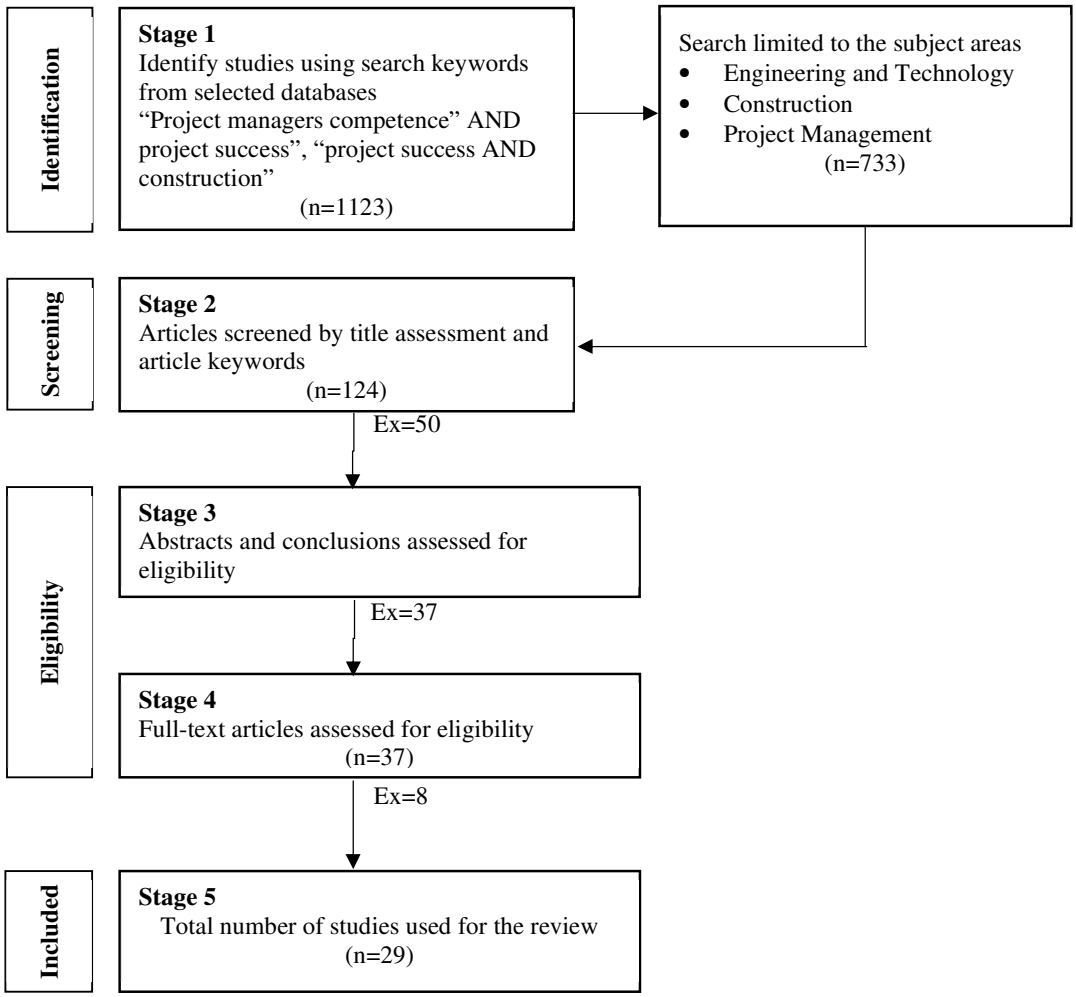

n = number of articles meeting specified selection criteria
Ex. = number of articles excluded

Figure 1: Systematic Literature Review Flowchart

The researchers then proceeded to screen the article titles and keywords to identify those that included relevant keywords. Those which included relevant keywords were pooled in category A and those which did not include this criterion were pooled in another category B. The abstract of articles in category A was further screened to determine if they met the purpose and significance of the study. Articles which were deemed important and significant were retained, while those that did not meet the eligibility criteria were deleted. At this stage articles which met the eligibility criteria for the paper were thoroughly read and critically reviewed. Few articles (n=8) which included relevant keywords but did not meet other criteria such as the study's scope as well as did not contribute to the objective of the review were later deleted. Hence, at this stage, a total number of 29 studies were then used for the review.

Selection Criteria

In developing the selection criteria for articles, Riaz and Igarashi (2013) approach was used. The initial search mandated that the articles included in the review meet the following criteria: (1) be published in the English Language; (2) be published in a peer-reviewed journal; (3) be related to the construction, engineering or project management field; and (4) include the specific searched keywords. The resulting number of articles found using the specified keywords in the selected databases were 1222 Furthermore, the researcher examined the resulting papers from both

databases to determine whether there were any duplicate articles. Given that the search for articles was made in two of the largest scientific publication databases, some duplicates were found and deleted accordingly. Subsequently, the researcher conducted a second screening to ensure that selected articles conformed to the selection criteria before the full-text articles were retrieved from the aforementioned databases

Analysis and Discussions

In our analysis of the literature, we put forward several questions to guide the review. Based on those guiding questions, the following information was abstracted from each reviewed article (1) the critical success factors that underlie construction projects based on the findings from the research literature (2) projects managers' competencies that are associated with construction projects (3) the empirical research pathways regarding project managers' competencies that can be inferred from the analysis of the literature.

Critical success factors for construction projects

As a starting point in the analysis of the literature, we sought to critique the literature to determine the critical success factors that are crucial for construction projects. Jari and Bhangale (2013) defined critical success factors for construction project as factors that can increase performance, improve success likelihood, and prevent critical delays during construction. The CSFs are crucial for taking proactive measures for the success of construction projects. Ahmadabadi and Heravi (2019) highlighted that the most important critical success factors within the project life cycle include: project mission, client consultation, technical tasks, client acceptance, supervision, and feedback, problem-solving, project manager's interpersonal competence and leadership skills. Table 1 shows a matrix of the critical success factors for construction projects based on existing project success frameworks.

Table 1: An overview of critical success factors for construction projects

Framework	Factors
Pinto and Slevin (1987)	Project mission, top management support, project schedule/plan, personnel, technical tasks, client acceptance, client consultation, communication, monitoring and feedback, and troubleshooting.
Belassi and Tukel (1996)	Project organisational structure, functional managers' support, project champion, Top management support, Project manager, and project characteristics, project team members, and the external environment (political, social, economic, and technological).
Holland and Light (2002)	Project mission, top management support, project schedule/plan, client consultation, personnel, technical tasks, client acceptance, monitoring and feedback, communication, troubleshooting, legacy systems, ERP strategy, business process change and software configuration.
Bradford and Florin (2003)	Perceived complexity, top management support, organisational objectives consensus, business process reengineering, training, and competitive pressure, technical compatibility.
Belout and Gauvreau (2004)	Project mission, top management support, project schedule/plan, client consultation, personnel, technical tasks, client acceptance, monitoring and feedback, communication, and troubleshooting.
Nah, Islam, and Tan (2007)	Top management support, project management, enterprise-wide communication ERP teamwork and composition.
Bradley (2008)	Project manager "full time, experience and reporting level'', top management evolvement, use of consultants, user resistance, champion and steering committee, ERP integration, and training quality and quantity.
Boo Young Chung et al., (2008)	User related variables (output, job relevance, image, result demonstrability, compatibility and system reliability) and project-related variables (internal support, function and consultant support).

El Sawah, El Fattah Tharwat, and Rasmy (2008)	Top management support, company-wide support, organisational culture, effective project management, users‟ training and involvement, consultants‟ and vendors‟ support, business process reengineering, careful package selection and minimal customisation.
Tarawneh (2011)	Experienced project manager, user involvement, formal methodology, standard software infrastructure, clear business objective, executive support and minimised project scope, reliable estimates, understanding requirements and managing requirements changes, organisational culture.
Abdulaziz and Mayhew (2015)	Top management support and commitment; strategic planning; project management; project team competencies; communication management; stakeholder management; partner and supplier management; training and education
Bond (2015)	Project mission, top management support, project schedule/plan, personnel, technical tasks, client acceptance, client consultation, communication, monitoring and feedback, and troubleshooting, Leadership Styles (Transformational Leadership Style, Transactional Leadership Style, Passive/Avoidant Leadership Style**),** Years of Experience

The matrix above shows that a critical understanding of the project mission, support from top management, a good project plan/schedule, experience, technical skills, project managers with proficient competencies, adaptive methodology/strategy, clear business objectives, monitoring and feedback, training and education, organizational culture, use of technology are some of the critical success factors for construction projects (Almajed and Mayhew 2015, Bond 2015, Chung et al. 2008, Bradley 2008, Bradford and Florin 2003, Belout and Gauvreau 2004, Tarawneh 2011, Nah et al. 2007, Holland et al. 1999, Belassi and Tukel 1996, Pinto and Slevin 1987, Ahmadabadi and Heravi 2019, Jari and Bhangale 2013). These identified critical success factors can summarily be referred to as the competencies that project managers require to achieve project success in the construction industry given that competencies according to PMI (2013) imply a cluster of related knowledge, attitudes, skills, and other personal characteristics that affect a major part of one's job, correlates with performance on the job, can be measured against well-accepted standards, and can be improved through training and development. The particular interest to project managers is how can these core competencies for project success be developed and harnessed to bring about project success in the construction industry? The literature also has reported on project managers' competencies that are crucial for project success. The next section discusses the identified project managers' competencies that are associated with construction project success.

Project Managers Competencies associated with Construction Projects

The researchers examined the literature to identify those core competencies that are associated with project success. Our review of the literature revealed a "shopping list" of these core competencies (Stevenson and Starkweather 2010, Moradi et al. 2019, Meredith and Mantel 2009, Kerzner 1998, Fisher 2011, Dillon et al. 2011, Dainty et al. 2005, Cheng et al. 2005, Alvarenga et al. 2019, Ahsan et al. 2013, Ahadzie et al. 2008, Project Management Institute 2013). Wen and Qiang (2019) explain that knowing what project managers do and what competencies they need is a critical step in their selection and development. Hence, Table 2 shows a matrix of the project managers' competencies associated with project success in the construction industry. These competencies range from experience to technical competence, communication, time management, adequate planning/scheduling, interpersonal skills, productivity, teamwork, monitoring and controlling in terms of cost, time, risk, quality and scope, project definition/specification, functional and contextual competencies, conflict management among others.

de Rezende and Blackwell (2019), explored project managers competencies and concluded that some of the most important competencies required by project managers for project success are; the capacity to influence, communication skills, emotional intelligence, contextual skills, managerial skills, cognitive abilities, professionalism, knowledge and experience, project management knowledge, and personal skills and attributes. In a similar vein, Alvarenga et al. (2019) explored the core project managers' competencies that are crucial for project success and proposed seven broad categories of competencies which includes: leadership, self-management, interpersonal, communication, technical, productivity and managerial competencies. However, Alvarenga et al. (2019) made claims that three of the most crucial and important competencies were communication, commitment and leadership. Furthermore, Joslin and Müller (2015), investigated the leadership competency profiles of successful project managers and found that the competencies crucial for project success were managerial, emotional and intellectual competencies. Also, the experience of project managers was one of the key competencies for project success that

several authors mentioned in their studies (Keren et al. 2014, Hoxha 2017, Bredin and Söderlund 2013, Armstrong 2015). This implies that project managers in addition to developing core competencies such as communication, leadership, and even technical skills must gain experience in order to successfully execute and complete construction projects. Experience is no doubt a critical competency for project success given its influences on knowledge, training and performance (Silva et al. 2019, Paton and Hodgson 2016, Jeong and Bozkurt 2014). Blixt, Carley & Kirytopoulos, (2017), researched the competencies of project managers in Australian public services where the results showed that a lack of experience was a major factor in failed project completion.

Table 2: An overview of project manager's competencies

Project Manager Competencies	Author/Year										
	Patanakul and Milosevic (2008)	Crawford and Nahmias (2010)	Omidvar et al. (2011)	Abdelnaser Omran et al. (2011)	Gherbal et al. (2012)	Brière, et al., (2015)	Maqbool et al. (2017)	Hashim et al. (2018)	Wen et al. (2019)	Alvarenga et al. (2019)	Rezende et al. (2019)
Leadership	√	√	√	√		√		√	√	√	
Communication Skills	√	√				√	√			√	√
Organizational experience	√	√	√						√		
Commitment	√	√				√	√			√	√
Knowledge competence	√					√		√	√		√
Conflict management	√				√	√			√		√
Self-management	√									√	
Interpersonal Skills	√				√	√	√			√	√
Technical Skills	√							√		√	
Productivity	√									√	
Multitasking	√									√	
Problem-solving skills		√									
Planning ability (cost, time, risk, quality, scope)		√									
Contract management		√									
Project definition		√									
Project delivery		√									
Monitoring and controlling (cost, time, risk, quality, scope)		√									
Administration		√								√	√
Top management support		√							√		
Change management		√				√					
Functional competence			√	√							
Teamwork/Team development			√					√			√
Contextual competencies			√								
Flexibility						√					
Tchnology/digitization								√	√	√	√

Some Empirical research pathways emanating from the review

Given the review of the literature examining project managers' competencies for project success, some gaps in the literature are no doubt evident. Hence, these identified gaps present opportunities for some empirical research investigations. Several studies in the project management literature acknowledge the importance and role of project managers' competencies, leadership, and the potential they can have in determining a project's performance or outcome. However, a review of the current literature reveals that there is a lack of empirical studies establishing the relationship between project managers' characteristics (i.e., their competencies, experience in managing projects as well as their adherence to certain critical success factors) and project success (He et al. 2019, Ahmadabadi and Heravi 2019, Ika 2009, Jitpaiboon et al. 2019). In a study conducted by Turner and Zolin (2012), it was revealed that the literature on project success did not essentially include an account of project manager's competencies, capabilities as well as adherence to some specific critical success factors (CSFs) as criteria that may lead to project success in the construction industry. The authors revealed that this was a direct contrast to the general management literature, which considers project managers' competence and other managerial characteristics such as experience and project manager's adaptation of the CSFs as important parameters for success in the management of organizations; thus, necessitating the need for further study in this area. Similarly, Anantatmula (2010), argues that there is a grey area in the literature because the specific competencies required by project managers and their roles in project success, especially in a developing country context has not yet been sufficiently addressed.

He et al. (2019) provided more support for research in this area when they argued that considerable effort had been expended in investigating the barriers to project success and strategies in the construction industry in developed nations like the United Kingdom (UK), whereas in examining the factors for improving the likelihood of construction project success in developing areas, so little has been done, which has consequently led to massive failures in construction projects in developing countries. He et al., (2019) also argued that the variations in social and cultural contexts of countries could result in errors in the application of project success theories or may necessarily require more region-specific strategies. This provides more grounds for more contextualized and region-based research in this area, in order to help contribute to research that may improve the practice of project managers in the construction industry.

Conclusions

The review sought to examine the project management literature to identify project managers' competencies that were associated with construction projects. A list of project managers' competencies was identified. Planning and organizing were critical success factors that are considered significantly important for an engineering project manager to achieve the project objectives of delivering a project in accordance with budgetary, schedule, scope, and quality constraints. Furthermore, in the review, our synthesis of project managers competencies that were crucial for project success revealed that communication, leadership as well commitment as the most critical CSFs for project managers. These skills are important for a project manager to effectively and efficiently manage construction projects as well as the teams and stakeholders involved in these project types. The SLR revealed that a project manager possessing certain of these competencies may achieve success, however, that does not necessarily guarantee the successful delivery of construction projects. Nonetheless, the adoption of critical competencies (such as communication, leadership skills, experience, adhering to some critical success factors as well as possessing technical competence, the ability to lead and develop teams, managing resources, as well as planning, were critical to the successful delivery of construction projects. These competencies would arguably improve the probability of project success and help to mitigate project risks. Besides, the success, or failure, of any construction project will be dependent on the specific project characteristics as well as less tangible aspects, such as the attitude adopted by the project manager, willingness to accept and respond to unforeseen changes as well as personal resilience. It is also worthy of note, that technology use/digitization was also one of the core competencies project managers require to successfully deliver construction projects especially in the 21st century. Knowledge/competence in applying and utilising technology tools to solving problems in and off construction sites is critical to the success of construction projects. Technological advancement in the 21set century has developed rapidly, and it would be interesting to explore how project managers' knowledge/competency on several technology tools impacts project performance or success in the construction industry. This can be further explored empirically. The review culminated with some suggestions for further research that became evident as a result of some gaps which were identified in the literature.

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University Support for Students during Coronavirus Outbreak Pandemic from Malaysian Experience

Ismi Arif Ismail
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
ismi@upm.edu.my

Steven Eric Krauss
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
lateef@upm.edu.my

Habibah Ab Jalil
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
habibahjalil@upm.edu.my

Abd Rahman Ahmad (Corresponding author)
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia
Batu Pahat, Johor
arahman@uthm.edu.my

Mohd Shahir Shamsir Omar
Deputy Vice-Chancellor (Research and Innovation) Office, Universiti Tun Hussein Onn Malaysia,
Batu Pahat, Johor
shahiromar@uthm.edu.my

Abstract

The speed at which COVID-19 has altered global education systems is unprecedented. In an effort to enhance support systems during the prolonged crisis period, and to better prepare Higher Learning Institutions (HLIs) for similar future events, this survey was conducted to capture the state of Universiti Tun Hussein Onn Malaysia (UTHM) students' well-being in the context of university support during the COVID-19 pandemic. The main objective of this paper is to help the university to formulate effective policies to respond to the coronavirus (COVID 19) outbreak they can further improve on communication with students to ensure the latter is updated frequently. Considering the survey findings, recommendations are made for administrators, lecturers, and students to address student well-being and continuity of learning during the coronavirus pandemic situation.

Keywords*:* Higher Learning Institutions, student learning, learning resources, COVID-19

Introduction

At the outbreak of the Covid-19 global pandemic, few educational institutions were fully prepared for a global pandemic, including UTHM. UTHM students are located at UTHM Parit Raja and Pagoh campuses. UTHM Parit Raja is the University's main campus with six faculties and the Pagoh campus is a satellite campus with three faculties located 84km north of the main campus. To enhance current support systems and responses during the prolonged crisis period, and to better prepare for future similar events, this survey was conducted to capture the state of students' well-being and learning effectiveness during the COVID-19 pandemic. At the time of writing the crisis is still ongoing. This report thus aims to help the University better understand the challenges that students are facing, and continue to face, as the crisis plays out. Having 'real-time' data can help the University formulate more effective and

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responsive policies to ensure that student well-being and educational quality are given the highest priority by the University.

Literature Reviews

During the implementation of the third phase of Movement Control Order (MCO), university students play an important role in the effort to slow down the COVID-19 outbreak in the country. Despite appeals from students in public and private Higher Learning Institutions (HLIs) that are still stranded on campus and off-campus to return home, the government has decided that they need to remain in their respective universities (Endan, 2020). According to Guo (2020), the fear factor also significantly affects the family decisions on the students' mobility during the outbreak. Meanwhile, Elmer, Mepham, and Stadtfeld (2020) pointed out that the COVID-19 has forced universities management to take drastic measures that affect students to interact and socialize with each other. They discover that there is an effect of social isolation and the development of mental health problems among students during the COVID-19 crisis. Here, it is important for university management and the government to closely monitor the situation with the strategy for helping students in fighting the COVID-19 pandemic (Zhai, & Du, 2020; Chesser, Drassen Ham, & Keene Woods, 2020).

Methodology

The survey aims to help UTHM's leadership team understand the potential impact of the outbreak on students, providing greater clarity on what kinds of technological and psychosocial support are needed to address their students' needs. The survey included 4,221 undergraduate and postgraduate students from different faculties within UTHM. Invitations were sent to all students by messaging through each respective faculty's WhatsApp [an android based messaging mobile application] group coordinated by the Deputy Dean for Academic Affairs. The message contained a hyperlink to the online survey for subjects to complete that included a description of the project. The online survey method was used because it is easily accessible in the time of crisis and cost-effective. The survey was administered using the online survey portal, Survey Monkey (Online survey services, San Mateo, CA, USA). Anonymous responses were collected, and the completed survey was tabulated in Microsoft Excel

Results and Discussion

The survey included 4,221 undergraduate and postgraduate students from different faculties within the University. The mean age of the sample was 22 years comprising 47.9% males and 52.1% females. In terms of the perceived severity of COVID-19 on their well-being and learning readiness, most students were very concerned and found it difficult to work effectively at home or their campus hostels during the early period of the outbreak. Despite the difficulties experienced, the students were optimistic about their future and the university leaders' ability to manage the crisis and provide adequate support to students. Challenges faced by students include difficulty undertaking online learning due to internet connectivity especially to those staying at home and available means to communicate. A critical success factor for students to engage in online learning during a crisis is their technological capacity to use online tools. The findings indicate that UTHM students reported an average of data capacity to carry out online learning and a level of accessibility to learn via popular social media apps. Despite the challenges of internet connectivity, the students took the effort to use their data capacity to access the learning resources provided by lecturers.

While UTHM has formulated effective policies to respond to the coronavirus (COVID 19) outbreak they can further improve on communication with students to ensure the latter is updated frequently. Considering the survey findings, recommendations are made for administrators, lecturers, and students to address student well-being and continuity of learning during the coronavirus pandemic situation.

Our first concern was to gauge students' perceptions of their general well-being during the crisis. This was obtained through questions about how worried they felt about the outbreak, their perceived difficulties in completing their work, the biggest challenges they faced, how long they could see themselves working under the movement restrictions, and their sense of optimism about their future. Figure 1 illustrates that most students were staying at home (79.8%) during the crisis period, with 10.4% near to the UTHM campus and 9.8% staying on campus. As a result, a large percentage of students were staying with their parents and siblings at home.

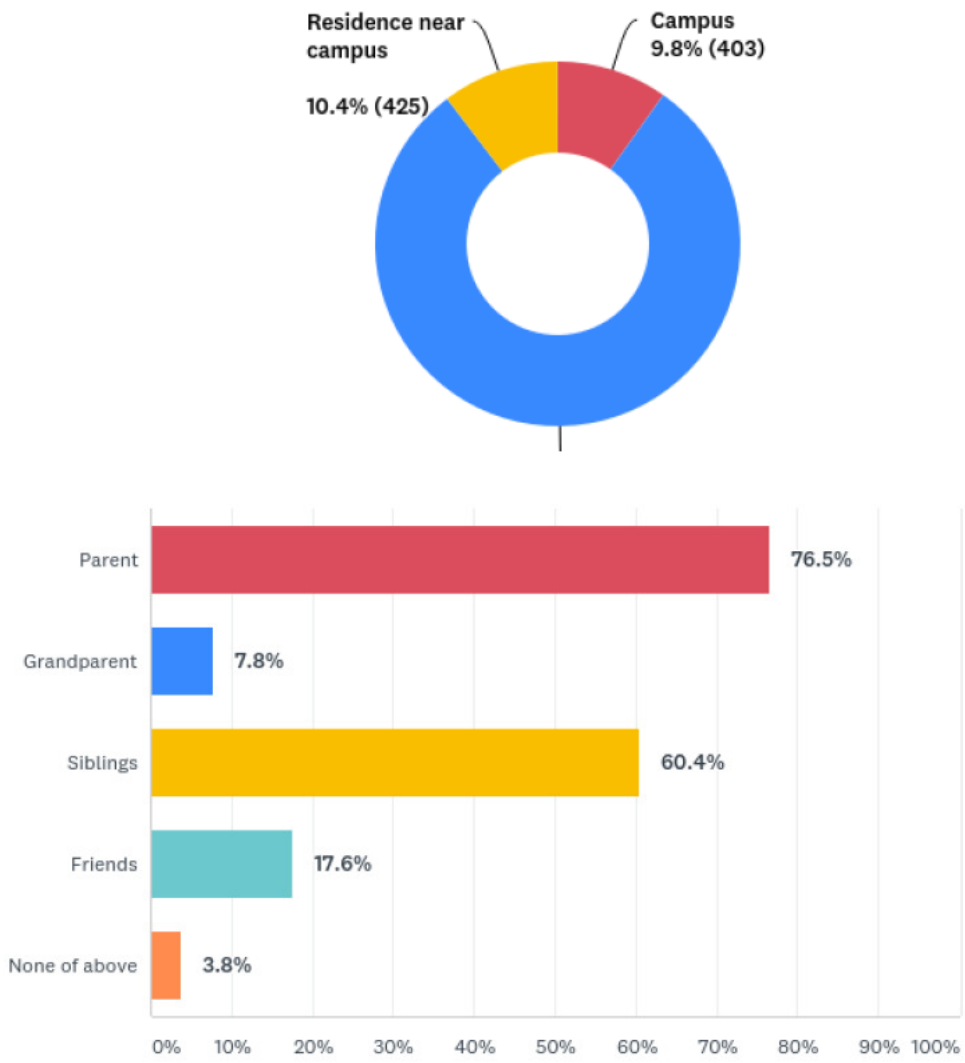

Figure 1: Student location and with whom they are staying

Most students reported staying with parents (76.5%) and siblings (60.4%). 17.6% reported staying with friends.

As illustrated in Figure 2, 46.2% of students felt that the university should communicate with them a few times per week, while another 26.3% preferred receiving news updates from the university once a week. One-quarter (25.3%) preferred daily updates from the university regarding the crisis.

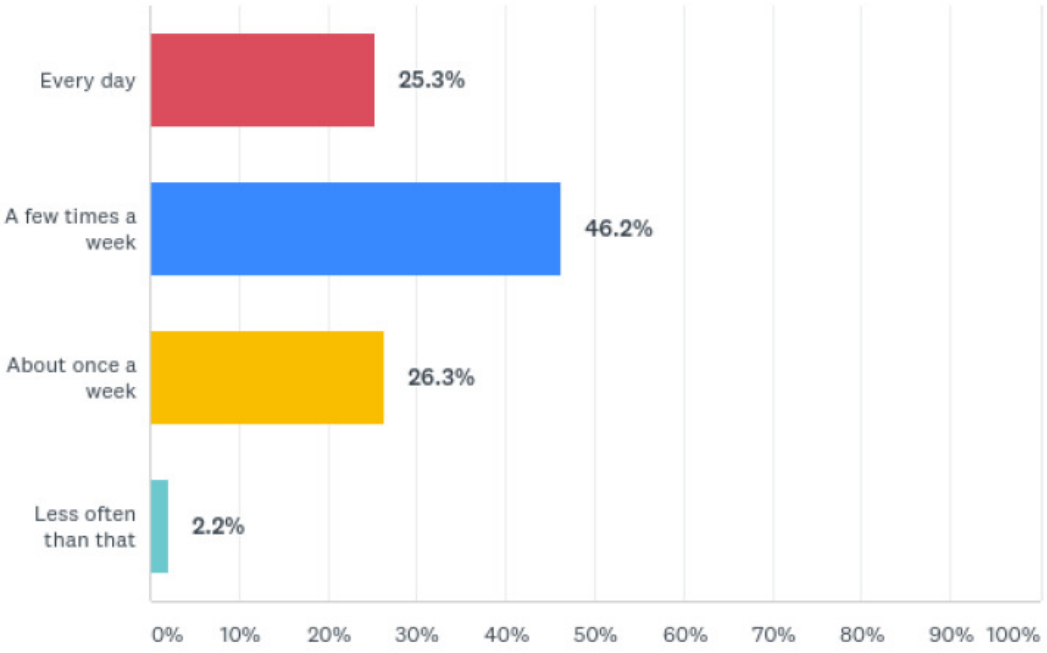
Every day
25.3%
A few times a week
46.2%
About once a week
26.3%
Less often than that
2.2%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

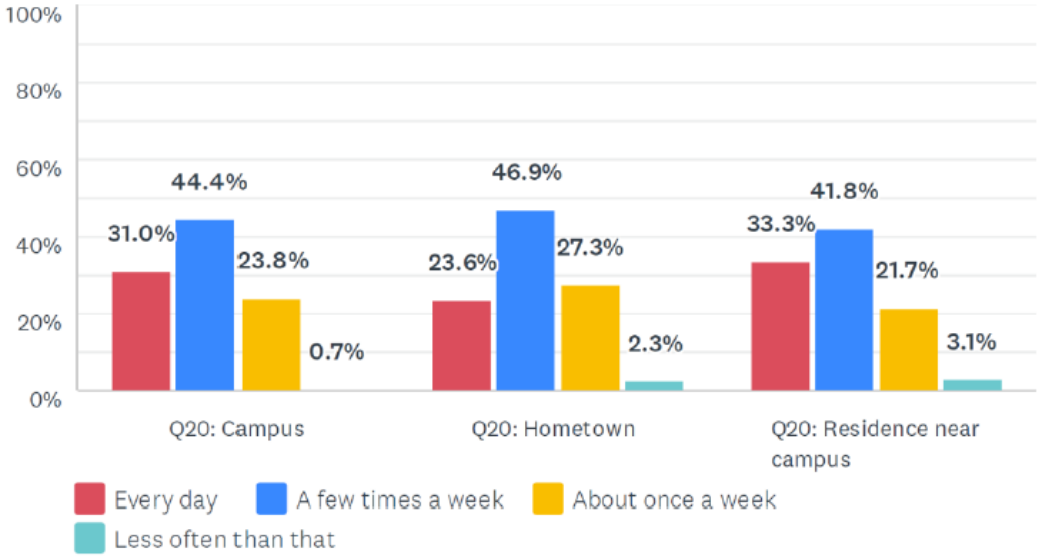
100%
80%
60%
40%
20%
0%
31.0%
44.4%
23.8%
0.7%
23.6%
46.9%
27.3%
2.3%
33.3%
41.8%
21.7%
3.1%
Q20: Campus
Q20: Hometown
Q20: Residence near campus
Every day
A few times a week
About once a week
Less often than that

	EVERY DAY (1)	A FEW TIMES A WEEK (2)	ABOUT ONCE A WEEK (3)	LESS OFTEN THAN THAT (4)	TOTAL
Q20: Campus	31.0% 125	44.4% 179	23.8% 96	0.7% 3	9.9% 403
Q20: Hometown	23.6% 769	46.9% 1,528	27.3% 889	2.3% 75	79.8% 3,261
Q20: Residence near campus	33.3% 141	41.8% 177	21.7% 92	3.1% 13	10.3% 423
Total Respondents	1,035	1,884	1,077	91	4,087

BASIC STATISTICS	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Q20: Campus	1.00	4.00	2.00	1.94	0.76
Q20: Hometown	1.00	4.00	2.00	2.08	0.77
Q20: Residence near campus	1.00	4.00	2.00	1.95	0.82

Figure 2: Preferred frequency of university communication with students

When compared across the three groups, students staying at home preferred more frequent communication from the university -- at least a few times a week (M = 2.08). Surprisingly, students staying in and around campus preferred daily communication from the university (M = 1.94 and M = 1.95).

As illustrated in Figure 3, most students reported a high level of confidence with university management's ability to manage the current crisis (44.2%). 14.9% said they felt very or extremely confident with the university management. Only 32.3% of students reported feeling somewhat confident and 8.7% had little or no confidence at all.

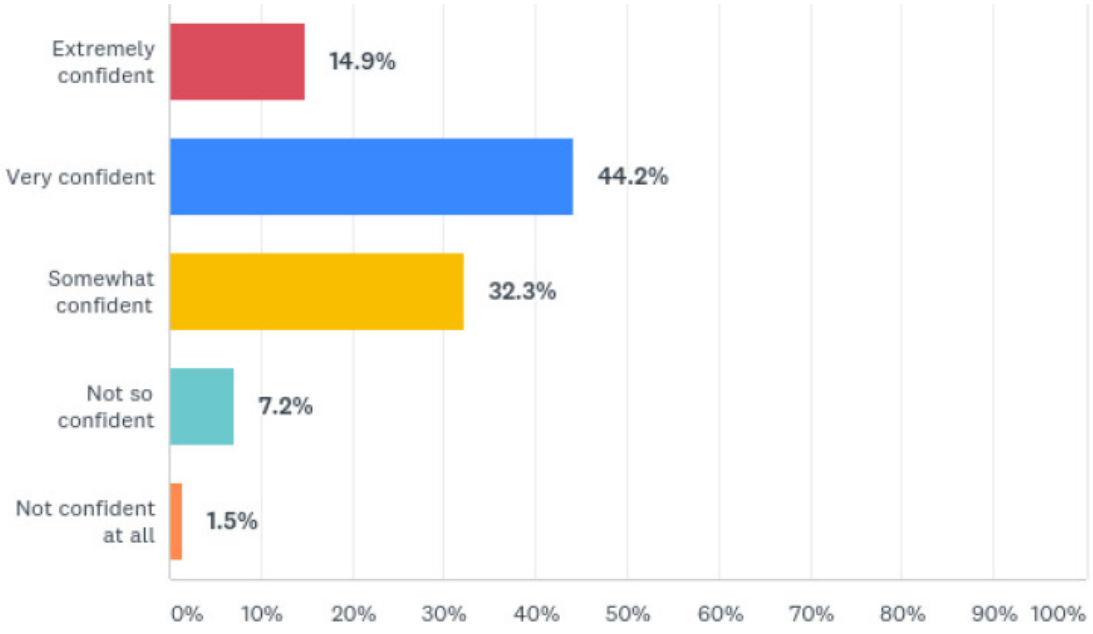

Figure 3: Students' confidence with the university leadership's ability to manage the current crisis

Like the previous finding, Figure 4 shows that most students were very confident in the level of assistance provided by the university during the crisis (93.6%). Only 1% of respondents reported having no confidence in the resources provided

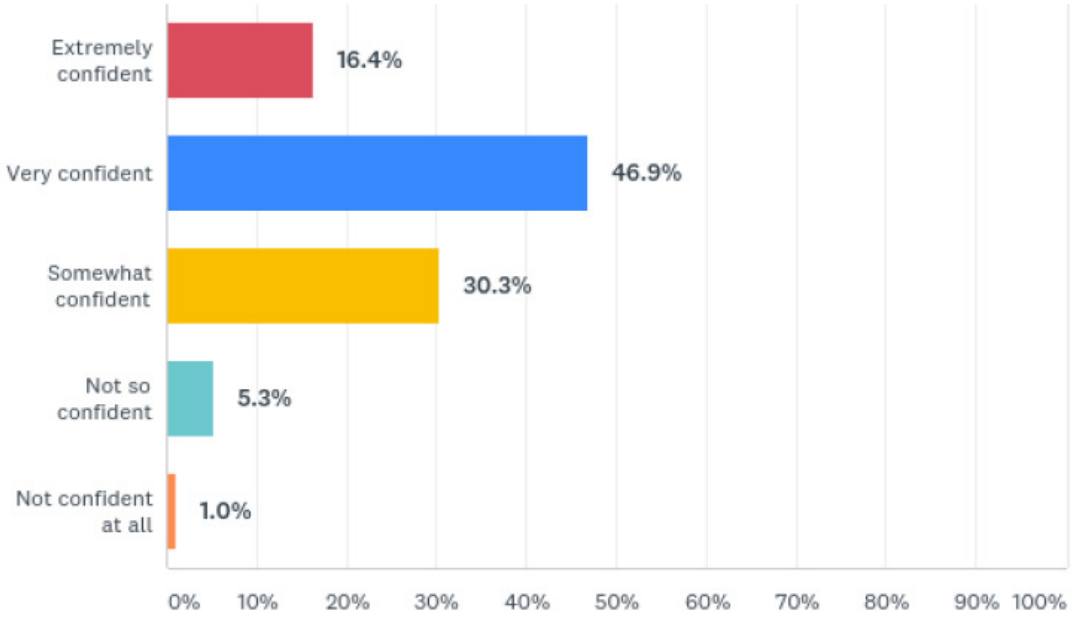

Figure 4: Confidence in the resources and assistance provided by the university

Considering the findings, we propose the following recommendations for UTHM administrators, lecturers and students to address student well-being and continuity of learning during the coronavirus pandemic situation

University Administrators

- University Administrators should ensure that the university COVID 19 response team's governance structure enables them to effectively handle the crisis and provide support to internal and external clients efficiently, with a high degree of accountability and transparency.
- University administrators should empower their response team by using daily real time data as a source for executing and monitoring policies and delivery strategies to respond to student needs.
- Considering the students' reported concern regarding their wellbeing and learning trajectory, University administrators should consider working closely with lecturers and student counsellors to provide online or telephone counselling to address students' emotional and psychological needs.
- University Administrators should prioritize regular and consistent communication with students to update them on the latest developments relating to the crisis, including the implementation of university responses and policy updates. UTHM should be applauded for having a dedicated COVID-19 website link that is visible, interactive and comprehensive. The university might consider ensuring that the links are integrated with the latest information and frequently asked questions regarding academic, support services for students' and staff members' reference. This link would also continue to serve as the main line of communication for UTHM decision-makers to share the latest news and policy updates related to the crisis.
- University Administrators should maintain close collaboration with internal and external stakeholders to ensure that adequate resources related to effective crisis management are allocated.
- University Administrators should ensure that the university has the appropriate cost model and capital efficiency to address the financial needs of the university community during the crisis.

Lecturers

- University lecturers should communicate regularly to ensure students' well-being and to provide intellectual and emotional support.
- University lecturers should make full use of online discussion platforms and social media like WhatsApp, Facebook, and other online meeting apps to communicate and collaborate. They should also accumulate online learning resources including virtual reality VR contents that can be shared with fellow lecturers and students.

Students

- University students should communicate frequently with peers to provide and receive updates on each other's well-being and to provide intellectual and emotional support during the crisis period.
- University students should make full use of technology to ensure that they are accessible to lecturers and peers and can undertake online and distance learning whether they are on or off campus.
- University students should prepare themselves for social distancing, staying at home and engaging in beneficial activities. They should continuously communicate with their peers to combat boredom, depression and anxiety during the isolation period.
- University students should make use of online and phone counselling services if needed.

Conclusion

While the university has formulated effective policies to respond to the coronavirus (COVID 19) outbreak, nearly half of the sampled students 26 expected the university to communicate more frequently with them to ensure that they are updated with the latest information and instructions on dealing with the crisis. Perhaps surprisingly, students staying in and around campus wanted more frequent communication from the university. University Administrators should prioritize regular and consistent communication with staff and students to update them on the latest developments relating to the crisis, including the implementation of university responses and policy updates. UTHM should be applauded for having a dedicated COVID-19 website link that is visible, interactive, and comprehensive. The university might consider ensuring that the links are integrated with the latest information and frequently asked questions regarding academic, support services for students' and staff members' reference. This link would also continue to serve as the mainline of communication for UTHM decision-makers to share the latest news and policy updates related to the crisis.

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Students' Learning During Coronavirus Outbreak in Malaysian Higher Learning Institution

Steven Eric Krauss
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
lateef@upm.edu.my

Ismi Arif Ismail
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
ismi@upm.edu.my

Habibah Ab Jalil
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
habibahjalil@upm.edu.my

Abd Rahman Ahmad (Corresponding author)
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia
Batu Pahat, Johor
arahman@uthm.edu.my

Mohd Shahir Shamsir Omar
Deputy Vice-Chancellor (Research and Innovation) Office, Universiti Tun Hussein Onn Malaysia, Batu Pahat, Johor
shahiromar@uthm.edu.my

Abstract

The purpose of this paper is to highlight the potential impact of the outbreak on students learning in one of the public universities in Malaysia, providing greater clarity on what kinds of technological and psychosocial support are needed to address their students' needs. A set of online questionnaires distributed to students through social media, using the online platform Survey. Data were collected during the early stages of the COVID-19 Mandatory Control Order (MCO) period from 26th March to 3rd April 2020. The survey included 1,450 undergraduate and postgraduate students from different faculties within one university in Malaysia. Results indicated that some of the challenges faced by students include difficulty undertaking online learning due to poor or unreliable internet connectivity, unfamiliarity with online learning mode, and difficulty completing online learning tasks assigned by lecturers. In light of the survey findings, recommendations are made for administrators, lecturers, and students to address student well-being and continuity of learning during the coronavirus pandemic situation

Keywords*:* Higher Learning Institutions, student learning, learning resources, COVID-19.

Introduction

To meet with the COVID-19 challenge, Higher Learning Institutions (HLIs) require primary data combined with real-time analytics to gain insight into the well-being and learning needs of their students. HLI leaders need to know the most effective ways to innovate and adapt to best support their students and ensure continuity in providing high-quality teaching and learning experiences. HLIs' decisions on how best to continue serving their students should be based not only on the collective wisdom of HLI leaders but also on data from the students themselves. Real-time data is critical for providing HLI leaders an accurate picture of the situation, resulting in effective responses to the crisis. This paper thus aims to help the University better understand the challenges that students are facing, and continue to face, as the crisis plays out. Having 'real-time' data can help the University formulate more effective and responsive policies to ensure that student well-being and educational quality are given the highest priority by the University.

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Literature Reviews

Viner, Russell, Croker, Packer, Ward, Stansfield, and Booy, (2020) highlighted that in order to overcome the transmission of COVID-19, many countries had instituted large-scale or national closure of learning institutions by March 2020. Due to that, the students' anxiety about COVID-19 has an impact not only limited to their health but also on their studies as well as employment (Cornine, 2020; Cao, Fang, Hou, Han, Xu, Dong, & Zheng, 2020; Wang, Horby, Hayden, & Gao, 2020).

As for learners and trainers, the eduction via a virtual world has become a new challenge for them. The global crisis due to the spread of the COVID-19 outbreak not only results in conventional teaching and learning postponed but also becomes increasingly challenging as they need to adapt to the new norms and habits that require the learning process to be implemented online (Berita Harian, 2020). Mamat (2020) argued that the world needs to elect the virtual learning process as an alternative to face-to-face learning 'mode' although the move may be seen as slightly challenging and limited. As for that, the implementation of e-learning should be utilized preferably during the limitations of movement caused by the COVID-19 pandemic (Abas, 2020).

Methodology

To ensure that the data collected would be relevant, this survey was compiled in the midst of the crisis. The initiative began in the middle of March 2020 with a target of one month from conceptualization to publication of findings. More specifically, data were collected during the early stages of the COVID-19 Mandatory Control Order (MCO) period from 26th March to 3rd April. As everyone was working under the same isolation restrictions, the research team took full advantage of online research and collaboration tools in the planning, communication and conduct of the research activities. The online surveys were password coded and secure so that only one respondent was able to access the survey at a time. Data were managed by one of the research team members and kept confidential at all times. All responses were anonymous -- no identifying information was collected. The findings are presented according to percentages, to acquire a general profile of students' experiences during the crisis.

Results and Discussion

The mean age of the sample was 22 years and the gender makeup of the sample closely followed the university as a whole, as 80% of respondents were female. As illustrated in Figure 1, 81.6% of students reported feeling were worried or extremely worried about the trajectory of their studies given the situation. Of note, students reported feeling more concerned about the impact of the outbreak on their studies, than on their general well-being (53.6% to 43.8%). Clearly, this is a serious issue for students that requires attention from decision-makers.

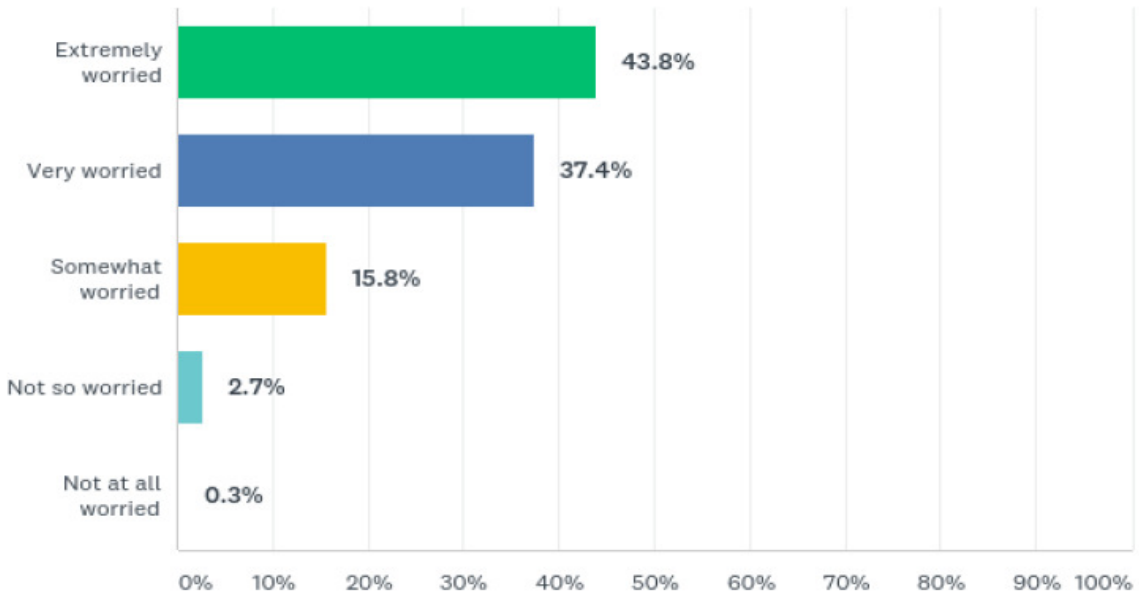

Figure 1: Impact of Coronavirus on students' anxiety

As illustrated in Figure 1, the vast majority of students (81.2%) were either very or extremely worried about the impact of the pandemic on them personally. This indicates that the perceived severity of the situation is very high. It also indicates a strong awareness of the threat that the outbreak poses to different aspects of their lives.

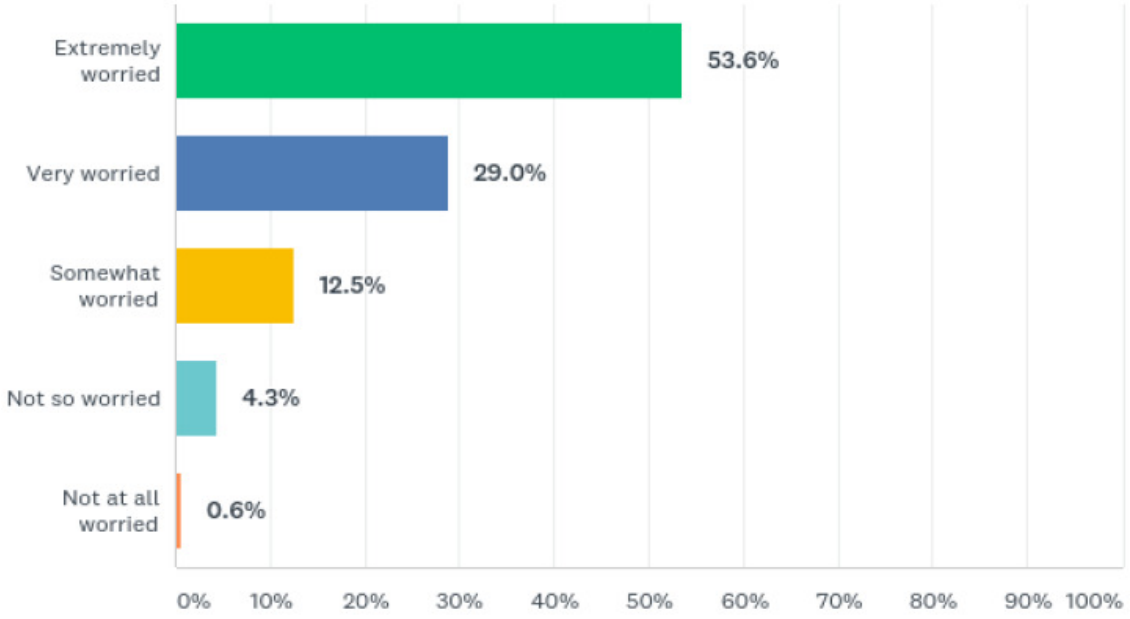

Figure 2: Impact of Coronavirus on students' learning

As illustrated in Figure 2, more than half of the students (55.6%) felt that carrying out their learning was at least somewhat difficult. Only 16.5% of those sampled felt that the current situation was easy for them.

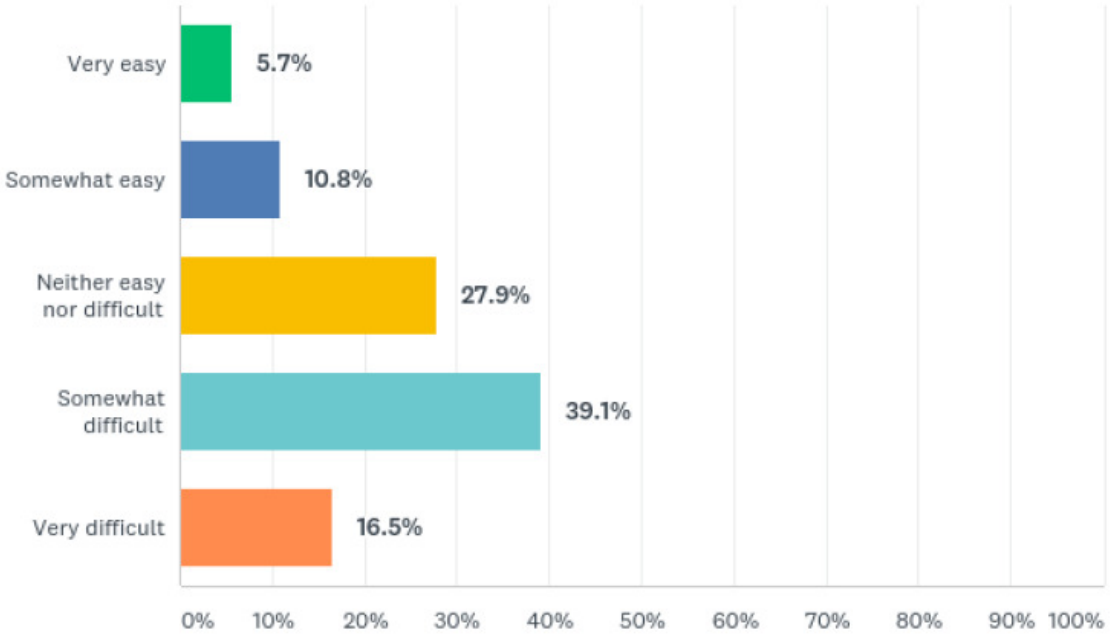

Figure 3: Perceived difficulties learning these days

The findings from Figure 3 indicated that the students have difficulty adapting to the learning process during the COVID-19 pandemic. Here, the teaching and learning methods have changed from face-to-face or traditional modes to the virtual learning activities. Therefore, many factors influence the students' readiness and awareness of virtual learning and these factors might cause some difficulty to the students.

A critical success factor for students to engage in online learning during a crisis is their technological capacity to use online tools. The findings indicate that out of five stars, students reported an average (three stars) data capacity to carry out online learning. The results suggest that there is a limited ability for the students to use online learning during the COVID-19 pandemic.

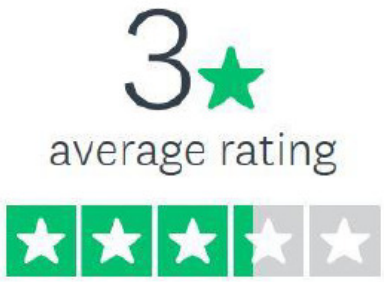

	1	2	3	4	5	TOTAL	WEIGHTED AVERAGE
☆	7.8% 71	15.3% 139	34.8% 316	25.8% 234	16.3% 148	908	3.27

Social media can be leveraged to support online learning. Our students reported (four out of five stars) a high level of accessibility to learning via popular social media apps. Social media have a big influence on the approach of teaching and learning processes and is found to be very popular among students. Indeed, social media also can become a platform for students and lecturers to be closer and friendly bring up the process of teaching and learning.

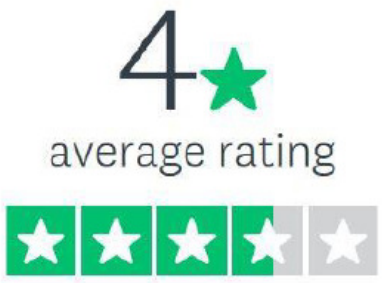

	1	2	3	4	5	TOTAL	WEIGHTED AVERAGE
☆	6.0% 53	11.7% 103	29.3% 258	24.5% 216	28.6% 252	882	3.58

In light of the survey findings, we propose the following recommendations for administrators, lecturers, and students to address student well-being and continuity of learning during the coronavirus pandemic situation.

University Administrators

- University Administrators should consider reconfiguring the university calendar to limit lost learning time. Students expressed deep concerns over the prospect of the crisis derailing their academic progress. This can be facilitated through the widespread application of web-based, online, and distance learning support to students on and off-campus.
- Following the practice of other universities, the University website can be further enhanced by having a dedicated Covid-19 crisis link for students and staff that is visible, interactive, comprehensive, and integrated with all of the latest information and frequently asked questions regarding academic, support services and student affairs. This link would also serve as the main line of communication for University decision-makers to share the latest news and policy updates related to the crisis.

Lecturers

- University lecturers should use technology-based and alternative pedagogical tools to conduct online and distance learning.
- University lecturers should use alternative assessment approaches for student learning to account for the diversity in students' level of access to the Internet, geographical location, and other basic facilities.
- University lecturers should make full use of online discussion platforms to communicate and collaborate. They should also accumulate online learning resources that can be shared with students.
- University lecturers should find ways to prepare students for social distancing and to encourage beneficial activities while at home. They should employ strategies that will allow students to be able to communicate with their classmates to combat boredom, depression, and anxiety during the isolation period.

Students

- University students should make full use of technology to ensure that they are accessible to lecturers and peers and can undertake online and distance learning whether they are on or off-campus.
- University students should be ready to participate in different forms of teaching and learning, not only through face-to-face interaction but also alternative modes of learning and assessment.
- University students should learn from their peers and share learning resources to ensure that they are up to date with the lessons and course content.

Conclusion

Despite the difficulties experienced, the students were optimistic about their future and the university leaders' ability to manage the crisis and provide adequate support to students. Challenges faced by students include difficulty undertaking online learning due to poor or unreliable internet connectivity, unfamiliarity with online learning mode, and difficulty completing online learning tasks assigned by lecturers. While the university has formulated effective policies to respond to the coronavirus (COVID 19) outbreak they need to improve on communication with students to ensure the latter is updated frequently especially in relation to teaching and learning methods.

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Quality Management of The Human – Machine System - Why Is Worth Developing the Ergonomic Designing?

Edwin TYTYK

Poznan University of Technology
Poznan, Poland
edwin.tytyk@put.poznan.pl

Abstract

In the paper defined is the concept of ergonomic engineering as a type of prospective engineering measures, which change the world of technical objects (artifacts) in the direction of increased ergonomic quality, safety for humans, and care for the environment. To effectively achieve this goal, it is necessary to make changes in thinking about the proposed system and the structure of the design process. The „check lists" used by designers serve to check the level of ergonomic quality, mainly of well-known design solutions and, to some extent, enable the improvement of this level through the correction of the faults observed in these designs. This approach is of little effectiveness. Radical improvement of the ergonomic level of products in this way is not possible. Modification of the aim should be obtained, implies the necessity for adequate modification of the method of obtaining it.
Important elements of the new structure of the design process of anthropo-technical systems are decision criteria, in terms of content belonging to the area of ergonomics. The paper presents the formulation of the principles of ergonomic decision criteria, tailored to the specific steps of design procedure and expressed in the engineering language.
Designing of anthropo-technical mega-systems encounters major methodological difficulties due to the multi-interdisciplinary nature of problems to be solved, incompleteness and uncertainty of knowledge of a prospective nature, and the risk of the appearance of unforeseen, adverse effects of engineering measures, which may become apparent in the long term.
The paper presents a concept of the structure of decision criteria that are relevant in the design process of elementary human-machine system and mega-systems of an industrial nature.

Keywords: Ergonomics, Design Criteria, Design Process, Ergonomic Quality.

Introduction

Costs of achieving high and satisfactory ergonomic quality of machines and other technological devices are considerable. They can be lowered, however, by the taking of proper decisions, from the point of view of ergonomics, already at the earliest stages of the product (e.g. machine) existence - i.e. at the phase of formulating project assumptions and in design process. In order to do that it is necessary to apply new design method which would ensure that the machine being designed meets the assumed proper ergonomic quality requirements.

The best known and used way of increasing the ergonomic quality level of products has been the „check lists" used by designers. They serve to check the level of ergonomic quality, mainly of existing design solutions (e.g. in the form of design documentation or prototypes of machines and devices) and, to some extent, enable the improvement of this level through the correction of the faults observed in these designs. This approach is of little effectiveness for methodological and psychical reasons. Radical improvement of the ergonomic quality level of products in this way is not possible. Modification of the aim which should be obtained (i.e. obtaining the product on high level of ergonomic quality), implies the necessity for adequate modification of the method of obtaining it.

Methodological Premises of The Ergonomic Design

The ergonomic design conception is based on the following methodological premises (Tytyk, 2001):

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1. Handling of the design object as a human - machine system and taking the interaction with environment into consideration – as well in case of automated systems which are characteristic for *Industry 4.0* (Figure 1d).
2. Ergonomic criteria ought to be treated with priority in relation to technical and economic criteria;
3. For each step of the design process, corresponding criteria should be assorted individually, by selecting them for the whole morphological space.

The ergonomic design strategy is most effective and allows to avoid many faults and deficiencies in technical solutions that have decisive influence on forming work conditions at the stage of the technical object exploitation.
The new approach to the design process, which is proposed here, is based on the three methodological assumptions:

a) The object being designed is a system: human - machine (or: human - technical object), acting in definite environment and time;
b) In the whole design process of the system, beginning from the stage of studying the problem and formulating assumptions, the decision criteria that are of a human-centric nature are taken to be as more important, having at least the same influence on the creation and selection of the concepts of design solutions, as the technological and economic criteria;
c) The ergonomic criteria, as the integral components of the design procedure, are properly selected for each step of the procedure. They contain information indispensable for designing each element of the system and connection between them, in such a way, that the demanded ergonomic quality level of the system is achieved.

The new method of creating of „user friendly" products has been called „ergonomic design".

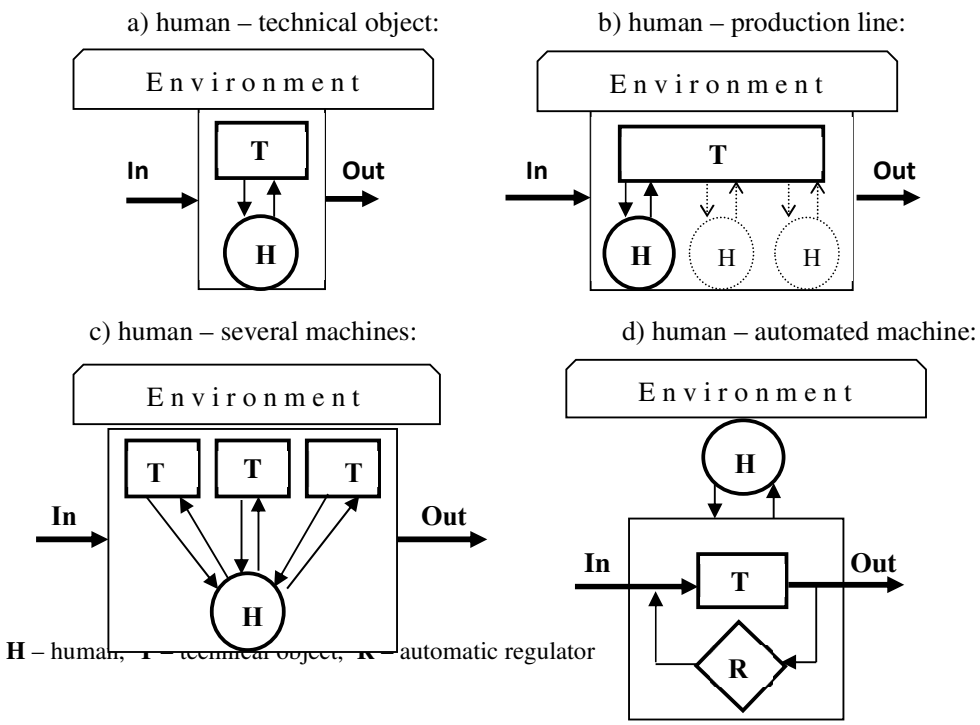

Fig. 1: The different configurations of elementary human - machine system (Tytyk, 2005)

In traditional design processes dominate a linear sequences of steps linked by iterative loops. There exist a justified view that iterations in the technical design process are a necessary and inevitable evil, and their presence proves that our knowledge of the essence and results of design decisions is very superficial. The structure of the technical design processes well reflect the construction processes of such technological objects and their elements, which are not closely related to human while being in operation.

Morphology of Ergonomic Criteria

An integral component of the ergonomic design procedure (Figure 2) are ergonomic design criteria (Table 1). The contents and sequence of criteria should be matched defined phase of design process. Design criteria have been

elaborated in detail and included to the structure of ergonomic design process. It makes possibility to applying computer to design process, even taking into account their heuristic character (Butlewski, 2013).

Ergonomic criteria of design decisions are of very great importance in methods of design. These criteria differ from those of evaluation, applied in methods of ergonomic diagnosis. This difference depends on the difference which separates the diagnostic process from the design process. In the diagnostic process there is a finite (most often real) object of analysis and estimation; in the design process, on the other hand, the object is *in statu nascendi* as an unfinished and incomplete mental product. Therefore, in design criteria the most important are their informative and implicative aspects; in diagnostic criteria, however, it is the imperative aspect (Tytyk, 2001).

The primary ergonomic criterion is the optimization of matching machines, tools, technological devices, work environment and work organization to psychical, physiological and anthropometric features of a human. The criterion (meta-criterion) formulated in such a general way cannot be used in the design process of work-stands. It is necessary to decompose the meta-criterion into a set of more detailed criteria that could be measured and which would have a psychical form (real standard). There can be many ways of decomposition, but not all of them will be of good help in the design process.

There are many lists of criteria used for ergonomic estimation of work-stands. The common defect of these methods is the fact that they can be used only for estimation of a ready-made project, in the form of technical documentation, or a prototype. The design process still remains without the „ergonomic supporting". The hope for improving the existing situation can be associated with working out criteria that would have such a form and essence which would be adequate for a definite design decision. It is one of main assumptions of methodology of *ergonomic design*.

Each ergonomic criterion can be considered as an element of *n*-dimensional space, constructed of the following dimensions:

1) hierarchical;	4) essential;
2) functional;	5) subjective;
3) logical;	6) ranking.

1) *Hierarchy* deals with the degree of criterion generality and allows us to distinguish the strategic, tactical and operative degrees. Ergonomic criteria for design decisions can have a strategic character considering their effects on further stages of the design process (for instance: division of tasks between the human and the machine, selection of technologies, etc.). Carrying on this way of thinking one can distinguish decisions (and adequate criteria) of tactical and operative character with imply consequences of relatively little importance to the final effect of designing.

2) *Functions* in the design process state the primary matter performed by a criterion in the decisive process. The following functions have been distinguished:

* the informative function: consist in informing the designer about problems important from the point of view of ergonomics and in enriching his knowledge in this field;
* the imperative function: resolves itself into ordering the designer to apply standard solutions, ergonomically correct, obtained from the „bank of ergonomic solutions" (maybe created in future);
* the implicative function: assumes directing the designer's thoughts to ergonomic correct solutions thanks to the use of heuristic principles.

3) The *logical* form of a criterion is determined by the locus of this criterion in the continuum: cause – effect. In each point of this continuum the effect of the action of a certain phenomenon is the cause of occurrence of the next phenomenon.

4)The *essence* of a criterion is closely connected with the logical dimension of the morphological space. The distinguished phenomena have the following contents which is the basis for elaborating criteria:

* macrosocial phenomena (on the level of the society);
* microsocial phenomena (on the level of the factory);
* individual phenomena (on the level of a human organism);
* direct phenomena (on the line of contact: human – technical environment);
* micro-technical phenomena (on the level of technological and organizational structure of a plant);
* macro-technical phenomena (on the level of a branch of industry, regional or national economy, social policy).

It is obvious that not all types of criteria can be applied to the design process. Middle types of above list are worthy of special interest.
5) The *subjective* dimension states precisely from what point of view, or rather in whose interest ergonomic criteria are formulated. It is a not trivial problem, because we can distinguish without any difficulties many recipients of criteria, for example:

* performers of the technical devices (e.g. machine);
* operators of the machine;
* workers controlling the machine;
* repair and maintenance workers;
* aiding and transportation workers;
* natural environment.

During the selection of the criteria that takes into account this aspect, it is necessary to adopt certain preferences and compromises. The basic data for this can be, for instance, planned *time* of human's (recipient's) stay by the designed machine.

6) The *rank* of criterion arranges criteria in order established on the basis of values of ranks. The problem of rank stating is most often solved in the way of more or less arbitrary evaluation, although there are attempts to make ranking objective. It seems to be proper to base ranking of ergonomic criteria on quantitative description of the following features:

* pathogeny;
* cumulativeness;
* inclination to synergy;
* susceptibility of a human to the factor;
* the effects for the natural environment;
* and the like.

At the same time, these features deal with the factor which is the essential basis of the criterion.

The list of the ergonomic design criteria

The ergonomic criteria are the factors aiding and directing the design decisions. They constitute an integral component of the procedure. The contents and sequence of criteria appearing in the design

Table 1: Indications of the group of ergonomic criteria (acc. to: Tytyk, 2001)

Indication (see Fig. 2)	Design phase	Group of the ergonomic criteria
E-1	Work process design	1.1. Work contents 1.2. Work methods 1.3. Functions of technical equipment
E-2	Design of work area	2.1. Conditions of body posture 2.2. Area of movements and eyesight work 2.3. Architecture of technological object
E-3	Design of the signalling and controlling elements	3.1. Information and signalling elements 3.2. Controlling elements
E-4	Design of the physical, chemical and biological environment	4.1. Sources of air pollution 4.2. Sources of microclimate disturbance 4.3. Sources of vibrations and noise 4.4. Sources of injurious radiation 4.5. Light sources 4.6. Sources of injurious substances

process result from the order of problems occurring during the designing of the system: human - technological object. They have been put together, formulated at the general level, are shown in Table 1 (acc. to Tytyk, 2001).

Structure of The Ergonomic Design Process

The structure of the ergonomic design process has a different shape to that of the traditional structures of technical design processes, where it is dominated by a linear sequence of steps linked by iterative loops. The structures of the

technical design processes well reflect the construction process of such technological objects and their elements, which are not closely related to human while being in operation. The process of ergonomic design has a twofold structure with a close and direct links of the both trends. This dualism is an effect of the necessity to treat differently the „human" and „technical" elements of the designed system, and to division of tasks between „human" and „machine" (Tytyk, 2001). The ergonomic design procedure assumes that the designer will exactly realise its successive steps in a consistent and correct way. This procedure can also make use both: of the CAD software and of heuristic procedures. Ergonomic designing caused a considerable modification of the traditional design process structure (Figure 2).

Designing of the „human" component contributes to the procedure certain invariable resulting from the recognised (average and extreme) psychological, physiological and anthropometric properties of the population of prospective users of the technological object. Those invariable constitute, at the same time, limits and definite of specific solutions within the designed technological object.

At the stage of formulating assumptions for a design the most essential ergonomic problem is the division of the tasks, which the system is supposed to perform, between a human and the technological object. The traditional approach resolves itself to the definition of the level of mechanisation and automation of the work and the decisions being made are based on technical-economic premises such as: the permissible cost of the technological object, realisation possibilities, technological destination (to realisation of the technology in piece, series or mass production), the possibility of assembling the object into production lines, labour market, required qualifications of an operator, etc. It is necessary to include into this set of conditions, a set of ergonomic criteria, called at the strategic level „Work process" (indication E-1, in Figure 2 and Table 1).

At the stage of creating concepts of technical solutions and initial designing, the criteria comprising other spheres of ergonomic problems are helpful. After the division of tasks between the two components of the system and initial definition of the work methods of human (taking into account, among others, biomechanical rules of performing work movements), it is necessary to define the recommended and allowed body postures of a human at work and rest pauses, making use of the anthropometric data and information from the field of work physiology (criteria set E-2). On that basis an initial design of space configuration of the technological object can be made, realising one of the essential requirements of ergonomics: „design adjustment" of a machine to human. At that stage it is also necessary to elaborate activity concepts of the indispensable functional units of the technological object and take into account certain esthetical requirements, mainly concerning the form, in connection to the function of the designed unit.

Next, on the basis of the information concerning the ergonomic features of destination, construction and configuration of the definite types of checking, information and control devices (criteria set E-3), it is necessary to work out an initial design of the control-checking unit. It is also necessary to design, with the use of anthropometric data (E-2), the sphere of human manipulation of the tool unit, in such a way that the tasks performed by the whole system would proceed safely, for both: human and environment, and moreover – efficiently.

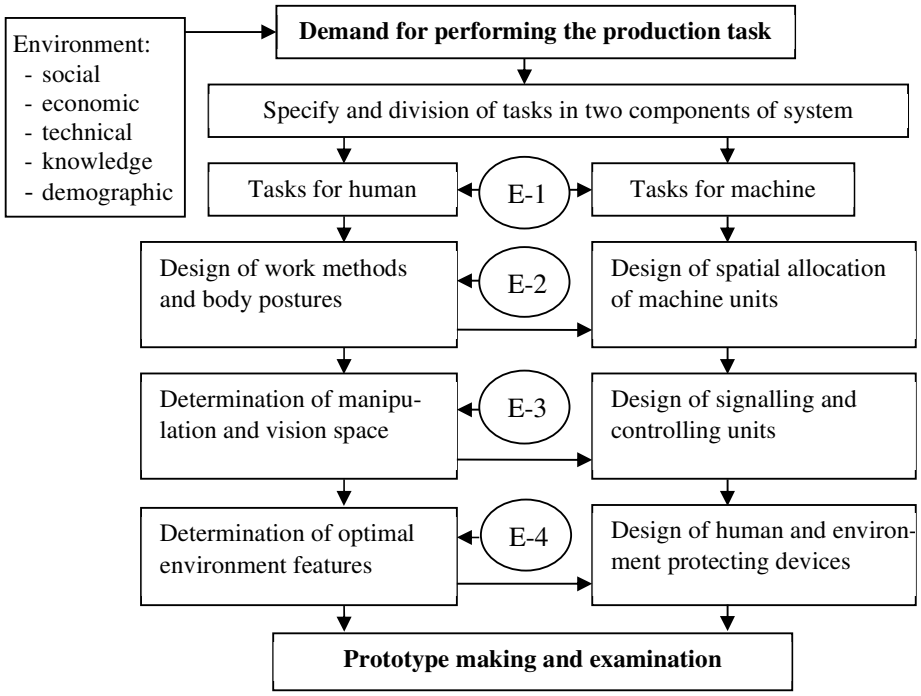

Figure 2: General structure of ergonomic design (acc. to: Tytyk, 2001)

The first step in the detailed designing is the prognosis of the size of human-load in the system on the basis of the predicted ergonomic attributes of the functional units. This is the physical load (dynamic, static, monotypic, hypokinetic), psychological load (intellectual and emotional) and sensory load (sight, hearing and other). If the prognosis is successful, i.e. if the possibility of excessive or insufficient load is excluded (taking into account the time of exposure to danger), the transition to the next step of the procedure will be justified. The particular functional units of machine should be treated as the emission sources of harmful energy and substances. The basic directions of searching solutions are marked out by the set and content of the strategic criteria belonging to the group E-4, whereas specific criteria from that group can indicate concrete ways of solutions.

Designing of an anthropotechnical mega-systems

It is easy to imagine the structure of the systems of a higher complexity, composed of many elementary human – technical object systems, (Figure 3). They can be called "anthropotechnical mega-systems" (ATMS).

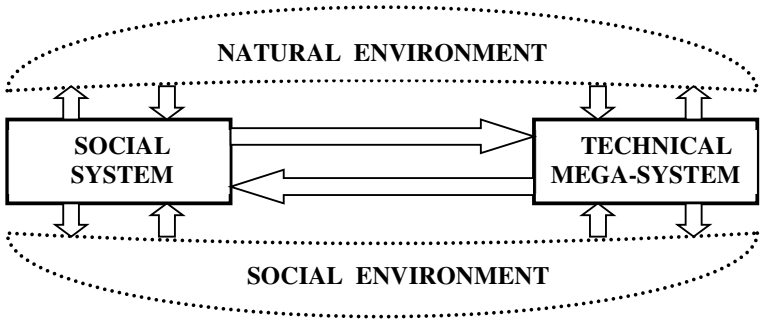

Figure 3: Anthropotechnical mega-system (Tytyk, 2012)

In practice, these can be for example a production department, office, hospital, school, neighborhood, and even a mega-system called a technical civilization. Here we enter into the area of scientific study called macroergonomics (Hendrick at all, 2002). The environment of systems with a higher degree of complexity is different than for the elementary system: here factors come into play that belong to economics, sociology, ecology, politics, also culture (Wyrwicka, 2011). To make a macro-ergonomic evaluation of ATMS, one must take into account the criteria belonging to many different areas of meaning. Conditions for the formulation of criteria are provided in Table 2.

Based on the assumptions presented in Table 2, one can formulate ATMS evaluation criteria or the decision criteria used for making design decisions. The lean framework of this article does not permit for the further development of this problem. However, one can assume that the individual criteria areas (column 2 in Table 2) will be evaluated on a scale of relative values in the range (0-1), where zero means an extremely poor score, and one – an extremely good score.

A problem will arise for the aggregation of these indicators. Aggregation models based on averaging (algebraic, geometric, weighted) can be considered inappropriate, because one cannot find a logical justification for the hypothesis of one-way interaction of the criteria belonging to different areas. Therefore, a graphical interpretation of the aggregation of criteria belonging to different areas of meaning is proposed. For the example shown in Table 2, which highlights eight areas of ATMS criteria, a graphical illustration of the aggregation model is shown in Figure 4. The individual "rays" (1-8) represent the values of criteria areas on a scale of (0-1).

Table 2: Principles for the formulation of macroergonomic evaluation criteria (Tytyk, 2012)

No.	Criteria area of meaning	Substantive grounds for the formulation of criteria
1	Ergonomics	psychology, physiology, anthropometry, medicine, technology, work organization, management, work economy, occupational risk, qualitology
2	Ecology	ATMS' impact as a relatively isolated whole and its components on ecosystems (human, animal, plant) in various stages of ATMS and its components
3	Economy	ratio of output to input, efficiency, productivity, costs of reliability and resistance to changing operating conditions
4	Sociology	professional qualifications and education of people, professional ethos, gratuities for work, market demand for labor in the profession, worker mobility, interpersonal relationships, social behavior
5	Culture	moral principles, ethical and religious beliefs, family ties, traditions, compliance of corporate principles with one's own system of values
6	Well-being	subjective feeling of "ones place," an understanding of the world, acceptance of the rules of functioning in society, health, stability, perspective of personal and professional development, social interaction
7	Social safety	salary and other gratuities, job security, health care, social security, pensions, pro-family policy
8	Public safety	lack of danger to themselves and their families from other social, political, or religious groups, protection against natural disasters and technological, biological, chemical, or energy disasters

The maximum aggregate score is equal to the surface area of a regular octagon with radius equal to unity (R = 1), namely:

$$S_{\Sigma 8} = \frac{1}{2} \cdot 8\, R^{\overline{2}} \sin \alpha = 2 \cdot \sqrt{2} \qquad (1)$$

The aggregate measure of the macroergonomic quality of ATMS can be defined as the relation of surface area of an inequilaterally octagon, formed from the assessed criteria areas in order of decreasing values of score indicators, to the surface area of an equilateral octagon with sides equal to unity (maximum). After simple mathematical transformations, for any number of areas of evaluation criteria (*i*) it could be in the formula (2):

$$Q_{ATMS} = \frac{1}{8} \Sigma\, x_i \cdot x_{i+1} \qquad \text{if:} \quad x_i \geq x_{i+1} \qquad (2)$$

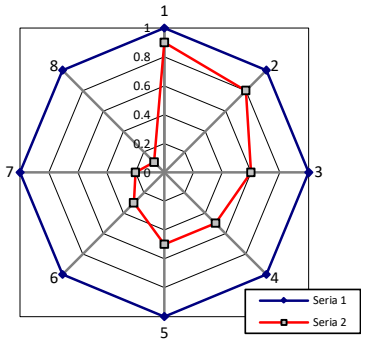

Figure 4: Graphical interpretation of the aggregation model of macroergonomic quality assessments

For example: using the formula (2), for the eight sub-points, in order of decreasing value: 0.9 – 0.8 – 0.6 – 0.5 – 0.5 – 0.3 – 0.2 – 0.1 we receive the aggregate scores of marcoergonomic quality with the value Q_{ATMS} = 0,25875 (Figure 4).

Conclusions

At the present time it is necessary or perhaps even indispensable to create a new quality approach to the process of designing in the field of technology. There is an urgent necessity for designers, constructors and engineers to acquire ergonomic knowledge so that they can create human- and environment-friendly technology. That kind of knowledge, in a specific way, influences evaluation of solutions to technical problems and generates modification of designing methods and its practical effects can be observed on the market of technical products.

Ergonomic knowledge implies the necessity of changes as far as designing methods are concerned. That is owing to the fact that we cannot reach the new goal (which is constructing a machine well-adjusted to a human being), using old, traditional methods of technical designing. The methods of ergonomic designing develop, following evolution principles – from "ergonomic assistance" of geometric designing and informative interface "human–machine" through an ergonomist assisting further steps of the designing procedure, to a radical rebuilding of the whole structure of the designing process. The above-mentioned methods can be computer aided as far as modeling and providing the designer with ergonomic information collected in computer banks of knowledge and ergonomic decision support system is concerned. However, it is still impossible to create simulation models of the human–machine systems that would accurately describe the real work systems, because the well-known mathematics tools are still inadequate for this purpose.

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The Relationship Between Heutagogy Learning and Student Motivation and The Mediator Role of Digital Literacy Among Students in Indonesia: A Proposed Conceptual Framework

Endang Fitriyah MANNAN

Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia, endang_fitriyah@yahoo.com

Shamila Mohammed SHUHIDAN

Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia, milashuhidan@gmail.com

Siti Arpah Binti NOORDIN

Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia, siti@salam.uitm.edu.my

Mohamad Norman MASREK

Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia, mnoorman@uitm.edu.my

Abstract

Revolution of industry 4.0 led to rapid changes in various fields of life, including the world of education and 21st-Century skills are required to meet the demand of it. As education has been transformed from pedagogy to andragogy and heutagogy learning, students should be able to think critically and solve problems, creative and innovative as well as communication and collaboration skills. From information science perspectives, these skills should be incorporated with digital literacy skills where students be able to find, manage, and use information and skilled use information technology. However, previous studies found that with digital literacy will lead to less motivation and student to become a more independent learner. Based on the literature review, this paper aims to propose a conceptual research framework for the relationship between heutagogy learning and student motivation among secondary school students. Besides, digital literacy skill is introduced to gain understanding, to what extent, it has a moderating relationship between the independent variables and dependent variable. Its hope that this proposed framework can argue in heutagogy learning necessary understanding of digital literacy skill to enhance student motivation

Keywords: Digital Literacy, Heutagogy Learning, Student Motivation

Introduction

Every aspect of human life is currently affected by information communication technologies (ICT). They play importan t roles in workplaces, companies, education and entertainment (Ratheeswari, K., 2018).. Technology evolution and expansion translate into expanded access in education through devices used to deliver distant and online education. ICT also has changed the traditional way of teaching and learning to the new method and experience It means the new method allows the teachers and students to explore more resources and flexible way. However, not all teachers and students can utilize all the information provided on ICT. Also, to adopt ICT as an innovative teaching and learning practices, the transformation of the education system also needs to be considered. The current form of education is heutagogy, which is focused on self-determined learning (Halsall, Powell, & Snowden, 2016) Heutagogy required students to be a more independent learner, and the role of the teacher only as a guidance and student have the freedom to set their own learning experience (Shuhidan, 2013) . In addition, (Hase, S., & Kenyon, 2013) stated heutagogy is appropriate to the needs of

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learners in the 21st-century, particularly in the development of individual capability. Therefore to cope with the current situation, the student needs to equip with digital literacy skill.

Studies found that there is a relationship between digital literacy and student motivation (Chan, Churchill, & Chiu, 2017; Kane, 2017; Niemi & Multisilta, 2016). Student motivation is essential in facilitating a desire to begin to engage in and pursue educational goals (Reeve, 2016). Student motivation is defined as a process where the learners' attention becomes focused on meeting their academic objectives, and their energies are directed towards realizing their academic potential student motivation. Also, (Bilal, 1999) as cited (Shuhidan, 2013) found that student will have a motivation, if their teachers allowed them to find their way for study. Student must have a freedom to choose their interest course or topic that related to their own interest. For example, students can utilize technology such as internet as facilitator for studying. The freedom method of study allows a student to explore and expand not only in experience but also in their knowledge with regards to some areas and fields of interest. Then, a student shows their high confidence and motivated to search the topics which is they are interested with.

Research Background

Heutagogy learning approach looks to the future in which knowing how to learn will be a fundamental skill given the pace of innovation and the changing structure of communities and workplaces. The method of heutagogy aims to prepare learners for the self-determined lifelong learning that is important for survival in the 21st century era (Ashton & Newman, 2006). Furthermore, in 21st century student requirements to gain new skills, method of learning, knowledge in line with living and working demands in a complex information atmosphere (Kuhlthau, C. C., Maniotes, L. K., & Caspari, 2015). As a result, digital literacy is an important skill for learners and teachers when they want to implement heutagogy in the school. The definition of digital literacy has expanded by some scholar. For instance, according to (Calvani, Fini, Ranieri, & Picci, 2012) state that "Digital literacy merges capabilities: purely technical aspects, intellectual competences and also competencies related to responsible citizenship. They all allow individuals such as students or teachers to develop themselves completely in the information society". For this reason, digital literacy competencies impact to enhance the student motivation term of capabilities, social emotional, copyright and ethical principles.

Education in the digital age demands students to have adequate literacy skills. Literacy in Indonesia is still low compared to other countries. Therefore, digital literacy, as part of 21st-century education is important since elementary school. The review of this article will further discuss the application of aspects of the digital literacy domain in primary school learning. In the end, the implementation of digital literacy requires the synergy of various parties; they are government, schools, parents, and society (Dianimdri, S. D., & Yuliani, 2018). Digital literacy education for the millennial generation is necessary. The technology can provide beneficial and harmful for the young generation. For example, the case of the hoax or the fake news, the millennial generation must have an ability to filter the true of false information. Another example, from a prior study, found that social media user is unmatured to select the information that provided by social media, which lead to bad impact of their behaviour.

Literature Review

Previous studies (Hase & Kenyon 2000; Blaschke, 2016; Eshet-Alkalai, 2010; Hargittai, 2010; Rhema & Miliszewska, 2014; Abdullah, 2015) show that heutagogy learning approach is to prepare the students to be a self-determined and it's a require a new set skills especially to deal with complex information age. This section will discuss the literature review from heutagogy, digital literacy and student motivation.

Heutagogy Learning

The way of teaching and learning is continually experiencing changes in simultaneous with the development of the country's vision in creating younger generations that are occupied in facing new challenges in the era of globalisation. Heutagogy methods addressing the self-directed learning needs of the autonomous professional learner include distance learning and use of technologies. The PAH continuum was devised as a way of understanding the processes of learning that might increase learner agency as the learner develops new learning skills. Thus, Luckin et al. (2011) define the PAH continuum as one in which learners develop cognitively, metacognitively, and epistemically within the learner context, arguing that learners need to be assisted to manage their own learning.

Digital Literacy

Today the topic of digital literacy is widely discussed in this era. Students and teachers are raises in social knowledge. Being advanced digital literacy is an existence skill they need computerized education abilities in each part of their life. To be educated in the modern sense, it is essential to be digitally literate (Eshet-Alkalai, 2010; Hargittai,

2010). The prior study defines digital literacy as the utilized of digital devices to establish meaning and communicate efficiently with some accessories such as digital texts, navigate non-linear digital documents and evaluate digital information (Bulger, M. E., Mayer, R. E., & Metzger, 2014; Eshet-Alkalai, 2010; Ng, 2012). In addition, (Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, 2014) defines digital literacy as the utilize of computers as a accessible and productive devices to collect, build, transform, and securely use information. Furthermore, ICT and DL as pre-mandatory of digital world. Consequently, it can be concluded that technological devices can be enhanced student motivation and attitude and the DL of students.

Student Motivation

Motivation can affect how students approach school in general. Student learning motivation must be a serious concern in developing 21st century skills. The learning environment needs to be developed in such a way as to make it more interesting so that learning does not merely transmit knowledge ('standard transmission'). Motivation to learn is enhanced by: greater involvement in and control by the learner in the learning process; self-initiated learning; the opportunity to develop and share patterns; and relevance (C. Hase, S., & Kenyon, 2000). Ferrari (2012) argue that "being digitally literate today involves the knowledge, attitudes and skills needed for operating technologies, using the internet, understanding the media and managing information. However, the convergence of literacies into the digital is, however, more than the sum of its single elements". Research finding has shown that a student's skill in technologies is a significant predictor of attitudes towards ICT. This attitude may influence the students' perceived and actual DL and ICT skills. Better ICT skills are seen to have a positive impact on students' motivations and attitude (Rhema & Miliszewska, 2014). Thus, a better DL enhances positive attitude towards technology (Abdullah, 2015).

Methods

This article uses the literature review method, which critically examines the knowledge, ideas, or research findings contained in the scientific literature, and formulates theoretical and practical contributions to a topic (Narbuko & Achmadi, 2005). The findings of the research are focused on the study of the effect of heutagogy learning on learning motivation that is moderated by digital literacy among students. Research articles were obtained and collected from google scholar, DOAJ, the Scopus database, and several electronic databases subscribed to by library. The purpose of using this approach is to find evidence through review and analysis of the content of the literature which helps in identifying key concepts, issues, problems, methods, findings and models/ frameworks. Several selected keywords and phrases were used in an effort to retrieve relevant articles such as "digital literacy", "information-digital literacy", "digital literacy skills", "digital literacy learning", "digital measurement literacy", "motivation learning" , "Student motivation", "heutagogy learning", "Pedagogy learning", Andragogy learning "," student learning ", and" student learning behavior ". There are four procedures used in writing this article. The four procedures are from Nakano & Muniz (2018), namely: (1) Organize, which is organizing the literature to be reviewed. The literature reviewed is the literature that is relevant to the problem. The stages in organizing literature are looking for ideas, general objectives, variables taken and conclusions from the literature and classifying literature based on predetermined categories; (2) Synthesize, which is to unify the results of the literature organization into a summary so that they become one unit, by looking for linkages between literature sources; (3) Identify, namely identifying the problems studied in the literature. and (4) Formulate, namely formulating questions that require further research.

Proposed Conceptual Framework

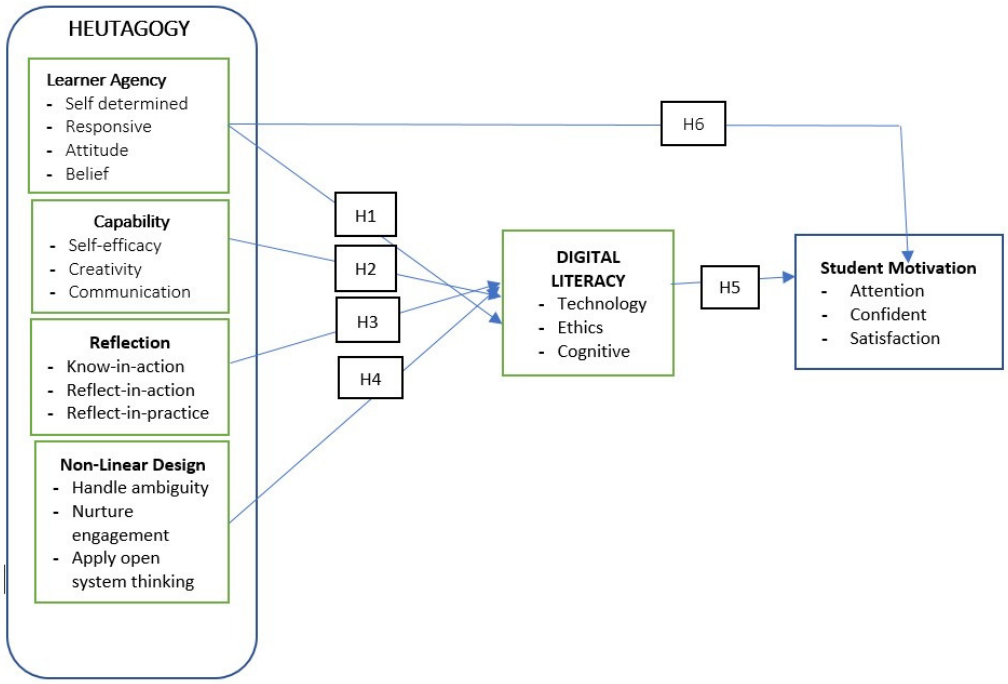

Figure 1: Proposed conceptual research framework

From underpinning theories and models of Heutagogy Learning, Digital Literacy and Student Motivation derived the proposed framework as Figure 1.0. The proposed framework aims to investigate the relationship between heutagogy learning and student motivation. The independent variable in this study is Heutagogy learning which has four (4) dimensions, namely linear agency, capability, reflection and non-linear design which will be considered to have an influence on student learning motivation which includes dimensions of attention, confident and satisfaction. An important addition to the framework is digital literacy skills which are expected to be strongly correlated with the use of electronic resources among students. Thus, digital literacy skills have been identified as a moderating variable whose introduction is expected to strengthen the effect of the four (4) dimensions on the independent variable. As the dependent variable it is predicted to have a relationship with the above independent and moderating variables.

Conclusion

The proposed framework is expected to provide useful and insightful findings about the relationship between heutagogy learning and student motivation. Furthermore, digital literacy skills are a moderating variable that is anticipated to have an influence on the relationship between both the dependent variable and the independent variable. It's hoped that, this research framework will offer research methods as well as instruments to collect and analyze data on the relationship between heutagogy learning and student motivation and the mediator role of digital literacy among students in Indonesia.

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Modern Concepts of Management Toolbox for Market's Pioneers and Operators

Krystian PAWLOWSKI

Poznan University of Technology, Faculty of Engineering Management, Poznan, Poland
krystian.pawlowski@put.poznan.pl

Abstract

In the literature related to strategic analysis and strategic choices, we find a very broad discussion on the interaction between an enterprise and its environment, situational selection of the enterprise's strategy depending on the conditions of its environment. The operational expression of the adopted strategies are concepts, methods and techniques of business management. On the other hand, internal conditions affect the scope and results of implementing management methods both on the side of barriers and factors favouring implementation. The following paper, out of many internal factors shaping the situational selection of modern management methods, assumes that leading ones are: standard (SSD) or non-standard (NSD) mode of operation related to the level of enterprise's innovation. A group of 150 medium and large enterprises of the industry in Poland were examined as a part of the research. The goal of the study was to identify the modern management methods which are used and their correlation with achieved economic results. The practical implications of the work results is the development of modern concepts of management toolboxes for Pioneers and Market Operators.

Keywords Innovation, Modern Concepts of Management Toolboxes, Market Pioneers, Market Operators.

Introduction

Companies, including both large multinationals, small and medium-sized enterprises operating on the local market, are forced to monitor changes in the environment and adapt their strategies to these changes. The need to adjust enterprises to the environment is indicated by P.R. Lawrence, I.W. Lorsch (1974), G. Stonenhouse (2001). In the literature related to strategic analysis and strategic choices, we find a very broad discussion on the interaction between an enterprise and its environment, situational selection of the enterprise's strategy depending on the conditions of its environment. The operational expression of the adopted strategies are methods and techniques of business management. They should be consistent with the strategies used by the company. Lists of typical management methods and techniques assigned to organizational strategy are well known and approved, e.g. Lean Management (Lean Toolbox), as well as general taxonomies of contemporary management methods, such as the work of Miller and Roth (Bolden at al., 1997), taxonomy developed by P. White (White, 1996), and the work of R. Bolden, P. Waterson, T. Wall, P. Warr, and Ch. Clegga (Bolden at al., 1997). However, there are no lists of management methods and techniques related to the operationalization of the strategy of market Pioneers and Market Operators. Internal conditions affect the scope and results of implementing management methods both on the side of barriers and factors favouring implementation. Empirical research on the application of management methods was carried out in the context of:

- internal conditions of enterprises and institutions: (Flieger, 2009, Firlej, 2011, Bieńkowska, Zgrzywa Ziemak, 2011, Walentynowicz, 2013),
- co-existence of management methods in enterprises (Bieńkowska, Zgrzywa- Ziemak, 2013),
- popularity of applications (Bieńkowska, Zgrzywa Ziemak, 2011, Bain and Company, 2017).

The following paper, out of many internal factors shaping the situational selection of modern management methods, assumes that leading ones are: standard (SSD) or non-standard (NSD) mode of operation related to the level of enterprise's innovation. It was assumed that the non-standard way of operating is associated with the "Pioneers" enterprises in which innovation leads to change or creation of new business segments in which there is

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yet no competition. On the other hand, the standard way of operating is associated with the "Market Operators" enterprises functioning in segments characterized by intensive competition, where innovation is focused on reducing costs or improving the quality of products. A group of 150 medium and large enterprises of the electromechanical industry in Poland were examined as a part of the research. The goal of the study was to identify the used modern management methods and their correlation with achieved economic results. Four groups of enterprises were distinguished for the needs of the research model: Pioneers with market success, other Pioneers, Market Operators with market success and other Market Operators. For each of the above groups, leading and positively correlated with economic results groups of modern management methods were identified. The practical implications of the work results is the development of modern manufacturing practices toolboxes for Pioneers and Market Operators. Additionally, during the research work, an original model was developed to differentiate between the inclusion of individual methods in the meta-concept (organizational strategies) lean and agile.

Research Problem

To sum up, the paper analyses the following research problem: what modern management methods are beneficial for high economic results in groups of Pioneers and Market Operators.

Literature Review

The Innovation of The Enterprise

D. Depperu and L. Gnan (2006) conducted a study on the correlation between formulation strategy and competitive pressures. These studies have positively verified two hypotheses:

• As demand increases, the need to obtain new resources and the need to innovate the business formula increases as well as the need to rationalize and modify the business formula and the need for consensus among stakeholders decreases.
• With increasing volatility of customers' needs, the need for the innovative business formula is growing.

The research of M.J. Ruiz Ortega and P.M. Garcii-Villaverde (2008), on the other hand, combined the level of innovation of the company with the selection of marketing strategy and key skills and the economic and financial results of the company. From the point of view of this work, it is important that the above-mentioned studies have shown the importance of the relationship between the levels of innovation and the strategies and skills of the company, as both strategies and skills have their designators used in the management methods.

Organisational Strategies

The organizational strategy is one of the functional strategies of the company. It converts the strategic objectives of the company and the objectives of the strategic business units into organisational objectives of the company. Organizational strategies concern both the organizational structure and business processes, including management methods and techniques. The meta concept of management in this paper is related to the organizational strategy of Lean and Agile understood in this paper as company paradigms. At the general methodological level, they are treated as meta management concepts, which means that they are more general in relation to concepts, methods, techniques, management tools. (Trzcielński, 2011, pp. 24-25).

In the subject literature, the management methods presented in Table 1 are also described in the context of meta concepts (methods) Lean Management or Agile Enterprise, but generally, the authors do not provide criteria differentiating the inclusion of individual methods into a given meta concept. With regard to Lean Management, there is extensive literature justifying the link between this concept and the 29 management methods and techniques described by Walentynowicz (2013). The relationship with Agile Enterprise is much less clear, and even less common application of methods by both meta concepts. During the research work, an original model was developed to differentiate between the inclusion of individual methods presented in Table 1 into the meta concepts of lean and agile. The basic assumptions of the model are presented below:

- The Lean strategy may be operationalised in the realisation of the following five interdependent phases (principles) of Lean (Womack and Jones, 2001, pp. 10-12), (Walentynowicz, 2013, pp. 54-59):

- Customer-defined value determination principle (*Specify Value)* - (V)
- Identification principle of the value stream *(Identify the Value Stream)* - (VS)
- The principle of harmonious flow *(Flow)* - (F)
- Principle Just In Time /Pull *(Pull)*- (P)
- Principle of excellence (Kaizen/KAIKAKU) (K)

- The operationalisation of the Agile strategy can take place in two main areas:
  - The realization of the enterprise's agility characteristics and the level of agility (Trzcielński, 2011, p. 75, and p. 133-150). The criteria related to the achievement of the enterprise agility features are cleverness, flexibility, intelligence and cunning.
  - Realization of the level of enterprise agility where we can distinguish four levels of enterprise agility development (Trzcielński, 2011, pp. 133-157): Reactive model (Mr), Proactive model (Mpa), Network model, Virtual enterprise.

Table 1: Scope of research - a group of 36 contemporary management methods included in the research model

No	Management Method	No	Management Method
(1.)	Just in Time (JIT)	(19.)	Learning Culture (LC)
(2.)	Levelling (LEV)	(20.)	Mass Customization (MC)
(3.)	Pull (PULL)	(21.)	Outsourcing (OS)
(4.)	One Piece Flow (FLOW)	(22.)	Marketing Research (MR)
(5.)	Takt Time (TTK)	(23.)	SWOT (SWOT)
(6.)	Multi process handling (MPH)	(24.)	Extrapolation Trends (ET)
(7.)	JIDOKA (JID)		
(8.)	Benchmarking (BEN)	(25.)	Delphi Method (DM)
(9.)	Statistical Process Control (SPC), (SQC) – Statistical Quality Control	(26.)	Sector Attractiveness Rating (SAR)
(10.)	Supply Chain Partnering (SCP)	(27.)	Porter's five forces analysis (P5F)
(11.)	Standardization (STA)	(28.)	Job Rotation (JR)
(12.)	Kaizen (KIZ)	(29.)	Skills matrix (SM)
(13.)	Total Productive Maintenance	(30.)	Business Process Management (BPM)
(14.)	5S (5S)	(31.)	Business Process Reengineering (BPR)
(15.)	Visual Management (VM)	(32.)	Flexible Manufacturing Systems (FMS)
(16.)	Empowerment (EMP)	(33.)	Concurrent Engineering (CE)

(17.)	Value Stream Mapping (VSM)	(34.)	Information and Communication Technology (ICT)
(18.)	Virtual Organization (VO)	(35.)	Manufacturing Cells (MC)
		(36.)	Team Based Working (TBW):

Source: own study.

Table 2 presents the authorial allocation of contemporary management methods to the organizational strategies of Lean and Agile.

Table 2: Lean & Agile Toolbox

Lean i Agile Toolbox	
Lean Toolbox	Agile Toolbox
1. Just in Time	2. Levelling / Heijunka
2. Levelling / Heijunka	6. Multi-process Handling
3. Pull	10. Supply Chain Partnering
4. Flow	13. Total Productive Maintenance
5. Takt Time	16. Empowerment
6. Multi-process Handling	18. Virtual Organization
7. JIDOKA	19. Learning Culture
8. Benchmarking	20. Mass Customization
9. Statistical Process Control	22. Marketing Research
10. Supply Chain Partnering	23. SWOT
11. Standardization	24. Extrapolation Trends
12. Kaizen	25. Delphi Method
13. Total Productive Maintenance	26. Sector Attractiveness Rating
14. 5 S	27. Porter's five forces analysis
15. Visual Management	28. Job Rotation
16. Empowerment	29. Skills Matrix
17. Value Stream Mapping	30. Business Process Management
21. Outsourcing	31. Business Process Reengineering
30. Business Process Management	32. Flexible Manufacturing Systems
31. Business Process	33. Concurrent Engineering

Reengineering	
35. Manufacturing Cells	34. Information and Communication Technology
36. Team Based Working	35. Manufacturing Cells
	36. Team Based Working

Source: own study.

The Research

Research sample

The research sample consisted of one hundred and fifty companies. The respondents were people directly managing enterprises (board members, directors). The survey was carried out with the help of an external company which was commissioned to conduct an interview. The answers collected in the research contain information on internal and external conditions of enterprises related to the implementation of new management methods and techniques, implemented modern management methods and tools and the economic situation of enterprises.

Scope of Research

Table 1 shows the range of tests. The list includes 36 contemporary management methods.

Research Methods

In order to verify the raised research problems, research was conducted in the theoretical and empirical sphere. In the theoretical sphere, a critical analysis and synthesis of the literature was made. In the empirical sphere, a questionnaire survey was conducted. The research was conducted in the form of an interview. The majority of answers were given according to the Likert's scale (1-5).

Data Processing Methodology

Identification of Pioneer/Operator companies

The entire sample of N=150 companies was divided into two groups of companies, Pioneers operating in a non-standard manner and Market Operators operating in a standard manner. In order to divide companies according to their level of innovation, the respondents were asked the following questions:

1. Is your company building a competitive advantage focused on:

    1. Increasing the efficiency of your processes and minimising costs.
    2. Creating innovative solutions.

In order to identify a group of pioneers an additional strengthening question was asked:

2. Changes in technique and technology result from improvements in existing solutions. (Respondents responded using a five-point scale, where 1 - definitely not, and 5 - definitely yes.)
The companies that simultaneously indicated answer 2 in question 1 and indicated answer 4 or 5 in question 2 were qualified to the group of pioneer companies with a high degree of innovation. By way of exclusion, the remaining companies were qualified to the group of Market Operators.

Analysis of the economic performance of enterprises

In order to divide the companies into groups: companies with good economic performance - company group A, and companies with bad economic performance - company group B - the rest, the respondents were asked a question:

Please tell me if:

1. In 2013 the value of sales was higher than in 2012.
2. The company has implemented its sales plan for 2013.
3. The company has fulfilled its financial targets for 2013.
4. The company has met its financial targets for the last 2 years.

Group A included those companies which answered all four questions on financial performance in the affirmative way. All the other companies were allocated to company group B on a debarment basis.

Determination of indicators for the level of implementation of modern management methods in the surveyed companies

In the questionnaire the respondents determined the degree of implementation of particular methods according to the Likert's scale, where 1 - meant no implementation, 3 - partially implemented, 5 - a given method was fully implemented. For the purposes of the research, the answers in the scales 4 and 5 were assumed to correspond to full implementation of a given method. In order to calculate the implementation rates of individual methods, fully implemented (response scale 4.5) methods were identified in each research sample. Then, the number of fully implemented individual management methods was divided by the number of a given sample in the segment. In the above procedure, an indicator was obtained which indicates the level of implementation of a given method.

Identification of modern management methods conducive to high economic performance in Pioneer and Operator groups

The following methodology was used to identify modern management methods conducive to high economic performance in Pioneer and Operator groups:

- Indicators were set for the implementation of modern management methods in groups of companies with high and low economic performance among Pioneers and Market Operators.
- The methods implemented to a higher degree in the group of enterprises with high financial results than in the group of enterprises with low economic results were identified.
- Supported by statistical dependencies and organizational strategies, the Toolbox for Market's Pioneers and Market Operators was built

Statistical link between the rate of implementation of methods and the economic performance of enterprises

In order to check if there is a statistical link, a correlation analysis was conducted. Since the variables take values on the ordinal scale, Sperman's rank correlation was applied. If, as a result of the analysis, methods positively correlated with the economic results of enterprises were identified, it can be assumed that the increase in the level of implementation of given management methods is accompanied by an increase in the economic results of the enterprise.

Results and Discussion

Identification of Pioneer/Operator Enterprises

Based on the adopted data processing methodology, 53 companies were qualified as Pioneers, which represents 35.33% of the surveyed sample. The group of Market Operators included 97 companies, which represents 64.67% of the surveyed sample.

Classification of Pioneers and Market Operators based on economic performance

In the Pioneers' group of enterprises, twenty enterprises were qualified to enterprises "A" obtaining high economic results, which constitutes 38% of the Pioneers' group. The remaining thirty-three companies were qualified to the group of companies "B" with low economic results. In the group of Market Operators' enterprises, twenty-four enterprises have been qualified as "A" enterprises with high economic results, which constitutes 25% of the group of Operators. The remaining seventy-three companies, accounting for 75% of the Operators, were qualified to enterprise group "B" with low economic performance.

Identification of modern management methods conducive to high economic performance in Pioneer and Market Operator groups.

Analysis and synthesis of implementation indicators of fully implemented management methods in the Pioneer group:

- The number of enterprises allocated: 53
- The number of enterprises allocated group A: 20
- The number of enterprises allocated group B: 33

Table 3 presents fully implemented management methods in the group of Pioneers , divided into groups A and B of enterprises. It presents, in order from the left, the name of the management method, the method implementation rate in enterprise group A presented as a percentage, the method implementation rate in enterprise group B presented as a percentage (described in detail in point 2.4.3.). In the last two columns the organizational strategy, Lean or Agile, to which a given method is assigned, is presented. At the bottom of the table in the last row, there is a summary showing in percentage scale the leading organizational strategies for the given segment. In the table yellow marked lines are methods implemented in a higher degree by group A than by group B and only this methods are taken into consideration in the analysis. Additionally red colour is to show which methods correlated positively with the economic results of enterprises (Sperman's rank correlation was applied).

Table 3: Methods fully implemented in the group of Pioneers. Source: Own study.

Methods	Implementation rate		Organizational Strategy	
	Group A	Group B		
1. Just in Time	15%	0%		Lean
2. Levelling / Heijunka	30%	18%	Agile	Lean
3. Pull	5%	6%		Lean
4. Flow	30%	12%		Lean
5. Takt Time	10%	9%		Lean
6. Multi-process Handling	15%	27%	Agile	Lean
7. JIDOKA	20%	33%		Lean
8. Benchmarking	15%	18%		Lean
9. Statistical Process Control	30%	24%		Lean
10. Supply Chain Partnering	25%	9%	Agile	Lean
11. Standardization	20%	36%		Lean
12. Kaizen	10%	15%		Lean
13. Total Productive Maintenance	10%	21%	Agile	Lean
14. 5 S	25%	15%		Lean
15. Visual Management	25%	27%		Lean
16. Empowerment	10%	21%	Agile	Lean
17. Value Stream Mapping	0%	12%		Lean

18. Virtual Organization	20%	9%	Agile	
19. Learning Culture	15%	27%	Agile	
20. Mass Customization	20%	21%	Agile	
21. Outsourcing	30%	21%		Lean
22. Marketing Research	25%	24%	Agile	
23. SWOT	30%	24%	Agile	
24. Extrapolation Trends	10%	27%	Agile	
25. Delphi Method	0%	15%	Agile	
26. Sector Attractiveness Rating	20%	18%	Agile	
27. Porter's five forces analysis	5%	6%	Agile	
28. Job Rotation	15%	15%	Agile	
29. Skills Matrix	25%	18%	Agile	
30. Business Process Management	30%	18%	Agile	Lean
31. Business Process Reengineering	20%	24%	Agile	Lean
32. Flexible Manufacturing Systems	15%	15%	Agile	0
33. Concurrent Engineering	10%	9%	Agile	0
34. Information and Com. Tech.	10%	24%	Agile	0
35. Manufacturing Cells	5%	12%	Agile	Lean
36. Team Based Working	20%	24%	Agile	Lean
			9	9
Leading Organizational Strategies			39,13%	40,91%
			Agile	Lean

Fig 1 presents modern management methods implemented in the group of Pioneers divided into groups A and B of enterprises. The Y axis indicates the level of implementation of modern management methods presented as a percentage (described in detail in point 2.4.3.). The X axis shows modern manufacturing practices and the organizational strategy to which a given method is assigned L - lean, A – agile.

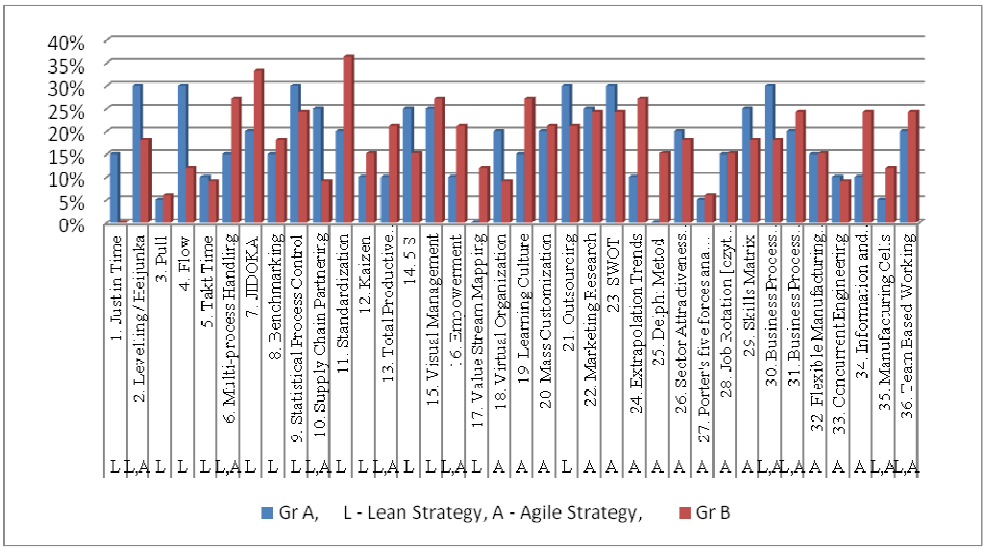

Fig. 1: Management methods implemented in the Pioneer group

Source: Own study

After the analysis of the results presented in Table 3 and Fig 1, we can come to the following conclusions:

- The share of Lean and Agile strategies is almost the same.
- The implementation of the nine methods that implement the organizational strategy of Lean among successful companies (in particular JIT, Heijunka, Flow) is most likely due to the high importance of production processes in the segment of electrical-machine enterprises in which the survey was conducted.
- The implementation of nine methods among successful companies that implement the Agile organizational strategy is in line with the expectations of the survey authors. A high level of innovation, a non-standard way of actions related to the creation of new markets should be supported by methods that increase the agility of the enterprise.

Table 4 presents the results of the implementation of modern management methods among Market Operators. Data are provided in the similar way to table 3.

Table 4: Methods fully implemented in the group of Operators

Methods	Implementation rate		Organizational Strategy	
	Group A	Group B		
1. Just in Time	8%	10%		Lean
2. Levelling / Heijunka	25%	18%	Agile	Lean
3. Pull	8%	7%		Lean
4. Flow	13%	21%		Lean
5. Takt Time	4%	8%		Lean
6. Multi-process Handling	42%	22%	Agile	Lean
7. JIDOKA	21%	12%		Lean
8. Benchmarking	33%	12%		Lean
9. Statistical Process Control	38%	25%		Lean
10. Supply Chain Partnering	29%	14%	Agile	Lean
11. Standardization	42%	21%		Lean
12. Kaizen	4%	11%		Lean
13. Total Productive Maintenance	25%	19%	Agile	Lean
14. 5 S	25%	18%		Lean
15. Visual Management	25%	12%		Lean
16. Empowerment	13%	12%	Agile	Lean
17. Value Stream Mapping	0%	10%		Lean
18. Virtual Organization	13%	7%	Agile	
19. Learning Culture	17%	22%	Agile	
20. Mass Customization	25%	15%	Agile	
21. Outsourcing	25%	23%		Lean
22. Marketing Research	4%	26%	Agile	
23. SWOT	17%	19%	Agile	
24. Extrapolation Trends	17%	11%	Agile	
25. Delphi Metod	8%	7%	Agile	
26. Sector Attractiveness Rating	29%	19%	Agile	
27. Porter's five forces analysis	8%	3%	Agile	
28. Job Rotation	4%	11%	Agile	
29. Skills Matrix	13%	14%	Agile	
30. Business Process Management	13%	14%	Agile	Lean
31. Business Process Reengineering	8%	11%	Agile	Lean

32. Flexible Manufacturing Systems	13%	5%	Agile	0
33. Concurrent Engineering	0%	4%	Agile	0
34. Information and Com. Tech.	8%	12%	Agile	0
35. Manufacturing Cells	4%	12%	Agile	Lean
36. Team Based Working	25%	18%	Agile	Lean
			13	14
Leading Organizational Strategies			56,52%	63,64%
			Agile	Lean

Source: Own study.

Fig 2 presents modern management methods implemented in the group of Market Operators divided into groups A and B of enterprises. The Y axis indicates the level of implementation of modern management methods. The X axis shows modern manufacturing practices and the organizational strategy to which a given method is assigned L - lean, A – agile.

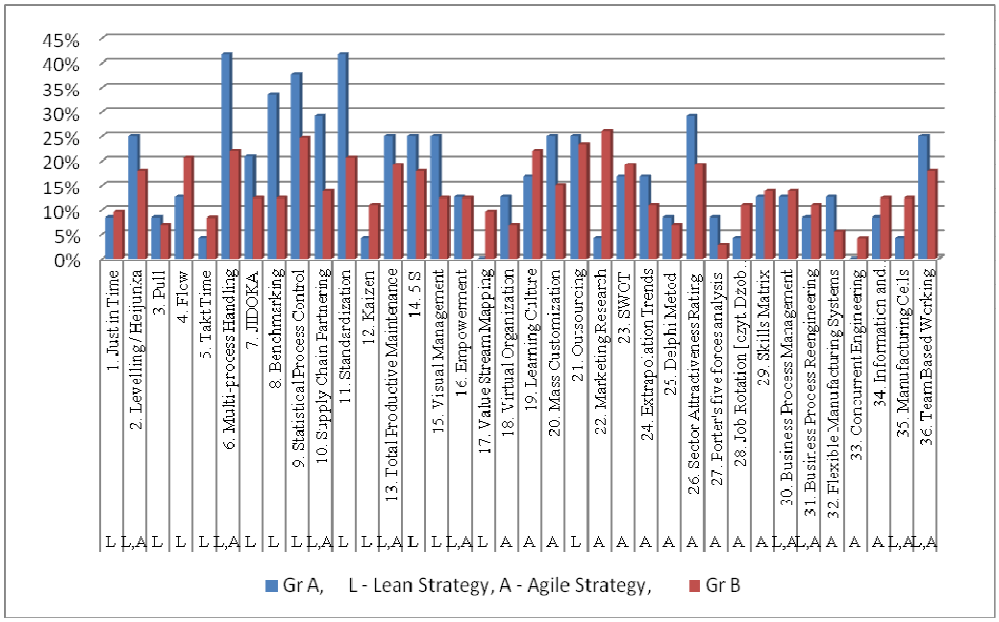

Fig. 2: Management methods implemented in the group of Market Operators.

Source: Own study.

Analysis and synthesis of implementation indicators of fully implemented management methods in the group of Market Operators.

- The number of enterprises allocated: 97
- The number of enterprises allocated gr. A: 24
- The number of enterprises allocated gr. B: 73

After the analysis of the results presented in Table 4 and Fig 2, we can come to the following conclusions:

- In the group of Market Operators, the share of Lean strategy prevails to a small extent.
- The implementation of the fourteen methods implementing the Lean organizational strategy among successful companies is in line with the expectations of the survey authors. The low level of innovation and the standard way of operating related to market penetration should be supported by methods that increase process efficiency.
- It should be noted that thirteen methods have been implemented among successful companies to implement the Agile organizational strategy. However, given the implementation rate of each method shown in the picture 2, a significant advantage of leading lean management methods should be noted.

Statistical link between the rate of implementation of methods and the economic performance of enterprises

In order to check if there is a statistical link between the level of implementation of modern management methods and economic performance, a correlation analysis was carried out. Since the variables take values on the ordinal scale, Sperman's rank correlation was applied. Statistica 13.1 software was used to perform statistical analyses. The analysis of Sperman's rank was performed with the assumption of significance level $p<0.05000$. The correlation coefficient does not give a causal effect response, however, it indicates the existence of a statistical relationship between the variables under study and is one of the conditions for the occurrence of a causal effect relationship (Małkowska Borowczyk, 2011).

The results of the analysis are presented in Table 3 and Table 4 presenting the implemented methods in the Pioneer and Operator groups.

Conclusions

The result of the study was the identification of groups of modern management methods that favour the high economic results of Pioneers and Operators. The practical implications of the work results is the development of modern manufacturing practices toolboxes for Pioneers and Market Operators. Table 5 shows modern manufacturing practices toolboxes for Pioneers and Market Operators. Red colour indicates methods that show a statistically positive correlation between the level of implementation and economic performance of companies (Sperman's rank correlation coefficient at the level of significance $p<0.05000$). In the group of the Pioneers dominate the methods that favour increase in the reactivity of companies looking for new markets and technological solutions by using methods such as Marketing Research, SWOT, Evaluating Market Attractiveness, Concurrent Engineering, Business Process Management, Virtual Organization. In the group of Operators, it is worth pointing out a significantly higher degree of implementation of methods that build an almost complete Lean Management toolbox, which leads to an increase in the effectiveness of the implemented business processes. To sum up, the developed toolbox is suitable for the electrical-machine industry, whereas its usefulness in other industries would have to be determined by further research. The research scope of the work was narrowed down to the electro-machinery industry mainly for the following three reasons:

- Lean Management was established and operated in the electrical engineering industry (Womack, Jones, Roos, 1990).
- The Agile Enterprise concept was developed for manufacturing systems that are specific to the electrical engineering industry (Goldman, Preiss, 1991).
- An examination of a wider range of industrial sectors could lead to non-comparable results due to significantly different conditions in individual sectors.

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The State of Adaptation of Enterprises in Poland to the Paradigms of Industrial Production Industry 4.0

Krystian PAWLOWSKI

Poznan University of Technology, Faculty of Engineering Management, Poznan, Poland

krystian.pawlowski@put.poznan.pl

Abstract

Industry 4.0 from the vision of the future has become a widely accepted reality for industrial companies, not only on a European but also worldwide scale. Taking into account the robotization rate, Poland is at the end of the European list with 42 robots out of 10 000 employees (data from 2019). However, the research conducted in 2018 shows that in the sector of micro, small and medium production enterprises located in Poland 60% of entrepreneurs have not heard about the concept of Industry 4.0 before. Therefore, a research problem was undertaken concerning the adjustment of Polish enterprises to the requirements of Industry 4.0, and in particular the adjustment to new paradigms of industrial production. The empirical research conducted in January 2020 covered 100 medium and large companies operating in Poland in various industries. This paper focuses on three issues related to the technological and business aspects of the digital transformation. The research covered the level of product agility, changes in manufacturing technology and the level of application of Lean Management methods and tools. The aim of the study is to determine the level of adjustment of enterprises in Poland to the requirements of industry 4.0 and to indicate whether the implementation of Lean Management methods and tools supports this adjustment.

Keywords Industry 4.0, paradigms of industrial manufacturing, lean management, Cyber-Physical Systems, Internet of Things, Internet of Services, Smart Factory.

Introduction

The modern business environment is characterized by the reallocation of wealth and industrial production from Europe and the USA to Asia (European Commission, 2009), cost-cutting and profit pressure, market risk and, in the macroeconomic perspective, weaker and more volatile growth of the global market (EY, 2013), or the disintegration of traditional economic chains and the establishment of networks of enterprises (Małkowska - Borowczyk, 2011). The IT revolution has led to a radical transformation of the world, comparable to the impact of new energy sources and mechanization on the first and second industrial revolution. After the introduction of the new Internet protocol IPv62 in 2012, it became possible to create the Internet of Things and the Internet of Services, and this allowed to create a network covering the entire production process, transforming the factory into Cyber-Physical Production Systems. This system includes, on the one hand, intelligent machines, storage systems, production facilities integrated through ICT and on the other hand, logistics, production and marketing processes (Kagermann, Wahlster, Helbig, 2013, p. 13 - 14). The vision of the future of Industry 4.0 has become a widely accepted reality, which affects the way companies operate (Jasiulewicz-Kaczmarek, Legutko , Kluk, 2020, pp. 74).

According to Smart Industry Poland research in 2018, over 60% of entrepreneurs representing the sector of micro, small and medium-sized production enterprises located in Poland had not heard of the concept of Industry 4.0 before (Research report of the Ministry of Entrepreneurship and Technology / Siemens). Another measurable indicator to compare the degree of robotization of economies is the number of industrial robots installed in relation to the number of employees in the industry. In Europe, Germany remains the leader (328 industrial robots out of 10,000 industrial processing workers), followed by Sweden (247), Denmark (240) and Italy (200). Poland is at the end of the list with 42 robots out of 10,000 employees (Grzeszak, Sarnowski, Supera-Markowska, 2019, p 11).

Research Problem

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The research problem undertaken in this paper concerns the adjustment of Polish enterprises to the requirements of Industry 4.0 and in particular the change of paradigms of industrial production. This paper focuses on three issues related to technological and business aspects of the digital transformation:

- The first problem is the level of product agility (business paradigm). M. Porter distinguishes the shortened product life cycle as one of the features of modern competition (Grudzewski, Koźmiński, 1996, p. 4). M. Bruce and L. Daly (2004), on the other hand, point out the increase in the turbulence of the environment and decrease in profitability of the sectors (Bruce, Daly, 2004, p. 151 - 170). Changes in the environment have resulted in an increase in the level of product customization (adapting products to individual customer needs) while shortening the delivery cycle. In practice, this means that changes in specification and, consequently, in design and technology appear during production. The results of research carried out on a large group of companies from eight countries (including the USA and Japan) indicate that mass customization is a very important mechanism that can be used in many manufacturing and service industries (Salvador, De Holen, Piler, 2009, p. 71-79). The concept of mass customization is defined as a system that uses information technology, flexible processes and organizational structures to deliver a wide range of products that meet specific customer requirements (often by choosing from a specific set of options) at costs comparable to those of mass production. Mass customization might be considered when the price of such a product does not exceed 10-15 % of the standard article price (Bednarz L., 2010, p. 105). Companies must use new product development as a strategy for remaining competitive in the market place, providing a new generation of products in response to changing consumer demands (Miranda, Pérez-Rodríguez, Borja, Wright, Molina, 2019, p 4392). Therefore, this paper asks whether companies are increasing their range of newly introduced products in existing and new markets.
- The second problem - changes in manufacturing technology towards automation, robotization and machine communication - (technological paradigm). Cyber-Physical Production Systems covering intelligent machines, storage systems and production facilities integrated through ICT is one of the Industry 4.0 paradigms (Kagermann, Wahlster, Helbig, 2013, p. 13 - 14). The second of the questions asked in the paper concerns changes in manufacturing technology.
- The third problem is the application of Lean Management methods and tools (business paradigm). The integration of industry 4.0 solutions is a major investment but is particularly beneficial in those areas where the cost reductions resulting from Lean Management are not sufficient to meet today's requirements. On the other hand, Lean Management production processes are standardized and transparent, which in turn simplifies the integration and implementation of industry 4.0 solutions. By analyzing the ideas of industry 4.0 in details we can find many links and similarities to Lean Management concepts:

    - Smart Product can support Kaizen (Continuous Improvement) by collecting data from the entire product life cycle, visualization, value stream mapping or Kanban (Kolberg, Zühlke, 2015).
    - Smart Machine can support Kaizen and pro-quality methods like Poka Yoke by collecting data,
    - Plug'n'Produce supports the implementation of the method SMED.
    - Augmented Operator should shorten the time between the occurrence of a failure and its reporting. A real-time message with a description and location of the failure helps Andon and Jidoka (Mrugalska, Wyrwicka, 2017).
    - Whereas the application of advanced analytical techniques on big data concerning technical condition, maintenance, use of manufacturing means is supported by TPM (Jasiulewicz - Kaczmarek, Gola, 2019, p 91).

The third question raised concerns the application of Lean Management methods and tools by companies and the impact of their application on the adaptation of companies to industry 4.0 requirements.

Objectives

The research aim is to find the answer to the question: are medium and large enterprises in Poland adapted to the new paradigms of industrial production of Industry 4.0 and whether the use of Lean Management methods and tools supports this adaptation. In order to achieve this goal, three questions were asked:

- Do companies aim to increase their product agility.
- Are companies turning manufacturing technologies into automation, robotization, and machine communication.
- Do companies use the basic methods and tools of Lean Management and whether their application is beneficial for the adaptation of companies to industry 4.0.

Literature Review

Situational approaches in organizational theory describe the impact of the environment on the organization and the resulting consequences for the management process. The need for companies to adapt to their environment is indicated, among others, by P.R. Lawrence, I.W. Lorsch (1974), G. Stonenhouse (2001), N. Najda (2009), P. Bórawski (2009), J. Skalik (2011), A. Bieńkowska and A. Zgrzywa-Ziemak (2014), K. Wach (2010).

In the development of companies in the industrial era, we can distinguish four phases. The first phase of production in the manufactures began with the industrial revolution. The second phase of industrial production, mass production, was initiated by the implementation of the technology of producing standardized and replacement parts at Cadillac Motor Car Company in 1904. The start of the third phase of industrial production based on the paradigm of eliminating waste was initiated by Toyota and the assumption that it is possible to reduce car production costs without economies of scale. As a result of the progressing industrial revolutions, the development of technology was followed by new demands. On the technological side, the third industrial revolution used the development of electronics and information technology (IT) to achieve increased automation of production processes, relating not only to mechanical but also mental work. This revolution was called "the Digital Revolution" (Trzcieliński, Kałkowska, Pawłowski, Włodarkiewicz-Klimek, 2016, pp. 9 -12), (Trzcieliński, 2020, pp. 25 – 26).

The paradigm of eliminating waste turned out to be an insufficient defence against another acceleration of environmental volatility. The company's agility has been defined as the ability to succeed in a competitive environment, where unpredictable changes that create market opportunities constantly take place. The essence of an agile enterprise is its focus on the opportunities that arise from the changing environment. In the literature on the subject, this paradigm is called agile or reconfigurable (Trzcieliński, 2011, pp. 10-12), (Trzcieliński, Kałkowska, Pawłowski, Włodarkiewicz-Klimek, 2016, pp. 9 -12), (Goldman, Nagel, Preiss, 1995, p. 8, 42-43), (Kagermann, Wahlster, Helbig, 2013, pp. 13 – 14), (Herman, Pentek, Otto, 2015). Thus, from a technological point of view, industrial companies entered the fourth revolution, industry 4.0. The main ideas of industry 4.0 were first published in Germany in 2011 (Kagermann, Lukas, Wahlster, 2011).

There is no single definition of industry 4.0 in the literature on the subject, despite the fact that it is one of the most discussed topics among practitioners and scientists from the German-speaking area (Herman, Pentek, Otto, 2015), (Mrugal, Wyrwicka, 2017, p. 469). Significant work in the definition of Industry 4.0 and key principles was done by M. Hermann, T. Pentek, B. Otto (2015). In the study, they conducted an analysis of literature and databases. On the basis of 51 selected publications, they have described the key elements and principles of Industry 4.0. Thus the authors have defined four basic elements of Industry 4.0: Cyber-Physical Systems, Internet of Things, Internet of Services, and Smart Factory. In addition, the authors have developed six principles supporting the adaptation of the company to the requirements of industry 4.0. These are interoperability, virtualization, decentralization, real-time capability, service orientation, and modularity (Herman, Pentek, Otto, 2015). Alcácer and Cruz-Machado, on the other hand, mention among the key technologies of industry 4.0: The Industrial Internet of Things, Cloud Computing, Big Data, Simulation, Augmented Reality, Additive Manufacturing, Horizontal and Vertical Systems Integration, Autonomous Robots, Cybersecurity (Alcácer, Cruz-Machado, 2019, pp. 901 – 912).

It is important to note that the assumptions that coincide with industry 4.0 were already developed at the end of the 1990s by Hans Jurgen Warnecke (Jurgen-Warnecke, 1999), who put forward the first hypothesis of fractal companies in which independent teams work together as a client-supplier both inside and outside the organization. The keynote for a fractal organization is to create self-regulating organizational working groups. A computer-aided information and communication system is used to control the input and output of fractals. H. Warnecke formulated the definition and basic characteristics of fractal units: "A fractal is a self-contained unit of a company whose objectives and performance can be clearly described (Warnecke, 1999, pp109-113):

- Fractions are self-like, everyone performs services.
- Fractions are self-organized.

The Research

Research Sample

The research sample included 100 industrial enterprises (including 60 medium-sized enterprises and 40 large-sized enterprises) operating in various industries in Poland. The respondents were people directly managing the

production and engineering area (middle and senior managers). The surveys were collected with the help of an external company, which was responsible for conducting interviews.

Scope of Research

The scope of the research included the types of offered products, the level of changes in the area of manufacturing technology towards automation, robotization and machine communication, and the scope of implementation of Lean Management methods: Outsourcing, Continuous Improvement, Empowerment, Just In Time, Supply Chain Partnership or Learning Culture. The selection of management methods was based among others on a research study by Bolden at all (1997); Bicheno, (2000); White, (1996); Walentynowicz, (2003, 2013, 2014).

Research Methods

To solve the research problem a questionnaire survey was conducted on a sample of 100 industrial companies in Poland. The research was conducted in the form of an interview, the research sheet in the scope of the research discussed here included 6 complex questions. Respondents provided answers on a scale of 1-5 (Likert), and a scale of 0-1. The data collected was processed using the Sperman Rank Correlation Test.

Data Processing Methodology

The following data processing methodology was developed in empirical studies.

- For the whole research sample was determined the level of intensity of the examined features which proves the adaptation of companies to the paradigms of industrial production 4.0.
- From the whole research sample, a group of companies adapted to the paradigm of industrial manufacturing 4.0. was identified based on the level of product agility and technological changes. For the identified group 4.0 and other companies from the sample, the level of implementation of Lean Management methods and tools was determined and compared.
- Correlation tests of Sperman's Rank were conducted for selected features

Level of Product Agility

The following question was asked about the level of product agility:
Q1. From which types of products does most of your company's profits come?
1. Existing products for existing buyers.
2. Existing products for new buyers.
3. Modified products for existing buyers.
4. New products for existing sectors.
5. New products for new sectors.

Responses on a scale of 3,4,5 were evaluated as a high level of product agility characterizing enterprises adapted to the requirements of the industry 4.0. and in accordance with the adopted research methodology to qualify these enterprises to test sample 4.0.

Changes in the area of manufacturing technology towards automation, robotization and machine communication

The following questions were asked about the level of changes in the area of manufacturing technology towards automation, robotization and machine communication:

Q2. What is your company's policy on machines/devices that communicate with each other? (single selection)
1. We do not plan to introduce such machines.
2. Perhaps we will introduce in the undefined future.
3. Decisions were made to implement them within five years.
4. Decisions were made to implement them within two years.

5. We have such machines and will increase their number.

Responses on a scale of 3,4,5 were evaluated as a characterizing enterprises adapted to the requirements of the industry 4.0. and in accordance with the adopted research methodology to qualify these enterprises to test sample 4.0.

Q3. What is the level of automation of the basic production process in your company? (single selection)
1. There is no automation/robotization.
2. There is automation/robotization, but human work dominates.
3. Automation/robotization is in balance with human work.
4. There is human work, but automation dominates.
5. Fully automated.

Responses on a scale of 3,4,5 were evaluated as a characterizing enterprises adapted to the requirements of the industry 4.0. and in accordance with the adopted research methodology to qualify these enterprises to test sample 4.0

Q4. What types of machines/devices are used in your company in the basic production process? (single selection)
1. Single-purpose machine/equipment (not universal).
2. Universal machines/devices - traditional.
3. Numerical or computer-controlled machines/devices.
4. Manipulators.
5. Robots.

Responses on a scale of 3,4,5 were evaluated as a characterizing enterprises adapted to the requirements of the industry 4.0. and in accordance with the adopted research methodology to qualify these enterprises to test sample 4.0.

Level of implementation of Lean Management methods and tools

Q5. To what extent are the following Lean Management methods implemented in your company?

1. Continuous Improvement (kaizen).
2. Empowerment (executive employees have relatively broad decision-making powers).
3. Just in Time (deliveries and sales of products are made with the physical omission of the warehouse).
4. Outsourcing.
5. Supply chain management (Supply Chain Partnering).
6. Culture promoting learning (investing in the development of employees; not just adaptation to the job).

Respondents gave answers in the Likert scale, where 1 - total lack of implementation, 2 - implemented to a small extent, 3 - half-implemented, 4 - implemented to a large extent, 5 - full implementation. Answers on a scale of 3,4 and 5 were considered to be implementations of a given Lean Management method. The rate of implementation of a given method was determined as a percentage indicator of the number of implementations (with a value of 3,4 or 5) of a given method in the examined sample to the total sample size according to the formula below:

$$P = \frac{n\,(3,4,5)}{N}\,[\%]$$

where:

P – the rate of implementation of a given method,

n(3,4,5) – number of implementations of a given method in a research sample of 3,4,5 according to the Likert scale.

N – sample size.

Statistical link between the rate of implementation of methods and the economic performance of enterprises

In order to check if there is a statistical relationship between the rate of implementation of Lean Management methods and tools and the level of intensity of the features that indicate the adaptation of the company to the requirements of industry 4.0 Sperman Rank correlation was used. To perform statistical analyses, Statistica 13.1 software was used. The analysis of Sperman's Rang was made assuming the level of materiality $p<0.05000$.

Results and Discussion

Level of Product Agility

Based on the adopted data processing methodology, 32% of companies from the surveyed sample N=100 offer new or changed products on existing and new markets. In the face of changes in the enterprise environment, this is a low result.

Changes in the area of manufacturing technology towards automation, robotization and machine communication

In the sample, 22% of companies declared that they use and plan to increase the number of communicating machines, another 11% of companies plan to buy within the next 2 years and another 10% plan to buy within the next 5 years. The data is presented in detail in Fig 1. 43% of companies declared their willingness to buy or current use of communicating machines.

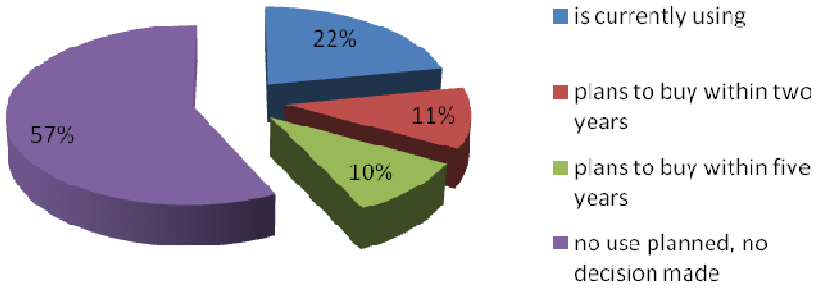

Fig. 1: Use of communicating machines

Source: Own study

Analyzing the level of automation, 19% of companies declared that half of the processes are automated, robotic, 13% of companies declared that there is human work but automation is dominant, while none of the respondents declared full automation and robotization of the manufacturing process. Whereas 35% of companies declared the use of manipulators or robots.

Level of implementation of Lean Management methods and tools

On the basis of the level of product agility and changes in the area of technology, a group of companies adapted to the paradigm of industrial manufacturing 4.0 was identified. Out of the whole research sample, only 8 companies were identified to meet all the adopted criteria to adjust to the paradigms of industrial manufacturing 4.0. For a

selected group 4.0 and for the rest of the companies, the level of implementation of Lean Management methods and tools was determined and compared from the sample. Fig 2. shows the level of implementation of Lean Management methods and tools in a separate group of 4.0. companies and the rest of the companies. The study included six Lean Management methods and tools. Out of the methods studied, only Outsourcing was implemented to a lower degree in group 4.0 compared to the rest of the companies. The other methods: Continous Improvement, Empowerment, Just In Time, Supply Chain Partnership or Learning Culture were implemented in group 4.0 to a higher degree than in the rest of the sample. The highest differences were noted in the methods Empowerment, Supply Chain Partnering and Learning Culture. The methods of Learning Culture and Empowerment support the following principles of industry adaptation 4.0: interoperability, virtualization and decentralization, making easier to introduce changes in the area of technologies leading to the creation of Cyber-Physical Systems and Smart Factory. Supply Chain Partnering arranges the logistic and production processes and simplifies product agility by increasing modularity. Just in Time i Outsorcing increase real-time capability and service orientation, however, these two methods were implemented to the lowest extent in the examined groups 4.0, and in the rest of the enterprises as well as in the whole population.

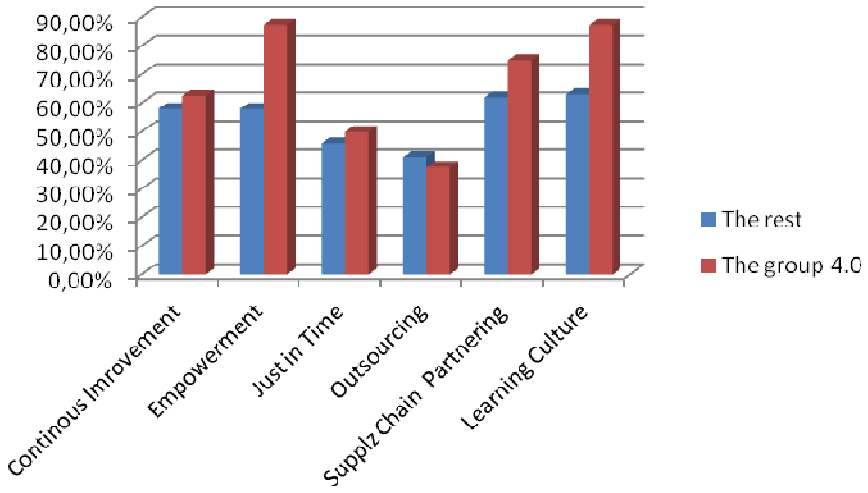

Fig. 2: Level of implementation of Lean Management methods and tools in Group 4.0 and other companies.

Source: Own study.

Statistical relations between changes in the area of technology and the level of implementation of Lean management methods

In order to check if there is a statistical relationship between the increase in product agility and changes in the area of technology, and the level of implementation of modern management methods, a correlation analysis of Sperman's Rang was conducted. The results of the analysis are presented in Table 1. The table from the left shows the Lean Management methods, then in the columns respectively the results of the Sperman Rank correlation analysis for questions Q1, Q2, Q3, Q4.1 and Q4.2. Red was marked with correlation values, which are statistically significant with $p<0.5$ (and only these results are taken into account). In the interpretation of the results, it was assumed that the value of the correlation coefficient at the level of $0.2 < r \leq 0.4$ is interpreted as a low linear dependence but clear (Ostasiewicz, Rusnak, Siedlecka, 2000, p. 311). The increase in product flexibility (question Q1) is only positively correlated with the Learning Culture method. Whereas Q2 and Q3 questions (related to automation and development of communicating machines) show correlation with methods: Continuous Improvement, Empowerment, Supply Chain Partnership, Learning Culture. The use of manipulators is correlated with Just in Time and Supply Chain Partnership. The correlation coefficient does not give a cause-and-effect response, but it does speak about the existence of a certain statistical relationship between the variables under study and is one of the conditions for the existence of a cause-and-effect relationship (Małkowska Borowczyk 2011).

Table 1: Correlation level between Sperman Rank for technological changes and product flexibility and adapted Lean Management methods. Source: Own study. Where: Q1. The question about the types of products from which most of the company's profits come from. Q2. The question about introducing communicating machines. Q3. Question about the level of automation. Q4.1 Question about the use of manipulators. Q4.2 Question about the use of robots.

Correlation of Spearman's rank order, BD removed in pairs the marked coefficients of correlation are significant with p <.05000	**Q1.**	**Q2.**	**Q3.**	**Q4.1**	**Q4.2**
Continuous Improvement	0,050781	0,285160	0,243663	0,126755	0,070232
Empowerment	0,106226	0,212038	0,215555	-0,007087	-0,020772
Just In Time	0,009829	0,147093	0,181459	0,268739	0,161081
Outsourcing	-0,067444	0,115205	-0,077602	0,114675	0,013546
Supply Chain Partnership	0,054588	0,291569	0,267706	0,241913	0,196081
Learning Culture	0,219474	0,258045	0,254835	0,189849	0,086513

Conclusions

The aim of this work is to answer the question whether medium and large companies in Poland are adapted to the new paradigms of industrial manufacturing - Industry 4.0, and whether the use of Lean Management methods and tools is conducive to this adaptation. In the area of increasing product flexibility and agility, the results show a low degree of adaptation, only 32% of the sample declared introducing changes in products. In the area of technological changes, the level of adjustment is higher, as a total of 43% of companies declared their willingness to buy or presently use communicating machines. As for the level of automation, 32% of enterprises have at least half of the automated processes, with 35% of enterprises declaring the use of manipulators or robots. The majority of the examined characteristics of the adaptation of enterprises to the paradigms of industrial production in industry 4.0 are at the level of 30% - 35%. Considering that industry 4.0 is a new industrial revolution, the above results, together with the index of 42 robots per 10,000 employees (Grzeszak, Sarnowski, Supera-Markowska, 2019, p. 11), indicate the overall low level of alignment of enterprises to industry 4.0. Moreover, out of the sample, only 8 companies met the cumulative condition of qualifying companies to the analyzed group 4.0. The results of comparative studies between the group of companies 4.0 and the rest of the population indicate that the use of Lean Management methods is conducive to the adaptation of industrial companies to the requirements of industry 4.0. The correlation analyses of Sperman Ranks also confirm this dependence.

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Availability Modeling with Two Types of Failures using Secure Data Maintenance from a Blockchain

Elena-Iuliana GINGU (BOTEANU)

University Politehnica of Bucharest and Advanced Technologies Institute, Bucharest, Romania, iuliana_boteanu@yahoo.com

Cristina MOHORA
University Politehnica of Bucharest, Romania, cristinamohora@yahoo.com
Miron ZAPCIU, University Politehnica of Bucharest and Romania and Academy of Romanian Scientists, Bucharest, Romania, e-mail: miron.zapciu@upb.ro

Abstract

The study of the manufacturing systems maintenance is mandatory and essential in order to grow the production efficiency and competitiveness. Therefore, the monitoring of performed maintenance activities is an important process in production setups and a blockchain can be the solution to share full transparency of the maintenance parameters. This research focuses on building a maintenance policy, considering that the products defects are caused due to machine malfunction in order to predict the availability of the system. More precisely, we present a modeling scenario for two types of failures: mechanical and electrical. The failure and repair behavior of a machine was modeled using Markov chains. An applied example is presented to illustrate the method. Arena software has been used to fit the statistic distribution concerning the time between failures and repair time, and CodeBlocks software to solve the equations from Markov chains.

Keywords: Failure, Modeling, Markov Chain, Blockchain.

Introduction

Nowadays, in the automotive industry, an important maintenance strategy is the implementation of predictive maintenance. Predictive maintenance allows monitoring the condition of the in-service machine and predicting potential failures. Moreover, the application of blockchain technology increased maintenance efficiency and automation through the reduction of the downtime of machinery using secure data and full transparency. Basically, the blockchain serves as a public and decentralized registry to record all the operations in an efficient, verifiable and permanent manner, without the use of a trusted central authority or central servers (instead, the distributed database are centrally controlled by a service provider). Therefore, the blockchain is a decentralized and distributed database with double security: asymmetrical cryptography, which requires two different keys - the public and the private key - and the mining process which suppose the exchange validation in the form of blocks. For this purpose, in this paper, new ideas of predictive maintenance with secure data are presented. The objective of the article is to monitoring the unexpected failures without worrying about the version changes or losing the latest records by keeping a good availability of the machines. The paper gives an overview of maintenance processes and describes some research studies from the literature concerning blockchains in Maintenance 4.0. We provide a case study from an automotive company where is presented secure maintenance data integration into a blockchain and a Markov chain methodology to estimate the availability of each machine from the flowline. This paper presents some conclusions and provides a standpoint for future work.

Around the unreliable systems, many maintenance strategies have been studied in the literature. The application of Markov chain model can be a solution to evaluate the availability of the system consisting of K repairable subsystems by the methods under various maintenance strategies (Kim, H.G. and Kim, W.S, 2016). In the manufacturing industry, the maintainability and reliability parameters can be considered: Mean Time to Repair (MTR), Mean Time Between Failures (MTBF), Mean Time To Failure (MTTF). Mean Time To Repair (MTTR) makes reference to the amount of time required to repair a system and restore it to complete functionality. MTBF assess the forecast time that passes between one previous failure of a manufacturing system to the next failure

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during normal operation. Mean Time To Failure (MTTF) establishes the period of time that a workpiece is expected to last in operation until it fails. All these parameters were studied with different methods. J. Stodt et al. (2019) provided a formal description of optimized maintenance processes using blockchain technology and integrated smart contracts for the automated triggering of activities. X. Wang et al. (2016) applied a semi-Markov model for the maintenance policy of a system consisting of two machines with a finite buffer. S Lee et al. (2013) demonstrated the optimal interval for inspection concerning the availability and productivity of a system based on Markov Maintenance Planning. G.K. Chan et al. (2006) presented an optimal value of the mean time applied in preventive maintenance by maximizing the availability of a single component. S Bloch-Mercier (2002) computed the long-run availability and gave sufficient conditions for the preventive maintenance policy. D Chen et al. (2001) presented the steady-state analysis of the periodic preventive maintenance problem with general failure and repair time distributions illustrated by numerical examples. A. K. Agrawal (2019) considered that maximum availability can be obtained by increasing the reliability and maintainability of the equipment. Q. Qiu et al. (2019) adopted an inspection-based maintenance policy in order to investigate the availability for a Markov repairable system with downtime threshold.

Methodology used for estimating the availability by machine integration into blockchain - study case

Maintenance secure data by applying blockchain

In the manufacturing systems, maintenance workers have to record the maintenance parameters from the machines. These technical records have to be issued and timely updated. Involving blockchain technology in maintenance, all the data are automated uploaded on the shared ledger. It is an intelligent platform accessible to all the stakeholders without worrying about the version changes or losing the latest records. Blockchain provides a secure solution because all the data are encrypted using hash functions and the nonces get the proof of work. The Secure Hash (SHA) algorithm with an output size of 256 bits (SHA-256) is the hash function used in many blockchains.

Fig.1: Encryption of the word "failure" with SHA 256 algorithm
Source: https://passwordsgenerator.net/sha256-hash-generator/

A cryptographic nonce is an arbitrary number used only once, and the process of determining the nonce value required to generate valid hashes is called *mining*. This technique is used in the consensus proof of work model which can help validate only correct identities. A blockchain starts with the Genesis block. Then, new blocks of data are added in the chain and the mine button validates each block in the network. The blocks are interlinked through the hash function, i.e. the hash function of the block is the previous hash function for the next block. The transfer of machine maintenance parameters is done through the Internet of Things (IoT), an implementation of sensors that are integrated into the manufacturing system and secure the collection of data (Albano et al., 2018, Vacca, 2019, Alladi et al., 2019, Miller, 2018, Gingu et al., 2020). In our study case, the machines failures are classified into two categories: mechanical (F_1) and electrical (F_2). Once a failure occurs, a recording of the time (down-time) of the failure is made in the blockchain and then a classification of the type of the failure according to the previous two categories is done (an example of blockchain is presented in Figure 2).

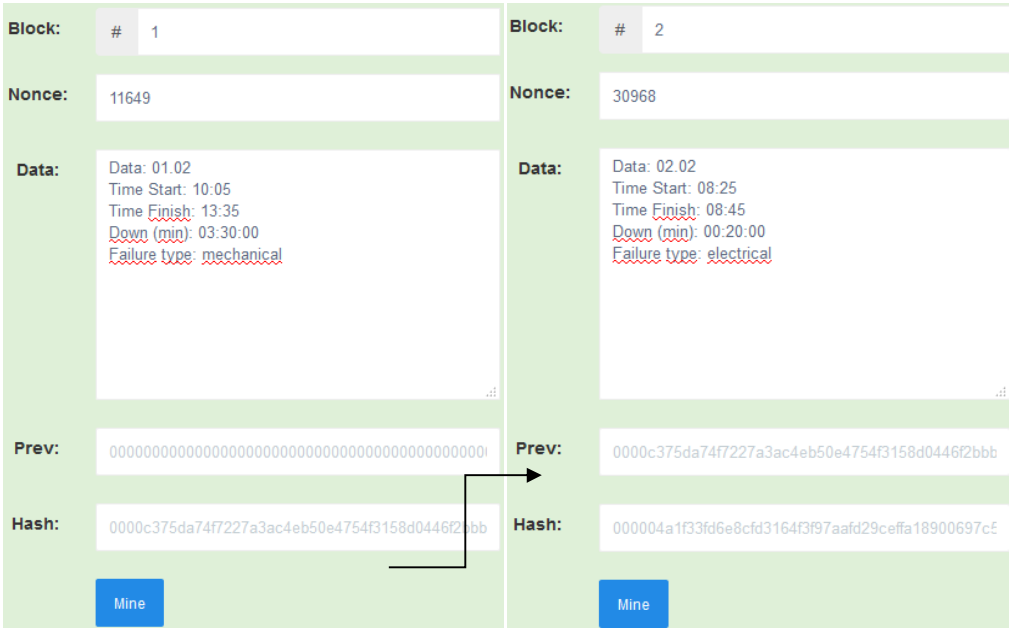

Fig.2:Proposed blockchain with maintenance parameters

Source: https://tools.superdatascience.com/blockchain/blockchain

Modeling scenario for two types of failure

This article presents a real-life example, a production line that manufactures "crown wheel white parts" from a local company. The "crown wheel white parts" line is an automated line, made up of technological systems that function as a unitary whole. Figure 3 shows the process flow. Operators will only have to make adjustments and supervise the control equipment.

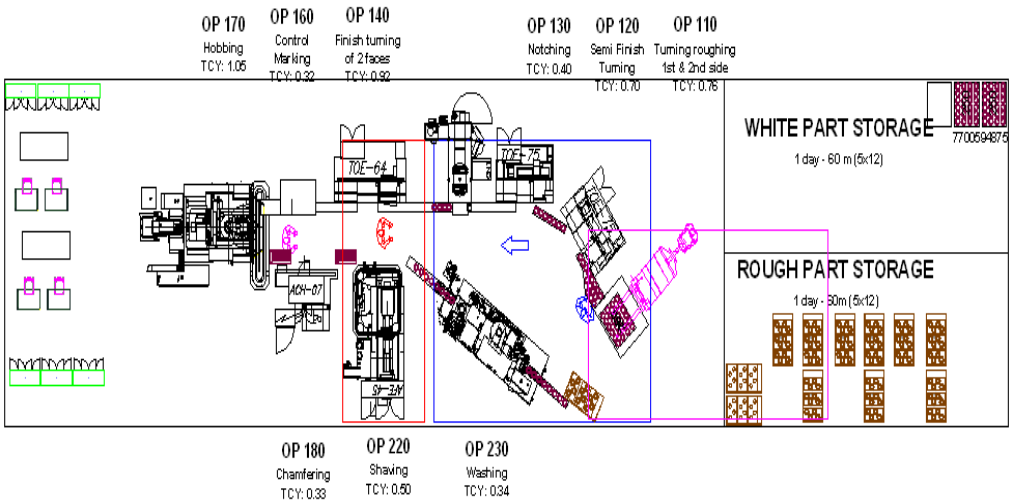

Fig.3: Production line operations

Input data are the key ingredients of the simulation modeling. The entire process flow had specific times for failure and repair for each equipment. The idea is to try to optimize the production taking into account all those accidental problems and to prevent them. Times to failure and repair times are random times and are specified via their distributions or probability laws (e.g., Markovian transition probabilities). The stages of modeling activity are:

- Stage 1. Data collection.
- Stage 2. Data analysis.

- Stage 3. Time series data modeling.
- Stage 4. Goodness-of-Fit testing.

The data collection stage brings observations of system characteristics over time. The analyst collects the data from the blockchain and the sample size collected should be representative and large enough. The analysis stage involves the computation of various empirical statistics from the collected data. In the data modeling stage, a probabilistic model is fitted to empirical time series data collected in Stage 1. The statistics give the analyst information about the collected sample, and establish the empirical statistics against which a proposed model will be assessed for Goodness-of-Fit. Arena software offers data analysis facilities through Input Analyzer tool, whose main goal is to fit statistical distributions to an established sample. The Goodness-of-Fit of a distribution to a sample is evaluated by a statistical test, where the null hypothesis H_0 shows that the distribution is a sufficiently good fit to the data, while the alternate hypothesis H_a asserts that it is not. The Chi-Square test and the Kolmogorov–Smirnov test are the most widely used tests for Goodness-of-Fit of distribution to sample data which compute the corresponding test statistic and the associated p-value (Altiok el al., 2017). In our case study, the machines failures are F_1(mechanical) and F_2 (electrical). The global failure rate is λ. With probability α, the failure is of type F_1 and with probability $(1-\alpha)$ it is of type F_2. An example of the Goodness of Fit test analysis is shown for machine M with the operation 110. Figure 4 shows the results of the Goodness of Fit test for the time between failures. The statistic distribution is $BETA(\beta, \alpha) = BETA(511.8,\ 504.26)$, as is shown in Figure 4.

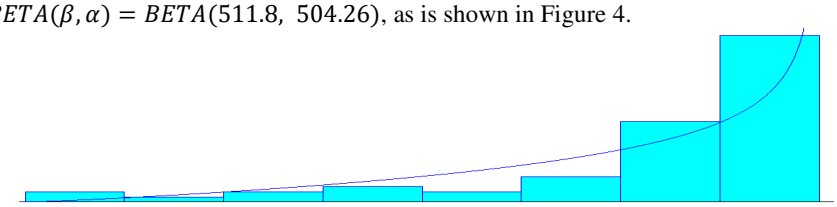

```
        Distribution Summary

Distribution:   Beta
Expression:     501 + 5 * BETA(2.16, 0.652)
Square Error:   0.016837

Chi Square Test
  Number of intervals   = 4
  Degrees of freedom    = 1
  Test Statistic        = 5.87
  Corresponding p-value = 0.0172

Kolmogorov-Smirnov Test
  Test Statistic        = 0.184
  Corresponding p-value = 0.0234

        Data Summary

Number of Data Points   = 64
Min Data Value          = 501
Max Data Value          = 506
Sample Mean             = 505
Sample Std Dev          = 1.15

        Histogram Summary

Histogram Range         = 501 to 506
Number of Intervals     = 8
```

Fig.4: Statistic distribution for time between failures

Table 1 lists the global failure rate value for machine M.

Table 1: Failure rate value

Machine	MTBF (Mean Time Between Failure)	MTTR (Mean Time To Repair)	MTTF (Mean Time To Failure)	Failure rate $\lambda = \frac{1}{MTTF}$
M	511.8	1.26	510.54	0.00196

The probability for the failure F_1 is $\alpha = 0.4$ and for the failure F_2 is $(1 - \alpha) = 0.6$.

When a failure of type F_1 occurs, the repair is done by the operator; the repair duration is exponentially distributed with rate μ_1. When a failure of type F_2 occurs the operator calls for a repairman. The waiting time for the repairman is exponentially distributed with rate μ_w. When the maintenance operator (repairman) repair the machine, the duration of the repair is exponential with rate μ_2.

The most appropriate distribution for repair time is Exponential with the value of EXPO (1.26) (Figure 5). The repair rate μ_1 is calculated as $\mu_1 = \frac{1}{MTTR} = \frac{1}{1.26} = 0.79365$.

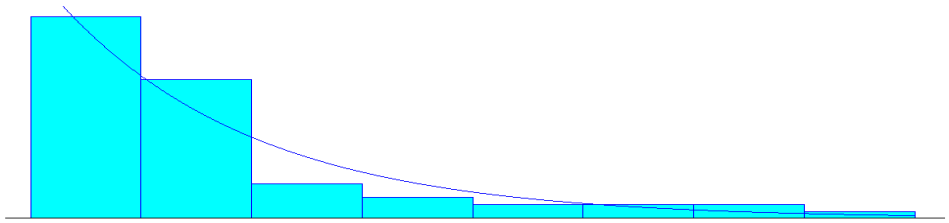

```
        Distribution Summary

Distribution:   Exponential
Expression:     EXPO(1.26)
Square Error:   0.010468

Chi Square Test
  Number of intervals   = 4
  Degrees of freedom    = 2
  Test Statistic        = 4.23
  Corresponding p-value = 0.131

Kolmogorov-Smirnov Test
  Test Statistic        = 0.219
  Corresponding p-value < 0.01

        Data Summary

Number of Data Points   = 64
Min Data Value          = 0.31
Max Data Value          = 5.16
Sample Mean             = 1.26
Sample Std Dev          = 1.15

        Histogram Summary

Histogram Range         = 0 to 5.65
Number of Intervals     = 8
```

Figure 5: Statistic distribution for repair time

Table 2 lists the repair time values.

Table 2: Repair rates values

μ_1	μ_w	μ_2
0.79365	0.04897	0.52083

At first glance, three situations are identified: the machine is working, the machine is under the failure of type $F_1$and the machine is under the failure of type F_2. The two first situations are indeed states while the third is not. In fact, knowing that we are under the failure of type F_2 is not sufficient information to predict the future of the machine; this depends on the presence of the repairman. The situation should then be shared into two states, which finally gives four states:

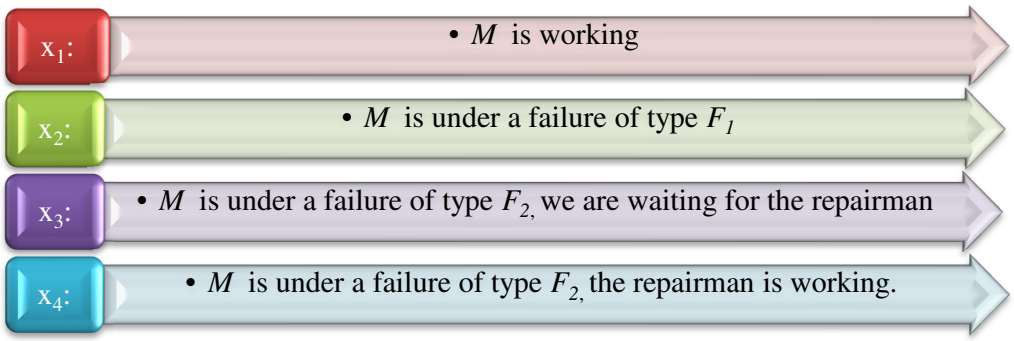

The graph of the Markov chain is designed in Figure 6.

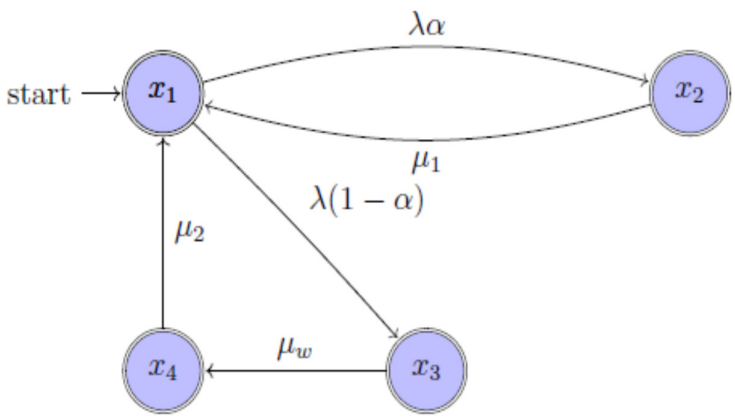

Figure 6: Markov chain graph

The balance equations are:

$$\pi_1\lambda\alpha = \pi_2\mu_1$$
$$\pi_3\mu_w = \pi_1\lambda(1-\alpha) \tag{1}$$
$$\pi_4\mu_2 = \pi_3\mu_w.$$

The normalisation equation is:

$$\pi_1 + \pi_2 + \pi_3 + \pi_4 = 1. \tag{2}$$

Using numerical values, it is obtained:

$$\pi_1 = 0.973463;\quad \pi_2 = 0.002198;\quad \pi_3 = 0.023377;\quad \pi_4 = 0.000962. \tag{3}$$

The availability of the machine M is equal with $\pi_1 = 0.973463$, since x_1 is the only state where the machine works. The data for the all line are presented in Table 3.

Table 3: Input data for the "crown wheel white parts" line

	OP110	**OP120**	**OP130**	**OP140**	**OP160**	**OP170**	**OP180**	**OP220**	**OP230**
	Turning roughing 1st & 2st side	Semi Finish Turning	Notching	Finish Turning of 2 faces	Control Marking	Hobbing	Chamfe-ring	Shaving	Washing
Cycle time	0.76	0.7	0.4	0.92	0.32	1.05	0.33	0.5	0.34

Tcy (min)									
MTBF	511.8	729.2	81.3	958.3	196.3	201.5	139.8	121.1	809.5
MTTR	1.26	0.96	4.92	0.96	1.63	1.49	2.36	4.13	0.42
MTTF	510.5	728.2	76.4	957.4	194.7	200.0	137.5	116.9	809.1
Failure rate λ	0.00196	0.0013	0.01309	0.00104	0.00514	0.0050	0.00727	0.0085	0.00124
Repair rate μ_1	0.79365	1.0416	0.20325	1.04167	0.61350	0.6711	0.42373	0.2421	2.38095
Waiting time rate μ_w	0.04897	0.1781	0.23810	0.2041	0.19050	0.1575	0.1000	0.1053	0.07480
Repair rate μ_2	0.52083	0.1111	0.11110	0.2041	0.10000	0.1429	0.0968	0.2000	0.09090

Making the calculus for each machine, we obtained the following availabilities results presented in Figure 7.

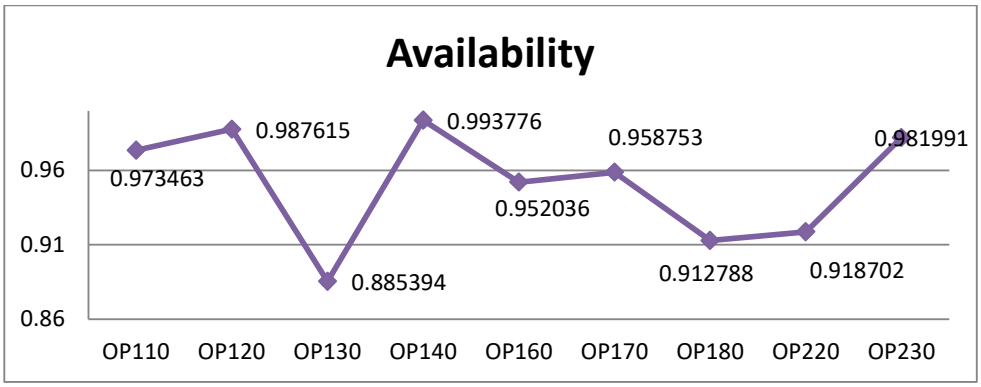

Figure 7: Availability for each operation

Therefore, the time of the machine's availability is predicted based on Markov chains modeling with two types of failure: electrical and mechanical.

Conclusions

In this article, the basic mathematical model and a practical application of Markov chains for manufacturing system availability analysis using two types of failures were examined. When the information on the system states is available, Markov chains provide an alternative to the standard availability calculations. The information about maintenance parameters is recovered from a blockchain platform. Blockchain offers great benefits where stakeholders need to share, store or capture critical data. The distributed blockchain register save all documentation related to the history of each machine in order to improve equipment reliability and facility equipment monitoring. Then, the data are statistical modeled using the Input Analyzer tool from Arena software in order to include the fitting of distribution to sample data. Therefore, a fitting statistical distribution was generated and tested with Chi-Square and Kolmogorov-Smirnov Goodness of Fit tests to assure high confidence. We had integrated the data into a Markov chain model to predict the availabilities for each machine in the "crown wheel white parts" line. The model is based on two types of failures with different probabilities, but also depends on the presence of the repairman. The results of the availabilities are including in the interval (0.88; 0.994). Starting from these results, the maintenance policy provide that there are no major downtimes. The benefits using these innovative methods (blockchain, fitting distribution, Markov chains) could bring advanced planning and control with relevant, real-time data, higher quality, flexible production, increased productivity, costs and wastes reduction. A topic for future research will include the consideration of failure prediction using regression analysis. This method could be conducted to predict the next coming failure given that a product's defect occurred.

Acknowledgements

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Fourth Industrial Revolution – Changing the Manufacturing Paradigms

Maciej SIEMIENIAK

Poznan University of Technology, J. Rychlewskiego 2 Str., 60-965 Poznan, Poland
maciej.siemieniak@put.poznan.pl

Abstract

The article briefly presents the most important paradigm changes in the manufacturing process in terms of industrial revolutions. The starting point was an attempt to explain the concept of paradigm in a short and general way and an attempt to consider it from the point of view of management science. The essence and significance of technology in the company's processes was also presented. A contemporary view of technology requires perceiving it as an environment in which there are resources enabling the design and implementation of solutions to problem situations, and to a greater extent contributes to the development of technical, technological and organizational innovations, which are the basis for revolutionary changes in the industry. The most important point of the article is a concise description of the most important changes in the methods of production for each stage of the industrial revolution, with particular emphasis on the conceptual assumptions that create a new production paradigm in the new industrial reality.

Keywords: Paradigm, Technology, Industrial Revolutions, New Manufacturing Paradigms

Introduction

The fourth industrial revolution is closely related to Industry 4.0, which is a difficult concept to precisely and unambiguously define. It is described by the changes that occur as a result of technological development and the use of advanced tools in the production processes of enterprises. The main feature of this revolution is the change in the manufacturing paradigm, i.e. changes in the product architecture, manufacturing system and business model, i.e. the method of delivering a new product to the market. New solutions are the result of the evolution of technological processes. The combination of the real and virtual world, transforming data into highly valuable information and knowledge, autonomy of industrial facilities, highly advanced automation and robotization of machines, a new form of human-industrial cooperation, constitute the basis for a change in the production paradigm that results not only from technological changes, but also from changes in the company's environment. Product personalization, i.e. the departure of enterprises from mass production towards the implementation of individual projects and new product solutions, is one of the changes in the manufacturing paradigm. An important change is also the departure from the models of centralized production, in which the product had a described technological route (assigning the product to specific machines), towards decentralized systems, i.e. systems in which the product, having information stored in it, communicates with industrial facilities and selects optimal manufacturing process. The new business model, which is an improvement of the lean manufacturing concept, is characterized by direct contact with the market thanks to the digitization of processes and an efficient flow of data and information from the client to the enterprise. The information obtained in this way about consumer needs allows for quick reaction of producers with the use of flexible production systems. The utilization of robotic objects in the manufacturing process creates a new human-machine relationship. Traditional operation and control of machines is transformed into technically and socially advanced cooperation (Łuciów, 2018).

The fourth industrial revolution changes the perception of manufacturing processes by transferring them to virtual reality and by free and autonomous data exchange between industrial facilities. Cyber-physical systems, Internet of Things and smart factory, properly designed, implemented and connected in the network, form a coherent whole. Technically advanced facilities that create complex systems and processes turn out to be very logical in their assumptions and allow the concept of Industry 4.0 to be seen as extremely homogeneous.

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Paradigm

In epistemology, there is a belief that reality can be explored, described, and shaped through paradigms. The concept of a paradigm, as defined by the philosopher Thomas Kuhn, means a set of concepts and theories that form the basis of a given science. He proves that science is not a steady cumulative acquisition of knowledge, but rather a series of quiet periods interrupted by violent intellectual revolutions. Then there is a change of the current world view into a new one. The paradigm term popularized by Kuhn was described as a set of views shared by a group of scientists and a general agreement, agreement on the understood issues. The paradigm guides the research of the scientific community. The phenomenon related to the transition in the process of evolution from one new paradigm to another has been noticed as a typical path of scientific development. Science thrives on the scientific community that works on the basis of one or a set of interrelated paradigms, and the result of creative work solving the problems of the current paradigm is progress. The process of development of science is an evolution from primitive beginnings, through successive stages that are characterized by increasing detail and a better understanding of the environment (Kuhn, 1962).

Generalizing the ambiguity of this concept, one can say that a paradigm is a pattern, model, or accepted way of seeing reality in a given field. People concentrated in organizations try to understand the reality around them through team actions, mutual information, sharing experience, and formulating judgments that are important for them for some reason. In this way, a set of beliefs deeply rooted in people's consciousness is created, which is the code of the organization, which can be called a paradigm (Woźniak-Sobczak, 2015). Paradigm shifts can occur in two cases: changes in the nature of reality and changes in the methods of studying it. Changes in the nature of reality can be a primal, basic premise. The process of change may also begin with the discovery and application of a new method that will result in learning about as yet undiscovered attributes of reality. A new paradigm does not have to exclude the old one, it can develop, improve or periodically replace it. A success of a paradigm does not mean that it has solved all of existing problems. The new paradigm, however, must find anchorage (dissemination, consolidation) in the scientific community and in products of its activity (Lichtarski, 2011). Paradigms in management sciences are practical in nature and are characterized by the ordering of patterns and principles of behavior in solving problems, as well as a scientific generalization of theories that arise on the basis of these paradigms to explain reality. It is assumed that a paradigm is a commonly accepted model for the description of reality, possible to be described with the use of specific research instruments appropriate for a given scientific discipline (Woźniak-Sobczak, 2015).

A Paradigm Shift

The key issues of the new reality in management include diversity, flexibility, adaptability, quick response to changes in the environment and meeting customer expectations. The rapidly changing technological, social and economic environment creates challenges for the creation of modern and advanced management systems. The growing complexity of the world of technology and the necessity to spread and transfer information and knowledge require the implementation of new solutions in the field of technology enabling its use (Jamali, 2005). The level of technological complexity of modern production systems and management systems implies disposition to have a higher level of knowledge needed by the employee and disposition to engage in a multidisciplinary manner (Boyett J.H., Boyett J.T., 2000). Enterprises operating in the knowledge-driven economy willingly use the achievements of science, technology, organization and management, as well as the skills and dynamically developing competences of employees. Old methods and management systems do not ensure employees the proper use of their knowledge and skills to create new solutions and take initiatives (Stallings, 2000). On the other hand, it should be noted that current customers are richer in knowledge, more inquisitive and critical, and this means greater requirements in terms of products and services offered by enterprises (Chapman, 2001). Thus, products in the new reality should be characterized by a high level of quality and functionality, their production costs should be low, and the product life cycle on the market should be as short as possible (Grudzewski, Hejduk, 2011).

Technology

The literature shows a wide use of the term technology. The analysis of various definitions of this concept allows to conclude that the proper understanding of the essence of technology, its role and meaning in the processes and systems of an enterprise requires considering it in a specific context. In engineering science, technology is defined as knowledge related to the methods of producing products. The elements that define the technology are physical objects (machines and devices), processes (they transform materials and components into finished products) and human knowledge (necessary to use physical objects and processes). The basis of technology is knowledge - scientific, empirical, material and immaterial. The modern view of technology requires that it be perceived as an environment

where resources exist to design and implement solutions to problems. The essence of technology is therefore the combination of physical objects with processes, knowledge, social, organizational and management aspects (Wiśniewska, 2015).

The implementation of technological innovations should be not only new, but also cost-effective. This is crucial for taking advantage of market opportunities. New, innovative products, services and processes enable the achievement of better economic indicators in the enterprise (Krusinskas, Norvaisiene, Lakstutiene, Vaitkevicius, 2015). A manifestation of the use of technological innovations are modern, advanced production technologies that provide benefits, e.g. in the form of savings (material, energy, labor) or reduction of pollutant emissions. Modern technologies contribute to the increase in production efficiency, process flexibility, product quality, work safety, reduction of the number of production shortages, computerization and automation of production processes. New reality technologies, such as e.g. artificial intelligence, virtual reality, cloud computing, autonomous robots, coming with the fourth industrial revolution, can provide new, significant values for the enterprise (Baruk, 2018).

Conceptual Assumptions of The New Industrial Reality

The basis for the creation of the new generation industry is the construction and development of cyber-physical systems, i.e. interconnected components of physical infrastructure (machines, devices, sensors) and ICT infrastructure (computers and software) based on algorithms. Devices operating in cyber-physical systems have digital counterparts in the computing cloud, where machines are simulated on the basis of data supplied from sensors in real time. Machine models in the cloud are exemplary for future analytical processes. They also enable monitoring of industrial facilities and individual stages of the production process. The process of creating a virtual model of industrial objects in the cloud computing consists of several stages: integration, conversion, virtualization, perception and configuration. In the first stage, the condition of machines and devices is self-identified thanks to the installed sensors. In the conversion stage, the data collected by the sensors is sent to the cloud, processed there and stored in a database. The virtualization stage allows, on the basis of the collected data, to create a virtual model of industrial facilities that is updated in real time. The perception stage is the archiving of data in a central database and presenting them on demand in the form of infographics. The last stage – configuration, is used to change the operating parameters of industrial facilities on the basis of given criteria in order to minimize the probability of failure.

The idea of cyber-physical systems assumes networking of industrial facilities, allowing for its remote control and configuration. This process takes place in the Internet of Things environment, which allows for communication, i.e. the exchange of information between machines (machine-to-machine – M2M) not only within one cyber-physical system, but can cover and integrate many such systems. Intelligent communication between industrial facilities requires the existence of systems that will enable remote monitoring, configuration and parameterization of networked facilities. This means the use of a two-way communication model that sends commands from the central computer to objects and allows remote configuration without human intervention. (Domińska, 2017).

Essence of The Industrial Revolutions

The first industrial revolution began at the end of the 18th century and lasted until the second half of the 19th century (Fig. 1). New technical inventions contributed to the transition from workmanship and manufactory production to mechanized factory production. The greatest importance was the invention of the steam engine, which was used on a large scale in mining. Another important invention was the spinning and weaving machine, which gave rise to mass production in the textile industry. In the steel industry, charcoal has been replaced with coke. The development of the steel, mining and textile industries contributed to the development of the machine industry. The steam engine was used to build steam locomotives and steam ships. The first industrial revolution increased the energy potential of workers - from that moment on, machines supported human work. There was an organizational breakthrough in factories, the aim of which was to rationalize work. This contributed not only to the increase in workers' productivity, but also prepared the industry to introduce modern techniques and technologies.

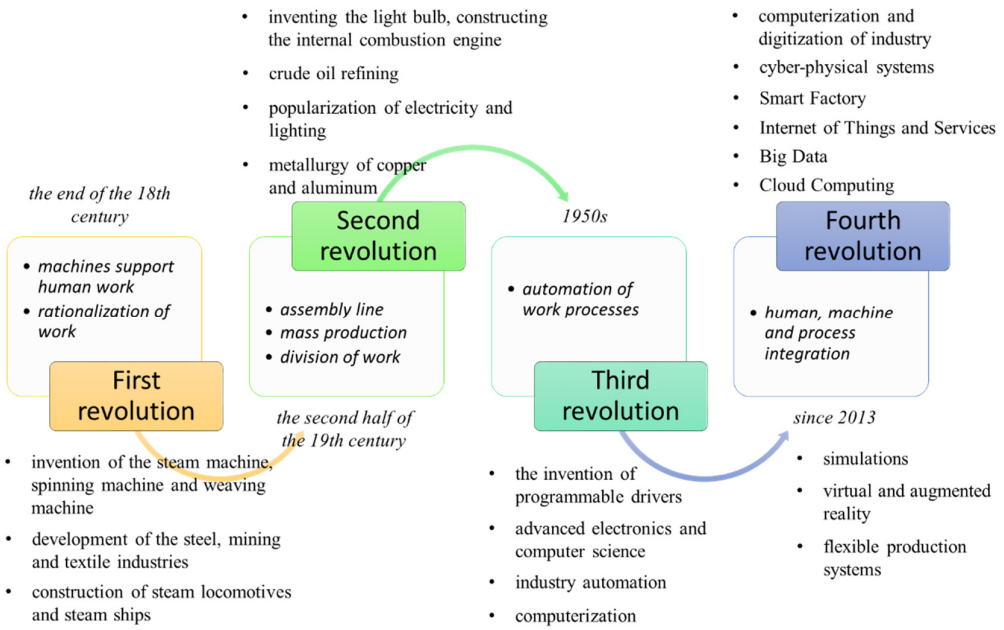

Fig.1: Technological changes in the evolution of industry [own]

The second industrial revolution began in the second half of the 19th century and lasted until the beginning of the 20th century. The biggest innovations that revolutionized the industry at the time were two new energy sources: electricity and the internal combustion engine. The age of mass production with the division of labor has begun. A method of refining crude oil was developed, which meant that it began to be used as a fuel. Oil displaced coal, aluminum and copper smelting developed. The invention of the light bulb made it possible to spread electricity and lighting not only in factories but also in households. Another breakthrough was the construction of the internal combustion engine. The world's first assembly line was launched at the Ford car plant. Until now, the entire vehicle was assembled on one workstation, since then the vehicles were produced in stages on a conveyor, which significantly accelerated the process and reduced costs.

The third industrial revolution is known as the scientific and technical revolution. Great changes in technology, science and industry have occurred since the 1950s. The most important aspects of this revolution include computerization, the use of alternative energy sources, the improvement of telecommunications and transport, and the development of industrial applications of programmable controllers. This opens an era of industrial automation based on advanced electronics, IT and work process automation. Innovations that shape the industry, increase production efficiency and speed, and reduce costs. As a result, mass production becomes possible.

The fourth industrial revolution will start with the development of new digital technologies. One of the most important will be the Internet of Things (IoT), through which huge amounts of data will be sent on machines, industrial facilities, work in progress, inventory, etc. Therefore, advanced methods of data processing will be required, which is why techniques of Big Data analysis in cloud computing are being developed. The technologies that complement the new industrial reality include advanced simulations, virtual and augmented reality, additive (3D) printing, autonomy of industrial facilities, a new level of communication and full integration of enterprise IT systems. One of the main effects of the fourth industrial revolution will be the flexibility of production systems. The fourth industrial revolution will intensify activities aimed at digitization and computerization of production. Cyber-physical systems (CPS) will be created, and these will contribute to the creation of smart factories.

New manufacturing paradigms in aspect of the industrial revolutions

The development of technique and technology, which contributed to the industrial revolution, is a factor enabling changes in the production paradigms, i.e. standards and adopted methods of organizing and controlling the production process. In terms of the industry-market relationship, four paradigms can be distinguished, dominant in subsequent periods of industrial reality (Fig. 2): craft production, mass production, mass customization and personalized production (Furmanek, 2018).

In craft production, each product was designed and manufactured for a specific customer by skilled craftsmen using universal tools, machines and devices.

Mass production was characterized by the production of a large number of identical products. Specialized machines and movable assembly lines were used for this purpose. The scale of production lowered the unit cost of manufacturing a product, and thus also lowered product prices, diversified the offers and increased the demand. The production of the product developed by the manufacturer had to effectively utilize the production system in the factory. The sales units were supposed to launch a mass product to the market (Furmanek, 2018).

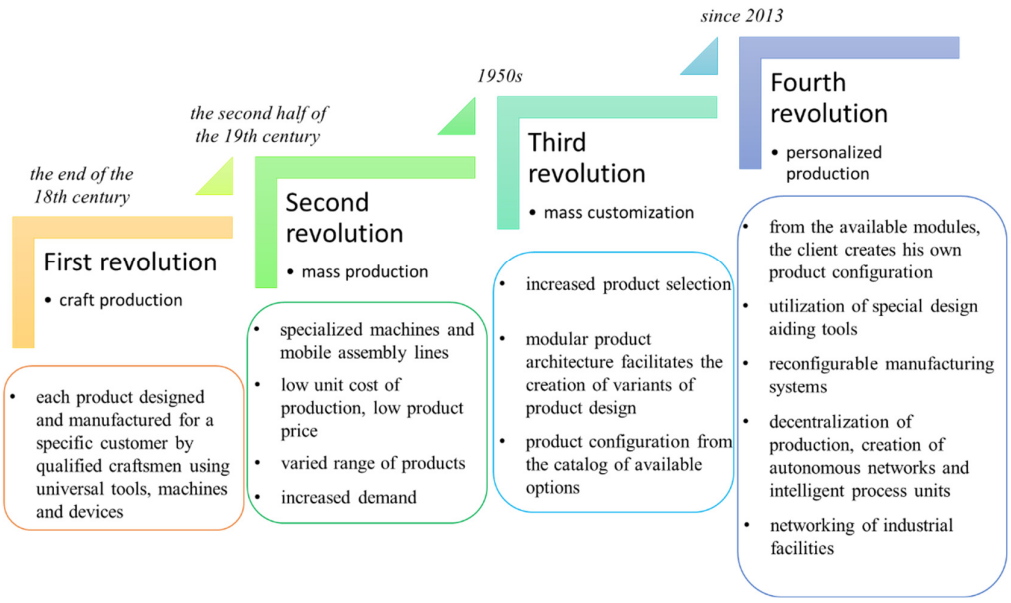

Fig.2: Four paradigms of manufacturing in different periods of the industrial reality [own]

The next stage in the evolution of industry is the paradigm of mass customization. It was created in response to social demand related to the increased choice of products offered by the manufacturer. The use of modular product architecture facilitated the creation of variants in the design of finished products. The use of programmable controllers and computerization of industrial facilities contributed to the automation of production lines and made it possible to extend the product range with a family of predefined modules. The product offer is very diverse thanks to the possibility of choosing a specific product configuration from the catalog of available options (Furmanek, 2018).

In the currently developing paradigm of personalized production, the customer becomes an active participant in the product design process. From the modules available from the manufacturer, the customer creates his own product configuration, usually with the use of special design tools. Effective implementation of this concept is possible thanks to the use of reconfigurable production systems. In the new reality, shaped by the fourth industrial revolution, smart products will determine the configuration of production systems. The fourth industrial revolution will change the way industrial systems are managed and controlled. The centralized production paradigm used so far meant the implementation of complete production tasks in one factory or multi-plant organization. The new decentralization paradigm will arise as a result of creating autonomous networks and intelligent process units that will exchange information and configure themselves to optimally run the production process and achieve results. The functioning of the production unit in the network forces the company to focus on its own key competences and transfer the remaining ones to cooperation. This then leads to a change in the business model from product orientation, when the organizational unit produces products, to service orientation, i.e. offering the best service in the network for the implementation of a part of the manufacturing process (Furmanek, 2018).

In the traditional approach to the value chain according to M. E. Porter the product moves one-dimensionally to the next organizational units, and each one adds value (Magretta, 2014; Gierszewska, Romanowska, 2017). Industry 4.0 provides for multidimensional networks of values in which the source of value is a combination of network elements based on interaction. Value networks in the new reality are related to the concept of a platform, meaning a business model that creates value by connecting suppliers, producers and consumers, and thus enables the exchange of values created by network participants and facilitates cooperation.

The paradigm shift also affects the human-machine relationship. The role of the worker will shift towards managing the activities performed by robots and highly automated machines. New technical solutions will be related to increasing the possibilities of employees. The development of competencies will be continuous and will be integrated with production processes, and will be supported by digital worker assistants. The ability to remotely communicate the worker with industrial facilities will contribute to more flexible work time planning.

Advantages of the new manufacturing paradigm

The new manufacturing paradigm shows a high level of functional integration. The data generated by IT systems is easily accessible and highly useful for management, and the new reality environment allows to create new business models. Thanks to the networking of industrial facilities and the quick exchange of data between machines and devices, enterprises can produce more economically and respond faster to individual customer needs. Changeovers and the preparation of machines for new needs is reduced to a minimum, so that the production system becomes more flexible. Machines, devices and production facilities communicate with each other and modify the performed task. Cases of wastage and loss of working time in the production process are detected thanks to better transparency of the value chain and access to current data, and this significantly increases production efficiency. The new industrial reality environment also supports workers by providing them with access to information about the production process and the value chain at any time and from anywhere.

Considering the business effects at the enterprise level, it should be noted that the implementation of the new reality principles will contribute to more precise recognition and better adaptation to market needs, thanks to combining external information with internal data about processes and flexible configuration of the manufacturing process. The increase in the company's profitability will be the result of the precise and timely fulfillment of customer expectations. The most important operational effect will be a better efficiency of using the company's resources, thanks to the flexible and quick preparation of resources and processes to the current needs and task accomplishment. The following will also improve: product quality (thanks to the immediate availability of data, the possibility of analyzing it on an ongoing basis) and the condition and availability of machines in the process (thanks to prediction methods in maintenance, ongoing data analysis, quick identification of problems and anticipating problem situations).

Summary

The most famous thought of the Greek philosopher Heraclitus of Ephesus, which tells us that the only constant thing in the universe is change, and that everything that surrounds us is constantly changing from one state to another, is still valid and can apply to all areas of human activity, including industrial activity. To paraphrase this concept, it can be said that the evolution of the production paradigms is a natural right of the changes resulting from the needs of various areas of human activity.

The change of production paradigms is the result of the accumulation of evolutionarily developed technological innovations, which mean that the current model of functioning in a given area requires a change. The basis of changes are technological innovations, market trends and socio-cultural changes. The accumulation of these factors leads to another breakthrough in the history of the evolution of industrialization, known as the fourth industrial revolution. Product customization, reconfigurable and decentralized manufacturing systems, full automation and robotization of manufacturing processes, a network of autonomous industrial facilities, a new level of communication, cyber-physical systems creating smart factories, the ubiquitous Internet of Things and Cloud Computing, as well as virtual and augmented reality are the elements creating the new manufacturing paradigm in the new industrial reality. The factor stimulating changes and enabling their development are technical, technological, organizational and managerial innovations, or more precisely, their interconnection and synergistic operation based on information and communication technologies.

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Growth Factors of Insurance Interests of Russian Citizens

Gulnara N. KAIGORODOVA
Associate Professor, Kazan Federal University, Kazan, Russia, e-mail: golsuorsi1@mail.ru

Alfiya A. MUSTAFINA
Associate Professor, Kazan Federal University, Kazan, Russia, e-mail: alfy2506@mail.ru

Guzel K. PYRKOVA
Associate Professor, Kazan Federal University, Kazan, Russia, e-mail: guzel831@mail.ru

Ruslana MAMCHUR
Associate Professor, National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine, e-mail: tagrin@ukr.net

Iryna M. ZELENITSA
Senior Lecturer, Kyiv National University of Trade and Economics, Kyiv, Ukraine, e-mail: zelenitsa@ukr.net

Tatyana N. KUL
Associate Professor, School of business of BSU, Minsk, Belarus, e-mail: kul@sbmt.by

Larisa V. BELINSKAJA
Professor, Vilnius University, Vilnius, Lithuania, e-mail: larisa.belinskaja@evaf.vu.lt

Abstract

The resent trends in the development of the Russian insurance market are favorable on the annual growth of insurance premiums. However, a detailed analysis allows us to conclude that the growth is mainly due to the rapid development of the investment life insurance segment. The main risks associated with the protection of housing, movable property, health are not the subject of an insurance contract due to the low level or lack of insurance interest of citizens.The article examines the issues of insurance protection of the interests of citizens of the Russian Federation in the context of reducing the possibilities of the state budget and other centralized funds for compensation of damage. The main aim of this article is to study the factors that determine the increase in the propensity to insurance among individuals and to identify the relationships between them.
Special attention is paid to the development of a system of measures to ensure an increase in citizens' interest in using the insurance mechanism. The directions that will increase the level of insurance penetration among the population have been identified.

Keywords: insurance, propensity to insurance, savings, welfare of citizens.

JEL Classification: G22; E21

Introduction

Insurance coverage in large part determines the ability of citizens to recover losses associated with loss of property or ill health in a market economy. Catastrophic events associated with forest fires and floods raise the question of using the insurance mechanism. It must be noted that most of the property items owned by individuals have not been insured. Citizens often demonstrate a leading-strings mentality, largely due to the expectation of compensation for damage from the state, the implementation of the constitutional right to housing. However, the state's ability to finance damages is limited by the existing tax burden. In addition, the formation of insurance funds provides financing for investment processes in the economy.

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The strategy of the insurance industry development of the Russian Federation for the period from 2019 to 2021 provides the implementation of a number of target indicators (All-Russia Insurance Association, 2020). It is expected to increase the share of insurance penetration from 1.4% to 1.7% of GDP by 2021, and the volume of insurance premiums per capita from 8.7 to 14 thousand rubles, that is by 60.9%. The need to achieve these indicators is due to the state's desire to reduce the burden on the budget, to use actively market mechanisms to cover damages from the insurance risks implementation.

Legislative norms that determine the need for home insurance against natural emergencies came into force on August 4, 2019. Regional programs may cover other risks as well: domestic gas explosion, flood, fire. It should be understood that the program is voluntary and the amount of the insurance premium will be included in utility bills by default. The homeowner has the right to decide whether to purchase this insurance policy or not. In fact, the traditions of fire insurance have been restored in Russia (Trynchuk, 2011), (Trynchuk, 2017).

There are positive trends in accident insurance, voluntary health insurance, home insurance against all types of risks and Transport Insurance. However, the level of coverage is insufficient, especially in emergency situations.

The article examines the factors that determine the development of citizens' propensity to insurance, systematizes possible points of growth, identifies directions for further researches in this area.

Literature Review

Considerable attention to the study of issues of increasing the citizens' interest in insurance is given in the works of scientists.

Some scientists consider the relationship between consumption and insurance (Hambel, et.al, 2017). Thus, the issues of long-term life insurance, consumption problems, investment and household insurance have been investigated. It is concluded that the presence of unresolved issues in consumption, the expectation of expensive purchases reduces the demand of insurance products. In particular, young families tend to avoid purchasing of long-term life insurance policies.

The scientists note that expected utility theory does not always work in the modern world. Increasingly, it gives the way to behavioral theories, for example, when government purchases of goods and services, including insurance, and non-price factors are not taken into account (Baranovsky et.al, 2020), (Tkachenko, et al, 2020). So, (Richter et.al, 2019) consider the well-established behavioral models, substantiate their relevance for the insurance industry. They note the importance of predicting customer behavior, understanding the influence of consumer behavioral factors in the insurance industry (Polinkevych, 2016), (Polinkevych & Kamiński, 2018). In particular, it has been noted that when choosing a particular service, priority is given to the one that impresses the customer on a psychological level and evokes certain emotions (Horyslavets et.al, 2018).

The questions of the influence of legislative changes on the insurance industry are investigated. In particular, (Heaton, 2017) considers this aspect in the area of auto insurance and notes that the relaxation of civil legislation does not lead to the increase in auto insurance coverage. Therefore, the issues of protection the rights of insurance services consumers (Horbova et al., 2018), (Ostrowska-Dankiewicz, A., 2019), improving of insurance culture, popularization of the institution of insurance are very important.

It is interesting to study the question of how the transparency of the formation of the insurance rate affects the propensity to buy an insurance policy. (Huber et.al, 2015) consider this problem using the example of endowment life insurance. It is concluded that no relationship has been identified between «price transparency» and a positive decision to purchase the policy.

The problems relating to the low level of population demand are studied in the works of Russian scientists. Kuznetsova N. considers separate definitions of this issue and also analyses the relationship between the well-being of citizens and the level of demand for insurance services in her work (Kuznetsova, 2016). The author concludes that the costs of high-risk insurance are considered by families as an expense for saving, not consumption. When studying the conditions for the formation of an insurance portfolio (Kokh et. al, 2016), it is noted that its structure is determined not only by the insurer's strategy, but also by the interest of consumers in individual or interrelated insurance types. A low level of insurance culture, lack of insurance interest, low quality of insurance services have been noted. At the heart of the strategy of insurers is dominated by marketing (Klapkiv, 2016).

The importance of the institution of insurance is obvious (Kaigorodova, et.al, 2018), since its development in large part determines economic growth of the state. The authors have identified the factors that determine the low level of demand for insurance services from the population in Russia.

Considerable attention is paid to the study of insurance behavior of the population. Modeling (Sinyavskaya & Tregubova, 2018) has shown that insurance behavior is determined by a number of socio-demographic, economic and behavioral characteristics. It is concluded that insurance behavior is not considered by Russians as a method of risk management, but manifests itself only if there is a financial opportunity. It is noted (Płonka et. al, 2020) that interest in insurance coverage increases with the approach of the retirement age.

The work (Spletukhov, 2019) is devoted to the study of the social factors of the interest of Russian citizens in insurance services, the criteria which are guided by insurance services consumers when choosing an insurance company. Various mechanisms of attracting the population to the purchase of insurance policies are considered (Kaigorodova et al, 2020; Horyslavets, P. et al, 2018), including digital technologies (Klapkiv et al, 2018) use, however, cyber risks of the insurer (Łyskawa et al, 2019) are noted. Insurance companies must take care of their customers trust, implementing the concept of social responsibility in relation to customers and partners to ensure their own development (Khovrak, et al, 2019), (Glonti, V. et al, 2020).

Hypotheses

The increase in the propensity of the Russian population to insurance depends on two factors: (1) the average per capita income of the population; (2) opportunities to save. Savings activity of the population can be manifested in various directions (purchase of financial products, currency in cash savings). Household deposits as the most frequently used product have been employed for the analysis.

Methodology and Data

It is necessary to investigate the change in the welfare of Russian citizens. First of all, we assess this by such indicators as the average per capita income of the population; housing per capita; the number of vehicles owned by individuals; individuals' deposits, as well as consumers loans. The data are shown in Table 1.

Table 1: Indicators characterizing the change in welfare of Russian citizens

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Average per capita income of the population, thous. rub.	19.0	20.8	23.2	25.9	27.4	30.3	30.9	31.9	33.2	35.2
Real disposable cash income of the population, % of the previous year	105.9	100.5	104.6	104.0	98.8	97.6	95.5	99.5	100.1	101.0
The total area of residential premises per inhabitant on average, sq. m.	22.6	23.0	23.4	23.4	23.7	24.4	24.9	25.2	25.8	26.3
Trucks owned by citizens, mln. units	3.0	3.1	3.3	3.5	3.8	3.8	3.8	3.9	4.1	4.0
Passenger cars owned by citizens, mln. units	32.6	34.6	36.9	39.2	41.4	42.3	43.2	44.8	46.1	46.3
The share of savings in the structure of using the population's monetary income, %	14.8	10.4	9.9	9.9	6.9	14.3	11.1	8.1	1.7	3.0
Individual deposits, trn. rub.	7.5	11.6	14.2	16.9	18.7	23.3	24.3	26.1	28.6	30.5
Loans to individuals, trn. rub.	3.6	5.4	7.2	8.8	12.0	11.3	11.5	13.0	15.9	17.7

Source: compiled by the authors, based (Official site of Central Bank of Russian Federation, 2020 & Official site of Rosstat, 2020)

The most significant changes were revealed in deposits and loans of individuals in 4.07 and 4.92 times, respectively. Significant growth was revealed in the indicator of passenger cars owned by the citizens, a change over the period of 142%. The provision of housing has slightly increased (in terms of the area of residential premises per inhabitant). The essential aspects that need to be analyzed in the process of pricing in the Russian housing market are regional characteristics and features of the impact of macroeconomic risks (Ermilova & Finogenova, 2017). The growth in the average per capita income of the population is noticeable, but for the study it is advisable to consider the change in the real disposable monetary income of citizens, that is, incomes adjusted for the inflation rate. According to this indicator, we observe insignificant, but a decrease in income. The share of savings in the structure of the use of monetary income is sharply reduced. It should be kept in mind that insurance services are implemented at the phase of GDP redistribution, as a rule when the consumers decide on the proportions of the budget between consumption and savings. If preference is given to consumption , then the decision to purchase insurance products for voluntary types of insurance, as a rule will be negative. In addition, when distributing the household budget, a person takes into account the emerging current situation, predicts its change. In particular, he may give preference to protection from social risks and risks associated with a possible deterioration of health not by purchasing an insurance policy, but by the services of sanatorium treatment and health improvement (Mustafina et.al, 2017).

In general, we can conclude that there is an increase in housing volume, vehicles owned by the citizens, and savings in the form of deposits are growing. The decrease in the share of savings indicates the increase in the current needs of households, inflationary expectations, and the increase in the share of income allocated to servicing loan obligations. The growth in the loans volume to individuals can be assessed in two ways. On the one hand, this indicator characterizes the empowerment of the citizens, the increase in aggregate demand in the market. On the other hand, a comparison of this indicator with a decrease in the real disposable income of the population may indicate the replacement of sources for meeting the needs of the citizens from their own to borrowed ones.

We will focus on the characteristics of insurance services use by the citizens. Unfortunately, statistics do not allow separating premiums paid by individuals and legal entities. Therefore, we will use the data of official statistics for the analysis, distiling such areas of insurance as life insurance, pension insurance, insurance against accidents and illnesses, and others, as they are related to insurance protection of the citizens' interests (Table 2).

Table 2: Insurance premiums accumulated on insurance products for individuals

Insurance premiums, bln. rub	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Life insurance (except for pension insurance)	21.3	33.8	51.8	83.3	106.9	128.2	214.3	330.1	450.8	407.3
Pension insurance	1.4	1	1.1	1.6	1.6	1.5	1.4	1.4	1.6	2.1
Insurance against accidents and illnesses	36.6	48.8	75	93.8	95.5	80.9	108	121.2	169.5	187.4
Property insurance of the citizens	n.d.	n.d.	25.8	29.8	38.6	43.9	51.4	57.4	64.8	71.9
Total insurance premiums for insurance of individuals	59.3	83.6	153.7	208.5	242.6	254.5	375.1	510.1	686.7	668.7

Source: compiled by the authors, based (Official site of Central Bank of Russian Federation, 2020).

Life insurance as the accumulative direction of insurance shows significant growth in the researched period. The main growth driver is investment life insurance. However, there is a decrease in growth rates in this area due to a lower actual level of profitability of investment life insurance products compared to the declared levels in 2019. Such risky types of insurance as insurance against accidents and health insurance are developing dynamically, especially in the last three years. Mortgage insurance and the inflationary rise in the value of the insured property are determining factors of the increase in premiums for insurance of citizens property.

The key factors influencing the increase in the propensity of citizens to insurance, in our opinion, are:

- growth in real disposable money income of the population;
- decrease in rates for mortgage lending, which leads to the increase in the volume of mortgages;
- participation of the employer in the formation of contributions for accumulative types of insurance;
- introduction of new types of compulsory insurance («fostering a culture of insurance»);
- stimulation the acquisition of new property by citizens (for example, the programs «First car», «Family car», etc.) and it encourages a person to take measures to save this property.

Correlation analysis has showed a high relationship between insurance premiums accumulated for insurance of interests of individuals and the total area of residential premises per one inhabitant, with deposits of the population, as well as with the number of cars owned by the citizens. The relationship with money income of the population is moderate.

The main share of insurance premiums for interests insurance of individuals is on life insurance in recent years, that is, accumulative types of insurance. It is advisable to construct a linear regression equation for two variables, i.e insurance premiums accumulated for insurance of interests of individuals and deposits of individuals. It should be noted that investment life insurance policies (which have the main share in the life insurance segment) are usually medium-term, and often short-term. However, the study of deposits structure of individuals also shows their short and medium term orientation. Regression analysis has allowed us to obtain the results shown in Figure 1. The accuracy of the approximation is satisfactory ($R^2 > 0.8$), high reliability of the results (significance F = 0.000705).

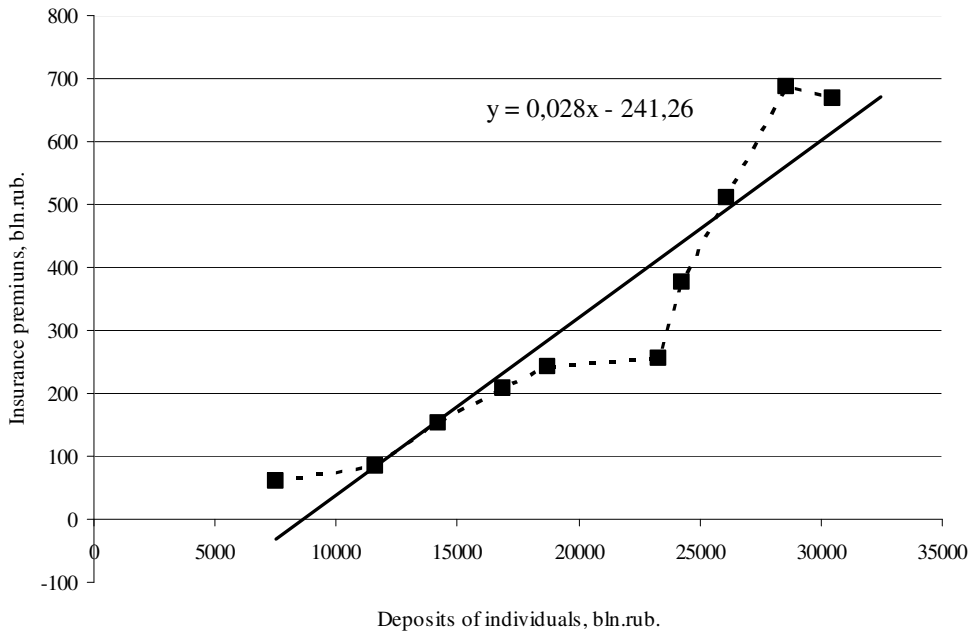

Fig. 1: Interrelation of insurance premiums for insurance of individuals interests and individuals deposits

Source: compiled by the authors.

Thus, we can note that the increase in the propensity of the population to save increases the interest in purchasing insurance services. We understand that the increase in accumulation and savings of citizens makes them think about the safety of financial well-being, about improving the level of financial culture. Further research requires the construction of a multivariate model, taking into account additional parameters, including a qualitative one.

We can offer the following points of growth of the insurance market with respect to insurance protection of individuals (Table 3).

Table 3: Directions for increasing the propensity of citizens to insurance

Growth factors	Possible ways of ensuring
1. The level of monetary income of citizens	– macroeconomic stability; – control over ensuring the basic constitutional rights of citizens, including the right to remuneration for work without discrimination; – state measures to support families; – retraining system.
2. Citizens' awareness of the potential danger of risks that threaten their financial well-being	– carrying out activities to improve the level of financial literacy, financial culture of the population; – establishing clear target criteria for the provision of state support in unfavourable events; – introduction of compulsory types of insurance for the most significant risks (including transferring home insurance against natural emergencies from voluntary to compulsory).
3. Trust in insurance companies	- further implementation and improvement of the system of Basic Standards for the provision of insurance services; - expanding the participation of the financial ombudsman in the settlement of insurance disputes; - formation of guarantee funds for socially significant types of insurance; - expansion of the reinsurance protection system; - activating the work of law enforcement agencies with insurance fraud; - improvement of Compalsory Automobile Liability Insurance system.
4. Availability of insurance services	- implementation of financial marketplace project; - maximum availability of purchasing insurance policies via the Internet, regulation of legal obstacles; - expanding the availability of online claims settlement procedures; - measures of economic stimulation of citizens to insurance protection of interests through tax incentives; - formation of healthy competition between life insurers and non-state pension funds; - microinsurance development.

Source: compiled by the authors.

The axiom seems reasonable that the monetary incomes of the population have an impact on the insurance market development. Such a relationship has been found in our research, although the correlation is moderate. However, it should be kept in mind that the official statistics do not take into account the income received in the «gray» labor market. According to various expert assessements, it takes up to 1/3 of the officially recorded income of Russians.

It is necessary to take into account a number of qualitative factors. The propensity to insurance is different among people of different age groups. Young people are actively interested in various services of the financial market. People of active working age, often face with mistakes or fraud in insurance, they are careful in purchasing insurance policies. However, they are the main (in terms of cost characteristics) consumers of goods and services. Both of these groups of the population are active users of the Internet, digital technologies, so access to them is the widest. Older people with lower incomes, however, tend to be more anxious about various dangers. This encourages them to purchase insurance policies, for example, real estate or homeowner liability.

Approaches to insurance development in different regions will be different. Despite the horizontal alignment of fiscal capacity, the level of economic development of the regions is different. This fact should be the basis for determining priorities in the development of certain types of insurance. It would be reasonable to form a kind of hierarchy of needs in the types of insurance services because Russians first of all care about the property safety and only then about compensation for health damage.

Results and Conclusion

Two mechanisms based on the use of state financial resources and with the help of a market mechanism for risk insurance can be distinguished in the damage compensation system. The current situation with systemic financing

of citizens' damages at the expense of centralized funds does not allow improve the insurance culture of the population, does not contribute to the development of insurance as a full-fledged market institution. The insufficient level of citizens monetary income is largely refuted by the growth in sales of consumer goods, durable goods, real estate, an increase in the volume of tourist trips, etc. There is a danger of missing a favourable moment and maintain leading-strings mentality in society.

There are several areas that will increase the level of insurance penetration among the population:

1) development and implementation of new compulsory types of insurance. This mechanism was used even in the post-war years in developed countries in order to form an insurance culture among several generations;
2) widespread use of the principle of the owner's responsibility for compensation for damage caused to his property, clear targeted support of socially unprotected property owners;
3) development of legal practice of compensation for damage and harm caused to property and/or health of third parties;
4) control by the state and self-regulatory organizations on compliance with the rules of business conduct of insurers and, in particular, insurance intermediaries;
5) stimulation of the development of accumulative life insurance, including pension insurance, creation of equal competitive environment with non-state pension funds;
6) consciously and competently make the transition to a truly insurance model of financing medicine.

Discussion

Realization of natural and technological risks, reduction of the budgetary system's ability to finance damages should increase the state's interest in using the insurance system as a mechanism for compensation for losses. The social insurance function is underutilized. Obviously, macroeconomic conditions are largely decisive in the formation of citizens' propensity to insurance. At the same time, the delay in improving the insurance culture of the population may result in a number of problems:

- irrevocable loss of property values when the state is unable to compensate for damage from centralized funds;
- a decrease in the level of compensation for damage for insured risks in the context of insurance fraud, the work of auto lawyers, etc .;
- further decrease in the level of insurance liability in conditions of unfair competition, dumping of federal insurers.

To form a behavior model, it is necessary to take into account:

- psychological characteristics and motivations of people of different ages;
- features of the development of the economies of specific regions;
- «the state must help» paradigm in society;
- the possibility of pursuing a purposeful government policy to «instill» insurance culture through the introduction of compulsory types of insurance.

The use of the insurance mechanism in terms of protecting the welfare of citizens will help reduce the burden on the state budget, form a responsible citizens' attitude to property, and expand the possibilities of using insurance funds as investment resources.

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The Classification of Households with Respect to the "Family 500+" Benefit

Agnieszka SAMSEL

University of Szczecin, The Faculty of Economics, Finance and Management, Szczecin, Poland
agnieszka.samsel@usz.edu.pl

Abstract

Pro-family policy in Poland has changed since April 2016. The programme described as "Family 500+" has been introduced and it has provided financial support for Polish households. A household, taking advantage of the programme, may treat it as an additional financial support (apart from remuneration for work performed) or the main source of income. The purpose of this article is to explain the concept of a household from an economic point of view, as well as to indicate the differences between related concepts. Additionally, the work aims at characterizing the pro-family policy of Poland (also over the years). The main purpose is the division of households (classification) on the basis of the financial use of the funds from the "Family 500+" benefit. The research methods used in the article include: critical analysis of literature, examination of documents, a questionnaire and statistical analysis.

Keywords: Households, Pro-Family Policy, "Family 500+", Household Finances.

Introduction

Households are the most numerous entities in the economy. It happens, however, that the terms: household, family, family household and a consumer are used interchangeably in scientific studies. A household needs financial resources to achieve its main goal, which is maximization of satisfaction of needs. A household can receive income from work performed or a profit from its business activities. In addition, a household can receive financial assistance in the form of a social or a family benefit, or a benefit for bringing-up a child . The "Family 500+" programme, which was implemented in Poland in April 2016, is the example of a benefit for bringing-up a child (a child-support benefit). Its main goal is to reverse the negative demographic trend, as well as to help in raising children. A lot of households treat additional financial resources as an opportunity to meet the children's needs (e.g. educational, leisure), which, due to current financial limitations, were impossible to satisfy before. It occurs, however, that households use the "Family 500+" benefit and other social benefits for current maintenance of the whole household, often giving up employment. Apart from the "Family 500+" programme, in Poland there are many forms of financial, material and non-material support for households in terms of pro-family policy. The purpose of this article is to classify households on the basis of the way the funds from the "Family 500+" programme are used. The additional aim is to characterize the pro-family policy in Poland, including the historical outline. As mentioned before, a household is identified with many other, related concepts. Separating the concept of a household is another goal of this work.

A Household and Related Concept

An attempt to define a household was made by numerous authors. In the literature, which was subjected to criticism, the definitions proposed by Polish and English-language authors were analyzed. A household in the economic literature was defined by Cz. Bywalec (Bywalec, 2017), K. Gutowska (Gutowska, 2003), T. Zalega (Zalega, 2007), or B. Świecka (Świecka, 2009). Among foreign authors, G.S. Becker (Becker, 1976), L. Beaman, A. Dillon (2012) or M. Tomás (Tomás 2013) tried to define a household. The presented authors present their definitions based on various criteria. The following criteria for defining the concept of a household can be distinguished:

- the criterion of living together,
- kinship criterion,
- decision-making criterion,
- criterion of satisfying consumer needs,
- fundraising criterion.

After analyzing the available definitions, taking into account various criteria, the most universal definition of a household is the one proposed by the OECD. For the purpose of this article, a definition proposed by the OECD has been adopted. According to the definition, a household is an individual (a single person household) or a group of people (a multi person household), who reside together in a given dwelling unit (a house, a flat, a room) and, above all, share the funds necessary for subsistence (OECD, 2017). It can be stated that the criterion determining a household is both a common budget and a shared place of residence. Still, there are exceptions from this definition, a good illustration being pupils or students living in one household with other members but temporarily staying in another place of accommodation. Or to take another example, a household head who is employed away from the place of residence of persons included in his/her household. In both of the exceptions mentioned, the criterion of joint management of cash remains unchanged, but the criterion of cohabitation is impaired.

As previously mentioned, a household may be identified with a number of related concepts. It should be pointed out, however, that a family, a family household or a consumer are not synonymous. Table 1 presents the differences between the terms associated with the concept of a household.

Table 1: A household and related concepts

The concept	Explanation
Consumer	A household is identified with an individual, namely a consumer. The decisions made by a household in practice are taken by an individual, i.e. a consumer (Galbraith, 1979).
Family	This is a sociological category. A family is defined as the basic social group, in which the bonds connecting family members (parentage, marital relationship, blood kinship or adoption) play a very important role. Another characteristics include: an internal structure and positions occupied by family members (e.g. the family head, the child), as well as interactions between family members (Gelles, 2000).
Family household	Persons who are related or related by marriage, living together and maintaining a common household. A family household jointly uses durable goods, and collects and disposes of financial resources. Simultaneously, educational, culture-creating and caring activities are undertaken by members of a family household (Zalega, 2012).
Consumer household	A household that does not have its own means of production. It supports itself on work done by its members beyond household, and fulfills the household production function at the same time. This term is used as a synonym of a household (Zalega, 2012).

Source: Own work

Despite differences between the related concepts, for the purpose of this article, the terms: a household and a family have been unified and simplified, and used interchangeably. According to the common definition, a household and a family is a group of people living together or not, connected by blood ties (or adoptions or marital bonds), jointly making decisions regarding the disposition and distribution of an income in such a way that the common goals of the household as well as individual needs of individual household members could be satisfied in the fullest possible way. In literature, an interchangeable use of the terms: a household and a family can also be found. It was used by Paul Samuelson (Samuelson, 2004), and Lidia Beskid (Beskid, 1977). Despite the simplification and the use of the concept of household for the purposes of the article, the author decided to indicate related concepts. The distinction between concepts is to show that there are concepts that are related and similar to households, but still have different features.

The main purpose of a household is satisfaction of needs of its members. In order to achieve this goal, a household divides its income in order to meet obligations, satisfy current consumption and have savings. Financial plans, financial statements and household budgets are the techniques which facilitate control over income and expenses (Gitman, Joehnk, Billingsley, 2014). A household budget is used to monitor and control the household income and expenditures, as well as to supervise purchases and savings within one month. A household budget may also be prepared for several months, a year or even several years (for a short or long period). Moreover, a household budget allows to determine the level of income and expenditure in a given week, month or year and, simultaneously, creates the opportunity to estimate the amount of savings (Hammonds, 2006). Also, in the case of a household and its budget, the expenditure side is equal to the income side. According to the Central Statistical Office, a household budget is a systematic statement of revenues and expenses, both monetary and non-monetary

Let us now examine revenues and expenditure of a household. Disposable income is the sum of current monetary and non-monetary revenue of all members of a given household, reduced by advance personal income taxes.

Disposable income is reduced by social and health insurance contributions, too. This income is earmarked for all kinds of expenses, including consumption expenses and savings. Disposable income is also called spendable household income, which is reduced by other expenses (e.g. taxes and fees paid to the state and local government). In general, expenses are expenditures on consumer goods and services and other expenses (mentioned above). Expenditures on consumer goods and services are incurred to satisfy a household's needs (Świetlik, 2011). The examples of a household's revenues and expenditures, included in a household budget, have been presented in Table 2.

Table 2: The examples of revenues and expenditures in a household budget

The examples of revenues	The examples of expenditures
Remuneration for work (wage), bonuses and payroll allowances, pension, retirement benefits, non-returnable social and family benefits, benefits for bringing-up a child, profit from a household member's business activity, inheritance and donations, interest on bank deposits, rent income (beyond business activity), revenues from investment funds and participation units	Food, clothing and footwear, durable goods (e.g. domestic appliances and electronics, furniture), sport (e.g. sport equipment and training passes), holidays and leisure activities, cultural goods (e.g. cinema, museum and theatre tickets), health care and purchase of medicines, educational needs (e.g. books, extracurricular activities), children's needs (e.g. toys), alcoholic beverages, entertainment and exploitation of a flat.

Source: Own work

Additionally, a household's revenues include all kinds of financial benefits that are social, family-oriented or child-support. The "Family 500+" programme, implemented in April 2016, is the benefit like that. Financial resources, obtained due to the programme, increase the income side of a household budget. Increased household income results in the change of expenditure structure, i.e. more current needs can be met or the level of savings can increase.

Family policy in Poland

For the purposes of this article, a number of documents were analyzed, including acts and draft acts on family policy in Poland and Europe. The analysis of current and archival documents helped to develop the characteristics of the family policy. Moreover, the analysis of the documents made it possible to distinguish the instruments of family policy. Family policy is the part of social policy of the state. The term 'family policy' was first used in the 1940s during debates on social policy in Europe. The first actions addressed to families were taken in France and Sweden at the turn of the 20th century. Pro-family policy is defined as all kinds of measures, actions and legislation that are introduced and adopted by the state; they are aimed at creating appropriate conditions for functioning of a family: its creation, proper functioning and fulfilling its all important social roles. In the subject literature, two types of family policy are mentioned: indirect policy (implicit), and direct policy (explicit). As for implicit family policy, actions are aimed neither at families nor households directly, but have important consequences for their functioning. These are, for example: unemployment prevention or tax policy. Explicit family policy consists of clearly defined actions, programmes and benefits aimed directly at families.

Family policy in Poland, has undergone a lot of modifications and transformations over the years. Between 1989 and 2015, three major periods can be distinguished: transformational (1989 - 1997), transitional (1997 - 2005), and mature (2005 - 2015). The first one (the transformational period) was characterized by limited family policy. Actions of the state were directed mainly at the unemployed and aimed at counteracting high unemployment. In the first phase of the transformation, there were neither explicit programmes nor strategies for families; what is more, a decrease in the number of places in nurseries and kindergartens could be observed. In the next period, from 1997, family policy took the form of programmes aimed directly at families. This can be illustrated by prolonging the maternity leave, tax relief for a child and a single payment birth grant (so-called 'newborn allowance'), as well as the gradual growth in the number of places in nurseries and kindergartens. In the last, mature period, the solutions introduced in previous years, have been improved and family policy has been aimed at both compensating families with expenses that they have had to cover in order to run a household and facilitating the reconciliation of professional life with bringing up children.

Family policy is implemented by means of instruments like: legal measures (i.e. all legal norms that regulate the relationships between families and the state or other institutions), cash benefits (all kinds of benefits and

allowances), payment in kind (material goods transferred to families), as well as services (e.g. nurseries, kindergartens, community centers). Table 3 presents selected instruments of family policy operating in Poland.

Table 3: The instruments of family policy in Poland

The type of the instrument	The name of the instrument
Monetary benefits	• Family allowance with supplements • Carer's allowance (related to care of a disabled child) • Single payment birth grant (so-called 'newborn allowance') • Child Tax Credit • Maternity allowance • Benefit for bringing-up a child • The "Family 500+" programme
Non-cash benefits (services, payment in kind)	• The nationwide Big Family Card • Paternity leave, maternity leave • Care for a child under 3 years: nurseries, toddler clubs, daytime babysitters • Preschool education

Source: Own work

The "Family 500+" programme, which has been operating in Poland since April 1, 2016, seems particularly noteworthy. In accordance with its assumptions, the programme provides universal and long-term support for families. The programme is designed to help raise children; and the monthly benefit aims to cover, at least partially, costs connected with meeting basic needs and child rearing. Next goal is to improve the material situation of Polish families, and to increase fertility in Poland. Broad eligibility criteria allow all kinds of families to apply for the benefit. It is granted for every family, i.e. parents or guardians of children until they reach 18. The "Family 500+" benefit is paid in the amount of PLN 500 per child each month. The "Family 500+" benefit is paid by town councils, community councils, social welfare centres or social benefit centres. However, in order to receive the benefit, a family have to submit an application to one of the above-mentioned institutions. After granting, a similar request have to be submitted every year. The benefit is paid from the month the application was submitted.

What seems essential, the benefit assigned (in the amount of PLN 500 and more) is not counted as family income while establishing entitlement to other benefits, e.g. alimony fund, family benefits, or various types of housing benefits. Moreover, the "Family 500+" benefit is tax-free, therefore parents of children for whom the benefit was granted receive PLN 500 per child and have no obligation to pay any taxes or contributions on this amount. This rule also applies to parents who run a business. Families who receives funding of a similar nature abroad are not entitled to the benefit.

The classification of households

The classifications presented in the literature

The classification of households is the division of these business subjects according to specific criteria. One household can be matched simultaneously to several types of classification. There are a lot of different criteria. The simplest criterion for the division is the size, namely the number of people making up a household (a single-person household and a multi-person household). In another classification, households are grouped into: rural and urban households. Here, the distinguishing criterion is the area of residence. Rural households are subdivided into typically agricultural households, primarily farming households and non-agricultural rural households. Likewise, households in urban areas are subgrouped into metropolitan households, mid-sized town households and small-sized town households Taking into consideration relationships between household members one may distinguish: single person households, family households, family households with other people and non-family households (based on different ties than family relationships). Similarly to the division of rural and urban households, family households are divided into several separate subgroups., namely: one-generation households, two-generation households and three-generation households (and more). Another classification proposed in the literature is based on the age of a household, i.e. the duration of a household. According to this criterion, there are newly established households (e.g. young married couples), medium-aged (e.g. married couples with small children), and incumbent - old (households of elderly people or after children leave the family home). The classification may also depend on the level of education of household members. According to this criterion, there are households at a low level of

education, medium level of education, high level of education and a very high level of education. According to the socio-economic classification, households can be categorized into households of employees, households of farmers, households of self-employed persons, households of pensioners and households living on transfer incomes (e.g. unemployment benefits, social benefits, family benefits, alimony) (Bywalec, 2017).

Although there are a number of household classifications, it clearly does not exhaust the topic. Taking into account other fields of knowledge (e.g. sociology, psychology), other household classifications may also be mentioned (e.g. depending on shopping preferences, religious beliefs, political orientation). Besides, households can be grouped according to the use of funds obtained due to pro-family policy. This classification has been presented below.

The classification of households - primary research

As was mentioned earlier, households can be divided on the basis of many different criteria. In accordance with the purpose of this article, the division of households has also been made according to the use of aid received under the generally-understood pro-family policy. In addition, households that benefit from the "Family 500+" programme were classified and characterized in detail.

For the purposes of this article, a questionnaire survey was conducted own and original on a purposive random sampling. The questionnaire was addressed to households that receive the "Family 500+" benefit. Households that do not receive benefits were not examined. Purposeful sample selection based on the tasks set out in this article - classification of households taking into account the 500+ benefit. Households that do not receive this benefit cannot be classified. The study was carried out using the PAPI and CAWI methods. 400 questionnaires were prepared, of which 368 were completed. Thus, 92% of the households, to whom the study was directed, answered. 285 questionnaires were filled correctly (71.25% of all prepared questionnaires). Errors were identified so there was no need to reject some questionnaires from the ones which were filled properly. The errors included: the lack of answers to some questions, the selection of several answers in the question (where only one answer was required), and adding some information in the questionnaire by people who do not receive the "Family 500+" benefit. The study was conducted in accordance with the following stages:

1. Development of theoretical issues.
2. Defining the research sample.
3. Development of questionnaire questions.
4. Conducting a pilot study.
5. Refining the questions of the questionnaire.
6. Conducting a proper examination (PAPI, CAWI method).
7. Analysis of the obtained research material.
8. Development and presentation of research results.

The table below presents the research group in detail in terms of socio-demographic characteristics.

Table 4: Characteristics of the research sample

Feature	Percentage of respondents
Gender	Female: 92.63% Male: 7.37%
Age	18 and under: 2.46%; 19 to 25: 37.89%; 26 to 32: 31.58%; 33 to 40: 22.11%; 41 to 48: 5.61%; over 49: 0.35%
Area of inhabitation	City area: 84.21%; Rural area: 15.79%
Number of children	1 child: 34.04%; 2 children: 47.37%; 3 children: 11.58%; 4 children: 5.26%; 5 children: 1.05%; 6 children and more: 0, 70%
Household income	Less than PLN 800 per person per month: 50.53%; from PLN 1,500 to PLN 2,200 per person per month: 13.68%; from PLN 2,200 to PLN 3,000 per person per month: 4.91% ; from PLN 800 to PLN 1500 per person per month: 27.37%; more than PLN 3,000 per person per month: 3.51%

Source: Own work

The result of the primary survey is the original classification of households. The aim of the study is to present the classification of households in terms of using family support, which has not been available in the domestic and

foreign literature so far.The presented classification complements the knowledge gap regarding the previously unavailable classification of households in terms of family benefits.

The following diagram presents the classification of households according to the use of pro-family aid. Simultaneously, this scheme allows for the analysis and review of available forms of assistance in terms of pro-family policy in Poland. The next diagram (Diagram No. 2) is a response to the objective set in the article – the classification of households with respect to the aid received in the form of a child-support benefit.

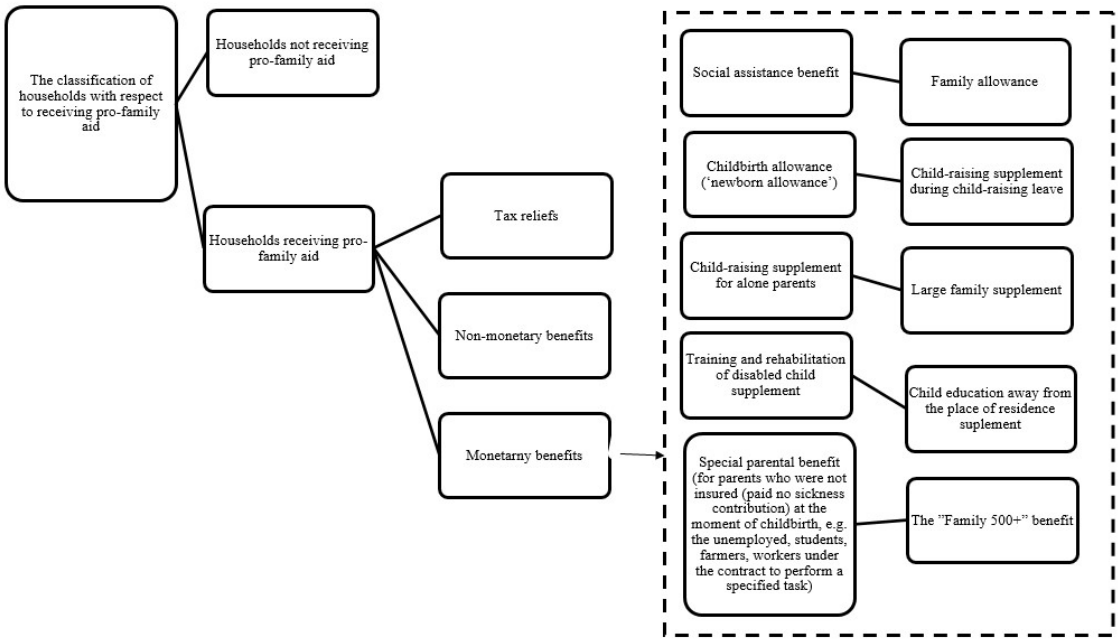

Diagram 1: The classification of households depending on the use of pro-family policy tools
Source: Own work

Diagram No 2 presents the classification of households that receive the "Family 500+" benefit. Besides, it contains a short description of households.

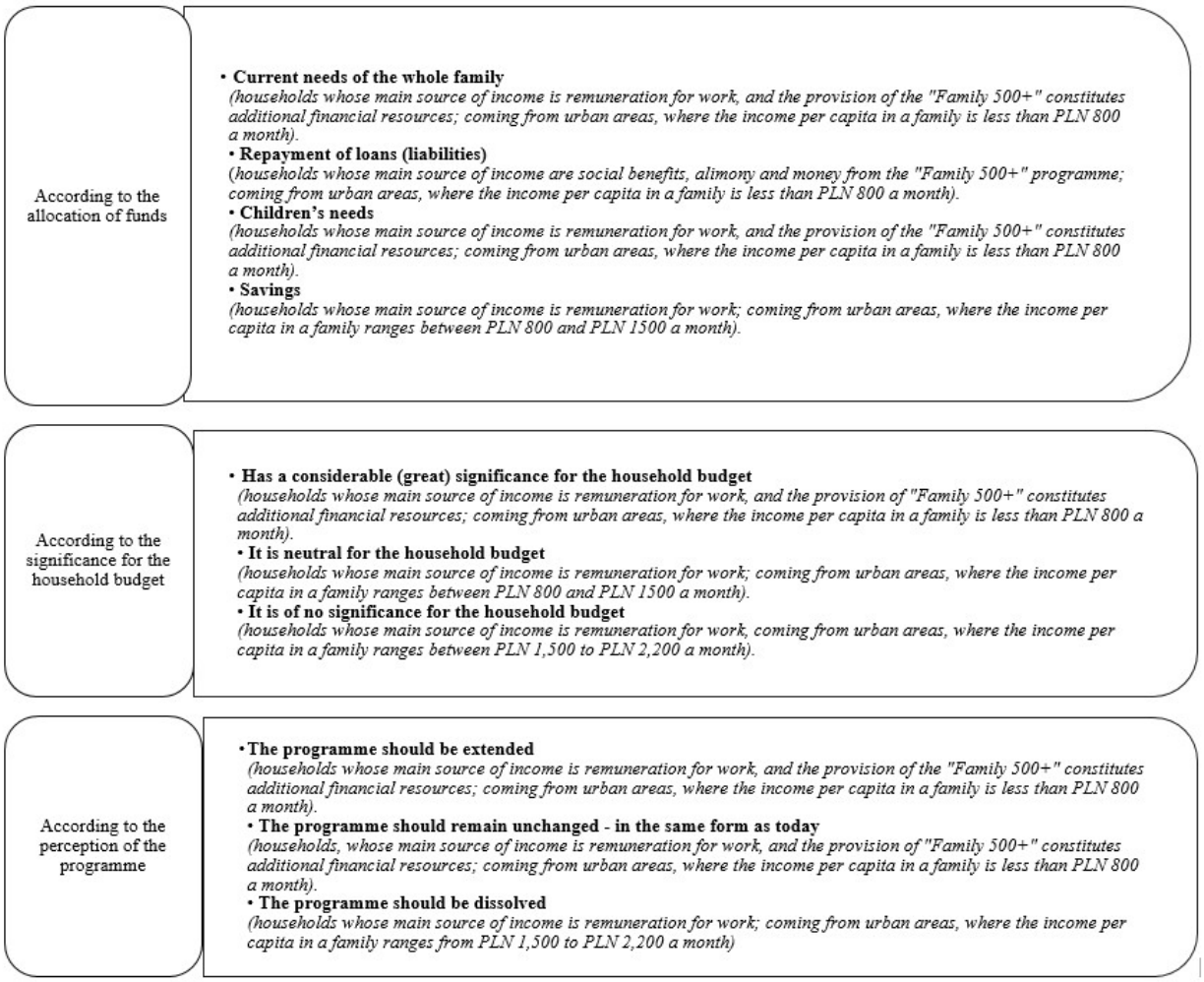

Diagram 2: The classification of households receiving the "Family 500+" benefit

Source: Own work

Conclusions from the analysis and the conducted research:

- the presented author's classification of households allows for filling the knowledge gap regarding the classification of households in terms of services supporting child upbringing,
- the largest group of respondents in terms of gender are women, which allows for the conclusion that they are the ones who manage the benefit received,
- the highest percentage of households stated in the study that the childcare benefit should be extended,
- child benefit is very important for households in rural areas than for households in urban areas,
- the smallest percentage of households (regardless of the area of residence and earnings) indicates that the 500+ benefit has no significance for household finances,
- households with an income lower than PLN 800 per person are of great importance in the finances of a household, and households with an income in the range of PLN 800 to 1,500 per person indicate a neutral importance.

Summary

A household, being the most numerous economic entities, can be defined in many different ways, depending on the author's point of view. The concept of a household is identified with other related concepts, too. The term 'family' seems to be the closest to the term 'household'. A family, as an entity, comes under the influence of pro-family

policy. This policy, by means of its different instruments, may directly or indirectly affect households (families). One of the instruments is the "Family 500+" programme, which is support for families of a universal and long-term nature. This programme, however, has caused a lot of controversy since the beginning of its operation Doubts have arisen over whether households will continue to be interested in performing paid work, and whether the quality of life of Polish families will improve. Still, additional financial resources from the programme have increased an available household budget.

As it was mentioned before, households can be classified in many different ways. One household can simultaneously be found under a number of classifications. Nonetheless, after the introduction of a child-support benefit, it seems important to classify households with respect to the “Family 500+” benefit. The classification like this allows to know the real purpose of the funds. Moreover, the classification of households with respect to the "Family 500+" benefit enables us to learn about the importance of this provision for a household budget, and know how the programme is perceived by households.

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The Impact of The Online Teaching & Learning on Engineering Students' Competencies

Cristin ZAHARIA
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, cristin.cranta@upb.ro

Cristian-Vasile DOICIN
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, cristian.doicin@upb.ro

Mihaela-Elena ULMEANU
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CE Building, District 6, Bucharest, Romania, mihaela.ulmeanu@upb.ro

Gabriela-Marina ENE
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CF Building, District 6, Bucharest, Romania, gabriela_marina.ene@upb.ro

Abstract

The current research aims to reveal how this period of online classes has affected students' lives professionally and socially and what learning methods they have approached during the pandemic to cope with the information received in various ways.
Due to the pandemic, teachers had to develop new methods and tools to approach laboratory work and courses taking into account the particular characteristics of student classes, level of learning, methods of information delivery and even available technology. Thus, the content of the teaching materials was delivered through a variety of online learning tools, in correspondence with the format of the materials developed, as follows: the Google Drive account of the department to monitor the entire teaching activity; Google feedback forms; Faculty website; PDF Guides for applications, the Moodle educational platform of the faculty; product design software, Microsoft Teams.
To highlight this online impact on students' competencies and lives, a questionnaire with explicit questions about the learning methods approached by the students and the strategies of teachers to support the courses and laboratories was used. The questionnaire contains four different sections as follows: identification of student participants, organizing online teaching activities, home themes/ projects/ applications and the impact of online learning on professional skills and social relationships.
The online classes were analysed with the help of this feedback in order to improve teaching and learning methods and the teaching materials also.

Keywords: Teaching and Learning Methods, Competencies, Online Classes/ Laboratories

Introduction

Talking about innovation today has become an exciting preoccupation for us all. According to Rees M. (2020) our daily working approach and socializing style has entirely changed, with imminent and permanent consequences into the future. The coronavirus outbreak has already put the world at a standstill - entire states placed under quarantine and many borders were closed. Currently, without leaving our homes, we are taking part to webinars, classes, laboratories and online scientific lectures from all over the world. Research cited by Li C. (2020) suggests that online learning has been shown to increase retention of information, and take less time, meaning the changes coronavirus have caused might be here to stay. In an introductory article for Scientific Journal TURBO, Vol. VII, no. 1, Banea (2020) concluded that nobody knows when the pandemic is going to end, but we agree to one certain fact: the world will bring many changes in our lives, as it happened after the World Wars. Everything we all did before has somewhat transposed into the online environment; all areas have had to adapt to the new rules. Therefore, the higher education environment has adopted new learning strategies to ensure the development of classes at the same standards so that students' competencies are not affected.

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According to Ulmeanu M. et al. (2019) delivering a successful course is a matter of balancing between the educators' competency level, efficient and targeted teaching materials, effective use of instructional strategies, and even available technology and students' interest. The importance of teaching materials in the learning process is highlighted by Fry H. et al. (2009) in their work, stating that efficient teaching materials should lead to increasing student achievements and to the development of targeted competencies. The United Nations (2020) recommends, through its policy brief released in august 2020, that educators and academic entities should build resilient education systems for equitable and sustainable development and reimagine education and accelerate change in teaching and learning. This paper aims to highlight the change that has been made in higher education institutions for online classes and laboratories, and the impact of new online learning strategies on students' lives.

Methods and Materials

The materials used in teaching online courses are very important because they must be developed so that students understand the content and be able, through individual study, to make connections and reach their maximum learning potential.

If in face-to-face learning mode, visual interaction is one of the most important ways to transmit information and create a connection with students, in online learning this aspect is highly diminished. Thus, the development and implementation of the courses becomes much more difficult.

The current study presents a thorough analysis of the process through which a higher educational institute in the field of technical sciences adapted to online and mixed teaching strategies.

In order to ensure the continuity of the learning process, teachers used new methods and strategies for transmitting information through social media and educational platforms. At university level, official ways of communicating with students and monitoring the entire activity had to be addressed. Thus, the entire educational process was changed, and everyone had to adapt to the new rules imposed by the pandemic. Laboratories are the most important practice that students have at hand to maximize the information received in classes. Thus, the development of these online laboratories was different from the normal one. Laboratory classes, which normally took place in rooms with specialized equipment, were replaced by videos, sketches, images and online presentations, but all at a level where students understand the whole process.

This moment could be the one through which the interdisciplinarity of scientific research should be transformed into a very important development factor in the field of innovation. It is the moment when globally, new solutions and directions are sought, especially in the medical field. Regarding this priority, the other areas suffer, so that the skills of engineering students accumulated during the pandemic have also become a priority for teachers.

With all these new issues affecting the entire world, the impact on financial markets, business and society, Covid-19 is still a surprise. From this point of view, individual study acquired a new meaning for students who had to be able to develop their learning style in order to keep pace with the requirements of employers in the field of interest.

The **target audience** for the current study consists of 344 participants: 331 students (96% of the target audience) and 13 teachers from the University POLITEHNICA of Bucharest (UPB). Students were selected from different years of study and different specializations of the Faculty of Industrial Engineering and Robotics. At UPB all classes and laboratories were made online using the available technology. The questionnaire was shared online and based on the answers, certain aspects of distance learning were counted.

To create a coherent and easy-to-follow set of teaching materials, teachers also considered innovative ways to integrate available technology. Thus, the content of the teaching materials was delivered through a variety of online learning tools, in correspondence with the format of the materials developed, as follows: the Google Drive account of the department to monitor the entire teaching activity; Google feedback forms; Faculty website; PDF Guides for applications, the Moodle educational platform of the faculty; product design software, Microsoft Teams.

Methods used in online teaching to transfer information from teachers to students were mainly based on the official methodology of the faculty, namely the **Moodle educational platform**. This platform fully ensures the continuity of the learning and teaching process as it allows an individual monitoring of students on its assessment, safe conduct of online exams, uploading various types of files to ensure a good understanding of the course and permanent information of students. Each student has access using their own account which ensures their visibility in the class of students to which they belong.

For the examination of the students during the semester, complex tests were developed by the teachers. The platform allows the creation of a library of questions and the generation of individual tests for each student using a certain number of questions, displaying in a random order the possible questions and answers, but also uploading files to solve a given topic. The test allows hiding the visibility to students, displaying at the set date and time, a certain duration and a limited number of attempts.

The official way to connect in real time (live) with students was the **Microsoft Teams** application. UPB has created an organization that includes all students enrolled at each faculty from the campus. Thus, the classes were carried out in an organized way, of which only those targeted were a part of. By restricting access to people outside the UPB, all information about courses, labs and applications was safe. Taking into account the advantages offered by this application, teachers and students were able to: record a certain segment of the course; resume the recorded course at a certain time; connect audio and video to establish eye contact and better interaction; quickly transfer different types of files.

To ensure appropriate assessment of all students, the university management proposed three main options of examinations (Figure 1).

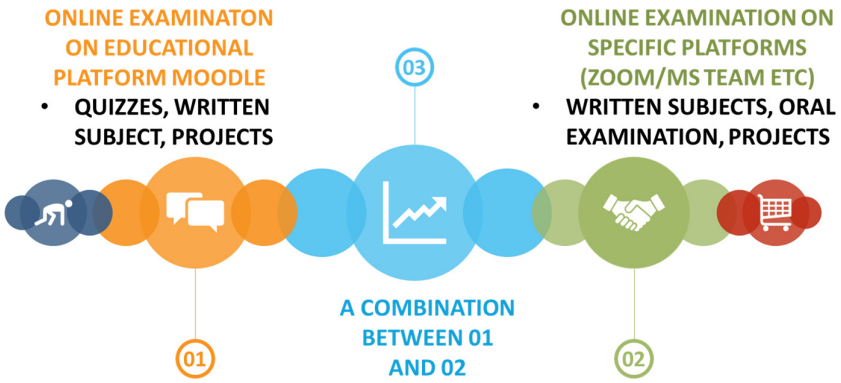

Fig. 1: Options for students' examinations

Pilot Test and Feedback

The target audience was comprised of 74.1% bachelor students, 22.1% master students and 3.8% teachers. The questionnaire was created in Google Forms tool, it contained 5 sections and 21 quick and different types of questions regarding the main topic. 82.3% of the respondents choose urban as the environment where they carried out most of the teaching activity, while the rest rural. The meeting point for the students and teachers, as it turns out from the responses, were the video interactions on the online platforms (Zoom, Microsoft Teams, Meet, Adservio, 24Edu, etc.) and the educational platform from the UPB university (Moodle). Most of the target group used the computer, laptop and phone in order to participate to online teaching activities, and a small part of them (4.9%) the tablet.

A significant element to take into consideration was the timetable. 59.9% claimed the timetable was kept the same as before the pandemic, while 38.4% of the participants suggests that the timetable was adjusted. The best way to transmit information through the teacher-student way, according to the answers, were the online meeting through MS Teams, Zoom etc. and using the educational platform Moodle. 77.6% of the audience participated to all the teaching activities, while 22.4% of them only at the mandatory activities. The main reasons for the absence were the poor internet connection, the lack of interest or the missing/inappropriate devices.

The volume of topics and projects received or requested during this period was divided in three: 30.5% of the students and teachers considered satisfactory, 29.7% as bulky and 38.7% of them believe there was an imbalance between the disciplines. Regarding the deadline for submitting the projects and homework, most of the target audience was on the chart. The most frequently used method for awarding grades for projects and home tasks was the educational platform Moodle (81% of the participants).

Learning and teaching materials were evaluated for their attractivity, structuring of information, utility and interactivity (Figure 2). Online classes affected the social relationships with colleagues for 37% of the respondents, while the rest of them did not feel drastic deteriorations of the actual relationships. The pandemic was a "blessing in

disguise" for 27% of the participants, while 52% considered the quality of learning and teaching methods did not improve. An engineering faculty involves demonstration laboratories with developing practical skills and learning how to use a machine or different tools; 47% of the target group believes that online teaching activities affected the understanding of the process due to the absence of students in the laboratories, while 21% were neutral.

The assessment of the impact of online activities on the skills acquired during this period was done by designing several multiple answer questions, addressing the following: digital skills, information capacity, time management, synthesis capacity etc. (Figure 3).

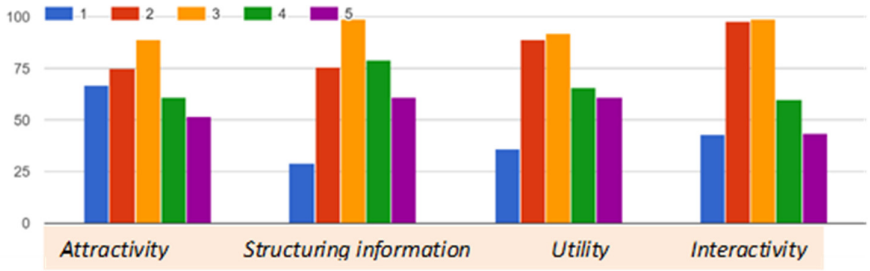

Fig. 2: How do you evaluate the materials (courses, applications) from the following points of view? 1 - very weak, 5 – very good

In order to evaluate the assessment for the whole semester, 76% of the participants choose as a suitable method the written exam (on Moodle platform), the oral exam on online platforms as Zoom/MS Team (4.4%) and the rest a combination between these two methods. The student's ability to adapt to change was demonstrated during pandemic, judging from the teacher's responses. 57% of the students and teachers showed enthusiasm for a face-to-face returning of academic activities.

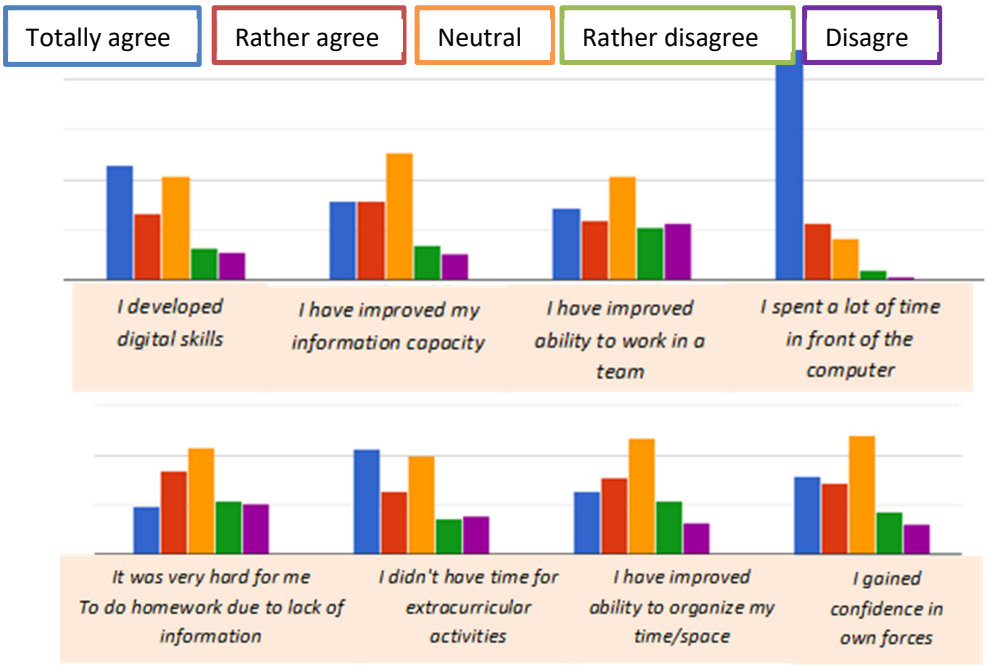

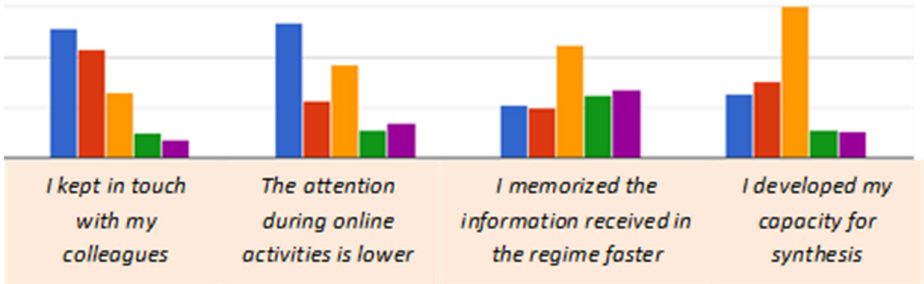

Fig. 3: How do you assess the impact of online activities on the skills acquired, during this period, compared to their face-to-face development?

Conclusion

Worldwide, this pandemic is seen an unprecedented crisis, a time when we all must do things differently and learn from ongoing experience. Our research highlights the fact that the students and teachers' performance and satisfaction with online courses have been an efficient alternative to classical, face-to-face teaching. Regardless of the studies and methods used, in the end the following question arises: "Is the performance of students who participate in online courses better or worse, compared to those who participate in traditional courses?" The impact of e-learning on schools will be constantly changing. Using e-learning methods in education, significant innovations are applied in information transmission and reception techniques. Technology leads to the personalization of the learning process, in which the contents are adapted to the students, regardless of the influence of the environment. The academic performance of students depends also on the methods of teaching and assessment, regardless of the environment in which they take place.

Development of academic activities is certainly facing a permanent chance. It is up to all educational process stakeholders to test, select and implement only the tools and methods which bring the most benefits and promote positive future development.

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Dual Effect of Payment for Negative Environmental Impact on Sustainable Development of Oil-Producing Regions

IRINA A. MAKAROVA
National Research Tomsk State University, Tomsk, Russia
chivchish@mail.ru

Irina V. SHARF
National Research Tomsk Polytechnic University, Tomsk, Russia
irina_sharf@mail.ru

MARGARITA R. TSIBULNIKOVA
National Research Tomsk Polytechnic University, National Research Tomsk State University, Tomsk, Russia
tsibulnikova2011@yandex.ru

Abstract

Due to technological peculiarities, the development of oil and gas sector adversely affects the environment, significant contribution being made by associated gas flaring. To solve this problem, the Government has set a maximum allowable rate of associated gas utilization and introduced the payment for its above-limit flaring. The effect of this payment on the income of low-level employees working at the state-funded organization is investigated. The objects under research are oil-producing regions of the RF, where the share of oil and gas sector in the regional industry and GRP is approximately the same and hydrocarbon resources possess similar characteristics. The hypothesis of the research relies on the idea that diversification of economy of oil-producing regions indicates the level of negative impact caused by the reduction in the funds entering the budget. The findings have revealed that the payment for negative environmental impact has a dual effect on the sustainability of socio-economical development of the oil-producing regions as, on the one hand, it contributes to better environmental situation, but, on the other hand, reduces the revenue of the budgets of the entities of the RF. This decreases the investment potential of oil-dependent regions. Such effect is insignificant in the regions with diversified economy.

Keywords: Payment for Negative Environmental Impact, Associated Gas Utilization, The Entity of The Russian Federation, Revenue, Budget.

Introduction

Due to technological peculiarities of exploration activity, oil and gas production, refining, and sales, development of oil and gas sector affects the environment. Flaring of associated gas is one of the pressing problems as it leads to a severe environmental impact, has negative effects on human health, wastes an energy resource and contributes to the loss of potential revenue that could be gained if the associated gas were rationally used. This runs counter to the concept of sustainable development which implies that the needs of present generations should be satisfied without prejudice to the needs of future generations and their rights to live in a clean and safe environment (Knizhnikov, 2017).

Since 2012 the Government has taken steps to tighten the regulation in rational use of associated gas, precisely, the payment for air pollutant emissions caused by gas flaring and/or venting has been introduced. The Government has also set a target to increase the rate of associated gas utilization up to 95% and initiated additional coefficients for higher-than-normal gas flaring volumes (table 1). In addition, the payment for flaring emissions is 120 times higher unless the emission control equipment is installed.

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Table 1: Additional coefficients to the payment for the volume of flared gas exceeding a 5% indicator

	2012	2013	2014	2020
Additional coefficient	4.5	12	25	100

Obviously, such policy has affected the activity of oil and gas companies which have accelerated implementation of technologies and equipment for associated gas utilization. According to the data provided by the Ministry of Natural Resources and Environment of the Russian Federation (RF), the investment amount of oil and gas companies exceeded 358 billion rubles over the period 2013-2018, which allowed them to reduce the payment for negative environmental impact.

At the same time, such policy has primarily resulted in lower income of low-level employees working at the state-funded organizations, which receive most of this payment (40% in 2005-2015, 55% in 2016-2019). This fact worsened their difficult financial position (Sharf, 2018).

However, these trends differentially affect the budget of oil and gas producing entities of the RF, which has stipulated the current research. The hypothesis of the research implies that diversification of economy of oil-producing regions indicates the level of negative impact caused by the reduction in budget revenue.

Methods and Materials

The research is based on the documents as follows: laws and regulations on environment protection, the data provided by the Federal State Statistic Service and the Integrated Budget System of the RF, the opinions of experts and reviews prepared in the course of the project by WWF Russia on preventing associated gas flaring. As for the methods applied, they are the structural and trend analyses, comparison and grouping. The objects under research are oil-producing regions of the RF, where the share of oil and gas sector in the regional industry and GRP is approximately the same and hydrocarbon resources possess similar characteristics (Filimonova, 2020).

Results

The payment for the negative environmental impact includes the charges on: 1) air emissions; 2) water contamination; 3) disposal of wastes produced in the course of production and consumption; 4) emissions caused by associated gas flaring and/or venting. It should be noted that in Russia payments for negative impact on the environment are established by the Law on Environmental Protection, and not by the Tax Code of the Russian Federation. Moreover, this fee is administered by the Federal Service for Supervision of Natural Resources. Therefore, in Russia, payments for emissions are related to non-tax budget revenues. Globally, emissions taxes are viewed as incentive-based instruments. (Makarova, 2007, Goulder, 2008).

Figure 1 shows that, in general, the government revenue from payments for the negative environmental impact tends to decrease in the regions under the study (except for particular years).

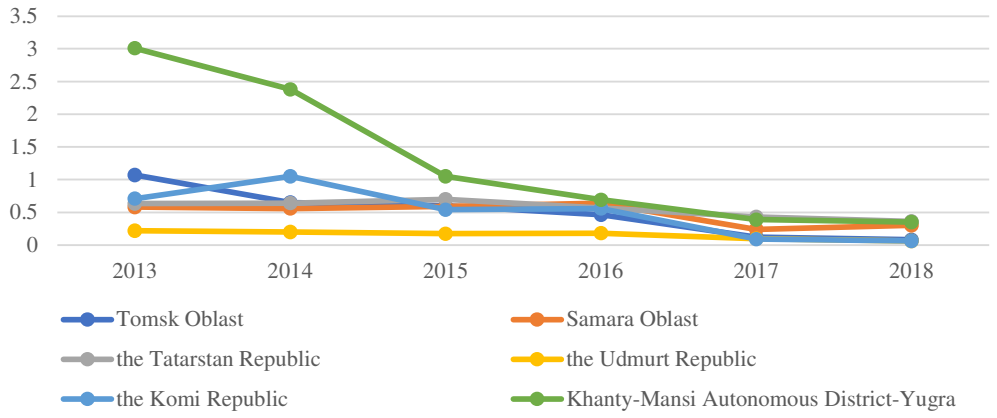

Fig. 1: Regional government revenues from payments for the negative environmental impact in oil-producing entities of the RF, billion rubles

The structural analysis of the payments for the negative environmental impact showed that since 2013 the government revenues in Tomsk Oblast and the Komi Republic have derived mostly from the charge on emissions caused by associated gas flaring. Meanwhile, in Samara Oblast, the Tatarstan Republic and the Udmurt Republic the revenues have derived mostly from the charge on disposal of wastes produced in the course of production and consumption, and in Khanty-Mansi Autonomous District – from that on air emissions.
The trend analysis indicates a sharp increase in the regional budget revenues in Tomsk Oblast and the Komi Republic over the period 2013–2015. After this period, the revenues reduced (Figure 2).

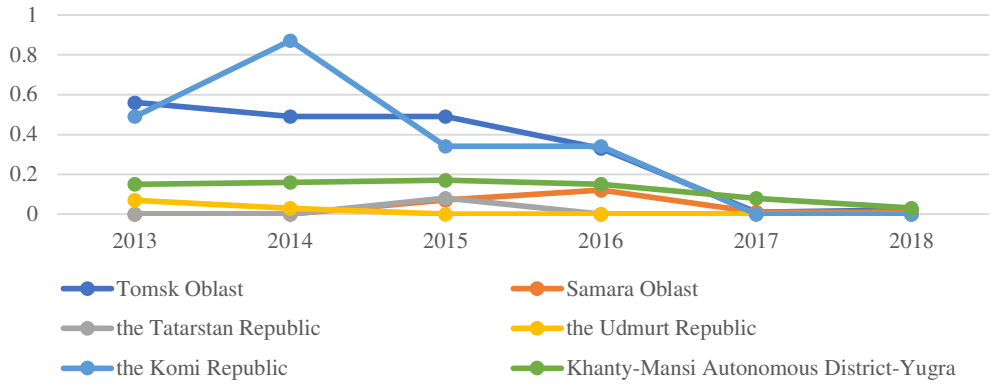

Fig. 2: Regional government revenues deriving from the charge on emissions caused by associated gas flaring and/or venting in oil-producing entities of the RF, billion rubles

Despite the strengthening of the requirements of the Russian legislation for associated gas flaring, a 95% indicator of associated gas utilization has been achieved in the Tatarstan Republic (Table 2), which is due to the available transport infrastructure of Volga Federal District and petrochemical facilities built during the time of the USSR (Eder, 2018). The set level has been also achieved in the Komi Republic due to the joint project of LUCKOIL and Gazprom for associated gas utilization, which was implemented in 2011. Within the project, Ukhta gas processing plant has been renovated. Since 2015 gas produced in the fields of LUCKOIL-Komi has been supplied to Sosnogorsky refinery, which has resulted in the increased refinery utilization rate. Until then, the refinery was reducing its capacity because of resource depletion.

Table 2: The level of associated gas utilization per oil-producing entities of the RF, %

	2012	2013	2014	2015	2016	2017	2018	2019
Russian Federation	75.9	79.5	85.5	87.6	87.5	86.6	84.4	80.9
Tomsk Oblast	72.7	81.1	80.3	84	84.3	84.7	83.9	83.4
Samara Oblast	72.4	75.7	83.7	83.2	87.2	83.2	91	88.6

the Tatarstan Republic	94.4	93.5	94.6	94.8	95.7	94.3	95.7	95.8
the Udmurt Republic	35.2	44.7	67.6	72.6	76.2	79.9	77.2	77.7
the Komi Republic	65.8	64.3	64.5	75.8	81.7	91.1	95.2	95.6
Khanty-Mansi Autonomous District-Yugra	-	90.9	92.7	94.1	95.5	95.6	94.9	94.4

Source: compiled by the authors on the basis of the data provided by the Federal State Statistic Service

Khanty-Mansi Autonomous District-Yugra is a region with unique resource potential. There are huge hydrocarbon deposits which allow the region to achieve significant funds from oil and gas industry and invest them into various endeavors including the associated gas utilization projects.

In some oil fields located in the Udmurt Republic, utilization of associated gas is problematic due to low gas combustion heat caused by high nitrogen content (up to 90% according to volume composition) (Chernov, 2017).

Samara Oblast is a leader in the number of small and very small hydrocarbon deposits which are proved to be marginal. Therefore, it is rather hard to achieve the set rate of associated gas utilization. The specialists of OOO "RITEK" suggest construction of pipelines for multiphase flows, i.e. simultaneous transportation of oil and gas to the processing facilities. A positive factor is high population density, which ensures gas supply from the closest locations.

In Tomsk Oblast the following associated gas utilization methods are applied: loading into trunk pipeline (76%), energy generation (15%), technological needs (6%) and others (3%) (Tomskaya oblast': trudnyy vybor svoego puti, 2014). The problem is that it is impossible to increase the volumes of gas transported via pipelines due to the set pipeline throughput, while the surplus of generated energy could be hardly used due to low population density of oil-producing regions. In addition, production of crude oil declined from 11.745 mln tons in 2012 to 8.5 mln tons in 2019. This fact also leads to the decrease in need for technological gas.

It is noteworthy that there is also a decline in production of crude oil in the Udmurt Republic production (from 11.025 mln tons in 2016 to 9.5 mln tons in 2019). In other regions there is a decrease in production of crude oil.

The comparison of the data presented in Figure 2 and Table 2 indicates an inverse dependence: the increase in associated gas utilization rate is accompanied by the reduction in budget revenue, particularly from the payments for emissions caused by associated gas flaring and/or venting.

Let us analyze the indicators which characterize the amount and dynamics of payments for negative environmental impact in Tomsk Oblast.

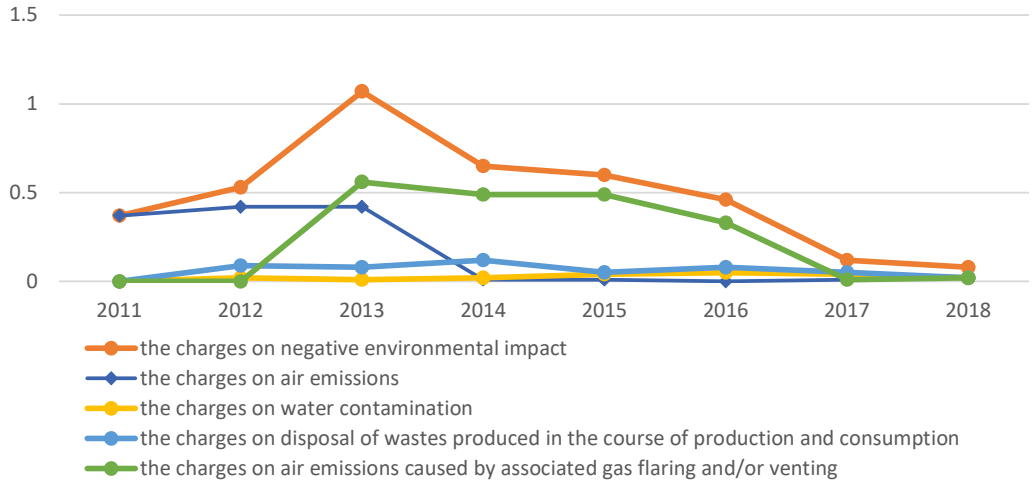

Fig. 3: Consolidated budget revenue from the payments for negative environmental impact in Tomsk Oblast, billion rubles

As is obvious from Figure 3, the dynamics of the charges on negative environmental impact is primarily affected by the charges on emissions caused by associated gas flaring and/or venting. Since 2013 charges on air emissions

caused by associated gas flaring and/or venting have dramatically increased due to additional coefficients. These charges have been falling since 2015. Compared to other examined oil-producing entities of the RF, the rate of associated gas utilization is the lowest during the period 2013-2018 (Table 2).

To prove the research hypothesis, it is essential to compare the share of extractive industries and hydrocarbon processing sector in GRP of the regions under the study (Table 3).

Table 3: The share of extractive industries and hydrocarbon processing sector in GRP

	Production of mineral resources	Processing industry
Tomsk Oblast	27.6	10.3
Samara Oblast	16.5	22.2
the Tatarstan Republic	25.2	17.2
the Udmurt Republic	24.5	20.5
the Komi Republic	37.2	11.7
Khanty-Mansi Autonomous District-Yugra	67.1	2.4

The data provided indicate a multifaceted impact on the budget revenue from payments for negative environmental impact in various entities of the RF (TEK Rossii-2018, 2019).

Discussion

The findings of the research partially prove the stated hypothesis based on the following aspects:

1. The most significant decline in the revenue from the payments for negative environmental impact is registered in Khanty-Mansi Autonomous District-Yugra, Tomsk Oblast, and the Komi Republic (Figure 1).
2. The reason for the sharpest decline in the payment for negative environmental impact in Khanty-Mansi Autonomous District-Yugra is due to unique resource potential of the region and, as a consequence, financial and investment opportunities of oil-producing companies.
3. The revenue from the payment for negative environmental impact in the entities of Volga federal district (Samara Oblast, the Tatarstan Republic, and the Udmurt Republic) is lower, which is explained by the large share of hydrocarbon processing sector.
4. The socio-economical factors (such as population density, availability of production infrastructure and trunk pipeline network) significantly affect the rate of associated gas utilization.
5. Oil and gas production in sparsely populated regions, particularly in Siberia and the Komi Republic, contributes to oil-dependent economy, therefore the decline in revenue of such entities of the RF, caused by the reduction in payment for negative environmental impact is the most painful (Sharf, 2019).

What are the future prospects of increasing the rate of associated gas utilization and how would this trend affect the regional budgets and the consolidated budgets of the entities of the RF? The Ministry of the Natural Resources and Environment of the RF considers the prospect to increase the rate of associated gas utilization up to 97.5%, which would attract investments into production-infrastructure projects related to associated gas utilization, but would not resolve the issue of replenishing different budgets. Due to awareness of the fact that this source of income is crucial for the regions and entities of the RF, the Budget Code of the RF has been amended. According to these amendments, the revenue of regional budgets from the payments for negative environmental impact should increase up to 60%. However, this solution, in our opinion, would not contribute to sustainable development of the entities of the RF over the long term.

Conclusion

Thus, the dual effect of the payment for negative environmental impact on the sustainability of socio-economical development is obvious. On the one hand, there is better environmental situation due to associated gas utilization; on the other hand, there is a decline in budget revenue, which is of particular significance for the entities of the RF. This also reduces investments into the various projects essential for local economy and society (Kloke, 2006). As a result, sustainable development principles require revision of the approaches to environmental payments due to implementation of environmentally sound technologies, precisely associated gas utilization, both in oil and gas

industry and other manufactures. It is an essential step in ensuring stable revenue in the medium and long term (Beuermann, 2006).

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Intellectual Property Intensity Analysis of Economy Industries

Irina ILINA
Grand PhD in Economics, associate professor, Director, The Russian Research Institute of Economics, Politics and Law in Science and Technology (RIEPL), Moscow, Russia
ilina@riep.ru

Andrey KLYPIN
PhD in Economics, Deputy Director for Research, The Russian Research Institute of Economics, Politics and Law in Science and Technology (RIEPL), Moscow, Russia
klypin@riep.ru

Sergey VYUNOV
Research Associate, Research Center in the Field of Intellectual Property Management, The Russian Research Institute of Economics, Politics and Law in Science and Technology (RIEPL), Moscow, Russia
s.vyunov@riep.ru

Alexey VASYUKOV
Analyst, Research Center in the Field of Intellectual Property Management, The Russian Research Institute of Economics, Politics and Law in Science and Technology (RIEPL), Moscow, Russia
a.vasukov@riep.ru

Roman TIKHONOV
Analyst, Research Center in the Field of Intellectual Property Management, The Russian Research Institute of Economics, Politics and Law in Science and Technology (RIEPL), Moscow, Russia
r.tikhonov@riep.ru

Abstract

The article describes a methodology for identifying priority areas of scientific and technological development of national economy industries. The analysis of patent activity in the article is based on such indicators as industry IP-capital intensity, industry IP-balance and industry IP-labor capacity. The choice of indicators is determined by the relationship between GDP, the average number of researchers and the level of application of intellectual property results. According to the comparison of the proposed coefficients with the average value for the national economy groups of high, medium and low intellectual property intensity industries are defined. To support industries, identified in the article as low intellectual property intensity industries, the authors propose amendments to the state policy tools in the field of intellectual property, earlier defined by the national project «Science» in the Russian Federation.

Keywords: Intellectual Property, Scientific Development, Patent, Industrial Analysis, IP Intensity

Introduction

The intellectual property market is a legal, economic and scientific component of the country's economy, since research and development field contribute to the competitiveness of national products and technologies. That is why its comprehensive analysis is important for national economy development.

At the same time, the level of intellectual property institute advancement depends on whether the economy is provided with enough research personnel, infrastructure and legal intellectual property protection instruments [6, 8]. In case the state and corporate sectors do not pay attention to these elements, the products and services of the national economy cannot be regarded as competitive for the domestic or foreign market [5, 13].

Modern economy conditions confirm the importance of analysis of patent statistics such as the filing of patent applications, the issuance of protection documents for intellectual property objects and their maintenance in force [4, 9, 11, 12].

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To simplify the process of making managerial decisions, the article sets the task of preparing a methodology for identifying priority areas of scientific and technological development of national economy industries.

Indicators based on patent data, contribute to the methods of evaluating the research activities productivity, allow to identify new points of technological growth and select promising areas for international collaborations.

The issues of studying and analyzing technological progress have been studied by the scientific community for many years.

M. Chimili, D. Dosi, R. Mazzoleni and B. Sampat (2011) note the high role of a patent as a source of technological information for those industries in which patenting will allow innovators to assess the possible profitability of inventions [3].

However, in the Russian Federation, statistical data of Russian Federal Service for Intellectual Property, the Federal Institute of industrial property (FIPS) and the Federal state statistics service (Rosstat) is presented only by territorial point. There are almost no statistics showing the relationship between IP and the number of researchers in a particular industry, income and export indicators.

Thus, in order to correlate the number of protected intellectual property results with the number of employed researchers, it is necessary to develop a model that allows to compare the development of industries by the criterion of IP usage.

Based on the analysis results, the authors propose a method for studying the degree of intellectual property use by industries of the Russian economy or, in other words, a study of the IP intensity of economy industries.

Materials and Method

IP intensity analysis of the intellectual property market in the article is conducted according to conversion keys of Russian classifier of economic activities NACE (OKVED) and codes of the International patent classification (IPC).

In order to define the specific industry as IP-intensive, the correlation of the number of intellectual activity results with the inputs and the number of researchers was performed [1].

Thus, the industry analysis of patent activity in the article is based on such indicators as industry IP-capital intensity, industry IP-balance and industry IP-labor capacity. The choice of indicators is determined by the relationship between GDP, the average number of researchers and the level of application of intellectual property results [2]. The analysis is mainly based on information of the Orbit Intelligence patent database. The indicator values correspond to 2018.

Results

Industry IP-capital intensity refers to the ratio of the number of patents and the volume of internal R&D expenditures, carried out within a given industry of the economy (or country in general) over a certain period of time, regardless of the source of funding (formula 1):

$$K_{IP\,i} = \frac{\mathrm{N\,p}\,i}{\mathrm{R\&D}\,i}, \text{ где} \qquad (1)$$

K_{IP} – coefficient, reflecting industry IP capital intensity;

N p i - number of patents in the industry;

R&D i – amount of internal R&D expenditures in the industry.

Industry IP-balance describes the ratio of the number of national patents, registered in foreign patent offices, and the number of foreign patents, registered in Russian patent office. Thus, this indicator allows to assess the degree of dependence of a certain industry upon foreign counterparties (formula 2).

$$\text{Ip-balance } i = \frac{\mathrm{N\,p}\,i\,\mathrm{Ex}}{\mathrm{N\,p}\,i\,\mathrm{Im}}, \text{ где} \qquad (2)$$

Ip-balance - indicator that characterizes industry export and import balance in relation to intellectual property;

N p i Im – number of industry foreign patents, registered in Russia;

N p i Ex – number of industry Russian patents, registered in foreign patent offices.

Competitive industries of the economy with a significant weight in GDP tend to attract labor resources. That is why it is necessary to analyze the efficiency of industry researchers, determining the value of industry IP-labor capacity, based on formula 3.

$$\text{IP-labor capacity}_{\,i} = \frac{\text{N p } i}{\text{N reserchers } i}, \text{ где} \qquad (3)$$

IP-labor capacity – indicator that characterizes the number of patents per 1 researcher in the industry;

N reserchers i – average number of researchers in the industry.

Comparison of the industry specific indicators of IP-capital intensity, industry IP-balance, and industry IP-labor capacity to average values of corresponding coefficients, calculated for the economy allowed the authors to verify:

• high-intensity intellectual property industries that exceed the average economy values more than 20%;

• medium- intensity intellectual property industries with indicators in the range of ±20% of the average for the economy;

• low- intensity intellectual property industries with indicators lower than the average value for the economy by more than 20%.

Based on the results of calculating the IP-intensity indicator for Russian economy industries, the following is determined.

The average value of the IP capital intensity indicator for the Russian economy was 1.18 patent / million rubles in 2018. The leading industry concerning this indicator is «Electricity, gas, steam and air conditioning supply», since 1 million rubles of intramural R&D expenditure in this industry accounts for 10.6 of issued patents in 2018.

Industry «Agriculture, forestry, hunting, fishing and fish farming» also had the value 20% higher than the average and can be categorized as highly intensive in terms of capital intensity.

The value of IP capital intensity for the «Transportation and storage» industry in 2018 was higher than average, but less than 20%, which is why this industry is considered medium-intensive according to the accepted classification.

Such industries as «Mining and quarrying», «Administrative and support service activities», «Manufacturing», «Water supply; sewerage, waste management and remediation activities», «Wholesale and retail trade; repair of motor vehicles and motorcycles», «Information and communication», «Real estate activities», «Education», «Human health and social work activities», «Arts, entertainment and recreation», «Other service activities» are characterized as low-intensity in accordance with the proposed classification (Fig. 1).

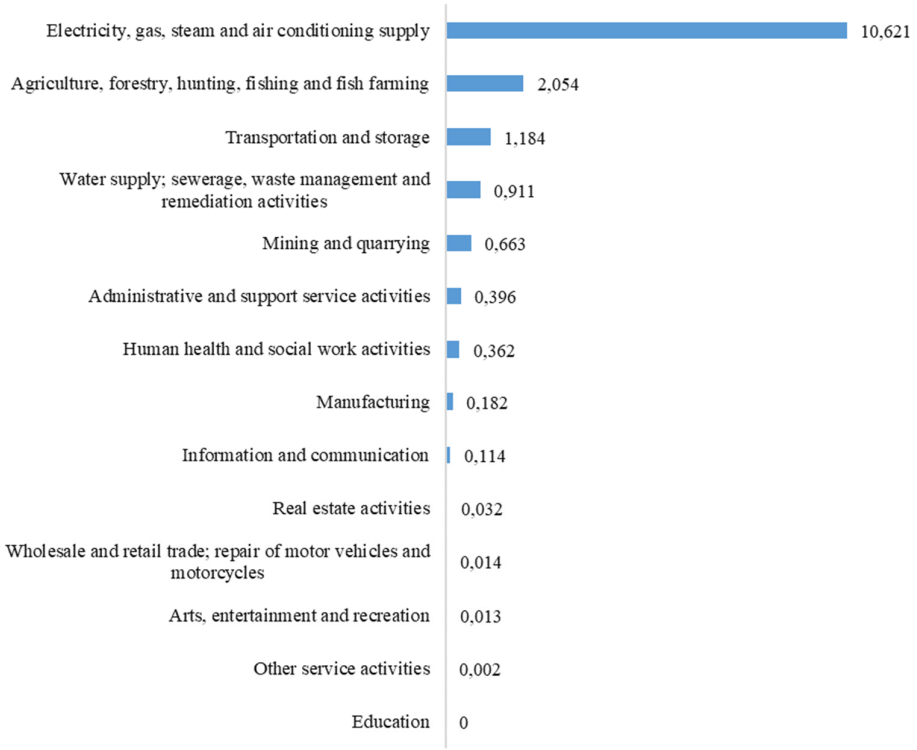

Fig. 1: IP-capital intensity of Russian economy industries in 2018

Source: Compiled by the authors based on Orbit Intelligence database

The average value of the IP balance indicator for the Russian economy was 0.148 in 2018.

The industry «Wholesale and retail trade; repair of motor vehicles and motorcycles» industry is considered to be the leader by this indicator, since 1 imported patent in this industry equaled 2.27 exported patents in 2018.

The value of the indicator for other industries is lower than the average by more than 20%. Thus, the industry «Wholesale and retail trade; repair of motor vehicles and motorcycles» is the only Russian high-intensity industry in terms of IP balance in 2018 (Fig. 2).

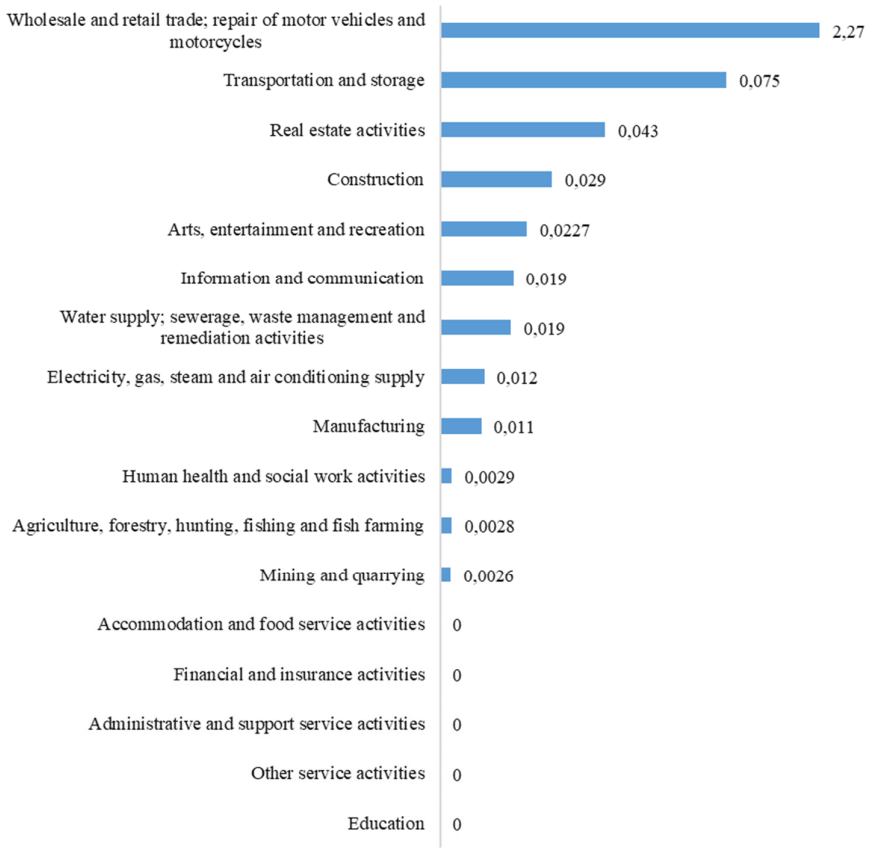

Fig. 2: IP balance for Russian economy industries in 2018

Source: Compiled by the authors based on Orbit Intelligence database

The average value of the IP-labor capacity of the Russian economy in 2018 was 0.95 units/person. The industry «Electricity, gas, steam and air conditioning supply» industry had the leading position by this indicator in 2018.

Also, the industries «Water supply; sewerage, waste management and remediation activities», «Mining and quarrying», «Transportation and storage», «Agriculture, forestry, hunting, fishing and fish farming» represented the indicator values higher than the average by more than 20%, and therefore are characterized as highly intensive in terms of labor capacity.

Other industries are characterized as low-intensity (Fig. 3).

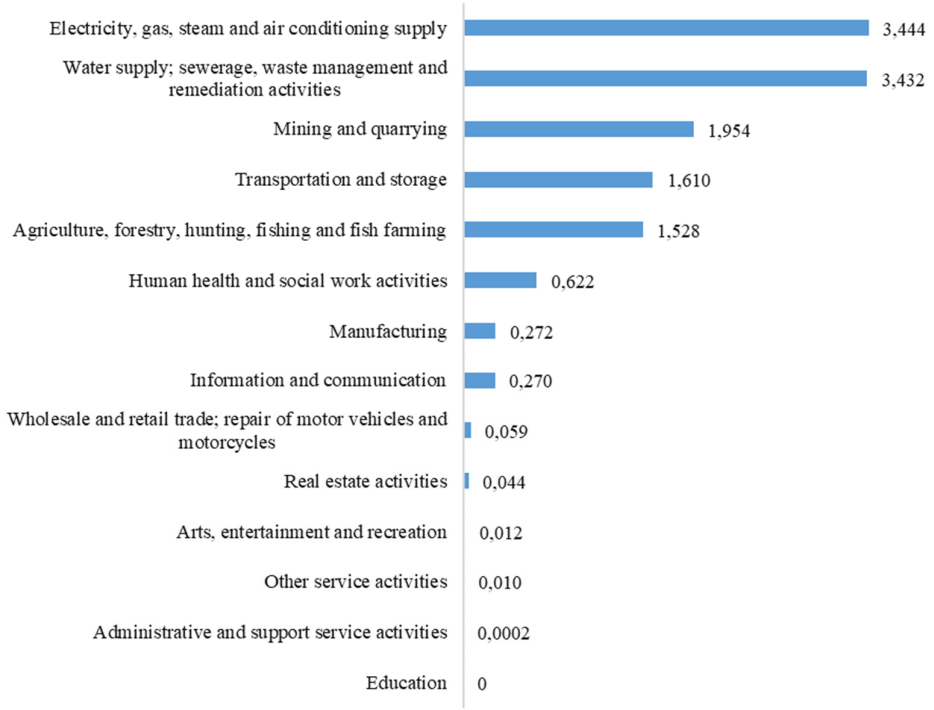

Fig. 3: IP-labor capacity of Russian economy industries in 2018

Source: Compiled by the authors based on Orbit Intelligence database

According to the authors, the calculation for the industry «Professional, scientific and technical activities» requires individual approach, due to the fact that this industry corresponds to the activities of research centers, institutes, that unite scientists and inventors of various profiles, conducting research in multiple sectors of the economy. Thus, the funds allocated to such research correspond to other industries of the economy as well.

Conclusion

Industry analysis of patent activity is proposed to be carried out on the basis of such indicators as industry IP-capital intensity, industry IP-balance and industry IP-labor capacity.

In relation to the Russian economy the research defines the industries «Electricity, gas, steam and air conditioning supply», «Agriculture, forestry, hunting, fishing and fish farming» as highly intensive in terms of IP, which means that these industries effectively use funds and personnel in terms of creating intellectual property objects. The industry «Wholesale and retail trade; repair of motor vehicles and motorcycles» is characterized as highly intensive in terms of IP balance.

At the same time, to support other industries, including the «Manufacturing» industry that had one of the lowest value of every indicator proposed, it is necessary to implement measures, developing the sphere of intellectual property.

State scientific and technical policy of Russian Federation in the field of intellectual property are defined by the national project «Science». According to the results of the analysis, the authors propose amendments to the content of the relevant policy tools:

1. Focus on the development of National technological initiative centers not only in economic megacities such as Moscow and Saint Petersburg, but in all regions of the Russian Federation, taking into account their scientific and technological features, the needs of organizations in the real sector of the economy, available infrastructure and production base [10].

2. Correlate the choice of topics and areas of research transfer with the needs of the business sector, provided freedom in the field of fundamental research.

3. Create world level research centers, performing research and development on priorities of scientific and technological development, based on achieved scientific results, cooperation of science, business and state.

4. Link the creation of innovative infrastructure objects not only to quantitative (and financial) indicators, but qualitative as well such as favorable conditions for agricultural activities, effective technological activities, human resources, and demand from organizations in the real sector of the economy [7].

5. Develop IP-related educational disciplines for programs and projects, implemented by world-class research centers, taking into account the needs of organizations in the real sector of the economy for appropriate specialists.

The proposed amendments for implementing the state policy in the field of intellectual property, contained in the national project «Science», will provide a qualitatively new level of technological transfer mechanisms for the development of science and technology of the Russian economy.

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Forecasting Economic Crises Using Fractal Characteristics

Anton V. GOLUB

System Architect, QIWI Plc, Moscow, Russia
e-mail: a.golub@qiwi.com

Natalia A. SHCHUKINA

Plekhanov Russian University of Economics, Moscow, Russia,
E-mail: shchukinan@yandex.ru
Financial University under the Government of the Russian Federation, Moscow, Russia;
E-mail: shchukinan@yandex.ru

Abstract

The paper studies the problem of modelling and forecasting economic crises. The fractal dimension local values time series serves as an indicator of the economic system stability. The paper analyses the fractal characteristics of exchange rates time series of 20 national currencies in different time periods. The relationship between the dynamic stability violation and the deviation of the fractal dimension currency fluctuations from the optimal value has been proven. The boundaries of the normal state of economic systems was also obtained. These stability boundaries are built on the basis of a linearly weighted moving average and fractal dimension time series. The crisis predicting was reduced to determining the intersection points of the fractal dimension local values curve with the curve of the normal system state boundaries. The informative ranges of time scales reflecting short-term and long-term tendencies in violation of information efficiency of foreign exchange markets have been determined. The macroeconomic systems were classified by the efficiency level of foreign exchange markets.

Keywords: Economic Crises, Fractal Dimension, National Currencies, Stock Indexes.

JEL Classification: C53; C68; E27.

Introduction

Today, one of the most popular methods of forecasting crisis phenomena is the "signal" method, which consists in developing threshold values for a selected indicator or a set of indicators, the intersection of which with a certain probability signals the threat of a financial crisis [Kaminsky & etc., 1998; Kaminsky, 1999]. Kaminsky, Reinhart (1999) proposed to use the exchange market pressure index (EMPI); however, it should be noted that EMPI is now being used more widely and is considered in a number of studies as an index of financial pressure, which allows the use of EMPI. to identify crisis situations in the economy as a whole, and not only to identify currency crises. Fedorova E.A. and Afanasev D.O. (2014) in their work propose to use a complex indicator to predict crisis phenomena in the Russian economy based on the Markov regime-switching model.

To build an adequate model predicting further changes in any system, you need to know the principles of this system. However, in nature, we often encounter self-organized systems, the principle of operation of which is very complex and at the time of research, in principle, is not known. Moreover, the main information about this system is only the time series, which is the dependence of the output value of the system on time. Therefore, the choice of an indicator for building predictive models is an extremely urgent task. Researchers propose to use as private indicators as an indicator of forecasting financial crises - net capital inflows and US military spending, the state of the US budget, oil prices, dynamics of stock indices, prices of precious metals, national currency rates, etc. (Ozer-Imer, I. and Ozkan, I., 2014; Ivanyuk V.A. & etc., 2019). Hristov N. and Roth M. (2019) proposed a structural vector autoregression model for a set of four euro area countries in order to investigate the dynamic responses of shocks to uncertainty,

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which showed that drop in uncertainty, while driving up real economic activity, prices, and stock market indices, induces crisis indicators to increase after about two years.

One of the most universal and objective indicators of the state of the economic system of any state is the price of its monetary unit in the international market - the rate of the national currency, which can serve as both an indicator of the development of the country's economy and an object of purposeful public administration. The mechanism of the floating exchange rate of the national currency, adopted by many states, makes it possible to analyze the state of macroeconomic systems based on the study of currency time series containing information about the foreign exchange equilibrium market and the economy as a whole.

In the general case, the mathematical analysis of currency crises, as a particular case of economic crises, should take into account the entire set of factors influencing changes in the exchange rate. The exchange rate is determined by banking and financial mechanisms both within the country and abroad, and is constantly influenced by international currency speculation. As a result of the interaction of these processes, a complex picture of currency dynamics arises, the stability of which has a fundamentally non-equilibrium nature and requires the use of new methods of analysis focused not on assessing the average values of state parameters, but on determining the conditions for maintaining the expected dynamic mode of functioning of the currency system.

Materials and Methods

To assess currency crises, an analysis of the dynamics of the fractal dimension of exchange rates is carried out and the ranges of fluctuations in the exchange rate are determined, within which the market is in a stable state. The dynamics of the exchange rate before and after the crisis is analyzed. Rates of national currencies represent the average daily values of the cost of 1 unit of the currency in question to the US dollar.

Table 1: List of National Currencies Studied

No.	Country	National Currency	ISO Code	Time period under study
1	Armenia	Armenian dram	AMD	12.01.2010-28.03.2020
2	Australia	Australian dollar	AUD	11.01.2006-28.03.2020
3	Azerbaijan	Azerbaijani manat	AZN	12.01.2010-28.03.2020
4	Brazil	Brazilian real	BRL	13.01.2010-28.03.2020
5	Bulgaria	Bulgarian Lev	BGN	12.01.2010-28.03.2020
6	Canada	Canadian dollar	CAD	11.01.2006-28.03.2020
7	China	Yuan	CNY	11.05.2006-28.03.2020
8	European Union	Euro	EUR	11.01.2006-28.03.2020
9	Great Britain	Pound	GBP	11.01.2006-28.03.2020
10	India	Indian rupee	INR	12.01.2010-28.03.2020
11	Japan	Japanese yen	JPY	11.01.2006-28.03.2020
12	Kazakhstan	Kazakhstani tenge	KZT	11.01.2006-28.03.2020
13	Norway	Norwegian Krona	NOK	11.01.2006-28.03.2020
14	Poland	Polish zloty	PLN	12.01.2010-28.03.2020
15	Romania	New Romanian leu	RON	12.01.2010-28.03.2020
16	Russia	Russian rouble	RUB	11.01.2006-28.03.2020
17	Singapore	Singapore dollar	SGD	11.01.2006-28.03.2020
18	South Africa	South African Rand	ZAR	12.01.2010-28.03.2020
19	South Korea	Won of the Republic of Korea	KRW	12.01.2010-28.03.2020
20	Sweden	Swedish Krona	SEK	11.01.2006-28.03.2020
21	Switzerland	Swiss Franc	CHF	11.01.2006-28.03.2020
22	Turkey	Turkish lira	TRY	11.01.2006-28.03.2020

Source: Authors

When studying economic time series, some preliminary transformation is traditionally used to bring the original series to stationarity. However, in the case of fractal analysis, the primary transformation of a series into a series of increments or returns may lead to an erroneous conclusion regarding the presence of long memory and the nature of

persistence. In this connection, the analysis is carried out to the initial data, which are not reduced to a stationary form. For the classical random walk process, the spectral dimension is β = 2, and for a process of the "white noise" type, β = 0. Thus, numerical differentiation of the time series corresponds to a decrease in β by 2, and numerical integration, on the contrary, to an increase in β by 2. This relation acts not only for integer values of the spectral dimension and order of integrability (β = 0, d = 0 - white noise; β = 2, d = 1 - random walk), but also for intermediate fractional values. Thus, the time series and its increments have different, but related, values of fractal characteristics, and a different nature of persistence and long memory. Therefore, the determination of the characteristics of persistence and long memory will be carried out for the initial time series.

An important class of signals with no scale dynamics has autocorrelation or power spectral density (PSDs, which follow the power law C | F | -α for some positive constant C and some power α. In some cases, the signal of interest exhibits a power-law PSD. series we will find an estimate of the spectral power density (PSD) using an estimate of the averaging of the overlapping Welch segments.Plots of the spectral power density for the time series GBP / USD, CNY / USD, CHF / USD and RUB / USD in double logarithmic coordinates are shown in Figure 1.

Note that the autocorrelation functions of the analyzed national currency rates time series gradually decrease, however, they decay rather slowly for all considered time series. This behavior of the autocorrelation function is typical for most time series. Separately, we note that even with lag = 300, the values of the correlation coefficient exceed 0.85 for all the series of time currencies under study. In this connection, autocorrelation functions are not informative for differentiating time series. The obtained information about the autocorrelation function of the studied time series also confirms the presence of the phenomenon of long memory in the analyzed time series. The calculated values of the exponent α PSD and the autocorrelation coefficients with a lag of 300 are presented in Table 2.

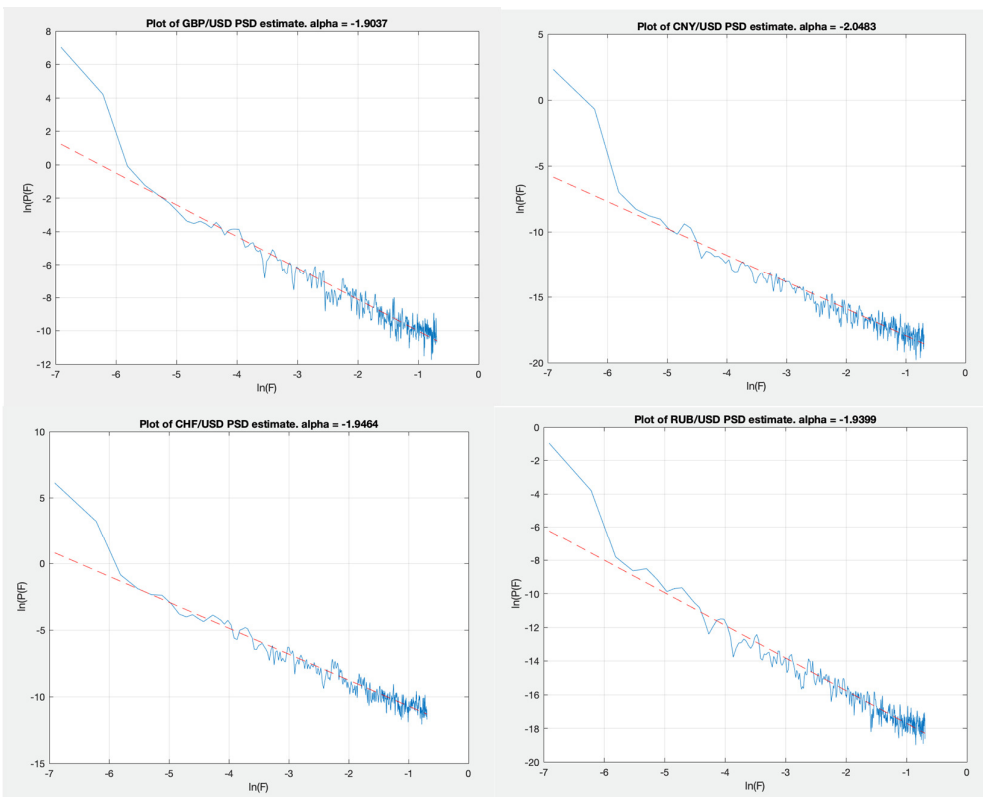

Figure 1: Graphs of the power spectral density of time series in the logarithmic coordinate system and the regression line for determining the parameter α

Source: Authors

Table 2: Values of the PSD and autocorrelation coefficient time series of the national currency exchange rates under study

No.	Time series	The Hurst exponent	Value of the alpha PSD exponent	The value of the autocorrelation coefficient for the lag is 300
1	AUD/USD	0.5892	1.8639	0.9295
2	GBP/USD	0.6133	1.9037	0.9075
3	CNY/USD	0.465	2.0483	0.9268
4	NOK/USD	0.6245	1.8671	0.9240
5	TRY/USD	0.5967	1.7611	0.9103
6	CHF/USD	0.6014	1.9464	0.9257
7	SEK/USD	0.6327	1.8456	0.9234
8	JPY/USD	0.5680	1.8602	0.9257
9	INR/USD	0.5410	1.978	0.8594
10	PLN/USD	0.6245	1.852	0.8711
11	RUB/USD	0.5340	1.9399	0.9028
12	KRW/USD	0.6143	1.9191	0.8874
13	BGN/USD	0.5994	1.8654	0.8782
14	CAD/USD	0.5992	1.8569	0.9231
15	BRL/USD	0.5957	1.8411	0.8517
16	EUR/USD	0.6076	1.9417	0.9211
17	KZT/USD	0.4514	1.9104	0.9058
18	ZAR/USD	0.6202	1.8269	0.8461
19	SGD/USD	0.5707	1.8984	0.9245
20	RON/USD	0.5643	1.8462	0.8571
21	AZN/USD	0.0604	1.8666	0.8740
22	AMD/USD	0.2667	1.8960	0.8702

Source: Authors

Note that the AZN / USD and AMD / USD series are not persistent, the Hurst exponent of these series is 0.0604 and 0.2667, respectively, which is lower than 0.5. Therefore, these time series are excluded from further research. Also note that the Hurst exponent for CNY / USD and KZT / USD are 0.465 and 0.4514, respectively, which is also below 0.5. However, it is not possible to test the hypothesis that the exponent value of these series is greater than 0.5, as well as to carry out interval estimation of the Hurst exponent, due to the fact that the final, prior distribution has not been proven for fractal characteristics. In connection with the above, the time series CNY / USD and KZT / USD were not excluded from further analysis.

Let's find out how different the signals are. To do this, we will calculate the values and plot the graphs of the multifractal spectra of the signals under consideration. The multifractal spectrum effectively shows the distribution of the scaling factors for the signal, i.e. provides a measure of how much the local regularity of a signal changes over time. A signal that is monofractal exhibits nearly the same regularity throughout time and therefore has a narrowly supported multifractal spectrum. Conversely, a multifractal signal exhibits changes in signal regularity over time and has a multifractal spectrum with wider support. Let us determine the singularity spectra D(h) and Hölder exponents h for the signals under consideration. The singularity spectrum and global Hölder exponents are estimated for linearly spaced moments of structural functions from –5 to +5 and are presented in Table 3.

Table 3: General range of scale indicators

No.	Time Series	The scale interval of the indicator	The range of the indicator scale
1	AUD/USD	[0.5211; 0.7164]	0.1953
2	GBP/USD	[0.0716; 0.8803]	0.8087
3	CNY/USD	[0.2425; 0.8028]	0.5603
4	NOK/USD	[0.3881; 0.6267]	0.2386
5	TRY/USD	[0.1825; 0.9948]	0.8123
6	CHF/USD	[-0.0106; 0.6160]	0.6266
7	SEK/USD	[0.3990; 0.5699]	0.1709
8	JPY/USD	[0.3558; 0.7427]	0.3869
9	INR/USD	[0.4788; 0.6859]	0.2071
10	PLN/USD	[0.0554; 0.6343]	0.5789
11	RUB/USD	[0.5985; 0.7903]	0.1918
12	KRW/USD	[0.2633; 0.6924]	0.4291
13	BGN/USD	[0.3684; 0.5950]	0.2266
14	CAD/USD	[0.3787; 0.6917]	0.3130
15	BRL/USD	[0.2786; 0.6857]	0.2786
16	EUR/USD	[0.1676; 0.4967]	0.3291
17	KZT/USD	[-0.0056; 1.7369]	1.7425
18	ZAR/USD	[0.1795; 0.6204]	0.4409
19	SGD/USD	[0.5305; 0.7152]	0.1847
20	RON/USD	[0.3142; 0.7379]	0.4237

Source: Authors

As you can see, the ranges of variation of the Hölder exponent of the studied time series are different. For example, AUD / USD and RUB / USD have similar ranges for the Hölder indicator, while SEK / USD, despite a similar range, has a smaller range. Note that the maximum swing among the analyzed time series belongs to KZT / USD and is 1.7425. In turn, some series are characterized by a rather small range of the scaling factor (less than 0.2). These time series include AUD / USD, SEK / USD, RUB / USD, SGD / USD. Figure 2 shows graphs of the multifractal spectrum of some time series.

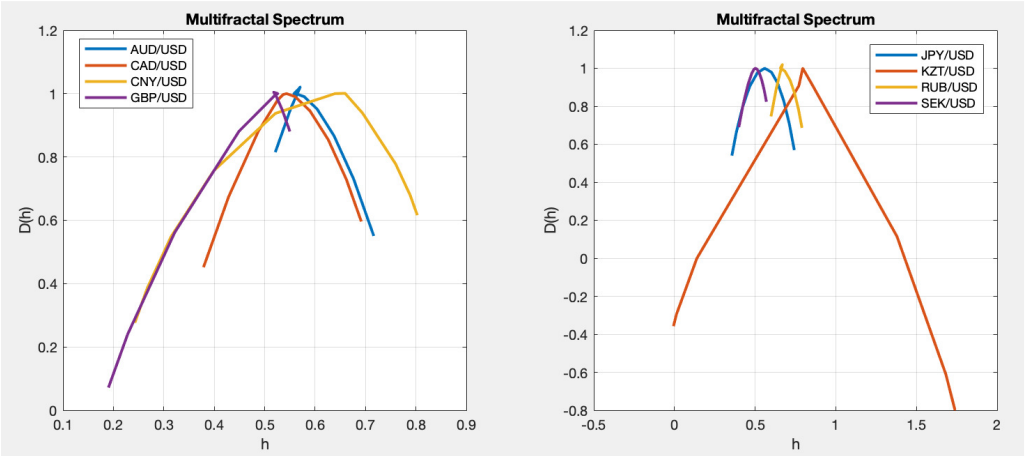

Figure 2: Graphs of the multifractal spectrum (singularity spectrum) of several time series

Source: Authors

The analysis of the multifractal spectrum makes it possible to suggest that the time series of national currencies rates considered in the framework of the work are multifractals, and, therefore, their fractal characteristics, including the fractal dimension, are not constant over the entire time period.

Results

Let's consider the fractal dimension at different time intervals in order to reveal whether the fractal dimension of the time series of currency pairs changes during the crisis. The period of the global economic crisis that began in 2008 was chosen as the crisis periods. The fractal dimension was estimated by the Higuchi method. Based on the results of the analysis of the fractal dimension before the crisis, during the crisis and after it, we note that in some time series, no significant change in the fractal dimension is observed. Such time series include GBP / USD, NOK / USD, CAD / USD. Some series changed their fractal dimension during the crisis, but after its end, the value of the fractal dimension recovered, such series include CNY / USD, EUR / USD. In turn, some of the series under study have different fractal dimensions in each of the 3 periods (Table 4). Note that both national economies and the rates of their national currencies reacted differently to the global crisis.

Table 4: The Fractal Dimension Values in different time periods

No.	Time series	The Fractal Dimension Values			
		before 2008	at 2008 – 2012	after 2012	2006-2020
1	AUD/USD	1.4838	1.4248	1.5407	1.4630
2	GBP/USD	1.4972	1.4471	1.5202	1.4990
3	CNY/USD	1.3448	1.1442	1.4695	1.3125
4	NOK/USD	1.4052	1.4621	1.4479	1.5069
5	TRY/USD	1.4370	1.6684	1.2579	1.3876
6	CHF/USD	1.4831	1.5164	1.7213	1.6058
7	SEK/USD	1.4145	1.5689	1.4400	1.4965
8	JPY/USD	1.5577	1.4896	1.4627	1.4064
9	INR/USD	-	1.3751	1.4406	1.3995
10	PLN/USD	-	1.6294	1.5685	1.5983
11	RUB/USD	1.2593	1.6603	1.4576	1.4013
12	KRW/USD	-	1.6612	1.5535	1.6442
13	BGN/USD	-	1.6068	1.4223	1.5179
14	CAD/USD	1.4108	1.4671	1.4809	1.5015
15	BRL/USD	-	1.5263	1.4623	1.3809
16	EUR/USD	1.3176	1.6208	1.4622	1.5413
17	KZT/USD	1.5904	1.1657	1.4531	1.2051
18	ZAR/USD	-	1.5142	1.4335	1.4245
19	SGD/USD	1.2865	1.4517	1.5493	1.5045
20	RON/USD	-	1.4969	1.4860	1.5218

Source: Authors

Analysis of the obtained values of the fractal dimension allows us to draw the following conclusions. The dynamics of exchange rates of developed countries is characterized by a more stable fractal structure. The fractal dimension takes values close to 1.5. In contrast, the exchange rates of developing countries' currencies before currency crises have overestimated or underestimated values of the fractal dimension in relation to 1.5. In most cases, the fractal dimension deviates from the value of 1.5 downward, which indicates the formation of "herd" behavior by investors. After the end of the currency crisis and the onset of the post-crisis stabilization phase, the fractal dimension values again approach 1.5. Thus, the fractal dimension can be an indicator of crisis phenomena.

For further investigation of the nonstationary dynamics of fractal dimension, the "sliding window" method was applied, the essence of which is as follows. First, a sequence of n values is selected in the time series of the currency rate, and for these data the fractal dimension is calculated using the Higuchi method. After that, the interval is shifted to the right along the time series by one value and the fractal dimension is calculated again. Repeating this procedure throughout the entire study period, we obtain the local values of the fractal dimension. Let us study a number of local values of the fractal dimension of the studied time series.

Analysis of the fractal dimensions of national currency time series rates dynamics indicate the existence of a limiting fractal dimension, when approaching which instability and possible crisis manifestations arise in the future. To predict the critical states of the system, it is important to establish the boundaries of the threshold of the normal state, which

depend on the current local values of the fractal dimension and the fractal dimension of the entire time series. In the work of Gafarova E. A. & Dobikova D.V. (2012) when analyzing the dynamics of the fractal dimension of the exchange rates of developed and developing countries, it was shown that the lower and upper boundaries of the fractal dimension for a crisis-free state are 1.3 and 1.7, respectively. However, these boundaries of the normal state of the system do not always allow one to judge about the violation of stability and can determine a sufficiently large number of false signals. The value of the lower and upper thresholds will affect the appearance of signals. The wider the border of the normal state interval, the fewer signals will appear. With a narrow interval of the normal state, the number of false signals will increase. It should be noted that a high value of the fractal dimension of the time series indicates a less stable state of the system, the time series will be characterized by sharp jumps, and the threshold of the normal state will be less sensitive to changes, which will avoid a large number of false signals. A low value of the fractal dimension indicator indicates a more stable state of the system, with a relatively low value of this indicator, the initial series of stock quotes will be characterized by a fairly smooth trend change and the absence of sharp drops and jumps, the threshold of the normal state will be more sensitive, which will allow not to miss the appearance of a critical point.

Calculations show that for financial series, the upper and lower boundaries of the normal state of the system can change. Therefore, it is necessary to determine the boundaries of the normal state in such a way that the critical states of the system can be identified for both an unstable and a stable period of the time series. A signal will be considered false if, after its appearance, there are no further points of trend change or sharp jumps. The threshold values of the normal state of the system for the initial time series are determined on the basis of moving averages and the total fractal dimension of the series. As a result of the experiments, the boundaries of the normal state were established as follows:

$$FD_{up}(t) = \frac{1}{4n}\sum_{k=1}^{4n} FD(t-k) + K_{up}FD;$$

$$FD_{dn}(t) = \frac{1}{4n}\sum_{k=1}^{4n} FD(t-k) - K_{dn}FD,$$

$FD_{up}(t)$, $FD_{dn}(t)$ – upper and lower boundaries of the normal state of the system,
$n = 250$ – width of the window for calculating local values of the fractal dimension,
FD – fractal dimension of the time series calculated by the Higuchi method,
$K_{up} = 0.15$, $K_{dn} = 0.165$ – empirically determined coefficients.

The algorithm for predicting the crisis state of the system is based on the analysis of the dynamics of local values of fractal characteristics and boundaries of stability. the lower boundary of stability, it is expected to rise or fall by more than 10%.

This algorithm demonstrates well the changes in the original series dynamics. Let's compare the dynamics of the GBP / USD rate with the dynamics of local values of the fractal dimension and the boundaries of the time series stability (Figure 3).

As you can see in Figure 3, approximately on the 600th trading day, there is a crossing of the local fractal dimension line of the upper stability border, followed by crossing the lower border and further high amplitude of the indicator. In the dynamics of the exchange rate in the period from the 610th to the 800th trading day of the studied period, there is a serious fall, followed by a period of instability. Starting from the 1000th trading day, the local values dynamics of the fractal dimension becomes less amplitude, and the periods of the growth alternation and fall of the fractal dimension values becomes small. The period of relative stability of the exchange rate fell on the 1100-1600th days.

Further, the dynamics of the fractal dimension local values shows increase in the amplitude of oscillations. The crossing of the lower boundary occurs at about the 1440th day, however, the periods of fluctuations are still small, this signal can be regarded as a signal for a subsequent increase in the periods of fluctuations of local values of the fractal dimension accompanied by a high amplitude, which is observed. Within 100 days (from about 1580 to 1670), there is a crossing of both the upper and lower boundaries, accompanied by a drop in the rate in the period 1700-1800 days. Further, we see 2 crossings of the upper border: the first - around the 1820th day, predicting a change in the trend from a relatively constant to a growing one; the second - on the 2010th day, signaling a new downward trend. Later, over 400 days, the dynamics of the values of the local fractal dimension is again characterized by small periods of low-amplitude fluctuations. An increase in the amplitude of fluctuations observed since the 2400th day predicts a fall in the rate of the 2600th day with a subsequent decline.

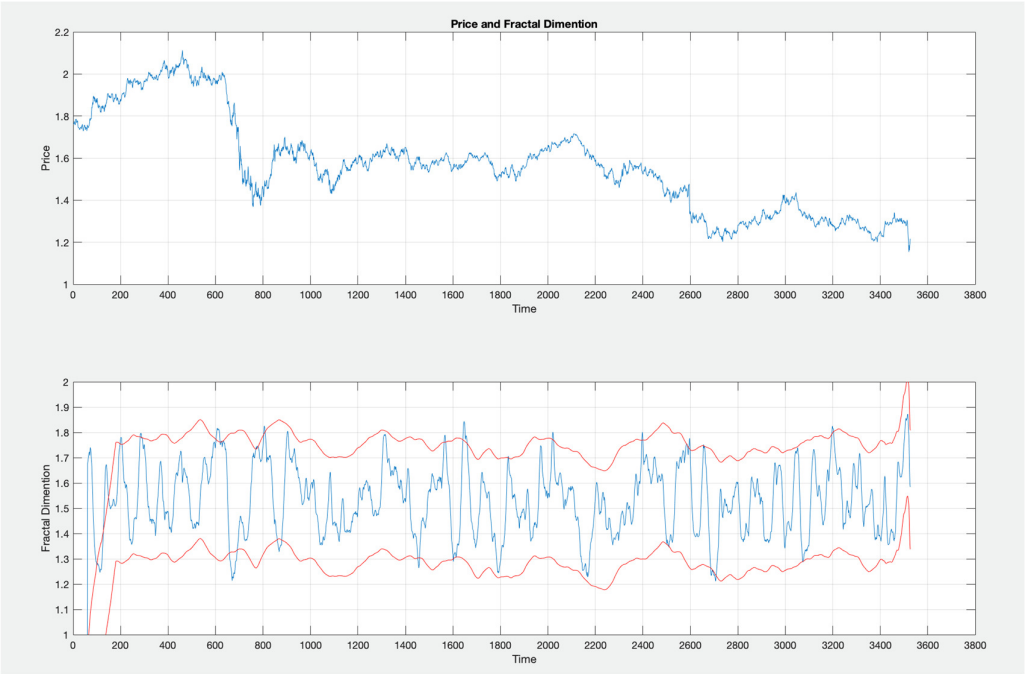

Figure 3: Dynamics of the GBP/USD exchange rate, local fractal dimension values, and the stability boundary of the currency exchange rate

Source: Authors

For the CNY / USD series, the boundary of the fractal dimension change during the crisis (sinusoid) is clearly visible, which is practically invisible for the time series of other exchange rates (Figure 4).

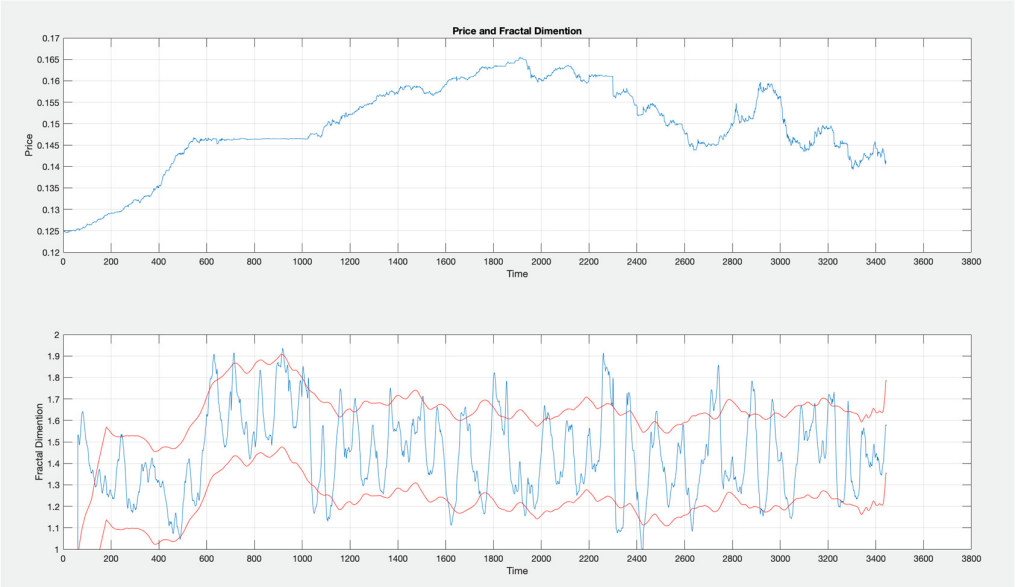

Figure 4: Dynamics of the CNY/USD exchange rate, local fractal dimension values, and the stability boundary of the currency exchange rate

Source: Authors

For the time series CNY / USD, one can observe false signals that indicate the unstable dynamics of the national currency rate. Therefore, it is possible to classify the fractal structure of currency series and distinguish groups of countries with high and low levels of efficiency of foreign exchange markets.

Countries Classification by the level of efficiency of foreign exchange markets

The countries were classified using the fractality index. Informative time ranges were determined, reflecting short-term ($\tau = 15$ days, index α_1) and long-term ($\tau = 60$ days, index α_2) trends in the violation of the information efficiency of foreign exchange markets.

The values of the fractality indices α_1и α_2 are determined in a sliding window with a width of 250 days and a shift of τ days. This allows us to classify the fractal structure of currency series and identify groups of countries with high and low levels of efficiency in foreign exchange markets. Table 5 shows the results of calculating the fractality index $\alpha_1$and α_2.

Table 5: Fractality Indices Values that assess short-term and long-term trends in the violation of the information efficiency of currency markets.

No.	Country	α_1	α_2
1	Australia	1.5921	1.5860
2	Great Britain	1.6877	1.7023
3	China	2.1248	2.1330
4	Norway	1.6138	1.6158
5	Turkey	1.5106	1.4874
6	Switzerland	1.6891	1.7059
7	Sweden	1.5878	1.6099
8	Japan	1.6429	1.6423
9	India	1.7723	1.7516
10	Poland	1.5416	1.5512
11	Russia	1.6788	1.6795
12	South Korea	1.6687	1.6481
13	Bulgaria	1.6661	1.6601
14	Canada	1.6624	1.6500
15	Brazil	1.5117	1.5182
16	European Union	1.6859	1.6981
17	Kazakhstan	1.9692	1.9566
18	South Africa	1.5923	1.5808
19	Singapore	1.8105	1.8182
20	Romania	1.9473	1.7348

Source: Authors

A preliminary analysis of the obtained fractality indices $\alpha_1$and α_2 showed a sufficient heterogeneity of the structure of currency series. To determine homogeneous groups of countries by the level of efficiency of foreign exchange markets we could classify them by their fractality indices $\alpha_1$and α_2. To obtain a stable classification, a step-by-step clustering procedure was carried out. At the first stage, the nearest neighbor method was applied. This made it possible to identify countries that differ from the majority. These include China and Kazakhstan. At the next stage, for the remaining 18 currency pairs, using the methods of hierarchical cluster analysis, a division into clusters is obtained. This breakdown was refined by the successive application of the -means method, which made it possible to obtain a stable classification and divide countries into three homogeneous groups and identify 2 atypical states in terms of the efficiency of foreign exchange markets. The resulting distribution of states according to the selected homogeneous groups is presented in Table 6 and Figure 5. The countries that most clearly reflect the main characteristics of the group are highlighted in bold.

Table 6: Clustering Results

Group number	Number of elements in the group cluster	Centroids	Countries included in the group
Group 1	12	(1.6473; 1.6482)	Australia, Great Britain, Norway, Switzerland, Sweden, **Japan**, Russia, South Korea, Bulgaria, Canada, European Union, South Africa
Group 2	3	(1.5213; 1.5189)	Turkey, Poland, **Brazil**
Group 3	3	(1.8434; 1.7682)	India, **Singapore**, Romania
Atypical	2		China, Kazakhstan

Source: Authors

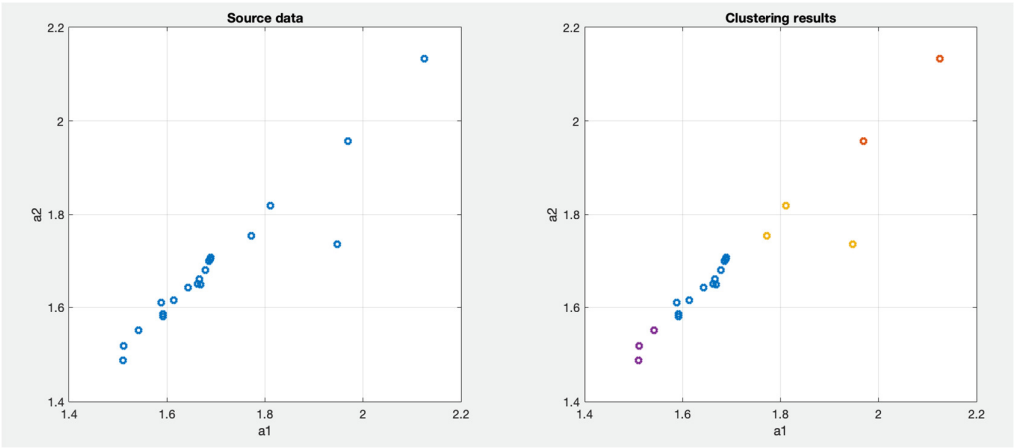

Figure 5: Graphical representation of clustering results

Source: Authors

According to the results of clustering, the currencies of the countries of the first group are characterized by the most stable and homogeneous fractal structure. The fractal dimension of these series remains practically constant over a fairly wide range of time scales. For the countries of the second and third groups, various forms of violations of the fractal structure in the pre-crisis period were revealed. As a rule, the currency crisis was preceded by both abnormally low and abnormally high values of the fractal dimension. These results can be interpreted as manifestations of violations of stability conditions during the formation of pre-crisis states of macroeconomic systems.

Conclusion

Crises are one of the most difficult phenomena in economics. Their manifestations are manifold. To assess currency crises, an analysis of the dynamics of the fractal dimension of exchange rates was carried out and the ranges of fluctuations in the exchange rate were determined, within which the market is in a stable state. The paper analyzes the fractal characteristics of the time series of the rates of national currencies of 20 states in different periods of time. The relationship between the fractal dimension of the dynamics of national currency rates and their trend has been established. The time series of local values of the fractal dimension serves as an indicator of the economic stability of the economic system. The boundaries of the normal state of economic systems have been established. A high value of the fractal dimension of the series indicates a less stable state of the system.

To predict the critical states of the economic system, an algorithm has been developed for determining the upper and lower thresholds of the normal state of local values of fractal dimension. The stability boundaries are built on the basis of a linearly weighted moving average and fractal dimension of the time series. Forecasting is reduced to determining the points of intersection of the curve of local values of the fractal dimension with the boundaries of stability. The developed algorithm for analyzing the fractal properties of economic indicators is implemented in the

MATLAB software environment. This algorithm is applicable both for analyzing currency time series and for analyzing time series of micro and macroeconomic indicators.

The conducted research demonstrates good results of analyzing the stability of economic systems and forecasting their critical states. The proposed algorithm for applying the methods of fractal analysis can act as one of the tools for crisis analyzing and forecasting.

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Mutual Shocks of Real Effective Exchange Rate and Remittances in Ukrainian Economy

Ihor OLEKSIV
Lviv Polytechnic National University, Lviv, Ukraine
ihor.b.oleksiv@lpnu.ua

Diana MIRZOIEVA
Lviv Polytechnic National University, Lviv, Ukraine
diana.mirzoieva.mnev.2019@lpnu.ua

Roman SHULYAR
Lviv Polytechnic National University, Lviv, Ukraine
roman.v.shuliar@lpnu.ua

Halyna MYKHAILIAK (LEMA)
Lviv Polytechnic National University, Lviv, Ukraine
halyna.v.mykhailiak@lpnu.ua

Abstract

Current paper concentrates on research of exchange rate shocks of Ukrainian hryvnia caused by inflows of remittances and vice versa in 1996-2019. We employed VAR model and found that real exchange rate (REER) is affected by values of itself and remittances with one-lag delay, which led to appreciation of REER. At the same time, remittances are affected only by its values with one-, two- and three-lag delays. Impulse response functions showed that positive shock in remittances leads to rapid appreciation of REER in one quarter. Finally, positive shock in REER causes increase in remittances in first two quarters.

Keywords: Remittances, Real Effective Exchange Rate (REER), Impulse Response Function.

Introduction

One of the noticeable factors influencing Ukrainian economy is significant labor emigration, caused by low wages, misbalanced labor market and political instability. As the result, share of remittances in GDP of Ukraine in 2018 reached almost 11% (fig.1). The other peculiarities of the Ukrainian economy are constant depreciation of exchange rate and steady remittances increase. Considering the high share and importance of remittance inflows into the Ukrainian economy the idea of the current paper is to investigate the influence of remittance inflows on Ukrainian real effective exchange rate (REER) and vice versa. To reach research objective we employed VAR/ VECM model. Additionally, we built impulse response functions (IRFs) in order to reveal possible shocks caused by rapid changes in chosen variables. As the result of conducted research, rapid change in remittances was found, that led to the short-term appreciation of the real exchange rate with one quarter. Rapid change in REER led to the increase in remittance inflows in two quarters. Finally, we delineated future research.

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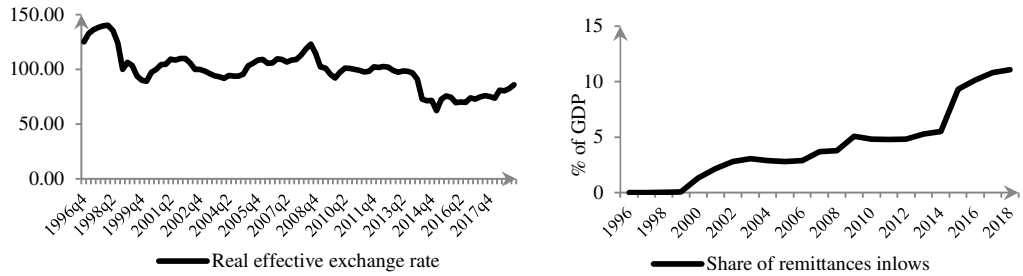

Fig.1: Real effective exchange rate of Ukrainian hryvnia and share of remittances in GDP in 1996-2018.

Source: International Financial Statistics Database of International Monetary Fund and World Bank Indicators.

Literature Review

Significant inflows of remittances are usually associated with Dutch disease, which results in appreciation of exchange rate of national currency (Caceres and Saca (2006), Bussolo and Medvedev (2007), Vargas-Silva (2009)). Some researchers found that inflows of remittances cause shocks in exchange rates and other macroeconomic indicators in recipient countries. For instance, Caceres and Saca (2006) reported that remittances lead to appreciation of real exchange rate in the short run, growth of consumer prices, interest rate, and volumes of imports in El Salvador using VAR model. Acosta, Baerg and Mandelman (2009) argued that appreciation of exchange rate caused by remittances depends on how financial system of recipient country channels them into investments. The research conducted for Small Island Developing Countries (SIDCs) conducted by Amuedo-Dorantez, Pozo and Vargas-Silva (2010) found that remittances tend to depreciate the real exchange rate, and appreciate the exchange rate if broader sample of countries are selected. Roy and Rahman (2014) supported the idea, that remittances engender inflationary pressure in Bangladesh. Contrary Oleksiv et al. (2020) reported that remittances inflows lead to depreciation of nominal effective exchange rate of Ukrainian hryvnia. For now, there are lack of research investigating influence of remittances on the exchange rate of Eastern European countries. Therefore, the research objective of the paper is to estimate short and long run effects of remittances on real effective exchange rate (REER) of Ukrainian hryvnia.

Methodology and Data

For the research, we have chosen two variables, which re the following: real effective exchange rate and remittance inflows. Real effective exchange rate was preferred to nominal, as it takes into account level of inflation and weights of different currencies in international trade of the country.

Depending on cointegration in sample of data, we will select either vector autoregression model (VAR) (1) or vector error correction model (VECM) (2).

$$\begin{aligned} REER_t &= a + \sum_{i=1}^{k} \beta_i REER_{t-i} + \sum_{j=1}^{k} \varphi Remit_{t-j} + u_{1t} \\ Remit_t &= \gamma + \sum_{i=1}^{k} \beta_i REER_{t-i} + \sum_{j=1}^{k} \varphi Remit_{t-j} + u_{2t} \end{aligned}, \quad (1)$$

where a, γ – constants; $REER_t$ – REER values in current periods; $REER_{t-i}$ – REER values in previous periods; $Remit_{t-i}$ – volumes of remittances in previous periods; β_i, φ_i – regression coefficients; u_{1t},, u_{2t} – errors.

$$\begin{aligned} \Delta REER_t &= a' + \lambda_1 ECT_{t-1} + \sum_{i=1}^{k} \beta_i' \Delta REER_{t-i} + \sum_{j=1}^{k} \varphi' \Delta Remit_{t-j} + u'_{1t} \\ \Delta Remit_t &= \gamma' + \lambda_2 ECT_{t-1} + \sum_{i=1}^{k} \beta_i' \Delta REER_{t-i} + \sum_{j=1}^{k} \varphi' \Delta Remit_{t-j} + u'_{2t} \end{aligned}, \quad (2)$$

where a', γ' – constants; $\Delta REER_t$ – REER differenced values in current periods; $\Delta REER_{t-i}$ – REER differenced values in previous periods; $\Delta Remit_{t-i}$ – differenced volumes of remittances in previous periods; β'_i, φ'_i – regression coefficients; λ_1, λ_2 – speeds of adjustment; ECT_{t-1} – error correction term; u_{1t},, u_{2t} – errors.

Before the estimation of VAR/VECM model, we are going to conduct Dickey-Fuller test for unit-root developed by Dickey and Fuller (1979) and to do the cointegration test (Johansen (1991). In order to reveal existence of shock caused by rapid increase of remittances we built impulse response functions (IRFs) based on results of VAR/VECM

model estimation. Quarterly data used for the analysis include volumes of remittances inflows and REER values for the period from 1996 to 2019 extracted from IMF International Statistics Database, IMF Balance of Payments Databases. In total, 90 observations were extracted for VAR/VECM model. As chosen variables are calculated in different measures, we normalized data by dividing values on relevant average value of each variable.

Results and Discussion

Basing on Akaike criteria, we selected the optimal lag of data at first difference, which is four lags or in the current case four quarters. Moreover, results of Dickey-Fuller test showed that both data on REER and on remittances are stationary at first difference (tab.1).

Tab.1: Dickey-Fuller test. Source: authors' research.

Variable	Test statistics	Critical values			MacKinnon approximate p-value for Z(t)	Conclusion
		1%	5%	10%		
REER	-4,389	-3,532	-2,903	-2,586	0,0003	Stationary
Remittances	-3,030	-3,532	-2,903	-2,586	0,032	Stationary

In order to decide VAR or VCEM model to choose Johansen cointegration test was employed (tab.2). Results of this test showed that there is no cointegration in data sample, which means that we can proceed with VAR model.

Tab.2: Johansen cointegration test. Source: authors' calculations

Maximum rank	Trace statistic	5% critical value	1% critical value	Maximum statistic	5% critical value	1% critical value
0	18,3891	12,53	16,31	17,2484	11,44	15,69
1	1,1406	3,84	6,51	1,1406	3,84	6,51

Results of VAR estimation showed existence of positive short-term relationship between REER as dependent variable and remittances as independent variable with one lag delay (tab.3). At the same time, REER in current period is affected by the value of REER in previous period.

Tab.3: VAR model estimation. Source: authors' research.

Dependent variables / Independent variables	REER	Remittances
$REER_{t-1}$	**1,077 (0,000)**	0,275 (0,447)
$REER_{t-2}$	-0,143 (0,365)	-0,023 (0,964)
$REER_{t-3}$	-0,059 (0,558)	-0,395 (0,24)
$Remittances_{t-1}$	**0,069 (0,031)**	**0,991 (0,000)**
$Remittances_{t-2}$	-0,083 (0,067)	**-0,383 (0,011)**
$Remittances_{t-3}$	-0,0005 (0,987)	**0,415 (0,000)**
Constant	**0,131 (0,003)**	0,185 (0,197)
Log-likelihood 185,963		
R squared	0,92	0,98

Finally, remittances are affected only by their lagged values: positively with one-lag delay and negatively with two- and three-lag delays, as REER variables are not statistically significant. For better interpretation of received results, we built impulse response functions (IRFs) for REER as impulse variable and remittances as response variable and vice versa (fig.2).

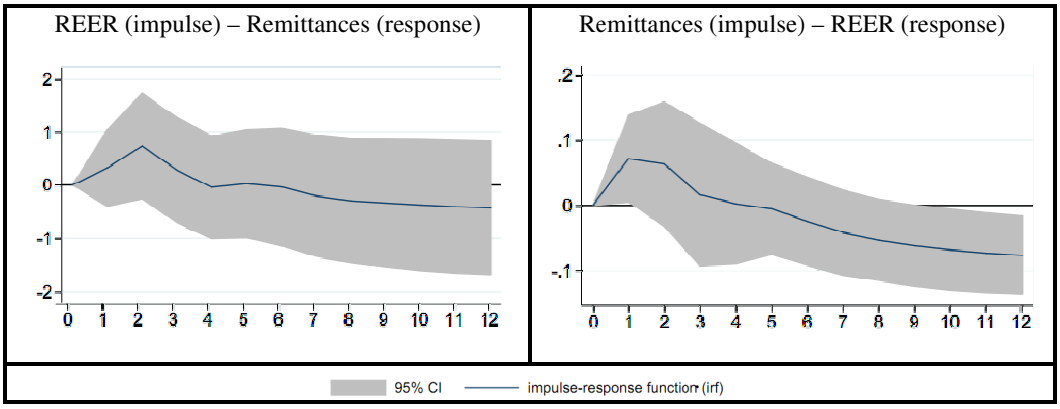

Fig.2: Impulse response functions for remittances and REER of Ukrainian hryvnia
Source: authors' calculations.

Built IRF graphs demonstrate that positive shock in REER causes a short-term increase in remittances in first two quarters and further decrease. In this case, remittances can be considered as stabilizers of consumption and income in conditions of exchange rate appreciation. At the same time, shock in volume of remittances leads to rapid appreciation of REER in the short run, which is approximately one quarter. However, in the third quarter REER depreciates. Such findings can be related to the ways of how population use received remittances, for instance the increase of consumption as the result of remittance inflows. Finally, the received results do not confirm the Dutch disease in Ukrainian economy in the long-term perspective. Moreover, depreciation of exchange rate of Ukrainian hryvnia cannot be considered as a threat for competitiveness of national export and international competiveness overall as was found for many developing countries (Bussolo and Medvedev (2007), Vargas-Silva (2009)). Considering the short-term mutual positive shocks of remittance inflows and REER we can delineate, two directions of regulation policy of Ukrainian government. They are inflation targeting and expansion of national export. In addition, government needs to understand and if possible to control, how the additional income is spent. Moreover, the latter partly confirms findings that "remittances can smooth consumption, increase business cycles volatility and lead to shortage of labor" (Gapen et al., 2006), which were identified as the result of Ramsey's policy investigation.

Conclusion

Conducted research found that significant inflows of remittances into Ukrainian economy lead to short-term appreciation of real effective exchange rate, followed by depreciation effect in future periods. The latter means that remittances do not cause Dutch disease effects. At the same time, positive shock in REER causes increase in volumes of remittance in two quarters. These findings delineate future directions of research, such as policy regulation of inflation and enhancement of export potential.

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Perception of The Social Economy and Social Entrepreneurship by Students as Potential Entrepreneurs

Malgorzata REMBIASZ

Poznan University of Technology, Poznań, Poland
malgorzata.rembiasz@put.poznan.pl

Abstract

The article is an attempt to describe the perception of the social economy and social entrepreneurship as well as evaluate their prospects and obstacles to their development in the context of entrepreneurial intentions of students. From the point of view of academic research, the social economy is a broad and multifaceted phenomenon. Social enterprises try to combine activities complying with typical market mechanisms with social justice. The social economy is an element of policies aimed at ensuring sustainable development of the global economy. Local and national authorities, organisations (including the European Union) as well as international agencies and foundations launch different types of support instruments designed for social enterprises. The study carried out by means of an auditorium survey on a selected group of students has shown that they do not fully understand the concept of social economy. It is therefore worthwhile to take steps to enrich their knowledge about this sector and its benefits as part of a new approach to entrepreneurial education. Current socio-economic changes, including those recently caused by the coronavirus pandemic, call for new innovative solutions that would contribute to building a stronger society. Social entrepreneurship can develop fast if it is taken up by young, educated and creative people who are open to the world and social problems.

Keywords: Social Entrepreneurship, Social Economy, Entrepreneurial Intentions of Students.

Introduction

There are many definitions of the social economy and social entrepreneurship in the literature. The social economy is described as alternative economy as it provides a framework for non-financial exchanges, ethical trade and setting up enterprises that work for the benefit of the local community (Amin, 2009).

Social entrepreneurship is an important element of the social economy. Its functions include not only the provision of goods and services, but also galvanising social capital, innovating and actively involving excluded groups (such as disabled people) in social and economic life. Importantly, this does not exclude economic efficiency as such social enterprises may become very competitive in the market. Even so, profit maximisation is not their main objective.

Social entrepreneurs often work in areas different from those where traditional entrepreneurs are active. The latter are driven mainly by commercial logic whilst the former typically operate at the intersection of the social, commercial and public sectors (Thornton, and Ocasio, 2008). The goal of social entrepreneurs is not to maximise economic profit but to maximise social welfare and create social capital (Zahra, Gedajlovic, Neubaum, and Shulman, 2009).

Brief overview of selected research problems concerning the social economy and social entrepreneurship - literature review

Enterprises operating in the social economy try to combine typical market mechanisms and economic laws with social conscience. Social companies should also strive to grow to be better able to meet their objectives and achieve success (di Domenico, Haugh, Tracy 2010).

As it has already been mentioned, social entrepreneurship does not exclude operating for profit. It may therefore be difficult to strike a balance between social and business objectives which presents a major challenge for any social enterprise A study carried out in 2013 showed clearly that social objectives prevail over economic ones, proving that Polish social enterprises behave "typically" and are similar to other such companies in the world. Moreover, NGOs

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who are also social enterprises declared firmly that they pursue business objectives in order to achieve those in the social domain. (Batko and Bogacz-Wojtanowska, 2015).

Social economy enterprises should be treated as important actors involved in public policies targeting the labour market. That the potential inherent in this sector is great can be observed in the current labour market where, compared to previous years, there is an increasing number of entities (mainly social cooperatives) that do well under open labour market conditions (Frączek 2018). Much involved in activating the unemployed, the social economy should also be perceived as an employment opportunity for people who are professionally inactive.

In the current and coming socio-economic situation there is a need for new employment strategies. In order to deal with the crisis it is necessary to provide more support for social entrepreneurship through institutional and even fiscal means. It is precisely enterprises operating in the area of the social economy that offer an opportunity to provide stable employment for disadvantaged social groups which suffer the most during recession. Moreover, such enterprises pursue social justice and gender equality objectives that are commonly considered to be beneficial. This includes greater representation of women in the total number of people employed in managerial positions compared to commercial companies (Núñez Bandeira and Santero-Sán, 2020).A study carried out among Polish entrepreneurs proved that the level of knowledge about the social economy is low. Only 28% of the entrepreneurs involved in the study declared that they knew of the concept of “social economy". Further, commercial entrepreneurs believe that social enterprises are ill-conceived economic ventures kept afloat thanks to state aid and focused on supporting those who struggle in their private and professional lives. Due to these negative associations entrepreneurs do not see any possibility of cooperating with the social economy sector. (Społeczna odpowiedzialność.., 2019).

Other studies carried out in Poland have confirmed the positive impact of entrepreneurial acumen on success measures and financial stability. This means that, if a social enterprise wants to be successful, it must pay attention to factors such as innovation, proactive attitude and risk-taking. Developing and strengthening their competitive advantage will allow them to increase their potential and then use it to solve social problems (Wronka-Pośpiech 2015).

The phenomenon of the social economy is also related to social innovations. Research results confirm that these are perceived as an important factor contributing to increased productivity and competitive edge of companies that operate in the market as well as those that are part of the social economy (Furmańska -Maruszak, Sudolska A. 2016). Even though social entrepreneurship offers an opportunity to efficiently channel social engagement of different social groups, this business model is not common in Poland. Studies have shown that the potential resulting from a socially engaged attitude of the young generation of Poles is not fully used which can be explained, among others, by the lack of knowledge about the social entrepreneurship model. (Stępczak 2020).

Hence, it seems that a major challenge for the social economy and social entrepreneurship is the introduction of these subjects in broadly-defined entrepreneurial education including at universities. According to M. Popowska (2018), young people who start their academic education in today’s Poland have grown up in the reality of market economy and are thus aware of its basic principles. This offers a unique opportunity to equip them with knowledge and skills related to the social economy as part of a new model of entrepreneurial education..

The author was encouraged to carry out the study by the postulate to teach students about social entrepreneurship as well as the already mentioned results of research conducted among entrepreneurs which showed that they do not know much about the social economy and have negative attitudes towards enterprises that operate in that sector. The purpose of the study being to examine the knowledge about the social economy concept as well as evaluate its prospects and obstacles to its development in the context of entrepreneurial intentions (plans to become self-employed) among students In order to solve the identified research gap, empirical studies were carried out.

Evaluation of social economy and social entrepreneurship – results of empirical research

Description of the research method and the research sample

The study was conducted in January 2020 among a selected group of students of management pursuing part-time studies at one of Polish private higher education institutions. The study was carried out by means of an auditorium survey. The author is aware of the limitations of survey studies. The respondents were asked to react to the statements included in the survey to reveal their opinions about the social economy. The results could have been influenced by the place where it was conducted (lecture hall), its timing (after students learned about the grades they obtained for one of the subjects) and perhaps by the fact that some of the respondents might have tried to guess the kind of results that the author expected. The questions that were selected for the survey were inspired by the already cited research among Polish entrepreneurs (Społeczna odpowiedzialność…, 2019). This helped to compare the responses provided by active businessmen with those supplied by potential entrepreneurs.

This article presents the results concerning a rather homogeneous group of 103 students aged 21 – 30. Data from six surveys have not been included in this study because of incomplete responses or the respondents' age (over 30 years old). Table 1 shows results related to entrepreneurial intentions of the students involved in the study.

Table 1: Responses to the question: "Are you interested in running your own business?"

Answers:	Percentage of responses (%)
Yes	36.9%
I already run a business	3.9%
No	24.3%
I don't know	34.9%

Source: own research

The table above shows that a relatively large number of respondents (as much as 36.9%) are interested in running their own company. The author obtained similar results in her 2019 study on student entrepreneurship in the context of business knowledge (Rembiasz 2019). Only four people were already running their own businesses which can be explained by the young age of the respondents. A rather high percentage of students with active entrepreneurial intentions (40.8%) is due to the respondents study management, a program they chose consciously. In addition, 98% of the respondents earned their living. Most respondents (73.8%) were women.

In order to verify hypotheses stated in this research and answer research questions IMB SPSS Statistics (v25) was used to analyze the data. First of all basic descriptive statistics were computed as well as Shapiro-Wilk test for normality of variables' distributions. Test results were significant in all cases. This means the distributions of variables were different in shapes then Gaussian curve. Nonetheless distributions were assumed normal based on absolute value of skewness not greater than 2 (George, Mallery, 2016) thus parametric models were used to verify hypotheses.

Differences in social economy perception based on willingness to run an own company

The table 2a, 2b I 2c show the results concerning the awareness and understanding of the social economy phenomenon. The surveyed students were divided into three groups: students who want to run their own business or already do so, those who do not plan it and students who do not know whether they want to become self-employed. Comparing the results of the three tables above yields the following conclusions. The great majority of the students to one of the fundamental assumptions of the social economy, i.e. combining economic and social objectives. The survey contained one false statement equating the social economy with state aid for the poorest, i.e. social assistance. Unfortunately, this statement was considered to be true by 47.6% of people with active entrepreneurial intentions, 48% of those who do not plan to be self-employed and 55.6% of those who do not know yet whether they will start a business. Based on the results of the study presented above, it may be concluded that the concept of social economy is not fully understood by students and needs to be included in economic education.

Table 2a : How respondents with active entrepreneurial intentions understand the concept of the "social economy"

Statements: Social economy...	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
means combining economic and social objectives	4.8%	7.1%	14.3%	64.3%	9.5%
means acting for the benefit of the local community	2.4%	16.7%	23.8%	45.2%	11.9%
means supporting people who experience difficulties through professional activation	2.4%	7.1%	40.5%	38.1%	11.9%
means acting for the benefit of the natural environment (reducing the	0.0%	11.9%	26.2%	50.0%	11.9%

use of natural resources and greenhouse gas emissions)					
means running a business ethically	2.4%	7.1%	28.6%	54.8%	7.1%
means taking account of social needs when designing and selling products	0.0%	11.9%	21.4%	54.8%	11.9%
is social assistance	9.5%	11.9%	31.0%	40.5%	7.1%

Source: own research

Table 2b: How respondents who do not plan to become self-employed understand the concept of the "social economy"

Statements Social economy...	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
means combining economic and social objectives	0.0%	12.0%	20.0%	52.0%	16.0%
means acting for the benefit of the local community	0.0%	16.0%	32.0%	28.0%	24.0%
means supporting people who experience difficulties through professional activation	4.0%	20.0%	16.0%	52.0%	8.0%
means acting for the benefit of the natural environment (reducing the use of natural resources and greenhouse gas emissions)	4.0%	4.0%	40.0%	44.0%	8.0%
means running a business ethically	4.0%	8.0%	20.0%	48.0%	20.0%
means taking account of social needs when designing and selling products	4.0%	12.0%	8.0%	64.0%	12.0%
is social assistance	0.0%	16.0%	36.0%	32.0%	16.0%

Source: own research

Table 2c: How respondents who do not know whether they want to become self-employed understand the concept of "social economy"

Statements **Social economy**	**Percentage of responses (%)**				
	Strongly disagree	**Tend to disagree**	**Hard to say**	**Tend to agree**	**Strongly agree**
means combining economic and social objectives	2.8%	2.8%	16.7%	69.4%	8.3%
means acting for the benefit of the local community	2.8%	11.1%	19.4%	47.2%	19.4%
means supporting people who experience difficulties through professional activation	2.8%	13.9%	25.0%	41.7%	16.7%
means acting for the benefit of the natural environment (reducing the use of natural resources and greenhouse gas emissions)	2.8%	22.2%	27.8%	41.7%	5.6%
means running a business ethically	0.0%	25.0%	33.3%	36.1%	5.6%
means taking account of social needs when designing and selling products	0.0%	8.3%	22.2%	41.7%	27.8%
is social assistance)	2.8%	13.9%	27.8%	38.9%	16.7%

Source: own research

In order to verify differences in social economy perception between examined groups an one-way analysis of variance was conducted. Assumptions of normality of dependent variable's distribution among compared groups as well as homogeneity of variances were met. Based on results shown in table 3 not any statistically significant difference was found. Compared means were illustrated in figure 1.

Table 3 : Comparison of social economy perception scores

	Interested in running own business (*n* = 42)		**Not interested in running own business (*n* = 25)**		**Not sure (*n* = 36)**				
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Social economy…									
means combining economic and social objectives	3,67	0,93	3,72	0,89	3,78	0,76	0,16	0,851	0,00
means acting for the benefit of the local community	3,48	0,99	3,60	1,04	3,69	1,01	0,46	0,634	0,01
means supporting people who experience difficulties through professional activation	3,50	0,89	3,40	1,04	3,56	1,03	0,19	0,828	0,00
means acting for the benefit of the natural environment	3,62	0,85	3,48	0,87	3,25	0,97	1,64	0,198	0,03
means running a business ethically	3,57	0,83	3,72	1,02	3,22	0,90	2,56	0,082	0,05
means taking account of social needs when designing and selling products	3,67	0,85	3,68	0,99	3,89	0,92	0,67	0,512	0,01
is social assistance	3,24	1,08	3,48	0,96	3,53	1,03	0,87	0,424	0,02

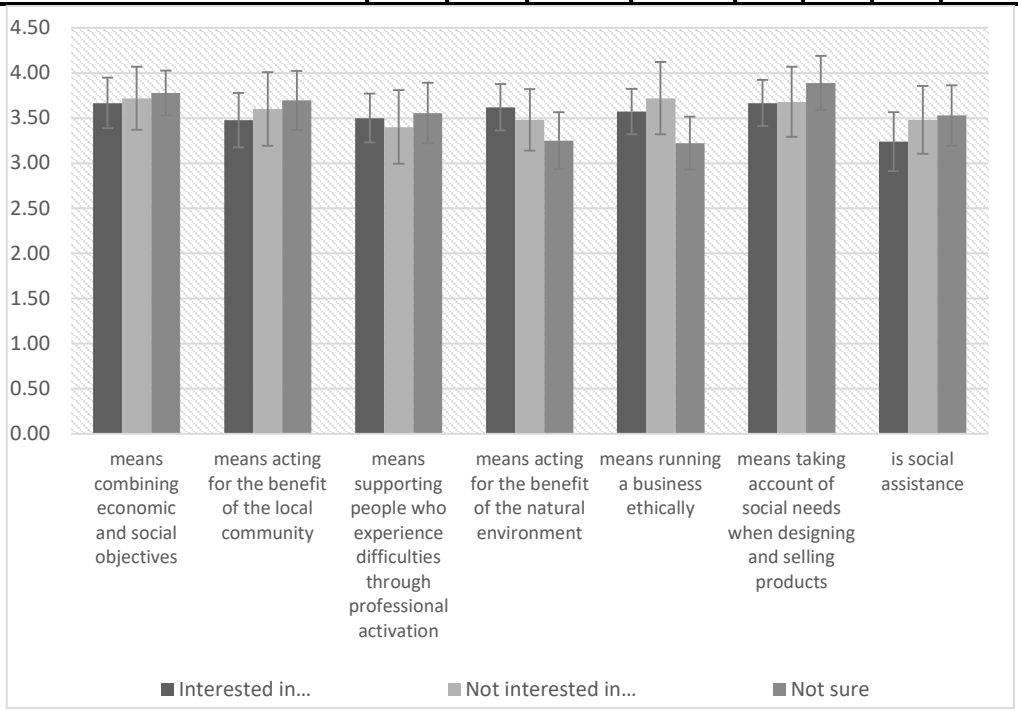

Figure 1: Means of social economy perception scores with 95% confidence intervals divided by compared groups

Differences in perception of the social economy's hampers based on willingness to run an own company

The tables 4a, 4b, 4c show how prospects and barriers related to the development of the social economy in Poland are evaluated by three different groups of students participating in the study broken down according to their declared intentions of running a business.

The results show that students with active entrepreneurial intentions evaluate the role of the social economy as a factor in the country's economic development lower than other students. This may be explained by associating the social economy with support for people in need and the budgetary resources this requires as well as the negative attitude towards social enterprises as economically ineffective and requiring different types of subsidy (as seen in a previously cited study). Declared future entrepreneurs reported less positive responses to the statement that the development of the social economy is hampered by the lack of interest among consumers. The obstacle to corporate social responsibility initiatives that was most often mentioned in the 2018 study was the lack of sufficient knowledge about the subject (Społeczna odpowiedzialność…, 2019). The same opinion was shared by a large group of students involved in the current research. Students with active entrepreneurial intentions and those who do not plan to start a business decided that, in the coming years, companies in Poland will take more social actions than they do now. Those who do not know yet whether they will be self-employed were least convinced about the statement.

In order to verify differences in social economy's hampers perception between examined groups an one-way analysis of variance was conducted. Assumptions of normality of dependent variable's distribution among compared groups as well as homogeneity of variances were met. Based on results shown in table 4 not any statistically significant difference was found. Compared means were illustrated in figure 2.

Table 4a: Evaluation and opinions concerning the phenomenon of social economy: respondents with active entrepreneurial intentions

Opinions	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
I believe that the development of the social economy is an important factor in the economic development of the country.	4.8%	4.8%	28.6%	50.0%	11.9%
In the coming years, companies in Poland will take more social actions than they do now.	2.4%	7.1%	21.4%	50.0%	19.0%
The development of the social economy is hampered by					
the lack of knowledge about opportunities for social action	4.8%	9.5%	28.6%	40.5%	16.7%
the lack of incentives and support from public administration	4.8%	4.8%	23.8%	47.6%	19.0%
the difficult economic situation of companies	2.4%	19.0%	38.1%	31.0%	9.5%
by the belief that social action does not bring tangible benefits	2.4%	11.9%	33.3%	35.7%	16.7%
the belief that social action generates high costs for the company	2.4%	19.0%	33.3%	28.6%	16.7%
by the fact that decision makers in companies underestimate the importance of social action.	2.4%	14.3%	33.3%	33.3%	16.7%
by the fact that consumers are not interested in this subject (no customer pressure)	0.0%	16.7%	42.9%	26.2%	14.3%

Source: own research

Table 4b: Evaluation and opinions concerning the phenomenon of social economy: respondents who do not plan to start a business

Opinions	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
I believe that the development of the social economy is an important factor in the economic development of the country.	0.0%	4.0%	24.0%	40.0%	32.0%
In the coming years, companies in Poland will take more social actions than they do now.	8.0%	0.0%	24.0%	40.0%	28.0%
The development of the social economy is hampered by					
the lack of knowledge about opportunities for social action	0.0%	12.0%	12.0%	36.0%	40.0%
the lack of incentives and support from public administration	8.0%	8.0%	32.0%	24.0%	28.0%
the difficult economic situation of companies	0.0%	16.0%	24.0%	36.0%	24.0%
the belief that social action does not bring tangible benefits	12.0%	12.0%	20.0%	32.0%	24.0%
the belief that social action generates high costs for the company	0.0%	12.0%	36.0%	28.0%	24.0%
the fact that decision makers in companies underestimate the importance of social action.	0.0%	0.0%	48.0%	40.0%	12.0%
the fact that consumers are not interested in this subject (no customer pressure)	8.0%	12.0%	16.0%	44.0%	20.0%

Source: own research

Table 4c: Evaluation and opinions concerning the phenomenon of social economy: respondents who do not know whether they will be self-employed

Opinions	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
I believe that the development of the social economy is an important factor in the economic development of the country.	5.6%	0.0%	19.4%	50.0%	25.0%
In the coming years, companies in Poland will take more social actions than they do now.	0.0%	2.8%	38.9%	38.9%	19.4%
The development of the social economy is hampered by					
the lack of knowledge about opportunities for social action	0.0%	16.7%	13.9%	47.2%	22.2%
the lack of incentives and support from public administration	2.8%	2.8%	27.8%	52.8%	13.9%
by the difficult economic situation of companies	0.0%	8.3%	27.8%	50.0%	13.9%

by the belief that social action does not bring tangible benefits	0.0%	2.8%	33.3%	44.4%	19.4%
by the belief that social action generates high costs for the company	0.0%	2.8%	33.3%	44.4%	19.4%
by the fact that decision makers in companies underestimate the importance of social action.	0.0%	8.3%	30.6%	52.8%	8.3%
by the fact that consumers are not interested in this subject (no customer pressure)	0.0%	11.1%	33.3%	41.7%	13.9%

Source: own research

In order to verify differences in social economy's hampers perception between examined groups an one-way analysis of variance was conducted. Assumptions of normality of dependent variable's distribution among compared groups as well as homogeneity of variances were met. Based on results shown in table 2 not any statistically significant difference was found. Compared means were illustrated in figure 2.

Table 5 : Comparison of social economy's hampers perception scores

	Interested in running own business (*n* = 42)		**Not interested in running own business (*n* = 25)**		**Not sure (*n* = 36)**				
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
The development of the social economy is hampered by…									
the lack of knowledge about opportunities for social action	3,55	1,04	4,04	1,02	3,75	1,00	1,83	0,165	0,04
the lack of incentives and support from public administration	3,71	0,99	3,56	1,23	3,72	0,85	0,23	0,793	0,00
the difficult economic situation of companies	3,26	0,96	3,68	1,03	3,69	0,82	2,60	0,079	0,05
the belief that social action does not bring tangible benefits	3,52	0,99	3,44	1,33	3,81	0,79	1,15	0,319	0,02
the belief that social action generates high costs for the company	3,38	1,06	3,64	0,99	3,81	0,79	1,96	0,146	0,04
by the fact that decision makers in companies underestimate the importance of social action	3,48	1,02	3,64	0,70	3,61	0,77	0,37	0,694	0,01
the fact that consumers are not interested in this subject	3,38	0,94	3,56	1,19	3,58	0,87	0,48	0,619	0,01

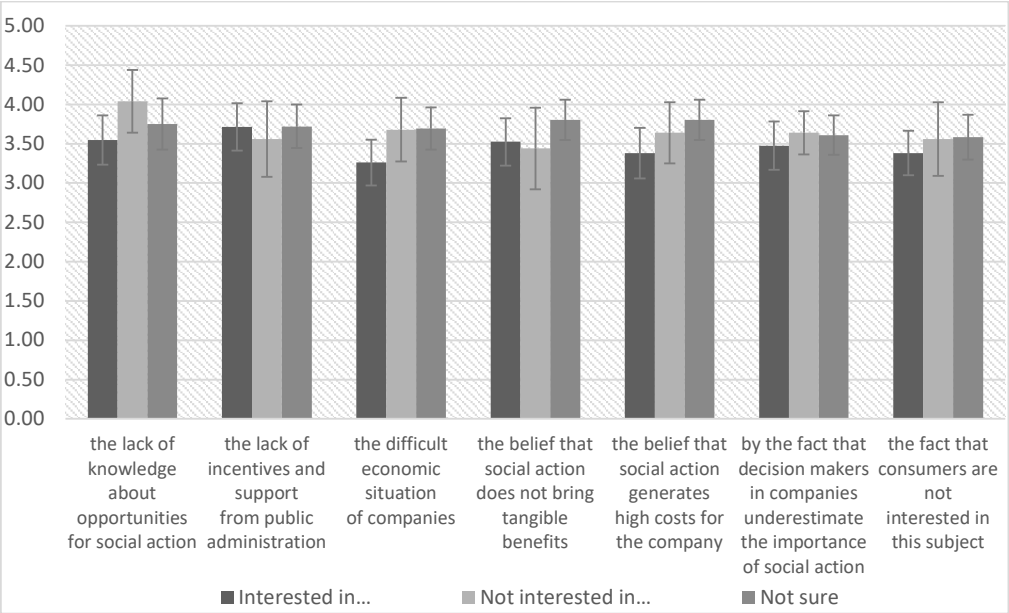

Figure 2: Means of social economy's hampers perception scores with 95% confidence intervals divided by compared groups

Differences in beliefs and attitudes towards social economy

At the end of the auditorium survey students were asked about their willingness to run a social enterprise or be employed in an enterprise of this type. The results are presented in the tables 6.1, 6b. 6.c.

6a. Evaluation of social entrepreneurship from the perspective of setting up or working in a social enterprise: students with active entrepreneurial intentions

Statements I am interested in...	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
setting up an enterprise operating in the social entrepreneurship sector	14.3%	16.7%	31.0%	28.6%	9.5%
working in an enterprise operating in the social entrepreneurship sector	11.9%	11.9%	31.0%	26.2%	14.3%

Source: own research

6b. Evaluation of social entrepreneurship from the perspective of setting up or working in a social enterprise: students who do not plan to start a business

Statements I am interested in...	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
setting up an enterprise operating in the social entrepreneurship sector	36.0%	28.0%	24.0%	12.0%	0.0%
working in an enterprise operating in the social entrepreneurship sector	12.0%	8.0%	48.0%	20.0%	8.0%

Source: own research

4c. Evaluation of social entrepreneurship from the perspective of setting up or working in a social enterprise: students who do not know whether they will be self-employed

Statements I am interested in...	Percentage of responses (%)				
	Strongly disagree	Tend to disagree	Hard to say	Tend to agree	Strongly agree
setting up an enterprise operating in the social entrepreneurship sector	13.9%	33.3%	38.9%	13.9%	0.0%
working in an enterprise operating in the social entrepreneurship sector	8.3%	27.8%	33.3%	25.0%	2.8%

Source: own research

According to the obtained results, a rather high percentage of students with active entrepreneurial intentions (38%) were interested in setting up an enterprise in the social entrepreneurship sector, which means that some of them see an opportunity to achieve their business objectives in this sector in spite of the related obstacles and negative stereotypes. Moreover, about 28% of the students who are not interested in running their own business do not exclude working in social enterprises in the future. The results confirm the thesis that it is worthwhile to teach students about the social economy as part of a new approach to entrepreneurial education.

In order to verify differences in scores of beliefs and attitudes towards social economy between examined groups an one-way analysis of variance was conducted. Assumptions of normality of dependent variable's distribution among compared groups as well as homogeneity of variances were met. Based on results shown in table 6 a statistically significant main effect for willingness to run an own company operating in the social entrepreneurship sector was found. To further investigate the differences *post-hoc* comparisons (with Tukey's correction) were performed. Statistically significant (p = 0,003) difference was found only between groups of respondents interested in running own business and respondents not interested in running own business. Rest of comparisons were statistically insignificant. This effect explained 10% of dependent variable's variance. Compared means were illustrated in figure 3.

Table 6. Comparison of scores of beliefs and attitudes towards social economy

	Interested in running own business (n = 42)		Not interested in running own business (n = 25)		Not sure (n = 36)				
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
The development of the social economy is an important factor in the economic development of the country	3,60	0,94	4,00	0,87	3,89	0,98	1,74	0,181	0,03
In the coming years, companies in Poland will take more social actions than they do now	3,76	0,93	3,80	1,12	3,75	0,81	0,02	0,978	0,00
I am interested in setting up an enterprise operating in the social entrepreneurship sector	3,02	1,20	2,12	1,05	2,53	0,91	5,84	0,003	0,10
I am interested in working in an enterprise operating in the social entrepreneurship sector	3,20	1,22	3,04	1,08	2,86	1,00	0,88	0,417	0,02

Source: own research

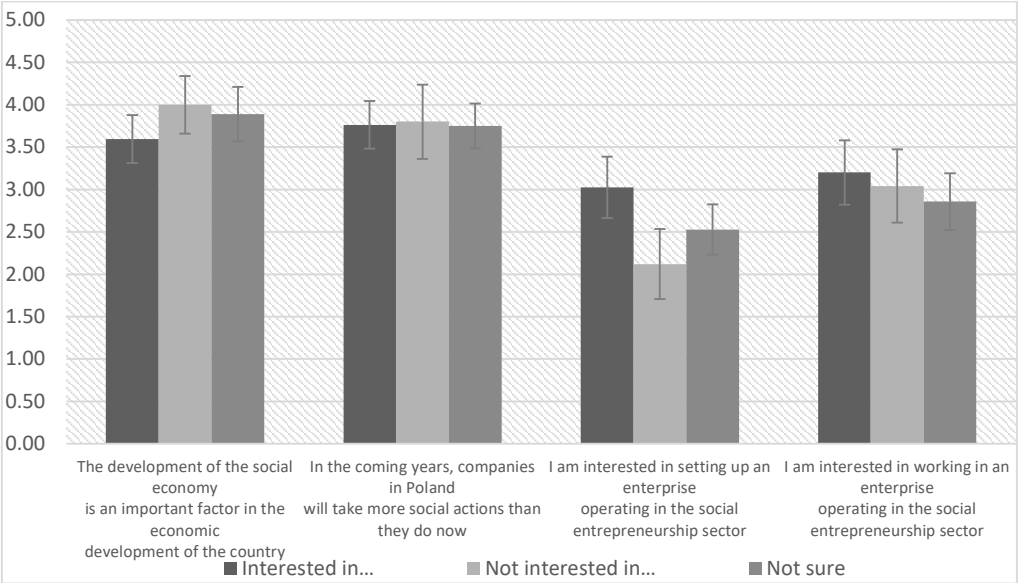

Figure 3: Means of beliefs and attitudes towards social economy scores with 95% confidence intervals divided by compared groups.

Conclusions and Discussion

The social economy is often portrayed as a counterbalance to neo-liberalism, but in fact, from the perspective of academic research, it is a broad and multifaceted phenomenon. Researchers should concentrate on showing its impact and social value in a creative and attractive way in order to foster its development and promote it among young people. Local and national authorities, agencies and international foundations have long been involved in the social economy as part of their activities aimed at sustainable development, recognising the potential of this type of economy to eradicate poverty in the word (Waghid, Oliver, 2017). The development of SSE has also been a permanent theme of the Polish economic policy (Act No. 11…, 2019). What is more, social enterprises can benefit from a number of EU support schemes (Ekonomia społeczna…, 2019).

The new "second wave of the social economy constituted one of the fundamental institutional responses to the crisis of the welfare state as well as the challenges of globalisation" (Rymsza 2007). This raises the question whether there will be a "third wave of the social economy" in response to the economic crisis sparked by the coronavirus pandemic. Will this type of economy change its nature and can we expect a stronger presence of innovative companies? For this to happen, the social economy would have to be made attractive for young, educated and creative people who are open to the world and social problems.

Current socio-economic changes call for new innovative solutions that would contribute to building a stronger society. On the one hand, it is claimed that the ongoing coronavirus pandemic, global economic lockdown and local restrictions on economic activity, all of which decrease company revenue, increase unemployment and exacerbate the related social problems, may contribute to strengthening social bonds and pro-social behaviour as people want to help those in need. On the other hand, there is a rise in aggressive and criminal behaviour and a return to the principles of "hard" capitalism manifested in restricted employee rights and job cuts. The research presented in the article was focused on the opinions that students, as potential entrepreneurs, have on the social economy and social entrepreneurship. Unfortunately, awareness of the benefits resulting from this type of activity is not high among young people. Hence, it seems that it is worthwhile to strengthen educational efforts in this area. Courses teaching the fundamentals of classic economics should also focus on meeting social needs not only though social transfers but also by professional activation of people who are unemployed and professionally inactive. Students should be aware that while the market is an important element organising social life and the exchange of goods, "market alone is not the answer to all the problems of the modern world" (Manifest, 2008)).

The author hopes that the case study results presented in the article will enrich knowledge about young people's awareness of the existence of the social economy and improve their attitude towards it. Moreover, the author plans to repeat the study at the beginning of 2021 in order to verify how the experiences of young people related to the global pandemic might have influenced their attitude to the growth of the social economy.

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COVID-19 Lockdown and IT-Powered Reporting: An Enabler, Irrelevant Factor, or Something in Between?

Bartlomiej GAWIN
Department of Business Informatics, University of Gdansk, Sopot, Poland
bartlomiej.gawin@ug.edu.pl

Bartosz MARCINKOWSKI
Department of Business Informatics, University of Gdansk, Sopot, Poland
bartosz.marcinkowski@ug.edu.pl

Abstract

This practitioner research insight explores how the usage patterns of reports targeted at internal decision-making evolved upon imposing COVID-19 restrictions Europe-wide that led to temporary Home Office conditions in a number of countries. The experiences of a multi-national Facility Management group are discussed. The contribution identifies some short-term corrective measures and provides the rationale for permanent post-lockdown changes.

Keywords: Reporting, Business Analytics, Facility Management, COVID-19, Organizational Change.

Introduction

Facility Management (FM) might be considered a profession targeted at enhancing business productivity and efficiency of customer companies while focusing on the specific needs and demands of workplaces as well as managing corporate social responsibility (Caryl, 2018). In recent years, managing the built environment began to be associated with newer and newer areas – just to mention in-depth data analysis (Konanahalli et al., 2018) as well as setting up telemetry and power consumption benchmarking (Gawin and Marcinkowski, 2017). The trend is expected to continue, as the necessity to integrate extensive knowledge management services for both internal and external use is highlighted by reputable bodies that monitor the FM market (Mehdi, 2018). Therefore, it is without little doubt a multi-disciplinary and highly IT-reliant business domain.

Whereas a bulk of FM companies still struggle with improving traditional FM services, integrating distributed IT solutions, increasing the quality of data being collected, setting up telemetry infrastructure, and backing up these activities with adequate staff competencies, the current market landscape calls for establishing effective mechanisms for making decisions based on data. Increasing the maturity of Big Data solutions in current use or under development shall enable broadening the range of determinants used within the analytics of how a given facility or group of facilities works, forecasting the life cycle of assets more reliably, increasing the transparency of reporting and shifting the center of gravity for compliance with standards and best practices from manually filled-in reports towards digitization and automatically calculated indicators. According to Ankerstjerne (2019), FM shall act in the future more as a provider of adequate data – and FM departments in organizations will probably know more about what is happening in the workplace than any other department, including Human Resources (HR) and IT. From both a final recipient and an operational employee point of view, reporting is at the heart of this process.

The outbreak of the COVID-19 pandemic caused by the SARS-CoV-2 virus in late 2019 and progressive lockdown in various countries significantly influenced the availability of retail and office spaces and flows of FM services, leading to a reviewing of current FM industry forecasts. Thus, the purpose of this contribution is confronting the utilization of FM reports put to work internally by a multi-national FM company to support decision-making with the reality of remote

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work forced by the lockdown – along with its implications for the post-lockdown era. As the current contribution focuses on the practitioner's perspective, empirical data were collected as a part of a single-unit case design (Yin, 2017) that constitutes a useful method for exploring typical and/or extreme cases (Molka-Danielsen, Engelseth and Le, 2017) across various industries. After the introduction, the business setting is discussed. Subsequently, findings are presented, followed by conclusions.

Business Setting

The SESCOM Group provides a diverse portfolio of FM services to its European partners through several subsidiaries. Group's Operations departments organize, supervise, and settle the performance of field works throughout distributed commercial facilities networks. These works are carried out by technical services specialized in many fields; just to mention air conditioning, ventilation, heating, refrigeration, electricity, and energy efficiency. To monitor the course of FM processes at their various stages, SESCOM employees use a number of reporting templates, e.g. regarding the monitoring of service events, material flows, and progress in clearing FM activities. In particular, the aforementioned report templates enable the staff to monitor:

- operational processes (e.g. monitoring of failure response times);
- logistics processes (e.g. monitoring of component delivery times);
- management processes (e.g. monitoring of task accomplishment times by employees).

The measures undertaken across the European Union due to the spread of SARS-CoV-2 forced SESCOM management to rely heavily on remote work. Such mode covered not only the entire staff of the headquarters but all the contractors and offices located in Poland. Not all subsidiaries were affected equally, as the Polish containment strategy might be considered firm compared to other major markets that SESCOM Group operates on. It included the closure of borders (that impacted the logistics), shopping facilities (which constitute a significant share of customers), cinemas and cultural institutions, educational institutions – and ultimately resulted in a general confinement policy.

Switching the headquarters to remote work and handling business processes for the entire organization remotely required preparatory steps in a couple of areas: HR and technical. As HR is concerned, it proved vital (1) to make the staff at all levels ready to perform tasks safely while being restricted to their homes, which included a series of targeted training sessions; as well as (2) to establish mechanisms for setting goals (for management staff) and tasks (for specialists) and verifying the progress of their accomplishment. On the other hand, preparations that fall into the technical area featured (1) equipping employees with hardware and specialized software for remote work; and (2) providing the staff with access to a teleconferencing environment with other employees and customers. A Crisis Unit was established for the duration of the pandemic. It was tasked with monitoring the development of the situation constantly, analyzing input from the business environment, and taking actions that correspond with fluctuations in the impact of the lockdown on the business.

Findings

Home office conditions are associated with the risk of introducing distractions and thus reducing the productivity of the workforce due to fear and anxiety (de Oliveira, Orrillo and Gamboa, 2020). Nevertheless, losing access to key information and disrupting the decision chain pose equally high risks. As remote work in isolation – depending on the lockdown measures in force at a given moment – prevented or limited the possibilities of organizing face-to-face meetings, maintaining the hindered information flow relied solely on the contents of reports. Such a shift of reporting role from an input to a discussion towards a major decision-making factor did not necessarily have to radically affect the total number of downloaded reports, as the group widely used such content before. That being said, a number of changes in habits and usage patterns were detected after benchmarking the average number of daily report downloads across Q1 of 2020 against Q1 of 2019. First of all, the hourly distribution of downloads changed visibly (Fig. 1). Whereas in the previous year the employees used report-based analytics more eagerly in the afternoon, after the lockdown measures were forced, the download peaked in the early morning.

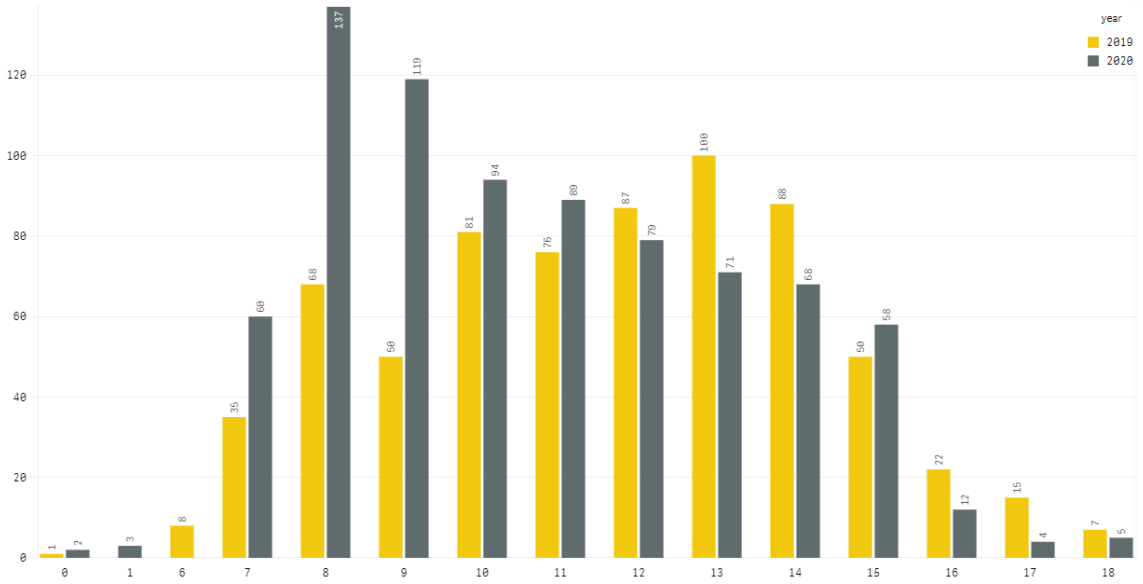

Fig. 1: Report downloads per hour

Secondly, report usage per user changed significantly. Generally speaking, in order to make themselves prepared for online meetings and back up decisions with relevant data, most of the 55 users that downloaded at least a single report during any of the quarters under analysis either intensified their report usage or initiated working with reports from scratch. Yet some users ceased their report usage altogether. After more in-depth analysis it was revealed that in some organizational units selected employees positioned themselves as a kind of “report hubs”, causing huge spikes and bringing down the downloads of other members of these units. The phenomenon arose around users who had already routinely used such analyses before. In the most extreme cases, an increase in report downloads of 320% and 275% respectively was observed (see Fig. 2). Users positioned as managers tended to narrow down their report-related activity. While such a phenomenon leads to enhancing communication within the organization both along horizontal and vertical paths, top-level management considered such voluntary data exclusion in terms of an organizational issue.

	2020																				
Hour → ↓ Username	0	1	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
No. of reports	**2**	**3**	**0**	**60**	**137**	**119**	**94**	**89**	**79**	**71**	**68**	**58**	**12**	**4**	**5**	**3**	**3**	**6**	**4**	**4**	**Total**
User_28	-	-	-	-	2	-	7	3	1	-	4	3	-	-	-	-	-	-	-	-	**20**
User_29	-	-	-	-	0	0	0	2	1	1	2	1	0	1	1	0	1	-	-	-	**10**
User_30	-	-	-	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	**0**
User_31	0	-	-	-	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	**0**
User_32	-	-	-	-	2	2	0	2	2	2	1	2	1	0	-	-	-	-	-	-	**14**
User_33	-	-	-	-	-	-	2	1	-	-	1	1	0	0	-	-	-	-	-	-	**5**
User_34	-	-	-	-	1	-	4	7	2	1	1	2	3	-	-	-	-	-	-	-	**21**
User_35	-	-	-	4	6	9	2	1	4	3	4	-	-	-	-	-	-	-	-	-	**33**
User_36	-	-	-	-	0	3	-	0	-	-	-	0	-	-	-	-	-	-	-	-	**3**
User_37	-	-	-	1	0	0	1	4	1	1	0	0	0	-	-	-	-	-	-	-	**8**
User_38	-	-	0	-	7	8	4	4	4	6	7	2	1	-	-	-	-	-	-	-	**43**
User_39	-	-	0	37	31	7	6	12	4	9	11	3	-	-	-	-	-	-	-	-	**120**
User_40	-	-	-	2	3	6	3	9	2	5	5	-	-	-	-	-	-	-	-	-	**35**
User_41	-	-	-	-	1	3	1	5	1	1	1	3	-	-	-	-	-	-	-	-	**16**
User_42	-	-	-	-	-	3	-	-	8	1	6	-	-	-	-	-	-	-	-	-	**18**

	2019																				
Hour → ↓ Username	0	1	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
No. of reports	**1**	**0**	**8**	**35**	**68**	**50**	**81**	**76**	**87**	**100**	**88**	**50**	**22**	**15**	**7**	**3**	**5**	**8**	**10**	**2**	**Total**
User_28	-	-	-	-	0	-	0	0	0	-	0	0	-	-	-	-	-	-	-	-	**0**
User_29	-	-	-	-	2	2	4	7	1	1	6	3	1	5	1	2	0	-	-	-	**35**
User_30	-	-	-	4	4	2	8	7	8	4	4	-	-	-	-	-	-	-	-	-	**41**
User_31	1	-	-	-	2	-	-	2	-	2	2	2	1	2	5	1	2	1	7	1	**31**
User_32	-	-	-	-	0	0	12	1	3	11	0	3	4	1	-	-	-	-	-	-	**35**
User_33	-	-	-	-	-	-	1	0	-	-	0	0	2	2	-	-	-	-	-	-	**5**
User_34	-	-	-	-	0	-	0	0	2	3	0	0	0	-	-	-	-	-	-	-	**5**
User_35	-	-	-	3	3	7	5	2	3	6	2	-	-	-	-	-	-	-	-	-	**31**
User_36	-	-	-	-	1	0	-	1	-	-	-	3	-	-	-	-	-	-	-	-	**5**
User_37	-	-	-	1	7	8	13	5	8	11	21	7	3	-	-	-	-	-	-	-	**84**
User_38	-	-	1	-	4	0	1	0	2	2	1	3	0	-	-	-	-	-	-	-	**14**
User_39	-	-	2	6	7	1	1	3	7	2	2	1	-	-	-	-	-	-	-	-	**32**
User_40	-	-	-	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	**0**
User_41	-	-	-	-	3	1	2	0	1	0	0	2	-	-	-	-	-	-	-	-	**9**
User_42	-	-	-	-	-	0	-	-	0	0	0	-	-	-	-	-	-	-	-	-	**0**

Fig. 2: Report downloads per user (excerpt)

On top of that, it was observed that people working in the same positions switched their reporting-related needs to a significant degree (see Fig. 3). Whereas managers focused more on high-level reporting, a wider portfolio of reports was put to use across the entire staff base. Among a total of 180 available reports, the coverage increased from approx. 57% to 69%. Whereas more state comparison and margin-related reports were requested, the peak related to the analytics of international phenomena. On the other hand, some reports targeted at certain customers and/or events were discontinued during the lockdown.

	2020																			
Hour → / ↓ Report name	0	1	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
No. of reports	**2**	**3**	**0**	**60**	**137**	**119**	**93**	**88**	**79**	**70**	**68**	**58**	**12**	**4**	**5**	**3**	**3**	**6**	**4**	**4**	**Total**
Filters assigned to HVAC devices in Hungary	-	-	-	-	0	3	0	1	0	0	1	3	2	-	-	-	-	-	-	-	**10**
Number of working service hrs of technicians	1	1	-	3	1	11	6	9	3	6	5	2	0	2	2	1	-	1	0	2	**56**
Number of invoices requiring authorization	0	-	-	0	1	0	2	0	-	0	0	1	0	0	0	0	0	0	0	0	**4**
Total costs of the Logistics Office	-	-	-	-	-	3	4	-	2	3	-	-	-	-	-	-	-	-	-	-	**12**
Service Office Costs	-	-	-	-	1	3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	**7**
Total costs of Technical Office	-	-	-	-	-	3	1	-	10	1	6	-	-	-	-	-	-	-	-	-	**21**
Indirect costs - Accounting and Finance Department	-	-	-	-	0	-	0	-	-	0	0	-	-	-	-	-	-	-	-	-	**0**
Indirect costs - ISO & OHS	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	**3**
Indirect costs - Marketing	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	**3**
Indirect costs - Main warehouse	-	-	-	-	0	0	-	-	-	2	0	0	0	-	-	-	-	-	-	-	**2**
Indirect costs - Coordination Department	-	-	-	-	1	1	0	1	0	2	1	2	0	-	-	-	-	-	-	-	**8**
Indirect costs - Technical Department	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	**2**
Indirect costs - Logistics Office	-	-	0	0	2	3	3	1	0	2	0	0	-	-	-	-	-	-	-	-	**11**

	2019																			
Hour → / ↓ Report name	0	1	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
No. of reports	**1**	**0**	**8**	**35**	**68**	**50**	**81**	**76**	**87**	**100**	**88**	**50**	**22**	**15**	**7**	**3**	**5**	**8**	**10**	**2**	**Total**
Filters assigned to HVAC devices in Hungary	-	-	-	-	1	1	4	5	3	6	1	0	0	-	-	-	-	-	-	-	**21**
Number of working service hrs of technicians	0	0	-	1	3	4	2	5	3	5	5	3	2	4	1	0	-	4	2	1	**45**
Number of invoices requiring authorization	1	-	-	2	4	1	2	5	-	10	2	2	1	2	5	1	2	2	7	1	**50**
Total costs of the Logistics Office	-	-	-	-	-	0	0	-	0	0	-	-	-	-	-	-	-	-	-	-	**0**
Service Office Costs	-	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Total costs of Technical Office	-	-	-	-	-	0	0	-	0	0	0	-	-	-	-	-	-	-	-	-	**0**
Indirect costs - Accounting and Finance Department	-	-	-	-	2	-	1	-	-	1	2	-	-	-	-	-	-	-	-	-	**6**
Indirect costs - ISO & OHS	-	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-	**0**
Indirect costs - Marketing	-	-	-	-	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Indirect costs - Main warehouse	-	-	-	-	1	4	-	-	-	0	5	1	1	-	-	-	-	-	-	-	**12**
Indirect costs - Coordination Department	-	-	-	-	1	0	7	2	3	11	4	4	2	-	-	-	-	-	-	-	**34**
Indirect costs - Technical Department	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-	**0**
Indirect costs - Logistics Office	-	-	2	2	1	4	1	6	12	12	15	2	-	-	-	-	-	-	-	-	**57**

Fig. 3: Report downloads per report type (excerpt)

Conclusions

The reporting potential in place proved to be a factor that without doubt assisted the company to successfully adjust its operations to the lockdown conditions. Superiors expressed the opinion that despite meetings being virtual and lack of direct access to a large share of hardware and facilities, employees at various levels were better prepared for meetings and had information enabling them to make effective decisions. That being said, neither did the COVID-19 pandemic revolutionize the workflows, nor the experiences of the SESCOM Group justify considering it to be a main driving force behind setting up market-ready solutions for supporting remote work in such a short timeframe. It should be noted that the fact is analysis was based on a single company inhibits the possibility to generalize the results (Lech and Zamojska, 2017). However, the findings may induce businesses that lack similar solutions to initiate their organic development in this regard or to purchase a generic reporting solution from one of the vendors. It can also drive, as it was in SESCOM's case, increasing both technological and organizational maturity in that regard in the long run.

Scrutinizing reports' usage made the management aware that the company needs to develop highly targeted procedures for working with reports that improve work efficiency (including dealing with "time thieves" during Home Office) and transparency. In particular, the company expects a 15% increase in future operational event handling times due to their more accurate verification, analysis, and monitoring. The feedback led to identifying office positions that achieved benchmarks for performance during the Home Office – ultimately enabling the establishment of groups that carried on performing their duties remotely in post-lockdown conditions and limiting office and parking spaces.

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Relationship Between Internet Use and Student Academic Engagement: Analysis on Romanian Youth

Laura BENCHEA

Bucharest University of Economic Studies
Bucharest, Romania
laura.benchea@rei.ase.ro

Abstract

In this age of technological imperative, the Internet has significantly impacted all areas of society and has transformed the ways things are done, businesses are conducted and educational goals achieved. The rapid expansion of information and communication technologies (ICT) in the educational field (schools and universities) over the latest decades demonstrate that new technologies are highly integrated within the educational process, with a huge impact on learning and teaching. Moreover, the internet has gained significance as a socializing tool, becoming a solid virtual platform for entertainment and social interaction. The benefits of the Internet have been highly praised in numerous research papers (such as rapid access to information and other learning resources), but a growing literature has demonstrated its negative effects especially related to its excessive use which adversely affects one's health (addiction, psychological distress exhaustion), social life (social isolation) or academic performance (lower engagement and lower grades). From this perspective, the internet as an educational tool can be a double-edged sword, which can either develop or impede students' academic engagement and, consequently, their educational performance. In this context, the study aims to analyze the dynamics of Internet use among Romanian youth and to assess the relationship between the Internet use and their academic engagement.

Keywords: Learning, Internet, Academic Engagement.

Introduction

Over the latest decades, the Internet has gained a significant role in the educational process, being one of the most used technologies for learning, teaching or research purposes. The introduction of the Internet in the educational system was intended to promote learning and knowledge acquisition through the easy access to information and different learning resources. All these useful educational tools came along with opportunities of entertainment and distractions which, misused or incorrectly understood, have a negative impact on the educational process and students' psychological development. Based on such observations, this study aims to determine the relationship between the Internet use and student academic engagement of Romanian youth. The hypothesis is that students mainly use the Internet for entertainment (movies, games, news, online shopping) and social media (Facebook and Instagram) to the detriment of proper online learning. Greater awareness of student practices inside and outside the classroom could inform the development of pedagogical tools meant to assist students' cognitive development while drawing on those practices in a way which makes them more relevant for student learning. Research findings as well as personal observations revealed decreasing student engagement in academic activities because of, among other factors, their intense preoccupations in the online sphere. This issue could inform the implementation of learning experiences that are more appealing to students. Based on my experience and observations, I have developed the following hypothesis which underpins the present study: students who spend more time on online activities (internet) will have less time to study and therefore their academic engagement and performances will diminish.

Research Questions

1. What do Romanian youth use the Internet for?
2. Are there any gender differences in the Internet use?
3. Is there any relationship between the internet use and the academic engagement of Romanian youth?

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Objectives:

1. To identify students' main purposes and interests for Internet usage;
2. To illustrate the positive and negative effects of the Internet usage on youth (from psychological, social and intellectual perspective);
3. To examine the relationship between Internet usage and the academic engagement of Romanian youth.

Methodology

This research is based on a secondary analysis of the data collected in 2014 by the Friederich Ebert Stiftung (FES) - a cultural non-profit institution, at a country level. Based on the data collected, a report entitled "Romanian youth: concerns, aspirations, attitudes and lifestyle" was issued in 2014. The data was collected using face-to-face interviews, questionnaires and focus-groups with Romanian youth (1302 respondents, aged 15-29, from different Romanian regions) with the purpose of identifying their values, lifestyles, aspirations, educational achievements or political implication. For the current study, I selected the data related to the topic, respectively information about the Internet use and their academic engagement (for those who are enrolled in the educational system).

Internet as an instrument for Education

There is a growing literature which studies the use of the Internet for educational purposes, underlying its important role in providing academic and scientific information, as well as social connection and entertainment. It is unquestionable that the Internet has shaped the way how teaching is provided and learning is achieved, and it also stimulated the change of mentalities, opened new opportunities for acquiring and delivering information, and enlarged the access to unlimited knowledge.

The benefits of Internet in education

Numerous studies have focused on the positive impact that the Internet has on teaching and learning. It was invented in the early 1960 with the scope of exchanging information on R&D in the military and science. Currently, it is the largest information infrastructure, holding more than 1.8 billion websites (www.internetlivestats.com, 2020) and other technological related products.

Supporters of the Internet as an essential tool for nowadays education believe that it provides major benefits in terms of academic performance. It provides an ocean of information on almost any subject nearly instantly. According to Deore (2012), having access to almost any information and the latest news keep students connected to the real world and this helps them make better decisions for their lives. An early and consistent report on the impact of Internet on education was issued by UNESCO in 2003. Back then the report identified the advantages as well as the drawbacks of the Internet in the education sphere and the scientific work. Among the advantages, the report mentions the quick access to information, data and references, rapidity in information retrieval, networking between participants, access to diverse databases, didactic efficacy by delivering materials through electronic means.

Internet in Education: Negative Outcomes

Cognitive and psychological effects of Internet usage

A number of researches demonstrate that a human's learning capacity may be severely damaged by brain overloading with diverse online stimuli. More information doesn't necessarily imply more knowledge. How do all the ingenious apps we depend influence us to find and assess the relevant information and to fulfill our cognitive tasks? In 2008, a Dutch psychologist, Cristof van Nimwegen carried out a study using computer-based learning in which two groups of volunteers had to solve a complicated puzzle. One of the two groups received soft-based assistance while the other group was given no help, suggestions or any other assistance to solve the puzzle. Initially, the soft assisted group made more rapid moves but as the game advanced, the skills of the other group developed as they were forced to rely only on their own intellectual capacities. Results showed that those who worked without assistance were able to anticipate the game, to design a strategy, were more focused and eventually identified better solutions. On the other hand, the more the other participants relied on software guidance in task solving, the less they learned and were able to rely on their own cognitive abilities. In van Nimwegen's conclusion, the more we

"externalize" problem solving to computers, the more we reduce the brain's capacity to build stable structures of knowledge (schemes) which can subsequently be applied in new circumstances (Carr, 2012).

The perils of Multitasking

Web browsing implies an intense form of multitasking because every time one shifts their attention from one subject to another the brain must reorganize, using more mental resources. As Maggie Jackson explains in "Distracted" (2008), a book on multitasking, the brain needs time to switch tasks, to remind the rules needed for the new task and to block the cognitive interference of the previous task, still in force. Even more, a simple exchange between two tasks may significantly increase the cognitive load, hindering thinking and increasing the probability to overlook or misinterpret relevant information (Foerde, Knowlton and Poldrack, 2006).

Studies in the field also emphasize that people tend to move quickly from one web page to another. A longitudinal study conducted by a group of researchers from the University College in London examined two popular research sites that give access to scientific articles, electronic books and other academic tools. They discovered that users displayed a "discontinuous form of activity" in which they rapidly jumped from one source to another, reading one or two pages at most from one article or book before moving to another site. "It is apparent that users do not read online in the traditional way; it seems that there emerge new types of reading and people go online to avoid traditional reading" (Carr, 2012). Students developed the ability to rapidly scan the needed information, but the time spent with deep and focused reading constantly diminished. According to Anderson (2009), the reasons why people spend so much time online is that there are numerous benefits in terms of work and pleasure and it is already too late to retreat in quieter times. On the other hand, Jordan Grafman a physician specialized in neurological disorders explained that improvement in the human capacity to solve multiple tasks impedes their deep thinking and creativity (Carr, 2012). Certainly, the Roman philosopher Seneca resumed it better 2000 years ago when he asserted that "Being everywhere means being nowhere".

Internet Addiction

The benefits of the Internet have been highly praised in numerous research papers, but a growing literature has demonstrated its negative effects especially related to its excessive use which adversely affects one's health, social life or academic performance. A study form 2006 (Mafe and Blass cited in Akhter, 2013) showed that the university students (aged 19-24) are more at risk of becoming Internet addicted as, during this period, they have more spare time and they are less monitored by their parents.

Akhter (2013) investigated the relationship between Internet addiction and academic performance of university undergraduates. He discovered that the excessive use of the Internet has a negative impact on the academic performance as it increases the probability to miss classes and, consequently, to get lower grades. Good academic results imply physical health, time management and hard work (for exams, assignments or group projects). This is why students who spend much time in online activities have little or no time for studies (Griffith, 2000 cited in Akhter, 2013). Other explanations point out that students lose their concentration most probably as a result of late night Internet sessions (Frangos and Frangos, 2009 cited in Akter, 2013).

Among the most important psychological disorders associated to Internet addiction, psychologists pointed out to depression, anxiety, loneliness and social isolation (Akhter, 2013). One of the most important studies on the relationship between depression and internet addiction was carried out by Young and Rogers in 1998. They discovered that there is a connection between Internet addiction and some characteristics attributed to depressives (low self-esteem, weak motivation, fear of being rejected and need of approval). One reasonable explanation is that the Internet, especially online communication, might help them overcome the interpersonal communication deficit in real life.

Student Engagement in the Internet Era

The concept of *student engagement/involvement* was coined by Astin in 1984 and defined as "the amount of physical and psychological energy that the student devotes to the academic experience. Thus, a highly involved student is one who, for example, devotes considerable energy to studying, spends much time on campus, participates actively in student organizations, and interacts frequently with faculty members and other students." (Astin, 1984). Today, engagement is no longer confined to the time and energy dedicated to educational

achievements, but includes investment in collegiate experience, online interactions with peers and involvement in other educational activities.
As social media are conceived as platforms for engagement and because students spend much time using these networks, several researches tried to examine the relationship between Facebook use, for example, and student engagement and how it affects students' success in the academic sphere. A study carried out in 2011 and entitled "Too much face and not enough books: the relationship between multiple indices of Facebook use and academic performance" (Junco, 2011) addressed this issue and found out that students who spend more time on Facebook have less time to study and therefore achieve lower academic performance (reflected in lower grades). These results are consistent with other findings (Astin, 1984) which demonstrate that academic success is dependent upon the time and energy invested in academic work. Therefore, the time spent on social media (Facebook, Instagram) might not be in itself a problem, but it prevents students from engaging more time in studying and researches show clear that engagement influences academic performance.

There are other studies which demonstrate that the amount of time students spend on Facebook (the most popular social networking) significantly influences their academic success. A survey conducted in the United States (Dahlstrom et al., 2011) on 3000 students reported that 90% of the college students were using Facebook and this *over involvement* had a negative impact on their academic performance as they had decreased time to study and a lower attention channeled towards academic activities (Ellore, Niranjan and Brown, 2014).

Data from Internet World Stats (2017) show that, in Romania, Facebook is the social network with an explosive growth over the past years, registering 8,900,000 users at the end of 2018. Even though not much research has been conducted on how social media impacts students' learning, it is apparent that it has become almost ubiquitous in Romanian universities. Some researches show that the reason why this social networks are so popular among students resides in the positive relation with forming and increasing social capital (Ellison, Steinfield and Lampe, 2011) while others (Valenzuela, Park and Kee, 2009) discovered that there is a relationship between civic participation, social trust and the intensity of Facebook use (studies cited in Junco, 2015).

Related to the relationship between the Internet use and academic engagement, there was a study carried out in 2011 on Romanian students who benefited a governmental voucher to purchase a computer. The study showed that students used the computers mainly for playing games, therefore remaining little time for homework, reading or other educational activities. Consequently, these students registered a decline in their academic achievement, scoring lower grades at Math, English and Romanian (the main subjects studied in schools). The study emphasizes that, despite the good intention to achieve educational purposes and increase knowledge, most of the students used their computers for entertainment and this attitude led to lower academic results (Malamud, Pop-Eleches, 2011).

Results

This research is based on a secondary analysis of the data collected in 2014 by the Friederich Ebert Stiftung (FES) - a cultural non-profit institution, at a country level. Based on the data collected, a report entitled "Romanian youth: concerns, aspirations, attitudes and lifestyle" was issued in the same year. The data was collected using face-to-face interviews, questionnaires and focus-groups with Romanian youth (1302 respondents, aged 15-29, from different Romanian regions) with the purpose of identifying their values, lifestyles, aspirations, educational achievements or political implication. For the current study, I selected the data related to the topic, respectively information about the Internet use and their academic engagement (for those who are enrolled in the educational system).

Data show that Romanian youth use the Internet mainly for social networks, but also as a source of information. Those aged over 25 are using the Internet for information related to their jobs or for online shopping. Not surprisingly, 9 out of 10 teenagers use the Internet for the social media platforms.

Table 1: Main purposes for Internet use

For work	23%
Reading news online / getting information	20,2%
Access to social networks (Facebook, Instagram)	40,4%
Looking up information	3,4%
E-mail	1,0%
Watching videos /listening to music	1,0%
Downloading films/books	2,0%
Video games	5,0%

About half (46,5%) of the young Romanians who were involved in this study were integrated into an educational structure (school, high school, university, master or PhD). The other half (over 25 years old) graduated at a certain level, most of them entering the job market. According to the survey, the young Romanian people devote little time to individual study. About half of the youth surveyed spend less than two hours per day on educational activities outside the classrooms, and only 21% study three hours or more per day (Table 2).

Table 2: Time devoted to study per day

Up to 1 hour	11,3%
1-2 hours daily on average	12,4%
2-3 hours daily on average	11,4%
3-4 hours daily on average	6,4%
More than 4 hours daily	3,4%
DK/NA	1,5%
Total	**46,2%**

An interesting aspect derived from the data analysis is that the TV and Internet use among the Romanian youth is correlated with some family characteristics such as parents' level of education and the perceived social class they belong to. Briefly, the more educated the parents are or the higher the class they belong to, the lesser time their children spend in front of the TV and the more time for online activities. For example, almost one third (32,4%) of the young people interviewed whose fathers have postgraduate studies never watch TV, but almost 30% of them spend more than 6 hours a day on the Internet. It can be underlined that TV is preferred by young people whose parents have a lower educational level or belong to a disadvantaged social class while the Internet is mostly used by those whose parents have superior educational attainments or belong to a better social class (FES, 2014). A possible explanation could be that poorer families can afford TV stations as compared to computers, the cost of utilization is cheaper and it doesn't require too much knowledge. In addition, the Internet usage is closely related to some liberal professions and its associated educational forms.

Analyzing the gender differences, data show that 30% of women spend three or more hours per day engaged in individual study as compared to 13% of men. Moreover, the data illustrate that 50% more women than men study between two and three hours per day. This outcome along with the extra effort and enthusiasm engaged by girls in accomplishing their educational activities may indicate the gender discrepancy in terms of educational results.

Consistent with other studies (Tsai et al., 2009; Akhter, 2013), the data collected on Romanian youth show that men spend more time than women in online activities (about 43% of men spend more than 4 hours a day on the Internet as compared to 34% of women). According to FES (2014), young men usually use the Internet for news or online games while women tend to browse for work related activities or for social media.

Table 3: Gender difference in Internet use

	Up to 1 hour	**Up to 2 hours**	**Up to 3 hours**	**4 hours or more**
Men	12,4%	19,2%	25,7%	**42,7%**
Women	19,4%	20,9%	25,5%	**33.9%**

Related to the academic results, the average score obtained by the interviewed in the previous year is 8.35 (FES, 2014). The best average score (8.4) is obtained by the group associated with undergraduates and graduates (college and master students, aged 20-24) On average, women in the sample got 0,6 points more than men, a statistically significant difference (the average female score is 8.63 while male got 8.01 in the year before the study).

The data show that here are also differences between the educational forms (levels). Overall, postgraduate students (enrolled in master or PhD programs) have better grades than the others (Figure1). However, the differences are not statistically significant because of the reduced sample of the students enrolled in post university courses (3%).

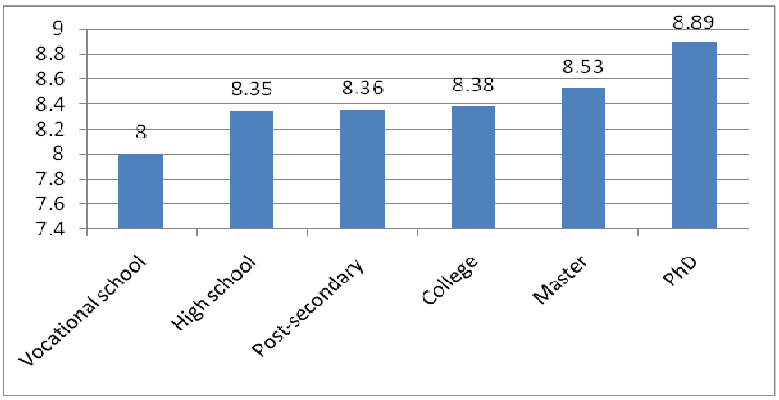

Figure1: Grade point average on educational level

The hypothesis which underpins the present study is that students who spend more time in online activities (internet) will have less time to study and therefore their academic engagement and performances will diminish. In order to establish if there is any relationship between the Internet use and student academic engagement, I had as reference the theory of student engagement elaborated by Austin (1984) and the analysis of the data presented in the current study. According to Austin, a student's involvement in the academic work, for example, can be measured quantitatively (how many hours the student spends studying - the theory suggests that "the extent to which students can achieve particular developmental goals is a direct function of the time and effort they devote to activities designed to produce these gains"). In essence, the more time students spend on learning, the more they learn and the better their marks are. In order to identify if there is any relationship between the time spent on the Internet and the academic engagement (measured in time devoted to studying), two variables are measured and the relationship between them: the average number of hours spent a day on the Internet and the grade point average of the previous

year. Figure 2 indicates that there is a negative correlation between the two variables analyzed (Pearson Coefficient, -.062).

Correlations

		How many hours a day on average do you spend on the Internet?	What was your grade point average last year?
How many hours a day on average do you spend on the Internet?	Pearson Correlation	1	-.062
	Sig. (2-tailed)		.167
	N	1181	502
What was your grade point average last year?	Pearson Correlation	-.062	1
	Sig. (2-tailed)	.167	
	N	502	518

Figure 2: Correlation between the time spent on the Internet and the average grade point

Therefore, the analysis supports the hypothesis and shows that the more time young people spend on the Internet (for non-educational purposes), the lower their grades would be and consequently their overall academic performance.

Conclusions

The rapid expansion of information and communication technologies (ICT) in the educational field (schools and universities) over the latest decades demonstrate that new technologies are highly integrated within the educational process, with a huge impact on learning and teaching. The purpose of this study was to analyze the dynamics of Internet use among Romanian youth and to assess the relationship between the Internet use and their academic engagement. In this respect, I have formulated three research questions:

RQ1: What do Romanian youth use mostly the Internet for?
RQ2: Are there any gender differences in the Internet use?
RQ3: Is there any relationship between the internet use and the academic engagement of Romanian youth?

Research question 1:
Data show that Romanian youth use the Internet mainly for social networks, but also as a source of information. Those aged 25 and more are using the Internet for acquiring information related to their work or for online shopping. Not surprisingly, 9 out of 10 teenagers use the Internet for the social media platforms (Facebook and, more recently Instagram). These findings reveal that, irrespective of age, Romanian youth mostly use the Internet for entertainment purposes in the detriment of scientific and educational work and this prevents them from achieving better academic results. Other previous researches in the field (Ravizza, Hambrick and Fenn, 2014) showed that the Internet used for non-academic purposes influences learning and the overall student's academic performance.

Research question 2:
The data collected on Romanian youth show that men spend more time than women in online activities (about 43% of men spend more than 4 hours a day on the Internet as compared to 34% of women). Moreever, young men usually use the Internet for news or online games while women tend to use it for social media or for work related activities.

Research question 3:
Data analysis indicates that there is a negative correlation between the Internet use and the academic results of Romanian youth, which leads to the conclusion that the more time is spent on online activities, the lower the academic results would be. These findings are supported by other studies (Astin, 1984; Akhter, 2013) which demonstrated that the more time students spend on the Internet, the possibility to get lower grades is higher, as there is no much time left to invest in studies or other educational activities.

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Comparative Analysis of International Ranking Systems for Universities

Roxana - Adriana MECHNO
University POLITEHNICA of Bucharest, Bucharest, Romania, mechnoroxana@yahoo.com;

Cristian - Vasile DOICIN
University POLITEHNICA of Bucharest, Bucharest, Romania, cristian.doicin@upb.ro;

Gabriel PETREA
University POLITEHNICA of Bucharest, Bucharest, Romania, gabriel.petrea@upb.ro;

Diana SCURTU
University POLITEHNICA of Bucharest, Bucharest, Romania, diana_scurtu@yahoo.com;

Alexandru - Ionut BUZATU
University POLITEHNICA of Bucharest, Romania, alexandru.buzatu@upb.ro.

Abstract

In the last years, higher education institutions have joined the top international rankings to "measure" their performance, through comparisons. The aim of this study is to identify the main indicators and criterions that international rankings pursue to classify the universities around the world. Moreover, this study also proposes to identify the similarities and/or differences among the rankings. At the same time, where similarities will be identified, a higher attention will be directed towards the indicator's significance/magnitude. The study follows the impact of rankings that analyses higher education institutions which addresses larger fields such as research, technological innovation, the prestige of the institution etc. The study analyses five ranking systems, most relevant indicators, valuable input on the top of the first 10 universities for each ranking in 2019, provides the junction point of the 5 rankings taken into account and interprets the obtained results with respect to the context.

Finally, based on the worldwide universities analysis, an overview on these classification and ranking systems will be obtained in order to provide a clearer general picture.

Keywords: Ranking, Higher Education, Research, Innovation

Introduction

In order to understand this paper, a very clear description of the used terms is mandatory. Thus, classification, due to the Explanatory Dictionary of the Romanian Language, the term represents "the action of classifying itself and its results; distribution or systematic distribution through different criterions such as class or in a certain order; categorization", while *hierarchy* implies "to place in a hierarchical order; to establish a hierarchy (system of subordination of the lower elements, degrees, functions, authorities, etc. towards higher ones". Therefore, it can be noted that classification does not represent a ranking, compared to the hierarchy which, by definition, generates a ranking.

In his paper (2013), David Robinson [2] stated that "university hierarchies have minimized the complexity of higher education institutions, their outcomes and practices, on a simple value scale, which cannot really be a valid indicator of quality". Thus, it can be assumed that such hierarchies measure the financial well-being of higher education institution rather than their quality.

Looking at the history of the emergence of international rankings, it can be observed that the US News and Report Ranking appeared in 1983, concomitantly with the ranking of the Business Week MBA program. In 2003, the Academic Ranking of World Universities (ARWU) was introduced by Jiao Tong University from Shanghai, and nowadays is the most popular and elitist international ranking. The ARWU have designed this ranking in order to

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position Chinese universities in relation to the best international universities. In 2010, two other rankings that classifies universities around the world occurred, namely Times Higher Education World University Ranking - Thomson Reuters and QS World University Ranking. This was closely followed by the Center for World University Ranking (CWUR) which implemented their own top and classification of international universities.
Based on the statement above, and analyzing five international rankings, the present study focuses on the following aspects:

- similarities between the 5 most important and significant international rankings,
- ranking's elements of differentiation,
- comparation between rankings,
- comparation between universities,
- interpretation of the indicators.

US News and Report Ranking

Approximately 30 years ago, US News began ranking universities in the United States, which nowadays is expand globally. In this ranking, the indicators are divided into 3 categories, depending on their type, as follows [7]:

1. Bibliometric indicators (65%);
2. Institutional reputation (25%);
3. Scientific excellence (10%).

The assessment of indicators is performed using the data processed by Clarivate Analytics InCites™ or Web of Science and a logarithmic scale. Figure 1 depicts the main indicators for US News and Report ranking.

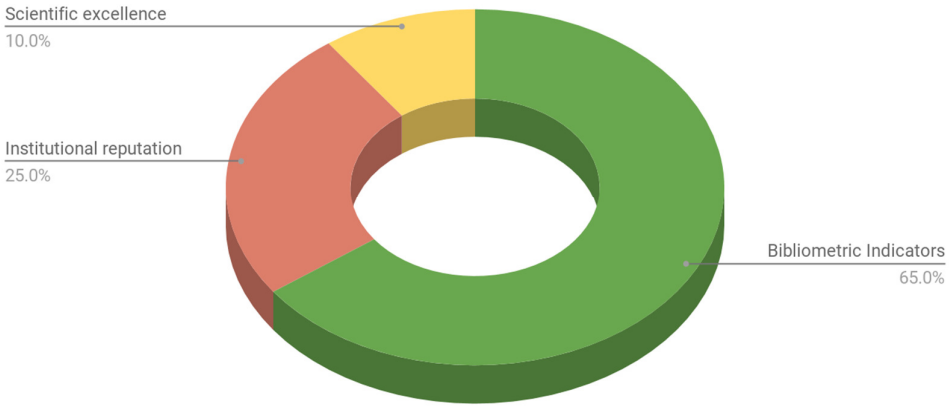

Figure 1: Indicator for US News and Report Ranking

As it can be seen in Figure 1, the US News and Report Ranking is based on the Bibliometrics, which is the strongest indicator when it comes to make a ranking. While for the institutional reputation and the scientific excellence a much lower percentage is attributed, of 25% and 10%, respectively, suggesting that attention is concentrated on publications, citations, books, conferences etc.

In table 1 are presented the top 10 institutions ranking, at the end of 2019, according to the US News and Report Ranking.

Table 1: Ranking of universities according to US News and Report Ranking

Number	*Name of institution*	*Country*	*Overall score*
1.	Harvard University	United States of America	100
2.	Massachusetts Institute of Technology	United States of America	98,4
3.	Stanford University	United States of America	94,9
4.	University of California - Berkeley	United States of America	90,3
5.	Oxford University	United Kingdom	87,2
6.	California Institute of Technology	United States of America	87,1
7.	Columbia University	United States of America	86,5
8.	Princeton University	United States of America	85,6
9.	Cambridge University	United Kingdom	85,5
10.	University of Washington	United States of America	85,3

Academic Ranking of World Universities – ARWU

As previously mentioned, ARWU is the most popular and known ranking of higher education institutions in the world. Given the city in which it is made, it is also known as the Shanghai Ranking. The indicators taken into consideration by those who compile this ranking refers to [4]:

1. Quality of faculty (40%);
2. Research output (40%);
3. Quality of education (10%);
4. Academic performance (10%).

In figure 2 are presented the main indicators taken into consideration by Academic Ranking of World Universities system.

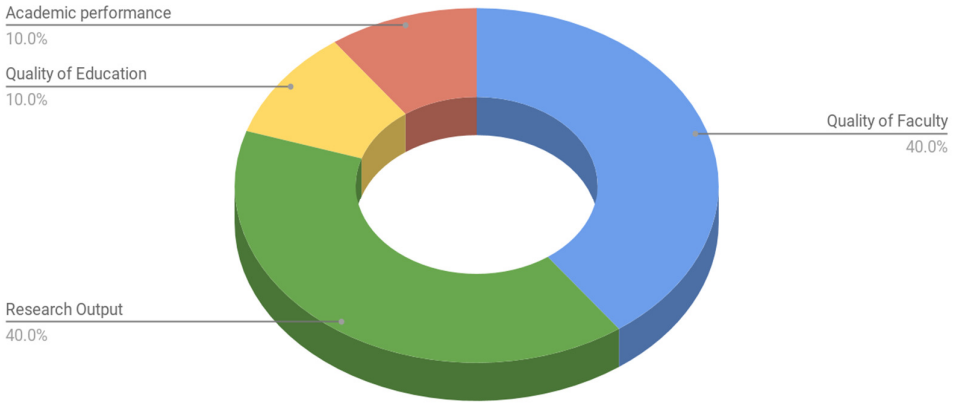

Figure 2: Indicator for Academic Ranking of World Universities

As shown in Figure 2, in the case of the international ARWU ranking, the most important indicators, Quality of Faculty and Research Output, respectively, have an equal share of 40%, while the Quality of Education and the Academic performance just 10% were attributed to each other.

In table 2 are presented the top 10 institutions ranking, at the end of 2019, according to the to ARWU.

Table 2: Ranking of universities according to ARWU

Number	*Name of institution*	*Country*	*Overall score*
1.	Harvard University	United States of America	100
2.	Stanford University	United States of America	75,1
3.	Cambridge University	United Kingdom	72,3
4.	Massachusetts Institute of Technology	United States of America	69
5.	University of California - Berkeley	United States of America	67,9
6.	Princeton University	United States of America	60
7.	Oxford University	United Kingdom	59,7
8.	Columbia University	United States of America	59,1
9.	California Institute of Technology	United States of America	58,6
10.	University of Chicago	United States of America	55,1

QS World University Rankings

QS World University Rankings is one of the classifications and ranking systems that is audited and approved by the Academic Ranking and Excellence (IREG) Observatory, being thus one of the most known such systems. In order to achieve a hierarchy, the following indicators are considered [6]:

1. Academic reputation (40%);
2. Total citations (20%);
3. Ratio between staff and students (20%);
4. Employer reputation (10%);
5. International faculty ratio (5%);
6. International student ratio (5%).

In figure 3 are presented the main indicators taken into consideration by QS World University Rankings system.

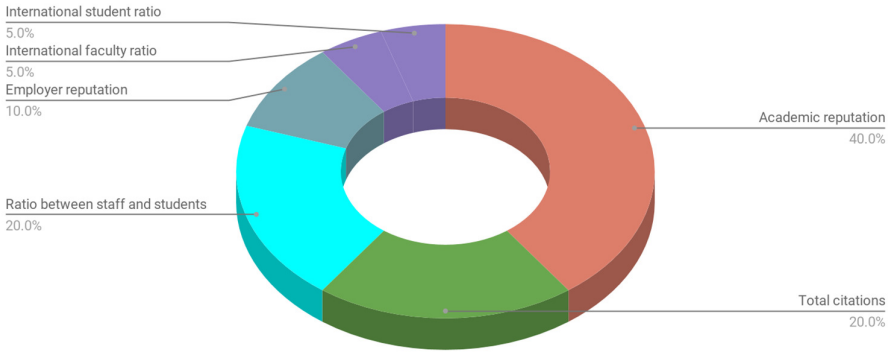

Figure 3: Indicator for QS World University Rankings

Figure 3 shows that Academic Reputation (40%) is the strongest indicator for the international QS World University Ranking. The papers citations and the ratio between the staff number and the students correspond to 20%, while with

equal weights, of 10%, are found to be the indicators that refer to the employer reputation and the internationalization of the respective higher education institution/university.

In table 3 are presented the top 10 institutions ranking, at the end of 2019, according to the QS World University Ranking system.

Table 3: Ranking of universities according to QS World University Ranking

Number	*Name of institution*	*Country*	*Overall score*
1.	Massachusetts Institute of Technology	United States of America	100
2.	Stanford University	United States of America	98,4
3.	Harvard University	United States of America	97,4
4.	Oxford University	United Kingdom	97,2
5.	California Institute of Technology	United States of America	96,9
6.	Swiss Federal Institute of Technology	Switzerland	95,9
7.	Cambridge University	United Kingdom	95
8.	London University College	United Kingdom	94,8
9.	Imperial College London	United Kingdom	94,1
10.	University of Chicago	United States of America	92

Time Higher Education World University Rankings

Times Higher Education World University Rankings (THE WUR) is another tool for ranking the higher education universities around the world, which is audited by PriceWaterHouseCooper and follows several indicators, grouped by classes as following [5]:

1. Teaching process has several indicators (30%);
2. Total number of citation (research influence - 30%);
3. Research (volume, income and reputation - 30%);
4. International outlook (7.5%);
5. Technology transfer (2.5%).

In figure 4 are presented the main indicators taken into consideration by THE World University Rankings system.

As the number of THE World University Ranking indicators is larger, compared to other systems, an illustrative overview reflecting the 5 main classes is depicted in Figure 4. It can be seen that, with equal weights, of 30% each, the first 3 indicators are found as fallowing, Teaching process, Research and Citations. With a much lower weight, of only 7.5% is considered the indicator that refers to the International outlook of a higher education institution/university, while the least significant is that of Technology transfer to industry.

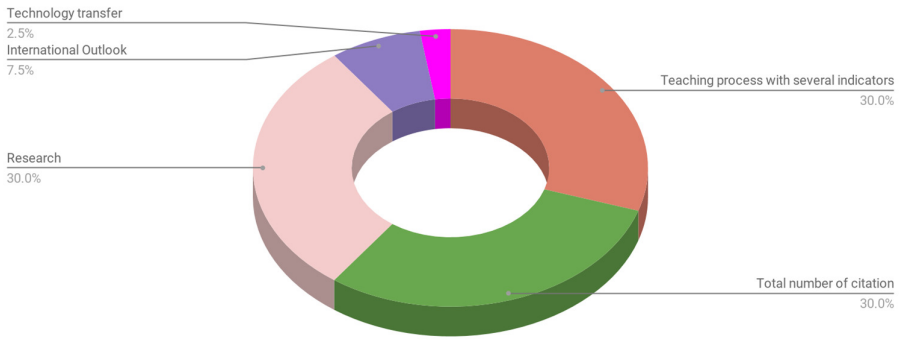

Figure 4: Indicator for THE World University Rankings

According to THE World University Ranking, the global ranking of institutions, at the end of 2019, is as follows:

Table 4: Ranking of universities according to THE World University Ranking

Number	*Name of institution*	*Country*	*Overall score*
1.	Oxford University	United Kingdom	95,4
2.	California Institute of Technology	United States of America	94,5
3.	Cambridge University	United Kingdom	94,4
4.	Stanford University	United States of America	94,3
5.	Massachusetts Institute of Technology	United States of America	93,6
6.	Princeton University	United States of America	93,2
7.	Harvard University	United States of America	93
8.	Yale University	United States of America	91,7
9.	University of Chicago	United States of America	90,2
10.	Imperial College London	United Kingdom	89,8

Center for World University Ranking

When conducting a classification, the Center for World University Ranking (CWUR) considers the quality of students education and training, as well as the prestige of the scientific community within the university through the quality of the conducted research. CWUR uses 7 carefully selected indicators to rank universities around the world, namely [3]:

1. Quality of education (25%);
2. Alumni employment (25%);
3. Professors with Nobel Prizes and Fields Medals (10%);
4. Research performance (40%).

In figure 5 are presented the main indicators taken into consideration by Center for World University Ranking system.

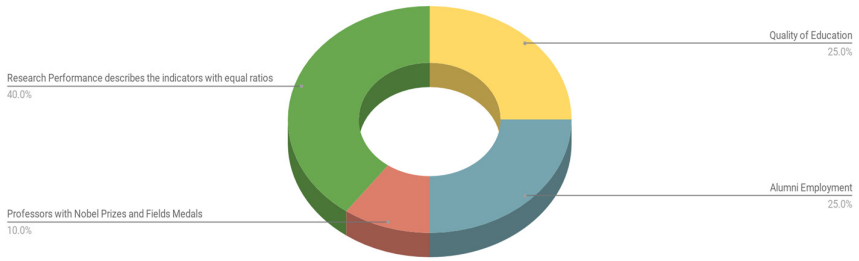

Figure 5: Indicator for Center for World University Ranking

Figure 5 shows that Center for World University Ranking focuses on the research performance (40%), the quality of education and alumni employability with equal percentages, of 25% each. The least important indicator with a percentage of only 10%, is considered to be the teachers who have obtained international distinctions.

In table 5 are presented the top 10 institutions ranking, at the end of 2019, according to the Center for World University Ranking system.

Table 5: Ranking of universities according to CWUR

Number	*Name of institution*	*Country*	*Overall score*
1.	Harvard University	United States of America	100
2.	Massachusetts Institute of Technology	United States of America	96,7
3.	Stanford University	United States of America	95,2
4.	Cambridge University	United Kingdom	94,1
5.	Oxford University	United Kingdom	93,3
6.	Columbia University	United States of America	92,6
7.	Princeton University	United States of America	92
8.	University of California - Berkeley	United States of America	91,6
9.	University of Pennsylvania	United States of America	91,1
10.	University of Chicago	United States of America	90,7

Point junction of the 5 international rankings

Figure 6 depicts the point junction of the 5-international ranking. As it can be noted from Figure 6, it is obvious that there are some similarities among the indicators taken into account by the international rankings, such as, the top 10 universities mentioned in all ranks, in most cases are the same, and only their position in the ranking may differ.

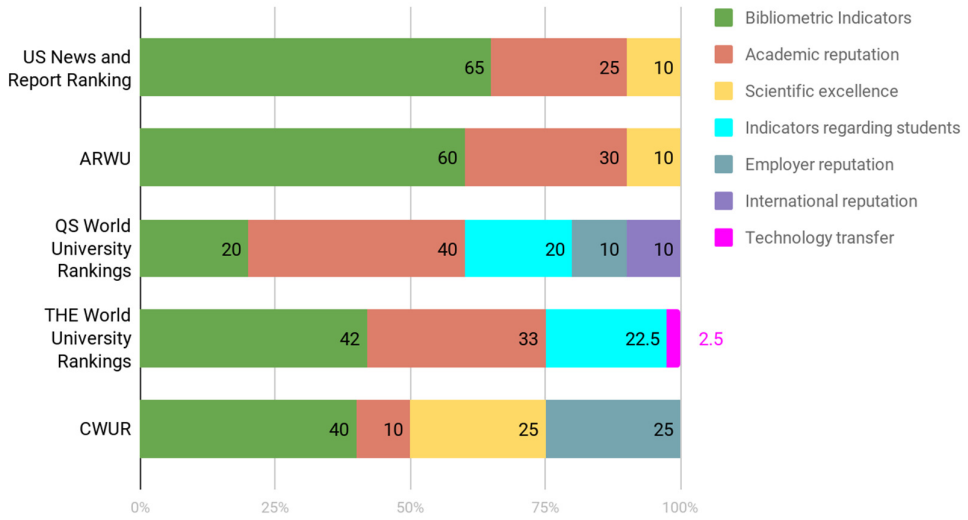

Figure 6: Intersection between the 5 international rankings and interpretation

Analysing the first two rankings, one can see similarities between US News and Report Ranking and Academic Ranking of World Universities. Some small difference of only 5% were noted in terms of bibliometric indicators and for the indicator regarding the academic reputation. Thus, based on these findings it can be assumed why the rankings, for 2019, of US News and Report Ranking and Academic Ranking of World Universities is similar. Moreover, the following can be said:

- if we take into consideration the first position of each rank, it can be observed that the same university is found, namely, Harvard University,
- if we refer to the first 10 position in the rankings, the same 9 higher education institutions are found in both rankings, the only difference being their occupied position in the ranking (e.g.: Stanford University is ranked 2nd in the US News and Report Ranking and 3rd in Academic Ranking of World Universities);
- it we take into consideration the 10th position the difference is given by the Washington University which according to the US News and Report Ranking occupies the 10th position, while in the Academic Ranking of World Universities occupies the 11th position, and by the Chicago University which occupies the 10th position in Academic Ranking of World Universities and the 13th position in the US News and Report Ranking.

Analyzing all 5 international rankings, both, similarities and certain differences, between them are highlighted, as follows:

- all 5 rankings have included the bibliometric indicator, even though at different rates as following: 65% for US News and Report Ranking, 60% for Academic Ranking of World Universities, 42% for THE World University Rankings, 40% for Center for World University Ranking and 20% for QS World University Rankings;
- all 5 rankings refer to academic reputation, in the following percentages: 40% for QS World University Rankings, 33% for THE World University Rankings, 30% for Academic Ranking of World Universities, 25% for US News and Report Ranking and 10% for Center for World University Ranking
- three of the 5 rankings take into consideration the indicator regarding scientific excellence, namely: 25% for Center for World University Ranking and, in equal ratio of 10% US News and Report Ranking and Academic Ranking of World Universities;
- two of the 5 rankings have also implemented indicators regarding students, this being THE World University Rankings in a percentage of 22.5% and QS World University Rankings in a percentage of 20%;
- in a rate of 25% and 10%, the Center for World University Ranking and QS World University Rankings, respectively, also take into account the employer reputation, which represents the perception of the universities among employers, as indicator when ranking universities,
- the only ranking that takes into consideration the international/global reputation is the QS World University Rankings;

- even though at a very small rate, of 2.5%, the technology transfer is a significant indicator when universities register to be ranked in THE World University Rankings.

If the indicators presented in Figure 6 are analyzed in detail, for each ranking, things are as follows:

Bibliometric Indicators

The ranking that most considers Bibliometric Indicators is US News and Report Ranking. The 65% percentage is divided for another 7 sub-indicators, which in turn consist of different percentages: publications that are among the 10% most cited (12.5%), publications in the most prestigious journals (10%), normalized citation impact in Clarivate Analytics (10%), percentage of total publications in the most 10% cited journals (10%), international collaboration (5%), total citations (7.5%), written books (2.5%) and conferences (2.5%). It can be seen how detailed is the indicator that analyzes the bibliometry.

For the Academic Ranking of World Universities, the bibliometry is described by 3 sub-indicators, one referring to the total number of citations (20%), within the Quality of Faculty indicator. Percentage of publications published in the most cited journals (Nature and Science) and papers indexed in Science Citation Index - Expanded and Social Science Citation Index, in equal percentages, of 20% each, come from the Research Output indicator.

THE World University Rankings is the next to consider the Bibliometric Indicators in a fairly high percentage of 42%. The percentage comes from a main indicator that refers to the Total number of citations, in percentage of 30% and two other sub-indicators, coming from Research indicator: research income and articles in Scopus, both having a percentage of 6%.

The Center for World University Ranking is also close to THE World University Rankings. The 40% percentage is defined by the research performance indicator, which describes the indicators with equal ratios: publications in prestigious journals (10%), publications in the most cited journals (10%), total number of citations (10%) and impact of citations (10%).

For QS World University Rankings, the Bibliometric Indicators refer strictly to total citations, the percentage being 20%.

Academic reputation

The ranking which highlights the great academic reputation is QS World University Rankings. The indicator has a percentage of 40% and it is based on a survey, which collects the opinions of experts of over 100,000 people in higher education on the quality of teaching and research at universities around the world.

For THE World University Rankings the percentage of 33% for Academic reputation indicator is described by two sub-indicators, coming from two different categories of main indicators, as follows: global research reputation (18%) which comes from research indicator and academic reputation (15%) which comes from the teaching process indicator.

ARWU is also close to THE World University Rankings. The 30% come from the sub-indicator professors with Nobel Prizes and Fields Medals, in a percentage of 20%, and from the academic performance indicator, in a percentage of 10%.

US News and Report Ranking describes Academic reputation indicator as having two sub-indicators, of equal proportions of 12.5%: global and regional reputation in terms of research.

For the Center for World University Ranking, the Academic reputation indicator is only 10% and refers to professors with Nobel Prizes and Fields Medals.

Scientific Excellence

CWUR is the ranking that emphasizes the most the Scientific excellence indicator. The Quality of education (25%) is measured by the number of a university's alumni who have won major academic distinctions relative to the university's size.

Two other rankings that consider this indicator are US News and Report Ranking, in 10%, where the indicator is measured by the scientific outcomes, and ARWU, also in 10%, in which the emphasis is on quality of education. for the students.

Indicators Regarding Students

Two of the 5 rankings analyzed consider indicators regarding students, as follows: THE World University Rankings describes this indicator both in the teaching process (15%), number of awarded PhD's (6%), ratio between staff and students (4.5%), ratio between PhD and bachelor (2.25%), institutional income (2.25%), as well as the international outlook, that consists of three sub-indicators with the same proportion, namely: ratio between local students and foreign students (2.5 %), ratio between employee and foreign student (2.5%), international collaborations (2.5%).

QS World University Rankings also has an indicator that refers to students, namely: ratio between staff and students, in proportion of 20%.

Employer reputation, International reputation and technology transfer

Employer reputation indicator appears in CWUR, in percentage of 25% and is called alumni employment, as well as QS World University Rankings, in percentage of 10%.

International reputation is an indicator considered by QS World University Rankings, which, in turn, is described by two other sub-indicators, of equal proportions (5%): international faculty ratio and international student ratio.

Even if the percentage is very small (2.5%), the only ranking that focuses on technology transfer is THE World University Rankings. This indicator refers to industry income, knowledge transfer, the ability of a university to help industry with innovations, inventions and consultancy has become a core mission of the contemporary global academy.

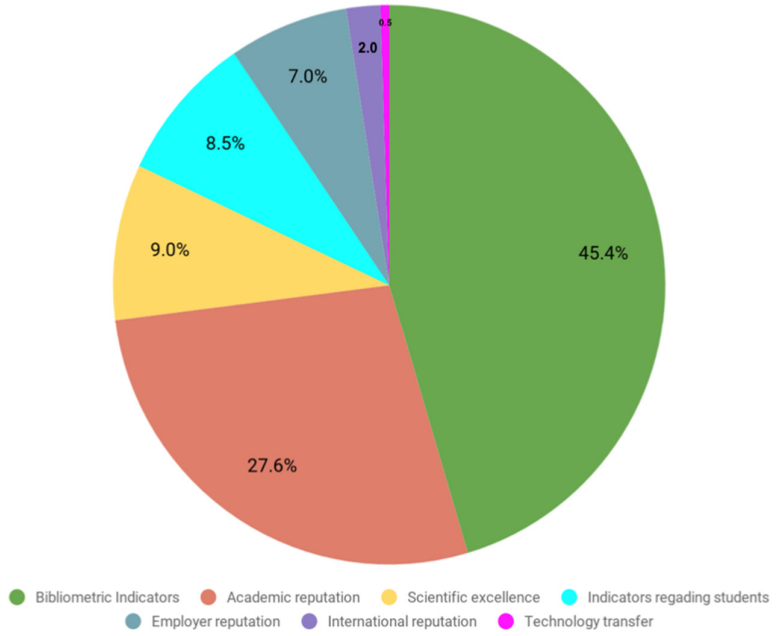

Figure 7: Percentage of the 7 indicators in the 5 international rankings

Analyzing the data from this paper and considering Figure 7, it can be seen how Bibliometric Indicators occupy almost half (45.4%) of the importance given to these rankings, globally. The other half is described by: the highest percentage identifies the indicators that refer to academic reputation (27.6%), followed by scientific excellence (9%), indicators regarding students (8.5%) and indicators which refer to employer reputation (7%) and the last two, in very small percentages: international reputation (2%) and technology transfer (0.5%).

Conclusions

Based on the analyzed data, the diversity and the evaluating mean of the higher education institution by these international classification and ranking systems was highlighted. Among all proposed indicators, research is the only common point, and each such system designates a significant percentage for this indicator. Based on the scientific collaboration between the analyzed university other university/institutes, it was noted that another common element

that appears in these systems is the one that refers to internationalization. Nevertheless, it is worth mentioning that these rankings (sometimes completely missing) do not follow up the impact of teaching and learning activities, this being considered only indicator of perception.

At the same time, it can be said that most of the classification and ranking systems follow a particular branch of study fields, which is in good agreement with the country institutional evaluation of which the university is part of, as it happens in our country, Romania.

However, it can be said that the universities consider that a good positioning in these rankings entails a better visibility and a higher impact of the international higher education institutions (attracting human and/or financial resources etc.), but it also allow the possibility to identify the university status, development level by comparison with other universities around the world.

Thus, the existence of such large number of classification and ranking systems reflects the different points of view which the academics community has on the manner and purpose that these mechanisms have in achieving university rankings at the international level.

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Gender Differences in Factors Affecting Willingness to Work as Occasional Courier

Andrii GALKIN
DSc, Associate Professor; Department of Transport System and Logistics, O. M. Beketov National University of Urban Economy in Kharkiv, 17, Marshala Baganova str., 61-002, Kharkiv, Ukraine, galkin.tsl@gmail.com

Valerii ABRAMOV
PhD, Associate Professor; Department of Tourism and Hospitality, O. M. Beketov National University of Urban Economy in Kharkiv, 17, Marshala Baganova str., 61-002, Khakiv, Ukraine
imandra67@ukr.net

Anton RYABEV
PhD, Associate Professor; Department of Tourism and Hospitality, O. M. Beketov National University of Urban Economy in Kharkiv, 17, Marshala Baganova str., 61-002, Khakiv, Ukraine
anton.ryabev@gmail.com

Denys SHAPOVALENKO
PhD, Associate Professor; Department of Tourism and Hospitality, O. M. Beketov National University of Urban Economy in Kharkiv, 17, Marshala Baganova str., 61-002, Khakiv, Ukraine
d.a.shapovalenko@gmail.com

Oleg KOLONTAIEVSKYI
PhD, Associate Professor; Department of Tourism and Hospitality, O. M. Beketov National University of Urban Economy in Kharkiv, 17, Marshala Baganova str., 61-002, Khakiv, Ukraine
olkolon@gmail.com

Anna ZHYHLO
PhD, Associate Professor; Department of Technology of Building Production and Building materials, O. M. Beketov National University of Urban Economy in Kharkiv
Kharkiv, Ukraine
anna.baranova@kname.edu.ua

Tibor SCHLOSSER
PhD, Associate Professor; the Head of Department of transport engineering and traffic
Slovak Technical University in Bratislava, Bratislava
e-mail: tibor.schlosser@stuba.sk

Abstract

This paper provides a background for studying the willingness of ordinary travellers to work as an occasional courier. The aim of the research is to determine the factors influencing the potential willingness of people to become occasional couriers (non-professional couriers) for the delivery of goods using crowdshipping technology. The research results show that the socio-demographic characteristics of non-professional couriers (age, gender, gender, income, travel time) significantly influence the decision to participate in the bulk delivery market. The relationship between these parameters and the maximum weight of the load was determined, which the respondents should translate for the trip. Regression models that characterize the described relationships are presented. The frequency of expected to pay value per delivery was determined for respondents of different genders. The document helps to assess the potential of the courier market (motivation, incentives, potential cost of the service) for companies that are going to use the crowdshipping service.

Keywords: Gender, Crowdshipping, Regression, Questionnaires, Parcel

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Introduction

Population growth, and its urbanization, the rapid development of e-commerce and the proliferation of fast delivery options require innovative solutions and business models to ensure the economic, environmental and social transportation of goods (Galkin, Dolia, Davidich, 2017). The development of logistics systems promotes the integration of services and infrastructure exchange, which represents new trends in sustainable transport development today (Galkin et al, 2019). With the advancement of information and communication technologies and the promotion of personal, mobile smart devices, there is a transition to new ways of sharing and sharing (Dril, Galkin, Bibik, 2016). Such an example is crowdsourcing – the process of transferring some functions or operations to a circle of people outside the company (external source) (Halkin, et al, 2019). Crowdsourcing is a modern concept unknown to many people (about 43% have never heard of crowdsourcing) (Rai, Verlinde, Merckx, Macharis, 2017) .Crowdsourcing - involves attracting people who are already traveling from points A to B, take from a package, thus creating new informal logistics networks (Carbone, Rouquet, Roussat, 2015).

Among other issues related to modeling the demand and supply of crowdsourcing, an important aspect is the study of the behavior of random couriers. Similar studies have previously been conducted to determine people's interest in being non-professional couriers. Thus, the maximum willingness to work as crowd-shippers (Galkin et. al, 2018), expected to pay value per delivery (Al-Saudi, Himpel, 2020), travel time tolerance issues (Yan, Lin, Lai, 2013) was studied.

To study the potential readiness of people to be couriers using survey methods (Al-Saudi, Himpel, 2020), interviews (Nyaga, 2017), regression and correlation analysis (Al-Saudi, Himpel, 2020), modeling (Miller et al ., 2017). As variables, the researchers used: age, gender, race, income, and education level, etc.

When using interview and survey methods, frequently asked questions include: willingness (desire) to become a courier (Nyaga, 2017), route (Binetti et al, 2019), the amount of remuneration for work performed (Dupljanin et al, 2019) , the maximum deviation (both in time and distance) that the respondent would take for consent and rejection of the package (Miller et al., 2017).

The results of the research show that the socio-demographic characteristics of non-professional couriers (age, sex, race, income and level of education) significantly influence the decision to participate in the mass transportation market. Thus, about 50% of respondents of different sexes want to be random couriers for a certain amount of money (Gatta et al, 2019). Couriers were interested in supporting the environment (Dai, Jia, Liu, 2020), as well as reducing the impact on public transport in the city (Vakulenko, et al, 2019). the benchmark solutions for the crowdshipping, helping to adjust the business model and market offer of other providers to the needs of different groups of stakeholders (Rześny-Cieplińska, Szmelter-Jarosz, 2019.

However, the potential for mass delivery of goods on crowdshipping technology in various respects is not yet clear. Existing methods never concentrate on the gender and did not assess its influence on willingness to work courier. Moreover, the obtained research has been limited in Determining the maximum weight of the parcel, which agrees to carry a courier of different genders depending on its socio-economic characteristics and order parameters. The issue remains: “Who is ready to work as a crowd partner? Are there any special socio-demographic characteristics associated with potential crowd partners? What motives and factors influence them? “How does gender affect the desire to be a courier? What fee do they expect? ” Studies of willingness to work as an occasional courier in Bratislava have not been conducted before. In particular, in Therefore, the aim of the research is to determine the factors influencing the potential willingness of people to become random couriers (non-professional couriers) for the delivery of goods by crowdshipping technology. Therefore, the specific objectives of this paper are:

1. Determine the impact of gender on the potential readiness to become a courier
2. Determine the maximum weight of the parcel, which agrees to carry a courier of different gender depending on its socio-economic characteristics and order parameters.
3. Determine the expected to pay value per delivery, for couriers of different genders depending on its socio-economic characteristics and order parameters.

Research Method

To obtain the original data was used as a method of data collection - questionnaires. To understand the courier's behavior and motivation, questions were developed:

1. Place of residence (territorial location) _____
2. Place of work, study (territorial location) _____
3. Do you cross the city center (old town) when moving (underline): Yes No.
4. Travel start time (morning / evening) (specify as a fraction) _____
5. End time of the trip (morning / evening) (specify in fractions) _____
6. Do you agree or do you have such an opportunity to transfer the parcel from the area of your residence to the area of work, study, etc. or vice versa? YES or NO
7. For what minimum amount did you agree to transfer the accompanying parcel? (underline the answer): up to 1 euro (fare); 1-2 euros; 2-5 euros; 5-10 euros; more than 10 euros.
8. Your average monthly income per family member, Euro _____:
9. Your age __ 10. Gender __ 11. What is the maximum weight of the parcel you agree to take __ kg.
The survey was attended by 79 respondents living in the city of Bratislava, aged 21 to 30 years.

Measuring the potential willingness of people to change status from regular passengers to partner passengers is of interest for sustainable transport and mobility. The simulation method involves the quantitative assessment of willingness to work (willingness to work) as non-professional couriers in hypothetical scenarios with different parameters (in different delivery conditions).

Results

Characteristics of the obtained personal data are given in table. 1.

Table 1: Characteristics of the original data

Experiment number	Origin	Destination	Do you pass the Old Town on your trip		Overall travel time in the morning, min		Overall travel time in the evening, min		Years	Gender	Monthly income, Euro	Travel time, min	Expected to pay value per delivery, Euro	The maximum weight of the parcel, kg
			Yes	No	Start	End	Start	End						
1	Petržalka	Bratislava	+	-	6:15	6:30	16:00	17:00	24	Muž	900	15	1	2
2	Staré Mesto	Staré Mesto	+	-	9:00	9:10	15:00	15:10	21	Muž	750	5	2	3
3	Petržalka	Nové Mesto	+	-	6:30	7:00	15:00	15:30	26	Žena	400	30	4	4
…	…	…	…	…	…	…	…	…	…	…	…	…	…	
40	Stare Mesto	Stare Mesto	-	+	7:45	8:00	15:00	15:15	22	Muž	750	45	3	3

The results of the survey of respondents on the performance of courier functions of crowdshipping is: 51% of respondents agree to consider such a possibility and 49% do not consider such a possibility. Further processing of the results was focused on 40 respondents: 22 men and 18 women, who answered that they potentially agreed to become couriers.

The maximum weight of a parcel that a courier of different genders agrees to carry was determined depending on its socio-economic characteristics and the characteristics of the orders. Under the characteristics of orders, the delivery route, its cost, and time frame were considered. The results of statistical processing of the results for the two types of gender are given in table. 2 (male) and table 3 (female). Regression models are developed.

The model maximum weight of the parcel that respondents agree to translate was obtained according to processing survey data via Statgraphics X64. The degree of influence of variables factors on maximal weight of parcel ware analysed. The regression coefficients were calculated using the least-squares method.

Table 2: Characteristics of the models for male (*Source:* Authors' own research)

Attributes	Value			
Variable	Monthly income, Euro (*I*)	Expected to pay value per delivery, Euro (*V*)	Age, years (*E*)	Overall travel time, min (*T*)
Model	$Q_{male} = (\frac{978,13}{I})^2$	$Q_{male} = (0,695\sqrt{V})^2$	$Q_{male} = (0,063E)^2$	$Q_{male} = \frac{1}{0,016T}$
Correlation,	0,9826	0,934	0,954	0,8882
T-Student	24,24	12,94	15,24	8,86
F-Ratio	587,88	144,96	232,40	78,55
Mean absolute error	0,266	0,588	0,476	0,216303
Standard Error of Est.	0,307	0,468	0,385	0,334667

Table 3: Characteristics of the models for female (*Source:* Authors' own research)

Attributes	Value			
Variable	Monthly income, Euro (*I*)	Expected to pay value per delivery, Euro (*V*)	Age , years (*E*)	Overall travel time, min (*T*)
Model	$Q_{female} = (\frac{865,8}{I})^2$	$Q_{female} = (0,352V)^2$	$Q_{female} = (0,366\sqrt{E})^2$	$Q_{female} = (\frac{41,41}{T})^2$
Correlation,	0,856	0,958	0,904	0,96
T-Student	10,04	13,74	8,75	14,31
F-Ratio	100,88	188,83	76,65	204,78
Mean absolute error	0,58	0,45	0,77	0,45
Standard Error of Est.	0,77	0,58	0,86	0,56

The obtained results allowed to draw a conclusion about the admissibility of using the obtained model of maximum parcel weight for the design of the delivery process of the occasional courier. The analysis of factors that affect the maximum weight of a parcel that a random courier agrees to transport is shown in Fig. 1.

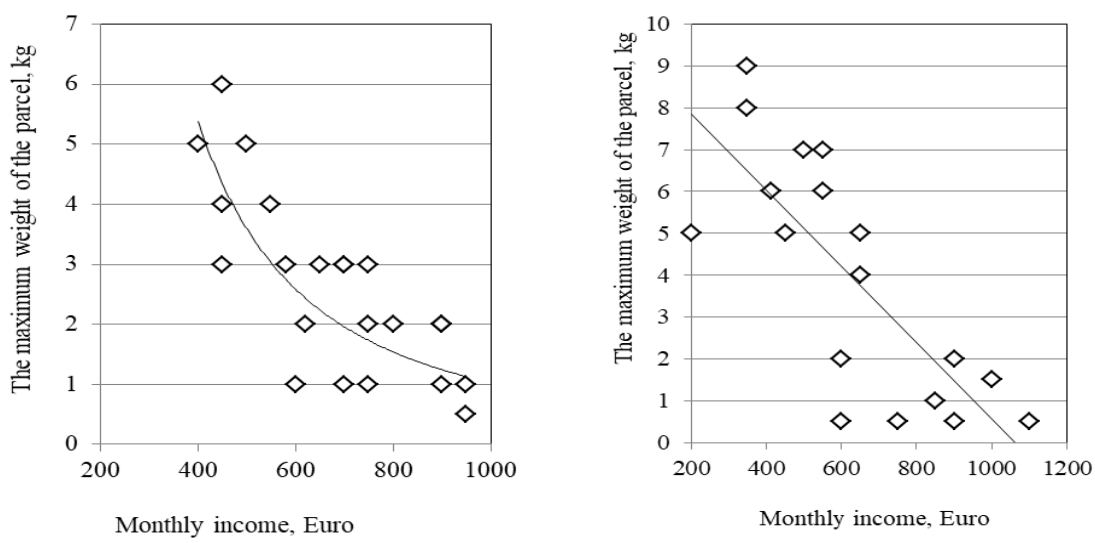

A) The maximum weight of the parcel from the monthly income of the respondent

Male

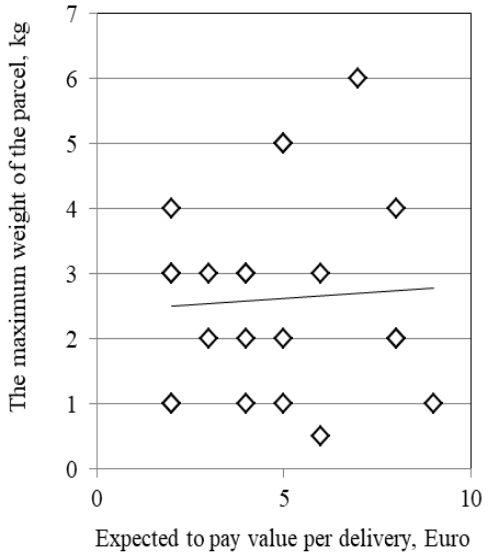

Female

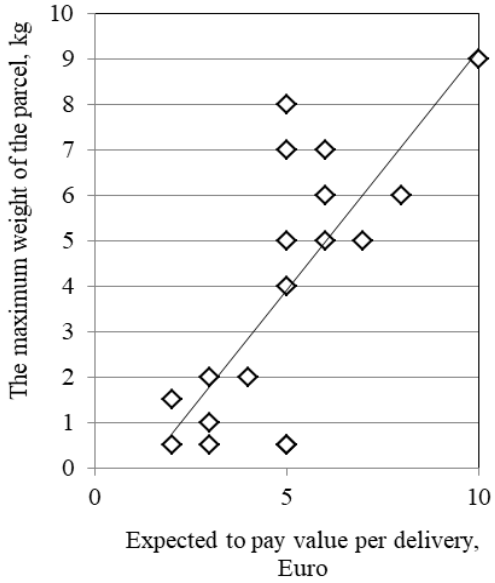

B) The maximum weight of the parcel that Crowd Partners agree to carry from Expected to pay value per delivery

Male

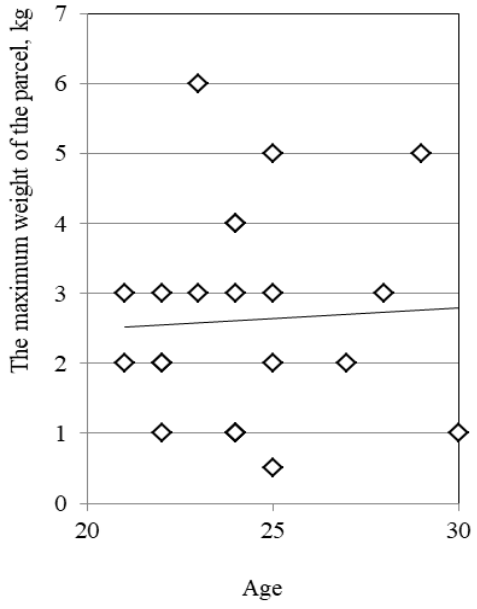

Female

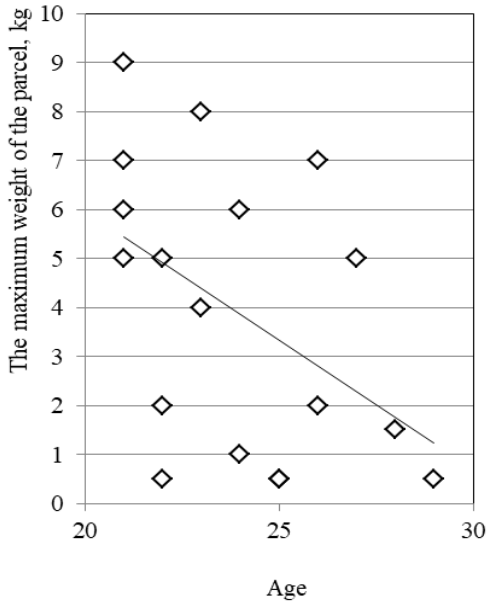

C) Age

Male

Female

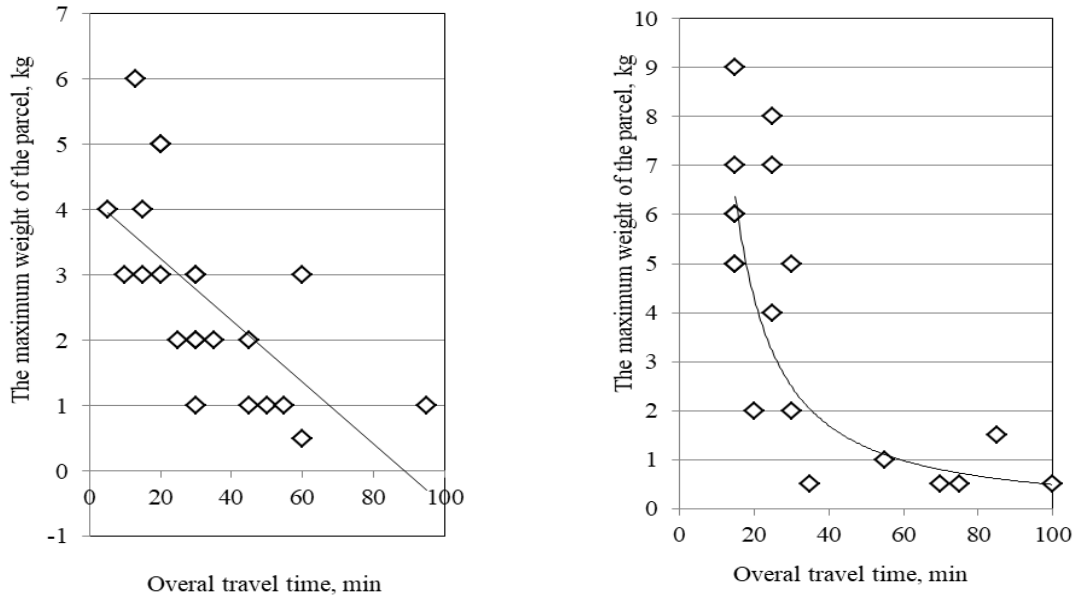

D) The maximum weight of the parcel on overall travel time of the respondent

Male Female

Fig. 1: Patterns of the maximum weight of the parcel affects parameters

Analysing fig. 1 a it can be concluded that there is a relationship between monthly income and the maximum weight of the parcel, which respondents agree to transfer. Thus, with a decrease in monthly income, the maximum weight of the parcel decreases, and vice versa for couriers of different genders. The increase in monthly income for men more moderately (gradually) reduces the maximum weight of the parcel, in contrast to women where the increase in income reduces it more straightforwardly.

Analysing fig. 1 b it can be concluded that there is a relationship between expected to pay value per delivery and the maximum weight of the parcel that respondents agree to transfer. So from expected to pay value per delivery increases the maximum weight of the parcel and vice versa for both genders. The increase in expected to pay value per delivery in men more moderately (gradually) increases the maximum weight of the parcel, in contrast to women where the increase in expected to pay value per delivery increases the willingness to take more weight of the parcel.

Analysing fig. 1 c it can be concluded that there is a relationship between age and the maximum weight of the parcel, which respondents agree to transfer. So with age the maximum weight of a parcel increases and vice versa. According to the results of the assessment of the dependence of the maximum weight of the parcel on the age of the possible courier, it can be concluded that the younger the executor, the larger the volume of the parcel he agrees to deliver. According to the graphical display of answers, it can be concluded that with the age of potential couriers decreases their potential capacity (capacity).

Analysing fig. 1 d, it can be concluded that there is a relationship between the total time of movement of the respondent and the maximum weight of the parcel that the respondents agree to transfer. According to the graphical display of answers, we can conclude that with increasing travel time decreases the maximum weight of the parcel and vice versa.

Also on the official Slovak website https://www.stavebnyportal.sk/ there are rules of procedure regarding the maximum allowable weight for the transportation of men and women. So for men under favourable conditions 15 kg, and unfavourable – 10 kg. For women 10 kg and 5 kg respectively. The data obtained indicate that the range of change in the weight of the parcel for men is from 1 to 10 kg, for women from 0.5 to 7 kg.

For couriers of different genders, the expected to pay value per delivery was determined, fig. 2.

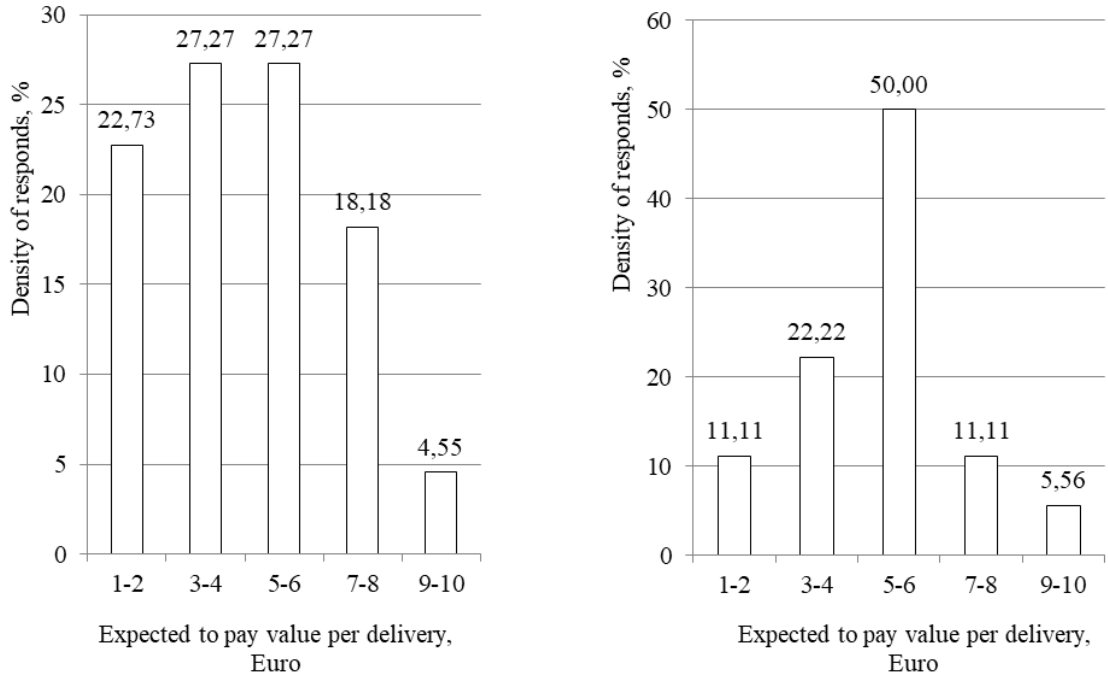

Fig. 5: Distribution of the cost at which respondents agree to deliver the parcel to:

a) Male b) Female

Accordingly, Fig. 5 (a), 22.73% of male respondents agree to provide the service in the range of 1 to 2 euros; 27.27% from 3 to 4 euros; and the same from 5 to 6 euros; 18.18% from 7 to 8 euros; and 4.55% agree to provide a service of at least 9 euros. Accordingly, Fig. 7 (b), 16.67% of women respondents agree to provide the service in the range of 1 to 2 euros; 27.78% for 3 or 4 euros; 33.33% of respondents from 5 to 6 euros; 11.11% from 7 to 8 euros; and the same percentage agree to provide a service of at least 9 euros.

Discussion and Conclusions

A preliminary study of willingness to work as an occasional courier was conducted in Bratislava for the first time. A survey was conducted to determine the desire to work as a random courier using crowdshipping technology. As a result, respondents of different genders were interested in performing the functions of a courier and the main factors influencing the choice.

The data processing results showed that the occasional courier's gender plays an important role in making willingness to work as an occasional courier. Of the 81 respondents wishing to work, most were interested in earning money. The results of the survey showed that 51% of respondents would be willing to work as an occasional courier for a certain amount of money.

In addition, it was found that expectations to pay mass shippers are reasonable and somewhat consistent with the literature on the value of time (Miller et al., 2017). Researchers point to a different range of variation in expected courier payment for a delivery service from $ 9.2 to $ 19 per hour (Miller et al., 2017; Le, Ukkusuri, 2019). The research was conducted in the United States, where the standard of living is higher than in Slovakia. Analysis of the logistics services market (Galkin et. Al, 2018) indicates that the average fee for courier delivery in Bratislava is from 4 euros per 1 kg. The detected range of expected payment costs will allow shipping companies to form a compensation scheme that matches the expectations of random couriers. This will potentially increase the recruitment and retention of crowd partners in the system.

The obtained dependences partially coincide with the previously known ones (Le, Ukkusuri, 2019; Gatta et al, 2018) where "age" is not a significant parameter. This is, in part, a correct statement when considering male couriers. If we consider the interest of women in the desire to work as couriers, then for them the age factor is

significant. It is also possible that the results obtained may be related to the traditional foundations of society and the individual behaviour of the people of Bratislava (Galkin et al, 2019). When considering a wider range of age parameters, it will be possible to refine the results.

This document helps to assess the potential of the Bratislava market for the use of the crowdshipping service, as well as for freight companies to better understand how to motivate staff and determine the potential cost of the service. This work provides a basis for analysing the application and effectiveness of crowdsourcing by studying the propensity of ordinary travellers to willingness to work as an occasional courier in Bratislava. Further research is still needed to validate the results in different contexts and to expand knowledge in this area.

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Les Antécédents Et Conséquences De La Qualité De La Relation Client-Fournisseur : Une Etude Exploratoire Dans Le Secteur Bancaire Marocain.

Noureddine AMINE
ENCG Tanger, Université Abdelmalek Essaadi, Tanger, Maroc
noureddineamine@yahoo.fr

Abderrahman AMINE
ENCG Tanger, Université Abdelmalek Essaadi, Tanger, Maroc
sidiamine@yahoo.fr

Imane BENMHALLA
ENCG Tanger, Université Abdelmalek Essaadi, Tanger, Maroc
ibenmhalla@gmail.com

Résumé

L'évolution que connait, actuellement le secteur bancaire au Maroc, accentuée par la concurrence acharnée entre les banques, la multiplication des offres et le développement technologique notamment au niveau de la stratégie multicanal, sont autant d'éléments qui accentuent la volatilité des clients et posent la problématique de la rétention des clients «rentables ». C'est dans ce contexte que s'inscrit notre recherche, elle s'intègre dans le cadre des relations B to B et plus particulièrement aux relations banques - PME.
Eu égard à la spécificité de la relation client fournisseur dans le secteur bancaire et à l'importance du maintien des relations sur le long terme, nous avons opté dans notre recherche pour une étude qualitative exploratoire, basée sur l'observation, le recueil et l'interprétation de données qualitatives.
Cette exploration, nous a permis de dégager les variables principales qui conditionnent la qualité de la relation entre les banques et les PME, et le maintien des relations collaboratives performantes sur le long terme dans le contexte marocain.

Mots clés : Qualité De La Relation Client-Fournisseur, Relation Banque –PME, Etude Exploratoire.

Abstract

The evolution which the banking sector is currently undergoing in Morocco, accentuated by the fierce competition between the banks, the multiplication of offers and technological development, especially at the level of the multi-channel strategy, are all elements which accentuate the volatility of customers and pose the problem of the retention of "profitable" customers. It is in this context that our research fits into the framework of B to B relations and more particularly bank - SME relations.
Given the specific nature of the client-supplier relationship in the banking sector and the importance of maintaining relationships over the long term, we opted in our research for an exploratory qualitative study, based on the observation, collection and interpretation of qualitative data.
This exploration allowed us to identify the main variables that condition the quality of the relationship between banks and SMEs, and the maintenance of successful collaborative relationships over the long term in the Moroccan context.

Keywords: Inter-Organizational Relationship Quality, Banking-SME Relationship, Exploratory Study.

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Introduction

Au cours des dernières décennies, les relations d'échange client-fournisseur sont passées d'une vision transactionnelle basée sur un transfert de propriété pure et simple, à une perspective relationnelle privilégiant le développement de la relation et intégrant une dimension sociale (Dwyer & al, 1987; Day, 2000).

L'approche relationnelle envisage les échanges sur le long terme et la relation dans sa globalité, et met en évidence les interactions entre les acteurs. Elle se distingue par rapport à l'approche transactionnelle par l'intégration d'éléments sociaux et non économiques qui conditionnent la réalisation de l'échange et qui permettent la réduction de l'incertitude et la maîtrise des coûts de transactions.

Dans cette perspective, les entreprises recherchent l'efficience à travers l'optimisation d'une série d'échange étalée sur le long terme, et la construction d'une relation forte et stable (Ramkumar & Savanan 2007) ainsi que la réalisation des bénéfices mutuels grâce à des relations gagnant/gagnant (Ivens & Mayrhofer, 2003).

C'est dans ce cadre que le concept de la qualité relationnelle a émergé pour devenir un construit central du marketing relationnel.

Dans cet article, nous allons dresser, en premier lieu, une revue de littérature sur le concept de la qualité relationnelle et sur les principaux antécédents et conséquences qui la déterminent.

Puis, en second lieu, nous présenterons les résultats de l'étude exploratoire effectuée auprès de dirigeants de PME marocaines, pour déceler les principales variables liées à la qualité relationnelle dans le contexte bancaire marocain et affiner notre champ de recherche.

La Qualité De La Relation

Objet Et Définition

La qualité de la relation est un construit central du marketing relationnel, qui prend de plus en plus de l'ampleur, que ce soit au niveau académique ou managérial (Jiang & al., 2016). L'intérêt pour l'étude de la qualité relationnelle s'est manifesté suite à la prolifération des travaux sur l'approche relationnelle à partir des années 80 (Dwyer et al., 1987 ; Crosby et al., 1990, Vieira, 2008).

Les études ont démontré que la qualité relationnelle rassure les partenaires sur les interactions et performances futures et les encourage à faire évoluer la relation d'échange à un niveau supérieur (Crosby et al., 1990 ; Rajaobelina, 2009 ; Lahiri & Kedia, 2011 ; Ghzaiel & Akrout, 2012). Elle reflète, ainsi, le résultat des efforts du marketing relationnel déployés par l'entreprise (Garbarino & johnson, 1999 ; Lahiri & Kedia, 2011 ; Jiang et al., 2016) ainsi que la force et la réussite des relations d'échange.

Au-delà des performances financières escomptées sur le long terme, la qualité relationnelle crée pour l'entreprise un avantage compétitif intangible et difficilement imitable par la concurrence, qui lui permet de différencier son offre par rapport à celle du marché et qui l'immunise contre les aléas de l'environnement (Rajaobelina, 2009).

Toutefois, malgré l'accord général sur l'importance du concept, il semble ne pas y avoir de consensus entre les chercheurs sur une définition exacte du concept de la qualité relationnelle ou sur le nombre et la nature des variables qui la déterminent et la composent (Dorsch et al., 1998 ; Garbarino & Johnson, 1999 ; Huntley, 2006).

En effet, le sujet de la qualité relationnelle a été étudié et opérationnalisé dans des secteurs variés. Sa conceptualisation diffère selon le contexte de l'étude, l'angle d'analyse et la perception du chercheur (Crosby et al., (1990), Kumar et al., (1995) ; DeWulf et al., (2001) ; Huntley, 2006 ; Vieira, 2008 ; Athanasopoulou, 2009 ; Jiang et al., (2016).

Certains auteurs envisagent la qualité relationnelle comme une évaluation globale de la force de la relation (Smith, 1998 ; Garbarino & johnson, 1999 ; DeWulf et al., 2001 ; Woo & Ennew, 2004 ; Palmatier et al., 2006, Vesel & Zabkar, 2010).

Alors que d'autres comme Boles et al.(1997), la définissent comme une évaluation des liens personnels et professionnels qui résultent des différentes interactions entre client et fournisseur.

Hennig-Thurau & Klee (1997) et Huntley (2006), par contre, suggèrent que la qualité de la relation reflète le degré de satisfaction global du partenariat.

Eu égard à ces éléments et dans le but de faire avancer les recherches, Woo & Ennew (2004) suggèrent qu'il serait judicieux d'accepter une conceptualisation générale et de se concentrer sur l'identification et l'étude des composantes de la qualité relationnelle.
Ainsi et de manière générale, la qualité relationnelle est considérée comme un construit d'ordre supérieur, composé d'un minimum de deux dimensions, qui reflète la nature de la relation entre les partenaires (Kumar et al., 1995 ; Dewulf et al., 2001 ; Hennig-Thurau 2002 ; Roberts et al., 2003) .

Les dimensions de la qualité relationnelle

Le concept de la qualité relationnelle fût introduit la première fois, respectivement, par Gummesson (1997) et Dwyer et al. (1987), puis opérationnalisée par la suite grâce à l'étude de Crosby et al. (1990) dans le secteur des assurances.

Crosby et al., (1990), stipulent que la qualité est un construit d'ordre supérieur composé d'au moins deux dimensions, qui sont la confiance et la satisfaction. La confiance se manifeste dans le fait que le client s'attend à un comportement bien défini lors des échanges futurs, de telles manières que ses intérêts seront préservés ou au moins pris en considération. Alors que la satisfaction est atteinte suite à l'évaluation des interactions et expériences passées.

L'étude de Croby et al., (1990) a servi de support à un nombre important de recherches, appliquées à des contextes diversifiés (services, industrie, distribution, B to B et B to C). Certains de ces travaux ont élargi le champ de recherche pour inclure de nouvelles variables, autres que la confiance et la satisfaction.

En effet, les recherches ultérieures ont révélé de nouvelles dimensions comme l'engagement (Huntley, 2006), l'éthique (Lagace et al., 1991), la communication (Anderson & Narus, 1990), l'opportunisme (Dorsch et al., 1998), l'équité (Kumar et al., 1995), les objectifs communs (Wilson, 1995), la coopération (Leonidou, 2006), l'adaptation (Woo & Ennew, 2004), l'atmosphère (Woo & Ennew, 2004), le pouvoir (Naude & Buttle, 2000), le partage d'information (Lahiri & Kedia, 2011), l'orientation à long terme (Jiang et al., 2016)...etc.

A l'instar de la plus part des recherches et étant donné que notre objectif est l'exploration des antécédents et conséquences de la qualité relationnelle et non les dimensions, nous avons choisi de considérer la qualité de la relation comme un construit composé de deux variables, à savoir la satisfaction et la confiance.

Les antécédents et conséquences de la qualité relationnelle

La qualité relationnelle a fait l'objet de plusieurs travaux de recherche, visant à mieux cerner ses différents déterminants et conséquences (Parsons, 2002 ; Holmlund, 2008 ; Athanasopoulou, 2009). A titre d'exemple, il est possible de citer la recherche méta-analyse effectuée par Palmatier et al., (2006), et qui ont réparti les antécédents et conséquences de la QR en trois catégories, décrites comme suit :

- Les antécédents centrés sur le client incluant les bénéfices de la relation et la dépendance vis-à-vis du vendeur.
- Les antécédents centrés sur le vendeur, qui sont l'investissement dans la relation et l'expertise.
- Les antécédents dyadiques, à savoir : la communication, la similarité, la durée de la relation, la fréquence d'interaction et le conflit.

En ce qui concerne les conséquences, elles ont été répertoriées de la manière suivante :

- Les résultats centrés sur le client composés de la fidélité, du bouche à oreille et de la continuité de la relation.
- Les résultats centrés sur le vendeur comme la performance objective du vendeur.
- Les résultats dyadiques : la coopération.

Selon Leonidou et al., (2014) et d'après une étude sur 76 cas empiriques, les déterminants de la qualité relationnelle sont l'absence d'opportunisme, la gestion du conflit, la communication, la distance ainsi que l'adaptation. Tandis que la principale résultante en serait la performance (relationnelle et financière).

Dans la même optique, Izogo (2016) suggère que l'orientation-client, l'expertise et le partage d'information sont les principaux antécédents de la qualité relationnelle et génèrent le ré-achat et la bouche à oreille positif.

Jiang et al., (2016) stipulent que la qualité relationnelle est composée de l'intensité de la communication, l'orientation à long terme et de la satisfaction, qu'elle soit économique ou sociale.
De manière générale, la revue de littérature que nous avons effectuée, nous a permis de constater les éléments suivants :

Les antécédents de la qualité relationnelle peuvent être regroupés en quatre catégories principales (Athanasopoulou, 2009 ; Ghzaiel & Akrout, 2012):

- **Les caractéristiques et les comportements des parties** comme l'expertise, l'éthique, la similarité, l'empathie, l'orientation-client, l'orientation relationnelle.
- **Les caractéristiques de la relation**, à savoir la durée de la relation, les fréquences d'interactions, la gestion du conflit, le comportement opportuniste, la coopération, le pouvoir/ dépendance, l'adaptation, la personnalisation.
- **Les caractéristiques de l'offre** qui comprennent la qualité de service, le service après-vente et la performance du produit.
- Et finalement, une quatrième partie relative **aux attributs de l'environnement**.

Il en est de même pour les conséquences, qui varient selon le secteur d'activité, et peuvent être de nature économique comme la performance financière, ou de nature non économique ou relationnelle comme par exemple la continuité de la relation et la fidélité.

Etant donné la variété et le nombre des variables recensées dans la littérature, il apparait opportun de procéder à une étude exploratoire afin d'en faire ressortir les déterminants et conséquences principaux qui conditionnement la qualité relationnelle dans le secteur bancaire marocain.

Méthodologie de Recherche

Eu égard à la spécificité de la relation client-banque et à l'importance du maintien des relations sur le long terme, nous avons choisi dans notre recherche, de procéder à une étude qualitative exploratoire, qui nous permettrait de faire ressortir les principaux déterminants et conséquences de la qualité de la relation Banque-PME.

Ainsi, dans le cadre de notre étude, nous avons opté pour un entretien semi directif basé sur un guide d'entretien avec des questions ouvertes préalablement définies, dont les thèmes ont été inspirés de la revue de littérature.

Ainsi, notre guide se compose de trois rubriques principales et se présente comme suit :

Une rubrique introductive, pour présenter l'objet de la recherche et le cadre de l'étude aux personnes interviewées, en leur assurant que leurs identités resteraient anonymes et en leur précisant la possibilité de mettre fin à l'entretien à tout moment.

Suivie d'une rubrique principale traitant les axes suivants :

- La perception de la banque de manière générale.
- La relation avec la banque principale du répondant (ancienneté, fréquence de contact, appréciation globale, relation avec le personnel, expériences positives et négatives, services utilisés, contraintes, problèmes rencontrés, attentes…etc).
- La perception d'une relation de qualité, les facteurs-clé de réussite la relation banque-PME et les conséquences qui en résultent.

La dernière partie du guide d'entretien est relative à l'identification de l'entreprise et aux caractéristiques socio-démographiques des répondants.

Pour réussir nos entretiens et obtenir le maximum d'information de la part des répondants, nous avons respecté les recommandations suggérées par Hlady Rispal (2002 :

- Laisser parler la personne le plus librement possible en évitant de poser des questions.
- Laisser l'interlocuteur utiliser des temps morts pour réfléchir.

- Relancer le répondant pour détailler les points déjà évoqués ou pour mettre fin à des temps prolongés.
- Adopter une attitude d'écoute totale en évitant de fournir des informations, de prendre des décisions, d'évaluer les idées développées ou encore d'interpréter de manière directe les propos évoqués.

L'échantillon

Comme il a été cité précédemment, notre recherche s'articule autour de l'étude de la relation client-fournisseur, en l'occurrence dans notre cas, l'étude des relations Banque-PME/TPE.

Pour pouvoir effectuer notre enquête, cerner notre échantillon et procéder à la collecte des données, nous avons utilisé la technique des informateurs-clé.

La collecte par le biais des informateurs-clé, est une technique qui consiste à identifier, au sein de l'entreprise, une personne qui possède les informations requises. L'interlocuteur principal doit être représentatif du groupe et doit avoir une expertise particulière, ainsi qu'une expérience dans le domaine étudié (Marshall, 1996). Cette technique, permet, ainsi, de collecter des données en interviewant un nombre de répondants pré-sélectionnés, qui sont choisis selon le statut, l'expertise, la connaissance ou l'accessibilité (Phillips,1981).

Ainsi et pour les besoins de notre enquête, et afin d'assurer la fiabilité et la qualité des données à collecter, les répondants n'ont pas été choisis de manière aléatoire, mais selon des critères bien définis. Pour cela, notre étude a été destinée à la personne (au sein de l'entreprise), qui se charge de la gestion des opérations bancaires et de suivi de la relation bancaire dans sa globalité. Elle doit justifier d'une ancienneté dans le poste et avoir des contacts réguliers avec la banque (tableau 5).

Le statut de la personne clé diffère d'une entreprise clé. Selon la taille et l'organisation de chaque entité, la gestion de la relation bancaire peut être assurée par le gérant, ou déléguée, éventuellement, à l'un de ses collaborateurs, qui se charge de l'aspect financier de l'entreprise (responsable financier, trésorier, comptable, responsable administratif…etc).

Notre tâche consistait à identifier et entrer en contact avec cette personne clé, pour éviter d'altérer ou de biaiser nos résultats de recherche. De même, le répondant a été invité à donner une opinion sincère, en fonction de sa propre expérience.

Au cours de cette phase exploratoire, nous avons opté pour un échantillon de convenance composé de six hommes et quatre femmes, opérant dans domaines variés dans la ville de Tanger et ayant une ancienneté bancaire minimale de trois ans (tableau 5).

De manière générale, et comme il est stipulé dans la littérature académique traitant les études qualitatives, la taille de l'échantillon doit répondre à un objectif de diversification des cas et non de représentativité statistique. Dans ce cas, le critère à respecter n'est pas le nombre d'entretien mais le principe de saturation sémantique.

Dans cette optique, nous avons veillé à varier notre échantillon en le composant de femmes et d'hommes, ayant des âges, des expériences et des profils différents. Cette variété vise à élargir et enrichir le contenu de notre étude (tableau 5).

Pour le critère de saturation, il est recommandé d'arrêter la collecte des données quand les derniers entretiens n'apportent plus d'informations pertinentes ou complémentaires (Thietart, 2007). A partir du huitième questionnaire, nous avons remarqué que les informations recueillies s'apparentent et tendent vers une même perception et réflexion.

Résultats de la recherche

Après avoir abordé le cadre théorique et méthodologique de notre étude, nous allons nous intéresser dans la partie suivante, aux résultats obtenus de l'enquête exploratoire.

La revue de littérature que nous avons effectuée (tableau 6), nous a permis de recenser un nombre important de variables liées à la qualité relationnelle, dont le nombre et la nature dépendent fortement du secteur étudié et de la perception du chercheur.

Ainsi, l'étude exploratoire que nous avons entreprise, nous a révélé cinq déterminants principaux qui influent directement sur la qualité de la relation banque-PME à savoir, l'orientation-client, l'expertise du personnel, la communication, les liens sociaux et la résolution du conflit. Ainsi que deux conséquences majeures qui sont la continuité de la relation et le bouche à oreille (tableaux 1, 2, 3 et 4, traitement effectué par le logiciel Nvivo 12).

Les antécédents de la qualité relationnelle

- ***L'orientation-client***

L'orientation –client (OC) est la variable qui a été citée le plus par la totalité des participants. Elle fait référence à la capacité et la prédisposition du prestataire de service à vouloir aider ses clients et adopter une attitude qui vise à comprendre et satisfaire leurs besoins, en œuvrant dans la réalisation des bénéfice conjoints, et en évitant les comportements opportunistes (Vieira, 2009).

L'OC est définie par Saxe & Weitz (1982) comme la concrétisation du concept du marketing au niveau individuel, que ce soit du côté du consommateur ou du vendeur. En d'autres termes c'est l'orientation de tous les acteurs d'une entreprise (managers, employés et actionnaires) vers la mise en place d'objectifs communs avec ses clients et la réalisation de bénéfices mutuels sur le long terme, malgré l'attrait du gain sur le court terme (Wray, 1994 ; Vieira, 2009 ; Al-alak, 2014).

Lors des entretiens avec les clients, nous avons remarqué que l'ensemble des interviewés ont souligné le rôle important de la banque, en tant que partenaire et non comme une entité dont la finalité se limite à l'intermédiation financière. En effet et selon les clients :

« La banque doit agir avec ses client comme un partenaire et non comme un exécutant financier ».

« La banque devrait prendre le devant et proposer un accompagnement financier et des offres qui s'adaptent à ses clients, au lieu, de se focaliser sur la ventes de produits standards et inadaptés ».

« Il faut que les banques proposent des offres adaptées aux caractéristiques des PME, formulées dans le sens du partenariat ».

De même, la revue de la littérature a révélé qu'il existe une forte relation entre l'OC et la QR ainsi que les variables qui la composent (Parsons, 2002 ; Kim, 2006). Elle a un effet positif sur la satisfaction (Brady et al., 2001) ainsi que sur la confiance (Kim, 2006).

- ***L'expertise :***

L'expertise est défini comme la perception qu'une personne possède le savoir et la qualification requis dans un domaine spécifique (Shamdasani, 2000 ; Rajaobelina, 2009). Il désigne, ainsi, les compétences techniques et les connaissances mais aussi, la capacité de transférer son savoir au client lors d'un échange donné (Wray, 1994 ; Palmer & Bejou, 1994 ; Boles et al., 2000).

L'étude de Crosby et al., 1990 a révélé le rôle majeur de l'expertise du vendeur dans l'appréciation de la qualité relationnelle et sur l'anticipation des ventes futures. L'expertise et les connaissances du vendeur peuvent réduire l'incertitude du client lors des transactions (Rajaobelina, 2009).

« Quand on s'adresse à un banquier, on s'attend à avoir des informations pertinentes et fiables. Il doit être à la hauteur des attentes des clients ».

A travers les études qui se sont succédées à celle de Crosby et al., 1990**,** il a été maintes fois prouvés que la compétence des employés influent directement sur le degré de satisfaction et de confiance du client (Izogo, 2016), et conditionne les échanges futurs (Lagace, (1991). Les clients ont, donc, tendance à nouer et à construire des relations fortes avec les partenaires jugés compétents (Izogo, 2016).

« Un banquier compétent inspire confiance : je ne peux pas confier mon argent et mon entreprise à une personne qui n'est pas crédible ».

L'expertise est, aussi, essentiel pour expliquer le produit ou le service au client et le convaincre de son utilité (Dampérat & Jolibert, 2009).

« Les qualités techniques liées à la fonction sont tout aussi importantes que les qualités humaines dans l'offre de service ».

- ***La communication***

Dans la littérature marketing, la communication est considérée dans les relations inter-organisationnelles (RIO) comme l'activité de base dans les interactions et échanges entre clients et fournisseurs (Vieira, 2014).

Anderson & Narus (1990) ont définit la communication comme un partage formel et informel d'informations significatives et ponctuelles entre les entreprises. C'est un aspect important de la relation qui reflète les dispositions bilatérales de parties, à fournir des informations utiles et qui leur permettent de coordonner leurs efforts pour l'atteinte des objectifs communs (Jiang et al., 2016).

La communication renvoie, donc, au dialogue interactif qui se développe tout au long des différents stades de la relation (Ndubisi, 2006). Elle englobe, aussi bien, les échanges de données formelles, verbalisées et structurées que les informations personnalisées et non planifiées qui se réalisent tout au long des interactions.

« …Il y' a aussi, la communication, l'échange d'information et la prise en charge dans les meilleurs délais en cas de réclamation. Des fois, même si la réponse risque de tarder, mais un simple feed back de la banque confirmant la prise en charge de notre demande peut avoir un impact positif sur la qualité de la relation et reflète la considération de la banque pour ses clients ».

Dans le secteur bancaire, la qualité de la communication est décisive pour la réussite des relations avec les clients professionnels.

D'ailleurs l'un des répondants à mentionner la « communication » comme l'un des éléments les plus importants dans la réussite de la relation Banque-PME : *« La communication : il y'a certaines banques qui ne communiquent pas l'information avec leurs clients et qui capitalisent sur le savoir, pour maintenir un pouvoir sur les clients et assurer leur dépendance »*

La communication permet de construire une forte relation et permet la résolution rapide des éventuels conflits, l'atteinte des objectifs et la création de nouvelles opportunités d'échange.

- ***Les liens sociaux :***

Tout au long de l'évolution de la relation d'échange et en fonction de la nature et la qualité des interactions, des amitiés se créent entre le personnel en contact et les clients (Wilson, 1995 ; Smith, 1998). Il s'agit de connexion, de sentiment et d'attachement personnel qui se nouent entre les acteurs (Paulssen, 2014), et qui reflètent leur degré d'amitié et d'appréciation mutuelle (Wilson, 1995).

Les liens personnels et relationnels se forgent à l'issue des processus de socialisation, d'adaptation et de personnalisation entre les partenaires de l'échange et dépassent la stricte relation d'échange de biens ou de service et (Holmlund & Kock, 1996).

En effet, 70% des personnes interviewées ont suggéré que les liens sociaux se tissent et se développent avec le temps et tout au long de la relation avec la banque.

« …Avec le temps et par la force des choses, la relation a dépassé le cadre professionnel pour intégrer des relations personnelles d'amitié ».

« Quand vous êtes en contact permanent avec une personne, forcément, il y' a des affinités qui se créent. Des fois, on se rencontre à l'extérieur pour prendre un café et discuter de chose et d'autres, qui n'ont rien à voir avec le travail ».

Dans la même optique, les liens sociaux influent sur les émotions et les sentiments associés à l'expérience du service (Chiu et al., 2005) et rend les clients plus enclin à l'écoute et à l'engagement sur le long terme.

« …Avec certaines personnes, vu leur gentillesse et leur traitements personnalisés, Ça nous arrive de discuter des choses personnelles avant d'entamer celles professionnelles : on prend mutuellement des nouvelles sur la famille. On se félicite pour les fêtes…etc ».

« A force des échanges et des contacts dans le temps, la relation avec le personnel a depuis longtemps dépassé le cadre professionnel pour intégrer des relations personnelles et amicales, sans arrières pensées et sans qu'il y'ait un intérêt commercial derrière ce comportement ».

- ***La résolution du conflit :***

Le conflit est inévitable dans les relations inter-organisationnelles, et peut être dû à plusieurs raisons, allant des contraintes économiques ou politiques, aux facteurs culturels et comportements des acteurs.

Le conflit est généralement défini comme un désaccord entre les partenaires de l'échange (Dwyer et al.1987 ; Anderson & Narus, 1990). Il fait référence, aussi, à tout comportement qui pourrait nuire au développement et la réussite de l'une des parties.
S'il n'est pas bien pris en charge, le conflit peut avoir un impact destructif sur la relation d'échange. En effet, il peut mettre en péril le climat de confiance déjà instauré entre les partenaires, et décourager les intentions d'investissement futures.

D'ailleurs, l'un des répondants l'a clairement mentionné lors de l'entretien : *« En cas d'incident grave, je m'attends à ce que mon banquier me trouve rapidement une solution efficace. Avant, quand il y'avait un problème, je devais moi-même intervenir auprès des responsables, pour faire accélérer les choses. Et j'avoue que je n'appréciais pas beaucoup cela. D'ailleurs, si cela avait continué, j'aurais envisagé de changer de banque ».*

De même, les entretiens effectués, nous ont révélé que les clients sont plus disposés à maintenir la relation avec leur banque actuelle, si leurs réclamations sont traitées à temps et de manière efficace.

« …Avec le temps, quand le banquier a une bonne connaissance de ses clients, les incidents ou les réclamations potentielles sont gérées de manière proactive, c'est-à-dire qu'il fait en sorte d'éviter les problèmes avant qu'ils ne se réalisent ».

« La disponibilité en cas de problème et la rapidité de prise en charge. Il est important d'avoir un interlocuteur à la banque qui soit joignable et qui prend en considération vos demandes et qui vous apporte des solutions efficaces et rapides ».

Les conséquences de la qualité relationnelle :

Les conséquences de la qualité relationnelle varient selon le contexte de l'étude, la perspective d'analyse du chercheur et de l'objectif de la recherche escompté. Dans notre cas, et à l'issu de notre étude exploratoire, nous avons pu constater que la continuité de la relation et le bouche à oreille sont les conséquences principales de la qualité de la relation Banque-PME.

- ***La continuité de la relation***

De manière générale, la continuité de la relation désigne la volonté des parties de prolonger l'accord de coopération sur une période donnée (Biong & Selnes, 1995 ; Kim, 2002). Elle reflète, ainsi, l'intention des parties à maintenir la relation dans le futur (Verma et al, 2015).

L'orientation sur le long terme reflète l'engagement des parties dans une relation stable orientée vers le futur et vers la réalisation de bénéfices conjoints sur le long terme (Ganesan, 1994). Dans cette optique, les entreprises sacrifient les gains financiers ponctuels au profit de partenariat et d'échange étalés dans le temps (Anderson & Weitz, 1992).

« Je suis client depuis 4 ans déjà. Je pense maintenir la relation avec cette banque tant qu'il n'y'a pas d'incident majeur qui nuit à l'intérêt de ma société ».

Les travaux de recherche ont démontré que la continuité de la relation est fortement conditionnée par le niveau de confiance qui règne entre les parties ainsi que le niveau de satisfaction résultant de l'historique des échanges (Selnes, 1998).

« Il est important qu'il y'ait un contact régulier entre la banque et ses clients, ça facilite l'échange et crée un climat plus favorable au développement des relations sur le long terme ».

Dans les relations bancaires, la continuité de la relation est considérée comme un indicateur du niveau de satisfaction des clients par rapport aux prestations servies. Elle garantit ainsi de revenus stables générés par des clients fidèles malgré l'attraction des offres de la concurrence.

« Le personnel est très sympathique avec moi et fait de son mieux. Je suis satisfait des services fournis et je n'ai pas de raison pour changer de banque »

« De manière générale, je pense que les banques offrent, pratiquement, les mêmes, produits et services, ce qui fait la différence pour moi, c'est la qualité des prestations offertes par le personnel. Si je suis toujours client de la banque X, c'est par égard au personnel, avec lequel j'ai développé des liens d'amitiés et de confiance tout au long de mes années d'activités ».

- . ***Le bouche à oreille (BAO)***

En marketing le bouche à oreille (BAO) est défini comme toute communication informelle d'une entreprise donnée, avec d'autres clients sur les caractéristiques d'un produit, d'un service ou d'un employé d'une entreprise donnée (Anderson, 1998). Il peut inclure les avis, les commentaires positifs ou négatifs, les attitudes ou les réactions vis-à-vis du produit, du personnel ou d'une marque donnée (Jansen & Zhang, 2009).

Les études ont démontré que le BAO à une forte influence sur l'image de marque de l'entreprise, beaucoup plus que les actions marketing qu'elle déploie. Ainsi, les clients ferait confiance, plus facilement, aux opinions de leurs proches ayant déjà expérimenté le produit ou service (Jansen & Zhang, 2009).

Ceci a d'ailleurs, été confirmé par l'un des répondants : *« Des fois, c'est le chargé d'affaire qui me demande de lui prescrire des connaissances personnelles. Ça ne me dérange de le recommander car je le connais, je lui fais confiance et je sais qu'il ne va pas me décevoir avec mes amis ».*

Le BAO permet, ainsi, de réduire l'incertitude liée à la première utilisation d'un produit, particulièrement lors des achats à risque (Kumar et al., 2003). Le bouche à oreille influence le processus de décision et le comportement d'achat du consommateur (Litifi & Najjar, 2015. Le client devient, alors, un partenaire actif et une source fiable d'information au service de l'entreprise (Hennig-Thurau et al., 2002**).**

« Je recommande toujours cet établissement à mes connaissances, vu la compétence et l'amabilité du personnel, le traitement personnalisé et la simplification des procédures. D'ailleurs, je leur ai apporté pas mal de clients ».

Discussion des résultats

A travers la revue de littérature effectuée sur le thème de la qualité relationnelle, nous avons pu constater un nombre important de variables qui impactent la qualité de la relation entre les clients et fournisseurs et qui sont tributaires du contexte de l'étude.

L'étude exploratoire réalisée nous a permis de ressortir cinq principaux déterminants adaptés aux particularités du secteur bancaire et qui sont l'orientation-client, l'expertise du personnel, la communication, les liens sociaux et la gestion du conflit.

De même, il a été constaté que la continuité de la relation et le bouche à oreille en sont les principales conséquences.

Au niveau managérial, cette étude permettrait aux gestionnaires de :

- D'orienter les efforts Marketing vers des actions susceptibles de développer le partenariat avec les clients.
- Proposer des produits adaptés aux attentes des clients et qui préservent leurs intérêts.
- Former les employés pour être à l'écoute des clients et fournir un service de qualité.
- Répondre aux requêtes des clients de manière rapide et fiable
- Encourager la gestion proactive visant à anticiper et à solutionner les incidents négatifs qui risquent de nuire à la relation client.
- Pérenniser les relations avec les clients sur le long terme.
- Accéder à de nouveaux prospects grâce à la recommandation des clients existants.

Limites et voies de recherche

La majorité des travaux de recherche abordent la qualité de la relation du point de vue du vendeur, et peu l'ont traité du côté de l'acheteur. Il serait intéressant de procéder à une analyse dyadique pour mieux cerner la divergence de point de vue des deux parties.

L'échantillon reste limité. Il serait opportun d'élargir l'étude à d'autres villes et à d'autres secteurs d'activités, en prenant en considération les caractéristiques culturelles de chaque contexte d'étude, pour valider les résultats.
De même, le cycle de vie de la relation mérite une attention particulière car il peut impacter le choix et l'importance des variables pour les acteurs.

Du point de vue académique, et afin de pouvoir confirmer les résultats préliminaires, il serait opportun de procéder à une étude empirique quantitative sur un échantillon plus large.

Annexes

Tableau 1 : Analyse qualitative par NVIVO 12 (Présence d'encodage)

	STE A	STE B	STE C	STE D	STE E	STE F	STE G	STE H	STE I	STE J
ORIENTATION CLIENT	Oui	Oui	Oui	Oui	Oui	Oui	Oui	Oui	Oui	Oui
COMMUNICATION	Oui	Oui	Oui	Oui	Non	Oui	Oui	Oui	Oui	Oui
EXPERTISE	Oui	Oui	Oui	Oui	Oui	Oui	Oui	Oui	Oui	Oui
LIENS SOCIAUX	Oui	Non	Oui	Oui	Non	Oui	Oui	Oui	Non	Oui
RESOLUTION DU CONFLIT	Oui	Oui	Non	Oui	Non	Oui	Oui	Oui	Oui	Oui
BOUCHE A OREILLE	Oui	Non	Oui	Non	Oui	Oui	Oui	Non	Oui	Oui
CONTINUITE DE LA RELATION	Non	Oui	Oui	Oui	Oui	Non	Oui	Oui	Non	Oui

Tableau 2 : Références encodage

	STE A	STE B	STE C	STE D	STE E	STE F	STE G	STE H	STE I	STE J
ORIENTATION CLIENT	5	4	1	1	2	1	1	2	2	1
COMMUNICATION	5	3	1	1	0	1	1	1	2	2
EXPERTISE	5	2	1	1	1	1	1	1	1	1
LIENS SOCIAUX	2	0	1	1	0	1	1	1	0	1
RESOLUTION DU CONFLIT	1	1	0	1	0	1	1	1	1	1
BOUCHE A OREILLE	2	0	1	0	1	1	1	0	1	1
CONTINUITE DE LA RELATION	0	1	1	2	1	0	1	1	0	1

Tableau 3 : Nombre de citation

Nom	Fichiers	Références
ORIENTATION CLIENT	10	20
COMMUNICATION	9	17
EXPERTISE	10	15
LIENS SOCIAUX	7	8
RESOLUTION DU CONFLIT	8	8
CONTINUITE DE LA RELATION	7	8
BOUCHE A OREILLE	7	8

Tableau 4 : Fréquence des citations des variables par répondant

	STE A	STE B	STE C	STE D	STE E	STE F	STE G	STE H	STE I	STE J	
ORIENTATION CLIENT	24,53%	23,69%	4,19%	3,77%	8,39%	1,89%	5,45%	7,76%	14,47%	5,87%	100,00%
COMMUNICATION	22,59%	8,47%	3,29%	6,35%	0%	5,65%	5,41%	7,29%	13,41%	27,53%	100,00%
EXPERTISE	31,85%	14,38%	3,08%	11,64%	8,22%	5,82%	3,77%	5,14%	4,45%	11,64%	100,00%
LIENS SOCIAUX	13,73%	0%	14,05%	8,82%	0%	8,17%	5,88%	15,69%	0%	33,66%	100,00%
RESOLUTION DU CONFLIT	13,04%	6,35%	0%	6,02%	0%	19,73%	7,69%	9,70%	14,72%	22,74%	100,00%
BOUCHE A OREILLE	24,56%	0%	5,85%	0%	27,49%	8,19%	11,11%	0%	2,92%	19,88%	100,00%
CONTINUITE DE LA RELATION	0%	15,56%	7,22%	15,56%	15,56%	0%	7,78%	11,11%	0%	27,22%	100,00%

Tableau 5 : Profils des répondants

Entreprise	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Ancienneté bancaire	3 ans	13 ans	8 ans	13 ans	4 ans	6 ans	10 ans	6 ans	5 ans	10 ans
Activité	Industrie	Industrie	Service	Industrie	Service	Industrie	Industrie	Construction	Service	Industrie
Ancienneté de l'activité	5 ans	14 ans	13 ans	13 ans	4 ans	9 ans	18 ans	10 ans	7 ans	10 ans
Fonction du répondant	Responsable financier	Gérante	Gérant	Gérant	Gérant	Gérant	Responsable financier	Gérant	Responsable financier	Responsable financier
Age	30 ans	44 ans	42 ans	37 ans	29 ans	30 ans	48 ans	46 ans	40 ans	37 ans
Sexe	Femme	Femme	Homme	Homme	Femme	Homme	Homme	Homme	Homme	Femme

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Model of Urban Information and Educational Space of Pedagogical Interaction

Mikhail A. RODIONOV
Penza State University, Penza, Russia
E-mail: do7tor@mail.ru

Irina V. AKIMOVA
Penza State University, Penza, Russia
E-mail: ulrih@list.ru

Margarita A. GAVRILOVA
Penza State University, Penza, Russia
E-mail: margogavr@yandex.ru

Zhanna DEDOVETS
The University of the West Indies, SOE St. Augustine, St Augustine, Universiti drive, 1,
Trinidad and Tobago
E-mail: Zhanna.Dedvets@sta.uwi.edu

Abstract

This article considers the pertinent issue of building a model of a person-oriented urban educational environment for teachers. As a prerequisite for building this environment for teachers, the authors consider a University Educational Complex organized in 1990, which in various years included such divisions as a multidisciplinary college, a pedagogical lyceum for rural schoolchildren, the V.G. Belinsky Pedagogical University school of early development, a kindergarten, a teacher training college, and a graduate school The authors describe the basic principles of forming an urban person-oriented educational environment, as well as the main opportunities that this environment opens up. The result of building this environment is a significant increase in the professional competence level of teachers.

Keywords: Model, Person-Oriented Urban Educational Environment, Competence, Teacher

Introduction

Education supports those social institutions of society where the quality of employees objectively determines progress. Consequently, the training of teachers must be adequate to promote national development. Global changes in education involve large-scale, long-term experiments. Therefore, it is necessary to form teachers' competences encompassing a set of professional and personal qualities.

The urban person-oriented educational environment is an open system of information resources structured for particular specifics of the subject-pedagogical activity of the teacher. This environment gives teachers the opportunities to integrate (combine in various ways) the content, technologies, and type of resources used depending on the current pedagogical situation. It contributes to the expansion of interaction between participants in the educational process and to the formation of new methodological approaches providing a new quality of learning outcomes.

Background of the study

In 1990, the University Educational Complex (UEC) was created. This complex was conceived as as a voluntary association of educational institutions at various levels based on the continuity of stages and levels of professional training. The interaction of all institutions is based on the coordination and consistency of pedagogical activities. The Educational - Methodological Council was created as a coordinator for this process at the Penza State Pedagogical

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University (PSPU). When it was created, the University Educational Complex included: a school (a multidisciplinary college at PSPU, added later), a pedagogical lyceum for rural schoolchildren, and the V. G. Belinsky Pedagogical University itself. In subsequent years, a school of early development, a kindergarten, a teacher training College, and a graduate school were added (Figure 1).

Established in 1990, the system of educational institutions was designed to ensure the continuity and integrity of professional training of teachers on the basis of common conceptual approaches. This system ensures the optimal content, forms, and time of training and strengthens the subject professional-pedagogical orientation, which contributes to the formation and development of professional competence of teachers.

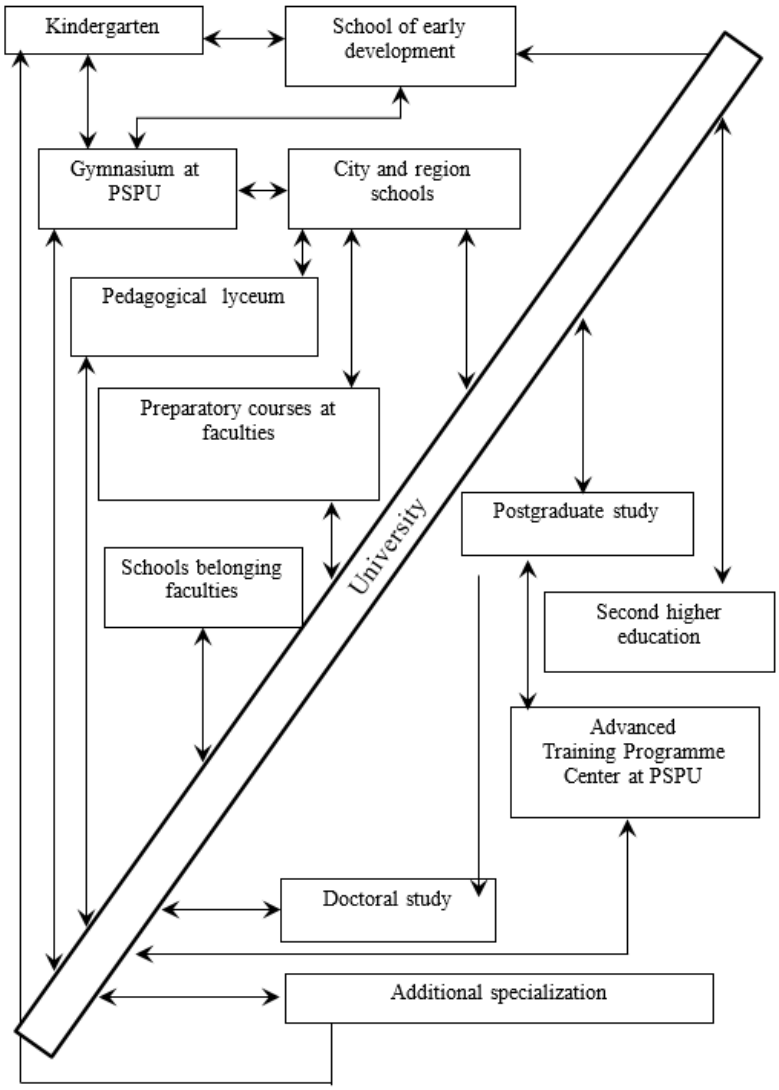

Fig. 1:Structure of the University Educational Complex (UEC)

The Purpose of the research

Transformation of UEC into an open forum for interaction between educational organizations and the creation of an urban educational environment for teachers.

Model

The urban person-oriented educational environment provides teachers with new opportunities for self-education, development of new learning technologies and new avenues for pedagogical communication, and increases the external motivation for their professional development.

The following principles were used in the formation of the urban person-oriented educational environment:

- multi-media (space must function in any standard operating environment);
- availability of space and its resources (the ability to access any module);
- openness (the ability to constantly supplement and modify information);
- adaptability (the ability to modify information in accordance with the specifications of the topic being studied);
- efficiency (structuring information reduces the time spent to search and convert it);
- invariance (compliance with the level of modern information products, the ability to use without additional improvements).

The urban person-oriented educational environment includes the following system modules: information - methodological center;

digital communication, interdisciplinary communication; subject-pedagogical growth.

The information- methodological system module is in the form of a multi-level structure of digital educational resources, control and diagnostic materials and provides:

- creation, modernization and adaptation of resources to specific subject-pedagogical conditions;
- creating a resource base, searching for resources based on emerging user requests and requirements;
- efficiency of the user's work with the resources provided to him, obtaining derived information;

The digital communication module contains constantly updated information that provides:
organization of dialogue, subject-pedagogical interaction, and information exchange.

organization of professional networking and contains reports, messages, publications, experimental materials, projects, and electronic resources.

The module of subject-pedagogical growth contains constantly updated information that provides:

- organization of scientific and methodological research;
- organization of project activities of participants in the pedagogical process;
- formation of an electronic library, media library;
- Refresher course

The meta-subject communication module includes

general pedagogical, psychological webinars, materials aimed at digitalization of the educational process.

The role of the coordinator is performed by the City Scientific - Methodological Center (CSMC), which accumulates all materials, ideas, and helps to establish cooperation. This center provides information support for all processes, promotes the creation of creative groups, laboratories, experimental and training sites, ensuring interaction between teachers, University staff, schoolchildren, and CSMC specialists.

The city's person-oriented educational environment is constantly expanding and supplemented by participants in educational activities. Various remote forms of working with the materials of each module are provided.

- The instrumental capabilities of the environment allow for rapid modification of educational materials, repeated use for different purposes, and replication of the prepared materials in different forms. The environment makes learning materials easily accessible at any time, regardless of location, i.e., it makes the materials mobile.

Working in the city's person-oriented information educational environment involves the use of remote work formats (online). The most popular are video conferences, video lectures, and digital materials.

In addition, the content of the educational module is constantly filled with special educational electronic resources created by the teacher independently or in collaboration with students or other teachers:

- simulators designed for students of different levels of training;
- diagnostic material, tests;
- textbooks designed for students who want to make a deeper study of mathematics;
- training program;
- interactive tutorial;
- reference books and encyclopedias.

Most of the resources have the necessary online links that allow you to quickly make contextual inquiries or go to the desired section of the complex of materials, which increases the information saturation of the content.

Methods

Since 2015, the authors have been monitoring the development of the city's person-oriented information and educational space and the effectiveness of its impact on the formation and development of teachers' competence. Table 1 shows the criterion for the effectiveness of the urban person-oriented educational environment.

Table 1: The criteria for the effectiveness of the urban person-oriented educational environment

Criteria	Monitoring by indicators	Diagnostics
Resource saturation	Fullness and Breadth of content	Expert evaluation
Content of teaching material	Systematization and updating	Expert evaluation
Availability and timeliness of information	Resource provision	Observation
Consistency of the resources of a college teacher with other educational environments	Interaction with other environments	Analysis
The degree of implementation in the educational process using the resources of the environment	Educational environment	Statistical analysis
The distribution of teaching time	Amount of time saved	Map of observations
Using technologies for training	Availability of new ICTs	Introspection
Intensity of using ICT	The use of interactive forms	The map of observations
Activity of teachers and students engaged in scientific research	Initiative	Statistical analysis
	Number of participants	
Interaction with other teachers	The degree of readiness of teachers to develop activity	Statistical analysis
	Shared experience	

The results of the assessment of the urban person-oriented educational environment are presented in diagram 1, which reflects the development of this process for each performance criterion.

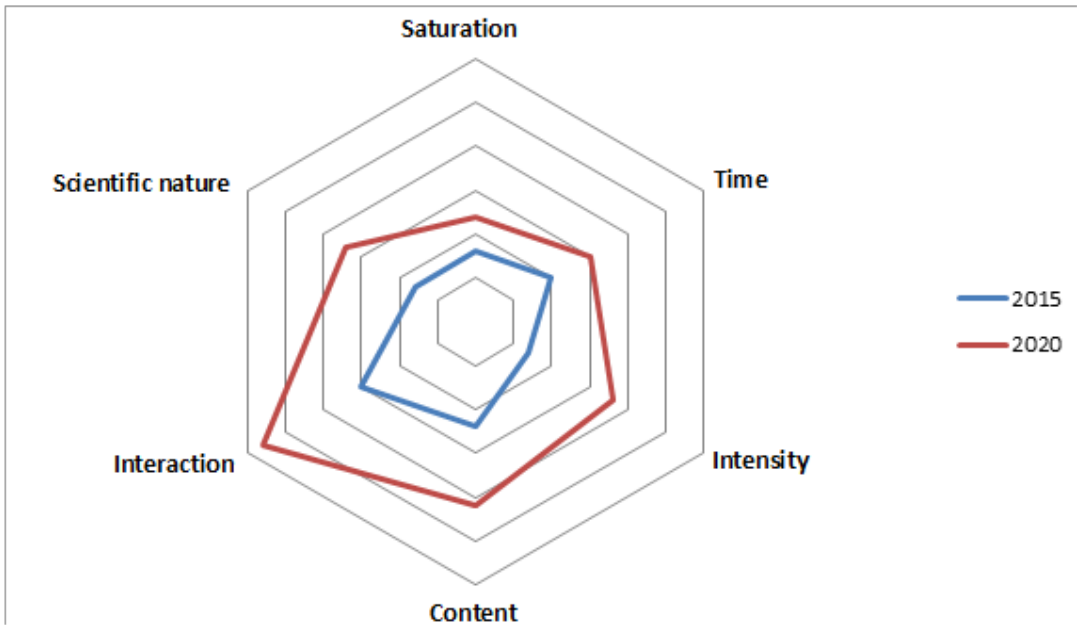

Figure 2

Results and Innovation

An urban person-oriented information educational environment supports:

- systematic use of digital educational resources;
- the process of subject-pedagogical self-development of a teacher on an individual trajectory;
- the process of interpersonal, network interaction, exchange of experience with colleagues;
- joint expert evaluation and development of electronic teaching resources.

An urban person-oriented information educational environment provides:

- inclusion in the professional activity of the teacher of the experience of using modern equipment, gadgets, and technologies in the preparation and conduct of lessons;
- formation and support of an informal community of teachers aimed at professional growth;
- material and moral incentives for teachers by increasing their rating indicators and implementing internal needs for new teaching activities;
- development of personal and professional qualities through the use of communication interaction, which modifies and expands the activity of the teacher.

The professional level of teachers in the following positions has significantly increased:

- ability to work in a team;
- ability to work with a variety of technical devices;
- ability to adapt depending on the pedagogical situation;
- ability to build an individual educational trajectory;
- ability to carry out network communication interaction;
- readiness for self-education, self-control.

Conclusion

The creation of an urban person-oriented educational environment has made it possible to effectively form and develop the professional competence of teachers and their ability to carry out multi-functional activities in dynamically developing modern education.

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Eustress and Academic Staff Performance: A Study of Covenant University Nigeria

Adeshola PETER
Landmark University, Omu Aran, Nigeria, adeshola.peter@covenantuniversity.edu.ng

Anthonia ADENIJI (Ph.D)
Covenant University, Ota, Nigeria, anthonia.adeniji@covenantuniversity.edu.ng

Kehinde OLADELE (Ph.D)
Covenant University, Ota, Nigeria, oladele.kehinde@covenantuniversity.edu.ng

Fred PETER (Ph.D)
Landmark University, Omu Aran, Nigeria, fred.peter@covenantuniversity.edu.ng

Maxwell OLOKUNDUN (Ph.D)
Covenant University, Ota, Nigeria, maxwell.olokundun@covenantuniversity.edu.ng

Henry INEGBEDION (Ph.D)
Landmark University, Omu Aran, Nigeria, inegbedion.henry@lmu.edu.ng

Abstract

This study critically examined the effect of eustress on academic staff performance. To accomplish this goal, a total of 171 academic staff drawn from covenant university Ogun State, Nigeria, were sampled. The data were analysed using regression analysis. The result showed that eustress has positive significant influence on performance of academic staff in the selected university. An implication of this study is that university management should ensure that academic staff performance appraisal should focus on research output, teaching effectiveness and community service engagement bearing in mind international standards and parameters and more emphasis should be put on adopting an internationally competitive reward mechanism for academic staff commensurate to performance demands.

Keywords: Eustress, Academic Staff, University, Nigeria.

Introduction

Eustress is the good stress that motivates employees to perform well and to work with interest. This stress can be a motivator and it provides an incentive to get the job done. The good stress is what everyone enjoys while performing work. Everyone needs a little bit of stress in life in order to continue to be happy, motivated, challenged and productive (Folkman, 2013). Furthermore, eustress improves the confidence level of people but at the same time it never makes them overwhelmed. It also instils in them a feeling that the goal is not too far away and out of reach but still slightly difficult for them to handle. This feeling is responsible for the focused action. As the goal is visible and can be reachable, it fosters challenge and motivation to realize the goal (Farber, 1991; Folkman, 2013). The outcome of eustress experience by academic staff may be quality and enhanced performance among academic staff in scheduled time (Allen, 2015). Currently, much of the traditional research on academic staff stress have focused mainly on negative stress which is considered harmful to employees over all wellbeing (Anthony, 2015; Figen & Tatjana, 2015; Akanji, 2013; Mark & Smith, 2012). The predominant mind set towards stress is that stress is debilitating and disruptive and negatively affect performance, but this mind set can be changed (Crum, Salovey & Achor, 2013). Musrrat (2013),

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Ahlam and Hassan (2012), Agbu and Olubiyi (2011) and Reda and Rania (2016) have advocated a more robust and holistic approach in exploring the negative and positive stress in order to gain subjective lecturers reports of stress and coping mechanisms resulting in a fuller picture on academic staff stress with future recommendations grounded in research. However, the aim of this study is to examine the influence of eustress on the performance of academic staff of tertiary institutions in Nigeria.

Therefore, the following hypothesis was formulated:

H_0: Eustress does not affect Academic staff performance.

Literature Review

The Concept of Eustress

Quick, Wright, Adkins, Nelson, and Quick (2013) identified eustress as a healthy, positive and constructive results of a stressful event and stress response. The positive side of stress is that it can jump-start your adrenalin and motivate you to perform your tasks more quickly in response to impending deadlines. Thus, eustress is considered the result of the body's positive response to a stressor. Eustress could be regarded as an increase of the buffer zone, with the effect of improving health and decreasing morbidity and mortality. Thus, it is the transition of the internal body system from a high level of allostatic load to a lower level of allostatic load. This process results in an increase of the bodies adaptive capabilities (Kupriyanov & Zhdanov, 2014). A second approach to eustress was the one of Lazarus (1993). According to him, eustress was more than an adaptation process but the positive cognitive appraisal of the response to a stressor which is experienced when the outcome is positive and when it preserved or enhanced well-being. Furthermore, eustress could be experienced when a challenge occurs, because such an event is considered as a potential for growth (Simmons & Nelson, 2001). Previous studies focused on general stress, where the concept of eustress has been overlooked. This has brought about an inadequacy of knowledge about eustress which obstructs the development of positive stress (Li, Cao & Li, 2016). Distress and eustress represent distinct constructs and are not at opposite ends of a continuum, because they cannot be distinctively separated (Keller, 2013). This is consequent upon the fact that the presence of eustress does not indicate lack of distress. They are mixed together like water in a bathtub and when combined the water temperature will be determined by the quantity of hot or cold water (Jarinto, 2010). However, there is an opinion that eustress and distress may occur simultaneously. Nelson and Simmons (2003) consider eustress and distress as two different reactions to the stress which can occur simultaneously supposed that eustress and distress represent separate and independent aspects of the overall response to stress. Lovallo (2015) also believes that the influence of stress is largely dependent on how a person interprets the situation. Therefore, in the university context, eustress associated with role demands for academic staff as an is literally the "good stress" that is associated with a positive outcome and enhanced well-being.

Job Performance

Job performance is a commonly used, yet poorly defined concept in industrial and organizational psychology (the branch of psychology that deals with the workplace). Nowadays, it's a part of Human Resources Management and refers to whether a person is performing his job well or not. Despite the confusion over how it should be exactly defined, performance is an extremely important criterion that relates to organizational outcomes and success. Job performance can be defined as how well an employee is performing at his work. Byars and Rue (2006) define performance as the extent to which an employee accomplishes the tasks that make up his or her job. Dolan & More (2002) defines performance as a record of outcomes produced during a specific job, over a specific time. According to Borman and Motowidlo (1993) and Campbell, Gasser and Oswald (1996), it is widely agreed that job performance is considered as a multidimensional construct. Dessler (1983) suggests that work performance is a measure of how well an employee meets the standards that are required for a specific job. Performance is the accomplishment of a given task measured against pre-set standards of accuracy, completeness, cost and speed. The behaviour of an individual directed towards goal accomplishment may be considered as his work performance. According to Jamal (2007), work

performance is the degree to which an individual executes his or her role with reference to certain specified standards set by the organization. Therefore, in the context of academic staff in the university context, meeting demands for research, teaching and community service based on certain specified standards set by the institution is termed as performance.

Methodology

A descriptive research design was used to obtain data from employees of the selected university. Data was collected through the administration of structured copies of questionnaire to academic staff of Covenant university Ogun State, Nigeria. The study population comprised the academic staff of Covenant University, with a population of 530 employees. Covenant university is a front-line private university in Nigeria with a drive and focus for excellence. The vision of the university to turn out to be one of the best ten universities in the world inspires a corporate drive to achieve the vision which can be associated with eustress as theorised by this study. The emphasis on the academic staff of the organization was founded on the fact that academic staff of any university are the foremost crop of work force that drive performance hence, the concept of eustress may be more applicable to them. The data collected was essentially quantitative in nature and a sample size of 171 employees was used. Regression analysis was employed to test the hypothesis stated. Eustress was measured using a three-item measure. These items are: teaching role demands; research and publication demand; community service role demands. Academic staff performance was assessed using a three-item measure. These items are; teaching effectiveness; research output; community service engagement. Responses ranged by 5-point Likert scaling from 1= “Strongly disagree” to 5= “Strongly agree

Data Analysis and Presentation of Results

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.344[a]	.118	.108	.64107
a. Predictors: (Constant), Eustress				

Source: Field Study Result (2018)

The above table is the model summary. It shows the extent to which the dependent variable variance (academic staff performance) is explained by the model (eustress). In this case, the R square value is .118 expressed by a percentage, this means that our model (the effect eustress has on academic staff performance) explains 11.8% of the variance on academic staff performance.

Table 2: ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.787	1	4.787	11.648	.001[b]
	Residual	35.755	87	.411		
	Total	40.542	88			
a. Dependent Variable: academic staff performance						
b. Predictors: (Constant), eustress						

Source: Field Study Result (2018)

The table above shows the assessment of the statistical significance of the result. The ANOVA table tests the null hypothesis to determine if it is statistically significant. From the results, the model appears to have a good fit, indicated by positive value F value of 11.648. Also, the table shows a statistically significant relationship between eustress and academic staff performance ($p < 0.01$). The implication of the statistical result is that driving eustress in the organization will result in high academic performance. Hence the null hypothesis should not be accepted.

Table 3: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.334	.386		6.054	.000
	Qual_Conscie	.325	.095	.344	3.413	.001
a. Dependent Variable: academic staff performance						

Source: Field Study Result (2018)

The table above shows the simple model that expresses the extent to which eustress affects academic staff performance. In this table, the beta co-efficient which relates to is .344. It makes the strongest contribution to explaining the dependent variable. Findings from this result showed that eustress has an effect on academic staff performance. Hence, we are accepting the alternative hypothesis (eustress has an effect on academic staff performance).

Discussion of Findings

The findings from this study shows that driving a culture of positive stress (eustress) in the university environment motivates performance of academic staff. This extends the work of Salvendy (1982) and Caitlin (2013) who carried out a sequence of experimental studies and results revealed that effective management of occupational stress is capable of increasing performance. Effective management of occupational stress in this context may suggest driving a culture of positive stress (eustress) to motivate performance of workforce. The findings of this study also re-echo the work of Ashimi, (2014) who argued that stress may not always be associated with negative outcomes because not all stress is harmful and dysfunctional in nature. In this regard it is assumed that stress can be a positive stimulus when one is helped to understand how stress occurs, what the consequences of stress are and how it can be coped with. However, as identified in literature, the positive side of stress is that it can jump-start adrenalin and motivate a workforce to perform tasks more quickly in response to demands. This owes to the fact that eustress motivates a positive cognitive appraisal of the response to a stressor which is experienced when the outcome is positive and when it preserves or enhances well-being. Therefore, in the context of this study the focal point is that if academic staff of a university hold a positive cognitive appraisal of the demands associated with research, teaching and community service based on the rewards and fulfilment anticipated, this can motivate a positive response resulting in increased performance.

Theoretical Implications

This study has contributed to existing studies by empirically showing the relationship between eustress and academic staff performance, especially in a developing economy, such as Nigeria. Therefore, subsequent scientific studies in the area of stress and performance research can gain insights on factors related to positive stress that motivate performance.

Recommendations

The findings of this study have important implication for university management in Nigeria. Motivation policy should be made differently according to the needs of the different academic staff. Academic staff performance appraisal should focus on research output, teaching effectiveness and community service engagement bearing in mind international standards and parameters. More emphasis should be put on adopting an internationally competitive reward mechanism for academic staff commensurate to performance demands

Conclusion and Further Studies

This research was undertaken to examine the influence of eustress on academic staff performance of covenant university. The study concludes that academic staff in universities in Nigeria will respond positively to stressors actuated by performance appraisal demands if the anticipated outcome is deemed commensurately rewarding. Further studies could explore other antecedents of academic staff performance.

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Accounting Reserves as An Instrument of Reducing the Economic Risks of Catering Organizations

Taya DENISOVA
Associate Professor, Department of Accounting, Analysis and Audit
South Ural State University (National Research University), Chelyabinsk, Russia,
lev-taya@mail.ru

Maksim GVOZDEV
Associate Professor, Department of Accounting, Analysis and Audit
South Ural State University (National Research University), Chelyabinsk, Russia,
maksim_gvozdev@mail.ru

Yulia MARKINA
Associate Professor, Department of Accounting, Analysis and Audit
South Ural State University (National Research University), Chelyabinsk, Russia, yulia27.86@mail.ru

Marina BAZHANOVA
Associate Professor, Department of Economic Security
South Ural State University (National Research University), Chelyabinsk, Russia, mbazhanova@mail.ru

Abstract

The article describes the implementation of the main principle of the activity of catering enterprises, or any other company for that matter – the continuity principle. The factors influencing the continuity of business are considered. The authors analyse the ways of managing and reducing the economic risks of catering enterprises.
The authors propose a method of provisioning as the most efficient way to reduce the economic risk. For the business activity of enterprises to remain continuous, it has been suggested to create a complex of reserves. Different approaches to the concepts of "uncertainty", "risk", and "reserve" have been considered.
In the process of solving the set tasks on achieving the goal of the research, the scientific provisions have been worded, which serve as the ground for improving the accounting and the internal control of reserves at catering enterprises, what aims at ensuring the continuity of business activity of these companies.

Keywords: catering enterprises, principle of business continuity, reserves.

Introduction

The accounting principle of business continuity of enterprises is stipulated by Art. 8 of the Federal Law "On the Accounting" and by para.6 of the Provision on Accounting "Accounting Policy of an Organization": "…the organization shall continue its business activity in the foreseeable future, and it has no intent of or need for liquidation or significant reduction of its activity and, therefore, the obligations will be duly discharged (continuity assumption)".

The business activity of catering enterprises is susceptible to the influence of internal and external factors, which could play a significant role in managerial decision making and affect the continuity of an organization's business activity.

The external factors of catering enterprises include the general economic situation in a country, demand for an enterprise's products and services in the market, changes in the prices for the raw materials being purchased, failures in food products deliveries, dishes not sold before their date of expiry, etc.

The internal factors of catering enterprises comprise the qualification level of specialists, technology of cooking dishes and semi-finished products, availability of the required equipment, quality of the raw materials being used, following the sanitation and hygiene standards, etc.

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Since the results of activity of an economic entity are to a large extent determined by the environment of its functioning, the entity needs to know this environment and be able to adequately react to the changes in it. The main characteristics of the financial and economic environment are the interrelatedness of its factors, the complexity, the flexibility, and the uncertainty.

Scientific literary sources define the uncertainty as incomplete and inaccurate information on the conditions of fulfilling a managerial decision, an impossibility of making accurate forecasts on the changes in the business environment, the unpredictability in the actions of contractors, etc.

The continuity of business activity of a catering enterprise means the ability of the catering enterprise to continuously maintain its technological processes on processing and cooking food products, and the absence of its intent for liquidation or termination of activity.

There can be different reasons for uncertainty: unstable situation in the economic and political spheres within a country and in the world in general; the uncertainty in the actions of contractors; the uncertainty in the demand for goods; inaccuracy of information, etc.

In the conditions of uncertainty, it is difficult for catering enterprises to make managerial decisions. The fulfilment of the made managerial decision is related to the concept of "risk".

Meanwhile, the risk can be related not only to losses, but also to possible extra income, that is why the specialized literature does not provide a unified approach to the concept of "risk".

The following main definitions exist for this concept *(Giliarovskaya, 2003)*:

"…1) danger of possible losses;
2) phenomenon related to the economic activity aimed at making the maximum profit based on satisfying the needs and demands of buyers in compliance with the market requirements;
3) uncertainty (income variability) in the return of capital employed;
4) risky activity performed with the hope of a successful outcome;
5) probability of a mistake or success from making this or that choice in a situation with several alternatives…".
Thus, risk, to put it simply, is a deviation of the expected result from the actual one, which can turn out to be either positive, or negative.

Main Problem

The problems of functioning of the accounting systems for various types of activity were considered in the works by the following Russian scientists: P.S. Bezrukhikh, N.A. Bereslavtseva, V.G. Get'man, N.P. Kondrakov, V.F. Paliy, Ya.V. Sokolov, V.I. Tkach, A.D. Sheremet, V.B. Ivashkevich, E.A. Mizikovskiy, A.M. Ilyshev, N.N. Ilysheva, I.V. Zyrianova, and others. Among foreign scientists dealing with the problems in accounting, reporting and analyzing, we should mention D. Middleton, B. Needles, G. Richard, P. Samuelson, E.S. Hendriksen, R. Anthony, and others. The research studies by these scientists are very important for the development of accounting. However, they were considering the concept of "reserves", its content and the methods in accounting in general, without sector-related specifics of an enterprise's business activity.

The problems of ensuring the continuity of business activity of enterprises are described in the works by such scientists as I.T. Balabanov, P.G. Grabovyi, M.G. Lapusta, E.A. Utkin, A.S. Shapkin, A.E. Shevelev, E.V. Sheveleva, and others. These researchers were considering such concepts as "continuity of business activity", "uncertainty", and "risk", and were proposing the methods of ensuring the continuity of business activity of enterprises. However, the considered types of risks and their classification are mostly inapplicable to catering enterprises that is why further research is required.

The accounting of financial reserves was studied by a number of foreign and Russian authors, including R. Adams, J. Bethge, D. Middleton, R. Anthony, S.V. Romanova, L.T. Giliarovskaya, Ya.V. Sokolov, A.D. Sheremet, L.R. Robinson, A.P. Rudanovskii, I.M. Ageev, L.A. Melnikova, E.V. Riabova, E.A. Popova, and others. The scientists were defining the concept of "reserves", proposing their evaluation and accounting of various types of enterprise's

business activity. However, these specialists were considering the reserves of enterprises either in general, or as applied to separate sectors of business activity of enterprises. In this context, various approaches were formed, which are practically not acceptable for the sphere of catering.

Methods

Due to the fact that the financial and economic activity of the market participants is becoming more and more complicated, there is a risk of unforeseen material and financial losses, or negative payoffs from various projects. Business activity of catering enterprises is especially susceptible to the risks, among which the production risks should be specifically mentioned as these are related to cooking of food products and a distinctive technological process.
The procedure of making a decision on the risk reduction at catering enterprises implies several stages.

At the first stage, the enterprises working with contractors inform the accounting office on the external environment. Production departments inform the accounting office on the internal environment.

At the next stage, the quantity and quality of the revealed risks are assessed by the specialists of the accounting office, internal control department. After that the analysed data are forwarded to the enterprise top managers.

Next, based on the analytical data, the enterprise top managers decide on the method of the risk reduction.

The assessment methods are chosen by the economic entity independently this is the responsibility of a top manager or a person in charge of risk management. Once the risks are assessed, the methods of risk management should be chosen:

– risk avoidance;
– risk transfer;
– risk acceptance; or
– risk reduction.

Risk avoidance is a method, which implies the development of measures completely eliminating a certain type of risk. Such measures may include:

1) avoiding the operations with high level of risk. Most of the economic operations within an enterprise's main type of activity are risky, that is why it is impossible to implement such measures all the time as the enterprise will see neither losses, nor profits;
2) avoiding the use of big loan funds. These allow gaining extra profit, but at the same time may lead to the enterprise's losing its financial stability.

Thus, the method of risk avoidance deprives catering enterprises of the extra profits and has negative effect on their rates of economic development. That is why risk avoidance should be rational if the following is true:

– avoiding one risk does not lead to emerging of another risk;
– level of the risk is incommensurable with the income gained as a result of this operation;
– losses from this type of risk cannot be compensated at the enterprises own expense.

Risk transfer in modern practice is fulfilled using the following methods.

1. Risk transfer by signing a factoring agreement.
Under this agreement, the enterprise's credit risk is transferred to a bank or a specialized factoring company. The use of this method is not typical for catering enterprises due to the fact that their business activity does not imply receivables from customers, and therefore, there is no credit risk. It is very rare that catering enterprises deal with loan funds.

2. Risk transfer by signing a guarantee agreement.
Article 361 of the Civil Code of the Russian Federation stipulates a possibility of signing a guarantee agreement. Under this agreement, the guarantor stands surety to the creditor for the third party's partial or complete fulfilling of its obligations. The use of this method is also not typical for catering enterprises due to the absence of credit risk.

3. Risk transfer to the suppliers of raw materials and semi-finished products.
Transferred are the risks related to spoiling or loss of the material and production stocks in the process of storing and transporting them, or performing associated works. Meanwhile, the losses caused by the drop in the products' market price cannot be transferred and are incurred by a catering enterprise.
Thus, risk transfer is possible if the parties sign an agreement, which has a specific section on transferring certain risks to the contractor.

The most dangerous risks which may lead to grave consequences for an enterprise shall be neutralized through insurance. In this case an insurance company shall act as the party accepting the risks.
When accepting a risk, an enterprise searches for the possible sources of the required potential loss reserves. In this case the loss reserves are taken both from the in-house resources, and from the loan ones. Meanwhile, if having used the loss reserves due to a risk, an enterprise lacks the assets; it may lead to a decline in production, and in the worst-case scenario to a bankruptcy.

The main methods of risk reduction are hedging, diversification of activities and investments, provisioning, and others.

Hedging is practiced in such spheres as stock-exchange, banking, and commercial activity. E.G. Dolan et al. in a book Money, Banking, and Monetary Policy define hedging as a "system of concluding fixed-term contracts and transactions, which takes into account the future probable changes in the exchange rates and aims at avoiding the unfavourable consequences of such changes". This method is not used at catering enterprises.

Diversification is a process of allocation of the capital between different investments directly related to each other. Diversification allows to partially avoiding risks when allocating the capital between several types of activity. Other types of activity different from the main one are rare at catering enterprises that is why this method is practically inapplicable.

Provisioning (self-insurance) is a method of risk reduction, which is based on an enterprise's reserving part of its resources and which allows to overcome the possible negative consequences.

Provisioning is essential in the following cases:

– there is an economic gain from its implementation, as compared to other methods of risk reduction; or
– it is impossible to implement some other method of risk management.
Thus, we can conclude that the latter risk reduction method is the most suitable one with regard to the business activity of catering enterprises.
Also, there are non-economical methods, such as the preliminary check on contractors, control over following the technology of cooking the products of own make, checking the expiry dates of raw materials, and so on.
The preliminary check on contractors implies the following security measures:

1) before the beginning of the contractual relationship, checking on a contractor in the extract from the Unified State Register of Legal Entities;

2) checking on the authorities of the contractor's representative by asking to submit relevant documents (Power of Attorney, Decree, Protocol of the Meeting of Founding Parties, Decision of a Sole Founder, and others) and comparing them against the passport data;

3) verifying the identity of the contractor's representative by asking him/her to produce his/her passport, making a copy of this passport, and saving all the data on all the contractors.
Among all of the described methods of risk reduction, provisioning is the most acceptable one as it means that an enterprise prefers to be on the safe side all on its own, thus saving on the insurance expenses. Creation of a separate

reserve fund to compensate for possible negative consequences of the catering enterprise's activity is the essence of provisioning, the main task of which is a prompt overcoming of temporary difficulties in the economic activity.

Results and Discussion

In order to implement the principle of the continuity of business activity of catering enterprises, it is necessary to use a reserves complex, a complex comprising a group of known and special reserves, to create which an enterprise should use accounts for the accounting of reserves, evaluate them and determine the actions required on the procedures of accounting and reporting.

Special reserves mean the reserves, which meet the specifics of catering enterprises' business activity, and which are created to cover possible losses related to the technological processes of processing and cooking food products, non-observance of the sanitation and hygiene regulations, and so on.

A specific feature of catering enterprises is the necessity to follow the requirements imposed on them by the society and the government and influencing their activity, such as holding of the required licenses as stipulated by the legislation; certification of the catering products; observing the sanitation and hygiene regulations; and the regulations on rendering catering services.

Thus, the non-observance of the regulations on rendering catering services, or the sanitation and hygiene regulations with regard to the business activity and products may result on the clients' addressing a sanitation and hygiene service, which in its turn can check on the enterprise, and fine or even close it. Not following the rules of the produce storage and transportation may result in its changing its consumer properties or spoiling. The mentioned factors lead to economic risks of the catering enterprises, and those affect the continuity of their business activity.

In this regard, the procedure of forming the group of reserves, which are used to build the reserves complex, has been adjusted to include the following actions:

1) determining the specifics of the catering enterprises' business activity;
2) identification and quality assessment of the risk caused by these specifics; and
3) determining the required reserve using the reserves classification.

Various situations related to the specifics of catering enterprises' business activity create certain types of risk. Depending on the situation, it is possible to accept a number of risks, but other risks require action to reduce undesirable consequences.

Let us consider the consistency of the specifics of the catering enterprises' business activity with the risks and reserves (Table 1).

Table 1: Consistency of the specifics of the catering enterprises' business activity with the risks and reserves

Specifics of the catering enterprises' business activity	Type of risk	Type of reserves
Technology of products processing and manufacturing	Risks of violating the technology of processing and cooking food products and manufacturing of goods	Reserves for the costs to be incurred related to the production activity of catering enterprises
	Risks of violating the sanitation and hygiene regulations	Reserves for the economic activity contingency
Using of food raw materials	Risks of using bad quality raw materials or the shelf life expiry	Reserves for the economic activity contingency

	Risks of decrease in the source raw materials	Reserves for natural losses
Short term of the products storing and selling	Risks of the products spoiling	Reserves for products spoiling
Taking goods on commission	Risks of spoiling or shortage of the products taken for the commission	Reserves for the guarantees issued

(Source: compiled by the authors based on practical experience)

Based on the performed analysis of the catering enterprises' reserves, a conclusion has been made that they need to be systematized to choose from them correctly while processing the accounting information.

Conclusion

Therefore, among all of the described methods of risk reduction, provisioning is the most acceptable one as it means that an enterprise prefers to be on the safe side all on its own, thus saving on the insurance expenses. Creation of a separate reserve fund to compensate for possible negative consequences of the catering enterprise's activity is the essence of provisioning, the main task of which is a prompt overcoming of temporary difficulties in the economic activity.

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Validation of a Full and a Short Form of The Abusive Supervision Scale in Polish Organizational Context

Jolanta BABIAK

Wrocław University of Science and Technology, Wrocław, Poland
jolanta.babiak@pwr.edu.pl

Beata BAJCAR

Wrocław University of Science and Technology, Wrocław, Poland
beata.bajcar@pwr.edu.pl

Abstract

In the current research, we validated the abusive supervision scale in Polish organizational setting. In two studies, we tested a full and a short form of the scale, and examined its psychometric properties. In study 1 ($N = 934$), we explored one-factor structure of both forms of the abusive supervision scale. In study 2, using an independent sample of employees ($N = 463$), we have confirmed the one-factor structure of both forms of the scale. Reliability parameters have yielded satisfactory levels for both forms. The two studies provided support for the predictive validity of the abusive supervision scale in the context of various work-related variables. We have found significant relationships between abusive supervision and perceptions of low trust in management and coworkers, diminished organizational justice ow effectiveness and low satisfaction. Heightened stress indicators such as somatic, cognitive, and emotional responses, offensive behaviors among co-workers like gossiping and conflicts, counterproductive work behaviors like sabotage, abuse, withdrawal and theft and low work engagement were positively related to abusive supervision. The abusive supervision scales, in a full and a short form, are thus valid and reliable measures of the perception of abusive supervision in Polish organizations.

Keywords: Scale Development, Scale Validation, Abusive Supervision, Employees' Psychological Well-Being

Introduction

Abusive Supervision

Abusive supervision has been defined as "subordinates' perception of the extent to which supervisors engage in the sustained display of hostile verbal and nonverbal behaviors, excluding physical contact" (Tepper, 2000, p. 178). Destructive forms of supervision, referred to as derailed leadership, destructive leadership, laissez-faire leadership, tyrannical leadership, supportive-disloyal leadership, toxic leadership, authoritarian leadership bullying, narcissistic (see Schyns and Schylling, 2013; for review) have been documented as increasingly pervasive in the current organizational reality (Mackey et al., 2017; Tepper et al., 2017). The list is by no means exhaustive here. As frustrating as it sounds some of the abusive behaviors may be perceived as worse than others. Pelletier (2010) presented weighted means of negative behaviors, among which ridiculing an employee's work in public had the highest value.

Comparably assessed was lying. Less harmful behaviors included reprimanding for mistakes or not participating in a meeting (Pelletier, 2010). Some researchers make a valid point however that the detrimental effects of abusive supervisors may vary due to differences in employees' perception of the magnitude and significance of the abuse. Some individuals may tolerate and endure much more of leaders' harsh behaviors than others (Schyns et al., 2018). Academics and practitioners have acknowledged detrimental impact of abusive supervision on employees' well-being and organizational effectiveness. In the literature, abusive supervision has generated the most substantial research

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from among any other concept of destructive leadership (Mackey et al., 2017; Martinko et al., 2013). In fact, abusive supervision scale developed by Tepper (2000) is one of the widely used measurement tool. Other instruments designed to gauge negative leadership behavior include Toxic Leadership Scale (TLS; Schmidt, 2008) and Destructive Leadership Questionnaire (DLQ; Shaw et al., 2011; Shaw et al., 2014). These measures however have not been as widespread in research (e.g. Babiak and Bajcar, 2019a; 2019b) as the abusive supervision scale.

The concept of abusive supervision and the resultant measurement tool have been validated across many studies. According to Tepper (2000; 2007), the phenomenon of abusive supervision stems from violation of justice and organizational norms. As such, perception of injustice at any organizational level has been recognized as a core contributing factor of abusive supervision (e.g. Hoobler and Hu, 2013). The mechanism of abusive supervision proliferation may result from frustration with the unjust behavior of one's bosses, "the higher-ups", (Liu et al., 2012), which, if unresolved, often leads to retaliation against other co-workers, especially those who are less powerful (Aryee, et al., 2007; Lin et al., 2013; Park et al., 2015). Antecedents of abusive supervision are many and the main categories relate to supervisor (e.g. personality, childhood experiences), organization (e.g. a steep structure), subordinate (e.g. ways of coping), as well as demographic characteristics of supervisors and subordinates (e.g. clash of generations) (Zhang and Bednall, 2015).

The drama of abusive supervision relates to its detrimental consequences for workers' personal and professional life spheres. Due to abusive supervision employees' well-being, health, work-life balance, job satisfaction may be seriously jeopardized (Skogstad et al., 2014; Wang et al., 2020; Zhang and Liao, 2015). Studies show that abusive supervision leads to such negative emotional outcomes as negative affect, anxiety, depression, lower self-esteem (e.g. Schmid et al., 2018), serious health issues, like paranoia (Lopes et al. 2018), or work-family conflicts (Mackey et al., 2017). These experiences may cause distress, emotional exhaustion, and burnout ultimately undermining commitment and engagement (Mackey et al., 2017; Zhang and Liao, 2015). Organizational loss due to tolerating abusive leaders aboard translates into lower performance (e.g. Chen and Wang, 2017; Zhang and Liao, 2015), counterproductive work behaviors (An and Wang, 2016; Sulea et al., 2013), like sabotaging organizational goals, stealing or high turnover intentions and departure of valued employees (Schyns et al., 2018). Undoubtfully, the consequences of abusive supervision, which is a current and vital theme of academic and practical considerations, shall be recurrently researched upon so that the knowledge is brought up to date for the organizational management to be fully informed about this real organizational problem.

The main aim of this research was two-fold: to examine the full Tepper's (2000) abusive supervision scale, develop its short form in the Polish organizational context, and assess the psychometric properties of both forms of the scale. We thus addressed two objectives to fulfill this aim: (1) to determine the factor structure of both forms, and (2) to examine the reliability and predictive validity of the full and a short form of the scale. In order to allow for enhanced universality in the use of the validated scales, we employed a cross-validation process (de Rooij and Weede, 2020) by conducting two studies using independent samples of participants.

Study 1

In study 1 we examined the factor structure of the 15-item abusive supervision scale. We also developed a short version of the scale. Next, we assessed the reliability of both forms of the scale in terms of the internal consistency, item-total, inter-item correlations, and temporal stability. Then, in order to investigate predictive validity of the abusive supervision full and short forms of the scale we examined their associations with employees' work effectiveness, work satisfaction, values at work, stress symptoms, and offensive behavior.

Participants and Procedure

The sample consisted of employees working in Polish organizations of different sectors and business operations. An online questionnaire was distributed using an electronic platform, with the link being provided to the participants. The anonymity and confidentiality of the answers were guaranteed. All participants provided informed consent before they have had begun to fill out the forms. A total of 932 individuals completed the survey, which yielded responses from 505 women and 427 men, aged between 18 and 63 (M = 29.07, SD = 12.80). The participants' mean tenure was 15.67 years (SD = 9.87).

Measures

Abusive supervision. The abusive supervision scale developed by Tepper (2000) consists of 15 items, which measure subordinate's perception of her supervisor's abusive attitudes and/or behaviors. Each item is rated on a 5-point Likert scale ranging from 1: "I cannot remember him/her ever using this behavior with me" to 5: "He/she uses this behavior very often with me" (Tepper, 2000).

Work effectiveness. The employees' work effectiveness was assessed by one item 'How would you rate your work effectiveness?' on a 5-point scale from 1 – very low to 5 – very high.

Work satisfaction. The employees' work satisfaction was assessed by three items referring to satisfaction with the leader, work, and relations with peers (e.g. 'How satisfied are you with your leader?'). Participants rated their satisfaction on a 5-point scale, ranging from 1 - completely unsatisfied to 5 – completely satisfied. In this study we considered a total score of work satisfaction. In this sample, the coefficient alpha reliability for the total score (α = .79) was acceptable.

In this study we used the Copenhagen Psychosocial Questionnaire (COPSOQ II; Pejtersen et al., 2010) adapted in Poland by Baka (2019) that measures various psychological and organizational variables in three categories: values at work, offensive behaviors, and emotional responses.

Values at work. The organizational justice, mutual trust between coworkers, and trust regarding management as values at work were measured by the COPSOQ subscales (Baka, 2019; Pejtersen et al., 2010). Each of these subscales consisted of several items assessed on a 5-point scale (from 1 – very little to 5 – very much). The organizational justice included 4 items (e.g., "Are employees appreciated when they have done a good job?". Mutual trust between employees is represent by 3 items (e.g., Do the employees in general trust each other?). Trust regarding management consisted of 4 items (e.g., Can you trust the information that comes from the management?). The reliability of these measures in this study were satisfactory (Cronbach α = .73 - .87).

Offensive behaviors. The offensive behaviors measured by COPSOQ II items (Baka, 2019; Pejtersen et al., 2010) included unpleasant teasing, conflicts and quarrels, and gossip and slander. Unpleasant teasing was assessed by a single question "Have you been exposed to unpleasant teasing at your workplace during the last 12 months?" Conflicts and quarrels were measured by item: "Have you been involved in quarrels or conflicts at your workplace during the last 12 months?" Gossip and slander were expressed in item: "Have you been exposed to gossip and slander at your workplace during the last 12 months?" Participants responded to these questions on a 5-point scale (from 1 – no to 5 – yes, every day).

Stress symptoms. To measure employees' stress symptoms at work four subscales from COPSOQ II (Baka, 2019; Pejtersen et al., 2010) were used: (1) stress (e.g., "How often have you had problems relaxing?), (2) somatic stress symptoms (e.g., "How often have you had a headache?", (3) cognitive stress symptoms (e.g., "How often have you had problems concentrating?"), and (4) burnout (e.g., How often have you been emotionally exhausted?"). Respondents answered on a 5-point scale (1 – at all to 5 - all the times). The internal consistency of these subscales ranged from .74 to .82.

Control variables. We included demographic (i.e. gender and age) and work-related (i.e. tenure) background variables.

Results

The abusive supervision scale was translated into Polish language by three independent translators with psychometric experience. After comparing all translated versions, individual items were assessed to meet the criteria of content validity, linguistic correctness and coherence, as well as common use in the Polish language. The final Polish version was back translated and used to test a group of bilingual individuals and English-speaking students (N = 18). The inverted version of abusive supervision scale showed satisfactory level of convergence with the original version. No statistically significant differences were noted in responses to items between the Polish version of the scale and its back translation.
In Table 1 the mean, standard deviation, item loadings and inter-item correlation for each item are presented. In the first step, the exploratory factor analysis was conducted (using IBM SPSS 25.0) to identify the internal structure of

abusive supervision measure. Bartlett's test for sphericity was significant (at the level 8993.39, df = 105, $p < 0.001$, and the KMO = .96) and suggested that the data were suitable for factor analysis. As depicted in Figure 1, an one-factor model was extracted, which explained 56% of variance. The fifteen items of the abusive supervision scale were then submitted to a principal component analysis, with free extraction of factors, which revealed one factor with an eigenvalue of 8.47. As displayed in Table 1, loadings of each item were above .55.

Table 1: Descriptive statistics, factor loadings, and discriminating power for abusive supervision items

		Factor loadings	Item-total correlation	*M*	*SD*
1*	My boss ridicules me.	.79	.74	1.58	.90
2	My boss tells me my thoughts or feelings are stupid.	.74	.68	1.56	.96
3	My boss gives me the silent treatment.	.55	.50	2.38	1.33
4*	My boss puts me down in front of others.	.82	.78	1.82	.84
5	My boss invades my privacy.	.73	.68	1.52	1.00
6*	My boss reminds me of my past mistakes and failures.	.78	.74	1.88	1.05
7	My boss doesn't give me credit for jobs requiring a lot of effort.	.70	.67	2.36	1.36
8*	My boss blames me to save himself/herself embarrassment.	.77	.73	1.72	1.11
9*	My boss break promises he/she makes.	.77	.73	1.97	1.11
10*	My boss expresses anger at me when he/she is mad for another reason.	.77	.73	1.91	1.18
11*	My boss makes negative comments about me to others.	.79	.75	1.55	.97
12	My boss is rude to me.	.75	.72	1.62	1.10
13	My boss does not allow me to interact with my coworkers.	.75	.70	1.41	.91
14	My boss tells me I'm incompetent.	.73	.68	1.47	.95
15*	My boss lies to me.	.79	.75	1.78	1.12

*Note. * Item included to short version of abusive supervision scale. Factor eigenvalue = 8.47.*

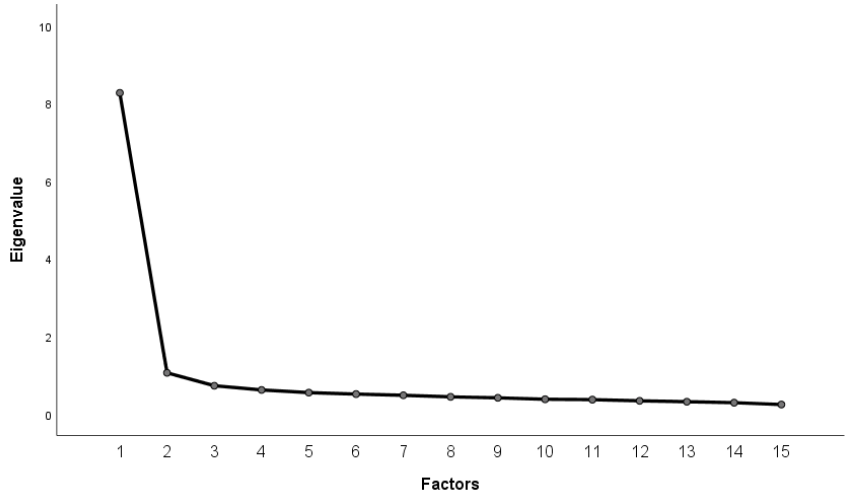

Fig. 1: Scree plot of eigenvalues for the factorial solution of abusive supervision scale (*N* = 932)

Next, according to validation standards (Ziegler et al., 2014) we developed a short form of abusive supervision scale. Items inclusion was based on the following criteria: 1) highest factor loadings, 2) impact on subscale internal consistency, 3) discriminating power of items (in terms of item-total correlations), and endorsement rates (i.e., items with considerable floor and ceiling effects were excluded). In cases where items demonstrated similar psychometric

properties, items were considered in terms of their length and content, with preference given to short and clearly worded items, and those deemed applicable to the widest range of respondents. In result, a short form consisted of 8 items with highest loadings (above .75) and highest discriminating power. Items with the lowest or highest mean score were excluded (see Table 1). The 8-item model explained 64% of the variance.

Reliability and validity of the abusive supervision measures

The reliability of abusive supervision measure was assessed using the internal consistency, item-total, inter-item correlations, and temporal stability. The internal consistency of the extracted factor was high. All parameters (i.e., Cronbach α, item-total correlation range, inter-item correlation mean, inter-item correlation range, inter class correlation) for the full and short form of the scale obtained high levels, indicating satisfactory reliability (see Table 2).

Table 2: Reliability parameters for abusive supervision measures in study 1 and study 2

	Study 1[1]		**Study 2[2]**	
	Full form (15 items)	**Short form (8 items)**	**Full form (15 items)**	**Short form (8 items)**
Cronbach α	.94	.92	.91	.88
Item-total correlation range	.50 - .78	.71 - .76	.41 - .73	.60 - .73
Inter-item correlation mean	.53	.59	.49	.48
Inter-item correlation range	.41 - .75	.52 -.75	.24 - .66	.31 -.66
ICC	.94	.92	.91	.88
Temporal stability[3]	.87	.85		

[1] N = 932, [2] N = 463, [3] N = 80. ICC - Inter class correlation.

Predictive validity of abusive supervision measure was assessed through correlation analysis between abusive supervision and three outcome variables, i.e. values at work, stress symptoms, and offensive behavior. As depicted in Table 3 abusive supervision correlated highly with offensive behavior and moderately with stress symptoms. Moreover, abusive supervision correlated negatively with values at work, such as organizational justice, mutual trust between employees and trust regarding management.

Table 3: Intercorrelations between variables analyzed in study 1

Variables	***M***	***SD***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. Abusive supervision (15 items)	26.33	11.83	1													
2. Abusive supervision (8 items)	13.78	6.63	.98**	1												
Values at work																
3. Trust regarding management	13.72	3.32	-.35**	-.34**	1											
4. Mutual trust between employees	10.21	2.50	-.41**	-.40**	.56**	1										
5. Organizational justice	12.75	3.46	-.19**	-.19**	.71**	.40**	1									
Stress symptoms																
6. Somatic stress symptoms	8.21	3.63	.54**	.53**	-.17**	-.29**	-.02	1								
7. Cognitive stress symptoms	8.93	3.55	.48**	.49**	-.08*	-.23**	.01	.74**	1							
8. Burnout	11.26	3.64	.40**	.41**	-.10**	-.20**	-.07*	.58**	.65**	1						
9. Stress	10.40	3.74	.46**	.48**	-.15**	-.26**	-.08*	.67**	.72**	.74**	1					

Offensive behaviors																
10. Gossip and slander	2.11	1.27	.51**	.49**	-.35**	-.40**	-.19**	.38**	.30**	.23**	.31**	1				
11. Conflicts and quarrels	1.83	1.02	.56**	.55**	-.22**	-.39**	-.08*	.39**	.39**	.31**	.37**	.52**	1			
12. Unpleasant teasing	1.78	1.09	.55**	.53**	-.21**	-.34**	-.09**	.39**	.38**	.32**	.37**	.53**	.61**	1		
Employees outcomes																
13. Work effectiveness	3.87	.72	-.24**	-.24**	.18**	.19**	.19**	-.18**	-.21**	-.19**	-.20**	-.20**	-.21**	-.19**	1	
14. Work satisfaction	11.38	2.73	-.49**	-.47**	.24**	.21**	.23**	-.22**	-.21**	-.23**	-.24**	-.24**	-.23**	-.25**	.35**	1

*Note. N = 932. * p < .05, ** p < .01.*

To check the differences between gender, age, and tenure and perception of abusive supervision the ANOVA was conducted.

Table 4: The effects of the control variables on abusive supervision measures in study 1 and study 2

	Abusive supervision scale					
	Full form (15 items)			**Short form (8 items)**		
	Women ***M (SD)***	**Men** ***M (SD)***	***F***	**Women** ***M (SD)***	**Men** ***M (SD)***	***F***
Gender						
Study 1	26.40 (10.82)	26.25 (12.93)	.04	13.83 (6.21)	12.71 (7.10)	.08
Study 2	22.50 (8.66)	21.89 (7.59)	2.72	11.74 (5.07)	11.15 (4.39)	2.11
Age[1]						
Study 1	-.05			-.03		
Study 2	.08			.10*		
Tenure[1]						
Study 1	-.01			.02		
Study 2	.09			.12*		

*Note. Study 1: N = 932; Study 2: N = 463; [1] Pearson correlation with abusive supervision * p < .05.*

The ANOVA results did not show significant differences between genders in terms of abusive supervision perception. Correlations of the abusive supervision with age and tenure were also non-significant (see Table 4).

Discussion of Study 1

In this study we have found a single-factor solution of the full form of abusive supervision scale, which explained 56,4% of variance. This result corroborates with the factorial solution found in other studies (e.g. Gatti et al., 2019; Mitchell and Ambrose, 2007). Furthermore, based on the EFA solution for the full, 15-items form, we extracted 8 items with the highest factor loadings and used it in subsequent analysis as a short form of the scale. The reliability indices, such as Cronbach α, item-total correlations, inter-item correlations, inter-class correlations, test-retest, for 15-item and 8-item forms of the abusive supervision scale represented satisfactory levels (Cronbach, 1951). These results correspond to previous findings showing adequate levels of the scale's independent reliability measures (cf. Gatti et al., 2019; Mitchell and Ambrose, 2007).

In preliminary support of the scale's predictive validity, we have found significant associations of abusive supervision with low trust in management and coworkers, and low organizational justice. This result is in line with previous findings on the relationships between abusive supervision and analogues variables like retribution (e.g. Park et al.,

2015; Zhang and Liao, 2015). Likewise, our findings of negative relationship between abusive supervision and trust between coworkers as well as display of behaviors such as gossiping, conflicts, unpleasant teasing gives further evidence to associations between abusive supervision and hostile behaviors of employees (Michel et al., 2015). Revealed in this study positive relationships between abusive supervision and stress symptoms provide evidence to support previous findings on the positive associations between abusive supervision and subordinates' psychological distress (Tepper et al., 2007; Wu et al., 2012; Zhang and Bednall 2015), reduced well-being (Lin et al., 2013; Zhang and Liao, 2015), and increased emotional exhaustion (Wheeler et al., 2013; Wu and Hu, 2009). At last, gender, tenure and age did not differentiate employees in terms of abusive supervision perception. The magnitude of the yielded correlations is low to moderate. Of note, many other factors, not considered in this study, also play an important role in the relationship between studied variables. They include personality characteristics of supervisors and employees, past experiences of abusive supervision, current or past mental health issues (e.g. Mackey et al., 2017). Other influences notwithstanding, the current findings add to the body of knowledge on the one factor structure of the full and short forms of Tepper's (2000) abusive supervision scale. Also, the results of study 1 provide preliminary verification of the predictive validity of the full (15-item) and a short (8-item) abusive supervision measure in the Polish organizational context.

Study 2

In study 2, we verified the factor structure of the full and a short form of abusive supervision scale. According to recommendations for cross-validation in the process of the scale validation (de Rooij and Weede, 2020), a confirmation of the factor solution of abusive supervision scale (a full and a short form) was performed using an independent sample of employees. We examined reliability, predictive validity of both forms of the scale in terms of their correlations with various relevant constructs, e.g. counterproductive behaviors, leadership quality, employees' work engagement.

Participants and Procedure

Data were collected in an online mode as in Study 1. Of the 463 participants 208 were female (44.8%). The average age of the participants was 29.8 (*SD* = 9.25). On average, the participants had an employment length of 6.67 years (*SD* = 8.20).

Measures

Abusive supervision. To measure abusive supervision a Polish version of Tepper's (2000) scale, as in Study 1 was used.

Counterproductive work behavior. Counterproductive work behavior was measured with 4 subscales from the short version of the *Counterproductive Work Behavior-Checklist* (CWB; Spector and Fox, 2005) in Polish adaptation (Baka et al., 2015). This included four subscales: 1) *abuse* (14 items; e.g., "Started or continued a damaging or harmful rumor at work."), 2) *sabotage* (7 items; e.g., "Purposely dirtied or littered your place of work."), 3) *theft* (5 items; e.g., Took supplies or tools home without permission."), and 4) *withdrawal* (6 items; e.g., "Taken a longer break than you were allowed to take."). Respondents answered on 5-point scale (from 1 – *very little* to 5 – *very much*). The reliability of the subscales ranged from .68 to .81 in this study.

Leadership quality. To measure leadership quality a subscale of COPSQ II (Baka, 2019) was used, which consists of 4 items, such as "To what extent would you say that your immediate superior gives high priority to job satisfaction?" Respondents answered on 5-point scale (1 – *very little* to 5 – *very much*). The reliability of this measure in this study was satisfactory (Cronbach $\alpha = .81$).

Work engagement. Work engagement was measured using the 9-item version of Utrecht Work Engagement Scale (UWES-9; Schaufeli et al., 2006). This scale consists of three subscales: *vigor* (6 items), e.g., "When I get up in the morning, I feel like going to school"; *dedication* (5 items), e.g., "I am enthusiastic about my job"; and *absorption* (5 items), e.g., "When I am working, I forget everything else around me." Respondents answered on 7-point scale (1 – *never* to 7 – *always*). Scores are summed, with higher scores indicating higher levels of work engagement. In this study Cronbach's alpha coefficients for the three-dimension subscales ranged from .88 to .91.

Results

Confirmation of the factorial structure of abusive supervision measures

The single-dimensional structure obtained in EFA was verified in the confirmatory factor analysis (Brown, 2015), with maximum likelihood estimation method using AMOS software (IBM AMOS 24.0). According to Kline (2015), the model is well fitted to the data, if fit parameters meet the following criteria: χ^2/df is between 2-3; root mean-square error of approximation (RMSEA) is below .08, standardized root-mean square residual (SRMR) is near 0; whereas comparative fit index (CFI), Tucker-Lewis index (TLI), goodness-of-fit index (GFI), and adjusted goodness-of-fit index (AGFI) are above .90.

The results obtained in CFA indicated that the model's goodness of fit was very good ($\chi^{2/}$df = 2.23, RMSEA = .052, GFI = .96, AGFI= .93, CFI = .97, SMSR = .036). These results suggest that the model is very well fitted to the empirical data (though very close to the threshold proposed in the literature). Since the fit indices presented acceptable values, we decided to not re-specify the model. Figure 2 shows the retained factor structure of the full form of the scale, in which all estimated parameters are statistically significant and the loadings of the items are much higher than .50. We also tested the model for the short form of abusive supervision. The 8-item model of abusive supervision scale has also yielded very good parameters of fit to the data ($\chi^{2/}$df = .86, RMSEA = .001, GFI = .99, AGFI= .98, CFI = .99, SMSR = .015).

Reliability and validity of the abusive supervision measures

All reliability parameters of the full and short abusive supervision measures (as Cronbach α, item-total, inter-items, and inter-class correlations) were comparably high and acceptable, although lower than in study 1 (see Table 2). Assessment of the predictive validity of the full and short forms was conducted through correlation analysis between abusive supervision and quality of leadership measure. Results, presented in Table 5, showed significant negative moderate (-.47 and -.45 respectively) correlations between measured variables. In order to test the predictive validity both form of the scale were correlated with 4 measures of employees' counterproductive work behavior, and three measures of work engagement and their total score.

Table 5: Intercorrelations between the analyzed variables in study 2

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Abusive supervision (15 items)	21.59	7.59	1										
2. Abusive supervision (8 items)	11.15	4.40	.96**	1									
3. Leadership quality	16.55	3.70	-.47**	-.45**	1								
Counterproductive work behavior													
4. Sabotage	8.26	2.414	.24**	.23**	-.23**	1							
5. Abuse	17.25	5.65	.32**	.30**	-.21**	.67**	1						
6. Withdrawal	9.25	3.19	.25**	.23**	-.21**	.52**	.49**	1					
7. Theft	5.79	1.64	.22**	.20**	-.20**	.70**	.63**	.43**	1				
Employees' work engagement													
8. Vigor	10.55	2.64	-.23**	-.21**	.31**	-.09	-.05	-.21**	-.08	1			
9. Dedication	11.74	2.68	-.18**	-.16**	.27**	-.13**	-.14**	-.25**	-.10*	.70**	1		
10. Absorption	11.44	2.79	-.17**	-.16**	.22**	-.17**	-.12*	-.19**	-.12**	.58**	.70**	1	
11. Work engagement (total)	33.73	7.13	-.21**	-.20**	.30**	-.15**	-.11*	-.25**	-.11*	.86**	.91**	.87**	1

*Note. N = 463. * p <.05, ** p < .01.*

Results presented in Table 5 confirm predictive validity of the full and short versions of abusive supervision scale, showing that both forms of the scale correlated significantly and positively with dimensions of counterproductive work behaviors and significantly negatively with dimensions and the total score of work engagement. The correlations were of low to moderate magnitude.

In addition, the ANOVA results showed no significant differences in abusive supervision perception between women and men. Correlations between abusive supervision and employee's age and tenure for the full form were non-significant, whereas for the short form these relationships were significant but weak (see Table 4).

Discussion of Study 2

In study 2, using an independent sample of participants, a single-factor solution of the full and a short form of the abusive supervision were confirmed. In addition, both abusive supervision scale forms revealed high reliability for all measured indices. The level of independent measures of reliability were high and resembled those reported in study 1. These findings provide additional support for the reliability of the Polish version of abusive supervision scale.

Test of the predictive validity indicated that abusive supervision measure was related to perceived low leadership quality. It corresponds with findings that emphasize the associations of abusive supervision and lack of trust in management (e.g. Chen and Wang, 2017). We also found positive and moderate correlations between abusive supervision and counterproductive work behavior. This result corroborates previous studies on the relationship between abusive supervision and counterproductive work behavior (e.g. An and Wang, 2016; Zhang and Liao, 2015) and further supports the evidence that workers who are victims of abusive supervision engage in a supervisor-directed and organization-directed deviance (e.g., Michel et al., 2015). These relationships may represent a specific retaliation mechanism directed at the personal sources of abuse (like supervisors) or impersonal sources, i.e. organization. Consistent with previous research (e.g. Lyu et al., 2016; Sungu et al., 2020), the current study provides further evidence to negative relationships between abusive supervision and employees work engagement. It seems possible that employees' psychological strain due to abusive supervision consumes the resources of energy, vigor and positive attitude towards fulfilling tasks thus resulting in diminished work engagement. In sum, study 2 confirmed the single-factor structure of the full and a short form of abusive supervision scale, its high reliability and predictive validity in the context of Polish organizations.

Conclusions

In the present research we have validated a full and a short form of the abusive supervision scale in the Polish organizational context. In study 1, we investigated one-factor structure of the full, 15-item form of abusive supervision scale thus supported previous studies (Tepper, 2000; 2007). Additionally, we developed a short, unidimensional form of the scale, that consists of 8 items. As such, the short abusive supervision scale appears to be a viable alternative to the full version. Developing shorter scale forms accords with a long-standing recommendation to strive for parsimonious solutions in scale development research (Boateng et al., 2018). In study 2, using an independent sample, we have confirmed one-factor solution of a full and a short form of the scale. Thus, support for unidimensional structure is convincing for both forms of Tepper's scale. In the two studies both forms of abusive supervision scale revealed high reliability in terms of internal consistency, discriminating power, and temporal stability.

Our findings provided support for high predictive validity of both forms of the abusive supervision scale (e.g. Skogstad et al., 2014; Wang et al., 2020; Zhang and Liao, 2015). In study 1 and in study 2 we established relationships between abusive supervision and employee work-related variables. Specifically, in study 1 we found that abusive supervision is significantly negatively related to trust regarding management, mutual trust between employees, organizational justice, work effectiveness, and work satisfaction. These results correspond with previous findings, which demonstrated associations of abusive supervision with analogues variables like management unjust behavior (e.g. Liu et al., 2012), retaliation against other co-workers (e.g. Park et al., 2015), job satisfaction (e.g. Wang et al., 2020), low performance (e.g. Chen and Wang, 2017; Zhang and Liao, 2015) and confirm predictive validity of the full and a short scale of abusive supervision. Also, study 1 revealed that abusive supervision is significantly positively related to stress symptoms such as somatic and cognitive, and offensive behaviors, like gossip and slander, conflicts and quarrels, and unpleasant teasing. The level of the relationships was low to moderate. Similar results were provided by Tepper et al., (2007), Wu et al., (2012) or Zhang and Bednall (2015) in relation to abusive supervision and

employees distress. In study 2, we have found that abusive supervision significantly negatively correlated with leadership quality, employees work engagement including vigor, dedication, and absorption. Also, abusive supervision significantly positively related to counterproductive work behaviors, like sabotage, abuse, withdrawal or theft. These findings are consistent with earlier studies showing that abusive supervision is associated with negative perception of leadership (e.g. Mackey et al., 2017), counterproductive work behaviors (e.g. An and Wang, 2016), personal problems that undermine commitment and engagement (e.g. Zhang and Liao, 2015), and further substantiate predictive validity of the full and a short scale of abusive supervision. In sum, this research indicates that a full-length- and a short scale of abusive supervision are psychometrically sound instruments to measure abusive supervision in Polish organizational settings. The preliminary characteristic of this research shall prompt to initiate studies to further validate the scales as well as additional studies into the pervasiveness of abusive supervision in organizations. This is especially important, because substantial amount of research has proven how detrimental abusive supervision may be for organizations and employees alike.

Abusive supervision scale may be a useful instrument in management research as well as in human resources management practice. It may help to identify undesirable organizational behaviors among managers and supervisors in the context of Polish organizations. By acknowledging that supervisory abuse does take place in the workplace this research is yet another statement that the negative organizational processes, to some extent, are still widespread, but often neglected by organizational decision makers. The enormous amount of research on destructive forms of leadership may be striking, researchers however shall investigate it deeper, further and more coherently in order to understand better the subtle differences between various kinds of destructive leadership, its antecedents, outcomes, and consequences, to challenge the organizational decision-makers and redirect their focus to these highly consequential social processes. For practical purposes, in cases where workers perceptions of abusive supervision are sound, managers should be trained to deal with the sources of the abuse.

Our research contributes to the current body of knowledge in three ways. First, we have provided a Polish version of the scale to measure abusive supervision in organizational context. Second, we developed a short form of this scale with good psychometric properties. Given its further verification, the short form may be a practical alternative to the full scale, both, in research and practice. Third, we have confirmed predictive validity of the full and a short abusive supervision scale. Since our data were collected in a different culture in comparison to data from the existing studies, we have also added support to the universality of Tepper's abusive supervision scale.

Limitations

The present study, like any other, has certain limitations. First, the measurement pertains to the perception of the attitudes and behaviors of abusive leaders. Perceptual inferences made by individuals may be influenced by a series internal i.e. personality characteristics, past experiences, and external factors i.e. organizational norms or type of industry. Nevertheless, the confirmation of this study's results with prior studies enhances our confidence on the generalizability of conclusions. The data set analyzed in this research was gained from organizations of different sectors. While this is important in order to gain a broader image of the abusive supervision structure, it limits conclusions for the contextual knowledge. Certainly, it would be noteworthy to see whether yielded in this study exploratory factor analysis model can be replicated in different contexts, like sectors, e.g. manufacturing, business services, government institutions or professional groups, e.g. IT, medical, public safety or educational.

Disclosure Statement

No potential conflict of interest was reported by the authors

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Calculation with Continued Fractions Operator

Mykola NEDASHKOVSKYY
Kazimierz Wielki University, Institute of Computer Science, Bydgoszcz, Poland
e-mail: nemo@ukw.edu.pl

Janusz DOROZYNSKI
Kazimierz Wielki University, Institute of Computer Science, Bydgoszcz, Poland
e-mail: janusz.dorozynski@ukw.edu.pl

Abstract

The article deals with a number of application models that lead to the use of the apparatus of continued fractions, and the algorithms for the obtained models. This is, in particular, the model of the mechanism of genetic control, the model of the mechanism of infectious disease, the task of optimal regulation and proposes approximate methods for the expansion of nonlinear integral equations by continued fractions operator. To understand nonlinear aspects of reality in the scientific method, it can be used a description of such non-linearity, including using nonlinear equations of differential and integral equations. To solve such equations can be used as state-dependent Riccati equation (SDRE) as periodic function to study interactions. This work discusses continuous fractions operator (OCF) to solving non-linear integral equations. That approach can be used in iterative procedures and in engineering software packages. General nonlinear equation can be express by continuous fractions operator (OCF), and subset of it - equation of Low type – by periodic OCF. Then the operator of branched continued fractions (OBCF) can be used for more general nonlinear integral equation. Considering the indicated signs of convergence of OBCF indicate the ability to calculate solution of non-linear integral equations with the given accuracy based on the given inequality checking.

Keywords: Nonlinear Integral Equations, Continued Fraction Operator, Convergence of The Computational Process.

Introduction

Most of the complex phenomena of the world around us is nonlinear. To understand such aspects of reality in the scientific method, we use a description of such non-linearity, including using nonlinear equations of differential and integral equations. A variety of methods, including calculation methods, are used to solve such systems of equations (Volterra, 1982). One such method is the state-dependent Riccati equation (SDRE), which can reduce computational load online (Bernat et al, 2018; Gad-El-Hak, 2019; Znoijil, 1989). Another recently proposed method of solving differential equations of nonlinear systems, which are also non-linear and can be solved using iterative procedures, is the use a periodic function to study interactions (Sobczyk and Radzik, 2018). This article proposes a different approach to this problem. The application of continued fractions operator (OCF) to solving non-linear integral equations is discussed. This solution can be used in iterative procedures and in engineering software packages.

Main Results

Model of The Mechanism of Genetic Control

The mechanism of genetic control can be described using a primary gene product *X*, a winter protein *Y* defined by this genome, and a metabolite produced by the metabolic *Z* activity of the protein. Let *x, y, z* be the concentrati enetic product is described by equations

$$x' = \frac{1}{1+z} - \alpha x, \quad y' = x - \beta y, \quad z' = y - \gamma z \tag{1}$$

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where α, β and γ are the positive steels. The solution of this system can be written in the form of an integral continued fraction. To do this, write down system (1) in matrix form

$$\Omega'(t) = A\Omega(t) + f(t) \tag{2}$$

where

$$\Omega = \begin{pmatrix} x \\ y \\ z \end{pmatrix}, \ f = \begin{pmatrix} \frac{1}{1+z} \\ 0 \\ 0 \end{pmatrix}, \ A = \begin{pmatrix} -\alpha & 0 & 0 \\ 1 & -\beta & 0 \\ 0 & 1 & -\lambda \end{pmatrix}$$

The Cauchy problem for system (1) is reduced to a nonlinear Volterra integral equation

$$\Omega(t) = \Phi_A(t,0)\Omega_0 + \int_0^t \Phi_A(t,s)f(s)ds \tag{3}$$

Here $\Phi_A(t; s)$ is the matriciant of the square matrix A

$$\Omega_0 = \begin{pmatrix} x(0) \\ y(0) \\ z(0) \end{pmatrix} \equiv \begin{pmatrix} \omega_1^{(0)} \\ \omega_2^{(0)} \\ \omega_3^{(0)} \end{pmatrix}$$

If

$$\Phi_A = \begin{pmatrix} \Phi_{11} & \Phi_{12} & \Phi_{13} \\ \Phi_{21} & \Phi_{22} & \Phi_{23} \\ \Phi_{31} & \Phi_{32} & \Phi_{33} \end{pmatrix}$$

then

$$z(t) = \sum_{i=1}^{3} \Phi_{3i}(t,0)\Omega_i^{(0)} + \int_0^t \Phi_{31}(t,s)\frac{ds}{1+z(s)} \tag{4}$$

The relation (4) allows us to construct the expansion into an integral continued fraction

$$b_0(t) + \int_0^t \frac{\Phi_{31}(t,\tau_1)d\tau_1}{1 + b_0(\tau_1) + \int_0^t \frac{\Phi_{31}(t,\tau_2)d\tau_2}{1 + b_0(\tau_2) + \ldots}} \tag{5}$$

which

$$b_0(t) = \sum_{i=1}^{3} \Phi_{3i}(t,0)\Omega_i^{(0)}$$

It is easy to check that the periodic integral continued fraction (5) is positive within variable boundaries of integration. Therefore, it is convergent and its value is equal to the solution *z(t)* of system (1).

The simplest model of infectious disease.

Consider a delayed model that effectively describes not only the body's immune response but also the dynamics of the disease as a whole, developed by G. Marchuk and co-authors (5)

$$\begin{aligned} \frac{dv}{dt} &= (\beta - \gamma F)V, \\ \frac{dC}{dt} &= \xi(m)\alpha F(t-h)V(t-h) - \mu C(C - C^*), \\ \frac{dF}{dt} &= pC - 10\eta\gamma FV - \mu_F F, \\ \frac{dm}{dt} &= \sigma V - \mu_m m, \end{aligned} \tag{6}$$

where V – is the amount A_r in the body; C – the number of plasma cells that reproduce antibodies *F; m* – relative characteristics of the diseased part of the body. All the constants that are in the equation system are inalienable.

Consider the process of chronicity of the disease, which is one of the pressing problems of modern medicine. In this case $\xi(m) = 1$:, in system (6), we replace the independent variable $t = \tau + h - 1$. Next we denote

$$V(\tau+h-1) = x_1(\tau),\ C(\tau+h-1) = x_2(\tau),$$
$$F(\tau+h-1) = X_3(\tau),\ m(\tau+h-1) = x_4(\tau).$$

Then after approximati[illegible]cheme of the previous point, we obtain a system of ordinary differential equations. This system is a system with quadratic non-linearity. It can be solved according to the scheme of the previous paragraph.

The problem of the optimal linear controller.

Let the state of a linear stationary control system be described by the equation

$$x(t) = Ax(t) + Bu(t) \tag{7}$$

Here A – $n\times n$ matrix, and B – $n\times m$ matrix, and the quality criterion is set using functional

$$J(u) = \int_0^\infty \left(x^T Qx + u^T Ru\right)\, dt,$$

where Q,R –- are symmetric matrices, R – positively defined, Q – additionally half-defined.

Then system (7) is reduced to the Riccati equation:

$$XBR^{-1}B^T X - A^T X - XA - Q = 0. \tag{8}$$

For a discrete stationary control system, the problem of the optimal controller is reduced instead of (7) to the discrete Riccati equation (all the coefficients of this equation are valid:

$$A^T XA - X - A^T XB\left(R + B^T XB\right)^{-1} B^T XA + Q = 0. \tag{9}$$

Here, the matrix A and B describes the state of the system

$$x(k+1) = Ax(k) + Bu(k),\quad A - n\times n,\quad B - n\times m,$$

and symmetric matrices Q and R set the quality criteria

$$J = \sum_{k=0}^{\infty}\left[x^T(k)Qx(k) + u^T(k)Ru(k)\right].$$

The R is positively defined, and Q additionally half-defined.

The solution of system (9) may be represented by a periodic matrix fraction.

$$X = -\frac{(A^{-1})^T Q|}{|E + BB^{-1}A - A} - B\frac{RB^{-1}A|}{|R} - B^T\frac{(A^{-1})^T QB|}{|E + BB^{-1}A - A} - \\ - \ldots - B\frac{RB^{-1}A|}{|R} - B^T\frac{(A^{-1})^T QB|}{|E + BB^{-1}A - A} - \ldots; \tag{10}$$

Considering a nonlinear equation.

Let us consider a nonlinear integral equation

$$X(u,v) = A(u,v) + \int^b\int^b X(u,\tau_1)B(\tau_1,\tau_2)X(\tau_2,v)d\tau_1 d\tau_2 \tag{11}$$

It is known that the concept of the product of two square matrices $||a_{i;k}||$ and $||b_{k,j}||$ for ($i = 1, 2, \ldots, n$; $j = 1, 2, \ldots, n$; $k = 1, 2, \ldots, n$) can be generalized in the case of matrices with an infinite number of elements. For this purpose (Syavavko, 1994), for the notion of the compositional product of the second kind of two functions $f(x, y)$ and $g(x, y)$ the rule is introduced

$$K(x,y) = \int_a^b f(x,\xi)g(\xi,y)d\xi$$

where a and b are constants.

Given this, equation (11) can be rewritten in the form

$$X(u,v) = A(u,v) + \int_a^b \left(\int_a^b X(u,\tau_1) B(\tau_1,\tau_2) d\tau_1 \right) X(\tau_2,v) d\tau_2 \tag{12}$$

Then fixing v, we will introduce the operation

$$(I-K)^{-1} f(u) = f(u) + \int_a^b R_K(u,\tau_2) f(\tau_2) d\tau_2$$

where $R_K(u, \tau)$ is the resolvent core of the function $K(u, \tau)$. Then (11) can be rewritten in the form

$$X(u,v) = A(u,v) + \int_a^b R_{k_1}(u,\tau_2) A(\tau_2,v) d\tau_2 = (I-K_1)^{-1} A \tag{13}$$

where

$$K_1(u,\tau_2) = \int_a^b X(u,\tau_1) B(\tau_1,\tau_2) d\tau_1$$

X can be symbolically written in the form

$$X = \frac{A}{I - XB}$$

Using this expression, we can develop X in the next OCF

$$X = \cfrac{A}{I - \cfrac{AB}{I - \cfrac{AB}{I - \ddots}}} \tag{14}$$

Equation of Low type.

Equations of type (11) also include a nonlinear singular integral equation of Low type (Znoijil, 1989). This class of equations arises when describing $\pi - N$ amplitudes of sifting in relativistic energies.

$$X(u,v) = A(u,v) + \int_0^\infty \int_0^\infty \tau_1^2 \tau_2^2 X(u,\tau_1) B(\tau_1,\tau_2) X^*(v,\tau_2) d\tau_1 d\tau_2 \tag{15}$$

where

$$A(\tau_1,\tau_2) = \tau_1^{-2} \delta(\tau_1 - \tau_2) S(\tau_1),$$

$$S(\tau_1) = \frac{1}{E(\tau_1) - E(v) - ie},$$

$$E(z) = (M_w^2 + z^2)^{1/2} + (M_\pi^2 + z^2)^{1/2}$$

For the compactness of equation (15), we can use the operator statement

$$X = A + XBX^*$$

and, consequently,

$$X(I - BX^*) = A,$$

or

$$X = A(I - BX^*)^{-1}$$

In addition,

$$X^* = (I - XB^*)^{-1}A^*$$

So,

$$X = A(I - B(I - XB^*)^{-1}A^*)^{-1} \tag{16}$$

Applying relation (16), we will receive the following development in the periodic OCF

$$X = A\cfrac{I}{I - B\cfrac{I}{I - A\cfrac{I}{I - B\cfrac{I}{I - A\cfrac{I}{I - \ddots}B^*}A^*}B^*}A^*} \tag{17}$$

More general equation.

This approach can be applied to a more general nonlinear integral equation

$$X(t) = f(t) + \int_0^b K_1(t,\tau)X(\tau)d\tau + \int_0^b\int_0^b K_2(t,\tau_1,\tau_2)X(\tau_1)X(\tau_2)d\tau_1 d\tau_2 \tag{18}$$

Let us consider some elements of the analytic theory for the operator of branched continued fractions (OBCF) in general form, suitable for both formulas (14) and (17). To this end, we introduce the notation

$$\begin{cases} D_1 = \sum\limits_{k_1=1}^{n} a_{k_1} b_{k_1}^{-1} c_{k_1}, \\ D_2 = \sum\limits_{k_1=1}^{n} a_{k_1}(b_{k_1} + \sum\limits_{k_2=1}^{n} a_{k_1k_2} b_{k_1k_2}^{-1} c_{k_1k_2})^{-1} c_{k_1}, \\ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \\ D_m = \sum\limits_{k_1=1}^{n} a_{k_{(1)}} \left(b_{k_{(1)}} + \dots + \sum\limits_{k_m=1}^{n} a_{k_{(m)}} b_{k_{(m)}}^{-1} c_{k_{(m)}} \right)^{-1} c_{k_1}, \end{cases} \tag{19}$$

where $k(i) = k_1k_2\dots k_i$ – are abbreviations for multi indices, $a_{k(s)}$, $b_{k(s)} \in X$ – restricted nonsingular operators over a field X.

<u>Definition 1</u>. The finite fraction $D_m.(m = 1, 2, \dots)$ is called the approaching fraction of the infinite OBCF

$$D = \sum_{k_1=1}^{n} a_{k_{(1)}} \left(b_{k_{(1)}} + \dots + \sum_{k_m=1}^{n} a_{k_{(m)}} (b_{k\{m\}} + \dots)^{-1} c_{k_{(m)}} \right)^{-1} c_{k_1}, \tag{20}$$

Introduce the notation:

$$\begin{cases} D_{k_{(m)},m} = b_{k_{(m)}}, \\ \dots\dots\dots\dots\dots\dots\dots\dots \\ D_{k_{(s)},m} = b_{k_{(s)}} + \sum\limits_{k_{s+1}=1}^{N} a_{k_{(s+1)}} \left(b_{k_{(s+1)}} + \dots + \sum\limits_{k_{(m)}=1}^{n} a_{k_{(m)}} b_{k_{(m)}}^{-1} c_{k_{(m)}} \right)^{-1} a_{k_{(s+1)}}, \quad (s < m) \end{cases} \tag{21}$$

Before we consider the signs of convergence for OBCF, we formulate the assertion needed to prove their convergence.

Lemma 1. If for OBFC, all $D_{k(s),m}$ $(k_s = 1, 2, \ldots, n;\ s = 1, 2, \ldots;\ m = s, s + 1, \ldots)$ have an inverse to all $k_s = 1, 2, \ldots, n;$ $s = 1, 2, \ldots, m-1;\ l = 1, 2, 3, \ldots;\ m = s, s+1, \ldots;$ equality is valid

$$D_{k_1k_2..k_s,m+l} - D_{k_1k_2..k_s,m} = (-1)^{m-s+1} \sum_{k_{s+1},..k_{m+1}=1}^{n} \prod_{j=s+1}^{m} D^{-1}_{k_1k_2..k_j,m} \times \\ \times \prod_{j=s}^{m} D^{-1}_{k_1k_2..k_{m+s+1-j},m+l} a_{k_1k_2..k_{m+s+1-j}} c_{k_1k_2..k_{m+s+1-j}} \tag{22}$$

Corollary 1. If the conditions of Lemma 1 are satisfied for the OBFC, then the difference $m = 1, 2, \ldots;\ l = 1, 2, 3, \ldots$ between its approach fractions can be calculated by the following formula

$$D_{m+l} - D_m = (-1)^{m+1} \sum_{k_1,k_2,\ldots,k_{m+1}=1}^{n} \prod_{j=1}^{m} D^{-1}_{k_{(j)},m} \prod_{j=1}^{m+1} D^{-1}_{k_{(m+2-j)},m+l} a_{k_{(m+2-j)}} c_{k_{(m+2-j)}} \tag{23}$$

Corollary 2. If for the OBFC the conditions of the lemma are fulfilled, then all of the residual term R_m can be calculated by the formula

$$R_m = D_\infty - D_m = (-1)^{m-1} \sum_{k_{(m+1)}=1}^{n} \prod_{j=1}^{m} D^{-1}_{k_{(j)},\infty} \prod_{j=1}^{m+1} D^{-1}_{k_{(m+2-j)},m} a_{k_{(m+2-j)}} c_{k_{(m+2-j)}} \tag{24}$$

where $D_{k(j),\infty}$ – the remains of the infinite OBFC for $m = 1, 2, \ldots$.

Definition 2. OBFC is called absolutely convergent, if the following series, composed of its approach fractions is conver $\sum_{\nu=0}^{\infty} \|D_{\nu+1} - D_\nu\|$

Definition 3. Let's say that one OBFC G has a higher value than another OBFC D, if there exists such an integer and positive number n_0, which for all integers M is such that for the ratio $n > n_0$ and $m > n_0$ the inequality

$$\|D_n - D_m\| \le M \|G_n - G_m\| \tag{25}$$

is true, where D_i, G_i – the apl BFC.

Convergence signs of OBCF.

A series of sufficient signs of convergence has been obtained for operator BFCs (Nedashkovsky, 2004).

Theorem 1. (Sign of Majority.) If the condition of Lemma 1 is satisfied for OBFC and there is such an absolutely convergent numerical branching fraction

$$\hat{b}_0 + \mathop{D}_{s=1}^{\infty} \sum_{k_s=1}^{n} \frac{\hat{a}_{k_{(s)}}}{\hat{b}_{k_{(s)}}} \tag{26}$$

with signified partial numerators that

$$\hat{D}^{-1}_{k_{(s)},m} \ge \|D^{-1}_{k_{(s)},m}\| > 0; 1 \le k_s \le n; s = 1, 2, \ldots; m = s + 1; s + 2, \ldots, \\ \|a_{k_{(s)}}\| \le |\hat{a}_{k_{(s)}}|; 1 \le k_s \le n; s = 1, 2, \ldots, . \tag{27}$$

then this OBFC is also absolutely convergent.

Definition 4. Let M be a subset of a Banach space $X \times X$. We will call M the domain of convergence of the branched continued fraction (20) with operator elements, if for all $a_{k(s)} \in M$ and $b_{k(s)} \in M$, the given OBFC coincides.

Definition 5. A closed subset of the linear space, which includes the value of the branched chain fractions, as well as the value of all of the approach fractions of OBCF (20), provided that all $a_{k(s)}$, $b_{k(s)} \in M$, is called the domain of the fraction (20) .

Theorem 2. OBFC (10) with elements satisfying the conditions

$$\left\| b_{k_{(s)}}^{-1} \right\| < \frac{1}{\left\| a_{k_{(s)}} \right\| \left\| c_{k_{(s)}} \right\| + n}, \quad (1 \le k_s \le n, s = 1, 2, 3, ...) \tag{28}$$

absolutely coincides, and its plural of values is an area

$$\{z \in X : \|z\| \le n\}. \tag{29}$$

Theorem 3. If the OBFC elements (20) satisfy the condition

$$\left\| b_{k_{(s)}}^{-1} \right\| < \frac{1}{1 + \sum\limits_{k_{s+1}=1}^{n} \left\| a_{k_{(s+1)}} \right\| \left\| c_{k_{(s+1)}} \right\|} \quad (1 \le k_s \le n, \quad s = 1, 2, ...) \tag{30}$$

then the fraction is absolutely identical, and its set of values is an area

$$\left\{ z \in X : \|z - b_0\| \le \sum_{k_1=1}^{n} \|a_{k_1}\| \|c_{k_1}\| \right\}. \tag{31}$$

Signs of convergence for OBFC of a special form.

By analogy with the features of (29) and (31), we can obtain a number of convenient enough criteria for convergence for fractions with operator elements of a special form.

$$\sum_{k_1=1}^{n} a_{k_{(1)}} \left(E + ... + \sum_{k_m=1}^{n} a_{k_{(m)}} (E + ...)^{-1} c_{k_{(m)}} \right)^{-1} c_{k_1}, \tag{32}$$

Theorem 4. The fulfillment of the condition

$$\|a_{k_1 k_2 ... k_i}\| \|c_{k_1 k_2 ... k_i}\| < \frac{1}{4n} \quad (i = 1, 2, ..; \quad k_i = \overline{1, n}) \tag{33}$$

is sufficient for the absolute convergence of the operator branched chain fraction (32).

Theorem 5. If conditions are satisfied for all $i = 1, 2, ...; k_i = 1, 2, ..., n$

$$\sum_{k_i=1}^{n} \|a_{k_1 k_2 ... k_i}\| \|c_{k_1 k_2 ... k_i}\| < \frac{1}{4} \tag{34}$$

then the operator BFC (23) is absolutely convergent.

The sufficient features offered are simple and easy to use. They can find practical use, in particular in computer algebra systems, and serve as the basis for obtaining other sufficient features for OBCFs. In fact, the same signs of convergence for matrix branching chain fractions have already been submitted (Nedashkovsky, 2004), but it is equally important to obtain reliable criteria for completing iterations and the convergence of the computational process (14) or (17) precisely to the solution of a particular equation.

Signs of convergence of operator branching chain fractions to solutions.

It is assumed that the solution of some equation (14) or (17) is on a certain interval of convergence of OBCF. Of course, the corresponding fraction will be convergent, and even more so, converging to a solution only under certain conditions. To study the problem of convergence in the solution of such developments, let us consider the non-canonical operant branch continued fraction (20) and formulate the criteria for making a decision on the termination of iterations and the convergence of the process precisely to the solution of specific equations.

Conclusions

Thus, the approaches to calculating the tuples of solutions of matrix polynomial equations are given, and sufficient criteria for the completion of iterative processes and their convergence to the solution are formulated.

Theorem 6. If there is only one solution of the polynomial integral equation (1) or (5) in the interval, then its corresponding expansion (4) or (7) under the iterative procedure in the OBCF with the elements satisfying the conditions

$$\left\|b_{k(s)}^{-1}\right\| \leq \frac{1}{\left\|a_{k(s)}\right\| \left\|c_{k(s)}\right\| + n} \quad (1 \leq k_s \leq n; s = 1, 2, ...) \tag{35}$$

converges to this solution.

Theorem 7. If in the range

$$\left[-\sum_{k_1=1}^{n} \|a_{k_1}\| \|c_{k_1}\|, \sum_{k_1=1}^{n} \|a_{k_1}\| \|c_{k_1}\|\right],$$

there exists only one solution of the integral equation (11) or (15) , then its development (14) or (17) under the iterative procedure in the OBCF with the elements satisfying the conditions

$$\left\|b_{k_{(s)}}^{-1}\right\| \leq \frac{1}{1 + \sum\limits_{k_{s+1}=1}^{n} \left\|a_{k_{(s+1)}}\right\| \left\|c_{k_{(s+1)}}\right\|} \quad (s = 1, 2, 3...). \tag{36}$$

converges to this solution.

The indicated signs of convergence indicate the ability to calculate Xm with the given accuracy based on inequality checking

$$\|X_m - X_{m-1}\| \leq \varepsilon$$

if one of the following sufficient signs of convergence to the solution is fulfilled. In this case

$$\|X_m - X\| < \|X_m - X_{m-1}\|$$

and therefore $X \subset (\|X_m\|, ; \|X_{m-1}\|)$.

It should be noted that in practice iterative computation processes are often convergent under significantly less stringent conditions. And numerous results of computational experiments convincingly confirm this fact.

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A Qualitative Approach to Assaying Customer Orientation and Market Dynamism of SMEs in Nigeria

*Agumadu Mercy Adeola
Department of Business Management, Covenant University, Ota, Ogun State
mercy.agumadupgs@stu.cu.edu.ng
*Corresponding Author

Moses Chinonye Love
Department of Business Management, Covenant University, Ota, Ogun State
chinonye.moses@covenantuniversity.edu.ng

Adeniji Anthonia Adenike
Covenant University
Department of Business Management, Covenant University, Ota, Ogun State
anthonia.adeniji@covenantuniversity.edu.ng

Salau Odunayo Paul
Covenant University, Department of Business Management, Covenant University, Ota, Ogun State
Odunayo.salau@covenantuniversity.edu.ng

Adeoye Funmilade
Covenant University Department of Business Management, Covenant University, Ota, Ogun State
Adeoye.funmiladepgs@stu.cu.edu.ng

Abstract

Entrepreneurs have to compete to survive in the ever-changing business environment especially during this Covid-19 Pandemic. Hence, there is an urgent need to find out solutions and survival strategy that can help cushion the effect of this crisis so that the SMEs can have a soft-landing at best. The study thus seek to find the influence of customer orientation on market dynamism. The study employed the qualitative approach where 12 top executives of registered four indigenous SMEs associations in Nigeria were interviewed. The study found out that customer orientation has a significant effect on market dynamism and the study recommended that entrepreneurs should involve in thorough analysis and modelling of the business during any market change and the customers satisfaction should be taken as top priority.

Keywords: Market, Customer, Pandemic, Dynamism, Entrepreneurs

Introduction

In Nigeria today, there is a need for the entrepreneurs to respond actively to the ever-changing market and business environment. The government, consumers and producers influence market changes greatly in this country (Chinwuba, Luke, Marcus & Kenechi, (2018). This has however, become a very great challenge for small and medium scale enterprises, who have a lot at stake especially at the start-up stage of their business. Many businesses are struggling to survive because there has been a severe fluctuation in the demand, supply and prices of goods and services especially due to the current ongoing corona virus pandemic (Omar, Ishak & Jusoh, 2020) Business survival has become topmost on the list of all SMEs owners at this crucial time, especially in Nigeria, where the government have done little or nothing to assist the entrepreneurs to sail through the pandemic (Musa & Aifuwa, 2020). To achieve a successful business in a dynamic market environment, (Islam, 2020) asserted that business owners should be able to identify the changes, understand the consequences and evaluate their resources and capabilities to fit into the emerging changes. This is especially challenging to organizational managers since they have to design and implement strategies

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that can achieve and sustain higher performance levels (Uchegbulam, Akinyele & Ibidunni, 2015). A dynamic market can affect the effectiveness of the firm's behavior and changes in customer behaviors are difficult to predict at this time (Zehir &Balak, 2018). Market dynamism can offer new and broader perspectives that will help to solve the firm's problems and capture new opportunities (Zehir &Balak, 2018). Apart from environmental conditions, market dynamism is emphasized as another important factor that affects firm performance (Zehir & Balak, 2018). Studies have also shown that reconfiguration plays a very significant role for entrepreneurs in achieving global account competitiveness when market dynamism is high (Shi & Wu, 2011).

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Research has shown that for the business to succeed there is a need to focus more on the customers (Gerald, Obianuju & Chukwunonso, 2020). This can be by ensuring that the product, services, discoveries, innovation and creativity is all about the customers. This is important because without the customers, the business have no reason for existence. It is not easy to recognize and satisfy the consumers' needs, expectations and habits, and knowing them doesn't guarantee success on the market, because consumer behaviour is not rational (Biesok & Wyród-Wróbel, 2011). Customer orientation is perceived by Domi, Capelleras and Musabelliu (2020) as a business approach in which a business focuses and solves for the customer first. Consequently, there is a need to investigate if adopting a customer-oriented approach can help SME owners to survive the ongoing market fluctuation. If so, what are the necessary things to put in place to ensure the success of this approach? Hence, this study aims to establish the influence of customer orientation on market dynamism with reference to SMEs in Nigeria. The hypothesis of the study is therefore, written as:

H_0: There is no significant relationship between customer orientation and market dynamism

Methodology

The paper adopts an exploratory research design in which the researcher had an in-depth interview with twelve top executives of the Association of Micro Enterprise (AMEN), NASME Women Group (NASME), National Association of Small Scale Industrialist (NASSI) and NECA's Network of Entrepreneurial Women (NNEW). The interview responses were analysed using the thematic coding method.

Analysis and Findings

Four (4) participants opined that their approach to addressing issues with **customer relations** is based on the common philosophy that the "customer is always right" The participants were also of the view that making one customer happy impact on the extent to which a business is able to retain and attract new customers. Therefore, the participants discoursed that it is important to maintain business relations that keep customers happy by trying to resolve any problem or challenges related them. This suggests that the participants were not only interested in resolving customer issues but they were also concerned about them having positive emotions towards the business. Quotations from the participants' statements are documented below;

We are in business because of our customers, so whenever we have a difficult customer we make sure we find a way of resolving the customer's problem and make him or her happy. (Participant 9).

We understand that without customers there is no us so we try as much as possible to make our customer happy no matter what. (Participant 5).

We always look for ways to solve all customers' problems no matter how difficult they are. We understand that we are in business to solve their problems not to make them unhappy. (Participant 4).

Customers are always right, due some customer are very funny but we always look for a way to make our customer happy and have good relationship with them. (Participant 6).

However, three (3) of these participants were assertive with the fact that all attempts to satisfy customers, make them happy or resolve challenges related to customer complaints **should not be at the detriment** or expense of their business. Excerpts from the participants' statements are documented in the quotes below;

"As the say goes "customer is always right" so for our customers we always do what will make them happy because we believe a customer can tell five others that will also become your customers. So we always make sure our customers leave our environment happy no matter what happens we always try our best to solve their problems. Therefore, customers can be difficult but we are always ready to hear them out and find the best possible ways to solve their problem. Note we treat our customers well but not to our own detriment". (Participant 4).

"We are in business because we want to solve people's problems, so as for difficult customers we always find a way to make them happy but not at the detriment of the organisation". (Participant 1).

"You can do without difficult customers in your business but customers are always right. So our business tries as much as possible to satisfy our customers on any complain but we won't want any customer to ride on us thinking that we are weak or something, we don't take nonsense". (Participant 9).

Similarly three (3) of the participants opined that the interest of customers must be **prioritized** hence they look for all possible ways to solve customers' problems. However, responses from these participants suggests that customer relations may not really be about the emotions of customers, rather they were more focused on solving customer problems and challenges which to them is overarching and predominant. Excerpts from participant statements is documented in the quotes below;

"Our customer is our number priority because they are the reason we are in business. We make sure that we look for all possible ways to solve their problems". (Participant 7).

"One of our core values is good customer relations. We are in business to solve people's problems no matter how difficult the customer may be. (Participant 9).

A bad person also have a soft part. We tend to look at people from a positive angle always. However our major objective to all our customers is to make sure we solve their problems". (Participant 2).

Customers Involvement in providing Solutions

In contrast, two (2) participants were of the opinion that customer relations and dealing with challenges associated with customer complaints should be tackled by patiently and painstakingly explaining the position of the business to customers on various issues. The statements from these participants suggests that the position of their businesses over rules or supersedes the dissatisfaction or customers. Excerpts from participant statements is documented in the quotes below;

"Most of my clients are online because I sell my products online. Whenever a customer types an angry response I always take time off and I try to be patient with the customer no matter how angry they are. It is not easy at first to cultivate this habit but you know one has to move the business forward by rendering good customer service". (Participant 8).

"There is nothing like a difficult customer to me all you need to do is to explain things to them and I believe they will understand. I believe one on one marketing is a good way to go when it comes to difficult customers". (Participant 2).

Market Changes

Among the twelve (12) participants interviewed, five of them were of the opinion that adopting a customer focused orientation is the most suitable approach to adjust to market changes in the business environment. They were of the view that knowing what the customer wants and keeping a healthy customer relationship and sustaining customer satisfaction cannot be overemphasized. They were also of the belief that although competitor analysis, market analysis or innovation is necessary for adjustments to market changes however, these should be implemented with the sole aim of satisfying customers. Excerpts from the interviews are documented in the following paragraphs;
"Change is very important in this dynamic business world. I believe that as a business the world and the Nigeria business environment is changing and one of the ways to adopt to these changes is to know what our customer want and know if the change will not affect our relationship with them and to make sure that when implementing any change that has been adopted it brings about satisfaction for our customer and also our business" (Participant 9).
"I do market analysis to know what customers want to improve. I innovate to satisfy our customers because that is the reason we are in the market". (Participant 12)

"Market changes is all I have been doing since I started business. I started business because a friend asked where he could get coconut oil and I sold to that person and from that time there has always been market changes in the quantity of product demand, material and so on. What I do is to listen to customers and find out what they want to adjust". (Participant 7).

"The best way I adjust to changes in the market is to look at what my competitors are not doing and do it, with that it gives me an edge. For example I bring my product into small pack that it affordable. I listen to the customers and find out what they want in order to adjust". (Participant 3).

"The way I adjust to the market is to go to study the product of my competitor look at what they are not doing well, see what we are not doing, improve on our product and serve our customer better". (Participant 2).

In contrast, four (4) of the participants were of the opinion that an **analysis of the business model** with a view to developing and implementing a more suitable one is the appropriate approach to adjust to market changes in the business environment. They were of the opinion that how their businesses will gain from the changes should be the focus. Excerpts from the statements of the entrepreneurs are quoted as follows;

"I believe change is one of the things or catalyst you need to be prepared for as an entrepreneur, because of the very dynamic business environment. However my business is always open to change so whenever there is any change we first sit down look at what are the pros and cons of the change and how our business tend to gain form the change after the proper analysis". (Participant 1).

"As for changes in the market, what we do is to do analysis on how our organisation can benefits from the change and then we implement it into our business model". (Participant 4).

"We will come up with a model to work with immediately thereafter we implement" (Participant 8).

"In the Nigeria business environment it is good to know that it is not predictable so we are always for change and as entrepreneurs we will work on the existing business model and implement all necessary actions to adapt and adopt the change in our business environment" (Participant 11).

Three (3) participants were of the view that adjustments to market changes in the business environment should focus more on **reduction in cost of production** as well as deliberate and intentional actions to ensure that the business operations are sustained without incurring debts. This is depicted by the excerpts from the statements of participants below;
"Whenever there is change in the business environment we look at the way we can cut down cost of product of the material we use and other things such as advert, branding and so on. This is because the only constant thing in the business environment is change. (Participant 5).

"The only thing that happens is that we do analysis on how we can improvise and to adopt and adapt the changes to remain in business. We also look for other means to improve our business with incurring debt for our business" (Participant 10).

"Well, the best way I adjust to change in my business environment is to first sit down do a proper analysis of the change in question for example if there is increase in the price of materials we sit down to know what and what we need to cut down on any still give our customer a good and better serve". (Participant 6).

Implications and Conclusion

Customer focus is one of the ways to solve the market changes, but not the only solution. Other solutions based on the findings of this study includes reduction in cost of production, weighing the effect of current change on the business venture, analysis of the business model and involving customers in preferring solutions to the emerging state of the business environment. Based on the findings of the study, entrepreneurs must be ready to do the following:

i. A thorough market analysis;
ii. Development of a business model that can handle the emerging situation;
iii. Positive emotions towards the change;
iv. Building a strong customer relations;
v. Make customers the top priority.

This is in line with the study of Ogunnnaike, Salau and Adeniyi (2014) who asserted that customers are not only satisfied when they get good quality but how much they enjoy the product and services rendered by the entrepreneurs. This implies that the entrepreneurs should ensure that customers are get the best out of all their decisions despite any emerging change in the business environment.

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Digital Labor Platforms as a Source of Social Pollution

Marina CHUDINOVSKIKH
Ural State University of Economics, Yekaterinburg, Russian Federation, chud-marina@mail.ru

Alena FEDOROVA
Ural Federal University, Yekaterinburg, Russian Federation, a.e.fedorova@urfu.ru

Ilona POLENTS
University of West Bohemia, Plzen, Czech Republic, watt@bk.ru

Aleksandr OVCHINNIKOV
Ural Federal University, Yekaterinburg, Russian Federation, alexgog77777@gmail.com

Abstract

The article discusses the features of organizing employment through Internet platforms. The authors identify the main employment models, the advantages and disadvantages of working through platforms and the risks of social pollution of labor relations. To identify the main difficulties faced by employees, the ratings of the most popular platforms and services in Russia (Uber, YandexTaxi, YandexFood, Profi, Delivery Club) were studied, the least satisfaction was revealed in such parameters as career growth and relationships with managers. The overall assessment by platform workers does not exceed 2.5 points on a 5-point system, which allows us to conclude that there is a high level of social pollution. Based on the content analysis of the feedback from Delivery Club employees, the problem of illegal fines and deprivation of bonuses was diagnosed. The results of the study led to conclusions about the need to improve the legal regulation of labor relations in sphere of work based on digital platforms.

Keywords: Internet Platforms, Employment, Telework, Social Pollution, Rating, Content Analysis

Introduction

In the context of the development of the information society, along with the traditional "employee-employer" relationship, new non-standard forms of employment appear, including the organization of work through Internet platforms. Such platforms are most widely used in the field of transport (taxi ordering services Yandex, Uber), services (for example, the Profi.ru website). Researchers are also very active in analyzing the experience of Amazon (Irani, 2015), Airbnb (Schor, Attwood-Charles, 2017) and others. The model for the evolution of such relations became possible thanks to the information technology progress and it is considered to be a phenomenon of the fourth industrial revolution and globalization (Beerepoot, Lambregts, 2014). It can be assumed that in the digital economy, this form of organization of activities will become more widespread. The Uber model has already become common (Hill, 2015).

The creation of Internet platforms leads to the formation of new mechanisms for organizing and controlling labor. Internet platforms allow selecting performers, assessing their work, collecting feedback, and conducting training. The point of view is put forward that such a platform assumes the functions of a leader (Möhlmann, Zalmanson, 2017). The main advantages of organizing employment through the Internet platform include: 1) flexibility and mobility, 2) the ability to attract specialists from different cities not only of one country, but also of the world, 3) reducing the cost of organizing work spaces (Constantinides, Henfridsson, Parker, 2018).

The Internet platform also provides certain advantages for performers. First of all, this is the opportunity to get quick money. Whereas in traditional forms of employment, wages are usually paid twice a month, when working

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through the platform, remuneration can be paid right after the order is completed. Internet platforms can provide jobs for residents of small towns, distanced areas.

Research interest is increasingly focusing on the disadvantages of digital labor platforms. Organization of work through Internet platforms has a number of organizational and legal problems that can be covered by the concept of "social pollution". In the framework of the study, social pollution is considered as the process of decreasing the quality of life, associated with damage to the well-being and damage to the physical and psychological well-being of workers as a result of internal and external economic activities of organizations (Fedorova, Menshikova, 2014, Koropets, 2019). Macklem points out that toxic jobs are characterized by "unquestionable demands, excessive pressure and cruelty" (2005). Factors of social pollution include: 1) violation of labor laws, 2) development of employment precarization, 3) the use of toxic human resource management practices, including toxic human technologies, toxic management and toxic jobs (Fedorova, Parsiukevich, 2013).

Internet platforms are transforming labor patterns, increasing the risk of labor law violations. The most important question is the status of a person who provides services through the Internet platform. The prevailing point of view is that there is no labor relationship between the contractor and the organizer of the Internet platform. Thus, in one of the Russian litigations, the driver, in order to substantiate claims for recognizing the relationship as labor relationship, provided printouts from his personal account - the orders that were completed by him through platforms of GetTaxiRus and Uber. However, the court decision states that “the execution of orders received from mobile applications does not indicate that the plaintiff has performed work under the labor contract during the disputed period,” including the part of it about “compliance with the Internal Labor Regulations, Labor Discipline, Work Regime time "(Appeal ruling of the Moscow City Court dated 12.04.2018 N 33-15213/2018). The taxi driver's claims for recognition of the relationship as labor relationship were denied. Working through Internet platforms can lead to precarization, that is, to the substitution of stable labor relations with unstable ones and then to the loss of social and labor rights.

A common position has not been developed in other countries either. So, there are court decisions on recognizing persons working through Internet platforms as self-employed. However, the development of such platforms causes formation of the opposite of above practice and a rethinking of the position of the judiciary. The example of UBER and other aggregator portals is illustrative. Appeal No. UKEAT / 0056/17 / DA, which has been ruled by the UK Employment Tribunal, may change the approach to business for Uber and other platforms that aggregate ads from individuals providing services. The plaintiffs were London Uber drivers who, along with others, filed lawsuits with the Employment Tribunal. They demanded to be recognized as workers with the aim of applying to them the 1996 Employment Rights Act, Working Time Regulations and the 1998 National Minimum Wage Act. The court concluded that any driver who had the Uber app turned on, was in an area that was allowed to work and was able and willing to accept assignments, worked for Uber London Ltd within the scope of an employment contract (Judgment of the Paris Court of Appeal (Cour d ' appel de Paris) dated December 13, 2017 in relation to drivers of "La Cab" company) (Adam, Bremermann, López, 2016). In general, most countries have not yet developed approaches to strict control over the activities of digital labor platforms, which allows a number of researchers to talk about the failure of legislative regulation (Collier, Dubal, Carter, 2017).

The peculiarity of the organization of labor using digital labor platforms is that instead of traditional bilateral relations (employee-employer), multilateral ties arise. Organization of work through Internet platforms provides for the participation in legal relations of at least three participants. Within such a legal relationship, the Internet platform provides the performer with information about the order and charges a certain commission. Potential performers respond to the emerging order. The execution of order can be occurred both with direct contact between the performer and the customer (for example, taxi services, tutors), or without it.

Another model implies that at least four types of participants are involved in legal relations. In the second model, the fourth participant is a legal entity or an individual entrepreneur who concludes an employment contract with direct executors. Such a four-part model is necessary if the activity, for example, is subject to compulsory licensing. For example, the field of transportation that involves not only the platform itself, the customer and the driver, but also the taxi stations. From a legal point of view, such a model gives an opportunity to achieve an optimal balance between employment flexibility and labor guarantees. In addition, in this case, the employer is obliged to comply with the standards for labor protection, safety of the services provided. However, from an economic point of view, such a model is less effective than a tripartite. An increase in the number of links in the chain of persons providing

services leads to an increase in cost and a decrease in competitiveness. Also, an increase in the number of participants and intermediaries leads to a dilution of responsibility. So, the registration of employees on the staff of logistics contractors is a normal practice for delivery aggregators or taxis: this allows the company to scale up faster. However, when disputes arise, Internet platforms often try to shift responsibility for problems onto intermediaries. For example, delays in payment for work performed are explained by the failure of settlements on the part of intermediaries.

Other challenges faced by digital platform workers include: difficulties in forming trade unions and collective defense of workers' rights (Vandaele, 2018; Bederson, Quinn 2011); hiring employees for short-term work and reducing the share of long-term labor relations (De Stefano, 2016).; a decrease in the level of social protection of employees (for example, in terms of the minimum wage, social and pension insurance, the provision of vacations and other guarantees) (Forde, Stuart, Joyce, 2017; Wood, Graham, Anwar, 2019); increasing intercountry, racial and gender inequality (Irani, Silberman, 2016; van Doorn, 2017; Schor, Attwood-Charles, 2017)

Thus, flexible forms of employment have become not only a phenomenon of the times, but also a huge challenge (Stone, 2006). Improving legal regulation should be aimed at solving the most pressing problems related to work through digital platforms, protecting workers' rights and reducing the level of social pollution. The development of directions for improving the legal framework should be promoted by highlighting the problems that workers most often face.

Methods

In order to determine the factors of social pollution connected with working through digital labor platforms, a number of methods can be used. In 2015, the http://faircrowd.work platform was launched, targeting workers in Germany, Austria and the Scandinavian countries (Harmon, Silberman, 2019) On this platform, employees rate platforms on a five-point scale. Several years of work of the platform showed that the rating is significantly influenced by the duration of work on the platforms, national and cultural characteristics. In order to provide more accurate information, the rating can be supplemented with a questionnaire (Adam, Bremermann, López, 2016) or a detailed review. Analyzing feedback and conducting employee interviews complements quantitative research methods and delineates more clearly the range of problems employees' face (Aloisi, 2016).

In the Russian Federation, employee reviews on the specifics of interaction with digital labor platforms are presented on a number of websites (https://pravda-sotrudnikov.ru/, https://antijob.net/, https://otrude.net/ and others). We chose the website https://otrude.net/ as the most informative and objective. Employee feedback was analyzed using a quantitative method (rating assessment of working conditions) and qualitative analysis (content analysis of the narrative part). The main goal of the study is to highlight problem areas and factors of social pollution.

Results

At the first stage, with the help of the website https://otrude.net/, a basis for the assessment was formed. The sample includes 5 most popular services in Russia – Uber, Delivery Club, Profi, YandexFood, YandexTaxi. For each service, the number of reviews, their time and geographic range, the total rating of each company and its detailing by separate components (remuneration, relations with management, workplace, team, career growth) are determined.

Table 1: Assessment of the largest digital labor platforms in Russia according to employee reviews on the website https://otrude.net/*

Features	Uber	Delivery Club	Profi.ru	Yandex Food	Yandex Taxi
Range of reviews	2017–2019	2020–2012	2014–2020	2018–2020	2017–2020
Total number of reviews	372	234	199	61	44
Overall rating on a 5-point scale	1,8	2,5	2,5	1,9	2,3

Including salary	1,6	2,2	2,6	1,8	2,2
Relationships with management	1,8	2,2	2,3	1,6	2,0
Workplace	2,3	2,8	2,6	2,0	2,9
Team	2,1	3,3	2,6	2,7	2,7
Career	1,4	2,2	2,2	1,3	1,9

**Authors' elaboration*

As the data shows, the largest number of reviews is presented for Uber, but since 2019, the website has not generated any actual reviews. In second place is the Delivery Club service. There were 199 reviews about the Profi platform, 61 reviews about Yandex.Food, 44 reviews about YandexTaxi. The presented data show that, in general, the level of employee satisfaction with working conditions through the platforms is low (does not exceed 2.5 points on a 5-point system). The lowest degree of satisfaction, regardless of platform, was recorded for the components "Relations with management" and "Career". From a geographical point of view, reviews are most often left by residents of cities with a population of more than 1 million people (Moscow, St. Petersburg, Novosibirsk, Yekaterinburg).

Next, we carried out a content analysis of the narrative parts of the reviews about Delivery Club. The choice of the company is explained by the largest number of reviews for the period from 2012 to 2020. The share of Delivery Club in the ready-made food delivery market at the end of last year was estimated at 48%, together with Yandex. Food they control 80% of the market. The main owner is JV Mail.Ru Group and Sberbank O2O Holding (98.1%), revenue in 2019 - 4.46 billion rubles. It is significant that 69 out of 234 employees of the Delivery Club Company recommend work in the company, 64 do not recommend the company for employment and 101 abstained from the assessment. The results of content analysis of the semantic core of feedback from Delivery Club employees are presented in the table

Table 2: Semantic core of feedback from Delivery Club employees *

Semantic core	Frequency of mention	Frequency of mention, %
Shift	98	1.15
To work	88	1,15
Order	76	1,04
Courier	74	0,89
Fine	61	0,87
Work	52	0,72
A lot	49	0,61
Salary	41	0,58
Hour	38	0,48
Month	33	0,45
Week	26	0,39
Sweat	18	0,31
Chat	18	0,21

**Authors' elaboration*

The semantic core allows you to accurately characterize the work even if you do not name the company and the specifics of its activities. The main staff is couriers who deliver food from restaurants. The fifth most frequently mentioned word is "fine". Also, indicative is the word "sweat" and the combination of the words "a lot" and "work". A more detailed study of the narratives shows that fines are set for lateness, unauthorized departure from the shift, refusal to fulfill an order, failure to fulfill an order on time. Some replies note that many foreign citizens work in the delivery service who are not familiar with the law, do not know Russian well and do not know how to defend their rights.

When analyzing the reviews, a trend of gradual decrease in ratings was also indicated. At the initial stage of the platforms' operation, workers in general showed higher satisfaction, which contributes to the flow of personnel from offline jobs. After 2-3 years of work and the completion of the phase of successful market launch, the

platforms change working conditions and wages downward, which causes a sharp downgrade in ratings. A significant part of employees during this period already lost contact with employers in traditional spheres. In the context of the spread of COVID-19, this problem has become even more acute due to the closure of many industries and areas of activity in the off-line format.

The high level of dissatisfaction with the working conditions led to the fact that in June 2020 Delivery Club employees began to threaten a strike, and also began to file complaints with law enforcement agencies. The Moscow Prosecutor's Office planned to start checking the observance of labor rights, since the current Russian legislation does not allow the introduction of disciplinary sanctions in the form of fines. Tasks that were assigned to employees were deliberately impossible. Under pressure from employees and regulatory authorities, the company took measures to change the payment and fines policy. In mid-June 2020, the company announced that information from social media had been considered. The company admitted that some couriers received fines for refusing to accept orders with an increased distance, which caused their dissatisfaction. These fines have been reimbursed to couriers, they will not be applied in the future, and testing of the enlarged zones has also been completed.

Conclusion

The conducted research confirmed the hypothesis that digital labor platforms pollute labor relations, use illegal and toxic practices. The level of social pollution is quite high, as the rights of workers are violated, there are numerous abuses, fines, and excessive control is recorded. Digital labor platforms use rigid, often even excessive, methods of monitoring employee activities, create a sense of surplus labor force among users and devalue labor (van Doorn, 2017).

There are a number of constraints and assumptions to consider when analyzing reviews:

- a small number of reviews reduces the reliability and relevance of ratings;

- websites collecting feedback on digital labor platforms policies are gradually beginning to affect the labor market;

- a large number of negative feedback from employees reflects real problems in the field of labor relations;

The study proves the need to form a legal framework for digital labor platforms in order to protect the rights of workers and ensure sensible level of social guarantees. Based on foreign experience, it seems necessary to pursue an open information policy to explain the specifics of non-standard forms of employment and create a single website for digital labor platforms. Every citizen has the right to know about the advantages and disadvantages of working through digital labor platforms. The website may also collect employee complaints and appeals. Analysis of complaints can become the basis for conducting inspections of compliance with the law and calling the violators to account.

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Operational Risk - From Spectator To Main Actor In The Risk Management Process

Maria-Alexandra CRISTEA

Bucharest University of Economic Studies, Bucharest, Romania
marialecsandra@gmail.com

Abstract

Operational risk can be generated by a multitude of factors and the potential financial losses that can be generated are significant. The appearance, in a short time, of numerous prudential regulations for an adequate operational risk management led to the inclusion of this risk in the top of the most important risks in the banking activity. This paper presents the components of operational risk, the stages in the risk management process and the causes of operational risk. Prudential regulations in the field of operational risk and methods for calculating the minimum capital requirement for operational risk are presented and highlighted within a case study on a Romanian bank. Crisis simulations are presented as an integrated part of operational risk management. An analysis was performed of the evolution of the minimum capital requirement for operational risk calculated in the Romanian banking system in the period 2008-2018, in parallel with the evolution of the minimum capital requirement for operational risk calculated in the European banking sector. This analyze conclude that in 2018 the basic indicator approach is used mainly for the calculation of the minimum capital requirement for operational risk, but during the analyzed period, the constant increase of the share of standardized approach use, as well as of the share of use of advanced measurement approach was observed.

Keywords: Operational Risk, Capital Requirements, Prudential Regulations.

Introduction

The financial crisis of the past decade has affected the financial stability of the banking systems, and the effects of this crisis were much more severe than all the scenarios used by the banks in their stress tests, proving that the financial institutions were governed by an inadequate risk management, in which the risks have not been correctly identified, managed and monitored.

In order for a banking system to be considered stable, it must function in balance in the context of different economic circumstances, without the need for external resources to support its activity. In order to ensure this stability, in the last years there has been an increasing concern of the supervisory authorities for the development of prudential regulations and of the instruments used in the process of supervision and continuous evaluation of banks.

It is well known that any activity carried out by a credit institution involves the occurrence of risks, especially of the operational risk. The operational risk events can be generated in all bank processes and operations, and all assets and activities of a bank are in one way or another the subject of operational risk.

The financial losses caused by the materialization of the operational risk events and the weakening of the financial stability of the credit institutions have led to an increased attention to this risk, both from the point of view of banks, and from the point of view of the supervisory authorities.

This paper presents the component elements of operational risk, the stages in operational risk management, along with the causes of this risk. The most important prudential regulations in the field and the calculation methods for the minimum capital requirement for operational risk are presented, materialized in a case study conducted by the author for a bank in Romania. Crisis simulations for operational risk can influence the analysis of the capital planning process, a fact highlighted by another case study conducted by the author. The article continues with the

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presentation of an analysis of the evolution of the minimum capital requirement for the operational risk calculated in the Romanian banking system, from 2008 to 2018.

Component Elements of Operational Risk and Their Management

Operational risk is that risk of loss registration that results either from the use of inadequate processes, persons or internal systems or that have not fulfilled their function properly, or from external events, as defined by the Basel Committee.

Neifar and Jarboui (2017) mentioned that considering the major technological progress in banking activities, globalization and deregulation, operational risk is one of the most important banking risks.

All possible sources of risk generation can be divided into 4 broad categories: human actions, inadequate functioning of software and hardware systems, inadequate functioning of internal processes, and external events.

Among the components of operational risk are legal risk, model risk, information technology risk and uncontrollable risks, being also an important link between operational risk and other risks, such as strategic risk and reputational risk.

The legal risk can be generated by both internal and external factors. The main factors that generate this risk are the improper application or non-application of the legal and contractual provisions by the employees, the non-correlation of the internal regulations with the legislative changes in the field, internal fraud, legal actions formulated by clients, employees, creditors or formulated by bank, external fraud.

Information technology risk is the most important component of operational risk. The computer system not only represents the network of computers and telecommunications, but includes all electronic computing, printing, display devices, systems and protocols for communications, security, storage units, and all associated data and activities (computers, servers, network environments, telephones, faxes, printers, programs and data for creating, recording, processing, storing, receiving, displaying, transmitting information in electronic format).

Model risk can materialize after using decisions based mainly on the results of internal models, the loss being caused by errors in the development, implementation or use of these models.

The uncontrollable risk is that risk for which the institution has no possibility to prevent its occurrence. External events such as natural disasters, terrorist actions or vandalism are included in this category. For this category of risks, a bank must create business continuity and disaster recovery plans, which should include stipulations related mainly to the definition of crisis situations, the crisis management model, roles and responsibilities, the system of business continuity management, critical activities and recovery times of activities at the level of organizational structures, communication strategy in crisis situation, business continuity plan testing, plan testing and test performance.

Like any risk, the operational risk must be evaluated from 3 points of view: from the perspective of the causes that can materialize it, from the perspective of the events and from the perspective of the impact. Also, according to Lu. (2013), the operational risk management involves the following steps: risk identification, risk analysis, risk mitigation and risk monitoring.

Stages in the operational risk management process

A number of factors relate directly to the definition and identification of operational risks, such as: development of banking technologies and practices, increasingly frequent use of automated technologies - decreasing the risk of manual processing error, while increasing the risk of the informational system by using electronic trading systems, risk of internal and external fraud, the involvement of a large number of personnel in complex activities that require a higher training, but also a higher concentration on the current activities, the mobility of the regulatory framework and the need to adapt quickly to its requirements.

The principles of an operational risk management policy must take into account:

i) identification of sources of risk,
ii) assessment of potential losses,
iii) monitoring,
iv) managing exposures to operational risk, as shown in Figure 1.

Fig. 1: Principles of an operational risk management policy

For the beginning, each product or service offered by the bank, any technical system and any processing flow used must be evaluated in terms of operational risk. Once the sources of materialization of the risk have been identified, the credit institution must evaluate the degree of exposure to the operational risks, thus deciding the acceptable level of risk. This degree of exposure is evaluated taking into account both the volume and the complexity of the processes and operations carried out by the bank. Also, at this stage of the evaluation, the degree of sensitivity of the information systems is considered in order to establish including the maximum acceptable duration of remediation of the deficiencies or the duration of failure of these systems, so that the productivity of the institution not be affected or maximum limited.

Operational risk monitoring is a continuous process that must be carried out both at the level of each flow or each operation (for the rapid detection of deficiencies that can lead to the occurrence of the risk and their correction), as well as at the level of the entire bank. This stage also involves establishing key operational risk indicators (Figure 2) and limits for them, with the purpose of identifying risk exposures, before these risks turn into losses. Keeping under control/ mitigating risk implies, among other things, that if certain risks cannot be managed or controlled, the credit institution can decide whether to accept them or to diminish or cease their activity that generates such risks, being transferred to the category of uncontrollable risks.

Fig. 2: Key Operational Risk indicators

Banking practices involve the management/ control of the operational risk according to the frequency of the events that can generate the risk and according to their severity, as shown in the table below:

Table1: Methods of managing operational risk, based on frequency and severity

ACTION	FREQUENCY OF APPARITION	SEVERITY
Assumption	low	low
Diminution	high	low
Transfer	low	high
Elimination	high	high

Contributory factors and causes of operational risk

Operational risk is a general concept that encompasses a number of other important risks. This risk is not only generated by the current operations of a bank. The main categories of factors and causes of operational risk are divided into nine categories, as follows: quality of employees, quantity of employees, internal communication, customer, model errors, external or caused by third parties, providers, IT systems and equipment and utilities. Chernobai et al. (2020) shows that the magnitude and the frequency of operational risk events increased significantly with bank complexity.

For a better example, a number of contributing factors and causes of operational risk are presented in the boxes below (Figure. 3 a, b, c).

The multitude of factors generating the operational risk led to the creation of sub-divisions of this risk. We thus encounter the risk of internal fraud, the risk of external fraud, the risk generated by employment and safety practices, the risk of damage to tangible assets, the risk associated with customers, products and business practices, the risk of business interruption and improper operation of systems and the risk generated by the execution, delivery and process management.

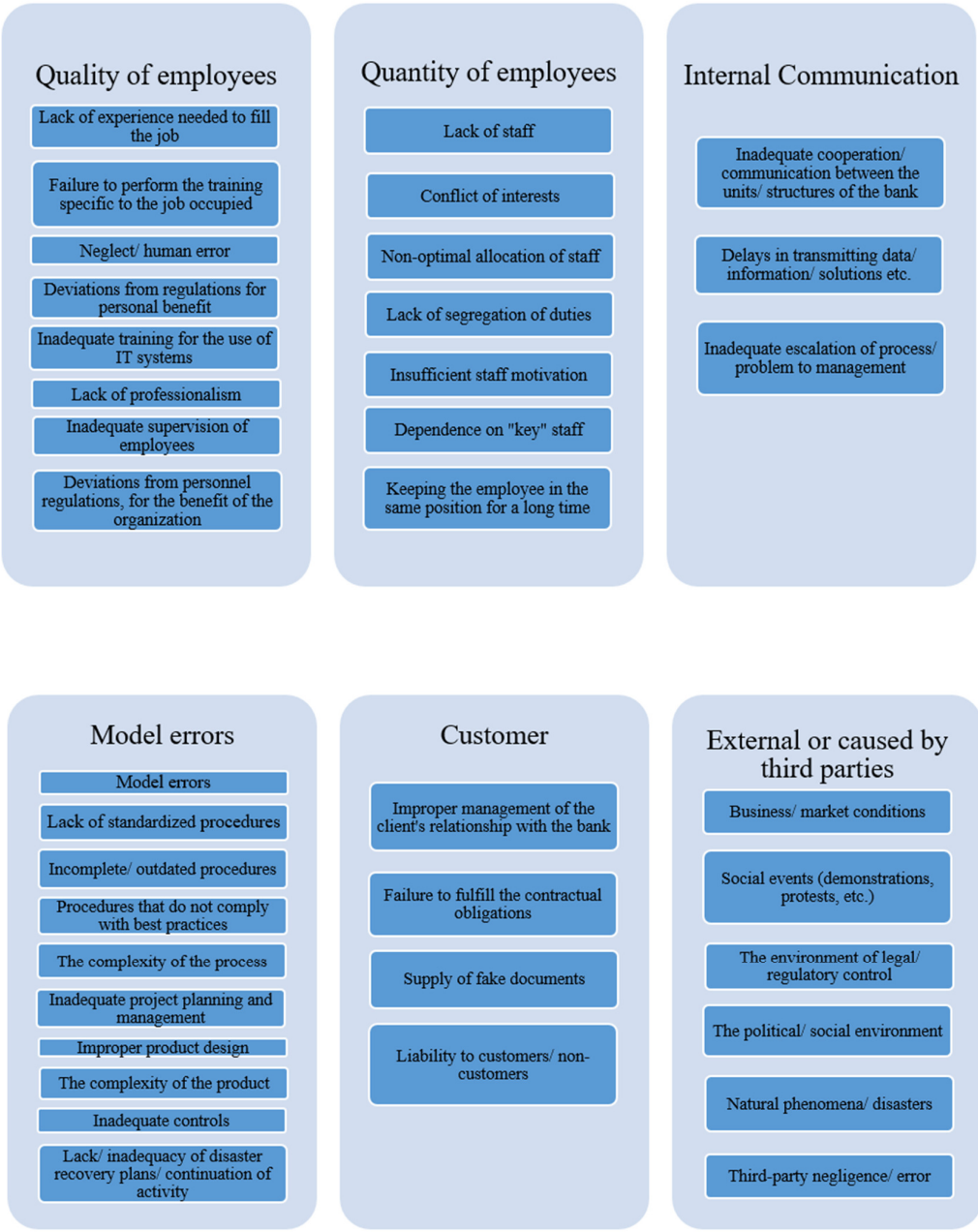
Quality of employees
Lack of experience needed to fill the job
Failure to perform the training specific to the job occupied
Neglect/ human error
Deviations from regulations for personal benefit
Inadequate training for the use of IT systems
Lack of professionalism
Inadequate supervision of employees
Deviations from personnel regulations, for the benefit of the organization
Quantity of employees
Lack of staff
Conflict of interests
Non-optimal allocation of staff
Lack of segregation of duties
Insufficient staff motivation
Dependence on "key" staff
Keeping the employee in the same position for a long time
Internal Communication
Inadequate cooperation/ communication between the units/ structures of the bank
Delays in transmitting data/ information/ solutions etc.
Inadequate escalation of process/ problem to management
Model errors
Model errors
Lack of standardized procedures
Incomplete/ outdated procedures
Procedures that do not comply with best practices
The complexity of the process
Inadequate project planning and management
Improper product design
The complexity of the product
Inadequate controls
Lack/ inadequacy of disaster recovery plans/ continuation of activity
Customer
Improper management of the client's relationship with the bank
Failure to fulfill the contractual obligations
Supply of fake documents
Liability to customers/ non-customers
External or caused by third parties
Business/ market conditions
Social events (demonstrations, protests, etc.)
The environment of legal/ regulatory control
The political/ social environment
Natural phenomena/ disasters
Third-party negligence/ error

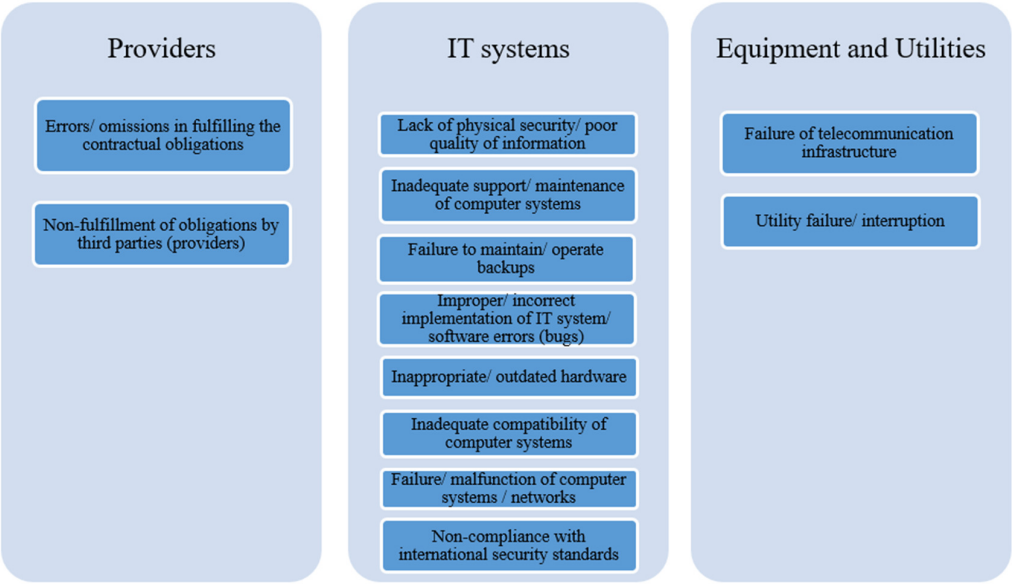

Fig. 3 a,b,c : Contributing factors/ causes of operational risk production

Prudential regulations in the field of operational risk

The diversification of the transactions types and the increase of their volume, the innovation in the financial field, but also the territorial extension and, implicitly, the need for personnel in the banking system created the premises for increasing the probability of materializing the operational risk. Thus, the prudential regulations of the banking activity, with emphasis on maintaining an appropriate capital adequacy, have undergone a continuous evolution according to the economic-financial events that have manifested worldwide.

Barakat and Hussainey (2013) mentioned that the determinants of the quality of risk reporting in banks must explicitly consider how the governance, regulation and supervision of the bank interact in this context.

In this regard, in 2004, the Basel Committee published the Basel II Agreement (its full version being published in July 2006), whose main contribution is the introduction of minimum capital requirements for credit risk, market risk and operational risk, in contrast to the Basel I Agreement, which took into account when assessing the adequacy of capital only the credit risk. This is the moment when the operational risk became the third most important risk in the banking activity.

The Basel II Agreement is built on 3 pillars, thus creating a close connection between (1) minimum capital requirements, (2) prudential supervision process and (3) market discipline.

Methods for calculating the minimum capital requirement for operational risk

The minimum capital requirement for the operational risk of a credit institution must be optimally calculated so that it plays a protective role and allows a rapid absorption of potential losses.

The provisions of the Agreement propose three approaches for calculating minimum capital requirements for operational risk: basic indicator approach, standardized approach and advanced measurement approach.

In case of using the basic indicator approach (BIA), the credit institutions will determine the capital requirement by applying a percentage of 15% to the gross average income of the last three years. The relevant indicator is calculated as the sum of the following items, extracted from the profit and loss account:

a) Interest income and similar income, including those related to fixed income securities;
b) Interest expenses and assimilated expenses;
c) Income from shares and other securities with variable income;
d) Income from commissions;
e) Commissions expenses;
f) Net profit or loss from financial operations;
g) Other operating income.

In the case of the standardized approach (SA), the operations of the banks will be divided by types of activities, to which the percentages established by the Committee apply (12%, 15% and 18%). The total capital requirement corresponds to the sum of all the results obtained for each type of activity identified previously. In order to be able to use the standardized approach, it is important for banks to have adequate operational risk management systems that meet the minimum criteria imposed in Basel requirements.

In 2017, the Basel Committee introduced the new standardized approach for calculating the capital requirement for operational risk, which replaces all operational risk approaches in the Basel II Agreement. Thus, according to this new approach (Figure 4), operational risk capital is the product of the business indicator component (BIC) and internal loss multiplier (ILM), where

- BIC = Business Indicator x Marginal Coefficients
- ILM = Loss Component / BIC, and
- Loss Component (LC) = 15 x average annual loss of operational risk over the last 10 years
-

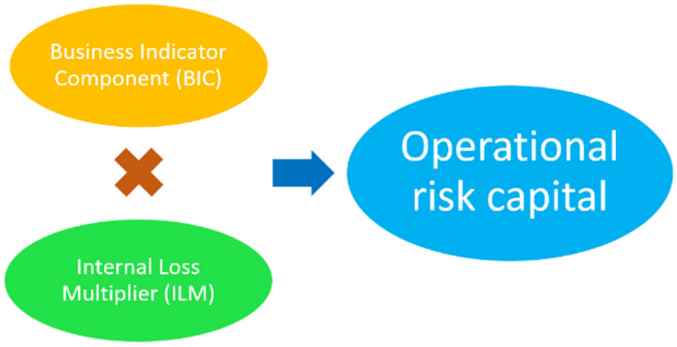

Fig. 4: New approach for operational risk capital introduced by the Basel Committee (data source: BIS, Operational risk standardized approach – Executive Summary*)*

According to Basel Committee, this new approach must be implemented by January 1, 2022 and is applicable to all banks operating internationally, but supervisory institutions can apply this approach also to local credit institutions.

If they opt for the advanced measurement approach (AMA), banks may use internal risk assessment systems, which require validation from supervisory authorities.

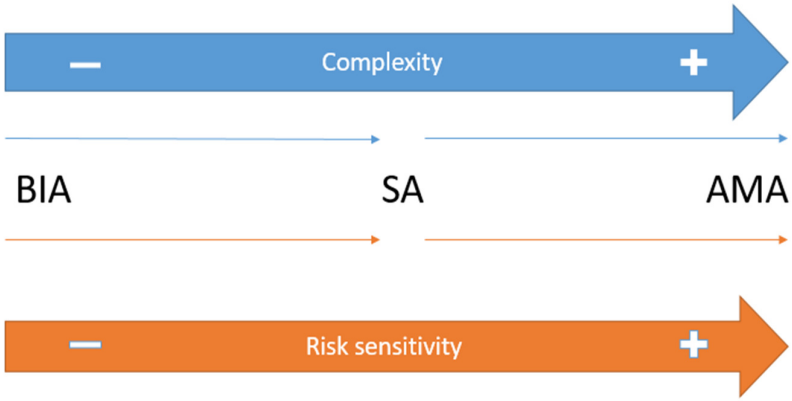

Fig. 5: The degree of sensitivity and complexity of the models

The figure above (Figure 5) illustrates the degree of sensitivity and complexity of the models. Thus, it can be stated that the use of a more complex method can more accurately quantify the operational risk impact on the bank's activity, and the minimum capital requirement can be calculated with greater accuracy.

Case Study

To illustrate that the use of a more complex method can more accurately quantify the impact of operational risk on the bank's activity, and the minimum capital requirement can be calculated with greater accuracy, we will analyze the case of one of the Top 5 banks in the Romanian banking system.

According to the Transparency Report for the year 2018 published on the website of the credit institution, the minimum capital requirement for the operational risk was in the amount of 588,487 thousand lei, this value being resulted from the use of the AMA.

The next step is the analysis of the Profit and Loss Account (for the years 2015, 2016 and 2017) and the extraction of the necessary values in the calculation formula of the relevant indicator for the BIA. After calculating the average for the 3 years and applying the percentage of 15%, for the minimum capital requirement for the operational risk, a value of 437,868.45 thousand lei resulted.

- *Calculating the requirement according to the AMA (used by the bank) = 588,487 thousand lei*
- *Calculating the requirement according to the BIA = 437,868.45 thousand lei*
- *DIFFERENCE = 150,618.55 thousand lei*

We can thus conclude that a bank offering a wide range of products and services for clients, with multiple categories of activities must pay greater attention to the accuracy of calculations of the minimum capital requirement, by creating internal models in which to include both internal and external data, macroeconomic evolutions, business environment and control factors.

Crisis Simulations - Early Warning Tools

On the line of prudential supervision, based on the legislation and regulations in force, the National Bank of Romania continuously evaluates the risk profile and the viability of credit institutions. This assessment is done by identifying the risks to which credit institutions are exposed or can be exposed, by monitoring the key indicators, by analyzing the business model and by evaluating the internal governance and the control system.

Regulation of the National Bank of Romania no. 5/2013 devotes an entire section to operational risk, drawing clear and well-defined lines on aspects of this risk. Thus, the Regulation provides for the obligation of credit institutions to carry out properly crisis simulations for operational risk and to consider the extent to which crisis scenarios for operational risk influence the analysis of the capital planning process. Also, credit institutions are required to carry

out assessments at the level of historical and hypothetical, but plausible, operational risk events, whose probability of production is low, but which causes a major negative impact.

Crisis simulations for operational risk are performed based on the evaluation of operational risk events (ORE). In this regard, starting from the database of operational risk events, respectively from the results of the annual risk self-assessment process, the bank analyzes the impact of recording some losses from open operational risk events (including legal risk, information technology risk, model risk and uncontrollable risks). The bank thus considers the extent to which the crisis scenarios for the operational risk and the global exposure of the bank to the operational risk can impact the profitability of the bank.

The crisis simulations should be performed according to the nature, extent and complexity of the bank's activity, as well as according to its risk profile.

Depending on the frequency of occurrence of operational risk events and their degree of severity, credit institutions may simulate changes such as: increasing financial losses from labor disputes, increasing financial losses from interruptions of information systems, increasing losses caused by natural disasters, increasing the losses caused by external events (vandalism, for example) or increasing the losses caused by the use of inappropriate models.

Performing regular crisis simulations may warn the credit institution of weaknesses that may affect profitability, solvency or compliance with the regulatory framework, and the bank's management structure may provide recommendations for remedial measures or actions, where appropriate.

Case Study

Crisis simulations for operational risk can influence the analysis of the capital planning process. For example, we have the following data from the table below (*due to confidentiality clauses, the name of the bank will not be disclosed):*

Table2: The relevant data for the operational risk events of a bank

Year	ORE	Financial Impact	Recovery	Financial impact achieved (net value)	Non materialized loss related to closed events	Potential loss
2012	6	2,646,660	-	-	2,646,660	-
2013	4	-	-	-	-	-
2014	39	7,467,155	538,334	374	6,924,447	4,000
2015	19	681,834	-	140,437	541,397	-
2016	21	1,090,741	47,776	12,267	226,519	804,179
2017	35	1,391,193	-	3,353	307,224	1,080,616
2018	35	1,194,970	113,795	8,603	-	1,072,572
Total	**159**	**14,472,553**	**699,905**	**165,033**	**10,646,247**	**1,072,572**
Percentage in total financial impact			**5%**	**1%**	**74%**	**7%**

For the period 2012-2018, are presented the relevant data for the operational risk events of a bank: the gross financial impact, the recoveries, the realized financial impact, the non-materialized loss related to the closed events and the potential loss related to the calculation year.

For the operational risk events opened in 2018, the bank constituted a provision amounting to 1,072,572 lei (100% of the amount in dispute). The initial estimated loss chances are 80%.
The stress scenario considers 3 hypotheses: increase with 25% of the estimated loss chances, increase with 35% of the estimated loss chances and increase with 50% of the estimated loss chances. In addition, for each hypothesis, the

bank performs simulations by increasing by 25%, 35% and respectively 50% the value of the potential loss. The results obtained are as follows:

Table3: Crisis simulations

Provision constituted	1,072,572.00		
Stress scenario hypothesis	25% increase	35% increase	50% increase
Loss value according to the scenario	1,072,571.76	1,447,971.87	1,608,857.63
Difference from the provision already established	**0**	**375,399.87**	**536,285.63**

The results of this simulation highlight the full coverage of the potential losses by establishing a provision in the first stress scenario, but in the other two scenarios it is necessary to allocate additional economic capital.

Analysis on the minimum capital requirement for the operational risk calculated in the Romanian banking system

For this study, I used the annual data on operational risk published by the National Bank of Romania, based on which I analyzed the evolution of the minimum capital requirement for operational risk in the period 2008 - 2018. I also analyzed the evolution of the minimum capital requirement for operational risk in the European banking sector, from 2015 to 2019, using annual data from European Central Bank.

Analyzing the Romanian banking system (Figure 6), between 2008 and 2018, most of the credit institutions used the basic indicator approach (BIA) regarding the calculation of the minimum capital requirement for operational risk, the other two approaches being used on a very small scale. It can be seen that since 2009, the share of standardized approach (SA) utilization has increased considerably (from 3.03% to 12.5%), and, starting with 2011, the standardized approach (SA) and the advanced measurement approach (AMA) had relatively equal weights, being up to 2017, at values between 9.09% and 10.71%. Banks have understood the importance of proper operational risk management, thus developing advanced internal models.

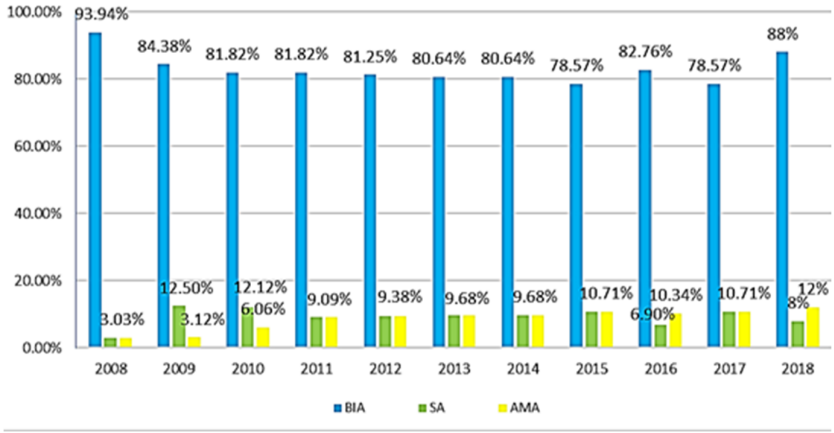

Fig. 6: Distribution of credit institutions by approach – Romania
(data source: National Bank of Romania)

Although the available data cover only the period 2015-2019 it can be observed in the European banking sector (Figure 7) the predominant use for calculating the minimum capital requirement for the operational risk of SA

(68.18% in 2018 versus 8% in Romania), but also a slight increase of weight of using AMA (from 17.95% in 2015 to 20% in 2018).

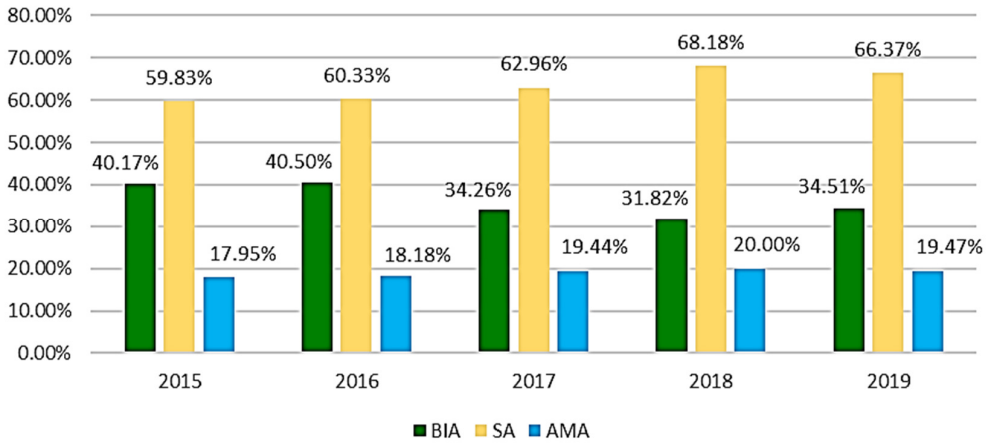

Fig. 7: Distribution of credit institutions by approach – European Banking Sector
(data source: European Central Bank)

Even though in 2008 approximately 93% of the total minimum capital requirement for operational risk at the level of the Romanian banking system was calculated using the BIA, the increasing share of the capital calculated using the AMA may be due to the fact that the banks active on the Romanian market which are subsidiaries of international institutions are using the internal models elaborated at the level of the Group they belong to. Thus, in 2017, the capital requirement calculated with the aid of AMA represented about 39% of the total capital requirement for operational risk (Figure 8).

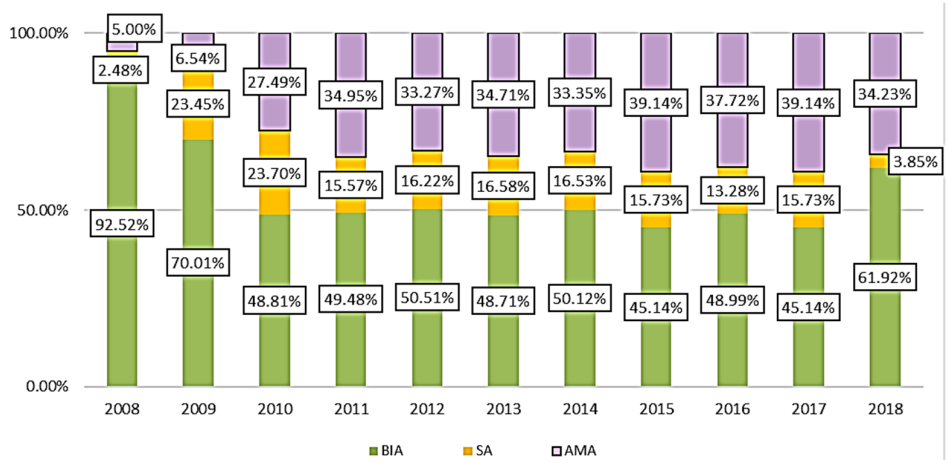

Fig. 8: Share of own funds requirement on Operational Risk depending on the approach – Romania
(data source: National Bank of Romania)

From the same point of view, at the level of the European banking sector (Figure 9), it is observed during the analyzed period the decrease of the share of the minimum capital requirement for the operational risk calculated using the BIA (from 8.27% in 2015 to 5.23% in 2018) in the total minimum capital requirement for the operational risk. Thus, in 2018, 55.24% of the minimum capital requirement for operational risk was calculated using AMA (versus 34.23% in Romania) and 39.53% was calculated using SA (versus 3.85% in Romania).

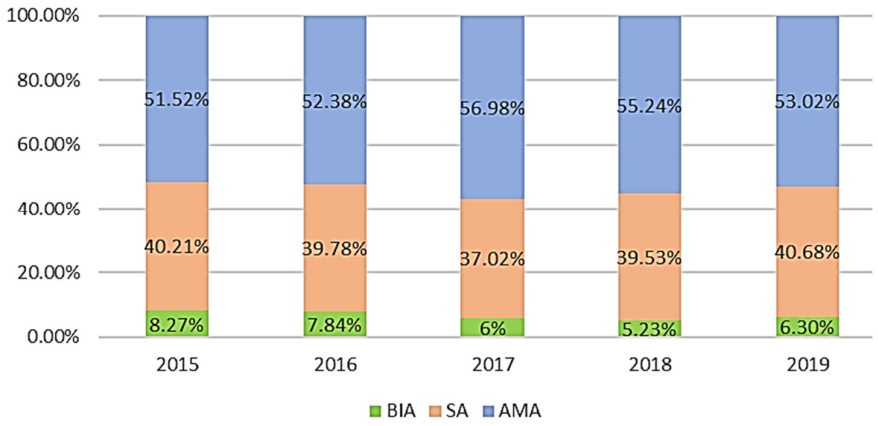

Fig. 9. - Share of own funds requirement on Operational Risk depending on the approach – European Banking Sector

(data source: European Central Bank)

Awareness of the financial impact that the materialization of operational risk events can have on the stability of both the bank and the banking system in Romania is equivalent to the interest for capital adequacy to the operational risk, translated by increasing the share of the capital demand for this risk in the total minimum requirements of capital, as can be seen below in Figure 10.

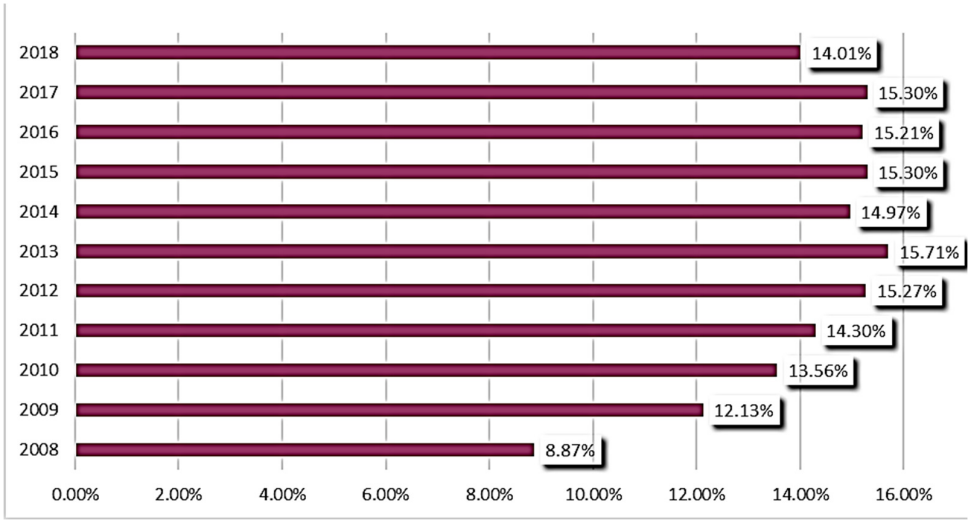

Fig. 10: Share of own funds requirements for Operational Risk in Total own funds requirements – Romania

(data source: National Bank of Romania)

At the same time, in the process of supervision, the National Bank of Romania periodically evaluates the capital adequacy to risks for all credit institutions and issues warnings and, where appropriate, sanctions for cases where the level of capital was not correlated with the significant risks the banks are exposed to. In this regard, during 2014-2016 and in 2018 (for 2017 there are no data available), within the supervision actions, the National Bank of Romania issued 66 measures for holding own funds in excess of the minimum capital requirements.

At the level of the European banking sector, lower weights of the minimum capital requirement for operational risk are noted in the total minimum capital requirement, as can be seen in Figure 11. Thus, in 2018, the minimum capital requirement for operational risk in the European banking sector accounted 10.54% of the total minimum capital requirement, compared to the Romanian banking system, where the share was 14.01%.

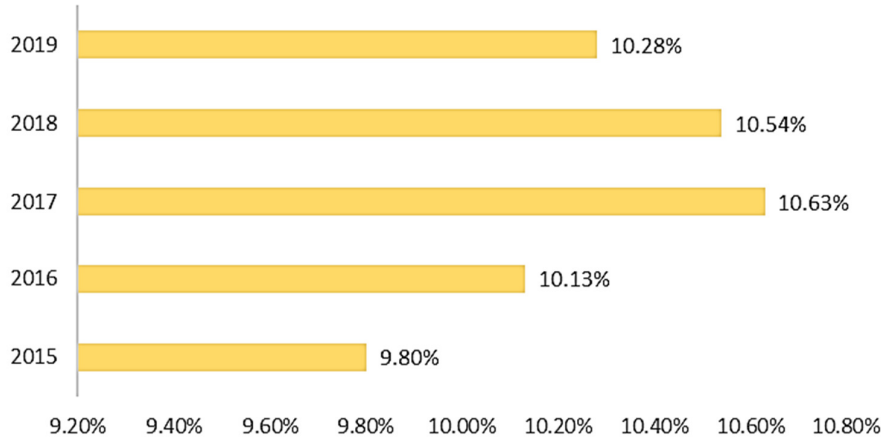

Fig. 11: Share of own funds requirements for Operational Risk in Total own funds requirements – European banking Sector

(data source: European Central Bank)

Considering the multitude of factors contributing to the production of operational risk, and the measures that can be taken along the lines of managing this risk are directed to several areas.

A first measure can be represented by the improvement of the process of identifying and collecting the operational risk events in order to report them in an efficient and standardized way, along with the revision of the operational risk indicators and the limits established for them.

From the point of view of the human resources component, the increase of the visibility and the degree of awareness of the operational risk at the level of the whole bank through courses dedicated to the persons responsible for its management/ reporting and testing of all employees to establish the level of assimilation of the knowledge regarding the operational risk must represent concerns for all banking institutions.

In the regulations area, banks must review internal policies and regulations so that they are constantly aligned with the new requirements of the competent supervisory authorities. Also, the constant updating/ development and testing of disaster recovery plans and ensuring the continuity of the activity must be among the priorities of the banks.

The operational risk management and measurement system must also be constantly reviewed, in accordance with the regulatory requirements, with the evolutions of the financial-banking system and of the macroeconomic environment, but also with the development of the credit institution's own activity. Also, each new product or service that the institution wants to promote, must have, in its analysis, the operational risk component.

Conclusions

The global financial crisis of the past decade can be perceived as a contributor to the banking institutions regarding the awareness of the importance of good risk management.
The multitude of factors that can generate the risk and the financial losses that it can bring to a credit institution, have led to the introduction of the operational risk (and its sub-categories) in the category of the three most important risks in the banking activity, besides the credit risk and market risk.

In the last 15 years, numerous regulations for operational risk management have been elaborated, the most important of these being the Basel II Agreement, whereby credit institutions have the obligation to calculate minimum capital requirements for operational risk, being proposed, within the same agreement, 3 calculation methods: basic indicator approach - BIA, standardized approach - SA and advanced measurement approach - AMA.

The calculation methodology is different for all 3 methods, so the basic indicator approach - BIA is preferable to be used by the local credit institutions, whose activity is not very complex and whose portfolio of products and services is not sophisticated. Standardized approach - SA assumes that the bank's operations are broken down by types of activities. In order to be able to use the standardized approach, banks must have adequate operational risk management systems that meet the minimum criteria imposed in Basel requirements, which makes this method more suitable for a medium-sized bank. The advanced measurement approach - AMA is the most complex method of calculating the minimum capital requirement for operational risk and involves the elaboration of internal models, being used, generally, by internationally active banks, which are part of a group of financial institutions.

In the Romanian banking system, in 2018 the basic indicator approach - BIA is used mainly for the calculation of the minimum capital requirement for operational risk, but during the analyzed period, the constant increase of the share of standardized approach - SA use, as well as of the share of use of advanced measurement approach - AMA, was observed.

The establishment of the minimum capital requirements is not sufficient for managing the operational risk. Banks use early warning tools, in this sense being able to use crisis simulations: regularly performing crisis simulations can warn the credit institution about weaknesses that may affect profitability, solvency or compliance with the regulatory framework, and the bank's management may provide recommendations for remedial measures or actions where appropriate.

The efficient management of the operational risk must also consider the application of measures for the most important factors that can generate operational risk events: improving the process of identifying and collecting the operational risk events in order to report them in an efficient and standardized way, reviewing the operational risk indicators and the limits set for them, courses dedicated to the persons responsible for the management/ reporting of the operational risk and testing all the employees to establish the level of assimilation of the knowledge regarding the risk, the constant alignment with the new requirements of the competent supervisory authorities, the constant updating/ developing and testing disaster recovery plans and ensuring the continuity of the activity.

The continuous development of banking technologies and practices, the increasingly frequent use of automatic technologies, the digitalization of the banking system, but also the fluctuation of personnel (present in most economic fields) are important factors that can generate operational risk events. The numerous studies in the field also show the importance of this risk and the continuous need to improve models, methods and tools for the identification, evaluation and efficient management of operational risk.

This article proposes future research topics, especially in the context of the coronavirus pandemic. Working from home, limiting face-to-face meetings, giving up the use of physical documents as much as possible are just some of the measures taken by credit institutions to prevent the spread of the virus. In this respect, being in an unprecedented situation, the chances of operational risk have increased considerably. Although each credit institution has Business Continuity Plans in case of disaster, the current reality could not be predicted and translated into action plans. Future research may study the evolution of the minimum capital requirement for operational risk in the context of the global pandemic and the response of the banking system to this health crisis.

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The Profilization of Regions Innovative Development in The System of the Economic Space of the Russian Federation

Irina DANILOVA
Professor of economic theory, regional economics, state and municipal government department,
South Ural State University (National Research University),
danilovaiv@susu.ru

Irina SAVELYEVA
Professor, Director of School of Economics and Management
South Ural State University (National Research University), Chelyabinsk, Russia,
ips60@mail.ru

Irina KILINA
Senior Lecturer of Department of Customs Affairs,
South Ural State University (National Research University), Chelyabinsk, Russia,
kilinaip@susu.ru

Anzhelika KARPUSHKINA
Professor of the Economic Security Department,
South Ural State University (National Research University), Chelyabinsk, Russia,
karpushkinaav@susu.ru

Abstract

There are the preservation of significant interregional differentiation and weak connectivity in the innovation sphere of Russian regions. This presupposes the study of the reserves of innovation dynamics: taking into ac-count the uniqueness of accumulated assets; comparative innovation advantage in resources, production and results of innovation; territorial location to relatively innovative growth centres. The authors propose a methodological approach for assessing the type of spatial environment of regions, which was tested on the example of subjects of the Russian Federation with a single-industry metallurgical specialization.
The proposed approach is based on a set of indicators characterizing the socio-economic and innovative conditions of regional development, determining the spatial status of regions of the Russian Federation, assessing the connectivity between regions within the macro-zone. The types of local innovation spaces are highlighted using cases of macro-zones in mono-specialized regions, limiting or stimulating interregional cooperation; promising partners for innovative interaction have been identified. The spatial approach to assessing innovative development allows expanding understanding of potential drivers of growth, directions and organizational formats that activate the innovation dynamics of regions. A verbal model of the development of interregional innovative relations and a real case on the example of the regions "Chelyabinsk region - Sverdlovsk region", determined by the actual innovative conditions and results in the innovation sphere of the regions, are presented.

Keywords: Innovative Development of Regions, Innovative Space, Innovative Macro Zone, Regional Connectivity, Innovative Profile.

Introduction

The current economic situation in the world commodity markets has actualized the problem of maintaining the high dependence of the Russian economy on energy prices and the need for a transition to a new technological order, search for production factors and, ultimately, a change the orientation in the economic development. Increasing the technological involvement of regions in the process of accelerating innovative development is one of the real

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mechanisms for creating competitive advantages, especially for mono-specialized regions, capitalization of regional assets to gain economic stability.

The definition of trends in the innovative development of countries is carried out using the information panel of data from international ratings Global Innovation Index *(Global Innovation Index | Who Will Finance Innovation?, 2018)*, European innovation scoreboard *(European Innovation Scoreboard 2019, 2019)*, Regional innovation scoreboard *(European Innovation Scoreboard 2019, 2019)*. And the positioning of Russian regions and identification of restrictions is based on the data from sources: Rating of innovative development subjects of the Russian Federation *(Rating of innovative development of constituent entities of the Russian Federation, 2017)*, Rating of innovative regions of Russia *(Rating of innovative regions of Russia, 2020)*. The ratings focus on the internal parameters of individual territories from the position of the conditions and results of innovative development, resource availability, involvement of business and industrial complex in the innovation process, productivity of scientific and research organizations, etc.

There is an insufficiently studied sphere of spatial innovation potential which was studied: the economic advantages of territorial location, direct and feedback correlation with other territorial actors, promising partners of interregional innovation cooperation.

In foreign studies, the innovative development of regions is analysed both from the standpoint of assessing the influence of endogenous factors by Arnault Morisson, Mathieu Doussineau (2019), Robert Hassink (2019), and taking into account the factors of the location of territories relative to innovation centres (authors are Daniel Coronado, Manuel Acosta, Ana Fernández (2008)). The results of the study by Petr Hajeka, Roberto Henriquesb, Veronika Hajkovac (2014) showed that the diversity of regional innovation systems is related, among other things, with inter-territorial relationships. While the works of De Nonic, Luigi Orsia, Fiorenza Belussib (2018) noted the positive spatial influence of regions that intensively generate new knowledge. The role of interregional cooperation in overcoming the technological gap is revealed in the publications of Mariachiara Barzotto, Carlo Corradini, Felicia M. Fai, Philip R. Tomlinson (2019). The implicit effects of innovation in the activation of inter-sectoral cooperation and the influence of the spatial proximity of the subjects of innovation are investigated in the works of Stephan J. Goetzab, Yicheol Hanc (2020). Different scales of territorial diffusion of innovations are classified in the article by Mokter Hossaina, Henri Simulab, Minna Halmec (2015):

- local and neighbouring diffusion (between regions with the same level of socio-economic development),
- distance diffusion,
- global diffusion.

The prospect of partnership relations for achieving a cumulative positive effect in the field of innovative development is based on the example of the Chinese regions by S.L. Zhaoa, L. Cacciolattic, S.H. Leeb, W. Songa (2015).

The productivity of inter-territorial relations in the direction of strengthening specialization in key stimulating technologies and their spatial diffusion is considered as an actual factor of regional economic growth by Rinaldo Evangelista, Rinaldo Evangelista, Valentina Meliciani, Valentina Meliciani, Antonio Vezzani (2017). The emphasis on the specifics of local conditions is assessed as an additional source of innovation dynamics by Markus Grillitsch, Björn Asheim (2018). Spatial “neighbourhood” facilitates the exchange of information and represents a source of creating radical innovations that are relevant from the standpoint of public administration efficiency *(Oerlemans and Mees, 2000)*.

Methodology

Each separate region is a structural unit of the innovation space, characterized by a specific level of intensity of production, scientific and technological, commercial, logistic connections with other regions, including those that are part of the territorial environment (with or without borders with the analysed region). The authors' position is that the innovation dynamics of a region depends on both its general level of socio-economic development (including innovation) and the quality of the country's innovation space as a whole, including the quality of the local innovation space (macro-zone). Within the framework of the study, to characterize the territorial environment, the concept of “local innovation space” or “macro-zone” was used, which includes the reference region (studied)

and regions that have a common border with the reference one (Fig. 1). The structural diagram of the innovation space and its components (local innovation spaces, as a reference region, an object of analysis, and territorial "neighbours") is shown in Figure 1.

The units of the meso-level are regional innovation systems, which differ in the conditions and effectiveness of innovative development, which directly affects the activity, the strength of innovative impulses "outside", the speed and degree of their territorial "absorption", innovative "conduction" into the economy of the macro-zone regions.

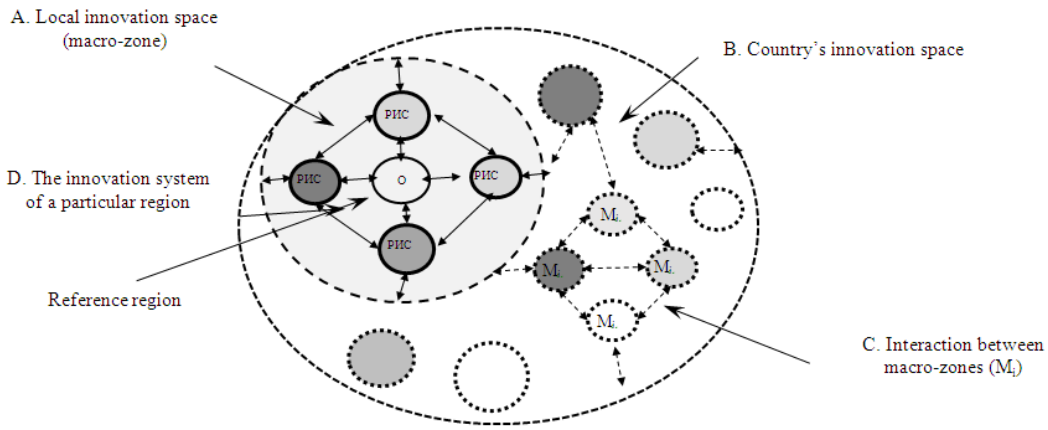

Fig. 1: The structural diagram of the innovation space and its components in the federative country
(Source: compiled by the authors)

Figure 1 formalizes the innovation space and the innovation system of a particular region: A - local innovation space (macro-zone), including the supporting region and the bordering regions of the Russian Federation; B - innovation space of the country as a whole, uniting the entire set of regions interacting with each other; C - lines of interaction between macro-zones, D - innovation system of a separate region.

Different models of potential neighbourhood are possible (Fig. 2) in the local macro-zone: 1) the reference region and border regions have polar levels of innovation development (in the matrix they are highlighted in bold); 2) the support and border regions are characterized by a similar level of innovative development (in the matrix they are italicized).

Table 1: Matrix of options for innovative situations in the macro-zone

У↑/ Р↑	**PP⁻**	*C*	*C*	*C*
У↑/Р↓	*P⁻*	**PP⁻**	**PP**	*C*
У↓/ Р↑	*K*	**PP**	**PP⁺**	*C*
У↓/ Р↓	*K*	*K*	*PP⁺*	**PP⁺**
Border region / Reference region	**У↓/ Р↓**	**У↓/ Р↑**	**У↑/ Р↓**	**У↑/ Р↑**

(Source: compiled by the authors)

Legend:
У↑ *– good innovative conditions;*
У↓ *– insufficient level of parameters of innovative conditions;*
accordingly, ***Р↑*** *– good innovative performance;*
Р↓ *– low innovative performance,*
C *– the possibility of full cooperation;*
K *– critical "neighbourhood",*
PP *– potential partnership is limited*

From the perspective of interaction, option "C" assumes the possibility of potential cooperation, the reference and neighbouring regions have a high level of innovative development (they can become "donors" of innovative achievements for each other). Situation "PP" shows the presence of polar innovation statuses of the regions, that is, the reference or border regions are radically superior in terms of conditions or innovative performance; partnership is limited, associated with the risk of an outflow of personnel and financial resources (PP+ is a form of communication, when the reference region has a status higher than the neighbouring regions, PP– is an inverse relationship). The quadrant “K” environment means functioning in an innovative vacuum.

The position of the region and the type of local innovation space determine the uniqueness of the driving forces of the innovation dynamics of each subject of the Russian Federation, including the dominant type of local innovation spaces in the context of macro-zones:

a) a space **favourable for** the innovation dynamics of the reference region;
b) the space is **unfavourable for the innovative development** of the reference region due to the low innovation parameters of the regions surrounding the reference region in the macro-zone.

State support measures will be more effective only when the type of environment and the situation in a given local innovation space are identified, in connection with which the authors have developed a methodological approach to assessing the situation in macro-zones. This approach includes 6 stages.

1) Specification of the subjects of the Russian Federation that share a common border with the reference (study) region, which allows you to structure the subjects of the macro-zone.
2) Systematization of intraregional indicators of innovation dynamics into groups that characterize the conditions and effectiveness of innovation development; the parameters for assessing the local innovation space are highlighted.
3) To determine the promising lines of interregional relations, an applied model of the actors of innovative development was used, which includes stakeholders, researchers, innovators and technological production.

Stakeholders are defined as customers of innovations, the business sector (as consumers and investors); researchers are research, scientific and educational organizations, scientific and educational centres; innovators - innovation centres, innovative business incubators, accelerators, engineering centres, technology parks; technological production includes production sites, industrial enterprises, collective use centres, innovative technology clusters, etc.

To assess the potential and directions of interaction between regions, intraregional indicators of innovative development are highlighted (Table 2).

Table 2: A set of intraregional indicators in the context of actors of innovative interaction

<table>
<tr><th colspan="4">Stakeholders</th></tr>
<tr><th colspan="2">Economic conditions (I_e)</th><th colspan="2">Innovative results (I_r)</th></tr>
<tr><td>X_{e1} – GRP per capita</td><td>X_{e3} – Industrial production index</td><td>Y_{r1} – Share of products of high-tech and knowledge-intensive industries in GRP, %</td><td>Y_{r3} – Share of innovative goods, works, services in the total volume of goods shipped, works performed, services of small enterprises,%</td></tr>
<tr><td>X_{e2} – Investment per capita</td><td>X_{e4} – Labour productivity index</td><td rowspan="2">Y_{r2} – Volume of innovative goods, works and services, % in the total volume of shipped products</td><td rowspan="2">Y_{r4} – Ratio of exports of technology goods and services of a technical nature to total exports, %</td></tr>
<tr><td colspan="2">X_{e5} – The level of economic diversification (Herfindahl - Hirschman index)</td></tr>
<tr><th colspan="4">Researchers</th></tr>
<tr><th colspan="2">Human resources (I_h)</th><th colspan="2">Social conditions (I_s)</th></tr>
</table>

X_{h1} – The number of personnel engaged in scientific research and development per 10,000 people	X_{h3} – The number of students enrolled in educational programs of high professional education per 10,000 population	X_{s1} – The ratio of the average per capita income of the population to the size of the subsistence minimum	X_{s3} – Real average monthly wages of employees
X_{h2} – Share of people with a scientific degree in the number of researchers, %	X_{h4} – Share of people employed in high-tech activities to the total number of people employed in the regional economy, %	X_{s2} – The proportion of the population aged 25-64 with higher education in the total population of the corresponding age group, %	X_{s4} – The ratio of the average monthly wages of workers engaged in research and development to the average monthly nominal gross wages in the region, %
Innovators			
Financial resources (I_f)		**Innovative activity (I_d)**	
X_{f1} – Costs for technological innovation, % to GRP	X_{f3} – Internal costs of research and development, % to GRP	Y_{d1} – Coefficient of inventive activity	Y_{d3} – Ratio of import of technologies and services of a technical nature to total import,%
X_{f2} – Costs for technological innovation of small enterprises, % to GRP	X_{f4} – Intensity of costs for technological innovation of industrial organizations, %	Y_{d2} – Share of organizations carrying out technological innovations in the total number of organizations (by industrial production organizations), %	Y_{d4} – Share of small enterprises carrying out innovations, in general small enterprises (by industrial enterprises), %
Technological production			
Material resources (I_m)		**Information resources (I_i)**	
X_{m1} – coefficient of fixed assets renewal	X_{m3} – capital productivity	X_{i1} – Share of organizations that used the Internet in the total number of surveyed organizations, %	X_{i3} – Organizations with a website, %
X_{m2} – The coefficient of serviceability of fixed assets	X_{m4} – The number of advanced production technologies used in the region, per million population, units	X_{i2} – The number of personal computers per 100 employees, including those with access to the Internet	X_{i4} – The use of electronic document management in organizations, including electronic data exchange between their own and external information systems, by exchange formats), %

(Source: compiled by the authors)

To assess and compare the regions of the macro-zone, the following indices are proposed:

1) to characterize **the stakeholders** - group indices characterizing economic conditions and an index for assessing the results of innovative development of the constituent entities of the Russian Federation (I_e and I_r);
2) to characterize **the researchers** - indices of personnel and social conditions (I_h and I_s);
3) to characterize **the innovators** - indices of financial conditions and innovative activity (I_f and I_d);
4) to characterize **technological production** - indices of material and information conditions (I_m and I_i).

For a generalized assessment of intraregional factors of innovative development, two indices were used such as the integral index of conditions and the integral index of the effectiveness of innovative development, which are calculated as the average geometric group indices of the corresponding block. Group indices are aggregated from

individual indicators, taking into account the weighting coefficients calculated by concordance of parameters within each group separately *(Savelyeva, 2019).*

To assess the positions of the regions with respect to the average situation in the Russian Federation, the average values of the integral indices of conditions and effectiveness of innovation activity were allocated (the average level was determined and fixed by the year of the beginning of observations in 2013). As a result of the classification of the constituent entities of the Russian Federation by intraregional parameters of innovative development, 4 typological groups were identified. Group I is a group with characteristics of conditions below average and performance above average, II - both conditions and performance above average, III - conditions above average, performance below average , IV - conditions and performance are simultaneously below average.

1) Estimation of spatial parameters (Table 3). Diagnostics of the general processes of innovative development was carried out based on the assessment of convergence and connectivity. With the help of convergence, the presence of a tendency of convergence of regions in terms of the level and pace of innovation parameters (whether the innovation space of the macro-zone is levelled out) is assessed. It is important to take into account how the space is levelled by reducing the level of strong regions of the macro-zone or "pulling up" the weak *(Danilova and Kilina, 2019)*. Convergence was analysed in terms of GRP (per capita), the cost of technological innovation in GRP, the number of personnel engaged in research and development per 10,000 populations, the volume of innovative products in GRP, and the share of organizations engaged in technological innovation. The assessment of potential infrastructural and innovative links between regions was carried out using a gravity model according to indicators that characterize economic (GRP, investments, volume of production of innovative products) and innovative development (high-tech products and manufacturing industries). The assessment of density (the degree of saturation of the territory with innovative parameters) and homogeneity (the degree of endowment of the constituent entity of the Russian Federation with innovative factors relative to other regions of the country) are calculated by indicators of GRP, investments, costs of technological innovations, including small enterprises, the number of personnel engaged in research and development in high-tech industries, the number of innovative enterprises and the volume of innovative products.

Table 3: Methodology for calculating the properties of the innovation space

Characteristics of innovative space	**Indicators used to assess the quality of the innovation space of the macro-zone**	
Convergence	**Sigma-convergence** is calculated based on the coefficient of variation: $k_{var} = \frac{\sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n}}}{\bar{x}} \cdot 100\%$ (1), where x_i – value of the indicator of the i-th region, $\bar{x}$ – average value of the indicator for all analyzed regions. To diagnose the presence of the sigma-convergence process, the values of the variation indicator are compared by year, if the equation $k_{var}^{t} < k_{var}^{t_0}$ is correct, then sigma-convergence is observed.	
Connectivity between regions in terms of innovation indicators	Gravitational model: $M = \frac{p_i \times p_j}{r^2}$ (2), where M – is the index of gravity (attraction), p_i, p_j – are innovative parameters	
Indicators used to assess the spatial parameters of regions in macro-zones		
Density by innovative parameters	$\rho = \frac{A_i}{S_i}$ (3), where ρ – is the density of the innovation space of the i-th region, A_i – is the value of the innovation parameter in the i-th region in the n-th period, S_i – is the area of the i-th region.	**Aggregated index of innovative development of regions by spatial parameters** $I_{\text{in sp}(i)} = \sqrt{I_{\text{density}(i)} \times I_{\text{str}(i)}}$ (7), where $I_{\text{in sp (i)}}$ – is the aggregated index of the innovation space (calculated by the spatial indicators of the constituent
Uniformity in innovative parameters	$d = \frac{A_i}{A} \times 100\%$ (4), where d – is the share of the i-th region in the total indicator for the Russian Federation	

Group indices of density and structure by innovative parameters	$I_{density(i)} = \sqrt{I^{\text{cond}}_{\text{density }(i)} \times I^{\text{perform}}_{\text{density }(i)}}$ (5), where $I_{\text{density (i)}}$ – is the density index of the innovation space of the i-th region; $I^{\text{cond}}_{\text{density }(i)}$ – group index of the density of conditions; $I^{\text{perform}}_{\text{density }(i)}$ – group performance density index. Innovation space structure index: $I_{\text{str}(i)} = \sqrt{I^{\text{cond}}_{\text{str }(i)} \times I^{\text{perform}}_{\text{str }(i)}}$ (6).	entities of the Russian Federation), i – is region. By the value of the aggregated index of innovative development of regions, the constituent entities of the Russian Federation are classified into 4 quartiles: Q_1, Q_2, Q_3, Q_4. Q_1 contains 25% of the best regions, Q_4 – 25 % of the worst regions.

(Source: compiled by the authors)

2) Assessment of the systemic innovation profile of the reference region and the border regions of the macro zone.
3) Identification of promising innovative partners in the structure of the macro-zone. An example of a verbal model that reveals the directions of interregional innovation processes is presented by a case on the example of a supporting region - the Chelyabinsk region and its macro-zone.

Results

The information base for the collection of the analysed indicators is the statistical collection Regions of Russia - Socio-economic indicators *(Regions of Russia. Socio-economic indicators, n.d.)* and the Unified Interdepartmental Information and Statistical System, UIISS *(Unified interdepartmental information and statistical system, n.d.)*.

The methodological approach has been tested on the example of 73 constituent entities and 4 macro-zones of the Russian Federation. Moscow, Sakhalin, Tyumen regions (including Khanty-Mansiysk and Yamalo-Nenets Autonomous Okrug), Nenets Autonomous Okrug due to abnormally high economic indicators. Sevastopol, Republic of Crimea, Magadan Region, Chukotka Autonomous Okrug, Chechen Republic, Republic of Ingushe was excluded from the total sample of regions due to the lack of data on a number of indicators.

Macro-zones are allocated for regions of the same type in the industry structure-subjects of the Russian Federation with domination in GRP of products of the manufacturing industry (metallurgical production): Chelyabinsk (35.3 % of the manufacturing industry in GRP in 2017 *(Regions of Russia. Socio-economic indicators, n.d)*, including 61.5% of metallurgical products), Lipetsk (39.4% and 67.4 %, respectively), Vologda oblast (38.1% and 62 %) and Krasnoyarsk territory (31.4% and 74.5 %).

Analysis of intraregional factors of innovative development showed (Table 4) that the Chelyabinsk, Lipetsk regions, Krasnoyarsk Territory have relatively strong positions within their local innovation spaces. While in the macro-zones of the Chelyabinsk and Lipetsk regions there are regions with a high level of innovative development: the Sverdlovsk region in macro-zone of the Chelyabinsk region and Voronezh, Kursk, Tambov, Tula regions in the macro-zone of the Lipetsk region. Consequently, we can say that there are potential partners to activate innovative interaction and a favourable environment for interaction. The weak Vologda region is surrounded by strong regions such as Yaroslavl, Novgorod, Kirov regions. The strong Krasnoyarsk Territory is surrounded by partners with a low level of innovative development; in fact, in such conditions the strategy of self-reliance is relevant for it.

Table 4: Typology of regions of macro zones by intraregional parameters innovative development, 2017

Macro-zone	Region	Group	Macro zone	Region	Group
I	**Chelyabinsk region**	**III**	II	**Lipetsk region**	**II**
	Sverdlovsk region	**II**		**Voronezh region**	**II**
	Republic of Bashkortostan	**II**		**Kursk region**	**II**
	Kurgan region	IV		Oryol region	IV
	Orenburg region	IV		**Ryazan region**	**II**

III	Vologda region	IV		**Tambov region**	**III**
	Kostroma region	IV		**Tula region**	**II**
	Tver region	III	IV	**Krasnoyarsk territory**	**II**
	Yaroslavl region	**II**		Irkutsk region	III
	Republic of Karelia	IV		Yamalo-Nenets Autonomous Okrug	No info
	Arkhangelsk region without Nenets Autonomous Okrug	IV		Khanty–Mansi Autonomous Okrug – Yugra	No info
	Leningrad region	**III**		Republic of Khakassia	IV
	Novgorod region	**II**		Tuva Republic	IV
	Kirov region	**II**		Kemerovo region	IV
				Tomsk region	**II**
				Sakha (Yakutia) Republic	IV

(Source: compiled by the authors)

Legend* the supporting regions of macro- zones are highlighted in grey, strong regions are in bold type, which have both performance and (or) conditions for innovative development above average level.

The analysis of convergence processes in the analysed macro-zones showed that for the period from 2010 to 2017 the levelling of space (reduction of interregional differentiation) is observed in 3 macro zones with supporting regions - Chelyabinsk, Lipetsk, Vologda regions (Table 5). A detailed analysis showed, for example, that the convergence in the macro-zone of the Chelyabinsk region in terms of costs for technological innovation was caused by a decrease in the average value of the indicator from 2.2% to 1.8%, which was largely influenced by the deterioration of the position of strong regions: for example, in the Chelyabinsk region the share of costs decreased from 6.08% to 1.6%, in the Sverdlovsk region - from 2.16% to 2.08%. At the same time, relatively weaker regions in this macro-zone (Orenburg Region and the Republic of Bashkortostan) increased their indicators from 1.4% to 2.8% and from 0.9% to 2.1%, respectively. In general, despite the pulling up of outsiders, the general background of the macro-zone in this parameter is unfavourable. The opposite trend is observed in terms of the "number of personnel engaged in research and development". Here the growth of the position of all regions is recorded.

Table 5: Fragment of assessment of sigma convergence of macro zones of alternative cases

Macro zone (reference region	Indicators	GRP per capita, million rubles		Costs for technological innovation of small enterprises, % to GRP		The number of personnel engaged in scientific research and development per 10,000 people		Volume of innovative products,% to GRP		Coefficient of innovative activity	
		2010	2017	2010	2017	2010	2017	2010	2017	2010	2017
Lipetsk region	Average value of the indicator for the macro-zone	158	↑**210**	2.4	↓1.7	0.13	↓0.12	5.4	↑**7.5**	7.2	↑**8.7**
	σ-convergence by macro-zone, %	17	14	155	58	81	71	67	47	33	52
Krasnoyarsk territory	Average value of the indicator for the macro-zone	254	↑**292**	0.66	↑**1.18**	0.14	↑**0.14**	0.87	↑**1.83**	8.2	↓5.6
	σ-convergence by macro-zone,%	84	93	4	25	31	32	20	39	54	55

(Source: compiled by the authors)

*Legend** The values of indicators for which convergence within the macro-zone is observed are highlighted in grey. Indicators are highlighted in bold, the average values of which have increased in the macro zone*

In the Lipetsk region the convergence in terms of GRP and the volume of innovative products was caused by an improvement in the position of the weaker regions of the macro-zone, while in terms of costs for technological innovation and the size of the population involved in research and development, the alignment of the innovation space is achieved in by reducing the parameters of strong regions.

The carried out qualitative and quantitative assessments of the intraregional and spatial characteristics (density and homogeneity, as well as connectivity) of the innovative development of regions allowed us to build a system innovation profile for each reference region.

Such an innovation profile includes integral indices of conditions and effectiveness of innovative development of the supporting and bordering regions; aggregated indices of spatial parameters of subjects of macro zones; indicators of connectivity (gravity) between the reference and border regions for innovative indicators. An analysis of the systemic innovation profiles of the Chelyabinsk, Lipetsk, Vologda regions and the Krasnoyarsk Territory showed that the subjects of the Russian Federation of the same sectoral orientation may find themselves in a different spatial environment.

Table 6: Qualitative characteristics of innovative development of macro-zone in regions

Macro-zone	Reference region/boarder region of the macro-zones	Region positions		Indicators for assessing the force of gravity				
				Economic			Innovative	
		According to the basic classification (intra-regional factors)	Rank by space parameters	Investments	GRP	volume of manufacturing	volume of products of high-tech and knowledge-intensive industries	volume of innovative goods, works and services
I	**Chelyabinsk region (reference region)**	III	Q1 - 10	Favorable type of spatial environment. Priority partner - Sverdlovsk region				
	Sverdlovsk region	II	Q1 - 7	1 545 759	70 113 790	7 672 552	3 316 663	485 982
	Republic of Bashkortostan	II	Q1 - 15	320 342	10 881 743	1 087 075	573 511	65 542
	Kurgan region	IV	Q4 - 58	63 310	3 771 494	282 244	211 807	6 717
	Orenburg region	IV	Q3 - 37	64 710	1 952 438	92 354	46 812	4 229
II	**Lipetsk region (reference region)**	II	Q1 - 17	Favorable type of spatial environment. Priority partner - Voronezh region				
	Voronezh region	II	Q1 - 9	2 544 350	27 139 359	1 486 314	646 297	129 117
	Kursk region	II	Q2 - 31	119 328	1 602 921	113 679	34 940	15 913
	Oryol region	IV	Q3 - 45	71 948	1 234 697	86 105	29 403	1 043
	Ryazan region	II	Q2 - 28	126 308	2 556 904	306 256	74 743	17 872
	Tambov region	III	Q2 - 26	867 907	8 212 347	397 987	167 630	44 886
	Tula region	II	Q1 - 13	214 726	3 246 957	527 072	96 961	59 860
III	**Vologda region (reference region)**	IV	Q4 -56	Favorable type of spatial environment. Priority partner - Yaroslavl region				
	Kostroma region	IV	Q4 -62	38 998	1 098 648	99 205	36 570	3 398
	Tver region	III	Q2 -35	52 730	738 803	50 667	28 800	680
	Yaroslavl region	II	Q1 -16	315 178	6 895 833	719 884	331 414	22 105
	Republic of Karelia	IV	Q4 -65	19 423	434 030	27 947	11 357	34
	without Nenets Autonomous Okrug	IV	Q3 -47	25 735	405 648	41 574	20 867	3 029
	Leningrad region	III	Q2 -33	108 838	1 144 193	129 473	34 623	919
	Novgorod region	II	Q3 -50	26 066	364 326	53 996	17 963	355
	Kirov region	II	Q3 -52	11 126	217 201	24 330	10 400	336
IV	**Krasnoyarsk territory (reference region)**	II	Q4 -55	Unfavorable type of spatial environment. Priority partner - Kemerovo region				
	Khanty–Mansi Autonomous Okrug – Yugra	no data	no data	59 608	1 017 184	7 665	8 715	168
	Yamalo-Nenets Autonomous Okrug	no data	no data	36 541	376 069	1 889	1 790	-
	Tuva Republic	IV	Q4 -72	6 585	174 240	492	6 090	6
	Republic of Khakassia	IV	Q4 -66	59 697	2 324 387	145 971	47 734	384
	Irkutsk region	III	Q3 -54	102 885	2 031 387	75 905	44 479	536
	Kemerovo region	IV	Q2 -36	318 880	7 010 845	314 801	141 114	3 933
	Tomsk region	II	Q3 -46	122 350	2 839 807	91 845	81 105	4 967
	Sakha (Yakutia) Republic	IV	Q4 -69	9 194	97 434	337	1 564	35

(Source: compiled by the authors)

Table 6 presents a summary characteristic of the systemic innovation profiles of macro-zones. The most promising partners are identified for each region. It turned out that the greatest potential connectivity is observed between

regions with a higher aggregated index of innovative development of regions in terms of spatial parameters, that is, the rank within quartiles.

Taking into account the statuses of the selected subjects of the Russian Federation, similar types of innovation space were identified according to the innovative profile of the region, which include: Lipetsk (typological group II according to the basic classification and Q1 - according to spatial parameters) and Voronezh (II, Q1) regions, Chelyabinsk (III, Q1) and Sverdlovsk (II, Q1) regions. The regions that are polar in terms of innovative development are also highlighted, where one region can be a potential donor of innovations, the other - a recipient. The latter type includes pairs of the Vologda (IV, Q4) and Yaroslavl (II, Q1) regions, the Krasnoyarsk territory (II, Q4) and the Kemerovo (IV, Q2) region, where there is a different type of interaction in the innovation sphere.

Accordingly, each region, depending on the innovative status and the level of innovative development of border territories, has additional incentives for innovative dynamics. So, in a macro-zone with the presence of pairs of regions with a high level of innovative conditions and performance, both partnerships and competitive interregional relationships can develop.

In the macro-zone, where the supporting and promising counterparty (one of the regions is a pronounced dominant), there is a high risk of resource flow from strong regions to weak ones. Decomposition of data on the weak and strong characteristics of each region of the macro-zone, both in terms of resource opportunities, innovative returns, and the availability of competencies, can serve as additional information for organizational decisions of the authorities.

Within the framework of this study, potentially possible directions of interregional innovative interaction were modelled and the case of the "Chelyabinsk - Sverdlovsk" region was considered (Table 6). Comparison of indicators showed that researchers and innovators of the Sverdlovsk region have higher parameters and strong positions than in the Chelyabinsk region, and technological production in the economy of the Chelyabinsk region has the best values in terms of the provision of material resources with insignificant differences in information conditions. As you can see from the Table 6, each region may be of interest for enhancing interregional cooperation, it is promising to include links of the innovation system of a neighbouring region, if their characteristics are better than the parameters of the region under consideration (in Table 7 they are highlighted in bold). Potential directions of interregional innovative interaction in a pair of regions of the Sverdlovsk (S) – Chelyabinsk region (Ch) are highlighted.

Table 7: Characteristics of the interregional innovation process

Chelyabinsk region III group, rank IP – 10 $I_{cond} = 0{,}321$, $I_{perform} = 0{,}160$	**Group Indices**	**Functional Roles**	**Interaction Areas**	**Functional Roles**	**Group Indices**	**Sverdlovsk region** II group, rank IP – 7 $I_{cond} = \mathbf{0{,}365}$, $I_{perform} = \mathbf{0{,}241}$
	$I_e = 0{,}309$ $I_r = 0{,}157$	Stakeholders	←	Stakeholders	$\mathbf{I_e = 0{,}396}$ $\mathbf{I_r = 0{,}216}$	
	$I_s = 0{,}459$ $I_h = 0{,}239$	Investigators	← ↔	Investigators	$\mathbf{I_s = 0{,}490}$ $\mathbf{I_h = 0{,}311}$	
	$I_f = 0{,}116$ $I_d = 0{,}164$	Innovators	←	Innovators	$\mathbf{I_f = 0{,}155}$ $\mathbf{I_d = 0{,}269}$	
	$\mathbf{I_m = 0{,}390}$ $I_i = 0{,}708$	Technological production	→ ↔	Technological production	$I_m = 0{,}354$ $\mathbf{I_i = 0{,}716}$	

(Source: compiled by the authors)

Legend:
← – inclusion of subjects of the Sverdlovsk region in the innovation system of the Chelyabinsk region
→ – inclusion of the subjects of the Chelyabinsk region in the innovation system of the Sverdlovsk region
↔ – cooperation

Conclusion

The use of a spatial approach to assessing the innovative development of regions made it possible to draw attention to additional reserves for stimulating the innovative dynamics of territories. Quite often, regions implement projects and innovations with a similar industry theme, which, in cooperation, would contribute to saving resources and increase the innovative return. A distinctive feature of the proposed approach from existing research is the ability to identify key points of spatial growth (cores, centres of space*) (Rumyantsev, 2015)* and the use of information about the systemic innovation profile in the economic space of the Russian Federation.

The proposed and tested methodological approach allows identifying the features of macro-zones, to develop a set of measures, adapted for a specific region, for regional authorities to enhance innovation dynamics. Strengthening inter-regional connectivity in the innovation sphere will eliminate the dilution of resources, duplication of functions, increase the efficiency of the use of innovation infrastructure, inter-production cooperation, which will help to intensify innovation diffusion processes, reduce the uneven development of the Russian regions, and create a single innovation space for the country.

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The Phenomenon of Students' Work Precarisation In an International Perspective. A Comparative Analysis of Work Experience of Polish, Czech And Slovak Academic Youth

Piotr CZAKON

University of Silesia, Katowice, Poland
pczakon@us.edu.pl

Abstract

This paper presents some quantitative data from research among Polish, Czech and Slovak academic youth. One of the main aims of the project was to establish to what extend work experience of students from three adjacent countries has been marked by the burden of precariousness. To answer this question roughly one thousand students from selected seats of learning were surveyed in 2018. Based on the findings, six main categories of working students were distinguished. As it turns out, there are significant discrepancies between work evaluation and precarisation experience among employees representing different segments of the labour market. The awareness of those differences can be seen as a crucial premise for shaping state economic policies.

Keywords: precarious work, work values, academic youth.

Introduction

The issue of young people coping with the reality of work is now recognised as one of the most important problems of collective life in many countries. The process of introducing younger generations to professional duties is fundamental by its very nature as it is associated with ensuring intergenerational continuity of social structures. However, the above issue has gained additional importance in the face of the increasing economic globalization, work automation (Fleming 2018; Therborn 2013) as well as the consequences of the financial crisis of 2008 (Santamaria 2019).

The young adults' category representatives (aged 20 - 35) are particularly exposed to difficulties in finding employment (Standing 2011). Unlike people from older age cohorts, they are less connected with the world of work, do not have many years of experience and do not function within the bodies of staff representation. Many of them, due to problems with employee activation, face the need to undertake multiple internships and work placements (Hunt 2020). Statistics from 2018 suggested that the percentage of unemployed young people (aged 20-29) in Poland, the Czech Republic and Slovakia is slightly (Slovakia: 9.9%; Poland: 7.3%) or significantly lower (Czech Republic: 3.9%) compared to the EU (EU average: 10.6%). At the same time, the group of young people (aged 20-29) ready to take up a job, but unable to get it, in the three mentioned countries is at a higher level than measures covering the majority of working-age persons (aged 20-64 – Poland: 7.3%; Czech Republic: 3.9%; Slovakia: 9.9%) (Eurostat 2018).

Based on the academic literature, it can be assumed that students constitute a special subcategory of adult youth. Their situation is defined by the concept of structural 'abeyance': 1) between the social position of their parents and their own social position; 2) between the social position they aspire to and the social position they will manage to attain; 3) between higher positions in the society, which are to constitute a kind of gain on higher education, and the peripheral labour market, as a position resulting from failure to fulfil life aspirations. Furthermore, it can be stated that in many respects of their characteristics, academic youth fits the approach to the notion of precariat proposed by Standing. First, it is about experiencing deficits related to coping with the reality of work, which may cause significant negative consequences – a sense of anomie, fear, alienation (Standing 2011).

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Based on work centrality and topicality of the problems related to it, the author carried out a study in 2018. Its aim was to determine to what extent the work experience of young people studying from Poland, the Czech Republic and Slovakia is marked by uncertainty and short-term nature. For comparative purposes, the research project covered representatives of selected centres from Poland (Upper Silesian Industrial District), the Czech Republic (Olomouc, Ostrava) and Slovakia (Nitra). Due to the limited space, this paper focuses only on a part of the broader issues raised in the study.

The aim of the paper is to describe the extent to which representatives of Polish, Czech and Slovak student employees are subject to the phenomenon of work precarisation. In the following sections, the subject matter of work precarisation will be defined and its operational aspects will be indicated. The obtained results will be presented broken down by national comparisons and lists of student employee groups. Finally, at the end of the paper, a model for classifying student employee groups broken down by their work experience will be proposed.

Literature Review

The latest scientific discourse about work includes various analyses from optimistic through balanced to fundamentally pessimistic. Among the comments of the first type, a special place is occupied by those which equate the post-industrial stage of economic development with an increase in creativity and innovation (Florida 2002). The academic literature also deals with many analytical viewpoints that, to an almost equal extent, perceive the potential of new dimensions of work, which indicates their possible shortcomings or refrain from clear assessment (Beck 1992; Castells 1996). Currently, voices stressing the negative aspects of the transformations of the work reality seem relatively broadly represented, i.e. less stability, increasing unemployment, degradation of the work ethic, ceasing to consider it as a factor shaping the permanent identity of individuals, breaking the linear relationship between the life trajectory and the career trajectory (Sennett 2000; Bauman 2005; Rifkin 1995; Klein 1999; Ford 2015).

In recent years, the status of probably the most important proposition to turn all negative social processes of labour transformation into one theoretical approach may be granted to Standing's concept of precariat. The above term – though rarely used since the 1980s by French and German researchers (Fink 2017) – gained prominence only in journalistic and scientific discussions on the social problems of societies affected by crisis. Standing, a British critic of globalization, successfully popularised this concept, demonstrating in his high-profile works that this term can be used to name a relatively recent and numerous category of people experiencing a number of deficits related to functioning in the real world of work. The title precariat is not allowed to gain permanent employment, social promotion, and professional identity. According to the author, this new class, existing in a state of permanent uncertainty, is a consequence of the post-industrial stage of social development – globalization, liberalization, greater flexibility of the labour market, and mainstreaming information technologies (Standing 2011). Although we should not take an entirely uncritical view of all his theses, the conceptual scope made popular by him is operationalised into an analytical framework (Szarfenberg 2016).

Precarious work can be defined as an activity devoid of social importance, which, although undertaken in order to satisfy someone's essential needs, does not lead to their fulfilment or allows their sufficient fulfilment for an individual. Precarious work does not allow an individual to permanently define their place in the social structure, nor are ethical norms and values applicable to it. Precarious work does not meet the needs in economic and cultural dimensions. On the one hand, it means low earnings forcing precarious worker to benefit from the support of others. On the other, precarious work has no prospects of self-development, training, or professionalism described by Richard Sennett (2000). The short-term, revolving nature of precarious work, on the other hand, excludes its determining function in working out individual's stand in society – building a permanent identification with a professional group and developing social promotion plans based on its performance. Life trajectories and work trajectories are independent of each other. Ultimately, work that takes a precarious form is devoid of an ethical dimension. This is due to its short duration and low compliance with the education of the people who perform it, which prompts them to consider such jobs as only something temporary – according to the 'no long term' principle.

Methodology

The empirical analysis presented in the paper is based on the author's own research, which was carried out between October 2017 and June 2018 in three out of four countries of the Visegrad Group. They were: Katowice, Poland (University of Silesia in Katowice, Silesian University of Technology, Medical University in Silesia, University of Economics in Katowice); Olomouc, the Czech Republic (Palacký University Olomouc); Ostrava, the Czech Republic (Technical University of Ostrava, University of Ostrava); Nitra, Slovakia (Slovak University of Agriculture in Nitra, Constantine the Philosopher University in Nitra).

In the project, the author used a questionnaire which was carried out in a form of a classroom survey among the academic youth completing their Bachelor and Master programmes in five main scientific disciplines: social sciences, humanities, economics, medical sciences and science. The questionnaire, consisting of several dozen of questions, was translated into Slovak and Czech, and then distributed by the researcher in the academic centres considered in the study. 313 questionnaires were completed in Poland, 304 in the Czech Republic, and 315 in Slovakia (932 in total).

Although the mentioned research tool consisted of four parts and dealt with the issues of objectified information about student work experience, its assessment, employee aspirations and socio-cultural capital, in this paper I will focus only on those questionnaire parameters that were directly subordinated to the problem of work precarisation. These were, in turn: 1) high assessment of job compliance with the field of study; 2) assessment of the job as a career stage; 3) high assessment of the social respect attributed to the job; 4) high assessment of job development; 5) high assessment of job prospects; 6) high assessment of job social importance; 7) assessment of job as too tiring.

Results

At least a temporary episode of work has been widespread among the respondents. Nine out of ten representatives of Czech (88.2%) and Slovak (90.2%) academic youth declared that in the last two years they had earned their living for a little while. In the case of Polish students, the experience of any work during the considered period was slightly less common, as it concerned eight out of ten respondents (79.2%). The relationship between nationality and the economic activation of students described here is confirmed by the statistical relationship test (V = 0,137).

There are similarities and differences in the number of individual occupational categories between the three compared national groups. The table below (Table 1) contains an original proposal of grouping the jobs performed by students, which loosely refers to the classification of professions recognised in sociology (EGP). I propose to describe the student professional structure as a configuration of six basic categories:

- Work based on specialist skills, i.e. intellectual qualifications acquired in the course of studies (e.g. teacher, tutor, researcher, programmer, logistician, quality controller, accountant);
- Office work, understood as less advanced intellectual jobs not necessarily related to the field of study (e.g. office assistant, call-centre consultant, customer service specialist, administrative employee);
- Work in catering sector (e.g. waiter, bartender, cafe service, fast-food service);
- Work in store sales (e.g. cashier, shop assistant);
- Work in services (e.g. guide, animator, receptionist, bank consultant);
- Work in manufacturing and manual jobs (e.g. production line worker, fitter, cleaner, merchandiser, security guard).

On the one hand, in the Polish, Czech and Slovak survey sample, the following categories had double-digit results: work in sales (Slovakia: 15.7%; Czech Republic: 20%; Poland: 24.6%), work in catering sector (Slovakia : 22%; Czech Republic: 21.6%; Poland: 17.4%;); work in manufacturing and manual jobs (Slovakia: 19.6%; Czech

Republic: 19.9%; Poland: 25.0%;) and work based on specialist skills (Slovakia: 23.6%; Czech Republic: 18%; Poland : 17.4%;). Thus, highly intellectually advanced jobs that derive from the 'hard' skills acquired in the course of studies are present in the experience of a minority group of students – 17 - 23 per cent of respondents depending on the country.

On the other hand, we can see that the percentages of the leading categories are not the same in the different national subgroups. The structure of students in Poland in relation to the other countries included is least marked by the profile of specialist jobs (Slovakia: 23.6%; Czech Republic: 18.0%; Poland: 17.4%), and they mostly occupy positions in sales (Slovakia: 15.7%; Czech Republic: 20.0%; Poland: 24.6%) and manufacturing (Slovakia: 19.6%; Czech Republic: 14.5%; Poland: 25.0%). Among Slovak youth studying relatively more often than among Czech or Polish students, we can find both specialist employees and those earning in catering sector. The Czech respondents, compared to their Polish and Slovak counterparts, have the highest percentage of service workers (Poland: 7.6%; Czech Republic: 17.6%; Slovakia: 9.1%), and the least numerous group of people earning in manufacturing and manual posts. The substantive discrepancy between the national order and the number of different employee groups is justified by the results of the chi square test (a comparison significant at $p < 0.05$) and the strength of the relationship between the variables (V = 0,175).

Students who belong to the identified employee categories consider their paid jobs differently – both in terms of their compliance with the educational path, coherence with the career vision, and the values pursued thanks to them. In order to summarise the most important results, a table has been prepared that contains the parameters of the previously developed simplified model of student precarious work (Table 2). The sub-items in the table below relate to the issue of work convergence with skills, the perception of its social usefulness and respect, and the assessment of development prospects. It turns out that within the mentioned aspects, representatives of specialist jobs clearly stand out positively in relation to the rest of the employee groups. Not only do the overwhelming majority of them highly assess their job compliance with the field of study (Slovakia: 76.7%; Czech Republic: 68.2%; Poland: 68.3%), but the vast majority of them also consider their work in terms of building a professional career (Slovakia: 70.0%; Czech Republic: 72.7%; Poland: 68.3%). What additionally distinguishes specialist employees is a significant percentage of declarations in favour of a high job assessment, both in terms of its perceived social importance (Slovakia: 51.7%; Czech Republic: 61.4%; Poland: 82.9%), social respect (Slovakia : 48.3%; Czech Republic: 61.4%; Poland: 56.1%), development (Slovakia: 71.7%; Czech Republic: 75.0%; Poland: 73.2%) and job prospects (Slovakia: 61.7%; Czech Republic: 60.5%; Poland: 58.5%;). There are certainly larger discrepancies between specialist employees from the three countries considered within some parameters. For example, Slovak specialists are a little less favourable towards social respect and the social importance of their job. Polish representatives of the category in question are characterised by a diametrically higher proportion of responses in relation to the job assessment as too tiring (Slovakia: 37.0%; Czech Republic: 38.5%; Poland: 70.3%;). However, the above discrepancies do not negate the general tendency, which indicates that, in almost all the analysed aspects, specialist employees stand out positively against the other categories.

Table 1: Classification of currently/recently performed jobs (by country and in %)

Country / Activity	Poland	Czech Republic	Slovakia
Specialist work	17.4	18.0	23.6
Office work	6.4	3.3	7.5
Work in catering sector	17.4	21.6	22.0
Work in sales	24.6	20.0	15.7
Work in services	7.6	17.6	9.1
Work in manufacturing and manual jobs	25.0	14.5	19.6

Source: Own studies; N respondents = 248 [PL]; 268 [CZ]; 284 [SK]. Measure of cross-correlation between variables are significant at $p < 0.05$; Cramer V = 0,175. Note: Data sum up in columns. The data do not add up to 100% due to the omission of the 'other professions' category.

In contrast, let us now look at the data characterising the work experience of those students who work in manufacturing and manual jobs. Not only do they rarely find a link between their paid occupation and the field of study (Slovakia: 12.0%; Czech Republic: 8.6%; Poland: 16.9%), but also rarely perceive their job as part of their professional career (Slovakia: 10 , 0%; Czech Republic: 11.4%; Poland: 15.3%). Furthermore, it was the group of students in manufacturing and manual jobs who relatively least frequently awarded high scores both in terms of the assumed social respect (Slovakia: 28.6%; Czech Republic: 22.9%; Poland: 27.1%) and social importance (Slovakia : 32.7%; Czech Republic: 23.5%; Poland: 27.1%), job prospects (Slovakia: 24.5%; Czech Republic: 22.9%; Poland: 13.6%) and its development value (Slovakia: 32.7%; Czech Republic: 34.8%; Poland: 23.7%).

The declarations of students employed in the catering sector show a similarly unattractive picture of employee experience. It turns out that the least frequently among all the groups covered, they perceive the link between their job and education (Poland: 2.4%; Czech Republic: 3.8%; Slovakia: 8.9%) and look at their job as a career stage (Poland: 4, 9%; Czech Republic: 13.2%; Slovakia: 12.5%). In Poland and the Czech Republic, a high percentage of them earn little (Poland: 26.8%; Czech Republic: 38.5%; Slovakia: 12.5%). In all three analysed countries, as many as six out of ten consider their job to be too tiring (Slovakia: 66.0%; Czech Republic: 59.6%; Poland: 67.6%). At the same time, however, it should be noted that catering employees have a more positive opinion on the parameter of social importance of their job than their colleagues working in manufacturing (Slovakia: 41.4%; Czech Republic: 41.5%; Poland: 31.7%).

Up to this point, three employee groups have been described, whose perception of earning experience sets two extreme limits of the model described here. There is a wide analytical space between the student specialist employees, who assess their job relatively best, and the students working in manufacturing, manual and catering jobs who have relatively the worst opinions about their work. This is a wide analytical space containing the other three employee segments identified in the study, namely: office workers, sales workers and service workers. While the contrasting properties of the first three reported groups allowed for their easy classification, the position of the other three categories is not so easy and clear to establish.

Office workers often see a link between their paid jobs and higher education (Slovakia: 21.1%; Czech Republic: 50.0%; Poland: 53.3%) and the chosen career path (Slovakia: 47.4%; Czech Republic: 75.0%; Poland: 53.3%). Compared to other groups of employees, a relatively low percentage of them say that their job is too tiring (Slovakia: 44.4%; Czech Republic: 33.3%; Poland: 14.3%) and are less enthusiastic than specialist employees when considering the parameters of social respect (Slovakia: 47.4%; Czech Republic: 37.5%; Poland: 46.7%) and the job importance (Slovakia: 52.6%; Czech Republic: 37.5%; Poland: 33.3%). A similar pattern also appears in the case of Czech and Slovak service workers. They often see the coherence of work with studies (Slovakia: 39.1%; Czech Republic: 40.5%) as well as career plans (Slovakia: 31.8%; Czech Republic: 41.5%). They rarely consider their job as too tiring (Slovakia: 17.4%; Czech Republic: 23.7%). However, less often than the previously described employee groups, they declare that they find social respect in their job (Slovakia: 21.7%; Czech Republic: 31.0%).

The last of the student professional categories that appears in the submitted model consists of sales employees. In terms of low assessment of links with studies (Slovakia: 7.5%; Czech Republic: 10.4%; Poland: 6.9%) and occupational plans (Slovakia: 17.5%; Czech Republic: 6.3%; Poland: 15 , 5%), these employees are close to the previously described representatives of the catering, manufacturing and manual work sectors. Sales workers are also characterised by a low perception of the social respect attributed to their jobs – in case of Czech and Slovak students it is the lowest percentage of responses (Slovakia: 15.0%; Czech Republic: 10.6%;), even lower than in the service or manufacturing sectors. However, what distinguishes the reported category of sales employees from the previous two groups (catering and manufacturing) is a clearly lower proportion of responses in relation to the assessment of job as too tiring (Slovakia: 44.4%; Czech Republic: 41.9%; Poland: 40.4%).

Table 2: The employee category and selected work parameters (by country and employee category, in %)

Employee category and country / Parameter	Specialist workers			Office workers			Workers in catering sector			Sales workers			Service workers			Manufacturing and manual workers		
	SK	CZ	PL	SK	CZ	PL	SK	CZ	PL	SK	CZ	PL	SK	CZ	PL	SK	CZ	PL
High assessment of compliance with the field of study	76.7	68.2	68.3	21.1	50.0	53.3	8.9	3.8	2.4	7.5	10.4	6.9	39.1	40.5	5.6	12.0	8.6	16.9
Work assessed as a career stage	70.0	72.7	68.3	47.4	75.0	53.3	12.5	13.2	4.9	17.5	6.3	15.5	31.8	41.5	11.1	10.0	11.4	15.3
High assessment of social respect	48.3	61.4	56.1	47.4	37.5	46.7	16.1	15.4	22.0	15.0	10.6	32.8	21.7	31.0	38.9	28.6	22.9	27.1
High assessment of development possibilities	71.7	75.0	73.2	36.8	75.0	60.0	23.2	34.0	34.1	40.0	21.3	27.6	47.8	54.8	55.6	32.7	34.8	23.7
High assessment of job prospects	61.7	60.5	58.5	36.8	62.5	53.3	16.1	17.3	14.6	20.0	19.1	19.0	52.2	35.7	16.7	24.5	22.9	13.6
High assessment of social importance	51.7	61.4	82.9	52.6	37.5	33.3	41.4	41.5	31.7	20.0	25.5	24.1	26.1	45.2	61.1	32.7	23.5	27.1
Assessment of job as too tiring	37.0	38.5	70.3	44.4	33.3	14.3	66.0	59.6	67.6	44.4	41.9	40.4	17.4	23.7	31.3	65.3	51.5	52.1

Source: Own studies; N respondents = 248 [PL]; 268 [CZ]; 284 [SK]. Cross-correlation measure between variables are significant at $p < 0.05$. Note: in the case of the 'high rating' parameters, the variants of the answers 'definitely' and 'rather' agree were combined. The 'other occupations' category was not included in the list.

Table 3: The strength of the relationship between the variables of employee affiliation and selected operating parameters (by country, in V Cramer)

Employee category / Country	High assessment of compliance with the field of study	Work assessed as a career stage	High assessment of social respect	High assessment of development possibilities	High assessment of job prospects	High assessment of social importance	Assessment of job as too tiring
SK	0,451	0,395	0,261	0,276	0,300	0,196	0,325
CZ	0,438	0,411	0,301	0,301	0,279	0,213	0,250
PL	0,425	0,430	0,241	0,306	0,308	0,370	0,348

Source: Own studies; N respondents = 248 [PL]; 268 [CZ]; 284 [SK]. Cross-correlation measure between variables are significant at p <0.05.

Virtually, all the previously described discrepancies in the experience of individual student professional groups is confirmed in mathematical tests (Table 3). The strength of the relationship, expressed by the Cramer V coefficient, turns out to be the highest in the comparison of the employee category variable, which is of interest to us, with the variable for assessing job compliance with the field of study (Slovakia: V = 451; Czech Republic: V = 0,438; Poland: V = 0,425) and the variable for assessing job as a career stage (Slovakia: V = 0,395; Czech Republic: V = 0,411; Poland: V = 0,430). Not the lowest statistics of relationship strength were also demonstrated for the perception of job development (Slovakia: V = 0,276; Czech Republic: V = 0,301; Poland: V = 0,241), job perspective (Slovakia: V = 0,300; Czech Republic: V = 0,279; Poland: V = 0,308) and social respect (Slovakia: V = 0,261; Czech Republic: V = 0,301; Poland: V = 0,241). All this would once again constitute the conclusion that placement within a student employee group is a factor that determines the nature of work experience more significantly than national origin.

Conclusions

Considering the empirical data broken down by nationality, it should be noted that students from Polish centres assessed their work a bit more critically than their Czech and Slovak peers. They were less likely to find values in the paid employment (e.g. remuneration, sense of satisfaction, stability) and more often reported irregularities in the conditions of its performance (such as: unfair treatment, excessive burdening with duties, waiting for work in conditions that did not meet the health and safety rules). Interestingly, these observations would largely coincide with the observations of other research projects that indicated a worse image of work in the minds of Polish workers than German workers (Czarzasty, Trappmann, Mrozowicki, Andrzejczuk 2018).

The obtained data also allow for the preparation of a model for the classification of student experience as employees. It is based on the relationship between job assessment and the degree of its precarisation among respondents from various earnings categories.

First, there is a combination in which the lower experience of work precarisation is accompanied by a high assessment of its value. Students who fall into this category are engaged in specialist and service work. Thus, such intuitive assumptions are confirmed, which would indicate employment in line with the field of the (specialist) education being acquired as potentially the most attractive for students. Providing not only the best qualitative working conditions, but also highly rated, the most prospective in the context of the future career path (for most students, their jobs are a stage of conscious shaping of the employee path), and seem to be closest to the structural position of the wage earners. In the three countries considered, representatives of the analysed category who would fit into this earnings profile are between 20 and 30 per cent. In the context of the previous results, however, the privileged ranking of service jobs – such as a guide, animator, receptionist or bank consultant – may be somewhat puzzling. Only sometimes they are coherent with the field of university education and thus the respondents rarely consider them as an important stage in their professional career. Despite this fact, students often admit that their jobs represent important values and relatively rarely report meeting precarised working conditions. This employment category covers over a dozen per cent of students included in the study (the highest proportion in the Czech centres).

The second segment of the model combines lower work precarisation with low assessment of its value. Such a paradox concerns only one small category of employees (about 5% of the respondents) – students who work the office employment sector (e.g. office help, administrative employee). The search for the reasons for such a state of affairs appears to be a valid premise for further research. Referring to the information obtained so far and remaining within the framework of preliminary guesses, some possible explanations could be indicated. Students who are office workers relatively often fall into in the casual employment profile (based the data obtained, it was over 45% of cases).

Within the third segment, there are several categories of employees, representing a total of approximately half of the surveyed student population. Work in sales, manufacturing, catering and simple manual jobs mean more exposure to precarious conditions and a lower assessment of the value of the paid job. Common features of all these jobs are: low association with higher education, not considering them as part of the planned employee path, and less frequent recognition of social respect and job importance.

Discussion

Identification of employee groups more exposed to precarious employment conditions is a valuable contribution to the discussion on the relationship between the education system and the employment market. In the academic literature, Poland is located closer to the liberal model of economic relations – with a small role of the state, the dominant role of general education and not very advanced vocational education. Such a state of affairs would not be harmful if it were complemented by high expenditure on research and development (Jasiecki 2013). The Czech Republic and Slovakia, on the other hand, are shown as those countries that have adapted to a greater extent the elements of the dual educational model – resulting in broader cooperation between the state and employers in education (e.g. through internship and work placement programmes). The results of own research presented in the paper would suggest that access to specialist education consistent with education – even during the studies – may be a deciding factor in shaping future employees' lives.

The current economic crisis opens up to new reflection on the results and conclusions presented in the paper. It is not yet certain what percentage of student jobs (both non-specialist and specialist) will be reduced in the face of a sharp economic slowdown or how working conditions will change in jobs that will be maintained. In the long-term perspective, hypotheses can be put forward regarding the deepening of the qualitative division between specialist and non-specialist student jobs, or even the permanent closure of the latter jobs within the precarious segment of the employment market. The answer to these issues will be found not until the years to come and in subsequent empirical research.

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Measuring Achievement Motivation as A Useful Tool to Identify Individual Sources of Coping with A Study Load

Ivana NEKVAPILOVA
University of Defence, Brno, Czech Republic, ivana.nekvapilova@unob.cz

Jolana FEDORKOVA
University of Defence, Brno, Czech Republic, jolana.fedorkova@unob.cz

Zdeněk MIKULKA
University of Defence, Brno, Czech Republic, zdenek.mikulka@unob.cz

Eva JIROUSKOVA
University of Defence, Brno, Czech Republic, eva.jirouskova@unob.cz

Abstract

Research on coping with a study load at civilian universities has confirmed that students choose both positive and negative coping strategies. However, an important factor that leads to achieving success in coping with the study load is the performance of an individual and his ability to remain in it – his achievement motivation. A standardized questionnaire tool has been developed to measure achievement motivation – the Achievement Motivation Inventory (AMI / the original German abbreviation is LMI), which has so far been used in the field of human resources rather than for the purposes of determining the prerequisites for coping with a study load. The article presents the results of the research into the structure and sources of motivation to perform professionally in the first-year students of the military type of study at military university in the economic and management focus obtained through this questionnaire. The results of each questionnaire were first processed manually in accordance with the standard evaluation procedure and then in Excel. Using a sample of 128 students, it has been proven that in probands, contrary to expectations, the sources of motivation, which are more related to the social conditions of the profession such as status orientation or dominance outweigh those, which are associated with the necessary personality traits to cope with the study load, such as perseverance, commitment, willingness to learn, independence, self-control and purposefulness. The results obtained are used by a military educational institution to tackle the problem of reducing prematurely terminated studies. At the same time, they are the first probe into the determination of motivation to perform in members of generation Z in tertiary education in the Czech Republic. The questionnaire can be recommended as one of the tools that suitably complements the set of diagnostic techniques for examining the student's ability to cope with the demands of the study and allows preventive measures against early school leaving to focus on more precisely. The findings are part of the solution of a specific research project entitled Experience of Foreign Military Universities wit Early Termination of Studies (SV19-FVL-K104-FED).

Keywords: motivation, development, study, achievement / performance, load.

Introduction

In today's society, graduation from university has become a necessary condition for the entry into a number of fields. Even if higher education in European and many non-European countries is far more accessible to a wide range of people than ever before, it has been facing the problem of a large number of prematurely terminated studies for a relatively long time. Just as civilian universities at home and abroad, Czech military higher education,

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represented by a single university – the University of Defence in Brno – seeks to increase the number of successfully completed studies through a number of measures and thus satisfy the demanding requirements of military practice. We can conclude that the benefits associated with the military profession and studies at a state university are no longer strong enough reasons for members of the current young generation to complete their studies.

As the experience of civilian universities shows, the measures taken to reduce the dropout rate introduced by the school should have the desired effect on students. The school should examine the problem of unfinished studies comprehensively and in depth, in a planned and targeted manner using the knowledge and possibilities of individual approaches to the problem, i.e. administrative, sociological and psychological, or their effective combination (Fedorková, Nekvapilová, 2020). If the measures to reduce the dropout rate are to be effective, it is necessary to know not only the individual reasons, but especially their connections, which ultimately lead to the dropout, and also know how the student's attitude to school and study develops – all this not only in general parameters of the population, but especially in relation to a specific educational institution, field and a specific group (year) of students (Fedorková, Nekvapilová, 2020). *"Prematurely terminated studies are the result of specific aspects of an individual´s characteristics, his family, school and education system only if these aspects have influenced long-term negative attitudes towards school and study"* (Knotová et al., 2014).

To strengthen the socio-psychological approach to the investigation of prematurely terminated studies at the University of Defence, a specific research project entitled Experience of Foreign Military Universities with Early Termination of Studies (SV19-FVL-K104-FED) has been implemented since 2019. In connection with its solution, several partial studies have already been created. In these studies, the following problems were gradually examined: operationalization of the concept of unfinished study, the records of approaches to researching the problem in general and especially in military higher education, the study load and the coping strategies in the first-year military students (Fedorková, Nekvapilová, 2020). They also showed that, as in previous sub-researches (Vlašín, 2015) coping with a study load it requires, among other things, a certain degree of perseverance, increased effort and the ability to maintain it in the long term. These are the parameters that characterize an individual's performance. It is, therefore, possible to believe that the knowledge of his achievement motivation as a factor in coping with the study load should contribute to clarify his way of managing the demands of study, especially in the dimensions of direction, intensity and stability of motivation. It is precisely the motivation that decides whether the student will be active in the study, will devote time and energy to the pursuit of understanding the problems and the acquisition of skills, will strengthen his will to overcome the obstacles that the study load presents to him.

The aim of this article is to present the results of an achievement motivation research using standardized tools – the Achievement Motivation Inventory – LMI (Schuler, Prochaska, 2003), which were prepared in favour of already mentioned specific research in successful defended student´s work within the competition of student´s creative activities. The goal of this research was to find out whether the sources of motivation to perform professionally in the first-year students of the Faculty of Military Leadership at the University of Defence (UoD) in Brno outweigh those that are associated with the necessary personality traits to cope with the study load, such as perseverance, commitment, willingness to learn, independence, self-control, purposefulness or those related to the social conditions of the profession such as status orientation or dominance. The results obtained, together with the previous research, should primarily help predict the students' ability to cope with the demands of study and specify how to help; secondarily, they should identify how students are motivated to perform at work, which may affect the quality of other tasks, such as military duties and activities. In the conditions of the University of Defence, they can be used for all those who participate in education and training of military professionals, i.e. for teachers and mentors, commanders and personnel providing consultancy services.

Individual sources of coping with the study load and their measurement

The study load is usually defined by the number of teaching units and credits from the viewpoint of university, which are the same for all students in the field. According to numerous researches in the field of university study load, measuring the ability to master it simply by monitoring the number of completed credits and the length of time they have been acquired is proving to be completely insufficient. Measuring the ability to manage it simply by monitoring the number of credits completed and the length of time they have been earned is proving to be completely inadequate. Not only have they demonstrated a significant influence of institutional factors (Pospíšil et al., 2018) on managing the study load, but it is increasingly confirmed that a key element in the whole area is the

student with his natural individual abilities and characteristics, which inevitably manifest themselves in the management of the study load. The study load may has various intensity: from small deviations from the optimum, the equilibrium state, which are tackled by usual servomechanisms up to stress, which occurs only at a certain intensity of deviation from the optimum (Rumberger, Lim, 2008), and the management of which is often unpredictable due to individual personality traits. Each of the students, manages and experiences the demands of study differently. Precisely the research of individual factors of students, especially their personality traits, degree of resistance to stress, or strategies for coping with the study load, can provide the university with a lot of valuable information on whether and how its students are able to manage the demands of study.

Socio-psychological research on coping with the study demands also shows that the real ability to cope with the university study demands is significantly affected not only by the strategy of coping with the study load, but especially by the motivation of the individual and his approach to study as a certain type of achievement. Knowing the motivation (derived from the Latin word moveo, which means to move) allows an individual to find out what moves him, what leads him to certain activities. As the socio-psychological view of motivation shows: *"Motivation is an intrapsychically ongoing process, resulting in an internal state, a motive. A distinction must be made between the ultimate goal, which is again some kind of internal state, generally called satisfaction, and the means, by which that satisfaction is achieved"* (M. Nakonečný 2005), is the motivation a relatively complex construct, the individual elements of which and their mutual relations cannot be neglected in the measurement. This assumption is based on both foreign (Mahasneh, Alwan and Al-rawwad, 2020; Cokley, Bernard, Cunningham and Motoike, 2019; Mazumder, Dakeev, 2015), and national researches on the motivation to study looking for connections between study prerequisites and study abilities, character and academic motivation of university students (Vlk et al., 2017; Slezáčková, Bobková, 2014; Pavlas, 2015).

Motivation is significantly influenced by: a friendly environment, the approach of teachers, the composition of courses, relationships with classmates, awareness of career perspectives and many other circumstances (Fedorková, Nekvapilová, 2019). It is these conditions that can influence educational institutions without realizing their importance. On the other hand, the student himself must contribute to the institutional effort through his own education, willingness to change the aspects of motivation, learning strategies, his beliefs and approach. The process is based on knowledge – self-reflection of one's own behaviour in the sense of determining what needs to be changed and how to do it in the academic environment. Applying effective motivational strategies in learning is part of the process of improving one's academic behaviour and a path to graduation.

How the motives are realized, what the relationship between behaviour and its results is enables the research on performance to be understood. Performance means both behaviour and results. Behaviour comes or radiates from an executor and transforms performance from abstraction to action. Behaviour is not only a tool for achieving the results, but it is also a result in itself. It is a product of mental and physical effort used to perform tasks and can be assessed separately from the results (Sigmund, Kvintová, Šafář, 2014). Already H. A. Murray (2018) assigned the need for performance to the list of human needs. He explained this need as an urge to manipulate physical objects, people, or ideas; more specifically, to do something difficult, and if the result of this effort is positive, the individual has a sense of success. In the case of study, it is, e.g. learning for an exam, then the result is an excellent mark. Being successful and being recognized by others is the motivation of many people, but it is also associated with the fear of failure, which is sometimes frustrating. Thus, the strength of the performance motive is given by the relationship (Nakonečný, 1997) as follows:

$$\textit{strength of performance motive} = \frac{\textit{desire for success}}{\textit{fear of failure}}$$

This formula tells us that the greater the fear of failure, the smaller the motive to perform well. This is also related to the so-called level of aspiration, i.e. the level of demands that an individual lays on himself and that is associated with life success and failures. In order for an individual to perform successfully, he must be forced to overcome obstacles or to avoid them. He must be forced, especially in the realm of ambition (Murray, 2018). Achievement motivation continues to stem from a desire for success and a fear of failure. McClelland and Boyatzis (1982) distinguishes three basic needs, on which his theory is based. They are: the need for achievement, the need for affiliation and the need for power. The extent and the intensity measure of these needs occur differently in each person. For example, McClelland and Boyatzis found out that: *"successful managers have a high need for power and a lower need for the attainment of goals"* (Atkinson, Hilgard, 2000). Based on this, they concluded that the need for power also affected the degree of success. Researchers in the field of performance have come to the

conclusion that people who are very eager to satisfy the need for a successful performance are also characterized by the fact that the performance itself is authoritative for them, not just a reward that is conditioned by performance and is based on that performance. These people focus not only on the result (reward), but also on the path that leads to the result. Thus, their own performance becomes the main subject of their interest in the performance activity for these people, while people with a low need for a successful performance focus more on the reactions of their social environment and the end of result.

These findings are followed by the authors of the Questionnaire – (LMI) Achievement Motivation Inventory – H. Schuler and M. Prochaska (2003), which represents all relevant dimensions of the broad concept of achievement motivation or performance orientation related to the profession and also serves for the research of personality psychology. Achievement motivation is considered by the authors to be a global orientation of behaviour, in which various aspects of personality are involved. In their performance motivation research model, motives are sorted by model of achievement motivation research, including the ranking of motives according to the significance of their influence on the individual's final performance and on the area of activities that require his own initiative and activity (Schuler, Prochaska, 2003). They consider achievement motivation to be one of the most important signs for achieving professional success. Although the questionnaire has so far been used more by personnel officers in admission procedures or for individual consulting activities in the field of career development, it can be successfully used in other areas, as mentioned by the authors themselves (Schuler, Prochaska, 2003). It can be applied in the university environment as a useful tool to identify individual sources of coping with a study load, i.e. to determine the ability of an individual to manage the demands of study and to know his motivation to study as a certain type of performance.

The use of this questionnaire for research requires a more detailed explanation. The final version of the questionnaire consists of a total of 170 items that are assigned to 17 scales (dimensions). The total mean value of all 170 items is 4.55, with a minimum of 2.61 and a maximum of 6.32. The authors have included purposefulness and perseverance in central signs – the dimensions of achievement motivation, whereas **purposefulness** is characterized as a relationship to the future in terms of setting goals and high demands on what the individual wants to achieve and perform – personality development. **Perseverance** is understood as tenacity and the use of forces to handle tasks. People with high values are characterized by the fact that they work on their tasks with concentration, maintain a sufficient level of energy and are not distracted. The authors consider independence or status orientation to be marginal signs. **Independence** is a tendency towards autonomous behaviour and **status orientation** is described as an effort to achieve professional advancement, i.e. an important role in the social environment, hierarchy. Self-control and confidence in success are included in the theoretically related signs. **Self-control** refers to the way of organizing and performing tasks – not postponing duties, but concentrating on the task and discipline leading to the achievement of long-term goals. **Confidence in success** is associated with the overall self-confidence of the individual and describes the anticipation of the results of a certain behaviour with respect to the possibility of success, the use of abilities, skills and knowledge to achieve the goal.

The motivation model also contains the signs that can be integrated into the construct less easily: **Dominance** affects the tendency to exercise power, influence others and lead them. In cooperation, people with high values are strongly oriented towards others, take the initiative, convince with their actions and are willing to take full responsibility for others. **Commitment** thematizes the personal willingness to deliver performance, to expend the degree of effort and the amount of work done. Individuals with high values work a lot and the inactivity does them no good. **Flexibility** relates to the way we deal with new situations and challenges. It also means a willingness to change and the need for change. **Flow** indicates a tendency to deal with problems very intensively with the exclusion of all disturbing stimuli and with high concentration. **Fearlessness** describes the assumption of the result of the activity in a positive way with regard to the possibility of failure. People with high values are not afraid of failure or negative evaluation. They are powerful, they can work under time pressure, and they are emotionally stable and able to withstand stress. **Internality** is understood as an individual's belief in his own responsibility for the results of his activity. They feel responsibility for failure and poor performance. **Compensatory effort** is perceived as a personal effort to expend energy, resulting from a fear of failure. It is a constructive attitude that helps a person cope with failure; people with high values invest a lot of effort to avoid failure. **Pride in performance** is related to positive feelings associated with success. People with high values are satisfied if they deliver maximum performance or they increase it, however, they are easily controlled through their ambition and their self-esteem depends on performance. **Willingness to learn** refers to the effort to accept new knowledge – to expand one's knowledge. **Difficulty preference** means choosing the level of demands and risks in completing a

task. Individuals with high values prefer difficult questions and challenging tasks that require a high degree of dexterity. **Competitiveness** means a tendency to experience competition as an encouragement and motivation for professional performance.

A number of other foreign tools for diagnosing work motivation should be mentioned: Need Satisfaction Questionnaire (NSQ, 1961), Intrinsic Motivation Inventory (IMI, 1987), Basic Psychological Needs Scale (BPNS, 1996), Managing by Motivation Questionnaire (BPNS, 1996), MbM, 1996), Work Motivation Inventory (WMI, 2000), Management of Motiv Index (MII, 2000), Motivational Trait Questionnaire (MTQ, 2000), Motives, Values, Preferences Inventory (MVPI, 2001). A standardized *questionnaire of* achievement *motivation* (*D-M-V*, 1984) by T. Pardel, L. Maršalová and A. Hrabovská (Fedorková, Nekvapilová, 2019) has been used for measuring achievement *motivation, anxiety supporting achievement and anxiety inhibiting achievement*. In the Czech environment, self-constructed questionnaires (achievement motivation questionnaires) have also been used to research school achievement motivation of pupils and students, focused on e.g. the research of areas – the tendencies (efforts) to achieve successful performance and the tendencies to avoid failure (fears of failure).

Research of Achievement Motivation of University Students

Finding out the strength and structure of an individual's motivation to improve overall performance can help clarify the sources of achievement motivation for study, i.e. motivation to cope with the study demands, both in individuals and in study groups and then more accurately determine the circle of people and the way how to help them cope with the study load. This is the main starting point for implementing the research into achievement motivation in the first-year students of the University of Defence.

Research Methodology

The aim of the research is to find out whether the sources of motivation to perform professionally in the first-year students of the Faculty of Military Leadership at the University of Defence in Brno overweigh those that are associated with the necessary personality traits to cope with the study load, such as perseverance, commitment, willingness to learn, independence, self-control, purposefulness, or those that relate to the social conditions of the profession, such as status orientation or dominance. Respondents represent members of the Z generation. They are known to want to learn and develop their skills, but also to solve things their own way. It would therefore be possible to assume that their main sources of motivation are more internal – they are connected with personality qualities for coping with the study load - than external – connected with the social conditions of study. The main research question was based on this assumption: Do the sources of motivation that are associated with personality qualities for coping with the study load prevail over those that are related to social conditions?

For comprehensive finding of achievement motivation in the 1st year of study, a quantitative research design was chosen, aimed at determining the frequency of motivational factor occurrence in the year of study (raw scores). The research method used was a questioning method implemented through a standardized Achievement Motivation Inventory (Questionnaire) (LMI). The questionnaire was administered in groups according to particular platoons in compliance with the conditions of administration specified in the manual (Schuler, Prochaska, 2003).

The research sample consisted of the first-year students of the Faculty of Military Leadership at the University of Defence in the academic year 2018/2019, divided into eight platoons (groups). The questionnaire survey was launched in July 2019, in the summer semester, within the teaching of the subject Leadership. Out of the total number of 136 students, 128 respondents completed the questionnaire. The return was 94.1%. Due to the low representation of female students in the 1st year of study, no gender differences in motivation to perform were observed.

The evaluation of the questionnaires was carried out manually in accordance with the methodological instructions of the authors of the handbook (Schuler, Prochaska, 2003) and using evaluation templates for including statements in an appropriate scale, finding raw scores in the scales and the total raw motivation score. Respondents always answered separately and expressed the degree of agreement with each of the statements on the scale from 1 (I do not agree at all) to 7 (I completely agree). The answer on the numerical scale 1-7 represents the raw score of the item. The dominant dimensions of achievement motivation are determined based on the frequency of statements in individual dimensions. According to the established methodology, the numerical values of the test profile 8 and 9

express the dominant qualities (dimensions) of the student. Value 7 is an above-average value (characteristic), 4-6 are average values and 3-1 are below-average values.

Research Results

For practical use in pedagogical and counselling work with students, the results were compared according to particular platoons (groups). A partial finding is that the individual platoons in the 1st year of the Faculty of Military Leadership differ from one another in the main sources of motivation. In the case of the 1st platoon it is commitment, in the 2nd platoon the most significant dimension is purposefulness and in the 3rd platoon fearlessness prevails. The most significant dimension in the 4th platoon is purposefulness. In the 5th platoon, it is confidence in success, in the 6th platoon the same dimension dominates as in the 1st platoon and that is commitment. I n the 7th platoon the main source of motivation is competitiveness and in the 8th platoon it is strong purposefulness. An interesting finding is the results in the dimension of willingness to learn. In all platoons, this source of motivation had the lowest score. In the 1st and 3rd platoon, this dimension gained only 31 points. Immediately after the dimension of willingness to learn there is the dimension of flow, but it does not have as low score as the previous one.

Attention has also been paid to the individual frequencies of responses in all sources of motivation. The responses with the values of 4-6 points (average band) predominate in the dimension of perseverance – a total of 62 students range in this point limit. The values of 1-3 (below-average) and 4-6 for the dimension of dominance occur in 47 and 49 students; it can be said that the dominance in most students is at the average to the below-average level. In these students, the dimension of dominance does not predominate over other dimensions. The values for dominance are similar to the values for commitment. There is a surprising result for the dimension of confidence in success, where this characteristic is not significant in students, but rather achieves a below-average result. The flexibility dimension belongs to other dimensions that have the average and below-average level. The most significant negative result has been achieved by the dimension of willingness to learn; it is at a below-average level in 95 students. The dimension of willingness to learn is followed by the dimension of flow. The flow dimension does not achieve positive results and does not dominate in students. The results of fearlessness and internality dimensions are similar, the values range between 1-3 and 4-6. The level of compensatory effort dimension is average to below-average. As for the preferences of difficulty, independence and self-control, the results are almost identical, students are not significantly characterized by these abilities. In most students, status orientation prevails and the dimension of competitiveness is balanced. As for purposefulness, the result is almost similar as in competitiveness.

Figure 1 presents the global level of achievement motivation in a professional context. It illustrates, which three platoons dominate in the year. It is the 5th, 7th and 8th platoon. It can be assessed from the results that platoons with the values of 1-50 focus on the sources of motivation, which are related to social conditions – status orientation or dominance. In platoons with the values over 50, personality traits for coping with the study load prevail, i.e. perseverance, commitment, willingness to learn, independence, self-control and purposefulness. In this case, it is the 5th, 7th and 8th platoon, however, the differences are not too significant, when compared to the others.

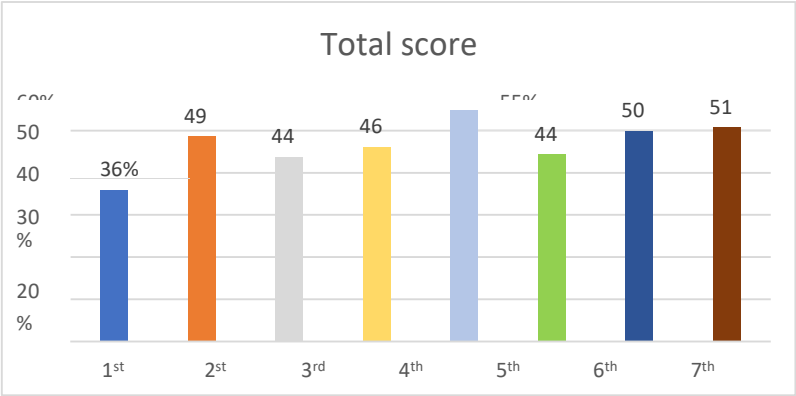

Fig. 1: Total score in the 1st year

Conclusion

The aim of the study has been fulfilled by implementing the research into achievement motivation in the first-year students of the Faculty of Military Leadership and by finding out the answer to the main research question. The results of the research show that in the dimensions of status orientation and competitiveness, the students achieved above-average values. In the dimensions that are important for personal coping with the study load, such as willingness to learn, perseverance, commitment and flexibility, below-average or average values were found out. The answer to the main research question is negative and the hypothesis that the sources of motivation for performance are internal rather than external among the respondents was not confirmed by the research. The sources of motivation associated with personality traits for coping with the study load do not prevail over those associated with social conditions. In the dimensions of status orientation and competitiveness, the results are above-average, in contrast to those that are associated with personality traits, where the results are below-average.

Further, it has resulted from the research into achievement motivation that the two most often below-average dimensions are willingness to learn and flow. The staff of the Department of Leadership carrying out the research has recommended the Faculty management the tools to help students accelerate these dimensions. For willingness to learn, it is appropriate to use a point system as a tool; students would receive points for completing the tasks, which would be evaluated by the Faculty management at the end of the academic year as a reward – in the form of awards and honour boards. The points would be included in the overall assessment of the student achievement. Based on the number of points, students would be divided into individual fields – specializations within the Army of the Czech Republic. In the flow dimension, strengthening education is a good tool for improving student achievement such as presentations, or meetings of specialized staff with students for the purpose of explaining the importance and ability to focus on learning, not doing things at the last minute, but being productive in the long run.

A warning was the finding, that in 14 out of 17 dimensions, which lead to achievement motivation as a prerequisite for coping with the study load, students are below-average, in rare cases they are average. These are the dimensions of perseverance, dominance, commitment, flexibility, flow, fearlessness, internality, compensatory effort, willingness to learn, preference for difficulty, independence and self-control. In two cases, i.e. status orientation and competitiveness, above-average results prevail. In the last dimension, which is purposefulness, all four numerical groups are equal, so it can be stated that in this dimension there are individuals who are not purposeful, but also those who set their goals high. However, the question is whether they can attain these goals through their achievement motivation. As a recommendation, the tools can be chosen, e.g. interactive lessons, where the laws of personality dimensions of achievement motivation are explained to students, further, how it is possible to develop them and then to excel in these dimensions and deliver great achievements. One of the possible ways for reducing the academic failure of military students is the monitoring of personality prerequisites and achievement motivation to study at the beginning of university studies and based on that a differentiated approach to working with students in the field of self-knowledge and the systematic development of their necessary personality dispositions.

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Analysis of The Relationship Between the Technological Potential of The Manufacturing Process and The Competitiveness of Products in The Metal Industry

Stanisław BORKOWSKI
Kielce University of Technology, Kielce, Poland, borkstanislaw@gmail.com

Sławomir LUŚCIŃSKI
Kielce University of Technology, Kielce, Poland,
luscinski@tu.kielce.pl

Izabela RUTKOWSKA
AGH University of Science and Technology, Kraków, Poland, irutkowska@agh.edu.pl

Abstract

The article presents the role and function of technology in the industry and the results of authors' research on the impact of the technological potential of manufacturing processes on the competitiveness of the product. The research was done by applying the original BOST© method developed by Borkowski on the principles of Toyota management implementation (toyotarsim). The research survey was conducted to production workers of 10 heavy industry enterprises located in the Silesian Voivodeship using the BOST© questionnaire. The methodological part of the article presents the BOST method and data analysis techniques. The importance of factors analysed in the BOST method and their impact on the competitiveness of products were determined through a well-documented extensive statistical analysis using a spreadsheet application that is an integral part of the BOST method.

Keywords: Toyotarsim, BOST method, technology, competitiveness.

Introduction

P. Love (1999), in his works, presents an opinion that technology is crucial and significantly influences strategic decisions made in the course of industry development. Technology and its changes affect the production economy, energy consumption, education level, etc. There is a common opinion that technology is a "flywheel" of development. The economic power of Japan and East Asian countries was built thanks to the consistent use and development of technology. Maintaining technological competitiveness allows entering global markets and contributes to increasing employment in manufacturing sectors. The issues of technology may seem to concern only industrial engineers and managers, people with excellent knowledge of technology. However, more and more often technology management is performed as part of the activities of non-technical managers, who are required to be aware of what technology is and the knowledge of its place in the entire area of science. Therefore, it appeared reasonable to read the literature in terms of understanding the essence of technology.

The textbook definition of technology is as follows: "*Technology is a science whose subject is the use of natural processes or the knowledge of craftsmanship. (...) Technology includes physical and mental processes by which the transformation of inputs into outputs occurs.*" According to P.Love, the aim of technology is complementary to science: *"The goal of science is to obtain general and publishable knowledge. In economic terms, scientific achievements become a public good. Technology, on the other hand, focuses on occasions, special problems or groups of problems. Their solution often brings proprietary knowledge of considerable value. The owners of such intellectual property share it only on a commercial basis.* "The encyclopaedic definition of technology says that it is an area of technology dedicated to developing and conducting, under certain conditions, most favourable processes for the production or processing of raw materials, semi-finished or finished products. The technology significantly influences human, as well as animal's, ability to control and adapt to their natural environments. The Dictionary of Foreign

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Expressions states that the term "*technology*" comes from the Greek words techne and logos (set, reason, etc.) and means "a method of transforming material goods into useful goods; also: knowledge about this process", the term is often confused with the name "*technique*". The same dictionary states that *technique* comes from the Greek word *techne* and means "*arts, crafts*" and "*all means and activities included in the scope of human activity related to the production of material goods*." Sometimes more attention is drawn to the fact that another, recently trendy English term "*know-how*" deserves the name "*technology*"; the dictionary explains it as "*the sum of technical and technological knowledge necessary to manufacture a specific product*".

The term "technology" may either be used generally or in specific areas; for example, construction technology, medical technology or information technology. There is a difficulty with the proper understanding of the term *technology* since it is often confused with the term *technique*, created by Stratton et al (2005). In German and other European languages (including Polish), there is a difference of meaning between "*technik*" and "*technologie*" which does not exist in English as both terms are usually translated as "*technology*". The French and German equivalents of "*technologie*" and "*gewerbekunde*" (literally: manufacturing science, craftsmanship) have similar origins. According to Schatzberg (2005), the English term "*technology*" not refers to the *science of technology* (i.e. technology), but to the *technique* itself. Terminological complexity gives unintentional ambiguity in translations as a result of the context and the person who uses the term. However, it is widely recognised that term *technology* describes a field of technical sciences dedicated to the study of production or processing methods.

Use of technology by human began by converting natural resources into simple tools. The prehistoric discovery of the fire control increased the availability of food sources; the invention of the wheel helped people to travel and monitor their environment. Technology affects society and its environment in many ways; has helped to develop a more advanced form of economies (including the globalisation of the economy) in many societies. Many technological processes generate undesirable by-products (pollutants) and lead to the depletion of natural resources with the detriment of the environment. Various implementations of technology influence society's value systems and new technologies often raise further ethical questions. The emergence of the concept of efficiency in terms of human performance is an excellent example of adoption a term initially only applied to machines. There are philosophical debates over the current and future use of technology in society, with disagreements over whether technology improves or worsens human life. Neo-luddism by Kirkpatrick and Spólny (2000), anarcho-primitivism of Jaworowski (2003) and similar movements criticise the omnipresence of technology in the modern world, believing that it harms the environment and distances people from themselves and nature.

Technology is one of the main factors determining the competitiveness of an organisation and the success of new production and service ventures, which makes it necessary to manage technology actively. The technological advantage of the enterprise, which is manifested in the development, implementation and application of new technologies for the production of innovative products, is the dominant factor in achieving a competitive advantage. The intensity of activities for the development of technology depends on the technological potential possessed by the organisation; the proficient use of which in everyday activities is conducive to technological progress (Łunarski, 2009).

Technology is strongly linked to competitiveness. The improvement of technology is dictated by the needs of the market and the pressures of competition - without improvement, one quickly loses the distance to the leaders. For these reasons, individual organisations launch unique motivational and organisational systems, the task of which is to increase the pace of improvement, its effectiveness, due to its particular usefulness for preventing natural destructive processes (wear, fatigue, corrosion, ageing, etc.) and the tendency to create chaos in systems without proper management.

Know-how improvements, new ideas for the use of available resources introduced in small steps (Kaizen) or milestones (innovations) almost directly translate into production efficiency, ergonomics of work in the process, and the competitiveness of the product itself. However, know-how is also management. It should be remembered that changes in management area are one of the most difficult, because they affect people, violate their habits, operating methods or cooperation systems. Therefore, it is necessary to continually introduce changes in the field of organisation, management, methods of motivation or problem-solving methods, as well as technology (Wiśniewska, 2014). According to Porter (2001), competitive advantage should be seen primarily in the ability to be innovative, to raise its level and thus obtain appropriate efficiency continually.

The World Bank and the International Monetary Fund emphasise that because of the ongoing trade liberalisation and "market opening", there is a positive and direct relationship between two variables, namely: competition and competitiveness. Meanwhile, in highly industrialised countries, literature is usually oriented towards gaining an advantage through lower prices and more efficient allocation. Competitiveness related to the freedom of trade is emphasised to a lesser extent, while the effects of antitrust policy on generating welfare are more strongly emphasised. However, whether in developed or developing countries, special attention is paid to the analysis of the relationship between competitiveness and innovation. Particular importance is attached to the importance of innovation in creating sustaining competitiveness. Technological competitiveness and the ability to compete in the distribution sphere are essential here. Currently, the ability to innovate has become an essential condition for achieving and maintaining sustainable competitiveness for every company and in every market, especially the global one (Wysokińska, 2013). One of the key factors increasing the competitiveness of an organisation is owning technology with the necessary features that competitors do not possess (Łunarski, 2009).

The Researched Companies

The research was conducted in a group of 10 companies from the metal industry operating in the Silesian Voivodeship; each company is identified in the article by using code name to preserve anonymity.

Enterprise M is a company operating mainly in the metal industry. Enterprise M can provide tooling facilities for manufacturing plants, which have press shops and use tooling up to 5000 kg. The company specialises in the production of tooling for plastic treatment. It produces wood and wood-based materials elements as part of its activity in the field of casting models.

The company M1 is a dynamically developing company in the fastener industry. The company provides solutions with the use of fasteners and fastening systems from leading domestic and foreign producers. The product range of the M1 company is used in many industries. The recipients are large industrial and commercial companies, as well as individual customers. The company is continuously working on expanding and improving its offer, putting the welfare and satisfaction of their customers first. The basic offer of the company includes fasteners manufactured according to domestic and foreign standards. Years of experience and professionalism in the field of fasteners are the advantages of the M1 company.

Enterprise M1 is a production, service and trade enterprise. It is one of the leading and recognised Polish companies producing steel screens from corrugated wires and meshes. The high position in the industry has been achieved through many years of experience in the field of steel screen production.

The M2 company provides complete service in the field of optimal product selection depending on the needs and taking into account individual requirements through production and offering the finished product. The high quality of our products, timely execution of orders and a short time of order execution are the advantages of M2 enterprise.

The priority is the continuous development of the company and individual products manufactured in it. The company cooperates with permanent suppliers to whom high requirements are set, by whom the company has no problems meeting the expectations of its customers. Competitiveness on the market also results from the reliability, honesty and integrity on which our company's operations are based.

For several years, the M3 company has been producing: screws, bolts for gutter clamps, double-threaded screws, metric pins, wall anchors, hooks, hex keys, rivets, screws and atypical fasteners for the construction, furniture and automotive industries. It also produces potting screws, bolts and pins made of all kinds of materials, including stainless, acid-resistant materials and in grades. It also performs galvanising of screw products and metal elements on pendants up to 3 meters long.

The M4 company offers processing of sheets, profiles and flat bars based on modern technologies. Operating both as a manufacturer and subcontractor, it increases the competitiveness and profitability of customers. It offers a comprehensive service from design, through production, to delivery logistics. It has a modern machine park and its own design office. Owing to the experienced staff, it guarantees short delivery times; serialisation adapted to the customer's needs and favourable prices combined with advantageous payment terms. The core competencies include the production of power cabinets, electrical and electronic enclosures, frames, frames, covers, cassettes, battery

shelves, containers, brackets and terminals - including component assembly. Concern for the environment is deeply embedded in the company. Based on partnership agreements, all standards for waste selection and waste disposal are fulfilled. 100% of the metal waste generated during production is recycled.

The M5 company is a producer of highly adjustable collars and metal containers for storage and transport. The company also manufactures many other metal products and structures according to entrusted or own documentation. The products are painted in various RAL colours and hot-dip galvanised at the customer's request. In order to meet the needs of the market, the company is constantly expanding its existing assortment while ensuring competitive prices and favourable sales conditions. The fundamental goal of the company is to satisfy customer requirements and to execute orders on time.

Enterprise M6 specialises at the production of fasteners, which is carried out with the use of modern technologies, the method of plastic working and machining with the use of numerically controlled machines (CNC). The company's primary goal is to offer a wide range of high-quality fasteners. Equipping the control department with a specialised measuring microscope, which allows accurate checking of the geometry of the thread outline, and with a testing machine connected to the IT system, they enable the generation of test reports.

The M7 company specialises in metalworking, including turning, gear milling, grinding and machining. It produces elements according to the documentation provided by the customer or a pattern made of regular steel, quality steel, non-ferrous metal alloys or plastics. According to the recipient's wishes, it produces elements and ready-made components from entrusted or own material. The M7 company has been adapting to the needs of a changing market for many years. Introducing optimal technological solutions translates into lower production costs. The employees are qualified and experienced staff with competences confirmed by the authorisations and certificates.

The M8 company has over 30 years of experience in the design and production of special tools made of tungsten carbide as well as quality steel. It is one of the leading suppliers of special tools for many companies and concerns. It employs qualified staff with many years of experience in this industry. The company's products are manufactured on high-class machines using the highest-quality semi-finished products. The M8 company is equipped with high-class measuring instruments, required for the production of dies and tools on the particular order. The machine park is modernised continuously; therefore, the products are made in the shortest possible time while maintaining high accuracy. The M8 company has extensive experience in electrical discharge machining. Wire EDM is performed on high-class Japanese numerically controlled machines.

The M9 enterprise was established in 1990 with the Polish-origin capital. From the very beginning, the company was focused on dynamic development, and it remains valid all the time. This strategy enabled it to become currently one of the largest Polish producer of perforated sheets, expanded metal, wire mesh welded from round and profiled wires, industrial screens as well as structures and products containing screens. It continually invests in the latest equipment, educates employees and develops the production base. These activities allow us to constantly expand our offer and produce products with better and better parameters at more competitive prices. The company have its own design office and a very well-equipped tool room and machining department are additional advantages.

Research Methodology

The research survey was conducted to production workers of 10 heavy industry enterprises located in the Silesian Voivodeship using the BOST questionnaire. The total number of respondents was 342. The proposed research approach is qualitative, based on the case study method (cases are specific companies in the metal industry). BOST is the legally protected name of research method developed by Borkowski S. (2012a) on the principles of Toyota management implementation. The acronym BOST was created from the first two letters of the author's surname and the first name. The framework of the BOST method is based on the identification of sets factors related to each of 14 Toyota management rules. The number of factors in each set depends on the scope of the particular rule, and it varies from 4 to 10. Sets of factors are called areas. Some policies are divided into two or three areas. Toyota's management policies are divided into four divisions. The BOST survey has two versions: an employee version and a supervisor version. The employee version includes a set of factors that describe the rules: 1; 2; 3; 4; 6; 7; 14 and elements of the Toyota's house roof (quality, costs, lead time, safety, crew morale). The supervisor version contains a set of factors describing all Toyota management principles and elements of Toyota's house roof. The presented questionnaire has a ranking scale. The respondents are expected to assess the importance of each factor by using a numerical scale. The

BOST survey is successfully used both in manufacturing companies and service institutions (including banks, hospitals, schools, shops). The BOST questionnaire and method are the primary instruments in toyotarism by Borkowski S. (2019).

The BOST survey provides two types of variables. The independent (explanatory) variables are characterising the respondents. The results obtained in the research are classified into dependent variables. The characteristics of the independent variable in the BOST method are presented in the form of an array (Table1).

Table 1: Characteristics of the respondents. General characteristics

Symbol	Designation of features and their characteristics					
	MK	**WE**	**WI**	**SC**	**MR**	**TR**
1	Man	<Secondary	< 25	< 5	1	Normal
2	Woman	Secondary	26 -35	6 to 15	2	Transfer
3		Higher I	36 - 45	16 to 25	3	Finances
4		Higher II	46 - 50	26 to 30	4	
5			51 - 55	31 to 35	5	
6			56 - 60	36 to 40	6	
7			61 - 65	41 to 45		
8			> 65	> 45		

Source: Borkowski (2016a)

The structure of the map described by the technological possibilities and the competitiveness of the product gives information about the purposefulness of producing a given product. The map in this literature is called a 3x3 matrix. In the case of testing the importance of significance, the technological potential and competitiveness of a product, the scale of evaluation is determined by the literature; it is "9" because it is required by the subjective matrix (3x3). The output for the 3x3 matrix is obtained from the BOST survey. For instance, it is area E4b, where the following request is addressed to respondents:

E4b. On a scale of 1 to 9, evaluate the competitiveness of the product and the technological potential of the manufacturing process.
1 – small, 9 – large

TK		Product competitiveness
TW		Technological potential

The version of the 3x3 matrix used in the BOST method is presented in Fig. 1. In the original by Love P. (1999), the X-axis is represented by technological capabilities and the Y-axis by market position. In the presented research, the Y-axis represents the competitiveness of a product. For substantive reasons, the matrix zones are numbered from 1 to 9, in the circular version and additionally, the axes are marked with letter symbols. It follows from the name of the matrix itself that the adopted rating scale must be divisible by 3.

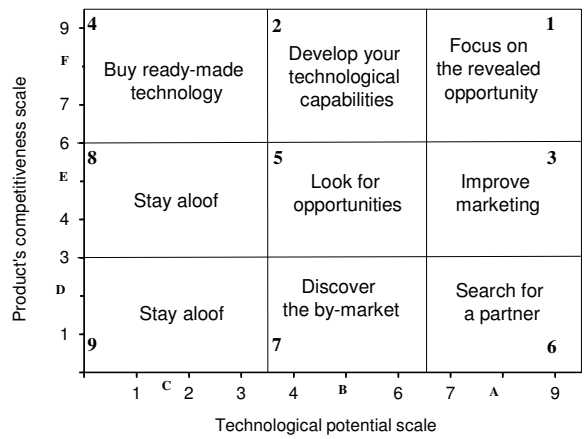

Fig. 1: General characteristics of matrix 3x3.

Source: Borkowski 2016a

For the statistical evaluation of the evaluation sets, parameters were defined which in some way determine the "centre" of a given sample, i.e. central tendency measures. These include averages of various kinds, the mode and the median. The arithmetic mean ($\bar{x}$) is calculated by adding all the values of the feature and dividing the obtained result by the number of units tested (n) (Koronacki, Mielniczuk, 2001). The dominant (D - mode, the most frequent value) is the value that occurs most often in the sample. The median (M - median value) of a set of n numbers of ascending order is:

- for an odd number n, the middle term of the sequence,
- for an even number n, the arithmetic mean of the two middle terms of the sequence.

The median plays a special role among quartiles; it is the second quartile that divides the community into two equal parts. Quartiles are positional measures of location, which divide the community into 4 equal parts, including $^{1}/_{4}$, i.e. 25% of units (Bielecka A., 2011). The comparison of the dominant, median and arithmetic mean gives the basis for the assessment of the accuracy of the rating set (Pulaska-Turin B., 2008):

$\bar{x}$ = D = M – symmetric distribution (1)

$\bar{x}$ > D > M– right-hand asymmetry (2) $\bar{x}$ < D < M – left-hand asymmetry (3)

Differentiation of Average Ratings

The non-parametric *Mann-Whitney U test* (which is a non-parametric equivalent of the Student's t-test) by Rabiej M. (2012) is used to compare the mean assessments of the importance of factors, due to its greatest power among the tests used to compare two independent groups. This test is also used because the available data (answers) are of the ordinal type (i.e. they can be ordered) and come from a group of independent (unrelated) measurements. The null hypothesis in this test assumes that the distributions of the studied variable in the analysed populations do not differ significantly (median ratings in the sectors compared). Due to the availability of a large research sample (n> 20), the Z test statistic for this test will be calculated. This statistic is a function of the sum of ranks and the sample size of (Rabiej M., 2012). The applied test statistic Z has the form of Więckowska B. (2016) (formula 2.2):

$$Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{n_1 n_2 (n_1+n_2+1)}{12} - \frac{n_1 n_2 \sum(t^3 - t)}{12(n_1+n_2)(n_1+n_2-1)}}} \quad (4)$$

where: U – test statistics for a small sample size, calculated according to the formula:

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \quad (5)$$

n_1, n_2 - sample size, R_1 - sum of ranks for the first sample, t - number of cases included in the combined rank; this is the arithmetic mean calculated from the successive natural numbers proposed for these values; the associated ranks are assigned to the repeated values of the variable (Więckowska B.. 2016).

The paper presents an assessment of the similarity of average ratings in terms of preferences. For this purpose, the Borkowski (2016) range scale was used, which is equivalent to the one comparative scale Borkowski and Knop (2014), the limit of similarity was 8% (Borkowski, 2020).

Due to having two sets of numbers, mathematical statistics measures can be applied to them, determining the correlations between the independent characteristics of the respondents and the importance of a given factor. Correlation analysis aim is to establish the existence of relationships between the variables and assess the strength and direction of these relationships (Maksimowicz-Ajchel , 2007), (Podgórski, 2010). The statistic, which describes the strength of the linear relationship between two variables, is the sample correlation coefficient (r). It takes values from the closed interval <-1; 1>. A value -1 indicates there is a perfect negative correlation and a value of 1 indicates a perfect positive correlation. A value 0 means no linear correlation. Correlation analysis makes it possible to determine whether there is a relationship between the studied features and what is its strength and direction. The calculated correlation coefficient will be compared with the critical coefficients for three levels: a = 0.05, a = 0.10, and = 0.20, taking into account the number of freedom. This analysis aim will be an assessment of the strength and direction of the relationship between the variables (Goryl et al, 2000).

Presentation of the survey results in terms of the importance of factors describing the 3x3 matrix

A study using the BOST Borkowski (2016b) method provided results from enterprises. To facilitate the reading of the distribution of factor scores in the analysed communities, they are presented in the form of a map superimposed on a 3x3 matrix (Fig.2). The 3x3 matrix allows us to determine the competitiveness of the product depending on the technological potential of the production process and allows concluding as to the direction of product development in the context of the technological potential.

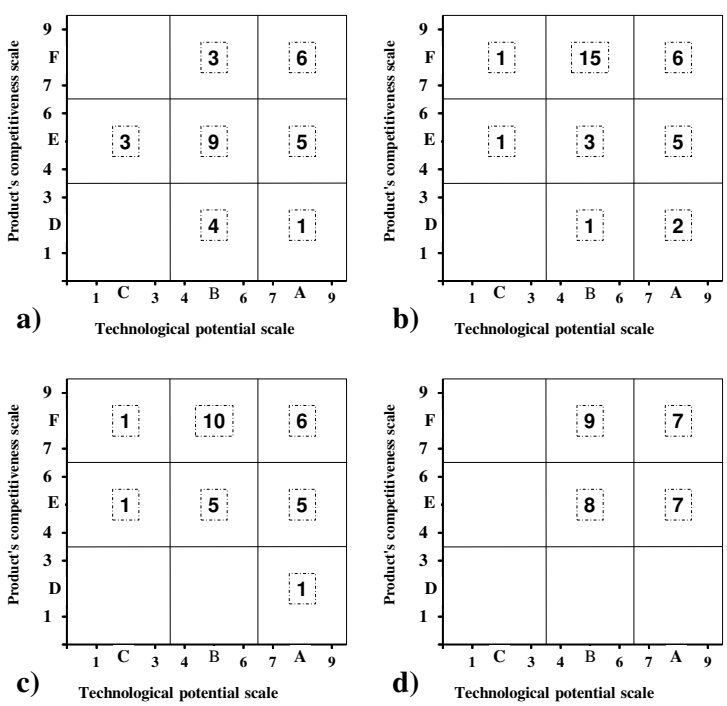

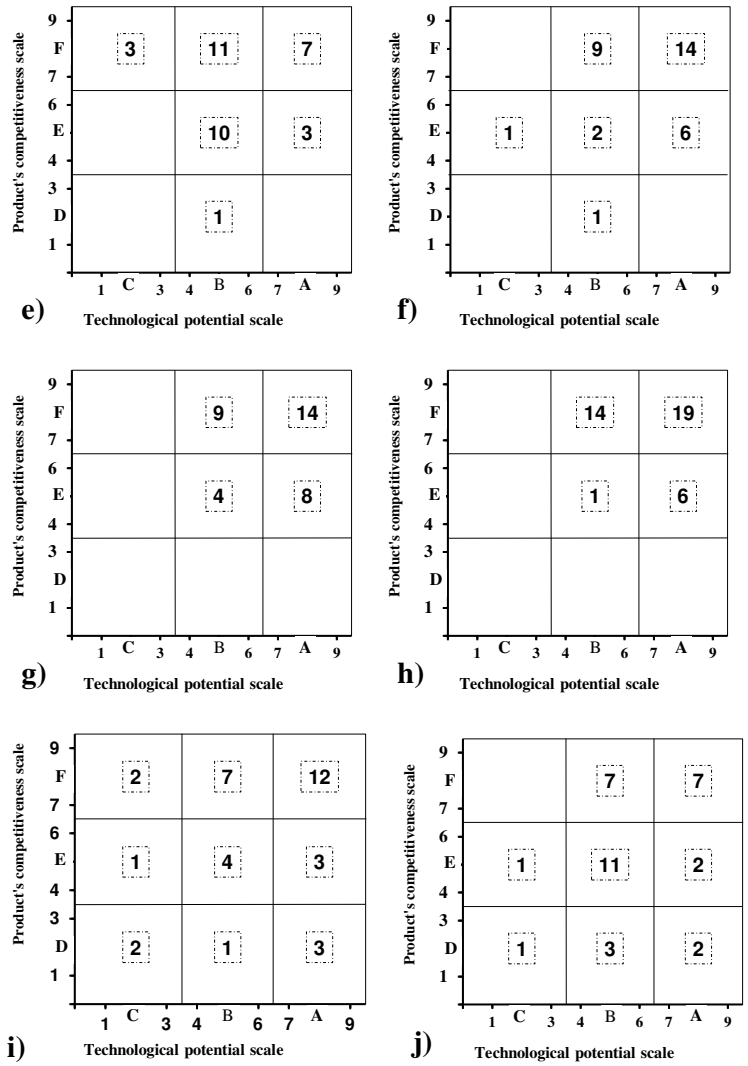

Fig. 2: Map of the number of pairs of ratings on 3x3 matrix, respectively for each company: a) M, b) M1, c) M2, d) M3, e) M4,f) M5, g) M6, h) M7, i) M8, j) M9.

Source: own study

Low ratings for a product's competitiveness can indicate poor production quality, as well as any other deficiencies, which indicate that the product is outdated in comparison to the products offered by competitors. Since production is carried out with the help of technology, it is possible to draw conclusions about the life stage of this technology based on this assessment. Well-known technology - widespread (in the peak phase of technology life) does not allow to produce a product "better" than the products of the competition. It is possible to achieve ratings of at most medium (4; 5; 6) or low (1; 2; 3). Achieving high marks (7; 8; 9) requires the use of a technology that is newer than the competition use. As production workers are rarely or not able to refer to marketing tools at all, their opinions can be the basis for management decisions.

The assessment of the technological potential of the manufacturing process relates to the technology owned by the enterprise, i.e. it covers the technology portfolio. Low portfolio scores mean that production is conducted with the use of standard technologies, and the need to manufacture some elements is outsourced to specialist companies. When assessing the average, the portfolio of technologies owned ensures that the requirements set by production are met,

and it keeps up with the competition. On the other hand, high marks prove that the company has such facilities that allow it to lead production in the latest technologies, outperforming the competition.

The data on Figure 2 show that the study involved: 31; 34; 29; 31; 35; 33; 35; 40; 35; 36 respondents from enterprises M, M1, M2, M3, M4, M5, M6, M7, M8, M9 respectively. The obtained assessments formed pairs of numbers which were distributed in all zones of the 3x3 matrix in one case (M8 enterprise), in eight - two enterprises (M1, M9), in seven - two enterprises (M, M2), in six - two enterprises (M4, M5), in four - three enterprises (M3, M6, M7). The characteristics of unused zones are as follows: zone A-D five times (enterprises: M3, M4, M5, M6, M7), zone B-D four times (enterprises: M2, M3, M6, M7), zone C-D eight times (M, M1, M2, M3, M4, M5, M6, M7), zone C-E four times (enterprises: M3, M4, M6, M7), zone C-F six times (M, M1, M2, M3, M4, M5, M6, M7). The comparison shows there were pairs of ratings in all ten cases in the zones A-E, A-F, B-E, B-F. These zones are characterised by high ratings of the importance of factors describing the axes of the 3x3 matrix. The consequence of the above list is the fact that four zones A-E, A-F, B-E, B-F determine the type of management decisions made regarding the technological potential and competitiveness of the product. Certainly, making a decision will help to determine the maximum number of pairs of ratings. It occurs in the following zones: A-F for four enterprises: M5, M6, M7, M8, B-F also for four enterprises: M1, M2, M3, M4, B-E for two enterprises: M and M9. It should be emphasised that the pairs of ratings from the A-F zone, the highest ones, indicate "Concentration of management activities on maintaining the existing state", there is actually use of the technological potential of the enterprise to obtain the highest competitiveness of the manufactured product. The location of the pairs of ratings in the B-F zone indicates the need to make management decisions in the enterprise in terms of greater use of technological potential. As it was shown in two enterprises, pairs of assessments were located in the central zone B - they were located in the central zone of the 3x3 matrix, forcing the enterprise to make decisions both in terms of improving the technological potential and increasing the competitiveness of the manufactured product, while it is supposed to "Look for opportunities" as to the order making decisions. The maximum number of pairs of ratings did not occur for zone A.

Statistical Analysis of The Obtained Evaluation Sets

Statistical analysis of the results from the BOST survey is based on comparison the value of the arithmetic mean with the dominant and the median to determine the skewness of the obtained sets of scores. The skewness assessment criterion is contained in the dependencies (1) - (3). The data for analysis are included in the figure. A comparison of the average ratings of the factors, characteristics of the dominants and medians will be presented first. The data on the left column of the figure indicates that in three enterprises (M, M8, M9) the average rating of the product competitiveness factor (TK) is lower than the average of the technological potential factor (TW). The lowest average score was the factor TK for enterprise M (5,39) and factor TW for enterprise M1 (5,79), while the highest for enterprise M7 (7,40) and enterprise M6 (6,89) corresponding to the factor TK, TW. Average scores were used to determine the zone on the 3x3 matrix. It was found that for the enterprises: M, M1, M2, M3, M4, M5, M6, M7, M8, M9, the zones are as follows: 9; 2; 2; 9; 2; 1; 1; 1; 9; 9 respectively. The compilation of this information shows there are three companies for which the arithmetic means are located in zone 1, the same amount in zone 2 and four in zone 9.

This chart differs from the 3x3 matrix zone chart according to the maximum number of votes. It is easy to notice that zone 2 has appeared, while zone 8 has disappeared, and the number of enterprises with zone 1 has decreased. The 3x3 matrix zone, based on the assessment of average factors describing its axes, may support the decision-making process in the enterprise. The analysis of the dominant value for the sets of assessments of the product competitiveness factor (TK) indicates that the rating 4 (M9) occurs only once, similarly the rating 5 (M), the rating 8 (M5) and the rating 9 (M6). In the remaining sets of ratings (six), the most common rating is 7. Regarding the median, the quantitative statement is as follows: one each has ratings: 5 (M), 6 (M9) and 8 (M5), in the remaining seven cases it is 7. As for the technological potential factor (TW), it should be noted that one time they occur as the dominant of the rating: 6 (M4), 8 (M7) and 9 (M8), three times the rating 7 (M1, M5, M6), in the remaining four cases, the score 5. Concerning the median, there are only two scores: 6 (in six cases) and 7 in the remaining four for the sets of enterprise scores (M5, M6, M7, M8). The analysis of the values: arithmetic mean, dominants, medians of the sets of factors assessments: product competitiveness (TK), technological potential (TW) present the following information:

- in three cases, the arithmetic mean of the sets of assessments for the product competitiveness factor (TK) is lower than the average of the sets of ratings for the technological potential factor (TW),

- the matrix zone determined on the basis of the arithmetic means of the TK and TW factors differ from the zones with the most scores,
- in the sets of assessments of the product competitiveness factor (TK), the most frequent assessment (dominant) is the grade 7 (the grades 5; 8; 9 are also dominant),
- the median of the sets of ratings for this factor is most often (seven times) described by the rating 7,
- the dominant feature of the set of ratings for the technological potential factor (TW) is usually (four times) the rating 5,
- assessment 6 of the set of assessments of the technological potential factor (TW) is the median in six cases,
- the dominant feature for the sets of product competitiveness assessments (TK) are the following assessments: 4; 5; 7; 8; 9 the median of 5; 6; 7; 8,
- while for the sets of assessments of the technological potential factor (TW) are the following ratings: 5; 6; 7; 8; 9 the median is only two ratings: 6; 7,
- the comparison of the above two statements shows that the number of ratings defining the dominant of the sets of ratings for both subjective factors is the same (the difference exists in the structure of ratings), in relation to the number determining the median, it is smaller in the case of the set of ratings for the factor technological potential (TW).

Returning to the skewness of the obtained sets of factor assessments, describing the 3x3 matrix, the following entries were obtained: $\bar{x}$ > D = M (2), $\bar{x}$ < D = M (6), $\bar{x}$ > D < M (1), $\bar{x}$ < D > M (1) in relation to the product competitiveness factor (TK). The summary of these dependencies for the sets of assessments of the technological potential factor (TW) indicates that the number of dependencies is as follows: : $\bar{x}$ < D = M (3), $\bar{x}$ > D < M (4), $\bar{x}$ < D > M (3). None of the entries corresponds to the formulas (1) - (3).

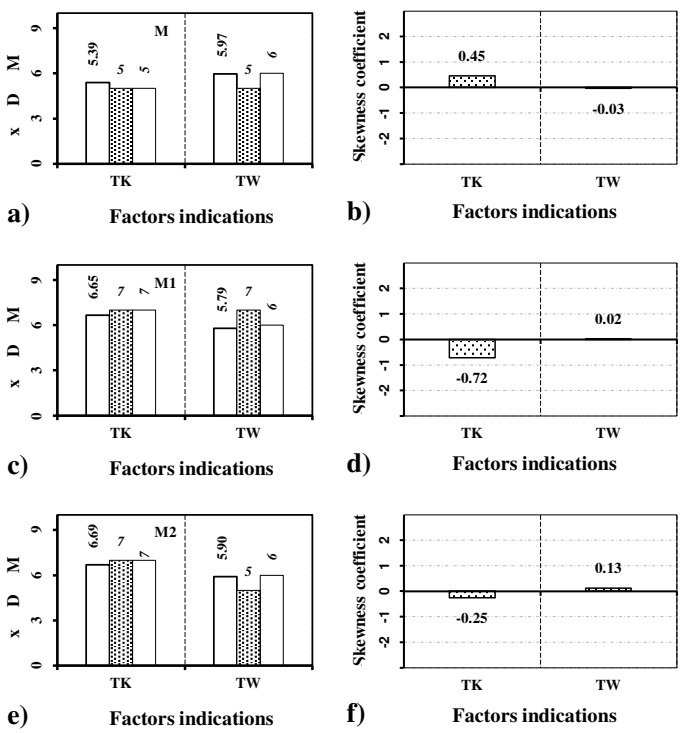

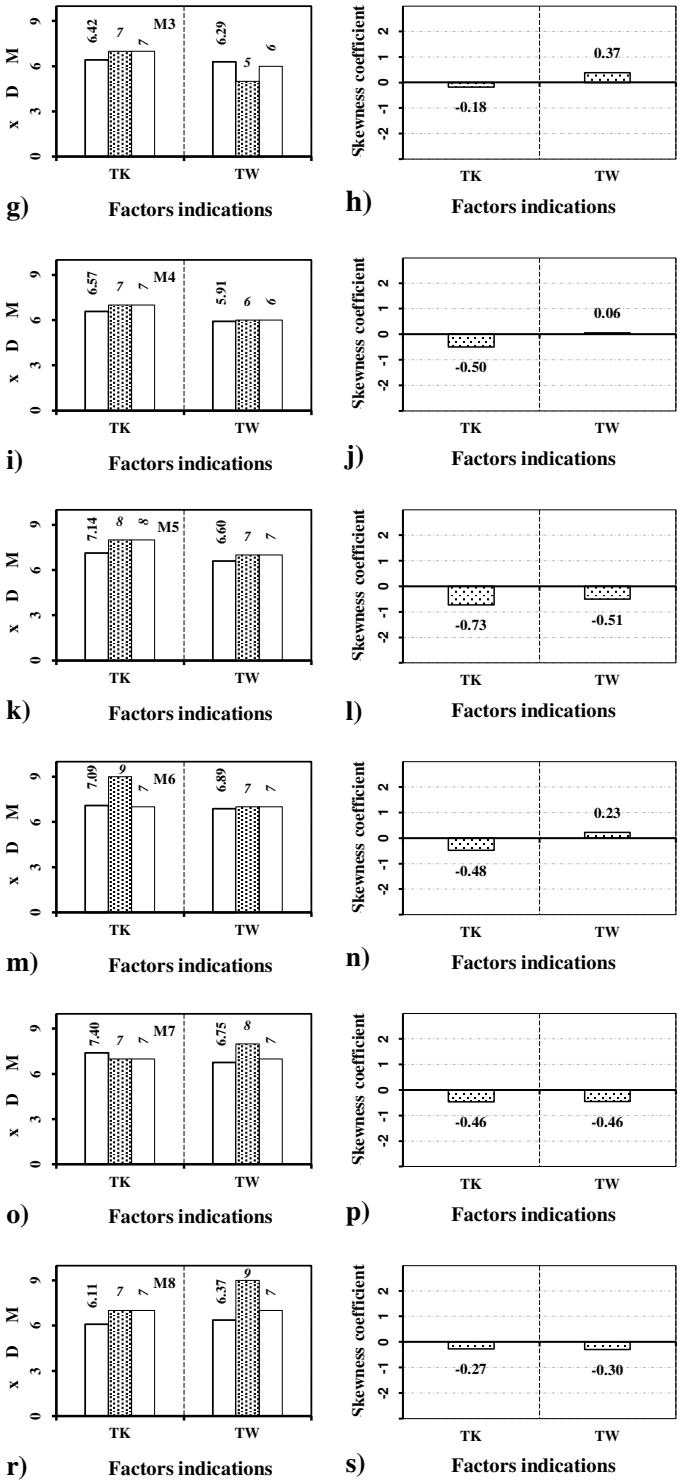
M3
6.42
7
7
6.29
5
6
M4
6.57
7
7
5.91
6
6
M5
7.14
8
8
6.60
7
7
M6
7.09
9
7
6.89
7
7
M7
7.40
7
7
6.75
8
7
M8
6.11
7
7
6.37
9
7
x D M
0 3 6 9
TK
TW
Factors indications
g)
h)
i)
j)
k)
l)
m)
n)
o)
p)
r)
s)
Skewness coefficient
-2 -1 0 1 2
-0.18
0.37
-0.50
0.06
-0.73
-0.51
-0.48
0.23
-0.46
-0.46
-0.27
-0.30

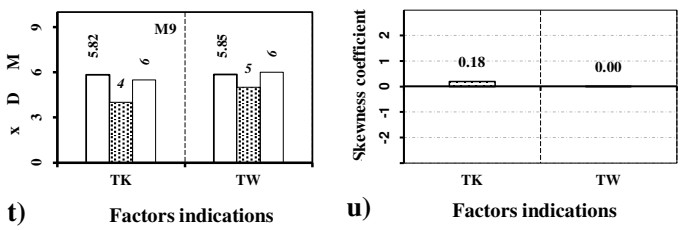

Fig. 3: Matrix 3x3-relationship analysis results for: $\bar{x}$; D; M.

Description: right column - skewness coefficients; left column- means, dominants, medians ($\bar{x}$; D; M) Fig. 3 sections applies respectively for each company: a), b) M, c), d) M1, e), f) M2, g), h) M3, i), j) M4, k), l) M5, m, n) M6, o), p) M7, r), s) M8, t), u) M9.

However, there is a certain similarity to the form of the mentioned formulas, namely: there are cases where the arithmetic mean is greater than the value of the dominant and cases, minorities - the dominant is equal to the median in both cases. In the case of the first statement, there is a reference to formula (2), the set of scores should have a right-hand skewness, while the second one refers to formula (3) and the set of scores should have a left-hand skewness. Verbal consultations with colleagues, working in statistics, confirmed the existence of other dependencies on the described formulas (1) - (3). In order to reliably determine skewness in such situations, the classic asymmetry coefficient should be calculated, which informs about the location of the obtained results relative to the average value (6):

$$W_A = \frac{\mu_3}{S^3(x)} \tag{6}$$

where:

W_a - classic asymmetry coefficient,

μ_3 - the third central moment calculated according to the formula (7):

$$\mu_3 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^3}{N} \tag{7}$$

Distributions can exhibit right (positive) skewness or left (negative) skewness. The strength of the asymmetry of the distribution can be determined on the basis of the skewness coefficient value as follows (Pulaska-Turyna. 2008):

- 0-0,4 - very weak asymmetry of the distribution,
- 0,4–0,8 - weak asymmetry of distribution,
- 0,8–1,2 - moderate asymmetry of the distribution,
- 1,2–1,6 - strong asymmetry of distribution,
- more than 1,6 - very strong asymmetry of distribution.

The results concerning the numerical value of the asymmetry coefficient (right column of the figure) indicate the existence of two right-skewed rating sets (M1, M9) and eight left-skewed rating sets for the product competitiveness factor (TK) rating sets. On the other hand, the sets of assessments of the factor technological potential (TW) have a right-hand skew in six cases, and left-hand skew in four cases. Descriptions of the histograms for the asymmetry coefficient indicate the strength of the asymmetry, and it falls into two groups: 0-0,4 and 0,4-0,8. The sets of assessments of the product competitiveness factor (TK) in six cases have weak distribution asymmetry, and the remaining four sets are characterised by very weak distribution asymmetry. Regarding the sets of assessments of the technological potential factor (TW), two cases of sets with a weak asymmetry of distribution were found (M5 and M7), the remaining eight sets are characterised by a very weak asymmetry of the distribution. Further analysis of the asymmetry factor indicates that there are four cases (M5, M7, M8, M9) for which the direction of the asymmetry of the evaluation sets is identical.

The evaluation values of average factors are compared: product competitiveness (TK), technological potential (TW), by answering the question, which factor's average is greater. The arithmetic means of the examined factors were used to define the zone of the 3x3 matrix. The sets of scores are used to determine the significance of the differentiation of

average scores and the correlation between them. Figure 4 shows the results, where the means differ significantly in 5 out of 10 cases, of which only 2 times (M1, M7) at the level of α = 0,05, also 2 times (M2, M4) at the level of α = 0,1 and once (M5) at the level of α = 0,2. The correlation between the assessments of the analysed factors occurs 6 times. At the level of α = 0,05 it occurs once (M), at the level of α = 0,1 the correlation appears 3 times (M1, M7, M9) and 2 times (M2, M8) at the level of α = 0,2. It should also be mentioned that in the case of M1, M2, M7 enterprises, the subjective factors have ratings and their means, showing statistically significant both relationships. However, for the data of enterprises: M3, M6, the mentioned relations are not found.

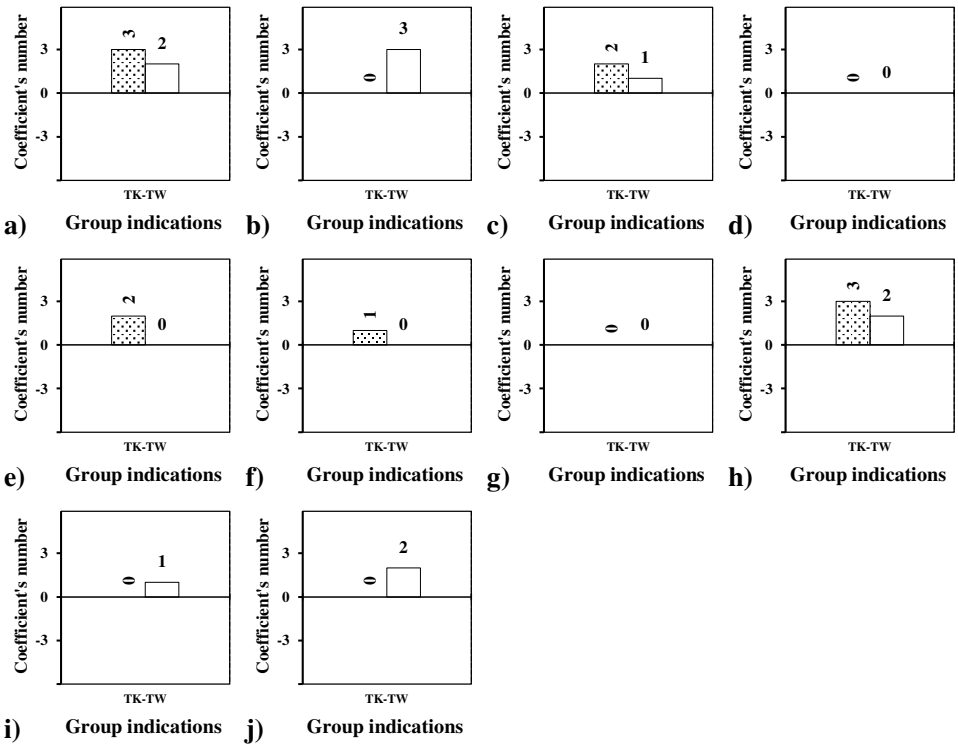

Fig. 4: Relations between the factors of the area E4b.Filled histogram - differentiation of means, empty histogram - correlation. Applicable companies: a) M, b) M1, c) M2, d) M3, e) M4, f) M5, g) M6, h) M7, i) M8, j) M9

Source: own study

Figure 5a shows the distribution of enterprises on the range axis for the product competitiveness factor (TK), while Figure 5b shows the structure of the distribution. The distribution on the range axis (Fig. 5a) of enterprises presents that there are two characteristic clusters of enterprises. In one of them, there are four enterprises (M3, M4, M1, M2), they are located in two zones of medium and high preferences. The product competitiveness factor (TK) in neighbouring enterprises is equally preferred because the distance between them is shorter than the criterion of 8% for 10 factors. More precisely, the interpretation of this cluster is as follows: the subjective TK factor in terms of preferences is similar to its preferences in both M3 and M1 enterprises. However, there is no similarity of this factor for M3 and M1 enterprises (the distance between them is 7,7 + 4 = 11,7 > 8). The product competitiveness factor (TK) in M1 is similarly preferred as in M4 and M2 instead. The second group of enterprises is in the highly preferred zone (80-100%).

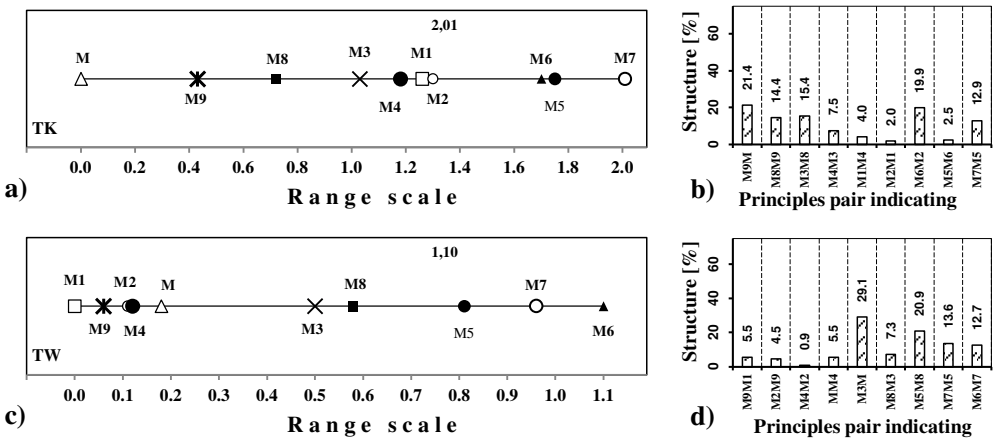

Fig. 5: Comparison of preferences of TK and TW factors in the surveyed enterprises. The left column of figures - distribution of companies on the range scale, right column - structure of the range scale. It concerns the following factors: a), b) product competitiveness (TK), c), d) technological potential of the manufacturing process (TW)

Source: own study

The preference of the technological potential factor (TW) in the examined enterprises (Fig. 5c) also shows two characteristic clusters of them. In one of them (in the low preference zone 0-20%) there are five enterprises: M1, M9, M2, M4, M. The least TW factor is preferred in M1, the preference in it is similar to the reference in M9. On the other hand, the preference in the M9 enterprise is similar to the preferences in the mentioned enterprise M1 and the following enterprises: M2, M4, because the sum of the distances M9-M2 (4,5), M2-M4 (0,9) is 5,4 <8%. The second group, consisting of two enterprises: M3, M8, is in the average preference zone (40-60%), in the mentioned enterprises, the TW factor is similarly preferred. When analysing enterprises in which the following factors: TK, TW are extremely preferred, it should be stated that the TK factor is the least preferred in enterprise M, while in this enterprise the TW factor is more appreciated (on the scale it took place with a coordinate of 16,4%). The most preferred factor of TK is in the M7 enterprise; also the factor of TK is highly preferred in it (it is located with the coordinate 87,3% on the scale), which is located in the highly preferred zone. TW factor is the least preferred in company M1, this preference is similar to the preference in company M9. As shown in Fig. 4a, in M1, the TK factor is strongly preferred. The TW factor is most preferred in the M6 enterprise; the respondents also strongly prefer the TK factor.

The resultant value of the ratings of factors: product competitiveness (TK), technological potential (TW), is the distribution of their pairs on the 3x3 matrix, which results in the percentage of placing these pairs in its individual zones. Results in the field of preferences of the respondents in four zones: (A-F) - focus on the revealed opportunity ("1"), (A-E) - improve marketing ("2"), (B-F) - develop your technological capabilities ("8"), (B-E) - look for opportunities ("9"), are shown in Fig. 5. A characteristic feature of the preferences of pairs of factors in zone "1" is the clustering of six enterprises on the 16,3% section of the range scale. In these enterprises: M1, M, M9, M4, M2, M3 the pair of factors TK and TW is poorly preferred. There is a case of similarity in terms of preferences of the factors TK and TW in four enterprises: M, M9, M4, M2, because the distance between enterprise M and M2 is 4,5% of the scale <8%, in the aforementioned group. As shown in Figure 5c, the percentage share of a pair of factors: TK, TW in zone "2" of the matrix, there is a grouping of five enterprises on the 20% range of the range scale, located in the 53% -73% range of this scale. Therefore, the analysed factors are moderately or strongly preferred in these enterprises. There are six cases (the most) in which factors are similar in neighbouring enterprises: TK, TW in terms of preferences. The distribution of enterprises for the data from the zone "8" of the 3x3 matrix differs from the data for the other zones of this matrix (Fig. 5e). Enterprises in which the respondents prefer several factors: TK, TW the least or the most, do not show similarity to preferences in other enterprises, because the distance to the "neighbour" is not less than 26.5% of the scale.

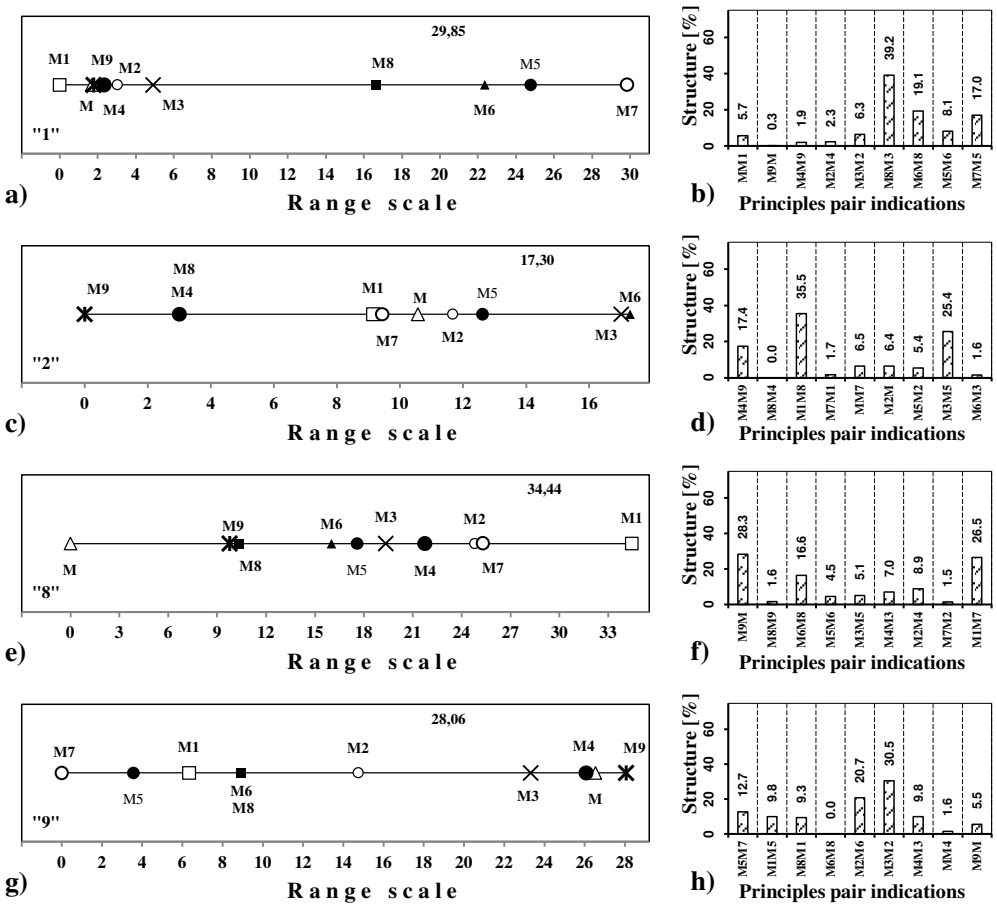

Fig. 6: Comparison of the preferences of the distribution of factors: TK, TW in selected zones of the 3x3 matrix. The left column of figures - the distribution of enterprises on the range scale, the right column - the structure of the range scale. Applies to the following zones: a), b) "1", c), d) "2", e), f) "8", g), h) "9".
Source: own study

Eight enterprises are spread over 45,2% of the scale, in this grouping there are five cases in which the factors are similar in terms of preferences, this applies to enterprises: M8-M9, M5-M6, M3-M5, M4-M3, M7-M2. Figure 5g contains data of the distribution of enterprises in terms of the percentages of pairs of factors: TK, TW in zone "9", middle matrix 3x3. It presents that there are five enterprises at the beginning of this scale, and four at the end of the scale. Almost in the middle part of the scale (51,5%) there is enterprise M2, in which the pair of factors: TK, TW does not show similarities in terms of preferences in neighbouring enterprises. There were three cases (the least) in which there is a similarity in terms of factor preferences: TK, TW and it concerns pairs of enterprises: M8-M6, M-M4, M9-M.

Influence of respondents' characteristics on the assessment of analysed factors

Figure 7 shows the results of the correlation analysis, the influence of respondents' characteristics on the importance of factors describing the 3x3 matrix.

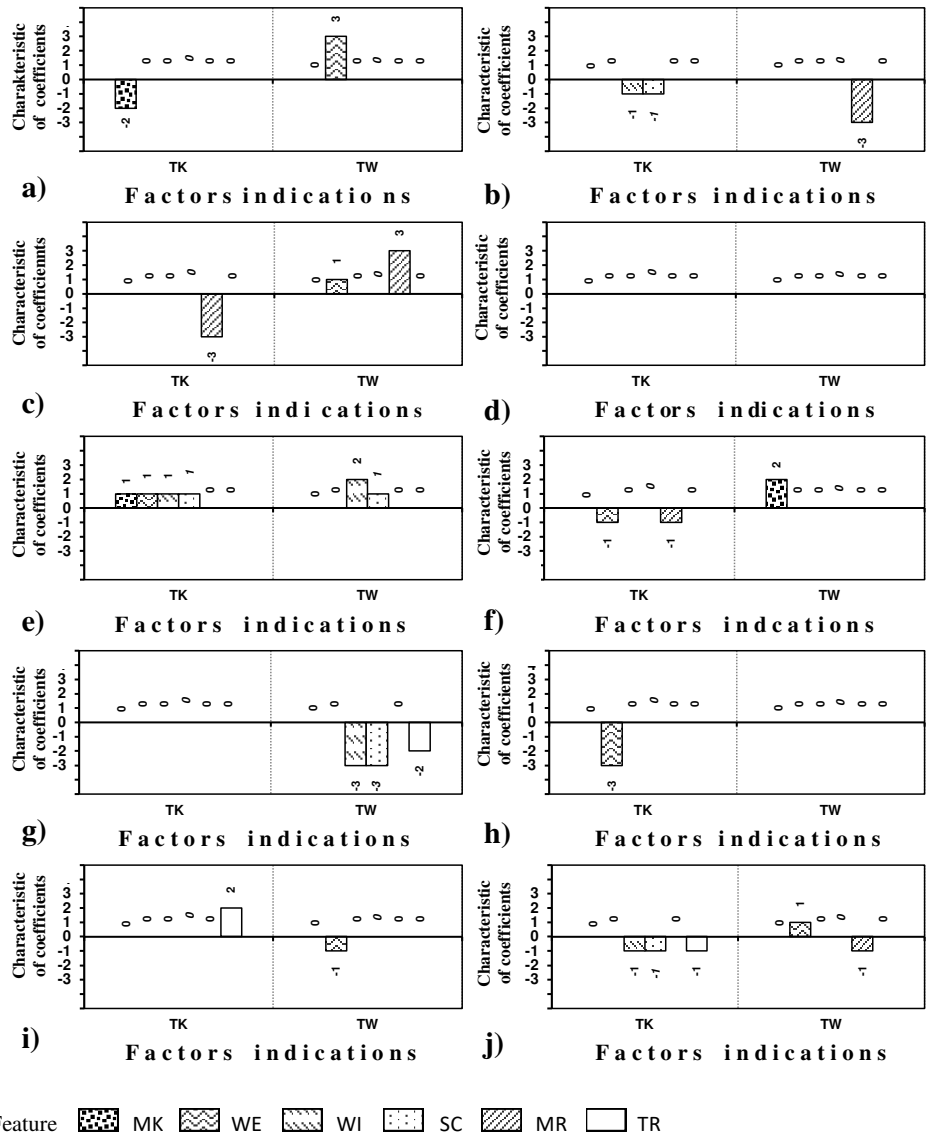

1; 2; 3 number of statistically significant coefficients. (+) positive correlation, (-) negative correlation

Fig. 7. Summary of the results of the correlation analysis to determine the influence of the respondents' characteristics on the importance of factors in the E4b area. Companies concerned: a) M, b) M1, c) M2, d) M3, e) M4, f) M5, g) M6, h) M7, i) M8, j) M9.

Source: own study

The independent variables were the respondents' characteristics: gender (MK), education (WE), age (WI), seniority (SC), mobility (MR), admission to work (TR). Dependent variables are the already mentioned coordinates of the 3x3 matrix, variable X - technological potential (TW), variable Y - product competitiveness (TK).

Out of a total of 60 cases of correlation (ten enterprises, six characteristics of the respondents), there was a correlation in 15 cases for the TK factor, and 13 for the TW factor. For the data of M3, no statistically significant correlation was found for the ratings of both factors at the level of $\alpha = 0,2$, while for the ratings of product competitiveness (TK) in the M6 company, and in the M7 company for the technological potential factor (TW). The maximum number of correlations occurs: for the product competitiveness factor (TK) for the enterprise data M4, there is a correlation based on gender (MK), education (WE), age (WI), and seniority (SC), (all only for $\alpha = 0,2$), for the technological potential

(TW) factor in the M6 enterprise, there is a correlation with age (WI), seniority (SC) of the respondents (for $\alpha = 0{,}05$) and their mode of admission to work (TR) (for $\alpha = 0, 1$). Regarding the activity of the influence of the respondents' characteristics on the level of assessments of the examined factors, the most active feature is the education of the respondents (WE) (6 cases), and the lowest mode of admission to work (TR) (3 cases).

Summary

The work concerns knowledge in the field of technology, competitiveness, innovation. While examining the scientific potential of knowledge in the field of technology, attention was paid to the importance of technology in the national economy. It has been shown that technology, which is one of the basic areas of creating positive value, is related to the competitiveness of a product. The innovative BOST research method is presented, allowing to determine the relationship between the technological potential of manufacturing processes (TK) and the competitiveness of products (TW) in 10 companies in the metal industry, the total number of respondents was 342. The research methodology uses the eastern approach to production management, based on the assumption that there is a sizeable creative potential in operational employees, enabling the identification of the importance of subjective factors (3x3 matrix).
The results of the BOST survey are presented in the form of the number of factor pairs: technological potential (TK), product competitiveness (TW) in individual zones of the 3x3 matrix, which made it possible to determine the number of respondents. It found that there is only one case of results appearing in all nine zones of the 3x3 matrix, while in three cases the results are only located in the following four zones: focus on the opportunity disclosed ("1"), improve marketing ("2"), develop your technological capabilities ("8"), look for opportunities ("9"). The maximum number of results is in one of the zones listed. The results in two cases, stay aloof ("5"), are characterised by severity ratings of up to 3 for both factors.
Statistical evaluation (skewness) of the obtained sets of scores was planned on the basis of the relationship between the arithmetic mean ($\bar{x}$), dominant (D) and median (M). These measures should show equality, minority, majority in relation to each other in the order listed. However, the following types of dependence occurred during the analysis $\bar{x} > D = M$, $\bar{x} < D = M$, $\bar{x} > D < M$, $\bar{x} < D > M$. The problem of unambiguous determination of skewness arose. The classical coefficient of variation was determined to explain the problem. It has been shown that in most cases (8) the sets of TK factors Left-hand skewness, while the sets of TW factor scores have half right-hand and half-left skew. As for the strength of the asymmetry, it is very weak or weak.

Summing the analysis of the range scale, it should be stated that the extreme positions on the range axis are taken by the following pairs of enterprises in the following zones: "1" - M1-M7: "2" - M9-M6; "8" - M-M1; "9" - M7-M9, the list does not include the following companies: M2, M3, M4, M5, M8. Further analysis of the set of pairs of enterprises shows the presence of enterprises twice. In M1, the factors: TK, TW are the least preferred in zone "1", while in zone "8" the most strongly, and in this case they do not show similarities to others in terms of preferences. In zone "9" of the matrix, subjective factors for a given enterprise are on average preferred. As for the preferences of factors: TK and TW, in zone "1" it is the most preferred in enterprise M7, in zone "2" this enterprise is near the middle of the scale and shows similarity to preferences in enterprise M1. The preference of the analysed pair of factors is the lowest in zone "9". The respondents revealed the lowest preferences of a pair of factors: TK and TW for zone "1" in company M9, while for zone "9" the preference is the strongest. The analysis shows that, depending on the zone of the 3x3 matrix, the subjective pair of factors is the least or the most preferred. Such a situation does not occur for the given enterprises: M and M6. It should be noted that these enterprises are in extreme positions on the scale of the range in terms of factor preferences: in company M, the factor TK is the least preferred, while the factor TW is the most preferred in company M6. The other two extreme positions are found in enterprises: M1 - the least preferred TW factor, M7 - the most preferred TK factor.

When making management decisions in terms of technological potential and product competitiveness, the data of the metalworking company (M7) for the TK factor, the manufacturer of fasteners (M6) for the TW factor should be used. However, in the case of a pair of these factors, to stay in the zone (A-F) - focus on the revealed opportunity ("1"), (A-E) - improve marketing ("2"), you should also use the experience of the mentioned companies. The signpost for the relocation of enterprises located in the following zones: (BF) - develop your technological capabilities ("8"), (BE) - look for opportunities ("9") to the previously mentioned zones of the 3x3 matrix are the data of the companies: manufacturer of screws, bolts (M1) and a manufacturer of perforated sheets and meshes (M9).

Total of 28 dependencies (15 for the TK factor) were found out of 120 possible as an result of the analysis of the influence of the respondents' characteristics. For the data of one enterprise, no statistically significant correlation was

found between the scores of the analysed factors and the characteristics of the respondents, in addition, no one case of the analysed relationship was found for both the TK and TW factors. The most active feature was the education of the respondents (WE) (6 cases out of 28 existing), and the least active (TR) (3 cases). Only for the data of one enterprise, there was a correlation dependence on four characteristics of the respondents.

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Impact of European Union Funds on The Level of Cohesion of Regions in Poland

Rafał CZYZYCKI, PhD
Institute of Spatial Management and Socio-Economic Geography, University of Szczecin, 70-453 Szczecin, Poland
rafal.czyzycki@usz.edu.pl

Rafał KLOSKA, Professor of the University of Szczecin, PhD
Institute of Spatial Management and Socio-Economic Geography, University of Szczecin, 70-453 Szczecin, Poland
rafal.kloska@usz.edu.pl

Elżbieta OCIEPA-KICINSKA, PhD Ing.
Institute of Spatial Management and Socio-Economic Geography, University of Szczecin, 70-453 Szczecin, Poland
elzbieta.ociepa-kicinska@usz.edu.pl

Piotr SZKLARZ, PhD
Institute of Spatial Management and Socio-Economic Geography, University of Szczecin, 70-453 Szczecin, Poland
piotr.szklarz@usz.edu.pl

Abstract

One of the main objectives of EU regional policy is to stimulate processes which enhance internal economic cohesion in individual regions. At the regional level, the purpose of cohesion may be perceived through the prism of the necessity to eliminate disparities between individual areas, i.e. districts (poviats), forming a given region, i.e. province (voivodeship). The aim of the study is to assess the impact of EU funds invested in individual Polish provinces on changing the level of diversity, and therefore the level of coherence of individual voivodeship in the area of social, economic, environmental and institutional and political governance. For this purpose were analyzed 208084 completed investment projects co-financing with Community funds amounted to PLN 433.5 billion, which were implemented in Poland in 2004-2018. The results of the conducted research clearly indicated areas in which there is a statistically significant relationship between the investments implemented with EU financial support and changes in the internal coherence of individual voivodships. This enables to issue recommendations regarding the way in which Community funds will be spent, which in the expected way affect the increase in internal cohesion of the regions.

Keywords: Economic Cohesion; Regional Policy; Economic Governance; Social Governance.

The importance of regional cohesion in European Union Regional Policy

The concept of EU regional policy has been defined in various ways. According to M. Rudnicki [Rudnicki 2000, p. 46], "EU regional policy is a thematically structured action introduced by the decision-making centre, which aims, through a set of legal and financial instruments, to remove disparities in the economic and social development of regions in the EU and to ensure sustainable growth of all its areas while maintaining its internal economic and social cohesion". European regional policy may also be understood as "a set of actions taken by the European Community's decision making centre to reduce disparities in economic, social and spatial development and to achieve cohesion between regions through the redistribution of financial resources in an integrated Europe" [Głąbicka 2003, p. 4]. However, the treaty provisions do not provide any formalised definition of regional policy. The term "regional policy" was not explicitly used in any of the three treaties establishing the European

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Communities (Treaty establishing the European Coal and Steel Community; Treaty establishing the European Economic Community; Treaty establishing the European Atomic Energy Community), nor was it used in the Single European Act, the Treaty on European Union or the Treaty of Amsterdam. Nevertheless, already at the beginning of the integration process, regional disparities and their adverse consequences on the political, economic, social and cultural sphere were recognised [Leszkiewicz 2012, p. 228]. However, EU regional policy has been pursued practically since 1956, when the report of the International Committee, which prepared the Treaty of Rome, indicated the regional scope as one of the three main common courses of action for Member States. This report stressed the need to use the resources as much as possible to eliminate developmental delays in the regions of Member States, and accordingly the necessity to establish a special investment fund was reported [Pietrzyk 2000, p. 621]. The EEC's non-treaty document, which addressed regional problems, was the Programme of Community Action for 1962 1965. In 1968, the General Directorate for Regional Policy was established which, using the tools for controlling aid granted by individual countries for regional development, initiated the coordination of EU-wide activities under the regional policy.

The 2021-2027 cohesion policy framework takes greater account of action at local level – it supports the development of local growth strategies by municipal, local or other territorial authorities which should be responsible for or involved in the selection of EU funded projects. Regional co financing rates will be raised to pre-crisis levels which will increase responsibility for the projects implemented and encourage the improvement of their quality. The EU contribution will be set at a maximum of 40% to 70%. The new framework additionally facilitates the continuation of “community-led local development”, i.e. the development of local growth strategies by action groups involving local authorities, civil society and business partners [EU Budget 2018]. Cohesion policy will continue to invest in all regions and three categories of regions will still exist (less developed; transitional; more developed). The method of allocating funds continues to be largely based on GDP per capita, however new criteria (youth unemployment, low education level, climate change and immigrants reception and integration measures) will also be taken into account to better reflect the actual situation. The outermost regions will continue to benefit from specific EU support. Cohesion policy will continue to support bottom-up development strategies and strengthen the position of local authorities in managing the funds. The urban dimension of cohesion policy has been strengthened by earmarking 6% of ERDF funding for sustainable urban development and by establishing a new networking and capacity building programme for municipal authorities of the European Urban Initiative [Regional Development 2020].

The EU regional policy involves not only the elimination of divergence effects, but their prevention by stimulating the spread effects. It is therefore justified to selectively support regional development on a sectoral and territorial basis, adopting a holistic approach to avoid the adverse effects of divergence [Ziomek 2008, p. 149]. The EU and the most developed countries take a bottom up approach to development and, to this end, programmes are launched to identify and highlight the potential of local development activities. This trend supports local entrepreneurship, develops human capital, promotes innovation and establishes regional institutions and networks of related enterprises to achieve competitive advantage [Jałowiecki 1993, p. 59].

Evolution of regional policy in Poland

In the first years of Poland's transformation, the state's economic policy was dominated by macro-economic priorities aimed at introducing a new order after the central management system.

As a result, the changes occurring at the level of regional economy led to [Gruchman 2006, p. 147]:

1. Significant development of several of the largest urban agglomerations which additionally contributed to changes in the territorial facilities in their immediate vicinity. The Warsaw agglomeration has developed particularly dynamically, clearly exceeding the average rate of development of the rest of the country. The agglomeration concentrates the country's considerable potential in many areas (especially in respect of science and research).
2. Slow restructuring and, consequently, slow development of industrial districts, raw material processing and concentration of large plants. This concerned in particular the Upper Silesia, the Copper and Sulphur Basin as well as the Łódź Light Industry District.

3. The particularly difficult situation of regions in which agriculture prevails, especially those with state agricultural ownership (in the north and west of the country), which was reflected in very low development dynamics and high unemployment.

The processes of political transformation led to a rapid increase in regional disparities. This concerned mainly the four major processes: changes in the labour market (of which unemployment was the most important element), privatisation of the economy, foreign investment and development of a favourable business environment. The regional differentiation of these processes led to a strong polarisation of the country's regions into relatively few areas of success and successful transformation process (the so-called transformation leaders) and areas beset with problems of different nature [Kuciński 1997, p. 65]. Since 1 January 1999, the conditions for conducting regional policy have been amended in Poland. The public administration reform introduced three tiers of local government: commune [gmina], district [poviat] and province [voivodeship]. Under the new solutions, the self-governing province was assigned the responsibility for the implementation of development processes on its territory. The new legal situation has created a qualitatively different reality which was conducive to shaping the general policy of the state's territorial development and to following the local authorities' own regional development policy. As a result, regional policy could be pursued in both dimensions – inter-regional (government towards the regions) and intra-regional (local authorities within their regions).

Polish regional policy, based on a compensatory model of the EU economic cohesion, requires continuous improvement both in the forms of its implementation and with regard to its scale and set of instruments. It is currently based on the creation of social and economic space as well as the preparation of development programmes on the basis of strategic objectives and operational programmes. However, the main purpose of an intentional influence of the local government on production entities and consumers should be to initiate endogenous market processes resulting from entrepreneurship and to increase the added value of the whole area. Therefore, local authorities should create conditions for free and competitive economic activity, substantial investment in science-intensive and innovative sectors and improving the structure of the region's economy [Spychalski 2006, pp. 5-18].

Methodological aspects of measuring regional cohesion

As is the case with studies aimed at determining the level of socio-economic development of regions, the assessment of the cohesion level of the said regions entails the problem of the appropriate selection of diagnostic variables. The most common procedure involves a general identification of groups of factors and then the selection of appropriate diagnostic variables for each group. However, due to the lack of a universal and timeless, generally applicable system of appropriate indicators and explicit rules for the selection of diagnostic variables, the selection is primarily determined by the possibility of obtaining comparable data and the need to meet substantive and formal requirements (the spatial scope of the assessment, temporal and substantive scope, and above all its purpose) [Johann 2005, pp. 54-55; Słaby 1994, p. 39].

Considering the purpose of this study, the following measures were selected as the variables determining the level of development:

- in respect of social governance – rate of migration for permanent residence of persons at the working age per 10,000 people at the working age (X1), deaths of persons up to 65 years of age per 1,000 people at the working age (X2), average gross monthly remuneration (business entities over 9 persons) (X3), percentage of children in pre-school institutions per 1,000 children aged 3-5 (X4), percentage of the long-term unemployed (more than one year) in the total number of the registered unemployed (X5), registered unemployment rate (X6), number of out-patient clinics per 10,000 inhabitants (X7);
- in respect of economic governance – value of capital expenditure in enterprises (current prices in PLN; excluding business entities employing up to 9 persons) per 1 inhabitant at working age (X8), the number of national business entities recently entered in the National Register of Business Entities [REGON] per 10,000 people at working age (X9), number of natural persons conducting business activity per 100 people at working age (X10), number of national business entities entered in the National Register of Business Entities [REGON] per 1,000 people at working age (X11), length of local public roads per 100 sq km (X12);

- in respect of environmental governance – emission of carbon dioxide [tons/year] from plants with considerable environmental impact per 100 employees (X13), electricity consumption [kWh] per 1 inhabitant (X14), percentage of retained or neutralised pollutants in pollution reduction devices in plants with considerable environmental impact in the total pollution produced (X15), forestation rate (X16), percentage of green areas in total area (X17), amount of mixed municipal waste [kg] from households collected per year per 1 inhabitant (X18), percentage of municipal and industrial waste water treated in total waste water requiring treatment (X19), number of illegal landfills per 100 sq km of total area (X20);
- in terms of institutional and political governance – number of registered foundations, associations and social organisations per 10,000 inhabitants (X21), commune budget receipts [PLN] from maintenance fees per 1 inhabitant (X22), percentage of capital expenditures of communes and districts in total expenditures (X23).

Assuming, however, that the degree of cohesion of a given region may be equated with the degree of its internal differentiation, from a statistical perspective, the classic coefficient of variation Vs may be considered the basic measure of cohesion.

In order to determine the impact of EU funds invested in individual Polish provinces on the change in the level of differentiation, and thus the level of cohesion of individual provinces in terms of social governance, the following research procedure was conducted:

1. On the basis of data collected from the local database (https://bdl.stat.gov.pl), a ranking of provinces was compiled demonstrating the changes in the level of differentiation of individual diagnostic variables between 2004 (Poland's accession to the EU) and 2017 (completion of the majority of projects carried out under the EU financial perspective 2007-2013), assuming that the province with the greatest relative decrease in differentiation will be ranked highest.
2. On the basis of information provided at www.mapadotacji.gov.pl, a ranking of provinces has been compiled presenting the value of financial aid received per 1 inhabitant from the EU funds for the implementation of projects co-financed with the EU funds in a given province, broken down by specific investment areas.
3. By means of the Kendall's tau coefficient, the compliance evaluation was carried out on the rankings created in points 1 and 2, assuming that obtaining a statistically significant value of this coefficient indicates at the same time a considerable impact of the EU funds on the development of cohesion of regions in Poland (determining the significance level at p-value ≤ 0.05).

Study Results

Comparing the trends in the values adopted for the study of diagnostic variables in the districts comprising individual provinces in Poland in 2017 with the trends in 2004, it is difficult to clearly assess the actual impact of EU funds allocated in a given region on the change in the cohesion level of that region. The analysis of the changes in the coefficient of variation Vs in this period reveals that in terms of social governance, in the case of the rate of migration for permanent residence of people at working age per 10,000 people at this age (X1), in the vast majority of provinces a gap was reduced, ranging from 2.3% in the Warmińsko-Mazurskie province to over 93% in the Pomorskie province, while when analysing the number of deaths among people up to 65 years of age per 1,000 people at this age (X2), a reduction in the gap was recorded in half of the provinces (i.e. an increase in internal cohesion), and in the second half an increase, however, the change in the size of gap most often did not exceed 20%. In terms of average monthly gross wages and salaries (X3), practically in all provinces, a decrease in internal differentiation by approximately 20% was noted, an increase in this respect was recorded only in the Łódzkie (by 1.2%), Podkarpackie (by 14.8%) and Małopolskie province (by 18.5%). Among all diagnostic variables determining social governance, the greatest improvement in the internal cohesion of provinces concerned the percentage of children in pre-schools in the total number of children aged 3-5 (X4). The related differentiation decreased from 47.9% in the case of Opolskie province to 78.3% in Świętokrzyskie province.

In respect of economic governance, the only province which in the analysed period enhanced its cohesion in terms of all diagnostic variables, included in this area, was Podlaskie province. In 12 provinces an increase in cohesion was observed in terms of the number of natural persons conducting business activity per 100 people at working age (X10), in 10 – in terms of the number of national business entities recently entered in the REGON system per 10,000 people at working age (X9), in 9 – in terms of capital expenditure per 1 inhabitant (X8) and the length of

local public roads per 100 sq km (X12), while in the case of the total number of entities registered in the REGON system per 10,000 people at working age a decrease in internal differentiation was recorded only in 4 provinces. Generally, the decrease in the differentiation of regions in the analysed period was at the level of 10-20%.

In respect of environmental governance, 15 provinces saw a decrease in the internal differentiation in the amount of mixed municipal waste from households per 1 inhabitant (X_{18}) (on average, *Vs* decreased by approx. 50%). In 13 provinces cohesion improved in terms of the percentage of treated wastewater in the total amount of wastewater requiring treatment (X_{19}) (in 6 provinces the decrease in the variation coefficient exceeded 90%), in 11 provinces cohesion increased in respect of electricity consumption per 1 inhabitant (X_{14}) and 10 provinces experienced a decrease in the internal differentiation in the number of illegal landfills per 100 sq km of the province area (X_{20}).

In terms of institutional and political governance, the internal differentiation decreased in the number of registered foundations, associations and social organisations per 10,000 inhabitants (X_{21}) and occurred in 11 provinces (from 0.76% in the case of Mazowieckie province to over 41% in Lubuskie province), and in 12 provinces there was an increase in the internal cohesion in respect of the commune budget receipts from maintenance fees per 1 inhabitant (from 0.41% in Lubelskie province to 41% in Śląskie province), and in terms of the percentage of capital expenditure of communes and districts in the total expenditure a decrease in the differentiation within a given province was recorded in 8 regions (from 4% in Wielkopolskie province to 60% in Opolskie province (see Figure 1).

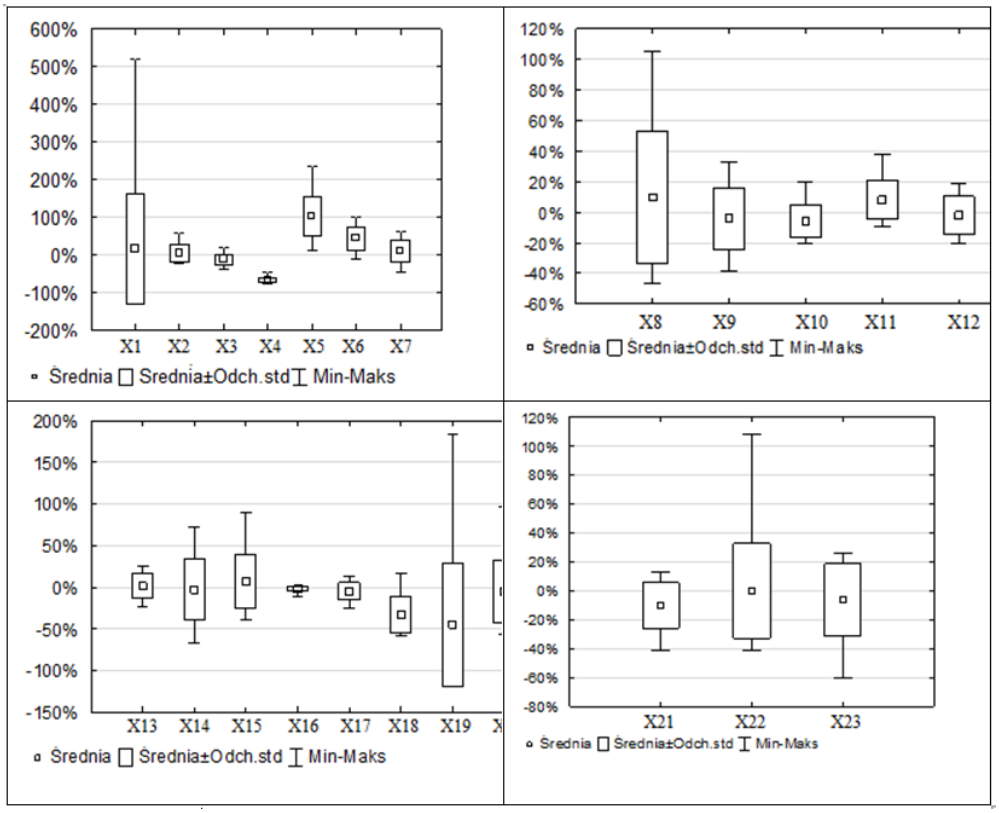

Figure 1: Change in variables depicting social, economic, environmental, institutional and political governance in individual Polish provinces in 2017, as compared to data from 2004, measured by means of the classic coefficient of variation Vs.

Source: own work

The analysis of the effects of projects carried out in individual provinces co-financed through EU funds on the change of internal cohesion of these provinces indicates that in terms of social governance:

1. as regards the rate of migration for permanent residence of persons at working age per 10,000 people (X1), there was a negative correlation between the change in the level of differentiation and the value of completed projects and the value of received EU aid for investments in the area of foreign cooperation. This entails a decrease in the internal cohesion of a given region as the value of such investment increases;
2. additionally, there was a negative correlation between the change in the level of internal differentiation of provinces in terms of the recorded number of deaths of people up to 65 years of age per 1,000 people at this age (X2) and the total value of investments co-financed from EU funds in respect of health care;
3. in terms of the average gross monthly salary (X3), the cohesion improved (decrease in internal differentiation) in the discussed regions, which saw a higher value of completed investment projects and a higher value of co-financing of those projects through Community funds, in the area related to supporting business development. Moreover, the value of all projects (completed as well as still in the implementation or settlement phase) had a significant, positive impact on international cooperation;
4. the internal differentiation in terms of the percentage of children in pre-schools in the total number of children aged 3-5 (X4) decreased in those provinces in which a higher value (per capita) of all "EU" projects categorised as "other" was reported.
5. as regards the percentage of the long-term unemployed in the total number of the unemployed (X5), the value of all projects in the category "work and social integration" had a negative impact on the internal cohesion of the region;
6. the internal differentiation of provinces additionally increased in the case of the general rate of registered unemployment (X6) as a result of an increase in the value of all projects and the value of EU funding for such projects, which were implemented in the area of international cooperation. The increase in the differentiation in this respect resulted also from the increase in the value of all investments carried out in the area related to power generation;
7. the cohesion of regions in terms of the number of out-patients clinics per 10,000 inhabitants (X7) was negatively affected by the value of EU funding for already completed projects related to power generation and regeneration (in this respect the overall value of such projects had a negative impact as well), while the overall value of completed projects in the area of research, development and innovation had a positive impact.

The table 1 presents information on the significance of the impact: the value of all projects (completed and settled, completed but not yet settled and in progress), the value of co-financing of the projects with EU funds, the value of completed projects only and the value of co-financing of completed projects (all values per 1 inhabitant of a given province), on the increase in internal cohesion of the province, where "+" means a significant, positive impact, "-" means a significant, yet negative impact, and "0" means no statistically significant impact. In respect of economic governance (cf. Table 1), there was a statistically significant impact of projects co-financed from Community funds in the area related to the generally understood business development on the increase in the internal differentiation of provinces in terms of the density of local public roads (X12), the impact of general value and the value of EU co-financing of projects concerning administration on the level of differentiation in terms of the level of capital expenditure in companies per capita (X8) and the amount of co-financing in respect of administration on the differentiation of provinces in terms of the percentage of natural persons conducting business activity was of similar nature (X10). A statistically significant positive impact on the cohesion of the regions in terms of economic governance was reported:

- between X8 variable and the total value and value of co-financing of completed investment projects in the area of power generation and the total value and the value of co-financing of all projects related to transport;
- in the case of variable X9 (number of entities recently registered in the REGON system per 100 people at working age) and the total value of all projects implemented by means of EU aid in the area related to science and education and the value of co-financing of completed projects in the area related to business development;
- between X10 variable and the value of co-financing of completed projects in the area of business development;
- X11 variable (total number of companies registered in the REGON system per 10,000 inhabitants) and the total value and value of co-financing of projects related to business development.

Table 1: Impact of projects co-financed by the European Union for the improvement of cohesion within Polish provinces in terms of economic governance in the years 2004-2017

Investment area	Variables related to economic governance				
	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}
Administration	–,–,0,0	0,0,0,0	0,–,0.0	0,0,0,0	0,0,0,0
Research, development, innovation	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Security	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Power generation	0,0,+,+	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Culture and art	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Science and education	0,0,0,0	+,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Environmental protection	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Health protection	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Work and social inclusion	0,0,0,0	0,0,0,0	0,0,0,0	0,0,+,0	0,0,0,0
Regeneration	0,0,0,0	0,–,0.0	0,0,0,0	0,0,0,0	0,0,0,0
Business development	0,0,0,0	0,0,0,+	0,0,0,+	0,0,+,+	–,–,–,–
Telecommunications and e-services	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Transport	+,+,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Tourism	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,–	0,0,0,0
International cooperation	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0
Other	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0	0,0,0,0

Source: based on own research.

In the case of changes in regional cohesion in respect of environmental governance, the significant impact of projects co-financed by EU funds could be observed only in six cases:

- regardless of the settlement method, environmental protection projects had a significant, negative impact on the internal cohesion of provinces measured by forestation rate (X16);
- the differentiation of forestation rate in districts included in the same province decreased under the influence of the amount of co-financing of all projects related to business development;
- the cohesion of regions in this respect was additionally positively affected by the co-financing of completed projects related to telecommunications and e-services;
- a significant decrease in the internal differentiation of provinces in terms of the percentage of pollution with considerable environmental impact which has been treated (X15) as a result of an increase in the total value of project related to administration was observed;
- there has been an increase in the differentiation of electricity consumption per capita in the province along with an increase in the total value of completed projects related to research, development and innovation and an increase in the total value and value of co-financing of completed projects related to international cooperation;
- the cohesion of provinces improved in terms of the amount of mixed municipal household waste per capita due to the increase in the amount of co-financing of completed projects related to research, development and innovations.

In the last of the analysed areas, concerning institutional and political governance, only three determinants are considered in relation to the impact of EU funds on the cohesion of regions in Poland in 2004-2017: the number of registered foundations, associations and social organisations per 10,000 inhabitants (X_{21}), commune budget receipts from maintenance fees per capita (X_{22}) and the percentage of capital expenditure of communes and districts in total expenditure (X_{23}). The conducted research demonstrated a statistically significant increase in the internal diversity of provinces in terms of X_{21} variable, which was accompanied by the increase in co-financing of completed projects related to power generation and health protection. The total value of completed projects concerning health protection and the value of all projects in a given province related to power generation were positively correlated with an increase in the province cohesion in terms of the X_{22} variable, while the decrease in the level of internal

differentiation of provinces connected with X_{23} variable was accompanied by a simultaneous increase in the total value and amount of co-financing of completed projects related to health protection.

Conclusions

The analysis of the impact of EU funds allocated in particular regions of Poland on the change in the level of cohesion of these regions give rise to several reflections. First of all, to a certain extent it is possible to clearly demonstrate the existing, statistically significant relationship between projects carried out by means of EU financial aid in specific areas and changes in internal differentiation of individual provinces. However, while substantive justification of the majority of such interrelations does not pose any problems, some of them would require an additional, detailed analysis of individual projects and then drawing general conclusions about the given interrelation. Interrelations which are not "statistically significant" is a separate issue. The absence of such interrelation does not necessarily mean that certain projects do not contribute to the increase (or decrease) of the region's cohesion. The lack of "statistical" recognition of such interrelation may result from insufficient observations, a wide scope of influence of such projects which are too difficult to be "captured" by a single diagnostic variable, or the possibility of a synergy effect strengthening the impact on the cohesion of a given province of projects co-financed by the EU in other areas. Another issue is the mere study of cohesion (or differentiation) in a given area. Assuming that from the statistical point of view, the least controversial measure is the classic coefficient of variation Vs , it should be stressed, that the change in its value is a result of changes in two values – occurring in the standard deviation meter measuring the actual average variation of units (districts) in terms of the feature under consideration and the arithmetic mean value of that feature in those units present in the denominator. This means that a change in relative differentiation in a given province may result not only from an actual change in the average differentiation of individual districts, but also from a change in the observed, average level of a given phenomenon. In-depth studies conducted in this area indicate that in most of the recorded cases, the change in the internal cohesion of provinces measured by Vs resulted from changes in average values of variables, not their absolute differentiation.

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Mixed Intelligent Methods for Quality Assessment in Manufacturing Process Mining

Tadeusz A. GRZESZCZYK

Warsaw University of Technology, Faculty of Management
ul. Narbutta 85, 02-524 Warsaw, Poland
tadeusz.grzeszczyk@pw.edu.pl

Michal K. GRZESZCZYK

Warsaw University of Technology, Faculty of Electronics and Information Technology
ul. Nowowiejska 15/19, 00-665 Warsaw, Poland
michal.k.grzeszczyk@gmail.com

Abstract

There is certain scientific interest in the field of process mining-based quality assessment and prediction models (using selected AI methods) that support faultless manufacturing. In the case of solving complex issues regarding such multidimensional problems it is advisable to search for new models that integrate several intelligent methods, e.g. linear regression for performing feature selection and Fully Connected Deep Neural Networks (FCDNN) for classifying business process instances. The purpose of this paper is to propose a quality assessment model based on Mixed Intelligent Methods (MIM) that can be used for manufacturing process mining. Theoretical considerations are illustrated with an example model implementation and results of computational experiments on industrial data. Conducting study on the use of MIM in process mining may be a development impulse for further research on quality assessment and prediction in Business Process Management (BPM) field as well as business and management study.

Keywords: AI methods in BPM, Process Mining, Quality Assessment Model, Recursive Feature Elimination, Regression, Deep Neural Network, Mixed Intelligent Methods.

Introduction

In conditions of high competition and global pressure, manufacturing companies should take advantage of market opportunities as well as build a strong competitive position on the global manufacturing industry market by offering products of appropriate quality and that have been manufactured in the shortest and constantly improved production cycles. Quality management in production processes is of key importance because poor quality of products obtained as outcomes of these processes may cause a decrease in competitive position and decrease in sales revenues. The results of the literature analysis in the field of Business Process Management (BPM) indicate that more than 60% of activities and projects related to quality improvement do not bring the expected results mainly due to the lack of predictive quality performance control and continuous monitoring of the occurrence of quality anomalies (Saab, Helms & Zoet, 2018).

There is an extensive literature describing the Manufacturing Execution System (MES) functioning as part of Enterprise Resource Planning (ERP) (Rozs & Ando, 2020). Existing MES and systems used by enterprises are often insufficient to ensure continuous processes improvement. Therefore, applications in this field of AI methods are developed, intelligent manufacturing systems are improved and even autonomous computer aided processes planning occur (Wei et al., 2019). Systems of this type are also enriched with Industrial Internet of Things technologies (associated with Industry 4.0 and cyber-physical systems), which enable the measurement of signals from connected sensors and various devices, as well as the collection and analysis of data and ensure achievement of specific economic benefits thanks to efficient management and improving the quality of production processes (Boyes, 2018).

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Adopting assumptions about high quality processes and faultless production, in accordance with the Total Quality Management (TQM) concept, means the number of read signals from the sensors is increasing. The automation of production processes limits the role of people in controlling these processes and enterprises need to rely on developed process mining technologies. The quality of the final product often depends on so many features (measures, variables, attributes and dimensions) that it is necessary to reduce their number before conducting analysis. However, it is difficult to clearly prioritize them and manually limit the number thereof. As a result of the feature elimination (selection, filter), attributes that are overly correlated or statistically insignificant are omitted, which does not significantly worsen the results of the performed analysis.

A number of quality assessment and prediction models are known, which are based on selected AI methods and support faultless manufacturing. For example, among others, the following methods are used for modeling and optimization of manufacturing flotation process parameters: multilayer perceptron (Allahkarami, 2016), Bayesian network (Yan et al., 2020), fuzzy logic (Jahedsaravani et al., 2016), convolutional neural network (Zhang et al., 2020) and Support Vector Machines (SVM) (Chehreh Chelgani, Shahbazi & Hadavandi, 2018). Research results confirm that single AI methods often do not provide good results for massive data, which are additionally complicated and have high-dimensional and auto-correlated structures, although for experiments carried out with Deep Neural Networks (DNN) the results obtained are slightly better (Pu, Szmigiel & Apel, 2020). Gaining experience in this type of research is both essential and necessary. In the case of complex problems related to multidimensional quality assessment and prediction, it is worth considering the use of Mixed Intelligent Methods (MIM) in this field and developing research related to finding the answer to a research question: is there a need and a possibility to use MIM for quality assessment in manufacturing process mining? Combined (integrated, hybrid) use of various intelligent methods is generally known for its great suitability for solving complex problems by taking advantage of the benefits of each component in the hybrid (Hatzilygeroudis & Palade, 2018). In particular, MIM may include linear regression, which is used as a reference in Recursive Feature Elimination (RFE), and Fully Connected Deep Neural Networks (FCDNN) used for classifying business process instances - only when using selected features. The presented results of analysis regarding quality prediction in the manufacturing flotation process use both process data and operational data in accordance with modern principles of process mining.

Literature Review

According to the integrated and holistic view of BPM (with eliminates functional and disciplinary biases), several BP research topics can be distinguished, including traditional organizational functions (e.g. human resource management, marketing and sales), intra-organizational (e.g. TQM, performance assessment and knowledge management) as well as inter-organizational (e.g. Supply Chain Management and e-commerce) (Sidorova & Isik, 2010). The young research discipline, which is process mining, helps to solve problems in these fields by combining experience resulting from the development of BPM, Business Intelligence (BI), data mining, enterprise resource planning and workflow management. It is based on the integration of two types of analysis: one concerning model-oriented processes and the other focused on data. Process mining, like the previously known data mining, is associated with Machine Learning (ML) and AI methods. Similarly, process models can be built automatically as a result of applying learning algorithms using historical data saved in the form of event logs.

So far, many event log extraction approaches, methods, techniques and tools have been developed for process mining, which are specific or generic (Dakic, 2020). They can be divided into the following three types: process model discovery (various miner approaches, such as: heuristic, fuzzy, genetic, alpha, multi-phase, region-based and classical), conformance checking (used for process evaluation, repairing models, auditing analysis, arrangement of business processes and algorithm discovery) and model enhancement based on experiences from current and previously implemented processes (Ahmed, Faizan & Burney, 2019). Activities related to process discovery, conformance checking and enhancement are implemented in order to conduct analysis or optimization (van der Aalst, 2011). When using discovery methods, the initial process models are usually built based on event logs, which are compared with observed behavior to further improve on the basis of determined deviations between models and empirical event logs (van der Aalst, 2013).

The process mining achievements can be successfully used to tackle quality assessment in manufacturing problems. These achievements do not replace the previously known process improvement methods but can be a significant complement to them. Business Process Improvement, Corporate Performance Management, Continuous Process Improvement, Six Sigma, TQM and others can be assisted in accelerating the understanding of analyzed business

processes, integration, modeling and re-design (Garcia et al., 2019). Process mining methods and models also include those based on selected AI methods. Literature studies have shown relatively little interest in using artificial neural networks and SVM in this field (Maita et al., 2015). All the more, there is a lack of research on attempts to combine these methods and build hybrid (mixed) models. Due to the fact that single AI methods often do not provide good results for massive, complicated and high-dimensional data often with auto-correlated structures, experience from research on MIM and Mixed Intelligent Systems (MIS) should be derived (Grzeszczyk, 2018).

Due to the development of modern approaches to modeling, analyzing and improving the quality of production processes, the number of process monitoring signals read from various sensors is constantly increasing. The quality of final products is often dependent on so many features that it is necessary to strive to reduce their number in order to simplify calculations. It is difficult to intuitively limit their number and necessary to use appropriate methods to perform feature elimination, applied in such a way that it does not significantly deteriorate the results of calculations. Research results so far prove that the proper use of feature elimination allows to reduce the run-time of ML algorithms (taking into account the run-time of feature selection algorithms) and at the same time only allows a slight deterioration of the classification accuracy (Hinkka et al., 2018).

Despite significant development of process mining, in order to carry out process optimization, many enterprises are still mainly based on meetings of experts, mappings, traditional process documentation, manual documents, simple numerical statistics and visualizations (Wynn et al., 2017). The need for continuous optimization of business processes is a key challenge for enterprises and in times of digital transformation, turbulent internal and environmental changes as well as a constant increase in customer requirements, there is an urgent need to include AI instruments to improve and optimize internal manufacturing processes in organizations using AI and ML methods (Vrbka & Rowland, 2020). Literature research results indicate a growing scientific interest in the field of AI methodologies, which are increasingly proposed for use in processes management and modeling, improving organization strategies and eliminate failures (Fernandes et al., 2019).

Among the AI methods useful in research, the results of which are presented in this paper, the authors drew attention to regression and FCDNN. In the case of solving many practical business problems, non-traditional regression-based methods provide better results compared to classic statistical tools (Zurada, Levitan & Guan, 2011). Various regression-based analysis methods are frequently applied in RFE (Chai, Lei & Yin, 2019). In turn, in the scientific literature, one can find research results on the use of DNN and, in particular, FCDNN for solving predictive problems (Zerwas et al., 2019; Liu, Zhang & Song 2020).

Methodology

Research question - "Is there a need and possibility to use MIM for quality assessment in manufacturing process mining?" - is the basis for choosing the right research methods that enable the analysis of the available dataset containing historical data on iron ore manufacturing processes and quality assessment of iron ore pulps for use in flotation plants (Eduardo Magalhaes Oliveira, 2017). The following research methods and techniques were used in the presented research: critical literature research, computer simulation and experiments. Model building, its example implementation and experimental calculations were based on linear regression and FCDNN algorithms. The essence of the proposed quality assessment model based on MIM mainly consists in a serial combination of two intelligent methods used in the following way: linear regression is applied during RFE (the most important features describing production processes are selected) and FCDNN was used for classifying business process instances. FCDNN learning was only carried out using a selected set of features.

The presented results of analysis regarding quality prediction in the manufacturing flotation process use both process data and operational data in accordance with modern principles of process mining. Therefore, the research did not focus on discovery and conformance of built and improved process models but was implemented in accordance with modern trends in process mining. In the verification process of the proposed quality assessment model based on MIM, empirical data stored in the dataset that contains more than 736000 samples consisting of 24 features were used.

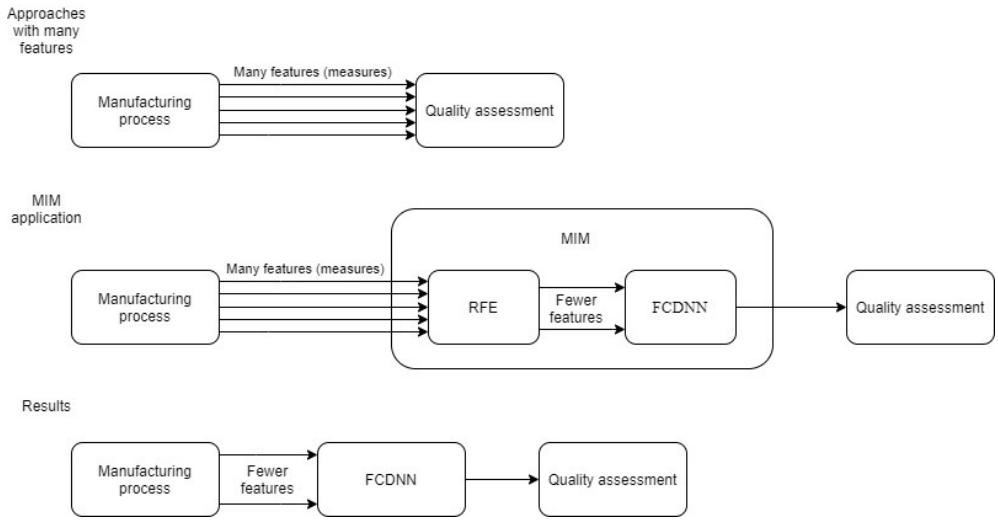

Fig. 1: Quality assessment in manufacturing process mining based on MIM
(source: own study)

In the current approaches of the manufacturing process often there are many measures analyzed for the quality assessment. The methodology proposed in the paper consists of two sequentially ordered intelligent methods (Figure 1). To facilitate the process of quality assessment RFE method was used at first for selecting most important measures with regard to the explained variable. The RFE used external model for estimating weights of features. As an external estimator the linear regression was used. RFE recursively used the linear regression model and checked its coefficients. After every repetition the least important features were deleted from the set of considered ones. The process was repeated until the desired number of features was reached. During experiments the number of selected features ranged from 1 to 21 (increasing by two at each of the experiment's step).

For each of the selected number of features the model was created, trained and evaluated. The more features, the more complicated the model containing more parameters to train is. The experiments were conducted using Python programming language, which is well known for its usefulness in data science (Porcu, 2018). The RFE method together with linear regression model were from Scikit-learn package (Scikit-learn user guide, 2020). Finally, FCDNN was implemented with the aid of Keras library with tensorflow backend (Abadi et al., 2016).

Results and Discussion

In the analyzed case based on a specific industrial dataset, the results of the application of MIM for quality assessment in process mining relate to quality prediction of raw materials that are delivered to production plants. Material purity is predicted using many features that have an impact on achieving satisfactory quality raw materials.

The measure for quality assessment which is the explained variable in the experiments is the percentage of silica in the iron ore concentrate (percentage of silica concentrate). Percentage of iron concentrate feature is highly correlated with percentage of silica concentrate and it would be highly desirable to measure the percentage of silica during iron ore mining process without using this feature. The date feature is irrelevant for measures, therefore both aforementioned features have been removed from the dataset resulting in 21 features (explanatory variables). Among selected features there are variables containing measures of the pulp before flotation process, air flows in flotation columns or pulp density etc. All variables were scaled to have mean 0 and standard deviation of 1 (standard normal distribution).

After the feature elimination process another intelligent method was used for estimating the percentage of silica in the iron ore concentrate. The variable in the dataset is continuous, therefore, it is a regression problem. For this task FCDNN was used. The model contains three hidden layers of 15-512, 512-256, 256-64 neurons respectively (each activated by ReLU function). Finally, the last layer contains only 1 neuron and has no activation (in this way regression task is achievable). Mean Squared Error (MSE) was chosen as a loss function and algorithm based on

Adaptive Moment Estimation (Adam optimizer) was used during training process. Finally, MSE and Mean Absolute Error (MAE) values were monitored for evaluating the model's ability to predict the percentage of silica.

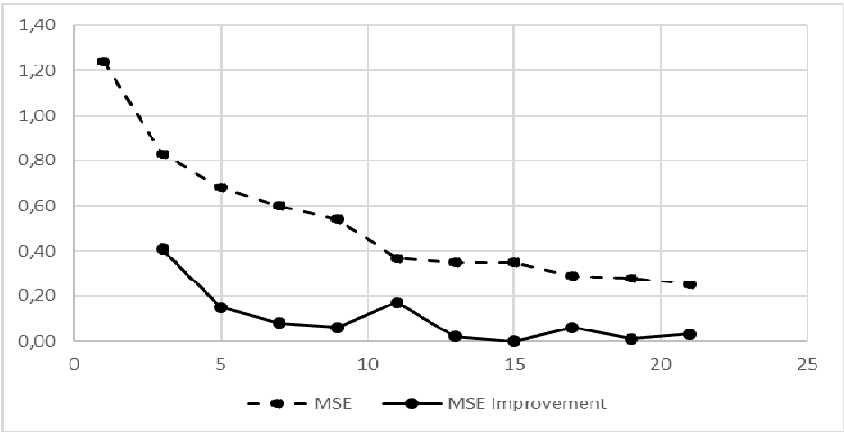

Fig. 2: MSE over number of features

(source: own study)

As expected, MSE measures are decreasing for increasing number of features. However, as can be seen in Figure 2, above 11 features the decline of errors is decreasing much slower. The knowledge hidden in the deleted features is compensated by the trained model. After conducting the experiments with MIM the process managers can decide to omit some of the least important measures if the error in quality assessment is negligible and the costs of implementing those measures are too high. Therefore, the process of taking measures for quality assessment can be simplified thanks to the usage of MIM. Table 1 presents MSE and MSA values depending on the number of features.

Table 1: MSE and MSA depending on the number of features

Number of features	1	3	5	7	9	11	13	15	17	19	21
MSE	1.24	0.83	0.68	0.60	0.54	0.37	0.35	0.35	0.29	0.28	0.25
MSE Improvement	-	0.41	0.15	0.08	0.06	0.17	0.02	0	0.06	0.01	0.03
MAE	0.90	0.69	0.60	0.55	0.52	0.41	0.41	0.41	0.37	0.36	0.34
MAE Improvement	-	0.21	0.09	0.05	0.03	0.11	0	0	0.04	0.01	0.02

Source: own study

Obtained research results confirm that there is a need and possibility to use MIM for quality assessment in manufacturing process mining. As a result of using this type of solution, it was possible to shorten the learning time, reduce the number of measuring sensors used in production processes, and simplify the monitoring and prediction systems of raw materials. This is possible by reducing the relatively large number of features and eliminating the need for a series of unnecessary measurements, because relying on fewer measurement points provides satisfactory results. The obtained research results have practical values, e.g. for processing engineers, who, thanks to them, achieve productivity optimization as well as the possibility of objectifying and automating processing assessment and control of raw materials' quality.

Positive and negative aspects related to the use of FCDNN included in the currently proposed MIM result from the features and properties of neural networks. They are usually resistant to damage and errors occurring in learning sets. The possibility to obtain correct results even for incomplete and noisy data is important. On the one hand, neural networks are characterized by considerable application possibilities, on the other, however, they operate on the principle of a 'black box' and the justification for the results related to prediction is not clear and reliable. This disadvantage is also a kind of advantage since the inability to look into the 'black box' relieves production engineers from the need to determine the mathematical relationship between the explanatory (independent) variables and the explained (dependent) variable associated with the expected quality of raw materials. The

obtained calculation errors regarding prediction can sometimes be quite significant and their values depend to a large extent on the proper selection of the type of neural network and its architecture used. Therefore, the quality of the results obtained largely depends on the experience of the designers of the neural networks used for prediction of quality and processed material purities.

Conclusions

There have already been some studies in the field of process mining based quality assessment and prediction models that were based on selected AI methods introduced to support faultless manufacturing. In the case of solving complex issues regarding such multidimensional problems, it is advisable to search for new models that integrate several intelligent methods, e.g. linear regression for performing feature selection and FCDNN for classifying business process instances. This paper presents a proposal to use MIM to build a quality assessment model that can be used for manufacturing process mining. The proposed solutions constitute a significant contribution in the light of methodological theory and practice within the discipline of management and quality sciences.

The obtained results of theoretical and practical research allow for a positive answer to the research question posed regarding the existence of the need and the possibility of using MIM for quality assessment in manufacturing process mining. Theoretical considerations are illustrated by an example implementation of the model and results of computational experiments based on the dataset which contains historical data on iron ore manufacturing processes. The calculations carried out were based on regression and FCDNN algorithms. The essence of the proposed model lies in the serial combination of two intelligent methods that were used in the following way: linear regression is applied during RFE (the most important features describing production processes are selected), while FCDNN - for classifying business process instances, which only learns using selected features.

As a result of the application of MIM, not only was the improvement of the AI method used and the learning time shortened, but also the basis for simplifying the quality monitoring system of the examined production processes was created. The elimination of a relatively large number of features allows, for example, to remove unnecessary, time-consuming or expensive measurements, relying on a smaller number of measuring points provides reliable information on the quality of products obtained as a result of the implementation of the analyzed production processes. As a result of the analysis and calculations carried out, the production process was simplified, which made it more transparent and understandable.

There is too little research on MIM applications, in particular on quality assessment in manufacturing process mining, and therefore it is important to undertake research to bridge this gap. Conducting current research and planning similar ones in the future may be a development impulse for further research on quality assessment and prediction in the BPM field as well as progress within the theory and practice in the area of improving models and methods in management discipline. Continuation of this type of research may, for example, consist in improving selected methods that create MIM, as well as adding more AI methods. One of the methods that may be a significant complement to MIM can be one of the Neural Architecture Search (NAS) methods. Due to the fact that the presented quality assessment model includes the use of DNN, while developing and improving MIM, the authors of the paper may consider using existing experience related to unifying model in which techniques and methods for NAS problems could be explored and quantitatively compared (Malekhosseini, 2020). The introduction of this type of generation of the model can improve its performance.

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Analysis of The Impact of Implementing Stricter Standards for Granting Mortgage Loans to The Mortgage Market in The Czech Republic

Ing. Linda Pudilová
Czech University of Life Science Prague, Department of Economic Theories, Faculty of Economics and Management, Kamýcká 129, Praha 6 – Suchdol, Czech republic, e-mail: pudilova@pef.czu.cz

Ing. Kamila Veselá
Ph.D., Czech University of Life Science Prague, Department of Economic Theories, Faculty of Economics and Management, Kamýcká 129, Praha 6 – Suchdol, Czech Republic, e-mail: veselakamila@pef.czu.cz

Abstract

In the last 20 years, the development of the economy and the need for own housing of the Czech population has been increasing, which is reflected in the increasing number of applications for housing loans. With the development of the economy, the overall indebtedness of economic entities is also increasing, confirming the trend of living on debt. Market developments have led to long-term interest rate cuts, with mortgage lending rates reaching a record low of 1.74% pa in 2016. As a result, even people with lower incomes were able to obtain a housing loan. Given that a similar situation preceded the past financial and mortgage crisis in the USA, the Czech National Bank has now tightened the criteria for granting mortgage loans.
The paper deals with the issue of these tightening criteria for the provision of mortgage loans, gradually implemented by the Czech National Bank since 2017. The main aim of the paper is to analyse the impact of introducing these stricter conditions on the mortgage market in the Czech Republic, on the average citizen and his/her ability to obtain a home loan, as well as the impact on the price of the loan, in particular the interest rate. In the paper are analysed housing loans in the form of mortgage loans and building savings loans. The paper seeks to quantify the impact of stricter criteria for granting mortgage loans on the creditworthiness of Czech citizens (i.e. their ability to raise and repay funds for their own property). Last but not least, the paper monitors the development of the housing market in the Czech Republic, the development of mortgage loans over time and interest rates on mortgage loans.

Keywords: Czech national bank, debt to income, debt service to income, mortgage loan, loan to value, interest, bank collateral

Introduction

The period 2017–2018 was a period of great changes in the mortgage market in the Czech Republic. In response to the development of previous years, when interest rates on mortgage loans reached their historical low (making mortgage loans more accessible even for people with lower income), the criteria for granting mortgage loans were tightened. Until then, banks granted loans at the risk limit, when they also granted mortgage loans to high-risk clients, who would probably not be able to repay their liabilities if the economic situation deteriorated, at record low interest rates (in 2016, for example, it was possible to obtain a mortgage loan at an interest rate of less than 2% pa) and with 100% financing (i.e. they lent an amount corresponding to 100% of the property value – LTV[1]). The measure of the Czech National Bank was the logical outcome of this development, as the Czech National Bank, fearing the emergence of another mortgage crisis, such as we witnessed in the USA in 2008–2009, took measures aimed at preventing over-indebtedness and granting of mortgage loans to people with lower income. The theoretical framework for this issue is defined by e.g. Mandel and Tomšík (13,14). For example, Revenda (16) points to the difference in the assistance of central banks to troubled banks in theory and in practice. According to

[1]Loan to value

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him, assistance to insolvent banks is currently more and more affected by the criteria of the size of the troubled bank and its interconnections within the banking system (9, 15).

As already mentioned, it was possible to obtain a mortgage loan at record low interest rates in 2016, which even fell to 1.7% pa. In this period, despite the efforts of the Czech National Bank (low interest rates close to zero, devaluation of the koruna), the economy was in a situation close to deflation. The analysis for 2005–2015 confirmed the decline in the share of money in the economy (measured by the M1 and M2 monetary aggregates) on a monetary basis (11,12). The result is a claim that the central bank's monetary policy is ineffective in relation to the development of the amount of money in the economy (18). The issuance of money into the economy is linked to the granting of loans by commercial banks to non-banking entities (17).

The aim of the presented article is therefore primarily to define the impacts of the introduction of stricter standards for granting mortgage loans by the Czech National Bank. The impact analysis is carried out from two angles, from the point of view of the impact of these measures on the average citizen and his/her creditworthiness, and from the point of view of the impact on the entire mortgage market.

Methodology, Data Sources

The crucial source of information for the processing of this article and the research that the article presents are secondary data obtained from the Czech National Bank. They are subjected to a time series analysis from the ARAD system presented on the Czech National Bank's web portal[2]. The length of the analysed time series always depends on the length of the published data. To analyse the impact of the interest rate on the volume of housing loans and mortgage loans, the following time series are analysed:

- housing loan interest rates;
- mortgage loan interest rates;
- building savings loan interest rates.

These time series are presented for the period 31/01/2004 – 31/12/2018 with a monthly periodicity. The ARAD database of the Czech National Bank is also a source of information on the volume of loans granted by type of loan. In particular, the following are analysed:

- total volume of loans;
- total volume of housing loans granted;
- volume of mortgage loans granted;
- volume of building savings loans granted.

Data are available from 31/01/1997 to 31/12/2018, also with a monthly periodicity.

Growth rate and trend analysis were used in the time series analysis and the correlation between the amount of the interest rate and the amount of loans granted determined by means of the Pearson correlation coefficient were used to determine the dependence. Prior to the time series analysis itself, the time series were adjusted for the effect of calendar variations, i.e. recalculated to the unit time interval. These data are obtained according to the equation:

$$y_t = y_t * \frac{\overline{k_t}}{k_t} \tag{1}$$

where:

$\boldsymbol{y_t}$ *is the value of the adjusted indicator;*
$\boldsymbol{k_t}$*is the number of calendar days in a given period;*
$\overline{\boldsymbol{k_t}}$*is the average number of calendar days in a given period.*

The moving annual average method was used for trend analysis, which is calculated as the average of a constant number of consecutive periods (12 months). The moving average is plotted in the middle of the moving part of the

[2] www.cnb.cz/docs/ARADY/HTML/index.htm

observed *p* periods. The smoothing effect of the moving averages increases with the increasing length of the moving part. At the same time, the length of the unbalanced part at the beginning and end of the row increases, which makes *(p-1)/2* periods at each of the two ends of the row. In the case of an annual total, i.e. 12 months (*p* = even number), a centered moving average is calculated. The centered moving average is then calculated as the average of two adjacent uncentered moving averages.

$$\bar{y}_t = \frac{y_{t-m}+2y_{t-m+1}+\cdots.+2y_{t+m-1}+y_{t+m}}{12m} \tag{2}$$

where: $\bar{y}_t$ *is the moving average at time* t*;*
m *is a time series element.*

In the case of the time series of the number of housing loans granted, their dependence on the development of the interest rate is analysed. The Pearson correlation coefficient is used for this purpose. The Pearson correlation coefficient is conditioned by the probability distribution of a random vector. According to the set, the linear relationship of the quantities was evaluated and the Pearson correlation coefficient is calculated according to the equation:

$$r = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2\sum_{i=1}^{n}(y_i-\bar{y})^2}} = \frac{\sum_{i=1}^{n}x_iy_i-n\overline{\overline{xy}}}{(n-1)s_xs_y} \tag{3}$$

where: $\bar{x}$ *a* $\bar{y}$ *are sample averages;*
$s_x s_y$*are sample standard deviations;*

n *is the range of the set;*
r *is the correlation coefficient.*

Time series are evaluated both in absolute terms and in terms of differential indicators. The differential indicators were created as first-order differences according to the equation:

$$D1_t = y_t - y_{t-1} \text{ for t =2, ..., n.} \tag{4}$$

The growth rate of time series is determined by the equation:

$$k_t = \frac{y_t}{y_{t-1}} \tag{5}$$

and as percentage according to the relation:

$$k_t^{\%} = 100 * \left(\frac{y_t}{y_{t-1}} - 1\right) = 100 * (k_t - 1) \text{ for t=2,....,n [\%].} \tag{6}$$

Results and Discussion

With the growing quality of life of the population in the Czech Republic, both the number of housing loans granted and the number of mortgage loans, which dominate among housing loans, are growing. It is reflected in housing construction and housing quality indicators, where a clear trend is evident, with the exception of the financial crisis, which temporarily changed the trend after 2008 and housing construction declined. Later, however, the real estate market returned to a phase of growth. Another milestone is the year 2018, when the aforementioned stricter standards were met by the Czech National Bank, which again has a negative impact on the mortgage market. The following table compares individual loans that can be used to finance housing according to the qualitative criteria that are decisive for loan applicants.

Table 1: Comparison of loan criteria for housing financing

criterion	**Mortgage loan**	**BS loan + bridge loan**	**American mortgage**	**Consumer credit**
Loan maturity	5–25 years	about 8–20 years	about 5–15 years	about 1–10 years
Interest rate	about 2–4%	about 2–6%	about 3.5–6%	4–12%
Loan repayment	Very low (the ↑ the maturity, the ↓ the repayment)	Medium	Low	High
Loan purpose	for real estate	for own home	NO	NO
Collateral	real estate collateral	according to the loan amount (NOT real estate)	real estate collateral	according to the loan amount (NOT real estate)
State aid	for new housing (for older tax deductions)	part of savings, tax deductions	NO	NO

Source: own processing

The reason why the demand for housing loans has been growing for a long time must be sought in the development of society, the desire for a better way of life and the preference for one's own housing over rental housing, even among young people without obligations. At the same time, it can be stated that people prefer smaller but own housing, rather than larger but rental housing. E.g. the average number of persons per 1 permanently occupied flat, which was 3.35 persons in 1961, decreased to only 2.47 persons by 2011; another example is the indicator of the number of persons per 1 room, which decreased from 1.86 persons in 1961 to 0.73 persons in 2011 (10). The following chart shows the number of housing loans and mortgage loans granted for residential real estate.

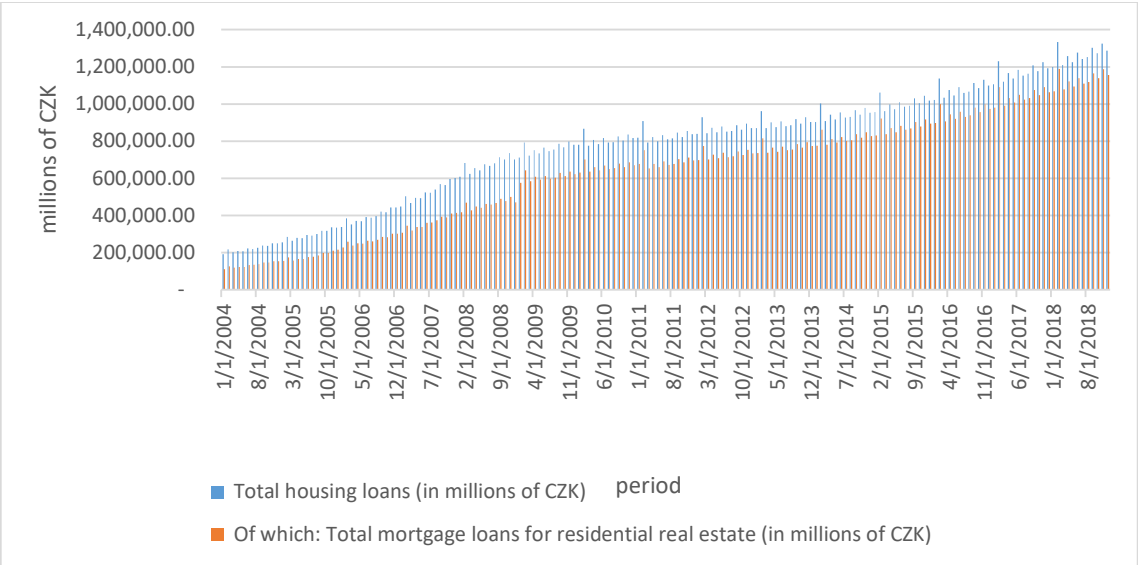

Chart 1: Development of total housing loans granted, of which mortgage loans for residential real estate

Source: own processing; data: Czech national bank available online: www.cnb.cz [2020-08-30]

The total indebtedness of households is growing. The reasons can be found, for example, in the growing availability of credit products, the declining trend in the development of interest rates and also in the current lifestyle, which can be described as consumerist, highly consumer-oriented. If we compare household indebtedness, the total household indebtedness amounted to CZK 522,848 million in 2005 (data as of 31 December 2019, time series of ARAD by the Czech National Bank) and to CZK 1,712,990 million in 2018 (data as of 31 December 2018, ČNB). At the same time, the gap between the total household indebtedness and the indebtedness for housing purposes is narrowing, as the share of housing debts was 54% of the total household indebtedness in 2005, and 73% in 2018. However, this fact may already be affected, for example, by the desire of people for better and more expensive housing and rising real estate prices on the Czech market (12).The development of the number of housing loans granted was also subjected to an analysis based on the principle of moving annual totals, as shown in the following chart.

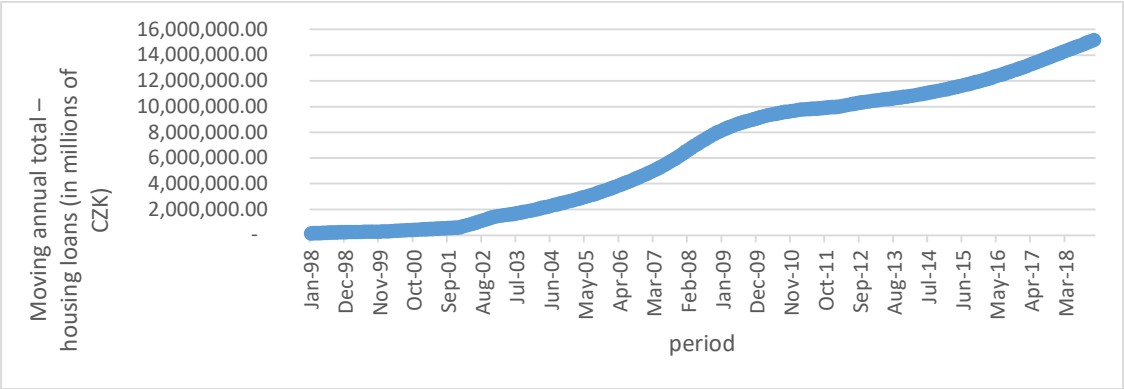

Chart 2: Development of the number of housing loans granted – moving annual total

Source: own processing; data: Czech national bank available online: www.cnb.cz [2020-08-30]

There was also a change in the structure of housing loans granted, especially in case of mortgage loans and building savings loans. While mortgage loans accounted for 47% of total housing loans in 2002 and building savings loans (and bridge loans from building savings) accounted for 36% of total housing loans, the market was fully dominated by mortgage loans in 2018, which amounted to 90 % of housing loans. The fact is caused both by a larger number of mortgage lenders than building savings loan lenders, and especially by differences in interest rates. For example, the interest rate on a mortgage loan was around 1.8% pa before 2018, while the interest rate on building savings loans was around 3% pa and more. The development of interest rates is confirmed by chart 3.

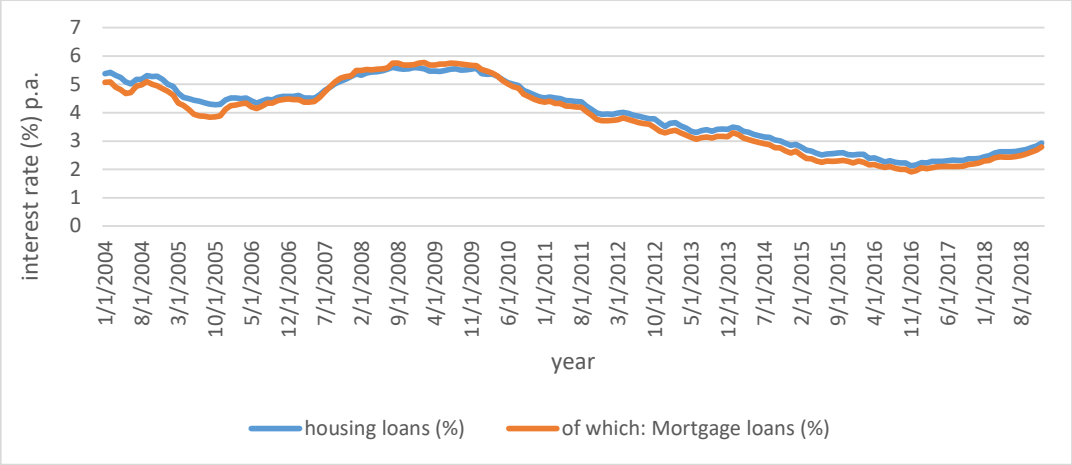

Chart 3: Development of housing loan interest rates

Source: own processing; data: Czech national bank available online: www.cnb.cz [2020-08-30]

The relationship between the development of interest rates and the number of mortgage loans granted was examined by means of correlation, or in this case, the Pearson correlation coefficient was used. It was analysed for the period 31/01/2004 – 31/12/2018 in monthly data. The correlation coefficient showed a value of -0.74 for total housing loans and -0.72 for mortgage loans, i.e. a strong correlation confirming that a decline in interest rates leads to an increase in loans granted. The time series of the volume of mortgage loans granted and mortgage loan interest rates in terms of differential indicators are shown in chart 4.

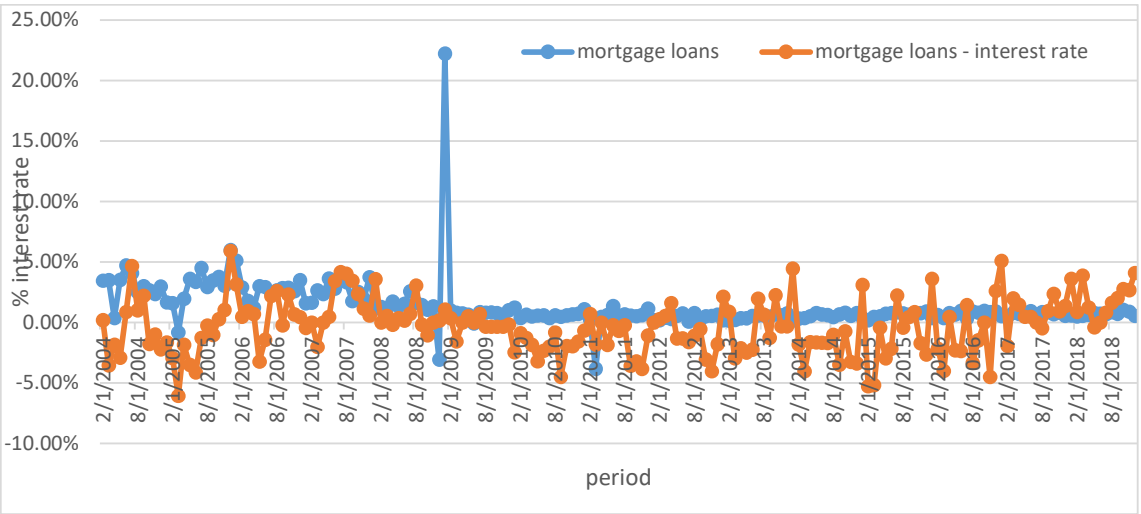

Chart 4: Development of the number of mortgage loans granted and of the mortgage loan interest rate

Source: own processing; data: Czech national bank available online: www.cnb.cz [2020-08-30]

Chart 4 presents the development of the volume of mortgage loans granted and the development of mortgage loan interest rates in terms of absolute differences. This approach clearly shows the milestones in the mortgage market. The extreme is the turn of 2008 and 2009, when there was a 22% increase in mortgage loans despite the increase in the mortgage loan percentage rate by 0.2%. The situation was caused by the entry into force of the amendment to the Building Savings Act and in the same period (i.e. from December 2008 to January 2009) there was a significant decrease in the volume of building savings loans granted from 705,000 newly concluded contracts in 2008 to 575,000 concluded contracts in 2009. Therefore, those interested in a housing loan at that time preferred mortgage loans over building savings loans.

When analysing and evaluating the time series of housing loans, it was possible to assess not only the impact of interest rates on the volume of loans granted, but also, for example, the impact of the mortgage crisis on the real estate market and the housing loan market (5) estimated that the financial crisis would have an impact on the economy in the following 10 years. At least as far as the mortgage market and real estate demand are concerned, this claim was not confirmed. The decline in demand for loans was reflected only in the following 2 years after the outbreak of the financial crisis (1, 6).

As already mentioned, in fear of the development of the economy and the mortgage market (as the example of the American mortgage crisis showed), when interest rates on mortgage loans attacked record lows in the Czech Republic as well, the national bank introduced stricter criteria for granting mortgage loans in 2017 (7). The measures were to focus in particular on how to better check the client and thus prevent the loan from being granted to persons without sufficient income. For this reason, not only did the CNB tighten the existing conditions (e.g. reduction in the LTV from 100% to 80% of the real estate value), but it also introduced completely new indicators (2). The following table clearly maps the conditions for granting mortgage loans before the introduction of stricter criteria and after their introduction.

Table 2: Overview of criteria for granting mortgage loans

Criterion:	**Conditions for granting mortgage loans**		
	General criteria		
age	18–65 (exceptionally 70 years old, working)		
income	Income confirmation, or 2 tax returns		
register	banking and non-banking register of debtors		
liabilities	according to the solvency margin		
residence	temporary for EU citizens, permanent for other foreigners		
	2016 and earlier	**2017**	**2018 and later**
income	- checking registers, - considering repayments of other loans	- checking registers, - considering repayments of other loans, - more detailed examination of structure of expenses	- checking registers, - considering repayments of other loans, - more detailed examination of structure of expenses
LTV	- 100% of the real estate price	- 80-90% of the real estate price	- 80% of the real estate price, exceptionally 90%
DTI	-	-	- total debt to annual income ratio (debt to income < 9x)
DSTI	-	-	- amount of all repayments to net income ratio (debt service to income < 45%)

Source: own processing

One of the most significant impacts of the introduction of stricter criteria on the average citizen was the limitation of loan to value (LTV), i.e. the fact that it is no longer possible to take out a loan at 100% of the real estate value, but it is necessary to have 20% of own resources. The criterion largely protects banks in the event that the client does not pay the loan and the bank is subsequently forced to sell the property. The new DTI and DSTI indicators then prevent a low-income client from reaching more expensive real estate even at a low interest rate, thus not getting into trouble in the event of a future increase in the interest rate. In the case of the DTI (debt to income) indicator, the applicant's total debt (i.e. the sum of all loans he/she has) must not exceed 9 times his/her annual income and the DSTI limits the applicant by the applicant's monthly mortgage loan repayment (and repayment of all other debts) not exceeding 45% of the applicant's net monthly income.

Conclusion

The CNB had rational reasons to tighten the conditions for granting mortgage loans. For many years, the mortgage market clearly adopted a trend of growing demand for own housing, i.e. growing demand for loans and a long-term decline in mortgage loan interest rates. Concerned about the emergence of the mortgage crisis (according to the example from the USA in 2008/2009) due to the granting of risk mortgage loans, the CNB decided to tighten the criteria (3, 8). The aim was first to protect banks from clients who do not pay (introduction of 80% LTV instead of the original 100%) and to thoroughly check clients and thus prevent over-indebtedness of Czech citizens (by introducing DTI and DSTI indicators).

It is logical that the main criterion of a person interested in a mortgage loan is the interest rate. A correlation between the development of mortgage loan interest rates and the volume of mortgage loans granted was also demonstrated. After the introduction of these criteria, the mortgage market thus expected the impacts, speculating

about an abysmal decline in the number of mortgage loans granted and an increase in the mortgage loan interest rates. However, 2019 showed that there was only a slight slowdown in the growth rate of mortgage loans and interest rates rose by an average of about 0.5% pa. It may seem that the CNB's measures were a step in the right direction, as they helped protect mortgage market participants and at the same time did not cause a sharp slowdown in the mortgage market that would lead to a slowdown in the economy.

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The Development of An Instrument for Measuring Job Autonomy of Malaysian School Teachers: A Content Validity Study

Mohamad Noorman MASREK[1], Mohammad Fazli BAHARUDDIN[2],
Shamila MOHAMED SHUHIDAN[3]
[1, 2, 3]Faculty of Information Management, UiTM, MALAYSIA, mnoorman@uitm.edu.my

Abstract

Measuring job autonomy has always been a daunting task for not only researchers but also practitioners. Various ways and methods have been developed but self-reported measures remain the most popular for researchers. The extant literature provides ample self-reported instrument which can be used to gauge job autonomy. However, given that the degree and scope of job autonomy differs according to the type of job title, the available instruments cannot be conveniently adopted without going through the process of assessing the validity. This paper reports the findings of content validity exercise for self-reported job autonomy instrument for Malaysian school teachers. The chosen instrument was originally developed for a study involving students' perspective and due to that, an issue of validity could arise when the instrument is to be used by practicing teachers especially those with long years of experience. Using a pre-testing approach of questionnaire development, the chosen instrument was refined and extended from 13 items to 20 items measuring four dimensions of job autonomy. The results of the content validity index assessment suggest that the revised instrument is acceptably valid to be used by Malaysian school teachers or teachers from other developing countries that have similarities and resemblance in their job scopes.

Keywords: Job autonomy, Content validity, Instrument assessment, Malaysian school teacher.

Introduction

Job autonomy is important for organizations to enhance employee work performances. Job autonomy is concern with the freedom, independence and discretion given to employee in executing their work (Burcharth et al., 2017). Job autonomy is presence in almost any job titles (Li, 2018; Paradis et al., 2015; Spiegelaere et al., 2014). However, the degree and magnitude varies. For certain jobs a high degree of autonomy is required while other jobs the autonomy is relatively very little. The teaching profession is an example where job autonomy is highly required (Baharuddin, Masrek, & Shuhidan, 2020). Without job autonomy, teachers would not be able to execute their jobs effectively and efficiently (Friedman, 1999).

In order to understand job autonomy of the teaching profession, researchers have embarked on empirical research focusing on school teachers. Various models and framework have been developed which outlined various variables or elements of job autonomy (Awang-Hashim et al., 2017; Dhar, 2016; Spiegelaere et al., 2016; Friedman, 1999). The similarities in terms of the variables used or found in these studies, further highlights and emphasizes the significance of that particular variables. On the other hand, the differences in terms of newly discovered variables signifies an enrichment to our understanding about the topic. Along with these models or frameworks, researchers have also developed as assessment instrument which is either self-assessed or assessed by immediate superiors, known as headmasters, in the Malaysian school setting. Between the two, the later seem to outnumbered the later, probably due to convenient factor.

In the Malaysian setting, the schools are categorized in different ways. Government or private is the typical classification normally made. However, in each of these two categories, there is another layer of categorization, identified as either boarding or non-boarding (Othman, 2016) i.e. day school. Boarding schools requires the pupils or students to stay in the school hostels. In the Malaysian contexts, higher requirements are needed for admission to the government funded boarding schools. In other words, the students who are admitted to these schools are normally considered creams or excellent academically (Malaysia Education Blueprint, 2013). The education system

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adopted in these boarding schools are also different to those used in the day schools. Given the differences that job nature, scope as well as performance indicators used in these schools are also quite different to teachers teaching in non-boarding schools. This distinction could suggest that the job autonomy would be also different. However, mining the literature indicates that studies addressing job autonomy has been focusing on non-boarding schools (Akbarpour-tehrani & Mansor, 2012; Awang-Hashim et al., 2017; Ismail, 2014). To this effect, it is not really known whether these dimensions are also applicable to boarding schools' teachers i.e. further examination is seen essential to validate the dimensions. On the basis of this background, the paper reports the findings of a study done to address this gap.

Literature Review

Table 1 showcases the different dimensions of job autonomy identified and used by previous studies. Depending on the research problem, objectives and scope, the researchers had dimensionalized job autonomy between three and six. Certain dimensions are being named differently, although the operational definitions are almost identical. For example, Spiegelaere et al (2012) and Dhar (2016) used the term 'organizing task' which is almost similar to 'teaching practice' used by Friedman (1999). However, upon further scrutiny on these studies, several themes or focus could be observed, namely freedom on performing jobs in terms of contents, delivery method and required training; freedom on the timing and location to perform jobs; freedom on making managerial decisions such as policy, finance and legal; and freedom on their professional behaviours. Out of these five themes, only the freedom on professional behaviours is considered relevant and appropriate for both boarding and non-boarding schools. In terms of jobs in terms of contents, delivery method as well as required training the Malaysian schools teachers do not seem to have much freedoms. In the same vein, limited autonomy is given in terms of work timing and place or location to execute their job.

Table 1: Dimensions of Job Autonomy

Authors	Dimension	Operational Definition
Dhar (2016); Spiegelaere et al. (2012)	1. Organizing Tasks	Freedom to perform jobs and activities.
	2. Learning Opportunities	Opportunities to develop my professional skills.
	3. Routine Work	Planning the routine tasks.
Spiegelaere et al. (2016)	1. Work Method	Sense of control over employees work and is likely to increase the overall work engagement of employees.
	2. Work Scheduling	Sense of control over the work and enables employees to react to different job demands by flexibly changing the sequencing of their tasks.
	3. Work Time	Discretion of employees on when to stop and start working.
	4. Place of Work	Freedom in deciding where to perform the job.
Verhoest et al. (2004)	1. Managerial autonomy	The decisions concerning managerial actions.
	2. Policy autonomy	The decisions concerning the structure and content of the primary production process, policy instruments and outputs, objectives and effects.
	3. Structural autonomy	Control by influencing the decisions through hierarchical and accountability lines.
	4. Financial autonomy	To the extent of which decision on funding or revenues for its financial resources.
	5. Legal autonomy	To the extent to which the legal status from altering the allocation of decision-making competencies or makes such changes.
	6. Interventional autonomy	The operations that require immediate intervention.
Friedman (1999)	1. Teaching	Decision on the school's pedagogical and social idiosyncrasy.

	practice	
	2. Achievement evaluation	Decision on means and procedures of evaluating student achievement.
	3. Parental involvement	Decision on parental collaboration modes.
	4. Staff development	Decision on the subjects for their in-service training in general, broad fields of interest.
	5. Extracurricular subjects	Decision on specific topics of enrichment activities for their students from existing programs.
	6. Curriculum change and development	Decision on developing unique teaching methods based on student needs.
Awang-Hashim et al. (2017)	1. Responsible	Attitude, dedication, and professionalism.
	2. Approachable	Flexible interpersonal teaching styles and friendliness.
	3. Shows respect	Gentle ways of dealing with students and colleagues.
	4. Conveys confidence	Ability to convey confidence to students and colleagues' capabilities.

Given that the objective of this study is to identify the dimensions used for assessing job autonomy in the context for boarding school teachers in Malaysia, the dimensions identified by Awang-Hashim et al. (2017) is considered the ideal option for further exploration. The four dimensions which are responsible, approachable, shows respect and convey confidence would be further validated as discussed in the methodology section of this paper. The fact that the study by Awang-Hashim et al. (2017) was done involving teachers in non-boarding schools, the need to empirically validate the dimensions and the corresponding scale is therefore very crucial. As stated in the preceding section, job nature, scope as well as performance indicators used in boarding schools differ to that non-boarding schools. To this effect simply adopting the dimensions together with the scales without undergoing validation process would raise the issue of validity and reliability.

Methodology

Instrument Development

As stated in the preceding section, the present study decided to further explore and validate the dimensions used by Awang-Hasim et al, (2017). The decision was made after reviewing the available literature on the topic. Using the four dimensions as the initial conceptual framework, the researchers embarked on a field study by interviewing the selected teachers from the boarding schools. The purpose of the interview was to understand the meaning of the four concepts (i.e. responsible, approachable shows respect and convey confidence) to them. Open ended questions revolving on "how" and "why" were put forwards. Each interview lasted for about 45 to 90 minutes. Appointment and arrangement was made earlier to make sure that the participants were totally free and they could fully commit and focus during the interview. For every responses given, the researchers tried to probe with follow-up questions so as to ensure that an in-depths responses could be collected. Using the thematic analysis of qualitative data analysis, the responses of the participants were mapped to the initial conceptual framework. The results of the analysis clearly showed that the four dimensions were also applicable in the context of the selected boarding school teachers.

Following the outcome of the interview, a follow up study was conducted to develop a self-reported assessment for measuring these four dimensions of job autonomy. The original instrument developed by Awang-Hasim et al, (2017) was assessed and evaluated by comparing with the responses obtained from the interviews. Several original items were removed while certain items were paraphrased. Several new items were also added and the final measurement is shown in Table 2. Given that the items employ perceptual measurement, each item is connected with a Likert Scale anchoring that gauge the extend to agreeableness or disagreeableness of the respondents. The anchoring used are 1: *Strongly Disagree*, 2: *Disagree*, 3: *Neutral*, 4: *Agree* and *5: Strongly Agree*.

Table 2: Items for Each Dimension

Responsible	
1	I display professionalism in my profession
2	I teach wholeheartedly using appropriate aids and activities
3	I give extra attention for all weak students
4	I don't mind providing extra classes for my students
5	I deal with students' issues responsibly
Approachable	
1	I understand and realize student's weaknesses
2	I am willing to listen to others problems
3	I am approachable by my student even outside of classroom
4	I am approachable by my colleagues even outside of school
5	I am approachable by parents of the students
Showing Respects	
1	I encourage everyone in school work in their own way
2	I speak gently with everyone in school
3	I acknowledge my colleagues' strength and weaknesses
4	I never humiliate anyone in school
5	I do not have favoritism among students
Conveys confidence	
1	I assign responsibility for school related tasks to the student
2	I conduct question and answer session in the class
3	I encouraged colleagues to work efficiently
4	I am generous with using encouraging words to students and colleagues
5	I always encourage students and colleagues to set high standards for achievement

Accordingly, a pre-test exercise was executed by following the steps suggested by Polit and Beck (2006). A form was created presenting the variables with the corresponding operational definitions and measurement items. The focus of the pre-testing is on the content validity, wordings, ordering of questions, instructions, layout, formatting, font, length and spelling. Lynn (1986) advised a minimum of three experts, but indicated that more than 10 were probably unnecessary. In the context of this study, a total of six participants as shown in Table 3 were engaged for the pre-testing exercise. Each of them was briefed to give their inputs on the aforementioned criteria.

Table 3: List of Panel Experts during the Questionnaire Pre-testing

No	Panel Experts	Organization
1	Associate Professor 1	Public University A
2	Associate Professor 2	Public University B
3	Teacher 1 (DG44)	School A
4	Teacher 2 (DG41)	School B
5	Teacher 3 (DG44)	School C
6	Education Officer (DG44)	State Education Department

For each item measuring the concept, a four-point ordinal rating was used: 1 = *No relevance at all*, 2 = *Item need some revision*, 3 = *Relevant but need minor revision*, and 4 = *Very relevant*. The experts were required to rate each item based on this scale. The content validity index for items (I-CVI) is computed as the number of experts giving a rating of either 3 or 4 (thus dichotomizing the ordinal scale into relevant and not relevant), divided by the total number of experts which is in this study involve 6 experts. Lynn (1986) suggested I-CVIs no lower than 0.83 if there are 6 experts in total. The other type of content validity performed was content validity index for scales (S-CVI) to measure the content validity of the overall scale which includes Universal Agreement (UA) and Ave (Average).

Findings

The results for the content validity assessment are shown in Table 4 until Table 7 while Table 8 summarizes the overall results. The I-CVI for all the items of the four dimensions ranged from 0.97 to 1.00. The S-CVI (Average) for responsible, approachable, and showing respect dimension of job autonomy were 0.97 (Table 5, Table 6 and Table 7) respectively. Meanwhile conveys confidence dimension of job autonomy was 1.00 (Table 8). The overall S-CVI for the 20-item scale was 0.98 which indicated high content validity of the items for the construct of job autonomy. All of the constructs are maintained as they have a relatively high value of agreement among experts. It can be concluded that the scores for pre-testing is above the recommended threshold and the constructs chosen for the research instrument are valid.

Table 4: I-CVI and S-CVI/Ave for Responsible (R)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number of Agreement	Item CVI
R1	1	1	1	1	1	1	6	1.00
R2	1	1	1	1	1	1	6	1.00
R3	1	1	1	1	1	1	6	1.00
R4	1	1	1	1	1	1	6	1.00
R5	0	1	1	1	1	1	5	0.83
Proportion Relevant:	0.80	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	0.97
							S-CVI/UA:	0.80
							S-CVI/AVE:	0.97
Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement								
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.83 and S-CVI/AVE is 0.90 for 6 experts								

Table 5: I-CVI and S-CVI/Ave for Approachable (A)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number of Agreement	Item CVI
A1	0	1	1	1	1	1	5	0.83
A2	1	1	1	1	1	1	6	1.00
A3	1	1	1	1	1	1	6	1.00
A4	1	1	1	1	1	1	6	1.00
A5	1	1	1	1	1	1	6	1.00
Proportion Relevant:	0.80	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	0.97

							S-CVI/UA:	0.80
							S-CVI/AVE:	0.97
Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement								
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.83 and S-CVI/AVE is 0.90 for 6 experts								

Table 6: I-CVI and S-CVI/Ave for Showing Respect (SR)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number of Agreement	Item CVI
SR1	0	1	1	1	1	1	5	0.83
SR2	1	1	1	1	1	1	6	1.00
SR3	1	1	1	1	1	1	6	1.00
SR4	1	1	1	1	1	1	6	1.00
SR5	1	1	1	1	1	1	6	1.00
Proportion Relevant:	0.80	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	0.97
							S-CVI/UA:	0.80
							S-CVI/AVE:	0.97
Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement								
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.83 and S-CVI/AVE is 0.90 for 6 experts								

Table 7: I-CVI and S-CVI/Ave for Conveys Confidence (CC)

Item	**Expert 1**	**Expert 2**	**Expert 3**	**Expert 4**	**Expert 5**	**Expert 6**	**Number of Agreement**	**Item CVI**
CC1	1	1	1	1	1	1	6	1.00
CC2	1	1	1	1	1	1	6	1.00
CC3	1	1	1	1	1	1	6	1.00
CC4	1	1	1	1	1	1	6	1.00
CC5	1	1	1	1	1	1	6	1.00
Proportion Relevant:	1.00	1.00	1.00	1.00	1.00	1.00	Mean I-CVI:	1.00
							S-CVI/UA:	1.00
							S-CVI/AVE:	1.00
Note: X = Item is relevant; I-CVI = Item Content Validity Index; S-CVI/UA = Scale Content Validity Index/Universal Agreement								
S-CVI/AVE = Scale Content Validity Index/Average Proportion; Minimum I-CVI is 0.83 and S-CVI/AVE is 0.90 for 6 experts								

Table 8: Summary of content validity

Construct	No. of Items	I-CVI (>= 0.83)	S-CVI/Ave (>=0.90)
Responsible	5	0.97	0.97
Approachable	5	0.97	0.97
Showing Respect	5	0.97	0.97
Conveys Confidence	5	1.00	1.00

Conclusion

The objective of this study is to identify the dimensions used for assessing job autonomy in the context for boarding school teachers for a developing country such as Malaysia. The literature review exercise had identified the appropriate dimensions and the corresponding. However, given that these dimensions were originally developed for non-boarding school teachers, further validation was conducted and the results showed that these dimensions, namely, responsible, approachable, showing respect and convey confidence were found to be relevant. In addition, the corresponding scales were also revised and the validation exercise showed that validity scores were highly reliable. Hence, researcher intending to examine job autonomy of boarding school teachers may consider adopting this scale.

While the study has successfully achieved its objective, it also suffers several limitations. The first and foremost is the dimensions chosen were purely based on a study done in the Malaysian context. Every country has its own schooling systems and due to that, care should be taken when adopting these dimensions and scales. Secondly, the chosen dimensions are also too narrow in terms of its scope, hence future research should consider extending by integrating other themes or category as highlighted in the literature review section.

Conclusion

The researcher would like extend our thanks to all respondents who participated in this study and also Universiti Teknologi MARA (UiTM) for providing all the necessary supports throughout the conduct of the study. The study is registered in UiTM as 600-IRMI/FRGS 5/3 (459/2019).

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The Mediating Role of Student Satisfaction on Student Commitment during the Digitalization Era

Nouran NASHAAT
Business Information Systems Department, College of Management and Technology, Arab Academy for Science, Technology and Maritime Transport, Cairo, Egypt n.a.nashat@aast.edu
Rasha ABD EL AZIZ
Business Information Systems Department, College of Management and Technology, Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt rasha_a@aast.edu
Marwa ABDEL AZEEM
Marketing and Business Department, College of Management and Technology, Arab Academy for Science, Technology and Maritime Transport, Cairo, Egypt Marwatarek1978@aast.edu

Abstract

The present study uses a proposed model to explore satisfaction and commitment of students in an online learning environment. First, it presents the key determinants of student satisfaction and their impact on student commitment. Second, it examines the significance impact of each of the three key determinants namely course structure, online tutorials flexibility and technology quality on both student satisfaction and commitment.

A sample of 410 students enrolled in an Egyptian higher education institution pursued an online questionnaire through Survey Monkey. This study uses structured equation model approach for data analysis that was gathered online. However, the only determinant namely course structure had insignificant effect on both student satisfaction and student commitment. Specifically, both key determinants namely online tutorial flexibility and technology quality had a significant influence on student satisfaction as well as student commitment. In addition, the mediating role of student satisfaction was tested and had positive influence between the key determinants and student commitment except with course structure.

The study highlights the issue of commitment as a behavior of students in an online learning environment and their satisfaction bonded with key determinants. The context is limited to one higher education institution in an online learning environment. Further research is needed to investigate the key determinants in other higher educational institutions in Egypt and could be extended to other countries if possible. This study will be useful for academics and educators interested in the behavior of students in e-learning through the digitalization era.

Keywords: satisfaction, commitment, online learning, course structure, online tutorial flexibility, technology quality

Introduction

Over the previous years, higher education institutions were offering courses online for students as one of their academic plan's components. Online courses are connecting a variety of tools such as social networking and curriculum available online through different e-learning platforms such as Moodle, Blackboard, etc. The active involvement of many students in these courses who participate individually according to their achieving goals, previous knowledge, and skills is a major factor for success. (McAuley et al., 2010). Education is one of the most dominant means of providing social equality as well as an accomplishing experience of an individual's life. The basic tools require computer screens connected to the internet so lectures could be delivered, the course content is visible for the students to read, audio devices are required to deliver the course content as well as interactions and discussions via video output. Many academic institutions used Zoom as their platform to deliver all course from video and audio tools as well as Moodle for the whole course content and syllabus from power points, pdf files, assignments, and quizzes.

E-learning is defined as the learning tool delivered via computers for the intention to develop education (Mayer, 2003), that has expanded quickly over last years with the upgrades in technology and the integration of it with educational curricula. (Smart and Cappel, 2006). E-learning is essential to develop good calibers well educated, as well as the rapid need of society for long term learning that is delivered in an appropriate form. Learning online

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can take many forms from fully online, blended or web-assisted, no matter what the delivery technique of learning, however number of different tools are available at the students and faculty members' hands. (Alshehri, 2017). In fact, online learning is a tool that is globally used for learning with standards and it is not required from the learner or the student to attend the class physically and is suitable for students who are interested in studying while they have other commitments. (El-Ebiary et al., 2016).

E-learning now is not a strategy to overcome just learning from distance, it is now a way to adapt to learning as per personal schedule especially after the pandemic of COVID-19 2020. In this study, students used Moodle that allowed them to interact with the lecturers using audio and video, submit assignments and quizzes, upload and/or download files, have feedback on their grades and have access to the content anywhere anytime. Development of such platforms or applications made the online learning a more interactive way for students to learn at their preference. In recent years, interventions using technologies based on the Internet have allowed electronic learning as a major element in education (Aşkar and Halici, 2004). Online learning can provide academic institutions with a reduced cost, and adaptable tool to grow globally (Casey, 2008).

Students enjoyed this way of online delivery and sometimes it seemed to be more effective than face to face teaching. While students have an online meeting with their instructors, this screen sharing approach may helped the students to feel less exposed when asking for help compared to a physical class within groups. The students may prefer a quicker way to ask for help such as posting their questions on the online chat. This way of asking questions may allow the student to feel more comfort than raising up their hands in front of their colleagues in a computer lab. Similar recent studies have reported (Davison, 2020) that student interaction was motivated through the use of online chat functionality. (Dwivedi et al., 2020).

In light of the dramatic increase in the use of online courses, in higher education especially after the pandemic of COVID-19, the current study deals with identifying key determinants of student satisfaction in an online learning environment namely online tutorials flexibility, online tutorials quality and technology quality. It also investigates the impact of the student satisfaction on their commitment towards the institution and the learning process. Several studies tackled student satisfaction and its key determinants but one of the recent studies investigated factors that were relevant to the online learning environment students have experienced through the pandemic in Egypt. In the study of (Harsasi and Sutawijaya, 2018), it included four variables namely course structure, online tutorials flexibility, online tutorials quality and technology quality but online tutorials quality had less impact on student satisfaction. Therefore, the proposed model investigates three variables namely course structure, online tutorials flexibility and technology quality according to the pandemic period in Egypt.

This study sheds light on some of the determinants of students' satisfaction and the impact of students' satisfaction on their commitment online. This is to know which determinants are the most effective on the students' satisfaction in the online learning process and to explore the influence of their online satisfaction on their commitment towards their institution. Technology becomes a crucial part in our life. E-learning, internet and computers have been used extremely in the learning process during COVID-19 (Khan and Raad, 2020). This study may have a marked impact on online course satisfaction and commitment. Furthermore, this study may affect not only academic courses but have a paved a way for academic institutions and professional training centers to measure the behavior of students after COVID-19. Instructors and researchers can use this study and the preliminary model for the benefit of their research and instruction specially to understand and improve the behavior of students through the online learning process.

Literature Review

There are number of studies that have investigated student satisfaction and commitment in relation to e-learning. A study found that the less student satisfaction the more the failure of any e-learning implementation, and there are many determinants that affect student satisfaction in e-learning. Moreover, (Hermans et al., 2009) suggested that student satisfaction has a vital role to endorse higher education successfully. These authors tested the relationships among different factors that influence student satisfaction in an online learning environments. (Alshehri, 2017)

A definition for satisfaction and commitment need to be clarified. Student satisfaction is an indicator of whether learners or students are satisfied with their learning experience. (Li et al., 2016). In the academic context of higher education, student satisfaction plays an important role in universities' success (Firdaus, 2006), and the concept of satisfaction has been extended to evaluations of higher education services. (Elliott and Healy, 2001) state that the concept of students' satisfaction is a short-term behavior and a result of students' experiences with their educational services provided by their institution.

Previous research has found that organizational commitment which is defined as a person's commitment to the organization that they work in is related to their career commitment (Womack, 2016) , which means that a person's commitment to their organization is an indicator of their commitment to his or her career. The concept of organizational commitment is altered to state the commitment that the student feels towards his or her institution. (Womack, 2016)
Commitment can be viewed as future-oriented self-regulation where one set the goals based on their identity and then behave in a way to achieve the goals bounded by their identity. (Human-Vogel and Vogel, 2015).

A tool was developed to measure employee commitment based on a three-component model of affective, continuance and normative commitment. Affective commitment refers to the attachment and involvement to the organization, Continuance commitment refers to the costs assessed of leaving the organization and Normative commitment refers to the feeling of supporting the organization and remaining in it. (Wilson et al., 2016). The aim of a recent study was to explore factors that have an effect on student satisfaction in online learning environment based on previous research by (Sun et al., 2008) and (Eom et al., 2006).

The impact of course structure on student satisfaction

Course structure is viewed as an important variable that support the success of online learning. According to (Moore, 1991) the course structure
"expresses the rigidity or flexibility of the program's educational objectives, teaching strategies, and evaluation methods" and the course structure describes
"the extent to which an education program can accommodate or be responsive to each learner's individual needs."

Course structure has two parts which are course objectives and course infrastructure. Course objectives are concerned with the course curriculum that includes the topics to be learned, the assignments to be completed, the class participation online, group projects and so on. Those parts affect the student satisfaction level and their learning outcomes. According to (Eom et al., 2006), it was stated that course structure will be correlated to student satisfaction and perceived learning outcomes when the course material is organized in a logical sequence and that a clarified course objectives will lead to high student satisfaction levels. (Eom et al., 2006)

Hypothesis 1: Course structure has a significant impact on student satisfaction.

The impact of online tutorials flexibility on student satisfaction
Satisfaction and participation of students are facilitated because of the flexibility in time, location and methods found in online learning courses. (Arbaugh, 2002) (Arbaugh, 2000) (Berger, 1999). Moreover, the exclusion of any traditional classroom environment enables more interaction that promotes cooperative learning. Students can communicate online anytime anywhere with no limits. In addition, the virtuality available online reduces the discomfort of face to face communication that is available in traditional classrooms. Students have the freedom to express their opinions and ask questions through discussion groups without restraint. "The definition of e-Learning course flexibility is learners' perception of the efficient and effects of adopting e-Learning in their working, learning, and commuting hours". (Sun et al., 2008)

Hypothesis 2: Online tutorials flexibility has a significant impact on student satisfaction.

The impact of technology quality on student satisfaction

Several researchers suggest that the technology quality and Internet quality affect satisfaction in e-Learning (Piccoli et al., 2001) (Webster, 1997). Students will be willing to adopt an e-learning software or tool with few barriers and their satisfaction will be improved. (Amoroso and Cheney, 1991). Online learning may involve learning and discussion using tools such as video conferencing. Therefore, quality of the technology and the Internet are important factors in e-Learning (Piccoli et al., 2001) (Webster, 1997). In addition, a research conducted by (Webster, 1997) studied learning effects on the technology applied in a distance learning of 247 students and found that quality and reliability of technology influence learning effects. "The definition of technology quality is the learners' perceived quality of IT applied in e-Learning (such as microphones, earphones, electronic blackboards, and so on)". (Sun et al., 2008)

Hypothesis 3: Technology quality has a significant impact on student satisfaction.

The impact of student satisfaction on commitment

In an academic context, the knowledge about teachers' attitudes needs more attention as the universities' performance depends on their staff which must be satisfaction and commitment (Tsui and Cheng, 1999). In the same manner, students are other academic entities and their satisfaction and commitment require more attention. stated that an academic employee will feel more satisfied, more committed to his or her academic institution and will develop the output of their universities (Sami et al., 2012). Some research studies support the contention that satisfaction predicts commitment and that satisfaction is positively related with affective and normative commitment, but not with continuance commitment. (Bashir and Ganai, 2019)

Hypothesis 4: Student satisfaction has a significant impact on student commitment.

Research Hypotheses

The main aim of this study is to explore the impact of each of those variables on student satisfaction in an online learning environment and the mediating effect of student satisfaction between independent variables and student commitment.

Based on the previous study, this research adopted three variables that have influence on student satisfaction online. These variables are course structure, online tutorial flexibility and technology quality. To achieve the research objectives, the hypotheses developed as follows:

H1: Course structure has a significant impact on student satisfaction.
H2: Online tutorials flexibility has a significant impact on student satisfaction.
H3: Technology quality has a significant impact on student satisfaction.
H4: Student satisfaction has a significant impact on student commitment.

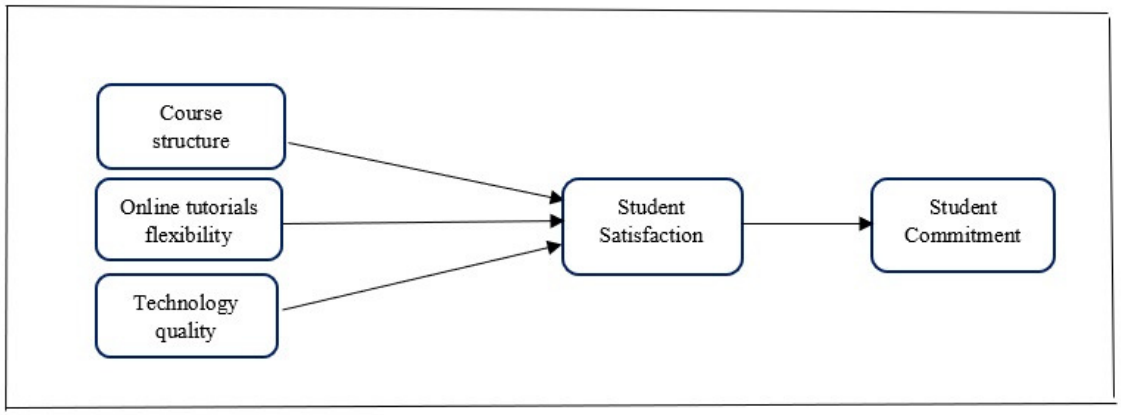

Figure 1: The proposed research model

Methodology

This research was based on the use of three independent variables (course structure, online tutorials flexibility and technology quality) and one mediating variable (student satisfaction). In addition, the dependent variable student commitment was used based on another previous study by (Wilson et al., 2016).

The observed data were collected using a survey methodology. The target population were students from higher education institutions and due to the pandemic of COVID-19, the sample size was 410 students inside one of the top accredited universities in Egypt. Participants of the study were students from different colleges inside the university. The students are those who pursued Second Semester 2020/2021 and who took the experiment of online courses through the pandemic of COVID-19.

A questionnaire was distributed to the students online through a link on SurveyMonkey. The responses to the questionnaire were 410 students from different colleges such as College of Management and Technology, College of International Transport & Logistics, College of Language & Communication, College of Computing & Information Technology and College of Engineering & Technology.

The survey instrument to explain the independent variables and the mediating variable that have been identified before were adopted from (Harsasi and Sutawijaya, 2018) while the dependent variable was adopted from (Wilson et al., 2016). Each variable's indicators are measured using 5 points Likert scale with the following scale:
1 = Strongly disagree
2 = Disagree
3 = Neither agree nor disagree
4 = Agree
5 = Strongly agree
Each variable has their own indicators as shown in Table 1.

Table 1: Indicators of each variable

Variable	Indicators	Code
Course Structure	1. Course material is presented in an organized structure	CS1
	2. The learning objectives in the online tutorial has been conveyed properly	CS2
	3. The material in the online tutorial has been understandable and arranged in a logical sequence	CS3
	4. The structure of the syllabus in the online tutorial already covers all the material I need to learn in one course	CS4
Online tutorial flexibility	1. Learning through online tutorial gave me the flexibility to adjust my learning time	OTF1
	2. Learning through online tutorial benefit me	OTF2
	3. Learning through online tutorial made me have the flexibility to divide the time between learning activities and other jobs	OTF3
	4. Learning through online tutorial has no disadvantage	OTF4
	5. Learning through online tutorial lets me manage my time more effectively	OTF5
	6. Learning through online tutorial makes me save time rather than having to attend class	OTF6
	7. Learning through online tutorial saved me from not missing the lecture as I can learn the material at any time	OTF7
Technology quality	1. I can access online learning anywhere	TQ1
	2. I do not experience any problems when learning online	TQ2
	3. I do not encounter any difficulty in responding to the discussion	TQ3

	4. I do not see any difficulty when uploading task, I feel that technology for online learning is:	TQ4
	Easy to use	TQ5
	Have useful functions	TQ6
	Very helpful for learning materials	TQ7
	Facilitate communication with tutors or other students	TQ8
Student Satisfaction	1. I am satisfied with the whole system of online learning	OSS1
	2. Overall, online learning system is already well	OSS2
	3. Overall, online learning has been successful	OSS3
	4. Learning through online learning system enable me to learn independently	OSS4
	5. I will keep learning through the online learning system in the future	OSS5
Student Commitment	1. I am happy being a student of AASTMT	SC1
	2. I enjoy discussing about AASTMT with the people outside it	SC2
	3. I really feel as if AASTMT's problems are mine	SC3
	4. I am deeply attached to AASTMT	SC4
	5. I am part of the family of AASTMT	SC5
	6. I feel emotionally attached to AASTMT	SC6
	7. AASMT has a great personal meaning for me	SC7
	8. I am afraid of what might happen if I quit my studies in AASMT without having another one lined up	SC8
	9. It would be very hard for me to leave my studies in AASMT right now, even if I wanted to	SC9
	10. Too much in my life would be disrupted if I decided to leave my studies in AASTMT now	SC10
	11. It would be too costly for me to leave AASTMT now	SC11
	12. Right now, staying on my studies in AASMT is a matter of necessity	SC12
	13. I think that people these days rarely move from a university to another	SC13
	14. I believe that a person must always be loyal to his or her AASMT	SC14
	15. Jumping from AASMT to another seems unethical to me	SC15
	16. One of the major reasons I continue to study in AASTMT is that I feel a sense of moral obligation to remain	SC16
	17. Even if I got another offer of a better university elsewhere, I would feel it is right to stay in AASTMT	SC17
	18. Things were better in the days when people stayed in one institution for most of their career	SC18

Results and Discussion

This section presents the data analysis part of the study. The analysis of this paper was done using the statistical package for social sciences (SPSS V26) for basic descriptive statistics, and (SmartPLS 3.2.7) for SEM-PLS modeling. It is divided into four sections respectively: Data preparation, measurement model for reliability and validity, several descriptive statistics and bivariate correlations are constructed and finally the structural model for hypothesis testing and mediation analysis.

Data preparation

This examination is important in any quantitative research and specifically when using SEM for data analysis (Hair Jr et al., 2017). The issue of missing data was inspected and found that some indicators have missing percent greater than 5%, so, according to (Hair Jr et al., 2017) the best scenario is the case-wise deletion. Considering outliers, there are no outliers detected in our dataset.

The data distribution is not an issue, since the SEM-PLS is non-parametric tool that does not assume normal data ((Hair Jr et al., 2017) (Garson, 2016). Structural equation modeling is an analysis approach that tests both the measurement model and path that helps to develop more realistic assumptions (Abdi, 2010) (Hair Jr et al., 2017). Hence, this study focuses on examining the prediction of the dependent variable, the mediation analysis, and the effect of independent variables, which make PLS method the most appropriate in this study.

Assessing the Measurement Model

The measurement models, which are also known as the outer models, describe the relationships between the constructs and their items. The assessment of the reflective measurement models in PLS-SEM requires evaluating the internal consistency reliability, convergent validity, and discriminant validity (Hair et al., 2011) (Nachtigall et al., 2003) (Xiong et al., 2015) (Garson, 2016). The internal consistency reliability examines whether all of the indicators associated with a construct are actually measuring it (Pallant and Manual, 2010). There are different ways to measure internal consistency. Cronbach's alpha is a statistical measure that is the most used for this purpose. The accepted value of Cronbach's alpha is 0.7, all values of Cronbach's alpha in the table (2) were above 0.7.

Table 2: Results of the Measurement Model

Latent Variable	Indicator	Loadings	AVE	CR	rho_A	Cronbach's Alpha	Discriminant Validity
Cut-off Point		> 0.4	> 0.5	> 0.7	> 0.7	> 0.7	HTMT ratio Less Than 0.9
Course Structure	CS1	0.829	0.792	0.938	0.921	0.912	Yes
	CS2	0.912					
	CS3	0.916					
	CS4	0.9					
Online Tutorials Flexibility	OTF1	0.849	0.683	0.937	0.923	0.921	Yes
	OTF2	0.846					
	OTF3	0.875					
	OTF4	0.688					
	OTF5	0.872					
	OTF6	0.818					
	OTF7	0.821					
Technology Quality	TQ1	0.686	0.664	0.94	0.932	0.927	Yes
	TQ2	0.798					
	TQ3	0.829					

	TQ4	0.843					
	TQ5	0.797					
	TQ6	0.84					
	TQ7	0.891					
	TQ8	0.819					
Student Satisfaction	OSS1	0.919					
	OSS2	0.931					
	OSS3	0.929	0.783	0.947	0.937	0.93	Yes
	OSS4	0.774					
	OSS5	0.862					
Student Commitment	SC1	0.784					
	SC2	0.82					
	SC3	0.822					
	SC4	0.851					
	SC5	0.825					
	SC6	0.865					
	SC7	0.882					
	SC8	0.808					
	SC9	0.77	0.637	0.969	0.967	0.966	Yes
	SC10	0.782					
	SC11	0.737					
	SC12	0.688					
	SC13	0.63					
	SC14	0.856					
	SC15	0.796					
	SC16	0.82					
	SC17	0.823					
	SC18	0.761					

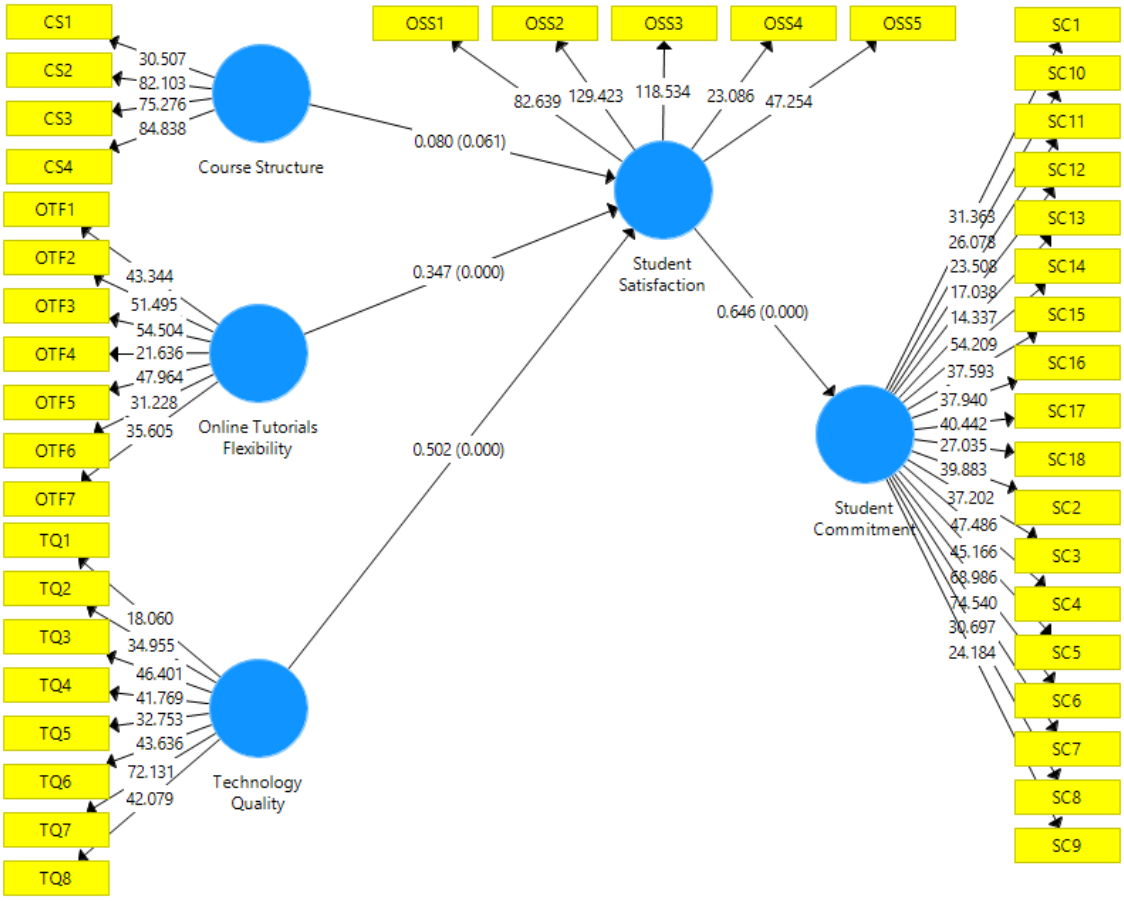

Figure 2: Path Coefficints with Corresponding P-values

The AVE is a standard measure used to establish convergent validity. All of the constructs in Table (2) have AVE scores higher than 0.50. After establishing the convergent validity, it is time to examine the discriminant validity. Discriminant validity examines how much a construct differs from other constructs.

Descriptive Statistics and Multiple Correlations

Table (3) shows the descriptive statistics of the variables. It can be shown that course structure has mean and standard deviation as $(M = 3.67, SD = 0.943)$ with direct medium correlation to both online student satisfaction $(r = .683, P < 0.001)$, and student commitment $(r = .611, P < 0.001)$.

Table 3: Descriptive Statistics and Multiple Correlations

		CS	OTF	TQ	OSS	SC
Multiple Correlations	CS	1	.718***	.712***	.683***	.611***
	OTF		1	.806***	.810***	.579***
	TQ			1	.837***	.688***
	OSS				1	.645***
	SC					1
Descriptive Statistics	Mean	3.6732	3.6504	3.7299	3.5813	3.7695
	Std. Deviation	0.94271	0.97918	0.85533	1.00841	0.88209
	Skewness	-0.746	-0.775	-0.662	-0.742	-0.718
	Kurtosis	0.271	-0.006	0.025	-0.088	0.152

***P<0.001

Online tutorial flexibility has mean and standard deviation as $(M = 3.65, SD = 0.979)$, with direct strong correlation to online student satisfaction $(r = .810, P < 0.001)$, and direct medium correlation to student commitment $(r = .579, P < 0.001)$. Technology quality has mean and standard deviation as $(M = 3.73, SD = 0.855)$, with direct strong correlation to online student satisfaction $(r = .837, P < 0.001)$, and direct medium correlation to student commitment $(r = .688, P < 0.001)$. Online student satisfaction with mean and standard deviation $(M = 3.58, SD = 1.01)$, and student commitment with mean and standard deviation $(M = 3.77, SD = 0.882)$ correlate to each other with direct medium correlation as $(r = .645, P < 0.001)$.

Assessing the Structural Model

Researchers provided guidelines for evaluating and reporting the structural model, including path coefficients, collinearity, coefficient of determination (R2), effect size (f^2), predictive relevance (Q2), and goodness of fit criteria, table (4) summarises those criteria.

Table 4: Criteria of Structural Model Assessment

Criteria	Guidelines	Reference
Path coefficients	Significance: $p \leq 0.05$	(Hair Jr et al., 2017)
Collinearity	VIF < 5	(Hair Jr et al., 2017)
Coefficient of determination (R^2)	Weak effect: $R^2 = 0.19$ Moderate effect: $R^2 = 0.33$ High effect: $R^2 = 0.67$	(Chin et al., 1998)
Effect Size (f^2)	f^2 between 0.02-0.14, small; f^2 between 0.15-0.34, moderate; $f^2 \geq 0.35$, High.	(Chen et al., 1998)
Cross-validated redundancy (Q^2)	Predictive Relevance Using blindfolding $Q^2 > 0$	(Chin et al., 1998)
Goodness of Fit (GoF)	GoF less than 0.1, no fit; GoF between 0.1 to 0.25, small; GoF between 0.25 to 0.36, medium; GoF between 0.25 to 0.36, large.	(Wetzels et al., 2009)

Path coefficients refer to the estimates of the relationships between the model's constructs. When assessing the PLS path, studies should report path coefficients beside the significance level, t-value, and p-value. According to (Hair Jr et al., 2017) , every significant coefficient eventually depends on the standard error, which is usually obtained by using bootstrapping. Moreover, the strength of path coefficients can be measured through direct and indirect effects. We are interested in some direct and indirect effects to test the hypothesis underlying this research.

The hypothesis testing has been done to understand the signs, size, and statistical significance of the estimated path coefficients between the constructs. Higher path coefficients suggest stronger effects between the predictor and predicted variables. The significance of the supposed relationships has been established by measuring the significance of the p-values for each path with threshold equalling p <0.05. The p-values and inference of hypotheses, as well as the confidence level for each estimate, are shown in Table 4. The findings of this study reveal that all hypotheses are accepted except H1 and H5.

The results show that online tutorials flexibility yeilded a significant effect on student satisfaction since ($\beta = 0.347, t = 4.798, P < 0.001, 95\%\ CI$ for $\beta = [0.208,0.493]$), so the 2nd hypothesis is accepted. Technology quality yeilded a significant effect on student satisfaction since ($\beta = 0.502, t = 6.858, P < 0.001, 95\%\ CI$ for $\beta = [0.351,0.637]$), so the 3rd hypothesis is accepted. Student satisfaction yeilded a significant effect on student commitment since ($\beta = 0.646, t = 15.87, P < 0.001, 95\%\ CI$ for $\beta = [0.561,0.724]$), so the 4th hypothesis is accepted. The mediation analyses showed that student satisfaction mediates the relationship between online tutorials flexibility and student commitment through the indirect effect ($\beta = 0.224, t = 4.759, P < 0.001, 95\%\ CI$ for $\beta = [0.135,0.32]$), so the 6th hypothesis is accepted. Student satisfaction also mediates the relationship between technology quality and student commitment through the indirect effect ($\beta = 0.325, t = 6.009, P < 0.001, 95\%\ CI$ for $\beta = [0.216,0.429]$), so the 7th hypothesis is accepted. The remaing hypotheses are not supported.

Table 5: Hypothesis Testing

	??	Mean	Std. Deviation	t-value	P-value	95% CI		Decision
						LL	LL	
Direct Effects								
H1: *Course Structure -> Student Satisfaction*	0.08	0.081	0.043	1.872	0.061	-0.001	0.164	Not Supported
H2: *Online Tutorials Flexibility -> Student Satisfaction*	0.347	0.348	0.072	4.798	0.000***	0.208	0.493	Supported
H3: *Technology Quality -> Student Satisfaction*	0.502	0.501	0.073	6.858	0.000***	0.351	0.637	Supported
H4: *Student Satisfaction -> Student Commitment*	0.646	0.648	0.041	15.87	0.000***	0.561	0.724	Supported
Indirect Effects								
H5: *Course Structure -> Student Satisfaction -> Student Commitment*	0.052	0.053	0.028	1.833	0.067	-0.001	0.11	Not Supported
H6: *Online Tutorials Flexibility -> Student Satisfaction -> Student Commitment*	0.224	0.225	0.047	4.759	0.000***	0.135	0.32	Supported
H7: *Technology Quality -> Student Satisfaction -> Student Commitment*	0.325	0.325	0.054	6.009	0.000***	0.216	0.429	Supported

Table 6: Structural model assessment measures

	Student Satisfaction		Student Commitment	
	Effect size	**VIF**	**Effect size**	**VIF**
Course Structure	0.011 (No Effect)	2.344	-	
Online Tutorials Flexibility	0.154 (Moderate)	3.224	-	
Technology Quality	0.325 (Moderate)	3.2	-	
Student Satisfaction	-		0.717 (High)	1
Student Commitment	-		-	
R Square	0.758 (Strong)		0.417 (Moderate)	
R Square Adjusted	0.755 (Strong)		0.416 (Moderate)	
Q^2	0.584		0.26	

Coefficient of determination (R^2) refers to the effect of independent variables on the latent dependent variables (Hair et al., 2011),which is one of the quality measures of the structural model (Hair et al., 2014). Researchers have used a different cut-off of R^2 value. For example, (Hair et al., 2011) in marketing research described that R^2 values of 0.25, 0.50, or 0.75 are low, moderate, or high, respectively. In business research, (Chin et al., 1998) suggested that R^2 with 0.19, 0.33, or 0.67 are low, moderate, or high, respectively. The results of R Square are reported in the table (6), the R-Square of student satisfaction equals 76% which means that about 76% of the variations in student satisfaction are explained by the variations in the selected independent latent variables. Additionally, the R-Square of student commitment equals 42% which means that about 42% of the variations in student commitment are explained by the other latent variables.

The f^2 effect size is the measure of how much impact the endogenous construct will have if an exogenous construct was removed from the model. Table (4) shows the cut-off for the effect sizes. It can be noticed that course structure has no effect on student satisfaction, while both online tutorials flexibility and technology quality have moderate effect on student satisfaction. Finally, student satisfaction has high effect on student commitment. Q^2 value indicates the model's out-of-sample predictive power. When a model is said to have a predictive power or predictive relevance, it means that it can accurately predict data not used in the model estimation. The Q^2 value is calculated through running a blindfolding procedure. Before running this procedure, an omission distance (D) must be specified.

Researchers suggest specifying a D between 5 and 10 while being careful that the sample size divided by the selected D would not produce an integer. The omission distance indicates that while running the blindfolding procedure, every x data point of the items will be omitted and then predicted, with x being the specified D value (Hair et al., 2016). Based on the recommendation from the literature, an omission distance of 10 was selected to examine the predictive power of the model. Table (6) presents the Q^2 values obtained from the analysis. The values of Q^2 for both student satisfaction and student commitment are higher than 0, so it can be safely concluded that the model has a good predictive relevance.

(Tenenhaus et al., 2005), proposed the Goodness of Fit (GoF) as a global fit indicator, it is the geometric mean of both the average R^2 the average variance extracted of the endogenous variables. The GoF index can be calculated as follow:

$$GOF = \sqrt{\overline{R^2} \times \overline{AVE}} = \sqrt{0.5875 \times 0.7118} = 0.647.$$

The criteria of GoF for deciding whether GoF values are not acceptable, small, moderate, or high to be regarded as a globally appropriate PLS model have been given in table (3). According to these criteria and the value of the GOF (0.647), it can be safely concluded that the GoF model is large enough to considered sufficient valid global PLS model.

Conclusion

The present study used structure equation modeling to investigate the behavior of students' commitment towards e-learning during the pandemic of COVID-19 and the key determinants of student satisfaction in online learning environment. Few studies have developed to examine levels of satisfaction and commitment of students in the Egyptian higher education context through the digitization era.

Over the examination of a sample of 410 students enrolled in an Egyptian higher education institution, the study proved the validity of all the indicators of the variables in the proposed model. Moreover, all variables had a significant impact on student satisfaction except course structure, there was a positive correlation between student satisfaction and student commitment while course structure had an insignificant impact on student commitment. In addition, the majority of students' responses were from College of Management and Technology while other colleges were of same responses and this can justify that even disciplines can differ from one another in the satisfaction and commitment level. Therefore, based on the previous literature review, all variables had significant influence on both student satisfaction and commitment except the variable namely course structure.

Though the present study provides significant information for students and decision makers concerned with levels of student satisfaction and commitment in online learning environment, it was limited to be applied on a specific higher education institution inside Egypt. To address this limitation, the study should be expanded to other higher education institutions inside Egypt in different settings. It will be beneficial and useful for academics and decision makers to understand the behavior of students concerned with the commitment towards their institutions.

Future exploration and investigation might embrace testing the model on other higher education institutions to determine its validity in forecasting the satisfaction and commitment of students in an online learning environment. Some studies (Sun and Zhang, 2006) suggest that moderator variables such as age and gender add a great value in which they can be tested in the future (HASSAN et al.). Furthermore, more variables can be tested to explore their effect on both satisfaction and commitment.

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Modern European Education and Digital Transformation

Flera Ya. KHABIBULLINA
Mari State University, Yoshkar-Ola, RUSSIA
khflora@yandex.ru

Iraida G. IVANOVA
Mari State University, Yoshkar-Ola, RUSSIA
iraida44@yandex.ru

Nikolaj A. KIRILLOV
Mari State University, Yoshkar-Ola, RUSSIA
kna27zergut@mail.ru

Nadezhda SMIRNOVA
Chuvash State University, Cheboksary, RUSSIA
nadyas05@mail.ru

Abstract

The task of the modern education system in a globalizing world is to exist competently in the digital sphere, connected with the emergence of new technologies, professions and changes in existing ones, digital transformation, the process of integrating digital technologies into various aspects of human activity, culture, operations and principles of creating new products and services. One of the main requirements for the European education system is the creation of adequate conditions for training citizens, employees, employers and entrepreneurs in digital literacy and mastering digital competence. The leading areas of digital transformation in EU education are: development of the nomenclature of digital competencies, information infrastructure, training, digital security and personal development.

Keywords: European Union, Education, Digital Transformation, Digital Technologies.

Introduction

Being competent in the digital sphere is a task for a person of the XXI century. Global trends of our time-changing habitual patterns of behavior and activity of people, the emergence of new technologies, new professions and changes in existing ones – are directly related to digital transformation (DT), the process of integrating digital technologies into business and other aspects of human activity, making fundamental changes in technology, culture, operations and the principles of creating new products and services, включая образование, например, преподавание латинского языка (Khabibullina, Ivanova, 2019).

Currently, the share of the digital economy in the US GDP is 10.9%, China-10%, the European Union (data for the UK, Germany, Italy, France and Sweden) - 8.2%, the Czech Republic and Poland-6.3%, Brazil-6.2%, India-5.5%, Russia (2015) - 3,9% (McKinsey, 2019).

The education system is a bridge that should ensure a confident transition to the digital age, associated with new types of work and a sharp increase in human creative capabilities and productivity.

The DST of education is caused by globalization, the development of continuing education, automation, training of transfessionals, total digitalization, leading to the blurring of borders within the organization of distance learning via the Internet (MOOC), the demand for specialists of the T-shape model, liberation from routine work, to life in the environment of digital traces, big data, (not)high-quality content, etc.

Centers have been established and programs have been developed to train people in digital technologies. Thus, a well-known center for research on digitalization is the canadian center for digital and media literacy "Mediasmarts" (Canadian's center for Digital and Media literature 'MediaSmarts') (Ottawa), created in 1994 under the auspices of the National Council of Canada for Cinematography (the original name of the "media Awareness Network") (MediaSmarts, 2019). In Russia, an educational program on digital transformation has been developed at the

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SKOLKOVO innovation Center, the purpose of which is to prepare company teams to create a strategy for digital transformation of the enterprise with the construction of a financial model that justifies the profitability of this process in both the long and short term (Managing of digital transformation, 2020). In 2017, the Russian government approved the "Digital economy" program (order No. 1632-R of 28 July 2017) for the country's transition to "digital" rails by 2025, which includes five areas: information infrastructure, information security, personnel and education, regulatory regulation, and the formation of research competencies and technological reserves (The Program “Digital economy of the Russian Federation”, 2017). A basic competence model has been developed, including a List of key competencies of the digital economy (06.2019) (Development of a basic model of digital economy competencies, 2019). An Atlas of new professions has been published, including the following in the field of education: moderator, game master, mentor of startups, coordinator of an educational online platform, developer of educational technologies, ecopropedist, trainer in mind fitness, developer of tools for teaching States of consciousness, etc. The system of basic skills of a teacher of the near future will include the skills of system thinking, intersectoral communication, project management, programming / robotics / artificial intelligence, client orientation, multilingualism and multiculturalism, working with people, working in conditions of uncertainty, artistic creativity, environmental thinking (The Atlas of Emerging jobs, 2018).

Methodology

The main approach to studying the problem of digital technologies in European countries has become a theoretical approach, which implies analysis and synthesis, study of documents of the Council of Europe, pedagogical and methodological literature; analysis of the process of practical activity.

Research Results

A notable phenomenon in promoting the idea of DT was the guide "Digital transformation in learning: Microsoft white paper" (Transformation numérique dans l'enseignement: le livre blanc de Microsoft, 2020). In this white paper, Microsoft proves that digital and technological advances are transforming our society. As a major player in the digital revolution, Microsoft has released this guide with the goal of providing examples of positive practices and feedback that are intended to help in the transformation. For cities, departments, and regions, they are a lever of innovation, dynamism, and attractiveness. For teachers and educational institutions, these recommendations are a learning tool, and for students, a tool for mastering key (digital) competencies for future employment.

The concept of DT goes back to the term "digital literacy", introduced into scientific and wide public circulation by Paul Gilster, an American writer and journalist, Professor Paul Gilster of the University of Illinois (Chicago), an electronics engineer, author of the monograph "Digital literacy" (1997). The criteria for achieving digital literacy include: 1. criteria for achieving media literacy; 2. skills to find the necessary information and tools to work with it, the ability to quickly master these tools (information literacy); 3. communication skills with other users (communicative competence); 4. skills of producing information in its various forms and formats (creative competence).

Digital transformation is already taking place in education in various countries, but it is not just a technological breakthrough, but also a tool that promotes the involvement of various groups of citizens and all students (Khabibullina, Ivanova, 2020).

Digital technologies are now a priority for education systems and governments in Europe, European and international organizations. Training and skills are the basic levers for the development of society and the economy. Digital competence is becoming a key skill for lifelong learning, given that it is estimated that almost half of the world's traditional jobs – and 30 % of those in the European Union-will disappear in the next 25 years. There will be new professions that require advanced digital skills (9 out of 10 jobs will require digital skills in the near future). This requires a fundamental transformation of the education and training (E&T) system across Europe. In General, more and more European countries are investing in digital strategies to reform education and training. Understanding this imperative of education for the future has led to the search for ways to digitally transform education, create new trends and the most important supra-professional skills and abilities of future employees. This is an important part of the Europe 2020 agenda and its various flagship and policy initiatives in the field of education.

EC JRC (European Commission Joint Research Centre) research in this area began in 2005 and focuses on how to better use ICTs to rethink learning, to innovate in education and training, and to meet new skill requirements, especially digital competence, to ensure employment growth and social integration. More than 20 major studies have been conducted and more than 100 different publications have been published. The research of the joint research center of the European Commission is structured in three main areas: Skills and competencies of the XXI century, Innovation and modernization of education and training, open education. The key task of research and policy is to ensure that supply and demand for new skills and competencies are matched (Learning and Skills for the Digital Era, 2019).

A study of technical issues of digitalization of the European educational space conducted for the European Commission in 2013 (Le numérique, priorité pour l'éducation, 2018) showed that digital equipment in European Union (EU) schools does not meet expectations, since 63% of students do not have access to a "school with effective digital equipment" (i.e., with appropriate minimal equipment, broadband access and high internal "connectivity"). 70% of teachers in the EU recognize the importance of using digital tools in the classroom, but only 20-25% of them trust these digital tools and support their use. Most teachers use ICT primarily to prepare for learning, rather than to work with students during classes. It is stated with a certain degree of confidence that it is likely that parents and students have negative perceptions and/or fears related to digital technologies, and that they also prevent the use of digital tools for educational purposes.

The European Commission's survey of employed and non-employed persons with basic and higher digital skills (2014) found that Finland has the best indicators among 28 European countries (more than 80%). Luxembourg, Netherlands. Sweden, Denmark, the United Kingdom, Germany, Estonia show more than 75% (in descending order), France - 75%, Austria, Belgium, Malta, Slovakia, Slovenia, Lithuania, Spain, Latvia, Hungary and the Czech Republic - from 74 to 60%. Indicators for Portugal, Ireland, Greece, Italy, Poland and Cyprus range from 60 to 52%. Less than 50% of citizens with basic digital skills live in Croatia, Bulgaria, and Romania (Learning and Skills for the Digital Era, 2019).

The latest situation studies (2016-2018) show that currently 44% of the European Union population aged 16 to 74 do not have basic digital skills, and 19% of the EU population do not have any digital skills. The existing significant differences between EU member States, the digital skills gap among the population, especially between men and women, generations and different social groups, make it necessary to adopt a common European strategy. Without appropriate and targeted policies, older people and people with disabilities are likely to suffer from the digital transition. The issue of gender parity in the digital sector is open. For example, there are 3.1 times more men in the digital sector than women, who make up only 20% of science professionals, 27% of engineering graduates, and only 20% of computer science graduates. Only 19% of employees in the ICT sector are female managers, compared to 45% of employees in other sectors (Rapport sur l'éducation à l'ère numérique, 2018).

In addition, it is important to prepare educational institutions, teaching staff and staff to provide the appropriate skills to adapt to the challenges of the digital age. Access to and use of the Internet, technological and digital equipment have changed social behavior and communication, especially in younger segments of society. By 2025, all schools in the Union should have access to Internet connections with download speeds and an upward bandwidth of 1 GB of data per second.

At the same time, the EU is concerned that excessive use of technological and digital equipment, such as computers and tablets, can cause health and well-being problems, including sleep problems, lack of mobility (inactivity) and computer addiction. Therefore, it is necessary to take into account research on the harmful effects of digital technology on young children and on their brain development. Digital technologies should be an integral part of a student-centered and age-sensitive approach to education. New and innovative approaches to learning should not be an obstacle to personal contact between students and teachers. Each participant in the educational process must be a competent Internet user, trained and complying with the rules of digital hygiene, cybersecurity, data protection, making informed decisions and aware of Internet risks, such as online misinformation (fake), harassment, personal data violations, etc. The EU believes that the curricula of universities and vocational training institutions should contain curricula on cybersecurity, be complemented by innovative and high-quality digital training, interactive methods that complement traditional master's courses and provide platforms for collaboration and knowledge creation.

Thus, the European Commission points out that digital technologies are now fully integrated into society, so it is necessary to adapt to them. Citizens and educational entities are waiting for a special environment where digital skills can be optimally developed so that students can effectively fit into the professional sphere in the future (Khabibullina, 2019).

In this regard, in recent years, a legislative framework has been created, and a number of legal documents regulating the EU's activities in the field of digitalization have been adopted. Fundamental documents of a General nature include: - articles 165 and 166 of the Treaty on the functioning of the European Union (the FUE Treaty); - The Charter of fundamental rights of the European Union, in particular article 14; - article 2 of the Additional Protocol to the Council of Europe Convention on the protection of human rights and fundamental freedoms concerning the right to education»; - decision (EU) 2018/646 of the European Parliament and of the Council of 18 April 2018 on the General framework for the provision of better qualifications and certification services (Europass) and repeal of decision no.2241/2004 / EC. Conclusions, decisions, messages and advice on education in the EU are spelled out in the following documents: - resolution of 12 June 2018 "on the modernization of education in the European Union»; - resolution of 14 September 2017 "on a new competence strategy for Europe»; - resolution of January 19, 2016 "on the policy for the development of skills to combat youth unemployment»; - resolution of 9 September 2015 "on empowering girls through education in the European Union»; - resolution of September 8, 2015 " on promoting entrepreneurship among young people through education and training»; - Council recommendation of 22 may 2018 "on key skills for education and lifelong learning"; - Council conclusions of 22 may 2018 "Implementing the idea of a single European educational space"; - Council recommendation of 22 may 2017 "on the European certification system for lifelong learning»; - conclusions of the Council of may 30, 2016 "on the development of education in the media and critical thinking through education and training»; - Council recommendation of December 19, 2016 "on advanced training courses: new perspectives for adults"; - Council conclusions of may 20, 2014 "on effective education and training of teachers»; - Council resolution of 28 November 2011 "on the updated European agenda for adult education and training", etc.

A number of documents directly relate to digital training of various segments of the population and school children: - communication of the European Commission of 2 may 2012 "European strategy for the Internet adapted for children»; - resolution of April 15, 2014 "on new technologies and free educational resources»; - Council conclusions of 27 may 2015 "on the role of early childhood education and primary education in promoting creativity, innovation and digital skills»; - Commission report dated may 30, 2017 "school Development and best practices for a good start in life»; - Commission's communication dated January 17, 2018 "on the action Plan in the field of digital education»; - message of the Commission dated December 7, 2016 " Improvement and modernization of education»; - conclusion Of the Committee of regions of November 30, 2017 "on the modernization of school and higher education", etc.

The EU takes into account that the development of effective digitalization policies requires constant monitoring and evaluation of the level of digital skills, both in organizations and among the General population. Therefore, along with the problem of increasing the level of digital skills necessary for the professional and personal development of all European citizens, the issue of developing tools for determining the level of European competence in the field of digital technologies remains an urgent agenda of the European Union.

JRC's current research in this area covers the following projects: Digital competence for citizens (DigComp), Digital competence for consumers (DigCompConsumers), entrepreneurial competence (EntreComp), and the study of computational thinking, which can become as fundamental as numeracy and literacy (CompuThink) (Learning and Skills for the Digital Era, 2019).

Since the summer of 2015, Europass CV has included the online tool DigComp, which allows job seekers to independently assess their digital competence, describes and includes it in their curriculum Vitale (CV). on June 10, 2016, the Commission heard the report "New competence strategy for Europe", related to the launch of the European digital competence system DigComp 2.0.This is a tool for assessing, self-evaluating and improving the digital competence of citizens. DigComp 2.0 provides an updated list of 21 competencies (also called the conceptual reference model). Within this product, digital competence means that people must have competencies in five areas of DigComp: information literacy, communication and collaboration, digital content creation, cybersecurity, and problem solving in the digital environment. The European model of digital competencies for citizens (DIGCOMPEDU 2018) includes supra-professional digital competencies corresponding to the main sections (21):

- Viewing, searching and filtering data, information and digital content; evaluating data, information and digital content; managing data, information and digital content.
- Interaction through digital technologies; exchange through digital technologies; civic participation through digital technologies; collaboration using digital technologies; etiquette in the network, managing your digital identity.
- Creation and development of digital content; integration and processing of digital content; copyrights and licenses; programming.
- Device protection; personal data protection and privacy; health and well-being protection; environmental protection.
- Solving technical problems; identifying needs and technological solutions; creatively applying digital technologies; identifying gaps in digital competence.

The allocated digital competencies are aimed at improving the use of digital technologies in teaching and learning; developing skills necessary for digital transformation; and relying on data-based analysis and forecasting in education. The digital competence system can help to define the level of digital competence, clarify learning goals, identify learning opportunities, and facilitate job search (European Union "DigComp 2.1, 2017).

In the published strategic report "DigComp into action", "DigComp 2.1: the digital competence framework for citizens: With eight proficiency levels and examples of use", the user can get acquainted with the concept of Digital Competence and presented practical results and examples of using DigComp in case studies and tools throughout Europe. For example, the Basque Country in Spain has created a free online self-diagnosis tool to test its level of digital competence based on the DigComp platform. After a 15-minute online test, the results are available in a simple format to evaluate your skills and identify learning opportunities. More than 10,000 people have already been tested. The EU is currently planning to introduce a similar tool that will eventually be available to all citizens in their native languages (Being digitally competent – a task for the 21st century citizen, 2019).

The digital competence framework can help not only monitor citizens ' digital skills, but also support curriculum development. The DigComp platform can be used for planning and creating training offers. For example, the Spanish Ministry of education, culture and sports adapted DigComp for Spanish language teachers and used It as a strategic support document for further development of professional growth of teachers (Marco comun de Competencia Digital Docente 2.0, 2017).

Wallonia, or the Walloon region of Belgium, offers 5 priority areas of policy in the field of digital education in schools: initial and continuous training of teachers, digital infrastructure in schools, technical and logistical support, pedagogical support for initiatives, cooperation and exchange between educational entities (Le numérique, priorité pour l'éducation, 2018).

The pan-European digital economy and society indexing (DESI) offers an indicator for digital skills that also uses the DigComp framework. The "digital skills" indicator is one of many indicators for measuring human capital that are needed to explore the opportunities offered by a digital society.

JRC's current research focuses on digital competence organizations (DigCompOrg), digital competence of educators (DigCompEdu), policy reforms towards integrating digital technologies in education (Digedu), and learning Analytics (Learning and Skills for the Digital Era, 2019).

The TTC is the subject of annual discussion at meetings of the European Parliament. For example, the 2018 report of the Commission on culture and education (speaker – Yana Toom) "on learning in the age of digitalization" (Rapport sur l'éducation à l'ère numérique, 2018) discussed the challenges, opportunities and lessons to be learned in determining the Union's policy in this direction in the near future. The Resolution of the European Parliament made proposals in the following main areas:

- ***Developing A Nomenclature of Digital Competencies:***

the importance of assessing and monitoring changes in European digital skills; developing tools at the European level for both organizations (the digital skills system and the common European system for assessing key skills for education and lifelong learning) and individuals (self-assessment tools such as SELFIE) in all regional and minority

languages in the member States of the Union; the need to develop the Union's capabilities in areas such as artificial intelligence, big data, software development, quantum computing and web design, including the digital skills component of the digital Europe Program;

- ***Information Infrastructure:***

significant public investment to provide all schools with high-speed and high-performance networks, using existing Union programmes, including the interconnection mechanism in Europe, which can support the physical infrastructure of high-capacity networks and the WIFI4EU credit system, particularly in poor rural areas, remote areas and mountainous areas; close collaboration between all stakeholders, industry, local and regional authorities, communities and civil society for a successful transition to a more digitally based learning environment; adapting educational institutions to new technologies and innovative approaches to learning, providing the necessary support to educational institutions to improve digitization in the field of languages within the Union; support for pilot initiatives related to the European student card and "Erasmus without documents", with the new pilot project "Digital learning opportunities" within the Erasmus+ and Horizon 2020 programs; implementation of the digital education action plan, such as the European computer programming week, the Coalition for digital skills and jobs, or the Sofia call to action on digital skills and digital education; promoting synergy between programmes including Erasmus Mundus, Erasmus+, Horizon Europe, InvestEU and Digital Europe, reserving funds under these programmes and European structural and investment funds for the digitization of libraries, archives and museums in order to improve their use in the field of education and culture;

- ***Training:***

transforming the training system at all levels with a focus on the needs of society and the labour market in the future; teachers and trainers should be at the center of the digital transformation and should therefore receive initial training and continuing education;

- ***Digital Security and Personal Development:***

targeting and focusing strategies on the needs of different age groups and students; ensuring the right to personal development, the right balance between relevant digital skills and the skills of everyday life, sustainability, critical thinking and innovative potential of people; cultivating traditional and humanistic skills despite the crucial importance of improving basic and advanced digital skills of students; investing in interdisciplinary research on the various implications of digital technologies for education, linking education, pedagogy, psychology, sociology, neurology and computer technology, maximizing the benefits of using digital technologies in education and minimizing the risks associated with digital technologies; improving children's online safety and addressing cyber harassment, exposure to harmful and disruptive content, and other cybersecurity threats by developing and implementing prevention programs and awareness campaigns such as#SafeInternet4EU; addressing the special needs of all students by developing effective measures to promote digital skills, including among students with disabilities, minorities, migrant communities, school dropouts, the long-term unemployed, and the elderly; ensuring a gender-balanced approach to career development in the field of ICT and digital technologies, bridging the gender gap in digital technologies, etc.

Conclusions

The digital boom has affected a wide range of industries, with education taking a special place among them. This is the industry that modern Europe relies on. Digital transformation in European education should shape the readiness of European society for the challenges of the future. Ensuring this goal is the main goal of the European Union and the organizations responsible for this process. The data analyzed in the article shows that the EU leadership as a whole manages to achieve significant results in the process of digitalization. At the same time, the European Parliament has set ambitious goals that require the joint efforts of all EU member States.

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Features of the Use of Digital Educational Technologies During the COVID-19 Pandemic

Flera Ya. KHABIBULLINA
Mari State University, Yoshkar-Ola, RUSSIA
khflora@yandex.ru

Iraida G. IVANOVA
Mari State University, Yoshkar-Ola, RUSSIA
iraida44@yandex.ru

Nikolaj A. KIRILLOV
Mari State University, Yoshkar-Ola, RUSSIA
kna27zergut@mail.ru

Nadezhda SMIRNOVA
Chuvash State University, Cheboksary, RUSSIA
nadyas05@mail.ru

Abstract
The article is devoted to a comparative analysis of digital educational technologies used in Russian educational institutions at different levels in the conditions of self-isolation caused by the coronavirus pandemic in the world. Based on the analysis of the results of the study, the authors conclude that the pandemic accelerated the transition to distance learning and at the same time exposed pedagogical, psychological and medical problems associated with the introduction of digital learning technologies. The positive results of digitalization of education are: the possibility of introducing new approaches, methods, models of teaching and upbringing in the educational process; the possibility of choosing an individual educational trajectory for students; increasing interest and more active involvement of schoolchildren and students in the process of obtaining and consolidation of knowledge; the ability to use a variety of mobile platforms, electronic textbooks, modern automated learning systems and augmented reality technologies that allow students to evaluate their knowledge and track their learning progress through a system of assessments and proposed test tasks.

Keywords: Digitalization of Education, Learning Technologies, Mental and Somatic Health, Coronavirus, Pandemic.

Introduction

The coronavirus pandemic around the world has pushed many sectors of the economy to digital transformation and transfer the work of employees to the online space. First of all, it affected the sphere of education. Thus, the educational institutions at all levels were transferred to distance learning in the first days after the announcement of the self-isolation regime in order to ensure the safety of life and health of students, professors, teachers and educators.

The transfer to online education, which was almost instantaneous, was facilitated by the creation of a passport for the priority project "Modern digital educational environment", developed in October 2016 by the Presidium of the presidential Council of the Russian Federation and the course adopted by the Government of the Russian Federation in 2019 on digitalization of the Russian economy (including education) and the signing of the corresponding national project. In addition, in recent years, one of the priority areas for improving secondary and higher education systems has been identified as the formation of an innovative educational environment based on information and communication technologies in order to improve the availability and quality of education. In order to solve this problem, the significant funds were allocated for technical and technological support of the educational process: for

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the development of digital zones; automation of management activities; digital support for libraries; introduction of digital educational resources in the educational process; Informatization of educational and extracurricular activities, introduction of distance learning to improve the skills and retraining of teachers and employees.

In General, such an educational environment should provide graduates with competitive advantages when entering universities, and in the future it should help them achieve significant success in their professional activities throughout their life (Akbar, 2016; Collins, 2009; Lonka K., Cho V., 2015). At the same time, there are practically no studies aimed at studying the impact of digitalization in the educational system on the health indicators of participants in the process: teachers and pupils, students and professors.

This problem remains relevant for all countries of the world that have entered the path of digital transformation. For example, digital security is the subject of annual discussion at meetings of the European Parliament. For example, the report of the Commission on culture and education in 2018 (speaker – Yana Toom) "on learning in the era of digitalization "[13] considered the challenges, opportunities and lessons to be learned when determining the Union's policy in this direction in the near future. The resolution of the European Parliament, along with the development of the nomenclature of digital competencies, the development of information infrastructure, the transformation of the system of professional training of teachers, made proposals on digital security and personal development. They discussed investing in interdisciplinary research on the various effects of digital technologies on education, combining education, pedagogy, psychology, sociology, neurology and computer technology; minimizing the risks associated with digital technologies; improving the safety of children on the Internet and addressing the cyber impact of harmful and destructive content and other threats through the development and implementation of prevention programs and awareness campaigns, etc. (Khabibullina, 2019; Khabibullina, Ivanova, 2020).

Based on the above, the purpose of this study was to identify psychological, pedagogical and medical problems associated with the introduction of digital technologies in the educational process.

Material and Methods of Research

To collect primary information, we used: a method of analyzing documents related to the introduction of digital technologies, a questionnaire and a recitation of students, teachers, secondary and higher professional teachers to determine their attitude to the digitalization of education and assess the positive and negative consequences of the introduction of distance learning.

The object of the study was participants in the system of secondary and higher professional education: students, teachers, research and teaching staff, representatives of the administration of educational institutions.

The subject of the study was the parameters of changes in well-being and individual indications of mental and somatic health of participants in the educational process when implementing digital technologies and distance learning.

Research Results

The introduction of distance learning after the announcement of the self-isolation regime in Russia has affected the change in the role and place of the teacher in the new educational environment. As a result, in the new reality, the teacher gradually turns into a kind of a consultant or a mentor, whose main task is to teach students algorithmic thinking and work with big data, as well as the ability to independent setting and realizing goals and tasks, evaluating the quality of work performed and developing needs, and self-education skills.

In a very short period, the pandemic coronavirus resulted in a request for the creation of new digital educational resources (DER), innovative scientific-methodical base for preparation of new generation of specialists and retraining of the already employed, and for the upgrade of the existing logistics.

If at the initial stages of digitalization of education only the text documents and other educational materials necessary for the organization of the educational process were used as DER, then during the transition to distance learning, digital educational resources were supplemented with digitally presented photos, presentations, films and

video clips, static and dynamic models, virtual reality and interactive modeling objects, sound recordings and other visual materials (Sappey J. Dr, Relf St., 2010; Saykili, 2019; Tulinayo, Ssentume, Najjuma, 2018).

In General, the use of DER in the system of higher education made it possible to apply the full range of modern information and telecommunications technologies in the course of educational activities; to conduct objective diagnostics and assessment of students ' knowledge, skills and training level in accordance with the requirements of the state educational standard; to organize individual and independent educational activities, to form skills of self-study, self-development, self-improvement, self-education; to ensure constant and efficient communication between various participants in the educational process. It is interesting that the first and the most informative digital educational resources in Russia appeared and began to function successfully in non-state (commercial) universities and in regional branches of large universities. Therefore, they were the most prepared for the coronavirus pandemic and the complete transition to distance learning (Kirillov, 2018; Kirillov, 2019).

The analysis of the online format for organizing the educational process, conducted during the period of self-isolation in the regions of the Russian Federation (March-July), allows us to see not only positive aspects, but also significant problems and negative consequences of digitalization of education. Thus, the main positive role of digitalization was to increase the level of digital literacy or the ability to use modern information and telecommunications technologies by all participants in the process, both on the part of students and teachers, since today digital literacy is already a prerequisite for the possibility of obtaining additional knowledge, skills and self-education and self-development (Zaripova, Salekhova, Danilov, 2017; Klikunov, 2017; Maloshonok, 2016).

Among other positive aspects, we should highlight the opportunities provided by information technology. These are: the introduction of new approaches, methods, models of teaching and upbringing; the possibility of choosing an individual educational trajectory for students; more active involvement of schoolchildren and students in the educational process; the possibility of using mobile platforms, electronic textbooks, modern automated learning systems and augmented reality technologies. Thus, the introduction of distance learning in practice has shown that e-learning programs developed in a short period of time allow students to evaluate their knowledge and track their progress in learning through a system of assessments and proposed test tasks.

In particular, after the adoption of the Federal law of February 28, 2012 N 11-FZ "on amendments to the Law of the Russian Federation "on education" in terms of the use of e-learning, distance learning technologies", training of full-time and part-time students through interactive electronic means (Internet and local networks) has become an integral part of education at Mari State University. For example, French electronic resources were used to teach classical languages to foreign Francophone students (Khabibullina, Ivanova, 2019).Therefore, immediately after the announcement of the self-isolation regime, full-time students were able to continue classes with teachers according to a pre-arranged schedule in online mode.

Part-time students started distance learning later, according to the schedule of the educational process. In addition, they had the opportunity for self-study of educational materials (in any convenient place where there is Internet access) prepared in advance by the teacher and posted on the e-learning server of Mari state University, where a learning management system was formed in the form of a virtual learning environment.

For the use of the electronic educational and information system, students and teachers had only to register and get an individual user name and password. After authorization in the virtual environment, teachers were able to enter various educational materials in the form of texts and multimedia elements, view their training statistics, create tests to test their knowledge, and consult students remotely via video conference. At the same time, a student or a student of the courses held at the University could independently choose the appropriate form of training, as well as check the material they have mastered during the test tasks.

The educational electronic platform Moodle was used for conducting classes and self - study of disciplines at the University, and the Zoom platform was used for conducting lectures, practical and seminars, intermediate or repeated certification in the online mode.

In addition, students and teachers of Mari state University have 24/7 free access to educational literature, regulatory documents, multimedia materials in the electronic catalog of the MarSU library, the electronic library system "The student consultant", the electronic library system "YURAYT"; educational materials and fiction "LAN publishing

house", the publishing center "Academy", and "WILEY" publishing houses (onlinelibrary wiley.com), "AMERICAN MATHEMATICAL SOCIETY (ams.org/mathscinet)," ENVOY POLPRED.COM»; electronic library system "IPRBOOKS"; electronic medical library "The doctor's consultant".

All employees and students of Mari state University can view and download the resources available on the following platforms: "SPRINGER LINK" (https://rd.springer.com), "NATURE" (https://www.nature.com), as well as in the SPRINGER MATERIALS databases (http://materials.springer.com), "SPRINGER PROTOCOLS" (http://www.springerprotocols.com), "ZBMATH" (https://zbmath.org), "NANO" (http://nano.nature.com). Thanks to this, students and teachers can use free textbooks, workbooks, scientific and popular science literature in the field of higher medical and pharmaceutical education, agricultural sciences, natural science, as well as a basic set of textbooks for all specialties and training areas.

Thanks to the existing learning platforms, students can interact with teachers on an ongoing basis, have the opportunity to express their suggestions, complaints or feedback, which contributes to the improvement of existing and functioning e-learning platforms. In the course of this collaboration, existing digital learning platforms are adapted to the specific needs of students and their teachers. For example, students can join separate groups to complete their academic and scientific tasks, and share their results and knowledge with each other.

The negative consequences of digitalization of education, first of all, include the health deterioration of all participants in the educational process. First of all, this concerns school teachers and teachers of secondary and higher professional educational institutions, whose time in front of monitors has increased by at least two or even three times due to the introduction of distance learning. A survey which was conducted among 116 teachers and University professors of the Republic of Mari El and Chuvashia showed that visual acuity of the majority of respondents had been worsened significantly during the period of self-isolation, symptoms of existing chronic and exacerbation of some occupational diseases began to appear more severely. Moreover, in addition to somatic diseases, a significant number of respondents registered initial signs of mental disorders (sleep disorders, feelings of fear or anxiety, difficulties in clear thinking, pathological beliefs, memory impairment, inability to perform everyday functions, substance abuse) associated with the introduction of a self-isolation regime.

Students had even more health problems. Thus, digitalization has led to a significant decrease in interest in writing and the development of various types of creativity. In our opinion, this is due to the fact that writing involves parts of the brain which are responsible for sensory interpretation and for putting letters into words, as well as for recognizing them (Broca's center). Therefore, children lose the desire to read books, which is reflected not only in a decrease in the ability to recognize written texts, forgetting the rules of spelling, punctuation and grammar, but also in the appearance of problems associated with abstract thinking, the processes of imagination, perception, memorization and extraction of necessary information from memory.

It is also proven the fact of digital addiction during the prolonged use of gadgets, which causes depression, short temper and aggression in children. Isolation from peers and long time spent at computer monitors often replaces normal communication, which leads to the loss of social skills, the appearance of autism syndromes and reduced adaptive capabilities. Over time, for such people, the virtual world completely absorbs the real one, as in the case of severe forms of mental disability which are difficult to respond to today's available methods of mental influence or psychotherapy.

Even the very use of wireless Wi-Fi networks in schools and pre-school educational institutions can increase the risk of cancer, damage to hippocampal neurons, and negatively affect the blood-brain barrier.

Previously existing hygiene standards which were recommended by ophthalmologists prescribed sitting at a computer in the first class for no more than 10 minutes a day; in 2-4 grades -15 minutes; in grades 5-7 - 20 minutes; in grades 8-9 - 25 minutes and in grades 10-11 - 30 minutes, and when switching to distance learning, students were forced to stay with their parents at monitors for six or more hours. Therefore, the consequences of implementing distance learning in the future may not be quite rosy and beautiful. We have to evaluate them yet.

Many negative aspects of the introduction of digital technologies are noted by teachers and psychologists in the organization of the educational process. Thus, most researchers note that smartphones and gadgets distract children

from the educational process, negatively affect the development of children's communication skills and social interaction (Robotova, 2017; Shestakov, Adzhemov, Manonina, 2018).

Teachers are particularly concerned about the problem of objective assessment of the results of educational activities and, especially, when performing control works, passing tests and exams, defending term papers and final qualifying works. The main ways to" deceive " the teacher in this case are copying and using other people's works, buying a ready-made abstract, term papers and theses. In addition, the quality of sources on the Internet does not always meet the expectations of users, although many educational organizations for students have formed a list of electronic educational resources that they should use in the educational process in a short period of time. It was facilitated by the creation of the National open education platform in Russia in 2015, WHICH operates on the basis of the best Russian Universities (MSU, ITMO University, nust MISIS, MIPT, HSE, Urfu, St. Petersburg state University). More than three hundred online training courses in various fields of training are currently available at these Universities.

It should be noted that existing educational resources can be used by both students and teachers. They are freely available and contain both educational and reference material: electronic tests, interactive models, video and audio materials, illustrations, ready-made developments, and other educational and methodological materials intended for preparing and conducting interesting classes, homework, course and research projects.

The self-isolation regime in Russia has also exposed the problem of unequal access of students from different regions of the country to electronic technological resources. It turned out that not all students have a tablet or laptop with constant Internet access. Therefore, schools, colleges and universities were forced to allocate money for their purchase from their own resources or recommend students to use libraries or other places of access to the world wide web for distance learning.

This is not a complete list of negative factors and consequences of the introduction of digital education, although it should be recognized that, despite these and other significant "disadvantages" of digital education, modern information technologies provide new opportunities, methods of transfer and dissemination of knowledge, and also contribute to the formation of necessary competencies based on the acquired knowledge, skills and abilities. They significantly simplify the process of managing the educational process and to a certain extent they can provide equal access to information and building of necessary skills.

Conclusions

Digitalization of education today is one of the conditions for the transformation of higher education institutions, the process of which has been accelerated due to the developing covid-19 coronavirus pandemic in the world. As a result of the imposition of a state of emergency or self-isolation, educational organizations at all levels of education were forced to switch to distance learning, which continues in some of them to this day or is being re-introduced in the new academic year. But even after the abolition of self-isolation, many universities continue to conduct some types of classroom lessons (primarily lectures) online, which may indicate both the effectiveness of e-education and the desire of educational institutions to "optimize" the educational process by reducing classroom lessons and teaching staff.

In General, the forced transition to distance learning has revealed not only positive aspects of e-learning, but also pedagogical, psychological and medical problems associated with the introduction of digital technologies on the part of both students and teachers. Therefore, we consider it necessary to conduct long-term research on the comprehensive study of the influence of electronic technical training resources introduced into the educational process on the mental and somatic health of teachers and students, and the full transition to digital education is premature.

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Expert Opinions as A Method of Diversification of Sources in Qualitative Research in Management Science

Grzegorz WOJTKOWIAK

Poznan University of Economics and Business, Poland
g.wojtkowiak@ue.poznan.pl

Marcin GOŁEMBSKI

Poznan University of Economics and Business, Poland
marcin.golembski@ue.poznan.pl

Abstract

The main problem of the article is a question: how to increase the credibility and variety of sources in qualitative research, especially in those areas of management science that cannot be directly verified by quantitative methods. The main aim is to assess the possibility of using business advisors (experts) as an objective source of research information. The background to the proposal is the area of making decisions in a crisis situation of an enterprise. In the empirical part, the method of systematic literature review was used. Furthermore, the paper presents recommendations for the use of various research tools enabling effective collection of information for research (based on authors' own experience).

Keywords: Experts, Research Information, Qualitative Research.

Introduction

The gap between theory and practice, considered in the context of the use of research results in business management, has been the subject of broad discourse in literature for a long time (Butler, 2008). It is often argued that management scientists focus on issues that are irrelevant to practitioners, and that most research results, due to their generalisations and the assumptions made, are devoid of application value (Bansal et al., 2012, Bullinger et al., 2015). Hence, conducting research in management sciences is generally considered as difficult and the results are inconclusive (Cohen, 2007). This approach is the reason for the widespread use of classical quantitative methods in research, which are the dominant research approach in most sciences (Klaes, 2012). This is due to the fact that quantitative research has traditionally been (and still is) associated with representativeness, care for data collection with objectivity and the development of systematic and standardised procedures. Studies conducted using qualitative methods, on the other hand, are often seen as related to that which is detailed, which condemns their results to remain at the 'pre-scientific' stage (Kelemen & Rumens, 2012). It is therefore not surprising that the alternative to the quantitative approach, i.e. the use of qualitative and unrepresentative methods, is subject to frequent criticism (cf. Sarma, 2015). At the same time, however, there are more and more demands in the research community to defend the qualitative methods. Many of the earlier critical arguments are being denied, and earlier criticism motivates the development of better tools and standards of their application. This allows for a better description of economic reality (cf. Czakon 2009, Sułkowski 2014; Bluhm, Harman, Lee & Mitchell 2011). At the same time, taking into account many non-measurable or difficult to measure factors results in a lower level of universalism of conclusions and sustainability of laws of science (Matejun 2011, p. 93).

One of the more difficult research areas of management science, where qualitative research is gaining ground, is strategic management and managerial decisions, particularly important in times of instability and crisis. Researchers are looking for the right models to describe the reality and practice of entrepreneurial choices, but they are aware of the enormous subjectivity of the conclusions drawn and the distortions that arise during the gathering of data. This creates a certain disparity between the desire for reproducible and universal conclusions and the awareness of the impact of many non-measurable factors on reality although many authors tend to prefer a qualitative approach to problems of a strategic nature (Greckhamer, V. Misangyi, H. Elms, R. Lacey 2008; Cornelissen 2017; Gaya & Smith 2016). One of the reasons for this trend is the problem of getting to the right sources as practice usually verifies all strategic plans and the process of strategic management itself becomes very dynamic and not always

formalised. In such conditions, it is not only the lack of documentary sources but also the distortions of opinion that occur during the time that make it difficult to systematise the researcher's tools.

The problem to be defined is therefore related to how to increase the credibility and variety of sources in qualitative research, especially in those areas of management science that cannot be directly verified by quantitative methods. On the one hand, the authors of the paper are in favour of accepting a wide range of qualitative methods but also, on the other hand, of the necessity to maintain the rigour of the stages of research proceedings. In the course of this discussion, they want to draw particular attention to the sources of information used by researchers applying the qualitative methods. The main aim of the paper is to assess the possibility of using business advisors (experts) as an objective source of research information. The background to the proposal is the area of making strategic decisions in a crisis situation of an enterprise. The paper justifies the choice of such an area (taken because of the particular difficulties in obtaining information from companies in a crisis and the risk of significant data distortion).

In the empirical part, the method of systematic literature review was used, which allowed for a formalised and objective synthesis of the scientific achievements to date, as well as for the evaluation of the research to date (Columb and Lalkhen, 2005). The research procedure included the analysis of 4,385 articles and 34 publications marked as conference materials in the database. Furthermore, the paper presents recommendations for the use of various research tools enabling effective collection of information for research.

Decision-Making in A Crisis – A Literature Review

Classical sciences with a much longer history than economics or management have set some standards that are difficult to match, especially in terms of universality and repeatability of the statements and truths they produce. In mathematics, commonly regarded as the 'queen of the sciences', it is difficult to talk about the variability of the issues being studied, although already in biology, for example, long-term evolution and variability of objects and phenomena are observed. In social sciences, these changes take place much faster, and the diversity of objects and phenomena being studied is connected not only with time or area but also with very individual features of each organisation and its every member. However, while e.g. in natural sciences, the existence of the so-called 'butterfly effect' does not exempt researchers from striving to build better and better mathematical models describing the reality (in fact, weather forecasts have improved significantly since the times of E. Lorenz), in social sciences much deeper questions are raised. Many authors point out that in the case of management problems it is impossible to determine the relation between the solutions applied and the economic effects of those solutions (Kaleta 2006, p. 43). The assumption of ceteris paribus (Latin phrase indicating the lack of influence of other factors), which is made in many theories, encourages the formulation of economic statements but it is too simplistic for the search for regularities in management problems, especially those of a strategic dimension.

At the same time, since the crisis of 2008, many authors have drawn attention to the need to search for a new model of economics (Jancar-Webster, 2016) that would be acceptable to companies and their decision-makers (Waterman, 2016). The contemporary consideration of social and environmental problems and related globalisation affects individual companies, even those operating on a local scale. This necessitates changes in research methods, especially taking into account the socio-economic context (Vlados, C., Deniozos, N., Chatzinikolaou, D., & Demertzis, M. (2018), the importance of which increases with the growing popularity of behavioural economics (cf. Thaler, & Ganser 2015, p. 77; Wilkinson & Klaes, 2017).

This need also applies to the very process of implementing changes and restructuring, especially as many of the problems related to crisis responses or restructuring measures are non-linear (cf. Datta, Guthrie, Basuil, Pandey, 2010, p. 339), which means that using the same tools can have different effects, and strengthening the tools will not always enhance the effect. It should be remembered that making managerial decisions in a crisis situation is a challenge as it is burdened with the need for a relatively quick response, most often under stress (Vargo & Seville, 2011). Moreover, during a crisis, people are affected by emotional factors that undoubtedly influence the decision-making process (Janka et al., 2015), which hinders the research process aimed at formulating generalisations. Thus, the result of a test conducted by an investigator on one sample need not be repeated on another one. This is one of the most important limitations of modern economics: it cannot formulate final decisions or any absolute truths (Mączyńska 2012, p. 11).

The use of mathematical methods in such conditions, however correct, cannot therefore do without qualitative research. The above-mentioned differences in the results obtained by various researchers for the study of management and strategic (including restructuring) problems, encourage the use of the descriptive approach describing real choices rather than the normative approach characterising hypothetical rational choices (cf. Stańczyk, Sus 2013, p. 8; Bunger, A. C, Powell, B. J., Robertson, H. A., MacDowell, H., Birken, S. A., & Shea, C. 2017; Gaya, H. J., & Smith, E. E. (2016)). Studies of literature (cf. Bakonyi, 2018; Higgins-Freedman, 2013; Parnell, 2015) allow to point out several reasons for using qualitative methods in the research of decision making, especially in a crisis situation. Firstly, this enables researchers to create multi-faceted analyses relating to complex social relations in organisations (Selmier et al., 2015). Secondly, it allows existing theories to be extended with new examples and observations (Eisenhardt & Graebner, 2007). Thirdly, qualitative research allows for a broader analysis of personal interpretations of a given situation, which in a crisis can provide important support for decision making (Bakonyi, 2018). It is also worth to refer at this point to Popper's diamond model (Popper, 2008) which illustrates research methods aimed at making scenario-based decisions. When analysing the said model, it is clear that qualitative methods such as interviews, literature review, morphological analysis, interaction trees, scenarios and SWOT analysis all make an integral part of the model.

Indeed, in many management areas, a growing share or even dominance of qualitative methods can be observed. For instance, they are more popular in the area of marketing research or general management issues (cf. Kan, Adegbite, Omari, & Abdellatif, 2016 although the study indicated a specific qualitative method, namely comparative analysis).

It is also worth noting the growing (predominant) share of case studies (Piekkari, Welch, 2018); among the individual research techniques, the methods of interviewing, examining documents, observations, and, less frequently, questionnaire research are mentioned (Matejun 2011, p. 93; Gummesson, E. (2017)).

At the same time, however, there are areas where these trends are reversed: authors who verify the way in which the area of public administration is examined noted, after analysing (in 2001-2010) over 1,600 papers from 4 leading journals, the domination of qualitative methods (56%); however, it is the share of quantitative methods that is growing significantly over time (Groeneveld, Tummers, Bronkhorst, Ashikali, Van Thiel, 2015). Likewise, some authors draw attention to some regional differences, e.g. a greater share of quantitative methods in American journals compared with European ones (cf. Cassell, C., 2017) although the conclusion drawn by these authors contains an assumption, adopted also in this paper, concerning the necessity of methodological improvement of qualitative methods and promotion of methodological diversity.

In view of the above, the next part verifies the research methods used based on our own research. However, referring to the earlier justification, the literature related to the subject of decision-making and strategic choices in a crisis situation was analysed.

Research methods – an analysis of the practice

In order to verify the distribution of methods, an analysis of scientific literature from the period 2012-2019 was used to search for information about the way the research was conducted, both in abstracts and full texts. The procedure was conducted taking into account indications of the Systematic and Reproducible Process for Identifying Journals, Articles, and Content to Include in a Literature Review Study (Aguinis, Ramani & Alabduljader 2018, p. 89). The search was carried out in the EBSCO database (the selection criterion was based on the availability of the database and its content) in the period 2012-2019. In order to narrow potential results to the area of management and quality sciences, the following databases were selected from among the available ones: EconLit with Full Text, Business Source Ultimate, Academic Search Ultimate, MasterFILE Premier, ERIC and MasterFILE Reference eBook Collection. The main role of the study was to obtain a picture of the popularity of the methods used, and not a direct evaluation of the results obtained, so the selection was not limited to high-indexed journals. The search process was based on 3 key concepts, i.e. decision making, crisis and strategy, which were the search criteria, while the types of sources were limited to papers and conference materials from scientific journals published in 2012-2019 (with online access to the full text). In the first stage of the search, the keywords were to be part of the headline or subheading. Unfortunately, due to the fact that only few publications fitted these narrow criteria (5 papers), modifications were made. The previously indicated terms were divided as follows: the concept of the topic was narrowed down to 'decision making' and the words 'crisis' and 'strategy' had to appear in the

content of the publication. The modification of the criteria made it possible to find 4,385 articles and 34 publications marked as conference materials in the database.

Table 1: Number of publications in the sample studied

Number of publications published in each year	Scientific journals	Conference materials
2019	174	0
2018	583	4
2017	603	2
2016	579	5
2015	639	12
2014	646	7
2013	618	2
2012	543	2
TOTAL	**4,385**	**34**

In the group of the papers identified, an attempt was made to find a way of conducting research by looking for appropriate wording in abstracts and full texts. The table 2 presents the results, where the results were aggregated combining different definitions of quantitative and qualitative research; the research techniques indicated are specified separately. It should not come as a surprise that qualitative methods prevail (the keywords sought were related to issues of strategy, and not e.g. finance). Noteworthy, however, is the frequency of the use of case study and interview techniques by the authors although this result is consistent with the theses put forward by the above-mentioned authors.

Table 2: Structure of the research methods applied in the sample studied

Type of research *(number of appearances)*	**Abstract**	**Full text**	**%** *(number of appearances/ Total*
Qualitative interviews, study, survey (…)	1,009	189	27.1%
Quantitative analysis, survey (…)	518	32	12.4%
Brainstorming	86	2	2.0%
Case study	1,945	324	51.3%
Experiment	1,196	135	30.1%
Interview	1,633	380	45.6%
Expert	**1,936**	**184**	**48.0%**
TOTAL *(one publication can have multiple types of research)*	**4,419**		

At the same time, it should be pointed out that the use of case studies and interviews is associated with the risk of one-sided opinions and the lack of a complete picture of the issue or case. Of course, the use of other methods, financial analyses or documentation reviews may affect the correctness of conclusions, but it will not be possible to resolve the issue of the decision-making cycle (especially in crisis situations) based on them. In the opinion of the authors, the answer to this may be the application of the knowledge of experts, i.e. external advisors to companies who actively participate in the processes of changes, restructuring and strategic decisions.

In the literature review carried out, the use of expert knowledge was additionally verified. In the available full-text literature, reference to expert knowledge was found in 184 items, which were subjected to detailed verification. In the course of further investigation it was established that the direct use of expert knowledge was referred to in 30 publications (out of 184).

Among the studies examined, as many as 22 directly concerned the process of making decisions in a crisis, including the way of communication, factors influencing the decisions (including the problem of information quality), the role of managers in decision-making, the identification of conflicts, the use of decision-supporting systems, and the study of the decision-making process in various types of companies (in the face of a crisis). The others addressed the issues of strategic choices and reasons for these choices in relation to the entire entities. Individual publications raised the issue of conflicts or human capital.

Experts as a response to the challenges of qualitative research methods – discussion

The application of expertise to qualitative research, in particular interviews and case studies, may affect the results of the research, but also the research process itself. In particular, there are many problems and distortions in the investigation of restructuring processes or crisis situations, including:

1. Problems related to the acquisition managers' (decision makers') knowledge:

    a. The impact of restructuring (crisis) on managers themselves, particularly in relation to perception and the reality of the increasing job insecurity and career insecurity (Foster, W. M., Hassard, J. S., Morris, J., & Wolfram Cox, J. (2019);
    b. The difficulty (often mitigated by e.g. participatory observation) in identifying the soft sphere, i.e. the effect of feelings or emotions on decisions made by managers (Z. Mikołajczyk (2014, pp. 158-159);
    c. Tendencies towards making distortions by the participants of the change processes, which includes exaggerating their own share in successes, omitting failures and changing their own evaluations ex post facto, which, in turn, makes it difficult to learn the actual reasons for decisions or the course of action;
    d. Difficulty in identifying determinants resulting from the organisational culture, informal solutions or the role of intuition;
    e. There also appears a practical difficulty in reaching the decision makers: on the one hand, they are the busiest people but on the other hand, they want to keep a lot of valuable information secret. Many researchers are familiar with the problems of mistrust, avoidance of meetings, time constraints or being sent to subordinates.
2. Problems associated with obtaining a broader picture of case studies, including the following:

    a. Low representativeness;
    b. High costs and time consuming research;
    c. Risk of intuitiveness and influence of the researcher's projections;
    d. Low access to measurable data;
    e. Excessive simplicity or the risk of generalisations.

There is no doubt that quantitative research makes it possible to reduce or bypass the aforementioned problems but it will not make it possible to learn about decision-making processes or their specific determinants.

In the opinion of the authors, the solution to this problem may be to use expert sources, not so much in terms of data interpretation, however, as in terms of the participation of experts in the processes described in the research. The advantages of this solution are shown by the situation of crisis, changes in organisation and restructuring:

1. External advisers (of different specialisations) usually have direct contact with decision-makers (and support them with their knowledge) so they can know both the conditions in which decisions are made and the decision-makers themselves (and their intentions).
2. They are not burdened with relationships with members of the organisation or other behavioural distortions.
3. They know the people, the organisation and the business parameters of the companies; in particular, they have detailed knowledge of their specialisation (which is necessary to provide consulting services).
4. They have much more experience in their field than the managers themselves.
5. In their work they use a professional language, largely consistent with the language used by researchers.
6. They can interpret events taking into account their other experiences (from other companies or situations).

Using the knowledge of professional and external participants in processes of changes and decision-making in companies also allows to reduce information asymmetry and to learn about management from perspectives other than the classic ones. This approach offers the opportunity to expand already established knowledge and develop generalisations (which can be further confirmed by quantitative studies) (cf. Bergh, Ketchen, Orlandi, Heugens, Boyd, 2019; Chakon, 2006).

Experts in Research Practice – Recommendations

Taking advantage of the authors' own experience in implementing research with the use of expert knowledge (Wojtkowiak 2019, Gołembski 2019), the group studied and the possible way of selecting experts as well as the way of acquiring and using data are indicated below. Attention is also drawn to certain practical aspects of the researcher's work.

When indicating experts as the source of research, it is worth specifying the group itself. Depending on the subject of the research, these may include auditors (of various specialisations, especially financial auditors), lawyers, industry specialists, different advisors (e.g. in the field of investments, finance, human resources, management, etc.).

Their selection, depending on the method of conducting the research, may be purposeful, where the criterion will be related to the area (selection of experts of a particular specialisation) or to the subject of the research (selection of experts related to a particular industry or company), but it may also be based on the criterion of availability. The role of the researcher is to:

- verify the expert's knowledge in the field under examination;
- agree on the scope of information and data to be used; this includes verification of the consistency of terminology and the correct interpretation of questions and issues (especially when using survey techniques);
- verify the expert's impartiality or take their bias into account (e.g. due to representing the client's interest) in the research results;
- maintain appropriate measures to guarantee the confidentiality of both the expert and the companies or persons presented by them.

Experts as a source of research are used in the Delphi method. Using these long-standing practices of this method, a wide range of information gathering techniques can be used to collect information from experts, i.e. experiments, expert panels, focus groups, surveys and direct interviews.

Specialists in various fields can be a source of knowledge about particular companies, situations, or other objects and subjects studied. It is worth noting, however, that their knowledge can also be used at further stages of research work, i.e. for commenting and critical analysis of the results obtained, testing models developed in the course of the research or forecasting future situations.

Reaching out to specialists and advisors may be a sort of challenge for researchers. In the authors' work, some effective ways of attracting interest in their knowledge were mutual recommendations, their own experience of expert work, contacts with managers (employing experts) and participation in industry conferences. On many occasions collaboration was encouraged through the sharing of the results obtained as well as presenting the practicality of the earlier results.

This systematisation is summarised below is a graph presenting a suggested procedure of using expert knowledge.

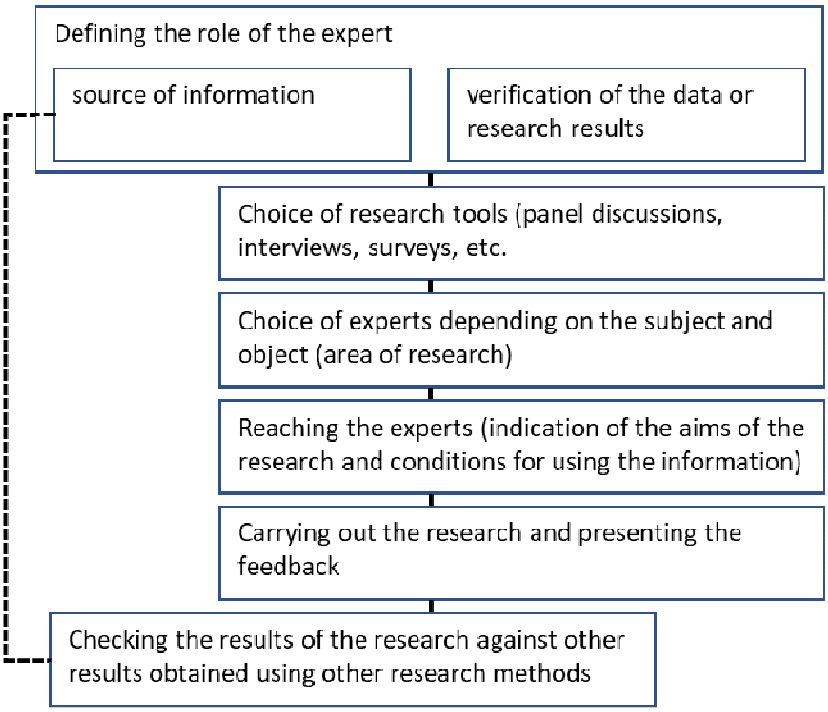

Figure: Procedure for the use of expertise

However, the use of experts as a source of information in research is not without its shortcomings. These include e.g. the risk of excessive specialisation, the risk of errors in interpretation and of the ever-changing perception of one's own role in the events examined (as in the case of managers), and the risk of incomplete image (incomplete expert knowledge). One should also bear in mind the fact that such studies are costly and time-consuming and may involve problems with reaching the experts themselves.

Yet, the risks listed above do not change the conclusion that in the era of the development of humanities and interdisciplinarity (cf. Prawelska-Skrzypek, Lenartowicz, 2013), diversification of research sources or stages, with the participation of professional experts, may enrich the description of reality. The examples of research by other authors referred to and the own research presented here show that there is a management area in which the participation of qualitative methods is significant and growing. Nonetheless, the use of expert knowledge is still rare, although there are areas, such as decision making in crisis situations, where research using expert knowledge is conducted by a larger group of authors.

Conclusions / Discussion

Management sciences have for many years been pointing to the need for methodological pluralism and holism combining methodological perspectives in order to gain a richer insight and better understanding of social phenomena (cf. Dainty, 2008, p.11; Groeneveld, Tummers, Bronkhorst, Ashikali, Van Thiel, 2015; Sułkowski 2005; Barker, Nancarrow, Spackman, 2001). Thus, it is worthwhile to combine both well-established quantitative research methods and to develop the methodology of the qualitative tools. It is possible to expand the sources of research and to improve the tools used, not only in order to search for permanent paradigms, but also to help understand such heterogeneous science as economics.

Management sciences are expected to provide the function of usability. On the one hand, they must build knowledge that meets the paradigms of coherence or impartiality; and on the other hand, they are expected to support decisions, effective prediction and the indication of possible choices. However, there is a paradox associated with management knowledge, which is linked to the volatility not only of the environment, but of both

the subjects of management and the managers themselves. Researchers must therefore use pragmatic, empirical methods that describe reality based on experience.

While scientists claim the right to describe, analyse and structure these experiences, it is the experts who are the best carriers of this knowledge; it is entrepreneurs who use their knowledge and thus become participants (and critics) of best management practices. From the considerations presented in this paper, an important premise emerges for further research on the possibility of using expert knowledge in conducting qualitative research. It is so that there appears a need for a more detailed verification of the publications selected in the course of the research procedure, in terms of the effects of using expert knowledge. In the opinion of the authors, this will allow for a broader exploration of the potential of qualitative methods for building the value of research conducted, for both the theory and practice of management.

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A Review on The Automation Technology with The Use of Internet of Things IoT For Managing Construction Materials in Malaysian Construction Industry

Mahdi M. Abdullah
Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia
Mahdi.mohammed34@gmail.com

Riduan Yunus*
Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia
riduan@uthm.edu.my.

Ahmed Saleh Ahmed Saif AL-SHAMERI

Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia
ahmedalshameri54@yahoo.com

Abstract

Malaysian Construction industry is facing such as a huge challenge starting from the new technologies that is placed as a trend for construction industry arising, productivity output and efficiency which focusing on the quality and value of any construction projects. Construction projects plays as an economic concern for the nationwide and construction work with its effort required such an implementation and installation for its handling of materials during that installation. This review paper contains a review for the current mitigation measures that are implemented for reducing from the construction waste among Malaysian practice in the side of automation technology such as the concept of 3R approach, IBS, BIM, GBI and Internet of Things (IoT) involvement that act as tracking for the materials during the placement which play as a remote operation for managing both human and materials resources. This paper presents a review of existing literature on construction waste and its mitigations measures in the Malaysian practices that have been implemented in the construction industry that substantially contributes to existing knowledge using solid foundation for further research in the application of IoT that connect to Automation technologies in construction in the aspect of materials management and the pattern of this review is to shows the important of technologies adoptions as existing strategies in construction industry in terms of reduce from the materials waste and the method of the placing information is focused on the current practice of construction waste practices during construction stage toward sustainable project in the Malaysian construction industry.

Keyword: Technology Automation, IoT, Mitigation measures, Materials Waste Reduction.

Introduction

Mahmud, Assan, & Islam (2018) identified in their research that IoT is a man-made technology conceptualized through intelligent virtual objects that can understand everything and allow the surrounding devices to interact automatically without manual control. Every year, the use of IoT devices is increasing exponentially. It is estimated that as many as 75.44 billion devices will be connected to the IoT network. With the expansion of the Internet of Things network, the construction industry should be considered, otherwise the construction industry will be left behind by other industries. This is because the construction industry should use the applications provided by the Internet of Things to ensure the stability of the construction industry in the project. Nowadays, the world is moving towards a new revolution, namely Industrial Revolution 4.0, in which the Internet of Things is the foundation of this new industrial revolution. The Internet

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of Things (IoT) method defines 370 global network structures based on standards and 371 communication protocol sets, including physical and virtual devices (Isikdag, 2015).

Yusof *et al.* (2017) stated that the relationship between Environmental Practice (EP) in construction projects and the environmental and economic performance in construction firms due to (EP) in construction management includes project management system through policies and procedures with conducts ongoing process improvement as the current knowledge. The relationship between construction companies has increased for their benefit by helping and clarifying these relationships. It is useful to help policy makers and construction companies to ensure a wide range of EP in the construction sector. According to research by (Pedro *et al.,* 2018), the main reason for environmental impact is discovered by consumption new materials resources to speed up the work during construction process with an accelerate destruction to make excellent functions performance for the projects, while there are side effects of sustainable materials that can be used significantly for wastes recycling elements with a consideration to the quality and their usefulness in terms of suitable dimension's materials that occupy a new position in the construction industry. Malaysia is realizing the vision of a smart city after the integration of smart city plans in the 11th Malaysia plan, the government has stimulated various plans to adopt IoT in the construction industry as in the smart city project (Bernama, 2018).

Construction waste has raised since last decades which caused serious environmental problems in Malaysian construction industry which generated approximately 8 million tons of construction waste per year realized by (GDP). That amount of wastes contribute an impact to the development of social and economic infrastructure such buildings, architectural, tunnels, road works, bridges and airports. Construction industry often referred to as friendly environment but with increasing of construction waste due to construction activities gradually increasing (Saadi *et al.,* 2016). There are many advantages to use Internet of Things in the construction industry that include better execution in the perspective of monitoring and control the necessary action and services that required for the construction project with better quality, cost and time savings. Due to its availability, it has also been extended for quick decision making, real-time data analysis with an improving for the crisis management of materials and emergency response that introduce an effective monitoring for the materials tracking and safety (Gamil Y *et al,* 2020).

In construction industry, there are such a crucial part which plays such an important factor with rapid effect in most countries toward the economy growth. Besides "Building Information Modeling" BIM technologies that played as automation technology application in the construction industry with major roles toward improving construction management setting. BIM implementation in construction industry helps to reduce from waste and the potential litigation. Rajendran *et al.* (2014) declared that construction industry is well-thought-out as one of the major contributions with negatively enhancing to the development of construction industry by outlay a lot of money for construction projects with reflection to the wasting of materials that act as challenge causing delay to the project among the estimated time then expenditure exceeding the budget of project.

Literature Review

Automation Technologies using in the Construction Industry

Rapidity in the construction growth among many projects in Kuala Lumpur as investiture resulted in increasing construction wasting problems as mentioned by Mohd *et al.,* (2016) earlier that for waste index method. Another study by Umar *et al.* (2018) stated that the weight index for construction waste among the construction implementation defined as the amount for the unit of volume or other description. It is defined as the weight of construction waste that is generated per the meter squared for the Gross Floor Area (GFA) or the area of the current activity for the actual stage or phase. Waste index computations had been predicted by Umar *et al.* (2018) as the amount of waste that arise for the life-cycles of any construction projects. In Malaysia, however, there is such a shortage among the available information regarding to the waste during project life-Sycle. Automation in construction is a term which focuses on the application of computer-controlled processes and mechanization concepts. It involves the application of the latest automation technologies, which may perform unfinished, undesirable or unsafe human construction tasks in the construction department (Xu & Lu, 2018). Therefore, the quantification method of waste mitigation measures in Malaysian construction industry had been modified to be comport with the point of data limitations for the quality whereas the incorporate for the effects among past research that conducted

in the perception of contractor's performance which CIDB classified as grade five, six, and seven had selected by (Umar *et al.,* 2018).

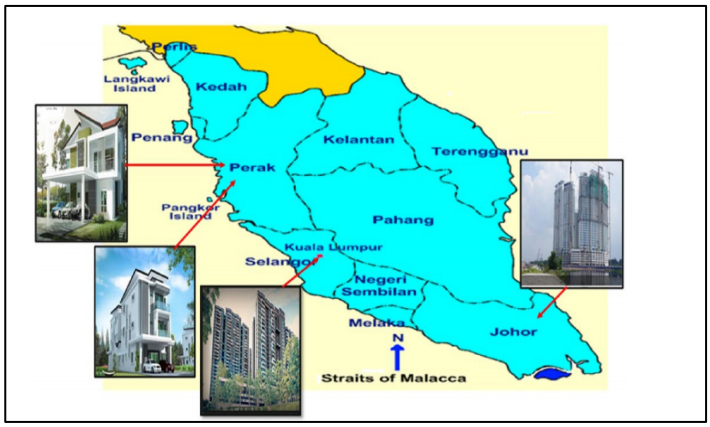

Figure 1: waste generated from high rise buildings, bungalow and terrace by

(Umar et al.,2018)

During the past studies among Malaysian construction industry, the surrounding terrace and bungalow projects had established awareness for the waste reduction and alleviation measures and that were for the building up to appropriate planning for the resources and environmental management during all phases of a construction project to ensure the quality of the project figure1. However, there are numerous authors who have given their own definition for the construction industry depending on their point of view (Saadi *et al.,* 2016). In general, the construction activities refer to many activities such as building works, tunneling, road works, bridges and airfield (Nagapan *et al.,* 2012), whereas construction projects are important in providing the necessary infrastructure towards the development of the country. Furthermore, construction wastes are also associated with serious environmental issues in Malaysia (Saadi *et al.,* 2016). Apart from that, Malaysia generates 25,600 tonnes of municipal solid wastes daily. The generation of Municipal Solid Waste (MSW) in one of the districts in the state of Johor, Southern Malaysia has increased up to 3000 tonnes per day (Begum *et al.,* 2009). On that notes, the Malaysian government needs to tackle this problem by revising the existing strategies in implementing construction waste minimisation initiatives.

Umar *et al.* (2018) estimated that the generated waste ranked among high rise buildings with accumulate 41% of all projects, while terrace and bungalow projects represent 51% and 8%, respectively which shows that the most of these projects were located in Selangor by the percentage of (25%) and Johor Bahru (15%); while the remaining 60% were found across the 12 states in Malaysia that became an important issue for the high densely populated cities in Malaysia. It is well known that several sources causing an impact for the environmental pollution as air emissions from the buildings which are considered as one of the major factors that contribute with compounds amount increasingly. Construction is a diligence field that generates a lot of waste, and the top of that is site waste due to construction work that performed during the site activities which direct of waste to a mixture, whether it is construction, site clearance, renovation or excavation.

Mitigation Measures using BIM Application

Building Information Modeling (BIM) application is considered as specific of the innovative technologies that need to be organized in the planning and design. Musa et al., (2018) mentioned that in construction as imperative features of BIM used to come up with an object oriented record composed which call intelligent objects that show the project in a 3D Dimensions that illustration of integrated information, and an interrelated relational record. The use of BIM as a technological innovation can be seen as one of the potential solutions to emerging problems and can make the industry more efficient, effective, flexible and innovative, while increasing from construction productivity to contribute to the

economic growth, although the implementation of BIM can overcome from constructive issues (Musa *et al.,* 2018). Construction workers need to understand the advantages of BIM and its future challenges for helping them to improve from the implementation of construction activities and processes. BIM is usually applied at all stages of project starting from the beginning to the delivery. BIM can covers the entire needs of construction community's and assessment of the terms of development, management, and the legal compliance during the equipment and materials lifecycle (Dein, 2013).

Encountered challenges start from the productivities among the communities to the consideration of quality and value output in construction project as mentioned by Bin Zakaria *et al.,* (2013). For Malaysian projects, the study that played as the most problematic issues among construction industry project is still critical in such as delay of projects, the production with low quality product and intensive labor when using old technology. BIM is used for model analysis, conflict detection, product selection and conceptualization of the entire project to improve the performance and quality of construction projects (Abrishami *et al.,* 2014 ; Mohd Nor & Grant, 2014).

The development rise by BIM implementation as diverse needs as its visualization look especially in 3D dimensions earlier and its analysis for the cost estimation, facility of manpower and duration. It involves as genuine innovations within the construction industry and its compliant from the perspective of "Building Research Establishment" (BRE) that developed a specification and huge database which named "Integrated Materials Profile And Costing Tools" (IMPACT) as overall for the aim of integrating" "Life Cycle Assessment" (LCA), "life cycle Cost" (LCC) and BIM (Akanbi *et al.,* 2018).

Mitigation Measures Using 3R and 4R Approach

Nasaruddin *et al.* (2008) & Umar *et al.* (2018) in there research developed the Malaysian waste management namely as disposal and sorting forms an integral part of the local authority administration. However, the increasing amount of disposal for the material was that it leads to emergent dumping with illegal large amount that is produced during construction implementing by major infrastructure projects. As a consequent, commercial building and housing development projects in Malaysian projects cause such significant impact to the environment as stated by Nasaruddin *et al.* (2008). This results in non-proper system to manage waste and one of the possible ways is to reduce, reuse and recycle construction waste whereas these issues have caught an attention for the government as the increased public concerns and local community needs.

Kazerooni Sadi *et al.* (2012) identified that 4R term for Reduce, Reuse, Recycle and Recovery approaches for reducing the waste in construction in the local construction industry which adds such recovery key as knowledge to reduce the waste by management progressions during the implementation while still far from satisfying. However, 3Rs principle, also known as the 3R approaches in WM 3Rs, which classify WM Waste Management strategies that still shortage for waste reduction which can be generally summarized into five categories encompassing such as "reducing waste through government legislation", "reducing waste by design", "developing an effective Waste Management System" (WMS), furthering "use of low waste technologies" and "improving practitioners' attitudes toward waste reduction". However, the 4R concept is still not fully functioning, which may lead to increase for the costs of wasted components because it hinders the setting of more formal practices and efficiency for management. Coordination between these three main impact minimization strategies in the demolition, design and construction processes is fundamental, and is a basic principle of waste management. Therefore, waste reduction is considered the most effective waste impact minimization strategy. However, it is inevitable that some C & D waste will be generated, and reuse and recycling strategies are a practical way to reduce the amount of C&D waste sent to landfills. "Reuse" usually means using the same material multiple times in a building, including reusing the material for different functions, such as structural steel, wooden shutters, and doors (Park & Tucker, 2017).

The economic downturn has also affected the local construction industry, and can use any low-cost waste management method to prevent the costs. For the differences amongst the technologies, waste recycling stands obtainable from the added three technologies according to the result that conclude among the local practitioners that have always been chosen as a method which is beneficial to them. Reducing waste in construction can be considered as a conceptual as it comprises an extensive planning for the different stages of project Kazerooni Sadi *et al.* (2012). Meanwhile, waste recycling

deliberates as a standard form for material handling, it can be seen that undamaged materials can be used for other purposes before they are completely damaged or recycled to be used again.

Mitigation Measures Using Industrial Building System IBS

IBS in construction is widely used by researchers, and governments which represents such an industrialization in the architecture. However, it covers wide range, including application and act as systems that properly not familiar with traditional practices. IBS became a term representing those construction industry based materials management and protection. In the Malaysian construction industry, IBS implementations has been such a good application that reduces from construction waste. Building System (IBS) is a method of using industrialized building materials for construction in manufacturing plants. This method can replace conventional methods and can reduce the number of foreign workers, improve construction quality, reduce costs, and reduce construction time (Nawi *et al.,* 2015).

The classifications provided by CIDB have also been misunderstood in place of systems with limitation to construction industry, and IBS is interpreted as a method or process for making buildings requiring less labor-oriented with faster progress which meets the quality requirements. The broad view of IBS is to change traditional concepts, redesign for the capital development with better cooperation that promotes transparency (Anuar *et al.,* 2011). However, it has been agreed that moving towards the industrialization of the construction industry is a global initiative, not a partial or isolated initiative. Definitions and classifications need to be developed, incorporating global perspectives and understandings. Therefore, the definition and classification of off-site, prefabricated, off-site construction, modern construction methods, off-site production, off-site manufacturing and pre-assembly need to be checked (Anuar *et al.,* 2011).

According to study by Ali *et al.* (2018), only about 70% of private projects and 42% of public projects in Malaysia use modern IBS technology. In addition, when the IBS roadmap 2011-2015 aims to score 70 or higher for all public projects in the perspective of using IBS, the use of IBS in public projects is lower than expected, with only 24% for the public projects which indicated value above RM10 million and it equal to 70 or higher. To date, as of May 2016, Datuk Fadillah Yusof, Minister of Works, said that according to a 2014 study by (CIDB), the private sector implementation rate as low, only about 14%, while 69% of government projects using IBS (Ali *et al.,* 2018).

Mitigation Measures Using Green Building Index GBI

Construction projects received GBI in Malaysia with ratings based on the six criteria such as “energy efficiency”, “indoor environmental quality”, “sustainable site planning”, “management materials and resources”, “water efficiency” and “innovation”. Meeting green technologies in construction industry which plays such a friendly environment quality, Key practice is a technology that has proven through experience and research to reliably produce the desired result (Aghili, 2018). Implementing the green principles as mitigation measure for project management is considered as significant for cost savings to be achieve over time more to the quality project life-cycle.

The main purpose of GBI is to reduce from the impact of wasting materials to the environment in order to achieve sustainable development. Green buildings system GBI have improved the environment in many ways which can protect the natural environment, promote a healthy life, and reduce from the negative impact on environment. Key practices of green building management affect positively the environmental assist as well as economic aspects. Similarly, environmental protection through sustainable projects can reduce project operating costs, increase the value of buildings, and increase return on investment (Vyas *et al.,* 2019). In recent years, the ideology of environmentally sustainable development and the new paradigm of "sustainable human development" has spread in the Malaysian construction to increase the industry's consciousness of viable development (the Malaysian government has launched the 11th Malaysia Plan). In 2016, The Construction Industry Development Board of Malaysia (CIDB) has developed a new construction plan that is the Construction Industry Transformation Plan (CITP) as one of the main goals of CITP to integrate from the environmental sustainability into the construction process (CITP, 2017).

There are many foundations to inspire the execution of GBI. For example, any green building project requires systematic management and appropriate operating activities. There is also a need to work with many experts to drive the success of green building projects.

Mitigation Practice using Internet of Thing IoT in Construction Industry

Isikdag (2015) stated that the use of IoT in construction industry is to generate early warnings and alarms as dynamical safety barriers for hazard energy on underground construction sites. In order to ensure the performance of the proposed system, the hazardous energy and its coupling mechanism are analyzed to provide safety barrier strategies and solutions to avoid unsafe behaviors and unsafe conditions of construction equipment and worker environments (Zhou & Ding, 2017).

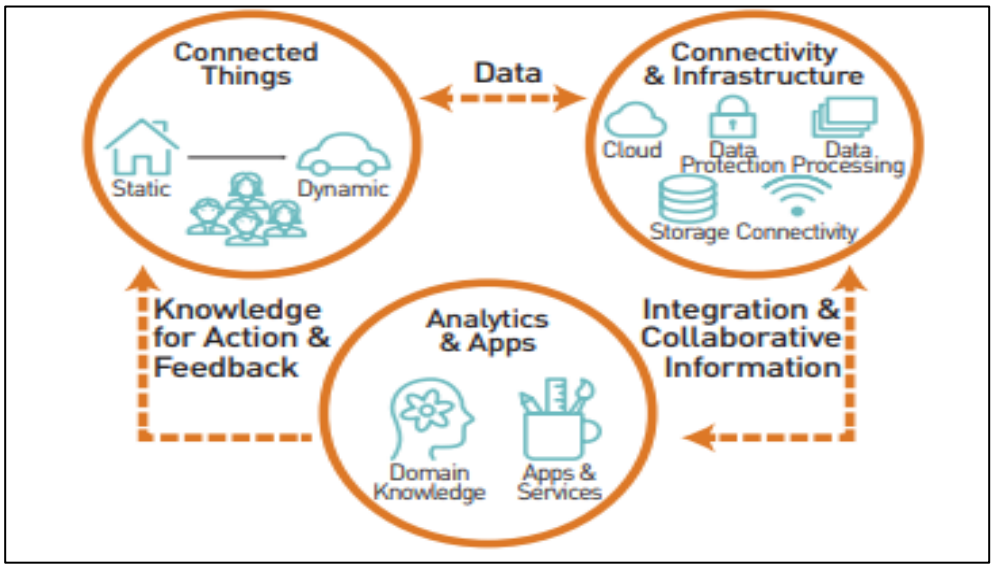

Figure 2: the connectivity of IoT sensors and storage (MIMOS Berhad, 2015)

According to the Malaysian National Internet of Things (IoT) summary by MIMOS Berhad (2015) reported that the (IoT) is such a convergence that includes smart devices that have the ability to generate the data through the sensors for storing the knowledge and information to increase from the human productivity that give such an enhancement for the quality of life. As in the Figure 2, there three main components that are connected namely "connected things" as dynamic and static with embedded sensors. The second is the "connectivity infrastructure" and the third as an important one is the "analytics application". They are respectively connected as a network for sorting and storing the data, knowledge and collaborate the information for the actual work and act as protection for the data with the workers and machinery information.

IoT in for Construction Industry

Internet of Things (IoT) is a human-designed technology conceptualized by a smart virtual object that can understand all substances and allow the surrounding devices to interact automatically without manual control. In simple words, IoT is a network of sensors, appliances and devices competent of sending and receiving data about changes to their current physical situation and environment nearby them over the internet (Maru & Raval, 2020). The Internet of Things technology has been developed in the three-layer network architecture, such as RFID-based instrument-level positioning and tracking technology, centimeter-level ultrasonic detection technology and infrared access technology, etc., to help workers change their dangerous behaviors and avoid changing Accident at the construction site (Zhou & Ding, 2017).

The Internet of Things (IoT) is dedicated to achieving communication between all the three devices, which are things that exist in real life or 4 are virtual. Being a real thing or a virtual thing is not the five key points of the IoT approach. As mentioned before Cheng & Cheah (2020) that IERC- The European Internet of Things Research Cluster stated that the Internet of Things is “a dynamic global network infrastructure with self-configuring functions based on standards and interoperable communication protocols, in which physical and virtual “things” have identities, physical attributes and virtual personalities. Use smart interfaces and seamlessly integrate into the information network. Figure 3 provides the simplest understanding of IoT because it is superior to all types of interactions, such as machine-to-machine, machine-to-environment, human-to-human, human-to-machine, machine-to-human, machine-to-environment, and physical systems.

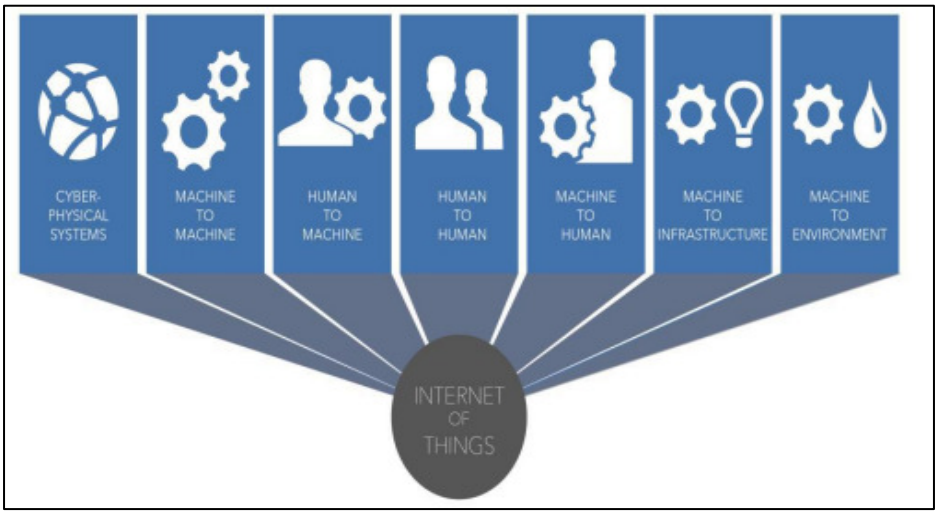

Figure 3: function of IoT toward the environment (Maru & Raval, 2020)

Using these advanced technologies, other industries are growing rapidly. The construction industry should emphasize the use of this IoT application because the construction industry will become more and more complex in the future. If there is no application that can promote related work, then the construction industry will be left behind by the development of other industries (Maru & Raval, 2020).

According to Cheng & Cheah (2020), Internet of Things applications can be divided into 3 major areas and various types of applications, namely the industrial domain, the smart city domain and the health welfare domain. "Smart" is usually marked with the realization of the Internet of Things such as smart homes and smart countries. "Things" in the environment can be sent through the Internet for analysis. There are many technologies or devices that can realize the invention of IoT, such as "sensors, network computing devices, web storage, data processing, and IoT applications".

The sensor is the first enabler of the Internet of Things. It collects data from the environment and sends it to the connected data processing, also known as the actuator. Sensors have been continuously developed with the development of microprocessors, even a mobile phone includes 14 sensors, such as cameras, motion sensors, GPS, etc. Wi-Fi and Bluetooth are also usually embedded in the Smart Lock system, and then this IoT lock will use this network to communicate with applications developed in mobile devices (Almosawi, 2018).

The Internet of Things is a huge prejudice. A large number of sensors and devices will connect to the Internet and interact with the cloud. The Internet of Things (IoT) is a system of mutually compatible computing devices that can transmit data through the network without human-computer interaction with people or people (Yacob *et al.,* 2020) Can withstand different business applications, such as vehicles, houses, buildings, machines, environmental sensors, etc. The Internet of Things is developing rapidly and is expected to include 18 billion connected devices by 2022 (Almosawi, 2018).

Table: some focuses of IoT in construction ((Arslan, Ulubeyli, & Kazaz, 2019)

Approach and Focuses	Author and Date
The research appointed on the smart objects	Kortuem et al. (2010)
On the smart homes	Park et al. (2017)
On the BIM integration	Teizer et al. (2017) Zhong et al. (2017) (Ding et al., 2018)
On the safety and health	(Park & Tucker, 2017) Mehata, et al. 2019) (Zhou & Ding, 2017)
Prefabricated materials in construction	(Xu & Lu, 2018)

According to Mehata *et al.* (2019), almost 48000 of workers dies accidently by such a fault or incident every year due to the accidents in the workplace of construction which the top of the recorded number were on the site as the list of dies reached 24.20 percent among the total accidents. However, most of the deaths that occurred were preventable.

Waste Management in Malaysian Construction Industry

Project's materials and waste management in construction are highlighted valuable and accounted substitute to the percentage of total cost of the project in the perspective of project economy. According to the analytical study by (Najafy, 2014), the interest trend currently in the arena of waste managing in the construction which has been upwards toward the contribution project benefit in cost saving as economic perspective. However, the two main developing countries, namely Malaysia and China, have shown increasing interest in waste management. For example, there is a lack of coordination in waste management and minimization in construction. This has become quite big problem if the work does not contain prefabricated components and components that minimize from the waste. So, this is a missed opportunity because using prefabrication can significantly reduce construction and demolition waste by as much as 52% compared to traditional construction techniques. In addition, it is reported that the interaction between the designer and the material supplier is minimal, while the other guiding role between the supplier and the contractor is minimal. This interaction between project partners is considered to be in the procurement process an important reason for continuing to over-order materials required for the project. Implementation of the elements and continuous waste throughout the supply chain (Najafy, 2014).

Aliferova *et al.* (2017) statement pointed out that all construction waste is caused by human activities and can cause environmental problems, such as construction waste, rubble, disasters, construction materials and site cleaning during construction and any waste in construction projects. In addition, previous studies have mentioned that construction waste is a useful, unnecessary or discarded material generated by human activities and is not free-flowing. However, appropriate waste is needed to avoid, reduce and reuse waste generated by human activities. In addition, the average number of buildings in 2015 was 28.6 tons of waste generated per day.

Implication of Material Waste in Malaysian Construction Industry

According to study by Tran (Tran, 2017), excessive materials are the main cause of construction waste, indicating that the largest source of material waste in commercial buildings is concrete waste (43.5%), followed by timber formwork (18.7%), steel bars (9.8%), and bricks (8.4%). %), mortar (8.4%) and tiles (1.2%). The waste rate is significant. According to the research results, another key factor that may have a significant impact on construction waste is the lack of commitment and support. Management and construction stakeholders cannot reduce waste to a minimum. Ismam & Ismail (2014) mentioned that several environmental problems that continue to plague the land and endanger the production of

natural resources. In addition, they added that if no effort is made to reduce carbon dioxide emissions, the greenhouse gas effect caused by carbon dioxide emissions is expected to increase to 40 billion tons by 2030. In addition, the construction industry has a huge impact on the environment, and the consideration of sustainable development has become the top agenda at the global level (Tunji *et al.,* 2018). A review by (Ding *et al.,* 2018) concentrated on the construction process in purpose of avoiding waste generation by waste's reuse and taking over the implementation of effective waste management among construction stages to reduce from CW generation and play such an important action of waste management during the implementation of materials. Basically, construction project has three foremost waste minimization practices that are placed to avoid materials wastage such as reduce, reusing and recycling of material waste in construction industry. In addition, to avoid waste in construction work the principal is relay on the shortage from the waste at from the sources followed by reusing the unwanted materials by recycling, whereby reducing the volume of waste material to be disposed and discharged (Ahmad *et al.,* 2014).

Ashraf (2018) mentioned in his study that practitioners in the waste during construction activities considered as sustainable practice for saving the cost of project and protect the environment from pollution when reuse the extra materials or disposal unwanted materials which the process of reuse as waste minimise and reduce be in the site work as the action of reuse after recycling indicated by information from the previous waste management as report by Ashraf (2018) that the solid waste is expected to be increase by 70% between 2010 and 2025, which equal more than 3.5Mt to 6Mt per day. The concept of sustainable development is seen as meeting to improve social and economic development practices without affecting the ability of the coming generations as evidence of research toward the sustainability for the developing countries compared to the developed countries currently in order to integrate from sustainability into new technologies and policies in construction industries for developing countries. According to Aliferova *et al.* (2017), the value of new projected construction work estimated in Malaysia as reported by CIDB in 2017 has been showed as RM 138 Billion for construction projects compared with RM131 billion in 2016. The forecast and development of the construction project in Malaysia shows a huge amount in structural projects with good investments in Malaysian construction industry. From the above discussion, the increase in demand for new development and renovation projects is important for increasing the development and renovation projects toward the new technology in construction by using the new renovation and technology especially in the construction projects, the development of infrastructure has contributed to environmental problems. Consequently, in construction industry among the minimization of waste materials which is the highest priority should be given to waste reduction strategies, because conceptually speaking, avoiding or reducing waste generation is more meaningful than developing a comprehensive waste treatment plan (Ashraf, 2018). In addition, reuse and recycling strategies can also enable the effective use of waste. However, although reuse and recycling can reduce the final disposal and treatment of waste, it cannot avoid waste generation. The significance of minimizing waste is that when materials are controlled and reused during construction to avoid waste generation, economic projects are used to ensure high quality of life, environmental cleanliness, health and safety, and sustainable construction.

Conclusion

Automation technologies in construction are such an emergent technology with keen move for its applicability and in the current technologies for construction has been criticized by some researchers. This review is an important collection that identifies such a review for the automation technologies uses in construction industry with an invest more on the implementing of IoT approach for the management of construction materials. IoT adoption in construction projects is unlikely to replace the human usage in workplace. Instead, it alter from the business efficiency in the industry when it reduces from the expensive errors on the worksite as it reduces from the injuries by the use of robotics and devices which makes the operations goes smoothly. The most likely approach in the Malaysian instructions using the 3R approach with BIM beside IBS practices that has the ability to bring up and introduce the technology with prioritized investment where IoT can have the immediate impact with its unique needs.

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Construction Waste and Its Initiatives Managing Among Malaysian's Practice (Review)

Mahdi M. Abdullah

Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia
Mahdi.mohammed34@gmail.com

Riduan Yunus*

Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia
riduan@uthm.edu.my.

Ahmed Saleh Ahmed Saif AL-SHAMERI

Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia
ahmedalshameri54@yahoo.com

Abstract

Initiatives concern in construction industry is one of the important terms that have dealt with management of construction materials with a huge concern to the social and monetary of the nationwide with a positive generation for the wealth and development. The inadequate deal with waste management administration among the construction players and practitioners rehearses has prompted such as fruitless outcome in diminishing of ecological effects and unlawful dumping for construction waste materials either during construction and build or demolition. This paper presents such a review on the construction waste management in Malaysian construction industry with the use of initiatives management toward the development that have been actualized in the Malaysian government and construction industry practice as far as to meet the development and technology involve toward construction waste management that apparently used in the current materials management in construction this paper fills in the gaps with effective way that enhance from the existing practices toward an effective construction waste management.

Keywords: Construction Waste, Initiatives for Managing Construction Waste.

Introduction

As stated by Veerasanai & Alias (2020), the development of any nation is strongly affected by the monetary development aside from the daily lives of citizen that serve the development of any country; the business' action fills in as a basic contribution for the exhibition of different segments in the nation. Manoharan *et al.* (2020) declared that the development for construction projects are hugely in conjunction with Malaysian plan 2020 according to the roles that have become much vital toward the growth. These roles played increasingly with a crucial enhancement for the status of development that battled to accomplish the target that has been planned initially to be accomplished in the year 2020. The development in construction industry is imperative increase with a vital improvement in the side of economic development which still in expand with both infrastructure and construction industry demand that are seeking a development and improvement as essential to the environments and sustainability as well as to the human life concern on the earth.

Zhang *et al.* (2014) stated that the pressure environmental change among the human change, land use, and economic growth movement. Development in construction aspects are in the demand for more improvement which blasting in a

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numerous nation's thought and priority. Construction industry act as a role for the socio-economic development for any country. Nowadays, Construction industry is rapidly increasing and growing according to the standard of living and the demands of infrastructure project's needs, changes in the consumption habits, as well as the natural increase in the population of citizens (Nagapan *et al.,* 2012) .

Hasmori *et al.* (2020) Expressed that the unused components of construction materials that come as a result for the construction activities either during the pre-construction or construction stage even post construction, despite such commitments and contributions with rapid development, are considered as a serious issue that is faced within the increase of the materials waste. The Public Cleansing Management Corporation of Malaysia reported that about 8 million tones' of construction waste generated from the construction projects every year.

The existing body of knowledge among the previous researcher's review could be explored and distinguished with such affective implementation in the term of waste minimization by the implementation of initiatives of waste minimization in construction industry among the initiatives managing and formulated use in the developed countries. Nurzalikha *et al.,* (2015) underscore that numerous nations are additionally considering the appropriate site management and location that utilize reusing and recycling for the generated waste that produced during construction activities with any condition have to be recycled and reused within any guidelines to secure the materials losses according to the environmental regulation and safety practice. The reason why construction waste is not systematic is that the construction party lacks awareness of construction waste management which can be seen from the statement that Malaysia needs systematic waste management to reduce from the amount of waste by 2020. Due to the expansion of lifestyle standards and development, the increase in construction demand and the increase in the amount of construction materials, the Malaysian construction industry has developed rapidly. The population has made a positive contribution to the increase in the numbers of generated waste (Mohd Hilmi & Narimah Kasim, 2017).

Overview of Construction Waste Management and its Initiatives Practice in Malaysia

Many of Malaysian organizations engaged with the development sector in the construction perspectives provide an economic strength that is connected to the development of infrastructure development that keeps moving for the nation development. Construction industry is one of the most challenging industries because it is risky and one of the most prosperous industries in the world. According to data reported by Kanimoli *et al.,* (2020), Department of Statistics Malaysia(2019) reported that the value of construction work that completed by the Malaysian Construction Department in the fourth quarter of 2018 was RM36.5 billion. In addition, from the overall economic performance of Malaysia in 2018, civil engineering and professional construction industries contributed 4.8% of Gross Domestic Product GDP. According to data from Trading Economics, by the end of the last quarter of 2019, global macro models and analysis expectations show that the Gross Domestic Product of the Malaysian construction industry is estimated to be 14.727 billion RM. In addition, the construction industry is one of the top five industries in Malaysia that directly contributes to Malaysia's economic performance (Kanimoli *et al.,* 2020).

CIDB educates key players in the industry through a series of training courses, workshops and awareness-raising activities that support national policies. However, according to the feedback from CIDB that align with what Ikau & Joseph, (2020) Malaysian industry participant's still lack knowledge about sustainable construction. Another initiative is to formulate with the National Green Technology Policy launched in 2009 which shows that green practices are used as the basis for Malaysian government to guide the sustainable practice in construction industry. In addition, the policy also indicates that the government is committed to solving all relevant green issues in the country, thereby complementing the global vision for sustainable development (Ismail *et al.,* 2012).

Construction industry is a major consumer for the natural resources worldwide, and almost 60% from the natural resources consumed by construction industry which caused many of the environmental impacts. These impacts include the destruction of water sources, changes in biological and ecosystems, and the destruction of the food supply chain between the biological factors. Several laws and regulations have been implemented in countries around the world. In addition, waste management technology is developed by government agencies, and researchers all over the world are working hard

to reduce from the waste generation. Various technologies such as recycling and recovery technologies are emphasized, which are very effective in reducing the rate of waste accumulation (Manoharan *et al.,* 2020).

The increase in the number of construction projects is attributed to the population needs, which has a harmful and negative impact on the waste ecosystem. In recent years, the management of construction waste, especially in the Malaysian construction industry, has become a major environmental issue that has been discussed in the media. There are still few shortage due to the minimization of construction waste that is daily generated and disposed to the landfill as most common disposal methods in the construction industry in Malaysia. At all stages of the construction industry, increasing pressures require the implementation of useful work strategies to minimize from the waste materials. Despite many government policies among the initiatives management that address this issue, on-site sustainable waste management is still not in a priority for most contractors. According to Jereme *et al.,* (2019), in 2020 the targeting goal is to recycle 20% of the total waste that generated while 15% of the intermediate treatment and the remaining 65% of the waste in the disposal of various landfills. The environmental performance of the built environment can be implemented by Waste minimization strategy to enhance. Waste reduction is one of the initiatives to advance the country's sustainable development agenda (Ikau & Joseph, 2020). According to Bidin (2020), many measures have been taken to ensure that the problems related to environmental degradation can be minimized. The introduction of green procurement is one of the strategies that help solve environmental problems when implementing construction projects in the Malaysian construction industry.

Construction Industry

Construction industry or as some researchers named the term as Engineering and Construction (EC) regard to the traditional and respond of change (Omar, 2017). Construction as a routine of staying and place for humankind purposes is considered as the one of the first action among businesses which human developed as a simple daily lives according to the requirement of living with a unique ways (Forum, 2016). Construction industry relays on the other industries in the perspective of business as it provides and maintains the accommodations and plants of infrastructure with a determination of where everyone lives, work and entertains. Construction is the decisive factor in where and how almost everyone lives and work. The construction industry is important for economic growth. However, Malaysia's growing for the development has led to environmental damage. That becomes a major problem (Nagapan *et al.,* 2013). In conjunction with Jain *et al.* (2020), the construction industry produced such a large amount of waste. On the other hand, it is recognized that construction activities and work throughout the renovation or demolition as well as it generates inert and non-inert materials, which are generally addressed as construction waste. For almost the entire population of the world, the built environment will seriously affect the quality of life. The annual revenue of the construction industry is nearly 10 trillion US dollars, and the added value is 3.6 trillion US dollars, accounting for about 6% out of global GDP (Mahidin *et al.,* 2020). However, by the most of states, it can be clearly seen by the immense contribution of construction industry in Malaysia economy in 2016 as shown in Table 1. It also illustrates, besides the entire Malaysia, there is ten states including; Johor, Kedah, Kelantan, Melaka, Sembilan, Pahang, Penang, Perak, Perlis, and Kuala Lumpur whose construction industry growth is bigger than their Gross Domestic Product growth. While only four states incorporating; Selangor, Terengganu, Sabah, and Sarawak whose GDP growth conquered the construction industry growth in this regard.

Table 1: the contribution of construction's growth to Malaysian economy by states 2016 Department Of Statistics Malaysia (DOSM,2017)

Region	**Construction (%)**	**(GDP) (%)**
Malaysia	7.4	4.2
Johor	24	5.7
Kedah	15.9	3.2
Kelantan	29.6	4.8
Melaka	5.6	4.5

Negeri Sembilan	9.8	3.5
Pahang	29.7	2
Penang	10.4	5.6
Perak	8.3	4.1
Perlis	9.8	3.9
Selangor	-2	4.8
Terengganu	2.0	3.1
Sabah	-3.2	4.7
Sarawak	-5.1	2.3
Kuala Lumpur	12.8	5.9
WP Labuan	-18.6	7.2

Table 2: The share and growth of the construction industry (DOSM, 2020).

Domain	**Share**			**Growth**		
	2019	**2020A**	**2020B**	**2019**	**2020A**	**2020B**
Non-Residential Buildings	25.1%	25.9%	29.4%	-10.3%	-11.0%	-36.2%
Special traders	4.9%	5.0%	7.0%	3.8%%	-8.6%	-28.7%
Residential Buildings	24.5%	24.1%	27.3%	2.7%	-7.6%	-38.7%
Civil Engineering	45.4%	44.9%	36.4%	7.9%	-2.3%	-55.2%

According to the Malaysian quarterly construction statistics, the value of construction work done has been decreasing from the fourth quarter of 2019 till the recent presented information in the second quarter of 2020 (that is RM37.0 Billion in 4th quarter 2019, RM35 Billion 1st quarter 2020, and RM19.8 Billion in the 2nd quarter of 2020). Based on the table, all the activities in the construction industry has slowed down in the first and second quarters of 2020. This slowdown was a result of the closing of construction activities due to the impact of Covid19 because they companies had to follow Movement Control Oder (MCO). Comparing the data in the table, it can be clear that the decrease was caused by Civil engineering, Residential buildings, Non-residential buildings and Special trade's activities. The highest decline, for example, was in the civil engineering which declines from 7.9% in 2019 and reached to -55.2% in the second quarter of 2020.

Furthermore, the Civil Engineering sub-sector is the main contributor to the value of the construction work although it has been decreasing through the tree quarters (45.4% in the fourth quarter of 2019, 44.9% in the first quarter of 2020, and 36.4% in the second quarter of 2020).

As a result of the increasing competition from entrants in the domestic and international markets, especially in the construction sector which has proven to contribute immensely to the growth of the Malaysian economy. Malaysian industries are urged and advised to make greater efforts to achieve performance effectiveness through better management and organizational strategies in the construction sector. In conclusion, it can be seen clearly that the construction industry has substantial value for Malaysian economy and considered as one of the biggest supporting sectors for Malaysian development. More precisely, it accounts for about 5% of GDP in the developed countries, while in the developing countries, it often accounts for more than 8% of GDP (Veerasanai & Alias, 2020). Construction industry is anticipated to

grow substantially in the next few years, with an estimated revenue of $15 trillion US dollar by 2025 (Forum, 2016 ; Omar, 2017) and they added that today there are more than 100 million people currently involved in the construction industry works worldwide.

Initiative among Construction Industry Practice

The current growth of industrial civilization with the rapid development of urban economy have brought increasing pressure to the natural environment change. Today, construction projects are very difficult and complicated to be understood as involving such a multiple interwoven processes as well several activities (Olawumi & Chan, 2019). Smart and innovative system and practice with the current technologies that implemented for construction project throughout the use of BIM, IBS and green sustainability and technology for managing the materials implementation during the activities of project showed such a positive output for construction project nationwide. The construction industry plays a role in the national welfare of a country by developing housing and office buildings, education and health centers, transportation infrastructure, industrial plants, and the restoration of national infrastructure and other public facilities (Subani et al., 2010).

Aliferova et al. (2017) pointed out that all construction waste is caused by human activities and which caused an environmental problems, such as construction waste, ruins, construction materials losses and construction site cleaning process and any waste in construction projects that the researchers has mentioned that such as unwanted materials and waste that produced during construction stages as unwanted which required an discarded. However, appropriate waste recycling and reuse by waste management and initiatives practice in construction projects generally have to mitigate and reduce to maintain the natural resources (Manoharan *et al.,* 2020). In addition, the average number of waste that produced from the construction industry which exactly was from the buildings in 2015 was reported as 28.6 tons daily.

As the review shows, the amount of construction waste that is generated is increasing, and illegal dumping and the reviews decleaed that the amount of construction waste since 2004 to 2013 as a sample among some studies were conducted in Penang, Johor, Malacca and Selangor. The current are soulotions as a potential for the problems for the existing practice in the construction industry onducted mong the contractors often incentivized by their suppliers to purchase a large quantities of materials. In this way, contractors can obtain greater discount rates from merchants and suppliers. In turn, this encourages contractors to use materials with ignoring the recycling for the waste that generaed as the new materials are cheaper than the recycling and its process for reusing Aliferova *et al.,* (2017) & Najafy (Najafy, 2014).

According to Adeleke *et al.,*(2019) construction is the foundation of all major economic drivers and has made a huge contribution to a country's economy, especially in the era of globalization. In order to keep the environment and ensure sustainable development, many environmental regulations and initiatives have been formulated. Most of these efforts are aimed at preventing the production of C&D waste and/or reducing it as much as possible. The summary of the Initiative among Construction Industry Practice is summarized in table 3.

Table 3: Summary for the previous researchers' gaps among construction waste in Malaysian practice

Previous research among waste minimization in construction industry	Gaps of their research	Authors /years
Construction waste minimizes as solid waste practice to minimize construction waste as barriers for reducing the hazards that come from construction activities.	The concern that the research focused in the final finding that the barriers of waste minimization practice in Malaysian industry was undergoing toward possible waste recycling using the current practice for prevent the environmental impact and moving toward green materials practice.	(Mallak et al.,2014)

Construction solid waste minimization practice among Malaysian construction by the evaluation of contractors in construction sites.	Focusses of this study on the types of construction's solid as a products with further discussed to minimization waste.	(Ahmad, et al.,2014)
-Quantification among local construction players for solid waste reduction among the current practice for waste in construction case study Klang Valley.	The research focused on the classifications of the waste on site. Generation of waste produced a negative impact to the environment.	(Nor et al., 2013)
Initial findings on the perspectives of local contractor's evaluation on waste Minimization and barriers as incentives on construction sites.	Identify the relative of importance factors that influencing waste minimization barriers and incentives on the construction sites location Kuching, Sarawak.	(Ikau et al., 2013)
The research identifying the causes for construction waste: case study on central region in the area of peninsula Malaysia.	The gape was focusing on the factors that causing construction waste in Malaysia.	(Nagapan, Abdul Rahman, & Asmi, 2012)
Municipal waste solid management for Malaysian construction among the current practices, challenges.	The focusses of this research restricted to the current practice and challenges for municipal solid waste management in Malaysia	(Dinie,et al., 2013)
Study on the waste minimization as sustainable, management strategy for Malaysian industries.	The gap of this research restricted to the Peninsular Malaysia which approximately 95-97% of solid wastes are transferred to the landfill as disposal and 3-5% of the generated wastes are recycled.	(Mallak et al., 2018)
Sustainable practice for construction waste management in Malaysia among contractor's perspective.	Research focusing on the current status of waste management practices the Malaysian construction sector.	(Effie et al., 2011)
Review on the construction waste management and initiatives in Malaysia	construction waste and Initiatives the initiatives practice in the construction industry reveals the current situation that exist in waste management in Malaysia but not all initiatives are implemented by stakeholders.	(Saadi et al., 2016)
Construction waste management among projects in Penang Malaysian	Relationship between the formalization and construction waste management the study conducted on Penang projects Malaysia.	(Kanimoli et al., 2020)

Initiatives Management among Circular Economy

Recent international and national policy for the initiatives management in construction industry promulgates the involvement of Circular Economy (CE) in construction as the new central pathway towards sustainability of construction project which the concept of Circular Economy (CE) has recently recaptured its momentum and even reached the mainstream discourses, in particular through the new policy of initiatives practice for construction waste (Hild, Schulz, & Edda, 2019). Although this method has successfully sparked such a discussions about the criticize approach for the

design of materials with longevity, reparability as a choice for the shared goods and services with critics criticizing this method. Criticism focuses purely on the technological fixation of circular economy approach and its ecological modernist ideas, that, gradually adapting as current system to the constraints of material resources, while leaving aside the sociopolitical aspects of consumption and the possibility of a self-sufficient lifestyle demand (Hild *et al.,* 2019).

Strategies toward CE Initiatives in Malaysia

Reuse and recycle waste as a prior remanufacturing or refurbishing for the other uses, the CE concept emphasizes the environmental protection by reducing the environmental impact which intends to create such a new opportunities to the transform of natural resources and renewable resources for the application of energy, saving and materials conserving (Lin *et al.,* 2019). It has been widely adopted in the developed countries, particularly on European nations and America that received significantly less attention than the developing country that still shortage for the understanding of the synergy that can be created in the improvement of CE approach for the sustainability in construction industry, meanwhile, the developing countries especially those who suffer from the low-income consequence, are facing such as growing in the waste disaster (Wilson, 2015).

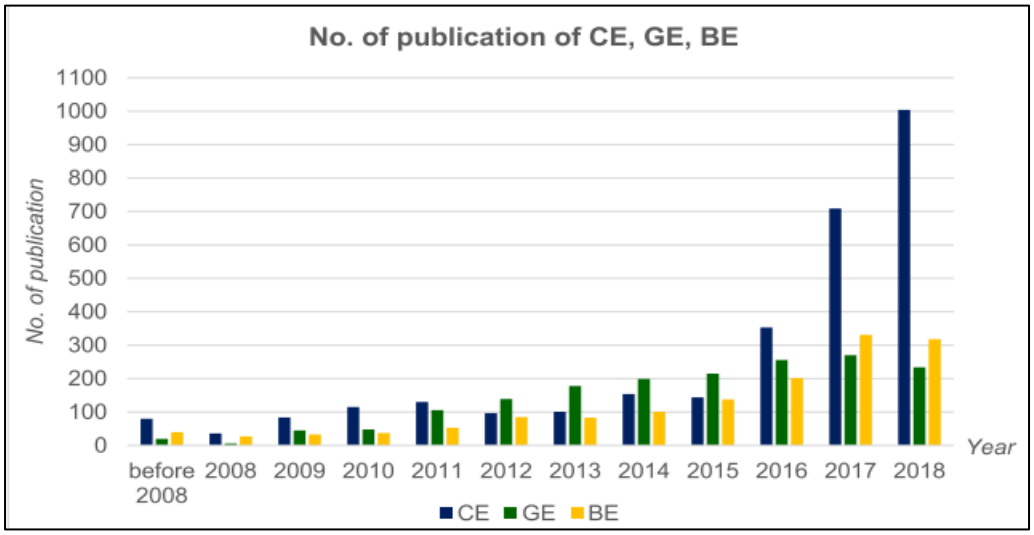

Figure 1 : Comparison between CE , Green Economy GE and Bio-Economy BE (Lin *et al.,* 2019).

Since CE is a relatively new term in the developing countries which is often used as alternate with the other mainstream of sustainable development approaches, green economy (GE) and bio-economy (BE) have three concepts with certain similarities in the promoting of economic, environmental and social sustainable keys of development. There are still some differences that cannot be ignored as figure 1. illustrates the comparisons between these three approaches since 2008 - 2018 for Malaysian practice CE marked as the first among GE and BE that helps Malaysian construction industries , stakeholders and construction players to choose the best operating and strategy on the road of sustainable development (Lin *et al.,* 2019).

According to a study by Aliferova *et al.* (2017), they reported that as a continuations action that the development of the construction industry took the place in Malaysia, more impact resulting as output for the generated waste out of construction activities. In addition, construction waste generated by construction projects has an adverse impact on the environment, especially in illegal dumping for the generated waste. The increasing number of illegal dumping activities in construction projects in Malaysia shows that construction waste management in Malaysia needs to be taken seriously by stakeholders and participants in the construction industry (Jain *et al.,* 2020). Therefore, Circular Economy CE showed such a treat for cutting the edge of recycled, repaired or reused materials instead of consume the natural materials or disposal regarded as "waste" has become one of the frontier strategies for the environment issues.

According to Hild, Schulz, & Edda (2019), to explain that the CE represents the boundary of the environmental sustainability and development by commodity the awareness, thereby establishing an effective relationship between the environmental protection and economic development, and as it realizing the prevention of materials losing which can be achieved through the long-term of economic concern and innovation especially with the current crisis upon COVID-19 pandemic that brought the global to fluctuations focus on construction waste and it's management with the response of policymakers (Bhakta *et al.,* 2020). Based on the redesign of the income stream to achieve an interaction between the designer and material supplier which still in lack, the other guidance between the supplier and the contractor is in need for attention as well. This interaction between the project partners is considered as procurement process and important reason for continuing to over-order materials that not required for the project and request the required materials to avoid waste for the components throughout the supply chain Najafy (Najafy, 2014).

Using BIM as Circular Economy

Based on Whole Life Performance Estimator (BWPE) the study by Akanbi *et al.* (2018), they mentioned that the development of building materials and project performance from their point of view, and the research that conducted using the BIM approach showed that the structural components have good performance, which affected the building molding at the design stage, and the results determined the factors that affect the performance of the structural components using the estimation of modeling methods to evaluate the building during design stage by BWPE for the factors of Weibull reliability distribution for in manufacturing products (Akanbi *et al.,* 2018) .

The rise development in construction industry by Building Information Modelling BIM implement such a diverse needs for the visualization look especially in 3D dimensions earlier as developed by (Akanbi *et al*., 2018) and its analysis for the cost estimation among facilities, manpower and duration that involves as genuine innovation within the construction of industry and its compliant as a perspective of "Building Research Establishment" (BRE) that developed with a specification and huge database which is named "Integrated Materials Profile And Costing Tools" (IMPACT) as overall for the aim of integrating of Life Cycle Assessment (LCA) and life cycle cost (LCC) with the involvement of BIM in the development of construction had a great offer for the solutions of many inefficiencies and systemic failures that inherent in the construction industry with several solving for problems that occur as design conflicts during the process and implementation (Sacks & Pikas, 2013)

Circular Economy (CE) concept and sustainability for construction projects had evolved that is increasingly appeared in the perspective of construction and come out with decision makers, and strives to establish such a conceptual relationship between the (CE) and construction sustainability as stated (Akanbi *et al.,* 2018).

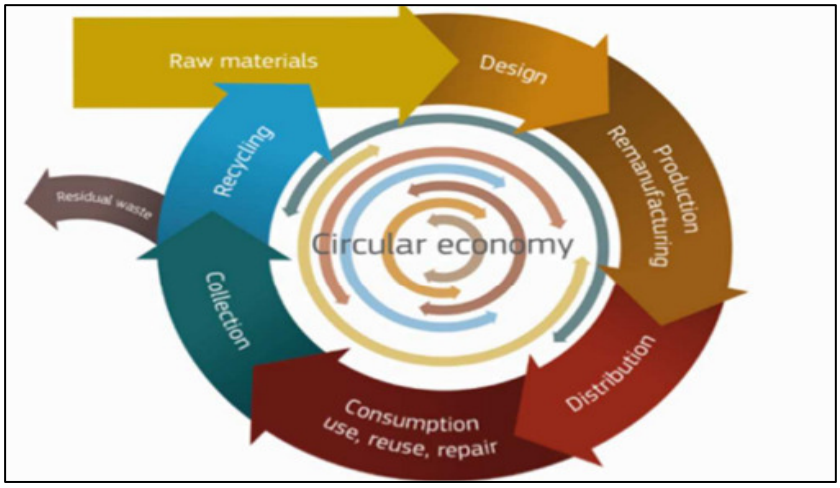

Figure 2 : A conceptual diagram for circular economy as sustainability economy (Wautelet, 2017)

The circular economy CE has recently been valued. It has created opportunities through the arising for CE principles as a set that brought such a rise to most global companies in the perspective of the economic forum and that opportunity based on the principals of CE (Wautelet, 2017). Circularity in economic indicates a durable use for the materials components on the behave of sustainability and giving some solutions in the materials loops which proposed the reuse and recycling with an upgrade and remanufacture by the term of materials resources with efficient profit that enable the materials loops to energy saving and renewable decrease in the materials system resilience figure 2. The concept of CE is rooted in the review as a living systems that starting with the use of materials from the design stage to reduce material waste, and puncturing the materials during construction and then distributing them. These can be consumed by the project, and the excess products. It can be used and repaired and transferred to recycling to prevent the final waste of materials, optimize from the cycle decomposition, and reuse the economic notice of the transfer of economic value to economic value to save the product through the implementation of the notice. The most extensive definition of sustainable development in the current compromise program is to meet the needs of future generations as future capabilities in minimizing materials resources with an input for waste mitigation and energy saving during the activities and supply replenishment of materials. This feature provides a mechanism to extend the collaboration between designers, engineers, constructors, and facility managers throughout the project's life cycle. Another aspect of BIM is that the information once created can be reused. Time, reduce errors improved consistency, clarity, accuracy, and clear author responsibility with the use of technology indicated 20-30% for the increase of construction productivity (Kivits & Furneaux, 2013).

Conclusion

This ongoing research is still in its early stages. Therefore, the information provided in this article is mainly based on a comprehensive review of the initiatives practice of Malaysian construction industry. An overview of construction waste and initiatives reveals the current status of construction waste management, and it elaborate some of circular Economy CE uses and approaches. Not all initiatives are implemented by construction stakeholders, so there are more comprehensive approaches needed to ensure that economic, social and environmental aspects can be protected. At the end, a strong support among Malaysian government is needed to provide such more effective toward construction waste management practice and policies. Otherwise, sustainability and environmental issues will not be effectively resolved.

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Information Security Management as A Determinant of The Functioning of Organisations

Klaudia SKELNIK

WSB University in Gdańsk
kskelnik@wsb.gda.pl

Summary

The aim of the article is to present and analyse potential threats posed by underestimating the influence of information security on the functioning of organisations. The immense influence of information security on organisations should not be ignored, as even the smallest decision in an organisation is based on the flow of information. Taking this into account the author deems information to be the most important factor which determines the functioning of an organisation. Such a formulation requires a description of the influence of information security management on proper and efficient functioning of organisations. The term information is becoming a key category, a central point of consideration which is a common set for research conducted at an intersection of various fields and scientific disciplines. When discussing organisations, their activities and functioning, it is necessary to include the role of information. Based on collected information and source literature the author intends to introduce the complexity of the term information, information security and its influence of shaping organisations. Based on the collected observations and literature analysis, the author wishes to present the complexity of the notion of information, information security, and its impact on the shaping of organisations. The author believes that most studies focus on technical threats connected with processing information, and do not devote enough attention to the significance of information, its value or the threats connected with this. The author wishes to highlight that numerous studies and participant observation show that many organisations underestimate information security. In fact, the top management and employees of many organisations show a lack of competence in the scope of the role and significance of information in organisations.

Keywords: Information, Organisation, Information Security.

Information and Its Significance

When trying to define the term information we need to stress that it is both difficult and frequently defined. As a result source literature provides numerous diverse perspectives representing different fields and scientific disciplines.

Information, depending on content and the accepted frame of reference, can be interpreted in a broader or narrower sense. In a broader sense it can be understood as "content taken from the outside world within our process of adjusting to it and adapting our senses to it" [Fischer B., Świerczyńska – Głownia W., 2006]. In a narrow sense information refers to a message "acquired by human beings through observation or mental activity, which is transferred in a transmission (from person) – reception (to person) system" [Groniewska H.,1990].

Information was also defined in an academic coursebook by J. Seidler titled *Nauka o informacji* (1983). According to the author: "Information is knowledge acquired through the reception of messages, which enables the recipient to carry out or improve activities. This means that information is restricted to those sensations which inspire the human mind and imagination. Its existence is relatively tied to the existence of human beings and their minds" (TN: own translation).

According to E. Niedzielska, a Polish specialist in the field of information technology, information is "a specific, immaterial good, which assumes growing significance with economic development and with the development of means and forms of social communication, thus changing the face of many traditionally organized economies of the world".

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An interesting view on information is presented by Werner Gitt, professor of engineering, in his book *In the Beginning was Information*. The author provides a precise definition of information presenting five various aspects of it (Gitt W., 2005):

1. Statistics – information is distinguished by a specific alignment of its components.
2. Syntax – information is provided in a logical system which can be read – e.g. Morse code
3. Semantics – information has a logical meaning as a transmission of content – e.g. the train form Wrocław departs at 1:00 pm from platform 1.
4. Pragmatics – information can be applied in a practical manner, e.g. in actions and processes in physical and biological systems.
5. Apobetics – using information in processes results in achieving a logical aim.

In Poland one of the first authors who provided a scientific definition of information was J. Ratajewski. He distinguishes between subjective and objective sense, which resulted in the emergence of two separate explanations. Information in an objective sense, i.e. perceived as a message, is "a mutual relationship between at least two objects (organisms), consisting of meaning (content) and a physical carrier (form), the purpose of which is to transmit signals from one object (organism) to another object (organism)". In a subjective sense, i.e. as action, information is "a set of specific activities (actions) for the purpose of producing, processing, storing, searching, sharing and receiving messages (content, meaning) regarding a specific object" [Ratajewski J., 2013].

Elżbieta Kałuszyńska states: "limiting information to consciously received and transmitted signals in my view also delineates the scope of this term too narrowly". According to W. Falkiewicz information is messages or combinations of messages which enable real or potential users to satisfy their needs regarding information, thus decreasing the level of ignorance concerning a studied phenomenon, and improve their knowledge of the environment as well as allow them to perform purposeful activities more efficiently [Kałuszyńska E., 2005].

We are dealing with numerous diverse perspectives which represent various fields and scientific disciplines. As demonstrated, information refers to a number of intuitive understandings of the term and it can be said that it lies at the beginning of everything. For the purpose of the author's considerations it is important to state that information is knowledge acquired through the reception of messages, which allows the recipient to carry out or improve activity, and its existence is relatively tied to the existence of human beings and their minds.

Analysis of the above statements does not justify rejecting any of them and accepting one as the "only right" option. On the contrary, it should be said that these are complimentary, mutually supportive opinions, which describe information from various points of view and in various contexts. Neither one of them can be treated as a complete interpretation of the term and each focuses only on a particular issue. What these statements also have in common is that they show information as something which exists, however, they do not operationalise it, i.e. they do not give instructions on how to analyse it, how to organise its processing, how to register it or how to carry out other relevant operations.

Marian Mazur, as a cyberneticist, placed his inquiries regarding information in the guiding environment, which is logical and fully justified in his case. Mere perception of information as an element of decision procedures means that inquiries on this regard should be placed in a somewhat broader context, selecting not merely the phenomenon of guiding but also that of influencing, the denotation of which takes a significantly larger set of designates into account than guiding, as an object of study. Influencing includes all influence exerted on all references through all sources of influence. In this space the dominant semi-spaces in which, according to Mazur, one can find answers to the fundamental problem question regarding identification of semantic content symbolised by the term information, seem to constitute designates which reflect thought perspectives on important characteristics of objects and phenomena, ascribed semantically to the terms: guiding, experiencing, cognising and communicating, connoted by influence. These terms do not delineate space connected only with information. They do not include all phenomena. However, they delineate a sufficiently large semantic space which includes content that many people refer to as information.

Other authors indicate difficulties in characterising the term, stating that information is "a basic term which is not fully defined because of its primary, elementary character. All past attempts at defining it are generally deemed

unsatisfactory or at best limited to showcasing certain aspects (…). A message (data, signal) analysed and processed to a form understandable to the recipient, which notifies him or her of a situation and has value for him or her in the decision-making process".
To sum up, the perspective of Sandra Braman on the multifaceted character of information seems accurate. The author orders information into four primary interpretational groups [Braman S., 2004]:

- Information as an asset – information, its creators, transformers and users are perceived as individual and distinct subjects. Information is fragmented, fluid and unconnected in a knowledge structure in which it could be organised
- Information as a commodity – this term includes a market element, it entails exchange and use of information by and among people. This exchange may have the character of a commercial transaction, thus the information has an economic value.
- Information as a perception of patterns – in this case information is seen in a broader perspective because it has a past and a future, depends on motivation as well as other environmental or random factors. What is more, it brings certain results. Such a broad understanding implies the possibility of using it with regard to social structures. Information also holds a certain value, though this value is usually limited to decreasing uncertainty regarding one specific area.
- Information as a constitutive force in a society – information plays an important role in shaping social context. It is not merely a force which influences the outside environment – it is also a subject to influence. Definitions in this stream refer to a very broad sphere of phenomena and processes, including those fundamentally based on information which is significant in creating social reality.

Additionally, the current development of information or the revolution in its transmission, creates new conditions for the functioning of organisations, which are characterised by an intensity of certain areas of activity. The environment of information provides people with numerous inaccurate, uncertain, incomplete and out-of-date, and thus useless and unreliable information. In this situation the quality of information becomes a key issue. As a result of the flood of information people cannot comprehend it and increasingly stop valuing, appreciating and noticing its influence.

The problems of modern information are related to its currentness, completeness, digestibility, clarity and credibility. Informational asymmetry is defined as a situation in which one party to the transaction possesses more information regarding the conditions and circumstances of the transaction than the other party. This phenomenon consists in an unequal distribution of information important for the parties to an agreement. The side which possesses an informational advantage may use it to increase its benefits at the expense of the side which less well informed. In this situation the allocation of resources will be less effective. The problem of informational asymmetry is connected with the problem of the so called imperfect information, which refers to a situation when an economic subject does not have full knowledge about a given phenomenon. Imperfect information may occur for just one subject while informational asymmetry requires at least two subjects between which certain relations occur.

An important characteristic of information is its substitutability and complementarity. Full complementarity of information is a much more frequent phenomenon than the complementarity of other commodities. We frequently encounter a situation when one information has zero value without another complementary information. An example of this is software, which is useless without passwords or codes connected with buying only the original version. Another example is the popular story of the half of the map leading to a treasure, which is useless without the other half [Forlicz, 1996].

The author believes that the answer to the question regarding information is also to be sought in spaces where it is used. One can highlight the role of information in decision-making processes or in economic activity. However, a human being is a personality which needs to be considered in various dimensions – professional, social, psychological, cultural and historical. In every such dimension information is always needed and assumes various and important roles.

Information as a Factor Shaping Action

According to James Gleick information is everywhere. The author also adds that information is "blood and fuel, the vital principle that runs our world". Tomasz Goban-Klas states that "without matter there is nothing, without energy there is no motion, without information there is chaos".

In all of research no one knows all the functions of information influence because these functions manifest themselves everywhere. All functions come to the fore in various statements and messages in varying degrees.
Wiesław Babik lists an expanded categorisation of information functions. Among the most important of these he mentions: informative, knowledge-creating, communicational, integrational, recreational, culture-creating, innovative, educational, decisional, guiding, motivational, capital, opinion-forming and resource. This catalogue is not a not list, nor is it a decisive one, for the same sequence of signals reaching many various recipients would cause various effects which would derive from the functions performed by given information [Babik W., 2002].

The informative function, particularly in advanced economies, becomes dominant as an integral part of an organisation's system of information. Without it an organisation cannot function effectively. Information provided in a proper manner in crucial and used in a broad scope. Among other things it constitutes a basis for determining the scope of activities of an organisation and its particular cells. This assessment is founded on information regarding the course of specific processes and their effects. After the information is subjected to proper analysis it constitutes an important basis for making operative (current) as well as strategic decisions which look into the future and are meant to result in better, more effective administration [Messner, 1944].

In modern economy we are dealing with two primary roles of information. The first is being factor in production and the second is connected with communication between an entrepreneur and the environment in a marketing perspective. Without information on consumer needs which collected through market research it would not be possible to create an offer which would satisfy their requirements [Medlik, 1995]. In fact adequate information about a product is often more important than production itself as a factor creating a consumer market. Information is undoubtedly the most important element of promotion. Provided adequately, on time and directed at the right group it is a tool for achieving competitive advantage [Medlik, 1995].

For an organisation information, its quality and currentness are important factors with regard to competitiveness, because in modern times success in the economy is measured not only by market share, the volume of consumer assets or market size, but also by success in managing knowledge and the ability to use the company's intellectual capital [Koźmiński, 2002].

Also of importance is the fact that information constitutes a necessary element of the decision-making process. That is why some believe that decision itself is a form of information for it frequently influences its content. Information also constitutes a tool for shaping human personality. Reception of information forces each of us to analyse it and results in a specific reaction: it forces us to choose an objective of our actions or the means of achieving that objective. The opinion-creating function is expressed by the fact that information also allows us to shape our opinion regarding other people and events. It can also be used for shaping individual outlook as well as building and structuring a value system. The guiding function consists in the fact that the sender aims at a specific reaction of the recipient and at influencing his or her behavior, opinion or position. This function is also related to a decision making process because an individual who gets information from the outside environment is initially faced with a decision dilemma and at a later stage takes specific action as a result of this information. The motivational function, which plays out in relation to relating response to an individual concerning a direction he or she has taken, may also serve as a stimulus to increase effort.

Glynn Harmon (1984) adopts a view that information is a type of meta-energy, which moves larger quantities of energy and decides on the intensity of the activities undertaken by human beings.

In order to illustrate the problem one should remember that transmission of information is communication. Most authors believe that communication is composed in such a way as to influence the recipient to act in a way as to reach an intended objective[1]. Moreover, some researchers understand "influencing" as all processes of the pre-informative and informative phase [Aleksandrowicz T., 2013]. Thus "influencing" is related to all processes connected with communicating content which is received through information channels. In this meaning the term "influencing" encompasses all phases connected with communication: sending → transmitting → receiving. It should be added that the widespread term "communication" also has many meanings.

When speaking of functions of information influencing in an organisation we take into account the role of internal management and the accepted communicational style.

An interesting classification of functions for the Polish theory of communication was implemented by Antonina Kłoskowska. The author of *Socjologia Kultury* accepts the structure of the communication process as the main criterion of the division of functions. Each message which is part of communication consists of five main elements: sender, recipient, designate (content of the message), code and a specific type of social contact. Antonina Kłoskowska focuses her attention on each of these elements and highlights the following functions of communication [Kłoskowska A., 1981]:

1) the emotive function (connected with the sender), also called the expressive function, which is manifested by expressing the state, emotions or thoughts of the sender;
2) the connotative function (recipient), also called the appellative function, used by groups of people for communication;
3) the referential function (designate), also called the cognitive function, which is directed at communicating information and descriptions of facts and phenomena;
4) the metalanguage function (code), which facilitates learning the rules of a given language and, by extension, a given communication system;
5) the phatic function (type of contact), which is meant to maintain social contact[1].

According to Kłoskowska the referential function is the most important from the point of view of communicating because it is the objective of all messages. She believes that the same message can have several functions at the same time. There are also messages which are dominated by only one function.

Taking all of this into consideration we can state that the impact of information in a given organisation can be reduced to the following issues:

1. The way in which communication takes place largely determines the content, structure and dynamics of changes occurring in organisations, which in turn impacts the process of communication and achieving objectives.
2. Communication influences the attitude of society, determining the reaction of employees on the content of the information and their behaviour in the sphere of human relations.
3. Communication influences the value system. Positive and negative changes occur in the recipients' value systems.

The list above is comprised only of the most important functions. It is certainly not complete. Confirmation of these functions and possible indication of new ones probably depends on experience and practice.

One could certainly put forward a thesis that one who has information has power. Agnieszka Szewczyk, invoking Andrzej Targowski, writes: "the one in power is not the one who is in power but the one who has the right bits of information in the right memory, accessible at the right time" (TN: own translation).
It seems that a broad research front should have ended the theoretical struggle over information long ago. However, the opposite of this is true. Research on information is so dispersed and specialised that it is very difficult to distinguish particular dimensions of information, and even more difficult to comprehend it in its entirety. The struggle continues and with it a discussion which involves representatives of various sciences.

More and more frequently the term information becomes a key category, a central point of consideration which constitutes a set common for research carried out at an intersection of various areas and scientific disciplines. The interpretations of the term information presented in the article are often inter- or transdisciplinary, for, as a result of globalisation, technological changes and convergence, it is becoming increasingly difficult to precisely separate the scientific areas and grounding them in one discipline.

In indicating the value of information the author wishes to emphasise its influence on the management of organisations. Thus it vital for every organisation to manage information security, as a determining factor for the functioning of organisations.

Information security and the operating of organisations

Entrepreneurship is inextricably tied with processing vast amounts of information. Some are strategic for the implementation of the organisation's aims, others are less significant. However, it is undeniable that information

should be one of the most important assets in an organisation, which requires proper security against a wide range of threats. Thus, the problem of information security concerns every business enterprise regardless of its size, organisation, industry or degree of development.
In defining the term 'information security' it is necessary to refer to the ISO/IEC 27001:2007 and ISO/IEC 17799:2007 norms, which use the term information security as retaining confidentiality, integrity and access to information. We can also include other properties, such as authenticity, accountability, incontrovertibility and reliability. The ISO/IEC 17799 norm refers to information security in a complex manner, and provides solutions which allow the elimination of the most frequently marginalised issues in creating safety procedures. Local regulations of all countries use the document as a type of reference.

The statement that information security is one of the most important area which should be secured by organs managing an organisation is trivial in the present times. Information security is nothing more than "guarding information which consists in preventing and impeding access to data on the physical character of the current and planned state of affairs and phenomena in one's own functioning space, making it difficult to lead to the knowledge of information entropy and to physically destroy storage devices [Kwieciński M., 2010]" (TN: own translation).

The term information security should be explained in more detail, beginning with the identification of the following risk areas [Biłaś, A. 2017]:

- traditional information threats – espionage, subversion, sabotage (aimed at gathering information, offensive disinformation conducted by other people, bodies, organisations),
- chance events – all natural disasters, catastrophes, accidents which influence information security in an organisation (e.g. fire in a building in which information is stored),
- technological threats – threats connected with gathering, storing, processing and transmitting information through ICT (cybercrime, cyberterrorism, information warfare),
- threats resulting from insufficient organisational and structural solutions

At each level of information security management the main objective is to prevent the disclosure of information. It should be highlighted that an excessively broad understanding of security may hinder the flow of information in a state, organisation etc.

K. Liderman characterises information security as justified confidence on the part of a subject with the quality and accessibility of collected and used information, thus the term information security relates to the subject (person, organisation), who is at risk of losing information assets or receiving information of insufficient quality (Liderman K., 2012). According to Liderman, information security has still not been unambiguously interpreted and along with the related term "security of information" is used in various contexts, encapsulating all forms – including verbal ones – of exchange, storage and processing of information.

The complexity of modern information influence requires a broad, multidisciplinary perspective. Selected threats to information security, for the purpose of this article, are listed below. P. Bączek classifies threats to information security into (Bączek 2006, p. 72-73):

- chance events;
- traditional information threats;
- technological threats;
- threats referring to civil rights of individuals or social groups.

Information security is understood in various ways, depending on the situation and requirements. However, irrespective of the participants and their level of involvement, all those who take part in exchanging information want to make certain that particular requirements regarding its security are met.

These requirements include: privacy or confidentiality, data integrity, authentication or identification, authentication of the message, signature, authorisation, attestation, access control, certification, timecode, evidence, receipt, clearance, ownership, anonymity, incontrovertibility or revocation.

Information security is also described in source literature as a state in which the risk of threats connected with the proper functioning of information assets is limited to an acceptable level (M. Wrzosek, 2010).

The author tries to highlight the fact that an increase in threats related to information security is connected with effective functioning of organisations. Risk and threats are something we became used to once we realised that "progress" is not necessarily a blessing. Each rise in the production of "goods" entails an increase in the production of "bads" (Beck 1992). Analysis of source literature on the development of the information society allows us to conclude that there are numerous studies containing information on the positive and negative aspects of this issue. Additionally, a separate problem is posed by information security. The lack of sustainability between the development of the information society and its knowledge on threats to information security is the most important threat. Security and threats to it are inextricably tied. They constitute two points through which we perceive social phenomena, because our sense of security is dependent on the magnitude of the threat – the greater it is the lower the sense of security becomes and vice versa.

The complexity of the modern information influence requires a broad multi-disciplinary perspective. For the purpose of the author's approach, in order to conduct an analysis, after defining information and information security it is necessary to present threats to information security in organisations. Information is sometimes knowledge gathered through receiving messages, which helps the recipient analyse and improve his or her actions, while its existence is relatively linked to the existence of humans and their minds. The method of observation through an analysis of events in the professional environment adopted by the author allows one to compare facts with studies, and to draw relatively broad conclusions, though not entirely detailed due to the character of the publication, the introduction of sources of threats in the sphere of information security in an organisation, as presented by the following figure.

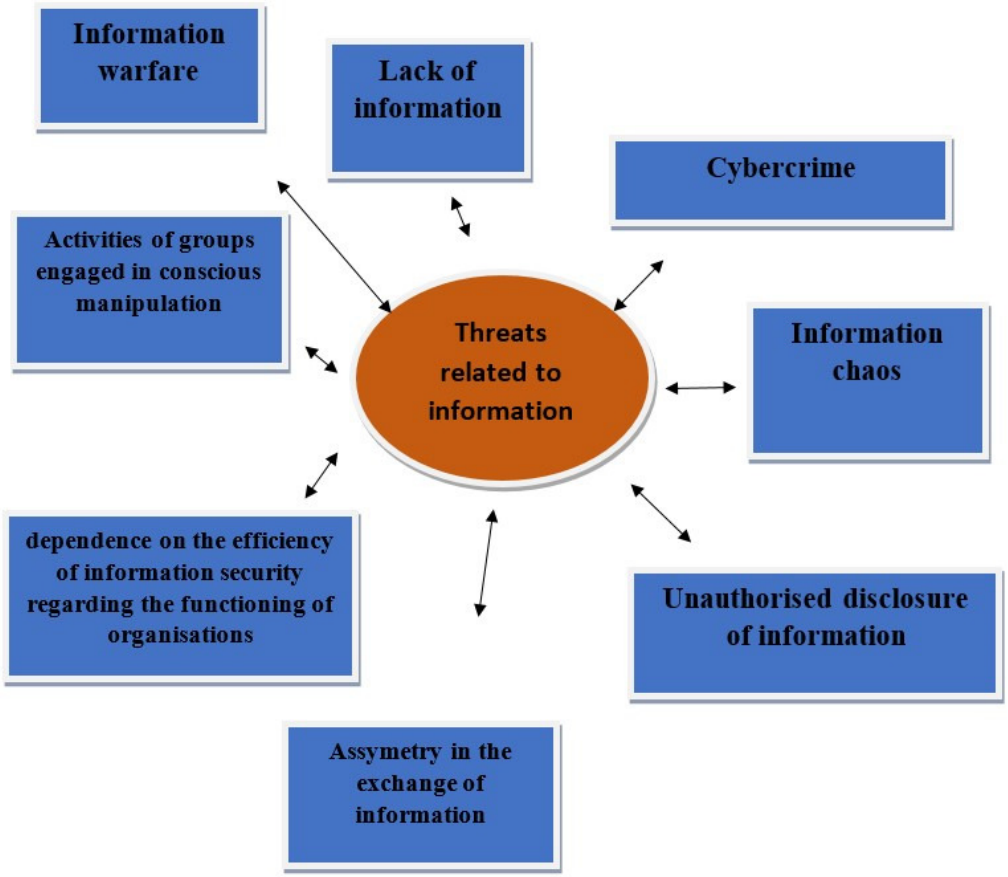

Fig. 1: Threats to information security in organisations

Source: own compilation

The author indicates selected threats to information in an organisation dependent on ensuring information security. The threats indicate how complex and information-based the process of functioning of organisations is. In organisations information plays a very important if not primary role. Moreover, the author believes that attention also needs to be devoted to the decision-making role of information as a crucial element of operation within organisations. Taking the above into account information was regarded as a deciding factor which determines effective functioning of organisations.
It should be stressed that in the aspect of information organisations should rely on the following premises:

1) increasing the security of information systems,
2) constant assessment of vulnerabilities of information systems which determne the operations and functioning of organisations,
3) development of methods to estimate the sustained and/or inflicted damage (information loss).

Ensuring information security, i.e. consequently aspiring to make certain that accuracy, reliability, accessibility, currentness and timeliness, amount of information, significance of information, responsibility and usefulness were adequate to the understanding and accurate assessment of risk connected with threats to security, should be the determining factor in organisations.

Living and operating in the modern world entails using information. This phrase encompasses the sense of social, economic, political and educational transformations. People entangled in various social processes, playing specific social roles is, from an early age, subjected to a stream of various information (Goban-Klas et al.). Effective functioning of organisations without at least a basic information infrastructure is impossible. Society perceives information security as a state of individual, group and societal confidence regarding the accessibility and quality of obtained, stored, used and transmitted information. However, this seems much more complicated.

Group activity is the basic type of activity. Each group activity requires guidance. According to J. Zieleniewski: “By guidance, in a general sense, we mean activity aimed at making other things function according to the objective of the person doing the guiding”. “In a narrower sense, i.e. <directing people> we understand […] such action which is aimed at making other people act according to the aim of the director”. In other words it can be said that guidance is to make a group or individual people function according to the assumptions of the organisation [Zieleniewski J., 1981].

All known and used terms such as managing, ruling, administrating or commanding are special cases of guiding. These activities assume a constant process of exchanging information realized horizontally (inside an autonomous information system and inside cooperating peripheral systems) and vertically (these are tasks assigned to subordinates by their superiors, as well as regular and ad hoc reports submitted by subordinates to superiors).

As stated earlier between every two objects (systems), where one is a sender and the other a receiver, there occurs information influence connected with the emergence of a specific informational (communicational) situation, which takes place through an information channel. It should be highlighted that informational influence in the guiding process is based on messages. However, it should be said that the element of evaluation will always generate separation between persuasive, informational and manipulative influence, which is heavily influenced by information security management.

To sum up, in the era of information, along with its greater accessibility and flow, information assumes greater significance in the everyday functioning of organisations. The subjectivity of information results in the fact that its value differs depending on recipient. This causes problems in the evaluation of the usefulness and value of information. Information, which is an intermediary in the creation of knowledge, is essential for making decisions. However, it is frequently the case that separating vital information from “noise” constitutes a major issue. Extraction of important, accurate information in time to make decisions will be the most important skill.

An individual needs information, because it enables him or her to build and expand the world they live in. Information needs lead to information behaviours, which in turn influence actions and decision processes in organisations. Thus, as indicated in the title, information determines the functioning of organisations.

Conclusion

Field work and the author's observations indicate that we can list situations, which indicate that every activity of every organisation is focused on determining which information and to what extent is at risk of being lost and thus may be of interest to competition. The aim of these activities is to indicate which information needs special protection. Thus it is necessary to constantly analyse the information at one's disposal and their value. This indicates the need for information security management. However, one should not contribute to the creation of barriers between a given organisation and its environment, for the exchange of information takes place in the form of feedback, giving subjects opportunity for development.

One should also remember that regardless of an organisation's size and scope of operation, each should introduce a security policy, which constitutes a set of principles connected with all aspects of security. A security policy, or a security strategy, is also a set of principles, methods and tools of information protection and supervision. It should encapsulate the following elements:

- information policy,
- information security,
- ICT security policy,
- the scope of protection of trade secrets,
- rules for preventing crimes against organisations.

The main aim of the article was to conduct an analysis of the scientific literature and the current standards, as well as to determine the significance of understanding the notion of information and security for the functioning of organisations.

When we observe the everyday practice of economic reality we become witnesses and often participants of events which testify to the fact that the threat to information security is real and that loss on information can damage the essential interests of an organization, and put the personal safety and basic values of social life in jeopardy. Modern entrepreneurs who play an active role on the business plane in a market environment cannot underestimate information security, nor can they afford not ensuring it. When we look at a business enterprise from the point of view of its internal processes, we can state that one of the most important of these is connected with gathering, processing and communicating information. That is because they constitute a basic element of all decisions made by the management. As a result, information assets can be considered the most important factor in achieving the goals of each economic subject. That is, if we assume that intentional information-decision processes form the content of all management functions. The essence of these processes lies in acquiring, processing and transmitting information, making and communicating decisions, as well as communicating with other subjects and with the environment. The significance of information is well highlighted by the statement that management is the art of using information.

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Enhancing Students' Performance in Professional Accounting Examination

Adibah Jamaluddin

Faculty of Accountancy, University Teknologi MARA (UiTM) Shah Alam, Malaysia
adibahj@uitm.edu.my

Melissa Mam Yudi

Faculty of Accountancy, University Teknologi MARA (UiTM) Shah Alam, Malaysia
melissamamyudi@uitm.edu.my

Siti Syaqilah Hambali

Faculty of Accountancy, University Teknologi MARA (UiTM) Shah Alam, Malaysia
syaqilah9972@uitm.edu.my

Nazreen Sahol Hamid

Faculty of Accountancy, University Teknologi MARA (UiTM) Shah Alam, Malaysia
nazreensahol@uitm.edu.my

Siti Aisyah Kamaruzaman

Faculty of Accountancy, University Teknologi MARA (UiTM) Shah Alam, Malaysia
aisyah9985@uitm.edu.my

Abstract

Possessing a professional accounting qualification means one is halfway through becoming a chartered accountant (CA) in Malaysia. However, due to the challenging nature of professional accounting examinations, candidates are struggling to complete the course timely, hence deterring the process of becoming a CA. Therefore, this paper focuses on three strategies - learning approach, study skills and learning pedagogy as a means for students to pass their professional accounting examination successfully. Review of relevant literature revealed that by adopting a deep approach to learning, frequent self-testing using past examination questions and applicating a teacher-centred pedagogy as part of the learning process could elevate students' performance. These findings may offer groundwork for empirical research to be conducted that may be beneficial to all students, tuition providers and the professional bodies.

Keywords: Professional qualifications; Academic performance; study skills.

Introduction

The dynamic and shifting business landscape demands a more significant role of an accountant to contribute towards nation-building and economic growth (Owusu, Obeng, Ofori, Ossei Kwakye, & Bekoe, 2018). The Malaysia Institute of Accountant (MIA) argues that to raise an accountant's quality and competency is by becoming a CA (Oh, 2014). Therefore, one of the agenda under the Malaysia Economic Transformation Programme's is to

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increase 60,000 CA by 2030 as the main engine to drive Malaysia's National Transformation Programme (MIA, 2018,2019).

One way of becoming a CA in Malaysia is to be a member of a recognised professional accounting body such as ACCA, MICPA, CIMA, CPA and ICAEW(MIA, 1967). This call for candidates to possess a professional accounting qualification with three years of working experience in the related field. The establishment of the Committee to Strengthen the Accountancy Profession in Malaysia (CSAP) further necessitate the completion of a professional accounting qualification (Lee, 2018). As a result, there is an increasing trend in the enrolment for professional accountancy programmes (Nor, Zaini, & Zahid, 2013;Vien, 2015;Lee, 2018).

Despite the spike in enrolment, achieving the targeted 60,000 CA seems to be a far stretch ambition. As of September 2020, the number of CA in Malaysia is only 36,976. To produce almost 23,000 CA in ten years, demand not only MIA but all accounting firms, professional bodies and tuition providers to shoulder the responsibility. In this context, since obtaining professional accounting qualification means candidates are halfway through becoming a CA, producing more accounting graduates with professional qualification can be seen as a means to fill the gap. Therefore, identifying challenges or obstacles in generating accounting graduates with a professional qualification is vital.

According to Roos (2009) and Mustapha and Abu Hassan (2012), one of the main obstacles is the professional accounting examination is too challenging to pass, thereby takes a longer time to obtain the qualification. For example, the average passing rate for ACCA papers at the Strategic Professional level from September 2018 to March 2020 is only about 40% (ACCA, 2020), while the average passing rates for CIMA case study exams as at September 2020 is about 52% (CIMA, 2020). Thus, the statistics indicate that obtaining a professional accounting qualification is not an easy task.

Meanwhile, Bahari, Tahir, & Mat Rahim (2014) argued that professional accounting programmes are more complicated than regular diploma programmes. The plausible reasons are threefold (Masters, 2015). First, the breadth of professional accounting syllabus demands a practical application of knowledge in a real-world business environment. Second, total reliance on final examination under extremely time-pressured settings means the student has to perform their best on the examination day for there are no continuous assessments. Finally, the separation between examining team who develop the examination questions with the lecturer who teach the courses also contributes towards posing an obstacle to passing the professional accounting examinations as "lecturer will have no idea what will appear in the exam" (Masters, 2015, p.2) Hence, overcoming these challenges deemed imperatives in crystallising the national agenda.

The objective of this conceptual paper is to analyse the current research finding to deliberate on the strategies to enhance student's performance in professional accounting examination. On the one hand, existing and potential students will have an overview of what is expected from them upon taking the professional qualification journey, thereby are more confident and prepared to face the challenges. On the other hand, the tuition providers will be able to devise suitable approaches to facilitate students in producing more accounting graduates with professional accounting qualification to materialise the nation's agenda.

Learning Approach

A professional accounting student is deemed to possess the expected competency and proficiency to be an accountant by having passed the professional accounting examinations (CIMA, 2019). This call for a suitable learning approach as the student's intention when studying and the way they process the information can influence academic performance (Siew, Basit, & Hassan, 2017; Ferriman, 2013; Salleh, Johan, & Saruji, 2019). Houghton (2004) distinguish between a deep and surface approach to learning. While the former refers to how a student "examines new facts and ideas critically, tying them into existing cognitive structures and making numerous connections between these facts and ideas", the latter is where a student merely "accept new facts and ideas and store them as isolated and unconnected items". This paper contends that a deep approach to learning helps to increase the chances to pass professional examinations based on the following arguments.

First, the question tested in professional accounting examination, especially at the strategic professional level, is mostly a scenario-based question that mimics a real business setting requiring the application and not a simple reproduction of knowledge (ACCA, 2013;CIMA, 2019). For example, one of the learning outcomes for ACCA's Performance Management paper is the ability to apply management accounting techniques and assessing the performance of the organisation. However, using an appropriate accounting technique in a newly set up business is very different than those that are well-established. Likewise, interpreting whether a company is performing well in a normal economic environment than those operating under a global financial crisis demands a student to demonstrate their ability to understand both the knowledge and the context of the question. Since a student who adopts a deep approach looks for meaning intending to understand rather than merely rote learning (Enwistle, 1987), they can develop a firm understanding of the key concepts and the logic behind it in relating and applying it to the scenario (Jackson, 2012).This has been proved to positively affect student's performance, particularly on complex examination questions (Davidson, 2002).

Second, the examination demands a higher level of cognitive processing ability as the question can be asked across the whole breadth of the syllabus, including prior or assumed knowledge. For example, to be able to perform well in ACCA's Strategic Business Leadership paper, a student should be able to link between those covered at the strategic and fundamental level. Similarly, CIMA's Strategic Case Study requires the student to integrate knowledge learned from at least paper E3 (Strategic Management), F3 (Financial Strategy) and P3 (Risk Management). Adopting a deep approach allows a student to relate new ideas to prior knowledge and to make sense of the experience to derive at a conclusion in solving a problem (Enwistle, 1987). This could explain why professional accounting students preferred to adopt a deep approach (Ahmad, Farizal Mohammed, Yatim, & Ismail, 2017) as it enhances their analytical and critical thinking. As argued by Hassall and Joyce (2001) and Flood and Wilson (2008), professional accounting bodies desire the student to be deep learners as the approach develops a life-long learning skill that is imperative when they build their careers.

In summary, the professional accounting qualification is designed to mould a student that is capable of displaying the desired competency and qualities to be an accountant demanded by the employers. To achieve that, a student must first pass the examination by adopting a deep approach to learning.

Study Skills

Academic progress and success have always been associated with good practice of study skills or habits – which are known as academic enablers or critical tools for learning (Gettinger & Seibert, 2002). Given the breadth of syllabus and the volume of materials that students would need to utilise in pursuing a professional qualification, taking a strategic approach on studying from the start is crucial for a rewarding outcome (Masters, 2015; ACCA, 2013). According to Nonis and Hudson (2010), those who practice good study habits can make study time effective rather than spending a large amount of time just studying without the proper approach. This paper suggests self-testing and familiarisation with past examination questions as the essential study skills or habits to pass professional accounting examination.

Darwin (2011)revealed that study habits have a high correlation with accounting grade. In particular, self-testing such as practice questions or practise quiz at the end of a chapter or topic and knowledge diagnostic checkboxes contributes towards the performance of the majority of undergraduate students to obtain high GPA score (Hartwig and Dunlosky, 2012). The reason is it allows students to monitor their learning progress; thereby increases the likelihood of information retrieval from memory (Kornell and Bjork, 2007). Therefore, frequent practice force students to stay current with the course allowing them to perform better in the exam (Roediger and Butler, 2011).

While self-testing contributes in gauging their progress in the course, familiarisation with past examination questions helps students to apply their technical knowledge and improve their exam technique (ACCA, 2013). As argued by Mam Yudi, Ahmad, Sahol Hamid, Yatim, and Abdullah (2018), working through the past examinations' papers reduce test anxiety as a student are more familiar with the examiner's question requirements, allowing them to retrieve and utilise materials they have learned successfully. More importantly, attempting the past examinations questions under the same time pressure and conditions as actual examinations increase the likelihood of passing the ACCA paper (Masters, 2015). This is consistent with Landauer and Bjork (1978), where the more difficult the process of memory retrieval, the better the retention of information.

In conclusion, self-testing and familiarisation with past examinations questions are a complement. With no continuous assessment, the frequency of self-testing using past examination questions will increase the probability to pass and obtain a professional accounting qualification for a student are more accustomed to the examiner's requirements and pressures of the actual examination day.

Learning Pedagogy

Each student is unique – they have different attitudes, learning pace and even different learning styles. Bahari et al. (2014) suggest that students who viewed themselves as more committed, determined and disciplined can pass the professional accounting examination better than those who did not. The reason is the nature of professional accounting examinations that is exam-oriented, i.e. pass or fail depends entirely on student's performance on the examination day (ACCA, 2013). Nevertheless, relying merely on self-determination is insufficient to pass the professional accounting examination as it depends on the process of imparting the knowledge, i.e. pedagogical approach too (Mohammed and Abdullah, 2018). This paper compares and contrasts between the student-centred and teacher-centred learning pedagogy to suggest that the latter is more suited for students to perform well in professional accounting examinations.

According to Batchelor & Di Napoli (2006), student-centred learning is when the students are in charge of their learning process. It focuses on flexibility in the learning atmosphere and providing greater access to learning resources (Jaijairam, 2011), accordingly shifts the responsibility of learning from the teachers to the students, for example, learning through group discussion and presentation and other interactive activities with the aid of technology. Greater engagement in the learning process increases their academic performance as students internalise the teacher's feedback and constructive comment to understand the subject matter (Dopper and Sjoer, 2004; Jaijairam, 2011). However, this may not be the case for professional accounting examinations where the professional bodies govern the syllabus (Mohammed & Abdullah, 2018). A deep understanding of theoretical knowledge and practices of the accounting principle is required (Qhosola, 2015) to match not only the heavy requirements of the professional bodies but also the comprehensiveness of the syllabus, thereby, offers a little or no time for student-centred activities (Coetzee & Schmulian, 2012).

Meanwhile, the traditional teacher-centred pedagogy is generally known as a style in which the teacher assumes primary responsibility for conveying the knowledge to students (Mascolo, 2009). The teacher delivers facts by connecting it to his expertise and experience where students simply accept the facts passively (Mohammed, Kassim, & Ismail, 2020; Mascolo, 2009). Consequently, the pedagogy was widely criticised for producing students with a strong theoretical base but not necessarily ready to face the challenges in a dynamic working environment (Mohammed & Abdullah, 2018).

Surprisingly, despite the criticism, Mohammed et al., (2020) prove that professional accounting programs' students favoured the pedagogy as they need the teacher's guidance in understanding and applying the accounting principle in solving the real-world scenario questions. This tends to lend support to Mohammed and Abdullah (2018)'s contention that a teacher-centred learning is more effective in increasing the chances to pass the professional accounting examinations. The reason is one of the roles of the teacher is to demonstrate how to apply the knowledge - explain why in certain scenarios, the answer can be different, but in certain contexts, the answer can be similar. For example, in devising a strategy to expand a business, although the decision to acquire a small business can be applied in scenario A, this may not be applicable in scenario B where there is no expert in the acquisition process and limited financial resources which is available in scenario A. However, some of the decision in scenario B can be applied in scenario C which operates under a global financial crisis setting. As suggested by Salleh, Johan, Artiqah, & Saad (2020) teachers should play a greater role in imparting the knowledge process as it contributes towards the success rates in the professional accounting examinations.

Interestingly, Pogacnik et al. (2004) claimed that the number of contact hours in class is associated with student's exam grade. The authors further explained that students who attend few lectures tend to study less and waste their extra available time. Impliedly, the findings of the study support a teacher-centred pedagogy (p.259), as the more contact hours that a student has with the teachers will encourage them to internalise their learning process, which positively affects their exam performance. In fact, Raghunandan, Read and Brown (2003) argue that a minimum 150-hours requirement as opposed to the prior 120 hours contributes towards higher success rates in the

professional accounting examinations. Therefore, this further supports the argument that adopting a teacher-centred learning pedagogy has exceptional benefits for those undertaking professional accounting examinations.

In a nutshell, one of the ways to pass a professional accounting examination is to rely more on the teachers who have expertise and experience to address the requirements of the syllabus and professional bodies as reflected in the examination's question requirements. Hence, a teacher-centred learning pedagogy is more suitable to guarantee a higher success rate.

Conclusion

Masters (2015) claims that "many students embark on this (professional accounting qualification) journey without really understanding what they are getting into" (p.1). Potentially, this explains why the examination pass rates for the professional accounting examination range between 30-50%. In this paper, first, we identify the challenges that pose as obstacles to pass in professional accounting examinations, that is, (1) the comprehensive syllabus that is governed by the strict requirement of the professional bodies; (2) the exam-oriented style that depends entirely on the student's performance on the examination day; and (3) the independency between the teaching team and the examiners that make the examination's requirements to be unpredictable and challenging.

We then focus on three strategies - learning approach, study skills and learning pedagogy to help address those challenges. We argue that adopting a deep approach to learning can shape a student to possess the desired skills and competency demanded from an accountant. This is achievable by having passed professional accounting examinations that calls for self-testing and familiarisation with past examinations questions. Having an expert and experienced lecturer to guide the learning process i.e. adopting a teacher-centred learning process further contribute towards enhancing the student's performance in the professional accounting examinations. This is vital because having passed the examinations means obtaining the professional accounting qualification as a feeder towards crystallising the national agenda in producing more CA. While the findings help to prepare the students in overcoming the challenges, it also allows the tuition provider to provide the necessary assistance in improving the passing rates and the professional bodies in finding ways to attract new members. More importantly, the findings offer a groundwork for empirical research to be conducted that may be beneficial to all students, tuition providers and the professional bodies.

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Economic Aspects of Assessing the Energy Security of Power Systems in Russian Regions

Evgeny LISIN
National Research University "Moscow Power Engineering Institute", Moscow, Russia, lisinym@mpei.ru

Oksana KONOVALOVA
National Research University "Moscow Power Engineering Institute", Moscow, Russia, konovaog@mpei.ru

Valery LOZENKO
National Research University "Moscow Power Engineering Institute", Moscow, Russia, lozenkovk@mpei.ru

Abstract

The paper examines the problem of assessing the level of Russian regions power systems energy security from the perspective of economic and managerial threats to consumers reliable power supply. A method for determining the economically justified level of energy security of regions in the conditions of market liberalization in the power industry is proposed. The method is based on an optimization criterion for ensuring a balance of interests of territorial government bodies and regional generating companies in the formation of regional energy systems development strategy.

Keywords: Energy security, regional power systems, territorial public administration, regional energy companies, energy markets, economic accessibility, optimization criterion

Introduction

Ensuring energy security is one of the priorities of the state's economic activity. At the same time, the state's activity in the energy sector is traditionally included in its economic functions and is understood rather narrowly as the regulation of natural monopolies in the energy sector, which is a clear underestimation of the role that energy plays in the economy (Bompard et. al, 2017; Chernyaev et al., 2018; Isaeva et al., 2018; García-Gusano et al., 2017; Lisin et al., 2018a).

The state's activity in the energy sector, first of all, should be aimed at ensuring reliable and continuous energy systems operation at various organizational levels, the sustainable development of which in the face of energy security modern problems and challenges will be a guarantee of energy security of the country and its regions. In this case, the economic relations regulation arising in the process of regional energy systems functioning and development will be the key mechanism of state management at the territorial level in market conditions. This representation of the state's activity allows us to distinguish its energy function as a set of economic activity directions aimed at ensuring the reliable operation and sustainable development of the energy system of the country and its regions, the formation of energy resources and products markets, and the regulation of legal relations between their participants.

The market model of energy sector management adopted in Russia requires coordination of development strategies for its facilities from the energy companies that manage them and territorial government bodies, in order to ensure the necessary level of energy security of the regions to respond to external and internal challenges to the reliability and efficiency of local consumers integrated energy supply.

The conflict of interests generated by the market, which is shown in the difference in ideas about the efficiency of the energy sector at different levels of management of its facilities (region and energy enterprises), leads to a mismatch of the territorial energy management system. While the state's criterion for the efficiency of the energy sector is effective operation of power systems while ensuring a given level of reliability, the criterion for energy

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enterprises is profitability, that is, the compliance of economic facilities with a competitive technological infrastructure that allows to earn profits in the various trading sectors of energy markets (Lisin et al., 2018a; Lisin et al., 2018b; Melas et al., 2017).

Failure to take this factor into account in the formation of regional energy policy leads to conditions under which energy enterprises are not able to meet the state requirements for the energy sector. Thus, the energy strategy of the region is deprived of the ability to carry out managerial functions, turning into a framework document. Preconditions are created not only for deviating the development of the energy economy from the science-based directions laid down in the strategy, but also for the formation of completely different vectors of its evolution, caused by unexplored causal relationships, which increases the uncertainty and, consequently, the probability of realization of threats to energy security.

Literature Review

The key documents defining the conceptual apparatus and the main indicators of energy security of Russian regions are (Senderov et al., 2018; Proskuryakova, 2017; Alekseev et al., 2019; 35-FZ; 190-FZ; 256-FZ; Bogoviz et al., 2018):

- Energy Strategies of Russia until 2030 and 2035 (2009, 2014)
- General layout of power facilities until 2030 and 2035 (2010, 2017)
- Federal Laws “On the Electric Power Industry” (2010), “On Heat Supply” (2010), “On the Safety of Fuel and Energy Complex” (2011)
- Energy Security Doctrine (2012)

According to these documents, energy security, expressing the energy aspects of national security, determines the state of the country's defense against threats to reliable fuel and energy supply, the provision of which is one of the priority tasks of the state.

The conceptual apparatus of energy security is based on the concepts of national security and reliability (Lisin et al., 2018a; Bogoviz et al., 2018; Proskuryakova, 2018).

From the standpoint of the concept of national security, energy security expresses its energy aspects and reflects the contribution of energy to its provision. In fact, energy security is a part of economic security that characterizes the security of economic relations. It is implemented through economic mechanisms and stands out in a separate category due to the decisive influence of energy on the development of the national economy (Lisin et al., 2018a; Bogoviz et al., 2018; Khrushcheva et al., 2016).

From the standpoint of reliability concept, energy security characterizes the continuity of the process of energy supply to consumers. At the same time, if reliability is a property of the regional power system, then energy security characterizes the state of the power system, achieved by ensuring (Bogoviz et al., 2018; Khorol’skii et al., 2017; Postnikov et al., 2017):

- a deficit-free supply of resources in the region,
- the economic availability of energy products for local consumers,
- the availability of technologies that make it possible to organize reliable and efficient operation of the power system under existing environmental restrictions.

Hence, energy security is characterized by such categories as resource sufficiency, economic accessibility and technological feasibility.

Background

Modern sources and threats to energy security

The main sources and nature of modern threats to energy security are enshrined in the Energy Security Doctrine of Russia. It identifies the following types of threats to energy security:

- internal economic threats,
- socio-political threats,
- technogenic threats,
- natural threats,
- foreign economic and foreign policy threats.

Economic and managerial are the key threats at the present stage of economic and energy development. Among them are the following main threats (Dudin et al., 2017; Lakhno, 2015; Lisin et al., 2015; Lisin et al., 2018c):

- Investment deficiency that can lead to uncompensated disposal of production facilities and energy complex,
- low innovative activity in the energy sector, which leads to a decrease in the technical level of energy complex facilities due to insufficient R&D funding,
- complication of the energy complex management system and the growth of uncertainty in the results of its operation caused by the processes of globalization and the energy sector liberalization,
- structural changes in the economy that lead to an increase in the unevenness of energy products demand due to an increase in the share in energy consumption of the population and the non-production sphere,
- slowdown in the diversification of the energy balance and the dominance of natural gas in the European regions of the country.

According to the Federal State Statistics Service of Russia, the depreciation of the main production assets of the electric power industry is about 40%. At the same time, the assets of the backbone grid complex are the least worn out, followed by the generation segment, and the closing one is the distribution grid complex with wear up to 70%. It should be noted that more than 90% of the capacities of existing power plants, 70% of boiler houses, 70% of electric and 66% of heating networks were put into operation before 1990. This suggests that the main strategy to combat the wear and tear of energy enterprises is to extend the service life of production assets through capital repairs (Lisin et al., 2017; Lisin et al., 2016a).

Fuel efficiency at thermal power plants has been decreasing over the past decades and is about 54%. This is caused by a decrease in the heat load of power plants due to the transition to heat supply mainly from boiler houses, which is caused by the low competitiveness of CHPs when operating in the energy market, and an incorrect pricing policy on the heat market (in particular, cross-subsidization), which led to a number of large heat consumers leaving of a from district heating systems. In general, the average efficiency of Russian power plants is 36.6% (38% - coal-fired, 41% - gas) (for comparison, in the world - 39-41.5%). At the same time, the International Energy Agency recommends the efficiency indicators of coal-fired stations at 43% and gas-fired stations at 55% as the lower technological limit of efficiency (Lisin et al., 2017; Lisin et al., 2016a; Lisin et al., 2016b). The discrepancy between efficiency indicators suggests low innovation activity and technological lag in the country's energy sector.

The level of energy efficiency in the country and its regions is characterized by the energy intensity indicator of the gross domestic product. Russia takes the last place in the world ranking of 44 countries in terms of energy consumption per unit of GDP, its energy intensity index is 5 times higher than the world's best values. High energy intensity is due to climate conditions (75% of energy consumed by the population is heat), low efficiency of energy and energy-intensive industries, as well as insufficient attention to energy conservation problems at the territorial level (Lisin et al., 2018a; Lisin et al., 2018b; Lisin et al., 2017). In the regions of the country there is a shortage of heat capacity, estimated at 20% of the total heat demand, which leads to fuel overconsumption due to the use of other energy sources by 2-2.5 times (when replacing heat with electricity - by 3.5-4 times). For comparison, the energy intensity of the GDP of Canada with a similar climate and developed industry is 1.8 times lower than that of Russia.

The gradual transition to a post-industrial economy leads to a reduction in the share of energy-intensive industrial production and an increase in the share of household consumers in the structure of energy consumption. This is due to the growth of urban population and an increase in energy consumption per capita due to an increase in the number of household appliances that consume electricity. This circumstance has a strong impact on the production efficiency of the power system.

In turn, the slowdown in the diversification of the country's energy balance is caused by the existing difference in the cost of coal and gas, which does not correspond to their differences in the quality of energy sources. Today, the ratio of gas and coal prices is 1.3 and does not even reach the world indicator of 1.5 (Lisin et al., 2016b; Takaishvili et al., 2019). At the same time, coal is a competitive fuel in comparison with gas with a price ratio of at least 1.6 at the present stage of energy conversion technologies development.

Energy Security Indicators

The Energy Strategy of Russia until 2035 contains the energy security indicators shown in Table 1. According to the developers of the Strategy, failure to implement them will lead to a threat to energy security (Alekseev et al., 2019; Bogoviz et al., 2018; Akhmetshin et al., 2018; Takaishvili et al., 2019).

Table 1: Values of energy security indicators by 2035

Indicator	Value
The ratio of the annual increase in the balance reserves of energy resources to their production volume	Not less than 1
Dynamics of domestic prices for energy resources and electricity	Not higher than the inflation rate
Reduction of average depreciation of fixed assets in the energy sector	Not less than 5%
Eliminating the deficit and maintaining the reserve capacity of power plants	At 17%
Share of energy exports in the total value of exports	Not more than 45%
Share of oil refining and petrochemical products in the total value of energy exports	Not less than 40%
Share of Asia-Pacific countries in total energy exports	Not less than 31%

As shown by the analysis, at the moment there are no prerequisites for the implementation of a number of the energy security indicators.

If the required ratio of the annual increase in the balance reserves of energy resources to the volume of their production can be achieved and even exceeded, subject to the development of deposits with a high cost of fuel extraction and the introduction of technologies that increase the profitability of its extraction, then domestic prices for electricity and gas for industrial consumers in the country have already reached and surpassed the US level. In particular, it was necessary to adjust the rise in electricity prices for the population. According to the forecasts of the Ministry of Economic Development for the coming years, with an inflation rate of 4%, an increase in electricity tariffs for a household consumer will be 5%.

Reduction in the average depreciation of fixed assets of electric power industry is also unlikely to provide. At the moment, it has stabilized and, most likely, it will not be less than 45% by the specified period.

The capacity reserves of the unified energy system are 38.6 GW, in other words, 16.3% of the installed capacity of the energy system. With an observed annual increase in production capacity of 1.8% and a slow growth in electricity demand (1.5%), the set indicator of 17% should be achieved.

The share of energy exports in the total value of exports is stable and has fluctuated around 70% over the past 5 years. The only decrease in the volume of exports in monetary terms was recorded in 2015 due to the devaluation of the ruble. This drop was offset by an increase in fuel supplies in physical terms to foreign markets, which contributed to a decrease in its price. Thus, the stated indicator value of 45% is hardly achievable. At the same time,

the share of the countries of the Asia-Pacific region in the total volume of energy exports is growing and at the moment is already more than 30% (more only with the EU - 45%).

Oil refining and petrochemicals are promising developing industries. At the same time, the share of high-tech products in the export of the petrochemical industry does not exceed 10% and is mainly represented by products of low and medium-depth processing of raw materials. The analysis of foreign trade of petrochemical products shows that the share of export sales is 52.8% of turnover, while the import is 47.2%. It can be concluded that the primary task in this area for the coming decades will be the implementation of the import substitution program and increasing competition in the domestic market, which will require the development of deep oil refining technologies (for comparison, the refining depth in Russia is 75%, in the EU - 85%, in the USA - 96%). It is clear that the export share of high-tech refined products of 40% is unattainable.

Full or partial realization of threats to the energy security of the country and its regions can lead to a disruption in the stability of regional energy systems, which will aggravate the problem of ensuring reliable energy supply to consumers and slow down the pace of economic development. Preventing and overcoming threats to energy security should be a key task for authorities at various territorial levels, which cannot be solved in market conditions without cooperation with the basic territorial energy enterprises.

Methods

Formation of a criterion for assessing the level of energy security

According to the clarification of the conceptual apparatus of energy security, we will characterize it as the state of protection of the country's region from threats to reliable fuel and energy supply, achieved by ensuring the functioning of its energy system in market conditions in accordance with the principles of consumer availability of energy products and economic profitability of its production.

Thus, energy security, on the one hand, is determined by the economic profitability of energy production, on the other by its availability to the consumer. In general, an assessment of the energy security level can be obtained from the analysis of the energy products cost for the consumer and its structure:

$$\begin{cases} P = PC + MP \le LP \\ MP \ge PC \cdot RR \end{cases} \tag{1}$$

where P is the price of energy products, PC - production costs, MP - marginal profit, LP - limit price, RR-the required rate of profit.

The price of energy products should not exceed the limit price, which guarantees the state economic availability of products for the final consumer in accordance with the level of socio-economic development of the region. In turn, the marginal profit of energy enterprises should correspond to the profitability that allows the enterprise to attract investments in order to reproduce fixed assets, improve the quality and ensure the competitiveness of products.

It can be said that the interests of the state and the energy business are contradictory. If a particular criterion of the state is the fulfillment of the condition of consumer availability of energy products, then for energy enterprises it is the production profitability.

This contradiction is overcome by coordinating the economic criteria of the state and business through the compilation of a generalized efficiency criterion that includes particular criteria. Finding the extreme value of the generalized criterion function makes it possible to determine the cost of energy products, at which a balance of interests is achieved. The higher the value of the generalized criterion, the higher the level of energy security. Thus, we assume that an economically justified level of energy security will be achieved at the cost of energy products that maximizes the function of the generalized criterion.

We represent the generalized criterion, which reflects the level of energy security as a multiplicative function of two particular criteria:

$$J_{ES}(P) = J_G(P) \cdot J_B(P) = (LP - P) \cdot (MP - PC \cdot RR) = \\ (LP - P) \cdot (P - PC - PC \cdot RR) \tag{2}$$

where J_G is a private criterion of the state characterizing the remoteness of the energy products cost from the limit value; J_B is a particular criterion for the energy business, characterizing the excess of the marginal profit over the required level of profitability from the energy products sales.

The economically justified level of energy security will be determined by the cost of energy products, at which, taking into account the restrictions, the generalized criterion will take the highest value:

$$J_{ES}^{0}(P^{0}) = \max_{P}\left\{J_{ES}^{0}(P)\right\} \tag{3}$$

$$\begin{cases} P \le LP \\ P \ge PC(1 + RR) \\ PC > 0,\ 0 < RR < 1 \end{cases} \tag{4}$$

Development of an energy security assessment model

To analyze the relationships between the economic parameters of energy security and their impact on the cost of energy products for the consumer, a model of relationships between the parameters was developed, presented in Fig. 1.

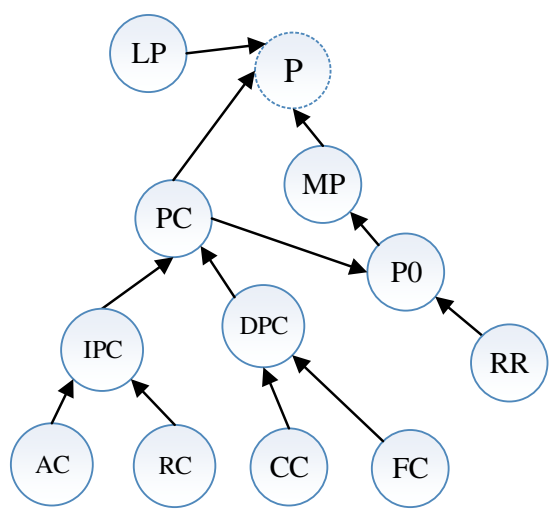

Fig.1: Model of relations of economic parameters of energy security

The cost of energy products for the *P* in market conditions is determined by the marginal profit *MP* and production costs *PC* of the generating enterprise, the transport tariff *T*, the established price limit *LP*, operating within the borders of the region. In turn, in the case of market pricing, the marginal profit *MP* depends on the established equilibrium market price P_0, which, under conditions of prevailing demand, is determined by the production costs of the generating company *PC* and its profit rate. Production costs are divide into direct production costs *DPC* (determined by the cost of fuel *FC* and the cost of converting it to energy products *CC*) and general production costs *IPC* (includes depreciation *AC* and RC reliability maintenance costs).The transport tariff *T* largely depends on the actual costs of transmission *TC* (determined by the material costs *MTC* and the cost of losses *WTC*) and tax deductions *D* from the profits of generating enterprises, which compensate for part of these costs.

The compiled diagram of connections allowed to develop an algorithm for analyzing the level of energy security of the region, shown in Fig. 2.

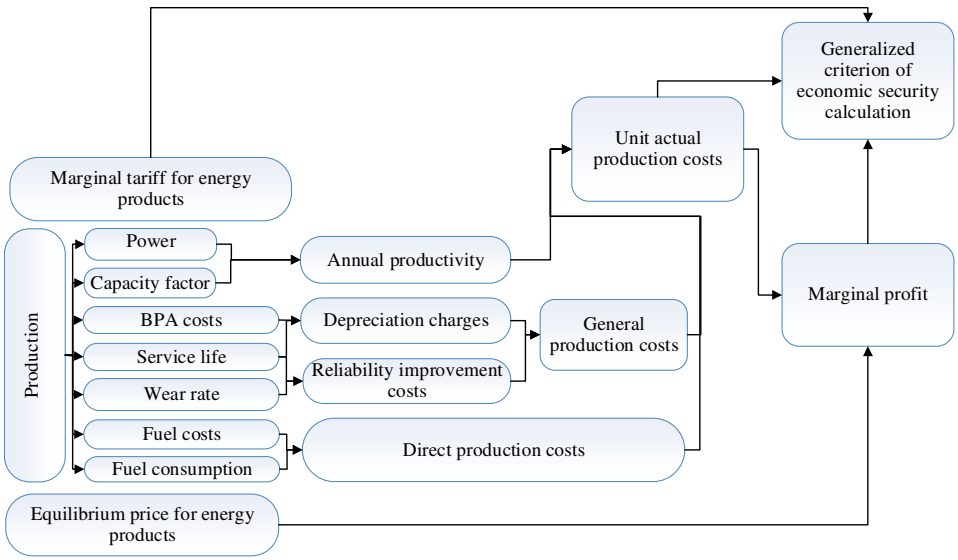

Fig. 2: Algorithm for assessing the level of region energy security

Results and Discussion

Selecting the research object for testing the model

The Far Eastern economic region was selected as the region for testing the proposed energy security assessment model. It unites 9 territorially related subjects of the country by economic relations. It includes: the Republic of Sakha, Primorsky, Khabarovsk and Kamchatka regions, Amur, Magadan and Sakhalin regions, Jewish Autonomous Region, Chukotka Autonomous Region. The territory of the Far Eastern economic region is 36% of the country's territory. At the same time, the population is only 6.2 million people (4.2% of the total population of the country), which is decreasing by about 0.3% per year) (Lisin et al., 2018a; Prokapalo et al., 2020).

The industrial specializations of the region are non-ferrous metallurgy, mining and food industries. main production of the region is concentrated in the Khabarovsk and Primorsky regions, Yakutia and the Sakhalin Region, where about 80% of the gross regional product is produced. The power system of the Far Eastern economic region is represented by a fuel supply system and production systems of heat and power supply.

The fuel supply system is focused on the use of local fuels (primarily coals). At the same time, the export of natural gas and oil products from Western Siberia is also carried out. The structure of consumption of primary fuel and energy resources in comparison with the structure of consumption in the country is shown in Fig. 3.

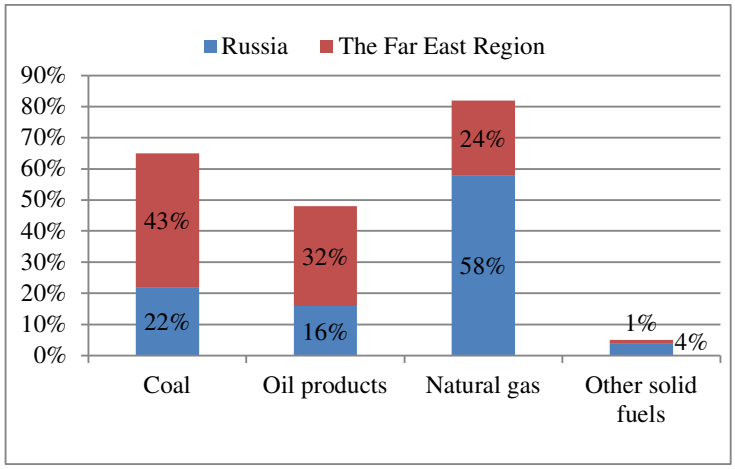

Fig. 3: Comparison of the consumption of fuel and energy resources of the Far Eastern region with the national average

As can be seen, in contrast to the structure of fuel consumption in the country, in which natural gas prevails, the main energy resource of the Far East region is steam coal. At the same time, due to the development of oil and gas condensate fields, the share of gas in the energy balance of the region has increased significantly over the past ten years. In the future, a rational decrease in the share of coal and oil products towards the use of natural gas will help to increase the level of energy security of the economic region and to solve environmental problems.

Own gross production of fuel resources in the Far Eastern region is almost 3 times higher than their consumption and is excessive for each energy resource. However, due to the uneven distribution of fuel sources across regions, only the Republic of Sakha, Khabarovsk Region and Sakhalin Region are surplus for coal, and Sakhalin Region for gas (more than 90% of the region's gas is produced). The demand for natural gas in the Sakha Republic, Kamchatka Territory and Chukotka Autonomous Region is provided by its own production, while the Khabarovsk and Primorsky Regions are fully provided by external supplies.

The distribution and type of available energy resources determined the location and type of power facilities in the economic region. The Amur Region and the Republic of Sakha (South) are surplus in terms of electricity generation, the surplus of which is mainly sold in the Khabarovsk and Primorsky Regions and the Jewish Autonomous Region. The energy systems of these territorial entities form the united energy system (UES) of the East, operating in parallel with the UES of Siberia and being part of the unified energy system (UES) of the country, operating in the conditions of the wholesale electricity market. The Republic of Sakha (North), Kamchatka Territory, Sakhalin and Magadan Regions, Chukotka Autonomous Region are autonomous in terms of energy supply.

The main threats to the energy security of the region

The following main threats to the energy security of the Far Eastern economic region can be identified (Lisin et al., 2018a; Senderov et al., 2018):

- increasing moral and physical deterioration of fixed assets for the production and distribution of energy (on average 41.6% for the regions, while in a number of regions it exceeds 60%);
- a significant share of coal in the fuel balances of a number of subjects of the economic region (especially in Yakutia and the Primorsky Region), which significantly affects the environment, production and technological efficiency of the industry and energy security;
- rather low indicators of the efficiency of energy resources use by the subjects of the economic region in comparison with the national average (despite the availability of their own energy resources, significant supplies of oil and gas are carried out from Western Siberia);
- focal industrial development of the economic region, due to the extremely uneven distribution of fuel and energy resources, the largest of which are concentrated in remote areas;

- high tariffs for energy resources (gas, oil) and services of infrastructure companies for industrial enterprises, exceeding the national average by 2.3 and 1.5 times, respectively.

Low energy efficiency of the region's energy system (Table 2) and high depreciation of its main production assets pose a significant threat to energy security (Lisin et al., 2018a; Kalashnikov, 2011).

Table 2: Specific fuel consumption and losses in the networks of the Far East region

Indicator	Far East region	Russia
Specific fuel consumption for electricity generation at TPPs, g.c.e / kWh	392,8	334,3
Specific fuel consumption for heat generation at TPPs, kg.c.e / Gcal	159,3	152
Power losses in the networks, %	11,4	10

Poor implementation of energy efficiency programs in the region's energy systems is largely due to the lack of coordination in the management of the energy complex development at various organizational levels. The reason for this is the liberalization of economic relations in the industry in 2007 and the emergence of many local energy management entities that represent conflicting interests of the state and the energy business. These conflicting interests have a significant impact on the formation of electricity prices in the region.

Economic assessment of the region's energy security level

Table 3 presents the assessment of the energy security level according to the developed model (Fig. 2) based on the analysis of the prevailing average prices for electricity in the territorial entities of the Far Eastern region.

Table 3: Results of the analysis of the Far Eastern region territorial entities energy security level

Region territorial entities	Current price for energy, RUB / kWh	Energy price limits that ensure energy security, RUB / kWh		Optimization results	
				Energy price, RUB / kWh	Reasonable level of energy security
Amur region	2,2	3,0	3,4	3,2	1,13
Jewish Autonomous Region	2,1	3,2	3,6	3,5	1,05
Kamchatka Territory	4,9	5,7	6,2	5,8	1,14
Magadan Region	4,0	6,0	6,5	6,5	1,00
Primorsky Region	2,7	2,9	3,2	2,9	1,15
Sakha Republic	6,2	4,4	5,1	5,1	0,67
Sakhalin Region	4,2	3,0	3,3	3,3	0,62
Khabarovsk region	2,9	3,6	3,9	3,6	1,17
Chukotka Autonomous Region	10,8	7,2	7,8	7,8	0,52

The lower limit of electricity prices is determined by the production costs of generating companies. In the considered territorial entities, they are quite high due to high fuel prices, that is associated with climatic conditions, insufficient development of local deposits and the pricing model used. Also, significant production costs are explained by the high level of depreciation of generating equipment, which increases the share of fuel costs in the structure of production costs.

The upper limit of electricity prices is determined by the level of socio-economic development of the territorial entity, reflecting the economic availability of energy products for the consumer. The significant economic potential of the Far Eastern region is currently rather poorly realized, which determines the need for significant containment of electricity prices to ensure its availability for the consumer.

High values of the lower limits of electricity prices at low upper limits lead to rather narrow price corridors, within which the energy security of territorial entities is ensured without subsidizing energy enterprises and consumers from the state. In turn, the current electricity prices for end consumers of territorial entities go beyond the borders of the corridor, which is a threat to energy security. For most of the territorial entities of the economic region, they are artificially lowered for political reasons and the need to provide conditions for the advanced development of industrial zones, which leads to unprofitable energy business. In this case, a decrease in the value of the lower limit of the interval is required. This can be achieved by optimizing the production structure of generating companies in order to reduce fuel costs and intensify the development and diversification of local fuel sources. At the same time, the electricity prices in a number of territorial entities of the economic region go beyond the upper limit due to the level of socio-economic development. This situation is caused by the significant role of generation in the structure of the gross regional product and its significant influence on the formation of the territorial entity budget. In this case, a policy of regional production diversification is required.

Conclusion

The result of the study is the proposal of a model for assessing the economically justified level of energy security of the country's region. The method is based on a refined concept of energy security, according to which it is assumed to achieve the protection of a country's territorial unit from threats to reliable energy supply if the conditions for consumer availability of energy products and economic profitability of its production are met.

The fulfillment of these conditions is associated with overcoming the contradiction in the criteria for the efficiency of the energy system development on the part of the state and energy enterprises. If a particular criterion of the state is the fulfillment of the condition of consumer availability of energy products, then the economic profitability of production is important for energy enterprises.

To coordinate the private criteria of the state and business, a generalized efficiency criterion was developed, based on the multiplicative principle that combines private criteria. The investigated indicator is the cost of energy products for the consumer, at which the maximum of the generalized criterion (indicating an economically justified level of energy security) is reached.

The Far Eastern economic region of Russia, whose economic development is a national priority, was chosen as a region for testing the proposed model for assessing the energy security level. It is shown that the existing policy of equalizing prices in the territorial entities of the Far Eastern region without taking into account the state and features of the functioning of regional energy systems, and their level of socio-economic development, not only cannot purposefully contribute to increasing the level of energy security.

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Competitive Business Model for Organizing Regional Energy Supply in The Formation of The Unified Energy Market of The Eurasian Economic Union

Evgeny LISIN
National Research University "Moscow Power Engineering Institute", Moscow, Russia, lisinym@mpei.ru

Oksana KONOVALOVA
National Research University "Moscow Power Engineering Institute", Moscow, Russia, konovaog@mpei.ru

Valery LOZENKO
National Research University "Moscow Power Engineering Institute", Moscow, Russia, lozenkovk@mpei.ru

Abstract

The paper examines the directions of development of power systems of the Eurasian Economic Union member countries when creating a unified electric power market. This problem is due to the fact that the key technology for energy production, which forms the basis of the energy systems of the post-Soviet countries, is the joint generation of electric and thermal energy at thermal power plants. At the same time, this type of combined production is ineffective in market conditions, and the creation of a unified energy market can significantly affect the economic efficiency of regional energy supply systems. In this regard, a unified competitive business model for organizing energy supply to regional consumers and a method for determining the marginal tariff based on market principles are proposed.

Keywords: Eurasian Economic Union, unified electric power market, combined power plants, energy supply systems, district heating, business models, performance evaluation

Introduction

In order to develop foreign economic activity and increase the resource and production potential necessary to overcome the effects of the global economic crisis and create a driver for the growth of national economies, countries combine their efforts in the economic sphere and form common economic spaces, which in essence represent a common market. This common market ensures the movement of goods, capital, services and labor between the member states of the common economic space. At the same time, the economic policies of the participating States are also coordinated in relation to macroeconomics and the financial sector, transport and energy, trade and industry.

In 2012, within the framework of international agreements on Eurasian integration, a single economic space was formed between Russia, Kazakhstan and Belarus, called the Eurasian Economic Union. In 2015 Armenia and Kyrgyztan also joined the Eurasian Union. It is planned that the integration of the economies of post-Soviet countries by creating a common market will lead to the following macroeconomic effects (Mostafa et al., 2018; Andronova, 2016; Ivanov et al., 2019; Falkowski, 2017):

- reducing the price of goods by reducing transport costs for transporting raw materials and equipment;
- increased competition in the common market of the Eurasian Union by ensuring an equal level of economic development;
- increasing production capacity due to increased demand for products;
- reduction of payback periods for new technologies and products due to increased market volume and capacity;
- growth of the gross product of the Eurasian Economic Union countries by at least 25%.

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The creation of a common market between the member States of the Eurasian economic Union implies the unification of national commodity markets in all areas of social production, including the organization of a unified electricity market.
The Unified Electricity Market (UEM) is a system of relations between the subjects of the internal electricity markets of the member states of the common economic space related to the sale and purchase of electricity (capacity) and related services, acting on the basis of general rules.
The integration of electricity markets will contribute to (Kolomeytseva et al., 2019; Lisin et al., 2017a; Sopilko et al., 2020a; Sopilko et al., 2020b):

- increasing the economic efficiency and reliability of the functioning of the Member States energy complexes;
- improving the model of functioning of the wholesale electricity market;
- increasing the volume of cross-border electricity trade, both inside and outside the common economic space;
- stabilization (reduction) of electricity prices and, as a result, the creation of a favorable investment climate.

The energy systems of the countries of the Eurasian economic Union were formed according to a single concept during the Soviet Union and formed a single energy system, which was artificially divided after the collapse of the USSR. This fact also contributes to the creation of a unified energy market, since we can talk about the existence of the necessary technological infrastructure (Lisin et al., 2017a; Sopilko et al., 2020a; Guliyev et al., 2017):

- the presence of high-voltage cross-border transmission networks with currently excessive capacity of the export-import section,
- the energy systems of the participating countries operate in parallel mode with the same characteristics and requirements for the quality of energy products.

At the same time, the key technology for the production of energy products, which forms the basis of the energy systems of the post-Soviet countries, is district heating, which implies centralized energy supply to consumers based on the joint generation of electricity and heat at CHPPs. In Russia, CHPP produces more than 40% of electricity, in Kazakhstan - 36%, and in Belarus - 56%. The role of CHP plants in district heating is even more significant: in Russia, CHP plants produce about 46% of heat, in Kazakhstan - 74%, Belarus - 83%. At the same time, it should be taken into account that the main consumer of the CHPP energy products is the population, which determines the significant social role of district heating (Lisin et al., 2017a; Makarov et al., 2017; Karatayev et al., 2016; Novikau et al., 2019; Kovalyov et al., 2013).

Despite the advantage of the combined production of heat and electricity in a single production cycle, expressed in fuel savings of up to 20-30%, in the conditions of the market model of the electric power industry, in particular, the wholesale energy market, this type of generation faces significant problems of maintaining competitiveness.

This phenomenon is associated with many reasons, the main of which is the low maneuverability of the CHPP. Providing heat to the population, CHP plants often cannot fulfill the System Operator command and respond to uneven power consumption, which does not allow them to participate in various competitive sectors of the electricity trade and indicates their inability to use in the wholesale energy market. Being displaced from the energy market CHP plants are essentially turning into large boiler houses. All the advantages of combined energy production and district heating are lost.

The spread of a market model for the functioning of the electric power industry in the countries of the Eurasian Economic Union and the creation of a unified energy market can aggravate the above problem and significantly affect the energy and economic efficiency and sustainability of regional heat supply systems development.

In this regard, it becomes relevant to consider possible ways of developing regional heat supply systems in the context of the integration of market mechanisms for pricing energy products in the member countries of the common economic space and identifying the risks of various business models of commercial activities in the field of heat supply.

Literature Review

The key interstate and intergovernmental documents determining the formation and development of the united electricity market of the Eurasian Economic Union (UEM EEU) are (Libman et al., 2012; Inshakova et al., 2019; Vinokurov, 2018; EEU program, 2016):

- Agreement on ensuring parallel operation of the electric power systems of the CIS member states (1998)
- Agreement on the transit of electricity and power of the CIS member states (2000)
- General principles of cross-border electricity trade in the CIS member States (2010)
- Agreement on the Eurasian economic Union (2014)
- The concept of the Eurasian economic Union formation (2015)
- The program for the formation of the EEU common electricity market (2018)

According to these documents, the functions of the EEU are:

- ensuring the balance of economic interests of producers and consumers of electricity in the member states;
- coordination and provision of joint operation of the systems for sale and purchase of electricity of the member states;
- ensuring the balance of supply and demand based on competitive pricing.

The functional structure of the UEM of the Union consists of (Lisin et al., 2017a; EEU program, 2016; Iskakova et al., 2017):

- a market for mutual trade under free bilateral agreements;
- a linked day-ahead market, which is a mechanism for ensuring the coordinated operation of the spot markets of the member states;
- balancing market that operates in real time according to uniform rules for all cross-border sections of the Union's UEM

The effective functioning of the Union's UEM is ensured if the market structures of the member states have segments of the trade market under free bilateral agreements and the spot market. Thus, during the formation of the Union's UEM, it is planned to liberalize the energy markets of the member with the aim of convergence of their structure and ensuring their functioning according to common market rules.

At the same time, most of the energy facilities of the member states were commissioned during the planned economy period and were not created to function in the competitive conditions of energy markets. The market conditions of functioning will significantly affect the efficiency of energy facilities, first of all, on heating systems that provide integrated energy supply to regional consumers.

Background

Current state and market structure of the Russian energy sector

Despite the fact that the energy systems of the countries of the Eurasian Economic Union were formed within the framework of the same concept laid down in the GOELRO plan adopted by the RSFSR in 1920, after the collapse of the Soviet Union, the countries developed different strategies for the energy economy development. The implementation of these strategies in recent decades has led to significant differences in the structure and approaches to management of the states' energy systems.

At present, the power system of Russia consists of 70 regional power systems, which form 7 integrated power systems: East, Siberia, Urals, Middle Volga, South, Center and North-West. All power systems are connected by intersystem power lines and operate in synchronous mode (in parallel) (Lisin et al., 2018a; Lisin et al., 2017b; Lisin et al., 2015).

The power systems form the unified power system of the country with an installed capacity of 246 656 MW. All stations generate about 1 trillion kWh of electricity annually. Thus there is an increase in electricity generation.

The electric grid sector of Russia is represented by 110-1150 kV transmission lines and covers an area of 12 million km2, where 143 million people live (more than 98% of the population). The rest of the country (about 29%) is supplied with energy by isolated power systems.

The Unified Energy System of Russia produces more electricity than it consumes. The electricity surplus is about 22 million kWh per year. This electricity is exported to neighboring countries (Lisin et al., 2018a; Voropai et al., 2018; Lanshina et al., 2018).

The main consumers of electricity are the oil and gas industry (mining and processing), metallurgical plants, mechanical engineering, light and food industries.

The Unified Energy System of Russia operates according to the rules of the market model of the wholesale electricity and capacity market. The natural monopoly of the state applies only to electricity transmission services.

The wholesale energy market model is a centralized auction of bids for the supply and purchase of electricity at the settlement nodes of the power system (Shindina et al., 2018; Lisin et al., 2018b). The wholesale energy market is divided into trading segments: free contracts market, day-ahead market (more than 72% of electricity is sold), balancing market, regulated contracts.

The structure of the wholesale energy market in Russia is shown in Fig. 1.

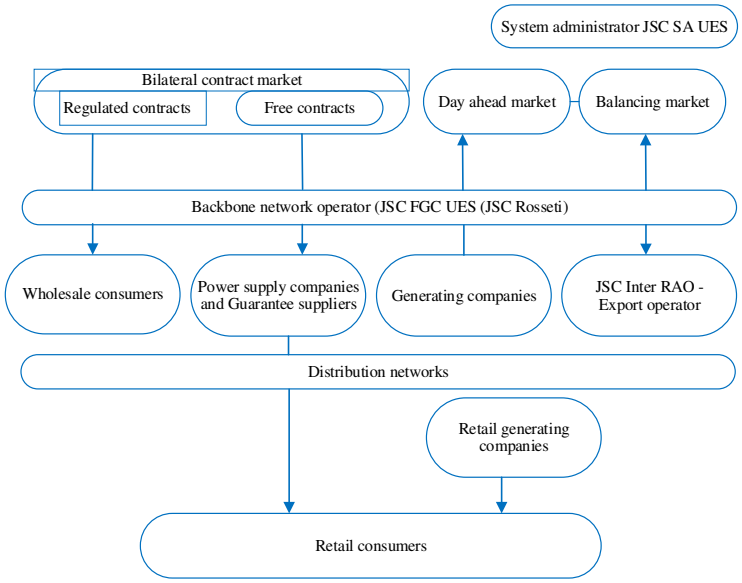

Fig.1: The structure of the wholesale energy market in Russia

Current state and market structure of the energy sector in Kazakhstan

The unified energy system of Kazakhstan covers an area of about 2 million km2 (74% of the country's territory) with a population of 16 million people (89% of the population). The country's energy system is conditionally divided into three zones: North, South and West. The Northern zone is energy surplus, it covers its own electricity demand and transfers the surplus to the Southern zone, as well as for export to Russia. The Western zone is characterized by both energy-surplus and energy-deficient areas. The existing restrictions on the permissible overflow in the cross-sections of the power grids do not allow providing the energy-deficient areas of the Western zone using its energy-surplus areas (Assembayeva et al., 2018; Sarbassov et al., 2013).

As well as the energy system of Russia, the energy system of Kazakhstan is energy surplus. Electricity generation in 2020 in Kazakhstan amounted to 106 billion kWh, and consumption was 105 billion kWh.The total installed capacity of the unified energy system of Kazakhstan is 22,936 MW.

The power grid of Kazakhstan consists of 0.4-1150 kV transmission lines. The main transmission lines of Kazakhstan are connected to the Russian power system in the north and to the unified power system of Central Asia in the south. There are large losses in the transmission and distribution of electricity - 21.5%. In the structure of electricity consumption in the country, the largest share falls on the industrial sector (over 68% of total consumption). The dynamics of electricity consumption by the industrial sector reflects the annual growth of electricity consumption by 5%, which indicates the energy intensity of the economy of Kazakhstan (Atakhanova et al., 2007; Dagoumas et al., 2020).

Market pricing mechanisms have been implemented in the rules of operation of Kazakhstan unified energy system. At the same time, the system operator of the power system is integrated with the backbone network operator (KEGOC JSC).

The electricity market is represented by a decentralized model based on bilateral contracts. More than 90% of electricity is sold under the trade segment of free bilateral contracts. The structure of the wholesale energy market in Kazakhstan is shown in Fig. 2.

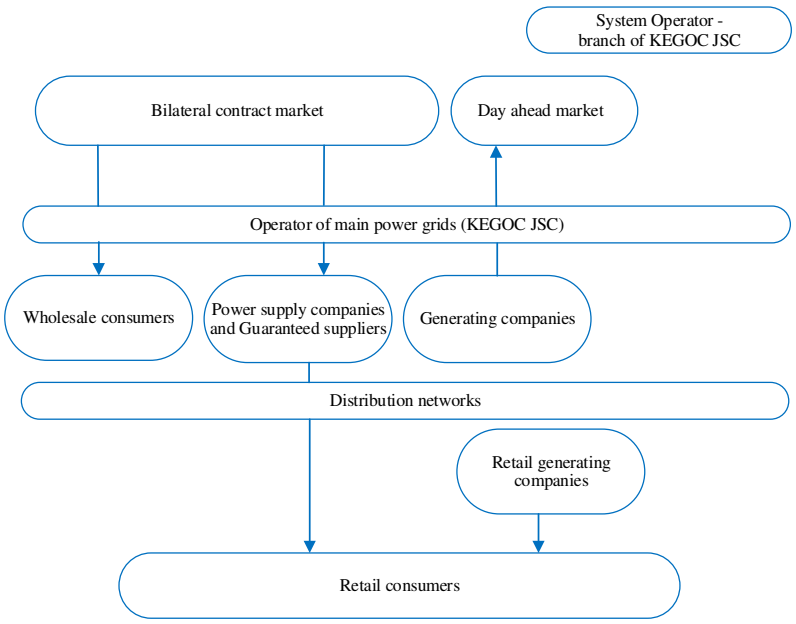

Fig. 2: The structure of the wholesale energy market in Kazakhstan

Current state and market structure of the energy sector in Belarus

The United Energy System of Belarus consists of regional energy systems with a single centralized operational dispatch control. The general management of the energy complex is carried out by the Ministry of Energy. The functions of energy management in Belarus are carried out by the State Production Association of the Electric Power Industry "Belenergo" (SPA "Belenergo"), subordinated to the Ministry of Energy. The energy sector is fully under the jurisdiction of the state. There are no market mechanisms in the power industry (Lisin et al., 2017a; Novikau, 2019; Sivak et al., 2003).

RUE Belenergo" consists of six regional republican unitary enterprises of the electric power industry, RUE Oblenergo, responsible for the functioning and development of regional power systems, as well as RUE “ODU”, which carries out centralized dispatching control of the unified energy system of the country.

Regional RUEs are formed on a territorial basis and are vertically integrated companies, which include power plants, electrical and heating networks.. They cover the entire territory of the state (207 thousand km^2) and provide energy supply to the population (9.5 million people) and industrial enterprises.

The installed capacity of the unified energy system of Belarus is 10,098 MW. The power system is characterized by a high share of combined production of electricity and heat (92% of thermal power plants are CHPs).

The power grid economy is represented by a 220-330-750 kV network, Cross-border and intersystem power lines are quite well developed and allow for the import and export of electricity in a wide range.

The United Energy System of Belarus is energy deficient. The country annually imports electricity from 3 to 8 billion kWh (up to 25% of its own electricity generation). The main energy donor is Russia.

Electricity imports mainly cover the peaks and half-peaks of electricity consumption. This ensures maximum fuel efficiency of the CHP operation.

In the structure of electricity consumption, industry accounts for 56%, population - 23% (Lisin et al., 2017a; Novikau, 2019; Sivak et al., 2003).

The electric power market is a vertically integrated structure - the united (republican) power system unites six regional power systems corresponding to the administrative-territorial structure of the state. Within each of the regional power systems, regional management enterprises operate, on the balance of which there are power plants and networks that form the power system. They are responsible for the production, transmission, distribution and sales of energy in the region.

The structure of economic relations in the power industry of Belarus is shown in Fig. 3.

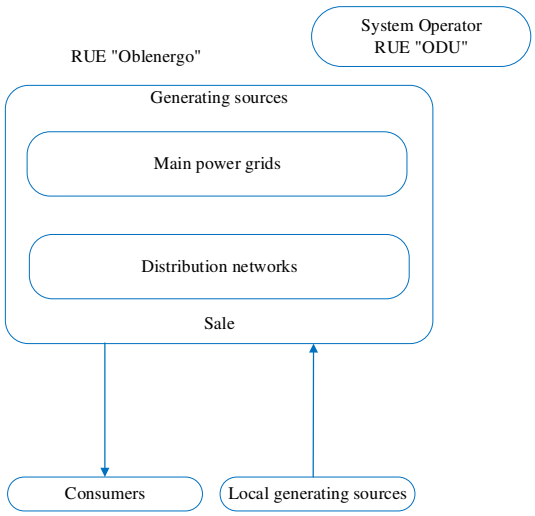

Fig. 3: The structure of economic relations in the electric power industry of Belarus

Methods

The scheme of heat supply systems organization

The heat supply systems of the countries of the Eurasian Economic Union are mainly built according to a centralized scheme, within the framework of which heat is supplied to many consumers from one source of heat energy (CHP or district boiler house) through a central heat point. About 63% of the housing stock in Russia is provided with heat and hot water from centralized heating systems, in Belarus and Kazakhstan at least 50% (Lisin et al., 2017a; Novikau, 2019; Stennikov et al., 2020; Kerimray et al., 2018).

The most common in the countries of the European Economic Union is an independent heat supply system, in which the piping systems of the heating network form several independent circuits, separated by an intermediate heat exchanger that transfers heat in contact with the coolant. Mains water acts as a heat carrier.

Fig. 4 shows the dynamics of heat consumption in Russia, Kazakhstan and Belarus.

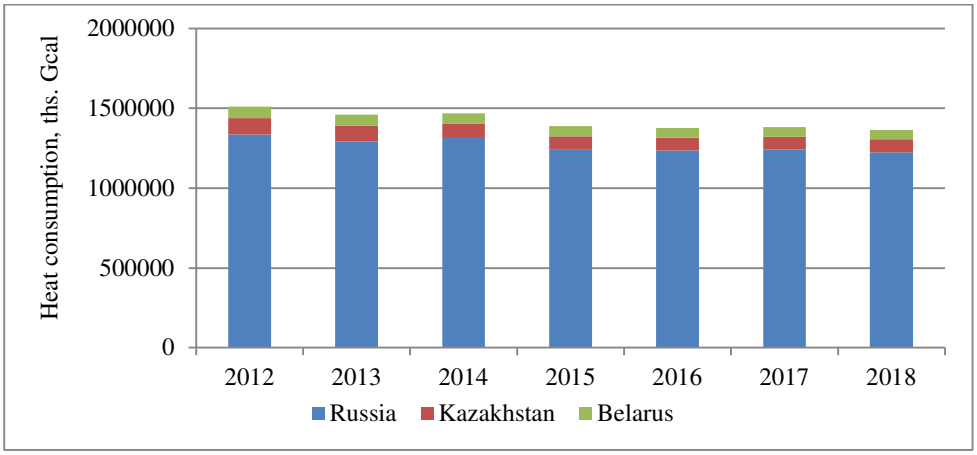

Fig. 4: Dynamics of heat consumption in the countries of the Eurasian Economic Union

As can be seen from the graphs, the heat consumption of the countries of the Eurasian Economic Union is decreasing. At the same time, if we analyze the change in the heat capacity of GDP, then in general the opposite picture is visible (Fig. 5).

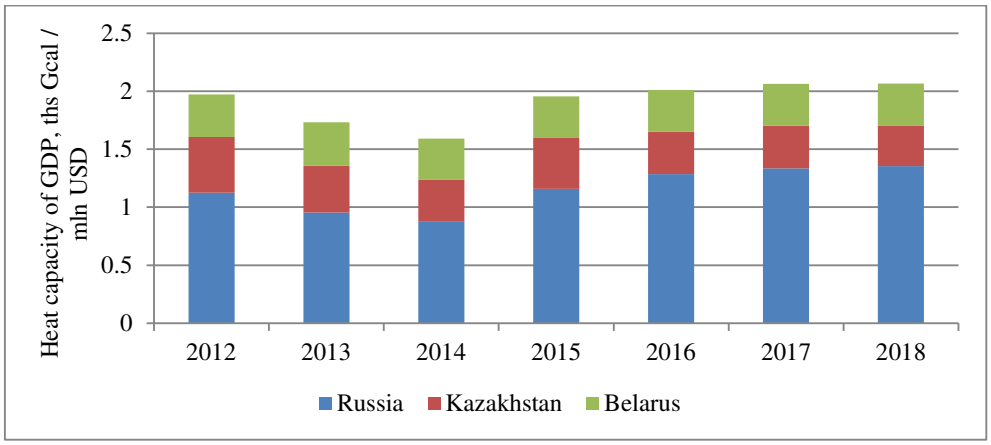

Fig. 5: Dynamics of the GDP heat capacity of the countries of the Eurasian Economic Union

This indicates the presence of crisis phenomena in the economies of countries, which led to a reduction in the gross product. At the same time, a decrease in heat consumption due to the modernization of heat supply systems and a decrease in heat losses does not allow to compensate for the negative growth trend in the heat capacity of GDP.

It can be said that today the schemes of heat supply systems have a complex fragmented structure due to different stages of their development. During the planned economy, heat supply systems for residential and industrial facilities sought to be implemented through centralized systems based on heating technologies – centralized heat supply in the production of electric and thermal energy in a single technological cycle at a CHP. Thus, it was possible to achieve energy savings and reduce the cost of heat energy and, ultimately, the tariff for consumers.

The production, transmission and distribution of energy in most countries of the Eurasian Economic Union ended up in different ownership, a lot of intermediaries appeared between generating facilities (heat sources) and consumers, which currently significantly affects the final cost of consumed heat.

District Heating Business Models

Based on the above systematic analysis of the organization and functioning of the energy systems of the key member countries of the Eurasian Economic Union, it can be assumed that the liberalization of economic relations in heat supply, which will be facilitated by the creation of a unified energy market, may lead to the emergence of the following business models for the development of regional heat supply systems and heat sales services:

1. A model for the development of a heat supply system based on the sale of heat energy through a wholesale reseller.
2. A model for the development of a heat supply system based on the direct provision of heat supply services using its own or leased networks.
3. A model for the development of a heat supply system based on the direct provision of heat supply services to consumers with transit through the networks of a third-party organization.

The first model describes the situation when a heat source (thermal power plant) releases heat energy from collectors in a wholesale reseller's network. In this case, the calculation of the cost of supplied energy is carried out on the basis of actually supplied volumes and tariffs set by the regional energy commission or by the "alternative boiler house" method. In this case, the wholesale reseller is also likely to be the owner or operating organization of heating networks.

The second model assumes the absence of any intermediaries between the heat source and heat consumers. To implement this model, the generating company must own, lease, or have operational management rights (a concession agreement) for both main and distribution district heating networks.

The last model is the most complex from the point of view of the regulatory system and the conflicts between the market participants potentially embedded in it.

The most likely is the implementation of the first business model of organizing heat supply systems, the introduction of which should lead to a decrease in the cost of heat for consumers and the heat capacity of GDP, provided that competition between heat suppliers develops.

Method of implementing the district heating business model

As a method of implementing the business model of the district heating system, it is proposed to form a single heat supply organization that sells heat at fixed tariffs to end users, collects payments, and has the authority to optimize capacity utilization. At the same time, it enters into unregulated contracts with heat suppliers, based on the principle of "alternative boiler house".

An alternative boiler house is understood as a set of standard technical and economic parameters for the operation of a model heat source. In accordance with this concept, an alternative boiler house is a local source of heat supply, which consumers in the region can use to replace third – party heat supply organizations. The determination of boiler house parameters is based on the premise of using the most modern and economical technologies. In the

process of modeling, based on a number of input parameters (technological and economic), in accordance with the payback period and the rate of return acceptable to the investor, the marginal level of the tariff for heat produced in the region (the required gross revenue) is calculated. This value is used to determine the marginal possible tariff for district boiler houses. The marginal tariff for heat generated by the CHPP is assumed to be equal to the tariff of the boiler house minus the cost of transporting heat through the main pipelines. The final tariff for the consumer is defined as the tariff of the boiler house with a surcharge for transportation through distribution networks:

$$Tariff_{CHP} = Tariff_{Boiler} - C_{lines}^{magistral} + C_{lines}^{distribution} \quad (1)$$

where $Tariff_{CHP}$ - marginal tariff for thermal energy generated at CHPP , $Tariff_{Boiler}$ - ideal boiler house tariff, $C_{lines}^{magistral}$ - the cost of transporting heat through the main networks to the heating point , $C_{lines}^{distribution}$ - the cost of transporting heat energy through distribution networks to the consumer.

At the same time, the "alternative boiler room" method has many disadvantages. So, model calculations show that the inclusion of capital costs of the boiler house in the calculation of the marginal price leads to a significant increase in the tariff for thermal energy in many regions. Also, the monopoly of a single heat supply company will not allow independent heat producers to develop.
To reduce the impact of these shortcomings, it is proposed to take into account the structure of heat sources operating in a single price zone when forming the tariff for heat energy (Fig. 6).

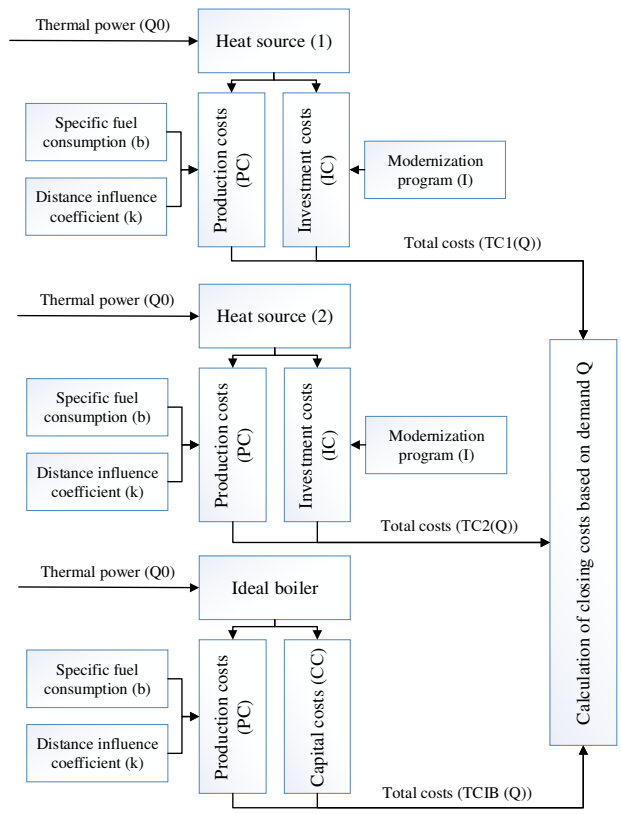

Fig. 6: Improved method of the marginal tariff for heat forming

According to the method, the key costs of heat producers are considered as a set of production and investment costs. Production costs are primarily determined by fuel costs. Investment costs are determined by the costs of modernization programs for fixed assets. The marginal tariff is determined by the closing costs of the last switched on heat source. The "ideal boiler house" model is involved in pricing.

Finding the closing costs (the last included heat source with the highest total costs when generating a volume of heat not provided by other sources) requires solving the dynamic programming problem:

$$TC(Q) = \min\left[TC_1(Q_1) + TC_2(Q_2) + \ldots + TC_n(Q_n) + TC_{IB}(Q_B)\right] \quad (2)$$

$$\begin{cases} TC_i(Q_i) = I_i + kbQ_i \\ TC_{IB}(Q_{IB}) = I_{IB} + kbQ_{IB} \\ Q_1 + Q_2 + \ldots + Q_n + Q_{IB} = Q \\ Q_i^{\min} \le Q_i \le Q_i^{\max} \\ Q_{IB}^{\min} \le Q_{IB} \le Q_{IB}^{\max} \end{cases} \quad (3)$$

where Q - the required heat capacity of the heat supply system to meet the needs of the consumer, Q_i - heat capacity of the *i*-th heat source, Q_B - heat output of an ideal boiler house, $TC_i(Q_i)$ - total costs of the *i*-th heat source, $TC_{IB}(Q_B)$ - total costs of an ideal boiler house.

Results and Discussion

Fig. 7 shows the results of calculating the marginal pricing for large cities in Russia according to the considered business model of the district heating system and the proposed method for forming the marginal heat tariff. The results are compared with the current tariff and calculations using the “alternative boiler house” method.

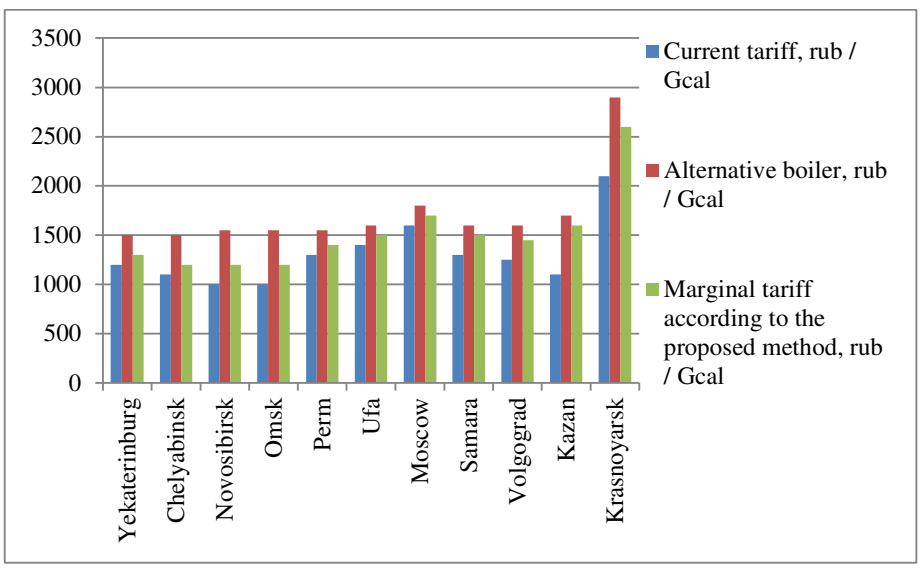

Fig. 7: Results of calculations of the marginal pricing according to the proposed method and the method of "alternative boiler house"

As can be seen from the above calculation results, the proposed marginal pricing method for the district heating business model based on the organization of a unified heat supply company allows to reduce the upper price limit obtained by the “alternative boiler house” method. However, the cost of heat is higher than the current tariff. To prevent tariff growth, it is necessary to improve the organizational model of the unified heat supply company by developing mechanisms to increase market competition between heat sources.

A separate issue is the identification of possible risks in the implementation of market business models for organizing district heating systems for consumers in the formation of a common energy market in the countries of the Eurasian Economic Union. These risks include:

- the emergence of a conflict of interests between the generating company and the wholesale reseller of energy;

- possible deviation of sales volumes from the planned indicators of the generating enterprise due to the high competition of heat producers for a single buyer represented by a wholesale reseller;
- when forming a tariff for a consumer based on the costs of a wholesale reseller, the latter loses incentives to reduce costs and efficiently distribute the heat load. As a consequence, the choice of a heat source can be made not on the basis of its efficiency, but on the basis of affiliation with a wholesale reseller;
- the risk of growth of generating companies receivables and an increase in wholesale reseller payables significantly increases.

The impact of these risks on the efficiency of the considered business models for the development of regional heat supply systems in the context of the Eurasian Economic Union energy markets integration requires separate studies.

Conclusion

The creation of a unified electric power market of the member countries of the Eurasian Economic Union affects the sustainable development and the rules for the functioning of regional heat supply systems, which is due to the fact that the key technology for the production of energy products, which forms the basis of the energy systems of countries, is district heating, which involves centralized energy supply to consumers on the basis of joint generation of electric and thermal energy at a CHPP.

The analysis of economic relations in the electric power industry of the countries of the Eurasian Economic Union showed that after the collapse of the Soviet Union, the countries developed different strategies for the development of the energy economy. While Russia and Kazakhstan have taken the path of liberalizing the electricity market, Belarus has maintained a planned energy economy. Market mechanisms introduced in the energy sector of Russia and Kazakhstan are aimed at increasing the volume of electricity production in order to reduce its unit cost and increase exports to energy-deficient countries. The planned development of the energy economy of Belarus involves the rational use of heating facilities and the extraction of the maximum economic and environmental effect from the combined production of electricity and heat. The implementation of these energy strategies in recent decades has led to the emergence of significant differences in the structure and management of energy systems of states.

The creation of an energy market will lead to the introduction of general market rules for the functioning of heating systems of states. At the same time, various business models for the development of regional heat supply systems and the provision of heat sales services may arise.

The most likely is the implementation of a model for the development of a heat supply system based on the sale of heat energy through a wholesale reseller. It requires the formation of a unified heat supply organization that sells heat at tariffs to consumers and concludes unregulated contracts with heat suppliers using the "alternative boiler house" method.

To eliminate the shortcomings of the “alternative boiler house” method, leading to an increase in the tariff for heat energy, an improved method of forming the marginal tariff for heat by a single heat supply organization is proposed. This method allows you to reduce the upper limit of the price by constructing a supply curve and finding the closing costs of the last heat source to be switched on. It is shown that in order to prevent tariff growth, it is necessary to improve the business model of a unified heat supply company by developing mechanisms to increase market competition between heat sources.

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Risk Sources in Early Phases of Inter-Organizational Cooperation

Bartosz MARCINKOWSKI, PhD
Department of Corporate Resources Management, Institute of Management
The Poznań University of Economics and Business, Poland
bartosz.marcinkowski@ue.poznan.pl

Sebastian NAROJCZYK, PhD
Department of Corporate Resources Management, Institute of Management
The Poznań University of Economics and Business, Poland
sebastian.narojczyk@ue.poznan.pl

Abstract

Enterprises, adapting to changes in the economy, often decide to change their cooperation strategy. However, it should be noted that when looking for new business partners and establishing relationships with them, they take risks. The main goal of the research is to identify the sources of risk occurring in the early stages of inter-organizational cooperation. In order to achieve the aim of the study empirical research using the in-depth survey method and direct interview was conducted on a sample of 244 entities located in Poland.

Keywords: Inter-Organizational Cooperation, Risk Management, Cooperation Risk.

Introduction

The economy of the 21st century is an economy that is constantly changing. Many market entities, seeking to improve the efficiency of functioning in new conditions and striving to position the company on a development path adapting to changes taking place in its environment, decide to cooperate with numerous partners under various conditions. Its goal is to achieve a number of benefits, such as increasing competitiveness, improving economic performance, reducing costs, or increasing the value of an enterprise.

It is worth noting that in order to successfully achieve the assumed goals, enterprises are often forced to change their cooperation strategy. Relationships that have been assessed as ineffective or inconsistent with the current development strategy are ended. At the same time, new relationships are being established with partners who will achieve their business goals. It should be noted, however, that decisions regarding the selection of contractors and the act of building numerous relationships of different nature are associated with risk. Therefore, it can be concluded that a thorough analysis of the risk occurring in the process of inter-organizational cooperation is crucial for achieving success in the implementation of restructuring activities.

On the basis of the above considerations, the main goal of the article was determined, which is to identify the sources of risk occurring in the early stages of inter-organizational cooperation. In order to achieve this goal empirical research using the in-depth survey method and direct interview was conducted on a sample of 244 entities located in Poland.

The Essence of the Risk of Inter-Organizational Cooperation

The analysis of the complex issues of risk occurring in the early stages of inter-organizational cooperation should begin with the exact definition of key terms. Although the subject of cooperation risk management is of interest to both the scientific and business community, it is difficult to find a uniform theory in the literature explaining the basics of threats occurring in cooperation between business entities. It is therefore worth trying to clarify concepts such as cooperation and risk. The view in Polish literature is that inter-organizational cooperation should be treated as cooperation focused on achieving benefits (Jaźwiński and Kiernożycka-Sobejko, 2006, p. 609; Kaczyński, 2012,

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p. 166; Mazur, 2011, pp. 290–291; Nowak, 2012, pp. 15–35; Olszyński, 1989, p. 11; Strzyżewska, 2011, pp. 27–29). According to many researchers, cooperation is primarily a form of achieving competitive advantage. Through cooperation, organizations gain the opportunity to functioning on global markets, access to cheap or qualified labor, taking advantage of the benefits of the scale or taking the most advantageous position in the value chain (Achrol and Kotler, 1999, pp. 146–147; Jarillo, 1988, p. 31; Narojczyk, 2016, pp. 57–63; Olszyński, 1989, pp. 12–15; Varadarajan and Jayachandran, 1999, p. 132).

At this point it should be emphasized that there are numerous forms of inter-organizational relationships in business practice. In addition, they have a dynamic and evolutionary character - they change over time, depending on the current requirements of entities, their level of development, market situation, or the adopted operations strategy (Jaźwiński and Kiernożycka-Sobejko, 2006; Kaczmarek, 2000; Lichtarski, 1992; Rangan and Yoshino, 1996; Webster, 1992; Wściubiak, 2017, pp. 375–387).

However, enterprises which decide to cooperate do not only benefit from such activity. Cooperation with a business partner involves some risks. It is worth noting, however, that the concept of risk has changed over the years, adapted to the level of development and the state of knowledge, which results in a multitude of perspectives from which this term can be interpreted, it has many meanings, associations, synonyms that occur in everyday, as well as scientific language. A general explanation of this concept can be found in the Polish dictionary(Szymczak, 1993, pp. 155–156), which states that risk is the probability that something will go wrong, a venture whose outcome is unknown, uncertain, problematic. It requires courage to take such a risk. On the other hand, in view of the problems of enterprise cooperation, risk is most often understood in accordance with the so-called negative concept. Its essence is to understand risk as the possibility that something will go wrong, have the courage to take the risk of which the outcome is unknown or risky, and is likely to cause damage (Małkowska-Borowczyk, 2012, pp. 9–10).

It should be noted that the risk of cooperation is a significant barrier to the development of inter-organizational relationships (Chundong et al., 2012, p. 197; Nowak, 2015, pp. 47–67). However, analyzing the subject's literature, it can be seen that these issues have not been sufficiently recognized. Although researchers agree on the existence of the phenomenon of the risk of cooperation itself, by isolating its sources and assessing the significance of its individual sources, they use diverse criteria, and achieve different results (Lee and Johnson, 2010, pp. 273–276; Liu and Zhao, 2009, pp. 4510–4511; Sumei, 2010, pp. 574–577; Wang Fei and Wang Shilei, 2010, pp. 418–420).

Research Metodology

Empirical research on risk in the early stages of inter-organizational cooperation was carried out in the period from 2017-2018. 244 entities located in Poland were analyzed using a questionnaire. In addition, an observation and direct interviews were carried out in selected entities, during which the author had the opportunity to obtain more extensive information and opinions resulting from experience and practice. The study was carried out in 5 stages as shown in the figure 1:

1. On the basis of the conducted literature studies, an appropriate theoretical framework was built to analyze the sources of risk. The cooperation process was defined and divided into successive phases. This article focuses on the phases of early cooperation (establishing the requirements profile and selecting a partner; establishing cooperation).
2. On the basis of literature research, participant observations and direct interviews, the sources of risk were identified and classified to the phases of the cooperation process.
3. In the survey, the respondents were asked to evaluate the previously identified risk sources in terms of the probability and consequences of their occurrence.
4. Based on the respondents' answers, the risk of individual events was estimated.
5. Factor analysis was used to reduce a large number of variables, the importance of which is initially difficult to estimate. Mutually independent common factors were received by combining correlated variables and removing insignificant ones.

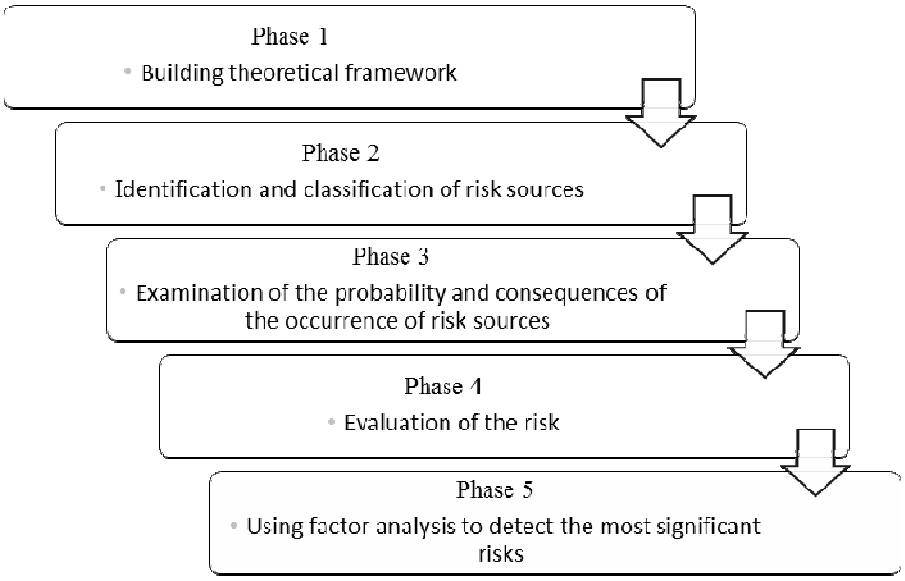

Fig. 1: research process

Source: own study.

Sources of risk in the early stages of inter-organizational cooperation

In the risk management process, the basic and at the same time the most important activity is the correct detection of risk sources, i.e. events that are a potential threat to the enterprise. It should be emphasized that the completeness and correctness of actions at this stage determines the accuracy of further measurements and the effectiveness of the developed procedures.

The starting point for research on the sources of risk in the initial stages of cooperation was to build an appropriate theoretical framework enabling easy and clear interpretation of the results obtained. In line with the above intention, based on the approach of Kapcia (1994), Marxt and Link (2002) and Urbaniak (2008), the process of cooperation of enterprises was divided into four successive phases presented in Figure 2:

1. Establishing the requirements profile and selecting a partner. At the beginning of this phase, an analysis of key competences and resources offered by potential partners is carried out, as well as verification of common goals. To ensure optimal results, it is necessary to use a variety of methods to search for information from many different sources. Then the most suitable of the available contractors is chosen.
2. Establishing cooperation. After meeting the requirements specified in the previous phase and finding the optimal partner, cooperation with the contractor is established. Enterprises should strive to establish a cooperative relationship aimed at achieving common goals. At this stage, the partner is often tested by gradually increasing the responsibility of the given tasks.
3. Cooperation development. At this stage, intensive cooperation occurs, which manifests itself, inter alia, in the rapid circulation of money between partners, or the development of the scope of assets included in the cooperation process. There is great commitment of employees at all levels in partner enterprises. Enterprises, through the development of relationships, strive to achieve stability, maintain internal stocks and strategic resources that allow their partners to survive in emergency situations.
4. End of the relationship. In this phase cooperation between partners is finalized. The reason for the decision in this respect can be both the achievement of previously set cooperation goals, the lack of further interest in cooperation, as well as the occurrence of a conflict between contractors.

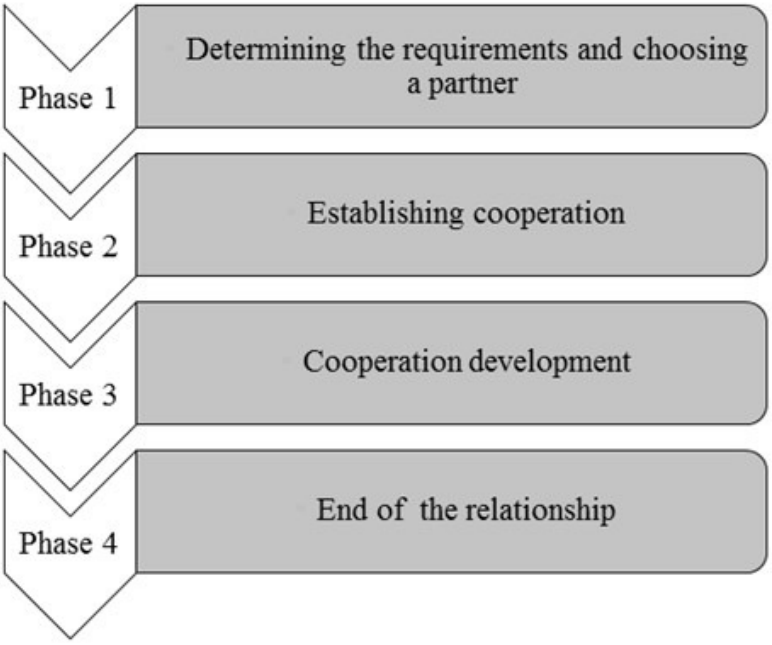

Fig. 1: Enterprise cooperation process

Source: own study based on: Kapcia, B., 1994. Fazy rozwoju współczesnej kooperacji. Przegląd Organizacji 18–20; Marxt, C., Link, P., 2002. Success factors for cooperative ventures in innovation and production systems. International Journal of Production Economics 77, 219–229; Urbaniak, M., 2008. Rola jakości w procesach budowania relacji z dostawcami na rynku B2B (cz. 1). Logistyka nr 6, 28–29.

Having in mind that companies adapting to changing market conditions, often change the strategy of cooperation, the main focus was on the sources of risk in the first two phases, i.e. determining requirements and choosing a partner, and establishing cooperation. Next, an attempt was made to classify the sources of risk in relation to the phase of the cooperation process in which they occur. According to the classification assumptions, each event could be assigned to only one group. At this point, however, it should be noted that the effects of some of the isolated events can be manifested at various stages of the cooperation process, e.g. the effects of a certain event that occurred during the selection of a partner may not appear until the relationship development phase. In such situations, the assignment of a given source of risk to a specific phase of the inter-organizational cooperation process was guided by the criterion of probability and consequences of its occurrence. Therefore, the event was classified into a phase in which the chances and effects of a given event are the highest. In the event of doubts, they were resolved primarily on the basis of literature studies carried out and the opinions of experts obtained during direct interviews and participant observation in selected entities.

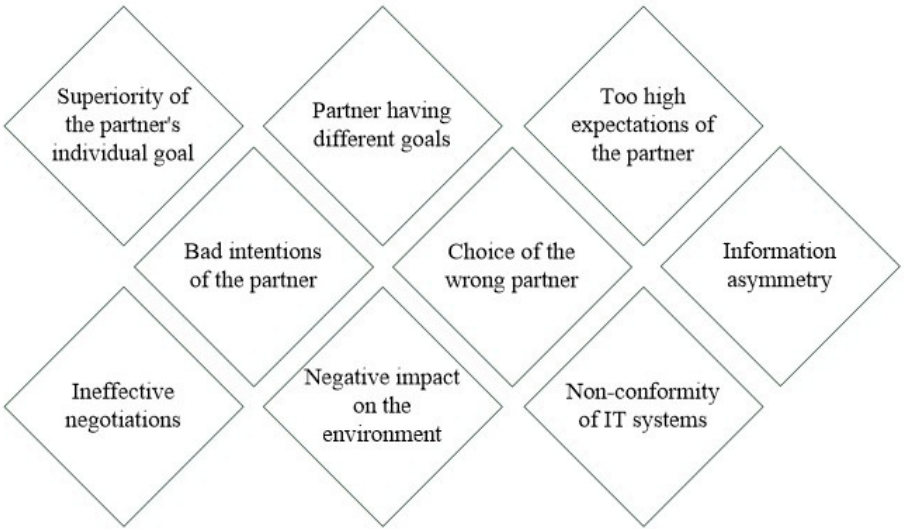

Fig. 3: Sources of risk occurring at the stage of determining requirements and selecting partners
Source: own study based on empirical research.

As part of research on the sources of risk manifesting themselves at the stage of determining the requirements for cooperation and the selection of partners, a number of factors have been identified, which are presented in Figure 3. It should be emphasized that the events identified primarily concern the analysis of their own expectations of future partners and the competences of potential contractors performed by enterprises, as well as compliance of the cooperation goals. The sources of risk occurring at the first stage of the cooperation process include:

1. Treating the potential partner's own individual goals as superior to cooperative goals. It should be noted that building a long-term and stable inter-organizational relationship on such a foundation is not possible, because a partner preferring self-interest over the common one is a source of serious danger, e.g. in the event of an opportunity for above-average profit, he can shift his resources engaged in cooperation towards more profitable venture.
2. Occurrence of different goals of the partner, which in the future will prevent building a close relationship, which should be based on common, compatible goals, motivating cooperation, as well as building trust. The selection of a partner whose basic goals are inconsistent with the company's goals may result in a conflict at a later stage of cooperation, or even lead to an end of the relationship.
3. Having too high expectations of the partner, which may result in overestimation of the value of relationships and excessive involvement of both tangible and intangible resources in cooperation.
4. The partner having bad intentions, which at the early stage of building cooperation is primarily associated with concealing goals and the desire to achieve individual benefits at the expense of other participants in the value chain.
5. Choosing the wrong partner due to incorrect analysis of his abilities, competences or possibilities. The consequence of such an event may not only be the involvement of significant resources in a relationship in which it will not be possible to achieve the set goals, but even the need to look for a new partner at the least convenient time for the company.
6. The occurrence of information asymmetry, i.e. a situation in which a potential partner has more or less information on planned cooperation. As a consequence of the above, incorrect or ineffective decisions based on incomplete knowledge may occur.
7. Conducting unsuccessful negotiations, which will not result in a win-win effect. As a consequence, it is possible that all enterprises involved in the cooperation process will not benefit equally from cooperation and

jointly pursue common goals. It should be noted that the partners treated as subordinate will not be willing to engage their key competences in cooperation organized in this way.

8. Choice of a partner who is negatively affecting the environment. It should be emphasized that units caring for ecology should not only analyze their core business in the context of ecosystem protection, but also the activities of all partners. In addition, establishing cooperation with an unsuitable partner in this respect, even if it is cooperation of low strategic importance, may result in significant costs and loss of the image of not one entity, but all units of the value chain.

9. Occurrence of IT systems non-compliance. When creating long-term close cooperation, this is an element that may cause communication difficulties and unnecessary costs in the future.

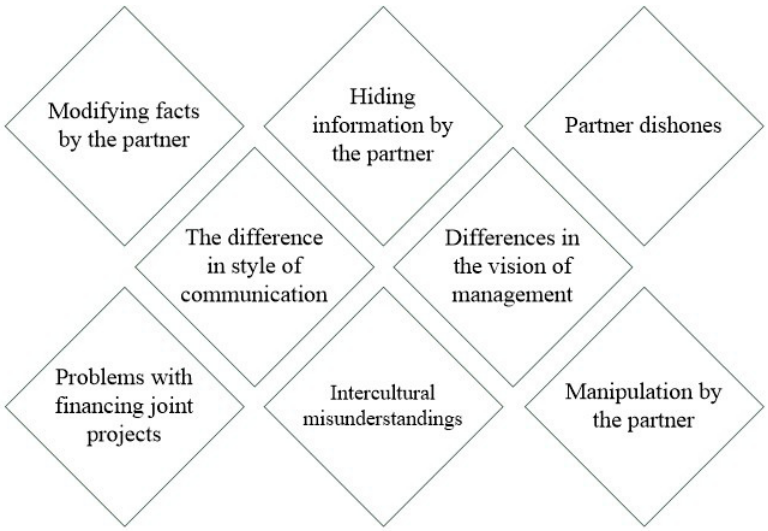

Fig. 4: Sources of risk at the stage of cooperation

Source: own study based on empirical research.

The next phase of the cooperation process, during which potential partners establish cooperation, must match each other and build a future relationship, is associated with certain specific threats presented in Figure 4. At this stage, a number of differences in the approach to running a business and methods of achieving goals are revealed. It should also be emphasized that enterprises when establishing relationships are particularly susceptible to broadly understood fraud and dishonesty on the part of partners seeking to maximize their own benefits at the expense of other participants in the value chain. The following events were classified as the most significant risk factors at the stage of commencing inter-organizational cooperation:

1. Modifying the facts by the partner, which is of particular importance in the context of providing information about production and service possibilities and sharing all kinds of financial data. Modifying the facts by the contractor in this regard threatens, among others, making wrong decisions based on false information, entrusting the contractor with overly responsible tasks that may not be fulfilled, and finally even leading to the end of the relationship.

2. Hiding information by the partner, which may be motivated by the desire to establish a highly profitable relationship, or an attempt to achieve their own hidden goals. As in the case of modifying the facts, it may threaten, among others making ineffective decisions and entrusting the partner with inappropriate tasks.

3. Establishing cooperation with a dishonest partner, which may result in the loss of funds, materials, employees or know-how. It should be noted that cooperation with an unreliable co-operator is very dangerous, especially in the case of small enterprises, because it can even lead to the loss of financial liquidity and, consequently, to bankruptcy.

4. The differences in the style of communication, which are revealed at the stage of establishing cooperation, can significantly impede the flow of information between partners and even cause conflicts in the future. This problem is particularly important in the context of international activities in various cultures.

5. Discrepancies in the joint venture management vision. Partners may disagree about methods and ways of achieving goals.

6. The emergence of intercultural misunderstandings, which is gaining in importance along with the rapidly progressing globalization, internationalization of economic activity and the expansion of markets. These misunderstandings can significantly affect the flow of information between partners.
7. Problems with financing joint projects, which includes difficulties in obtaining financing sources and problems with fair distribution of liabilities between partners.
8. Manipulation of the company's behavior by a partner aimed at achieving individual, hidden goals and own benefits at the expense of the contractor.

Discussion

At the next stage of the study, the respondents were asked to determine the probability and consequences of the above-mentioned events on a five-point Likert scale. It allowed, in the course of further studies, to estimate the risk level of individual events and to detect the most important ones. At this point, it should be emphasized that the entrepreneurs participating in the study could also supplement the list of risk sources with further events concerning cooperation, which in their opinion are important, and were not included in it. However, none of the respondents decided to extend the list, considering it extensive and exhaustive.

Then, in accordance with the adopted risk definition, the probability of occurrence of individual events indicated by the respondents was multiplied by the scope of their negative consequences, thus obtaining a number of variables describing the risk of cooperation. At the last stage of the research, in the course of further analyzes, in order to reduce a large amount of information obtained, a factor analysis with Varimax rotation was used. It allowed to reduce many primary variables to several mutually independent common factors by combining correlated variables and removing insignificant ones, the importance of which is initially difficult to assess. The use of such an approach allowed for the identification of risk areas in the early stages of cooperation, of the greatest importance for entrepreneurs, due to the high chances of occurrence on the one hand and high consequences on the other. Such an analysis of the problem should make it much easier for organizations to build new or develop already existing risk management systems through a clear and legible definition of the areas of threats related to cooperation, to which special attention should be paid.

In the conducted analysis, 4 common factors were distinguished using the Kaiser criterion (according to which the factor loading of each of the common factors subject to further analysis should be greater than 1). It should be noted that the selected factors explain almost 56% of the variance of the analyzed problem. The first of the common factors, characterized by a high loading (5.6), explains over 32% of the variability of the studied phenomenon. Subsequent factors have a lower and lower loading, up to the last, borderline fourth one, which has a loading of 1.03. The last factor explained 6% of the variance of the problem studied. Detailed data on the structure of the factors, their loadings and the explained variance are presented in Table 1.

Table 11: Risk areas in the early stages of inter-organizational cooperation

Common factors	Risk loads	Factor loading	Percentage of variance explanation
Dishonesty of the partner	- Manipulation by the partner - Manipulation by the partner - Partner dishonesty - Hiding information by the partner przez partnera	5,60	32,94
Ineffective communication	- Non-conformity of IT systems - Differences in the style of communication	1,71	10,04
Differences in strategy of management	- Partner having different goals	1,17	6,88
Information asymmetry	- Information asymmetry (unequal access to information)	1,03	6,06

Legend: Factor analysis with raw Varimax rotation was conducted. Loads greater than 0.68 were used in the construction of factors.
Source: own study based on empirical research.

The main factor explaining the largest part of the variability of the analyzed phenomenon (32.94%) is a factor consisting of such loads as risk of: manipulation by the partner, modifying facts by the partner, partner dishonesty and hiding information by the partner. This factor can be described as the risk of dishonesty. This risk is particularly important at the stage of setting requirements and choosing a partner. As the research shows, establishing a relationship with an unreliable partner is both highly probable and may have the greatest consequences in the future, during the development of cooperation.

The second factor is related primarily to the way of communication. Due to the fact that it is correlated with such primary variables as: non-conformity of IT systems and differences in the style of communication, it can be described as communication risk. This factor explained 10.04% of the variability of the studied phenomenon, and it becomes particularly important at the stage of setting requirements and choosing a partner, because the mismatch between partners in this respect will affect the effectiveness of the future relationship.

Another factor identified threatens to achieve the assumed effects of cooperation. It can be defined as a strategic risk, because it is shaped by such a factor load as the risk of partner having different goals. This factor explains 6.88% of the variability of the analyzed phenomenon.

The last examined common factor, explaining 6.06% of the variance of the problem studied, can be described as the risk of information asymmetry. This risk is related to the relationship in which one of the partners decides to establish and develop cooperation having greater access to information and planning to use it to achieve greater benefits than the other parties involved in the cooperation.

It should be emphasized that enterprises striving to achieve new competitive advantages, expanding sales markets or reducing operating costs by increasing the scope and intensity of inter-organizational cooperation, should place particular emphasis on risk reduction in early stages of cooperation. This will allow to establish cooperation with the right partners and reduce the risks of future cooperation development. At this point, the importance of a properly designed and implemented risk management system should be emphasized. However, in order for this system to work efficiently and effectively, especially in the light of the very complex issues of cooperation between enterprises, a thorough assessment of cooperation risks is necessary, which includes the evaluation of both the probability and consequences of specific events, and a comprehensive analysis of the risk level.

Conclusion

To sum up, it should be said that on the basis of literature studies, empirical research, own observations and experiments, a group of 17 sources of risk was identified in the early stages of the enterprise cooperation process, i.e. when determining the profile of requirements and partner selection and establishing cooperation. It should be noted that each of the distinguished stages was characterized by certain specific types of threats. The conducted analyzes showed that in the early stages of cooperation, enterprises should pay special attention to the risk of dishonesty of the partner, ineffective communication, differences in strategy of management and information asymmetry.

The results of the above research can be used by enterprises adapting to changes in the economy by changing the cooperation strategy. Based on the prepared list of risk sources occurring at the initial stages of cooperation, it is possible to develop an effective risk management system, taking into account the complex specifics of relationships between business entities. It should be emphasized that further research on the issue of cooperation risk should focus on a more detailed analysis of the identified sources of risk.

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Big Data Management Intentions in Higher Education Sector: A Perspective of Public Research Universities in Malaysia ~ A Pilot Result

[1]TASMIN, R., MUHAMMAD, R. N., ABDUL HAMID, N. A.

Department of Production and Operation Management,
Faculty of Technology Management and Business,
Universiti Tun Hussein Onn Malaysia (UTHM),
86400, Parit Raja, Johor, MALAYSIA.

Abstract

Industry 4.0 primarily focuses on 4 major domains, namely artificial intelligence, robotics, the Internet of things and big data analytics. Decision to adopt big data management is influenced by numerous factors, some of which are behaviorally interrelated. Discovery and validation of these factors are essential to be able to empirically describe their relationships and impact on one's decision to make use of the technology in the future. This paper reports the result of a pilot survey aiming to validate a questionnaire that is specifically designed to collect data on the behavioral intention factors that may likely influence higher education institutions to intend to adopt big data management. A total number of 50 sampled responses were used in the study. The Statistical Package for the Social Sciences (SPSS) version 23 was applied for the factor analysis and reliability analyses of the collected data. The result shows that the 50 responses were reliable and appropriate for the main study survey. All the factor reported loadings have fulfilled the acceptable threshold of 0.70. Both the reliabilities of the items and the scales were also within the acceptable threshold. Thus, it was concluded that the questionnaire was reliable and can subsequently be applied on the aim it was designed for.

Keywords: Big Data, higher education, Adoption Readiness, Malaysian Research Universities

Introduction

Competitiveness is today an exciting topic for research studies. Most organizations are engaged in a certain form of competition, either for the purpose of customers or for benefits due to scarcity of resources (Mainardes *et al.,* 2011). With globalization in organizations, there is virtually no sector in which competition has not increased significantly (Campbell-Hunt, 2000), including the higher education sector (Levy, 2006). In the current competitive business environment, organizations aim to push beyond the boundaries of table sheets and inadequate business intelligence reporting in order to achieve a more personalized and more extensive data utilization experience. Today, organizations continuously receive and send data in several formats, at various speeds and using various techniques. Hence, organizations are seen rapidly growing both internally and externally. Thus, this pushes them in seeking ways to sustain competitive advantage to improve their performance, particularly through new innovation (Tasmin & Woods, 2007). This growth forecasts an industrial revolution driven by real-time analysis, very accurate and alert actions. As a result, data are processed and transmitted instantly while the models and algorithms are stored. Therefore, the organization's potential to analyze this diverse variety of voluminous data is vital and nowadays, readiness and adoption for such analytics are at the center of attention.

In recent decades, the higher education sector has been the subject of growth due to its strategic nature to nations. In this respect, the education sector has undergone shifts emerging increase in competition among higher education institutions (HEIs) (Ahan, 2014; Tasmin et al., 2020). This competition has had consequences for all the higher education sector stakeholders. Such changes in the environment of higher education have begun to demand more

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measures and management to sustain competitive advantage in order to advance (Muhammad et al., 2020). Data-driven innovation is required to improve the previous fewer developments in the sector as competency demands are needed to sustain competitive markets such as capabilities and resources; resulting that students having sufficient and appropriate job market training (Azziaty *et al.,* 2017).

To sustain on this phenomenon, especially in hostile market competition, big data technology has vast potentials to improve the teaching-learning orientation in HEIs. In order to attain this, management must revert to the identification of their competitive advantages and successive structure of strategies, which have been established in the identified benefits (Nda & Tasmin, 2019). Even though higher education institutions are very different from other business organisations, their actions must also include strategic management (Asma & Rosdi, 2017). In other words, to sustain competitive advantage, HEIs need to adopt data-driven innovative strategies such as big data management to capture, recruit and retain both students and staffs, to assure or enhance its involvement and contribution in the market. In view of that the fundamental affair of HEIs is academic education, the need and use of appropriate and formalized competitive strategies to support these institutions in the division and positioning are required in the proposed target market (Oster *et al.,* 2016). Similarly, given the essential environment of HEIs in government viewpoint, the leaders of the HEIs need to upgrade strategies to sustain competitive advantage. In this context, it is crucial to find organisational theory strategies to support educational institutions in building enhanced and forward-looking strategies.

Malaysia's Vision 2020

Paragraphs are Malaysia's education sector has undergone immense transformation and improvements. The parliament implemented National Education System after the Education Act 1966 was passed. Through a collaborative syllabus and curriculum, the government was able to use education to promote nation-building (Lestari & Armayah, 2016). The National Philosophy of Education was released in 1989 and became part of the Vision 2020 of Malaysia, which was to attain the position of a developed country by 2020 (Grapragasem *et al*., 2014). Consequently, to reinforce Vision 2020 and better to make ready the newer generation for the requirements of the 21st century. In 2012, a new National Education Blueprint (NEB) was developed and launched by the Ministry of Education (MOE) Malaysia (Grapragasem *et al*., 2014). Likewise, the government reorganized the higher education structure through MOE to allow it to take action to the need for building the nation according to challenges in the Vision 2020. In addition, the government has developed initiatives and policies to ensure that Higher Education Institutions are motivated to pursue reforms and attain excellence in the face of the global education market competition (Zain *et al*., 2017).

According to Sirat (2010), the history of Malaysian higher education has progressed through four stages, which include: Education for affirmative action, Education for privileged, Education for business and Education for global competition. The MOE introduced two blueprint plans, to reposition its higher education institutions which are: The National Higher Education Action Plan (NHEAP) 2007–2010 and the National Higher Education Strategic Plan (NHESP) beyond 2020 (Sirat, 2010). The author also mentioned that there are four steps of the strategic plan, which are: Putting the foundation (2007–2010); Establishment and enhancement (2011–1015); Excellence (2016–2020) and success and sustainability (beyond 2020).

The competitive advantage of Higher Education Institutions

Competitive advantage has been introduced as HEIs are regarded on the market as service providers (Sultan & Wong, 2014). Hence, HEIs have constantly had the ecosystem of trying to sustain competitive advantage to achieve high standards academically, to reach academic excellence, and to gain reputation and status internationally (Asma, 2017). To accomplish sustainable competitive advantage, capabilities and resources should be part of HEIs. There is a higher number of items related to sustainable development in HEIs such as corporate governance and environment, students, staff, society and companies (Rose *et al.,* 2012). It was stated by Ribeiro *et al.,* (2016) that several of the principles and resources apprehended by university staff and students are values for sustainability.

The competitive advantage of Malaysian HEIs has managerial implications, particularly for public research universities. Through practising competitive advantage in the HEIs system, as internationalization has shown, unavoidably this introduces numerous consequences to the system. Malaysian higher education has moved to

internationalization and Malaysia has subsequently proven to be an international student hub (Knight & Morshidi, 2011). Internationally, Malaysian HEIs have strategized to compete and sustain competitive advantage. The dimension of acceptance from leaders, experts, tools and techniques that can be used to manage and coordinate internationalization activities at Malaysian HEIs, would help to ensure that the quality of the process to attract and retain international students in the nation.

Therefore, there is no doubt that the Malaysian public research universities will also operate in a volatile situation that is continually changing due to political, social and economic variations within the internal and external productive environments. Such changes require a renewed focus on strategy progress, execution and transparency at all levels to make the plan operational and track its effectiveness. Consequently, sustainable competitive advantage signifies a critical factor of economic growth and a key contributing element to a prosperity of a nation in which the dean or head of faculty denotes a facilitator of the basis to sustain competitive advantage; take advantage of opportunities in the environment and uses the resources effectively to optimize profits and lessen costs. HEIs is similar with the development of civilization, with the sole of the most important avenue for understanding, saving, spreading and passing on the logical, scientific, and inventive legacy from among generations (Collini, 2013). This, in effect, will ideally strengthen academics' efforts to influence a consensus on the philosophical essence of competitive advantage of the educational institutions.

Objectives of the Study

This research aims to recognize the factors that influence the intentions of adopting big data management by public research universities in Malaysia and transformational leadership (TL) role as a moderating variable influencing such intentions. Currently, big data management is seen as one of the most important developing technologies in the digital era and likewise, it has appeared to be one of the most studied and sought information technology (IT) in information system (IS) topics. However, several prior IT/IS, social science and psychological studies have limited investigation empirically on the readiness intentions particularly in the context of education sector background but are more focused toward eventual usage or adoption by organizations such as business, healthcare and engineering sectors and gaining intention of acquiring IT/IS technologies.

Furthermore, there is also limited studies that simultaneously obtains the factors that influence readiness intentions and leadership role effect to encourage into making the decision to sustain competitive advantage. Thus, this research will integrate the effects of TL theory; whether the constructs of TL will have moderating significant effects on the Unified Theory of Acceptance and Use of Technology (UTAUT) variables. Therefore, the objectives of this research aimed at addressing the following:

1. To investigate the significant impact of the UTAUT constructs toward big data management adoption readiness among Malaysian public research universities.

2. To investigate the TL as the moderating effects on the UTAUT constructs whether TL can significantly influence the intention among Malaysian public research universities to adopt BDM.

3. To generate a new integrated big data management competency model to support the Malaysian public research universities towards empowering industry 4.0.

Methodology

Before conducting the main survey, a pilot study is carried out to collect information from respondents to accomplish the itemized objectives above. The purpose of the pilot study is to confirm the reliability and validity of the instrument developed for the research. This is done to minimize errors in the questionnaire, makes the test run smoother, make response rate easier, and make available a valuable and useful questionnaire (Muijs, 2004; Fink, 2017). Similarly, Mathers *et al.,* (2009) indicated that questionnaire pilot-testing is to ensure that all relevant matters are incorporated; in the correct order; unclear or confusing statements are acknowledged, and significant issues are not absent from the questionnaire. The data were obtained using a close-ended questionnaire. The questionnaire was formulated on the basis of a 5-point Likert scale (Vagias, 2006). After which, 1 and 5 represented

strongly disagree and strongly agree, respectively, 3 representing neutral, while 2 and 4 were disagree and agree respectively (i.e. intermediate values).

The instrument was tested on sub-sample by conducting a pilot study of the study sample. The data collected was analyzed for the pilot study by use of descriptive analysis for the variables. Cronbach's Alpha coefficient is used to assess the reliability grounded on the recommendation of Pallant (2016). In addition, normality of the data is assessed using Skewness and Kurtosis as established on the suggestion of George (2016) which stated that the Skewness and Kurtosis values should be within -/+2 of range to consider the response to be normally distributed. Likewise, outliers and the missing values are observed and appropriately treated. The data structure is also assessed by using factor analysis. The multicollinearity possibility is examined by using the Variance Inflation Factor (VIF) and Tolerance level which need to be less than 10 and 1 respectively (Pallant, 2016).

The questionnaires were distributed to the respondents from the staffs of University of Malaya (UM), Universiti Putra Malaysia (UPM), Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia (UTM) and Universiti Kebangsaan Malaysia (UKM) which are the public research universities in Malaysia. The respondents chosen were staffs in charge of handling and managing institutional data of each respective university. Participants were randomly selected from the following department: The Office of the Vice-chancellor, Academic Affairs Office, Student Affairs office/Alumni office, Information Technology faculty, Strategic Management office, Legal Affairs office, Research Management Office and the Library. Accordingly, the instrument is analyzed. The result of the analysis is presented in the following sections.

Pilot Instrument Administration

Table 1 below represents how the questionnaires were distributed; the numbers returned and considered valid for analysis.

Table 1: Pilot Instrument administration

Number of:	Frequency	Per cent
Questionnaires Administered	50	100
Returned	50	100
Valid and Usable	50	100

Table 1 shows the number of questionnaires distributed to the respondents. A total of 50 questionnaires were administered to staffs of the public research universities in Malaysia, who is in charge of handling and managing institutional data of each respective university which 100 per cent were returned for the analysis due to the reason that the questionnaire was administered via email. Therefore, the response rate was excellent.

Data Descriptive, Normality, Reliability and Factorability

This subsection gives the result of the pilot study descriptive, normality, reliability and factorability according to the questionnaire constructs. These constructs are; for the independent variables are Performance Expectancy (PER), Effort Expectancy (EFF), Social Influence (SOC), Facilitating Conditions (FAC), and for the dependent variables is Behavioural Intention (BHV) with the Transformational Leadership (TL) as the moderating effect.

Independent Construct

Table 2: Pilot Result for Performance Expectancy

Code	Mean	Normality		Factor Loadings	Variance Explained	Cronbach Alpha
		Skewness	Kurtosis			
PER1	3.34	.042	-.987	.966	70.26	.877
PER2	3.68	-.948	.559	.685		
PER3	3.40	.064	-.789	.894		
PER4	3.64	-.989	.290	.611		
PER5	3.32	.030	-.928	.969		

Table 2 shows the pilot result for the Performance Expectancy construct, which produces mean values ranging from 3.32 to 3.68. The skewness and kurtosis values were all within -/+2 (George, 2016). All the variables under the construct have strong factor loadings which cumulatively explained 70.26 per cent of the variance which is considered satisfactory. The reliability of the construct was assessed using Cronbach's alpha coefficient which produced a value of 0.877 above the suggested minimum value of 0.7 (Tabachnick, 2007; George, 2016; Pallant, 2016). Therefore, this shows that the obtained result is adequate, and hence, the data is reliable and normally distributed. Thus, the instrument is considered valid for the main research survey.

Independent Construct

Table 3: Pilot Result for Effort Expectancy

Code	Mean	Normality		Factor Loadings	Variance Explained	Cronbach Alpha
		Skewness	Kurtosis			
EFF1	3.54	.340	-.268	.682	63.01	.847
EFF2	3.38	-.140	-.410	.865		
EFF3	3.50	-.244	-.893	.825		
EFF4	3.56	-.354	-.454	.681		
EFF5	3.38	.026	-.739	.890		

Table 3 depicts the pilot result for the Effort Expectancy construct, which produces mean values ranging from 3.38 to 3.56. The skewness and kurtosis values were all in the threshold of -/+2 (George, 2016). All the variables under the construct have strong factor loadings which cumulatively explained 63.01 per cent of the variance which is considered satisfactory. The reliability of the construct was measured by using Cronbach's alpha coefficient which produced a value of 0.847 above the suggested minimum threshold of 0.7 (Tabachnick, 2007; George, 2016; Pallant, 2016). Therefore, this shows that the obtained result is adequate, and hence, the data is reliable and normally distributed. Thus, the instrument is considered valid for the main research survey.

Independent Construct

Table 4: Pilot Result for Social Influence

Code	Mean	Normality		Factor Loadings	Variance Explained	Cronbach Alpha
		Skewness	Kurtosis			
SOC1	3.18	-.021	-.514	.979	68.37	.808
SOC2	3.74	-1.15	.835	.400		
SOC3	3.54	-.505	-.349	.813		
SOC4	3.20	.105	-.631	.977		

Table 4 shows the pilot result for the Social Influence construct, which produces mean values ranging from 3.18 to 3.74. The skewness and kurtosis values were all the threshold of -/+2 (George, 2016). All the variables under the construct have strong factor loadings which cumulatively explained 68.37 per cent of the variance which is considered satisfactory. The reliability of the construct was measured by using Cronbach's alpha coefficient which produced a value of 0.808 above the suggested minimum threshold of 0.7 (Tabachnick, 2007; George, 2016; Pallant, 2016). Therefore, this evinces that the obtained result is adequate, and hence, the data is reliable and normally distributed. Thus, the instrument is considered valid for the main research survey.

Independent Construct

Table 5: Pilot Result for Facilitating Conditions

Code	Mean	Normality		Factor Loadings	Variance Explained	Cronbach Alpha
		Skewness	Kurtosis			
FAC1	3.66	-1.048	.273	.682	65.33	.850
FAC2	3.92	-1.314	.768	.865		
FAC3	3.90	-1.308	.786	.825		
FAC4	2.98	-.118	-.146	.681		
FAC5	3.46	.402	-.572	.890		

Table 5 shows the pilot result for the Facilitating Condition construct, which produces mean values ranging from 3.46 to 3.92. The skewness and kurtosis values were all the threshold of -/+2 (George, 2016). All the variables under the construct have strong factor loadings which cumulatively explained 65.33 per cent of the variance which is considered satisfactory. The reliability of the construct was measured by using Cronbach's alpha coefficient which produced a value of 0.850 above the suggested minimum threshold of 0.7 (Tabachnick, 2007; George, 2016; Pallant, 2016). Therefore, this shows that the obtained result is adequate, and hence, the data is reliable and normally distributed. Thus, the instrument is considered valid for the main research survey.

Dependent Construct

Table 6: Pilot Result for Behavioral Intention

Code	Mean	Normality		Factor Loadings	Variance Explained	Cronbach Alpha
		Skewness	Kurtosis			
BHV1	3.32	.031	.114	.848	69.91	.903
BHV2	3.34	-.282	-.658	.907		
BHV3	3.40	-.196	.210	.871		
BHV4	2.56	.087	-.680	.820		
BHV5	3.84	-.983	.164	.682		
BHV6	3.72	.230	-.683	.871		

Table 6 shows the pilot result for the Behavioural Intention construct, which produces mean values ranging from 3.32 to 3.84. The skewness and kurtosis values were all the threshold of -/+2 (George, 2016). All the variables under the construct have strong factor loadings which cumulatively explained 69.91 per cent of the variance which is considered satisfactory. The reliability of the construct was measured by using Cronbach's alpha coefficient which produced a value of 0.903 above the suggested minimum threshold of 0.7 (Tabachnick, 2007; George, 2016; Pallant, 2016). Therefore, this evinces that the obtained result is adequate, and hence, the data is reliable and normally distributed. Thus, the instrument is considered valid for the main research survey.

Moderating Construct

Table 7: Pilot Result for Transformational Leadership

Code	Mean	Normality		Factor Loadings	Variance Explained	Cronbach Alpha
		Skewness	Kurtosis			
TL1	3.18	-.021	-.514	.897	83.76	.932
TL2	3.74	-1.15	.835	.964		
TL3	3.54	-.505	-.349	.818		
TL4	3.20	.105	-.631	.973		

Table 7 shows the pilot result for the Transformational Leadership construct, which produces mean values ranging from 3.18 to 3.74. The skewness and kurtosis values were all the threshold of -/+2 (George & Mallery, 2010). All the variables under the construct have strong factor loadings which cumulatively explained 83.76 per cent of the variance which is considered satisfactory. The reliability of the construct was measured by using Cronbach's alpha coefficient which produced a value of 0.932 above the suggested minimum threshold of 0.7 (Tabachnick, 2007; George, 2016; Pallant, 2016). Therefore, this shows that the obtained result is adequate, and hence, the data is reliable and normally distributed. Thus, the instrument is considered valid for the main research survey.

Descriptive of the Aggregate Constructs

Table 8: Descriptive of the Aggregate Constructs

	Mean Statistics	Standard Deviation Statistics	Skewness		Kurtosis	
			Statistics	Std. Error	Statistics	Std. Error
PER	3.47	.882	.191	.337	-.894	.662
EFF	3.47	.748	-.126	.337	-.266	.662
SOC	3.41	.815	.265	.337	-.583	.662
FAC	2.58	.975	-.885	.337	.237	.662
TL	3.61	.943	-.845	.337	.004	.662
BHV	3.53	.805	.382	.337	-.968	.662

Table 8 depicts the descriptive of all the constructs used in the questionnaire. The result produced mean values ranging from 3.41 to 3. 61 with low dispersion as indicated by standard deviation values of less than 1. The skewness and kurtosis values are all with the recommended threshold of -/+2 (George, 2016). This shows that all the constructs of the study are normally distributed. Generally, it could be concluded that the scales are reliable and could be used to measure what they were proposed to measure.

Conclusion

This research sought to investigate higher education universities readiness for big data management. Institutional readiness is a significant state of affairs, as it governs the optimal operation of technology. Results of this pilot study have indicated that the reliability analysis showed that all the scales were significantly accurate, leading to the conclusion that the questionnaire can be applied into the main survey to collect information from the larger sample of the targeted population.

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Digital Transformation of The Russian Economy: Incentives and Barriers

Natalya N. MASYUK

Vladivostok State University of Economics and Service, Vladivostok, Russia
masyukn@gmail.com
orcid.org/0000-0001-8055-8597/ E-3887-2016

Tatyana P. FILICHEVA

Vladivostok State University of Economics and Service, Vladivostok, Russia
Tatyana.Filicheva@vvsu.ru

Abstract

Today, digital transformation is one of the main drivers of economic growth. Businesses that can embrace flexible work models and adapt to change have more room for growth than ever. Russian companies have a unique chance to realize their potential in the course of the digital revolution and take their rightful place among the key players in the global market. Despite the presence of objective constraints, companies are transforming, and the state is developing new support mechanisms. The article discusses the main factors stimulating the introduction of digital technologies into the practice of Russian enterprises, as well as the barriers hindering the development of digitalization in Russia.

Keywords: Digital Technologies, Digitalization, Incentives, Barriers.

Introduction

Digitalization is the most significant innovation in a globalized economy (Rogers 2003; Schot, and Geels 2008). Most organizations believe that by 2022, on average, half of their revenues will be generated in digital channels (Kulagin, Sukharevski, and Meffert 2019). Further, according to the estimates of the World Economic Forum, by 2025 the total economic effect of digital transformation in relation to business and society will exceed 100 trillion US dollars (Zhuravlev 2019). Three waves of digital transformation – significant influence on gross value added as an opportunity and a threat for industry: a) automotive logistics; b)
mechanical & plant engineering, electrical engineering, medical technology & energy systems; c) chemicals aerospace (The Digital Transformation of Industry 2020).

In 2016, the founder and permanent chairman of the World Economic Forum, Klaus Schwab, wrote that we are on the verge of the Fourth Industrial Revolution (Industry 4.0), which will link the biological, physical, and digital worlds together, affecting all aspects of human life and activities. Now we can say that we have already entered this era: technologies that appeared several years ago are rapidly developing and becoming more complex. This includes, for example, 3D printing, blockchain, and machine learning (Schwab 2016).

Digitalization is actively penetrating all sectors of the economy, as a result, a digital regulatory environment is gradually being created (Masyuk, Bushueva, Bragina 2019). But some of the most notable changes are now taking place in industry (Skrug 2018). As a result, the term Industry 4.0 appeared (in a broad sense), which means a new level of development of automation of production and logistics networks (Digital economy: problems and consequences of modern technologies 2019). Industry 4.0 implies fully automated production, controlled by intelligent systems in real-time and in constant interaction with the external environment, not limited by the framework of one enterprise (Zemnukhova 2018).

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It should be noted that the introduction of digital technologies in any enterprise is almost always accompanied by conflict, the resolution of which is one of the main tasks in the implementation of digitalization (Masyuk, Bushueva, Vasyukova, and Mosolova 2018). In real life, no matter what sphere of the economy we take, the adoption of a managerial decision for the absolute resolution of conflicts is impossible, the most acceptable is the adoption of a quasi-optimal managerial decision based on local compromises (trade-offs). Examples of such solutions are given in a number of works (Bushueva, Korovin, and Masyuk 2013a, b; Masyuk, Vasyukova, Bushueva, Mosolova and Kozminykh 2016; Zhang, Stafford, Dhaliwal, Gillenson and Moeller 2014). The digital revolution entered a decisive phase in 2017 - every second inhabitant of the Earth connected to the Internet. According to the McKinsey Global Institute (MGI), in the next 20 years, up to 50% of production operations in the world can be automated, and in scale, this process will be comparable to the industrial revolution of the 18th and 19th centuries. (Hyysalo, Jensen and Oudshoorn 2016; Schwab 2016).

The Industrial Digital Agenda Initiative within the Eurasian Economic Union (EEU) was made possible by the implementation of similar initiatives in various states of the world, integration associations, in particular in the European Union, as well as in large transnational companies. Digital strategies were approved in the European Union - "Digital Europe 2020" (2010), Germany - "Industry 4.0." (2011), China - Internet Plus (2015). The autonomous non-profit organization "Institute for the Development of the Internet" (Russia), as part of the development of the "Strategy for the development of the Russian segment of the information and communication network of the Internet and related sectors of the economy" (2015) refers to 15 approved programs in the field of digital economy and development of the Internet economy in various countries (including the European Union, Germany, China, Japan, Brazil, USA, Great Britain, Estonia, Holland, Ireland, Sweden, Singapore, Philippines, Malaysia). Also the largest industrial and industrial companies in the world implement development strategies in the concept "Industry 4.0", "Internet +" (for example, Siemens, General Electric, SAP, Intel). In March 2015, international management consulting firm Roland Berger (The only leading consulting company of European origin 2018) published a report titled "Digital Transformation of Industry" 8 9, which indicated what digitalization of industry can bring Europe an additional 1.25 trillion euros in gross value added, or a loss of 605 billion euros.

In general, digital transformation is a significant restructuring of the business model of an organization using new digital technologies (Zhuravlev 2019). It leads to a fundamental rethinking of the current structure and a change in all processes, allows you to create new formats in working with partners, for example, consortia, as well as to adapt products and services to the needs of a particular client. The result should be the achievement of key results of economic efficiency by companies, optimization of business costs, and improvement of the quality of the service provided or the product produced.

Method and Methodology

The main research method was the method of a systematic review of the activities of Russian enterprises, which makes it possible to determine the factors stimulating the introduction of digital technologies, as well as to identify the barriers arising in the way of this development in the Russian economy at the regional level.

Results

Industrial companies are the foundation of the Russian economy. The rapid start of mastering modern Industry 4.0 technologies, such as the Industrial Internet of Things, 3D printing, virtual reality, touch interfaces and the widespread use of new generation robots, will allow industrial companies to take advantage of the development of these areas "from scratch" and take the lead.

The active position of the state further spurs on the digitalization of all players in the national economy. The issues of using digital technologies in public administration are discussed in their works by many authors (Scholl, 2002; Stoker, 2006; Janssen, and Joha, 2006; Bharosa et al, 2012,2013; Stegmaier, Kuhlmann, and Visser, 2014; Garnov, Topchiy, and Kosheleva 2017) and etc. It should be noted that robots are also an integral part of digital transformation (Robot density rises globally World Robotics Industrial Robot 2018).

Russia has implemented the largest projects in the field of digitalization of public services, which are among the best in the world (Garnov, Garnova 2016). Successful projects include the federal portal of the State Service,

digitalization of the Federal Tax Service, as well as projects of the Moscow Government: “My Documents”, “Parking lots”, “My Polyclinic”, and others.

In 2018, the Government of the Russian Federation launched national projects, one of which was the Digital Economy project, which includes a number of measures of state support for projects aimed at the formation and implementation of end-to-end digital technologies. Within the framework of the national project until 2024, in particular, it is planned to launch an electronic passport of the Russian Federation, a unified state cloud platform and infrastructure "Digital Profile" for the exchange of information between the state, citizens, and organizations; connect 97% of households to broadband Internet access, launch 5G communication networks, and 85% switch to domestic software in government organizations. The state plans to increase the cost of developing the digital economy in GDP by 3 times.

In Russia, it was possible to create large digital companies almost from scratch, and some of them achieved international fame. This is Tinkoff Bank - the world's largest online bank that does not have physical branches at all, digital portals and ecosystems of Yandex and Mail.ru services, the manufacturer of marine training complexes and electronic navigation systems Transas, the Avito electronic advertisement platform, the developer of digital solutions to ensure the security of "Kaspersky Lab" and many others. Digitalization also opens up great opportunities for traditional market players who are not digital companies by nature. “Severstal”, for example, being the largest player in the metallurgical sector, puts digitalization and the use of big data among its strategic priorities to achieve sustainable competitive advantage in the industry.

In developed countries, manufacturing companies have a high level of implementation of modern digital technologies, in this, they are still ahead of domestic companies. One of the reasons is the lack of a clear strategic vision of digital transformation and change management mechanisms in a number of Russian enterprises. You can also note the low level of automation of production processes and administrative functions (finance and accounting, procurement, personnel). For example, in 40% of companies, the processes are not automated.

However, this is also an incentive for a significant increase in indicators. According to an expert survey, Russian manufacturing companies are showing high interest in the topic of digital transformation. Thus, 96% of companies in the next 3-5 years plan to change the current business model as a result of the introduction of digital technologies, a third of companies have already launched organizational changes, almost 20% are already implementing pilot projects. For example, “KamAZ” has already launched a digital transformation program, which provides for a digital and continuous chain of processes, from the development stage to the after-sales service stage under life cycle contracts. This makes it possible to produce new models of premium-class trucks, which are not inferior in characteristics to products of foreign competitors.

“Sibur” implements the concept of a “digital plant”, which provides for the digitalization of production and logistics processes. The company implements advanced analytics for predictive maintenance of equipment, digital twins in railway logistics to optimize the transportation process, as well as machine vision systems and unmanned aerial vehicles for monitoring production and conducting technical inspections. Ultimately, this will allow the company to reduce costs and reduce industrial safety risks.

As part of the transition from a traditional postal operator to a postal and logistics company with IT competencies, the “Russian Post” has already launched its own digital big data analysis platform for fleet management. Moreover, the company develops an ecosystem of services in the e-commerce market: from the automation of sorting centers to financial and courier services that make life easier for customers. Other large corporations also have successful digital transformation projects, for example, “Russian Railways”, “Rosatom”, “Rosseti”, “Gazprom Neft”, etc.

The massive transition to remote work due to the spread of coronavirus infection can also become an impetus for the more active digitalization of Russian companies. The ability to maintain uninterrupted and high-quality support of key business processes in the digital environment turns into a competitive advantage. Network interactions become especially relevant in such a situation (Katz, and Shapiro 1985; Zhang, Hu, Dai, and Li 2010). The so-called mobile assistants are becoming increasingly important (Reeves 2017; Klowait 2017; Lomas 2018; Moore, and Arar 2018; Guzman 2019 etc).

Leaders of Russian companies consider the lack of technological competencies, lack of knowledge about technologies and suppliers, and lack of financial resources as the main constraints to digital transformation. Despite this, some companies are already successfully overcoming existing barriers: experimenting with new digital technologies to improve the efficiency of current business models, collecting significant amounts of data necessary for deploying digital services, initiating organizational changes, including the creation of specialized divisions within companies to raise the level of corporate technological competencies, as well as, together with specialized scientific and educational institutions, they launch practice-oriented programs for training (Berezin 2019).

The Analytical Center under the Government of the Russian Federation (hereinafter referred to as the Analytical Center) conducted a survey of the regional executive authorities (hereinafter referred to as the ROIV) of the Russian Federation. Questions were asked about the problems in the regions in the implementation of projects for the development and implementation of digital technologies and the development of the digital economy in general. The survey was conducted in August - September 2019 (Barriers to the development of the digital economy in the constituent entities of the Russian Federation 2019).

Information was requested on the following groups of barriers:

- regulatory barriers
- administrative and managerial barriers
- financial barriers,
- the level of development of information infrastructure,
- training of personnel for the digital economy,
- barriers in the development of projects in the field of "end-to-end" digital technologies,
- information barriers,
- additional barriers (other).

As part of the survey, responses were received from 70 constituent entities of the Russian Federation, of which 3 constituent entities indicated that there are no barriers to the development of the digital economy at the regional level *. The key barriers to the digitalization of the economy at the regional level of the ROEI include difficulties in training competent personnel in the digital economy (18.8% of responses about barriers out of the total number of barriers indicated by the ROEI), barriers in the field of legal regulation (17.3%) and difficulties in financial support of the regional budgets (16.9%). In addition, the ROIV indicated the presence of administrative and managerial barriers (16.0%), difficulties in the development of information infrastructure (13.9%), the presence of information asymmetry (11.1%), and barriers to the implementation of projects based on "end-to-end" digital technologies (6.0%) (Table 1).

Table 1: Key barriers to the implementation of the digital economy in Russian regions

Barrier name	%
Difficulties in training competent personnel in the digital economy	18.8%
Barriers in the field of legal regulation	17.3%
Difficulties in financial support of the regional budgets	16.9%
Administrative and managerial barriers	16.0%
Difficulties in the development of information infrastructure	13.9%
The presence of information asymmetry	11.1%
Barriers to the implementing projects based on end-to-end digital technologies	3.1%
Other	2.9%

Discussion

When introducing digital technologies, it is important to take into account high-quality planning of business needs and assess the effects of implemented solutions in the process of the digital transformation of the company, as well as ensure a high speed of project implementation, which is a determining factor in a competitive market. By the way, in foreign practice, the key factors for the success of digital transformation were the focus on changing the

business model, the creation of a competence center under the leadership of the CDTO (digital transformation manager), and the stimulation of complex transformations in key business units.

Russian manufacturing companies expect from the state, first of all, support for the implementation of technological solutions, as well as the formation of specialized educational programs and the development of an innovation ecosystem and technological entrepreneurship. Therefore, the task of the state is to create a basis for providing support in the development of digital technologies and their comprehensive implementation in the real sector of the economy.

Conclusion

Digital transformation is changing the face of the economy and is the basis for high rates of economic growth. Now Russia is noticeably lagging behind many developed countries in terms of the pace of digital transformation of the industry. At the same time, Russia has excellent opportunities to become a leader, relying on the existing technological and intellectual potential. As expected, Russian companies focus primarily on the digitalization of business processes and data-driven management, as well as customer experience management. These directions are basic for transformation and directly affect the main operating activities of the organization. Areas that remain underestimated make an important contribution in the long term in innovation potential and competitiveness companies - human capital development and competencies (digital culture) and create their own new products (R&D). Digital transformation involves the transition of an organization into a new state of permanent changes. To bring these changes to life a trained team and digital culture. In addition, many employees commented that insufficient attention to the development of competencies increases stress levels and decreases efficiency transformations. Many organizations are already planning their budgets for 2019 today, and it is high time for them to focus on funding key aspects of driving digital transformation initiatives. To move forward successfully, digital leaders must share lessons learned and actively learn from their peers. An era is opening before us, filled with gigantic opportunities and tremendous challenges, but requiring the unification of our knowledge. Hopefully, by 2025, we can significantly advance our digital change, transformation, and modernization initiatives. It can be concluded that one of the main reasons for the lag is the lack of investment resources; a regulatory framework that does not meet modern requirements; Digital divide; lack of qualified personnel, etc. We are confident that the measures implemented by the state will help increase the interest and involvement of business and society in digital transformation processes and will allow them to quickly adapt to modern requirements in the Russian and global markets.

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Investigation the Change of The Quantitative Scope of Telecommuting and Influence on Job Satisfaction Under Corona Pandemic

Katja ZOELLNER

Faculty of Management, Comenius University in Bratislava, Slovakia
zollner1@fm.uniba.sk

Rozalia SULIKOVA

Faculty of Management, Comenius University in Bratislava, Slovakia
rozalia.sulikova@fm.uniba.sk

Abstract

The Corona Pandemic 2020 is changing life conditions, industry, commerce, job market and working conditions continually and permanently. It triggered a surge in digitalization and the proportion and frequency of home office in companies. Teleworking has had positive effects for companies and workers in the last years before the Corona Pandemic. By reducing the risk of infection from viral infections, teleworking currently gains also momentum to save jobs and companies. The research question focuses in the first step on the changing scope of teleworking and its influence on job satisfaction, which is subject of this article. Further it is aimed to analyze a possible scope of teleworking, which can reduce the job satisfaction of workers and could be implemented as a guideline for HR manager. The research fundamentally bases on an extensive literature review by using various databases, Web of Science, SpringerLink, SCOPUS, Research Gate, Google Scholar, Bitkom Research, Google Search, Wiley Online Library and others. 34 studies employing quantitative, qualitative and mixed-method designs have been included in the review. The method of qualitative content analysis as outlined by Mayring has been used to analyse the literature and interpret the findings. Elaboration of theoretical basics targeted on the topic is required for achieving the goal. The growth of teleworking frequency and influence on job satisfaction is represented. Telework indicates positive effects on job satisfaction, including some negative aspects targeted social and professional isolation, and perceived threats in professional advancement. This review may be a complementary support for academics and practioners.

Keywords: Corona Pandemic, Teleworking, Job Satisfaction, Company

Introduction

Office work turned from single office into community office in the USA in 1960. Nearby work-places give workers only little privacy. Developing cubicles improved this problem in 1964. Open-plan offices established in the USA in 1970 and disseminate to Europe. A countertrend to larger offices realized in the turn of the millennium in the course of digitization while home office became popular (Segelkern, 1994). Before the Corona Pandemic the scope of home-office use was increasing steadily (Statista, 2019). Today the affinity to home office is rapidly raising because of the Corona Pandemic, which is worldwide a challenge for everyone's health and for companies' and workers' existence since the beginning of the 20th century under the Spanish Influenza Pandemic at the end of the first world war. Home-office under the Pandemic implies at least for many companies an emergency program to let companies survive. Actually, the Pandemic couldn't be foreseen and came unexpected. Companies had to react rapidly and bankruptcies could not be prevented. According Statista (2020a) a prognosis by Euler Hermes SA Paris for 2021 compared to 2019 the USA will present 57% more bankruptcies and Germany 12%. Companies ratio of teleworking continuously has raised the last years continuously and

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the last months rapidly. While state required regulations have been entailed in order to dam the virus, the digitization paired with teleworking has keeping workers on job and companies on market. Home office has become an immediate integral and essential part of the working world in contrast to the last years. Three components of teleworking can be distinguished. Teleworking, called as home office, the worker's workplace is his home. Alternating teleworking is characterized as a partial time home office mixed with coordinated working time at office at the company headquarters. Mobile teleworking consists of varying workplaces, mainly utilized by representatives and account managers (Sonntag, 1997). The Federal Ministry for Agriculture, Regions and Tourism (2018) carried out that teleworking produce more work quality like attractiveness of the employer and productivity of the employee proven by better concentration, less distraction, less driving times to the office and thus time savings for getting work done. Assessments of higher efficiency of the meeting results through better coordination and cooperation, enabling more personal responsibility and optimizing the work-life balance were also cleared out. Teleworkers save climate-damaging CO_2 by reducing car traffic and contributes to environmental and climate protection. For cashiers and mechanics on the assembly line working from home is not suitable, however conception, controlling, customer care, editorial staff, personnel planning, appraisal and programming tasks, accounting, documentation is suitable to arrange as a home office work. Requirements for home office user are self-reliance, reliability, tech-savvy, equipment at home, voluntariness, being teamwork. Considering the demographic change the last five years home office adapted to companies' and workers' needs representing a possible work structure for worker who do not find an accommodation in the cities. Home office could be an emphasizing possibility to revive the rural areas. According European Parliament Brussels (2019) significant demographic contrasts can be observed between the core and the periphery in the EU and EU Member States. Population growth has been determined in eastern Ireland, the southern part of the United Kingdom, Belgium, Netherlands, Austria. Parts of western Germany, northern Italy and Scandinavia have benefited from population growth. Trends show an increasing concentration of population in certain urban areas and a depopulation of some rural areas. About 3.1 million first residence permits were issued to non-EU citizens in the EU in 2017. One out of five first residence permits were issued in Poland mainly due to migration from Ukraine, followed by Germany with 17%, the United Kingdom 16%, France 8%, Spain 7%, Italy 6% and Sweden 4%. The fastest expanding populations in 2016 were often concentrated in eastern Ireland, western Germany and southern Sweden. Most of the teleworking studies focuses on employees in general and do not differentiate between managers, employers and employees. A survey of workers conducted by the German health insurance DAK from April to May 2020 resumed the impact of home office from worker's point of view (Bodanowitz, 2020). An actual survey of the University Heinrich Heine in Düsseldorf Germany collected data from test persons who were asked to provide assessments of the work situation before Corona and to answer questions about their current situation in the home office during the Corona Pandemic and differentiate between managers and employees. Kempf (2015), scientist of Bitkom Research, particularly interviewed 1500 managing directors and HR managers from companies with 3 or more employees from all industries in 2015. The survey is representative of the overall economy in Germany. The results show significant positive effects of teleworking and give recommendations for adjustments and improvements related to teleworking structure within companies. An expansion modul of teleworking and a counterforce against overpopulation in cities is represented by co-working. Established in the USA, Silicon Valley, in 2005, a worldwide movement related to work in rented offices was initialized by freelancers and micro-enterprises in order to escape partial from latent home office, which isolated them from colleagues and chiefs. While co-working workers join a community, established companies were interested in this new form of office work. Employees of different companies are able to work in these offices. There they work for their own project, can exchange ideas and knowledge with each other and can profit from each other. In 2015 half a million users and 2017 already more than one million users are counted in co-working spaces (Weibel and Sapegina, 2018). The existing research on teleworking is extensive and detailed towards applied questionnaires. It remains to be examined if there is a scope of teleworking within long term teleworkers existent, which signalized a threshold over which an amount of teleworking has a negative influence on the job satisfaction and respectively productivity.

Relationship between teleworking and job satisfaction

Locke (1976) defined job satisfaction as "a pleasurable or positive emotional state'' resulting from the appraisal of one's job or job experiences. Various and mixed researches with conclusions are performed. Telecommuting has as well positive as well negative effects on job satisfaction (Bailey and Kurland, 2002). Some researchers found curve linear effects (Guimaraes and Dallow, 1999) and some inverted U shape linearity effects of the relationship (Golden and Veiga, 2005).

It implicates that up to a threshold of telework hours the job satisfaction decreases, which can be a guideline for managers and employees themselves. Figure 1 primarily indicates the coherences between the telecommuting intensity and individual outcomes. According to the researches of Gajendran and Harrison (2007), Charalampous et al. (2019) and Golden and Veiga (2005) an increase of telecommuting intensity in an adequate range could result in a growth of individual outcomes, like job satisfaction, performance and perceived carrier prospects. If the telecommuting intensity is not adequate, it tends to cause role stress or turnover intention. Secondarily, the quality and quantity of psychological mediators for instance perceived autonomy, relationship quality and work family conflict, better explained like work family relationship, are able to trigger the individual outcomes in an attenuated or strengthened mode. Figure 1 demonstrates the relation between telecommuting intensity, psychological mediators and individual outcomes. The theoretical relationship of sections guides as framework of the meta-analysis of Gajendran and Harrison (2007). Therefore they applied conceptual support for role of perceived autonomy, work–family conflict and relationship quality, from models developed by Allen, Shore and Griffeth (2003) and Feldman and Gainey (1997). The individual outcomes of telecommuting also derived from previous treatments of the consequences of telecommuting (Shamir and Salomon, 1985). Circles with their intersections describes figuratively that each condition enters the other, like action and reaction. The circles, respectively their contents, can affect the other in an individual way, considering employees or telecommuters with an individual constitution and environment. For instance, negative effects related to individual outcomes or psychological mediators could require a decrease in telecommuting intensity, and vice versa.

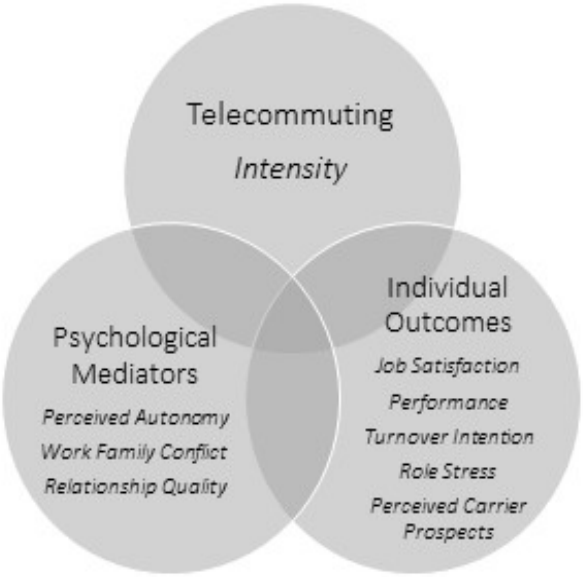

Figure 1: Telecommuting and its affection on workers' well-being

Source: own depiction of Gajendran and Harrison (2007)

Methods

This research intends to answer the following research question: Is there a change in the quantitative scope and quality of teleworking and influence on job satisfaction under Corona Pandemic? To answer the proposed research question an extensive literature review and a qualitative literature analysis was performed. For this purpose, the following databases/library catalogues were used for literature searches: Springer Link, SCOPUS, Research Gate, Google Scholar, Google Search, Wiley Online Library, Forbes, JSTOR, Harvard Business Review. The following search terms were used as part of a targeted literature search: 'Telecommuting scope before Corona Pandemic', 'Telecommuting scope under

Corona Pandemic', 'Telecommuting and its impact on job satisfaction before Corona Pandemic', 'Telecommuting and its impact on job satisfaction under Corona Pandemic'. Quantitative and qualitative data from scientific studies with cross-sectional, meta-analysis and longitudinal character were collected and analysed. The main profession of analysing field is Human Resource Management. Data included descriptive statistics and were deductively analysed. Thereby tables, graphics and charts with nominal, ordinal and metric data of interviews and surveys are collected and analysed. All analysed research papers included in sum 699529 employees and managers from age 20 to 65 as probands. Elaboration of theoretical basics targeted on selected problems required for achieving the goals. The literature research identified in total and worldwide 17000 researches before the Corona Pandemic and 703 within the Corona Pandemic. 70 elaborated potential sources and 34 relevant sources between 1991-2020 attached as references. Researches were also searched through reference lists of existing articles. Some of those works lacked data. They were often instructional advice on setting up remote work arrangements rather than empirical data outcomes. All sources that corresponded to the generally valid scientific requirement for the level of detail and quality of the elaboration were classified as relevant. Relevant data were collected, categorized, and analysed. In the process, the literature has been coded with the MAXQDA software (Kuckartz, 2020). For this purpose, one main code, reflecting the ''Corona effect'', leads to two ''1. level subcodes'', represented by the upper terms of bankruptcies and teleworking. Five ''2. level-subcodes'' are contributed by the topic field ''telework'', from which six ''3. level-subcodes'' were defined inductively and deductively. The present literature was encoded according to the method of structured content analysis. Thereby passages were encoded in 684 codings and subsequently analyzed in relation to the research questions. Synthesizing all data, lead to the following results and conclusion. Frequent individual research reflected similar results and could lead to an inductive relation leading to possible recommendations. Figure 2 shows the sequences of the process within the structured content analysis related to the research question. The text work consisted of text review, while the categories of the topic related to the analyzing field were formed. Relevant sources were analyzed and classified into these categories by elaborating relation to each other. For an overview of the Structured Content Analysis approach, see Figure 2.

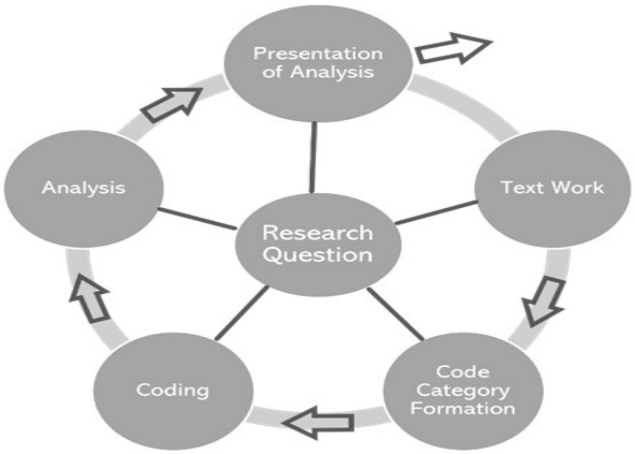

Figure 2: Procedure Structured Content Analysis

Source: own depiction of Kuckartz (2019)

For an overview of the created codes and subcodes, as well as their hierarchy, see Figure 3.

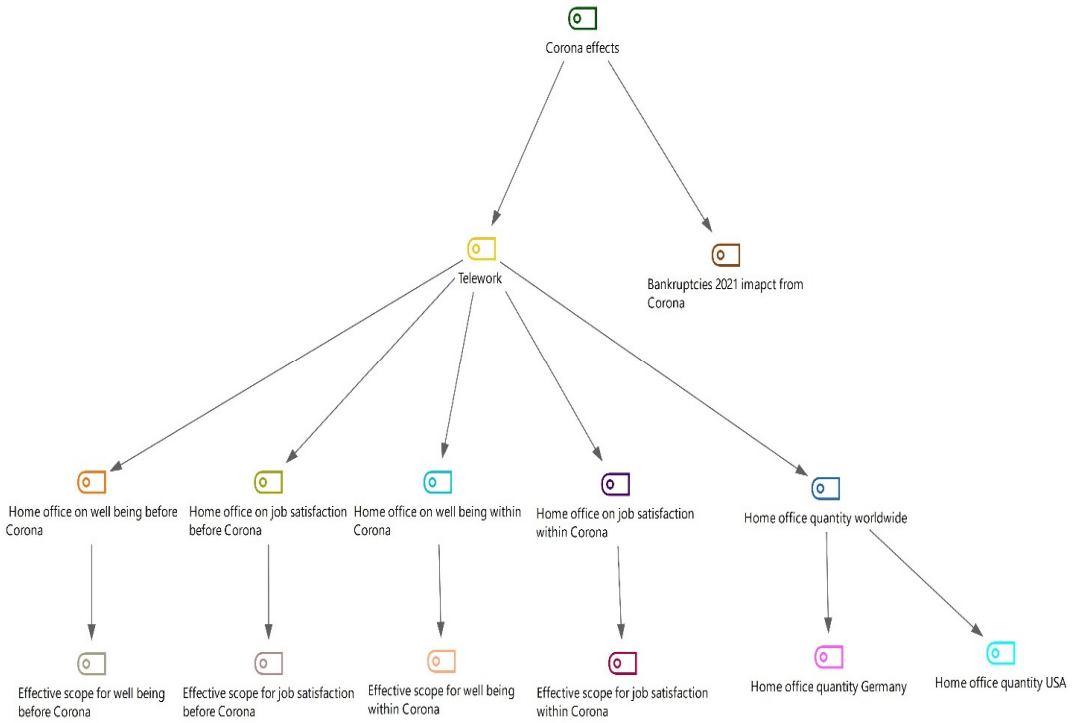

Figure 3: Hierarchical code-subcodes model

Source: own depiction of Kuckartz (2020) MAXQDA

Results

The results originated by a structured synthesis of all included studies. The final sample is made up of 34 studies involving 699529 probands from single studies and included two meta-analyzes. Three of total researches analyzes teleworking and its influence only on one dimension, i.e. job satisfaction. All other investigations used more than one dimension affecting working individuals' wellbeing i.e. categorized in affective, cognitive, social, professional, and psychosomatic modi. There was an international representation of countries, like the USA, Austria, Germany, Swiss and Belgium, where studies were conducted. Considering table 1, as a cutout of tabular overview specifying researcher, topic, research field with their analytical parameters, proband-sample-size and publish date, it becomes clear that the authors use various data-pools and have analyzed various dimensions with different variables and conditions in relation to teleworking within different times, respectively years. It became clear that until the COVID-19 crisis the share of remote workers shows inconsistent results. According Statista (2020b), based on survey with 800 interviewed German HR managers conducted by the Ifo-Institute, in the second quarter of 2020, it was stated that around 40 % of the workforce in companies managed from home in their permanent home office before the Corona crisis. As a result of the Pandemic, this distribution has increased by around 20 percentage points to around 60 %. Contrasting to Ifo-Institute, results of the Fraunhofer IAO survey (Hofmann, Piele and Piele, 2020) from May 4, 2020 to May 24, 2020, with almost 500 companies from various industries and sizes includes 78 % belonged to the private sector and 22 % to the public sector. Companies with more than 1000 employees had with 50 % by far the largest share probands of total. 54 % of the respondents resumed that there were only few employees who could use the home office before the Corona crisis. 17% of them totally uses teleworking. The possible degree of use was largely 1 day per week home office or less. Before the Coronavirus Crisis, around 20 % of the workers had the opportunity to work from home for more than 10 days per month. In time of Corona Pandemic 70 % of the respondents stated that their office workers almost completely or mostly work in the home office, 21 % follows the model of a 50:50. The Mannheim Corona Study leaded by Blom et al. (2020) revealed more differentiated, that before the Coronavirus Crisis

almost 20% of employees in Germany occasionally or often worked from home. A further 35.4% of employees wanted to use home office, but could not do so, 13.5% did not want to work from home and 31.7% said that working from home is fundamentally not possible in their job. Respondents who worked at home in January 2020 had the largest proportion of home office during the Corona Pandemic, as expected. In March 2020, almost 70% of them worked from home. But in contrast, the majority of respondents who expressed a desire to work from home in January 2020 work exclusively at workplace. 57% of them work at workplace in March 2020, 61% exclusively at workplace and 17% partly at workplace and partly in the home office in June 2020. The respondents who do not want to work from home are also the group that most frequently continue to work exclusively at workplace. In July 2020, more than 70% of this group was again working exclusively at workplace and almost 10% partly at workplace and partly in the home office. The data could suggest that even during the contact restrictions due to the Corona Pandemic, it is easier to realize a preference for working at workplace than the desire to work from home. The group who fundamentally excluded home office for their work in January 2020, only around 7% still work from home during the Corona contact restrictions. This proportion decreases very significantly below 1%. At the end of March 25% of employees worked completely or predominantly in the home office, in May only 7% are now exclusively in the home office, 22% work partly at home and partly at workplace. There is strong social inequality when using home office by considering in the first few weeks at the time of the lockdown, 60% of those with high school diplomas were working from home, but only 15% of those with middle school diploma. Over 50% of the employees in Germany work at workplace at their previous place of work. 25% of employees work in the home office, including significantly more people with high educational qualifications and good earnings. Short time working and job loss particularly affect people with low incomes and jobs in the hospitality industry and in the arts and culture. The risks of the Corona Pandemic are unevenly distributed. Lower income groups are likely to be at greater risk of infection with the Coronavirus due to their work at workplace, while at the same time they are affected earlier by the negative economic effects of the Corona Pandemic. The proportion of the population who was employed in January 2020, at the end of April 1,5% are unemployed, 2,5% released without wages, 3,8% released with wages and 13,1% in short time work. Work at workplace in the previous scope measured with 58,9%, exclusively in the home office in the previous scope 5.0%, works partly at workplace and partly in the home office measured by 23.1% in June. A survey of workers conducted by the health insurance DAK compared a sample over 7000 probands from December 2019 and of this sample 6000 took part in the second survey in April 2020. 59 % of employees who regular work from home for the first time said that they work more productively than in their normal workplace. 75% of the respondents are critical because of the diminished direct contact with colleagues. 48 % miss contact to their boss and 41% miss access to files. A survey by the Federal Ministry for Agriculture, Regions and Tourism (2020) on the topic 'Work-life balance through home office carried out among employees in Austria' in July 2020, a total of 43% of respondents were of the opinion that the ability to work from home makes it easier to combine family and work. It can be stated that the Coronavirus Crisis triggered a quantitative increase of telework in the range of 20% to 50% dependent on the survey structure, like selection in numerous and type of probands and branch. Qualitative aspects were also detected and measured quantitatively. Worth mentioned are the findings of strong social inequality when using home office (Blom et al., 2020).

Home office work and job satisfaction before Corona Pandemic

Findings of Schall (2019) to the relationship between remote work and job satisfaction cleared out an existing positive correlation before the Corona Pandemic. An inverted u-shaped curvilinear relationship between the extent of telecommuting intensity and job satisfaction was not found and instead support for a positive, linear relationship. This current research signalizes that a teleworking intensity with no more than 13,7 hours per week indicates a positive relation between teleworking and job satisfaction, but not curve linear. This small sample of 185 surveyed participants did not really use teleworking more than 18 hours per week and to this conditions the author defined a positive relation of teleworking and job satisfaction. The quadratic form of teleworking intensity was entered in order to establish whether an inverted u-shaped curvilinear relationship existed between telecommuting intensity and job satisfaction. There was not found a clear threshold up to that job satisfaction decreases. The confirmation was stated by theoretical statistics and not by collecting real participant data. The major implication of the findings is that increasing remote work in the workplace may be an efficient way to increase employees' job satisfaction levels. According to Schall (2019) remote work influences employees to have higher perceived autonomy, less work-family conflict and more telecommuting intensity, which in turn influences their job satisfaction. Compared to previous measurements especially according the Gallup Study Report (Clifton, 2017), the overall trend, engagement increases between the intervals of those who do not work remotely and

those who work remotely less than 40% of the time. Golden and Veiga (2005) cleared out that 15,1 hours per week let decrease job satisfaction. Instead lower intensities increase job satisfaction.

Home office work and job satisfaction within Corona Pandemic

According researches of Beart et al. (2020) teleworking under Corona Pandemic produces many positive characteristics, like increased efficiency and better work-life balance. 65.7% of 14005 probands indicate that their overall satisfaction with their job increases with telework. 64.6% think that telework improves their work-life balance. According 48.4% of the employees' telework helps to decrease work-related stress and 47.6% of the probands assert that teleworking reduces the chance of burnout. Performance was also positively influenced. 56,3% of the participants affirm that telework improves their efficiency in performing tasks and 50,7% of participants confirmed that telework increases their work concentration. These positive effects of teleworking on job satisfaction, work-life balance, role stress, burnout and performance are in line with the findings of previous studies (Charalampous et al., 2019; Golden and Veiga, 2005). Based on the findings of the OECD report (OECD, 2020) telework can improve firm performance by raising worker satisfaction and thus worker efficiency. Better work-life balance, less commuting or fewer distractions leading to more focused work or less absenteeism. In contrast to the positive effects, worker satisfaction decreases with telework, only, due to solitude, hidden overtime and a fusing of private and work life, or an inappropriate working environment at home. In sum telework can improve or hamper firm performance, with its effects depending on two polluter principles. Companies should notice that direct affection of firm performance could cause by changing the efficiency, motivation and knowledge creation of the workforce and indirectly by facilitating cost reductions that free up resources for productivity enhancing innovation and reorganization. Table 1 gives an overview about more comprehensive researches with experimental character by using a high contingent of probands, e.g. employees. Researches related to telecommuting and its influence on job satisfaction before and after Corona Pandemic are analyzed and collected.

Table 1: Overview of more comprehensive researches, Part 1/4

Researcher	Country	Topic	Publish Date	Type of Research/ Parameter	Proband Number and Job Position
Guimaraes and Dallow	USA	Empirically testing the benefits, problems, and success factors for telecommuting programmes	03/1999	cross-sectional/ telecommuting dependent benefits, problems, and success factors	316 employees from 18 companies various position

Table 1: Overview of more comprehensive researches, Part 2/4

Researcher	Country	Topic	Publish Date	Type of Research/ Parameter	Proband Number and Job Position
Bailey and Kurland	USA	A review of telework research: findings, new directions, and lessons for the study of modern work	06/2002	meta-analysis/ who participates in telework, why they do, and what happens when they do? motivation, willingness, outcomes job satisfaction productivity	6745 employees various position
Mann and Holdsworth	UK	The psychological impact of teleworking: stress, emotions and health	10/2003	cross-sectional/ psychological impact of teleworking compared to office-based work	72 employees various position
Golden and Veiga	USA	The Impact of Extent of Telecommuting on Job Satisfaction: Resolving Inconsistent Findings	04/2005	cross-sectional/ impact of teleworking on job satisfaction	321 employees various position
Gajendran and Harrison	USA	The Good, the Bad, and the Unknown About Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences	12/2007	meta-analysis/ positive and negative consequences of telecommuting on psychological mediators and individual outcomes	45740 employees various position
Kempf Bitkom	Germany	Digitization offers opportunities for flexible working	02/2015	cross-sectional/ forecast of home office increase	1500 managing directors and HR managers
Beckmann and Rupietta	Swiss	Working from Home – What is the Effect on Employees' Effort?	07/2016	meta-analysis, descriptive statistic/ employees' work effort	22000 employees various position

Table 1: Overview of more comprehensive researches, Part 3/4

Researcher	Country	Topic	Publish Date	Type of Research/ Parameter	Proband Number and Job Position
Clifton Gallup Press	USA	State of the American workplace	2017	meta-analysis/ qualitative and quantitative conditions at workplace	195600 employees various position from Gallup Panel and Gallup daily tracking in 2015/16
Charalam-pous et al.	UK	Systematically reviewing remote e-workers' wellbeing at work: a multidimensional approach	01/2018	metaanalysis, quantitative, qualitative and mixed-method designs/ dimensions of workers wellbeing at work: affective, cognitive, social, professional, and psychosomatic	37553 workers from 63 studies various position
Schall	USA	The relationship between remote work and job satisfaction: the mediating roles of perceived autonomy, work-family conflict, and telecommuting intensity	05/2019	cross-sectional/ relationship between remote work and job satisfaction	185 employees various position
Bodanowitz DAK	Germany	Digitization and home office relieve employees in the Coronavirus Crisis	04/2020	longitudinal study/ scope of home office, job satisfaction, work life balance, stress level, scope of digitalization	employees before Corona Pandemic 7000, after Corona Pandemic 6000, various position
Alipour, Falk and Schüller	Germany	Germany's Capacities to Work from Home	04/2020	cross-sectional quantitative research / home office potential	7160 employees various position 2018 of BIBB/ BAuA Employ ment Survey included own calculation

Table 1: Overview of more comprehensive researches, Part 4/4

Researcher	Country	Topic	Publish Date	Type of Research/ Parameter	Proband Number and Job Position
Süß Heinrich-Heine-University Düsseldorf	Germany	Study on teleworking and childcare during Corona Pandemic: home office influences productivity and conflicts	05/2020	cross-sectional/ assessments of the work situation before Corona Pandemic and current situation in the home office during the Corona Pandemic	1027 employees and manager, various position
Beart et al.	Belgium	The COVID-19 Crisis and Telework: A Research Survey on Experiences, Expectations and Hopes	05/2020	cross-sectional/ employee perceptions of telework on various life and career aspects, distinguishing between typical and extended telework during the COVID-19 crisis including job satisfaction	14005 employees various position
Hofmann, Piele and Piele Fraunhofer Institute	Germany	Working in the Corona Pandemic – on the way to the new normal	07/2020	cross-sectional/ worker's well being, workplace, managerial, organisational	more than 350000 various position
Blom et al. University Mannheim	Germany	The Mannheim Corona study: focus report on the use and acceptance of home offices in Germany during Corona lockdown	07/2020	cross-sectional/ home office potential, quantitative and qualitative working and private conditions	3600 of the German Internet Panels, various position
Federal Ministry for Agriculture, Regions and Tourism	Austria	Work-Life-Balance by home office in Austria 2020	08/2020	cross-sectional/ ability of combining family and work	705 Employees various position
					SUM 699529 probands

Source: own creation

Discussion

Telework and its influence on workers' job satisfaction and in general well-being has been extensively analyzed and discussed. Job satisfaction has received the most empirical attention. Some conditions related to teleworking could trigger an increase or decrease of job satisfaction. The comprehensive meta-analysis of Charalampous et al. (2019) gives a detailed insight to this working field and the dependent variables. Teleworking are responsible for workers´ positive emotions, to increase their job satisfaction and organizational commitment levels and to ameliorate feelings of emotional exhaustion. As result of this working category teleworkers feel more autonomous. Exclusively social isolation could be the reason for a drawback of teleworking. According Golden and Veiga (2005) the relationship between the extent of telecommuting and job satisfaction is curvilinear and satisfaction and amount of telecommuting are positively related at lower levels of telecommuting and satisfaction plateaus resulted from higher levels of telecommuting with around 15.1 hours per week. This curvilinear relationship is moderated by several variables and the curve flattens with jobs higher in discretion and interdependence and for individuals higher in performance-outcome orientation. In terms of personality, teleworkers with a greater tendency to order and a higher need for autonomy report greater job satisfaction than do teleworkers with lower needs for order and autonomy. Considering the development of scope applying teleworking in companies, it is conspicuous that teleworking in German companies raised from 22% to 39% from 2014 to 2018 (Statista, 2019). Employees statistically have experience with telework, both in general and in its extensive form due to the COVID-19 crisis. The Ifo Institute reported 20%-increasing of teleworking scope under COVID-19. Beart et al. (2020) resumed that 65.9% of Flemish workers are completely satisfied with the increase of extended teleworking within the Corona Pandemic. 85% foresee the COVID-19 crisis as making teleworking and 81% of them foresee digital conferencing much more common in the future. Golden and Veiga (2005) revealed a special termination of teleworking to receive beneficial job satisfaction. This could use as guideline for companies and workers with view of preventing productivity of workers in times without a pandemic. Life conditions abruptly changed in 2020 and teleworking became a need preventing serious infection. The worldwide population is obliged to train and always comply to keep distance from others, called ''social distancing'' as long as the virus is not contained. Office jobs have to be new structured and teleworking is the easier way to be arranged by companies and employees. We can assume that workers' and companies' attitude towards teleworking modifies to an obligatory workplace also for the next time. The situation cannot be assessed for the future. The researches within Corona Pandemic, worth mentioned the work of Beart et al. (2020), analyzed the number of employees which are satisfied with extended teleworking within the crisis. An evaluation towards a precisely extend of telework in relation to the effects on job satisfaction and productivity in this research lacks in contrast to Golden and Veiga (2005). In case of persistent pandemic it is relevant to analyze workers' attitude towards teleworking in precise manner in order to cope with the crisis. According to Blom et al. (2020) of Mannheim University there is strong social inequality when using home office. Lower income groups are likely to be at greater risk of infection with the Coronavirus due to their work at workplace, while at the same time they are affected earlier by the negative economic effects of the Corona Pandemic. This is a disruptive factor which generally have negative influence on workers' job satisfaction and distorted the real well-being factors of employees. Companies were interested in finding new ways to create new solutions and combinations of telecommuting arrangement e.g. co-working and teleworking for the last five years. Interesting results gained from a one-year co-working experiment with 5 companies in cooperation with the Village Office Cooperative (Josef et al., 2019). It deals with the question of which specific value propositions and benefit scenarios co-working offers established companies. Further research of the subject teleworking and previous co-working to a new model by elimination the negative affecting mediators of job satisfaction within teleworking could be progressive for companies' work structure. For established companies, the question is how co-working fits into existing forms of work (corporate office, home office, mobile work) and what influence this new scenario has on the existing culture of collaboration (Weibel and Sapegina, 2018). Instead, companies actually have to accomplish and implement hygiene rules at workplace and their future focus have to arrange a new working structure. The researches of 2020 with focus of workplace in times of COVID19 and secondarily in relation to job satisfaction cannot give precise results because the new problem and companies' challenge has only existed for 7 months. The OECD report (OECD, 2020) summarized following coherences, which could help to give a guideline for companies and provide researchers with new ideas for studies:

- widespread telework may remain a permanent feature of the future working environment, catalyzed by the experiences made with teleworking during the COVID-19 crisis

- the use of telework before the crisis varied substantially across countries, sectors, occupations and firms, which suggests a large scope for policies to contribute to the spread of teleworking
- while more widespread telework in the longer-run has the potential to improve productivity and a range of other economic and social indicators (worker well-being, gender equality, regional inequalities, housing, emissions), its overall impact is ambiguous and carries risks especially for innovation and worker
- to minimize the risks of more widespread teleworking harming long-term innovation and decreasing worker well-being, policy makers should assure that teleworking remains a choice and is not 'overdone'; co-operation among social partners may be key to address concerns e.g. of 'hidden overtime'.
- to improve the gains from more widespread teleworking for productivity and innovation, policy makers can promote the diffusion of managerial best practices, self-management and ICT skills, investments in home offices, and fast and reliable broadband across the country.

These correlations, summarized by the OECD (Organisation for Economic Cooperation and Development), are worth mentioned and leads to a new research ground. Connecting previous research results with analyzed new conditions generated by the crisis of Corona Pandemic will open new niches for researchers and companies. The crisis requires new advanced methods to reach more robust and adapted conclusions. For instance, more cross sectional and longitudinal data is something that obstructs our ability to define causation and the actual direction for most of the relationships discussed in previous researches and above to the new situation. The need is to reveal mechanisms, crisis dependent dimensions and limitations. Additionally, it would be useful to conduct more diary studies which will allow us to capture a person change on levels of well-being, as opposed to a cumulative group change. An advantage of this method is that it decreases retrospective bias, which often threatens the validity of cross-sectional surveys.

Conclusions

The present study aims to give an overview of the previous literature related to the relationship of teleworking and its influence on job satisfaction with regard to the current literature with the hardship and challenge of the sudden Pandemic. In particular, it can help to understand the new experience of working from home for the first time and to know the satisfaction of this work type. Furthermore, it is given in insight to the changing conditions of experienced teleworkers within the Pandemic. A clarification of the changing extent of teleworking and job satisfaction should be given. According to previous findings of teleworking, respondents working from home will be willing to work like that, because of the condition to be protected from virus and their attraction to telework increase, if they are having good and supportive environment to work from home. Understanding the needs of employees provides employers with an opportunity to help their employees constructing a supportive and controlled work environment, which may result higher number of workers showing increased affinity to work from home. Controlling the problems e.g. of social inequality dimensions revealed of the current comprehensive study results of the Mannheim University and processes the coherence findings of the OECD (2020), researchers and practioners are able to elaborate and implement new COVID19 adequate structures into the managerial departments and workplace. This increase the probability for employees having higher job satisfaction and efficiency. The attention of a good protection from virus must not be neglected. Protection is the assurance against absenteeism maybe for a long time in fact of COVID-19, possible infections and its possible long-term consequences. The results of the present study provide a cutout of potential ways maybe for future research. It includes the differences in opinion of employees towards work from home across the states. The impact of the Pandemic affects some people more strongly, related to their age, income, academic status, personality and gender. COVID-19 makes clear how vulnerable we all are, also employees and employers. Businesses around the world have be restructured in order to have a future or disappear due to the Pandemic. Workers have to be retrained or lose their job. New ways are needed to minimize health costs and also economic costs due to these actions.

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The Design of Spin N Go Board Game as A Game-Based Learning for Employment Income

Fatimah ALWI
Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia
fatim347@uitm.edu.my

Norul Akma MANSOR
Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia
norul195@uitm.edu.my

Siti Marlia SHAMSUDIN
Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia
sitim008@uitm.edu.my

Shahrel Nizar BAHAROM
Faculty of Art and Design, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610 Seri Iskandar, Perak, Malaysia
shahr169@uitm.edu.my

Mohamed Izzat MOHAMED KHALIL
Faculty of Art and Design, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610 Seri Iskandar, Perak, Malaysia
izzatkhalil@uitm.edu.my

Abstract

Traditional teaching-learning process required teachers to tell everything to students which end up students passively involved during the class or tutorial sessions. As the world has globally changed, the teaching and learning process needs to incorporate the interactive elements and methodologies in order to encourage peer-to-peer-discussions as well as to develop problem-solving skills that would be needed for their future professional development. Therefore, this paper presents the design process of a board game named as Spin N Go Board Game that will be used in taxation classes, in particular for the topic of Employment Income. The development of this board game applied the Serious Game Design Assessment Framework (SGDAF) (Mitgutsch and Alvarado, 2012). It contained six domains – purpose, content, framing, mechanic, fiction/narrative and aesthetic/graphics. At this stage, the board game is not yet tested on the students. However, it is believed that by using this board game, students will gain more knowledge in this topic due to enhanced engagement and motivation in their studies because games provide fun ways to learn.

Keywords: Board game, Employment Income, Taxation, Game-Based Learning, Serious Game.

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Introduction

In the past decade, the teaching and learning process has witnessed a transform to engage students to become part of the effective learning. The purpose of education nowadays not only to share the knowledge but also to promote life-long learning. Besides that, many tertiary students today are from millennials generation who were born between 1980 and 2000 (Strauss & Howe, 1991). These millennials groups are reported to be more affluent and better educated as compared to other generations (Howe & Strauss, 2000). Hence, teachers need to modify their teaching method in order to further elevate conceptual comprehension and integrate students during the class discussions (Muell et al., 2020). As cited by de Campos et al. (2020), there are many methods used to promote effective learning such as flipped classroom, team-based learning, peer instruction, collaborative testing, and constructions of educational models and experimental classes. In addition, blended learning, gaming, simulation, educational drama and/or role play as well as Moocs – massive open online courses (Khan & Pearce, 2015) are also among the strategies used to tackle the students interest during the class sessions. Out of these, board games have been widely used in education field for decades because it is believed that board games have huge social impact on young individuals (Rizov, Djokic & Tasevski, 2019).

The application of board games in addition to the lecture-based classes have been successfully used in previous researches such as Gut Game (de Campos et al., 2020) in health sciences students, Small Star Empires with Augmented Reality (AR) implementation (Rizov, Djokic & Tasevski, 2019), prototype game refers to Knowledge Management (KM) model (Taspinar, Schmidt & Schuhbauer, 2016) in management class and Logo Board Game (Khan & Pearce, 2015) which used in undergraduate business students. Nevertheless, based on available education board games in the market, it is hardly difficult to find the board game that suitable for the Accountancy students especially for the taxation class.

Moreover, Employment Income is one of the complicated topics in the Individual Taxation course. It has five applicable Sections as per Income Tax Act 1967 (ITA 1967) and a handful of items in each Section. Certain information may affect the fundamentals applied in the computation of employment income. Traditional methods of learning via lectures and tutorials may not engage undergraduates at the optimum level as this course is very technical. Therefore, this article aims to describe the design of a board game namely as Spin N Go Board Game (SNGBG) in particular to the topic of Employment Income by adopting the Serious Game Design Assessment Framework (SGDAF). The designation of this board game is one of the efforts to fill the gap that we found during the taxation class for undergraduate students in order to provide innovative ways to engage and motivate students in supplement to the traditional lecture-based class.

This article is a conceptual paper; its focus is only on the application of SGDAF in the development of Spin N Go board game. Even though SGDAF is a framework for virtual games, it is adapted to Spin N Go board game because it is also applicable. As this board game is still in the development process, some information such as students' feedback as users is not yet available. However, feedback from academicians with a solid taxation background had been obtained in order to improve features of this board game.

The remainder of this article is structured as follows: in Section 2, we look at the literature review about the previous studies on the board game, virtual game and also the background about SGDAF. This lead to the discussion on the application, implementation and designation of the board game – Spin N Go Board Game in Section 3. Finally, we conclude the ideas about the board game for the further research in Section 4.

Literature Review

Game-based learning

Education is a powerful tool that able to change the quality of life via improved critical thinking and interpersonal skills, higher level of confidence and better communication skill. Over the years, there are many studies have been performed to examine the best teaching methods and its impact on learning and student's performance (Syal & Nietfeld, 2020;

Behnamnia et al., 2020). Among these are teacher-centred approach, student-centred approach, high-tech approach and low-tech approach. Beside the traditional teaching methods, game-based learning has also been using as part of the effective tool to ensure the students are actively engaged and increase their motivation to learn (Tseng, Yang & Lu, 2019). According to Syal and Nietfeld (2020), game-based learning environment has increased significantly as it improves the academic and motivational outcomes. As the technology is growing and getting advance, the current trend of game-based learning also includes using technologies such as tablets or smartphones (Behnamnia et al., 2020). Noroozi et al., (2020) emphasized that to aligned with the 21st century education system, digital games can be used to develop scientific arguments skills. The technology can stimulate the imagination in the games such as the game-based character and narrative, increase the curiosity which can increase the joy to play.

The findings on the effectiveness of the game-based learning toward the student's performance are inconclusive. According to Behnamnia et al. (2020) and Noroozi et al. (2020), game-based learning can increase the level of student's learning as it may increase the students' creative thinking skill and problem solving skill. Additionally, the previous researches also found that game-based learning environment is less stress compared to the school environment as the students can explore the game for longer time. Similarly, Syal and Nietfeld (2020) revealed in their study that successful game-based learning is when the students are focused on the game, have a mastery approach orientation and most importantly they are interested in game itself. However, developers must exercise cautious upon designing game-based learning. Some of the game features may distract the students from the main goals of the game. This happens when students stuck in a challenging quest and become frustrated. The difficulty of the game will negatively affect the emotion and interest of students to keep playing the game (Behnamnia et al., 2020). This was in line with another study where challenges in the games such as whether things are too easy or too difficult will lead to student's boredom and frustration (Noroozi et al., 2020). The games with more audios and videos can prevent confusion but the games with too much text will confuse the students. Thus, it is important for game developers to focus on the game architecture and narrative to reach the optimal amount challenges embedded in a game so that it will increase the interest of students' in a learning engagement.

Board Game vs Virtual Game

Many people including children, teenager and adults love playing games as it can provide higher level of happiness, relaxation and can enjoy to greater creativity, thus lead to happier life. Therefore, many famous game companies such as Tencent, Xbox Game Studio, Nintendo, Electronic Arts, Activision Blizzard, Ubisoft, Konami and Rockstar Game, Capcom, Sega, and Namco Bandai have developed variety genre of games such video game, virtual reality, social game, board game, action, puzzles, mystery and many more. According to Grace (2005) the genre of games can be defined as a description of the narrative content of a game. Board game is one of the popular games that has existed for long time. In general, board game is played by moving pieces on the board according to a set of rules. Among the famous board game in the world are Monopoly, Scrabble, Chess, Risk, Uno, Battleship, Yahtzee, Evolution, Bio-sphere, Bios and many more. The traditional teaching method is associated with uninteresting and lack of experiential learning (Khan & Pearce, 2015). Moreover, different student has different learning styles that need to be taken into consideration. Thus, many studies have been done to support the effectiveness of teaching by using games.

According to Slegers et al. (2015), board games are interesting as mostly people are already exposed to this genre of games since childhood and its casual elements may act as an icebreaker. In addition, the relaxed atmosphere board games created have setting the user to be at ease and making them feel comfortable to share their thought compared to role -play method. Muell et al. (2020) supported that board games emphasized on the strategy and consequences for decision makers and thus contributed to the education's evolution. The students can use the board games to stimulate their critical thinking by identifying the concept that the games get right or wrong and omitted. Consistent with the other study, Khan and Pearce (2015) reported that students who playing board games showed higher level of flow compared to attending conventional tutorial session. Thus, it is effective to introduce a new topic by using a board game as it will increase the students' motivation, enjoyment and absorption. On the other hand, Tseng, Yang and Lu (2019) argued that it is challenging to develop a board game that include specific learning and entertainment purposes because innovation, knowledge and experience are required.

Virtual games are different from board games. Virtual games allow players to experience and influence the game environment. The effects in virtual game are also shown in real time by means of gaming devices and accessories such as hand controller, virtual reality headsets and sensor-equipped gloves. Various media can be used for virtual games such as computers, tablets and smartphones (Affadil, 2020). Due to its supreme characteristics, virtual games are widely used in many industries such as education, healthcare, entertainment, military, training and consultancy, art and industrial. In education, virtual games can be seen a lot in teaching medical and language students. For example, Verkuyl, Romaniuk and Mastrilli (2018) mention that to facilitate the transition from the classroom to clinical practice, the most effective way is by using realistic virtual simulation. According to Verkuyl et al. (2017), the main purpose of virtual games is learning than entertainment because virtual world allows students to practice scenarios on any computer, everywhere and most importantly it is also cost effective. Through virtual games, students are feeling excited and motivated to learn and thus increase the students' engagement. Additionally, virtual experience can establish good emotional connection between students and the characters as they played. Verkuyl et al. (2017) evidenced that virtual games can make the students feel confident and increase their skills. On the other hand, they also found that when the virtual games are played individually, the outcome is better than they games is played in a group. However, virtual games may also have shortcomings. One of the disadvantages is it requires a good internet connection (Verkuyl, Romaniuk & Mastrilli, 2018). One of their findings was some of the students had difficulty to refresh their screen during playing the games. As a result, the flow of the virtual game was disrupted.

The Serious Game Design Assessment Framework (SGDAF)

Serious games are designed to promote learning. It combines strategies, knowledge and structure to teach and train specific skills than to entertain. Many studies have been done to test the use of serious games to achieve specific goals. For example, Fleming et al. (2020) used Risk Assessment Simulation for Emergency Training Exercise (RAMSETE) examined the motivation behind decision made by the stakeholders while Coghlan and Carter (2020) used Design Play Experience (DPE) as a tool to attract positive emotions among the tourist regarding the threaten ecosystem. This study used the Serious Game Design Assessment Framework (SGDAF) developed by Mitgutsch and Alvarado (2012). This framework measures the effectiveness of a serious game according to six domains; they are purpose, content and information, framing, mechanic, fiction/narrative and aesthetic/graphics.

Figure 1 shows the SGDAF that applied in our board game. Firstly, every game created has its own goal or purpose that will give impact to the player. In general, the nature of the games related to education is usually designed to achieve specific target or skills than entertainment. Therefore, SGDAF emphasize that in order to design the components of the games, the explicit intention and purpose of the games need to be considered as it will influence how the player experience the game itself. The first domain in SGDAF is content and information. Content and information are referring to the data and facts provided in a game that can be seen and approachable to the players. The examples of the content are names, supplementary information and the stats of the players. In some games, the content presented to the players are not related to the games. Thus, in designing a serious game, it is important to provide information that is fact-related, valid and can be approached by the players.

Next domain is the game mechanics. Game mechanic can be defined as the rules or methods that will guide the player's moves or actions. Good game mechanic will give impact on the quality and whether or not the players are engaged and entertained enough to play the games. Games with better mechanic will provide immerse experience and fun to the players. The application of fiction and narrative in games are important to make the game stories become smooth, interesting and giving the player narrative path to follow from beginning to the end. Thus, SGDAF focuses on creating the fictional space which emphasised on the games purpose. According to Coghlan and Carter (2020), aesthetics and graphics is referring to audio-visual language that represent the overall aspects in the games such as information, fiction, framing, setting and mechanism. Game aesthetics is defined as the expression of the game such as emotion, pleasure, form giving and sociability that the player will encounter in the games. The last elements in SGDAF is framing. Framing is referring to loading the content of the game into a frame to suit the need of the game. An effective frame game should be able to adapt the objectives, characters and purpose of the games. Additionally, good framing leads the player to easily follow the games instructions and able to challenge them with the right extend which mean not too easy

or difficult, thus give them amazing playing experience. All these components must be fully interrelated in order to avoid conflicts and to have a good flow of game.

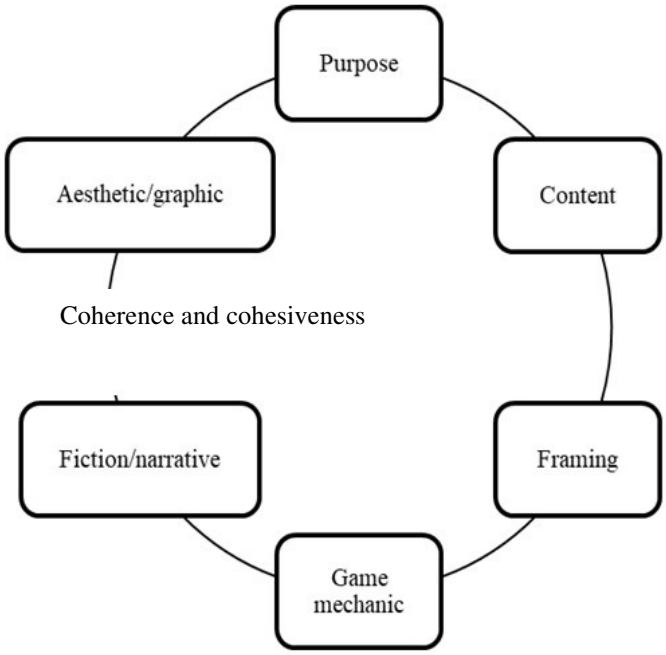

Figure 1: The Serious Game Design Assessment Framework (Mitgutsch & Alvarado, 2012).

Employment Income under Income Tax Act 1967

Under Individual Taxation syllabus in Malaysia, one of the important topics is Employment Income. Income tax on employment income is an important source of revenue to the government. It relates to an employee, a consideration paid by an employer for the services rendered. Section 13(1) of the Income Tax Act 1967 (ITA 1967) categories various types of employment income into five sub-sections (a) to (e) (Fatt, 2020) whereby these Sections will become the fundamental reference for the questions that we developed for the board game. Figure 2 describes the examples of items under Section 13 (1) of the ITA 1967.

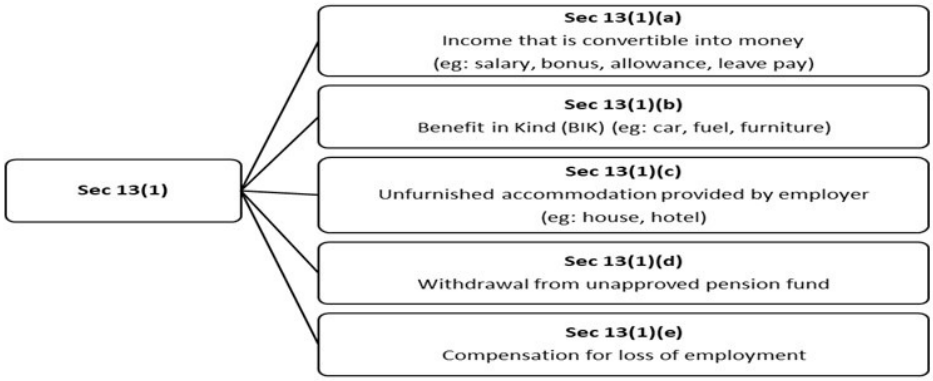

Figure 2: Example of items under Section 13(1) of Income Tax Act 1967.

Discussion

Application of the Serious Game Design Assessment Framework in the Spin N Go Board Game

The Serious Game Design Assessment Framework (SGDAF) by Mitgutsch and Alvarado (2012) is used as a reference in the design of Spin N Go Board Game (SNGBG). However, since the SGDAF is developed for virtual games, a few components such as leader boards and badges will not be applicable. The application of the SGDAF components in the SNGBG is as follows:

Purpose

The SNGBG has several objectives. Firstly, the goal of the game is to increase student engagement in the learning of subject matter, hence improved academic performance. For this purpose, the designers embed elements of fun adapted from snake and ladder as well as UNO. Finally, as SNGBG mimics the real-life situation, it is expected that the undergraduates may obtain some rough ideas in relation to working in the industry. In this game, the setting is in a tax firm which the players start off as new employees as well as service directors and directors of controlled companies.

Content

Content refers to data, information and facts of a game. For SNGBG, only partial data of the game is available to the players. These items are the name of the employer or tax firm, points collected by the players and points provided for each question. Similarly, pawns and their pseudo names are also available to the players' knowledge. On the other hand, questions and answers are treated as confidential data. They are only accessible to the moderator of the game which his role in this game is the employer. The questions also have different levels of difficulty in order to provide challenge to the players (Hamari et al., 2016) in terms of cognitive component. The designers used Bloom's Taxonomy in the complexity of the questions (Anderson & Krathwohl, 2001). The basic verbs in the question cards are compute and decide. For easy level, the questions are at domain C2 (understand) which is to classify or identify items. For medium level, the questions are at domain C3 (application) which students are required to compute single items of employment income. The questions in the hard level are still at domain C3 (application) but consists of more items of Employment Income. Additionally, challenge is also included in the game mechanic which will be discussed later.

Framing

The selection of players as target group and their level of literacy on the subject matters are both crucial. The selection of the correct target group will support the objective of the game – to enhance students' motivation and engagement to study the subject matter. Obviously, the audience will be the students who are undertaking a course known as Individual Taxation in the current academic session which Employment Income is one of the topics covered. Students who shows low level of control, self-determination and self-regulation in their studies will be selected as the target groups (Sawyer et al., 2017). In terms of literacy, the players are expected to have a reasonable amount of knowledge and skills because this game will be provided after the lectures and tutorials are completed. This is to encourage continuous usage of the game in the future (Mitgutsch & Alvarado, 2012). Therefore, the players should be able to demonstrate the fundamentals of Employment Income according to the Income Tax Act 1967.

Game Mechanic

Game mechanic involves rules of the game, its reward system and obstacles/challenges. The maximum players at one time is four with one moderator who will be in control of the game. The moderator will read questions which will be selected by the players, check for the answers and provide points for correct answers. First of all, players will choose a pawn and determine their turn. Next, they will turn a spin which will determine the position of their pawn on the board. Next, players will choose a question card randomly and answer the question accordingly. The players will only have one chance to answer the questions in an unlimited period of time. Used questions will be taken out from the collection of question cards in order to reduce the possibility of picking up the same questions and avoid boredom.

Points will be rewarded only for correct answers. Different level of difficulty will provide different points – easy (1), moderate (3) and hard (5). In order to include challenge in the game, misfortunes are included in the board game and distraction cards. For instance, taking a prolong medical leave is an unfortunate event included in the board. Similarly, "loss a turn" and "give ten marks to the previous player" are hurdles being included in distraction cards. In order to balance the difficulty of the game, random rewards are also provided in the board game distraction cards. For examples, promotion is included in the board game and printed cards with "immune to misfortune" and "entitled for another turn".

Fiction/Narrative

Fiction/narrative offers the storyline of the game. Since SNGBG is a board game, it has a limited amount of fiction/narrative. Nevertheless, the characters of players consist of employees, service directors and directors of controlled company. They will be provided pseudo names and pawns as their identity on the board as employees. Another character is an employer being the moderator of the game whose functions are to read out the questions, check for the correct answers and records the players' points. The plot is the players need to solve a number of tax cases over time and will be rewarded only for correct answers. As they are heading towards the end of the game, they will come across a number of good luck that help them to finish up the game. Yet, hurdles are also placed on the board for the opposite effect.

Aesthetic/Graphics

The game components of SNGBG are design in visual language and not as other digital game that using audiovisual approach. The graphic design is really important because its capable to represent the game identity which drives players to determine the purpose of playing games (Mitgutsch & Alvarado, 2012). SNGBG require physical contact parallel with the objective of the game that give understanding about employment income. Visual of the games are semantically followed the target audience, setting, characteristic and theme of the game that are based learning board game for employment. Figure 3 illustrates the examples of board game such as Monopoly and Saidina that have shown the elements of business and income for the visual and characteristic of the game. In addition, the appearance has visual the symbol of money and tax that semantically shows to the players about the theme and purpose of the game.

Based on the book title 'Aesthetic and design for game based learning' by Dickey (2015), mentioned that the role of aesthetic in games involved the design of visual materials which embrace the discussion of principles of graphic design. Therefore, it involved all the visual component such as typography, layout, color and all the design element. In this games, it used modern typeface for typography that represent the characteristic of smartness and intelligent.

Figure 3: Examples of Board Games

Coherence and Cohesiveness

All these six components of the SGDAF should be interrelated in order to support the purpose of the game and to avoid conflicts among them (Mitgutsch and Alvarado, 2012). During the pre-production phase, the designers tested SNGBG a few times in order to ensure an optimum coherence and cohesiveness is achieved. As a result, a few changes in the design of the game were made. Firstly, the characters involved only employees. However, this may cause only partial of the content can be tested. For instance, the assessment of the house value provided under Section 13(1)(c) of ITA 1967 is different among employees, service directors and directors of controlled companies. Therefore, the other two characters are included in the fiction/narrative of the game. Secondly, in order to lessen the pressure during the game, the restriction of time to answer is changed to unlimited of time. The purpose is to adjust the level of difficulty of the game, hence to avoid boredom or other negative emotions against the game (Behnamnia et al., 2020 & Noroozi et al., 2020). Another aspect of game mechanic that is amended is the presentation of the questions. Initially, the questions were printed on the question cards thus, the flow of the game was simplified and not interrupted. Once the players chose a question card, the questions would be readily visible to them. However, this plan was not suitable for questions of hard level as they were lengthy and contained many information. Therefore, the designers will only print the number of questions on the question cards while the questions will be kept in a file. Thus, once a player chooses a question card, the moderator/employer will read out the specific question. The later design may impede the flow of the game to a certain degree. However, it is unavoidable because the questions are lengthy and technical causing it impossible to shorten them. Moreover, it is easier for the designers to amend the questions in the future (if necessary) because the content is subject to changes every year in accordance to Malaysian budget.

Conclusion

In conclusion, the application of SNGBG in combination with traditional classes, could be useful for both students and teachers. Students can gain a better understanding about the topic of Employment Income which in turn provoked their thoughts, creativity and ultimately increase their academic performance. At the same time, the board game will allow

students to actively discuss the content, visualize the topic in daily situations as well as solve problems in a playful and relaxing environment. This active methodology also will help students to clarify the terms or concepts used during the taxation class that they were not completely understood before. On top of these, from the teachers' side, this board game could be one of the teaching tools to help them to teach students in a better way. With the advancement of technology, the role of teachers has been shifted from just being the knowledge provider to the facilitators of learning (de Campos et al., 2020). Thus, by using this board game, it is hopefully can help teachers to develop conceptual comprehension among students about the topic of Employment Income during the tutorial session.

Nonetheless, this board game has several important limitations to be highlighted. First, when this article focuses on the presentation and designation of board game to be shared with students and teachers, it is our prospects to further evaluate the outcomes of this methodology. Hence, this board game lacks of students' feedback since it does not test yet to them. Secondly, the board game may not suit all learning styles because our focus is only for the topic of Employment Income. Thus, some students may not give full cooperation. Students who do not have basic knowledge about taxation might not be interested to play this board game. Finally, this board game cannot measure the students' academic performance as a whole which is the main criteria in assessing the students' learning achievement since this board game only cover one topic area, not the whole syllabus.

Whereas this article focuses only on the presentation of the board game to be shared it with educators, it is in our prospects to further evaluate the outcomes of this methodology. Hence, for our future research, it is recommended to test and play the board game among the tax students and educators so that we could get the feedbacks from them. Secondly, future research also could focus on the digitalization of the board game for example transforming from physical board game into the online games in order to make it more exciting and attracting more players. Finally, it is also recommended to add the value of performance measurement into the board game so that it could become one of the assessment methods in the process of teaching and learning.

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Board Industry Expertise of Government-Linked Companies in Malaysia

Rabia Kausar MOHAMMAD ASHRAF
Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Puncak Alam Campus, Bandar Puncak Alam, Selangor, Malaysia
rabiakausar99@gmail.com

Seri Ayu Masuri MD DAUD*
Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Puncak Alam Campus, Bandar Puncak Alam, Selangor, Malaysia
seriayu@uitm.edu.my

**corresponding author*

Abstract

This study is motivated by the current debate on the lack of qualified directors on the corporate boards of government-linked companies (GLCs) in Malaysia, which is believed to have caused these companies to perform relatively poorly. Drawing on extant literature and anecdotal evidence, this study argues that industry knowledge is one of the most relevant acumens required for the board of directors' efficacy. Accordingly, we examine whether GLCs have significantly less board industry expertise relative to non-GLCs. Using 27 matched-pairs of GLCs and non-GLCs listed on Bursa Malaysia from 2010 through 2017, we find that GLCs have a significantly lower *proportion* of industry expert directors compared to non-GLCs. The findings of this study provide empirical support for the concern on the deficiency of qualified directors on the corporate boards of Malaysian GLCs.

Keywords: Government-Linked Companies, Malaysia, Board Expertise.

Introduction

The main purpose of Government-Linked Companies (GLCs) in Malaysia back in 1959, when they were first established by the Ministry of Finance, was to supervise the companies that were once owned by the British Colonial Government (Entebang, 2010). However, from 1971 onwards, the purpose of GLCs was to support the Malaysian New Economy Policy that was introduced in 1970 by the Malaysian Government. The policy was aimed to elevate the position of Bumiputera in the country's economic development (Kershaw, 2000). To this end, the Government-Linked Investment Companies (GLICs) were incorporated to invest on behalf of Bumiputera, and to control and influence the GLCs (Chang, Tam, Tan, & Wong, 2007). Ever since GLICs were established, GLCs play a critical role in the Malaysian economy as the backbone of the country's capital market (GLC Transformational Programme Graduation Report, 2015). In 2015, GLCs' economic profit was recorded at RM4.2 billion, or 11.1% of the total Malaysian economy output with 2.9 times growth in market capitalisation in Malaysia. GLCs made up seven out of the ten largest listed companies in Malaysia by market capitalization, and these seven have a combined market capitalization of RM474 billion (Toh, 2018). In total, the GLICs have a majority ownership of 35 public-listed companies among the top 100 companies in terms of market capitalization and control of about 42% of Bursa Malaysia (Gomez, Padmanabhan, Kamaruddin, Bhalla, & Fisal, 2018).

Despite the significance of GLCs in Malaysia, there have been claims that they performed poorly relative to their non-GLC counterparts (Boycko, Shleifer & Vishny, 1996). The public perception towards these companies has been further tainted by the continuous poor performance of large GLCs, such as Malaysia Airline System Berhad and Proton Holdings Berhad. These anecdotal evidences appear to support the theory that government intervention often leads to lower productivity and operational inefficiency (Boycko, Shleifer & Vishny, 1996). Previous literature conjectures that GLCs are inefficient because of several reasons; social and political goals may not be consistent with profit maximization, managers are chosen based on their political connections instead of their skills and expertise, greater information asymmetries and transaction costs, and greater agency costs and less monitoring (Gaio & Pinto, 2018).

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The empirical findings on the performance of GLCs do not seem to fully support the above anecdotes and conjectures. While some researchers documented poorer performance of GLCs compared to non-GLCs (Van Den Berghe & Baelden, 2005; Ab Razak & Aliahmed, 2008; Najid & Rahman, 2011), several others found the contrary (Bhatt, 2016(b)). These inconsistent findings suggest the assumption that government intervention impairs firms' performance is unlikely to hold for all GLCs. Consistent with this latter conjecture, an economist and a GLC expert in Malaysia, Professor Terrence Gomez cautions against assuming that GLCs are underperformers, or run-of-the-mill firms. "What we are seeing here are dynamic firms maintaining their performance as the top companies in the country." (The Edge, July 2017). Further, Cuervo and Vilalonga (2000) provide evidence on the effects of differential organizational characteristics on privatized firm's performance. Together, this evidence suggests other determinants of GLCs' performance may be at work.

It is logical to think that the firms' productivity and operational efficiency will be subordinate to the board of directors' and executives' objective function(s) and their related strategic choices. Arguably, some level of industry expertise and experience on the board would help the board of directors to competently fulfil their responsibilities. The potentially critical role of industry expert directors is implicit in the following anecdote involving a poorly performing GLC in Malaysia, Malaysia Airlines System (MAS):

> *"Even as MAS's shares tanked, its main union, Malaysian Airlines System Employees Union (Maseu), maintained that the airline could be returned to the black within a year if helmed by someone (in-house) with* ***aviation experience****. A 20,000-strong union, Maseu wants MAS chief executive Ahmad Jauhari Yahya, whose previous experience includes media and power, to leave."* (The Business Times, May 20, 2014, emphasis added).

Hence, *ceteris paribus*, variation in the board industry expertise is a potential explanation for the performance of GLCs. More specifically, poor firm performance could be a result of ineffective monitoring or advising, hence, strategic decision-making in which the boards lack the relevant industry expertise. Accordingly, the key research question that this study seeks to address is whether, on average, GLCs have significantly less board industry expertise relative to non-GLCs.

The remainder of this paper is structured as follows. In section 2 we review the relevant literature and develop our empirical predictions. Section 3 explains our empirical design, and section 4 presents our descriptive and empirical results. Finally, section 5 concludes.

Literature Review and Hypothesis Development

One of the reasons claimed to be the cause of government-owned company's inefficiency and poor performance is the selection criteria of the firms' executives and members of the board of directors (Gaio & Pinto, 2018). Particularly, executives and directors of GLCs appear to be selected based on their political connections instead of their expertise (Gaio & Pinto, 2018). However, the board composition and control structure of government-owned firms have not been widely studied. A few empirical studies that investigated the latter issue include Megginson, Nash, and Van Randenborgh (1994), which documented significant changes in the size and composition of corporate boards of directors after privatization. Particularly, they documented a considerable change in the board composition with only 54% of the new boards composed of continuing directors on average. The size of the board also changed frequently with 34% of companies elected larger boards following privatization while 24% downsized their boards. Additionally, 14% of the companies replaced their CEO after privatization.

In Malaysia, anecdotal evidence suggests that the board of directors of GLCs exhibit some common compositional features including having many former government officers and politically connected directors. For example, two out of six (33.3%) board members of D'nonce Technology Bhd are politically connected and former government directors. UMW Holdings Bhd and Boustead Holding have six out of twenty (30%) and one out of five (20%) politically connected and former government directors, respectively.

Organizational characteristics including culture (Bishop & Thompson, 1992), objectives, business nature and location, organizational structure and management, and labor (Martin & Parker, 1997) differ across GLCs and non-GLCs. Overall, GLCs appear to receive more negative than positive perceptions with poor corporate governance, and incompetent top executives being the main area of attack (Ting & Lean, 2015). Particularly, GLCs are associated with lack of managerial capabilities and skills (Castanias & Helfat, 1991). As Barberis, Boycko, Shleifer, and Tsukanova (1996, p.764–790) have noted, 'pre-privatization (government-owned) managers might have the 'wrong' skills,

because they are good at dealing with politicians, but not at facing competitive market conditions'. Dahlan (2010) suggests GLCs have a poor recruitment system. Particularly for the board members, there has been a conjecture in the literature that directors of GLCs are often appointed based on their networking and political connections rather than skills and expertise (Hamid, 2011; Lau & Tong, 2008; Gaio & Pinto, 2018), potentially resulting in a lack of relevant expertise and qualifications on board.

Furthermore, given that directors need to get paid according to their skills and knowledge, and that there is a limited pool of directors with industry expertise, appointing industry expert directors can be sufficiently costly to the firms (Jeanjean & Stolowy, 2009; Hamid, 2011). As GLCs are associated with inadequate compensation to its directors and employees (The Edge, 2004), it is argued that GLCs have a relatively weak incentive to appoint industry expert directors on their boards. Consequently, the industry expert directors are more likely attracted to join non-GLCs, leading to non-GLCs having more industry expertise on their boards of directors.

In view of the above arguments, the following hypothesis is predicted:

H1: On average, GLCs have lower level of board industry expertise compared to non-GLCs.

Research Design

Sample Selection and Data Sources

The sample of this study are the 38 public quoted GLCs listed in the Putrajaya Committee on GLC High Performance (PCG) website (http://www.pcg.gov.my/). This study focuses on public listed GLCs because their annual reports are publicly available. Malaysia is chosen as a setting for this study given the suggestion that GLCs in Malaysia have poor corporate governance (Ab Razak, Ahmad, & Aliahmed, 2011).[1] That is, the board's decision-making including the appointment of new directors in GLCs in Malaysia is highly intervened by the government through its controlling power in the companies (Jamaludin, Sanusi, & Kamaluddin, 2015). Consequently, there are many occasions where directors of GLCs in Malaysia are appointed based on their political connections rather than their skills and qualifications (Hamid, 2011). Therefore, Malaysia is expected to provide an interesting setting with sufficient variation in the board expertise across GLCs and non-GLCs. The sample period for the study is 2010–2017.

A matched control group of non-GLCs are used as a benchmark to measure differential board expertise. The control non-GLCs are matched on industry classifications and total assets to control for industry effects, and firm size. Matching on these variables helps to rule them out as alternative explanations for any difference found in board expertise between the GLCs and non-GLCs.

After completing the matching procedure, there are 27 useable pairs left in the study. Table 1 contains a reconciliation of the 38 initial list of GLCs and the 27 final pairs used in this study. Ten of the initial 38 GLCs do not have total assets data because they merged with or acquired by another company. One GLC, that is Malayan Banking Bhd (Maybank) from the Finance sector, does not have a matched non-GLC because its total assets are too large, thus, it is dropped from the sample.[2]

[1] This perception of poor corporate governance in GLCs led the Malaysian government to order the formation of an integrity and governance unit at all GLCs effective from 5th October 2018 with a 2-year grace period. The order was widely gazetted on 21st November 2018 (see for example Free Malaysia Today, 2018; News Straits Times, 2018).

[2] For example, in 2017, Maybank's total asset stood at RM736 billions, which is nearly doubled the largest non-GLC for this sector, Public Bank Bhd. Public Bank Bhd recorded total assets of RM380 billions for 2017 and is used as a matched non-GLC for the second largest GLC in the Finance sector, which is CIMB with total assets of RM485 billions in 2017.

Table 1: ***Reconciliation of the 38-initial list of GLCs and the 27 final pairs used in this study***

Matching and sample selection process	**Number of companies**
GLCs listed in the Putrajaya Committee on GLC High Performance (PCG) in 2018	38
GLCs without total asset data	(10)
GLCs without matched non-GLCs	(1)
Total firm pairs left in the study	27

The summary statistics of firm size (measured using natural logarithm of total assets) for GLCs and non-GLCs are provided in Table 2. By design, the two groups should have mean firm size that are approximately equal. As can be seen from Table 2, the mean natural logarithm of total assets for both GLCs and non-GLCs is 22.38.

Table 2: Descriptive statistics of the sample firms' size

Variables		**Min**	**Max**	**Mean**	**SD**	**Skewness**	**Kurtosis**	**N**
Firm_Size	GLCs	17.65	26.70	22.38	2.24	-0.43	-0.47	169
	Non-GLCs	17.65	26.70	22.38	2.21	-0.23	0.60	169
	All firms	17.65	26.95	22.49	2.22	-0.33	-0.56	338

Variable definition: ***Firm_Size*** is the natural logarithm of total assets for firm i at year t.

Director industry expertise data is hand collected from the annual statutory reports filed with Securities Commission. The total asset data is obtained from the Thomson Reuters DataStream.

Board Industry Expertise Measurement

This study employs three measures of board industry expertise, which are further discussed below.

Arguably, board industry expertise is multi-dimensional covering relevant formal education and experience in the industry. That is, a director is deemed to have the industry expertise if he/she has *either* relevant formal education *or* experience in the industry. While relevant formal education engenders technical knowledge in an individual, expertise developed from industry experience builds tacit knowledge in the individual (Kor & Misangyi, 2008), hence, equips the learner with the knowledge and skills for effective application.

Formal education and training could take the form of university degrees or professional affiliations and accreditations (Christy, Matolcsy, Wright & Wyatt, 2013). Directors' relevant professional affiliation and accreditation is defined as membership of industry-specific relevant professional bodies. The relevant university degrees and professional bodies are identified by searching the industry job advertisements for the qualifications required of potential candidates. Data on directors' relevant university degrees and professional qualifications is hand-collected from the director profile section of the companies' annual reports from the year 2010 through 2017.

Similarly, the profile of each director of the sample companies is manually examined from annual reports to determine a director's industry experience. A director is classified as one with industry expertise if he/she is described to have served at least one company operating in similar industry or if he/she has been with the company/group of companies for a certain number of years at the senior manager level and above.

The directors' industry expertise is then aggregated at the board level to create the three measures of the board's relevant expertise consistent with Krishnan, Wen, and Zhao (2011):

(1) a dummy variable that equals one if the company has at least one director with relevant formal education or prior experience at senior manager level and above in a similar industry, and zero otherwise *(Ind_Expert)*
(2) number of directors with relevant formal education, or prior experience at the senior manager level and above in similar industry *(#Ind_Expert)*
(3) the proportion of the board that has relevant formal education *or* prior experience at the senior manager level and above in similar industry *(%Ind_Expert)*

Empirical Models

Hypothesis 1 predicts that GLCs have significantly lower board's industry expertise compared to non-GLCs. To test Hypothesis 1, the independent samples *t*-test is employed. This test will compare the *mean* of board industry expertise for GLCs and matched non-GLCs and report if the mean difference between the two groups is statistically significant.

Results

Descriptive Statistics

Table 3 reports the distribution of sample firm pairs (each pair consists of a GLC and a matched non-GLC) across industries and sample years. As can be seen, the distribution of sample firm pairs is fairly consistent across the sample years. However, there is some variation of the sample firm pairs across industries. The highest number of pairs belongs to financial and industrial industries with 36 and 37 firm pairs, respectively. On the other hand, utilities and technology report the lowest number of sample pairs with 8 and 7 pairs, respectively.

Table 3 : Distribution of sample GLC and non-GLC pairs across industries

	Number of firm pairs									
Year	**Industry**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**All industries**
2010	2	2	1	1	5	4	2	1	1	19
2011	3	2	2	2	4	4	2	1	1	21
2012	3	2	2	2	5	4	2	1	1	22
2013	3	2	1	2	5	5	2	1	1	22
2014	3	2	1	2	5	5	2	1	1	22
2015	3	2	2	2	4	5	2	1	0	21
2016	3	1	2	2	4	5	2	1	1	21
2017	2	2	2	2	4	5	2	1	1	21
Total firm pairs	22	15	13	15	36	37	16	8	7	169

Industry: (1) Basic Material; (2) Consumer Cyclical; (3) Consumer Non-cyclical; (4) Energy; (5) Financial; (6) Industrial; (7) Telecommunication; (8) Utilities; and (9) Technology

Table 4 reports the minimum, maximum, mean, standard deviation, kurtosis and skewness of the three measures of board industry expertise. As shown in Table 4, it is common for GLCs and non-GLCs to have at least one industry expert directors on their board as the mean of *Ind_Expert* is nearly 1. For both *#Ind_Expert* and *%Ind_Expert,* non-GLCs report higher mean compared to GLCs. Among the nine industries, utilities show the highest mean of *#Ind_Expert* and *%Ind_Expert* of 7.44 and 61%, respectively. This statistic could be due to the highly specialized and heavily regulated nature of the utilities industry, thereby suggesting the appointment of more industry expert directors on the companies' boards.

Table 4: Descriptive statistics of board industry expertise

		Industry											
Variables		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**All industries**	**GLC**	**Non-GLC**
	N	44	30	26	30	72	74	32	16	14	338	169	169
Ind_Expert	Min	0	0	0	1	0	0	1	1	0	0	0	0
	Max	1	1	1	1	1	1	1	1	1	1	1	1
	Mean	0.89	0.97	0.69	1.00	0.79	0.99	1.00	1.00	0.93	0.91	0.91	0.91
	SD	0.32	0.18	0.47	0.00	0.41	0.12	0.00	0.00	0.27	0.29	0.29	0.29
	Skewness	-2.52	-5.48	-0.89		-1.47	-8.60			-3.74	-2.84	-2.91	-2.79
	Kurtosis	4.56	30.00	-1.32		0.16	74.00			14.00	-6.11	6.59	5.88
#Ind_Expert	Min	0	0	0	1	0	0	2	5	0	0	0	0
	Max	6	4	6	6	4	11	5	9	6	11	7	11
	Mean	2.57	2.27	1.35	3.33	1.22	2.58	3.50	7.44	3.43	2.59	2.46	2.72
	SD	1.37	1.04	1.41	1.34	0.97	1.82	1.04	1.46	1.99	1.92	1.67	2.15
	Skewness	-0.23	-0.19	1.54	0.61	0.88	1.71	-0.09	-0.15	-0.56	1.17	0.60	1.34
	Kurtosis	-0.02	-0.71	3.33	-0.37	0.67	5.32	-1.13	-1.67	-1.32	1.98	-0.22	2.19
%Ind_Expert	Min	0	0	0	0.17	0	0	0.18	0.45	0	0	0	0
	Max	0.10	0.60	0.85	0.60	0.44	0.84	0.71	0.75	0.75	0.10	0.10	0.10
	Mean	0.36	0.33	0.19	0.38	0.14	0.26	0.39	0.61	0.42	0.29	0.27	0.32
	SD	19.05	16.74	19.98	11.66	10.75	17.19	13.20	8.78	21.92	19.46	17.36	21.14
	Skewness	0.25	-0.09	1.70	0.05	0.77	0.95	0.44	-0.29	-0.49	0.46	0.28	0.45
	Kurtosis	2.19	-1.12	3.95	-0.73	0.25	0.73	-0.01	-1.08	-0.80	-0.25	-0.96	-0.20

Industry: (1) Basic Material; (2) Consumer Cyclical; (3) Consumer Non-cyclical; (4) Energy; (5) Financial; (6) Industrial; (7) Telecommunication; (8) Utilities; and (9) Technology

Empirical Results

The independent samples *t*-test results are presented in Table 5. The *number* of industry expert directors, *#Ind_Expert* of GLCs are lower than non-GLCs for consumer non-cyclical, industrial, utilities and technology industries. However, the *overall* mean of board industry expertise for GLCs are not statistically significant from that of the non-GLCs for the first and second measures of board industry expertise, *Ind_Expert* and *#Ind_Expert,* which is inconsistent with Hypothesis 1. This finding is not of concern given that the first measure of board industry expertise, *Ind_Expert,* is a dummy variable, which may not capture a systematic variation between GLCs and non-GLCs. *#Ind_Expert,* on the other hand, measures the absolute number of directors with industry expertise, which is not scaled by board size. Therefore, the mean of board industry expertise for the second measure is highly likely affected by the board size of the GLCs and non-GLCs. That is, firms with larger boards are expected to have more industry experts. Accordingly, a direct comparison between the level of board industry expertise of GLCs and non-GLCs using *#Ind_Expert* may be less meaningful.

The result for the third measure of board industry expertise, *%Ind_Expert,* is consistent with Hypothesis 1. As can be seen from Table 5, the overall mean of board industry expertise for non-GLCs is 0.32 while the mean expertise for GLCs is only 0.27. The mean difference between the two groups is positive and significant at 5% level suggesting

that non-GLCs have a significantly higher percentage of directors with industry expertise.[3] Further, Table 5 reports that the mean differences of board industry expertise between non-GLCs and GLCs are positive and significant for the consumer non-cyclical and industrial industries. On the other hand, the mean differences of board industry expertise between GLCs and non-GLCs are *negative* and significant for the energy and technology industries. That is, the percentage of industry expert directors is higher in GLCs relative to non-GLCs. A potential explanation for this unexpected result is that these are highly specialized industries in which technical expertise is highly critical and not easily transferred to industry outsiders. In Malaysia, these two industries are largely controlled by the government in that the GLCs such as Petronas Gas Bhd, Petronas Dagangan Bhd, and Formosa Prosonic Industries Bhd. are the giant players in the market. For the remaining industries, non-GLCs report higher but insignificantly differences in mean of board industry expertise for *%Ind_Expert* compared to GLCs.

Conclusion

GLCs play a widespread and pervasive role in the economic and social development in Malaysia, (Menon, 2017). Despite GLCs' significance in this country, there have been anecdotal evidences to suggest that they are underperforming. Notwithstanding, the empirical findings on the performance of GLCs are so far mixed. These inconsistent findings suggest other determinants of GLCs' performance may be at work. One of the reasons claimed to be the cause of GLCs inefficiency and poor performance is poor recruitment system (Dahlan, 2010; Gaio & Pinto, 2018). Particularly for the executives and directors of GLCs, there has been a conjecture in the literature that they are often appointed based on their networking and political connections rather than skills and expertise (Hamid, 2011; Lau & Tong, 2008; Gaio & Pinto, 2018), potentially resulting in a lack of relevant expertise and qualifications on board.

Consequently, we hypothesized that GLCs in Malaysia have lower level of board industry expertise compared to non-GLCs. The results are consistent with prediction. On aggregate, GLCs have lower *proportion* of directors with industry-related formal qualification or experience. As argued in Section 2, the ineffective directors' appointment in GLCs by the government that is biased towards appointing directors with government connection with them may be done at the expense of the company. That is, these politically connected directors may be appointed even when they do not have the relevant industry expertise. This finding provides empirical support for the potential ineffective and biased appointment of directors on to the boards of GLCs in Malaysia by the government.

The main limitation of this study is that it assumes that the most relevant (if not the only relevant expertise) to enhance firm performance is industry expertise. However, prior literature suggests that the board of directors should be composed of relevant 'skillset' endogenous to the firm (Christy et al., 2013). A set of relevant skills may include other types of expertise such as accounting (or financial), legal, or even networking skills. Therefore, future research may extend this study by examining the role of other potential relevant expertise on the performance of GLCs. A particularly interesting extension of this study will be to test the effect of having directors connected with the government on the performance of GLC

[3] As discussed in Chapter 4, an alternative approach to test Hypothesis 1 is using Equation (1) estimated using the ordinary least squares regression. However, both approaches should yield consistent results. Untabulated estimates for Equation (1) indicate that α_1 is not significant for the first two measures of board industry expertise. For the third measure of board industry expertise, *%Ind_Expert,* α_1 is -4.404 (significant at 5% level) suggesting that GLCs have significantly lower percentage of industry experts on board. Overall, these results are consistent with the independent samples T-test results presented in Table 4.4.

Table 5: Differences in the mean of board industry expertise between GLCs and matched non-GLCs (2010-2017)

		Industry									
Board Industry Expertise	**Companies**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**All industries**
Ind_Expert	Non-GLCs	0.91	0.93	0.85	1.00	0.72	1.00	1.00	1.00	0.86	0.91
	GLCs	0.86	1.00	0.54	1.00	0.86	0.97	1.00	1.00	1.00	0.91
	Mean difference	0.05	-0.07	0.31	0.00	-0.14	0.03	0.00	0.00	-0.14	0.00
	t-value	0.465 (0.644)	1.000 (0.334)	1.732 (0.097)	-	1.452 (0.151)	1.000 (0.324)	-	-	1.000 (0.337)	0.188 (0.851)
#Ind_Expert	Non-GLCs	2.68	2.47	2.15	3.00	1.06	3.00	3.50	8.75	2.14	2.72
	GLCs	2.45	2.07	0.54	3.67	1.39	2.16	3.50	6.13	4.71	2.46
	Mean difference	0.23	0.40	1.61	-0.67	-0.33	0.84	0.00	2.62	-2.57	0.26
	t-value	0.545 (0.588)	1.047 (0.304)	**3.516**** (0.003)	-1.375 (0.180)	-1.474 (0.145)	**2.021*** (0.048)	0.000 (1.000)	**9.391**** (0.000)	**3.133*** (0.018)	1.245 (0.214)
%Ind_Expert	Non-GLCs	0.40	0.35	0.29	0.33	0.12	0.33	0.42	0.42	0.28	0.32
	GLCs	0.32	0.30	0.09	0.42	0.15	0.19	0.36	0.36	0.56	0.27
	Mean difference	0.08	0.02	0.20	-0.09	-0.03	0.14	0.06	0.06	-0.28	0.05
	t-value	1.327 (0.192)	0.759 (0.454)	**2.931**** (0.007)	**-2.345*** (0.027)	0.996 (0.323)	**4.012**** (0.000)	1.324 (0.195)	1.324 (0.195)	**-3.111*** (0.020)	**2.294*** (0.022)

Industry: (1) Basic Material; (2) Consumer Cyclical; (3) Consumer Non-cyclical; (4) Energy; (5) Financial; (6) Industrial; (7) Telecommunication; (8) Utilities; and (9) Technology.
Mean differences between GLCs and non-GLCs are significant at 5% (*) and 1% (**) levels respectively (two-tailed) with p-values in parentheses

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A Conceptual Study of the Impact of UTAUT Model on the Intention and Adoption of Electronic Medical Records By physicians of Mohammed VI University Hospital Center (UHC) in Marrakech (Morocco)

Oumaima Hafide[1], Abdelaziz Zitouni[2] and Youness Lafraxo[3]

[1]PhD student, Faculty of Law, Economics and Social Sciences Marrakech, Morocco

oumaima.hafide@gmail.com

[2]PhD student, Faculty of Law, Economics and Social Sciences Marrakech, Morocco

zitabdelaziz@gmail.com

[3]University professor, Faculty of Law, Economics and Social Sciences Marrakech, Morocco

younes.lafraxo@gmail.com

Abstract

The adoption of electronic medical records in the e-Health sector in Morocco is intended to enhance hospital quality, to decrease the frequency of medical errors and to minimize the cost of health care. But few studies have focused on the predictive factors of physicians' intention to use an EMR system. Using the indicators in the **UTAUT model**, a theoretical model is suggested to illustrate the behavior of physicians in using an **EMR system** at the **Mohammed VI University Hospital Center in Marrakech, Morocco**.

Keywords: UTAUT model, Adoption of the Electronic Medical Records, EMR system, Mohammed VI University hospital, Marrakech (Morocco).

Introduction

The electronic medical record is the main component of any hospital information system. It overcomes the disadvantages of the paper medical record by making it more accessible and more secure. Access time is now measured in seconds instead of hours. Networked, the electronic medical record can be shared and consulted by several stakeholders at the same time. Data protection is ensured by access authorizations (Login, passwords, data encryption, etc.). The electronic medical record facilitates data sharing, communication and coordination between the different partners in the healthcare system. It is the hub of any hospital information system.

The majority of hospitals in developing countries are characterized by the predominance of the classic medical data management system, associated with problems such as the lack of an electronic medical record, duplication of medical information, difficult access to health data and loss of time (Omary Z et al., 2009). Aware of the importance of the implementation of the electronic medical record and with the objective of taking advantage of its benefits and overcoming its drawbacks paper, The Morocco, during the last ten years, has launched the deployment of hospital information systems in major public hospitals and mainly in the University Hospital Centers (UHC). However, despite the willingness of public authorities and the investments made, the process of deploying the electronic medical record faces many obstacles related mainly to the acceptance of its use by health professionals. The objective of this study is to develop, through the UTAUT model, a conceptual framework that brings together the main factors influencing the adoption of EMRs by physicians, which will be empirically tested with physicians working at the Mohammed VI UHC in Marrakech.

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Physicians are the primary users of EMRs in hospitals. Specifically, they can easily build, consult, distribute and share patient records between physicians and other stakeholders. During EMR implementation, many physicians, however, are confronted with technical problems (system failure and poor interface design), inefficiency, data errors and system incompatibility issues (Freudenheim, MILT (2012)). As well, physicians are becoming worried about losing autonomy or changes in the power structure, Sherer, S.A. (2010). There is a critical barrier to the adoption of EMRs across the board due to a limited physician support base. To increase physicians' willingness to adopt the EMR, it is important to change their attitudes and receive ongoing support, as they are the primary users of these systems (Venkatesh, V., Sykes, TA, Zhang, X. (2011)). Many countries are currently creating a medical record; however, the limited acceptance of this technology presents a serious challenge to its successful use. As a result, this document is intended to clarify the acceptance of the EMR system, especially at Mohammed VI University Hospital Center, located in Marrakech, Morocco.

The choice of UHC Mohammed VI to test our research model is motivated by the fact that this center is the largest hospital in the region of Marrakech and is a regional medical reference. 1500 beds and contains more than 20 medical specialties and employs more than 500 doctors and 1500 nurses. In addition, as part of the "Digital Morocco" project launched by the government in 2008 to computerize all public and private institutions, the UHC Marrakech has since 2009 a Hospital Information System called HOSIX and an electronic medical record, becoming the first health institution in Morocco to engage in such a project. The EMR at the UHC Marrakech has been in operation for 11 years, but its deployment seems to be hampered by resistance and obstacles related mainly to user commitment.

For this study, the objective is to identify the most significant determinants of physicians' acceptance of EMRs in a sampling of general practitioners and specialists in the province of Marrakech. Our main efforts focused on resolving the following questions: What are the user's intention factors for the adoption of an EMR at Mohammed VI Hospital?

This study investigates the impact of performance expectation, effort expectation, social influence and perceived risk on behavioral intention and the effect of enabling conditions on the physician's perception of the situation.

We will have conducted a field survey to collect data from physicians who had experience using EMR exchange systems at UHC Mohammed VI. A questionnaire will be administered directly to a sample of 200 physicians.

To test the proposed research model, we employed structural equation modeling using the partial least squares method.

Literature Review and Theoretical Framework

UTAUT is one of the most influential frameworks for the prediction of factors that influence technology acceptance and adoption (H. San Martín et al.,2012). The model has proven that ithas good predictability. Nevertheless, its ability to predictThe adoption of electronic medical records by physicians is unclear, especially in developing countries (V. Venkatesh et al.,2011).

Consequently, many authors have used UTAUT either along side variables from other theoretical models or by examining antecedents and moderators of key determinants when used in healthcare (Seok Kim, et al.,2015) Thus, the addition of context-specific determinants should be used to improve the predictability of UTAUT when used in healthcare (Abd Rahman Ahlan et al.,2014)

a) Unified Theory of Acceptance and Use of Technology (UTAUT):

The unified theory of technology acceptance and use (UTAUT) was proposed by (V. Venkatesh, 2003) as an alternative to the TAM. UTAUT was formulated with four main determinants of information technology intent and use, namely performance expectation (EP), effort expectation (EE), social influence (SI) and enabling conditions (CF). PE, measuring the extent of an individual's feeling, believes that the system could improve its performance and that this configuration is similar to the utility concept of the TAM model. EE measures the extent to which users believe that the system is easy to use and that this configuration is similar to the ease of use construction in the TAM model. UTAUT also theorizes the moderating effect of four other influences such as gender, age, experience and voluntary use (V. Venkatesh, 2003). The actual UTAUT model is extended with additional variables (Nuq & Aubert, 2013; Oh & Yoon, 2014; Slade, Williams, & Dwivedi, 2013). Personal innovativeness in IT (PI) and resistance to change (RC) are regarded as important determinants that impact the physicians' intention to use the

eHealth services (Hoque & Sorwar, 2015).This study takes into account the behavioural factor related to computer use, which plays an important role in the adoption of EMRs by doctors at Mohammed VI Hospital in Marrakech.

b) Adoption of EMR

As noted above, previous research has attempted to identify the factors that influence physicians' adoption of EMRs in different ways (Hossain et al (2019)) (Vossebeld et al (2019)). For example (Hossain et al., 2019), based on the theory of acceptance and use of unified technology (UTAUT), to study physician adoption of EMR systems in Bangladesh (Hossain). et al. Taddei (Vossebeld et al. (2019)) studied factors such as anxiety, self-efficacy, self-confidence, inadequacy and data security indirectly had a significant influence on physicians' intentions to use the EMR.

c) Performance Expectancy (PE):

Performance expectation is considered an important construct in behavioural research and refers to the expected improvement in performance after the adoption of a new system (V. Venkatesh et al 2003). This factor is derived from the perceived utility construct proposed in the TAM. The most valuable system is one that users believe will reduce their diversity and improve their performance (A. Granic and N. Marangunic, 2015) (V. Venkatesh, 2003).
It is found that PE is the strongest factor of users' BI to use a new technology (Lean, Zailani, Ramayah, & Fernando, 2009; Liébana-Cabanillas, Marinković, & Kalinić, 2017; Oliveira, Faria, Thomas, & Popovič, 2014; Venkatesh, Morris, Davis & Davis, 2003). PE influences users' BI to adopt the neweHealth services that may facilitate the overall health information systems (Gagnon et al., 2016; Pai & Huang, 2011). PE has a positive impact on users' intention to adopt a new technology (Hoque & Sorwar, 2015; Hoque, 2016a).

d) Effort Expectancy (EE)

According to Venkatesh et al (2003), effort expectation is defined as the degree of ease of use of the system. it was created from the perceived ease of use variable proposed in TAM (FD Davis, 1989). It refers to the ease of use of a new technological system and is associated with the user's interest in understanding it (Venkatesh V et al. (2011)). EE is a necessary variable to determine user behaviour in many areas, such as online systems,[(Jewer J 2018), (Steinhilber S, 2013) ((Hoque R, 2017)]. EE significantly influences the users' intention to adopt new technologies (Alalwan, Dwivedi, & Rana, 2017; Alalwan, Dwivedi, Rana, & Algharabat, 2018; Hoque & Sorwar, 2015; Weerakkody, El-Haddadeh, Al-Sobhi, Shareef, & Dwivedi, 2013). Previous studies also propose that EE has a positive impact on the users' intention to adopt the health information system. Such as, EE is regarded as a significant determinant directly affecting users' intention to use the EHR system, M-health monitoring systems, and eHealth services (Boontarig, Chutimaskul, & Chongsuphajaisiddhi, 2012; Lian, 2015; Sun, Wang, Guo, & Peng, 2013).

e) Social Influence (SI)

Social influence is defined as the extent to which an individual believes that other important users should use a new system (V. Venkatesh et al. (2003)). Three measures of SI used in this study include (1) user perspectives, (2) attitude of the living environment, and (3) community recognition of general practitioners. The SI as a direct attitude factor towards system use and behavioural intentions is presented as a subjective norm in TAM2, (V. Venkatesh and FD Davis, (2000)). FC is an important factor of BI and use of the new technologies (Yi, Jackson, Park, & Probst, 2006). The infrastructural support has a significant role in facilitating the use of the health information systems (Bhattacherjee & Hikmet, 2008). FC has a positive impact on the BI and use of the new eHealth services (Boontarig et al., 2012).

f) Facilitating Condition (FC)

FC is about how people think there is a technical support infrastructure in place that allows them to use the technology whenever necessary (V. Venkatesh et al. 2003). FC is an important factor of BI and use of the new technologies (Yi, Jackson, Park, & Probst, 2006). The infrastructural support has a significant role in facilitating the use of the health information systems (Bhattacherjee & Hikmet, 2008). FC has a positive impact on the BI and use of the new eHealth services (Boontarig et al., 2012). FC is a key factor for people using telemedicine systems ((Hoque R, 2017)(H. Sallehudin et al (2016)).

g) Perceived Risks

Perceived risk has been defined as the combination of two components: uncertainty and negative consequences (R.A. Bauer, 1960). Similarly, the adoption and use by physicians of technologies of Healthcare information is also subject to uncertainty and the degree of negative outcomes (A.K. Yarbrough & T.B. Smith,2007). Perceived risk was based primarily on the perceived level of uncertainty in the physician's use of health care information

technology (A.K. Yarbrough & T.B. Smith,2007). Previous studies have identified facets of perceived risk. Cunningham,1967 proposed the following six dimensions of perceived risk: (a) performance risk; (b) financial risk; (c) psychological risk; (d) social risk; (e) physical risk; and (f) temporal risk. In the context of online services, the following seven dimensions of risk were identified: (a) performance risk; (b) financial risk; (c) time risk; (d) psychological risk; (e) social risk; (f) privacy risk; and (g) overall risk.

In the context of healthcare, potential security and privacy problems compromising the confidentiality of EMRs indicate the importanceof performance, psychological, and privacy risk (A. Weeger et al.,2011)
In this study, we define physicians' perceived risk based on their perception of the likelihood of losing patient data or fear of losing the confidentiality of medical and personal patient data when exchanging EMRs between physicians and between hospitals.

Therefore, in this study perceived risk is a critical research variable.

Perceived risk is one of the most important concepts (Zhao, Y., Ni, Q. and Zhou, R. (2018)). In this study, perceived risks are related to the perceptions and/or uncertainties perceived by physicians when using the EMR. previous research has attempted to explore perceived risks for the use of EMRs (J.M. O. and González, M.VR (2011)) (Hsieh, P.J. (2015)). Other studies have shown that PR plays a negative role in the adoption of EMRs (Zhao, Y., Ni, Q. and Zhou, R. (2018)).

h) Behavioral intention to use EMR system

This research's principal objective is to examine the factors that influence physicians' behavioral intent and to continue to use the EMR as a support for the SIS in the future. According to Ajzen, (1991), intention is an indicator used to examine the factors that influence utilization behavior,Ajzen, (1991). FC is an important factor of BI and use of the new technologies (Yi, Jackson, Park, & Probst, 2006). The infrastructural support has a significant role in facilitating the use of the health information systems (Bhattacherjee & Hikmet, 2008). FC has a positive impact on the BI and use of the new eHealth services (Boontarig et al., 2012).

Table 1: Previous EMR adoptions by physicians

Study	Theory	Method	Variable
Hossain and al.	Unified Theory of Acceptance and Use of Technology (UTAUT)	Survey Sample = 249 physicians	**DV[1]:** behavioral intention, and use behavior **IV[2]:** performance expectancy, effort expectancy, social influence, facilitating condition, personal innovativeness in IT, and resistance to change
Emani and al.		Survey Sample = 1,075 physicians	**DV**: satisfaction with the outpatient EHR. **IV:** physician age, gender, race, specialty (primary care, medical specialty, and surgical specialty), number of outpatients seen per week, number of outpatient hours worked per week, practice size
Venkatesh and al.	Theory of acceptance and use of technology	Survey Sample = 141 physicians (longitudinal study)	**DV:** Behavioral intention and use behavior **IV:** Performance expectancy, effort expectancy, social influence, and facilitating conditions
Egea and González	TAM	Survey Sample = 254 physicians	**DV:** Perceived risk, institutional trust, perceived usefulness, perceived ease of use, attitude towards usage, and usage intentions of electronic health care records (EHCR) **IV:** information integrity

[1]DV: dependent variable.
[2]IV: independent variable.

Sykes et al.		Survey Sample = 151 physicians/8,440 patient	**DV:** EMR system use and performance (patient satisfaction) **IV:** Characteristics of individual, technology perception, and social network centralities

Hypothesis and Research model

Based on the literature review on the extended UTAUT model in the healthcare sector, the purpose of our study is to investigate the factors that influence physicians' behaviour towards the EMR system adoption.

This model explain behavioral intention by suggesting four principal factors, namely performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). After extensive review of literature conducted using UTAUT in health technologies,we used the basic constructs of the UTAUT model (Fig. 1) and modified it based on extensive literature review .

The proposed model established in this study hypothesizes that apart from the four basic constructs (PE, EE, SI and FC), perceived risks (PR) may have significant loading on the acceptance and use of the EMR system in Morocco.

The modification on the model is to increase the prediction of the intention to use the EMR system by physicians. The following sections explain the hypotheses developed in this study for investigating the research question.

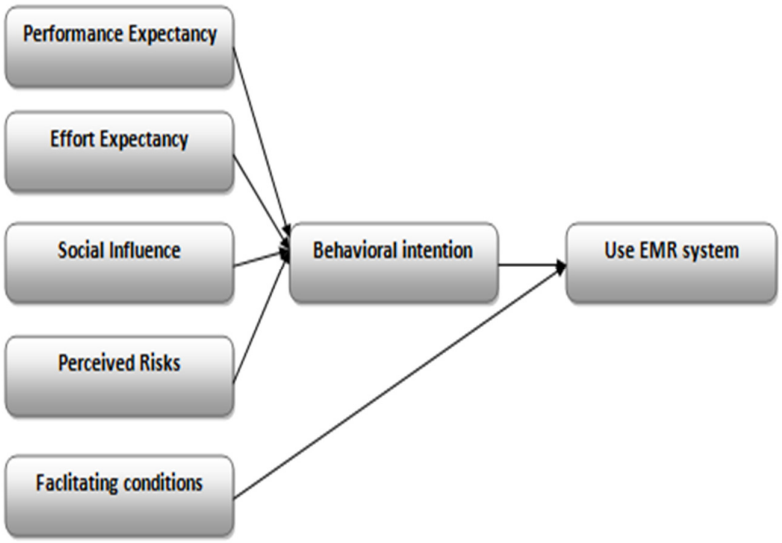

Figure. 1: Research Model (2019)

Hypothesis1: *Performance Expectancy has a significant influence on the behavioral intention to use EMR.*
Hypothesis 2*: Effort Expectancy has a significant influence on the behavioral intention to use EMR.*
Hypothesis 3: *Social Influence has a significant influence on the behavioral intention to use EMR.*
Hypothesis 4: *Facilitating Condition has a significant influence on the behavioral intention to use EMR.*
Hypothesis 5: *Physician's perceived risk has a significant influence on the behavioral intention to use EMR.*
Hypothesis 6: *behavioral intention has a significant influence on the use of EMR system.*

Conclusion

Based on the findings presented in the literature review, the UTAUT model is one of the most commonly used models in healthcare information technology adoption research. As part of the research model proposed above, additional qualitative and quantitative research would be required to determine the ability of this model to explain the end-user's intentions to use the EMR system. Our study's main objective is to validate the UTAUT model and

variables that identify physicians' intentions and behaviours that can be used in the context of e-recording and technology communication.

The construct measures shown in Fig. 1 will all adopted from previous studies and measured using a 7-point Likertscale; the anchors ranged from “strongly agree” to “stronglydisagree.” Although previous studies have validated the ques-tionnaire items, we will conducted pretests by requesting severalphysicians and information management professors to evalu-ate each item. To ensure validity and reliability, we will conducted a pilot test with a sample that was representative of the actualrespondents. We will conducted structural equa-tion modeling using partial least squares (PLS) estimations forthe data analysis because the PLS method requires a minimalsample size and has few residual distribution requirementsfor model validation . The target participants will be physi-cians who had experience using the EMR exchange in Mohammed VI University Hospital Center in Marrakech, Morocco.

EMR adoption in hospitals may be very important to improve health services. Understanding and identifying the needs and perceptions of physicians and the physicians of Mohammed VI Hospital in Marrakech is very important for the implementation of the EMR. E-Medical records will help physicians by offering them more information about the health of their patients as well as providing them with health care services in remote locations.

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Determinants of EMR Adoption and Use by Healthcare Professionals in Developing Countries: A Systematic Review

Oumaima Hafide[1], Abdelaziz Zitouni[2] and Youness.Lafraxo[3]

[1]PhD student, Faculty of Law, Economics and Social Sciences Marrakech, Morocco
oumaima.hafide@gmail.com

[2]PhD student, Faculty of Law, Economics and Social Sciences Marrakech, Morocco
zitabdelaziz@gmail.com

[3]University professor, Faculty of Law, Economics and Social Sciences Marrakech, Morocco
younes.lafraxo@gmail.com

Abstract

Background: The Electronic Medical Record (EMR) is the backbone of today's global healthcare systems, enabling the management and computerized sharing of all patient medical information. The sharing of medical data between healthcare professionals enables the improvement of the efficiency and quality of healthcare services provided to patients. Despite the promise of EMR use, health care professionals continue to resist its adoption and successful EMR deployment remains a major challenge. **Objectives**: The objective of this study was to identify and synthesize the determinants of EMR adoption, through a systematic literature review, by healthcare professionals in developing countries. **Methods**: A systematic literature review was conducted using the PRISMA-P (Preferred reporting items for systematic reviews and meta-analyses) methodology. Articles published between January 2010 and June 2020 that studied the determinants of EMR adoption and acceptance by health professionals in developing countries were identified using five online databases: ScienceDirect, Springer Link, Scopus, Emerald and Sage journals. The selection process excluded duplicate articles and articles that did not directly address the objectives of this study. In the end, 17 articles were included. The extraction of results was done by two researchers, independently. **Results**: This study included 17 articles that examined the determinants of adoption and acceptance of EMR use by health professionals in developing countries. From these articles, 27 factors were identified and grouped into 4 classes: (1) technological factors (2) individual characteristics of healthcare professionals, (3) organizational and managerial characteristics and (4) social factors. **Conclusion**: Identifying the determinants of EMR adoption in developing countries is crucial for health system managers and policy makers. It allows them to grasp the expectations of potential users and to adjust EMR deployment strategies in order to successfully integrate the EMR into medical practices.

Keywords: EMR Adoption; EMR Adoption; Developing Countries.

Introduction

Over the past decade, worldwide, there has been a shift from paper-based documentation to electronic documentation and the way in which patient information is stored and accessed in healthcare (Aruldass, 2019). The use of electronic patient medical records (EMRs) has made it easier for healthcare professionals to access critical patient information. Organizational quality and safety teams are now able to capture and communicate data more effectively. This process helps guide practice improvement and ensure the provision of high-quality, ongoing care (BORYCKI, 2015)[1].

EMR implementation has also contributed to a reduction in unnecessary surveys and procedures and medication errors, mainly due to error-prone handwritten documents, illegible handwriting and the care of professionals using different terminology. Research has shown that the use of the EMR has improved communication between health

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care providers, patients and their families, compared with the previous paper-based documentation (BORYCKI, 2015).

Physicians are the primary users of EMRs in hospitals. Specifically, they can easily create access, distribute and share patient records among physicians and other stakeholders. During EMR implementation, however, many physicians face technical problems (system failure and poor interface design), inefficiencies, data errors and system incompatibility issues (Freudenheim, MILT (2012)). In addition, physicians are concerned about loss of autonomy or changes in the power structure, Sherer, S.A. (2010). Nurses and midwives, the largest cohort of health care staff, are important professionals affected by advances in EMR technology (ACN, 2017, Dixit and Sambasivan, 2018, University of Scranton, n.) [2].

There is a major barrier to widespread adoption of EMRs due to the limited support base of physicians. To increase physician willingness to adopt EMRs, it is important to change their attitudes and receive ongoing support, as they are the primary users of these systems (Venkatesh, V., Sykes, TA, Zhang, X. (2011)) [3]. Many countries are in the process of creating a medical record; however, the limited acceptance of this technology presents a serious challenge to its successful use. Therefore, this paper aims to clarify the acceptance of the EMR system, particularly in developing countries.

For this study, the objective is to identify the most significant determinants of EMR acceptance by health professionals in developing countries based on a systematic review of 17 articles on the topic. Our main efforts focused on addressing the following questions: What are the user-intention factors for EMR adoption in developing countries? In the form of a new integrated model.

Methods

Search Strategy

Five electronic databases (ScienceDirect, Springer Link, Scopus, Emerald and Sage journals.) were systematically searchedto identify articles published between January 2010 and June 2020 examining the factors influencing healthcare professionals' adoption and use of electronic medical record (EMR) Inhealthcare settings in the developing countries. The search string was: (adoption OR acceptance OR use) AND (electronic health record OR EHR OR electronicmedical record OR EMR OR electronic record) AND (developing countries).

Article Selection

A set of inclusion and exclusion criteria were applied to select the articles to include in our analysis. An article has been included if it meets all of the following criteria:

(1)examined the factors influencing healthcare professionals 'adoption and use of electronic medical record (EMR); (2) was conducted in one of the developing countries; (3) has been the subject of empirical research in healthcare establishment; (4) was published between January 2010 and June 2020; (5) the full text of the article was available and (6) has been published in English. Literature review articles, opinions and comments were excluded from this review. Applying the PRISMA method "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" and using the online software Covidence, duplicate articles have been excluded. Then, two PhD students (ZI and HA) independently reviewed the titles and abstracts of the remaining papers to exclude papers that did not meet one of the inclusion criteria listed above. The full-text of eligible articles were then examined. The reviewers submitted their analysis to the concordance process and extracted relevant articles from among those previously selected. The above selection process was repeated until saturation; Figure 1 summarizes this process

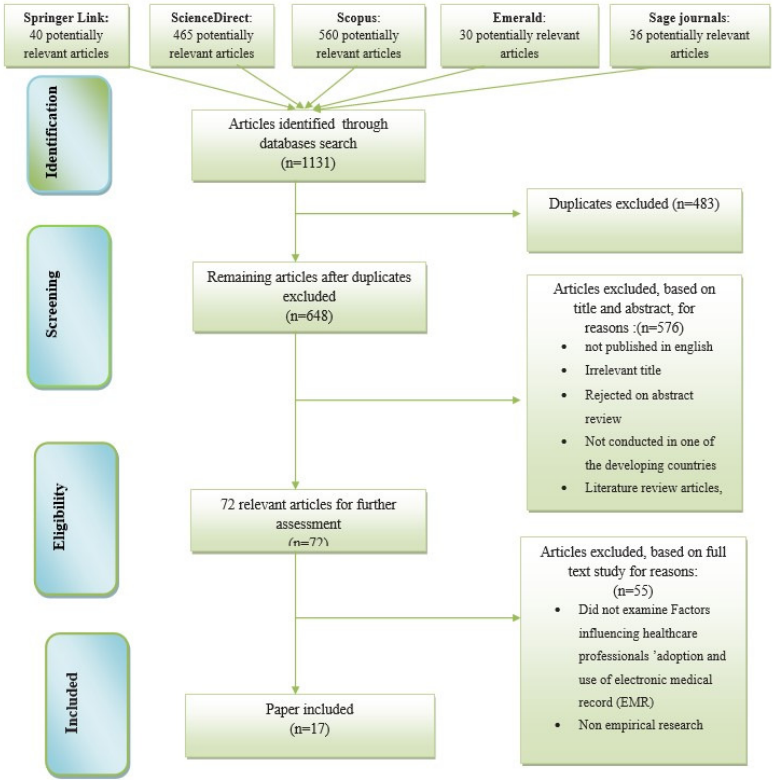

Figure 1: Study selection process.

Key Finding:

Table 1 below summarizes the main findings of the 17 selected articles and the main factors influencing EMR adoption by health professionals in developing countries. The results of this systematic review found that acceptance of EMR use by health care professionals are influenced by a variety of factors. These include factors related to the technological characteristics of the system, health care the personal characteristics of the professionals, social factors and organizational and managerial factors.

Table 1: key findings

Author/s and	Title	Country	Study setting	Type of research	Types of participants	Number of participants/cases	Results of study / key findings	Factors influencing adoption of EMR/
Bakheet et al. ,2018 ([4])	"Assessment of factors influencing nurses acceptance of electronic medical record in a Saudi Arabia hospital"	Saudi Arabia	Hospital	quantitative	nurses	153	Results showd that System qualities,Top management and IT support, perceived usefulness and perceived ease of use were the main factors influencing nurses acceptance of EMR implementation EMR acceptance.	*System qualities *Top management * IT support *Perceived usefulness * Perceived ease of use
Noh Mijin et al.,2019 ([5])	"Attitude toward the use of electronic medical record systems: Exploring moderating effects of self-image"	Korea	Hospital	quantitative	doctors, nurses, and administrative staff	209	Results of the studys showed that compatibility, security and accuracy have a positive effect on perceived usefulness.Moreover, self-image acted as a moderating variable between the relationships between PEOU and attitude and between PU and attitude toward the use of EMR	*Compatibility *Security *Accuracy *Perceived usefulness (PU) * Perceived ease of use(PEOU) *Self-image acted as a moderating variable
Basma Salameh et al.,2019 ([6])	"Nurses' Attitudes Toward the Use of an Electronic Health Information System in a	Palestine	Hospital	Quantitative	nurses	191	Results of the studys showed that nurses with more experience were more positive about the electronic health information system,	* Work experience * Degrees level

	Developing Country"						also nurses with higher degrees had more positive attitudes: degrees level toward EHRs.	
Seok Kim et al .,2016 ([7])	"Analysis of the factors influencing healthcare professionals' adoption of mobile electronic medical record (EMR)"using the unified theory of acceptance and use of technology (UTAUT) in a tertiary hospital	South Korea	Hospital	Quantitative	doctors and nurses	449	Results of the studys showed tha the influences of Performance Expectancy (PE) on Attitude(ATT) and ATT on the Behavior Intention to Use were stronger than the other relationships between the latent variables , Effort Expectancy (EE) in the Mobile EMR positively influence ATT. Social influence (SI) in the Mobile EMR positively influence the intention to use. Faciliting Conditions FC in the Mobile EMR positively influence the intention to use.greater influence of PE on ATT and a greater influence of ATT on the behavioral intention to use EMR.	* Performance Expectancy (PE) *Attitude(ATT) *Effort Expectancy (EE) * Social influence (SI) * Faciliting Conditions (FC)
Akram Hossaina et al .,2018 (8)	« Investigating factors influencing the physicians' adoption of electronic health	BANGLADESH	Hopital	Quantitative	Physicians	249	Results of the studys showed that Performance Expectancy (PE), Attitude(ATT) ,Effort Expectancy (EE)	*Performance Expectancy (PE) *Attitude(ATT) *Effort Expectancy

	record (EHR) in healthcare system of Bangladesh: An empirical study »						,Social influence (SI) Faciliting Conditions (FC) appeared the most important factors influencing EMR use.	(EE) *Social influence (SI) *Faciliting Conditions (FC)
Mohammadhiwa Abdekhoda et al.,2014 ([9])	"The effects of organizational contextual factors on physicians' attitude toward adoption of Electronic Medical Records"	IRAN	Hopital	Quantitative	physicians	330	Results of the studys showed that perceived usefulness (PU), perceived ease of use (PEOU), management support ,physicians' involvement, physicians' autonomy, and the doctor–patient relationship have direct and significant effect on physicians' attitudes toward EMRs' adoption	* Perceived usefulness (PU), * Perceived ease of use (PEOU), * Management support; * Physicians' involvement, * Physicians' autonomy, * Doctor–patient relationship
Mohamed Khalifa.,2013 ([10])	"Barriers to Health Information Systems and Electronic Medical Records Implementation"	Saudi Arabia	Hospital	quantitative	healthcare **professionals**	158	Results of the studys showed that the main Barriers to Health Information Systems and Electronic Medical Records Implementation: 1) Human Barriers, related to the beliefs, behaviors and attitudes, 2) Professional Barriers, related to the nature of healthcare jobs, 3) Technical Barriers, related to computers and IT, 4) Organizational Barriers, related to the hospital management, 5) Financial Barriers, related to money and	*Human Barriers, related to the beliefs, behaviors and attitudes, * Professional Barriers, related to the nature of healthcare jobs, *Technical Barriers, * Organizational Barriers, related to the hospital management, * Financial Barriers * Legal Barriers, related to laws and legislations.

							funding and 6) Legal and Regulatory Barriers, related to laws, regulations and legislations.	
PouyanEsmaeilzadeh et al.,2015 ([11])	"Adoption of clinical decision support systems (CDSS) in adeveloping country: Antecedents and outcomes of physician's threat to perceived professional autonomy"	Malaysia	Hospital	quantitative	physicians	335	Results of the studys showed that factors such as perceived threat to professional autonomy, performance expectancy, and physicians' involvement in making decision about CDSS have significant impact on physicians' intention to adopt CDSS;(2) physicians' attitude toward knowledge sharing, interactivity perception and computer self-efficacy of physicians play a crucial role in influencing their perceived threat to profes-sional autonomy	*Perceived threat to professional autonomy, *Performance expectancy, *Physicians' involvement *Physicians' attitude toward knowledge sharing, *Interactivity perception *Computer self-efficacy *Social network,
Badeia Jawhari et al.,2016 ([12])	« Barriers and facilitators to ElectronicMedical Record (EMR) use in anurban slum."	Kenya	Hospital	Qualitative	Staf of two primary care clinics	2	Results of the studys showed that systems challenges (e.g.,power, network, Internet, hardware, interoperability) and software (e.g., data integrity, confidentiality,function) , social factors (e.g., identity management, training, use incentives)	*Interoperability * Data integrity, *Confidentiality * Social factors * Management, * Training, * Use incentives

							appeared the most important factors influencing EMR use.	
Pi-Jung Hsieh(2015) ([13])	« Physicians' acceptance of electronic medical records exchange: An extension of the decomposed TPB model with institutional trust and perceived risk. »	Taiwan	Hospital	Quantitative	physician Chief resident Resident intern	191	The study findings show that the following five factors have a significant influence on the physicians' intentions to use EMR exchange systems: (a) attitude; (b) subjective norm; (c) perceived behavior control; (d) institutional trust; and (e) perceived risk. These five factors are predictable by (PU), (PEOU), and compatibility, facilitating conditions and self-efficacy, institutional trust, respectively.	*Attitude, * Subjective norm, * Perceived behavior control, *Institutional trust, *Perceived risk, * Perceived usefulness(PU), *Perceived ease of use (PEOU) *compatibility * self-efficacy * facilitating conditions
Kirubel Biruk Shiferaw and Eden Abetu Mehari (2019) ([14])	« Modeling predictors of acceptance and use of electronic medical record system in a resource limited setting: Using modified UTAUT model »	Ethiopia	Hospital	Quantitative	Physicians Nurses	423	The results from this study depicted that behavioral intention to use EMR is a result of performance expectancy, social influence and attitude towards using EMR system. Among these three predictor variables, attitude	* Performance expectancy. * Social influence. * Attitude.

							towards using an EMR system, and social influence, were relatively the strongest predicting factors.	
Daria Spatar et al.(2019) ([15])	« Adoption factors of electronic health record systems »	Turkey	Hospital	Quantitative	Healthcare employees from different organizations with different purposes.	300	Results of the studys showed that Ease of use was significantly and positively affected by information quality, software mobility and accessibility, user interface, and ease of learning. Developers should take factor that had a positive effect in perceived usefulness.	* Ease of use, * Information quality, * Software mobility * Accessibility. * User interface. * Ease of learning. * Perceived usefulness.
Tsai Min-Fang et al.(2019) ([16])	« Understanding physicians' adoption of electronic medical records: Healthcare technology self-efficacy, service level and risk perspectives. »	Taiwan	Hospital	Quantitative	physicians from 15 different academic medical centers and metropolitan hospitals.	217	Results of the studys showed that Physician's perceived service level positively influences their PU and PEOU of EMR. Healthcare technology self-efficacy of physicians significantly positively influences their PEOU of EMR.	* Perceived usefulness (PU). * Perceived ease of use (PEOU). * Healthcare technology * Self-efficacy of physicians. * Perceived service level.
Chung-Feng Liu1 and Tain-Junn Cheng(2015) ([17])	« Exploring critical factors influencing physicians' acceptance of mobile electronic medical records based on the dual-	Taiwan	Hospital	Quantitative	Physicians	158	Results of the studys showed that The inhibitor of perceived threat has a significant impact on the physicians' perceptions of usefulness as well as their intention to use.	*Perceived threath. * Perceived usefulness (PU). * Perceived ease of use (PEOU). * Perceived mobility.

	factor model: a validation in Taiwan »						The enablers of (PEOU) and (PU) were also significant. In addition, as expected, perceived mobility was confirmed to have a significant impact on (PEOU),(PU) and perceived threat.	
Jeremiah Scholl et al.(2011) ([18])	«A case study of an EMR system at a large hospital in India: Challenges and strategies for successful adoption »	India	Hospital	Qualitative	Hospital managers. IT staff. health staff and an employee of the vendor	21	A significant factor related to the complex organizational environment at was that the EMR system was expected to deliver a wide range of benefits. One of the key social issues that made adopting the system a challenge was that many of the staff were reluctant to change, and in some cases had little or no previous experience using computers	* Perceived benefits *Resistance to change * Management * Computing experience.
Ren-Zong Kuo (2018) ([19])	« EMRS Adoption: Exploring the effects of information security management (ISM) awareness and perceived service quality. »	Taiwan	Hospital	Quantitative	Health professionals	200	Results of the study indicate that with sufficient technical support and high ISM awareness, it can facilitate to enhance the quality of system characteristics of EMRS, which in turn favourably increases users' willing to continue using the system to advance their	* Technical support. * Perceived service quality. * information security *management awareness

							healthcare practices, resulting in successful adoption of EMRS.	
Azza El.Mahalli (2015) ([20])	« Adoption and Barriers to Adoption of Electronic Health Records by Nurses in Three Governmental Hospitals in Eastern Province, Saudi Arabia »	Saudi Arabia	Hospital	Quantitative	Nurses	300	Results of the study indicate that the most frequently cited barrier among all hospitals was "loss of access to medical records transiently if computer crashes or power fails" (88.6 percent). This was followed by "lack of continuous training/ support from information technology staff in hospital" (85.9 percent), "additional time required for data entry" (84.9 percent), and "system hanging up problem" (83.8 percent). Complexity of technology (81.6 percent). .	* IT support * Contnuous training *Additional time * Complexity of technology

Results and Discussion

A total of 17 papers met the criteria for adoption of the EMR, of which 8 were on individual factors (Perceived Usefulness, Perceived Ease of Use, Work Experience, Computer experience, Degrees level, Effort expectancy, Self efficacy, Professional autonomy) and 8 on Organizational & managerial factors. Some of the articles also include technological factors (Compatibility, Complexity, Security data, Accuracy data, data integrity) and social factors (Social influence, Docor-patient relationship, Interactivity perception). The articles reviewed provide a diverse international perspective on the topic of EMR adoption in developing

countries. The methodology applied in the 17 articles reviewed is summarized in Tables 1 and 2. 15 articles reported on studies using quantitative methodology with surveys and two articles used qualitative methodology.

The results of this systematic review found that acceptance of EMR use by health care professionals are influenced by a variety of factors. These include factors related to the technological characteristics of the system, health care the personal characteristics of the professionals, social factors and organizational and managerial factors, as shown in Table 2 below.

Individual determinants are the most frequently cited, with Perceived Usefulness and Perceived Ease of Use being the main explanatory factors for EMR adoption, this result is consistent with other empirical findings (S. Hong, J.Y.L. Thong and K.Y. Tam 2006; M.-C. Lee 2010; Bowling, A.2016).The influence of organizational and managerial factors is less important than that of individual factors, in this sense, the review of this study showed that management of EMR implementation and technology support promote the adoption of EMRs by health care providers, a result consistent with other empirical findings (Bowers et al. 2011; Kowitlawakul et al. 2013; Choi, Lee, Park, 2015). The influences of social and technological factors are less significant than individual and organizational/managerial factors because health care professionals have a high degree of autonomy in decision-making.

Table 2: factor frequencies

Category	Factors	References	Number of references per category	Number of references per factors
Technological	*Compatibility *Complexity *Security data *Accuracy data *data integrity	5;13 20 5;19;12 5 12	8	2 1 3 1 1
Individuals	*Perceived Usefulness * Perceived Ease of Use *Work Experience *Computer experience *Degrees level *Effort expectancy *Self efficacy *Professional autonomy	5;9;13;15;16;17 4;5;9;13;16;17 6 18 6 7;8 11;13;16 9;11	22	6 6 1 1 1 2 3 2

Organizational & managerial	*Top management *IT support *Facilitating conditions *Physicians' involvement *Use incentives *Training *legal factor *Social influence	4;10;12;18 4;9;19;20 13 9;11 12 12;20 10 12;14	17	4 4 1 2 1 2 1 2
Social	*Social influence *Docor-patient relationship * Interactivity perception	12;14 9 11	4	**2** **1** **1**

Conclusion

This study examines health care professionals' intentions regarding EMR maintenance and their adoption of the extended functions of EMR systems in their practice. In order to achieve the study's objective of identifying and synthesizing the determinants of EMR adoption by health professionals in developing countries through a systematic review of the literature.

This study includes 17 articles that examine the determinants of adoption and acceptance of EMR use by health professionals in developing countries. From these articles, 27 factors were identified and grouped into 4 classes: (1) technological factors, (2) individual characteristics of health professionals, (3) organizational and managerial characteristics, and (4) social factors.

A review of the identified articles shows the wide range of opportunities and barriers to implementing EMRs. Despite the positive effects of EMR use in hospitals, the rate of adoption of EMR systems in hospitals is still low and they face resistance from health care professionals.

The use of electronic medical records requires the presence of certain users and system attributes, the support of others, and many organizational and managerial factors and environmental enablers. In addition, difficulties in using EMRs and the non-use of specific functions result from the presence of barriers.

By considering the factors identified in this study, it should be possible to improve clinicians' ability to use EMRs easily and effectively. This, in turn, will increase the likelihood of quality and safety improvements through EMRs.

The review found that implementers can insulate the project from these by establishing strong leadership, using technical project management, standards setting, and training of their staff to ensure risks do not compromise successful implementation. Decision support tools can only be used to accelerate universal adoption of the EMR.

The findings of this study can be used as an overview of adoption drivers and barriers that professionals may potentially see in the EMR implementation process.

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The Stabilization Effects of Fiscal Policy on Banking System Stability in Nigeria

Agatha Nkem AMADI[1]
Department of Banking and Finance, Covenant University, Ota, Nigeria
agatha.amadipgs@stu.cu.edu.ng
agatmercy@gmail.com

Kehinde Adekunle ADETILOYE[2]
Department of Banking and Finance, Covenant University, Ota, Nigeria
kehinde.adetiloye@covenantuniversity.edu.ng

Alexander Ehimare OMANKHALEN[3]
Department of Banking and Finance, Covenant University, Ota, Nigeria
alexander.omankhanlen@covenantuniversity.edu.ng

Idimmachi Pius AMADI[4]
Department of Economics and Development Studies, Ota, Nigeria
idimmachi.amadi@stu.cu.edu.ng

Pascal NWODIMMAH[5]
Department of Banking and Finance, Covenant University, Ota, Nigeria
pascal.nwodimmah@stu.cu.edu.ng

Abstract

The study examined the stabilization effect of fiscal policy on banking system stability in Nigeria between 1985 and 2019. The study adopted ADF, and Cointegration technique to check the stationarity and to determine the existence of long run relationship among the variables. Ordinary least square technique was used to evaluate the interaction between fiscal policy and banking system stability. The finding indicates that fiscal policy actually has strong influence on banking system stability in Nigeria. It further was discovered that among the fiscal policy variables, Public Debt has more effect on banking systems than other variables used in the study. This indicates that the more debt the government accumulates, the greater the instability in the banking system. It is thus imperative to offer policy implications for Nigeria. The study recommends that government should put appropriate checks in place to avoid borrowing that will creep into deficit since debt affects banking system stability. Finally, government should ensure that its borrowings are channelled towards productive segments of the economy to enhance Sustainable repayment of debt and the mechanisms for debt repayment must be severely adhere to.

Keywords: Stabilization, Policy, Debt; Expenditure.

Introduction

The 2007 financial crisis of United States caused so many negative effects on its economic growth and those of other economies of the world which triggered the Great Financial Crisis (GFC) of 2008 (Alqahtani and Mayes (2018), Knowles Phillips and Lidberg (2017). The banking system, being the centre of financial system experienced diverse challenges that led to the liquidation of many banks. According to Dumičić (2019) fiscal policy has some vast macro-prudential potentials because of its several link with both the real economy and the financial systems. For example, tax policies, public expenditure, public debt management, different social and structural measures and other fiscal policy measures are aimed at fuelling higher employment and sustainable economic growth. Adegoriola (2018) opined that fiscal policy is a critical part of post-crisis framework for macro-financial stability. The study revealed

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further that while banking crisis cause havoc to public finances, rising fiscal risks also directly or indirectly cause deterioration to the financial system.
In Nigeria, fiscal policy became a major tool used for economic and banking system stabilisation since 1970s due mainly to; (i) the dominant role the domestic public sector played during the oil boom era in early (ii) the necessity for reconstruction of the whole economy after the civil war, (iii) the strategy of industrialization adopted at a time in Nigeria which was the militarization of governance and the import substitution industrialization policy (Agu, Okwo, Ugwunta and Idike 2015). Indisputably, fiscal policy is crucial for the existence of a sound and healthy banking system because government's control to tax and expenditure affects the general business environment and disposable income of citizens and corporations which aids banking system stability. Despite the undisputable relevance of fiscal policy for curbing instability and preserving banking system stability, there are currently, no prior researches on the coordination between fiscal policy and banking system stability in Nigeria and no study exists on fiscal policy that aims at stabilizing Nigeria banking system.

The empirical study is imprecise about whether or not any of the tools of government policy matter in decoupling the banking system stability in Nigeria. The counter-cyclical fiscal policy reaction to banking system stability is one channel that has been identified. However, in the empirical literature, lesser attention is given to its effects on banking system globally, particularly emerging countries like Nigeria that has frequent banking system crisis which are cause by both domestic and global shocks, thus making it very challenging and indeed difficult for government to adjust its fiscal expenditure in adverse periods of shocks. Consequently, not only is this sort of study timely and necessary, it is central in decoupling the banking system stability link through fiscal policy response tools. Again, the rationale for this study cannot be overstated as the banking system in Nigeria is faced with persistent and large shocks that results from global crisis, the uncertainty of oil prices and the implementation of counter-cyclical fiscal policies to boost the economy. Subsequently, the core thrust of this study is to analyse the effect of fiscal policy variables on banking system stability in Nigeria. This study adds to the existing literature in three ways. First, this study applies broad measures of fiscal policy tools on banking system stability in Nigeria. Second, the importance of the link between fiscal policy tools and banking system stability in Nigeria is analysed, and lastly, econometric model is used to examine the macro data in order to provide appropriate policy direction for the management of banks, financial regulators and the government. The study is designed in five sections. Following this section is the literature review section while sections three and four represent the methodology and empirical analysis, respectively and section five is the conclusion and recommendation. Indisputably, fiscal policy is crucial for the existence of a sound and healthy banking system because government's control to tax and expenditure affects the general business environment and disposable income of citizens and corporations which aids banking system stability.

Literature Review

Conceptual Review

Fiscal Policy

According to Ubi-abai and Bosco (2017) fiscal policy is defined as interventions tools of government via expenditure and tax system used for the achievement of macro-economic goals such as full employment, price stability and economic growth. The automatic stabilizers are a set of fiscal policy designed to offset variations in a country's economic activities through normal operations without extra approval by the policymakers or government. It is called automatic stabilizer fiscal policy because it stabilizes economic cycles and financial system and are routinely triggered without extra government action. For instance, during boom, tax receipts automatically increase while expenditure on benefits falls automatically, thereby, limiting the amount of economic growth. Automatic fiscal stabilisers differ from discretionary fiscal policy in that automatic stabilisers take place during recession when a government automatically spends extra due to additional claims for unemployment benefits. However, government may increase expenditure if it discovers that the automatic stabilisers are not sufficient to cater for the unemployment claims.

Banking System Stability

The Basel Committee on banking supervision established the initial set of guidelines- Basel I to complement banking regulations which was to improve the stability of the banking system and to fill the synchronization gap that lead to prior financial crisis. It was however discovered that Basel 1 is ineffective owing to rapid financial development

caused by innovation and risk management. A new framework called Basel II was developed in 2004 which was based on three pillars: supervisory review, market discipline and minimum capital requirement. The implementation of Basel II framework was both slow and difficult. The 2007-2010 global financial crisis had massive impact on global banking system stability. The unpredictable business environment characterized by increased financial distresses and bank failures called for immediate attention to be paid to the banking system in particular and financial institution in general. A lot of issues were raised and due to the impact they had on the economies, the desire to salvage the problems became top priority for financial experts, scholars, policy makers and researchers. This made the Basel Committee on banking and supervision to implement another novel framework for banking supervision which was established after serious re-examination of the previous banking regulatory frameworks – Basel I and II and caused formation of guidelines for Basel III framework. A huge disruption of the banking system operations will certainly affect the entire society. Thus, banking stability critical to reducing the extensive social and economic shocks that may arise from problems in the banking system (Neem 2019).

The relationship between fiscal policies and the banking system

The fiscal policies of the governments (local, state and federal) have *direct link* with the banking system when their fiscal deficits are financed and debts managed. This direct relationship eminent from government participating as a borrower or lender in the financial markets, the provision of incentives through tax and tax cuts, as well as the spending structures. Similarly, the *indirect* relationship among fiscal policy and the banking system through households and non-financial corporations are broad and highly relevant. This indirect link may likely have more relevance for banking system stability than the direct links. The fiscal policy could signify a risk to banking stability if it poses a risk for the operations of the real economy. Nevertheless, fiscal policy contributes positively to banking system stability as long as it supports the overall economic developments. Furthermore, the concept of the direct and indirect linkage between the fiscal policy and banking system stability may depend mainly on the financial capacity of the government which is in turn is influenced by the size of accepted and contingent government support already provided to the banking system (Itoro Ubi-Abai 2017; Okoye, Evbuomwan, Modebe, & Ezeji 2016).

Framework

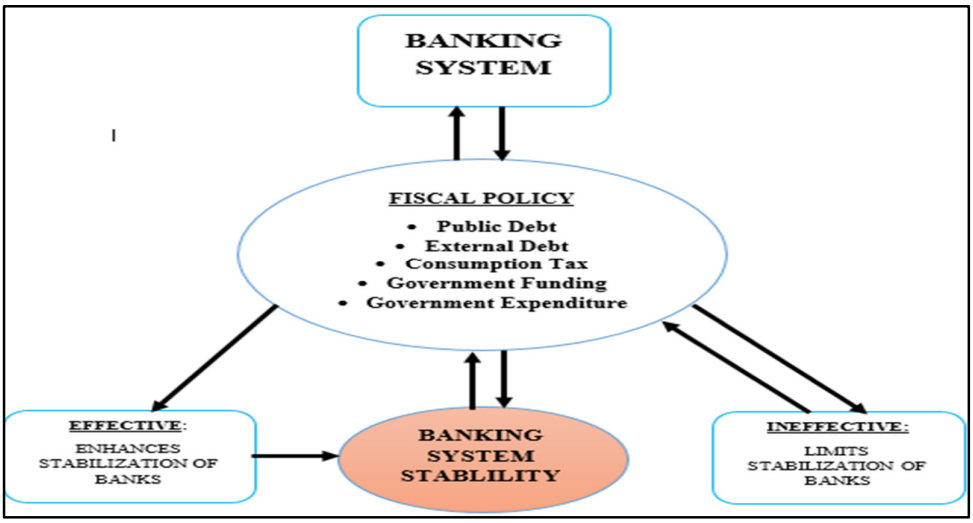

Fig. 1: Fiscal Policy and Banking System Stability.

Sources: Author's Own compilation (2020).

Stylized Facts

According to Okoye et al (2016) fiscal policy has been defined by scholars like as a channel through which government regulates the level of its spending to monitor and impact on the economy. Fiscal policy used alongside the monetary policy the central bank influence money supply in a country. These policies are used to achieve macroeconomic goals which include; favourable balance of payment, price stability, decrease in poverty level, full employment, reduction in a country's debt, and sustainable economic growth. Government spending is a key component of the GDP and it denotes public expenditure on goods and services. It is among the fiscal policy tools which involves adjustment of taxation, setting up budget targets.

Previous study showed that there has been an increase in government spending from ₦1,077,871.98 million in the 3rd quarter of 2019 to ₦1,082,949.34 Million in the last quarter of 2019. Increase in government spending impacts positively on banks' performance which is a plus to banking system stability because more funds will pass through the banks to the end user – the consumers. Similarly, it found that there was a decrease in fiscal expenditure decreased from ₦2,074.46Billion in the third quarter of 2019 to ₦2,414.03Billion in the fourth quarter of 2019 (Trading Economics 2020).

Empirical Review

As indicated in a study by Matallah and Matallah (2017); Okoye et al (2016); Aero and Ogundipe (2016) fiscal policy involves deliberate actions of the government as it relates to expenditure and levying taxes or tax cuts for the sake of influencing the macroeconomic factors in the preferred direction. The importance of fiscal policy tools with regards to banking system stability is yet to gain prominence in Nigeria (Neem 2019). In this section, the study discussed numerous strands of previous literature. This include: Okoye et al (2016); Aero et al (2016); Agu et al (2015) which focused on fiscal policy and economic growth. Thach, Oanh and Chuong (2019); Adegoriola (2018); Ubi-abai et al (2017) analysed the nexus between fiscal policy and financial stability. Dumičić (2019) studied the linkages among fiscal policy and financial instability.

For studies that focus on fiscal policy and economic growth, Aero et al (2016) confirmed that significant negative link among fiscal deficits, economic growth and financial depth in Nigeria. Also, a 5% threshold level was established, this is said to be a conducive level for economic growth at a 1-year lag. It therefore resolved that the economy has been categorized by constant fiscal deficits which has negative influence on economic growth. Similarly, Neem (2019) focused 10 countries between the period of 2002 to 2014 and adopting a dynamic panel of ARDL technique, the result showed that fiscal policy is a basic instrument for economic growth.

Dumičić (2019) examined the relationship between fiscal policy and financial instability. The study ascertained and defined the key channels by which fiscal policy is related to financial instability. The study explored numerous features of public debt that are linked to financial stability, which includes; the funding costs of government and its effect on private sector costs of funding, exposures of financial institutions to the government and sustainability of public debt management. The study found that in the case of fiscal policy, which relates to election cycles have different time horizon for each of economic policymakers as its peculiar problem. Thus, have a negative effect on countercyclical capacity. It further revealed that in future policy work and research, the macro prudential capability of fiscal policy will attract more attention.

Moreover, Ubi-abai et al (2017) focused on the effect of fiscal policy measures on key macroeconomic goals from 1980 to 2013 in Nigeria. The result shows that fiscal policies caused increased growth in output however, the long run impact was not effective. Furthermore, Thach et al., (2019) discussed the impacts the interaction between fiscal and macro-prudential policies have on financial stability in Vietnam from 2008 to 2009. The result revealed that fiscal and macro-prudential policies have great influence on financial stability.

Agu et al (2015) analysed the influence of several tools of fiscal policy on the economy of Nigeria. The result showed that aggregate government expenditures have inclined to increasing with government revenue but revenue increased slower than expenditure. Thus, indicating poor economic growth in Nigeria. It found further that positive correlation exists among government expenditure and economic growth. Again, Alińska (2016) established that fiscal policy is a critical measure of the post-crisis macro-financial stability framework. The study confirmed that the banking

system crisis cause distraction to public finances and increased fiscal risks also lead to the decline of the financial system. The result showed that a resilient countercyclical standpoint could help to take care of the excess growth of asset prices and credit.

From the literature reviewed, it is apparent that quite a number of scholars have beamed light on the nexus between fiscal policy and economic growth (see Neem 2019; Matallah et al 2017; Aero et al 2016), with others focusing on the linkages between fiscal policy and financial stability (like Thach et al 2019; Adegoriola 2018 and Ubi-abai et al 2017). The effect of fiscal policy on banking system stability is omitted in most discussions in previous studies. Moreover, the fact that fiscal policy tools are crucial to the stabilization of banking system in developing economies like Nigeria, therefore, their effect on general banking system stability cannot be overlooked. Again, as at the time of this study, very few prior literatures existed on fiscal policy and banking system stability in Nigeria despite its relevance. This present study intends to fill this noticeable gap by adding to the few existing studies and extends the frontlines of knowledge by examining the links among fiscal policy and banking system stability. Thus, this study tests the effect of fiscal policy tools - government expenditure, external debt, government funding, public debt and consumption tax on banking system stability. Furthermore, this study includes consumption tax instead of Value added tax in the model which is omitted in most studies. The inclusion of consumption tax in the model is due to its effect on the purchasing power of the citizens. The higher the consumption tax, the lesser the amount available to purchase more goods and the lesser the savings ability. Thus, reducing the purchasing power of consumers. This current study is dearth in literature particularly in banking system in Nigeria, hence, represents our core contribution to literature.

Research Methodology

Theoretical Framework

In an effort to highlight the theoretical basis for the explicit relationship this current study seeks to explore, the study is theoretically underpinned to Keynesian economics theory developed by John Maynard Keynes in 1930. Keynes established the theory in an effort to comprehend the Great Depression. It is an economic theory that explain the effect of aggregate expenditure on inflation and output in an economy. It is a demand-side" theory that centres on economic changes over the short run period. The theory established that in order to stimulate demand and tug the world economies out of depression, the governments must increase their spending (expenditure) and reduce taxes (tax cuts). Keynesian economics theory is a concept which explicitly explained the possibility of achieving optimum economic performance while preventing economic crash by influencing total demand via economic intervention and activist stabilization policies. Thus as the economy and the financial institution are stabilized via effective implementation of appropriate fiscal policies, the banking system which is the centre point of the financial institution will also be stabilized.

Model Specification

The methodical framework adopted for this study follows basically the Keynesian framework and Chukwudi and Henry (2020). In the Keynesian framework, preferred aggregate demand link is stated in the goods market as specified in the equations below;

$$Y = C + I + G + (X - M) \quad (1)$$

Where:

Y represents aggregate output at a specific period of time C is total consumption, I indicate total investment;

G is aggregate government expenditure and (X−M) represents net exports. Output could be influenced by its own past level in time series setting. Consequently, the model can be extended in the relationship between fiscal policy and banking system stability as stated below:

$$BST_t = f(CADF_t, DRG_t, PD_t, GFD_t,, CTAX_t, EXD_t,, GCEXP_t \quad (2)$$

$$BST_t = CAR_t \quad (3)$$

$$BST_t = CAR_t = f(CADF_t, DRG_t, PD_t, GFD_t,, CTAX_t, EXD_t,, GCEXP_t \quad (4)$$

Explicitly, the econometric model is stated thus;

$$BST_t = \alpha_0 + \alpha_1 CADF_t + \alpha_2 DRG_t + \alpha_3 PD_t + a_4 GFD_t + a_5 CTAX_t + \alpha_6 EXD_t + a_7 GCEXP_t + et \quad (5)$$

Hence, model used in the analysis is stated as follows:

$$CAR_t = \alpha_0 + \alpha_1 CADF_t + \alpha_2 DRG_t + \alpha_3 PD_t + a_4 GFD_t + a_5 CTAX_t + \alpha_6 EXD_t + a_7 GCEXP_t + et \quad (6)$$

Where:

BST represents Banking System Stability; the dependent variable is proxied by bank soundness indicator (CAR). CAR represents Capital Adequacy Ratio. The independent variables include; CADF which represents Current Account Deficit, DRG is Debt growth, PD signifies Public Debt, GFD is the Government Funding, CTAX represents Consumption Tax, EXD signifies External Debt, the only control variable in the model is GCEXP which represents Government Capital Expenditure, et indicates stochastic error term and t is time period measured. α_0 represents the intercept describing banking system stability when the independent variables are equivalent to zero. α_1, α_2, α_3, α_4, α_5, α_6, α_7 are the parameters or coefficients or of the independent variables. The inclusion of the stochastic or error term (e_t) in the above model is to capture the impact of other variables that are not included in the model. In order to convert the variables to their natural logarithm formula in order to match the small values for regressions. Thus, most of the variables are logged. We now have log of profit, log of public debt, log of government funding, log of government capital expenditure, log of consumption tax, and log of external debt. The a priori expectations are stated as follows: $\alpha_1>0$; $\alpha_2>0$; $\alpha_3>0$ $\alpha_4<0$; $\alpha_5<0$; $\alpha_6<0$; $\alpha_7<0$.

Data Sources and Operationalization

The variables employed in this study are based on several extant literature and the theoretical stance of the study as discussed above. The study relied entirely on secondary data sourced from the Central Bank of Nigeria Statistical Bulletin and World Development Indicators. The study period is from 1985 to 2019. The period was chosen due to availability of data as well as to capture the effect of fiscal policy on the banking system during the various global financial crisis periods and the domestic financial reforms in Nigeria.

Data Presentation and Analysis

In this section, the ADF Unit Root Test and inferential analysis of the data were discussed.

Table 1: Summary of ADF Unit Root Test of the Model

Variables	P value I(1)	Critical Values 1% & 5%	ADF t-statistics I(1)	Status
CADF	**0.0001**	**-3.646342 (-2.954021)**	**-5.257183**	I(1)
CAR	**0.0000**	**-3.646342 (-2.954021)**	**-9.255976**	I(1)
LDRG	**0.0027**	**-3.646342 (-2.954021)**	**-4.152804**	I(1)
LPD	**0.0000**	**-4.262735 (-3.552973)**	**-7.706170**	I(1)
LGFD	**0.0000**	**-4.262735 (-3.552973)**	**-7.265155**	I(1)
LGCEXP	**0.0000**	**-3.646342 (-2.954021)**	**-8.191326**	I(1)
LEXD	**0.0012**	**-3.724070 (-2.986225)**	**-4.625385**	I(1)
LCTAX	**0.0000**	**-4.262735 (-3.552973)**	**-7.986416**	I(1)

Source: Authors Computation (2020)

Table 1 shows an ADF unit root test result. The result of the test carried out on all the variables revealed that the variables became stationary only at first difference. This means that the series are I(1) series. The table shows that the different probability values are less than 1%.

Table 2: Johansen Co-integration Test

Variables	Trace Eigen Statistics	Significance level of 0.05	P value	Maximum Eigen Statistics	Significance level of 0.05	P value
None *	256.7235	159.5297	0.0000	74.08092	52.36261	0.0001
At most 1 *	182.6426	125.6154	0.0000	60.44764	46.23142	0.0009
At most 2 *	122.1950	95.75366	0.0002	40.98569	40.07757	0.0394
At most 3 *	81.20928	69.81889	0.0047	29.89419	33.87687	0.1390
At most 4 *	51.31509	47.85613	0.0228	25.87364	27.58434	0.0814
At most 5	25.44145	29.79707	0.1463	16.84683	21.13162	0.1793
At most 6	8.594620	15.49471	0.4042	6.214213	14.26460	0.5859
At most 7	2.380406	3.841466	0.1229	2.380406	3.841466	0.1229

*Note: ** significant at 5% critical level* **Source: Authors Computation (2020)**

In Table 2, the trace test shows that five cointegrating vectors are present at 5% critical level while the max-eigen test confirms that three cointegrating equation exist at 5% critical level. The explanation is that we reject the non-existence of cointegration stand of the null hypothesis and accepts the alternative hypothesis proposition of existence of cointegration in the model. Thus, the study concludes that there exists long-run link between current account deficit, debt growth, public debt, government funding, consumption tax, external debt, government capital expenditure and Banking system stability in Nigeria over the period of study.

Regression Result

Table 3: Long Run Estimation Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.162878	0.181269	-0.898544	0.3768
CADF	0.001723	0.001747	0.985959	0.3329
LDRG	-0.036672	0.021363	-1.716639	0.0975
LCTAX	0.134118	0.065793	2.038496	0.0514
LEXD	-0.004116	0.017325	-0.237592	0.8140
LGCEXP	0.033548	0.021529	1.558250	0.1308
LGFD	-0.018488	0.007834	-2.360004	0.0258
LPD	0.031050	0.009294	3.340995	0.0025
R-squared	0.777304	Mean dependent var	0.139430	
Adjusted R-squared	0.719568	S.D. dependent var	0.061783	
F-statistic	13.46307	Akaike info	-3.804178	

		criterion	
Prob(F-statistic)	0.000000	Durbin-Watson stat	2.043675

Source: Authors Computation (2020)

Table 3 presents the ordinary least square results which indicates that the estimates of the long run model captures the effect of Fiscal policy on Banking system stability in Nigeria during the period covered by this study. The result shows that four variables; current account deficit, consumption tax, government capital expenditure and public debt have positive relationship with Banking system stability proxied with bank soundness indicator - capital adequacy ratio. This confirms our apriori expectation for these variables. The remaining three variables; debt growth, external debt and government funding have negative association with Banking system stability in Nigeria. However only consumption tax and public debt have positive and significant relationship with capital adequacy ratio while debt growth DRG and government funding have negative but significant association with capital adequacy ratio. Again, the result showed that the coefficient of CTAX, PD, and GFD which are 0.134118, 0.031050, and -0.036672 respectively are significant at 5%. This indicates that a unit change in CTAX induces a 0.13-unit positive change in CAR, a unit change in PD induces a 0.03 units positive change in CAR while a unit change in GFD induces a -0.03 units negative change in CAR. The coefficient of DRG, has positive and significant impact on CAR although not significant at 5%. CADF and GCEXP both have coefficient that show positive and non-significant impact on CAR. On the other hand, EXD is the only variable that has a coefficient that shows negative and non-significant impact on CAR. The positive and significant effect of CTAX and PD could be as a result of the impact these policies have on bank customers and the various business sectors which have direct impact on banks operations and performance in Nigeria. The R^2 value of 0.777304 indicates that about 78% of the dependent variables jointly explained by the independent variables i.e. Capital Adequacy Ratio is explained by the explanatory variables in the model.

Table 4: Summary of Error Correction Model (ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006570	0.009484	0.692707	0.4954
D	0.001632	0.001661	0.982656	0.3360
D(LDRG)	-0.030912	0.039280	-0.786961	0.4393
D(LCTAX)	0.116888	0.055070	2.122540	0.0448
D(LEXD)	-0.012965	0.013661	-0.948984	0.3525
D(LGCEXP)	0.026214	0.022489	1.165627	0.2557
D(LGFD)	-0.009828	0.008285	-1.186337	0.2476
D(LPD)	-0.007713	0.016782	-0.459605	0.6501
ECM(-1)	-0.918408	0.262035	-3.504912	0.0019
R-square	0.73.7051	-	-	-

Source: Authors Computation (2020)

The table 4 shows the short-run analyse of the relationship between fiscal policy and banking system stability in Nigeria between 1985 and 2019 using error correction mechanism (ECM). The result is the short-run analysis which shows that, current account deficit, consumption tax, government capital expenditure have positive relationship with Banking system stability - capital adequacy ratio. This implies that increase in current account deficit, consumption tax and government capital expenditure has high impact on banking system stability. This is understandable because these three variables directly affect the consumption, investment and savings culture of the citizens, which also have direct impact on banks' intermediation role. Similarly, increase or decrease in the noted variables are critical to business growth in Nigeria. This have direct impact also on banks' performance, liquidity and profitability. On the other hand, debt growth, external debt, government funding, public debt and have negative association with capital adequacy ratio. This is in conformity to expectation because debt growth and external debt have little or no direct effect on domestic banks in Nigeria as the fiscal deficit and external debt are financed with external loans, thus, it will not have direct positive effect on banks as when financed with loan from domestic banks or sources. The parsimonious error correction model results in Table 4 shows an R^2 of about 73.7% and this shows better goodness

of fit, meaning that there is a strong relationship between the variables used. Thus it shows that 73.7per cent of the variation is explained by all the variables employed in the model, leaving only a 26.3% attributable to the white noise error term.

Conclusion

This sub-section draws conclusions from the summary of the regression analysis; Co-integration and Ordinary Least Square analysis, along with the Error Correction Model (ECM), the results regards to the effect of fiscal policy on banking system stability in Nigeria between 1985 and 2019 which span across the periods before the - Post, during and after-Structural Adjustment Programme (SAP) in economic eras. The results revealed that the fiscal policies of the government significantly affect banking system stability in Nigeria directly and indirectly. Indirectly through debt growth and external debt which affect capital inflow, foreign investment, foreign business partnership etc and directly through government funding, government capital expenditure, consumption tax. and other government spending. The funds are usually channelled through the domestic banks to individuals (contractors, investors), corporate bodies and other government agencies in Nigeria. Thus we reject the null hypothesis of nonexistence of association between fiscal policies and banking system stability in Nigeria and accept the alternative hypothesis that states that fiscal policy significantly impact on banking system stability in Nigeria.

Recommendations

Based on the conclusion reached, the study recommendations are as follows: (i) The government should increase its expending in the domestic economy. (ii) The management of banks should ensure that they pay close attention to fiscal policy tools which significantly impacts on banking system. (iii) Appropriate checks should be put in place by the government to avoid government borrowing that will lead to continuous deficit since debt affects banking system stability. (iv) The government should ensure that its borrowings are channelled towards productive segments of the economy to enhance sustainable repayment of debt. (v) Finally, mechanisms for debt repayment must be severely adhere to.

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Identification of The Dependence of The Hungarian Capital Market on The Leading Capital Markets in Europe

Marek ZINECKER

Brno University of Technology, Brno, Czech Republic
zinecker@fbm.vutbr.cz

Michał Bernard PIETRZAK

Nicolaus Copernicus University in Toruń, Toruń, Poland
michal.pietrzaj@umk.pl

Tomas MELUZIN

Brno University of Technology, Brno, Czech Republic
meluzint@fbm.vutbr.cz

Adam P. BALCERZAK

University of Wamia and Mazury in Olsztyn, Olsztyn, Poland; University of Entrepreneurship and Low, Czech Republic; Brno University of Technology, Brno, Czech Republic
a.balcerzak@uwm.edu.pl

Abstract

The subject of the article concerns the issue of interdependence between capital markets and the problem of identifying the long-term equilibrium between these markets. The phenomenon of interdependence between markets is an element of their functioning, however, the progressive globalization of world economies significantly strengthens the system of mutual connections. The subject matter is important as the last world financial crisis of 2008 has shown that it is possible to shift shock effects from financial markets in one economy to other countries, which results in crisis situations not only in the financial sphere, but also destabilising the real economy. The main goal of the article is to establish a long-term equilibrium between the UK capital market as the main capital market in Europe and the capital markets of the Visegrad Group countries, which can be considered as the markets of local importance. The article presents a research hypothesis stating that there is present the similar long-term development of interdependencies between selected capital markets. The DCC-GARCH model with a conditional t-student distribution was used to measure the interdependence, on the basis of which the conditional correlations for the established pairs of capital markets were determined. The article presents a cointegration analysis for conditional correlations between selected capital markets, and then estimates the parameters of the VECM model were obtained. An equation has been established to define the long-term equilibrium between capital markets and the short-term equation. The obtained results allowed for the verification of the research hypothesis regarding the existence of a long-term path for the course of the interdependence between the capital markets of Great Britain, Poland, the Czech Republic and Hungary.

Keywords: Capital Market; Cointegration Analysis; DCC-GARCH Model; Conditional Variance; Conditional Correlation.

Introduction

The capital market in Hungary started operating in the 19th century. In the twentieth century, this market ceased to function during the communist period after World War II. It was only after 1989 that Hungary began building a

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market economy, and in June 1990 the Budapest Stock Exchange (BSE) was established. Budapest Stock Exchange obtained the status of a joint-stock company in 2002. It should be emphasized that Hungarians did not introduce any safeguards against taking over the stock exchange by institutions or investors. As a result, in 2004 BSE was taken over by the Austrian stock exchange. This acquisition did not have a positive impact on the development of the Hungarian stock exchange and as a result of many years of decline in stock exchange capitalization, the Hungarian Central Bank (MNB) took over a controlling stake in the Budapest Stock Exchange in 2015.

The economy of Hungary and its capital markets, like economies and capital markets in other countries, is subject to the processes of progressive globalization (see Edison et al., 2002; Łapińska, 2013, 2016; Hadaś-Dyduch, 2016, 2017; Cieślik, et al., 2019a; 2019b; Pieterse, 2019; Jakimowicz and Rzeczkowski, 2019a, 2019b; Jaklič & Svetličič, 2019; Sánchez-López et al., 2019; Shkolnyk et al., 2019; Zhao et al., 2020; Skalická et al., 2019a, 2019b; Uslu & Akay, 2019; Spulbar et al. 2020; Nikolic, 2020). In addition, the development of the capital market is influenced by the economic reforms introduced after 2003, which significantly improved the level of competitiveness of the economy and increased the value of investments and outlays for the growth of innovation. Institutional changes and convergence processes, which significantly improved the situation on the labour market, structure of consumption and trade relations with other countries, also influenced the competitiveness level of the real economy, which in the longer term should influence the development of the capital market (see Kuc, 2015, 2017, Gavurova et al., 2016; Cheba & Szopik-Depczyńska, 2017; Simionescu et al, 2017; Shin, 2017; Zogning. 2017; Jankiewicz, 2018; Kurowska-Pysz et al., 2018; Meluzín et al., 2018a, 2018b, 2018c; Khursheed et al., 2018; Rollnik-Sadowska & Dąbrowska, 2018; Kijek & Matras-Bolibok, 2019; Legenzova et al., 2019; Kusairi et al, 2019; Ludbrook et al., 2019; Lampropoulos et al., 2019; Čepel, 2019; Balcerzak, 2020). The mentioned re-takeover of Budapest Stock Exchange by Hungary and the significant socio-economic development of the country after 2015 contributed to the improvement of the capital market situation, which translated into an dynamic changes in the capitalization of the stock exchange.

Technically speaking, the main index of the Hungarian stock exchange BUX, which will be used in current analysis, consists of fifteen companies, but four stock exchange companies account for ninety percent of the BUX index capitalization: OTP Bank, MOL, Richter and Magyar Telekom. This factor should be always taken into consideration in the case of conclusions on the results concerning this market.

Undoubtedly, due to the globalization processes in both financial and real sphere (Booth, 2018; Grossman. 2018, Chessell, 2018; Kliestik et al., 2020, Peters et al., 2020), the Hungarian capital market is characterized by strong interdependencies with the main capital markets in Europe (see Forbes & Rigobon, 2002; Boswijk & Doornik, 2004; Corsetti et al., 2005; Pietrzak et al., 2017; Gaigaliene et al., 2018; Skare and Porada-Rochoń, 2019a, 2019b, Stavytskyy, et al., 2019). The subject of the article, related to the formation of interdependence on capital markets, is important due to the possibilities of transferring risk from financial markets to the economies of individual countries, which not only took place during the 2008 global financial crisis, but it can be also present during so called standard times (see Bekaert & Wu, 2000, Baur, 2003; Pericoli & Sbracia, 2003; Billio & Caporin, 2010, Engle 2009, Reboredo et al., 2015; Hanias et al., 2020).

The global financial crisis has shown that the financial interdependencies in a time of high degree of globalization can lead to negative consequences for functioning or even collapse of national economies. Therefore, the constant monitoring of that phenomenon can help to design policies and tools, which can be used to reduce that risk. As a result, the aim of the proposed article is to identify the strength of the dependence of Hungary's capital market on major capital markets in Europe. The analysis covers the interdependencies with the UK capital market, as the leading market in Europe and with the capital market of Germany, which due to the geographical reasons and strength of the real economy, is the most important capital market for Central and Eastern European economies. The development of interdependencies between capital markets was examined in the years 1998-2019, where the DCC-GARCH model was used to measure the interdependence.

Data and the Methodology

In line with the adopted aim of the article, the dependence of the Hungarian capital market on the capital markets of Great Britain and Germany was identified. The study used logarithmic rates of return of three stock exchange indices (BUX, FTSE 100, DAX). Data for the years 01.01.1998-30.12.2019 was obtained from the yahoo website

(http://www.finance.yahoo.com). The assessment of the strength of correlation was based on the values of the conditional correlation between the respective pairs of stock indices. The DCC-GARCH model was used to measure the conditional correlation between pairs of indices (see Engle, 2002, 2009). This model allows the simultaneous modelling of conditional variance for individual indexes as well as conditional correlations for selected pairs of indexes.

In the DCC-GARCH model, standardized residuals from the variance equation and delayed conditional correlations are used to describe the course of conditional correlation. As a result of preliminary research on the properties of index returns, the specification of the AR model (1) in the equation for the conditional mean and GARCH model specifications (1,1) in the equation for the conditional variance were adopted for each index.

The two-stage maximum likelihood method was used to estimate the parameters of the DCC-GARCH model (see Engle, 2009), where the conditional t-student distribution was assumed for the random component. The significance level of 5% was adopted to assess the significance of the DCC-GARCH model parameters.

Results

Table 1 presents the results of estimation of the DCC-GARCH model. According to the mentioned in methodological section assumed level of significance, the parameters of the AR (1) model and the parameters of the GARCH (1,1) model are statistically significant for each of the three indices. The parameters of the conditional correlation equation are also statistically significant. The obtained estimates of the parameters of the degrees of freedom of the student's t-distribution indicate the presence of fat tails for the rates of return of the analysed indices, which justifies the adoption of this distribution in the study.

Table 1: The results of the DCC-GARCH model parameters estimation

Equations for index BUX				**Equations for index DAX**			
Model	Parameter	Estimate	p-value	Model	Parameter	Estimate	p-value
AR(1)	α_0	0.001	~0.00	AR(1)	α_0	0.001	~0.00
	α_1	0.024	0.004		α_1	0.063	0.011
GARCH(1,1)	ω_0	0.001	0.02	GARCH(1,1)	ω_0	0.001	~0.00
	β_1	0.085	~0.00		β_1	0.087	~0.00
	γ_1	0.909	~0.00		γ_1	0.906	~0.00
	v	5.895	~0.00		v	8.4732	~0.00
Equations for index FTSE100				**Equation of conditional correlation**			
Model	Parameter	Estimate	p-value	Model	Parameter	Estimate	p-value
AR(1)	α_0	0.001	~0.00	AR(1)	α	0.022	~0.00
	α_1	0.0121	0.021		β	0.961	~0.00
GARCH(1,1)	ω_0	0.001	~0.00		v	7.352	~0.00

	β_1	0.113	~0.00	Log-Likelihood	49571.122
	r_1	0.812	~0.00	Akaike criteria	-19.555
	v	6.321	~0.00	Bayes criteria	-19.526

Source: Authors' study.

Then, on the basis of the obtained DCC-GARCH model estimation results, the course of the conditional correlation between the pairs of the studied indexes in 1998-2019 was determined. The determined time series of conditional correlations for the index pairs (FTSE100, BUX) and (DAX, BUX) are presented in Figure 1.

The analysis of the correlation allowed for the assessment of the strength of dependence of the Hungarian capital market on the capital markets of Great Britain and Germany. The preliminary visual analysis of the conditional correlation values shows a very high similarity in the course of the correlation between the studied pairs of capital markets (Hungary, Great Britain) and (Hungary, Germany) in the years 1998-2019.

It should be emphasized that the strength of the interdependence between the analyzed capital markets fluctuates throughout the period under examination. A relatively high level of interdependence occurred in 1999-2003, which was the market reaction to the preparation of Hungary and other Central and Eastern European countries to join the European Union. Then, after joining of the Hungary to the EU, the strength of interdependence decreased, which was influenced by significant institutional changes resulting from Hungary becoming more similar to the old EU countries. This indicated the growing role of the internal information in shaping the situation on the market.
The next increase in the interdependence between the pairs of the studied countries took place in 2008-2012, which in turn was the result of the global financial crisis.

After 2012, the situation on the global capital markets calmed down, which translated into a decline in the strength of the analyzed interdependencies.

It is worth emphasizing that in the analyzed period, the Budapest Stock Exchange (BSE) was more strongly correlated with the UK capital market than with the much closer geographically the German capital market. This factor can confirm the leading role of the UK as the financial center of Europe, which during the analytical period was not really affected by the process of Brexit.

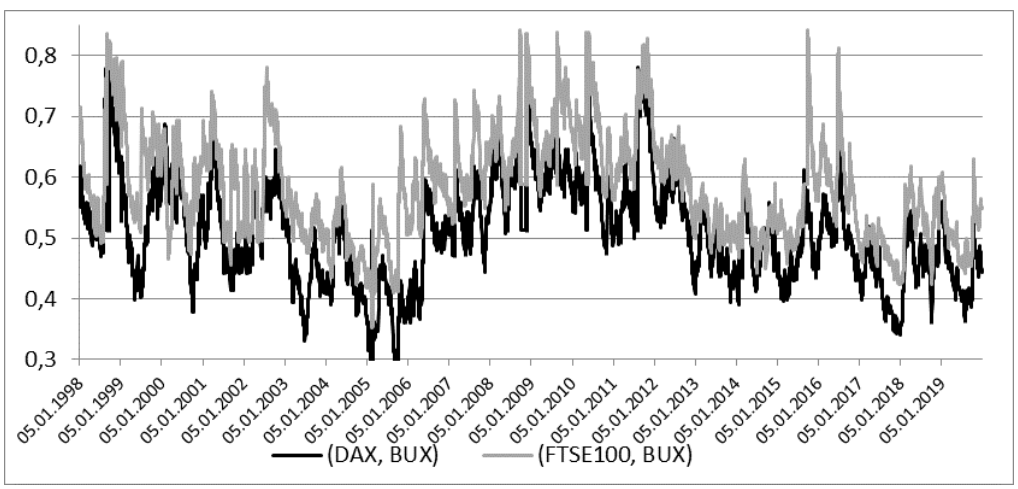

Fig. 1: Time series of conditional correlation for the (BUX, FTSE100) and (BUX, DAX)
Source: Authors' study.

Conclusions

The subject of the article concerns the analysis of the interdependencies between selected capital markets in Europe. It should be emphasized that the high level of interdependence results from the progressing globalization. This means that the phenomenon of interdependence between capital markets becomes a significant risk factor for the functioning of national economies. The growing links between markets become particularly important in crisis situations that may lead to the disruption of the functioning of a single economy or even to the collapse of the economic system. In such a situation, stabilization measures resulting from the undertaken economic policy may turn out to be ineffective. Therefore, the analysis of interrelationships between markets appears as an important research problem. The obtained empirical conclusions may be useful for political decision-makers in the context of creating effective economic policy related to the development of individual economy markets, including the functioning of the capital market.

The aim of the article was to identify the strength of dependence of the Hungarian capital market on the UK and Germany, which can be considered as the leading capital markets in Europe. The conducted research allowed to establish the interdependencies between selected pairs of capital markets in the years 1999-2019, and then to evaluate their course. As a result of the conducted research, a similarity in the development of the correlation between the analyzed pairs of capital markets was established. This means that the Hungarian capital market reacts similarly to external information from the main European markets. This indicates the risk related to the functioning of capital markets in Europe, where fundamental global shock events are spreading through the markets of Great Britain and Germany to the capital market of Hungary. The conducted research allowed for the conclusion that the Hungarian capital market should be still considered as relatively shallow developing market. It should be stressed, however, that the way the Budapest Stock Exchange (BSE) operates is becoming more similar to the functioning of mature European capital markets.

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Identification of The Long-Term Equilibrium Between The UK Capital Market and The Capital Markets of The Visegrad Group

Marek ZINECKER

Brno University of Technology, Brno, Czech Republic, zinecker@fbm.vutbr.cz

Michał Bernard PIETRZAK

Nicolaus Copernicus University in Toruń, Toruń, Poland, michal.pietrzaj@umk.pl

Tomas MELUZIN

Brno University of Technology, Brno, Czech Republic, meluzint@fbm.vutbr.cz

Adam P. BALCERZAK

University of Wamia and Mazury in Olsztyn, Olsztyn, Poland; University of Entrepreneurship and Low, Czech Republic; Brno University of Technology, Brno, Czech Republic, a.balcerzak@uwm.edu.pl

Abstract

The subject of the article concerns the issue of interdependence between capital markets and the problem of identifying the long-term equilibrium between these markets. The phenomenon of interdependence between markets is an element of their functioning, however, the progressive globalization of world economies significantly strengthens the system of mutual connections. The subject matter is important as the last world financial crisis of 2008 has shown that it is possible to shift shock effects from financial markets in one economy to other countries, which results in crisis situations not only in the financial sphere, but also destabilising the real economy. The main goal of the article is to establish a long-term equilibrium between the UK capital market as the main capital market in Europe and the capital markets of the Visegrad Group countries, which can be considered as the markets of local importance. The article presents a research hypothesis stating that there is present the similar long-term development of interdependencies between selected capital markets. The DCC-GARCH model with a conditional t-student distribution was used to measure the interdependence, on the basis of which the conditional correlations for the established pairs of capital markets were determined. The article presents a cointegration analysis for conditional correlations between selected capital markets, and then estimates the parameters of the VECM model were obtained. An equation has been established to define the long-term equilibrium between capital markets and the short-term equation. The obtained results allowed for the verification of the research hypothesis regarding the existence of a long-term path for the course of the interdependence between the capital markets of Great Britain, Poland, the Czech Republic and Hungary.

Keywords: capital market; cointegration analysis; DCC-GARCH model; conditional variance; conditional correlation.

Introduction

The dynamically progressing globalization processes contribute to the growth of connections between the countries that have been creating the expanding system of world economies since the 1990s (see Edison et al., 2002; Hadaś-Dyduch, 2016, 2017; Cieślik, et al., 2019a, 2019b; Janus, 2019; Pieterse, 2019; Sánchez-López et al., 2019; Uslu, & Akay, 2019; Ludbrook et al. 2019; Stavytskyy et al, 2019; Booth, 2018; Grossman, 2018; Chessell, 2018; Kliestik et al. 2020; Peters et al., 2020; Nikolic, 2020). This translates to the greatest extent into an increase in interdependencies between capital markets (see Bekaert & Wu, 2000; Baur, 2003; Pericoli & Sbracia, 2003; Engle 2009; Billio & Caporin, 2010; Reboredo et al., 2015; Shin, 2017; Pietrzak et al., 2017; Zogning, 2017, Legenzova et

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al., 2019; Skare & Porada-Rochoń, 2019a, 2019b; Spulbar et al., 2020; Zhao et al., 2020). It should be emphasized, however, that globalization processes, by tightening political and economic relations between countries, also contributes to the increase of interdependence between all markets of economies, also the ones in the real sphere. For over thirty years, a systematic increase in migration, convergence processes, changes in the structure of consumption, the level of trade exchange, the flow of foreign direct investment, diffusion of innovation has been recorded for most countries (see Łapińska, 2013, 2016; Kuc, 2015, 2017; Cheba & Szopik-Depczyńska, 2017; Litavcová, Hečková, Chapčáková, 2017; Simionescu et al, 2017; Tvaronavičienė & Gatautis, 2017; Jankiewicz & Pietrzak, 2020; Khursheed et al., 2018; Kurowska -Pysz et al., 2018; Čepel, 2019; Jakimowicz & Rzeczkowski, 2019a, 2019b; Jaklič & Svetličič, 2019; Kijek & Matras-Bolibok , 2019; Lampropoulos et al., 2019; Kusairi et al, 2019).

The subject of the article concerns the identification of connections between capital markets, the analysis of their volatility over time and the identification of the long-term equilibrium between these markets. The discussed topic is important because in the reality of the mentioned dynamically developing globalization processes both in financial and real sphere, the current knowledge on the international interdependencies between the financial markets, allows to create economic policy, which takes into consideration important aspects related to the functioning of financial markets, which during the crisis can destabilise the real economy (see Forbes & Rigobon, 2002; Corsetti et al., 2005, Shkolnyk et al., 2019; Karkowska & Kravchuk, 2019; Gospodarchuk & Suchkova, 2019). The world financial crisis in the years 2008-2012 clearly showed that shocks occurring in the financial markets may spread to other markets of the economy and then lead to a disruption of the functioning of individual countries or a crisis of the entire economic system (see Gaigaliene et al., 2018).

Depending on the analyzed aspect of globalization processes, it is possible to identify the dominant centers that contribute to the greatest extent to the growth of connections between countries. In the case of capital markets, the dominant centers are the world's largest stock exchanges. The British capital market with the London Stock Exchange undoubtedly dominates in Europe. On the other hand, capital markets of local importance are the markets of the Visegrad Group countries (see Meluzín et al., 2018a, 2018b, 2018c; Skalická et al., 2019a, 2019b). Numerous studies indicate their strong dependence on the main capital markets in Europe, including the UK capital market.

The main purpose of this article is to establish the long-term equilibrium between these capital markets. The article presents a research hypothesis stating that there is a process of similar long-term development of the interdependence between the capital market of Great Britain and the capital markets of the Visegrad Group countries.

In order to verify the adopted research hypothesis, a cointegration analysis was performed for conditional correlations between selected capital markets and a VECM model (Vector Error Correction Model) was built (see Engle & Granger, 1987, Boswijk & Doornik, 2004; Lütkepohl, 2005; Engle, 2009; Pietrzak et al., 2017). The DCC-GARCH model was used to measure the interdependencies (see Engle, 2002, 2009), on the basis of which the conditional correlation for selected pairs of capital markets were determined.

Data and the Methodology

In line with the adopted objective of the article, the main indices of selected capital markets were adopted, the FTSE100 index in the UK, the PX index for the Czech Republic, the WIG index for Poland and the BUX index for Hungary. The study used logarithmic rates of return of selected stock indices for the years 01.01.1999-30.12.2019. The data was obtained from the yahoo website (http://www.finance.yahoo.com). Slovakia was not included in the analysis due to significant data gaps.

In the first step of the analysis, the parameters of the DCC-GARCH model were estimated, which allowed for the determination of conditional correlations for subsequent pairs of capital markets. The next step in the study was to perform a cointegration analysis. The analysis verified the hypothesis of long-term equilibrium between the UK capital market and the capital markets of the Visegrad Group. As a result of the conducted research, a VECM model was built, which is a VAR model for cointegrated processes (see Engle Engle & Granger, 1987). The Johansen procedure (see Johansen, 1988, 1991, 1995) was used to identify the number of cointegrating vectors, which is

iterative in nature and is used until the null hypothesis is rejected. Johansen's procedure uses the maximum eigenvalue test and the trace test (see Johansen, 1995).

Cointegration analysis was performed on the basis of conditional correlations obtained from the DCC-GARCH model. Therefore, the following long-term equation for conditional correlations was adopted:

$$q_{t,y_0} = \alpha_0 + \alpha_1 q_{t,y_1} + \cdots + \alpha_n q_{t,y_n} + \varepsilon_t \qquad (1)$$

The obtained results of the Phillips and Perron tests (see Phillips & Perron, 1988) allowed to state that all the conditional correlation series are integrated in the first degree.

Johansen's procedure was performed in the second step of the analysis. The obtained results made it possible to test the number of integrating relations. After determining the number of cointegrating vectors, the long-term equation of the VECM model was estimated. Finally, the parameters of the short-term equation were estimated, where the explanatory variables were the delayed in time first differences of conditional correlations and the term ECM_{t-1} responsible for the long-term relation.

Results

The values of the calculated test statistics are indicative of the presence of one integrating vector for the Johansen's procedure are presented in Table 1.

Table 1: Results of Johansen's procedure

Number of cointegrating vectors	**Max-Eigenvalue test**		
	Eigenvalue	**Statistic**	**p-value**
None	0.011	83.291	0.001
At most 1	0.005	38.324	0.071
At most 2	0.003	15.093	0.229
Number of cointegrating vectors	**Trace test**		
	Eigenvalue	**Statistic**	**p-value**
None	0.011	44.967	0.007
At most 1	0.005	23.218	0.175
At most 2	0.003	12.792	0.289

Source: own calculation.

After determining the number of cointegrating vectors, the following long-term equation of the VECM model was estimated, where all the parameters in the VECM equation were statistically significant:

$$q_{t,FTSE100,WIG} = -0.731 + 1.932\, q_{t,FTSE100,BUX} + 0.658\, q_{t,FTSE100,PX} + \varepsilon_t \quad (2)$$

The obtained equation indicates a long-term equilibrium between the capital market of Great Britain and the capital markets of the Visegrad Group, which confirms the hypothesis presented in the article. The process of conditional correlation between a pair of indices (FTSE100, WIG) combines a significant positive relationship with the process of conditional correlation of an index pair (FTSE100, PX) and the process of conditional correlation of an index pair (FTSE100 , BUX). This means that the UK capital market plays a dominant role in the long run and sets the long-run equilibrium in Europe, which is indicated by the cointegrating relation from equation 2. As it was given in the methodological section, in the last step, the parameters of the short-term equation were estimated, where the

explanatory variables were the delayed in time first differences of conditional correlations and the term ECM_{t-1} responsible for the long-term relation. The obtained results concerning the parameter estimates and the t-statistics for the next three equations are presented in Table 2. Most of the parameters for the delayed differences of conditional correlations are statistically insignificant in the short-term equation. This means that the delayed first differences of the conditional correlations are not able to sufficiently describe the short-term dependencies. The parameters for the variable ECM_{t-1} turned out to be statistically significant, and negative assessments of these parameters indicate the existence of the equilibrium mechanism for all researched pairs of markets.

Table 2: Vector Error Correction Model

VECM		$q_{t,FTSE100,WIG}$	$q_{t,FTSE100,BUX}$	$q_{t,FTSE100,PX}$
constant	estimate	-0.001	-0.001	0.001
	t-statistics	4.589	4.055	1.818
ECM_{t-1}	estimate	-0.005	-0.006	-0.002
	t-statistics	5.094	6.024	3.053
$q_{t-1,FTSE100,WIG}$	estimate	-0.001	0.03	-0.001
	t-statistics	0.061	1.786	0.055
$q_{t-2,FTSE100,WIG}$	estimate	-0.011	-0.026	0.003
	t-statistics	0.648	1.556	0.305
$q_{t-1,FTSE100,BUX}$	estimate	0.023	-0.027	-0.008
	t-statistics	1.378	1.589	0.799
$q_{t-2,FTSE100,BUX}$	estimate	0.015	0.008	-0.014
	t-statistics	0.873	0.454	1.336
$q_{t-1,FTSE100,PX}$	estimate	-0.001	-0.015	-0.009
	t-statistics	0.098	0.994	0.943
$q_{t-2,FTSE100,PX}$	estimate	-0.015	0.001	-0.006
	t-statistics	0.999	0.054	0.672

Source: own calculation.

Conclusions

The subject of the article concerns the analysis of the interdependencies between the capital markets of selected European countries, the strength and range of which have significantly increased in the last 30 years. Undoubtedly, the main factor of this phenomenon are dynamically progressing globalization processes. The problems discussed in the article are important because the current and precise knowledge on the interdependencies may allow for the development of appropriate economic policies of individual countries and tools to improve the functioning of capital markets. The world financial crisis that occurred in 2008-2012 showed the possibility of the collapse of the entire system of financial markets and the need to future secure the proper functioning of the financial markets of individual countries.

The aim of this article was to establish a long-term equilibrium between the capital markets of Great Britain, Poland, Hungary and the Czech Republic. In the cointegration analysis carried out in the article, the number of cointegrating vectors was checked and the VECM model was estimated. As part of the study, the equation determining the long-term equilibrium between capital markets and the short-term equation were determined, where the explanatory variables were the time-delayed first differences in conditional correlations and the term ECM_{t-1} responsible for the long-term relation. Obtained negative assessments of these parameters indicated the existence of the equilibrium mechanism for all pairs of the capital market.

The research carried out on the basis of conditional correlations between selected capital markets allowed for the verification of the research hypothesis regarding the existence of a long-term path for the course of interdependence between the capital markets of Great Britain, Poland, the Czech Republic and Hungary. This confirms the existence of similar development tendencies in the formation of interdependencies between the capital market in Great Britain and the markets of the Visegrad Group countries. To sum up, the conducted research allowed for the assessment of the capital markets of the Visegrad Group countries as a group of markets with similar development trends, dominated by the capital market of Great Britain.

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Conditions of Functioning of SME Enterprises in Poland during COVID-19 Pandemic: A Case Study

Lukasz BRZEZINSKI
Poznan School of Logistics, Poznan Poland, lukasz.brzezinski@wsl.com.pl

Magdalena Krystyna WYRWICKA
Poznan University of Technology, Poznan Poland, magdalena.wyrwicka@put.poznan.pl;

Abstract

The COVID-19 pandemic, which started in December 2019 in Wuhan, China, changed the global economy significantly. Due to its unprecedented scale - for at least 100 years - the pandemic has been the source of a macro-economic shock. Its range and impact cause changes in the functioning of organisation, the market structure, competition principles and even in the legal system. This not only affects the volume of trade and prices, but also daily activities like shopping or greeting one another. At the same time, a series of economic processes have been seen to stop, including production and distribution of many goods, along with the freezing of transactions and debt. Since Coronavirus is an external factor, once the pandemic is over from the macroeconomic perspective, the economies of individual countries should be back to "balance" in the longer run. However, the way the global economy regains its growing trend will depend on how the virus subsides. Additionally, going down to the microeconomic level, a special role of individual entrepreneurs becomes notable, since by managing economic entities they are capable of cancelling the pandemic's negative effects in order to survive in the market and, subsequently, implement growth strategies. Deloitte's research has shown that the SARS-CoV-2 epidemic has had a negative impact on the functioning of 58% of Polish enterprises (Deloitte, 2020).

This paper presents a case study of a micro-enterprise that manufactures packaging. The purposes of the article is to analyse the impact of the COVID-19 pandemic on the functioning of a Polish SME company, with particular focus on the effects on the domestic and international market, the role of IT systems in its business, the plans for the future and the state's assistance.

Keywords: Enterprise Functioning, COVID-19 Pandemic, Small and Medium Enterprises Sector, Freezing of Economy

Introduction

Facing the growing, global epidemic, the resulting economic crisis, especially the threat of dramatic decline in the job market requires, just like with the 2008 financial crisis, or perhaps to an even higher degree, the change of paradigms of thinking about the future, in the perspective of several years. Up until today, the most important common feature of globalisation was the revolution in informational technologies that introduced IT tech, the Internet, automation and robotisation to even the furthest corners of the world, despite the fact that the rate of changes and utilisation of the benefits of the technology is not distributed uniformly (Carbonero, Ernst and Weber, 2018).

Global economy is based on the free flow of goods and capital, associated with quick technological changes, although it fails to guarantee stable growth with no risk and turbulences (IMG, 2019). One of the fundamental, structural features of today's economy are short-term temporal changes of cyclical nature that is evident in the alternating phases of growth and decline of the volume of manufactured goods and offered services within a geographical location. The consequence of this phenomenon are also fluctuations of employment in the job market, just like after 2008, when the global financial crisis hit (Arpaia, Kiss, 2014).

The emergence of the SARS-CoV-2 coronavirus in China and the disease it causes, COVID-19 (full name Coronavirus Disease 2019) forced a redefinition of cognitive perspective and political priorities virtually all over

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the world. The COVID-19 pandemic is the first global event in 21th C. that resulted in most countries all over the world having to significantly subject the ongoing functioning of the economy to the necessity of maintaining the societies' health security. This phenomenon was referred to as "freezing the economy" (Laurent, 2020).

Description of Temporal Characteristics of the COVID-19 Pandemic

Pursuant to the data from the World Health Organisation (WHO), the global emergence of SARS-CoV2 coronavirus may be connected with the identification of the virus in Wuhan, China (Hubei province) in December 2019. The sequence of events related to the spreading of SARS-CoV-2 in the world, from December 30, 2019 to August 26, 2020, was as follows (Męcina, Potocki, 2020; WHO, 2020):

- December 30, 2019 - notification of China National Health about the emergence of several clusters of pneumonia of unknown etiology in Wuhan.
- January 01, 2020 - closing of a local Huanan seafood wholesale market in Wuhan.
- January 07, 2020 - isolation of a new coronavirus.
- January 12, 2020 - disclosure of the sequence of the new virus.
- January 13 - 19, 2020 - first coronavirus cases identified outside China (Thailand, Japan, South Korea).
- January 20, 2020 - first cases of infection among healthcare workers caring for patients who were carriers of SARS-CoV-2.
- January 24, 2020 - 835 infections identified in China.
- March 11, 2020 - World Health Organisation announces COVID-19 pandemic.
- The first official case of SARS-CoV-2 infection in Poland was publicly announced on March 04, 2020 (Mostowy, 2020).
- On March 06, 2020 the number of registered cases in the world exceeded 100,000.
- On April 02, 2020 the number of confirmed deaths in the world exceeded 50,000, with 1,000,000 registered infections.
- On May 09, 2020 the number of registered cases reached 4,000,000.
- On August 26, 2020 the number of registered cases reached 24,000,000.

It is worth noting that activities aiming to minimize the effects of pandemic in Poland were initiated with the adoption of an act, on March 02, 2020, on special solutions related to the prevention, counteraction and combating COVID-19 (Journal of Laws, 2020, Item 374). The temporal characteristics of preventative activities aiming to reduce the risk of infection that was similar to the Polish characteristics, was also present among other European Union states - preventative activities were taken when the development of epidemic was already covered publicly (Herszenhorn, Wheaton, 2020).

The source literature underscores that the issue of efficient national pandemic governance in Europe was already less than certain (Speakman, Burris and Coker, 2020). There are two fundamental ways of reducing the scale of infection within a population (Imperial ... , 2020):

- mitigation – a strategy consisting in delaying the process of proliferation of the virus within a population, aiming to reduce the burden on national healthcare and to protect individuals most vulnerable to the infection;
- suppression – the strategy's main goal is to stop and reverse the upwards trend with regard to the number of infections to a fixed, low level.

In both these strategies there are fatalities of the infected, but only the suppression strategy increases the probability of significant reduction of cases that result in the death of the infected. In fact, both strategies only serve as a help, until an effective vaccine against the infectious disease is developed or a combination of existing drugs which allow curing of the infected is established.

It should be noted here that from the global perspective, the already known strategies of alleviating the effects of the pandemic have not worked as expected. Until August 27, 2020 there were a total of 24,35 million cases and 829,899 fatalities (Table 1).

Table 1: Coronavirus in Poland and in the world - confirmed cases, recoveries and fatalities - data as of August 27, 2020 (Scope…, 2020)

Confirmed cases	
Poland	**World**
64,689	24,349,576
Recoveries	
Poland	**World**
44,097	16,885,119
Fatalities	
Poland	**World**
2,010	829,899

It is worth noting that the emergence of a pathogen on a massive scale, an example of which is COVID-19, contributed to the economic shock and negative changes in particular sectors of the world's economy. These issues are discussed in the following section.

Perception of the pandemic as a global implicator of changes

Researchers fail to agree on the scope and depth of changes that the COVID-19 pandemic may bring to the global socio-economic system. Today, some politicians, economists and commentators believe that nothing really happened and that "in a short while" the world's economy will be back on track, growing as usual. Some even think that in the wake of the pandemic today's world may cleansed and take a turn in the right direction, an example of which may be getting convinced to stop climate changes (Wyns, 2020, Sikora, Lisowski, Wójcik, 2020). Sadly, there are many evidence pointing to the contrary, with such views possibly untrue or even mere wishful thinking. Most importantly though, having little to do with reality. The opposing views, emerging at a growing rate, claim that the world is facing a metamorphosis that is has not experienced in at least 100 years (Mazzucato, 2020).

According to M. Mazzucato (2020) that world is now facing a triple crisis: health, economic (financial) of unthinkable proportions and climatic, all of which cannot be tackled by "business as usual". In the wake of it, the contemporary world economy's deficiencies will become transparent, especially drastic in terms of the labour market, increasingly more dominated by transnational corporations (Kowalczyk, 2020).

The world has been taken by surprise by the epidemic. Questions are arising about the future of the economy and seeking explanation as to why contemporary economic theories cannot provide answers to today's challenges. There is one point, however, with which the overwhelming majority seems to agree. The problem will not be solved and the pandemic overcome without radical changes in the role and meaning of the market and, most importantly, the state (Reddy, 2020). According to J.K. Galbraith (2020) however, the pandemic can be overcome with relative ease, compared to a war, provided the government steps up to the challenge. Which means providing reliable information about the course of the pandemic to the people, financing all medically necessary expenses from the budget (including efforts to develop a cure and a vaccine) and, most importantly, putting in place a special agenda that addresses the effects of the pandemic.

The signs of "panic about the future" can be observed more and more frequently. The reason behind the radical and quick revaluation of opinion on the course of growth tendencies of the global economy was, naturally, the SARS-CoV-2 pandemic and the diseases it causes, COVID-19. This gives rise to more and more fears about the future, and not just the future of the civilization's fundamentals, such as the economy, but about the future of the civilization in itself. This is a simple consequence of the fact that although the economy itself is slowly rising from the global financial crisis in the beginning of 21st C., the economic has not yet been ready to explain this phenomenon and most certainly to accurately name the basic principles of the new theory of economics. This has been overlapped by a strong need to counter the challenges of the pandemic. The challenges related to the future model of the economy, the relations between the market and the state or the intensity of international cooperation. The situation is dangerous in that the rate at which the global economy, labour market and financial stability is very quick and that is starting to threaten the national security of more and more countries (Kowalczyk, 2020).

The predictions on the future of national economies and the entire, global economy are becoming more and more pessimistic and troubling. According to J. Bullard, the head of the Federal Reserve Bank in St. Louis, one of the banks of the Federal Reserve System (FED), even 47 millions Americans may lose their jobs in the wake of the SARS-CoV-2 pandemic, brining the unemployment rate up to 32.0% (Bullard, 2020). According to the International Monetary Fund the pandemic has already pushed the world into recession (Bluedorn, Gopinathand Sandri, 2020).

Based on the data from the European Commission, all European Union states will suffer recession. In 2020, Poland's GDP will shrink by 4.3%, with an average 7.4% fall for the entire EU (Forbes, 2020).

The pandemic has already made an impact on the situation in individual sectors of the economy. First, it impacted economy sectors closely related to human traffic, namely tourism and communication, and secondly trade, which is the movement of goods. Declines are also affecting global financial markets.

Consequences of COVID-19 for enterprises in Poland

The speed of reaction of governments of individual EU states to the proliferation of the virus within populations depended on objective factors - the number of infections and fatalities, and subjective ones - how the decision makers evaluated the epidemiological risk. One of the key decision rationales was the occurrence of the first fatalities caused by COVID-19. The introduction of measures which affect the course of social and economic processes to such a high degree promptly produces negative consequences on national, regional and global scale.

Using the typology of susceptibility of economy sectors to the pandemic-induced economic crisis, as created by the analysts of the International Labour Organization (ILO), it may be estimated that 37.46% of the globally employed (1.25 billion people) work in global economy sectors that are most vulnerable to the crisis (ILO, 2020).

At the same time, the International Labour Organization claims that around 2.7 billion employees (81% of the world's workforce) are subject to partial or complete work limitation. Even 195,000,000 people could lose their jobs in Q2 2020, of which 12,000,000 in Europe along (PulsHR ..., 2020).

The program for supporting Polish economy announced by the government of the Republic of Poland initially provided for the activation of PLN 212 billion (PAP, 2020). It was acknowledge, however, that an insufficient part of the expenses was appropriated directly to protect jobs and guarantee income to employees and other groups if such income is lost. A large part of the program was more related to the support for the financial sector, to help companies maintain financial liquidity and to introduce bank guarantees to keep companies solvent (BGK, 2020). The growing social expectations, increasingly higher political postulates and the firm stance of entrepreneurs and labour union representatives convinced the government to activate additional assistance worth PLN 100 billion, dedicated to maintain employment and protect jobs, regardless of the size and type of business activity. The total value of intervention of the government of the Republic of Poland will be around PLN 300 billion (15% of Poland’s GDP) (Tarcza ..., 2020).

However, moving to the micro-economic level, of relevance for a single enterprise, mainly negative effects of the COVID-19 pandemic can be shown. Based on Devire's[i] organisations research, the problems predominantly affect sectors such as transport, forwarding, logistics, automotive, aviation, commerce, construction and manufacturing. In the territorial context, employers from the Łódzkie province exhibited the most pessimistic mindset - 86% of them declared that their businesses would be negatively impacted by coronavirus. Only 5% of employers saw a chance for them in the current situation - this group declared that it would have a positive impact on their activity. The most dramatic boom can be seen in e-commerce, because most of commerce dealings moved online. Manufacturers of sanitary goods and protective clothing are also reaping profits. Also, information technology businesses sees higher demand for hardware, services and remote working software (Devire, 2020). This research shows that entrepreneurs were expecting, to the greatest extent, reduced demand for products or services (48% of the respondents), in such sectors as: consulting, transport, forwarding, logistics and industrial manufacturing. Additionally, as many as 45% of entrepreneurs pointed to the possibility of reducing their employment (mostly in manufacturing, aviation, commerce and gastronomy) (Devire, 2020).

Although the discussed difficulties the entrepreneurs are or will be facing have been identified among a wider group of businesses, the following points will discuss the results of a case study of a micro-business[ii], with regard to the effects of the COVID-19 pandemic.

Methodology

The purposes of the article is to analyse the impact of the COVID-19 pandemic on the functioning of a Polish SME company, with particular focus on the effects on the domestic and international market, the plans for the future and the state's assistance.

The following research problems were formulated:

1. What are the effects of the COVID-19 pandemic on the analysed entity (in domestic, international and strategic view)?
2. What is the scale of the state's assistance for enterprises during the economy's lock-down?
3. What are the plans for the future and the strategy for the coming year?

The applied study methods included a case study and a documentation method. The case study, or analysis and description of a single, most usually real case, that allows drawing conclusions on the causes and results of its course and, in a broader sense, a given business model, market specifics, technical, cultural and social conditions, etc. This means drawing conclusions on the basis of a single case. It is a study method consisting in a comprehensive description of a certain group or a unit, approached without any initial hypotheses. The subject of exploration is individual in nature. The case study's most important element, looking from the perspective of credibility, is the quality of its substantial content. The quality is manifested, among else, by the accuracy of the raised problems, formulated diagnoses and the adequacy of solutions proposed for a given situation (Langley 1999). The documentation method consists in the use of factual information for examination purposes, collected, in advance, for economic practice purposes and recorded in relevant documents.

A case study of a manufacturing enterprise

Enterprise X[iii] will be analysed in this article, a business manufacturing and trading corrugated and plain cardboard packaging. The enterprise manufactures packaging from 2-, 3- and 5-ply cardboard, in various corrugation configurations (C, B, E), as well as flap boxes, otherwise known as FEFCO201, along with custom shaped packaging.

According to the Polish Classification of Activity, this is classified as Section C, Division 17.21.Z - Manufacture of corrugated paper and paperboard and of containers of paper and paperboard, SIC code: 51119902 – Printing paper, 51130304 – Corrugated and uniform box packaging (PKD, 2020).

It is worth adding that the COVID-19 pandemic forced a more widespread use of IT solution than previously. While the economy was in lock-down, the organisation fully transitioned to remote working to maintain relations with employees and business associates. Speaking of relations with clients and suppliers, remote working elements had been implemented earlier, especially with regard to daily correspondence, invoicing and bank transfers. Hence, the work's specific nature and organisation was not largely affected.

Answers to individual research issues will be provided below.

The effects of the COVID-19 pandemic on the analysed entity (in domestic, international and strategic view)

The change of the scale of activity must be identified as the main element. The analysis of the company's revenues in the months preceding the pandemic (January - March, 2020), until the months during lock-down (April - June, 2020), a 34.61% drop in sales was identified (Table 2).

Table 2: Total sales in January - June, 2020, in X enterprise (Own work)

Month	Total sales
January	PLN 134,132.89
February	PLN 175,812.73
March	PLN 227,383.71
April	PLN 104,246.55
May	PLN 126,042.50
June	PLN 121,091.59

The reduction in sales resulted from limited orders and reduced scale of operations of the company's clients. Many businesses with which enterprise X cooperates export their products and their shut-down, in turn, forced X to hold their operations.

With regard to the overheads, such as warehouse leases, leasing contracts, machinery depreciation or accounting and legal fees, which did not change during the pandemic, the reduced sales resulted in employee remuneration being paid from current revenues and the remaining overheads from the organisation's previously saved resources. Operational loss was incurred from April to June.

Employment-wise, production employees have civil law agreements, meaning that no job orders translated in no work and no remuneration. Employees with employment contracts received their remuneration as usual.

In order to minimise any additional costs, some of the tasks and subcontracted (outsourced) services were taken over by the enterprise's employees. For example, transport services were no longer outsourced (X would deliver the goods to the clients on their own) and warehouse tasks were taken over by X's production employees (preparing adequate quantities of goods for shipment, accepting deliveries, warehouse cleaning).

The scale of the state's assistance for enterprises during the economy's lock-down

The enterprise X received the state's assistance in the form contributions paid to the Social Insurance Institution (ZUS) waived for three months (April - June, 2020) and a low interest loan for micro-businesses from the Labour Fund, amounting to PLN 5,000, which may be remitted, provided the enterprise continues business activity for three years since the day of issuing the loan.

Plans for the future and the strategy for the coming year

X's most important client was a business whose main activities include offset printing, impregnating, coating and laminating clothing articles. The client uses products that are difficult to obtain or whose prices are impossible to accept in the Polish market. The growing trade relations made it possible to import these goods from Chinese vendors. From October 2019 until March 2020 around 30% of the enterprise's revenues came from the sale of goods to this particular client. Sadly, the even sector is still battling serious problems, resulting in no new orders. Therefore, a significant reduction in the sale of a specific range of items can be identified (Table 3).

Table 3: Volume of sales of individual goods for the most important client, January - June, 2020, [pcs] (Own work)

Product name	January	February	March	April	May	June
Cleaning tape for pad printing [pcs.]	1010	1190	690	138	138	621
PET heat transfer film [pcs.]	2000	4000	4000	0	0	0
Carbide ring, 2 mm [pcs.]	30	20	30	0	10	10
Squeegee rubber [pcs.]	5	5	5	0	0	5
PTFE Teflon film [pcs]	220	445	225	0	0	100

The reduced revenues and changes in the structure of clients forced the enterprise to introduce major modifications in its operation. Most importantly, the enterprise focused on seeking new, potential clients. A lot of enterprises are still dealing with the effects of the economic lock-down. Entrepreneurs were forced to stop leasing warehouses and let go production employees, all in order to survive in a market seeing dramatically reduced sales. They still, however, expect better availability of goods, the possibility of placing order at any time and short lead times.

With these facts in mind, strategic business rationales were developed for the coming year. New business partners were found, to whom solutions for particular problems were offered, e.g. storage of goods. Once these clients provided forecasts until the end of 2020, inventory stocks were agreed that would be maintained by X within a specific time, with goods delivered at the client's request. This means that the organisation is capable of handling such deliveries within a single day, or even mere hours. Many businesses find this solution very beneficial, because given their specific scale of operations, larger entities would not commence small series production, not to mention being able to offer to the smaller buyer prices that would be satisfactory for both parties.

Conclusions

It is evident that the coronavirus pandemic will have far-reaching consequences, both for global and Polish economy. The course and severity of this impact will be the outcome of numerous processes, most notably the duration of the pandemic, the scale and involvement of states in the liquidation of the inevitable results, as well as the attitude of entrepreneurs.

The recently unprecedented reduction of international economic exchange is, and will remain, the direct effect of combating the pandemic. Private consumption suffered a dramatic drop due to closed borders, shopping centres, restaurants and cultural facilities. Several sectors, such as entertainment, restaurant, and most importantly tourism and transport, suffered a major downturn.

The economies of today are interrelated via capital, both with regard to the supply chain and the value chain, in terms of operation of entities within a specific brand and from a macro-economic perspective. A single economic entity may affect numerous organisations by limiting or stopping, altogether, its operations. Most importantly, this applies to large enterprises which cooperate with a wide array of suppliers and subcontractors.

The article discusses the results of a case study of enterprise X, a manufacturer and seller of corrugated cardboard and cardboard packaging. The COVID-19 affected the enterprise's functioning to a high degree. Most importantly, a reduction in sales of around 34.61% was noted during the freezing period. Operating profits suffered a loss, despite some government assistance (waived ZUS contributions, low-interest loan). From the strategic perspective, X's business model was modified, because the enterprise's key client reduced its business activity (the client generated nearly 30% of the revenue). More focus was put on other areas of activity - such as storage services for specific range groups, maintaining their availability and keeping customer service at a high level (e.g. delivery within several hours).

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[i] The research was conducted using CAWI method, in March 2020, on a group of 2,500 respondents. The surveyed included: 38% managers, 20% directors CEO, 33% specialists and 9% employees with other functions.

[ii] A micro-business is understood as an entity employing fewer than 10 employees, whose annual turnover or balance sum does not exceed EUR 2 million (Official Gazette L 187 of June 26, 2014).

[iii] The organisation's owner refused to name the company.

Indicators of The Development of Enterprises from the SME Sector in the Conditions of COVID-19 Pandemic in Poland

Lukasz BRZEZINSKI

Poznan School of Logistics, Poznan Poland
lukasz.brzezinski@wsl.com.pl

Magdalena Krystyna WYRWICKA

Poznan University of Technology, Poznan Poland
magdalena.wyrwicka@put.poznan.pl;

Abstract

The development of small and medium-sized enterprises (SMEs) is an important subject of interest in the field of economic and social sciences. It is caused, inter alia, by the influence of the SME sector entities on the socio-economic processes taking place in the modern economy. In many countries, small and medium-sized enterprises constitute an important base of entrepreneurship and create a dynamically developing sector of the economy, but on the other hand, it is an extremely ”delicate” sphere of activity, susceptible to the influence of various factors and conditions. In this aspect, the COVID-19 pandemic – caused by the SARS-CoV2 coronavirus – can be indicated. It started as an epidemic on November 17th 2019 in Wuhan, Hubei Province, Central China, and on March 11th 2020, was declared a pandemic by the World Health Organization (WHO) (Coronavirus…, 2020).

The health crisis caused by COVID-19 and the ongoing isolation of many markets pose unprecedented challenges to people and economies around the world. According to the International Labour Organization, about 2.7 billion workers (81% of the world’s workforce) are partially or completely cut back on work. In the second quarter of 2020, up to 195 million people could lose their jobs, including 12 million people in Europe alone. To mitigate the effects of the crisis, governments of many countries are introducing various support programs for entrepreneurs and employees (PulsHRa…, 2020). In order to overcome the economic slowdown, organizations should adapt to the new reality, which on the one hand may generate barriers, but also development factors.
The article will present the results of an expert survey on barriers and factors for the development of small and medium-sized enterprises during the COVID-19 pandemic in Poland. The aim of the article is **to identify potential barriers and determinants of the development of economic entities from the SME sector in Poland during the COVID-19 pandemic**, based on the opinions of Experts.

Keywords: Enterprise Development, COVID-19 Pandemic, Sector of Small and Medium Enterprises, Determinants of Enterprise Development, Barriers of Enterprise Development.

Introduction

In order to survive, an enterprise strives for development, which often boils down to a set of activities introducing such internal changes in the system, caused by active shaping of external conditions, as a result of which the system is able to achieve a greater degree of complexity and thus a greater repertoire of diversity compared to earlier state (Hapten, 1988; Koontz & O'Donnell, 1989; Roystron& Altman, 1994; Segarra & Callejon, 2002).

The development of the enterprise means coordinated changes to the enterprise’s systems, adapting to the constantly changing environment. These adjustments are effective if they ensure that

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the enterprise achieves and maintains a competitive advantage, which is a prerequisite for surviving on the market (Strotmann, 2007; Watson, 2010).

Development is primarily a qualitative phenomenon consisting in the introduction of product, process and structural innovations as well as in the field of organization and management (Pierścionek, 1998). Development is an objective phenomenon occurring in society and economy, consisting in constant changes, however, not every change should be equated with development (Piecuch, 2010).

The global COVID-19[i] pandemic has forced many changes in the approach to enterprise management, the basic dimension of which is the ability to adapt tasks and functions as well as methods of work organization and management to the radically changing conditions of their operations. On an international scale, measures have been taken to prevent the spread of disease. Travel has been reduced, quarantines and curfews have been introduced and a number of sports, religious and cultural events have been postponed or cancelled. Some countries have closed their borders or introduced restrictions on border traffic, including the arrivals of passengers, and restrictions on people crossing the border. Controls at airports and railway stations were introduced. The pandemic caused global, social and economic disruptions, including the largest worldwide recession since the Great Depression (Garcia et. al., 2020). It led to the delay or cancellation of events, widespread shortages in supplies, which were deepened by panicked purchases, which in particular changed the structure and perception of barriers and factors for the development of enterprises in the SME sector, which are extremely vulnerable to any cyclical changes.

Barriers and determinants of the development of enterprises from the SME sector

The development of the enterprise means coordinated qualitative changes in the systems in the enterprise, adapting them to the dynamic environment .These activities are effective if they ensure that the enterprise achieves and maintains a competitive advantage, which is a necessary condition to survive on the market (Urbaniak, 2016; Wyrwicka, 2003).

The essence of managing an organization and shaping its development potential, and thus determining the right strategic directions, is to deal with various kinds of tensions. The ability to identify contradictions and then reasonably integrate them, thanks to which a certain kind of complexity and uniformity of development is achieved, is a challenge for people managing enterprises in today's world (Machaczka & Machaczka, 2011, pp. 162-167).

In this context, it is worth referring to the concept of barriers to enterprise development, which may constitute the adopted solutions in terms of resources or processes and the related states and the situation in the environment. Business development barriers are divided into two categories: external and internal. The first ones include market, personnel, financial barriers resulting from the government's economic policy, legal barriers resulting from the lack of access to information. On the other hand, the second (internal) ones include: imperfections in the field of management, basic activity (e.g. production), lack of competences or an inadequate scale of activity (Strategor, 2001; Czekaj, 2010).

Among the internal barriers to the activity and development of the enterprise, there are, therefore, imperfection in the management, limitations related to the basic activity, scope of operation or lack of competences of the owners and staff of the enterprise (Table 1).

Table 1: Characteristics of individual groups of barriers to the development of enterprises from the SME sector (Matejun, 2007)

Management imperfections	
Development strategyerrors	- demonstrated mismatch between the product or services and the expectation of recipients, - bad location of the enterprise, - too low initial capital, - dependence on a specific group of recipients/suppliers
Operational management errors	-lack of funds for current operations and investments -mistakes made in planning, implementing solutions and control
Staffingproblems	- maladjustment of incentive systems or Staff competences to the

Management imperfections	
	needs of the company's operations, -mismatch between qualifications or terms of reference of the management to the needs of the organization, - permanent changes at the highest levels of management
Weaknesses of organizational structures	- communication problems within the company, - lack (or errors) of allocation of decision-making powers, - insufficient level of delegation of tasks and powers, - lack of staff preparing indications of the spectrum of possibilities in order to make the right decision
- unforeseen increase in operating costs: rents, energy, telecommunications fees, costs of raw materials, semi-finished products and others.	
- ignorance of modern management concepts, methods or techniques.	
Barriers related to the owners policy	
Inadequates kills	- in the field of scales and marketing, -in the field of business planning, - in the field of financial management,
- low tendency to learn, development innovation and creativity, - abandonment of *know-how* - chasing the novelty without taking into account the experiences of previous professional generations	
Barriers related to the basic activity	
- means of work or technologies inadequate to the needs, - processing capacity inadequate to the needs, - supply difficulties, - problems with technology transfer, difficulties in keeping up with technical progress.	
Housing barriers	
- inadequate (too small or too large) premises, - problems with choosing the right location for customer service points, - renovation costs, - no parking spaces, - remotness from main communication routes.	
Barriers related to the size of the business	
- failure to recognize market needs in the context of the product life cycle, - no risk management or deliberate provisioning, - lack of flexibility related to the size of the business, - lack of readiness to change the market offer, **-** inappropriatehumanresources policy.	

The problem of the impact of internal barriers to activities grows and accumulates with the growth of the organization (e.g. measured by the size of employment, sales) and its "aging". Larger, longer-lasting businesses face more complex challenges. An example is the need to separate management processes from the ownership sphere. The negative impact of limited housing resources may also appear to a greater extent, and the activity in a complex market with greater volatility may introduce the need to improve the qualifications and competences of the management and employees of such entities (Matejun, 2007, pp. 128).

In the processes of their functioning, enterprises may use various factors that may support their development. These factors, referred to as stimulators, determinants, or catalysts of development, are measurable components distinguished in a complex of phenomena, which are considered as the cause of development processes (Pszczołowski, 1978) and constitute their driving forces. The literature on the subject points out that they may come from within the organization, being its strengths (internal factors) or from the environment, creating opportunities for the development of a small enterprise (external factors) (Nogalski, Rutka and Wójcik-Krapacz, 2007). The selected internal and external factors (stimulants) of the development of small and medium-sized enterprises are presented in Table 2.

Table 2: Selected internal and external factors (stimulants) of the development of small and medium-sized enterprises (Matejun, 2008)

Internal factors of the development of SME	External factors of the development of SME
- the ability to manage the resources of the organization -knowledge, experience and entrepreneurship of the management -employees' competences and skills -the nature of the market the knowledge of it -ability to implement technical progress -the size of the capital -production abilities -quality of offered products and / or services -cooperative links -ability to operate flexibly -level of sales profitability	-legal conditions for starting and running a business -the country's economic growth -development of demand and supply in the market -market competition -access to external financing -customs policy -regulations of the financial and tax system -the government's policy towards SMEs -the scope of the state's financial and non-financial support -entrepreneurial culture

Enterprises always operate in a specific external environment. They operate in a specific region in conjunction with the state and other companies. The environment provides them with certain opportunities and possibilities, but at the same time imposes requirements and limitations on them. This state of affairs is of particular importance during the COVID-19 pandemic, which has had an unprecedented impact on the activities of entities from the SME sector

The impact of the COVID-19 pandemic on the development opportunities of enterprises in the SME sector

The COVID- 19 pandemic is not only the most serious global health crisis since the Great Flu in 1918 (the so-called Spanish flu), but it is, also, the most economically costly pandemic in recent history (BIS, 2020). The economic effects of "stopping" the globalized and computerized world are felt by all participants of economic processes.

According to the estimates of the European Commission, all European Union (Eu) countries will face a recession (Forbes, 2020). Despite the swift and comprehensive policy response at both EU and national level, the coronavirus pandemic will have a significant impact on the economic performance in 2020 as lifting of restrictions is slower than expected. The scale and duration of the pandemic and possible future containment measures are still largely unknown. The Eu economy is expected to contract by 8.3& in 2020 (including Poland by 4.3%), and by 5.8% in 2021. In the euro area, a decrease of 8.7% in 2020 and an increase of 6.1% in 2021, respectively (Forecast…, 2020).

Interesting is the opinion of the Bank for the International Settlements (BIS) analysts, which indicate that, on the one hand, the high losses due to global efforts to contain the COVID-19 pandemic are unprecedented. On the other hand, it is unclear if the counterfactual would be less costly – an uncontrolled pandemic like the Great Flu of 1918 caused significant and lasting damage. It is therefore necessary to better understand the COVID-19 shock transmission channels for the economy, the interactions between economic decisions and the epidemic, and political compromises. (BIS, 2020).

The pandemic has already marked its different impact on the situation of individual sectors of the economy. In the first place, it hit the areas of the economy closely related to the spatial movement of people, i.e. tourism and communication and secondly with the movement of the goods, i.e. trade. The declines are also affecting the global financial markets.

Therefore, in the face of the spread of the SARS-CoV-2 virus, it is reasonable to ask about the effects of this phenomenon on the Polish, micro, small and medium-sized enterprise sector. This is an important matter, because nearly half of the gross domestic product in Poland is produced in this sector, and almost 60% of workers are employed there. It is also the sector most exposed to any changes and turbulences in the economy.

Based on the research carried out jointly by PwC, SpotData and CBM Indicator[ii], it can be indicated that almost **90% of enterprises in Poland from the SME sector experienced disruptions in their operations resulting from social isolation and changes in customer behaviour**. From over one third of companies (35.3%), the decrease in revenues exceeds 50% compared to the same period in the previous year (PwC, 2020).

In addition to the drop in revenues, delays in payments from customers are also a very important problem. Over 50% of companies experienced difficulties with financial liquidity. One third of companies intend to cut employment in response to the economic shock. Most of such companies are among small enterprises – as much as 42.5%. On the other hand, in the group of medium-sized enterprises employing 50-249 employees, a quarter has already started or are planning layoffs. This confirms the conclusion that the smallest companies feel the shock the most, and the larger companies may be slightly more resistant to short-term shocks (PwC, 2020).

It can therefore be concluded that the scale of the negative effects of the COVID-19 pandemic for the Polish SME sector is unprecedented in the history of the Polish free market economy. In this context, it is particularly important to search for and identify both threats and market opportunities. One of the elements of these activities is the analysis of barriers and indicators of development, which was carried out in the research part of this article with the use of an expert survey and the use of network analysis to interpret the results.

Methodology

The aim of the research was to **identify potential barriers and determinants of the development of economic entities form the SME sector in Poland during the COVID-19 pandemic**, based on the opinion of Experts.
The following research problems were formulated:

1. **What are the barriers to the development of enterprises from the SME sector in Poland during the COVID-19 pandemic,** based on the opinions of Experts?
2. **What are the dominants of the development of enterprises from the SME sector in Poland during the COVID-19 pandemic,** based on the opinions of Experts?

In the process of collecting research material, two research methods were used: **a questionnaire survey (expert survey)** and **a network analysis**.

The questionnaire survey consists in obtaining data by asking questions on the basis of a specially prepared questionnaire - obtaining answers by the interviewer from respondents, selected on the basis of appropriately selected research samples. It should be noted that an expert survey is a special type as it consists in using the knowledge and creativity of people, who are specialists in a given field (Magruk, 2005, pp. 257). Most often they are carried out on a small, deliberately selected research sample. In expert surveys, questions asked to respondents concern not only facts or their attitude towards them, but also attempts to explain and predict them. Thanks to professional knowledge and "imagination embedded in reality" they can also create valuable (realistic) forecasts of the development of the situation in a given fragment of the economic and social reality (Babbie, 2004, pp. 327; Churchill, 2002, pp. 309-311).

Network analysis is a method of detecting, describing and identifying relationships among groups of people or organizations (Wassermann & Faust, 1994). It i san interdisciplinary method that uses elements of graph theory, statistics, matrix algebra, as well as sociology, social psychology or anthropology, focusing primarily on the structure of the existing relationships between social entities (people, teams, organizations, regions, etc.). Network analysis is practically used (mainly in analytical processes) in management and quality sciences, both at the supra-organizational level, including interregional (Reid, Smith & Carroll, 2008, pp. 345-352), and in relation to the broadly understood activity enterprises (Kijkuit, van den Ende, 2010, pp. 451-479).

In the research part of the article, the following network analysis indicators will be used:

- Nodes betweeness, it is the ratio of the number of the shortest paths between any two nodes passing through a given node to the total number of all the shortest paths; sometimes mediation is normalized in such a way that the maximum mediation in the network is 1, mediation indicates which nodes are the most

important, i.e. it determines the probability with which a given factor (element) is key for the total tides in the network;
- Cumulative value of a vector – it is the sum of all connections from a given network node, it parameterizes the range of influence of a given factor on the flows in the network.

Network analysis allows to evaluate network structures by analysing connections at various levels, identifying structural gaps and distinguishing subgroups connected by a particularly strong structure of relations, as well as assessing the importance of individual people in the analysed economic and social processes (Scott, 2000).

The ”Pajek” program developed by V. Batagejland A. Mrvar (Program, 2015), was used for the analysis and visualization, thanks to which it is possible to reflect the relations and interactions between departments, employees, their activities, processes, material and non-material resources, as well as the environment of the organization.

The article is a continuation of the series of experimental research on the use of the ”Pajek” program as an auxiliary tool in creating a concept of solving specific problems of enterprises based on the relational systems between employees and other resources at the disposal of the organization, as well as environmental factors and phenomena(see: Brzeziński, Wyrwicka, 2015; Brzeziński, Kliber & Wyrwicka, 2016).

The study was conducted in August-September 2020 on a sample of 34 experts related to both the business and scientific spheres (16 scientists from the disciplines of management science, economics and finance, 3 business owners and 15 managers with at least 5 years of experience in their job). An expert research form was used in which the respondents were asked about barriers and determinants of entities from the SME sector in Poland. Moreover, the impact of these factors was determined on a scale from 1 to 5 (where 1- no impact, 2- weak impact, 3- medium impact, 4 – high impact, 5- very high impact)

Indicators and barriers of the development of enterprises – analysis of own research

The study was conducted in August-September 2020 on a sample of 34 business experts and scientists. An expert questionnaire form was used to collect the research material, which consisted of two parts: concerning the assessment of the impact of barriers on the development of enterprises from the SME sector, and also concerning the assessment of the impact of determinants on the development of enterprises from the SME sector. In terms of barriers, the following categories were distinguished: administrative, tax, management, owner, policy, core business and housing. However, development was divided into internal and external factors.

In terms of analysis and interpretation, network analysis tools were used – visualizations and brokerage indicators and vector value. In response to individual research problems, a division was made into the work part related barriers to development, as well as determinants. In the case of work visualizations in the ”Pajek” program, the thickness of the lines between individual network element determines the strength of the relationship and the thicker it is, the stronger the impact.

In order to select the factors significant for the development of an enterprise in the SME sector, the authors chose two parameters for the analysis: the intermediate value and the vector value, which can be determined by the ”Pajek” program.

The value of intermediation indicates the probability with which a given factor is crucial for the formation of barriers or determinants in this case (it is calculated from all connections in the network, and the values sum up to one). The higher the mediation value, the greater the importance of a given factor can be indicated. On the other hand, the value of the vector determines the strength of the factor’s impact on the indicator, in this study it ranges from 1-5 (where 1- no impact, 2- weak impact, 3- medium impact, 4- high impact, 5- very high impact). The higher the value of the vector, the greater its impact on the indicator.

Individual opinions of experts have been complied in relations to individual barriers and determinants of enterprise development, takin into account the strength of the impact of individual factors, On this basis, it is possible to indicate the characteristics of the relationship network:

- 104 network elements, including: 34 experts, 70 factors (35 barriers of development; 35 determinants of development);
- 2238 network connections.

The summary of experts' opinions is included in the network visualization -fig. 1. Symbols:

- Black diamond – indication of individual experts;
- Red circle – categories of barriers to enterprise development;
- Red triangle – barriers to enterprise development;
- Green circle- categories of enterprise development factors;
- Green triangle – factors of the company's development.

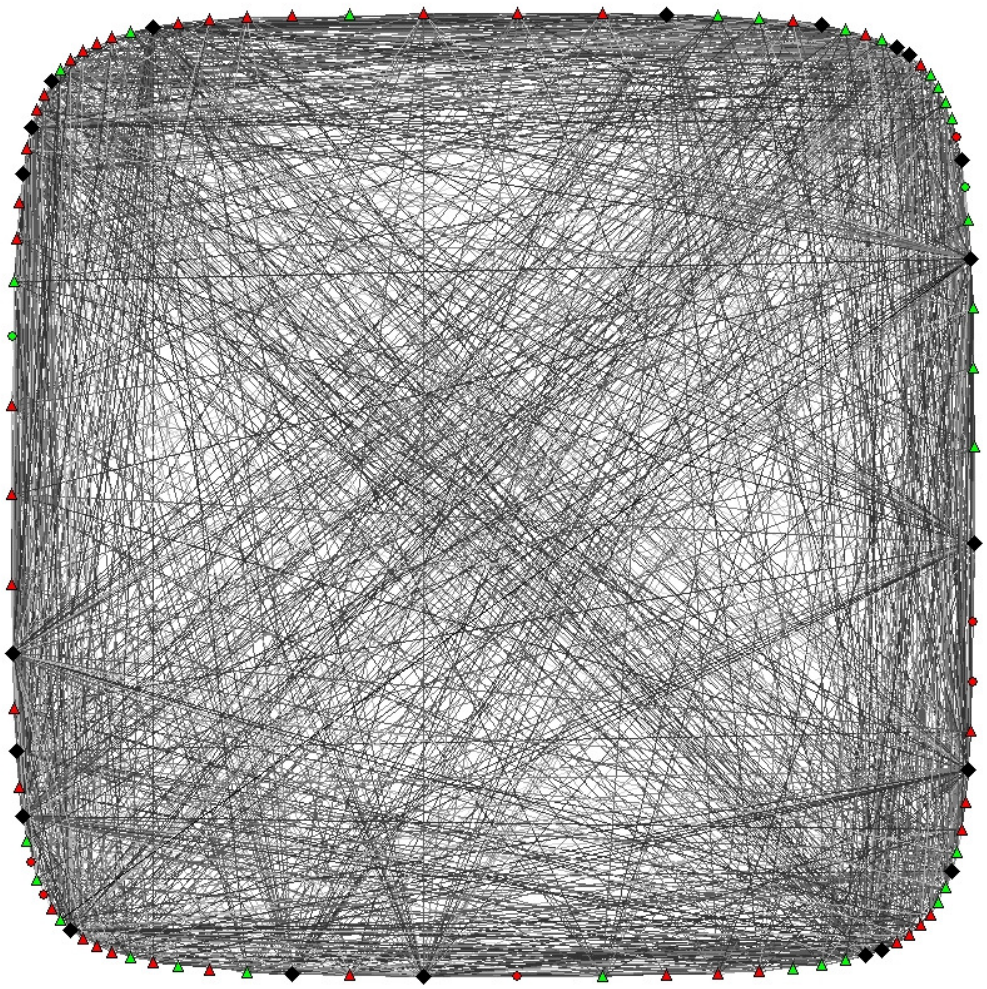

Fig. 1: Network visualization of Experts' opinions on barriers and determinants of the development of enterprises from the SME sector in Poland in the COVID-19 period (source: own study)

Barriers of the development of enterprises from the SME sector in Poland in the COVID-19 period, based on the opinion of Experts

The value of the vector determines the strength of the factor's impact on the indicator, in this study it ranges from 1-5 (where 1- no impact, 2- weak impact, 3- medium impact, 4- high impact, 5- very high impact). The higher the value of the vector the greater its impact on the indicator. The list of the highest values of cumulative vectors of barriers to enterprise development is presented in Table 3.

Table 3: List of the highest values of cumulative vectors of barriers to the development of enterprises from the SME sector in Poland – based on experts' opinions (Own study)

136,000000	No risk management or intentional provisioning
136,000000	Development strategy errors
135,000000	Drop in revenues due to the COVID-19 pandemic
134,000000	Low propensity to learn, develop innovation and creativity
134,000000	The nature of the market and its knowledge
130,000000	Operational management errors
130,000000	Personnel problems

It should be noted that the most important barriers (based on vector values in the network) are: no risk management or intentional provisioning; development strategy errors; drop in revenues due to the COVID-19 pandemic.

The value of intermediation indicates the probability with which a given factor is crucial for the formation of barriers or determinants of development (it is calculated from all connections in the network, and the values sum up to one). The higher the mediation value, the greater the importance of a given factor can be indicated. Table 4 presents the list of the highest values of the index of intermediation of barriers to enterprise development.

Table 4: A list of the highest values of the index of intermediation of barriers to the development of enterprises from the SME sector in Poland – based on the opinion of experts (Own work)

0.000538	Duration of proceedings before a civil and administrative court
0.000538	Procedures of applying for aid funds and their settlement (also in the scope of the
0.000538	Public procurement procedures
0.000538	Number of required permits, permits, concessions, licenses
0.000538	Labor law regulations
0.000538	Duties regarding declarations submitted to administrative authorities
0.000538	Start-up procedurę̨s
0.000316	The period of waiting for the interpretation by the Minister of Finance

Among the factors with the highest value of intermediation index, we can distinguish: duration of proceedings before a civil and administrative court; procedures of applying for aid funds and their settlement; public procurement procedures; number of required permits, permits, concessions, licenses; labor law regulations; duties regarding declarations submitted to administrative authorities; Start-up procedures; the period of waiting for the interpretation by the Minister of Finance.

Determinants of the development of enterprises from the SME sector in Poland in the COVID-19 period, based on the opinion of Experts

The development factors with the highest cumulative values of vectors include: ability to manage company resources; the quality of the products and / or services offered; shaping the demand and supply in the market. The list of the highest values of cumulative vectors of barriers to enterprise development is presented in Table 5.

Table 5: A list of the highest values of cumulative vectors of determinants of development of enterprises from the SME sector in Poland – based on experts' opinions (Own study)

146,000000	Ability to manage company resources
141,000000	The quality of the products and / or services offered
136,000000	Shaping the demand and supply in the market
134,000000	The nature of the market and its knowledge
133,000000	Management knowledge, experience and entrepreneurship
133,000000	Ability to act flexibly
133,000000	Legal conditions for starting and running a business
130,000000	Employees' competences and skills
130,000000	Regulations of the financial and tax system

With regard to development determinants, the same -high – value was obtained by many factors, such as: legal conditions for starting and running a business, the rate of economic growth of the country after the COVID-19 pandemic and shaping the demand and supply in the market (Table 6).

Table 6: A list of the highest values of the intermediation index for the determinants of development of enterprises from the SME sector in Poland – based on experts' opinions (Own work)

0,000582	Legal conditions for starting and running a business
0,000582	The rate of economic growth of the country after the COVID-19 pandemic
0,000582	Shaping the demand and supply in the market
0,000582	Market competition
0,000582	Access to external financing (including the
0,000582	Customs policy
0,000582	Regulations of the financial and tax system
0,000582	Government policy towards enterprises from the SME sector
0,000582	The scope of the state's financial and non-financial support
0,000582	Entrepreneurialculture
0,000582	Freezing the economy after the lock-down period caused by the COVID-19 pandemic

It should be noted that it is interesting that both experts and scientists did not indicate any specific features that may be of particular importance during a global pandemic. First of all, entities from the SME sector are struggling with the decline in revenues, the blunders of strategies that did not take into account the epidemic. In the current situation, the implication of the development of small and medium-sized enterprises may be the modification of business models and a flexible focus on identifying market niches and creating a new range of services or expanding the functionality of products. This applies to both relationships with individual and business customers. Currently, the second wave of epidemics is taking place in Poland, therefore the experiences of entrepreneurs from the first half of this year, as well as the identified development factors, may contribute to the development of strategic premises that will help to survive on the market in this difficult period.

Conclusions

The Polish economy has not experienced such a violent shock as in response to the COVID-19 pandemic since the systemic transformation in 1989. This is a new situation for owners, managers, employees and politicians alike. The scale of the crisis and recession is significant at the macroeconomic level, and the small and medium-sized enterprise sector itself was significantly affected by the "freezing of the economy". It is estimated that as many as 90% of entities in this sector experienced business disruptions, including those related to reduced turnover, difficulties in maintaining financial liquidity, or the need to reduce employment (PwC, 2020).

Based on the conducted research based on the opinions of experts, the most important barriers to development include: no risk management or intentional provisioning, low propensity to learn, develop innovation and creativity,

problems with technology transfer, difficulties in keeping up with technical Progress, inadequate skills in sales, business planning, financial management, marketing, low propensity to learn, develop innovation and creativity as well as chasing the novelty without taking into account the experiences of previous professional generations. However, the factors of development include primarily: the quality of the products and / or services offered, ability to manage company resources, sales profitability level, legal conditions for starting and running a business, the rate of economic growth of the country after the COVID-19 pandemic, as well as shaping the demand and supply in the market.

In addition, the very circumstances surrounding the COVID-19 pandemic provide an opportunity for companies to somehow challenge the current perception of work, or even give it a new shape in the future. It is primarily about introducing new working methods – promoting flexibility in the workplace, adapting the environment in terms of maximizing commitment and productivity, and in a broader context even adapting to the lifestyle and work of individual employees (PulsHRb).

Therefore, the determinant of enterprise development may be not only the provision of appropriate equipment (breaking the technological barrier), used to perform professional duties, but also a change in the aspect of work culture – to a flexible work environment, focused on task-oriented work, or optimization of investments, the pandemic stood in the opposition to the perception of the job.

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[i] By September 4th 2020, there were nearly 26.34 million cases of COVID-19 in 188 countries and territories, including over 869,000 deathsand over 17.57 million recoveries (ECDC, 2020).

[ii] The aim of the study was to analyse the first effects on companies of the fight against COVID-19 disease. The survey was conducted on March 24th – April 2nd this year, with the use of telephone interviews (the so-called CATI survey) and on-line surveys, on a sample of over 750 micro, small and medium-sized enterprises (PwC, 2020).

Understanding Success: A Constructionist Approach to Identifying Success Factors Among the Polish Entrepreneurs Using Polish Panel Survey (POLPAN), 1988-2018

Yevhen REVTIUK

Poznan University of Technology, Poznan, Poland
E-mail: yevhen.revtiuk@put.poznan.pl

Olga ZELINSKA

Institute of Philosophy and Sociology, Polish Academy of Sciences, Poland
E-mail: ozelinsk@sns.edu.

Abstract

In this initial investigation we took the constructionist stance attempting to enhance the scholarly community's understanding of how Polish entrepreneurs construct own success factors and if this has changed over time, as the country transited from command to market economy. Using the data from the Polish Panel Survey, POLPAN, waves 1988-2018, we were able to identity "Social Capital", "Luck" and the "Need for achievement" as the main factors which entrepreneurs believed contributed to their success. At the same time, we were able to demonstrate that the way entrepreneurs construct own success factors has changed during Poland's transit.

Keywords: Entrepreneurship, Success, Constructionism, POLPAN, Poland

Introduction

Entrepreneurship is a specific type of activity, which, by its nature, involves creation of something new, e.g. developing a new product, starting a new company or investing in a new market, and therefore targets success. It is, thus, natural, that both scholars and practitioners have long been interested in answering the questions about effective ways to achieve entrepreneurial success. There are, however, several problems associated with this type of research. First, there is a lack of agreement on the exact criteria for entrepreneurial success. Although the financial results are often considered the main criterion for a successful company, business success understood broadly depends on the goals set by an entrepreneur, including her financial (profit, income or economic growth) and organizational (creation of a new product, team building, survival of the company in the market during crisis), as well as personal (economic well-being, lifestyle success) aims. Secondly, existing research exaggerates either endogenous (individual traits) or exogenous (socio-economic surrounding) success factors, paying little attention to the interaction of these two sets of explanators in the actual entrepreneurial performance and their change over time.

Taking the constructionist stance, in this initial exploration we complement the existing scholarship by analyzing the factors which entrepreneurs considered important for own success under the different periods of economic transition. Using the data from the Polish Panel Survey (POLPAN) panel survey, carried out in Poland during 1988 - 2018, we examined the beliefs of entrepreneurs about the factors of success. Using the factor analysis we have identified three main factors that were important prerequisites for success, namely the factors of "Social capital", "Luck " and the "Need for achievement". We demonstrate that the composition of the obtained factors differs in different waves, reflecting the general change in the entrepreneurial climate in Poland, which was transiting from command to market economy.

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Theoretical Framework

The literature offers no single definition of the "entrepreneurship" or the "entrepreneur". Entrepreneurship was defined as the entry of new firms, and the creation of high-growth firms (Hoffmann, 2007); the ability of individuals to create and develop innovative organizations that generate value(Gartner, 1990); or even competitive behaviors that drive the market process (Davidsson, 2016). For the purposes of this study, we will look at entrepreneurship in terms of its occupational choice – entrepreneurs are individuals who choose to work for themselves as opposed to others (Hébert and Link, 1988). Entrepreneurs, at the same time, are "individuals who have risked or intend to risk their personal capital, personal time, and/or personal reputation in pursuit of business ventures" (Ness and Seifert, 2016, p.90).

Success is a controversial category because it depends primarily on the value obtained results for every individual entrepreneur (Rauch and Frese, 2000). At the same time, the criteria of success for an individual and an enterprise will differ significantly depending on national characteristics (Ray and Trupin, 1989), gender (Dyke and Murphy, 2006), age (Glass, 2007) or membership in a professional group (Orser and Dyke, 2012). Entrepreneurship researchers analyzing the reasons for success of the enterprise also use various criteria for its evaluation, such as creation of ventures (Shane, 2003), entrepreneurial exit (Lee and Lee, 2015), venture growth (Baum and Locke, 2004) and other different performance indicators (Fisher, Maritz and Lobo, 2014), goal achievement, economic success or lifestyle success (Rauch and Frese, 2000). The search for ways to avoid contradictions between different perceptions of factors of entrepreneurial success has led researchers to develop various multicriteria models of success (for example (Wach, Stephan and Gorgievski, 2016), which, despite their complexity, still cannot take into account all the variety of understandings of the concept of success by different individuals.

Given that success is among the key motives of entrepreneurial activity, attempts to study the factors that can lead to such success have been extensive. Existing theories that explain the reasons for success or failure of the entrepreneurs can be classified into two groups: 1) those stressing the agency behind success – so called trait model and 2) those stressing the role of the structure, various characteristics of the external environment in shaping success of the enterprise, driven by the contingency thinking (Littunen, 2000; for extensive overview see also Bouchikhi, 2016). As we demonstrate below, focus on either endogenous or exogenous factors can be limiting to the entrepreneurship research, leading to multiple calls for alternative theoretical approaches.

Supporters of the trait model try to explain the phenomenon of success or failure of the entrepreneurs using a variety of traits, which, generally, can be combined into 5 groups: 1) need for achievement, 2) locus of control, 3) problem - solving orientation, 4) interpersonal reactivity and 5) assertiveness (Caliendo and Kritikos, 2008; Rauch and Frese, 2000). Particular qualities of individuals form her or his entrepreneurial capital (Revtiuk and Malecka, 2019), which is a part of the human capital (Becker, 1964), cultural capital and social capital (Bourdieu, 2002). Human capital, including education, experience, knowledge, and skills, is among the key resources needed for the successful entrepreneur (Unger et al., 2011). At the same time, no less important is perseverance and hard work of an individual. "Entrepreneur labor refers to the entrepreneurial characteristic of hardworking, which is expected to transfer human capital to venture success" (Lee, 2019). Social capital of the entrepreneur depends on her social skills (Baron and Markman, 2000) or specific social traits (Brandstätter, 2011), and provides additional advantages in the market, usually through formation and utilization of personal relationships and social networks. At the same time, often overlooked in this type of research is the fact that the traits that lead to success in different economic systems will be different.

Theories based on the contingency thinking address this context-dependence by suggesting that the characteristics of successful entrepreneurs are not universal. This idea can be illustrated by the statement of Gartner that entrepreneurship is the ability of a person to the creation and development of innovative organizations (Gartner, 1990). Further, this degree of innovation of the same product, market or production method, may differ not only between countries but also for different regions. Successful entrepreneurs operating in different countries or cultures, have different leadership styles (Stephan and Pathak, 2016), possess different levels of human capital (Unger et al., 2011), including different levels of education (Fried and Tauer, 2009), different characteristics of cultural capital and social capital (Davidsson and Honig, 2003). However, suggesting the deterministic nature of the socio-economic structure at the expense of the agency may be equally harmful for the research on entrepreneurship.

Along with multiple attempts for multi-factor analysis, which tried to combine internal and external factors in a single model, often limiting the complex reality of entrepreneurial process to a set of variables (for critique see Bouchikhi (1993), calls for an alternative research paradigm also emerged. Social constructionist perspective, borrowed from social sciences, is seen as one of approaches which can potentially develop new and/or neglected perspectives in the field of entrepreneurship. As Lindgren and Packendorff (2009), who are among constructionism' most vocal

advocates, suggest "[constructionism] is about pluralism in entrepreneurship research; it acknowledges different meanings about entrepreneurship, provides knowledge about interaction processes and describes complexity". Constructionist stance would suppose seeking understanding of how individual entrepreneurs perceive, define, produce and reproduce entrepreneurial action across societies and time.

Guided by this logic in this initial investigation we aim to understand how entrepreneurs themselves subjectively construct their perception of success. We purposefully avoid testing any predictions, implying instead a descriptive inquiry into what factors contribute to entrepreneurs' success, from their point of view, and if these change over time within the same socio-economic system. For our exploration we have chosen Poland, a country that has undergone a successful transformation from a command socialist to a successful market economy over the past 30 years.

Background

In 1988, Poland was on the verge of market transformation. Painful but successful market reforms in 1991-93 eventually led to transition of the country: since 1996 Poland is a member of the OECD; in 2004 it become a member of the EU. The territory of Poland is 312.7 thousand sq.km., in 2017 the population amounted to 37.98 million people, GDP (current) is 526.47 billion US dollars, GDP growth (annual%) equals to 4.8% (World Bank Open Data | Data). In 2018 Poland ranked 37th in the Global Competitiveness Index and was a successful developed country and one of the leaders in Eastern Europe in terms of economic development.

Although entrepreneurial activity, unlike most other socialist countries, was initially allowed in Poland, entrepreneurs at first did not enjoy social prestige due to the lack of prospects for developing their own business (Rumiński, 2017). Rapid economic changes, however, had impacted the dominating society's views on the factors that lead to success (Janicka and Słomczyński, 2007, 2016). The beginning of economic reforms led to the revival of the entrepreneurial class in the country, which played an important role in Poland's success story (McMillan and Woodruff, 2002). For example, by the end of 1989, more than 16,000 new businesses were registered (Wilson and Adams, 1994).

Studies of entrepreneurship in the post-socialist Poland take into account different traits and their importance of entrepreneurial success in different periods, for example the impact of education and family history (Boruc, 2018), the role of social connections (Osborn and Słomczyński, 2005) or parent-son inheritance of entrepreneur status (Domański, 2000).

Methodology

This study is based on the data of the Polish Panel Survey (POLPAN), one of the longest continuously run panel studies in Central and Eastern Europe, carried out by the Institute of Philosophy and Sociology, Polish Academy of Sciences. Since it was initiated in socialist Poland in 1987-88, POLPAN reached the respondents in five-year intervals, with most recent wave fielded in 2018. This survey collects socio-demographic and socio-economic information of respondents and their families, as well as data on participants' various socio-political attitudes (Polish Panel Survey POLPAN., 2020). For this article we used the results of the all seven waves of the POLPAN (1988 to 2018). In this way the analysis covered all phases of transit of the Polish economy from late socialism to a developed market economy, which allowed to see what factors the entrepreneurs believe lead to success and if these vary depending on the external social economic environment.

For the analysis we took into account the answers of respondents, who indicated own business as the main place of work. Further, we used a set of questions about the importance of factors for success, that were asked to all respondents who participated in all waves of the POLPAN survey. Particularly, respondents were given a Likert scale from 1 to 5 (from "1=very important" to "5=not at all important") on the importance of (a) ambition, (b) of knowing the right people, (c) of hard work, (d) of political influence, (e) of coming from a rich family, (f) of a good education, (g) luck, and (h) innate ability for success in life. We assume that entrepreneurs associate success in life with their professional activity. Descriptive statistics of these variables are provided in Table 1.

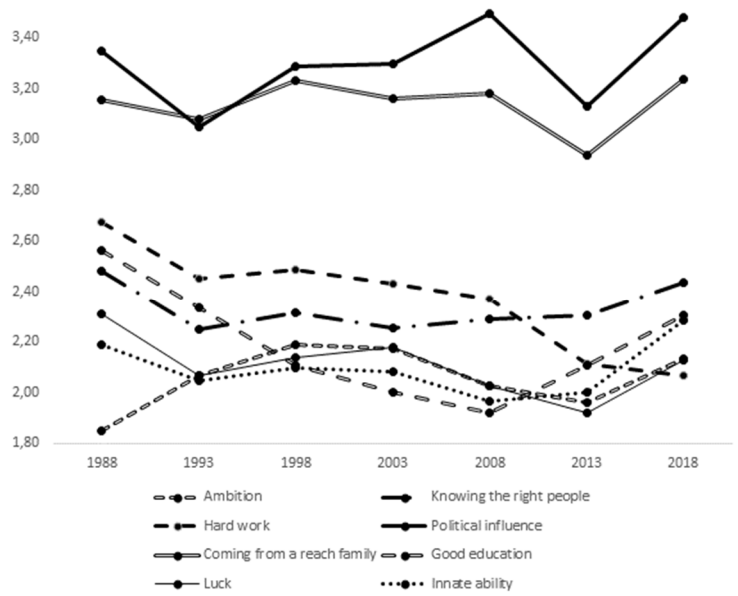

Fig. 1: Average value of importance of the given factor for success in life for POLPAN, 1988-2018 (1= very important, 5= not at all important).

The analysis of the dynamics of change in the arithmetic mean of the indicators under study suggests that political influence (mean ranges from 3.05 in 1993 to 3.5 in 2008) and coming from a reach family (mean ranges from 2.94 in 2013 to 3.24 in 2018) are, according to the respondents, the least important success factors. Instead, ambition (mean ranges from 1.85 in 1988 to 2.19 in 1998), good education (mean ranges from 1.92 in 2008 to 2.56 in 1988) and innate ability (mean ranges from 1.96 in 2008 to 2.26 in 2018) are the most important. The steady increase in the importance of hard work among entrepreneurs throughout the analyzed period from 2.68 in 1988 to 2.06 in 2018 is also worth noting.

Considering that entrepreneurs are a heterogeneous stratum and will differ in types of economic activity, business size or business experience, the study used factor analysis, which allowed to identify groups of factors related to them and their weight in different waves POLPAN survey. Table 2 describes the factor groups obtained after processing the POLPAN data in SPSS using the Varimax rotation method. To verify the adequacy of the results obtained we used Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO, ranging from 0.521 to 0.773).

Findings

We grouped the results obtained in different waves of the survey depending on the obtained values of the coefficients of factor weights. As a result, we were able to identify three groups of factors including: 1) the factor of “Social Capital “(characterized by high factor weights for "Knowing the right people", "Political influence" and "Coming from a reach family”), the factor of “Luck” (characterized by high factor weights of “Luck” and “Innate ability”) and the factor of the “Need for achievement” (characterized by high factor weights of “Ambition”, “Hard work ” and, in the waves of 2003, 2008 and 2013, "Good education " and "Innate ability"). Figure 1 illustrates the obtained factors of the respective groups depending on the survey wave.

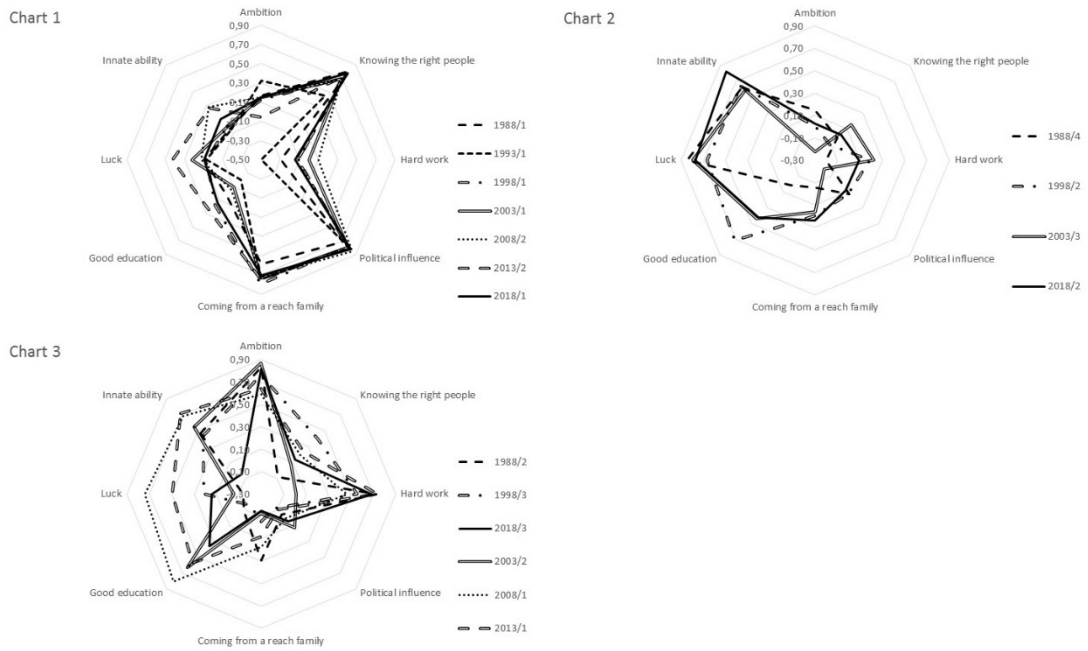

Fig. 2: The size of the coefficients of factor weights for factors of "Social Capital" (Chart 1), "Luck" (Chart 2) and the "Need for achievement" (Chart 3)

Our findings suggest that the most stable factor, according to the surveyed entrepreneurs, which leads to success, is the factor of social capital, which is found among the results of the analysis of all waves of the survey, explaining from 20.436% to 26.186% of the results. It should be noted that in the wave of 1993, the factor weight of "Knowing the right people" is the lowest (0.445), which, in our opinion, may be the result of new opportunities for entrepreneurs as a result of reforms in Poland. In other words, the rapid development of entrepreneurship has reduced the importance of knowing the right people to achieve entrepreneurial success. Saturation of markets, which occurred due to the growth of the number of enterprises, and the establishment of "rules of the game" led to the restoration of the importance of this factor for entrepreneurs in the later waves.

The "Luck" factor occurs in the early waves (1988, 1993 and 2003) and in the last wave of 2018. In our opinion, the factor of luck, according to the entrepreneurs, was important during the period of rapid economic transformation, because it was filled with "windows of opportunity", which allowed the early entrepreneurs to succeed quickly without investing significant effort and money. The success factor has returned to the agenda of entrepreneurs after the crisis years, during which small and medium-sized businesses suffered losses. Thus, the belief in the importance of luck for success was re-formed among the entrepreneurs.

Finally, perhaps the most important factor is the factor which we called "The need for achievement". The core of this factor consists of the indicators of "Ambition" and "Hard work", its weight is high in 1988, 1998, 2008, 2013 and 2018. In the wave of 2003, the factor weight of "Hard work" was quite low (0.013). Next, it should be noted that in the waves 2003, 2008 and 2013 (with the exception of 2003 wave) "Good education", "Innate ability" and "Luck" were significant for this factor. In our opinion, this is due to the reduction of economic turbulence associated with the completion of reforms and the country's accession to the EU.

Conclusion and Discussion

In this study we proposed to move beyond the mainstream research in the field of entrepreneurial success, that, by and large, is focused on achieving economic results, and, using the ideas of constructionism, to look at success through the eyes of entrepreneurs themselves. By looking at the respondents' answers about the factors of success in life we did not initially set any quantitative or qualitative criteria for measuring success of their entrepreneurial activity, and thus avoided problems characteristic to studies comparing the performance of entrepreneurs operating in different industries or businesses of different size. The use of factor analysis allowed us to synthesize success factors from the

respondents' answers and trace their change during the 30-year history of Poland's transit from socialism to a successful market economy. Perhaps the most interesting trend is the dynamics of the "Luck" factor, which was important both during the early transformation period and regained importance in 2018, when Polish economy is considered one of the most successful among the new EU member states.

We acknowledge multiple limitations connected to this study. First and foremost, in POLPAN, the respondents, although were not specifically asked about the success of the enterprise, were still given a set of answers which would characterize their beliefs about success in life. Working with this data has pushed us into making assumptions about the relationship of constructed image of one's life and the role of professional activity within it. Thus, our results have to be interpreted accordingly. Additionally, our analysis relied on the answers of different respondents, grouped by the sole fact of performing entrepreneurial activity. This, on the one hand, allowed us to understand the general trends observed among the Polish entrepreneurs, for different survey waves. At the same time, we did not delve deeper into the data to understand how beliefs about success of specific individuals had changed from wave to wave. This additional analysis is possible thanks to the panel nature of the POLPAN data, and will become a subject for future investigation.

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Table 1: Descriptive statistics for variables used in the study

Variable	1988			1993			1998			2003			2008			2013			2018		
	N	Mean	St.D.	N	Mean	St.D.	N	Mean	St.D.	N	Mean	St.D.	N	Mean	St.D.	N	Mean	St.D.	N	Mean	St.D.
Ambition	65	1,85	0,775	87	2,07	0,818	165	2,19	0,785	126	2,17	0,811	109	2,03	0,799	160	1,96	0,760	144	2,13	0,702
Knowing the right people	64	2,48	0,976	89	2,25	0,870	164	2,32	0,870	126	2,25	0,885	108	2,29	0,897	160	2,31	0,816	145	2,43	0,771
Hard work	65	2,68	1,062	86	2,45	1,025	164	2,49	1,138	125	2,43	1,034	108	2,37	1,064	160	2,11	0,945	124	2,06	0,804
Political influence	63	3,35	1,124	78	3,05	1,194	157	3,29	1,166	118	3,30	1,256	103	3,50	1,145	159	3,13	1,007	121	3,48	1,148
Coming from a reach family	65	3,15	1,253	87	3,08	1,174	163	3,23	1,092	126	3,16	1,084	109	3,18	1,107	157	2,94	1,011	143	3,24	1,048
Good education	64	2,56	0,957	89	2,34	1,033	165	2,11	0,863	125	2,00	0,880	110	1,92	0,847	159	2,11	0,897	145	2,30	0,892
Luck	65	2,31	1,060	89	2,07	0,915	166	2,14	0,838	124	2,18	0,837	110	2,03	0,923	160	1,92	0,832	124	2,13	0,865
Innate ability	64	2,19	0,871	89	2,04	0,638	165	2,10	0,767	126	2,08	0,776	109	1,96	0,719	160	2,00	0,801	124	2,28	0,750

Table 2: Factor groups obtained after processing the POLPAN data in SPSS, using the Varimax rotation method

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1988			
1988/“Social Capital”	1,635	20,436	20,436
1988/”Need for achievement”	1,566	19,578	40,014
1988/3	1,403	17,542	57,556
1988/”Luck”	1,190	14,874	72,431
KMO	0.521		
1993			
1993/“Social Capital”	1,796	22,446	22,446
1993/2	1,775	22,184	44,630
1993/3	1,112	13,903	58,534
KMO	0.541		
1998			
1998/“Social Capital”	1,782	22,271	22,271
1998/”Luck”	1,463	18,288	40,560
1998/”Need for achievement”	1,335	16,693	57,253
KMO	0.652		
2003			
2003/ “Social Capital”	1,710	21,373	21,373
2003/”Need for achievement”	1,500	18,744	40,117
2003/”Luck”	1,357	16,957	57,074
KMO	0.560		
2008			
2008/”Need for achievement”	2,311	28,883	28,883
2008/“Social Capital”	1,850	23,119	52,002
KMO	0.693		
2013			
2013/”Need for achievement”	2,128	26,595	26,595
2013/“Social Capital”	2,095	26,186	52,781
KMO	0.733		
2018			
2018/“Social Capital”	1,854	23,180	23,180
2018/”Luck”	1,522	19,028	42,208
2018/”Need for achievement”	1,333	16,667	58,875
KMO	0.591		

Practice of Institutional Auditing Within the Education Quality Management System

Liudmyla ILICH

Dr of Economics, Associate Professor, Head of the Department of Management,
Borys Grinchenko Kyiv University, Kyiv, Ukraine
l.ilich@kubg.edu.ua

Olena AKILINA

Ph.D. in Economics, Associate Professor,
Borys Grinchenko Kyiv University,
Kyiv, Ukraine, o.akilina@kubg.edu.ua

Alla PANCHENKO

Ph.D. in Public Administration, Associate Professor,
Borys Grinchenko Kyiv University,
Kyiv, Ukraine, a.panchenko@kubg.edu.ua

Abstract

Purpose: The objective of this article is to develop tools of intelligent education quality management, analyze the elements of institutional audit and its introduction into practice of school operation. **Methodology**: While doing research the following methods were used: method of expert evaluations, data analysis, method of experiments, sociological methods, observation, and survey. The paper analyses foreign experiences and Ukrainian practices concerning reforms introduction into educational and management processes of school operating. We consider institutional auditing as a conceptually new approach to external assessment of school operation in contrast to their certification which is of oversight nature and serves as a tool of school support. Recommendation on school operation improvement is also the result of institutional auditing. Its main stage includes school self-evaluation which is widely used while carrying out experimental work at schools. Based on the results of theoretical analysis and experimental research, it is supposed that scientific organization of education quality monitoring enables to make relevant management decisions and forecast educational and training situations for further academic year, intervene promptly and implement appropriate corrections to pedagogical process, plan specifically the work on relevant challenges with both teachers and pupils, create the conditions for comparison own assessment of pedagogical staff operation and independent external experts' evaluation. **Conclusions**: Institutional auditing confirms that, first and foremost, its effectiveness depends on systematical school self-evaluation at different stages of its operating and researching aspects of its operation that encourage school education quality improvement. As the results of this study testify, experimental work at school promoted improvement of pupils' performance improvement, their cognitive interests' development, as well as provides progressing of pedagogical staff's professional skills. The results of experimental work serve the example of schools preparation for institutional audit as an external assessment of education quality assurance. **Implications**: The results of experimental studies serve as an example of schools preparation for institutional audit to evaluate education quality assurance externally. The development and implementation of bilingual education model is the result of experimental studies (2008-2020). Due to the introduction of bilingualism the students gain opportunities to improve their language skills at the courses in Institute Grand Bleu (Cannes, France), Alliance Française (Strasbourg, France), to be involved into exchange programs between schools and College des Alberts (Argelès-sur-Mer, France) and Lyceum (Rethel, France) according mutual agreements, to participate in French-speaking and English-speaking sessions of European Youth Parliament which take place at schools etc.

Keywords: Institutional Audit, Educational Establishment, Quality, Monitoring.

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Introduction

Ongoing transformations in education led to introduction of competence approach, practice-oriented methodology, and innovative education technologies in training required for improvement of education monitoring during a pandemic, especially concerning distant learning education. The key features of those changes are time, the scope of educational process participants' involvement, technical complications of changes.

The concept of organizational development technology includes structural dimension and human resources. Within structural approach, beneficial framework for achieving the goals of organizational development is created with the assistance of changes in organizational regulation. Human resources approach focuses on the development of staff, encouraging their commitment to accept and bring changes. The implementation of successful organizational transformations in both dimensions requires introduction of the important organizational development tool, institutional audit, which is the key point of this study.

The objective of the article is to develop tools of intelligent education quality management, analyze the elements of institutional audit as one of the tools of general secondary education management and outputs of its organization and introduction at schools. While doing research the following methods were used: method of expert evaluations, data analysis, method of experiments, sociological methods, observation, and survey.

The term 'audit' is traditionally associated with financial checks, but the scope of its application as a process of comprehensive testing goes far beyond pure accountancy. Being a powerful tool for verification of conformity of compliance with the provisions of law in any activity, audit can be applied in education. Auditing is a process of constant interaction which enables to evaluate competitiveness and improve the development strategy of any organization.

Literature Review

The problem of controlling in education, including the external one, became more common after shaping the holistic education system in the 19th century on the territory of Austrian-Hungarian Empire. Our special attention is given to the fact of establishing the first Inspectorates on the territory of Ukraine (the part which was captured by the Empire) whose duties included ensuring quality education as we understand it nowadays. However, general secondary education management was uncoordinated: inspectors of gymnasia and inspectors of real schools were engaged. Their responsibilities included following up on the implementation of Ministry orders, teachers' checking and inspecting, financial supervision of schools condition and writing annual reports on educational establishment activity. School inspectors not only checked the status of establishment work, but also develop special programs on reforming schools in compliance with legislation. These programs ensured unification of curricula, methodical assistance to the teachers through improving qualification courses establishing, provision of material assistance to support educational facilities (Penishkevich, O.I., 2002; Shevchenko Scientific Society,1949).

The First and the Second World Wars significantly complicated the development and formation of the tools aimed at ensuring education quality on the territory of Ukraine. Nevertheless, trends of increased monitoring in education started to develop in the world. It was in interwar and postwar period when the USA began to shape monitoring evaluation of education quality. To reform the system of school education in the USA monitoring was applied to keep the track of the level of graduates' training at 30 schools as well as the level of formation affected features (public position, critical thinking) in them. Since 1955 monitoring as a tool of tracking education system has spread around Europe. It is widely applied in different countries while planning and implementing education reforms in practice. In 1958 the manager of the Centre of comparative pedagogy, Chicago University, K. Anderson suggested detailed comparing national systems of school education based on empirical measurements of inputs and students' academic achievements.

1960-1970 marked in educational monitoring shaping. It featured internationalization of the studies, justification of monitoring conceptual framework and development educational indicators system. In 1959 International Association for the Evaluation of Educational Achievement (IEA) carried out international comparative monitoring research on achievements of primary and secondary school pupils in Mathematics (First International Mathematics Study – FIMS). Further international studies of academic performance level in specific subjects, information and communication as well as functional literacy of pupils were conducted by UNESCO Institute of Education, International Association for the Evaluation of Educational Achievement (IEA), the International Association for Educational Assessment (IAEA), the International Institute for Educational Planning (IIEP – UNESCO),

the International Bureau of Education (IBE-UNESCO), the Organization for Economic Co-operation and Development (OECD), United Nations Children's Fund (UNICEF), World Bank Institute of Economic Development and other organizations. At the beginning of the 1960s experimental committee on designing the assessment measures for the National Assessment of Education Progress (NAEP) was created under the leadership of Ralph Tyler. In 1969 the first national assessment of education progress was conducted under the funding of the US Government, in 1978 the Law on compulsory periodical national assessment of education progress was adopted.

In the 1980s-1990s the challenges concerning cost-effectiveness, organizing efficient resource management, assessment of ensuring educational system efficiency became of actual importance. Education quality was transformed into political category. Significant extension of the quality assessment and quality management systems in humanities, including education, contributed a lot.

Nowadays the studies on above-mentioned subject matters are grounded on powerful methodological base, statistical methods of theoretical data assessment are used, multi-level models are implemented. The creation of hierarchically streamlined information system of education quality management comes true. In international studies TIMSS, CIVICS, PISA, MONEE and others experiments aimed at developing efficient methodology of assessment and parameters of the researched objects within education system, determining unified indicators and criteria of education quality and its constituent parts are implemented.

The assessment of educational networks operation comes into view of a great number of current international studies, projects and programs. The four studies should be paid specific attention to as the ones covering the scope of our interests:

1. Program “Indicators of Education Systems” (INES) (OECD, 2012), directed at catalyzing reforms to educational policy and practice in the OECD’s 34 member countries and partner countries, highlighting successful educational outcomes and strategies. INES support countries’ understanding of their education systems by placing them in a global context, enables education systems to assess themselves in light of other countries’ educational performance by providing a rich and internationally comparable set of indicators on: the output of educational institutions and the impact of learning on economic and social outcomes; the financial and human resources invested in education; access to education, participation and progression; the learning environment and organization of schools.

2. Project “Education management in territorial communities: the experience of European Quartet countries, or V4 for Ukraine” implemented under the support of International Visegrad Fund and aimed at improving governance efficiency of education system management in territorial communities of Ukraine by dissemination of experience and best practices of European Quartet countries (Kavunets, A., 2018).

3. Program “U-LEAD with Europe” is similar to our study. Experts of Central reform office under the Ministry of development of communities and territories of Ukraine have been evaluating ‘School education network capability Index’ in united territorial communities (Creemers, B.P.M. and Reezigt, G.J., 2005). This index demonstrates to the citizens the compliance of real network with the model funded by the state. School education network capability index in united territorial communities takes into account the difference between the indicator of estimated class fill rate and the indicator of actual class fill rate. The former is obtained by the formula considering such indicators as the quantity of pupils and territories peculiarities. Calculated index shows to local authorities reserves for efficient use of financial resources and ways of improving the quality of education services in general secondary education system.

4. Regarding the issue of efficient educational network, it should be comprehended that efficient school and improved general secondary education operation are of different origin. Efficiency of school operation is directed at identifying the factors that work in education and why. Improvement in school operating is the practice focused on policy and directed at desirable changes. But being oriented on final results, internal data, process and context in education, they have much in common. Project ‘Effective School Improvement’ (ESI) (Creemers, B.P.M. and Reezigt, G.J., 1997) merges two traditions. In its theoretical part different orientations in a model of effective school improvement were analyzed and united. Grounded on this analysis, framework of evaluation to review case studies of school improvement projects in member countries was developed. Theoretical model and results of case studies review were united under the project of effective school improvement.

Vanda Mendes Ribeiro and Joanna Borges de Guzman (Ribeiro, V. M. and Borges, G.J., 2010) represent their studies of quality indicators application in education – Indique – a tool of self-evaluation for schools. Indique offers indicators grouped as a set of measurements and interpreted as 'fundamental elements which school should take into account while improving its quality'. The parameters include educational environment, pedagogic practice and assessment, teaching of reading and writing, democratic school management, training and working conditions of teachers at school, physical condition of the school building, pupils' access to school and their staying inside. Offered indicators regarded as quality signs are evaluated by stakeholders at brainstorming sessions which is rather appropriate. We fully agree to the main assumption of this article which states that assessment may have positive, negative and mixed consequences for the policy of municipal schools, lives of teachers and pupils. The role of evaluation varies depending on the fact how locals assimilate, adopt or oppose state policy.

Conceptual Approaches to Institutional School Auditing

Based on provisions established in management and stating that realization of any strategy is a process of ongoing changes of varying scale and complexity, it may be argued that organizational changes are always linked to implementation and correction of operating strategy. Assessment of school operation effectiveness within current conditions of educational environment is of actual importance concerning competitiveness and importance of framing policy of education development. Identification of appropriate indicators and indexes is a necessary tool for creating informational basis of school effectiveness monitoring. We consider that school assessment should be subordinated to the goal of its results application and include the following aspects: economic (establishment is evaluated as an entrepreneurship entity), benchmark (education quality and education services are estimated taking into account appropriate minimum state and regional requirements) and parametric (quality management system based on ISO 9000 is developed and implemented).

Capacity of schools to employ internal reserves and efficiently manage them copens up opportunities for shaping competitive benefits. The famous researchers in quality management Joseph M. Juran and Armand W. Feigenbaum were the first who paid attention to economic aspect of proper quality issue. Then the term 'value of quality' originated. Value of quality related to expenses on preventing poor quality, monitoring and control, as well as to expenses on correcting low-quality product. Joseph M. Juran and Armand W. Feigenbaum's approach to accounting and analysis of expenses on quality provision was widely adopted, though generating a lot of dilemmas and mistakes. In 1996 William Edwards Deming's philosophy of total quality management was studied to implement it in educational establishments (Winchip, S.M., 1996). Five key principles of the philosophy were found appropriate for educational establishments: purpose, cooperative systems, improvement, leadership and methods-processes.

It is clear that strictly defined criteria should be laid in the foundation of efficient institutional school audit. They are of two types: accreditation, promoting the procedure of state assessment of education quality, and sociological. The latter are grounded on the views of education process participants and feedback methods, or so called 'criteria of consumer monitoring'. This set of criteria is shaped by school to conduct consumer monitoring with the use of sociological studies and local surveys of specific groups of educational process participants. The most important component of assessment and guarantee of educational establishment activity quality is a monitoring of stakeholders' satisfaction with education.

In Ukraine the history of monitoring system promotion in education at national level started in 1997 when the Centre of education monitoring under Institute of content and methods of schooling of Ministry of Education of Ukraine was established. In 1999 it was transformed into the Department of monitoring of general secondary education quality under Scientific and methodological center of secondary education. It began all-Ukrainian monitoring researching in several areas: quality of basic educational literature for general education establishments (2001, 2003, 2004), quality of Physics learning (1999), quality of Maths learning by the graduates of primary, secondary and high school (2002), level of pupils' physical, moral and psychic development, as well as infrastructure of educational establishment which provides schoolchildren's health care (2005). In 1999 the first organization in the field of professional evaluation and staff selection was established in Ukraine. It was called the Centre of testing of professional competence under Ministry of Health of Ukraine. In 2005 Ukrainian center of evaluation of educational quality with its regional branches was established. It conducted monitoring of academic performance quality in primary (4th grade) and secondary (8th grade) school with the use of TIMSS technologies. The city of Kyiv, Vinnitsa, Donetsk, Lviv, Kharkiv regions and Autonomous Republic of Crimea became the units of shaping the regional systems of education quality monitoring.

The center of education monitoring which keeps the track of educational system operation in Kyiv, its effectiveness and quality was created. Its mission is to mirror the real educational processes in the city of Kyiv, shape the models of future state of Kyiv's educational system, as well as the ways of its successful development.

The adoption of a new Law of Ukraine "On Education" was one of the latest steps on the way to education improving (Verhovna Rada, 2017). In its Chapter V the main principles of education quality ensuring, particularly its internal and external systems were established. Conceptual changes in school operating started in 2018. They included among others the following: 12-year of schooling, a new structure of schools (primary (Grades 1-4, two cycles of primary education: Grades 1-2 and Grades 3-4)), basic (Grades 5-9), profile (Grades 10-12), competence approach to learning etc. According to part 2 article 41 of the Law of Ukraine "On Education" the system of education quality ensuring includes internal system of education quality ensuring and system of external education quality ensuring.

The internal system of education quality ensuring may include evaluation of education environment, pedagogical staff activity, academic performance and education management (Figure 1).

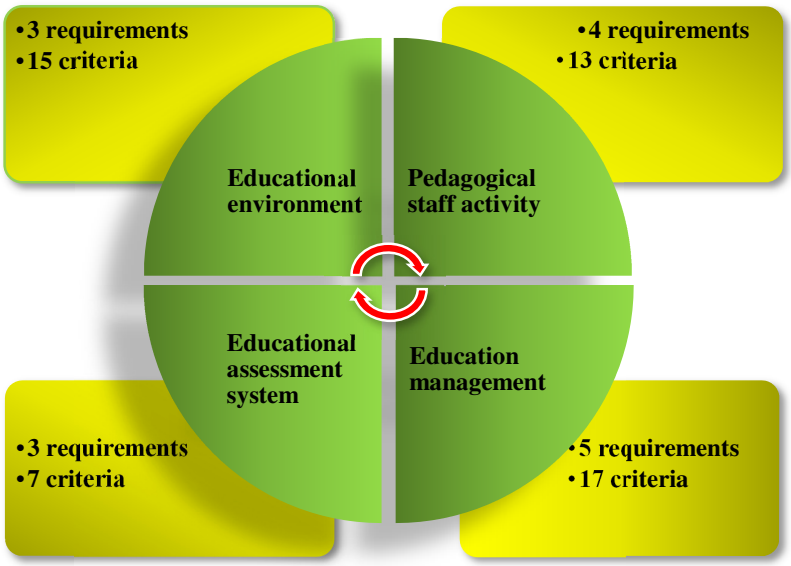

Fig. 1: Internal system of education quality ensuring

Educational reforms in Ukraine resulted in transformation from state certification of educational establishments to their institutional audit. State certification was undertaken by the local educational authorities who managed the educational establishments which made impossible to assess their operation fairly.

Institutional audit is now conducted by independent organizations (Service and its territorial branches, accredited professional public associations, other entities which can accredit educational establishment). Such situation promotes fair assessment of school activity, enforcement of state policy framework in education concerning institutional separation of control (supervision) and support for the educational establishment operation.

Institutional audit provides the application of unified tools and procedure for conducting. Moreover, it is much more efficient than state certification as it results in making conclusions on the quality of educational establishment operation and internal system of education quality ensuring.

Recommendation on school operation improvement is also the result of institution audit conducting. Self-evaluation which is undertaken directly at school is the main stage of institution audit as an external assessment of educational establishment operation. Self-evaluation as an up-to-date tool of educational policy analysis is directed at studying the topical issues of educational establishment operation. Based on this study, the solutions concerning further actions of educational organization institutional development are made. Self-evaluation process in school practice is widely employed during experimental work in educational establishments. Considering the results of experimental study and theoretical analysis, we claim that scientific organization of education quality monitoring enables to make management decisions and forecast teaching and educational situations for the next school year; intervene promptly and make appropriate changes in pedagogical process; formulate specific steps concerning the issue with teachers

and pupils; create the environment for comparison own evaluation of pedagogical staff activity and independent evaluation undertaken by external experts.

Experimental Work

One of the authors of this article, Alla Panchenko, is a scientific leader of two experiments carried out at schools within implementation of institutional audit reforms. Here is the outcome of this work:

1. The subject of experimental research: "The creation of bilingual educational establishment model" (2008-2014)

Hypothesis: implementation of bilingual education promotes improving general language skills of pupils, integration of subject knowledge in different educational fields, expansion of sociocultural communication.

The outcomes of experiment:

1. Model of bilingual educational establishment as a structural unit within the system of ongoing studying (school – Ukrainian higher educational establishment – French higher educational establishment) is reasoned, designed and tested (Figure 2).

2. The outcomes received are compared with the purposes and hypothesis set, concerning promotion bilingual education for improvement general linguistic skills of pupils. To achieve this purpose monitoring of academic performance level in bilingual subjects and subjects in Ukrainian in Grade 6-9 was conducted.The experiment reveals that motivation to study foreign language is increasing, pupils' outlook is widening due to broadening information field, pupils' general academic skills are developing (while working on retrieving the specific information from the texts and its application to solve the educational tasks), the pupils' interest in getting additional information studying the subjects in foreign language is growing, and , which is the most important, learning technologies are improving.

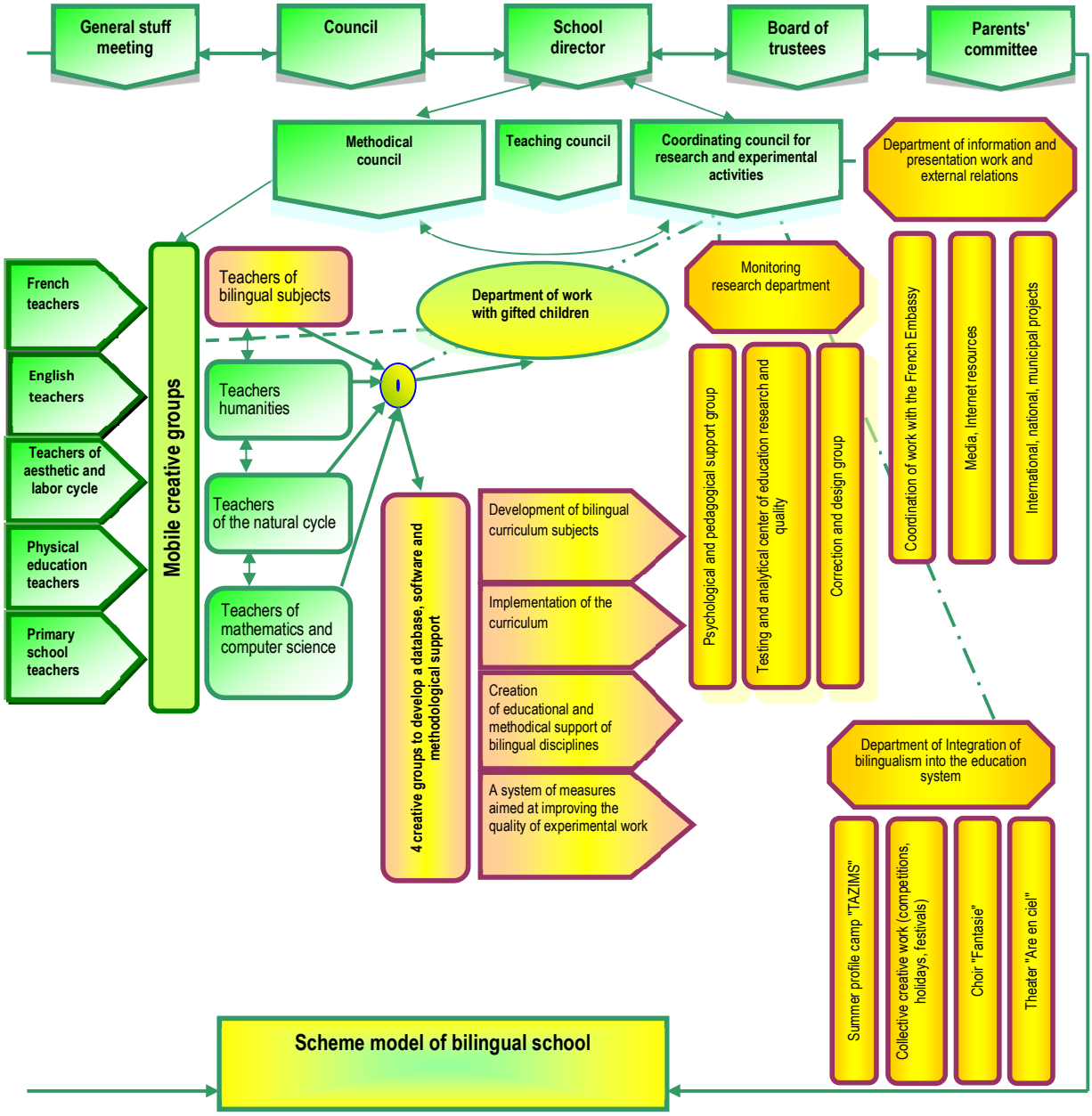

Fig. 2: The model of bilingual school

Full application of information technologies in teaching and educational process increases the efficiency of studying and its intensification and individualization depending on pupils' capacities, as well as increases proportion of creative independent work.

While researching the efficiency of creation of bilingual educational establishment model, pedagogical staff concluded that process of bilingual learning provides preconditions for deeper and advanced learning French by the pupils. This fact is confirmed by the results of international exams in French DELF. The trend to improve the knowledge quality in basic subjects by the pupils due to studying bilingual subjects was also kept the track of (Figure 3 and 4).

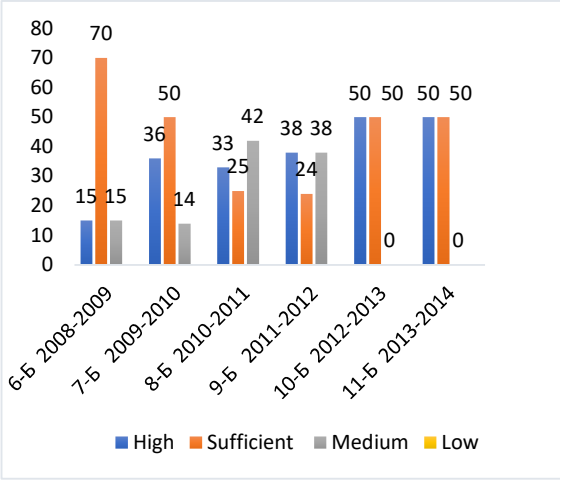

Fig. 3. Geography in French

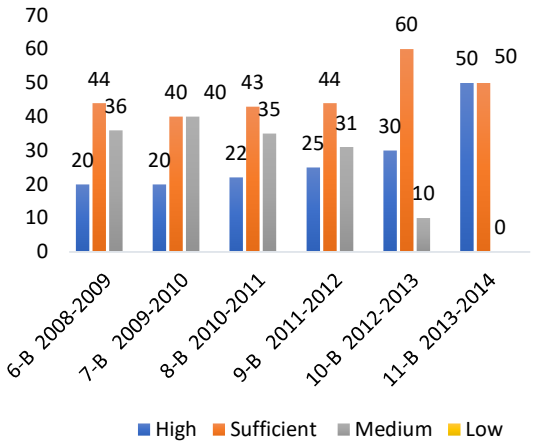

Fig. 4. Optional course – Mathematics in French

The system of providing the opportunities for school graduates to receive the certificates of full general secondary education of Ukraine and France with the right to continue their education in higher educational establishments abroad played the significant role in experiment (Figure 5).

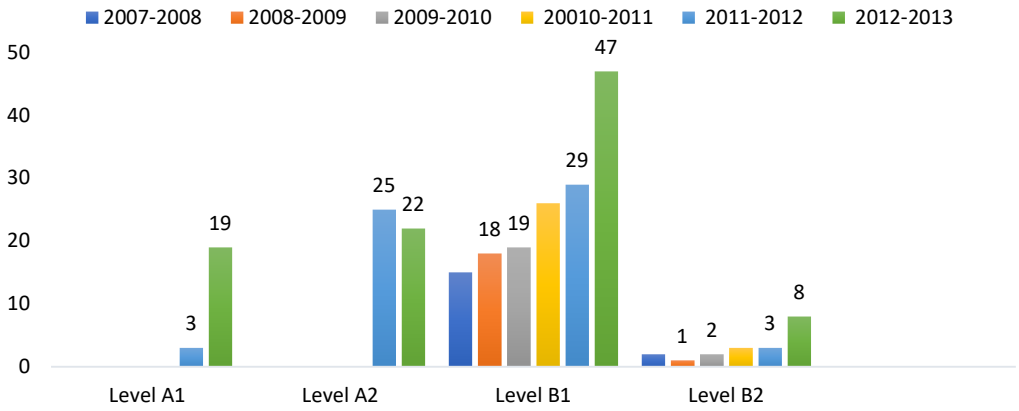

Fig. 5: Academic performance of pupils according to results of DELF tests at levels A1, A2, B1, B2

In appropriate manner it is stated that efficient application of all resources of bilingual studying promotes positive dynamics of pupils' knowledge quality, shapes communicative skills, expands positive motivation to learning, adapts pupils to life and activity in current pluricultural society, shapes the research skills in teachers and pupils.

The approbation of educational establishment bilingual model proved that it is a structural unit within ongoing studying (school graduates continue their studying in higher educational establishment of French-speaking countries).

According the outcomes of this experiment the decision concerning the feasibility to carry on this experimental work aimed at its further realization as a structural and component bilingual learning technology model was made with the outcomes to conduct the following experiment.

2. The subject of experimental research: "Development of bilingual educational establishment educational space within transformations in education and society" (2014-2020).

The program "Psychological and pedagogical design of personality social development among the students of comprehensive and vocational educational establishments" was implemented to realize efficiently the tasks set at school (Scientific leader: Kirichuk V. Institute of child prodigy under Academy of Pedagogical Science of Ukraine). It gives a chance for all participants of educational process to define the correctional methods based on psychological observance of all educational stakeholders accompanied personally to develop the pupils in independent manner.

The basis of diagnostic complex "Society" is consisted of three authorial methodology: "Personality vitality by the main activities"; "Grade pupils' social and communicative development- social metrics"; "Values in communication", as well as methodological projects: "Value prioritites" (S. Tyschenko); diagnostics of personal disabilities "DVOR" (Z. Karpenko); "Parents' attitude" (A. Varga and V. Stolina).

This experiment promotes prioritizing the salient values of pupils, particularly "My health and I", "My civil duties and I". The work to promote learning and working also requires increased attention.

Experiment outcomes: The proper organized bilingual learning provides a qualitative leap to cultural and intellectual pupils' development. The students accumulate cultural and linguistic experience benefitting for successful adaptation to living. All cultural, pedagogical and linguistic aspects of bilingual learning are closely linked. These schoolchildren obtain broader cultural horizons than their mates and are open up more for intercultural exchange.

Bilingual subjects learning impacts memory capacity development, attention and scope of pupils' capacity.

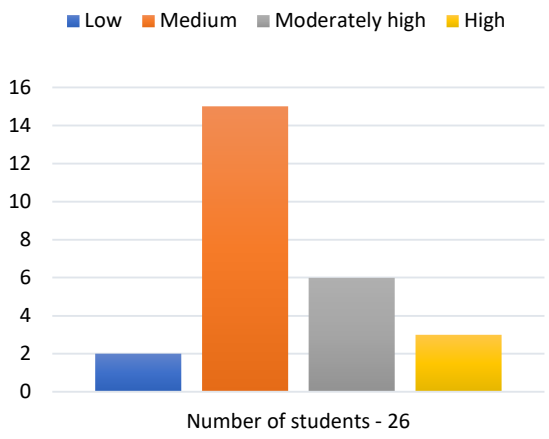

Fig 6: Pupils' motivation level of successful performance

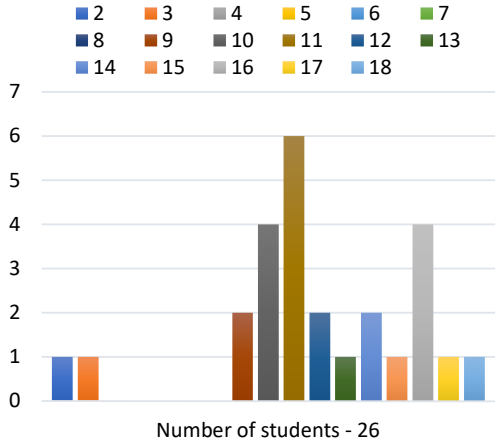

Fig 7: The level of self-evaluation

Conclusion

The foreign experience analyzed in this study as well as Ukrainian practice of reforms implementation in educational and management school operation enables to state that building confidence in school education functioning and continuous improvement of education quality for sustainable development of schools are of actual importance. Institutional audit as a new conceptual approach to external evaluation of Ukrainian school operation compared with certification which had supervision and control functions is now implemented as a tool of schools' support. At the same time the state guarantees the security of institutional audit of educational and managerial processes through regular data collection, unbiased analysis and adoption of relevant decisions.

Monitoring is the main tool of school education quality; its framework enables to assess the school operation efficiently and forecast the further steps concerning its improvement.

The process of institutional auditing confirms that first and foremost its effectiveness depends on systematical self-evaluation of school operation at different stages of its aspects functioning and studying which encourage improvement of school education quality on the whole.

The results of this study confirm that experimental work at schools promoted improvement of pupils' knowledge quality, development of their cognitive interests, as well as improvement of professional skills of pedagogical staff. Implementation of bilingual model of school education is the result of experimental studies (2008-2020). Due to implementation of bilinguality the pupils gain the opportunity to improve their language skills to improve their language skills at the courses in Institute Grand Bleu (Cannes, France), Alliance Française (Strasbourg, France), to be involved into exchange programs between schools and College des Alberts (Argelès-sur-Mer, France) and Lyceum (Rethel, France) according mutual agreements, to participate in French-speaking and English-speaking sessions of European Youth Parliament which take place at schools etc.

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Optimizing the Quality of Low Linear Density Polyethylene (LLDPE) Film by Controlling the Temperature with Infrared Thermography

Marina DUMITRU
University POLITEHNICA of Bucharest, Bucharest, Romania, maryna6888@yahoo.com

Stefan Constantin PETRICEANU
University POLITEHNICA of Bucharest, Bucharest, Romania, corresponding author: constantin.petriceanu@upb.ro

Damian SIRBULESCU
University POLITEHNICA of Bucharest, Bucharest, Romania, sirbulescudamian@outlook.com

Oana CHIVU
University POLITEHNICA of Bucharest, Bucharest, Romania, virlan_oana@yahoo.co.uk

Constantin DUMITRASCU
University POLITEHNICA of Bucharest, Bucharest, Romania, costishor40@yahoo.com

Abstract

This study shows how the quality of low linear density polyethylene (LLDPE) foil can be optimized by controlling the outlet temperature of the extrusion head, using infrared thermography. The first part of the paper presents the material and the description of the quality testing method used in the field of polyethylene film testing. The theoretical foundations of the thermography method used is also briefly shown. The hypothesis is that the variation of the mechanical properties of the foil along the extruder cylinder is caused by temperature differences at which the process takes place. To confirm these aspects, an experimental plan was designed with the help of an infrared thermography camera to highlight the connection between local temperature and mechanical characteristics. It was found that even at 5% temperature variations, the difference in mechanical properties is very important with a sharp decrease in the case of samples taken from the ends of the cylinder. Real-time temperature measurement, at any point on the extruder generator, made it possible to observe the values that appear in the manufacturing process as well as to design and validate an automated reaction loop system that maintains the temperature at the extremities in the area of the corresponding levels from the half of the cylinder where the best product quality is obtained.

Keywords: Temperature, Mechanical Properties, Infrared Thermography, Polyethylene, LLDPE.

Introduction

The subject of the study of the mechanical characteristics of LLDPE arouses the interest of many researchers around the world. The first studies on the influence of temperature on the mechanical properties of LLDPE were published by Huizenga (1990). The increased interest for this type of material has led to an increase in the number of studies on this subject, the researchers being interested in obtaining the best possible mechanical characteristics of the LLDPE foil, Bhattacharya (1998), Fang (2005), and Bawa (2006).

Nowadays there are intense concerns, materialized through the activity of specialized research centers located in large countries producing such materials, such as: Greece - Maillis Group, Italy - Hipac Group, Poland - Strapex GmbH, Efekt Plus, Turkey - Prens Plast A.S., Poliner Plastik A.S., S.U.A. - Multiple Research Centers and Raw Material Manufacturers - Dow Chemical, Exxon Mobil, China - Hebei Orient Rubber & Plastic Co. The biunique relationship between the extruder outlet temperature and the mechanical properties of the foil has been studied and

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presented in several scientific articles, starting with the year 1998. Actually, numerous studies made by Kontou (2006) and Zaghloul (2018), reveal this correspondence without any of them strictly referring to the influence of the extruder outlet temperature for foils with thicknesses between 5µm and 25µm. The interest for such a result is given by the requirement to use a small amount of material, which ensures the functional role and mechanical properties like the thicker foils, located between 50µm and 90µm.

Materials and Methods

Stretch foil is a flexible plastic layer based on polyethylene with adhesion properties, used for packaging. Due to its elasticity, the stretch foil can be stretched at normal temperature when subjected to forces. Once the resistance force ends, the foil tries to return to its original size giving stability and a good packing result. Polyethylene is a thermoplastic polymer with a variable crystalline structure and an extremely wide range of practical applications in various fields of activity. In fact, polyethylene is the largest plastic product in the world, with tens of millions of tons produced annually. It has gradually become the most successful synthetic product with various applications depending on the type of material produced. Polyethylene comes in several forms of composition, each with its precise destinations. Low density polyethylene (LDPE / PEJD) - It comes in the form of a very flexible material, a property that makes it easy to process and extremely malleable, one of the best-known applications being shopping sacks. The production process is carried out under very high pressure (1000-3000 [atm]), at moderate temperatures (420-570 [K]), from granules, according to the following chemical formula:

$$nC_2H_4 \rightarrow [-C_2H_2-C_2H_2-]_n \quad (1)$$

The industrial facility used in the study is highly productive, with an overall size of up to 5000 [mm] and a material volume of 2700 [kg/h]. Tensile strength (elongation at break) is one of the most important and common requirements of stretch foil. It represents its ability to stretch between 10% - 400%. The "Tensile test" is used to determine the breaking strength. This is a test in which a sample is placed in the testing machine and a constant load of traction is applied so that it stretches and eventually breaks. A measuring device or extensometer is used to measure the elongation. The value obtained at the highest applied force is the tension force. Typically, these tests are performed according to an internationally recognized standard procedure and by calculating the results so that the data are portable between laboratories. The loading rate can be applied as either a constant expansion rate, constant stress speed or constant loading speed, depending on the standard. Tearing strength is the stress at which a prescribed value of plastic deformation occurs (usually 0.2%). The elongation describes the value of the sample stretch before tearing. Information on the strength, rigidity and ductility of a material can be obtained through this test. Tensile strength is the stress at which a material breaks or deforms permanently. This is an intensive property and therefore does not depend on the size of the test sample. However, it is dependent on the sample preparation and the temperature of the test medium and material. Stretch testing is an important part of design, as well as quality control, to ensure the safety and integrity of products and is an essential part of consistency tests in manufacturing and construction.

Infrared thermography (IRT) is a science dedicated to the collection and processing of thermal information from non-contact measuring devices. It is based on infrared radiation, a form of electromagnetic radiation with longer wavelengths than visible light.

Infrared radiation is the energy radiated from the surface of an object whose temperature is higher than absolute zero. The emitted radiation is a function of the temperature of the material, the higher the temperature, the higher the intensity of the emitted infrared energy. There are three ways in which the radiant energy that encounters an object can be dissipated: absorption, transmission, and reflection. The portions of total radiant energy that are associated with each of these dissipation modes are called body absorption transmissibility, and reflection. Measuring temperature using infrared thermography measures the infrared radiation emitted by an object and converts the detected energy into a temperature value. However, because not all the radiation received comes from the target object, to accurately measure temperature, radiation from other sources (such as surrounding objects or the atmosphere) must be removed upon conversion to temperature. The total radiation received by the camera (W_{tot}) comes from three sources: the emission of the target object (E_{obj}), the emission of surrounding bodies reflected by the object (E_{refl}) and the atmospheric emission (E_{atm}). In summary, this situation can be expressed in Equation (2). The whole process is illustrated in figure 1.

$$W_{tot} = E_{obj} + E_{refl} + E_{atm} \quad (2)$$

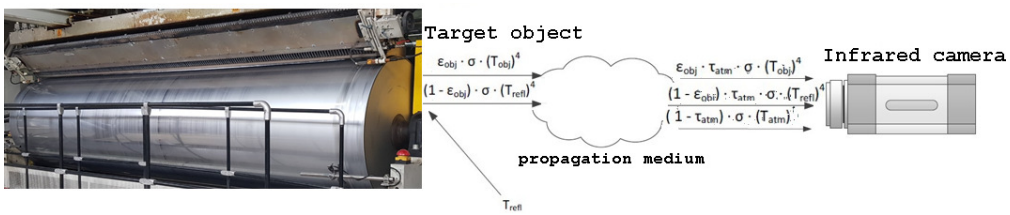

Fig. 1: Infrared radiation received by the camera.

The first source is the emission from the target object. However, not all of the radiation emitted by the target object is received by the camera. Depending on the transmittance of the atmosphere (τ_{atm}), some wavelengths and some of the radiation are absorbed by the atmosphere. Thus, the emission of the target object can be expressed as in equation (3).

$$E_{obj} = \varepsilon_{obj} * \tau_{atm} * \sigma * (T_{obj})^4 \quad (3)$$

Real bodies have a reflection greater than zero and reflect the infrared radiation emitted by the surroundings. The reflection can be calculated starting from the emissivity, as shown in Equation (4). Some of this reflected radiation is also absorbed by the atmosphere. This is the second component received by the camera and can be expressed as in equation (4).

$$E_{refl} = \rho_{obj} * \tau_{atm} * \sigma * (T_{refl})^4 = (1 - \varepsilon_{obj}) * \tau_{atm} * \sigma * (T_{refl})^4 \quad (4)$$

The third component is the emission of infrared radiation from the atmosphere. This can be expressed in equation (5), where $(1 - \tau_{atm})$ is the emission power of the atmosphere.

$$E_{atm} = \varepsilon_{atm} * \sigma * (T_{atm})^4 = (1 - \tau_{atm}) * \sigma * (T_{atm})^4 \quad (5)$$

By conveniently substituting in the above equations, equation (6) is obtained, which represents the total energy received by the infrared thermography camera sensor.

$$W_{tot} = \varepsilon_{obj} * \tau_{atm} * \sigma * (T_{obj})^4 + (1 - \varepsilon_{obj}) * \tau_{atm} * \sigma * (T_{refl})^4 + (1 - \tau_{atm}) * \sigma * (T_{atm})^4 \quad (6)$$

In turn, the temperature of the object can be calculated from equation (7). Similar equations are used by different chamber manufacturers to perform temperature measurements.

$$T_{obj} = \sqrt[4]{\frac{W_{tot} - (1 - \varepsilon_{obj}) * \tau_{atm} * \sigma * (T_{refl})^4 - (1 - \tau_{atm}) * \sigma * (T_{atm})^4}{\varepsilon_{obj} * \tau_{atm} * \sigma}} \quad (7)$$

To solve equation (7), the following parameters must be found: the emissivity of the object (ε_{obj}), the reflected temperature (T_{refl}), the transmittance of the atmosphere (τ_{atm}) and the temperature of the atmosphere (T_{atm}), knowing the Stefan-Boltzmann constant $\sigma - 5{,}67 \cdot 10^{-8} [\frac{W}{m^2} \cdot K^4]$.

The infrared thermography camera used for measurements is type SC640, with microbolometer type sensor, without cooling. It has the possibility of recording on electronic media with a speed of up to 30 [frames/s] and the exposure angle can be up to 45°.

Working Approach

After determination of the technological parameters of the extrusion process, approximately 10 minutes, the input parameters of the infrared thermography camera were adjusted to correspond to the average temperature provided by the temperature sensors at the exit of the extrusion head, according to table number 1.

Table 1: Input parameters of the thermography camera

Crt.	Parameters	Values
1	Ambient temperature	22,5°C
2	Average extrusion head temperature	280°C
3	Ambient humidity	62%
4	Reflected temperature	22 °C
5	Emissivity coefficient	0.89

The experimental plan consisted of continuous recording of the process for 80 minutes, stopping filming every 10 minutes, for easier identification of the selected samples. At the end of the experiment, the samples of material necessary for the test were taken. The recorded samples and films were coded alphanumeric, to ensure correspondence between them. For filming, the code F_K was used, where K = 1÷8 and for samples PF_j, where j = 1÷8. The samples are taken from the total length of the cylinder in the areas of interest according to Figure 2.

Fig. 2:Sampling scheme

This way of working was chosen to reduce the number of measurements and because it was found that the largest temperature variations are on the ends of the cylinder. Samples were taken in turn, from P1 to P8, successively, at each stop of the recording. To determine the mechanical properties of each test roll, a sample measuring 100 × 15 [mm] shall be drawn, with the axis of symmetry at 242.5 [mm] from the left edge of the foil. Sampling for the tensile test shall be performed after 10 [m] of foil has been unwound from each spool and after variations in the parameters at the beginning of the manufacturing cycle have stabilized. The resulting samples were tested in the laboratory on a Tinius Olsen 300 ST hydraulic dynamometer.

Results and Discussions

In order to establish a possible correlation between the temperatures on the cooling cylinder and the mechanical properties of the foil, the films recorded during the experiment were interpreted using specialized infrared image processing software and their conversion into temperature at each point of the thermal scene. For each recording, three inspection lines were drawn on the cylinder. The first line (L1) was drawn at 5° to the extrusion head, the second line (L2) at 45° to L1 and the third line (L3) to 60° to L1.

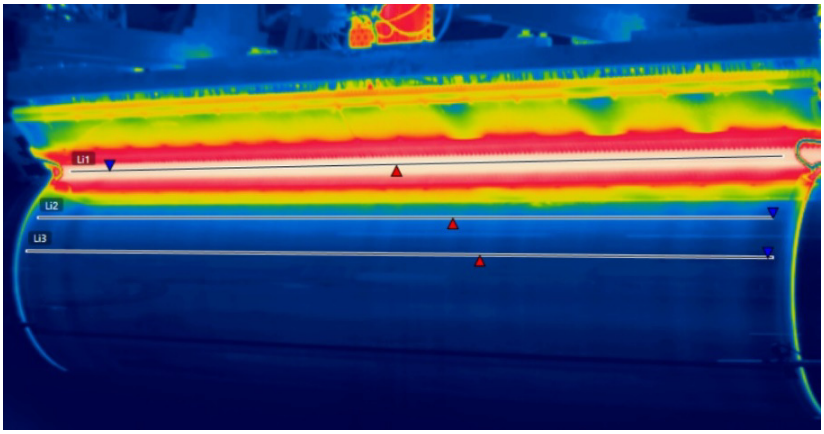

Fig. 3: Thermographic film analysis scheme

On the inspection line L1, for temperature values, variations are observed between the ends of the cylinder (colder) and the central part (hotter). The resulting graph looks like a bell with a higher height in the central area. The maximum mean variation on the eight successive determinations is 12.17 [°C].

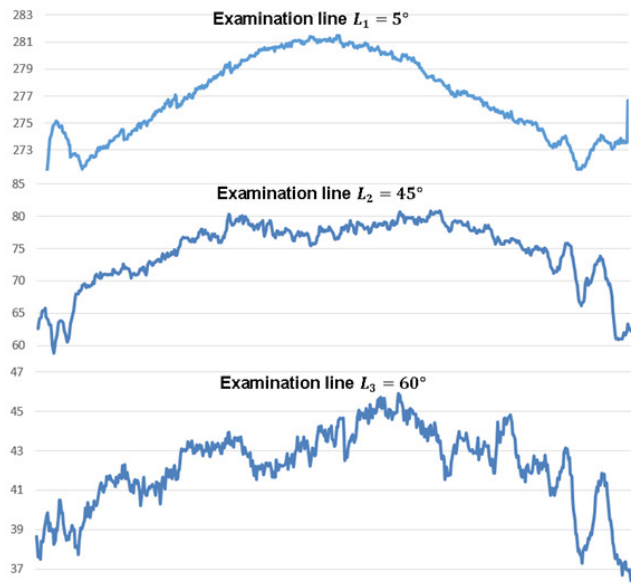

Fig. 4: Temperature evolution on the three inspection lines (average values between the eight samples)

On the inspection line L2, the allure of the bell-type curve for the variation of the temperature per cylinder is maintained and accentuated. The average temperature difference between the extremities, on all eight tests, this time is more than double, respectively 27.19 [°C]. On the inspection line L3, as the recorded nominal values decrease, the difference between the maximum and minimum values observed decreases. The average temperature variation on the eight tests is only 11.06 [°C]. The mechanical tests for the foil samples taken showed that the more accentuated cooling of the ends of the extruder cylinder causes the tensile strength of the foil to decrease. Thus, the samples taken from the central areas (Z5 and Z6, respectively samples P4 and P5) have the maximum values both for the tearing elongation (410 and 422 [%]) and for the tearing force (4.19 and 5.37 [N]).

Table 2: Tensile test results

Crt.	Average foil temperature on line L2 on the sampling area T_F (°C)	Dynamometer	
		Tearing elongation E (%)	Tearing force F_R(N)
1	62,38	282	3,32
2	68,21	318	3,84
3	72,87	359	4,15
4	78,53	410	4,19
5	79,68	422	5,37
6	71,96	360	4,19
7	68,93	355	4,15
8	64,12	317	3,8

From the representation with the help of the MATLAB program of the interpolated surface of the three vectors, respectively temperature, tearing force and tearing elongation, it results that the best values for elongation and tearing force are obtained around the average foil temperature per cylinder on the line L2 observation, 75-78 [°C], which corresponds to elongation values of 410-416 [%], for values of tearing strength of 5.12-5.15 [N]. It is also observed that small temperature variations of only a few degrees can lead to an increase in tearing elongation by more than 40 percent. The force at which the tearing takes place is also improved by about 0.3 [N].

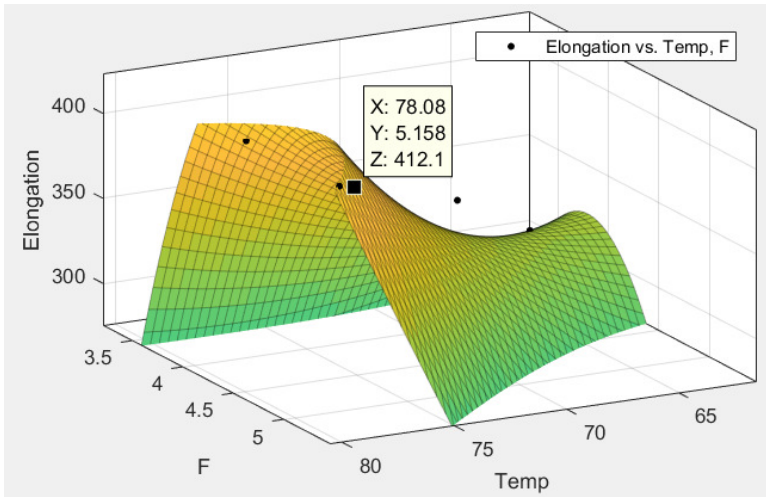

Fig. 5: Optimizing the quality of LLDPE foil with MATLAB

Conclusions

The study showed that there is a very close correlation between the temperature of the LLDPE foil at the exit of the extruder and its mechanical properties, especially at an angle of 45° from the exit line of the extruder. The continuous inspection of the process allows to determine the temperature at each point of the image using infrared thermography. This process allowed to obtain a very large series of data, which properly analyzed provided accurate information about how it works. The correlation of the temperatures in certain areas with the values of the mechanical properties determined by tests led to the possibility to optimize the process.

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Internet of Things – Digital Technology in Polish Enterprises In Context of Industry 4.0

Maciej SIEMIENIAK

Poznan University of Technology, J. Rychlewskiego 2 Str., 60-965 Poznan, Poland
maciej.siemieniak@put.poznan.pl

Abstract

The article presents the results of research conducted in one hundred Polish enterprises operating in various businesses. The research aimed to present the state of Polish enterprises in terms of preparing the enterprises to enter the world of the fourth industrial revolution. The conducted surveys on the use of modern technologies and the level of their advancement show that changes in the technological area are perceived as those that have a positive impact on functioning of the enterprise. This indicates a high level of awareness among companies regarding the need for improvement, innovation and the transition to advanced technological levels. The article focuses on one of the many elements of Industry 4.0 - the Internet of Things as one of the most important technologies of the new reality that can contribute to the improvement of processes in the enterprise and the creation of smart factories.

Keywords: Industry 4.0, Digital Technologies, Internet of Things (Iot), Research.

Introduction

A high productivity, efficient and capable machines, low manufacturing cost, high quality of products, diversity of products and flexibility of change production profile are the main goals of enterprises realized by innovative technical and technological solutions. Many of them turned out to be disruptive over the course of industrial development and they initiated revolutionary changes in industry, contributing also to economic, changes in the world.

Nowadays, customers' needs determine changes in the way of thinking in the approach to production process, management systems, logistics, work culture and ecology. The short product life span is currently one of the most important problems of the contemporary market. Such a situation requires enterprises to frequent assortment changes, even changes in the production profile, and the need to adapt quickly permanently increasing customers' demands. It can be assumed the transition of enterprises to the model consistent with the principles of Industry 4.0 will increase a value of existing and new products, services, processes, systems and business models.

Industry 4.0

The term Industry 4.0 (originally from German Industrie 4.0) comes from the strategic project of the German government, which promoted the computerization of manufacturing processes. The first time was used during the fair in Hanover in 2011 (Schwab, 2018).

The beginning of Industry 4.0, also known as the fourth industrial revolution, is considered to be 2013, when a working group was created in Germany, whose task was to define activities aimed at formulating the principles of factory automation. The result were recommendations for necessary implementations that are lead to achieve the level so-called Intelligent Industry.

The key problem in the context of Industry 4.0 is the definition of a new reality because the process of shaping it is currently in the preliminary stage. The existing definitions are descriptive and present a vision which will shape the upcoming transformation of technology and organization (Controlengineering [2], 2016).

Industry 4.0 in a very general sense of the term is the integration of machines, devices, industrial facilities, systems and processes as well as make modifications in production processes aimed at increasing production efficiency and

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make modifications in flexible changes to the assortment. It concerns not only technology, but also new methods of work and new role of man in industry (Piątek, 2017).

The concept of Industry 4.0 means to bring to one form and to combine all elements into the one whole of the real world of production facilities with the virtual world of the Internet and information technology (IT). People, industrial facilities and IT systems exchange information automatically during production. This exchange takes place both in the area of the enterprise and in various IT systems operating for the enterprise.

New Digital Technologies

The development of Industry 4.0 will intensify activities aimed at digitization and computerization of production. Cyber-physical systems (CPS) will then be created, from which smart factories will be developed. Machines and devices, connected to the Internet of Things (IoT), will communicate and make autonomous decisions. Human participation in the production process will be limited to necessary minimum, but due to new technical and organizational solutions, will receive better support. It will be an integration of man, machine and process. Interaction in such the system will be possible between machines, machines and people, as well as between the entire stages of production, which will become interrelated. Then the supply chain will become more flexible and the manufacturing process more efficient and faster.

It is predicted that the fourth industrial revolution will start with the development and use of new technologies. One of the most important ones will be the Internet of Things (IoT), by which huge amounts of data will be sent on a state and condition of machines, devices, production in progress, inventory, etc. Therefore, advanced methods of data processing will be required, which is why techniques of Big Data analysis and Cloud Computing are being developed. The security of transmitted and processed data in the network will also be related to the development of cybersecurity. The technologies that complement the main system architecture include advanced simulations, virtual and augmented reality, additive (3D) printing and full integration of enterprise IT systems.

The key technical innovations, considered as factors enabling the fourth industrial revolution, are

(Controlengineering [2], 2016):

- a new quality of communication where the digital and real worlds are interconnected and exchange digital information;
- intelligent sensors with built-in individual identification systems;
- cloud data processing;
- analysis of big data on products and production;
- techniques for simulating real objects in virtual projections;
- direct communication between devices;
- advanced human-machine interfaces;
- cybersecurity solutions ensuring secure communication and access to systems and devices;
- a new generation of robots that interact with environment and with other robots;
- augmented reality systems supporting design and servicing;
- 3D printing technologies for prototyping.

Disruptive changes in the industry will be caused by the scale of their application, synergy, integration, as well as the dynamics of development.

Advanced IT tools that should also be mentioned are APS and SCADA systems. The APS system is an advanced tool for automatic planning and scheduling of production orders in real time. It allows you to perform complex calculations in a short time, as a result of which optimal production plans are generated, in accordance with previously set assumptions. Calculations performed with the use of algorithms make it possible to create optimal production schedules according to various criteria. APS systems are an extension and complement of ERP class programs. The system is able to simulate various production situations. Advanced production planning programs allow you not only to observe the progress of production on an ongoing basis, but also to react in real time to any adverse events, such as failures, changes in priorities or changes in the ordered quantity.

SCADA is a computer system aimed at increasing production efficiency. With the use of SCADA, it is possible to collect data from machines and measuring devices in real time, which enables supervision over the production process. A very important function of the system is the visualization of current data and historical data. The system

allows the user to control the production process, detects alarms and informs the operators about them, thanks to which it is possible to quickly react to errors and irregularities.

Internet of Things

The concept of the Internet of Things is closely related to Industry 4.0, which concerns the exchange of information between devices, systems and people.

The Internet of Things (IoT) is a concept that was first formulated in 1999 by Kevin Ashton. It relates to a system in which objects equipped with sensors (and thus clearly identifiable) communicate and exchange data with computers and other devices. This process is done using various network solutions, especially wireless (Mącik, 2016).

The Internet of Things is a dynamic global network of physical objects, systems, platforms and applications that are capable of communicating, transmitting data, and sharing intelligence among themselves, the external environment, and people (Furmanek, 2018). Thanks to the system of individual identification, IoT enables interactions and cooperation of objects to achieve common goals. In relation to the industrial environment, the term Industrial Internet of Things (IIoT) is used. There is also the concept of the Internet of Everything (IoE), which is the name for a network of people, processes, data and things connected to the Internet.

In practice, the Internet of Things network based on intelligent objects differs from the traditional concept of the Internet based on data servers connected with user access terminals. In the concept of the Internet of Things, the transfer of data between objects is important, and the interaction with humans is based on immediate needs and requests (Ożadowicz, 2014).

IoT in production process

The use of a network based on the concept of the Internet of Things can contribute to improve processes in the enterprise. Equipping production facilities with sensors increases the level of their control. Sensors allow objects to send data to a computer for collecting and analyzing the data, allowing efficient identification of the problem, deviations from the standards and make it easier to predict possible failures. This will reduce unplanned downtime of machines and devices, and this will optimize the work of the production system.

The advantages associated with the use of smart objects in a manufacturing process may include (Mącik, 2016; Smejda, 2016):

- increase in speed and quality of production processes by current data analysis,
- more effective use of production potential of industrial facilities based on current data,
- increased efficiency by automation of production tasks,
- making key business decisions thanks to data availability,
- effective waste management and reduction of environmental pollution
- increase in the production rate while maintaining the highest quality standards,
- personalization of production and short series – an easy adaptation to new tasks enables profitable production,
- predictive maintenance – a permanent monitoring of machines' work allows to optimize the work and predict breakdowns,
- modeling - it is possible to create virtual lossless production systems and test in any configuration before deployment,
- strict control of production process leads to the minimization of loss of working time, raw materials and energy.

The importance of the Internet of Things technology

The Internet of Things (IoT) technology is one of the most important technologies in the fourth industrial revolution. Digital transformation has become necessary for organizations that care about increasing production efficiency, efficient data and information flow and better process management.

The development of digitization of enterprises, advanced computerization and robotization of production systems, connecting industrial facilities into a network of cyber-physical systems that create smart factories, will contribute to create new opportunities for enterprises: algorithmic and programmable products and services related to data processing in the Cloud and the use of artificial intelligence. It will be possible to collect customer feedback that will have an impact on design of products that achieve new value for customers. It opens up the possibility of creating new businesses and strategies for the company.

The greatest advantage of the Internet of Things is participation in the Big Data analysis process. New solutions, tools, services and applications will improve the efficiency of collecting and combining data from separate IT systems. In addition to participating in analytical processes, IoT allows to monitor and detect upcoming problems in the area of maintenance and repair planning. Control of the state of use (consumption) of resources enables the timely replacement of tools and machine elements. In this way, IoT supports the concept of predictive maintenance, thus increasing the reliability of machines and devices, their availability and reducing the costs of unplanned downtime (Controlengineering [1], 2019; Pawłowicz, 2016).

The main factor influencing the development of the Internet of Things (IoT), especially the Industrial Internet of Things (IIoT), is the need to control production infrastructure by monitoring performance and maintenance costs. A big challenge for the organization, in the context of the fourth industrial revolution, is to change the way of thinking and see the benefits of using IoT solutions in industrial processes: business analytics, faster and better decision-making processes, higher efficiency and lower production costs, predictive maintenance, diagnostics and analysis of machines condition, increased safety (Controlengineering [4], 2018).

Internet of Things - digital technology in Polish enterprises

The research conducted in 2019 in one hundred enterprises, medium-sized (from 50 to 250 employees) and large (over 250 employees), operating in various business shows that changes that are currently taking place in the macro environment are perceived unfavorably by the management (Fig. 1).

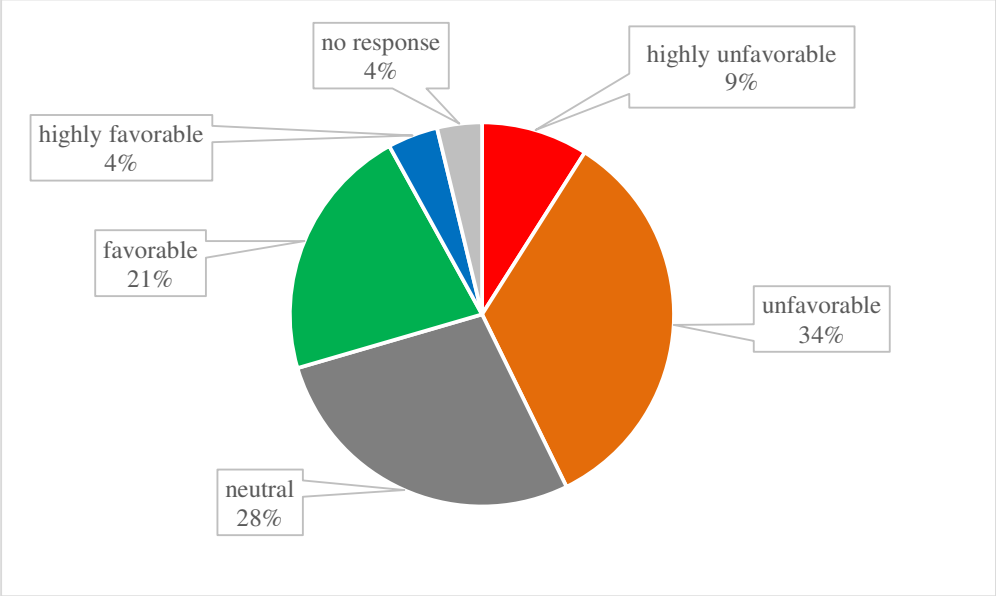

Fig. 1: Structure of the assessment of changes in the macro-environment of enterprises [based on own research]

The issue of assessing changes taking place in the environment will become even more important when the level of generality in the presented structure increases. Then it turns out that the changes are perceived very negatively (highly unfavorable and unfavorable - 43%), and only some enterprises assess them positively (favorable and highly favorable - 25%).

Developing this issue by specifying the areas of changes in the macro-environment will allow to understand the reasons for such an attitude of management (Fig. 2).

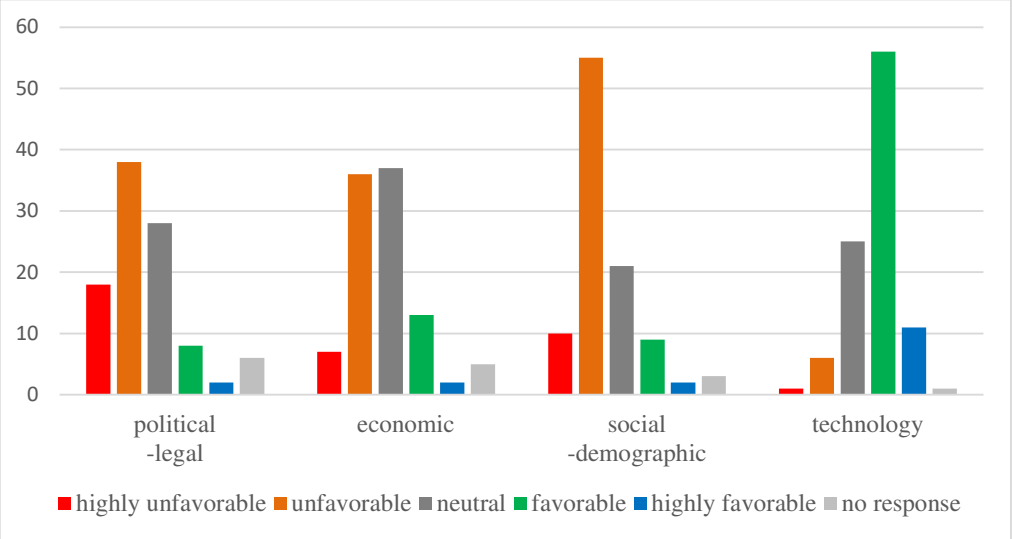

Fig. 2: Areas of changes in the macro-environment by importance for the company
[based on own research]

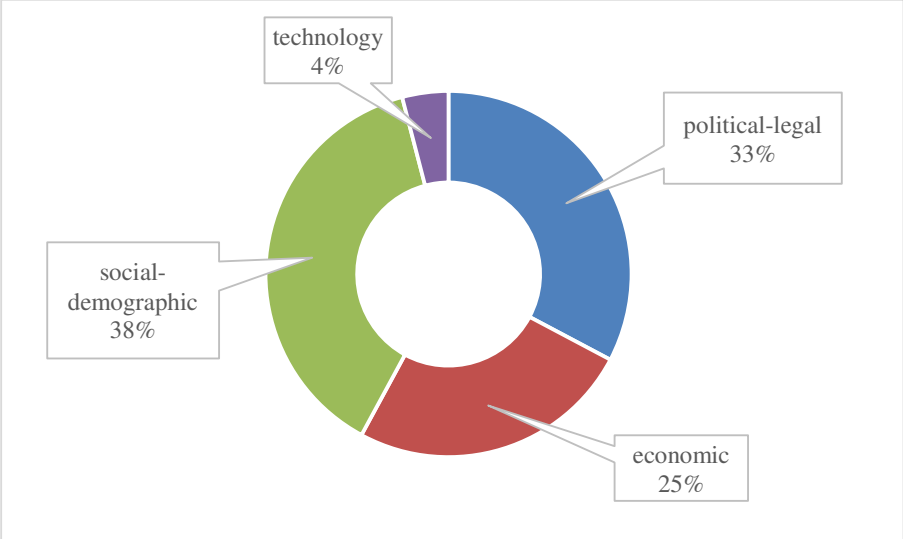

Fig.2: a Structure of areas for a very unfavorable and unfavorable assessment of changes
[based on own research]

A very positive phenomenon is the clearly favorable impact of changes in the technological area on the functioning of the company (Fig. 2b). The beneficial and very beneficial impact of technological changes is 67% (Fig. 3), which indicates a high level of awareness of the management of the companies regarding the necessity for improvements, innovations and the transition to advanced levels of know-how. Digital transformation in industry is a time of great changes and challenges - combining technologies and creating non-standard solutions. Industry 4.0 connects the supply chain and enterprise resource planning system with the production line, providing integrated, automated and autonomous manufacturing processes that make better use of capital, raw materials and human resources.

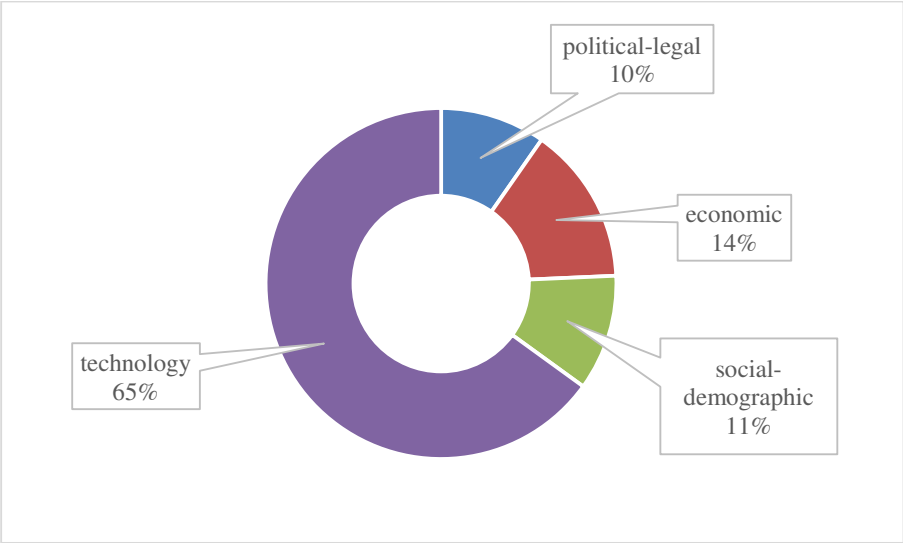

Fig.2: b Structure of areas for favorable and very favorable assessment of changes in the macro-environment
[based on own research]

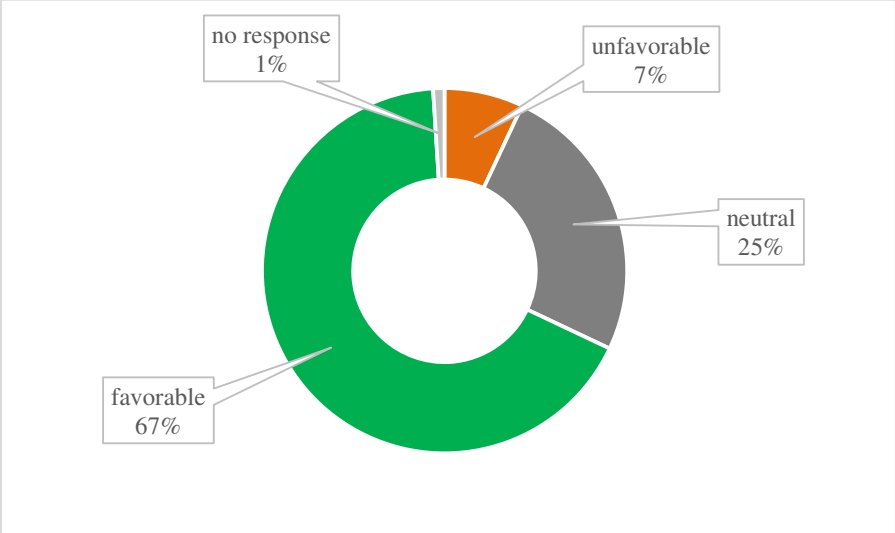

Fig. 3: The structure of the assessment of technological changes taking place in the macro-environment

[based on own research]

Competition and growing customer expectations contribute to the continuous improvement of production efficiency and capability. The third industrial revolution, due to computerization, computerization and automation of work processes, increased the efficiency of production, reducing costs and enabled the development of mass production. Currently, the problem is to manufacture short series of products, designed according to the customer's needs. The flexibility of production systems is one of the main assumed effects of the fourth industrial revolution.

In the surveyed enterprises, 68% of them declare the share of mass production in at least half of the manufactured products (Fig. 4).

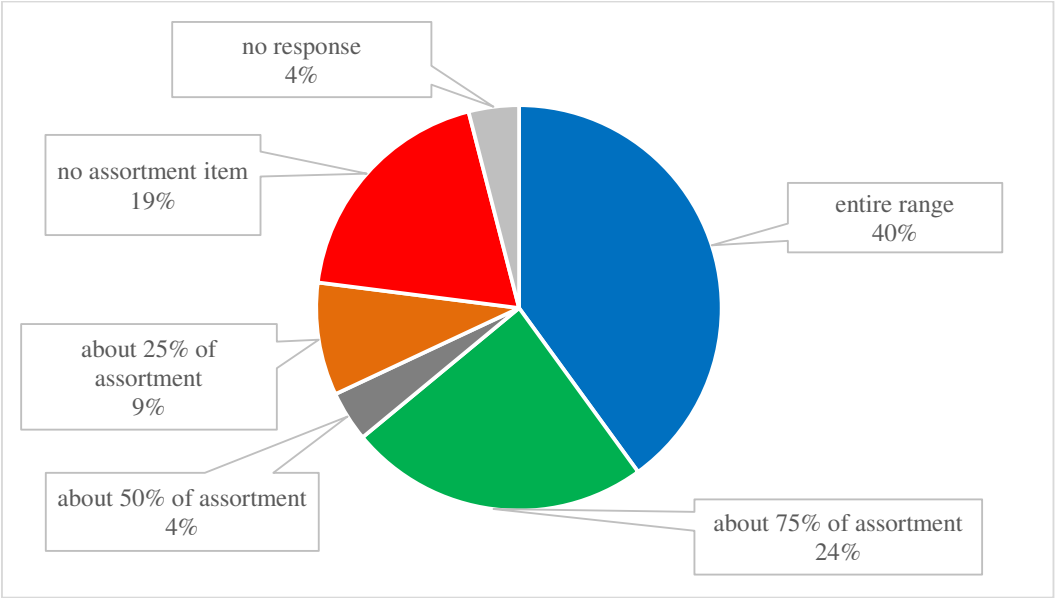

Fig. 4: Share of mass production in the entire range [based on own research]

An interesting position is 19% of enterprises declaring no mass production for their product range. This applies to 79% of medium-sized enterprises surveyed in this category, employing 50-249 workers, and 21% of large enterprises employing over 250 workers. The lack of mass production in these enterprises may suggest a shift to the production of short series of products using flexible manufacturing systems, however, further research has shown that the technological level of robotization, digitization and communication of industrial facilities and the methods of managing the production system is not sufficient to enable talk about their readiness to apply the principles of Industry 4.0.

Lean Management (LM) methods, about which the surveyed companies were asked, are used to a small extent or have been implemented only partially. The lack of implementation of LM methods (total lack and implemented to a small extent - 43%) is several dozen percentage points greater than the declared implementation of them at least to a significant extent (29%) (Fig. 6). Half of the implementation (26%) means that LM methods are known in various businesses, but they are not appreciated. The situation means a short-term approach of the management to managing the enterprise due to the lack of pressure from the environment on organizational changes and innovative technological solutions. This leads to the conclusion that the management and control systems of the production process are outdated, and the road to implementing the principles of Industry 4.0 is long.

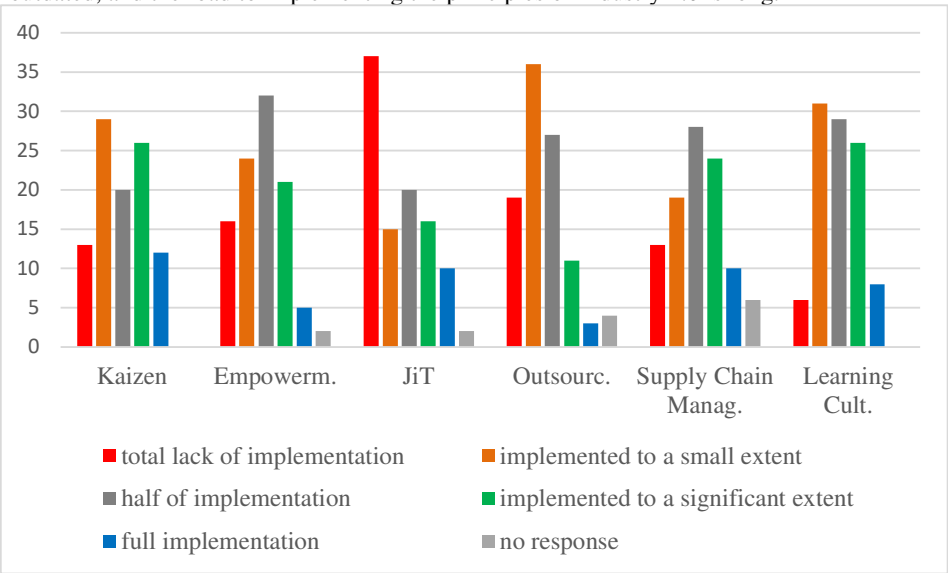

Fig. 5: Lean Management methods according to the degree of implementation
[based on own research]

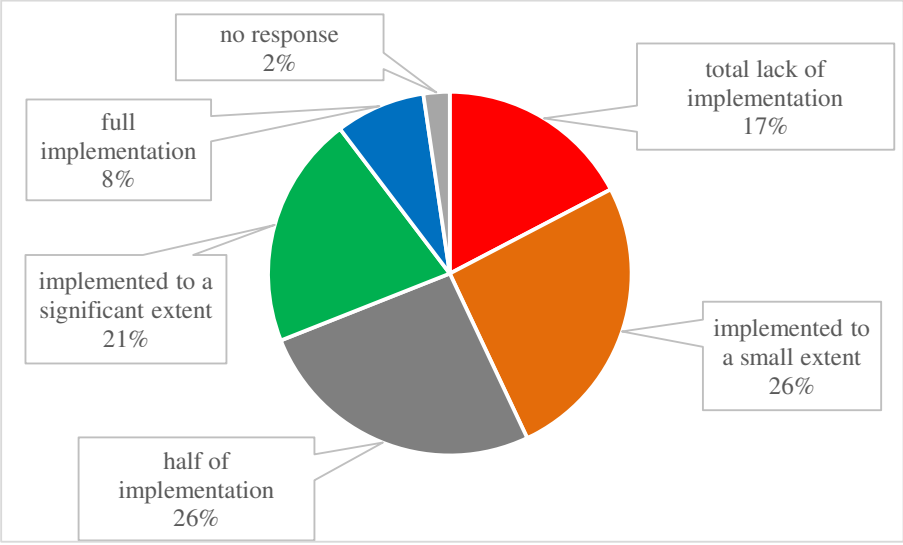

Fig. 6: The structure of the implementation extent of Lean Management methods
[based on own research]

The digitization of production and the establishment of a network of industrial facilities are factors for building a smart factory that is part of Industry 4.0. It will not be possible without the use of modern machines and devices that enable the implementation of innovative manufacturing methods. Modern industry is moving towards flexible production systems that are used to easily adapt production to changes in the market. Flexible manufacturing systems increase production efficiency, minimizes costs and shortens the time of task completion. The flexibility of production systems is one of the main assumed effects of the fourth industrial revolution.

The current structure of industrial machines in the surveyed enterprises consists mainly of numerical control (NC) and computerized numerical control (CNC) machines or universal machines (Fig. 7). A slight extent of robotization is achieved by 13% of enterprises, while a technologically advanced machine park is declared by 12% of the surveyed companies. The low extent of robotization of enterprises is a serious barrier to competitiveness in the global market.

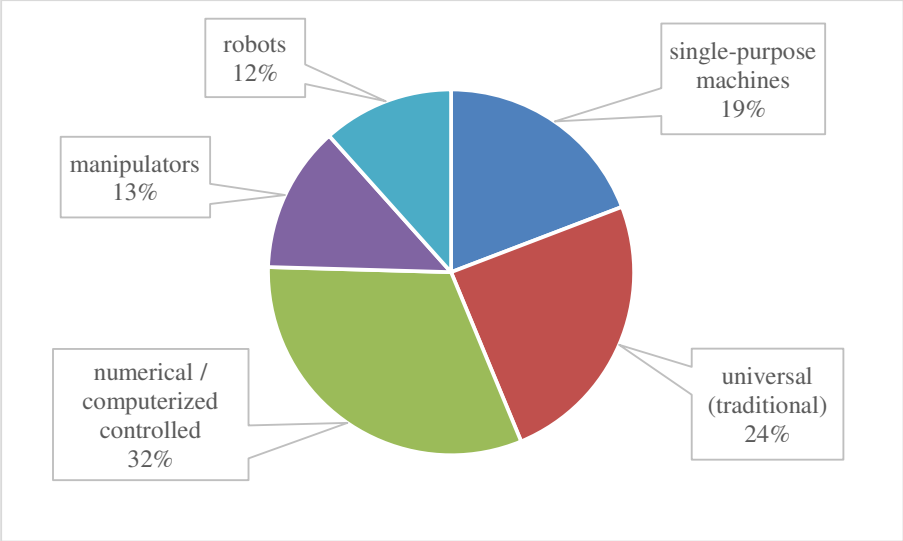

Fig. 7: Structure of industrial machines
[based on own research]

The implementation of advanced machines, devices and production systems enables development and transition to a higher technological level. A digital factory is an organizational unit where people and industrial facilities interact and share real-time information about all stages of the production process.

Almost half of the surveyed enterprises are dominated by the human work model assisted by process automation / robotization. Every fifth company speaks of the lack of robotization and almost as many declare the balance of human work with the work of automated or robotic machines. The enterprises do not show full robotization and automation of their processes, although there are those in which the level of technological advancement is so high that human work is limited to the necessary minimum (13%) (Fig. 8). The integration and interaction of human, machine and process enables interdependence and a new level of communication. Industry engineer 3.0 is a task-focused person. He can work in a group, although he does not like changes and new situations. An engineer 4.0 is a person open to changes and flexibly adapting to the new environment. Has the ability to communicate and provide detailed technical information in an optimistic way and has a conceptual approach to problem solving. The new industrial reality requires an engineer to have interdisciplinary skills, which means that only technical knowledge is not enough. The combination of soft skills with technical knowledge allows you to operate effectively in an environment of change.

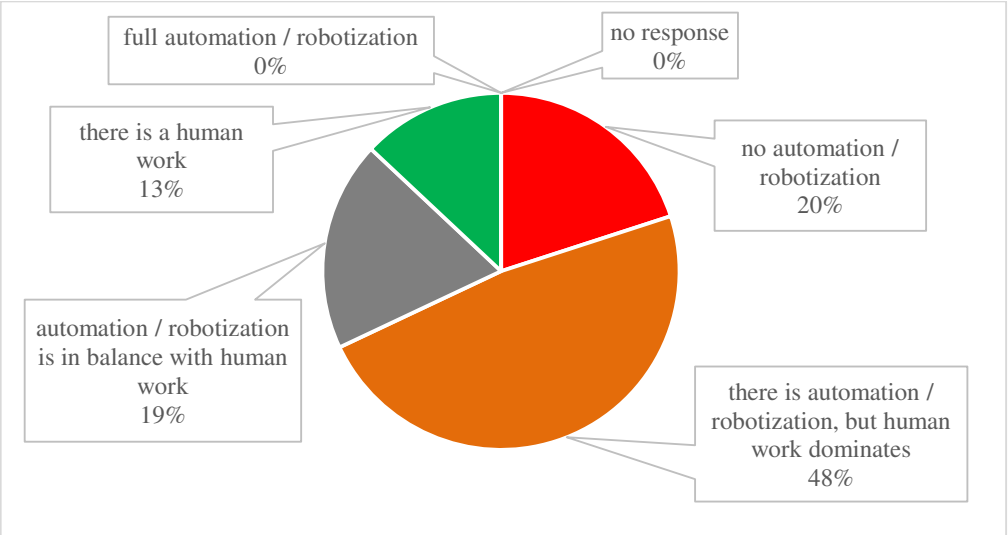

Fig. 8: The share of automation / robotization in human work in the enterprises
[based on own research]

Implementing changes should start with the analysis and assessment of the current situation of the company: machinery, IT systems, competences of management and employees, and financial possibilities. Based on this analysis, it is possible to create a strategy for implementing new technologies.

More than half of the management of the surveyed enterprises is not interested in the development of the technology of the new reality and does not have specific plans (Fig. 9). Some of them have already started the process of implementing solutions (22%) of the communication technology of machines and devices, or plan to implement them within the next 2-5 years (21%). The willingness to develop in the area of robotization and communication of industrial facilities was more willingly declared by representatives of medium-sized enterprises (71%) than large enterprises (29%). Among companies that use modern technology solutions, more than half of medium-sized companies 55% and 45% of large companies have already used solutions that enable mutual communication between machines.

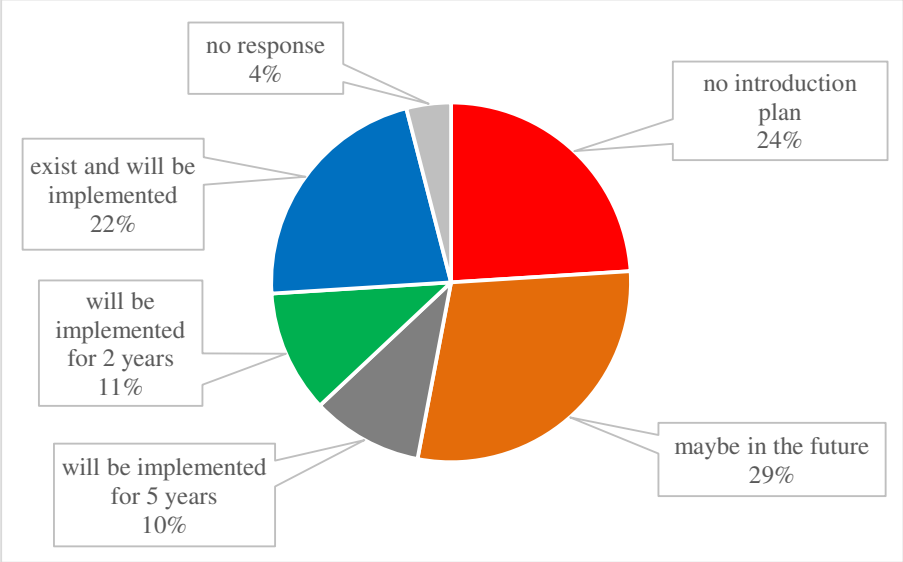

Fig. 9: The structure of the policy of implementing communicating machines in the enterprises
[based on own research]

Companies implement concepts, approaches, and methods to improve production management and control, collect feedback, reduce work in progress and inventory level in the entire process, reduce machine retooling time, or improve workplace management. The methods and concepts of managing the production process have evolved over all industrial revolutions. Often, efficient management and control of the process involved the use of several methods at the same time. The implementation of many methods and techniques would not be possible without the IT support offered by MRP / ERP (material requirements planning / enterprise resource planning) systems. In this way, it is possible to collect and process data from the production area and make better decisions. ERP systems are integrated, multi-module, with a central database (Controlengineering [3], 2014).

The computerization of enterprises is a very important factor determining technological development. The surveyed companies most often use MRP/ERP systems (47%) (Fig. 10). A good phenomenon is the use of Business Intelligence (BI) tools, i.e. business analytics (22%) in the process of transforming data into information, and then into the knowledge necessary for company management to make the right tactical and strategic decisions. BI is the integration of the system, application and database that enables management to conduct real-time analyzes. The use of mobile devices (19%), allowing for processing, receiving and sending information without the necessity to maintain a wired connection to the network, supports the work of company management. The growing popularity of the use of applications and mobile devices at work is, among others, the effect of increasing capability, efficiency and availability of solutions in the area of mobile technologies. The new mobile technologies are now becoming a natural work environment for many people, the basic communication tool and a source of knowledge. They allow to get closer to the phenomenon of analyzing large amounts of data, often performed online. Today Big Data Analysis is the basis of many enterprises - information improves the company's operations, supports the quality of management decision-making, allows to create effective strategies, reduce costs and enable the creation of new businesses. From this analysis uses 12% of surveyed companies.

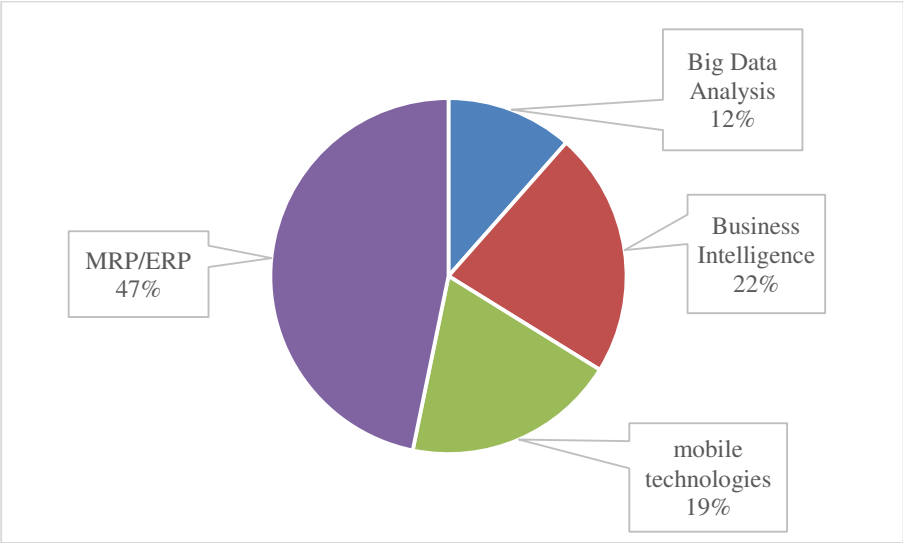

Fig. 10: The structure of using management support methods
[based on own research]

A very positive phenomenon and undoubtedly a significant step approaching the fourth industrial revolution is the use of the latest IT technologies. The enterprise management policy includes in strategies plans for the implementation of Business Intelligence or Big Data Analysis (Fig. 11). Only 13% of companies declare the use of these technologies in their daily work, including 38% of medium-sized and 62% of large enterprises, while 11% declare their implementation in the near future (2-5 years). As many as 66% of enterprises do not have any plans regarding the use of these technologies ("no plan" and "possibly in the future").

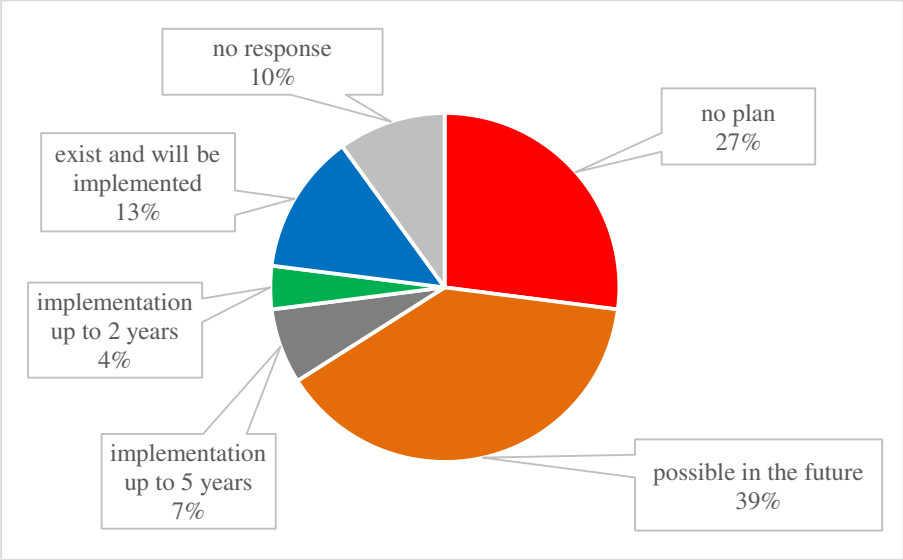

Fig. 11: Participation in the drive to implement Big Data Analysis or Business Intelligence
[based on own research]

Technological progress creates favorable conditions for the creation of new tools for data processing and the use of Big Data. The method of data analysis and use determines their value, and the effects of effective analytics are used in the most important business decisions.

The fourth industrial revolution is a combination of modern information technologies, high-efficiency computers, cloud computing, artificial intelligence and robots. It is the latter that are to contribute to the revolution in production systems. Industry 4.0 does not aim to create enterprises in which people will be replaced by robots, but only to make them a better place for everyday work. Due to modern technology and new solutions, employees will receive better information support (Płoszczyński, 2017).

Among the surveyed enterprises, 28% agree (and strongly agree) with the opinion that the implementation of robotization is conducive to the effective use of human resources in the manufacturing process (Fig. 12). Implementing robotization into an enterprise requires emotional preparation of employees for the new role they will play in the work process (31%). It will be an integration of man, machine and production process, due to mutual cooperation and interaction in the new system. However, there is an anxiety among respondents that robotization will fully replace human work in the manufacturing process (16%). They claim that an employee, operator of machines and devices in the production process is an irreplaceable resource of the enterprise (25%). Its role will, however, evolve towards managing the activities performed by robots.

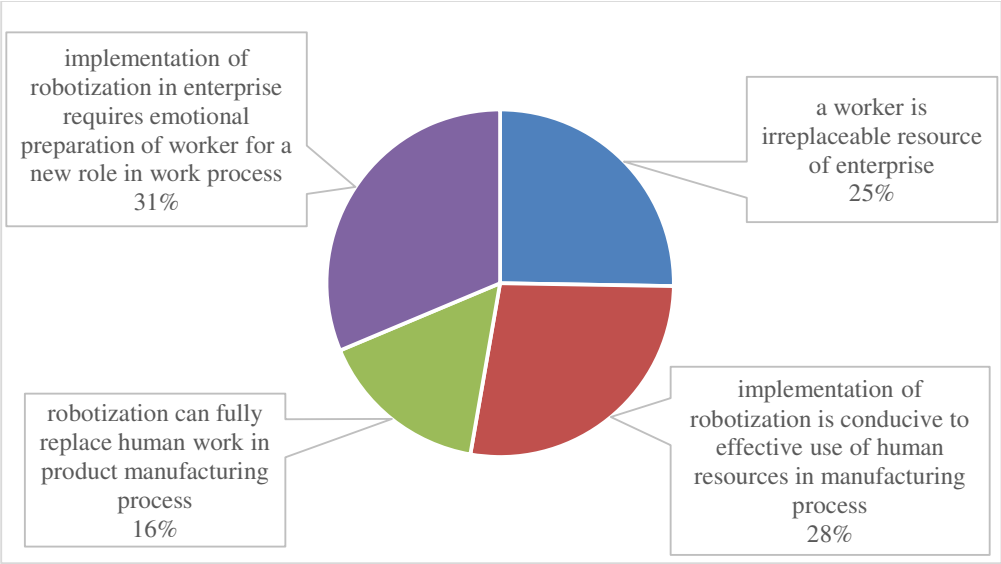

Fig. 12: The impact of robotization on the efficiency of human resources use in manufacturing processes
[based on own research]

Analyzing in details the opinions of company representatives on the impact of robotization on the work of employees, two interesting attitudes can be noticed - one that expresses a clear acceptance of the impact of modern technologies, and the second one, which indicates a clear difference of opinions of the respondents regarding the possibility of complete replacement, i.e. worker from the manufacturing process (Fig.12a). It is important to know that the role of an employee will change towards managing the activities performed by robots. New technical solutions will be associated with increasing the possibilities of employees, not removing them from the process. Competency development will be continuous and will be integrated with production processes.

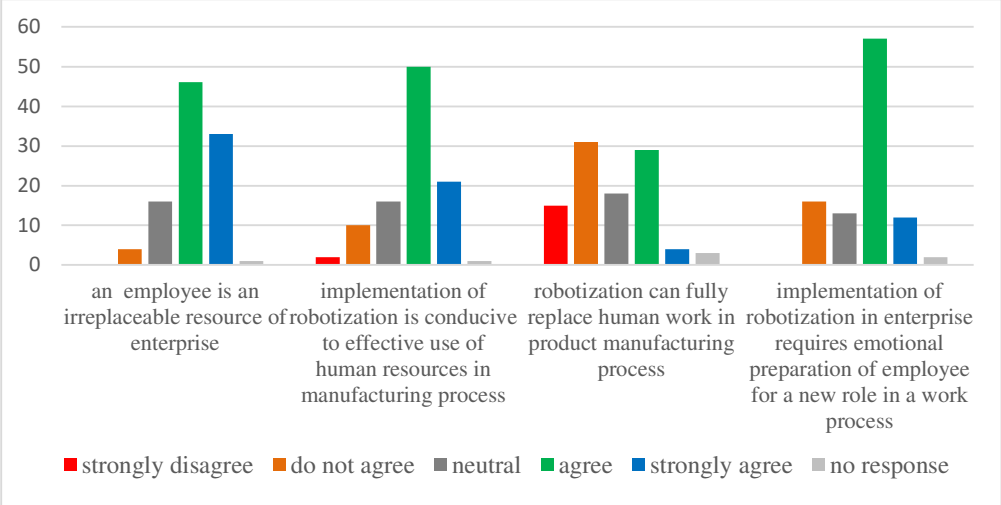

Fig. 12a: The share of robotization influencing the effectiveness of human resources use in manufacturing processes

[based on own research]

Maintenance is one of the most important elements of the production process. Machine downtime due to breakdowns causes losses in work, and thus delays in production, and above all generates costs. Automation of industrial processes and the development of IT technologies contribute to the transition to a higher level of diagnostic systems, using databases where historical data is stored. Predictive maintenance replaces the outdated, but still used, reactive methods that react after a machine failure, as well as the classic preventive approach, operating in accordance with the planned schedule of machine inspections and maintenance. The prediction of industrial machinery and equipment consists in monitoring parameters, non-invasive testing, control, trend and correlation analysis, statistical data analysis. All this allows to determine the future states of machines on the basis of a set of values of the current parameters. It is then possible to work out a method of assessing the condition of machines by systematically collecting and analyzing key information. It allows to predict the moment of failure. This becomes an opportunity to invest in Industrial Internet of Things (IIoT) technologies and tools.

Figure 13 shows the structure of maintenance models applied in the surveyed companies. Most of the companies apply the model in which the pre-planned schedule of renovation works plays the main role (29%). The proactive preventive model (25%) and the least technologically advanced - reactive model (23%) were ranked next. The latest predictive method is applied by 8% of the surveyed companies.

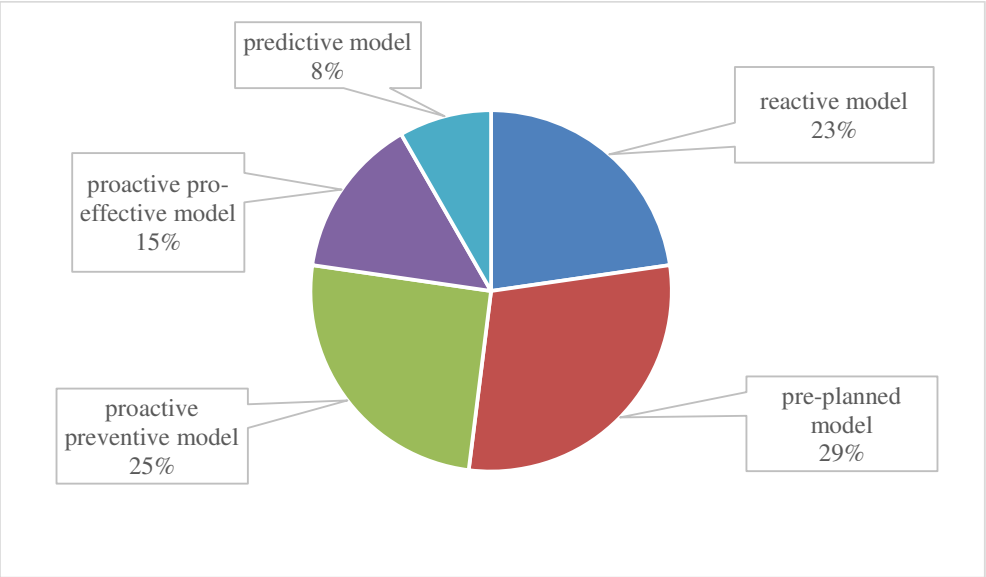

Fig. 13: Structure of applied maintenance models in enterprises
[based on own research]

Summary

The development and wide use of new digital technologies in industry will be the beginning of changes in organization, control and management of processes in a modern factory. One of the most important technological changes will be the Internet of Things, or rather the industrial Internet of Things, through which it will be possible to send huge amounts of data on the condition of machines, devices, work in progress, inventory, etc. Therefore, advanced methods of data processing will be required, which will be associated with the development of methods and techniques for analyzing large data sets in the computing cloud. The technologies that will complete the main architecture of the IIoT system include advanced simulations, virtual and augmented reality, additive printing and full integration of enterprise IT systems. Technologies that top the main architecture of the IIoT system up include advanced simulation, virtual and augmented reality, additive printing, and full integration of enterprise IT systems. The development of the industrial Internet of Things will contribute to the emergence of a new way of communication - not only between employees of a modern factory, but above all between autonomous machines, machines and employees, and finally between the real and virtual worlds. Converting individual factories into end-to-end automated and networked production environments will contribute to the creation of smart factories, driven by a huge amount of high-quality data delivered in real time. Technologies come together in industry as a result of digital transformation. This way, new solutions will emerge that will make better use of resources. Internet of Things technology is one of the most important technologies in the fourth industrial revolution. Digital transformation becomes necessary for

organizations that care about increasing production efficiency, efficient data and information flow and better process management.

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State Policy of Supporting Social Entrepreneurship in Russia

Natalia Vladimirovna VYSOTSKAYA

Russian University of Transport (MIIT), Moscow, Russian Federation, vyssotsk@mail.ru

Elena Viktorovna LYLOVA

Peoples' Friendship University of Russia (RUDN University), Moscow, Russian Federation, lylova-ev@rudn.ru

Abstract

Purpose. The main issue of this research is the hypothesis that the modern state policy of supporting entrepreneurship in Russia does not meet the needs of social entrepreneurs. The authors reveal the main directions of the Russian Federation state policy supporting social entrepreneurs and analyze practical examples of social entrepreneurship. **Design/methodology/approach.** The research was conducted using applied study, based on the results of which the analysis of the effectiveness of state policy in relation to social entrepreneurs has been concluded. The comparative analysis method and the content analysis method were also used. **Findings.** The conducted analysis made it possible to identify the problems of state policy implementation that lead to the impossibility of fully functioning social entrepreneurship in Russia. The authors conclude the prospects for social entrepreneurship development in Russia. **Research limitations/implications**. On the basis on this research, more accurate results could be obtained in a larger sample, which may be a promising direction for further scientific research. **Practical implications.** The results of the research can be used by the government to develop and implement policies supporting social entrepreneurship, as well as by social entrepreneurs to determine their interaction strategy with the government. **Originality/value.** The originality of the research is to clarify the functions of government in the framework of supporting social entrepreneurship policy in Russia.

Keywords: State Policy of Social Entrepreneurship Support, Social Projects, Social Enterprise, Social Entrepreneurship.

Introduction

According to the Sustainable Development Goals the development of a modern state requires a partnership between government and business, "partnership for sustainable development". Social entrepreneurship is particularly important for this type of interaction (Vysotskaya, 2010). Russia has joined the global community interested in implementation of sustainable development goals, and will present an overview of its achievements in this area at the UN political forum on sustainable development in 2020 for the first time.

In this light, it is important to assess the state policy supporting social entrepreneurship, as well as to analyze the practical activities of social entrepreneurship. It is important to identify factors that significantly complicate and substantially prevent social entrepreneurs from effectively carrying out their business activities, which in its turn hinders resolution of significant social issues and the state development as a whole.

The scientific and practical contributions of this article are: 1) in development of state social entrepreneurship support policy implementation in Russia; 2) in identifying weaknesses and strengths of state social entrepreneurship support

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policy in Russia, both from a theoretical perspective and based on the results of an expert survey of social entrepreneurs; 3) in the improvement proposals for the state policy supporting social entrepreneurship in Russia.

The purpose of the article is to analyze and assess the degree of "maturity" of modern social entrepreneurship in Russia based on the results of theoretical and applied research, to assess the relevance of the state policy to support social entrepreneurship to the requirements of the businesses' structures themselves, and to develop proposals to improve the quality and satisfaction of social entrepreneurship with state support.

Theoretical Framework

Social entrepreneurship appears to be a relatively new area of research (Arai, 2013). A vast number of research work focuses on the different aspects of social entrepreneurship. The most significant Russian researchers are Batalina, Moskovskaya and Taradina, who consider the conceptual essence of social entrepreneurship (2008), Grishina, who reveals the legal aspect (2013) and others (Moskovskaya, Berendyaev, Moskvina, 2017).

There is a significant number of foreign scientists engaged in research in this field. First of all, we should mention Alter (2007), Omidyar (2011), Hogendoorna and Hartog (2010), Defourny and Nissan (2010) and others (Smith, et al, 2010).

Researchers Yakimets and Nikovskaya (2019), Pleten (2016) and others (Umnov, Plyukhina, Matveev, 2018; Karpenko, 2019) have studied the issues of state policy implementation in support of social entrepreneurship.

In modern society, the importance of social entrepreneurship is undoubtedly recognized. For successful implementation of actions in the field of social entrepreneurship it is necessary to have two balanced components: 1) finding and solving problems that are relevant to a society; 2) generating a profit.

Let's analyze the main provisions of a relevant regulatory framework. Thus, in July 2019, Russian legislation implemented amendments to Federal law No. 209-FZ from 26.07.2019 "On the development of small and medium-sized enterprises (SME's) in the Russian Federation".

In accordance with implemented amendments, definitions of "social entrepreneurship" and "social enterprise" were included in the text of the law as well as conditions under which state and regional governments are able to provide support to entrepreneurship as well as an exhaustive list of types of support available to social enterprise companies.

There is also a mention of social entrepreneurship in the Letter of the Ministry of economic development of the Russian Federation dated 22.12.2011 No. OG-D05-2585 «On the implementation of state support measures for small and medium-sized businesses". This refers to measures which support small and medium-sized social entrepreneurship. It mentions that "social entrepreneurship is a socially responsible business activity of medium-sized, small and microenterprises aimed at solving social problems" and followed by a list of business activity areas.

From the letter of the Ministry of economic development, it can be concluded that social entrepreneurship is very limited in the choice of its field of activity. At the same time, we note that article 24, paragraph 2 of Law No. 209-FZ provides a broader list of business activities, and also indicates the possibility for regional governments to establish additional criteria for recognizing small and medium-sized businesses as social enterprises.

At the same time, the regulatory definition of social entrepreneurship as an independent type of business activity remains unclear. In practice, entrepreneurs register their organization as socially–oriented non-for-profit organizations, as individual entrepreneurs, or as limited liability companies (Romanova, 2015). It seems that in the future, social entrepreneurs will have access to any legal form that is available to commercial enterprises. At the same time, in accordance with the criteria specified in the Federal law and the criteria approved by the members of Russian Federation, these business structures will have the status of a social enterprise.

Other important documents that reflect the establishment of a regulatory framework for the support of social entrepreneurship are the Strategy of small and medium-sized businesses development in the Russian Federation for the period up to 2030, approved by the Government Decree No. 1083-R from June 02, 2016, and the State program of economic development and innovation economies, approved by the Government Resolution No. 316 from April 15, 2014. In addition, Government Decree No. 1284-R approved a list of indicators which are used to calculate members of the Federation ratings. The rating is based on the results of implementing socially oriented non-for-profit organizations' and social entrepreneurship' support mechanisms. This rating is also based on the access level given to non-governmental organizations to provide services in the social sector and implementation of competitive methods of providing state (municipal) services.

Supporting and developing small and medium-sized businesses in the Russian Federation strategy identifies social entrepreneurship as a separate category (Chapter IV. Methods and mechanisms for achieving the Strategy's goals). The Strategy refers to the full state support for social entrepreneurs, however, the very concept of social entrepreneurship is interpreted quite narrowly, referring to the category of organizations which produce goods or provide services for socially vulnerable and disadvantaged groups of citizens or create jobs for such groups of citizens. This does not reflect another important aspect of social entrepreneurship - the economic effect of the implemented business activities.

There is a growing public and scientific interest in the topic of social entrepreneurship, which is reflected in the content of educational programs for future entrepreneurs. Thus, the Higher School of Economics has opened a professional retraining program "Master of management in social entrepreneurship "Social innovations and entrepreneurship"". Since 2013, Moscow State University has been offering a continuing professional development program called "Management in the field of social entrepreneurship". Every year a contest "Social entrepreneur" is held by "Our Future" Foundation. Thus, it is obvious that social entrepreneurship is becoming a kind of a trend that stands out from other social organizations and entrepreneurship in general.

However, it is difficult to name an exact number of organizations in Russia that could be attributed to social entrepreneurship. It is difficult to determine a proportion of social entrepreneurs in the total number of entrepreneurs in Russia, since Federal Statistics Service does not distinguish them in a separate category. It was expected that the first entry in the register of SME's for the list of social enterprises registered as of 01.04.2020 would take place on April 10, 2020. However, by the beginning of the second half of 2020 this information is not available on the Federal Statistics Service website (as of September 7, 2020).

Another difficulty in identifying and defining social entrepreneurship in Russia as a phenomenon is its similarity to other types of organizations. For example, there are non-for-profit organizations that perform social functions (they include a fairly wide range of organizations, including higher education institutions). As well as socially oriented non-for-profit organizations which are closest in their mission to social entrepreneurship, but are non-for-profit in nature.

The closest term, reflecting the essence of social entrepreneurship, can be considered the term "social enterprise", which is interpreted in Federal Law No. 209-FZ in article 3, paragraph 7, as "a small or medium-sized enterprise entity operating in the field of social entrepreneurship", where social entrepreneurship is an "entrepreneurial activity aimed at achieving socially useful goals, contributing to solving social problems of citizens and society".

The authors believe that the term "social enterprise" in this case restricts the nature of social entrepreneurship. Social entrepreneurship is initially created as an entrepreneurial structure which solves social problems in economic ways.

Thus, in theory, one can encounter a fairly broad interpretation of the content of the concept of "social entrepreneurship". At the same time, based on their practice, social investment funds have long defined characteristics of social entrepreneurship. The assessment is based on the principle of social impact, which in turn can be determined by the following parameters: 1) evaluation of the purpose and mission of the organization, as well as the target audience; 2) selection of criteria for achieving the strategic goals of the organization and compliance with the goals of the organization's mission; 3) selection of justified methods for achieving the organization's goals and their effectiveness in implementing

changes; 4) transparency of actual indicators of changes and evidence of their achievement using selected methods. Predicting results with and without changes; 5) determining the cost of the project, the ratio between costs and outcome (Stannard-Stockton, 2009).

The state uses tax incentives as support measures for socially oriented organizations or organizations that support them. In the Letter of the Ministry of Finance of the Russian Federation dated 02.06.2004 No. 03-05-06/63 «On property tax relief for organizations in the socio-cultural sector" it is stated that in accordance with the Tax code, organizations in the socio–cultural sector are exempt from property tax. To determine the type of organization, it is proposed to use the all-Russian classification of fixed assets. Federal Law No. 7-FZ from January 12, 1996 "On non-for-profit organizations" establishes that socially oriented non-for-profit organizations and organizations that provide material support to socially oriented non-for-profit organizations can benefit from tax relief, but the Tax code does not specify which types of tax relief can be applied to these organizations. In addition, the legislation generally specifies tax preferences for non-for-profit organizations (Grishina, 2012), but does not specify the type of support for socially-oriented commercial organizations, since they operate in the general tax field.

It is necessary to allocate such methods of state support as grants (tenders for granting subsidies or targeted subsidies), preferential lending, preferences for participation in public procurement, technologies for transferring budget funds to social entrepreneurs as suppliers of goods and/or services in the social sector (for example, a target certificate), property support, and other informational and organizational support.

Researchers Yakimets V.N. and Nikovskaya L.I. (2019) proposed a classification of all types of state support, divided into four classes (categories): financial, property, sales and promotion of services support, infrastructure support. For each of these categories, they evaluated state support in the Russian regions based on three criteria: respondents' awareness of support mechanisms' availability in the region; the quality of mechanisms' work; and the significance of these mechanisms in the development of social entrepreneurship.

We can conclude that the legislation regulating the activities of social entrepreneurship in Russia is not sufficiently developed. Despite this an organizational and functional structure for supporting and developing social entrepreneurship is gradually being established at the state level. A major role in the development of social entrepreneurship in Russia is played by "Our future" Foundation, which also provides organizational, informational, advisory and financial support.

However, it is difficult to assess government agencies and non-for-profit organizations' support measures for the winners of the competition. Along with the positive results of such government support, in practice there are also cases of projects' state support being cancelled, replication of the business ideas not being followed, as well as the implementation of the project itself not going ahead. It is noteworthy that participation in the competition and implementation of the project requires the competition winner to participate in financing the project. It is obvious that the larger the project (even if it belongs to SME's), the greater the amount required for its implementation. Respectively, even 30% of co-financing from the entrepreneur's budget is a large amount of funds, and the refusal from the state to further support social entrepreneur threatens them with serious debts, and in some cases even bankruptcy.

Thus, social entrepreneurship support in Russia is not systematic, there is no coherent line in the current government policy, and there is no specialized organizational structure in the government that deals with this type of support.

Study Design and Data Collection

The main objective of the study is to identify existing problems in social entrepreneurs' main business activities implementation, as well as to assess the degree of state support for social entrepreneurs based on the analysis of information obtained as a result of a social entrepreneurs' expert survey.

A so-called applied research plan was created and implemented in order to complete the study. This seems most relevant, to the existing theory on the chosen research subject — social entrepreneurship, as well as to the subject of researching issues within business actions' implementation in social entrepreneurship field and state support for this activity. It also allows us to solve the research task.

The goals of the formed applied research plan are: 1) in the social entrepreneurs' practical operations to check the presence of the issue which was identified during the study of the theory of social entrepreneurship, namely: the lack of necessary systematic support for social entrepreneurs from the government; 2) to formulate directions of social entrepreneur's state support improvements.

Note that the implementation of such applied research allows us to identify different precedents and characterize each of them in parallel with the solution of the main task.

This kind of "side" research results can be extremely useful and important for practitioners (in the case of solving the task – for the government). They can be used to adjust government policies relative to social entrepreneurs.

The study involved 24 social business structures representing various industries (Table 1) and regions in Russia (Table 2).

Within the framework of the applied study, an attempt was made to determine the scope of social entrepreneurship, to identify the degree of support for social entrepreneurs by state authorities. As well as to identify the problems and expectations of social entrepreneurs in relation to implemented state support policy. Of the 24 organizations, six are non-for-profit organizations; the remaining 18 are business entities, half of which are individual entrepreneurs; eight organizations are limited liability companies and one organization is a joint-stock company. All companies belong to microenterprises and small businesses both in terms of the number of employees (Fig. 1) and their level of income (Fig. 2). Half of the companies that took part in the study employ people with disabilities (Fig. 3).

In accordance with the task and purpose of the conducted applied research plan the main methods of research were documentation study and social entrepreneurship' management and owners survey.

In 22 companies from the total sample, materials published on "Our Future" Foundation's website were analyzed – information about participants who won grant competitions and who won interest-free loans from the Foundation.

In the course of the survey, respondents (experts) answered questions about tax relief and benefits received from the state, the degree of social entrepreneurs' state support development (subjective opinions), reasons that hinder the development of dialogue between state authorities and social entrepreneurs, and the prospects of developing a policy of state support for social entrepreneurs in Russia.

The main hypothesis of the study was: social entrepreneurs are a special category of entrepreneurs engaged in socially oriented activities, which objectively exists. But there are no special tax conditions and systematic support from government agencies, which is the main reason that hinders the development of social entrepreneurship in Russia.

Table 1: Specialization and quantity of social entrepreneurship companies

Type of company's business activity	Quantity
IT-companies	1
Companies producing and selling food products	1
Companies selling ethnic products and maintaining national traditions	1
Companies manufacturing, selling, and/or repairing equipment for people with disabilities	1

Companies providing training to people with disabilities	1
Publishing and printing companies	1
Companies providing medical services	3
Travel service companies	2
Consulting services	2
Zoo	1
Taxi companies	1
Collection and recycling of secondary raw materials companies	1
Nurseries, development centers and health centres (including swimming pools)	4
Hotel businesses	1
Social rehabilitation companies	2
Restaurants and cafes	1
Total	24

Table 2: Regional affiliation of social entrepreneurship companies

Region	**Quantity**
Altai Region	1
Arkhangelsk Region	1
Belgorod Region	1
Bryansk Region	1
Volgograd Region	1
Vologda Region	1
Irkutsk Region	1
Kaliningrad Region	1
Kamchatka Region	1
Krasnoyarsk Region	1
Kursk Region	1
Moscow	1
Novosibirsk Region	1
Perm Region	3
Republic of Bashkortostan	1
Republic of Buryatia	1
Saint-Petersburg	2
Tomsk Region	1
Tula Region	1
Udmurtia Republic	2
Total	24

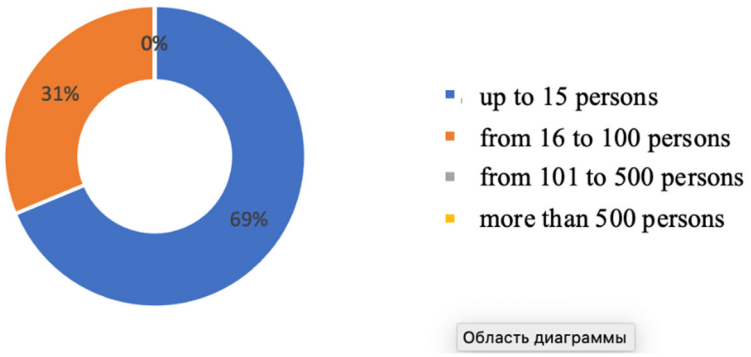

Fig. 1: Characteristics of social entrepreneurship companies by number of employees

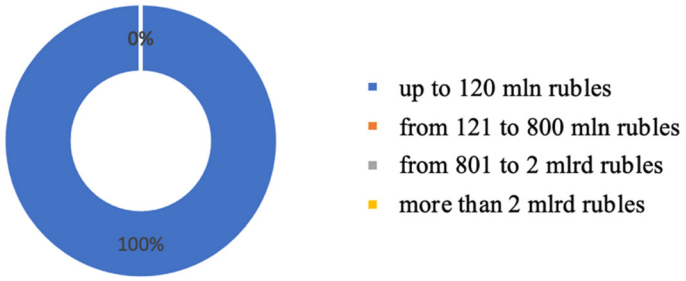

Fig. 2: Revenue of social entrepreneurship companies in 2018

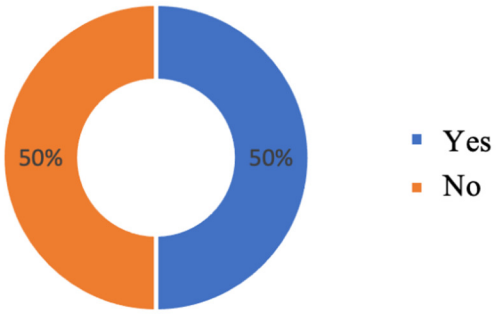

Fig. 3: Number of social entrepreneurship companies which employ people with disabilities

Results of the Research

Benefits and preferential treatment provided to social entrepreneurs can be divided into several types: 1) benefits provided to entrepreneurs due to the small scale of their business (simplified taxation system); 2) benefits provided for the payment of "social" taxes (medical, pension, social insurance); 3) benefits to non-for-profit organizations; 4) preferential treatment provided to SME's in the framework of public procurement; 5) benefits for people with disabilities.

The low results of evaluating the effectiveness of state policy in relation to social entrepreneurs are primarily due to the lack of tax relief (noted by 12 participants of the study) and preferential treatment (noted by 10 participants of the study). 25 % of studied participants noted that they receive benefits that are available to anyone who works as a microenterprise and a small business. 8 % of respondents receive a preferential rental rate for their business premises and 8 % participate in employment programs for people with disabilities and population employment. When asked about the effectiveness of the state policy in relation to social entrepreneurs, 54.2 % of respondents noted a complete lack of support, while the rest were not satisfied with it to varying degrees (Fig. 4).

Fig. 4: Companies ' assessment of the effectiveness of state policy regarding social entrepreneurs (0 – lack of support, 5 – high degree of support)

Social entrepreneurs note that they face serious, in their assessment, problems with their main business activities implementation: local authorities' "autocracy"; limited opportunities to participate in support programs for SME's, bureaucracy, corruption and officials' incompetence.

Based on the results of the research, the following conclusions are made. Social entrepreneurship in Russia: 1) is represented by small or medium-sized businesses; 2) may be an enterprise with different forms of ownership; 3) does not have the ability to use a special tax regime, benefits and preferential treatment, regardless of the region and area of business activity.

It is revealed that in Russia, the Government structure does not include: 1) specialized division for social entrepreneurship support; 2) all-Russian public organizations representing the social entrepreneurs' interests (there are only organizations at the regional level which are included within Russian Union of Industrialists and entrepreneurs).

It seems that in order to develop social entrepreneurship in Russia, it is necessary to implement several groups of priority actions of various types.

1) Organizational measures group of actions:

– Investment Policy and Business Development Department of the Ministry of Economic Development of the Russian Federation should implement a policy of social entrepreneurship support as a separate type of SME's in accordance with the amendments to the Federal law «On the development of small and medium-sized businesses in the Russian Federation". As well as provide continuing professional development to the Department's employees in accordance with changes coming into their employment roles and responsibilities.

- It is necessary to establish an all-Russian public organization that unites all social entrepreneurs and provides consulting and organizational services to its members.

- It seems that the body evaluating social entrepreneur's contribution into society's development and socially significant problems solving and which also determines social entrepreneur's compliance with their status should be independent. For example, it may be the Federal service for supervision in social entrepreneurship business area. It is proposed to differentiate the responsibilities of government bodies which grant benefits to social entrepreneurs and accredit their business activities. Establish business incubators for social entrepreneurs in the "scientific valleys" at universities, and expertise centers and accelerators in the regions. (In fact, social entrepreneurship expertise centers are a kind of "startup" for the gradual formation of social entrepreneurship projects accelerator).

- Create an organizational and functional model for socially oriented businesses development and social entrepreneurship by public authorities at the federal level which unite both state structures and public organizations.

2) Economic measures group of activities:

- Identify forms and types of social entrepreneurs ownership (currently, socially oriented non-for-profit organizations can't access benefits available for SME's. On the contrary small and medium-sized socially oriented businesses are deprived of preferential treatment available to socially oriented non-for-profit organizations). The introduction of social enterprise concept within the legislation only partially solves the problem.

- Create a complete and comprehensive list of social entrepreneurs business activities, correlated to the types of business activities under the all-Russian economic activity types classification.

- Amend the tax code in terms of tax reliefs and preferential treatment for social entrepreneurs and socially oriented businesses.

- Develop financial instruments for use by social entrepreneurs in support of their activities.

- Encourage large business' investment into social entrepreneurship by lowering tax rate for large businesses and developing impact investment.

- Establish preferential credit conditions for social entrepreneurship development and interest-free loans.

- Assign subsidies for rent payments and utility costs.

3) Methodological, informational and telecommunication measures group of actions:

- Develop specific, measurable and uniform criteria for performance evaluation based on social impact assessment for all socially oriented organizations.

- Develop a methodology for assessing the social impact of social entrepreneurs business activities. This can allow to minimize the human factor errors by authorized personnel for decisions making on the provision of benefits and preferential treatment.

- Develop and implement a system of measures to promote and develop social entrepreneurship.

- Create a single information database with accessible information about the system of preferential treatment, tax reliefs, grants and competitions for various categories of socially oriented businesses - a system that is open and transparent.

Conclusion

The goal of social entrepreneurship implementation and modern state policy in Russia is to achieve a new high standard of quality of life for country's citizens. As the President of Russia noted in his address to the Federal Assembly in 2019, "we need to get rid of everything that restricts the freedom and initiative of entrepreneurship". It remains to implement this principle in practice.

Russia faces many challenges. Above all social entrepreneurship companies have a desire of transforming social reality, solving existing social problems, and improving the level and quality of life. In these circumstances, the most important task of state authorities is to form new relations with businesses, to provide state support for social entrepreneurship and create partnerships with businesses to implement socially significant projects and programs.

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Sensor Signal Processing Techniques for Mileage Estimation Indoors

Alexandru Marius OBRETIN

Economic Informatics Department, Bucharest University of Economic Studies, Bucharest, Romania
alexandru.obretin@csie.ase.ro

Abstract

Indoor location has recently become a growing market, as well as topic of interest for more and more academic and business enthusiasts. Initiatives that integrate novel technologies to tackle sensitive challenges are developed on a regular basis. Though, the field is still in its infancy and there is plenty of room for innovation, as most solutions have been adapted for a predefined setup and therefore, they lack scalability, not being general purpose indoor positioning systems, suitable for dynamic environments where changes occur frequently. This paper enhances an already proposed model that relies on build-in sensors in a smartphone and engages with several identified limitations. The proposed architecture follows segregation of concerns principles and displays a software equivalent for an attitude and heading reference system, capable of identifying current position within a reference building along with a navigation module that is able to determine the mileage. The implemented design provides solutions for indoor positioning corner cases that have not been considered in previous research efforts, as well as for several issues that are inherent in native mobile applications. Nevertheless, this article is introducing a software ecosystem that is open for extension and battery friendly, providing an effective and enjoyable user experience for someone interested in indoor navigation.

Keywords: Indoor Positioning System, Sensors, Signal Processing, Statistical Analysis.

Introduction

In recent years indoor positioning has evolved from a peripheral research topic to a developing industry where more and more academic and commercial initiatives try to innovate and design novel and ingenious algorithms that can tackle stringent challenges in order to capitalize and gain recognition. International events are held for stakeholders to meet and exchange ideas, special issues are dedicated to the topic in research journals and overall prospects are positive.

Although indoor positioning systems are yet expensive, complicated and sometimes inefficient, they reveal atypical use cases in indoor routing, asset tracking, real-time personnel management and monitoring, behavioural studies and emergency situations management. Over the years various proof of concept applications have been designed to approach indoor positioning challenges, the most interesting relying on neural networks to assist victims in cases of emergency - Falcon and Schulzrinne (2018), augmented reality tools for environment scanning - Rajagopal et al. (2019), Haynes et al. (2018), Cankaya et al. (2015) or image-based facility management - Baek et al. (2019), Koch et al. (2014).

Moreover, a classification initiative from Lashkari et al. (2019) categorized available indoor positioning systems into crowdsensing and crowdsourcing. While the former is characterized by mandatory implicit initiative from the user, the latter insists on explicit initiative. Concretely, crowdsourcing systems gather information directly from the users. Differently, crowdsensing systems collect data from already deployed networks of sensors. In spite of the increased attention both groups have received in the past years, the initiatives are rather sporadic, they do not have a high degree of generality and what is appropriate in one context may be inappropriate in another, because indoor location systems are often sensitive to the particularities of the environment in which they are deployed.

Related work

Another classification might categorize indoor positioning systems into hardware backed systems and software backed solutions. The first category is heavily dependent on existing information exchange protocols and technologies, such

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as Near Field Communication, Wi-Fi, Bluetooth Low Energy or magnetic field detection. One major disadvantage of this category is represented by the strong correlation between system's accuracy and the physical characteristics of the sensors networks that support the entire infrastructure, networks that are usually expensive to deploy and maintain. Nevertheless, the accuracy of these layouts tends to get affected when the reference buildings get crowded, when the batteries run out of energy or when they interfere with materials that have particular physical properties that block signal propagation. The second identified paradigm involves the use of innovative information technology solutions to compensate for the logistical and economic disadvantages of the first category. The studied initiatives belonging to this spectrum generally use common infrastructure, elements that the subjects possess in their great majority, in a modern society. In particular, the most used device in experiments in this way is the mobile phone. The prominent technological evolution of the last decades, the miniaturization of integrated circuits and hardware components, the increasing performances of the processing units, the incorporation in a mobile device of a wide variety of sensors and the development of innovative technologies such as artificial intelligence or augmented reality have facilitated new research opportunities. A number of initiatives have been successfully developed and tested in isolated contexts, either capturing video streams via the camera, which they then process using image recognition techniques and geometric analysis - Jeong et al. (2017), Zhang et al. (2016), or using artificial intelligence algorithms to estimate, based on data collected in real time, the mileage – Sui and Wang (2015), Ha et al. (2018), Huang et al. (2017).

A major disadvantage of the latter category compared to the former is the dependency on an updated building model of the reference venue. More precisely, for software solutions that rely on image processing techniques that compare video streams captured with the camera with an already known model, external changes, like advertisements, posters, lighting can prevent pattern recognition. Therefore, such applications require model maintenance and for example, in the context of large shopping centre, whenever a shop is replaced, or with every season's new collections that get displayed behind glass walls or holidays decorations, the reference images need updated to reflect the reality. A solution for this stringent issue in the realm of software based indoor positioning systems is to rely on something more static, like the floor plans.

The hereby paper will adapt, test, analyse and enhance several indoor location techniques detailed in Xu et al., where the authors proposed a software solution using smartphone capabilities to determine displacement inside venues. Although, this is not the only article of its kind, other similar initiatives that outline thought-provoking results being available in Truong et al. (2016), Zhang, Liu and Qu (2016) and Puangnak (2019), it would be the reference material for the research efforts detailed in this work, as some strategies can be adjusted and extended to a large variety of contexts, providing the prerequisites for a more general purpose indoor location application.

Theories and Methods

Since the sensors present in smartphones are capable of high frequency measurements, an architectural decision has involved the migration of processing algorithms to a stand-alone service, isolated from the source of information gathering, so as to avoid overloading the system. As such, the mobile phone remains responsible only for data acquisition and display of results, while the processing logic is migrated to a dedicated web server. This separation of responsibilities has favoured the development of individual modules, with a specific, well-defined role. In addition, during the implementation, the need for a mechanism to facilitate a phase-out and at the same time dissociated communication has been identified, because the frequency with which the information can be generated exceeds the frequency of its processing. Therefore, the entire architecture has evolved around the producer-consumer pattern, in which a number of components of the application are responsible for generating information, while others aim to process existing information and determine derived results.

The attempt to implement a software solution that integrates distinct components that communicate with each other through Apache Kafka has materialized in defining a service responsible on the one hand for aggregating and processing the values collected from the accelerometer, and on the other hand for correlating these values with angles measured by the gyroscope. The values from the accelerometer describe the acceleration exerted on the mobile phone, which is decomposed into a three-dimensional system associated with forward-backward, left-right, top-down motions, also known as roll, pitch and yaw – Fig. 1.

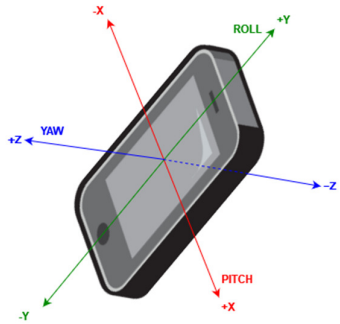

Fig. 1: The roll, pitch and yaw of a phone

The values obtained with the help of the gyroscope highlight the angle between the front of the phone and the magnetic North Pole. The displacement estimation service reads these values from the Kafka cluster and ensures the data integrity, verifying that the measurements made by the two sensors are recorded simultaneously and the length of the data sets corresponds. For each monitored time interval, an aggregate acceleration is determined as the difference between the root of the sum of the squares of the decomposed accelerations and the gravitational acceleration, as suggested in Xu et al. Once the aggregated acceleration has been computed, by simply graphing the values, the need for an intermediate stage of statistical processing is noticed, as the values obtained in this manner faithfully reflect the raw quiddity of the digital signals, being therefore strongly altered by digital noise. The hardware characteristics of the accelerometer, as well as the imperfect nature of the measurements that are heavily influenced by frictional forces with various surfaces and oscillations specific to human movement while the position of the phone varies simultaneously on the three components during a step, lead to the appearance of local extrema points in the graph that distort the representation and alter the result, as shown in Fig. 2.

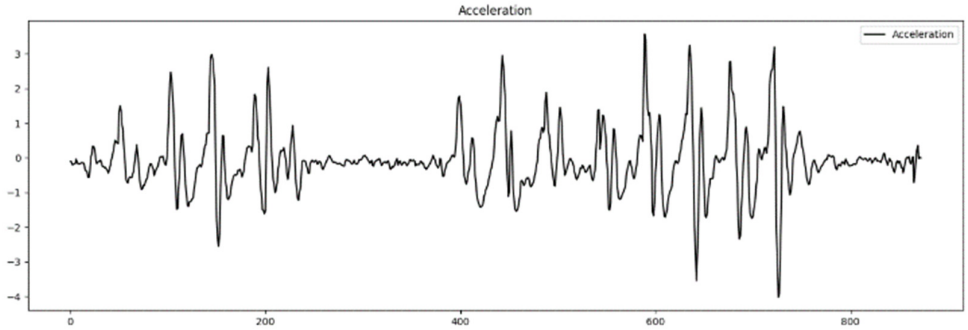

Fig. 2: Unfiltered acceleration values measured with phone's accelerometer

In an attempt to remove the noise and smooth the graphical representation, one tested solution is filtering using a simple moving average. Starting from a numerical series and a fixed size subset of it, usually the first n elements of the series, the first value of the simple moving average is obtained by calculating the arithmetic mean of the whole subset. In general, a reasonable size of this subset is chosen, so that the resulted average is representative for the measured values. In this case, the chosen size is 10. Subsequently, the subset is altered by forward translation, which involves excluding the first element from the set and including the next, then the average of the new range is computed. The process is repeated until the complete processing of the initial series values.

Simple moving averages are generally used in time series processing to smooth short-term fluctuations and highlight long-term trends or cycles. Areas that make extensive use of such instruments include financial analysis, in particular the estimation of stock market prices and traded volumes, the examination of the gross domestic product value, the unemployment rate and other macroeconomic time series. From a mathematical point of view, a moving average is a type of convolution and can therefore be used as a low-frequency filter in the processing phase of time series that describe measured values of signals.

Through its intrinsic characteristics, the simple moving average is able to correct the presence of invalid local extrema points, the result thus obtained being much more malleable in the perspective of further processing and more accurately

reflecting the dynamics of motion. However, the simple moving average can neither completely remove the statistical noise collected by the accelerometer when stationary, nor can it flatten all the measured pseudo-peaks, as can be seen from Fig. 3.

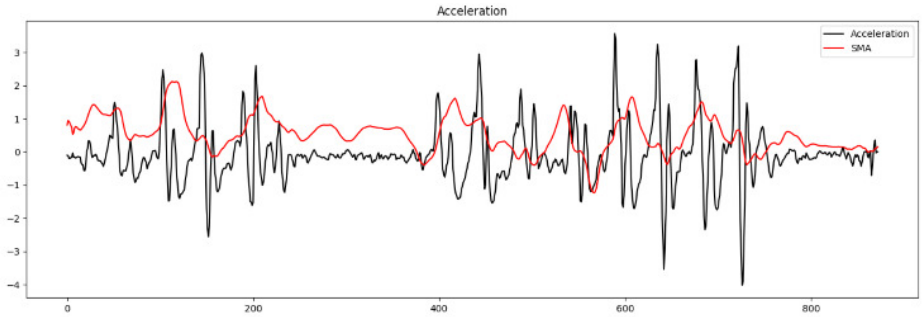

Fig. 3: Simple moving average (red) of the measured acceleration (black)

Given the smoothing of the graph, the next step would be to determine the local extrema points and apply a threshold filter, resulting in a set of points corresponding to the footsteps that the user performed while walking. This detail is relevant in the consideration of an empirical observation that outlines the fact that between successive motion intervals, separated by rest moments, the average values of the acceleration vary. In other words, the average acceleration monitored by the phone sensor is not constant over the motion intervals and therefore the transitions from motion to rest can project local extrema points that in the prospects of future processing represent invalid points that need filtered, but which cannot be excluded with a threshold filter, without eliminating values associated with valid extrema points, as well. Fig. 4 graphically represents the values recorded by the accelerometer in the context of a rectilinear motion, where the subject is walking in two successive intervals, separated by a stationary period. It is visible how the trend decreased between the monitored intervals and the same characteristics have been noticed also for short stops required for door openings or changes in navigation direction, when the subject turns to one side to enter a room that is not collinear with the previous path.

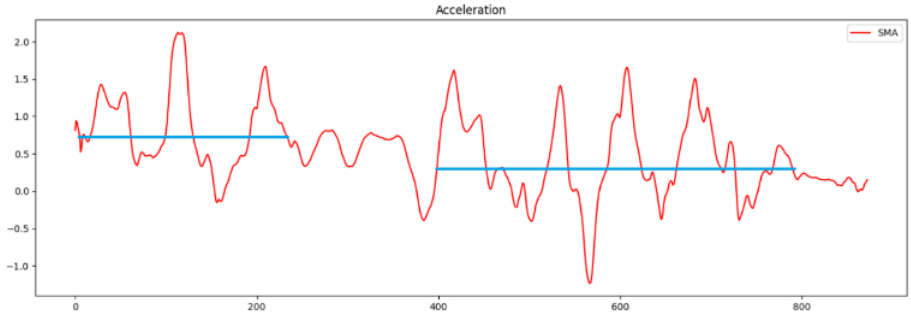

Fig. 4: Different trend values of acceleration in successive rectilinear motions separated by a stationary period

Consequently, the use of the simple moving average has been reconsidered and a triangular moving average has been opted for, as the second choice does not react as quickly in conditions of frequent variability. In the case of accelerometer signals, pseudo-peaks generated by measurement errors and digital noise, identified by the successive presence of two peaks of similar amplitudes in very short time intervals, largely double the number of oscillations, which impacts the result of a simple moving average. The triangular moving average represents the average of the averages for a given data set. In the first stage, the simple moving averages for a conveniently chosen window are calculated, and then, based on the obtained simple averages, a secondary average is similarly determined. Visually, a triangular moving average describes a graph whose evolution is constant and slow compared to a simple moving average, that forces such representations to remain in trend for a longer period of time, providing a more accurate picture of the studied phenomenon. The differences between the two are visible in Fig. 5.

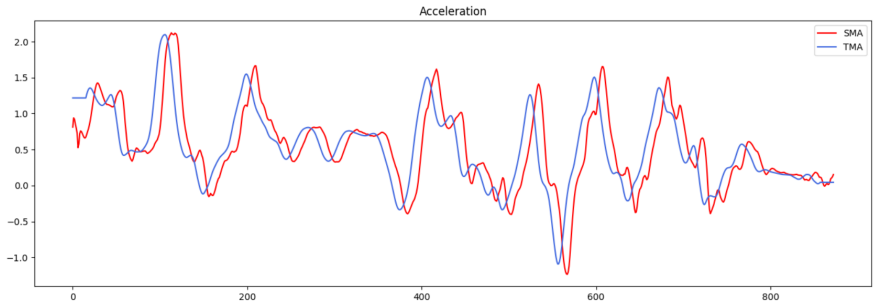

Fig. 5: Simple moving average (red) and triangular moving average (blue) of the measured acceleration

The main advantage offered by a triangular moving average is that of staying in trend for a longer period, which produces in terms of graphics processing a superior flattening of the secondary peaks, resulted from measurement errors. However, not all secondary peaks are flattened below a triangular moving average and the method also alters the amplitudes of the initial data set. Therefore, the use of a triangular moving average has been in turn reconsidered to the detriment of a Savitzky-Golay filter, described in Schafer (2011).

The algorithm proposed by Savitzky and Golay, as outlined by Ostertagová and Ostertag (2016), involves a digital filter that can be applied to a set of points in order to smooth the graph they describe, thus achieving superior accuracy, without distorting the general trend of the signal. To obtain this result, a convolution is used to try to match subsets of adjacent points with a low-grade polynomial, based on the least squares method. When the points are evenly spaced, a solution for the least squares equations can be identified as a set of convolution coefficients, which can then be applied to all other subsets, to obtain a continuous and uniform representation of the signal at all central points of each subset – Pandia et al. (2010).

However, a distortion of the initial signal following the convolution process is inevitable. From a polynomial degree higher than 3, when the values describing local extrema points are smoothed, the amplitude of the vertex will be reduced, and the median width of the graph portion will increase. Both the magnitude of the distortion and the improvement of the signal-to-noise ratio decrease with increasing polynomial degree, respectively increase with the size of the convolution function.

Although moving averages provide better digital noise reduction, they are unsuitable for smoothing functions that have curves described by point subsets. A quadratic function used as a filter is inappropriate for obtaining the derivative of a parabola with an inflection point, because a quadratic polynomial has no inflection points. The Savitzky-Golay filter can be explained in a few words as an effective interpolation in the case of univariate time series. From a graphical point of view, all variants represent techniques used for smoothing data series and it would be erroneous to assess one being better than the other, as their performance level is strongly dependent on the particularities of the data. Fig. 6 depicts a graphical representation of them in the current context.

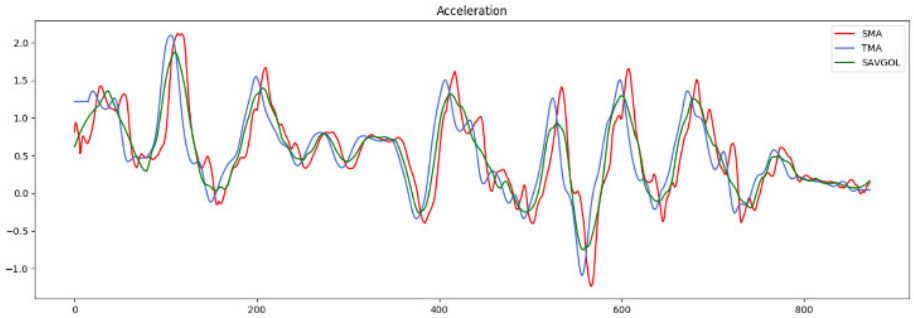

Fig. 6: Simple moving average (red), triangular moving average (blue) and Savitzky-Golay filter (green) of the measured acceleration

Because footsteps determination is strongly correlated with the aggregate acceleration, which is computed as a square root from the sum of the squares on the three components, from which the gravitational acceleration is subtracted, the application considers redundant movements as displacement, with associated graphical highlighting. Repetitive sequences of steps to the left and right cause oscillations of acceleration on the X component, which successively record positive and negative values. As the used calculation function is based on the square value of this record, the direction of travel is ignored, the value is always positive, and the algorithm assumes that the user is moving at a constant pace in a certain direction, a chart describing this case being detailed in Fig. 7.

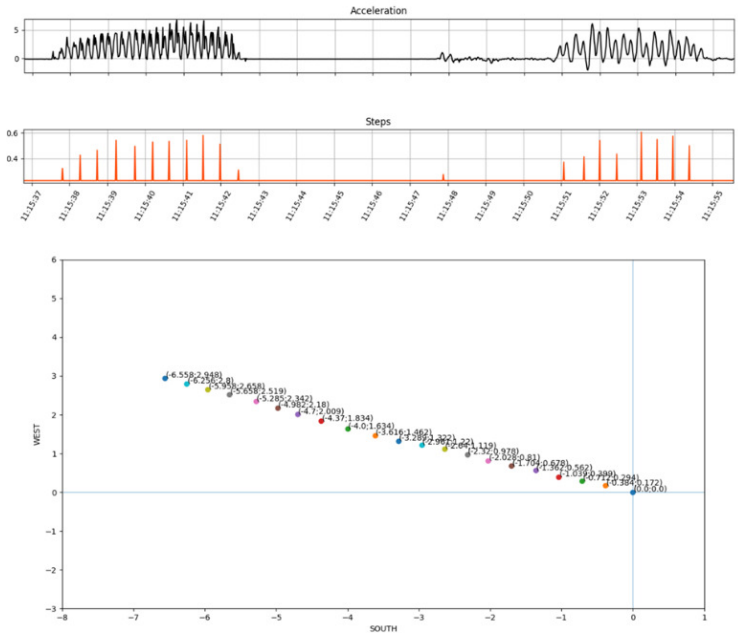

Fig. 7: Graphical representation of a linear left-right motion of the phone on a flat surface

Similarly, the same erroneous behaviour has been noticed for repetitive forward-backward navigation, this time the impact being on the Y coordinate. By analogy, climbing and descending the same step on a stair repeatedly will determine the distance calculation function to assume that the user is advancing to an upper floor of the building.

Following the reasoning described above, but introducing the orientation angle in the equation, it must also be considered the scenario in which the user rotates with the phone in an arc of a circle or even in a complete circle, sitting more or less in place. Such movements describe changes in the direction of travel or even turns, many of them inherent in the context of motions. However, rotating on the spot determines either positive or negative values, depending on the rotation direction, for acceleration on the X component. A correct behaviour of the displacement function should identify the moments when the user makes turns and not consider the data associated with these movements.

Experimental Results

These impediments identified in the process of concrete experiments led to transition from the aggregated approach proposed in Xu et al., in which the acceleration is perceived as a cumulation of values on the three components towards a solution that distinguishes between these values and makes informed decisions, taking into account the position of the phone and the behaviour of the user. Thus, depending on the values recorded by the accelerometer in the three-dimensional reference system, the displacement consideration is mainly assessed in relation to a single component. Specifically, if the user uses the phone perpendicular to the normal plane, the accelerations related to the Z component are the ones that determine the motion, while in the context of using the phone in a position parallel to the normal plane the Y or X component is the relevant one.

The strength of this approach consists of two distinct aspects. On the one hand, there is an isolation between the gravitational acceleration exerted on the phone naturally and the concrete acceleration the user impresses to the device

while walking. On the other hand, by eliminating the use of the squared components, an indication of the moving direction is kept during the measurements. From this point of view, not only can positive and negative values be seen at data set level that suggest depending on the position of the phone the direction of motion, but several generally valid assumptions can also be identified.

Some empirical observations during the tests:

- having the mobile phone in portrait mode, with the screen parallel to the floor and facing the ceiling and the top of the phone away from the subject, at rest, the acceleration values on the components are: X approximate 0, Y approximate -1, Z approximate -9.8
- having the mobile phone in portrait mode, with the screen parallel to the floor and facing the ceiling and with the top of the phone close to the subject, at rest, the acceleration values on the components are: X approximate 0, Y approximate 1, Z approximate -9.8
- having the mobile phone in landscape mode, with the screen parallel to the floor and facing the ceiling and the top of the phone oriented towards the right of the subject, at rest, the acceleration values on the components are: X approximate 1, Y approximate 0, Z approximate -9.8
- having the mobile phone in landscape mode, with the screen parallel to the floor and facing the ceiling and with the top of the phone oriented towards the left of the subject, at rest, the acceleration values on the components are: X approximate -1, Y approximate 0, Z approximate -9.8
- when moving in the forward direction, with the mobile phone in portrait mode, with the screen parallel to the floor, on Y component of the acceleration, before the first step there is a slight decrease in the acceleration value on this segment, followed by steep increases associated with each step, these increases exceeding in value the adjacent trend;
- when moving in the backward direction, with the mobile phone in portrait mode, with the screen parallel to the floor, on the Y component of the accelerator, before the first step there is a slight increase in the acceleration value of this segment, followed by sudden decreases associated with each step, these decreases being below the value of the adjacent trend – Fig. 8;

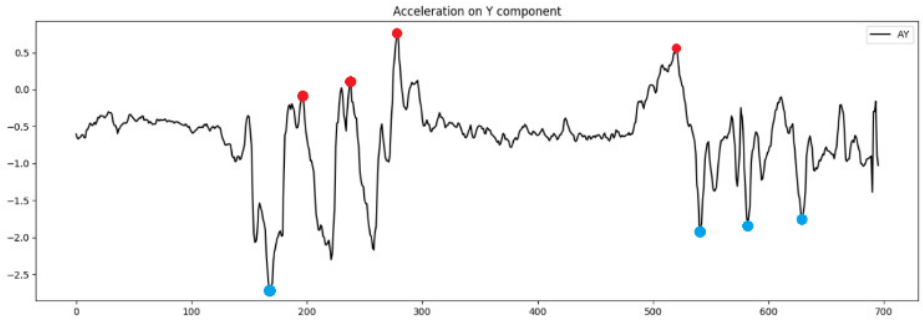

Fig. 8: Identified patterns in linear forward - backward motion

Identifying the aforementioned patterns in the graphical representation is a key aspect, as it helps understanding the way the information is collected from the sensor and provides a visual tool for identifying sequences of steps in either direction. Besides the positive/negative values the accelerometer collects, that are further stored in an unfiltered manner in the Kafka cluster, the graphical analysis module integrated in the solution represents an inspection mechanism that can validate the results. Currently, the proposed software solution integrates two distinct services that are accountable for interpreting raw data. On the one hand, there is a plotting module that portrays the information in convenient visual ways and on the other hand, there is the navigation module that can determine displacement.

Considering the previously mentioned data processing techniques and the strengths and weaknesses of each approach, the proposed architecture has adopted a Savitzky-Golay filter for noise reduction. Having three different streams of data, representing acceleration values on each axis, the filter eliminates the pseudo-peaks resulted from measurement errors, followed by a secondary threshold filtration that removes peaks which are located too close to a neighbour, as body mechanics brings some constraints that prevent consecutive steps in less than 0.4 seconds – Chen et al. (2015),

in a walking context. After the filtration process, the resulted data set is used to determine local extrema points corresponding to the subject's footsteps while navigating inside a building.

The developed application requires a QR code reading in the initial point of the mapping that contains details about the respective position relative to the entire building representation. Following this step, the user gives the consent for data collection and the application starts gathering information from the sensors. While navigating inside the venue, the sensors harvest data and send them in an asynchronous manner, in batches, to the server where the information is stored in predefined Kafka topics. Further, when a detailed representation of the mileage is requested from the webpage, the solution determines the original user's coordinates in the floor plan from the metadata written in the QR code, and then, incrementally, based on the identified local extrema points, calculates the displacement using the current position and the angle relative to the magnetic North Pole. This is a sequential process where the steps are determined one by one. The displacement is estimated using a linear mathematical model for estimating the length of a step depending on the height of the subject – Guest et al. (2017) and the step frequency. Precise estimation of each step is retrieved in a Cartesian system, using trigonometric functions to calculate the relative distances on the horizontal and vertical axes. Currently, the solution is capable of retrieving indoor location in a moment subsequent to the actual motion.

Fig. 9 shows the motion between two rooms located on the same level in a residential building.

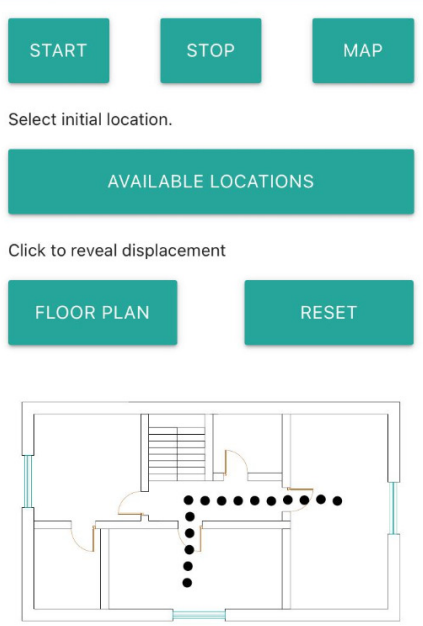

Fig. 9: Screen capture from the web interface of the navigation service

Conclusions

The proposed solution addresses several challenges that other studies mentioned in the related work section have not considered, providing an effective solution for indoor location in a one-story building context. The decomposed acceleration approach provides the necessary means for correctly estimating the movement direction depending on the values sign. A comprehensive filtration step flattens the measurement prominences and outlines a continuous, smooth graphical representation that is suitable for mathematical analysis. Local extrema points correspond to actual footsteps that can be represented on a bidimensional floor plan, computing precise coordinates using basic trigonometry and relative angles between the gyroscope recordings and the magnetic North Pole. Correlated with a magnetometer, these principles emulate the behaviour inside an attitude and heading reference system capable of correctly assessing the current position of an object over time.

The architectural strategies applied to this project offer two major advantages over other projects mentioned in this paper. On the one hand, the segregation of concerns allows the complex, laborious tasks to run on a different device, saving energy and resources on users' smartphones. Compared to native applications, the proposed solution does not

require any storage space on the actual device, it does not store any temporary data, others than those of the browser when the page is loaded. On the other hand, the approach proposed in the hereby paper relies on sensors that already work in the background for monitoring device rotations or falls and collects information from them in an asynchronous manner, using web workers that run on separate threads, without interfering with the main user interface thread. Moreover, the information is collected and sent to the Kafka cluster in batches, drastically reducing the number of message exchanges between the client and the server. Therefore, the energy consumption is diminished, avoiding a battery drain that would otherwise impact the user experience.

The system has been successfully tested in two distinct reference buildings providing accuracy levels under a meter for various scenarios that include linear motion, turns over sharp, straight or obtuse angles, walking backwards or in-place rotations. Last, but not least, this infrastructure free software solution can easily be extended to different structures grace to its loosely coupled design and further improvements can include routing capabilities or real-time indoor location.

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Instruments of Competition in Industrial Processing Enterprises

Sebastian NAROJCZYK, PhD
Department of Corporate Resources Management, Institute of Management
The Poznań University of Economics and Business, Poland
sebastian.narojczyk@ue.poznan.pl

Bartosz MARCINKOWSKI, PhD
Department of Corporate Resources Management, Institute of Management
The Poznań University of Economics and Business, Poland
bartosz.marcinkowski@ue.poznan.pl

Abstract

The aim of this article is to examine the scope of instruments of competition used in industrial processing enterprises. The article presents and describes the theoretical review of the essence of competitiveness and instruments of competition. However, the empirical part was based on surveys carried out in 162 industrial processing enterprises.

Keywords: Enterprise competitiveness, instruments of competition, industrial processing enterprises.

Introduction

Competition or competitiveness are indispensable elements of modern free market economy. Competition occurs between at least two business entities and is understood as actions forced by the desire to succeed and overtake other rivals in pursuit of the same or similar goal (Maniak, 2005, p. 67). However, due to the impact of the global economy, the current competitive conditions are constantly and dynamically changing. Companies have to deal with the increase in the prices of materials and services, the specific requirements of customers, and even the shortage of unskilled or non-specialized staff (Sobolewski and Marcinkowski, 2017, p. 143). As a result, entrepreneurs must be constantly active in standing out from other rivals. Therefore, companies wishing to build or improve their competitiveness should precisely define the scope of applied competition instruments that directly affect the market. It is worth adding that this process should have been continuous due to the constantly evolving environment in which the company operates.

The purpose of this article is to examine the scope of use of classified competition instruments that are used in conducting direct competition between enterprises. The first part of this article presents only an outline of theoretical research regarding the essence of competitiveness and the concept of competition instruments, while the greater part of the article is devoted to empirical research conducted on a sample of 162 industrial processing enterprises, using the in-depth survey method.

The essence of enterprise competitiveness

Information and knowledge have become the basis for today's economy, exerting a critical impact on competitiveness, production nad productivity (Castells, 2001). As a result, the level of technological development has affected how people communicate and interact (Liberato *et al.*, 2018) and finally how people seek products, services and information (Abreu *et al.*, 2017).

Competitiveness is a key category for every enterprise, as it demonstrates the power regulating market economy mechanisms (Wolak-Tuzimek, 2017, p. 695). Ultimately, this leads to competition between others with similar businesses on the market.

When reviewing the definition of the concept, you will come across two basic approaches to enterprise competitiveness: static and dynamic (Olszewska and Piwoni-Krzeszowska, 2004, p. 508). According to static enterprise competitiveness, competitiveness is a state that illustrates the capabilities of a given enterprise relative to

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its rivals. In the dynamic approach competitiveness is compared to the ability to use its own potential and external conditions, as well as to create and improve the current competitive position. However, it is worth noting that most researchers adopt the dynamic approach.

Enterprise competitiveness is a complex and multi-faceted concept. This is confirmed by the review of the literature on the definition of competitiveness presented in Table 1, which has been presented by various authors.

Table 1: Review of the definition of competitiveness of enterprises according to various authors

Author	Definition of enterprise competitiveness
J. Burnewicz (1993)	Ability to stand up to competition (Burnewicz, 1993)
G. Hamel and C.K. Prahalad (1993)	The ability to win (thanks to high quality products) first place in the opinion of customers (Hamel and Prahalad, 1993).
M. Lubiński (1995)	Ability to sustain sustainability in the long term and striving to maintain and increase market share (Lubiński, 1995).
D. Faulkner and C. Bowman (1996)	The company's ability to become a leader in the industry (Faulkner, Bowman and Albigowski, 1996).
M. Gorynia (2002)	Current or future competitive position determined by the company's ability to compete (Gorynia, 2002).
T. Wattanapruttipaisan (2002)	Ability to obtain greater efficiency in production (Wattanapruttipaisan, 2002).
L. Dwyer and Ch. Kim (2003)	The ability to constantly provide added value to the company's stakeholders (Dwyer and Kim, 2003).
M.J. Stankiewicz (2005)	Ability to efficiently (effectively), profitably and economically achieve goals on the competitive arena market (Stankiewicz, 2005).
J.E. Lombana (2006)	Maintaining a dominant market position and being "profitable" (Lombana, 2006).

Source: Based on own study.

The overview of the definitions of enterprise competitiveness presented allows to draw the conclusion that this concept should undoubtedly be treated as a developed feature of the entity. It is also worth noting that most of the cited definitions have a common aspect. They define competitiveness as the company's ability to "be" better than other market rivals (Chikán, 2008, p. 25). It's worth mentioning that this definition is also known and used by international practitioners in the field (Lee and Karpova, 2018).

Achieving competitiveness requires from the companies continuing adaptation to changing economic and social condition and norms (Markus and Rideg, 2020). Therefore, competitiveness should be treated as a concept that evaluates market participants from the point of view of the results obtained and the ability to achieve benefits in the future (Bossak and Bieńkowski, 2004, p. 19). It should also be added that competitiveness applies to all participants competing with each other on the market, both those who achieve success and those without success (Grzebyk and Kryński, 2011, p. 111).

Instruments of competing as part of the competitiveness of enterprises

The increase of interest in the competitiveness of enterprises resulted in the need to identify tools that may have a direct impact on it. These factors have been classified as instruments of competition because their proper use allows obtaining a competitive advantage and, as a result, allows to develop an appropriate market position. This concept is generally used in two areas of business operations:

1. In the sphere of resources - where they are used to acquire new resources, and then transform them into strategic resources.
2. On the target market - where they create an attractive market offer and make the buyer feel that he/she is buying a product that will fully meet their needs (Grzebyk and Kryński, 2011, p. 111).

According to Roszyk-Kowalska, instruments should be defined as tools and methods of acquiring buyers on terms that enable the company to achieve its goals (Gorzelany-Dziadkowiec, 2014, p. 33). However, Grabska emphasizes that competing instruments are significant differences for the client covering the company's offer (2006).

Stankiewicz adds that these are all conscious created funds that are used to attract customers (Stankiewicz, 2005, p. 242).

Continuing the considerations in this field, one may come to the conclusion that the discussed dimension of the company's competitiveness is a function of the nature of the company's offer itself. On the other hand, the nature of the offer is most often conditioned by the market arena, i.e. the area of the company's impact on the environment. In the literature on the subject, three market arenas in which instruments of competition can be used can be distinguished (Stankiewicz, 2005, pp. 243–251):

1. Arena "at the entrance" - refers to creating conditions that will promote the creation of new values in the context of the resources which the enterprise already owns. The company acts here as a buyer, and the purpose of using instruments in this sphere is to achieve maximum efficiency of acquired resources. On the other hand, a characteristic feature of the "at the entrance" instruments is that they only generate costs and indirectly affect the value of the enterprise.
2. The "at the exit" arena - includes activities confirming the value of the offer created by the company. The company acts here as a supplier of a product or service. The main purpose of using instruments within this sphere is to maximize sales revenue and make buyers aware of the value of the product offered.
3. The company image arena - in this sphere, the enterprise itself is a product, and its main goal is to create the most favorable image in future partners, investors and cooperators, which will allow them to "sell themselves" in the future.

A common feature of all competing instruments is the fact that they all have a similar role. Well, the main purpose of their use is primarily to inform about the product. In addition, the basic task of any competing instrument is to convince as many potential buyers as possible that the product or service is better than the one offered by the competition.

To sum up, the discussed dimension should be treated as a direct tool with which one can influence the competitiveness of the enterprise. In addition, competing instruments should contribute to the acceptance of the offer by the recipients, offering them added value. In all market arenas listed, only the instruments used "at the exit" meet the above condition. This is due to their direct contact with buyers and the impact on the amount of revenue generated. It should be emphasized, however, that the other arenas are no less important because they include activities related to acquiring resources and creating conditions for future functioning. Proper management of competition instruments is often one of the basic sources of gaining competitive advantage. In addition, the more complex the tool, the greater its importance from the perspective of obtaining the desired competitive position.

Research Method

The subjective scope of the article covered a specific group of enterprises. Based on literature sources and criteria used in business practice, it was decided that the entities that will be included in the study will be industrial processing companies that conduct production activities. It should be mentioned that these companies are a typical example of the Porter's Value Chain (Porter, 1985). Thanks to this, it is possible to analyze competition instruments according to the areas of impact proposed by Stankiewicz (2005).

Studying the instruments of competition requires determining their significance and long-term impact. Only experience that can be acquired in the course of running a business will allow entrepreneurs to form an opinion on the instruments and their impact on their functioning. Based on this assumption, entities that had been operating on the market for less than 3 years were therefore excluded from the research. It was considered that the period of 3 years is sufficient because it allows to assess which tools of competition used are more or less effective. The research was carried out in several stages and empirical research was carried out in the period from November 2017 to January 2018. The questionnaire was sent to 400 companies operating on the Polish market, with 216 sending the forms back, of which 162 were admitted for further analysis. The remaining forms were rejected as non-compliant or incomplete. The detailed characteristics of the sample are presented in Table 1.
The process of processing empirical data was controlled. The collected empirical material was verified, reduced, and then processed to alphanumeric form using specialized software. For this purpose, the statistical package Statsoft Statistica 12 and, as an auxiliary, Microsoft Excel spreadsheet were used.

Table 2: Characteristics of the enterprises according to the adopted criteria

No.	Characteristic	No. of indications N=162	Share (in %)
	Enterprises		
1.	Small	71	45.68
2.	Medium	41	25.31
3.	Big	47	29.01
	Year of foundation		
1.	Until 1990	52	32.10
2.	1991-2000	64	39.51
3.	2001-2010	27	16.67
4.	After 2010	19	11.72
	Market		
1.	Local market	19	11.72
2.	Regional market	12	7.41
3.	Domestic market	27	16.67
4.	International market	82	50.62
5.	Global market	22	13.58

Source: own study.

Instruments of competing in industrial processing enterprises

The formulated strategy of competing is realized through the creation and application of appropriate competition instruments. These tools must be easily recognizable and quickly identified by consumers. Therefore, competition instruments affect the value of the company's offer and are consciously created means of achieving market goals contained in the adopted competition strategy.

Based on critical studies of the subject literature and opinions and comments obtained during the pilot studies, a number of competition instruments were identified. During the analysis of their cognitive load, classified variables were placed into groups according to the following areas of impact: quality, price, support/service, information. A detailed presentation is shown in Table 2.

Table 3: Instruments of competing by areas of impact

Quality	Price	Support / Service	Information
Quality of products / services offered	Terms of payment	Qualifications and experience of employees	Company image
Flexibility to adapt to customer requirements	Price	Geographical scope of activity	References
Assortment breadth	The benefits of the economy of scale	Terms and warranty period	Industry connections
Product Brand	Cost level	Efficient distribution channels	Promotion methods
Innovation		The scope of after-sales services provided	Advertisement
Having more modern technology		The scope of pre-sale services provided	
Own scientific and research base			

Source: Based on own study: (Stankiewicz, 2005, pp. 242–249); (Juchniewicz, 2014, p. 112).

Next, during research, the respondents were asked to evaluate individual instruments of competition, taking the key rival as their main reference point[1]. Using the 5-point Likert scale, entrepreneurs could assess the tools used, giving

[1] The key rival was the company that directly competes for a common customer target group.

them the following rank: 1 meant very poor rating, 2 – poor rating, 3 – average rating, 4 – good rating and 5 - very good rating. The distribution of individual answers is presented in Figure 1.

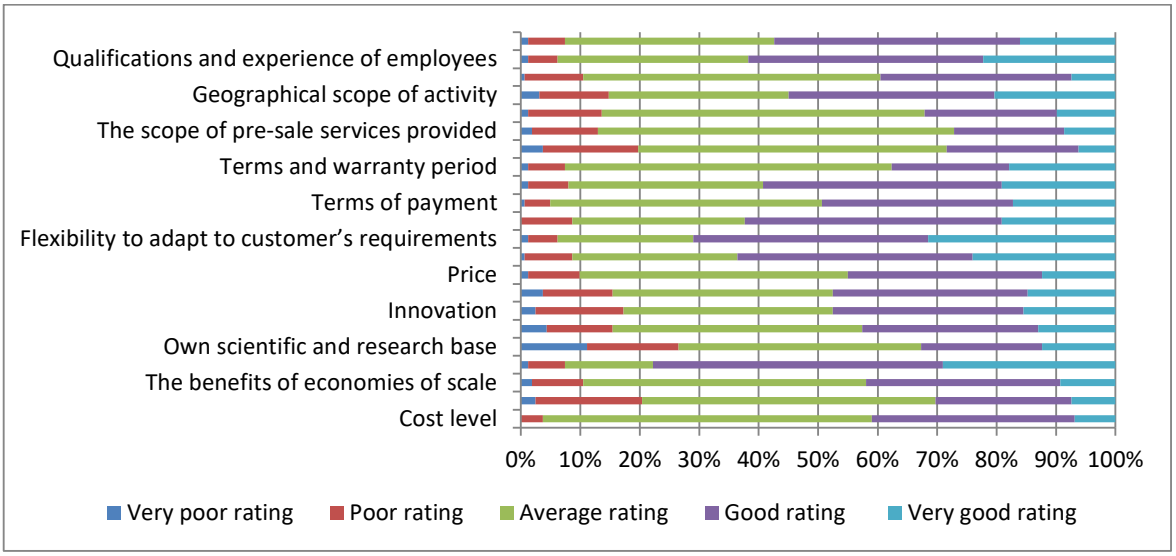

Figure 1: Distribution of answers regarding the assessment of competition instruments of the analyzed sample

Source: own study based on the results of empirical research.

In the next stage of the study, the empirical material obtained was ranked according to the significance factor R, which was the arithmetic mean of the ratings in individual categories. This made it possible to rank the variables that determine the competition instruments of industrial processing enterprises. They were presented both in general arrangement and according to the adopted enterprise size criterion. Detailed data is presented in Table 4.

Based on the obtained results, it should be noted that for the entire population, the average scores of the specified instruments of competition fluctuated within the range of <3.07; 3.98>. However, standard deviations ranged from 0.70 to 1.14. Thus, the distribution of responses on the scale used was moderately varied, which indicates relatively unanimous responses of the respondents in this matter.

The surveyed industrial processing enterprises in Poland rated the instruments of competition related to the quality of offered products / services and the flexibility of adapting to the recipients' requirements the highest. The results of empirical research confirm that entities engaging in competition on the market focus primarily on offering products with better properties than the products of competitors, while trying to adapt them to individual buyers.

Table 4: Ranking of competing instruments for the entire population and by enterprise size criterion

The instrument of competition	Average (N=162)		Small N=74	Medium N=41	Large N=47
	R	OS	R	R	R
Quality of products / services offered	3,98	0,89	3,89	4,00	4,11
Flexibility to adapt to customer requirements	3,95	0,92	3,84	3,95	4,13
Assortment breadth	3,78	0,92	3,54	3,85	4,11
Qualifications and experience of employees	3,77	0,90	3,74	3,56	3,98

The instrument of competition	Average (N=162)		Small N=74	Medium N=41	Large N=47
	R	OS	R	R	R
Company image	3,73	0,87	3,68	3,68	3,85
Product Brand	3,69	0,90	3,53	3,73	3,91
References	3,65	0,87	3,64	3,54	3,77
Terms of payment	3,60	0,84	3,69	3,44	3,62
Geographical scope of activity	3,57	1,04	3,27	3,61	4,02
Terms and warranty period	3,47	0,90	3,30	3,44	3,77
Price	3,46	0,86	3,55	3,32	3,45
Innovation	3,43	1,00	3,15	3,46	3,85
Having more modern technology	3,43	1,00	3,18	3,44	3,83
Cost level	3,43	0,70	3,32	3,39	3,62
The benefits of economies of scale	3,39	0,84	3,16	3,46	3,68
Efficient distribution channels	3,36	0,99	3,03	3,56	3,70
Industry connections	3,36	0,79	3,24	3,39	3,51
The scope of after-sales services provided	3,27	0,85	3,19	3,12	3,53
The scope of pre-sale services provided	3,21	0,82	3,16	3,05	3,43
Promotion methods	3,15	0,89	3,01	3,22	3,30
Advertisement	3,11	0,88	2,93	3,12	3,38
Own scientific and research base	3,07	1,14	2,86	2,98	3,49

Legend: R - significance factor, OS - standard deviation.

Source: own study based on the results of empirical research.

The results of the conducted research clearly show that the assortment breadth is also highly rated, especially in the group of large industrial processing enterprises. The full assortment gives greater sale opportunities and reduces average transport costs for combined deliveries. In addition, it allows companies to offer buyers complete sets of products or services with full equipment. The appropriate range of products was rated lowest in small entities. This may be due to certain conditions that enterprises must meet to maintain product / service diversity, i.e. the use of different production and sales technologies, storage space, etc.

Instruments related to having experienced and qualified employees were also highly rated. Therefore, it should be concluded that an employee is becoming increasingly important not only in the process of creating competences, but is also an important tool for acquiring potential buyers. In addition, for this instrument, the scope of customer service which is connected to the competence of employees. A high range of manufactured products or services requires comprehensive service, especially maintaining its appropriate standard.

The company's image is also an important instrument of competition that was highly rated by respondents. Products and services offered by companies of good public opinion often enjoy a good reputation among consumers. Nevertheless, current image creation is a multi-faceted and extremely complex process. Enterprises are not evaluated solely from the perspective of production or service activities. Aspects such as the company's impact on the environment, charity activities and involvement in social / sports activities are also taken into account.

All in all, it is worth pointing out the factors that were the rated the lowest, i.e. methods of promotion, advertising and own scientific and research facilities. Therefore, compliance with the results presented in subsection 5.1 of this dissertation can be seen. Respondents, who rated areas of competitive potential related to R&D and marketing, also rated relatively low instruments of competition that are directly related to them.

The low rating of the scope of pre-sales and after-sales services is particularly surprising. It is emphasized that these instruments are the foundation for building customer relationships. Therefore, the low ratings of respondents are puzzling, indicating that entrepreneurs from the industrial processing sector are not trying to distinguish the scope of these competition tools. The reason for this phenomenon may be the fact that both pre-sales and after-sales services often do not generate additional profit for the company.

Turning to a detailed analysis of empirical data, taking into account the criterion of the size of the enterprise, it can be concluded that large entities usually rated the instruments of competition higher, compared to other enterprises participating in the survey. The exception to this rule are: payment terms and price, because it was the small enterprises that had the highest significance factor among the listed ones. This means that these entities mainly focus on tools which primarily allow them to offer lower prices than larger competitors. In addition, in the case of payment terms, respondents representing small enterprises, during in-depth interviews, explained their higher ratings by having a wide range of options for paying for products / services. They emphasized that they use attractive forms of credit, extend payment periods or accept many payment methods, e.g. internet, mobile, e-wallets, etc.

Conclusion

To sum up, it should be said that modern enterprises, operating in extremely dynamic market environment conditions, should place particular emphasis on the selection and scope of instruments of competition used. Undoubtedly, competition instruments understood as tools, methods or means to acquire customers are the basis by which business entities can consciously build, maintain and strengthen their competitiveness. Based on empirical research, it appears that the surveyed entities rated competition instruments, which are related to the quality of products / services offered, flexibility in adapting to the requirements of recipients and assortment breadth the highest. Therefore, industrial processing enterprises should base their strategy of direct competition on the sale of goods and services which are better in quality, however the offer should be diversified, e.g. by complementary or substitutive elements. Entrepreneurs should also take into account the possibility of adapting to the needs of customers, e.g. by giving the product / service individual features. In the respondents' opinion, competition instruments related to promotion methods, advertising and their own scientific and research facilities were rated the lowest. It is worth noting that these practices are associated with a high risk of return on investment and are characterized by the difficulty of measuring the profit that may be generated in the future. Therefore, it should be emphasized that further, in-depth research in the field of competition instruments seems necessary and that research should be published in an accessible form for readers.

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Customs Preferences of Territories with A Special Economic Status in the Asia-Pacific Region

Olga SINENKO
Far Eastern Federal University, Vladivostok, Russia
sinenko.olga@gmail.com

Igor MAYBUROV
Ural Federal University, Ekaterinburg, Russia
mayburov.home@gmail.com

Anna SASHCHENKO
Far Eastern Federal University, Vladivostok, Russia
sashchenko8@yandex.ru

Abstract

The article presents a study of preferential customs treatment within special economic zones in the Asia-Pacific. The study aims to analyze customs incentives by type of special economic zones in the Asia-Pacific. The subject of the study is special economic zones in the Asia-Pacific region. The article presents a systematization of customs incentives within special economic zones in the Asia-Pacific. The authors analyze the formats and conditions of the provision of customs incentives in each type of special economic zones in the Asia-Pacific. The results are presented of a study into the practice of the application of preferential customs treatment within special economic zones in Russia. The authors show that flexible and rapidly developing special economic zones are the perfect potential growth areas thanks to tax and customs concessions and streamlined customs clearance procedures.

Keywords: Special Economic Zones, Asia-Pacific, Preferential Customs Treatment.

Introduction

One of the key trends in the regulation of special economic zones is the introduction of trade rules that establish a system of tariffs on imports and envisage a set of non-tariff requirements and administrative procedures applicable to both imports and exports. Tenants of SEZs are often exempt completely or partially from customs duties and are entitled to benefits offered by the customs-free zone regime. The application of specific formы of preferential customs treatment depends on the objectives of the special economic zone, such as promoting foreign direct investment, boosting exports, or earning foreign currency. In retrospect, however, the performance of some zones leaves mixed impressions. This makes it necessary to examine the practice of preferential customs treatment within special economic zones, constituting a relevant research problem. The value of the study lies in the fact that of 127 countries surveyed by UNCTAD 98 have SEZ laws stipulating fiscal incentives, including elimination or reduction customs tariffs; and 94 have SEZ laws that provide for a special customs regime, which makes preferential customs treatment the most popular tool for attracting investment in special economic zones, (UNCTAD, 2019). The study aims to analyze customs incentives by type of special economic zones in the Asia-Pacific. The subject of the study is special economic zones in the Asia-Pacific region.

Methodology

The key research methods are analysis, synthesis, and comparative analysis. An analysis was performed of special economic zones specializing in foreign trade. A classification was developed of the types of preferential customs treatment within special economic zones in the Asia-Pacific and their functional focus was identified on the basis of the core qualifying features. An analysis was conducted of preferential customs treatment by type of special economic zones in the Asia-Pacific and the practice of using preferential customs treatment within special economic zones in Russia was studied. As a result of the analysis, the key components of each type of preferential customs treatment were identified. The analysis utilized data from the official websites of special economic zones based in the Asia-

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Pacific and academic journals. The analysis was done by type of special economic zone and by main type of preferential customs treatment available in the zones.

Research

1. Special economic zones in the Asia-Pacific: focus on international trade. Special economic zones (SEZs) play a key role in promoting international trade and business. The concept of free ports dates back to centuries ago. Modern free trade zones that are adjacent to seaports, airports or along border corridors appeared in the 1960s. More of them popped up in the 1980s with the spread of export-oriented industrial development across the world, especially in Asia, as well as the increasing reliance of global manufacturers on offshore production. Among the countries that pioneered the establishment of special economic zones were the Chinese province of Taiwan (1966), Singapore (1969), and South Korea (1970). (Mayburov, I., Sinenko, O., 2017)

The acceleration of international production in the late 1990s and 2000s and the rapid growth of global value chains generated another wave of new SEZs, with many developing countries across all regions aiming to emulate the early success stories of SEZ projects in Asia. The global financial crisis and the resulting dip in global trade only marginally slowed the establishment of new SEZs. The current deceleration in international production and globalization is having a positive effect, as governments are responding to greater competition for mobile industrial activity with more SEZs and new types of SEZs. There are around 5,400 SEZs today, more than 1,000 of which have been established in the past five years. At least 500 more zones (approximately 10% of the current total) have been announced and are expected to open in the coming years. Most SEZs derive from the concept of free zones (also called free trade zones), the defining characteristic of which is a separate customs area. Free zones tend to be located next to seaports, airports or border corridors, their tenants mostly being firms that provide warehousing, logistics and services. Today, SEZs are used by more than 140 countries, three quarters of developing countries, and nearly all transition economies. In most developed countries, the free zone model has remained close to the original concept (Table 1).

Although free trade zones mostly providing logistics and warehousing are predominately clustered in developed countries, the majority of the existing and planned zones in developing economies are multi-activity zones that are designed to promote export and import transactions and to attract investment in diversified production projects. Such zones are often adjacent to industrial parks and provide easy access to international markets for their tenants.

Table 1: Distribution of special economic zones by region or regional group (percentage points), 2019

Region or regional group	SEZ with focus on logistics (free trade zones)	Multi-activity zones	Sector-specialized zones	SEZs with focus on innovation
Globally	**8**	**62**	**25**	**5**
Developed economies	91	8	1	0
Africa	1	89	10	0
Asia	2	65	26	7
China	*1*	*92*	*1*	*6*
Latin America and the Caribbean	9	77	13	1
Transition economies	3	35	59	5

As of 2019, over 85% of SEZs were found in the Asia-Pacific: China (2,543, including 522 national-level SEZs; 1,991 province-level ones), the Philippines (528), Latin American countries (486, including 73 in the Dominican Republic, 52 in Nicaragua, 49 in Costa Rica, 39 in Colombia, 39 in Honduras), the USA (262), the Russian Federation (130), Thailand (74), South Korea (47), Malaysia (45), Cambodia (31) etc. (UNCTAD-OECD-WTO, 2020).

2. Classification of special economic zones with the focus on international trade. Despite the wide variety of special economic zones, there is no universal classification of them in global practice. Moreover, SEZ-related terminology varies from country to country, too. The World Bank differentiates between six main types of special economic zones, including those that focus on international trade and, therefore, have special customs procedures in place (Fig. 1), for example, (Chen, X., 2019).

-*free trade zones* are zones with functions for storage, sorting and minimum processing of imported goods. Free trade zones are usually established in the vicinity of customs checkpoints, seaports and airports. Free trade zones encompass foreign-trade zones, duty free zones, offshore zones, free cities, free transit zones, free customs zones (bonded warehouses, free port) etc. Free trade zones are most common in countries whose geographic location is conducive to active foreign trade policy, e.g., the United States, China, Japan etc.

- *export-oriented manufacturing zones* are industrial estates the main objective of which is the sale of goods abroad. The category includes industrial/ duty-free export-oriented manufacturing zones, free export zones, joint venture SEZs etc. Export-oriented manufacturing zones are common in developing countries, e.g., Myanmar, Vietnam, Colombia, Brazil, etc.

- *free ports (porto franco)* are special economic zones that are adjacent to a port or a port area where duty-free import policies and a mix of tax concessions are available. The examples include the free ports of Singapore, Hong Kong, Gibraltar, Russia, and China.

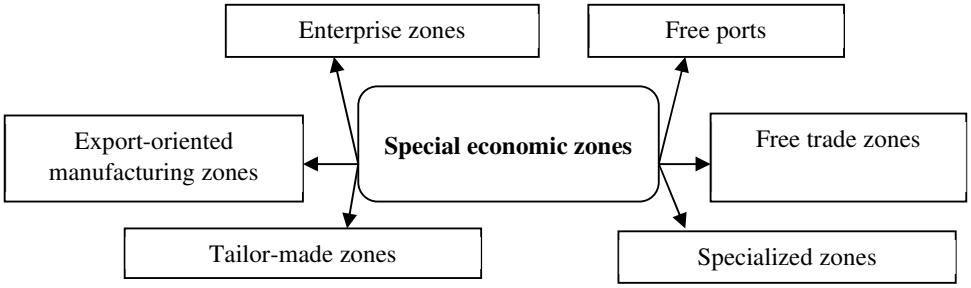

Fig.1: World Bank's typology of special economic zones

China that accounts for the largest number of special economic zones both in the Asia-Pacific and globally (47.2% of all SEZs in the world) has been actively experimenting with new types of special economic zones. Five types of national-level SEZs are formally identified in China (Chen, X.,2019):

1. Economic and Technological Development Zones (ETDZ);
2. High-Tech Industrial Development Zones (HIDZ);
3. Special Customs Supervision Zones (SCSZ);
4. Border/cross-border economic cooperation zone (BECZ);
5. Other types of zones (specialized ones etc.).

Special customs supervision zones (SCSZ) are a type of economic development zone in China, which were first set up in the 1990s to attract and promote foreign trade. As of 2019, there were 135 SCSZs in China (5.9% of all SEZs in the world) that are split into six classes of special customs zones, which is a record for the Asia-Pacific (Fig. 2)

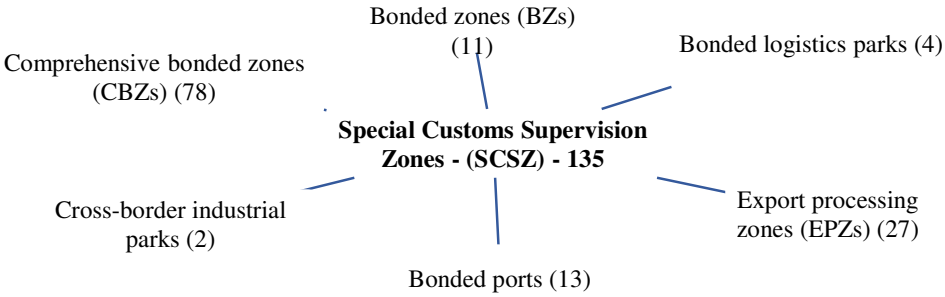

Fig.2: Special customs Supervision Zones in PRC, 2019

Source: Zoey Ye Zhang (2019)

As proposed in the Plan to Speed Up the Integration and Optimization of SCSZs Scheme issued in 2015, all existing SCSZs will be integrated into two types in the future: Bonded Zones (BZs) and Comprehensive Bonded Zones (CBZs). The transformation started in 2017, delivering 140 SCSZs and 96 CBZs by 2019. One secret of the popularity

of CBZs is that they integrate the functions of other SCSZs and offer the widest possible range of services and the most convenient customs clearance procedures. Today, China is promoting CBZs as the most advanced form of SCSZs. In Shanghai, for example, there are 10 SCSZs that have received approval from the State Council on their integration and optimization plans to become CBZs.

Special border and cross-border economic zones are a widely spread type of SEZs in the Asia-Pacific. The geographic advantage of border economic zones is their proximity to targeted foreign investment and foreign markets, especially for specialized export-processing zones. The first such zones were set up in the northern border areas of Tijuana, in Baja California and Ciudad Juarez, in Chihuahua in the 1960s. (Sinenko, O., Mayburov, I., 2019).

The US manufacturers built assembly plants in a 12-mile-wide free zone starting at the border and exported their products to the home country of their companies, which offered special incentives provided by Mexico, lower labor costs and proximity to their markets in America. Deepening regional integration has also accelerated the development of border SEZs. Regional development initiatives and cooperation programs encouraged the establishment of SEZs along regional economic corridors. For example, that was the effect of the development of the Greater Mekong Subregion corridors, a regional economic cooperation program involving Cambodia, China, the Lao People's Democratic Republic, Myanmar, Thailand, and Vietnam (Fig. 3).

Bavet - Cambodia		**Moc Bai** - Viet Nam
Chiang Kong - Thailand		**Houaysai** – Laos (Lao People's Democratic Republic)
Dong Kralor -Cambodia		**Khong Phapeng** – Laos
Koh Kong - Cambodia		**Trat/Souy Cheng** – Thailand
Lao Bao - Viet Nam		**Dansavanh** – Laos
Mohan -China		**Boten** – Laos
Myawaddy - Myanmar	⇆	**Mae Sot** – Thailand
Pak Nhai - Cambodia		**Pleiku** - Viet Nam
Poipet - Cambodia		**Aranyaprathet**- Thailand
Savan–Seno - Laos		**Mukdahan** – Thailand
Tachileik- Myanmar		**Mae Sai** – Thailand
Thadeua - Laos		**Nong Khai** – Thailand
Vang Tao - Laos		**Chong Mek** – Thailand

Fig. 3: Border zones within the Greater Mekong Subregion economic corridors, 2018.

Some of the zones are of traditional type, for example, in 2016, most firms operating in the Mae Sot SEZ in Thailand were Thai firms producing goods for the Thai market but employing day labor from Myanmarю Other zones, for instance, a SEZ on the China-Laos border, on the opposite, sought to merge two border zones into one (Mohan - China- Boten – Laos). The Mohan SEZ was established on the Chinese side in 2001 as border trade zones.

The Boten Zone on the Lao side as developed in 2003 as a tourism and trade center. The development plan of the cross-border zone was approved in 2015 by the two governments, and the construction is still under way (ASEAN Secretariat and UNCTAD, 2017).

3. Preferential customs treatment within special economic zones in the Asia-Pacific. One of the key regulatory trends in special economic zones is the introduction of trade rules that establish a system of tariffs on imports and envisage a set of non-tariff requirements and administrative procedures applicable to both imports and exports. SEZ tenants are often partially or fully exempt from customs duties and entitled to benefits offered by the customs-free regime (Fig. 4), which means facilitated simplified traded procedures, for example, accelerated customs clearance or bonded warehousing.

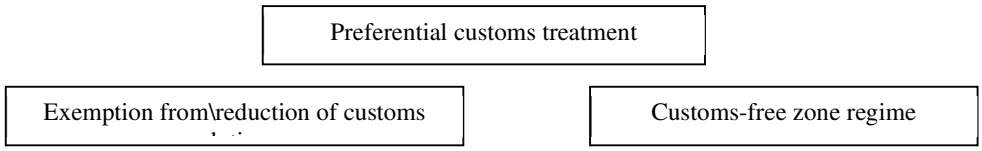

Fig.4: Preferential customs treatment within special economic zones

Customs clearance procedures within customs-free zones is a peculiar model of mutually beneficial cooperation between companies involved in international trade and the state. The advantages of the procedure include customs and tax incentives for businesses and investment, including foreign investment for the state. Free-zone procedures can be available in various types of special economic zones with the exception of some specialized zones, for example, tourism development zones in Russia.

Of the 127 countries surveyed by UNCTAD, 98 have SEZ laws stipulating fiscal incentives, including elimination or reduction of customs tariffs; and 94 have SEZ laws that provide for a special customs regime. This indicates that preferential customs treatment is the most popular tool for attracting investment in special economic zones (Fig. 5).

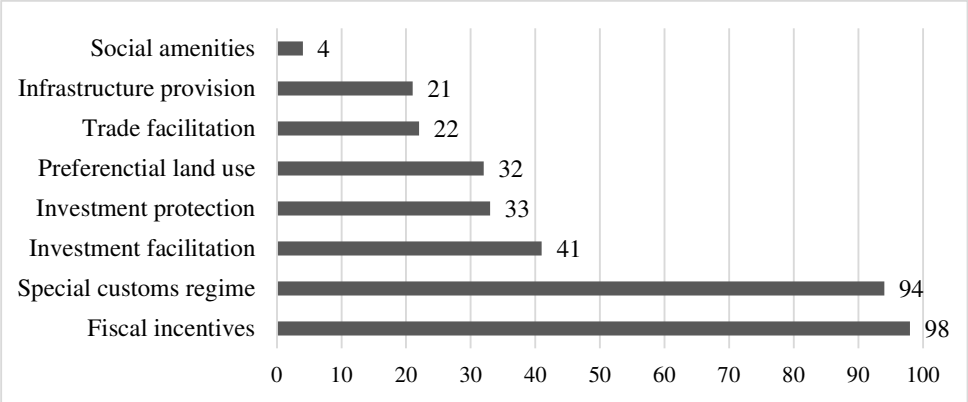

Fig.5: Investment attraction tools in SEZs (2019)

Source: UNCTAD (2019)

The application of a specific type of preferential customs treatment depends on the objectives of the special economic zone that can vary from FDI attraction, export promotion, to earning foreign currency. Table 2 presents a comparative analysis of the types of preferential customs treatment applied by various SEZs across the Asia-Pacific.

Table 2: Comparative analysis of preferential customs treatment by type of special economic zone in Asia-Pacific

SEZ	Preferential customs treatment options
Technology parks	
PRC: China-Singapore Suzhou Industrial Park (CS-SIP)	duty-free import of raw materials, equipment and components for goods intended for export
Thailand: Bang Chan Industrial Estate	Duty free import of goods
Free trade zones	
PRC: Shanghai Pilot Free Trade Zone (CSPFTZ)	Duty-free import of industrial equipment
South Korea: Jeju Investment Promotion Zones	Exemption from customs duties for 3 to 5 years
Japan: Okinawa Special Free Trade Zone (OSFTZ)	Exemption from customs duties
export-oriented manufacturing zones	
South Korea: Masan Export Processing Zone	Customs duties waved on goods imported for use in the zone.
Philippines: Bataan Export Processing Zone	duty-free import of raw materials, equipment and components
PRC: Shanghai Jinqiao Export Processing Zone (JEPS)	Customs duties on exports are waived
special economic zones (non-specialized)	
Philippines: Philippine Economic Zone Authority (PEZA)	duty-free import of raw materials, equipment, and spare parts etc; customs duties are waived on all exports .

PRC: Shenzhen Special Economic Zone	Taxes are waived on imports that are intended for producing goods for export
Thailand: Narathiwat Special Economic Zone	exemptions on import duties for equipment, machinery and inputs for the development and operation of SEZ.

Compiled by the authors using information from the official website of the special economic zones: China-Singapore Suzhou Industrial Park, Industrial Estate Authority in Thailand, Brief introduction of Shanghai Development Zones, Jeju Investment Promotion Zone, Special Free Trade Zone in Okinawa, Philippine Economic Zone Authority, Jinqiao Export Processing Zone, Incentives in Shenzhen, Guide to investment in the SEZ. Thailand.

In China, special economic zones account for over 80% of total FDI inflows. In Malaysia, nearly 90% of all funds invested in SEZs arrived from abroad. In Vietnam, SEZs account for 60 to 70% of total FDI. Eight percent of all tenants of Myanmar's Thilawa Special Economic Zone are foreign companies, and another 15% are joint ventures with foreign firms. In the other low-income countries in the region, Cambodia and the Lao People's Democratic Republic, special economic zones, too, are the main recipients of foreign investment, accounting for a significant share of total FDI (ASEAN Secretariat and UNCTAD, 2017).

Another key objective of special economic zones is the promotion of exports not only in terms of increasing export volumes, but also in terms of export diversification. Customs incentives are one of the key tools of international trade development: 87% of measures implemented by the G20 economies since 2012 had to do with the facilitation of customs treatment (Gereffi, G., S. Frederick and P. Bamber, 2019). At the same time, some special economic zones that offer preferential customs treatment put forth additional requirements to exporters. For example, in Nepal, 75% of goods and inputs manufactured within a zone must be exported; in Malaysia, goods are produced within a free industrial zone exclusively for export; to be used domestically, goods must be cleared by appropriate authorities. (Sinenko, O., Mayburov, I., Ibragimova, M., 2019)

In many countries, SEZs account for a major share of exports, especially of industrial goods: over 60% in the Philippines; over 50% in Costa Rica, the Dominical Republic and Nicaragua; 31% in Mexico; 20% in Bangladesh; 13% in Colombia. SEZs enabled the countries of the Caribbean and Central America to diversify their exports away from fruits and vegetables. Costa Rica managed to increase the share of goods exported by SEZs in total industrial exports from less than 10% in 1990 to 55% in 2003 (Mayburov, I., Sinenko, O.,2017).

Table 3 presents an assessment of the impact of special economic zones on annual trade growth, the share of foreign value-added in exports and the ratio of foreign direct investment to GDP. As special economic zones tend to grow at the same pace as national economies in the first few years of operation, the performance indicators are ranked by country – five leaders have been identified and comparative data for the Russian Federation are presented. As one can see from Table 3, having special economic zones in a country and the number of SEZs cannot be sufficient drivers of trade and export. For example, China had 2,543 SEZs in 2017, yet its FDI to GDP ration was 12.

Table 3: Effect of special economic zones on key performance indicators of Asia-Pacific countries

Trade growth			**Integration into global value chains**			**FDI**		
Country	Annual growth in sales turnover, 2007–2017	SEZs, total	Country	Foreign value-added content of exports, 2017	SEZs, total	Country	FDI to GDP, 2017	SEZs, total
Laos	18	12	Singapore	62	10	Singapore	397	10
Vietnam	16	19	S. Korea	37	47	Chile	99	4
Cambodia	13	31	Malaysia	35	45	Cambodia	94	31
Mongolia	12	3	Vietnam	32	19	Nicaragua	78	52
Bangladesh	11	39	Thailand	31	74	Vietnam	58	19
Russia	0	130	Russia	9	130	Russia	28	130

Compiled by the authors UNCTAD (2019)

4. The practice of preferential customs treatment within special economic zones in Russia. The Customs Code of the Eurasian Economic Union stipulates a customs procedure applied to the foreign goods and Union goods, under which the said goods are placed or used in the territory of the free economic zone (FEZ) or its part, without paying customs duties, taxes, and safeguard, anti-dumping, countervailing duties, provided that the terms and conditions of placement of the said goods under this customs procedure are complied with and that the said goods are used in accordance with this customs procedure.

Goods eligible for being placed under the procedure for the free economic zone are the goods that are intended to be placed and/or used by residents of the FEZ within the territory of the FEZ for the residents of the FEZ to pursue their business and other activities within the territory of the FEZ [12]
Fig.6 shows which special economic zones in Russia enable their residents to enjoy the customs procedure for the free economic zone.

The procedure for the free economic zone is applicable to residents of all special economic zones in Russia with the exception of tourism development SEZs. There are, however restrictions stipulating that residents of port SEZs must provide security for payment of customs duties and taxes. The security may not be less than:

- 30 million roubles in the case of the warehousing of any goods along with storage of, wholesale or stock-exchange trading in them, including excise goods or mineral raw material;
- 10 million roubles in the case of the warehousing of goods which are not excise goods or mineral raw material, along with storage of or wholesale stock-exchange trading in them;
- 2.5 million roubles when conducting other port-related activity (FTS, 2020).

For the purposes of applying the customs procedure for the free customs zone the Free Port of Vladivostok and the territory of advanced socio-economic development (FCS, 2020) are deemed equivalent to special economic zones.

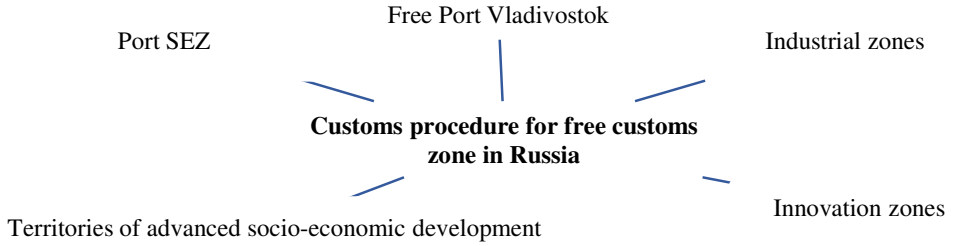

Fig.6: Application areas for customs procedure for the free customs zone in Russia

The special customs zone regime also exempts residents from paying value added tax on goods imported into Russia. When importing goods from the Eurasian Economic Union, residents do not pay VAT if the goods are placed under the customs procedure for the free customs zone or the bonded warehouse. When importing goods from countries that are not member states of the Eurasian Economic Union, residents are exempt from VAT if:

- the goods are cleared under the procedure for release for domestic consumption after the completion of free customs zone procedure in the Kaliningrad Region SEZ;
- the imported goods are placed under customs regimes of transit, customs warehouse, re-export, duty-free shop, temporary storage, free customs zone, destruction, abandonment and the special customs procedure, as well as when declaring stores;
- the imported goods are cleared under the customs procedure of reprocessing in the customs territory. The tax is not payable if reprocessed goods are imported from the customs territory of the Customs Union within a set timeframe.

Conclusion

Special economic zones are the most common mechanism for reducing the tax costs of businesses and facilitating customs clearance procedures in international trade. Special economic zones account for more than 40% of international trade in more than 160 countries, provide jobs to over 80 million people. This is clear evidence of the role of SEZs in the structure of global value chains. The World Trade Organization posits that digital technologies could boost international trade by a third in the next 15 years, making global value chains faster, less costly and more productive. In this environment, flexible and fast-developing special economic territories are the perfect potential growth areas thanks to the tax and customs incentives and streamlined customs clearance procedures that they offer.

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Students' Well-Being and Learning Readiness during Coronavirus Outbreak in Malaysian Higher Learning Institutions

Habibah Ab Jalil
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
habibahjalil@upm.edu.my

Ismi Arif Ismail
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
ismi@upm.edu.my

Steven Eric Krauss
INNOVATE Research Centre of Excellence, Faculty of Educational Studies
Universiti Putra Malaysia
lateef@upm.edu.my

Abd Rahman Ahmad (Corresponding Author)
Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia
Batu Pahat, Johor
arahman@uthm.edu.my

Mohd Shahir Shamsir Omar
Deputy Vice-Chancellor (Research and Innovation) Office, Universiti Tun Hussein Onn Malaysia, Batu Pahat, Johor
shahiromar@uthm.edu.my

Abstract

The main objectives of this paper were to identify the perceived severity of COVID-19 on students' well-being and learning readiness, and to better understand how students are coping with the present crisis, both in general and in regard to their daily learning activities. Despite the difficulties experienced, the students were optimistic about their future and the university leaders' ability to manage the crisis and provide adequate support to students. Challenges faced by students include difficulty in undertaking online learning due to internet connectivity and available means to communicate. A critical success factor for students to engage in online learning during a crisis is their technological capacity to use online tools. The findings indicate that students reported an average data capacity to carry out online learning but a slightly higher level of accessibility to learn via popular social media apps. Despite the challenges of internet connectivity, students took the effort to use their data capacity to access the learning resources provided by lecturers.

Keywords: Higher Learning Institutions, student learning, learning resources, COVID-19

Introduction

At the outset of 2020, the year in which Malaysia was set to welcome fully developed nation status, the world was struck with the first major global pandemic in a century. By February, the COVID-19 crisis had worsened dramatically, affecting the health and well-being of not only individuals but also the entire higher education ecosystem. Almost overnight, new approaches to teaching and learning for students staying both on and off-campus became a pressing need, one in which Higher Learning Institutions (HLI) were ill-prepared for. To meet this challenge, HLIs require primary data combined with real-time analytics to gain insight into the well-being and learning needs of their students. HLI leaders need to know the most effective ways to innovate and adapt to best support their students and ensure continuity in providing high-quality teaching and learning experiences. HLIs' decisions on how best to continue serving their students should be based not only on the collective wisdom of HLI

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leaders but also on data from the students themselves. Real-time data is critical for providing HLI leaders an accurate picture of the situation, resulting in effective responses to the crisis. Hence, the main objective of this paper is to identify the perceived severity of COVID-19 on students' well-being and learning readiness in one of the Malaysian HLIs.

Literature Review

The implementation of social distancing and movement control orders (MCO) in Malaysia and around the world, has minimized student's movements and interaction for face to face teaching and learning (Rapanta et al. (2020). Sahu (2020) pointed to five (5) challenges that HLIs are facing during the COVID-19 outbreak: (1) Shifting from Face-to-Face to Online Classes; (2) Assessment and Evaluation; (3) International Students; (4) Travel Restrictions; and (5) Mental Health. Indeed, the COVID-19 pandemic may have a serious impact on online delivery mode. Here, HLIs should be ready to invest more in effective pedagogical methods with or without the use of online technologies (Capone, Caso, Donizzetti, & Procentese, 2020; Rapanta et al., 2020).

Yang, Tu, and Dai (2020) suggested that positive thinking and resilience could reduce the negative effects of COVID-19 on mental health among college students. Likewise, greater psychological support could help to reduce the mental health consequences of the COVID-19 pandemic (González-Sanguino et al., 2020). Students feel worried that they will be exposed to COVID-19 and unable to carry out their normal activities. Here, managing psychosocial well-being during the COVID-19 pandemic with greater support from the family, community, and HLIs is very important (Ardan, Rahman, & Geroda, 2020).

Methodology

The survey was conducted in collaboration with researchers from INNOVATE Research Centre of Excellence, Universiti Putra Malaysia (UPM), and the offices of the Deputy Vice-Chancellors for Research and Innovation at Universiti Tun Hussein Onn Malaysia (UTHM) and Universiti Pendidikan Sultan Idris (UPSI) The survey was conducted to gauge students' psychological wellbeing, their online and distance learning readiness plus technological capacity at hand, and their confidence in their respective universities' support during the coronavirus (COVID 19) outbreak. The survey aimed to help HLI leaders understand the potential impact of the outbreak on students, providing greater clarity on what kinds of technology and psychosocial support are needed to address their students' needs.

Quantitative and qualitative data were collected through a set of online questionnaires distributed to students through social media, using the online platform Survey Monkey. For the purpose of this initial report, only the quantitative descriptive results are presented. Data were collected during the early stages of the COVID-19 Mandatory Control Order (MCO) period from 26th March to 3rd April 2020. The survey was conducted to capture the state of students' well-being and learning effectiveness during the COVID-19 pandemic which included 6,306 undergraduate and postgraduate students from different faculties within the University. The mean age of the sample was 22 years and the gender makeup of the sample closely followed the university as a whole, as 75.7% of respondents were female and 24.3% were male. Invitations to participate in the survey were sent out through the Student Representative Council and the offices of the Vice Chancellor and Deputy Vice Chancellor for Academic and International.

The online surveys were password coded and secured so that only one respondent was able to access the survey at a time. Data were managed by one of the research team members and kept confidential at all times. All responses were anonymous -- no identifying information was collected. The findings are presented according to percentages, to acquire a general profile of students' experiences during the crisis.

Results and Discussion

Our first concern was to gauge students' perceptions of their general well-being during the crisis. This was obtained through questions about how worried they felt about the outbreak, their perceived difficulties in completing their work, the biggest challenges they faced, how long they could see themselves working under the movement restrictions, and their sense of optimism about the future. As illustrated in Figure 1, the vast majority of students (89.2%) were either very or extremely worried about the impact of the pandemic on them personally. This indicates that the perceived severity of the situation for students was very high. It also indicates a strong awareness of the threat that the outbreak poses to different aspects of their lives.

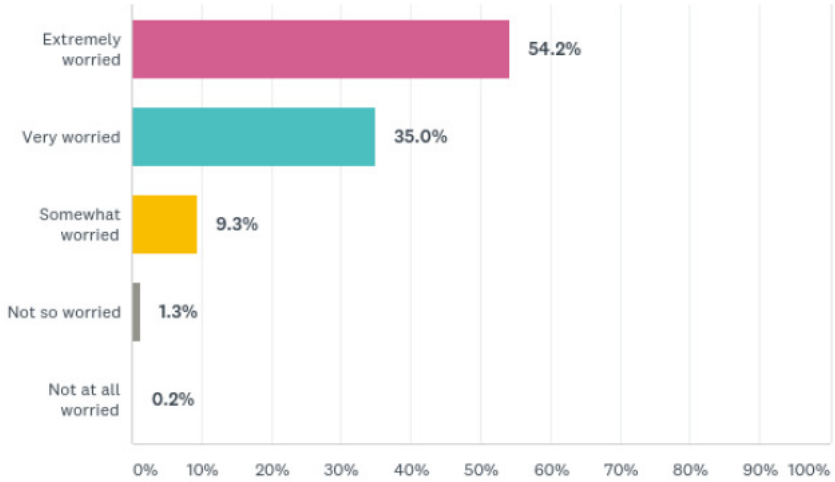

Figure 1: Impact of Coronavirus on students' anxiety

As shown in Figure 2, just under half of the students surveyed (42%) found it at least somewhat difficult to work during the MCO period, with nearly 20.3% responding that the present work situation was 'very difficult'.

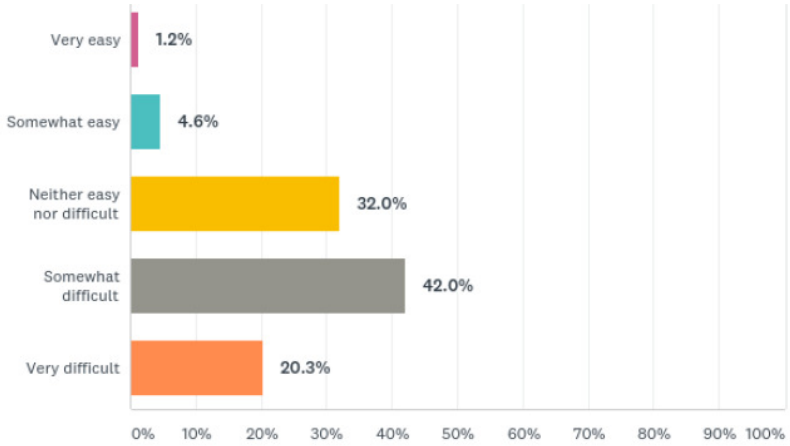

Figure 2: Perceived difficulties working these days

To further understand the particular challenges that students have faced, Figure 3 shows that communication with course mates (62.1%) and Internet connectivity (60.8%) have been the most challenging, followed by having many distractions at home (40.8%). Other significant challenges include limited access to tools or information at home (31.7%) and keeping a regular schedule (27.2%).

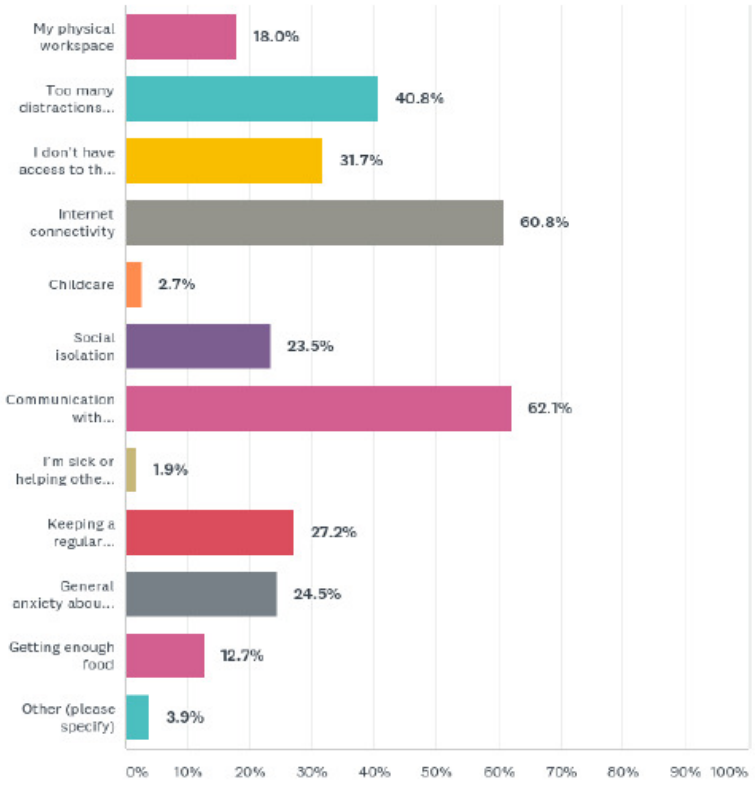

Figure 3: Greatest challenges working remotely

Almost one-quarter of respondents cited the challenges of general anxiety about the impact of coronavirus on their lives (24.5%) followed by social isolation (23.5%). Lastly, physical workspace was cited as major challenge by 18.0% of the students surveyed. Of note, 12.7% of respondents indicated that getting enough food to eat was a major challenge. This indicates that more than 1 in 10 students from the institution are finding it difficult to meet basic daily needs.

Probing the findings by gender, the results differed between males and females in two of the challenges. Having too many distractions at home [35.6% (M) to 42.4% (F)] was more of a challenge for female students, while social isolation [31.9% (M) to 20.7% (F)] was a greater challenge for male students. The findings could be pointing to the fact that females often have additional responsibilities at home, making it more of a challenge to find time and space to meet their academic responsibilities. Male students, on the other hand, may find the lack of daily face-to-face interaction with peers outside the home more isolating than female students.

As illustrated in Figure 4, students' perceptions on how long they can cope with the restrictions faced varied considerably. The largest percentage (30.3%) reported that they could continue to work from home for a few weeks. However, 22.8% felt that the situation was not presently sustainable. This was followed by 18.6% who said they could do it for about a month and 14.9% could do it for a week. Only 13.3% reported that if they had to, they could continue to do it for an extended period of three months or longer.

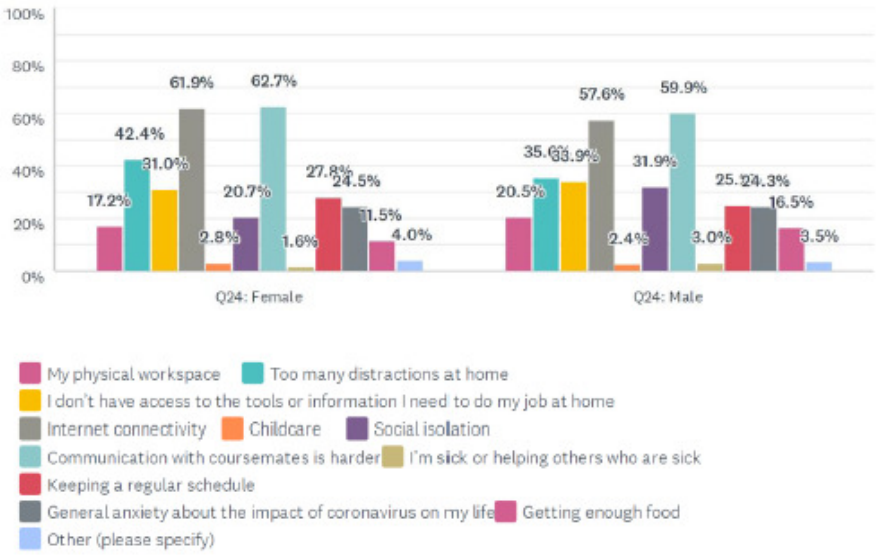

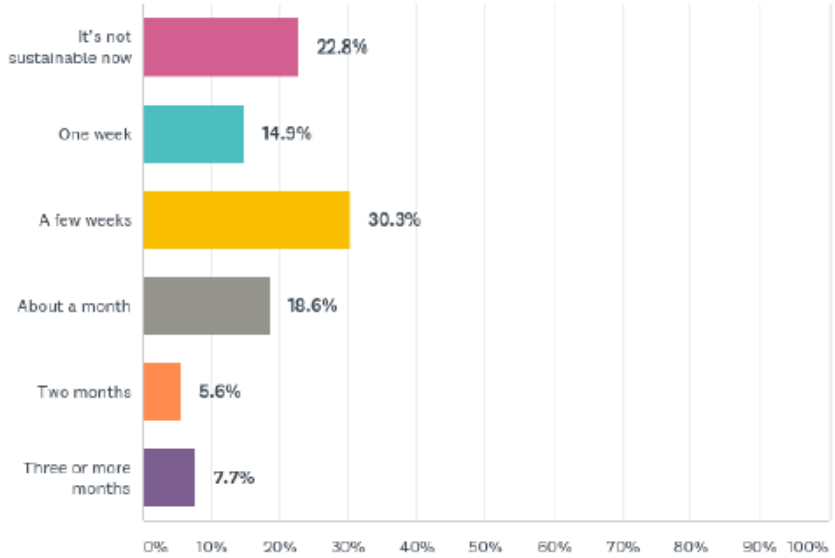

Figure 4: Length of time coping with the situation

Given the above responses, surprisingly, students remain quite optimistic about their future. As illustrated in Figure 5, more than half of the sample (62.1%) felt optimistic about the current situation, where 25.9% reported being very optimistic, and 36.2% optimistic. This finding indicates that in the early phase of the outbreak, students maintained a certain level of resilience.

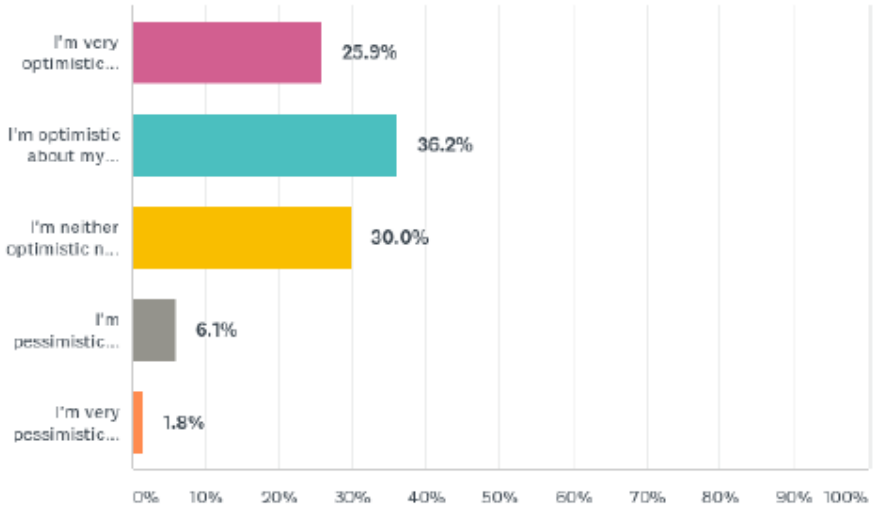

Figure 5: Impact of Coronavirus on students' optimism about the future

In terms of perceived severity of COVID-19 on their well-being and learning readiness, a majority of students were significantly concerned and found it difficult to work effectively at home or at their campus hostels during the early period of the outbreak. Despite the difficulties experienced, the students were optimistic about their future and the university leaders' ability to manage the crisis and provide adequate support to students. Challenges faced by students include difficulty undertaking online learning due to internet connectivity and available means to communicate. A critical success factor for students to engage in online learning during a crisis situation is their personal technological capacity to use online tools. The findings indicate that out of five stars, students reported an average data capacity to carry out online learning but a bit higher level of accessibility to learn via popular social media apps. This means that despite the challenges of internet connectivity, the students took the effort to use their personal data capacity to access the learning resources provided by lecturers. While the institution has formulated effective policies to respond to the coronavirus (COVID 19) outbreak they can further improve on communication with students to ensure the latter are updated frequently. In light of the survey findings, recommendations are made for administrators, lecturers and students to address student well-being and continuity of learning during the coronavirus pandemic situation.

Conclusion

From the findings, we can draw the following conclusions from the survey that in terms of perceived severity of COVID-19 on their well-being and learning readiness, a majority of students participated in the survey were extremely worried about the impact of the pandemic on them personally and on their learning trajectory. More than half of the sampled respondents also found it difficult to work effectively and to communicate with their peers at home or at their campus hostels during the early period of the outbreak.

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An Organizational Resilience Potential Scale within the Hospitality Industry in the face of the COVID-19 in Poland

Tomasz EWERTOWSKI

Poznan University of Technology, Faculty of Engineering Management, 2 J. Rychlewskiego Str., 60-965 Poznan, Poland, tomasz.ewertowski@put.poznan.pl

Abstract

The hotel industry turned out to be severely affected by the COVID-19. Reopening the Polish hotel industry after government restrictions, provides an opportunity to analyze the individual strategies taken by hotels to maintain their operational capabilities. Against this background, resilience as a risk measure used to assess the performance of an organization plays a very important role. The article proposes the Organizational Resilience Potential Scale for assessing the potential of resilience measures such as: redundancy, resourcefulness and rapidity. Additionally, four sub-measures related to the key resilience capabilities of the organization were identified. The survey was based on the questionnaire consisting of 22 questions to measure the potential of resilience. The results of the analyses were referred to risk matrices for individual measures to qualify them to a specific risk category, allowing managers to find out what aspects need to be taken into account to increase the resilience of the organization.

Keywords: Organizational Resilience, Hospitality Industry, Crisis Management.

Introduction

COVID-19 was first identified in China (peak incidence February 13, 2020), and next it spread to neighboring countries (South Korea - peak incidence February 29). Subsequently, the disease began to spread around the world and was recognized as a pandemic by the World Health Organization (WHO) on March 11, 2020. By the end of June, 4.1 million active cases were reported, including several hundred thousand deaths. Most cases were recorded in Europe and North and South America. In Poland, the first case of the novel coronavirus was detected on March 4, 2020, while the first known death was reported on March 12, 2020. By the end of July 2020 a total of 47,469 cases was reported, of which 1,732 people died (www.worldometers.info, accessed 3 August 2020). Analyzing the intensity of the pandemic in Poland on the example of the daily number of infections and comparing with Italy's cases (as of June 30, 2020), we can be cautiously optimistic. This comparison is depicted in Fig. 1. However, we may conclude that we are probably just at the beginning of the recovery phase. Managing such an uncertain situation in hotels, when we have to reckon with the possibility of a recurrence of an increased rate of infection, is even more difficult and shows the gravity of the situation.

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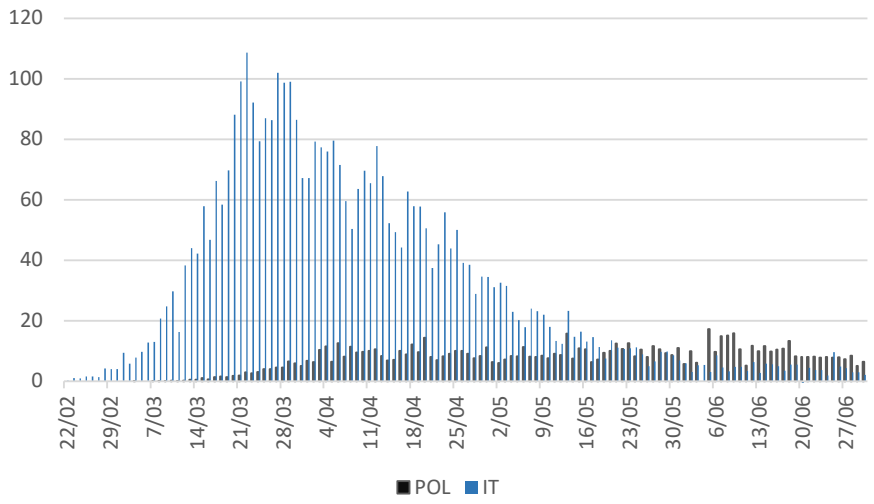

Figure 1: Daily new cases in Poland and Italy per 1 mln. Source: European Centre for Disease Prevention and Control, 24 July 2020

The raging pandemic and the subsequent governmental actions have mainly affected the industries vulnerable to this type of threat. One of the most affected sectors in this crisis is the tourism industry, and the hotel industry in particular (Gössling, 2020).

In Poland there are over 2.6 thousand hotels (2 635), approximately 144 thousand hotel rooms, of which 32 percent are those operating under various hotel chains. The structure of hotel guests is 79.6% domestic tourists and 20.4% foreign guests (stat.gov.pl 2020). Before the crisis caused by the pandemic, the entire industry was responsible for 12 percent of Polish GDP. Until March, the industry was stable. Then, as a result of the global pandemic and social distancing rules introduced by the government, the hotel sector recorded a sharp decline in revenues and a real prospect of bankruptcy appeared before many hotels. The situation has become dramatic for the Polish hotel industry (www.propertynews.pl, 22 May 2020). Currently, despite the still unresolved threat associated with the pandemic and the possibility of the emergence of a second wave of infection, many hotels are slowly trying to resume operations and at least partly recover lost revenues (reopen). According to Haywood (2020), if there are no solutions for going back to having a high demand scenario like in the pre-COVID era, and all businesses that serve travelers understand that they have to adjust to the social distancing norms, the business models will have to realign. In such times domestic tourism will be the only hope. Additionally, Rivera et al. (2016) state that the expansion of tourism and satisfaction are directly proportional; tourism activities should be resumed in order to bring back normalcy in society. Basing on prior experience, tourism should return to normal in one to two years once the COVID-19 pandemic is over.

Literature Review of the Hotel Industry's Organizational Resilience

The outbreak of the COVID-19 pandemic has undoubtedly caused a crisis in the hotel industry around the world. In that context it is a very interesting issue to analyze how the branch is vulnerable to that kind of event or rather how resilient it is against a crisis. Defining organizational resiliency for hotels seems to be crucial for organizations to better understand requirements for efficient crisis management and answering the question how to be better prepared in case of this type of emergency.

COVID-19 very quickly began to be compared to the phenomenon of the Black Swan, one which is theoretically impossible, however its course shows it has been an underappreciated phenomenon in terms of safety (Taleb 2007). It was equally quickly noticed that many researchers have previously warned of a global virus, and therefore the current situation should not be assessed as impossible, but only previously underestimated. On the other hand, securing oneself against many different threats is expensive and may prove ineffective for many organizations in the long run. Self-awareness of risk and the ability of an organization to manage their vulnerabilities, and be adaptive and innovative (Aldunce et al., 2014) is a much better solution. We call this ability the organization's resilience. Resilience in the hotel industry also has other contexts, most often it is a systemic, economic and environmental one (Bruneau,

Andrei 2004). The article focuses mainly on the organizational context of hotels. There are many definitions of organizational resilience. Organizational resilience considers physical properties as well as organizational structure and capacities (Cutter et al., 2008, Barroso et al., 2015). Brown et al. (2017) state that a resilient organization should detect unexpected events early and then must develop resilience capabilities to react to the negative consequences of unexpected events and to return quickly to its original state, the one before risk occurrence, or to move to a new best state after being affected by the risk, and continue business operations as efficiently as possible. The root word of resilience comes from the Latin 'to bounce back'. Kapucu, Hawkins, and Rivera (2013) created the Adaptive Resilience Framework in the context of a "community's behavior after the disaster". The model distinguishes between "bouncing back", which uses the engineering resilience approach that emphasizes reconstruction, and the adaptive resilience approach that mitigates harm or utilizes opportunities based on redevelopment. This adaptability makes an organization stronger against crises and works like a vaccination. Organizations need to integrate elements of resilience into their everyday business practices to improve response in the face of adversity (Sawalha, 2015). Organizational resilience in the literature is described through the prism of four key organizational skills (Hollnagel et al., 2011):

a) **responding**, defined as skills and knowledge of what to do and how to respond to regular or irregular disturbances and crises by either introducing previously prepared actions or by adapting normal functioning to a changing situation,
b) **monitoring**, defined as skills and knowledge of what to look for, what could be or become a threat in the near future; monitoring must include both the organization's environment and its own activities,
c) **anticipating**, defined as skills and knowledge of what to expect in terms of development, threats and opportunities in the future, e.g. potential changes, disruptions, pressure and consequences of the mentioned factors,
d) **learning**, defined as skills and knowledge derived from both positive and negative experiences.

These capabilities are illustrated in Fig. 2.

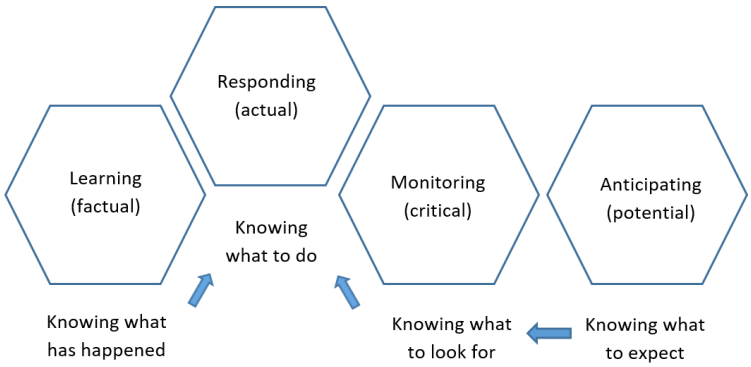

Figure 2: Key resilience assessment skills. Source: own work based on Hollnagel et al. (2011)

Schilari (2013) states that the concept of resilience has been applied in several fields, such as ecology, social and organizational science, psychology, computer science, etc. It is important that the meaning of resilience generally remains similar across applications. However, the application of resilience engineering is usually dedicated to specified industries, but the survey is useful to explain some specific definitions and components of resilience indicators. That is the reason to determine the level of resilience based on the commonly used and applied in technical systems so-called resilience triangle. One of the first examples of the triangle's use was described in a work by Bruneau and Andrei (2004). The resilience triangle presents a decrease in the functionality of the organization (system) due to the ongoing crisis and related damage. The triangle taking into account linear relationships is obviously a simplified model, because in reality we are dealing with curvilinear relationships. In Fig. 3 the curve depicts performance changing over time during a crisis situation. The y-axis refers to Performance – P (i.e. the length of stay or number of guests) and the x-axis refers to time – t from pre-event to resolution. The so-called resilience triangle is formed by vertices at [t_0, P (t_0)], [t1, P (t_1)] and [t_2, P (t_2)]. The slope of the declining section (represented for time $t_0<t<t_1$ by [P(t) – P(t_0)]/t-t_0) of the performance curve provides data about system redundancy. The slope of

the rising section (represented for time $t_1<t<t_2$ by $[P(t) – P(t_2)]/t-t_2$) of the performance curve provides data about system resourcefulness. Performance level $P(t_1)$ provides information about the robustness of the system. Section $|t_2 – t_0|$ describes the speed of overcoming the crisis (rapidity). Section $|t_2 – t_0|$ can be divided into two. The first section $|t_1 – t_0|$ symbolizes the time of crisis escalation from its occurrence to its culmination (dampen time) and often in literature, with very sudden events, it is assumed at 0 (just like the first phase of a crisis situation may not occur at all or last for a very short time). The second section $|t_2 – t_1|$ shows the time after the peak to recover back to pre-crisis level (recovery time). The $P(t_0) – P(t_1)$ value represents the amount of system performance lost or, in other words, the severity of the disruption expressed as a percentage – disruption severity. The area under the curve between time t_0 and t_2 symbolizes the organization's resilience to the crisis.

We can achieve resilience by implementing previously prepared actions or by adapting normal functioning to a changing situation. These actions will allow the organization (system) to adapt to the impact of the disruption. These adaptation options help the system to cope with and recover from a disturbing event in order to return to a predisturbance level of performance as rapidly as possible. Adaptation options can be grouped into four categories: **Redundancy** is the ability of an organization to provide uninterrupted services in the event of a disruption (e.g., having the right number of personnel to replace in the event of infection, having excess space to meet sanitary regimes); **Resourcefulness** is the utilization of materials (human resources, financial, technological and informational) to establish, prioritize, and achieve operational goals (e.g., participation in campaigns promoting stays in domestic hotels, hotel safety certifications – compliance with sanitary regimes); **Robustness** is the strength or the ability of the system to resist disturbance-induced stressors (e.g., no significant financial liabilities, diversification of income). The robustness is not a measure of its own and it is measured indirectly by redundancy; **Rapidity** is the capacity to return the system to a predisturbance level of functioning as quickly as possible (Simonovic, Arunkumar, 2016).

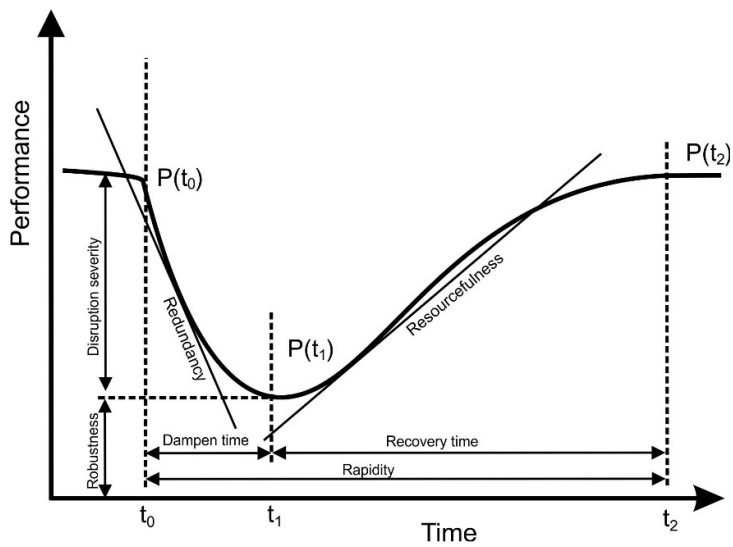

Figure 3: Generic presentation of system resilience. Source: own elaboration based on Simonovic and Arunkumar (2016)

The mathematical calculation of the loss of performance (ρ) can be presented as the area in Fig. 3 between the beginning of a disturbing event (t_0) and the end of the disruption recovery process (t_2). It can be obtained mathematically as:

$$\rho = \int_{t_0}^{t_2} [P(t_0) - P(\tau)] d\tau \;\; where \;\; t \in (t_0, t_2) \qquad (1)$$

where $P(\tau)$ represents the measure of system performance and $P(t_0)$ is the initial system performance level (Simonovic, Arunkumar 2016).

In contrast, the area under the curve between times t_0 and t_2 represents system resilience. Minimizing the value of ρ, i.e. loss of resilience, can be achieved in two ways: min $|P(t_0)-P(t_1)|$ – minimizing the effects of the disturbance or min $|t_2-t_1|$ – minimizing the time necessary to recover to the state before the disturbance. In the literature, reducing the area of the resilience triangle, while maintaining a constant recovery time $|t_2-t_1| \approx$ const. is known as static resilience, which is necessary to recover to the state before the disturbance. However, the reduction in the resilience triangle's area due to a decrease in time (with a constant value of the effects of interference $|P(t_0)-P(t_1)| \approx$ const.) is known as dynamic resilience (Rose 2014).

Materials and Methods

Due to the specific situation during the shutdown of the Polish hospitality industry, the survey was directed at the management of Polish hotels in order to obtain statements describing the potential of resilience to the crisis caused by the outbreak of the COVID-19 pandemic. The data collection procedure was conducted in the period between May 18, 2020 and May 28, 2020. The questionnaire consisting of 31 questions each rated on seven-point Likert-type scales (presented in Table 3) was sent to the Managers of 650 hotels indicated by the number of stars category from one to five (25% of total number of Polish star category hotels). The number of the hotels was in proportion to the number of hotels with the appropriate category in Polish hospitality industry and they were located in all regions of Poland (three-star -340, two-star – 160, four-star – 92, one-star – 44 and five-star hotels – 14). The questionnaire included a cover letter, explaining the purpose of the research. The survey was conducted online. 35 responses were received (three-star -16, two-star – 4, four-star – 12, one-star – 3 and five-star hotels – 0). The response rate was 5,4 %. During the research managers from 35 hotels were questioned, of which full and comprehensive information was obtained in 22 cases. Additionally some questions connected with structure data of the surveyed hotels were added to the questionnaire. The size of the hotel and its duration of operation were used as the study's acceptance criteria (those hotels that have not commenced operations or that have been freshly put into operation were rejected). Ultimately, the sample included 3 and 4 star hotels typical of the Polish hospitality industry. The structure of the surveyed hotels is presented in Table 1.

Table 1: Features of survey respondents

		All	* 3	4 *
Hotels		22	11	11
average years of operation		13.3	15.7	10.8
has additional sources of income from the hospitality sector (accommodation, recreation and entertainment, transportation, food and beverage, other expenditures).		21	10	11
estimated percentage decline in revenues (in the period from March 1 to May 15 compared to the same period last year)	90% -100%	16	8	8
	80% -89%	5	3	2
	70% -79%	1	-	1

The collected data has been coded and checked for correctness and randomness of the answers given. Records indicating random responses and not meeting the test criteria were removed (too short time on the market and insufficient number of employees and the facility class). The STATISTICA 13 program was used in the data analysis.

Methodology for calculating the resilience potential to risks associated with COVID-19 in the hospitality industry

The prepared survey included crisis management practices in the hotel industry, especially those which helped hotels from around the world survive crises (Kim, Chun, Lee 2005), including those affected by the SARS epidemic in 2003 (Tew et al., 2008, Shirali, Mohammadfam, Ebrahimipour 2013). In the current crisis situation in the hotel industry caused by the COVID-19 pandemic, since we are not able to clearly determine at which point we are in this situation; it is currently not possible to measure the resilience of hotels (e.g. lack of t_2). There are only a few methods that specifically focus on how to measure resilience, or rather the potential for resilience, and there is a clear gap when it comes to assessing resilience using quantitative methods (Tew et al., 2008). In this paper the results of quantitative assessment would be considered using a questionnaire. A review of literature has shown that there are three main principles (indicators) and four sub-indicators of organizational resilience, and also there are many different definitions that are accepted by different authors. This article tries to elaborate for these principles a quantitative assessment of the potential of organizational resilience.

The questionnaire consisted of 31 questions. During the analysis the number of questions was reduced (because of correlation and Cronbach's alpha criteria) thus consistency and simplification of measurement was achieved. The questions were then allocated in a selective manner to three main dimensions, i.e.: measure of the potential of system redundancy, measure of the potential of resourcefulness and measure of the potential of rapidity. The scoring of individual response results on seven-point Likert-type scales is as follows:

1. I strongly disagree - 1 point,
2. I disagree - 2 points,
3. I rather disagree - 3 points,
4. I have no opinion - 4 points,
5. I rather agree - 5 points,
6. I agree - 6 points,
7. I strongly agree - 7 points

Measures defined in this way enable us to obtain the resulting data to estimate the robustness potential, which is based on the measure of the potential of redundancy and the measure of the potential of resourcefulness which is based on the measure of itself, and to estimate the potential of total resilience, which is based on the measure of the potential of rapidity.

The questionnaire also provides four sub-measures: a measure of learning ability, a measure of responding ability, a measure of monitoring ability and a measure of anticipating ability. The specified sub-measures can be obtained from the measurement of the potential of rapidity selecting its questions into specific sub-categories (see Table 3).

Results

Table 2 presents statements describing hotel strategies to overcome the effects of a pandemic crisis and lockdown. The overall Cronbach's alpha coefficient of Resilience Potential measurement was 0.79. But the item-total correlation varied. Item-total correlations indicate that in the case of resilience we are not dealing with one single course of action, but rather with many different factors undertaken in various areas by entities from the hotel industry. The goal of our research is to build up a consistent measure of sub-resilience categories.

Table 2: Internal consistency analysis results

No.	Rated Item	Mean	SD	Item-total correlations
1	During the epidemic we minimize expenses - e.g., reduce the number of active elevators and other devices to save energy and operating costs	6.00	1.57	0.19
2	We work closely with airlines, travel agencies and other entities in the hospitality industry in the field of joint marketing and sharing key information	4.55	1.62	-0.03
3	We offer attractive discounts and voucher programs that enable our customers to obtain future services cheaper	5.64	1.43	-0.02
4	We make firm demands to support the industry through dedicated assistance programs	6.36	1.11	0.03
5	We encourage employees to take leave as an alternative to group layoffs	4.95	1.82	-0.01
6	We have limited the employment reduction to the maximum	5.55	1.37	-0.15
7	We have established a competent anti-crisis team to better manage the crisis	4.59	1.75	-0.40
8	We are actively involved in the fight against the crisis in our local community (e.g. ad hoc adaptation of hotel infrastructure and services offered for emergency services)	4.82	1.47	0.13
9	We provide employees with training programs that will help alleviate the impact of a pandemic on the hospitality industry	4.41	1.53	0.26
10	We involve employees in programs in the field of safety and health protection (e.g. disinfection program of the common part of hotel rooms)	6.09	1.44	0.68
11	People in our organization work intensively on the problem until it is resolved	6.00	0.95	0.51
12	We actively monitor the hotel industry in order to recognize emerging problems early	6.27	0.91	0.53
13	We quickly solve problems that appear in our hotel	6.59	0.49	0.56
14	We make difficult decisions quickly	6.05	0.82	0.54
15	We are able to use knowledge in an innovative way in practice	5.77	0.95	0.35

16	We've built strong relationships with others with whom we may have to work in a crisis	5.77	0.90	0.25
17	If key people were unavailable at any given time, there are always others who could replace them	5.18	1.59	0.75
18	There are few obstacles to good cooperation with other organizations	5.18	1.27	0.43
19	We selected areas for monitoring threats and defined indicators characterizing them and the limits of their tolerance	4.95	1.22	0.30
20	Our organization maintains sufficient resources to protect itself against unexpected situations	4.00	1.41	0.32
21	We have clearly defined priorities, which is important during and after the crisis	5.82	0.98	0.42
22	We focus on being able to respond to unexpected situations	5.59	0.98	0.35
23	We plan well to prepare for unexpected situations, taking into account past problems and actions taken by the organization that have contributed to their resolution.	5.32	1.10	0.29
24	We periodically test the effectiveness of our contingency plans	3.95	1.43	0.15
25	In planning, we strongly consider not only current threats, but also potential and future ones	4.73	1.39	0.51
26	In threats we see opportunity and we do not focus on threats and the risks associated with change	4.27	1.32	0.66
27	We believe that it is better to take action that most employees will benefit from and the minority will suffer rather than do nothing	5.64	1.30	0.61
28	We try new activities, tolerating the possibility of errors	5.55	0.78	0.51
29	We analyze the hotel operating context on an ongoing basis (external and internal factors relevant to achieving our goals)	5.45	1.03	0.65
30	We have a comprehensive corrective action plan in the phase of overcoming the crisis	5.14	1.22	0.38
31	We believe that we will survive the crisis and return to the original level of functioning in the foreseeable future	4.86	1.46	0.82

The list of factors presented in Table 2 was used to develop scales of individual resilience dimensions in the hotel industry. Table 3 presents the original and modified list of factors in individual resilience scales in the hotel industry. The original version took into account the dimensions of individual resilience scales identified in the literature analysis. The removed statements were only slightly or negatively correlated with the other statements. In this way a high value of internal consistency was obtained.

Table 3: Subscales of Organizational Resilience Potential

Scale	Original Items list	Reduced list of factors	Cronbach's alpha	Item-total correlations
Potential of system redundancy	1, 6, 9, 14, 17, 20, 23, 24, 31	1, 9, 17, 20, 31	0.77	0.38-0.75
Potential of system resourcefulness	2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31	10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31	0.90	0.39-0.74
Potential of rapidity	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	9, 10.11.12, 13, 14.15, 16.17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31	0.90	0.23-0.81
Subpotential of Learning ability	2, 6, 7, 8, 10, 11, 13, 15, 16, 20, 21, 22, 2324, 27, 28, 29	10, 11, 13, 15, 16, 20, 21, 22, 23, 27, 28, 29	0.83	0.37-0.67
Subpotential of Responding ability	1, 3, 4, 5, 6, 8, 9, 10, 12, 14, 15, 18, 23, 27, 28, 30	10, 12, 14, 15, 23, 27, 28, 30	0.80	0.38-0.65

Subpotential of Monitoring ability	2, 7, 9, 10, 11, 12, 13, 1417, 18, 19. 20, 25. 26. 29. 30, 31	9, 10, 11, 12, 13, 14, 17, 18, 20, 25, 26, 29, 31	0.89	0.35-0.86
Subpotential of Anticipating ability	3, 4, 5, 16, 17, 19, 21, 22, 24, 2526, 27, 31	16, 17, 19, 21, 22, 25, 26, 27, 31	0.83	0.29-0.84

Based on the results obtained, a five-stage risk matrix of resilience was developed, assigning the point results of individual measures to appropriate risk categories. The matrices are depicted in Table 4.

Table 4: Resilience risk matrix

Potentials scales / **Risk levels**	**Potential of redundancy** (max 35 points - min 5 points)	**Potential of resourcefulness** (max 133 points - min 19 points)	**Potential of rapidity** (max 154 points - min 22 points)
Very high risk (0.15-0.34)	5,00-11,99	19,00-46,99	22,00-53,99
High risk (0.35-0.54)	12,00-18,99	47,00-72,99	54,00-84,99
Considerable risk (0,55-0,69)	19,00-24,99	73,00-92,99	85,00-107,99
Moderate risk (0,7-0,84)	25,00-29,99	93,00-112,99	108,00-129,99
low risk (0,85-1,00)	30,00-35,00	113,00-133,00	130,00-154,00

The questionnaire also consisted of four sub-measures: a measure of learning ability, a measure of responding ability, a measure of monitoring ability and a measure of anticipating ability. The specified sub-measures can be obtained from the measurement of the potential of rapidity (see Table 3). The matrix of the risk of resilience for individual dimensions is presented in Table 5.

Table 5: Resilience risk matrix for individual subpotentials.

Subpotential scales / **Risk levels**	**Subpotential of Learning ability** (max 84 points - min 12 points)	**Subpotential of Responding ability** (max 56 points - min 8 points)	**Subpotential of Monitoring ability**(max 91 points - min 13 points)	**Subpotential of Anticipating ability** (max 63 points- min 9 points)
Very high risk (0.15-0.34)	12,00-28,99	8,00-19,99	13,00-31,99	9,00-21,99
High risk (0.35-0.54)	29,00-45,99	20,00-30,99	32,00-49,99	22,00-34,99
Considerable risk (0,55-0,69)	46,00-58,99	31,00-38,99	50,00-63,99	35,00-43,99
Moderate risk (0,7-0,84)	59,00-70,99	39,00-47,99	64,00-76,99	44,00-53,99
Low risk (0,85-1,00)	71,00-84,00	48,00-56,00	77,00-91,00	54,00-63,00

The results of individual potential measures can be classified according to the matrix in Table 4 as moderate risk except for the potential of redundancy which was classified as considerable risk. The complete results of the risk assessment are presented in Table 6.

Table 6: Assessed risk of organizational resilience potential

Scale	Score	Potential level [%]	Risk	Characteristic of a resilience potential
Potential of redundancy	24,45	0,69	Considerable	Static resilience
Potential of resourcefulness	104,09	0,78	Moderate	Dynamic resilience
Potential of rapidity	118.64	0,77	Moderate	Total resilience
Subpotential of Learning ability	67,59	0,80	Moderate	Subtotal resilience
Subpotential of Responding ability	45,82	0,82	Moderate	Subtotal resilience
Subpotential of Monitoring ability	69,09	0,76	Moderate	Subtotal resilience
Subpotential of Anticipating ability	48,82	0,77	Moderate	Subtotal resilience

The risk of organizational resilience potential presented in Table 6 should be assessed by managers of hotels according to the Process for Managing Risk included in ISO 31000 : 2018, thus this standard is applicable to all organizations, regardless of type, size, activities and location, and covers all types of risk.

Discussion

The Organizational Resilience Potential Scale (ORPS) has been initially verified positively through a survey of 22 hotels in Poland. However, it should be noted that the study is not a conclusive effort because of its small sample size. The findings could be incomplete and may not be generalized. For the final validation of the ORPS further studies need to be performed. But because of the dynamic crisis situation the study will provide useful suggestions in the context of resilience to the hotel management. The results of the research show that the potential of static resilience is lower than that of dynamic resilience, but generally the potential is at an average level in the examined hotels (mean scores), and the risk associated with its loss is both moderate and considerable. the results of the surveyed hotels vary and there are those that fare better or worse in the context of resilience. One should take into account the differences between resilience and its potential. An organization can have relatively good resilience potential but in the face of such a serious global crisis it can fail and lose its potential, but on the other hand thanks to its resourcefulness can use it as an advantage. This depends on how the organization recognizes threats and if it sees them also as opportunities rather than risks only. Currently we are past the peak of the crisis, in the recovery phase. During this time, dynamic resilience (represented by the potential of system resourcefulness and potential of rapidity) is very important. Polish hotels, after almost two months of not functioning due to the pandemic, including restrictions imposed by the government, are slowly trying to regain their performance through a series of comprehensive actions described in the survey questions, such as an industry-wide demand for governmental assistance for current expenses, marketing to domestic tourists with a focus on specific attributes of the location, price drop on special offers, government vouchers for tourist services for company employees and sanitary audits of hotels. These activities and the structure of hotel guests (79.6% domestic tourists and 20.4% foreign guests) show that especially in terms of resourcefulness one can be a moderate optimist. In addition, the fact that more than 95% of the surveyed hotels declare operation in at least two branches of the hospitality sector (accommodation, recreation and entertainment, transportation, food and beverage or other expenditures) speaks favorably. On the other hand, unfortunately, we still do not know at what exact stage of the pandemic we are currently at and whether there will be any possible recurrence of an increased rate of infection. How long the recovery time will last may depend on the capacity and resources of individual hotels, the strategy adopted (reactive or proactive), but also on governance assistance and many other internal and external factors. The presented tool allows executives to find out what aspects should be taken into account to increase the robustness and resilience of the organization. It is anticipated that the Organizational Resilience Potential Scale after modifications may find universal application in other industries to assess the organization's resilience potential.

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Economic Sanctions as A Means of Influencing International Order as Seen in The Example of The Construction of The Nord Stream 2 Gas Pipeline

Bartosz PACHOLSKI

University of Szczecin, Szczecin, Poland
bartosz.pacholski@usz.edu.pl

Abstract

Sanctions in international law are a significant lever that serves to enforce rules of procedure which the international community perceives as desirable. They involve ensuring efficiency of application of international legal norms, as well as securing interests of actors operating under this order. In the reality of a global economy, particular significance is attributed to economic sanctions. Those who support their efficiency point to the key role of economic impact as a non-military measure, whereas opponents doubt their efficiency as an independent repressive measure and notice burdens associated with the application of economic measures for the authority that introduces them.

The US defence budget act (National Defense Authorisation Act, NDAA) for 2020 adopted at the end of 2019 introduced economic sanctions against operators involved in the construction of the Nord Stream 2 gas pipeline whose second string is to connect directly the Russian Federation with the Federal Republic of Germany. The sanctions affected stakeholders involved in the construction of the pipeline who provided highly-specialised technology necessary to lay gas pipes at the bottom of the Baltic Sea, thus making the company Allseas withdraw from the project, and in consequence halted the work.

The aim of this paper is to analyse the motifs, principles of introduction and effects of application of economic sanctions by the USA with regard to construction of the Nord Stream 2 pipeline. This purpose was implemented be means of the analytical method. The result of the study includes an assessment of the impact of measures applied by the USA on the international economic order and of compliance of decisions that were taken with international law.

Keywords: economic sanctions, international economic law, international relations, Nord Stream 2

Introduction

The decision about building the Nord Stream 2 pipeline which is supposed to be the Russian Federation's second direct gas link with the Federal Republic of Germany has risen controversy among international law actors since its very beginning. The construction of the Nord Stream 1 gas pipeline at the bottom of the Baltic Sea, launched in 2005 and finished in 2011, which bypassed natural transit countries (such as Ukraine, Poland, Belarus or the Baltic republics), was already assessed as a decision that was political in nature. The EU energy commissioner Andris Piebalgs concluded that "(w)e should never have the situation we will have with this pipeline, where one partner country decided a project that is not acceptable to others, not even discussing it" (Beunderman, 2006).

Preparations to start a new investment began in 2012. Nord Stream then informed about the outcomes of its analysis and the economic need and technical feasibility of constructing another gas pipeline at the bottom of the Baltic Sea. An agreement about financing the project was made in the second quarter of 2017. In September 2018, pipelaying operations commenced in the Baltic Sea.

The launch of the investment was responded to with wide international critique. At the beginning of 2018 the US Secretary of State R. Tillerson said that the United States sees the planned Nord Stream 2 gas pipeline between Russia and Germany as a threat to Europe's energy security (Goettig, Kelly, 2018). The critique of the decision to build the gas pipeline also came from the European Commission, Ukraine, Poland and Scandinavian countries.

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By contrast, the German chancellor Angela Merkel has tried to maintain that the construction of Nord Stream 2 pipeline is a common sense economic project, with no political consequence (Wintour, 2018). The investment's supporters also emphasize that any additional gas infrastructure can contribute to increased supply security in Europe (Goettig, Kelly, 2018). One needs to note here that proponents of the construction of the new gas pipeline see the USA's critical stand as acting in its own economic interest which is supposed to encourage European partners to buy American liquefied natural gas.

The first economic sanctions were imposed by the USA at the end of 2019. The US defence budget act for 2020 included stakeholders involved in the construction which supplied specialised technology necessary to lay gas pipes on the Baltic seabed, thus leading to the Swiss-Austrian Allseas withdrawing from the project and announcing just hours after the sanctions were signed into law that it had suspended its Nord Stream 2 pipelay activities. What is more, in mid-July 2020 the House of Representatives expanded and specified the scope of the sanctions at a rare political consensus of the Democrats and the Republicans.

The aim of this paper is to analyse the motifs, principles of introduction and effects of application of economic sanctions by the USA with regard to the construction of the Nord Stream 2 pipeline. This issue is worth analysing in detail due to the application of a rarely seen procedure of imposing sanctions on an ally. A 2015 public opinion poll showed that roughly seven-in-ten Americans see Germany as a reliable ally, and about six-in-ten Germans trust the United States (Pew Research Center survey, 2015). In light of the above, the decision to impose economic sanctions for the construction of the Nord Stream 2 gas pipeline, which the German government believes to be a strategic infrastructural investment, seems controversial. The result of the study includes an assessment of the impact of measures applied by the USA on the international economic order and of compliance of decisions that were taken with international law.

The essence of sanctions in international law

The concept of sanctions is one of the basic elements of the system of international law, understood as an appropriately ordered set of legal norms. As written by S. Wronkowska and Z. Ziembiński (1997, p. 43), if a given stakeholder is an addressee of a certain norm of conduct then the coercion concerning him involves a prediction that certain harm will be done in response to failure to meet a given norm and such harm is called a sanction for exceeding this norm. This definition, however, should not be transposed onto the ground of international law due to the specific construct of this legal order (absence of an authority or coercion apparatus) and a specific status of entities that both create international law norms and execute them. This is why Bierzanek and Symonides (2005, p. 24) define a sanction in international law as a negative response from the international community that a country which violates norms of international law meets with. The legal scholarship points to a highly differentiated classification of sanctions (Florea and Chirtoaca, 2013, pp. 268-269; Antonowicz, 2015, p. 27; Bierzanek, Symonides, 2005, p. 27). A two-level classification of sanctions according to the division characterised by Cała-Wacinkiewicz (2012, p. 6) seems the most relevant - psychological (public response), retaliation (applied by the aggrieved party, such as retorsion, reprisal, trade embargo) and organized (imposed by a relevant international organ, such as organizational, economic, political) sanctions on the one hand, and non-military (included in Article 41 of the Charter of the United Nations) and military (when the lawful state fails to be restored and the UN Security Council deems these measures insufficient) sanctions on the other. Economic sanctions must be included in the category of retaliation non-military measures. Even though they are a relatively new instrument in international relations, they have now become a common and recurring feature in political interactions between states (Caruso, 2003).

The genesis of economic sanctions must be sought in the search for a way to exercise the interests of international law actors in a less risky or controversial manner than a military intervention. At the beginning of the 20th century it was universally seen as a humanitarian alternative to war. As former US president Woodrow Wilson stated in 1919, "(a) nation that is boycotted is a nation that is in sight of surrender. Apply this economic, peaceful, silent, deadly remedy and there will be no need for force. It is a terrible remedy. It does not cost life outside the nation boycotted, but it brings a pressure upon the nation which, in my judgement, no modern nation could resist." (Hufbauer et al., 2009).

Economic sanctions can be generally defined as measures of an economic - as contrasted with diplomatic or military – character taken to express disapproval of the acts of the target or to induce that to change some policy or practices or even its governmental structure (Lowenfeld, 2002, p. 9). Through their economic impact they are to be a means of

exerting pressure by which the sanction addressee changes its behaviour and adapts to the rules of conduct in line with the intention of the actor applying such an instrument. The basic assumption of their functioning is a belief that altering the welfare of people in the targeted society - whether many with comprehensive sanctions, or few with targeted measures - will somehow generate political changes desired by the "senders" (Jones, 2015).

Economic sanctions may be applied both by an individual country and in an organized form by groups of countries or international organizations (such as the UN or the EU). The scope of their application is wide - they may address individuals, a certain group or the entire country (or countries). As M. Wiśniewska (2005, pp. 31-32) writes, generally adopted sanctions universally include:

- export and import restrictions (e.g. embargo on weapons or technology supplies);
- services-related restrictions (transport by sea or air, specialist industrial services);
- financial restrictions and restrictions concerning equity transactions (withholding transfer of cash to the penalized country).

Legal basis of the USA's application of sanctions

Imposition of sanctions by states and the right to apply retaliation measures are one of the most important possible responses to violations of norms of international law. The United States is the most active country in this respect - the authorities of this country have imposed more sanctions than all other countries in total (Andreasson, 2008, p. 17). Application of economic sanctions has been considered a basis of the concept of foreign relations of the American government at least since President Carter's term, which is motivated by treating this type of activity as in intermediate measure between violence and dialogue (Bradford, Ben-Shahar, 2012, p. 377).

The American political system prescribes that the initiative to introduce sanctions may come from the executive or the legislative. The legal basis of the activity of the president in this regard is the International Emergency Economic Powers Act which gives the president special powers to regulate commerce with regard to a specified threat for a period of one year, unless extended by the president or terminated by a joint resolution of Congress (Masters, 2019). This procedure starts most often with the president's issuing an executive order that declares a national emergency in response to an "unusual and extraordinary" foreign threat. The president may also modify sanctions by means of the executive order.

The Congress may pass acts that impose new sanctions or modify existing ones on its own initiative as part of a standard legislative procedure. Sanctions for the construction of the Nord Stream 2 gas pipeline were adopted in this way. On 20 December 2019 the US President Donald Trump singed the 2020 National Defense Authorization Act for Fiscal Year 2020, which is an annual Department of Defense policy bill aimed at covering measures unrelated to defense (Hessler, 2019). In part S. 1441 titled "Protecting Europe's Energy Security Act of 2019" a decision was taken to impose sanctions with respect to the provision of certain vessels for the construction of Russian energy export pipelines, and for other purposes. The motif for introducing this act was the particular relationship between the USA and Europe and the United States should stand against any effort designed to weaken this relationship. The most important point of the act is a provision according to which entities and persons that provided vessels that engaged in pipe-laying at depths of 100 feet or more below sea level for the construction of the Nord Stream 2 pipeline project, or any project that is a successor to either such project and foreign persons have knowingly sold, leased, or provided those vessels for the construction of such a project would be subject to U.S. sanctions in the form of their U.S. visas being denied or revoked, and their U.S. properties blocked. The bill described the pipeline as a 'tool of coercion and political leverage'.

Effects of introducing economic sanctions with respect to the construction of Nord Stream 2

Some 627 companies are involved in building Nord Stream 2 — among them only two pipelaying specialist firms — Allseas Group from Switzerland and Italy's Saipem (Hessler, 2019). Allseas has deployed the world's largest pipelaying vessel, the Pioneering Spirit, to complete the tube's final offshore stretch and it is this company that was the main addressee of the sanctions introduced by the USA. The new law brought about the expected result - the very next day after the bill was singed Allseas stated: "In anticipation of the enactment of the NDAA, Allseas has suspended its Nord Stream 2 pipelay activities. Allseas will proceed consistent with the legislation's wind down

provision and expect guidance comprising of the necessary regulatory, technical and environmental clarifications from the relevant US authority." Thus, the construction of the pipe line was halted in the moment the investment was 94% ready (Reed, Jakes, 2020).

Introduction of economic sanctions was the subject of wide critique, especially in Germany. Germany's minister of finance O. Scholz considered the introduction of sanctions as "a severe intervention in German and European internal affairs". The head of the SDP in Bundestag R. Mützenich took a firmer position seeing the USA's activities as a blackmailing attempt or proof of treating Germany as "vassals obliged to pay tribute" (Kędzierski, 2019). Whereas according to the Greens' MP J. Trittin Washington "treats Germany as a hostile country". The sanctions are also opposed by the European Union. The spokesman for the European Commission informed about on-going analyses concerning the consequences of American actions - in principle the EU opposes imposition of sanctions on EU companies conducting business lawfully and the EC's goal is to ensure transparency and supervision over the Nord Stream 2 gas pipeline according to unambiguous rules (Kędzierski, 2019).

It seems that despite significant hindering of the process of building Nord Stream 2, its construction will be continued. As soon as the day after the introduction of the sanctions, the group laying Nord Stream 2 also issued a statement. "Completing the project is essential for European supply security. We, together with the companies supporting the project, will work on finishing the pipeline as soon as possible". At the beginning of 2020 political support to the project was once again reassured: the German Chancellor Angela Merkel ensured the Nord Stream 2 will be implemented "no matter what", while President V. Putin added that "Russia is capable of completing the project on its own and that it would be finished either by the end of this year or early next year" (Harper, 2020). Experts agree that Allseas' withdrawal is a serious logistic challenge, but Gazprom has the possibility to use their own (Russian) vessels to lay the remainder of the pipeline. It became possible thanks to the consent given at the beginning of July by Denmark's Energy Agency pursuant to which Nord Stream 2 could use pipe-laying vessels with an anchor, rather than those only with advanced self-positioning technology as outlined in the original permit for the project (The Moscow Times, 2020). Finishing the remaining stretch will, however, take considerably longer because Russian vessels lay pipes at a speed that is approximately three times slower than vessels used by Allseas until the sanctions were introduced (Pallardy, 2020).

Impact of the sanctions imposed by the USA on the construction of Nord Stream 2

Introducing economic sanctions by the USA on entities involved in the construction of Nord Stream 2 was a controversial decision and received as an attack on one of US's closest European allies in Europe. Even though representatives of American authorities criticised the construction from the moment the decision about it was made, no measures other than psychological were taken. It only changed upon President Donald Trump's signing the NDAA at the end of 2019. As A. Mikulska from the Center for Energy Studies at Rice University noticed at the beginning of this year "if only the current sanctions remain in place, Russia would be able to lay the pipeline using its own vessels, though with significant delay." (Harper, 2020).

The American side does not intend to stop at the decisions taken last year. After the Danes agreed to the continuation of the construction of the gas pipeline by Russian vessels, US State Secretary Mike Pompeo announced a reversal to guidance issued by his predecessor Rex Tillerson in 2017, paving the way for further sanctions to be slapped on the pipeline (Mackinnon, 2020). Pompeo expressed a clear message to all stakeholders involved in the construction of Nord Stream 2: "Get out now, or risk the consequences". What is more, as early as in the beginning of July the House of Representatives, at a rare collaboration of the Democrats and the Republicans, passed the amendment to the NDAA. New sanctions would expand existing ones to include companies that support pipe-laying activities, as well as insurance and underwriting services (Mackinnon, 2020). On 23 July the Senate adopted the NDAA for fiscal year 2021. The bill require sanctions against persons or companies that engage in any pipe-laying activities for the construction of Nord Stream 2, that facilitate providing vessels for such activities, or that provide insurance of certain services for those vessels. Now the amendment goes to the Senate which in its proposal wants further extension of the sanctions on support vessels and companies involved in certifying the pipeline once it's complete. Germany's Foreign Ministry responded immediately saying that "it noted with regret US plans to expand sanctions on the Nord Stream 2 and that new sanctions would constitute a serious interference in European energy security and EU sovereignty".

At the same time the pressure on stakeholders involved in the construction of the gas pipeline does not subside. On 5 August 2020 three senators – T. Cruz, T. Cotton and R. Johnson warned the German company that operates the port of Mukran, a key staging post for ships involved in the pipeline's construction, that the company, its board members, corporate officers, shareholders, and employees were at imminent risk of "crushing legal and economic sanctions," including visa bans and asset freezes, if they did not cease their cooperation with the project (Mackinnon, 2020). The German Green party's J. Trittin has called the letter an "economic declaration of war", while Mecklenburg-Western Pomerania's State Premier M. Schwesig has described it as "outrageous" and an "attempt at blackmail" (von Hammerstein, 2020).

A key question remains whether new sanctions will enter into force before the project is completely finished because it is obvious that finishing the gas pipeline without access to port infrastructure will be impossible. As rightly noted by Reed and Jakes (2020), Washington could still cause more delays and raise the costs for Gazprom, but most analysts expect the pipeline to be completed because it is so close to the finish line and because Gazprom needs it to bring gas from new fields it is developing to market. Analyst J. Rangel aptly notices that "they are not going to abandon the project, because they have put so much into it". It is worth noting that despite clear support from the government German companies are also not certain about the possibility of finishing the construction. The Düsseldorf -based energy company Uniper which co-finances the construction of Nord Stream 2 admitted in a periodic report published at the beginning of August that due to the growing threat of US sanctions they see the likelihood of this project failing (Widzyk, 2020). To date Uniper has invested EUR 950 million in the construction of the gas pipeline.

Determination of both sides seems high and it is difficult to prejudge today whether the economic sanctions imposed by the USA will manage to hold back the start of operation of the new gas pipeline. As rightly noted by K. Book (Mackinnon, 2020), "The race then is between a slow pipe and a slow sanctions bill".

Conclusion

The above arrangements allow a conclusion that economic sanctions imposed by the USA against actors involved in the construction of the Nord Stream 2 gas pipeline significantly complicated the finishing of the new gas pipeline. Allseas' withdrawal led a to a few-month downtime in the works, the need to modernise Russian vessels in order to adapt them to the requirements of specialist operation of laying pipes at the seabed and postponed the final date for finishing the investment. One of geopolitical outcomes also includes a new transit agreement between Russian Gazprom and Ukrainian Naftogaz which ensures the flow of gas through Ukraine for the next five years (Jakóbik, 2019). The Ukrainian side remains one of the biggest critics of the new gas pipeline fearing significant decrease in the amount of gas transmitted through their territory after the launch of Nord Stream 2.

The assessment of legality of introducing the sanctions from the perspective of international law remains a subject of dispute. As has been mentioned earlier, the very title of the act introducing the restrictions (Protecting Europe's Energy Security Act) and the preamble specifying the allied relations between the USA and Germany is to confirm that the aim of the sanctions policy is Russia's dominant position as the main supplier of the raw material for Europe. Americans fear that in consequence this may lead to the entire European energy sector being dependent on political decisions taken in Moscow. Senator T. Cruz has even called the pipeline "a critical threat to America's national security" (Reed and Jakes, 2020). Many commentators also point to another factor which causes such great motivation of the USA to prevent the launch of the new gas pipeline - the real objective is to obtain the market for American liquefied natural gas (LNG) (Widzyk, 2020). As R. McNally says (Reed and Jakes, 2020) "We want them to buy from us, not the Russians".

There are no doubts on the German side as to the legality of economic sanctions applied by the USA. H. Mass, the German foreign minister, has stated: "with its announcements on measures that also threaten European companies with sanctions, the US Administration is disrespecting Europe's right and sovereignty to decide itself where and how we source our energy. European energy policy is decided in Europe and not in Washington. We firmly reject extraterritorial sanctions" (Maas, 2020). Moreover, Germany's Energy Ministry said in an email to the New York Times that it considered secondary sanctions a violation of international law (Eddy and Erlanger, 2020).

When assessing compliance of the economic sanctions applied by the USA with norms of international law one needs to point out that despite numerous attempts to codify international responsibility this field has not been regulated so far. Universally acknowledged principles of responsibility of international law actors have been developed over the

years by legal commentators and judicial decisions and the achievements of the International Law Commission are most important in this regard (Czapliński and Wyrozumska, 2014, p. 735). They demonstrate that sanctions applied by states are only justified where they are imposed against a country which first violated international obligations. Even though the sanctions concerning the construction of the Nord Stream 2 gas pipeline do not target Germany or Russia directly, their main recipients include European companies which conduct legal activity. This leads to a conclusion that Americans, by means of targeted economic sanctions, want to ensure implementation of its international policy, including energy policy, in Europe. Such action cannot be deemed compliant with international law, especially with regard to a close ally. As aptly noted by K. Westphal (Eddy and Erlanger, 2020), Washington is substituting sanctions for foreign policy and weaponizing interdependence.

The above allows a conclusion that economic sanctions imposed by the USA against the construction of the Nord Stream 2 gas pipeline cannot be considered actions in compliance with international law. An attempt to force the implementation of geopolitical interests by repressive measures cannot be assessed positively regardless of how the motives and outcomes of the decision to lay a new gas pipeline are assessed. In place of this it is suggested that the American side should consider introducing conditional sanctions which would be applied if concerns as to the possible manipulation by Russia of supplies of natural gas to Europe were confirmed.

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E-Access to Public Information in Poland In the Context of Cyber Threats

Dominika SKOCZYLAS

University of Szczecin, Szczecin, Poland
dominika.skoczylas@usz.edu.pl

Abstract

The globalization process and the development of information society have had an indispensable impact on expanding the scope of e-access to public information. Unfortunately, information and communication systems are at risk of various types of cyber threats.
The aim of the paper is to present the concept of universal e-access to public information as part of e-government, taking into account legal regulations in force in Poland. The study will characterize the benefits and threats associated with managing e-information by administrative bodies. The paper provides answers to questions about the aspects that must be closely looked at by public administration when information and communication tools are used in order to be able to ensure transparency and accessibility of public information and security of information processing on the Internet. The research verifies the hypothesis according to which e-access to public information is a basic factor that promotes the principles of e-participation and e-democracy. However, noticing the increasing activity of cyber offenders, optimal organizational and legal solutions need to be created that will ensure cyber security of the information processed in e-repositories.
The study includes characteristics of e-government in the context of managing public information in information and communication systems. Additionally, types of cyber threats that e-access to public information is exposed to are presented on the example of Poland. In order to verify the research hypothesis, regulations concerning network security, e-services and e-government are analysed. The method of interpretation of applicable law and legal comparison methods are employed in the study.

Keywords: E-Access to Public Information in Poland, Cyber Threats, E-Government, Cyber Security.

Introduction

Advantages of e-communication have been recognized and appreciated in the sector of managing public information. Public authorities play the role of the administrator (Sasvari, 2012, p. 35). Innovative technological solutions made it possible to transform the traditional way of making information available into a new type of electronic administration (e-government). E-government also plays a regulatory role involving specification of relations between the sender (administrator-official) and the recipient, e.g. an applicant-citizen or another official. Public information may be given externally or as part of internal administration structures (Romaniuk, 2016, p. 84). Its basic advantages are that the transfer of the message is quick, simple and up-to-date.

Given the positive aspects of using means of electronic communication in public administration and the needs of information society for permanent access to public information, one cannot leave out threats associated with e-access to public information. Security of e-information may be understood in a very broad manner, i.e. as security of computer systems and software and as security of electronically processed data. Ensuring availability of information, maintaining integrity and authenticity of data is a challenge for e-government. Cyber security of e-access to public information also includes protection of critical infrastructure and information and communication resources (Ganczar, 2017, pp. 85-85) and resistance of systems in which e-information is processed to attacks of a cyber-criminal nature.

It is worth noting that in the case of specifying principles of e-access to public information, one needs to take into account technological solutions, requirements of information society and ensuring security on the web. Rules of e-participation and e-democracy cannot be fully implemented if cyberspace is insufficiently protected. Cyberspace threats may result from inadequate application of ICT (hardware failures, disruption of critical infrastructure) or they may involve cyber-attacks. In the latter, assessing whether a cyber-attack will occur is extremely difficult because, in principle, it is unexpected and anonymous.

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Electronic Administration and Managing E-Access to Public Information

Producing and storing information, its processing and practical application are important to information society. Access to information encourages social development, education, implementation of principles of free market economy or friendly administration (Goban-Klas and Sienkiewicz, 1999, p. 43). Universal application of means of electronic communication has had a positive impact on access to public information, ensuring an easy and quick method of remote communication. Information and communication technologies (ICT) allow automatic gathering and processing of unlimited amounts of e-information. An adequately adapted ICT infrastructure that allows constant transmission and updating of information and software that secures data against unauthorised activity of third persons enable full implementation of principles of informatization (Żelazny, 2015, p. 10).

Ensuring universal access to public information is currently the main task of public administration. Adopting an interdisciplinary meaning of public information, it needs to be pointed out that it is "a transferable good that reduces uncertainty" (Szpor, 2016, p.104). Information is a value recognized by society, to which each citizen should have unrestricted access. Depending on regulations adopted in a given state, it may concern a diverse scope of public affairs. Access to public data may also vary and be restricted to a lesser or greater degree. Article 61 of the Constitution of the Republic of Poland of 2 April 1997 (Dz. U. (Journal of Laws) of 78 item 483 as amended, hereinafter: Polish Constitution) emphasized the principle of transparency of public information, which is applied also to electronically processed information. It involves granting citizens a practically unrestricted right to information about the activity of organs of public authority. Specification of the Polish Constitution is provided for in the provisions of the act of 6 September 2001 on access to public information (Dz. U. (Journal of Laws) of 2019 item 1429 as amended, hereinafter: API).

A report from Statistics Poland (GUS) shows that the percentage of people in Poland aged 16-74 who use services of public administration by means of the Internet rose by 4.9% compared to 2018 to amount to 40.4%. A growing trend may be observed in the question of access to broadband Internet for 2019 when 83% of households had it. When it comes to e-government services, the number of downloaded and submitted forms went up in 2019 compared to 2018: downloads - 24.6%, up by 2.5%, submissions - 31.4%, up by 6.8%. The demand for searching for information on public information websites grew slightly, 24.4% in 2018, 24.9% in 2019 (GUS, 2019, pp. 1-3).

Modernisation of public information made it possible to shape a new level of implementation of the principles of transparency, clarity and availability of public information by using ICT solutions for this purpose (Burczyński, 2011, p. 29). A positive aspect of informatization of public administration in Poland consists in the fact that by implementing IT tools it was possible to ensure, in principle, unrestricted electronic access to public information and cases examined by public authorities (Werenowska, 2018, p. 313). The applicants willingly use basic sources of making public e-information available - the Public Information Bulletin, the official information and communication gazette (Article 8(1) API) or services of the ePUAP platform - an electronic platform of public administration services.

Regulations of the EU law are not without significance in reference to legal basis of e-access to public information. Both the cyber security policy and functions of e-government are emphasized. Ensuring resistance of ICT infrastructure, implementation of the principles of a digital single market, universal and transparent provision of information, interoperability of services and counteracting digital exclusion are basic EU principles that allow full e-democracy and e-participation in public life (Banasiński, 2018, pp. 45-47). Next to principles resulting from the Digital Agenda for Europe or the Digital Single Market Strategy, the essence of the concept of universal access to public information as part of e-government may be read by using the content of EU e-government action plans. The European eGovernment Action Plan 2016-2020 clearly states the benefits of e-government. They include i.a. support for administrative processes, improving the quality of services and increasing internal public sector efficiency. It is emphasized that digitalization of the administration sector supports interactions with citizens, reduces the costs of operation of offices, and makes the procedures faster, more efficient and transparent. For the Polish legislator it primarily means that creating a relevant system of managing public e-information requires introduction of principles of e-government.

Transparency and accessibility of e-information as part of e-democracy and e-participation

The use of ICT in order to provide information gratuitously allows increased access by automation of remote transfer of information, which needs to be seen as a positive fact. Simplicity and speed of electronic communication allows

effective management of information, contributes to increased satisfaction among citizens and facilitates improvement of information and regulatory activity of public authorities. Transparency of public e-information is the main principle of e-democracy and e-participation (Fang, 2002, p.4). Benefits associated with managing e-information by administrative bodies are noticeable both for officials and citizens. For the former, they facilitate technical and organizational improvement of providing public information, reduce the time of handling matters, improve efficiency and effectiveness of the message, reduce costs of providing information, ensure automatic activities and correction of information and thus its authenticity, and reinforce the image of a friendly and open administration (Śwital, 2020, pp. 960- 961). In turn, what is essential for citizens is the aspects of universal, unrestricted and fast e-access to public information as well as the possibility to exercise rights in terms of obtaining public information or co-participation in public debate implemented by means of electronic communication (Jastrzębska, 2018, p. 53).

E-participation and e-democracy as part of e-access to public information is possible thanks to implementing relevant solutions that guarantee security of online information processing and at the same time transparency and availability of public information. Therefore, a question arises: what aspects need to be looked at closely when public administration uses ICT tools so that e-access to public information remains undisturbed? First of all, it is key to apply technically best security mechanisms and procedures thanks to which only the information administrator will have control over providing, changing or updating it. He will also ensure confidentiality and integrity of the provided data. His duties will involve protection, supervision and monitoring of access to information so as to prevent unauthorised persons from disrupting e-access. Administrators should introduce a relevant e-information security policy and institutionalized protection principles and practices (AlKalbani et al, 2017, p. 107). E-information security strategies should provide the manner of conduct in the event when cyber security of e-information is at risk of third person activity (cyber-attack) or a technological failure (software failure, system failure). It is a duty of organs of public administration responsible for adequate e-access to public information to respond to all types of threats, regardless of whether they are of a web incident nature, involve activity of cyber criminals, consist in critical infrastructure failure, prevent identification or authentication of details of the person applying for e-information or allow disclosure of confidential information or personal data.

Cyber threats to e-access to public information as seen in the example of Poland

Network disturbances resulting from inadequate use of security software or systems or inadequate operation of them might prove particularly dangerous. Naturally, they are problematic. However, attacks of cyber criminals involving unauthorised access to ICT systems managed by organs of public administration may have much more negative consequences. The effect may involve serious disruption of the operation of e-platforms or infrastructure, distortion, capture or modification of public information, reduction of freedom of access to public information or disclosing personal data or classified information (Więcaszek-Kuczyńska, 2014, pp. 213-214). An attack on confidentiality, integrity and availability of information is a serious threat in the context of cyber security of public information and personal data.

When examining the Polish case, it may be concluded that cyber-attacks did not bypass platforms managed by public administration. In 2012 cyber-attacks were made on servers that host websites of i.a. the Office of the Sejm (lower house of parliament) of the Republic of Poland, the Office of the President of Poland, Ministry of National Defence and the Chief Police Headquarters. In 2014 data from the ICT systems of the Warsaw Stock Exchange was stolen and data of employees of the National Electoral Commission. Currently, it is not only public information of organs of government administration or state institutions that are subject of attacks of cyber criminals. Local government units are becoming an attractive target because they most often have less secure ICT systems and limited possibilities to predict or resist the attacks. For example, the ICT system in a town of Kościerzyna was hacked in 2019 and files and information managed by the municipality office were encrypted. In essence this paralysed the work of the office, it was impossible even to publish public information or pay benefits (Kaczmarek, 2019). Cyber threats to ICT systems in the context of disrupting access to public information cause a violation of basic information rights, of the principle of transparency of public life and of the implementation of the principles of e-democracy, regardless of the type of a cybernetic attack (which might involve distribution of malware (viruses, Trojans or worms), breaking into ICT systems, blocking access to platforms, encrypting data, unauthorised data change, hardware damage or disrupting operation of e-access to public information) (Kesan and Hayes, 2012, p. 442).

The above examples of cyber-attacks cause numerous irregularities in e-access to public information, falsification or unauthorized change of e-data or blocking access to it. They may infringe the protection of privacy, classified information or personal information. Thus, they make it practically impossible to enjoy the possibilities of e-government's remote information services. With regard to processing information in ICT systems, technological threats, next to typical computer offences, may consist in the introduction of the so-called disinformation offensive - unlawful interference in e-data. It may result in unauthorized disclosure of data or, what is worse, manipulation of public information and in effect - serious disruption to e-access to public information (Zawieja-Żurowska, 2019, p. 134). A much more serious result of violation of e-transparency and e-access to public information will involve impossibility to use key services and digital services provided by electronic administration. To be more specific, that is when the cyber-attack concerns ICT infrastructure.

Poland, noticing the problem of disruption of e-transparency and e-access to information, adopted specific organizational-legal solutions with regard to cyber security. Detailed guidelines are listed in the act of 5 July 2018 on the national cyber security system (Dz. U. (Journal of Laws) of 2020 item 1369), which implements the NIS Directive into the Polish legal order (OJ L 194, 19.7.2016, p. 1–30). The provisions of the Cybersecurity Strategy of the Republic of Poland are also significant. The act on the national cybersecurity system in particular highlights cybersecurity of cyberspace in the aspect of resistance of ICT systems against actions which may cause violation of confidentiality, integrity, availability and authenticity of data (information) processed in the system of e-services. Lowering the quality or disrupting the implementation of a public task by a public entity - that is an incident within a public entity - may be treated in categories of a threat to e-access to public information (Banasiński and Nowak, 2018, pp. 160-161). Depending on the organization, it is also essential to introduce e-security policy that addresses the security of the entire ICT system, its development, configuration and changes and the security of processing information and making it available in an electronic form and rules of procedure in the event of a cyber-threat (Suchorzewska, 2010, p. 281). The above encourages a conclusion that an optimal solution will involve developing a security policy for e-access to public information based on the assessment of existing cyber threats and their potential effects for the functioning of e-government. Protection of e-repositories with classified information or sensitive data is a challenge. This is why Poland, noticing the problems of cyberspace, tries to introduce an optimal organizational and legal framework for the security of ICT systems. Cybersecurity of individual e-registers managed by public administration is an essential element of the national strategy (Tumkevič, 2016, p. 83).

Conclusions

The above findings demonstrate that managing access to public e-information is a basic responsibility of public authorities that stores it. Therefore, the concept of universal e-access to public information as part of e-government is worthy of approval because it is the administrative entities that, firstly, are able to ensure uninterrupted access to information and, secondly, create an organizational and legal framework of cybersecurity. In the case of using ICT tools by public administration, one must point to the aspects of ICT security that involve introduction of relevant software, hardware maintenance and appropriate information archiving, as well as to cyber threats that most often involve hacking or cyber-crimes. A positive mark must be given to activities in terms of application of technically best security mechanisms and procedures, supervision of making information available, changing or updating it, and ensuring confidentiality and integrity of e-information. As results from the above analysis, taking care about the above-mentioned elements will ensure security of processing information on the web, and at the same time transparency and availability of public information.

In an extraordinary situation where the source of the attack in not known and sudden, especially if it is of a cyber-crime nature, the public information administrator should take all necessary legal measures allowing uninterrupted access to public information. It may be noticed i.e. in Poland, where the legislator introduces at the national level detailed regulations concerning the processing of public information and the protection of the cyber space environment. Promotion of relevant models of behaviour is also praiseworthy, which is why development of appropriate policies of network security within the organization is crucial. E-access to public information is a basic factor promoting the principles of e-participation and e-democracy. However, noticing the increasing activity of cyber offenders, optimal organizational and legal solutions need to be created that will ensure cyber security of the information processed in e-repositories.

To sum up, the above-mentioned solutions demonstrate that in the time of development of new technologies and information society ensuring web security in the aspect of a service involving e-access to public information provided

for by e-government results in a need to regulate in detail the scope of protection of processing public, personal data and classified information in e-repositories. The activity of public e-information administrators in terms of creating special management policies also is approval-worthy. Therefore, as a postulate, administrative entities should pay particular attention to follow-up actions and also to the preventive aspects of controlling cyberspace in order to frustrate cyber-attacks that hinder the implementation of the principle of e-democracy and e-participation in public life.

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Evolution of The Content of The Right to Be Forgotten in The Internet

Ewa MICHALKIEWICZ-KADZIELA

University of Szczecin, Szczecin, Poland
ewa.michalkiewicz@usz.edu.pl

Abstract

The right to be forgotten was first granted to citizens of the European Union by the judgement of the Court of Justice of the European Union, and then grounded by means of an EU regulation - a universal act that does not need to be implemented and is directly in force in the Member States. The aim of the paper is to show the evolution of the right to be forgotten throughout the years. Outlining the content of this right in 2014 was helpful in this respect, when the Court of Justice expressed its opinion on it. So was comparing it with the content of this right in a 2016 regulation. The analysis is supplemented by a discussion on the most important theses of a 2019 judgement of the Court of Justice which still modifies the final shape of the right to be forgotten. Therefore, the method of interpretation of applicable law is the dominant method employed in this study. As a result, it became possible to specify the full content of the right to be forgotten, the most frequent practical problems that occur when enforcing this right and specific obligations imposed on data controllers. The analysis allows a demonstration of the influence of EU regulations on how courts in Member States adjudicate currently in the cases of protection of the right to privacy. Moreover, an entirely new impact of the right to be forgotten in the aspect of creating one's own identity has been pointed out.

Keywords: Internet, right to be Forgotten, New Technologies, Human Rights.

Introduction

The right to be forgotten functioned already for some time in the legal space of European countries, though it did not have a uniform shape. In France for example it was known in the context of erasing information about the criminal past of convicts who served their sentence and successfully completed the social rehabilitation process (Rosen 2012, p. 88). With time, however, the idea of erasing data that could in various situations violate people's privacy gained significance. Particular interest was ignited by the possibility of applying this right in reference to the digital reality, in which this information is disseminated on an unprecedented scale. The European Commission (EU), by taking up this subject-matter, began works on establishing a legal framework of the right to be forgotten (de Terwange 2013). Nevertheless, before it happened in 2014, the Court of Justice of the European Union issued a breakthrough ruling in which it granted citizens of Member States the possibility of invoking this right and requesting that controllers remove links to search results which could violate their right to the protection of personal data.

The said ruling was to be breakthrough, however, in real life it only stated to whom the order of protection of personal data against its unlawful use is directed. As a result, it turned out that the addressees of this order often do not know how to act in order to implement the CJEU guidelines and instead they apply various procedures of data removal, guided by their own conscience only. All these uncertainties caused the need to introduce relevant legal regulations which would order these issues. However, along with the emergence of detailed legal regulations, the original content of the right to be forgotten, outlined in the CJEU judgement, evolved too.

This study focuses on citing the original content of the right to be forgotten and discussing the most frequent problematic issues in terms of its implementation. The primary content of this right was also compared with its new scope, supplemented by the added regulations. In turn, analyses of the CJEU rulings of 2014 and 2019 and the EU act of law - the General Data Protection Regulation - outline the background for further reflections on the contemporary essence of the right to be forgotten and its role in the national judicial decisions and in shaping its own identity.

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Judgement of the Court of Justice of the European Union

The right to be forgotten on the Internet was constituted in the European system of international law by the judgement of the Court of Justice of the European Union of 13 May 2014 (Google Spain SL *v.* M. González 2014) as a derivative of the right to privacy. The case in question began when Mario Costeja González filed a complaint at the Spanish data protection agency, AEPD, against Google's Spain division. The applicant said that after typing in his personal data into the Google search engine one of the first results display information about announcements regarding the forced sale of his properties, which was supposed to be held more than 10 years earlier, though never did. Not only does this information negatively influence his reputation, but also hinder his operation of his business activity. Given the above, Mr González, invoking protection of his privacy, in particular of his personal data, requested that the said information in search results be permanently removed. The Spanish data protection agency, AEPD, approved his claims for a violation of the right to privacy and ordered that the old information be removed. However, the Spanish division of Google decided to appeal against this decision in court. In turn, the court examining the appeal issued a legal question to the CJEU (Jaaskinen 2013).

When adjudicating the case, the Court of Justice decided against the opinion of the Advocate General and also lay down new rules of interpretation of legislation, which thus far had regulated matters related to search engines and the Internet. It concluded that everyone has the right to request that the controller remove information about them, that everyone who operates data, even in the form of search results, is a controller of such data. This decision was supposed to be breakthrough as it was to guarantee everyone the right to deal freely with their personal data, even if it was made available by third parties.

The mechanism of removing personal data protected under the law was supposed to be simple. The person whose data was made available requests that it should be removed and every operator who processes such data should comply with such a request. Adoption of such a broad interpretation of the right to be forgotten resulted in the announcement of the new age of the Internet immediately after the discussed decision was issued. The said age was initiated by enabling us to independently administer any available information about us. However, with time, these hopes were verified.

Original content of the right to be forgotten

An in-depth analysis of the decision issued by the CJEU demonstrated that the entity requesting protection of his personal data, cannot, nevertheless, administer it freely. A final decision on whether the given information should be left in the digital space is taken by the processor. It is up to him if the produced content is deemed "inadequate, irrelevant or no longer relevant, or excessive" (Google Report 2019) and removed, or whether it will be left there due to a valid social interest. What is more, it turned out that the universally used term removal of personal data in fact only means the order to delist websites where the personal data under protection is placed. This means that the source data will still be left in the digital space where it was originally published or in places where this information was reproduced (Sikorski 2017, p. 55). Therefore, a consequence of the use of the right to be forgotten does not consist in complete removal of submitted personal data, but making it more difficult to find it by eliminating links that may lead to this data (de Terwangne 2013, p. 6).

The subject-matter of using the right to be forgotten afforded to everyone became much more complex than first commentators of the judgement predicted. The Court of Justice, apart from confirming that such a right is afforded to us and presenting who, in the meaning of the provisions of the EU law (Directive 95/46/EC), may be treated as a controller, did not establish any rules on the basis of which the right to be forgotten ought to function. As a result, difficulties in executing the said right have occurred in practice.

First, a problem related to the need to establish common premises appeared, where on the basis of such premises the controller will decide about removing or leaving such data. Guidelines in this respect were first drawn up only by Google and for a very long time they had an internal character. This meant that all requests submitted under the right to be forgotten were examined by internal teams of lawyers of individual divisions of Google. In the first days after issuing the judgements, individual divisions even held meetings on how to carry out the new obligations imposed on them. During such a session in the Polish division of Google, it was even discussed whether actual delisting is necessary or whether the CJEU judgement can be complied with by moving the said links to the very end of the list of search results (Słowik 2014).

Secondly, no official procedure of removing personal data was established which is why the appeal procedure in each country could be subject to different rules. This gave rise to certain claims of unequal treatment in individual Member States of the European Union. Lack of procedural unity also caused uncertainty as to whether internal rules introduced by Internet corporations will truly implement the CJEU's will.

Thirdly, the right to be forgotten was restricted with regard to persons participating in public life, thus it was deprived of the nature of an absolute right. It mostly concerns the fact that removal of certain content should not violate the right to information. Critics pointed out, however, that taking care to protect one right, we fail to notice that the mere granting of the right to be forgotten violates the essence of freedom of expression (Lee 2016, p. 544; Newman 2015, p. 507). The possibility to have any information removed will make it more difficult to express one's opinion on a given subject honestly and unrestrictedly.

Evolution of the content of the right to be forgotten

Entering the right to be forgotten in the act of given law, that is the Regulation on the protection of personal data of 27 April 2016 (EU Regulation, 2016/579 - GDPR), provides a certain solution to the discussed problematic issues. Article 17 of this act presents situations in which "the data subject shall have the right to obtain from the controller the erasure of personal data concerning him or her without undue delay and the controller shall have the obligation to erase personal data without undue delay". The catalogue of premises presented in the said article is of a closed nature, which means that only in these situations can one request that their personal data be erased. These include, for example, situations where the personal data is revealed without prior consent from the data subject, where the data subject gives their consent but then withdraws it or where the data is unlawfully processed.

Placing such regulations in an EU act of law which is directly applicable in European Union Member States and does not require implementation eliminated the problem of the lack of premises on the basis of which the controller examined requests of individual persons that their personal data be erased. At the same time, the possibility of direct application of the provisions of the regulation eliminated the lack of equality as to application of various appeal procedures in cases related to appeal against refusals to have one's personal data erased. Ultimately, Article 17(3) GDPR also established clear and precise premises concerning situations in which the right to be forgotten may be restricted or suspended, e.g. where the right of freedom of expression and information must be protected; where data processing constitutes an implementation of a legal obligation vested in the controller; where data processing is necessary to exercise or defend legal claims.

Given the above, it might seem that the right to be forgotten has gained a relevant legal shape and has become a fully enforceable right. However, one must point out that it has come across one difficulty when it comes to the issue of its application - territorial scope of its validity. Since the judgement in Google Spain SL vs. Mario Costeja González, a question about whether the European Union is entitled to demand that the right established by it be effective has been coming up.

Ultimately the doubts were only dispelled in the CJEU judgement of 24 September 2019 in the Google LLC vs. CNIL case (Google LLC *v.* CNIL,2019). This judgement sad that the territorial scope of the right to be forgotten includes the territories of the European Union Member States. In practice it means that the internet search operator is obliged to remove any personal data or to hinder access to it only in those versions of search engines which operate in the EU countries. Still, though, it will be possible to find this information in search engines which operate in other countries.

The above judgement expanded the possible behaviour of controllers with making it more difficult to access information from searches, and also outlined the area of enforceability of the right to be forgotten - it is only the territory of the European Union. The content of this judgement could not be different, of course, since it is difficult to expect internet corporations, operating e.g. on the territory of the United States, to comply with the law constituted by an international organization to which they do not even belong. Theses of this judgement only show that exercising the right to be forgotten has its limits. Despite declarations from some countries (which come from other continents too, e.g. India), which, inspired by the operation of the European Union, themselves want to introduce on their territories similar regulations that protect personal data (Abishek 2019), the scope of application of the right to be forgotten is limited. This of course results in the weakening of the protection of personal data, which was granted to each person on the basis of the generally applicable EU law.

Such a state of affairs causes doubts concerning the validity of granting EU citizens this tight that cannot be fully implemented since relevant legal tools for it are missing. However, at the same time this forces the strive to establish international cooperation between countries located not only in Europe but also on other continents. Establishing such cooperation is, however, very difficult given mostly the cultural differences between individual countries (Rosnay, Guadamuz 2017). The discussion on the introduction of the right to be forgotten to the national legal system is currently happening in the United States of America. Adoption of solutions modelled on the EU ones is, however, criticised by opponents of this idea due to the Americans' attachment to the First Amendment of the US Constitution which guarantees freedom of expression and information (Heilweil 2018).

Despite these critical comments, it is worth noting that the right to be forgotten has a great impact on the decision-giving activity of courts of Member States when adjudicating national cases for protection of privacy. In 2018, the England and Wales High Court ruled in the case of a businessman who demanded the removal of Internet links to pages with information about his conviction for a criminal conspiracy in order to falsely account for his real estate sale activities. The court dismissed the businessman's request pointing out that firstly, he is a public figure and secondly, persons who intend to cooperate with him in the future should know about his criminal past, which falls under their right to be informed (D. Heywood, 2019; NT1, NT 2 *v.* Google LLC). In the same year, the Regional Court in Amsterdam ordered Google to remove links to websites on which unofficial "black lists" of doctors operated. The court concluded that a surgeon whose personal data were placed on such a website due to a disciplinary procedure for committing a medical error has the right to request protection of his reputation. The court noticed that placing the applicant on the said lists is like a "digital pillory" which serves to defame doctors. True information about the doctor and the proceedings against him can be found without a problem on the official websites of the Dutch health service. This information, however, is not of a pejorative nature as is the case of the compiled "black lists" (D. Heywood 2019; W.C.E. baron van Lynden te Amsterdam *v.* Google LLC).

Then, it needs to be shown that the right to be forgotten was supposed to become primarily a guarantee of protection of broadly understood privacy and majority of researchers focus on this very aspect. However, in reality, it may be read in a multidimensional way - not only as a protection measure, but also as a creational tool. The possibility to remove information about oneself from generally available Internet sources may be an excellent way to shape one's identity, and at least its individual elements. M. Gonzalez's example supports this thesis and so does the said blurring of criminal sentences. This means that even information that was once legally published but is now outdated can be removed from search results (Korenhof, Ausloos, Szekely, Ambrose, Sartor, Leenes 2014).

Thus, in the case of a possibility of excising the right to be forgotten (where the catalogue of premises that substantiate refusal is closed) may to a certain degree determine what information about us will be available on the Internet and, in consequence, how we will be seen by the society. One needs to remember at that the right to be forgotten covers with its scope only this personal data which has an objective character and on the basis of which we can be identified, therefore limits of creating our identity by using this right have a restricted character. This is also backed up by the fact that each request for removal of personal data is examined individually by controllers according to the GDPR guidelines and their own subjective assessment of it. This is why many studies show that exercising the right to be forgotten should be a last resort, while first one should always think about the consequences of making their personal data available on the Internet.

Summary

The right to be forgotten has evolved significantly in the few years of its operation in the EU legal space. From a fragmentarily regulated order that controllers remove personal data on request, to a right placed in generally applicable provisions of given law. And although at the moment not only the personal scope of this right is known, but its material scope has also been regulated in detail, this right is still not fully enforceable.

Firstly, always when removing specific information or making access to them difficult, the human factor plays a significant role, that is a person who examines a submitted request. Secondly, the right to be forgotten has a specified territorial scope, thus it is valid only on the territory of the European Union. Information that will be removed in EU Member States will still be present in search engines of other countries. Finally, developing a global consensus as to the right to be forgotten seems currently impossible due to cultural differences which divide individual countries.

However, this does not mean that the right to be forgotten is an unnecessary right. In the age of digitalization of life and unrestricted dissemination of information, there must be a fuse which will allow for it to be controlled or possibly removed if it should violate certain social or legal standards. At that, one needs to note that the mere creation of legal rules which on the one hand will secure the right to privacy and on the other will protect the right to be informed and the freedom of expression was incredibly difficult. It is worth pointing out that the right to be forgotten, apart from its typically protective function, may also play a creational function, because by managing one's own data we can also create, to a certain degree, how others will see us.

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Project Management of a Research Internship in Medical Applications

COSTACHE Simona

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, simona.costache@upb.ro

ULMEANU Mihaela-Elena

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CE Building, District 6, Bucharest, Romania, mihaela.ulmeanu@upb.ro

DOICIN Cristian-Vasile

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania cristian.doicin@upb.ro

SPÂNU Paulina

University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania paulina.spanu@upb.ro

Abstract

Design and development of medical applications often require a multidisciplinary approach in order to accurately identify the specific needs of customers. Due to the complexity and multiplicity of knowledge and information sources, a structured approach to product design and development of medical applications brings several advantages, specific to the research area, amongst which: standardisation and regulation of preoperative and postoperative medical care of patients, improvement in patient compliance, more accurate medical training materials and devices. The purpose of the current paper is to present in detail a methodology for management and implementation of a research internship as a project that brings together knowledge and competences acquired in medical applications design. The research internship was undertaken within an academic context and environment, based on a structured approach and it applies the basic principles of project management such as project initiation—defining the problem, determining project feasibility by research, planning-monitoring-control, execution and evaluation. This research paper summarizes the background and the purpose of the research internship, describes the process and the methods used to accomplish the tasks by defining the resources, calendar, activity plan and by evaluating the final results at the end of the process.

Keywords: Project Management, Medical Applications, Mandible, 3D Printing.

Introduction

Project management is the discipline which addresses how to initiate, plan, execute, control and conclude the individual or teamwork, in order to achieve specific objectives and key success criteria. Project management involves people able to apply knowledge, techniques, a wide range of skills and tools to meet the requirements of a project. According to Artto A.K (1999) many of the projects that were not completed on time, did not fit in the budget or were not completed to the expected quality, are due to the lack of project management strategy or a project manager able to ensure success by integrating all aspects of the project, bringing together its strengths and weaknesses. Hagan P. (2012) highlighted that the concept of project management is used in a wide array of areas, like engineering, industry, information systems, financial services, medical and health services, commerce, education and training etc.

Payne M.J. et al (2011) underlined that there is little published research and information describing the usage of project management in medical applications due to the pressure of creating an efficient project plan. This entails costs

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and time savings as much as possible, but at the same time with appropriate risk management and quality assessment, to avoid affecting the patient's health and wellbeing.

It is a big challenge to bring together improvements of the healthcare system that haven't been tested before and the patients' life, but studies also show that not just once, the approach of project management in medical applications led to the identification of risks and, thus, managing to implement the project without unfortunate results.

In this case, the aim of the research internship was to design and develop an experimental model of a complete edentulous mandibular bone, using reverse engineering and 3D printing techniques. Research timeframe was set at 4 months by the specificity of the academic agreement. The role of the project manager was assumed by an engineering masters' student. Thus, a list of required abilities has been structured to facilitate the implementation of the projects' aim adapted from Hagan P. (2012), as follows:

- Adapt to and participate in change;
- Problem solve in unfamiliar situations;
- Use a system approach;
- Identify strengths and weaknesses;
- Apply appropriate technical knowledge;
- Have advanced problem-solving, analysis and synthesis skills;
- Ability for engineering design and creativity;
- Be able to think and work individually and in teams;
- Listening, influencing, motivating and communication skills;
- Need for continuous improvement.

Unlike commercial projects or curse guidelines, Lopez C. (2010) shows that the project management of an academic research internship is based on two main components: the student's ability to apply all previously acquired knowledge and the skills to understand, analyse and evaluate their own work, submitted throughout the internship. Due to the academic context of the internship implementation, the main project management challenge in terms of resources, tools and techniques used was the structuring and the automation of the process. In terms of innovation, the topic of the internship was considered as the main asset. Nevertheless, the complexity of designing an experimental model of a complete edentulous mandibular bone, together with the limited timeframe and the low medical expertise of the engineering masters' student, made this project a challenge. The current study describes the main project management stages, starting with the idea all the way until developing real medical products, by setting goals, defining key indicators, planning activities, controlling and evaluating the obtained results.

Process Specification and Methods

The research internship was undertaken by an engineering senior masters' student from University POLITEHNICA of Bucharest and it entailed a five-step process flow (Figure 1).

Figure 1: Project management structure adapted from Payne M.J. et al (2011)

The initiation phase represents the answers to few main questions that every project manager must think about such as: Why to create this project? It is feasible? and if so, what it is needed to complete it? Once the project manager got the answers to them all, the project can step forward to the second phase: Planning. The most common method as an answer to all the questions is brainstorming method.

Planning phase, the core of the project management, speaks about creating the team and represents the stage where all the member have to set the main objective of the project, the expected timeframe, budget, individual or group activities, potential risks and backup solutions etc. For the planning stage of the projects, there are several software that can be used such as Microsoft Planner, Windows Primavera etc.

The third phase of project life cycle refers to the execution of all activities defined on the planning stage. The execution is mainly based on the communication and collaboration between all members of the team and each member's sense of responsibility to accomplish the given tasks.
The next phase, monitor and control, represents the responsibility of the project manager to ensure the smoothness of the development of the process in terms of deadlines, costs and efficiency. In order to do it, the project manager can create chat groups, plan meetings or can ask activity reports to each member of the team.

During the last phase, the closure of the project life cycle, represents the simulation of the results and the review of each member's contribution. The results stage can help the project manager to define which were the strengths of the actual strategic plan in order to use them for future projects.

Project Results

Initiation

The project main goal was the design and development of a completely edentulous mandibular bone experimental model by using reverse engineering and additive manufacturing techniques. The developed prototypes aim to be used in academical environment, by the PhD students on the Department of Dentistry, Faculty of Medicine, University of Coimbra, Portugal, as preoperative patterns, in order to simulate the surgeries and so to avoid unfortune mistakes or complications.

As main partners of the project Department of Dentistry, Faculty of Medicine, University of Coimbra, Portugal together with the Faculty of Biomechanical Engineering, Polytechnic Institute of Coimbra, Portugal decided to assign the project idea as an internship stage work to a master engineer student, in the role of project manager and they defined the timeframe as being 4 months.

Once assigned the topic and the main roles, a first meeting of the entire team has been planned, in order to introduce the tools and materials that the faculty provided, the offices, laboratories and workplaces where the student together with the whole team could work during his stage.

Planning

From the very beginning, the main partners together with the project manager set the most important objectives of the project such as: MO (main objective): Design and development of a completely edentulous mandibular bone and five secondary objectives: O1. Research of at least 100 scientific papers within 4 weeks on the current state of the art, O2. Converting medical DIICOM data and developing two 3D mandibular masks (trabecular and cortical), O3. Developing two 3D mandibular molds by the end of the 3rd month of the project time, O4. 3D printing of one trabecular and one cortical mold assembly, O5. Developing at least two final prototypes by the end of the internship stage.

In order to ensure a good life cycle of the project and to reach the expected results, a list of possible risks and their contingency plan has been drawn up, forecasting the weight of each of them and it have been allocated grades from 1-3 to describe the level of importance and the impact that can have it on the project life cycle: 1- Low impact; 2- Medium; 3- High impact. The score was calculated by multiplying the contingency grade with the level and importance, the total score showing up the probability that the project to be feasible. Table 1 shows the risks' forecasting of the actual project.

Table 1: Risk analysis

Risk	Objective	Contingency plan	PI	Weight [%]	Score
1. Failure of the 3D printing equipment	O4	The labs are equipped with more than one printer	1	15	0.15
2. Inability to find suitable materials for the injecting process	O5	The Department of Biomedical Engineering provides basic materials such as foam and plastic in order to be able to test the molds and the methodology	3	15	0.45

3. Inability to provide medical data of patients	O2	Using online databases with free medical data access (eg. COCHRANE)	1	10	0.1
4. Risk of delaying the materials delivery	O5	The mold will be tested with the backup materials until the proper delivery	1	10	0.1
5. Risk of FEA simulation results to be different than the real mandibular bone	O5	It will be considered just the methodology of creating the prototypes	2	50	1
*[PI] Potential Impact: 1- Low; 2- Medium; 3- High				**100%**	**1.8**

Succeeding the qualitative analysis of the project risks and considering the maximum possible risk value being 4, it has been concluded that the risk incidence rate of the current project is low (1.8).

For a cleaner picture of the steps to follow in order to achieve the main objective, to all the secondary objectives have been allocated a list of activities and responsible members from both main partners of the project. Table 2 represents the human resources list and the distribution of the objectives for each member.

Table 2: Human resources and task distribution

Team members	Task distribution
Project Manager	Managing and organizing O1- O5 activities
Biomechanical Engineer	Ensuring support and overseeing all O1-O5 activities
Dentist	Ensuring support to the researches from O1, Approving the mandibular models from O2 and O5
Dentist Trainee	Ensuring support to the researches from O1 and testing the prototypes of O5
Design Engineer	Ensuring technical support and developing O2, O3 models
Technician	Ensuring technical requirement and support from O2, O3, O4

It is true that the cost, time and quality are predominant criteria to ensure the main scope of the projects, but for a more accurate success, the project manager defined also a list of key performance indicators for each objective such as: KPI_1: one documentation file related to state of the art in additive manufacturing, anatomy of mandibular bone and reverse engineering; KPI_2: two STL masks of mandibular bone parts (trabecular and cortical), KPI_3: two 3D models of trabecular and cortical molds; KPI_4: two 3D printed trabecular and cortical molds; KPI_5: at least two mandibular bone prototypes.

In the end of the internship stage, the project development was examined through the help of this KPI set. Table 3 represents the relations between the objectives and their allocated activities and the KPI.

Table 3: Working plan and relation between objectives and KPI

Main objective: Design and development of a completely edentulous mandibular bone
O1. Research of at least 100 scientific papers within 4 weeks on the current state of the art
KPI*: one documentation file related to state of the art in additive manufacturing, anatomy of mandibular bone and reverse engineering
A1.1. Mandibular bone anatomy
A1.2. Additive manufacturing
A1.3. Reverse engineering techniques
A1.4. Establishing necessary materials and equipment
O2. Converting medical DIICOM data and developing two 3D mandibular masks (trabecular and cortical)
KPI: two STL masks of mandibular bone parts (trabecular and cortical)
A2.1 DIICOM data processing
A2.2 Desinging two separated masks for the mandibular bone (trabecular and cortical)
A2.3 Creating the STL files of both trabecular and cortical models

O3. Developing two 3D mandibular molds by the end of the 3rd month of the project time
KPI: two 3D models of trabecular and cortical molds
A3.1 Convering and importing the STL files in CAD software
A3.2 Design and development of the trabecular mold
A3.3 Design and development of the cortical mold
A3.4 Grippers simulation
O4. 3D printing of one trabecular and one cortical mold assembly
KPI: two 3D printed trabecular and cortical molds
A4.1 Creating the G codes of the molds
A4.2 3D printing of the trabecular mold
A4.3 3D printing of the cortical mold
A4.4 Grippers acquisition
A4.5 Assembling simulation
O5. Developing at least two final prototypes by the end of the internship stage
KPI: at least two mandibular bone prototypes
A5.1 Acquisition of necessary materials and tools
A5.2 Development by using injection methods of trabecular prototypes
A5.3 Development by injection methods of cortical prototypes
A5.4 Testing the prototypes
*KPI= Key Performance Indicators

For a smoother image of the project development and in order to allocate the costs and the time of each activity, the project manager implemented the Gantt Chart method for the time efficiency and defined a list of expenses as a budget breakdown list. Table 4 represents the Budget breakdown of the project.

Table 4: Budget breakdown

No.	Category	Units	Price [euro]	Total [euro]
1	**Personnel expenses**			
1.1	Project Manager	16 weeks	10 €/h	3200
1.2	Biomedical Engineer	16 weeks	8 €/h	2560
1.3	Dentist	6 weeks	8 €/h	960
1.4	Dentist Trainee	2 weeks	5 €/h	200
1.5	Design Engineer	2 weeks	8 €/h	320
1.6	Technician	1 week	6 €/h	120
2	**Logistics expenses**			
2.1	Software license (Materialise Mimics, SolidWorks)	2	2595+1295	3890
2.2	Materials (Polyirethane Foam, Liwuid Plastic)	3	85	255
2.3	Tools (screws, syringe, threaded rod, etc.)		100	100
2.4	Consumables (paper, pens, gloves,lab coats, lab glasses,etc.)		500	500
3	**Fixed assets**			
	Electricity, water, heat, etc.		1500	1500
			TOTAL	**13605**

The project was implemented over a period of 4 months (W1 ÷ W16), without working weekends, and the activities were organized in the form of a logical and consistent sequence, assigning a time limit for each of them, as shown in Table 5 below.

Table 5: Gantt Chart

	ACTIVITY	START	DURATION [weeks]	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
A1	Research of at least 100 scientific papers within 4 weeks on the current state of the art			A1															
A1.1	Anatomy of mandibular bone	W1	4																
A1.2	Additive manufacturing	W2	1																
A1.3	Reverse engineering	W3	1																
A1.4	Establishing necessary materials and equipment	W3	2																
A2	Converting medical DIICOM data and developing two 3D mandibular masks (trabecular and cortical)							A2											
A2.1	DIICOM data processing	W5	1																
A2.2	Designing two separated masks (trabecular and cortical)	W5	3																
A2.3	Creating the STL models for both trabecular and cortical	W7	1																
A3	Developing two 3D mandibular molds by the end of the 3rd month of the project time									A3									
A3.1	Converting and importing the STL files	W7	1																
A3.2	Design and development of customized trabecular mold	W7	2																
A3.3	Design and development of customized cortical mold	W9	2																
A3.4	Grippers simulation	W11	1																
A4	3D printing of one trabecular and one cortical mold assembly													A4					
A4.1	Creating the G codes of the parts	W11	1																
A4.2	3D printing of trabecular mold	W11	1																
A4.3	3D printing of cortical mold	W12	1																
A4.4	Grippers acquisition	W13	1																
A4.5	Assembling simulation	W13	1																
A5	Developing at least two final prototypes by the end of the internship stage																A5		
A5.1	Acquisition of necessary materials and tools	W14	1																
A5.2	Development by injection of trabecular prototype	W14	1																
A5.3	Development by injection of cortical prototype	W15	1																
A5.4	Testing the prototypes	W16	1																

Execution

As a summary of the execution plan, the partners from the Department of Dentistry had to acquire DIICOM data from the computed tomography scan of the patient, which represents the 2D scan images of the mandibular bone of the patient and the first input of the project. Starting with it, they had to share with the master engineering student the personal medical paper of the patient, his anatomical stage and basic details of the research about the medical applications.

The PhD Dentist trainee had to present the requirements of the future mandibular product, to show the techniques and methods of how it will be used, in order to create the hypothesis of the project and to give an overview of the final product to the engineering student. Once them all have been set and the research was ready, the report has been written and the first objective was accomplished. Throughout the research on the anatomy of the mandible, the student developed medical skills and relevant knowledge about the mandibular bone, the meaning of trabecular and cortical part and most important, mechanical properties of each part of the bone, necessary for finding similar materials that can be used to create the experimental model.

Reverse engineering ended up being the most useful way to develop the mandibular model, by starting from the CT scan of the patient, turning it into a 3D model using customized medical software. In order to design the medical data, the biomechanical engineer and the master student defined as tool the medical imaging software Materialise Mimics. The main goal of the activities was to separate the bone in two different masks as trabecular and cortical part. The STL files of the masks have been created and so the second objective was done.

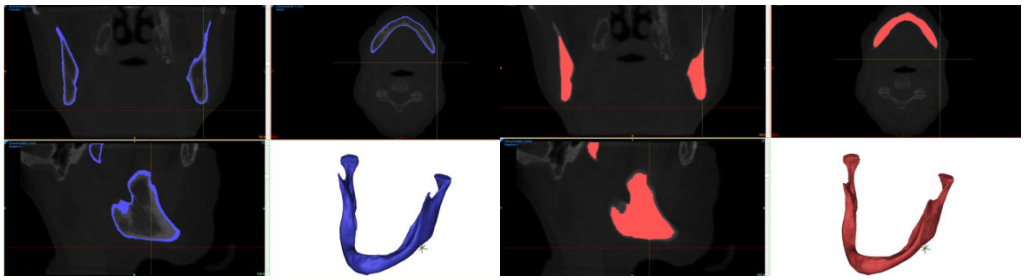

Figure 2: STL trabecular and cortical masks

The next step on the project plan was the development of 3D molds of each mask. The team members that assumed this task were the biomechanical engineer and the master student. Solidworks software was the main used tool for designing and simulating the assembly of the molds and once accomplished, the third objective has been reached.

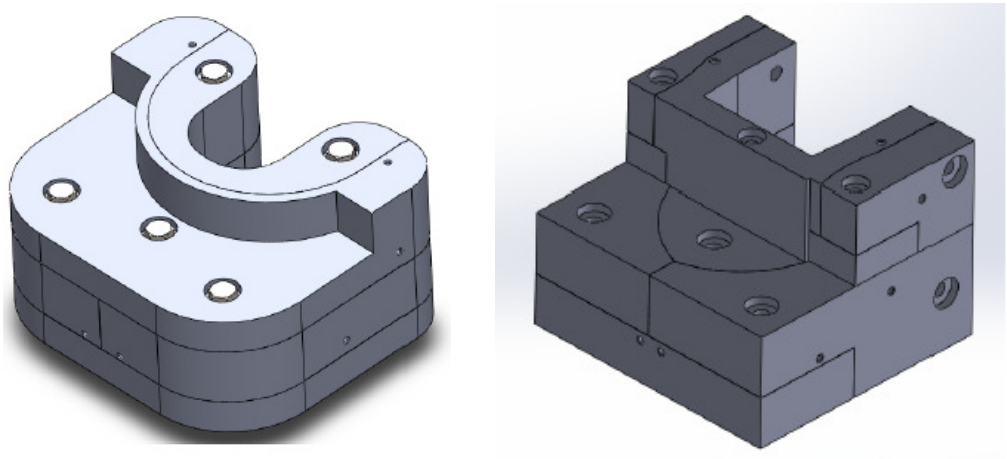

Figure 3: Trabecular and cortical molds designed in Solid Works

The fourth objective speaks about the 3D printing of the molds. First step was to create the G codes of the files, a data format that can be read by the printing equipment. The 3d printer used was FlashForge Adventurer 3 and the task have been allocated to a team created by the biomechanical engineer, a design engineer and the technician.

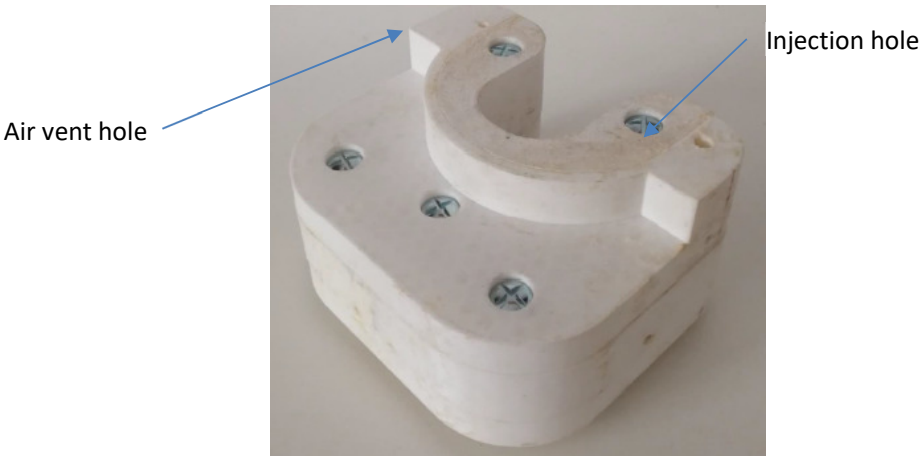

Figure 4: 3D printed trabecular mold using FlashForge Adventurer 3 3D printer

The development of the mandibular prototypes, last objective of the project plan, meant to assembly the trabecular mold, to inject the material for the inner surface and so to create the trabecular side, followed by positioning the created part inside the cortical mold and a second injection procedure to be applied with a tougher and stronger material, in order to create the external side. Polyurethane foam and liquid plastic were the chosen materials for the last stage and the task was allocated to the master and the biomechanical engineers.

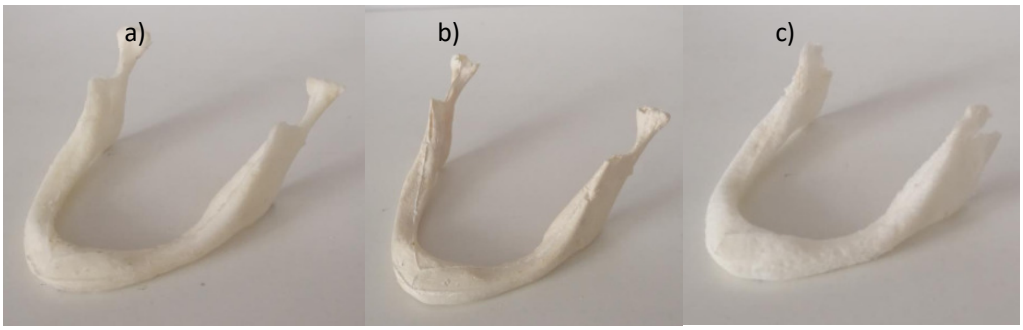

Figure 5: Mandibular prototypes: a) Polyurethane foam (density 128-240 Kg/m³); b) Liquid plastic; c) Polyurethane foam (density 1080-1230 Kg/m³);

Control and Monitor

The control and monitor part of the project management consisted mainly of meetings organized with all the members involved on the team, status reports were written for all the task of each of the team members, ensuring the closure of the project before the ending of the deadline.

Results

The project has been delivered on time, documentation was written as a final report and it has been presented as a pitch PowerPoint presentation in front of the committee composed by members of the team and one outside teacher from the Department of Biomechanics.

The final products, three models of experimental mandibular bone were created and tested using finite element analysis, in order to see which material is getting closer and responds to the tests the same or most like the mechanical properties of the real mandibular bone.

On the following table is shown the correlation of the results with the defined objectives of the project.

Table 6: Objectives and the correspondent results

Objective	Results
O1. Current state of the art.	R1. Final report and documentation speaking about the usage of additive manufacturing and reverse engineering techniques in medical approaches
O2. Design of medical data	R2. Customised STL files of two separated mandibular masks (trabecular and cortical)/ Mimics Materialise Software
O3. Computer Aided Design of the mold	R3. Two different 3D CAD models / Solidworks Software
O4. 3D printing of the molds	R4. Two separated 3D printed molds using FDM additive manufacturing technologies/ FlashForge Adventurer 3
O5. Development of the final products	R5. Three prototypes/ Polyurethane, Foam & Liquid Plastic

Conclusion

The project management plan led to a successful process, all the objectives have been accomplished without delays or added costs. Regarding the final products, the mandibular prototypes have been used by the PhD Dentistry trainee as samples for surgical simulation and the documentation obtained created a structured methodology of developing anatomical models by using additive manufacturing and reverse engineering techniques that can help both on subject global evaluation and on individual projects' evaluation. These have been adapted to a university context where some specific restrictions existed: professors and students' dedicated time, professors' workload, and diversified nature of the projects. Currently, the products and the process are being used by the dentistry trainees in collaboration with master engineers to develop a customized mandibular pattern that can help prevent unfortunate events during surgical procedures. The products may also allow the comparison between preoperative intervention and the postsurgical results and help the surgeons to receive feedback of their work.

Regarding future research, the methodology of the process to develop mandibular experimental models is open to improvements in terms of time, costs and other materials with more similar mechanical properties in comparison with the real mandibular bone.

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Reading Habits of User Affecting Reading Culture in Public Library *XYZ*

Siti Nur Aidah JOHARI
Universiti Teknologi MARA, Shah Alam, Malaysia,
sitinuraidah532@gmail.com

Nurhidayah HASHIM
Universiti Teknologi MARA, Shah Alam, Malaysia,
nurhi066@uitm.edu.my

Mohd Yusof MUSTAFFAR
Universiti Teknologi MARA, Shah Alam, Malaysia,
yusof769@uitm.edu.my

Abstract

Based on the previous research, there are numerous studies done in order to identify the benefits of reading habits among user in the public library. The purpose of this research is to identify the ways to promote reading culture in Public Library XYZ. The significant of the research address how the reading habits of user affecting the reading culture in the Public Library XYZ. This study will give huge contribution to the library and society. As for the library, they can prepare a well plan activities and suitable materials to ensure the reading culture among users will sustain. The respondent of this study is among users from Public Library XYZ itself. The users will be determine based on their Library ID card or it call MyID that represent the membership or non-membership of the library users.

Keywords: Reading, Reading Habits, Reading Culture.

Introduction

Reading is a hobby that widely should be chosen by people nowadays. This hobby is important and priceless activities to do in leisure time. Reading activities is important to develop the habit of reading which it not just for knowledge but also for personal growth and development. It develops positive thinking and gives a better perspective in life. Reading habits significantly known as a beneficial hobby with a million of advantages to daily life. According to Lindita Skenderi & Suzana Ejupi (2017), reading habits are undoubtedly developed and learned from earlier age. Library users in 21st century have a lot of opportunity to read a book in order to do better in life. These days, by reading, people might have a great academic performance. There are many readings programmed and competition that given gifts as a prize pool. For example, storytelling competition, short video competition and others in any festival might give a huge impact to contester. Reader tend to read a reading for fun during their leisure time. The reading culture is often promoted because knowledge is seen as a form of power in contemporary times. In the era of information explosion, people need to have a knowledge to classify all the information received, which one is useful and which one is not? In order to that, people must have a knowledge. In order to gain a knowledge, people need to read and read from trustful resources.

Literature Review

According to Lindita Skenderi & Suzana Ejupi (2017), reading habits are undoubtedly developed and learned from earlier age. Reading habits significantly known as a beneficial hobby with a million of advantages to daily life. Nowadays, online book such e-books omnipresent with modern reading platforms such as smartphones, computers, console and tablet or via social networking sites. Reading habits influenced human behavior in appropriated way or vice versa. There are many positive impacts effected to the people who involve in reading world on their behavior. A reading habit is an essential life skill (Inderjit, 2014). There are several studies have

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followed the benefit of reading habits among user in Public Library XYZ, including the increased academic and career performance, improve reading skills and widen user experience and knowledge.

Increased Academic Performance

According to the previous study, it is confirmed that good reading habits enhance academic performance (Fatiloro, 2017). The author said that reading is very important to progress and expand our minds and disseminating views in order to improve performance in the areas of career or life (Saiful Farik, 2014). This means and confirmed that reading habit has influence on academic performance and there is a relationship between reading habit and academic performance. As mention by Noraien (2017), majority of students read English material purely for academic purpose and they would read specifically to seek and gain information in order to get excellent academic achievements (Bronny, 2016). Most of the user in Public Library XYZ teach their children to love reading and always visit a library to lend a book. Some of the parents agreed that by reading their kids increased their academic performance. As supported by Lindita Skenderi & Suzana Ejupi (2017), reading is not only one of the four language skills, but it is a very important element in the aspect of vocabulary enrichment, personality building and better academic performance. According to Caroline Rabaud (2017), reading has been confirmed to help in achieving a better academic performance by students. A study of this type, by Owusu-Acheaw reveals that most of the respondents claim they have seen improved academic performance after reading more books. As we can see, reading culture in Public Library XYZ can be develop. Most of the users that lend a book in Public Library XYZ would be a Chinese. This is because of the cultivating their kids to love reading. When their kid's growth up, reading habits determinate as their hobby.

Improve Reading Skills

Reading skills are important throughout our lifespan, particularly as we respond to the new demands and changes in jobs. Reading for pleasure or recreational has been found to improve reading comprehension, writing style, vocabulary, and grammatical development (Inderjit, S. 2014). According to the previous research, it has provides evidence that the act of reading itself improves reading performance (Noraien, 2017) and it define reading as a process which is active, cognitive and affective (Lindita Skenderi & Suzana Ejupi, 2017). Reading as one of the skills of literacy is the defense against solitude (Fatiloro,2017) and the findings revealed that the status of ESL students' reading habits is still bad but it can be enhanced with proper guidance and encouraging activities to motivate students' to enhance their reading skills (Noraien, 2017). Public Library XYZ as the information center that provided all kinds of the knowledge need to encourage user by doing fun activities that can cultivate their reading skill. Either less or more it can motivate user having a positive attitude about learning while reading. According to (Inderjit, 2014) reading attitude is an integral part of the development and use of lifelong reading skills.

Widen User Experience and Knowledge

Reading is important for acquiring knowledge and information. Reading is the position of the utmost character that helps to pass on knowledge and virtue through ages (Fatiloro, 2017). As mention by Inderjit (2014), through reading, we acquire new ideas and knowledge, obtain needed information, relax the minds, and improve our command of language and vocabulary. According to Mohamad Z. A. Jafre (2011) constructivism theory is a theory of knowledge or epistemology which argues that humans generate knowledge and meaning from an interaction between their experiences and ideas. Reading provides experience through which the individual may expand his horizons of knowledge, identify, extend and intensify his interest and gains deeper understanding of himself, of other human beings and of the world (Olubunmi, 2016). Believe it or not, reading habits can widen user experience and knowledge. Reading not only increases our knowledge, but it also builds maturity and character, sharpens our thinking, and widens our awareness in social, economic, political, and environmental issues (Inderjit, 2014).

Table 1 : Analyze Review

No	Author	Increased Academic Performance	Improve Reading Skills	Widen User Experience and Knowledge
1.	Fatiloro, 2017	✓		✓
2.	Lindita Skenderi & Suzana Ejupi, 2017	✓	✓	
3.	Inderjit, 2014		✓	✓

4.	Saiful Farik, 2014	✓		
5.	Noraien, 2017	✓	✓	
6.	Bronny, 2016	✓		
7.	Caroline Rabaud, 2017	✓		
8.	Mohamad Z. A. Jafre, 2011			✓
9.	Olubunmi, 2016			✓

The Ways to Promote Reading Culture in Public Library XYZ

According to Caroline Rabaud (2017), without the right method of reading culture, reading habits are poor and cannot be expected to progress. According to Ezaleila Mustafa (2014), encouraging children to read is seen as an essential act by many groups as an effort to open the minds as well as making them creative and innovative. The reading culture is often promoted because knowledge is seen as a form of power in contemporary times; however, not all children enjoy reading books. They will not read voluntarily, unless they enjoy the experience. There are many positive impacts effected to the people who involve in reading world on their behavior. A reading habit is an essential life skill (Inderjit, 2014). There are several studies have followed the ways to promote reading culture in Public Library XYZ, including the strategic and conducive space for reading, create programmed to excite user and improve digital reading.

Strategic and Conducive Space for Reading

There is a promising potential in making use of the library's services in a new norm. Therefore, libraries are more valued now for their spaces and the opportunities that they create for the community, such as support for education, reading culture, access to recent technologies and help user to increase reading habits. Re-designing and refreshing the library space is another way to encourage users to visit the library. The physical environment can provide cues to shape social behavior within spaces, and the spaces can be deliberately and thoughtfully assembled to encourage preferred learning behaviors (Cleveland, 2017). In Public Library XYZ, reading space was divided into three department which is children department for children who want to read, circulation department is for all age of users while reference department is meant for adult. According to Olubunmi (2016), ease of accessibility to reading materials can encourage reading. Reading corners in classrooms, theatres, villages etc. can provide easy and convenient access when needed. How the users feel about a particular space contributes to their desire to visit the space and to engage in particular learning behaviours (Chin Ee Loh, 2017).

Create a Program to Excite User

Create a program to excite community and society is important. There are a lot of initiatives created by Public Library XYZ as information centre. Previous study by Ezaleila Mustafa (2014), the library plays an important role to implement reading activities such as reading programs like "Bookstart", and "Read to Me" which involve parents in their children's reading activities. Through this programmed, it provide exposure and training to parents regarding practical strategies such as the way to read children's books, how to review children's reading abilities, and provide parents with information on how to help children read a good book, as an effort to develop and inculcate reading habits in daily life. By doing this activitiy, reading program culture will become widen and give a huge impact to the library. Replications of high impact initiatives such as enhancement of resource sharing; recontinued program; and rebranded program can rectify these issues (Bronny, 2016). The programmed that launched by National Library about Malaysia Reading slogan is an effort to stand support 'Kempen Dekad Membaca Kebangsaan' as recommended by Ministry of Education in 2019. Public Library XYZ also supported the program like 'Jom Baca 10 Minit' as it would be the routine in the library every day on 11.00am. This shows an effort of the library in order to support the program launched by National Library. Public Library XYZ also has the "Reading with Libraries" projects being organized by Kota Buku with National Library collaboration. It is an outreach service that provides reading programs for institutions such as children's centres, orphanages, and other organizations that do not have access to libraries. According to Nazeem Hardy (2016), email campaign "I'm reading…" a short-lived but very noteworthy campaign undertaken by the LIS Department was the "I am reading …, what are you reading" slogan campaign. Library staff at all levels were allowed and encouraged to add this slogan to their email signature, indicating what they were reading, and invited comment not only from inside of the department but from external correspondents.

Improve Digital Reading

As mention by Ezaleila Mustafa (2014), the objectives are to analyze the reading habits and attitude of the undergraduates toward reading, evaluate factors which influence a student to engage in independent reading, determine factors to encourage student more prefer to use digital reading given the huge impact to the revolution in the e-reading field and to explore a possible relationship between independent reading and digital reading. According to Mohamad Z. A. Jafre (2011), internet is a part of the technological and digital culture of the teenagers. Therefore, online reading would better suit teenagers compared to reading printed materials or books. An increase in digital information and time spent reading digital media has been noted which indicate the impact of the digital environment on the reading behavior (Caroline Rabaud, 2017) and with the growing amount of digital information available and the increasing amount of time that people spend reading electronic media, the digital environment has begun to affect people's reading behavior (Inderjit, 2014). The revolution of digital age affecting more to read in digital. In Public Library XYZ, there are tablet that can be used for free to find the information. According to Ezaleila Mustafa (2014), electronic platforms on which children read also can be diversions, competing for children's time and attention in mere clicks which is involving e-books, these platforms may include games, apps, websites like YouTube, social media like Instagram and other ways of watching television and movies. Kota Buku is trying to provide and publish more children's book and literature in the form of electronic and interactive books to encourage the reading culture among children.

Table 2: Analyze Review

No	Author	Strategic And Conducive Space For Reading	Create Programmed To Excite User	Improve Digital Reading
1.	Ezaleila Mustafa, 2014	✓	✓	✓
2.	Inderjit, 2014			✓
3.	Caroline Rabaud, 2017			✓
4.	Mohamad Z. A. Jafre, 2011			✓
5.	Nazeem Hardy, 2016		✓	
6.	Bronny, 2016		✓	
7.	Olubunmi, 2016	✓		
8.	Chin Ee Loh, 2017	✓		
9.	Cleveland, 2017	✓		

Research Objective

The purpose of the research is to identify reading habits of user that affecting the reading culture in Public Library XYZ. The purposes that focus in the research are:

1) To identify the benefits of reading habits among user in Public Library XYZ
2) To determine the ways to promote reading culture in Public Library XYZ

Operational Variable

Operational variable means finding a measurable and valid index for the independent and dependent variables. The questionnaire is measured by using the variable in the research framework. Next, dependent variable consists of the reading habits of user affecting reading culture in Public Library XYZ and independent variable divided into two which is the benefit of reading habits among user and the ways to promote reading culture in Public Library XYZ.

Study Population

The population for this study focuses among users of library from Public Library XYZ itself. The target audience of user is based on their ID card or it call MyID that represent the membership or non-membership of Public Library XYZ users.

Sample

The sample of the study will be selected using the simple random sampling. In this study the total number of users are listed was 50 users.

Framework

This figure shows two sub frameworks in order to guide this research. First sub framework, Benefit of Reading Habits Among User in Public Library XYZ. In this study, we identified three different independent variables. Independent variables are defines based on previous discussion in Literature Review subtopic like academic performance, improve reading skills and widen user experience and knowledge.

Besides, the other sub framework to guide this research is The Ways to Promote Reading Culture in Public Library XYZ. In this research, there are three independence variables that have been allocate, and all of these have been discussed in Literature Review subtopic like strategic and conducive space for reading, create programmed to excite user and improve digital reading.

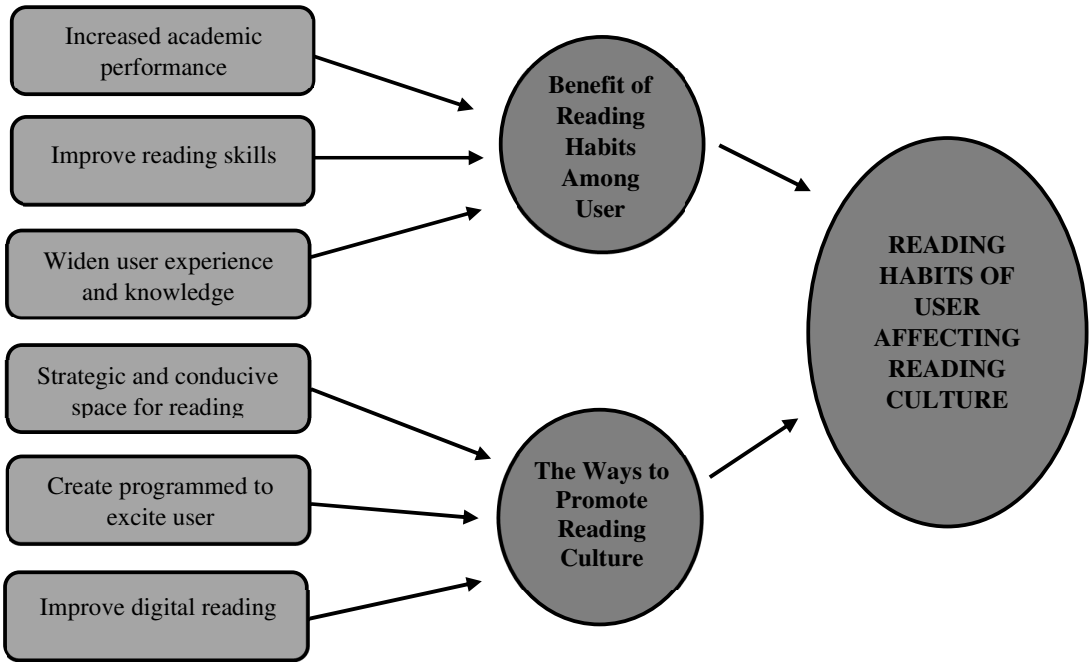

Through the discussion, the benefit and ways to promote reading culture exist when the reading habits became a hobby in life. The analysis of review also provided to make it more reliable. Then, proposed framework provided to demonstrate the continuity of the relationship between the benefit of reading habits among user and the ways to promote reading culture in Public Library XYZ.

Findings

Demographics in terms of gender, there are more males respondents compare than females. 52% are males and 48% are females. Most of the users are adults. 36% of them are in the age range of 10-19 years old. Next, the age range of 20-29 years at 28%, the age range of 30-39 years at 22%, 40-49 years are at 12% and finally, the age range of 50 years and above at below 2%.

In terms of marital status, most of the users are single, 60% of them are single, 24% are married, 4% are divorced as same as single mother and father. This is obvious since generally most of the users are teenagers. Ethically, the biggest group are the Chinese at 46%, followed by the Malays at 32%, Indian at 20% and finally, the Iban at 2%. In terms of academic achievements, a reasonable majority belongs to the UPSR (6%), PT3 are 14%, while the SPM constitutes 30% and diploma 36%, degree 14% and others 2%. This clearly shows a great majority of the library users are young students.

Absolutely, most of the library users are members of the library. Only 4% of the users are non-members of the library, while 96% are members. There is a clear indication that the library promotion towards their users is successful. The category of users are children 2%, adult 43% and family 12%. All the respondents respond that

they are enjoy going to the library because 100% of them said 'Yes'. Same goes to the question about enjoying reading in library which responded totally said that they are enjoy with it. In terms of frequency of reading, most of the users respond that they read one or more books in a week, which collect 50% from total respondent, while 34% of them read 1 book about in one month or and lastly 16% of users read 1 book more than a month.

A great majority of the users find out their reading level skill which 66% choose good, 33% very good and the last one could be poor 4%. Most of the respondents are agreed that when reading they will get experience and knowledge as like the next question the users read books of their interest influenced their academic performance which the result shown 88% answer 'yes' while 12% answer 'no'. This indicates that users regard the library as a knowledge and information hub and storehouse. As wanted to rate their reading habit, majority of respondent answer Good which 90% while 10% of the answer Very Good. By reading it can influence people surrounding which most of them answer 'yes' which collect 88% and 6% could be 'no'.

In terms of the love reading using digital devices, most users answer agree (54%), while 26% was neutral and some are answer strongly agree with 20%. Majority of users comfortable with library space which 62% answer agree, while 24% answer strongly agree and 14% answer neutral. The main reasons for liking reading environment affecting reading culture are because library take an action to have some programs at it which 56% answer agree, 28% answer strongly agree while 16% answer neutral. The reading culture can cultivate reading habit among themselves which 40% said agree, 32% said strongly agree and 14% answer neutral. Based on the question library can play role to develop reading culture which most of them answer agree 52% while 26% answer neutral lastly 22% said strongly agreed. So, if user knows the important of reading, they can understand better; because of academic requirement; they feel motivated; and because more reading materials are available.

Recommendation

Public Library XYZ can initiate a program like nurturing the reading of user from the early age stages. A campaign can be done and the librarian should play their roles to educate their users, especialy married users to understand the important of nuturing the reading from the early stage. Besides, the library can provide any activities that can attract bachelor users to come to the library because they contribute the large majority of the library visitors in Public Library XYZ. Library also can extend their opening hours because the bachelor might have benefit from it to come at night because of they are free from family commitment compare to married users.

In the other hand, to have a reading culture among users, Public Library XYZ should have an action plan that library must restructured and reconstruct all the programs that have been done before. In spite of the fact that library are led intermittently, there is a need to improve these program by upgrading and organizing them to address the issues of various unstatisfied of user about reading culture in Public Library XYZ. Library can make use the data that shows users that make a culture in reading habits have success in their academic performance and their life. Library can make a forum or a talk show by inviting the successful library users to share their experience and suggestions. As a result, a good example might build up a good trend of reading habit by other library users and it will be their culture in life.

Conclusion

This study has not covered areas of concern pertaining to the reading habit of library users in Public Library XYZ. Major area of concern is the majority of library user is male. What has made the male gender have majority in the library membership compare to women. A further study should be conduct and it will help the library to increase their membership among women. The library great initiative and activities that have been organized should be continued. Based on the success of several initiatives and programs, action plans have been identified to improve weak spots and to alleviate areas of concerned. The action plans might include online campaign, forum or talk show from the library users itself and library should create a new section like Café Conner or others that suit the need of users.

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Neuroscience Techniques in Studying Advertisements Effectiveness: An Experimental Investigation

Agata WAWRZYNIAK
University of Szczecin, Szczecin, Poland
agata.wawrzyniak@usz.edu.pl

Barbara WASIKOWSKA
University of Szczecin, Szczecin, Poland
barbara.wasikowska@usz.edu.pl

Abstract

The aim of the article is to familiarise the reader with the procedure of conducting marketing studies with the use neuroscience techniques including electroencephalography (EEG), galvanic skin response (GSR), electrocardiography (ECG), and eye tracking (ET) in order to identify those characteristics which should be present in marketing communication. In the present research we were interested in identification of factors which are taken into consideration when choosing a product on the yoghurt market. The first part of the study was constituted by an experiment with the use of the following techniques: EEG, GSR, and ECG. We recorded signals from a group of 44 healthy subjects while they were watching a documentary intermingled by a series of TV advertisements. The second part of the study was conducted with the use of two methods of gathering empirical data: eye tracking and a questionnaire. The aim of this experiment was to collect data that would enable us to identify which characteristics of yoghurt packaging are significant from the point of view of choices made by the respondents (n = 32). Data analysis shows which commercial was remembered and why. Findings also show what elements of TV advertisement evoke positive and negative emotions. When it comes to eye tracking data, the results obtained have allowed us to establish which elements placed on the yoghurt packages the participants noticed or focused on, and which were entirely ignored. In conclusion, EEG and eye tracking methodologies could be used to obtain information not obtainable with verbal interviews. We argue that the use of these methods by a company may significantly improve the management's existing knowledge about their clients and facilitate the creation of appropriate strategies in the future, e.g. product launch strategies. Further research with an extended set of subjects will be necessary to further validate the observations reported in this article.

Keywords: electroencephalography (EEG), eye tracking, perception of packaging, marketing communication

Introduction

Advertising is present in modern person's life virtually all the time. Consumers have at their disposal hundreds of TV channels, thousands of newspapers and magazines and millions of websites. And everywhere they come across various forms of advertising. Therefore, modern marketing requires from entrepreneurs something more than merely creating new products and services, giving them attractive prices and ensuring their availability. Companies must communicate with current and potential clients. In order to reach target clients successfully and influence their purchasing decisions, they creatively apply various forms of communication, including mass communication, whose primary tool is advertising.

One of the important instruments of marketing communication is product packaging (Kotler, Keller, 2012, p. 372). Packaging, as a medium of marketing communication, was taken into consideration and developed at the end of the 20th century. At the same time, first research about the influence of packaging on consumers' decisions was done. In order to influence consumers, producers nowadays are using ever more original packages, which allow to distinguish the product from its competitors. The job of packaging is to influence buyers so that they will, consciously or unconsciously, choose one particular product from the others offered by competitors. In this case, the impression made by packaging are projected onto the entire product and customers form their opinion on the quality of a product based of those impressions. External characteristics of packaging are paramount as the majority

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of consumers reacts most strongly to visual stimuli. Knowing this, producers decide to study those reactions using various scientific methods.

The aim of the article is to familiarise the reader with the procedure of conducting marketing studies with the use of electroencephalography (EEG), galvanic skin response (GSR), heart rate (HR), and eye tracking (ET) in order to identify those characteristics which should be present in marketing communication. The main point of this article is to present the results of authors' experimental studies concerning the identification of factors which are taken into consideration when choosing a product on the yoghurt market. The aim of the study was also to present some advice for yoghurt producers allowing them to adapt their market offer to the needs of consumers.

Methods

Participans

The study involved a total of 76 healthy volunteers, students aged 20-24 (38 females and 38 males) from various universities in our city. The proper bioethics committee had issued permission to conduct both parts of the experiment. Out of the seventy-six volunteers, forty-four took part in the first part of the experiment and the remaining thirty-two in the second part. Each of the participants had received written information about the goal and the method of conducting the study. Additionally, the respondents were also informed about it verbally. Each of the participants had expressed their consent to taking part in the experiment in writing.

Procedure

The first part of the study. The first part of the study was constituted by an experiment with the use of the following techniques: electroencephalography (EEG), galvanic skin response (GSR) and electrocardiography (ECG). The study was conducted in a specialist laboratory located at our faculty. On the day of the experiment the participants entered the laboratory individually, in turns every 90 minutes. After a participant had been informed about the course of the experiment and after he/she had signed the consent form, the respondent would sit on a chair at a distance of 80 cm from the computer monitor. Then, with the use of specialist paste (Ten20), seven electrodes were attached to respondent's head. The electrodes were attached to the scalp in seven points, i.e.: Fp1, Fp2, F3, F4, F7, F8 and Fz (according to the international 10-20 system). Those particular points were chosen since the scientific literature has pointed to the special role of frontal and prefrontal lobes in occurrences we had wanted to study (Davidson, 2004; Werkle-Bergner, 2006). A unipolar recording of brain electrical signals was performed. The reference point was left earlap. Sampling was performed with the frequency of 256 Hz and impedances below 5 kΩ. Brain waves were recorded with the use of 19-channel electroencephalograph KT88-2400 (Digital Electric Activity Mapping) from Contec Medical Systems. Figure 1 presents a part of a sample EEG recording. Moreover, an ECG electrode was attached to the left wrist of each respondent and 3 GSR electrodes on the phalanges of fingers of the non-dominating hand. Galvanic skin response was measured by Neurobit Optima 4 equipment (Fig. 2).

The next step involved all volunteers watching a 30-minute nature documentary interrupted by three advertising blocks. Each of the advertising breaks consisted of 4 commercials, which means that 12 advertisements were presented in total. The first break contained commercials of yoghurts, the second – mineral water and the third – cars. Data was recorded both during the film and the advertisements. The aim of this part of the experiment was to establish which advertisement from a given series was remembered by the participant and which elements of the advertising message were key to its remembering. After the end of the experiment, the respondents were asked to take part in a survey in a form of a direct interview. Respondents' answers were entered by the researches into an electronic questionnaire – a specially prepared Excel spreadsheet. The first part of the interview consisted of demographic questions and four questions concerning the film. Demographic questions aimed at obtaining data concerning demographic characteristics of respondents, e.g. age and sex. The study omitted questions referring to education, profession or marital status. This resulted from the fact that all respondents were students and therefore their answers would have been identical.

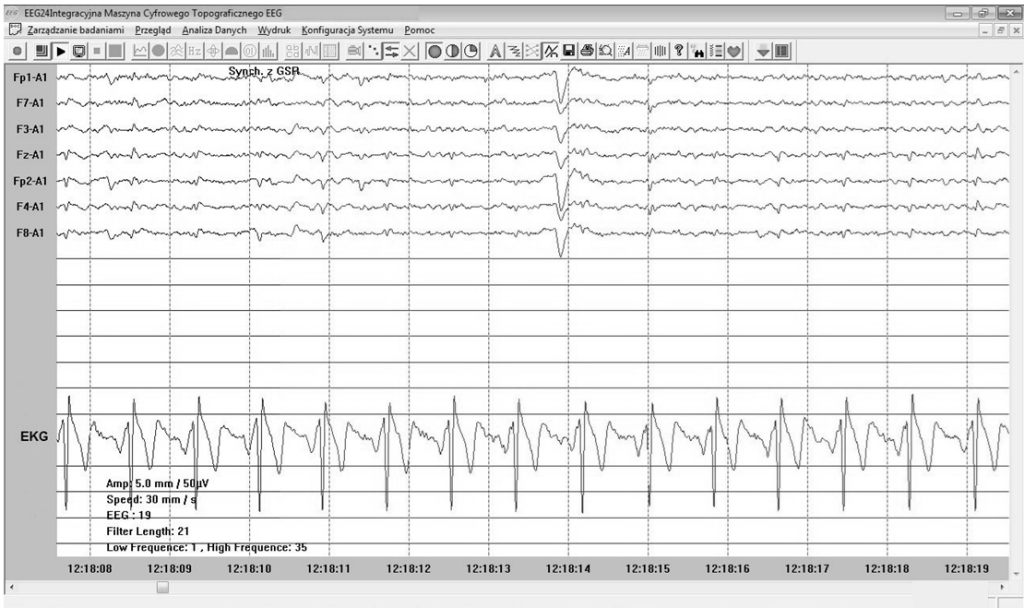

Fig.1. Fragments of EEG and ECG recordings. Source: authors' own elaboration

Fig.2. EEG, GSR and ECG recordings while the respondent was watching a film with advertising breaks. Source: authors' own elaboration

The second part of the interview consisted of questions concerning advertising breaks. The first question connected with commercials aimed at detecting which of the brands and products presented had been remembered by the participant. Question 1 was worded as follows: "You have just watched a film. During the projection you were shown some commercials (12 commercials in total). Do you remember the commercials you saw? Which commercials do you remember?"). The respondents' task was to enumerate brands and products which they

remembered when they were watching the film and if a person did not remember any commercials, one should proceed directly to question 3. Then, in question 2, the researcher asked the respondents to give details about the plot of commercials they remembered, i.e. about people featured in the advertisements, places, props, scenes featured in the commercial. In the next stage the interviewer enumerated at random various brands (including brands which were not featured in the material) in order to check whether the respondent remembered the advertisement of a given brand and whether during watching it they remembered watching it earlier. Question 3 was worded as follows: "Did you see the advertisement for this brand while you were watching the film? When watching the film, did you recall seeing this advertisement before?". For both of these questions, the respondent may have answered "Yes" or "No". The entire first part of the experiment took one hour. The analysis of data gathered about the first advertising block (yoghurt advertisements) will be presented in the next parts of the article.

The second part of the study. The second part of the study was conducted with the use of two methods of gathering empirical data: eye tracking and questionnaire. The aim of this experiment was to collect data that would enable us to identify which characteristics of packaging are significant from the point of view of choices made by the respondents. The objects of the experiment were photographs of yoghurt packages, presented to the participants on the computer screen. MKo Eye Tracker produced by Hyperbeing was used to conduct this study. This is a stationary eye tracker in the form of glasses. It is equipped with only one camera sensitive to infrared light, therefore in order to use it, respondent's head needed to be immobilised with a special chin rest (Fig. 3). The chin rest had been made by the authors of this article.

Fig. 3. An example of a study with the use of MKo Eye Tracker. Source: authors' own elaboration

For the study, recording, and analysis of the data, the following software was used:

1. AOIHelper (so that areas of interest could be defined graphically),
2. ITU GazeTracker (to capture and process images from camera, to locate the pupil in the picture, and to calibrate and to determine the position coordinates of the focal point of the eye),
3. Hyperbeing software, working with Matlab R2010a with Psychtoolbox-3 module installed (to validate the calibration process, record and analyse data).

The experiment was conducted at our faculty. Similarly to the first part of the experiment, participants had been first informed on the purpose and course of the experiment (both in writing and verbally). After signing the consent form, a participant was seated as close to the desk as possible in order to rest the head on the chin rest. For safety reasons the chin rest has been screwed to the desk. The next step involved adapting the height of the chin rest and

the height of the monitor so that they fitted the participant. The next stage was the calibration of the equipment. The purpose of calibration was to determine the mapping between camera space and screen space, where calibration points were projected. The calibration was conducted in accordance with methods described in academic literature (Duchowski, 2007, p. 70). The calibration of the equipment was followed by the essential part of the experiment. The task of the participants was to look at yoghurt packages displayed on the monitor. Each photograph was shown on the screen for 6 seconds in random order each time. During the session each participant watched 5 photographs of yoghurt packages. Each experimental session lasted ca. 15 minutes. After the end of all sessions, a computer analysis of data gathered in the eye tracking study was conducted.

The questionnaire part of the experiment was focused on identifying the elements of packaging significant from the point of view of attractiveness and the evaluation of the packages done by the respondents. The participants were asked how important it is for them to read information on the packaging when choosing a yoghurt.

The analysis of data obtained in the first part of the study

Electrocardiographic signal processing. Software in the Python programming language design by the authors themselves was used to analyse data obtained in the first part of the experiment. The analysed advertising block consisted of commercials of four different yoghurts, namely: Muller Mix, Danone Activia, Danone Aksamitny and Bakoma Premium. The aim of the analysis was to compare advertisements of one category in order to create reference points and norms for this category.

The data analysis began with filtering signals with a band-pass filter, with the upper frequency limit of 2 Hz and lower frequency limit of 30 Hz. Then the recorded signal was cleared from artifacts caused by eye blinking, eye ball movements or muscle tremor. The Independent Component Analysis (ICA) method was used for this task. After clearing the signals for all participants, the signals were transformed with the use of spatial filter called CAR (Common Average Reference). Individual Alpha Frequency (IAF) was calculated for each participant, with the application of the method described in literature in order to establish selected frequency bands. In the next step, the filtered EEG signals were used to calculate Global Field Power (GEP) (Lehmann D., Skradnies W., 1980). The obtained values were then used to determine the Pleasantness Index in accordance with scientific literature (Vecchiato, Cherubino, Trettel, Babiloni, 2013, p. 81):

$$PI = GFP_{right} - GFP_{left} \quad (1)$$

where the GFPright and GFPleft stand for the GFP calculated among right (Fp2, F4) and left (Fp1, F3) electrodes, respectively.

The analysis of data obtained with the EEG was conducted observing the brain asymmetry paradigm created by professor Richard Davidson from the University of Wisconsin-Madison (Davidson R. J., Ekman P., Saron C. D., Senulis J. A., Friesen W. V. 1990; Davidson R. J., 2004). According to this paradigm, the analysis of frontal and prefrontal lobe activity of the right and left brain hemisphere and then the comparison of the results allows to interpret brain activity in motivational context. If a volunteering participant is engaged and interested in what they see on the screen, the difference between the activity of their left and right lobes will be positive (i.e. the activity of the left hemisphere will be stronger). However, when the participant is not interested in a film or advertisement, the result of subtracting the activity of the right hemisphere from the activity of the left hemisphere will be negative (Davidson R. J. 1979). In case both hemispheres are equally stimulated, we encounter neutral activity (i.e. the respondent has been neither interested or disinterested). In 90% of cases the increase of interest/involvement is accompanied by a positive emotional reaction (but not always).

Galvanic Skin Response signal processing. In the above-mentioned study, the electrodermal activity (GSR) was measured by Féré method, with the use of constant voltage of 0,5 V. In order to analyse the recording of the galvanic skin response, a band-pass filter was employed with the lower frequency limit of 0.2 Hz (in order to separate the phasic components of the electrodermal activity from the tonic components) and the higher frequency limit of 1 Hz (in order to filter out the noise and to suppress artifacts caused by Ebbecke waves; Schmidt and Walach, 2000). Both the GSR signal and other signals were registered for the entire duration of the film. Then the registered signals were divided into fragments (those recorded during the film separate from those recorded during

advertisements). The GSR signal was analysed simultaneously with the respective EEG records. Thanks to this we were able to establish what kind of emotions were induced by particular marketing communication.

Electrocardiography signal processing. The registered ECG was processed in order to extract heart rate (HR) signals. HR signals were isolated by establishing the peak-to-peak distance on the ECG record (i.e. by calculating the interbeat interval – IBI – between successive heartbeats), and then by calculating the reverse of this distance (Fig. 4). The HR record is an additional (aside from EEG and GSR) source of information on the emotions experienced by the respondents during the film and the advertisements.

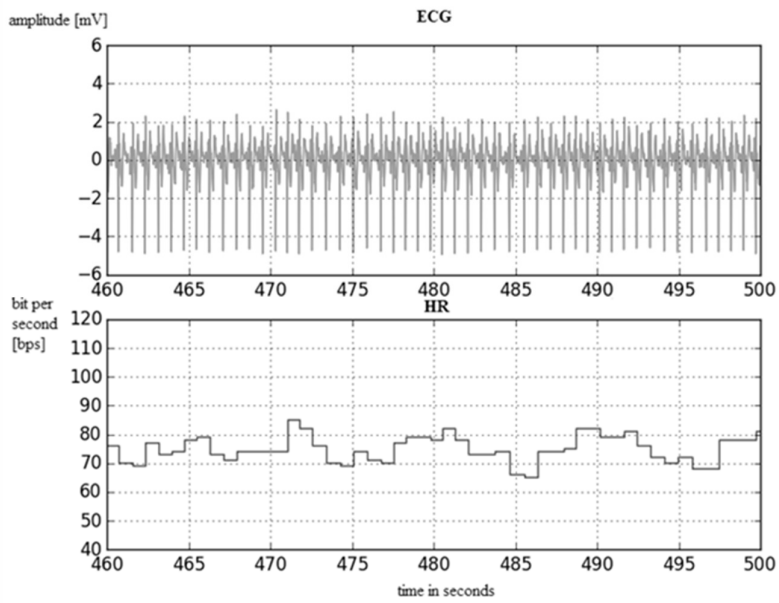

Fig. 4: A fragment of ECG recording and corresponding HR recording. Source: authors' own elaboration

The analysis of data obtained in the second part of the study

To analyse data gathered with the use of the eye tracker, we used Hyperbeing software which works with Matlab R2010a with Psychtoolbox-3 module installed. As a result of the analysis we obtained:

- Scan paths and Fixation paths for each session individually and for each stimulus,
- Heat map, both for individual sessions and for all sessions together,
- Focus map, both for individual sessions and for all sessions together, like above,
- Area of Interest (AOI) with percentage description of the focus of attention, also both for individual sessions and for all sessions together.

Additionally, the results obtained were recorded as CSV text files, which were later analysed with the use of an appropriate module in the Matlab software.

Results

Creating an effective advertising message concerning food products, such as yoghurt, is relatively difficult. Yoghurt, which comprises the second largest group in the consumption of dairy products, is increasingly more valued by purchasers. Due to the high expectations of customers, producers must constantly know and adapt to the ever-changing needs and expectations of their customers, in order to effectively compete in the market, increase their sales and raise brand awareness. This causes an intensification of promotional actions which aim at creating a positive image of the company and its products and also at increasing their brand recognition, as compared to the competitors. This is why a television commercial, as a tool of mass communication, is commonly held as an effective medium of information about products. Unfortunately, yoghurt is a food product which is relatively

homogeneous (we can distinguish only natural yoghurt and flavoured yoghurt in a few basics flavours) and there is not a large difference between them, which would allow producers to distinguish their products easily from other brands. This is reflected by the large level of similarity of yoghurt commercials: they mostly inform consumers about the same characteristics of the products. Studies conducted show that many respondents had difficulty telling how many yoghurt commercials they had seen during the film. The commercials seemed to them one flow of communication. Aside from this, yoghurt advertisements tend to be described by consumers as not attractive or even boring. Yoghurt is a type of product which lends itelf easily to being the object of stereotyping and clichés. The majority of yoghurt commercials show typical family scenes connected with eating breakfast together (smiling parents and children, happy atmosphere of a picnic, spring outside the window). This is confirmed by the galvanic skin response (GSR) records of individual respondents. An example of such a recording is presented in Figure 5. When analysing the GSR recording (Fig. 5a), one can see a significant drop in interest (attention) of respondents at the moment the film stopped and the advertisements started. GSR recordings for Danone Activia, Danone Velvety and Bakoma Premium were similar. The attention increased again while the advertisement for the cherry-flavoured „Muller Mix Cherry" was shown (Fig. 5b). The rise in interest in this advertisement was confirmed by the EEG recording.

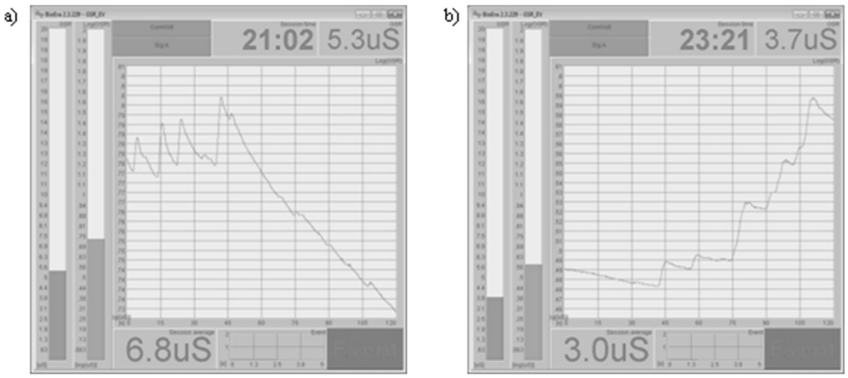

Fig. 5: A sample galvanic skin response (GSR) recording a) decrease in interest when the advertising break started, b) increase in interest in Muller Mix Cherry commercial. Source: authors' own elaboration

Yoghurt commercials usually show a person or a group of people (e.g. a family) gorging themselves on yoghurt of a particular brand. However, respondents perceived such scenes as boring. The commercial for Muller Mix Cherry was different from other advertisements in that it showed a person eating yoghurt only in the penultimate scene. Before that, a short story has been told with pictures (Fig. 6). The commercial starts with a scene where a container is being filled with milk and it forms the sign "Muller". During this, a drop of milk falls on the surface and it flows on this surface, forming a picture of a branch with cherries. Then, cherries formed from the milk fall down and make a splash, which looks like a cow. The cow is transformed into a milk cloud and milk drops falling from this cloud fall into a package of yoghurt. The next scene shows that the package contains both yoghurt and fruit which can be mixed together. It is only then when we see a young girl eating cherry yoghurt. The last scene shows the logo of the company and a sign that says "Flavour comes from the milk".

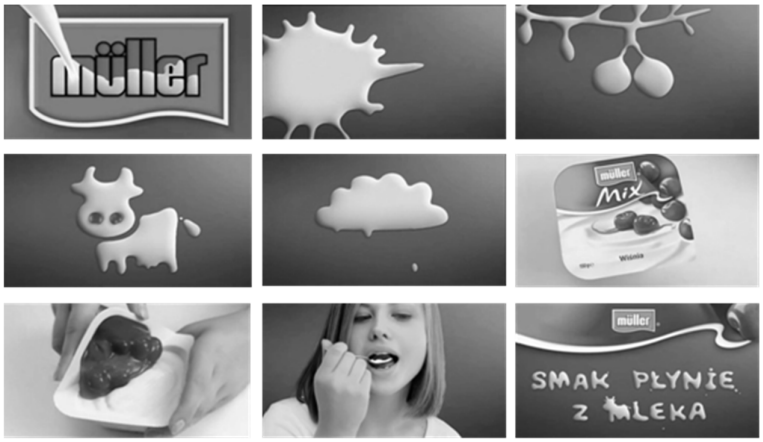

Fig. 6. Selected scenes from Muller Mix Cherry commercial. Source: authors' own elaboration

The interest of respondents in this particular commercial was confirmed by surveys conducted directly after the study. Among all yoghurt advertisements, it was this one which was best remembered due to the interest it had aroused.

When analysing EEG and GSR data one can also learn which advertisements or which particular scenes cause unpleasant feelings in respondents. It turned out that the commercial for the Activia yoghurt from Danone company was not received well by the participants. This advertisement was well remembered by almost all respondents as it featured a well-known Colombian pop singer, Shakira. However, the yoghurt was presented in the commercial as a golden ray of light, coming from the lips and going to the stomach, which caused rather unpleasant feelings in the respondents (Fig. 7). The associations were all the more so unpleasant that the stomach was portrayed as an overgrown jungle, with the ray of light traveling through it.

Fig. 7. Selected scenes from Danone Activia commercial. Source: authors' own elaboration

When it comes to eye-tracking data, the results obtained have allowed us to establish which elements placed on the yoghurt packages were well-noticed by the participants, and which were entirely ignored. On the basis on the results it has been observed that men taking part in the experiment concentrated most often on the name of the product and the brand. Women, however, paid more attention to the calorie count of the products and in general read information on the package quite carefully (especially information relating to the ingredients present in yoghurt). We have also established the order in which all areas of each package were perceived by the participants (Fig. 8). Typically the respondents started looking at the middle of a picture and they also finished by looking at the middle. Heat maps generated by the programme, both for individual sessions and for all sessions together allow us to determine which elements of the package attracted participants' attention to the greatest extent. Figure 9 shows an example of a heat map of attention areas for an individual participant as well as for the entire group of respondents.

Fig. 8. Sample paths: a) scan path, b) fixation path. Source: authors' own elaboration

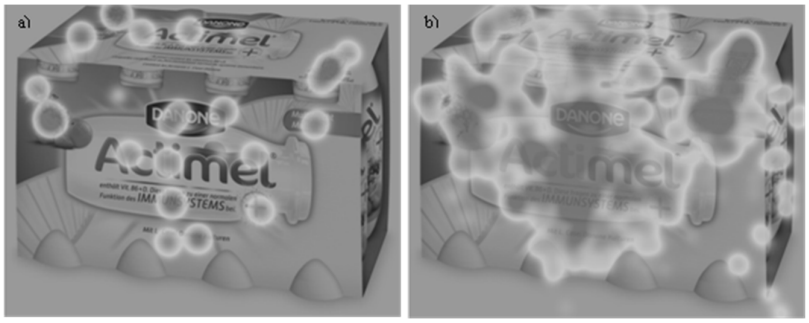

Fig. 9. Heat map a) individual session, b) all sessions. Source: authors' own elaboration

The alternative to such a way of presenting data is a focus map which shows even more clearly which elements of the package attracted the attention of the volunteer taking part in the experiment (Fig. 10). Such information may also be obtained by analysing areas of interest with a percentage description of the focus of attention (AOI) (Fig. 11).

In the questionnaire part of the experiment the respondents were asked how important for them (when choosing a particular yoghurt) is information located on the packaging. The results obtained on the basis of participants' answers show that the most important ones are: a photograph or a picture of one of the ingredients and nutritional facts. The name of the product and the producer's logo are, however, of average or low importance (Fig. 12). Interestingly, the observation results of respondents' real behaviour seem to contradict that (Fig. 13 and Fig. 14). Which suggests that subconsciously customers do pay attention to the brand of the product.

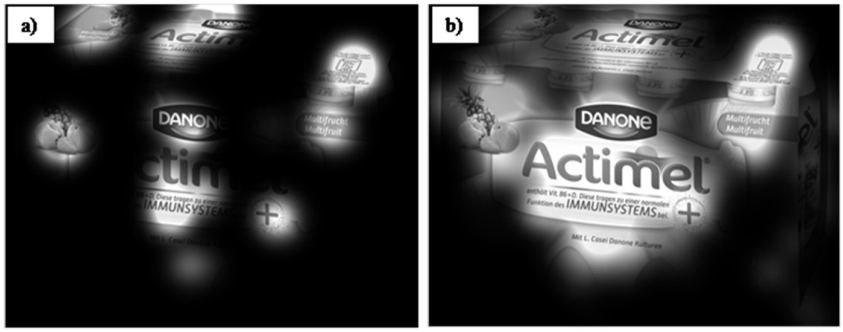

Fig. 10. Focus map a) individual session, b) all sessions. Source: authors' own elaboration

Fig. 11. Sample areas of interest with percentage description of the focus of attention. Source: authors' own elaboration

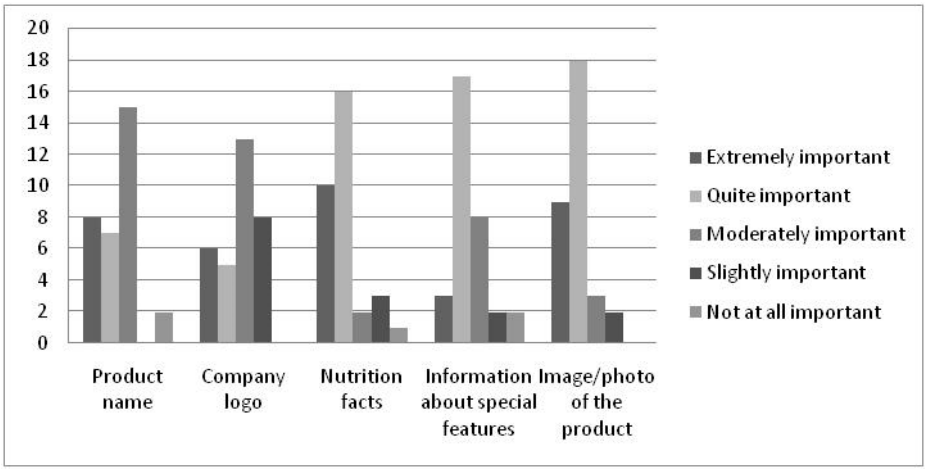

Fig. 12. Declared relevance of selected elements of the package. Source: authors' own elaboration

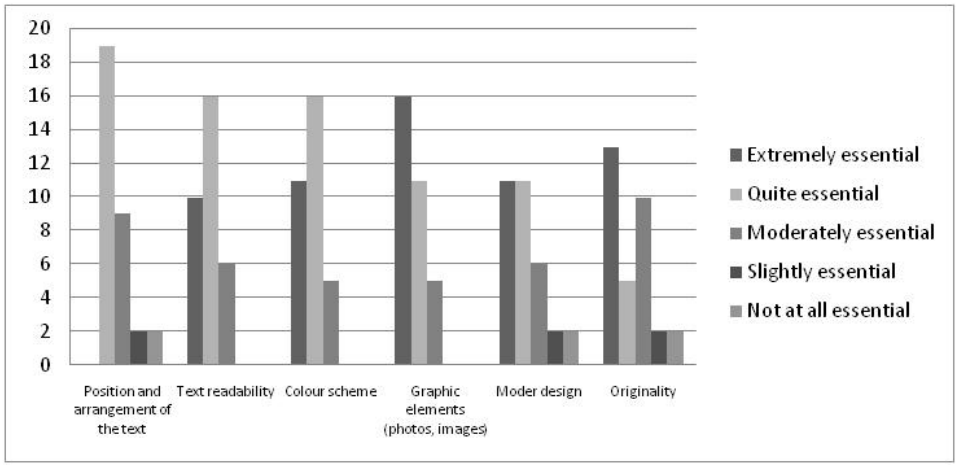

Fig. 13. Factors determining the attractiveness of packaging. Source: authors' own elaboration

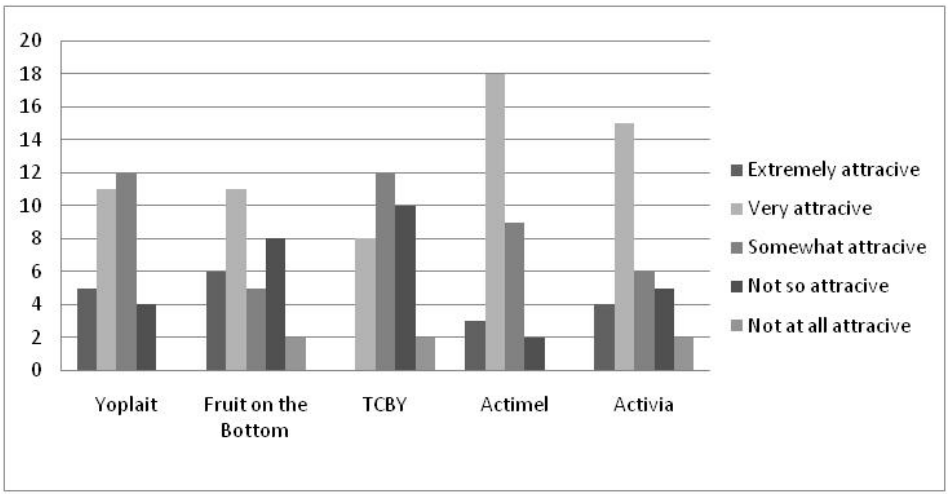

Fig. 14. The assessment of attractiveness of selected yoghurt packages. Source: authors' own elaboration

Discussion

Conclusions from the first part of the study. The increasing amount of messages and the ever growing chaos in that field cause entrepreneurs to look for media, forms and contents which would reach the customer. The developments in cognitive neuroscience and in the functioning of the human brain allow us to increase our understanding of customer behaviour. The application of neurobiological knowledge in the context of marketing contributes to our comprehension of the course of such processes as emotions, attention, memory or decision-making. Undoubtedly, these are key notions for advertising and consumer behaviour. Knowing brain's reaction to various stimuli, one can increase the effectiveness and efficacy of advertising communication. Neuromarketing is capable of showing how customers react to a studied product and its accompanying marketing communication. It allows to determine whether customers pay more attention to the colour of the package or to its shape, or whether they find music or image more important in commercials. The use of EEG in neuromarketing brings a lot of new data concerning irrational choices, the significance of taste, smell and touch before making the decision to purchase, the importance of background music and the timbre of voice in commercials and their role both in positive emotional perception and in remembering an advertisement for a long time.

On the basis of experiments conducted we have determined that the effectiveness of an advertisement increases in correlation with a rise in consumer's emotional involvement. Marketing communication should therefore be more personalised, particularly in case of advertising brands well-known to consumers. We have also established that an advertisement for yoghurt:

- should not be too long
- should not be boring and ideally should tell a short story,
- should evoke emotions (preferably positive emotions),
- should clearly present company's logo in the last scene.

Questionnaires and interviews we conducted have also shown that customers rarely search for information on new products in the yoghurt market. Consumer behaviours are rather routine. Therefore, in order to increase the activity of customers, producers should apply non-standard forms of promoting their products, e.g. contests, building information-sharing portals, or creating applications whose task would be to arouse the interest of potential buyers of the product. The eye tracking study has also shown that marketing communication placed on a yoghurt package should be varied according to gender (owing to differences in perceiving some elements of the package by women and by men).

Conclusions from the second part of the study. Packaging, as an important constituent of a product, is also a significant tool for marketing. It should attract the attention of potential buyers, allow them to identify the product, incite the desire to have the product, lead to the purchase and additionally, influence consumers' satisfaction while using the product. Moreover, the product packaging creates some positive impressions as to the quality of the product inside the package and hence influences purchasers' emotions. And thanks to its ability to attract potential customers' attention, it also has a visual impact. Therefore entrepreneurs should place great importance on choosing packaging for their product.

The main advantage of eye tracking is that it allows us to study objectively the reactions of respondents to visual stimuli connected with packaging. One may learn which elements of the package are the ones really attracting customers' attention. Depending on the stage in which the study is conducted and on its purpose, various visual elements of packaging may be taken into consideration. It is worth underscoring that the process of designing packaging should not be dominated by individual tastes and preferences of marketing specialists or managers but it should be controlled by professional graphic designers. The next step is to verify the design by studying purchasers' response, including eye tracking studies. If a company applies such a mode of operation, it is almost guaranteed that the product will succeed, which means that customers will prefer the particular product offered and not a competitor's products.

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Promotion in the Creative Industries: A Case Study of the Perspective of Micro and Small Business Owners from the Publishing Industry Subsector

Peter MIČÁK

Brno University of Technology, Faculty of Business and Management, Department of Economy

Kolejní 2906/4, Brno, 612 00, Czech Republic

E-mail: xpmicak00@vutbr.cz

Abstract

This paper aims to describe the theoretical differences in the application of marketing in the creative industries compared to traditional sectors of the economy, and identify, through statistical analysis, factors affecting the perception and opinion of the representatives of companies on the importance of promotion for the company. This paper analyses the companies from the publishing industry, which is a subsector of the creative industries. The theoretical part of the paper is based on the research of secondary sources in the form of scientific articles. The analytical part establishes the research hypotheses and analyses the primary data obtained from questionnaires. These data are analysed by using correlation analysis. Due to the ordinal nature of the data, their distribution and quantity, the Kendall correlation coefficient, was chosen to evaluate the hypotheses. Based on the established hypotheses, the following variables have been found to have an impact on the respondent's views on the importance of promotion for the company: the existence of the planning process, the number of employees, the achieved education of the respondent and the production of the tailor-made products. The age of the company does not have a demonstrable statistical correlation with the opinion on promotion in the company. The established hypotheses were evaluated in the article but considering the nature of the creative industries and their inhomogeneity, it is not possible to automatically assume that the results related to the publishing industry will automatically apply in other subsectors.

Keywords: Creative Industries, Publishing Industry, Promotion, Marketing of SMEs, Opinions on Marketing.

Introduction

A significant milestone in the development of the creative industries and, in essence, their beginning in the broader political discourse can be seen as their initial definition and the beginning of their mapping based on the activities of the British government started in 1998 through DCMS (Department for Digital, Culture, Media and Sport) (O'Connor, 2015). Since then, the creative industries have undergone significant development in many parts of the world and have received considerable recognition from academics, politicians or creative workers (Jones et al., 2016). Academic research in this area has been divided into several directions since 1998, but Business, Economics and Geography are the main areas through which the creative industries are researched (Cho et al., 2018). Nowadays, no one questions the importance and benefits of the creative industries for the artistic and cultural life of the country (Bakhshi & McVittie, 2009). Nor does anyone doubt the significance of their innovational and growth potential for the country's economy (Protogerou et al., 2016). In addition to the direct advantages, they also represent tremendous benefits in the form of spill-over effects. They create space for the cultivation of human creativity, reinforce social cohesion among the population, and they also have a significant positive impact on the companies outside the creative industries. Indeed, there is evidence that companies that are not directly part of the creative industries, but are connected to them, are more innovative than other companies that do not have such connection (Bakhshi & McVittie, 2009).

A growing number of studies of the creative industries underline that the creative industries are becoming an increasingly important component of global knowledge economies (Win, 2014). However, when researching the

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creative industries, it is crucial to keep in mind that this is not a homogeneous group. The creative industries cover many sectors that fall under them, from the publishing industry, through film and music, to the gaming industry, just to name a few. Therefore, it is not possible to talk about a consistent organizational form of the companies or their internal processes. On the contrary, it is possible to speak of different organizational structures that arise in local conditions at different times, for different technologies and various industries (Jeffcutt & Pratt, 2002). However, despite considerable progress in creative industries research, there are still areas where there is no generally accepted consensus. One of these areas is the definition of creative industries. There are a large number of definitions, but for the purposes of this article, the definition of the Czech Ministry of Culture will be used. This definition is based on the British definition and recommendations of the European Union, but with regard to Czech cultural specifics. Creative industries in the Czech Republic are defined as follows: *"Cultural and Creative Sectors" activities are based on human creativity, skills, and talent. (…) They have the potential to create wealth and jobs, especially by exploiting the intellectual property. They include public, non-profit and market activities or products irrespective of the type and mode of financing of the entity implementing them. They add value to other economic sectors and can be a source of technological and non-technological innovation. Cultural and Creative Sectors have many other positive impacts on both society and individuals"* (Ministry of Culture of the Czech Republic, 2014).

This article aims to analyse the views and opinions of owners of small and medium-sized enterprises operating in the publishing industry in the Czech Republic, on the importance of marketing and promotion for their businesses. The article will analyse some of the factors that may influence their views and opinions. Arts promotion is fundamentally different from traditional marketing, as it is often based on a more inclusive multi-directional approach (Boorsma, 2006). Furthermore, as in any study of the creative industries, the local context, history and culture, in this case, the Czech Republic, must be taken into account. Powell and Ennis (2007) point out that the marketing of small and medium-sized enterprises faces many challenges, but this is especially true for companies operating in the creative industries.

Theoretical Framework

Since its inception in the 1980s, marketing of culture and arts has undergone rapid development and professionalization. At present, cultural and arts managers usually have an education in marketing theory and do not question the strategic importance of this kind of education for art and culture (Boorsma, 2006). Of considerable importance is the fact that the targeted education of these managers began to develop gradually in the form of academic study fields and creation of conferences (Lee & Lee, 2017). Seminars focusing on marketing training in the creative industries are on the rise. Their goal is to reflect current trends and make the artist an innovative entrepreneur. An entrepreneur/artist trained in this way is expected to fund his resources and promote his work with a higher dose of professionalism (Win, 2014).

Marketing in the creative industries, despite the adoption of modern marketing techniques, still differs significantly from the traditional sectors of the economy, it is influenced by many aspects that we do not encounter to such an extent in traditional industries. One example may be the role of art critics, who greatly influence the functioning of organizations; and in some cases, these critics could be even viewed to some extent as precursors for the restructuring of institutional logic and processes (Glynn & Lounsbury, 2005). Concepts such as opportunity identification, proactive approach, innovative approach and risk-taking should be part of the managerial way of thinking in the creative industries (Parkman et al., 2012) because although these approaches are less used in this area of the economy than in traditional sectors, they are critical for the long - term success of the company in the creative industries. Another specificity, that managers must take into account in this area, is the influence of emotions on consumer decision making. Emotions represent a significant part in customer decisions making process. Management, therefore, mostly relies on artistic quality and content. However, research shows that the quality of services or the environment also has a crucial impact on customer decisions (Hume et al., 2007).

Boorsma (2006) points out that there are many pros and cons to the traditional customer value approach, with both currents of opinions being somewhat correct. Therefore, it could be harmful and hasty to reject this approach, but it could also be hasty to adopt a marketing philosophy from a purely commercial sphere that may not be sufficiently suited to the creative industries environment. Of course, the form of marketing primarily adapts to the area or subsector of the creative industries in which the company operates. Examples are the area of galleries and museums or areas of performing arts for which it is common to build a membership base. Research of Kleinschafer et al. (2011) shows that the effort to obtain potential members by several methods has a positive impact, whether in the form of

higher patronage or, for example, greater availability of volunteers who are an essential part of internal processes in many non-profit organizations.

The research of Parkman et al. (2012) suggests that if companies in the creative industries want to identify and take advantage of market opportunities successfully, they need to align the company's management with its creative capabilities. Being successful with a new product is vital for the continuity and growth of most companies (Leenders & Wierenga, 2002). Thus, companies from the creative industries necessitate marketing, as they struggle with a large amount of alternative use of leisure time and very active competition. If cultural institutions are under pressure and have problems attracting customers, they often reach for an unconventional and creative form of advertising. These attempts to use unconventional advertising have a more positive impact on the attendance of the monitored institution than conventional equivalents of advertising (Buljubašić et al., 2016).

However, such a rapid development of management and marketing in the field of art and culture also brings negative aspects. The expansion of training and available statistics are proof that the relationship between art and business is becoming increasingly explicit and openly welcomed (Win, 2014). Many institutions had to start competing with others for customers due to the gradual professionalization in their field. One of the tools that these institutions have decided to use is branding. Consequently, it escalated to a point in which in addition to the quality of the works, the place where it was exhibited is also assessed because the brand is what can increase the impact and quality of the artwork (Lee & Lee, 2017). Marketing professionalism, together with an innovative approach, is now by default assumed, which of course causes notable challenges and difficulties for many artists. They are automatically expected to awaken their entrepreneurial spirit, and in addition to generating ideas and creating artwork, they are also expected to fundraise, promote, collaborate, network and participate in many other activities (Win, 2014).

A common disadvantage of cultural and artistic institutions in Eastern Europe is that they do not have a marketing department to perform their customer research and look for various alternative ways to connect with target groups (Buljubašić et al., 2016). Another common ailment is the lack of realization that there is no single homogeneous creative industry, as there are many subsectors, each with its own rules, networking and labour markets (Jeffcutt & Pratt, 2002).

Methodology

As the research of secondary sources in the theoretical part of this paper suggests, marketing and promotion activities in the creative industries are in no small extent different and have a significant number of specifics compared to the traditional sectors of the economy. The analytical part of the article will deal with the analysis of 77 completed online questionnaires collected during spring of 2020 from companies operating in the Czech Republic in the publishing industry subsector, which officially falls under the creative industries sector. The companies were selected based on a data from the Czech Statistical Office and Amadeus database. The relevant questions from the questionnaire consist of closed questions, which can be answered by choosing one of the offered answers in the form of Likert scale. The Results and Discussion section of this paper will present the data on which the methods of descriptive statistics will be applied. In particular, the ownership of intellectual property that is characteristic for companies operating in the creative sectors will be described, the promotion methods used will be evaluated and the data related to the evaluation of the impacts of this promotion will also be analysed. Subsequently, the research hypotheses, which this paper aims to verify, are described. Due to the ordinal nature of the analysed data, their quantity and distribution, a nonparametric Kendall correlation coefficient, namely Kendall's tau-b, will be used to evaluate the hypotheses.

Results and Discussion

The analysed data results are from 77 completed questionnaires, which were filled by micro and small companies operating in the publishing industry in the Czech Republic. According to the official definition of the creative industries in the Czech Republic, the publishing industry is considered a subsector that falls under the creative industries. Given the definition of the creative industries mentioned in the introduction section of this paper, it is crucial to focus on the intellectual property of businesses operating in the creative industries. Therefore, it is not surprising that 77 analysed companies own a substantial amount of intellectual property, primarily in the form of

copyright and trademark. As many as 71 companies (92.2%) out of the total number of analysed companies have a copyright, 26 companies (33.8%) have a trademark, three companies (3.9%) own a utility model, and one company (1.3%) own an industrial design.

Today, companies have a large number of promotion channels at their disposal, which they can use to communicate the chosen message to customers. In the case of the analysed companies from the publishing industry, it is also possible to talk about a large variety of communication channels. Forty-nine companies chose the most frequently used promotion via the Internet (63.6%), followed by a printed advertisement used by 34 companies (44.2%), followed by promotional items used by 24 companies (31.2%). Less used promotional tools are direct marketing, which is used by 17 companies (22.1%), followed by advertising on radio, which is used by 14 companies (18.2%), followed by advertising on television, which was used by nine companies (11.7%). The least used form of promotion is product placement, which is used by only seven companies (9.1%). The use of promotion and advertisement in the analysed companies can also be seen graphically depicted in the following graph.

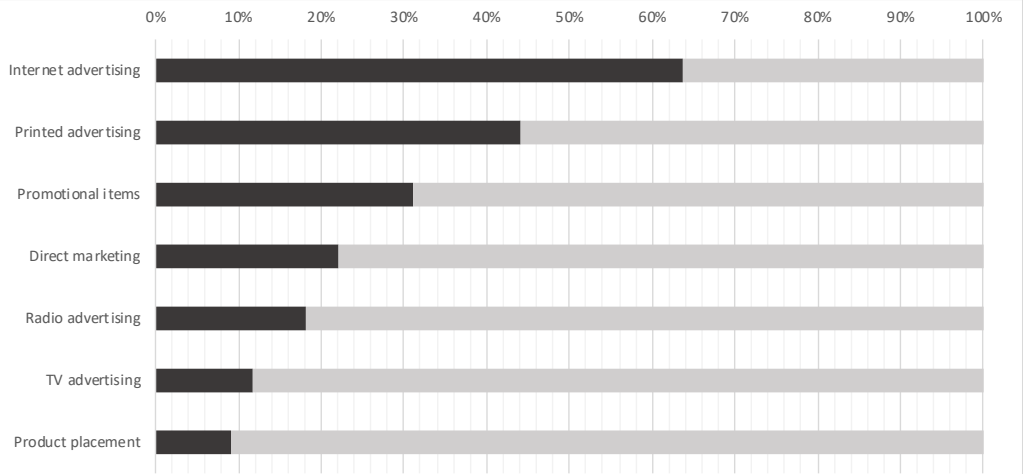

	Product placement	TV advertising	Radio advertising	Direct marketing	Promotional items	Printed advertising	Internet advertising
Yes	7	9	14	17	24	34	49
No	70	68	63	60	53	43	28

Figure 1: Promotion tools used in the analysed companies (Source: Author's own study)

Fifty-four out of the total number of analysed 77 companies, use promotion and advertising, which amounts to over 70.1%. Conversely this means that 23 companies do not use any form of promotion. It is a surprising finding that out of 54 companies that use promotions to communicate with customers, up to 39 companies (72.2%), evaluate the quality of their communication and its impact on customers. This means that despite the fact that the creative industries are formed in the vast majority of cases by SMEs, companies are aware of the need to retrospectively evaluate the effectiveness of resources invested in promotion and advertising.

As for the composition of respondents by size, up to 63 companies (81.8%) have less than ten employees and are therefore micro-enterprises. The remaining 14 companies (18.2%) have up to 50 employees, and therefore, we can classify these companies as small companies. The respondents copy the already mentioned trend in the creative industries, in which only a tiny percentage of companies is regarded as medium and large companies. Based on the data of the documents of the official mapping of creative industries in the Czech Republic, the share of medium and large enterprises in the total number of enterprises in creative industries in the Czech Republic is 3.61% (Bednář & Kraus, 2015).

As was previously mentioned, this article aims to analyse the views and opinions of the owners of small and medium-sized enterprises operating in the publishing industry on the importance of marketing and promotion for their businesses. To this end, five research hypotheses were established, which are as follows:

Table 1: Established hypotheses (Source: Author's own study)

H1	Setting plans to achieve business goals has a positive effect on the view of the importance of promotion
H2	Having more employees has a positive effect on the view of the importance of promotion
H3	Higher achieved education of the owner / executive manager of the company has a positive effect on the view of the importance of promotion
H4	The higher age of the company has a positive effect on the view of the importance of promotion
H5	The production of a tailor-made product has a negative effect on the view of the importance of promotion

The premise for establishing the first hypothesis is that if the company sets strategies and plans, then in such a company there is a planning process and thus the company also adopts management procedures, which create a precondition for a more positive perception of the importance of promotion. This assumption can be taken for granted for bigger companies, but it is necessary to be aware of the micro and small size of the analysed companies. Given the result of the correlation analysis in the case of the first established hypothesis, it is possible to accept the null hypothesis and reject the alternative hypothesis. Hence, there is a statistically significant relationship between having plans and strategies in companies and the favourable opinion of owners or executive employees on the importance of promotion.

Table 2: Evaluation of the first hypothesis (Source: Author's own study)

H1	Setting plans to achieve business goals has a positive effect on the view of the importance of promotion		
	Kendall's tau b	Correlation Coefficient	.232*
		Sig. (2 tailed)	.028
		N	77
	* Correlation is significant at the 0.05 level (2 tailed)		

The formation of the second hypothesis is based on the assumption that larger companies require a higher level of management than micro-enterprises, for example in the form of a defined organizational structure and transparent clarification of the relationships between the company's employees. The second hypothesis is based on a similar assumption as the first one and thus that in companies with more employees, the role of promotion is also perceived more positively. Given the results of the correlation analysis, it is possible to accept the null hypothesis and reject the alternative hypothesis. The correlation is particularly significant at the 0.01 level in the second hypothesis. With the growing number of employees in the company, the opinion of the owners or executive employees on the role of promotion is also growing. Even more precisely, due to the negative correlation of analysed data, it is possible to speak of a declining negative opinion on the role of promotion in a company with an increasing number of employees.

Table 3: Evaluation of the second hypothesis (Source: Author's own study)

H2	Having more employees has a positive effect on the view of the importance of promotion		
	Kendall's tau b	Correlation Coefficient	-.303**
		Sig. (2 tailed)	.003
		N	77
	** Correlation is significant at the 0.01 level (2 tailed)		

The third hypothesis is based on the assumption that with the growing education of the owner or executive employee, a precondition arises for a better understanding of the tools and the importance of marketing for the management of the company. Given the results of the correlation analysis, it is possible to accept the null hypothesis and reject the alternative hypothesis. Thus, with higher achieved education of the owners or executive employees in the company, there is a more positive perception of the significance of promotion. More specifically, given the negative correlation of the analysed data, it is possible to speak of a declining negative opinion on the role and importance of promotion of the owner or executive employee with a higher achieved education.

Table 4: Evaluation of the third hypothesis (Source: Author's own study)

H3	Higher achieved education of the owner / executive manager of the company has a positive effect on the view of the importance of promotion		
	Kendall's tau b	Correlation Coefficient	-.249*
		Sig. (2 tailed)	.019
		N	77
	* Correlation is significant at the 0.05 level (2 tailed)		

The fourth hypothesis was established on the assumption that the representatives of the companies that were established earlier and had more experience in the market will perceive the role of promotion more positively. Given the results of the correlation analysis, it is not possible to speak of a statistically significant correlation between the observed variables. That means that we reject the null hypothesis and accept the alternative hypothesis. The reason for the absence of a statistically significant correlation between the age of the company and the perception of the importance of promotion by its representatives may be the fact that older companies that have already established themselves in the market and have their regular customers and business partners may not perceive the role of promotion as necessary for their business activities. There is also the presumption that companies that have been on the market for a longer time have been established at a time when marketing was not considered as important as it is nowadays.

Table 5: Evaluation of the fourth hypothesis (Source: Author's own study)

H4	The higher age of the company has a positive effect on the view of the importance of promotion		
	Kendall's tau b	Correlation Coefficient	-.187***
		Sig. (2 tailed)	.057
		N	77
	*** Correlation is statistically insignificant		

The last fifth hypothesis is based on the assumption that companies in the creative industries that produce tailor-made products will probably not consider promotion as an essential tool for the company. Given the results, it is possible to accept the null hypothesis and, conversely, reject the alternative hypothesis. That means that companies that produce tailor-made products perceive promotion as less necessary for the company than in the case of companies that do not produce a tailor-made product.

Table 6: Evaluation of the fifth hypothesis (Source: Author's own study)

H5	The production of a tailor-made product has a negative effect on the view of the importance of promotion		
	Kendall's tau b	Correlation Coefficient	-.246*
		Sig. (2 tailed)	.017
		N	77
	* Correlation is significant at the 0.05 level (2 tailed)		

Conclusion

The aim of this research paper was to identify what factors influences the opinion of representatives of companies operating in the publishing industry on the importance of promotion. Five research hypotheses were established for this purpose. These hypotheses tested the influence of planning process in the company, the number of employees, the education of the respondents, the age of the company and whether the company produces tailor-made products, on the opinion of the owner or executive employee in the company regarding the importance of promotion for their businesses. Considering the theoretical part, it is possible to say unequivocally that marketing in the field of culture and art has many specifics that may not be reflected in traditional industries. In the case of research of the creative industries or their subsectors, it is always necessary to approach the analysed problem contextually. The results show that there are statistically significant correlations between planning, number of employees, education achieved by the owner or executive employee, and whether the company produces a tailor-made product, and an opinion on the importance of promotion for the company's business. In the case of the fourth hypothesis, the correlation between the age of the company and the opinion on the promotion was not statistically confirmed.

As Jeffcutt & Pratt (2002) suggests, what applies to one of the subsectors of the creative industries may not automatically apply to another subsector. Thus, one possible direction for future research could be to compare these correlations with other subsectors of the creative industries. It is also necessary to realize that the development of marketing in the creative industries is not always welcomed with open arms and many representatives of companies or artists are almost defensive about the concept of marketing and management in general because they feel they are at odds with their artistic feeling. In the creative industries, it is crucial to explore the opinions of their representatives and the factors or variables that may stimulate those opinions. This article is a modest attempt to implement such an approach. This approach could be vital for understanding the internal workings of processes in the creative industries. Despite the topicality and great present value of the creative industries, the internal processes that shape and transform the creative process in the creative economy remain mostly unclear and poorly understood (Jeffcutt & Pratt, 2002).

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A Comparative Study of Tourism Attractivity by Using Internet and Classical Tools for Two Cities in Southern Transylvania

Cristina-Maria PACURAR

Transilvania University of Brasov, Faculty of Mathematics and Computer Science, Brasov, Romania, cristina.pacurar@unitbv.ro

Victor-Dan PACURAR

Transilvania University of Brasov, Faculty of Silviculture and Forest Engineering, Brasov, Romania, vd.pacurar@unitbv.ro

Ruxandra-Gabriela ALBU

Transilvania University of Brasov, Faculty of Economic Sciences and Business Administration, Brasov, Romania, ruxandra.albu@unitbv.ro

Abstract

The paper presents a comparative study of tourist attractivity for two cities, Brasov and Sibiu, located in Southern Transylvania, Romania. For the attractivity assessment, a combined approach was tested, using a digital, online tool (Google Trends) and a classical method (qualitative research). The results were consistent, outlining that these cities are both highly ranked by tourists, but Brasov records a constant advance. This was explained, by the subjects of the qualitative analysis, as related to differences in the natural potential (mainly climate and vegetation peculiarities). By analysing the time series of monthly Google searches (for the period January 2004- August 2020), it is clearly observable the higher interest for Brasov for almost all this period and a noteworthy exception, in 2007-2008 (in 2007, Sibiu was European Capital of Culture). Such events prove their importance in increasing tourist appeal, but the effect is limited in time, thus requiring a certain periodicity and for their optimised time planning, the Google Trends could offer very useful information.

Keywords: tourist attractivity, tourist destination, Google Trends, qualitative research, natural potential.

Introduction

Tourism represents a major economic sector worldwide and its importance is currently increasing. With this general ascending trend, that will most probably continue in the future decades (despite some possible severe drawbacks induced by social crises, like the present pandemics), the faith of particular destinations would be significantly different, in accordance with the evolution of the visitors' flux, driven by the tourist attractivity. Consequently, for sustainable tourism management, the assessment and monitoring of attractivity are of vital importance. By employing new tools, available in the present digital era, real-time information could be added to the data obtained by classical methods, potentially improving the decision-making process.

The amount of digital data generated every second in the present is astonishing. Thus, the importance of keywords is growing at a steady pace. Google Trends has been launched in 2006 to track and analyse the searching trends on Google (2017). Since its appearance, it has been a useful tool not only in keyword research but also in numerous research papers covering various topics. A comprehensive study upon articles that employed Goggle Trends is that of Jun et al. (2018).

Today, the importance of search engines is indisputable as they are an indispensable part of our daily life. The undoubtable significance of search engines in tourism and hospitality has led to a substantial literature on the subject. An extensive literature review covering the five-year-period of time 2012-2017 is that of Dinis et al.

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(2019). According to them, the majority of articles which employ Google Trends are related to "forecasting/nowcasting; knowing the interest of users' searches for tourist attractions or destinations; showing the relationship between the official tourism statistics and the search volume index of Google Trends; and estimating the effect of one event on tourism demand".

The present study is aimed to analyse the correlation between the number of worldwide Google searches as provided by Google Trends and the attractivity of a destination. There were chosen two tourist destinations in Southern Transylvania with significant national importance for Romania, but less known at the international level.

Brașov is one of the most important tourist destinations in the central region of Romania. It is an area with a significant historic and cultural patrimony, in addition to its magnificent natural scenery, in the close vicinity of the mountains. Its tourist value is increased by the winter resort Poiana Brasov at the outskirts, probably the top Romanian skiing attraction, and by the nearby Dracula Castle, at Bran, with numerous visitors from all over the world.

Sibiu is also well known as a major tourist attraction in Southern Transylvania, with structural and historical similarities with Brasov, sharing a similar Saxon tradition (Kronstadt and Hermannstadt are their German names). Its tourist attractiveness has been increased by obtaining the title of European Cultural Capital (in 2007, together with Luxemburg), being the first city in Eastern Europe with this title.

Materials and Methods

The data were collected from Google Trends for the past seventeen years, from January 2004 to August 2020. The data consist of individual entries summarised as monthly values, which represent a normalized number, scaled from 0 to 100, according to Rogers (2016). The relative number of searches for the two Romanian destinations, Brașov and Sibiu, as it results from the collected data, gives an inside on the interest that is received from the online community.

In order to obtain an attractivity evaluation, as perceived by tourists, a qualitative research was conducted, using the in-depth, semi-structured interview method. As remarked by Hennink et al. (2020) "qualitative research begins with the formulation of the research questions and study objectives". Thus, the present survey was aimed to formulate a comparative attractivity index for the two cities, as well as to identify the attractions that make tourists visit a certain place, from the point of view of the tourists who have previously visited the destination.

In order to obtain a relevant sample in a qualitative research, some authors suggest that the ideal sample size should be of 12 to 26 subjects according to Luborsky & Rubinstein (1995), and "as a very general rule of thumb" to never exceed 50 subjects, as stated by Ritchie et al. (2003). Some authors consider that "recommendation for in-depth interviews is to have a sample size of 20-30" as stated by Shetty (2020).

The interview guide, comprising 18 questions, was composed of questions related to general aspects regarding the attractivity of the tourist destinations Brașov and Sibiu (questions 7, 8, 9, 10, 11 and 12), questions which aimed to identify the visitation frequency (questions 1, 2, 3 and 4) and questions regarding the correlation between attractivity of a destination and search engines (questions 13 and 14). The last questions of the survey are related to the background of the respondents.

The qualitative method used was the exploratory one. The communication technique chosen was the direct, individual one and the semi-individual, profound one. The interviews were conducted between June 2020 and August 2020, being afterwards transcribed to conduct a content analysis.

The sample for the present study consists of 23 subjects, with an age range from 21 to 80 years, who have previously visited both Brasov and Sibiu. The sex distribution of the respondents was of 60.9% women to 39.1% men. As far as education is regarded, the subjects are divided as follows: 65.2% have higher education, while an equal per cent of 17.4% have medium or postgraduate education. As far as occupational categories are concerned, 56.3% of respondents are employees (in different professional areas), 4.3% are entrepreneurs, 26.1% are students, 8.7% are retired and 4.3% have answered something else.

The study destinations are well known by the subjects, most of them having updated information, obtained through recent visits (96% visited Brasov and 59% Sibiu last year, as indicated by the answers at questions 2 and 4).

Most of the respondents (78%) have used Internet search engines when they decided to visit Brasov and Sibiu, and they stated that this influenced considerably their decision to visit the destination (75% for Sibiu and 69% for Brasov).

Results and Discussions

The differences in popularity as resulting from Google Trends are interestingly divided worldwide. Brașov has been most searched in Moldova (77% compared to 23% for Sibiu), Israel (74%), Italy (69%), UK (67%) and Greece (66%). Even though Brașov tends to be generally more popular, in terms of searches worldwide, as it can be observed in the following graphs (Fig. 1, 2 and 3), Sibiu leads in searches from the following countries: Germany (63% compared to 37% for Brașov), Austria (56%) and Switzerland (53%). This situation can be explained by the presence of the German community in the Sibiu region, which despite its consistent reduction in the last decades (especially during the communist regime and in the immediately subsequent period) is now more important than in Brasov.

The Google searches monthly averages for the study period (2004-2019), charted in Figure 1, are obviously higher for Brasov as compared to Sibiu.

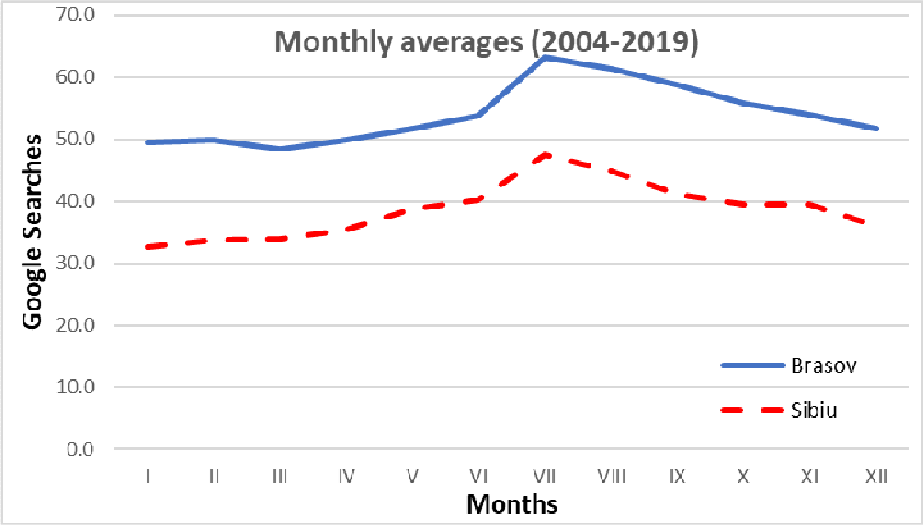

Fig. 1: Annual variation of the Google searches monthly averages, for the 2004-2019 period

The monthly data of Google searches, for the analysed tourist destinations, show a generally similar shape, with an increase of the number of searches in the summertime, with a maximum in July, for both cities. The tourist interest decreases in winter and early spring, when the monthly mean minimums are recorded, in January (Sibiu) and March (Brasov). These slight differences in the searches dynamics, also observable on the chart, could be explained by the presence of the well-known ski resort Poiana Brasov, located in the Postavaru Mountains, at the southern border of Brasov city, that determines the occurrence of the minimum interest towards the end of the skiing season. The number of searches is decreasing in late autumn and early winter (with a more evident drop from November to December for Sibiu, with a lower focus of the winter sports lovers, as compared to Brasov), despite the very high number of visitors, in both destinations, during the Christmas Holliday (when attractive feasts are organised in the Central Squares, in the German style), but probably those travelling plans are drawn in the previous months.

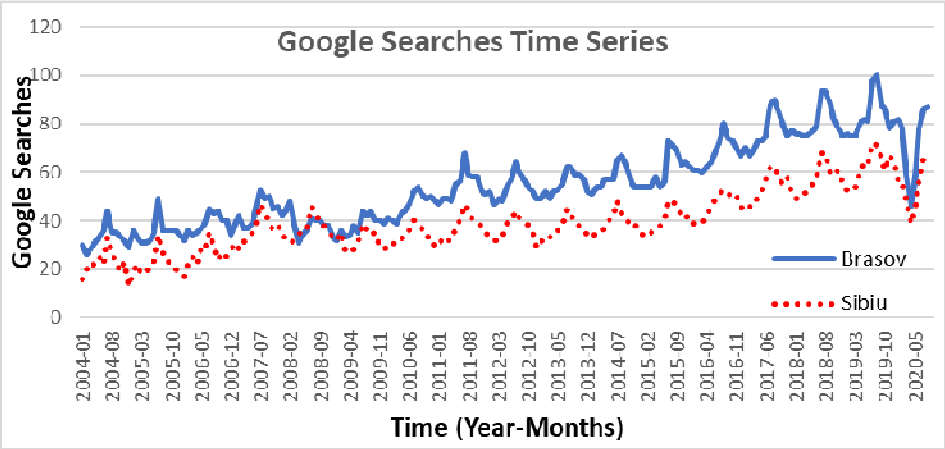

Fig.2: Monthly Google searches, for Brasov and Sibiu, from January 2004 to August 2020

As regards the time series of monthly Google searches for Brasov and Sibiu, in the period spanning from January 2004 to August 2020, graphically represented in Figure 2, apart of the jagged aspect, determined by the seasonal variations previously analysed, it is easily observable that the number of searches for Brasov is considerably higher for almost the whole time interval. There are two exceptions, firstly the number of searches was higher for Sibiu in 2008, from April to August, and very close to Brasov in the adjacent periods, as a clear effect of the increased tourist interest for the 2007 European Cultural Capital (it is noteworthy to observe that the tourist focus on Sibiu was maximum in the summer of the following year, when people's amplified curiosity met the customary main holiday season) and secondly in the spring of 2020, when the Google searches decreased to close low values for both destinations, most probably due to the Covid-19 lockdown.

The time evolution of the difference in Google searches between Brasov and Sibiu could be more easily analysed in the following diagram (Figure 3), where the previously analysed exceptions are clearly marked as minimums, the one in July 2008 with a negative value.

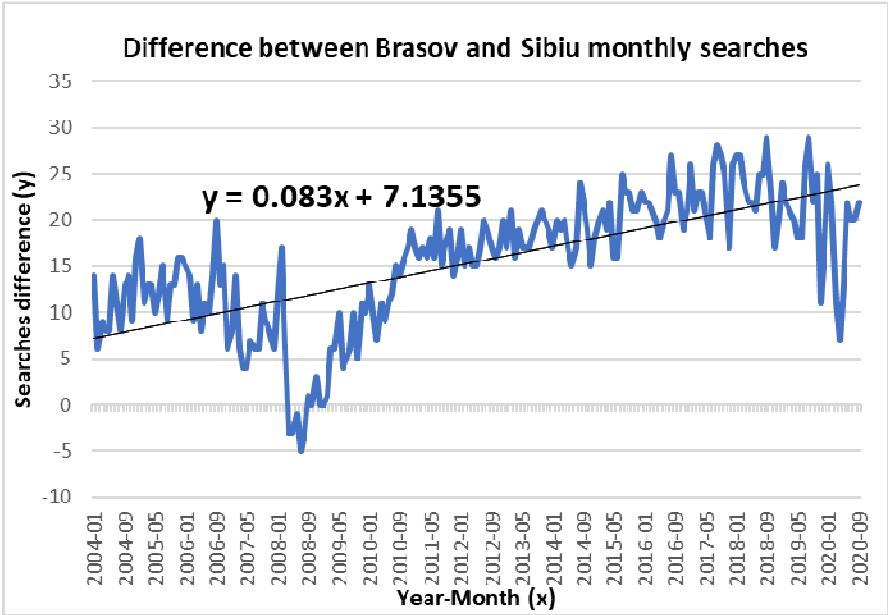

Fig.3: Time series of monthly differences between Brașov and Sibiu searches

The diagram also shows that after 2007, the effect of the increased attractivity of Sibiu (European Capital of Culture in that year) was not very long-lasting, as the difference has abruptly increased, reaching in 2-3 years values comparable with those in 2005-2006. Afterwards, till 2019, the difference continues its growth at a lower but almost constant yearly rate. For the entire study period, the trendline on the chart (with its equation noted above the graph) indicates a rising tendency.

Based on the above study of the Google Trends data, one could infer a higher tourist attractivity for Brasov, with a generally increasing trend. For verifying this hypothesis and possibly consolidating these assumptions, a very useful tool is offered by the qualitative research, using the in-depth, semi-structured interview method. Much more than providing an alternative evaluation of the two destinations' attractivity, for comparison reasons, this classical approach was also designed for supplying the information necessary to identify the decisive factors for the tourist attractivity (components of the tourism potential and/or offer).

As concerns the tourist attractivity assessment for Sibiu and Brasov, which was the first objective of the qualitative research, the results are in accordance with the outcomes of the Google trends analysis (see Figure 4)

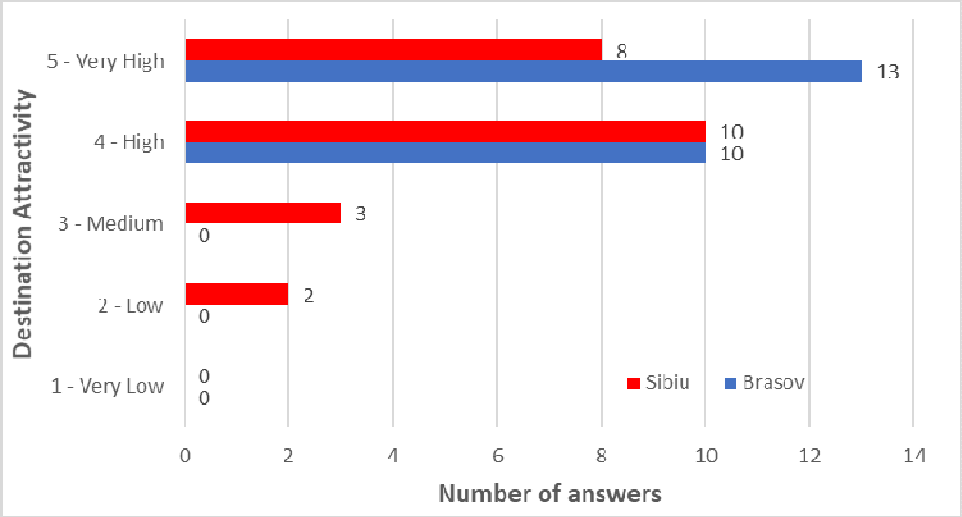

Fig.4: Qualitative research assessment of study destinations tourist attractivity

The majority of the interviewed subjects ranked the attractivity of both tourist destinations as high and very high (100% for Brașov and 78.3% for Sibiu). However, there is a noticeable difference in respondents' perception about the attractivity of these cities, in accordance with the outcomes of the Google searches analysis. The attractivity was evaluated as very high (the top category) by 56.5% of the respondents for Brasov and only 34.8% for Sibiu, resulting a per cent difference of 21.7%, well correlated with 15.5, the average difference of monthly Google searches, observable in Figure 3 (a value that could be compared with the percentual values, since these are normalized numbers, scaled from 0 to 100).

The qualitative research also offers information regarding the importance of the various factors affecting tourist attractivity. These factors were grouped into three categories (each one focused by a question in the interview guide), referring to the natural potential, the anthropic potential (attractions created by humans) and tourist infrastructure.

The natural potential was appreciated to be superior for Brașov as compared to Sibiu (with total scores of 85 and 32 respectively). Among the natural potential components, the maximum differences between the considered cities occur for climate (16 points) and vegetation (14 votes), as clearly observable in Figure 5.

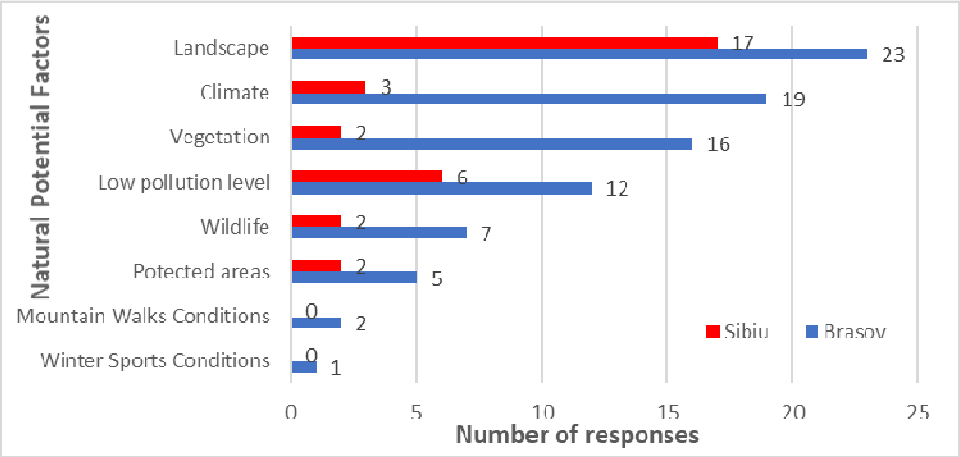

Fig.5: Natural potential factors importance for tourist attractivity

The above-mentioned situation is changed for the anthropic potential, where Sibiu records a slight advance against Brașov (with a cumulated score of 87 versus 86). Despite this close overall situation, one could easily observe on the chart (see Figure 6) that the differences in favour of Sibiu are much higher for several components (monuments, museums and traditions) while Brașov was more appreciated for its churches and gastronomy.

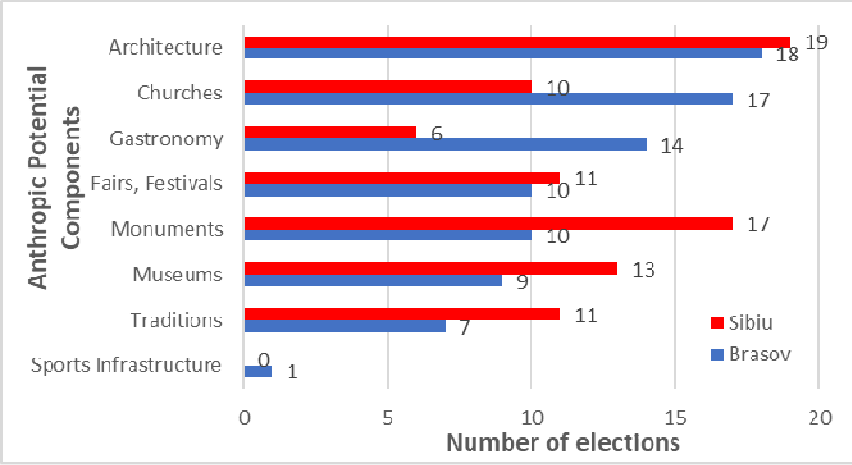

Fig.6: Significance of anthropic potential factors for tourist attractivity

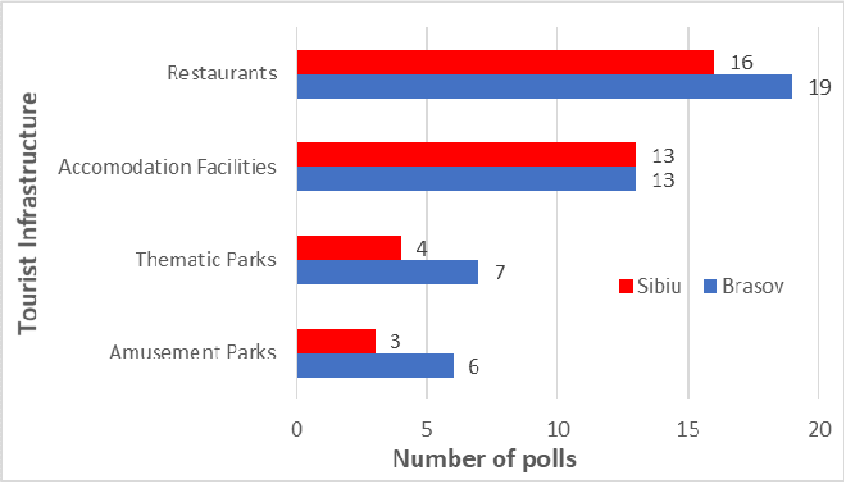

Fig.7: Tourist Infrastructure contribution to destination attractiveness

The tourist infrastructure was appreciated to be better in Brasov (with a total of 45 points and only 36 in Sibiu), but it is worth mentioning that the differences, recorded for three components, are all equal to 3 votes (see Figure 7).

By synthesising all the above-mentioned factors, contributing to the tourist attractivity, it clearly occurs that, in the opinion of the qualitative research subjects, the difference between Brasov and Sibiu is mainly related to their natural potential, with a special emphasis for climate and vegetation (forests).

At a first glance, the tourism potential of the two well-known Transylvanian cities, Brasov and Sibiu, seems very similar. Most probably this resemblance is related to their German (or more precisely Saxon) inheritance that is easily noticeable, especially in the structure and the architecture of their main squares. But even from these central positions, an important difference could be observed by any visitor. The Central Square in Brasov is in the shade of the Tampa Massif (that gave a popular alias to the city name "The Town at Bottom of Tampa"), and the nice forests draping its Western slopes (with changing colours from season to season, fresh green in the spring, gilded in the autumn sun and glittering silver in the winter frost), are creating a picturesque background to the historical buildings of the old downtown. And Tampa is not alone, on the other side the hillslopes of the Warthe Hills, are also covered by beautiful woodlands, with their green blanket stained, from place to place, by the withe limestone of the old towers and walls (like the White and The Black Towers, which are important tourist attractors). Thus, the mountains, with their piedmonts (before mentioned) inserted in the city, create a clear difference in the landscape.

Mountains are also not far from Sibiu, from several positions one could observe the Fagaras Mountains Summits (the Transylvanian Alps, as sometimes named). But these mountains and their forests are not in contact with the city.

This situation is related to the local climate of those regions. Brasov is situated in a depression area, where cold air is draining towards the bottom, especially in wintertime, creating temperature inversions with frost pockets at lower elevations and a more hospitable warmer belt at the bottom of the surrounding mountains. As a consequence, human settlements mainly avoided the lower areas and most of the towns and villages, not only Brasov, are located at the contact between the depression and the mountain range, coming in contact with the forests.

The social importance of the forests surrounding Brasov, considerably exceeding their contribution to the tourist potential of the area, is greatly recognized by the community, as documented by previous researches. In a study by Pacurar and Albu (2018), concerning the perception about the services provided by Brasov's forests, all respondents highly appreciated their role in the community life, some of them adding the following comments: "the forests help in reducing climate change, are sources of wood products, food and water, offer shelter for numerous wildlife species", "the forest is like a member of my family", "it maintains the ecological equilibrium, represents a source of food for men and animals and a source of wood "and "prevent erosion and landslides, provide oxygen and absorb carbon dioxide, reducing pollution, offer a place for relaxation and an outstanding landscape".

Conclusions

The new tools, presently available online, such as the Google Trends, used in this study, offer outstanding opportunities for applications in various domains. This synthetical information could be easily and quickly obtained and is extremely useful in assisting the decision-making process generally and particularly in tourism management.

By adding to this modern, digital approach a qualitative analysis, which could offer accurate outcomes faster than other classical methods, the results and conclusions could be consolidated and expanded.

This study sustains the usefulness of this combined approach in assessing the tourist attractivity and explaining the possible differences occurring between various destinations. This is of great importance for the sustainable management of a tourist destination. As Albu and Pacurar (2019) stated, "an accurate evaluation of the touristic potential of Brașov county, along with identification of the resources which will allow an increase in the attractivity throughout the entire year, is highly important for maintaining a constant touristic flow of visitors".

For obtaining a complete image of the attractiveness of a destination, it is important to combine the methods presented in this study. The optimal planning of the sustainable tourism development strategy for a tourist destination requires to focus all the main categories of stakeholders. For achieving better management decisions in the tourism sector, it is also advisable to apply such a combined procedure in evaluating the attractiveness of tourist destinations, involving both modern tools and classical methods. In this study, the classically acquired information about tourists' opinions were highly useful for explaining the results. Obviously, the qualitative research should be always adapted according to the typology of tourist destinations. The comparative analysis of Brasov and Sibiu attractivity, with consistent results provided by the study of Google Trends and the qualitative research, showed that these are both highly ranked by tourists, but Brasov records a constant advance. This was explained by the difference in the natural potential, mainly related to the climate and vegetation peculiarities. Obviously, these researches must be continued and deepened for confirming the results. For instance, this special focus on climate and forests decisive influence corresponds to reality, being also confirmed by experts' opinions, but the figures could be artificially inflated by the overwhelming (and not always accurate) presence of these topics (forests and climate) in the Romanian mass media. The study also brings new evidence for the efficiency of cultural events, with broad international impact (like those hosted by Sibiu, in 2007, as European Capital of Culture) in increasing the tourist attractivity, but also signals its limited duration. Consequently, new similar events need to be periodically organised, for maintaining the tourist interest, and for planning them and optimising the costs, the monitorisation of Google trends could be a simple but highly effective method.

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Leadership Style, Entrepreneurial Orientation and Their Consequences: A Review Paper

Hieu Minh VU

Faculty of Business Administration, Van Lang University, Vietnam
Email: hieu.vm@vlu.edu.vn

Abstract

Effective Leadership is important for the growth and survival of every organization. Entrepreneurial orientation dimensions of risk-taking, innovativeness, and proactiveness enable an entrepreneur to spot and exploit opportunities ahead of competitors. The author uses a critical literature review method to draw insight on leadership styles, entrepreneurial orientation, and their consequences. The review highlights the important role different leadership styles play in promoting business performance, organizational effectiveness, and growth. It was observed that role of entrepreneurial orientation (EO) dimensions of risk-taking and innovativeness to organizational success is relatively unclear and inconsistent. This is due to mixed findings that were reported by scholars. The author recommends that more studies should be conducted on entrepreneurial orientation by incorporating more antecedents and consequences.

Keywords: Leadership, transformational leadership, entrepreneurship, entrepreneurial orientation (EO).

Introduction

Globalization, fast-changing technology, changing workplace, demographic changes, and Covid 19 pandemic are influencing firm performance. In this context, effective leadership is needed to cope with these forces that are shaping organizational success. Leadership is the art of influencing others to cope with the complexities of the fast-changing global environment (Nahavandi, 2002). Several scholars (e.g. Severinsson and Holm, 2012; Hotho and Dowling, 2010; Vardiman et al., 2006; Anderson et al., 2009; Amagoh, 2009) demonstrated that firms with good leadership thrive, even in difficult times. Francis (2013) notes that organizations fail due to poor leadership. Therefore, organizations need to develop leadership capacity to navigate a dynamic and uncertain business environment. Leadership style is the consistent pattern of behavior that characterizes a leader (DuBrin, 2001) that fosters an organization's effectiveness or performance (Nahavandi, 2002). Researchers have examined different approaches to leadership; contingency or situational leadership (Avolio, 2007; Haslam et al., 2011; Northouse, 2015), transformational leadership (e.g. Burns, 1978; AlimoMetcalf and Alban-Metcalf, 2005), distributed/shared (Hartley et al., 2008), transactional leadership (Burns, 1978), strategic leadership (Onu et al., 2018; Masungo et al., 2015; Kabetu and Iravo, 2018, Nwachukwu and Vu, 2020) and entrepreneurial leadership (Goossen and Stevens, 2013; Dover, Hariharan and Cummings, 2014; Renko, Tarabishy, Carsrud and Brännback, 2015). Entrepreneurial orientation is one of the entrepreneurship research domains where the body of knowledge is growing (Rauch et al., 2009). Covin and Wales (2012) acknowledge that entrepreneurial orientation is a driving force behind an organization's effort to succeed. The literature on entrepreneurial orientation is not fully established in non-US business environments (Runyan et al., 2012). Entrepreneurship behaviors foster a firm competitive edge (Vu & Nwachukwu, 2020; Kuratko, 2009), economic growth (Antoncic & Hisrich, 2004), and financial, cultural, or social values (Nwachukwu, Chládková & Zufan, 2017). Studies on entrepreneurial orientation are well documented (e.g. Lim and Envick, 2013; Jia, Wang, Zhao and Yu, 2014; Vojtovič, 2016; Hudakova, Buganova, and Dvorsky, 2015) which lend credence to the importance of EO to Small and Medium Enterprises - SMEs. The present paper examines the concepts of leadership, entrepreneurial orientation, and their consequences using a critical literature review approach. The paper adds to the leadership and entrepreneurship literature by reviewing and discussing the role of leadership styles and entrepreneurial orientation in promoting organizational outcomes. Specifically, academicians and managers will be informed of the importance of different leadership styles and EO dimensions risk-taking, proactiveness, and innovativeness in fostering organizational success. This paper is arranged as follows. In the following section, this paper presents an overview of the review of the theoretical underpinning and concepts of

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leadership and leadership styles, entrepreneurship and entrepreneurial orientation, and consequences of leadership styles and entrepreneurial orientation. Next, the methodology. Finally, discussion, conclusions, limitations, and suggestions for further study.

Literature Review

In the contexts of leadership, the democratic theory focuses on getting assistance from subordinates in planning and decision making. It recognizes and appreciates the contributions of subordinates in promoting organizational success. From the resource-based view and human capital theory stance, leaders' unique insights, skills, intellectual characteristics, education, business ownership experience, and capacities influence employees and enhance productivity and performance. The dynamic capability theory has been used to explain the concept of entrepreneurial orientation (EO). Thus, value creation through entrepreneurial orientation (risk-taking, proactiveness, and innovativeness) and actions can enable firms to create and sustain value; thus, an important element in the dynamic-capability framework.

Conceptualizing leadership and leadership styles

Grint (2010) and Northouse (2015) summarise that leadership falls into one of four typologies; leadership as a position, leadership as a person, leadership as a result, and leadership as a process. Leadership as a position suggests the positional power of leaders that enables them to achieve goals within their area of responsibility or power. Leadership as a person focuses on the personal qualities and traits of the leader. Leadership, as a result, emphasizes the leaders' actions and efforts towards the attainment of agreed goals. Leadership as a process suggests that leadership is an interactive and fluid relationship between leaders and followers. Accordingly, leadership involves the process of influencing a group of individuals to achieve a common goal. Extant literature has used trait theory; behaviours, qualities, or attributes of leaders (Avolio, 2007) to explain the concept of leadership. Mann (1959) submits that the connection between leadership and traits was inconsistent. On the other hand, the behaviour theory of leadership focuses on task-oriented and people-oriented behaviours of a leader (Mendez-Morse, 1992). Tasks-oriented activities include planning, organizing, and assigning tasks and jobs in an organization among others. People-oriented behaviour focuses on using recognition of the social and emotional needs of individuals, self-esteem, and work satisfaction to promote people's performance. Contingency or situational leadership is another approach to conceptualizing leadership. This approach suggests that the situation shapes the behaviour of leaders (eg. Avolio, 2007; Haslam et al., 2011; Northouse, 2015). Transformational leadership is one of the new paradigm approaches to leadership (AlimoMetcalf and Alban-Metcalf, 2005). Transformational Leadership aims to transform people and to help them actualize their potential and enhance organizational performance (e.g. Northouse, 2015). Transactional leaders were described as those who give something in exchange for what they want. Transactional leaders direct energy, live within the organizational culture, and hold followers in a dependent position. Transactional leadership connotes the exchange or transaction between a leader and the follower (Burns, 1978). For instance, followers received rewards for their contribution to common goals. Arguably, most leadership models are transactional and common with all types of organizations. Distributed or shared leadership is another model of leadership that suggests that leadership is distributed or shared with others. As such, all members of the organization can lead when needed (Hartley et al., 2008). The concept of entrepreneurial leadership emerged from the combination of two concepts (entrepreneurship and leadership) (Yang, 2008). Ireland, Hitt and Sirmon (2003), Vecchio (2003), and Kuratko (2007) assert that entrepreneurial leadership is the ability to influence others to use resources strategically. It encompasses both the opportunity-seeking and advantage-seeking behaviours of a leader. In the words of Goossen and Stevens (2013), entrepreneurial leadership involves creating an environment that motivates followers towards spotting new opportunities and exploiting them for sustainable success and value creation.

Conceptualizing entrepreneurship and entrepreneurial orientation

Extant literature suggests that entrepreneurship plays an important role in promoting the economic growth of nations (Antoncic and Hisrich, 2004; Kuratko, 2009) and the success of Small, and Medium Enterprises (SMEs) (Nwachukwu, Chládková and Zufan, 2017). According to Kirzner and Santet (2006), entrepreneurship involves human creativity and the ability to spot profitable ideas that enable firms to leverage new and socially beneficial gains from trade. Arguably, entrepreneurship focuses on creating new economic opportunities in the market. An entrepreneur takes business and financing decisions that transform innovations to value for customers. Entrepreneurs must collaborate and cooperate with employees to develop and execute meaningful ideas (Vu and Nwachukwu, 2020). Entrepreneurial orientation involves the process, practices, and decision-making activities that facilitate new entry (Miller, 2011; Lumpkin and Dess, 1996)). Entrepreneurial orientation is a firm's strategic orientation that explains the specific aspects of entrepreneurial decision-making, methods, and practices (Wiklund and Shepherd, 2005). Dess

and Lumpkin (2005) assert that entrepreneurial orientation is 'a frame of mind' and view about entrepreneurship that is shown in a firm's processes and culture. Additionally, entrepreneurial orientation suggests strategy-making processes that enable organizations to take entrepreneurial decisions and actions (Rauch et al., 2009; Wales et al., 2011). In light of Miller (1983), entrepreneurial orientation entails a firm's propensity for risk-taking, innovativeness and proactiveness. Lumpkin and Dess (1996) expand the entrepreneurial orientation construct by adding competitive aggressiveness and autonomy. In explaining the construct, Rauch et al. (2009) describe the risk-taking dimension as the ability of a firm to deploy significant resources to ventures in uncertain environments. Risk-taking describes the uncertainty that emerges from behaving entrepreneurially and the ability of an entrepreneur to spot and deal with the risks (Ogunsiji and Kayode, 2010). Lumpkin and Dess (2001) submit that risk-taking enables a firm to calculate and plan business opportunities considering uncertainties in the marketplace. Innovativeness entails the ability to engage in creativity through the introduction of new ideas, products/services as well as technological leadership. The proactiveness dimension emphasizes "opportunity-seeking" characterized by the introduction of new products and services ahead of the competitors. Arguably, proactive firms can take advantage of market opportunities before competitors. Competitive aggressiveness explains a firm's efforts to outwit competitors. Firms use strong offensive posture or aggressive responses to neutralize competitive threats. According to Lumpkin and Dess (1996), competitive aggressiveness focuses on competitors while proactiveness is the initiative towards customers. The autonomy dimension of entrepreneurial orientation explains entrepreneurial independence when creating and implementing new ideas (Rauch et al., 2009).

Leadership styles and its consequences

Extant literature has shown effective leadership fosters strategic flexibility, performance, organizational effectiveness, and business sustainability (Ling, Simsek, Lubatkin and Veiga, 2008; Engelen et al., 2012; Yukl, 2013; Nwachukwu and Vu, 2020). Eddleston (2008) submits transformational leadership to promote positive family cultures, commitment, stewardship, and strategic flexibility. Wales et al. (2011) and Cogliser and Brigham (2004) report that leadership fosters entrepreneurial ventures' success. In the study of the public sector in the United Kingdom, Alimo-Metcalf and Alban-Metcalf (2005) find transformational leadership positively influences employee satisfaction, motivation, and productivity, and reduce levels of sickness absence and employee turnover. Empirically, Gyensare et al. (2016) conclude transformational leadership positively influence turnover intentions. Demirtas and Akdogan (2014) demonstrate ethical leadership promotes the awareness of ethical climate, as well as employees' turnover intentions. Using structural equation modeling, Azanza et al. (2015) report authentic leadership positively impacts employees' turnover intentions. Yang et al. (2019) find entrepreneurial leadership lower employee turnover intentions. Kuratko (2007) asserts entrepreneurial leadership allows firms to remain competitive and survive in the marketplace. Entrepreneurial leaders foster superior venture performance by creating strategic value (Yang et al., 2019). Rahim et al. (2015) evaluate the effect of entrepreneurial leadership on the performance of Malaysian SMEs and conclude entrepreneurial leadership positively influences organizational performance. Nwachukwu and Vu (2020) contend that strategic leadership is a firm's capability that promotes sustainable performance.

Entrepreneurial orientation and its consequences

Extant studies highlight the importance of risk-taking, innovativeness, and proactiveness to business sustainability and profitability (e.g. Lumpkin and Dess, 1996). Arguably, entrepreneurial orientation enables firms to identify new opportunities, benefit from risk-taking, develop innovative products, and proactively position themselves in the market. Previous studies suggest firms with robust entrepreneurial orientation outperform those that do not adopt entrepreneurial orientation (De Clercq et al., 2010). Karacaogl et al. (2013) submit risk-taking dimension of entrepreneurial orientation positively influences the financial performance of manufacturing firms in Turkey. Similarly, Neneh (2016) conclude risk-taking enables SMEs to survive in the marketplace. Jalali et al. (2014) find a strong positive association between risk-taking, firm performance, and growth. In the retail sector in Ghana, Anlesinya et al. (2013) report a positive and significant connection between risk-taking and profitability of micro-enterprises. Conversely, Gürbüz, and Aykol (2009) demonstrate risk-taking is negatively related to sales growth. In the same direction, Zhou and de Wit (2009) report there is no significant relationship between risk-taking and employment growth. Mirela (2008) argues that innovation promoted business survival and growth. Nwachukwu, Chládková and Fadeyi (2018) observe that innovation explains competitive heterogeneity between firms. Empirically, Calvo (2006) opines that the EO dimension of innovativeness significantly influences sales and productivity growth. He adds that the impact of innovativeness on employment growth in Spanish SMEs is insignificant. In Turkey, Karacaogl et al. (2013) report innovation has a positive effect on the financial performance of manufacturing firms. Matchaba-Hove and Vambe (2014) submit innovativeness has a significant influence on the success of small businesses in South Africa and the growth of Micro and Small Enterprises (MSEs). On the other hand, Neneh (2016)

finds there is no significant association between innovativeness and firm performance. Similarly, Anlesinya et al. (2013) demonstrate a relationship does not exist between innovativeness and profitability of microenterprise operating in the retail sector. Wiklund and Shepherd (2005) opine a proactive firm can spot and exploit new market opportunities and enhance innovative performance. Hughes and Morgan (2007) assert proactive firms can quickly respond to market signals. Proactiveness gives firms the first movers advantage in terms of profitability and market share (Lumpkin & Dess, 2001). Gürbüz and Ayko (2009) find a significant link between proactiveness, SMEs' employment, and sales growth. Similarly, Kaya and Agca (2009) report proactiveness dimension of EO significantly influences performance. Similarly, Matchaba-Hove and Vambe (2014) find that proactiveness has a significant and positive effect on the success of South African SMEs. In Ghana, Anlesinya et al. (2013) and Boohene et al. (2012) observe proactiveness is significantly related to the profitability of microenterprises in the retail and professional services sector. However, Fatoki (2014) submits microenterprises are less proactive and preferred to be followers rather than leaders.

Table 1: Theories underpinning the concept of leadership styles and entrepreneurial orientation

Variables	Theories	Literature
Leadership styles	Democratic theory,	Appadorai (1975)
	Resource-Based View (RBV)	Brush et al., (2001); Nwachukwu and Chládková (2019); Carter et al., (2003); Leitch et al., (2013).
	Human Capital Theory (HCT)	Unger, Rauch, Frese and Rosenbusch (2011); Ventakaraman, (1997); Backes-Gellner and Werner (2007).
Entrepreneurial orientation	Dynamic capability	Teece (2014); Teece, Pisano and Shuen (1997); Teece (2003); Jantunen, Puumalainen, Saarenketo and Kylaheiko (2005)

Source: Author (2020)

Methodology

The researchers use literature to support a variety of opinions. According to Transfield et al. (2003), a comprehensive review enables a researcher "to map and assess the intellectual territory" within a field of study. The author uses search strategies such as searching databases and websites to collect relevant articles used in the study. To search for these articles, the author uses the keywords; leadership, leadership styles, entrepreneurship, and entrepreneurial orientation. The search of EBSCO host, Google Scholar, Scopus, and Web of Science databases between 1959 to 2020 yielded 87 articles. A systematic literature review was done on both qualitative and quantitative studies.

Discussion

The review shows that leadership can be looked at from four perspectives: leadership as a position, leadership as a person, leadership as a result, and leadership as a process. It was observed that leadership can be operationalized based on behaviour, situation, transformation, transaction, distributed or shared, strategic leadership, and entrepreneurial leadership. The review suggests that entrepreneurial orientation is a firm's strategic orientation that supports entrepreneurial decision-making. Further, the author observes that entrepreneurial orientation encompasses five dimensions; risk-taking, innovativeness, and proactiveness (Miller, 1983) and competitive aggressiveness and autonomy (Lumpkin and Dess, 1996). The literature review suggests that entrepreneurial dimensions of risk-taking, innovativeness, and proactiveness have been widely examined. The review highlights the consequences of leadership style and entrepreneurial orientation dimensions of risk-taking, innovativeness, and proactiveness. Effective leadership influences strategic flexibility, performance, effectiveness, entrepreneurial ventures success, and business sustainability. Transformational leadership promotes positive family cultures, commitment, stewardship, and strategic flexibility, employee satisfaction, motivation, and productivity, and reduces levels of sickness absence and

employee turnover. Ethical leadership fosters the awareness of ethical climate and employees' turnover intentions. Authentic leadership influence employees' turnover intentions. Entrepreneurial leadership lower employee turnover intentions, improve competitiveness, survival, and venture performance. Strategic leadership allows firms to achieve sustainable performance. Arguably, leadership is vital for value creation and building sustainable businesses. The risk-taking dimension of entrepreneurial orientation fosters financial performance, survival and growth, profitability. Also, the review identifies the negative impact of risk-taking on sales growth and employment growth. Innovation fosters business survival, growth, sales and productivity growth, and competitive heterogeneity between firms. The review shows that innovativeness does not have an impact on employment growth, performance, and profitability. Innovative activities can allow SMEs to provide innovative products and services to customers and improve profitability (Nwachukwu and Zufan, 2017). Proactive firms can spot and exploit new market opportunities and enhance innovation performance, employment and sales growth, and profitability.

Conclusions

Effective leadership is vital to navigating a very challenging business environment. The literature review examined four areas. The first part of the review discusses the concept of leadership and leadership styles, the second area describes entrepreneurship and entrepreneurial orientation. The third part discusses leadership styles and their consequences. The fourth area focuses on entrepreneurial orientation and its consequences. Organizations with the right leaders can achieve sustainable superior performance. Extant studies on the entrepreneurial orientation dimension of risk-taking, innovativeness, and proactiveness show mixed findings. Nonetheless, entrepreneurs' risk-taking ability, innovativeness and proactiveness are important to achieve superior performance and stay ahead of competition. The study contributes to leadership and entrepreneurship literature by informing managers and entrepreneurs on how different leadership styles and entrepreneurial orientation affect the success of their organization.

The present study is exploratory and uses the review of the previous literature on leadership and entrepreneurial orientation, which somewhat limits its applicability. Further, the consequences of entrepreneurial orientation dimensions of risk-taking and innovativeness are relatively unclear and inconsistent. More empirical studies are needed on the antecedents and consequences of entrepreneurial orientation, especially risk-taking and innovativeness. This paper contributes to the ongoing debate on leadership and entrepreneurial orientation.

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Constraints and Enablers to Growth of Female-Owned Businesses: Empirical Review

Hieu Minh VU

Faculty of Business Administration, Van Lang University, Vietnam.

Email: hieu.vm@vlu.edu.vn

Chijioke NWACHUKWU

Horizons University, Paris France.

Email: cesogwa@yahoo.com

Abstract

Globally, there is a growing interest in female entrepreneurship. many female-owned businesses are faced with several obstacles that threaten their survival and growth. this paper focuses on literature in women entrepreneurship contexts. considering recent events, it is important to understand the enablers and the constraints female entrepreneurs experience in a developing country context. we draw insights about the subject using historical data and findings from past studies. based on our review, it was observed that gender discrimination, financial constraints, work-family conflict, lack of infrastructural support, unfavorable business and political environments, lack of entrepreneurship education, and personality-related issues hinders growth, profitability, and cause the failure of female-owned businesses. furthermore, creative education and training, leveraging team attributes and resources, digital technology, the nature of the industry, type of financing, and women entrepreneur empowerment stimulate the growth of female entrepreneurship. The authors conclude that policymakers must create a conducive environment and incentives to promote female entrepreneurship.

Keywords: Female Entrepreneurship, Feminist Theory, Institutional Theory, Enablers, Constraints

Introduction

Entrepreneurship behavior fosters the firm competitive edge (Vu and Nwachukwu, 2020a; Kuratko, 2009) and economic growth (Antoncic and Hisrich, 2004). Women entrepreneurship contributes to the economic and social development of countries. Entrepreneurial activities foster the survival and growth of business organizations (Nwachukwu, Chládková and Zufan, 2017). Female entrepreneurship is an emerging phenomenon (Jamali, 2009; Martinez and Marlow, 2017; Zahra and Wright, 2016), which positively impacts economic growth and job creation as well as the quality of life (Orhan and Scott, 2001; McMullan and Warnice, 2016). The literature on female entrepreneurship and institutions is still considered disconnected (Jennings and Brush, 2013; Giménez and Calabrò, 2018). Female entrepreneurship is a source of entrepreneurial diversity. Nonetheless, their talents and potential often remain underutilized in developing countries because of economic and socio-cultural complexities (Jamali, 2009). However, understanding the role of the institutional environment and gender is fast growing in the literature (Yunis et al., 2019) and has provided a robust theoretical foundation for studying female enterprise. The literature on the contextual environment for entrepreneurship is scanty (De Bruin et al., 2007; Dvouletý et al., 2018), which presents a limited understanding of the subject (Paul et al., 2017). Many scholars have attempted to offer a better understanding of the difficulties faced by women setting up businesses and making them grow (Link, 2017). Prior studies in Africa (e.g., Bardasi and Getahun, 2008) and elsewhere (Fairlie and Robb, 2009; Thébaud, 2015) have reported that women entrepreneurs are often hindered by limited access to finance, human capital development opportunities, discrimination, and social constraints, restrictions in making decisions, working and traveling (Terjesen and Elam,

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2012), balancing work and family life, handling patriarchal societies and gender discrimination (Panda, 2018). However, extant literature suggests that women entrepreneurs are successful in developing and running small businesses (e.g., Stevenson and St-Onge 2011). Therefore, it is important to understand gender in the context of entrepreneurship, particularly to identify the constraints and drivers of the growth of female-owned businesses. The objective of this study is to propose recommendations to policy-makers based on the review of the constraints and enablers of the growth of female entrepreneurs.

Literature Reviews

Gender bias and stereotypes are more pronounced and grounded in the common belief in male-dominated contexts like entrepreneurship (Acs et al., 2011; Bardasi et al., 2011). This hinders women's advancement and women entrepreneurs' access to business and social capital. Based on role congruity theory, female entrepreneurs may face more obstacles since entrepreneurship is seen as a masculine endeavor (Jennings and Brush, 2013). Women are perceived to possess communal qualities (Rosette and Tost, 2010) such as relationship-oriented and being sympathetic to others' needs. These characteristics can assist female business owners to flourish in retail and/or other services. However, these perceptions that female entrepreneurs should engage in feminine business may put them at a disadvantage in venturing into certain male-dominated industries or seeking funding. The limited access to funding that women entrepreneurs face may be connected to gender biases among lenders and investors who perceive women entrepreneurs as being ineffective. Extant literature has used institutional theory to explain how entrepreneurs are constrained and enabled by the environment in which they live and work (Scott, 2008; Gaddefors and Anderson 2017). Rules and standards to which an individual is expected to conform with (informal institutions) encourage or discourage entrepreneurial behavior (Welter and Smallbone, 2011; Mckeever et al., 2014) and limit the entrepreneur's beliefs and actions (Amable, 2003). Arguably, informal forces influence an entrepreneur in society. On the other hand, regulatory forces (formal institutions) are compulsory rules that attract formal sanctions for non-compliance (e.g., Anderson et al., 2018). Indeed, these institutional forces constrain or enable female entrepreneurship.

Constraints to the growth of female-owned businesses

The existing literature provides evidence that female entrepreneurs in developing countries experience many challenges that arise from external and internal factors. The female entrepreneur can deal with internal constraints, whereas external factors are beyond the control of the entrepreneur. For instance, women entrepreneurs in Africa may not be hindered by internal family restrictions but are faced with external labor market challenges. External forces such as weak private sector, physically demanding jobs, and limited access to global markets posed a serious challenge for female entrepreneurs (Kuada, 2009). Muslim women experience challenges as a result of traditional family beliefs, but the external economy supports their businesses (Itani et al., 2011). Empirical studies in varying contexts have shown that insufficient support for business, lack of business knowledge, tough business climate, political instability, uncertain economy, limited access to resources, inadequate access to education and training, as well as gender biases in labor markets, work-family imbalance, and internal fears and insecurities are challenges that hinder female entrepreneurs (Danish and Smith, 2012; Ronoh et al., 2014; Maden, 2015). Based on the literature, seven key constraints that affect women entrepreneurs in developing countries are elaborated.

Gender Discrimination

Entrepreneurship is seen as a man's domain (Jennings and Brush, 2013; Panda and Dash, 2013), which make it difficult for women to establish credibility in the face of discrimination. Society gives less value to independent women (Karatas-Ozkan et al., 2010; Maden, 2015), which discourages women from pursuing entrepreneurship. Patriarchal societies and male-dominated labor markets limit women's ambitions in the entrepreneurial space (Karatas-Ozkan et al., 2010). For instance, Lebanese women experience strong resistance from their family members (Jamali, 2009). Whereas, in Saudi Arabia, women combined entrepreneurship with societal sensitivities (Danish and Smith, 2012).

Work-family conflict

Women constantly struggle to balance social expectations and their own goals. Women entrepreneurs are burden with managing their business and family (Itani et al., 2011), as well as taking care of their children (Andersson et al., 2007;

Brush et al., 2009). These social expectations reduce the time they dedicate to business-related activities such as networking and mentoring, which negatively affect their performance (Brush et al., 2009; Panda and Dash, 2015).

Financial constraints

Prior studies provide evidence on how access to finance constrains the growth of women entrepreneurs across developing countries (Halkias et al., 2011; Ramadani et al., 2015; Naguib and Jamali, 2015). Entrepreneurship is considered as a high-risk venture (Thampy, 2010), and factors such as inadequate collateral, information asymmetry, and lack of credit history limit entrepreneurs' access to loans, especially women entrepreneurs (Panda, 2012; Sandhu et al., 2012). A lack of alternatives such as private equity and microcredit and venture capital worsens the financing situation. Inconsistent work histories, lower compensation, and inadequate savings make it hard for female entrepreneurs to raise capital (Carter et al., 2001; Andersson et al., 2007). The government prefers to extend financial resources to businesses owned by men leaving little opportunity for women (Halkias et al., 2011). Sometimes, women display a risk-averse mentality and are not keen on obtaining loans to start their business (Ama et al., 2014; Maden, 2015; Naguib and Jamali, 2015). Women prefer to start with their savings in services sectors that are less expensive and easy to set up (Cosh and Hughes, 2000). This limits their ability to grow and diversify their businesses (Horrell and Krishnan, 2007).

Lack of infrastructural support

Lack of supporting infrastructure hinders the growth of female-owned businesses. Challenges such as lack of access to technology, ancillary business services, and lack of access to resources for undertaking feasibility studies and market research impede the growth of female-owned businesses. Robb and Coleman (2010) note that limited networking opportunities and consulting services also hamper female entrepreneur business performance. Gender stereotypes discourage female entrepreneurs from asking for help and support.

Unfavorable business, economic and political environments

Unfriendly business environments, economic recessions, and unstable political environments have a negative impact on entrepreneurship (Panda and Dash, 2014). For instance, armed conflict in the African region has discouraged investments, destroyed infrastructure, and hampered entrepreneurial activities (Singhand and Belwal, 2008). More so, complicated laws, bureaucratic bottlenecks, and unsupportive government policies and programs hinder the development of female entrepreneurship. Though the unfavorable business environment affects the entire entrepreneurship space, female entrepreneurs suffer more due to gender discrimination, especially in gender-segregated societies (e.g. Saudi Arabia, the UAE, Ethiopia). Therefore, women entrepreneurs find it difficult to balance the influence of the business environment with their family expectations.

Lack of entrepreneurship training and education.

Women entrepreneurs lack insights into basic business practices such as bookkeeping, engaging in marketing, and consumer-related initiatives. They come from various educational backgrounds, possess different skill sets, and lack formal business and entrepreneurship training. Empirical evidence suggests that women with university education in applied disciplines (e.g. computer science) find it hard to transfer their skill sets into their entrepreneurial ventures due to lack of opportunity, work experience, or inability to adapt to fast-changing technology (Brush et al., 2009; Adema et al., 2014).

Personality-based constraints

Sometimes, the cognition and mental attitude of women towards life limit them from achieving their full potential as entrepreneurs. They are afraid of taking risks which exposes them to loneliness and isolation in their entrepreneurial journey. Lack of self-confidence and self-doubt (Shelton, 2006) and lack of female role models (Danish and Smith, 2012) hinder the growth of female entrepreneurs.

Enablers to the growth of female-owned businesses

Research has shown that the factors fostering high growth are categorized into individual (entrepreneur and entrepreneurial team characteristics), venture (strategy, organizational structures, and systems), resources, location, and environment (Brush et al. 2004; Gilbert et al. 2006). According to Yunis et al. (2019), opportunity identification (enablers) connotes the personal characteristics of entrepreneurs, such as financial independence, resilience, self efficacy, autonomy, passion for changing women's status, and their empowerment. Characteristics and personality traits of entrepreneurs such as educational background, prior industry experience, or prior entrepreneurial experience (e.g., Baum et al. 2001), aspiration and intention (Wiklund et al. 2003; Cassar 2007), team size, heterogeneity, and capabilities influence growth (Eisenhardt and Schoonhoven, 1990). In Israel, Lerner et al. (1997) observe that the level of education significantly influences the performance of female enterprises. Devine et al. (2019) demonstrate female entrepreneurs can achieve high growth by leveraging top management team education, venture capital investment, and ownership dilution. They concluded that female-owned businesses should implement programs and policies that can enable them to optimize team attributes and resources. Digital technologies are an important source of transformation of the entrepreneurial environment (Bi et al., 2017; Giones and Brem, 2017), due to their disruptive potential as "external enablers" in the growth of new ventures (von Briel et al., 2017). Empirically, Pergelova et al. (2019) examine the impact of digital technologies on the internationalization process of women-owned businesses in Bulgaria. They found that digital technologies foster small and medium-sized enterprise internationalization through international market intelligence. It was concluded that female entrepreneurs use digital technologies to grow their businesses. Yacus, Esposito, and Yang (2019) report that women-owned businesses in "feminine industries" can achieve high growth compared to women-owned firms in "non-feminine industries." Likewise, women who used equity achieved higher rates of growth than women who used debt financing. The nature of the industry and the type of financing are enablers to the growth of female-owned businesses. Ngoasong and Kimbu (2019) shed light on the context-specific decision-making processes and practices of growth-oriented women entrepreneurs in an emerging economy. The study suggests that highly embedded women entrepreneurs have easy access to resources that result in high-growth businesses in Cameroon. Indeed, the environment drives the growth of female-owned businesses. Previous studies suggest that the empowerment of women focuses on improving women's mobility, economic security, freedom, health, and participation in decision-making processes (Afrin, 2008). Policymakers have focused on minimizing social and economic barriers to motivate and engage women in entrepreneurial activities (Kabeer, 1999; De Vita, Mari and Poggesi, 2013). Women's empowerment (self-determination, competence, and perceptions of impact) fosters entrepreneurial outcomes (Buttner and Moore, 1997; Bamiatzi et al., 2015). In India, Digan et al. (2019) find that women's entrepreneurial empowerment enhances business revenues.

Methodology

This paper relies on historical data and past studies on women entrepreneurship. We conducted a systematic search of online databases such as Google Scholar, ProQuest, and Scopus using the keywords "constraints faced by women entrepreneurs", enablers of women entrepreneurs, and "female entrepreneurship". The systematic literature review was employed to reduce bias (Tranfield et al., 2003). Only peer-reviewed articles published from 1990 to 2019 were included to improve the validity and relevance of the study. We included in our review theoretical, qualitative, and quantitative studies.

Conclusion

Entrepreneurs create, innovate, dominate, and execute new ideas to achieve superior business performance (Oboh and Nwachukwu, 2018). This paper reviews the constraints and enablers to the growth of female-owned businesses in developing countries. Our review suggests that female entrepreneurs face seven main barriers: gender discrimination, financial constraints, work-family conflict, lack of infrastructural support, unfavorable business and political environments, lack of entrepreneurship education, and personality-related barriers. These arrays of hindrances have many negative consequences for female-owned firms: smaller size and lower growth rate (Coleman, 2007), low profitability (Robb and Wolken, 2002), and increased failure rate (Minniti and Naudé, 2010). In addition, this study revealed that personal characteristics such as level of education and training drive the growth of female entrepreneurs. Creative education and training can enhance female entrepreneurs' creativity. Extant studies suggest that both human and financial resources foster superior strategic performance (Shigang and Guozhi, 2016; Neneh, 2016; Nwachukwu and Chládková, 2019; Vu and Nwachukwu, 2020b). As such, leveraging team attributes and

resources, digital technology, the nature of the industry, type of financing, and women entrepreneur empowerment are important drivers of the growth of female-owned businesses. Empowering women can enable them to overcome sociocultural issues, interpersonal constraints, and family issues (Sonwalkar and Nandedkar, 2016). In this context, policymakers can make available microfinance and resource-based initiatives to motivate female entrepreneurship. Also, they should provide access to education and training, experience-based learning opportunities, and link female entrepreneurs to networks of supporting agencies. In so doing, female entrepreneurs will enhance their knowledge of entrepreneurship and entrepreneurial activities. Likewise, policymakers must create a conducive climate to support female entrepreneurship. This study focused on the review of empirical literature which somewhat limits its applicability. Nonetheless, it informs policy-makers of the need to allocate resources in a priority area, especially female entrepreneurship. This study offers a road map for policymakers to create an enabling environment that supports the growth of female entrepreneurship. This is important due to criticisms about the effectiveness of funded entrepreneurship programs that do not prioritize women (Minniti and Naudé, 2010). Future research should examine the opportunities and constraints experienced by female social entrepreneurs, how they react and the strategies they adopt to cope with context-related opportunities and constraints within the context of a developing country. Understanding how female social entrepreneurs cope with context-related opportunities and constraints can stimulate the growth of female social entrepreneurs.

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Strategic Role of Tourism in Emerging and Consolidating Sub Sahara Africa (Ssa) Destinations

Chijioke NWACHUKWU

Horizons University Paris France
Email: cesogwa@yahoo.com

Hieu Minh VU

Faculty of Business Administration, Van Lang University, Vietnam
Email: hieu.vm@vlu.edu.vn

Abstract

Recently, the African tourism sector is experiencing steady growth. Nevertheless, a lot needs to be done in terms of harnessing tourism potentials in Africa. The study focuses on the contribution of tourism to Gross Domestic Products (GDP), employment, investment, and visitor exports in nine African countries; namely Botswana, Cape Verde, Ghana, Kenya, Mauritius, Namibia, Seychelles, South Africa, and Tanzania. The authors did trend analyses of the economic contribution of tourism in nine African countries. Secondary data covering 2008-2018 collected from the World Travel and Tourism Council database was used to shed light on the economic contribution of tourism in Africa. We observed that all the economic indicators (GDP, employment, visitor exports, and investment) show a positive and upward trend. South Africa, Kenya, and Tanzania are the top performers among the sampled countries. The study identified challenges and proposed some recommendations to managers and policymakers in the tourism sectors in Africa.

Keywords: GDP, Visitor Exports, Employment, African Countries, Investment.

Introduction

Globally, the tourism industry has received attention because of its capacity to stimulate consumption, promote trade and international communication (Qian, Shen and Law, 2018). Indeed, the tourism industry contributes to job creation and foster entrepreneurship. Arguably, a well-managed tourism sector has the potential to preserve the ecosystems, cultural heritage, and empower the local communities. Tourism is considered as one of the fastest-growing industry in the twenty-first century (Shahzad, Shahbaz, Ferrer, and Kumar, 2017), that can promote economic recovery and growth. Past studies had suggested that tourism is a major contributor to economic growth and development in an emerging market (Haller, 2012; Shahzad et al., 2017). Since the 1990s, tourism has increasingly contributed to Africa's Gross Domestic Product (GDP), employment, and visitor export and investment. In 2017, Tourism contribution to Africa GDP was $177.6bn (8.1% of GDP), visitor exports, $48.7bn (9.7% of total export), investment, $28.2bn (5.7% of total investment) and employment, 22.7 million (6.5% of total jobs created) (World Travel and Tourism Council, 2018).

Despite the sector's potential to develop multiple linkages with other productive sectors throughout its value chain, tourism in Africa is characterized by weak intersectoral linkages, largely due to limited domestic productive capacities across sectors. The dominance of foreign-owned airlines, tour operators, travel agencies, hotel chains, and the heavy reliance on imported inputs by tourism establishments in African countries contribute to high economic leakages in Africa's tourism sector. This study focuses on the contribution of tourism to Gross Domestic Products, employment, investment, and visitor exports in nine African countries (Botswana, Cape Verde, Ghana, Kenya, Mauritius, Namibia, Seychelles, South Africa, and Tanzania). These countries were selected using the World Bank typology of Sub Sahara Africa (SSA) destinations, which ranked the 47 SSA countries by level of tourism development. Specifically, we focused on countries categorized as emerging and consolidating. Emerging countries have robust institutions and are

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doing well in terms of quality and competitiveness. Countries classified as consolidating have relatively mature tourism sectors and the highest economic and tourism performance in SSA (Christie, Fernandes, Messerli and Twining-Ward, 2013). Tourism contribution to total GDP represents activities that deal with tourists such as hotels, travel agents, airlines, restaurants, and leisure industries. Total employment represents jobs created directly and indirectly in the travel and tourism sector. The investment includes capital investment spending directly related to travel and tourism such as new visitors' accommodation, passenger transport equipment, restaurants, and leisure facilities for tourism use (WTTC, 2018). Visitor exports refer to spending within the country by international tourists for business and leisure trips excluding spending on education.

The objective of this study is to assess and compare the economic contribution of tourism in nine African countries using 11-years data. Understanding economic contributions matter because it will inform policymakers of the importance of implementing policies that support tourism. Secondly, to propose recommendations to managers and policymakers based on the evaluation of the subject. This chapter is organized as follows: The next section presents an overview of strategic management in tourism, tourism in African, and the nature of tourism in selected African countries. Followed by the analyses of the economic contribution of tourism in sample African countries. Finally, conclusions and recommendations are presented.

Strategic Management in the Tourism sector

According to Cox et al. (2012), strategic management focuses on analyzing the internal and external environments, formulating strategies, and allocating resources to gain a competitive advantage in an industry. A systematic approach to strategic analysis allows firms to neutralize possible/potential threats and leverage opportunities to enhance business results (Nwachukwu and Chládková, 2019). Kızıloglun and Serinkan (2015) opine that strategic management involves the decisions of creating and executing effective strategies as well as monitoring of results. In the tourism context, Yasenok and Stenyushkina (2016) assert that strategic management is an effective mechanism to increase revenues and to foster sustainable tourism development. Changing the business environment and competition pose a serious challenge for managers responsible for strategy-making (Nwachukwu, Chládková, and Olatunji, 2018). Indeed, tourism development strategies require investments in tourism infrastructure (physical and social). As such a strategic approach to managing these resources is important to achieve the long-term success of the tourism organization. Strategic management enables tourism organizations to adapt to a volatile environment in the tourism destination.

Tourism destination is an important element in the tourism system and composes the essentials. Tourism destination consists of a multiplicity of actors such as tourism demand, local private tourist activities, public actors, the host community, and tourist perceptions among others (Manente, 2008). A destination is a unit providing a comprehensive experience or a product to customers (Buhalis, 2000; Murphy et al., 2000) created by an individual (Haugland et al., 2011). Mezei (2009) submitted that destination management focuses on optimizing strategic, organizational, and operational decisions and resources to promote and market tourism destination products. A well-managed tourist destination can support the ecosystems and loss of cultural integrity and identity of the destination (Charters and Saxon 2007; Rio and Nunes, 2012) and ensure tourism sustainability (Conaghan et al., 2015).

In terms of the tourism carrying capacity and tourist area life cycle (TALC), Saveriades (2000) opines that tourist carrying capacity is the maximum allowable number of tourists in a specific constrained by the ecological environment and basic facilities. According to the Canadian Arctic Resources Committee (2002), tourism carrying capacity is the ecosystem capacity that supports healthy organisms, their renewal productivity, adaptability, and capability. On the other hand, the tourism area life cycle connotes destinations and tourism products, follow a relatively consistent process of development and cycle of evolution (Butler, 1980, 2000). The TALC model suggests that the development of a destination is characterized by the number of visitors and the level of infrastructure. The model identified six phases of progression: the exploration stage of the tourism area, the involvement stage, development, consolidation, stagnation, and post-stagnation stages. The post-stagnation stage is characterized by a period of decline, rejuvenation, or stabilization. Thus, Tourism carrying capacity and tourist area life cycle (TALC) are appropriate theoretical lenses to explain the role of tourism in any economy.

Tourism in Africa

Tourism in Africa can be linked to the Roman era in Egypt. During this period people visited Thebe and Sepulchers; the Valley of the Kings, the Valley of Queens, and other places. Also, Muslim and Christian missionaries visited Sub Saharan Africa to help and to try to convert the native population to their beliefs (Manga, 2014). Africa has a robust tourism potential that can help the continent to achieve economic growth and development. However, Sub Sahara Africa's tourism industry is lagging compared to other tourist destinations (Manga, 2014). This may be as a result of the inadequate transport network, lack of common business strategies as well as the rise in manufacturing development. The fifth IPCC report of 2014 established the economic importance of tourism to Africa (Niang, 2014). The African Union (AU) Commission suggests that countries in Africa need to double tourism's contribution to the continent's Gross Domestic Product (GDP) by 2023 to support Africa's development initiatives. It has been argued that Africa's tourism sector loses a lot of revenues through economic leakages. These leakages stem from profits shifting by foreign-owned tourism businesses to their home countries rather than reinvesting them in destination countries. Figure 1 shows an upward movement in terms of the number of jobs created in the tourism sector in the last four years (2015-2018). In 2018, 9.59 million people were employed in the tourism industry in Africa.

Table 1 shows the mean and standard deviation of the contribution of tourism to GDP, employment, investment, and visitor exports of Africa for 11 years. In Africa, the average GDP is US$65.23bn, 8,938,000 million jobs were created, investment US$26.28bn and visitor exports are US$44.37bn over the entire period from 2008 to 2018.

Table 1: Descriptive statistics on the economic contribution of tourism to Africa

	GDP		Employment		Visitor exports		Investment	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	65.23	5.15	8938	289.8	44.37	2.92	26.28	1.97
N	11	11	11	11	11	11	11	11

Source: Author, 2019

The Nature of Tourism in Selected African Countries

Tourism in Botswana

In Botswana, tourism is seen as an important driver of economic growth (Rogerson and Visser, 2011). The tourism industry has been identified as one of the sectors that could help diversify the economy beyond diamond mining (Kalikawe, 2001). Botswana enjoys a comparative advantage because of abundant wildlife and natural resources ranging from the Kalahari Desert in the south to the internationally acclaimed Okavango Delta and the Chobe-Linyanthi River to the north. These ecosystems are still relatively clean and fresh, hence attract tourists from other countries of the world (see DoT 2000; DoT 2010). For this reason, the tourism sector holds great potential for sustainable economic growth and job creation in Botswana. Improvements in infrastructure and accessibility to Botswana's wilderness areas have made tourism to become an important economic sector (Hambira, 2017). The popular tourist attractions in Bostwana are The Okavango Delta, Moremi Game Reserve, Chobe National Park, and Southern and Central Kalahari (Hambira, 2017). The Okavango Delta is the second most visited destination by leisure tourists in the country (DoT 2010, see also Mbaiwa, 2005). Tourism in the Delta is highly seasonal and offers rich aesthetic value comprising meandering palm and papyrus fringed waterways, palm-fringed islands and woodland, lush vegetation, and rich wildlife (Department of Environmental Affairs (DEA, 2008).

Tourism in Cape Verde

Cape Verde's economy depends more on income from tourism and international development aid flows. The tourism sector, account for about 90% of Foreign Direct Investments (FDI), and over 60% of exports (Monteiro and Ferro, 2017). Thus, tourism is the main driver of economic growth and employment in Cape Verde. The islands of Sal and Boa Vista are the main tourists' destinations because of the availability of sun and beach tourism (77% of the tourists

and 91% of the night stays) and foreign direct private investment (Monteiro and Ferro, 2017). In 2016, the rest of the islands (Brava, Santiago, Fogo, Maio, Nicolau, São Vicente, and São Antão) received 146,832 tourists which accounted for 23% of the total and only 9% of the night stays (Monteiro and Ferro, 2017). Despite the importance of the tourism sector to the Cape Verde economy, evidence suggests the absence of explicit strategies and connections between the tourism activities, the economic sectors, and the national development strategies (Monteiro and Ferro, 2017).

Tourism in Ghana

Ghana possesses considerable and diverse tourism assets that can be leveraged with balanced strategies and tourism support services, infrastructure, and marketing to enhance economic growth and employment. Ghana's tourism assets are usually grouped into four sectors: 1) natural attractions; 2) historical heritage; 3) cultural heritage, and 4) other attractions. In Ghana, there are opportunities for the development of ecotourism, cultural and heritage tourism, conference and business tourism, leisure tourism, and beach resort tourism (Frimpong-Bonsu, 2015). Tourism assets in Ghana include wildlife sanctuaries, national parks, resource reserves, and wetland reserves. Ghana boasts of two properties on the UNESCO World Heritage Site: forts and castles, along the coast, and Asante traditional buildings (Frimpong-Bonsu, 2015).

Tourism in Kenya

Kenya is Africa's most popular safari destination with decent tourist infrastructure and many resorts along its coastline. The government of Kenya acknowledges the importance of the tourism sector by making it one of the six priority sectors in its development initiatives. Kenya's tourism sector heavily relies on its beaches and wildlife. Masai Mara Game Reserve**,** Mount Kenya, and Lamu are notable tourists' destinations in Kenya. Kenya boast of a high level of international air connectivity, better local infrastructure, and tourist facilities. Tourism is seen as an important sector in Kenya's development aspirations. Nonetheless, the sector is faced with various internal and external challenges. (Mayaka and Prasad, 2012). Notable among the challenges is a security threat, which if not properly managed may make tourists switch to competing destinations.

Tourism in Mauritius

Tourism is a major contributor to the economic growth and development of Mauritius. Mauritius is a holiday destination for beach-resort tourists, endowed with resources, and has the potential to be a green destination. It has a wide range of natural and man-made attractions, enjoys a sub-tropical climate with clear warm sea waters, attractive beaches, tropical fauna and flora complemented by a multi-ethnic and cultural population. These tourism assets are supported by decent hotels, reliable and operational services, and infrastructures. The Aapravasi Ghat- the Immigration Depot and Le Morne Cultural Landscapes have been declared as World Heritage. Black River Gorges National Park is on the tentative list of Mauritius to be nominated by UNESCO as World Heritage Site. The government of Mauritius has identified strategies to promote leisure and entertainment, business, shopping, and Medical tourism. Efforts have been made in the area of capacity building in the tourism sector.

Tourism in Namibia

The country is among the popular destinations in Africa and is known for ecotourism which features Namibia's extensive wildlife. Every year almost one million tourists visit the country from South Africa, Germany, United Kingdom, Italy, and France. In December 2010, Lonely Planet recognized Namibia as the 5th Best Tourist Destination in the World in terms of value. The Namibian government sees tourism mainly as a trade and export commodity which is expected to generate revenue. The government of Namibia has a strong interest in generating foreign exchange from tourism and drive the country's economic growth. The tourism product consists of the principal resources that Namibia has to offer. These products include sun, sea, and sand, reefs for snorkeling and diving, wildlife for safari tourism, mountains, rivers, forests and valleys for nature, scenic and adventure tourism, cultural assets a living heritage expressed in distinctive local customs, song, dance, art, handicrafts, etc, and museums. Both the public and private sectors play an active role in the Namibian tourism industry. The private businesses are expected to drive economic growth in Namibia.

Tourism in Seychelles

Seychelles is blessed with wonderful natural tourism assets such as beautiful beaches and mountain backdrops. The success story of the tourism sector can be linked to good governance and strategic policy choices. The Seychelles tourism sector has shown sustained growth both in terms of supply and demand. The Seychelles economy heavily relies on the tourism industry, which accounts for 24.8% of its GDP (World Bank Group, 2013). Out of the few countries in the world whom their economies depend heavily on tourism (Macau and Maldives), Seychelles is more endowed to attract investors and tourists (WTTC, 2012). The country's world-class beaches, lush mountain backdrops, excellent infrastructure, friendly people, good climate, and a largely pristine environment make Seychelles a highly competitive tourist destination. The tourism sector's success is also linked to strong sector stewardship that has created a robust policy framework and sophisticated marketing apparatus (World Bank Group, 2013).

Tourism in South Africa

South Africa's tourism sector fosters inclusive economic growth and provides the necessary incentive for the government’s transformation programs (Rogerson, 2002a, Rogerson, 2002b). Tree and half million (3.5 million) tourists visited Cape Town in August 2017, which makes it an important tourist destination in Africa. South Africa's tourism industry is dominated by a small group of locally owned large tourism firms. Nonetheless, the tourism sector has many small firms operating in the industry (Rogerson, 2004b). The majority of tourism businesses in South Africa are owned by the white minority (Rogerson, 2003, 2004a). South Africa tourism products include adventure tourism (climbing, surfing, diving, hiking, horseback safaris, mountain-biking, river-rafting), cultural tourism (tourist destinations: Ukhahlamba-Drakensberg Park, Mapungubwe in Limpopo, Soweto's Heritage, and many cultural villages), fauna, flora and varied landscapes and Agri-tourism. The high crime level is a major challenge facing the South Africa tourism sector.

Tourism in Tanzania

The United Republic of Tanzania is endowed with untapped natural resources and abundant wildlife, which offer a wide range of tourism potentials. The country’s tourism industry experienced an average annual rate of 12 percent between 2000 and 2012 (World Bank, 2015). Tanzania tourism sector presents investment opportunities in the areas like accommodation development, conference tourism, leisure parks, specialized cuisine restaurants, beach tourism, historical sites, amusement parks, golf courses, air and land transport infrastructure developments, and wildlife tourism. Tanzanian tourism mainly consists of wildlife (MNRT, 2002). The country has 15 national parks that have different species of wildlife, 31 game reserves, 38 game-controlled areas, and historical and archaeological assets that form part of cultural tourism (Kazuzuru, 2014). Selous game reserve, Ngorongoro Conservation Area, Serengeti National Park, Kilimanjaro National Park, Zanzibar, the ruins of Kilwa Kisiwani, and the ruins of Songo Mnara have received world recognition as being world tourist heritages (MNRT, 2002). Tanzanians are friendly, generous, and hospitable people (MNRT, 1999). The tourism sector in Tanzania is faced with the problems of pollution of national parks due to tourist activities, such as the wastes discharged from hotels, air pollution from vehicles carrying the tourists, and land degradation (TTB, 2006; Kulindwa et al., 2001), depletion of ebony trees (Kulindwa et al., 2001), lack of empirical studies linking promotion efforts to the growth of tourism, tax policy issue, competition in the use of natural resources, financial leakage (Sandbrook, 2008), uncertainty and health issues (Kazuzuru, 2014) among others.

The Economic Contribution of Tourism in Sample African Countries

Table 2 suggests that in the last three years, tourism contribution to GDP (real prices) of Botswana, Cape Verde, Ghana, Kenya, Mauritius, Namibia, and Seychelles experienced upward movement. However, that was not the same for South Africa and Tanzania. Both countries witnessed a decline in tourism contribution to GDP (real prices) in 2017, followed by a rise in 2018. Tourism contribution to South African GDP (real prices) is more than that of other sample countries. Indeed, tourism contribution to South African GDP (real prices) in 2018 of US$10.46bn is more than the combined tourism contribution to GDP (real prices) US$9.38bn of the eight other countries.

Table 2: Tourism Contribution to GDP

Year	Botswana	Cape Verde	Ghana	Kenya	Mauritius	Namibia	Seychelles	South Africa	Tanzania
2008	0.49	0.24	0.95	2.06	0.93	0.23	0.28	8.85	1.17
2009	0.46	0.19	0.99	1.89	0.83	0.24	0.27	8.51	1.1
2010	0.52	0.22	0.89	2.36	0.81	0.25	0.26	9.27	1.13
2011	0.49	0.24	1.1	2.59	0.84	0.29	0.28	9.06	1.25
2012	0.58	0.28	1.42	2.69	0.85	0.31	0.31	9.63	1.41
2013	0.61	0.29	1.41	2.52	0.77	0.33	0.3	9.97	1.54
2014	0.63	0.27	1.38	2.54	0.81	0.35	0.31	10.42	1.67
2015	0.69	0.26	1.32	2.55	0.89	0.4	0.33	10.32	1.78
2016	0.67	0.28	1.27	2.64	0.95	0.38	0.34	10.49	2.1
2017	0.69	0.31	1.34	2.85	0.98	0.37	0.39	10.22	1.98
2018	0.73	0.32	1.4	2.99	0.99	0.39	0.4	10.46	2.16

Source: World Economic Forum – adapted by authors (2020)

Table 3 shows that tourism contribution to employment in Botswana experienced a decline in 2016 (25.03) and arise from (25.93) in 2017 to (27.05) in 2018. In Cape Verde, tourism contribution to employment experienced a sharp rise from 34.41 in 2016 to 38.65 in 2018. Tourism contribution to employment in Ghana economy witness steady growth from (300.23) in 2016 to (307.34) in 2017 and (311.85) in 2018. In the case of Kenya, tourism contribution to employment increased from 403.47 in 2016 to 441.53 in 2018. Mauritius experienced a steady rise in tourism contribution to employment from 40.98 in 2016 to 41.44 in 2017, followed by a marginal decline to 41.03 in 2018. Namibia witness a decline in tourism contribution to employment from 23.75 in 2016 to 22.77 in 2017, then rose to 24.26 in 2018. Seychelles witness a rise in tourism contribution to employment from 11.41 in 2016 to 12.27 in 2017, followed by a marginal fall to 11.83 in 2018. South Africa witness a downward movement in tourism contribution to employment from 741.99 in 2016 to 726.59 in 2017, then increase to 733.94 in 2018. In the last three years (2016-2018), Tanzania showed a similar trend with South Africa in terms of tourism contribution to employment. Our results suggest that in the sample countries, tourism contribution to employment is not steady and characterized by a high level of fluctuation. In the last eleven years, the South African tourism sector has created more jobs compared to other sample countries (Botswana, Cape Verde, Ghana, Kenya, Mauritius, Namibia, Seychelles, and Tanzania). Apart from Mauritius and Seychelles, all the other countries' (Botswana, Cape Verde, Ghana, Kenya, Namibia, South Africa, and Tanzania) tourism sector created more jobs in 2018.

Table 3: Tourism contribution to employment

Period	Botswana	Cape Verde	Ghana	Kenya	Mauritius	Namibia	Seychelles	South Africa	Tanzania
2008	20.97	25.83	326.57	379.02	51.18	16.59	12.65	652.32	323.22
2009	21.41	22.55	330.72	346.75	44.54	19.31	12.23	611.95	284.78
2010	24.68	25.17	303.72	413.9	42.48	20.71	10.92	621.38	286.88
2011	24.93	28.26	323.52	450.72	40.58	21.4	11.46	640.17	305.93
2012	26.51	27.85	356.29	453.79	39.75	20.89	13.17	666.07	338.77
2013	24.95	30.55	329.08	413.41	35.77	21.18	12.28	675.96	375.29
2014	26.68	32.69	324.17	407.49	34.59	21.86	11.04	696.82	393.16
2015	28.89	32.54	310.84	397.97	39.27	24.08	11.45	730.62	404.97
2016	25.03	34.41	300.23	403.47	40.98	23.75	11.41	741.99	465.85
2017	25.93	37.62	307.34	429.38	41.44	22.77	12.27	726.59	445.83
2018	27.05	38.65	311.85	441.53	41.03	24.26	11.83	733.94	477.66

Source: World Economic Forum – adapted by authors (2020)

Table 4 reveals that tourism contribution to investment (real prices) for Botswana grew from US$0.23bn in 2008 to US$0.48bn in 2015, declined to US$0.47bn from 2016, and US$0.44bn in 2017, and then rose to US$0.46bn in 2018. In Cape Verde, tourism contribution to investment (real prices) is characterized by fluctuation in the period under review. Tourism contribution to investment (real prices) in Ghana is not steady but stagnant in the last three years (2016 -2018). Recently it appears that the Ghana tourism sector is less attractive to investors. It may also be due to market saturation in the tourism sector. In the case of Kenya, tourism contribution to investment (real prices) declined from US$0.87bn in 2008 to US$0.69bn in 2010. From 2010 to 2014, Investment grew from US$0.8bn to US$0.91bn, followed by a decline in 2015 and 2016 and a steady rise from US$0.82bn in 2017 to US$0.88bn in 2018. In Mauritius, tourism contribution to investment (real prices) declined from US$0.27bn in 2008 to $0.12bn in 2010, followed by a marginal rise to US$0.14bn in 2011. From 2012 to 2016 there was no growth. However, in 2017 and 2018 witnessed a marginal increase of $0.12bn and US$0.13bn respectively. Investments in the tourism sector in Namibia witnessed the expansion and upward movement from 2011 to 2015. Investments in the Namibia tourism sector dropped sharply to US$0.36bn and US$0.33bn in 2016 and 2017 respectively. Seychelles witnessed a rise in investments in the tourism sector from US$0.09bn in 2008 to US$0.14bn in 2012. There was no growth from 2013 to 2015. There was a marginal increase in investment in the tourism sector from 2016 to 2018. South Africa witnessed a downward movement in tourism contribution to investments from US$6.2bn in 2008 to $4.48bn in 2010, followed by an increase from US$4.65bn in 2011 to US$5.5bn in 2014. In 2018, there was a decline in investment in the South Africa tourism sector. Investments in the Tanzania tourism sector declined from $0.68bn in 2008 to US$0.73bn in 2010, followed by heavy investments in the sector from 2011 to 2015. 2016 to 2018 saw a sharp fall in investment in the Tanzania tourism sector. There is a connection between Investment and employment in the tourism sector. We reason that as private and public sectors invest in new visitors' accommodation, restaurants, leisure facilities, and new tourism products more jobs are created. It is evident that the South Africa tourism sector has the highest investment and created more jobs compared to other countries. This is consistent with the argument that investment drives job creation and reduces unemployment.

Table 4: Tourism Contribution to Investment

Year	Botswana	Cape Verde	Ghana	Kenya	Mauritius	Namibia	Seychelles	South Africa	Tanzania
2008	0.23	0.16	0.21	0.87	0.27	0.24	0.09	6.2	0.68
2009	0.26	0.17	0.21	0.74	0.18	0.25	0.12	5.54	0.73
2010	0.27	0.16	0.12	0.69	0.12	0.24	0.12	4.48	0.73
2011	0.28	0.16	0.12	0.8	0.14	0.25	0.13	4.65	1.02
2012	0.36	0.13	0.2	0.83	0.11	0.31	0.14	4.86	0.94
2013	0.41	0.11	0.17	0.82	0.11	0.34	0.13	5.39	1.1
2014	0.41	0.11	0.21	0.91	0.11	0.47	0.13	5.5	1.16
2015	0.48	0.13	0.2	0.86	0.11	0.5	0.13	5.49	1.09
2016	0.47	0.14	0.17	0.73	0.11	0.36	0.14	5.5	0.31
2017	0.44	0.14	0.17	0.82	0.12	0.33	0.15	5.55	0.33
2018	0.46	0.15	0.17	0.88	0.13	0.34	0.15	5.51	0.36

Source: World Economic Forum – adapted by authors (2020)

Table 5 suggests that tourism contribution to visitor exports (real prices) in Botswana experienced a steady rise from US$0.49bn in 2011 to US$0.69bn in 2015, followed by a decline of $0.66bn in 2016. Visitor exports grew in 2017 and 2018. In Cape Verde, tourism contribution to visitor exports (real prices) declined from US$0.36bn in 2008 to US$0.29bn in 2009, increased from US$0.35bn in 2010 to US$0.41bn in 2013. There was no growth in 2014 and 2015. Visitor exports resumed upward movement from US$0.42bn in 2016 to US$0.47bn in 2018. In the case of Ghana, tourism contribution to visitor exports (real prices) declined from US$0.86bn in 2008 to US$0.63bn in 2010, followed by a steady rise from US$0.65bn in 2011 to US$0.96 in 2012, declined to US$0.79bn in 2013, followed by a sharp increase of US$1.06bn in 2014. The last three years (2016-2018) experienced a marginal increase from US$0.91bn in 2016 to US$0.93bn in 2018. In the case of Kenya, tourism contribution to visitor exports (real prices) declined from US$1.85bn in 2008 to US$1.49bn in 2009. In 2010 and 2011, visitor exports increased from US$2.15bn and US$2.48bn respectively. There was a consistent fall of visitor exports from US$2.34bn in 2012 to US$1.69bn in 2016, followed by a rise of US$1.88bn in 2017 and US$1.98bn in 2018.

In Mauritius, tourism contribution to visitor exports (real prices) dropped from US$1.75bn in 2008 to US$1.51bn in 2009, followed by a rise from US$1.64bn in 2010 to US$1.7bn in 2012. There was a fall in visitor exports in 2013. From 2014 to 2018, Mauritius has consistently increased its foreign exchange earning capacity from tourism with a steady growth of visitor exports. Spending by international tourists in Namibia shows a high level of fluctuations. This correlates with a poor level of investments in the tourism sector. In the last six years (2013 – 2018), Seychelles witnessed a steady rise in tourism contribution to visitor exports from US$0.44bn to US$0.59bn. It appears that the robust policy framework and sophisticated marketing strategies put place by the Seychelles Government is working. South Africa witnessed a decline in tourism contribution to visitor exports from US$9.51bn in 2008 to US$8.01bn in 2011, followed by an increase from US$9.08bn in 2012 to US$9.99bn in 2014. In the last eleven years, spending by international tourists in South Africa was the highest (US$10.12bn) in 2016. Spending by international tourists in Tanzania declined from US$1.39bn in 2008 to US$1.29bn in 2009, followed by a consistent growth from US$1.34 in 2010 to US$2.38 in 2018.

Table 5: Tourism Contribution to Visitors' Exports (USD bn)

Year	Botswana	Cape Verde	Ghana	Kenya	Mauritius	Namibia	Seychelles	South Africa	Tanzania
2008	0.61	0.36	0.86	1.85	1.75	0.52	0.42	9.51	1.39
2009	0.49	0.29	0.87	1.49	1.51	0.52	0.41	8.55	1.29
2010	0.51	0.35	0.63	2.15	1.64	0.48	0.38	8.3	1.34
2011	0.49	0.36	0.65	2.48	1.69	0.53	0.41	8.01	1.45
2012	0.55	0.41	0.96	2.34	1.7	0.49	0.46	9.08	1.68
2013	0.61	0.41	0.79	2.07	1.51	0.46	0.44	9.4	1.75
2014	0.64	0.39	1.06	1.87	1.6	0.48	0.45	9.99	1.82
2015	0.69	0.39	0.99	1.74	1.77	0.5	0.49	9.73	1.93
2016	0.66	0.42	0.91	1.69	1.91	0.37	0.51	10.12	2.22
2017	0.69	0.46	0.93	1.88	1.97	0.33	0.58	9.51	2.18
2018	0.73	0.47	0.94	1.98	1.99	0.36	0.59	9.83	2.38

Source: World Economic Forum – adapted by authors (2020)

Conclusion

Africa is the second-fastest-growing tourism region after the Asia-Pacific region (WTTC 2019). The importance of tourism as a foreign exchange earner has led to growth in the sector in Africa. Yet, African countries can enjoy more economic benefits from tourism and effectively exploit its potential contribution to socio-economic development. Arguably, a well-developed tourism sector can create more economic opportunities for citizens and ensure that a larger share of the sector's revenues remains in local economies, thereby reducing poverty in rural areas. This study explored tourism contribution to GDP, employment, investment, and visitor exports from selected African countries. Providing innovative products and services to customers can foster profitability (Nwachukwu and Zufan, 2017) and growth in the tourism sector. To put the tourism sector on the path of sustainable growth, it is important to tackle these mirages of problems and challenges facing the tourism sector in Africa. The present study used secondary data and descriptive statistics to shed light on tourism contribution to Africa economies. Despite the limitation described above, the study provides insight into the tourism literature in the African context. Researchers can develop this study by empirically testing the relationship between tourism and economic indicators in more African countries. Also, scholars can carry out a comparative analysis of countries and regions in this study.

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Demand for Educating Future Engineers in The Field of Social Subjects

Paulina SIEMIENIAK

Poznan University of Technology, Poznan, Poland

paulina.siemieniak@put.poznan.pl

Abstract

The aim of the article is to compile the views of future and current engineers on the need for teaching social subjects at technical universities. Based on research in the literature, the article identifies the areas of non-technical knowledge that society and employers require from engineers, in particular as regards Industry 4.0. The author compared the results of observations of other researchers with the results of the author's research carried out at the Poznań University of Technology. Conclusions from the presented case study provide arguments for the development of social competences and the integration of science in the process of educating engineers and are in line with the principles of the Bologna process. The presented results enrich knowledge that may contribute to the socio-economic development of the European region.

Keywords: Education of Engineers, Social Competences, Requirements of The Labor Market.

Introduction

Educating engineers is an extremely important process because it determines the level of a country's infrastructure (Bojanowicz, 2012). Graduates of STEM subjects are currently in high demand among employers due to their significant impact on improving the economic situation of the country. Moreover, engineers are one of the professional groups that are in least danger of being replaced by modern systems or technologies (Gorustowicz 2019). Meanwhile, the development of Industry 4.0 entails a reduction in the demand for human labor and it is forecast that this may pose a threat to over 40% of occupations in countries such as the United States or Germany (Görmüş, 2019).

Nowadays, there is a sharp distinction between the technical sciences and the humanities. A person specialized in the former appears to be interested in what is practical and concrete, whilst a humanist's area of focus seems to be rather vague and not necessarily needed by contemporary people. "In the present day, the hallmark of education has become: separation, specialization and, consequently, deepening hermetization" (Kluczyński, 2017, p. 11). As a society, we strictly separate more and more research fields and scientific disciplines, which is reflected in the offer of study programs and specializations available within them. As a consequence, we reaffirm the social belief that there is a deep gap between the humanities and technical sciences. At the same time, it becomes increasingly evident that the modern labor market requires interdisciplinary education, and graduates are expected to have comprehensive knowledge and skills. Professionals emphasize the need for holistic education of future engineers (Trbusic, 2013).

The Engineer's Profession

Technical education is related to the concept of "engineer". The word is derived from French and means a person who has specific technical knowledge. The professional title of engineer relates to the professional activities in the area of technology. Currently, in Poland, it can be obtained at technical universities, as well as agricultural and military schools (Szczepańska-Woszczyna, 2014).

In the International Standard Classification of Education (ISCED), a classification for organizing educational programs and qualifications by educational levels and fields, engineering is included in one broad category with manufacturing and construction. Narrowed down, engineering and its related professions include (http://uis.unesco.org):

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- Chemical engineering and processes,
- Environmental protection technology
- Electricity and energy
- Electronics and automation
- Mechanics and metal trades
- Motor vehicles, ships and aircraft
- etc.

Due to their education and the tasks performed, engineers are persons who are clearly connected with the world of technology. In addition, the work of an engineer is defined as: scientific, creative, mental and involving management skills. Education helps an engineer to analyze and solve technical problems in a scientific way (Kaźmierczak, 2016).

The growing demand for engineering knowledge and skills is linked to the outbreak of World War II. The country that led the way in the production of weapons and military equipment was the USA, which, by equipping Great Britain, Canada and the USSR, became the most industrialized country in the world at the end of the 20th century (Bojanowicz 2012). The increasing importance of engineers in society echoed the perception of the relationship between the effects of their work and the welfare of mankind.

As Rojter writes, the humanistic aspects of engineers' work were noticed already in the mid-nineteenth century. Among others, research carried out in the UK shows that there is a need to include more humanities content in the curricula to reflect the realities of the work of engineers (Rojter, 2004).

Social sciences in the education of engineers

In the last century, the task for which engineers were prepared was to create technology and build machines that, in terms of performance, were to be better than the previous ones. There is no doubt that modern engineers face additional, non-technical challenges of economic and social nature. Therefore, it is postulated that engineering education programs at technical universities should be modified and supplemented with the achievements and offer of non-technical sciences (Kaźmierczak, 2015; Kaźmierczak, 2016). The social roles played by active and future engineers should be presented more broadly in order to prepare graduates to fulfill their roles in the contemporary, multidisciplinary world.

Currently, engineering education in the USA is provided as part of 4-year undergraduate engineering programs and includes General Education (Gen Ed) as well as courses in social sciences and the humanities. These are compulsory classes, and students choose the subject they want to study (Bojanowicz, 2012).

In Poland, about 15% of the points obtained in the first cycle of technical studies are awarded for knowledge and skills related to non-technical aspects of engineering activities as well as non-engineering skills and other general competences (Kraśniewski, 2010). This area also includes foreign language classes (about 6% of the points obtained as part of the first cycle of higher education). Social subjects are included in the class grid of each field of study. They are often elective, which means that students themselves decide what subject will be taught.

An OECD analysis shows that engineers made up 14.6% of all graduates in Poland in 2018 (OECD, 2020). By comparison, engineers accounted for 7.8% of graduates in Australia,, and 7.2% in the United States. Poland ranks fourth in the European Union in terms of the number of science graduates (Gracel, Stoch, 2017, p. 62). However, this does not mean that it is easy to recruit engineers as highly-trained people leave the country to seek development opportunities and more attractive pay abroad.

Premises of non-technical education of engineers over the years

Engineering education prioritizes mathematics and natural sciences, and the role of the humanities and social sciences is not appreciated by students or faculty staff. The humanities include art, history and literature, whereas social sciences comprise economics, political science, sociology and psychology (Evans, 2013). A student whose knowledge is well-grounded in the humanities and social sciences is able to see the wider context of engineering problems. Since the 1940s, the humanities (and later social sciences) have been considered to enhance the creativity and social awareness of engineers thus enabling the delivery of more complete public services. The need for non-technical training has been postulated in the world in the following decades by members of various associations of engineers (see Table 1).

Table 1: Recommendations for non-technical engineering education

Year, institution/organization	Areas of education
1940 Dominion Council of Professional Engineers	- public speaking, - the use of precise English, - literature, - art, - philosophy,
1944/45 Faculty of Applied Science and Engineering of the University of Toronto,	- English, - engineering and society, - general economics, - political science, - modern world history, - modern political and economic trends, - philosophy of science, - the profession of engineering,
1950/60 Syracuse University	- scientific method, - social and philosophical implications of science and technology,
1963 Committee on Future Development of the Engineering Profession	- responsibilities to society, employers, clients and other professionals, - ethical and legal requirements of engineering practice,
1975 Canadian Accreditation Board	- require a minimum of one half year of appropriate humanities and social sciences, which should include at least a course in economics,
1970 Worcester Polytechnic Institute, Massachusetts	- engineering students completed a minor in the humanities and a community engagement project,
1988 Science, Technology and Society Studies at Lehigh University	- Humanities; the ability to teach interpretation and critical thinking, the ability to consider how the work of engineers will be used,
90's various scientific institutions and publications	- multidisciplinary courses, - the ethical, economic and social issues of engineering work, - English literature and creative writing courses, - history of science and technology, - the impact of engineering work on society,
since 2000 various scientific institutions and publications	- ethical and socially responsible engineers and leaders, - cross-disciplinary historical studies, - discussion-based courses in the area of humanities and social sciences, - creative problem solving, - teamwork.

Source: study based on Donald et. al. (2017)

Discussions on the humanistic aspects in engineering education are also present in the literature of the 1980s and 1990s (Wragge, 1987, Florman 1996). Research from this period shows that employers in Australia were concerned about the level of social skills and knowledge of human affairs among engineering graduates. It was suggested to include these issues in the curricula, even at the expense of some engineering subjects (Rojter, 2004).

It follows from the above considerations that the effect of a balanced education of engineers is primarily an understanding of the context and the ability to think critically. The education process should be based on four pillars: mathematics, natural sciences, humanities, and social sciences (Evans, et al., 2007). The American Society of Civil

Engineers with the professional boards of licensure intend to require engineers to not only complete a four-cycle education system, but also obtain a master's degree. According to this concept, the aim of the first four years of education is to teach the fundamentals of the above-mentioned areas, while the necessary technical depth is provided during second-cycle studies (Evans, et al, 2007).

The task of engineers is to respond to social and economic needs, so their education should prepare them to work in project teams whose members are specialists in various fields of knowledge. In addition, engineers should develop communication skills that allow them to share their own knowledge, learn to accept different perspectives, show responsibility and creativity, and skillfully solve problems (Tribusic, 2013).

Demand for competences on the labor market

Graduates' skills must meet the requirements of potential employers. The analysis of labor market demand leads to the conclusion that the expectations of employers exceed the level of competence displayed by candidates-graduates. This also applies to the group of specialists in technical sciences (Jelonek, 2019). Therefore, the challenge of today's universities is to prepare graduates in such a way that their qualifications and competences are adequate to the requirements of the industry (Carnevale, 2013). In one of the studies in search of the key competences of engineers entering the labor market, the expectations of employers were compared with the opinions of technical students and professionally active engineers (Tobór-Osadnik, Wyganowska, 2016). The results show that students highly value knowledge and professional skills, but are much less appreciative of aspects such as work ethics and the mission of technology in the modern world. Such an attitude may negatively impact engineering decisions taking into account the good of society and the environment.

What is most valuable in the work of engineers is having high technical qualifications combined with soft skills (Gorustowicz, 2019). An engineer entering the labor market is required to have substantive knowledge and specialist skills necessary to perform well in the profession. However, employers also expect social knowledge and skills that are universal and useful in any profession. The latter are called social (or soft) competences and are related to the psychological properties of an individual, including their ability to cope with situations involving other people. Social competences also comprise the knowledge and skills required to organise one’s work, efficient planning, forecasting, coping with stress, time management, the ability to motivate oneself, assertiveness, creativity, and emotional intelligence. In addition, the area of "soft skills" includes the knowledge and skills of teamwork, i.e. managing, motivating and inspiring others, setting goals for team members or persuading them, making unpopular decisions, and resolving conflicts (Gorustowicz, 2019).

Similar competences are mentioned in the research of the World Economic Forum. Emotional intelligence is defined as one whose growth is associated with greater employee productivity (World Economic Forum, 2016). Conclusions to this effect can be drawn from other studies too. For instance, the US Department of Labor has created a list of workplace essential skills divided into two categories: foundation and functional. The first group includes, among others, decision-making skills, problem-solving, creativity, self-management and social skills. Functional skills are specific to the functions that employees perform in their work, and include resource management, the ability to use technology, information and interpersonal skills (such as teamwork) (Draghici, et al., 2011).

In another taxonomy, employee competences are divided into four categories: technical, methodological, social and personal (Hecklau, et al., 2016). Technical competences are work-related knowledge and skills. Methodological competences relate to general problem solving and decision making. Social competences refer to collaborating and communicating with others. Finally, personal competences encompass the social values, motivations and attitudes of an individual.

The issue of competences is gaining importance in connection with the forecasts related to technological development. In Industry 4.0, the required level of knowledge and skills will be higher than it is today, and therefore the education system will also change to Education 4.0 (Benešováa, Tupaa, 2017). As Gorustowicz emphasizes, in Industry 4.0 the basis of an engineer's authority will still be the scope of his technical knowledge, and among the new "hard competences" the most desirable will be knowledge and skills in the field of: integration of IT control systems, programming of industrial robot teams, integration of analytical systems in data clouds with local systems, cybersecurity, and the use of artificial intelligence algorithms in automation systems (Gorustowicz, 2019).

The main demand will concern the IT and manufacturing professions. Apart from technical skills, employees will have to meet the following requirements: responsibility, independence, flexibility, creativity, as well as the ability and motivation to learn new things (Benešováa, Tupaa, 2017). There is consensus in the engineering community

about competences that are lacking in new graduates, such as communication, entrepreneurship, teamwork, creativity, lifelong learning and problem solving skills (Brunhaver, et al. , 2016). This is due to the lack of sufficient experience required by the industry. Providing valuable training becomes the responsibility of the university. Additional training to supplement the missing competences comes with extra costs that employers are reluctant to cover (Azmi, et al., 2018).

It is worth mentioning that social competences are considered deficient in almost every group of specialists. While this deficit is not surprising, it does draw attention to the fact that graduates assess their competences (especially social competences) very highly (Jelonek, 2019). Therefore, it can be concluded that students are not aware of the requirements of the labor market in the field of social competences and show little interest in gaining these competences due to a strong focus on professional and technical skills. In order to raise awareness, universities should introduce more apprenticeships, workshops and counseling in order to build a professional path already during studies (Azmi, et al., 2018).

Educating Future Engineers

The conducted analysis leads to the conclusion that in the process of educating engineers, social attitudes and the perception of the mission of technology in society should be made more prominent (Tobór-Osadnik, Wyganowska, 2016). The formal education of an engineer (whether working directly in industry or designing) must be very broad. It cannot focus solely on physical and vocational subjects, but should include economic, social and human sciences to meet the needs of a 21st-century enterprise. Moreover, apart from imparting knowledge, the task of a university is to shape attitudes. After all, engineers and the effects of their work have a direct impact on living conditions and safety of people. Ashby recommended that subjects related to ethics, jurisprudence, languages, social and industrial history, and the history of technology should be relevant to engineering education (Ashby 1966). As Olsson recalls, in Sweden the teaching of history (in particular the history of ideas and technology) as well as philosophy and ethics is postulated (Olsson, 1995). There, preference is given to multidisciplinary subjects that will not only facilitate the understanding of the human condition, but also promote innovative thinking. The ethical framework is considered very important to engineering career decisions.

One of the most interesting concepts of engineering education (CDIO: CONCEIVE - DESIGN - IMPLEMENT - OPERATE) assumes that the expectations of employers are best addressed by integrated studies focused on the ability to solve a problem based on many areas of knowledge, including social sciences and management. This approach should replace studying separate disciplines (Szczepańska-Woszczyna, 2014). It involves studying classic science content and shaping soft skills such as teamwork and communication, but also developing the motivation to understand technical ideas.

As suggested in the interview by Prof. A. Targowski, the principles of educating Polish engineers should include the principle of educating good and responsible representatives of this professional group (Bojanowicz 2012). A good engineer is one who can create engineering solutions in the context of ethical and sustainable development, bearing in mind their responsible application in society. A broad, humanistic and social reflection seems to be a decisive ally in achieving these goals.

Methodology and Results of Own Research

The aim of the research was to determine the motivation to study social subjects by first-year and second-year students of technical faculties at one of the best Polish engineering schools - Poznan University of Technology. The research question was related to how engineering students perceive the requirement of studying social subjects. The research sample consisted of 233 students who took part in a course of social psychology. The research tool was the proprietary auditorium survey, and the answers were provided in the period from January to February 2020. The students' fields of study are presented in Table 2. The vast majority of the respondents studied in full-time mode, 20 people are part-time students. 62.3% of first-year students and 37.3% of second-year students participated in the study. Most of the respondents were men, constituting 73% of the sample. The youngest respondents were 19 years old, and the oldest 25. The 20-year-olds were definitely the most numerous in the group (48.1%).

Table 2: Respondents' fields of study

Fields of study:	Percentage:
Full-time studies	
Chemical and Process Engineering	20.6
Environmental Protection Technologies	7.3
Power Engineering	34.8
Automatic Control and Robotics	28.8
Part-time studies	
Computing	5.2
Power Engineering	3.4

The analysis of class attendance shows that only 26% of students were present at all or almost all lectures (over 90% of the offered lectures). 41% of students participated in less than half of the classes.

Another question revealed that only slightly more than half of the students see the need to educate future engineers (including themselves) in social subjects (see Table 3). Among the respondents, students of Automatic Control and Robotics (71.6%) as well as part-time students were the most aware of the need for social education. Among students of other faculties, the number of supporters and opponents of educating future engineers in social subjects is very similar, with respondents being divided into groups of almost equal percentages.

Table 3: Students' answers to the question "Do you think it is necessary to educate future engineers (including yourself) in social subjects?"

Answers:	Percentage:
Yes	59.2
No	40.8

Source: own research.

Students who felt that social sciences are needed in engineering education were asked to substantiate their views by selecting up to three of the responses presented to them. About 30% of the respondents are aware that higher education entails the necessity to have broad, multidisciplinary knowledge, going beyond the field in which they have a diploma. A similar number of students associate the acquisition of social knowledge with an increase in personal and/or professional effectiveness, as well as are aware of the requirements of the labor market in this respect (see Table 4).

Table 4: Justification of the answer: "Yes, education of future engineers in social subjects is needed."

Answers:	Percentage:
Nowadays the knowledge of social mechanisms is valued and even required by employers	30
I can use the knowledge gained during the classes to effectively achieve my personal and/or professional goals	31.3
A person with higher education should demonstrate knowledge that goes beyond their field	31.8
I can deepen my knowledge of myself, which makes me more mature and/or more responsible	19.7
I can deepen my knowledge of other people, which may help me function in the social and/or professional world	29.2
The teaching content is simply interesting for me	18.5
I can develop the ability to think flexibly and/or tolerate ambiguity	10.7
Other	1.7

Source: own research.

Students also had the opportunity to justify their belief that there is no need to educate future engineers in the field of social subjects. For this purpose, they could choose up to three answers presented to them or add their own.

The analysis conducted in the subgroup of respondents who opposed educating future engineers in social subjects shows that almost one third of them believe that they should acquire only technical knowledge and skills during their studies. In addition, every fifth respondent justified his reluctance about social education by the necessity to invest extra time and energy. More or less every tenth respondent perceives social knowledge as useless and unnecessary at work (see Table 5). These responses show little awareness of the realities of professional life.

It is worth noting, however, that in the group opposing social education, first-year students believed that only technical knowledge should be acquired by engineers during their studies almost three times more often than second-year students. Therefore, it is to be hoped that as future engineers become more mature and gain more specific knowledge about their field, they will begin to see the importance of the human aspect. This insight is also supported by the fact that second-year students were one and a half times more likely to see the possibility of using social knowledge to effectively achieve their personal and/or professional goals, and recognized the need to acquire interdisciplinary knowledge.

Table 5: Justification of the answer: "No, educating future engineers in social subjects is not necessary"

Answers	Percentage
Knowledge of social mechanisms is not necessary in professional work	9.4
Professional development requires only a high level of technical knowledge	6.0
Knowledge of social sciences is of little use	12.4
I want to get a diploma at the lowest possible cost, and including social subjects in the study plan requires more time and energy	21.5
I believe that I should only be educated in technical competences	28.3
It is boring for me	14.2
Knowledge of social sciences is too abstract for me	7.7
Other	3.4

Source: own research.

All surveyed students were asked to choose their most preferred social subjects, i.e. those in which they would like to participate during engineering studies (see Table 6). Apart from social psychology, a course of which was just about to end, students most often indicated: management and marketing as well as small-business management. Occupational ethics was chosen least often (only 3%). This is a worrying result, as the lack of interest in work ethic may lead to engineers neglecting the moral context of their professional activity and thus failing to meet one of the requirements of the modern labor market.

Table 6: Most preferred course titles. Student opinions.

Course title:	Percentage	Course title:	Percentage
Social Psychology	32.2	The basics of entrepreneurship	14.2
Ethics	9.0	Basics of economics	17.6
Professional ethics	3.0	Economics of enterprises	6.0

Philosophy	15.9	Small-business management	20.6
Interpersonal communication	15.0	Management and Marketing	21.0
Business negotiations	14.6	Basics of economics and management	11.6
Managing a team of employees	16.3	Economics with elements of accounting	9.9
Self-presentation in business	10.7	Basics of market economy and organization	12.0
Professional data presentation	6.4		

Source: own research.

Discussion

Despite the need to expand the knowledge and social skills of engineers, as signaled by specialists and the society, the results of the presented research show that future engineers underestimate the importance of this area of knowledge. This confirms the conclusions of other studies and observations. One can get the impression that the respondents overestimate their knowledge in this area and do not associate it with effective professional functioning. Excessive and inadequate self-esteem combined with a failure to recognize the value of social knowledge may result in a situation where graduates will not be able to consciously and effectively use this knowledge in their professional activities. They may tend not to reflect on and neglect the human context of their work. This may result in professional activities carried out in an automatic and unreflective manner with no flexibility or openness to changes.

Adapting educational programs to the requirements of the modern labor market requires that universities emphasize the importance of knowledge and social skills. In order to raise the importance of education in the field of social sciences and the humanities, it may be advisable to introduce practical classes (exercises, workshops, tutorials) and to test the acquired knowledge in action through apprenticeships which consolidate not only technical but also social skills. It is also advisable to provide students with reliable feedback on their skills. The interdisciplinary approach should include the assessment of knowledge and social skills in the performance of technical tasks, and the creation and promotion of development programs.

Summary

The knowledge of a modern engineer should not be limited to technical matters, but should include economic, social and human sciences. Most of the products developed by engineers have a direct impact on the safety of people and their living conditions (Tobór-Osadnik, Wyganowska, 2016). Also in the context of staff education for Industry 4.0, it is believed that, rather than focusing only on his narrow specialization, an engineer should have the ability to understand concepts from other fields (Gorustowicz 2019).

Despite the fact that the results of the presented research are case studies, they seem to confirm the existing knowledge about the skeptical attitude of engineering students towards social education and the simultaneous demand of the society. The requirement facing modern universities is to adapt education programs to the expectations of employers by ensuring a higher level of social competences among graduates.

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The Effects of Quality, Price, Environmental Value and Perceived Behaviour Control towards Intension to Accept Electricity Demand Side Programs in Qatar Kahramaa

Samar Abdulrazzaq Mohammed AL-GHALEBI
University Tenaga Nasional, Malaysia, samaralgalebi@gmail.com

Zainon Mat SHARIF
University Tenaga Nasional, Malaysia, drzainon@gmail.com

Ahmed Saleh Ahmed Saif AL-SHAMERI
University Tun Hussein Onn Malaysia, Malaysia, ahmedalshameri54@yahoo.com

Saba'a Saleh Ahmed SAIF
Sana'a University, Yemen sabaasaif2018@yahoo.com

Saleh Ibrahim Mohammed AL AAMRI
The University of Queensland, simalamri@hotmail.com

Abstract

Increasing demand of electricity is problematic issue nowadays and Demand Side Management programs is suggested to be the best method for reducing the demand of electricity. However, the implementation of such technologies is still problematic because the customer behaviours are different from one county to another, and the application of such technologies depends largely on the perceptions and the acceptance level of that specific country. Thus, this study has embarked to study the factors affecting the intention to accept the demand side management programs among the KAHRAMAA employees in Qatar. The study aimed at identifying the factors affecting employees' intention and to determine the impact of the independent variables (attitude, quality value, price value, environment value and the perceived behaviour control) on the dependent variable. The sample size of this study that was analysed was 294 questionnaires. The study used SPSS 22.0 for analysing the results. The findings revealed that all the factors were having high mean values. The study also highlighted three main factors which do have impact on the intention to accept demand side management programs which are quality value, environment value, and perceived behaviour control. Besides, some recommendations have been supposed for the future research and policy makers.

Keywords: Demand Response programs, Intention, KAHRAMAA.

Introduction

Since the global societies relay heavily on the energy and the energy management, enormous changes and technological advancement, like the Smart Grids, can bring many social changes (Ellabban & Abu-Rub, 2016). All the countries, including Qatar, are threatened with the risk of energy resources depletion due the increasing consumption of energy because unwise usage of the electricity and the increasing number of population around the world (Al-Marri, 2018). As a result, the future societies are going to depend on continuous innovation, creativity and transformation which is necessary to enhance the efficiency of their energy consumption (Afroz, Higgins, Urmee, & Shafiullah, 2017). Demand side management is not a new concept, but it is growing globally because it is a good opportunity for integrating the renewables

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generation. The world has started to focus more on the demand side management (Alasseri, Tripathi, Joji Rao, & Sreekanth, 2017). Due to the complexity of the demand side programs, the intention toward accepting these demand side programs are much studied nowadays because they cannot be implemented without the acceptance of society individuals (Park, Hwang, Ko, & Kim, 2017).

During the previous decades, the electricity infrastructure and supply have faced much stress from the increasing demand required due to the over-consumption of electricity by people in all regions of the world (Ferreira, Rocha, & Araujo, 2018). This created the need for more reliable power supply which in turn has pushed the policy makers to the perception of smart grids. The concept of demand side management was first used by the Electric Power Research Institute in the 1980s in a form of activities that utilities go through to reduce their energy consumption. EPRI did all these activities to maximize benefit, delay of investment, and enhancement of reliability (Gellings, 2017). The implementation of demand response programs involves many issues. According to (Behrangrad, 2015), in the past the most difficult problem in implementing the DSM proliferation was the technological hurdles, however, these challenges have vanished with the technological advances in the area of smart grids.

The most influential factors that affect KAHRAMAA staff's intention to accept and use electricity demand response programs are the staff's attitude, quality value, price value, environmental value, and perceived behavior control. This intention is believed to be translated into actual actions based on many social theories and research. Staff's intention is affected in many factors. For instance, good impressions will be formed in the staff mind about the acceptance of the electricity demand response programs when they these programs believed to be having many values such as the quality and the price values. Moreover, the concern about the energy consumption and the more trend into the smart grids and technological advancement in the demand side management (Behrangrad, 2015). Thus, there is a need to examine the factors affecting the intention towards the intention to accept such programs and to identify the impact of such factors on the intention.

Per-capita consumption of electricity in Gulf counties is one among highest electricity consumption in the world because of the very high personal incomes, the need to air conditioning around the whole year, and the subsidies energy (Bayram, 2019). Petroleum reserves in the Gulf countries is about 41% of the oil in the world and 24% of the gas found the whole world. Because of the prosperous economy in the Gulf countries, the consumption of gas, water and energy is increased. The rapid growth in local need of electricity is one of the most important issues that the Gulf countries confront.

Because of the increased electricity demand during the peak time in summer-time and their experience with electricity shortage, the people focus on long-run solutions like the solar energy has been increased significantly. Qatar is one of the Gulf countries. Qatar population is predicted to increase largely as a result of the high rate growth in economy. This will increase the demand for energy, including electricity. Al-Marri, Al-Habaibeh, & Abdo (2017) stated that since the energy prices are low, it is fundamental to increase the awareness and knowledge of people in order to decrease the waste of resources and maintain sustainable energy and secured economy for Qatar. Electricity consumption per person in Qatar is one of the highest in the world. Electricity consumption is very high. Figure 1.1 shows the energy consumption per capita among many counties, including Qatar, in which the consumption is near to 200%.

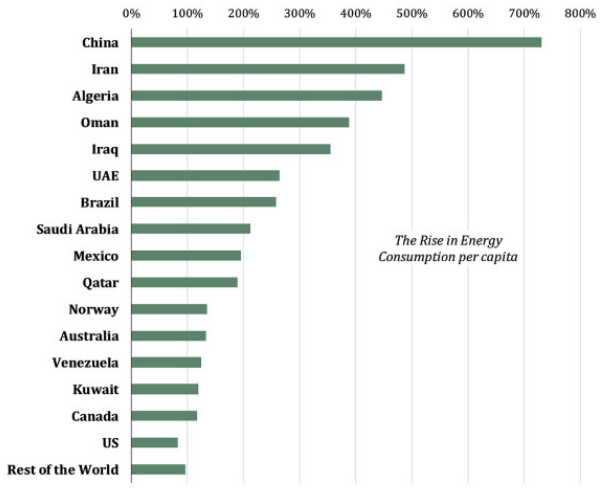

Figure 1: The rise in total energy consumption per capita of Resource-Rich Countries between 1973 and 2017.
Source: (Sahin, Bayram, & Koc, 2019)

In Qatar, however, no much research or data about their domestic electricity consumption (Al-Marri *et al.,* 2017). More than half of the electricity consumption (59%) is accounted by the residential sector (Bayram, Saffouri, & Koc, 2018). The Qatari people intention should be changed to secure their future. Sahin *et al.(*2019) stated that Qatari people now do not consider the value of energy, and their electricity usage is more than they need because the electricity is provided for free to Qatari people. Regarding the demand side management in Qatar, there are only energy efficiency measures in a form of national program. This program was found in 2012 by the Qatari local utility company (Kahramaa). This program is called "Tarsheed" after the Arabic word "awareness". This program was successful to reduce water and electricity per capita consumption (by 18% and 17% respectively) in Qatar by the end of 2017 (Al-Marri *et al.,* 2017).

The study on demand side management and demand responds programs in Qatar are still limited. In this research, we tried to provide additional insights into the significance of using demand side management program such as incentive based program which this study has elaborated and highlighted the main variables that can contribute to motivate people reducing electricity usage and maintain the sustainability of the environment. This will be having a significant impact on the main stakeholders (including policy makers and energy users) involved in promoting the sustainable development of Qatar in the future, and will promote sustainable energy choices as part of the national development strategy. Two main objectives are developed for the propose of conducting this study which are stated as follows: (1) To determine the influential factors affecting the intention to accept the electricity demand side programs, (2) To examine the impact of the influential factors affecting the intention to accept the electricity demand side programs.

Literature Review

Much research has been done in many countries on the programs that can lower the electricity consumption. The studies have different reasons. Many studies indicated that these new technologies are very important to reduce the demand for the renewable energy, to protect the environment, and to reduce the electricity bill. In addition, many factors have been found having influence in affecting the customers acceptance of these technologies. Out of the many researches in the related area, some of the literature related to this study is discussed here.

Lackes, Siepermann, & Vetter (2018) conducted a study in Germany on drivers and barriers that influence the Direct load control (DLC) acceptance among the participants. This study was a quantitative study based on a survey distributed among 653 consumers. Fishbein's Theory of Technology Acceptance Model was utilized to conduct this study. This study was based on the assumption that DLC is a great opportunity to handle the issue of the energy turnover. The findings showed

that environmental impact or value, the increased comfort and the price value are the main factors or drivers that affect the respondents' attitudes to accept DLC. On the other hand, the respondents' attitudes to accepts such technology were found to be decreased because of the loss of control, unprotected usage and the technical safety. The rest of the respondents in the service provider was not found influencing the respondents' attitudes. However, trust was found having a role in affecting the participants' perceptions of the DLC advantages and disadvantages.

Milchram *et al.* (2018) conducted another study on the acceptance of smart grid technologies which focused on the moral values. The basis of this study is that smart grid technologies are the best solution to energy systems that ere more sustainable, however the implementation of these technologies is based on the social acceptance of such technologies. Thus, the study focused on the moral concerns among the literature review. The findings show that moral values work as both derivers and barriers for the acceptance of smart grids.

Another study was conducted by (Moser, 2017) in Switzerland on the perceived control and the security concerns that affect the individual acceptance of electricity load-shifting programs. The study stated that public often reject the smart metering technologies because they fell the lack of control over their appliances and the data security problems. Thus, this study embarked on studying the way these concerns influence the social acceptance of load-shifting programs. The findings show that the acceptance levels will decrease significantly when the customers feel that they have no control over their appliances. No findings were concluded regarding the factor of the data security concerns. Furthermore, the study suggested that there are serious concerns about control of their appliances. Thus, more understanding of these issues will help producing more socially accepted programs.

Reka & Ramesh (2015) conducted a survey to analyze the demand response evolving in many countries. The study was a comparative study between different countries, and it showed a portrayal for many demand responses programs in different countries with some details. The study elaborates the demand side management scenarios developed in many countries. In other words, the study focused on giving reviewing the implement DR programs and their effect in different countries. More than that the study has analyzed the impact the demand response programs have in electricity demand reduction during the peak hours and their energy efficiency.

Parrish, Heptonstall, Gross, & Sovacool (2020) defined intention as the person willingness or readiness to perform certain behavior. It is considered as the antecedent of any behavior, so it is what forms the behavior of an individual. It is the indication whether the individuals will accept and use the electricity demand side programs or not. Zhang, Xiao, & Zhou (2020) defined the intention as the individual willingness to purchase energy-saving appliances. The current study attempts to examine the KAHARMA staffs' intention to accept and use the electricity demand side programs. Thus, in this study the behavioral intention refers to the individual readiness and willingness to accept these programs. Perceive effectiveness and the perceived values were added to the TPB, so the respondents' intention towards the electricity demand side programs can be studied thoroughly. It is not always that intensions result in the actual behavior. However, the probability of conducting the behavior is increasing when the intention is stronger (Römer, Reichhart, & Picot, 2015).

Methodology

This study was conducted among the staff of the KAHRAMAA Company, Dawha, Qatar. The study followed the qualitative survey approach using online questionnaires. The population wad KAHRAMAA staff, with minimum sample size of 278. The data was collected from April to May 2020. The study followed the random sampling as the most suitable type of sampling for this current study. According to KAHRAMAA website, the total population of the KAHRAMAA staff is more than 3,000. Thus, the sample size for population more than 3,000 at the 95% confidence level are 341 respondents (Taherdoost, 2016). The data was collected by the Five-points scale questionnaire. Then the data is analyzed by using SPSS version 22.0. Some tests were used to analyze the data; pilot study, reliability test, descriptive analysis, correlation analysis, and regression analysis.

Two main methods were used in this research to collect the data. The first and main method was the hard copy questionnaires. A set of 170 hard copies were distributed at KAHRAMAA out of which 105 questionnaires were returned. The second method was the online soft copy questionnaires. A sum of 194 questionnaires were received from this method.

Only 5 questions were not considered as they show that the respondent did not answer properly. Thus, the total number of questionnaires that were analyzed are 294 in total which represents 86.21% return rate. The data and response rate is summarized in table 4.

Table 4: Questionnaire Return Rate

Population	Sample Size	Questionnaire hard copy returned	Questionnaire online returned	Total Questionnaire Returned	Return rate (%)
3000	**341**	**105**	**194**	**294**	**86.68**

Pilot study has been conducted before the real distribution of the questioner. In this pilot study, 25 respondents participate to answer the questionnaire. The respondents were given the questionnaire with an introductory paragraph on about the study, assuring the security of the respondents. The respondents were also asked to give their suggestions on how to enhance the questionnaire. The results were satisfying which shows that the questions were understandable and relevant, assuring the validity of the scales. The generally agreed upon lower limit for Cronbach's alpha is 0.70 as recommended by (Taber, 2018). Thus, the reliability of the pilot study shows satisfactory results ranging from 0.744 to 0.855.

Results and Findings

Reliability Analysis

Cronbach's alpha is used in this study to measure the internal consistency reliability. Cronbach's Coefficient Alpha is always used for the measurement of the reliability of questionnaire. Normally, it ranges between 0.0 to + 1.0. When it is higher, it reflects high degree or consistency. The results of the reliability of this study are presented in Table 6. The result of the Cronbach's Coefficient Alpha for this study was 0.611 which is considered good.

Table 6: The Reliability Test of the Actual Study

Variables	Cronbach's Alpha	N of Items
Intention to Accept Electricity Demand Response Programs.	**0.755**	**3**
Attitude Toward the Intention to Accept Electricity Demand Response Programs.	**0.624**	**4**
Quality Value	**0.833**	**4**
Price Value	**0.633**	**3**
Environmental Value	**0.854**	**4**
Perceived Behavior Control	**0.843**	**3**

Frequency Analysis of the Respondents' Demographics

Frequency analysis is every essential in all the researches which shows the frequency of the respondents answers for the questions. It is part of the descriptive analysis. In other words, it shows the how many times the respondents selected certain answers.

Gender

The gender information of the respondents is presented in Table 7 and Figure 4. Based on the chart, it can be seen that 198 of the respondents participating in this study were males whose percentage was 67.34% of the total percentage. On the other hand, the number of females participating in this study was 96 respondents whose percentage was 32.65%. Thus, it can be concluded that male respondents were more than the female respondents in this study as they were almost double the number of the females.

Table 7: Respondents' Gender

Category	Frequency	Percentage
Male	**198**	**67.34%**
Female	**96**	**32.65%**
Total	**294**	**100%**

Respondents' Age

The respondents age was divided to three categories, and the respondent were asked to choose among these categories. The first category is those whose age ranged between 18-24. The number of respondents from this category was 19 which account for only 4.46% of the total number. The second and the third category were those whose age range between 25-34 and 35-44. Their percentages were almost similar as 37.75% and 39.79% respectively. The last category was those participants whose age ranged between 54-60 whose percentage was 15.98%. Thus, it is clear that the largest number were 35-44 years old. Table 8 and Figure 5 summarize the information of the respondents' age.

Table 8: Respondents' Age

Category	Frequency	Percentage
18-24	**19**	**4.46%**
25-34	**111**	**37.75%**
35-44	**117**	**39.79%**
54-60	**47**	**15.98%**
Total	**294**	**100%**

Education Level

The respondents were having four education levels including diploma, degree, master, and PhD. The number of respondents having diploma was 59 which is 20.06% of the total percentage. Those who have degree certificates were 135 and they accounted for 45.91% of the total number. The last two categories were those who have whether master or PhD and their numbers were 64 and 36 respectively, and their percentages were 21.76% and 12.24% respectively. Table 9 and Figure 6 Summarize the information presented in this section.

Table 9: Respondents' Education Level

Category	Frequency	Percentage
Diploma	**59**	**20.06%**
Degree	**135**	**45.91%**
Master	**64**	**21.76%**
PhD	**36**	**12.24%**
Total	**294**	**100%**

Housing Condition

Housing condition refers to the respondents' condition of the house he/she lives it which can be own house, renting house or others. First the number of the respondents who live in their own house is 102 whose percentage is 34.69%. Second, the number of the participants who are renting a house was 167 which accounted for 56.50% of the total percentage. However, those who selected the other option were 25 and their percentage was8.50%. The "other option" refers to those who are not having house and are not renting houses. They could be living with their parents or other relative house. In short, the largest number of the respondents were renting a house. This is because of the fact that the employees of KAHRAMAA company comes from about 35 worldwide countries (KAHRAMAA website, 2020). Table 4.7 and figure 4.4 summarize this section.

Table 10: Respondents' Housing Condition

Category	Frequency	Percentage
Own House	**102**	**34.69%**
Renting House	**167**	**56.80%**
Other	**25**	**8.50%**
Total	**294**	**100%**

Knowledge About Electricity Demand Response Programs

A separate section in the questionnaire was used to ask the respondents if they know about the electricity demand response programs. Interestingly, almost two thirds of the respondents answered "Yes" whose number was 210 participants and with a percentage of 71.42%. This is normal results since the respondents are working in an electricity company and have great background in this sector. On the other hand, only less than on third of the respondents answered "No" whose number was 84 and their percentage was 28.57%. In short, the number of the respondents who know about the electricity DRPs programs are much more than those who do not know about such programs. The information of this section is presented in Table 11 and Figure 8.

Table 11: Respondents' Electricity DRPs Knowledge

Category	Frequency	Percentage
Yes	**210**	**71.42%**
No	**84**	**28.57%**
Total	**294**	**100%**

Descriptive Analysis

The traits and the characteristics of the phenomenon or the individuals being involved in the study are illustrated with the use of the descriptive analysis (Loeb *et al.,* 2017). In other words, descriptive analysis was used to help the researcher to present characteristics of the gathered data in a quantitative way. Thus, the data was analyzed statistically. In this statistical descriptive analysis, many measures have been conducted including the measures of the variability (deviation, Kurtosis, and Skewness) and the measures of the central tendency (such as mean an median) in order to go further and fulfill the objectives of this study.

Findings Objective 1

The first objective of this study was "To identify the influential factors affecting the intention to accept the electricity demand side programs". This objective was first accomplished in chapter two with the use of the literature review. Nevertheless, this section will emphasize and highlight more on the importance of these factors and their influential levels on the intention to accept the electricity demand side management programs which will help reduce the demand and save the electricity. Five factors were identified in this study (attitude, quality value, price value, environmental value, and perceived behavior control). To achieve the objective, mean analysis was effective to find the central tendency of the variables and establish their ranking and significance.

The variables of this study were measured by the use of the five-point Likert scale in the questionnaire. The scale starts with number one which means "Strongly Disagree" and ends with number five which means "strongly Agree". Therefore, if the mean of the variable is less than 2.32, it was considered as low. In addition, if the factor or the variable scored a mean value between 2.33 and 3.66, it was considered as average. Meanwhile, the mean score is between 3.67 and 5.00, it was highlighted as high.

The results obtained though the mean analysis are depicted in Table 13. Overall, four factors were found having high central tendency which are attitude, quality value, environmental value, and perceived behavioral control. However, price value was found having average central tendency in the analysis. More than that the standard deviations of the variables were also presented in table.

Table 13: Descriptive Statistics

	Questions	Average Mean	Std. Deviation	Total Average Mean	Mean score interpretation
Intention	**Q6**	4.12	.706	**3.77**	**High**
	Q7	4.06	.752		
	Q8	3.15	.909		
Attitude	**Q9**	3.62	.984	**3.81**	**High**
	Q10	3.77	.878		
	Q11	4.09	.747		
	Q12	3.79	.876		
Quality Value	**Q13**	4.22	.797	**3.93**	**High**
	Q14	4.13	.785		
	Q15	3.68	2.529		
	Q16	3.71	.828		
Price Value	**Q17**	3.99	.826	**3.85**	**High**
	Q18	3.25	1.076		
	Q19	4.33	2.439		
	Q20	3.83	.764		
Environmental Value	**Q21**	3.52	.881	**3.73**	**High**
	Q22	3.47	.841		
	Q23	4.20	.720		
Perceived Behavior Control	**Q24**	3.88	.759	**4.06**	**High**
	Q25	4.23	2.430		
	Q26	4.08	.714		

Based on the statistics in Table 13, it is clear that the variables or the factors score high means. A closer look can show that the mean scores of the items was ranging from 3.15 to 4.33. Meanwhile, the table also shows the standard deviation of the items which ranged from .706 to 2.529. Standard deviation scores show the dispersion of the items from their standard. A good example is the standard deviation of Q6 which is .706 which shows that most of the respondents agreed on the statement.

First is the dependent variable of the study which is the intention to accept Electricity Demand Side Management programs. Three statements were used in this variable to measure their level of intention to accept the Electricity DRPs which are; I think I am ready to accept any electricity demand response programs, I will make every effort to reduce my electricity consumption by using demand response programs, and I have a great intention to use electricity demand response programs. The total mean score of this variable was high (3.77) with standard deviation of (.789). This shows that the respondents have high intention to accept the usage of the programs at their houses.

Regarding the factors affecting the intention to accept the Electricity DRPs, perceived behavior control scored the highest mean 4.06 (Std. Dev:1.301), followed by quality value 3.93 (Std. Dev:1.248). Meanwhile, Price value and attitude came next as they obtained mean values of (3.85 and 3.81 respectively), with standard deviations (1.276 and .871 respectively).

Thus, analytical and statistical analysis have been carefully conducted to achieve the first objective of this study which is to identify the factors affecting the intention to accept the electricity DRPs among the KAHRAMAA Employees. The results showed that all the factors influential factors for the respondents' intention with change in the effect. Perceived behavior control was the most influential factors scoring a mean of 4.6. The second factor was the quality value because it scored a mean of 3.93. The third factor was the price value with a mean value of 3.85. This was followed by the attitude as it obtained a mean value of 3.81. The last factor was the environmental value which scored an average mean of 3.73 making it the last factor.

Findings Objective 2

The second objective of this study was to examine the impact and find the relationship between the intention to accept the electricity DRPs and the five factors of the study (attitude, quality vale, price value, environmental value and perceived behavior control). This objective was achieved with the use of the correlation analysis and the regression analysis. Five hypotheses are established under this objective which will be examined. Before conducting the correlation analysis and the regression analysis, the normality analysis should be conducted to examine the normality of the distribution of the questionnaire. This will help to determine which correlation analysis is effective to examine the relation between the variables.

Normality Analysis

Normality test can be performed by analyzing the skewness and kurtosis. Skewness will show the symmetry of distribution while kurtosis will show the peskedness of the data distribution. Table 14 presents the result of the normality analysis for all variables.

Table 14: Normality Test

Variables	Kolmogorove-Smironv Significant	Kurtosis
Intention	**.000**	**.000**
Attitude	**.000**	**.000**
Quality Value	**.0-00**	**.000**
Price Value	**.000**	**.000**
Environmental Value	**.000**	**.000**
Perceived Behavior Control	**.000**	**.000**

Since the sample of this research was more than 200 questionnaires, Kolmogorov Smirnov was used to test the normality of the distribution. The result indicated that the data was not distributed normally because the significant values are less than 0.05.

Correlation Analysis

This analysis showed the correlation between the variables. Table 15 shows the statistical results of the correlation analysis. Generally, the results show that all the five variables are correlated to the dependent variable at 0.05 level because all the Sig. values are less than 0.5, while at the 0.01 level, attitude and price value were not correlated to the intention to accept DRPs. The strength of the relation ranged between the one variable to another. The strongest relation was found between Quality value and the intention to accept Electricity DRPs (.418). Meanwhile, the weakest relationship was between the price value and the dependent value as the Sig. value for this factor was .128.

Table 15: The correlation results

Intention		Attitude	Quality Value	Price Value	Environment Value	Perceived Behavioral Control
	Correlation	.150*	.418**	.128*	.325**	.316**
	Sig. (2-tailed)	.010	.000	.029	.000	.000
	N	294	294	294	294	294

Table 16: depicts the Inter-Item Correlation matrix values of the variables. The values of all the matrix were positive which indicates that all assessed items measured the same underlying attribute and that there is a relation between the dependent and the independent variable.

Table 16: Inter-Item Correlation Matrix

Item	DV	IV1	IV2	IV3	IV4	IV5
DV	1					
IV1	.150	1				
IV2	.418	.164	1			
IV3	.128	.026	.186	1		
IV4	.325	.243	.349	.332	1	
IV5	.316	.207	.286	.137	.220	1

Regression Analysis

This section is devoted to conduct the regression analysis after the factor analysis and correlation analysis has been carried out. Correlation was used to test whether there is a correlation between the dependent variable and the independent variables. However, it is not enough to examine the impact of the independent variables on the dependent variable. More than that correlation analysis showed whether there is a relationship between the variables, but it did not show the magnitude (how much) and the direction (positive or negative) relationship. Thus, regression analysis was needed to examine the impact of the independent variables on the dependent variable in this study.

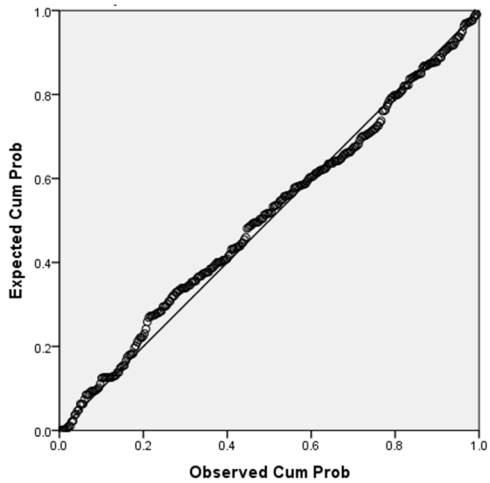

Figure 10: Normal P-P Plot of Standardized Residual

Table 17: Regression Analysis Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.494[a]	.244	.236	.52223
a. Predictors: (Constant), PBC, A, PV, QV, EV				
a. Predictors: (Constant), Quality Value, Perceived Behavior Control, environment Value				

Table 17 shows the summary model of the regression analysis. Based on the data in the table, the R Square value is .244. This value means that 24% of the changes in the intention to accept the electricity DSMP. Based on the regression only three factors were included in the model as having impact on the dependent variable that are quality value, perceived behavior control and the environment value. Meanwhile, two factors were excluded which are attitude and the price value.

Table 18: Regression ANOVA

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
3	Regression	25.503	3	8.501	31.170	.000[b]
	Residual	79.090	290	.273		
	Total	104.593	293			
a. Dependent Variable: Intention						
b. Predictors: (Constant), Attitude, Quality value, Price Value, Environment value, Perceived Behavior Control						

Table 18 depicts the ANOVA information of the regression analysis. The overall significance of this model is shown in this table. According to the table, the Sig. value of the model is .000 which is less than 0.05. This indicates that the model and the data represented by the model are significant. In addition, this Sig. value of .000 illustrates that a satisfactory level has been accomplished by the model in representing the variance of intention to accept the electricity DRPs toward the other five independent variables in this study. Thus, the results of this study are significant, and the study has been successful in predicting the relation and the impact of the independent variables on the intention to accept the electricity DRPs at a satisfactory level.

Table 19: Regression Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
3	(Constant)	1.419	.250		5.685	.000
	Quality Value	.310	.058	.301	5.376	.000
	Perceived Behavior Control	.116	.033	.190	3.541	.000
	Environment value	.173	.053	.178	3.242	.001
a. Dependent Variable: Intention						

The results of the regression analysis of the relationship between the variables which shows the impact of the independent variables on the intention to accept DSMP are presented in Table 19. According to the table, the T values of the independent variables are as follows: quality value (5.376), perceived behavior control (3.541), and environment value (3.242). In addition, the results showed that the respondents intention to accept DRPs is affected only by quality value, environment value, and perceived behavior control because the Sig. value of these factors are .000 for quality value, .000 perceived behavior control, and .001 for the environment value. On the other hand, attitude and price value were found to have no impact on the intention to accept DRPs and were excluded by the model.

To illustrate more on the impact of the independent variables, a closer look is needed at the standard coefficients (B). It is clear that the percentage of the impact of the quality value has the highest positive impact on the intention to accept the $DSMP_s$ as the B value of this factor is .310. The impact of quality is positive and the value means that as the value of the quality increase by a value of 1 (every unit of change of quality, it will result in a 3.10% in the intention to accept the DRPs). Thus, when the quality value increase the intentions will increase. This was followed by environment value as its B value was .173. In addition, the B value for perceived behavior control was .116. Thus, it is clear that all the three factors selected affect the intention toward accepting the demand side management programs.

Conclusion

This study was on the factors affecting the intention of the staff at KAHRAMAA company toward the acceptance of the demand side management programs. Five factors were studied which are attitude, quality value, price value, environment value, and perceived behavior control. All the factors scored high mean values, and all the factors were correlated with the intention to accept DRPs. However, only quality value, environment value and perceived behavior control were found having impact on the intention to accept SRPs while attitude and price value were found having no impact on the intention of the respondents. In short, this study has presented great results and discussion as a reference for policy-makers which can be used for promoting the most promising DRPs in Qatar based on the factors affecting the residents' intention to accept these programs. The results can also be used by other countries with similar characteristics for forming the best policies and enhance the sustainability and development of the power operation systems in Qatar.

The first main limitation is the limit of the scope. This study was conducted among the staff of KAHRAM company. Thus, the results may not be generalized and might not be applicable to the other places in QATAR. Besides, only five factors were studied in this research. So, the study is not inclusive. The third limitation is the short time devoted to complete this study which resulted in some of the abovementioned limitations. Nevertheless, the study has followed a scientific and systematic process to conduct all the steps of the formal research starting from the study background, identifying objectives, collecting and analyzing the data and finally discussing the results and the findings.

Application of DRPs differs from one country to another country for different reasons. Based on the findings of this study, it is recommended that policy makers should focus on the quality of the technology used in the application of the DRPs

as well as raising the awareness of the residents on the benefits of the DRPs and how it will reduce the environment pollution and save the oil resources. Besides, residents should also be knowledgeable of the usage of the programs. Moreover, future research should be on a wider scope to include a bigger population size to generalize the results. In addition, more factors should be studied under this area.

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Review Paper on The Demand Response Programs and The Intention to Accept Them as A Solution for Increasing Demand of Electricity

Samar Abdulrazzaq Mohammed AL-GHALEBI
University Tenaga Nasional, Malaysia, samaralgalebi@gmail.com

Ahmed Saleh Ahmed Saif AL-SHAMERI
University Tun Hussein Onn Malaysia, Malaysia, ahmedalshameri54@yahoo.com

Zainon Mat SHARIF*
University Tenaga Nasional, Malaysia, drzainon@gmail.com

Saba'a Saleh Ahmed SAIF
Sana'a University, Yemen sabaasaif2018@yahoo.com

Saleh Ibrahim Mohammed AL AAMRI
The University of Queensland, Australia simalamri@hotmail.com

* corresponding Author

Abstract

Increasing demand of electricity is a problematic issue nowadays. Two main strategies are used in the power system operation to face this issue that are reducing the electricity demand or increasing the electricity generation. However, literature review have proven Demand Side Management Programs to be the best solution for the increasing demand of electricity with the problem of level of acceptance of such programs among the nations. Thus, this review paper is aimed at reviewing the available literature on the acceptance of Demand Response Programs which special focus on the the Gulf countries. The paper has also reviewed the important factors that have an impact on the intention of people to accept such programs.

Introduction

Many countries around the world, Qatar included, have shifted their focus on producing more renewables. However, these nations are facing a big obstacle because the electricity demand of household cannot be satisfied with the renewables production (Moser 2017). Thus, electricity demand side programs are the solution for the nations to balance their household electricity demand with the renewables production ability. Milchram, van de Kaa, Doorn, & Künneke (2018) stated that the technologies of smart grid are very important as they enable the transform to energy systems that are more sustainable. Renewable energy sources are integrated into networks of electricity by integrating the rising shares of volatile. To integrate these rising shares of volatile in large scale, DRPs should be first accepted by the societies. Nevertheless, many societal concerns regarding these programs or technologies have been revealed by the related literature review. These concerns should be considered when developing these technologies to achieve the goal of developing energy systems that sustainable. This is because demand response programs are still in their early stages. Thus, this study has embarked to review the available literature on such programs and the effect of attitude, quality value, price value, environmental value, and perceived behavioral control on towards the intention to accept and use the demand response programs.

The program runs through the application of arrangements that targets the efficiency of the energy of domestic appliance usage. However, the application of the demand response programs, based on price and incentive, encounter the following issues: (1) supporting the prices of electricity, the bills of low electricity and the benefits of the employee where the bills guide to increased use of electricity; (2) the constant and heavy use of AC and water is needed in the

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climate conditions; (3) high disposable annual income limits the applicability of monetary incentives capitalized by price-based DSM techniques (Alrawi *et. al,* 2019). Thus, a good solution is the electricity demand side programs or systems which will reduce the unneeded amount of electricity used. Most of the previous studies on demand side programs and smart grids suggested that the application of these technologies of sustainable energy systems must be preceded with a study on the factors affecting consumer's acceptance of these programs.

The intention of the people around the world towards the acceptance of the DSPs is improving a lot. They have recently increased the usage of renewable energy sources as their target. Their motivation is driven by mitigation of climate change and the transition to energy systems that are producing low carbon and reduce the electricity consumed. Meanwhile, the technologies of smart grid and electricity demand response programs are considered as the best solution to fulfil the aim of increasing the usage of renewable energy sources. The electricity demand response programs are allowing the electricity providers to maintain supply intermittencies and decentralization. This is achieved by the use of innovative information and communication technologies (ICT).

In Europe, people are willing to accept the demand side programs. Dane, Finck, & Zeiler (2017) conducted a survey in Denmark on 785 individuals to investigate their perception and attitudes towards the smart grid technologies. The results of this study showed that people are having high positive attitude toward such programs, and they are willing to adopt them. Another quantitative study was in United Kingdom (UK) with 2411 respondents to examine their attitudes and intention to accept demand side programs (Nicolson, Huebner, and Shipworth 2017). The study showed that respondents are having good perceptions toward the demand side management. The respondents are concerned about the climate change and environmental issues. Thus, they are having high acceptance levels.

Demand Side Management

The operation of the electricity generation systems is considered as not optimal and not sustainable in the long run because of the shortcomings and the environmental concerns. On the other hand, demand side management (DSM) is accepted as promising resource for electricity consumption reduction. DSM was introduced in 1980 by the Electric Power Research Institute as activities to be undertaken in order to reduce the electricity consumption. It was introduced because they wanted to reduce their electricity consumption, maximize their profit, and enhance their reliability. Because of the liberalization in the electricity market, this DSM was subdivided into two groups. The first one is the energy efficiency (EE) which aims at reducing the amount of electricity being consumed for the provision of products and services that require electricity. The second one is the Demand response (DR), which aims at changing the use of electricity by the consumers as a response to price incentives (Behrangrad 2015).

Demand side management (DSM) refers to the process or behavior of modifying the manner of using electricity and reducing it which enhances the efficiency and consumption in the systems of demand side energy (Gellings 2017). DSM is gaining popularity nowadays as a solution for the increasing demand of electricity and because of the smart girds technology advancement and the deregulation of the electricity market. Activities in DSM can be divided into two types: "energy efficiency (EE)" and "demand response (DR)". To ensure the sustainability of DSM, there must be a creation of business models that are sustainable. Behrangrad (2015) stated that DSM models has been affected considerably with the spread of the devices of storing energy, infrastructures of smart grids, and interrupted resources of the renewable energy.

Residential sector nowadays is contributing greatly to the energy balance of the world. However, it has been very difficult to control or make the energy demand elastic with the conditions of the power grid. Although many energy resources that are renewable have been introduced, the residents still have to participate to maintain sustainable and efficient system of electricity by following flexible patterns. Thus, the mechanisms of demand management are useful to deal with the energy resources and the demand of the customers. According to Esther & Kumar (2016), demand-side management (DSM) is a promising method which aims to make the residents energy-efficient with the continuous use of this method. Saffari et al., (2018) stated that DSM was used to refer to the load management which include many measures. These measures do many tasks like reducing the conservation, smoothing the peak load, and helps balancing the demand and the supply of the energy. Another researcher (Hsu et al. 2017) defined DSM as the technology, the programmes or the actions that are used to help reducing the energy consumption for the purpose of reducing the expenditures of the energy system and accomplishing the aims of the policy such as reducing the emissions or creating a balance between the supply and demand of the energy. Demand response is very useful for

reducing the market power and solve the problem of the higher prices introduced by the producer that are much higher than the production costs (Asadinejad and Tomsovic 2017). Besides, residents will also benefit from low bills of electricity if they follow the time-varying rates and reduce their consumption (Schneider and Sunstein 2017).

Many surveys and papers have been conducted on the DR from different point of views. Careful analysis of research in the previous decades would show that there is gap in the DSM frame because they have used many methods and terms with unclear definitions. Besides, many different methods are claimed to be different without any distinguished features, however, these different methods are very similar. According to Meyabadi & Deihimi (2017), there is a need for developing aggregated theoretical framework for the DSM branch because there is a lack of explicit definitions for the concepts and the methods. Overall, there are two different strategies in the power system operation to face the total expected load demand. These are the two main strategies includes the expanding of energy production and the use of the managerial measures which reduces the demand for electricity.

The concept of demand-side management (DSM) covers three main sub-terms; the DSM participants, the DSM objectives and the DSM category(Khalid, Amin, and Chen 2018). Xue, Tu, Yang, & Zang (2015) defined the DSM participants as the entities responsible for gathering of the small load reduction from the energy consumer and combine it as the total load reduction which will help the operator mountain the capacity market balance. The researcher explained more that these entities include local or national government, demand resource aggregators, the consumers and the utilities. More than that in the DSM category, many processes and technologies are covered such as the conservation of energy, the efficiency of energy, the incentive and price-payment based demand response, the storage and generation that are on-site. According to Celik, Roche, Suryanarayanan, Bouquain, & Miraoui (2017), the DSM objectives take many form such as to provide a reliable and secured energy by maintaining a balance between the power system while also maintaining a reduction in the energy bills and the carbon emission.

DSM provide many advantages. For instance, the power utilities can get advantage when the load is reduced because there will be no need to build more power plants and the networks for the transmission and distribution which will help save the investments. More than that DSM is helping to attain the power systems that are stable and reliable. The DSM will benefit the end user by reducing the power bill when the energy storage and the conservation actions are employed. There are also advantages for the industries in that the production cost are lees and the products are more competitive. The advantages do not stop here but go more to include the environment. There is a great improvement in the environment if the emissions are reduced with the energy conservation. Zhang, Jiao, & Chen (2017) stated that DSM help mitigating the risk of 'outages of power' during the energy crisis and reduce the carbon emissions.

Demand response programs

Demand response is defined as the development in the consumer ordinary usage patterns of electricity according to the subsequent change in the tariff changes of electricity with user and utility interaction (Alasseri, Tripathi, Rao et al., 2017). The objective of the demand response programs is to balance all the energy providers involved in the market with the aim of reducing the tariff with various programs lunched. These programs try to balance the demand and supply at the peak time. The examples of demand response can be switching off non-essential loads, switching off some elevators and turning on emergency generator. More than that one of its characteristics is the arrangement for less energy usage at the peak time.

Demand response programs can reduce the electricity usage and the electricity bills during the peak period. The customers will be able to use much electricity while paying less tariff during the off-peak periods. At the same time, the electricity providers will be able to control electricity supply and reduce the blackouts. The demand response programs will also enable the electricity providers reduce the expenses and carbon dioxide on their systems. The systems will permit more productive use of existing power era within the system limits. This decrease the need for building new generation plants. Subsequently, it is believed that electricity demand response programs will have many advantages such as bill savings, improvement of efficiency, environment benefits, reduced outages and so on. Because of the circumstances of power systems and market evolve so fast, a variety of price-based and incentive-based demand response programs are of great benefit for solving the challenges of the longstanding industry. These programs are presented in table 1.

Table 1: Electricity Demand Response Programs Currently Used

Demand Response Options	
Price-Based Options	**Incentive-Based Programs**
•Time-of-use (TOU): defined as a price with various unit rates used in diverse periods of time, commonly determined for 24 hours a day. •Real Time Pricing (RTP): known as the rate in which the electricity price hourly varies showing variations in the electricity whole sale price. •Critical Peak Pricing (CPP): Its rates are a mixture of TOU and RTP project. TOU is considered as a primary rate structure. Nevertheless, substituting a higher CPP price for the ordinary peak price is a condition under particular trigger situations. one situation is the compromise of system reliability. Another condition is the highness of the supply prices.	•Direct load control: It is a program by which the program operator ceases or cycles the operation of the electrical equipment related to the customer in a not enough time. •Interruptible service (IC): reduced options merged into retail tariffs which supply a bill credit or bill discount for the purpose of corresponding to decrease load the contingencies of the system. •Demand Bidding/Buyback Programs: based on these programs, customers provide bids in order to reduce based on market prices of wholesale electricity or equality. This is fundamentally provided to senior customers. •Emergency Demand Response Programs: these types of programs supply customers dense payments for the reduction of load during periods at the time of arising reserve shortfalls. •Capacity Market Programs: Through these programs, customers exchange traditional generations or delivery resources by providing load reductions. •Ancillary Services Market Programs: Customers show load reductions as active reserves in the markets of ISO/RTO. They pay the customers the market price to be immediately ready to help when needed if the bids they have are approved.

Source: U.S. Department of Energy (2006)

The measures of the demand-side contribute to achieve the balance between the demand for power and its supply which helps improving the efficiency of the energy and rising the power grid reliability. The conception of DSM is broad in nature. It includes actions like the installation of appliances that are energy-efficient, energy consumption reduction, the implementation of mechanisms that enable better pricing as well as changing the time of the electricity usage (Khalid, Amin, and Chen 2018). This will certainly be changing the consumer behaviors of electricity use. Thus, when the time patterns are changed and the load of the network magnitude, this would result in a change in the shapes of the load. Some of the main aims of the DSM are depicted in figure 2.1 (Illés et al. 2018). The DSM has six main aims of functions which are Load shifting, valley filling, peak clipping, strategic conservation, strategic load growth, flexible load shape.

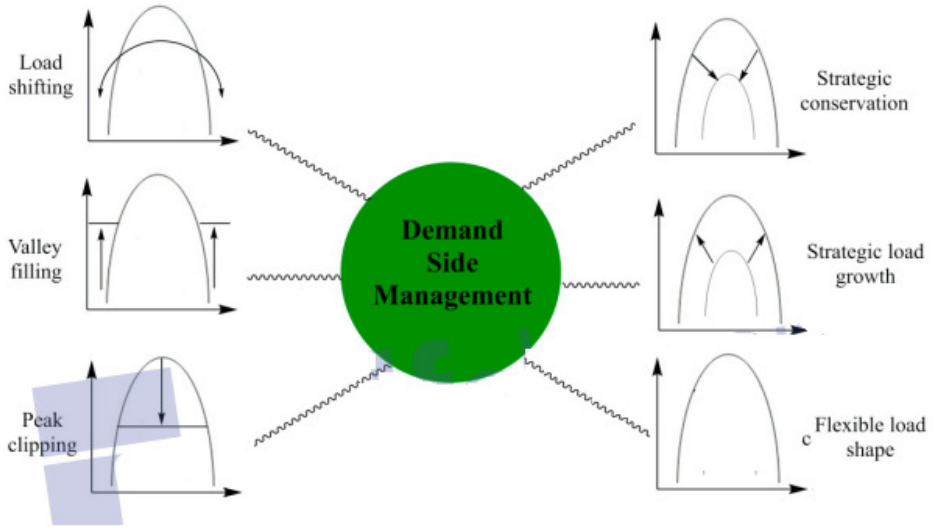

Figure 2: DSM Techniques

World Consumer Perceptions about Demand Response Programs

The consumer perception towards the demand response programs has been discussed worldwide. This helps countries to study the possibility of implementation the new technologies and measures the acceptance level among the residents among the countries. The International Energy Agency's DSM Programme (IEA DSM Programme) has been in support for the development of DSM research globally starting from 1993. This was by means of conducting many tasks that aim to be a source for DSM information and tools for the governments and the other institutions. It is a database for the case studies of the countries globally that is growing constantly. Zhang *et al.* (2017) highlights the increasing number of governments involved in DSM as an alternative for the increasing demand of electricity. In this report, many countries were discussed. It was illustrated that North American countries were dominating the literature between the period of 1970s till 1990s while it was dominated by the European countries during 1990s–2010s. Currently, Asian countries like China, India, Thailand and South Korea are focusing more on the DSM and the DSM programmes (Urmee, 2018). The findings revealed that some projects are not successful in all countries. A successful project in one country may not be successful in another country. This indicates that countries must do the research and find out the suitable programmes for their nations according to the affecting parameters.

Uk is also among the countries focusing on the DSM and its application. A study conducted by (Whittle, Jones, and While 2020), shows the perceptions of people in UK. It was revealed that cost is an important reason that makes people take DSM measures, and those who are concerned about the cost of energy have less intention to accept the use of the DSM while it is more accepted by those who are concerned about the climate change. Moreover, a big portion of residents are willing to share their data which is important for many types of DSM.

Another situation can be mentioned is China. A report was revealed by Zhang *et al.,* (2017) show how China can benefit from the implementation of DSM. Many pilot studies have been conducted in China which show that significant power saving and environment benefits can be achieved in China. The experts of the Natural Resource Defense Council (NRDC) predicted that if the new energy-saving measures are implemented on the air-conditioning and the refrigerators in China, it will be saving an electricity quantity that is same to the quantity produced by the Three Gorges Dam. Yang, Wang, Liu, & Zhang (2018) IEA DSM revealed that reduction of electricity in China in the warm provinces would result in 38% reduction in the electricity use.

Moreover, much research has been on the acceptance of the DSM. Yan, Ozturk, Hu, & Song, (2018) stated that the literature is suggesting that price and the demand supply security are nowadays main motivations to change the energy

usage behavior and their impact is more than the impact of the environmental issues. Thus, structuring the demand response programs objectives might impact the acceptance among the residents.

Meyabadi & Deihimi (2017) discussed the perception of the demand side management and how price is an influencing factor. Based on the study, simple price structures which stay the same for longer period are more preferred by the consumers than those which are dynamic and keep changing. Saving money is a motivational factor that makes consumer change their consumption patterns and adopt the demand side management measures. Meanwhile, consumers will go back to their previous behavior if they do not feel the benefits of their change. In addition, some house consumption cannot be reduced such as cooking. Table 2.2 presents some of the DS programs in some of the rich countries.

Table 2: Various DSM programs in MENA region and some resource-rich countries.

Country	Plan
Australia	Direct Load Program Three Tariff Rates in Day (TOU)
Algeria	Water Efficiency Program (Shuval and Dweik, 2007)
Canada	Demand Opportunity Service, Load Reduction Program
China	Direct Load and Interruptible Load Control Programs
Saudi Arabia	Time of Use (TOU)
Kuwait	Incentive Based Programs (IBP)
Morocco	Water Efficiency Program
Oman	Time of Use (TOU)
Qatar	Water Conservation Policy e Tarsheed Social Awareness Programs
Tunisia	Water Efficiency Program
UAE	Time of Use (TOU) Smart Water Meter Installing Re-use of Treated Wastewater Energy Conservation Program e Taqati
USA	Peak Shifting by RTP Demand Bidding Program, Critical Peak Pricing, Load Reduction Program, Emergency DR Program, Day- Ahead DR Program Direct Load Control, CPP, RTP, TOU

Source: (Sahin, Bayram, and Koc 2019)

GCC Consumers Perception Review about DSM

Hydrocarbon resources are very popular in the Gulf countries like Saudi Arabia, Oman, Kuwait, Qatar, and Bahrain. These countries are considered as the biggest countries in the world in having the oil fields (Al-marri, 2018). Moreover, Oman and Qatar are nowadays heading towards producing more and more natural gas. Besides, Qatar is focusing on implementing the sustainable energy programs. By the use of the energy resources that are renewable, they are able to reduce the energy waste which will reduce the intensity of electricity consumption. Examples of these measures are the electricity efficiency regulations, and energy labelling and certificate schemes for household devices. A good example in Qatar is the project hosting the 2022 World Cup by the government which introduced the solar power technologies for the cooling (Sofotasiou, Hughes, and Calautit, 2015).

The potential saving of energy with the use of DSM in governmental, commercial, and institutional sectors of Oman was predicted and the discounted payback was 4 and 12 years for equipment that is energy efficient and accomplish the sustainability while also advancing the renewable energy development is to manage the demand at the domestic level (Al-marri, 2018).

A recent study in Kuwait focused on four main suggested programs which are summer vacation program (SVP), monetary incentive (MI), cash refund (CRF), and nonmonetary incentive (NMIs). The study revealed that SVP was

the most preferred program. Although respondents are more influenced by the MI, they are similarly attracted by nonmonetary incentive (Alasseri, Rao, and Sreekanth, 2020).

All the Gulf countries have joined the high-level political forum based in the United Nation's program aimed at sustainable development that is based on the UN's 2030 agenda mean for the development and sustainability (United Nations Sustainable Development, 2019). These countries are taking advantage of the great oil resources they have and the economic boom, however, they are having problems with the wastage of resource's, the diversification of economic, and issues related to the environment pollution (Friedrichs & Inderwildi, 2013). Moreover, these countries are suffering from the huge consumption of energy and water for which the governments are paying high subsidies. This consumption will make the region vulnerable if they do not take sustainable measures because the consumption is even more than that in the industrialized countries (Salahuddin & Gow, 2014). Many studies have been conducted in the Gulf countries on the programs that can be used to reduce the consumption. First, a study was conducted in Kuwait which aimed at investigating the which DSM policy is fit for the country situation (Alasseri et al., 2017). Another study by Gaouda discussed the possibility of saving energy after implementing the DSM policies in the UAE (Gaouda et al., 2013). In Saudi Arabia, however, different DR programs were investigated with the study of their environmental influence (Eissa, 2011). Other researchers also conducted different studies in other Gulf countries like (Kiani, 2017), used on of the electricity consuming items “air conditioners”. The study was on both residential and commercial sectors with the aim of examining their influence on the economy of UAE with forecasting various scenarios of electricity usages. Furthermore, much research has been conducted in Qatar with the introduction of QNV 2030 program focusing on how to reduce the usage of electricity and water. Jasim et al. examined the potential influence of treated waste water effluent policy (Jasim et al., 2016), and Jraiw studied the influence of travel demand management policies on safety of roads (Jraiw, 2015). In electricity sector, Bayram et al. revealed the role of DSM on the integration of PV renewable energy for Qatar in 2017 and, in 2018, they further showed the patterns of the electricity consumption in Qatar (Saffouri, Bayram, and Koc, 2018). Thus Table 2.3 summarized some of the policies used in Gulf countries.

Table 3: Some EE policies adopted in GCC countries

Country	Plan	Implementer	Concept
UAE	Urban Master Plan Abu Dhabi 2030	Abu Dhabi Urban Planning Council (UPC)	Sustainability
	The Pearl Rating System	Estidama	Sustainable development
	Developing the DSM strategy	The Economic Affairs Unit of Abu Dhabi	Electricity and water consumption
	Dubai Strategic Plan 2015	Dubai government	Sustainable development
	Energy efficiency label and standard scheme	Emirates Authority for Standardization and Metrology	Environmental impact
Kwait	Code of practice for energy conservation	MEW	Energy conservation
Saudi Arabia	Energy efficiency program	Ministry of Water and Electricity	DSM
	Energy labeling program	Saudi Arabian Standards Organization	Quality of imported electrical products
Qatar	Program to educate and increase awareness	Qatar Green Building Council	Green building
	National Vision 2030	Ministry of development planning and statistics	Sustainable development
Oman	Energy conservation program	Electricity companies	DSM
Bahrain	Energy efficiency program	Electricity and Water Conservation Directorate	Energy conservation and DSM

Source: (Alasseri et al., 2017)

Factors Affecting Attitude toward the intention to accept demand side management

Attitude

Attitude was defined as the psychological construct, emotional and mental entity that characterizes the individual (Zhang, Xiao, and Zhou, 2020). Attitudes are very complex, and they are acquired through experiences. It refers to the person state of mind in relation to a value, and it is interpreted by means of an expression describing a place, person, thing, or events, which in turn affect the customer's thinking and action. Attitude is connected with the experiences and situations and affects the person's response to all those situations, objects or places (Sahin, Bayram, and Koc, 2019). In simple words, is the way in which the mind tends to act based on previous experience and behaviors. According to Zhang, Xiao, and Zhou (2020), attitude is the way in which the mind tends to evaluate things whether positively or negatively. In addition, it is defined as the person feeling about performing certain action whether positive or negative.

Thus, attitude is one of the important elements to study and explore the individual motivations to accept electricity demand side programs (Römer, Reichhart, and Picot 2015). Many studies have been conducted in this area to examine the factors affecting the individuals' attitude toward the intention of accepting and using energy saving electricity demand side programs.

Quality Value

Quality value can be perceived as an important driver that make consumers chose a product (Zhang et al., 2020). It is the utility derived from the perceived quality and expected performance of the product (Al-kharsan *et al.,* 2018). The product characteristics and attributes usually form the quality value of that specific product. Individuals, in general, focus on the quality that can be derived from a particular product or service. Customers are looking for many aspects of the product to conceptualize its quality value. They pay attention to two main aspects: quality and performance. When they evaluate the quality, they would consider the fine manufacturing process of the product and its stable quality. However, performance, for the consumers, covers aspects like advanced technology used in producing the product and the working effect. A good example of the working effect is the frequent conversion technology when customers use the air conditioner. In this study, the quality value refers to the quality value of the electricity demand side programs that makes people accept these programs. Many studies have been done on the effect of quality value in adoption of new technologies. (Stenner *et al.,* 2017) conducted a study on the possible effect of the consumer perceived quality value to DSM. A positive and significant effect was found from the quality value on the acceptance of mobile data services. If the People sense a high quality value from the electricity demand side programs, they will formulate good impression about these energy saving programs. Therefore, there intention to accept electricity demand side programs is improved.

Price Value

Price value can be defined as the utility brought by individual' perception of cost reduction (Vardakas, Zorba, and Verikoukis, 2015). The energy efficiency of electricity demand side management programs is very high. With the use of the electricity demand side management programs, consumers can reduce the electricity bill. Some people may say that the installation of these programs might be expensive, however it is very effective for the long run. Thus, when the consumers perceive higher long-term cost reduction, the perceived price value will also be high. So, individuals feel that they will be saving money by using the electricity demand side management programs. Therefore, consumers will probably think that accepting the electricity demand side management programs is significant and right, which will result in improving their attitude toward acceptance of electricity demand side management programs.

Environmental Value

Environmental value refers to the protection the electricity demand side programs will provide to the environment. Traditional consumption and electricity systems are producing more harm for the environment, with much emissions being produced, much air pollution, and many other harms that result in the destruction of the environment and spread of the diseases (Quek *et al.,* 2019). Thus, environmental value is the value obtained from using the electricity demand

programs. It is the environment-friendly feature derived from these programs such as reducing the air pollution. This kind of value makes the individuals' pursuit toward the environmental ecological value satisfied as they value their environment. When the customers think about acceptance and using the electricity demand programs, consumers will consider this value which will protect the environment from the harms like the pollutant emission and the depletion of resources. Many researchers believe that if consumers are allowed to make a decision while saving energy, they will decide a reasonable ration based on a reasonable green commitment (Park *et al.,* 2017).

Perceived Behavioral Control

Based on TPB, perceived behavioral control is one of the main factors affecting the individual intention (Römer et al., 2015;Parrish et al., 2020). A modification in Theory of Technology Acceptance model states that perceived ease of use has a direct effect to the individual attitude toward the behavioral intention. Perceived behavioral control refers to the consumer perceived fitness and ability to perform certain action which will affect the person attitude toward conducting that action. The perceived behavioral control refers to the ability of the individuals to acquire the electricity demand side management programs which will increase their acceptance levels towards the programs.

Conclusion

This paper has reviewed the available literature on the demand response programs by presenting the previous studies in the global level and goes down to the Gulf level. The review has shown that demand response programs are the best solution for the increasing demand of electricity faced by the nations in the current time. Besides, it has shown how the applications of such programs differ from one country to another with the difference in the intention of people to accept such programs. It is suggested that the nations that are facing the increase in the demand for electricity should be investing more on the application of such programs. In addition, it is recommended that the intention of people to accept such programs should be examined before applying such programs because the acceptance level varies from one country to another country.

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A Study of The Factors Affecting UTHM Students' Entrepreneurial Intention

Abdulhameed Mohammed Mohammed ABDULLAH
University Tun Hussein Onn Malaysia, Malaysia, abod.mahdi012@gmail,com

Siti Sarah OMAR*
University Tun Hussein Onn Malaysia, Malaysia, sarah@uthm.edu.my

Ahmed Saleh Ahmed Saif AL-SHAMERI
University Tun Hussein Onn Malaysia, Malaysi, ahmedalshameri54@yahoo.com

Mahdi Mohmed ABDULLAH
Universiti Tun Hussein Onn Malaysia, Malaysia, mahdi.mohammed34@gmail.com

Salah Ahmed Abdulwahab ABDULHAFEDH
salahahmedabdo.sa@gmail.com

Abstract

Unemployment is an issue in most of the countries, both developing and developed. Students spend their available life, money, and efforts in education for getting a good job. However, when they finish their education, they spend much time looking for a job and sometimes stay unemployed. It is believed that one of the best solutions for this problem is to start a privet business. Thus, the objective of the study was to study the factors that affect UTHM students' entrepreneur intention and find the relationship between these factors and the intension to become entrepreneurs. Four main variables were studied in this research namely, attitude, perceived behavior control, need for achievement, and family background. The study followed the quantitative method and collected the data via online and hard questionnaires. The Sample size of the study was 375 based on Morgan table. The data was analyzed using the Statistical Package for Social Science (SPSS) version 22.0. For achieving the objectives of the study many statistical test were conducted including reliability and normality test, mean analysis, and correlation & regression analyses. The findings of this study showed that all the variables were correlated with entrepreneurial intention. Moreover, the study also showed that all factors have a significant impact on entrepreneurial intention, except for the family background which was found to have no significant impact.

Keywords*:* Entrepreneurial Intention.

Introduction

Students' Entrepreneurial Intention is crucial and fundamental aspect that Malaysian government has been recently focus on with more effort to push the entrepreneurial minds of students as a way of creating more opportunities for the university graduates. Thus, this study will fill the research gap of the factors that impact the student's intention to become entrepreneurs.

The economy plays an indispensable job in estimating the achievement or success of each nation around the world. Therefore, every country is resolved to discover various approaches to improve its economy and one of the generally realized choices and widely known is through entrepreneurship. Without a doubt, numerous countries around the globe believe that the way to economic improvement is through entrepreneurship (Mustapha & Selvaraju, 2015).

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Numerous researchers and economists are also in favor of the way that entrepreneurship is a significant factor in the improvement of society (Shamsudin *et al.,* 2016). Entrepreneurship has built up its situation as the most dominant economic power in the course of the most recent decades. What's more, entrepreneurship is seen as the motor that drives the economy and thus, there is a rising interest for the advancement of education programs that promote entrepreneurship (Popescu *et al.,* 2016). Entrepreneurship is a strategic field that is continually advancing and changing with time. Entrepreneurship is viewed as the driver of the economic development of the country and assurance of the endurance of society. Entrepreneurship is one of the significant supporters of a country's economic development, advancement, and competitiveness (Hussaina, 2017).

One of the factors driving the growth of entrepreneurship in any country is the position of universities through the preservation of entrepreneurship education. The university is liable for educating and enabling its graduates and motivating them to choose entrepreneurship as their profession. University needs to implement specific entrepreneurial learning examples dependent on experimental contribution to furnish students with important information so as to encourage student motivation for entrepreneurship (Asiah *et al.,* 2018). This is because entrepreneurs are the most dynamic, creativity and innovation. They are prepared to face uncertainty through creativity and determination to succeed. This spirit has led them to see the opportunity and the confidence to seize the opportunity. Therefore, entrepreneurs need to create and venture into new fields to enhance their competitiveness by giving people more choices (Hoque, 2018). Studies have recommended that entrepreneurship can be learned or by one way or another supported through entrepreneurship education (Manik & Sidharta, 2016). In addition, entrepreneurship education can likewise be considered as the proper exchange of innovative abilities and entrepreneurial competencies, that allude to the ideas, aptitudes, and mental mindfulness that people use during the time spent starting, developing and building up their development growth-oriented ventures (Shamsudin *et al.,* 2016).

Nowadays, unemployment among graduates has been a significant issue in Malaysia (Kadir & Merican, 2017). And the issue of unemployment among graduates is not new and is a problem for the country. The genuine circumstance today is that an ever-increasing number of graduates are joining the joblessness queue. And that unemployment problem occurs every time a university releases thousands of graduates each year. Youthful and fresh graduates, specifically, experience challenges in securing their first employment (Taha *et al.,* 2017). As the quantity of graduates surpasses the market request, the joblessness pace of new graduates additionally increments. This is because of the absence of openings for work (Taha *et al.,* 2017). Consequently, the involvement of graduates in entrepreneurship can curb and reduce the problem of unemployment. Even this field offers employment opportunities to others. Therefore, graduates need to be exposed to this field from an early age (George, 2017).

Several studies reveal that most countries these days are confronting an increase in unemployment problems. Along these lines, entrepreneurial knowledge and aptitudes may assist the nations with reducing the joblessness problem (Saraih *et al.,* 2018). Restricted chances to gain work happened for the most part in competitive environments. With this statement, graduates from colleges and universities face challenges to get a job in both the public and private sectors because of the present economic environment condition (Saraih *et al.,* 2018). It has been realized that tertiary education providers produce graduates for whom there is no business market. The period among graduation and work has kept on increasing and has turned into the basis of a disappointment for Malaysian graduates (Hoque, 2018).

According to the statistics revealed by Eduadvisor (2018), about 290,000 students finish their higher education. One out of five of these students remain unemployed, most of whom are degree holders. The number of these unemployed people account for about 55% of the unemployed people in Malaysia. The Figure 1 below also shows data on the unemployed fresh graduates based on their fields of specialization.

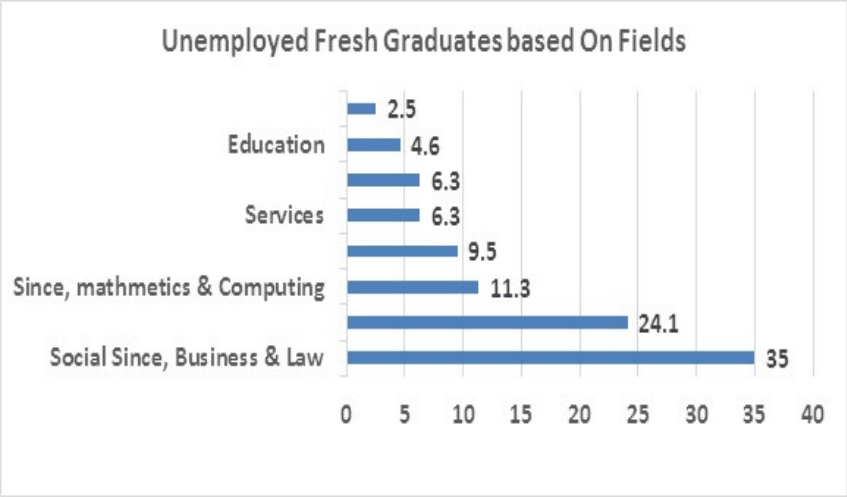

Figure 1: Unemployed Fresh Graduates based On Fields

Source: Eduadvisor (2018)

In the present conditions, it is asserted that one of the potential choices is for these graduates to move toward becoming entrepreneurs (Hoque, 2018). However, like any other problem-solutions, there are some factors that probably affect the students to start their own businesses. These factors are attitude, perceived behavioral control, family background, and need for achievement. First, attitude plays a great rule since students probably have no idea about being entrepreneur, so this affects their intention negatively. Thus, it is important to study UTHM students' attitudes toward the entrepreneurial intention. Second, perceived behavioral control is also significant because it is the nature of humans to have no intention to do behaviors which the individuals do not have the ability to perform. Family background is also- having a considerable effect because people always inclined to follow others in life. The last factor is the need for achievement. Since the introduction of David McClelland on motivation, the need for achievement is considered as a characteristic of entrepreneurs (Dina *et al.,* 2016).

While the pace of growth of jobless graduates is increasing, entrepreneurship is viewed as one of the variables that can increase work and be a critical factor for economic growth in creating nations (Hoque, 2018). Thus, this research aims at identifying the factors that affect the students' intention to become entrepreneurs. Given that, independent work as an entrepreneur is a profession that must be given consideration as an option for graduates (Mazdan, 2015).

Literature Review

Regardless of the shifting meanings of 'entrepreneurship' and the nonattendance of one generally definition meaning of the term, all the accepted definitions rotate around the thought of start up a business or endeavoring to start up a business (Hoque, 2018). Intent can be defined as a state of mind directing an individual's consideration towards a particular item or a way so as to accomplish something (Israr & Saleem, 2018). The entrepreneurial intention, along these lines, can be defined as a person's choice to begin their very own venture later on (Hakimin *et. al,* 2015). Entrepreneurial intentions can likewise be defined as the state of mind of a person that directs the person toward the idea of venture creation (Manik & Sidharta, 2016), without intentions activity is far-fetched. The expression of entrepreneurial intention has a comparative assignment to different terms that are every now and again used, for instance, entrepreneurial mindfulness, entrepreneurial potential, trying entrepreneurs, entrepreneurial proclivity, entrepreneurial affinity, and entrepreneurial direction (Nguyen, 2018).

Entrepreneurial intention is the beginning stage of the choice to participate in any business or venture, making it an increasingly significant indicator of future entrepreneurial contrasted with characteristic and demographic models or frames of mind and outside factors that are by and large situational (Jumamil *et al.,* 2017). Being a procedure, it is a

purposeful conceptualization or change so as to make or include an incentive through the composed utilization use of resources (Jumamil *et al.,* 2017).

Entrepreneurial intention as a perspective that advances the improvement or foundation of new business. In other words, it is a mentality impacting the decision of entrepreneurship and offering basic bits of knowledge and vision into procedures including opportunity accepted, concluded that a solid entrepreneurial intention should bring about an inevitable endeavor to begin a business notwithstanding prompt changes in conditions like marriage, childbearing, graduation, work which may cause delays (Koe, 2016). It is theoretically believed that providing a person with education and entrepreneurial experience from an early age can increase one's potential to become an entrepreneur (Hussaina, 2017).

Jumamil *et. al* (2017) conducted a study on UPLB (University of the Philippines Los Baños) graduates to investigate the factors affecting entrepreneurial intention. The results showed that self-efficacy, attitude, and knowledge on the availability of entrepreneurial support were the most influential factors towards entrepreneurial intention. Other demographic factors like gender, entrepreneur parents and friends were also found affecting the entrepreneurial intention. More than that the researcher has stressed the importance of entrepreneurial intention in taking decisions to engage in business more than the demographics, attitudes or external factors. This researcher stated that entrepreneurial intention predicts future business engagement, while the others are only situational.

Saraih *et al.* (20.18) studied the effect of self-efficacy in the engineering students' intention to become entrepreneurs in one of the Malaysian universities. The study used a quantitative method and following the Bandura Social Learning Theory. The findings showed that respondents have a high interest to become entrepreneurs and a moderate level of self-efficacy. Moreover, the study revealed that there is a significant relationship between the entrepreneurial intention and the self- efficacy.

Another quantitative study was conducted by Anas Al Bakri & Ahmed Mehrez (2017) at Qatar University. This study focused on the role model, university role, and demographics as factors affecting the students' entrepreneurial intention. University's role was the most influential factor. It was also revealed that male students are more inclined to be entrepreneurs than females. The role model factor scored a mean of 6.72 which indicates that respondents think of entrepreneurial role models, and there is a positive relationship between the availability of role models and students' preferences towards entrepreneurship.

Popescu *et al.* (2016) has studied psycho-behavioral traits including the need for achievement and its effect on entrepreneurial intention. The finding revealed that the need for achievement does have a strong effect on the students to become entrepreneurs. The results were similar to the findings of Pillis and Reardon (2007), the students to start their businesses to acquire a higher state of well-being which they consider as self-achievement. The studies also showed that the respondents need to gain recognition, self-realization, prosperity and never stay without work, which can be achieved through starting new businesses.

Shirokova *et al.* (2015) studied the gap between intention and behavior. The study suggested that although the intension-behavior relationship in other fields is at a high level, the research regarding this relation in entrepreneurship is still lacking the king and scarce. Thus, the study examined the relationship between entrepreneurial intention and action among the students regarding the contextual factors and environmental characteristics. One of the main factors was the family entrepreneurial background. The findings revealed that the Entrepreneurial family background factor has a strong influence on the students' intention to become entrepreneurs.

Another study was conducted by Ambad & Damit (2016) in Kota Kinabalu, Sabah, Malaysia. This paper applied the Theory of Planned Behavior to identify the factors that affect the entrepreneurial intention among the students because most of the literature indicates that entrepreneurial intention can be determined by using this theory. The study focused on educational support the students perceived, subjective norms, perceived structural support, personal attitude, and perceived behavioral control. The findings revealed that only three factors that have an impact on the students' intention to become entrepreneurs which are personal attitude, perceived behavioral control, and perceived relational support.

Thus, this study suggests that the students will incline to be entrepreneurs if they have a positive attitude, feel the ease of starting a business and have friends and family support.

Personal Attitude

Attitudes toward any certain behavior is the good or bad evaluation a person has toward the behavior (Grandom and Mykytyn, 2004). Attitude is an essential part of producing different choice behavior and intentions. Beliefs and fillings are what form the attitude (Zanna & Rempel, 1988). Attitudes are formed and saved in mind; this makes the decision making easier and strengthen the decision quality. Xavier et al. (2009) defined the relation between attitude entrepreneurial intention as the perceived benefits the individual probably feel they can obtain from starting a new business.

Gelard Saleh (2011) stated that there is a good relation between attitude and entrepreneurial intention. This was refuted by (Skosana, 2012). Krueger (2000) conducted a survey on students and the findings supported the theory of Planned Behavior except for the perceived social norm which was found to have non-significant effect on the students' entrepreneurial.

Another study was by Franke and Luthje (2004) on entrepreneurial intention among business students at two universities in Germany and one of the leading USA academic institutions. The findings revealed the positive relation between the students' intention toward starting a business and their attitude. The results also supported by the findings of Dohse & Walter (2009) and Paço et al., (2011) which found that the attitude toward the behavior has direct and positive effect on entrepreneurial intentions.

Perceived Behavioral Control

Perceived behavioral control refers to the individuals' perception regarding their ability to control certain events or actions that influence their lives (Hussaina, 2017). The Perceived behavioral control orientation involves assuming the belief that the results of our actions are influenced by what we do (Jumamil et al., 2017). It is considered that entrepreneurs, unlike other people, can have greater control over the results of their actions (Dina et al., 2006). Perceived behavioral control is behavior based on the level of control of an individual's belief system, the Perceived behavioral control of an entrepreneur should be understood as a clear cause of the entrepreneur's ability to control the entrepreneur's belief system throughout his life (Shirokova et al., 2016).

The concept of Perceived behavioral control refers to an individual's belief in himself (the locus of internal control) or his belief that he is influenced by an external factor (locus of external control (Koe, 2016). The Perceived behavioral control over expectations to control one's environment and beliefs in order to control the level of self-control and environmental pressures and to overcome them, meanwhile, Perceived behavioral control refers to the degree to which one feels that his success or failure depends on himself (Bin Yusoff et al., 2015). This statement implies whether an individual has the power or self-confidence in the events that occur to him or her. Individuals who believe that they can influence their own lives are expected to have internal control, while individuals who think they cannot influence the environment are said to have an external locus of control (Hussaina, 2017).

Family Background

Entrepreneurial family background alludes to those individuals whose parents or family members are associated with independent work (Shirokova et al., 2016). The family, and specifically the dad or mother, assumes the most powerful role in setting up the attractive quality and believability of entrepreneurial action for an individual (Hussaina, 2017). Numerous researchers contend that the presence of an entrepreneurial parent makes a domain wherein entrepreneurial development is empowered and success is stressed. Social encounters picked up by kids, for example, observing an entrepreneur, may direct the person's quest for a career similar to those early learning experiences (Shamsudin et al., 2017). There are several pieces of proof in student entrepreneurship literature proposing that students with family

business background foundation come from a specific familial setting that may impact their future job intentions (Kadir & Merican, 2017).

Growing up in an entrepreneurial environment offers a chance to gain from independently employed parents, who fill in as good examples (Shirokova et al., 2016) making along these way positive convictions about an entrepreneurial vocation and an ideal disposition towards shared with into entrepreneurial activities, which thusly may make youngsters just want to become toward becoming entrepreneurs, Moreover, the family business background gives bits of knowledge into entrepreneurial activity and basic leadership forms and decision-making processes the being students originating from entrepreneurial families (Shirokova et al., 2016).

Need for Achievement

The need for achievement is an important determinant of an individual's entrepreneurial intentions, the construct need for achievement is regarded as a major influential element behind human action (McClelland, 1964). As a concept, the need for achievement is the satisfaction felt by an individual when he or she achieves a goal through his or her own efforts. Therefore, it is not surprising that such people are always looking for success, both of their own and of those with whom they are working (Hoque, 2018). However, in order to achieve their goals, they prefer tasks of moderate difficulty, avoiding, as much as possible, the challenges with a high degree of difficulty. At the same time, the tasks that are too easy are not interesting for them (Hussaina, 2017). The need for achievement seems to be more important in the case of small and medium businesses (Hattie, 2013), being a very good predictor for the entrepreneurial intentions of those who will begin such an activity (Popescu et al., 2016).

Methodology

This study is quantitative in nature. In this research, stratified random sampling was utilized to choose the samples. This type of sampling is very good in making sure that a large number of population is represented. The sample size of the study was determined based on Morgan table. The data was collected with the use of the questionnaire method and then analyzed by SPSS Version 22.0. There were about 375 copies of questionnaires distributed to the targeted respondents of UTHM students. The researcher managed to collect back 345 questionnaires from the respondents. This constitutes a sum of 92 % response rate. According to Fellows *et al.* (1997), the normal useable response rate is ranging from 25% to 35%. Therefore, the total response received is considered sufficient for the purpose of this research.

The questionnaires were collected from online and by hard copies. The online questionnaires returned were 71 which accounts for almost 29% of the total number, while the collected hard copies questionnaires were 274 questionnaires which accounted for 79.42% of the total questionnaires. Thus, most of the questionnaires were collected through the hard copies distributed among the students because the students seem to be not responsive to fill the questionnaire form online. More than that the university was about to close due the Corona Virus, so the researcher tried to distribute more hard questionnaires as it is more effective way to get the data. In Addition, many statistical analysis were conducted to achieve the main objectives of the study. These include reliability test, descriptive analysis of the data, correlation analysis, and the regression analysis.

Data Analysis and Discussion

Reliability Test

According to Table 4.2, the Cronbach's Alpha reliability coefficient on the analysis of the factors affecting the students' entrepreneurial intention among the collected result with a value of 0.872 that is considered to be Very Good Reliability.

Table 1: Reliability of the Study (Cronbach Alpha)

Reliability Statistics	
Cronbach's Alpha	N of Items
0.872	**31**

Demographic of Respondents

Respondent's Gender

In this study, the respondents were 345 from different faculties at University Tun Hussein Onn Malaysia (UTHM). This part is explaining the gender information of the respondents as shown in Table 4.4 and Figure 4.1. This survey provides an accurate data finding among the genders from the students male and females. This is because the data pointed that more men students participated in the survey than women students. Figure on Table 4.1, the numbers of male respondents were 220 which make 63.8% of the total number. On the other hand, the number of female respondents was 125 which accounted for 36.2%. Thus, the majority of the respondents were males.

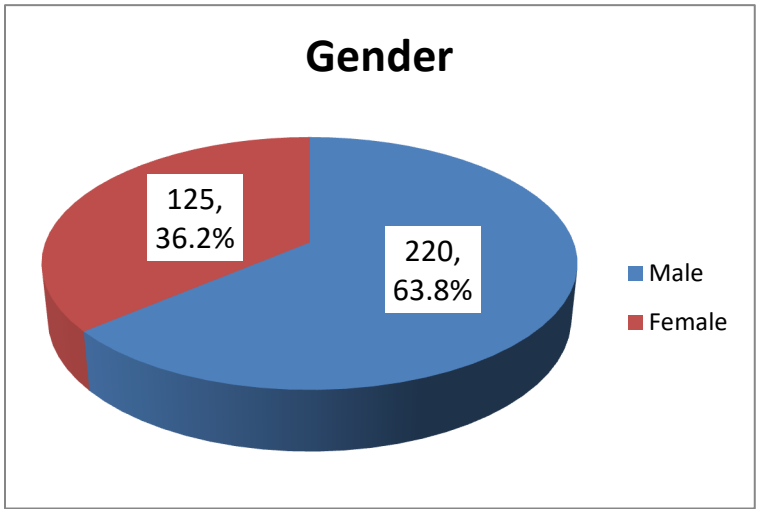

Figure 2: Frequency of Respondent's Gender

Respondent's Age

This section presents data on the age of the respondents. The data shows that most students are between 23 and 27 years old whose percentage was (45.2%). The second biggest category was those students aged between 18-22. Their percentage was 33.9%. The third category was for those students aged between 28-32. These students accounted for almost 12.5%. The smallest number of respondents was from the last category with the average age above 32. The data analysis of the respondents' age showed that most of the respondents were Bachelor or Master Students.

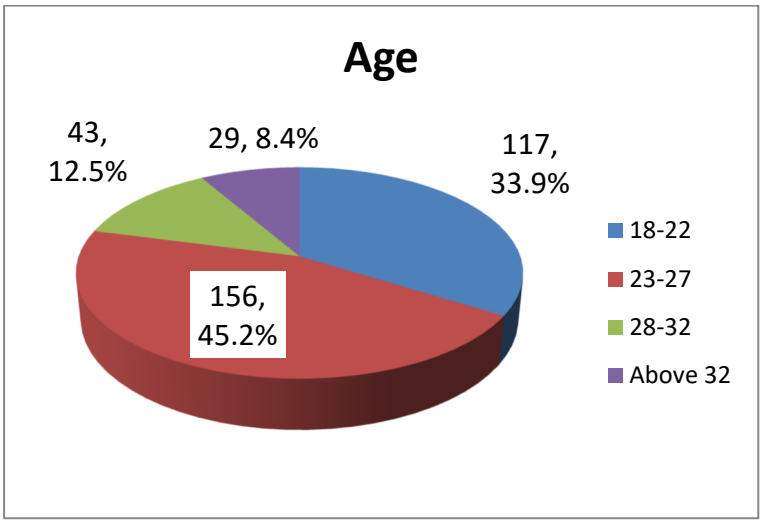

Figure 3: Frequency of Respondents Age

Respondents Race

This section shows data about the respondents' race. Overall, the majority of the respondents were Malay. From the demographic information in Table 4.6 and Figure 4.3, the number of respondents whose race is Malay was 141. This number was the heist number among the other groups. It accounts for 40.9 % of the overall number. The second big number was the Arab respondents whose number was 96, and their percentage was 27.8%. In addition, the number of Chinese respondents and the number of Indian respondents were almost similar (32 and 26 respectively), and their percentage was 9.3% for the Chinese, and 7.5% for the Indians. Moreover, 50 respondents chose the category "Others" which refers to other countries like Pakistan, Somalia, and other countries. The percentage of these respondents was 14.5%.

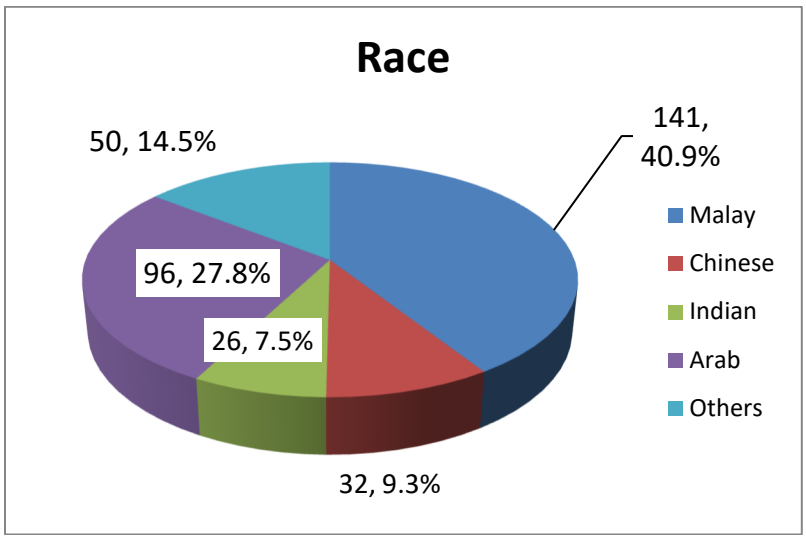

Figure 4: Frequency of Respondents Race

Respondents Education Level

Figure 4.4 shows the educational background of the respondents. Among the survey from UTHM students, the output recorded 229 out of the demographic which 66.4% were Bachelor students. Thus, it is clear that Bachelor students were the majority of the respondents in this study. The second category was pointed as Master students with percentage 91 and that accumulate 26.4%. This is followed by the third category which is the PhD students whose number was 25 which accounted for only 7.2% out of the total respondents.

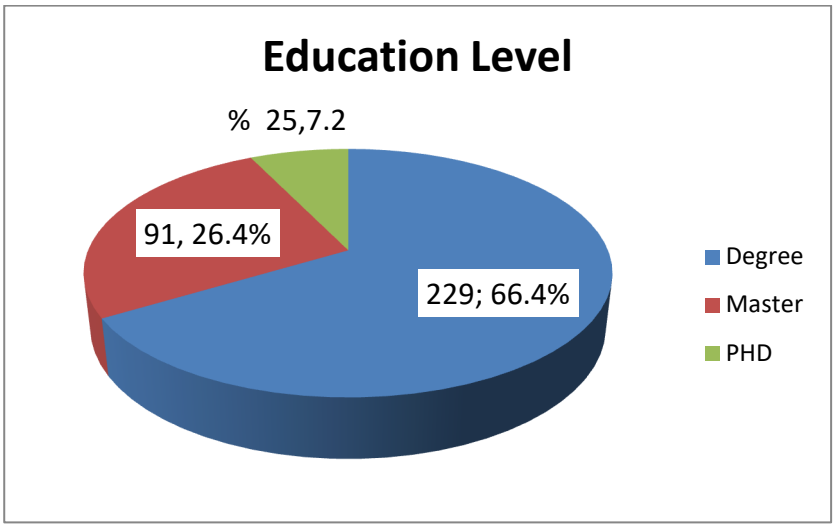

Figure 5: Frequency of Respondents Education Level

Respondents Faculties

Figure 4.5 shows data on the faculties of the respondents. The biggest number of respondents were from the FPTP whose number was 97 and their percentage was 28.1%. This figure was followed by the students from FSKTM and FKMP as their numbers were almost similar (65 and 60 respectively), and their percentage was 18.8% and 17.4% respectively. A good number of respondents was from the FKAAS as their number was 52 (15.1%). Finally, the small number of respondents came from the FKEE and FPTV as their numbers were 39 and 32, and they accounted for 11.3% and 9.3% respectively. To conclude, much number of respondents were from the FPTP.

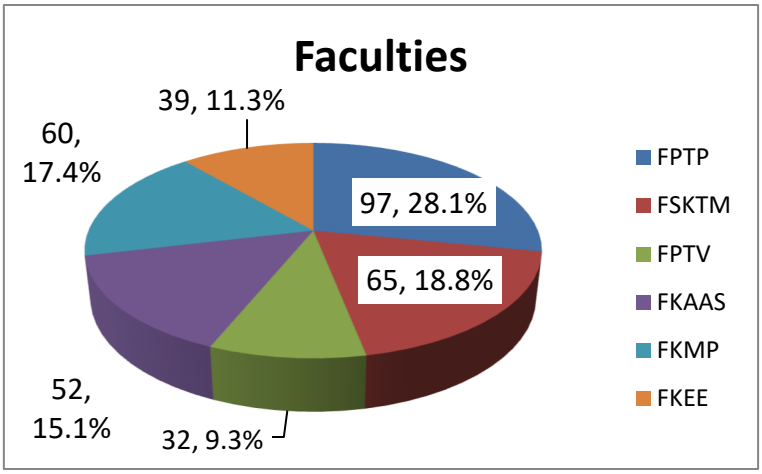

Figure 6: Frequency of Respondents Faculties

Family Business

This section shows the data regarding the respondents' family business background. The respondents were asked whether their families have business or not. From the demographic information in table 4.9 and figure 4.6, it is clear that number of respondents were 345. From this number, 149 respondents answered "Yes". This number accounts for 43.2% of the total number. On the other hand, 196 of the respondents answered "No". The percentage of these respondents is 56.8% of the total number. Thus, the number of respondents who their families do not have business is more than the number of respondents whose family do have business.

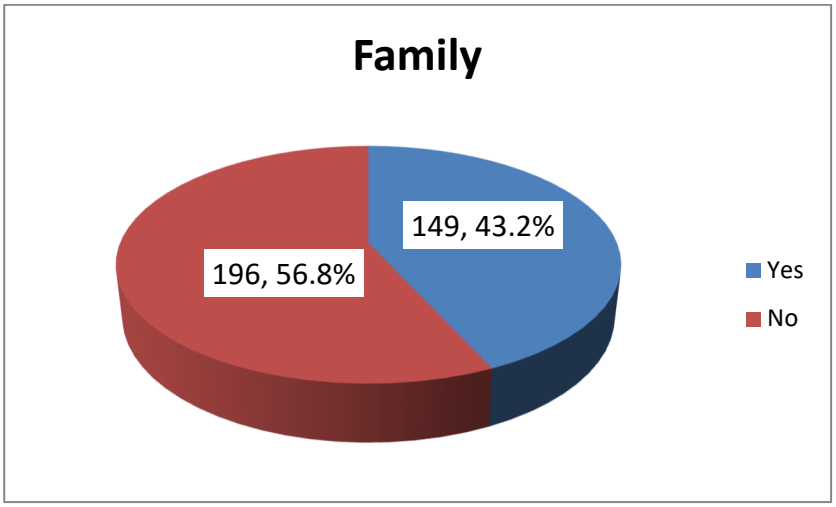

Figure 4.6: Frequency of Respondents Family Business

Descriptive Analysis

The Findings of Objective 1

The first objective was to identify the factors that affect UTHM students' intention to become entrepreneurs. There are four main factors being examined in this study; attitude, perceived behavior control, need for achievement, and the family background. This objective was first achieved by discussing these factors in the literature review of the study in Chapter 2. To fully satisfy the first objective of the study and answer its related question, the mean analysis was selected as the best method to determine the central tendency of the factors which will specify the average mean of each variable and its level of tendency.

Table 2: Descriptive Statistics

Factors	Average Mean	Std. Deviation	Total Average mean	Interpretation
Intention	3.90	.916	3.78	**High**
	3.69	.980		
	3.72	.993		
	3.84	.966		
Attitude	3.93	.868	4.02	**High**
	4.11	.807		
	4.02	.859		
	4.04	.784		
	4.00	.886		
Perceived Behavior Control	3.29	1.038	3.44	**Average**
	3.34	1.025		
	3.42	.912		
	3.51	.915		
	3.66	.915		
Need for Achievement	3.68	.904	3.75	**High**
	3.61	.822		
	3.85	.831		
	3.79	.831		
	3.83	.879		
Family Background	3.85	.906	3.80	**High**
	3.94	.872		
	3.71	.942		
	3.81	.946		
	3.72	.938		
	3.81	.911		

The mean and the standard deviation were summarized in the previous table after they have been extracted from the SPSS Version 22.0. One main dependent variable was studied in this research which is the intention of the respondents toward the entrepreneurial intention. While the independent variables are four factors as stated in the table. The five-point Likert scale was used to measure the tendency level of the variables starting from 1 that is strongly disagree to 5 meaning strongly agree. Based on this five-point Likert scale, the results will take different forms as such 1.00 – 2.33 means that the mean level is very low, 2.34 – 3.67 means that the mean level is moderate, and 3.68 – 5.00 means that the mean is high.

The second type of data that was represented in the table is the standard deviation of the items in the study. In fact, standard deviation measures the dispersion of the items from heir mean. Actually, the standard deviation is very high for most of the items. Q7 and Q8 are the first two items in the table with the standard deviation of .916 and .980. These levels of standard deviation show that majority of the respondents agreed on the statements in the questionnaire that was distributed.

Overall, based on the data of the mean and standard deviation in Table 4.3, it is clear that the mean of the variables were high and average. The mean scores of the variables ranged from 3.44 to 4.02 while the standard deviation ranged from .784 to 1.038.

Based on the data, the highest mean value among the variables is the value of the attitude toward the entrepreneurial intention as it scored 4.02 (Std. Dev: .565). Need for achievement and family background were almost having similar mean score as they scored 3.75 and 3.80 respectively, and (Std. Dev: .629 and .661). Finally, perceived behavioral control was having the smallest mean score which was 3.44, and its standard deviation was .720.

Thus, it can be concluded that the finding of objective one of this study was that all the factors are affecting the entrepreneurial intention of the UTHM students with variation in the percentage. Attitude was found the most influential factor with the average mean of 4.02. It was followed by the family background and need for achievement. The last variable was the perceived behavior control.

The Findings of Objective 2

The second objective of this study was to determine the relationship between the factors of attitude, perceived behavioral control, family background, and need for achievement and UTHM students' intention to become entrepreneurs. Entrepreneurial intention is the dependent variable while the others are independent variables. Four main hypotheses were formulated under this objective which are tested in this section. Two main tests were conducted in this section (Correlation Analysis and Regression Analysis) that have been determined effective to achieve objective number two of the study. However, a normality analysis will be first conducted to examine the normality of distribution and to determine which type of test should be run.

Normality Test

As shown in Table 4.4, it is the results of the normality of data. Since the sample size was more than 200, the Kolmogorov-Smirnov test was used. This showed that the data are not normally distributed. In this case, the significance value is 0.000, suggesting a violation of the assumption of normality according to Pallant (2011). The analysis shows that the results are not usually distributed because the significant values are less than 0.05.

Table 3: Normality Test

Study Variables	Kolmogorove-Smironv Significant	Shapiro-Wilk Significant
Entrepreneurial Intention	.000	.000
Attitude	.000	.000
Perceived Behavior Control	.000	.000
Need For Achievement	.000	.000
Family Background	.000	.000

Since the questionnaires, were not normally distributed, Pearson correlation was selected as an effective tool to examine the relationship as shown in next section.

Correlation

Correlation analysis was selected as the first method to examine the relationship between the variables. It will show the variables are correlated to each other. The result of the correlation analysis is shown in Table 4.5. Overall, all the variables were found correlated to the dependent variable. Based on the data, is clear that the strongest relationship was found between the need for achievement and the entrepreneurial intention of the students (r=.557, p-value = 0.000). However, the weakest correlation was between the Family background and the entrepreneurial intention.

Table 4: Correlation Analysis

Entrepreneurial Intention		Attitude	Perceived Behavior Control	Need for Achievement	Family Background
	Correlation	**.465****	**.452****	**.557****	**.367****
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**
	N	**345**	**345**	**345**	**345**

Multiple Regression Analysis

In the previous section, correlation analysis was used to test the correlation of between the entrepreneurial intention and the indepen-dent variables. However, it is believed that correlation analysis is not enough to satisfy the findings. Thus. Regression analysis was also used in this study because it perfectly predicts the effect of the independent variables on the dependent variable. Unlike the correlation which shows the sufficient relationship between the variables, the regression shows the magnitude (how much) and the direction (positive or negative) relationship between the dependent and the independent variables.

The following table shows the ANOVA data of the regression analysis. This result shows the significance of the overall model. Based on the table the model is significant and the data are significant since the significance score was .000 which is less than .05. This also means that the model has achieved a satisfactory level in predicting the variance of entrepreneurial intention towards the other four independent variables.

Table 5: ANOVA of the Regression Analysis

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	91.087	4	22.772	60.63	.000[b]
	Residual	127.629	340	.375		
	Total	218.716	344			
a. Dependent Variable: EI						
b. Predictors: (Constant), FB, PBC, A, NFA						

Table 4.7 shows the results of the regression analysis. Based on the table the standardized coefficients of the attitude is .296, perceived behavior control .189, need for achievement .347, and family background .000. More than that the results show that attitude, perceived behavior control and the need for achievement are the main variables that affect the respondents' entrepreneurial intentions because their significant value is less than .05. However, family background was

found not having significant effect on the respondents' entrepreneurial intentions because its significant value is .980 which is more than the .05 level. In other words, family background has no contribution to the entrepreneurial intention.

Table 6: Coefficients of the regression analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.269	.276		-.973	.331
	Attitude	.417	.066	.296	6.304	.000
	Perceived Behavior Control	.209	.055	.189	3.775	.000
	Need for Achievement	.440	.069	.347	6.370	.000
	Family Background	.002	.060	.000	.26	.980
a. Dependent Variable: Entrepreneurial Intention						

Thus, based on the T test in the previous table, there are only one variable that is not relevant to the equation that is the family background. The hypothesis of the family background, thus, was not supported. The R value in Table 4.8. Also strengthen the results. In more clear words, the R Square score indicates that all the variables can -express 41.60% of the changes in the entrepreneurial intention.

Table 7: Regression Analysis Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.645[a]	.416	.410	.613

a. Predictors: (Constant), FB, PBC, A, NFA

Conclusions and Recommendations

This study was on the factors affecting UTHM entrepreneurial intention. Attitude scored the highest mean. The correlation analysis also shows that all the factors are correlated with the entrepreneurial intention. However, the regression analysis shows that all the factors are having impact on the dependent variable, except for the family background which has no effect.

Some recommendations were formulated. First, it is recommended that this study should be conducted in other universities in Malaysia. The future research should also conduct the study in a bigger scope such as conducting the study in more than one university in both private and public universities which will enable the researcher to compare the results between different universities. This would be very helpful for the policy and decision makers in the government. Furthermore, future research should focus on more factors to be conclusive. Besides, the policy and decision makers in the government should take the findings of this study with other studies into consideration. Thus, the government should make the process of establishing new businesses easier. More than that they should provide some financial support and loans because perceived behavioral control is one of the main factors that were found having positive correlation and impact on the entrepreneurial intention, and finding support from government such as loans and

financial support of course contributes to the increasing of the perceived behavior control among the graduates. In addition, students should get more knowledge in the entrepreneurship while they are still at the university. They should think how they can apply this specific specialization and knowledge in the real life by developing private businesses that can generate return.

Finally, like any other research, some limitations were identified during the conducting of this study. These limitations should be taken to consideration when findings and results of this study are interpreted. The first main limitation is the limit of the scope. This study was conducted among the students of only one public university in Johor. Thus, the results may not be generalized and might not be applicable to the other states in Malaysia. The second limitation of this study is that only four entrepreneurial factors were studied in this research. So, the study is not inclusive. The framework of the study did not include all the factors found in the literature review. The third limitation is the short time devoted to complete this study which resulted in some of the abovementioned limitations. Nevertheless, the study has followed a scientific and systematic process to conduct all the steps of the formal research starting from the study background, identifying objectives, collecting and analyzing the data and finally discussing the results and the findings.

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The Materiality of a Hybrid Capital in Partnerships on The Example of Limited Partnerships

Artur JASTRZEBOWSKI
Poznań University of Economics and Business, Department of Accounting and Financial Audit, Poland, artur.jastrzebowski@ue.poznan.pl

Marek WIERZBINSKI
Poznań University of Economics and Business, Department of Management Accounting, Poland, marek.wierzbinski@ue.poznan.pl

Abstract

This article aims to present arguments that justify the introduction of hybrid capital in limited partnerships' financial statements. A limited partnership is becoming an increasingly popular form of doing business. Legal regulations in the field of accounting, as well as the literature, do not devote sufficient attention to limited partnerships or other partnerships. Issues connected with, among others, the recognition gap in accounting books and the presentation of equity in the financial statement. One of the tools which can help to cover it is hybrid capital. The work was prepared with the use of literature analysis methods and Polish regulations regarding the functioning of companies. A detailed analysis of statistical data was made in the empirical part. As a result of the research, the significance of the information gap in the area of an entity's capital was identified, and thus the potential for using the hybrid capital presentation was demonstrated.

Keywords : Materiality Principle, Limited Partnership Company, Hybrid Capital, Accounting of Limited Partnership Company.

JEL Classification: M48, M41.

Introduction

The modern accounting system was created as a result of the centuries-old evolution and it transformed from a simple register of business activity into an advanced set of activities that are necessary for enterprise's effective management. As a consequence of these changes, accounting began to perform many different functions resulting from its practical nature.

In the literature, the following functions are usually identified (Jastrzebowski, 2015):

- information,
- control,
- evidence,
- reporting,
- analytical.

The information function deserves special attention, because it fully realizes the concept of accounting as an information system (Kamela-Sowińska 2006, Hońko 2008).

According to Z. Messner (2003), the essence of the information function is connected with the formation of specific sets of information, their processing and transferring them to the management of a certain entity for their adequate use in the management process. The definition that extends the above-mentioned description was presented by (among

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others) K. Szymczyk-Madej (2007). She indicated that the information function is based on the creation of specific set of information for the purposes of enterprise management and sets that are useful for external recipients.

The above characteristics differ in terms of the needs of external users of the accounting system. The second of the cited definitions points out that accounting is a highly relevant enterprise system. It is useful for all types of stakeholders (internal and external). The aforementioned diversity of users forces not only the development of different areas of accounting (e.g. financial, management or tax), but also the development of methods for sharing information prepared in the accounting system. Therefore, information is a product presented to recipients in an aggregated form via financial statements of entities (IFRS, 2020).

The reporting function is strictly connected with one of the accounting subsystems – financial reporting. The reporting (itself), according to the definition proposed by W. Gabrusewicz (2007), is a set of various compilations and numerical data concerning a specific period, which are prepared with the use of determined principles and formulas. The information contained in the financial statements is the basis for evaluation of the activity of an economic entity (Remlein, 2013).

The main factor, which affects the appearance of new elements of the financial reporting's subsystem, is the separation of ownership functions from operational functions. Owners, who remain outside the enterprise and do not have any access to the entity's operating processes, look for sources of information that will allow them to assess the property and financial condition of the entity. However, the popularization of the agency model in enterprise management is not the only factor that influences the development of the reporting function. The second factor is the expansion of the scope of actions conducted by an entity – and thus an increase in the number of realized economic operations. Managers of individual levels need information about the property and financial situation of an entity in order to make rational decisions. However, the large number of transactions makes it impossible to present the company's image in a quick way. Therefore, information generated within the framework of the accounting system is aggregated and presented in the form of numerical and numerical-descriptive reports (doctorate).

In summary, through the implementation of the accounting's information function, external and internal users receive information that is necessary in the decision-making process. However, it should be noted that the technological progress and the intensification of globalization processes contribute to the increase of a pace of changes in surroundings of an economic unit. Increasing variability forces the management of the unit to optimize the decision-making process, including shortening time needed to evaluate the unit's situation and make right economic decisions. Therefore, accounting performs a reporting function, which is connected with the aggregation of information from the accounting system (presented in the form of financial statements), allowing for the shortening of the decision-making process. However, simplifications may affect the legibility of the unit's image. One of the areas subject to the risk of inappropriate presentation is company's capital presented in the balance sheet.

The aim of this article was to present arguments that justify the introduction of hybrid capital in limited partnerships' financial statements. In the final part of the study, the materiality of a potential information gap in the financial statements concerning the entity's equity was examined.

Finally, the study was divided into four main parts covering the presentation of the principle of materiality in accounting, the essence of a limited partnership and a hybrid capital, as well as its importance from the point of view of the financial statement's legibility.

The first part presents the importance of the materiality principle and methods for the determination of the materiality threshold in the accounting system.

Next to, the actual state of regulations regarding the functioning of limited partnerships was discussed – based on examples of regulations, which are in force in Poland. These companies combine freedom in shaping a financial statement reserved for partnerships with the scale of operation for typical capital companies. Particular attention was paid to the problem of relationship between the risk of conducting business activity in this form and benefits connected with this fact (mainly tax benefits). The surplus of benefits contributes to the systematic increase in the interest of entrepreneurs in this form of business activity. As a confirmation of this thesis, the research results showing an upward trend in the number of new limited partnerships was presented in the empirical part.

The third part of the article presents the hybrid capital, its characteristics and a potential impact on the entity's financial statement.

On the other hand, the empirical study focused on two elements – the analysis of using the form of a limited partnership (as a partnership) to conduct business and determination of the materiality of an information gap in the presentation of units' capitals. In purpose of this paper gap is understood as a difference between the total value of capitals and a share capital's value. As a result, it was indicated that the number of companies operated as a limited partnership has been growing continuously for many years. Furthermore, the information gap in the field of the presentation of units' capitals is significant. Consequently, it should be stated that, from the point of view of the usefulness of financial statement, limited partnerships (as partnerships with legal possibilities to apply broadly understood simplifications) should recognize the hybrid capital as an element that explains the entity's source of funding.

The article uses the method of analyzing regulations and the literature, as well as a critical analysis of the primary study data and own statistical research.

The concept of materiality in accounting

Fundamental principles of building the accounting system are not based on rigid rules, but on the principles that should be implemented by this system. Within the framework of the area of continental influences, the principles of true and reliable image as the overriding principles of accounting are defined. However, the implementation of the target concerning the presentation of an accounting image that corresponds to the reality is realized by consideration other principles, including the principle of materiality. The concept of materiality appears in both national regulations (here on the example of Polish accounting regulations), as well as in international accounting standards.

According to the provisions of the Polish Accounting Act (UoR), an entity may use simplifications as a part of the adopted accounting policy – if they do not have a significant negative impact on the reliable and clear presentation of the property and financial situation, as well as the financial result. The regulations show a whole range of simplifications that a company may apply in its financial statement – both when it is subject to the audit obligation, and when it is exempt from it. They concern, among others, failure to apply some principles, aggregation of certain items or omission of adequate documentation. In addition to the Act, in Poland, the problem of materiality was also determined in the provisions of the national auditing standards (KSRF 1 2020). According to them, one of the basic elements of the audit of financial statements by a statutory auditor is determination of the materiality, which defines limits, to which the identified deficiencies may not be corrected (without detriment to the quality of the financial statement and the correctness of accounting books constituting the basis for its preparation). Failure to make such corrections will not mislead the reader of the financial statement.

As mentioned, the materiality provisions have been presented in the international regulations. According to the conceptual assumptions (IFRS 2020), the information is material if its omission or misstatement could have an impact on decisions of users based on financial information about a specific entity. Thus, the materiality is a feature of suitability specific for a certain entity (depending on the type or size (or both) of the item, to which the information is related). Moreover, according to the standards (IAS 2020a), material omissions or misstatements occur when they could (individually or collectively) influence the economic decisions made by users on the basis of the financial statement. This rule, as in the case of the above-mentioned national regulations, may be applied in terms of aggregating financial information and its disclosure. A single item may not be so important and it can be indicated in a separate line in the statement. However, its presentation in a separate item of additional information may be important.

The target materiality level for a given enterprise should be set by its manager. In the Polish national regulations (UoR), it was clearly stated that the entity's head should make a selection in the scope of parameters determining the level of materiality in the accounting policy (principles). Taking into account parameters occurring in practice, it is not necessary to use them simultaneously. The selection of parameters and their level should be made is such a way that they match the specifics of a certain entity as reliably as possible. In practice, it can be stated that the head of the entity should adopt the materiality threshold on an estimate basis (preferably in a percentage) – taking into account such values as: balance sheet total, sales revenues, equity or gross result on business activity or net profit.

The long period of shaping the accounting system and the importance of this problem caused that standards for the levels of determining the materiality threshold for individual economic categories have been developed in the circle of accountants and users of accounting information.
According to the recommendations presented in the literature, it can be assumed that the materiality threshold can be set at the following level (GOFIN 2018, INFOR 2017):

- from 0.5% to 3% of revenues,
- from 1% to 2% of equity,
- from 0.5% to 3% of balance sheet total,
- from 3% to 7% of gross financial result.

The values within the above ranges may be considered as irrelevant from the point of view of the usefulness of the financial statement, and thus all activities taken within the framework of the accounting system.

As already mentioned, determining whether the omission or simplification of some information affected the applicability of accounting information by users of financial statements cannot be considered solely from the perspective of a single information. Simplifications and omitted data should be summed up and the aggregated values ought to be subject to the above evaluation.

Furthermore, it ought to be considered whether this rule should also be transferred to the ground of macroeconomic data allowing not only the evaluation of a single entity, but also entire groups of enterprises and sectors of the economy. The above-mentioned consideration will be developed on the basis of the problem concerning the recognition of hybrid capital in limited partnerships.

Characteristics of a modern limited partnership

The concept of a limited partnership has a long history. Originally, a limited partnership was a tool enabling the cooperation of people with various interests: people willing to put specific capital in the project, but not interested in offering their own labor and incurring risk, as well as people, who do not have their own capital (or have insufficient capital to undertake the project), but willing to engage their work in the project and bear the risk in the case of its failure. The members of the first group are referred to as limited partners, and the second group of people – general partners.

The asymmetry of business risk is the most characteristic feature of a limited partnership. However, over the centuries, the role of a limited partnership has changed. Nowadays, this form of conducting business activity is mainly popular due to the possibility of optimizing the risk of activity and the level of its taxation.

According to entrepreneurs, economic activity should be characterized by two features: low risk and low taxation. Low risk is ensured by capital companies, where the liability of shareholders is limited to the amount of invested funds. Unfortunately, capital companies are connected with the necessity of double taxation of income. On the other hand, single taxation of income is possible in partnerships. However, in the majority of cases, partners in these companies are fully responsible for the company's obligations. A hybrid of advantages of a capital company and a partnership is a limited partnership, in which a capital company is usually a general partner (most often a limited liability company). It is a general partner with assets (and thus: the level of risk) that can be limited by setting the share capital at the level accepted by the partners.

In Poland, a limited partnership is obliged to keep accounting books, regardless of the size of its turnover. The limit of 2.000.000 EUR does not apply to this company (like in the case of, among others, unlimited companies or limited liability partnerships – UoR). Pursuant to the Polish Code of Commercial Companies, a limited partnership is established upon entry in the register. When taking advantage of the option of establishing a limited partnership via electronic means, it is a shorter period of time – however, in the case of a traditional establishment of a partnership (at a notary's office) at least a few weeks pass from the moment of concluding articles of partnership to the entry in the National Court Register. There is not limited partnership in organization. Therefore, accounting books of a limited partnership are opened with the date of its entry in the register – not with the date of concluding the articles of partnership.

The limited partnership agreement specifies the amount of a limited partner's liability and amount of partner's contributions. The limited partner's liability is the limit of the material liability of limited partners for the company's obligations. It is not included in the company's accounting books, because it does not entail (at least until the insolvency of the company) real cash flows. The case of contributions to a limited partnership is different. In the partnership agreement, partners define contributions, but there is no need to pay them at the time of concluding the articles of partnership. In practice, it turns out that the payment of contributions is often deferred. Such a situation is provided by specific regulations (the Code of Commercial Companies - CCC). They determine that the profit attributable to a limited partner for a given financial year is allocated (in the first place) to supplement his contribution (actually made) up to the value of the agreed contribution. In the event of the confluence of the company's formation and the payment of contributions, contributions are accounted as a share capital in the corresponding asset. However, posting of contributions to the share capital does not result from the legal provisions (due to the lack of CCC regulations in this respect – mentioned earlier), but it rather adheres to the principle of a true and fair image: the core capital constitutes a "founding" source of asset financing.

Another specific feature of a limited partnership is the method of settling accounts with partners. The limited partnership makes a profit. It is not a taxpayer of income tax, but its partners are taxpayers. Therefore, regardless of the transfer of profits to partners, they must pay appropriate income tax on the corresponding profits of the company: tax on natural persons or legal persons. Moreover, partners, who are natural persons, are obliged to pay social and health insurance contributions as entrepreneurs. This is related to the emergence of a demand for cash enabling at least the realization of these public law obligations. Furthermore, shareholders usually expect cash flows from the company in order to ensure its day-to-day functioning. However, the Code of Commercial Companies does not exclude the possibility of making advance payments for profit – it is a discretionary issue whether the payment of the advance is an activity that goes beyond the scope of company's ordinary activities (requiring a resolution of shareholders), pursuant to Article 121 § 2 of the Code of Commercial Companies.

The favorable method for the taxation of profits and the possibility of minimizing the risk of business activity cause that (nowadays) a limited partnership is a willingly chosen form of undertaking business activity.

The concept of hybrid capital

The concept of hybrid capital (also known as mezzanine capital), which previously was outside the area of accounting interest, is important for further considerations. In Polish literature, the concept of mezzanine capital is closely connected with obtaining financing sources constituting hybrid instruments. These sources represent both characteristics of equity and liabilities, so their use enables the optimization of the financing structure. The etymology of the term "mezzanine" comes from French and it literally means an entresol or a mid-floor – i.e. something in between. Therefore, the concept of mezzanine is used in corporate finance sciences. So far, it has not been clearly defined, but (in practice) it is used to identify various hybrid forms of financing. Thus, the mezzanine capital means forms of business financing covering different financial instruments with a mixed nature between equity and external capital. Instruments eligible for the mezzanine capital include, inter alia, subordinated loans, seller loans, profit-sharing loans, silent partnership contributions, owner loans, rights to participate in profits, convertible bonds and warrant bonds (Grzywacz, 2012).

The considerations concerning the mezzanine financing found in Polish literature focus their attention on the advantages of this capital as a form of financing that combines the advantages of equity and external capital. It is emphasized that mezzanine is more convenient and more accessible than traditional financing. Furthermore, it enables the financing of enterprises with increased risk. Mezzanine instruments create a capital relationship and (at the same time) enable to use the financial leverage (Juszczyk, Nagórka 2009). Other benefits of the mezzanine capital, such as: filling the capital gap, dual character of financing, increase in creditworthiness, incurring tax costs, flexibility, risk distribution or increase in financial liquidity, as well as its disadvantages (relatively high cost, limited availability and increased scope of control) are also analyzed (Grzywacz, 2012).

However, it is worth paying attention to the mezzanine capital from the perspective of accounting. The concept of mezzanine means the introduction of another element to the structure of liabilities (including forms of financing that are clearly neither equity nor external capital). So far, authorities developing accounting standards or legal acts regulating its problems have not decided to take such a move. However, along with the development of these forms of financing, it may be necessary to ensure the reliability of the financial statement.

All instruments with characteristics that combine equity and external capital could be presented as the mezzanine capital (or hybrid capital) – in accordance with the structure of liabilities presented in Figure 1.

Assets	Equity	
	Mezzanine capital	Instruments with characteristics of equity and external capital
	Liabilities (external capital)	
	Other items of liabilities, e.g. reserves	

Fig. 1: Mezzanine capital in the structure of liabilities in the balance sheet.

Source: Own study.

Undoubtedly, the introduction of such a structure of liabilities would increase the credibility and usefulness of the financial statement – thanks to the avoidance of simplifications connected with the unambiguous assignment of hybrid instruments to equity or external capitals. It would enable to comply with the following accounting principles: materiality, reality over appearance, precautionary. On the other hand, specification of the hybrid capital requires additional work of the company's financial and accounting personnel, as well as the special attention of auditors, who examine a financial statement. Therefore, in the further part of the study, the author tries to justify the need to specify the hybrid capital based on the implementation of the principle of materiality in accounting.

Data and Methodology

As stated in the previous section, the hybrid capital is a structure enabling a more complete presentation of the specificity of capital in partnerships, including limited partnerships. Undoubtedly, the introduction of the principles of recording, estimation and disclosure of hybrid capital to the accounting policy will generate additional operating costs of the accounting system, including the preparation and evaluation of financial statements. Therefore, it is important to determine whether there are any reasons for making this effort – in other words, whether the hybrid capital is a significant source that may affect the assessment of the entity's condition?

In order to answer this question, it is necessary to examine the scale of the phenomenon of using limited partnerships. These considerations are based on macroeconomic data for the Polish market and own research carried out on a sample of 381 Polish companies conducted in the form of limited partnerships.

The purpose of the study conducted for the needs of this article is to determine the attractiveness of the legal form of a limited partnership for the purposes of conducting business activity under the conditions of the Polish legal system and the significance of potential information gaps arising as a result of applying simplifications in the preparation of a financial statement determined for partnerships. Consequently, the study was divided into two stages:

- Determination of the change in the attractiveness of this form of business among Polish entrepreneurs,
- Examination of the materiality of a potential information gap.

The following analysis is based on source data collected and prepared by the Central Statistical Office in Poland (GUS) within the framework of the primary research under the name "Structural changes in groups of entities of the national economy in the REGON register, 2018" (published in 2019), "Activities of non-financial enterprises in 2018" (published in 2020), "Groups of enterprises in Poland in 2018" (published in 2020) and own calculations.

Moreover, the study presents an analysis of national economy entities in the REGON register with specification of the number of newly registered and deleted entities (according to selected features, including legal forms, covering the years 2009-2018).

Finally, the collected data for the entire economy was confronted with the results of own research conducted on a representative group from the population of 40,850 limited partnerships conducting business activity in Poland. The size of the research sample from the entire population was determined on the basis of the assumption of a 95% confidence level and the size of the fraction of 0.5. Additionally, a maximum error of 5% was adopted. Consequently,

the sample size accepted for the study was 381 companies. Data on individual companies was obtained from the website of the Polish National Court Register. The selection of units for the sample was performed using simple random selection.

Results and Discussion

Polish entrepreneurs acquired full freedom in the field of shaping their economic projects along with the economic and social transformations in the early 1990s. During this period, the process of searching for optimal forms of company organization also began. This process continues to this day. This thesis may be confirmed by the data complied by the Polish Central Statistical Office, showing the continuous increase in the number of registered enterprises.

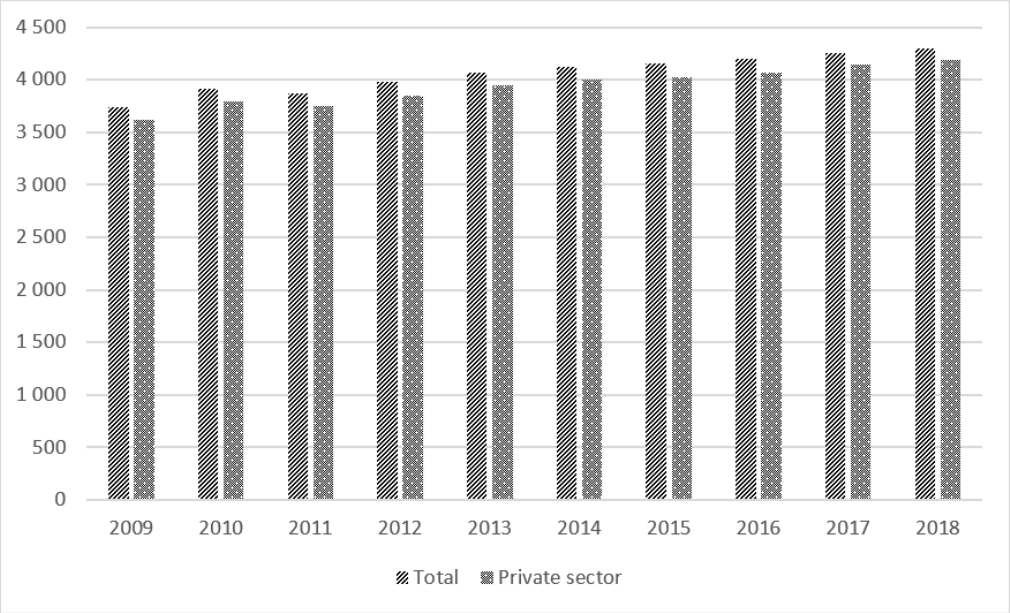

Fig. 2: Number of entities registered in Poland (in thousands).
Source: Own research based on (GUS, 2019).

Despite the fact that over the decade there has been no significant change in the number of entities operating within the Polish economic area, the number of entities has been systematically growing – starting from approx. 3.7 million entities (at the end of 2009) to approx. 4.3 million entities (on the last day of 2018).

Along with the growing number of enterprises in the analyzed period, the share of non-capital units operated by natural persons also increased.

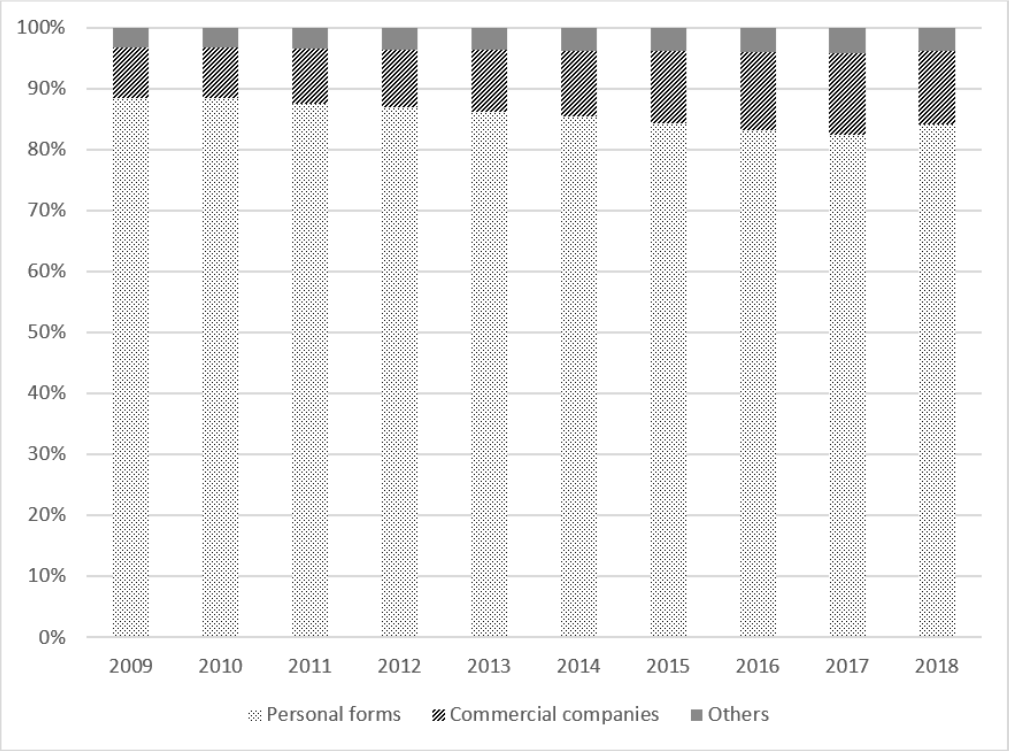

Fig. 3: The share of enterprise organization forms in Poland.
Source: Own research based on (GUS, 2019).

As mentioned above, limited partnerships in the Polish nomenclature are included in the group of individuals. Therefore, the trend of doing business in this form should be examined. Further analysis of the data prepared by the statistical office indicates that this form has been gaining popularity in recent years. This trend is showed in the next chart.

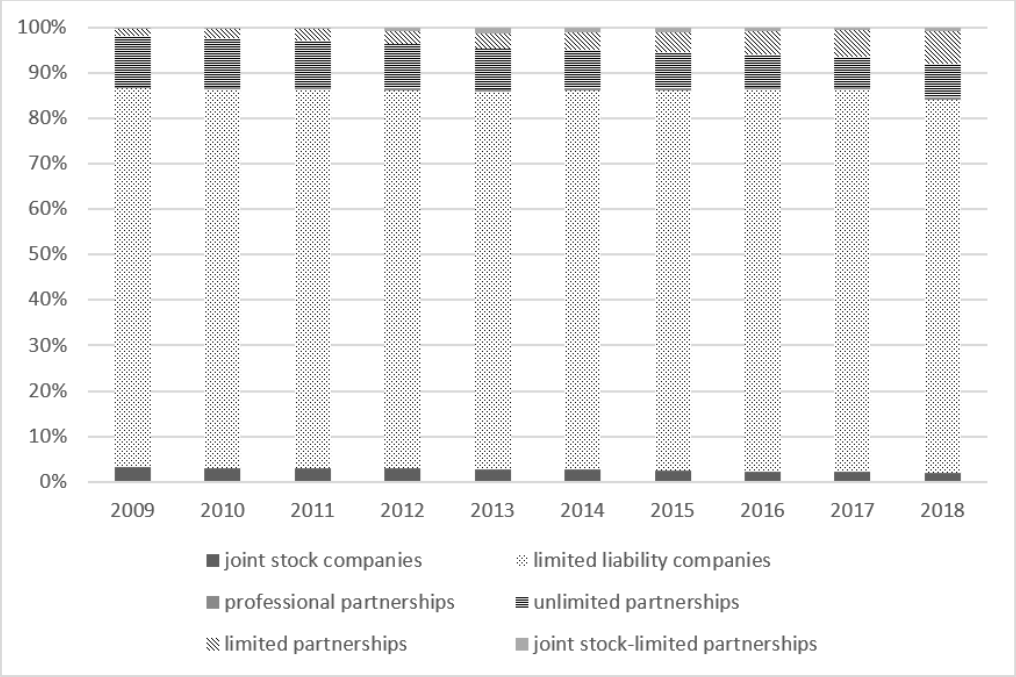

Fig. 4: The share of limited partnership forms in the structure of Polish companies.
Source: Own research based on (GUS, 2019).

The total number of limited partnerships and limited joint-stock partnerships increased from approx. 6 thousand entities (at the end of 2009) to 40 thousand entities (on the last day of 2018). In other words, the attractiveness of this form of business activity in Poland is so large that the increase in this type of companies amounted to over 650% in the years 2009-2018.

In summary, it can be stated that the interest in using the form of a limited partnership to conduct business activity in Poland has systematically increased in recent years. Unfortunately, as noted in the previous part of this study, this form (as a partnership) is not subject to such strict regulations in the field of disclosure of information. Due to this fact, entities decide on numerous simplifications. Data aggregation also covers the sphere of the individual's capital and (thus) makes it impossible to reveal the real image of enterprises. At this point, the key question is whether the scope of this data is large enough to be considered as material.

The data collected by the central statistical office shows that at the end of 2018 (the last fully audited period) the total value of equity of entities keeping the accounting books amounted to 524 818,1 million PLN (with the structure presented in the diagram below).

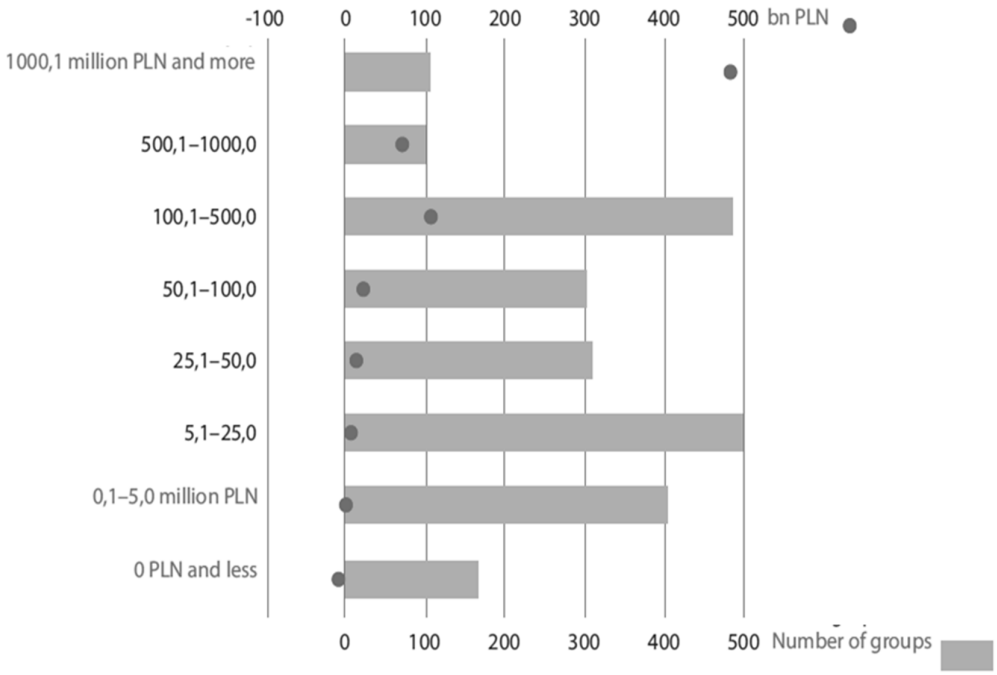

Fig. 5: Value of equity of enterprise groups in 2018.

Source: Based on GUS 2020b.

According to the same study, the share capital of companies totaled 152 750,6 million PLN – i.e. the remaining equity capital amounted to 372 067,5 million PLN. As you can see, the value of other capitals exceeds the value of core capitals. Therefore, it should be determined whether they ought to be subject to further division, including with the use of the concept of hybrid capital. Therefore, the materiality level of the data in macroeconomic terms should be determined.

In accordance with the previously presented principles, the materiality would have values (GUS 2020a):

- from 0.5% to 3% of revenues – i.e. from 24 778,68 million PLN to 148 672,11 million PLN (with total revenues of non-financial companies amounting to 4 955 737 million PLN),
- from 1% to 2% of equity – i.e. from 5 248,18 million PLN to 10 496,36 million PLN,
- from 0.5% to 3% of the balance sheet total – i.e. from 6 064,96 million PLN to 36 389,76 million PLN (with a balance sheet total of companies amounting to 1 212 992,3 million PLN),
- from 3% to 7% of the gross financial result – i.e. from 1 611,11 million PLN to 3 759,26 million PLN (with the total gross result for entities amounting to 53 703,8 million PLN).

Taking into account the above calculations, it should be concluded that the cognitive gap in the amount of 372 067,5 million PLN ought to be considered as material, because it exceeds all limits (possible to determine).

However, it should be considered whether the same conclusions can be extrapolated to limited partnerships. For this purpose, an own study was carried out to examine the significance of the information gap in the group of limited partnerships. The analysis consisted in determining the average value of the cognitive gap based on a research sample of 381 units from the group of Polish limited partnerships amounting to 40 850 entities. The study compiled the balance sheet total, equity and share capital. Then, the absolute value of the information gap in the companies' capitals and the ratio of its size to the value of the total assets were calculated. The last stage was to determine the weighted average share for the tested sample, where the weights were the values of assets of individual companies. Finally, the information was obtained according to which the ratio of the absolute value of the information gap to the value of the balance sheet sum is 27.28%, which, in accordance with the adopted methodology, may be considered as the level exceeding the significance mark.

Therefore, limited partnerships, which are entities with an attractive legal form, should detail their financial statements in terms of equity. As indicated earlier, the hybrid capital is an element that can captures the characteristics of capitals in partnerships (including limited partnerships), so it should be a natural choice in the scope of information gap's liquidation.

Conclusion

As shown in this article, a limited partnership is becoming an increasingly popular form of doing business. Legal regulations in the field of accounting, as well as the literature, do not devote sufficient attention to limited partnerships or other partnerships. Issues connected with, among others, the recognition gap in accounting books and the presentation of equity in the financial statement, including the hybrid capital, remain unregulated.

The aim of the article was to present arguments that justify the introduction of hybrid capital in limited partnerships' financial statements. In connection with this goal, the article presents the most important areas concerning the characteristics of limited partnerships and hybrid capital (taking into account its position and materiality in the entity's balance sheet). Finally article presents numerical arguments confirming the significance of information gaps in the area of an entity's capital. Thus, the discussed hybrid capital can be effectively used to present a true and fair view of the enterprise.

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Generation Z's Ecological Awareness and Entrepreneurship Attitudes

Denka ZLATEVA
University of Economics – Varna, Bulgaria, zlateva@ue-varna.bg

Mariya VELEVA
University of Economics – Varna, Bulgaria, maria.veleva@ue-varna.bg

Maciej DEBSKI
University of Social Sciences Warsaw, Poland, mdebski@san.edu.pl

Antoni KOLEK
University of Social Sciences Warsaw, Poland, akolek@san.edu.pl

Abstract

Ecological awareness of the new generations plays a major role in forming their social and business attitudes. Moreover, it has a significant role in their decision-making process, concerning the youth's business development through entrepreneurship. The characteristic features of today's generations are object of numerous studies, but they are mainly focused on the generation Y while the generation Z remains insufficiently studied. This is especially true for the post-communist countries. So far there is a lack of comparative studies on the ecological awareness and entrepreneurial attitudes of Generation Z from these countries. The aim of this research is to conduct a comparative study of the ecological awareness and entrepreneurship attitudes of Generation Z in three Middle- and Eastern-European countries (Poland, Bulgaria and Ukraine). The research finds that Generation Z representatives, in all three countries, pay attention to the pro-ecological idea, although - with varying degree of awareness. There is a strong bond between their ecological awareness and the level of their intention to establish a pro-ecological restaurant as a start-up. However, a difference could be seen among the representatives of the three countries studied. This paper could be used for further studies and comparative analyses of the pro-ecological and entrepreneurship attitudes of Generation Z representatives.

Keywords: Generation Z, Pro-Ecological Behaviour, Ecological Awareness, Entrepreneurship.

Introduction

Young people are more and more important segment of the labor market. At the same time, the question of sustainable development is a significant notion in the development of the modern society (Tzschenke, Kirk, Lynch, 2004), and it has become an important topic of analyses (Berezan, Milar, Raab, 2014). A key aspect of the modern industry is ecology and care for environment, which in many places is endangered by the excessive development of some nature polluting productions. Ecological awareness of the new generations plays a major role in forming their social and business attitudes. It is the green concept itself that is identified as one of the most crucial tasks facing the nowadays industry (Han, Kim, Kiatkawsin, 2017), and its dynamic growth inevitably means high impact on the environment (Rosa, Silva, 2017). Another important issue is to outline the role of this ecological awareness in their decision-making process, concerning the youths' future business development through entrepreneurship. According to Machnik-Slomka and Klosok-Bazan (2017), strong ecological awareness influences the system of values and forms eco-friendly attitudes and behaviors of entrepreneurs. Also, entrepreneurs with ecological awareness are not afraid of taking up ecological challenges, which has an impact on improved business competitiveness (Machnik-Slomka, Klosok-Bazan, 2017).

Some authors analyzevarious age groups which determine the demand on the global markets, as well as the ecological attitudes of these groups. One of such groups of ever increasing importance is the group of young people, born between 1995 and 2010, the so called Generation Z. The characteristic features of today's generations are object of numerous studies, but they are mainly focused on the generation Y (Buffa, 2015; Jang, Kim and Bonn,

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2011) while the generation Z remains insufficiently studied. This is especially true for the post-communist countries. So far there are no comparative studies published on the environmental awareness and entrepreneurial attitudes of Generation Z representatives from these countries.

The aim of this research is to conduct a comparative study of the ecological awareness and entrepreneurship attitudes of Generation Z in three Middle- and Eastern-European countries: Poland, Bulgaria and Ukraine.

Literature Review

The Generation Z – general characteristics

It is well known that a generation is a group that shares mutual birth year, vital events and similar behavior patterns within these events. As some authors (Marshall, 1999; Delahoyde, 2009; Chen, 2010) precise, each generation consists of individuals, born in the same period and affected by the same economic, technological and political conditions, sharing similar values, behavior and lifestyles.

Most of the authors define the Generation Z as people born between 1995 and 2010 (Lazanyi, Bilan, 2017; Vallone et al., 2016; Ivanyi, Biro-Szigeti, 2019). Oblinger and Oblinger (2005), state that Generation Z is surrounded by digital technology from their birth in the digital era. Therefore, this generation is also called internet generation. They have the highest motor skills synchronization.

Since they have the opportunity of long distance communication, they can, they do, and they will probably continue to live alone. It is expected from them to be highly qualified and inventive. At the same time, the literature accentuates the need for studies concerning the behaviors of the representatives of different generations (Li, Li, Hudson, 2013). Some of the analyses point out the fact that the young people from Generation Z are independent (Desai, Lele, 2017), expect fast access to information and instant answers to their questions (Opis, Cenusa 2017). This should be seen as an important premise for the employers who are responsible for communication with the young ones. This generation is characterized as more online than offline (Hamed, 2017; Ip, Lee, Law, 2012; Rudez and Nemec, 2015). Another characteristic feature is their use of smartphones to gain access to the internet (87% of them) when compared to older generations (Ivanyi, Biro-Szegedi, 2019).

The environment and the need to protect it have been named as one of the main factors determining the behavior patterns of nowadays generations, which affects their ecological and business/entrepreneurship attitudes. Moreover, the significance of this factor is still rising (Dwyer et al., 2009). As early as in 2010, over 60% of Europeans voiced their concerns about air pollution and 50% feared the negative impact of food on health (Food-related risks, EC, 2010). It is observed that a lot of people implement often radical changes to their lifestyles in order to limit the impact on the environment (Bostrom, Klintman, 2011; Zalejski, Faszczewska, 2012). Sidali, Huber and Schamel (2017), in turn, present an analysis revealing the different attitudes to the ecological issues depending on the respondents' age. Other sociological factors such as sex, level of education or level of income do not seem to generate any significant differences. Hence, it is worthwhile focusing on specific age groups, including the Generation Z. Han et al. (2017) present results, showing that young people do care about the environment and are eager to undertake pro-ecological actions. For example, in Poland it is the young who are most committed to pro-ecological actions (Zalejski, Faszczewska 2012).

Ecological awareness of Generation Z

Nowadays youth behavior is strongly influenced by environmental or "green" values. According to Doszhanov and Ahmad (2015) and Mohd (2013) these values influence their needs and attitudes. 'Green'-oriented persons are usually defined as individuals who apply everyday practices that are viewed as environmentally-friendly (Connolly and Prothero, 2008), prefer organic food and pro-ecological restaurants.

In the widest sense the 'green'-oriented person is one, who is interested in the environment and implement green practices at home (Di Pietro et al., 2013). According to Han et al. (2011) they are mid to high income earners, female and youths (Baltescu, 2017). This trend results in a new market - with an environmental conscience and new competitive advantages for the companies. In the same time, rising environmental and health concern about the

current global industry has contributed to increasing number of young people considering the ‘‘eco-friendly’’ life as value (Mohd, 2013). Baltescu (2017) surveys 264 students in Brasov. The results show that 95% consider themselves as highly environmentally concerned, while at the same time, only 34% were aware of establishing pro-ecological restaurant as a sign of ecological awareness. To young adults, an ecofriendly restaurant attributes are: use of renewable energies, attention to the use of ingredients, avoiding of frying procedures, and the use of organic ingredients (Baltescu, 2017). Jang et al. (2011) defined a pro-ecological restaurant as one that implements green practices. According to some authors, green practices that can be widely applied in restaurant businesses include employing energy- and water-efficiency equipment, using locally-grown and organic food, offering healthy menus, forbidding disposable cups and to-go containers, training employees to adopt green practices, recycling and disposing of cooking oil, and reducing pollution (Gázquez-Abad et al., 2015; Schubert et al., 2010).

The demand for environmentally friendly practices has risen quickly over recent decades. Establishment of new environmental regulations has increased individuals’ environmental awareness. A study conducted by Harris Interactive (https://harris-interactive.co.uk/) shows that 63% of consumers would spend more for organic food or locally grown food. That’s why increasing consumer interest in eco-friendly food caused a number of changes to the restaurant industry. There are lots of studies pointing out Generation Y consumers’ behavioral intentions concerning green restaurants (Yoon et al., 2011), but studies for Generation Z are yet insufficient. That’s why, it is worthwhile to conduct more studies about the so mentioned subject.

Generation Z Entrepreneurship Attitudes

It is well known that workplace consists of a mix of multiple generations of employees whose experiences have molded them into individuals with characteristics defining their generation. These generations have different behavioral characteristics that define their expectations and preferences at the workplace. The diverse profiles of various generations demand an environment in which all the generational age cohorts will thrive in the workplace (Otieno and Nyambegera, 2019). Typical features of Generation Z are: self-confidence, proactivity, creativeness, innovativeness, leadership. They want to guarantee their future. Happiness is very important on the business area. If they cannot find this happiness on the work place, they will quite the job easily. They do not like authority and don’t have any significant relation with age groups. There is no difference for both man and woman relevant with it (Ozkan and Solmaz, 2015). Considering these features of Generation Z, it could be suggested that they will prefer to establish their own business rather being employed.

Jenkins (2019) points that some of the characteristics, behavioral traits and entrepreneurship attitudes of the post millennials (Generation Z) are:

- Working habits of Generation Z include: “do it yourself” approach, hard work and pragmatic mindset;
- Generation Z gravitates towards global communication and collaboration across virtual platforms;
- Generation Z is quick to adopt new communication channels and prefers real-time, transparent, and collaborative digital communications;
- Generation Z has developed a much higher instinctual relationship with technology and the increasingly interconnected world shifts their expectations for how work can and should be executed;
- Generation Z are self-starters, self-learners, and self-motivators seeking swift impact at work;
- Generation Z place a premium on entrepreneurship and innovation.

Since they are born in the digital age, they are not that good in communication skills (Ensari, 2017). The summarizing all these characteristics of Generation Z confirms the idea that they will be more oriented towards self-employment rather than being hired as employees.

Methodology

In order to gain more precised perspective on ecological awareness and entrepreneurship attitudes of Generation Z, for the purpose of this study a comparative analysis is carried out. The analysis includes groups of university students in three Middle- and Eastern European countries: Poland, Bulgaria and Ukraine.

Sample and Data Collection

The study took place in the period November 2019 - April 2020 and included a group of Generation Z representatives (born between 1995 and 2010) in three Middle- and Eastern European countries: Poland, Bulgaria and Ukraine. Having in mind their age, it was considered appropriate to hold it among university students. The survey is addressed to 18-26 years old respondents at University of Social Sciences - Lodz (campus Warsaw, Poland), and University of Economics - Varna, Bulgaria (Bachelor and Master degree students). 600 questionnaires were distributed, as 55 of them were incomplete or invalid. 545 questionnaires were processed (195 Poles, 204 Ukrainians and 146 Bulgarians).

Questionnaire Development

Questions to be answered by respondents were established in accordance with the social research methodology aimed at limiting the interviewer's influence (Babbie, 2008). The respondents' knowledge of the issue also allowed questions to be predicted about future behavior and motivations (Schwarz, 2007). The survey questionnaire consisted of 7 questions. All the answers were measured using a nominal scale.

Data Analysis

The statistical analysis procedures used in the research are descriptive statistics as well as factor analysis. First, descriptive statistics such as simple frequencies and average values were used. Then analyzes were made detailing socio-demographic characteristics, as well as international comparisons.

The comparative analysis used in the article is an element of the study consisting in listing objects distinguished due to a common factor and observation of other differentiating aspects. The differences in the perception of eco food and eco business revealed as a result of the study have revealed the specifics of perception of this industry in different countries.

Results and Discussion

Respondents' Profiles

According to gender criteria, out of 545 respondents, 361 are female and 184 - male. Among the different nations included in the research, the percentage between male and female respondents is as follows (table 1):

Table 1: Respondents based on gender

Gender	Ukrainians	Poles	Bulgarians
Female	70%	59%	69%
Male	30%	41%	31%

Source: own research

More women than men took part in the study. The largest percentage of women can be found in the group of Ukrainians (70%) and Bulgarians (69%). In the case of Poland, the proportion was 59% to 41%.

People between18-26 is considered as Generation Z. In according to this, and the age criteria, 156 of the respondents are 18-20 years old, 248 of them are 21-23 years old, and 141 are 24-26 years old. Table 2 shows the distribution of the respondent groups by age and nationality as follows:

Table 2: Respondents by age

Age	Ukrainians	Poles	Bulgarians
18 – 20 years old	54%	23%	1%
21 – 23 years old	38%	51%	48%
24 – 26 years old	5%	26%	51%

Source: own research

Respondents by Social Groups

The survey results in table 3 present the distribution of respondents by social groups (students and working students).

Table 3: Respondents by social groups

Social groups	Ukrainians	Poles	Bulgarians
Student	25%	18%	48%
Working student	75%	82%	52%

Source: own research

Attitudes towards pro-ecological actions in the everyday life

Environmental values and pro-ecological actions are suggested as a main part of planned behavior of young people (Kaiser, Wolfing and Fuhrer, 1999). Some regular everyday activities could be a measure of their ecological awareness and behavior. According to the conducted research, as much as 62% of Bulgarians believe that the ecological behavior is important and they always pay attention to the eco-friendly actions. In this case, only 22% of Ukrainians, and 12% of Poles surveyed said that they always pay attention to it. This is shown in Table 4:

Table 4: Attitude towards pro-ecological actions

Attitudes towards Pro-ecological actions	Ukrainians	Poles	Bulgarians
it is important, I always try to act in line with ecology	22%	12%	62%
I try to act according to ecology, but I do not always succeed	64%	67%	38%
I'm indifferent	7%	13%	0%
I follow the rules of ecology only as long as it is in line with my interest	5%	7%	0%
It is a waste of time	2%	1%	0%

Source: own research

The results show that young people, in all three countries, pay attention to the pro-ecological idea but with varying degree of awareness. The fact that all respondents from Bulgaria indicate the first or second answer is a sign of a naive attitude, rather than of strictly following the ecological way of life. The concept of ecological lifestyle is relatively new to the Bulgarian society and is not yet deeply adopted by the young people there. Among the Ukrainians and Poles surveyed, the largest is percentage of the respondents who try to act according to the ecological idea but do not always succeed, which is much more reliable. For Bulgarians it is approximately one third of the respondents. 13% of Poles and 7% of Ukrainians surveyed are indifferent and 1% of the Poles and 2% of the Ukrainians say that, being pro-ecologically oriented is a waste of time. It is disturbing that more than 8% of all respondents are still not aware of the importance of pro-ecologically oriented lifestyle. On the other hand, they are still young and it could be presumed that in nearest future they may become more ecologically oriented.

The answer "I follow the rules of ecology only as long as it is in line with my interest" was indicated by 7% of Poles and 5% of the Ukrainians. This position reveals selfish-oriented values. Even such a widely spread idea such as the ecological concept is not able to change their value system and behavior yet.

Some early studies (Kaiser, Wolfing and Fuhrer 1999), on environmental attitude and ecological behavior, state that individual behavior is more important and could affect the environment rather than the behavior of the whole society. Individuals' every day's actions and practices contribute towards environmental preservation.

In order to indicate what the respondents' everyday life related to environmental protection is, they were asked what activities and behaviors they perform. Table 5 presents the results referring to measures: definitely yes - 0, rather yes - 1, rather not - 2, definitely not – 3. According to the respondents' answers, the most frequently implemented action among Ukrainians is to take the empty glass bottles to recycle-collection point; to avoid plastic packaging and to use biodegradable packaging. Among Poles, sorting garbage and switching off lights are the most important things. Also they usually use own shopping bags in order to avoid disposable plastic one. It is well known that they are non-degradable and are considered as one of the biggest environmental threads. In the case of Bulgarians, the most common form of pro-ecological activities is also delivering empty glass bottles to recycle / collection point, to carry own shopping bag, and sorting of garbage.

Table 5: Everyday ecological behaviors implemented in respondents' life

Everyday behavior	Ukrainians	Poles	Bulgarians
I sort my garbage	1,58	1,14	1,92
I save water cutting down its use	1,52	1,26	2,38
I carry my own shopping bag so that I don't need to buy disposable plastic ones	1,69	1,20	1,66
I use biodegradable bags	1,12	1,31	2,82
I save electricity cutting down its use	1,68	1,36	2,58
I try to buy and eat healthier foods	1,89	1,47	2,66
I pay attention/react to unnecessarily switched-on light	2,42	1,19	2,49
I take empty glass bottles to recycle/collection point	0,52	1,93	1,65
I avoid plastic packagings	0,9	1,65	2,65

Source: own research

The results in Table 5 indicate that for the different nations the same everyday activities have different impact to their ecologically oriented lifestyle. It could be suggested that there is still no generally accepted idea for ecological behavior by the studied countries.

In 21st century, young people adopt a leading role in achieving a sustainable future. According to Valente and Atkinson (2019), they are the next group of business-thinkers and decision makers. In regard to this, a question was set in our survey: "Does the establishment of restaurants following a pro-ecological policy support the idea for ecologically oriented business?" The results are presented in Table 6:

Table 6: Does the establishment of restaurants following a pro-ecological policy support the ecologically oriented business

Possible answers	Ukrainians	Poles	Bulgarians
Definitely yes	22%	18%	95%
Rather yes	48%	52%	5%
No opinion	22%	16%	0%
Rather not	7%	12%	0%
Definitely not	1%	2%	0%

Source: own research

Less than 10% give a negative answer, while 78% are confident that implementing these practices can help for cleaner nature. Presented by nations - 70% of the Poles, 70% of the Ukrainians, and all of the Bulgarians support this idea. Our findings confirm the survey results of Bell and McMinn (2011) that Generation Z agrees that business should obtain sustainable business practices, regarding social and environmental matters.

According to Frunzaru and Cismaru (2018) the concept of entrepreneurial orientation is related to the theory of planned behavior. They state that behavior is a function of believes, relevant to the behavior. For Generation Z the psychological approach to entrepreneurship could be related to their need for reaching their own business success, high social status, or to the importance of the family tradition in business. In order to study if the ecological awareness is related to entrepreneurial intentions of Generation Z representatives, a question whether they would like to establish pro-ecological restaurant was asked. The results are presented in Table 7:

Table 7: Intentions for establishing a pro-ecological restaurant as a start-up for own business

Possible answers	Ukrainians	Poles	Bulgarians
Definitely yes	18%	9%	60%
Rather yes	43%	18%	39%
No opinion	17%	23%	1%
Rather not	16%	33%	0%
Definitely not	6%	17%	0%

Source: own research

The results show that 26.2% of all the respondents answer “definitely yes”, as in this quota prevail the answers of the Bulgarians (60% of the Bulgarian respondents). 33% of all answers are “rather yes”. In this case prevailing is the quota of the Ukrainians (43% of the Ukrainian respondents). Almost 60% of the young people belonging to Generation Z, included in the survey, have entrepreneurial intentions and would start their own business (answers “definitely yes”, and “rather yes”). The biggest is the share of the Bulgarians, followed by the Ukrainians, and the Poles. It is difficult to define the exact reason for these results. Nevertheless, it could be suggested that most of the young Bulgarians believe that through establishing their own business they could gain financial independence and self-managed professional development. 26% of the respondents are not interested in establishing their own pro-ecological restaurant, at the same time, 14.8% state that they have no opinion.

Conclusions

Summarizing the results of this study, Generation Z’s representatives (nevertheless the nationality) show a high level of ecological awareness. In their everyday life they implement pro-ecological activities. It reveals their commitment to the ecological concept and environmental protection. This attitude affects not only their way of thinking but also their intentions for establishing self-business.

The research found that Generation Z representatives, in all three countries, pay attention to the pro-ecological idea, although - with varying degree of awareness. For the young people of the three nations, presented in the study, the same everyday activities (sorting garbage, saving water, using bio-degradable bags, avoiding plastic packaging etc.) have different impact to their ecologically oriented lifestyle, but they do apply them.

Almost 75% of the respondents estimate higher the value of restaurants following a pro-ecological policy which highlights their ecological consciousness regardless of nationality, and consider it as a competitive advantage. There is a strong bond between their ecological awareness and the level of their intention to establish a pro-ecological restaurant as a start-up. However, a difference could be seen among the representatives of the three countries studied. A large number of respondents representing Generation Z believe that such restaurants could help to protect the environment. We can conclude that their entrepreneurial attitudes are strongly bound to their environmental awareness.

Limitations of the research are: all respondents are university students only; the study concerns entrepreneurial intentions but not readiness for business start-up; there is lack of prior researches on this topic in the three Middle-

and Eastern European countries (Poland, Bulgaria and Ukraine), and it makes impossible to compare our findings to previous results.

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Romania's Regional Development by Supporting the Agricultural Sector - Irrigation System Influencing Factor

Ioana PANAIT

The Bucharest University of Economic Studies, Bucharest, Romania
panaitioana48@gmail.com

Marian Catalin CUCU

The Bucharest University of Economic Studies, Bucharest, Romania
cmc.catalin02@gmail.com

Abstract

The realization of a modern and extended irrigation system to irrigate larger agricultural areas is necessary due to the conditions faced by the Romanian regions in terms of weather factors but must be done in a responsible and efficient manner that will lead to a development of the Romanian agricultural sector. Accelerate the adaptation of irrigation infrastructure to the needs of farmers to reduce the vulnerability of agricultural production to external climatic factors and develop economic viability for farms by ensuring a socio-economic balance while ensuring environmental protection. Rural development contributes to regional development and reducing interregional gaps. In Romania, agriculture is a common activity in the lives of people in rural areas, so this paper aims to highlight the importance of a well-developed irrigation system in the context of agriculture's dependence on weather conditions. Agriculture recorded a significant increase in production in the period 1997-2019 due to research, development and innovation in the field, but continues to be an activity largely dependent on nature.

Keywords: Competitiveness, Economic Growth, Irrigation Infrastructure.

Introduction

Regional development is a complex process that combines the harmonious development of all areas of a country in order to ensure a relative balance between levels of social and economic development of areas and reduce territorial disparities, all taking place in the context of environmental protection and of efficient management of natural resources. (Istudor, 2006)

In 1998, the legal framework for its development was established, by Law 151/1998 on regional development in Romania, through which the content of the regional development was outlined, the legal support for the constitution of the development regions was created. These development regions are set up based on the existing system at Community level, is the classification system of NUTS territorial units, being NUTS II level. (Bomher, 2011)

The agricultural sector plays an important role in regional economic development, showing stability in the face of the crises we face. Agriculture is a field that is greatly influenced by climate change, and any change and extreme weather phenomenon brings major damage to farms, adapting to the effects of climate change by preventing and reducing their impact being essential for the development of the agricultural sector. (Howden et al., 2007) The importance of irrigation denotes that water is a component that cannot be missing from agriculture, being a vital element for any type of agricultural production, and an efficient irrigation system contributes to the adaptation of the agricultural sector to climate change.

Water is a vital natural element for life, both for humanity and for the environment and water resources must be protected and consumed responsibly, always considering the sustainability of water resources. For the agricultural sector, water is a primary resource with an enormous influence on agricultural production and Food and Agriculture

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Organization (FAO) stating that "A reliable and adequate water supply through irrigation can lead to improvements in agricultural production and ensure the economic vitality of farmers."

The irrigation infrastructure is an important component from an agribusiness and aims to ensure the necessary water to combat the negative effects of drought, ensuring the farmer the right conditions for a good harvest and generating significant agricultural income. (Gohar et al., 2015) Through a well-developed irrigation system in terms of its length and the appropriate arrangement to cover all regions of the country, it is intended, first of all, to ensure the necessary water for plants to obtain high yields, and secondly, through irrigation it contributes to the conservation of biodiversity and the rational management of water resources. From an economic point of view, irrigation systems must be designed to maximize efficiency and minimize labour and capital requirements. (Walker,1989)

The choice of an appropriate irrigation system must consider the compatibility between the irrigation method and the irrigated culture, but also the main characteristics of the agricultural holding, such as topographical characteristics, soils, water supply, crops while the socio-economic aspects are taken into account, such as the community and the economic viability, but also the environmental aspects that must aim at the protection of natural resources.

Methodology

The methodology of the paper consists in quantitative statistical analysis based on statistical data in absolute values are from the National Institute of Statistics Romania (NIS). An index of agricultural production calculated based on the production of the current year expressed in the prices of the previous year and the value of the production of the previous year was also analyzed.

Based on the analyzed data, the results obtained contribute to the identification of the situation of the eight development regions of Romania and the evolution of the main indicators of agriculture to determine the degree of competitiveness between the Romanian regions through the contribution of agriculture and especially by the irrigation system to regional development.

Analysis of the regional development in Romania regarding the vegetal agricultural sector

Analysing the value of the total production both at the country level and at the regional level in table no 1, in the period 1997-2018 a significant increasing rhythm is found, interspersed with small oscillations of the value from year to year.

Table 1: The value of vegetable agricultural production in the regions of Romania

U.M.: Millions RON

Year	Bucharest-Ilfov	Center	West	North-West	South-East	South-Muntenia	South-West Oltenia	North-East
1997	76	495	511	594	854	925	694	791
1998	76	607	598	679	821	917	686	958
1999	113	861	842	1,047	1,368	1,473	1,033	1,434
2000	132	1,339	1,024	1,491	1,582	1,510	1,181	1,777
2001	221	1,904	2,169	2,394	2,284	3,222	2,408	2,879
2002	213	2,377	2,196	2,874	2,705	2,668	1,361	3,691
2003	272	3,184	3,238	3,832	4,052	3,948	2,921	4,473
2004	580	4,341	4,328	4,937	6,685	7,170	4,536	5,521
2005	416	3,137	3,140	4,037	4,593	4,652	3,175	4,809
2006	430	4,008	3,451	4,689	4,727	5,067	3,435	5,522
2007	294	4,320	3,599	4,888	3,879	4,396	2,590	4,757
2008	421	5,250	4,875	6,194	7,632	8,417	5,231	7,722
2009	349	4,442	3,719	5,022	5,318	6,320	4,516	6,050
2010	493	4,864	5,339	5,311	7,347	7,999	5,200	6,935
2011	516	5,743	5,665	6,156	9,936	10,974	6,605	8,586
2012	445	3,801	4,940	4,608	6,765	8,614	4,827	6,170
2013	548	5,434	5,908	5,938	9,579	11,540	6,222	8,675
2014	548	5,367	5,275	5,839	8,676	9,657	5,688	8,009
2015	473	4,410	4,340	5,051	8,230	9,344	5,208	6,518
2016	481	4,492	4,989	5,371	8,496	9,387	5,429	6,511
2017	562	4,732	5,539	5,959	10,216	11,148	7,427	7,633
2018	606	5,348	6,862	7,015	11,724	12,428	8,141	9,092

Source: NIS

At the country level, Romania registered a constant growth in the period 1997-2004, starting with 2005 there were small oscillations but keeping the same upward trend. Reporting the year 2018 to 1997, Romania registered an increase of the value of the vegetal agricultural production of 1239 percentage points.

Comparing in terms of value the regions between them, we find that the lowest contribution to the total value of national agricultural production has the development region Bucharest - Ilfov, which is due to the much smaller agricultural area compared to other regions. In the period 1997-2018, the largest contribution to the value of national agricultural production was made by the South-Muntenia development region with an annual average of RON 6,444 million, followed by the South-East region, the North-East region, and the North-West Region. This is due, first, to the large agricultural areas found in the regions listed above.

Following the analysis from table no 2 of the indices of vegetal agricultural production, the oscillation of each region is highlighted from year to year and at the same time the dependence of this branch of the economy on certain external factors.

Table 2 : Indices of agricultural production made by the regions of Romania

U.M.: %

Year	Bucharest-Ilfov	Center	West	North-West	South-East	South-Muntenia	South-West Oltenia	North-East
1997	110.80	92.90	96.80	93.10	121.80	119.90	126.80	114.10
1998	93.00	90.80	99.00	89.70	80.00	85.50	85.60	96.40
1999	107.10	110.70	101.80	115.80	124.40	114.50	106.50	111.60
2000	72.90	91.90	79.80	90.60	78.50	71.90	68.10	81.80
2001	140.00	127.60	154.30	132.30	102.70	150.00	168.10	127.50
2002	84.20	97.70	89.70	97.50	109.10	75.70	50.10	106.00
2003	102.70	98.90	108.70	101.80	116.60	119.50	169.10	91.40
2004	164.20	115.40	117.80	111.60	140.00	157.50	137.20	106.50
2005	69.70	78.20	83.20	89.00	78.80	74.20	82.60	96.00
2006	104.10	106.70	100.10	100.70	98.90	104.60	103.90	101.80
2007	57.00	86.30	76.60	79.80	65.50	67.60	58.30	67.70
2008	127.10	112.50	120.00	114.00	169.00	167.10	177.70	143.80
2009	98.00	99.30	95.20	96.70	90.00	96.20	111.50	96.10
2010	113.90	97.40	134.80	93.80	117.70	108.90	98.60	100.30
2011	112.90	116.80	93.80	113.40	116.40	116.60	113.00	116.50
2012	75.30	65.50	83.20	72.20	61.30	73.00	65.60	68.40
2013	133.80	138.00	125.10	128.60	152.30	141.70	136.70	141.20
2014	94.40	112.20	103.00	110.40	101.50	95.50	101.20	104.80
2015	82.20	88.10	81.60	88.00	94.20	96.00	91.40	81.40
2016	102.40	101.10	125.90	108.70	105.50	101.00	107.20	96.20
2017	114.90	107.80	112.50	111.70	122.30	119.90	137.10	120.50
2018	102.30	108.40	120.10	114.60	111.20	109.00	106.30	114.20

Source: NIS

The agricultural production index shows the evolution of each year compared to the base year (previous year), and the highest index was registered in the Bucharest-Ilfov Region in 2004 (164.2%), in the Centre Region in 2001 (127 , 6%), in the North-East Region in 2008 (143.8%), in the North-West Region in 2001 (132.3%), in the South-East Region in 2013 (152.3%), in the South-Muntenia Region in 2008 (167.1%), in the South-West Oltenia Region in 2008 (177.7%) and in the West Region in 2001 (154.3%).

These record values recorded over time are largely due to unfavourable weather conditions (drought) recorded in the previous year, leading to low yields and therefore significant differences from one year to another. In addition to weather conditions, agricultural production is directly influenced by factors such as low mechanization of farms, agro-chemical use, excessive land fragmentation which has led to a large number of farms, lack of financial resources that limit investment.

Table 3: Agricultural production of the main vegetable crops in the regions of Bucharest, Centre, West and North-West

U.M.: kg/ha

	Bucharest-Ilfov			Center			West			North-West		
Year	**Corn grains**	**Wheat total**	**Sunflower seeds**	**Corn grains**	**Wheat total**	**Sunflower seeds**	**Corn grains**	**Wheat total**	**Sunflower seeds**	**Corn grains**	**Wheat total**	**Sunflower seeds**
1997	4,731	2,710	1,178	3,435	2,856	1,173	3,937	2,863	855	3,341	2,577	860
1998	2,269	2,563	1,284	2,308	2,422	814	3,347	2,909	1,049	2,861	2,397	973
1999	4,081	3,284	1,255	3,351	2,485	1,095	3,841	2,706	1,003	3,273	2,287	1,172
2000	541	2,471	691	2,865	2,269	1,003	2,005	2,507	999	2,076	2,058	975
2001	3,343	3,073	1,191	4,132	3,042	1,338	4,021	3,445	1,343	3,687	3,043	1,184
2002	3,366	1,573	1,267	3,713	2,821	1,399	3,521	2,964	1,646	3,607	2,825	1,429
2003	2,944	708	924	3,500	2,400	1,364	3,437	3,037	1,885	3,427	2,610	1,606
2004	5,585	3,352	1,623	4,377	3,421	1,675	4,769	4,001	1,588	4,549	3,809	1,816
2005	4,310	2,847	919	3,785	3,086	824	4,272	3,244	1,542	4,174	3,166	1,529
2006	4,784	3,177	1,170	3,573	2,534	1,594	4,185	3,101	1,452	3,762	2,775	1,607
2007	698	997	401	2,946	2,520	1,243	2,641	2,734	1,158	2,785	2,381	1,080
2008	2,966	3,366	1,125	3,845	3,283	1,645	3,589	3,437	1,779	4,037	3,445	2,095
2009	2,959	2,218	1,579	3,826	2,789	1,432	3,498	2,806	1,866	3,429	2,228	1,420
2010	3,980	3,008	1,477	4,428	2,753	1,777	4,557	2,993	1,549	4,275	2,920	1,272
2011	4,470	3,791	1,782	4,668	3,656	2,114	4,480	4,032	2,166	4,425	3,620	1,846
2012	1,719	2,846	1,354	2,542	2,647	1,365	2,890	3,878	1,743	2,730	2,968	1,358
2013	4,716	4,174	1,938	4,299	3,312	1,480	4,201	4,342	2,387	4,269	3,811	2,041
2014	5,352	4,035	1,867	5,147	3,699	2,317	4,711	4,005	2,973	4,621	3,843	2,057
2015	4,271	4,231	1,823	4,025	3,736	2,103	3,703	4,451	2,110	3,156	3,891	1,649
2016	4,314	4,157	1,919	4,747	3,795	2,260	5,688	4,658	2,852	4,263	3,380	2,043
2017	6,180	4,579	2,482	5,767	4,263	2,725	5,300	5,274	2,436	5,912	4,255	2,929
2018	7,617	4,273	2,166	7,047	4,210	2,825	8,339	5,100	2,701	7,404	4,280	2,781
2019	6,297	4,600	2,645	6,275	4,105	2,705	8,335	5,249	3,459	6,688	4,040	2,944

Source: NIS

Analysing the production per hectare of the most common field crops in Romania, we see in table no. 3 an upward trend in the analyzed period 1997-2019, but with oscillating values in terms of analysis of each year compared to the previous year. Reporting the year 2019 to the base year 1997 it is found:

The Bucharest-Ilfov region recorded increases in production per hectare of: 33% among corn crops, 70% for wheat crops and 125% in terms of sunflower crops. The Central Region recorded increases of 83 percentage points among maize, 44 percentage points for wheat and 131 percentage points for sunflower. The Western Region saw an increase of 112% for maize, 83% for wheat and 305% for sunflower. The North-West region increased by 100 percentage points for maize, 57 percentage points for wheat and 242 percentage points for sunflower.

Comparing the 4 regions analyzed above, we notice the fact that the highest increase in terms of production / ha for the analyzed crops is registered in the Western development region.

Table 4: Agricultural production of the main vegetable crops in the regions of South-East, South, South-West and North-East

U.M.: kg/ha

	South-East			South-Muntenia			South-West Oltenia			North-East		
Year	**Corn grains**	**Wheat total**	**Sunflower seeds**	**Corn grains**	**Wheat total**	**Sunflower seeds**	**Corn grains**	**Wheat total**	**Sunflower seeds**	**Corn grains**	**Wheat total**	**Sunflower seeds**
1997	4,888	3,168	1,178	4,568	3,198	1,138	4,512	2,998	1,048	3,414	2,577	1,206
1998	2,486	2,409	1,142	2,613	2,615	1,183	2,946	2,555	988	2,839	2,587	1,115
1999	3,689	2,876	1,339	3,812	3,024	1,237	4,004	2,657	1,130	3,152	2,494	1,366
2000	1,756	2,176	967	1,104	2,631	733	883	2,094	423	1,786	1,762	933
2001	1,770	2,289	714	2,980	3,345	1,253	3,672	3,271	1,054	2,695	2,887	1,171
2002	2,651	1,818	1,058	2,815	1,716	1,001	1,566	949	407	3,175	2,685	1,619
2003	3,473	493	1,255	2,605	722	1,167	2,229	1,469	941	2,836	850	1,409
2004	4,982	3,173	1,547	4,952	3,541	1,736	4,231	3,308	1,558	3,199	2,341	1,251
2005	4,299	2,998	1,499	4,061	2,768	1,209	4,044	2,950	1,562	3,207	3,018	1,274
2006	3,404	3,005	1,615	3,649	2,720	1,521	3,559	2,394	1,511	3,141	2,917	1,417
2007	863	1,424	736	943	1,253	410	888	789	397	1,411	1,741	652
2008	2,409	3,572	1,352	3,026	3,535	1,359	2,843	3,054	1,417	3,676	3,205	1,450
2009	2,451	2,142	1,253	3,824	2,330	1,559	3,801	2,607	1,617	3,399	2,615	1,331
2010	4,337	2,725	1,577	4,583	2,621	1,665	4,303	2,478	1,748	3,881	2,696	1,500
2011	4,759	3,732	1,594	4,963	3,822	1,987	4,061	3,219	1,741	4,239	3,366	1,787
2012	1,677	2,353	1,150	2,552	2,669	1,500	1,458	2,396	1,193	1,976	2,317	1,148
2013	4,261	3,224	1,794	5,199	3,772	2,232	4,257	2,831	1,795	4,541	3,173	2,006
2014	4,526	3,486	1,992	5,294	3,746	2,307	4,137	3,197	2,175	4,967	3,340	2,064
2015	3,313	3,702	1,641	4,067	4,039	1,974	2,958	3,326	1,631	3,147	3,029	1,623
2016	3,939	4,202	1,908	4,162	4,110	2,181	3,433	3,315	1,617	3,569	3,609	1,474
2017	5,859	5,060	2,999	6,643	5,127	2,909	6,410	4,735	3,155	5,594	4,313	2,956
2018	7,991	5,094	3,166	7,919	4,901	3,103	7,354	4,717	3,046	7,098	4,128	3,165
2019	6,012	4,568	2,622	6,698	5,116	2,611	5,707	4,748	3,024	5,783	4,032	2,415

Source: NIS

Following the analysis of the table no. 4 that reflects the production per hectare of the South-East, South-Muntenia, South-West Oltenia and North-East development regions in the period 1997-2019, an ascending trend of all productions is found again, interspersed with small oscillations from year to year. Reporting the year 2019 to 1997 we find:

The South-East region recorded an increase in production of 23% among maize crops, 44% among wheat crops and 123% among sunflower crops. The South Muntenia region registered an increase of 47 percentage points for maize cultivation, 60 percentage points for wheat cultivation and 129 percentage points for sunflower cultivation.

The South-West Oltenia region registered an increase in production per hectare by 26% in terms of corn cultivation, 58% for wheat cultivation and 189% for sunflower cultivation. The Northeast region saw an increase in corn cultivation of 69 percentage points, among wheat cultivation of 56 percentage points and 100 percentage points for sunflower cultivation.

All the indicators analyzed above show us the upward trend of Romanian agriculture due mainly to the development of agricultural research and innovation, but the oscillations recorded from year to year of each region show its dependence on certain factors and the most important factor the influence is represented by the meteorological conditions characteristic of each year, but also of the poorly developed irrigation infrastructure, the low degree of technical endowment, the degree of chemicalization which is an intensive one.

Improving the Irrigation System in Romania To Increase Regional Competitiveness Through Agriculture

The creation of a complex and efficient irrigation system leads to an agriculture less dependent on the meteorological conditions, therefore constant productions can be achieved, diminishing the possibility of regional gaps in the agricultural sector.

The Irrigation System

The irrigation infrastructure is a complex system that consists of pumping stations, pumping stations for lifting water on terraces and networks of canals that transport water to water supply points that are represented by farms. (Angelakıs et al, 2020)

Eurostat defines the Agri-environmental indicator – irrigation to provide plants with sufficient water to obtain optimum yields and a high-quality harvested crop. Irrigation is essential in dry climates where precipitation is not sufficient for plant growth. Reddy (2016) considers that supplemental irrigation is also vital to produce high levels of quality and yield of crops on croplands in semi-arid and sub-humid climates during dry seasonal periods and drought spells where otherwise farming would not be economically viable. Irrigation water use is a major driving force behind water abstraction globally.

Given the importance of irrigation and drainage in the production process of crops, the development of irrigation capacity and the increase of irrigated areas are essential for the development of agriculture to be able to ensure quality production and high yields.

Lack of irrigation in times of drought leads to economic losses because crop yields will decline, this being an immediate, short-term effect but in the medium and long term some natural factors are affected, such as soil and microorganisms. By the uniform application on the agricultural surface of the quantity of water in the form of irrigations, the entire necessary water for the production process of the plants is ensured, which will later influence the yield and quality of the products. (Rey et al., 2017) On the other hand, if not properly applied, irrigation can lead to over-abstraction of groundwater supplies, secondary salinization and to pollution of water by nutrients, pesticides, and other farm inputs. (EC, 2012)

For the sustainability development of agriculture, farmers by using irrigation must simultaneously develop the three pillars of sustainability, as follows:

Environmental: rational use of water resources to conserve it and to reduce the water footprint

Social: ensuring the necessary consumption through improved yields that will cover the needs of the population, without affecting the natural resources needed for future generations

Economic: the use of innovations and technologies for a precision agriculture that helps to make water use more efficient and that will lead to an improvement of crop production yields and implicitly to an increase in production that will generate higher incomes for farmers

The Water Framework Directive (WFD) since 2000 emphasized the importance of adopting a sustainable approach to water resources management with focused strategies on long term protection, especially in agriculture where consumption is high.

The traditional irrigation system that came before the 1990s needs to be modernized and replaced with a more intensive one, which will permanently cover the needs of farmers, especially in the unpredictable times when drought sets in. The irrigated agricultural area in Romania has not registered major changes in recent years, being approximately 619,916 hectares, representing 34% of the total agricultural area, but it is much below the need of farmers. (National Plan)

An integrated system of irrigation of agricultural areas must be implemented to provide intelligent solutions, from adaptation to the specifics of the farm, small farms using drip or micro-sprinkler irrigation while farms with large areas need larger equipment to provide information in real time on water needs and resource consumption.

Meteorological conditions in Romania

Depending on different factors such as the level of annual rainfall, climate and zonal microclimate, Romania divides its development regions into two categories: the West, Northwest and Central regions have a higher level of rainfall, so the need for irrigation is lower compared with the southern, south-eastern and eastern regions that have water deficiencies and the degree of irrigation needed is higher. According to studies realized by the National Meteorological Agency of Romania, it is found that Romania has agricultural areas facing drought, and the south, south-east and east regions are the driest in Romania. In addition to covering the need for water from rivers and the Danube river, which is the main source for Romania, specialists' estimates show that 75% of the water used for irrigation comes from the Danube. The European Environment Agency (EEA) presents in detail all the data about the meteorological conditions.

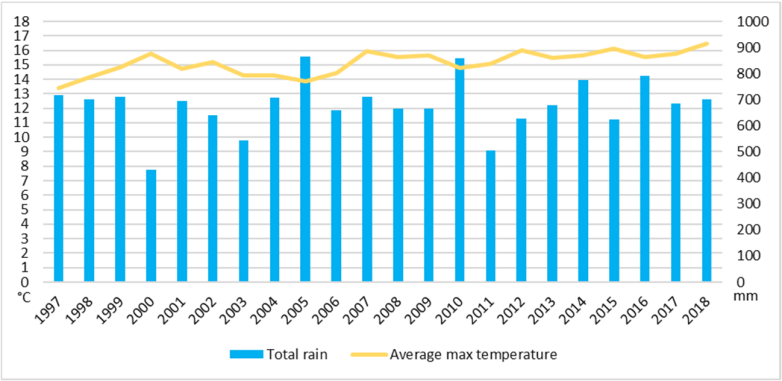

Graph 1: The evolution of the average temperature and of the average precipitations in Romania

Source: EEA

Graph no 1 presents the evolution of the average temperature and of the average precipitations in Romania during 1997 and 2018. In 1997, the lowest average temperature in Romania was recorded in the analysed period, respectively 13.37 degrees, while the level of precipitation was high. The constant increase of the temperature from 1997-2000 by 2.42 degrees led to a drastic decrease of the precipitation level by 285 mm, thus the year 2000 represented the year with the lowest value of precipitations, only 431 mm, from the entire analyzed interval 1997- 2008, while the temperature was above the average of the period.

From 2000 to 2005, the air temperature fluctuates, but reaches a low of 13.86 degrees in 2005 being the second lowest temperature in the entire period analyzed. The year 2005 is also marked with the highest level of precipitation, 865 mm. Recently, in 2018, the highest average temperature was registered, 16.46 degrees, while the precipitation level was at 700 mm, both values increasing compared to the previous year by 4% and 2%, respectively.

These fluctuations of precipitation have an unpredictable character that hinders the agricultures activities, so it is necessary a complex and modern irrigation system that covers much of the agricultural surface to prevent meteorological phenomena such as extreme drought, so it is necessary a complex and modern irrigation system that covers much of the agricultural surface to prevent meteorological phenomena such as extreme drought.

Statistical Analysis of Irrigated Areas in Romania

Based on the statistical data provided by NIS, we created a database that includes values of irrigated agricultural areas from 1997-2019 on the 8 development regions of Romania for which an extensive statistical analysis was performed. From the available data on land improvements made in Romania, the values for the total irrigation arrangements and

the 3 land use modalities were chosen, respectively Total irrigated area, Agricultural arranged area and value for Arable land to determine a share of irrigated areas by regions, but also the dependency ratio between the evolution of arable and irrigated area. The Arable land is the part of Total irrigated area which represent the irrigated arable land. According NIS, Land improvements is the total hydrotechnical works meant for land improvement, ensure the soil fertility or to improve the development conditions of crops on low productivity land and Irrigated area represents the total works carried out to ensure the controlled water supply to the crops in order to increase the agricultural output and guarantee its independence from weather conditions.

Table 5: The evolution of regions in the less irrigated area in Romania

U.M.: 1000 ha

	Bucharest-Ilfov		Center		West		Nord-West	
Year	**Agricultural arranged area**	**Total irrigated area**	**Agricultural arranged area**	**Total irrigated area**	**Agricultural arranged area**	**Total irrigated area**	**Agricultural arranged area**	**Total irrigated area**
1997	62.19	62.23	17.75	18.10	53.45	54.69	22.04	22.61
1998	62.19	62.23	17.75	18.10	53.45	54.69	22.04	22.61
1999	62.19	62.23	17.75	18.10	53.45	54.69	22.04	22.61
2000	62.19	62.23	15.47	15.81	53.45	54.69	22.04	22.61
2001	62.19	62.23	15.16	15.51	53.45	54.69	22.04	22.61
2002	62.19	62.23	15.16	15.51	53.45	54.69	22.04	22.61
2003	62.16	62.19	15.16	15.51	53.45	54.69	22.04	22.61
2004	62.05	62.08	15.15	15.51	53.44	54.69	22.03	22.60
2005	61.95	61.98	15.06	15.41	53.43	54.67	22.03	22.60
2006	50.23	50.26	15.05	15.41	53.36	54.60	17.81	18.37
2007	49.82	49.85	15.05	15.41	53.19	54.43	17.81	18.36
2008	49.53	49.56	15.05	15.40	53.08	54.32	17.81	18.36
2009	49.39	49.56	15.04	15.40	52.95	54.32	17.81	18.36
2010	49.32	49.56	15.04	15.40	52.88	54.32	17.81	18.36
2011	49.20	49.56	15.04	15.40	52.86	54.32	17.63	18.18
2012	49.15	49.56	15.04	15.40	52.83	54.32	17.63	18.18
2013	49.15	49.56	15.03	15.40	52.69	54.32	17.63	18.18
2014	49.15	49.56	15.03	15.40	52.69	54.32	17.63	18.18
2015	49.15	49.56	15.01	15.40	52.68	54.32	17.63	18.18
2016	49.15	49.56	15.01	15.40	52.64	54.32	17.63	18.18
2017	49.15	49.56	14.96	15.40	52.64	54.32	17.63	18.18
2018	49.15	49.56	14.96	15.40	52.64	54.32	17.63	18.18
2019	49.15	49.56	14.96	15.40	52.64	54.32	17.63	18.18

Source: NIS

The Bucharest-Ilfov development region is the main region in Romania, which also includes the country's capital, being the main economic pole and the most populated region. In recent years, migration from the province to the Bucharest has increased and globalization has led to the emergence of several international companies and large factories, as well as numerous logistics warehouses in this region, while areas from Ilfov county for agriculture have been removed from the agricultural circuit and introduced in the urban area to cover the needs of housing and land for different types of economic activities that have developed in the area. Thus, the agricultural sector with agricultural areas and areas arranged with land improvements such as irrigation decreased its activity in the Bucharest Ilfov region, which is why Agricultural arranged area and Total irrigated area decreased steadily during 1997-2019.

The Centre Region is a predominantly mountainous region with low average temperatures in which agriculture is represented by extensive crops such as potatoes, being the most representative crop in Covasna, Harghita and Brasov counties, and by raising animals in mountain areas such as cattle and sheep. The urbanization of areas such as Brasov and Sibiu counties, the improvement of tourist capacities and the promotion of areas as well as the development of the local economy through new economic activities led to fluctuations of agricultural areas, finally the area for agriculture decreased and the same trend was for Agricultural arranged area and Total irrigated area.

The West region represents a region that in the analysed period registered decreases of the Agricultural surface and implicitly of the two surfaces destined for irrigation. With a high degree of urbanization above the national average, with the share of agricultural area of 12% and with relief differences between the component counties, from counties predominantly with plain areas where Timis and Arad counties register the highest values of agricultural areas in the region at counties with covered hills and mountains and with forests where subsistence agriculture predominates, there is an involution of agricultural areas.

The North West region is divided into areas with a high emphasis on agriculture especially on fruits crops but with a weak capitalization of the livestock sector, urban centres that are heading towards the modernization of economic activities and in areas for tourism, but the region's average in terms of agriculture is below the national average so the areas for irrigation have decreased, even if the area Agricultural, due to small fluctuations maintains its value.

Table 6: The evolution of regions in the most irrigated area in Romania

U.M.: 1000 ha

	South-East		South-Muntenia		South-West Oltenia		North-East	
Year	**Agricultural arranged area**	**Total irrigated area**	**Agricultural arranged area**	**Total irrigated area**	**Agricultural arranged area**	**Total irrigated area**	**Agricultural arranged area**	**Total irrigated area**
1997	1,166.21	1,199.51	1,048.59	1,081.58	583.39	608.02	135.44	137.32
1998	1,166.82	1,200.13	1,046.65	1,080.36	580.24	604.91	135.44	137.32
1999	1,166.82	1,200.13	1,046.26	1,079.96	580.09	604.77	135.44	137.32
2000	1,166.82	1,200.13	1,046.26	1,079.96	580.00	604.77	135.44	137.32
2001	1,166.82	1,200.13	1,046.26	1,079.96	580.00	604.77	135.44	137.32
2002	1,165.95	1,199.21	1,046.26	1,079.96	576.61	604.77	135.44	137.32
2003	1,165.95	1,199.21	1,046.26	1,079.96	576.61	604.77	135.44	137.32
2004	1,166.47	1,199.73	1,046.26	1,079.96	576.61	604.77	135.42	137.30
2005	1,166.46	1,199.72	1,046.00	1,079.71	576.56	604.72	135.42	137.30
2006	1,163.69	1,196.60	1,046.13	1,079.84	576.56	604.71	135.35	137.22
2007	1,163.60	1,196.51	1,045.69	1,079.41	576.54	604.70	135.34	137.22
2008	1,165.66	1,198.63	1,045.17	1,078.89	576.54	604.69	135.31	137.18
2009	1,165.46	1,198.63	1,044.40	1,078.89	576.53	604.69	135.30	137.18
2010	1,165.25	1,198.63	1,040.74	1,075.49	576.53	604.69	135.30	137.18
2011	1,163.97	1,197.63	1,040.46	1,075.49	573.01	601.12	135.29	137.18
2012	1,163.59	1,197.63	1,039.89	1,075.49	572.92	601.12	135.29	137.18
2013	1,163.69	1,197.85	1,039.73	1,075.49	572.76	601.12	135.29	137.18
2014	1,163.62	1,197.85	1,039.57	1,075.49	572.75	601.12	135.29	137.18
2015	1,163.37	1,197.85	1,039.56	1,075.49	572.74	601.12	135.29	137.18
2016	1,163.35	1,197.85	1,039.56	1,075.49	572.74	601.12	135.29	137.18
2017	1,163.33	1,197.85	1,039.46	1,075.49	572.73	601.12	135.29	137.18
2018	1,163.31	1,197.85	1,039.43	1,075.49	572.71	601.12	135.29	137.18
2019	1,166.53	1,201.19	1,039.41	1,075.49	572.69	601.12	135.29	137.18

Source: NIS

The South-Muntenia region is the most representative region in terms of agricultural area, over 2.4 million hectares for agriculture with over 40% irrigated area, being the most important area of the country in terms of agricultural activity, both in terms of plant cultivation and animal husbandry and fish farming. The location along the Danube River gives the region an advantage in terms of irrigation, providing accessibility and sufficient water, so the short distance to a water centre has led to a faster development of the irrigation system. The favourable conditions for the practice of agriculture as well as the major investments made in agribusinesses determined that the South Muntenia region has the largest agricultural area and the most employees in the agricultural sector, ensuring the development of the local economy. Unfortunately, despite the potential of the region in terms of consolidation and development of the agricultural sector, the Agricultural arranged area and Total irrigated area decreased throughout the analysed period, but the agricultural area also decreased slightly.

The South-East region is the second region of the country after the total agricultural area, but it is on the first place in terms of irrigation in Romania and registers the most irrigated areas, in 2017 versus 1997 both agricultural and irrigated area increased. Agriculture is significant in this region, viticulture, vegetable growing and cereal crops being the most representative in the country, while the fishing sector is an activity with a tradition in the maritime area as well as in the Danube Delta. The Danube is the main source of water for irrigation in the area, so there are several important stations that cover the water needs of large agricultural areas that are primarily faced with a low rainfall and extreme weather. But despite the less favourable climatic conditions and the unpredictability of weather phenomena, the large agricultural area that is served by the irrigation system has contributed positively to the development of agriculture, especially in the field of vegetables and cereals.

The North-East region is the least developed region of the country, but it is the largest in area and the most populated, but agriculture is a basic activity in the development of the region, this is represented by cereal cultivation, areas with tradition in viticulture and orchards of fruit trees. In recent years, the agricultural area has fluctuated, and irrigated

areas have decreased, in the period 2011-2019 Agricultural arranged area being constant, and Total irrigated area remained at the same level between 2008 and 2019.

The South-West Oltenia region decreased its agricultural area annually, keeping the same trend for the Agricultural arranged area and Total irrigated area. The relief is diversified, from mountains to plateaus and plains, and the southern area where the plains predominate is characterized by dry air and a phenomenon of desertification of agricultural land. Also, the counties in the south of the region are the most representative in terms of agricultural activities, where cereals predominate, fruit crops such as grapes and melons and the Danube offers the possibility of developing fish farming. Having 3 important water sources, the Danube, Olt and Jiu that provide different counties of the region, the region can provide its water needs for irrigation more easily if it has a well-defined zonal infrastructure, especially to combat desertification leading to the loss of agricultural land.

After analysing the evolution from 1997-2019 of the 8 development regions of Romania, we conclude briefly that in 2019 versus 1997 the Bucharest-Ilfov Region registered the largest decreases of the 3 studied indicators, followed by the North-West region while the Southeast region is the only region that has progressed. Also, no region reported that all agricultural arranged area had been irrigated.

Strategic Directions to Regional Development by Improving the Irrigation System in Romania

The Minister of Agriculture and Rural Development from Romania (MARD) is the main authority in Romania that deals with the irrigation system and has established since 2016 a series of strategic initiatives for the development of irrigation according to the table below.

Table 7: Strategic initiatives of MARD for the development of irrigation in Romania

Sectoral strategic objectives	Strategic initiatives
Strategic priority - Development of an efficient irrigation system	Establish a strategy for creating a modern irrigation system adapted to current requirements Development and modernization of the primary irrigation infrastructure - Application of the provisions of OUG no. 4/2015 regarding some measures for organizing the land improvement activity, approved by Law no. 269/2015 Development and modernization of secondary irrigation infrastructure - investments from NRDP Irrigation Sector Project Strategy in Romania

Source: Strategic Plan of MARD 2016

The European Union, through the structural funds, provides financial support for investments in irrigation infrastructure, so Romania's National Rural Development Program 2014-2020 (NRDP) has a sub-measure, 4.3 Irrigation dedicated to Investments for the development, modernization or adaptation of agricultural and forestry infrastructure irrigation infrastructure that has as main objective the modernization of the irrigation infrastructure of the beneficiaries who can be both organizations and federations of water users and who receive non-reimbursable support that fully covers eligible expenses and is a maximum of 1,000,000 euros for each project related to irrigation systems of pressure stations and access to agricultural roads and a maximum of 1,500,000 euros for each project aimed at arranging irrigation systems related to pumping and pumping stations.

Important actions that can generate added value in the activity of farmers are:

- Water management for the supply of irrigation needed with optimal quantities
- Creating an irrigation development action plan to be offered to farmers with technical-economic specifications regarding the irrigation system according to the requirements of each culture and the specificities of the development region

- Providing agricultural consultancy supporting the agricultural exploitation by improving the agricultural performances, yields and the incomes
- Risk management plans to prevent and mitigate the negative effects of drought
- Water efficient technology for precision agriculture to consider the rational use of water
- Improving RDI activities to adapt Romanian farms to climate change from the point of view of the efficiency of the irrigation system regarding the provision of the necessary water at the opportune moment

The plan for the development of the irrigation system to improve both the infrastructure and the access of farmers must consider objectives with long-term impact that are economically viable and accessible to as many farmers as possible through which to increase agricultural production.

Conclusions

Agriculture has played and continues to play an important role in the development of the Romanian rural area. Following the analyses performed, there is an upward trend of the production both in value and quantity in the period 1997-2019, registering oscillations from year to year. These fluctuations in production from one year to another are due to various influencing factors, including to unfavourable weather conditions recorded in certain years, so the irrigation system requires more attention, being a factor that can revive agriculture in dry periods. In the last 23 years, all surfaces fluctuated, finally in 2019 reaching a decrease compared to the base year, 1997 as follows: agricultural arranged area decreased the most, -1.32% and total irrigated area decreased by -0.99%.

Precipitation is a rather unpredictable factor with a significant impact on agriculture, often impeding agricultural activities, therefore the development of a complex and modern irrigation system to cover as large an area of the total Romanian agricultural area can reduce the dependence of agriculture on natural factors, significantly diminishing the influence of drought on production.

It can be said that the main factors that did not allow the development of the agricultural irrigation system were: lack of investments in irrigation infrastructure for its modernization and development; high costs for farmers and reduced access to funds; lack of information to all farmers about the benefits of crop irrigation.

Actions are needed to lead to the improvement of the irrigation system and infrastructure because in addition to chemicalization, irrigation also has a decisive contribution to increasing yields, leading to the development of agricultural activities in the area and thus to the regional development of the country.

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Developing and Validating the Initial Version of The Robotic Process Automation Maturity Model

Andrzej SOBCZAK

Warsaw School of Economics, Warsaw, Poland
sobczak@sgh.waw.pl

Abstract

In a narrower sense RPA (Robotic Process Automation) can be perceived as one of the categories of software for the automation of business processes. At the same time, it can be considered as a specific type of organisational and technological change. Assuming the latter sense as crucial from the perspective of the implementation of digitisation of a company, it is necessary to carry out a periodic assessment of the maturity of an organisation in terms of RPA. Thanks to such an assessment, it is possible to determine the current advancement of an organization in this regard, but also to determine the improvement activities required for the implementation. However, it is necessary to use an appropriate research tool to carry out such an assessment. The goals of this article include: (G1) presenting the understanding of the term robotic process automation, (G2) describing the building blocks of the maturity model, (G3) presenting the proprietary robotic process automation maturity model and its initial verification.

Keywords: Maturity Model, Robotic Process Automation, RPA, Robotic Process Automation Maturity Model, MORPH

Introduction

”Robot” is a relatively new term, as it was coined at the beginning of the 20th century. A Czech writer Karel Čapek used this term for the first time in a play titled Rossumovi Univerzální Roboti in 1921. That term originates from the Slavic word ”robota”, that means effort, hard work.

The terms "robot" and "robotization" are used in the article in the context of the Robotic Process Automation related research area, in a reference to the research trend that emphasizes the importance of metaphors in management sciences. According to this approach, metaphors referring to the processes taking place in the natural world have an impact on a specific understanding of reality through another part thereof, as well as on the shaping of science and its language (Morgan, 2006, pp. 10-11). The author makes an assumption that a software robot is a computer program operating based on the set algorithm, created with the use of one or more RPA (Robotic Process Automation) tools, used to automatically perform business processes or parts thereof, that usually imitates human work. From the terminology point of view, a software robot is also referred to as a digital worker in the subject matter literature.

The deployment of software robots needs to be implemented in the form of coordinated organizational and technological projects. In addition, it is important to implement mechanisms for monitoring the robots' performance and maintaining the continuity of the robots' operation. As more and more enterprises decide to widely use robotic process automation, a methodological tool that can help improve the activities performed by the robots may involve the use of the robotic process automation maturity model. An appropriately implemented maturity model allows an organization to assess its skill level, the effectiveness of the processes implemented and the methods of operation used.

The issues related to robotic process automation and robotic maturity assessment are in line with the research trends undertaken as part of several sub-disciplines of the management and quality science (Belz et al., 2019), in particular:

- Change management (sub-discipline: Strategic management) - robotic process automation is considered in the article as a specific type of an organizational change that should be managed appropriately;

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- Organization's maturity (sub-discipline: Process and project management) - the article presents the characteristics of issues related to the robotic process automation maturity of an enterprise, which is one of the aspects of an organization's maturity;

Management in the robotic process automation environment (sub-discipline: Production, services and technology management) – the management context in the robotic process automation environment is the main theme of the discussion presented in the article.

The goals of this article include: (G1) presenting the understanding of the term robotic process automation, (G2) describing the building blocks of the maturity model, (G3) presenting the proprietary robotic process automation maturity model and its initial verification.

A diverse set of research tools was applied to achieve each of the paper's goals. They included, accordingly: literature research, partly structured expert interviews, creative thinking techniques and the case study method.

Based on the above presented objectives of the article the following structure of the paper was adopted. Section two presents the main concepts of robotic process automation. Section three includes key concepts of the maturity models and their building blocks. Section four presents the proprietary robotic process automation maturity model, including the discussion of the results of its initial verification. Section five presents the summary of the thus-far considerations and the potential directions of further research are outlined – in particular with respect to developing the proposed model.

Understanding the term Robotic Process Automation

Currently the "robotic process automation" concept is viewed in two different ways in the subject matter literature.

According to the first view, robotic process automation (RPA) is a class of IT tools. S. Aguirre and A. Rodriguez indicate that the origins of this class of software date back to 2010 (Aguirre, Rodriguez, 2017, p. 66), while the practically exponentially rising interest in this class of tools began around 2015. The current RPA market leaders include such companies as (listed in the alphabetical order): Automation Anywhere, Blue Prism, UiPath, WorkFusion (Gartner, 2020). The solutions provided by these companies are intended to be used for robotically automating processes that are characterized by the following properties:

- high stability over time - the lower the process variability over time, the better;
- a small number of deviations and exceptions - the smaller the number of deviations and exceptions occurring during the process, the easier the implementation thereof and the lower the risk that a specific emergency situation will not be taken into account;
- high frequency of process performance - the higher the frequency of starting the given process, the better, because the return on investment in the automation thereof will then be higher;
- the need to have complete knowledge of the way the process is currently performed, expressed as a set of unequivocal business rules. In particular, this means that in the event of an emergency - i.e. unforeseen during the preparation of the software robot – the information on such an event will be forwarded to the human operator, who will take an action appropriate to the situation.

The developers of the robotic process automation solutions are currently working on the second generation of the tools. According to the compilation (Lacity, Willcocks, 2018, p. 26), the future of this class of tools is cognitive automation, i.e. one where automation is implemented thanks to the software capable of effective operation in unforeseen and uncertain situations, as such automation tool (software) has the ability to use the information held in a manner similar to human reasoning. Cognitive automation uses algorithms and technological approaches derived from artificial intelligence, such as natural language processing, text analysis and data exploration, semantic technologies and machine learning (see Marshall, Lambert, 2018, pp. 200-210). Thanks to such solutions IT tools are able to autonomously evaluate and interpret knowledge. Cognitive automation provides completely new operational capabilities (van der Aalst et al., 2018, p. 271). Firstly: software that implements this type of automation has the ability to learn to react to the appearance of new objects and new situations (Leopold, van der Aa, Reijers, 2018). Such cases have up to now been a weak point of the classical automation solutions. In the event of an unforeseen situation, the tools, at best, provided information about it, and, at worst, took nondeterministic actions. Secondly: cognitive automation software has the ability to make complex decisions or decisions that involve ambiguities or seemingly competing alternatives. Thirdly, at last: this class of software is capable of detecting and reacting to the situations where risk and consequences of an error are high.

According to the second view of the term, ”robotic process automation” can be regarded as a particular type of an organizational and technological change the inherent part of which is the deployment of specific software (including cognitive software), ultimately leading to the formation of a hybrid workforce (Fersht et al., 2019), (Lacity and Willcocks, 2018), (Willcocks et al., 2020). Such a workforce is understood as a coherent ecosystem of software robots, as well as human resources with specific skills and competences, performing specific business processes and processing specific data.

The latter, broader understanding of the robotic process automation concept has been assumed for the purpose of this article. The adoption of such an understanding of robotic process automation leads to the viewing of actions related thereto not only from the technology point of view but also from the organizational and cultural perspective.

Key concepts of the maturity models and their building blocks

The maturity concept is very broad, it may mean something "fully developed", "brought to perfection" (Cooke-Davies, 2004, p. 1234-1264). The term may also refer to enterprises and the condition they are in. In this context, one of the most frequently cited definitions of maturity models was proposed by M. Kohlegger, R. Maier and S. Thalmann in 2009. In accordance with that definition, model is defined as a model that “represents phases of increasing quantitative or qualitative capability changes of a maturing element in order to assess its advances with respect to defined focus areas. The focus area determines which indicators for maturity can be used to assess a maturing element”. Another approach to the maturity model can be found in (Axelos, 2013, pp. 6-7). According to that view, the maturity model is, simultaneously, an improvement process, as well as a development path and signpost, along with the precisely defined criteria and indicators, defining the current, as well as the desired condition based on the transparent external reference values.

The majority of the existing maturity models are based on the commonly known, developed in 1991, SW-CMM (Capability Maturity Model for Software) model that was created for the software engineering needs. It should be noted that its precursor was QMMG - Quality Management Maturity Grid, a model developed by P. Crosby already in 1979 (Albliwi et al., 2014). Starting as of 1991 this model was adapted to the needs of various disciplines, such as (Nikkhoua et al., 2015, pp. 319) (Proença and Borbinha, 2016, p. 1045-1047), (Sarmento and Seixas Costa, 2019): systems engineering (SE-CMM – Systems Engineering Capability Maturity Model), integrated product and process development (IPD-CMM – Integrated Product Development Capability Maturity Model), people management (P-CMM – People Capability Maturity Model), enterprise architecture management (EEAMM – Extended Enterprise Architecture Maturity Model, NASCIO EAMM – NASCIO Enterprise Architecture Maturity Model, ACMM - Architecture Capability Maturity Model), process management (BPMM – Business Process Maturity Model, PEMM – Process and Enterprise Maturity Model), project and project/program portfolio management (PMMM – Kerzner Project Management Maturity Model, P2MM – PRINCE2 Maturity Model, OPM3 – Organizational Project Management Maturity Model, P3M3 – Project, Program, Portfolio Management Maturity Model), business continuity and enterprise risk management (BCMM – Business Continuity Maturity Model, ERM MM – Enterprise Risk Management Maturity Model, RIMS-RMM – Risk and Insurance Management Society Maturity Model).

It is noteworthy – at least based on the number of the existing maturity models – that they have won broad recognition, both among representatives of academic community, as well practitioners. Their use is supported by simplicity and ease of applying the concept, use of coherent terminology, ease of understanding the results obtained and the ability to undertake specific actions based thereupon (Lasrado et al., 2015).

At the same time, it should be emphasized that this simplicity also constitutes one of the main criticisms raised by the critics of such an approach. They are of the opinion that complexity and volatility of organizations are so high that referring to a closed list of issues (topics) (and such one always occurs in case of this type of approach) makes it impossible to take into account the specifics of the given organization (Mettler, 2011, pp. 82).

When analyzing maturity models certain common structural elements thereof can be identified. They include (Lasrado et al., 2015), (Proença and Borbinha, 2016, p. 1044-1045):

- purpose of applying the model,
- building blocks and their hierarchy,
- approach to conducting a maturity assessment,
- approach to representing the results of a maturity assessment.

Each of the structural elements of maturity models is described below.

Purpose of Applying Maturity Models

The primary purpose of applying an organization maturity model is the ability to conduct, in a systematic manner, an assessment of the organization's operations in the selected area of its operations.

Maturity models usually perform one of four functions (de Bruin et al., 2005):

- descriptive function that helps determine what the actual level of an organization's maturity is at the given moment in the assessed area; such information is required, among others, to fulfill the reporting obligation (e.g. in international capital groups the information on the maturity of selected aspects of the organization's functioning is provided to the head office),
- prescriptive function that describes the desired target condition (state) and defines the gap that exists between the existing condition (current state) and the desired condition (state),
- function defining the scope of the transition that says what actions should be performed in order to transition from the existing condition (current state) to the desired one,
- comparative function that enables referencing the maturity level of the given organization to its direct competition or the best organizations in the given class (provided such benchmark data is available; frequently benchmark databases are created by consulting companies but they can be accessed usually for a fee).

Building Blocks of Maturity Models and Their Hierarchy

The structure of the majority of maturity models is similar. Assessment dimensions are usually defined within models (typically there are a few of them, not more than 10). In some models dimensions are decomposed to the level one notch below – namely to areas (usually there are no more than 20 such areas). Each of the assessment areas is assigned issues (topics)/practices/assessment questions. Depending on the subject area that the model is applicable to and the degree of assessment accuracy – the number of issues (topics), practices or assessment questions ranges between several dozen and even 500 items. When referring to the individual issues (topics), practices or assessment questions, the degree of implementing them in the given organization's context should be defined. Authors of a model usually define possible answers and assign weights thereto. This way an assessment can be made quickly, and the results obtained can be compared to other assessments (conducted at the same or at other organizations).

Approach to Conducting A Maturity Assessment

Authors of individual models recommend various methods of conducting a maturity assessment. One of three approaches can be selected:

1) self-assessment based on observation,
2) filling of a questionnaire by an in-house team of the organization's representatives with the support of an external methodology consultant,
3) filling of a questionnaire by an external team of experts with the support of the in-house team of the organization's representatives.

Option 1) is simplest, fastest and cheapest but can be burdened with the largest error due to the subjective approach and a lack of clear assessment criteria.

Selecting option 2) and 3) is based on a number of conditions – from the financial ones (the second approach is by far cheaper), up to the security issues (the second approach more easily gains acceptance of the assessed organization's security/compliance department).

In all three approaches the level of maturity in the individual assessment areas is assessed. Based on that, a graphical analysis, e.g. in the form of a radar chart, has been prepared. It can be the basis for assessing how the level of maturity of selected aspects of the organization's operations is changing over time (e.g. every year).

Approach to the Representation of the Maturity Assessment Results

When applying maturity models, one of two methods of representing the maturity assessment can be adopted: staged or continuous.

In case of the staged representation an organization can be classified on one of several (usually five, but models with 3 or 6 levels are also possible) maturity levels, where the first level signifies the lowest level.

In case of the staged approach, coefficient γ, presenting the organization's maturity level in a general way, can be calculated:

$$\gamma = \frac{1}{n} \sum_{k=1}^{n} P_k \quad (1)$$

where: n – the number of identified areas within which an assessment of the maturity level of selected aspects of the organization's operations is made; Pk – maturity level for the kth area of the organization's operations.

In case of the continuous approach, each of the areas is assessed separately. This assessment is also carried out using assessment questions. The outcome of applying this approach is a single column matrix containing the results of the assessment in the individual areas. This way it is possible to adapt the sequence of improvements to the organization's specifics and push areas that are considered as key to the forefront.

Developing and verification initial version of the proprietary robotic process automation maturity model

The author developed the initial version of the proprietary robotic process automation maturity model (MORPH – Model Oceny Dojrzałości Robotyzacji Procesów Biznesowych - Robotic Process Automation Maturity Model). The need to develop the proprietary maturity model stemmed from the fact that, as shown in the literature research carried out earlier by the author, there was no model for assessing the robotic maturity of an enterprise that would have been developed under the methodological regime. The existing models (HfS Research Maturity Model for RPA, Forrester Robotics Quotient Model, Mindtree's Automation Maturity Model, Federal RPA Community of Practice Maturity Model) have been developed by the consulting organizations and firms and they do not meet this condition.

Such techniques as creative thinking and literature research were used to develop the proprietary robotic process automation maturity model. In order to maintain the methodological regime the model development was based on the maturity model creation procedure presented in (Becker et al., 2009, p. 218). It is composed of a series of the following steps: Initiation, Problem definition, Comparison of existing maturity models, Determination of development strategy, Iterative model development, Conception of transfer and evaluation, Implementation of transfer media, Evaluation, Introduction of amendments to the model.

Literature research included both the articles that were published in the reviewed magazines and books prepared by the representatives of the academic community, as well as consulting companies' analyses and reports, and materials presented at industry conferences. The author was an organizer of nationwide seminars and workshops held at SGH (Warsaw School of Economics) in 2017-2019; attended by over 600 participants in total (both from the practitioners' world, as well as the representatives of the academic community) and with more than 80 papers presented[i]. Additionally, the author took part in 7 industry conferences and seminars organized by other entities within that time frame. Materials obtained this way constituted the starting point for developing the initial version of the proprietary robotic process automation maturity model.

Additionally, the author conducted semi-structured expert interviews with persons dealing professionally with robotic process automation. The information obtained during such interviews was also used as a contribution to developing the proprietary model's assumptions and formulating assessment questions[ii].

When developing the maturity model the author also used his own experiences in deploying the RPA tools as part of the projects implemented.

The developed MORPH model's structure is hierarchical. Three robotic process automation maturity assessment dimensions were defined at the highest level of generality and they included:

1. Organizational aspects of robotic process automation,
2. Technological aspects of robotic process automation,
3. Cultural, ethical and competence related aspects of robotic process automation.

Each of the robotic process automation maturity assessment dimensions was decomposed into assessment areas. The number of assessment areas for each dimension varies. There are 12 assessment areas in total, with the given assessment area assigned precisely to a single dimension.

Thanks to the introduced model hierarchy the diversity of issues (topics) related to robotic process automation was exposed – starting from the organizational, through the technological, up to the cultural, ethical and competence related ones.

The following assessment areas were defined for the ”Organizational aspects of robotic process automation” dimension:

1.1. Robotic process automation performance (efficiency) goals and metrics (indicators) and their alignment with the organization’s business strategy,
1.2. Roles and bodies related to robotic process automation and interfaces between robotic process automation and other areas of the organization’s operations,
1.3. Preparing processes for robotic automation and developing robots,
1.4. Robot maintenance and operation (performance) monitoring,
1.5. Managing risk factors during robotic automation and continuity of robotically automated processes.

The following assessment areas were defined for the ”Technological aspects of robotic process automation” dimension:

2.1. Managing the architecture of tools used for robotic process automation,
2.2. Information technologies used for robotic process automation,
2.3. Information technology tools used to support robotic process automation.

The following assessment areas were defined for the ”Cultural, ethical and competence related aspects of robotic process automation” dimension:

3.1. Communicating issues (topics) related to robotic process automation,
3.2. Developing robotic process automation competences among the organization’s workforce,
3.3. Providing retraining support for employees whose jobs are subject to robotic process automation,
3.4. Ethical aspects of robotic process automation.

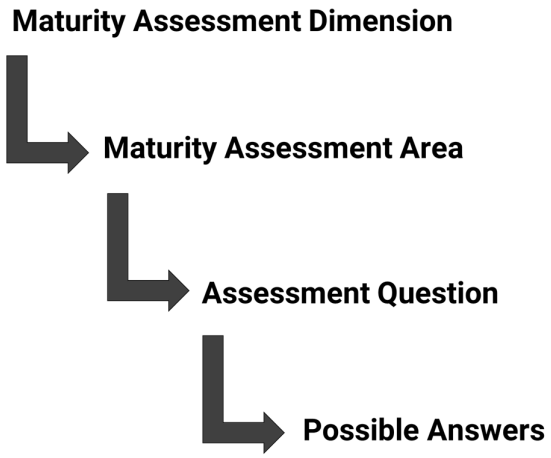

Fig. 1: Framework structure of the development of the proprietary Robotic Process Automation Maturity Model

Source: own compilation.

Assessment questions were defined for each assessment area, along with the permitted answers assigned thereto. 40 assessment questions were defined in total. Such a number of assessment questions allows to precisely define the robotic process automation maturity level in the individual areas.

Each of the assessment questions can be answered with two types of answers (where the answer is the result of the subjective perception of reality by the respondent):

- Yes / No – this type of answer is applicable in a situation where only one of two results of the implementation (resolution) of the given issue is possible.
- Yes / To a large degree / To a medium degree / To a small degree / No – this type of answer is applicable in a situation where several degrees of the result of the implementation (resolution) of the given issue are possible.

Information obtained when providing answers to assessment questions is the basis for evaluating the maturity level for the given assessment area. The following answer evaluation system was adopted:

- In case of Yes / No answers - for the answer "Yes" - 5 points are obtained, for "No" - 0 - points.
- In case of a Yes / To a large degree / To a medium degree / To a small degree / No answers - 5 points are obtained for the answer "Yes", 4 points are given for the answer "To a large degree", for the answer "To a medium degree" - 3 points, for the answer "To a small degree" - 2 points, "No" - 0 - point.

The outcome of applying the described technique is the aggregate indicator presenting the organization's maturity for 12 assessment areas (Enterprise Robotic Process Automation Maturity Indicator – ERPAMI).

The ERPAMI is described by the formula:

$$\text{ERPAMI} = Round\left(\frac{1}{n}\sum_{i=1}^{n} Round\left(\frac{1}{k_i}\sum_{j=1}^{k_i} x_{ij}\right)\right) \quad (2)$$

where: n – the number of robotic process automation maturity assessment areas; xij – the value of the answer to the jth assessment question in the ith assessment area; ki – the number of assessment questions in the ith assessment area; Round - function rounding to the nearest integer.

Due to space constraints the article does not present the complete list of assessment questions, but it outlines what issues (topics) are raised in each of the 12 assessment areas and one sample question from each assessment area is cited.

As part of the first assessment area "Robotic process automation performance (efficiency) goals and metrics (indicators)", references are made to the following issues (topics):

- Whether and how was the scope of robotic process automation defined?
- Whether and how were the goals of robotic process automation defined?
- Whether and how was the way of measuring the achievement of the individual goals of robotic process automation defined?

A sample assessment question: Were the adopted goals of robotic process automation formally accepted by a representative of the organization's management team?

As part of the second assessment area "Roles and bodies related to robotic process automation and interfaces between robotic process automation and other areas of the organization's operations", references are made to the following issues (topics):

- Whether and how were the roles related to robotic process automation management defined?
- Whether and how were the roles related to robot development defined?
- Whether and how were the roles related to robot maintenance and robot operation (performance) monitoring defined?
- Whether and how were the rules of cooperation with IT, security, compliance departments established?

A sample assessment question: Is there an established change management process in IT systems on which robots are working and are consultations between the department responsible for robotic automation and the IT department a part of such a process?

As part of the third assessment area "Preparing processes for robotic automation and developing robots", references are made to the following issues (topics):

- Whether and how are processes to be robotically automated selected?
- Whether and how are processes optimized prior to their robotic automation?
- Is there a standardized procedure in place to document processes to be robotically automated?
- Is there a standardized procedure in place to develop a robot?
- Is there a standardized procedure in place to document a robot code?
- Is there a standardized procedure in place to test a robot?

A sample assessment question: Does the organization have a formally adopted and commonly applied procedure in place to document the code of the robot being developed?

As part of the fourth assessment area ”Robot maintenance and operation (performance) monitoring”, references are made to the following issues (topics):

- Whether and how is robot operational performance monitored?
- Whether and how are exceptions handled during a robot’s operation?
- Whether and how does a notification of robot operation occur?
- Whether and how is the documentation required to maintain robot operation developed?

A sample assessment question: Does the organization have formally adopted and applied non-availability times for individual robot types?

As part of the fifth assessment area ”Managing risk factors during robotic automation and continuity of robotically automated processes”, references are made to the following issues (topics):

- Whether and how does the organization manage risks related to robotic process automation?
- Does the organization have emergency plans in place in case a failure of robotically automated processes occurs?

A sample assessment question: Does the organization have a formally adopted robotic process automation exit plan in place?

As part of the sixth assessment area ”Managing the architecture of tools used for robotic process automation”, references are made to the following issues (topics):

- Whether and how does the organization manage the architecture of IT environments related to robotic process automation?
- Whether and how does the organization manage architecture standards related to robotic process automation?

A sample assessment question: Does the organization have a documented architecture of the production, test and development environments in which robots are operating?

As part of the seventh assessment area ”Information technologies used for robotic process automation”, references are made to the following issues (topics):

- Whether and how did the organization select IT tools used for robotic process automation?
- Whether and how does the organization update IT tools used for robotic process automation?

A sample assessment question: Were the IT tools used for robotic process automation selected consciously, in line with the applicable procedure?

As part of the eighth assessment area ”Information technology tools used to support robotic process automation”, references are made to the following issues (topics):

- Does the organization use IT tools to model/analyze business processes prior to their robotic automation?
- Does the organization use IT tools for robot code version control?
- Does the organization use IT tools for robot service (operation) orchestration?
- Does the organization use IT tools for robot operation (performance) monitoring?

A sample assessment question: Does the organization use IT tools that allow for creating documentation of the process to be robotically automated?

As part of the ninth assessment area" Communicating issues (topics) related to robotic process automation", references are made to the following issues (topics):

- Whether and how does the organization communicate issues (topics) related to robotic process automation to middle and higher-level management teams?
- Whether and how does the organization communicate issues (topics) related to robotic process automation to the field personnel?
- Whether and how does the organization communicate issues (topics) related to robotic process automation to social partners (e.g. trade unions)?
- Whether and how does the organization communicate issues (topics) related to robotic process automation outside the organization (e.g. media)?

A sample assessment question: Does the organization have a plan in place to communicate issues (topics) related to robotic process automation that takes into account all of its workforce groups?

As part of the tenth assessment area "Developing robotic process automation competences among the organization's workforce", references are made to the following issues (topics):

- Whether and how does the organization monitor competences related to robotic process automation among business departments' personnel?
- Whether and how does the organization develop competences related to robotic process automation among business departments' personnel?

A sample assessment question: Does the organization measure the level of competences related to robotic process automation among business departments' personnel?

As part of the eleventh assessment area "Providing retraining support for employees whose jobs are subject to robotic process automation", references are made to the following issues (topics):

- Whether and how does the organization monitor the impact of robotic process automation on its personnel, in the context of providing support for their retraining?
- Whether and how does the organization provide retraining support for employees as a result of the robotic process automation completed?

A sample assessment question: Does the organization measure the impact of robotic process automation on its personnel?

As part of the twelfth assessment area "Ethical aspects of robotic process automation", references are made to the following issues (topics):

- Whether and to what extent does the organization undertake actions aimed at raising the awareness related to ethical aspects of robotic process automation?
- Does the organization have the defined responsibilities related to ethical aspects of robotic process automation?

A sample assessment question: Is there an appointed person in the organization that coordinates issues (topics) related to ethical aspects of robotic process automation?

The author is aware of the proposed MORPH model's limitations. They entail, among others, potential difficulties with interpreting individual assessment questions. For example, in the majority of cases the organization can apply robot documentation development standards, but its initial robots do not have documentation because the standards did not exist yet when such robots were designed. At the same time, the organization does not have organizational capabilities (resource constraints) to fix the documentation gaps.

In order to ensure the correctness and usefulness of the MORPH model being developed for enterprises the author presented its successive versions during industry meetings (two presentations were made in 2019). During such events, attended by domain experts dealing with robotic process automation, both from management, as well as

technical side, the author presented individual stages of works on the MORPH model – from its very early version, up to the ever more mature one. Based on the comments submitted by experts the model developed by the author was systematically improved, for example with respect to the assessment dimension names and the assessment question formulation and completeness.

MORPH model's pilot deployment was conducted after the works on developing and improving the model had been completed. The author is aware of the limitations of such an approach – in particular, the results obtained cannot be generalized to apply to the entire population based on a single case. However, the approach adopted in the paper assumes that case studies should not be used to generalize, but primarily to revise the theory (Pizło, 2009, p. 248).

An enterprise operating in the financial industry (considered a large undertaking in the understanding of (European Commission, 2014)), with numerous competitors – both on the domestic, as well as the international market, was selected for the pilot deployment. However, versus its competitors the company is viewed as one of smaller entities in the area of its operations – in terms of headcount and market share. Like the majority of similar entities the enterprise finds itself under regulatory and cost pressures, and at the same time it must continuously increase customer service satisfaction level. Additionally, it has recently (2018-2019) been feeling very strong pressure to raise workforce wages – in particular in the back-office part, but also in the sales network.

The enterprise was selected to conduct the pilot project for the following reasons:

- the company already has experience related to robotic process automation – conducted based on two models: using an external service provider, as well as in-house resources;
- the enterprise understands benefits provided by robotic process automation and there is a consensus within the organization that the works are worth continuing;
- the enterprise has technical capabilities to deploy robotic process automation on a broader scale;
- a discussion was started within the enterprise on how to ensure the scalability of robot deployments and, at the same time, approach the maintenance of the already deployed robots.

As part of the pilot deployment the author performed the role of providing methodological support: provided the interested entity with the tool (MORPH model and the application), conducted training on the structure (design) and the principles (rules) of using the model, provided clarifications on the use of the model on an ongoing basis (in particular, explanations related to the interpretation of the individual questions). At the end of the deployment a representative of the organization presented a summary of the MORPH model's application to the author.

The representatives of the pilot organization had questions related to the individual assessment questions formulations. The clarifications were provided on an ongoing basis by the author and some of them were taken into account in the MORPH model's version that was developed after the pilot deployment had been completed. The pilot organization appreciated the completeness and comprehensiveness of the assessment questions, but also noted a relatively long time required to give an answer. Furthermore, the representatives of the pilot organization indicated that it would be extremely valuable for them to be able to compare the results they obtained with the results of other organizations (most preferably from the same industry). The author noted that creating a benchmark database could be problematic due to formal reasons, as companies (Polish firms in particular) are reluctant to grant consent for making their, even anonymized data, available for scientific research.

Based on the feedback received the final (as of this moment) version of the MORPH model was prepared.

At the same time, the completed deployment allowed to initially prove at least some of 5 design assumptions defined at the beginning of this section to be true:

- application of the model allowed for objectively assessing the actual robotic process automation maturity level for the given organization;
- model can be used at a company that does not have a lot of experience in robotic process automation yet, but during the pilot project no limitations were identified that would prevent the model's application at a higher maturity level company.
- model was applied at a large company operating in the financial industry but no limitations were identified that would prevent the model's application at a company of a different size or a different industry;
- model was applied using the organization's in-house resources;

- model is not connected to any specific robotic process automation vendor/tool (the company at which the pilot deployment was completed used one of the highest rated RPA tools on the market, but the model can be used to assess maturity at companies that use other, even niche solutions).

Summary and Directions of Further Research

As a result of very widespread use of robotic process automation tools by enterprises, an interdisciplinary research area dealing with advanced automation and robotic automation technologies from the point view of their impact on economic and organizational aspects of the operations of enterprises (in particular, companies operating in the services sector), which is defined by the term robonomics (Ivanov, 2017), is currently developing.

Robotic process automation - viewed as a special type of organizational change - may affect the modification of the components of the enterprise's business model, as well as the elements of its management system. If properly implemented, it allows for achieving a number of benefits - both financial and non-financial. If improperly implemented, it can even disrupt the continuity of the business processes. That is why conscious and mature robotic process automation management is so important. This can be helped by the systematic assessment of the company's robotic maturity.

In the first part of the article the author lays out three goals of this paper. In the second part of the article an attempt is made to accomplish the first goal: understanding the term Robotic Process Automation. In the third part of the article the structure of maturity models is discussed, and thus the second goal of the article is achieved. The proprietary model for assessing robotic process automation maturity at enterprises is discussed in the subsequent part of the article. The approach to its design is presented, as well as its initial verification method is described. This way the third goal of the article is accomplished.

The initial verification of the developed MORPH model confirmed its applicability. Therefore, the author is planning to continue research in this area. In particular, based on the experience gained the author is planning to expand the approach developed: he is intending to enrich the robotic process automation maturity model with aspects related to the intelligent (cognitive) robotic process automation. As far as possible, works on the verification of the model by international organizations will also be undertaken. Additionally – in accordance with the feedback from the pilot deployment – an attempt will be made to develop an anonymized organization self-assessment benchmark database. This is why the MORPH model developed by the author is made available free of charge – including the detailed description (along with the complete list of assessment questions) and the IT tool supporting its application. Any organization may apply the model for its internal needs, and also adapt it to the extent required thereby. The precondition for the free of charge use of the model shall be the consent of the interested entity to provide anonymized assessment results to the benchmark database.

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[i] The author was an organizer of the following research events: "Robotic process automation, cognitive automation, augmented intelligence – presence and ambitions" seminar (July 4, 2018), "From simple automation to accounting and reporting robots" seminar (September 20, 2018), "Democratization of automation and robotic automation in the creation and absorption of digital innovation" seminar (July 4, 2019), "Developing advanced digital competences (robotic process automation and artificial intelligence) among business departments' personnel" seminar (December 12, 2019), "Customer management strategies in the world of business automation and robotic process automation" workshops (March 22, 2017), "Data + algorithms in customer management" workshops (April 26, 2017), "Robotic process automation from the legacy systems' perspective" workshops (May 30, 2017).

[ii] Author conducted an analysis of 18 projects completed in Poland, related to the implementation of the RPA tools in medium and large companies representing diverse industries (banking, insurance, telecommunications, financial services, BPO (Business Process Outsourcing) and SSC (Shared Service Center), e-commerce, traditional retail). However, the author is aware of the fact that an 18-interview sample is limited in size. The reason for such limited size was still a low penetration of robotic process automation. The analysis was based on semi-structured interviews conducted with persons in charge of robotic process automation deployments (middle level management personnel) or supervising such implementations (higher level management personnel). The criterion for selecting respondents was having completed at least one pilot RPA tool implementation. The interviews were carried out in the 2018-2019 time frame.

Cultivating Leadership Among Accounting Educators in Malaysian Context Using Qalb-Guided Leadership Framework

Indarawati TARMUJI,
Faculty of Accountancy, Universiti Teknologi MARA UiTM Selangor, Malaysia
indarawati@uitm.edu.my

Radziah MAHMUD
Faculty of Accountancy, Universiti Teknologi MARA UiTM Selangor, Malaysia
radzi132@uitm.edu.my

Tengku Fairuz TENGKU EMBONG
Faculty of Accountancy, Universiti Teknologi MARA UiTM Selangor, Malaysia
tengkufairuz@uitm.edu.my

Abstract

This paper aims to discuss the concept of qalb-guided leadership and the importance of cultivating the qalb-guided leadership elements among Malaysian accounting educators. The educators are leaders that play a significant role to educate students to become intellectually, spiritually, emotionally and physically balanced as well as harmonious to their family, community and country. Leadership without qalb (heart) will lead to intellect without heart, negligence, lack of mindfulness, confusion and doubtfulness. Nowadays, there are tremendous issues in relation to integrity, corruption and unethical behavior in teaching and learning as well as in the accounting profession, which could not be ignored. Thus, using qalb-guided leadership framework components namely wisdom, justice, courage and temperance, this paper can explain how it could reinforce the commitment with drive, focus, energy and synergy of accounting education in higher institutions with consistency, resilience and perseverance among accounting educators. This discussion is expected to add value to the existing literature on leadership quality issues since the integration of qalb-guided leadership elements in education is still at the early stage. Since wisdom, justice, courage and temperance are universal concepts, they are relevant to be practiced in any higher education institutions globally.

Keywords: Qalb-Guided Leadership, Accounting Educator, Education.

Introduction

Education plays a significant role in the development of individual characters (Muhamad, Saleh, Abu Kasim and Suppiah, 2019). In transforming the education system, it is essential to consider the outcomes of the education system beyond the economic implication. Malaysian education sector is guided by National Philosophy of Education (NPE) and directives from Ministry of Education (MOE) and Ministry of Higher Education (MOHE). The NPE sets out the education blueprint which stipulates that education must be aspired to foster a person to be balanced in terms of intellectual, spiritual, emotional and physical in line with religious faith (Ministry of Education, 2008). While MOE is the government agency that oversees the pre-school, primary and post- secondary education level, MOHE is another agency that governs the Malaysian higher education. Both MOE and MOHE assist the government in cultivating and fostering students' potential in fulfilling the country's vision (Ministry of Education, 2013; Ministry of Higher Education, 2020). Thus, by focusing on a holistic education system, it is hoped that Malaysia will become a developed country that has congruent citizens with high earnings economy.

The ethical behavior of accountants is extremely significant since accountants are seen as the custodian of public trust (Muhamad et al, 2019, Salleh and Ahmad, 2010). In order to curb immoral and unethical behavior among accountants, ethical values must be inculcated in accounting education starting from the first year of the students' life. In 2006, the demonstration of students' ethical values has been incorporated as one of the learning outcomes in the Malaysian

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accounting degree curriculum (Hala Tuju 2, 2007). Before accounting educators can integrate ethics into their teaching and learning activities, they must possess such values. They serve as models of desirable leadership traits to their students within the university environments and society. The educators' values will determine their emotions, behavior and accordingly the outcomes of their teaching and learning activities. Since they have integral roles in establishing holistic students in achieving balance and harmonious life, educators must portray themselves as individuals who possess such ethical manners.

Qalb-guided leadership is seen as a recommended approach in cultivating ethical behavior among accounting educators. Accounting educators are regarded to be leaders since they have the authority to influence their students' achievements within their position as educators (Jaques, 1989). Instead of motivated by incentives, sovereignty or eminence, accounting educators should be motivated by a sense of responsibilities, accountability and clarity of purpose that are determined by qalb or spiritual heart (Abdul Razak, Mohd Noor, Abdul Mutalib, Mohd Jailani and Wan Razali, 2018). Leadership with qalb will lead to intellect with heart, care, mindfulness, clarity and certainty. Consequently, a good leader should have, among other things, good intentions, be forever mindful of Allah, just, trustworthy and truthful.

By applying qalb-guided leadership, accounting educators should be able to transform their essence and strengthen their responsibilities and accountability. Having pure qalb will induce accounting educators to reconcile religiosity and their engagements including teaching and learning activities. The good values possessed by educators will be demonstrated by instilling love, kindness, mercy and graciousness in dealing with any issues that the educators encounter.

The leadership attributes that form the foundations in qalb-guided leadership are principally derived from the viewpoint of al-Ghazali. These attributes are persistent with other behaviors of leaders across various circumstances and perspectives. In accordance with al-Ghazali, four cardinal virtues of a leader are wisdom, justice, courage and temperance. Justice is argued to be the most important cardinal virtues, as it must not be separated from the other virtues (Abdul Razak et al, 2018).

Thus, this study seeks to discuss the concept of qalb-guided leadership and the importance of cultivating the qalb-guided leadership elements among accounting educators.

Problem Statement

The term 'leadership' should be discussed in a wider perspective. It includes not only the head of departments but also all individuals in the organization. Thus, leadership is not associated with the position held as individuals are deemed to be leaders in their surroundings (Abdul Razak et al, 2018). In the context of the corporate world, accountants are considered to be one of the leaders in an organization. Being entrusted to safeguard public trust, accountants should possess high integrity and act professionally and ethically in disseminating financial information to the users.

Contemporary failures in high-profile corporates such as One Malaysian Development Berhad (1MDB), Felda Global Ventures Holding Berhad (FGV), Transmile and Perwaja Steel have triggered many questions. One of the questions can be related to leadership effectiveness and consequently, the integrity of the accountants is at stake. Even though the accountants have attended leadership training as part of the education curriculum at the university level and through corporate education, they may engage in unethical conduct to pursue their personal interest at the expense of the organization. This situation demands a holistic approach in promoting ethical and professional values that lead to effective leadership practices among the accountants in Malaysia and globally. Study done by Alam, Said and Abd Aziz (2019) found that ethical leadership quality has positive influences on leaders' behavior. Thus, it is suggested the ethical values among leaders should be cultivated at lower and higher education levels.

The current trend has shifted the focus of accounting educators from teaching culture to product-driven research culture. Instead of teaching activities, the main criteria in promotion exercises to be generally considered are conference presentations, research grants, publications and consultancy (Chunmei and Chuanjun, 2015). Thus, accounting educators who actively present papers, do research and consultancy work will be highly recognized and financially rewarded. Due to practical restrictions encountered by accounting educators such as heavy workloads, limited resources, institutional and individual differences as well as unprofessional review and publication process, educators may involve in unethical and immoral conduct such as plagiarisms and academic inequities. By possessing strong and sufficient leadership virtues, educators should be able to exercise ethical and professional judgment

continuously at all education levels (Shairf, Junaid and Malik, 2019) regardless of the pressure from the top management.

The educational approach has experienced a major shift starting from March 2020 due to COVID-19 pandemic. Since face-to-face classes are not permissible to be conducted, online teaching and learning are seen as the best alternatives to the conventional approach in order to ensure academic continuity. A study done by Akdemir, Vural and Çolakoğlu (2015) indicated that the tendency to perform unethical behavior in virtual environment is greater. Due to stress and pressure, educators may act unethically to ensure their tasks are completed while juggling with challenges faced in working from home. The integrity of accounting educators may not be upheld and instead of focusing on teaching-related tasks, they take the opportunity to involve in activities for their personal interest. Thus, this situation shows the importance for accounting educators to have leadership virtues that uphold the integrity and ethical values in all circumstances.

All these ethical issues can be minimized if the educators possess appropriate leadership virtues. Literature suggests that the virtues on leadership can be explained in various ways. This study intends to elaborate on the leadership concept using a qalb-guided leadership framework. Thus, this study aims to discuss the concept of qalb-guided leadership and the importance of cultivating the qalb-guided leadership elements among accounting educators.

Education Leadership

Nowadays, there is an extensive belief of the quality of leadership makes a significant difference to the higher institution and student outcomes (Bush, 2007). All higher institutions require effective leaders and managers to provide the best possible education for their learners. The main asset is the people, which requires the development of skill and knowledge to become competent. This requires trained and committed educators, which, in turn, creates powerful leaders. Leadership is a process of inspiration built on clear values and beliefs and fosters a 'vision' for the higher institutions. The vision is expressed by leaders who strive to gain the assurance of staff and stakeholders and its learners for the institutions' benefit in the future (Bush, 2007).

Education in Malaysia is a continuous endeavor to build human capacity as a whole and to combine efforts to create people based on faith and obedience to God who are mentally, spiritually, emotionally and physically healthy and harmonious. These initiatives are aimed at developing Malaysians who are knowledgeable, virtuous, accountable and able to achieve personal well-being and contribute to the peace of their families, societies and countries. Referring to the National Education Philosophy (1966) blueprint, there are four dimensions of leadership education. The first dimension is enhancing individual potential in a comprehensive and integrated manner to be someone who is balanced and harmonious. The second dimension involves a balance encompassing intellect, spirituality, emotion and physical wellbeing, initiated with faith and compliance to God's rules. The third dimension is producing Malaysians who are knowledgeable, competent, virtuous and responsible and possess the ability to achieve personal wellbeing. The fourth dimension is the capability to develop and contribute towards the harmony of their family, community and country. Thus, all academicians play a significant role in molding students as humanistic persons, holistic and balance in their values, thinking and action.

Ensuring future quality leadership is vital for higher education and educational systems need to focus on fostering future leaders, as well as making academia an attractive profession. In systemic terms, the present challenge of leadership is not only to enhance the quality of current leaders but also to establish clear plans for future leadership and efficient leadership succession processes, particularly for educational institutions. Many educational representatives are active in governance problems, engaging with local, state or national levels of university education (Abdul Razak et al, 2018). The educational leaders at the university level usually function as university administrators, such as department chairs or academic deans.

In the context of the Malaysian higher education institutions, the Ministry of Higher Education (MOHE) has released Malaysian Education Blueprint 2013, which focusing to improve the quality of graduates especially accountancy talents produced by higher institutions (Johari. Mustaffha, and Mohd Deni, 2016). The education system's direction is to ensure that all students maintain awareness, expertise in professional and leadership, bilingual expertise, integrity, faith and foreign identity (Jalil, Haron and Muda, 2019). MOHE subsequently published the Malaysian Education Blueprint 2015-2025 (Ministry of Higher Education, 20xx) introduced elements of ethics and spirituality as one of the qualities of the graduates. It is predicted that students will be ethically and socially upright, religiously grounded, humane and loving, respect environmental growth and a balanced lifestyle (Jalil et al, 2019). The idea of qalb-guided leadership was then implemented as an additional factor needed to improve the skills of institutional

leaders. Qalb-driven leadership is used to control the conduct, thinking, behavior, feelings and emotions of leaders, according to the Malaysian Higher Education Leadership Academy or AKEPT Program Book (2018). The presence of qalb concept in the higher education system aims to offer high quality education, excellent individual and prosper the nation (Sarif, 2018). Qalb concept is based on both the Rukun Negara and the Philosophy of National Education which inspires a concept of "balanced and harmonious human being" (Johari, Mohd Shamsudin, Yahya, Tan and Zainun, 2018). This qalb-guided leadership is expected to assist the accounting educators to transform their essence and strengthen their responsibilities and accountability in producing talented accounting graduates that have a balance between knowledge and ethic. In the current education system, educators are focused on educating the mind and neglected the heart. Therefore, graduates of straight-A's often lack of soft skill, leadership skill or qualities to shape the society (Majid, Liming, Tong and Raihana, 2012).

Ramsden (1998) gives the concept of Academic Leadership and he suggests that higher education leadership has features such as leadership in teaching, i.e. presenting new teaching concepts, bringing enthusiasm to teaching, leadership in the study, strategy vision, networking and collaboration. Educational leadership is primarily concerned with the duties and responsibilities of the leadership team in improving the management of the institution (e.g. university), as well as students' achievement (Connolly, James and Fertig, 2019). Accounting educators are collaborating with the team leader and expected to create positive change in the institution's educational policy and processes. Besides, leader should inspire people to be open and put more effort to achieve challenging objectives. The leader must provide an atmosphere of trust and support, equal and productive management, i.e. the delegation of tasks and the coordination of tasks, creation and acknowledgment of results (Siddique, Aslam, Khan and Fatima, 2011). Leaders are agents of transformation whose effectiveness is measured by how efficiently they articulate and execute the strategic vision and mission (Dess, Eisner, Lumpkin and McNamara, 2019) of the education system.

Academic leaders should also have a strong insight into values and familiarize themselves with internal and external developments in the needs of the higher institution. Today, the learning world is full of challenges. The academic leader should be experienced and professional enough to efficiently handle their duties (Jalil et al, 2019). In the contact of accounting educators, they should portray a good role model for their students. Therefore, educators are sought to constantly purify their qalb and to choose in moderation the way of life to attain the dimension of harmony, intellectuality and spirituality. The strong basis for the accounting educator's excellent leadership is to foster good value through components of qalb-guided leadership, i.e. Wisdom, Justice, Courage and Temperance (WJCT).

Qalb-guided Leadership

Leadership without qalb will lead to intellect without heart, negligence, lack of mindfulness, confusion and doubtfulness (Abdul Razak et al, 2018). It will create a blind heart with no compassion, which in turn increases the hardness of the heart and affects other human abilities, such as looking but not seeing or seeing but not perceiving, hearing but not listening or listening or not understanding. The main ingredient of good values for leadership is the qalb. Through accepting the nature of the qalb the good leadership qualities could be extracted eventually. It is crucial to understand the quality of the leadership, the nature and the function of the heart to make it transformative; otherwise, it will be less meaningful and remains as a ritual.

Qalb is a term that originated from the Arabic word which means heart (qalb), is a masterpiece of spiritual compositions of the human being. Heart (qalb) is inclusive of both the physical organ that pumps blood in humans and animals and the spiritual entity which can be portrayed as sincerity, a reflection of someone that has a heart (Abdul Razak et al, 2018). The most essential spiritual heart fosters spiritual knowledge, intelligence, intellect personality, compassion, love, affection and courage. Thus, the central of spirituality is the heart. Heart (qalb) has a close connection with the human character that could affect the human point of view of the world. It works to influence human behavior. Social and emotional learning, life skills education, critical thinking, ethical reasoning and dispute resolution are all included in the definition (Solihah, 2012). Heart (qalb) is a priceless asset because it is like mirrors which reflect the way human act or view. Human is formed in the pure heart (qalb) due to the existence of the heart (qalb). However, education and experience have some power to create paradigm fetters. Those fetters close the essence of a pure heart (qalb), the loss of a pure heart would have failed to think and remain critically (Solihah, 2012). The heart will determine a person either has faith, love anxiety, sadness, happiness, mankind or religiousness, a good or bad person (Syaefulloh, 2016).

Abdul Razak et al, (2018) introduced a Qalb-Guided Leadership framework which is formulated on the basis of al-Ghazali's Ihya' Ulum al-Din description of the Four Cardinal Virtues - Justice, Wisdom, Courage and Temperance (WJCT). Abdul Razak et al, (2018) had been discussing the relationship between qalb and leadership. They had suggested that as a leader, all humans should have a balance of all four elements (WJCT). The first element, Wisdom, demands balance and it gives rise to discretion, excellence and comprehension of the soul's implicit consequences of actions and secret weaknesses (Abdul Razak et al, 2018). When wisdom is unbalanced, cunning, swindling, deception and slyness will be the result. Further, if the unbalanced is in extreme deficiency, the vice of stupidity is generated. When they have the competent mindedness of modesty as a result of their analytical competence and still have a thorough and critical thinking ability, accounting educators should exercise the sound of wisdom. In line with education wisdom, Helskog (2019) also proposed the approach of realistic theory to imaginative and holistic dialogues as a way to promote wisdom-oriented pedagogy. Wisdom is crucial in the relationship between educators and young people, not just to make life sustainable, but also to allow it to flourish.

The second element is Justice where the condition and strength in the soul will control the expansion and contraction of anger and desire as directed by Wisdom (Abdul Razak et al, 2018). The absence of justice has no extreme of excess and defect; it has only one opposite, which is cruelty. In the course of the teaching and learning process, accounting educators are expected to show consistency and justice in their decision making. Often educators face problems in penalizing the misconduct of the students such as absenteeism, plagiarism in finishing the project or task and so on. Thus, the educators should possess good negotiating skills when dealing with a problematic student, not too much sympathy, but they should have rationale empathy. Compassion skills in handling their students according to their emotional reaction will reflect effective communication. Effective communication is a must for educators in providing the teaching and learning process. This is the principle of justice that all educators should uphold and embed in their mind set. Fabionar (2020) argued that it is necessary to incorporate program content that will inspire new educators to deliver justice that will offer students the skills they need to build and sustain justice practices in their everyday lives.

The third element is Courage, which refers to the subjection of the irascible ability to the intellect. The irascible ability, when sound and balanced is called courage. Courage gives rise to nobility, endurance, dignity and suppression of rage. Irascible ability when it loses its balance and inclines towards excess is called recklessness (Abdul Razak et al, 2018). When unbalanced and inclined towards weaknesses and insufficiency, it is termed fearfulness and laziness. Accounting educators should have the consistency of mind or spiritual courage to venture, persevere and endure any apprehension or challenge when fulfilling their duties. As a reflection of their academic abilities, they can still be self-confident, self-motivated and becoming an aspiration to their students (Payne, 2020). The accounting educators should have self-control skills when engaging with their students and the community. The analytical reasoning skills also should be embedded in the educators' skill set where they have the ability to collect and analyze the information, problem solving and decision-making. Payne, (2020) also indicates that the concepts of education leadership can be effectively extended to the framework of a higher education learning practice and provide a certain discretionary approach when developing and implementing the course. Thus, the element of courage is essential for educators, as they need to be role models and assist their students in understanding their talents and strength.

The last element namely Temperance means the disciplining of the appetite by the intellect and the law. Temperance is a quality that gives rise to kindness, modesty, patience and tolerance (Abdul Razak et al, 2018). When pushed to the point of exceeding the needs are called greed, cupidity and obscenity. The accounting educators must practice the power of self-restraint, socially upright and extremely principled, which will help form and transform the society. Education in higher institutions should encourage moral growth, shape positive qualities of character, i.e. moral values that should be formed by maturing individuals, so that they can make tough decisions and sacrifice for change (Horowski, 2020).

Based on the four fundamental virtues for leadership as explained above, it is important to cultivate and reflect all the accounting educators with these four elements namely wisdom, justice, courage and temperance. The positive value that can be derived from WJCT will enable the accounting educator to become a leader that possesses the right and clear direction to achieve the mission of education as well as to achieve the vision of the national policy of education (NPE). Besides being trustworthy, accountable and responsible, the accounting educators also are expected to have wisdom and intelligence, openness and tolerance. The accounting educators should always be transparent and keen to high integrity conduct, balance and sustainable as the accounting profession nowadays being exposed with so many

unethical issues as being highlighted in the problem statement above. Accounting educators play an extremely important role in shaping the personality and actions of an individual, soul and spirituality, as they will be leaders in the future (Liou, 2016).

Again, it is worth highlighting the needs of spirituality elements in creating a leader. Subsequently, spirituality is a path emphasizing self-awareness, human interdependence, creativity, practicality, social justice and love. Therefore, it will naturally enable transformation without denying our basic human nature. Spirituality establishes a harmonious relationship between human beings and the Creator and impart balance to both inner and outer needs of human, thus reducing all the unethical conduct. Some people become too materialistic, greedy i.e. to focus on self-achievement and individualism, resulted in an imbalance in self-career development. More than that, it is quite common that certain academician, when they are more focused on personal glorification, they would not be able to attain the true meaning of knowledge, unable to realize their true selves and failed to gain their true sense of happiness (Abdul Razak et al, 2018).

Thus, cultivating the qalb-guided leadership will enable the accounting educators to transform their inner self, embrace the right values as well as empowering responsibility and accountability. Qalb-guided leadership also can shape talent, icon and potential leaders, excellent delivery, provide solutions, reconcile religiosity on daily activities, reconcile high performance and human relationship besides nurturing love, kindness, mercy and gracious (Abdul Razak et al, 2018).

The Importance of Qalb for Accounting Educators in Accounting Education

Accounting education blends education with the accounting practice in which accounting and accountant education are necessarily related to the presence of accounting in the industry (Dellaportas, 2019). Accounting as a discipline has enjoyed a growing degree of popularity within the corporate world in the twentieth century. With a rising population of accounting graduates, accounting education has enjoyed a similar reputational development (Jalil et al, 2019). They become technically skilled when students are prepared, rather than educate, but are less well-rounded in terms of communication, interpersonal, critical-thinking, decision-making and professionalism (Nelson, 1995).

The nature of accounting education requires educators to think more carefully about the quality of accounting education and clear about what accounting education is attempting to achieve. The accounting educators face challenges in educating the accountants to become highly integrity, ethically and act professionally. Inculcating students with principles to become reflective practitioners should be the aim of contemporary accounting education so that they can behave honestly, with expertise and contribute to a life in which they forsake personal well-being for the wider community's interests (Jalil et al, 2019).

In an age of postmodernism, accounting educators still face difficulties in teaching modernist education (Read and Miley, 2019). In Industry 4.0 and Society 5.0, soul and qalb environments are important to allow for greater human communication, interaction and involvement. The most powerful force to face all the challenges in this era is to have a solid and determined heart or qalb (Sarif, 2018). As such, qalb (heart) influences beyond ranking business (Radojicic and Jeremic, 2012). According to Sarif (2017), the effects of qalb with the Tawhidic paradigm are ready to provide a holistic view on Industry 4.0 with Society 5.0 which is capable of strategic planning of higher learning institutions in Malaysia into the orientation, standardization, practices, conviction and commitment.

Another concern about the profession is ethical standards learned and ultimately exercised by the accountants. Stephenson (2017) recognized that the principles of those entering colleges did not meet the ethical criteria of the accounting profession, but noted the need for high ethical standards required by the profession and the difficulties faced by the profession in hiring individuals with high ethical standards. The reassessment report on the accounting program at public universities i.e. Hala Tuju 2006 was issued by the Malaysian National Higher Education System, which mandated that professional principles and ethics should be integrated into all accounting program courses (MOHE, 2006). While ethics has now been integrated into the curriculum of higher education, it still appears to be inadequate. There is a criticism that educators have been contributing to the raise of business news scandals by discharging low quality technical education. As a result, the role of accounting education has increased in importance as a means of inculcating good conduct among accountants to complement regulatory action (Jalil et al, 2019). The underlying philosophy of the degree of education obtained during their studies is one of the fundamental aspects of an accountant's intellectual growth. Ethics in accounting education must begin with principles, not ethical codes of

conduct and responsibilities, not laws (Jalil et al, 2019). It is therefore assumed that the cardinal virtues of qalb-guided leadership i.e. WJCT will help or complement the ethics curriculum that is embedded in the higher institution.

The main function of qalb is to shape individual personality and get a strong human character (Syaefulloh, 2016). Educating and cultivating qalb (heart) are required since it affects all human parts include physical (IQ), psychological (EQ) and spiritual dimension (SQ) (Solihah, 2012). Education does not only deliver the newest and fullest information, it also develops the deep confidence and character of the student in order to boost the strength and pursue the objective of life. The accounting educators must have a high understanding of the principals of the teaching and learning process in educating their students. Moreover, education is not only focused on teaching and learning, assessment, pass the examination and get a good job, but the most important part is to ensure that the students can decide which one is right and wrong (Solihah, 2012). Excellent in grade but not having the right attitude is futile. Thus, both should be balanced i.e. excel in academics and attitude (Syaefulloh, 2016). Therefore, it is suggested to get a clear direction by using the qalb-guided leadership, inclusive with the element of WJCT.

Subsequently, the good qalb will produce good leadership and create good quality, while the bad qalb will build the characteristics of bad personalities in a person's leadership skills (Kamaruding, Naim, Kamaruding and Ibrahim, 2019). Leadership is essential to the growth of a stable society and the survival of the region, as addressed by Lukman (2015); in the Islamic tradition, the issue of leadership receives considerable attention. This is because, in Islam, leadership is regarded as the most important tool for an ideal society's fulfilment. Leaders must be able to affect not just the accomplishment of a shared goal, but also the legal achievement of the goals (Jamaludin and Akhir, 2016). The formation of a noble personality in accounting educator as a leader is thus important, as it is the foundation for getting the students to the desired outcomes as well as encouragement along the right path. An accounting educator could become a competent leader who possesses leadership skills, knowledge, abilities and behaviors that contribute to superior performance. Subsequently, this could produce a professional accounting profession in the dynamic business environment (Johari et al, 2018).

Accounting educators have a vital role to play in human development. Integrating the qalb components, WJC, is a core component of efforts to understand the potential of human growth. The human growth process must also consider conditions that prohibit the heart from being completely formed, hence reach its fullest level of purification (Jamaludin and Akhir, 2016). Therefore, qalb-guided leadership virtues are expected to change the accounting educators' personality, values, emotion and motivational level (Abdul Razak et al, 2018). Through wisdom virtue, accounting educators will be more productive and resourceful while considering others in their conduct. Having strong courage, accounting educators will be more diligent and flexible while having self-control, analytical and intellectual skills. Accounting educators who have temperance virtue should have high self-discipline, positive orientation, tolerance and socially aware of their surroundings. Justice value cultivated in the accounting educators' life will imbue them to be better in making decisions by having appropriate skills in negotiation, communication and relationship. It is suggested that qalb-guided leadership virtues practiced by accounting educators will help them to collaborate with other stakeholders in the education sector to bring wellness and wellbeing to the nation (Sarif, 2018). Besides, Dogarawa, (2013) has argued that a person who practices hisbah (the practice of deeds and prohibition of wrongdoing) will always be persistent and diligent to create a wise, truthful, trustworthy, moral, and reasonable.

Conclusion

Renewing the education leadership concept by integrating with qalb-guided leadership which focuses on four fundamental virtues, WJCT is crucial nowadays to reduce or minimize the unethical crises among the accounting profession. Hala Tuju 2006 was published by Ministry of Higher Education which stresses professional integrity and ethics, incorporated into the curriculum, backed by acts taken by many professional accounting bodies such as the American Accounting Associations, International Federation of Accountants (IFAC), Association of Chartered Certified Accountants (ACCA) and Malaysian Institute of Accountants (MIA) to improve ethics coverage in the accounting curriculum, nevertheless the qalb-guided leadership elements is necessarily needed as it could complement the professional accounting profession even better in the future. Spirituality is so impactful since it could impart balance for both the outer and inner needs of humans (Abdul Razak et al, 2018). In educating potential accountants, the qalb-guided leadership virtues will assist accounting educators to produce not only human capital but also a human being since a holistic education system is crucially more important than science and technology subjects (Md Aroff, 2014). The practical implication on the use of qalb framework could cultivate the educators to become more impactful and sustainable leaders. The four cardinal virtue (WJCT) will enable accounting educators to have self-monitoring, self-awaken, self-consciousness, self-regulation, self-discipline, self-management and self-leadership. Besides, it could establish a harmonious relationship with the self, society and God. Therefore, it is suggested that the qalb-

guided leadership virtues should be practiced by accounting educators because it will significantly influence their students' behavior. The values that have been learned will be applied by the students in their daily life resulting in more civilized behavior and alleviation in fraud and corruption. Students that are equipped with qalb-guided leadership are expected to become impactful leaders. Wisdom, justice, courage and temperance are universal concepts, thus this theoretical framework is very impactful to practice not in Asian context only but that makes global practice relevant. The empirical analysis using this approach is suggested for future research after the adoption of this qalb-guided leadership framework as a standard in the higher education institution, so that progress can be shared and the loophole could be strengthened.

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Factors Influencing Tax Compliance: A Literature Review

Christina VINCENT

Multimedia University, Melaka, Malaysia
1132702822@student.mmu.edu.my

Zauwiyah AHMAD

Multimedia University, Melaka, Malaysia
zau@mmu.edu.my

Yen Yen YIP

Multimedia University, Melaka, Malaysia
yyyip@mmu.edu.my

Abstract

Studies on tax compliance have evolved over the years and it is highly important to analyse on the depth of the research findings and voids that could be filled for future researches. In general, past empirical studies warrants the importance of institutional factors, attitude, social factors and enforcement factors in raising tax compliance among the taxpayers. The inadequate sample and contradicting findings are the two major voids identified from the past studies to be addressed in the upcoming tax compliance studies.

Keywords: Tax Compliance, Factors, Taxpayers

Introduction

Malaysian income tax is the greatest contributor to the country's income, which is about fifty to fifty-five per cent each year (Inland Revenue Board of Malaysia [IRBM], 2018). The highest tax figure was noted in year 2018 where individuals, the second largest direct tax contributors achieved a tax record of 26.32% or RM 36.065 billion from the total direct tax revenue of RM 137.035 billion in 2018 (theedgemarkets.com, 2019). In 2004, the major tax reform took place in Malaysia where the Self-assessment system (SAS) was introduced replacing the Official Assessment System for individual taxpayers. The ultimate objective of SAS was to attain cost effectiveness in the process of tax collection via voluntary tax compliance and the eradication of enforcement efforts (Silvani and Baer, 1997; Kasipillai and Hanefah, 2000). However, the tax reform implemented has led issues of tax compliance (Hai and See, 2011; Saad, 2009). Tax compliance issue has initiated much interest among researchers, with the main attempt of identifying the influencing factors and determining ways to increase compliance. This paper attempts to explain the key factors investigated in the previous studies relevant to tax compliance and identify significant research gaps that are left to be addressed.

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Literature Review

Tax Compliance

Tax compliance has been interpreted in different manners by tax researchers. In the earlier years, Jackson and Milliron (1986) described tax compliance as declaring the taxpayers' entire revenue and tax remittance to the appropriate tax body on time in accordance with the relevant tax rules, regulations and court orders (as cited in Mas'ud et al., 2014). Cuccia (1994) explained tax compliance in terms of filing every necessary tax return in the right time and correctly declaring the tax payable in accordance to the tax legislation practicable when filing the tax return. Andreoni et al. (1998) explained tax compliance as the willingness of the taxpayers in complying with tax regulations for the purpose of attaining the nation's economic balance. James and Alley (2002, p. 32) defined compliance as "the willingness of individuals and other taxable entities to act in accordance within the spirit as well as the letter of tax law and administration without the application of enforcement activity". Later, Palil and Mustapha (2011) interpreted tax compliance as the readiness of a taxpayer to obey the tax laws, report the accurate earnings, make the right claims and settle all taxes in a timely manner. As James and Alley (2002, p. 29) reported in their study, compliance definitions are looked as a continuum of definitions, and "this ranges from the narrow law enforcement approach, through wider economic definitions and on to even more comprehensive versions relating to taxpayer decisions to conform to the wider objectives of society as reflected in tax policy". Therefore, the interpretations of tax compliance itself have evolved over the years as reported by diverse number of tax scholars and practitioners. Determinants of tax compliance could be categorised into institutional factors, personal and social factors, and enforcement factors. The following subsections deliberate on past studies based on these categories.

Institutional Factors

Institutional factors form the external pressure or motivating factors influencing tax compliance. Institutional factors refers to individuals' perceptions towards the government and the tax authorities, including perceived fairness towards government spending and tax system, as well as trust and confidence towards the government. Studies that examined institutional factors are mostly influenced by the Equity Theory. The theory postulates that individuals evaluate the fairness of a situation by assessing the inputs and outcomes. Individuals tend to lower their input or raise their outcomes when outcomes are perceived to be inequitable. In the context of tax compliance, perceived inequitable treatment (e.g. misuse of public funds, tax money was spent on projects they do not approve of, corruption), would cause taxpayers to reduce the taxes paid. Tax compliance has also been found to improve whenever taxpayers perceived fair treatment by tax authorities, trust officials and received good services (Tanzi and Zee, 2000; Torgler, 2005; Alm and Martinez-Vazquez, 2007).

In Barone and Mocetti (2011), perceived fairness was found to positively affect tax morale among Italian taxpayers. Perceived fairness was analysed based on the fair outcomes of taxes paid and government efficiency. This reflects the existence of psychological contract between the two parties, the taxpayer and the government or more precisely the fiscal authorities. Fairness in tax system and the level of enforcement have been found to influence tax morale in Yee et al. (2017). The study involved 400 Malaysian taxpayers. The study concluded that when the government is perceived as fair, respondents were more likely to comply with taxes. Nevertheless, Saad (2009) found that fairness perceptions do not significantly influence taxpayers' attitude. The study conducted involved a survey of 852 individual taxpayers in Malaysia.

Ibrahim et al. (2015) examined patriotism, democracy satisfaction, parliament confidence, and government trust in relation to tax morale. The study found that confidence and trust placed by the individuals on the parliament, provision in public spending, government transparency and governance, as well as government efforts to reduce corruption positively enhances tax morale. In contrast, patriotism and the level of contention perceived by the individuals in democracy have been found as not significant. Similarly, corruption and patriotism have been found to negatively influence tax morale in Rutkauskas (2016). Policy changes has been found to negatively impact tax compliance in Engida and Baisa (2014) although perceived government disbursements, perceived equity fairness, function of tax

authorities and tax knowledge did not. Taxpayers who were attentive to policy changes tend to affect taxpayers negatively when policy changes did not produce any anticipated favourable outcomes. Nonetheless, this study suffered from the limited sample used.

In Uganda, Nkundabanyanga et al. (2017) found tax system transparency, voice and accountability and effectiveness of government significantly influence tax compliance. The study also reported the significant influence of fairness factors, including those of public spending allocation and value, tax levels, and tax equalities on tax compliance. Similarly, in Faizal et al. (2017), perceived justice dimensions were investigated in relation to tax compliance. Using responses from 90 survey respondents, the authors concluded that tax compliance is positively influenced by individual's trust on the tax authority and procedural justice. Alasfour et al. (2016), in a survey involving 329 financial managers, certified accountants and auditors, found that tax compliance is negatively impacted by government corruption rate and tax rate. In the same study, productive government spending and perceived tax system fairness was reported to significantly affect tax compliance.

Personal and social factors

Studies on the influence of personal and social factors on tax compliance have been well supported by the Theory of Planned Behaviour (Ajzen, 1991). Past studies are more inclined towards this theory in explaining the relationship between attitude, social norms and perceived behavioural control on tax compliance. Attitude has been explained as one's emotional state related to a particular behaviour. Subjective norms is one's understanding of how the significant others perceived the specific behaviour. Perceived behavioural control is described as a one's perceived comfort or hardships of performing the behaviour (Ajzen, 1991; Ifinedo, 2012).

The influence of attitude on tax compliance has been reported in Saad (2009), Damayanti (2012), Sarrah et al. (2016), Nurwanah et al. (2018), and Sulistianingtyas et al. (2018). These studies reported that tax compliance could be associated with positive attitude towards the behaviour. The relationship is rather straight forward, which is well described by the TBP. However, Salman and Sarjono (2013) documented a different result. The authors found that attitude failed to determined tax compliance. The study used responses from 87 respondents and the limited sample size may have impacted the results considerably.

Subjective norms is significant in Wenzel (2005), Saad (2009), Damayanti (2012), Salman and Sarjono (2013), Mohdali et al. (2015), Jimenez and Iyer (2016), Sarrah et al. (2016), Nurwanah et al. (2018). Jimenez and Iyer (2016) maintained that the influence of social norms on tax compliance becomes significant when social norms are internalised as personal norms by the taxpayers. Such internalisation has a dominant influence over the individual's credence and faith in government where this trust shapes the perceived fairness and eventually tax compliance. In Nurwanah et al. (2018), the influence of social norms on tax compliance, nevertheless, is subjected to individuals' social awareness. These factors could have affected the results in Sulistianingtyas et al. (2018), whereby subjective norms was found to be negatively associated with tax compliance.

Significant influence of perceived behavioural control on tax compliance is documented in Damayanti (2012), Salman and Sarjono (2013), and Sulistianingtyas et al. (2018). However, in Saad (2009), perceived behavioural control is not significant. Sarrah et al. (2016) reported that perceived behavioural control indirectly affects tax compliance via intention. Perceived behavioural control reflects how easy or hard individual taxpayers think in performing any tax compliance behaviour. The influence of perceived behavioural control on tax compliance could have been modified by the respondents' knowledge on tax and experience in tax filing. This support for this notion could be found in Salman and Sarjono (2013), whereby the tax law complexities has been found to negatively and significantly influence tax compliance intention. The study defined complexity as "complex tax laws or failure of good legal norms regarding his actions, implementation, and about the material", (p.316). The study, however, suffered from the low sample size of 87 survey respondents. When the degree of complexity is great and comprehension of tax laws is more difficult, the intention to comply with taxes decreases. The moderating influence of tax knowledge and experience on perceived behavioural control, however, has been adequately examined in past studies on tax compliance.

Enforcement Factors

Various enforcement methods have been employed by the Inland Revenue Board in order to encourage tax compliance, including legal sanctions and penalties. The influence of these enforcement factors, nonetheless, received lesser attention from researchers and existing studies showed conflicting results – hence forming a considerable gap in the literature. In Benk et al. (2011), legal sanctions were found to influence tax compliance. The sanctions examined relates to detection risk and penalty magnitude. The probability of being audited formed the strongest determinant of tax compliance although penalties were found to be insignificant in relation to tax compliance. In Alasfour et al. (2016), tax compliance was found to increase with increased audit rates and penalty rates. In Mohdali et al. (2014), it was determined that punishment threats may have adverse impact on tax compliance. Similarly, Sulistianingtyas et al. (2018) reported that sanctions do not affect tax compliance.

Discussion and Conclusion

Based on the analysis of past literatures, several conclusions can be derived. The significant role of psychological factors to be thoroughly considered by the government in designing and implementing action plans to boost voluntary compliance among the taxpayers. For example, the government should care on how their actions are being perceived by the taxpayers since many of the former researchers have provided concrete evidences on the impact of perception on tax compliance. It is also important for the government especially the tax authorities to understand the taxpayers' attitude towards tax compliance and find ways in apprehending negative attitude among the taxpayers. For example, social medias and mass medias can be utilised to spread the message on paying taxes as a civic duty that every Malaysians must fulfil. The government should actively look out for ways in making tax paying practices as a vital responsibility that should be willingly undertaken by the citizens. It is also important to ensure tax compliance becomes a social obligation to be fulfilled and denying those responsibilities should be viewed as socially unacceptable. The awareness can be created via enforced sanctions. However, it is highly important to recognise the extent of which such enforcement could be effective in enhancing in tax compliance without backfiring.

A significant research gap or lack in the past empirical studies was the inadequate sample. The sample used by some of the researchers in their studies was not a proper representative of the target population being studied. The insufficient sample quality is due to poor quality in sample selection and inadequate sample size leading to a low response rate. For instance, Mohdali et al. (2014) research sample was made up of near 90 per cent of taxpayers who were subject to monthly tax deductions from their salary and only 10 per cent of tax payers who were subject to declare their own earnings and calculate their own tax. This sample casted a doubt on the accuracy of the findings due to the high probability the findings were dominated by the respondents whose tax compliance behaviour were determined by enforcement rather than voluntary in nature. Small sample sizes also may have restricted the research findings, such as those in Salman and Sarjono (2013) with 87 responses and Faizal et al. (2017) with 90 responses.

Another limitation of the previous researches can be seen from the presence of many conflicting findings. For example, in Engida and Baisa (2014), the perceived equity fairness was reported as not significant in determining tax compliance. However, other studies like Nkundabanyanga et al. (2017) had indicated the significant influence of perceived equity on tax compliance. Contradictory results are also apparent in studies of enforcement factors.

Future Studies

Considering the gaps in the current literature, the following factors should be considered in future studies. First, the sample selection should well represent the taxpayers. If voluntary compliance is the main focus, there should be adequate representation of self-employed taxpayers in the sample. Secondly, future studies could focus on factors that increase perceived fairness in the effort to increase tax compliance. Past studies have shown significant influence of perceived fairness on tax compliance. It is about time that perceived fairness is investigated further as to encourage tax compliance. Thirdly, tax knowledge and experience in tax filing should be incorporated in the Theory of Planned Behaviour as these variables could have impacted the relationship between perceived behavioural control and tax

compliance. Fourth, the lack of studies on enforcement factors warrants further research. Enforcement factors have been found to either encourage or discourage tax compliance. Hence, more studies are needed before concrete deductions could be made.

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Why Do Banks Fail to Shield Themselves from Money Laundering Risk?

Yusarina MAT ISA

Faculty of Accountancy
Universiti Teknologi MARA, Puncak Alam Campus,
42300 Bandar Puncak Alam, Selangor, Malaysia
yusarina@uitm.edu.my

Zuraidah MOHD SANUSI

Accounting Research Institute
Menara Sultan Abdul Aziz Shah, Universiti Teknologi MARA
40450 Shah Alam, Selangor, Malaysia
zuraidahms@uitm.edu.my

Rob MCCUSKER

Australian Graduate School of Policing and Security,
Charles Sturt University, Panorama Ave, Bathurst NSW 2795, Australia
robmccusker@hotmail.com

Abstract

It is at times perplexing that with vigorous measures in place, banks are still knowingly and unknowingly absorbing money laundering risk into their institutions. Besides various measures implemented by the banks, the regulators are also making constant attempts to protect the banking industry, but the regulatory force is far from providing a total solution. This paper attempts to discuss some of the reasons (drawn from micro and macro perspectives and looking at institution-specific and industry-specific causes) that might explain why banks are still exposed to money laundering risk despite continuous efforts to reduce the use of the banking sector as a conduit for illegal activities.

Keywords: Money Laundering, Risk, Banks, Competency, Governance.

Introduction

By looking at the modus operandi of money laundering, banks are primarily the first-level contact point with the money launderers (Idowu & Obasan, 2012). The nature of banks, in terms of the products and services offered, accessibility and convenience, lures the money launderers in a far greater proportion than with any other financial intermediaries (Mclaughlin & Pavelka, 2013; Sathye & Islam, 2011) and banks should be aware that they are at risk criminally if they are knowingly involved in accepting money laundering risk into the institutions (Simser, 2011). Money laundering impacts upon the banking sector in two main ways: the erosion of their integrity and the possible threat of financial liability in the event of any legal suit levelled against, or regulatory fines imposed upon them (Bartlett, 2002). Thus, money laundering is a risk that affects not only the banks but also the banking industry and overall financial stability.

It is inarguable that the operations of banks are about taking risks, albeit calculated ones (Al-Tamimi & Al-Mazrooei, 2007; Cebenoyan & Strahan, 2004). Nevertheless, although some money laundering risk is inherent in the very nature of banking operations, it can also be exacerbated by poor control measures and non-compliance with anti-money laundering (AML) policies (Naheem, 2015; Pramod, Li & Gao, 2012) as well as the inability of bank employees to filter the risk posed by the customers (Favarel-Garrigues, Godefroy & Lascoumes, 2007; Johnston & Abbott, 2005). These non-inherent factors could originate from the institution-specific as well as industry-specific causes.

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In fighting money laundering, concerted efforts are being undertaken not only by banks but also the regulators (Araújo, 2009; Usman Kemal, 2014). The endless exposure of the banks to money laundering risk has compelled the financial regulators around the world to be more vigilant in regulating this industry. It is universally recognized that all financial transactions are under surveillance nowadays, and banks are required to operate diligently and be conscious that the regulatory authorities are overseeing how they are functioning (Favarel-Garrigues et al., 2007). At the international level, the Financial Action Task Force (FATF) is an inter-governmental body mandated to set standards and to actively promote effective implementation of legal, regulatory and operational measures for combating money laundering and other related threats to the integrity of the international financial system (FATF, 2012). The regulatory authorities in the respective countries and FATF are actively geared towards making the banks as a secure financial intermediary that is safely shielded from money laundering risk.

Nevertheless, with the persistent measures in place, banks are still being continuously exposed to money laundering risk. Over the years, a number of large and prominent banks around the world, such as Standard Chartered Bank and HSBC Bank, are being affected by money laundering risk (Mclaughlin & Pavelka, 2013; The Guardian, 2019). Hence, question arises as to why these banks are being incessantly exposed to such risk? This paper aims to presents some of the possible reasons that could have led to this predicament. Banks could have managed their money laundering risk more efficiently and effectively with a better understanding of the underlying reasons for this problem.

Nature of Money Laundering Risk in Banks

Money laundering risk in banks can be grouped under two broad categories – regulatory risk and business risk (which is sub-categorised into inherent risk and residual risk) (Sathye & Islam, 2011). Regulatory risk is associated with non-compliance with the practices of customer identification, reporting, record keeping and implementation of an AML programme. Banks have to comply with a substantial amount of legal obligations to safeguard them against money laundering risk. Business risk, on the other hand, implies uncertainty and danger of loss as well as any event that poses a risk due to unforeseen circumstances which could cause banks to fail.
Inherent risk emanates from the customers seeking banking services, the products offered to the customers, the delivery method of the products and the geographical location from which the customer comes or the location in which the offering of products and conduct of transactions take place. Residual risk, on the other hand, refers to the risk that may still exist despite the robust money laundering risk management framework to alleviate all the four types of risks mentioned above.

The most critical aspect relates to the risk originating from the bank employees' assessment of customers' risk. Both Sathye and Islam (2011) and Killick and Parody (2007) similarly explained the inherent business risk by emphasizing the description of the source of risk. The customers themselves, either individual or institutional customers, bear risk due to their source of income and wealth, their past activities and the intended nature of their activities. The customers who are deemed a risk should be assigned with a high alert on the possibility of an alleged money laundering, for example politically exposed persons (PEPs), a customer who has an unusual request for service provision and a customer whose source of funds is unexplained.

Product risk, on the other hand, is the risk posed by the products being offered to the customers and their inherent attractiveness to money launderers as a conduit for illegal activities (Sathye & Islam, 2011). Some products offered by the banks may present greater appeals to the money launderers. For example, investment products, whose returns may involve receipt of a periodical annuity and full payment on maturity, are ideal for money launderers. The way the products are delivered to the customers also poses a different level of risk to the banks. Products that are delivered face-to-face generally pose lower risks compared to those delivered online.

With the Internet, customers are offered with varieties of online transactions that do not require a direct interface with the customers (McDowell & Novis, 2001; Sathye & Islam, 2011). For banks, online transactions, for example online fund transfer, pose a greater risk as the identity of the customer is not visually verified. For jurisdiction risk, money laundering risk can be country-specific in which the economic activity which gave rise to the income or wealth was derived from, or where the activity is to take place. Among these risk elements, customer risk is the strongest link that connects all four elements of risk. Banks need to develop profiles on these risk elements to form the grounds upon which customer identification documents are determined in order to ensure a thorough assessment of the related risks.

The Magnitude of Money Laundering Involving Banks as a Conduit

In 2019, the amount of fines imposed by the regulators topped USD$7.7 billion and banks were the primary recipients of those (Compliance Notes, 2019). Those banks involved were the international banks which are large in size and whose operations span across many countries. Despite good controls being in place, given that they were some of the most established banks in the industry, money could still be laundered via these institutions. The following paragraphs outline some cases involving banks at the international front which have been fined by the regulators for their involvement in money laundering activities.

The first case is London-based HSBC Bank that has been fined by the United States regulator for USD$1.92 billion in 2012 for failing to stop Mexican drug traffickers from using its banking system to launder money (Mclaughlin & Pavelka, 2013). The sum is the largest fine ever collected by a single regulator in a money laundering case. The regulator managed to substantiate that the bank had failed to maintain an effective AML programme and failed to conduct proper customer due diligence (CDD) on some of its account holders, including Mexico's Sinaloa cartel who was infamously connected with drug trafficking activities. Despite the known risk of Mexican-originated customers, the bank put Mexico in its lowest risk category and ignored the warnings that HSBC was likely to be tempting to money launderers.

HSBC agreed to pay the fine and the executives responsible for the relevant banking deal have since left the bank. No criminal charges were initiated as it had been agreed with the prosecutors that criminal charges should be set aside in the event certain conditions were met, including the payment of substantial fines. Some criticised that the fine was too lenient (Fernholz, 2012; The Guardian, 2013) and allowed the bank to avoid pleading guilty to any wrongdoings even though the case could have had very serious implications for financial and economic stability due to the huge size of HSBC globally. This case reinforces that money laundering should be tackled at the point of initial contact with the banks, as once absorbed into the institutions, less can be done to curtail its impacts towards the economy.

The second case involves Standard Chartered Bank which was fined for USD$1.1 billion in 2019 for poor money laundering controls and breaching sanctions against high-risk countries including Iran, Cuba, Sudan and Zimbabwe (The Guardian, 2019). This was not the first money laundering case involving the bank since it was fined USD$340 million in 2012 for breaking AML laws in its handling of transactions for risky Iranian customers. The United States and its allies have increased economic sanctions against Iran for the past few years in an effort to deter the country from developing its nuclear capabilities. The bank was accused of approving more than 60,000 financial transactions totalling USD$250 billion for Iranian customers over a span of a decade. In 2014, Standard Chartered Bank had paid a further USD$422 million in civil penalties for failures to routinely check transactions for signs of money laundering. This series of incidences have dragged the bank into the regulatory spotlight and presented a reputational threat that could be damaging to the bank's market performance.

Another recent case involved Swiss BSI Bank amid the 1 Malaysia Development Berhad (1MDB) sovereign fund issue (Teichmann & Falker, 2020; The Straits Times, 2016). Three of BSI's Bank executives in a Singapore branch were charged with various wrongdoings including money laundering related offences for failing to flag out suspicious transactions that had passed through the bank. One of the executives was sentenced to two weeks in jail and a fine of SGD$10,000 for failing to report suspicious transactions and another executive is serving an 18-week jail term after pleaded guilty in for similar offence. The case has also dragged a former private banker with the bank, who was charged with a similar offence and the court ruled for him to be jailed for four and half years (Thomson Reuters, 2017). Apart from BSI Bank, another giant bank affected by 1MDB scandal is Goldman Sachs which has resulted in an erosion of close to USD$1 billion of its bottom line due to litigation provisions provided in the wake of the scandal (Financial Times, 2020). Goldman Sachs allegedly helped 1MDB in raising USD$6.5 billion in a series of bond issuances, with returns amounting to USD$600 million in fees. Goldman Sachs was criticized for its lack of compliance control and some of the bank's most senior management were also purportedly involved in soliciting the illegal money derived from 1MDB investment activities. The association of Goldman Sachs with 1MDB has led to a series of lawsuits charged by the United States and Malaysian authorities. Although the parties involved are reaching a settlement agreement with Goldman Sachs of USD$3.9 billion for the Malaysian government over the scandal, the bank's reputation has arguably been terminally tarnished.

With these scandals involving large banks, which are deemed to be supposedly equipped with robust risk management practices, it is puzzling as to why these banks are still susceptible to money laundering risk. Questions have been

asked as to whether these banks are actually voluntarily taking in this risk, as they could be abiding with the 'high risk, high return' principle. From another angle, the banks could have been involuntarily and unknowingly absorbing money laundering risk into the institutions due to reasons that require solutions beyond the generic risk management practices.

Factors Contributing Towards Continuous Exposure of Money Laundering Risk in Banks

With all the efforts that have been put together, the question remains on why banks are continuously being vulnerable to money laundering risk. In this paper, we are discussing some of the possible reasons that could contribute to such risk exposure to the banks, both at the micro and macro perspectives and in terms of institution-specific and industry-specific causes.

Bank employees lack soft competencies

Banks could have different ways of monitoring their money laundering risk, with some relying on automated risk monitoring solutions and some still depending on a manual system. There are many automated risk monitoring solutions in the market, some of which are designed for larger institutions, and some of which are adaptable to banks of multiple sizes (Cocheo, 2010). However, the automated solutions encompass limitations such as the lack of criteria for the system to assess money laundering risk. According to Cocheo (2010), in dealing with false alarms and other 'noises' generated by automated solutions, "manual" (human) expertise is needed. The risk screening system used can generate an output which sometimes can be voluminous, and the data output needs to be analysed by people. There is a need for human intervention to assess whether the cases flagged out by the system are truly bearing money laundering risk. Although the banks are exposed to choices of automated solutions in assessing money laundering risk, the human factor in assessing the risk is indispensable (Dowling & Leech, 2007). At the end of the spectrum, risk management within the banks shall not be totally depending on automated solutions. The banks could face potential liability if they fail to establish measures in the form of procedures to detect money laundering which in effect could potentially lead to the conduct of negligence by their employees (Sahamid, 2008).

It was further argued that having hard infrastructure is not quite enough in facilitating the assessment of money laundering risk. Hard infrastructure, for instance in the form of information system technology and regulatory mechanisms, would provide structural support for money laundering risk assessment, but 'soft infrastructure' in the form of human intellectualism is equally important. Information system technology would generate information, as much faster efficiency and human judgement is needed to interpret the information. As the regulators are putting much emphasis on money laundering risk management, the bank employees should have a solid behavioural perspective in looking at money laundering risk. The employees, particularly the frontliners, should act as the first line of defence by utilizing the hard infrastructure and at the same time injecting their soft competencies, in optimizing their capabilities in assessing money laundering risk. This 'soft' capability, however, is deemed to be lacking (Mat-Isa, Mohd-Sanusi, Haniff & Barnes (2015).

Financial crime from within

Employees in the banks, from frontliners to higher-level management, could be complicit in allowing money laundering risk to penetrate the banks. The employees could have used their status and position in the banks to conceal their wrongdoings, which might have led to crimes remaining undetected. These insiders who at times appear to be vulnerable for various personal and work reasons, could be exploited by money launderers who know that these employees are the easiest targets for assisting them in placing the illegal money in the bank. Among the functions that the employees can be complicitly involved in are creating counterfeit checks, co-ordinating banking transactions is a way that can avoid suspicious transaction reporting (STR) and conspiring with money launderers to accept fictitious documents without checking on their authenticity (FATF, 2018).

Bartlett (2002) advocates that money laundering is often a correlation between the crime of laundering the money and fraudulent activities by the bank employees. At higher volumes of money laundering activity, banks in developing countries are vulnerable to corruption by criminals seeking to gain further influence over their money laundering channels, which could involve corrupted employees within the banks. Additionally, he points out that customer trust

is fundamental to the growth of sound banks, and the perceived risk to depositors and investors from employee fraud and corruption is an obstacle to such trust. Hence, opportunistic money launderers would leverage on this predicament to involve the bank employees acting as the insiders to facilitate their crimes of laundering their illegal money through the banks.

Professional Money Launderers

The emergence of professional money launderers with sophisticated modus operandi has made it even more difficult for the banks to detect money laundering risk. The FATF defines professional money launderers as those individuals, organisations and networks that are involved in third-party laundering for a fee or commission (FATF, 2018). They are serving their criminal clients and are complicit partners who may act in professional capacity, such as accountants and lawyers. Professional money launderers may provide a more holistic arrangement for complex money laundering schemes or develop a unique modus operandi tailored to the specific needs of their criminal clients. (FATF, 2018, Neumann & Sartor, 2016). The FATF has revealed that many countries are not adequately investigating and prosecuting professional money launderers as efforts are being channelled to self-proclaimed money launderers i.e. the criminals themselves.

Professional money launderers have become even harder to detect as they are operating a number of different business models, such as in an individual capacity, underground organizations with network of firms, or operating on an online set-up without a clear structure of ownership. Professional money launderers are often found to network with other professional money launderers, creating a complicated web of connections that act internationally to deceive financial intermediaries all over the world. Their camouflage appearance could be deceiving to the banks as they can represent their clients in a legal capacity to disguise nature, source, location, ownership, control, origin and/or destination of the illegal funds in order to avoid detection by the banks (FATF, 2018). By deceivingly acting in their legal capacity, professional money launderers would know how to evade the banks' AML regulations and procedures, and the banks could have missed to detect this risk as much trust have been put on these professionals to act truthfully to their profession.

Silent tone of Proper Governance

At the helm of banks, boards of directors and top management play a crucial role in ensuring proper governance is in place. According to De Haan & Vlahu (2016), solid governance in banks is important because banks hold a dominant position in the financial system. Jayasuria (2009) has proven that good governance practices are positively correlated with the implementation of AML activities, of which top-down support is crucial in ensuring the implementation of the AML activities at the grassroot level. Similarly, the AML compliance programme within the banks is largely dependent on the messages passed down by the board of directors and top management. Failure in having a conducive culture of compliance initiated via a top-down approach would lead the frontliners to perceive lack of consistent efforts in fighting money laundering. This would leave the frontliners to feel that they were battling the war of money laundering with limited capability on their part to have a major influence on the banks.

Absence of good governance leads to a void in the check and balance mechanism, whereby those charged with governance could have abused their power and operate the banks in their own interests instead of the shareholders'. This is seen in the case involving Goldman Sachs and the 1MDB scandal, whereby top management was involved in deriving personal advantage at the expense of many other parties involved. The board of directors and top management should have set a proper tone of governance and shown that the fight against money laundering should be a collaborative effort between all levels in the institutions. Absence of this proper tone of governance 'from above' would undermine the roles of those charged with governance in disseminating the message that they are the gatekeeper for the whole institution.

Differentiated effect of regulatory enforcement

Apart from governance from within, banks are also forced to comply with regulatory requirements. As risk management may be subsumed within the banks' own objectives on deriving commercial advantages, effective supervision by the regulator may diminish the conflict of maintaining good risk management with optimising rate of return to the shareholders (Favarel-Garrigues et al., 2007). As such, banks should manage their regulatory risk by

being constantly alert on the requirements enforced by the regulators. This is crucial as criminals would seek to use banks that operate in lax regulatory environments, or have reputations for non-compliance with AML regulations, as their conduits to launder their dirty money (McCusker, 2000).

However, enforcement effects by the regulators may have different effects on the banks and the employees. For competent employees, strict regulatory supervision is often regarded as a culture of strong monitoring that drives them to act in the best interest of the banks. Bank employees would be compelled to abide by the prescribed AML law, rules and regulations imposed by the regulators since they are aware that any non-adherence would implicate not only the banks but also their individual culpability. In contrast, for less competent employees, they would likely perceive strict regulatory supervision as a nuisance as low-performing individuals generally do not prefer to be monitored. Once monitoring by the regulator reaches a certain limit, less competent employees would tend to reduce their efforts as they feel they would be penalised for their incompetence. Less competent employees would also tend to be ignorance on the requirements of the AML law, rules and regulations. They would be ignorant of the fact that any non-adherence with the AML law, rules and regulations would affect them individually, hence, creating less motivation for them to perform better.

Mighty force of political influence

The politically exposed persons (PEPs) could be those politicians having power over the banks' management as well as random PEPs who comes to the banks seeking banking services. The PEPs, who are commonly the individuals entrusted with prominent public functions (including their immediate family members and close associates), are deemed as those who are influential in the society, hence receiving preferential treatment in conducting their banking transactions (Choo, 2010; Cogman & Head, 2017). The FATF has classified PEPs as risky and banks are required to be more meticulous and thorough in their risk assessment given the exposure posed by the PEPs. A study by Johnson (2008), however, found that there is a lack of scrutiny by the banks in conducting CDD for PEPs. Despite the requirements by the FATF and Basel Committee on Banking Supervision for banks to conduct enhanced CDD on PEPs, Johnson found that requirements to identify PEPs and scrutinise their financial transactions are not fully implemented even by banks in FATF member countries.

Furthermore, in some banks, the political structure of the country may have called for intervention from PEPs' 'hidden hands' in dealing with the banking business. Corrupt politicians, particularly, would use the banks under their power to serve their political as well as their personal needs even if the funds involved are derived from illegal means. In the case of Malaysian 1MDB, the alleged involvement of a prominent PEP in the scandal has forced one of Malaysian domestic banks, AmBank Berhad, to get entangled and fined by the Bank Negara Malaysia for RM53.7 million (The Edge Malaysia, 2015). This kind of mighty political influence from a powerful figure has left the bank in a difficult position to say no to an unusual request for service provision. Banks are at times are forced to give in and provide leeway to the PEPs despite knowing that the sources of funds are intricately unexplained.

Conclusions

In summary, there are several main issues to explain why banks are still exposed to money laundering risk. In struggling to compete and boost banks' market share and profits, some banks may compromise their gatekeeping of money laundering transactions. Banks continue to breach compliance with AML rules to pursue more market share in competitive markets (e.g. ING, 2018). Likewise, the enforcement of money laundering regulations has imposed greater challenges for the enforcement agencies to work under complex issues. Furthermore, transparency and accountability are some of the issues that need to be addressed in tackling money laundering risk. Suspicious transaction reporting needs to be enhanced to ensure effectiveness in the reporting and investigation, including those classified as PEPs. Although the regulators impose and enforce stringent AML compliance regulations, the accountability of top management and bank officers are rather subjective (Yeoh, 2019). There could be many other issues that can pose further challenges for the banks to detect money laundering risk, such as digital banking and cryptocurrencies (Whisker, 2019). Hence, more intensive efforts and initiatives need to be taken by the regulators and banks to elevate the trust of the stakeholders.

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Students' Perceptions and President Buhari's Administration (2015-2019)

Olakunle OLOWOJOLU
Landmark University, Omu Aran, Nigeria, olowojolu.olakunle@lmu.edu.ng

Bamidele RASAK (PhD)
Landmark University, Omu Aran, Nigeria, rasak.bamidele@lmu.edu.ng

Barnabas OBASAJU (PhD)
Landmark University, Omu Aran, Nigeria, obasaju.barnabas@lmu.edu.ng

Oluwaseun OGUNDELE
Landmark University, Omu Aran, Nigeria, ogundele.oluwaseun@lmu.edu.ng

Solomon Adebayo ADEDIRE (PhD)
Landmark University, Omu Aran, Nigeria, adedire.solomon@lmu.edu.ng

Abstract

General Muhammudu Buhari (retd), a former military ruler became democratically elected president of Nigeria in 2015 after making several attempts. Buhari's assumption to power signaled the end of the 16 years rule of the erstwhile ruling party, the People's Democratic Party (PDP). This study is premised upon the perceptions of undergraduate students in Landmark University on the performance of President Muhammudu Buhari's administration. Well structured questionnaires were administered to students of Political Science, International Relations, Sociology and Economics departments. he feedbacks garnered from students reveal an overall pessimistic outlook on the performance of the incumbent administration as most of the responses of students fall in the negative domains in respect of issues appertaining national security, the state of the economy and the anti-corruption drive.

Keywords: Perceptions; President Muhammudu Buhari; National Security; Economy; Anti-corruption; Structured Questionnaires.

Introduction

Nigeria's incumbent president, General Muhammudu Buhari (retd) is one of the key political figures in Nigeria's political history. Buhari served as Nigeria's military head of state (1984-1985) after the military took over power from the Alhaji Shehu Shagari led civilian administration of the second republic. Buhari and his influential deputy, General Tunde Idiagbon (retd) steered the ship of Nigeria for 20 months before General Ibrahim Badamosi Babangida (retd) staged a palace coup to oust them from power.

The Buhari/Idiagbon military regime was heralded as the solution to the crippling socio-economic problems rocking Nigeria as at that time. President Shehu Shagari's government (1979-1983) became very unpopular with most Nigerians because his administration lacked the political will to checkmate widespread corruption (Olowojolu, 2017). Under Shagari, Nigeria's once buoyant economy nosedived. Additionally, there were widespread condemnations over the conduct of the 1983 general election that was characterized by gross electoral fraud (Olowojolu, 2017).

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Upon assuming power on January 1, 1984, the Buhari- led military regime came up with War Against Indiscipline (WAI) in order to fight corruption and indiscipline that have engulfed the Nigerian society. Prominent politicians were arrested and jailed by the military administration of Buhari based on corruption related matters (Olowojolu, 2017).

The military government of Buhari went on to expel illegal aliens from Nigeria; change the Nigerian currency; rejected IMF economic policies, closed Nigeria's borders to neighbouring countries and got involved in a much publicized diplomatic face off with Britain over the failed abduction of Alhaji Umaru Dikko (Fawole, 2003).

Across different sections of the Nigerian society, Buhari's military government was condemned for the regime's infringement on the fundamental human rights of Nigerians and the high handedness in handling the affairs of the country. On August 27, 1985, Buhari's military government was toppled in a palace coup that was masterminded by General Ibrahim Badamosi Babangida (retd) who went on to rule Nigeria for another 8 years.

Muhammudu Buhari resurfaced in the political equation of Nigeria when he defeated the incumbent president, Dr. Goodluck Ebele Jonathan in the 2015 presidential election. Prior to Buhari's 2015 victory, he had contested for the presidency in 2003, 2007 and 2011 elections with the penchant of ending as runners up. It must be noted that Buhari is the second military ruler to become a civilian president after Olusegun Obasanjo who was military ruler (1976-1979) and president between 1999 and 2007.

As Nigeria's first opposition candidate to defeat an incumbent president in an election in Nigeria, Buhari was saddled with the responsibility of re-positioning Nigeria on the right pedestal among the comity of nations. Buhari emerged as president of Nigeria at a time when the country was faced with Boko Haram Insurgency in Northeast that has claimed over 20,000 lives and left 2 million displaced from their homes (Al Jazeera, 2017). Secessionists' threats from Independent People of Biafra in Eastern Nigeria and the Fulani herdsmen and farmers clashes in some states of the country have become issues of great concern. Rising rates of unemployment and poverty, lack of basic social amenities and the high rate of corruption are major burning issues confronting the Buhari presidency. President Buhari asserted that his government will focus on three major areas: security, economy and corruption (Vanguard, January 22, 2018). In a 2018 official document released by the federal government of Nigeria, the administration of President Buhari highlighted 57 key achievements of the government.

Upon assuming office, President Buhari swung into action by embarking on foreign trips that were considered very strategic. On June 3, 2015 President Buhari made his first foreign trip to Niger republic in order to discuss about the security threats of Boko Haram, trans border crimes and proliferation of small and light weapons within the West African sub region (As'mau and Ismail, 2017). Buhari's next diplomatic shuttle was to N'Djamena the capital of Chad for a bilateral meeting with the Chadian president, Idris Derby on 4th June 2015. According to Thurston (2015), Buhari's visit to Chad helped in operationalizing the Multi Joint Task Force (MNJTF).

Under security, the government claimed that Boko Haram has been technically defeated. The federal government has intensified efforts in fighting Boko Haram insurgency by investing millions of dollars into the establishment of Multinational Joint Task Force (MNJTF) and the Civilian Joint Task Force (CJTF). Obamamoye (2017), noted that the collaborative efforts of Nigeria and its West African neighbours have weakened the potency of the boko haram insurgents. Nigeria's fight against terrorism has been bolstered through intelligence sharing with America's security experts as well as the purchase of A-29 Super Tucano aircrafts from America in 2017 (Ibekwe, 2017). Audu (2016) noted that all the 60 local government areas under the umbrella of boko haram were recaptured by the military.

The government of Nigeria in conjunction with the International Red Cross and Swiss government were able to secure the release of 106 out of the 276 Chibok girls that were kidnapped by Boko Haram on April 14, 2014 (3rd Year Report, 2018). Similarly, the government has been successful in securing the release of over 13,000 Boko Haram hostages and 105 of the Dapchi girls abducted in Yobe in February 2018 (3rd Year Report, 2018). Additionally, Buhari's presidency claims that over a million displaced persons have returned to their local communities in the Northeast, since 2015 (3rd Year Report, 2018).

The biggest security issue during Buhari's first tenure in office was the Fulani herdsmen and farmers clashes. The major hotspot of the Fulani herdsmen and farmers is in the Middle Belt region of Nigeria that is predominantly occupied by various ethnic groups (Yonas, 2016).

Traditionally, majority of Fulani people are into animal husbandry, while indigenes of the Middle Belt region are mostly farmers (McDougal et al, 2015). The quest for pasture by the Fulani herdsmen (who are considered to be settlers) in other parts of the country has often pitched them against the hosting communities (indigenes) in Nigeria. Another school of thought is of the view that the Fulani herdsmen and farmers conflict has religious connotation. For instance, the 2016 report published by Open Doors International stated that "violence against Christians in northern Nigeria has religious, political and cattle grazing/land issues, religion is a "common denominator".

Despite the devastating effects of the Fulani herdsmen and farmers clashes, the Buhari administration has been accused of been sloppy in addressing the problem. To some analysts, the Buhari administration has given more attention to ending the insurgency in Northeast than the Fulani herdsmen and farmers clashes (Ibekwe, 2015). Some of the government decisions under Buhari coupled with the fact that the president is a Fulani Muslim have further raised suspicions from various quarters that Buhari is promoting an agenda to Islamize Nigeria (Vanguard, August 3, 2015; Vanguard, December 17, 2015).

In order to address the crippling economic woes of Nigeria, President Buhari's administration devised the Economic Recovery and Growth Plan (ERGP) that will implemented between 2017 and 2020. The key objectives of ERGP include:

• Stabilizing the macroeconomic environment;
• Achieving Agriculture and Food Security;
• Ensuring energy efficiency (especially in power and petroleum products);
• Improving transportation infrastructure; and
• Driving industrialization, primarily through SMEs.

The Buhari administration has launched other programmes such as Ease of Doing Business Reforms, Social Investment Programme, Government Enterprise and Empowerment Programme (GEEP), Home Grown School Feeding Programme and Conditional Cash Transfer in order to tackle unemployment, strengthen private sector participation, ameliorate poverty and fight widespread hunger. In addition, this administration has embarked on measures to fighting corruption in Nigeria.

The federal government launched the New Whistleblowing Policy, Presidential Initiative on Continuous Audit and the full implementation of the Treasury Single Account and the Presidential Executive Order No.6 in order to block leakages and recover stolen public funds. Just between 2015 and 2017, over $29 billion dollars stolen funds and assets were recovered by the Economic and Financial Crimes Commission (Macaulay and Michael, 2018).

In order to open the frontiers of the Nigerian economy, Buhari engaged key allies by entering into bilateral and multilateral economic agreements. During Buhari's first term in office, Nigeria deepened its economic relations with America, Saudi Arabia, China, Germany, United Arab Emirates (UAE), France, G7 and G20 countries among others (Otu et al, 2018). Buhari's state visit to China in 2016 resulted into trade agreements worth a whooping $6 billion (US dollars) (Odubajo, 2017). To buttress this assertion, Bello et al (2017) noted that:

… led to the signing of the framework to enhance infrastructural development and industrial activities in Nigeria between National Development Reform Commission of China and Ministry of Industry, Trade and investment of Nigeria; Technological and Scientific Cooperation between both countries, the visit lasted for one week. In the aftermath of the visit, a number of the loan was granted to Nigeria especially to finance the deficit of 2016 budget, infrastructure loan for trains, among others. It must be noted that massive railway projects and road construction works are ongoing in different parts of Nigeria.

Given that the opposition party (All Progressives Congress) that won the 2015 general election capitalized on the undoing of the President Goodluck Jonathan administration to design her manifesto and manner of campaign to appeal to the electorate, the predominant issues of concern to the electorate became the vocal strength of the opposition party at the detriment of the ruling People's Democratic Party (PDP). All the people wanted was a change in their political experience which they believed only had a chance of happening if the men and party at the corridor of power changes. The All Progressives Congress (APC) brought the message of "change" that captivated millions of Nigerians.

To effect the desired change, the Buhari campaign manifesto stood on a 3-point agenda - security, economy and corruption (Vanguard, January 22, 2018). Now, President Buhari is almost about completing four years in office. But

there remain some questions begging for answers: Broadly speaking, has there been a real bifurcation away from the experiences of Nigerians under the leadership of the incumbent president of Nigeria?

In specific terms, given that the current administration captured power by priding herself on the ability to utilize a 3-point agenda to better the lots of Nigerians, this current study is motivated by the need to examine the perceptions of the citizens, of the performance of the current administration. To achieve the purpose of this study, questionnaires were administered to 300 and 400 level students from selected departments from the social sciences in a private university in Nigeria – Landmark University. The departments are Political Science, International Relations, Economics and Sociology. The choice of the level and departments follow from the reasoning that the 3-point agenda of the current administration are closely linked to political and socio-economic issues, and it is expected that students in the selected levels would possess better conversancy with the on-goings in the country and understand the questions put forward in the questionnaire..In a nut shell, the key thrust of the research is to examine the perceptions of Landmark University students, of Buhari's administration from 2015 to 2019.

In what follows, the relevant theory which would serve as the theoretical underpinning of this current study, the study area and data collection, the presentation and discussion of results are carried out. The paper winds up with the conclusion.

Theoretical Underpinning

David Easton's systems theory is primarily concerned with portraying the relationship between a system and the environment in which it is located. Easton espoused our attention to boundaries between politics and other aspects of social life and postulates the existence of a close relationship between a system and the environment (Easton, 1965).

He divides the basic component of his model of political system into "inputs" "outputs" in the form of decisions connected by a feedback (Easton, 1965).

The "supports" derives from the satisfaction of the outputs of the system and from more generalized or diffused support or approval for the system itself. The latter is necessary because a system's output cannot satisfy everyone. Easton distinguished between external demands coming from the environment and the internal ones emerging from within the system. There are also three subjects of support – political community or a group that seek to settle differences or promote decisions through peaceful action in common; regime or processing of demands and the implementation of decisions and government that undertakes concrete tasks (Easton, 1965).

Answering the question on how the potentially successful conditions from the environment communicate themselves to the political system, Easton presented his input-output model. Inputs consists of all the demands and supports through which wide- ranging activities in the environment can be channeled, mirrored, summarized and brought to bear upon political life; they are the key indicators of the way in which environmental influences and conditions modify and shape the operations of the political system (Easton, 1965).

These inputs are the contributions of individuals, pressure groups, civil society, mass media, and political parties towards shaping the responses of the government in terms of programmes and policies that are designed to improve on the different aspects of the society.

On the other hand, "Outputs" are the decisions of the authorities. Thus, the decisions taken by the legislative, executive, and judicial departments may be termed "political outputs"; moreover, they are authoritative as they are taken by men in authority roles. In between the inputs and the outputs, there is a "feedback loop" the identification of which helps to explain the process through which the system may cope with stress (Easton, 1965). Through it the system may take advantage of what has been happening by trying to adjust its future behavior. The feedback loop consists of the production of inputs by the authorities, a response by the members of the society to these outputs, the communication of information about the response to authorities and finally, possibly succeeding actions by the authorities giving rise to new round of the same activities. The feedback is thus crucial in determining the capacity of the system to cope with stress (Easton, 1965).

Easton's systems theory is relevant to this study because majority of Nigerians expect Buhari's government to address numerous issues that include: Boko Haram insurgency; kidnappings; armed bandits; Fulani-Herdsmen/Farmers conflict; Niger Delta militancy; the secessionists' threat of Independent People of Biafra (IPOB); corruption; unemployment,

poverty; lack of infrastructures and many more. The demands placed on Buhari's administration represent the inputs while, the efforts, initiatives, policies and programmes of President Buhari's administration in addressing the demands represent the outputs. The responses of the respondents that participated in this study shall represent the feedbacks.

Study Area and Data Collection

This study was conducted in December 2018. Landmark University students from 300 and 400 level were the target population. The target population for the research was drawn from Political Science, International Relations, Economics and Sociology under the umbrella of College of Business and Social Sciences (CBS). A well structured questionnaire was used to assess students' perceptions about the performance of President Buhari's administration on key areas such as the economy, national security and anti-corruption crusade. In total, 142 students filled the questionnaires.

Data Analysis

Descriptive statistics were used to highlight the perceptions of students about President Buhari's administration by obtaining the mean, mode, median, frequencies and percentages using the Statistical Package for the Social Sciences (SPSS).

Figures and Tables

Results and Discussion

Demography of the Study Population

Table 1 shows the sex of respondents. The numbers of male respondents were 69 and females were 71. Table 2 shows the age distribution of respondents. The age range that had the highest number was 15 to 19 years with 50 %, followed by 20 to 24 years with 35.2 %. 25 years and above had 2.1 % while, 18 respondents (12.1 %) did not fill the age section on the questionnaire.

Table 3 shows the distribution of students according to their departments. Sociology recorded the highest number of respondents with 38 (26.8%), followed by Economics with 36 respondents (25.4 %), International Relations 25 respondents (24.6 %) and 33 respondents from Political Science representing 23.2 %.

Table 1: Sex of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	69	48.6	49.3	49.3
	Female	71	50.0	50.7	100.0
	Total	140	98.6	100.0	
Missing	System	2	1.4		
Total		142	100.0		

Table 2: Age of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15-19 Years	71	50.0	57.3	57.3
	20-24 Years	50	35.2	40.3	97.6
	25 and above	3	2.1	2.4	100.0
	Total	124	87.3	100.0	
Missing	System	18	12.7		
Total		142	100.0		

Table 3: Department of Students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Political Science	33	23.2	23.2	23.2
	International Relations	35	24.6	24.6	47.9
	Sociology	38	26.8	26.8	74.6
	Economics	36	25.4	25.4	100.0
	Total	142	100.0	100.0	

Responses Connected to Agenda 1: National Security

On security, respondents responded to the different sub sections as contained in the questionnaire. Table 4 captures the breakdown of the perceptions of respondents on national security matters. On Boko Haram insurgency, 4.1 % (strongly agree) and 21.8 % (agree) of the respondents perceived that the President Buhari administration have defeated Boko Haram as shown in Table 4. However, the study shows that 31.7 % (strongly disagree) and 41.5 % respondents (disagree) scored the President low in the fight against the Boko Haram sect. This means that a total of 73.2% of the responses fall in the pessimistic domain.

In Table 4, 1.4 % (strongly agree) and 18.3 % (agree) of the respondents perceived that relative peace has been restored in Northeast region. 42.3% (strongly disagree) and 37.3% (disagree) of the respondents held the view that relative peace has not been restored in the enclave of Boko Haram, the Northeastern part of the country.

On the Fulani Herdsmen/Farmers conflict, the administration of President Buhari received low ratings as 54.9 % (strongly disagree) and 30.3 % (disagree) of respondents perceived that the incumbent government has not taken adequate measures in addressing the conflict (Table 4). 2.1 % (strongly agree) and 12 % (agree) of respondents were of the view that Buhari's administration has done enough in tackling the Fulani Herdsmen/Farmers conflict.

On the effects of the Fulani Herdsmen/Farmers conflict, 51.4 % (strongly agree) and 21.4 % (agree) of the respondents believed that food security cannot be attained with the lingering crisis. 10.6 % (strongly disagree) and 12 % (disagree) of the respondents perceived that the Fulani Herdsmen/Farmers conflict will not affect the attainment of food security in Nigeria.

On Niger Delta, 7% (strongly agree) and 27.5% (agree) of respondents agreed that Buhari's administration is handling Niger Delta affairs very well. 23.2 % (strongly disagree) and 40.1% (disagree) of respondents disapproved the handling of Niger Delta affairs by the Buhari-led administration.

Table 4: How has President Muhammudu Buhari's administration fared in handling national security?

QUESTIONS	SA	A	SD	D
The war on Boko Haram insurgency has been won by the Federal Government of Nigeria	4.1	21.8	31.7	41.5
	SA	**A**	**SD**	**D**
Relative peace has been restored in the North East geo-political zone of Nigeria	1.4	18.3	42.3	37.3
	SA	**A**	**SD**	**D**
The Buhari administration has taken enough measures in addressing Fulani Herdsmen/Farmers conflict	2.1	12	54.9	30.3
QUESTIONS	**SA**	**A**	**SD**	**D**
The lingering Fulani Herdsmen/Farmers conflict is a threat to the attainment of food security in Nigeria	51.4	21.4	10.6	12
	SA	**A**	**SD**	**D**
The Buhari administration has done well in handling Niger Delta affairs	7	27.5	23.2	40.1

Table 5: Students' perceptions on the state of the Nigerian economy under President Buhari

QUESTIONS	**SA**	**A**	**SD**	**D**
Agricultural revolution is evolving under the administration of President Buhari	13.4	35.2	22.5	27.5
	SA	**A**	**SD**	**D**
Graduate unemployment and poverty rates have reduced under the administration of President Buhari	5.6	9.2	51.4	33.1
	SA	**A**	**SD**	**D**
The value of Nigeria's Exchange rate is reducing under the administration of President Buhari	23.2	29.6	21.8	22.5
	SA	A	SD	D
The standard of living of Nigerians has declined under President Buhari's administration	42.3	31.7	12.7	12.7
	SA	A	SD	D
There is steady GDP growth under President Buhari's administration	4.9	16.9	33.1	47.1

Responses Connected to Agenda 2: The State of the Nigerian Economy

For this study, the Nigerian economy was the second yardstick used in assessing students' perceptions of President Muhammudu Buhari as shown in Table 5.

13.4 % (strongly agree) and 35.2 % (agree) of the respondents applauded the initiatives taken by the Buhari administration in boosting the growth of the agricultural sector. 22.5 % (strongly disagree) and 27.5 % (disagree) of the respondents did not agree that the agricultural sector is experiencing revolution under Buhari's administration.

5.6 % (strongly agree) and 9.2 % (agree) of the respondents were of the view that graduate unemployment and poverty rates have reduced under President Buhari. However, 51.4 % (strongly disagree) and 33.1% (disagree) of the respondents did not agree that graduate unemployment and poverty rates have reduced between 2015 and 2019.

23.2 % (strongly agree) and 29.6 % (agree) of the respondents admitted that the value of the exchange rate of the Nigerian currency is reducing under Buhari's administration. 21.8% (strongly disagree) and 22.5% (disagree) of the respondents opposed the view that the value of the naira is reducing.

Table 5 shows that 42.3 % (strongly agree) and 31.7 % (agree) of the respondents perceived that the living standard of Nigerians has plummeted under President Buhari's administration (2015-2019).

It must be noted that 12.7 % (strongly disagree) and 12.7% (disagree) of respondents opposed the view that the living standards of Nigerians have reduced under President Buhari's administration.

4.9% (strongly agree) and 16.9% (agree) of respondents did agree that the gross domestic product (GDP) is experiencing steady growth under Buhari's presidency. 33.1% (strongly disagree) and 47.1% (disagree) of the respondents claimed that there is no steady growth in Nigeria's GDP. Overall, the perceptions here are in consonance with those under national security as most of the responses remain negative.

Table 6: Students' perceptions on anti-corruption crusade of President Buhari

QUESTIONS	SA	A	SD	D
The Buhari administration is more serious about fighting corruption than all the previous governments in Nigeria	23.9	42.3	14.1	16.2
	SA	A	SD	D
There is strong public awareness on the anti-corruption crusade of President Buhari	16.2	52.1	11.3	16.2
	SA	A	SD	D
The fight against corruption is targeted at the perceived enemies of Buhari's government	20.4	46.5	11.3	16.9
	SA	A	SD	D
The anti-corruption crusade of President Buhari has brought about the repatriation of some stolen funds from abroad	24.6	50.7	10.6	9.9
	SA	A	SD	D
Nigeria is enjoying international prestige as a result of the anti-corruption crusade of President Buhari	10.6	26.1	25.4	34.5

Responses Connected to Agenda 3: Anti-Corruption

The third parameter used in assessing the perceptions of Landmark University students about President Buhari's administration was on the fight against corruption. As shown in Table 6, 23.9% (strongly agree) and 42.3% (agree) of the respondents agreed that the incumbent government of President Buhari is fighting corruption more seriously than all previous governments in Nigeria. 14.1% (strongly disagree) and 16.2% (disagree) of the respondents did not agree with the submission that President Buhari is fighting corruption with more intensity than previous administrations.
16.2% (strongly agree) and 52.1% (agree) of the respondents agreed that there is strong public awareness on the anti-corruption crusade of President Muhammudu Buhari. 11.3% (strongly disagree) and 16.2% (disagree) of the respondents gave negative views about the existence of strong awareness against corruption under President Buhari's administration. Thus, the majority agree that the current administration is doing fine in respect of bringing the anti-corruption crusade to the knowledge of the masses.

20.4% (strongly agree) and 46.5% (agree) of the respondents believed that the fight against corruption is targeted against the perceived enemies of the APC-led government of President Buhari. 11.3% (strongly disagree) and 16.9% (disagree) of the respondents declined to support the notion that the anti-corruption crusade is aimed at the perceived enemies of the federal government of Nigeria. In essence, the majority are of the opinion that the anti-corruption drive is a mere fight against the opponents of the current administration.

24.6% (strongly agree) and 50.7% (agree) of the respondents agreed that the anti-corruption crusade of Buhari's government has brought about the repatriation of stolen funds back to Nigeria. On the flip side, 10.6% (strongly disagree) and 9.9% (disagree) of the respondents were of the view that the anti-corruption crusade has not helped in the repatriation of stolen funds back to Nigeria. The general view thus supports that the current administration scores well in terms of engendering the repatriation of stolen funds to Nigeria.

10.6% (strongly agree) and 26.1% (agree) of the respondents believed that Nigeria is enjoying international prestige as a result of President Buhari's anti-corruption crusade. But the majority holds a contrary view, as 25.4% (strongly disagree) and 34.5% (disagree) of the respondents objected to the notion that Nigeria is enjoying international prestige as a result of President Buhari's anti-corruption crusade.

Conclusion

The emergence of former military ruler, General Muhammudu Buhari as the elected president of Nigeria in 2015 raised the hopes and aspirations of many Nigerians. Buhari's administration emphasized on achieving three cardinal objectives which include; ensuring protection of lives and property of Nigerians; boosting the growth of the Nigerian economy and fighting corruption.

In order to the assess the performance of President Buhari's administration based on the three cardinal objectives of his government, this study sampled the perceptions of 142 students within the campus of Landmark University, Omu Aran by administering questionnaires.

The primary data collected was analyzed with the use of SPSS package. The results analyzed showed that majority of the respondents scored President Buhari's administration low in the areas of national security and the management of the Nigerian economy. From the analysis, majority of the respondents gave positive remarks about the anti-corruption crusade of President Buhari. However, a larger percentage of the respondents asserted that anti-corruption crusade of President Buhari is targeted towards the opposition and that Nigeria has not started enjoying international prestige despite the anti-corruption posture of Buhari's administration.

Despite the below average ratings accorded to President Buhari's administration in its first tenure by Landmark University undergraduate students, President Muhammudu Buhari recorded a resounding victory over his closest rival, Atiku Abubakar at the 2019 presidential election. With Buhari's re-election, he has been given the opportunity to take Nigeria to the next level of greatness.

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Database Encryption Performance Impact

[1]André GOMES, [1]Carla SANTOS, [2]Cristina WANZELLER,
[2]Pedro MARTINS and [3]Maryam ABBASI

[1]Polytechnic of Viseu, Viseu, Portugal
[2]CISeD – Research Centre in Digital Services, polytechnic of Viseu, Portugal
[3]University of Coimbra, Coimbra, Portugal
estgv15362@alunos.estgv.ipv.pt, estgv15359@alunos.estgv.ipv.pt, cwanzeller@estgv.ipv.pt, pedromom@estgv.ipv.pt, maryam@dei.uc.pt

Abstract

One of the greatest assets of today's organizations is information, and normally, where is value a malicious people is trying to use it for their benefit. Thus, data security gains an important role in the confidentiality, integrity, availability, authenticity and legality of the data. Security has become a constant concern for improvement, which brings an increase in complexity that is later reflected in the performance of the applications that use them. To study the impact of the performance of a database with and without encryption, operations were tested for both cases and the average times, as well as the space occupied, were documented. Preliminary results show that encryption has a substantial impact on the database read and write performance.

Keywords: Security, Database, Cryptography, Performance, Encryption

Introduction

To make a performance analysis for the use of encryption in a relational database, an attempt was made to find a model that would strike a good balance between performance and security. The encryption of databases can be done in different ways: the data can be encrypted at the table level; row; or column level.

For this performance study, PostgreSQL was used with the native module pgcrypto. This database was chosen because it has good results in performance tests concerning other databases (Ohlsson & Persson 2019). Also, because of its flexibility to choose the encryption method, analyze issues such as security level, study the performance of insertions and queries. Note that also the total storage space was taken into account.

We started by using PGP encryption, which is known to be secure on email systems (Kar et al. 2019) and other messaging platforms (Ilmonen 2020), but in our preliminary tests proved to be inefficient for large volumes of data, so it was discarded. The best solution found was the use of raw encryption with AES (Bhange & Mathur 2019), which, being simpler, proved to be more efficient. This type of encryption is used in several current scenarios, as is the example of smart cities (Farahat et al. 2019). This decision naturally leads to a decrease in security. Even so, there was a decrease in performance compared to tests without encryption.

The data read results, queering, show that, with encryption, the times increase as there is a need for decryption. As expected, with the same queries, the use of primary and foreign keys allowed the reduction of time, but with encryption, the same did not happen for all tested queries.

Another analysis that is important to consider is the difference in the space occupied by the data, which was found to increase in scenarios with encryption and keys.

This document is organized into four sections. In Section 2, we perform a study of different forms of database encryption. In Section 3, is explained the experimental scenario. Section 4 is where the case study results are presented. Finally, Section 5 concludes the work, and we present possible future work guidelines.

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Related work

In this section, some works carried out in this area are analyzed. These help to identify alternatives and improvements to the current state-of-the-art.

Asymmetric keys

Since data security is an issue of increasing importance, in this case, study, the use of cryptography algorithms is tested. These algorithms have become a constant concern for improvement, which has led to an increase in complexity involving higher execution times that are reflected in a decrease in application performance.

Thus, we make a comparison of the execution times of three algorithms using asymmetric keys, depending on the size of the keys, used in different scenarios and database domains, Rivest-Shamir-Adleman (RSA) (Sharma et al. 2019) (Bhange & Mathur 2019), ElGamal (Li 2020) and Elliptic Curve Integrated Encryption Scheme (ECIES) (Saravanan & Venkatachalam 2019).

The results in (Boicea et al. 2017) show that the encryption time increases with the number of encrypted characters, but with special attention to RSA where the encryption time varies very little with the increase in the number of characters. It was also analyzed that the algorithms have encryption times of the same order of magnitude, considering the length of the encryption key. The decryption time is dozens of times less than the encryption time for all algorithms and increases with the size of the key, again the RSA with shorter times is highlighted.

AES to IoT

In the IoT scope, security is also a criterion to take into account, after being received, the encrypted data from the IoT sensors are saved in text format. However, suppose the integrity, validity and security of the data are to be guaranteed. In that case, these encryption and decryption operations cause overhead in the data query time, which, in turn, result in additional operational delays and increased consumption of data power in wireless IoT devices.

In (Singh et al. 2017), the encryption performance of a database that contains relational tables and tables with BJSON data fields. Since the commonly used benchmarks do not include tests of encrypted column databases, the authors created a set of Python scripts to test PostgreSQL AES-128bit encryption in CBC (Hameed et al. 2019) mode, currently used for data transmission wireless IoT devices. Analyzing this case study and the present, both use symmetric key encryption algorithms and AES (Bhange & Mathur 2019) encryption. The works differ in the type of data, in which relational and non-relational BJSON data fields are used.

As for the results in (Kokkonis et al. 2019) for data with BJSON, they showed that the average insertion time is the same for encrypted and unencrypted. However, for queries, an 8% increase in processing time has been noted for encrypted documents compared to plain text documents.

FNR encryption

FNR encryption storage preserves the length and format of the fields. For this, an encrypted database was used in CryptDB using the FNR encryption scheme. This scheme consists of the classification of the data type, which is encrypted in a text with the same size that is again converted into data with the format of the original. To this end, scenarios are tested to explore the feasibility of Format Preserving Encryption (FPE) (P´erez-Resa et al. 2020). Using SQL Aware Encryption, an encryption scheme was defined for each predefined set of SQL operations, so all data items are encrypted so that any operation is possible without the need for decryption.
In comparison to the present scenario, and in addition to all the application and technologies being different, the encryption itself is also different. This allows the preservation of the size and format of the fields in a

way that does not require decryption in a set of SQL operations, something that is considered inevitable in most forms of encryption, including those used in the context of this document.

In the experimental results (Chandrashekar et al. 2015), improvements in storage were measured, with a decrease in performance. Because, in terms of storage, they showed a decrease of approximately 50% concerning AES. Although this value always depends on the data of the chosen application, it was found that the size of the data with FNR was always equal to the size in normal text, in contrast to the AES which was always much larger. The performance, of insertion operations, of the FNR when compared to the AES-128 was about seven times higher since the FNR scheme uses several encryption steps internally.// Thus, it is concluded that encryption using FNR reduces the size of the database because the size of the data remains. Still, it leads to a decrease in performance in data insertions because it requires several steps to reach the final encrypted data.

Experimental Setup

For the experimental scenario, 10GB of data were generated with the TPC-H. The interaction with the database was carried out through Python using the SQLAlchemy module, so for insertions the Python script that reads each row of data from each table and converts it into an insertion command with 4kB of bulk.

For encryption scenarios, this command changes: for each field, the encryption function is added. In this way, the loading was tested, with and without encryption, to measure the difference in performance and space occupied by the data.

As for the consultations, five queries of different complexities of the TPC-H were chosen (Q1, Q2, Q3, Q4, Q5), where for each scenario they are executed five times, and the average is calculated discarding the maximum and the minimum. These are also executed by a Python script where, in the case of encryption, it was necessary to add decryption functions to the data so that operations could be performed on them.

In the experimental scenario, the module pgcrypto (Odongo & Bukenya 2019) was used, which provides cryptographic functions for PostgreSQL (Juba & Volkov 2019). This module provides several forms of encryption. Initially, the PGP encryption model was tested using symmetric keys. In this model, the password provided is a hash calculated from a String2Key (S2K) algorithm (Shakya & Karna 2019). The data, to be encrypted must undergo a manipulation that includes compression, conversion to UTF-8 and/or conversion of line terminations. Then the data is prefixed with a block of random bytes, a SHA1 hash of the random prefix and the data is attached and placed in a data pack. This model was discarded as soon as data was entered, and times increased exponentially, which became impractical times for large amounts of data. Therefore, raw encryption functions were used, using the AES algorithm, which only performs a cypher on the data and does not have any advanced PGP encryption feature. This model directly uses the user's key as the cypher key and does not provide any data integrity checks. Although it does not deal with text, having to be converted to bytes, this model proved to be more efficient for insertion.

Experimental Results

In this section, the results are presented in the form of charts and their analysis is carried out, so it will be divided into two sub-sections, insertions and queries. In the first, the encryption scenario using PGP, the AES encryption scenario and the

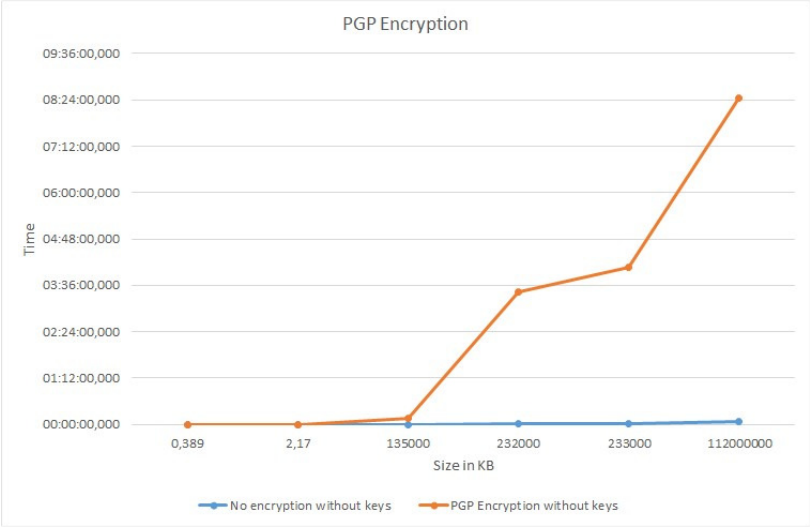

Figure 1: Chart encryption PGP

same with the use of keys is be presented. For queries, AES encryption is used, with and without keys.

Insertion Performance

The results of the insertions in scenarios with and without encryption are presented to evaluate the performance differences. In 4.1.1 the PGP encryption method is tested. In 4.1.2 and 4.1.3, the raw encryption method is tested with and without AES, and with the use of keys, respectively.

PGP encryption

Through the chart 1 the insertion times with the PGP model are shown using symmetric keys in comparison to the insertion without encryption.

As can be seen in figure 1, a high increase began to be noted with only 13.5 MB of data which worsened dramatically by 1.12 GB. These times can be explained by the numerous steps, described above, for encrypting a single row of data. Thus, it is concluded that, despite being good encryption that allows the verification of integrity, it is impractical to use this encryption for large volumes of data.

AES encryption

Since PGP encryption proved to be impractical for this volume of data, crude encryption functions were used with the use of AES. The chart 2 shows the perfor-

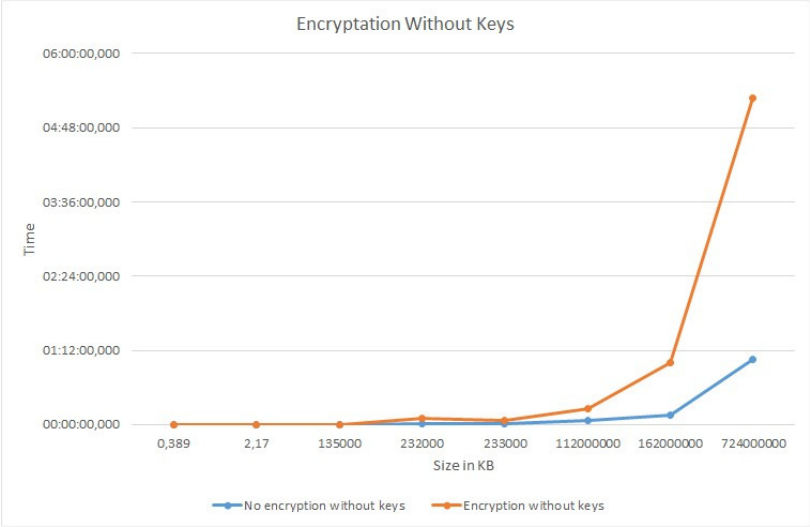

Figure 2: Chart encryption AES

mance of this encryption compared to the same scenario without encryption.

This encryption model (Figure 2) proved to be more efficient than the previous one, since comparing both for 1.12 GB of data, this one lasts around 11 minutes, while in the previous one lasted 8 hours. Compared to the scenario without encryption, the times remained close to 1.12 GB of data, noticing a dispersion that grew with the increase of the data volume. Concerning total times, without encryption, it took 1:18:34 h, while for this encryption it took 05:23:27 h, about five times longer.

In conclusion, this encryption mode is less secure, as it has no integrity check. On the other hand, it proved to be more efficient than the previous one, already compared to the scenario without encryption, with the increase of the data volume, the performance is degraded.

AES encryption with keys

The previous scenario was repeated, including the use of primary and foreign keys, and the times are illustrated in the chart 3.

About the scenario without encryption with keys, the conclusions are the same as in the previous one, but the increase in time concerning the increase in volume proved to be even more significant, reaching 25:13:21 h for 7.24GB. Thus, the scenario without encryption with keys took a total of 03:33:15 h, and with encryption and keys, it was 27:34:11 h, an increase of around nine times.

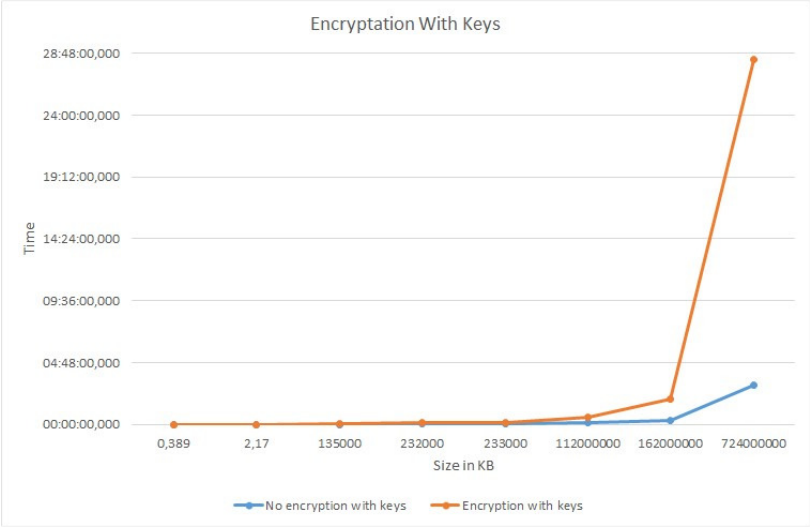

Figure 3: Chart encryptation AES with keys

Performance in Queries

This section is analyzed the performance of data queries with and without encryption.

In chart 4, the average execution time without keys is shown for each query. With encryption, all queries have increased execution times, being more visible in some more than others due to the amount of data required, explained by the amount of data that is accessed to perform them, as they need decryption to perform operations, or to process the join operations, as well as the amount of data to perform the final data projection.

The same query scenario was performed for encryption with primary and foreign keys, and the average execution times can be seen in the chart 5. Compared to the same scenario without encryption, the times were higher, as expected. Still, while in scenarios without encryption, the execution times decreased with the use of keys, in scenarios with encryption, the same did not always happen. There were three queries in which the times increased with the use of the keys.

Occupied storage space by the database

In Figure 6, the occupied storage space is studied. When comparing the space occupied by the databases with and without keys or indexes, there is a natural increase in the use of encryption, as this, regardless of the type of data, converts into a bit chain with sizes that are mostly larger than the original. The increase was about 3.8 times. For databases with the use of keys, the same difference was noted, with an increase of approximately four times.

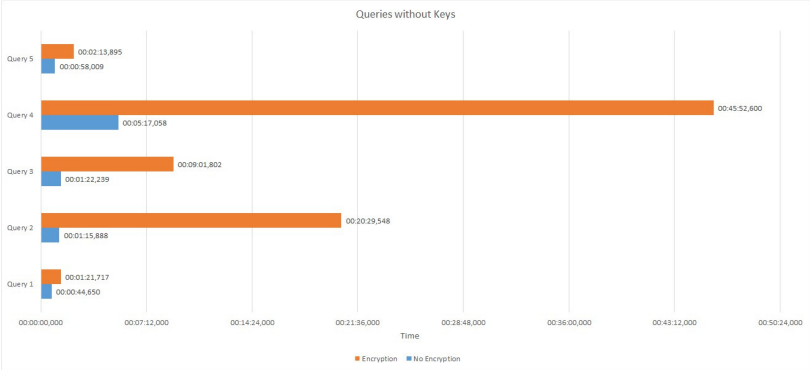

Figure 4: Chart queries without keys

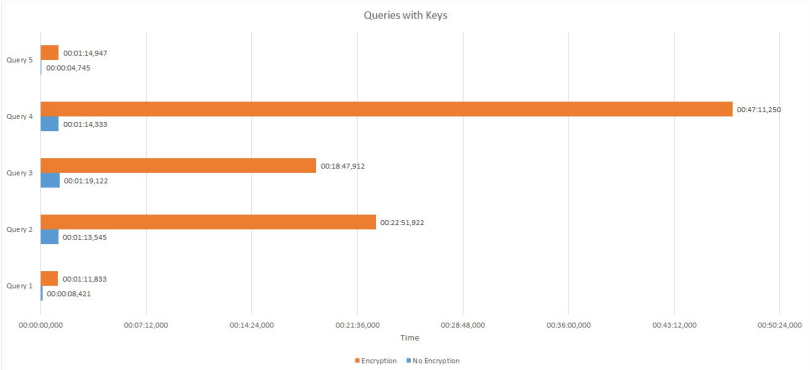

Figure 5: Chart queries with keys

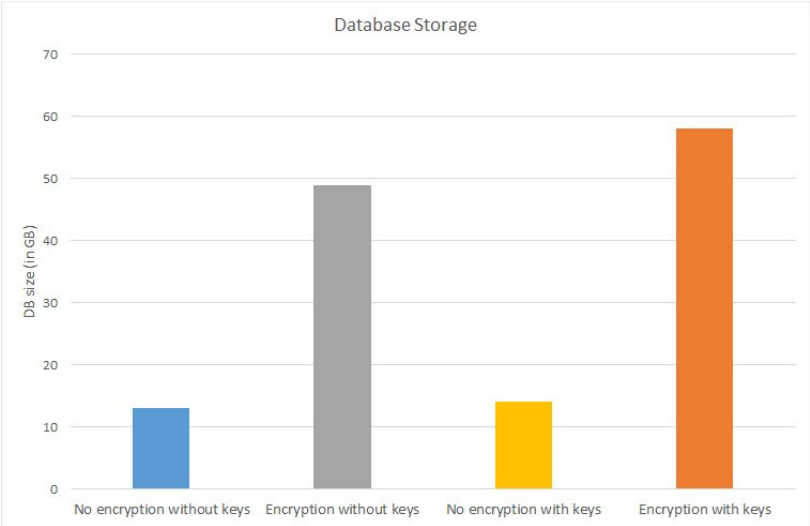

Figure 6: Chart Database Storage

Conclusions and future work

With the security level being the most important criterion, an algorithm with fewer security breaches may involve a longer encryption and decryption time, depending on the key size. This leads to significant reductions in performance, additional consumption of resources on the server and increased storage space for encrypted data. Another important aspect is key management because if decryption can only be done

with the corresponding encryption key, there is a risk that the administration will lose data due to failure, and the entire database is compromised.

In a search for encryption that would strike a better balance between security and performance, the solution went through the use of raw encryption with the use of AES. Despite being less secure encryption, as it does not have data integrity validation, it proved to be more efficient, but still with performance losses quite accentuated as the data increases.

It is concluded that the loss of performance in data encryption is inevitable. Still, depending on the requirements of the scenario to be implemented, the best balance between the desired security and performance should be sought. In the case presented, this happened when there was a decision to change between PGP and AES encryption.

For future work, it is important to analyze this encryption mode for larger volumes of data, to continue the evaluation of the identified performance degradation with the increase in data. Additionally, it would be interesting to compare the impact of encryption in different databases.

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Ethical Leadership toward Job Involvement among Manufacturing Exempt Staff in Penang

Nasina MAT DESA*
Management Section, School of Distance Education, Universiti Sains Malaysia, nasina@usm.my

Muhammad Hasmi ABU HASSAN ASAARI
Management Section, School of Distance Education, Universiti Sains Malaysia, hasmi@usm.my

Kumaran KOOTHA PERUMAL
Management Section, School of Distance Education, Universiti Sains Malaysia, kumarankp@gmail.com

** Corresponding Author: nasina@usm.my*

Abstract

Job involvement among employees is vital in the organization as it works as internalizing values of goodness and importance of working among people around them. Ethical behavior needs to start with leaders within the organization. The importance of ethical leadership as the driving force for ethical practices can't be underestimated. Meanwhile, perceived organizational support is vital in an organization to maximize the involvement of employees. The objective of this paper is to examine the relationship and impact of ethical leadership and job involvement among manufacturing employees. A total of 250 self-administered questionnaires were distributed among exempt staff of a manufacturing organization in Penang, Malaysia. They are the employees who are exempted from minimum wage, overtime regulations, and other rights and protections in the organization. Data analysis such as demographic, reliability, correlations, and regression was done. The finding of the paper reveals that ethical leadership can affect job involvement among staffs in the manufacturing organization. If ethical leadership are not practiced by the organization's management, then they are likely to face issues on their employees' job involvement. Hence, the findings in this paper help the organization in finding a way of dealing with their exempt staff to make them work better in their organization.

Keywords: Ethical Leadership, Job Involvement, Manufacturing, Exempt Staff, Malaysia.

Introduction

In today's competitive business environment, keeping employees enables the organization to be successful. Employees are seen one of the most important assets for organization whereby particularly in term of products and services provided by them. The benefits provided by the organizations offer successful performance for the organizations. In the context of Malaysia, the manufacturing organization of lighting solutions for automotive, computer displays, televisions, and general lighting has been seen as one of the contributors to the nation's economy.

Job involvement among employees is vital in the organization as it works as internalizing values of goodness and importance of working among people around them. Job involvement work as a subjective condition that makes people devoted to their work (Schaufeli et al., 2002). Job involvement towards organization makes a desirable feature that makes people spend energy and do their best in their work and organizational roles (Kahn, 1990). Moreover, although, job involvement is not associated with a plethora toward the job, it causes workers to enjoy their work and reduces their fatigue whereby it does not only increase the workers' job satisfaction, organizational commitment, organizational leadership behavior, perceived organizational support, emotional attachment to the organization, voluntary actions beyond the job description, and participation in organizational decisions, but also reduces the desire to leave the job (Saks, 2006). Besides that, organizations are expected to adhere to a certain set of ethics, examples of ethical behavior need to start with leaders within the organization. The importance of ethical leadership as the driving force for ethical practices can't be underestimated. Often, these top executives set the tone for every decision made within a company, no matter how small. Those who lead ethically are considered role models who can hold

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themselves and their employees accountable whereby they make ethical culture a part of every function in an organization, from hiring and training through performance management and mentoring programs (Walumbwa et al., 2017). Meanwhile, perceived organizational support also vital in an organization to maximize the involvement of employees. Job involvement of employees and their well-being thus could increase employees' commitments towards the organization. This will reduce employees turnover in the organization.

Moreover, this paper intended to explore the management practices on ethical leadership and perceived organizational support to increase job involvement among exempt staff in a manufacturing organization. All these impacts have been studied in numerous fields such as health care, education, service and other service industry, however, it was seldom or very little being performed in engineering manufacturing industries. Thus, this research is intended to investigate the impact of ethical leadership and perceived organizational support toward job involvement among exempt staff in a manufacturing organization of lighting solutions in Penang.

Literature Review

Job Involvement

Job involvement denotes employees' attitudes toward their jobs and is one of the most specific factors relevant to work performance (Judge et al., 2017). It is a key contributing factor to an organization's success. From an organizational viewpoint, it has been regarded as the key to unlocking employee motivation and increasing productivity. Furthermore, Kanungo (1982) stated that job involvement defines as the unswerving commitments of workers and their concerns about work and the result of personal experiences and current environment.

According to Lee et al. (2015), job involvement refers to how staffs and employees perceived their jobs in relation the environment of their organization, the work itself and on how their work and their life are integrated. Zopiatis et al. (2014) stated that the idea of ideological work involving active involvement in a job or intensive involvement of employees to meet their inherent needs. The fulfilment of these needs helps to satisfy personal satisfaction. Furthermore, Zopiatis et al. (2014) also stated that work engagement and job involvement offers the opportunity to make decisions for individuals, the foundation for strengthening their work commitment.

Moreover, Holtom (2016) suggest that an integral part of employee's self-definition is the degree to which they are involved in their job. Consequently, highly-job-involved employees are more committed to their organization, invest substantial effort to achieve organizational objectives and are thus less likely to turnover and by utilizing these constructs, and by synthesizing critically the work of past literature thus this studies intended to examine the relationship between these aspects of job involvement.

Ethical Leadership

Ethical leadership is known as the demonstration of appropriate conduct through personal actions and relationships and the promotion of such conduct to subordinates through two-way communication, reinforcement, and decision making. This definition shows that ethical leaders can set an example for others and refrains from any temptations that can happen during given duty and responsibilities. Ethical leadership is crucial and vital in providing direction that enables the organization to fulfil its mission and vision and achieve declared goals (Kanungo, 1996).

According to Kark et al. (2017), the ethical leadership process occurs in either one way of two ways, either transformational or transactional. Transformational leadership is conveying and exposing the corporate leadership to the transition leadership to develop a vision and to change the foundation for the company's strategies, policies and practices. The transformation leader uses their organization strategies and techniques empower the followers, enhance their self-efficacy, and change their values, minds and attitudes, which are in line with the leaders' vision. This is one of the ethical leadership ways.

According to Toor et al. (2009), self-centred, unreliable, power-hungry and manipulative leaders are known as pseudo transformational leaders meanwhile authentic transformational leaders refer to leaders with strong moral concerns, strong concerns for self and others and ethical values which linked with the vision of the organization. However, a transactional leader is concerned with the surveillance and direction of the work to fulfil the given task. The transactional leader affects followers, rewards, sanctions and the stability of proper authority or stimulating behavioral compatibility of the influencer. The transactional leader presumes that the employee will not do anything except for a transaction in which the payment for service is large enough to motivate the employee to perform (Schubert, 2017). In the transactional leadership style, the employee acts as a means of making money, not realizing the loyalty and selflessness of the employee system.

Walumbwa et al. (2017) define ethical leadership as a formal conducting demonstration of personal conduct and personal relationships, and the promotion of such conduct to both employees in strengthening and decision-making. The definition refers to the interpersonal relationship and promotion through two-way communication and decision making. Saini (2017) also describe an ethical leader as a person that be examples for others with the right values and the strongest person to bear the test. Ethical leaders are partners in companies trying to achieve their vision, vision and value, without compromising self-interest, thus enhancing employee jobs and organizational duties thus could increase employee job involvement.

Perceived Organization Support

Perceived organizational support refers to employees' view regarding how much the organization values their contribution and cares about their well-being (Eisenberger et al., 1989). Perceived organizational support increases employees' initiative to help the organization reach its objectives. A few factors that influence whether employees recognize organizational support are organizational rewards, job conditions, and observed fairness.

Perceived organizational support has shown that researchers are more interested in management companies (Slovic, 2016). Miring'u (2016) defined perceived organizational support as staff of global beliefs about the company's assessment of their contributions and their level of concern about their well-being. Perceived organizational support is also defined as how much the organization values employees' contributions and cares about them (Lamm et al., 2015). Moreover, perceived organizational support created because of working conditions and some human resource practices will generate positive employee mentality and behavior. Reasonable treatment, supervision support, and rewarding and favorable working conditions showed a strong commitment to employee work involvement and perceived institutional support (Eisenberger et al., 2016).

On the other hand, perceived organizational support strengthens employees' effort in the organization, resulting in greater efforts to fulfil the organization's goals (Eisenberger et al., 2016). Organizational support theory refers to the high level of support to gain in return lead to employees work harder to help their organizations to reach its goal because perceived organizational support affects job involvement (Eisenberger et al., 2016). Thus as overall, these studies intended to examine the impact of perceived organizational support on job involvement.

Relationship between Ethical Leadership and Job Involvement

Job involvement as far as knowledge is concerned, the employee can engage in work by engaging in job-related work by engaging in work. Khan et al. (2011) define job involvement as a degree in emotional or mentally in identifying the work. According to Liao and Lee (2009) explored the phenomenon of job involvement and proposed that job involvement respects the extent of the importance of work in the worth of the individual. Highly involved individuals relate performing well in their job to their self-esteem Liao and Lee (2009). Thus job involvement is the vital variable for employees with high job involvement.

Moreover, ethical leaders express a moral identity and take responsibility for their actions and encourage the company to make sure they send clear messages of ethical value. When employees show interest in their organization or leaders, they are more likely to invest in trying to achieve the organization common goals. Alshammari et al., (2015) suggested that leaders create expectations about the ethical behavior that penetrates the environment. Organizational stability is emphasized by practices and expectations affecting the effectiveness of moral ethics. Therefore ethical leadership do influence job involvement and working environment among staff and employees in an organization. According to those ethical and social learning perspectives can be proposed to encourage the ethical conduct of the employer in a company.

Moreover, people and employees who have attained ethical and social values are people with a moral person. An individual's characteristics such as ethics and honesty are moral values and ethical identities, which generate positive approaches to organization and work based on the amount of attitude that individuals are engaged in their present work. Personal qualities of the employee as the ethical leader are related to ethical leadership towards job involvement among employees. Thus, hypothesis that been generated based on this relationship as below:

H_1: Ethical leadership is positively related to job involvement.

Relationship between Perceived Organizational Support and Job Involvement

Perceived organizational support is expected to be a member of the prospect of rewarding by fulfilling the organizational goals, and as a result, these expectations will increase in job involvement in organizational

engagement. For the organization to be progressive, its employees need to be motivated and be involved all the time because an employee is the largest and most important assets for the organization. However, dedication and commitment from employees depend largely on their views supported by the organization. Supporting employees views make employees feel that organization value staff contribution and commitments.

Moreover, perceived organizational support represent a related job involvement in the work of a substantial number of employees to identify a worker with a company employee. Those who are highly involved among the employees of an organization must make an effort to maximize organizational efficiency. For highly engaged employees in their organization, their jobs are inextricably linked according to different identities, interests and life goals, and can be satisfied with their duties effectively.

Furthermore, perceived organization support theory set a common concept to assess the social-emotional needs and to assess their contributions to the employees, to assess their contributions to assess the benefits of increased work efforts. Such perceived company support increases the perceived commitment of the employees to help their organization expectations to achieve the company objectives for their commitment to the organization and the enhanced efficiency.

In an organizational context, organizations treat employees well via opportunities for reward, kind treatment, or showing commitment towards the employees. Employees who recognize this positive support then have more favorable attitudes (such as higher job satisfaction, job involvement and organizational commitment) and may reciprocate through work effort exerted towards performing well on the job or serving the organization (Tuazon, 2016). Thus, hypothesis that been generated based on this relationship as below:

H_2: Perceived organizational support is positively related to job involvement.

Theoretical Framework

Figure 1 below shows a theoretical framework for this paper. This paper examines the relationship between ethical leadership and perceived organizational support on job involvement among exempt staff.

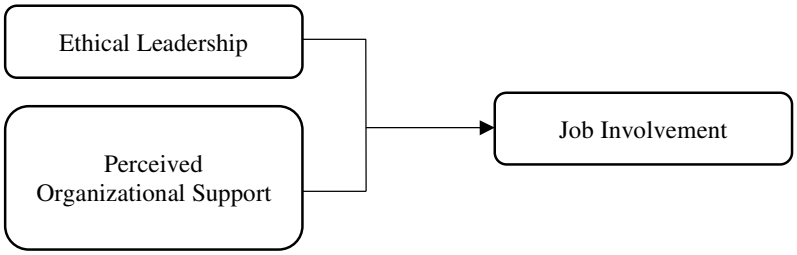

Figure 1: Theoretical Framework

Methodology

Research Design

A quantitative research method will be used for this paper with inclusive of both the primary and secondary data. These methods are chosen to define and explain the relationship between the independent variables which are ethical leadership and perceived organizational support and the dependent variable which is job involvement.

Population & Respondents

The manufacturing employees of exempt positions are studied. The exempt employees referred to as employees who are exempted from minimum wage, overtime regulations, and other rights and protections afforded in contrast to the non-exempt employees. Employers must pay a salary rather than an hourly wage for a position for it to be exempt (Barada, 2020). Typically, only executive, supervisory, professional or outside sales positions are exempt positions. The number of employees or the number of population is 800 exempt staff obtained from the Human Resource Department statistics. Among this, 250 exempt staff that worked were randomly selected using random sampling to represent the executive, supervisory and professional.

Research Instruments & Instruments Reliability

The self-administered questionnaire was divided into four parts. Firstly, Part A, this part comprised of the respondents' demographic background which consists of gender, age, religion, marital status, education status, years of service in the organization, department serving in, duration of service in this department, corporate-grade, duration of service in this corporate grade, monthly salary and gender of your manager.

Table 1 depicts the summary of the instruments reliability. Ethical leadership consisted of 21 items which were from Khuntia et al. (2004) with a reliability of 0.96. Meanwhile, perceived organizational support had 17 items which were adopted from Eisenberger et al. (1986) with a reliability of 0.93. Finally, job involvement had 10 items which were adapted from Kanungo (1982) with a reliability of 0.80.

Table 1: Instruments Reliability

Variable	Source	No of Questions	Cronbach's Alpha
Ethical Leadership	Khuntia et al. (2004)	21	0.96
Perceived Organizational Support	Eisenberger et al. (1986)	17	0.93
Job Involvement	Kanungo (1982)	10	0.80

Data Analysis

Response Analysis

The response rate by the respondents was 92% whereby a total of 230 self-administered questionnaires were collected from 250.

Demographic Analysis

Table 2 depicts the demographic analysis of the respondents. In terms of gender, the findings show that male employees were 140 (60.9%) against female employees of 90 (39.1%). Furthermore, married employees were 217 (94.3%) and single employees were 10 (4.3%). Majority of the employees were aged 40 to 49 years old (44.8%); and followed by 30 to 39 years old were 84 (36.5%) employees, above 50 years old were 23 (10%) employees, and 20 to 29 years old were 20 (8.7%) employees.

Due to the nation's ethnicity, majority of the employees employed were Malays (n=128; 55.7%); and followed by Indian employees (n=76; 33.0%), Chinese employees (n=18 (7.8%), and other employees (n=8; 3.5%). Academically, majority of the employees had a degree (n=161; 70%) as compared to 30 employees (13.0%) had a diploma, 18 employees (7.8%) had a higher certificate, 14 employees (6.1%) had a master, and 7 employees (3.0%) had a lower certificate.

Employees were asked on their length of service with the organization. Ninety-eight employees (42.6%) had 16 to 20 years of service and followed by 78 employees (33.9%) with 6 to 10 years of service, 22 employees (9.6%) with 11 to 15 years of service, 20 employees (8.7%) had 1 to 5 years of service, and 12 employees (5.2%) had less than 1 year of service.

In detail by the department, 82 employees (35.7%) were in the Human Resource Department; and followed by 48 employees (20.9%) were in the Information Technology Department, 42 employees (18.3%) were in the Engineering Department, 32 employees (13.9%) were in the Logistics Department, 15 employees (6.5%) were in the Quality Control Department, 5 employees (2.2%) were in the unclassified departments, 3 employees (1.3%) were in the Finance Department, and 3 employees (1.3%) were in the Procurement Department.

Table 2: Demographic Analysis

Item	n	%
Gender:		
• Male	140	60.9
• Female	90	39.1
Marital Status:		
• Married	217	94.3
• Single	10	4.3
• Others	3	1.3
Age (years old):		
• 20 to 29	20	8.7
• 30 to 39	84	36.5
• 40 to 49	103	44.8
• Above 50	23	10.0
Ethnicity:		
• Malay	128	55.7
• Chinese	18	7.8
• Indian	76	33.0
• Others	8	3.5
Academic Qualification:		
• Lower Certificate	7	3.0
• Higher Certificate	18	7.8
• Diploma	30	13.0
• Degree	161	70.0
Masters	14	6.1
Service (years):		
• Below 1 year	12	5.2
• 1 to 5	20	8.7
• 6 to 10	78	33.9
• 11 to 15	22	9.6
• 16 to 20	98	42.6
Department:		
• Engineering	42	18.3
• Finance	3	1.3
• Human Resource	82	35.7
• Information Technology	48	20.9
• Logistics	32	13.9
• Procurement	3	1.3
• Quality Control	15	6.5
• Unclassified	5	2.2

Reliability Analysis

The reliability analysis was conducted in examining the level of reliability of the adopted instrument used on the employees in the manufacturing. Table 3 depicts the reliability analysis whereby ethical leadership had a Cronbach's Alpha of 0.92, perceived organizational support had a Cronbach's Alpha of 0.92, and job involvement had a Cronbach's alpha of 0.93. The value of the reliability analysis was excellent.

Table 3: Reliability Analysis

Item	No of Questions	Cronbach's Alpha
Ethical Leadership	21	0.915
Perceived Organizational Support	17	0.922
Job Involvement	10	0.929

Correlations Analysis

Table 4 depicts the correlations analysis between ethical leadership and job involvement of employees in manufacturing. The employees indicated a high relationship (r=0.89) between ethical leadership toward their job involvement. Moreover, the employees also indicated a high relationship (r=0.92) between perceived organizational support toward their job involvement.

Table 4: Correlations Analysis

Item	1	2	3
1. Ethical Leadership	1	0.947*	0.893*
2. Perceived Organizational Support		1	0.921*
3. Job Involvement			1

**. Correlation is significant at the 0.01 level (2-tailed).*

Regression Analysis

Table 5 depicts the simple regression analysis was conducted on the ethical leadership and perceived organizational support toward job involvement.

Firstly, manufacturing employees had the R^2 value showed 85.2% for the dependent variable of job involvement which was explained by the ethical leadership. This means that 14.8% of the variance for job involvement was explained by other unknown additional variables that have not been explored. The simple regression model (F=653.47, p<0.00) was proven to be a significant model due to the F ratio being significant in predicting job involvement. Overall, the F ratio result presented that the combination of ethical leadership and perceived organizational support were a good fit in predicting job involvement.

Secondly, ethical leadership (β=0.20, p<0.01) was a significant predictor for job involvement for manufacturing employees. Moreover, this explained that ethical leadership was positively related to job involvement among manufacturing employees. Therefore, hypothesis H_1 was supported in explaining manufacturing employees impact of ethical leadership on their job involvement.

Finally, perceived organizational support (β=0.73, p<0.00) was a significant predictor for job involvement for manufacturing employees. Moreover, this explained that perceived organizational support was positively related to job involvement among manufacturing employees. Therefore, hypothesis H_1 was supported in explaining manufacturing employees impact of perceived organizational support on their job involvement.

Table 5: Regression Analysis

Item	Job Involvement	
	β	Sig.
Ethical Leadership	0.203	0.011
Perceived Organizational Support	0.729	0.000
R^2	0.852	
Adjusted R^2	0.851	
F-Value	653.469	
Sig. F-Value	0.000	

In summary, the organization management portrayed their ethical leadership and perceived organizational support had an impact on their employees' job involvement. The summary of the hypothesis result is depicted in Table 6.

Table 6: Hypothesis Result

Hypothesis	Result
H_1: Ethical leadership is positively related to job involvement	Supported
H_2: Perceived organizational support is positively related to job involvement	Supported

Discussion & Conclusion

The paper shows that ethical leadership and job involvement does have a significant relationship among exempt staff in the manufacturing organization. The result was by Akbari (2016) where there was a significant coefficient between ethical leadership and job involvement.

Based on the results of this paper, the organization management needs to have ethical leadership are an attitude that should be emphasized as to satisfy their exempt staff. Moreover, the organization management should portray and let their employees felt that they had practiced ethical leadership. This situation will impact their employees' job involvement in the organization. Meanwhile, perceived organizational support has a good impact on job involvement exempt staff. This is in accord with Tuazon (2016) where there is a significant relationship between perceived organizational support and job involvement.

This paper has provided a breakthrough on how ethical leadership can affect job involvement among staffs in the manufacturing organization. If ethical leadership are not practiced by the organization's management, then they are likely to face issues on their employees' job involvement. Hence, the findings in this paper help the organization in finding a way of dealing with their exempt staff to make them work better in their organization.

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Management of Covid-19 Pandemic And 2020 Hajj Pilgrimage

Olakunle OLOWOJOLU
Landmark University, Omu Aran, Nigeria, olowojolu.olakunle@lmu.edu.ng

Bamidele RASAK (PhD)
Landmark University, Omu Aran, Nigeria, rasak.bamidele@lmu.edu.ng

Michael ALEYOMI (PhD)
Federal University, Oye-Ekiti, Nigeria, aleyomimike@yahoo.com

Oluwafemi FAYOMI
Landmark University, Omu Aran, Nigeria, fayomi.oluwafemi@lmu.edu.ng

Abstract

Covid-19, a viral disease was first discovered in late 2019 at Wuhan, China. The coronavirus outbreak has since metamorphosed into a global pandemic in the current year 2020. The global pandemic caught governments, institutions and the entire global community unawares. Covid-19 pandemic has caused the deaths of thousands of people while several millions have been infected. The global pandemic has had devastating effects on global economy in an unprecedented way. The central theme of this study is aimed at analyzing the impact of Covid-19 pandemic on the holy pilgrimage of Muslims to Mecca and Medina. Using human security theory, the paper justified the health safety measures implemented by Saudi authorities in checkmating the spread of coronavirus during the 2020 hajj.

Keywords: Covid-19, Coronavirus, Human security, Pandemic, Saudi Arabia.

Introduction

On December 12, 2019, the novel coronavirus (COVID-19), an acute respiratory syndrome was discovered in Wuhan, Hubei Province in China (Alandijany, Faizo and Azhar, 2020). By March 11, 2020, the World Health Organization (WHO), pronounced COVID-19 as a global pandemic (Alandijany et al, 2020).

Generally, the identified symptoms of COVID-19 include cough, fever, headache, fatigue and shortness of breath (Anjorin, 2020). Nations, scientists and pharmaceutical companies are working assiduously in discovering vaccines that can cure the highly transmittable disease.

As at August 13, 2020, COVID-19 pandemic has caused over 749,000 deaths, while over 20 million people have been infected in 188 countries (Al Jazeera, August 13, 2020). It must be noted that as at August 13, 2020, over 12 million people have recovered from the coronavirus (Al Jazeera, August 13, 2020).

Table 1.1: Countries with the highest cases of COVID-19 as at August 18, 2020

COUNTRIES	COVID-19 CASES
United States of America	5,354,013
Brazil	3,340,197
India	2,702,742
Russia	932,493
South Africa	589,886

Source: https://covid19.who.int/table

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Table 1.1 shows the top 5 countries that recorded the highest cases of COVID-19 as at August 18, 2020. United States topped with 5,354,013 cases followed by Brazil with 3,340,197 cases; India with 2,702,742 cases; Russia with 932,493 cases and South Africa with 589,886 cases respectively (WHO, 2020).

Table 1.2: Countries with the highest fatalities as at August 18, 2020

COUNTRIES	NUMBER OF FATALITIES
United States of America	170,497
Brazil	108,536
Mexico	57,023
India	51,797
United Kingdom	41,454
Italy	35,400
France	30,434
Spain	28,646
Peru	26,281
Iran	19,804
Russia	15,707
Colombia	15,372
South Africa	11,982

Source: https://coronavirus.jhu.edu/data/mortality

Table 1.2 shows the top 10 countries with the highest COVID-19 fatalities as at August 18, 2020. The breakdown of Table 1.2 indicates that United States of America recorded 170,497 deaths; Brazil 108,536 deaths; Mexico 57,023 deaths; India 51,797 deaths; United Kingdom 41,454 deaths; Italy 35,400 deaths; France 30,434 deaths; Spain 28,646 deaths; Peru 26,281 deaths; Iran 19,804 deaths; Russia 15,707 deaths; Colombia 15,372 deaths and South Africa 11,982 deaths (John Hopkins University of Medicine Resource Center, 2020).

Impact of Covid-19 On Saudi Arabia

Saudi Arabia which is the central focus of this study has been badly hit by the coronavirus pandemic. Saudi Arabia, the world's largest producer of crude oil and home to Mecca and Medina, the two holiest sites in Islam hosts the annual Hajj and Umrah (small or lesser) pilgrimage that is attended by millions of Muslims all over the world. During the Hajj pilgrimage, Muslims perform rituals that are considered very sacred in Islam.

The major rituals include praying around Kaaba, the house of Allah (God), drinking from the Zamzam well, praying at Mount Arafat and throwing stones symbolically at Satan (Al Jazeera, November 18, 2009). In 2019, 2.5 million pilgrims participated in the Hajj, while over 19 million Muslims attended Umrah in Saudi Arabia (TRT World, June 23, 2020). The holy pilgrimage to Saudi Arabia generates $12 billion dollars which is equivalent to 7 percent of gross domestic product (GDP) and 20 percent of Saudi's non-oil GDP (TRT World, June 23, 2020).

According to the International Monetary Fund (IMF), the oil rich Saudi Arabia which boasts of the largest economy in the Middle East is expected to have a 6.8 percent reduction in GDP as a result of the COVID-19 pandemic and fall in oil prices (Al Jazeera, July 25, 2020). The COVID-19 pandemic affected wide range of businesses such as hotels, real estate/property owners, food vendors, airlines, road transporters, livestock sellers, cloth sellers and other accessories that pilgrims utilize during Hajj and Umrah in Saudi Arabia.

As at August 11, 2020, Saudi Arabia has recorded 291, 468 cases of coronavirus infections, 3,233 deaths and 255,118 recoveries (Worldometer, August 11, 2020).

Human Security and Management of Hajj During Covid-19 Pandemic

The theoretical framework of this study is premised upon human security. The concept of human security came into global limelight in 1994 when the United Nations Development Programme (UNDP) published its Human Development Report.

The UNDP (1994) stated that:

Human security is a child that did not die, a disease that did not spread, a job that was not cut, an ethnic tension that did not explode in violence, a dissident who was not silenced. Human security is not a concern with weapons –

it is a concern with human life and dignity…It is concerned with how people live and breathe in a society, how freely they exercise their many choices, how much access they have to market and social opportunities– and whether they live in conflict or in peace.

Human security is concerned about the security of individuals rather than placing emphasis on the security of nation states. According to UNDP (1994), human security covers different aspects of human life such as:

- Economic Security: an individual's enjoyment of a basic income, either through gainful employment or from a social welfare in order to have good standard of living.
- Food security: an individual's access to food supplies.
- Health security : an individual's freedom from various diseases and debilitating Illnesses and his or her access to adequate health care.
- Environmental security: concerned about the safety of land, air, and water from environmental hazards in order to preserve the existence of human beings.
- Personal security: an individual's freedom from crime and violence, especially women and children who are more vulnerable.
- Community security: cultural dignity and to inter-community peace within which Individuals live and grow.
- Political security: Protection of an individual against human rights violations.

This study will analyze how the government of Saudi Arabia employed human security in the management of the 2020 Hajj pilgrimage. Firstly, Saudi authorities scaled down the number of Hajj pilgrims to 10,000 instead of the over 2 million prospective participants (BBC, July 29, 2020).

International travels were restricted from moving in and out of Saudi Arabia. This measure was taken in order to avoid possible outbreak of coronavirus during the Hajj. Also, the Saudi authorities restricted participation in the Hajj by allowing only foreigners and citizens living in Saudi Arabia to perform the holy pilgrimage.

Secondly, all the Hajj pilgrims were made to undergo thorough medical tests in order to ensure that all pilgrims were COVID-19 free. Only those that were between ages 20 and 50 with no terminal illnesses and symptoms of COVID-19 were allowed to perform the holy pilgrimage (Time, July 29, 2020). All pilgrims were ordered to quarantine in their hotel rooms and quarantine after the completion of the Hajj. The movements of pilgrims were monitored by connecting wristbands to the phones of the participants (Time, July 29, 2020).

Thirdly, Saudi authorities ensured that social distancing was strictly followed during the Hajj pilgrimage. The usual experience of having mammoth crowd was limited to small groups of 20, while standing apart in order to limit the potential outbreak of coronavirus (Time, July 29, 2020).

Another safety measure put in place by the Saudi authorities was by providing free sanitizers, towels, soaps, umbrellas and other accessories. These materials were freely given to the pilgrims in order to ensure personal hygiene and minimize the outbreak of contagious diseases (Time, July 29, 2020).

The Saudi government prevented the International media from covering the 2020 Hajj pilgrimage. Instead, Saudi government ensured that the pilgrimage was televised live to the global audience.

In summary, COVID-19 pandemic has had devastating impact on all aspects of life. The impact of COVID-19 pandemic will definitely have short, medium and long term effects on the global community. The Hajj, which is one of the most important religious rituals in Islam with global appeal was affected by the outbreak of coronavirus. The Saudi authorities implemented safety measures that ensured the success of the 2020 Hajj despite the threats posed by the COVID-19 pandemic.

In conclusion, this study advocates that other nations can learn from Saudi Arabia in ensuring the safety of individuals and nations from the potential dangers of coronavirus outbreak and other highly contagious diseases that are capable of disrupting global peace and co-existence of human beings across the world.

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The Application of Inventory Models to Attain Optimality in A Cement Manufacturing Firm

adebayo. T ADEDUGBA[1].,
adebayo.adedugbapgs@stu.cu.edu.ng
Department of Business Management,
Covenant University, Ogun State, Nigeria

olaleke O OGUNNAIKE[2].,
olaleke.ogunnaike@covenantuniversity.edu.ng
Department of Business Management,
Covenant University, Ogun State, Nigeria

Kingsley A ADEYEMOA.,[3]
kingsley.adeyemo@covenantuniversity.edu.ng
Department of Accounting
Covenant University, Ogun State, Nigeria
&
busola E KEHINDE[4].,
busola.kehinde@covenantuniversity.edu.ng
Department of Business Management,
Covenant University, Ogun State, Nigeria

Abstract

The measure of stock will decide or influence the flow of the manufacturing procedure as well as the adequacy and proficiency of an organization. The cement factory produces more than 8 million packs of cement each day. The accomplishment of the cement factory depends upon the accessibility to crude or raw materials. Along these lines, in the event that the inventory of crude materials can not address the requirement of production, at that point the production procedure will be disruption. On the account of overloading production volume will be excessive. Inventory and production optimality can be achieved by utilizing economic request quantity and production request quality model. These techniques were utilized by the means of QM software, to get an optimal request amount of 15452 and 31866 respectively and the yearly holding cost for inventory or stock is 6,711,223,000 Naira and the yearly holding cost for production is 2,768,032,000 Naira.

Keywords: Optimality, Inventory, Production Request Quantity and Economic Request Quantity.

Introduction

Inventory is the assortment of assets that has a financial related worth within any organization. It is held with the goal of future utilization, for example, manufacturing, and marketing. Inventory is the connection between manufacturing and sales. It comprises an enormous level of cost within an organization and it is one of the most significant resources within a production facilities. It represents a huge portion of the overall capital however, there are three classes of inventories, they as follows:

1. Crude materials: Inputs into the manufacturing procedure that will be adjusted or changed into completed merchandise.
2. In process products: It is partially finished meaning that the manufacturing procedure is still ongoing
3. Completed products: These are merchandise that are available to be purchased, appropriation, or kept.

A decent inventory administration is fundamental for any production facility since it spares the organization from low-quality production, the dismay of clients, and profit reduction, which in turn has an immediate impact on the firm(Adeyeye, Ogunnaike, Amaihian, Olokundun and Inelo, 2016). This is attained by guaranteeing an ideal conveyance of crude materials to the processing plant and dispersion of completed merchandise. Therefore, in-other

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to manage inventory effectively and efficiently inventory control is essential. According to Fithri, Hasan, and Asri (2019), inventory or stock control is a significant issue that decides the measure of stock that will influence the flow of manufacturing procedure just as the viability and effectiveness of the organization. Deferrals or out of stock will not just impact the procedure of production but also reduce profitability.

The sum or level of stock required by an organization is diverse for each organization, contingent upon the amount of production, the storage limit of the plant, and the procedure. The stock or inventory level in a framework has huge ramifications on its productivity since it decides under stocking, overloading, the capacity cost, as well as the holding cost (Inegbedion, Eze, Asaleye & Lawal, 2019). However, the inventory stream is a fuction stock level. In this manner, inventory contributes to the production procedure and the yields from the procedure. A significant concern, particularly in the manufacturing industry has to do with the determination of an appropriate stock or inventory. Therefore this study applied economic request quantity model and production request quantity model to determine an optimal production and inventory.

Literature Review

Keshavarzfard, Makui, and Tavakkoli (2019) stated that optimization techniques, such as economic request quantity model and economic production quantity model are utilized to determine an ideal solution for both single product and multiple products. Additionally, the accomplishment of an optimal inventory is basically a heuristic procedure proposed to acquire the near optimal outcome for multiple products. A numerical model was applied by Taufik and Dharma (2019) to acquire an optimal request amount that limits the overall cost of inventory notwithstanding, the model assumes that lead time is steady and the lead time request follows a gamma distribution. Sensitivity analysis was utilized in the model to see the effect on the optimal request quantity and absolute inventory expense.

Economic request quantity model is inferred to decide the optimal inventory which minimizes the overall inventory in both the acquired and leased outlets nonetheless, the solution technique for understanding the model is created and shown through a numerical model (Makoena & Olufemi, 2019). Samithambe (2019) asserted that an idle inventory framework shows the quantity of a product that is aimed at diminishing the absolute cost of both handling stock and request processing cost therefore, economic request quantity model is applied to reduce overall cost, request cost and handling cost. The study utilized two fundamental strategies for deciding the the economic request quantity model i.e. trial & error and mathematical methodology.

It is smarter to purchase in small quantities, in light of the fact that it is described by a one-time modification of sales costs to the outright purchase of tons of merchandise, however, the two cases were checked based on the solver apparatus, utilizing non-linear model that is an integer optimization (Paweł, 2019). The conclusive outcome of the study was to decide the optimal amounts with the least inventory expenses. The proposed outcome by Suganthi and Jayalalitha (2019) was gotten from an optimal framework arrangement through a numerical model alongside a differential matrix to obtain an optimal size for the inventory in food production. A numerical model and sensitivity analysis was engaged in the study to explain the framework.

Justification for the study

The inventory volume in the cement manufacturing firm has a huge ramification on its productivity and profitability since it decides under-stocking or overloading, production rate as well as the holding cost. The demand quantity for cement is high. In this way, the volume of inventory determines the rates at which inventory streams in and out of the manufacturing framework. The streaming out of inventory is presumed to be a ceaseless movement in which inventories such as crude materials and work in progress items are put into the production framework for processing to obtain the final product. Subsequently, the manufacturing firm is confronted with the challenge of deciding an optimal stock to avoid under-stocking or overloading.

As a result of this lacuna the manufacturing firm encounters under-stocking deficiency which will halt production. On the account of overloading, there will be over production and holding cost will increase. This situation will make the value to decrease due to over time. In this manner, the study seeks to mathematically investigate and decide an optimal inventory and production in-other to reduce holding cost.

Objective of the study

The study utilized economic request quantity model and production request quantity model which is an inventory model to obtain an optimal production and inventory quantity which in turn will reduce holding cost.

Methodology

Economic request quantity model is a numerical model utilized to decide the quantity of items that should be requested to satisfy the anticipated request at a minimal inventory cost. Economic request quantity model objectively decides the reorder point for requests. While Production request quantity model is a mathematical formula applied to determine the quantity of production based on request and available inventory. The mathematical equations beneath are generic formulas for economic request quantity and production request quantity.

EOQ (Q) : $\sqrt{\frac{2DS}{HC}}$

D = The demand yearly
S = Ordering cost
C = Unit cost
H = Holding cost

POQ: $\sqrt{\frac{2DS}{H(1-d/p)}}$

D= Demand
S= Setup/Ordering cost
H= Holding cost
d = Daily demand
p = Daily production rate

Presumptions of economic request quantity model:
a) The model resolves each item exclusively in a business.

b) Annual necessity (Demand) for items in units is known.

c) Ordering cost is consistent for every year.

d) Handling expense is known and consistent. However, if the cost of handling an item is given as the level of the cost of the item, the unit cost of the item continues as before.

e) No money or discount is permitted.

f) The arranged amount of the item is conveyed immediately.

g) Immediate renewal of requested amount is on schedule (No postponement and stock deficiency).

h) Constant lead time is just permitted (no change is allowed).

The economic request quantity and production request quantity model was engaged to obtain an optimal output via QM software.

Information Analysis and Presentation

The information for this examination was secondary assembled from the cement production firm. The information incorporates the demand, ordering cost, holding cost, unit cost, daily production rate, daily demand. The information was examined utilizing economic order quantity model and production order quantity model by the means of QM software to get an optimal size.

Table 1: Economic order quantity model initial Tableau

Parameter	Value
Demand	107014317
Setup/Ordering cost(S)	969060
Holding cost(H)	868642
Unit cost	2570

Table 2: Economic order quantity model Final Tableau

Parameter	Value
Optimal inventory quantity(Q)	15452
Maximum inventory level	15452
Average inventory	7726
Orders per period (year)	6926
Annual setup cost	6711223000
Annual holding cost	6711223000

Table 3: Production order quantity model initial tableau

Parameter	Value
Demand	91025730
Setup/Ordering cost (S)	969030
Holding cost (H)	868642
Daily production rate (p)	10000000
Daily demand rate	8000000
Unit cost	2570

Table 4: Production order quantity model final tableau

Parameter	Value
Optimal production quantity(Q)	31866
Maximum inventory level	6373
Average inventory	3187
Production runs	2857
Annual Setup	2768032000
Annual Holding	2768032000

Conclusion

In light of the study, economic request quantity model and production request quantity model was utilized to obtain, an optimal output of 15452, and 31866 respectively for a year. The yearly holding cost for inventory is 6,711,223,000 naira and the yearly holding cost for production is 2,768,032,000 naira. A mathematical methodology of economic request quantity model and production request quantity model will enable inventory and operations manager to make prescriptive decisions that will achieve optimality and reduce cost. It further clarified the logical and linear connection between economic request quantity model and production request quantity model to achieve optimality because the production output is a function of inventory. The proposed inventory or stock framework did not consider issues like decay, capacity, storeroom limit and spending imperatives. These variables are significant when buying bigger amounts on the grounds that in specific occasions, the managers may be compelled to rent additional facilities on the bases of larger resources. This will unquestionably expand costs. The model introduced in this paper can be stretched out to incorporate capacity limits, spending limits, and other economic request quantity model and production request quantity model variables.

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Assessment of The Normalizing Aggregation Method in The Methodology of Multiple-Level, Multiple Criteria Evaluation of Urban Transportation Projects

Miroslaw KRUSZYNSKI

Poznan University of Technology, Faculty of Engineering Management, Logistics Institute, Poznan, Poland, miroslaw.kruszynski@put.poznan.pl

Abstract

In the paper, the author assesses an original normalizing aggregation formula, developed and applied as part of the methodology of multiple level, multiple criteria evaluation of varied transportation projects for the aggregation of rankings obtained following evaluation of urban transportation projects included in pre-defined classes into one final ranking which covers all varied urban transportation projects regardless of the class from which they originate. The aggregation of rankings from particular classes into one final ranking has been carried out using the author's original formula for normalizing aggregation, supported by 10 other formulas based on normalization methods which derive from distinct families of normalization formulas, i.e. quotient, logarithmic and zero unitarization formulas. Ultimately, employing Spearman's rank correlation coefficient and vector of similarity measure, the author conducts an assessment of the aforesaid original formula for normalizing aggregation applied at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects for the aggregation of partial rankings into one final ranking. Having reviewed the results of both procedures to assess normalizing aggregation, it may be stated that the original formula, introduced by the author, performed very well in comparison with other normalizing aggregation methods.

Keywords: Methodology of Multiple Level, Multiple Criteria Evaluation of Varied Urban Transportation Projects; Normalizing Aggregation Formula; Spearman's Rank Correlation Coefficient; Vector of Similarity Measure.

Introduction

The author approaches the problem of evaluating varied urban transportation projects as an issue which entails multiple level, multiple criteria sorting of variants. The assessment of projects relating to public transport, private – individual transport, non-motorized transport (pedestrian, bicycle) and integration of various transportation types takes place at three levels of urban management: strategic, tactical and operational, involving research into the impact of the projects on the achievement of chief objectives: strategic goals (as part of overall policy) of a metropolitan area, tactical – sectorial goals (relating to the transportation policy of the metropolitan area) and operational – subject-oriented goals, which remain strictly linked to the specific characteristics of the projects (Kruszynski M., 2014).

One of the crucial elements in the methodology of multiple level, multiple criteria evaluation of transportation projects is aggregation of rankings generated at particular levels of analysis, i.e. subject-matter, sectorial and strategic rankings, into the final ranking. Another important component of the methodology, applicable at its level II, is aggregation of partial rankings resulting from evaluation of urban transportation projects in each class into a single subject-matter ranking of the entire range of varied urban transportation projects (Kruszynski M., 2014; Kruszyński M., 2015; Żak J., 2015).

At level II of the methodology (evaluation in respect of operational goals), projects are assessed in the first place within a specific class (transportation projects addressing similar issues) to produce subject-matter rankings of the projects. At that stage of evaluation, a different family of criteria is employed for each class, whereby the number of criteria in a given criterial family often varies, to arrive at distinct arrays (rankings) for each of the classes (the number of projects in the classes may vary as well). Consequently, the obtained results (rankings) need to be aggregated into a single subject-matter ranking of all transportation projects (spanning all classes).

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In this paper, the author discusses the assessment of an original normalizing aggregation formula used to aggregate rankings generated in the course of subject-matter evaluation of transportation projects belonging to distinct classes into one subject-matter ranking of all urban transportation projects, irrespective of their class. Detailed analysis is carried out to examine the subject-matter ranking obtained on the basis of the original formula as well as the rankings resulting from aggregation of partial rankings in accordance with 10 normalization formulas (quotient, logarithmic and zero unitarization). Finally, using two procedures to support the process of evaluating and selecting the preferable method of normalizing aggregation, a conclusive assessment is made, by virtue of which the original formula for normalizing aggregation at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects is recommended for application.

The paper comprises 4 chapters. Preliminary considerations contained in Chapter 1 introduce the reader to the essence of the issue under discussion. Chapter 2 outlines methodological foundations of the study, providing characterization of multiple level, multiple criteria evaluation of transportation projects, ranking aggregation according to that methodology as well as multiple criteria decision aid methodology (MCDA). Also, the chapter collates normalizing aggregation formulas developed from normalization formulas which represent various families of such formulas (quotient, logarithmic and zero unitarization) as well as procedures aiding the process of assessing and selecting such an aggregation method, i.e. the procedures involving Spearman's rank correlation coefficient and vector-based measure of similarity. Chapter 3 includes a detailed characterization of ranking aggregation in the operational stage of multiple level, multiple criteria evaluation of urban transportation projects and presents the results obtained by means of the original aggregation formula and 10 normalizing aggregation formulas derived from known normalization formulas; in addition, the author discusses how the analysis proceeded and assesses the formulas applied. Chapter 4 provides the conclusions and recapitulates the paper, following which the references are supplied.

Principal Methodological Concepts Employed in the Study

Multiple level, multiple criteria evaluations of urban transportation projects

The methodology of multiple level, multiple criteria evaluation of urban transportation projects enables comprehensive assessment of varied urban transportation projects whilst taking into account their impact on the achievement of goals designated in transportation itself (subject-matter goals), in urban transportation policy (sectorial goals) and in urban development strategy (strategic goals), formulated at different tiers of urban transportation and municipal management (Kruszyński M., 2014). It allows for the multiple level, multiple criteria nature of the decision-making problem in question, the numerous technological, economic, social, environmental and political aspects, as well as the interests of various stakeholders, including residents and city users, municipal authorities, operators of public transport and its passengers (Kruszyński M., 2014).

Using this methodology, a complex decision problem can be resolved based on the methodology of multiple criteria decision aid (MCDA) with a possibility of coupling it with the methodology of Group Decision Making (GDM) (Kruszyński M., 2014; Kruszyński M., 2012). In general, the methodology consists in a five-level analysis (see Fig. 2.1). At level I, specific decision problems are resolved, i.e. a variant of urban transportation project is opted for, or projects are categorized into varied predefined classes, whereas at levels II - IV one addresses decision subproblems which have been isolated from the complex decision problem. The solution to the latter, involving a comprehensive, global evaluation of varied transportation projects is arrived at the final level V (Kruszynski M., 2014).

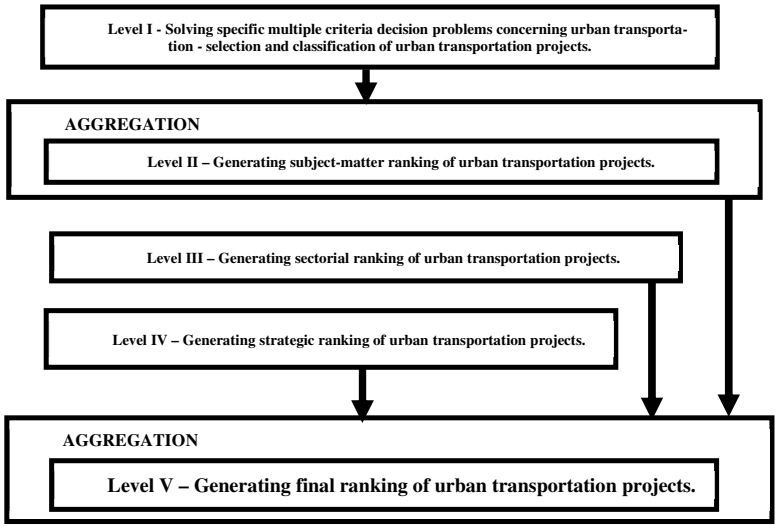

Fig. 2.1: Methodology of multiple level, multiple criteria evaluation of urban transportation projects (Kruszyński M., 2014)

Ultimately, the solution one obtains is a listing of varied urban transportation projects arrayed in order, from the undertaking which demonstrates the highest utility and simultaneously achieves subject-matter goals specific to various types of urban transport, urban transportation policy and with regard to city's strategic development goals, down to the undertaking with the lowest impact on the achievement of goals defined in the multiple level structure of urban transportation management (Kruszynski M., 2014). Such an approach enables effective use of public resources/means designated for the functioning and development of urban transportation, allowing for the preferences of decision makers, city residents (users) and interveners.

In the methodology of multiple level, multiple criteria evaluation of varied urban transportation projects, ranking aggregation takes place at two levels and represents its crucial component (Fig. 2.1). Rankings generated following subject-matter assessment of transportation projects are aggregated at level II, while level V involves aggregation of rankings obtained from the assessment of transportation projects at levels II, III, and IV, which pertain to subject-matter, sectorial, and strategic domains, respectively (Kruszyński M., 2014).

Multiple criteria decision aid

Multiple criteria decision aid (MCDA) serves to provide the decision maker with procedures, tools and mathematical-computer methods to solve decision problems whose analysis requires numerous, often opposing viewpoints to be taken into account. The MCDA methodology is applicable to multiple criteria decision problems that necessitate selecting, classifying, and sorting, i.e. situations in which, given a defined set of variants A (which are to be analyzed and assessed in the course of the decision-making process) and a consistent family of evaluation criteria F (which should meet the requirements of exhaustiveness of evaluation, consistency of evaluation with the principal goals of the decision maker, and non-redundancy of criteria), the decision maker aims to choose a variant or classify variants into predefined classes or to sort the variants (Morisugi H., 2000; Vincke P., 1992).

The general methodology of solving multiple criteria decision problems is staged into six phases (Żak J., 2005):

– Phase I: Identification and verbal description of the decision problem.
– Phase II: Construction of the mathematical decision model.
– Phase III: Analysis and selection of methods and algorithms by means of which the decision problem can be solved.
– Phase IV: Development of computer-based implementation of selected methods and algorithms.
–Phase V: Computer-based computational experiments.
– Phase VI: Analysis of results, review and assessment of solutions and selection of the most satisfactory

(compromise) solution.

MCDA methods which serve to solve multiple criteria decision problems may generally be divided into three groups (Roy B., 1990): multiattribute utility theory methods, methods bases on the outranking relation and interactive (dialogue) methods.

Normalization methods

Next to the original formula for normalizing aggregation, aggregation of partial rankings into a final ranking at level II of the methodology also takes advantage of 10 normalization formulas that are applicable to stimulant variables (Żabicki P., 2014; Jarocka M., 2015; Żabicki P., 2014; Walesiak M., 2016) which integrate quantity quotients of the partial ranking from which a particular variant (project) originates and of the number of analyzed and assessed variants from all partial rankings (Kruszyński M., 2014; Kruszyński M., 2015; Żak J., 2015):

– Normalizing aggregation incorporating normalization by Van Delft and Nijkamp:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij}^2}} \tag{1}$$

where:

x_{ij}^{*} – normalized value of variant j from partial ranking (class) i,
x_{ij} – value of variant j from partial ranking i,
l_i – number of variants in partial ranking (class) i
m – number of partial rankings (classes),
n – number of variants in partial ranking i.

– Normalizing aggregation incorporating Weitendorf's normalization:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{x_{ij} - x_j^{-}}{x_j^{+} - x_j^{-}} \tag{2}$$

where:

x_j^{+}, x_j^{-} – highest, lowest value of variant j from all (m) partial rankings (all classes).

– Normalizing aggregation according to normalization by Peldschus:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \left(\frac{x_{ij}}{x_j^{+}}\right)^2 \tag{3}$$

– Normalizing aggregation incorporating normalization by Jüttler:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{x_j^{+} - x_{ij}}{x_j^{+}} \tag{4}$$

– Normalizing aggregation incorporating normalization by Stopp:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{100 * x_{ij}}{x_j^{+}} \tag{5}$$

– Normalizing aggregation incorporating sum-based normalization and Pattern's stimulant normalization:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{x_{ij}}{\sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij}} \tag{6}$$

– Normalizing aggregation based on linear normalization:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{x_{ij}}{x_j^{+}} \tag{7}$$

– Normalizing aggregation incorporating normalization by Jüttler and Körth:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \left(1 - \left|\frac{x_j^{+} - x_{ij}}{x_j^{+}}\right|\right) \tag{8}$$

– Normalizing aggregation incorporating logarithmic normalization:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \frac{\ln(x_{ij})}{\ln\left(\prod_{i=1}^{m}\prod_{j=1}^{n} x_{ij}\right)} \tag{9}$$

– Normalizing aggregation incorporating maximum standardization:

$$x_{ij}^{*} = \frac{l_i}{\sum_{i=1}^{m} l_i} * \left(\frac{-x_{ij}}{x_j^{+}} + 1\right) \tag{10}$$

Procedures supporting the assessment of the original normalizing aggregation method

Pertinent literature provides numerous methods which may support the assessment and selection of the normalization method; ultimately, two have been chosen as the most suitable for the evaluation of ranking correlation (Spearman Ch., 1904; Kendall M., 1948; Jarocka M., 2015; Kukuła K., 2015; Walesiak M., 2017; Walesiak M., 2018).

In the first procedure, described as vector of similarity measures, the results of inter-ranking comparisons yields the assessment of applied normalizing aggregation methods that generated the rankings, by means of measure m_{pq} according to formula (11) (Kukuła K., 2015):

$$m_{pq} = 1 - \frac{2\sum_{i=1}^{n}|c_{ip} - c_{iq}|}{n^2 - z}, \quad p, q = 1, 2, \dots, r, \tag{11}$$

where:

c_{ip} – position i – of the variant in ranking p,
c_{iq} – position i – of the variant in ranking q,
$z = \begin{cases} 0, n \in P \\ 1, n \notin P \end{cases}$, a P – set ot natural even numbers,
$m_{pq} \in [0,1]$,
r – number of rankings.

Following comparisons between rankings one arrives at matrix M: a symmetric matrix with dimensions $(r \times r)$ according to formula (12) (Kukuła K., 2015):

$$M = [m_{pq}] = \begin{bmatrix} 1 & m_{12} & m_{13} & \dots & m_{1r} \\ m_{21} & 1 & m_{23} & \dots & m_{2r} \\ \dots & \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots & \dots \\ m_{r1} & m_{r2} & \dots & \dots & 1 \end{bmatrix} \tag{12}$$

where:
$m_{pq} = 1$, when $p = q$,
$m_{pq} = m_{pq}$, when $p \neq q$.

In order to determine the degree of similarity of a ranking obtained using p – of this normalizing aggregation method with respect to the remaining rankings one needs to calculate the sum of elements p in the line (or column) of matrix M reduced by 1 in accordance with the following formula (Kukuła K., 2015):

$$u_p = \frac{1}{r-1}\sum_{\substack{q=1 \\ P \neq q}}^{r} m_{pq}, \quad p, q = 1, 2, \dots, r, \tag{13}$$

One should choose that normalization method for which u_p assumes maximum value (Kukuła K., 2015):

$$\overline{u_p} = \max_{p} \overline{u_p} \tag{14}$$

Another mode of comparing rankings and, consequently, the applied normalizing aggregation methods is to determine Spearman's rank correlation coefficient (Jarocka M., 2015). Spearman's *rho* coefficient is computed based on the following formula (15) (Spearman Ch., 1904):

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2-1)} \tag{15}$$

where:

d_i^2 – square difference between ranks of corresponding values of characteristics x_i and y_i,
n – number of pairs of data.

Interpretation of Spearman's rank coefficient is as follow: below 0,2 – negligible correlation (practically no relationship); 0,2-0,4 – low correlation (discernible relationship); 0,4-0,6 – moderate correlation (relevant relationship); 0,6-0,8 – high correlation (substantial relationship); 0,8-0,9 – very high correlation (very strong relationship); 0,9-1,0 – practically perfect relationship (Spearman Ch., 1904).

Empirical Verification

Ranking aggregation at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects

As already noted, level II of the methodology entails investigation within a particular class in the first place, so as to obtain partial rankings of urban transportation projects for each class. The number of intermediate rankings corresponds with the number of classes of transportation projects under consideration; in this paper, the number in question is 4. The following classes are taken into account in this case: private transport-oriented projects (PrT), public transport oriented projects (PuT), non-motorized mobility projects (MN) and transport integration projects (IT).

Subsequently, it becomes necessary to carry out normalizing aggregation of partial rankings of urban transportation projects with computed utilities into a final ranking. The aggregation is performed according to the following original formula (16) (Kruszyński M., 2014)

$$U_{ij}^{mer} = \frac{l_i}{\sum_{i=1}^{m} l_i} * U_{ij} \tag{16}$$

where:

U_{ij}^{mer} – utility of variant/urban transportation project *i,j* in the subject-matter ranking,
U_{ij} – utility of variant/urban transportation project j in the ranking of projects in class i,
l_i – quantity within class i, where $i = 1,2, \ldots, m$,
m – number of classes, where $m = 4$,
j – variant/urban transportation project in class i, where j= 1, 2, …, l_i.

The objective of this paper was to compare the result of normalizing aggregation at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects using the original formula (16) advanced by this author in (Kruszyński M., 2014) with 10 normalizing aggregation methods described and listed above as formulas (1), (2), (3), (4), (5), (6), (7), (8), (9), (10), with a view to evaluating the original aggregation formula (16). The ranking generated by means of the original formula (16) is designated as R0, while rankings obtained based on the normalization formulas from (1) to (10) have been marked from R1 to R10, respectively. Tab. 1 presents the positions of the urban transportation projects under consideration in ranking R0 as well as the positions of the same projects in rankings R1, R2, R3, R4, R5, R6, R7, R8, R9 and R10.

Table 1: Positions of the assessed urban transportation projects in subject-matter rankings generated by means of normalizing aggregation methods, i.e. according to (1), (2), (3), (4), (5), (6), (7), (8), (9), (10), (16)

i	*i,j*	l_i	*Variant*	*Uij* [%]	R0	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
1	1,1	1	IT-1	31.94	7	7	7	5	16	7	7	7	7	17	16
	1,2	2	IT-2	42.70	5	5	3	2	18	5	5	5	5	16	18
	1,3	3	IT-3	25.36	13	13	11	8	14	13	13	13	13	18	14
2	2,1	4	MN-1	18.84	15	15	13	12	7	15	15	15	15	15	7
	2,2	5	MN-2	32.68	4	4	4	4	15	4	4	4	4	9	15
	2,3	6	MN-3	27.35	6	6	6	6	13	6	6	6	6	10	13
	2,4	7	MN-4	21.13	12	12	10	11	9	12	12	12	12	13	10
3	3,1	8	PrT-1	20.26	3	3	5	7	6	3	3	3	3	2	6
	3,2	9	PrT-2	8.01	17	17	17	17	2	17	17	17	17	6	2
	3,3	10	PrT-3	12.79	9	8	15	14	5	8	8	8	8	3	5
	3,4	11	PrT-4	29.76	1	1	1	1	10	1	1	1	1	1	9
	3,5	12	PrT-5	12.37	10	11	16	15	4	11	11	11	11	4	4
	3,6	13	PrT-6	7.83	18	18	18	18	1	18	18	18	18	8	1
	3,7	14	PrT-7	8.98	16	16	14	16	3	16	16	16	16	5	3
4	4,1	15	PuT-1	18.99	14	14	12	13	8	14	14	14	14	14	8
	4,2	16	PuT-2	21.79	11	10	9	10	11	10	10	10	10	12	11
	4,3	17	PuT-3	21.96	8	9	8	9	12	9	9	9	9	11	12
	4,4	18	PuT-4	37.26	2	2	2	3	17	2	2	2	2	7	17

Assessment of the original method of normalizing aggregation of rankings

The assessment of the original method of normalizing aggregation with respect to 10 other normalizing aggregation methods enumerated in Chapter 2 was carried out using two procedures in which Spearman's rank correlation coefficient was employed, and one procedure involving the vector of similarity measure.

However, prior to the above, an analysis was carried out to estimate how a change of the normalizing aggregation method affected the sorting of projects in the global subject-matter ranking (following aggregation of 4 intermediate/partial rankings). Based on a cursory analysis of positions of particular urban transportation projects in ranking R0 in relation to the positions in rankings R1 - R10, generated in the course of computational experiments in which 10 normalizing aggregation methods were employed to normalize results of project evaluation within their classes, one readily observes that their positions have changed (see Tab. 2). In fact, no project in R0 has retained the same position in the remaining 10 rankings. The winning PrT-4 project in ranking R0 changed position in 2 rankings (least frequently of all 18 evaluated projects). Most frequent change with respect to position in R0, i.e. in all 10 rankings, was noted in the case of two projects from the class of private transport projects, namely PrT-3 and PrT-5. Two projects from the public transport projects class—PuT-3 and PuT-2—changed their R0 positions in numerous other rankings, the former in 9 and the latter in 8 rankings. In the other instances, changes occurred less often, with 4 projects shifting in 3 rankings, 5 projects in 4 rankings, and the remaining 4 projects in 5 rankings.

On the grounds of this cursory analysis alone, it may be inferred that the choice of the normalizing aggregation method for the aggregation of intermediate rankings generated following the evaluation of urban transportation projects assigned to 4 subject-specific classes into one global subject-matter ranking does affect the outcome, namely the position of a given project/variant in the final ranking.

For the purposes of a detailed analysis of the rank changes of urban transportation projects in the final subject-matter rankings (R0 and R1, R2, R3, R4, R5, R6, R7, R8, R9 i R10) depending on the adopted normalizing aggregation formula, Spearman's rank correlation coefficient was computed for the positions of each transport project across the rankings; the output values are provided in Tab. 2.

Table 2: Spearman's rank correlation coefficient values between rankings R0 and R1, R2, R3, R4, R5, R6, R7, R8, R9, and R10

	R0	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
R0	1.000	0.996	0.893	0.878	-0.647	0.996	0.996	0.996	0.996	0.238	-0.624
R1		1.000	0.893	0.878	-0.647	1.000	1.000	1.000	1.000	0.238	-0.624
R2			1.000	0.969	-0.800	0.893	0.893	0.893	0.893	-0.051	-0.781
R3				1.000	-0.868	0.878	0.878	0.878	0.878	-0.051	-0.847
R4					1.000	-0.647	-0.647	-0.647	-0.647	0.531	0.998
R5						1.000	1.000	1.000	1.000	0.238	-0.624
R6							1.000	1.000	1.000	0.238	-0.624
R7								1.000	1.000	0.238	-0.624
R8									1.000	0.238	-0.624
R9										1.000	0.556
R10											1.000

High Spearman's rank correlation coefficients, whose values fluctuate between 0.9 and 1.0, attest to perfect relationship of position results in those rankings, while those in the range from 0.8 to 0.9 indicate strong correlation of the rankings, which means strong correlation of the employed normalizing aggregation methods. Perfect relationship is thus observed between R0 and R1, R5, R6, R7, R8, i.e. with 5 rankings. Each of these rankings (R1, R5, R6, R7, R8) demonstrates full correlation with 5 other rankings as well. The remaining rankings are not correlated to the same degree, as only R2 and R3 are mutually correlated with the value of Spearman's rank correlation coefficient above 0.9; the subsequent do not display perfect relationship with any other ranking.

Ranking R0 also proves to have strong correlation (value range of Spearman's rank correlation coefficient from 0.8 to 0.9) with two rankings, i.e. R2 and R3. Furthermore, ranking R0 is weakly correlated with R9 and has negligible relationship (hardly any correlation) with rankings R4 and R10. Ranking R9 was generated through normalizing aggregation constructed on the basis of logarithmic normalization, R4 is the result of normalizing aggregation according to Jüttler's normalization, while R10 was obtained following normalizing aggregation relying on maximum standardization. The normalizing formulas which served to perform normalizing aggregation that yielded rankings characterized by strong or perfect correlation with R0 all belong to one family of normalization formulas, the so-called quotient formulas. It may be presumed that besides the original formula (16) which the author employed for normalizing aggregation at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects, other formulas of normalizing aggregation derived from the quotient-based family of normalization formulas may also be applied, i.e. (1), (2), (3), (5), (6), (7) and (8).

In the subsequent, second procedure aiding the assessment of the original formula of normalizing aggregation used as part of the methodology of multiple level, multiple criteria evaluation of urban transportation projects with respect to 10 other formulas developed from normalizing methods for each pair of rankings (generated following those formulas) in Tab. 1, the values of measure m_{pq} were estimated according to formula (11). All computed values were recorded in matrix M, in which the number of the line (column) corresponds to the normalizing aggregation method which yielded the respective global subject-matter ranking:

$$M = \begin{bmatrix} 1{,}000 & 0{,}975 & 1{,}000 & 0{,}802 & 0{,}111 & 0{,}975 & 0{,}975 & 0{,}975 & 0{,}975 & 0{,}444 & 0{,}123 \\ & 1{,}000 & 0{,}827 & 0{,}815 & 0{,}111 & 1{,}000 & 1{,}000 & 1{,}000 & 1{,}000 & 0{,}444 & 0{,}123 \\ & & 1{,}000 & 0{,}889 & 0{,}062 & 0{,}827 & 0{,}827 & 0{,}827 & 0{,}827 & 0{,}296 & 0{,}074 \\ & & & 1{,}000 & 0{,}037 & 0{,}815 & 0{,}815 & 0{,}815 & 0{,}815 & 0{,}272 & 0{,}049 \\ & & & & 1{,}000 & 0{,}111 & 0{,}111 & 0{,}111 & 0{,}111 & 0{,}543 & 0{,}988 \\ & & & & & 1{,}000 & 1{,}000 & 1{,}000 & 1{,}000 & 0{,}444 & 0{,}123 \\ & & & & & & 1{,}000 & 1{,}000 & 1{,}000 & 0{,}444 & 0{,}123 \\ & & & & & & & 1{,}000 & 1{,}000 & 0{,}444 & 0{,}123 \\ & & & & & & & & 1{,}000 & 0{,}444 & 0{,}123 \\ & & & & & & & & & 1{,}000 & 0{,}556 \\ & & & & & & & & & & 1{,}000 \end{bmatrix}$$

Following the procedure, it may be stated that R0 displays high degree of similarity to other rankings, with values of the similarity measure approaching unity ($\overline{u_p} = 0{,}993$), at the same level of similarity measure with regard to other rankings as R1 and R5, where that measure reached the maximum value of unity ($\overline{u_p} = 1{,}000$). In the remaining cases, the values for similarity measure are significantly lower (see Tab. 3).

Table 3: Average values of inter-ranking similarity measure

	R0	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**
$\overline{u_p}$	0.993	1.000	0.948	0.945	0.733	1.000	0.730	0.730	0.730	0.833	0.737

Summary and Conclusions

This paper set out to assess an original normalizing aggregation formula used for the aggregation of intermediate/partial rankings into a final subject-matter ranking at level II of the methodology of multiple level, multiple criteria evaluation of transportation projects. The assessment was performed while relying on the result of normalizing aggregation according to 10 aggregation formulas derived from 10 normalization methods (quotient, logarithmic and zero unitarization).

Based on the conducted computational experiments, it may be concluded that the choice of the normalizing aggregation method for the aggregation of intermediate rankings generated in the course of evaluation of urban transportation projects from 4 subject-specific classes into one global subject-matter ranking affects the outcome, i.e. the position of a project/variant in the final subject-matter ranking.

In view of the determined impact of the employed normalizing aggregation methods on the position of urban transportation projects in individual final subject-matter rankings, the methods in question were assessed. For this purpose two procedures applicable to normalizing aggregation methods were implemented, one of which used Spearman's rank correlation coefficient, while the other relied on vector of similarity measure.

The first procedure demonstrated that the original normalizing aggregation formula is in perfect correlation with as many as 6 out of 11 formulas, and in strong correlation with further two. In the second procedure, 5 formulas showed measure of similarity approaching unity.

Having reviewed the results of both procedures to assess normalizing aggregation, it may be stated that the original formula (16), introduced by this author in (Kruszyński M., 2014), performed very well in comparison with other normalizing aggregation methods (1), (2), (3), (4), (5), (6), (7), (8), (9), (10). In the procedure assessing normalizing aggregation formulas based on Spearman's rank correlation coefficient, ranking R0 obtained from the aggregation of intermediate rankings according to original normalizing aggregation method (16) is perfectly correlated with 5 other rankings (R1, R5, R6, R7, R8), which originate from the family of quotient normalization formulas. Also, ranking R0 remains in strong correlation with two more rankings, i.e. R2 and R3, which derive from the quotient family as well. In the procedure aiming to assess normalizing aggregation formulas using vector of similarity measure, it was shown that ranking R0 displays full similarity to ranking R1 and ranking R5, as well as to R2 and R3. Further, this procedure demonstrated that R0 generated on the formula (11) is fully similar to rankings obtained by means of the quotient formulas for normalizing aggregation ((1), (2), (3), (5)). It may be presumed that the remaining normalizing aggregation methods, originating from other families of normalization formulas—logarithmic or zero unitarization—are less useful when carrying out normalizing aggregation of partial rankings into a final ranking in the methodology of multiple level, multiple criteria evaluation of urban transportation projects.

Significant, original methodological findings of this work include:

– developing 10 formulas for normalizing aggregation based on 10 normalization formulas,
– conducting aggregation of intermediate/partial rankings of urban transportation projects in 4 classes into one final subject-matter ranking using previously developed normalizing aggregation methods,

– performing assessment of the original method of normalizing aggregation based on comparisons of the subject matter rankings obtained by means of the original aggregation method and rankings generated with 10 other normalization methods,
– formulating final recommendations.

The following may be considered to constitute significant practical outcomes of the work:

– verification of suggested procedures for the assessment of normalizing aggregation formulas involving obtained subject-matter rankings,
– demonstration of practical application of both procedures for the assessment of normalizing aggregation methods used to aggregate intermediate rankings into a final subject-matter ranking at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects.

Computational experiments conducted as part of this study make it possible to formulate the following recommendations:

– the original formula of normalizing aggregation, presented by this author in (Kruszyński M., 2014) may be applied to aggregate intermediate ranking into single final subject-matter ranking on a par with other normalizing aggregation formulas developed on the basis of normalization formulas in the quotient family,
– in order to assess the original formula of normalizing aggregation in the process of aggregating intermediate rankings into one final ranking at level II of the methodology of multiple level, multiple criteria evaluation of urban transportation projects, as well as the normalizing aggregation formulas derived from 10 normalization formulas in the various families, i.e. quotient, logarithmic and zero unitarization formulas, employed for the same purpose, one can take advantage of both procedures to aid the assessment, namely the procedure using Spearman's rank correlation coefficient and the procedure involving vector of similarity measure,
- next to the original formula of normalizing aggregation, aggregation of intermediate rankings into one subject-matter ranking may also rely on the normalizing aggregation formulas incorporating Van Delft and Nijkamp normalization and Stopp normalization.

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The Involvement of Public University Students in Social Entrepreneurship Activity: Empirical Study in Malaysia

Nor Suhaida Bt AWANG
Faculty of Technology Management and Business, Tun Hussein Onn University of Malaysia, Johor.
norsuhaida.awang@yahoo.com

Prof Dr Wan Fauziah Bt WAN YUSOFF
Faculty of Technology Management and Business, Tun Hussein Onn University of Malaysia, Johor.
fauziahy@uthm.edu.my

Raudah Bt MOHD ADNAN
Faculty of Technology Management and Business, Tun Hussein Onn University of Malaysia, Johor.
raudah@uthm.edu.my

Abstract

The purpose of this research is to identify individual factors that influence students to participate in social entrepreneurship activity and the outcome of social entrepreneurship activity to human capital and social capital. This quantitative research has been conducted on 797 Enactus students using stratified sampling at three categories of public university in Malaysia. For this purpose, statistical analysis was done on the data obtained from 797 Enactus students using stratified sampling at 20 public university in Malaysia. Based on Partial Least Squares structural equation modelling (PLS-SEM) method, our empirical study showed that involvement in social entrepreneurship activity is influenced positively by four key factors: empathy, moral obligation, self-efficacy and social support. Data analysis also revealed that there is a significant relationship between these individual factors with their human capital and social capital. The study that highlighted the influence of individual factor on student's involvement in social entrepreneurship activity and its relationship with human capital and social capital is not well validated empirically in Malaysia. Thus, this study was contributing the new body of knowledge in social entrepreneurship development in Malaysia.

Keywords: Involvement, Social Entrepreneurship Activity, Public University.

Introduction

In Malaysia the concept of social entrepreneurship shows good development and has received a lot of attention from academics and policy makers. In May 2015, social entrepreneurship was officially introduced by the government through the Malaysian Social Entrepreneurship Blueprint (MaGIC, 2015). To further increase the involvement of individuals in social enterprises, in 2019, the Accreditation of Social Enterprises (SE. A) has been established to confirm the status of a social enterprise to help them gain access to various support and greater opportunities to grow their business (website Medac). Recently, the Malaysian government has also launched the National Entrepreneurship Policy (DKN) 2030. It is the country's long-term strategy in making Malaysia a superior entrepreneurial nation by 2030 (website Medac). Among the area that will be given attention is the field of social entrepreneurship. Therefore, this policy will act as a catalyst for Malaysia to achieve a more equitable and inclusive economic distribution, subsequently emerging as the axis of the Asian economy (website Medac). However, despite the many social entrepreneurship programs implemented by the government and organizations, the involvement and awareness of Malaysians towards social entrepreneurship to support government policy is still very low. According to the Thomson Reuters Foundation (2016), the level of knowledge of Malaysians about social entrepreneurship is still low. This low knowledge leads to the lack of involvement of Malaysians in social entrepreneurship activities. Therefore, there is a need to study the involvement of students in social entrepreneurship activities in Malaysia.

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So, what exactly is meant by social entrepreneurship and why it is necessary to encourage more Malaysian to engage in this activity? The first and most popular definition of social entrepreneurship is the definition introduced by Dees (1998), pioneers in the field of social entrepreneurship. According to Dees, social entrepreneurship is an activity that uses conventional business models to address social issues. It is an agent of change in the social sector such as implement the ideal of changing and improving social values, looking for opportunities to make continuous changes, always engage in the process of innovation, adaptation, learning that he faces, act regardless of limitations and have accountability in accounting the decisions he achieves to the community. Other than that, social entrepreneurship can be defined as innovative development, income-generation efforts, job creation and can be carried out by individuals, groups of individuals or organizations (Pomerantz, 2003). Social entrepreneurship is driven by financial sustainability. They also provide alternative delivery systems for public services such as health, education, housing and society (Harding, 2006). Therefore, to overcome the economic and social crisis simultaneously, one of the methods that can be used is through social entrepreneurship activities. It not only can overcome the socio-economic imbalance but also indirectly can help to reduce government budgets to solve social issues.

Literature Review

Researchers have identified several studies on student involvement in social entrepreneurship activities, factors that influence students involved in social entrepreneurship activities and the outcomes of social entrepreneurship activities on students as below.

Empathy

Barnett et al. (1981) found empathy to be a very relevant feature for social entrepreneurs. Morreale, Spitzberg and Barge (2001) define empathy as the ability to experience similar feelings toward others. In the context of this study of social entrepreneurship, the definition of empathy is one's ability to understand the feelings of disadvantage people. Students who involved in social activities as a whole have a high level of empathy (Greeno, E. J, Ting, L., and Wade, K., 2018). Empathy has a positive effect on involvement in corporate voluntary activities (Forster & Grichnik, 2013). According to Sophie bacq and Elisa Alt (2018), empathy has no direct relationship to involvement in social entrepreneurship but is moderated by other factors. Thus, the development of hypothesis for empathy is as below:

H1: Empathy has positive influence on student's involvement in social entrepreneurship activity

Moral obligation

Moral obligation is defined as an individual decision to determine whether something is wrong or wrong, ethical or unethical (Schwepker & Good, 2010). Moral obligation is the second characteristic that contributes to the formation of social entrepreneurial intentions (Mair & Noboa, 2006). Personal moral values are a key driver for corporate social entrepreneurship (Hemingway, 2005). Moreover, the decision to start a social activity is often driven by an individual's ethical and moral perceptions (Kickul & Lyons 2012). Thus, the higher the level of moral obligation is seen to positively influence a person involved in social entrepreneurship (Smith, Kistruck, & Cannatelli, 2016). Thus, the development of hypothesis for moral obligation is as below:

H2: Moral obligation has positive influence on student's involvement in social entrepreneurship activity

Self-Efficacy

The basic principle of self-efficacy theory is that individual achievement and motivation are determined by self-belief (Bandura, 1982). Students who have high level of self-efficacy have a higher desire to engage in social entrepreneurship activities (Tiwari, Bhat, & Tikoria, 2017). Thus, the development of hypothesis for self-efficacy is as below:

H3: Self-efficacy have positive influence on student's involvement in social entrepreneurship activity

Social Support

Social support in this study refers to the support from family and friends influencing a person's decision to engage in social entrepreneurship activities (Hockerts, (2015). Social entrepreneur who gets encouragement and support from their parents and friends inspires them to continue to be successful as social entrepreneurs (Omorede, 2014). Other than that, individuals are more likely to form intentions to engage in entrepreneurship when they think that the decision is supported by people close to them, when entrepreneurial activity gives positive value to society, when they see others becoming entrepreneurs and successful (Malebana, 2016). Thus, the development of hypothesis for social support is as below:

H4: Social support have positive influence on student's involvement in social entrepreneurship activity

SE Involvement and its influence on human and social capital

There are several definitions regarding the term of involvement. Cohen and Uphoff (1977) state that involvement is a process, that is, the individual can approach himself or have a relationship in the planning and implementation of a program. Apart from that, from other aspects involvement also means a person's behavior towards an activity. This is supported by Leithwood and Jantzi (1999) who stated that involvement is divided into two dimensions namely affective and behavioral. Russell, Ainley and Frydenberg (2005) state that involvement consists of three forms, namely behavioral, emotional and cognitive. According to Kamidin, Mahmood and Pin (2006), involvement is more influenced by the internal input of the individual such as motivation, background, economic situation, academics and the knowledge that is in the self will form the perception of the individual and subsequently translated into the form of involvement. Therefore, the involvement factor is greatly influenced by one's individual factors.

There are several studies shows positive outcome of involvement in activities such as social entrepreneurship. It can help improve student interpersonal skills such as the ability to solve problem, work with others in addition to being able to understand the problems faced by society and experience dealing with real issues (Astin & Sax, 1998; Rahim & Lajin, 2015).

H5: SE involvement have positive influence on human capital

According to Coleman (1990) social capital is the existing relationship in the family among the organization of a community that is useful in the cognitive and social development of an individual. According to him, there are two relationship structures in social capital, namely within the family and outside the family. Social entrepreneurship activities such as service-learning have a positive effect on social capital such as the sense of social responsibility (D'Agostino, 2010). In addition, the results of this study are also in line with the study of Tshikovhi (2013) that students involved in social entrepreneurship activities through the Enactus project also has networking skills and is able to build better professional contacts. Volunteering can strengthen relationships with each other as well as social interaction (Alias & Balakrishnan, 2017).

H6: SE involvement have positive influence on social capital

Methodology

The objective of this study was to study and examine the involvement of students in social entrepreneurship and its effects on their level human capital and social capital. The study was performed on 797 students who are participate in social entrepreneurship activity in their University. The questionnaire for collecting data has a 5-point Likert scale from 1 (complete disagreement) and 5 (complete agreement). This questionnaire was sent to the respondent via google form, walk-in, and by post to increase the return of valid survey. The process of analysis data involves the use SPSS software and Smart PLS.

Result

This study also conducted to identify the individual factor that contribute to participation of students in social entrepreneurship activity. Other than that, this study also carried out to find outcome the of participation in social

entrepreneurship activity to human capital and social capital. The analysis is conducted to look the direct relationship between participation in social entrepreneurship activity and its outcomes. This analysis is carried out using PLS-SEM starting with measurement model assessment, followed by structural assessment as discussed in the following subtopic.

Measurement model assessment is carried out using PLS algorithm and the value in report is automatically generated as in Table 4.1. Based on the measurement model, Composite reliability (CR) and Cronbach's Alpha for all construct is below the threshold value.

Table 4.1: Result of Composite reliability (CR) and Cronbach's Alpha

Construct	Composite reliability (CR)	Cronbach's Alpha	Internal consistency reliability α >0.8 and 0.60<CR<0.95
EFI	0.876	0.831	Yes
EMP	0.846	0.783	Yes
HUM	0.916	0.884	Yes
INV	0.917	0.904	Yes
MOR	0.909	0.880	Yes
SOC	0.921	0.893	Yes
SOS	0.880	0.795	Yes

(Notes: EMP=Empathy; MOR=Moral obligation; EFI=self-efficacy; SOC=social support; INV=Involvement; HUM=human capital; SOS=social capital)

Next step is the convergent validity test. There are two tests under convergent validity that is indicator reliability and the average variance extracted (AVE) of all constructs.

Table 4:2 Convergent Validity Based on Item Loadings And AVE

Construct	Items	Loadings	AVE	AVE>0.6	Loadings >0.5
EFI	Efi1	0.738	0.542	No	Yes
	Efi2	0.755			
	Efi3	0.663			
	Efi4	0.820			
	Efi5	0.783			
	Efi6	0.641			
EMP	Emp1	0.696	0.482	No	Yes
	Emp2	0.622			
	Emp3	0.791			
	Emp4	0.776			
	Emp5	0.512			
	Emp6	0.731			
MOR	Mor1	0.790	0.625	Yes	Yes
	Mor2	0.812			
	Mor3	0.782			
	Mor4	0.820			
	Mor5	0.799			
	Mor6	0.740			
SOS	Sos1	0.802	0.709	Yes	Yes
	Sos2	0.872			
	Sos3	0.851			
HUM	Hum1	0.763	0.685	Yes	Yes
	Hum2	0.805			
	Hum3	0.872			
	Hum4	0.885			
	Hum5	0.809			
SOC	Soc1	0.783	0.700	Yes	Yes
	Soc2	0.865			
	Soc3	0.842			
	Soc4	0.863			
	Soc5	0.829			

Table 4.3: Outer loading after modification

Construct	Items	Loadings	AVE	AVE>0.6	Loadings >0.5
EFI	Efi1	0.783	0.635	Yes	Yes
	Efi2	0.782			
	Efi4	0.837			
	Efi5	0.785			
EMP	Emp1	0.730	0.605	Yes	Yes
	Emp4	0.779			
	Emp6	0.821			
MOR	Mor1	0.790	0.625	Yes	Yes
	Mor2	0.811			
	Mor3	0.782			
	Mor4	0.820			
	Mor5	0.799			
	Mor6	0.740			
SOS	SoS1	0.803	0.709	Yes	Yes
	SoS2	0.871			
	SoS3	0.851			
HUM	Hum1	0.763	0.685	Yes	Yes
	Hum2	0.805			
	Hum3	0.872			
	Hum4	0.885			
	Hum5	0.809			
SOC	Soc1	0.783	0.700	Yes	Yes
	Soc2	0.865			
	Soc3	0.842			
	Soc4	0.863			
	Soc5	0.829			

Result

Based on Table 4.4 below, the beta value (β) is shown in the original column of the sample while the t-value is shown in the T statistics column. Beta values (β) or path coefficients are used to see the strength of the relationship between the independent variable and the dependent variable. The standard beta (β) value is between -1 to +1, i.e. the value approaching +1 indicates there is a strong positive relationship and the value approaching -1 indicates a strong negative relationship (Hair et al., 2014). Whereas, t-value is used to identify whether the relationship of independent variables and dependent variables is significant or not. According to Hair et al., (2017), beta values should be compared with critical values. In this study the critical value used is 1.96 (two-tailed). Based on t-value, the researcher will decide whether to reject or accept the hypothesis of this study (Gotz et al., 2010).

The results of the analysis show that individual factor that is empathy (t = 22.493, β = 0.314), self-efficacy (t = 20.486, β= 0.015), moral obligation (t =31.260, β =0.015) and social support (t =15.522, β =0.012) affects the level of involvement in social entrepreneurship activity. In addition, the results of the analysis also show that student involvement in social entrepreneurship activities affects the level of human capital (t = 22.321, β =0.026) and student social capital (t = 22.138, β = 0.012) where it has a t-value exceeding 1.64. Therefore, this indicates a significant path. Thus, there is a positive relationship between individual factor and level of involvement in social entrepreneurship activity. This study also highlighted that there is a positive relationship between student involvement in social entrepreneurship activities with human capital and social capital. Therefore, these results support the hypothesis that empathy, self-efficacy, moral obligation, and social support affects the level of involvement in social entrepreneurship activity. Other than that, these results also support the hypothesis that involvement in social entrepreneurship activities affects the level of human capital and social capital of the students.

Table 4.4: The Relationship of Human Capital and Social Capital of Students Involved in Social Entrepreneurship Activities with Involvement Factors in Public Universities

Hyphotesis	Relationship	Original sample (β)	Standard deviation (STDEV)	T statistics (t-value)	Significant
H1	**EMP -> INV**	0.264	0.012	22.493	Yes
H2	**MOR -> INV**	0.471	0.015	31.260	Yes
H3	**EFI -> INV**	0.314	0.015	20.486	Yes
H4	**SOS -> INV**	0.188	0.012	15.522	Yes
H5	**INV -> HUM**	0.572	0.026	22.321	Yes
H6	**INV -> SOC**	0.560	0.025	22.138	Yes

(Notes: EMP=Empathy; MOR=Moral obligation; EFI=self-efficacy; SOS=social support; INV=Involvement; HUM=human capital; SOC=social capital)

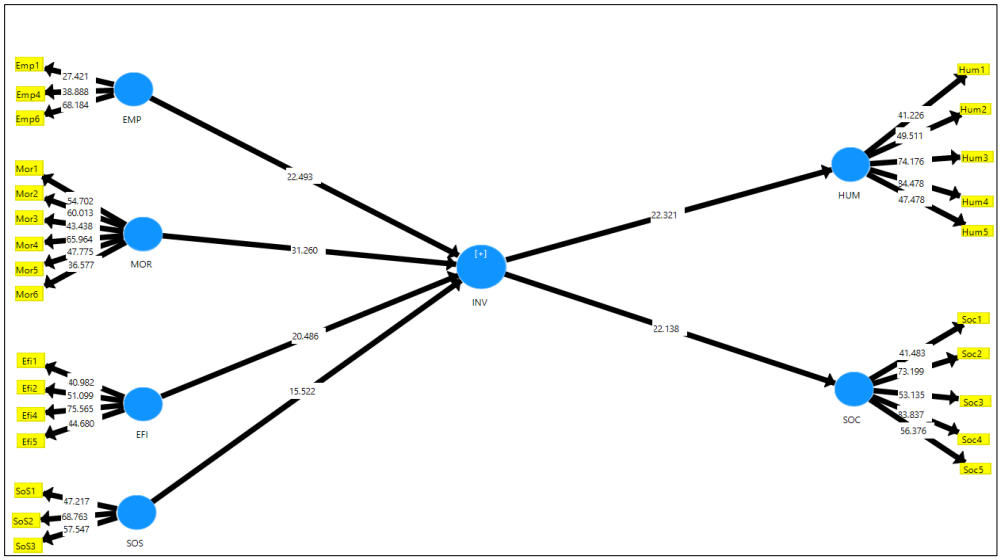

Diagram 4.1: t-value relationship between factors of individual involvement in social entrepreneurship activities with human capital and social capital in Public University

i) Coefficient of determination (R^2)

The inner model test can be performed using Smart PLS 3.0 by looking at the R-Square value for the dependent variable construct. Table 4.5 shows the R-Square values for Public Universities as a whole produced by dependent variables namely human capital and social capital. The results of this R-Square test aim to see how much contribution is made by the involvement factors to the of level of human capital and social capital. Figure 4 shows the inner structural model with further explanation.

Table 4.5: Result of R-Square

	R Square	R Square Adjusted
INV	0.987	0.987
HUM	0.327	0.326
SOC	0.314	0.313

Firstly, the R-Square value shown in Figure 4.5 above for the variable of involvement (INV) is 0.987. This shows that factor of empathy, moral obligation, self-efficacy and social support contributes 98.7% variance to the formation of involvement while the rest is 1.3%. This is because the situation has been influenced by other variables that have not been studied by the researcher. Secondly, R-Square value for the variable of human capital (HUM) is 0.327. This shows that the involvement factor contributes 32.7% variance to the formation of human capital factors while the rest is 67.3%. This is also because the situation has been influenced by other variables that have not been studied by the researcher. Lastly, the R-Square value of the variable social capital (SOC) is 0.313% of which the involvement factor contributes 31.4% variance to the formation of social capital. According to Cohen (1988), the value of R2 is divided into three category that are strong (R2 = 0.26), moderate (R2 = 0.13) and weak (R2 = 0.19). Therefore, the value of R2 in this study exceeds 0.26 which indicates that the model has a strong predictive strength.

ii) Effect size (f^2)

Next is the effect size assessment, f2. This measurement aims to see whether independent variables have an influence on dependent variables (Bobow-Thies & Albers, 2010). The results of the analysis are shown as in the diagram below to identify the effect size of involvement factors on the human capital and social capital.

Table 4.6: Result of f^2

	HUM	INV	SOC
EFI		4.272	
EMP		2.732	
INV	0.486		0.458
MOR		7.720	
SOS		1.803	

Based on the table above, the results f^2 of involvement, human capital and social capital are obtained. According to Cohen (1988), the value of f^2 at 0.02 is small effect size, 0.15 medium effect size and 0.35 is substantial effect size. The results show that the factors of involved have a substantial effect on R2 of involvement, human capital and social capital.

iii) Predictive relevance (Q^2)

In addition to R-Square values, Q^2 values are implemented using the blindfolding process in SmartPLS 3.0 Software. This assessment was conducted to look at the model's ability to predict (Henseler et al., 2009). If the value of Q^2 exceeds zero (0), it indicates that the study model has predictive relevance for the endogenous construct. Whereas if the Q^2 value is less than zero (0), it indicates that the study model does not have good predictive relevance (Henseler et al., 2009; Ramayah et al., 2017). In this study, the value of Q^2 exceeded the values> 0, which is 0.207, 0.323 and 0.289. This shows that the study model has a strong predictive relevance level and this study model has the ability to predict the path for involvement, human capital and social capital. Moreover, Hair et al (2017) stated that the relative measure value of predictive relevance 0.02 is small, 0.15 is moderate and 0.35 is large. This means that EFI, EMP, MOR and SOS items have moderate predictive effects. The results of the blindfolding process are as in Table 4. below:

Table 4.7: Cross validated Communality (Q^2)

	Q^2
HUM	0.209
INV	0.323
SOC	0.206

Discussions

This study concludes that the involvement of students in social entrepreneurship activity increases when they have a high level of empathy, moral judgment, self-efficacy and social support. The factor of empathy, moral obligation, self-efficacy and social support contributes 98.7% variance to the formation of involvement while the rest is 1.3%. This may support previous research that argue these constructs (empathy, moral obligation, self-efficacy and social support) influence through the two mediating variables of perceived desirability and perceived feasibility that have not been studied by the researcher (Shapero & Sokol, 1982; Krueger, 1993; Mair & Noboa, 2006). In addition, the results also show that there is a positive relationship between student involvement in social entrepreneurship activities on human capital and social capital. The result show that SE activity help students become more creative, innovative, competitive, have problem-solving skills and leadership skills. The results of this study are supported by Urban (2015). The results of his study show that positive self-efficacy factors related to students' human capital are to increase sustainability, social networks and innovation. In addition, the results of this study are also in line with Humphrey (2013) which shows that a person with high empathy is more innovative and creative and has better leadership skills. On the other side, this study also shows that the involvement in SE activity can increase level of social capital. It helps students to access to many professional contacts, increase sense of social responsibility, fostering loving relationships with others, gaining extensive information from their contacts and cultivating trust in others (D'Agostino, 2010; Tshikovhi, 2013; Alias & Balakrishnan, 2017).

Studies on the relationship between involvement factors and the impact of involvement in social entrepreneurship activities are still not extensive. Therefore, previous studies to support the results of the study obtained in this study are limited. Therefore, there is a need to look at the factors of empathy, self-efficacy, moral judgment and social support on the level of human capital and social capital among students in this study. Through student's involvement in activities social entrepreneurship, they can contribute ideas and energy to make social change in society by using their interpersonal and social skills. This is because previous studies have focused on only one factor, namely empathy or self-efficacy, but the factors of moral judgment, social support, external institutions and internal institutions have not been studied. Therefore, this study is a new finding in the study of social entrepreneurship research in Malaysia.

Conclusions

The findings of this study contribute to several things in the field of social entrepreneurship. First, this study offers a theoretical approach to social entrepreneurship research. It also developed and adapted a framework based on the model of Mair and Noboa (2006) and included additional variables such as human capital and social capital. In addition, many previous research papers use qualitative methods. Given that there are very few empirical studies in Malaysia about the current involvement of students in social entrepreneurship activity. Hence, the empirical results of this study are expected to help increase knowledge in this field in Malaysia.

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Project Planning for The Development of an E-Learning Interactive Educational Platform in Industrial Engineering-Based Applications

ULMEANU Mihaela-Elena
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CE Building, District 6, Bucharest, Romania, mihaela.ulmeanu@upb.ro

DOICIN Cristian-Vasile
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CD Building, District 6, Bucharest, Romania, cristian.doicin@upb.ro

SPÂNU Paulina
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, paulina.spanu@upb.ro

GHEORGHIȚĂ Vlad
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, vladgheorghita90@gmail.com

ENACHE Vlad
University POLITEHNICA of Bucharest, Splaiul Independenței, No. 313, CB Building, District 6, Bucharest, Romania, enachevlad31@yahoo.com

Abstract

Current socio-economic developments generated by the SARS-Cov2 outbreak have pushed e-learning into the spotlight more than ever before. With imminent high-performance expectations from e-learning management systems the academic society has found itself in an unprecedented situation, struggling to adapt to the swift change from face-to-face activities to online teaching. A thorough state of the art analysis on e-learning solutions led to the identification of several gaps, like: a lack in statistical control for confounding factors when calculating improvement in learning; available blended learning solutions are scarce in the industrial or mechanical engineering areas; customization of content is difficult at an individual level, particularly for large theoretical classes. To overcome these gaps, authors propose a detailed management planning procedure for the design and development of an e-learning interactive educational platform able to generate and deliver a student-centered customized curriculum for complex project development in industrial engineering-based applications. The e-learning solution aims to integrate a Curriculum Route Builder, which could allow the identification and interpretation of real individual needs of one learner and integrate them into the general goal of the designed subject curriculum. To help achieve the main objective of the research, twelve specific objectives have been defined. A comprehensive workplan was developed, made up of four work packages. Each work package has associated specific activities, estimated results, key success indicators and deliverables. Risk analysis was undertaken and with a 1.82 score it was concluded that the risk incidence rate is low. After allocation of resources, it was established that three laboratories are needed to implement the project, all within a total budget of 449996.0 lei.

Keywords: Hybrid Education, Custom Curriculum, Learning Objectives, Project Planning.

Introduction

Marope M. et al. (2017) conclude that from a socio-economic and cultural point of view, curricula must enable learners to acquire competences which allow them to properly address the requirements of a demanding labor

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market, all in a complex and fast changing environment due to Industry 4.0 and Artificial Intelligence influences. According to Harward D. (2017) audience is hyper connected to personal devices and usually expects at least the same level of engagement and excitement from any form of teaching/ learning/ training activity to show interest. Several approaches have been shown to shift the learning experience from teacher-centered instruction toward innovative, student-centered teaching, like: project-based learning as stated by Jensen A.A. et al. (2019) in their work; team-based approaches, as discussed by Mal P.R., Suneel P. (2019); blended learning, as presented by several researchers like First A.I. and Ayse A. (2019), Sahni J. (2019) or Dias S.B. and Diniz J.A. (2014); and even gamification of content, as presented by Subhash S. and Cudney E.A. (2018) and Alomari I. et al. (2019). These are rapidly becoming mainstream, as Dziuban C. et al. (2018) identifies that the labor market requires more and more competences like creativity, critical thinking, complex problem solving, deductive reasoning and social intelligence. OECD (2018) forecasts that, in the future, graduates will have to apply their knowledge in unknown and evolving circumstances, needing a broad range of skills, including cognitive and meta-cognitive skills (e.g. critical thinking, creative thinking, learning to learn and self-regulation); social and emotional skills (e.g. empathy, self-efficacy and collaboration); and practical and physical skills (e.g. using new information and communication technology devices). Garrison D.R. and Kanuka H. (2004) state that more and more commonly used, hybrid or blended learning refers to a combination of face-to-face learning, including but not confined to lectures, and online learning.

From a scientific point of view, Twigg C.A. (2003) classifies blended/ hybrid learning courses in four main categories: replacement, supplemental, emporium or buffet, depending on the relationship between the face-to-face and online components of the curricula. The replacement model involves that face-to-face lectures are substituted either partially or fully by online material, and class meeting time is either reduced or repurposed. Bowen W.G. (2012) shows that the most common practice is to require students to watch videos online prior to coming to class and/or to complete some type of assignment. Repurposing of lecture time can mean: • Answer students' questions; • Provide traditional recitation sessions or optional remedial sessions; • Give students the opportunity—or require them—to participate in discussions or active learning exercises. The supplemental model analyzed by Twigg C.A. (2003) assumes that students to attend the same number of class meetings, but to access technology-based materials outside of the classroom as additional resources. In the emporium model, students work solely online but within a "learning resource center". The buffet model, as, for example, implemented by Ohio State University and recorded by Pearl D. (2003), provides students with a menu of learning activities in both face-to-face and online formats, being the most flexible of the blended learning opportunities.

As implementation of blended learning solutions within higher education institutions is becoming a more common practice, at an international level, feedback on its' impact varies across specialists like Lack K.A. (2013) noted. One major drawback identified by Zhao Y. and Breslow L. (2013) is that most studies lack a statistical control for confounding factors when calculating improvement in learning.

One of the most important limitation of the existing blended learning solutions, is that they are currently delivered with a pre-planned curriculum workflow structure. In order to be truly customizable, a curriculum should allow each learner to have an individual learning experience, while achieving the same learning objectives across the same subject.

Another significant drawback of current blended curriculum design is being less concerned with individual learning styles, leaving students confused with the amount of available information. One major downside of this approach is that students who are not responsive to this model tend to fall behind, because of decreased levels of engagement and motivation. Available blended learning curricula offer solutions only for lecture or seminar-based subjects, leaving a gap for laboratory intensive subjects, like engineering classes, where specific equipment and materials are required for the teaching experience to be effective. Out of the 42 studies reviewed by Zhao Y. and Breslow L. (2013) not one was industrial or mechanical engineering based.

Considering the abovementioned, the authors propose a detailed management planning procedure for the design and development of an e-learning interactive educational platform (HYBRID-ED) able to generate and deliver a student-centered customized curriculum for complex project development in industrial engineering-based applications. The HYBRID-ED initiative is approached as a project which tackles the above-mentioned disadvantages of current approaches, by providing a fully customizable curricula for complex project development in engineering-based applications, within an e-learning educational platform.

The challenges of the proposed approach will be to design a fully customizable Curriculum Route Builder (CRB), which will allow to identify and interpret the real individual needs of one learner and integrate them into the general goal of the designed subject curriculum. The CRB is developed using the following programming environment: LabView toolkits, CSS and PHP modules.

The importance of the proposed hybrid learning solution resides in its' applicability for a continuously evolving and more demanding target audience. Once implemented the hybrid education e-learning platform will be a cost efficient and convenient solution for higher education institutions. It will offer options for monitoring, assessing and evaluation of the following main parameters: learner progress; trainer performance; consumable material stocks; equipment performance and maintenance status. Computer aided project planning software solutions (like Primavera P6) will be used to design custom resource workflows. The project is proposed to be implemented at POLITEHNICA University of Bucharest (UPB) from Romania.

Hereafter, the main management planning tools are presented in detail for the successful implementation of the HYBRID-ED initiative.

Study background and methods

Since the Future Shock's inception written by the futurist Toffler A. (1970), in connection with the educational system, a question which does not yet have an appropriate answer, has arisen: „Why is everything massified in the system, rather than individualized in the system?". The concept of "customized learning" becomes more and more current, as, according to Toffler, „new technologies make possible customization in a way that the old system — everybody reading the same textbook at the same time — did not offer". His ideas are now made possible through the buffet model proposed by the current research, according to Twigg's C.A. (2003) classification. The new approach is that of considering each learner different and customizing the teaching activities and the contents specifically for that individual, in an „education mass customization system" able to both reduce customizations costs and offer targeted teaching for each different person. A lot of e-learning platforms are available, but they are working in the same way, letting teachers to upload courses (the same for all learners) and learners to access them. HYBRID-ED offers the solution for staying in the middle of the subject with an innovative technology-breaking suggestion: hybrid learning, containing a set of characteristics able to be offered in an education mass customization system: customized, on-line contents of courses, teaching-on-demand, multimedia and interactive teaching materials, in a word, a powerful IT platform, based on artificial intelligence algorithms, able to conceive and offer a „menu" of learning activities in both face-to-face and on-line formats. This type of teaching must be provided in special classrooms, having a state-of-the-art endowment in terms of gadgets, computers and communication facilities. This is the image of the future education, and HYBRID-ED has the resource to fulfil this image and to concretize it.

The impact in the socio-economic and cultural environment is given by the broad range of skills the system can provide, including cognitive and meta-cognitive skills; social and emotional skills; and practical and physical skills. The platform runs artificial intelligence meta-algorithms able to identify the need of the learner for a certain type of skills, according to a set of initial tests and to customize the scientific content of the courses, by combining different modules and to generate new content, learner dependent. Thus, the project could change the way the students and the faculty see and understand the teaching and learning process, in the 21st century, by offering to each learner what he/she needs for personal evolution.

The impact in scientific environment is given by the new technology the platform uses and by the novelty of the algorithms and of the working mode. This could boost the universities on the road of introducing new technologies in the teaching process. The integrated platform could open new doors in the higher educational system, by exploring new applicative directions in the field of new education methods in the Industry 4.0 era. It is an opportunity for high schools and universities to discover an open teaching-learning system connected with the nowadays technology evolution.

The current e-learning solution used at UPB is a static Moodle platform. HYBRID-ED is aimed to be integrated within the learning opportunities of the Faculty of Industrial Engineering and Robotics from UPB, thus improving efficiency, learner and trainer compliance, whilst addressing the globalized issue of education transformation.

The development of a fully functional industrial engineering product is considered, in the context of the current initiative, a complex project design task (Figure 1). There are three main systems of any industrial engineering complex project, namely: mechanical system, software system, electronical system.

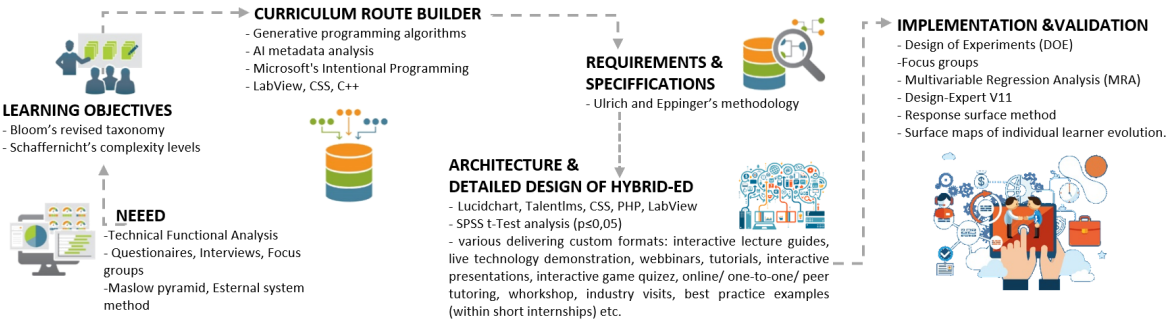

Figure 1: Life cycle of project implementation – methods and instruments of investigation

The projects' main objective is to design and develop an e-learning interactive educational platform able to generate and deliver a student-centered customized curriculum for complex project development in industrial engineering-based applications. The e-platform must assess the initial state of the students, from educational requirements point of view and to generate and adapt a customized curriculum for each person, being the first generative e-learning platform in the field of industrial engineering. The innovation level, novelty and originality of the implementation is derived from the way the curriculum is customized, in a generative approach controlled by artificial intelligence meta-algorithms, by selecting available knowledge in three different fields, mechanic, electronic and software, on three different levels (beginner, intermediate and advanced) and many different types of delivering the knowledge, based on the initial level of competencies of the students, identified also automatically. Calculating improvement in learning, has been shown by previous research conducted by Zhao Y., Breslow L. (2013), to lack in statistical control for confounding factors. The currently proposed initiative integrates validated scientific instruments, methods and methodologies for quantitative and qualitative measurement of learning improvement of subjects.

To support the main objective and further demonstrate the elements originality, twelve specific objectives have been defined, as follows: SO1. Identify the educational needs for industrial engineering based higher education learners; SO2. Define accurate cognitive learning objectives, behavioral learning objectives and learning outcomes in correlation with complex project design systems: mechanical, software, electrical; SO3. Develop a Curriculum Builder software tool, that evaluates and interprets real individual needs of learners. Algorithms are be defined for automatically generating a custom route curriculum for student centered learning; SO4. Develop a Task Book (TB) for a hybrid e-learning platform. The TB contains product, process and system requirements and specifications (RS), identifying in a precise and measurable way what the hybrid e-learning platform must do and how it must perform in order to satisfy the customer needs; SO5. Design the hybrid e-learning interactive educational platform architecture and functionalities; SO6. Program and implement the generative algorithms into the hybrid platform; SO7. Develop curriculum modules for complex project design in industrial engineering applications; SO8. Design and test a Pilot course for hybrid e-learning; Pilot testing also involves the undertaking of statistical analysis for result significance and validation; SO9. Test and improve design of the hybrid e-learning interactive educational platform; SO10. Develop the customized curriculum for each learner; SO11. Design an experimental plan with multivariable regression analysis using DOE. This provides a scientifically valid instrument for the development and interpretation of Surface maps for individual learner evolution; SO12.Disseminate results through scientific research publications in ISI journal and conference proceedings.

A sustainable and realistic objective of the project is to integrate the final version of the hybrid e-learning platform within the learning opportunities of the Faculty of Industrial Engineering and Robotics from UPB.

Project Planning

The Curriculum Route Builder (CRB) is the first initiative of its' kind, which could allow the identification and interpretation of real individual needs of one learner and integrate them into the general goal of the designed subject curriculum. The CRB programming considers an extended set of the following seven initial input parameters:

learning style, instructional strategy, delivery method, assessment method, competency (knowledge, skills, abilities) level, complexity level and personal preferences. The extended set is obtained through needs analysis.

Hybrid curriculum efficiency progress evaluation implies the usage of both quantitative and qualitative assessment methods, showing both what students learned and, also, how they can apply, synthesize, evaluate, and design what they have learned. Significance of the obtained results are established using an independent t-test using SPSS software. Final evaluation of the hybrid curriculum is done with design of experiments (DOE) implemented through Design-Expert V11 Software for multivariable regression analysis. Dependent and independent variables are be based on the defined cognitive and behavioral learning objectives of the hybrid curriculum.

The development and implementation of such a bold initiative requires a thorough project planning. Hereafter, the project workplan (Table 1) and main activities are described in detail.

Table 1: Project Work Plan: Work packages, activities and achievement of corresponding specific objectives (%)

Work packages and activities	2020							2021												2022				
	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8	M 9	M 10	M 11	M 12	M 13	M 14	M 15	M 16	M 17	M 18	M 19	M 20	M 21	M 22	M 23	M 24
WP1. Curriculum requirements and specifications	**WP1**																							
A1.1. Needs analysis for engineering based higher education learners	A1.1							**SO1** (100%), **SO2** (100%)																
A1.2. Design of custom route curriculum builder (RCB) for student centred learning		**A1.2**						**SO3** (100%)																
A1.3. Establishing the requirements and specifications for the functional platform architecture				**A1.3**				**SO4** (100%)																
WP2. Architecture and detailed design of hybrid e-learning platform								**WP2**																
A2.1. Architecture design of Alfa version for hybrid e-learning platform								**A2.1**												**SO5**(70%), **SO6**(50%)				
A2.2. Design of content curriculum modules for complex project design in engineering applications								**A2.2**									**SO7** (80%)							
A2.3. Pilot course development and testing for complex project design									**A2.3**										**SO6**(40%), **SO7**(20%), **SO8** (100%)					
A2.4. Interpretation of results and improvement of architecture design															**A2.4**									
WP3. Implementation and method demonstration																				WP3				
A3.1. Design and implementation of Beta version for hybrid e-learning platform								**SO5** (30%), **SO6** (10%), **SO9** (80%), **SO10** (100%)												A3.1				
A3.2. Repeatability tests and validation of final hybrid e-learning platform								**SO9** (20%), **SO11** (100%)														A3.2		
WP4. Project management and result dissemination	**WP4** **SO12** (100%)																							
A4.1. Project management	**A4.1**																							
A4.2. Publication writing for conferences and journals			**A4.2**																					
A4.3. Conference participations and study visits					**A4.3**						**A4.3**					**A4.3**						A4.3		

WP1: Curriculum requirements and specifications

The first Work Package (WP1) is comprised of three main activities (A1.1 – A1.3) and is planned to be implemented during a period of seven months (M1 – M7). Hereafter, the detailed activities, estimated results, key success indicators and deliverables are described in detail.

A1.1.(M1-M3): A needs analysis is undertaken for three main systems of a complex industrial engineering project: mechanical system, software system, electronical system. The main assessment tools are: questionnaires, interviews and focus groups. The target group of the project is 1200 undergraduate students, representing all undergraduate students, from year 1 to 4, studying in the industrial engineering domain, enrolled at UPB. The sample group for the

needs analysis is comprised of 100 students, selected randomly out of the 1200, to preserve statistical significance of the study. All materials for questionnaires, interviews and focus group are designed in accordance with the graduates' necessary competence set, which is defined by RNCIS in the diploma supplements of graduates from industrial engineering domain. The question/ item structure follows both Ulrich K. and Eppinger's S. (2015) methodology. The needs analysis considers the evaluation of 7 initial CRB input parameters. The need reports includes, for all three systems of a complex industrial engineering project, the following mandatory elements: an extended set of CRB input parameters, sets of cognitive and behavioral learning objectives, set of learning outcomes, for each domain. Learning objectives are defined using Bloom's revised taxonomy as described by Gershon M. (2018). Complexity Levels as defined by Schaffernicht M.F.G. and Groesser S.N. (2016) are also be taken into account, in the needs analysis. (LAB 1)/ A1.2. (M2-M7): Using the extended set of the input parameters, learning objectives and learning outcomes, the team members construct a CRB process design flow chart using Lucidchart software. This step allows a perspective view of the generative solution needed for CRB design and implementation, allowing data to be paired with insight, at each individual step of the flowchart. CRB involves a generative programming approach, controlled by artificial intelligence meta-algorithms. LabView, C++ and Microsoft's Intentional Programming software are used to design the CRB in accordance with the constructed flowchart. The final CRB is embedded in the in the architecture of the hybrid e-learning platform. (LAB 2)/ A1.3. (M2-M7): Requirements and specifications (RS) are defined in order to identify in a precise and measurable way what the hybrid e-learning platform must do and how it has to perform in order to satisfy the customer needs. Three categories are considered for the analysis, namely: product, process and system requirements and specifications. In order to quantify the RS a list of metrics is put together, assigning them relative importance, limit and ideal values. The instructional tools used in RS identification and construction are described in the previous work of authors Doicin C. and Ulmeanu M. (2018). Bases on external functional analysis tools the Task Book (TB) of the hybrid platform is constructed. (LAB 1, 2)

Estimated results: R1. Needs analysis report, which contains a process flow describing all used assessment tools and specific outcomes. R2. Curriculum Route Builder software application; R3. Requirements and specifications for the functional hybrid e-learning platform architecture.

Key success indicators: No. of sample group participants: 100; No. of initial CRB input variables: 6; Set no. of extended input variables: 1; Set no. of cognitive learning objectives: 3; Set no. of behavioural learning objectives: 3; Set no. of learning outcomes: 3; No. CRB flowcharts: 1; No. of designed software stand-alone applications: 1; Set no. of requirements and specifications: 1.

Deliverables: D1. Report on interpreted questionnaires used in needs analysis; D2. Report on interpreted interview data sheets; D3. Focus groups evaluation report; D4. Descriptive report on definition protocol for learning objectives and learning outcomes. D5. CRB programming protocol report; D6. Curriculum Route Builder software application; D7. Task book for hybrid e-learning platform.

WP2: Architecture and detailed design of hybrid e-learning platform

The second Work Package (WP2) has four main activities (A2.1 – A2.4) and is planned to be implemented during a period of twelve months (M8 – M19). Hereafter, the detailed activities, estimated results, key success indicators and deliverables are described in detail.

A2.1. (M8-M19): The hybrid e-learning interactive educational platform must be able to generate and deliver a student-centered customized curriculum for complex project development in engineering-based applications. The general architecture is based on the Task Book, ensuring that specific RS are reached within specified limits. Targeted software solutions integrated into the general architecture are: LabView, CSS, PHP, Talentlms. The advantages of each software solution, embedded with the developed CRB, allow metadata collection usage for generative personalized curriculum in a mass specified setting. (LAB 2)/ A2.2. (M8-M16): Design of content curriculum modules involves the compliance with several previously obtained results: extended input variables; cognitive learning objectives; behavioral learning objectives; learning outcomes; CRB and hybrid platform system parameters. A labor extensive activity, it involves the creation of a meta database with existing freeware curriculum content in the three main proposed systems (mechanical, software, electronical). Content curriculum is adapted and personalized for UPB available infrastructure. (LAB 1)/ A2.3. (M9-M16): A Pilot course is developed for testing of the main functional features of the platform. Course content must meet the same restrictions as stated in A2.2.

Testing of the course is undertaken on a randomly selected sample of 25 students (years 1 to 4) studying in industrial engineering area. Using SPSS an inferential statistics paired-samples t-Test is undertaken, to allow generalization of the results, beyond the gathered data. The paired-samples t-Test was selected for analysis, offering more statistical power, as it reduces possible variability between learners. This type of statistical test also coincides with the used assessment methods at UPB. 3-point analysis is preferred. The beginning of this activity was set in M9 (February 2021), as to coincide with the beginning of the academic semester at UPB, allowing the testing and implementation of the pilot course. (LAB 1, LAB 3)/ A2.4. (M15-M19): Result of the t-Tests are processed using SPSS and a report is developed by the team members. Significance of the results is determined by the p value of the analyzed data. A targeted value of $p \leq 0.05$ is desired. The tests evaluate the degree to which students fulfil the proposed learning objectives, through their obtained learning outcomes. The amount of difference between the two at three independent moments (3-point t-test), indicate the areas of the pilot test that need improving. Solutions for improvement are based on the previously developed RS. (LAB 1)

Estimated results: R4. Functional Architecture of Alfa version for a for hybrid e-learning platform; R5. Curriculum modules for complex project design in industrial engineering applications; R6. Pilot course for hybrid e-learning;
Key success indicators: No. protocols: 1; No of architecture flowcharts: 1; No. of curriculum modules: min. 10; No. of pilot courses: 1; No. statistical tests used and interpreted: 1;
Deliverables: D8. Functional protocol for architecture design of a hybrid e-learning platform; D9. Extensive report on curriculum content development; D10. Pilot course design report. D11. Report on testing procedure, implementation and result interpretation of pilot course.

WP3: Implementation and method demonstration

The third Work Package (WP3) has two main activities (A3.1 – A3.2) and is planned to be implemented during a period of five months (M20 – M24). Hereafter, the detailed activities, estimated results, key success indicators and deliverables are described in detail.

A3.1. (M20-M124): This activity involves the integration of the full curricula modules (developed in A2.2) in the hybrid e-learning platform environment. (LAB 1, LAB 2)/ A3.2. (M22-M124): Using DOE, a base experimental plan is developed at this stage, considering at least two independent natural variables. Functionality and repeatability tests are undertaken using focus groups. Results are statistically analyzed using Design-Expert V11 Software for multivariable regression analysis. A natural logarithmic transformation is preferred for simulation runs. Response surfaces are constructed for normalized variables in 3 dimensions: Ox – mechanical system, software system, electronical system; Oy - learning style, instructional strategy, delivery method, assessment method, competency level, complexity level and personal preferences; Oz – normalized intensity levels. Results are fed through a feedback loop into the architecture design of hybrid e-learning platform. The final concept of the platform is proposed for usage within the Faculty of Industrial Engineering and Robotics, offering a three-level customization designed for semester, year and final diploma complex project development. (LAB 1, LAB 3)

Estimated results: R7. Beta version for a hybrid e-learning platform; R8. Final hybrid e-learning platform for complex project development in industrial engineering applications.

Key success indicators: no. of experimental plans: 1; no. of focus groups: min. 3; no. of surface maps: min 15; no. of hybrid platform versions: 2.

Deliverables: D12. Report on Beta version design and implementation for a for hybrid e-learning platform; D13. Experimental plan with multivariable regression analysis; D13. Surface maps of individual learner evolution.

WP4: Project management and result dissemination

The final Work Package (WP4) deals with project management and result dissemination and has three main activities (A4.1 – A4.3). It is planned to be implemented during the entire period of the project (M1 – M24). All activities, estimated results, key success indicators and deliverables are described in detail below.

A4.1.(M1-M24). Project management is done throughout the entire duration of the project, so that each activity proposed in the project is provided with all the human, material and financial resources necessary to accomplish its

waging effectively and on time. A project management strategy is planned to be developed in the first month, so that all problems are detected early fast and effective solutions are found for any technical or financial barrier that may occur during the project implementation. Management involves: compliance with quality management strategy, establish policies for conflict solving, on-going assessment of activities, monitoring and reporting. (LAB 1)/ A4.2. (M3-M24). Publication in ISI quoted journals and conference proceedings are aimed in order to disseminate the original results of the project (LAB 1)/ A4.3. (M4-M7, M11-M13, M16-M18, M22-M24) Participation to scientific events (conferences, symposiums, webinars, seminars, workshops, etc.) and study visits are undertaken for both result dissemination and good practice . (LAB 1)/

Estimated results: R9. Management research strategy; R10. Published scientific papers and participations in international conferences

Key success indicators: No. of ISI published journal papers: 1; No. of published ISI conference papers: 3; No. of conference participations: 2; No. of study visits: 2.

Deliverables: D14. Intermediary Scientific Research Rapport. D15. Final Scientific Research Rapport.

Risk Management and Ethics

The fulfilment of the proposed objectives and the generation of the expected results depends to a large extent on the appropriate and rigorous risk management. For each identified risk, a response strategy is developed in accordance with SR ISO 31000: 2010 and SREN 31010: 2010. The qualitative analysis of the most prevalent technological, commercial, human resources and research risks are presented in Table 2, as well as the main contingency plans. Considering the total risk score of the project (1.82, compared to the maximum value 4) obtained from the qualitative risk analysis, it is concluded that the risk incidence rate is fairly low, and the project is feasible (Table 2).

Table 2: Qualitative analysis of the technological, commercial, HR and research risks for project implementation

Technological risks (TR) / (CP) Contingency plans - (SO1÷SO4)	I*	W**	Score
TR 1. Inability to provide 100 eligible participants to the sample group within the specified timeframe. **CP 1.** A status evaluation of the participants' no. will be undertaken every week during A1.1. The planning is: M1–20, M2–50, M3–30. If the reports show inaccuracies in following the plan, participants will be selected from other Universities in Bucharest and Ilfov (same recruitment procedure), within the industrial engineering domain.	3	20%	0,60
TR 2. Sporadic unavailability of main e-learning environment. **CP 2.** A back-up of all e-learning content will be made on the freely available Moodle platform of UPB.	3	15%	0,45
TR 3. Incompatibility between the programming environments for generative design algorithms. **CP 3.** The main programming environment will be LabView; For compatibility with all online systems and embedded functions the Stand-Alone Toolkit will be used; As extra precautions CSS, C++ instruments will be used.	1	10%	0,10
Commercial risks (CR) / Contingency plans (CP) - (SO5, SO6, SO10, SO11)			
CR 1. Inability to make acquisitions for laboratory consumables and software licence in time for scheduled activities. **CP 4.** A necessary list will be put together and a university financed material stock will be made available.	2	5%	0,10
CP 2. SPSS software licence expiration. **CP 5.** The software licence is annually payed by UPB, and between the beginning of the calendar year and the approval of the acquisition budget, there can be gaps in payments. An IBM SPSS software discounts for students & faculty pricing plan is considered as a transition option.	1	13%	0,13
Human resources risks (HRR) / Contingency plans (CP) - (SO7)			
HRR 1. Withdrawal from project of a member. **CP 6.** At any time, implemented activities will be accompanied by descriptive deliverables, in the extent to which at least one other team member can substitute until a new one is employed.	1	15%	0,15
Research risks (RR) / Contingency plans (CP) - (SO8, SO11)			
RR 1. Proposed t-type models are not significant. **CP 7.** A feedback loop is designed within the sample group testing.	2	9%	0,18
RR 2. Proposed MRA models are not significant. **CP 8.** A feedback loop is designed within the focus group testing. Repeatability tests are provided.	1	11%	0,11
TOTAL SCORE		**100%**	**1,82**

**I - Importance: High-3; Medium-2; Low-1; ** W - Weight (%)*

Scientific research, technological development and innovation activities within the project are subject to: Law no. 206/2004 on good conduct in scientific research and its subsequent amendments; Law 64/1991 on patents, republished, as subsequently amended, of Law 129/1992 regarding the protection of industrial designs, republished in 2007; and Law 8/ 1996 on Copyright and Related Rights. Compliance with specific EU legislation is ensured. Because the project involves collecting, processing and analyzing of personal data from human subjects, national GDPR Law no. 190/2018 and EU GDPR Regulation no. 679/2016 are complied with.

Resources and budget

The project is set to be implemented at the premises of UPB, using the appropriate infrastructure presented in Table 3. Each of the presented laboratories is destined for specific systems of the complex project development. Each activity detailed above has associated one of the three laboratories.

Table 3: Available infrastructure for project implementation and correlated estimated results

Laboratory & infrastructure	Estimated results
LAB 1 (https://erris.gov.ro/TCM---UPB): **3D printing Equipment** (50 3D printers), as follows: 5 Zortrax Inkspire 3D printers which are based on a version of the Stereolithography technology; one Ultrasound cleaning unit; 3 Zortrax Dual 3D printers using Material Extrusion (MEX); 5 Zortrax M300+ 3D printers (MEX); 3 Zortrax M300 3D printers (MEX); 2 BCN SigmaX dual extruder 3D printers (MEX); 10 3D Kreator 3D printers (MEX); 20 Creality CR20-Pro 3D printers using (MEX); one Zcorp 310 3D printer using Binder Jetting technology; one Powder recycling unit for the ZCorp 310 equipment; one Projet 1500 3D printer using Digital Light Processing; Go!SCAN 3D Portable Scanner Creaform 3D; 25 web cameras; 100 desktop computers; **Software:** SolidWorks, Inventor, Catia, Cura, Simplify 3D, Meshmixer, Zprint Software; ProJet Client Software; Magics 13.0; VX Elements 2.0 SR3; Mimics Research 17.0, 3-Matic Research 11.0 **Robotics:** 16 Arduino based toolkits each with Arduino Projects Book, Arduino UNO, and Breadboard-400 Pins. **Target Complex Project Development Systems: MECHANICAL & ELECTRICAL**	**R1, R3, R5, R6, R7, R8**
LAB 2 (https://erris.gov.ro/CTANM---UPB)**:** Laboratory gear, Modelling & Simulation Software, General usage Software, Data acquisition software, Data acquisition and control systems, LabVIEW modules and toolkits: 1. Programmable power supplies; TrueRMS Multimeters; Soldering stations; Drilling machine; 3 axis CNC milling machine - GoCNC A3 Evolution. 2. Inventor, Solid Works, FlexSim, INCONTROL Enterprise Dynamics, ProPlanner. 3. Primavera P6, Adobe Photoshop, Microsoft Visual Studio, Microsoft Expression Studio 4 Ultimate, Microsoft Robotics Developer Studio R3/ LabVIEW 2011 Full Development System/ NI data acquisition equipment on USB, ISA, PCI, PCMCIA, Simulation Interface, NI SoftMotion, Robotics Module. **Target Complex Project Development Systems: SOFTWARE & ELECTRICAL**	**R2, R3, R4, R7**
LAB 3 (https://erris.gov.ro/CCMA---UPB)**:** Mechanical simulation equipment: Testing system INSTRON 8800 100 kN; Testing system WALTER-BAI LVF 50 kN; dynamic extensometer SANDNER EX A 25-5X; axial extensometer EPSILON 3542-010M-100-ST extensometer 3541-010M-100-ST for testing fracture mechanics; Testing system Z010 ZWICK / ROELL 10 kN. **Target Complex Project Development Systems: MECHANICAL**	**R6, R8**

According to the project detailed budget breakdown structure Table 4, acquisitions are planned for software licenses and consumables. Mechanical and electronic module insertion kits must be purchased for pilot testing and repeatability tests. The insertion kits are comprised of: Arduino CTC 101 Program – Full (10000 lei); Elergoo Sensor module kits compatible with Arduino (7000 lei); POXL Smart Robots for UNO programming (8000 lei) ZYLtech HyperCube Full DIY Kit - 300mm Cubic Build Volume w/ Dual Z (with Heated Bed Upgrade Premium high power 12V heated bed Frame color Aluminum Anodized) (22000lei).

Table 4: Detailed Budget Breakdown (in lei)

Budget chapter (expenses) - LEI	2020 (7 months)					2021(12 months)					2022 (4 months)					Total 2020-2022
	Lei/ hour*	h/ M**	Full time %	months/ member	Total 2020	Lei/ hour	h/ M**	Full time %	months/ member	Total 2021	Lei/ hour*	h/ M**	Full time %	months/ member	Total 2022	
1. Personnel expenses																
Project coordinator	250	20	25	1.75	8750	250	20	25	3	15000	250	20	25	1.25	6250	30000
CS I	250	20	25	1.75	8750	250	20	25	3	15000	250	20	25	1.25	6250	30000
PhD student	160	20	25	1.75	5600	160	20	25	3	9600	160	20	25	1.25	4000	19200
PhD student	160	20	25	1.75	5600	160	20	25	3	9600	160	20	25	1.25	4000	19200
Engineer	100	20	25	1.75	3500	100	20	25	3	6000	100	20	25	1.25	2500	12000
Engineer	100	20	25	1.75	3500	100	20	25	3	6000	100	20	25	1.25	2500	12000
Master student	100	20	25	1.75	3500	100	20	25	3	6000	100	20	25	1.25	2500	12000
Total Personnel expenses					39200					67200					28000	**134400**
2. Logistics expenses																
Software TalentLMS					30000											
Lucidchart solution					15000											
Module insertion kits					47000											
Laboratory Consumables					18000					35500					10000	63500
Materials					10000					17000					10000	37000

Dissemination, docum. etc.					4500					7300					2500	14300
Access to third parties infrast.					7830					11200					2600	21630
Total Logistics expenses					132330					71000					25100	**228430**
3. Travel expenses																
National and international scientific events, research and docum. internships etc.	5000	1			5000	5000	2			10000	5000	1			5000	20000
4. Indirect expenses																
Overhead					25906					29640					11620	67166
TOTAL BUDGET					202436					177840					69720	**449996**

** Gross salary including employer's taxes; ** h/ M – hours / months.*

Conclusion

The current research presents a detailed management planning procedure for the design and development of an e-learning interactive educational platform aimed at delivering a student-centered customized curriculum for complex project development in industrial engineering-based applications. Authors conducted a thorough literature research, identifying the main gaps, and tailoring the project structure so as, through the planned work packages, to fill in those gaps. A project plan with four work packages was designed, ready to be implemented in a 24-month time frame. The project was proposed to start together with the UPB academic year, so as to facilitate the testing of the pilot e-platform. Main resources were considered to be available within UPB's laboratories, with all the infrastructure described in the Erris platform. A Detailed Budget Breakdown was put together in order to identify the necessary financial efforts needed to implement the proposal.

Future research involves the improvement of the management planning procedure and project call application for funding of the proposal. The importance of the current research is even greater in the current socio-economic developments generated by the SARS-Cov2 outbreak.

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Participación De Los Padres En El Entorno Educativo Y Su Influencia En El Rendimiento Académico De Los Estudiantes

María Fernanda Constante[1,]

Universidad Técnica de Cotopaxi
maria.constante@utc.edu.ec

Yolanda Paola Defáz Gallardo[2,]

Universidad Técnica de Cotopaxi
yolanda.defaz@utc.edu.ec

Julio Castañeda Carranza[3,]

Universidad Nacional de Trujillo, Perú
acastañeda@unitru.edu.pe

Ricardo Gómez Arce[4,]

Universidad Nacional de Trujillo, Perú
rgomez@unitru.edu.pe

Resumen

En el presente artículo hablaremos sobre la participación de los padres de familia en el entorno educativo y su influencia en el rendimiento académico de sus hijos, de modo que, el trabajo de los padres de familia tiene como finalidad, ayudar a mejorar el rendimiento académico de los mismos, a través de la participación activa como representantes legales de los niños y como eje fundamental de este proceso. El rendimiento académico, es sinónimo de calidad, desde este punto de vista el trabajo realizado, la metodología utilizada fue en primer momento cualitativa con ayuda de un instrumento siendo la encuesta, está dirigida a los padres de familia, proponiendo una alternativa de discernimiento del problema planteado. De la misma forma los resultados obtenidos de la investigación determinaron que: en los docentes existen criterios divididos en cuanto al nivel de compromiso de los padres de familia sobre los hijos, por lo que considera que los padres de familia que se involucran en la educación de sus hijos presentan un mejor rendimiento académico, por otra parte la mayoría de los padres de familia, a pesar de manifestar tener buena comunicación con sus hijos les resultaría de utilidad, contar con una guía de orientación que les permitan ser parte del proceso de enseñanza – aprendizaje de sus hijos, a fin de que éstos eleven su rendimiento académico. Producto de la investigación, se recomienda que las instituciones integren talleres y herramientas que refuercen los lazos parentales y charlas sobre la importancia de brindar seguridad y apoyo a sus hijos y por consiguiente; lograr elevar el nivel académico, siendo el docente el protagonista secundario del grupo de estudiantes sobre todo de aquellos que no cuentan con el apoyo de sus padres, que posiblemente por no contar con una herramienta adecuada, no se obtiene un proceso de enseñanza-aprendizaje apropiado a sus edades.

Palabras Claves: Padres De Familia, Estudiantes, Educación, Nivel Académico, Conocimiento, Enseñanza - Aprendizaje, Docentes.

Abstract

In this article we will talk about the participation of parents in the educational environment and its influence on the academic performance of their children, so that the work of parents is intended to help improve the academic

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performance of the same, through the active participation as legal representatives of the children and as a fundamental axis of this process. Academic performance is synonymous with quality, from this point of view the work done, the methodology used was first qualitative with the help of an instrument, the survey being directed at parents, proposing an alternative to discern the problem raised. In the same way, the results obtained from the research determined that: there are divided criteria among teachers regarding the level of commitment of parents over children, for which reason it is considered that parents who are involved in the education of their children have a better academic performance, on the other hand, most parents, despite claiming to have good communication with their children would find it useful to have an orientation guide that allows them to be part of the teaching process - learning of their children, so that they raise their academic performance. As a result of the research, it is recommended that institutions integrate workshops and tools that reinforce parental ties and talks about the importance of providing security and support to their children and therefore; achieve higher academic level, the teacher being the secondary protagonist of the group of students, especially those who do not have the support of their parents, who, possibly due to not having an adequate tool, does not obtain an appropriate teaching-learning process at their ages.

Keywords: Parents, Students, Education, Academic Level, Knowledge, Teaching - Learning, Teachers.

Introducción

La familia es un concepto muy amplio, aún más, cuando se trata de la interacción que se tiene en el desarrollo educativo de sus hijos. Por ello, se ha demostrado que cuando los padres de familia intervienen en las actividades educativas de sus hijos ellos obtienen mejores calificaciones y tienen mayor positivismo al momento de realizar cualquier actividad.

Receto nos dice "Cuando hablamos hoy de familia, debemos entenderla desde varias vertientes; no sólo como uno de los ejes sociales y culturales fundamentales a lo que respecta a la estructura de la sociedad, sino, como el órgano esencial del proceso de civilización, puesto que es el agente protagonista en el proceso educativo de las personas" (2011, p.4). Como es de conocimiento, la educación de los niños tiene origen en el entorno familiar, siendo los padres los primeros educadores, encaminado a educar niños capaces de comprender el mundo, las personas y a ellos mismos, formando personas empáticas dispuestas a ser partícipes de su educación.

Actualmente el trabajo de los educadores ha llegado a ser más complejo y desafiante, antes era suficiente tener conocimiento del plan de estudios, y el dominio de estrategias para facilitar el proceso de enseñanza-aprendizaje de los estudiantes que se evaluará. Ahora a los educadores se les pide convertirse en expertos para lograr la participación de los padres de familia, hecho que influye mucho en el proceso de aprendizaje y desarrollo de sus hijos.

Sánchez nos manifiesta que "Si bien la familia es el primer y más importante lugar educativo, es preciso aceptar que tendencias y exigencias propias de la vida moderna —el individualismo, el trabajo exacerbado y deshumanizante, el consumo han puesto bajo presión y en cuestión la capacidad de las familias para practicar su misión educativa" (2008, p.5). De esta manera, la escuela ha tenido que asumir la responsabilidad de la educación de los niños, sin embargo, este tema no solo está en las manos de las educadoras sino también en el interés de los padres de familias o representantes legales, debido a la necesidad de sacar a su familia adelante deben tomar largas jornadas de trabajo, limitando el tiempo de los padres para ser parte de la educación de sus hijos y teniendo como consecuencia la falta de compromiso con la educación de sus hijos.

La educación es aquella herencia natural que los padres comparten y dejan a sus hijos con sacrificio, única y exclusivamente dentro del seno familiar, otorgando todo tipo de interrelaciones personales: de amor, afecto, comprensión, comunicación, ayuda y orientación, que, de tal manera, modifican los comportamientos de todos los que conforman la familia. El rol más importante en la educación de sus hijos lo cumplen los padres, convirtiéndose en los primeros educadores de vida. La educación familiar se trata del cuidado, la motivación y la interacción del padre de familia con el ámbito educativo de su hijo, permitiendo de esta manera la Inter educación entre los padres e hijos.

La educación es un proceso de formación continuo que parte desde la misma concepción hasta la muerte del individuo. De ahí que la educación es un proceso interactivo de aprendizaje, entre padres e hijos, entre amigos, entre maestro y estudiantes, etc. A pesar de corresponderles la educación formal a los maestros, el papel que los padres constituyen

en este proceso de enseñanza es muy importante, debido a que deben convertirse en entes activos del proceso educativo de sus hijos. Comprender esta interacción educativa incluye a todos, como una actividad permanente que integra a los hijos, maestros, padres y su entorno social.

La escuela y los padres de familia establecen una acción conjunta y coordinada que contribuye decisivamente en el desarrollo intelectual, social y emocional del niño. Si bien en los primeros años de vida, la familia es la principal instancia socializadora, la escuela se convierte en el contexto decisivo de su desarrollo social. La colaboración entre ambas instituciones es fundamental ya que conducirá a su estimulación, aumentando autoestima, rendimiento escolar y capacidades actitudinales también para la mejora de sus habilidades sociales, psicomotrices, creativas y cognitivas.

Sánchez (2005) El entorno familiar tiene la responsabilidad de motivar y cuidar a sus hijos Para así tener una mejor educación, proporcionando medios para que mejore su desarrollo de aprendizaje con el fin de crear una zona intermedia entre la escuela y los padres de familia que de una u otra manera inciden en el rendimiento académico de sus hijos. La familia interviene dentro del desarrollo infantil tanto que ayudan a sus hijos a llenarse de pensamientos positivos y así lograr sus objetivos llegando a enorgullecer a sus padres, hay que considerar que en estos tiempos ya no solo actúa el docente sino también padres de familia para así poder dar un mayor significado a los conocimientos de los niños.

En síntesis, los padres de familia están dentro del proceso en el cual tuvo como consecuencia inevitable el asumir funciones por parte de la escuela y la regulación por el Estado. En este caso, si la participación de los padres se considera como una palanca para promover el logro académico de sus hijos, potencializar los resultados que se tendrá al momento que sus hijos realicen sus labores educativas. Como veremos en este trabajo, la cantidad de investigación desarrollada al respecto no es deficiente. El detonante de muchos de esos estudios fue el concepto de participación de los padres como un incentivo para el desempeño académico de los alumnos, o, al menos, como un catalizador o multiplicador de otras causas relevantes.

La amplia gama de temas tratados y los matices de estos estudios nos muestran que la participación de los padres es un fenómeno multifacético y multidimensional que implica dificultades conceptuales para la investigación, y problemas organizativos para la administración y la política educativa.

La educación de los niños es muy importante para su desarrollo intelectual y para que esto se realiza de una manera fácil y continua el docente debe contar y adecuar las instalaciones donde el infante se desenvuelve junto con sus compañeros y compañeras, debe ser un lugar que genere en el niño seguridad en el que pueda socializar y al mismo tiempo aprender. Al igual que en su hogar, los padres deben buscar un ambiente seguro para su desarrollo social, cognitivo y emocional.

Consecuencias de las dificultades del aprendizaje

Las dificultades en del aprendizaje se desencadenan desde la niñez, adolescencia y adultez en donde pueden sufrir una inferencia en su vida académica, laboral, económica y social, por la influencia de su conducta, auto concepto y autoestima. Según el análisis realizado por Shessel y Reiff (1999) es el único que realiza un análisis de las consecuencias de varias DEA en personas adultas a nivel social, psicológico, emocional, educativo y laboral (pp.305-314). Este enunciado manifiesta que una vez llegado a la vida adulta las consecuencias pueden manifestarse en dificultades de acceso al empleo cualificado, menos oportunidades laborales, un inferior nivel de ingresos y en posibles situaciones de riesgo de exclusión social, además relaciones sociales, donde posteriormente da lugar a un aumento del riesgo de consumo de sustancias, fracaso, desarrollo de problemas de salud mental y problemas con la justicia.

Los niños con problemas de aprendizaje suelen tener un nivel normal de inteligencia, en donde tratan de seguir las instrucciones, concentrarse y portarse bien en la escuela y en la casa, sin embargo a presar de sus esfuerzos presentan dificultades al momento de dominar las tareas de la escuela y se atarazan. Según Fernández Guerrero (2011, pp.3-4) señala que un 29 % del fracaso escolar se debe a las DEA y un 10 % al TDAH. Martínez et al. (2009) subrayan que las DEA son la causa más frecuente de fracaso escolar (pp.182) y que los alumnos con DEA tendrán en un 80 % de los casos bajo rendimiento escolar, y un 45% repetirá al menos un curso escolar (p.181).

Los problemas de aprendizaje afectan a 1 de cada 10 niños en la edad escolar estos problemas merecen una evaluación comprensiva por un experto que pueda enjuiciar todos los diferentes factores que afectan al niño. Un siquiatra de niños y adolescentes puede ayudar a coordinar la evaluación y trabajar con profesionales de la escuela y otros para llevar a cabo la evaluación y las pruebas escolásticas y así clarificar si existe un problema de aprendizaje.

Tratamientos o actividades para mejorar las dificultades de aprendizaje

Para (Osewalt, 2014) "Los maestros saben que los estudiantes tienen gran variedad de habilidades y tratan de encontrar maneras para satisfacer las necesidades de todos los estudiantes, incluyendo aquéllos con dificultades de aprendizaje y de atención"

Instrucción diferenciada

Los docentes utilizan lo que los estudiantes necesitan aprender, cómo lo asimilan y cómo lo conciben. Cuando un estudiante tiene dificultades en un área, los docentes crean un plan que sigue instrucciones paso a paso y tareas especiales.

Andamio cognitivo

El aprendizaje se fragmenta en partes más pequeñas. Las partes siguen un orden lógico y respaldan un objetivo claro. Los docentes crean una conexión entre lo que ya saben y lo que no pueden hacer por si solos. A esta conexión se le denomina "andamios", donde se puede incluir gráficos, dibujos y tarjetas con notas.

Mnemotecnia

Los estudiantes usan frases para ayudar a recordar información. Esta estrategia también puede ayudar a ampliar el vocabulario. Por ejemplo, un niño puede aprender el nombre científico del gato, *Felis catus*, usando *feliz* como la palabra clave junto a la foto de un gato jugando.

Instrucción Multisensorial

Esto permite relacionar lo que los estudiantes ven, lo que escuchan, cómo se mueven y lo que conciben. Ya que cuando se aprende a usar los sentidos se aprende mejor. Tomando en cuenta que cada niño aprende de manera diferente.

Entonces se podría considerar importante que los niños con problemas de aprendizaje sigan los tratamientos que son proporcionados por los especialistas ya que de ello dependerá saber si el tratamiento es eficaz y permita una correcta enseñanza que fortalezca las dificultades que presente cada niño. También se debe tomar en cuenta que estos especialistas muchas veces recomiendan medicación para ciertos trastornos entonces se debe tomar en cuenta que efecto causa en el niño y saber si se beneficia de ello, porque de lo contrario sería irresponsable recetar algo que sea desfavorable.

Metodología

Enfoque de la investigación

La investigación tiene un enfoque cuantitativo debido a que manifiesta la forma de ser y pensar de los padres de familia y docentes, ya que por medio de la recolección de datos verídicos los mismos que nos ayudaron a determinar el análisis y discusión de los resultados arrojados por las encuestas aplicadas, para poder consolidar conclusiones.

Propósito de la investigación

El propósito de la investigación es conocer y analizar los problemas que surgen en el rendimiento académico de los estudiantes por la escasa participación de los padres de familia en el entorno estudiantil.

Tipo de Investigación. Investigación bibliográfica

Se realizó una investigación cualitativa debido a que se utilizó como fuentes confiables, tales como revistas, libros, ensayos y la biblioteca virtual de la Universidad Técnica de Cotopaxi.

Investigación Exploratoria

Nos permitió recoger e identificar los antecedentes generales, respecto al problema investigado, como es el caso de las redes sociales y su aplicación en la educación, para determinadas observaciones para diagnosticar el problema planteado. Por otro lado, con la aplicación de la investigación exploratoria, permitió descubrir, reconocer y reconocer una acción preliminar, mediante la cual se obtuvo una idea general del objeto investigado. Mediante este tipo de investigación, se pudieron formular las preguntas directrices de la investigación.

Metodologías de la Investigación Unidad De Estudio

Para la recolección de datos sobre la participación y su influencia en el rendimiento académico de los estudiantes, se ha tomado en cuenta el instrumento de la encuesta dirigida a 10 representantes legales de diversas escuelas.

Tabla 1: población y muestra

Población	Número
Representantes legales	10
Total	10

Métodos De Investigación

Los métodos que se utilizaron fueron los siguientes:

Método inductivo
Se utilizó este método, ya que se indago experiencias dentro del ámbito educativo entre los docentes y los padres de familia, a su vez que conozcan la importancia de involucrarse en la educación de sus hijos.

Método deductivo
A través de este método se permitió reflexionar sobre la importancia de que los padres se involucren en la educación de sus hijos, y su influencia dentro del ámbito educativo y personal del niño.

Método Analítico
Se aplicó este método, para determinar cuántos padres de familia se involucran en la educación de sus hijos y cómo estos avanzan en su nivel académico.

Técnicas e instrumentos Encuesta
En esta investigación se utilizó como instrumento una encuesta, que nos ayudó a conocer de una manera factible las dudas que se han evidenciado acerca a la participación familiar en la educación escolar de sus hijos. Así mismo se realizó 6 preguntas dirigidas hacia los padres de familias.

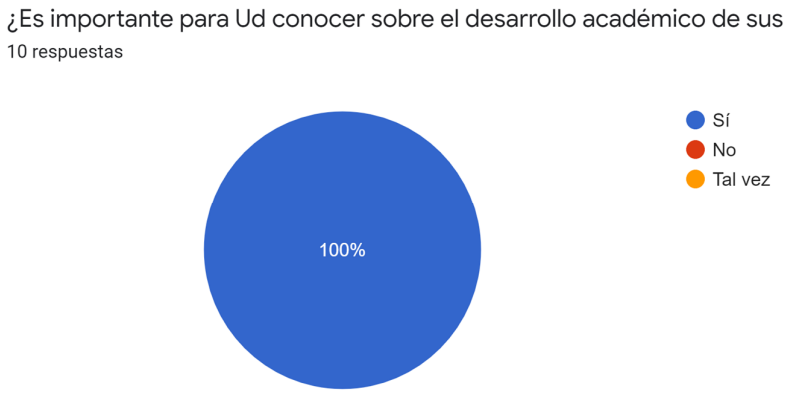

Análisis

En cuanto a la pregunta ¿Es importante para Ud conocer sobre el desarrollo académico de sus hijos? De los 10 padres encuestados que corresponde al 100%, nos dice 10 padres que sí es importante, con un equivalente al 100%.

Interpretación

Según los resultados obtenidos todos los padres de familia piensan que es importante conocer sobre el desarrollo académico de sus hijos, ya que así pueden involucrarse más en sus estudios y saber cuáles son las materias que se les dificulta más aprender.

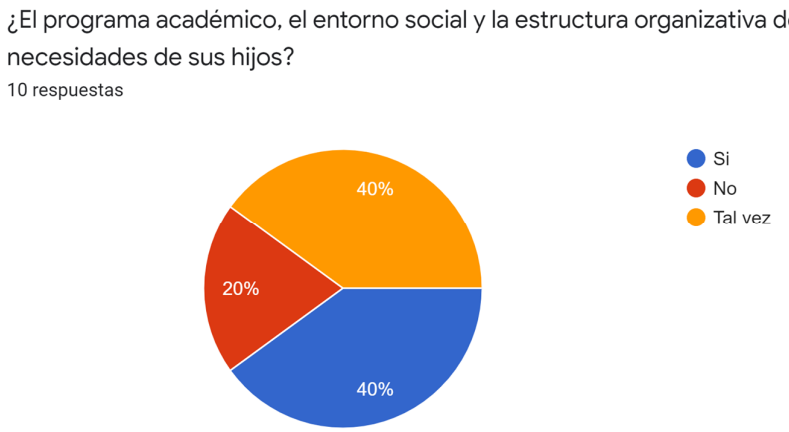

Análisis

En cuanto a la pregunta ¿El programa académico, el entorno social y la estructura organizativa de la escuela satisfacen las necesidades de sus hijos? De los 10 padres encuestados que corresponde al 100%, nos dice 4 padres que sí satisfacen las necesidades de sus hijos, con un equivalente al 40%, 4 padres nos dicen que tal vez satisfacen las necesidades de sus hijos, con un equivalente al 40%, y 2 padres dicen que No satisfacen las necesidades de sus hijos, con un equivalente al 20%.

Interpretación

Según los resultados obtenidos los padres de familia piensan que el programa académico, el entorno social y la estructura organizativa de la escuela satisfacen las necesidades de sus hijos, ayudándoles así a conocer más de los temas a tratar.

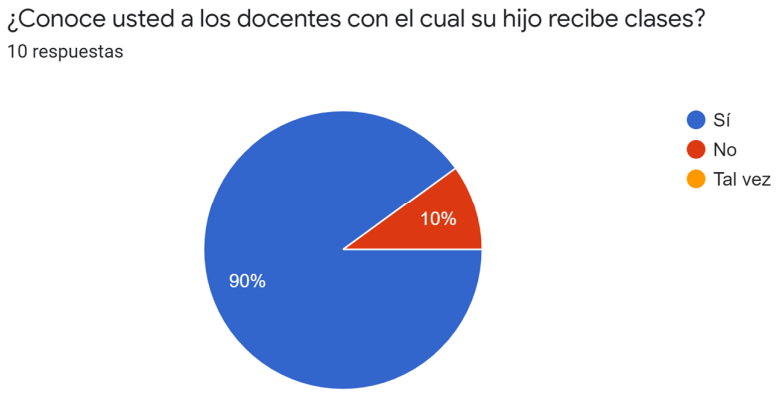

Análisis

En cuanto a la pregunta ¿Conoce usted a los docentes con el cual su hijo reciba clases? De los 10 padres encuestados que corresponde al 100%, nos dice 1 padre de familia que no conoce a los docentes que le imparten clases a su hijo, con un equivalente al 10%, 9 padres de familia nos dicen que, si conocen a los docentes que le imparten clases a sus hijos, con un equivalente al 90%.

Interpretación

Según los resultados obtenidos la mayoría de los Padres de Familia conocen a los diferentes docentes que imparten clases a sus hijos, esto les permite conocer las diferentes estrategias que utiliza cada educador para enseñar de manera correcta y eficaz las diferentes temáticas que se van a impartir en las horas clases a sus hijos

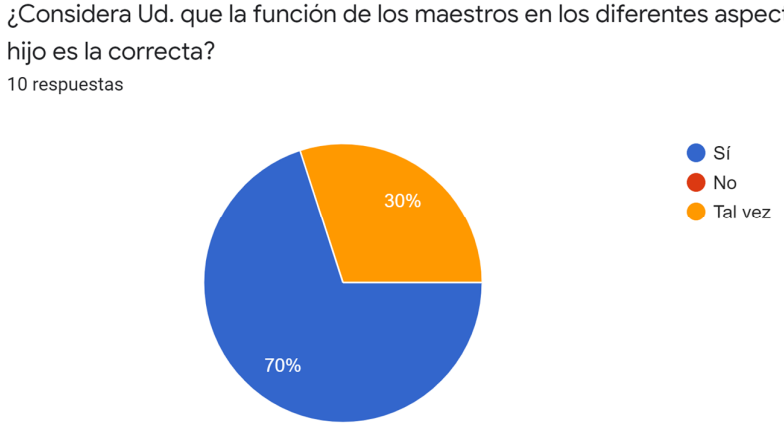

Análisis

En cuanto a la pregunta ¿Considera Ud. que la función de los maestros en los diferentes aspectos de la educación de su hijo es la correcta? De los 10 padres encuestados que corresponde al 100%, nos dice 3 padres que tal vez la función

de los docentes sea la adecuada, con un equivalente al 30%, 7 padres nos dicen que, si consideran que los docentes hacen una buena función en cuanto a la educación de sus hijos, con un equivalente al 70%.

Interpretación

Según los resultados obtenidos la mayoría de los padres de familia piensan que la función que realizan los maestros como guías del aula de clase es la correcta generando así un aprendizaje significativo en cada uno de sus estudiantes.

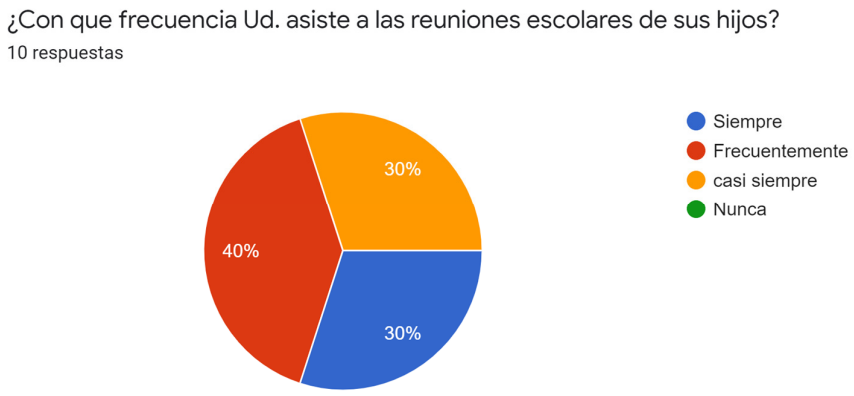

Análisis

En cuanto a la pregunta ¿Con qué frecuencia Ud. asiste a las reuniones escolares de sus hijos? De los 10 padres encuestados que corresponde al 100%, nos dice 4 padres que frecuentemente asisten a las reuniones, con un equivalente al 40%, 3 padres nos dicen casi siempre asisten a las reuniones escolares, con un equivalente al 30%, y 3 padres dicen que siempre asisten a las reuniones escolares, con un equivalente al 30%.

Interpretación

Según los resultados obtenidos la mayoría de padres de familia asisten siempre a las reuniones convocadas por los centros educativos de sus hijos, con el fin de saber más sobre las actividades que realizan sus hijos en la escuela.

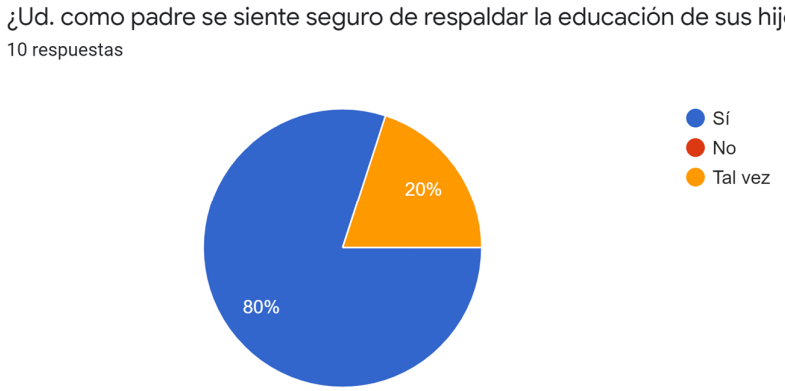

Análisis

En cuanto a la pregunta ¿Ud. como padre se siente seguro de respaldar la educación de sus hijos? De los 10 padres encuestados que corresponde al 100%, nos dice 8 padres que sí se sienten seguros al respaldar la educación de sus hijos, con un equivalente al 80%, 2 padres nos dicen que tal vez se sienten seguros al respaldar la educación de sus hijos, con un equivalente al 20%.

Interpretación

Según los resultados obtenidos la mayoría de los padres de familia sienten seguridad al respaldar la educación de sus hijos ya que evidencian en sus hijos un aprendizaje significativo.

Conclusiones

- Podemos concluir que los padres de familia cumplen un rol muy importante en el ámbito educativo de sus hijos y lo ayudan a tener un buen rendimiento académico.
- Concluimos que los docentes deben de involucrar a los representantes de cada estudiante a formar parte de su desarrollo en el entorno académico.
- Los Padres de Familia deben participar en la educación de sus hijos, actividades escolares y tomarse el tiempo de realizar actividades, tales como con la tarea, ya que esto fortalecerá los lazos afectivos, de confianza en ellos mismo y tendrán más oportunidades de sobresalir académicas, y debido a esto, debería existir un vínculo entre la familia y la escuela, logrando una inter-educacion entre padres e hijos.

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El Juego Como Principal Herramienta De Aprendizaje En El Desarrollo De Los Niños De Educación Inicial

Yolanda Paola Defaz Gallardo[1,]
Universidad Técnica de Cotopaxi
yolanda.defaz@utc.edu.ec

María Fernanda Constante Barragan [2,]
Universidad Técnica de Cotopaxi
maria.constante@utc.edu.ec

Julio Castañeda Carranza[3,]
Universidad Nacional de Trujillo, Perú
acastañeda@unitru.edu.pe

Ricardo Gómez Arce[4,]
Universidad Nacional de Trujillo, Perú
rgomez@unitru.edu.pe

Resumen

El proyecto de investigación acerca del juego como principal herramienta de aprendizaje en el desarrollo de los niños de Educación Inicial; se desarrolló bajo la premisa de diagnosticar la importancia del juego en el aprendizaje de los niños de Educación Inicial. El problema que se encontró en el desarrollo investigativo es la falta de conocimiento acerca del juego como herramienta de aprendizaje en el desarrollo de los niños y niñas de educación Inicial. Para lo cual se partió del problema, la justificación, y los objetivos del proyecto. El método aplicado durante la ejecución del proyecto de investigación se enmarco en el enfoque cuantitativo, también la investigación de campo el cual permitió profundizar la investigación. La población fue de 5 educadoras y 20 padres de familia, el cual se aplicó la técnica de la encuesta y el instrumento del cuestionario con el objetivo de conocer los beneficios que se da en los niños; que se obtiene a través del juego en el contexto familiar y educativo. Los resultados arrojados del proceso investigativo han permitido concluir que las docentes y los padres de familia tiene un alto grado de conocimiento en la utilización de juegos dentro del aula. Se concluye que debido a que el juego es un elemento de motivación que facilita el aprendizaje; y de esta manera permitiendo al niño experimentar sus emociones y expresar sus sentimientos para adquisición de nuevos conocimientos.

Palabras Clave: Juego, Herramienta De Aprendizaje, Jugar, Conocimiento, Habilidades

Abstract

The research project on play as the main learning tool in the development of Early Childhood Education children; It was developed under the premise of diagnosing the importance of play in the learning of Early Childhood Education children. The problem that was found in the research development is the lack of knowledge about the game as a learning tool in the development of children in Initial education. For which the problem, the justification, and the objectives of the project were started. The method applied during the execution of the research project was framed in the quantitative approach, also the field research which allowed to deepen the investigation.
The population consisted of 5 educators and 20 parents, who applied the survey technique and the questionnaire instrument in order to know the benefits that occur in children; that is obtained through play in the family and educational context. The results obtained from the investigative process have allowed to conclude that teachers and parents have a high degree of knowledge in the use of games in the classroom. It is concluded that because the game is a motivational element that facilitates learning; and in this way allowing the child to experience their emotions and express their feelings to acquire new knowledge.

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Keywords: Game, Learning Tool, Play, Knowledge, Skills

Introducción

La investigación acerca del juego como principal herramienta de aprendizaje en el desarrollo del niño es una actividad que genera emociones, las mismas que ejercen en la educación. La cual es una función importante, pues a través del juego se adquieren roles que cada niño lo asume de forma individual.

El juego constituye una herramienta indispensable para estimular el aprendizaje del niño, siendo este el canal el que permite al docente propiciar situaciones agradables a través de las cuales buscamos guiar al niño en la conquista de objetivos para enriquecer su desarrollo integral a través del juego se desarrollan sus habilidades es así que puede comunicarse y manejar emociones o demostrar su creatividad sim embargo esto les ayudara a trabajar en equipo y explorar sus habilidades intelectuales ya que podrán resolver a una corta edad sus problemas. Ayuda a la liberación de tenciones, emociones, ya que estos pequeños momentos ayudan al desarrollo durante toda su vida al realizar estos pequeños movimientos se desarrollan sus musculo, sus extremidades, van adquiriendo coordinación, ellos van elaborando sus vivencias emocionales y practican los roles que tendrán desarrollar como adultos.

Además, en los niños se convierte en una herramienta de aprendizaje ya que el juego, es una actividad propia del ser humano y se presenta en todos los niños, no solo en la niñez, sino que es un proceso que se dará durante toda la vida. Impulsan al niño a profundizarse en el mundo del conocimiento ya que estos ayudan a tener concentración y atención, los mantiene activos atentos consiguiendo un esfuerzo más profundo para obtener grandes logros, la acción de jugar les da oportunidad a sus curiosidades del mismo modo pueden desarrollar aspectos psíquicos en áreas como la afectividad , la motricidad ,la inteligencia la creatividad, y la socialización, es así que sin darse cuenta el niño ya va adquiriendo conocimiento y a su vez aprendizajes nuevos .

No todos los juegos son iguales con el pasar del tiempo van cambiando, por lo tanto el proceso de aprendizaje también, es ahí donde el acto de jugar cumple un papel muy importante, pues a través de éste puede estimularse y adquirir mayor desarrollo en sus diferentes áreas como son psicomotriz, cognitiva y afectivo-social es decir el niño va adquiriendo más conocimiento de la vida cotidiana es de ese modo el niño enriquece su lenguaje e interpretara lo que está pasando en su entorno.

Se realiza la fundamentación teórica de algunos autores sobre la importancia del juego en el proceso de enseñanza aprendizaje en los niños, se busca la metodología más adecuada para el estudio su población y muestra se calcula a través de la muestra y se obtiene los resultados de la investigación de los cuales se concluye con el aporte a la investigación y al finalizar se ingresa las referencias bibliográficas.

Fundamentación Teórica

(Moreno, 2002)"el juego es algo esencial a la especie humana, la actividad lúdica es tan antigua como la humanidad. El ser humano ha jugado siempre, en todas las circunstancias y toda cultura, desde la niñez ha jugado más o menos tiempo y a través del juego ha ido aprendiendo por tanto a vivir". (p 11)
Por tanto, el juego es una actividad que siempre ha venido dándose en el transcurso del tiempo, lo cual esto se ha ido progresando y de esa manera ayudando a los niños a que se desarrollen por medio de los juegos en todos los contextos y además en la cultura.

(Flinchun, 1988)"el juego abastece al niño de libertad para liberar la energía que tiene reprimida, fomenta las habilidades interpersonales y le ayuda a encontrar un lugar en el mundo social".
Se dice que el juego es muy importante en el niño porque de esa manera va desarrollando todos sus conocimientos, destrezas, aptitudes que el posee y de esa manera él va a ir encontrando el medio natural en el cual se pueda desarrollar adecuadamente.

(Zapata, 1990): Afirma que: "el juego no exige esfuerzo, pero algunos pueden requerir más energía de la necesaria para realizar sus acciones cotidianas".
Sin embargo, varios de los juegos necesitan que los niños poseen un entusiasmo, alegría, tener esa energía positiva que les ayudara a poder manipular de una mejor manera el juego y puedan obtener un buen desarrollo.

(Pugmire, 1996) “el juego es tan necesario para el pleno desarrollo del cuerpo, el intelecto y la personalidad del niño como lo son, la comida, la vivienda, el vestid, el aire fresco, el ejercicio, el descanso y la prevención de enfermedades y accidentes para su existencia efectiva y prolongada como ser humano”.
Por lo tanto, el juego es muy importante en el crecimiento de los niños, porque de esa manera ellos van desarrollando todas sus habilidades, la psicomotricidad fina y gruesa, su forma de actuar ante las cosas que va a realizar en su vida diaria.

(Garvey, 1985) “el juego infantil refleja el curso de la evolución desde los homínidos prehistóricos, hasta el presente. La historia de la especie humana estaría recapitulada en todo el desarrollo infantil individual”. (p 12)

Dice que el juego es algo muy importante dentro del ser humano y se debe tomar en cuenta que ha ido cambiando desde la antigüedad, hasta la actualidad y por ende esto va ayudando al infante a ir obteniendo conocimientos nuevos.
(Bañeres, 2008) “el juego es una actividad que le procura placer, entretenimiento y alegría de vivir, que le permite expresarse libremente, encauzar sus energías positivamente y descargar sus tensiones. Es refugio frente a las dificultades que el niño se encuentra en la vida, le ayuda a reelaborar su experiencia acomodándola a sus necesidades, constituyendo así un importante factor de equilibrio psíquico y de dominio de sí mismo”. (p 18)

Se manifiesta que el juego es una diversión para el niño ya que le permite desenvolverse en libertad y de esa forma pueda expresar todas sus potencialidades y asi pueda irse desarrollándose adecuadamente y por ende también le ayuda a obtener una buena salud mental.

(Moreno, 2002) “jugar no es estudiar ni trabajar, pero jugando el niño aprende a conocer y a comprender el mundo social que le rodea”. (p 25)

Se dice que el juego es una diversión para el niño ya que por medio de eso el va aprendiendo nuevos conocimientos y de esa manera él se va desarrollando en su ámbito natural y social.

(Sarlé, 2006) “el juego provee al niño de un contexto dentro del cual puede ejercitar no solo las funciones cognitivas con las que ya cuenta, sino también crear estructuras cognitivas nuevas. La enseñanza y el juego promueven el aprendizaje infantil al implicar una expansión de la zona de desarrollo infantil del niño. El juego contextualiza a la enseñanza y facilita en los niños el aprendizaje y los contenidos que se necesitan para jugar el juego”. (p 173)
De acuerdo a lo citado el juego es algo muy indispensable dentro del ámbito educativo de los niños porque de esa forma ellos experimentan nuevas cosas, conocimientos, habilidades, destrezas, les ayuda en su psicomotricidad y es así que obtienen un buen aprendizaje y de tal manera van conociendo hasta los contextos que los juegos necesitan para ser ejecutados.

(; Bonilla-, 2017.; María del Rosario Bonilla-Sánchez1 • Yulia Solovieva1 • Ignacio Méndez-Balbuena1 • Ileana Díaz-Ramírez1, /2017.) Menciono que “La actividad de juego de roles donde se representan situaciones sociales dando la posibilidad a los niños de solucionar conflictos, de analizar opciones de solución y de criticar las acciones y actitudes propias y de los demás participantes en el juego”.

De acuerdo a lo citado por Bonilla se puede argumentar que el juego ayuda al niño favorablemente para ganar confianza e ir asumiendo roles favorables para el mismo y para la sociedad porque él va relacionándolo con su entorno, de este modo el podrá solucionar problemas por si solo las situaciones que se le presenten ya que el tendrá un concepto más claro de la idea y de ese modo podrá tener su propia visión u opinión.

(López Risco, Manuel; Saldanha Pereira, Ana E.; Guerrero Barona, Eloisa; Garcia – Baamonde, Elena; García, Psicología, Nº4, 2010.) Nos menciona “La importancia de que el fenómeno de la discapacidad sea abordado desde un enfoque holístico. Así, el ocio, la cultura, los deportes, entre otras, son actividades que permiten que las personas con discapacidad puedan participar en la vida social, a la vez que desarrollan sus inquietudes.”

Según los diferentes autores podemos decir que la discapacidad es una realidad que se vive a diario y pensando en ellos que se busca dar nuevas estrategias , de enseñanza aprendizaje para evitar que el niño este sin realizar actividades o este sin tener conocimientos previos para poder integrarlo con su entorno y las diferentes actividades recreativas que se realizan, brindando la oportunidad de relacionarse con el ambiente que los rodea , dándoles a conocer nuevos conceptos e integrándolos en la sociedad para lograr un desarrollo adecuado .

(Marco, 2008) Da a conocer que "A alargo de la historia el juego ha sido considerado como un recurso educativo explotado por el hombre desde la antigüedad"

De acuerdo a lo que nos mencionó por Marco podemos decir que la existencia de los juguetes no es algo reciente ya que desde la antigüedad han llegado para cambiar el mundo de la ecuación y dar nuevos puntos de vista, ayudando en el desarrollo del infante, logrando tener y captar nuevos aprendizajes significativos con los juegos cotidianos.

(Alejandro Tamayo Giraldo, Jaime Alberto Restrepo Soto, 2016) Hace referencia a "Las emociones que se orienten hacia el entretenimiento, la diversión, el, esparcimiento, lo que conduce a gozar, reír, gritar e inclusive llorar es una verdadera fuente generadora de emociones"

De acuerdo a lo mencionado recalcaremos que las emociones están presentes en el niño en todo momento puesto que, el aprovechar de estas oportunidades e impartir conocimiento es indispensable para obtener un logro y una expresión social adecuada a futuro.

(Tamayo Giraldo, Alejandro; Restrepo Soto, Jaime Alberto, 2016) "Se hace mención del papel que tiene el juego en el desarrollo de la moral, permitiendo lograr en el sujeto una conciencia de la norma y su práctica." aseguran que el juego tiene grandes beneficios en los niños aportan favorablemente en ciertas áreas tales como motricidad fina gruesa su desarrollo intelectual les ayuda a generar un estilo de vida más saludable más activo.

(Tamayo Giraldo, Alejandro; Restrepo Soto, Jaime Alberto, 2016) "El desarrollo del juego simbólico es similar en los niños sordos y en niños oyentes en la mayoría de las dimensiones"
Tanto en niños con capacidades especiales o no es importante desarrollar las habilidades de concentración y entendimiento es por ello que el juego simbólico es una de las mejores estrategias de aprendizaje para lograr una captación adecuada del tema tratado.

(Alejandro Tamayo Giraldo, Jaime Alberto Restrepo Soto, 2016)La acción, el juego y el trabajo fueron el primer maestro en darle importancia "al juguete" o "dones para lograr su objetivo". En consideración a Alejandro Tamayo y Jaime Restrepo Soto Nos supo manifestar, que el juego es parte del alumno desde que nacen ya que estas pequeñas acciones ayudan en el desarrollo del niño convirtiéndose en aprendizajes sin presión, divertidos, llamativos, alegres, capases de llenar las curiosidades educativas

Metodología

Enfoque de la investigación

La investigación tiene un enfoque cuantitativo por cuanto pone de manifiesto la forma de ser y pensar de los padres de familia y docentes en base al análisis obtenido; a través de la recolección de datos, de esta manera ayuda a obtener conclusiones y recomendaciones.

Proposito de la investigacion

El presente trabajo de investigacion tiene como la finalidad de dar a conocer la gran importancia del juego como herramienta de aprendizaje ; de esta manera diagnosticar los resultados que se obtien en cada niño mediante el juego. Con el objetivo de que las docentes conoscan de esta herramienta y lo apliquen en el aula de clase.

Tipo de investigación

Es una investigacion descriptiva el cual permitira recoger informacion para describir acerca de del juego como principal herramienta de aprendizaje en la educacion de los niños de educacion inicial de 0 a 4 años de edad de manera que seran interpretados según la realidad que se observa.

Es decir que esta investigacion se baso en la informacion obtenida por los padres de familia y los docentes en el centro de desarrollo infantil GARABATITOS

Metodologia de la investigacion que se aplico en la investigación

La metodología que se aplica en la presente investigación es la de campo por que se realizo un cuestionario el cual se aplico a los docentes y padres de familia de la institución educativa enmarcados en mejorar el proceso de enseñanza - aprendizaje en los estudiantes de la institución educativa.

Población y Muestra

Para la recopilacion de los datos acerca del juego como principal herraminta de aprendizaje en la educacion de los niños de educacion Inicial ; se realizo la tècnica de la encuesta y como instrumento el cuestionario que se aplico a 20 padres de familia y a 5 docentes que elaboran en el Centro de Desarrollo Infantil "GARABATITOS", en la parroquia Pastocalle barrio Santa Rita del cantón Latacunga.

Tabla 1: Poblacion y muestra

POBLACION	NUMERO
Padres de familia	20
Docentes	5
TOTAL	25

Fuente: Investigación de campo

Métodos De Investigación

A continuación, se detallará los métodos que se utilizaron para realizar la investigación y fueron los siguientes:

Método Inductivo

Este método nos permitió analizar las experiencias particulares acerca del juego como principal herramienta de aprendizaje en la educación de los niños de educación inicial para poder generalizarlo y a futuro implementar en un salón de clases, mediante una aplicación educativa de educación inicial.

Método Deductivo

Mediante este método se consiguió analizar acerca de la aplicación de los conceptos generales, para que se realice en la práctica en el Centro de Desarrollo Infantil "GARABATITOS" en la parroquia Pastocalle barrio Santa Rita del cantón Latacunga en el nivel de Educación Inicial.

Método Analítico

Se aplicó este método, para establecer el nivel de conocimiento que tienen los padres de familia y los docentes del Centro de Desarrollo Infantil "GARABATITOS", sobre el juego como principal herramienta de aprendizaje en la educación de los niños de educación inicial, cuyo fundamento sirvió para tener una idea clara sobre el tema de la presente investigación.

Método histórico lógico

A través del método histórico se pudo llegar hacia la investigación de conceptos y el estudio sobre la importancia que tiene el juego en el aprendizaje de los niños y mediante las encuestas determinar cuál es el estado de conocimiento sobre el tema y los avances que ha tenido el juego en el desarrollo de los niños en la actualidad.

Método Sintético Analítico

Este método se utilizó en el desarrollo de la introducción del proyecto puesto que tanto el análisis como la síntesis nos ayudó a entender el objeto de estudio del proyecto.

Técnicas E Instrumentos

Encuesta

Esta técnica está enfocada en un cuestionario más adaptable, la misma que nos permitió entender el conocimiento, la aplicación y la necesidad del juego como principal herramienta de aprendizaje en la educación de los niños, con el objetivo de obtener información y conocimientos previos acerca del tema planteado, la misma que estuvo dirigida a los padres de familia y docentes del CDI "GARABATITOS", y de esa manera alcanzar los objetivos planteados en la investigación.

Instrumento

Se relaciona a los cuestionarios que se realizó a base de diez preguntas en las encuestas que fueron aplicadas a los padres de familia y docentes del centro infantil en la presente investigación.

En particular en la investigación se aplicó un cuestionario para la obtención de los resultados los cuales fueron los más óptimos y se socializo con los docentes y autoridades de la institución educativa para mejorar el proceso de enseñanza – aprendizaje en los niños.

Resultados

1. **¿Usted como docente recibe capacitaciones acerca del juego como la principal herramienta de aprendizaje para los niños?**

Tabla 1: Capacitaciones acerca del juego.

Alternativa	Frecuencia	Porcentaje
Si	5	100%
No	0	0%
A veces	0	0%
TOTAL	5	100%

Fuente: Educadoras del CDI "Garabatitos"

Elaborado por: Investigadoras

Interpretación

El 100% de las docentes manifiestan que, si reciben capacitaciones acerca del juego como la principal herramienta de aprendizaje para los niños, ya que de esta manera les ayuda a obtener más conocimiento de lo importante que es

el juego en el desarrollo educativo del niño para de esa manera puedan aplicarlo en el aula de tal forma que les ayude a que desarrollen sus capacidades y la psicomotricidad fina y gruesa.

2. **¿Cree usted que es necesario tener más conocimiento acerca de los juegos que ayudan al niño?**

Tabla 2: Conocimiento acerca de los juegos que ayudan al niño

Alternativa	Frecuencia	Porcentaje
Mucho	15	75%
Medio	0	0%
Poco	0	0%
Nada	5	25%
TOTAL	20	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

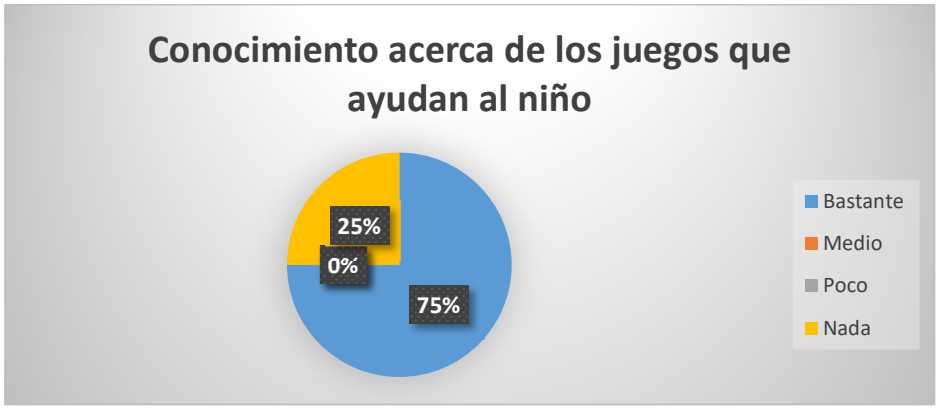

Interpretación

El conocimiento acerca de los juegos que ayudan al niño los padres de familia dicen, mucho el 75% y nada el 5% lo cual la mayoría dice que, si es necesario tener más conocimiento de los juegos para que ayuden a los niños en su ámbito educativo, ya que por medio del juego los niños experimentan, aprenden, reflejan y transforman activamente la realidad.

3. **¿Cómo docente cree que los padres de familia tengan conocimiento sobre la importancia que tiene el juego?**

Tabla 3: La importancia que tiene el juego.

Alternativa	Frecuencia	Porcentaje
Mucho	3	60%
Más o menos	1	20%
Casi nada	1	20%
TOTAL	5	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

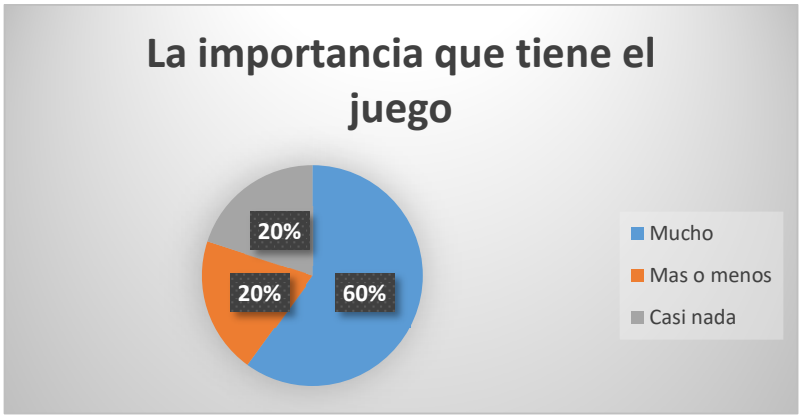

Interpretación

El conocimiento que los padres de familia deben tener sobre la importancia del juego, las docentes manifiestan mucho el 60%, más o menos y casi nada el 20%, ya que dicen que la mayoría de los padres toman énfasis en aprender más sobre el juego lo cual es una herramienta para el aprendizaje del niño.

4. ¿De qué manera ayuda el juego en el aprendizaje del niño?

Tabla 4: Ayuda el juego en el aprendizaje del niño.

Alternativa	Frecuencia	Porcentaje
Positivamente	0	0%
Negativamente	0	0%
Positivamente y negativamente	5	100%
TOTAL	5	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

Interpretación

El 100% de las docentes manifiestan que la manera en que el juego ayuda en el aprendizaje del niño es positivamente y negativamente, lo cual dicen que el juego es una herramienta que favorece el aprendizaje de todas las áreas del

desarrollo infantil como sensorial, motricidad, comunicación y por otro lado dicen que los niños crecen a través el juego, por eso no debe limitar al niño en esta actividad lúdica.

5. **¿Considera usted que los docentes en el CDI aplican el conocimiento acerca del juego en el aprendizaje de los niños?**

Tabla 5: Aplican el conocimiento acerca del juego

Alternativa	Frecuencia	Porcentaje
Si	12	60%
No	3	15%
Nunca	5	25%
TOTAL	20	100%

Fuente: Educadoras del CDI "Garabatitos"

Elaborado por: Investigadoras

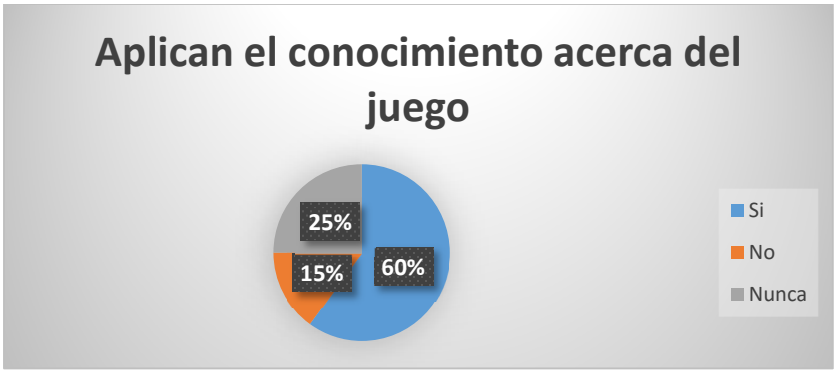

Interpretación

La aplicación del conocimiento sobre el juego en el aprendizaje del niño en el CDI por parte de los docentes, los padres de familia manifiestan que, si es 12%, no el 3% y nunca el 5%, lo cual se da a entender que la mayoría de las docentes en los centros infantiles si aplican los conocimientos que ellas poseen sobre el juego y de esa manera ayudar a que el niño se vaya desarrollando y aprendiendo más.

6. **¿Cree usted como docentes que es importante la selección de material cuando el niño va a jugar?**

Tabla 6: Selecion de material cuando el niño va a jugar

Alternativa	Frecuencia	Porcentaje
Si	3	60 %
No	2	40 %
Nunca	0	0%
total	5	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

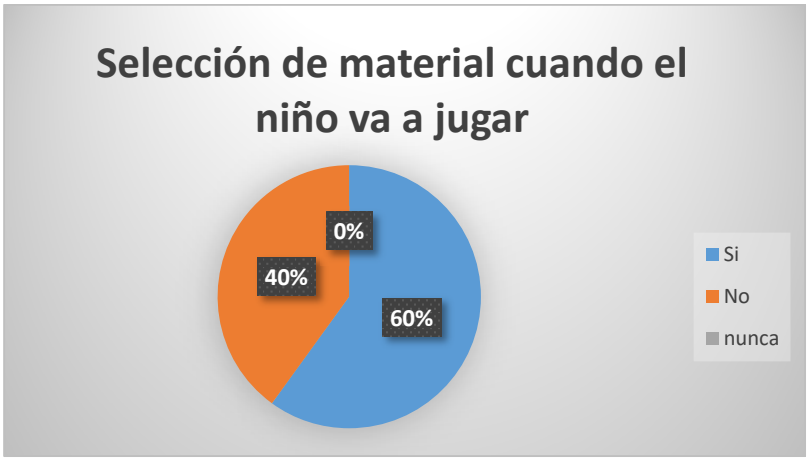

Interpretacion

La importancia de la selección de material didáctico cuando el niño va a jugar, las docentes manifiestan que, si es el 60 %, no el 40 % y nunca el 0%, lo cual se da a entender que es muy necesario seleccionar el juguete acorde a la edad del niño por ejemplo si es un bebe las botellas de la calma si es un niño de dos años los juegos de construcción y de tres años en adelante los rompecabezas para que de esa manera el niño manipule cada objeto y adquiera conocimientos.

7.- ¿Considera usted como docente si es necesario utilizar en el CDI los juegos tradicionales?

Tabla 7: Es necesario utilizar en el CDI los juegos tradicionales.

Alternativa	Frecuencia	Porcentaje
Si	3	75 %
No	1	25 %
Casi nada	1	0 %
TOTAL	5	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

Interpretación

Como docentes mencionan que es necesario utilizar en el CDI los juegos tradicionales el 75 mencionan que sí; el 25% dicen que no; el 0 % casi nada; en si los juegos tradicionales ayudan a los niños a estimular la sociabilidad; ya que de esta forma aprender a acatar y entender normas y reglas.

8.- ¿Utiliza material reciclable al momento de crear materiales didácticos para el aprendizaje de sus niños?

Tabla 8: Crear materiales didácticos para el aprendizaje de sus niños.

Alternativa	Frecuencia	Porcentaje
Si	3	60%
No	2	40%
Nunca	0	0
Total	5	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

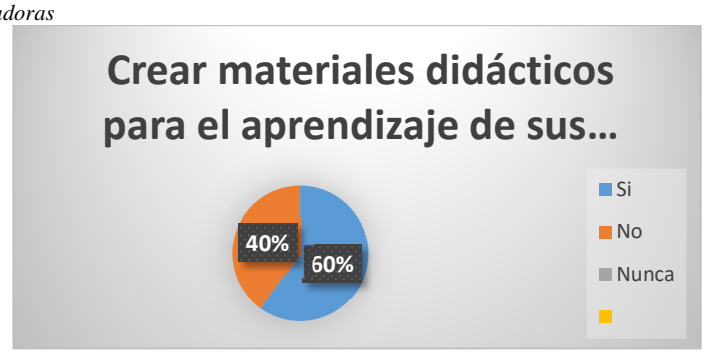

Interpretacion

utilizar materialbbles reciclables al momento de crear materiales didacticos para los niños se descubre que el 60 % corresponde que si ; el 40% a no y el 0% a nunca; es necesario dar a conocer a los niños que hay que reciclar las botellas, tapas, cartones y de esta manera hacerles entender que hay que cuidar el planeta reciclando.

9.- ¿Usted realiza en casa actividades lúdicas con su hijo?

Tabla 9: Actividades lúdicas con su hijo.

Alternativa	Frecuencia	Porcentaje
Si	3	75 %
No	1	25 %
Aveces	1	0
TOTAL	5	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

Interpretacion

Manifiestan los padres de familia que realizan actividades lúdicas en casa con su hijo; el 60 % corresponden que sí; el 25% dicen no y el 0% a veces; mediante las actividades lúdicas le permite al infante a que refuerce y fortalezca su autoconfianza y autonomía y así ayudando de esta manera en el desarrollo de su personalidad; mediante actividades recreativas como: juegos, canciones, retahílas etc.

10.- ¿Cree usted que mediante el juego el niño expresa sus emociones y sentimientos?

Tabla 10: Mediante el juego el niño expresa sus emociones y sentimientos.

Alternativa	Frecuencia	Porcentaje
si	10	50
Mas omenos	5	25
Casi nada	5	25
Total	20	100%

Fuente: Educadoras del CDI "Garabatitos"
Elaborado por: Investigadoras

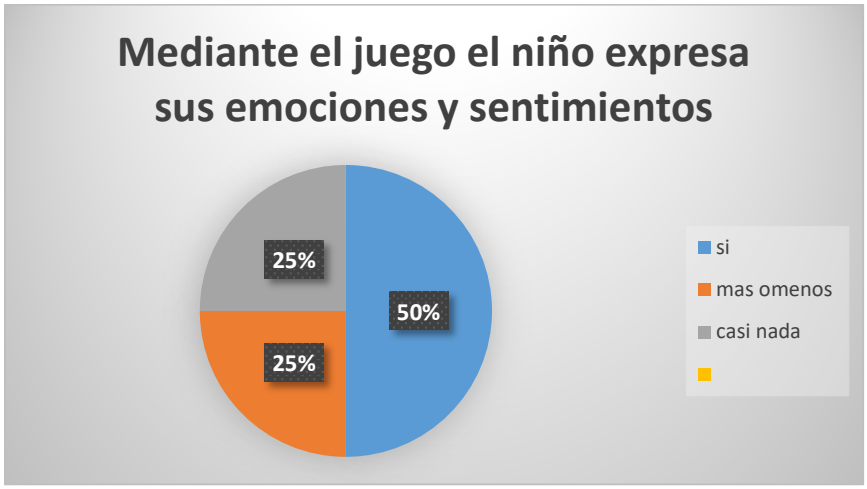

Interpretación

Los padres de familia responden si mediante el juego el niño expresa sus emociones y sentimientos. El 50% corresponde a que sí; el 25% a más o menos y el 25% a casi nada; mediante el juego el niño expresa sus emociones por ejemplo si un niño observa en su hogar que su padre maltrata físicamente a su madre el niño; hará lo mismo con sus juguetes y también con sus compañeritos de la clase; es por eso que los niños son como esponjitas que absorben todo lo que observan.

Discusión De Los Resultados

El objetivo de este estudio fue investigar los aportes significativos que dan el uso de los juegos en el proceso de enseñanza – aprendizaje en los niños como se muestra en cada una de las preguntas existe la predisposición para realizar estas actividades y la aplicación por parte de los docentes dentro de las aulas para tener mejores resultados en sus alumnos a través de los conocimientos aprendidos en el aula.

Conclusiones

- El juego es primordial en el desarrollo de los niños al ingresar a la educación Inicial donde se puede observar que, al practicar distintas actividades lúdicas como bailes, juegos de la gallinita ciega, el gato y ratón, juegos al aire libre, etc.; ayudan a los niños a tener una mejor coordinación y equilibrio; asimismo es muy fundamental que la docente realice juegos para mejorar su motricidad fina y gruesa el cual ayudara al niño a la escritura.
- Se pudo observar que los juegos que se realizan en el Centros de desarrollo infantil GARABATITOS ayudan a que el niño se desenvuelve en la socialización, facilita el aprendizaje, desarrolla la madurez, y la adquisición de conocimientos en cada niño.
- También se puede decir que los niños al momento de jugar lo hacen con placer y ellos mismos son quienes marcan sus reglas y sus metas; por esta razón los niños son seres humanos justos al cumplir las reglas del juego que se les solicita en la clase.
- Se llega a la conclusión que al niño también de le debe dar materiales didácticos reciclables como con botellas, tapas, cartones, entre otros el cual el docente debe realizar materiales didácticos como la caja de bastidores de vestir, manitos con diferentes texturas, rompecabezas, instrumentos musicales, etc. de esta manera indicándoles a los niños a aprenderán a cuidar el medio ambiente reciclando.

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Research Regarding Specific Management Principles Increasing The Quality of Educational Systems

Daniela Alice LUTA
(MANOLESCU), University Politehnica of Bucharest, Romania
a_alice13@yahoo.com

Adrian IOANA
University Politehnica of Bucharest, Romania
adyioana@gmail.com,

Daniela TUFEANU
University Politehnica of Bucharest, Romania
dana.tufeanu@gmail.com,

Dragos Florin MARCU
University Politehnica of Bucharest, Romania
dragos.marcu@arasnet.ro,

Bogdan FLOREA
University Politehnica of Bucharest, Romania
florea_b2004@yahoo.com,

Daniela Ionela JUGANARU
University Politehnica of Bucharest, Romania
juganaru_dana@yahoo.com,

Bianca Cezarina ENE
University Politehnica of Bucharest, Romania
raykindergarten.ag@gmail.com

Abstract

The starting point of this article is the objective of defining the educational system. The components of the educational system are also defined: social institutions, economic institutions, socio-cultural, political, professional (occupational) groups, certain NGOs. Many management principles are presented too, specific for raising the quality of an educational system, such as: the continuity principle, the student-centered principle, the didactic inovation principle, the ensurance and development of complementarity and correlation between main subjects; partenerships development for education (I) – scientific research (CS) – production (P).

Keywords:Management; Educational Systems; Quality; Principles.

Introduction

An education system is a subsystem of a global social system. We can define the education system (which is also called the institution of education) as the total number of a society's institutions, which are involved in the education of people.

The components of the education system (institutions involved in the education of people) can be: Social institutions; economic institutions; socio-cultural; political; professional groups; specific NGOs.

The main role of an education system is to generate and ensure through its functions the development of the training process of human perosnality. The design and implementation of the functions of education are carried out through specific, formal and non-formal content and methodologies.

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In order to raise the efficiency of the activities specific to an education system, it is important to study and optimize the links between: the education system – the teaching system - the teaching process, in terms of social and pedagogical relations between them. Figure 1 shows the schematic representation of these correlations.

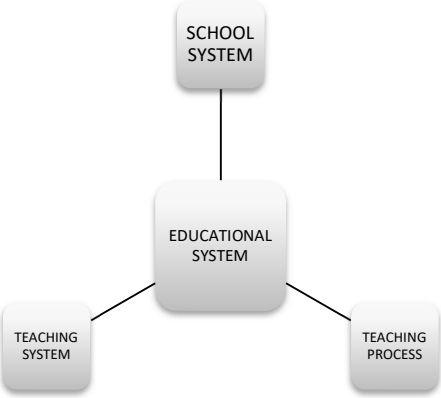

Fig. 1: The correlations between the educational system, teaching systeam and the teaching process

The education system can be defined and analyzed both from a narrow and a broad point of view. Therefore, in the broad sense, the education system refers to "all institutions involved in organizing school architecture, more precisely in the general evolutionof studies on cycles, directions, specializations, etc.". (Dictionnaire encyclopédique de L'éducation et de laformation, 1994, pg.956).This includes school institutions, but also some institutions specialized in non-formal training (clubs, camps, professional development training centres, television and radio broadcasts, etc.).

Principles increasing the quality of educational systems

The entire education system has to be led by the saying "**quality must prevail**". From this point of view, it is important to know and apply a number of specific principles. We present and analyze below some of them.

The continuity principle – according to it, the education must be a continuous process. Therefore, specific methods and tools must be used for each stage of development (pre-school, primary, secondary school, university, post-graduate).

The principle of the student centered – the pre-school pupil, the student, the Master Degree student, the doctoral student must be the central element of the education system. Thus, the educational materials, tools and methods specific to the education system must place in the centre the beneficiary of the educational process. Looking at a famous marketing saying, we can state „the student is our master".

The principle of teaching innovation – including a wider use of modern means of presentation and communication in teaching at all levels.

Ensuring and developing complementarity and correlation between the content of the subjects taught is another principle specific to an effective education system.

The development of partnershipsin education (I) – **Scientific research** (CS) – production (P) is another principle of an education system. Figure 2 shows the diagram of connections and correlations among these three partnerships.

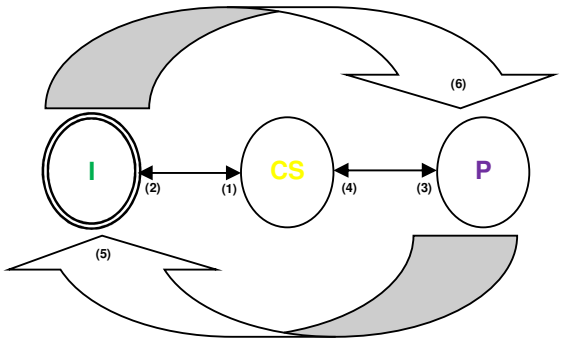

Fig. 2: Connections and correlations among The development of partnershipsin education (I) – Scientific research (CS) – production(P)

I will further exemplify some of the main correlations within this triple partnership.

(1): UE→SC - University education provides specific training and knowledge to enablethe Scientific Research.

(2): SR→UE - Scientific research (both university and non-university) provides education with **increased conditions for development**. This development mainly refers to two components: the first one is connected to the material aspect (equipment, installations, apparatus); the second one is connected to the scientific aspect including the specialists (the specialization of a highly qualified human resource).

(3): SR→P - Scientific research, not only the applied one, but also the fundamental one, provides theproduction with **modern and high-performance technologies and procedures.**

(4): P→SR - The production provides **the scientific research with a conduciveenvironment, appropriate for industrial experiments, in order to quantify and validate the estimated results and efficiency**. Here we must also consider the diversification of professional relationships with production specialists.

(5): P→UE - In relation to university education, production **must be seen as the main activity environment for future graduates**. Production can also provide university education with **important primary bases of technological and economic data.**

(6): UE→P - University education has the important purpose of providing **well-trained specialists necessary for the productive sectors** (and not only).

The efficiency of applying the principles of the educational system is quantified by the efficient realization of the functions of this system, namely:

- Socializing
- Transmission of culture through the two types of knowledge: academic knowledge and institutional knowledge.
- Formation and development of the personality of the subject of the educational system.
- Selection, preparation and placement of individuals in society.
- The evolution of the subject of the educational system.

Conclusions

To render an educational system more efficient, specific scientific principles of management should be applied.

The main desideratum of any educational system must be quality assurance. From this point of view (and not only), placing the subject of the educational system in a central position plays an important role.

Along with the learning and education process, theunconventional and complementary activities ensure a major opening of the educational system, which leads to an increase in its efficiency.

Also, an important role for ensuring the increased efficiency specific to any educational system is played by the improvement of the human resource involved, as a source (transmitter) in the communication process.

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Business Intelligence for Decision Making in the Sales Area – A Systematic Literature Review

Jhudith EGOCHEAGA-OSCCO
Universidad Autónoma del Perú, Lima, Perú, jegocheaga@autonoma.edu.pe

Angelo CHAVEZ-VELI
Universidad Autónoma del Perú, Lima, Perú, achavezv@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Autónoma del Perú, Lima, Perú, jgamboa65@hotmail.com

Alfonso ROMERO BAYLÓN
Universidad Nacional Mayor de San Marcos, Lima, Perú, arombay@yahoo.es

Luis SOTO-SOTO
Universidad Nacional Mayor de San Marcos, Lima, Perú, lssotos@hotmail.com

Oscar MUJICA-RUIZ
Universidad Nacional Federico Villarreal, Lima, Perú, omujica@unfv.edu.pe

Summary

In the world today, large companies handle a high volume of data, making it difficult to analyze efficient decision making. This problem has led to a large number of research into the implementation of business intelligence (BI) to improve the management decision making, achieve strategic objectives that help generate value to the organization, and position themselves in front of their competitors. This document provides a systematic review of the literature from different studies that have been carried out since 2015 using BI in different areas of businesses. This review provides a comprehensive statistical analysis of specific information extracted from 97 articles published between 2015 and 2020. The results provided in this document show interesting results about the effectiveness of BI implementation in different areas of organizations and how this tool can have a great influence on effective decision making, thus achieving a competitive advantage in organizations.

Keywords: Business Intelligence, Decision Making, Ralph Kimball, OLAP, Systematic Literature Review

Introduction

Currently, companies have great difficulty in implementing a decision-making process in different parts of the organization. In recent years, medium-sized and large-sized companies have been generating a large amount of data, which is becoming difficult to manage and leads to congestion in the delivery of information [53]. BI systems have been observed as the solution for information management and decision-making problems. However, there has been an absence of research on how this system would be adopted and implemented to help decision makers [37].

Advances in information systems and organizational technologies led to the emergence of business intelligence (BI) systems in the late 1990s [96]. The BI solutions are a very important element in companies, where they provide analytical reporting capabilities based on integration of data collected from internal and external sources. This reporting facilitates efficient decision making by managements [22]. BI systems are considered a major investment in organizations, as this tool has the capacity to break down organizational information barriers and influence decisions that have a greater impact on business strategies [22]. In many companies, BI is considered a key technology that helps in the commerce decision making. Currently, with the availability of several BI systems, BI effectively supports better decision making. In addition, companies' information can be analyzed more efficiently [55].

Therefore, the use of BI in companies can generate value in different areas of the organization by providing key information for efficient decision making. It also reduces manual reporting and generates signals that are key to

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optimal decision making. The BI tool is a key acquisition for organizations that want to be successful by analyzing the information in real time in an efficient manner. In this article, we review the research on the use of BI for the improvement of decision making in different areas of a company. This paper is developed as a detailed review of techniques to identify research gaps in the literature. The paper is organized as follows. Section I presents the Introduction, and Section II details the background and the works related to this investigation. Section III provides the methodology used, Section IV presents the results of the systematic review of literature, and Section V presents the discussion. Finally, Section VI presents the conclusions and future work.

Background and Related Works

In recent years, many studies have proposed different methods for the implementation of BI in different organizations and identified the steps necessary for a successful introduction of this tool.

Ain et al. [96] reveal that to achieve success of the BI solution in an organization, the quality of the data, the system, and IT infrastructure are important for the success of this tool. Organizations should also keep in mind that education, training, and management support in creating a proper organizational culture are very important for a successful implementation.

Other studies also show that the concept multidimensional is the right one to build a data warehouse, being this the key to BI success, enabling powerful data analysis based on BI [27]. They also add that, in the extraction, transformation, and loading (ETL) process performing mining of data is necessary to have potentially important data and effectiveness of BI in organizations.

Brgui et al. [6] proposed a natural language-based method for the design multidimensional DM and ETL generation. They developed a prototype software called ARVAT. This software supports the construction of ETL, specification of requirements, and generation of multidimensional DM schemes, in preparation for ETL procedures, indicating effectiveness in the implementation of BI. They also indicate that the specification of requirements is very important for a BI solution for an organization to succeed.

It can be assumed that BI can be implemented in all areas and industries that have an information database. This view is supported by the various researchers who, through the use of information, have been able to achieve the goal of streamlining processes and improving performance [51]. In this implementation of the BI storage, the ETL process was designed to incorporate data quality to filter out inconsistent data with respect to data scheme and value of the data. Therefore, this quality data process allows for correct and qualitative data in the data warehouse. In addition, verification of data quality has been incorporated, as well as the data detection rules to filter the data scheme without same and the range of data that are stored in the data warehouse for your analysis.

BI research in different organization is key to improve decision making in any area in which BI is being implemented. However, sometimes the implementation is not successful because requirements, and data storage infrastructure are not well defined. Therefore, research is necessary to determine what processes are required to achieve a successful implementation of BI.

Methodology

For the development of this research, the systematic literature review was applied. This is a technique used to separate and synthesize the evidence of a particular response-oriented topic, and it defines the research questions and classifies the articles. To do so, these steps were followed to choose and to evaluate different studies in a timely manner and to provide evidence for them. This study involves a comprehensive search of relevant databases to identify the BI literature for taking decisions in different areas of an organization. Fig 1 shows the steps that were used in this research.

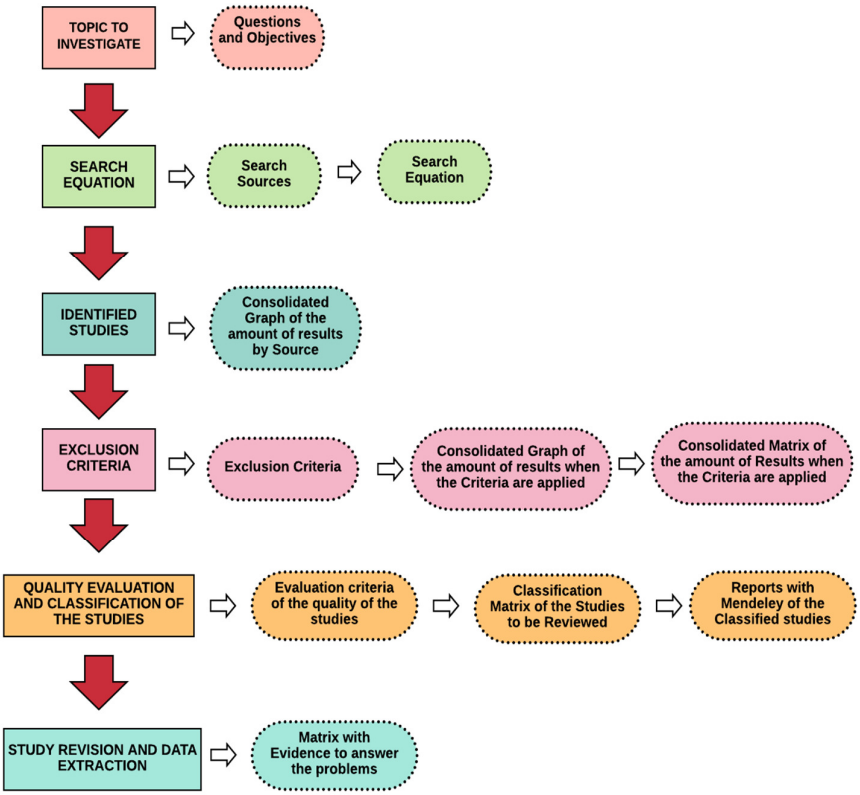

Fig. 1: Diagram of the research methodology

A. Definition of Research Questions

The main purpose of this research is to answer objectively to a series of questions by reviewing articles, as presented in Table 1.

Table 1: Questions and motivation for research

Research Questions	Motivation
RQ1: Which ones are the criteria for measuring the effectiveness of business intelligence development, based on Ralph Kimball's methodology, on the improvement of decisions?	Determine the development effectiveness of business intelligence based on Ralph Kimball's methodology on improving decision making.
RQ2: How many studies were published in the last 5 years by source and type of business intelligence publication?	Determine how many studies were published in the last 5 years by source and type of publication.
RQ3: In which areas business intelligence has been applied?	Knowing in which areas business intelligence has been applied.
RQ4: What methodologies are the most used for the development of business intelligence?	To know which methodologies are the most used for the development of business intelligence.
RQ5: What technology tools support business intelligence?	Get to know the technological tools that support business intelligence.

B. Sources Search

This study process uses 11 sources of relevant database, including Science Direct, Dialnet, IEEE Xplore Springer Link, Google Scholar, DOAJ, Taylor & Francis Online, Scopus, ProQuest, EBSCOhost, and Microsoft Academic.

C. Search Equations

To perform the searches in these sources, a series of search equations according to each source, as shown in Table 2, was used to find relevant articles. For this purpose, the following terms related to the research topic were used: BI, methodology or model or method, and decision making, as shown in Table 1.

Table 2: Search equation by source of search

Source	Search Equation
Science Direct	("Method" OR "Model" OR "Methodology") AND Business Intelligence AND Decision Making AND Data Warehouse
Dialnet	(“Business Intelligence”) AND (“Decision Making”) OR ("Ralph Kimball Methodology")
IEEE Xplore	((("All Metadata”: Business Intelligence) AND "All Metadata”: Decision Making) OR "All Metadata”: Ralph Kimball)
Springer Link	'"Business intelligence" AND "Decision Making" AND (Method OR model OR Methodology)'
Google Scholar	Business Intelligence AND Decision Making AND Kiimball AND (Method OR Model OR Methodology)
DOAJ	"Business Intelligence": "AND", "Decision Making"
Taylor & Francis Online	[All: business intelligence] AND [All: ralph Kimball] AND [[All: Method] OR [All: Model] OR [All: Methodology]]
EBSCOhost	TX (Business Intelligence) AND TX Decision Making AND TX ((Ralph Kimball OR Methodology))
ProQuest	((Businesses Intelligence) AND (Decision Making)) AND (Ralph Kimball) AND (Methodology OR Method OR Model)
Scopus	(ALL (“Business Intelligence”) AND ALL (“Decision Making”) AND ALL (“Ralph Kimball” OR “Methodology or Method or Model”))
Microsoft Academic	"Business Intelligence" AND "Decision Making” AND "Ralph Kimball" AND " Method OR Model OR Methodology "

D. Consolidated number of results by source

After searching the 11 sources, according to the search equation, 29 794 articles were obtained, as shown in Fig 2.

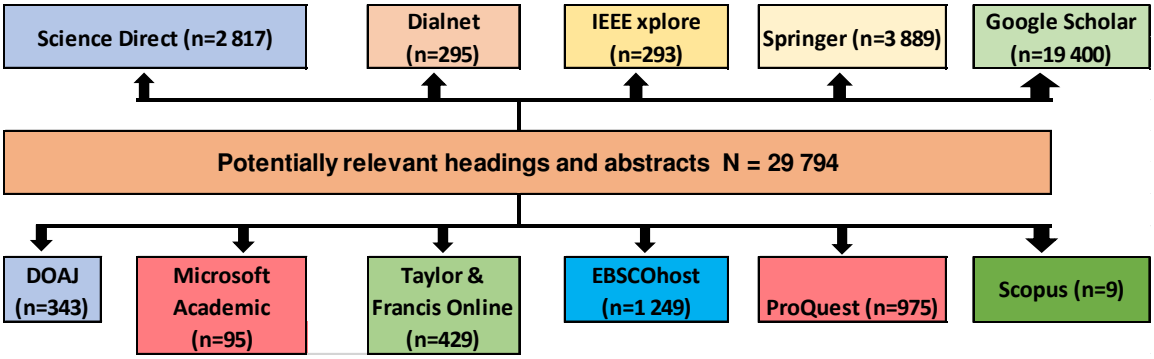

Fig. Error! Bookmark not defined.**:Articles found through source searching**

As mentioned in the previous point, 29 794 articles from the 11 database sources were found. However, it would be too time consuming to read all these articles. Therefore, in the next step, exclusions were applied according to criteria that were formulated, to select only the most relevant articles and to locate more research related to the research topic.

E. Exclusion Criteria

To select the most important articles and to make the review more efficient, seven exclusion criteria were formulated, as presented in Table 3.

Table 3: Exclusion criteria

Id.	Criterion exclusionary
CE1	The items were not published in the recent 5 years OR
CE2	The articles are not written in English OR
CE3	Articles do not show the sample unit OR
CE4	The articles do not consider the methodology of Ralph Kimball OR
CE5	Items are not unique

F. Consolidated number of results at apply criteria

In this step, the five exclusion criteria were used to reduce the number of items obtained and to find the most important articles related to the research topic. This step resulted in the selection of 97 articles.

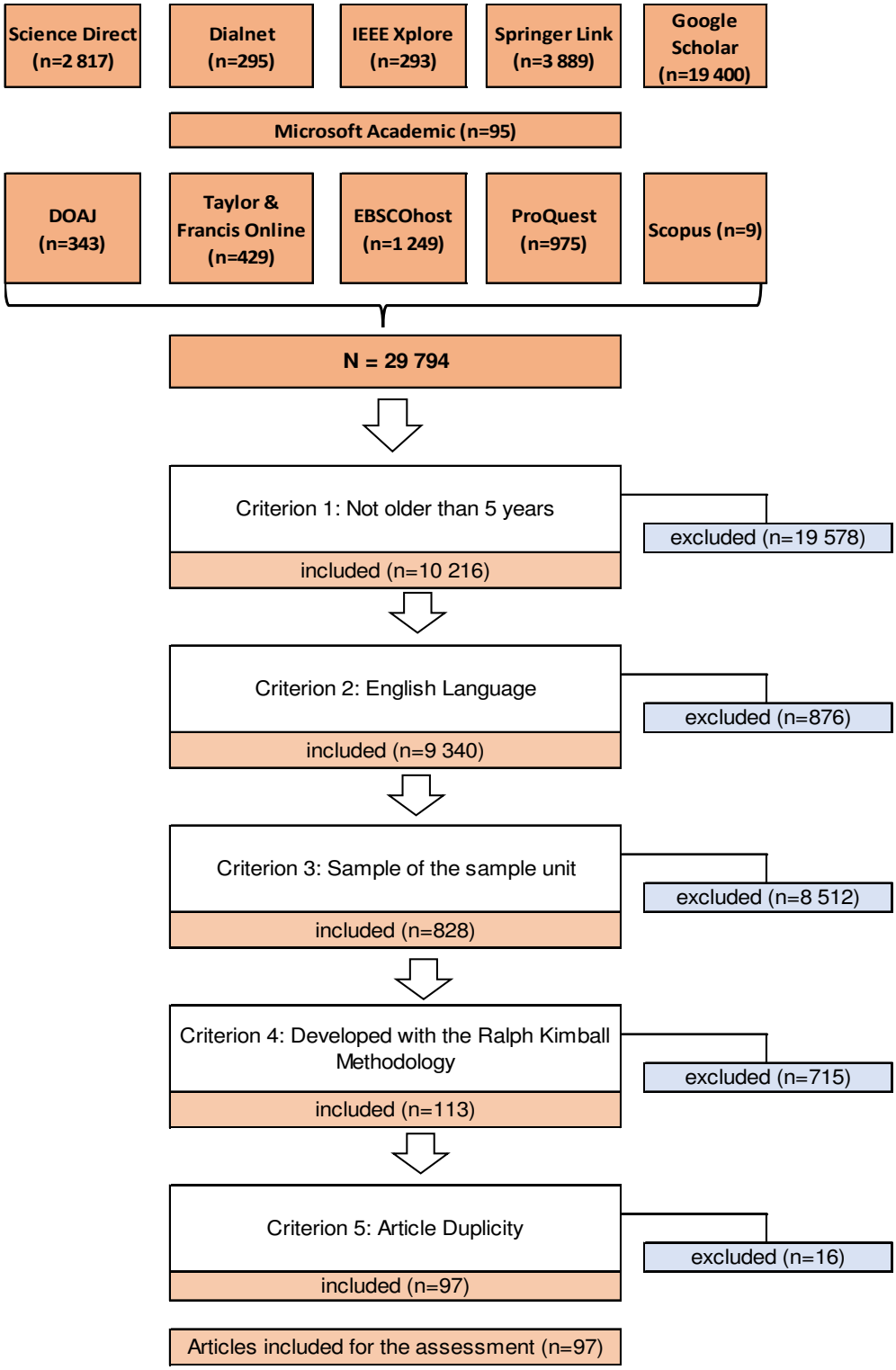

Fig. Error! Bookmark not defined.**: Consolidation of numbers when applying criteria**

G. Criteria for assessing the quality of studies

Quality criteria were formulated to assess whether the selected articles are relevant to the research study. The criteria are presented in Table 4.

Table 4: Criteria for quality

Id.	Quality criteria
QA1	Does the topic belong to the fields of IT, information systems, or management?
QA2	Is the article relevant?
QA3	Are the bibliographic sources of quality?
QA4	Are the authors relevant and prestigious?
QA5	Is the collection adequately described and data measurements?
QA6	Is it clear which technique(s) TM can be used to support the SLR process?

When the 97 articles were checked and evaluated against the criteria of quality, each of them meets the 6 criteria formulated; therefore, no items were removed.

H. Reports with Mendeley of the studies classified

Here, we report the management of the studies using the Mendeley tool for reading and highlighting answers located for each question. This tool helps make all changes intact, as well as the highlights and comments made to each item.

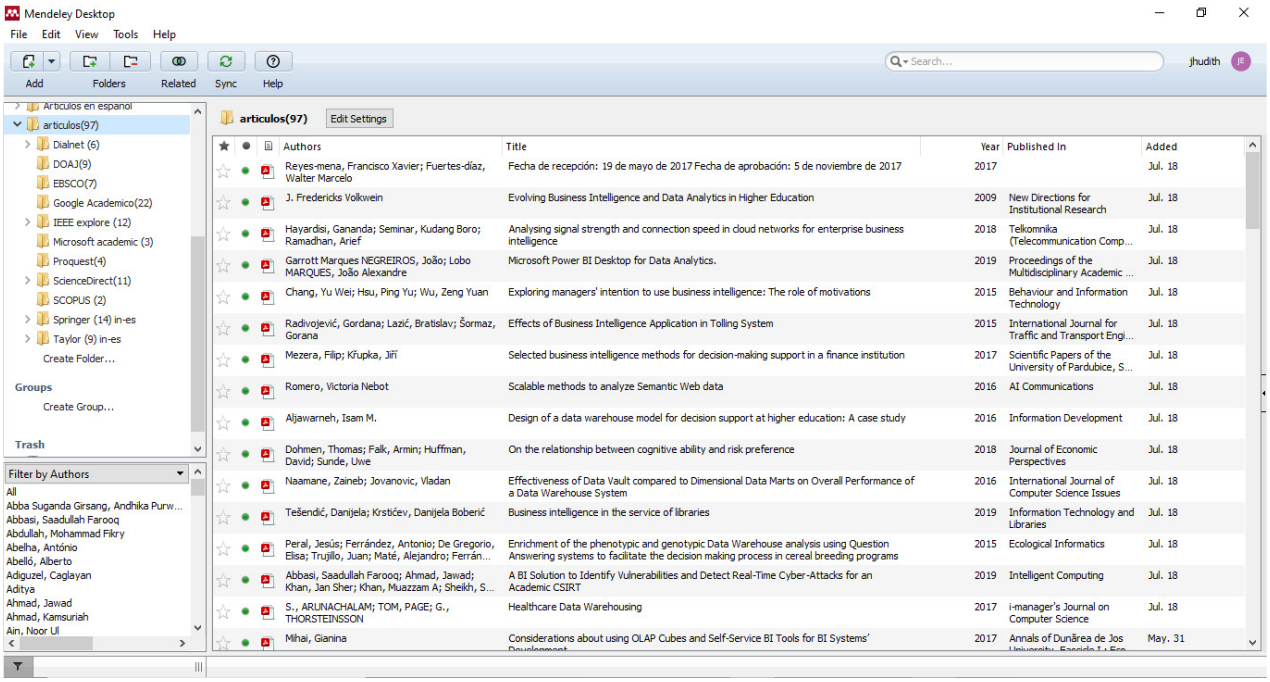

Fig. 4: Item report selected in Mendeley

I. Findings Miscellaneous

In this section, interesting and varied preliminary results obtained by the systematic review are presented.

Fig 5 shows the initial items for each source. The search results show that the source with the most articles is Google Scholar with 65.11%.

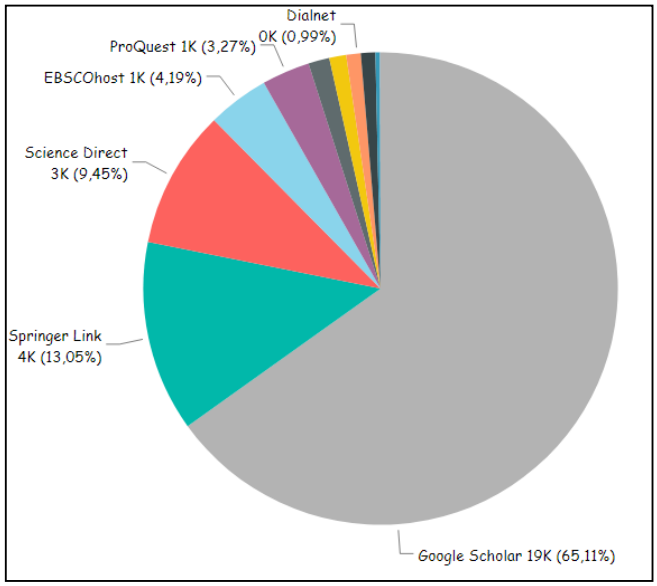

Fig. 5: Initial studies through source searching

Fig 6 shows the final studies to be reviewed for answers to each of the questions in section A of the methodology. The number of articles per source is shown as well as the percentage according to the articles selected.

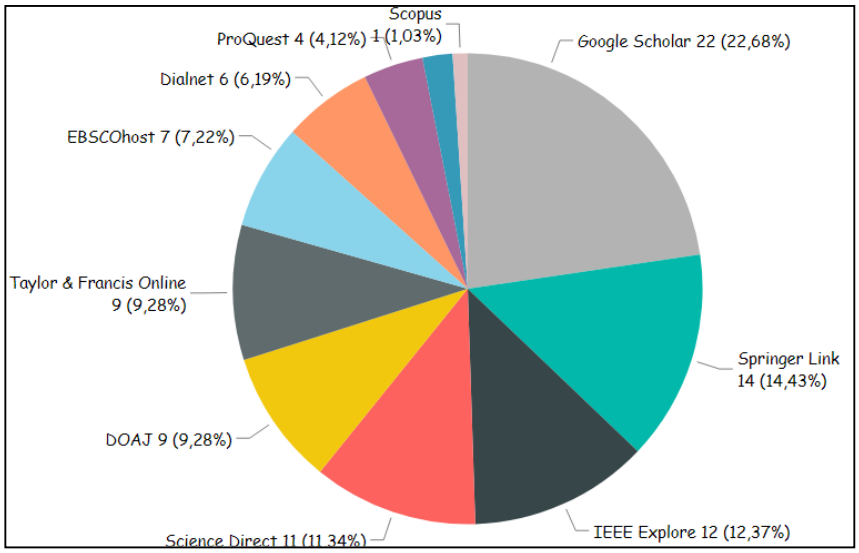

Fig. 6: Final studies by source

Fig 7 shows the word cloud for the titles of the articles. The most prominent words are intelligence and business.

intelligence
business
data
and
of
in
for
the
a
system
warehouse
analysis
study
management
case
design
decision
education
model
performance
implementation
process
systems
based
using
to
an
with
on
making
analyzing
analytics
applications
software
database
applying
better
requirements
measurement
warehousing
architecture
detect
vault
support
services
olap
towards
review
bi
cyber
multi
build
about
catalog
conceptual
competitive
vulnerabilities
customers
cereal
changing
cross
impact
african
solution
service
bid
higher
smes
cubes
accreditation
corporate
answering
commission
approaches
academic
methods
ability
advantage
electricity
survey
cognitive
developing
complex
mart
agile
benchmarking
social
platform
smart
self
approach
media
analysing
enterprise
role
breeding
critical
portuguese
modeling
power
telecommunication
quality
acquirer
research
desktop
tools
view
grid
active
at
cloud
each
around
deliver
airline
reporting
dimension
pervasive
changes
warehouses
by
abuse
university
grids
real
comparative
healthcare
controlling
customer
knowledge
construction
bigdimetl
multicriteria
alerts
comparison
centric
systematic
processes
provide
control
acknowledgement
analytical
broadcasting
concept
capabilities
country
different
collection
dashboards
information
improve
company
kimball
chain
from
csirt
decades
classification
adoption
decisions
attacks
government
decision-making
development
compared
building
institution
analyze
libraries
managers
designing
between
considerations
determinants
destinations
companies
communication
extraction
connection
department
dashboard's
disruptive
activities
actions
organization
holistic
time
dimensional
literature
automatic
accommodating
perspective
its
application
measurement
content
as
cross
african
cyber
review
case
build
multi
smes
bid
higher
smart
grid
active
at
airline
abuse
alerts
comparative
healthcare
controlling
processes
provide
broadcasting
analytical
acknowledgement
capabilities
collection
different
country
concept
control
comparison
construction
bigdimetl
multicriteria
centric
systematic
knowledge
customer
education
by
changes
pervasive
warehouses
reporting
airline
dimension
deliver
desktop
tools
view
at
active
grid
using
cloud
each
around
design
decision
modeling
power
portuguese
role
breeding
critical
telecommunication
quality
acquirer
research
performance
controlling
provide
university
grids
real
abuse
alerts
comparative
healthcare
model

improved decision making	[1] [4] [7] [13] [14] [15] [16] [21] [23] [28] [31] [42] [47] [48] [49] [54] [60] [61] [65] [79] [80] [88] [89] [93] [94] [97]	26	12
time saving	[15] [19] [23] [27] [30] [31] [32] [33] [35] [36] [41] [42] [51] [54] [56] [60] [61] [74] [77] [80] [82] [83] [87] [88] [93] [97]	26	12

It is observed that the criterion for measuring the effectiveness of BI most used is improved information analysis with 78 articles, which represents 35%. It is also noted that the BI criterion least used to measure effectiveness is time saving with 26 items, representing 12%.

Leonardo and Maria [28] demonstrate the benefits derived from the development of the BI tool visualizing data for the analysis of an organization's indicators, allowing the generation of a simple and intuitive method for the user.

Idrajani and Pandy [20] indicate that data storage developed at an XYZ university is key to the effectiveness of a BI solution since it generates relevant, consistent, and accurate information, thus providing management with the analysis of data and decision making.

Aljawarneh [53] mentions that most organizations are receiving benefits due to the use of BI, concluding that this tool has become one of the main strategies to maintain a competitive advantage.

According to Adiguzel [21], the use of BI showed that there are many benefits to making a decision. This result was obtained by carrying out a complete process of data storage and processing of data well, making this a source of valuable information generating a good decision making back up.

In a study carried out by BI solutions, it was noted that in the organizations where BI was successfully implemented, the production of reports had decreased in comparison with the time prior to implementing a BI solution. This shows that by implementing BI in an organization, the time spent in the elaboration of reports can be reduced [60].

RQ2: How many studies were published in the last 5 years by source and type of business intelligence publication?

Through the systematic review, the studies conducted over the last 5 years (2015–2020) on the 11 sources of search be determined, as well as how many articles were found in each source. Fig 8 shows that Google Scholar is the source that provided the most articles (22), which represents 22.68% of articles over the last 5 years. It is also shown that the source that provided the least number of articles is ProQuest with four articles, representing 4.12%.

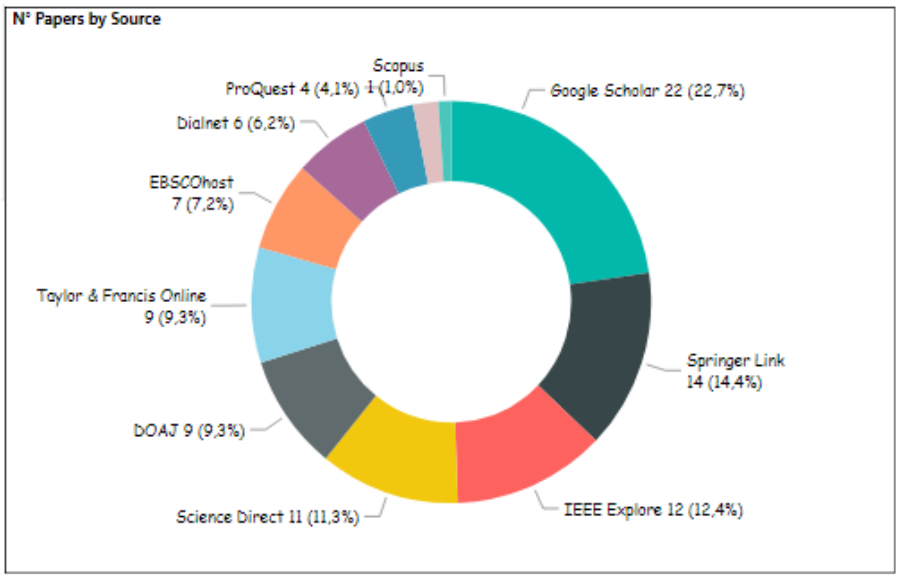

Fig. 8: Items by source of search

The number of articles published for each year can be determined, thus obtaining the results in Fig 9. The year 2018 was the year with the most articles published (22), which represents 22.68%. The year that provided us with the least number of items is 2019 with 13 items representing 13.4%.

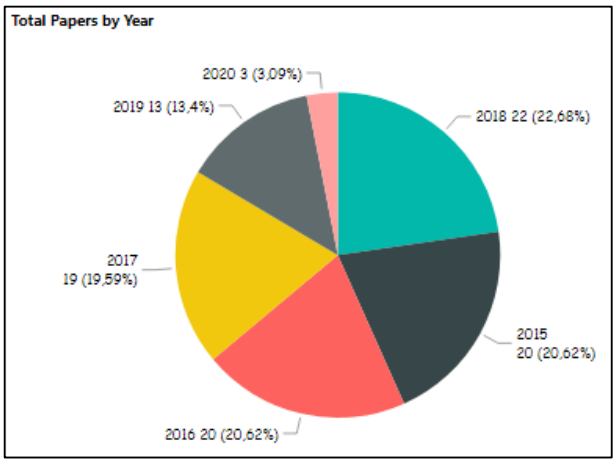

Fig. 9: Items per year

Through the systematic review, we also found two types of publication where the articles were published, such as conferences and journals. Journals published 71 articles, representing 73.2%, where conferences published 26 articles, representing 26.8%, as shown in Fig 10.

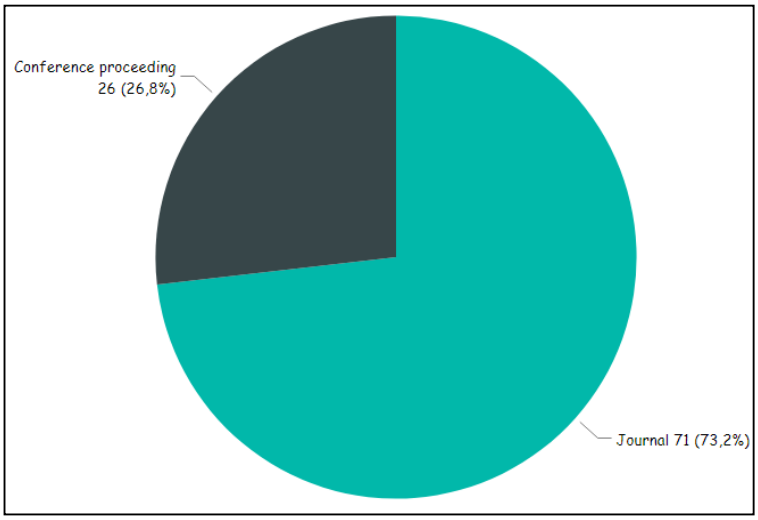

Fig. 10: Items by type of publication

Fig 11 of Google Trends shows the progress of the research in terms of BI in the last 5 years.

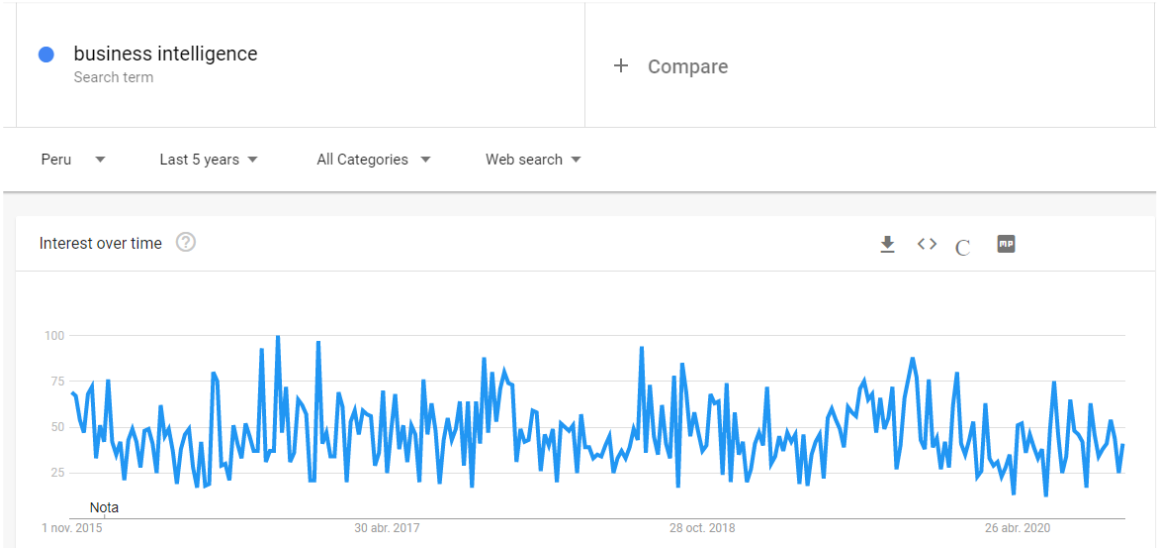

Fig. 11: BI search frequency in the last 5 years

RQ3: In which areas business intelligence has been implemented?

To answer this question, areas are mentioned where BI has been developed within the 97 articles reviewed with the RSL methodology. Table 6 displays the areas where BI was implemented.

Table 6: Areas for business intelligence implementation

Areas of implementation	Articles	Nro.	%
Sales	[6] [7] [8] [13] [18] [21] [23] [24] [27] [30] [31] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [47] [50] [55] [60] [61] [62] [66] [69] [71] [74] [80] [82] [83] [86] [94] [95] [97]	38	21
Marketing	[2] [4] [7] [13] [14] [23] [24] [27] [29] [36] [40] [42] [47] [53] [55] [59] [61] [64] [66] [69] [76] [78] [80] [82] [84] [88] [92] [94]	28	16
Finance	[2] [4] [5] [6] [13] [15] [18] [21] [22] [23] [31] [37] [49] [50] [55] [56] [60] [61] [63] [64] [69] [73] [78] [82] [91] [94] [96] [97]	28	16
Production	[4] [6] [7] [9] [13] [15] [16] [23] [25] [42] [44] [46] [54] [55] [59] [62] [67] [72] [75] [76] [82] [85] [91] [95] [96]	25	14
Academic	[1] [4] [5] [6] [9] [10] [11] [16] [17] [20] [34] [35] [37] [40] [44] [46] [49] [53] [61] [63] [68] [79] [90] [96]	24	13
Telecommunicatio n	[1] [2] [11] [14] [23] [24] [29] [30] [34] [36] [43] [50] [51] [54] [59] [68] [69] [71] [94] [96]	20	11
Purchase	[7] [21] [24] [29] [33] [41] [45] [55] [66] [71] [74] [76] [80] [82] [83] [86] [88]	17	9

As shown in Table 6, BI has been implemented in different organizational areas, with sales being the area with most implementations as shown by 38 articles, representing 21%. Further, the area where BI was implemented the least is purchasing, as found in 17 items, which represents 9%.

RQ4: What are the most widely used methodologies for business intelligence development?

Through the systematic review of literature, we found three methodologies for the development of BI, as shown in Table 7.

Table 7: Business intelligence methodologies

Business Intelligence Methodology	Articles	Nro.	%
Kimball	[1] [3] [4] [5] [6] [7] [8] [9] [11] [12] [13] [14] [16] [17] [20] [21] [24] [25] [26] [27] [28] [29] [31] [32] [33] [36] [38] [39] [40] [42] [44] [46] [47] [49] [50] [51] [52] [53] [55] [56] [57] [58] [59] [61] [62] [63] [66] [67] [68] [70] [76] [78] [79] [80] [81] [86] [88] [89] [90] [93] [97]	61	60
Inmon	[3] [4] [5] [7] [13] [14] [21] [24] [27] [29] [32] [33] [38] [39] [40] [41] [42] [46] [47] [49] [51] [52] [53] [55] [56] [58] [62] [63] [64] [68] [70] [86] [87] [89] [94] [95]	36	35
Data Vault	[3] [32] [38] [59] [96]	5	5

As shown in Table 7, Kimball's methodology is the most applied with 61 articles, representing 60%, and the least applied methodology is data vault with five items, which represents 5%.

Andrea and Felipe [9] in their study define Ralph Kimball's methodology as a bottom-up approach up, in which the data marts are created first. This is preferred by most organizations because it provides a more refined view of the data, as this model focuses on the ease of user access and provides high performance for the data warehouse (DW).

Delgado and Fernando [89] mention that Kimbal's methodology offers more appropriate information support and provides all the elements necessary to deliver value to business users; they also mention that this methodology is suitable for small projects because of its easy understanding for the user and rapid development.

RQ5: What technological tools support business intelligence?

There are many tools that support BI according to the 97 articles reviewed. The tools found are shown in Table 8.

Table 8: Technological tools

Most used techonological tools	Articles	Nro.	%
Oracle Business Intelligence	[5] [19] [31] [32] [40] [41] [44] [51] [54] [56] [60] [61] [63] [68] [74] [76] [80] [87] [90] [91] [93] [94]	22	19,8
SAP business intelligence	[5] [8] [20] [21] [30] [37] [42] [43] [45] [47] [55] [61] [63] [64] [67] [69] [70] [73] [74] [88] [90] [97]	22	19,8
Pentaho	[1] [11] [12] [16] [17] [20] [25] [26] [28] [33] [51] [54] [56] [57] [87]	15	13,5
Microsoft Performance Point Server	[1] [13] [18] [40] [41] [46] [52] [58] [59] [65] [68] [72] [74] [76] [96]	15	13,5
Microsoft SQL Server	[1] [13] [32] [40] [41] [46] [51] [52] [58] [59] [61] [68] [72] [74] [76]	15	13,5
QlikView	[47] [48] [79] [86] [89]	5	4,5

OpenI	[1] [42] [88] [97]	4	3,6
SPSS	[29] [30] [43] [70]	4	3,6
SAS Institute	[11] [63] [74]	3	2,7
Crystal Reports	[74] [77]	2	1,8
Office SharePoint Server	[74]	1	0,9
JasperReports	[33]	1	0,9
IBM Cognos Analytics	[94]	1	0,9
Microsoft Dynamics	[32]	1	0,9

As shown in Table 8, the tools most used are Oracle BI and SAP BI. These tools are mentioned in 22 articles, which represents 20% of the total percentage. The least used tools are Office Share Point Server, Jasper Reports, IBM Cognos Analytics, and Microsoft Dynamics, with one article each, which represents 1% of the total percentage.

Discussion

To the best of our knowledge, there are many studies on BI, which has benefits to organizations, such as improved decision making, competitive advantage, and better data analysis, which help generate value for the companies. The findings clearly indicate that there is a good deal of research that show the effectiveness of BI implementation, as observed in the studies carried out from 2015 to 2020.For these studies Google Scholar was the source of data with the most articles reported with 22.68%, followed by Spring links with 14.43%; it can be said these two sources provided the most articles for the study. Looking at the last 5 years, we see that the year with most articles published was 2018 with 22.68%, followed by 2015 and 2016 with 20.62%. The year with the lowest number of studies carried out was 2020 with 13.4%. Comparison between type of publication, Conferences and Journals, show that more studies were published in Journals with 73.2%.

For the most valued authors during years 2015–2020, the authors of article [94] received the most citations with 23%; in second place, we have the authors of the article [37] with 15%; and in third place, the authors of articles [64] and [77] with 10%. These were the three most valued authors during the last 5 years (2015–2020). In addition, Indonesia, Portugal, Ecuador, India, and Serbia were the countries that conducted the most studies from 2015 to 2020. Two articles published in the United States were the most valued with over 15 citations. With regard to the means of publication, eight articles published in journals received more than 15 citations. Hence, presumably, articles in journals are most often cited, and *Information Systems Management* and *Journals of Computer* are the most quoted media. These publications are the most valued for the subject of appropriate methodology for implementation. In these articles, many researchers mentioned that the methodology of Ralph Kimball was best suited because of the bottom-up approach, easy comprehension for users, and not too expensive to be implemented.

For researchers, the studies performed must be conducted with great care, because there are also studies that are not very clear about their methods or instruments used; hence, they did not achieve the expected results.

In particular, we agree with the study by Cohelo and Miranda [96] that the use of BI brings many benefits to an organization. Their study also helps decision makers in their daily tasks, providing them with a new perspective, and can help them make the right decisions and achieve positive impacts.

It can be assumed that the use of BI can be generalized to be used in all fields of organizations depending on the infrastructure of its database and thus achieve the objectives of the organization.

Conclusion and Future Studies

This study has succeeded in identifying and analyzing the effectiveness of BI by determining its benefits, areas where it can be implemented, methodologies more frequently applied to BI and more often used tools, and the relationship of BI and improved decision making. The findings were based on the SLR research questions submitted on articles published between 2015 and 2020 in various journal databases. Based on the search equations, we found 29,794 items that were further examined applying the exclusion criteria. This step reduced the number of articles to be reviewed to 97. The results of the review found the following benefits from a successful implementation of BI, improvements in

the decisions made, quality of information, competitive advantage, analysis of real-time information, and savings in costs and time. BI helps improve decision making and can be implemented in different areas of an organization and in different business lines that have a solid data infrastructure. The applied methodology used more frequently in the implementation of BI was that of Ralph Kimball. This methodology is easy to understand for users and allows for growth of the DW because of its bottom-up approach.

This review has some limitations that a future research can address. This is the case with the issue of BI effectiveness, which in this study was analyzed in a general way based on the benefits of BI and with a time limit for the articles that were reviewed; in other words, articles were obtained between 2015 and 2020. However, further study should be focused on BI success using more recent studies. More recent research and published works on this subject will help increase awareness among professionals and researchers in this field and will provide more value to the use of BI in organizations.

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Trend of Social Media News: A Viewpoint of COVID-19 Tweets Using Natural Language Processing

Sunday Adewale OLALEYE*

Department of Marketing, Management and International Business, Oulu Business School, Erkki Koiso-Kanttilan Katu, Oulu 90570, Finland, sunday.olaleye@oulu.fi*

Oluwafemi Samson BALOGUN

School of Computing, University of Eastern Finland, FI-70211, Finland, samson.balogun@uef.fi

Bukola SALAMI

School of Computing, University of Eastern Finland, FI-70211, Finland, bukolas@uef.fi

Abstract

The meteoric rise of social media news during the ongoing COVID-19 is worthy of advanced research. Freedom of speech in many parts of the world, especially the developed countries and liberty of socialization, calls for noteworthy information sharing during the panic pandemic. However, as a communication intervention during crises in the past, social media use is remarkable; the Tweets generated via Twitter during the ongoing COVID-19 is incomparable with the former records. This study examines social media news trends and compares the Tweets on COVID-19 as a corpus from Twitter. By deploying Natural Language Processing (NLP) methods on tweets, we were able to extract and quantify the similarities between some tweets over time, which means that some people say the same thing about the pandemic while other Twitter users view it differently. The tools we used are Spacy, Networkx, WordCloud, and Re. This study contributes to the social media literature by understanding the similarity and divergence of COVID-19 tweets of the public and health agencies such as the World Health Organization (WHO). The study also sheds more light on the COVID-19 sparse and densely text network and their implications for the policymakers. The study explained the limitations and proposed future studies.

Keywords: Social Media, COVID-19, Twitter, Tweets, News, Trend, Natural Language Processing

Introduction

The meteoric rise of social media news during the ongoing COVID-19 is worthy of advanced research. From the records of extant studies, Facebook and Twitter play a predominant role in social information dissemination (Olaleye, Sanusi, and Salo 2018). Freedom of speech in many parts of the world, especially the developed countries and liberty of socialization, calls for noteworthy information sharing during the panic pandemic. Twitter is a preferred social media platform for this study because its information aggregation is methodical, and its communication privilege is snappy.

There are evolving trends in social media in the past. For instance, political communication through e-electioneering has become a trend in many countries globally, and this development is promoting citizen engagement in e-democracy (Macnamara and Kenning, 2011). The current global events and news stories are the trends in China (Yu, Asur, and Huberman, 2011), while Patton, Eschmann, and Butler (2013) examined gang violence, masculinity, and hip-hop in the society through Twitter due to the Internet banging. As a public relations tool for the citizenry, social media is the trend of many local governments across the United States of America (Graham and Avery, 2013).

Though social media use as a communication intervention during crises in the past is remarkable, the Tweets generated via Twitter during the ongoing COVID-19 is incomparable with the former records. Current literature on social media in the context of COVID-19 focused on data and information management from different perspectives. Cinelli et al. (2020) combined five social media platforms and compared questionable and reliable information regarding COVID-19. The authors discovered different information spreading patterns and rumors amplification.

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Timely dissemination of information to the public in Vietnam is the focus of the study of La et al. (2020), and the result of their research shows how the combination of policy response, social media, and science journalism helps the Vietnamese fight the deadly Corona Virus promptly. In the same line, Huynh (2020) discussed the risk perception of COVID-19 and concluded that geographical regions and behaviors exhibited while using social media positively affect the risk perception of COVID-19 in Vietnam. Information sharing during the ongoing pandemic is with mixed feelings, and Depoux et al. (2020) argue that the virality of COVID-19 misleading information is as dangerous as the virus itself, and this proposition is in tandem with Pennycook, McPhetres, Zhang, Lu, and Rand (2020). Likewise, the Editorial of Lin (2020) believes that an increase in fear and stigma may escalate through misinformation and misperception of information.

Still, on social media misinformation, Llewellyn (2020) suggests carefulness with trust and expertise on social media, and the author used the personal experience of panic and COVID-19 misleading message saturation as an early warning for the social media users. An earlier study has focused on social media misinformation and information spreading patterns, but a study on close comparison of the public and World Health Organization (WHO) Tweets are limited.

This study intends to examine the trend of social media news and compares the Tweets on COVID-19 as a corpus from Twitter. This study answers the following research questions to explore the set objectives: 1) What is the difference between the public and WHO information spreading patterns via Tweets? 2) How to strike a balance between sparsely and densely tweets during the ongoing COVID-19? The study employed a quantitative methodology and used Natural Language Processing data analysis technique. The study results show three trendy topics and their interrelationship.

This study starts with an introduction, followed by a literature review, methodology, and data analysis. The next part discusses the result, practitioner implication, and conclusion.

Literature on Natural Language Processing (NLP)

This section focuses on literature, which deals with the application of NLP on how social media is used as a means of communication during the COVID-19 pandemic to share ideas and thoughts about the effects of the pandemic in different areas of life, with Twitter being the social media platform widely used during the pandemic.

The authors of the reviewed literature cited their ideas using different NLP methods to review people's thoughts and opinions about the pandemic and its effects on the masses. They also gave an insightful contribution to how social media used during the pandemic, and some of them gave future direction on how social media can be used to solve issues related to the pandemic. The contributions of the synthesized literature is a mixture of positive and negative contradiction. For example, out of thirteen (13) recent papers reviewed, nine (9) studies did not give future direction based on their results. See Table 1 for details.

Natural Language Processing (NLP) Literature Table 1

No	Author(s)	Year	Focus	Methodology	Contribution	Future Direction
1	Kim	2020	This research incorporates a computer-assisted content review to determine which social grooming variables are reducing Incivility of users of social media when writing or reporting on the COVID-19 situation in South Korea.	Binary logistic regression and semantic network analysis	The study indicates that the scale of the social network is a negative indicator of incivility for Twitter users who have built up broader networks and earned supportive feedback from those who are less likely to use uncivil language. The linguistic choice between users varies depending on the scale of the social network.	It suggested that for future work, Social grooming of larger and more diverse social networks is a significant indicator of a decline in civility. It suggest a hybrid study of text and Visual information or other technical research (e.g. visual knowledge) Sentiment Analysis, popularity prediction, virality prediction) as its methodology.
2	Abd-Alrazaq et al.	2020	The purpose of this study is to identify the key topics posted by users of Twitter concerning the COVID-19 pandemic	Sentiment analysis	The study established 12 subjects, which were grouped into four key themes: the origin of the virus; its source; its effects. People, countries, and the economy; and ways to reduce the risk of infection. The mean sentiment for 10 was good Subjects and negatives on two subjects (deaths caused by COVID-19 and increased racism).	-
3	Cinelli et al.	2020	This research offers an in-depth study of social trends in a time period where theories and moods in social media linked to	Text analysis (NLP) and Mathematical model (SIR model)	The study suggests that the distribution of information is influenced by the model of interactions enforced by specific social media or / or the particular patterns of interaction between groups of users interested in the subject. The authors	-

			COVID19 have risen and spread.		suggest that understanding the social dynamics behind content consumption and social media is an important topic, as it may help to develop more effective disease models for social behavior and to introduce more effective communication strategies in times of crisis.	
4	Sarker & Gonzalez	2017	The research introduces an unlabelled corpus and a collection of language models to the data science, natural language processing and public health communities.	Natural Language Processing	The authors-built language models to help the development of data mining tools and methods in this area using the data, which are rich in drug-related chatter.	-
5	Al-Garadi et al.	2020	The purpose of this paper is to explain the creation and evaluation of A natural language processing and machine learning framework using Twitter data to automatically detect Tweets containing self-reported symptoms of COVID-19-positive patients.	BERT-based classifier	The BERT-based model shows high performance in detecting tweets with non-COVID-19 symptoms, while the classifier shows strong performance in detecting tweets with COVID-19 associated symptoms.	The authors propose that current performance can be enhanced in the future by incorporating more training data with a wide variety of positive COVID-19 symptoms.

6	Chen et al.	2020	In this report, the authors examine, from a language perspective, crawled tweets (Twitter posts) with and without contentious words associated with COVID-19.	Latent Dirichlet allocation (LDA) and LIWC2015 (Linguistic Inquiry and Word Count 2015)	The study shows significant variations in the usage of controversial words such as "Chinese virus" and non-controversial words such as "COVID19" and indicates that while the word "Chinese virus" may be viewed as either neutral or derogatory, its use in social media is strongly linked to the latter.	-
7	Mackey et al.	2020	The purpose of this research was to identify and classify user-generated conversations that could be correlated with the research. COVID-19 associated signs, familiarity with access to research, and discussion of disease recovery using an unsupervised machine learning. Approach.	Biterm topic model (BTM)	The research used unsupervised machine learning to describe self-reporting of symptoms, test experience, and COVID-19-related recovery references. Some users reported symptoms that they felt were linked to COVID-19, but were unable to get tested to validate their concerns.	The authors suggest concentrating on developing feature-based supervised machine learning classifiers based on established conversational characteristics reported in this study to identify self-reported COVID-19 symptoms, testing and recovery experiences for future studies.
8	Li et al.	2020	This research focuses on the application of natural language processing (NLP) Techniques for evaluating tweets in terms of	BERT model, Correlation analysis and Emotion trend analysis	The research creates an EmoCT dataset for classifying COVID-19-related tweets into different emotions, and the authors use two approaches to measure keyword correlations to understand why the public may feel sad or afraid.	Future research is to do more in-depth studies to better understand how COVID-19 impacts mental health.

			mental wellbeing			
9	Banda et al.	2020	This work presents a large-scale curated dataset of more than 152 million tweets, that daily in relation to COVID-19 chatter produced at the time of writing from 1 January to 4 April.	Natural language processing (NLP)	The authors concluded that the open dataset would allow researchers to undertake a range of research projects related to emotional and mental responses to social distancing measures, the identification of sources of misinformation and the stratified measurement of pandemic sentiment in almost real time.	-
10	Massaad, & Cherfa	2020	The research is focused on exploring the nature of social media data correlated with Telehealth and public awareness to strategically simplify and speed up the digital health transition	NLP, Generalized linear regression and cluster analysis	The Result identified some words and the states were commonly used in tweets and the study showed a correlation between the number of telehealth-related tweets posted in a given state and the number of Covid-19 reported cases in that particular state	-
11	Guo et al.	2020	The authors present a CORD19STS dataset that contains annotated 13,710 Sentence pairs obtained from the open research dataset COVID-19 (CORD19) challenge to translate their output into a	Sen-SCI-CORD19-BERT language model	The authors suggest CORD19STS, a semantic textual similarity dataset for COVID-19, which addresses the question that previous STS datasets lack in-domain knowledge of the global pandemic outbreak	-

			domain-specific context such as COVID-19.			
12	Karisani & Karisani	2020	The focus is to find out to what extent machine learning models are able to distill data generated by the user.	Naive Bayes, Logistic Regression and Bidirectional Encoder Representations from Transformers (BERT)	Machine learning has been used to automatically identify positive feedback or even to track patients' mental well-being via social media posts may significantly enhance the efforts of the organizations concerned to track the public Health, and timely response.	-
13	Rashed et al.	2020	The authors proposed a toolbox for NLP relating to SARS-CoV-2 and COVID-19.	Natural processing language	NLP toolbox was used to extract information from scientific and news articles or to identify social media posts relating to SARS-CoV-2/ COVID-19.	-

Methodology

Collection of Twitter Data

To study similarities between tweets, we chose Twitter as our target field. Twitter has one of the world's biggest social network platforms and hosts abundant user-generated posts, closely reflecting the public's reactions towards this pandemic with low expectancy. By deploying Natural Language Processing (NLP) methods on tweets, we were able to extract and quantify the similarities between some tweets over time, which means that some people say the same thing about the pandemic while some Twitter users view it differently. The tools we used are Spacy, Networkx, WordCloud, and Re.

Twitter is a platform to post tweets, share feelings with people, and respond to others' tweets. Thus, besides likes/replies/retweets, the content of COVID-19 related tweets was mined to see how similar and meaningful some tweets are: Tweet Value.

	Tweet	Retweet count	Likes count	Tweet value	Date	User
0	TRUMP TWO WEEKS AGO: "You have 15 people [in t...	5503	19357	950.17	2020-03-11 13:25:56	Judd Legum
1	It looks like the Democrats, along with the le...	1603	6231	2729.58	2020-03-11 13:18:33	Diamond and Silk
3	Brooklyn teacher, returning from Italy and fee...	4924	6380	435.53	2020-03-11 13:16:45	David Cay Johnston
4	Italy: on lockdown bc of coronavirus \nChina: ...	29346	188955	9.62	2020-03-11 13:14:08	Georgiax
7	Credit where credit is due. Everyone should be...	2169	9358	8877.61	2020-03-11 13:01:12	Donald Trump Jr.
8	BREAKING: #Germanys Chancellor Angela Merkel s...	1064	1641	714.10	2020-03-11 12:59:39	Dr. Dena Grayson
9	You know why Im not so worried about coronavir...	9156	58124	13.51	2020-03-11 12:58:21	Bridgie Merritt
11	The most effective way to wash your hands sta...	2726	5518	223.25	2020-03-11 12:54:01	SisQ

Fig 3.1: The few rows of the content of COVID-19 related tweets

Since the first confirmed case of the virus in January 2020, #COVID-19 and other similar tags have been trending on Twitter. With thousands of COVID-19 related tweets collected, we wondered how people on Twitter reacted to such tweets over time. Firstly, we explored some engagement metrics of tweets, such as the number of likes. The figure below shows the average likes/replies/retweets per tweet each day. The tweets included COVID-19 related keyword tweets. The tweets were extracted from a large number of everyday opinions.

We used the Twitter data from an open-source, and it was collected throughout 10-weeks, commencing from January 22, 2020, to April 7, 2020. The tweet was in the English language and other languages and contained six variables: public tweets and WHO tweets. A total of 37,315 tweets were captured within the sample. The study selects WHO tweets because it is one of the leading organizations that advocate for the prevention of the COVID-19 disease, and the public information was selected to balance the opinion of people towards the pandemic.

The data was sufficiently high to conduct meaningful analysis, and because of the non-English words in them, during the study's data-cleaning phase, some tweets that did not contain the Latin alphabets were discarded. A total of 200 tweets was selected from WHO tweets and 600 tweets from public tweets posted in March and April 2020. The time of the tweets extraction was when the virus was assumed to have spread to almost all the continents.

Finally, the final dataset containing 800 tweets was extracted for analysis after cleaning and considering that the dataset was sufficiently high for a meaningful interpretation. The final variables of the data were used for machine learning analysis.

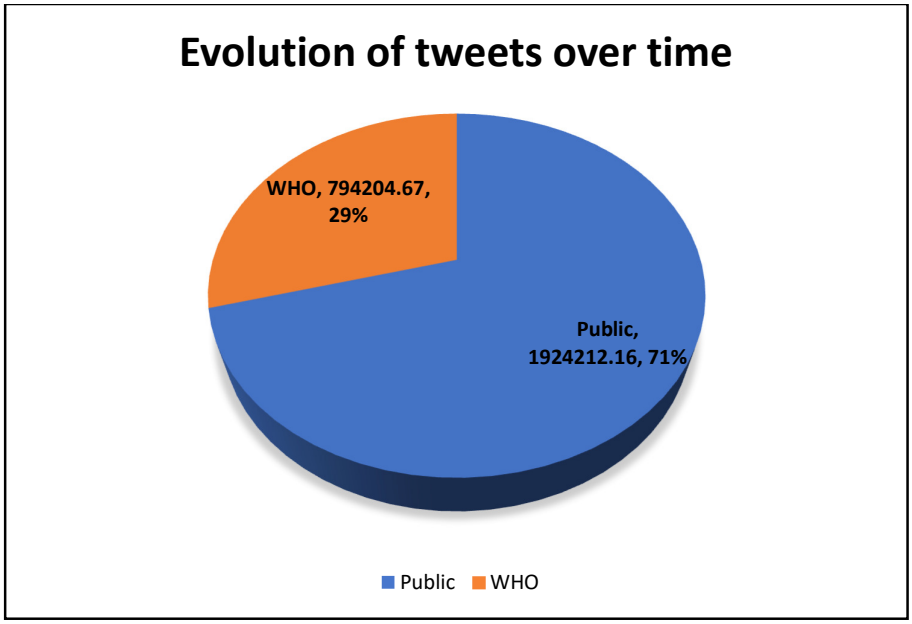

Figure 3.2: The evolution of tweets over time

Experiments and Evaluation

The final dataset of 800 tweets for both WHO and public tweets was qualitatively coded. Figure 1 shows the data preparation process from data preprocessing to data processing. The coding process tests the similarities between tweets and the relevance of a coding framework for Covid-19 tweets. These similarities had already been done in a few papers but on sentiment analysis.

First, spacy NLP analysis tools were used to explore the tweet dataset for part of speech, tokenization, and Lemmatization, as shown in Figure 3.3 below.

	Tweet	Retweet count	Likes count	Tweet value	Date	User	parsed_doc	comment_tokens	comment_lemma	pos_pos
0	TRUMP TWO WEEKS AGO: "You have 15 people [in t...	5503	19357	950.17	2020-03-11 13:25:56	Judd Legum	(TRUMP, TWO, WEEKS, AGO, :, ", You, have, 15, ...	[TRUMP, TWO, WEEKS, AGO, :, ", You, have, 15, ...	[TRUMP, two, week, ago, :, ", -PRON-, have, 15...	[PROPN, NUM, NOUN, ADV, PUNCT, PUNCT, PRON, AU...
1	It looks like the Democrats, along with the le...	1603	6231	2729.58	2020-03-11 13:18:33	Diamond and Silk	(It, looks, like, the, Democrats, ,, along, wi...	[It, looks, like, the, Democrats, ,, along, wi...	[-PRON-, look, like, the, Democrats, ,, along,...	[PRON, VERB, SCONJ, DET, PROPN, PUNCT, ADP, AD...
2	Gente, con todo esto del coronavirus, hay pasa...	1510	5002	12.47	2020-03-11 13:17:13	Sebastin Campos C.	(Gente, ,, con, todo, esto, del, coronavirus, ...	[Gente, ,, con, todo, esto, del, coronavirus, ...	[Gente, ,, con, todo, esto, del, coronavirus, ...	[PROPN, PUNCT, X, PROPN, PROPN, PROPN, NOUN, P...
3	Brooklyn teacher, returning from Italy and fee...	4924	6380	435.53	2020-03-11 13:16:45	David Cay Johnston	(Brooklyn, teacher, ,, returning, from, Italy,...	[Brooklyn, teacher, ,, returning, from, Italy,...	[Brooklyn, teacher, ,, return, from, Italy, an...	[PROPN, NOUN, PUNCT, VERB, ADP, PROPN, CCONJ, ...
4	Italy: on lockdown bc of coronavirus \nChina: ...	29346	188955	9.62	2020-03-11 13:14:08	Georgiax	(Italy, :, on, lockdown, bc, of, coronavirus, ...	[Italy, :, on, lockdown, bc, of, coronavirus, ...	[Italy, :, on, lockdown, bc, of, coronavirus, ...	[PROPN, PUNCT, ADP, NOUN, PROPN, ADP, NOUN, SP...
5	Cuba anuncia vacina contra o Coronavrus \n\nht...	3215	17909	22.20	2020-03-11 13:09:43	Lenilda Luna 80	(Cuba, anuncia, vacina, contra, o, Coronavrus,...	[Cuba, anuncia, vacina, contra, o, Coronavrus,...	[Cuba, anuncia, vacina, contra, o, Coronavrus,...	[PROPN, PROPN, PROPN, PROPN, PROPN, SPA...

Fig 3.3 : Glance at the tweet document and parsed documents

Furthermore, we analyze the similarities in the tweets on a more detailed level, comparing two rows in the tweet data to find similarities. To further clean the dataset, stopwords are removed from the dataset. Stopwords are commonly and frequently used words that search engines or analysis packages are programmed to ignore when searching and retrieving results of a search query. Examples of stopwords include *elsewhere*, *against*, *on*, *and alike* (Geeks for Geeks, 2016).

We conducted further analysis by utilizing the spacy library. Spacy is a free, open-source library for Natural Language Processing in Python. It features NER, Part of Speech (POS) tagging, dependency parsing, word vectors, and many more (Spacy, 2020). Here in this analysis, we used it in combination with NetworkX to form nodes and edges linking similar words together, basically forming a graph. NetworkX library is used for studying graphs and networks.

Here is how it was generated: The first step was to prepare the spacy library dataset to analyze from, where we find similarities between two tweets. However, in similarities between two tweets, sentence embedding is constructed on spacy by averaging the word embeddings and, most importantly, meaningless words such as stopwords in ordinary sentences. We use the Word2Vec model to calculate the sentence similarity in tweets since the tweet sentences are composed of words. We created another column of parsed_doc to parse the tweets to its component parts, as shown in fig 3.3. For the second step, we introduced the NetworkX to form graphs to link similar words, as shown in Fig 4.4.

In the third step, we defined some metrics to help further comprehend the changes in our analysis. We first tokenize the tweets to separate them into smaller units, which is also included in the spacy library. After this separation, we introduced the Word Cloud package to visualize the tweet dataset. Word Cloud library in python is a data visualization technique used for representing text data in which the size of each word indicates how often it appears or its importance in a sentence or list.

Findings

After putting our model results in the timeline under the pandemic context, we summarized some interesting findings.

```
data.Tweet[11]
```

'The most effective way to wash your hands stay clean my friends #coronavirus #COVID https://t.co/k1rkcoGyNg'

```
data.Tweet[14]
```

'These are 7 simple steps to protect yourself and others from #COVID19.\n\n https://t.co/RU2gRs6jmc #coronavirus https://t.co/TNAw5YrP0u'

```
data.Tweet[17]
```

'Every single person should be participating in Coronavirus response by taking the same simple precautions every day.\n\nMore from Ambassador Birx: https://t.co/8gcLkyOTIk'

```
data.Tweet[13]
```

'Nottingham Forest confirm all players, staff and officers have been tested for the coronavirus and all results have come back negative.'

```
data.Tweet[15]
```

'One of the first Americans to be diagnosed with Coronavirus (a 48-year-old man from Rhode Island) shares his experience with WSJ\n\nIt almost killed me. Its alarming when I hear people minimize it as a cold. It was no simple cold for me. \n\nhttps://t.co/fAvsoMGQO4 https://t.co/qnNEB22b4A'


```
data.Tweet[13]
```

'Nottingham Forest confirm all players, staff and officers have been tested for the coronavirus and all results have come back negative.'

```
data.Tweet[14]
```

'These are 7 simple steps to protect yourself and others from #COVID19.\n\n https://t.co/RU2gRs6jmc #coronavirus https://t.co/TNAw5YrP0u'

```
data.Tweet[15]
```

'One of the first Americans to be diagnosed with Coronavirus (a 48-year-old man from Rhode Island) shares his experience with WSJ\n\nIt almost killed me. Its alarming when I hear people minimize it as a cold. It was no simple cold for me. \n\nhttps://t.co/fAvsoMGQO4 https://t.co/qnNEB22b4A'

```
data.Tweet[17]
```

'Every single person should be participating in Coronavirus response by taking the same simple precautions every day.\n\nMore from Ambassador Birx: https://t.co/8gcLkyOTIk'


```
data.Tweet[40]
```

'Knowing the symptoms of #COVID19 will help you get the treatment if you need it. Learn how to tell the difference between #Coronavirus #Flu and the #CommonCold.\n\nSpread the message not the virus.\n\n@HSELive | @CMOIreland | @hpscireland https://t.co/mDuK7Gdm13'

```
data.Tweet[61]
```

'Coronavirus conference canceled in New York because of coronavirus https://t.co/qorEtBkUmm https://t.co/ONwla2DbbB'

```
data.Tweet[61]
```

```
'BREAKING  DOH confirms another    cases of  COVID   in the Philippines    bringing the country s total to      '
```

```
data.Tweet[95]
```

```
' Every day  nurses are putting themselves at risk to alleviate suffering  amp  save lives   Theyre reorganizing wards to open
more beds for  COVID   patients  while continuing to provide care for other patients with urgent health needs  incl women in la
bour   DrTedros  WorldHealthDay'
```

```
data.Tweet[89]
```

```
' Meanwhile  babies are still being born  Midwives are still trying to provide care to make pregnancy and childbirth the safe a
nd joyful experience it should be   DrTedros  SupportNursesAndMidwives  WorldHealthDay'
```

```
data.Tweet[112]
```

```
'The full briefing on  COVID   by  DrTedros   '
```

```
data.Tweet[124]
```

```
' Less than     days since WHO was notified about the new  coronavirus  research has accelerated at incredible speed      The v
iral genome was mapped in early January and shared globally  which enabled tests to be developed and vaccine research to start
DrTedros  COVID  '
```

Fig 4.1: Some tweet sentence used for similarity

```
print(data['parsed_doc'][11].similarity(data['parsed_doc'][14]))
print(data['parsed_doc'][14].similarity(data['parsed_doc'][17]))
print(data['parsed_doc'][13].similarity(data['parsed_doc'][15]))
print(data['parsed_doc'][40].similarity(data['parsed_doc'][61]))
```

```
0.8957637483824192
0.846027668055336
0.8695006365395701
0.6865398265896244
```

Fig 4.2: Similarity results between public tweets

As shown in the figure above, there is a similarity between the tweet in row 11 and 14. This comparison accounts for 89.57% of the Twitter dataset. Likewise, tweets 14 and 17 with a similarity value of 84.60%, and tweet 13 and 15 give a similarity value of 86.95%. The similarity values are strong and conform to the threshold of > 0.7 (Gerstman, 2008; 2014). However, even though the similarity is high between these tweets because of the messages they carry, it does not necessarily mean it valued the same; that is, the importance allocated to them because of the user's opinion, as shown in figure 4.2. We also checked the likeness between tweets 40 and 61, which gave a similarity value of 68.65%. This similarity value is moderate and conforms to the boundary of 0.7 (Gerstman, 2008; 2014). Their similarity is relatively low compared to the other public tweets' similarities (see Figure 4.1).

```
print(data['parsed_doc'][11].similarity(data['parsed_doc'][124]))
print(data['parsed_doc'][14].similarity(data['parsed_doc'][89]))
print(data['parsed_doc'][13].similarity(data['parsed_doc'][95]))
print(data['parsed_doc'][112].similarity(data['parsed_doc'][61]))
```

```
0.7462380490630407
0.7467730928883817
0.4950193718372327
0.6973556097428223
```

Fig 4.3: Similarity results between public tweets and WHO tweet

Likewise, there are similarities between public and WHO tweets, but not similar to having the tweets from the same source, as seen between public tweets. As indicated in figure 4.3, tweets 14 and 89, tweets 11 and 124, 112, and 61 give a similarity value of 74.62%, 74.68%, and 69.74%. Tweets 13 and 95 shows a similarity value of 49.50%. The first and second values conform to the threshold value > 0.7 while the third and fourth similarity values conform to moderate (see figure 4.1).

Furthermore, we linked similar words together with networkX, as mentioned earlier. To make the graph legible enough, we represented 70 tweets on the networkX graph, and we showed just a part of the graph in the figure below:

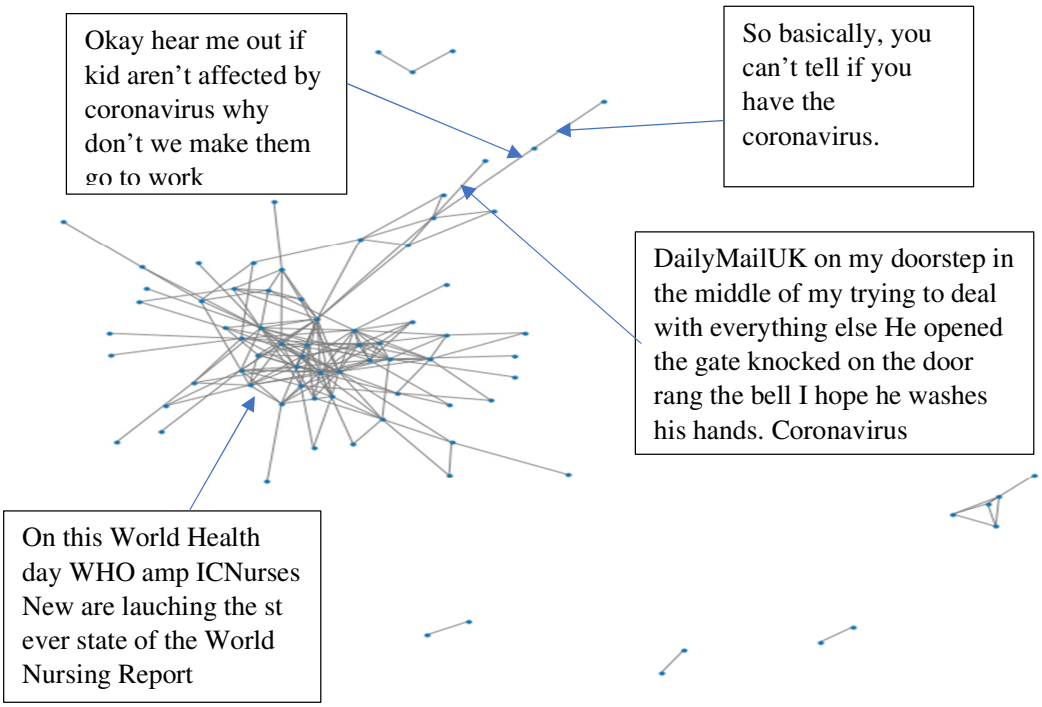

Fig 4.4: NetworkX graph showing empty nodes of both Public and WHO tweets selected random

News Topics in Tweets

With the topic modeling, we extracted some hidden topics summary from the tweet, and each topic is considered a collection of keywords in some proportion. Extracting a good quality topic depends on the text used in the analysis. We used Latent Dirichlet Allocation (LDA) from the Gensim package (a very efficient LDA implementation). After

filtering tweets by keywords, suggested by the frequency of some words and the topic trends, we modelled ten topics, as shown in fig 4.4.

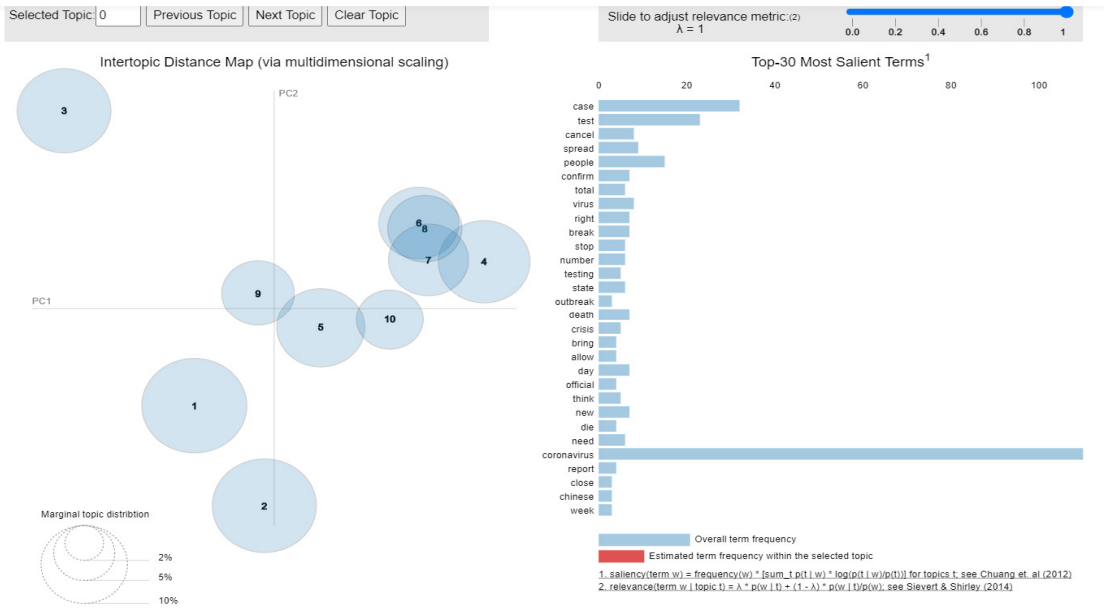

Fig 4.6: Topic Modelling graphs for public tweets

The first thing we did was to get the top-30 most salient terms. Saliency is a measure of how much the term tells us about a topic, while Relevance is the weighted average of the word's probability, given the topic normalized by the probability of the topic. The bubble in the inter-topic distance map measures the importance of the topics relative to the data. The larger the bubble, the more critical the topics are. As shown in fig 4.4, specific topics clustered together, indicating a similarity between topics, and the more the topics, the more clusters form and similarities.

The same trend of news topics applies here as tweets mentioning CORONAVIRUS, and some related words to its outbreak spread from China to other parts of the world. As shown in the table and word cloud, the public paid more and more attention to government actions over time. Medical-related, economic impact, and life during COVID topics increased slowly. The game season, mask, and stay at home topics did not show much upward trend over time with the tweet from the period taken.

Table 4.1: Table showing 5 topic model for public tweet

Topic 1	Topic 1 weight	Topic 2	Topic 2 weight	Topic 3	Topic 3 weight	Topic 4	Topic 4 weight	Topic 5	Topic 5 weight
coronavirus	0.059	coronavirus	0.033	coronavirus	0.092	coronavirus	0.055	confirm	0.040
Spread	0.038	outbreak	0.031	cancel	0.044	people	0.035	coronavirus	0.035
stop	0.030	need	0.018	day	0.020	virus	0.022	break	0.032
amp	0.021	medium	0.017	response	0.019	test	0.022	online	0.018
patient	0.020	disinfect	0.013	rate	0.018	think	0.020	report	0.016
learn	0.020	space	0.013	get	0.017	know	0.019	email	0.016

believe	0.020	live	0.013	cut	0.013	tell	0.018	country	0.016
virus	0.019	pay	0.013	healthy	0.013	way	0.016	team	0.016
student	0.016	paycheck	0.013	chart	0.013	health	0.013	news	0.016
flu	0.014	penalty	0.013	credit	0.011	panic	0.012	share	0.013

When visualizing using word clouds, we can see the high importance given to the word CORONAVIRUS so many times as well as some words like a test, flu, people, break, virus, public, china, cases, spread, death, hospital, trump, response, and new cases seems to be some of the most used words in the tweets from January 22, 2020, to April 7, 2020.

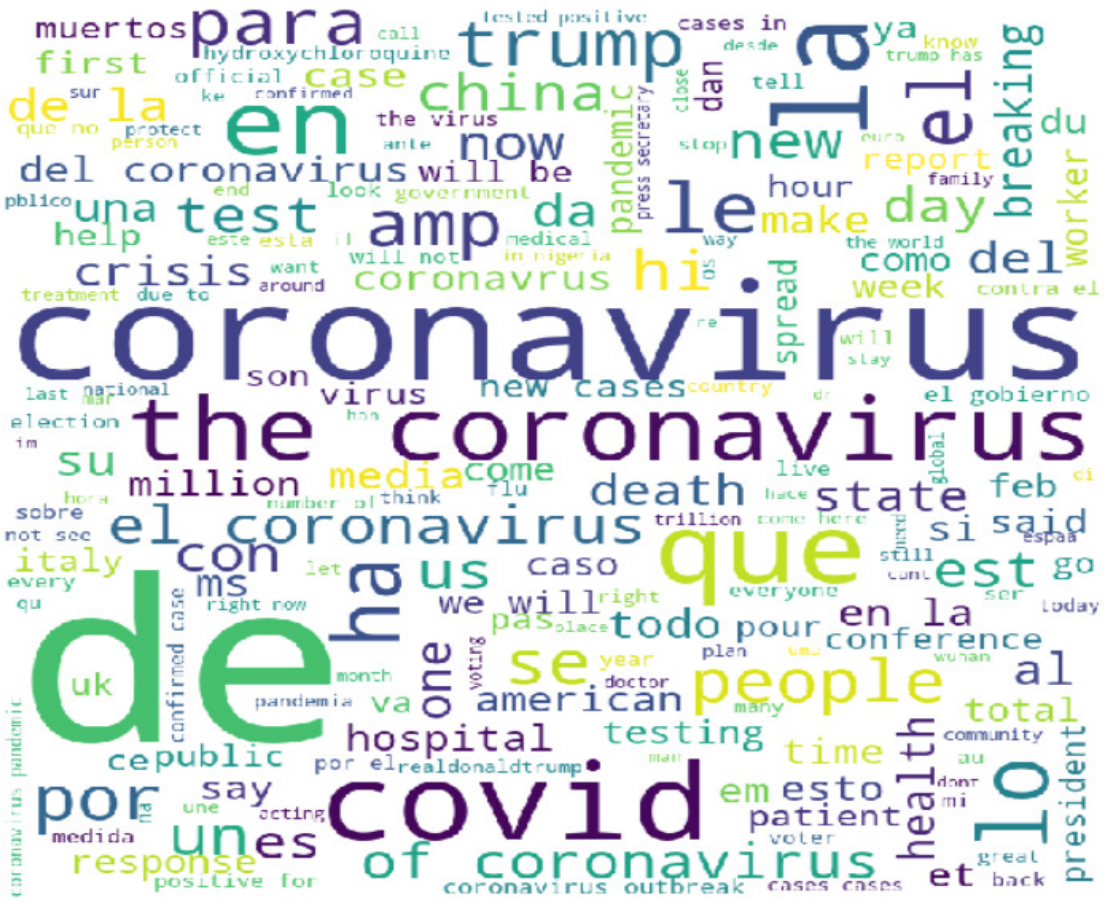

Fig 4.7: Word Cloud showing frequency in some words

Practitioner Implications

One of the recent studies established the trust level of online news, mainly social media and search engines, and concludes that trust levels on traditional news media are higher than social media (Park, Fisher, Flew, and Dulleck, 2020). In like manner, Llewellyn (2020) raised some warning signals as an antecedent of social media message trust. Besides, other authors have raised their concern on rumors amplification, information dissemination timeliness, location, behaviour, fear, and stigma as the source of social media information misinformation, misconception, and misperception (Cinelli et al. 2020; La et al. 2020; Huynh (2020; Depoux et al. 2020; Lin 2020; McPhetres, Zhang, Lu, and Rand 2020). With arguments and proposition from the earlier studies, it became apparent that multiple

uncensored sources of information through social media is a challenge that needs quick intervention. Social media are confused about whom to trust, public or government. If it is possible to tread the line of authority and specialization, WHO information should be more reliable for the public and preferable to the public information. This study answers the research question of *the difference between public and WHO information spreading patterns via Tweets* (RQ1).

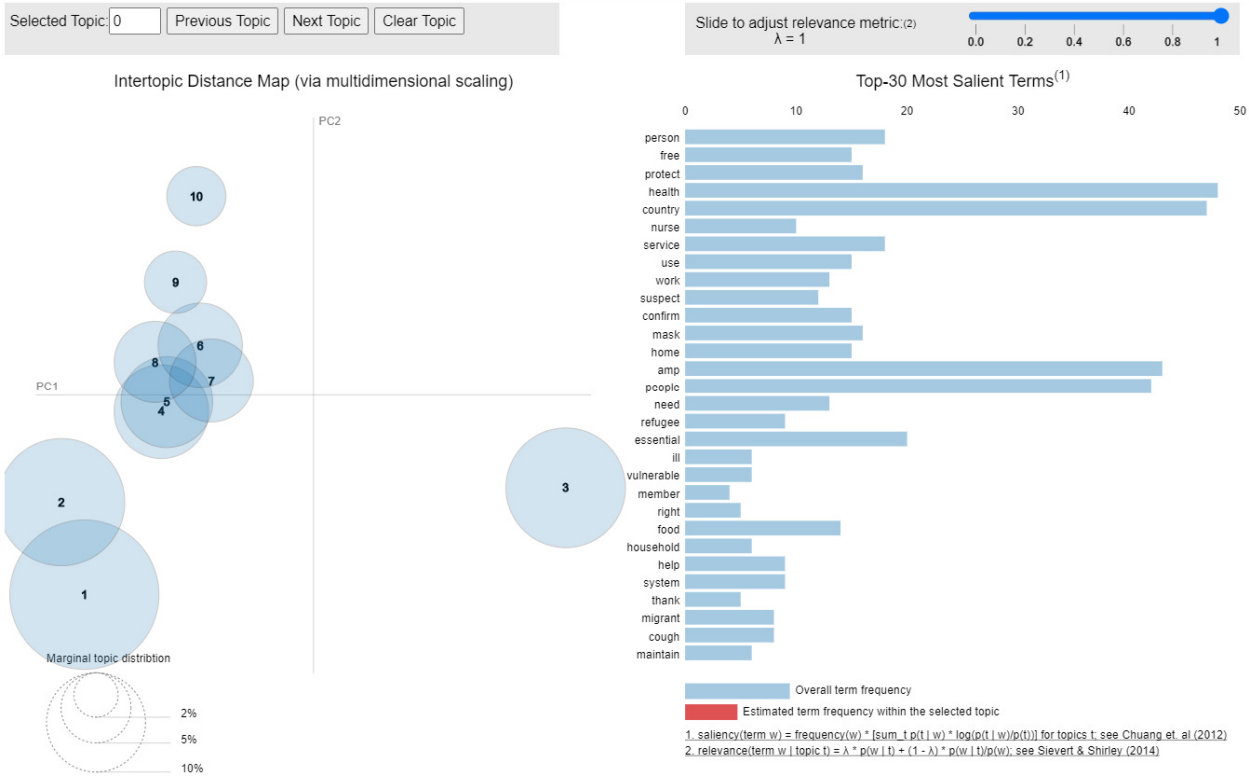

Fig 4.8: Topic Modelling graphs for WHO tweets

The study shows a close similarity of tweets between the public and the WHO, but in terms of the worth and weight, WHO's tweet value, surpasses the public tweet. To go by this result, people still perceived the WHO information dissemination through tweets to be reliable and dependable despite the bias and sentiment of misinformation. Another question that prompts this finding is why WHO information on traditional media has the same equal weight with social media through the same content but a different channel. The earlier studies mentioned above show an imbalance of social media messages.

Table 4.2: Table showing 5 topic model for WHO tweet

Topic 1	Topic 1 weight	Topic 2	Topic 2 weight	Topic 3	Topic 3 weight	Topic 4	Topic 4 weight	Topic 5	Topic 5 weight
country	0.028	person	0.042	right	0.027	people	0.037	free	0.040
health	0.028	coronavirus	0.039	need	0.025	ill	0.026	coronavirus	0.029
system	0.023	use	0.031	people	0.025	vulnerable	0.026	maintain	0.022
vital	0.020	home	0.030	prepare	0.024	household	0.026	course	0.019
patient	0.019	confirm	0.028	service	0.018	amp	0.025	language	0.019
shortage	0.017	suspect	0.028	world	0.016	coronavirus	0.021	product	0.019
coronavirus	0.014	mask	0.022	coronavirus	0.014	country	0.021	work	0.018
mask	0.013	refugee	0.021	global	0.014	work	0.018	join	0.014
incl	0.013	people	0.021	support	0.013	water	0.015	area	0.012
improve	0.012	cough	0.019	government	0.013	soap	0.015	demand	0.012

It is a combination of fake and genuine news with mixed reactions. The study also answers the question of *how to strike a balance between sparsely and densely tweets during the ongoing COVID-19* (RQ2). This study established COVID-19 sparsely and densely tweets.

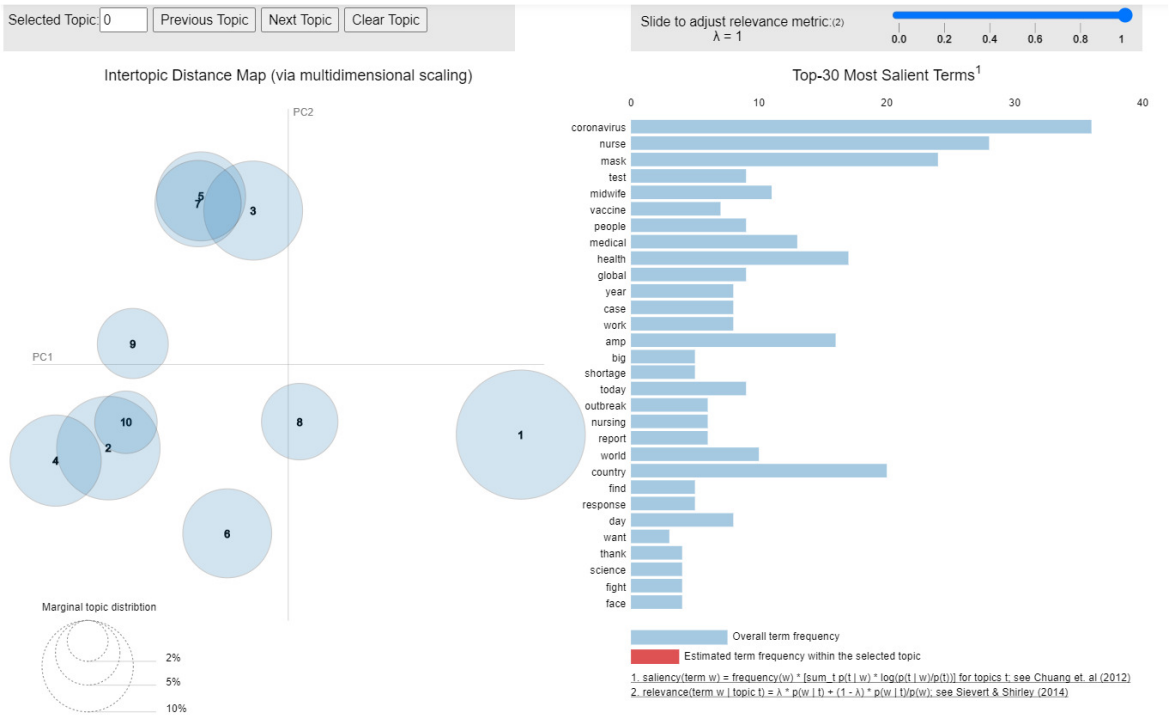

Fig 4.9: Topic Modelling graphs for Public and WHO tweets

This comparison indicates that the similar tweets clustered together and densely populated while the unfamiliar tweets lightly clustered together and sparsely recognized and indicate different opinions. The dense tweets show that COVID-19 tweets of highly connected opinions are more equally linked together, which might be advantageous for policymakers' information processing. The revealed dense networks can give COVID-19 managers new ideas about the COVID-19 message's sentiments and how COVID-19 spread in an increasingly interconnected society, and how this affects the increasingly connected society. This insight helps the manager's position their strategy on transferring information in a very transparent manner and positively influencing the societal decision. This study recommends that the managers will strike a balance between sparsely and densely tweets when leveraging on it for decision making.

Conclusion

In addition to what earlier studies emphasized, social media's importance and danger in information dissemination is escalating, especially during the ongoing COVID-19. This study contributes to the social media literature by understanding the similarity and divergence of COVID-19 tweets of the public and the health agency such as WHO. The study also sheds more light on the COVID-19 sparse and densely text network and their implications for the policymakers. Despite the contribution of this study, it is limited by time-series data of COVID-19. As COVID-19 prediction is curvilinear, its dataset is changing. Future studies should collect more COVID-19 tweet data and embark on a comparison study to give meaning to the past and current data.

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Data Analytics: An Exploration of Quality Control to Determine Students' Academic Performance

Oluwafemi Samson BALOGUN
School of Computing, University of Eastern Finland, FI-70211, Finland
samson.balogun@uef.fi*

Sunday Adewale OLALEYE
Department of Marketing, Management and International Business, Oulu Business School,
Erkki Koiso-Kanttilan Katu, Oulu 90570, Finland
sunday.olaleye@oulu.fi

Richard Osei AGJEI
School of public health, Imperial College, London
richardagjei65@gmail.com

Akwasi Gyamerah ADUSEI
Department of Industrial Engineering and Management, University of Oulu, Product Management, Erkki Koiso-Kanttilan Katu, Oulu 90570, Finland
akwasi.adusei@oulu.fi

Abstract

Quality control and improvement is a crucial process development of any institution that craves growth. One part of the SPC approach is to aid the constant improvement of performance by further reducing unexplained variability. Another aspect of Statistical Process Control (SPC) is that planned and unplanned changes signaled as fast as considering the natural process variability. This paper aimed to determine whether students' performance is significantly distributed according to academic patterns using the quality control procedure. This study found that one of the notable Nigerian Private University student academic performances drawn from three engineering departments based on the mean chart is in control and out of control, indicating excellent, intermediate, and lower results. The study also shows upper, average, and lower results with a close margin. This insight is an interdepartmental issue. The school managers need to formulate a holistic policy that will improve the existing academic performance to move the outlier students from worst to better and from better to best.

Keywords: Academic performance, Statistical Process Control, Control Chart, Assignable cause, GPA

Introduction

Quality control and improvement is a crucial process development of any institution that craves growth. Aslam, Saghir, and Ahmad (2020) categorize quality improvement as an intention for rigorous competition and a desire for profit maximization. People believe that statistical process control (SPC) is peculiar to the manufacturing processes. It is still a growing process in health, education, government services, Internet traffic monitoring, and environment protection (Qiu, 2019). There is a caution by earlier study not to tamper with the existing process until it is statistically proving that the process is misbehaving (Aslam et al. 2020). More initial research by Elepo and Balogun (2016) has established a misbehaving process in Nigerian University student academic performance, hence calls for this follow-up study.

Statistical Process Control (SPC) is a structure of thoughts (Wheeler and Chambers, 1992) and a collection of problem-solving tools useful in accomplishing process stability through reduced variability (Quesenberry, 1997; Mitra, 1998; Montgomery, 2009). One part of the SPC approach is to aid the constant improvement of performance by further reducing unexplained variability. Another aspect of SPC is planned and unplanned changes that signal as fast as considering the natural process variability (De Vries and Reneau, 2010). Statistical Process control began in

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the manufacturing industries during the 1920s, yet there are presently bounteous applications in health care and disease transmission (Woodall, 2006; Thor et al. 2007).

According to Carey and Stake (2003), "Statistical Process Control (SPC) is a theory, technique, and collection of approaches for the continuous improvement of systems, procedures, and outcomes. The SPC methodology is based on data learning and focused on the principle of variance (understanding common and special causes). The SPC strategy combines analytical; process thought, avoidance, stratification, stability, capacity, and prediction. SPC involves estimation, data collection techniques, and expected research. Graphical techniques, such as Shewhart charts (more generally referred to as 'control charts'), run maps, frequency graphs, histograms, Pareto analysis, scatter diagrams, and flow diagrams, are the key instruments used in SPCs." The control chart is one of the critical instruments of the SPC. A control chart is a statistical tool used for observations plotted after some time to see if the mechanism is working, as it should (De Vries and Reneau, 2010).

Morales (2013) also defined control charts as apparatuses of Statistical Process Control (SPC) that monitor a production process's condition, identifying when a product change's quality characteristics. The concept of 'control' relates to the quality feature within limits set (control limits) to ensure output and quality efficiency. If the attribute (i.e., weight, length, and dimensions) is not within these limits, then the process is in an "out-of-control" state. In such a case, it is essential to discover and address the assignable cause that originated this state (failure).

This paper aims to determine whether or not students' performance is significantly distributed according to academic patterns using the quality control procedure, detecting any statistically significant positive or negative shift in a student's GPA from the desired target level using quality control charts.

This study will facilitate proper monitoring of student performance in the university so that "non-conforming" scores are identified quickly so that such students could properly and adequately be advised to forestall poor outcomes shortly.

Recent studies examine the strength of academic performance agreement as a counseling guide for the University (Balogun, Moshin and Olaleye, 2020). Other studies also applied SPC to monitor mechanized sugarcane harvesting (Paixão et al., 2020) and the monitoring of anatomical changes of individual patients during the head-and-neck radiotherapy process (Lowther et al. 2019). Integrated production maintains a policy for unreliable manufacturing systems (Bahria, Chelbi, Bouchriha, and Dridi, 2019). The proposal of an intelligent SPC method based on feature learning (Zan et al. 2020) and Qiu (2019) highlights some recent literature that showcases nonparametric SPC, control charts for monitoring Spatio-temporal and dynamic processes. These studies portray the vast research domain of SPC. This study divides into six sections. The first section captures the introduction, the second section with literature, the third section with methodology, the fourth section with results, the fifth section with discussion, and the last section concludes the study.

Literature Review

Predicting Student's Academic Performance

Predicting students' academic performance is a crucial part of institutions of higher learning. A better appreciation of the factors that influence students' academic performance is a challenging research exercise because of many diverse aspects such as previous academic performance, interaction with teachers, cultural, and social (Romero and Ventura, 2013). Numerous studies have been carried out on these factors, and they had brought about concrete results. Some works have been done on how socioeconomic status affects students' academic performance (Goddard, Sweetland, and Hoy, 2000). Some other researchers studied the relationship between student's academic performance and the behaviors of their parents (Attaway and Bry, 2004) while others focused on the efficiency of the teacher to improve student's academic performance (Bassam, Ahmed, Mohammad, Mohammad, 2014; Gerber and Fin, 2001). Romero and Ventura (2013) suggest that studies conducted on EDM have been applied to web-based education due to the Learning Management System (LMS) (e.g., WebCT Blackboard and Moodle). Providing information about students' academic assessments and the number of times students access teaching resources. This step is very relevant information to predict students' academic performance and discover course weaknesses (Romero, López, Luna, and Ventura, 2013). Prediction and analysis of students' academic performance are essential for student academic progress (Baker, Corbett, and Koedinger, 2004; Romero and Ventura, 2013).

The objective of predicting student academic performance is to estimate the unknown value that describes the student. In education, the values usually predicted are performance, knowledge, score, or mark. The value of a student's

academic performance is either continuous/numerical (regression- Draper and Smith, 1998) value or discrete/categorical (classification-Espejo, Ventura, Herrera, 2010) value. Prediction of a student's academic performance remains an old and widespread application of data mining in education. Different techniques and models, such as neural networks, correlation analysis, rule-based systems, regression, and Bayesian networks, have been applied.

Intelligent Tutoring Systems

Intelligent Tutoring Systems (Hämäläinen and Vinni, 2006) is a machine learning method employed to student's academic performance to predict either fail or pass in a course. A similar algorithm, such as Moodle usage data, is utilized to predict students' final marks (Romero, Ventura, Hervás, Gonzales, 2008). The Moodle usage data algorithm is used to predict students' academic final grade dependent on features extracted from logged data (Minaei-Bidgoli, Kashy, Kortmeyer, Punch, 2003) and to predict University students' academic performance (Ibrahim and Rusli, 2007).

Neural Network

Different types of neural network models have been used to predict the performance of a candidate being considered for admission into the university (Oladokun, Adebanjo, Charles-owaba, 2008); predict final student grades (Gedeon and Turner, 1993); performance from test scores

(Fausett and Elwasif, 1994); predict the number of errors a student will make (Want and Mitrovic, 2002); and predict students' marks from Moodle logs (Delgado, Gibaja, Pegalajar, Pérez, 2006). The application of Bayesian networks is seen in the prediction of student's academic performance within a tutoring system (Pardos, Heffernan, Anderson, Heffernan, 2007); student-applicant performance (Haddawy, Thi, Hien, 2007); to predict a future graduate's Cumulative Grade Point Average (CGPA) based on the background of the applicant at the time of admission (Hien and Haddawy, 2007).

Rule-Based Systems

Different types of rule-based systems have been used in the prediction of student's academic performance in terms of predicting the marks in an e-learning environment through the application of fuzzy association rules (Nebot, Castro, Vellido, Mugica, 2006); to predict, monitor, and evaluate student's academic performance by applying rule induction (Ogor, 2007). Rule-based systems can predict students' academic learner performance based on the learning portfolios compiled using key formative assessment rules (Chen, c., Chen, Li, 2007). Rule-based systems can predict student grades in LMSs, using grammar guided genetic programming (Zafra and Ventura, 2009). Using decision tree rule-based systems can be applied in predicting students' academic performance and providing well-timed lessons in web-based eLearning systems (Chan, 2007).

Regression Techniques

Several regression techniques, such as locally weighted linear regression, neural networks, support vector machines, model trees, and linear regression, have been applied to predict students' marks in an open university (Kotsiantis and Pintelas, 2005). Linear regression prediction models can predict end-of-year accountability assessment scores (Anozie and Junker, 2006). In predicting students' performance from the log and test scores in web-based instruction, a multivariable regression model technique has been employed (Yu, Jannasch-pennell, Digangi, Wasson, 1999). Similarly, stepwise linear regression can predict students' academic performance (Golding, Donalson, 2006). Using multiple regression factors that have the probability of predicting student's academic success in courses run in colleges can be identified (Martinez, 2001), while linear regression can be used to predict student's examination results in courses taught in distance education (Myller, Suhonen, Sutinen, 2002). Again, using a robust Ridge regression algorithm, the linear regression technique is often applied in predicting the probability a student has of producing the right answer to a problem in an ITS (Cetintas, Xin, Hord, 2009). To predict end-of-year accountability assessment scores (Anozie & Junker, 2006) and indicate a student's academic performance test score (Feng, Heffernan, Koedinger, 2005).

Bayesian Networks

Bayesian networks predict student knowledge through cognitive tutors (Baker, Corbett, Aleven, 2008). Bayesian networks have been used to detect students' academic learning styles in a web-based education system (Garcia,

Amandi, Schiaffino, Campo, 2007). To correctly predict whether a student will answer a problem correctly, Bayesian networks can be applied (Jonsson, Hasmik, Johns, Mehranian, Arroyo, Woolf, Barto, Fisher, Mahadevan, 2005). Bayesian networks can be used to model a student's changing state of knowledge within the period of skill acquisition in ITS (Chang, Beck, Mostow, Corbett, 2006). Bayesian networks are used to infer intangible learning variables from students' academic performance help-seeking behavior, particularly in a web-based tutoring system (Arroyo, Murray, Woolf, 2004) and for knowledge tracing to authenticate the impact of self-discipline on students' academic knowledge and learning (Gong, Rai, Beck, Heffernan, 2009).

Methodology

Data for this study were collected from students' academic records in the Department of Information and Communication Engineering, Mechanical Engineering and Petroleum Engineering, Covenant University, Ota, Ogun State, Nigeria from 2004/2005, 2005/2006, 2006/2007, 2007/2008, 2008/2009, and 2009/2010 academic sessions. Thus, this study's data is secondary data of 195, 166, and 195 observations on students' G.P.A. for six academic sessions. In this work, we will be using a control chart to monitor the mean and the variability of the process (students' academic performance). The analysis is carried out on IBM SPSS version 25.

Derivation of $\bar{x}$ and s formula

According to Montgomery (2009) setting up and operating $\bar{x}$ *and* s control charts require a similar sequence of steps as that of $\bar{x}$ *and* R chart, except that for each of the sample we calculate the sample mean $\bar{x}$ and sample standard deviation s. If the σ^2 defined as the unknown variance of the probability distribution, then the unbiased estimator of σ^2 is as follows:

$$\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$$

However, the sample standard deviations is not an unbiased estimator of σ. If the underlying distribution is normal, s estimates $c_4\sigma$, where c_4 is a constant which depends on the sample size n. Furthermore, the standard deviation of s is $\sigma\sqrt{1-c_4}$. The information so far is used to establish the control chart of $\bar{x}$ *and* s. Considering the case where the standard value is given for σ. Since $E(s) = c_4\sigma$, the center line for the control chart is $c_4\sigma$. Using the three sigma control limits for s are then

$$UCL = c_4\sigma + 3\sigma\sqrt{1-c_4^2}$$

$$LCL = c_4\sigma - 3\sigma\sqrt{1-c_4^2}$$

It is therefore customary to define the two constants as:

$$B_5 = c_4 - 3\sqrt{1-c_4^2} \quad and$$

$$B_6 = c_4 + 3\sqrt{1-c_4^2}$$

Consequently, the parameters of the s chart with a standard value for σ is given as:

$$UCL = B_6\sigma, \qquad CL = c_4\sigma, \qquad LCL = B_5\sigma$$

The values of B_5 and B_6 are from the table with various sample sizes. The statistic $\frac{\bar{s}}{c_4}$ is an unbiased estimator of σ. Therefore, the parameters of the S chart would be

$$UCL = \bar{s} + 3\frac{\bar{s}}{c_4}\sqrt{1-c_4}$$

$$Center\ line(CL) = \bar{s}$$

$$LCL = \bar{s} - 3\frac{\bar{s}}{c_4}\sqrt{1-c_4}$$

The constants are defined as

$$B_3 = 1 - \frac{3}{c_4}\sqrt{1-c_4^2} \quad and$$

$$B_4 = 1 + \frac{3}{c_4}\sqrt{1-c_4^2}$$

Consequently, the parameters of the s chart are written as:

$$UCL = B_4\bar{s}, \quad Center\ line\ (CL) = \bar{s}, \quad LCL = B_3\bar{s}$$

Note that $B_4 = \frac{B_6}{c_4}$ and $B_3 = \frac{B_5}{c_4}$. When $\frac{\bar{s}}{c_4}$ is used to estimate σ, the control limits on the corresponding $\bar{x}$ chart is defined as:

$$UCL = \bar{\bar{x}} + \frac{3\bar{s}}{c_4\sqrt{n}}$$
$$Center\ line\ (CL) = \bar{\bar{x}}$$
$$LCL = \bar{\bar{x}} - \frac{3\bar{s}}{c_4\sqrt{n}}$$

Assume the constants $A_3 = \frac{3}{c_4\sqrt{n}}$. Then the $\bar{x}$ chart parameter becomes:

$$UCL = \bar{\bar{x}} + A_3\bar{s}, \qquad Center\ line\ (CL) = \bar{\bar{x}},\ \ LCL = \bar{\bar{x}} - A_3\bar{s}$$

Definition of symbols used

According to Akinrefon and Balogun (2015) the symbols used for $\bar{x}$ *and* s are defined as follows:

$\bar{\bar{x}}$ = Average of the subgroup average
$\bar{x}$ = Average of subgroup
n = Number of subgroups
σ = Population standard deviation of the subgroup average
s = Sample standard deviation of the subgroup average
$\bar{s}$ = Average of the standard deviation of the subgroup
UCL = Upper Control Limits
LCL = Lower Control Limits
B_4 = Approximation factor used to calculate within subgroup standard deviation chart control limit
B_3 = Approximation factor used to calculate within subgroup standard deviation chart control limit
A_3 = Approximation factor used to calculate control limit
c_4 = Approximation factor used to calculate within subgroup standard deviation

Results

This section interprets the results from mean and standard deviation control charts from three departments, namely: Petroleum Engineering, Chemical Engineering, Information, and Communication Engineering department.
Petroleum Engineering Department

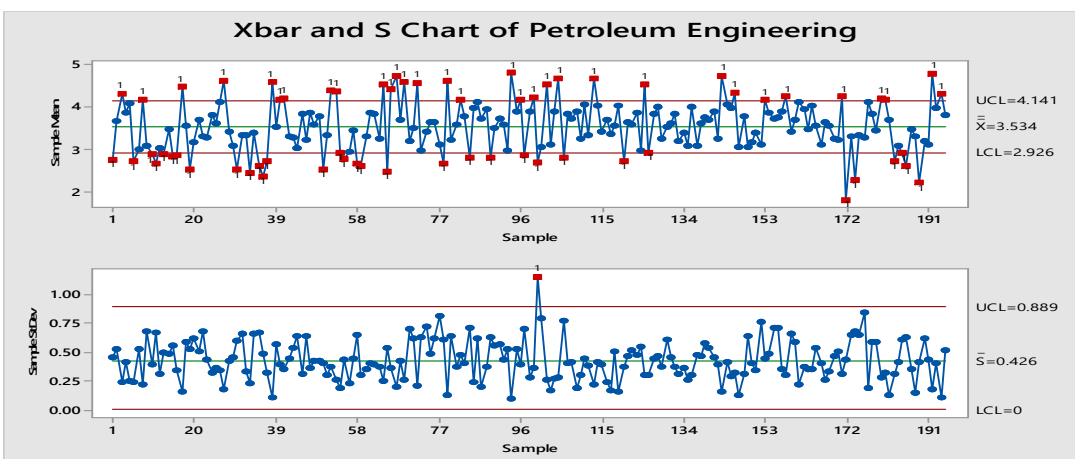

Fig. 1: Xbar and S chart for Petroleum Engineering department

Interpretation of the control chart

For mean chart: $UCL = \bar{\bar{x}} + A_3\bar{s} = 4.141, CL = \bar{\bar{x}} = 3.534\ and\ \ LCL = \bar{\bar{x}} - A_3\bar{s} = 2.926$. The mean chart of the student's GPA from the Petroleum Engineering department shows that not all the points are within the control limits. Thus, the student's performance is out of control, meaning that there is some assignable cause of variation in the

student's performance, which should be observed and corrected. This study emphasizes points that fall below the control limit, i.e., students with poor results. From Fig. 1, the upper limit is 4.14, which means that students whose GPA falls on and above the upper control limits are extremely good since those students would graduate with second-class upper and first-class from the department. The department's average student performance is 3.53, which corresponds to the second grade, which means that the average student in the department will graduate with the second-class grade. The lower limit is 2.93, which implies acceptable performance and is thus considered the lower bound for students' academic performance from the department. A GPA, which drops below the limit, is considered out of control. The Students whose GPA falls below the lower limits will be graduating with a second-class, a third class, or a pass. Generally, the results of students graduating from the department are strong, except for a few students whose performance is poor as they graduated in the third grade. This result is due to the facilities available to students and lecturers, the academic program's quality, and the lecturers' attitude. This success is evident in private universities in Nigeria. From standard deviation chart: $UCL = B_4\bar{s} = 0.889, CL = \bar{s} = 0.426\ and\ \ LCL = B_3\bar{s} = 0$. The standard deviation chart of students' GPA from the Petroleum Engineering Department indicates that two-point is outside the control limits. As such, the process is out of control due to an assignable cause of variation in student results. Students whose GPA falls below the lower control limit will graduate with an average or unsatisfactory result. In contrast, those who fall above the upper control limit will graduate with an outstanding result.

Chemical Engineering

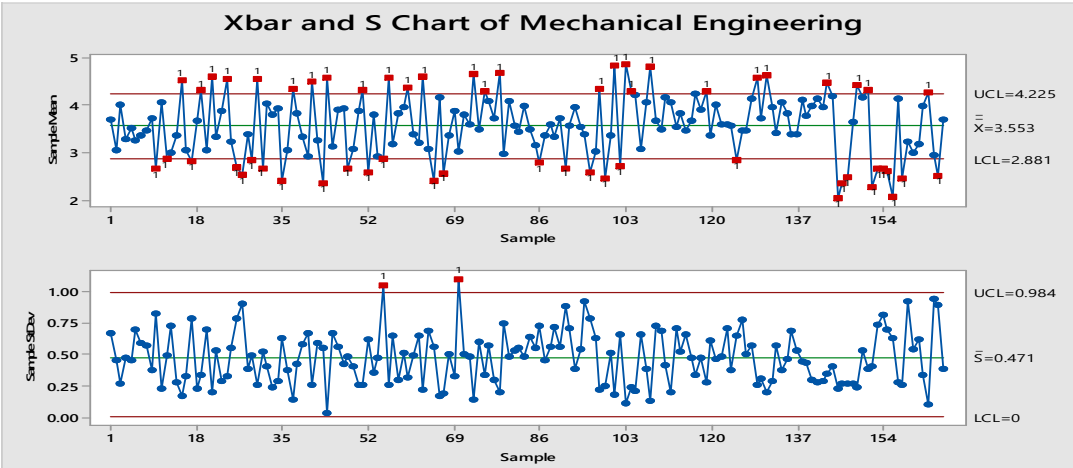

Fig. 2: Xbar and S chart for Chemical Engineering department

Interpretation of the control chart

For mean chart: $UCL = \bar{\bar{x}} + A_3\bar{s} = 4.225, CL = \bar{\bar{x}} = 3.553\ and\ \ LCL = \bar{\bar{x}} - A_3\bar{s} = 2.881$. The mean chart of students' GPA from the Chemical Engineering Department indicates that not all points fall within the control limits. Thus, the student's performance is out of control, meaning that there is some assignable cause of variation in the student's performance, which should be detected and corrected. This study emphasizes points that fall below the control limit, i.e., students with poor results. Fig. 2 shows the upper limits are 4.23, indicating students whose GPA falls above the upper control limits are considered extremely good. Such students would be graduating with second-class upper and first-class grades from the department. The department's average student performance is 3.55, which corresponds to the second grade, which means that the average student in the department will graduate with the second grade. The lower limit is 2.88, which implies acceptable performance and is thus considered the lower bound for students' academic performance from the department. The GPA, which falls below the limit, is considered out of control. Students' GPA falls on the lower limits would be awarded a second class, a third class, or a pass. Generally, the results of students graduating from the department are good, except for a few students whose performance is bad as they graduated from the Third-Class grade.

From standard deviation chart: $UCL = B_4\bar{s} = 0.984, CL = \bar{s} = 0.471\ and\ \ LCL = B_3\bar{s} = 0$. The standard deviation chart of students' GPA from the Department of Mechanical Engineering indicates that one point is outside the control limits. As such, the process is out of control due to an assignable cause of variation in student results. The point that falls below the lower control limit is that students will graduate with an average or poor result. In contrast, the students who fall above the upper control limit will graduate with an outstanding result.

Information and Communication Engineering

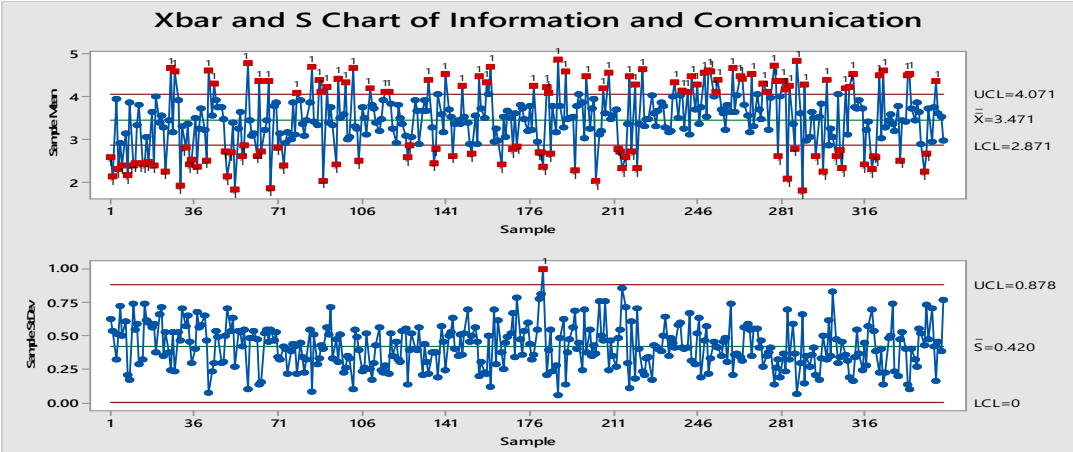

Fig. 3: Xbar and S chart for information and Communication Engineering department

Interpretation of the control chart

For mean chart: $UCL = \bar{\bar{x}} + A_3\bar{s} = 4.071, CL = \bar{\bar{x}} = 3.471\ and\ \ LCL = \bar{\bar{x}} - A_3\bar{s} = 2.871$. The mean chart of the students' GPA from the Information and Communication Engineering Department indicates that not all points are within the control limits. Thus, the student's performance is out of control, meaning that there is some assignable cause of variation in the student's performance, which should be detected and corrected. This study emphasizes points that fall below the control limit, i.e., students with poor results. Fig. 3 shows the upper limit is 4.07, implying that students whose GPA falls below and above the upper control limits are extremely good since those students would graduate with a second-class upper and first-class grade from the department. The average students' performance in the department is 3.47, which corresponds to the lower grade second class, which means that the average student in the department will graduate with a second-class lower grade. The lower limit is 2.87, which implies acceptable performance and is thus considered the lower bound for students' academic performance. A GPA, which falls below the limit, is considered out of control. Students' GPA falls within the lower limits will be graduating with a second-class lower grade, a third class, or a pass. The results of students graduating from the department are good, except for a few students whose performance is poor as they graduated from the Third-Class grade. From standard deviation chart: $UCL = B_4\bar{s} = 0.878, CL = \bar{s} = 0.420\ and\ \ LCL = B_3\bar{s} = 0$. The standard deviation chart of students' GPA from the Information and Communication Engineering Department indicates that one point is outside the control limits. As such, the process is out of control due to an assignable cause of variation in student results. The point that falls below the lower control limit is that students will graduate with an average or poor result. In contrast, those who fall above the upper control limit will graduate with an outstanding result.

Discussion

This study found that one of the notable Nigerian Private University student academic performances drawn from three engineering departments based on the mean chart is in control and out of control, indicating excellent, intermediate, and lower results. The study also shows upper, average, and lower results with a close margin. The clustering of ideal, middle, and lower points is distinct but only requires the student to get 0.62 to cross from lower to average and 0.59 from average to the upper level in the GPA SPC chart. Comparatively, the Petroleum Engineering department emerged in the upper point, became second in average point, and first in a lower point. Chemical Engineering attained second in upper point, first in average point, and second in lower point while Information and Communication Engineering came third in upper, average, and lower points. Petroleum Engineering and Chemical Engineering department undulate while Information and Communication Engineering maintain a steady rank in all the applied metric system. This study's result is similar to Haddawy, Thi, and Hien (2007), which predicted the future graduate's Cumulative Grade Point Average (CGPA) with the Neural Network data analysis technique. However, the difference between the upper, average, and lower points of each engineering department in a private setting is not conspicuous. Additional research is needed to determine how students who fall into the lower category can improve and become average students and, likewise, for intermediate students to become upper students. Excellent results in the private university will enhance public relations and boost students' chances of getting hired after their studies. Producing exceptional students in a Private University may also be an extension of reputation management, competitive advantage, and indirectly for-profit maximization (Olaleye, Sanusi, and Salo, 2018; Aslam, Saghir, and Ahmad, 2020).

Conclusion

This study found a considerable variation in the students' academic performance, especially the out of control groups. This insight is an interdepartmental issue. The school managers need to formulate a holistic policy that will improve the existing academic performance to move the outlier students from worst to better and from better to best. This policy will pave the way for continuous student academic improvement. This study is significant because it is foremost to apply SPC to determine private university students' academic performance. Despite this study's impact, it is limited to only three departments, which may not represent the entire private university's programs. It will be interesting if future studies can study the whole departments established in a private university concerning students' academic performance. Future studies also can compare private and public universities' student academic performance in emerging countries.

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Critical Criteria of Women-Owned SMES Performance Using Analytical Hierarchy Process (AHP)

Siti Fatimah Azzahra' JOHARI

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Malaysia

s.fatimahazzahra01@gmail.com

Umi Kartini RASHID

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Malaysia

kartini@uthm.edu.my

Edie Ezwan MOHD SAFIAN

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Malaysia

edie@uthm.edu.my

Juzaimi NASUREDIN

Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Malaysia

juzaimi@uthm.edu.my

Abstract

In coping with the vision that Malaysia will become a developing country by 2020, the Malaysian government encourages to improve higher growth in Gross Domestic Product (GDP) while increasing the number of entrepreneurs in various sectors. Growing the number of women entrepreneurs is one of the government's current initiatives in realizing the vision of being a well-developed country with a competitive economy, sustainable revenue, and stable social structure as a multiracial country. Several researchers have conducted studies on the relationships between Entrepreneurial Competencies (EC) and Entrepreneurial Orientation (EO) dimensions towards women-owned SMEs business performance and overlooked the measurement of criteria and sub-criteria ranking, which is the most important factor in contributing their performance and becoming a crucial gap to be further investigated. Hence, this study evaluates the effective criteria that contribute most towards women-owned SMEs' performance by using Analytical Hierarchy Process employing Super Decision software. The survey questionnaires were distributed among 140 respondents in Batu Pahat, district of Johor state. However, only 128 sets of questionnaires were usable for data analysis, with a 91.43% response rate. The findings indicate that EC and EO ranking criteria are equally important to the women-owned SMEs' performance. In contrast, the consistency ratio (CR) was found to be equal to zero. Consequently, CR will give value if the paired comparison is more than two criteria, and the consistency applies only to the pairwise comparison matrices.

Keywords*:* Entrepreneurial competency, Entrepreneurial orientation, Women-owned SMEs, Business Performance, Analytical Hierarchy Process.

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Introduction

Small and medium-sized enterprises (SMEs) have played a critical role in growing Malaysia's economy since the late 1990s (Chin & Lim, 2018), as well as being drivers of economic development, generating job opportunities, and promoting innovation (Haider, Asad & Fatima, 2017). Despite this phenomenon, they recognize that male entrepreneurship is being explored, but previous studies have emphasized the emergence of female entrepreneurs and their contribution to the economy and social well-being (Sucheta Agarwal, 2018; Lenka & Agarwal, 2017; Yadav & Unni, 2016). Day by day, women entrepreneurs' involvement has increased dramatically worldwide (Sucheta Agarwal, 2018). It has been nominated as the new engine for economic growth, bringing prosperity and welfare in developing nations. As reported by Economic Census 2016 by the Department of Statistics Malaysia (DOSM) (2017), SMEs constitute 98.5% or 907,065 of business establishments in Malaysia, and 20.6% of them are wholly owned by women entrepreneurs with an annual growth rate of 8% (DOSM, 2017). Hence, women-controlled and women-owned businesses are now regarded as essential functional components of society and economy, comprising around 25.8% to 28.1% of the total entrepreneurs worldwide (Kumari Amrita, Chandra Prakash Garg, 2018). In Malaysia, women-owned SMEs are most probably underperformed by a lack of intangible resources, different behavior, or women entrepreneurs' characteristics compared to their male counterparts (Teoh & Chong, 2007). According to Ali Jafri & Khurram (2019), the difference in male and female entrepreneurs' business performance is due to their intrinsic and discrete patterns of socialization and approach to their businesses.

Despite the number of women entrepreneurs, entrepreneurial competencies (EC) is one of the significant factors when it comes to performance (Chimucheka, 2018). The previous research was revealed that EC is the vital criteria for the success of an enterprise and several training programs primarily on enhancing the level of competencies among the small businesses in an attempt to broaden the competitive advantage and market performance (Ramadani, Gërguri, Dana, & Tašaminova, 2013; Chimucheka, 2018).

Besides EC is considered the crucial criterion to focus on, the other EC criteria, which is the entrepreneurial orientation (EO), also the criteria stated as the key contributor to the women-owned SMEs (Rashid, 2017). In line with Ali Yassin (2013), EO criteria have fascinated increasing interest, yet most of the studies were conducted among men businesses as the criteria that affected the firms' growth (Eggers, Kraus, Hughes, Laraway & Snycerski, 2013; Rashid, 2017). EO plays a vital role in the entrepreneur's success in the growth of businesses and economic development (Arshad, Rasli, Arshad, & Zain, 2014).

Thus, in general, the previous studies have been conducted to look at EC and EO's relationships towards women-owned SMEs' business performance using SPSS (Mitchelmore & Rowley, 2013; Ali Yassin Sheikh Ali, 2014; Almubarak, 2016; Rashid, 2017). Nevertheless, the studies' findings only proved the significance of the relationship and overlooked the measurement of ranking the most effective criteria that contributed to their performance. Therefore, this study looks at the measurement using an absolute scale by implementing AHP through several criteria and sub-criteria.

Literature Review

Women-owned SMEs

In this paper, women-owned SMEs defined as a female who is an owner-manager of a business (Mckay, 2001; Subramaniam, P., & Islam, 2014), or a woman or group of women, who initiate, organize and operate a business enterprise (Suganthi, 2009; Thayammal, 2011). As cited by Bakar et al. (2015), owner-managers become the subject because they are key informants of business, and they are involved in the overall running of the firms.

Entrepreneurial Competencies (EC)

According to Kaur A. (2013), entrepreneurial competency is defined as the individual characteristics that underlying possess by a person which result in new ventures creation, survival, and growth with primary characteristics such as basic and specific knowledge, motivates, traits, self-image, roles and skills (Bird, 1995). In line with Man et al. (2002), EC well-defined as the entrepreneur's entire capabilities to execute the job role fruitfully consists of six major areas: an opportunity, organizing, strategic, relationship, commitment, and conceptual competencies.

Opportunity Recognition Competency

According to Man et al. (2002), this competency to the ability to recognize the opportunities in the market through various means; and is operationalized by measuring various behaviors such as identifying the services or products needed by the customers, perceiving unmet needs of the customers, looking for beneficial product and services for the customers, and availing the best opportunities. Parallel with Man et al. 2002 and Tang et al. (2012), an entrepreneur must be mindful of any chance and assets accessible that empower them to perceive the holes and ought to have coordinated the chance or assets that they have.

Relationship Competency

According to Man et al. (2002), this perspective of building participation and trust utilizes associations, influential correspondence and correspondence, and relational aptitudes. While referred to Rowley (2013), individual and relationship competencies refer to the ability to haggle with others and maintain a good personal network of work contacts, developing long-term trusting and loyal relationships with others.

Conceptual Competency

Conceptual competency refers to the conceptual abilities reflected in the entrepreneurs' behavior in making the decision for market opportunities and understanding the complex information to improve the businesses by using an alternative solution (Man & Lau, 2000; Mamun et al., 2019).

Organizing Competency

Organizing competency includes the organization of internal and external resources such as budget, materials, human resources, work schedule, and programs (Snell, Lau, Snell, & Lau, 1994; Man et al., 2002; Kaur A., 2013; Mamun et al., 2019) through team-building, managing employees, training, and controlling for better performance (Man & Lau, 2000; Bae & Rowley, 2004).

Strategic Competency

Strategic competency involves an entrepreneur's ability to develop a business vision in mind, which is consistent with the literature of entrepreneurial competency (Snell et al., 1994; Thompson et al., 1996; Mamun et al., 2019) by setting, evaluating and implementing the strategies of the firm (Man et al., 2002).

Commitment Competency

Commitment competency refers to the driver of an entrepreneur to continue business (Mamun et al., 2019), who strive to achieve a long-term goal with strong devotion (Man & Lau, 2000), and also will define as an effort or hard work that required by entrepreneurs to manage their business (Sambasivan et al., 2010).

Entrepreneurial Orientation (EO)

EO is defined as a firm-level strategic orientation that captures an organization's strategy-making practices, managerial philosophies, and firm behaviors that are entrepreneurial (Doris, 2016). As indicated by Green, Covin, & Slevin (2008), entrepreneurial orientation is building strategic domain concepts including the specific firm-level outcomes and priorities related to management, beliefs, and behaviors that expressed between senior managers of a firm (Green, Covin & Slevin, 2008) and EO determines as specific strategic decisions and resource allocations in organizations (Edmon & Wiklund 2010). In this study, EO is recognized by three-dimensional conceptualization, namely, innovativeness, proactiveness, and risk-taking (Miller, 1983).

Risk Taking

Risk-taking is known as a tendency to take bold actions such as venturing into unknown new markets, committing a large portion of resources to ventures with uncertain outcomes, and/or borrowing heavily (Dess & Lumpkin, 2001).

Innovativeness

The concept of innovativeness is described as a willingness to support creativity and experimentation in introducing new products/services, and novelty, technological leadership, and research development (R&D) in developing new processes (Dess & Lumpkin, 2001).

Proactiveness

Proactiveness is the pursuit of opportunities and competitive rivalry in anticipation of future demand by introducing new products or services to create change and shape the business environment (Dess & Lumpkin, 2001).

Methodology

Comparison of Multi-Objective Decision Making (MODM) and Multi-Attribute (MADM) Approaches

Previous research highlighted that the multi-criteria decision-making method (MCDM) effectively deals with the intrinsic multidimensionality, complexity, and subjectivity in the research area (Merad et al., 2013; Wang, 2015; Calabrese et al., 2019). The main attribute of MCDM is its emphasis on the judgment of group decision making, determining the objectives (goals) and criteria, estimating the weighted relative importance, and assessing the contributions of each option for each criterion (DCLG, 2009). Hence, the MCDM problems can be categorized into two groups, which are Multi-Objective Decision Making (MODM) and Multi-Attribute Decision Making (MADM) (Lu, Zhang, Ruan, & Wu, 2007).

Table 1: Comparison of MODM and MADM Approaches

	MODM	MADM
Criteria	Objectives	Attribute
Number of alternatives	Infinite (Large number)	Finite (Limited number)
Decision maker's control	Significant	Limited
Relevant to:	Design/Search	Evaluation/Choice
Relevant of geographic data structure	Vector-based GIS	Raster-based GIS

Source: Adapted from: (Malczewski, 1991)

As the continuous type of MCDM, MODM is the method that considered the values of decision variables that are many available alternatives, for example, Goal Programming (GP). As claimed by Vyas and Misal (2013), MADM methods are discrete with a limited number of predetermined alternatives. The MADM methods include Multi-Attribute Utility Theory (MAUT), Analytical Hierarchy Process (AHP), and Technique for Order Preferences by Similarity to Ideal Solutions (TOPSIS) and Analytical Network Process (ANP). Based on the table below show the strength and weakness of MADM methods.

Table 2: Strength and Weakness of MADM methods

Method	Strengths	Weaknesses
AHP	•Easy to use •Scalable •Hierarchy structure can easily adjust to fit many sized problems •Not data intensive	•Problems due to interdependence between criteria and alternatives •Can lead to inconsistencies between judgement and ranking criteria •Rank reversal
ANP	•Allow accessing the consistency of judgements •Facilitates the process of assigning weights because splits up the problem into smaller parts	•Requires filling in a lot of questionnaires

SAW	•Ability to compensate among criteria •Intuitive to decision makes •Calculation is simple does not require complex computer programs	•Estimates revealed do not always reflect the real situation •Result obtained may not be logical
MAUT	•Takes uncertainty into account •Can incorporate preferences	•Need a lot of input •Preference need to be precise
SMART	•Simple •Allows for any type of weight assignment techniques •Less effort by decision makers	•Produce may not be convenient considering the framework
TOPSIS	•Has a simple process •Easy to use and program •The number of steps remains the same regardless of the number of attributes	•Its use a Euclidean Distance does not consider the correlation of attributes •Difficult to weight and keep consistency of judgement
ELECTRE	•Takes uncertainty and vagueness into account	•Its process and outcome can be difficult to explain I layman's terms •Outranking causes the strength and weakness of the alternatives to not be directly identified
PROMETHEE	•Easy to use •Does not require assumption that criteria are proportionate	•Does not provide a clear method by which to assign weights

(Source: (Lesmes, Castillo, & Zarama, 2009; Velasquez & T.Hester, 2013)

In particular, AHP is a simple decision-making tool to deal with complex, unstructured, and multi-attributed problems established by (Saaty 1980; Esra Albayrak, 2004), and is widely used by the decision-maker and researcher (Russo & Camanho, 2015). As supported by Tseng, Wu, Ma, Kuo, & Sai (2017), AHP is a practical method that assists in decision making using structural hierarchy with various criteria weighted by pairwise comparison. Hence, to gauge the individual's preference and needs is a critical part of the different decision-making levels. Due to the numerous attributes of women-owned SMEs' criteria, this may lead to difficulties in selecting the most effective criteria that affect the performance. Therefore, AHP, as an MCDM, will prescribing an accurate decision and helps the decision-makers find the one that best suits their needs and their understanding of the problem (Yang & Li, 2010).

Judgment Matrix and Consistency Test

In this paper, Super Decisions of AHP is a software package developed for the analysis, synthesis, and justification of complex decisions, with dependence feedback based on the analytic hierarchy process (AHP) methodology (Sharma *et al.*, 2018). The scale method of grade 1-9 was used to determine the relative merits of the elements. The figure 3.1 shows Super Decision model and figure 3.2 shows the comparison between parameters as questionnaires survey form of women-owned SMEs using the absolute scale method 1-9 based on the principle and judgement matrix of AHP.

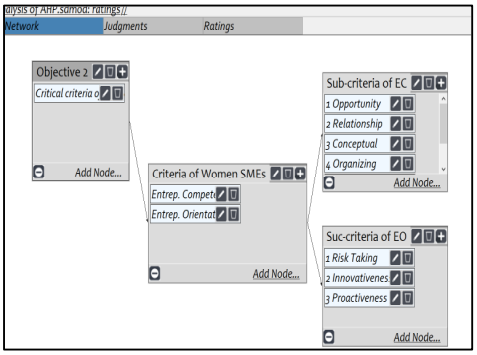

Figure 1: Super Decision Model showing Clusters and Node

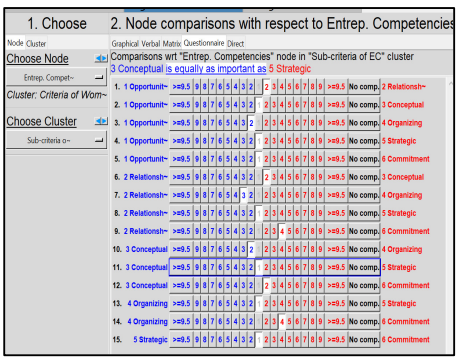

Figure 2: Super Decision Model showing pairwise comparison between parameters as Questionnaires Survey Form

Process of Methodology

Figure 3 presents a two-stage process of methodology. Initially, the process was conducted to identify the criteria and sub-criteria of women-owned SMEs' performance based on EC and EO. The systematics of the literature review has been conducted from the previous existing research. By reviewing the literature, the researcher has conducted a preliminary study to finalize women-owned SMEs' critical criteria. The criteria of EC and EO have contributed to women-owned SMEs.

After conducting a preliminary study, the questionnaire surveys were designed and distributed to the selected respondents. The questionnaire consists of three sections: the demographic profile, criteria of women-owned SMEs, and sub-criteria of women SMEs. The demographic will be analyzed using the Statistical Package for Social Science (SPSS) version 23. The next step was completed by applying the Super Decision software AHP method to calculate the weights of criteria and sub-criteria using an absolute value scale. Therefore, the ranking and assessment of the criteria and sub-criteria were analyzed after checking the comparison consistency. Based on the ranking results of AHP, the discussion and conclusion have been summarized.

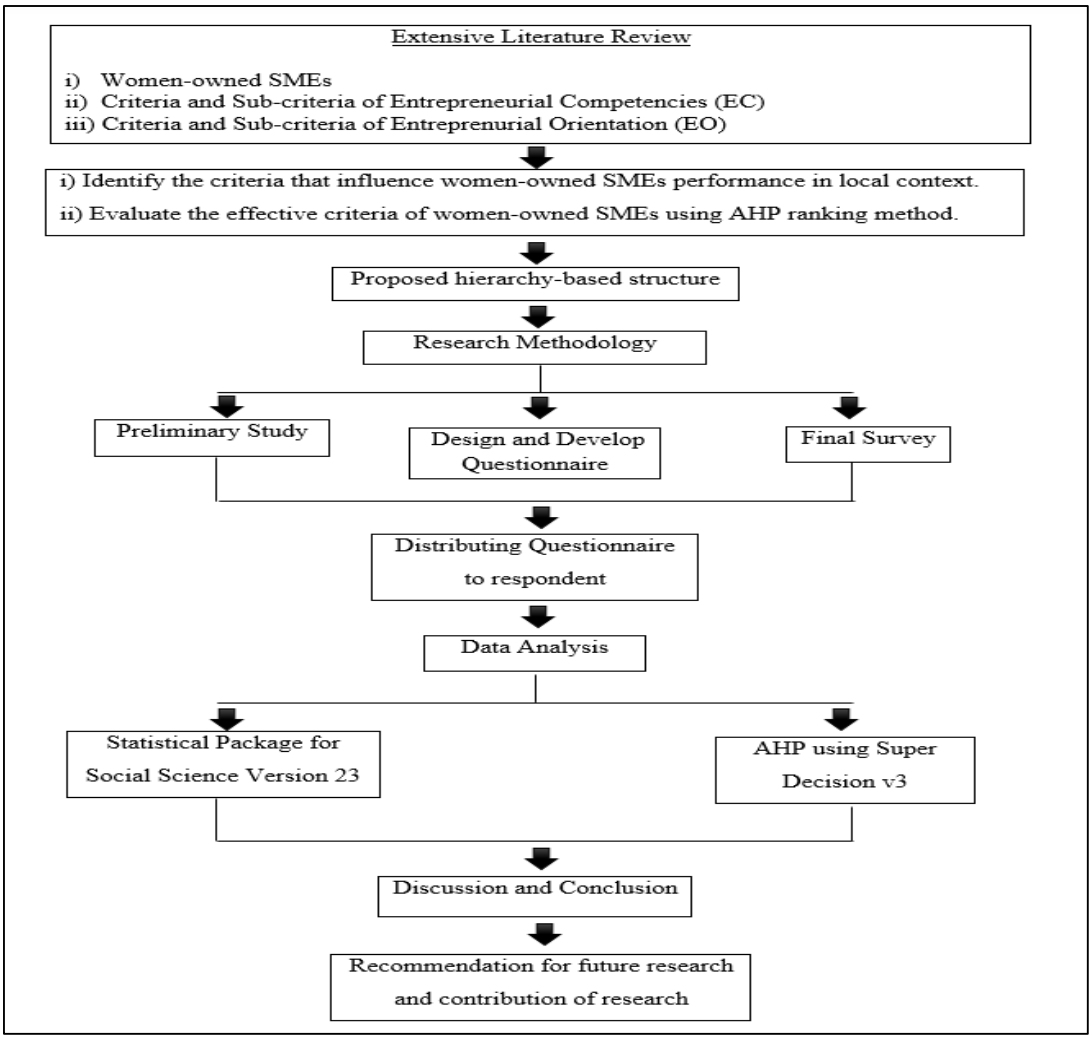

Figure 3: The Process of Methodology

Results and Findings

Profile of Respondents

The demographic profile responses of the 128 survey respondents are illustrated in Table 4.1. The respondents are capable of evaluating the critical criteria of women-owned SMEs in Batu Pahat, Johor.

The current age category for the respondents was analyzed to ensure the involvement of all age spans. Women-owned SMEs ranging from 31 to 35 years old were recorded as the highest score of 26.6 percent (n=34) and followed by 36 to 40, which contributes 24.2 percent (n=31).

The current age of women-owned SMEs in the range below 25 years old has the lowest percentages, 3.9 percent (n=5), due to a lack of business confidence. The current age between 26 to 30 years old respondents just about to set up their business, which also contributes to low percentages which are only 7 percent (n=9). Next, the current age of respondents in the range from 41 to 45 years, 46 to 50 years, and above 50 years old, accordingly contributes 14.1 percent (n=18), 13.30%(n=17), and 10.9 percent (n=14).

The next section of demographic analysis presents the respondents' age when they have started to own or manage their businesses. The majority of them have started their businesses below 25 years old, with a total percentage of 37.6 percent (n=47). Women owner-managers ranging from 26 to 30 years old account for 18.6 percent (n=24), followed by 16.4 percent (n=21) for those aged 36 to 40. The range of age between 31 until 35 contributed 15.6 percent (n=20) and then dropped to 10.2 percent (n=13) for those in the range of 41 to 45 years old, and gradually only 2.3 percent (n=3) of those over 50 years old.

In terms of marital status, three options were given in the survey: single, married, or widow. According to overall respondents, the majority of them with 79.7 percent (n=102) stated that they are married, while the percentages of those who are single or widowed stated 9.4 percent (n=12) and 10.90% n=14).

Concerning race, most of the respondents are Malay, representing 76.6 percent (n=98) of the population sample,22 Chinese (17.2 percent), and 14 Indians (6.3 percent). The next section of the descriptive analysis of respondents will explain the number of children. The number of children for respondents between 1 to 3 accounted for the highest percentage, 43 percent (n=55), and followed by 4 to 6 children, which accounted for 29.7 percent (n=38). Despite that, 22.7 percent (n=29) of the respondents have less than one child, and 4.7 percent (n=6) has more than six children.

Concerning educational background, respondents who finished their secondary school accounted for 57.8 percent (n=74), while those who obtained their diploma accounted for 28.9 percent (n=37) and first degree accounted for 10.2 percent (n=13). The lowest education level was primary school, which accounted for 3.1 percent (n=4).

In terms of working experience, most of the respondents have a total working experience between 1 to 5 years, which accounted for 30.5 percent (n=39), followed by 27.3 percent (n=35) of those with working experience 6-10 years. A percentage of 22.7 percent (n=29) have 11 to 15 working experience,10.2 percent (n=13) has more than 20 years working experience, and 4.7 percent (n=6) for those with working experience less than one year and 16 to 20 years.

Table 3 shows the years of experience with the firm. A percentage of 45.3 percent (n=58) has been with the firm between 1 to 5 years, 28.1 percent (n=36) has been with the firm between 6 to 10 years, 13.3 percent (n=17) has been with the firm between 11 to 15 years, 6.3 percent (n=8) have been less than one year, 3.1 percent (n=4) have been the firm between 16 to 20 years and 3.9 percent (n=5) for more than 20 years.

Table 3: Analysis of Profile Respondents

Profile Respondents		Frequency	Percentage (%)
Current Age ***(Age years)***	Below 25	5	3.90
	26-30	9	7.00
	31-35	34	26.60
	36-40	31	24.20
	41-45	18	14.10
	46-50	17	13.30
	Above 50	14	10.90
TOTAL		**128**	**100.00**
Age When Started Owning/Managing Business ***(Age years)***	Below 25	47	37.60
	26-30	24	18.60
	31-35	20	15.60
	36-40	21	16.40
	41-45	13	10.20
	46-50	0	0.00
	Above 50	3	2.30
TOTAL		**128**	**100.00**
Marital Status	Single	12	9.40
	Married	102	79.70
	Widow	14	10.90
TOTAL		**128**	**100.00**
Race	Malay	98	76.60
	Chinese	22	17.20
	Indian	14	6.30
TOTAL		**128**	**100.00**
Number of children	Less than 1	29	22.70
	1 to 3	55	43.00
	4 to 6	38	29.70
	More than 6	6	4.70
TOTAL		**128**	**100.00**
Educational Background	Primary	4	3.10
	Secondary	74	57.80
	Diploma	37	28.90
	FirstDegree	13	10.20
	Master	0	0.00
	PhD	0	0.00
	Others	0	0.00
TOTAL		**128**	**100.00**
Total Working Experience ***(years)***	Less than 1	6	4.70
	1-5	39	30.50
	6-10	35	27.30
	11-15	29	22.70
	16-20	6	4.70
	Above 20	13	10.20
TOTAL		**128**	**100.00**
Years of Experience with the Firm ***(years)***	Less than 1	8	6.30
	1-5	58	45.30
	6-10	36	28.10
	11-15	17	13.30
	16-20	4	3.10
	Above 20	5	3.90
TOTAL		**128**	**100.00**

Results of Decision AHP

The criteria and sub-criteria of women-owned SMEs were analyzed using the Super Decision V3 software of AHP. These comparisons were used to obtain the weights of importance for the decision criteria. The results obtained were used to rank the most important criteria for women-owned SMEs for better performance.Meanwhile, Table 4 until Table 6 shows the theoretical matrix representing the questionnaire survey form for criteria and sub-criteria of women owner-managers and based on the pairwise comparison. Based on the results, the ranking of important criteria and sub-criteria are recorded in Table 7 below.

Table 4: Theoretical Matrix representation of Questionnaire Survey Form for Criteria of Women-SMEs Performance

Pair Comparison	Entrepreneurial Competencies	Entrepreneurial Orientation	Eigen Vector	Performance (%)
Entrepreneurial Competencies	1	1	0.50	50.00
Entrepreneurial Orientation	1	1	0.50	50.00
	CR=0		**1.0000**	**100%**

Based on the findings that the researcher had analyzed for the 128 respondents, the Consistency Ratio (CR) for women-owned SMEs' criteria is equal to zero. CR will give value if the paired comparison is more than two criteria, and the consistency applies only to the pairwise comparison matrices. For the Eigen Vector, the value for EC and EO are evaluated as equally important, which 50 percent of both criteria women-owned SMEs performances. After comparing the main criteria, each sub-criteria have also been compared for their groups.

Table 5: Theoretical Matrix representation of Questionnaire Survey Form for Sub-Criteria (EC) of Women-SMEs Performance

Pair Comparison	Opportunity Recognition	Relationship	Conceptual	Organizing	Strategic	Commitment	Eigen Vector	Performance (%)
Opportunity Recognition	1	1/2	1	2	1	1	0.157348	15.73
Relationship	2	1	1/2	3	1	1/4	0.1678965	16.79
Conceptual	1	2	1	2	1	1/2	0.0992844	9.93
Organizing	1/2	1/3	1/2	1	1	1/4	0.1162039	11.62
Strategic	1	1	1	1	1	1	0.3196311	31.96
Commitment	1	4	2	4	1	1	0.139636	13.97
	CR= 0.08682						**1.0000**	**100%**

Table 5 reports the comparison matrices between EC's sub-criteria for overall respondents with the CR=0.08682 < 0.1. The evaluation of the important criteria of women-owned SMEs' performance is being considered as acceptable. The paired comparison for strategic has contributed the highest percentage with 31.96 percent for women-owned SMEs for 128 respondents in Batu Pahat. It means the women owner-managers in Batu Pahat have concluded that strategy is one of the most important sub-criteria in improving their business performance. Meanwhile, the percentage that has contributed as important gives 16.79 percent, followed by opportunity recognition 15.73 percent, commitment 13.97 percent, and 11.62 percent for organizing. The lowest percentage of the sub-criteria of EC is conceptual, with 9.93 percent.

Table 6: Theoretical Matrix representation of Questionnaire Survey Form for Sub-Criteria (EO) of Women-owned SMEs Performance

Pair Comparison	Risk Taking	Innovativeness	Proactiveness	Eigen Vector	Performance (%)
Risk Taking	1	2	1/3	0.2809364	28.09
Innovativeness	1/2	1	1/9	0.2552477	25.53
Proactiveness	3	9	1	0.4638159	46.38
	CR= 0.35331			**1.0000**	**100%**

Table 6 reports that the pair comparison matrices between the sub-criteria of EO with CR=0.35331, > 0.1. The consistency is desirable to be less than 0.10 or 10%. Each of the respondents was looked at, and the consistency was tried to improve if it was above 0.10. However, it has limitations while doing the way to improve it, and it should be convincing. Due to limited knowledge and unaware of others, this will make the results inconsistent (Natee et al., 2016). To summarize the results, the percentage of proactiveness has contributed 46.38 percent and followed by risk-taking with 28.09 percent and innovativeness 25.53 percent.

Table 7: Rank of Importance Criteria and Sub-criteria of Women-owned SMEs

Main Criteria	Rank	Sub-criteria	Rank
Entrepreneurial Competencies	**1**	Opportunity Recognition	**3**
		Relationship	**2**
		Conceptual	**6**
		Organizing	**5**
		Strategic	**1**
		Commitment	**4**
Entrepreneurial Orientation	**1**	Risk Taking	**2**
		Innovativeness	**3**
		Proactiveness	**1**

After the pairwise comparison matrix is formed, the measurement's priority vector and consistency are being calculated based on the method explained. The data were obtained from the respondent in Batu Pahat. Based on the overall result for the 128 respondents, the ranking of important criteria and sub-criteria of women owner-managers that were recorded, which contribute to the average result of EC and EO. However, based on EC's sub-criteria, the most important sub-criteria is strategically categorized in the first ranked, followed by relationship, opportunity recognition, commitment, organizing, and the last is conceptual. Then, for EO's sub-criteria, proactiveness is recorded as the first rank and followed by risk-taking and innovativeness.

Discussion and Conclusion

This study aims to identify the criteria of women-owned SMEs' performance, EC and EO, using the Super Decision of AHP method. The findings indicate that EC and EO's ranking criteria are equal in important for women-owned SMEs performance. While the consistency ratio (CR), was found important too. Consequently, SMEs' will give value if the pair comparison is more than two criteria, and the consistency applies only to the pairwise comparison matrices. Based on the previous research, EO and EC were significantly related to women-owned SMEs' business performance (Rashid, 2017; Zainol, 2018). However, previous studies only focused on the relationship between SMEs' and EC of women-owned SMEs towards performance and overlooked the ranking of performance that important to be studied in this paper. Thus, this study is important for women entrepreneurs as their guideline to improve their skills, knowledge and entrepreneurial elements in order to make their business more successful. This research revealed that are broadened and deepened in this study contribute to the existing body of knowledge in women entrepreneurs' study and entrepreneurship literature towards improving the SMEs' performance. The theoretical contributions and practical implications will contribute to the better findings for women owners/managers of SMEs and women entrepreneurial development in Malaysia. Finally, it is further hoped for better results that will help boost the growth of women-owned SMEs, which are crucial to developing the economy.

Limitation and Recommendation

This paper encounters a few limitations, which is first based on the criteria of EO. Therefore, the data collected may suffer from CR because the consistency is above 0.10. Even though the CR has been tested and was found acceptable in this research, it may invariably affect the results' accuracy. Therefore, the current study recommends the combination method with a qualitative methodology, such as the Delphi method, to complement the pairwise comparisons in future research. Secondly, the findings and conclusions drawn from this research might not be limited to one state only, including other states in Malaysia. As for that, the results may not be applicable since it only focused on a limited area. Thus, the results could be broader, and it can be compared to the other states to examine generalisability. Finally, while these findings of the research allude to the importance of criteria for women-owned SMEs, the critical criteria of women-owned SMEs' performance are not examined. Therefore, future research can be considered to examine these effects. This will draw superior implications and maximize their business performance by focusing on the criteria that yield countless impacts on SMEs' business performance.

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A Multi-Criteria Model for Assessing The Quality of Nursing Care as an Element of Health Care Facility Management

Dorota GAWRONSKA

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland

dorota.gawronska@polsl.pl

Abstract

The presented article presents a multi-criteria fuzzy model of nursing care quality evaluation based on the evaluation criteria given in the proprietary BOHIPSZO procedure. A multi-criteria model was created on the set of criteria and sub-criteria. For each sub-criterion, a score of 0-10 points was assumed, which provided a broader picture of nursing care standards' fulfillment. The assessment is made by randomly selected patients - because each of the eight essential criteria consists of several factors. The possibility of representing the patient's uncertainty about the assessment was taken into account by the prospect of giving a score range in case of doubt.
Additionally, it was proposed that the commissioning team could define the importance of particular criteria if this team places greater emphasis on specific standards of nursing care. Based on the patients' assessments, each patient's final judgments are calculated, taking into account the (optional) importance of the criteria and sub-criteria. In the final phase, the final assessment of the health unit is determined.

Keywords: Quality of Nursing Care, Fuzzy Model, Fuzzy Numbers, Multi-Criteria Programming, Management Of Health Care Facilities

Introduction

Nowadays, quality in health care is one of the most critical problems in managing health care facilities. In the health care system, the quality of services provided is of particular importance because it concerns human health and life. The quality of medical services is most often the essential criterion for choosing a health center by a patient, which in turn has an impact on the constantly growing expectations of patients, and in health centers require continuous work for the quality of services offered to achieve or maintain a high position on the market of medical service providers, including nursing.

The initial stage is to define the current standard of nursing services offered, to identify strengths and weaknesses. To this end, the health unit should be assessed based on the measures that determine the potential patient's expectations. The first step is to adopt criteria for evaluating nursing services. There are various methods in the literature to measure and assess the quality of nursing care. The best known are the Nursing audit, Monitor, Qualpacs, and BOHIPSZO. This study aims to define an optimal nursing care assessment model that can be supported by units managing a given health care unit. In this smaller paper, the basis for developing a multi-criteria model of nursing care assessment is the BOHIPSZO procedure (the procedure discussed in point 3 of the article) by Lenartowicz (1998). In addition to adopting the criteria structure described in this procedure, a different scoring method has been introduced, taking into account the patient's uncertainty regarding the nursing care assessments.

Representation of uncertain information - *LR* type numbers

Because the model assumes the possibility of taking into account the uncertainty as to the number of points awarded under individual sub-criteria, the use of fuzzy numbers of the LR type was adopted as a representation of the variables describing the number of points awarded in the form of ranges - as an expression of uncertainty as well as a specific value in the case of confidence in the assessment by Piegat (1999). Three parameters where characterize these numbers:

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- parameter m is a real number called the average or most probable value,
- parameter α is the left-hand "spread" (the difference between the value of the parameter m and the value of the minimum rating)
- parameter β is the right-hand "spread" (the difference between the maximum amount of the assessment and the value of the m parameter)

In this study, a triangular membership function was used, which considers the evaluation's minimum and maximum values and the most probable one. The following formula describes this function:

$$\mu_A(x) = \begin{cases} L\left(\dfrac{m-x}{\alpha}\right) & dla \quad x < m \\ 1 & dla \quad x = m \\ R\left(\dfrac{x-m}{\beta}\right) & dla \quad x > m \end{cases} . \tag{1}$$

However, the L and R functions are functions defined by the formula:

$$L(x) = R(x) = \begin{cases} 0 & dla \quad x < m-\alpha \\ 1-|x| & dla \quad m-\alpha \le x \le m+\beta \\ 0 & dla \quad x > m+\beta \end{cases} . \tag{2}$$

Value$m$ is the determining value - the most expected or, if not specified, it is calculated according to the formula:

$$m = \frac{m-\alpha+m+\beta}{2}. \tag{3}$$

Nursing care assessment quality assessments are presented in the form of point intervals ([m-α, m] and [m, m + β]), which take into account the uncertainty to the most probable value of m. The evaluation is based on mathematical operations on these three parameters m, α, β(by Piegat (1999)).

Multi-criteria model of nursing care quality assessment

Nursing care assessment should include documentation analysis, interviews, and observation. The assessor (team) should review the patient's medical history and care, diagnosis, patient problems, and care plan. The presented model is based on the nursing care quality assessment procedure criteria by H. Lenartowicz – BOHIPSZO by Lenartowicz (1998). This procedure covers 71 sub-criteria divided into eight groups. The individual criteria (*Level 1*) with sub-criteria (*Level 2*) are presented below, taking into account the assumed variable representation as *LR* fuzzy numbers:

1. Safety (*theLevel 1* criterion) is described by a fuzzy variable $S_i(m_{S_i}, \alpha_{S_i}, \beta_{S_i})$ consisting of the following sub-criteria (*theLevel 2 criteria*):

1.1. Electrical, gas, and oxygen installations, apparatus does not endanger the patient, the patient is instructed on safe behavior, warning notices are posted $S_{i-1}(m_{S_{i-1}}, \alpha_{S_{i-1}}, \beta_{S_{i-1}})$

1.2. The rooms (patient room, treatment room, corridor, and others) are: tidy, adequately lit at night, dry floors, proper cleaning, beds secured with sidewalls or other means, windows and doors secured, if necessary $S_{i-2}(m_{S_{i-2}}, \alpha_{S_{i-2}}, \beta_{S_{i-2}})$

1.3. Efficient signaling is within reach of the patient in the room, bathroom, toilet, appropriate handles, and handrails are attached, the trolley and the bed have efficient brakes $S_{i-3}(m_{S_{i-3}}, \alpha_{S_{i-3}}, \beta_{S_{i-3}})$

1.4. The ward first aid kit is not accessible to unauthorized persons. Medicines and infusion fluids are stored in their original packaging and a designated place. Disinfectants and other chemicals are not available to patients $S_{i-4}(m_{S_{i-4}}, \alpha_{S_{i-4}}, \beta_{S_{i-4}})$

1.5. Standards for calling a resuscitation team and managing an emergency are developed and known to nurses. Appropriate equipment and pharmacological agents are prepared $S_{i-5}(m_{S_{i-5}}, \alpha_{S_{i-5}}, \beta_{S_{i-5}})$

1.6. The course of action in the event of a fire and the method of evacuating the sick are known to nurses and auxiliary staff. Fire fighting equipment is in place $S_{i-6}(m_{S_{i-6}}, \alpha_{S_{i-6}}, \beta_{S_{i-6}})$

1.7. The patient is wearing an identification bracelet. On the front of his nursing record, he is allergic to what drugs. His name and surname are written on the Bed $S_{i-7}(m_{S_{i-7}}, \alpha_{S_{i-7}}, \beta_{S_{i-7}})$

2. Protection against infection (*Level 1* criterion) is described by a fuzzy variable $PAI_i(m_{PAI_i}, \alpha_{PAi_i}, \beta_{PAI_i})$ consisting of the following sub-criteria (*Level 2*criteria):

2.1. The nurse acts aseptically in performing or assisting in all procedures requiring sterility $PAI_{i-1}(m_{PAI_{i-1}}, \alpha_{PAI_{i-1}}, \beta_{PAI_{i-1}})$

2.2. Tools are disposable or sterilized according to the rules. Sterility is checked regularly, and validity periods are adhered to $PAI_{i-2}(m_{PAI_{i-2}}, \alpha_{PAI_{i-2}}, \beta_{PAI_{i-2}})$

2.3. Disinfected by established rules are: medical equipment, e.g., incubators, respirators, oxygen masks, etc., sanitary equipment, e.g., swimming pools, ducks, bowls, IV stands, heating booths, furniture, beds with mattresses, cabinets $PAI_{i-3}(m_{PAI_{i-3}}, \alpha_{PAI_{i-3}}, \beta_{PAI_{i-3}})$

2.4. Handling of clean and dirty underwear, dishes, kitchen waste, used dressing material and disposable equipment, etc. $PAI_{i-4}(m_{PAI_{i-4}}, \alpha_{PAI_{i-4}}, \beta_{PAI_{i-4}})$

2.5. The ward rooms are disinfected according to the rules, and often Aires $PAI_{i-5}(m_{PAI_{i-5}}, \alpha_{PAI_{i-5}}, \beta_{PAI_{i-5}})$

2.6. A potentially infected and contagious patient is isolated by a sanitary regime. The used equipment, underwear, other material is destroyed correctly, moved, disinfected, and sterilized $PAI_{i-6}(m_{PAI_{i-6}}, \alpha_{6PAI_{i-6}}, \beta_{PAI_{i-6}})$

2.7. Nurses and their staff: wash their hands after each activity, use different protective equipment (gloves, gowns ...) adequately to the situation $PAI_{i-7}(m_{PAI_{i-7}}, \alpha_{PAI_{i-7}}, \beta_{PAI_{i-7}})$

2.8. All nurses and auxiliary staff have up-to-date health records. The Nursing Infection Committee represents nursing. Nurses know the infection rate inside the hospital where they work $PAI_{i-8}(m_{PAI_{i-8}}, \alpha_{PAI_{i-8}}, \beta_{PAI_{i-8}})$

3. Hotel services and satisfaction of needs (*Level 1* criterion) are described by a fuzzy variable $HSMN_i(m_{HSMN_i}, \alpha_{HSMN_i}, \beta_{HSMN_i})$ and consists of the following sub-criteria (*Level 2*criteria):

3.1. The patient's room is adequately spacious and furnished. The patient was helped to maintain body temperature (heating/cooling). The bathroom and toilet are clean $HSMN_{i-1}(m_{HSMN_{i-1}}, \alpha_{HSMN_{i-1}}, \beta_{HSMN_{i-1}})$

3.2. The bed is comfortable and clean. The bedside cabinet, screen, curtains, floor are clean $HSMN_{i-2}(m_{HSMN_{i-2}}, \alpha_{HSMN_{i-2}}, \beta_{HSMN_{i-2}})$

3.3. The patient's body (skin, mucosa, teeth, hair, nails) is clean. Underwear, bed linen, towels are clean. The male patient is shaven; the female patient is combed. Personal hygiene products such as soap, toothpaste, comb, and slippers are provided by the ward when needed $HSMN_{i-3}(m_{HSMN_{i-3}}, \alpha_{HSMN_{i-3}}, \beta_{HSMN_{i-3}})$

3.4. The patient is allowed to use his clothes, as long as there are no clear contraindications $HSMN_{i-4}(m_{HSMN_{i-4}}, \alpha_{HSMN_{i-4}}, \beta_{HSMN_{i-4}})$

3.5. The patient is provided with a comfortable and proper position and peace and quiet, conducive to rest during the day and night. The patient is not woken up in the morning to wash, take temperature, and other procedures $HSMN_{i-5}(m_{HSMN_{i-5}}, \alpha_{HSMN_{i-5}}, \beta_{HSMN_{i-5}})$

3.6. A lying patient can regulate the radio, TV, and bedside lighting. The locker, bedside table, and other personal equipment are within easy reach of the patient $HSMN_{i-6}(m_{HSMN_{i-6}}, \alpha_{HSMN_{i-6}}, \beta_{HSMN_{i-6}})$

3.7. The patient was assisted in starting or limiting his movement. The patient can use a cane, stroller support, stroller. The recommended exercises are performed frequently enough by the patient himself. Activities performed with the help of a nurse $HSMN_{i-7}(m_{HSMN_{i-7}}, \alpha_{HSMN_{i-7}}, \beta_{HSMN_{i-7}})$

3.8. The patient receives meals according to the ordered diet, at the right temperature. Meals served at the right time. Dishes and cutlery are aesthetic, clean, and properly stored $HSMN_{i-8}(m_{HSMN_{i-8}}, \alpha_{HSMN_{i-8}}, \beta_{HSMN_{i-8}})$

3.9. The patient is watered and fed by the nurse without rush, in a calm atmosphere $HSMN_{i-9}(m_{HSMN_{i-9}}, \alpha_{HSMN_{i-9}}, \beta_{HSMN_{i-9}})$

3.10. The patient was encouraged to consume or limit fluids and food. The patient received help with nausea and vomiting $HSMN_{i-10}(m_{HSMN_{i-10}}, \alpha_{HSMN_{i-10}}, \beta_{HSMN_{i-10}})$

3.11. The following are properly stored: - private, valuable things, food of the patient $HSMN_{i-11}(m_{HSMN_{i-11}}, \alpha_{HSMN_{i-11}}, \beta_{HSMN_{i-11}})$

3.12. The patient was given a pool/duck as soon as he asked. The dish was picked up without being asked to retake it. Bowel movements and urination are recorded and regulated $HSMN_{i-12}(m_{HSMN_{i-12}}, \alpha_{HSMN_{i-12}}, \beta_{HSMN_{i-12}})$

4. Information (*Level 1* criterion) is described as a fuzzy variable $I_i(m_{I_i}, \alpha_{I_i}, \beta_{I_i})$ and consists of the following sub-criteria (*Level 2*criteria):

4.1. The patient has access to information about the types, scope, and conditions of care provided by the hospital/institution. He is informed of all his rights. Familiar with the course of submitting complaints and information. An information booklet and a written set of his rights are available $I_{i-1}(m_{I_{i-1}}, \alpha_{I_{i-1}}, \beta_{I_{i-1}})$

4.2. The patient was familiarized with: - the layout of rooms in the ward, facilities for patients in the community and the hospital, - customs, daily schedule, with patients from the same room $I_{i-2}(m_{I_{i-2}}, \alpha_{I_{i-2}}, \beta_{I_{i-2}})$

4.3. The patient knows the name and surname of the treating physician, ward nurse, and nurse responsible for his care. It is customary in the ward to introduce themselves to the sick, giving their functions $I_{i-3}(m_{I_{i-3}}, \alpha_{I_{i-3}}, \beta_{I_{i31}})$

4.4. The patient is acquainted with the state of health - diseases that determine the scope of nursing - in an accessible way. He receives real-time information about everything that has to be done and why. Has access to the nursing documentation, demands that it be supplemented if it is incomplete or corrected if it is inaccurate $I_{i-4}(m_{I_{i-4}}, \alpha_{I_{i-4}}, \beta_{I_{i-4}})$

4.5. The confidentiality of the information obtained during the patient-nurse contacts and obtained from other sources is maintained $I_{i-5}(m_{I_{i-5}}, \alpha_{I_{i-5}}, \beta_{I_{i-5}})$

5. The subjectivity of the patient (*Level 1* criterion) is described by a fuzzy variable $SP_i(m_{SP_i}, \alpha_{SP_i}, \beta_{SP_i})$ and consists of the following sub-criteria (*Level 2* criteria):

5.1. After informing about the goals, course, expected results, and consequences, the nurse asks the patient for consent to the proposed treatment and nursing procedures, demonstration for educational purposes and the presence of students, visits of people not related to the patient, and not taking part in care, participation in surveys and research scientific $SP_{i-1}(m_{SP_{i-1}}, \alpha_{SP_{i-1}}, \beta_{SP_{i-1}})$

5.2. The patient or a close person takes part in the care planning, co-decides on the method of nursing and the duration of the procedure, if there are different methods and different times are possible. It is included in the course of a medical visit. It is included in the duration of a nursing visit $SP_{i-2}(m_{SP_{i-2}}, \alpha_{SP_{i-2}}, \beta_{SP_{i-2}})$

5.3. The nurse respects the patient's moral and cultural values, beliefs, and beliefs. He does not comment; he does not judge. Religious needs are respected $SP_{i-3}(m_{SP_{i-3}}, \alpha_{SP_{i-3}}, \beta_{SP_{i-3}})$

5.4. The nurse: - addresses the patient with his favorite phrase with courtesy and kindness, - listens to the patient carefully, - encourages to express thoughts and feelings - related to his health - illness, especially about anxiety, fear, - talks to the patient during exercise activities, - sitting and talking to the patient, regardless of performing instrumental procedures, - greets the patient and his relatives according to the custom in the ward $SP_{i-4}(m_{SP_{i-4}}, \alpha_{SP_{i-4}}, \beta_{SP_{i-4}})$

5.5. The patient's intimacy and personal dignity are respected. The nurse interviews the patient in a secluded place in a cultural and discreet atmosphere. Performs treatments with closed doors, curtains/screens closed, without the presence of bystanders $SP_{i-5}(m_{SP_{i-5}}, \alpha_{SP_{i-5}}, \beta_{SP_{i-5}})$

5.6. The nurse reacts immediately to the evoking light or sound signals; the patient does not have to repeat the request for the service $SP_{i-6}(m_{SP_{i-6}}, \alpha_{SP_{i-6}}, \beta_{SP_{i-6}})$

5.7. The means of communication between the patient and the external environment are provided: - the patient is visited according to his / her wishes, - access to a telephone enabling privacy of conversations is easy, - the patient can use the hospital's book collection, - the patient can use the daily press, correspondence contacts are facilitated $SP_{i-7}(m_{SP_{i-7}}, \alpha_{SP_{i-7}}, \beta_{SP_{i-7}})$

5.8. The nurse organizes the patient's free time: - reads to the patient, writes on his / her behalf, - initiates group games, encourages new interests, and Hobbes $SP_{i-8}(m_{SP_{i-8}}, \alpha_{SP_{i-8}}, \beta_{SP_{i-8}})$

5.9. A nurse helps an injured patient to maintain his physical appearance as desired. It gives evidence that it is not rejected $SP_{i-9}(m_{SP_{i-9}}, \alpha_{SP_{i-9}}, \beta_{SP_{i-9}})$

5.10. A dying patient hates physical pain. He is not alone; nurturing continues. The nurse is present, maintains contacts until the end, touches him, holds his hands, the seriousness of death is preserved. The family was shown to help ease their pain $SP_{i-10}(m_{SP_{i-10}}, \alpha_{SP_{i-10}}, \beta_{SP_{i-10}})$

6. Self-care (*Level 1* criterion) is described as a fuzzy variable $SC_i(m_{SC_i}, \alpha_{SC_i}, \beta_{SC_i})$ and consists of the following sub-criteria (*Level 2*criteria):

6.1. Teaching the patient/relatives are included in the plan $SC_{i-1}(m_{SC_{i-1}}, \alpha_{SC_{i-1}}, \beta_{SC_{i-1}})$

6.2. The patient (relatives) was provided with information on a healthy lifestyle: improving breathing, quantitative and qualitative needs of the body, caloric content and methods of preparing meals, fluid balance, personal hygiene, means and methods of regulating excretion, regulating temperature, heating and cooling the body, functioning of the system sexual maturity, emotional, moral, bodily, sexual maturity, human values of sex life, contraception, physical activity, sleep, rest, ways of maintaining physical fitness, self-acceptance, emotional balance and self-confidence, the satisfaction of mental needs, participation in cultural life, maturity and social sensitivity of family, social and social life, biological and environmental threats, specific risk factors and disease prevention $SC_{i-2}(m_{SC_{i-2}}, \alpha_{SC_{i-2}}, \beta_{SC_{i-2}})$

6.3. The patient/family was taught self-monitoring of a health condition: measuring body temperature, pulse, blood pressure, body weight, and breast examination (women). The patient is aware of the values accepted as normal $SC_{i-3}(m_{SC_{i-3}}, \alpha_{SC_{i-3}}, \beta_{SC_{i-3}})$

6.4. The patient is encouraged, convinced, and motivated to lead a healthy lifestyle $SC_{i-4}(m_{SC_{i-4}}, \alpha_{SC_{i-4}}, \beta_{SC_{i-4}})$

6.5. Patient: understands the essence of his disease, its causes, symptoms, dietary and surgical treatment, type of surgery and consequences, pharmacological, names, doses and effects of drugs, rehabilitation, and the perspective of health/limitations. Patient: knows how to perform appropriate nursing, treatment, and rehabilitation activities, e.g., urine tests, injections, has received a written set of recommendations and descriptions of medicines at home, knows how to notice changes in health, knows what symptoms he cannot ignore, knows how to proceed, where and when to get checked $SC_{i-5}(m_{SC_{i-5}}, \alpha_{SC_{i-5}}, \beta_{SC_{i-5}})$

6.6. The patient knows how to eliminate harmful factors in his lifestyle and environment related to his health – disease $SC_{i-6}(m_{SC_{i-6}}, \alpha_{SC_{i-6}}, \beta_{SC_{i-6}})$

7. Treatment and care treatments (*Level 1* criterion) is described by a fuzzy variable $T_i(m_{T_i}, \alpha_{T_i}, \beta_{T_i})$ and consists of the following sub-criteria (*Level 2* criteria):

7.1. Basic and patient-specific health parameters - diseases are measured, observed, recorded $T_{i-1}(m_{T_{i-1}}, \alpha_{T_{i-1}}, \beta_{T_{i-1}})$

7.2. Material samples for testing were collected: after the patient was prepared, on the agreed day and time, in the right way $T_{i-2}(m_{T_{i-2}}, \alpha_{T_{i-2}}, \beta_{T_{i-2}})$

7.3. Other diagnostic procedures were performed: after preparing the patient on time, using the right technique

7.4. The patient is given medication: in the right dose, often enough to eliminate the pain $T_{i-4}(m_{T_{i-4}}, \alpha_{T_{i-4}}, \beta_{T_{i-4}})$

7.5. The nurse changed position, used other measures to relieve pain $T_{i-5}(m_{T_{i-5}}, \alpha_{T_{i-5}}, \beta_{T_{i-5}})$

7.6. Care of: skin exposed to pressure, wounds, bedsores, fistulas according to $T_{i-6}(m_{T_{i-6}}, \alpha_{T_{i-6}}, \beta_{T_{i-6}})$

7.7. The patient received the prescribed medications: in the right dose, at the right time, the right way and technique, by authorized persons, the principle of one-person responsibility for the administered medication is applied $T_{i-7}(m_{T_{i-7}}, \alpha_{T_{i-7}}, \beta_{T_{i-7}})$

7.8. Supplemental oxygen is properly administered (amount, hydration, tubing/mask fixation) $T_{i-8}(m_{T_{i-8}}, \alpha_{T_{i-8}}, \beta_{T_{i-8}})$

7.9. Catheter drainage: aseptic drains and pouches, their placement facilitates drainage, closed drainage (protection against dust), perineal toilet performer $T_{i-9}(m_{T_{i-9}}, \alpha_{T_{i-9}}, \beta_{T_{i-9}})$

7.10. Anti-inflammatory treatments performed: punctually, by the established rules, by an employee with sufficient qualifications $T_{i-10}(m_{T_{i-10}}, \alpha_{T_{i-10}}, \beta_{T_{i-10}})$

7.11. Other treatments performed: after preparing the patient on time, using the right technique $T_{i-11}(m_{T_{i-11}}, \alpha_{T_{i-11}}, \beta_{T_{i-11}})$

7.12. Rehabilitation procedures are performed: after preparing the patient, often enough, with the correct technique $T_{i-12}(m_{T_{i-12}}, \alpha_{T_{i-12}}, \beta_{T_{i-12}})$

7.13. Procedures do not unnecessarily limit the patient's independence (e.g., needles, drips, drains, dressings, pouches are carefully applied, the patient can move/walk) $T_{i-13}(m_{T_{i-13}}, \alpha_{T_{i-13}}, \beta_{T_{i-13}})$

8. Organization and documentation (*Level 1* criterion) are described as a fuzzy variable $OD_i(m_{OD_i}, \alpha_{OD_i}, \beta_{OD_i})$ and consists of the following sub-criteria (*Level 2* criteria):

8.1. The nursing practice in the ward is theory-based. The department (nurses) has a formulated mission $OD_{i-1}(m_{OD_{i-i}}, \alpha_{OD_{i-1}}, \beta_{OD_{i-1}})$

8.2. Each patient has an assigned nurse responsible for his care and stay in the institution; the patient knows about it and experiences her role $OD_{i-2}(m_{OD_{i-2}}, \alpha_{OD_{i-2}}, \beta_{OD_{i-2}})$

8.3. The patient's condition was diagnosed on admission: physically, emotionally, mentally, and socially. The collected data and the results of the performed measurements are recorded in the documentation $OD_{i-3}(m_{OD_{i-3}}, \alpha_{OD_{i-3}}, \beta_{OD_{i-3}})$

8.4. The patient's nursing problems are recognized and recorded in the documentation $OD_{i-4}(m_{OD_{i-4}}, \alpha_{OD_{i-4}}, \beta_{OD_{i-4}})$

8.5. Care plan (goals, activities, methods, resources, deadlines, frequency of activities performed independently by the patient and by the nurse): is developed by the nurses, is developed together with the patient (family), is updated, has a written form accessible to the patient and not available for bystanders $OD_{i-5}(m_{OD_{i-5}}, \alpha_{OD_{i-5}}, \beta_{OD_{i-5}})$

8.6. The patient/family is involved in the care. Delivery of care, response to therapy, progress, and results are recorded $OD_{i-6}(m_{OD_{i-6}}, \alpha_{OD_{i-6}}, \beta_{OD_{i-6}})$

8.7. Cards: feverish, fluid balance, additional observational - carefully carried out. Reports: are carefully and accurately kept $OD_{i-7}(m_{OD_{i-7}}, \alpha_{OD_{i-7}}, \beta_{OD_{i-7}})$

8.8. Between each shift of duty: there is a report, a nursing round of the staffing of both changes, regular conferences in the ward on the quality of nursing $OD_{i-8}(m_{OD_{i-8}}, \alpha_{OD_{i-8}}, \beta_{OD_{i-8}})$

8.9. The patient's discharge is planned together (with him or his family). Adequate persons and institutions notified to ensure continuity of care $OD_{i-9}(m_{OD_{i-9}}, \alpha_{OD_{i-9}}, \beta_{OD_{i-9}})$

8.10. The nurse responsible for patient care cooperates with the treating physician, rehabilitator, and other specialists in the field of care for "his patient." $OD_{i-10}(m_{OD_{i-10}}, \alpha_{OD_{i-10}}, \beta_{OD_{i-10}})$

There are eight criteria in the presented model. Descriptive sub-criteria were assigned to each standard. To assess the quality, you can choose criteria and sub-criteria based on which the quality of the examined health center's nursing services will be evaluated. Randomly selected patients assess care. In the BOHIPSZO procedure, three variants of the assessment were adopted: YES, NO, NO REQUIREMENT. Individual criteria were estimated on a multi-point scale. The sum of all requirements was 240 points (100%). In the final stage, the overall nursing care factor is calculated, making it possible to compare the state of care provided to the level of care that the patient should receive. In the model presented in this article, it is assumed that a scale of 0 to 10 is used to assess nursing care in a health center, which enables a broader assessment taking into account the degree of meeting a given criterion. Because each sub-criterion consists of several factors presented in a descriptive form, the possibility of a range assessment expressing the assessment's uncertainty were taken into account [min; max]. In the proposed model, the possibility of taking into account the importance of individual criteria and sub-criteria is also used, if the person (team, institution) ordering the assessment differentiates the weight of unique criteria.

Once the scores against the selected criteria have been determined, the next step is to calculate each patient's final nursing care score. Depending on the purpose of the assessment, two (or more) health centers can be compared in

terms of nursing care - in the case of comparative analysis, or the level of care offered to the level of care that the patient should receive - achieving the maximum number of points for each of the sub-criteria adopted. On this basis, it will be possible to determine the strengths and weaknesses of the health center and deficiencies in the implementation of individual areas of nursing care. In the final stage of the assessment, a global evaluation of the quality of care is determined for the entire surveyed health center (or its unit).

Multi-criteria fuzzy model of nursing care quality assessment

In the presented model, it is assumed that *N* patients are involved in determining the ratings. The set of patients *P* is determined:

$$P = \{P_1, P_2, ..., P_i, ..., P_N\} \qquad i = 1, ..., N \tag{4}$$

The importance of groups of criteria (*Level 1* criteria) is given in the variable W_k (*k-Level 1* criteria). It is assumed that the importance of the requirements are set on the interval [0,1], which is related to the condition that the sum of the weights of the criteria expressed by the decision-maker must be 1.

$$\sum_{k=1}^{8} W_k = 1. \tag{5}$$

The Level 2 criteria' validity - *Level 1* sub-criteria is described by a variable W_{kj} (*k-Level 1* criterion, *j-Level 2* criterion). As in the *Level 1* criteria, the importance of the requirements is set at [0,1], and the sum of the weights of the criteria must be 1.

$$\sum_{j=1}^{J} W_{kj} = 1. \tag{6}$$

Below are the general rules for describing the assessment of the quality of care to individual sub-criteria using the fuzzy number of the *LR* type O_{ikj}, defined characteristic three $(m_{O_{ikj}}, \alpha_{O_{ikj}}, \beta_{O_{ikj}})$, where $\alpha_{O_{ikj}}, \beta_{O_{ikj}} > 0$ are fixed left and right scatter (range expressing uncertainty as to the precision of this term), $m_{O_{ikj}}$ is the determining value - the most expected or average calculated according to the formula:

$$o_{ikj}^{\text{mod}} = \frac{o_{ikj}^{\min} + o_{ikj}^{\max}}{2} \tag{7}$$

The *L* and *R* functions are fixed base functions described by the formula (2). Assessments o_{ikj} are treated as "around o_{ikj}^{mod}, "and the uncertainty as to the precise determination is expressed in the form of the limits of the range [$o_{ikj}^{\min}$, $o_{ikj}^{\max}$]:

$$L(o_{ikj}) = R(o_{ikj}) = \begin{cases} 0 & dla \quad o_{ikj} < m_{ikj} - \alpha_{O_{ikj}} \\ 1 - |o_{ikj}| & dla \quad m_{O_i kj} + \beta_{O_i kj} \geq o_{ikj} \geq m_{O_{ikj}} - \alpha_{O_i kj}, \\ 0 & dla \quad o_{ikj} > m_{O_{ikj}} + \beta_{O_{ikj}} \end{cases} \tag{8}$$

Because the value of qualitative assessments o_{ikj} is treated as the degree of care fulfillment for the *i*-th patient of a particular ideal state in the light of a given criterion, the value of these assessments should be normalized.

$$\hat{\alpha}_{O_{ikj}} = \frac{\alpha_{O_{ikj}}}{\max\ (m_{kj} + \beta_{kj})}, \tag{9}$$

$$\hat{m}_{O_{kji}} = \frac{m_{O_{ikj}}}{\max\ (m_{kj} + \beta_{kj})}, \tag{10}$$

$$\hat{\beta}_{O_{ikj}} = \frac{\beta_{O_{ikj}}}{\max\ (m_{kj} + \beta_{kj})}, \tag{11}$$

where $\max(o_{kj}^{\max})$ is the highest value among the lawful limits of patient care ratings for a given criterion $(m_{O_{kj}} + \beta_{O_{kj}})$. After normalization, the variables $\hat{\alpha}_{O_{ikj}}$ $\hat{m}_{O_{ikj}}$ i $\hat{\beta}_{O_{ikj}}$ are the new valid variables $m_{O_{ikj}}, \alpha_{O_{ikj}}, \beta_{O_{ikj}}$. The membership function of the care assessment *i* –patient concerning a given standard is as follows:

$$\mu_{O_{ikj}}(o_i) = \begin{cases} L\left(\dfrac{m_{O_{ikj}} - o_{ikj}}{\alpha_{O_i}}\right) & dla \quad o_{ikj} < m_{O_{ikj}} \\ 1 \quad dla \quad o_{ikj} = m_{O_{ikj}} & \\ R\left(\dfrac{o_{ikj} - m_{O_{jkj}}}{\beta_{O_{ikj}}}\right) & dla \quad o_{ikj} > m_{O_{ikj}} \end{cases}. \tag{12}$$

When normalized scores against *the Level 2* criteria are defined, care scores against the higher tier criterion (*Level 1*) can be defined as the sum of scores for each standard within a given group (if you include criteria weights, define a weighted assessment of patient care within each group).

Assuming that O_{igj} it is the assessment of care against *the Level 2* criterion, determined by the characteristic three $(m_{O_{ikj}}, \alpha_{O_{igj}}, \beta_{O_{igj}})$, the final assessment against *the Level 1* criterion O_{ik} is as follows:

$$O_{ik} = \frac{\sum_{j=1}^{J} W_{kj} \cdot O_{ikj}}{\sum_{j=1}^{J} W_{kj}}. \tag{13}$$

Since O_{ik} it is an assessment of care against *the Level 1* criterion, the defined characteristic Tyree $(m_{O_{ik}}, \alpha_{O_{ik}}, \beta_{O_{ik}})$, the final evaluation of respect for the *i*-th patient against the global standard O_i is as follows:

$$O_i = \frac{\sum_{k=1}^{K} W_k \cdot O_{ik}}{\sum_{k=1}^{K} W_k}. \tag{14}$$

This operation assigns each patient in the *P* set a fuzzy score against the worldwide criterion. The next step of the algorithm is defuzzification, i.e., determining the fuzzy evaluation's real number. This paper proposes the center of gravity method:

$$O_i = \frac{3 \cdot m_i - \alpha_i + \beta_i}{3}. \tag{15}$$

At this stage, the strengths and weaknesses of nursing care can be identified in detail.Based on the received nursing care ratings for individual patients, the overall nursing care rating for a given unit of a health facility can be determined according to the formula:

$$O = \frac{\sum_{i=1}^{N} O_i}{N}. \tag{16}$$

Based on the received assessment of a given health center's care, a comparative analysis of the obtained results of various units can be made. The higher the rating value, the higher the positive opinion a given center receives.

Assuming the above general model and the designation of fuzzy variables representing the assessments of nursing care by individual patients, we proceed to the first step, i.e., the membership function's determination for the reviews against *the Level 2* criterion. For example, for *the Level 2* criterion –"Electrical, gas, and oxygen installations, apparatus does not endanger the patient, the patient is instructed on safe behavior, warning notices are placed"described the formula describes fuzzy variable membership function:

$$\mu_{S_{ikj}}(s_i) = \begin{cases} L\left(\dfrac{m_{S_{ikj}} - s_{ikj}}{\alpha_{s_i}}\right) & dla \quad s_{ikj} < m_{s_{ikj}} \\ 1 \quad dla \quad s_{ikj} = m_{S_{ikj}} & \\ R\left(\dfrac{s_{ikj} - m_{S_{jkj}}}{\beta_{S_{ikj}}}\right) & dla \quad s_{ikj} > m_{S_{ikj}} \end{cases}. \tag{17}$$

Similarly, we define the membership function for the grades against the subsequent *Level 2* criteria.

The next step is to normalize the assessments determined by patients based on*the Level 2* criteria. For example, for *the Level 1* criterion - "Safety"and the first sub-criterion " Electrical, gas, and oxygen installations, devices do not pose a threat to the patient, the patient has been instructed on safe behavior, warning notices are placed"the described variable $S_{i-1}(m_{S_{i-1}}, \alpha_{S_{i-1}}, \beta_{S_{i-1}})$ normalization is as follows:

$$\hat{\alpha}_{S_{i-1}} = \frac{\alpha_{S_{i-1}}}{\max(m_{S_{k1}} + \beta_{S_{k1}})}, \tag{18}$$

$$\hat{m}_{S_{i-1}} = \frac{m_{S_{i-1}}}{\max(m_{S_{k1}} + \beta_{S_{k1}})}, \tag{19}$$

$$\hat{\beta}_{S_{i-1}} = \frac{\beta_{S_{i-1}}}{\max(m_{S_{k1}} + \beta_{S_{k1}})}, \tag{20}$$

where $\max(m_{S_{k1}} + \beta_{S_{k1}})$ is the highest value among the lawful limits of patient care ratings under the criterion specified in 1.1.: $(m_{S_{k1}} + \beta_{S_{k1}})$. After normalizing, the variables $\hat{\alpha}_{S_{i-1,k1}}$, $\hat{m}_{S_{i-1,k1}}$ i $\hat{\beta}_{S_{i-1,k1}}$ are the new valid variables $m_{S_{i-1,k1}}, \alpha_{S_{i-1,k1}}, \beta_{S_{i-1,k1}}$. We formalize the grades in the same way against all *Level 2* criteria.

When normalized scores against *Level 2* criteria are defined, care scores against a higher tier criterion (*Level 1*) can be defined as the sum of scores for each standard within a given group (if you include criteria weights, define a weighted assessment of patient care within each group). And so, the judgments against *the Level 1* criteria are as follows:

1. Safety

$$S_i = \frac{W_{1,1} \cdot S_{i-1} + W_{1,2} \cdot S_{i-2} + W_{1,2} \cdot S_{i-3} + W_{1,4} \cdot S_{i-4} + W_{1,5} \cdot S_{i-5} + W_{1,6} \cdot S_{i-6} + W_{1,7} \cdot S_7}{\sum_{j=1}^{7} W_{1j}}. \tag{21}$$

2. Protection against infections

$$PAI_i = \frac{W_{2,1} \cdot PAI_{i-1} + W_{2,2} \cdot PAI_{i-2} + W_{2,2} \cdot PAI_{i-3} + W_{2,4} \cdot PAI_{i-4} + W_{2,5} \cdot PAI_{i-5}}{\sum_{j=1}^{8} W_{2j}} +$$

$$+ \frac{+ W_{2,6} \cdot PAI_{i-6} + W_{2,7} \cdot PAI_{i-7} + W_{2,8} \cdot PAI_{i-8}}{\sum_{j=1}^{8} W_{2j}}. \tag{22}$$

3. Hotel services and meeting your needs

$$HSMN_i = \frac{W_{3,1} \cdot HSMN_{i-1} + W_{3,2} \cdot HSMN_{i-2} + W_{3,2} \cdot HSMN_{i-3} + W_{3,4} \cdot HSMN_{i-4} + W_{3,5} \cdot HSMN_{i-5} + W_{3,6} \cdot HSMN_{i-6}}{\sum_{j=1}^{12} W_{3j}} +$$

$$+ \frac{W_{3,7} \cdot HSMN_{i-7} + W_{3,8} \cdot HSMN_{i-8} + W_{3,9} \cdot HSMN_{i-9} + W_{3,10} \cdot HSMN_{i-10} + W_{3,11} \cdot HSMN_{i-11} + W_{3,12} \cdot HSMN_{i-12}}{\sum_{j=1}^{12} W_{3j}} \tag{23}$$

4. Information

$$I_i = \frac{W_{4,1} \cdot I_{i-1} + W_{4,2} \cdot I_{i-2} + W_{4,2} \cdot I_{i-3} + W_{4,4} \cdot I_{i-4} + W_{4,5} \cdot I_{i-5}}{\sum_{j=1}^{5} W_{4j}}. \tag{24}$$

5. The subjectivity of the patient

$$SP_i = \frac{W_{5,1} \cdot SP_{i-1} + W_{5,2} \cdot SP_{i-2} + W_{5,2} \cdot SP_{i-3} + W_{5,4} \cdot SP_{i-4} + W_{5,5} \cdot SP_{i-5}}{\sum_{j=1}^{10} W_{5j}} +$$

$$+ \frac{W_{5,1} \cdot SP_{i-6} + W_{5,1} \cdot SP_{i-7} + W_{5,1} \cdot SP_{i-8} + W_{5,1} \cdot SP_{i-9} + W_{5,1} \cdot SP_{i-10}}{\sum_{j=1}^{10} W_{5j}} \tag{25}$$

6. Self-care

$$SC_i = \frac{W_{6,1} \cdot SC_{i-1} + W_{6,2} \cdot SC_{i-2} + W_{6,2} \cdot SC_{i-3} + W_{6,4} \cdot SC_{i-4} + W_{6,5} \cdot SC_{i-5} + W_{6,6} \cdot SC_{i-6}}{\sum_{j=1}^{6} W_{6j}}. \tag{26}$$

7. Healing and beauty treatments

$$T_i = \frac{W_{7,1} \cdot T_{i-1} + W_{7,2} \cdot T_{i-2} + W_{7,2} \cdot T_{i-3} + W_{7,4} \cdot T_{i-4} + W_{7,5} \cdot T_{i-5} + W_{7,6} \cdot T_{i-6}}{\sum_{j=1}^{13} W_{7j}} +$$

$$+ \frac{W_{7,7} \cdot T_{i-7} + W_{7,8} \cdot T_{i-8} + W_{7,9} \cdot T_{i-9} + W_{7,10} \cdot T_{i-10} + W_{7,11} \cdot T_{i-11} + W_{7,12} \cdot T_{i-12} + W_{7,13} \cdot T_{i-13}}{\sum_{j=1}^{13} W_{7j}} \tag{27}$$

8. Organization and documentation

$$T_i = \frac{W_{8,1} \cdot T_{i-1} + W_{8,2} \cdot T_{i-2} + W_{8,2} \cdot T_{i-3} + W_{8,4} \cdot T_{i-4} + W_{8,5} \cdot T_{i-5}}{\sum_{j=1}^{10} W_{8j}} +$$

$$+ \frac{W_{8,6} \cdot T_{i-7} + W_{8,6} \cdot T_{i-8} + W_{8,8} \cdot T_{i-9} + W_{8,9} \cdot T_{i-10} + W_{8,10} \cdot T_{i-10}}{\sum_{j=1}^{10} W_{8j}} \quad (28)$$

Since the quality of care ratings o_{ik} are treated as the degree of fulfillment of care for the *i*-th patient of a specific ideal condition in light of a given criterion, these ratings' values should be normalized. For example, for *the Level 1* criterion - "Safety," standardization is carried out according to the following formulas:

$$\hat{\alpha}_{S_i} = \frac{\alpha_{S_i}}{\max(m_S + \beta_S)}, \quad (29)$$

$$\hat{m}_{S_i} = \frac{m_{S_i}}{\max(m_S + \beta_S)}, \quad (30)$$

$$\hat{\beta}_{S_i} = \frac{\beta_{S_i}}{\max(m_S + \beta_S)}, \quad (31)$$

where $\max(m_S + \beta_S)$ is the highest value among the legal limits of patient care ratings under the "Safety" criterion $(m_S + \beta_S)$. After normalization, thevariables $\hat{\alpha}_{S_i}$ $\hat{m}_{S_i}$ i $\hat{\beta}_{S_i}$ are the new valid variables $m_{S_i}, \alpha_{S_i}, \beta_{S_i}$ In the same way, we normalize the scores against all *Level 1* criteria.

After normalizing the scores against *the Level 1* criteria, you can define the care scores against the global standard as the sum of scores for each measure (if you include the criteria weights, specify a weighted score for patient care). Because O_{ik} is the assessment of care against *the Level 1* criterion,criterion, the determined characteristic three $(m_{O_{ik}}, \alpha_{O_{ik}}, \beta_{O_{ik}})$, the final evaluation of respect for the *i*-th patient against the global standard O_i is as follows:

$$O_i = \frac{W_1 \cdot S_i + W_2 \cdot PAI_i + W_3 \cdot HSMN_i + W_4 \cdot I_i + W_5 \cdot SP_i + W_6 \cdot SC_i + W_7 \cdot T_i + W_8 \cdot OD_i +}{\sum_{k=1}^{8} W_k}. \quad (32)$$

The above action assigns each patient in the *P* set a fuzzy nursing care score against the global criterion. The next step in the evaluation procedure is defuzzification, determining the actual number of fuzzy evaluation. In this study, the center of gravity method described by the formula was adopted:

$$O_i = \frac{3 \cdot m_i - \alpha_i + \beta_i}{3}. \quad (33)$$

At this stage, the strengths and weaknesses of nursing care can be identified in detail. It is critical information for the managers of a given health unit.

Based on the nursing care ratings received for individual patients, the overall nursing care rating for a given unit of a health facility can be determined according to the formula:

$$O = \frac{\sum_{i=1}^{N} O_i}{N}. \quad (34)$$

Based on the received assessment of a given health center's care, a comparative analysis of the obtained results of various units can be made. The higher the rating value, the higher the positive opinion a given center receives.

Summary

It seems justified to create quality teams as an indispensable element of ensuring the changes introduced in providing high-quality nursing care. High quality affects the competitiveness of a given health center and its excellent image. It is a testimony to the high level of a given unit among other medical service providers. Each health care unit should strive to obtain the highest possible level of quality of services provided. Systematic estimation of the quality of nursing care provided is an indispensable element. Its deficiencies should be the basis for developing a corrective plan and introducing changes and improvements to improve nursing care quality.

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Explorative Study of Female Leadership Deficit in Indonesia

Dian Rezky Catur PITALOKA
Faculty of Economics and Business Universitas Indonesia, Depok, Indonesia
dian.rezky61@ui.ac.id

Muhammad Irfan SYAEBANI
Faculty of Economics and Business Universitas Indonesia, Depok, Indonesia
syaebani@ui.ac.id

Maria ULPAH
Faculty of Economics and Business Universitas Indonesia, Depok, Indonesia, mulpah@ui.ac.id

Harryanto SUHARDJO
Faculty of Economics and Business Universitas Indonesia, Depok, Indonesia
harryanto.suhardjo@ui.ac.id

Abstract

The lack of women's participation in top management positions is illustrated by the level of involvement that has eroded and the increase in jobs (Huang, Krivkovich, Starikova, Yee, and Zanoschi, 2019). The participation of women at higher levels or strategic positions in the company becomes essential because of the benefits it brings; in terms of social, political, and economics. Researchers want to explore how the Broken Rung phenomenon participates as a cause of Female Leadership Deficit in Indonesia. This study used a qualitative method with the Phenomenology approach. Retrieval of research data by conducting semi-structured in-depth interviews. Research analysis consists of four stages of coding, including open coding, axial coding, selective coding, and process coding. This research concludes that the Broken Rung is not found in Indonesia because before its system was unfair to females, there were already a few females in specific industries. The findings show that it happens due to job/industry stereotyping and self-discrimination by female itself.

Keywords: Broken Rung, Female Leader, Leadership, Gender Equality

Introduction

Based on data from Worldometers (2020), the difference between male and female population is only 0.8%, which means the number of the female population is not much different from the number of the male population. However, in terms of the involvement of women in various productive sectors in the world, women then become a minority, resulting in a significant gap when compared to the participation of men in the same industry. In Indonesia, male labor force participation is 83.9%, and female labor force participation is 54.3% (World Economic Forum, 2019). While the participation rate of women at work continues to increase, the quality of women's involvement in work also needs to be improved. Indonesia ranks 115 out of 152 countries in the category of the labor force participation rate and 112 of 152 in the professional and technical workers category (World Economic Forum, 2019).

The lack of women's participation in top management positions is illustrated by the level of involvement that has eroded and the increasing level of jobs. According to data from Huang et al. (2019), women comprise 48% of entry-level professional staff, and the number decreases with middle and high management positions. Women occupy only 38% of middle-level management positions, and then only 21% enter leadership-level (c-level). The involvement of women in strategic positions is one of the targets to be achieved globally through The Sustainable Development Goals (SDGs) or commonly known as Global Goals in 2015. This target reads:

"Ensure women's **full and effective participation and equal opportunities for leadership at all levels of decision-making** in political, economic, and public life" (Nations, 2015).

According to Desvaux, Devillard, Labaye, Sancier-Sultan, Kossoff, de Zelicourt, and Barton (2017), if every country in the world can close the gender gap, global GDP growth in 2025 may increase to $12 trillion. Indonesia also can

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increase GDP to $135 billion if more women are involved in the productive sector. Research from Powell and Butterfield (2015) shows the importance of having women in strategic positions so that women at lower levels can successfully overcome challenges in their careers. Research from Moreno-Gómez, Lafuente, & Vaillant (2018) said that the representation of women in top management positively affects the company's Return on Assets and Return on Equity.

Gender diversity initiatives have been echoed by leading companies, and not a few female employees have been given opportunities in middle and top-level management. However, women still cannot make it to the top of their careers. There is an opinion that says that the phenomenon of Female Leadership Deficit is rooted in the lack of promotion systems in the company, known as "Broken Rung." This study wants to explore how Broken Rung participates in the Female Leadership Deficit, what factors play a role and how to overcome this phenomenon so that Indonesia can utilize the benefits and maximize the potential that exists from the presence of more female leaders in the company's strategic position (Huang et al., 2019).

Literature Review

Female Leadership and Distributive Justice Theory

Leadership is identified and classified in personal, organizational, and cultural contexts (Howell & Costley, 2006). The definition of leadership varies according to place, social background, work environment, type of industry, and gender (Muna, 2011; Wang, Oh, Courtright, and Colbert, 2011). In the context of gender, psychologists argue that the differentiation of gender roles in human society is based on traits that can be inherited genetically (Buss & Schmitt, 2011). Social role theory (Eagly, 1987) argues that since infancy, boys and girls are subject to different rewards and sanctions. So that women and men in leadership are two different things. The natural state of women, which allows them to conceive, is a limitation on the contribution of women in economic terms compared to men (Wood & Eagly, 2002). Gender is a cultural reference that helps people build and maintain relationships with others. The status of men and women develops into a hierarchy where men are considered more suitable to be leaders.

Women are often categorized as having a transformational leadership style. Some authors even refer to it as "the feminine leadership style" (Chao, 2011; Carless, 1998). Ridgeway (2011) shows that women tend not to be leaders in an environment that consist of a mixture of men and women (Eagly & Karau, 1991), face the problem of legitimacy (Ritter & Yoder, 2004) and get a rougher evaluation when their effectiveness is being questioned (Eagly, Makhijani, and Klonsky, 1992).

Leadership in the gender context illustrates that there are differences between leadership carried out by men and women. The difference in question is how a woman who leads is assessed, treated, and considered different from men, so that in the future, the opportunities that are obtained, the access they have, and the outcome/output produced will also be different (Ridgeway, 2011). This inequality refers to the theory of distributive justice. Distributive justice refers to individual perceptions of whether resource allocation is fair (Greenberg, 1990). Equity theory posits that individuals compare their output/input ratios (Adams, 1963). The output comprises the factors that individuals receive in exchange for investing themselves in their work. Input, on the other hand, refers to situations in which individuals invest themselves. The ideal situation is for individuals to perceive that their ratio is identical to that of others. The differences between gender often reflect injustice and inequity, which, in this context, leads to gender inequality.

The most basic demand for justice is equal treatment of all people in the same situation. Women in leadership positions in companies have fought to achieve gender equality. The United Nations Sexual and Reproductive Health Agency (UNFPA) describes gender equality as the same pleasure/benefit received by women and men for goods, opportunities, resources, and awards. Gender equality does not mean that women are equal to men, but that access to opportunities and changes in life does not depend on or limited by gender. With the explanation above, gender equality needs to be achieved. From the research, there are still inequalities in the enjoyment/benefit of women and men for goods, opportunities, resources, and awards received.

Broken Rung

The initial theory to understand how women develop to achieve leadership positions is explained by Ragins and Sundstrom (1989), they differentiate factors at four levels of analysis, namely social, organizational, interpersonal, and individual. At the individual level, women must have many skills and abilities to become leaders. They must also have a good relationship with their subordinates and co-workers (interpersonal level). Not only that, although women may have good skills and relationships with subordinates, they may face challenges in selection and promotion

(organizational level). Lastly, the social level concentrates on factors such as how people stereotype women's roles (Peus et al., 2015).

At the organizational level, women face recruitment and promotion challenges. This is what the study starts with. The term Broken Rung was first used by Huang et al. (2019) in a report titled "Women in The Workplace 2019" by LeanIn.org & McKinsey & Company. The Broken Rung is said to be the initial cause of a woman's obstacle to occupy a strategic position in the company. The barriers that come from the company promotion system or "Corporate Ladder" are not friendly with female employees' ability to rise to a higher position in the company. Out of every 100 men promoted and employed as managers, only 72 women are promoted and employed as managers (Huang et al., 2019).

The Broken Rung then produces more women who are trapped at the initial managerial level, and fewer women become managers. Therefore, it is not surprising that men end up holding 62% of manager-level positions, while women only hold 38% of positions at the same level (Huang et al., 2019). Because there are far more men than women at the managerial level, fewer women will be employed or promoted to senior managers. The number of women decreases at each subsequent level (Lange, Wodon, and Carey, 2018).

The initial allegation of many women not being in the top position of the company is due to the "opt-out" phenomenon. That is a situation when many women leave the company because they prefer to take care of other things that are considered critical, such as household affairs. Women do not leave companies with higher rates than men. Only less than 2% of female employees plan to leave the workforce to focus on the family; the rest leave to work elsewhere (Huang et al., 2019).

Another problem with this obstacle is that there are only a few companies that are aware of The Broken Rung barriers. This is indicated by the low awareness of the company's HR to provide support for female employees to pursue their careers (Huang et al., 2019).

The Broken Rung focuses more on the causes of problems that are in the company's promotion system. This is because the companies are not aware of the importance of women's representation at the initial managerial level. Companies are satisfied with the number of representations of their female employees at the initial managerial level (Huang et al., 2019). Karam and Afiouni (2014) argue that the roots of individual gendered behaviors and actions lie not only within organizations but also in societies and institutional mechanisms outside of organizations. Hence we try to explore the cause of the female leadership deficit in Indonesia through the organization dimension (particularly, Human Resource Management) as a start point.

Research Method

This study uses a qualitative approach with consideration of topics and research objectives. This qualitative research uses the Phenomenology approach. That is an approach where researchers focus on finding meaning from individual life experiences related to a phenomenon. Then the researchers interpret individual social actions as something that has meaning and has something to do with the phenomenon being studied (Creswell, 2009). The method used in this approach is an in-depth-semi-structured interview. A semi-structured interview itself is an interview where the question and answer session are conducted more flexibly and openly. In choosing research subjects, researchers use a purposive and snowball sampling. The number of research subjects on the purposive and snowball methods is often determined based on theoretical saturation, which is a point where the information obtained no longer provides additional information on the research question. Data on the study did not provide additional information/saturated to the 24th respondent. Twenty-four interviews were conducted with female leaders in their company and human resource managers (Table I). Respondents came from diverse industries.

In analyzing qualitative research, there are at least four stages that can be done to get the results of the research. These stages are open coding, axial coding, selective coding, and process coding (Corbin and Strauss, 2014). These four stages are not rigid and linear, but rather a stage that can be worked on repeatedly.

Before conducting interviews with respondents, a pilot test was conducted with fellow researchers. To guarantee the Internal Validity of this study, researchers used the source triangulation and investigator triangulation. These triangulations are used by using research sources from various reference journals and researches evaluated by external parties. To strengthen the data, researchers provide what is often referred to as "thick description." The thick description (Davis, 1991) is a comprehensive explanation related to the questions that will be asked to the research subject to be understood thoroughly by the research subjects. Reliability of research can be guaranteed using the audit trail, where an auditor checks the information obtained and the methods used in the study (Lincoln and Guba, 1985).

Conformability of the research refers to how much the research results can be confirmed and corroborated by other parties so that this study presents pieces of interview transcripts that are relevant to the topic being discussed (Wahyuni, 2016).

Respondent Profile

The results of this study were taken from 24 respondents who had different backgrounds, industries, and company scopes. In the findings and analysis section, the respondents are divided into high-level employees (female leaders) and middle-level employees. The status of female employees is also divided into single, married and having children, married and not having children, and divorced. The industries of the respondents in this study are not limited, so that from the data above, it can be seen that the existing industries are very diverse. Overall, four respondents are in the technology industry in various fields, for example, finance, textiles, education, to health. In addition to the technology industry, the fast-moving consumer goods (FMCG) industry was also filled by four respondents in this study. Furthermore, the industries, each of which has three respondents, include social and creative media. Meanwhile, there are two respondents each, including mining and island tourism (diving). The rest are diverse industries, and there is only one respondent's representative, namely conventional finance, oil and gas, insurance, mental health, skin health, and transportation. The respondents' length of work experience ranged from 3-27 years. This is understandable because most of the respondents have occupied upper managerial positions, which require much time. Finally, the scope of the company is divided into national and multinational companies. In the findings and analysis, there is no difference between the two company scopes. In both national and multinational companies, women experience obstacles in their respective organizations, which hinders their career advancement in each industry. As for the explanation of the respondent's profile is summarized in the following table:

Table 1: Respondent's Profiles

R	Age (years)	Status	Position	Industry	MNC/National Company	Experience (years)
R1	38	Married, two kids	CEO	Technology	National Company	19
R2	30	Single	Dive Center Manager	Tourism	National Company	6
R3	27	Married	Professional Health and Hygiene Coordinator	Mine	National Company	7
R4	36	Single	Branch Manager	Beauty	National Company	13
R5	30	Single	Executive Editor	Media	MNC	10
R6	24	Single	Founder & CEO	Mental Health	National Company	4
R7	30	Single	Program coordinator	Social	National Company	5
R8	24	Single	CEO and Founder	Garment Technology	National Company	4
R9	29	Single	Operational Head	Basic Needs	National Company	10
R10	38	Married, one kid	General Manager	Digital Agency	National Company	17
R11	43	Married	VP of Strategic Planning & Corporate Management	Oil and Gas	National Company	20
R12	37	Single	Construction Director	Public Transportati on	National Company	12
R13	51	Married	HR Lead	Food	MNC	25

R	Age (years)	Status	Position	Industry	MNC/National Company	Experience (years)
R14	28	Single	Assistant Manager	Tourism	National Company	6
R15	29	Single	Head of Digital	Media	National Company	7
R16	45	Married, four kids	Executive Director	Social	MNC	22
R17	45	Divorce, two kids	Head of Human Capital Policy	Mine	National Company	20
R18	47	Single	Executive Director	Business Coalition	National Company	27
R19	41	Married	Director of Fundraising	Social	MNC	17
R20	26	Single	Business Development	Micro Finance	MNC	8
R21	29	Married	HR Manager	FMCG	MNC	6
R22	32	Married, one kid	HR Leader	Fintech	National Company	10
R23	26	Single	HR Executive	Insurance	National Company	3
R24	30	Single	HR Business Partner	FMCG	MNC	7

Research Result

From the interview, the respondents gave positive responses to the female leader. Not only assuming that women can be good leaders, but most respondents (14 out of 24 respondents) also say women can be good leaders because women have specific characteristics not possessed by men, such as being mothers to create particular abilities.

> In some aspects, women are better than men because we have differences. We are a better listener, we have better intuitive, we are more perseverant, we are more patient, so sometimes we can be better leaders in inspiring other people. Women can be good leaders because women have characteristics that may not be owned by men (Respondent 12)

> Precisely one of the advantages of women is multitasking because we have been trained since childhood. For example, we have to take care of the family and the company, and it is parallel (Respondent 11).

On the question "how can one be a good leader" and its description, researchers refer to several theories of the division of the nature of leaders divided into feminine and masculine (Williams and Best, 1990). The result is that the respondents mention the feminine nature of being able to listen, to have empathy, to protect their subordinates, and to have a service nature. Respondents also mentioned masculine characteristics such as being responsible, providing clear direction to their subordinates, and having good time management skills.

However, respondents mentioned that the nature of leadership is neutral (apart from the feminine and masculine nature), including being able to give an example to subordinates, can create other leaders, be able to move others to achieve common goals, and have an influence where they are on. The neutral attitude shown by the respondents is reflected when answering the question "can a woman be a good leader?" respondents have the view that good leaders do not have a relationship with their gender.

> I do not see any difference. Leadership is not a sex linkage. Other factors are about our character, our knowledge, our competence (Respondent 1)

A total of 11 respondents in this study determined the figure of women as leaders who had lots of personal influences on them. A total of 6 of respondents set the figure of a mother as a true leader who became a role model and gave many lessons:

> My mom works and takes care of the household. We do not have helpers. My mom told me that women must be able to work to have our own income, and we are not being underestimated (Respondent 4).

The figure of a man also becomes a leader and role model that influences the respondents. Six respondents mentioned men as leaders who gave personal influence; 3 of them mentioned the figure of fathers as true leaders:

> ... from my father, because my mom is just a housewife, so automatically I see the leader as my father. It is also because I am close to my father. Mostly if you talk about work, usually we want to tell the story to the person who also works (Respondent 9)

Although the views on women leaders are progressive, some views are still obstacles for women leaders, one of which is the view that leaders should not be women. In certain places or contexts of society, the views of women leaders cannot be separated from the role of women as a mother or a wife.

> Because people still think men should lead. You are a woman, and you want to lead, what's the proof? What have you done? So, we have to show and give proof that we are right. Because it is not enough for men, we have to be more than that. Because even our efforts will be considered less, so it must be more so that it can be seen as equal (Respondent 9).

> There is a double standard for women. It is assumed that women will be successful if the household life is successful (Respondent 12).

Female leaders will also be considered flawed if it is proven to fail to separate their personal and professional affairs, where the female leader, in this case, does have a dual role as a leader and also a wife/mother. The female leader will also be judged poor because of the system she passed as a leader so that when her performance is low, the system/rules will be criticized.

> The bad thing is that, what is forced, leaders must be female because this is the share of females, only for diversity, so there must be females without even seeing their competencies. Right now, some companies must have at least several females, so they were accepted just for the sake because they are females and it does not fair. She got the position, there is a privilege for female (Respondent 1).

Broken Rung

Broken Rung focuses on how companies realize the importance of gender equality in middle and upper-level managerial positions. In addition to awareness, the company's satisfaction with its performance to achieve gender equality can also be seen from the statements of the respondents.

In mid-level managerial positions, 11 companies are dominated by female employees and 7 companies that are dominated by men. Whereas at the top managerial position, 8 companies are dominated by women, and 12 companies are dominated by men. The rests of the gender proportion at each level are equal.

Awareness of the importance of gender equality is one of the keys to achieve gender equality itself. At the middle level, as many as 13 companies said they were aware of the importance of gender equality, however this was not / had not been achieved due to other factors beyond the respondents' control.

> in my opinion, there are still many men (in this company). Because back to the island culture, men are the ones who work, women stay at home. This industry is also specific (tourism, diving), so it cannot be equated with banking, for example (Respondent 3).

Because there are factors beyond the control of the respondent that cause the absence of gender equality in middle-level managerial positions (especially in certain industries), so that makes the respondent feel "satisfied" or surrender to the conditions that exist in the field:

> My work is indeed a male-dominated world. Not many women want to study geology or metallurgy, how many women studies engineering? Well, if only a few women studied so what is in the world of work? So, to enlarge the ratio, it must be from an early age, from the STEM, from the beginning it has been taught that it is not gendered biased (Respondent 17).

Meanwhile, there are still companies whose mid-level are dominated by men, and do not make gender equality something that needs to be considered:

> I think it's normal (middle-level proportions dominated by men) because in my company alone it doesn't feel like, "oh the manager must be a man, oh the manager must be a woman". still reasonable because in my opinion, if you want to be a leader then you try (Respondent 22).

Companies that are not sensitive to gender equality, especially at the middle managerial level, stated that other factors cause the least participation of women:

> As a company, there are no gender-related policies, evenly. Usually, those who are intimidated are women, there are those who don't want to get promoted because for example, they cannot share time with family, when they are needed, they cannot fulfill that. So, the limitation is indeed on the person, not on the system (Respondent 11).

In top managerial positions, 12 companies have realized the importance of gender equality. A total of 7 of them are companies with a top-level dominated by women. As for the causes of not achieving gender equality at the top managerial level because there are other factors beyond the control of the respondent/company:

> It is not because I set the companies to have more women, but rather the fields of companies are related to mental health, and maybe because there is a stigma that mental health is more feminine, so it attracts those who have a feminine side (Respondent 6).

According to some respondents, this is because from the beginning the availability of female human resources was not much, especially in certain industries:

> Actually, at that time, because there were not many women who could fulfill the position. Because the mining industry has more operations which are clearly for men, so it goes down more and more ... the portion is a lot of work for men (Respondent 2)

Unconsciousness of the importance of gender equality in managerial positions over those dominated by men is also caused by social views of men and women themselves:

> If that proportion is true, I think it's still reasonable because it goes back to stigma and, and maybe yes I'm not saying that, for example, a woman has poor education, no, but as a man they already has a faith: "you should be able to advance yourself, you have to be successful", that's what happens in Indonesian society, right? Like as a man, "you have to be more advanced" (Respondent 22)

One respondent whose company has achieved gender equality in a mid-level managerial position stated the challenges faced by the company to achieve gender equality as a whole:

> Almost every company is around that (gender equality) because that's the standard now. At the engineer-level, we already have 47% female. At the entry-level, it's already 50:50. The next challenge is how we can retain them, so it is about grooming, developing them from the start. Therefore, they can go up the positions fairly. The company can provide that, but at the same time, if they still have a problem with their family, where they have to prioritize certain aspects it might be something that we might not be able to help that much, because it's their choices (Respondent 12).

Discussion

The researchers discuss how the findings above contribute to the phenomenon of Female Leadership Deficit, what factors play a role and how to overcome the phenomenon. A report entitled "Women in The Workplace 2019" by LeanIn.org and McKinsey & Company states that Broken Rung is the initial cause of a woman's obstacle to being able to occupy a strategic position in her company. The main problem is the employee promotion system in companies that are not friendly to the career advancement of a female employee so that there are only a few and there will be fewer women who occupy top-level positions. Broken Rung is illustrated by the low awareness of the company about the importance of gender equality at every career level. Companies that are not aware of the importance of gender equality are also easily satisfied with women's representation at every career level even though the numbers have not been equal.

The findings in this study indicate another matter. More than half of the respondents' companies have realized the importance of gender equality at every career level. However, from 24 companies, there are only 4 companies that have achieved gender equality at each managerial level. Companies that have not yet achieved gender equality but are aware of the importance of the matter stated that this happened because of stereotypes in certain industries. In the companies with a majority of women employees, the industry is considered to be a feminine industry, such as the beauty and mental health industries while the majority of male companies are companies in industries that are closely related to masculinity such as oil and gas, technology, and remote island tourism. This is supported by the findings of Tomoko Adachi (2013) that the ratio of jobholders is strongly associated with gender stereotypes of work. The results of Tomoko Adachi (2013) then support the findings of Gottfredson (1981) that job drawings tend to reflect the actual work and that the sex of the worker is the most prominent work attribute in shaping the job description. The results also coincide with findings from Glick, Wilk, and Perreault (1995) who found the gender ratio is one important component of the sex factors, and findings from Kulik (1999), who reported that the sex of the job was based on perceptions of distribution of man and woman employees in each occupation. This shows that the formation of job gender stereotypes is based on the perceived ratio between men and women in certain jobs.

In the study which examined bias in determining candidacy for leadership positions, Garcia-Retamero and López-Zafra (2006) found that when the candidate is female, and the industry is not congruent with her gender role, decision-makers manifest prejudice in selection. Mulvaney, O'neill, Cleveland, and Crouter (2007) argue that the contradictions between typical female role (i.e. staying at home and taking care of others) and typical employee role (i.e. spending time outside the home) may adversely affect women's career advancement. It's finally resulting only few female in certain industry (male dominated industry).

Not only are there a small number of women in the masculine industry, but a small number of men in the feminine industry are also caused by gender stereotypes of the job itself. If it focuses on the lack of female leaders, then the cause is the number of female workers in industries that are considered to be masculine is still very small. The discrimination that often occurs in respondents in this study is "self-discrimination" when entering and in jobs where women "choose" certain jobs. Women often decide not to apply for certain positions because they anticipate discrimination or they are socialized to believe that the traditional division of labor is true. This also happens in the education field, where women often discriminate themselves with several majors that are not under their gender stereotypes, engineering majors, for example. Whereas forms of direct discrimination tend to benefit men in recruitment, provision of training, promotions, types of contracts, and wage rates.

Therefore, one of the causes of the small number of women leaders is that the number of female workers is still small. This often happens in industries with masculine stereotypes. Evidently, according to the presentation from Debbie Chastity, Vice President and General Counsel of PT Chevron Pacific, based on statistics, Chevron has a total workforce of 3,500 people, but they only have 11% of women. This is why even though the company has realized the importance of gender equality by having rules and facilities for gender equality in its system, gender equality will not be achieved because the number of women since entry-level alone is not the same as the number of men.

There are complicated reasons why women seem not to "break the ceiling" or seem to accept obstacles that prevent them from getting those promotions. This attitude can also result from self-discrimination in order to avoid deeply rooted social discrimination (Anker, Richard Melkas, & Helina Korten, 2003). This creates women to be more reluctant to enter the industry which they consider to be masculine. This then creates only a small number of female workers in industries that are considered to be masculine/male dominated industries.

According to Bola Adesola, CEO of Standard Chartered Bank Nigeria (Desvaux et al., 2017), often it is the thoughts that exist in women themselves that prevent them from doing more in their careers. This may be formed due to the influence of "reality" or external factors experienced by women themselves, but unfortunately, women seem to "accept" all the reality or assumptions that exist in the socio-cultural community (Desvaux et al., 2017). Therefore, the most important way that must be done to overcome this phenomenon is to reset what is in the women's mindset. Women must be confident that they have the same abilities and opportunities as men. This has been proven by the respondents who managed to be in the top managerial positions. They recognize that internal obstacles become challenges in their careers, but they have a strong mindset that women are the same as men, have the same abilities and opportunities, as long as they also have strong ambition and motivation.

Conclusion

Female and its many potentials and advantages are still facing the obstacle to get to the top position. It is because there are only a few female leaders in organizations responsible for strategic and decision-making roles. Like a domino effect, this situation will make females, especially in male dominated-worlds, not being represented in which

their needs and voices are seldom to be heard, and it will not be changed if there are still few females in top positions. Broken Rung which is mentioned as one of the causes of this phenomenon is not found in the findings.

The respondents' companies were already aware of the importance of gender equality. The broken rung is not founded because before the companies had a promotion system that was unfriendly to the female employees, the females themselves were indeed not available in certain industries, which resulted in the company inevitably having only a few females occupying the top managerial position in the male-dominated industry. The most basic internal factor is the result of self-discrimination by females, a mindset that follows what is in reality namely social discrimination. Females who have discriminated themselves will then limit themselves in doing things or making decisions.

It is in line with the statement from Ragins and Sundstrom (1989) that the dimensions faced by women in achieving leadership positions are individual, interpersonal, organizational, and social. But from this study, it turns out that before the organizational dimension inhibits women's career advancement, there is an individual dimension that is symbolized by self-discrimination and a social dimension with gender stereotypes in certain industries that prove that broken rung has not been found in this study.

The initial solution from this problem is a whole changing mindset with strong beliefs and motivations from the female. Because it will not affect much if the company has a good promotion system for a female employee and if the female employee itself didn't match with the number of male employees available to be promoted. From these findings we knew that the root cause of the Female Leadership Deficit in Indonesia is not from the promotion system which is not friendly to female employees, yet, there's another factor that cannot be controlled even by the company whereas this factor supports female workers availability in a certain industry.

Implication

Managerial Implication

These findings can provide information for individuals, professionals, organizations, and decision-makers about the initial problem of the phenomenon of Female Leadership Deficit. By knowing that there are stereotypes in certain jobs/industries, companies can implement strategies that are on target if they want to achieve gender equality. Because without knowing that actually, broken rung does not occur in Indonesia, the company will be considered a party that does not provide opportunities for female employees to be promoted. Meanwhile, it turns out that the number of female employees is not the same as the number of male employees from the entry-level.

If the company commits to gender equality, there have to be some ways to deal with stereotypes in the industry/work. Companies can carry out gender equality campaigns by showing the seriousness of the company related to gender equality in industries that have gender stereotypes. This can be done by creating empowerment programs for minority employees in the industry. For example, in the male-dominated industry, a female employee empowerment program is held by giving training and development programs so that the capabilities and competencies possessed can be equal to those of male employees. Women are vulnerable to social discrimination and self-discrimination, companies can deal with this problem by providing support in the form of motivational training programs, support groups, and also creating a supportive and fair corporate culture.

In addition to empowerment programs, in a male-dominated industry, companies must be able to guarantee a supportive and safe environment for female employees. In addition to the fairness and objectivity of the company in evaluating employee performance, companies need to realize that a healthy and supportive environment is very important to keep female employees to avoid opt-out/turnover. Female employees still feel discrimination because it is considered not suitable to lead, so it is very vulnerable to eventually leave the company. This causes fewer female employees to be available.

Suggestion for the next research

- In this research, researchers had not anticipate that there are industries with the characteristics of male-dominated industries and also female-dominated industries. Therefore, this research using the assumption on general industries that all industries are the same.
- The facts that there are different nature from the female-dominated industries to male-dominated industries. Therefore, researcher must understand that there are female-dominated and male-dominated industries. Researcher cannot assume that the nature of the industry is the same with other industry.

- Because of the differences in nature, researcher must assume that this factor might play role in understanding the phenomenon of female leadership deficit in male-dominated industry versus female-dominated industry and be able to make comparison between those two industries respectively.

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SMART Cities, SMART Regions, SMART Solutions in Regional Innovation Ecosystems of a Selected Model Area of the South Bohemian Region

Jiri DUSEK

College of European and Regional Studies, Management and Marketing Services Department, Ceske Budejovice, Czech Republic
dusek@vsers.cz

Stepan KAVAN

Faculty of Health and Social Science, University of South Bohemia in Ceske Budejovice, Czech Republic
stepan.kavan@email.cz

Abstract

The Smart Region/City concept aims to reach sustainable growth and a balanced relationship within and between cities and the countryside, it continuously improves the quality of infrastructure and services in many areas ranging from energy industry, transport, health care, social services and education to security. The Smart concept is unique because it involves cooperation among many different fields which are different at first sight and which should be integrated into one complex whole within the Smart Region or Smart City concept. The goal of this analysis is to map the current state and the degree to which the South Bohemian Region is involved in the Smart City/Smart Region concept, to map the level of this Smart concept implementation process and the opinion of the need for its support, and subsequently to find appropriate measures to increase the involvement in the concept. An integral part of this analysis will be to determine the development and limiting factors of the Smart City/Smart Region concept.

Keywords: Developing factors, Limiting factors, SMART City, SMART Region.

Introduction

These days, the world is full of "smart cities" and "smart regions". They proliferate rapidly as new digital technologies are applied to enhance daily life. Smartness is "in", it is "cool", and the labels proliferate. Yet, this labelling often masks the real challenges of smart regions and smart citizens living in smart societies. How can we make so-called smart regions smarter? What do residents need to be able to survive, and thrive, in smart regions? What is the nature of smartness? (Markkula, Kune, 2015).

Smart City or Smart Region are one of the concepts of applying the principles of sustainable development to the organization of a city/region using modern technology in order to improve the quality of life and make governance more effective. This concept is most widely used in the fields of energetics and transport, both of which can be dealt with more effectively by using appropriate information and communication technologies. However, the Smart City/Region concept does not only cover the above-mentioned areas, it can also be applied e.g. to water management, safety, public lighting, waste management, e-government or crisis management.

The Smart City concept is a program change driven by the political representation of the city and it is a gradual process, not a state. In contrast to conventional planning and operation of urban agendas, Smart City simplifies the process of engaging the professional and general public by using electronic tools (e.g. communication platforms or social networks). It enables the city's strategies to be made up not only by a professionally competent contractor in cooperation with the relevant department of the city, but also by work groups made up of experts from various institutions, local entrepreneurs and interest groups that are effectively coordinated by the city using electronic media. The resulting strategies can be submitted for comments in electronic public forums and then discussed with the public at open meetings so that the introduction of their final form is generally accepted by the citizens and reflects as many notions and ideas as possible at the same time. This approach also anticipates prudent investment in new technologies

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that will support these new programs. This has an impact on the investment costs but above all on the operating costs associated with the technology (Bárta, et al., 2015). There is an equivalent of the Smart City concept on a regional scale, on the level of self-governing lower units and it is called the Smart Region concept.

Smart City/Region Concept

In Europe, the Smart City/Region concept is a response to considerable urbanization and, to a large extent, a further step in the development of the EU's regional policy, which has so far focused on supporting larger regions. However, the ongoing concentration of economic power requires a special approach to tackling the problems of small regions, cities and municipalities, which are being pushed by citizens' demands for environmental improvements while maintaining economic performance that largely ensures quality of life. Massive investments to improve urban conditions are becoming increasingly complicated and the tight budgets of smaller regions or municipalities are not prepared to carry out such activities without an external impulse (the state, the European Union). Smart City/Region involves industry, universities and not just the capacities of the city or region (human, financial) to improve conditions. In this partnership the city/region in fact creates conditions for pilot projects aimed at finding solutions that are beneficial to citizens, while looking for innovative economic models to finance further expansion of the system. It is an interconnection of existing processes towards seeking synergies for their higher efficiency (Král, et al., 2017).

The Smart City/Region concept is not yet clearly defined in literature, but there are some common features of Smart City/Region that are common for most scholarly and conceptual documents on this subject. They include particularly the following attributes (Caragliu, Del Bo, Nijkamp, 2009):

- High-quality network infrastructure in the city and its effective use to meet the economic, social and other needs of the city's inhabitants.
- Urban development of the city which is friendly to business and innovation.
- Cities have an efficient public service apparatus that enables economic growth while ensuring social inclusion.
- Emphasis on the development of creative, innovative and high-tech sectors, including the development of qualified work infrastructure and appropriate infrastructure.
- Emphasis on environmental and energy sustainability of urban development.

The following definition of Smart City suitably summarizes the above-mentioned basic attributes (Hollands, 2008). In this definition, Smart City is understood as a modern urban concept, the basic vision of which is to achieve interconnection of highly developed urban infrastructure (energy, telecommunications, transport, environmental), business and education and educational institutions in the city into one effective whole with maximum functionality.

Smart City works with other “intelligent” technology concepts, especially Smart Grid, smart buildings and clean mobility. The emphasis on a comprehensive approach is also reflected in the European project of the University of Vienna, which has defined the basic dimensions of Smart City development as follows (Giffinger, et al., 2007): Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, Smart Living.

It is important to point out that Smart City is not a purely technical field. It involves interconnection of a wide range of different professions, and even though state-of-the-art technologies are its integral part, they only act as one of the tools to ensure a high-quality life for the city's inhabitants and make energy and services more efficient. Just because a city has smart and energy-efficient street lighting doesn't mean it's Smart at the same time. Terminal devices, in most cases sensors, are the basic technical element of smart cities. Sensors are basically very simple devices that can measure a certain physical or technical quantity. Sensors are further integrated into sensor networks, which can generate a large amount of information on various changes in the environment. An important feature within a smart city is sharing collected information among different systems. To improve the interoperability of individual components, we need to share information with users and provide data among systems, ideally in real time. What makes the whole Smart City concept really smart is analysing a huge amount of data (the so-called Big Data) and then performing defined actions. Interconnection of products, services and people into one unit through the so-called Internet of Things (IoT) was made possible mainly by the following factors (Bláha, 2016): new technologies and cheap internet connection, availability of sensors and necessary hardware, massive use of smartphones, availability and speed of the Internet.

However, this very fast and almost uncontrolled development and technological complexity of integrating existing infrastructures with relatively young internet technologies, such as cloud services, smartphones and mobile applications, wearables, wireless technologies (Wi-Fi, RFID, NFC), etc., open doors to potential cyber threats.
This implies that the Smart City concept is relatively flexible and can be adapted to the level of development and to the needs of a particular city. For example, the initiative called Smart Cities and Communities supported by the European Commission (European Union, 2019) and the related mayor initiative Covenant of Mayors (2008) focus primarily on 3 dimensions out of these 6 dimensions, namely on smart mobility, smart environment and smart housing (especially with regard to energy savings in buildings and networks). On the other hand, for example Amsterdam chose to focus primarily on innovation and entrepreneurship in its Smart City concept – see more Amsterdam City (2019), i.e. on the dimensions of smart economy and smart people.

Methods

The aim of this analysis is to map the current status and the degree of involvement of the South Bohemian Region in the Smart City/Smart Region concept, to map the level of this Smart concept implementation and opinions on the need for its support and to propose appropriate measures of how to increase involvement in this concept accordingly. Using the SWOT analysis to determine the development and limiting factors of the Smart City/Smart Region concept forms an integral part of this analysis. The paper also contains data from the research of regional development of municipalities in the South Bohemian Region which was carried out by the authors in 2007-2015 on a basic set of 623 municipalities in the South Bohemian Region.

Research Results

Implementation of Smart concept in EU and Czech Republic

On the European level the concept of Smart Cities started to be used and developed mainly from the initiative of industry. In 2011, the *Smart Cities and Communities* industrial activity was established, involving the link between transport and energetics and aimed at reducing their environmental demands. A year later, the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) was launched, including information and communication technologies and giving the Smart Cities concept a basic structure. However, this does not mean that the term "smart" did not exist in the context of the deployment of various smart technologies in cities or regions before 2011. This is evidenced by the Czech Smart Region Vrchlabí, which was launched as a pilot project of smart energy networks in the Czech Republic and a part of the transnational Grid4EU project in 2010. The activities of the city of Písek, whose strategic document *Blue and Yellow Book Smart Písek* was created in 2015, can be considered the first comprehensive strategic approach to the Smart Cities concept. Since then, according to Collective of Authors (2018) many other smart cities have been developing in the Czech Republic, more or less based on the *Methodology of the Smart Cities Concept*.

Sustainable mobility and the area of information and communication technology and effective territorial management are the dominant target areas for the implementation of the Smart concept in the Czech Republic. These areas are among the most frequently mentioned when identifying successfully implemented projects. In this category, projects in the field of ICT and effective territorial management account for 45% of the total number of projects already implemented and projects in the field of sustainable mobility make up 31% of the projects. Among the Smart Concept projects currently underway, projects for the ICT target area and effective territorial management account for 28% of the total number of projects which are currently being implemented, while the projects currently underway in the area of sustainable mobility account for 44%. These two target areas maintain a dominant position among the projects under preparation, where approximately one third of the intended Smart concept projects are directed into each of these areas. In the *Analysis of the Current Level of Involvement of the Czech Republic in the Smart City and Smart Region Concept in Relation to New Trends* the biggest obstacles to the implementation and the development of the Smart City/Region concept were identified to be: lack of financial resources, legislative obstacles, insufficient communication of ministries relevant to the implementation of the Smart City/Region concept, insufficient political will, overwhelming by devolved state administration and administrative demands – for details see Greg, et al. (2018). These findings also correspond to a number of other domestic and foreign researches – whether they are specifically focused on Smart City and Smart Region (see, for example, Růžička, 2018, or Dolejš, 2018) or generally targeted to the barriers of regional development as such. According to Schnabel (2012) unfavourable framework political

conditions and narrow profiles of all available resources are among the biggest problems in Germany. Local "selfishness" and the diversity of interests of individual participants are also a significant barrier. Other obstacles are perceived to be less significant by the respondents. The unfavourable framework political conditions mainly reflect the complexity of the German local and regional public administration.

In the Czech Republic, a number of development problems arise from the size structure of municipalities and that is why the lack of financial resources is the most frequently mentioned barrier (and also an incentive) to regional development. This was confirmed by the *Questionnaire Survey Focused on the Analysis of Selected Issues of Municipalities and Towns in the South Bohemian Region* which was carried out by the authors in 2004 and 2014. In this survey, the "lack of financial resources" is seen an obstacle to regional development by up to 80.4% of municipalities. However, after accession to the EU, the situation improved noticeably, the figure being only 56.7%, which is a decrease by approximately one quarter. The 80% perception of the lack of financial resources as a serious barrier to development corresponds to similar results of research carried out, for example, by the Centre for Regional Development Research, University of West Bohemia in Pilsen. As regards barriers for regional development, considerable % growth during the programming period of 2007-2013 was recorded by the time and administrative demands of this cooperation and project implementation. The assessment of answers shows that respondents point to complicated and rapidly changing legislation, not fully prepared programming period, involvement of other partners, etc. It is therefore not surprising that almost 20% of Czech municipalities do not make use of the possibilities offered by the European funds or grant schemes of the state or regions.

Although the implementation of the Smart City/Region concept has been well advanced in recent years and today almost every major city has its concept or strategy, we are still encountering limits that prevent the concept from spreading more massively. Although technology is developing very quickly, in some areas it is clear that current opportunities are still lagging behind expectations. In contrast, the initial optimistic forecasts were not fulfilled in other respects and other solutions are being sought. However, technology itself is probably the smallest problem today. In many cases, the financial aspect is particularly limiting, because not all Smart projects are savings-oriented. They often consist in improving services, which costs something. Another major limitation is the lack of awareness of what Smart concepts really mean, what practical solutions they can bring and how they can improve citizens' lives. What must not forgotten either is a significant complication (especially when working with data) in the form of legislation or historical contractual relations still in progress. In some cases, these relationships may make it impossible to use existing datasets efficiently. However, it can be assumed that the above problems and barriers will gradually find solutions and new technologies will be able to penetrate all municipalities and regions in a better way, not only in Czechia but also in other EU countries (Kožený, 2019).

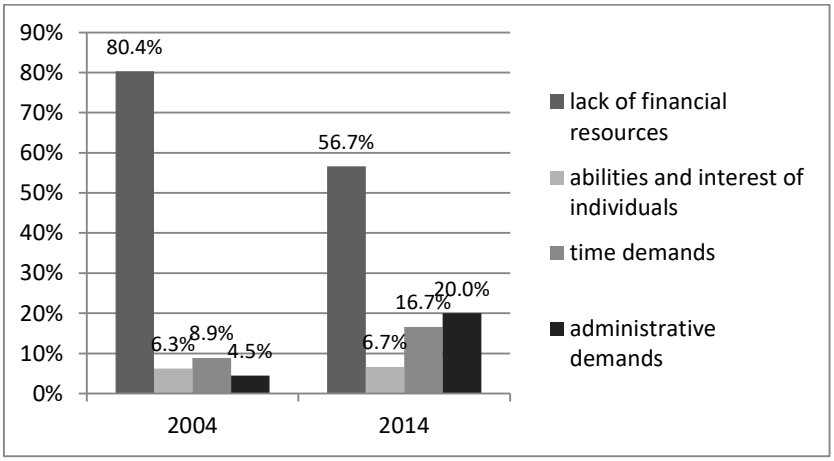

Fig. 1: Obstacles to regional development in the South Bohemian Region

Source: Authors' own research – within the *Questionnaire Survey Focused on the Analysis of Selected Issues of Municipalities and Towns in the South Bohemian Region* (2004, 2014).

Results from analyse made in South Bohemia Region

If we focus on the involvement of cities, municipalities and regions of the South Bohemian Region in the Smart concept, only 12 municipalities involved can be identified (see also PricewaterhouseCoopers, 2019, authors' own research), of which 7 with a strategic document or analysis:

- České Budějovice - document entitled *Smart Cities Potential Analysis* (* 2018),
- Český Krumlov - analysis entitled *Smart City Maturity Scape* (* 2018),
- Milevsko - strategy document entitled *Live Milevsko* (* 2017),
- Písek - "ideological" document *Blue & Yellow Book Smart Písek* (* 2015),
- Předmíř - strategic document *Our Smart Předmíř* (* 2018),
- Strmilov - strategic document *Smart Village Strmilov - Smart Solutions for Small Towns* (* 2019),
- Tábor - strategic document *Smart City with a Face* (*2018),
- Bechyně - without a strategic document, implementation of a Smart project Charging Infrastructure for Electromobility (* 2019),
- Blatná - without a strategic document, implementation of a Smart project Capa Sitty Solar Benches (* 2017),
- Jindřichův Hradec - without a strategic document, implementation of projects Parking System and Smart Tourism (* 2018),
- Prachatice - without a strategic document, implementation of smart waste sorting, smart benches and systematic care for the elderly (* 2018),
- Strakonice - without a strategic document, implementation of monitoring how full the waste containers are (* 2019).

Out of the 17 municipalities with extended powers in the South Bohemian Region, 9 municipalities (i.e. 52.9%) participate in Smart concepts and as regards former district towns, 6 out of 7 towns participate (i.e. 85.7%). Only Český Krumlov is not involved, where guidance boards for parking lots have been in operation since 2003, but it is not a fully-fledged Smart technology. Among municipalities with extended powers, Dačice, Kaplice, Soběslav, Trhové Sviny, Třeboň, Týn nad Vltavou, Vimperk and Vodňany do not participate. On the sample of municipalities involved we can clearly demonstrate that so far the Smart concept has been the privilege of large, economically and politically strong municipalities, with the 7 largest cities in the South Bohemian Region involved in the Smart concept. On the contrary, except for Milevsko, 8 out of the 9 smallest municipalities with extended powers do not participate. Small towns and municipalities - Bechyně (5,097 inhabitants), Strmilov (1,425 inhabitants) and Předmíř (332 inhabitants) - are a positive exception among large municipalities. The collected data/results can be generalized by saying that the differences regarding the involvement in the Smart City or Smart Region concept increase with the degree of disaggregation (i.e. the involvement is higher at the level of large cities, former districts and lower units, such as administrative districts of municipalities with extended powers, than in smaller regions and municipalities of the South Bohemian Region).

Table 1: SWOT analysis of the Smart City/Region concept in the South Bohemian Region

Strong points	**Weak points**
➢ mobility is the Smart topic which is discussed most (parking, entry of cars in the centre, speed measuring) ➢ pilot projects in the fields of mobility, eGoverment and digitalization, energetics, environment, social and health services, effective territorial and innovation management ➢ development of electromobility ➢ initiation of activities is based on the interest of the public and commercial sphere ➢ inspiring examples of good practice from abroad ➢ regional subsidy program to support Smart projects ➢ existence and sharing of large amounts of data concerning the city administration ➢ high readiness of technological tools already implemented ➢ existing infrastructure providing information ➢ strong background in scientific and research environment ➢ working groups dealing with Smart issues at the level of regions and selected cities ➢ support of the Smart concept in strategic concepts ➢ strengthening the innovation structure of the South Bohemian Region ➢ interest in developing the digital region and implementing innovative solutions ➢ creation of the Smart Region of South Bohemia Commission	➢ not much emphasis is put on dealing with certain topics ➢ no network infrastructure ➢ large area with low population ➢ problems with the implementation of eGovernment ➢ lack of data for effective work with certain agendas (e.g. in the field of transport) ➢ low level of knowledge and ability to work with data ➢ incompatible formats of historical data ➢ problems with data storage and backup ➢ low extraction of information from the collected data ➢ fragmentation and confusion of data sources ➢ data duplicity ➢ weak interconnection of stakeholders in the course of the region's development ➢ low awareness, communication and information about Smart activities ➢ financial, technical and human resources used in an inefficient way ➢ bureaucracy and administrative complexity of Smart projects ➢ the return of the investment is longer than the election period ➢ lack of interest in Smart issues and implementation of Smart projects ➢ demographic changes ➢ lack of technically educated persons ➢ poor commercialization of science, research and innovation results ➢ a short period of time to implement projects from the Smart City subsidy program, low program allocation
Opportunities	**Threats**

➢ implementation of new innovative Smart projects ➢ building a nationwide network of electrical charging stations ➢ centralization of data and unification of subjects' awareness ➢ public education on working with data and using the Smart City / Region concept ➢ access to open data ➢ sharing data with entities of the same nature ➢ analysis of the existing data and its availability in the region ➢ data aggregation using analytical tools and learning how to work with available data across disciplines ➢ possibility of cooperation on the development of ICT with technological and research institutions ➢ elaboration of other strategies that will contribute to the development of the region ➢ creation of a communication platform to share knowledge and popularize the Smart concept ➢ development of eGovernment ➢ modernization and expansion of network infrastructure ➢ utilization of technological trends (e.g. 5G network, IoT, etc.) ➢ utilization of the growing potential in science and research institutions ➢ increasing the number of projects implementing smart approaches and solutions ➢ bringing together experts from different fields and disciplines to target projects in a better way ➢ establishing long-term cooperation with foreign entities ➢ applying the Smart Village concept to small villages and towns ➢ communication platform with all stakeholders in the territory, which will be connected with the region and cities ➢ knowledge transfer using previous knowledge from projects implemented for other regions ➢ significant support for technology transfer and support for the commercialization of research results ➢ support of towns, municipalities and regions in mutual cooperation	➢ suburbanization across a region with unsolved infrastructure ➢ failure to create an ecosystem of cooperation between entities ➢ Smart topics will be developed separately and non-systemically ➢ discontinuation of cooperation with stakeholders ➢ implementation of projects due to a large number of stakeholders ➢ vendor lock / blocked data ➢ failure to find professionals working with data ➢ security threat / abuse / disclosure of sensitive data from the GDPR perspective ➢ restrictions on working with data owned by other entities ➢ no link between information and data from the systems ➢ data is not shared to GIS and GEO portal ➢ lack of interest in working with digitized eGovernment services ➢ low usability of communication services ➢ security threat and unsecured data ➢ non-systemic changes in legislation ➢ subsidy programs for the implementation of projects will be cancelled ➢ no subsidy program for the next programming period 2021-2027 ➢ unwillingness to accept proposed solutions ➢ low amount of financial resources for the implementation of Smart solutions ➢ loss of support when political representation changes ➢ introduction of GDPR in other waves ➢ failure to provide citizens with information ➢ low cooperation with stakeholders ➢ the knowledge platform will be closed for sharing knowledge and experience ➢ the existence of barriers which will hinder the cooperating ecosystem ➢ cancellation of the Smart Region of South Bohemia Commission

Source: Own processing based on strategic documents of towns, municipalities and the South Bohemian Region (2019).

Conclusions

There is a paradox in the regions, cities and municipalities - the speed of building infrastructure is insufficient as regards the pace of development, there are inadequacies in public transport or on roads, but residents demand constantly improving quality of life. The problem cannot often be solved by expanding cities or parts of cities, so the latest smart technologies that transform existing infrastructure come into play. The Smart City/Region concept can integrate intelligent solutions into the infrastructure of cities and municipalities, successfully enhancing the efficiency of buildings, transport and energy systems. These steps lead to improving the quality of life of the inhabitants of cities and municipalities. Thanks to the utilization of the latest technologies, efficiency, safety and economic competitiveness is increased and pleasant and healthy living environment is created. Digitization and automation are fundamentally changing the entire infrastructure. By using intelligent algorithms that process data and start processes immediately, it is possible to optimize performance, efficiency, and improve the quality of life of the inhabitants of cities and municipalities (Siemens, 2019).

The analysis of strong points and weak points was prepared with regard to the forthcoming Strategic Development Plan of the Smart Region of the South Bohemian Region. Both the internal environment and external factors were analysed. The analysis of the internal environment consisted mainly in analysing the current state of implementation of measures in the areas of mobility, eGovernment and digitization, energetics, environment, social and health services, effective territorial and innovation management. The analysis also dealt with the level of utilization of information and communication technologies and a partial risk analysis was performed. The analysis of the external environment consisted in analysing higher strategic documents, relevant global and technological trends and also an analysis of key participants was performed. The results of the individual partial analyses have been generalized and

they are included in the above SWOT analysis. Based on the performed analyses incl. the SWOT analysis, the initial general assumptions were identified and confirmed - i.e. the main positives and negatives/problems the Smart City/Region concept is currently facing in the South Bohemian Region (possible suggestions and solutions are listed in the SWOT analysis - opportunities):

+ introducing innovative technologies for citizens,
+ using the Smart concept in a number of different sectors,
+ a number of pilot projects in different areas,
+ improving the quality of life in cities and municipalities,

– financial limitations of cities, municipalities and regions,
– involvement only in large municipalities of the region,
– insufficient awareness of the Smart City/Region concept
– legislative obstacles.

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Assessment of Digital Maturity of Enterprise as a Precondition of Digital Transformation

Alla POLYANSKA
Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine
E-mail: parvs@ukr.net

Svitlana SAVCHUK
Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine
E-mail: svitlanansv555@ukr.net

Yevhen REVTIUK
Poznan University of Technology, Poznan, Poland
E-mail: yevhen.revtiuk@put.poznan.pl

Abstract

The article considers the assessment of the digital maturity of the enterprise as one of the important precondition for its digital transformation. The concept of digital maturity of the enterprise is analyzed and its essence is determined. Existing models of estimation of the enterprise's digital maturity, developed by foreign scientists and consulting companies, are characterized. It is established that the given models of assessment of digital maturity have a structure that corresponds to the standard model of the CMMI and provides the possibility of finding bottlenecks of the enterprise for carrying out digital transformation. It is proved that the existing models also have certain features that make them ineffective for localization of problems and construction of the enterprise development plan, and the disadvantages of these models are not adapted to the reality of the environment in which Ukrainian enterprises operate. Therefore, an author's model for assessing the digital maturity of an enterprise has been developed that provides a structured approach to assessing digital maturity and is complete enough to cover all aspects of the digital transformation of the enterprise. On the basis of the conducted research, a method of enterprise's digital maturity assessment was developed which provides for determining the level of digital maturity in 6 directions of activity of the enterprise: strategy, personnel, structure, technologies, marketing, organizational culture. It is concluded that the assessment of the digital maturity of the enterprise enables the enterprise to obtain certain advantages: the opportunity to form a holistic view of the real level of digital maturity and the desired state; making recommendations based on the conditions and features of a particular enterprise; identifying the hidden digital potential of the enterprise; familiarization with the opportunities provided by digital technologies.

Keywords: Digital Maturity, Enterprise, Digital Transformation, Digitization, Digital Maturity Assessment Algorithm

Introduction

The world is constantly changing, and one of the main modern drivers of development is the digital economy. Digital technologies open up unique opportunities for the progress of the national economies as in the whole as in individual enterprise. In order to achieve the maximum efficiency of digital transformations in the enterprise, it is firstly necessary to understand the current situation in this area. Otherwise, valuable time and resources may be wasted and may not bring the desired effect to the company.

The digital transformation of an enterprise take place through various processes, some of which are evolutionary, some of which are revolutionary. It all depends, first of all, on the current digital maturity of the organization. That is why understanding of organizational digital maturity is the first logical step towards digitalization.

Assessing and increasing the digital maturity of the company allow achieving better results and a stable position compared to competitors. This is especially relevant in an era when the digital environment is tending to constant

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unpredictable changes. The benefits of digitalization are obvious, but relatively few domestic enterprises are fully realizing their digital potential, losing many opportunities and competitive advantages. This is often happened due to the complexity of the digital transformation process itself, as the company cannot assess its current capabilities and choose the most effective way to implement necessary changes. This determines the relevance of the chosen research topic. Thus, the assessment of an enterprise's digital maturity as the subject of the proposed paper is the question that deserves attention.

Taking into account noted above, the goal of this article is to work out the methodical approach to the assessment of an enterprise's digital maturity on the base of the characteristic of existing models and to implement it on the enterprise to summarise its practicalness and valueness as preconditions of digital transformation. To atchiev this goal, the structura of the article include:

- to work out the algorithm of assessment of the digital maturity of the enterprise;
- to acknowledge the general characteristics of existing models for assessing the digital maturity of the enterprise;
- to point out the characteristics of digital maturity of a specific enterprise;
- to make the assessment of the digital maturity of the enterprise;
- to summarise the getting result.

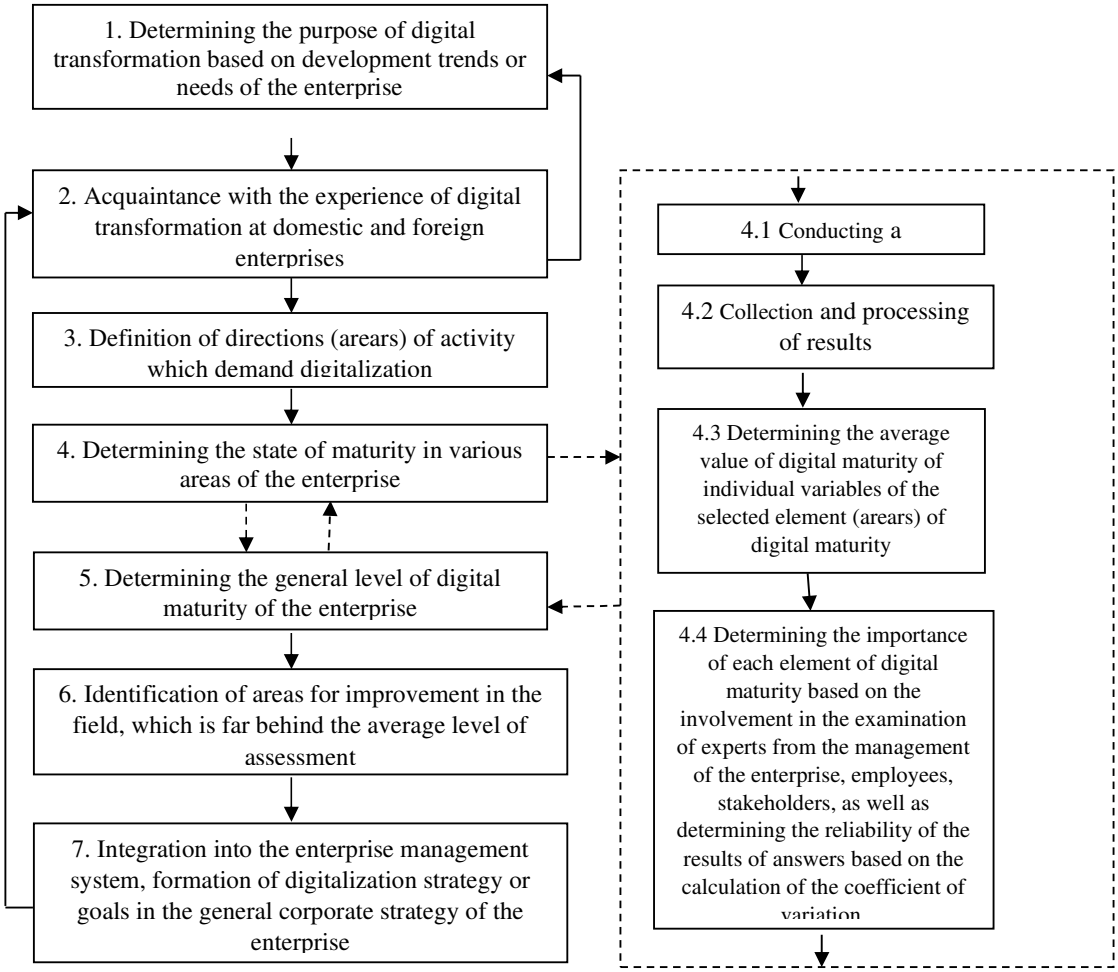

Fig. 1: The algorithm of the digital maturity assessment

Methodology

The European Center for Information Systems Research (ERSIC) [1] identifies three steps that an enterprise must take to create the necessary conditions for digital transformation, namely:

- assessment of the current level of digital maturity and existing development skills in this area;
- determining the level of current and desired digital maturity of the business;
- defining the action plan that is needed to achieve the desired level of digital maturity.

Digital maturity assessment is used as a standardized structure to determine the overall capabilities and ambitions of the company. It helps to prioritize those areas that have the greatest impact on business and can provide maximum effect in the digitalization. And each enterprise can organize the assessment of digital maturity by taking into account the enterprise's needs and world tendencies of digitalization.

Implementing mentioned above three important steps to digital transformation, we worked out the method of digital maturity assessment (Fig.1) that can help the enterprise to identify its level of maturity as in specific areas as in the whole.

Results

At this stage of the investigation, we propose to apply the formed algorithm of the digital maturity assessment into practice and sequintly consider each of the levels of digital maturity assessment.

1. Determining the purpose of digital transformation based on development trends or needs of the enterprise.

We tend to use the meaning of digital maturity that is defined as the level at which an organization is able to optimize its online presence, with using analysis to improve digital performance and anticipate future customer needs [2]. However, in this definition, digital maturity is limited by the usage of the technology in marketing area. But the definition of digital maturity concept itself is much broader, because the maturity of the enterprise determines not only the level of implementation of digital technologies in various areas of the enterprise (personnel management, production, communications), but also the effectiveness of digital strategy. In a study by Capgemini and the MIT Digital Business Center [3], digital maturity is considered as a function of two dimensions:

- digital intensity - the amount of investment in digitalization; measured by coordinated areas of digital transformation (digital project portfolio);
- the intensity of digital transformation management or digital enterprise support, as measured by the availability of digital vision, the effectiveness of digital strategy, etc.

So, due to the studies of digital maturity we can conclude that the perpose of digitalization is to support or divelop useful for enterprise areas.

2. Acquaintance with the experience of digital transformation at domestic and foreign enterprises

In order to implement digitalization initiatives, it is necessary to assess the digital maturity of the enterprise. To obtain an objective assessment, foreign scientists and consulting companies have developed various models for assessing the digita maturity of the enterprise. Table 1 lists and summarizes some of the most famous models.

- Some models don't concider enough indicators of insufficient for the assessment to be able to assess a large enterprise that has different activities;
- The models are somewhat superficial in the coverage of specific c issues, as they are designed as universal and suitable for companies in various industries;
- Models are not adapted to the reality of the environment in which Ukrainian enterprises operate;
- Models of the enterprise digital maturity don't offer ways to improve enterprise management due to the general nature.

Based on the analysis of existing models for digital maturity assessing, there is a demand to develop a model of digital maturity that will meet the following requirements:

- The model provides a structured approach to the evaluation of digital transformations and is complete enough to cover all aspects of digital transformation;
- The model is detailed in accordance with the peculiarities of enterprise management in the framework of digitalization;
- The model is independent of how the production processes of the enterprise are organized;
- The model doesn't contradict the existing models for assessing the digital maturity of the enterprise.

Table 1: The General characteristic of existing models for assessing the digital maturity of the enterprise

№	Model name	Characteristic
1	*Center for Digital Business*) i Capgemini Consulting	According to the results of the analysis of more than 400 large companies from different industries, three key areas of digital transformation were identified: customer experience (Transforming Customer Experience), operational processes (Transforming Operational Processes) and business models (Transforming Business Models) [4]. Within each of the selected areas there are three complementary elements, and these elements form a set of building blocks of digital conversion. However, no company completely transforms all elements at once. Different companies are moving towards digital transformation at different rates and achieving different levels of success
2	Digital Maturity Model of Deloitte company [5]	Digital capabilities are assessed in 5 key areas: consumers, strategy, technology, manufacturing, structure and culture. tour of the organization (Customer, Strategy, Technology, Operations, Organization & Culture). The five main dimensions are divided into 28 sub-dimensions, which, in turn, are divided into 179 indicators, according to which digital maturity get assessed. The emphasis is made on the business strategy. Consecutive steps of the strategy concretization are to define a business model and an operating model.
3	*Digital Transformation Index*, developed by analytical agency *Arthur D. Little* [6]	Has a larger number of consolidated areas of evaluation: a) strategy and leadership (Strategy & Governance); b) products & services; c) customer management; d) operations and supply chains (Operations & SupplyChain); e) corporate services and control; f) information technology (InformationTechnology); g) workplace and culture (Workplace & Culture). For each company, the evaluation results are presented in the form of a radar, which, taking into account industry specifics, as well as marks of the level of "virtual stars" (Virtual Star) and the average industry level (Average).
4	(*Digital Business Aptitude - DBA*) company *KPMG* [7]	It combines 5 areas of evaluation: vision and strategy (Vision & Strategy), digital talents (Digital Talent), key digital processes (Digital FirstProcesses), flexible sources and technologies (Agile Sourcing & Technology), leadership (Governance). As in the previous two models, each of the selected areas includes several components. The evaluation results are presented in the form of radar, each evaluation sector has its own color. A feature and advantage of this model is a diagnostic tool for self-assessment, which is freely available. On a radar on each direction of an estimation 2 levels are allocated: for the given enterprise and average on all enterprises which have passed an estimation. Thus, a basis for comparative evaluation is formed, which is very important for decision-making in the field of strategy selection and priority areas of digital transformation.

5	Dgitization Piano, developed at the initiative of companies IMD i Cisco (Global Center for Digital Business Transformation) [8].	Similar to the 7 notes, there are 7 Transformation Categories, which are the most important elements of the value chain of the organization: business model (Business Model), organizational structure (Structure), employees (People), processes (Processes), IT capabilities (IT Capability), proposals (Offerings), model of interaction (Engagement Model). A list of guiding questions has been developed for each of them, the answers to which can help to make a plan of transformations. A feature of this model is to determine the gap between the current and desired levels in each direction. Thus for reception of effect simultaneous transformation of several elements and technologies - creation of musical chords is recommended.
6	Evaluation by company method *Ionology*[5].	Company Ionology identifies 5 blocks of digital transformation: Strategy & Culture, Staff & Customer, Process & Innovation, Technology, Data & Analytics.
7	Industry Maturity Index 4.0 Acatech [9]	Developed on the basis of research that was conducted by the National Academy of Sciences and Technology of Germany. There are four key areas of digital transformation: resources, information systems, culture and organizational structure. The evaluation methodology is somewhat more complex than described above. The index is formed simultaneously in several areas. The selected areas are evaluated in accordance with the stages of development of Industry 4.0 (informatization, connectivity, clarity, transparency, predictability, self-correction). In addition, corporate processes are analyzed in terms of five functional areas (development, production, logistics, service, marketing and sales). Particular attention is paid to the transformation of organizational structure and culture. The main goal is to create a flexible company that is constantly evolving.

These models for digital maturity assessing have a structure that corresponds to the standard model CMMI (Capability Maturity Model Integratio) and provides the ability to find bottlenecks in the enterprise for digital transformation. But they also have certain features that make them ineffective enough to localize problems and build a business development plan:

Based on the mentioned above, we offer a model for digital maturity assessing, which will be as close as possible to the modern realities of the enterprise in Ukraine. This model involves the determining of digital maturity level in 6 areas of enterprise activity: strategy, personnel, structure, technology, marketing, organizational culture.

3. Definition of directions (arears) of activity which demand digitalization

A review of literature sources has allowed summarizing and describing the follows elements of the enterprise so that to select criteria for the digital maturity assessment, namely:

Strategy - a plan to support and form the competitive advantages of the enterprise and actions aimed at responding or anticipating changes in the external environment, which allows providing efficient operations and sustainable development of the enterprise. To determine a certain level of digital maturity, it is necessary to assess the existence of a digital strategy and the level of its integration with the development strategy of the enterprise, to determine what components the strategy has and how it is implemented.

Personnel are a set of permanent employees who have received the necessary training, have necessary skills and practical experience. Successful implementation of the digitalization strategy involves the readiness of staff to change and their awareness of future changes. Involving, motivating and involving people in the digitalization process are the key to success.
The organizational culture understands a system of material and spiritual values and beliefs that reflect the individuality of the organization, influencing the behavior of staff and the organization as a whole. An important component of achieving a high level of digital maturity is the readiness for change in the field of organizational culture.

Technologies are a set of methods, production processes, software and hardware, united in a technological chain, which ensure the efficient operation of the enterprise. Technology is the main driver of digital transformation. Therefore, their availability and the effectiveness of these technologies determine the level of digital maturity of the enterprise.

In this case, marketing should be understood as the activity of the enterprise, which is aimed at creating demand and achieving the goals of the enterprise through the maximum satisfaction of consumer needs. The company's customers are considered as digital partners, so it is necessary to evaluate the effectiveness of digital channels of interaction.

Structure is the interaction and interrelation of the constituent parts of a whole organisation. In order to assess the digital maturity as accurately as possible, it is necessary to check the structure of the enterprise for flexibility as well as to assess the interaction between its components.

According to the study of enterprises' digitalization process, as well as the analysis of attributes of digital maturity in different models and characteristics of digital transformation, there was identified a list of relevant questions to assess digital maturity in each of the activities of the enterprise. The answers to these questions will help to determine the state of enterprise digital maturity.

The proposed in the article model of enterprise's digital maturity is developed in the form of a questionnaire and consists of 61 questions in 6 components: "Strategy" (13), "Personnel" (15), "Organizational culture" (10), "Technology" (10), "Marketing" (6), "Structure" (7). For each question / statement, 5 answer's options are proposed, from which one must be chosen. A fragment of the questionnaire is presented in table 2.

Table 2: A fragment of the questionnaire of the author's model of digital maturity assessment

Questions to describe the factor	**Answer options**				
	5	**4**	**3**	**2**	**1**
STRATEGY					
Existence of a clearly formulated digital development strategy					
Level of personnel awareness of digital strategy and goals					
PERSONNEL					
The level of measures implementation to develop digital skills and staff skills					
Employees' level of basic computer skills					
ORGANIZATIONAL CULTURE					
The level of coherence and interaction of management levels in the digital transformation					
Existence of measures to overcome (prevent) the resistance of employees that arises in the process of digitalization of the enterprise					
TECHNOLOGIES					
The level of provision of computers and other equipment necessary for the proper functioning of the enterprise					
The level of implementation of effective modern security systems to ensure cybersecurity of the enterprise					
MARKETING					
Availability of a modern interface of the company's website, the use of SEO-optimization technologies					
The level of usage of digital sales channels					
STRUCTURE					

The level of organizational management system flexibility and its ability to adapt to changes in the external environment (including changes associated with the digital revolution)					
The level of usage of modern architectures (API, cloud, etc.) to increase the speed and flexibility of the enterprise					

The assessment of the level of digital maturity firstly is carried out within each component, and then the overall level of digital maturity of the enterprise is determined. For an objective assessment, it is necessary to choose a quantitative scale that allows not only to understand what digital technologies are presented in the enterprise, but also to determine how well they are used. This will allow forming further recommendations for the company, namely the determination of what measures will improve management in the context of digitalization. The evaluation scale consists of 4 levels, which correspond to how well this or that digital technology is used in the enterprise. Table 3 describes the levels of digital maturity.

Table 3: Scale for assessing the level of enterprise's digital maturity

Level of digital maturity	Quantitative evaluation (points)	Description of the digital maturity level
Observers	1-2	The company is skeptical about digital technologies and does not consider their impact on the business seriously enough. The company's management investigates only the practice of digital transformation of competitors or other companies.
Beginners	2-3	The company is very slow to perceive digital technology. The process of digital transformation stretches for a long time, and the digitalization itself is quite superficial and does not cover all areas of the enterprise.
Experienced	3-4	The company supports digital technologies and invests in to innovations and digital marketing. Management focuses on the implementation of technology, but does not measure the effectiveness and analysis of these innovations. Insufficient attention is also paid to the planning, development of digital strategy and the formation of digital competencies of employees.
Innovators	4-5	The company uses all the opportunities provided by the digital technology. The process of digital transformation is systematic and covers all areas of business. Innovation is monitored and evaluated, the company's digital strategy is developed.

4. Determining the state of maturity in various areas of the enterprise.

An expert method of digital maturity evaluation is based on a survey of a group of experts within the questionnaires that were used to assess chossen indicators. The survey was conducted among middle managers (heads of branches and other structural units of the company, heads of departments). The survey was conducted in the form of a traditional written questionnaire.

We apply the developed model to assess the level of digital maturity of the company, which provides a full range of logistics and related services. 'Nova Poshta" is a leader in the logistics market, which provides easy delivery to each customer: from the branch, post office, to the individual customer address. The company provides a range of services, namely: storage of goods in warehouses, picking and sending orders to the recipient; the company's customers can make money transfers and electronic money transactions; Nova Poshta Global is developing an international partner network to provide customers with express delivery services not only in Ukraine but also abroad.

On the basis of questionnaires we form the table of points and calculate average value of estimations of each question (tab. 4). The average level of digital maturity ($\overline{X}$) of each element of the enterprise is determined by the formula [1]:

$$\overline{X} = \frac{\sum_{i=1}^{n} x_i}{n} \quad (1)$$

where x_i – a value of DM_e (digital maturity element) variable; n – the number of variable elements.

Given the goal, it is advisable to conduct a comprehensive assessment of the enterprise's digital maturity in different areas of activity. However, each of the studied elements of the enterprise will have its impact on the overall assessment, so it is necessary to set the weights of each element that have impact on the overall level of digital maturity. For the practical realization of the set goal, the method of ranks was applied. The essence of this method is to assess the experts view on significance of each of digital maturity indicator and to give it some weight. The results of expert evaluation of weights are presented in table 5.

Based on the usage of the method of ranks, we determined the weights for each element in the assessing of digital maturity. It should be noted that the weight coefficients were determined specifically for the case of "Nova Poshta". When assessing the digital maturity of another enterprise, new weights should be determined.

Table 4: The obtained results of the questionnaire

Element	Question number	Respondents										Average value for each variable element, ($\overline{X}$)	Average value for DM_e
		1	2	3	4	5	6	7	8	9	10		
Strsategy	1	4	5	5	5	5	5	4	5	5	4	4,7	3,58
	2	4	5	4	5	4	4	4	3	4	4	4,1	
	3	5	5	4	4	4	4	4	3	4	3	4,0	
	4	4	4	4	3	4	3	3	4	4	4	3,7	
	5	4	4	4	3	3	3	4	3	5	4	3,7	
	6	3	2	3	4	5	3	3	3	3	4	3,3	
	7	5	3	4	4	4	4	5	4	4	5	4,2	
	8	3	3	3	3	4	3	3	3	4	3	3,2	
	9	3	2	2	3	3	3	3	4	3	4	3,0	
	10	4	2	3	3	4	2	3	3	4	3	3,1	
	11	4	4	4	4	5	4	4	4	4	3	4,0	
	12	3	3	3	3	3	3	3	4	3	3	3,1	
	13	2	2	2	3	2	2	3	3	4	2	2,5	
Personnel	1	3	1	3	4	3	3	5	3	3	3	3,1	3,05
	2	3	2	2	3	3	2	4	3	4	4	3,0	
	3	4	2	3	4	3	3	3	3	3	2	3,0	
	4	2	2	2	3	2	4	3	2	4	3	2,7	
	5	2	1	2	3	2	3	2	3	4	3	2,5	
	6	3	1	3	2	2	3	2	3	3	3	2,5	
	7	4	4	4	4	3	4	3	4	3	4	3,7	
	8	3	3	3	3	3	3	4	4	4	4	3,4	
	9	4	4	4	4	4	3	4	4	5	4	4,0	
	10	3	3	2	3	3	3	4	3	5	4	3,3	
	11	2	2	3	2	3	2	3	3	4	3	2,7	
	12	3	4	3	3	4	3	4	4	3	4	3,5	
	13	2	3	2	3	3	3	4	4	3	3	3,0	
	14	1	2	2	3	2	2	3	3	3	2	2,3	
	15	3	2	3	2	3	4	3	4	3	3	3,0	
Organisation cultura	1	2	3	4	3	3	3	3	4	4	4	3,3	3,36
	2	2	3	3	2	3	3	3	3	3	3	2,8	
	3	4	3	3	3	4	3	4	4	5	4	3,7	
	4	4	3	3	4	4	3	4	3	5	4	3,7	
	5	4	4	3	3	4	3	3	3	5	3	3,5	
	6	4	2	2	3	3	4	5	4	5	4	3,6	
	7	3	2	2	2	4	3	4	3	3	3	2,9	
	8	3	2	3	4	4	3	4	5	4	5	3,7	
	9	2	3	2	3	3	2	3	3	3	5	2,9	
	10	3	3	3	3	2	3	4	4	5	5	3,5	
Tech	1	3	4	3	4	4	4	4	4	5	4	3,9	3,83

	2	3	3	3	4	3	3	3	5	5	4	3,6	
	3	5	4	4	4	4	4	5	4	5	4	4,3	
	4	5	4	4	5	4	4	5	4	4	4	4,3	
	5	4	4	5	5	4	4	5	5	4	4	4,4	
	6	5	5	5	5	4	4	5	5	4	4	4,6	
	7	5	5	4	4	4	4	5	5	5	5	4,6	
	8	1	2	2	3	2	3	3	3	2	2	2,3	
	9	3	3	4	3	2	4	3	4	2	3	3,1	
	10	4	3	3	4	2	3	4	3	3	3	3,2	
Marketing	1	4	4	5	4	5	4	5	4	5	4	4,4	4,37
	2	4	4	4	4	4	5	5	4	4	4	4,2	
	3	4	4	5	4	5	4	5	5	4	4	4,4	
	4	4	5	4	5	4	4	5	5	5	4	4,5	
	5	4	4	3	5	5	4	5	4	4	4	4,2	
	6	5	5	4	5	5	4	5	4	4	4	4,5	
Structura	1	4	3	3	4	4	4	3	4	5	3	3,7	3,79
	2	4	4	3	4	5	4	3	5	4	3	3,9	
	3	2	3	3	4	4	4	3	4	3	4	3,4	
	4	3	3	4	4	5	5	4	4	3	5	4,0	
	5	4	3	5	4	4	4	5	5	3	4	4,1	
	6	4	4	4	5	4	4	4	5	3	4	4,1	
	7	3	3	3	4	3	3	3	5	2	4	3,3	

At the next stage it is necessary to assess the degree of o the respondents' agreement. The consistency of respondents' opinions on the weight of the objects of study is determined by using the coefficien concordance or the coefficients of variation [14] and proposed system of respondents' agreement level [15]. It is established that the analysis of the agreement of experts' opinions by calculating the concordance coefficient is rather incomplete, as this coefficient is focused on checking the unanimity of judgments. If the judgments of experts are concentrated around several points, for instance, the experts are divided into several different groups with the same views within the group; the concordance coefficient does not allow detecting this. The coefficient of variation *Vj* is determined for each element of digital maturity of the enterprise and characterizes the degree of consistency with experts' opinions on the relative importance of the *i*-elements of digital maturity of enterprise. The smaller is the value of *V*j, the higher is the degree of agreement of experts on the relative importance of the *i*-th element of enterprise's digital maturity.

$$V_i = \frac{\sqrt{\frac{\sum_{k=1}^{N}(a_{ik} - a_i)^2}{N-1}}}{a_i}, \qquad (2)$$

where V_i– the coefficient of variation; a_i – weighting coefficien of i-element of enterprise's digital maturity; i – the elements of enterprise's digital maturity; a_{ik} – the numerical value of the weight of the coefficien, which was given by the k-th expert; N – the number of experts who participated in the examination.

Table 5: The results of the respondents' expert assessment of the enterprise's digital maturity elements weight coefficient

Experts	Element of the enterprise *(i)*						The sum of points
	Strategy	Personnel	Organizational culture	Technolog	Marketing	Structure	
1	0,185	0,155	0,143	0,213	0,135	0,169	1,0
2	0,198	0,152	0,132	0,200	0,170	0,148	1,0
3	0,177	0,161	0,154	0,186	0,163	0,159	1,0
4	0,182	0,148	0,137	0,232	0,149	0,152	1,0
5	0,191	0,159	0,144	0,193	0,158	0,155	1,0
6	0,179	0,156	0,151	0,217	0,148	0,149	1,0
7	0,169	0,160	0,150	0,204	0,156	0,161	1,0
8	0,180	0,154	0,141	0,221	0,155	0,149	1,0
9	0,183	0,160	0,129	0,225	0,159	0,144	1,0

10	0,190	0,156	0,150	0,192	0,161	0,151	1,0
$w(DM_e)$	**0,183**	**0,156**	**0,143**	**0,208**	**0,155**	**0,154**	1,0
V_i	0,0445	0,0262	0,0590	0,0748	0,0620	0,0484	

V_i =0,26-0,35 – consistency of experts' opinions on the weight coefficient of the enterprise's digital maturity below average;

V_i =0,16-0,25 – average consistency;

V_i =0,11-0,15 – above-average consistency;

V_i < 0,1 – consistency of experts' opinions is high.

5. Determining the general level of digital maturity of the enterprise

The total value of the digital maturity level of the enterprise is calculated by the formula (3) and presented in Tabl. 6:

$$D_m = w(DM_e) \times DM_e, \quad (3)$$

D_m – the level of digital maturity of enterprise; $w(DM_e)$ – digital maturity elements weight coefficient (Tabl. 5):

$$D_m = 0{,}183 * D_m(strategy) + 0{,}156 * D_m(personnel) + 0{,}143 * D_m(organization\ cultura) + 0{,}208 * D_m(technology) + 0{,}155 * D_m(marketing) + 0{,}154 * D_m(structure);$$

$$D_m = 0{,}183 * 3{,}58 + 0{,}156 * 3{,}05 + 0{,}143 * 3{,}36 + 0{,}208 * 3{,}83 + 0{,}155 * 4{,}37 + 0{,}154 * 3{,}79 = 3{,}6691.$$

Table 6: The results of the assessment of digital maturity the level of "Nova Poshta"

Elements of the enterprise	Values for each subsystem		General significance	
	Estimated value	Characteristics on a criterion scale (Tab.3)	Estimated value	Characteristics on a criterion scale (Tab.3)
Strategy	3,58	Experienced	3,6691	Experienced
Personnel	3,05	Experienced		
Organizational culture	3,36	Experienced		
Technology	3,83	Experienced		
Marketing	4,37	Innovators		
Structure	3,79	Experienced		

6. Identification of areas for improvement in the field, which is far behind the average level of assessment.

The assessment of digital maturity level of organization "Nova Poshta" allows to make conclusions that the company has a general level of digital maturity, named "Experienced", which indicates that "Nova Poshta" invests in digital technologies and tries to automate and robotize warehousing processes. Another novelty of the company is the entering into exploitation the postal drones. So far, the aircraft is being tested, but in the future it will be able to carry about 50 envelopes over a distance of 350 km. The company is also working out the question to minimize human participation in the issuance of parcels, actively developing the project of post offices. The table 6 shows that in this regard, there is a well-developed field of marketing with modern website as well as a convenient application. "Nova Poshta" has pages on social networks and is working to improve the quality of the brand and its recognizability. The visualization of research results, shown in Fig. 2 demonstrates that the most mature area for digitalization is marketing, and the lowest – personnel.

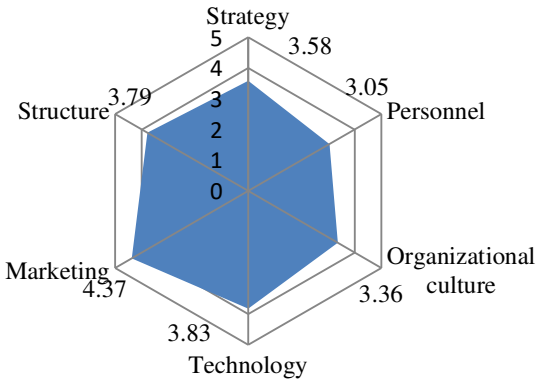

Fig. 2: The Nova Poshta digital maturity chart

With regard to the issue of personnel management in the context of digital transformation, the score is lower (3.05), and therefore it is necessary to pay attention to this area. In order to increase the level of readiness for changes as well as openness to innovation, it's important to satisfy the employees need in digital education and training at all levels. An appropriate level of organizational culture will contribute to this.

Conclusions

Digital transformation of the enterprise is a complex process that must take into account many factors of its internal and external environment. It is impossible to create a strategy or invest in digital technologies without first assessing enterprise's real opportunities and weaknesses. That is why understanding organizational digital maturity is the first logical step towards digitalization.

To simplify the process of digital transformation at the enterprise, it's available to take into account the proposed in article method that allows assessing current enterprise digital state on the base of considered areas, compare these areas with an average level of enterprise's digital maturity. Following these steps will direct to the vital recommendations on the way of improving enterprise digital maturity on the whole.

Moreover, assessment of digital maturity of the enterprise gives the enterprise the opportunity to poit out spesific advantages in the way of digitalization, namely:

- formation the desirable level of digital maturity and the desired state;
- formation of recommendations based on the conditions and features of a particular enterprise, got from provided inveatigation like questionnaire;
- detection of hidden digital potential of the enterprise;
- acquaintance with the opportunities that are provided by digital technologies.

The future investigation will be held on the integration of determining areas of digital maturity improvement into the enterprise management system as well as the formation of digitalization strategy or goals in the general corporate strategy of the enterprise.

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Comparative Approach Regarding Good Governance

ZAI Paul Vasile

Babeş Bolyai University, Cluj-Napoca, Romania
zai@fspac.ro

Abstract

This paper tries to analyze good governance using an Eurostat and World Bank approach. In the first part, a brief history of good governance will be presented along with various definitions of the concept and its key characteristics. Then, in the second part, various indicators of good governance at EU 28 level will be shown, together with their corresponding data for the past 10 years and more, according to different sources such as Eurostat and the World Bank. The author also tried to create a model for participatory budgeting.

***JEL Codes**: E6*

Keywords*:* Eurostat, World Bank, Indicators, Good Governance.

Introduction

Governance, as the World Bank defines it, refers to the "the manner in which power is exercised in the management of a country's economic and social resources for development[1]". This simple and clear definition shows both what governance is – exercise of power towards state level resource management, and what its end goal is, namely the socio-economic development of that state. Furthermore, this definition is useful because it also links the age-old concept of governance with the relatively modern concept of "good governance", which emerged during the "government crisis"[2] of the late 1980s of several African countries in which the IMF and the World Bank, at the time, were implementing economic aid programs that were severely hindered by administrative corruption and ineffectiveness.

Nanda (2006) stated that good governance emphasizes the means of achieving development, by fighting corruption, nepotism and bureaucracy, and by instituting principles such as transparency and accountability in government institutions.[3] Moreover, due to these governance issues, the two aforementioned international aids started conditioning financial aids based on good governance principles, so as to ensure the efficiency and effectiveness of those aids.[4] This shift of paradigm meant that the quality of the government now became the main factor of the long-term socio-economic development, and so, sustainability became the key for requesting aid.[5]

According to UNDP (1997), the concept of good-governance has been thoroughly debated, and there are dozens of definitions and views upon it depending on the agent (scholar, institution, organization etc.). Hence, it can be seen

[1] World Bank, "Managing Development - The Governance Dimension", 1991, Washington D. C., available [Online] at http://wwwwds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2006/03/07/000090341_20060307104630/Rendered/PDF/34899.pdf

[2] World Bank, "Sub-Saharan Africa: From Crisis to Sustainable Development", 1989,Washington, D. C., World Bank, [Online] disponibil la adresa http://wwwwds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1999/12/02/000178830_98101901364149/Rendered/PDF/multi0page.pdf

[3] See Nanda V P, "The 'Good Governance' Concept Revisited", 2006, 603: 269, available [Online] at http://ann.sagepub.com/content/603/1/269

[4] Idem.

[5] Santiso, C., "Good Governance and Aid Effectiveness: The World Bank and Conditionality", 2001, The Georgetown Public Policy Review Volume 7 Number 1 Fall 2001, available [Online] at http://www.sti.ch/fileadmin/user_upload/Pdfs/swap/swap108.pdf

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as a series of positive principles which aims to fight administrative dysfunctionalties[6], an instrument that eases financial aids as previously mentioned[7] and also as a fundament for consensus and representation in decision-making[8]. In addition, the World Bank gives the most comprehensive definition of the concept, namely that good governance "is epitomized by predictable, open and enlightened policy making (that is, transparent processes), a bureaucracy imbued with professional ethos; an executive arm of government accountable for its actions; and a strong civil society participating in public affairs, and all behaving under the rule of law."[9]

Thus, linked with the long-term state socio-economical development, good governance is both a means and a goal in itself. It manifests itself on three main levels – political, administrative and social level and, according to some views, incorporates not only public institutions but civil society organizations as well.

The concept of good governance involves and also reinstates that the means of achieving socio-economical development are as important as the goals of doing it. Public administration is no longer an enclosed system which functions independently of its citizens. On the contrary, people's needs are the focus now. Their freedom must be ensured, as well as their dignity, as according to human rights, and they must have a voice in policy making. Therefore, besides efficiency and effectiveness in public institutions, there is also a need for transparency and accountability in the public office, which must now be open to criticism, praise and amendment, since after all, governments must be "off the people, by the people, for the people"[10] as a fundament for both a well functioning democracy and a good state governance that enables long term social and economical development and sustainability. I chose this topic in order to realize a comparative approach between indicators of good governance from E.U. and indicators from World Bank. Another very important motivation was to derermine the situation regarding good governance in the countries from global level.

Methodology

The data used in this paper is exclusively from the European Commission site: Eurostat which is a free provider of a high quality statistic database (it describes itself as follows: "Eurostat is the statistical office of the European Union. Its task is to provide the European Union with statistics at European level that enable comparisons between countries and regions"), and the World Bank site. Taking into consideration the type of data being used, a quantitative research will be conducted with special regards to budget.

Principles of Good Governance

The basis of good governance at the European Union level contains the following five main principles[11]:

Principle	Description
• **Openness**	The European institutions should attach more importance to transparency and communication in their decision-making.
• **Participation**	Citizens must be more systematically involved in the drafting and implementation of policies.
• **Accountability**	The role of each party in the decision-making process needs to be clarified. Each actor involved should then assume responsibility for the role given to him.

[6] See Srivastava, M., "Good Governance - Concept, Meaning and Features: A Detailed Study", 2009, available [Online] at http://dx.doi.org/10.2139/ssrn.1528449

[7] See Mkandawire Thandike: "Good governance: the itinerary of an idea", 2007, Development in Practice, 17:4-5, 679-681, [Online] disponibil la adresa http://dx.doi.org/10.1080/09614520701469997

[8] As mentioned in UNDP, "Governance for Sustainable Human Development", New York: UNDP, 1997, available [Online] at http://gis.emro.who.int/HealthSystemObservatory/Workshops/WorkshopDocuments/Reference%20reading%20material/Literature%20on%20Governance/GOVERN~2.PDF

[9] World Bank, "Governance: The World Bank's Experience", 1994, p. vii, available [Online] at http://books.google.ro/books/about/Governance.html?id=lylQWqEdtrkC&redir_esc=y

[10] See the famous " Gettysburg Address" of US President Abraham Lincoln (1809-1965), available [Online] at http://www.abrahamlincolnonline.org/lincoln/speeches/gettysburg.htm

[11] Source for the principles and their corresponding description is taken from The EU White Paper on Governance Summary, available [Online] at http://europa.eu/legislation_summaries/institutional_affairs/decisionmaking_process/l10109_en.htm

• **Effectiveness**	Decisions need to be taken at the appropriate level and time, and deliver what is needed.
• **Coherence**	The EU conducts extremely diverse policies which need to be pursued coherently.

Of these five principles, participation, accountability and effectiveness are identical to those from the UNESCAP model. Furthermore, the openness principle from the EU level incorporates the transparency component from the previous model. In addition, the coherence principle frames the overall government activity into that of policy integration that aims to ensure the integrity and well functioning of state institutions which can be linked not only with efficiency and effectiveness but also with vision and long-term sustainability that actually depends on the latter. On a final note, it must be mentioned that all these five principles enclose good governance into the activity of public institutions, and somehow remove the external dimension of government, even though they require openness, transparency and participation.

Good Governance Indicators

Table 1: Good Governance Indicators

Source/Agent	Indicators	Information
Eurostat	• Infringement cases • Voter turnout in national and EU parliamentary elections • Shares of environmental and labor taxes in total tax revenues from taxes and social contributions • Transposition deficit • E-government on-line availability • E-government usage by individuals • Level of citizens´ confidence in EU institutions (for sub-theme policy coherence and effectiveness)	At EU level, good governance is strongly linked with the concept of sustainability in the sense of providing a good life quality to everyone from both the present generation and the generations to come.[12]
World Bank	• Voice and Accountability • Political Stability and Absence of Violence • Government Effectiveness • Regulatory Quality • Rule of Law • Control of Corruption	For the World Bank, good governance depends on three major sets of factors: 1. how public authority is exercised in a state, 2. how the government is selected, monitored and replaced, and 3. the government's capacity to formulate and implement "sound" policies that are also representatives for citizens and organizations within that state.[13]
Gross National Happiness (Index)[14]	• Dimension: Political participation -> Indicators: Possibility of voting, Frequency of attendance in decision-making assemblies. • Dimension: Political freedom -> Indicators: Freedom of speech, vote, association, to join a political party, to be a member of an association, equal pay for value, and freedom from discrimination based on sex, religion, age etc. • Dimension: Service Delivery -> Indicators: distance from the nearest health care centre, waste disposal	Good governance is a component of the Gross National Happiness Index which aims to measure the subjective well-being of individuals. Among other components of the index, psycho-logical well-being, health, education, culture, time-use, community vitality, ecological diversity and living standards are very important.[15]

[12] European Comission – Sustainable Development – Presentation Article, available [Online] at http://ec.europa.eu/environment/eussd/
[13] See the Governance definition from http://info.worldbank.org/governance/wgi/index.aspx#home
[14] All information is taken from Ura et. all, A Short Guide to Gross National Happiness Index, The Center for Bhutan Studies, 2012, pp. 25-27, available [Online] at http://www.grossnationalhappiness.com/wp-content/uploads/2012/04/Short-GNH-Index-edited.pdf
[15] Idem.

	method, access to electricity and water supply and quality. • Dimension: Government performance -> Indicators: Efficiency in various fields, such as employment, equality, education, health, anti-corruption, environment and culture.	
Source: own processing of data from Eurostat, World Bank		

Having in mind the Eurostat indicators for good governance, one must notice that they are far from being able to encompass even the main components of the concept which were presented in the previous section.

For example, when measuring participation, in terms of voter-turnout in national elections and European Parliament elections, one can notice a slight decrease of 1.5% from 2000 to 2018, which followed a major decrease since the early 1990s.[16]

At EU27 level, there is a slightly big discrepancy between countries regarding national elections. Countries such as Malta, Luxembourg, Belgium, Denmark, Italy, Cyprus, Sweden and Austria have a turn-out rate higher than 80% (even close to 90% for some of those countries), while most of the other countries range from 60 to 80%, and countries from the Eastern Block such as Romania, Bulgaria, Hungary and Poland have less than 40% turn-out rates.

Croatia, the newest entrance into the EU has a slightly increased voter turnout – 59.6% in 2007 and 54.2% in 2018[17]. Its entrance slightly changes the average with only 0.1% decrease for EU28 as opposed to EU27.[18] Among the causes which decrease voter-turnout, young population absenteeism from elections[19] , population size, electoral closeness and electoral expenditures are of great significance.

Analyzing Main Indicators Eurostat

After gathering the required data for the analysis, the author will try to determine, using the indicators, firstly, which countries from the European Union have the highest level of good governance and what policies did they apply in order to reach that level.

The author will also try to find out new correlations and new theories out of this analysis.

1. Firstly, the **"new infringement cases"** indicator will be analyzed. As stated above, this indicator represents new direct actions brought before the Court of Justice, which concern the failure of a Member State to fulfill his obligations. (United Nations, 2007: 25–32; Mayntz, R., 2002: 86–99).

Therefore, the higher the number of new cases of infringement, the worse the level of good governance in that country. The data from Eurostat from year 2012 (the most recent year available) shows the following growth regarding new cases of infringement.

With the exception of Croatia, which has been recently added to the EU, and since there are no recent data to categorize it, the top list of new infringement cases in the member states shows as follows:

The countries with the smallest number of cases are: United Kingdom, Sweden, Finland, Romania, Austria, Malta, Latvia, Estonia, Denmark and Czech Republic. The leading countries with the largest number of cases in 2012 are: Poland, Germany, France, Italy, Spain, Hungary, Bulgaria and Slovenia. The in-between countries which have 1-2 new cases are Belgium, Ireland, Greece, Cyprus, Lithuania, Luxembourg, Netherlands and Slovakia.

[16] European Comission Report, Sustainable Development – Good Governance, available [Online] at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Sustainable_development_-_good_governance#cite_note-6

[17] : Election Guide (CEPPS), Eurostat (tsdgo310).

[18] Idem.

[19] See Delwit, P., 2013, The End of Voters in Europe? Electoral Turnout in Europe since WWII, Open Journal of Political Science, vol.3 (1), pp. 44–52.

In parallel, the *average of the new infringement case numbers growth* (how much did this number grow in these six years) is analyzed, for the same indicator, from year 2007 until 2018. The list rendered the following order: (ascending, from the smallest numbers to the biggest numbers) Czech Republic, Denmark, Estonia, Latvia, Malta, Austria, Romania, Finland, Sweden, United Kingdom, Lithuania, Luxembourg, Netherlands, Slovakia, Belgium, Ireland, Greece, Cyprus, Bulgaria, Slovenia, Spain, Hungary, France, Italy, Germany and Poland.

It can be seen that almost all five leading countries kept their position: Poland, Germany, France, Spain and Hungary, which shows a constant growth in the last six years. The five countries that show the best numbers, which means less new infringement cases, are: Austria, Malta, Romania, Sweden and Czech Republic.

Between 2007 and 2018, the number of new Single Market related infringement cases fell by 38 %. Most of this decline occurred since 2010. Taxation and environmental issues make up the two largest groups of Single Market related infringement cases by policy sector, representing 44 % of all the pending infringement cases in November 2012.[20]

2. Moving on to the next indicator, **the transposition deficit** (which shows the percentage of Single Market directives which have not been notified yet "as national transposition measures" to the Commission in relation to the total number of directives that should have been notified by the deadline) the following can be observed:

After dropping significantly since 2000, the transposition deficit of EU Single Market law reached a new decrease of 0.6 % in November 2018. Promoted by the Internal Market Scoreboard as the 'best result ever', the transposition deficit was 0.4 percentage points below the 1 % target for the transposition of Single Market rules.[21]

Again, for the year 2018, the following 13 countries have big percentages (from 2% to 0.6%) of transposition deficit: Belgium, Poland, Austria, United Kingdom, Slovenia, Cyprus, Italy, Finland, Luxembourg, Lithuania, Spain, Germany and Bulgaria. The countries that have a number of deficits under 0.6% (from 0.5% to 0%) are: Hungary, Greece, Romania, Netherlands, Latvia, Denmark, Slovakia, France, Czech Republic, Sweden, Malta, Estonia and Ireland (with 0%).

Table 2 :Shares of Environmental and Labor Taxes in Total Tax Revenues from Taxes and Social Contributions %

Environmental taxes

	2008	2010	2018
Belgium	4,8	5,07	4,76
Bulgaria	10,69	10,6	10,11
Spain	5,08	5,19	4,82
France	4,13	4,15	4,08
Malta	10,18	9,34	8,86
Netherlands	9,58	9,83	9,12
Romania	6,35	7,52	6,84
Slovenia	8,06	9,64	10,15
Slovakia	7,03	6,65	6,18
Finland	6,27	6,55	6,96
Sweden	5,84	6,02	5,64
U. K.	6,54	7,55	7,42

Source: own processing of data from Eurostat

It can be observed that for the **period 2008-2018, the evolution of this problem regarding deficit** renders the following: The top 5 countries with the biggest percentages of deficit are: Poland, Italy, Belgium, Cyprus, Luxembourg and Greece. The top 5 countries with the smallest percentages of deficit are: Malta, Denmark, Latvia,

[20] http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/237EN/EN/237EN-EN.PDF
[21] Idem

Slovakia, Bulgaria and Romania. (S´everine Menguy, 2008: 1093–1105; Paredesa, J., Pedregalb, D. J. and Pérez, J. J., 2014: 84–97).

3. Taking only about the second and third part of the next indicator (openness and participation), which are e-government on-line availability and E-government usage by individuals, the following can be observed (data from annex 3*):

The 10 peoples that have used the internet mostly for interaction with public authorities, for a 3 year period 2008 - 2010 (most recent data) are: (starting with best score) Denmark, Sweden, Netherlands, Finland, Luxembourg, Estonia, United Kingdom, Slovenia, Austria and Germania. The last 6 countries on the list are: Poland, Italy, Czech Republic, Bulgaria, Greece and Romania. Yes, Romania is the last on the list, which means that Romanians hardly go online to search for public information.

Citizens' online interaction with public authorities in the EU rose by 8 percentage points between 2008 and 2018. After a slight decrease in 2011, internet interactions with public authorities have increased again, reaching 44 % in 2018. This trend partly reflects an overall increase in the internet usage across the EU.

4. Moving on to the **environmental taxes**, which represent tax revenues, they stem from four types of taxes: energy taxes (which contribute with around three-quarters of the total), transport taxes (about one fifth of the total), and pollution and resource taxes (about 4 %). (Mutiganda J. C., 2013: 518–531; Aronson, R. and Schwsrtz, E., 1996: 114–136).

The author of this paper extracted the data from Eurostat for a period of 3 years regarding this indicator, measuring the level of the revenues that comes from this type of environmental taxes. He chose a period no longer than 3 years because after verifying other options, he noticed that the data was constant.

The top ten countries that have the lowest level of environmental taxes (under 7%) are: France, Belgium, Spain, Germany, Sweden, Austria, Lithuania, Luxembourg, Slovakia and Hungary. The countries that have the highest level of taxes (over 8%) are: Slovenia, Bulgaria, Netherlands, Malta, Croatia, Ireland, Latvia, Estonia, Greece and Denmark.

Shares of Environmental and Labour Taxes in Total Tax Revenues from Taxes and Social Contributions %

Taxes on Labour

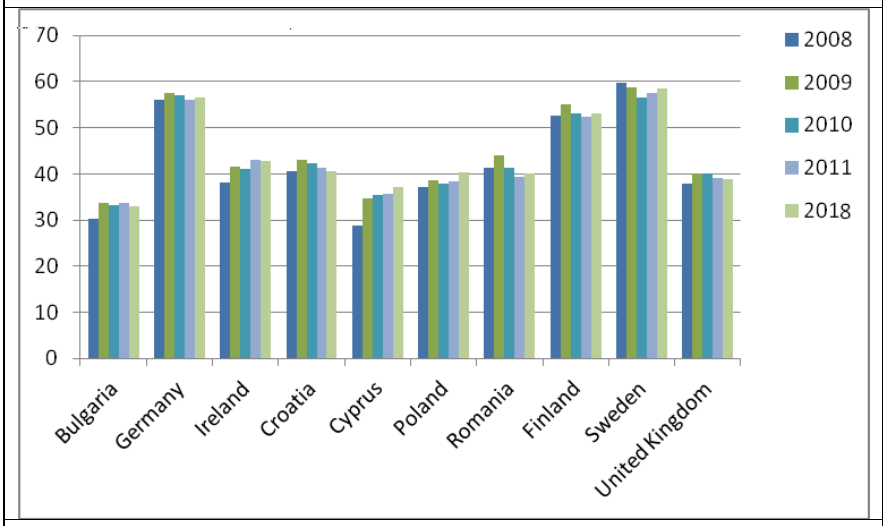

Chart 1

Source: own processing of data from Eurostat

This indicator "Economic instruments" has two layers. It considers the shares of environmental and labour taxes in total tax revenues from taxes and social contributions. One layer is environmental taxes, which has just been analysed and the second is labour taxes.

Taxes on labour are defined as all personal income taxes, payroll taxes and social contributions of employees and employers that are levied on labour income (both employed and non-employed). On average, about 65 % of labour taxes consist of social contributions.

The next graph will helps see the existent labour taxes level measured in percentage in each country of the EU.
It can also be seen that Bulgaria, Malta, Cyprus, United Kingdom, Romania, Poland, Croatia, Greece and Ireland have a level under 45 %.

The share of labour taxes in total revenues from taxes and social contributions showed a fluctuating but an overall increasing trend between 2000 and 2011, reaching almost 55 % in 2011. This is compared with an overall decline in the share of environmental taxes over the same period, reaching 6.17 % in 2011. This trend counters the Europe 2020 strategy's argument that 'raising taxes on labour, as occurred in the past, at great costs to jobs, should be avoided'.[22] Nevertheless, there are large differences in the share of labour taxation among the Member States, ranging from 33.4 % to 58.1 %.

Level of Citizens' Confidence in EU Institutions %

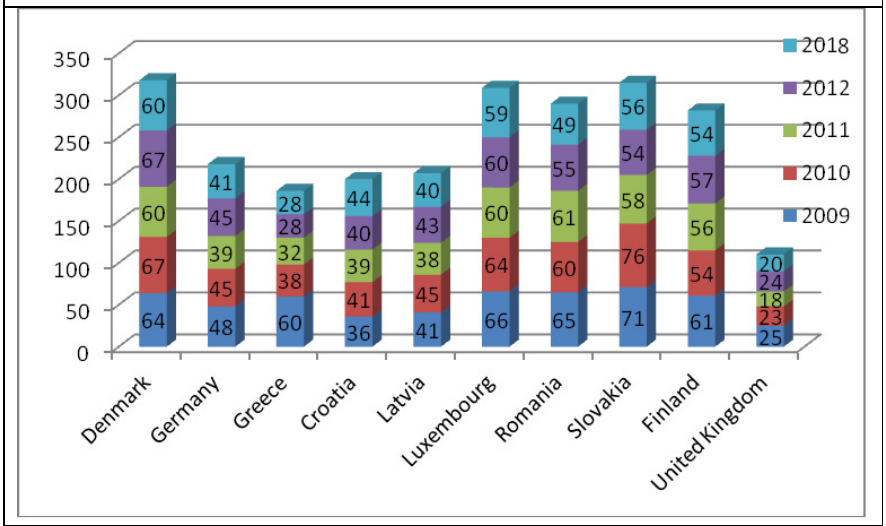

Chart 2

Source: own processing of data from European Commission, Eurobarometer

With regards to the environmental taxes, only two Member States (Bulgaria and the Netherlands) showed a share above 10 % of the environmental taxes in total revenues from taxes and social contributions in 2011, and two others (Malta, Slovenia) had a share above 9 %. In the remaining Member States, the share of the environmental taxes ranged from 4.15 to 8.94 %.[23]

5. Next on the list is **the level of citizens' confidence in EU institutions.** This indicator is expressed as the share of positive opinions (people who declare that they tend to trust) about the institutions.

On average, in the period 2011-2018, people in Denmark, Luxembourg, Belgium, Hungary, Estonia, Sweden, Slovakia, Bulgaria, Finland and Malta trust the EU institutions the most, while people from countries like UK, Spain, Greece, Cyprus, Italy, Slovenia, France, Latvia, Germany and Ireland have low trust level in the EU institutions.

Less than half of the EU citizens have trust in the three main EU institutions. In 2012, the European Parliament was the most trusted among them (44 % of the citizens say they trust it), followed by the European Commission (40 %) and the Council of the EU (36 %). Citizens' trust in political institutions on all political levels is generally low, especially regarding the political parties and institutions at the national level. [24] In order to create a good governance

[22] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Sustainable_development_-_good_governance
[23] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Sustainable_development_-_good_governance
[24] http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/237EN/EN/237EN-EN.PDF

level in the EU, several lists of scores obtained by these countries were created for each indicator. The countries that constantly got good scores in every list are: **1. Estonia, 2. Malta, 3. Denmark, 4. Sweden, 5. Bulgaria.** (6. Netherlands, 7. Latvia, 8. Finland, 9. Ireland, and 10. Luxembourg).

Analyzing Main Indicators World bank

Control of Corruption

The first two states with the best results in corruption control are Germany and UK, but both of their values were steadily declined in the 2003-2009 period, and only after the 2008, the crisis started to rise again. Furthermore, this gradual decline in corruption control is present in all the six countries, and the most visible one belongs to Bulgaria, which started from 2005 and continued through 2008 and 2009.

Control of Corruption in Germany, France, UK, Romania, Hungary and Bulgaria in the Period 2003-2018.

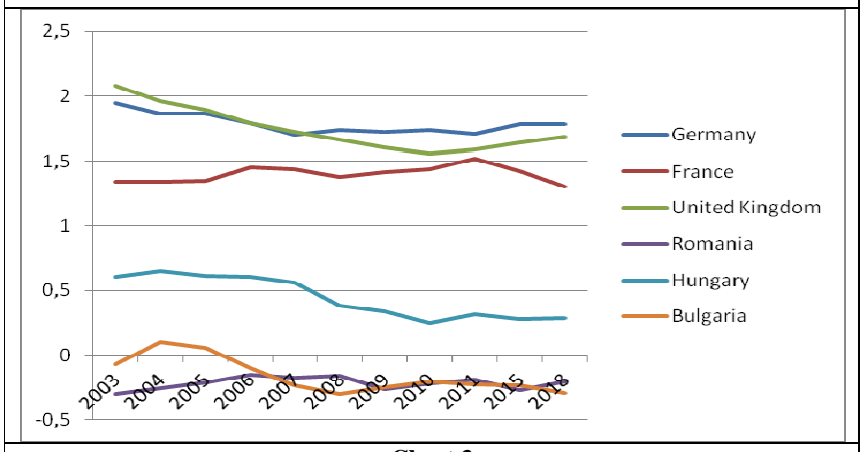

Chart 3

Source: own processing of data from World Bank

However, in most of the countries, the emergence of the crisis triggered slight increases in corruption control, when severe state interventions were actually required, and needed as much control as possible over corruption cases, which led to inefficiencies and waste of precious financial resources due to private interest use of the public money. Unfortunately, Romania and Bulgaria present negative values in corruption control. While in Bulgaria, there was that serious downfall, in Romania, there were slight increases over the years that were weakly affected by the financial crisis.

There was also a downfall in government effectiveness related to service provision, proper policy making, state commitment and credibility in the case of Germany, France and UK which reached similar values for all the three Western states in 2018. The other three countries are more dispersed, with Hungary following the Western trend for the decline in government effectiveness, then by Bulgaria which again had a series of increases and decreases during the analysis period, and of course Romania, which although it had less abrupt shifts, still maintained negative values related to government effectiveness up until 2018, and it appears in that it will reach a positive value in the forthcoming years.

Government Effectiveness in Germany, France, UK, Romania, Hungary and Bulgaria in the Period 2003-2018.

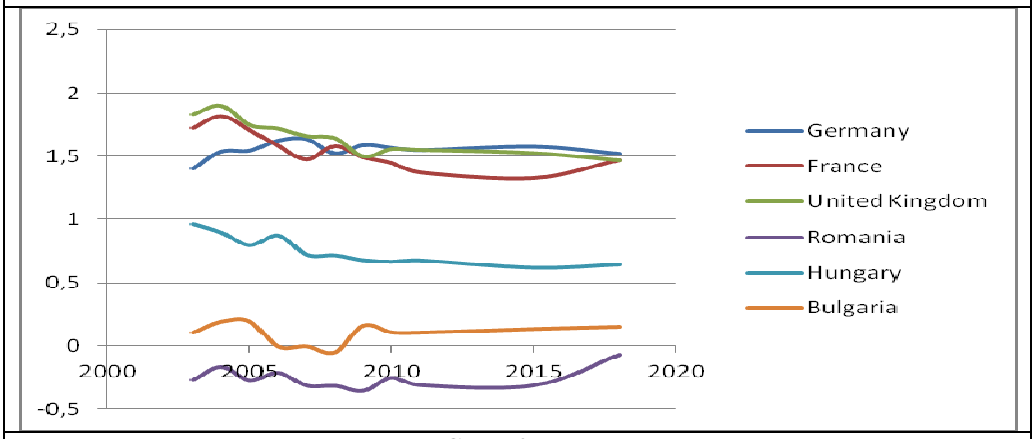

Chart 4

Source: own processing of data from World Bank

Political Stability and Absence of Violence and Terrorism in Germany, France, UK, Romania, Hungary and Bulgaria in the Period 2003-2018.

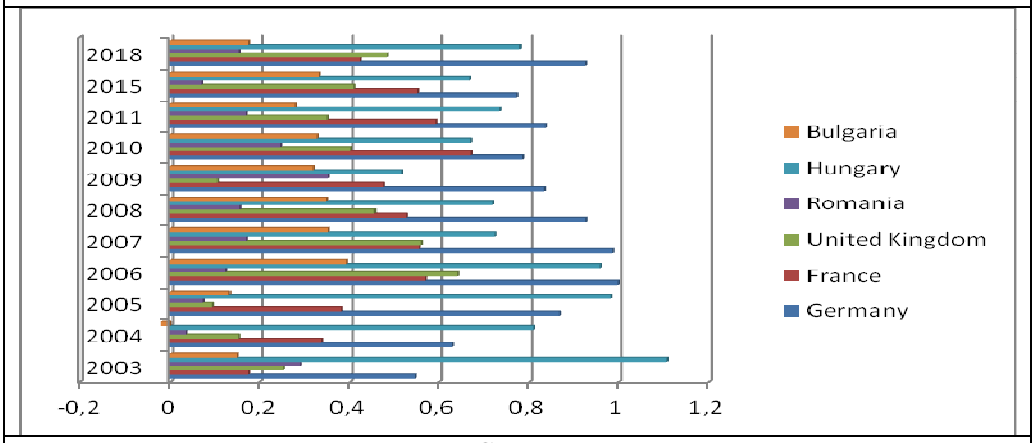

Chart 5

Source: own processing of data from World Bank

There is a severe downfall and subsequent uprisings in the political stability visible for all the analyzed 6 countries after the 2008 financial crisis, which can be explained by the increased level of social unrest due to diminishing incomes, high unemployment rates and severe austerity measures. One cannot but notice the heavy downfall of stability that happened in the UK in 2009, when it was lower than that of both Romania and Bulgaria, but which then started to increase after 2010, surpassing again the two countries. Hungary was one of the most stable countries at the beginning of the analysis period in 2003, but up until 2018, it drastically shifted a couple of times and fell behind Germany, which has the highest values from all the 6 countries and which experienced a major increase in the political stability from 2004 to 2005.

As for France, the country had two major uprisings and downfalls in the decade, ending up with a slightly lower value in 2013 compared to the UK. When it comes to legislation quality, according to the chart, the United Kingdom leads, followed by Germany, then France, then Hungary, and in the last two places, Romania and Bulgaria. For most of the countries, the shifts are not abrupt, except in the case of Romania where there is rather a significant increase from 2003 to 2006, in the period before entering the EU that continued with slightly lower increase values up until 2018. Last but not least, it is interesting to see that the countries are paired-two by having similar evolutions throughout the years.

As it was with the regulatory quality, the United Kingdom again leads in the Rule of Law dimension. Its course throughout the decade runs very close to and in parallel with Germany. France is again next, with a couple of shifts that somehow translate into a stagnation on this dimension since the values in 2018 are similar to those from 2003 despite those subtle increase-decrease turns. Bulgaria and Romania have an overlapping evolution which ends in 2007, the year in which they both entered the EU, when Romania had a slight increase in values up until 2018 while Bulgaria continued steadily, thus ending up being surpassed by Romania.

For Germany, France and the UK, regarding voice and accountability in the country, a small peak can be noticed for all the three in 2004, followed by a steady evolution in which Germany emerged as the leader, followed closely by the UK, and then by France. In the case of Hungary, a steady decline can be observed on the chart. Whereas Romania and Bulgaria again had an almost parallel course of a slight decline after their 2007 EU integration.

Rule of Law in Germany, France, UK, Romania, Hungary and Bulgaria in the 2003-2018 Period.

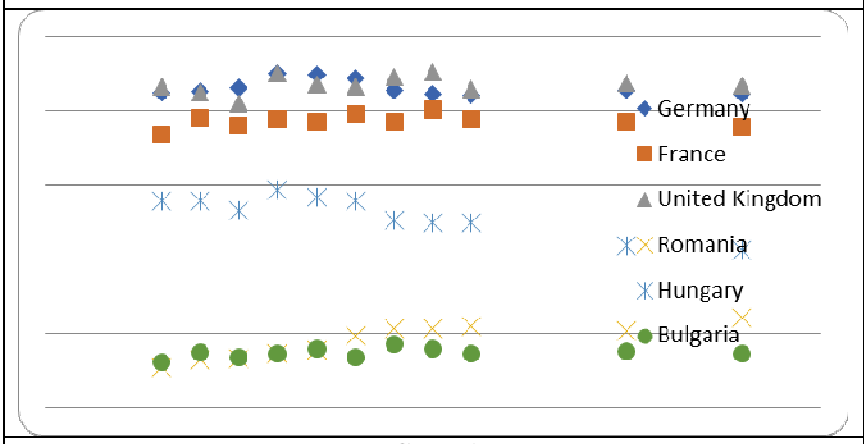

Chart 6

Source: own processing of data from World Bank

Voice and Accountability in Germany, France, UK, Romania, Hungary and Bulgaria in the 2003-2018 Period.

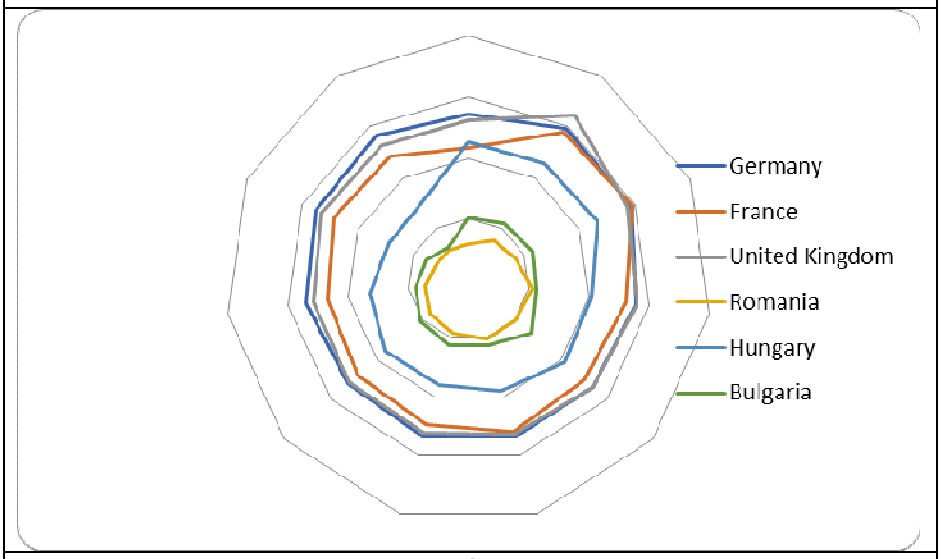

Chart 7

Source: own processing of data from World Bank

World Bank – Governance Indicators Correlation

One can see that for the most part, there is a direct correlation between corruption control and voice and accountability in Romania for the respective time period.

From 2003 to 2006, in the case of both indicators, a slight increase is visible which can be explained by mentioning that during that respective period, Romania was able to absorb pre-accession funds from the EU. Therefore, the corruption control inside the public institutions was increased, as a condition for administrative capacity, and concurrently public institutions in the country also became more open and representative to ensure better resource management and policy formulation and implementation. Then, after Romania's entry in the EU in 2007, the two indicators had a similar evolution - a slight decrease, followed by a slight increase, as more development funds were available to the country to access, both for public institutions and civil society organizations. Then, after the 2008 crisis, the indicators passed through a downfall, one more severe in the case of corruption control, than in the case of accountability and public voice, perhaps because the economical uncertainty triggered an increase in acts of corruption. After the crisis, the indicators took a different direction, so while the voice & accountability remained constant, at a significant level lower than before the crisis, the control of corruption shifted rather drastically, increasing after the crisis, then decreasing after 2011, followed immediately by another increase. This period was considered as one of many political scandals in the country as multiple cases of broad-scale corruption were uncovered, many political and public charts were caught in corruption scandals and some of them were even sent to prison. Of course, the parliament and the presidential elections in that period also contributed to these shifts as a consequence of the many power shifts caused by them.

Forecasting for the years 2019-2025

The data for the years 2015-2020 was extracted using the FORECAST function of MICROSOFT OFFICE EXCEL based on previous data beginning with the year 2003.

Control of Corruption and Voice and Accountability Correlation for Romania, in the Period 2003-2018.

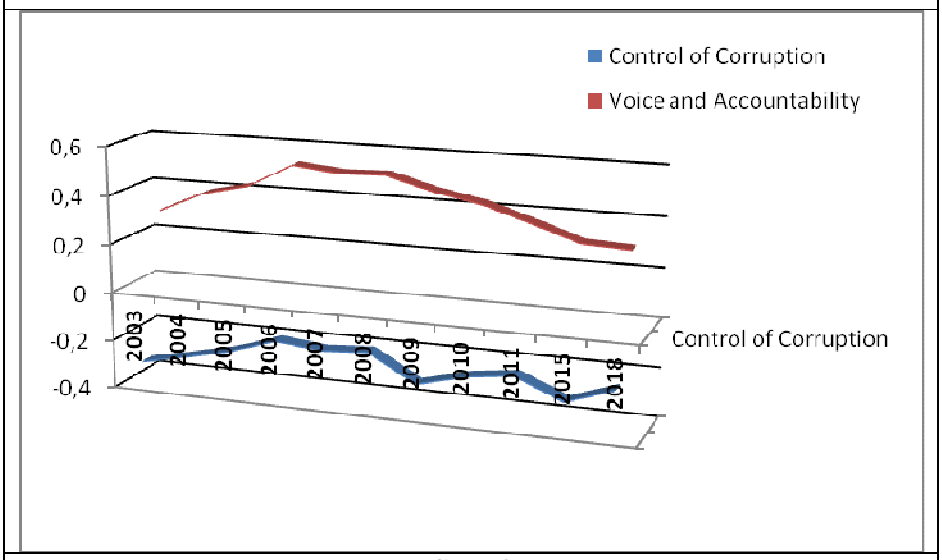

Chart 8

Source: own processing of data from World Bank

Biggest amounts are in Nordic countries and in developed countries.

Forecasting for the Years 2019-2025.

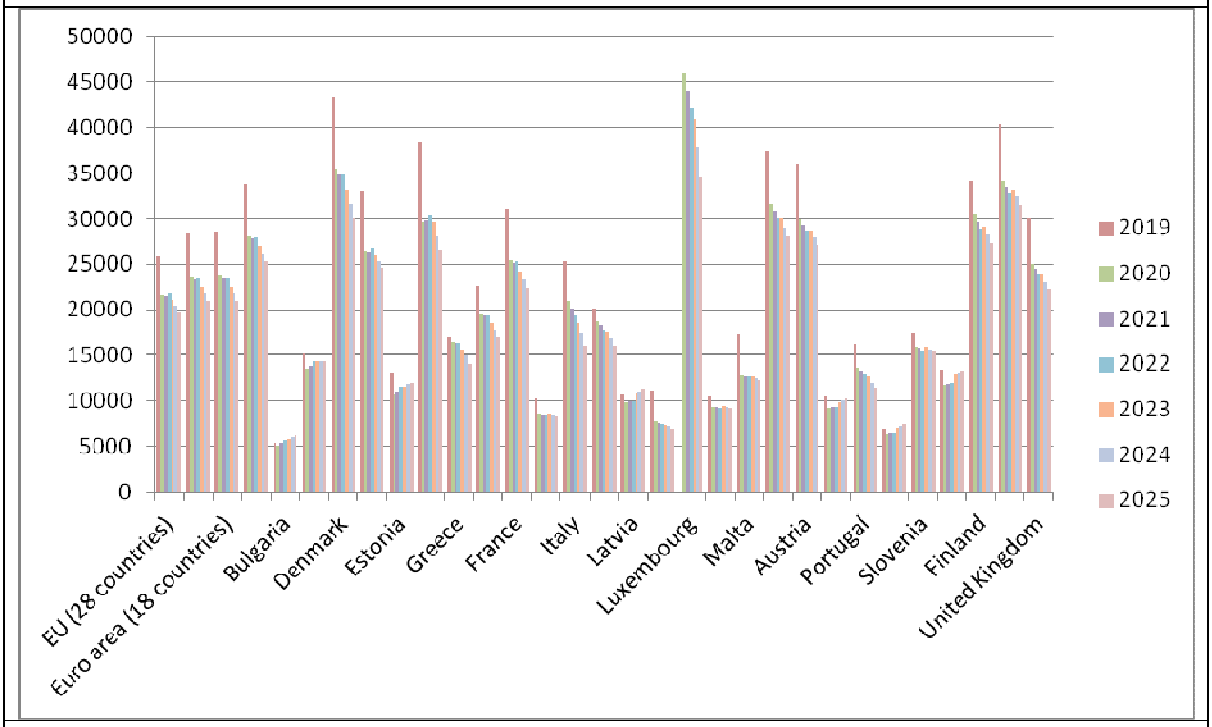

Chart 9

Source: own processing of data from World Bank

Conclusions

Good governance is an absolute must in all countries because without proper resource management at state level, proper openness and participation, control of corruption, accountability, trust in public institutions, and sound legal frameworks, corruption, waste and loss of legitimacy become prevalent. Of course, other principles must be included so as to ensure good governance, such as transparency, efficiency and equity so that state institutions provide the best goods and services to citizens and make the most satisfying decision for all of them. Then, the measurement of good governance, by Eurostat and the World Bank, focuses on internal processes, how institutions should function and what principles to implement, like for example those mentioned above, but the author of this paper suggests a new series of indicators which focuses on the results or outcomes of state institutions, namely the real GDP/capita which measures the economical performance in terms of welfare and population income increase, and also proper resource allocation in social fields so as to diminish the rate of poverty risk for citizens, in environmental policies in order to reduce pollution and ensure long term socio-economical development and sustainability, and also in innovation, research and development in order to access more and more useful technologies which increase goods and service production and provision. As for concrete results, almost in all governance indicators from the World Bank, those mentioned before and also in terms of the economical performance, there is a high discrepancy between the Western States and the Eastern States, with better performances present in the Western States such as UK, Germany, France, Netherlands and Luxembourg, in contrast with the Eastern States such as Romania, Bulgaria and Hungary.

In order to achieve the principles of transparency, collaboration and involvement of citizens, a research instrument was created according to social sciences, by which the opinions of citizens will be collected, centralized and studied. This semi-structured guide interview allows respondents to identify by themselves as many local problems as possible and then evaluate them by the indicators of costs, emergency, period of time and number of people affected. The idea behind this method is that it will help in studying the differences between the evaluation of citizens and that of an expert, differences which consist in a helpful instrument for studying the degree of public awareness on local problems.

The author of this paper hopes that the instrument will be successfully applied through the local authorities' collaboration and citizens' implication. That will be a real achievement for his academic background and a strong sign for participatory democracy in allocating public funds for local problems.

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Switching in Donation Behavior Using Financial Technology During the Covid-19 Pandemic in Indonesia

Maulia Nurul HAKIM[1], Syifa FAUZIAH[2], Rika Yulita AMALIA[3], NURWAHIDIN[4] and Nurul HUDA[5]

[1]School of Strategic and Global Studies, University of Indonesia, Jakarta, Indonesia, maulia.nurul@ui.ac.id
[2]School of Strategic and Global Studies, University of Indonesia, Jakarta, Indonesia, syifafauzi25@gmail.com
[3]School of Strategic and Global Studies, University of Indonesia, Jakarta, Indonesia, yulitarika0@gmail.com
[4]School of Strategic and Global Studies, University of Indonesia, Jakarta, Indonesia, nurwahidin@ui.ac.id
[5]Faculty of Economic, Yarsi University, Jakarta, Indonesia, pakhuda@yahoo.com

Abstract

Social restrictions and suggestions to stay at home in the era of the Covid-19 pandemic have changed Indonesian people's habits to interact with one another, including donation activity. This study aims to determine the factors contributing to Donation Switching Behavior from the use of cash to Financial Technology during the Covid 19 Pandemic. This study uses the Technology Acceptance Model (TAM) with the addition of the Safety Needs and Trust variables. Data obtained from a questionnaire analyzed by PLS-SEM. The results showed that Perceived of Use and Trust had a significant positive effect on Switching intention to pay for digital donations through financial technology platforms. Other variables, Perceived of Used and Safety Needs, do not affect Switching Intention. On the other hand, Switching Intention supports Switching Behavior to make digital donations during the Covid-19 pandemic.

Keywords: Digital Donations, Financial Technology, Switching Behavior, Covid-19 Pandemic.

Introduction

The uncontrolled spread of COVID-19 has caused more than 800,000 people to die from all over the world (WHO, 2020). To reduce the spread of the coronavirus, Indonesia government has implemented a lockdown and physical distancing. The government also continues to campaign for the slogan to stay at home and advocate work from home and learn from home to limit meetings between people. It directly affects the performance of companies and other institutions. The situation in this pandemic has caused a huge challenge that has never happened before, the company will experience many changes so it is necessary to rethink the strategy of a company to survive (Pantano, 2020).

Finally, the employees of the company also lose their income and even their jobs. The World Bank (2020) claims that this pandemic is hitting workers with daily wages in emerging countries because more than 23 million people will become lower. It means that the coronavirus's impact has not only caused problems for human health and safety but has also penetrated economic and social problems.

On the other hand, a positive effect of efforts to control the coronavirus spread is increasing digital services. The implementation of lockdown and physical distancing has limited the interaction space between people. It causes people to switch from direct interaction to digital services. That way, they can protect themselves from the possibility of contracting the virus. The pandemic forces people to access extraordinary digital leaps that require significant adjustments among the community (Iivari et al., 2020).

Redseer collected data showing the increasing use of digital services in Indonesia during the COVID-19 pandemic. The sector that experienced the most increase was e-commerce by 69%; the use of digital wallets also increased by

[1] Corresponding author: maulia.nurul@ui.ac.id Magister student in School of Strategic and Global Studies, Universitas Indonesia

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65% (Katadata, 2020). The report submitted by The Financial Services Authority (OJK) of Indonesia also shows the growth of lending based on financial technology of 185.54% year-on-year (Detikcom, 2020). The data above shows that the migration of people to use financial technology is very significant for their daily activities. It also means that financial technology has a critical role in supporting public financial transactions during a pandemic in the financial sector.

Moreover, related to the migration to use financial technology for financial transactions, financial technology can be one of the choices for people to collect donations during a pandemic. That is how, in this study, we highlight the factors that contributed to the behavior of shifting donations from using cash to financial technology during the Covid 19 Pandemic. Research on switching to financial technology services is still very limited and still focuses on commercial financing. Afandi (2020) reviews the switching of banking customers to financial technology lending services. Another study analyzed customer switching to internet banks (Cheng and Davis, 2012; Yen and Malarvizhi, 2016; Yu, 2015; Devlin and Yeung, 2003).

Literature Review

Since Keaveney (1995) introduced, studies on customer switching are continuously developed by researchers from various fields. Ross (1999) discusses the service provider switching model, Colgate and Hedge (2001) review the switching process in retail banking, while Marshall et al. (2011) in the financial market. Bansal et al. (2005) use migration as an analogy to explain the concept of consumer's switching behavior. Consumer's switching behavior is a migration of customers from one service provider to another. According to Bansal et al. (2005), migration can occur because of consumers' willingness at any time because consumers feel they have no choice but to migrate, for example, if their service provider closes, or because they adjust their needs.

This research highlights people's migration in donating using financial technology during the COVID-19 pandemic. This research focuses on the migration of people in donations using financial technology during the COVID-19 pandemic by examining the factors that influence it. Use of FinTech in line with the lockdown and physical distancing rules because FinTech focuses on the use of digital services it diminishes the need for physical interaction.

The Financial Stability Board (FSB) defines financial technology (FinTech) as a form of technology-based financial innovation that can produce new business models, applications, processes or products with material effects related to financial markets, institutions, and financial services, providers. FinTech products can be divided into four categories based on the type of innovation; Payment, e-aggregator, risk and investment management, and peer to peer lending and crowd-funding. Rashmi (2018) discovered that implementing non-cash transactions increases GDP by using cards and reduces social costs, increasing financial inclusion as a society can adapt to electronic payments. Ragaventhar (2016) found that the cashless society can be described as an economic condition when financial transaction activities are not carried out with physical money in the form of paper or coins, but through transfer of information between transacting parties.

The Technology Acceptance Model (TAM) is built from two main factors, perceived usefulness and perceived ease of use (Davis, 1989). Perceived usefulness theorized to be influenced by perceived ease of use (Davis, 1989; Pavlov, 2003; Diop et al., 2019; Alsamydai, 2014; Ghani et al., 2017; Ha and Stoel, 2008). According to Lin and Wang (2017), a user is likely to switch if the service can be more useful. It is perceived usefulness that has positive and significant effects on switching intention (Fahmi et al., 2018; Msaed et al., 2017). Moreover, several studies have also concluded that perceived ease of use influences switching intentions (Fahmi et al., 2018; Msaed et al., 2017; Syah et al., 2018; Afandi and Mutaali, 2019; Afandi, 2020). We used an extended Technology Acceptance Model to evaluate switching behavior in donations using FinTech during the COVID-19 pandemic by adding safety needs and trust.

The number of people infected with the coronavirus is increasing every day. Therefore, in these times, security and safety are essential. Refer to Maslow's hierarchy of needs theory, safety needs are protection, security, order, stability, and freedom from fear (McLEod, 2018). In particular, Berry et al. (2020) divided safety needs in a pandemic into four categories; physical, emotional, financial safety, and information safety. The four categories are to serve as

benchmarks for the acceptance of a service product during the pandemic. It means safety needs can also affect technology adoption during the pandemic. The study discusses safety needs as an effect of consumer behavior is still limited. So, this research will enrich the literature on this subject.

Online transactions have characteristics of uncertainty, dependability and risk (Mulia et al., 2020). So, consumer trust has become vital for business success in the electronic-based payment system (Mondego and Gide, 2018). Trust in business service could be measured by three dimensions: competence, benevolence, and integrity (Mayer and Davis, 1999).

Trust has a positive effect on switching intention (Lin and Wang, 2017; Kordnaeij et al., 2015; and Al Ghammari and Ahmed, 2017). In other studies, trust is significantly related to brand switching (Tumbol et al., 2017). Furthermore, customers' intentions to switch positively affect their actual switching or switching behavior (Bansal et al., 2005; Lin and Wang, 2017; Sahi, 2016).

Based on the relationships proposed by the TAM model, we consider the following hypotheses:

H1: Perceived Ease Of Use is positively related to the switching intention in donations using FinTech during the COVID-19 pandemic.
H2: Perceived Usefulness is positively related to the switching intention in donations using FinTech during the COVID-19 pandemic.
H3: Perceived Ease Of Use is positively related to Perceived Usefulness.
H4: Safety Need is positively related to the switching intention in donations using FinTech during the COVID-19 pandemic.
H5: Trust is positively related to the switching intention in donations using FinTech during the COVID-19 pandemic.
H6: Switching Intention is positively related to the switching behavior in donations using FinTech during the COVID-19 pandemic.

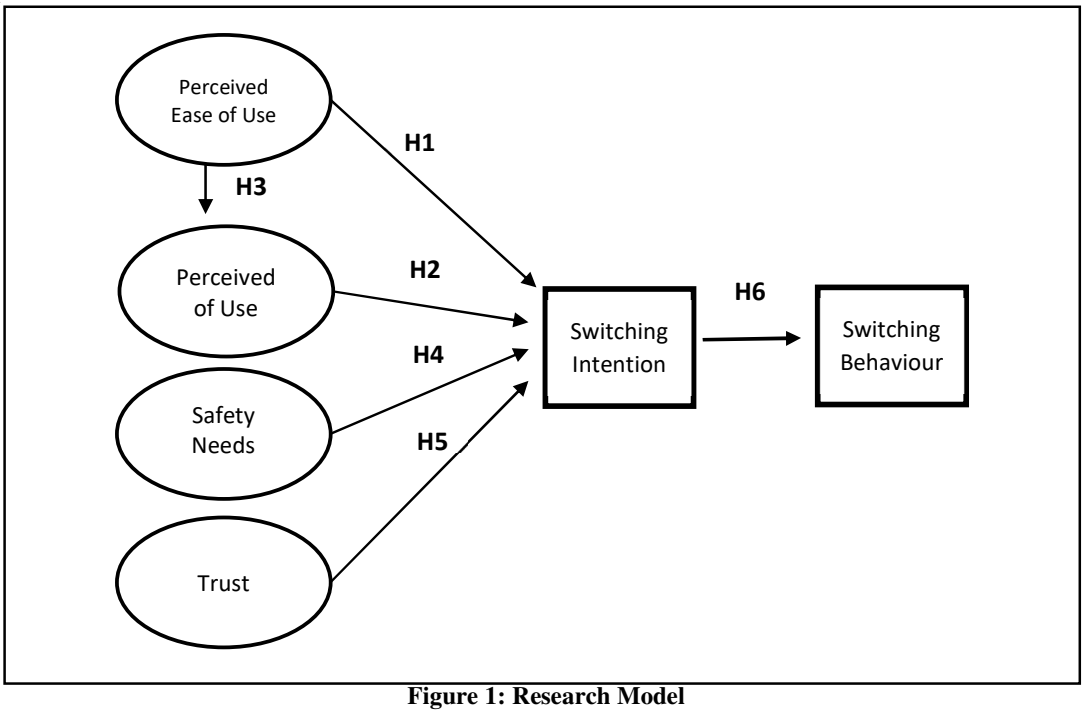

Figure 1: Research Model

Research Methodology

This study uses primary data collected using an online survey in June 2020 during the COVID-19 pandemic. The sample and population in this study were Indonesia people who never have, rarely, and only occasionally or not often use FinTech to donate before the COVID-19 pandemic. Then, the data collected analyzed by partial least square structural equation modeling (PLS-SEM) using smart PLS software. PLS-SEM is a statistical modeling technique and is primarily used to develop theories in exploratory research (Hair et al., 2017). The questionnaire's measurement tool uses a five-point Likert scale ranging from "strongly disagree" to "strongly agree."

The measurement items based on theory and previous researches. The measurement items of perceived ease of use and perceived usefulness adapted from Ghani et al., (2017), Mulia et al., (2020), and Niswah et al., 2019. Safety needs items develop from Berry et al. (2020). The measurement items of trust, refer to Mayer and Davis (1999), Lin and Wang (2017), and Mulia et al., (2020). Both measurement items of switching intention and switching behavior were adapted from Bansal (2005), Lin and Wang (2017).

Stage of evaluation	**Parameters**	**Role of thumbs**
Evaluation of measurement model		
Reliability (internal consistency)	Cronbach's alpha Composite reliability	≥ 0.70 – 0.95 ≥ 0.70 – 0.95
Convergent validity	Indicator reliable by outer loading AVE	≥ 0.70 ≥ 0.50
Discriminant validity	Outer loading or Fornell-Larcker criterion	outer loadings > cross-loadings the square root of AVE > its correlation with any other construct
Evaluation of structural model		
Coefficient of determinant	R2	values of 0.75, 0.50, or 0.25 can be described as respectively substantial, moderate, and weak
Predictive relevance	Q2	>0
Size and Significance	Path coefficients T statictics P value	-1 - +1 represent negative to positive relationship t value > 1.96 p value < 0.05
F2 effect sizes		Values of 0.02, 0.15, and 0.35 indicate an exogenous construct's small, medium, or large effect, respectively

Source: Hair et al., 2017; Garson, 2016

Meanwhile, accepted and rejected hypothesis criteria as follows.

a. Assess the significance value and outer weight of each indicator. Weight value which suggested are positive and t-statistic greater 1.960 (p-value < 0.05 for two-tailed. The indicator with a value less than this requirement should be dropped out from the model and then re-analysis.

b. Assess the inner weight from relationship on latent variable. Weight of value should be showed positive with t-statistic greater 1.960 (p-value < 0.05) for two-tailed.

c. Alternative hypothesis (Ha) has accepted if weight value from relationship on each latent variable showing positive value with t-statistic greater 1.960 (p-value < 0.05) for two tailed. Contrarily, H0 failed to rejected if weight value from relationship on each latent variable showing negative value with t-statistic greater 1.960 (p-value < 0.05) for two tailed.

Data Analysis and Results

Table 1 presents demographic information about gender, education, occupation, income, and knowledge of donations through the financial technology of respondents who participated in the study. Table 1 shows that slightly half of the respondents were women (65.45%), while the remaining half were men (34.55%). For the education sector, the results showed that the majority had degrees (59.16%), high school (21.99%), master's (12.04%), and diploma (6.81%). Likewise, the results of the study show that the majority of those who earn less than IDR 3,000,000 (45.03%), earn between IDR 3,000,000 - IDR 5,000,000 (23.56%), earn between IDR 5,100,000 - IDR 10,000,000 (23.04%) and the rest have income between Rp.10,100,000 - 15,000,000 (6.28%), and have income above Rp.15,000,000 (2.09%).

Table 1: Descriptive Analysis of the Demographic

Variable	Content	N	Percentage (%)
Gender	Male	66	34.55%
	Female	125	65.45%
	Total	**191**	**100.00%**
Education	High School	42	21.99%
	Diploma/Certificate	13	6.81%
	Degree	113	59.16%
	Master	23	12.04%
	Total	**191**	**100.00%**
Occupation	Student	48	25.13%
	Civil Servant	18	9.42%
	Private Employee	53	27.75%
	Entrepreneur	15	7.85%
	Professional (Consultant, Doctor)	8	4.19%
	Academics (Lecturer, researchers)	10	5.24%
	Wife house	26	13.61%
	Other	13	6.81%
	Total	**191**	**100.00%**
Income	< Rp. 3.000.000	86	45.03%
	Rp. 3.000.000 - 5.000.000	45	23.56%
	Rp. 5.100.000 - 10.000.000	44	23.04%
	Rp. 10.100.000 - 15.000.000	12	6.28%
	> Rp. 15.000.000	4	2.09%
	Total	**191**	**100.00%**
Know about FinTech for donation	Yes	118	61.78%
	No	73	38.22%
	Total	**191**	**100.00%**

Measurement Model

In the first-stage measurement model, we evaluated the internal consistency reliability with Cronbach's alpha and composite reliability values. Cronbach's alpha value and reliable reliability values are variable values that are higher than 0.7. This testing technique is a questionnaire testing technique that is often used (Bryman and Bell, 2007), and can detect inconsistent indicators (Malhotra, 2012). In table 2, it can be seen that the Cronbach's alpha value PEOU = 0.935, PU = 0.917, SB = 0.896, SI = 0.907, SN = 0.766, TRUST = 0.885. and the composite reliability values were PEOU = 0.951, PU = 0.917, SB = 0.897, SI = 0.907, SN = 0.766, and Trust = 0.886. These values assume that the six variables are consistent and reliable.

Table 2: Items loading, Composite Reliability (CR), internal consistency reliability (ICR)

Construct	Items	Item loading	Composite Reliability	ICR (Cronbach's alpha)
PEOU	PEOU1	0.856995587	0.951247477	0.935698116
	PEOU2	0.92007398		
	PEOU3	0.928222917		
	PEOU4	0.901446172		
	PEOU5	0.852011436		
PU	PU1	0.837287855	0.938100549	0.917481518
	PU2	0.878964897		
	PU3	0.891865613		
	PU4	0.878430493		
	PU5	0.848210191		
SB	SB1	0.857683942	0.935439726	0.896788069
	SB2	0.934103351		
	SB3	0.936976893		
SI	SI1	0.890320668	0.941775647	0.90707534
	SI2	0.930546907		
	SI3	0.933934275		
SN	SN1	0.828630877	0.844903012	0.766144857
	SN2	**0.665813753**		
	SN3	0.847987306		
	SN4	0.767742396		
	SN5	**0.464548187**		
TRUST	T1	0.872404337	0.920947248	0.885571178
	T2	0.855238655		
	T3	0.847457889		
	T4	0.875817207		

Other measurement tests such as item loading criteria are also checked so that all questions are valid and reliable to be used as a variable measure in the survey. Convergent validity values indicate the value of different instruments capable of measuring the same construction (Portney and Watkins, 2000). This value can be measured by loading the factor item in the model construction. Barclay, Higgins, and Thompson (1995) describe the observed principle for convergent validity by maintaining items with a load of 0.7 or more. The table shows that all items except SN2

(0.6658) and SN5 (0.4645) have item loading values above 0.7. Meanwhile, items with a value below 0.7 were excluded from the analysis model.

Discriminatory validity is ensured well when the AVE value is above the threshold value 0.5, and the square root of AVE is more significant than all other cross-correlations (Gefen and Straub, 2005). The table shows that the diagonal (thickness) value is greater than the corresponding correlation value in the adjacent column and row, so the discriminant validity is confirmed.

Table 3: AVE and Discriminant Validity

	Average Variance Extracted (AVE)	PEOU	PU	SB	SI	SN	TRUST
PEOU	0.796	**0.892312**					
PU	0.752	0.774273	**0.867197**				
SB	0.829	0.482656	0.37916	**0.910329**			
SI	0.844	0.496037	0.586211	0.625568	**0.918481**		
SN	0.531	0.577501	0.711601	0.371686	0.565939	**0.728595**	
TRUST	0.744	0.559985	0.582842	0.580582	0.645839	0.58467	**0.86281**

In determining the model's effectiveness in terms of predictability, we evaluate the coefficient of determination (R2), which can indicate that the model is working well for most of the variables. The determination coefficient (R2) describes the proportion of construct variants that can be predicted by the model's antecedent constructs. Although there is no specific limit value for measuring R2, a high value demonstrates a better variable contribution (Gefen et al., 2000). R2 values higher than 0.1 can indicate the usefulness of endogenous variables in the model (Falk and Miller, 1992).

The table below shows the coefficient of determination for all variables in the model. Most of the variables have a value of more than 0.1. In terms of choosing the ultimate criterion variable, most of the variance is. The variable affecting PU = 59.9%, SB = 0.391, and SI = 0.494 so that the model can explain the three variables influenced by the independent variable.

Finally, the overall measurement test is well. It indicates that all statement items are valid and reliable and can use as a measure of variables in the survey.

Table 4: R Square

	R Square	R Square Adjusted
PU	0.5994993	0.59738
SB	0.391335	0.388115
SI	0.49497	0.484109

Structural Model

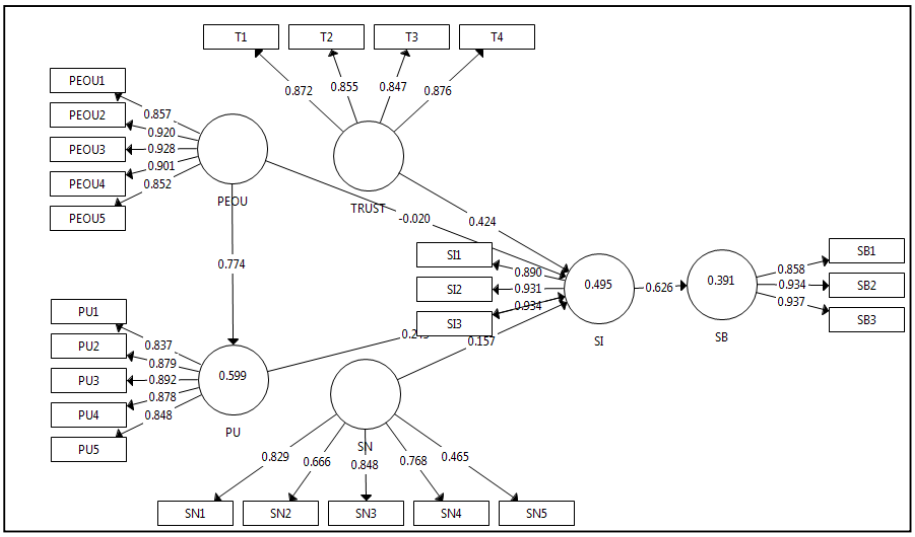

Figure 2: Structural model

Table 5: Path Coefficient Result

Hypothesis	Path Coefficient	T Statistics (|O/STDEV|)	P Values	Result
H1: PEOU -> SI	0.24338005	0.244	0.807	Rejected
H2: PU -> SI	-0.02012531	2.106	0.036	Accepted
H3: PEOU -> PU	0.77427343	17.526	0.000	Accepted
H4: SN -> SI	0.15667408	1.685	0.093	Rejected
H5: Trust -> SI	0.42365459	5.962	0.000	Accepted
H6: SI -> SB	0.6255677	11.017	0.000	Accepted

The results of the Smart PLS structural model can be illustrated in the table below, which demonstrates the relationship of constructs of this study. The path coefficient results are available in the table whose results are also shown in the modeling figure. Perceived Usefulness has a significant negative relationship with SI, while Trust has a significant positive relationship with SI, and SI also has a positive effect on SB. On the other hand, the Perceived Ease of Use and Safety Needs variables have an insignificant relationship with Switching Intention to make donations through Fintech during the Covid-19 Pandemic.

This study found that most respondents considered financial technology easy to use.? However, the research results do not show the effect of Perceived Ease of Use on Switching Intention. H1 was rejected because the relationship between Perceived Ease of Use and Switching Intention has a t-statistic <1.96 and p = 0.807. The results of this study are different from Fahmi et al. (2018, Syah et al. (2018), and Msaed et al., (2017). In previous studies, they found a positive relationship between Perceived Ease of Use and Switching Intention. This study's difference in research time was held since social restrictions were imposed during the Covid-19 pandemic. In contrast, previous research was conducted when there was no pandemic, and there were no social restrictions. Bansal et al., (2005) found that changes or migration of behavior can only occur because of the user's willingness when they have no other choice but to migrate according to their needs.

This study resulted in the finding that Perceived of Use affects Switching Intention such as research H2. Perceived of Use has a positive and significant effect on Switching Intention with a t-statistic of 2.056 and a p-value of

0.040. This finding is in line with research conducted by Fahmi et al. (2018). The research shows that the Perceived of Use financial technology positively influences switching intention. In particular, the perceived benefits affect the public in making donations using financial technology services. Therefore, most respondents answered firmly that the ease of using and accessing financial technology through their devices could save time, be flexible, and feel comfortable. In Indonesia, large-scale social restrictions (PSBB) have been in place since April 2020, a month after Covid-19 began attacking Indonesians. Thus, this study sees a change in the intention to share assets (donations) to poor people through financial technology.

Perceived Ease of Use in the results of this study positively affects Perceived of Use to support H3. PEOU has a significant effect on PU with a statistical value of 15,831 and a p-value of 0.000. The positive effect of the relationship between these two variables confirms the findings of Davis (1989), Pavlov (2003), Diop et al. (2019), Alsamydai (2014), Ghani et al. (2017), Ha and Stoel (2008). These findings suggest that the easier a financial technology service is to use, he more people will use the service so that the public can change intention to use it at one time or continuously.

Variable Safety Needs does not affect Switching Intention. Thus, H4 is not supported. The question of safety needs relates to the safety needs of making donations with technology financial services when the Indonesian government imposes social restrictions.

The findings show that Trust has a positive effect on switching intention so that H5 is accepted. Trust affects Switching Intention with a statistical value of 6,026 and a p-value of 0,000. The positive influence of the two variables supports the findings of Lin and Wang (2017), Kordnaeij et al. (2015), and Al Ghammari and Ahmed (2017). Trust is an essential element that underlies electronic transactions. Therefore, it is necessary for service providers of products to build user trust. Digital donation requires an added value that donors can accept so that Trust can grow in users' minds so that it does not raise suspicion and does not dampen changes in intention to use digital financial platforms. Indicators of service capability, policy and service provider integrity are used in the Trust variable research question.

The final research hypothesis (H6) is accepted because it has a T-statistical value of 11.017 and a p-value of 0.000. Switching Intention positively and significantly influences switching behavior. The results of this study confirm the previous findings of Bansal et al. (2005), Lin and Wang (2017), Sahi (2016), which show the significant influence of these two variables.

Discussions, Implications and Conclusions

This research focuses on the transition of people to making donations via digital platforms during the Covid-19 pandemic. Social restrictions and orders to stay at home force people not to leave the house so that behavior changes from the normal era. The Indonesian community usually makes donations in various ways, by donating directly to charities, places of worship, foundations, or donating by meeting directly with people in need. Donations positively impact economic growth because this behavior is a distribution of income, especially during the Covid-19 pandemic.

This study concludes that the variable that positively and significantly supports the transfer of one's intention and behavior to donate using a digital platform during the Covid-19 pandemic in Indonesia is Perceived of Use. These results indicate that digital donations users already have a high level of confidence in switching intention of digital donation activities.

Trust variable also has a significant positive effect on Switching Intention. These findings indicate that trust is a factor that needs to be considered in the efforts of digital service providers so that they are able to change the intentions of digital donors.

In addition, Perceived Ease of Use also has a positive influence on Perceived of Use. These results prove that the ease of using technology in conducting donation activities through digital platforms provides more benefits and provides a positive response by potential users to attract them to use digital donation services.

Furthermore, Switching Intention also has a significant effect on Switching Behavior. These results indicate that Switching Intention indicates a change due to a shift in perspective on an object that makes individuals change their behavior, starting with an interest in finding information about digital donation services, considering using it, and making donations through financial technology.

The results of the influencing variable have implications for academics and stakeholders. For researchers, this research can become a foundation that leads to further research on digital donations in the Covid-19 pandemic era. This study explains the factors that can make people shift their intention and behavior to use financial technology services for stakeholders, especially donation service providers. This is because the public considers practical payments, benefits both the giver and recipient, time efficiency, and costs. Public trust can also be built from well-targeted distribution of donations.

Providers of the donation platform at a financial technology provider can continue their experiments so that the public can start accepting so that donation transactions can continue during the global crisis due to the Covid-19 pandemic. Future research should try to develop more variables to contain a more accurate sample representation.

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Regularities and Specific of Modern Governance Development Under the Influence of Information Technology and Sociopolitical Transformations

Larysa NOVAK-KALYAYEVA

Lviv Regional Institute for Public Administration of the National Academy for Public Administration under the President of Ukraine, Lviv, Ukraine
novak.kalyayeva@gmail.com

Jarosław CZERW

Jan Kochanowski Univercity in Kielce, Kielce, Poland
czerw@post.pl ORCID : 0000-0003-2042-3177

Abstract

The article examines the patterns and specifics of the development of social processes and managerial reality, typical for most European countries at the end of the 20th and the beginning of the 21st century. Based on the methodology of public administration, the main trends in modern society and governance development are identified, analyzed and generalized: changes in public administration priorities under the influence of ambiguous socio-political processes at the turn of the century are substantiated. The controllability of administrative structures is characterized as a basis of sustainability of the society and governance. The problems of social interaction, responsibility and democracy in modern management practices are defined. It is suggesed that the influence of information technology and the revitalization of the civil society have led to such changes in social reality, the assessments of which are ambiguous and controversial, both in countries of democratic transformation and in mature European democracies. They have influenced the formation of certain trends, which sometimes show opposite and not always constructive directions. It is argued that improving the efficiency of public administration by involving public in the development and implementation of policies, improving the timing and quality of qualified management decisions determine an important positive trend in the development of public administration the and society as a whole. At the same time, the change of generations of managerial elites in post-totalitarian countries has led to problems against the background of attempts to simplify the essence and algorithms of management and spontaneous changes in the institutional structure of society and government. Gaining experience, mastering modern communication technologies and professional training, obviously, have a chance to balance these trends in favor of improving the quality of both management and society i life n general.

Keywords: Governance, Information Technology Influence, Social Transformation, Manageability.

Introduction

The existing public administration systems in the vast majority of developed countries in Europe and the world are in a state of permanent reforms against the backdrop of dynamic changes in geopolitical balance, geostrategic imperatives and relevant national strategies. There are changes in the attitudes and priorities of states, attitudes and aspirations of individuals and social groups in different spheres of society's life. The sphere of public administration during the second half of the XX - beginning of the XXI century has been substantially updated, both as regards the interpretation of the role and place of governance in the context of social change, and concerning methods and tools for the implementation of immanent governance functions. There is a need to clarify the conceptual approaches of government bodies to social interaction in crisis situations of different origins.

The methodology of scientific research of the indicated processes and senses is conditioned by the recognition of the principles of human rights as fundamental in the modern paradigm of state administration. The genesis of the conceptual positions of human rights in society and governance are considered on the basis of the dialectical method of cognition. The dialectical method also allowed substantiating the causal relationships between social

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processes and phenomena, which resulted in the introduction of human rights methodology in governance theory and practice, including the concept of sustainable development. It is on this basis that the basic imperatives of the development of modern society and governance are formed. At the same time, the interpretation of these processes has never been unambiguous in the historical retrospect and remains debatable in our day. The historical method is used in the retrospect of European state-building and governance in the context of the emergence, establishment and development of humanistic ideas. The axiological method has made it possible to characterize the social values which are accumulated in the concepts of human rights and sustainable development and are transposed to the criteria of the effectiveness of public administration.

The issues of public administration efficiency are being actively discussed in interdisciplinary discourse by such scholars as V.Bakumenko (2003), Z. Bauman (1996), G.Rouet, G.C.Pascariu (2019), J.R. Grote (2018), J. Kooiman, (2003), P. Nadolishniy, P. (2003). V.Schmidt (2019), M.Wood (2019) etc. This perspective has significant practical potential, which determines the relevance and timeliness of its further development against the background of current challenges and threats. The purpose of the article is to identify and analyze the main trends in public administration in the dynamics of information technology and socio-political changes, summarize their impact, in particular on efficiency, social interaction and democratization of society and governance at the end of the 20th and the beginning of the 21st century.

Analysis and Results

Changing priorities of public administration under the influence of ambiguous socio-political processes at the turn of the XX century

Reforming the management system in accordance with the specifics of social development of each country can ensure the alertness and adequacy of public administration in solving current problems and determining strategic prospects, in particular local communities. The main feature of the current stage of the development of both advanced European democracies and countries of democratic transit is the commitment of governments to rationalize the national system of public administration and to raise the level of its efficiency. One of the most effective and efficient ways to achieve this goal is to democratize management practices, particularly by involving the public in governance processes. Such an approach could bring positive effects on the level of public legitimacy of the government and guarantee the support of population in the implementation of public policies. The rule of law as a basic component of public administration stimulates a public debate on freedom of thought within the democratic tendency aimed at developing a dialogue between the society and the government in order to increase the effectiveness of the latter.

Despite the strong skepticism of scholars, in particular executives, political scientists, sociologists, philosophers, economists of the late XX - early XXI centuries, who have expressed some reasoned doubts about the ability of the state and government to influence the development of the society in terms of information and technological changes and deep individualization and political subjectivity of citizens, a modern state, as a guarantor of security, productivity and sustainability of society, has not exhausted its potential.

There is a reassessment of the principles and theoretical concepts typical of the last century. The point is that the concepts of "welfare state", "social state", "new state management", "low-cost state", etc., embodied in the 2nd half of the 20th century, have largely exhausted themselves. This has led to the emergence of more balanced approaches, typical of the theory and practice of "appropriate governance", "activating state", "e-state" and so on. There are also the attempts to form a "generalized model" of public administration capable of meeting national needs and harmonizing basic approaches at the integration level. The search for a universal approach to public administration reforms is becoming a transnational movement which is aimed to optimize these reforms and is based on the theoretical research in the field of public administration in the interdisciplinary discourse.

Interdisciplinarity demonstrates the organic connection of the theory of public administration with philosophy, political, legal, economic and other sciences, the subject of which is society and its functioning. Economic, psychological, legal and sociological aspects of development and functioning of management structures, in which mechanisms and tools that can satisfy the society regarding the management are formed, condition the variety of proposals to achieve the benefits of a "well-organized society" led by authoritative leaders and effective public management based on the conscious support of civil society and entrepreneurship and in close cooperation with them.

At the turn of the century, theoretical and methodological studies of the conceptual foundations of public administration have demonstrated ambiguous approaches in assessing the prospects for their improvement or reform. J. Habermas (1992), in particular, questioned the ability of European nation-states to "manage national economies as their own economic resources" in the context of globalization. In turn, the adherents of the postmodernism minimized the analysis of the issue of the dominant theories of public administration to the need to recognize their random nature. D. Farmer (1995) encouraged theorists of administrative management to abandon their residual scientism and recognize that public administration is "one more language game" among others in order to "overcome the fascism that we all have". According to the scientist, it is necessary to fight for "anti-administration", which is radically open to a variety of "coincidence" and "otherness" (D. Farmer, 1995, p.228), and "in this way, perhaps, we will be lucky to develop an anti-program and form an anti-institutional line of thought, still providing services"(D. Farmer, 1995, p.243). The issue of responsibility for the consequences of such management was left far from the author's spotlight. Z. Bauman (1996) was more optimistic about the process of state transformation in European countries, emphasizing that, "against the background of a conflict-ridden planet, Europe looks like a laboratory where the tools to improve public administration are still being developed". Attempts, according to Wilson's advice, to adapt the modern science of public administration to the "basic practical needs of democratic self-government" were ultimately aimed, according to V. Bakumenko (2003), at achieving public independence and administrative efficiency.

Political and economic elites, personal positions of government officials and politicians, who sought to strengthen the existing system of public administration and restore public confidence in public institutions, led to the nature of administrative reforms which have been in progress in some European countries and the EU since the early80's of the 20th century. Despite the significant interest of scientists in the theoretical issues of public administration in different countries, in the scientific literature, according to J.Czerw (2020), there is still no consensus on the ability of individual, territorially determined theoretical approaches to ensure the effectiveness of public administration in practice.

The common traditions of European management culture,which are approximately the same for the most developed European countries, and socio-economic and political conditions have become important regional factors in the process of modern governance universalization. Specific socio-cultural characteristics such as traditions, customs, psycho-emotional characteristics of the population are individual for each European country and significantly affect the current situation. They are becoming demonstrative under the influence of globalization and imperatives of expediency, efficiency and effectiveness of public administration, both nationally and and at the integration level. The ambiguity in the assessments of social experiments of the implementation of certain concepts, in particular European ones, does not diminish the importance of the practical experience of European countries to implement the theory.

At the turn of the century, a common trend is the desire of modern managers to determine the structural-functional, instrumental and tactical algorithms of public administration, taking into consideration the complexity of multilevel and multifunctional management structures at the integration level and the effectiveness of multilevel governance in decentralization (L.Novak-Kalyaeva et al, 2018). For most of the "old democracies", which developed and implemented efficient social models, offering the population their specific but effective approaches to solving problematic aspects of life of all population categories, the social component remained important but was not longer as acute as in the postwar years. The vast majority of citizens of the developed countries in Europe and America were provided with the ability to satisfy their essential daily needs and receive assistance from the state in case of need. New approaches to the interaction of government and society have led to social activity of the people and accountability and controllability of the government on the basis of decentralization and professionalism of public administration. Instead, the implementation of the policies and management concepts aimed at improving the welfare of the population remains an unconditional priority for Ukraine. That is, the social determinant remains relevant and predominant among others.

Generalization of the latest approaches to governance has been proposed by international structures, which have identified common factors for all countries that determine compliance or inconsistency of public administration with the needs of society at the present stage of its development. The United Nations has stressed the necessity to improve the governance through human development and political reforms of public institutions. According to the UN the guiding principles of proper governance should be as follows: a focus on the rule of law, efficiency, consensus in management, activity, predictability, transparency, responsibility, intelligibility, fairness and ability to respond adequately to public inquiries (UNESCAP, 2009).

The major donors and international financial institutions, including the International Monetary Fund and the World Bank base their efforts on the belief that the recipient will use financial assistance and loans to implement reforms that ensure effective governance by eliminating inefficient management and corruption. In particular, in 1996 the International Monetary Fund (IMF) stated that “the implementation of appropriate governance in all its aspects, including through ensuring the rule of law, improving the efficiency and accountability of the public sector and combating corruption are the key elements of the structure, in which the economy can prosper " (The IMF's Approach, 2005). According to the IMF analysts, corruption in the economy was due to inefficient economic governance and inconsistency of proportions when regulation was either too much or too little. In 1992 the World Bank, which was more closely associated with the reform of economic and social resource management, highlighted three aspects that affect the nature of governance in a country: the type of political regime, the process by which power is exercised for the purpose to develop the management of economic and social resources, the government's ability to form the policy and ensure its effective implementation.

Manageability of management structures as the basis of sustainability of the society and governance

The imperative for implementation of modern approaches to governance was " manageability of management", because one of the most important general consequences of changes in public and private governance is a significant loss of traditional institutions of control, deregulation of checks and balances system of power, mechanisms of its accountability when populists and non-professional politicians and managers come to power, or the use of outdated or less effective practices. Such issues are important for interdisciplinary research, and the science of public administration is an element that unites the components of interdisciplinary discourse, in particular the problems of governance, accountability and legitimacy of power.

Effective governance always requires a certain centralization and concentration of political power in order to ensure human security, that is to solve the problems of rational social order, crime, civil conflicts and wars, including hybrid ones; protection of people from threats of natural and technological origin, problems of physical and economic survival; protection of nature from people, that is the problems of greening the governance and environmental thinking. In the modern world the differences between the public and private enterprise, between politics and economics, between politics and administration, as well as between the commercial and non-profit sectors are exacerbated.

Overcoming or at least reducing contradictions is a challenge for the governing bodies and self-organization of the population. It is about developing an updated system of checks and balances in order to control the exercise of powers, prevent possible abuse and arbitrariness of their use, motivate the authorities to be accountable and protect citizens, consumers and employees. The latter is always a source of tension at all levels of governance and administration. In this context the loss of compliance or balance reduces the power and impedes the ability of authorities to act and ensure the policy implementation (Support to political parties, 2020).

Thus, manageability in the context of public administration means a fairly high level of political and institutional stability and efficiency of a decision-making process at all levels of governance. This applies to the continuity of rules and institutions, as well as the pace of the response to public demands, the consistency and effectiveness of management decisions. In practice, this is a shortcut between a request from the society and the result of government actions in order to respond to that request. In general, it is the potential for further adaptation between the standard and its implementation, between the regulation and its results, between supply and demand for policy and administrative services. Controllability depends on the quality of the management, that is the level of maturity of organized society and its ability to rely on overall responsibility in the implementation of decisions and in the art of appropriate management.

Controllability in the society is determined by certain indicators, in particular the intensity of the existing demand for public policy, that is how satisfied the community is with services and changes in regulations; the intensity of political conflicts and the ability to resolve them proportionately and meet the demands; the nature of obstacles to meeting society's request. In particular, according to J. R.Grote, (2018), it is necessary to identify whether they are the result of chronic problems and outdated structures, the capacity of the institutional system, especially the political one with its normative-legal environment concerning the response to the demand of society and the expediency of the division of competencies for its satisfaction among different branches of governance; measures of autonomy, corporatism and direct influence at all levels of governance; the level of governance in a civil society in

general, and also regarding the possibility to exercise public control over government institutions; the level of the civil society involment in the development of rules and in activities for the benefit of the state interests.

In each country the strength or capacity of state organizations is imposed, firstly, on democratic political institutions that exercise the rule of law, human rights, stability, efficiency and legitimacy of government or administration; secondly, on the quality of public policy, especially their economic and social component, in particular at the operational level, in accordance with the adopted strategic goals; thirdly, it depends on the quality of public administration that implements these laws and policies and is able to be effective in terms of increasing society's demand for social services provided by the state. Ensuring the governability in public administration is imposed on the strategic core of the government, which should be formed of professional senior public officials and provide the highest quality services in conjunction with elected politicians in accordance with the public decisions. On the other hand, each government should rely on the decentralized state infrastructure, each structural element of which, that is an agency, according to J. Kooiman (2003), is responsible for the result, not for the implementation of the procedure in order to ensure the efficiency of social services at a high scientific level, which is the characteristic of modern democracies.

The main areas of adaptation to the modern public administration systems are informatization, debureaucratization, decentralization, privatization and implementation of economic mechanisms for regulating management processes and service administrating. The general tool for the implementation of the identified plans was the intention of governments to improve the quality of budget services through the active cooperation of public administration bodies with non-profit structures, business and population. The implementation of such approaches is characterized by the desire to ensure the high quality of public services provided to population by creating an effective system of consumer protection, introducing special procedures for resolving conflicts and conducting regular surveys of consumers on the quality of services. The standards of work with the citizens developed by British executives include the requirements and define the basic indicators of the successful work of public administrations with the population. At the same time, annual reports on indicators of the best practice code are posted on the official websites of the local administrations. In order to increase the transparency and efficiency of services provided to the population, it is advisable to assess the results of the implementation of state reform programs based on the analysis of public opinion on the quality of public services (C.Berry, 2009).

The trends in the development of public administration show ambiguity and variability in the assessment of the results of administrative reform. On the one hand, the introduction of technology and informatization of communication between citizens and public authorities have improved the quality of budget services. In this context, the modern paradigm of public administration determines the tendency to regard information as a strategic resource. Proper information support of management processes has become a necessary basis for effective management decisions. The implementation of the ”E-Governmet” system has had a significant impact on management practices, as new procedures, approaches, structural and substantive innovations have been introduced, and they have dramatically raised the level of the efficiency of public authorities. At the same time the issue remains controversial, particularly in the context of significant dependence on the infrastructure condition and appropriate qualifications of both the civil officials and the consumers of the services.

The formation and activation of political networks and the practice of multi-level governance as universalized, in particular for the European administrations have become a step forward in the development of the modern management process (L.Novak-Kalyayeva et al., 2019). The European Union as a political entity is characterized by a multilevel structure of power, and its significant number of levels differs considerably in the standarts of competencies and methods of making management decisions. We are talking about the existence of supranational, regional and national structures, which at the integration level lose the general hierarchy and tend to appropriate situational subordination, while at the national, regional and local levels there is a standard scheme of subordination with a tendency to form a new configuration of national "verticals of power". There is a blurring of national characteristics and unification of the processes and structures of public administration. On the other hand, in this context, the modern period is characterized by a significant controversy of arguments against the background of the crisis of legitimacy regarding the division of competencies between supranational and national levels, and between executive and local governments at the national level.

Problems of social interaction, responsibility and democracy in modern management practices

The formation of new forms of interaction of public administration agencies of different levels takes place against the background of cooperation between supranational and national authorities, which is blurring the hierarchical relationship of subordination within the national borders. Problems of duplication and uncertainty of powers and competencies are typical of the national level in European countries, which have been in the state of administrative-territorial reforms since the early 1980s, gradually restructuring their governance systems to meet the demands of the effective and professional government. This situation in some way reduces the effectiveness of local authorities.

Self-organizing network, “governance without government”, has been typical for the Internet, radio and mobile users from the beginning of the 21st century. Subsequently, networking within the framework of neo-institutionalism proposed a variety of network structures, within which certain resources are also produced, in particular information and others, based on personal and informal relationships. It is connections that are treated as a valuable resource in the real world, despite their ambiguous impact on the efficiency of markets and management processes.

Government officials are surrounded by specific people and act under their diverse influence, in particular while taking decisions and making policy . The distribution of subsidies, grants, tenders, even the sequence of services can be motivated not only and not so much by state interests, but by personal preferences, political positions and friendly relations, and not without prejudice. Despite considerable autonomy from the state, networks can be run by different officials or political leaders. Networks can be an alternative to the market mechanism and the state hierarchy, in particular, and personified as elite, diaspora, corporate or professional groups. At the same time these are ambiguous prospects, because in the context of European integration, network management is a reality that involves increasing both centralized regulation and the involvement of an increasing number of national actors. The latter lose some legitimacy in the network management system in favor of the central administration. The network management, in turn, creates new problems of legitimacy. Whether the informal networks can be considered satisfactory substitutes for democratic accountability of representatives whose right to power (mandate) is derived from general elections based on formal equality of all citizens is the issue that, according to J.Czerw (2020), has been debated by the scientific community since the beginning of the 21st century.

The main problem of “governance without government” is the lack of accountability, that is the fact that “most teams in the globalized space are not responsible for their actions” (P. Rosenau, 2000), regardless of whether they are non-governmental organizations, expert groups or international organizations. In international law the "democratic discipline of law" gains more importance, that accepts, for example, going beyond the system of human rights treaties. Against this background, the consequences for the relationship between a democratic government, the responsibility of officials acting at their own discretion in accordance with personal beliefs and understanding of "good and evil" and international law are questionable. In this way, the representativeness of democracy compared to bureaucracy becomes problematic, as both the priority of activities and the requirements of accountability to citizens change. The problem of democratic accountability exists, in particular, because elected officials lose their power over public bureaucracies and individual leaders, and opportunities to maintain public control are considerably narrowed or diminished. Privatization and delegation of “independent” regulatory agencies reduce the ability of citizens to control these institutions through representative democracy. Summarizing the results of this situation, R. Barnes (2000) defined it as "exile of the state", because the transfer of public services to the agencies simultaneously fragments the government and blurs the understanding of responsibility. Transparency of political decision-making makes it possible to determine the location of the source, that is to determine where decisions are made and who is directly responsible for them. Thus, legal certainty, equality before the law and protection of legal interests may be threatened by a loss of credibility or function when, in the light of the information and communication technology revolution, such institutions of representation as parliaments and political parties are engaged.

Involving new combinations of social, economic and political interaction, which may differ from the civil society, the market and the state, causes tensions in the modern society within interactive governance. In particular, advisory or discursive policy analysis based on the new communication policy helps members of the society (individuals, groups, formal and informal structures) to state their problems and participate in their solving (according to the government's response).

At the same time, against the background of populism, which in recent decades has characterized the state of individual political systems at almost all levels of governance, there is a destabilization of public order and democracy, which largely interact and determine the relationship between the state, the market and the civil society. There is an active personalization of politics and a significant shift of power in favor of professional leaders inside political parties, which limits the influence of ordinary members of the party (M. Gotta, 2000); there is a change in the source of policy from the legislature to the executive, and in some cases to the presidential power. As a result, the marginalization of parliamentary institutions and the technocratization of policy-making processes are progressing. In the countries with democratic transit, the manipulation of the judiciary is usually used as a tool for political competition and influence in policy-making. Destabilizing trends associated with the processes that exist in the relationship between the state and the market are characterized by increased sectoral self-regulation, the implementation of commercial (corporate) logic in management processes, as well as personalization and dramatization of policy when public tasks and functions are implemented on the basis of deregulation (liberalization) and outsourcing (privatization), and when the spheres of regulation and market competition are outside the effective democratic control. As a result, the level of trust in the government decreases, the number of citizens who neglect their responsibilities as voters, or determine their positions in the elections emotionally, "from the opposite" or indifferently and "for a reward" increases. There is a decline in collective identities and conscious individualization. Ideological identification of parties is also declining, programs are being replaced by slogans, the distance between politicians is increasing, and the radicalization of arguments minimizes the possibility of a program-based coalition. The intensification of direct consultations with citizens in the form of referendums indicates the unwillingness of the political leadership to take full responsibility for their own actions (R. Barnes, 2000).

The results of the World Values Survey (WVS, 2015) argue that the trust in the government depends mainly on the availability of key assets, among the most important of which are security, health, education, housing, transport, electricity , management of infrastructure and investments that the private sector is not ready to finance, and adequate regulation of socio-economic activities. The joint confrontation of threats and overcoming the consequences of the COVID-19 pandemic have actualized the demand of the population of European countries and most national governments for sectoral centralization in crisis conditions. The need to coordinate joint efforts on the basis of the complete picture and the ability to quickly develop and effectively implement the management decisions for the public benefit have become the real challenges for the European community and its leadership.

Institutional sustainability of the modern governance as a competitive strategy for its modernization

A lot of key aspects of modern management were considered by J. Kooiman (2003), noting the practices of meta-management (management of the management). The latter is the basis for formation and implementation of the projects of the World Bank and the International Monetary Fund, and the interaction management is a tool for implementing meta-management in the context of globalization, glocalization and Europeanization of the management (The IMF's Approach, 2005),. Types and methods of social relations that provide modern management interactions with a clear political aspect belong to competing management models, such as "art of management" (M. Foucault), which deals with the historical and political nature of interaction management. This term has a strong qualitative aspect when it comes to how the government and the administration carry out management actions, how people (officials) manage or behave, and how these two processes are interrelated.

The practices of the "art of management" necessitate the use of the technology of power, the technology of market and the technology of self-realization of the person in managerial actions. They relate to the ability of individuals to control and implement guiding influence on the environment at different scales. The guiding force here is not the rule of law, but the interest of personal and public benefit and personal responsibility, which are realized independently of the government on the basis of normalization. In the broadest sense, this means living in accordance with established norms and self-esteem, realizing and using one's own capabilities on the basis of constant self-esteem, personal discipline and self-improvement.

Each of the technologies presented as the "art of governance" can work simultaneously, separately or together, or even overlap from time to time, helping to set the boundaries of the role of the government in a given society. The emphasis is on pluralism, personality and mutual responsibility, which distinguishes the latest approaches to politics and governance. This understanding of pluralism is considered the norm of the politicy designed to respond to the many interests and identities of the modernity within the social diversity, multiculturalism, complexity of structures

and interactions, accelerated by the dynamics of the society as a whole, when politics becomes the environment and the tool for empowering people and improving the exercise of their freedom of choice (L.Hooghe, G.Marks, 2001).

The processes of multilevel management illustrate the current trend of convergence of theory and practice of the management, according to which theoretical generalizations are made on the basis of both theoretical hypotheses and practical steps (C. Berry, 2009). In this sense, it is interesting to remember the history of the formation and implementation of "sustainable development" as a new focus of management, the ideas of which, developed and announced by L.C. Caldwell (1963), found practical confirmation only in 1990th.

Discussion

Finding ways to preserve economic, social and environmental balance

There is an organic connection between the principles of sustainable development and the principles of public administration, embodied in the concept of institutional sustainability of public administration. In this context, the institutional sustainability of government structures, both state and self-governing, means that they are able to maintain structural integrity, functional integrity, ability to interact, regroup and update in accordance with the new conditions created by the crisis, especially in the situation of destructive or threatening external or internal influences of temporary or long-term nature (L.Novak-Kalyaeva et al., 2018). The increasing intensity of natural, social and economic phenomena in the globalized world has raised the issue of sustainability of the governance structures at the regional level in the context of the system's ability to adapt to changing conditions and scope of responsibility, challenges and threats, risks or opportunities. Adaptation is considered as the process by which any system (a state, a region, a municipality, an institution, etc. adapts to changes. Adaptation can be reactionary, as the consequence of the crisis that has already occurred (for example, economic shock), or expected, as the adaptation to the long-term trends.

In conditions of aggressive external influences or critical states the systems are able to self-regulate, changing their internal structure. The argument is formed around the idea that sustainable socio-economic systems are constantly able to reorganize their institutional and economic structures. Sustainability, in this context, is considered as a constant evolutionary process, rather than just restoring or achieving a new stable state of equilibrium (J.Simmie, and R.Martin, 2010). Management of local economic development can be considered sustainable if it is able to reorganize the structures and / or functions of the economic system so that to maintain the acceptable growth and development in the medium and long term. The adaptive resilience of territorial social systems and the institutional resilience of relevant goverment structures (municipalities) are based on their ability to evolve and is considered as the system's ability to return to pre-crisis conditions, in particular in terms of income and employment.

In times of crisis, it is desirable not only to return to the level of development, but also to adapt to new conditions and attain new views of development. Institutional sustainabilit and adaptability in the long run contributes to the weakening of ties between the participants of the system, which allows flexible restructuring of its internal structures in the new environment. The research on the sustainability of public administration focuses on finding an appropriate paradigm that ensures stable growth and development over the long term. Such development should be aimed at the maintaining economic, social and environmental balance. Institutional sustainability of municipalities with adaptive self-government provides them with a higher adaptive capacity compared to others, even at a lower level of their social and economic adaptability.

The tools for determining the sustainability of municipal structures were offered by G. Masik and O. Sagan (2016), who included the following indicators in the sustainability criteria: strategic planning (quality, including the current state and the role of strategic documents and the adequacy of measures, that is their connection with the local problems) , cooperation (with local companies, residents, NGOs and government agencies), functioning of municipal institutions (quality monitoring, qualification of officials, knowledge management). The researches of Polish regions have allowed scientists to determine the sustainability index, which takes into account the indicators of GDP, the employment, the income, the number of businesses and export earnings of innovative products and others. The international researches usually include not only the regional indicators, but also the national ones and the surveys of population, economy, social and natural conditions. According to the results of the research, the most representative indicators of the regional stability are proposed to be the dynamics of the gross domestic product and the employment (L.Novak-Kalyaeva et al, 2018).

The sustainability has become a key concept in both domestic and foreign policies of the EU and the most democracies around the world. The areas of strategic importance, such as public and economic governance, growth and sustainable development; energy, environmental and social spheres develop their own concepts of sustainability, operational and strategic documents on the basis of its generally recognized principles. In times of the permanent crises of various origin and intensity, the health care, the education system, the labor market and the foreign relations are directly dependent on the ability of management to anticipate and confront the threats and challenges. Political governance and public administration had to be smarter, more inclusive and more resilient in order to respond to internal and external shocks adequately (G.Rouet, G. C.Pascariu, 2019). It is important not to lose long-term and medium-term influence on stability, security and sustainable development in the context of structural economic, social, institutional and political instability. The identification of the areas of economic growth, stagnation zones, the impact of external funds on the development, including social, economic and spatial cohesion do not lose their significance.

Conclusion

Improving the efficiency of public administration by involving the public in the development and implementation of policies, optimizing the timing and quality of professional management decisions determine an important positive trend in the development of public administration and the society as a whole. At the same time the change of generations of managerial elites in the post-totalitarian countries has provoked the tendency to simplify the essence and algorithms of management, which negatively affects the institutional structure of the society and government. Thus, there is no doubt about the need to oppose destructive tendencies against the background of populism, the uncertanity of foundations of democracy and social interaction. The most constructive way to balance the main trends of the society and governance development against the background of globalization, integration, decentralization and information technology impacts will be the development of the critical self-assessment strategy. It is a matter of governments and integration management structures defining their real capabilities and limitations in such a way as to ensure an appropriate balance between the state, the private sector and the civil society. This approach requires as much transparency as possible on the part of the state in order to ensure the support of the society and business in the development and implementation of the policy. The concept of sustainability is another idea of the sustainable development issues, as the emphasis is on the strength of institutional systems and their ability to constantly change. Sustainability is expected to be the most constructive strategy, and gaining the experience, mastering modern communication technologies and training obviously has a chance to balance both trends in favor of improving the quality of both the management and the life of society.

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Institutionalizing Global Governance in The Sphere of Security and Defense: The European Context

Anatoliy KALYAYEV
Lviv Regional Institute for Public Administration of the National Academy for Public Administration, Office of the President of Ukraine, Lviv, Ukraine,
toldek@ukr.net ORCID : 0000-0002-5675-187X

Irina SURINA
Pomeranian University in Słupsk, Słupsk, Poland, isurina@wp.eu
ORCID: 0000-0002-5038-12147

Lesia RUDENKO
Hetman Petro Sahaidachny National Army Academy, le_ru200@yahoo.com
ORCID: 0000-0002-2768-8496

Abstract

The process of transformation of European institutions in the field of security and defense is surveyed in the context of ensuring their institutional sustainability in the view of new geopolitical challenges and threats. The institutional system of governance in the sphere of EU security is scrutinized on the base of a systematic approach. The formation processes of a modern system of collective security and defense in Europe are researched in their dialectical connection as to ensure effective cooperation of institutions. The positions in the capability assessments of the institutions of governance of the European security system and the prospects for improving their effectiveness are generalized, in particular, within NATO in conditions of current conflicts. The deepening of integration in the provision of collective protection is being updated due to the need to expand the powers of the EU's supranational institutions on security and defense and in order to mobilize efforts to counteract global threats. Emphasis is placed on rethinking the European Union's ability to countervail threats related to gaining strategic autonomy. The justification is based on the conclusion that in order to ensure the institutional sustainability of the EU supranational security structures it is expedient to unite the military-strategic plans of all EU defense institutions of different levels and to ensure their compatibility with NATO structures on the basis of centralized management (Joint Command), the decisions of which must be mandatory to perform by all countries included in the system of collective security and defense. The measure of national sovereignty limitation, in this context, must correlate with the scale of threats and be adjusted in conditions of real military-political situation. It is concluded that a joint integrated system for monitoring the identification of threats and the effectiveness of existing management structures in the field of security and defense is able to optimize all defense institutions on the basis of crisis management and counteracting hybrid threats on an ongoing basis.

Keywords: European Security Governance, Institutional Sustainability, Collective Defense, Geopolitical Threats

Introduction

One of the most important areas of cooperation between the EU countries is the formation of a common security environment in order to prevent and eliminate military conflicts and achieve international understanding. In recent decades, military conflicts of varying intensity and scales, both outside the EU and outside the continent, have remained a potential threat to all European countries, also in modern conditions. The system of collective security and defense of the EU countries must be ready to organize a reliable defense of European countries, in particular, countries that are the EU's geopolitical neighbors of the first order like Ukraine. The problems became relevant against the background of a change in the positions of the US military and political leadership on ensuring European security by NATO forces. Reduction in the dynamics of EU spending on the army in the last quarter of the twentieth century and the ambiguous position in assessing the level of European security at the turn of the century had their effect at the beginning of the XXI century. Leaders of individual member states assessed the level of external dangers differently. Thus, European security and defense policy has proved ineffective in the face of

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new challenges and threats, which has contributed to the raised awareness of the need to reform the EU's security structures, as well as the system as a whole.

The European Union's global security policy, set out in the relevant Strategy adopted in 2016, embodied a new consolidated view of protecting Europe's common future. The question then arose about the ability of existing institutions to ensure the security of an individual EU member state in the event of external aggression, including hybrid. The creation of separate from NATO European defense institutions was seen as a possible option for their optimization. The tasks of responsibilities allocation, ensuring institutional stability and functional integrity of management structures in developing common approaches to the formation and implementation of appropriate strategies and tactical algorithms have so far been interpreted ambiguously, both in theoretical and practical terms. At the same time, the search for the optimal way to create a new configuration of security institutions at different levels is still continuing, the latter fact confirms the relevance and significance of the chosen topic.

Conceptual principles for solving problems of international security have been studied, in particular, by Howorth J. (2007), Mandragelya V. (2011), Novak-Kalyayeva L. (2016), Nowak A. (2006), Shay D. (2019), Walt S. (2005), Witney N. (2008). At the same time, in the conditions of modern permanent changes in the nature of armed confrontations, constant improvement of means of attack and defense and intensification of terrorist threats, research of tasks and supranational structures of EU security governance becomes particularly important.

The methodology of this study is based on a systematic approach, with the help of which, in particular, the institutional management system in the field of EU security was studied. The processes of formation of the modern system of collective security and defense in Europe are examined on the basis of the dialectical method. The axiological method provided an opportunity to consider the effectiveness of the institutions of the European security system in terms of modern wars and conflicts and to justify the position as for their effectiveness and political perspective.

The aim of the article is to determine the priorities of institutional development of EU security structures against the background of ambiguous results of reforms and geopolitical changes that influence the European and world community as a whole.

Analysis and Results

Institutional sustainability as a Factor of Management Efficiency

Economic crises, local wars and terrorism, financial hardships, hunger and poverty become arguments in the debates over the governance effectiveness in the face of permanent crises of various origins. The ability of management structures to maintain their functionality, productivity and competence to act constructively during crises and in the new post-crisis reality is defined by the term institutional stability. Crisis phenomena of various scales and nature can be a natural consequence of long-term cyclical processes and in this case they are more or less predictable. At the same time, they can be a spontaneous result of certain processes, events, actions, extraordinary situations that are difficult to anticipate. The security and defense sector may face an urgency of a prompt response to the threat. That is, it is important to quickly assess the threat and act in the interests of the society, which the expert structures in this area are designed to protect. In the conditions of hybrid threats of different genesis and orientation, the structural-functional and qualitative characteristics of management structures largely determine whether the society will be protected and will have the prospect of sustainable development.

Transformation processes that take place almost permanently at all levels of governance in the field of security and defense do not narrow or facilitate the responsibilities of management structures. Ensuring their resilience and ability to adapt during periods of change helps to avoid conflicts between old and new institutions, functions, structures, approaches to assessing the current situation and vision of perspective. All the above mentioned leads to increased attention to the institutional approach, which considers the peculiarities of institutional dynamics and claims to explain the most general patterns of development of any society and management.

The genesis of the ideas of institutional theories has been actively studied for the last two centuries. Still, according to O. Ryby (2010), there is no agreement on a universal definition of this concept both among the representatives of the science of public administration and within individual institutional theories. Accordingly, there is no unity in solving the other key issues of the institutional aspects of the economy, politics and governance functioning, the

interpretation of which is quite scattered and unsystematized in the interdisciplinary discourse.The way of explaining the main characteristics, features of functioning and changes of the institution varies, mainly depending on the way the institution is viewed (as a norm, regulator of behavior, formal organization or informal rule…). Institutions (social, legal, governmental) are the basic unit of institutional theory, and their complex is its subject. The concept of "institution" is seen as an established form of organization, regulation and ordering of public life, people's activities and behavior. They also include a set of social norms, patterns of behavior and activities; in law they include a set of law rules that regulate any defined relationship (D.S. North, 1993).

Thus, institutions are considered to be social, political, economic structures, phenomena and processes that interact in society on the basis of rules, with assistance and under control of corresponding structures that legitimize, legalize and regulate such interaction. That is, institutions operate in the legal field in order to meet certain needs of society and at its request.

As Ilchenko (2015) mentioned, the main role of institutions in society is to reduce uncertainty by establishing the stability of interactions. Institutions identify and limit the set of alternatives that each person, structure or process has. They give a certain structure to the relationship between people, between an individual and society, or the state, and between them all. The most important functions performed by social institutions, as a rule, include creating opportunities to meet the needs of members of society and their socialization, ensuring social integration, stability of public life, lives of individuals, etc. According to Kirillov (2004), the institution of public administration, in this context, can be considered as the activity of state administration bodies; or as an opportunity to use state institutions to achieve public goals of individuals or various social groups; or as a technology for harmonizing personal and public interests; or as a way to provide certain guarantees through institutionalized control over the formation and use of public resources and goods, etc. Reforms of public administration as an institutional complex as a whole must be accompanied by changes in the specific systems of its institutions. At the same time, changes in their informal components can be the key to the effectiveness of such reforms, as well as the stability of formalized governance structures. The institutional sustainability of management in the field of security and defense, as part of the institutional one, is of great importance today. The success of policy development and implementation in the research area directly depends on the stability of management structures, their ability to foresee threats, manage risks arising as a result of sudden or gradual changes in the external or internal context.

Transformation of supranational institutions in the field of security against the background of global threats of the late twentieth - early XXI century

For developed democracies, conceptual approaches to providing security are based on the requirements of compliance of public policy with the liberal doctrine, according to which the existence of a developed civil society is the main guarantor of the security of the individual, society and the state. Attention is consistently focused on the political, economic and military-political aspects of security. Political aspects take into account the threats to the foundations of democracy from globalization, the consequences of information and technological influences, changes in traditional ideas of state sovereignty, alternative models of political transformations, and so on. Military-political and military aspects cover the relationship between the civilian and military sectors, which transform into the so-called problem of civil-military relations. An important factor that determines the specifics of modern wars, as I. Ballah (1972) emphasized, is the institutionalization of new political components - supranational and regional entities represented by interstate economic, political and military blocs, as well as transnational economic and financial corporations; states not recognized by the world community; nations and territories fighting for self-determination; various terrorist and criminal groups, etc. The political content of wars in modern conditions has changed significantly due to the fact that they reached a much higher - transnational, global level. Global policy of ensuring international security is a purposeful, coordinated or independent activity of states, international (governmental and non-governmental) organizations and other subjects of international law to eliminate (neutralize, reduce) a set of dangers, threats, risks and challenges on a global scale, and development of effective mechanisms and tools to counter them. (Kalyayev et al, 2019). In order to ensure and strengthen the external security of the world community members, primarily the nation-states, it is necessary to create a system of international security which is based on a set of obligations, guarantees and capabilities of its subjects.

Geopolitical rivalry and the fight of great powers for resources are projected at the regional and local levels in the form of stimulating local conflicts. Although modern conflicts are mostly internal in nature and are based on interethnic, national or interfaith contradictions, external interference from the side of powerful states very often contributes more to the aggravation of conflicts than to the settlement of them. Modern experience shows that it is

impossible to counter international threats by the means of separate states and even individual organizations. To solve this problem we need a concerted effort, and above all, of international organizations that ensure the security not only of individual countries but also of entire regions. In addition, combating such threats requires such a large number of resources that it can only be found in the case of broad cooperation between states and international organizations.

To analyze the security system we will define its main subjects. It is important that the purpose of creating supranational security governance structures of the EU was to ensure coordination of efforts of European countries, members of the EU in the field of security and defense. It envisages involvement of many actors of pan-European, state, regional, public and private levels of administration, which are not in hierarchical subordination, into resolving security and defense issues. The main EU institutions of a supranational nature are the seven main governing bodies of the EU: the European Parliament, the European Council, the Council of the European Union, the European Commission, the EU Court of Justice, the European Central Bank and the European Court of Auditors.

The institutional model of governance in the EU, in the form which is defined by the Single European Act and the Lisbon Treaty, is marked by certain features that significantly distinguish it from national systems:

– by the presence of two types of institutions: interstate and supranational. In this case, the members of the first type of bodies (Council of Ministers) act as official representatives of the member states, and the members of the second types of bodies (European Commission) act as independent individuals who are not affiliated with the states that delegated them;

– by the absence of separation of powers into the legislative and executive branches: legislative powers are alloted between the Council and Parliament, and executive powers - between the Council and the Commission. This is a unique managerial experience, particularly for young democracies;

– by the absence of vertical management structures and a central regulatory body;

– by the existence of a checks and balances system established by the fundamental documents of the EU, under which none of the European institutions can make decisions on its own, and which ensures the balance of supranational-intergovernmental dualism.

At the same time, some institutions are directly engaged in the field of security and defense. They are:

The European Council, which, at the level of Heads of States and Governments with the right of a final decision and political responsibility, clarifies issues related to foreign and security policy, sets out a common strategy to be implemented by the European Union in matters of common interest for member states. The European Council implements it through joint activities and the development of common positions;

The Secretary General of the European Council who has the authority of the High Representative on issues of common foreign and security policy;

The General Affairs and External Relations Committee (GAERC), the Committee of Permanent Representatives (COREPER), which formally employs state ambassadors in EU, and the Political and Security Committee;

High Representative for the Common Foreign and Security Policy - HR-CFSP;

European Commission - EC, influences solving security issues through the Directorate General for External Relations and the Commissioner for External Relations.

The European Parliament is responsible for passing laws, and supervising and monitoring the applying of executive powers by the institutions of the European Union. The views of the European Parliament are taken into account in the development of security and defense policy.

The Council of the European Union, ie the Council of Ministers, considers the proposals submitted by the Commission and is the main governing body of the Union; it is responsible for setting political goals, coordinating national policies and resolving disputes between members or other institutions. The European Defense Agency

(EDA), founded by the Council of the European Union, supports member states in their efforts to improve Europe's defense capabilities in the field of crisis management, European security and defense policy. The Agency still faces the task of developing a military resource base, defense scientific research and development, and pan-European projects of cooperation on armaments issues, and creating a common competitive market for military products.

In addition, two more institutes were established in 1999. The European Union Military Committee (EUMC) is the highest military structure of the Council, which comprises the Chiefs of Defense. Its main function is to provide unanimously approved by all Committee members advice to the European Council through the COPS on issues related to the military domain and recommendations for action. Such unity is essential when using EU forces for military operations. The last institution is the European Union Military Staff (EUMS), which consists of more than 150 senior officers from 15 member countries. It provides military expertise for operations. The headquarters operates under the auspices of the EU (through COPS), and is directly subordinate to the EUMC. After 2004, three more structures were added to the institutions of the European security sector. The Political and Security Committee (COPS) became the most important one. It is responsible for monitoring the international situation in the context of common foreign and security policy and for developing policy implementation plans for the Council.

According to scientists, in particular, S. Andryushin (2015), the EDA did not have a single development strategy for a long time. This situation persisted until 2019 and it negatively influenced the effectiveness of the EDA as a security institution (Security and defense, 2019). The lack of a consolidated view of the GAERC concept in the EU in the context of deeper integration also had its effect. Nevertheless, the Agency managed to demonstrate its effectiveness. Meanwhile, the decisions of the European Council demonstrate the development and continuous improvement of the EU's single EOA development strategy which indicates considering the possibility of granting it supranational powers.

Search for Common Positions and Changing the Paradigm of Military-Political Management

The debate over institutional changes has virtually continued since the beginning of the 21st century. EU Member States, recognizing the need for intensive cooperation and enhancing the Union's security capacity, were not prepared to lose national control mechanisms. There have been contradictions between the supranational functions of the Commission and the intergovernmental functions of the Council. Under such conditions collective decision-making was extremely difficult and time-consuming. As V. Mandragelya (2011) mentioned, institutional problems raised the most questions. For example, interdepartmental competition constituted a problem, as the implementation of certain decisions faced wars of influence, especially between the Commission and the Council Secretariat. This issue has been particularly acute in the field of civil crisis management (Nowak A., 2006). Complex relationship between member states and the EU presented one more problem. It was rather "governance without government", where sometimes a sporadic separation of powers between individual states and Brussels took place (Sbragia A. 2007). The third challenge is institutional density. The European Union has competed with other international institutions in the field of security. These are, first of all, NATO, the OSCE, the UN, which have different approaches and potentially conflicting interests.

On the next issue, it should be noted that NATO is still a key factor and guarantor of national sovereignty and countering external threats to the EU, in accordance with the provision of Article 5 on "collective assistance".

Since the end of World War II, the American military presence, and especially NATO's nuclear component, has ensured the security of Allies based on the principles of collective and territorial defense. Under the de facto military and political guardianship of the United States, the level of economic development, quality of life, civil rights and freedoms in the European Union have reached the highest standards in the world. That is why the countries of Western Europe have not formed a common policy in the field of foreign policy, security and defense. Concentrating integration processes in the socio-economic and socio-political spheres, they did not see an urgent need to become more active in this area, given NATO's guarantees. Meanwhile, at the turn of the century, both the new US position and the EU's desire to become an independent center of power with its own course in world politics, capable of defending its interests, began to take shape, leading to a revision of EU positions. (Walt S., 2005).

In general, there has been a rather tense struggle between the three main approaches to the ESDP. Different interests of EU members, as well as resources and, more importantly, different security cultures, have become the drivers of

institutional reforms in the ESDP. Strengthening the military component, increasing professionalism and capabilities of the military, improving decision-making structures and transforming the EU into an independent and autonomous player in this domain - this was the position of the French management and military elites.

British government shared the position of France and was aware of the paradigm shift and the need to increase the military power of EU member states. At the same time, maintaining the central role of NATO as the main instrument of European defense was not ruled out. The duplication of the alliance's institutional structures at the European level remained a problem.

For the positions of some Scandinavian countries and Germany the priority was to strengthen the civilian component and resources of the ESDP, based on a comprehensive approach to crisis management, starting from crisis prevention and to post-conflict stabilization.

The mechanisms for the implementation of fundamental EU legislation acts rather than their content should be considered the main problem in this dimension.The Political and Security Committee, the Military Committee, the Military Headquarters, the European Satellite Center, the Information Collection and Storage Center became the institutional basis for the implementation of the idea of a pan-European security system in the EU. The ultimate goal of these efforts was the creation of the European Rapid Reaction Force (ERRF) with a strength of 60,000 troops, with its own command, communications, intelligence, naval contingent and aviation to carry out humanitarian, rescue and peacekeeping operations or combat operations on crisis management.

Apart from these functional tasks, the creation by the European Union of the European Rapid Reaction Force (ERRF) was primarily intended to demonstrate the EU's ability to pursue an independent security and defense policy on the European continent and to get rid of dependence on the United States in solving purely European affairs. According to European politicians, this gave the opportunity to institutionally assert the EU as a strong, independent geopolitical actor.

In 2003 the European Security Strategy was adopted to conceptualize this policy. The Strategy represented common to EU member states threats, goals and objectives in the security and defense field. The provisions of the Strategy were set out at the European Union summit on 13 December 2007 in the "Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community". According to the provisions of the Lisbon Treaty, the transition to a common defense policy is implemented based on a unanimous decision of the European Commission. The Treaty provides for the collective responsibility of EU member states, mandatory assistance by all possible means to the country that becomes the victim of aggression. In fact, the provisions of the Lisbon Treaty for United Europe on "mutual assistance" duplicate Article 5 of the Washington Treaty on establishing NATO. The North Atlantic Alliance is characterized by the Strategy as one of the main elements of the international security system. At the same time, the contractual and legal obligations of the EU member states in the field of security and defense are implemented in view of the unconditional supremacy of the UN Charter provisions, without violating the specific provisions of the national legislation of neutral countries and the obligations of membership in the North Atlantic Alliance. The Lisbon Treaty provides for the creation of the post of EU High Representative for Foreign Affairs and Security Policy, which combines the functions of the High Representative for CFSP and the Commissioner for External Relations.

Due to the aggressive actions of the Russian Federation the creation of the European Defense Alliance, which will help NATO, is on the agenda. The idea of the practical content of the EU's Common Security and Defense Policy CSDP took shape in June 2016 with the presentation of a new Global Strategy on Foreign and Security Policy. The idea is that the creation of a European Defense Alliance in partnership with NATO will allow the EU to act autonomously in operations abroad to stabilize the neighboring area and enhance EU's role as a security guarantor. The European Parliament's resolution called for the establishment of a Directorate-General for Defense, which would be responsible for the internal aspects of defense and security policy at the EU level, and also suggested creating a European Intelligence and Situation Centre (EU INTCEN).

In early December 2017, the EU Council decided to launch the Permanent Structured Cooperation (PESCO) program in the field of defense of EU member states. The program will allow to jointly counter military threats from Russia and strengthen the EU's defense capabilities, unless disputes and disagreements between the participants impede this. The main goal in the field of defense is to increase the EU's potential to act autonomously from NATO if necessary, to strengthen the Union's security capabilities by deepening cooperation between member

states regarding the efficient use of available resources, along with a parallel increase in defense budgets. As part of the institutionalization of security guidelines, it was proposed to create a separate headquarters to manage all EU operations abroad.

At the first stage, the pan-European center should coordinate the issues of medical care, joint use of transport aviation, exchange of intelligence data. The formation of the EU Military Planning Conduct and Capability Facility became the first result of suchlike integration initiatives. Although it has not become a classic full-fledged military headquarters yet, it will be responsible for EU military operations. However, the EU has no plans to distance itself from NATO, but instead it deepens cooperation with the alliance. According to some experts, Europe is powerless without American military-strategic, satellite, intelligence capabilities and air defense technologies. At the same time,the implementation of PESCO projects should improve the defense capacity of EU member states, in particular the ability to withstand challenges and threats from Russia.

Today, in case of a military conflict, the EU countries are unable to guarantee their security individually as their defense spending and security capabilities do not meet modern requirements. The main goal for the development of European military capabilities requires the ability to rapidly deploy (within 60 days) and keep operationally powerful forces at least for a year. The permanent structured cooperation in the field of defense and security currently involves 25 participating countries: Austria, Belgium, Bulgaria, the Czech Republic, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, The Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain and Sweden.

The goal is also to create smaller rapid response units that will be at a very high level of readiness. The achievement of the stated goal is significantly hampered by the crisis processes in the European Union caused by both internal events and external factors. It has become especially evident recently.

The first event in this context was Britain's decision to leave the European Union. This raised the question of the possibility of further British-French defense cooperation, which was considered to be the engine of European integration in the security sector. In any case, the European Union has closely approached the issue of further integration of member states in the field of CSDP. On September, 11, 2016, the EU introduced their own vision for strengthening defense cooperation within the EU to NATO officials. First of all, it meant to create a separate headquarters to manage all EU operations abroad. At the first stage, the pan-European center should coordinate the issues of medical care, joint use of transport aircrafts and exchange of intelligence data. Franco-German initiatives also provided for full combat readiness of joint combat tactical groups, as well as the introduction of a joint budget for the development and purchase of transport aircrafts, satellites, UAVs and cyber gadgets and equipment.

At the same time, the creation of a certain supranational structure in the form of a pan-European army was denied, it was only a matter of strengthening cooperation between EU member states. The first result of such integration initiatives was the establishment of the EU military headquarters, namely, Military Planning Conduct and Capability Facility. Although it has not become a classic full-fledged military headquarters yet, it will be responsible for EU military operations. The European Commission preparation of proposals to strengthen cooperation in the field of CSDP and their discussion at an informal meeting of defense ministers of EU member states in November 2016 became the logical development of these measures.

Discussion

The European Parliament supported the idea of creating a European Defense Union. The developments of the European Commission, the European Parliament and other governing bodies resulted in the adoption of a number of documents united in the so-called "Winter Package" on the European Security and Defense (2016 EU Security and Defense Winter Package) at the December 2016 meeting of the EU Council at the level of heads of states and governments. It includes: new political goals and intentions in the field of security and defense - the Implementation Plan of the EU Global Strategy on Security and Defense (Implementation Plan on Security and Defense); financial resources, defined in the European Defense Action Plan; a set of proposals for the implementation of the EU-NATO Joint Declaration. Further integration processes in the field of EU CSDP were implemented in the form of bringing to life a plan of "permanent structured cooperation" (PESCO) of the EU countries in the military-political sphere, which was given the "green light" by the EU leaders at the summit in Brussels on June 22, 2019.

It can be stated that this project combined the European Defense Action Plan, previously approved by the European

Commission, and the EU Global Strategy Implementation Plan. On June 17, 2019, the Ministers of Defense of Germany, France and Spain approved the largest defense project in Europe - the air combat system of the future, which should be ready for combat use by 2040. Apart from combat aircrafts, the system will also include escort drone units, flagship and patrol aircrafts, ground stations and satellites. The total cost of the project is estimated at up to 50 billion Euros. () Also on the same day, the Foreign and Defense Ministers of all 28 EU countries approved the EU Global Strategy, which outlines common defense and security capabilities and considers ways to further strengthen the EU's role as a global player.

The United Nations should be considered one of the general security institutions operating in Europe. According its statute (Article 51 of the UN Charter) the inalienable right to individual or collective self-defense is guaranteed to all UN member states. It authorizes actions that they can take to exercise this right until the UN Security Council takes the necessary measures to preserve international peace and security. It should be noted that all European security institutions operate within the requirements of the UN Charter.

Lately, the United Europe has managed to move from individual proposals on how to step up security and defense cooperation to concrete approved plans that look quite ambitious. Rethinking the importance of independent ability to withstand threats has already begun, it has gained strategic autonomy and raised the issue of CSDP to the highest level of attention - to the level of heads of states. In addition to political decision-making, some practical steps were taken in the first year of implementation of the Global Strategy to strengthen this security and defense dimension in the EU.

Firstly, a number of documents were approved, combined in the so-called "Winter Package" on European Security and Defense, which became the framework for the later adopted plan of "permanent structural cooperation"

Secondly, the EU has strengthened its defense governance structures. The creation of the EU military headquarters became a step in the implementation of the EU Global Strategy.

Thirdly, the creation of the EU military headquarters has provoked expert discussions about the creation of a "European army". Today, it is unlikely that the European Union will take such a step. The formation of a "European army" creates risks of splitting transatlantic unity, as not all EU countries support this idea. What is more, it is extremely difficult to draw a demarcation line between the EU and NATO powers in the field of security and defense. However, some elements of the common policy in the field of security and defense are being implemented in the European Union in the form of combat tactical groups, as well as expert discussions on the possibility of creating the so-called "Defense Union" (also proposed by the European Parliament in November 2016).

Fourthly, cooperation between the EU and NATO has intensified, as had been planned by the Global Strategy. For the European Union, the Alliance remains a mainstay in Europe in terms of countering military threats, as no EU member state has sufficient military capabilities. The EU-NATO Joint Declaration, signed in June 2016, set out the areas for this cooperation, which were detailed in a set of EU proposals in December 2016. However, this package of 40 proposals for EU-NATO cooperation is more of an indicator than a planned arrangements for the development of cooperation. One of the successful examples of cooperation between the EU and NATO in modern conditions and with the existence of new challenges was the signing by the EU and NATO member states of the agreement on the establishment of the Center for Countering Hybrid Threats in Helsinki in April 2017.

Fifthly, the EU countries are forced to reconsider national defense spendings. A number of countries have already announced an increase in defense spendings.

In order for the EU to succeed, it is necessary to focus on the following tasks: decisive, urgent action in key areas of the defense sector; persistent pooling of efforts and resources; improving the efficiency of the European Defense Agency (EDA). The practice of specialization of roles (Lithuanian water purification units, Czech experience in protection against nuclear and chemical weapons, etc.) also seems promising. Despite the international consensus on the goals, models and framework for security sector reform, as noted by N. Witney (2008), there was a conceptual-contextual gap between political practice and oriented ideals in different environments. The programming of reforms had a narrow focus on individual security institutions (most often, the police and the armed forces) and demonstrated a return to previous models of training and equipping the structural elements of the security and defense systems in the face of security crises.

In May 2019 cooperation between 23 EU countries in the field of intelligence began. This indicates strengthening of

contacts on a new platform called the European Intelligence Board (Intelligence College of Europe, ICE).

In fact, in the EU governance system in the field of security and defense there was no separate institution, which, as part of the structural and functional scheme, would implement and be responsible for the EU policy in this direction. However, some infrastructure has been created. In particular, the post of High Representative for the Common Foreign and Security Policy (CFSP) to be held by the EU Secretary General of the Council was established under the Amsterdam Treaty (1997, Article 15). The Lisbon Treaty (2007) provided for the creation of the post of EU High Representative for Foreign Affairs and Security Policy, which combined the functions of the High Representative for the CFSP and the Commissioner for External Relations. The PESCO program (2018) provided for the establishment of the headquarters for joint military operations and the establishment of the EU military headquarters.

Some researchers, as I.Surina (2020), in the field of international security suggest that the new EU strategy may launch a European strategic culture that would be seen as an integral part of military alliances and political organizations. At the same time, it is considered one of the "most serious challenges, as all member states have their own history and national traditions, but the fact that the content of these traditions implies contradictions between their own reality and the wider European stratum is extraordinary " (Howorth J, 2007). The general content of the European Security Strategy suggests that the EU actually uses a wide range of instruments in its security and defense policy. However, these tools are part of the "soft power" concept. For the present,the introduction of tighter security regimes in public places and strengthening cooperation between law enforcement agencies of European countries on combating terrorism, illegal migration, organized crime, drug trafficking, etc. seems to be really promising (Shay D, 2019).

This proves that European security and defense policy remains somewhat insensitive for the Member States and that they are not prepared to bring in a military dimension to its implementation. Partnership with Allies makes the role of partners in international security more essential. At the same time, changing NATO's collective defense priorities has put the issue of partnership in the background. Rebuilding partnerships can help convince the public that the Alliance has a political rather than a purely military approach to security. The issue of insufficient funding of defense and security needs by European countries has already become a chronic problem for the EU member states. Therefore, the reassessment of collective views on the dangers and risks of splitting the Alliance should be considered an important component of ensuring collective security in the new geopolitical environment. Only the unity of NATO and the EU in the face of new threats and challenges can be a guarantee of security.

Conclusion

State security policy in the EU member states must be viewed through the prism of two interrelated tendencies : the intensification of the struggle for the expansion of national interests and leadership in the geopolitical space, Russia's efforts to restore lost influence in the international arena, and so on. This, in turn, requires significant reforms and closer consolidation of actions of international organizations, primarily the UN and the UN Security Council, the IMF, the WTO, especially in terms of ensuring that the aggressor is brought to justice for violating international laws.

It is necessary to ensure the unity and compatibility of military-strategic plans of all EU defense institutions of different levels with NATO, with the establishment of a system of centralized management (joint command) whose decisions should be binding on all countries included in the collective defense system. This implies the possibility of limiting national sovereignty to the extent required by the military-political situation. It is advisable to introduce a single monitoring system for the strategic and operational identification of hazards and threats, and for the effectiveness of existing security and defense institutions. It is important to optimize all defense institutions by informatizing management systems, and by providing highly qualified managers with experience in crisis management and organizing the resistance to hybrid threats.

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Pyrophobia-3D: A Virtual Environment for Fear of Fire Therapy

Dimitrie COADA
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania, coada.dimitrie@gmail.com

Oana MITRUT
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania, oana.balan@cs.pub.ro

Alin MOLDOVEANU
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania, alin.moldoveanu@cs.pub.ro

Florica MOLDOVEANU
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania, florica.moldoveanu@cs.pub.ro

Abstract

This paper presents and analyzes a virtual environment for exposure therapy. The lack of a viable solution to help treating pyrophobia, as well as the abundance of articles demonstrating the success of therapy with virtual media and virtual reality equipment represented the basis for the Pyrophobia-3D project. Developed as a 3D game, the application managed to produce conclusive results after testing with the help of 8 participants, of which 4 men and 4 women. The player is placed in a virtual environment that simulates a fire in an office space, the objectives being to extinguish the flames with the help of the fire extinguisher, but also to save as many documents as possible. The quantitative and qualitative results demonstrated that our approach was effective for reducing pyrophobia-related anxiety and we will continue to address this niche of pyrophobia therapy with other virtual scenarios.

Keywords: Phobia, Pyrophobia, Virtual Reality, Game

Introduction

The context

Fear is one of the first survival instincts that man has. People have tried to defeat their fears through a wide variety of methods that worked more or less, depending on each individual. One method that has proven to be effective in studying the behavior of all individuals on the perception of trauma / fear is Virtual Reality (VR). Over the last decade, virtual reality had a strong impact on exposure therapy. Exposure therapy is a type of behavioral therapy that helps people manage their fears. It is manifested through a gradual exposure to situations that cause fear and anxiety. The purpose of this therapy is to create a safe environment in which the person can reduce his/her anxiety in order to improve their life quality. In exposure therapy, the specialist may recommend several methods of exposure, depending on the needs of each patient:

- Imaginary exposure - in this type of exposure, the patient must imagine a situation that would cause discomfort, facing it with the specialist. For example, a person who is afraid of heights may imagine that he/she is on the top of a very tall building.

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- In vivo exposure - in this type of exposure, the specialist induces the confrontation with the patient's fear gradually, by introducing indirect scenarios. For example, a person who is afraid of snakes may first watch an image of a snake, then watch a video of a snake, and after many therapy sessions, he/she can touch a non-venomous snake.

- Virtual reality exposure - in this type of exposure, the specialist simulates a virtual environment, specific to each phobia, with the help of virtual reality glasses. The patient will wear VR glasses and will be exposed to various scenarios that should help reduce his/her fears. For example, a person who is afraid of dogs can use VR glasses to enter a virtual environment where he/she can play with a dog and feel comfortable around him.

The problem

The fire was discovered by Homo erectus about 400,000 years ago. Our ancestors discovered that if fire is handled carefully, it can become extremely useful. Over the years, the risk of uncontrolled fires has decreased, but has not permanently disappeared. Psychology describes phobias as anxiety disorders, characterized by an irrational fear of specific situations or things. People with phobias have tense mental symptoms (anxiety, loss of control, fear) and vegetative symptoms (more frequent heartbeats, fainting, sweating, breathing problems) (Horváthová et al, 2015).

Pyrophobia is a pathological condition manifested through an exaggerated fear of fire (Pyrophobia definition). In general, the fear of fire occurs as a result of an unpleasant event during lifetime. Most people who suffer from pyrophobia are aware that this fear is superficial, even if the anxiety persists. The smell of burned materials, the smell of smoke, a lighted candle or even a burning match can trigger a panic attack. Exposing a person to a real fire in order to cure pyrophobia would be far too risky and far too expensive. Pyrophobia can become an impediment in an individual's daily life, and the only effective solution to cure this phobia is virtual reality. Exposure through virtual reality, without any risk, to different situations in which fire plays an important role, can train the psyche towards a welcomed balance.

Objectives

The main objective of this project is to create a virtual 3D environment that can help in the pyrophobia therapy. This virtual environment consists of an interactive game that will aim to heal using exposure therapy. The game consists of two scenarios:

- The first scenario is an office building where the player will have to collect boxes containing important documents and to extinguish fires with a fire extinguisher.
- The second scenario is an outdoor scene in which the player can play with fire. It can burn the grass, burn some wood constructions, as fire spreads progressively.

In parallel, data will be collected for each subject. After a subject suffering from pyrophobia navigates through the virtual environment several times, there may be decreases in the level of anxiety caused by fire. The data collected can be interpreted further by a specialist, in order to assess the efficiency of the virtual environment. The environment is safe, as it will not expose the subjects to physical risks, such as the fire itself. It offers the convenience of being used on any computer / laptop, without the assistance of a specialist.

Requirements Specification

The Pyrophobia-3D virtual environment has been designed specifically for people suffering from pyrophobia. It can be used by people of any age. In order to create a satisfactory and functional product, an analysis of the potential users was required. First of all, the percentage of people who suffer from a phobia must be checked. The case study presented in (Sana et al., 2015) involved 200 random persons from various age groups. The study shows that 21% of the people suffer or have suffered from some form of phobia and 79% do not suffer or have never suffered from any phobia.

Secondly, we researched the percentage of people who might have pyrophobia. We designed a questionnaire in order to identify the percentage of people who suffer from fear of fire. The persons who filled in the questionnaire were between 18 and 78 years old. Given the fact that all people react instinctively, with fear, in front of fire, we will consider only the most determined answer (High Fear). From this questionnaire, it appears that 20% of people suffer from pyrophobia. At the same time, 10% answered that pyrophobia is a problem they should deal with, and 15% that their life would be easier without its existence. Lastly, given the fact that Pyrophobia-3D is a computer-run virtual environment, people who use this virtual environment should have a minimal knowledge of how to operate a mouse and a keyboard. According to the International Telecommunication Union (ITU), 53.6% of the world's population uses the Internet (Statistics).

Functional Requirements

Here are the functional requirements:

- Implement an office and a lawn as realistic as possible
- On the home screen: fill in the username and the number of the session
- The " Start Game!" button starts the game
- The viewing point of the game is First Person
- Help menu by pressing the F1 key
- Statements that the player must appreciate, depending on his/her level of anxiety, used to analyze the player's condition. They appear during the game and a file is generated based on the name and session number entered on the home screen.
- The player will move around using the keys W, A, S, D and with the mouse
- Apply gravity to make it possible to go down and up the stairs
- Targeting and activating the level 1 fire extinguisher and the level 2 torch will be done with the mouse.
- Dynamic continuity of fire burning
- Warning if the player is too close to the fire
- Extinguish the fire with the help of the fire extinguisher
- Lift the boxes with the F key
- Counter for the number of fires extinguished and for the number of boxes raised
- Activation of the portal to level 2 after all the fires have been extinguished and all the boxes have been lifted
- Spread of fire on surrounding objects depending on the wind
- End the game by pressing the ESC key

Non-Functional Requirements

- Here are the non-functional requirements:
- Strategic placement of the fires and boxes
- Create an intuitive scene by placing objects correctly
- Choosing the mouse sensitivity and speed of the player
- Choosing the right statements (which appear during the game) to be able to draw the correct conclusions at the end of the game
- The text of the instructions and the text at the beginning of the game must be easy to understand
- The virtual environment by walking around the player must have a realistic structure
- The player needs to have Internet access in order to fill in the online questionnaire

System Requirements

Running the virtual environment requires a computer, a mouse, a keyboard and a monitor. The resolution and level of graphics quality can be set before the game starts, in order to increase compatibility with as many computers as possible, whether they are from older generations or from newer generations. By running the game on many

computers, we noticed that the minimum operating requirements of the virtual environment are the following: 1 GB RAM, 1GHz processor speed, any audio card, video card / integrated video card and 1 GB available disk space.

Motivation

Given the analysis of potential customers above, we came to the conclusion that pyrophobia is a real problem in the lives of some people. It is a phobia with which you can be born or which you can acquire. Therefore, the motivation of this paper is to create a reliable virtual environment, which can have a positive impact on people suffering from pyrophobia. We wanted to develop a functional product, based on a scenario that the users can encounter in everyday life.

Market Research

Over the last thirty years, the virtual reality industry has grown exponentially. Virtual reality has been introduced for the first time in the gaming industry.

3.1. Similar Applications

The paper presented in (North et al, 1995) is one of the first psycho-therapy works in which virtual reality was used. Published by Max M. North in 1995, the paper aimed to study the effects of virtual reality on agoraphobia - the fear of open spaces. Agoraphobia is one of the most serious and prevalent anxiety disorders in the psychiatric field. This represents about 60% of all phobias encountered so far (Michelson et al, 1985). Agoraphobia is defined as the fear of being in places or situations from which escape can be difficult or embarrassing. Agoraphobia leads to the avoidance of situations such as: being alone outside home, being alone at home, being in a crowded world or in public transportation. Sixty students suffering from agoraphobia participated in a study for this project. Two questionnaires were applied, before and after using the virtual environment, after which the results have been compared.

Most people have not been trained to react correctly in the event of a fire. Because of this, many can get stuck or take decisions that lead to unfavorable situations that can endanger their lives. The project presented in (Zhang et al, 2017) is based on the implementation of a program that teaches the users several recommendations in case of fire. It was designed for students in a university campus. The creators claimed that the training methods that already existed were not effective enough due to the lack of practice. The system was implemented using the Unity graphics engine. Campus scenes were created, such as a dormitory room or an amphitheater. In these scenes, there are implemented various scenarios that can occur in real life.

The virtual environment is based on 2 parts:

- Learning the theoretical part - this part presents all types of fire, the sounds of a fire alarm, safety signs, the equipment used in case of fire. This part also contains a test for the learned knowledge.

- Operational practice - contains the part where the users will have to perform certain tasks, such as: find the source of the fire, safe evacuation, extinguish a fire with a fire extinguisher, etc.

Another project that aims to cure a phobia is Arachnophobia (Granado et al, 2007), available on the Steam digital game distribution platform. Fear of spiders is one of the most common phobias. In general, people suffering from arachnophobia develop a behavior that is based on avoiding all spider-related contexts. Many people who suffer from arachnophobia are so afraid of coming into contact with a spider that they eventually refuse any kind of therapy (Davey, 1991).

Comparison between Graphics Engines

In terms of technology, we will compare 3 available graphics engines: CryEngine, Unreal Engine and Unity.

CryEngine is a graphics engine created by Crytek (Cry Engine). This graphics engine is well known for its ability to render extremely realistic environments. At the same time, it is also recognized for the graphic effects it offers, having especially an extraordinary lighting. However, CryEngine is difficult to use and it is not recommended for beginners. Another disadvantage of this engine would be its documentation, which does not contain all the details needed to finish a project, and it is often necessary to use tutorials from external sources.

Unreal Engine is a graphics engine created by Epic Games (Unreal Engine). One of its strengths is that it can process millions of particles in a single scene. There is a special editor for creating materials. However, its documentation has many weaknesses.

Unity is a graphics engine owned by Unity Technologies (Unity Engine). One of the greatest qualities of this graphics engine is its compatibility with many platforms. It can be easily exported to any type of platform. The scripting part is done in C #. Unity also has a large community, so it is the perfect graphics engine for beginners. The documentation is extensive, containing all the details needed to create a game. At the same time, it also has an asset store. This asset store contains a multitude of applications (assets), free or for a fee, which are very useful in many situations (Unity Asset Store).

In conclusion, we chose to use the Unity game engine because it is the most compatible with the functionalities implemented in this project. A decisive factor was the useful documentation and the existence of a community open to any questions.

Pyrophobia-3D

The goal was to create an environment as realistic as possible, in order to help the players understand the scenarios and behave as naturally as possible. We have divided the virtual environment in three main sections which are described below.

Visual Components

The game start screen is the first image that appears in front of the player when the game starts (Fig. 1).

Fig 1. Pyrophobia-3D home screen

A welcome message and an introductory text appear on this screen. The text specifies what must be filled in before pressing the "Start game!" button. Two input boxes are placed. Each box contains the required information for the field to be filled in (name, respectively session number). Under the "Start Game!" button, there is a statement announcing the player which will be the format of the file generated by the game and where it will be saved. The "Start game!" button starts the game when it is pressed.

The next screen is the game screen. This is the screen that appears after a single press of the start button. This screen presents in the upper left corner, the number of fires extinguished from the total number of fires (8) and the number of boxes raised from the total number of boxes (7) (Fig 2). Thus, the user knows his progress in the game at any time.

Fig 2. Level 1 screen

When the F1 button is held down, the instruction popup window appears, presenting the objectives that need to be achieved in order to move to the next level (Fig 3).

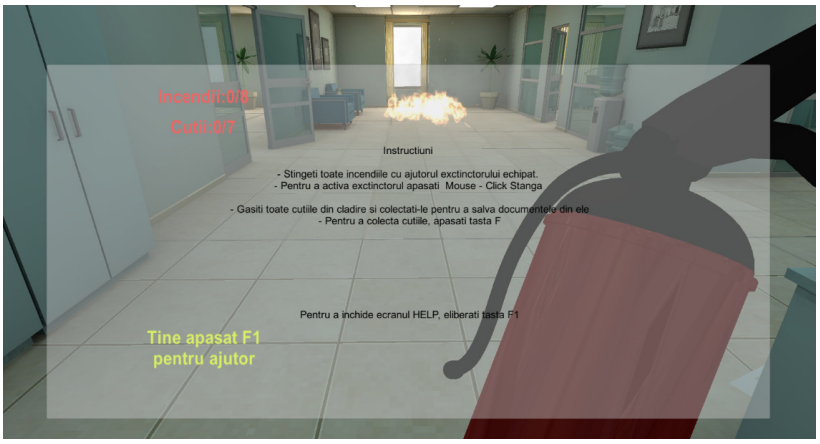

Fig 3. Pop-up instructions

When the player gets too close to the fire, a warning message appears. This warning message disappears when the player moves away to a safer distance from the fire (Fig 4).

Fig 4. Fire removal message

At the same time, when the player is in the vicinity of a box, a message appears indicating what needs to be done to collect the box - press the F key (Fig 5).

Fig 5. Box lift message

There are points on the map that trigger the display of 3 status statements that are used to measure the functionality of the game. The user must tick an option for each statement (Fig 6).

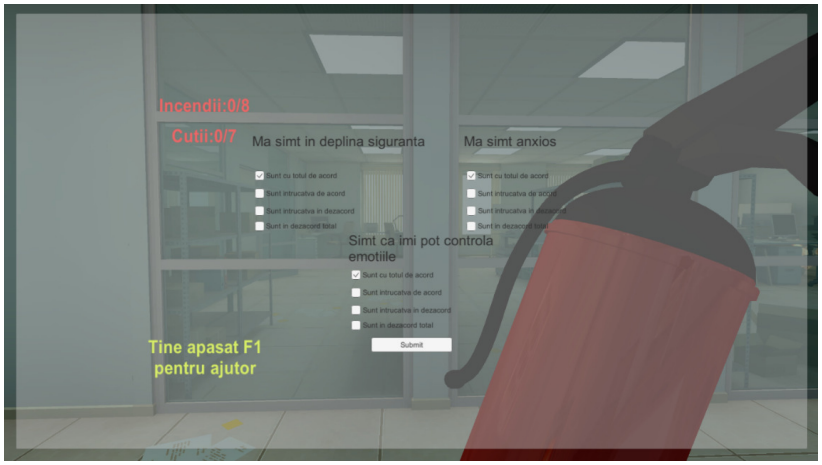

Fig 6. Emotional statements

The display from the game's second level contains the operating instructions in the upper left corner and the game mode in the upper right corner (Fig 7).

Fig 7. Level 2 indications

The Game Mechanics

In order to arouse the interest of potential users, the game has implemented certain objectives that the player must achieve in order to reach the end of the game. He/she can move in the virtual environment by using the keys: W, A, S and D. There are small fires inside the office, that lead to the first target. The player must find and extinguish all the 8 fires inside the office building. He/she will put out these fires with the help of the fire extinguisher. The fire extinguisher is already placed in the player's hand at the beginning of the game and can be activated by clicking the left button of the mouse. The aiming of the direction in which the fire extinguisher shoots is done with the help of the mouse (Fig 8). In order for the fire to be extinguished, it must be touched by the fire extinguisher foam for 3 seconds. When a fire is extinguished, the counter will be updated.

Fig 8. Extinguishing a fire with the fire extinguisher

There are 7 boxes more, containing documents that need to be saved from the fire. When a box is collected, the box counter in the upper left corner is updated, and the box disappears, along with the help message stating that the box should be lifted. Once all the boxes have been collected and all the flames have been extinguished, the portal that makes the transition to the next level is activated. This portal is located to the exit of the office building (Fig 9).

Fig 9. Portal to the next level

When the player passes through the portal at the exit of the building, he is teleported to level 2. In this level, he/she holds a torch in his/her hand with which he/she can set fire to objects in the virtual environment. Wooden huts, grass and wooden barrels can be set on fire (Fig 10).

Fig 10. Level 2 fire

In this level, the fire is extinguished by itself and the area on which it burned changes to highlight the damage caused by the burning (Fig 11).

Fig 11. Burning marks

The game ends once the player presses the ESC key.

Data Collection

The application has implemented a mechanism for collecting live feedback from the player. There are 3 sentences for which the player must give a rating, depending on his or her emotional state.
The sentences are as follows:

- "I feel completely safe"
- "I feel anxious"
- "I feel that I can control my emotions"

The ratings that the player can give are the following:

- I totally agree

- I kind of agree
- I somewhat disagree
- I totally disagree

These 3 phrases will appear 5 times during the game. The answers will be saved in a txt file. The file name will have the structure *(PlayerName)(SessionNumber).txt*. The data collected for a number of 20 people who tested the application is analyzed in Chapter 5.

Case study and results evaluation

We created a questionnaire (a form) that collects data related to pyrophobia. The following table lists the questions in the questionnaire, together with the possible answers.

Table 1: Pyrophobia questionnaire

Question	Answers				
How afraid are you, when you think about fire or flames?	Extremely afraid	Very afraid	Afraid	Little afraid	Not at all afraid
On a scale from 1 to 10, how serious do you think your pyrophobia is?	1-2	3-4	5-6	7-8	9-10
How severe your pyrophobia symptoms are?	Very serious, I used drugs to fight them	Serious, but I avoided using drugs	They are noticeable and I used drugs	They are noticeable, but not uncomfortable	I did not have any symptoms
Do you imagine often that you are put into situations involving fire or flames?	Yes, very often and the feelings of fear is very strong	Sometimes, and the feeling of fear arises	Sometimes, but they don't have such a high impact	From time to time	Never
Did this fear have a negative impact on the relationship with the people around you?	Yes, it had a negative impact on the relation with other people	An observable impact	There have been difficult moments of interaction	Very little	Not at all
How much does this fear affect your everyday life?	It destroys my life	It is a problem I have to deal with	Life would have been easier without her	Acceptable	It has no impact
If you could get rid of this problem, how do you think your life would be?	It would change my life in many ways	It would be an improvement to my life	A great relief	It would be much better	It would not make a difference

This questionnaire has been answered by 20 people, 12 men and 8 women, aged 18-78 years. We made a selection based on the answers provided and we kept 8 people who had a higher fear of fire than usual, of which 4 females and 4 males.
In Pyrophobia-3D we used 3 instruments to measure the player's progress in the virtual environment. These three instruments are based on the three sentences that analyze the level of the following feelings: the feeling of safety, the feeling of anxiety and the feeling of control over emotions. As we mentioned in the previous chapter, in the virtual environment there are several points that trigger the display of the panel containing these three sentences. At the end of the game, a file containing all the players' answers is generated. For each feeling, an intensity index will be calculated according to the players' answers. The answers will have the following impact:

- I totally agree – it is worth 4 points
- I kind of agree – it is worth 3 points
- I somewhat disagree – it is worth 2 points
- I totally disagree – it is worth 1 point

The intensity of each feeling will be calculated based on the mean of the values of the answers given by the player. The index is interpreted as follows:

- In the interval [1; 2] - the feeling has low intensity
- In the interval (2; 3] - the feeling has medium intensity
- In the interval (3; 5] - the feeling has strong intensity

In order to assess the impact of the virtual environment, we collected data from three different game sessions. The user we chose to give as an example had a medium-to-high pyrophobia level. In the chart below (Fig 12) it can be seen that during the three game sessions, the feeling of anxiety decreased in intensity from a strong level of 3.4 to an average level of 2.2.

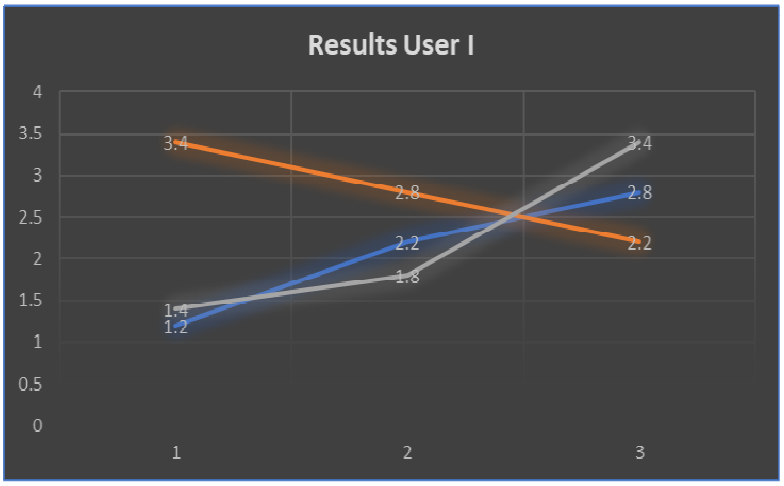

Fig. 12: User1 analysis. Blue – safety, Orange – anxiety, Grey – control over emotions

At the same time, Pyrophobia-3D helped to improve user safety and control. The table below presents the index values of the other participants in the study during the 3 game sessions (Table 2).

Table 2: Results of the case study

User	The evolution of the safety index	The evolution of the anxiety index	The evolution of the control over emotions index
User 2	1.2 - 1.4 - 2.2	2.8 - 2.4 - 1.8	2 - 2.2 - 2.4
User 3	2 - 2.2 - 2.2	2 - 1.8 - 1.6	3 - 3.2 - 3.2
User 4	1.4 - 1.4 - 1.8	2.6 - 2.4 - 2.4	1.6 - 1.6 - 2
User 5	1.4 - 1.6 - 1.6	3.4 - 3.2 - 3.2	1.8 - 2.4 - 2.4
User 6	1.6 - 2 - 2.2	2.8 - 2.6 - 2.2	1.8 - 1.8 - 2
User 7	2.2 - 2.4 - 2.8	2.2 - 2 - 1.6	2 - 2.6 - 3.2
User 8	2.6 - 3 - 3.4	1.8 - 1.8 - 1.4	2.4 - 2.4 - 2.8

The purpose of the second questionnaire (Table 3) was to receive feedback from the game users in order to improve certain aspects in the future. The purpose of the game and the mechanics have been appreciated by most users, with relevant changes in their perception of fire.

Table 3: Feedback questionnaire

Question	**Answers**			
What do you think about the graphics of the Pyrophobia-3D game?	I really like it	It is OK	It is OK, but it can be improved	I do not like it
On a scale from 1 to 10, how intense is your fear of fire?				
Did you feel any anxiety while playing Pyrophobia-3D?	Yes, mostly	Yes, a few times	Yes, only once	Not at all
Did you find that the game objectives are relevant in relation to the pyrophobia therapy?	Yes	No		
On a scale from 1 to 10, what rating would you give to the mechanics of extinguishing the fire with the fire extinguisher?				
Have you found yourself in a scenario that you think you might encounter in your daily life?	Yes	No		
With what percentage do you think your level of pyrophobia has dropped after playing this game?	0-20%	20-40%	40-60%	60-100%
Do you have any other suggestions for improving Pyrophobia-3D?				

62.5% of the users considered that they really liked the application and 37.5% stated that the application is nice. 50% felt anxiety while playing the game. 87.5% considered that the game objectives are relevant in respect to pyrophobia therapy. All the respondents stated that they found in the game a scenario they might encounter in their everyday life. 62.5% of the users said that their pyrophobia anxiety level decreased by 20-40%, 25% of them considered that the anxiety reduced with 40-60% and 12.5% of the users stated that the anxiety decreased with less than 20%.

Conclusions

In conclusion, the systems for phobia therapy have a great importance and can have a positive impact on the people's lives. As we saw in Chapter 2, pyrophobia is one of the few fears for which a virtual environment has not been created yet. Therefore, we designed Pyrophobia-3D, that includes all the features necessary for virtual therapy.

Fear of fire can become an impediment in the daily life of a person suffering from pyrophobia, who can develop an involuntary obsessive-impulsive behavior. In the case study from the previous chapter, we demonstrated the ability of a virtual environment designed to significantly reduce the anxiety resulting from pyrophobia. At the same time, the use of exposure therapy in a virtual environment eliminates the risks.

Regarding further development, by taking into account the suggestions received in the feedback questionnaire, we plan to introduce a new level and a scenario with a fire in the house. Also, we aim to integrate sensors for physiological signal monitoring in order to better evaluate the emotional states, as exemplified in Ferche et al (2015) and Moldoveanu et al (2019).

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Test Data Generation based on Artificial Intelligence Impacts Banking IT

Joerg STRAESSER

Department of economy and finance, Faculty of Management, Comenius University
Odbojárov 10, 831 04 Nové Mesto, Slovakia
E-mail: joerg.straesser@gmx.ch

Zuzana STOLICNA

Department of economy and finance, Faculty of Management, Comenius University
Odbojárov 10, 831 04 Nové Mesto, Slovakia
E-mail: zuzana.stolicna@fm.uniba.sk

Abstract

The scope of this publishing item is to reflect the research status around test data generation by Artificial Intelligence methods and what could be the influence factors for the decision of the IT management in banking sector for the professional usage of AI. This article also aims to outline the differences between test data generation by traditional approach versus Machine /Deep Learning algorithms as subset of AI.

Keywords: Artificial Intelligence, Banking, IT Management, Product brand, Testing, Test data.

Introduction

A product alone can influence strongly the threshold for a purchase request in the public (e.g. Apple, Porsche, Netflix). That´s why, products are essential for the financial success of a company - on the other hand, it means it strengthens the brand of a company on global marketplace. A term was created to combine product and brand - the product brand. "Product brands refer to the individual products of a company and are the foundation of its brand world" (Trust, B. (2020, February 26)).

When the banking sector will be considered with its products - there are mostly digital ones. On the other hand, those products will be traded on digital marketplaces and composed by a combination of single data units (BaFin, Studie: Big Data trifft auf Künstliche Intelligenz, 15.06.2018)(Insights, M. (2020, April 02). Those product data will be delivered from various companies, like asset data, trading data and tax data.

All these data are not longer to be considered as technical ones, rather be a multiple combination of many single data in order to be a business logical construct. From a management scope of view those business data are classified and rated as capital and treasure of banking (Insights, M. (2020, April 02)).

These data constructs has been evolved to a "Quasi" currency, which are traded on various marketplaces as such one and those needs an appropriate supporting technology like AI (Schulz, Bastian. (2019, July 11)). Professor Ben King said: " The field of business analytics is the ‘gold rush’ for the millennial generation. Our information age creates a wealth of data and the tools to access it ..." (Davis, B. (2015, May 14)).

Data segments within banking operations can be divided into the main groups of productive data and test data.

Productive data are the summary of data representing an information universe of an organization to handle the daily operations in interaction with its stakeholders.

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Test data are data as one of the created or selected basics of IT test management discipline. Next to test cases, the purpose of those ones is to be essential input part during the execution of test runs. This special segment of data supports the quality check of a system, objects and processes.

Method

In the first part of this article we are going to focus in general on the topics of Test Data with its expressions, Test levels depends on the focus, Bank IT management as a special part of Management and AI with its essential parts. After the clarification of those terms, the minimal preconditions for the Test Data creation process in general and for AI specially will be listed.

As a next step for this scientific work product, the process of Test Data creation will be described from worldwide most used IT system, called legacy system, until the handover into Artificial Intelligence technic approach.

Moreover, the advantages of AI created Test Data versus traditional ones will be shown.

Finally, to obtain an overview about the differences between the traditional Test Data creation discipline and the AI oriented, with a script listed in sequence steps based on main indicators those ones will be visible.

Test Data Creation

Some test data will be created manually and others (semi)automatically related to the purpose and objective of usage.

One of its attributes is the ability for re-use. A part of them can be re-used multiple times, others are planned for single use. For example, attributes with multiple test usability within banks can be the ISIN of an asset, but another part of the same object - the maturity date is for single use. Most of multiple use data are recoverable for following test sessions by the current IT system environment with appropriate effort.

But under the current circumstances to recreate a single use data with old core banking applications - called legacy systems - has got many restrictions in order to model the business context of an expired test data after a test run.

Often, the best practice is here, the complete creation of that data by manual work of a bank and / or IT specialist. Another weakness of the legacy system is the requirement to generate new test data based on the combination of findings of historic test data and its results after the runs. It needs a considerable effort to fulfil this demanding request.

One possibility of solution can be the support by Artificial Intelligence by doing via Machine Learning (Matt High. (2020, April 13))(Litzel, Nico and Anja Klauck (2020, February 26)) and Deep Learning algorithms and functions corresponding with Big Data Analytics.

Test levels

The defined test data will be used in combination with test cases during various test runs/sessions.

Common levels for each focus are (Hooda, I., & Chhillar, R. (2015, February)):

Smoke Testing

It is a pre-testing to reveal simple failures severe enough. This tests has to cover the most important functionality of a component or system, used to aid assessment of whether main functions of the software appear to work correctly.

Regression Testing

This kind of testing has to ensure that previously developed and tested software still performs after a change.

Unit Testing

The lowest level of testing mainly performed by developer to test the unit of code encapsulated.

Integration Testing
This is to test the data and message flow between various modules to make sure data is flowing across various components correctly.

System Testing
The overall system is tested to ensure that it is behaving or functioning as intended and as specified in requirement document. Regression testing is performed to ensure that nothing is broken in system after fixing bugs and testing bugs.

End-to-End Testing
The whole workflow chain of a use case will be tested with focus on data and message flow.

Bank IT Management

IT Management is an organizational derivative from the common management of a company with a special focus. It has the task with the steering of the IT in general. Concrete, it is not delimited for the responsibility of Hard- and Software rather to give guidance on orders, objectives and personal-related issues with intersection to the IT topic.

The main objective of the IT Management is to contribute an added-value to the overall earnings performance of the company in which ideally the quality level increases and in the same time the costs will decrease as well as the risks will be mitigated (Raffael Herrmann (2012, September 09))

Artificial Intelligence (AI)

AI as an abbreviation of Artificial Intelligence is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with humans, such as the ability to reason, discover meaning, generalize or learn. Some other comparable definitions are:

"Artificial Intelligence (AI) is a general-purpose technology that has the potential to improve the welfare and well-being of people, to contribute to positive sustainable global economic activity, to increase innovation and productivity, and to help respond to key global challenges. It is deployed in many sectors ranging from production, finance and transport to healthcare and security." (OECD-LEGAL-0449, 05/2019)

The WTR (World Trade Organization) has the following definition for AI:
"Artificial intelligence (AI) is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with humans, such as the ability to reason, discover meaning, generalize or learn from past experience." (World Trade Organisation. (2018)).

Machine Learning as a sub-method of AI is the ability to adapt to new information and event circumstances and to detect and extrapolate patterns. It delivers decisions and solution constructs after learning trainings sessions (Eberspächer, Jörg, and Thomas Goetz. (2014)). Deep Learning as the conclusion engine of Machine Learning splits the solution generation process into many hierarchical interim layers analogical an artificial neuronal network. After various execution steps including the analysis of the data universe (Big Data Analysis) the solution will be created. The underlying algorithms, functions and procedures generates dedicated conclusions with an interpolation and extrapolation statistical approach.

Here is to be observed that the AI engine can generate new attributes like creation date, interest rate and others based on past and present information as well as predicted analysis (Jasrotia, A. (2018)) of relevant information impacts and influences.

Basic conditions

To implement this service, what are the necessary minimum conditions or requirements of a successful AI service in general?

a) Data accuracy
In this context the quality of the results depends on the input data quality directly. It means, in case of weak quality of the data repository and pool the AI related conclusion results are wrong often.

b) Huge amount of data / big data lakes
Because of that, the quality of well-trained AI engine with the belonging algorithm and functions increases with the high volume of available well-structured data and numbers of performed trainings sessions. This engine is self-adaptable depends on the findings of each training (re-)run.

c) Performing technical environments
To perform AI training / conclusion sessions with an expected qualified outcome within an acceptable response time it is mandatory to fall back to a high performing IT backbone.
For example: The Quantum technology opens the possibility to have access for necessary performance (Mayer-Crenu, A. (2020, February 19))(Deeg, Janosch (2020, February 20)).

AI for Banks

Reasons for AI usage for Bank task coverage

Why does it provides the occasion of AI usage for test data generation within the banking sector?
The banking industry owns the biggest size of data comparable to other industries.
One of the reason is that Financial institutes has got a lot of interdependencies between information systems and related processes internal and external.
That´s why, as described before, one of the conditions is given that the quality of the AI conclusion results will be high (Matt High. (2020, April 13))(Litzel, Nico and Anja Klauck (2020, February 26))(FSB - Finance Stability Board. (2017, Nov 1))(BaFin. (2019, Jan.)).

To achieve and to keep the data accuracy in banks on an appropriate level are a real problem to solve independent of usage of AI or traditional IT. The experience of data clean-up and enrichment projects in the past shows a disproportion of investment of resources like time, budget and human capital to the revenue outcome.

Despite promising approaches like database refactoring the amendment covered only the redesign of technical structures (DB-Scheme, Relations, Data administration, Access possibilities, etc.) while retaining data behavioral and informational semantics - it was not a change from the data quality itself.

The AI discipline can serve parallel with a fluent data and algorithm modification during the engine trainings.

Data sources

Which can be the data sources for the AI engine in the bank?

As a result of the AI technical discipline, it offers the generation of conclusions from various
data sources - the derived information. This data portfolio consists of bank internal sources as well as of bank external static and dynamic oriented data edges - the Big Data pool with various data lakes.

From a business perspective of a bank the underlying data of the daily business has got a widespread of the scope (Risk Management, Trading, Accounting, Supervision, Front Office, Back Office, Corporate Management, etc.). All these are compositions with several weights of real-life, historical, predictive data (models, simulations) from internal and external feed.

1. Real-life data
They delivers one of the most valuable basic source for generation of similar test data in combination with data masking.
2. Historical data

Often, they stored as time series based pillar data; there are single data itself as well as constructs are essential sources too for the extrapolation of future test data constructs based on empirical values.

3. Data sources bank externally
These are data which the bank not owned, is not able to generate initially; that´s why the organization imports the data as spectrum/cluster/group from external suppliers into the own core banking environment. This could be messages, asset prices, interest rates, lending values, tax data, external security events, etc. from data suppliers, government, public surveys, etc. with an interim step of structuring there are also valuable basics.

Benefits of AI

What is the advantage of AI created test data versus conventual ones?

A general introduction for this question are described in (Maitino, Phil(2020, Jan. 17)).
As follows the concrete advantages for AI created test data:
a) Apparently "senseless" test data were be generated, which perhaps would never be created by cognitive manually intervention. But exact those data supports the explorative test approach without any reference to the test scope. The system reaction will be checked in case of fail-safe, fail-operational, ABEND (Abnormal End), undefined / unclear situation - every status can be simulated by this portfolio of test data.

b) The numbers and effort for single use test data definition by hand with several characteristics will be reduced, whilst the AI will generate those ones repeatable and similar new ones as proposed by the conclusion algorithm.

For example: Exactly for the test object security event of interest rate maturity the same one will be generated and another one will be suggested with the same interest rate but another interest period.

c) The AI is able to extend the test data universe on horizontal level in general, whilst for semantical similar logical units in comparison with the initial object those new ones will be generated likewise. This is possible on conclusion based on existing test objects stored in historical executed test sessions in relation to a strategy paper of the bank management with the hint to publish new products out of the product line.
For example: The semantical business need for securities with fixed terms for testing will be enlarged with securities with variable terms.

d) The test object spectrum will be extended on vertical level (Data enrichment): the existing data construct from pretests will be extracted out of the data lake, enriched with further attributes and restored again. It delivers the opportunity to expand the functional business tests on a repeatable regeneration sequence, but with an mutated object under changed circumstances.

Data Creation Script / Process steps

For the comparison of the Test Data creation process with traditional IT and the AI approach it offers itself the cost factor manual intervention versus automatical workflow.

The process can splits into the steps:

- Preliminary work
The existing data should be analyzed to detect wrong content, bad combinations, senseless semantics, obsolete components, wrong plausibilities as well as incorrect redundancies.

- Initial work
Depends on the planned purpose of the test data new ones has to be conceptual defined or retrieved and combined out of data warehouses, data lakes and stocks in general.

- Generation
In a further step the data has to be generated along the defined drafts.

- Maintenance
The created or used data should be re-analyzed and archived as reference items for later test sessions. In addition, the supporting tools and technical mechanism has to be updated onto the current findings of improvements and issue fixings.

Expandability / Scalability

Those questions will be raised:

On which degree has the approach, tool, process the chance to perform on a higher level? How can be the usage of resources for further development of that process more efficient?

As follows the table shows some relevant actions along the process steps for both approaches - Traditional IT and Artificial Intelligence:

Process steps	Traditional IT			Artificial Intelligence		
Preliminary work	- Data Clean-up	X		- Clean-Up Algorithm preparation - Data Clean-up	X	 X
Initial work	- Creation new date by hand - Selection data out of existing data stores/lakes	X X		- Initial data stock will be generated based on existing data stores/lakes		X
Generation	- By usage of data generation tool based on manual implemented rules	X	X	- Self-Generation of data based on high sophisticated self-learning algorithm / functions		X
Maintenance	- Maintenance effort focussed on data reference models, interpretation rules and generation tool	X		- Autonomous fine adjustment of algorithms and functions, self-paced training of technical components mentioned (unsupervised learning		X
Expandability / Scalability	- Limited on the interpretaion rule set/model - Strong dependency from regular maintenance work	X	X	- Possible high scalability on the basis of self-paced learning algorithms and functions (Machine / Deep Learning)		X

Legend:

- Manual intervention

- Automatical workflow

Figure 1: Data creation process - Comparison Traditional IT - Artificial Intelligence

After finish of the appropriate process step a quality gate has to be checked to satisfy the level beforehand defined.

Conclusion

AI offers the possibility to generate test data close to the production standard splitted into for multiple and single use during regular und unscheduled test sessions on core banking systems. The scope extends over Smoke and Regression tests for daily bank business as well as Integration, System and End-to-End tests for forecasted system changes in form of upgrades, updates, releases and patches.
A concrete bullet point plan (Script Test Data creation) have to underpin the proceeding with a strict satisfying indicator for each milestone of a completion step. It is recommended to start with a small task to gain in short time the appropriate results with a high transparency of the creation workflow. Moreover, the effort for possible amendments and adjustments of code, data, environment, etc. is on moderate level.

An agile project management is a suitable approach to support this short-term planning and to monitor the progress with the possible daily status view.

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The Importance of Ecological Tourism in The Context of Hotel and Restaurant Business Management in The Conditions of Stability of Ecosystems of Territories

Liudmyla NESHCHADYM
Uman National University of Horticulture, Uman, Ukraine
E-mail: n_lydmila@ukr.net

Svitlana TYMCHUK
Uman National University of Horticulture, Uman, Ukraine
E-mail: sv_tumchyk@ukr.net

Liubov KOVALENKO
Uman National University of Horticulture, Uman, Ukraine
E-mail: lavreniukliuba@gmail.com

Diana NAHERNIUK
Uman National University of Horticulture, Uman, Ukraine
E-mail: diana_nagernyuk@i.ua

Valentyna NEPOCHATENKO
Uman National University of Horticulture, Uman, Ukraine
E-mail: nijuchka.va@gmail.com

Svitlana PODZIHUN
Uman state pedagogical university, Uman, Ukraine
E-mail: spodzigun@ukr.net

Abstract

This article examines the comprehensive implementation of the concept of sustainable development, helps to make eco-tourism more important every year. An important goal of this article is the efficient and rational use of resource potential and the optimal solution of regional development problems. The ecotourism industry performs important functions in the development of the economic complex and economy of the country, district, region as it increases local incomes; creates new jobs; promotes the development of industries focused on the production of ecotourism services; develops social and production infrastructure in tourist centers; increases budget revenues. Entrepreneurs' interest in ecotourism can be explained by a number of factors: in order to start an ecotourism business, you do not need large financial investments; in the market of ecotourism services, despite the competition, both large and medium and small companies and firms can successfully interact; ecotourism business allows you to quickly turn capital. The results of environmental activities are assessed by ecological and economic efficiency. The concept of ecological efficiency includes reclaimed land and disturbed landscapes, planted forest areas instead of cut down or killed by acid rain, contaminated groundwater, frost, hurricanes, felling of diseased trees and shrubs, restored meadows and forest litter, conservation and reproduction of rare species of flora and fauna and other restorative measures. The main indicator of ecological efficiency of environmental measures in relation to recreational resources is the possibility of their use for their intended purpose with the subsequent receipt of economic benefits.

Keywords: Tourism, Ecology, Ecological Tourism, Business, Development, Economy.

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Introduction

Comprehensive implementation of the concept of sustainable development makes ecotourism more and more important every year. Efficient and rational use of resource potential and optimal solution of regional development problems are the two most important goals of the sustainable development strategy for any territory. These two goals would be realized in the development of ecological tourism, which will preserve the unique beauty of natural areas, reduce anthropogenic pressure on the environment, increase the younger generation's knowledge of nature and experience with it, improve the welfare of local people and more. That is, ecological tourism can be called sustainable ecologically balanced tourism. Due to the prospects for the development of ecotourism in Ukraine, it is interesting to interpret the concept of ecotourism adopted in international documents, its principles and criteria, the study of the relationship between the concepts of ecotourism and sustainable tourism.

The purpose of the article is to theoretically analyze the importance of ecological tourism in the context of hotel and restaurant business management in the conditions of stability of ecosystems of territories

Theoretical and methodological fundamentals of ecotourism

The International Ecotourism Society (TIES) in 1990 gave the following definition: "Ecological tourism is a responsible trip to natural areas that promotes nature protection and improves well-being of local population". In 1996, the International Union for Conservation of Nature (IUCN) officially adopted a partially revised definition proposed in 1983 by Mexican economist, architect, and ecologist Hector Ceballos Lascurain, "ecotourism is ecologically responsible traveling and visiting relatively untouched natural areas in order to study, admire and explore nature and related cultural monuments, which contribute to the preservation of the environment, cause minimal damage to nature and create socio-economic benefits to local population."

Ecotourism is an effective means of economic and social revival. The ecotourism industry performs important functions in the development of the economic complex and economy of the country, district, region as it increases local incomes; creates new jobs; promotes the development of industries focused on the production of ecotourism services; develops social and production infrastructure in tourist centers; increases budget revenues. Today, ecotourism is one of the few fastest growing businesses. Entrepreneurs' interest in ecotourism can be explained by a number of factors: in order to start an ecotourism business, you do not need large financial investments; in the market of ecotourism services, despite the competition, both large and medium and small companies and firms can successfully interact; ecotourism business allows you to quickly turn capital [2].

Ukraine has sufficient ecotourism resources, the use of which, along with growing tourism services, will naturally contribute to the intensification of infrastructure development and territorial organization of ecotourism activities [1]

The results of environmental activities are assessed by ecological and economic efficiency. The concept of ecological efficiency includes reclaimed land and disturbed landscapes, planted forest areas instead of cut down or killed by acid rain, contaminated groundwater, frost, hurricanes, felling of diseased trees and shrubs, restored meadows and forest litter, conservation and reproduction of rare species of flora and fauna and other restorative measures. The main indicator of ecological efficiency of environmental measures in relation to recreational resources is the possibility of their use for their intended purpose with the subsequent receipt of economic benefits.

Different approaches are used to assess methodological approaches to determining the environmental damage caused to recreational areas. Thus, the fee for the use of recreational resources is a mechanism for the extraction of differential rent, which is defined as the difference between the value of the use of natural resources and the regulatory level of the reduced costs to ensure its use for recreational purposes. However, when using natural ecosystems and their individual elements, it is necessary to take into account the rule of the degree of transformation, which is the inadmissibility of exceeding the limits of the ability of self-support and self-restoration. In this case, the unit of renewable resource can be obtained for a certain period of time, which is determined by the speed of functioning of ecosystems, as well as the physical parameters of the environment.

Pollution of air, water and soil has a significant impact on the sustainability of the ecosystem, and the resistance of different components of the biosphere to the same actions is ambiguous. Thus, black wattle and narrow-leaved

linden are resistant to sulfur dioxide (SO_2) and nitrogen oxides (NOX), European larch, birch and beech have intermediate sensitivity to SO_2, and silver fir – to NOX, at the same time it is sensitive to SO_2, and European birch and larch are sensitive to NOX [2].

The concept of sustainability in ecology is interpreted ambiguously, and therefore its assessment is carried out on various grounds, manifestations [3]:

1) the difference of the system of one state relative to another (Z2 – Z1 = ΔZ);
2) the allowable value of the difference from the base state, i.e. its variability (Z0 – Z1 < ΔZ);
3) the time interval within which changes occur or sustainability is assessed (Δt);
4) the influence of external factor (F) or their group, against which stability is assessed. According to the ratio of these manifestations M. D. Hrodzynskyi [5; 4]:

- resistance (elasticity, inertia) – the ability of the ecosystem (E1) under the influence of the factor (F1) during the time (Δ t1) to stay within certain limits (stability) (Z1); F1 /Δt1 ← Z1;
- plasticity (mobility) – the ability of the ecosystem (E2) after the cessation of the factor (F1) during the time (Δ t1) to return to the original stable position (Z2); F2 /Δt2 →Z2.

Thus, sustainability can be considered, on the one hand, as the ability of the ecosystem to counteract the influence of external factors, to preserve its essence and quality characteristics in the state Z1, and on the other – to restore its properties, i.e. to be plastic (Z2) [6]. Therefore, resistant and plastic sustainability are completely different properties of ecosystems. The more the ecosystem resists the influence of external factors, the harder it is to break, but if it is broken, then it is difficult to return it to its original state. That is, the higher the plastic resistance is, the lower the resistance of ecosystems is.

In addition, the features of scattering of pollution over the study area and its functional purpose must be taken into account. In relation to air pollution, environmental effectiveness of measures (E) to reduce emissions is determined by the formula [7]:

$$Э = \sum_{i=1}^{n} \Delta M_i f_i K_0 \quad \text{unit of weight/h}$$

where ΔM_i - change in the weight of emissions of each i-component of pollution, units of weight/hour;

f_i - the coefficient characterizing the scattering conditions of the impurity in the atmosphere, depends on the height of the pipe, vertical and horizontal mobility of the atmosphere, the type of impurity. Approximately for gases it is taken equal to one, for dust and ash, with a degree of purification of less than 75%, f_n =3, and 90% - f_n =24;

K_0 - the value of relative danger of the territory of different purposes, taken according to table 1 [4].

Table 1: The value of the coefficient K_0

Type of territory	Value K_0
Resorts, holiday centers, reserves, natural reserves	10
Suburban recreation areas, garden cooperatives	8
Territories of industrial zones	4
Forests	0,2

In addition to regular man-made emissions that have a negative impact on ecosystems, significant environmental damage is caused by accidental, volley emissions and discharges of harmful and toxic substances. The magnitude of the damage depends on the absolute volume and toxicity class of the components of the emission (discharge), its duration over time and the area of distribution.

When carrying out environmental activities in the normal technological mode of polluting enterprises, full economic effect, for example, from the purification of emissions from dust and gases can be determined by the formula for the accounting time period (quarter, half-year, year) [4]:

$$Э_0 = \sum_{i=1}^{2} \left(\Delta y_i + \Delta D_i \right), \text{ UAH,}$$

where Δy_i - the amount of damage prevention by reducing payments for dust emissions (i = 1) and gas (i = 2) after commissioning of dust and gas cleaning equipment, UAH;

$$\Delta D_i = Ц_i \bullet M_i$$

where $Ц_i$ - unit cost of the extracted i-component, UAH/unit of weight;

M_i - mass of the removed i-component, unit of weight (t/kg).

Annual economic effect for the company from environmental activities is calculated by the formula

$$Э_г = \Delta П_i + \Delta Д_{гi} - \Delta C_i - E_н \bullet \Delta K_i, \text{ UAH/h,}$$

where $\Delta П_i$ - change in the amount of payment for pollution (by components), UAH/h;

$\Delta Д_{гi}$ - additional income over the year from the use or sale of extracted components, UAH/h;

ΔC_i - increase in operating costs after installation of filters for the i-pollution, UAH/h;

E = 0,15 - normative coefficient of economic efficiency of one-time expenses, assigned per year;

ΔK_i - increase in costs for design, purchase and installation of filters, UAH

With unfavorable ecological conditions in industrial and other zones it is impossible to develop ecological tourism at the local level. Therefore, there is a secondary economic damage caused, firstly, by the need to export outside the region or country of money used for recreation, and secondly, the population must bear the cost of travel to other places.

Conclusions

Work on the restoration of existing ecosystems for the sustainable development of ecological tourism should be based on thorough research of air, water and soil pollution. Restoration of the resilience of the ecosystem is the key to increasing its plastic resilience. Therefore, sustainable ecotourism is successfully developing with sufficient resistance of the ecosystem to the influence of external factors, which are often significant flows of tourists in a given area.

It is necessary to conduct environmental activities in the normal technological mode of enterprises that pollute the ecosystem of the territory intended for ecological tourism. To assess ecological damage caused to recreational areas, a number of methods are presented that are necessary for the restoration of ecosystems of areas intended for sustainable development of ecological tourism in Ukraine.

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Analysis of Awareness and Attendance Criteria in the Mala Fatra Region

Miriam GARBÁROVÁ

University of Zilina, Žilina, Slovak Republic
Miriam.Garbarova@fpedas.uniza.sk

Abstract

It is known that the tourism sector positively contributes to the process of economic growth of a country through different channels. The paper deals with the issue of tourism in the Mala Fatra region in the Slovak Republic. The main objective was to analyze the awareness of the Mala Fatra region, the attendance of the destinations in the Mala Fatra region and the visitors' preferences in the tourism sector. To meet this goal, a questionnaire survey was conducted to determine awareness of the Mala Fatra region, attendance of the Mala Fatra destinations, satisfaction with services in these destinations and to identify factors that are important for choosing a destination. Based on the analysis of the results of primary research, it is possible to categorize the respondents to three segments. The results of primary research and identified criteria could contribute to the best possible design of the tourism offer of the Mala Fatra region for a specific target group in the future.

Keywords: Tourism, Mala Fatra Region, Destination, Visitors.

Introduction

Tourism is a set of activities aimed at meeting the needs related to travel and residence of persons outside the place of permanent residence, usually in leisure time. Their goal is relaxation, exploring, health, entertainment, cultural and sports activities. Also, business trips and gaining a comprehensive experience, as mentioned in materials of Ministry of Transport and Construction of Slovak Republic.

According to Šefčík et al. (2019), tourism is very often described as a complex socio-economic phenomenon that affects a wide range of economic and non-economic (social, psychological, ecological, geographical) areas of society.

Gúčik (2011) stated that tourism becomes a factor of regional development, usually where there is a suitable primary offer, such as cultural, historical, natural attractions and destinations causing visitation. Where the primary supply of tourism is the most attractive, tourism is the subject of economic appreciation and a tool of regional development. Tourism can be in various positions as an economic activity. The greater supply of tourism in the region and its role will be more critical as a tool of its economic and social development.

Sanjeev & Birdie (2019) mentioned that tourism is among the fastest-growing industries in terms of both income generation and job creation. The World Travel and Tourism Council 2019 report on travel and tourism impact exhibited that the share of tourism represents about 10.4% of global GDP and 319 million jobs (i.e. 10% of the total employment) globally.

The tourism sector is recognised to positively contribute to the economic growth process of a country through different channels, including the fact of course that it is a currency earner sector; that stimulates physical and human capital accumulation, and pushes (and uses) technology and innovation. As stated by Mayer & Vogt (2016), at the same time, tourism promotes, directly and indirectly, other economic industries such as transportation, hospitality or retailing.

According to Brida, Gomez and Segarra (2020), tourism is a significant sector of diffusion of technical knowledge, and potentially it can stimulate research and development.

As mentioned by Gúčik (2010), the set of elements that, in various combinations, form the goods of tourism form the offer of tourism. Their consumption affects the final effect of tourism. The bearer of the offer (object) of tourism is the destination, companies and institutions of tourism. The nature and scope of the offer are determined by the primary offer and the secondary offer derived from it. Primary offering associate with the natural, cultural and historical

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potential of the country for tourism. This potential has a specific functional and time usability in tourism in terms of the motivation of the visitor - customer. The primary offer can be given by natural conditions or created by human activity, which consists of cultural-historical conditions and organized events. On the other hand, Rentková and Vartiak (2017) discovered that the situation is quite different in the countries belonging to emerging markets, where tourism is vital for the economic survival of those countries. If the goal of visitors in tourism is resting, health, sports or cultural activities in a suitable environment, then the secondary offer is a means to achieve this goal, because it creates the conditions for the use of the primary offer and adapts to it, Gúčik (2010) continued. The secondary offer consists of three basic groups of factors, namely tourism institutions in destinations, tourism infrastructure and general infrastructure.

Gretzel, Fesenmaier, Formica, & OLeary (2006); Khalilzadeh & Wang (2018); Line & Wang (2017); McCamley & Gilmore (2018); Pike & Page (2014); Vartiak (2015) mentioned that destination marketing is a naturally complex proposition involving the cooperation of agencies at the national, regional and local level; the collaboration between governmental, commercial, and non-governmental not-for-profit groups is critical. A large mass of literature focuses on this very relationship, reviewing the challenge that nations face in trying to "identify and satisfy consumer needs more effectively than their rivals".

Gúčik (2010) found out that the proportions between the primary and the secondary offer depend on the quality of the primary offer, which limits the optimal functional use of the secondary offer. In terms of time, this is a permanent offer that is associated with year-round service. It is also a seasonal supply, which is conditioned by the occurrence of seasonal events causing demand. In economic terms, the offer represents economic goods, of which consumption satisfies their guests' needs. By consuming them, visitors gain a utility effect (experience), while businesses and tourism institutions gain a value effect (sales, taxes). The characteristic features of the offer include diversity and complexity, commitment to large investments, a high degree of readiness to provide services.

Aguiló, Rossello, & Vila (2017); Brida, Cortes-Jimenez, & Pulina (2016); Brida & Scuderi (2013); Dogru, Sirakaya-Turk, & Crouch (2017), Čorejová, Genzorová & Stalmašeková (2017), Rentková & Vartiak (2017) mentioned, effective promotions of destinations, attractions and services requires careful consideration of the target markets, likely effectiveness and the costs of gathering data thereon.

According to Brida, Gomez and Segarra (2020), many governments are paying greater attention to support and promote tourism as a potential source of growth and employment and as a sector which adds value to cultural, natural and other capital with no market price. On the other hand, in the academic sector, there is a growing interest in the relationship between tourism and economic growth.

The Mala Fatra Region

The Mala Fatra region is located in the north of Slovakia in the Zilina region. The area of Mala Fatra is a trendy summer and winter tourist destination. The Mala Fatra region offers many exciting attractions, or a relatively large number of bike paths.

By https://www.regionmalafatra.sk, Mala Fatra is undoubtedly one of the most beautiful tourist destinations in Slovakia. It offers 17 km of ski trails, 22 km of cross-country trails, 600 km of marked bike paths and 150 km of marked hiking trails.

Table 1 shows the accommodation statistics of the Mala Fatra region in the years 2018 and 2019. Zilina has the highest number of accommodated visitors and overnight stays, as it offers the widest range of accommodation facilities. As we can see in comparison with 2018, the number of visitors increased and with it the number of overnight stays, which shows that tourism in Mala Fatra is growing year on year.

Table 1: Accommodation statistics of Mala Fatra municipalities for the years 2018 and 2019

Village	Number of visitors		Number of overnight stays		Number of accommodation facilities		Number of beds	
	2018	2019	2018	2019	2018	2019	2018	2019
Zilina	87 014	10 2901	205 763	214 077	39	42	2 213	2 175
Bela	18 547	22 393	39 969	44 464	8	8	400	401
Terchova	35 632	43 453	84 766	103 847	39	55	1 183	1 702
Strecno	9 870	11 530	26 774	29 752	3	4	175	185
Varin	364	797	1 269	1 882	3	6	68	201

Source: Custom processing by Accommodation statistics of the region Mala Fatra, sent by email from: riaditel@regionmalafatra.sk

The Mala Fatra region offers many attractions. Nevertheless, its capacity is not fully utilized nowadays. The region is mostly visited by the local population. Visitors stay in it mainly in the summer and for a one-day stay, despite the fact that the region is suitable for year-round and multi-day recreation.

The aim of regional tourism organizations is to increase the number of visitors in the region, which would also increase business activities and employment in the region and thereby improve the living standards of the local population.

Therefore, the aim of the primary research is to find out awareness about the Mala Fatra region, to find out the attendance of the destinations in the Mala Fatra region and to identify the factors that are important for visitors when choosing a destination.

Methodology

The marketing research consists of two parts. Based on the calculation of the sample, the minimum number of required respondents was determined. The implementation part of the marketing research was focused on the collection, evaluation and interpretation of data obtained through an online questionnaire survey.

The primary research was conducted through an online questionnaire survey using Google Forms. The questionnaire consisted of 21 questions, which accounted for 3 identification questions and 18 substantive questions, which were used to collect data such as awareness of Mala Fatra destinations, attendance of Mala Fatra destinations, criteria for choosing a destination, etc.

Data were collected by an online questionnaire survey of the population of the Slovak Republic from 10/05/2020 to 20/05/2020. The analysis of merit questions was performed on a sample of 418 respondents older than 15 years. 51.8% of female respondents and 48.2% of male respondents participated in the online questionnaire survey.

The largest number of respondents, 47.8%, were young people aged 16-25. The second most represented (21.6%) were respondents aged 26-35 years. Respondents aged 36-45 were in third place with 11.1% representation. This was followed by respondents aged 46-55 years with 8.2% representation, followed by respondents aged 56-65 years with 5.6% representation, respondents aged 66 and over accounted for 4%. The lowest proportion of 1.6% were respondents under 15 years of age for whom the research was not primarily intended, and their sample was not included in the analysis of merits questions.

The third identification question categorizes respondents based on their social status. The largest group of respondents, 40.7% were students. They were followed by employees 33.6%, respondents radiating into the self-employed group accounted for 8.9%. The research also participated in 5.6% of mothers on maternity and 7.1% of pensioners. Unemployed respondents were the least numerous group (4%).

Results

Awareness of the destinations of Mala Fatra was investigated by analysis of answers. As can be seen in Figure 1, up to 77.8% of respondents know Strecno Castle. It is followed by Janosik holes in Terchova known by 73% of

respondents. Then Vratna Valley is known by 67.5% of respondents, followed by Statue of Janosik in Terchova, which is known by 59.3% of respondents, rafting in Strecno known by 52.9% of respondents, sightseeing towers – Duben and Strecno known by 51.7% of respondents. Cycling routes around Zilina and Terchova are known by 48.6% of respondents, Château Gbelany is known by 40.2% of respondents, only slightly fewer respondents (39.2%) know Krasnany Castle, and the least known destination of Mala Fatra is Domasin Meander (32.8% of respondents).

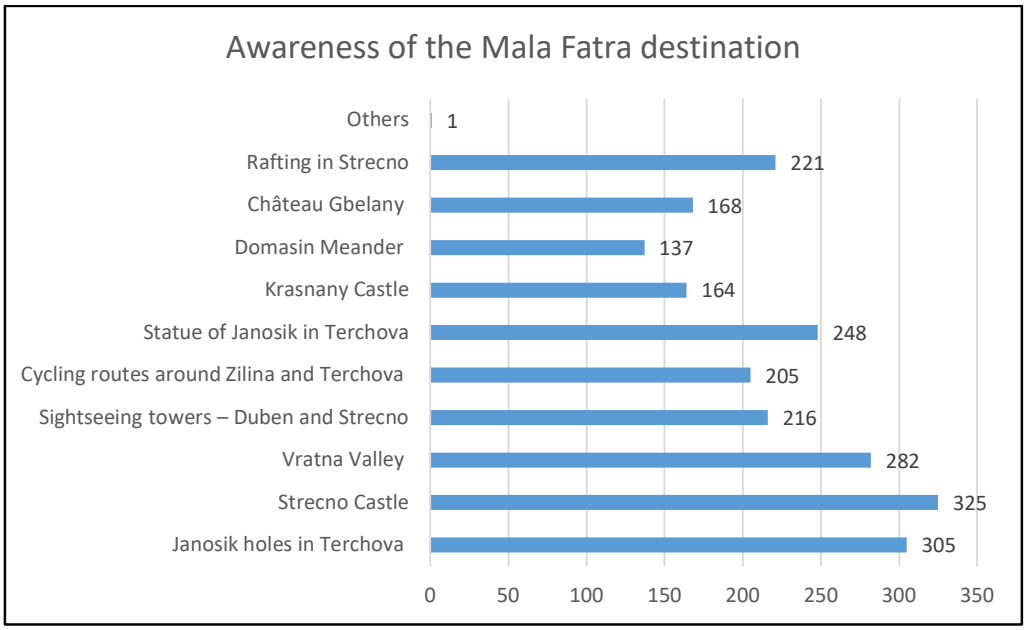

Fig. 1: Awareness of the Mala Fatra destinations

The research examined where the respondents learned about the destinations of Mala Fatra. Most respondents (63.4%) know the Mala Fatra destinations from family members or acquaintances, 45.9% of respondents obtained information about those destinations through social networks, 43.5% of respondents found out about the destinations through the official websites, and 30.9% of respondents received information about the destinations through newspapers, television or leaflets.

As many as 92.1% of respondents have already visited one or more of the destinations in Mala Fatra, and only 7.9% of respondents have not visited any of them yet.

Most respondents, 64.9%, visited Strecno Castle and Janosik Holes in Terchova (59.7%). Vratna Valley was visited by 42.6% of respondents, the Janosik Statue in Terchova was visited by 39.5% of respondents, 37.9% of respondents visited Sightseeing Towers – Duben and Strecno, cycling routes around Žilina and Terchová by 36, 6% of respondents and 28.6% of respondents sailed on rafts in Strecno. 17.7% of respondents visited Château Gbelany, and 16.6% of respondents visited Krasnany Castle. The least respondents, 15.1%, visited Domasinsky Meander (Figure 2).

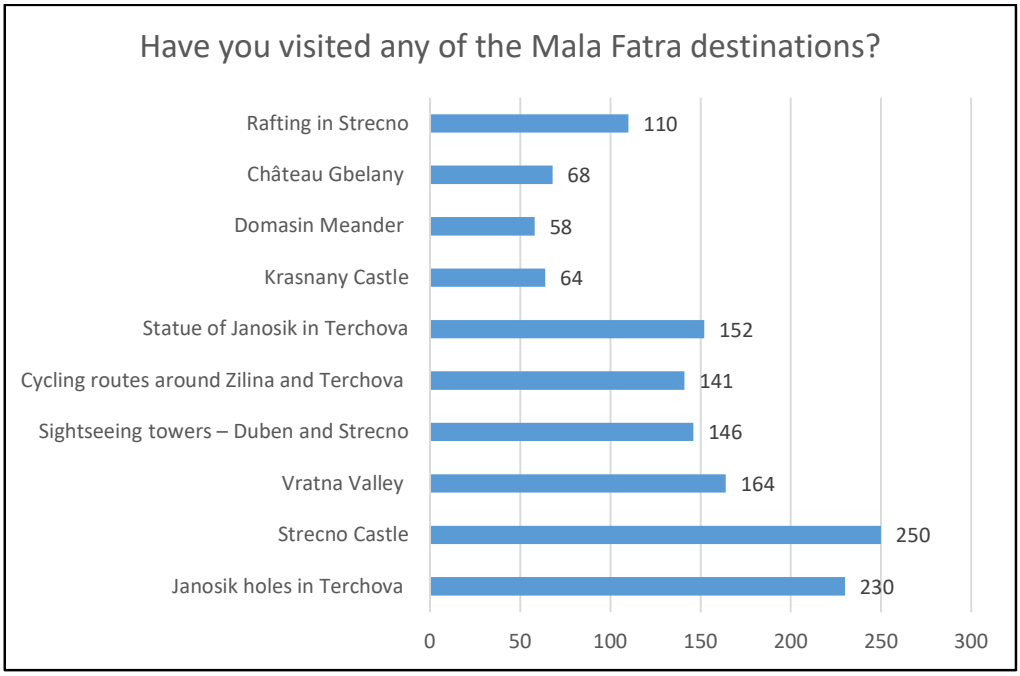

Fig. 2: Attendance of the Mala Fatra destinations

The main reason why most respondents (80.5%) visited the destination of Mala Fatra was nature. Other reasons were sports (34.5%), history (31.7%) and cultural enjoyment (30.9%).

Respondents visit the destinations of Mala Fatra usually in summer (56.6%), in spring it is visited by 19.2% of them, 18.2% in autumn and only 6% in winter.

It was also examined how many times the respondents visited the destinations of Mala Fatra. Most respondents 41% visited Mala Fatra destinations 3-5 times, 21.3% of respondents visited Mala Fatra destinations 6-10 times, 20.3% of respondents visited those destinations only 1-2 times, and 17.4% of respondents visited the destinations of Mala Fatra more than ten times.

There are only 35.3% of respondents who used accommodation services in the destinations of Mala Fatra, and 64.7% of those who did not use accommodation services.

It was found out what is the average time the respondents spent visiting one of the destinations in Mala Fatra. 66.8% spent an average of 1 day there, 26.5% of respondents spent an average of 2-3 days in the destination. The average number of respondents who spent 4-7 days in Mala Fatra was 4.2%, and only 2.6% of respondents spent more than seven days in the Mala Fatra destinations.

Up to 80.3% of respondents used catering services in the destinations of Mala Fatra and only 19.7% of respondents have not yet used catering services.

The question concerning the evaluation of the respondents' satisfaction with various aspects of the destinations of Mala Fatra was optional, as the respondents did not have to experienced all the elements. Thus, they would not be able to evaluate them. In this case, the respondents assessed only the aspects they encountered in the destinations of Mala Fatra. The pros of Mala Fatra's destinations are the natural attractions, with which up to (261) respondents were satisfied, 109 respondents were somewhat satisfied, only 5 respondents were somewhat dissatisfied, and no respondents were very unhappy. Other aspects of Mala Fatra's destinations were rated by the respondents as follows (Figure 3):

- Price – 66 very satisfied, 202 somewhat satisfied, 90 rather dissatisfied, 6 very unhappy respondents.
- Transport accessibility to the destination – 45 very satisfied, 218 somewhat satisfied, 83 rather dissatisfied, 13 very unhappy respondents.
- Possibility of parking - 44 very satisfied, 180 somewhat satisfied, 108 rather dissatisfied, 63 very unhappy respondents.

- Accommodation (was rated only by 136 respondents) - 39 very satisfied, 75 somewhat satisfied, 19 rather dissatisfied, 3 very unhappy respondents.
- Refreshment - 85 very satisfied, 188 somewhat satisfied, 36 rather dissatisfied, 0 very unhappy respondents.
- Cultural and historical attractions - 167 very satisfied, 168 instead satisfied, 16 somewhat dissatisfied, 2 very unhappy respondents.
- Sports activities - 114 very satisfied, 192 somewhat satisfied, 31 rather dissatisfied, 0 very unhappy respondents.

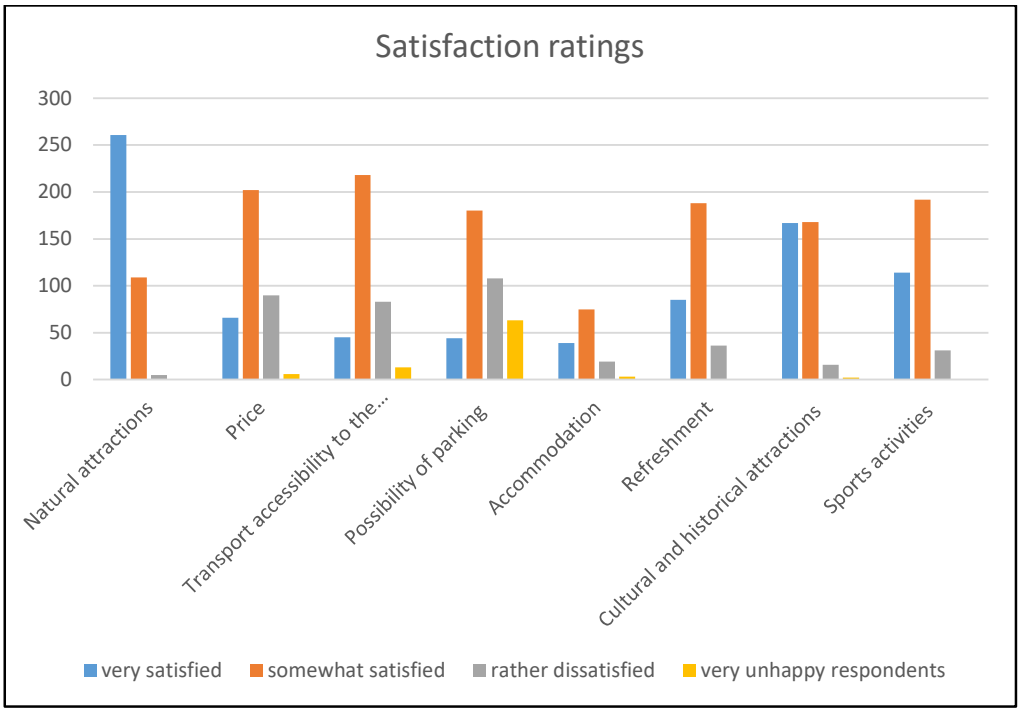

Fig. 3: Satisfaction ratings

Respondents were able to express what they liked the most during their visit of one of the destinations in Mala Fatra. The question was answered by 81 respondents who enjoyed the most: nature, tourism and historical monuments.

Respondents could also describe what they would change or improve in the destinations of Mala Fatra. The question was answered by 76 respondents who would like to change/improve in particular: cleanliness of the environment, more student discounts and more parking places.

The destinations of Mala Fatra has not been visited by 33 of the respondents yet (Figure 4). The reasons were: lack of time (72.7%), poor transport accessibility and lack of information about destinations (36.4%), high prices (12.1%), an uninteresting offer of destination and insufficient accommodation services (3%).

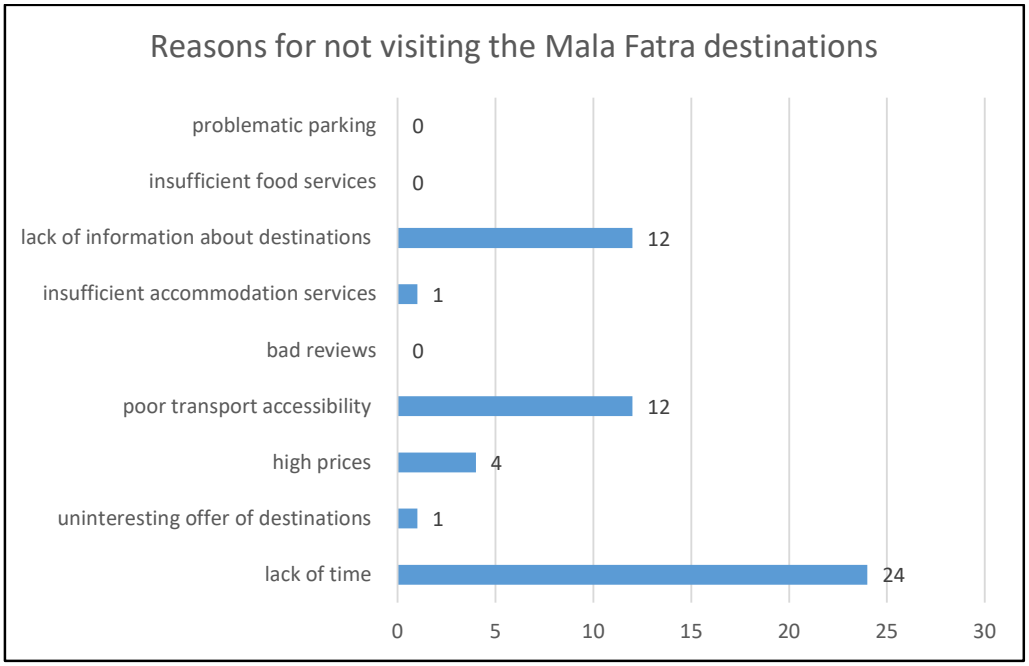

Fig. 4: Reasons for not visiting the Mala Fatra destinations

The aim was also to find out if the respondents who have not visited the destinations of Mala Fatra yet were interested in visiting it in the future. Up to 97% of these respondents are interested in visiting one of the destinations in Mala Fatra in the future, and only 3% of respondents are not interested.

We also examined which of the following destinations the respondents would like to visit in the future. Most respondents (59.4%) would like to visit Janosik holes in Terchova, Strecno Castle would like to visit 56.3% of respondents, the statue of Janosik in Terchova 3

1.3% of respondents. Destinations Vratna Valley and rafting in Strecno would like to visit 18.8% of respondents, sightseeing towers - Duben, Strecno would like to visit 15.6% of respondents, Domasinsky Meander and Château Gbelany 12.5% of respondents and the least respondents (9.4 %) would like to visit the destinations of Krasnany Castle and cycling routes around Žilina and Terchova.

The importance of the criteria in selecting a destination was also examined. Price is significant for 250 respondents and important for 117 respondents, relatively unimportant for 38 respondents and trivial only for 12 respondents. For other criteria of importance, respondents answered as follows (Figure 5):

- Natural attractions are significant for 232, necessary for 172, relatively unimportant for 12, and trivial for only one respondent.
- Transport accessibility to the destination is essential for 110, necessary for 204, relatively unimportant for 90, and trivial for 13 respondents.
- The possibility of parking is significant for 139, necessary for 148, relatively unimportant for 105, and insignificant for 25 respondents.
- Accommodation is essential for 55, necessary for 150, relatively unimportant for 171, and insignificant for 41 respondents.
- Refreshment is vital for 106, essential for 232, relatively unimportant for 69, and insignificant for 10 respondents.
- Cultural-historical attractions are significant for 182, necessary for 182, relatively unimportant for 46, and insignificant for 7 respondents.
- The possibility of sports is significant for 177, necessary for 149, relatively unimportant for 61, and insignificant for 30 respondents.

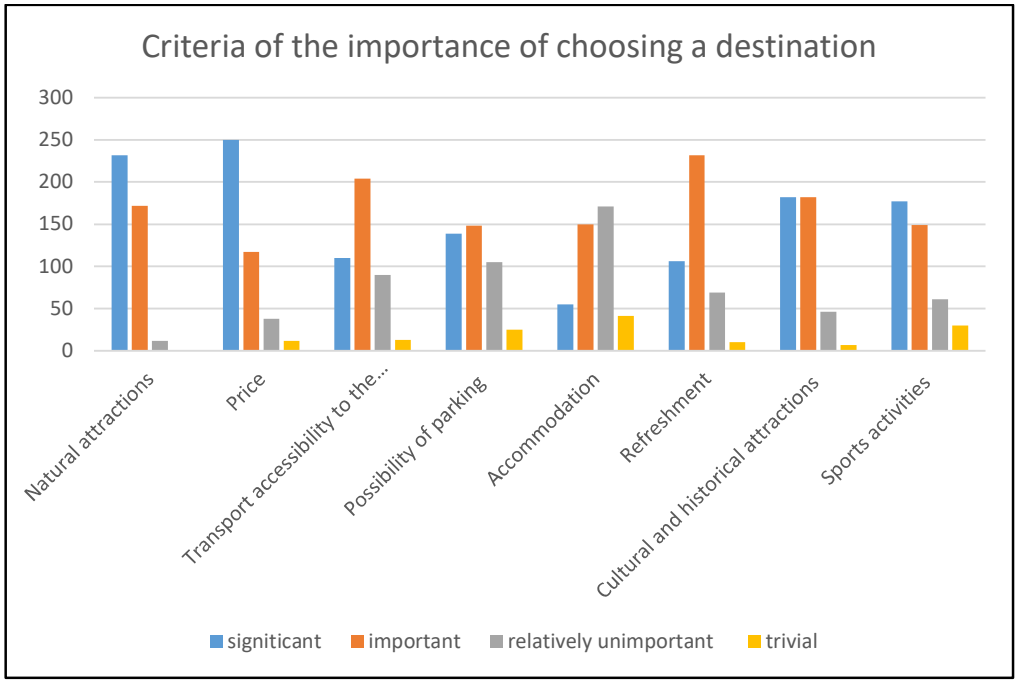

Fig. 5: Criteria of the importance of choosing a destination

Discussion

This primary research could be used to design the marketing strategy and marketing communication strategy of this region. However, regional participants should focus this strategy on the individual segments that emerged from the primary research. Based on the analysis of the results of primary research, it is possible to segment the respondents as follows:

The segment of young active visitors consists of visitors aged 16 to 35 years. They visit the destination mainly for nature and sports. They usually spend a day in the region. Most of them are students, and therefore they consider price to be an essential criterion.

The mobile visitors' segment consists of men and women in the age category from 36 to 55 years. Comfortable transfer to the destination and also the possibility of parking is an essential criterion for them. They visit the destination mainly because of nature and culture. In the region, they tend to spend one day or 2-3 days.

The passive visitors' segment consists of men and women aged 56 and older. They visit destinations mainly because of nature, culture and historical monuments. They consider price and food to be essential criteria for destination selection. They also tend to spend one day or 2-3 days in the region.

Categorization and segmentation of visitors is an essential factor in the design and creation of a new tourism offer or product. It is crucial to know to whom the new product will be offered and whether the segment is interested in this offer.

Genzorova, Corejova & Stalmasekova (2018) stated that people today are more willing to spend money on travel than ever before. Because of new possibilities, traveling is easier and travelers can choose options quicker for immediate travel. As Stofkova & Repkova Stofkova (2020) mentioned, modern technologies began to offer a huge amount of data, information. Today, people´s decisions are influenced by the use of mobile applications in tourism, which can help not only with finding accommodation the world over, but also with transport to the destination, raising awareness of the destination and making destination more attractive. Currently, there are several mobile applications that can be helpful to visitors of the Mala Fatra region. These mobile applications are mainly related to hiking and cycling routes in the region. They could be extended with other tips for trips in the area, booking accommodation, buying ski passes or tickets to wellness centers.

As can be seen from the research results, the criteria of the importance of choosing a destination include the possibility of parking and transport accessibility to the destination. The use of shared services in the field of transport and travel can therefore be an opportunity, not only for the individual but also for the region. These services are currently used mainly by young people. As Stalmašeková et al. (2017) mentioned, a simple person no longer has to rely on public transport, but can often choose to leave and arrive at the chosen destination himself. The opportunity to ride with someone who has the same path brings many benefits. In a research study by Garbárová & Hollá Bachanová (2018), in Slovakia, there are already quite a lot of platforms, through which the services of the shared economy are implemented. However, compared to other countries, it is still just beginning. Shared economy services are mostly used by young people between the age of 21 and 30, mainly by employees and students. Their feedback on the use of services is positive, and therefore they return to these platforms and spread them among other people. Respondents from the Žilina Region knows mainly platforms "Uber" and "BlaBlaCar". The services of the sharing economy use 58 % of respondents. The reason for their use is primarily to obtain cheaper fare and saving money.

Another option to make the Malá Fatra region more attractive for visitors could be a suitably chosen loyalty program. According to Hollá Bachanová & Garbárová (2019) Loyalty programs of Slovak travel agencies are simple and do not offer a redesigned remuneration system to customers. Conversely, as has emerged from the analysis, foreign travel agencies offer their customers much more benefits and ways of rewarding. Slovak travel agencies should redesign the loyalty reward system to achieve customer satisfaction, which may affect profitability.

Conclusion

Awareness of the Mala Fatra destinations is obtained through a variety of sources. Most respondents found out about the Mala Fatra destinations from family or acquaintances.

The criteria based on which visitors choose which destination to visit can vary. It was found out that for students, the price criterion is fundamental because most of them not having a steady income yet. They would welcome various student discounts that they could apply in the destinations of Mala Fatra. Men, as frequent drivers of motor vehicles, consider an essential and critical criterion when choosing a destination where they can park their car comfortably. Young people aged 16 to 25 think the possibility of sports as an integral and crucial criterion when choosing a destination.

The purpose for which most respondents visited the destinations of Mala Fatra is nature. Most respondents visited Mala Fatra destinations 3-5 times and usually visited this destination in summer. Accommodation services in Mala Fatra were used by only 35.3% of respondents because most respondents spend only one day in the destination. Conversely catering services in the Mala Fatra destinations has been used by 80.3% of respondents.

The reasons for not visiting Mala Fatra differ, and the most common reason is lack of time, but also poor transport accessibility and lack of information about the destinations. Students did not visit Mala Fatra due to high prices in the destination.

Nowadays, social networks represent a great opportunity that the destinations of Mala Fatra should use effectively. Through social networks (Facebook, Instagram, Twitter…), destinations can become better known to the younger people but also, the older generation; so they can quickly and effectively publish all the necessary information or news to their followers.

Also mobile applications can help people not only with finding accommodation, but also with transport to the destination, raising awareness of the destination and making destination more attractive. Thanks to mobile applications tourism today is much simpler.

The Malá Fatra region has great potential in tourism, which it is trying to use more or less today. However, it still has a huge number of opportunities that can be used to further development of tourism.

The region has a huge potential to develop many forms of tourism in the future. From geographical point of view, it can focus not only on national but also on international tourism. According to the number of participants, individual as well as collective tourism can develop. By age, tourism in the Mala Fatra region can be targeted at all age groups of visitors. From a geographical point of view, it is not only national but also international tourism, according to the number of participants it can develop both individual and collective tourism, according to the age of the participants it can focus on all age groups from families with children to seniors. Within domestic tourism, one-day events and trips or weekend stays have great potential. From the point of view of tourists and visitors from abroad, the region has the opportunity to focus on multi-day stays. In domestic tourism, one-day events and trips or weekend stays, have great potential. In terms of foreign tourism, the region has the opportunity to focus on multi-day stays.

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Management of ICT Technologies In the Smart City Research: Bibliometric Analysis

Konrad Henryk BACHANEK

University of Szczecin, Management Institute, Faculty of Economics, Finance and Management, Logistics Department, Szczecin, Poland, konrad.bachanek@usz.edu.pl

Ewa PUZIO

University of Szczecin, Management Institute, Faculty of Economics, Finance and Management, Logistics Department, Szczecin, Poland, ewa.puzio@usz.edu.pl

Blanka TUNDYS

University of Szczecin, Management Institute, Faculty of Economics, Finance and Management, Logistics Department, Szczecin, Poland, blanka.tundys@usz.edu.pl

Abstract

Nowadays, cities are a source of benefits and problems related to social, economic and environmental aspects. There is no doubt that the benefits of urbanization are drawing more and more people to live in urban centers. However, such a situation favors the creation of many threats to various socio-economic spheres. Smart cities and advanced information and communication technologies are now becoming the research area of many scientists. Attempts to define and characterize the Smart City concept show how many disciplines are interested in addressing this topic. However, research on Smart City and its components lacks a clear definition of the directions of scientific research supported by practical ICT solutions, taking into account the correlation of scientific research in the field of Smart City. To this end, the authors carried out a detailed structured review of scientific articles to provide a synthetic insight into the characteristics of current smart city research. The article presents a bibliometric analysis showing the correlations of the studied phenomena in economic practice. The presentation of the author's visualization of the use of ICT in the Smart City concept based on a review of scientific articles with the use of an advanced analysis of the interdependence of identified research areas in the field of Smart City, will allow to determine the relationship between the variables and their directions and scenarios for future research. The authors also made a schematic classification of the areas of the analyzed systematic units - taxa (keywords and areas of coexistence). The VOS Viewer and CitNet Explorer software used enriched the bibliometric analysis by showing the degree of correlation of the studied areas by means of visualization of network connection maps.

Keywords: Smart City, Bibliometric Analysis, Visualizations, ICT.

Introduction

The ongoing process of globalization and the transformation of cities into the new Smart City concept implies an increase in the efficiency and quality of services provided by governments and enterprises, which results in a measurable rate of growth in the quality of life of residents. This process requires scientists to use a range of activities and tools that include collecting data, processing and using a range of information to disseminate it to citizens.

The growing spread of information and communication technologies (ICT) in many areas has resulted in an increased increase in research results and the interest of various communities in the Smart City concept.

The article presents a bibliometric analysis of the Smart City concept based on information and communication technologies on the grounds of the analysis of research documents indexed by the Scopus and Web of Science

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platforms published in 2008-2020. The study analyzes various bibliometric patterns: publication, citation and occurrence of keywords, and visualizes the basic bibliometric aspects of research conducted in this field.

Despite many scientific studies on the Smart City area, most of them focus only on presenting a certain perspective and description of phenomena. General bibliometric analysis enriched with research visualization is still rare. The author's visualization of collected data presented in this article shows areas related to current scientific research in the field of smart city, which may help future researchers and practitioners to define new frameworks and assumptions for the evolution of Smart City concepts.

The aim of the article is to present the author's visualization of the use of ICT in the Smart City concept based on a review of scientific articles using an advanced analysis of the interdependence of identified research areas in the field of Smart City. The analysis will allow to determine the strength of the correlation between the variables and their directions and scenarios for future research.

Problem Description

The basic factor for the development of the Smart City concept is the permanent increase in the importance of the ICT information and communication infrastructure in all urbanization processes of cities (Lombardi et al. 2012, pp. 137-149). Information and communication technologies play a key role in the development of an agglomeration, at the same time determining the increase in the importance of social capital, ecology and progress in the area of education of city dwellers (Komninos 2019; Caragliu 2019; Romanelli 2020).

This constantly developing area of research on modern ICT solutions contributes to the growing interest in it both in literature and in business practice. In the scientific literature, you can find many definitions of the concept of smart city, as well as many characteristics that describe this phenomenon (Komninos 2002; Mayring 2003, Yap et al. 2010; Dawe et al. 2016; Peprah et al. 2019; Dinh et al. 2020). Summarizing the considerations covering most of the approaches, it can be assumed that smart cities mean integrating, through ICT solutions, such areas of city functioning as: economy, environment and infrastructure.

According to Zanella (Zanella et al, 2014) can be said that it is "effective use of public resources, improving the quality of services offered to citizens, while reducing operational costs of administration, achieved through the deployment of the urban Internet of Things, i.e. Communication infrastructure that provides unified, simple and cost-effective access to a large number of public services, thereby triggering potential synergies and increasing transparency for citizens." Yigitcanlar (Yigitcanlar et al, 2019) indicate that smart city: improving economic and administrative decision making through technological innovation; improving social inclusion in the development and adaptation of the emerging technologies; raising the profile of high-tech industries in contributing to the economic growth; effective embedding of technology in wider physical and social systems the smart city model has been promoted as an ample instrument to manage aforementioned urban and environment al challenges.

The evolution of the definition of Smart City over the years has led to the emergence of new areas of this concept. From the four areas described by Komninos (Komninos 2002; Sharifi 2020), another two were created, described by Novotný, Kuchta, Kadlec (Novotný et al, 2014). It can therefore be seen that cities develop extensively. Scaling basic services to meet increasing demand and is a challenge for cities. A smart city that combines its physical infrastructure, social system and economic framework with information systems (ICT) to increase the overall efficiency of operations can be seen as a single approach. Increasing operational efficiency can be achieved by making better operational choices, combining good management analyzes through continuous modeling of phenomena and processes.

The current lack of a scientific approach to the development and transformation of the new Smart City concept (taking into account the current economic condition of cities) contributes to stagnation in the area of development of new innovations improving the quality of life of city residents. The model of the Smart City concept, updated and enriched with a review of new ICT tools, would enable research cooperation between countries (regions), organizations and authors based on a series of collaborative analyzes. Synthetically collected data, such as the number of research centers dealing with a selected topic, the country in which the research is conducted, or the number of publications from given research centers, will contribute to the expansion of groundbreaking information for researchers and practitioners from research communities related to smart cities.

Methodology

In order to achieve new research goals and the presented assumptions, a detailed identification of the main trends in the scientific literature characterizing the use of ICT tools in research on the Smart City concept was made on the basis of bibliometric analysis of articles published on the web using the Scopus and Web of Science databases. The research period is set for the years 2008-2020. The authors used VOSviewer and CitNetExplorer software to perform bibliometric analysis and then to visualize research trends regarding the current level of use of ICT tools in order to further develop the Smart City concept.

The result of extensive analysis of scientific articles is the development of the existing theory and the resulting new view, becoming the beginning of a new, current method of managing innovative cities.

Literature review is a widely used and accepted approach to research as well as a necessary step towards structuring the research area and an integral part of any research conducted (Mentzer & Kahn, 1995; Easterby-Smith et al. 2002), both quantified in terms of management and logistics. Taking into account the considerations of J. Meredith (Meredith 1993), it should be emphasized that there are seven types of conceptual methods that are grouped into three categories: conceptual models (consisting of: conceptual description, taxonomy and typology, philosophical conceptualization); conceptual framework (conceptual induction, conceptual deduction, conceptual system) and theories (meta-frames).

State of the Art

A detailed analysis of the scientific literature allows to observe the multifaceted development of smart cities, the functioning of which is based on sustainable development with the use of ICT. The Smart City concept is defined as: smart cities, cities based on innovative knowledge, Smart City and City Logistics or a digital city or a cognitive city (Peprah et al. 2019). The interest of scientists representing various fields of knowledge and science shows that it is difficult to identify and adopt a clear and universal definition of a smart city. Smart city practitioners and researchers approach the concept differently due to their main orientation and research lines, e.g. technology, economy, society, environment and management (Yigitcanlar 2017; Lom 2020).

The Smart City concept is an innovative idea whose goal is to manage the city as and its resources in an ecological, modern, economical and effective manner. Contemporary urban areas are constantly developing their own innovative technologies, primarily information and communication technologies (Kumar et al. 2020). These changes are aimed at improving the functionality of cities together with the improvement of all intra-structural processes. To exploit their potential, it is necessary to symbiate modern technical solutions with the existing and modernized infrastructure. Thanks to that every city that is "smart" will be a progressive place that cares for improving the comfort of life of its residents without degrading the natural environment.

The authors, taking into account the evolutionary nature of smart city levels in the concept, proposed new stages of advancement, taking into account the current level of urbanization of cities, as shown in Figure 1.

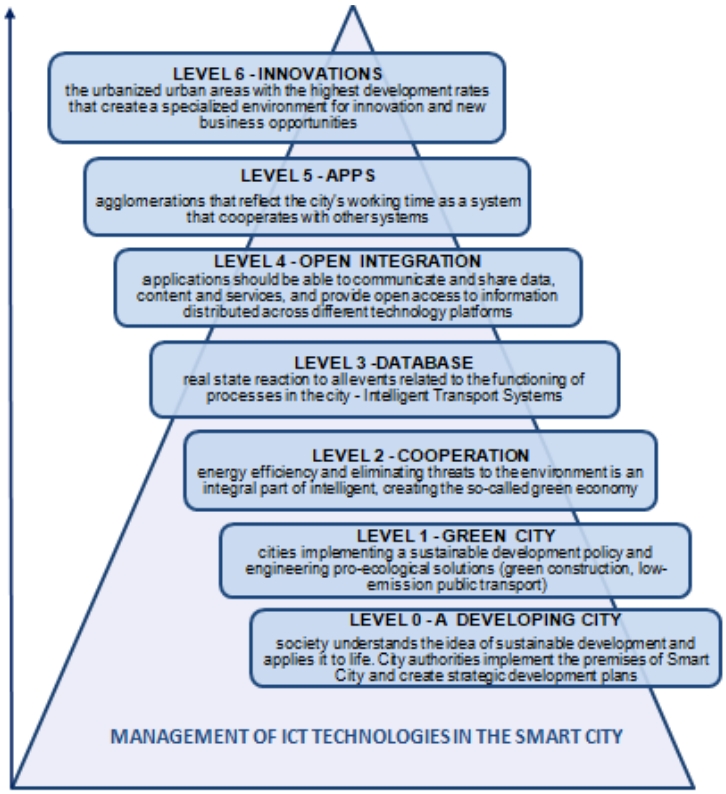

Fig. 1: The development pyramid of the Smart City concept based on the management of ICT technologies

Source: own elaboration.

The evolutionary nature of the Smart City concept proves that cities are constantly evolving and expanding the scope of their operation. Globalization processes and highly developed urbanization require scientists and practitioners in this area to make constant measurements, research and analyzes in order to model the city system in the most accurate way, increasing the quality of life of the inhabitants.

Attempts to define and characterize the concept of Smart City along with the evolutionary nature of this phenomenon show how many disciplines are interested in addressing this topic. However, research on the Smart City concept and its components lacks a synthetic definition of the directions of scientific research supported by practical ICT solutions. To this end, the authors conducted a detailed, structured review of scientific articles to provide synthetic insight into the characteristics of current smart city research.

Data collection and Limitations

One of the most difficult decisions when using content analysis is choosing the right documents (papers). Searching for and analyzing data is quite complicated, and one of the problems is new content and articles appearing almost daily. The authors decided to use the Scopus and Web of Science databases. In the first stage, which concerned only the classification of relevant documents, the analysis was limited to: article titles, keywords and abstracts. For further analysis (including the creation of a taxonomy), the entire content of the articles was analyzed in order to indicate the multiplicity of definitions, including the area scope of the smart city concept as well as the categories and elements included in the concepts described, including the areas of research on innovative ICT technologies.

In the first phase of the research, a comprehensive approach to analysis was adopted, including publications and the latest research results in the field of "smart city" and "ICT management" in the years 2008-2020. In the course of research it turned out that the databases (Web of Science and Scopus) contain very large amounts of publications.

Therefore, the authors decided to conduct several stages of research in order to eliminate documents according to predetermined criteria. The first step and stage of the research was to identify documents from the above-mentioned databases. In the first stage, the concept of "smart city" and the scope of 2008-2020 were taken into account. Over 5,000 documents appeared in both databases. Therefore, the authors decided to go to the second stage and limit the search. The search was limited to an "article" only, so, for example, conference papers or a book chapter were deleted. Nevertheless, the number of items exceeded 1500 documents, so the authors moved to the third stage, in which the categories / topics were limited. The focus was on aspects of economics, business, social sciences, computer science, engineering and urban planning. This means that publications in the field of chemistry, library science and architecture were rejected. However, the number of publications was still very large, therefore further stages of research were carried out, introducing further restrictions. As it was recognized that there was a link between the exact (technical), humanities, arts and social sciences in a given topic, it was decided to deepen the analysis.

This time the focus was exclusively on the field of social sciences and limited to related issues. In this way, it was decided to focus only on the area of social sciences, limiting ourselves to issues related to: economics, business and management, thus rejecting the field of technical sciences (from this point of view, the authors would like to indicate the interest and research on the smart city in the context of business and management). A total of 430 articles were fully scanned on the basis of this selection. The full analysis allowed for the elimination of repeated publications in both databases and those that did not fully reflect the issues related to a smart city in the field of social sciences. As a result, 377 publications were submitted for further analysis, which were reviewed and based on them, analyzes were made that allow to draw conclusions and indicate limitations related to the concept and essence of smart city in the field of social sciences, with particular emphasis on the management of ICT technologies in smart city research.

Table 1: Number of publications in the "management of ICT technologies in a smart city" area of social sciences (economics and management) in 2008-2020.

NUMBER OF PUBLICATIONS BY YEAR		
YEAR	**SCOPUS**	**WEB OF SCIENCE**
2008	0	1
2009	0	0
2010	0	2
2011	0	0
2012	4	0
2013	0	1
2014	8	5
2015	12	22
2016	17	33
2017	33	33
2018	48	36
2019	61	40
2020	12	9
Total	195	182

Source: own elaboration.

Content analysis may also take into account the country of origin and the affiliation of authors who conduct research in the field of ICT technology management in terms of the Smart City concept. This is an interesting analysis that shows that both Scopus and the Social Science Web of Science are mostly published by Italian authors, followed by UK and US authors. Europe and the USA dominate the top 10 affiliations. Authors from India are 5th in the Web of Science database, and Chinese are 7th in both databases. This may indicate that social, economic, technical and technological aspects dominate in highly developed countries. The concept is also highly advanced due to the extensive infrastructure. The presence and interest of authors from China and India may also

indicate that the subject matter is beginning to gain popularity in these countries as well, which is probably related not only to the theoretical aspect of the concept, but also to practical solutions that need to be scientifically substantiated.

Table 2: Scientific articles in Scopus and Web of Science databases by the author's related entity (country)

THE LARGEST NUMBER OF ARTICLES IN SCOPUS AND WEB OF SCIENCE DATABASES BY AFFILIATE (COUNTRY) OF THE AUTHOR				
No.	**Scopus**	**Number of authors**	**Web of science**	**Number of authors**
1	Italy	29	Italy	50
2	UK	23	USA	44
3	USA	16	UK	22
4	Spain	14	Spain	18
5	Netherlands	13	India	15
6	Australia	11	Finland	12
7	China	11	China	12
8	India	11	Canada	11
9	France	10	France	9
10	Belgium	9	Germany	8

Source: own elaboration.

While analyzing the most popular journals, it can be pointed out that the authors most often publish in Cities, Technological Forecasting and Social Change (which can be found in both databases), Advances in 21st Centures Human Settlements, Journal of Cleaner Production, Smart Economy in Smart Cities.

Table 3: Source title (10 most popular) - in the field of economy, business, management

SCOPUS	WEB OF SCIENCE
number of publications >10	
cities(31)	technological forecasting and social change (34)
technological forecasting and social change (30)	advances in 21st century human settlements (29)
journal of cleaner production (13)	smart economy in smart cities (29)
number of publications (from 3 to 9)	
• INTERNATIONAL JOURNAL OF SERVICES TECHNOLOGY AND MANAGEMENT • JOURNAL OF SCIENCE AND TECHNOLOGY POLICY MANAGEMENT • KNOWLEDGE MANAGEMENT AND E- LEARNING • JOURNAL OF THEORETICAL AND APPLIED ELECTRONIC COMMERCE RESEARCH • PRODUCTION PLANNING AND CONTROL • BUSINESS HORIZONS • INNOVATION	• SOCIAL SCIENCE COMPUTER REVIEW • TECHNOLOGY INNOVATION MANAGEMENT REVIEW • CAMBRIDGE JOURNAL OF REGIONS ECONOMY AND SOCIETY • SMART CITIES ATLAS WESTERN AND EASTERN INTELLIGENT COMMUNITIES • SPRINGER TRACTS IN CIVIL ENGINEERING • ENERGY POLICY • JOURNAL OF SCIENCE AND TECHNOLOGY POLICY MANAGEMENT • PROGRESS IN IS • SMART CITY IMPLEMENTATION CREATING ECONOMIC AND PUBLIC VALUE IN INNOVATIVE URBAN SYSTEMS • IEEE SYSTEMS JOURNAL • INTERNATIONAL JOURNAL OF SERVICES TECHNOLOGY AND MANAGEMENT • PRODUCTION PLANNING CONTROL • PUBLIC ADMINISTRATION AND INFORMATION TECHNOLOGY • UNDERSTANDING SMART CITIES A TOOL FOR SMART GOVERNMENT OR AN INDUSTRIAL TRICK

Source: own elaboration.

The publications selected and presented relate to a limited selection only. Other journals (e.g. Sustainable City and Society) are also very popular among scientists, but the analysis of titles and keywords eliminates them from the analysis, because the most frequently analyzed areas are: the use of multi-criteria methods, smart energy grids, smart city, mechanisms of transformation, aspect of financing development smart city, privacy protection through multidimensional data, hybrid approaches using the BWM method, cybersecurity, urban climate justice, smart city forest, ITS, the ZEB principle in creating smart cities, inference and analysis of big data, itinerant healthcare, mobile processing in cloud, COVERS-UP, optimization of solid waste collection using GIS, ECG, ANP and DEMATEL biometrics.

Keywords are interesting to analyze (in the field of economics, business, management). The most popular (in both databases) are: smart city, smart cities, innovations and urban planning. Interesting for analysis (in the field of economy, business, management) are keywords. The most common (in both databases) are: smart city, smart cities, innovation and urban development.

Other keywords are largely related to modern technologies, the concept of sustainability and the research method chosen: case study. Further analysis was performed using VOSViewer software (version 1.6.11). The article contains a taxonomy in the field of smart city that has not been present in the world of science so far.

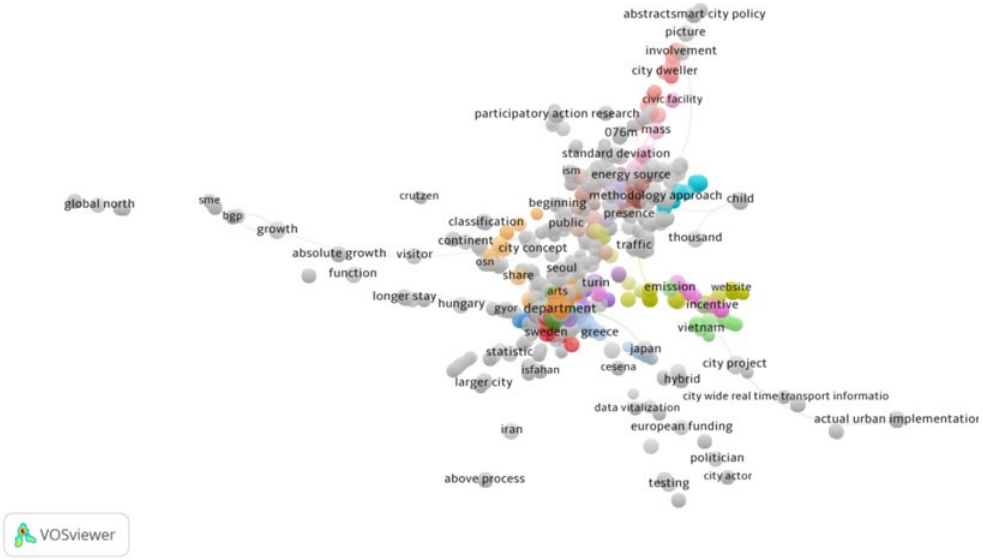

Fig. 2: Map of connections related to the most common words in publications in the field of smart city and ICT

Source: own elaboration (with the use of VOSViewer software).

On the map shown in Figure 2 (limitations of 7000 events (words), repeated at least 5 times 185, limitation to 60%, 112 records), the most frequently used words in smart city publications are the most frequently mentioned words such as: department, approach, city concept.

Figure 3 shows a map of connections related to geographical areas from which the authors of scientific publications on Smart City come from, including ICT solutions. The map shows the collaboration of authors from different geographic areas. As part of the scientific cooperation, the authors of scientific publications in the field of smart city provide the following links: scientists from Singapore cooperate with scientists from India and Hong Kong. Additionally, Hong Kong is establishing cooperation with South Korea, the United States, Brazil and Europe.

Research centers from Poland, the Netherlands, Finland, Austria, Spain, Belgium, Italy, France and Great Britain cooperate in Europe. A separate research center is Japan, whose representatives cooperate with Great Britain and Brazil.

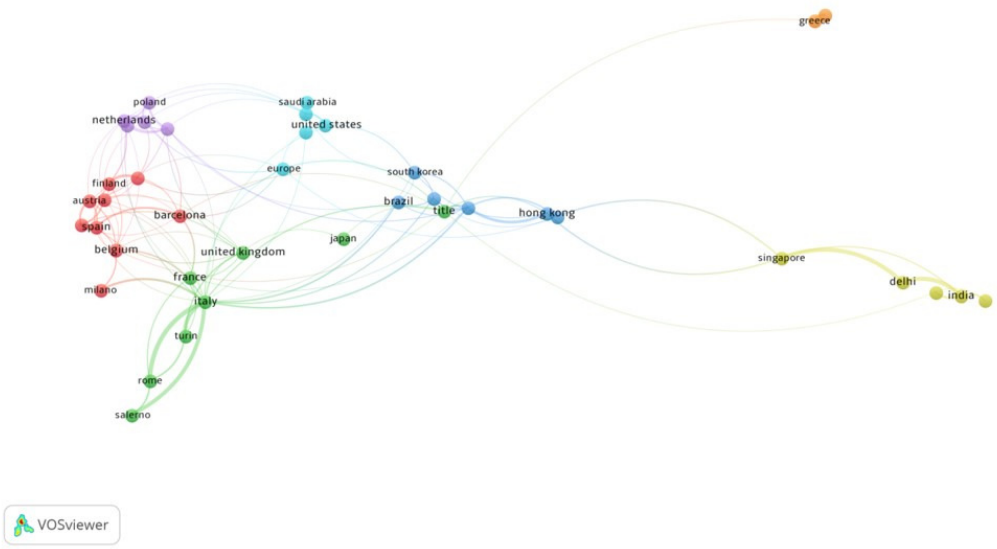

Fig. 3: A map of links related to geographical areas from which authors of scientific publications on Smart City originate

Source: own elaboration (with the use of VOSViewer software).

Another area of bibliometric analysis using the VOSViewer tool concerns the most common keywords related to a smart city and ICT technology - Figure 4.

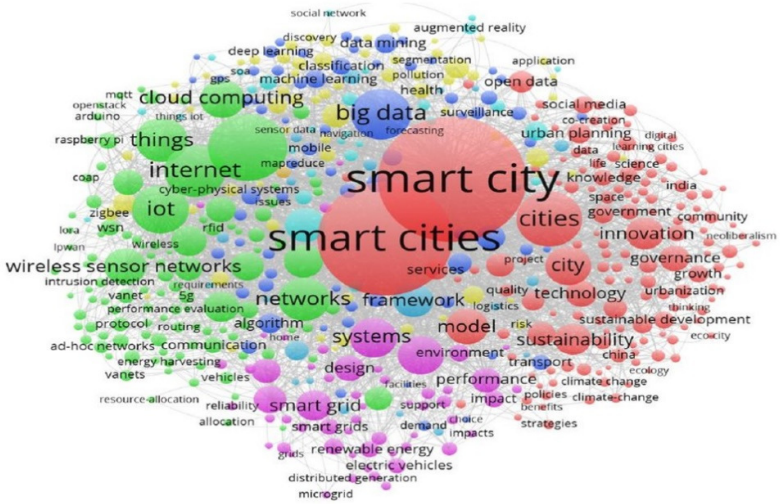

Fig. 4: Map of the most common keywords characterizing publications related to smart city

Source: own elaboration (with the use of VOSViewer software).

Figure 4 (limitation of 18374 events (words), repeated at least 10 times 615, limitation to 60%, 982 records), shows that the most frequently repeated keywords are smart city and smart cities, followed (with fewer repetitions) by cities, city, big data, Internet, IoT, networks, systems, model, sustainability, smart grid and innovation.

Next analysis is the map of connections related to the most frequent areas of searching for readers of publications in the field of smart city and ICT.

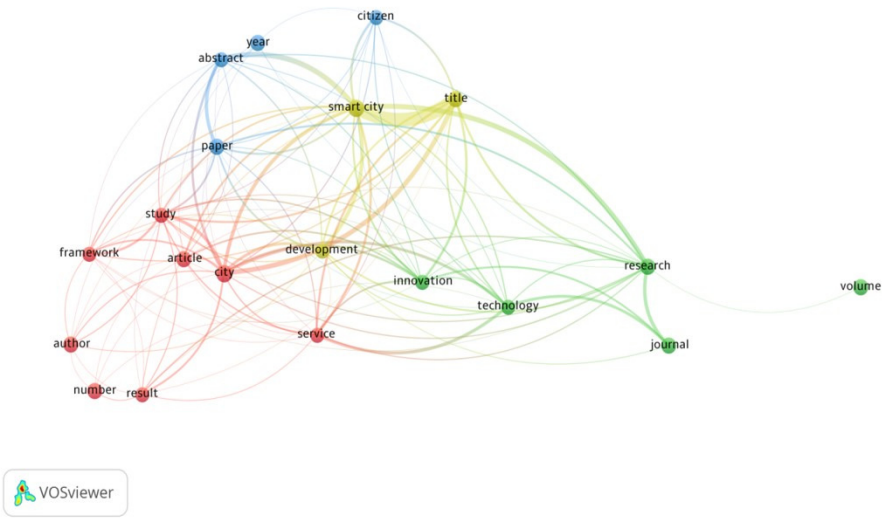

Fig. 5: Map of connections related to the most frequent areas of searching for readers of publications in the field of smart city and ICT.

Source: own elaboration (with the use of VOSViewer software).

When interpreting Figure 5 (limitation of 1014 events (words), repeated at least 5 times 102, limitation to 60%, 98 records), it should be pointed out that the search areas for readers include smart city as the most common word and words such as development, innovation, technology or city and abstract.

Conclusions

Undoubtedly, the application of new technologies (ICT) is a challenge for cities, but also an opportunity for further development. Modern cities using the smart city concept are becoming increasingly competitive and at the same time more sustainable. The analysis may be the first step towards further research, including the creation of dedicated indicators and measures of functioning and evaluation of smart cities.

The article reviews scientific literature in the area of Smart City with regard to the management of ICT technologies. The publications from the Scopus and Web of Science databases on smart cities from 2008 to 2020 were analyzed in detail.

Over the last 12 years, the subject of the smart city has become an area of intense research by many scientists, the most noticeable of which is the rapid increase in the number of publications since 2010.
A reduced number of publications is seen in 2020. This fact is mainly due to the pandemic situation related to the COVID-19 virus.

The presented analyzes show leading research centers dealing with Smart City and ICT issues, which include, in particular, Italian research centers.

Through the scientific analysis of the cooperation of countries (regions), VOSViewer divided the 25 analyzed countries (regions) into 6 closely related research camps, led respectively by the United States, China, England, Spain, Italy and Australia. They also collaborated on smart cities research - both in author's and national cooperation, the USA and China were in the top two, but the two main countries in smart city research had a different approach to the intellectual environment, and China. he had a more cooperative attitude. In fact, China is one of the new research centers in the world. High-intensity co-authorship countries / regions have a strong co-authoring regime.

Based on the analysis of the network with keywords, the main research areas in the field of smart cities can be distinguished: smart growth; telecommunications and IT; a smart strategy for sustainable development; innovation and technology.

Although research on the concept of Smart City and ICT has been going on for years, bibliometric analysis is still one of the few sources that allows for a broad view of the issues undertaken by scientists, as well as for getting to know the directions of development of a given issue. As the analyzes show, the Smart City area is constantly evolving and requires further research on their development.

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An Exploratory Study on the Bookkeeping Practices among *Pasar Tani* Micro-Entrepreneurs

Halim Shuhaimi YEOP JOHARI
Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Puncak Alam Campus, Bandar Puncak Alam, Selangor, Malaysia
hash@uitm.edu.my

Cedrena NADINE
Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Puncak Alam Campus, Bandar Puncak Alam, Selangor, Malaysia
cedrenanadine@gmail.com

Seri Ayu Masuri MD DAUD*
*corresponding author
Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Puncak Alam Campus, Bandar Puncak Alam, Selangor, Malaysia
seriayu@uitm.edu.my

Abstract

Micro entrepreneurs contribute significantly to economic growth, and poverty eradication through self-employment, and job creation. However, micro-entrepreneurs are believed to wrestle with effective financial recording and planning. In the absence of proper bookkeeping, business analysis, and hence future growth planning are difficult. This exploratory study draws on the Social Entrepreneurship Book Keeping Program initiated by the Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, in 2018. This study examines whether the micro-entrepreneurs at *Pasar Tani* maintain a proper record of their business transactions, and if not, what are the reasons for not doing so. Using a purposive sampling design involving sixteen micro-entrepreneurs, this study finds a striking result that half of them did not record their business transactions at all. The other half recorded their transactions but to a very limited extent. Furthermore, most of them had no accounting background and were not aware of the importance of bookkeeping for their business growth. Interestingly, 62.5% of the micro-entrepreneurs indicated that they were keen to learn more about accounting even though only 37.5% of them claimed that such a learning opportunity exists. Together, the findings of this study suggest that more accounting short courses and training programs should be organized and promoted to assist the micro-entrepreneurs with their financial recording and planning.

Keywords*:* Bookkeeping, Financial Records, Accounting, Micro-entrepreneurs

Introduction

Bookkeeping is part of the accounting process, which entails recording and reporting the financial transactions or economic events of a business. Extant literature on bookkeeping practices among micro-entrepreneurs documents mixed evidence. However, the definition of a micro-entrepreneur 'depends on the purpose to which it is to be put so that different aspects of smallness may therefore be more appropriate for some purposes than for others' (Haynes, 1992, p. 39). The SME Corporation defines micro-entrepreneurs as firms with annual sales of less than RM300,000 or employees of less than 5 (SME Corporation, 2020).

The main contribution of this study is that it focuses on the micro-entrepreneurs in the smaller annual sales brackets between RM40,000-60,000. To date, empirical evidence on this smaller group of micro-entrepreneurs is scarce. These businesses are interesting to study as they have a simple business model with a single sales source and very few cost items. This simplicity potentially further discourages the entrepreneurs from recording their business transactions

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thinking that it is not necessary. Furthermore, most of these businesses are financed by the owner's personal savings. The absence of pressure from fund providers may further disincentivize them from having proper bookkeeping.

Arguably, a proper accounting system is critical for the decision-making process even for small-scale business entrepreneurs (Hatteu, 2012; Umeji & Obi, 2014). For example, business transaction records are required for an accurate break-even or profit margin analysis (Chepkemoi, 2013). According to Germain (2009), one of the causes of business catastrophe and bankruptcy within the few months of operation was the failure to embrace the practice of proper recording of business financial transactions or bookkeeping.

This study draws on the Social Entrepreneurship Book Keeping Program initiated by the Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, in 2018. This program was intended to assist micro-entrepreneurs at *Pasar Tani* to record their business transactions in accordance with the established accounting principles. The program involved 96 first year degree students majoring in Accountancy, 30 supervising lecturers, and 16 micro-entrepreneurs. The students were assigned as Junior Consultants to help the micro-entrepreneurs record their business transactions in a cashbook. While doing so, the students were given the opportunity to conduct a survey and interview the micro-entrepreneurs to find out more about their business and bookkeeping practices. At the end of the project, the students presented their findings to the lecturers verbally and in writing. Their presentations and written works were then graded accordingly.

Using the students' written reports, we attempt to address the following research question: Do the *Pasar Tani* micro-entrepreneurs maintain a proper record of their business transactions, and if not, what are the reasons for not doing so? The remainder of this paper is organized as follows. Section 2 reviews the extant literature on bookkeeping among micro-entrepreneurs. Section 3 presents the research method, followed by results and discussion in Section 4. Finally, Section 5 concludes.

Literature Review

The extant literature has established that failures of micro-enterprises exhibit a homogenous process including lagged response towards issues at hand and hence delayed or even incompetent rectifications (Ropega, 2011). While these factors may lead to business failure over time, a failure to embrace proper bookkeeping is suggested to cause a more immediate catastrophe within as short as several months (Germain, 2009).

Lussier (1995) develops a model to predict the success or failure of small businesses using 16 quantitative and qualitative managerial factors. This model has been tested across industries and nations with its prediction accuracy above 50%. Lussier's model has also been tested for a sample of micro-entrepreneurs with 0-10 employees (Lussier & Corman, 1996). This well-tested model includes bookkeeping and financial control as one of the predictors. As decision making depends heavily on the maintained business records, the absence of proper bookkeeping potentially translate into poor decision making (Duli, 2019).

Despite the established importance of proper bookkeeping, empirical evidence suggests the level of its implementation among micro-entrepreneurs is still low. This is particularly evident in developing countries including Nigeria (Umeji, 2014), and the Philippines (Duli, 2019; Yap, 2019). Even in countries where micro-entrepreneurs practice bookkeeping pervasively such as South Africa, it is mostly done manually and without completing the bookkeeping cycle (Nyathi & Benedict, 2017).

An important deterrence of the bookkeeping practice among micro-entrepreneurs is potentially their lack of bookkeeping skills and awareness of the bookkeeping importance. A survey by Umeji (2014) documents that record-keeping was one of the skills perceived to be very important by the micro-entrepreneurs in Nigeria, but the levels of possession were still below expectations.

Research Method

This cross-sectional study was carried out in a non-contrived setting with little interference from the researcher. That is, the researcher had direct contact with the subject of study (the micro-entrepreneurs), however, the normal flow of work among the subjects was not significantly disrupted.

The data of this study is sourced mainly from the written reports submitted by the Accounting undergraduate students involved in the Social Entrepreneurship Book Keeping Program. The sample of this study is sixteen conveniently

selected micro-entrepreneurs of *Pasar Tani* who were involved in the Social Entrepreneurship Book Keeping Program. This program was organized by the Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Puncak Alam Campus as one of its entrepreneurship and community engagement activities. This program was carried out at a *Pasar Tani* in Saujana Utama, Puncak Alam in the following four phases: 1) 29 September 2018, 2) 3 October 2020, 3) 5-16 October 2018, and 4) 17 October 2018.

In the first phase, 96 students and accompanying lecturers visited the *Pasar Tani*. They then distributed the survey questionnaire to sixteen randomly selected entrepreneurs who received complimentary consultancy services from the students and lecturers. Working in a group of 6, the students then conducted follow-up interviews with the micro-entrepreneurs to collect richer information needed for their reports in the second phase. Both survey questionnaires and interview protocols were reviewed by lecturers supervising the project. The final survey questionnaire and interview protocols were standardized for all student groups. Next, in the third phase, students transcribed their interviews and analyzed the collected data from both the survey and interview. Then, the final reports were prepared following a standard format outlined by the supervising lecturers. In the final phase, students presented their findings before the micro-entrepreneurs and supervising lecturers. Each group of students also handed in their written reports to their supervisors. Survey responses and interview transcriptions were also attached to the final reports.

Results and Discussion

Current Practice of Recording Business Transactions

Figure 1 presents the results of the survey and a structured interview with the *Pasar Tani* micro-entrepreneurs.

Fig. 1: Number of entrepreneurs that record their business transactions, have the opportunity to learn accounting, and have an interest in obtaining accounting assistance.

As indicated in Figure 1, half of the interviewed entrepreneurs recorded their business transactions, while the remaining half did not record anything at all. It is important to note that those micro-entrepreneurs that recorded their business transactions did it to a very limited extent. For example, one of the micro-entrepreneurs recorded only the cash outflow. That is, none of the interviewed micro-entrepreneurs maintained proper bookkeeping.

In terms of the opportunity to learn accounting, only 6 (38%) of the micro-entrepreneurs reported that they had such an opportunity. Interestingly, 10 (62%) of the surveyed micro-entrepreneurs stated that they were interested to attend accounting training or workshops should such an opportunity exists. These findings suggest that majority of the micro-entrepreneurs did not have bookkeeping knowledge or even the opportunity to learn that knowledge.

Reasons for Not Recording Business Transactions

Several common reasons for not recording their business transactions were reported by the interviewed micro-entrepreneurs. The reasons include time and labor constraint, lack of bookkeeping knowledge, lack of discipline, lack of trust in employees, and the perception that bookkeeping is not important and costly. All of the sample entrepreneurs mentioned a combination of a few of these reasons. Figure 2 depicts the number of entrepreneurs that pointed out each of those reasons.

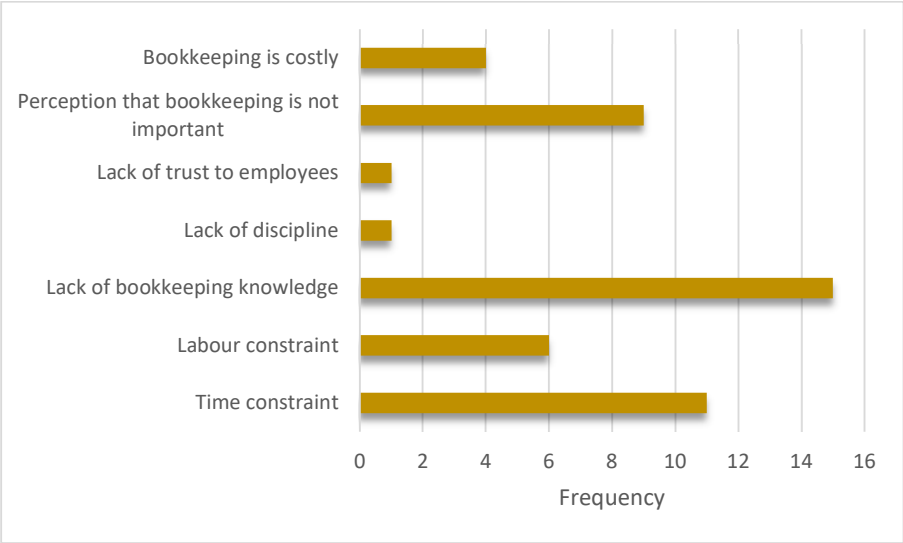

Fig. 2: Reasons for not recording business transactions among *Pasar Tani* micro-entrepreneurs

Figure 2 reveals that 15 (93.75%) of the interviewees associated the absence of proper business transaction records with their lack of bookkeeping knowledge. 11 (68.75%) of them faced time constraint while 9 (56.25%) believed that bookkeeping is not important leading them to resort in not practicing bookkeeping.

Together, an important implication of the above findings is that more bookkeeping and accounting training opportunities should be made available to *Pasar Tani* entrepreneurs if bookkeeping practice is to be improved among them. Furthermore, the findings of this study bear out the conjecture that 'continued policy support for new business start-up micro-enterprises must be based on a stronger training element' (Smallbone, 1990, p. 44).

Conclusion

The importance of proper bookkeeping has been well established including its bankruptcy-inducing effect. However, a large number of micro-entrepreneurs are still not keen to maintain a proper business recording. The findings of this study extend our understanding of this issue by documenting that a lack of bookkeeping knowledge is another major hindrance to proper bookkeeping among micro-entrepreneurs. This low level of knowledge potentially leads to a lack of awareness of the importance of bookkeeping.

In addition, a simple business model, and the absence of pressure from external fund providers are the disincentives to a proper recording system. Many micro-entrepreneurs believe they could manage just fine without the records. An interesting area for future research would be to analyze the costs and benefits of proper bookkeeping to micro-entrepreneurs particularly to those in the smaller sales threshold. Given a simple business model and the absence of agency problem, it would be interesting to delve into the net benefits of a proper financial recording.

Notes

Pasar Tani is a form of marketplace in Malaysia established in 1985 by the Federal Agricultural Marketing Authority (FAMA). The business concept of *Pasar Tani* is to provide a niche market for the micro entrepreneurs who are mainly farmers or producers to market their products directly to consumers.

Lussier's Model has been tested across industries including retail (Lussier, 1996a), services (Lussier, 1996b), and real estate (Lussier, 2005). This model has also been tested across nations such as Central Eastern Europe (Lussier & Pfeifer, 2001), Chile (Lussier & Halabi, 2010), Israel (Marom & Lussier, 2014), Pakistan (Hyder & Lussier, 2016), and Ghana (Gyimah, Appiah & Lussier, 2020).

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A Conceptual Study: Marketing and Artificial Intelligence

Zineb JOUHARI
PhD student, Faculty of law, Economics and social Sciences Marrakech, Morocco
Jouharizineb55@gmail.com

Younes LAFRAXO
University Professor, Faculty of law, Economics and social Sciences Marrakech, Morocco
Younes.lafraxo@gmail.com

Mohamed Larbi SIDMOU
University Professor, Faculty of law, Economics and social Sciences Marrakech, Morocco
ml.sidmou@uca.ac.ma

Abstract

Marketing is one of the areas most affected by Artificial Intelligence (AI), Building from extant research and recent developments related to the field of Artificial Intelligence, the authors offer specific answers that can lead to a better understanding especially since AI is not as easy to understand as it seems and that a good number of marketers think that AI would be beneficial to them in their work. However, the fear is felt about what it will generate once installed. We demonstrate based on Artificial intelligence replacement theory that in marketing the type of human work and the tasks play an essential role.

Keywords: Artificial Intelligence, Marketing, AI Replacement Theory.

Introduction

We have been witnessing the rise of artificial intelligence (AI) in recent years and all sectors are directly or indirectly affected, in the future artificial intelligence is likely to substantially change at the same time customer behaviors and marketing strategies, including the way that firms market products and services to consumers (Dhruv Grewal et al, 2019). In the future artificial intelligence will affect also sales processes in various industries, and sales people will be assisted by an AI agent that monitors tele-conversations in real time (Davenport at al, 2019), in the same way, we can give the example of companies such as Netflix, Amazon and e-Bay that adopt intelligent agent technologies for recommendations, personalization and price-comparison engines to facilitate exchanges in the market place (Iacobucci et al., 2000). In analysis of more than 400 artificial intelligence use cases, 9 business functions across 19 industries, indicates that the greatest potential value of artificial intelligence pertains to domains related to marketing and sales (Chui et al., 2018), and marketers intend to use artificial intelligence in multiple areas like personalization, segmentation, predictive behaviors related to customer and analytics linked to marketing strategy (Columbs 2019).

The role of the technological advances is becoming profound in our lives especially by influencing who our friends are, what we buy, who we hire also even how elderly and children are cared for (Arun Rai, 20191). In spite of being major source of innovation, artificial intelligence threatens human service jobs also (Ming Hui Huang, 2018). For example, researchers find that a significant percentage of the tasks in high- paying jobs, such as Physicians, senior managers and portfolio managers can be automated by using current technology (Chui et al., 2015).

In light of the above the aim of this paper is to provide a comprehensive understanding of How is artificial intelligence (AI) increasingly reshaping marketing by performing various tasks, constituting a major source of innovation? We focus on the following research questions that deal with conceptual and theoretical understanding, applications and artificial intelligence outcomes: First With the buzz surrounding artificial intelligence (AI), today's marketers can feel as much in a sea of opportunity as in a minefield plagued by productivity traps, the question we

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have to answer is How Artificial Intelligence Is Transforming Marketing? Artificial intelligence (AI) generates many fantasies and fears, in particular because it makes it possible to empower certain tasks in an increased way, thus playing a major role in the mutations of work, the next question that we will have to answer is What is the impact of artificial intelligence on employment? Regarding the relationship between artificial intelligence and human intelligence is it integration or rather a replacement is it a "Human Replacement or Integration?" The objective of answering this question and knowing if artificial intelligence replaces us all, until the last; or, on the contrary, that it will only increase our capacities tenfold, constituting a breeding ground for unsuspected growth and productivity.

Introduction to Artificial Intelligence

Artificial intelligence (AI) is the simulation of human intelligence processes that allows computer systems to automatically learn from experience and perform human-like tasks to improve efficiency of daily tasks (Aghaei, Nematbakhsh, & Farsani, 2012).

Usage context or industry	Description
search engines (e.g., Google)	Google Assistant speech recognition AI uses deep learning to
	Understand spoken commands and environment. Questions
	Thanks to techniques developed by the Google Brain project by the
	Google. Google's translation tools now also comes under the Google
	Brain umbrella, and operates in deep learning.
Social media (e.g., Facebook)	Facebook is building a business with long-term prospects where the
	role of Facebook Artificial Intelligence is unfathomable.
	AI enables machines to learn to clarify data, all by themselves.
	The simplest example of this would be AI image analysis identifying
	dog, without telling that machine what a dog looks like.
Multinational enterprise (e.g., Apple)	Apple's investments in AI won't boost its near-term revenue growth,
	But they'll strengthen its hardware devices and tether more
	Users to its services ecosystem. That improvement should widen
	Apple's moat gives it an edge against Google's fragmented universe of
	Android devices.
Self-driving car Artificial intelligence will learn much faster than people, because	
	When a self driving car makes a mistake, all driving cars learn from
	it because of connectivity.

From the above we can say that the artificial intelligence have revolutionized approximately every aspect of human existence.

Artificial Intelligence and Marketing Transformation

Artificial intelligence is known for its sophisticated personalized recommendation systems, predictive analytic capabilities (Dhruv Grewel et al, 2019), which make it easier to contribute to consumer well-being, generally by making the choices more efficient, easier and more practical (Quentin André et al, 2017). The facilitation of the automation of some consumer needs does not make the Artificial intelligence a one-sided currency, because it could also undermine sense of autonomy which may be detrimental to consumer's well being. For example if you searched a platform video to watch a movie such as Netflix, Artificial Intelligence was no doubt integrated in your decision about what to watch which can be useful in terms of facilitating choices which will undoubtedly be based on previous choices of films or series, but which at the same time forces us to somehow make restricted choices as mentioned in the new documentary-drama from Jeff Orlowski, social media dilemma (2020) that explore the dangers of social networking through interviews with tech experts.

Marketing which is defined as the analysis of consumer needs and the set of means of action used by organizations to influence their behavior is not really valid with the presence of such systems. This is why marketers these days use sophisticated algorithms that sift through vast amounts of consumer data, for example, allow online marketers to deliver the right product or service, relieving consumers of not only research costs, but also unpleasant and difficult compromises, which the consumer often chooses entails (Quentin André et al, 2017).

Chatbots is an innovation that has also revolutionized the way marketers treat their consumers, the example of Jasper can perfectly answer the question of how. Jasper is a new AI application meant to act just like your best friend because it is programmed to ask meaningful multiple questions about your life so that it can offers you emotional support with no judgment (Fowler.G., 2019). This kind of technologies learns about human habits and interests over time, it could also adopt your linguistic sytanx in the way a very close friend might. All the capabilities that serve to better understand consumers can be used by marketing managers to offer them the best offer in an effective and efficient way.

Artificial Intelligence and Employment

according to the previous analyzes we could say that the question is no longer do we now need artificial intelligence for our organizations, contrariwise how our organization can incorporate AI in strategies in effective way(Davenport, 2018). Chui, Manyika, and Miremadi (2015) find that a significant percentage of the tasks performed by those in high-paying jobs, such as portfolio, physicians, senior managers and senior managers, can be automated by using current technology. Which mean that the jobs are replaced by AI and that the number of employees decreases? Based on AI Job replacement theory, The decision between using the AI or not should be taken at the task level, which means that an organization needs of task portfolio of a job is to optimize the division of labor between AI and workers, Firms must take into consideration several factors: Nature of tasks, nature of service, strategic emphasis of firms (Ming-Hui Huang et al, 2018).

Understanding the nature of service work, why and how AI may substitute or replace humans in each type of task is necessary to make the right choice. As the various AI technologies have matured for implementation today, managers need to have a clear understanding of the potential pitfalls, capabilities, and benefits in order to be able to map out a roadmap of artificial intelligence applications.

The observation that I A constitutes a source of innovation is increasingly replacing service jobs, motivates us to explore more rigorously and fully the way AI will reshape service and the following research may give importance to this exploding topic.

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A Comparative Study of The National Innovation Systems in Various EU Countries – Possible Lessons for Romania

Constantin M. PROFIROIU

The Bucharest University of Economic Studies, Faculty of Administration and Public Management, Bucharest, Romania, profiroiu@gmail.com

Corina-Cristiana NASTACĂ

The Bucharest University of Economic Studies, Faculty of Administration and Public Management, Bucharest, Romania, cnastaca@gmail.com

Ariana NĂSTĂSEANU

The Bucharest University of Economic Studies, Management Doctoral School, Bucharest, Romania, ariana.nastaseanu@gmail.com

Abstract

The present research aims to analyze the national innovation systems in various European Member States in order to establish what could Romania do to develop a competitive Research & Development (R&D) system. The study is based on the European Innovation Scoreboard (EIS) which categorizes Romania as being a modest innovator, revealing the necessity of improving the situation of the Romanian R&D system. The main objective of the paper is to present a short history of the EU research programmes and the national innovation system of different European countries. The comparison will be made amongst countries situated on different positions in the EIS in order to reveal some treats of them enabling some good examples and streams for Romania, which occupies one of the latest positions. The research methodology consists of an exploratory study using secondary data analysis, collected from the European Union (EU), and The Organisation for Economic Co-operation and Development (OECD) official documents. In the first part, document analysis was conducted in order to present the situation regarding the research and innovation system in four European countries. The countries were selected according to the four categories mentioned in the European Innovation Scoreboard. One example for each category of countries (leader, strong, moderate, and modest innovators) was chosen for analysis. In the second part of the study, a comparative analysis among these countries, using statistical indicators was conducted to observe the differences between leaders, strong, moderate, and modest innovators. Finally, the study ends with a series of conclusions and recommendations for Romania. The study revealed the need for Romania to improve various aspects regarding its R&D system, such as: set up incentives to increase technological transfers between the public and private sectors, create business and research clusters according to the American 'Silicon Valley' model, create an attractive special tax status for the innovative start-ups or adopt a favorable tax regime for patents.

Keywords: Innovation, European Innovation Scoreboard, Romanian R&D System

Introduction

A short history of EU research and innovation policies

In 1958, the Community research was limited to only two specific energy fields since the research was not included as a competence area for the Community (European Parliament, 2017). The involvement of the European Union (EU) in research activities (outside the coal and nuclear fields) began in the 1970s with the adoption of the Council of the first Community research programmes. These were adopted one after the other, responding to the need for applied research in a specific area at an emerged European level. At the beginning of the 1980s, the European

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Commission (EC) proposed a strategic tool to manage the technological applications at the Community level through the framework programme (FP) for research and development (European Parliament, 2017).

The first framework programme (FP1) was adopted in 1983 reflecting the principle of the subsidiarity that allowed the EU's intervention for the cases when the Member States could not tackle individually the challenges. The Single European Act (Official Journal of the European Union, 1986) introduced research as a Community competence in the Treaty establishing the European Economic Community and provided a firm legal basis for the adoption of the following FPs. FP2 and FP3 were adopted in 1987 and 1990 respectively with increased budgets. The Treaty of Maastricht (Official Journal of the European Union, 1992), which entered into force in 1993, modified the legal basis for the adoption of FPs, transforming them into financial tools for EU research activities. It also broadened the range of topics for which research programmes could be conducted by the EU. FP4 and FP5 adopted in 1994 and 1998 enlarged the scope of the FP and the focus on pre-competitive research was abandoned in favour of an approach that would see the FP addressing societal challenges and supporting a wider range of activities in the innovation process. The development of the European Research Area concept in 2000 marked a clear shift in the evolution of the FP.

Moreover, FP6 and FP7, adopted in 2002 and 2006 respectively, were designed to implement this EU research policy aiming at addressing the fragmentation of the European research landscape. The adoption of the Europe 2020 strategy and the Innovation Union flagship initiative in 2010 influenced the structure of Horizon 2020, which was adopted in 2013 (European Parliament, 2013).

As the FP evolved, the instruments used for its implementation diversified. The initial grants for transnational cooperative research projects were complemented, inter alia, by the development of agile public-public and public-private partnerships, the establishment of new structures, such as the European Research Council (ERC) and the European Institute for Innovation and Technology (EIT), specific instruments for Small and Medium-sized Enterprises (SMEs) support, and individual mobility grants for researchers. With Horizon 2020, the FP became a complex programme of programmes fostering the science transfer into economic and societal benefits. Therefore, in 2014, the FP of the EU built financial streams to support the innovation process and supported various EU policies. Complexity in the management and implementation of the FP brought about a new level of fragmentation at the EU level regarding the funding of innovation-related activities.

Measuring Research and Innovation Performance

Since the 1960s, OECD has initiated the first comparative analysis of science and technology policies. Since then, many scholars have manifested their interest in international comparisons (Nelson 1993, Freeman, 1995, Edquist, 1997, Laredo & Mustar, 2001, Lundvall, 2010).

Every 10 years, OECD engages the policy community, data users, and providers into an open dialogue to review and develop its long-term agenda on science, technology, and innovation (STI) data and indicators. This event, "OECD Blue Sky Forum" (OECD, 2020), represents an open and unconstrained discussion on evidence gaps in science and innovation and on initiatives the international community can take to address data needs in this area.

To compare innovation performance, the European Commission uses inter alia, the 'Indicator of Innovation Output', produced by the Joint Research Centre (JRC) (Vertesy & Damioli, 2020), which measures the extent to which ideas from innovative sectors are sold on the market, offering better jobs and increasing the competitiveness of Europe. The Research Excellence composite indicator developed by the JRC tries to measure the capacity of the national and European Research and Innovation (R&I) system to diffuse knowledge and technology as well as the role of structural change towards a more knowledge-intensive economy.

The EU's methodology applied for measuring the performance of national innovation systems is using 27 performance indicators, distinguishing between ten innovation dimensions in four main categories introduced the new European Innovation Scoreboard measurement framework. The objective of this regrouping is to better distinguish between framework conditions, investments in innovation, enterprises' innovation activities, and the impact of these activities. The second change brought since 2017 deep revised edition has intended to add one more dimension to better capture the environment in which enterprises operate.

According to the last analysis made by the European Commission (2020), Denmark, Finland, Luxembourg, the Netherlands, and Sweden are Innovation Leaders with innovation performance well above the EU average. Austria, Belgium, Estonia, France, Germany, Ireland, and Portugal are Strong Innovators with performance above or close to the EU average. The performance of Croatia, Cyprus, Czechia, Greece, Hungary, Italy, Latvia, Lithuania, Malta,

Poland, Slovakia, Slovenia, and Spain is below the EU average. These countries are Moderate Innovators. Bulgaria and Romania are Modest Innovators with performance well below the EU average (European Commission, 2020).

The European Innovation Scoreboard (European Commission, 2020) shows an improved overall innovation performance. For the EU as a whole, it increased by 8.9 percentage points between 2012 and 2019. Over the same period, the performance improved for 24 Member States, most notably for Lithuania, Malta, Latvia, Portugal, and Greece, where the innovation performance grew by more than 20 percentage points.

Comparing the EU's average to a selection of global competitors, the EU continues to have a performance lead over the United States, China, Brazil, Russia, South Africa, and India. South Korea is the most innovative country, performing 34% above the EU's performance score in 2019. Since 2012 South Korea, Australia, and Japan have increased their performance lead over the EU, while the gap between the EU and the United States, China, Brazil, Russia, and South Africa has become smaller.

International Cooperation in Research

The international cooperation research programme was commenced in 1983 when the European Commission launched a dedicated programme called the Science and Technology for Development (STD) Programme. It had three editions: STD1, 2, and 3, which ran in parallel with The Community's Research Framework Programmes (European Parliament, 2017).

In 1992, the Programme was integrated into the Fourth Research Framework Programme (1994-1998) as the International Cooperation Programme (INCO) and has, ever since, been an integral part of all Framework Programmes (European Parliament, 2017).

The Seventh Framework Programme (2007-2013) placed a new emphasis on international research cooperation, including mainstreaming international cooperation across the entire spectrum of FP7 activities. The Seventh Framework Programme also included strategic activities underpinning the building of a European Research Area open to the world that require a policy dialogue with major regions of the world and true partnership with those countries with which an S&T (Science & Technology) Cooperation agreement has been signed (European Parliament, 2017).

In Horizon 2020 (H2020), International Cooperation is a cross-cutting priority and not a separate activity; also, part of Societal Challenge 6 focuses on specific international cooperation policy support activities. Horizon 2020 is fully open to the world, allowing researchers from all over the globe to take part in projects. Furthermore, many calls particularly encourage the participation of organizations from specific partner countries that are not EU Member States or associated with the framework programme (European Parliament, 2017).

Countries such as China, Brazil, Russia, India, and other economies that have grown strongly over the past years will continue to be important partners for the EU. This is reflected in the fact that all these countries will still be able to participate in all parts of Horizon 2020, allowing their researchers to cooperate with their counterparts in the EU on topics of their choice.

Some of these countries, and in particular those where the Gross Domestic Product (GDP) is exceptionally large, will, however, no longer enjoy automatic access to EU funding, even if the country in question is classified as middle-income by the World Bank. This reflects the fact that over the past years, these countries made considerable efforts to invest in their research and innovation systems and strengthen their qualities. These countries are therefore now capable to cooperate with the EU based on a partnership among equals. The new strategy foresees to complement this change in the approach to automatic funding by increased efforts to facilitate the funding of participants from these countries through their national channels.

Research Methodology

The present research aims to analyse the national innovation systems in various European Member States in order to establish what could Romania do to develop a competitive Research and Development system.

The basis of the study is the European Innovation Scoreboard which categorizes Romania as being a modest innovator.

The main objective of the paper is to present a short history of the EU research programmes and of the national innovation systems in different European countries. The comparison will be made amongst countries situated on different positions in the European Innovation Scoreboard with the purpose of revealing some treats of them enabling some good examples and streams for Romania which occupies one of the last positions.

The study proposes three research questions:

1. Which is the situation regarding research and innovation among the Member States?
2. What have the other Member States done in order to become innovative leaders and strong innovators?
3. Which are the lessons for Romania to improve its position in the European Innovation Scoreboard?

The research methodology consists of an exploratory study using secondary data analysis, collected from the EU and OECD's official documents. The study is based on qualitative research methods. In the first part, a document analysis was conducted to present the situation regarding the research and innovation systems from four European countries. The countries were selected according to the four categories mentioned in the European Innovation Scoreboard. One example for each category of countries (leader, strong, moderate, and modest innovators) was chosen for the analysis.

In the second part of the study, a comparative analysis between these countries, using statistical indicators was conducted to observe the differences among leaders, strong, moderate, and modest innovators. Finally, the study ends with a series of conclusions and recommendations for Romania.

One Example for Each Category: Leader, Strong, Moderate, and Modest Innovators.

In the next part of the study, the situation concerning the research and innovation systems in various European countries will be presented. According to the four categories mentioned in the European Innovation Scoreboard, namely leader, strong, moderate, and modest innovators, one example for each category of countries was chosen for analysis.

Sweden

Sweden represents a success story for a seamless determination to shift the historical paradigm. A century ago, Sweden was among the poorest countries of Europe but in a couple of years, it has consolidated its position as an European leader in innovation. The latest innovation scoreboard supports this statement. Sweden is one of Europe's top three spenders in the research and innovation area, investing 3.6% of its GDP in R&D in 2003. Analysing data since 2003 and comparing it with the EU-wide target of 3% GDP allocation to R&D by 2020, there is a first success factor for the top position occupied by this country (World Bank, 2019).

Each year, Harvard Business School compiles the National Innovation Capacity Index, a study of different countries' innovation potential. In 2010, Sweden was ranked eighth among 173 countries. In terms of trained engineers per capita, Sweden ranked second, close behind Japan. The study also notes that in the past 15 years, Sweden has had the second-fastest growth rate in the number of patents per capita (Porter & Stern, 2010).

A new system for the allocation and redistribution of the appropriations for research and postgraduate education to the higher education area was introduced in Sweden in 2009. The model aims to reward quality in research and give higher education institutions to manage the incentives to take measures and increase the quality and relevance of the research undertaken at their institutions. This is done by allocating parts of the research appropriations based on two indicators: publications/citations, and external funding of research (Joint Research Center, 2017).

This new system also gives incentives to the universities to cooperate with the private sector as the more external R&D funds they receive from i.e. the Swedish firms, the more they receive from the state through the redistribution of appropriations. The impacts are visible: as a result of the new system introduction, external funding from foreign firms to Swedish universities, which has been more or less constant up to 2008, has started to grow steadily. The proportion of public funding, that was annually redistributed along with the new model, was initially 10% and has increased to 20% from 2014 onwards (Jonkers & Zacharewicz, 2017).

The competitive funding model spurs competition between universities since better performers will receive more basic funding than others, which promotes a more strategic approach to the specified quality and efficiency criteria. The model can be implemented without necessarily increasing the total funding, and does not need to result in major shifts in the basic funding, since all universities tend to increase their performance and efficiency.

At present Sweden investigates possible future developments of the resource allocation system, which may include peer/expert review, as well as performance/output with the surrounding society.

In 2019, Sweden had the second-highest share in the EU of Human Resources in Science and Technology (HRST) of the total active population (60.7%). The distribution of total HRST full time employed by sector of performance was 29% in business, 35% in government, and 36% in Higher Education Institutions (HEI) in 2014. The share of female researchers was also above the EU average (45.7 vs. 41% in 2014) (Eurostat, 2020).

According to Doing Business 2020 (World Bank, 2019), Sweden is situated in the 10th position and second among EU Member State, reflecting the competitiveness of its economy.

In terms of participation in H2020, Sweden's success rate is higher than the EU average, 14.77% compared to 12.02%. The net EU contribution to the Swedish organizations amounts to 1.94 billion Euro (8th position of 28 EU states) out of which 291 MEUR (Million Euros) represents the contribution to the innovative SMEs.

In Sweden, two of the most worldwide well-known innovations were created: Spotify, an online music service that lets users stream millions of tracks on demand to their computer or mobile device. It offers a monthly subscription service or a free version supported by advertising. Founded in 2006 by two Swedish entrepreneurs Daniel Ek and Martin Lorentzon, the company is now multinational. The second one, Skype (the online phone system free of charge) was founded in 2003 by two entrepreneurs, Niklas Zennström from Sweden and Janus Friis from Denmark. Skype was acquired by eBay in 2005 and sold to Microsoft in 2011.

France

France has put efforts into boosting its innovation capacity since early 2000. In 2005, it created clusters ('pole de competitivite') to foster collaboration between the universities, start-ups, SMEs, and research organizations. The R&D subsidies were designed as an appropriate policy tool for stimulating private investment in R&D (Fu et al. 2012; Meuleman & De Maeseneire, 2012).

French R&D investment as a share of GDP is below the 3% target for 2020. Total R&D intensity remained stable in 2018 at 2.20% GDP, above the EU average of 2.12%. However, it decreased from 2015, when it stood at 2.25%. Public R&D spending for 2017 and 2018 (0.73% of GDP) was almost the same as in 2007. The business sector's R&D spending for 2017 and 2018 (1.44% GDP) was the same as in 2012 (European Commission, 2020).

An important characteristic of research in France that differs from almost all the other OECD member states is the central role played by the State in its financing- around 50% of all research and development expenses.

As mentioned by the same report, France remains the 16th most innovative country in the world according to the World Intellectual Property Organisation's Global Innovation Index. Also, it ranks 11th in the 2019 European Innovation Scoreboard and is positioned as a strong innovator behind the group of innovation leaders (European Commission, 2019).

In regards to the total patent cooperation treaty applications, France occupies the seventh position of the ranking led by Sweden (JRC, 2020).

According to Doing Business 2020 (World Bank, 2019), France is situated in the 32nd position, the second EU Member State, which reflects the competitiveness of its economy. Concerning the private funding of innovation, the French system includes most of the other mechanisms found in other advanced economies but their level of development and availability, especially regarding the availability of cheap capital for start-up's, often lacks behind what can be found in the national strategies of innovation of world leaders of innovation like the United States.

In order to incentivize the companies to stimulate more spending on research and development, France introduced in 2008 the R&D tax credit. Tax incentives give firms the freedom to choose their R&D projects without targeting a particular sector or technology and are, therefore well-suited to the complexity and multidisciplinary nature of innovation processes (Quemener, 2017).

As regards funding mechanisms for research and innovation in the economy, the role played by the "business angels" and venture capital is still insufficient. France is even below the average of the European Union for the availability of venture capital expressed as a percentage of GDP and that situation persists despite the creation of

the Fond National d'Amorçage (FNA/ National Fund for Start-up Companies), which represents only around 100 million euros of investment per year (Kornprobst & Douady, 2015).

In 2019, France modified a set of rules to make interactions between research labs and the private sector much more fluid (e.g. allowing a public researcher to spend 50% of his or her working time in a private company or to keep shares of a company he or she created) and launched an Innovation Council to foster breakthrough innovation.

In 2019, France had a higher share in the EU of Human Resources in Science and Technology of the total active population (53.4%) than the EU 28 states' average (48.5%). The distribution of total HRST full time employed by sector of performance was 29% in business, 35% in government and 36% in HEIs in 2014. The share of female researchers was above the EU average (45.7% vs. 41% in 2014) (Eurostat, 2020).

In terms of participation in H2020, France's success rate is higher than the EU average, 15.55% compared to 12.02%. The net EU contribution to the French organizations amounts to 6.37 billon Euro (3rd position of 28 EU) out of which 920 MEUR represents the contribution to the innovative SMEs.

Spain

Spain belongs to the Moderate Innovator Group. Low investment in R&D is holding back Spain's innovation performance. Total R&D expenditures declined from 1.35% of GDP in 2009 to 1.24% in 2018. Public R&D expenditure was cut during the crisis and the cuts have not been reversed. Public investment in R&D declined from 0.65% to 0.54% of GDP between 2009 and 2018, well below the EU average of 0.69%. Private investment in R&D fell from 0.73% of GDP in 2007 to 0.64% in 2016. It has since recovered to 0.7% in 2018, but it is still low compared with the EU average of 1.41% (2018).

The relative strengths of its innovation system are in human resources, innovation-friendly environment, and attractive research systems. Its relative weaknesses are in innovators, linkages, and finance and support.

The Spanish authorities have reacted to the 2008 crisis by implementing a programme of structural reforms with the view of alleviating barriers and finding new sources for growth and jobs. Along with fiscal consolidation, restructuring of the banking sector, and modernization of public administration, structural reforms are being implemented in the labour market and new strategies have been adopted to promote R&D, innovation, digital economy, and entrepreneurship.

In 2013, after a wide consultation of stakeholders, the Spanish government in agreement with the Autonomous Communities approved a new Spanish Strategy for Science, Technology, and Innovation for the 2013-2020 period (henceforth, the Strategy) (Spanish Government & The Ministry for Economy and Competitivity, 2020). The Strategy briefly pursues four main goals:

1. Promoting talent generation and employability of human resources in R&D, including mobility within the public sector and between this and the private sector.
2. Raising excellence in research.
3. Boosting business leadership in R&D.
4. Responding to societal challenges.

A National Plan for Scientific and Technical Research and Innovation (PECTI) (2013-2016) has been established to implement the Strategy (The Ministry for Economy and Competitivity, 2013). The main changes brought by the current strategy, compared to the previous ones are:

- The integration of science, technology, and innovation into a single strategy (before being two separate strategies).
- A wider consultation process and active involvement of regional policy-makers.
- An increased focus on coordination of the action of public administrations.
- A stronger emphasis on societal challenges.

In addition, Spain has adopted a law to support entrepreneurs and their internationalization, which includes specific references to RDTI activities. The law adopted in 2013 is supposed to, inter alia, provide the creation of a regime of limited liability for entrepreneurs, the establishment of out-of-court settlement mechanisms to allow formerly bankrupt entrepreneurs a fresh start, and also fiscal, financial, and other measures to support company growth. To

promote business growth, it extends the list of activities that are not subject to municipal licenses and reduces obstacles for entrepreneurs to gain access to public contracts.

The International Peer Review Panel commissioned by the Spanish Ministry of Economy and Competitiveness and the State Secretary for Research, Development and Innovation that reviewed the Spanish research and innovation system believed that finding new sources for sustainable growth and employment in the Spanish economy requires deep changes on three fronts:

1. A reform of the public research system so that it can increase its productivity, quality level, and relevance to the needs of the Spanish economy and society;
2. The upgrade and expansion of innovation capacities in the private sector in view of changing the economic specialization towards more added-value and knowledge-intensive activities;
3. A better exploitation of the R&I potential presented all around the country through the creation of national-regional synergies in resources and policies.

The Spanish economy's low innovation performance is also related to shortages of technical skills. High early school leaving rates undermine equal opportunities and contribute to the high share of low-skilled training in the population. The low attractiveness of vocational education and training amplifies shortages of medium to high technical skills. School-to-work transitions remain difficult, as job opportunities are limited and often of low quality. At the same time, the economy does not create enough high-skilled occupations, reflecting its low innovation dynamics.

In 2019, Spain had a smaller share of HRST of the total active population (46.5%) than the EU 28 average (48.5%) (Eurostat, 2020).

In terms of participation in H2020, Spain's success rate is higher than the EU's average (12.02%). The net EU contribution to the Spanish organizations amounts to 5.22 billion Euro (4th position of 28 EU) out of which 1.11 billion EUR represents the contribution to the innovative SMEs.

Romania

Romania is a Modest Innovator. The country's innovation performance is poor, ranking last in the EU according to the 2019 European Innovation Scoreboard (European Commission, 2020). Investment in employee training and ICT solutions is lower than the EU average (European Innovation Scoreboard, 2020). R&D investment is very low, with an R&D intensity of 0.51% of its GDP in 2018, well below the 2020 national target of 2% and the EU average of 2.12%. Public R&D investment was 0.2% of its GDP in 2018. Private expenditure on R&D was only 0.30% of GDP, below the EU average of 1.41% (European Commission, 2020).

Four smart specializations defined at the national level were aggregated through the foresight-based elaboration process in the National Strategy for Research, Development, and Innovation (NSRDI) 2014-2020 (Romanian Government, 2014):

- Bioeconomy (based on the agricultural potential of the country),
- ICT (currently the most dynamic RDI sector in Romania),
- Energy and environment (related to the challenges of energy efficiency, and water resources),
- Eco-technologies (focused on new-generation vehicles and equipment, the generation of bio-resources, depolluting and waste reuse). The set of specializations was then expanded by political decisions in the adopted form of the National Strategy to include: space and security, energy production, climate change, and new materials (substitution of critical materials, new polymer materials, and nanomaterials).

Romania is a market with potential, a strategic location for exports to Turkey, the Middle East, and the Balkans, as well as a business environment that offers opportunities, but also vulnerabilities. According to Doing Business 2016, Romania ranked 37 out of 189 countries in the ease of doing business, lower than Poland, Slovak Republic, and the Czech Republic, but higher than Bulgaria and Hungary. Romania ranks 45 on the ease of starting a business, while the lowest rankings are on the ease of getting electricity and construction permits, for which the procedures remain complex.

In 2019, Romania had the lowest share in the EU's HRST of the total active population (28.2%) (Eurostat, 2020).

In terms of participation in H2020, Romania's success rate is very close to the EU average, 12.47% compared to 12.02%. The net EU contribution to the Romanian organizations amounts to 234.2 MEUR for SMEs (20th position out of the 28 EU states) out of which only 27.84 MEUR represents the contribution to the innovative projects.

The number of new doctorate graduates is relatively high (1.14 new doctorate graduates per 1000 population aged 25-34 compared to 1.07 (EU 28 average), while the number of researchers per thousand of the population is only 1.38 compared to 5.36 (EU 28 average), Romania having the lowest share of researchers per total population (Eurostat, 2015). The new doctoral schools – initially funded through Structural Funds – provided financial support to about 7800 Ph.D. students in 2015. Nevertheless, the figure is not reflected in the number of researchers increase, which tends to remain constant, with small fluctuations around 27.000 (and, respectively, total R&D personnel of around 43.000). For the 2014-2020 period, the new objective in terms of researchers was to double their number and simultaneously reach a share of 45% in the business sector (NSRDI 2014-2020) (Romanian Government, 2014).

Romania with its free education system, coupled with a rewarding system for students, but the underpaid and unsatisfied staff, and with a relatively high supply of Ph.D. holders, continues to face substantial challenges, both for increasing the number of researchers and for reducing the serious brain-drain phenomenon. The country has a significant number of researchers (World Bank, 2014) and more than 20.000 doctors working abroad, its best graduates are recruited by top world universities, who do not return, while many good graduates from soft fields work in sectors, which do not correspond to their level of expertise and specialization.

Comparative Analysis of the main Research and Development Indicators for the four cases presented

In order to have a common ground for analyzing the performance in the innovation sector, the main R&D indicators for the four countries are presented below.

Table 1: Main R&D indicators – Sweden

	2010	2011	2012	2013	2014	2015	2016	2017	2018
GERD (as % of GDP) See the key-indicator	3.17	3.19	3.24	3.27	3.11	3.23	3.25	3.37	3.32
GERD in national currency (Million units) See the key-indicator	113207	118809	120911	124635	123848	137146	143372	155532	160351
R&D funded by abroad (as % of GDP) See the key-indicator		0.35		0.22				0.34	
R&D funded by EC (% of GDP)		0.05		0.06		0.05			

Source: Data extract from European Commission, (2020) Research and Innovation Observatory – Horizon 2020 Policy Support Facility, (2020)

It can be noticed that in Sweden's case, a steady increase of the General Expenditure for Research and Development (GERD) has occurred since 2010, exceeding the seal of 3% setup as aimed by the European Union. Overall, the percentage of the R&D activities funded by the EU remained unchanged, representing 0.05% of the GDP. The correlation between the high investment through public funds, doubled by enablers of the innovation ecosystem might represent a key success feature of Sweden's top position in the European Innovation arena.

Table 2: Main R&D indicators – France

	2010	2011	2012	2013	2014	2015	2016	2017	2018
GERD (as % of GDP) See the key-indicator	2.18	2.19	2.23	2.24	2.23	2.27	2.22	2.21	2.2
GERD in national currency (Million units) See the key-indicator	43468.832	45111.514	46519.037	47362.045	47918.737	49839.13	49650.923	50619.332	51768.559
R&D funded by abroad (as % of GDP) See the key-indicator	0.16	0.17	0.17	0.18	0.17		0.17	0.17	
R&D funded by EC (% of GDP)	0.03	0.03	0.03	0.03	0.04		0.03	0.03	

Source: Data extract from European Commission, (2020) Research and Innovation Observatory – Horizon 2020 Policy Support Facility, (2020)

In the case of France, it can be observed that gross domestic expenditure on R&D (GERD) as % of GDP was maintained at almost the same level in all the analysed years (between 2.18% and 2.2%) with the highest allocation in 2015 (2.27%). As far as GERD in the national currency (million units) is concerned, it can be noticed that the amount increased in each analysed year. The R&D activities funded by the European Commission (as % of the GDP) kept the same pace over the eight-year span analysed and reported to the European Commission. However, the percentage of R&D activities funded abroad is constant, compared to the EC contribution which is higher. This can be explained by the strong international collaboration of the French main actors involved in the innovation ecosystem.

Table 3: Main R&D indicators –Spain

	2010	2011	2012	2013	2014	2015	2016	2017	2018
GERD (as % of GDP) See the key-indicator	1.36	1.33	1.3	1.28	1.24	1.22	1.19	1.21	1.24
GERD in national currency (Million units) See the key-indicator	14588.455	14184.295	13391.607	13011.798	12820.756	13172	13260	14063	14946
R&D funded by abroad (as % of GDP) See the key-indicator	0.08	0.09	0.09	0.09	0.09	0.1	0.1	0.1	
R&D funded by EC (% of GDP)	0.04	0.05	0.06	0.06	0.05	0.06	0.06	0.06	

Source: Data extract from European Commission, (2020) Research and Innovation Observatory – Horizon 2020 Policy Support Facility, (2020)

As regards Spain, it can be observed that gross domestic expenditure on R&D (GERD) as % of GDP decreased from 2010 in all the analysed years (between 1.36% and 1.24%). As far as GERD in the national currency (million units) is concerned, it can be noticed that the amount is rather flat. The R&D activities funded by the European Commission (as % of the GDP) increased from 0.04 to 0.06, as a result of Spain's very active presence in EU FP, especially in H2020. The % of R&D activities funded abroad increased from 0.08% to 0.1%. This can be explained by a strong international collaboration of the Spanish organizations.

Table 4: Main R&D indicators – Romania

	2010	2011	2012	2013	2014	2015	2016	2017	2018
GERD (as % of GDP) See the key-indicator	0.46	0.5	0.48	0.39	0.38	0.49	0.48	0.5	0.5
GERD in national currency (Million units) See the key-indicator	2413.467	2786.83	2872.728	2464.779	2555.662	3476.933	3675.142	4317.087	4769.28
R&D funded by abroad (as % of GDP) See the key-indicator	0.05	0.06	0.07	0.06	0.07	0.09	0.05	0.04	
R&D funded by EC (% of GDP)	0.04	0.05	0.05	0.05	0.04	0.06	0.04	0.03	

Source: Data extract from Research and Innovation Observatory – Horizon 2020 Policy Support Facility, 2020

The last analyzed case, Romania, kept the level of the gross domestic expenditure on R&D (GERD) as % of GDP from 2010 in all the analysed years on a flat curve (between 0.46% and 0.5%). As far as GERD in the national currency (million units) is concerned, it can be noticed that the amount has increased, reflecting the increased level of the GDP in absolute figures. The R&D activities funded by the European Commission (as % of the GDP) surprisingly decreased from 0.04 to 0.03. The % of R&D activities funded abroad remains flat and modest.

Conclusions and Lessons for Romania

Analysing various policies applied either in Europe or overseas, some commonalities can be depicted:

- Steady public and private financial support for research and innovation, long-term commitment and predictability.
- Analysis and identification of national capabilities.

History shows that focusing on a limited number of areas is a good recipe for success. The Swedish government for instance has chosen to focus strategic investments on three key areas: medicine and bioscience, technology, and climate.

- Long term development and access to big research infrastructure.

The EU Member States and the Associated Countries to Horizon 2020 operate a diverse system of RIs ranging from well-established sectors like *physics, astronomy, energy and materials science*, mostly based on large single-sited laboratories, to the fast-developing *health, food, environment and cultural* innovation sectors where novel architectures of RIs are being developed that build on distributed capacity and specialty. The scientific and economic advantage in operating as research infrastructures in merit-based open-access mode has prompted an evolution of national and macro-regional based initiatives towards fully pan-European and international organizations, as broad consortia allow the optimization of the investment of both human and financial capital resources and the maximum impact and return to society. The RI system is also intrinsically more dynamic and responsive to the needs of a multidisciplinary approach increasingly required when addressing the so-called "grand challenges" that can be difficult to tackle in a sectorial way (economy vs. society vs. knowledge) or within the framework of academic disciplines.

The story of CERN (the European Organization for Nuclear Research) from post-war Europe to the present time has been thoroughly analysed as an example of how a science-driven facility can become a reference institution for shaping science policy worldwide. This transition has been fed by a strong focus on scientific excellence and by the open collaboration model developed at a global level by CERN.

An advanced system of RIs operating through merit-based open access to science and the data is a key attractor for young people to engage in science and innovation in Europe, or to come to Europe to perform their research projects. RIs are the most effective solution to provide state-of-the-art instruments and methods for performing research on a large scale. Most of the resources that can be accessed by users of the RIs would not otherwise be available to the vast majority of researchers or simply not available at all. By strategically linking advanced education and training at RIs with the academic curricula in all disciplines as well as with the "continuous advanced training" of technical staff employed in industry or government one can have a greater number of highly skilled user-scientists and a greater number of more effective innovation experts. In order to address the great challenges, Europe needs a new generation of highly trained people capable of generating new data through research, effectively exploiting data for innovation and of integrating cross-disciplinary knowledge.

An interim report (2016) on the role of RIs in innovation was produced by the Working Group on Innovation stressing the concept of "industry as a full partner of RIs" (supplier and user) as a way forward to promote extensive partnerships on joint R&D projects and cooperative programs, development of advanced technologies, innovation, and training. RIs and industry can generate active ecosystems of innovation exploiting their complementary enabling technologies and support services. The RIs are also unique places to train new generations of scientists and engineers in these very new interdisciplinary areas related to the Grand Challenges.

New scenarios arise where new proposals of high quality and scientific profile have significant overlaps in mission and use with existing European Strategy Forum on Research Infrastructures (ESFRI) RIs (Project or Landmark). ESFRI does not consider it to be healthy to have projects competing in the same area of the roadmap as the decisions for support may become complex and difficult.

Nevertheless, the merit of the projects presses one to consider how to proceed optimally by involving the concerned ESFRI infrastructures, in an evaluation of the synergies with such new proposal by means of agreements or common science programmes to the benefit of the European and international users' community.

As regards spurring innovation, Romania would benefit from exploring some models already tested and proved in all the three countries analyzed in the article:

- Set up incentives to increase technological transfers between the public and private sectors
- Creation of business and research clusters on the American 'Silicon Valley' model
- Creation of attractive special tax status for the innovative start-ups
- Adopt a favorable tax regime for patents. In France, for the patents that have been filled or acquired, it is allowed to deduct from the taxable profit (corporate tax or personal income tax depending on the legal structure of the company) an amortization equal to one-fifth of the value of the patent each year during five years, even though patents are protected by the Institute National de la Propriété Industrielle (INPI / French Patent Office) for 20 years.

- Better payment and attraction of young researchers in the research field.

The present study approached a matter of great interest, especially for Romania, in the context of Horizon 2020 when the European Union allocated the most significant amount of funds in its whole history. Romania should focus on developing the R&D system which has a significant impact on the economic and social development of the country. The research limitations consist of the fact that analyses only four countries from the European Innovation Scoreboard and also did not compare the situation from European countries with states such as United States or China. Further research will be conducted in order to create a comprehensive picture regarding the R&D systems from several Member States compared with states from other continents.

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The Role of Wind Farms in Estimating Energy Demand in A Microgrid

Semion PELESKOV
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania
semenpeleskov@gmail.com

Ana-Maria-Ruxandra RESCANU
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania
anarescanu@yahoo.com

Mihai REBENCIUC
Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania
m.rebenciuc11@gmail.com

Abstract

The management and control of renewable resources through smart networks represent the future of technology and sustainable development. This paper conducts a study on monitoring the structural health of Smart Grids, more exactly of its nodes - Micro Grids. The main purpose of the research is the estimation of energy demand by modeling the wind speed distribution, determining the power and energy production of the wind turbine. Thus, the Weibull distribution with two parameters, scale parameter and shape parameter, was used in the sense of nonlinear control of the probabilistic wind speed distribution. Using the Maximum Likelihood Method and an algorithm coded in Python, each value in the reference range of the shape parameter was assigned corresponding values of the scale parameter for the two human settlements. Subsequently, by applying the Grammatical Evolution algorithm, which implies a context-free grammar, the best relation which depends on the environmental variables for the scale parameter was obtained. In the future, we intend to improve the nonlinear control of the statistical distribution by completing the Grammatical Evolution algorithm and adding the location parameter in the Weibull distribution.

Keywords: Micro Grid, Wind energy, Weibull distribution, Grammatical Evolution.

Introduction

Smart networks "Micro Grid", which were presented in fig. 1 by Kuo and Lu, in their research study from 2013, are in fact nodes of a one bigger network named "Smart Grid". "Micro Grid" is a project proposed within the concept of "Smart City", which suggests changes in the organization of the infrastructure of a human settlement. "Micro Grid" is based on intelligent principles of energy production, storage and redistribution. The main idea is that the energy in these networks is never lost but is redirected to the nodes where energy demand is higher. In addition, the “Micro Grid” has the advantage of being completely autonomous, both in the city and in rural areas, in case of damage to the National Power System (NPS).

Wind energy requires anticipating the distribution of wind speed to estimate the value of its production. The estimated value will be reported to the energy dispatcher, in order to regulate the energy flow coming from hydropower plants, respectively thermal power plants. In the case of a “Micro Grid”, based on these predictions, the energy demand can be estimated depending on the area in which it is located, and the climatic factors of this area.

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Thus, two problems are identified: modeling the wind speed distribution (WSD) and simulating the estimation of the amount of energy produced. In this paper, the wind speed distribution is modeled using two methods: the Maximum Likelihood Method associated with Weibull's Distribution, and by applying Grammatical Evolution. The amount of energy produced is estimated by the Analytical Equation of Wind Energy Production.

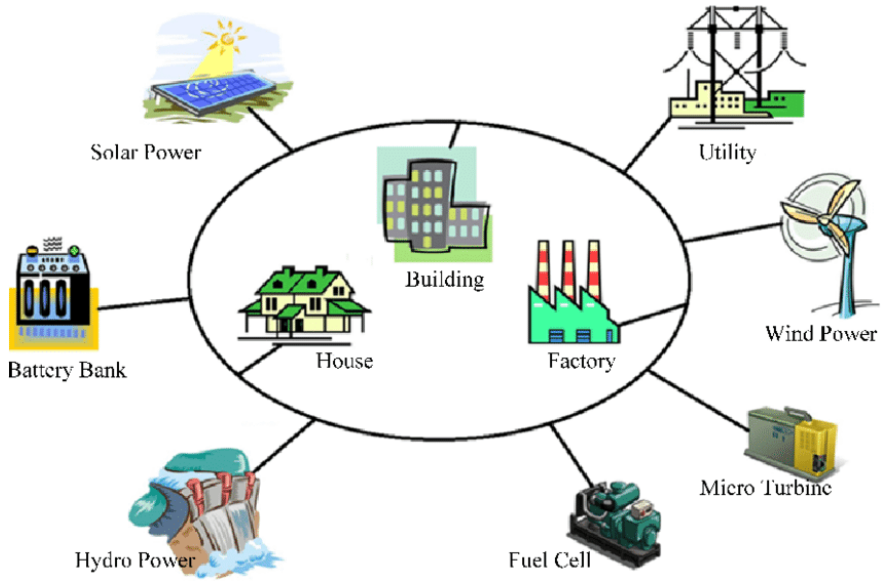

Fig 1. General scheme of Micro Grid

Biomimicry in Programming

Many areas of human life depend on technologies, which are based on principles that have been borrowed from nature. BIA (Biologically Inspired Algorithms) are the technologies underlying Genetic Programming (GP) and Grammatical Evolution (GE). Conventionally, these algorithms use the terminology, principles and processes enunciated by Charles-Robert Darwin in 1859 in his work "On The Origin Of Species".

The Genetic Algorithm (GA) is a technique for obtaining the minimum point of a multidimensional function. In the language of evolutionary theory, the result of the Genetic Algorithm produces a population that best fits an environment presented in the problem. In the book written by O'Neil and Brabazon in 2006, they have structured all BIA's as in the fig. 2. In addition, there are marked programming formalities applied in this research.

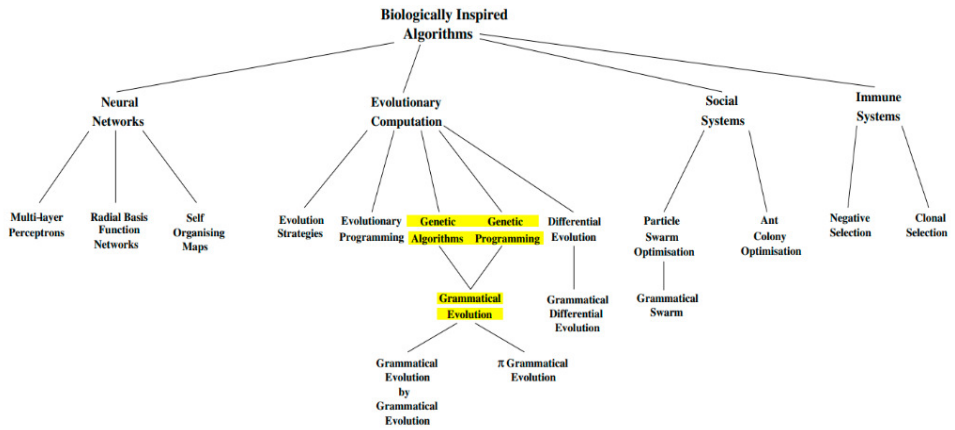

Fig. 2: Tree type scheme of the main BIA's highlighting those applied in the paper

Genetic Programming

GP has two fundamental differences from GA. Instead of evolving binary strings, which represent an indirect coding of a potential solution, in GP the search is applied directly to the solution, in this case, the solutions being programs. In the GP formalism pronounced by John Koza in his study from 1998, these programs have the form of an "S-expression", which represents a syntax scheme. Fig. 3 represents his vision of coding a row:

$$\sin(x) + (3.14x) + \left(\frac{y}{x}\right), \text{ x, y are predefined constants}$$

(+ (sin x) (* x 3.14) (/ y x))

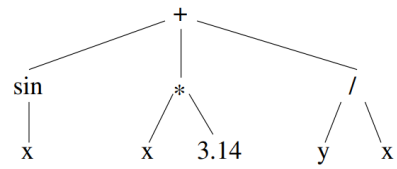

Fig. 3: "S-expression" example (left), and associated syntax tree (right)

In GP, it is recognized that the length of the solution cannot be known from the beginning, so the number of genes (codons) must also have evolved itself.

Each individual in a population in GP goes through a certain "life" which consists of processes similar to those in nature: birth, crossover, mutation, reproduction. After the initialization of the first population, each participating individual goes through the following procedures cyclically as presented in fig. 4.:

1. **Selection.** It is a process of choosing the most suitable individuals (according to the "fitness" function) to produce the next generation of the population. There are several selection modes, which are chosen according to the requirements of the problem;
2. **Crossover**. The procedure consists of recombining the parents' genes. There are several possible ways to perform a crossover (crossing over): at one point, at two points, etc.;
3. **Mutation.** This process is made to avoid cases when the population "falls" in a local minimum of the function, not reaching the optimal solution (global minimum). It represents a small random change in the values of several parental genes;
4. **Reproduction.** It is a process, which creates a new generation based on all the steps taken before. Once a new generation has been created, the cycle repeats.

Exit conditions will be discussed in the subchapter 2.

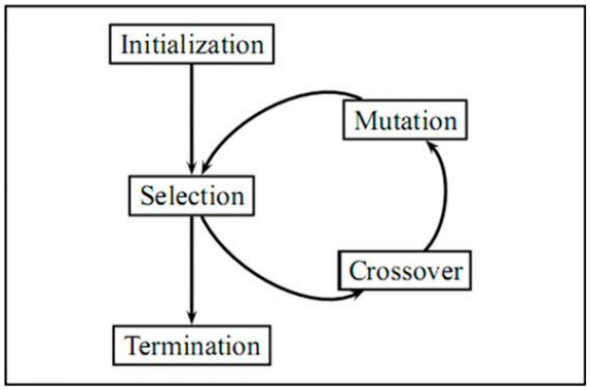

Fig. 4: An individual's life cycle in GP

Grammatical Evolution

GE is a completion form for GP based on the formalism of a grammar. A set of rules called Backus-Naur Forms (BNF) is used to represent a context-free grammar. This is a language, proposed by John Backus and Peter Naur as a formal notation to describe the grammar of any other language. Among the advantages of applying Grammatical Evolution we can mention:

1. Application of a “mapping” algorithm for transforming a “genotypic” binary or integer string produced by the GP into a “phenotypic” output program. In other words, the transition from tree-type syntax (GP) to linear-type syntax is performed;
2. GE has a modular architecture as presented in fig. 5. In an algorithm, the search engine, the objective function and the grammar are distinct objects, which provide more space for optimizations;
3. “Output” of a GE is data written in arbitrary languages programmed in the BNF.

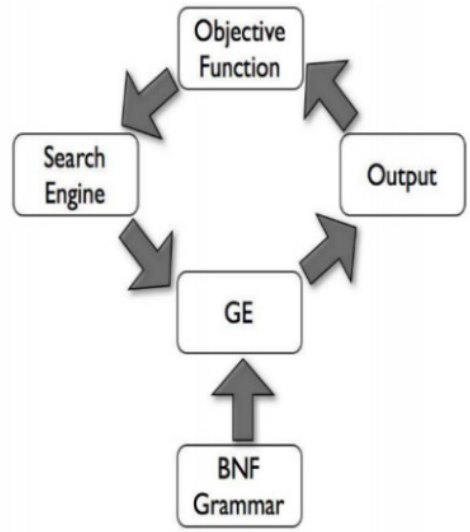

Fig. 5: Representation of the modularity of the GE design (Brabazon, O’Neil and Dempsey, 2009)

A BNF grammar represents a tuple containing 4 components fig. 6:

1. N – are non-terminal symbols. They are expressions that after the mapping process will turn into T;
2. T – are terminal symbols. The "output" of a program will always contain only these types of symbols;

3. P - are production rules that fully describe what will happen to N following the mapping process. A remarkable example is shown in fig. 7;
4. S - is the start expression. Obligatory a member of N.

```
G = {N, T, P, S}
N = {<expr>, <biop>, <uop>, <bool>}
T = {and, or, xor, nand, not, true, false, (, )}
S = {<expr>}
```

Fig. 6:Representation of the grammar in the example "Boolean Expression" (P is omitted)

```
# "::=" - becomes, "|" - logic "or"
# (n) - choice count
<syntax> ::= { <rule> }
<rule> ::= <identifier> "::=" <expression>
<expression> ::= <term> { "|" <term> }
<term> ::= <factor> { <factor> }
<factor> ::= <identifier>          (0)
           | <quoted_symbol>       (1)
           | "(" <expression> ")" (2)
           | "[" <expression> "]" (3)
           | "{" <expression> "}" (4)
<identifier> ::= <letter> { <letter> | <digit> }
<quoted_symbol> ::= """{ any_character }"""
```

Fig. 7: BNF grammar describing BNF rules

The mapping process begins when the GP returns a new generation. Starting with the first individual of the population, a rule for calculating the remainder applies to each of its codons.

RULE = c mod r,

where "c" - codon value, and "r" - the number of possible choices of a non-terminal symbol.

For example, in the case shown in fig. 7, let the next term N be <factor>, then c = 10, then calculating 10 mod 5 = 0, we get that <factor> becomes <identifier>. The cycle repeats, moving to the next codon value. Process runs cyclically until one or more of the following conditions are satisfied:

1. The program is completely generated. All members of N went through the mapping process and turned into T;
2. The mapping process has reached the end of an individual's genome. Then the wrapping operator is applied which starts the process of reusing the genome;
3. The number of iterations of the wrapping operator is reached. In this case the individual is associated with the lowest value of the "fitness" function, which leads to its elimination from the population. The second option is for the individual to associate with a default value.

In the end, when GP reaches the limit of generations, he returns an answer written in arbitrary language, according to predefined grammar.

Weibull Distribution. Wind Speed Modeling

Weibull Formalism

The Weibull distribution is very often used for modeling wind speed data. This paper uses the 2-parameter Weibull Distribution and the Maximum Likelihood Method (MLM) for a more accurate approximation of the shape parameter and the scale parameter.

The probability density (PDF) of the Weibull distribution is given by the relation (1) which is demonstrated in the research by Ciucu, Rebenciuc and Petre, 2013:

$$X(\beta, c) = f(x) = \frac{\beta}{c^{\beta}} x^{\beta-1} exp\left(-\left(\frac{x}{c}\right)^{\beta}\right), \quad for\ x > 0, \tag{1}$$

where x is the wind speed and $X(\beta, c)$ is a random variable with parameters β, respectively, c of Weibull distribution.

The cumulative distribution (CDF) of the Weibull distribution is given by the relation (2):

$$F(x) = 1 - exp\left(-\left(\frac{x}{c}\right)^{\beta}\right), \tag{2}$$

where β is the shape parameter (dimensionless), c is the scale parameter that is measured in $(m \cdot s^{-1})$.

Usually, the shape parameter β takes values between 1.5 and 3, each number being assigned to a certain climate. Scale parameter c depends on β and is directly proportional to the average wind speed.

Further in the paper, the Maximum Likelihood Method is used to estimate the shape parameter and the scale parameter, respectively. The estimated values are obtained by solving the nonlinear equation:

$$\frac{1}{\beta} - \left(\sum_{i=1}^{n} x_i^{\beta}\, ln\, x_i\right)\left(\sum_{i=1}^{n} x_i^{\beta}\right)^{-1} + \frac{1}{n}\sum_{i=1}^{n} ln\, x_i = 0 \tag{3}$$

$$c = \left(\frac{1}{n}\sum_{i=1}^{n} x_i^{\beta}\right)^{\frac{1}{\beta}} \tag{4}$$

The solutions of equation (3) are determined with the Newton Method, applied iteratively, and the results will be the approximate values of the parameters of the Weibull distribution, respectively $\hat{\beta}$ and $\hat{c}$.

Case Study

In the present case study, two geographical areas in Romania are considered, in which the wind speed and the behavior of the Weibull Distribution parameters during a day will be analyzed. The purpose of this study is to estimate energy production, respectively the role of wind farms in estimating energy demand, for two different types of human settlements, respectively two different climates.

The Gorbănești Commune from Botoșani County and the city of Timișoara are taken as references for study. Gorbănești commune is located in the northeastern extremity of Romania, in the center of Botoșani county, the area being characterized by a hilly relief. The climate is temperate-continental, being strongly influenced by the air masses in the east of the continent (extreme-continental influences). The city of Timișoara is located in the south-east of the Pannonian Plain, in the western part of Romania. The climate is moderate continental temperate, with sub-Mediterranean influences. The registered values of wind speed are presented in table 1 for Gorbănești commune, respectively in table 2 for the city of Timișoara. All recordings was taken on 05.05.2020 from open weather data source www.windfinder.com. Fig 8. represents the variation in time of the wind speed for Botoșani, respectively, Timișoara.

Table 1:The wind speed in Gorbănești commune

Wind Speed	Time
5.14	00:00
3.09	06:00
3.09	12:00
2.06	18:00

Table 2: The wind speed in Timișoara

Wind Speed	Time
0	00:00
1.03	06:00
2.06	12:00
2.06	18:00

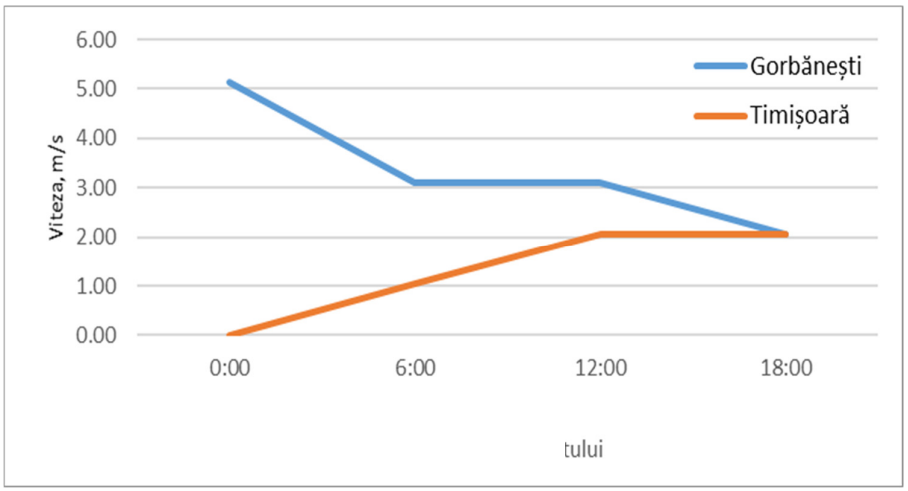

Fig. 8: Variation of wind speed in time

The values in tables 1 and 2 are entered in formula (4), for each value of the shape parameter $\beta \in [1.5, 3]$, obtaining this way the scale parameter c. The calculations are performed using a Python program illustrated in fig. 9

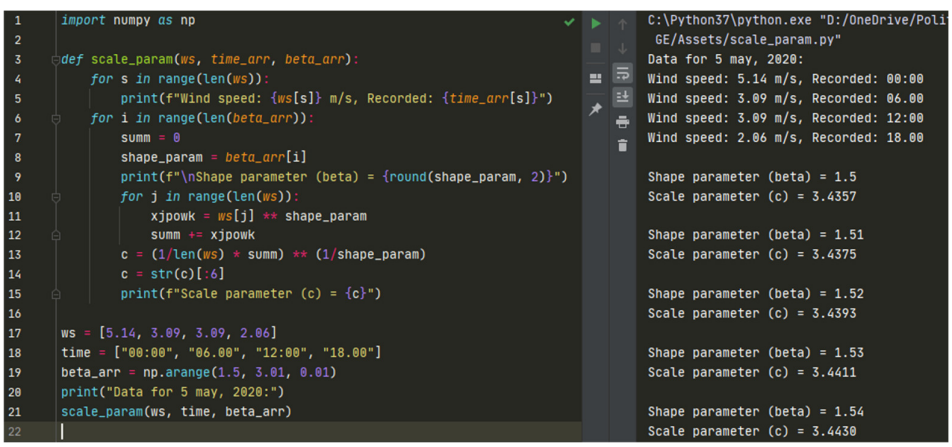

```
import numpy as np

def scale_param(ws, time_arr, beta_arr):
    for s in range(len(ws)):
        print(f"Wind speed: {ws[s]} m/s, Recorded: {time_arr[s]}")
    for i in range(len(beta_arr)):
        summ = 0
        shape_param = beta_arr[i]
        print(f"\nShape parameter (beta) = {round(shape_param, 2)}")
        for j in range(len(ws)):
            xjpowk = ws[j] ** shape_param
            summ += xjpowk
        c = (1/len(ws) * summ) ** (1/shape_param)
        c = str(c)[:6]
        print(f"Scale parameter (c) = {c}")

ws = [5.14, 3.09, 3.09, 2.06]
time = ["00:00", "06.00", "12:00", "18.00"]
beta_arr = np.arange(1.5, 3.01, 0.01)
print("Data for 5 may, 2020:")
scale_param(ws, time, beta_arr)
```

```
C:\Python37\python.exe "D:/OneDrive/Poli
 GE/Assets/scale_param.py"
Data for 5 may, 2020:
Wind speed: 5.14 m/s, Recorded: 00:00
Wind speed: 3.09 m/s, Recorded: 06.00
Wind speed: 3.09 m/s, Recorded: 12:00
Wind speed: 2.06 m/s, Recorded: 18.00

Shape parameter (beta) = 1.5
Scale parameter (c) = 3.4357

Shape parameter (beta) = 1.51
Scale parameter (c) = 3.4375

Shape parameter (beta) = 1.52
Scale parameter (c) = 3.4393

Shape parameter (beta) = 1.53
Scale parameter (c) = 3.4411

Shape parameter (beta) = 1.54
Scale parameter (c) = 3.4430
```

Fig. 9: The code sequence for determining the scale parameter

In the code sequence, the vector $\beta \in [1.5, 3]$ is recalculated with step 0.01 for accuracy, for the identification of the most appropriate value for the proposed climate. The values for the shape parameter β, respectively for the scale parameter are presented în table 3 for Gorbănești Commune, respectively table 4 for the city of Timișoara.

Table 3. Values of β and c, for Gorbănești

	Shape parameter β	Scale parameter c	
β_1	1.50	3.4357	c_1
β_2	1.51	3.4375	c_2
...	...	...	...
β_{152}	3.00	3.7056	c_{152}

Table 4. Values of β and c, for Timișoara

	Shape parameter β	Scale parameter c	
β_1	1.50	1.1598	c_1
β_2	1.51	1.1592	c_2
...	...	...	...
β_{152}	3.00	1.5480	c_{152}

Thus, when values of β are high, the wind is more stable than for small values.

The values obtained can be processed using Grammatical Evolution (GE) to determine the scale parameter c, depending on time and variables introduced by the environment. To exemplify the process, we considered the logic diagram represented in fig. 10, and we introduced the variables I, solar radiation, T, ambient temperature, and P, atmospheric pressure. The estimation of the scale parameter is performed as a function of time, t, and variables $I(t-1)$, $T(t-1)$, and $P(t-1)$.

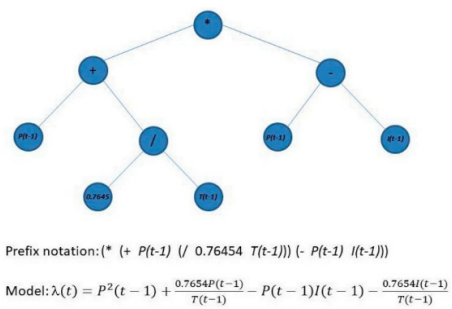

Fig. 10: Logic scheme of the GP algorithm, Borunda et al. (2020)

The BNF grammar-based code sequence that will output the expression of the c-scale parameter is presented in fig. 11.

```
<c> ::= "c = c(t) = " <c_polynomial>
<operator> ::= "+" | "-" | "*" | "/" | "^"
<char> ::= "I" | "T" | "P"
<int> ::= [0-9]
            | <int> <int>
<float> ::= <int> "." <int>
<ct> ::= <int> | <float>
<function> ::= <ct> "*" <function>
             | <char> "(t-1)"
             | <char> "^" <ct> "(t-1)"
<monomial> ::= "(" <monomial> <operator> <monomial> ")"
             | <function>
<c_polynomial> ::= <monomial> <operator> <monomial>
```

Fig. 11: BNF grammar code sequence

Output examples generated by algorithm from fig. 11.:

1) c = c(t) = 3*I(t-1)*((I^0.6(t-1)-T(t-1))-I^5(t-1))

2) c = c(t) = (I(t-1)^T(t-1))^P(t-1)

Starting from the code sequence of fig. 11, a new program can be made using Genetic Programming (GP) to automatically select the most suitable expression for the scale parameter.

To model wind energy production, according to the Wind Association, the power of a wind turbine can be approximated by the relation (5) illustrated in the research of Yu and Tuzuner from 2008:

$$P = 0.5A\rho CpNbNg(ws)^3, \quad (5)$$

where P is the motor power (Watt), A is the rotor surface exposed to wind (m^2), ρ is the air density, ws is the wind speed, Cp is the performance coefficient, Ng is the generator efficiency, Nb is the bearing efficiency.

Based on the characteristics of the turbine rotor, it is possible to simulate energy production, useful for estimating energy demand.

Conclusions

In conclusion, wind farms have an important role not only in estimating energy demand, but also in monitoring of the structural health of Smart Grids. Based on the implementation of a GE algorithm in the code sequence exposed in the case study, the exact value of the shape and scale parameter can be estimated, respectively. Each climate can be associated with a specific value of the shape parameter, which means that the Grammatical Evolution will progress in a unique way for each climate and human settlement. With the help of the Weibull Distribution, the wind speed distribution can be modeled, and the value of energy production could be simulated. In this paper Maximum Likelihood Method was applied to assign corresponding values of the scale parameter for the two human settlements using an algorithm coded in Python.

In the future, we intend to improve the nonlinear control of the statistical distribution by completing the Grammatical Evolution algorithm and adding the location parameter in the Weibull distribution. Regarding to the MicroGrid, we intend to study a network structural health and verifying if there are any quantum phenomena in case the network is damaged.

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University Student's Academic Performance: An Approach of Tau Statistic

Oluwafemi Samson BALOGUN*
School of Computing, University of Eastern Finland, FI-70211, Finland
samson.balogun@uef.fi*

Sunday Adewale OLALEYE
Department of Marketing, Management and International Business, Oulu Business School,
Erkki Koiso-Kanttilan Katu, Oulu 90570, Finland
sunday.olaleye@oulu.fi

Olayemi Joshua IBIDOJA
Department of Mathematical Science, Federal University of Gusau, Gusau, Nigeria
ojibidoja@fugusau.edu.ng

Abstract

The poor performance of tertiary graduates in Nigeria has been the subject of speculation for stakeholders in the education sector. In pursuance of Academic excellence, Nigeria's target is to become one of the top 20 economies. Performance is the ability of a student to complete a task. The task completion results could be positive or negative. Academic performance in private universities is undulating between first and third classes. These results are in public universities. If the result is positive, it indicates that the student performs brilliantly or excellently, but on the other hand, if it is negative, it indicates woeful performance. Student performance is an outcome of a rigorous evaluation through examination or other assessment methods. Performance criteria start from day one on campus, and it extends and accumulates to the end of the student's study. The study uses 1841 students' academic records from seven Engineering departments from the School of Engineering, Covenant University, Nigeria. This study examines the relationship between the first year and final year results and the reliability between first year results and final year results. The methodology adopted in this study is a quantitative technique. The analysis for the study carried out with IBM SPSS version 27 using Pearson correlation and Tau statistic. The Pearson correlation coefficient shows a strong positive correlation between the students of the first year and final year results, and it shows a significant linear relationship between students' first and final year results from the seven departments. This work will serve as a valuable source of advice to stakeholders in the education sector, inside and outside the university system, to enhance students' academic performance in the University system.

Keywords: Tau Statistic, Agreement Index, Significant, Academic Performance, Cumulative Grade Point Average

Introduction

Performance is the ability of a student to complete a task. The task completion results could be positive or negative. Academic performance in private universities is undulating between first and third classes, rare in public universities. If the result is positive, it indicates that the student performs brilliantly or excellently, but on the other hand, if it is negative, it indicates woeful performance. Student performance is an outcome of a rigorous evaluation through examination or other assessment methods.

Performance criteria start from day one on campus, and it extends and accumulates to the end of the student's study. Student performance literature is growing globally, and recent studies touched on the effect of flipped classroom versus traditional teaching on student performance using meta-analysis.

The authors discovered the flipped classroom's moderative positive effect on student performance regardless of discipline and education level (Strelan, Osborn, and Palmer, 2020). Different factors are responsible for student performance; Schwartz and Rothbart, (2020) study shows the impact of universal free meals on student performance and concludes that increases in school free lunch improve poor and non-poor student academic performance.

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Tomasevic, Gvozdenovic, and Vranes (2020) also contributed to the literature on student performance and gave an overview and predict student examination performance with supervised data mining techniques. The authors conclude that adequate data acquisition functionalities and the student's interaction with the learning environment require a robust student examination performance.

Sunday et al. (2020) focused on student performance in the context of programming education by using classification data analysis techniques and discovers class attendance as the determinant of success or failure of student academic performance.

The poor performance of tertiary graduates in Nigeria has been the subject of speculation for stakeholders in the education sector every year, mainly because of its target of becoming one of the world's top 20 economies this year (https://digitalcommons.unl.edu/libphilprac).

Recent statistics published by the review bodies have shown that good performance is scarce as average performance rises. This research analyzed the relationship between the first year and final year results and the reliability between the first year and the final year students of seven Engineering department at Covenant University.

The first-year performance represented the class of degree that the students start engineering courses from 200 level and the final year result was the class of degree at graduation. Reliability approaches determine the consistency between the first year and the final year to know the coefficient of reliability between them.

The agreement is a particular case of association and not the other way around. It represents the degree to which the observer classifies a given subject identically into the same group. In contrast, the association's measure represents the strength of the predictable relationship between the two observers or raters' ratings. Notwithstanding estimating the psychometric nature of different ratings, it is possible to ascertain the interrater reliability or interrater agreement. The interrater reliability coefficient indicates the accuracy of the response pattern or the ranking of responses between two or more raters, regardless of those ratings.

Jolayemi (1990) suggested a statistic for the calculation of agreement that uses the Chi-square distribution. The statistic evolves from the coefficient of determination R^2, an index for the regression model's stated variability, which applies to the square contingency table. Despite the impact of the recent studies examined, there is still a gap in tau statistics as a reliability measure for students' academic performance.

This study intervenes to fill this gap and to contribute to the student performance literature. The outstanding research question that this study intends to answer is: Why is it essential to examine the reliability measure of academic performance in a tertiary institution, and what is the impact of the student performance reliability to students and the University decision-makers? The study intends to check whether there is a strong correlation between the first year and final year result and examine if there is a significant linear relationship between the first year and final year result of students across the School of Engineering School.

This study divides into five parts, and for clarity, the first part is an introduction, second, literature review, third, methodology, fourth, discussion, and finally a conclusion. The study also discusses the study limitation and future study.

Theory of Academic Performance

Students have the capability for extraordinary academic achievement in a University environment. This proposition diver among different students. Down-to-the-earth accomplishments happen in day-to-day practice in University settings. At the beginning of the semester, the teachers and administrators take a turn to inspire the students to pursue their dreams to come out with flying colors at the end of their study. Since accomplishments are a shared vision of the entire academic community, a theory of performance is applicable in many learning contexts.

The theory of academic performance (ToP) emanates from Elger (2007), and the author described ‘perform’ as an ability to produce a valued result and ‘performer’ as an individual or a group that engages in collaboration while the level of performance as the location in an academic journey. According to Elger (2007), there are six components of performance levels, and they are: level of knowledge, levels of skills, level of identity, personal factors, and fixed factors and proposed three axioms for effective performance as performer’s mindset, immersion in an enriching environment, and engagement in reflective practice.

The theory of performance challenges educators to improve their performance through empowerment to help others learn effectively and grow. This type of learning will foster quick success and produce knowledge that will influence society. Inferring from the study of Wiske (1998), performance indicates learning-for-understanding.

Higher academic performance produces results that lead to an increase in academic quality. This process creates an environment where performance exceeds the expectations of the academic community stakeholders. There will also be a decrease in cost; that is, the financial resources involved in producing the desired result will be reduced. Higher academic performance will also increase capability, capacity, knowledge, skills, and motivations. This development is a good signal for the university publicity and acceptance.

Applying the academic performance theory to the Private University results, the performer will need to stabilize the students at the forefront and encourage the backing students to improve drastically. The performer can set a challenging goal for the student from the beginning of the semester and allows failure as part of the rubrics to motivate high performance. This intervention should be a gradual process.

Related Literature

The literature on academic performance across different levels of education globally is advancing, and this development established the visibility of academic performance research domain. Earlier, Brown et al. (2008) examined social cognitive as predictors of academic performance in College setting using meta-analytic. Turner, Chandler and Heffer, (2009) digressed from social cognitive and researched on the influence of parenting styles, achievement motivation and self-efficacy of College students. Since academic importance is all-encompassing, Akiri and Ugborugbo, (2009) focused on how teacher's effectiveness impacts the academic performance of the secondary school students. Similarly, Akinsolu, (2010) combined teachers and students' academic performance as an implication for planning in Nigerian Secondary Schools. Also, Koles, et al. (2010) studied the impact of team-based learning on medical students' academic performance while Li, Chen and Duanmu,

(2010) embarked on a comparative study of Chinese students and their colleagues in other international schools and gives insight into the determinants of international students' academic performance. Gaultney, (2010) studied the effects of sleep disorders of college students on their academic performance while Farooq, Chaudhry, Shafiq and Berhanu, (2011) researched on the factors that affect students' academic performance quality. It means the students perform, but not all the students did not attain academic performance quality level.

Investigating student performance is very in institutions to help students work hard and assist administrators in their plans to get the best performance from their students. Several researchers have worked on different areas of academic performance. Samaha and Hawi (2016) used Pearson correlation and Multivariate analysis of variance to examine if satisfaction with life mediates stress and academic performance facilities Smartphone addition.
Also, Balogun, Oyelere and Atsa'am (2019) examined the relationship between student's first year and final year academic performance using Regression and Correlation analysis.

Kusurkar et al. (2013) applied a structural equation modelling technique to assess how Relative Autonomous Motivation (RAM) influences academic performance through a sound research strategy and higher study effort.

Giunchiglia et al. (2018) examined the impact of social media on students' performance, and the result showed that social media usage negatively impacts students' academic performance. Similarly, the study carried out by Paul, Baker and Cochran, 2012; Junco, 2012; Meier, Reinecke and Meltzer, 2016 showed a similar result.

Balogun, Moshin and Olaleye (2020) used Cohen's kappa, Intra kappa statistic and Pearson correlation coefficient to determine the agreement and relationship between students' first year Grade Point Average (GPA) and final year Cumulative Grade Point Average (CGPA).

In the same vein, Elepo and Balogun (2016) applied Kappa statistics to investigate student's academic performance using the students' first-year GPA and graduating CGPA.

Literature on Predicting Academic Performance

Fernandes et al. (2019) applied Gradient Boosting Machine (GBM) to predict student's academic performance at the end of the school year. The result shows that the neighbourhood, school, and age indicate students' academic success or failure.

In a study carried out by Miguéis et al. (2018), the authors proposed a two-stage model that uses students' first year to predict their overall academic performance. The result shows Random Forest to be superior to other methods used in terms of accuracy.

Iyanda et al. (2018) conducted a comparison of neural network models to predict student academic performance based on a single performance factor. The result shows that the Generalized Regression Neural Network performs better than the Multilayer Perceptron model in terms of accuracy to predict students' academic performance.

Zaffar, Savita and Hashmani (2018) applied the Feature selection algorithm, a form of Educational Data Mining (EDM), to predict students' academic performance. The result shows a 10% difference in the prediction accuracy between the dataset with different features.

Material and Methods

This study collects data from the School of Engineering which comprises of Chemical, Civil, Computer, Electrical and Electronics, Information and Communication, Mechanical and Petroleum Engineering of Covenant University, Nigeria, during the 2005/2006 academic session were followed-up to their year of graduation in 2010.

The study further checked the spreadsheet of each student to know the category or class of degree they started with 100 level for students who admitted with University Matriculation Examination and 200 level for direct entry.

The appropriate class of degree for each student recorded and equally checked to know the class of degree that he or she later graduated. The study is limited to the first year and final year students' academic performance from seven departments in the School of Engineering from 2005/2006 to 2009/2010 sessions.

The analysis for this study carried out using IBM SPSS version 27 using Pearson correlation and Tau statistic.

Pearson Correlation

Accord to Wang (2012) a nonparametric measure of association for two random variables is known as Pearson correlation coefficient r. It has the value between +1 and -1.

The Pearson correlation coefficient defined as:

$$r = \frac{n(\sum XY) - \sum X \sum Y}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}$$

Tau Statistic

Jolayemi (1990) suggested a statistic for an agreement calculation that uses the Chi-square distribution. The statistic was introduced from the perspective of R^2, the coefficient of determination, an index for the stated variability of the regression model applied to the square contingency table. The author proposed a theorem that was also shown to consider the I x I (square) contingency table obtained by classifying the same N subjects in one of the possible I outcomes by two raters.

The Pearson Chi-square (χ^2) statistic for independence is said to be at most $(I-1)N$. The author also proposed a statistic which measures agreement, the statistic is denoted by $\tau = \sqrt{\lambda}, -1 < \tau < 1$.
Where the λ which is R^2 type statistic is defined by $\lambda = \frac{\chi^2}{max(\chi^2)}$ and
max(χ^2) is proved to be $(I-1)N$. Hence, $\lambda = \frac{\chi^2}{(I-1)N}$.

The benefit of this statistic over kappa is that $(\lambda = \tau^2)$ is possible to make an inference to τ even by means of λ , which estimates the stated variability shown by the configuration of the table. The author also proposed some arbitrary division based on $|\tau|$ with the respective strength of the agreement, as Landis and Koch also proposed for the Cohen Kappa statistic (Landis & Koch, 1977).

Range of Tau Statistic with the Respective Strength of Agreement

$\lvert \tau \rvert$ statistic	Strength of agreement
0.00 — 0.20	Poor
0.21 — 0.40	slight
0.41 — 0.60	moderate
0.61 — 0.80	substantial
0.81 — 1.00	almost perfect

When $\tau < 0$, the agreement is negative.

Result

This section comprises of the results from Pearson correlation and Tau statistic. A sample of the R code used for the Tau statistic is attached at the appendix section.

Table 1: Pearson Correlation Coefficient for Chemical Engineering department

	Final year	
	Pearson Coefficient	P-value
First year	0.893	<0.001
Pearson Correlation Coefficient for Civil Engineering department		
	Final year	
	Pearson Coefficient	P-value
First year	0.899	<0.001
Pearson Correlation Coefficient for Computer Engineering department		
	Final year	
	Pearson Coefficient	P-value
First year	0.915	<0.001
Pearson Correlation Coefficient for Electrical and Electronics Engineering department		
	Final year	
	Pearson Coefficient	P-value
First year	0.880	<0.001
Pearson Correlation Coefficient for Information and Communication Engineering department		
	Final year	
	Pearson Coefficient	P-value
First year	0.905	<0.001
Pearson Correlation Coefficient for Mechanical Engineering department		
	Final year	
	Pearson Coefficient	Pearson Coefficient
First year	0.890	<0.001
Pearson Correlation Coefficient for Petroleum Engineering department		
	Final year	
	Pearson Coefficient	P-value
First year	0.923	<0.001

Table 2: tau statistic and interpretation for the seven departments

Department	Jolayemi tau statistic	Interpretation	Chi-square	p-value	Interpretation
Chemical Engineering	0.5827	Moderate	201.65	<0.001	Significant
Civil Engineering	0.5348	Moderate	130.40	<0.001	Significant
Computer Engineering	0.5628	Moderate	473.78	<0.001	Significant
Electrical and	0.5363	Moderate	468.21	<0.001	Significant

Electronics Engineering					
Information and Communication Engineering	0.5225	Moderate	381.07	<0.001	Significant
Mechanical Engineering	0.5893	Moderate	172.92	<0.001	Significant
Petroleum Engineering	0.5042	Moderate	198.30	<0.001	Significant
School of Engineering	0.5230	Moderate	2014.50	<0.001	Significant

Confidence Bound for the tau statistic for School of Engineering

The 95% confidence interval is defined as follows:

$$C.I. = \tau \pm Z_{\alpha/2}\sqrt{\frac{\tau(1-\tau)}{n}}$$

$$= \tau \pm Z_{1-\alpha/2}\sqrt{\frac{\tau(1-\tau)}{n}}$$

$$= 0.5230 \pm 1.96\sqrt{\frac{0.5230(1-0.5230)}{1841}}$$

$$= 0.5230 \pm 1.96(0.011640808)$$

$$= 0.5230 \pm 0.02282$$

$$= (0.50018, 0.54582)$$

Interpretation: the 95% confidence interval shows that the reliability coefficient for the School of Engineering is between 50% and 55%.

Discussion

This study aims at examining the relationship between the first year and final year results and the reliability between first year results and final year results from seven Engineering departments and the School of Engineering. From the result of the Pearson correlation coefficient, it shows there is a strong positive correlation between the students the first year and final year result, and it also shows there is a significant linear relationship between students first and final year result from the seven departments.

For Chemical Engineering, about 58% of the variation was accounted for, the remaining 42% was due to the variance of the first year even when the final year was taken into account, about 58% of the students would end up with the class of degree they started with.

For Civil Engineering, about 53% of the variation was accounted for the remaining 47% was due to the variance of the first year even when the final year was taken into account, about 53% of the students would end up with the class of degree they started with.

For Computer Engineering, about 56% of the variation was accounted for the remaining 44% was due to the variance of the first year even when the final year was taken into account, about 56% of the students would end up with the class of degree they started with.

For Electrical and Electronics Engineering, about 54% of the variation was accounted for the remaining 46% was due to the variance of the first year even when the final year was taken into account, about 54% of the students would end up with the class of degree they started with.

For Information and Communication Engineering, about 52% of the variation was accounted for, the remaining 48% was due to the variance of the first year even when the final year was taken into account, about 52% of the students would end up with the class of degree they started with.
For Mechanical Engineering, about 59% of the variation was accounted for, the remaining 41% was due to the variance of the first year even when the final year was taken into account, about 59% of the students would end up with the class of degree they started with.

Furthermore, For Petroleum Engineering, about 50% of the variation was accounted for, the remaining 50% was due to the variance of the first year even when the final year was taken into account, about 50% of the students would end up with the class of degree they started with. Lastly, For School of Engineering which comprises all the departments, about 52% of the variation was accounted for, the remaining 48% was due to the variance of the first year even when the final year was taken into account, about 52% of the students would end up with the class of degree they started with.
The chi-square shows there is significant association between the first year and final year results from the seven Engineering department and the School of Engineering ($p - value < 0.001$).

The results of this research shared similar findings with other existing studies. For example, the study carried out by Balogun, Moshin and Olaleye (2020) which adopted kappa statistic as their method of analysis using data collected from a private University while in our study tau statistic was adopted to examine the academic performance of students from private University. From both studies, we noticed that a reasonable proportion of the students will end up with the class of degree they started with in their first year. Besides, Banjoko et al. (2015) applied kappa statistic using data collected from public University while we implemented tau statistic using the academic performance of students from private University. Both studies revealed that more than half of the students' considered will end up with the class of degree they started with in the first year. Also, the study conducted by Elepo and Balogun (2016) examined students' performance from a public university using Kappa statistic on the data from public University while our study considered the academic performance of students from private University. The summary of the findings of both studies showed that majority of the students will end up with the class of degree they started with in the first year. Lastly, Ibidoja, Ajare and Jolayemi (2016) and our study adopted tau statistic, but the data considered differs. The findings also showed that majority of students will end up with class of degree they started with in the first year.

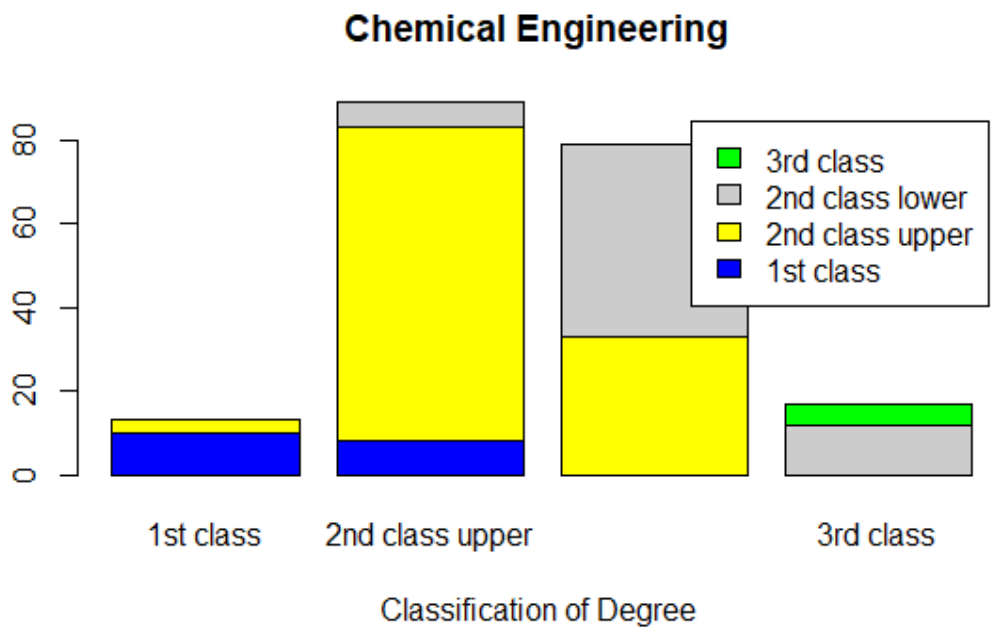

Figure 1: Bar Plot for Chemical Engineering Department

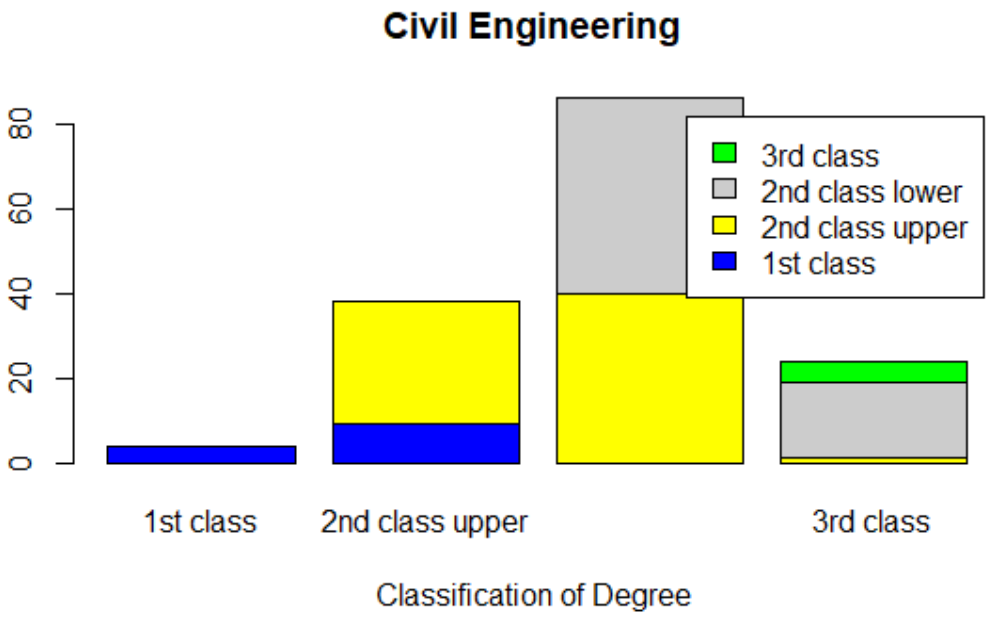

Figure 2: Bar Plot for Civil Engineering Department

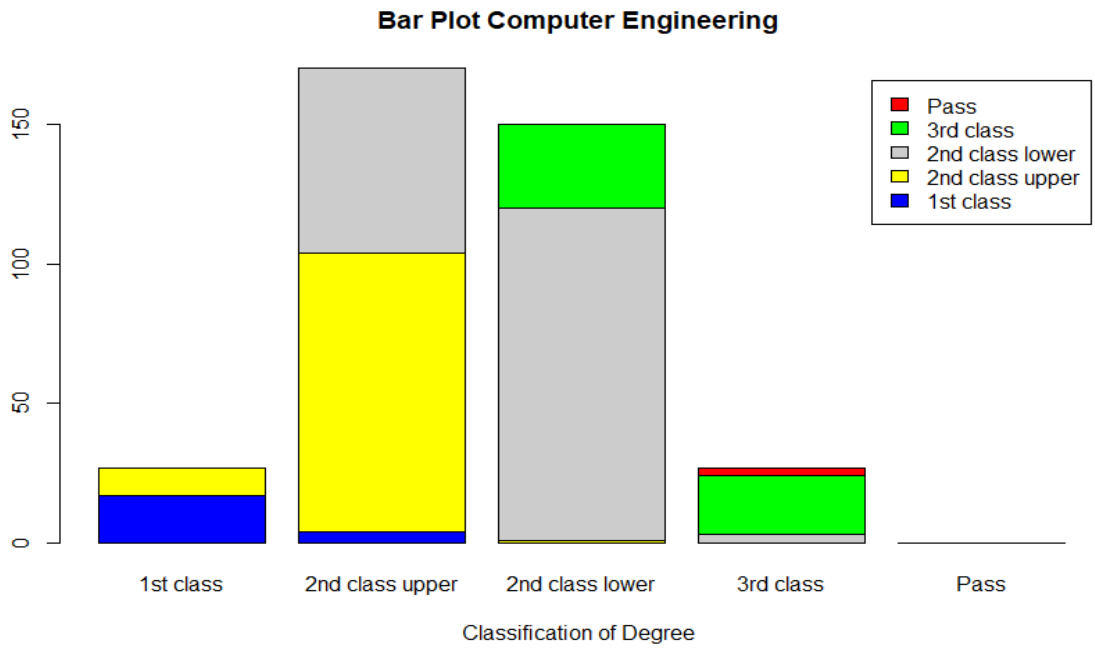

Figure 3: Bar Plot for Computer Engineering Department

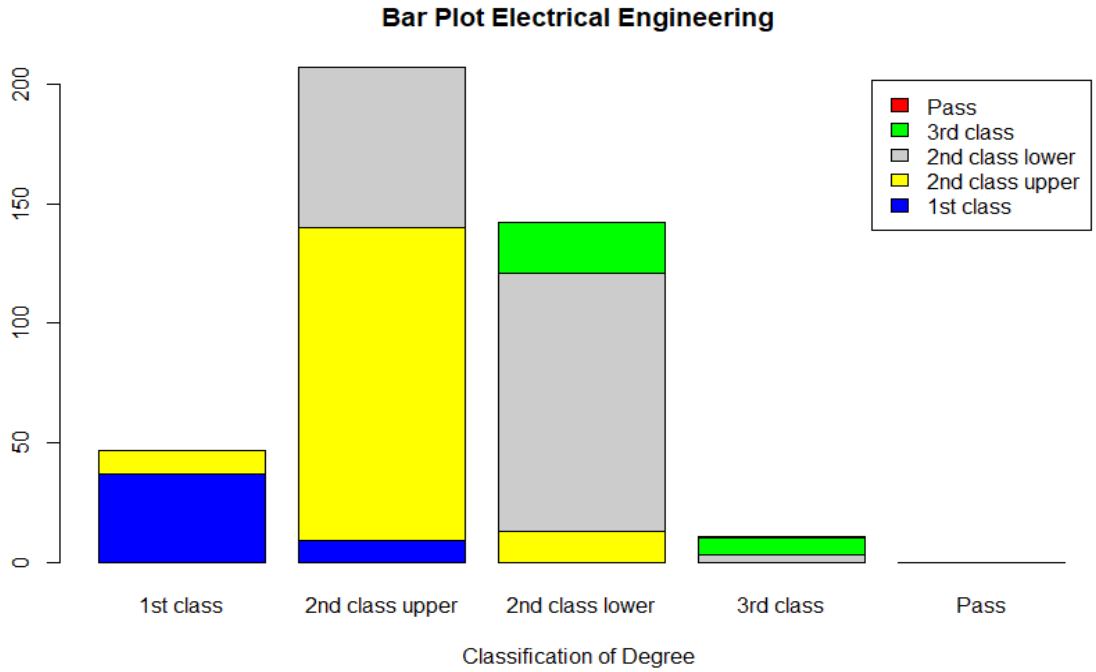

Figure 4: Bar Plot for Electrical and Electronic Engineering Department

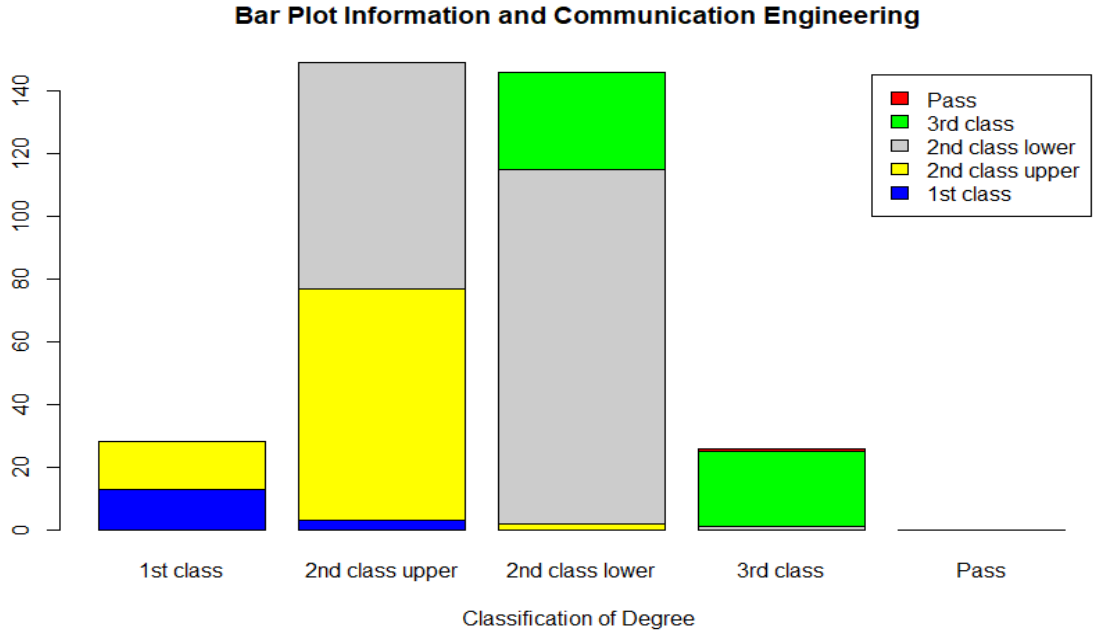

Figure 5: Bar Plot for Information and Communication Engineering Department

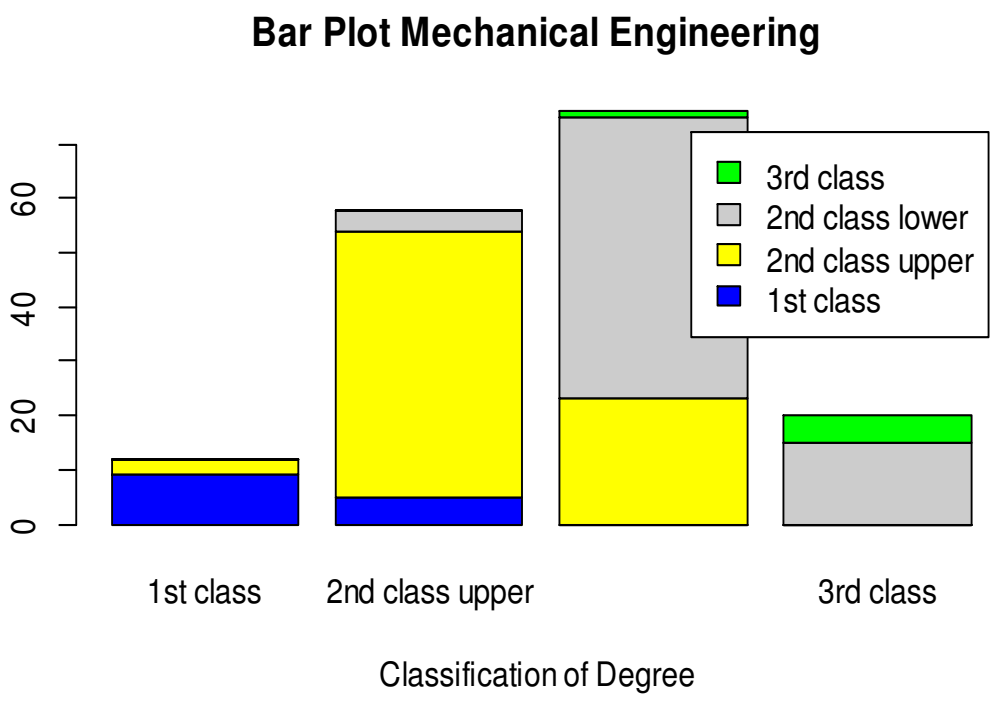

Figure 6: Bar Plot for Mechanical Engineering Department

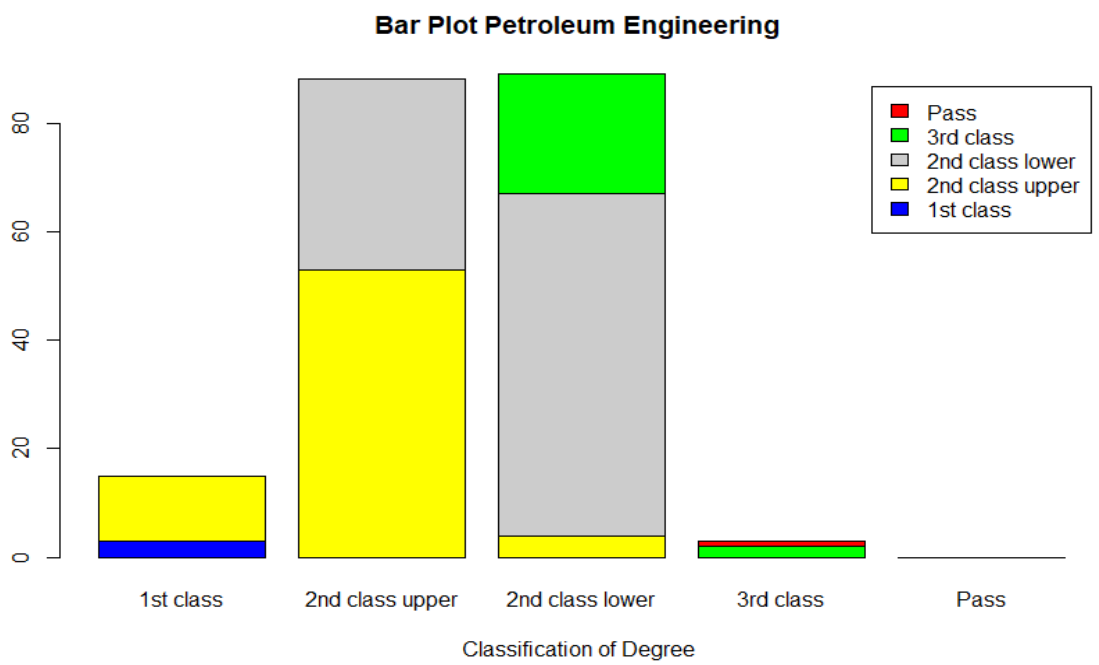

Figure 7: Bar Plot for Petroleum Engineering Department

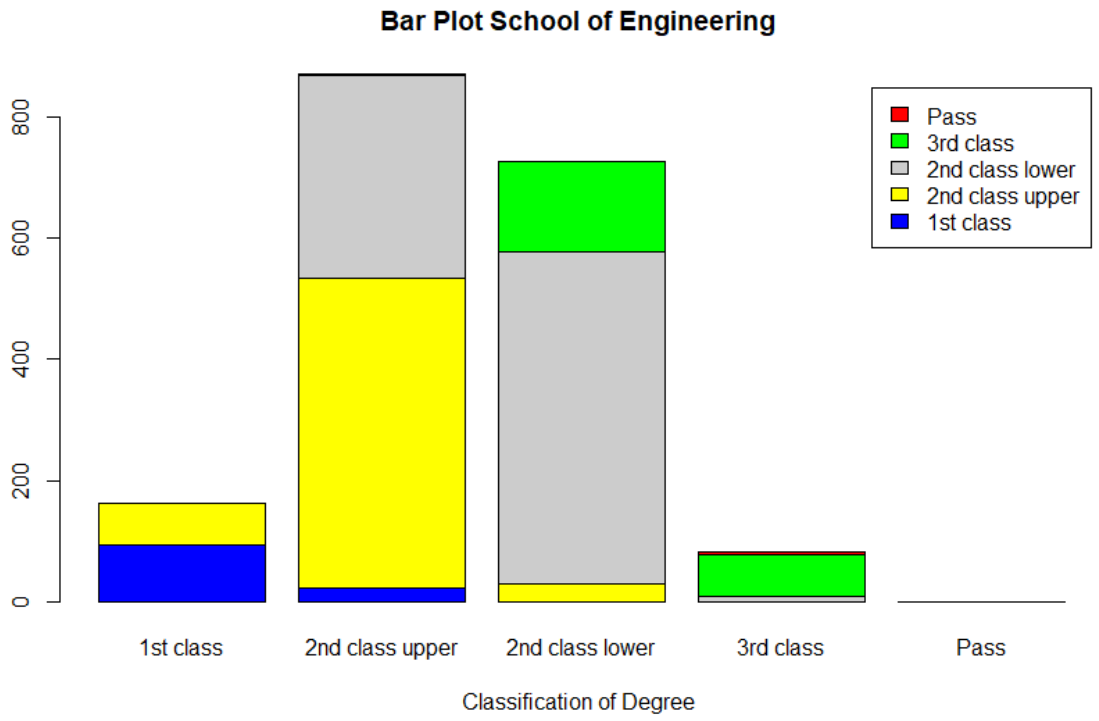

Figure 7: Bar Plot for School of Engineering Department

Conclusion

The study shows that there is a strong correlation between the first year and final year result and also it shows that there is a significant linear relationship between the first year and final year result of students across the seven departments in the School of Engineering.

The analysis showed that the relationship between the first year and final year in the Department of Chemical, Civil, Computer, Electrical, Information and Communication, Petroleum Engineering and the School of Engineering which comprises of all the departments were moderate.

From the tau statistic, it shows that about 58% of the students from Chemical Engineering department would end up with the class of degree they started with while about 58% of the students from Chemical Engineering department would end up with the class of degree they started.

The result from tau statistic reveals that about 53% of the students from the Civil Engineering department would end up with the class of degree they started.

It also shows about 56% of the students from the Computer Engineering department would end up with the class of degree they started and about 54% of the students from the Electrical and Electronics Engineering department would end up with the class of degree they started.

Similarly, the result shows about 52% of the students from the Information and Communication Engineering department would end up with the class of degree they started.

The tau statistic shows that about 59% of the students from the Mechanical Engineering department would end up with the class of degree they started with,

Furthermore, the result from tau statistic shows that about 50% of the students from Petroleum Engineering department would end up with the class of degree they started with, and about 52% of the students from the School of Engineering which comprises of all the departments would end up with the class of degree they started.

The study also shows there is a significant association between the first year and final year results of students from the seven departments and in the School of Engineering of the University. The 95% confidence interval shows the School of Engineering's reliability coefficient to be between 50% and 55%. This study is limited to secondary data extracted from the academic records of students of seven departments from the School of Engineering from the 2005/2006 session to the 2009/2010 session of Covenant University, Nigeria. Future research will make a comparison between tau and kappa statistic. Also, the various outcomes of this work will serve as valuable therapy tools for stakeholders in the education sector inside and outside the university system to enhance students' academic performance in the system. This research would also support parents and guardians from introducing the requisite steps to help enhance their children's academic performance at the university.

Lastly, this study recommends that students spend a lot of their time reading than using it on social networks and watching soccer. Students should develop the practice of reading books in the library and using books in the library. Students should use internet facilities to research their courses.

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Appendix

- R code shows the result for the tau statistic, the chi-square and the histogram.
- mechanical=matrix(c(9,5,0,0,3,49,23,0,0,4,52,15,0,0,1,5), nrow=4,byrow=T)
- dimnames(mechanical)=list(firstyr=c("1st class","2nd class upper","2nd class lower","3rd class"),finalyr=c("1st class","2nd class upper","2nd class lower","3rd class"))
- chisq.test(mechanical)
- x1mechanical=ncol(mechanical)-1
- x2mechanical=sum(mechanical)
- taumechanical=sqrt(172.92/(x1mechanical*x2mechanical))
- barplot(info,main ="Bar plot mechanical Engineering ",xlab="Classification of Degree ",col=c("blue","yellow","grey80","green"),legend=rownames(mechanical))
- The same process is repeated for all the departments and the school of Engineering.

The Economic Impact of Torre De Moncorvo's Wine and Taste Festival

Joana FERNANDES [a], Aida CARVALHO [b] and Victor MOREIRA [c]

[a] Joana Fernandes, joana@ipb.pt, Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal; CITUR

[b] Aida Carvalho, acarvalho@ipb.pt, Instituto Politécnico de Bragança, Campus de Santa Apolónia 5300-253 Bragança, Portugal; CITUR

[c] Victor Moreira, victorsmoreira@sapo.pt, Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança.

Abstract

An event can exist at a particular time and place, specifically prepared and developed with a certain purpose and for a target audience. According to the purpose and other factors, one can categorize events in a multitude of classifications. In this sense, this paper will focus on food and wine touristic events.
A touristic event has the potentiality to attract new people to a region and, as such, attract new money, enhancing not only the economic activity of the region, but also its visibility, its image, and the diffusion of local culture.
An event moves people, creating jobs and increasing the revenues for a country or a region, and can also develop the destinies' notoriety and increase the demand in low seasons.
This potential economic enhancement and cultural visibility is increasingly appealing for local and regional public and private entities as part of the economic and promotional development strategy of the region. As such, it is relevant to understand the annual Vinho & Sabor Douro, a wine and taste festival, that happens in Torre de Moncorvo, regarding its economic impact and how it promotes local culture and products.
A survey was conducted in order to estimate the behaviour of exhibitors and visitors of the event. With the data collected it was possible to understand the importance of this event regarding exhibitors' revenues, visitors' preferred products, and how much the visitors spent, which allowed to estimate the economic impact of the event for the region.

Keywords: Wine and Food Festival, Cultural Tourism, Economic Impact, Torre de Moncorvo**.**

Introduction

For a long time now it is accepted that tourism is a tool for regional development (Moscardo, 2007). Among different types of tourism, event tourism has gained a considerable importance. An event can exist at a particular time and place, prepared and developed specifically with a certain purpose and for a target audience (Getz, 2009).

When a touristic event occurs there is the potentiality to attract new people to a region and, as such, attract new money, enhancing not only the economic activity of the region, but also its visibility, its image, and the diffusion of local culture (Almeida & Araújo, 2017). An event moves people, creating jobs and increasing the revenues for a country or a region, and can also develop the destinies' notoriety and increase the demand in low seasons (Getz & Page, 2016).

This potential economic enhancement and cultural visibility is increasingly appealing for local and regional public and private entities as part of the economic and promotional development strategy of the region (Allen, O'Toole, Harris, & McDonnell, 2010).

Although, literature presents some studies regarding economic impact analysis that certain events have in regions, it still lacks examples of deprived and isolated regions, that struggled harder to attract visitor, such is the case of Torre de Moncorvo. In this sense, this work intends to present the case of the wine and food festival to shed more light on the subject.

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Literature Review

In the broader area of tourism one can find different types of tourism among which there is event tourism. This type of tourism regards the movement of people with a particular interest in participating in events. Events have been, for a long time, part of local, regional and national strategies regarding destination's development, since they are important promoters of tourism (Getz & Page, 2016).

Food tourism can be define, in the words of Hall and Mitchell (2001, p.308) as "as visitation to primary and secondary food producers, food festivals, restaurants and specific locations for which food tasting and/or experiencing the attributes of specialist food production regions are the primary motivating factors for travel". Food tourism can be define in a simpler way as the search for an unique experience regarding eating and drinking. According to World Food Travel Association, "is the act of traveling for a taste of place in order to get a sense of place". Usually, this search for food experiences is related with an interest about the origin of the products, the authenticity of the food, the culture and traditions of the places (Cunha, Barroco, & Antunes, 2019; Hall & Sharples, 2008).

In literature, tourism has infinite references and only a small part refers to food and wine events. However, the focus in this niche is increasingly growing, not only for the economic interest of the producers but also because they have the potential to attract visitors to the regions and lead them to contact to local producers that wouldn't happen otherwise (Montella, 2017).

Currently, food is seen as a key element to increase the value of a destination and to attract loyal tourists. This connection is stronger when food is related with wine, since both elements can add value to the destination and enable the differentiation and promotion of the regions (Marques, Lopes, & Varela, 2020). Wine events are considered a subcategory of food events. In reality, food and wine events are so attractive due to the gathering of two general interests: people like to eat and to drink. Getz (2019) enhances that the consumption is probably the "core experience", and the visitors that attend the event are focusing on tasting and buying.

Food and wine tourism is when a tourist visits a region with the main purpose of experimenting a specific type of food or wine (Hall & Gössling, 2016). Food and wine tourism complement each other and are also regarded as promoters of local tradition, authenticity and local identity and also contributing to preserve cultural and historical heritage (Getz, 2019).

However, it is necessary to refer that sometimes regions decide do avoid this path and don't promote these events, since the events must be close connected with local development strategies. It can be determined that such an event would do more harm than good to local residents and cultural authenticity (Getz, 2019).

Local economic development strategies that intend to enhance food and wine tourism tend to concentrate in using local suppliers and so reduce the economic leak to outside the region; enhance the product image; enhance branding and marketing strategies and promote local identity; among others (Hall & Gössling, 2016). One way to do so, and a current trend, is the organization of events related to food and wine, specifically, festivals (Van Niekerk, 2017). In recent years, events and festivals have been extensively promoted as a form of tourism particularly useful for regional development since they attract visitors and their spending to the local economy (Star, Rolfe & Brown, 2020). However, this trend also brought to light that some destination had these events merely to respond to the fact that other destinations were following this path and not because they considered it a strategic action for the region. As such, many events were one time only. When there is a planned and strategic approach to festivals, with a correct adjustment to local infrastructures, manufacturers and products, the region can select the event that best responds to the objectives and can truly differentiate from other regions (Van Niekerk, 2017).

The pursuit of the regions to develop food and wine festivals is easily understood since they are crucial to the promotion and dissemination of local products. Alongside, they can also communicate local cultural heritage and enhance local identity. However, the final pursued result, is always to boost local economy (Dixit, 2019).

There is a perspective extensively studied that emphasize economic benefits, although currently there are some different approaches that consider the possible existence of other benefits not economically related. However, even with this recognition of a different range of benefits that arise from festivals for the hosting regions, one can see in literature that studies focus mainly on four benefits: economic impact of the festival; marketing and service quality related to visitors profile; marketing and service quality related with the festival management; and positive and negative impacts of the festivals in local residents (Getz, 2019; Moscardo, 2007).

This type of events are important cultural and touristic attractions at national, regional and local level.
Portugal is one of the best food and wine destinations in Europe and the Touristic Strategy 2027 (TE 2027) aims to place Portugal as one of the most competitive, innovator, and sustainable destinations in the world. The TE2027 identifies the wine and food product as an strategic asset for the qualification of the destination, since it enhances the touristic experience and adds value to the touristic offer of the regions (Turismo de Portugal, 2017).

According to Getz (2019), destinations have to determine what benefits they expect from events and how can the results be measured. Even the "perceived impacts, whether they are believed to be good or bad, and from whose perspective, is a necessary complement to market research" (Getz, 2019, p.152),. Therefore, it is necessary to understand what benefits and to what range the hosting regions have accomplished them. The economic perspective is always one of the chosen perspectives and when the expectations are not met, usually the events tend to end (Getz & Page, 2016).

Even recognizing the existence of other benefits, due to time and resources constrains, the economic perspective is the focus of this paper. The particular case in study, Vinho & Sabor Douro, is a festival that belongs to the thematic events of food and wine. In the following sections the methodology and results obtained are described.

Methodology

This work was developed based on a literature review regarding specific information about touristic events and the economic impact they can bring to a region. Afterwards, a survey was conducted to understand the behaviour of exhibitors and visitors do a specific wine and food event, the Vinho & Sabor Douro (Wine & Taste Douro). The survey was supported in two structured questionnaires, one directed to the exhibitors of the festival and one directed to the visitors. A pre-test was conducted to 10 individuals. The questionnaires were applied during the event (September 7-8, 2019).

The exhibitors' questionnaire had two sections, the first directed to characterize the exhibitors in terms of professional profile and the second regarded the result of their activity in the festival (sales, revenues, complains, and so on). The visitors' questionnaire had three sections, the first intended to describe their socio-economic characteristics, the second intended to understand their behaviour regarding habits of visiting other events, and on the third section it was intended to understand their behaviour as consumer of the goods and activities available in the festival.

With the collected data it was possible to characterize the exhibitors and their economic results and also the visitors regarding who they are, what they bought and how much they spent.

Results

The municipality of Torre de Moncorvo is located on the south of the Bragança district, integrated in NUT III-Douro. This region is located in the northeast of Portugal and is characterized to be a deprived and isolated region (Figure 1).

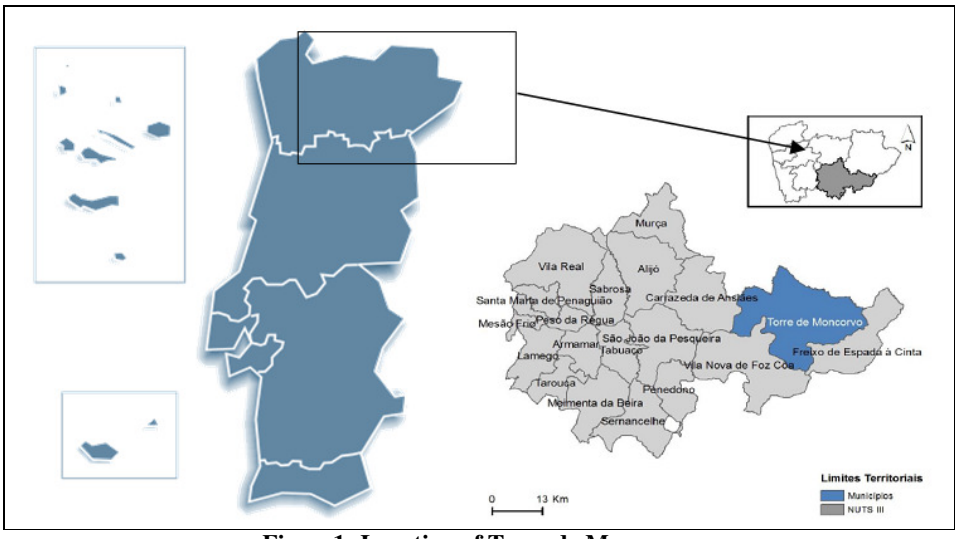

Figure1: Location of Torre de Moncorvo

Source: Statistics Portugal (2020; 2018).

Torre de Moncorvo has 532 km^2 and spreads over a geographical area of 532 km^2, has a population density of 16.1 per km^2 (Portuguese mainland is 112.8 per km^2) and an aging index, that is the ratio between individuals with 65 or more years and individuals with 15 or less years) of 394.8 (for Portuguese mainland is 130.6) (Portugal Statistics, 2020). The municipality is divided in 13 parishes and is decreasing the number of inhabitants, easily perceived in the population density, due to different aspects namely decreasing of the birth rate, migration of the young ones either to go to study in other regions or to look for a job.

Although it is a region with severe restriction in terms of population and development indexes it includes the region "Douro Vinhateiro" that is a world heritage protected region by the UNESCO since 2001 and is one of the main touristic attractions to the region. Alongside, the municipality has invested in attracting tourist to the city, not only to appreciate the historic buildings but also to enjoy the cultural agenda, very rich in cultural events, were the Medieval Fair and the Vinho & Sabor Douro are examples.

Torre de Moncorvo's Vinho & Sabor Douro

Due to its location, in the Douro Superior, Torre de Moncorvo is a distinguished wine region with 1,530 acres of vineyard, representing 16% of the Douro Superior and 3.5% of the Douro region. In this context, during September and October, when the harvest occurs, it was developed a wine and food event in order to potentiate tourism and attract those specific tourists that want to taste wine and experiment the surrounding activities concerning its harvest. This event started in 2014 with the designation Sabor Douro Wine Summer Fest and since 2019 is designated Vinho & Sabor Douro (VSD) and it happens every year in a fluvial beach of the Sabor river.

The festival is restricted to wine producers from Torre de Moncorvo, since one of the objectives of the festival is to show and promote local wines. This festival can be a front row for excellent local wines, and at the same time can enhance local economy, since all the products presented and sold in the festival are from local manufacturers.

In 2019 there were 12 exhibitors in the festival, nine wine manufacturers and three enterprises of the food area. The municipality estimates 6,000 visitors to the festival during the two days. These were the individuals that were considered to answer the questionnaire. On the exhibitors side, the entire population answer the questionnaire, and on the visitors side 193 answers were gathered through a convenience sampling.The following sections present the results from the collected data.

Exhibitors results

In this section the results from the exhibitors' questionnaire are presented. A total of 12 exhibitors were questioned.

Exhibitors Sample Profile

Since the festival is restricted to wine producers of Torre the Moncorvo, it was understandable that the exhibitors' place of origin was 50% from the village of Torre the Moncorvo and 50% was from the county. Regarding their economic and legal activity, the main one is "Agriculture, livestock production, hunting, forestry and fishing" and for the remaining three was "restoration".

Participation in this and others Medieval Fair´s

Table 1 shows the participation in this and other similar events. One can see that the majority (%8.3%) has participated in previous editions of the festival, however also the majority usually does not participate in this type of events.

Table 1: Participation in this and other events

Variables	Frequency	Valid%
Previous participation in VSD		
Yes	7	58.3
No	5	41.7
Usual participation in other similar events		
Yes	5	41.7
No	7	58.3

Source: Own elaboration.

Exhibitors' Revenues

Another aspect was regarding the total revenues of the exhibitors, to understand if the event did perform according to the objectives of promoting local wine and draining stocks. Table 2 describes the amounts the exhibitors stated for the two days festival. According to them, almost all (91.7%) estimated revenues under 2499 euros, in average the estimated revenue per exhibitor reached 1,458 euros.

Table 2: Exhibitors' revenues

Variables	Frequency	Valid%
Sales amount (euros)		
Up to 2499	11	91.7
Between 2500 and 4999	1	8.3
Between 5000 and 7499	0	0.0
Between 7500 and 9999	0	0.0
Mean Sales amount (euros)	1458.3	

Source: Own elaboration.

National and foreign visitors' spending

It was possible to distinguish national and international visitors and their spending. Table 3 presents the amount spent by Portuguese visitors and by foreign visitor.

From Table 3 it is possible to see that foreign visitors spend more, in average 47.2 euros, than national visitor that reach in average 38.6 euros.

Table 3: National and foreign visitors' spending

Variables	Frequency	Valid%
Amount spent by national visitors (euros)		
Up to 49	9	81.8
Between 50 and 99	1	9.1
Between 100 and 149	1	9.1
Between 150 and 199	0	0.0
Between 200 and 249	0	0.0
Average spending	**38.6**	
Amount spent by foreign visitors (euros)		
Up to 49	6	66,7
Between 50 and 99	2	22,2
Between 100 and 149	1	11,1
Between 150 and 199	0	0,0
Between 200 and 249	0	0,0
Average spending	**47.2**	

Source: Own elaboration.

Need for Extra Workforce

It was also relevant to find out if the exhibitors required extra labour force to participate in the event. A vast majority (75%) stated that they needed to employ more collaborators. According to Table 4 it is visible that they employed individuals from the region and for the two days vent 13 people were recruited.

Table 4: Extra workforce

Variables	Frequency	Valid%
Need to recruit more employers		
Yes, in the village	6	50.0
Yes, from other places	3	25.0
No	3	25.0
Number employees recruited: 13		

Source: Own elaboration.

Future participation in this event

Lastly, one important indicator that the event had successfully achieve the exhibitors objectives was about the intention to participate in future events. In this question it was a consensual answer with 100% stating that they will participate in future editions of the festival.

Visitors Results

In this section, the results obtained from the gathered data are presented. The estimated number of visitors to the festival reached 6,000 individuals and the total sample registered 193 answers.

Visitors Description

The data collected referred to the main demographic characteristics of the visitors. The majority of the visitors (88.6%) were Portuguese and of the foreign visitors 59.1% were from Spain and 27.3% were from France. This was already expected since the majority of the visitors tend to be Portuguese and the foreign are typically from Spain due to the proximity and from France due to the migrant tradition.

The educational level was mostly with secondary education, having 11.9% only basic educational level and 43.5% a higher education level. Regarding their professional activity the majority is employed (58.3%), self-employed (17.5%), 8.4% are unemployed, 7.6% are students and 7.4% are retired. Their monthly incomes are distributed

along different intervals registering the class “up to 635 euros” 14.7%; “from 636 to 1135 euros” 27.2%; “from 1136 to 1635” 22.1%; “from 1636 to 2135” 18.9%; and “over 2135 euros” 17.1%.

It was also studied with whom did the visitors attend the event as is resumed in Table 5.

Table 5: National and foreign visitors’ spending

Variables	Frequency	Valid%
Visits alone or accompanied?		
Alone	51	26.4
With company	142	73.6
With Whom?		
Life Partner	73	--
Descendants	26	--
Other family members	27	--
Friends	56	--
Other person	1	--
Number of companions		
1 Person	30	25,4
2 Persons	25	21,2
3 Persons	41	34,7
4-5 Persons	15	12,7
6 or more persons	7	5,9

Source: Own elaboration.

The majority of the visitors (73.6%) attended the festival with company and only 26.4% attended alone. From the company identified it was possible to determine that the majority visited the event with their life partner and the second most referred company was with friends. It is visible that , this event attracts small groups with one, two or three people reaching 81.3%.

Length of stay and accommodation

It is relevant to understand if the visitor remain in the region for only one day, for the duration of the festival or if they stay for longer periods. Table 6 presents the length of stay of the visitor not only in the event but also in the region.

Table 6: Visitors’ length of stay

Variables	Frequency	Valid%
Length of stay exceeding one day		
Yes	116	60.1
No	77	39.9
Length of stay in the event		
½ day	85	44.0
1 day	39	20.2
2 days	69	35.8
Average	1.1 days	
Length of stay in the region		
1 day	94	48.7
2 days	49	25.4
3 days	27	14.0
4 or more days	23	11.9
Average	2.1 days	

Source: Own elaboration.

It is noticeable that visitor mostly come one day to the event, reaching 64.2% the visitors that stay half a day or a hole day. However it is also possible to see that although the majority remains one day to visit the festival they remain for longer in the region (51.3% stay for more than one day) and in average they stay for 2 days. As such, it was interesting to see where the visitors stay for the night. Table 7 resumes the different accommodation options.

As can be seen in Table 7 the majority opts for lower price range accommodations, with "camping", "family and friends", "own accommodation" being the three top choices (with 66.1%).

Table 7: Visitors' accommodation typology

Accommodation typology	Frequency	Valid%
Local accommodation	21	18.1
Hotel	0	0.0
Rural Tourism	10	8.6
Camping	26	22.4
Family & Friends	26	22.4
Own Accommodation	25	21.6
Other	8	6.9

Source: Own elaboration.

Usual visitor to this type of event

The visitors were also questioned if they usually attend this type of events, since food and wine events tend to have a more hedonistic visitor with more specific characteristics. 58% of the visitors referred that they came to the festival specifically for the thematic involved.

They also described the number of times they attended these events, as is seen in Table 8. The majority of the 81 individuals that visited the VSD more than once, was repeating the visit between two and three times (69.1%) and 30.9% was visiting for the 4th and 5th time.

Table 8: Visitors' accommodation typology

Variables	Frequency	Valid%
Visits to the VSD		
1st time?	112	58.0
More than once	81	42.0
Number of visits (for repeated visitors)		
2 - 3 editions	56	69.1
4 - 5 editions	25	30.9
6 – 8 editions	0	0.0

Source: Own elaboration.

Visitors' Spending

The last part of the questionnaire to the visitors regarded their spending. What did they buy and how much did they spent. The majority of the visitors bought food in the festival (64.8%). On average the visitors had one meals in the event and spent an average amount of 14.1 euros on food. Overall, the visitors, during their length of stay had 2.3 meals locally (inside and outside the event) and spent an average amount of 34 euros in food.

During their visit 52.1% also bought souvenirs in the festival from local craftsman; 47.6% bought covered almond or almond related products; 19.7% bought wine; 18.7% bought olive oil; 15.5% bought cheese; and with lower percentages there can be identified honey, smoked sausages, and others.

Table 9 resumes the products bought and the amounts spent. It is noteworthy that only the souvenirs were bought in the festival precinct all the other products were bought locally outside of the event.

Table 9: Visitors' spending, per type of product and per value

Products acquired	Valid%	Average amount (euros)
Souvenirs	52.1	15.6
Almond	47.6	4.0
Wine	19.7	2.0
Olive Oil	18.7	4.5
Cheese	15.5	2.2
Honey	9.3	0.8
Smoked Sausages	7.8	1.0

Source: Own elaboration.

Estimated economic impact of the visitors

With the amounts determined for the visitors' spending it was possible to create a new variable that aggregates the different variables related to spending. As such, an average amount of 64 euros per visitor. Since all the products and food were bought locally or in the county, it is possible to assume that all the spending will remain in the region. For a simple purpose of magnitude determination one can estimate that the 6.000 visitors spent in the region almost 400,000 euros. This is clearly underestimated since it was not possible to determine how much the visitors spent for accommodation.

Conclusions

The development and hosting of an event, and as in this case a specific and thematic event, is intended to attract people to the region where it happens boosting the economy and enhancing the image of the region and of its cultural aspects.

With this paper it was intended to describe the wine and food festival that occurs in Torre de Moncorvo every year since 2014. From the results it is possible to see that there are 6,000 visitors in two days in the village and that they spend around 400,000 euros.

With this event, not only there is a boost in the economy, with a great protection of local manufacturers, granting that the money will remain in the region, but also it is an opportunity to promote local wine and other products, such as covered almond that is a premium product and exclusive of the region.

Although there should be other factors considered, in order to more accurately estimate the impact, the intention was to have a magnitude of the impact and to understand in what amplitude can an event stimulate an isolated rural region.

Acknowledgment

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A Mathematical Study Regarding Wind Turbines

Valeria-Alina ANDRONESCU

Faculty of Energetics, University POLITEHNICA of Bucharest, Bucharest, Romania,
valeria.andronescu@stud.energ.upb.ro

Elena-Corina CIPU

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering "Traian Lalescu", University POLITEHNICA of Bucharest
corina.cipu@upb.ro

Abstract

The following paper's purpose is to reveal a mathematical study regarding wind turbines and two different distributions of them so the efficiency increases, but also how could Romania as a European country use the green-energy instead of fossil fuels to sustain the requires. Besides, there is a comparison between the standards that were set up in 2011 and what Romania has achieved in 2020 in terms of wind power.

Keywords: Wind, Turbine, Applied Mathematics, Distribution.

Introduction

It is well known that pollution has become a heated issue nowadays and its effects on nature determined people to look for other ways of producing energy, thus wind energy has stepped out. But the problem is how to increase the performance of the wind turbines. This is the aim of our study, to optimize the distribution of the wind power plants that may replace fossil fuel energy in Romania.

What is a Wind Turbine?

To begin with, everyone needs to know how a wind turbine looks like and its principle of functioning. A wind turbine is an ensemble used for over 3000 years with a precise configuration (presented in Fig. 1) that includes the blades (1) meant to capture gusts of wind and to set in motion the rotor (2). This last one gives an impulse to a low-speed shaft (5), then to a gearbox connected to a generator (7). The generator, based on electromagnetic induction, produces wind energy which is then forwarded to an electrical station.

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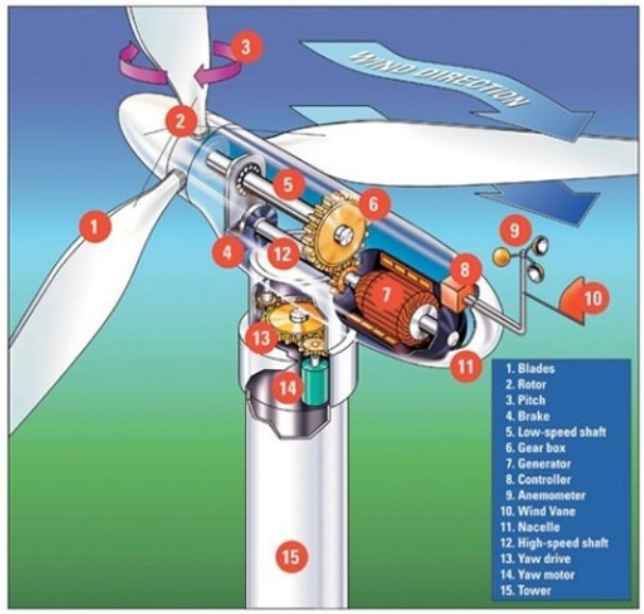

Fig. 1: Components of a wind turbine

When the weather is unfavorable to producing wind energy, the power plant has an anemometer (9) attached to measure the direction and speed of the wind. If the wind exceeds a certain value, it activates a brake to stop the blades' rotation and any damage to be done.

What needs to be pointed out is the fact that there are various types of wind turbines, but each of them has uses the same principle and the best known is the one with one rotor and three blades, presented above.

There are also turbines with a smaller number of blades, mounted either upstream or downstream, with a shaft either horizontally or vertically (Figure 2. b), with multiple or simple rotors (Figure 2. a). They can also be mounted either on-shore or off-shore. Some examples are shown in the images below.

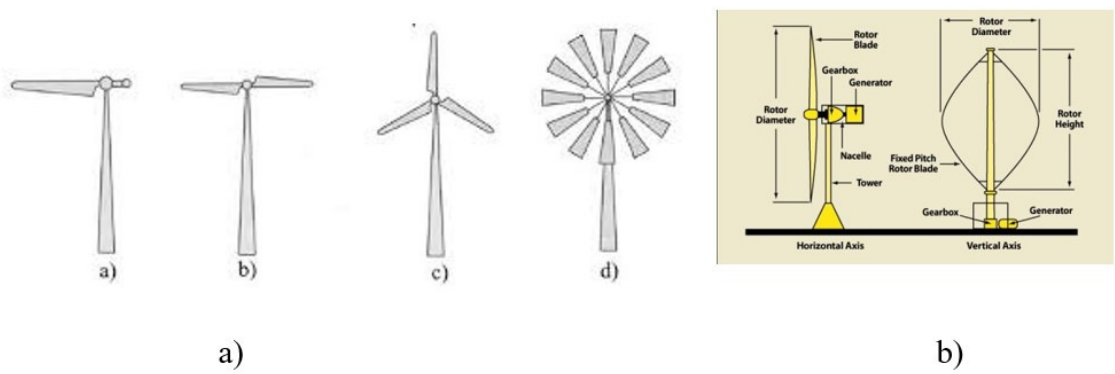

Fig. 2: Turbines with a smaller number of blades

A wind system is designed to give efficiency to certain parameters set by the manufacturer. Normally, a turbine with a rotor and three blades has:

- A power of 2,5 MW;

- Wind speed: between 3 and 25 m/s (over 25 m/s the turbine stops automatically so as not to endanger the devices inside);
- Tower Height: 90 – 140 m;
- Propeller speed: 6 – 15 rot/min;
- Propeller diameter: 100 – 110 m;
- Weight: 20 – 200 tons.

We present some formulas used to optimize energy production below:

a. $\frac{V}{V0} = (\frac{h}{h0})^{\alpha}$ (1);

Equation (1) represents **the relation of the wind speed *v* as a function of the height *h***, where v_0 and h_0 are the speed, respectively the ground height, and α is the exponent of Hellman, specific to the area, the time of the day, the season, etc.

Table 1: Examples of values for Hellman's exponent

Location and state of the atmosphere	Hellman's exponent - α
The unstable atmosphere above the water surface	0,06
The neutral atmosphere above the flat coastal area	0,16
The unstable atmosphere above human habitats	0,27
The neutral atmosphere above human habitats	0,34
Constant atmospheric conditions above human habitats	0,60

b. $P = \frac{1}{2} C_p \cdot \rho \cdot S \cdot v^3$ (2);

Equation (2) reveals **the power of the turbine** where C_p is the power (performance) coefficient of the turbine, ρ is the air density (approx. 1,25 kg/m^3 under normal conditions of temperature and pressure), S represents the area covered by the turbine blades and v – the wind power. We should point out that for a wind speed of 10 m/s, the power developed by the turbine is 8 times higher than for a speed of 5 m/s.

The graphic below was made using a Mat Lab program and reveals the dependence of the wind speed on the height of the propeller.

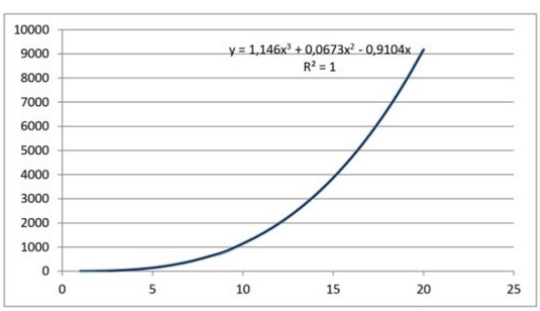

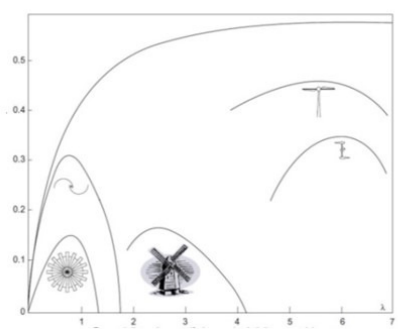

Fig. 3.a.Power dependence on the speed of wind b. Ideal efficiency curve

c. **Betz's Limit**: $C_{pmax} = 59{,}3\%$

This limit shows that, in the absence of any friction with air and the friction of the internal components between them, the maximum efficiency of a turbine does not exceed the threshold of 59,3%. However, modern ones reach up to 40-45% efficiency. The picture on the right side illustrates the variation of the coefficient of performance C_{pmax} with the ratio between the peripheral speed of the blades and wind speed for different turbines.

d. **The average distance between two turbines** is **8 rotor diameters** (meaning 8 complete circles of blade rotations). For instance, for a turbine with a diameter of 100 m, the optimal distance would be 800.
e. For **multi-rotor turbines**, the diameter of one rotor shall be calculated according to the following formula: $d = \frac{D}{\sqrt{n}}$ (3), where D is the diameter of a rotor that would replace all smaller rotors in terms of power and n is the number of rotors.

Rightsizing Wind Turbine's Distribution

In the following lines, we will calculate to find out the number of wind turbines Romania needs to completely replace the energy produced with fossil fuels. Foremost, fossil fuels cover about 15 327,9 million kWh in the first 8 months of 2019 and the production in wind farms was about 4406,9 million kWh (218,6 million kWh more than the same period of 2018), according to Transelectrica.

Based on this data, the wind farm that is needed should generate about another 16 billion kWh, besides what it already produces. So 2.2 billion kWh will be required to replace energy from fossil fuels. Given this number, we will be capable of estimating the number of wind turbines, but also their configuration.

For the calculation of the number of turbines needed to get the respective energy in a year, we write: $365 \cdot 2.5 = 912.5 \frac{MW}{year}$ would 1-rotor-and-3-blades turbine produce, and also we get $\frac{2\,100\,000}{912.5} \cong \mathbf{2\,300}$ **turbines.**

Now that the number of turbines is known, the next issue would be adequate space to build. Taking into account the last point's information, namely that there must be 8 times the rotor diameter between two turbines, then it is 800 m. To distribute the 2300 turbines, it will be used the knowledge related to fractals, respectively Peano's curve, which should ensure the optimal distance and efficiency in field distribution.

Peano's curve is an example of a fractal, defined by Benedoit Mandelbrot, as an object whose Hausdorff and topological dimensions are different. A fractal is a fragmented geometric figure that can be divided into parts, so each of them is a copy of the original. The fractal, as a geometric object has the following characteristics:

- it is **self-similar** at least approximately or stochastic;
- it has a **simple and recursive definition**;
- it has **infinite detail and complexity**: any level of magnifications seems identical and has a fine structure at infinitely small scales;
- it has a **fractal dimension** or a self-similarity dimension.

In the book by Salvado (2011), the author notes that Peano's curve is a fractal which, on one hand, is a curve – a continuous geometric shape on the interval [0, 1], and the other hand, it passes through all the points in the 2-dimensional space [0, 1] x [0, 1]. Owing to these properties, it is also called *the space-filling curve*.

We say that a space-filling curve is a curve whose range contains the entire 2-dimensional unit square. These curves are special cases of fractal constructions, in which the fractal dimension is 2. Space-filling curves in the 2-dimensional plane are called Peano curves, as Giuseppe Peano was the first to discover one. Peano discovered a dense curve that passes through every point of the unit square interval onto the unit square.

To construct an example of a Peano curve, we start with a square of vertices (0, 0), (0, 1), (1, 0), and (1, 1). Step 0 is the function $y = x$ (Figure 5 a).

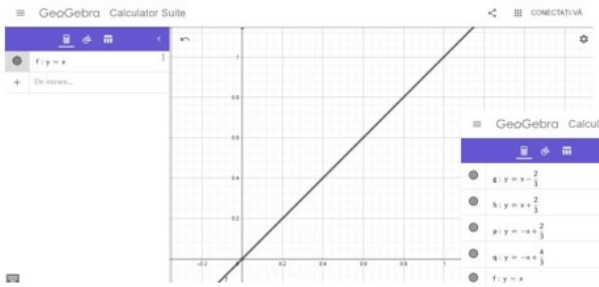

Fig. 5 a. Function $y = x$

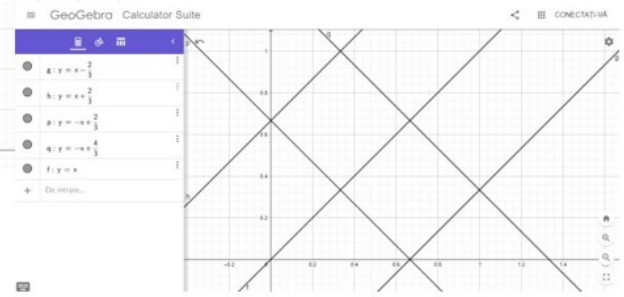

Fig. 5 b. Functions used to construct step 1

For step 1, we draw the following functions: $y = x, y = x - \frac{2}{3}, y = x + \frac{2}{3}, y = -x + \frac{2}{3}, y = -x + \frac{4}{3}$ (figure 5 b). The last two figures were made using Geogebra Calculator.

The functions that describe step n are: $y_k = x + p_k$, where $p_k = \frac{-3^n+1+2k}{3^n}$, with $k = 0,\ldots,3^n - 1$ and $y_j = -x + p_j$, where $p_j = \frac{2j}{3^n}$, with $j = 1,\ldots, 3^n - 1$.

The following figures made with the help of the AutoCAD 2017 program have the role of exposing the placement of all wind turbines on the surface that was distributed based on Peano's curve.

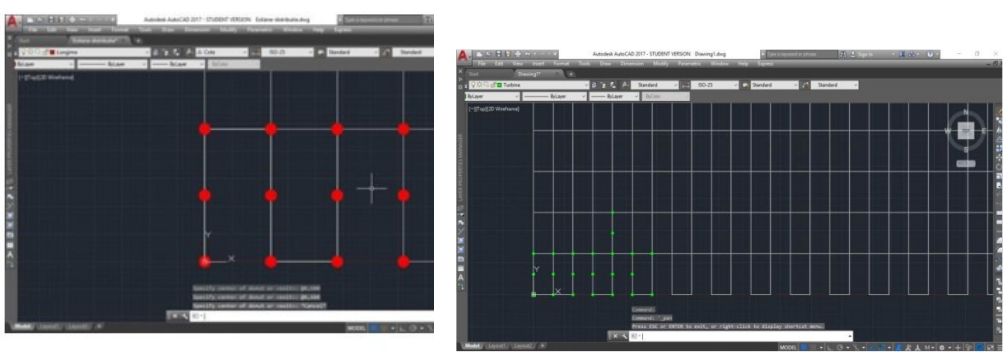

Fig. 6: Placement of all wind turbines

Each red dot represents a wind turbine, the distance at which they were drawn is 800 mm, which is equivalent to 800m in the field. As seen from the picture, the advantage of this settlement is the ease with which wind turbines can be built, saving land. Even if they were placed on-shore or off-shore, they would not disturb either agricultural work or marine animals' lives or even prevent off-season fishing, as cameras are monitoring the area.

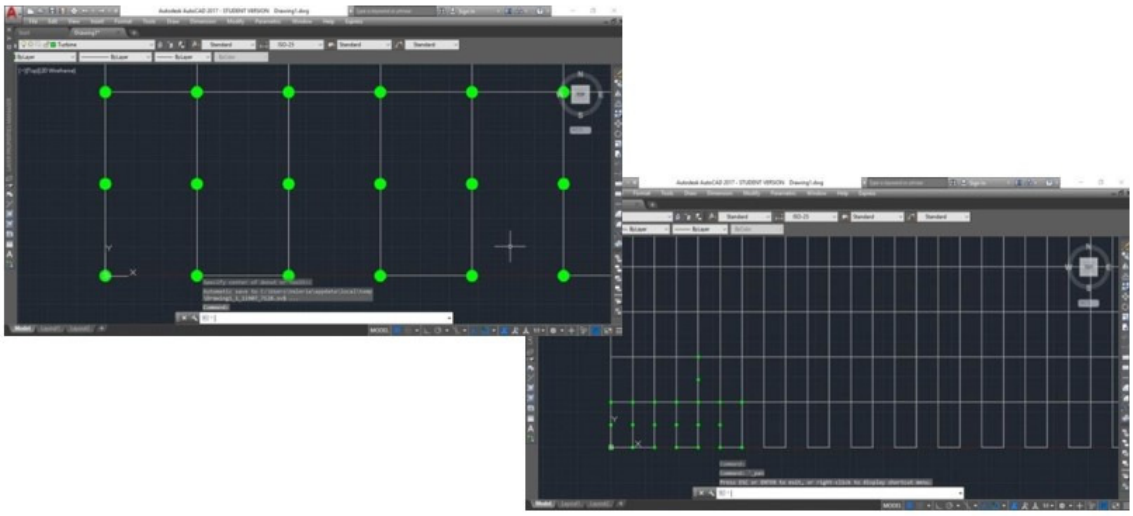

Fig. 7: New displacement

The total area covered is 1474,5 km^2 and the total amount of electrical power is 5750 MW.

From another point of view, we will now consider another type of turbine, namely turbines with several rotors. As a prototype, we will process the design of Vestas's **4-rotor turbine**, still in prototype condition, but which has ended its testing period.

We will then calculate its power relative to our common turbine (power of 2,5 MW and rotor's diameter of 100m). Using eq. (3), we have that the diameter of a small rotor is 50m, and the power developed by such a turbine is about 5 MW. This means that the number previously calculated will be halved, so it will require there only 1150 multi-rotor turbines that can electrically support the demand. Peano's curve model shall settle these. This time, we will use the same distance between 2 turbines, 800 m. The total area is 739,84 km^2 and the total power: 5750 MW. The photos below were created using AutoCAD 2017 and the green dots are the multi-rotor wind power plants.

Fig. 8: Four-rotor wind turbine (Vestas prototype)

Table 2: Comparison of the 2 types of placement

	Multi-rotor turbine	Single-rotor turbine
Number	1150	2300
Area covered (km^2)	739,84	1474,5
Power (MW)	5750	5750

European standards

According to European Commission, 2011 brought hope in the wind energy field by proposing that 34% of total electricity consumption be provided renewable energy sources, of which 12% represent wind energy, all at the European level. In other words, the target was to triple the percentage in recent years, i.e. about 4,8%. In 2011, the European Commission estimated that wind energy will exceed the 161 GW thresholds by 2020.

It should also be noted that the prices of the construction of a wind power plant have decreased considerably since the first appearances of this invention, reaching about 1,23 million/MW on land and 2-2,2 million/MW offshore. The most common types of turbines are those with a horizontal shaft, mounted upstream and with 3 blades on the rotor which start the movement of the blades at speeds above 3 m/s and to stop automatically when reaching a speed of 25 m/s, to not endanger the electrical installation of the materials.

As for development in the member states, it is different because of the particular levels of economy and investment in this area. Denmark (for instance) is currently the market leader, with the largest offshore wind farm having a capacity of 1200 MW and 174 turbines. Romania is not bad in this regard either, having a great development opportunity, especially in the Dobrogea area (already exploited in this sense) and the Bărăgan area. The figure below unveils the share of energy from renewable sources in the gross final consumption of energy, from 2004 to 2017 and the information was taken from the official Eurostat website.

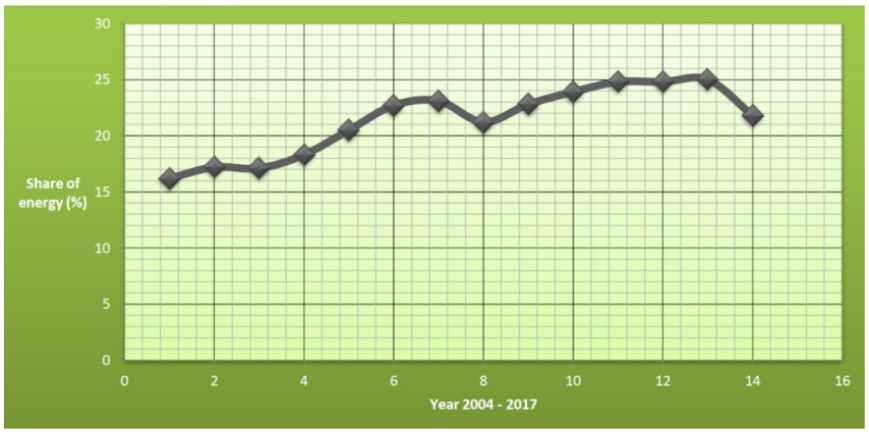

Fig. 9: Share of energy from renewable sources between 2004 and 2017

Although hardly any investment was made in the area (no other wind turbine was built in 2018), this did not affect production, and it even multiplied it. For the future, Romania aims to reach a percentage of 27,9% of total electricity from renewable sources by 2030, which some specialists have described as “little”, given the percentage that has already been reached (23,9%).

Conclusions

Romania has a very high wind energy potential, which brings many advantages to both the community and the natural environment. Wind energy means reducing gas emissions, helping to reduce dependence on energy savings, and high costs to obtain raw materials, however harmful to humans.

Even if it might seem easier to build a single rotor turbine, that it covers a greater area might become a drawback at some point, thus a wind farm made of 1150 multi-rotor wind power plants with a power of 5 MW each could sustain the demand of electricity in Romania, practically to erase the need of fossil fuels.

Given that our country is so close to reaching its 2020 target in terms of renewable energy production, it can be concluded that the project of 1150 multi-rotor wind power plants meant to save us from pollution is not just a dream, but it can be made true with perseverance and well-trained people.

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Covid-19 Sentinels

George-Alexandru NEAGU

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, neagualex75@yahoo.com

Stefan-Alexandru MITACHE

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, alexalex82313@yahoo.com

Mihai REBENCIUC

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, m.rebenciuc11@gmail.com

Abstract

Since the 2020 Covid19 Pandemic people have tried to find various ways to prevent humanity from catching this virus and one of the best examples is China's Corona-Virus application. In this regard, we are creating Covid19 Sentinels which are robots with thermal vision that will especially be placed in areas with a high infection rate and have the role to detect if pedestrians have the Corona-Virus temperature which was agreed through convention that is roughly 37.3 degrees Celsius. Let's say there is a Covid19 static Sentinel in a shop and 4 men enter the shop. The robot will analyze each individual then it will decide if any of them is infected and if one of the individuals is infected then the alarm will trigger. The robot gather some important data from each pedestrian and the most important ones are distance and the temperature as the robot needs to be at a certain range to be very precise so there are not any false alarms; the machine has a set of rules according to Grammatical Evolution based on context free grammar. An future improvement for Covid19 Sentinels are a laser that can pinpoint the infected individual.

Keywords: Covid-19, Security, Grammatical Evolution.

Introduction

This study aims to present a group of robots called sentinels that can analyze the temperature of a man infected with Covid-19. These robots have the ability to analyze through Grammatical Evolution (GE) the color generated by the thermal view in the robot's room.

Grammatical Evolution has the role of forming a grammar for analyzing the colors seen through the thermal chamber. Each color shade has its own HTML code (example: red not combined with another color has the code FF0000).

Grammatical Evolution

Grammatical Evolution (GE) is an evolutionary search algorithm that is similar to Genetic Programming (GP). It is usually used to generate programs with syntax defined by a particular grammar.

It has tangents with principles from molecular biology to the representative power of formal grammars. Because a grammar is used to describe the structures generated by GE, it is commonplace to change the output structures by simply changing the grammar of the plain text. Explicit grammar allows GE to easily generate resolutions in any language. For example, GE has been used to generate solutions in multiple languages, including Schemes, C / C ++, Java, and English.

A grammar is a set of rules that describe the syntax of sentences and phrases in a language. While grammars were originally invented for the study of natural languages, they are widely used in computer science to describe programming languages. This concept can be written as a tuple (N, T, S, P) where:

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- N is the set of non-terminal variables or symbols;
- T is the set of terminal symbols;
- S is a special variable called the start symbol;
- P is the production rule for terminals.

The notation for expressing the language of a grammar as a product rule is called Backus Naur Form (BNF). This notation consists of a tuple <T, N, P, S>. An example of a BNF is:

T = {sin, cos, tan, log, +, -, *, /, X, (,)},
S = <expr>,
N = {expr, op pre_op},
P is represented as follows: <expr> :: = <expr> <op> <expr>
| (<Expr> <option> <expr>)
| <Pre-op (<expr>)
| <Var> ,
<op> :: = + | - | * | / .

Thus we can conclude that evolutionary grammars have the following scheme of action:

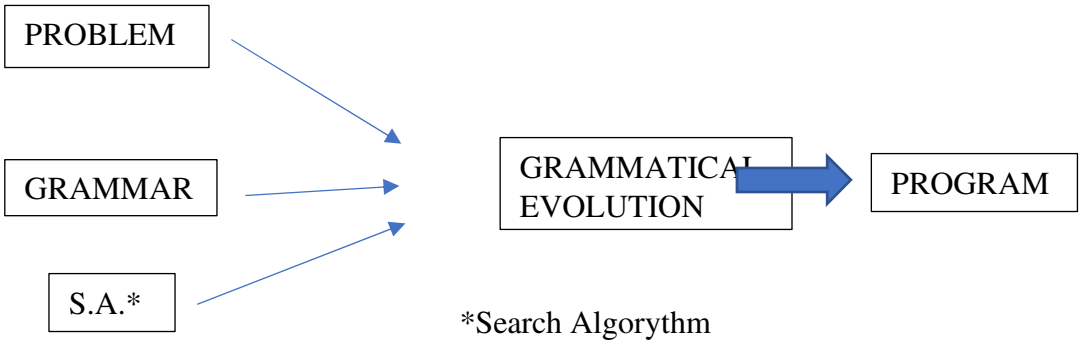

Fig.1: How Grammatical Evolution works

Application

The chosen formalism that aims to analyze the color seen through the robot's camera and to indicate the individual who has Covid-19 temperature.

The average temperature of the Coronavirus carrier is 37.3 ° C. Using the Heat Index we find that orange is the color that represents the temperature of 38 ° C that has the HTML code of FF6C00.

The thermal view camera registers the human body as a body colored in red, orange or yellow depending on the temperature it has on the camera. Thus, the information is transformed from HTML code into temperature value.

To meet the condition that the robot checks whether the equation

[Temperature om] ^ 2 = [Temperature Covid-19] X 〖[Distant]〗 ^ 3

is found by the program once the 2 variables are introduced, ie [Human temperature] and [Distance] from which the recording is made plus [Covid-19 temperature] which is constant 37.3. Temperatures will be measured in degrees Celsius, and distance in meters.

If the sentinel finds the formula presented in the previous chapter then the person analyzed has the temperature Covid-19 and the program will activate an alarming sound that will alert the people around.

A potential upgrade of this machine is the attachment of a device that helps us always know the location of the sentry in case of theft or in case of finding an individual carrying Coronavirus.

Street Sentinels

Aiming to detect people with Coronavirus, the sentinels will have a static position in relation to pedestrian traffic and will partially scan passers-by from a pole. The distance between the camera and the passers-by is carefully chosen to maximize the success rate of the analysis. At the same time, these sentinels can be placed wherever needed, such as in a grocery store or in an industrial area.

It is supposed to be a grocery store where 4 people enter without respecting social distance. These individuals enter the store one by one and are analyzed by the sentry through the following code sequence using the evolutionary grammars that are in the attached section of this presentation.

The following table shows the data on the individuals entering the store:

Name	Distance	Temperature
Alexander	3.40m	36.1
George	3.50m	37.0
Arthur	3.29m	38.0
Daniel	3.34m	37.4

The program uses the following equation to normalize the error by adjusting the impact on low values (people with low temperature) and high values (people with high temperature:

$$e = \frac{1}{N}\sum \log\left(1 + |p - \hat{p}|\right)$$

where e is the normalized error, N is the number of samples, p is the person's temperature and $\hat{p}$ is the result of the symbolic regression.

This will display the following table:

distanta	temperatura	temperaturaCovid19	GE
1	3.40	36.1	39.3	39.4
2	3.50	37.0	42.8	42.8
3	3.29	38.0	35.6	35.6
4	3.34	37.3	37.3	37.3

After performing the program, it is found that Daniel is infected with Coronavirus with a temperature of 37.3-37.4 showing a mostly orange color on the room with thermal view.

This sentinel requires a very precise point of application to detect the infected individual as quickly as possible.

Conclusion

Thus, through the ideas presented above, the algorithms and lines of code used, we were able to find out with the help of "Sentinels" if there is a so-called infected person in a group of people. The sentinel created by us using Evolutionary Grammys helps the authorities in discovering new cases. We want to expand this in the future to help society and to be able to easily identify an infected person.

Nonetheless, the robot can be raised to the next level by adding a device that can be tracked on the map in case of a robery or if the machine caught a suspect of Coronavirus.

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  HTML color codes https://htmlcolorcodes.com/
- Intruduction to Grammars https://www.tutorialspoint.com/automata_theory/introduction_to_grammars.htm
  John Koza Genetic Programming Series
- John Koza Genetic Programming I
  John Koza Genetic Programming II
- Krawiec_GP_tut(2016)
  M. O'Neill and C. Ryan, "Grammatical Evolution" IEEE Transactions on Evolutionary Computation
- O'Neill, Ryan_GE EAP AL (Kluwer_2003)
  Poli et al. A field guide to GP (2008)
- Ryan et al Hbook GP Applications (2015)
  Krawiec_GP_tut(2016)

Annex

Temperature analysis code sequence:

```
  S=<expr>
Production rules: R
{expr} ::= {expr}{op}{expr} | {sub-expr}
{sub-expr}::={func}({var})|{var}|{var}^{n}
{func}::=log | sqrt | sin | cos
{op}::= +| - | ×
{var}::=temperatura|temperatura^{n}|{n}
{n}::=1|2|3|4
R>library(„gramEvol")
R>ruleDef < −list(expr=grule(op(expr,expr),func(expr),var).
+                    funct=grule(sin,cos,log,sqrt),
+                    op=grule('+', ,'−' , '*'),
+                    var=grule(temperatura, temperatura^n,n)
+                    n=grule(1,2,3,4))
R>grammarDef < − CreateGrammar (ruleDef)
R>indivizi< −c („Alexander", „George" , „Arthur" , „Daniel")
R>distanta< −c(3.30, 3.32, 6.35 , 6.34)
R>temperatura< −c(36.1 , 37, 38, 37.4)
R>SymRegFitFunc< −function(expr){
+   result < −eval(expr)
+
+   if (any(is.nan(result)))
+     return(Inf)
+
+   return (mean(log(1+abs(period-result))))
```

```
+  }
R>ge< − GrammaticalEvolution(grammarDef, SymRegFitFunc, terminationCost=0.032)
+
R>ge
R>best.expression< −ge$best$expression
R>data.frame(distanta,temperatura,temperaturaCorvid=sqrt(distanta^3),
+                GE=eval(best.expression))
R>customMonitorfunc< −function(results){
+    cat(”--------------------/n”)
+    print(results)
+}
R>ge< −GrammaticalEvolution(grammarDef,SymRegFitFunc,
+                                    terminationCost=0.032,
+                                    monitorFunc=customMonitorFunc)
```

Quantum Algorithms for Quantum Fourier Transform Used in Quantum Information Theory

Vasile – Laurentiu DOSAN

Faculty of Applied Sciences, University POLITEHNICA of Bucharest, Romania
vasile.dosan@stud.fsa.upb.ro

Elena-Corina CIPU

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering "Traian Lalescu", University POLITEHNICA of Bucharest
corina.cipu@upb.ro

Abstract

In this work, we describe Quantum Fourier Transform (QFT) which basically is a Discrete Fourier Transform (DFT). It's main application is phase estimation, an essential part in Shor's algorithm used in Quantum Computation. We gave a brief introduction about the mathematical language of Quantum Information Science for implementation circuits on QFT and inverse QFT using IBM Quantum Experience and we did an approximation of QFT.

Keywords: discrete Fourier transform, Quantum Fourier transform, Quantum Computing, Shor's algorithm.

Introduction

During the past few decades great effort has gone into realizing a new form of computation – quantum computing. In classical case a single bit can be in two distinct states at any moment of time. A quantum bit, a qubit, has the ability to be in a superposition of both zeros and ones. The deep ways that quantum information differs from classical information involve the proprieties, implications, and uses of quantum entanglement. Entanglement is a quintessential quantum property. Entangled states have quantum correlations stronger than any classical correlations. Consequently, entanglement is an important resource for quantum technologies (teleportation, sensing, communication etc).

Quantum computers provide a new way of solving problems not otherwise realistically solvable by classical computers. One of these problems is integer factorization, which is used as a one-way function in protocols for key distribution and can be efficiently solved by Shor's algorithm as we can see in the bible of Quantum Information by Nielsen and Chuang (2010). In Gramstorm's paper (2018) we discover that finding the prime factorization of an n-bit integer is thought to require $\exp(O(n^{1/3}\log^{2/3}n))$ operations using the best classical algorithm. This is exponential in the size of the number being factored, so this is a great problem for classical computers: it quickly becomes impossible to factor even modest numbers.

Shor's algorithm is used in quantum computation. It consists of a classical part and a quantum mechanical part. Quantum mechanical part uses *Quantum Fourier Transform (QFT)* to find the period of a certain function. One of the most useful ways of solving a problem in physics, mathematics or computer science is to transform it into some other problem for which solution is known. Fourier transform appear so often and in so many different contexts that the transformation is studied for it own sake.

Quantum Fourier Transform is a linear transformation on qubits and is the quantum analogue of the inverse Discrete Fourier Transform (DFT). We define DFT of a signal x, the vector y with the following components:

$$y_k = \sum_{n=0}^{N-1} x_n e^{-\frac{2\pi}{N}ikn}, \mathrm{k} = 0, \dots, \mathrm{N}-1$$

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Using notation $\omega = e^{-\frac{2\pi}{N}i}$, equation becomes:

$$y_k = \sum_{n=0}^{N-1} x_n \omega^{kn}, \mathrm{k} = 0, \dots, \mathrm{N}-1$$

with $|\omega|= 1$. We introduce the matrix W,

$$W = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ 1 & \omega & \omega^2 & \dots & \omega^{N-1} \\ 1 & \omega^2 & \omega^4 & \dots & \omega^{2(N-1)} \\ \dots & \dots & \dots & \dots & \dots \\ 1 & \omega^{N-1} & \omega^{2(N-1)} & \dots & \omega^{(N-1)(N-1)} \end{bmatrix}.$$

W is a symmetric matrix and we can compute the product

$$W \cdot \overline{W} = \overline{W} \cdot W = N \cdot I_N$$

Then, the inverse of W will be

$$W^{-1} = \frac{1}{N} \overline{W}$$

For

$$Y = \begin{bmatrix} y_0 \\ y_1 \\ \vdots \\ y_{N-1} \end{bmatrix}, X = \begin{bmatrix} x_0 \\ x_1 \\ \vdots \\ x_{N-1} \end{bmatrix}$$

The discrete Fourier transform can be written as follows:

$$Y = WX.$$

As we can see in the book by Nielsen and Chuang (2010) and in the book by Nakahara and Ohmi (2008), the quantum Fourier transform is based on essentially the same idea with the difference that the vectors x and y are state vectors, i.e.

$$|x\rangle = \sum_{j=0}^{N-1} x_j |j\rangle$$

$$|y\rangle = \sum_{j=0}^{N-1} y_j |j\rangle$$

where $|j\rangle$ is a basis vector. In other words, QFT is a linear operator whose action on any of the computational basis vectors $|0\rangle, |1\rangle, \dots, |2^n - 1\rangle$ associated with an n-qubit register is described by the transformation:

$$|j\rangle \longrightarrow W|j\rangle = \frac{1}{\sqrt{2^n}} \sum_{k=0}^{2^n-1} e^{\frac{2\pi i j}{2^n}} |k\rangle, 0 \le j \le 2^n - 1$$

Bra-ket notation is a notation for quantum states (vectors in a complex Hilbert space on which an algebra of observables acts). The bras and kets are defined as

$$\langle\phi| = [\phi_1, \phi_2, \dots, \phi_n], |\psi\rangle = \begin{bmatrix} \psi_1 \\ \psi_2 \\ \vdots \\ \psi_n \end{bmatrix}, \langle\psi| = |\psi\rangle^\dagger$$

Using bra-ket notation, we can define the inner product and we can construct matrix as it follows:

$$\langle\phi|\psi\rangle = [\phi_1, \phi_2, \dots, \phi_n]\begin{bmatrix}\psi_1\\ \psi_2\\ \vdots\\ \psi_n\end{bmatrix} = \sum_{k=1}^{n}\phi_k\psi_k$$

$$|\psi\rangle\langle\phi| = \begin{bmatrix}\psi_1\\ \psi_2\\ \vdots\\ \psi_n\end{bmatrix}[\phi_1, \phi_2, \dots, \phi_n] = \begin{bmatrix}\psi_1\phi_1 & \psi_1\phi_2 & \dots & \psi_1\phi_n\\ \psi_2\phi_1 & \psi_2\,\phi_2 & \dots & \psi_2\phi_n\\ \vdots & \vdots & \vdots & \vdots\\ \psi_n\phi_1 & \psi_n\phi_2 & \dots & \psi_n\phi_n\end{bmatrix}$$

In Quantum Mechanics, a state can be represented as a vector in Hilbert space. The simplest quantum state, qubit (in pure state), can be written

$$|\psi\rangle = \cos\frac{\theta}{2}|0\rangle + e^{i\varphi}\sin\frac{\theta}{2}|1\rangle$$

It can be represented on the *Bloch sphere* as a vector with spherical polar coordinates φ and θ.

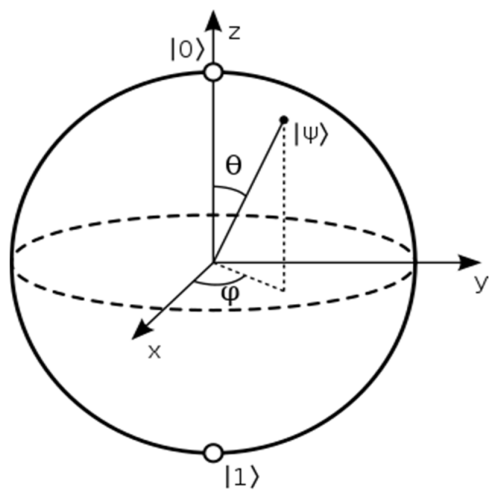

Fig.1: Bloch Sphere – representation of a qubit using spherical polar coordinates.

If we want to describe a system of qubits, we use the second postulate of quantum mechanics which says that the state of the system is given by the tensor product of the individual states. In other words, if we have 2 states $|\phi_1\rangle$ and $|\phi_2\rangle$, the system will be

$$|\psi\rangle = |\phi_1\rangle \otimes |\phi_2\rangle$$

If $\dim(|\phi_1\rangle) = \mathrm{d}_1$ and $\dim(|\phi_2\rangle) = \mathrm{d}_2$, then $\dim(|\psi\rangle) = \mathrm{d}_1 d_2$. The tensor product between $|\phi_1\rangle$ and $|\phi_2\rangle$ is defined as

$$|\phi_1\rangle = \begin{bmatrix}a\\ b\end{bmatrix}, |\phi_1\rangle = \begin{bmatrix}c\\ d\end{bmatrix} \rightarrow \ |\psi\rangle = |\phi_1\rangle \otimes |\phi_2\rangle = \begin{bmatrix}ac\\ ad\\ bc\\ bd\end{bmatrix}$$

For $|0\rangle = \begin{bmatrix}1\\ 0\end{bmatrix}$ *and* $|1\rangle = \begin{bmatrix}0\\ 1\end{bmatrix}$, we have

$$|00\rangle = |0\rangle \otimes |0\rangle = \begin{bmatrix}1\\ 0\\ 0\\ 0\end{bmatrix}, |01\rangle = |0\rangle \otimes |1\rangle = \begin{bmatrix}0\\ 1\\ 0\\ 0\end{bmatrix}, \ |10\rangle = \cdots = \begin{bmatrix}0\\ 0\\ 1\\ 0\end{bmatrix} \ and \ |11\rangle = \begin{bmatrix}0\\ 0\\ 0\\ 1\end{bmatrix}$$

Quantum Fourier Transform circuits

From the works of Marquenzio et al (2010), Nam et al (2020) and Gyongyosi (2012) we can discover that QFT is the transform which takes the amplitudes of a N dimensional states and computes the Fourier transform on these amplitudes. In other words,

$$\sum_{x=0}^{N-1} a_x|x\rangle \rightarrow \sum_{x=0}^{N-1} \bar{a}_x|x\rangle = \sum_{x=0}^{N-1} \frac{1}{\sqrt{N}} \sum_{y=0}^{N-1} \omega^{-xy} a_y|x\rangle$$

QFT is given by the matrix

$$U_{QFT} = \frac{1}{\sqrt{N}} \sum_{x=0}^{N-1} \sum_{y=0}^{N-1} \omega^{-xy} a_y|y\rangle\langle x|$$

U_{QFT} is a unitary matrix:

$$U_{QFT}^{\dagger} U_{QFT} = \frac{1}{N} \sum_{x=0}^{N-1} \sum_{y=0}^{N-1} \omega_N^{xy} |y\rangle\langle x| \sum_{x'=0}^{N-1} \sum_{y'=0}^{N-1} \omega_N^{-x'y'} |y'\rangle\langle x'| =$$

$$= \frac{1}{N} \sum_{x,y,x',y\prime=0}^{N-1} \omega_N^{xy-x\prime y\prime} \delta_{yy\prime} |x\rangle\langle x'| = \frac{1}{N} \sum_{x,y,x'=0}^{N-1} \omega_N^{y(x-x\prime)} |x\rangle\langle x'| =$$

$$\sum_{x,x'=0}^{N-1} \delta_{xx\prime} |x\rangle\langle x'| = I$$

The QFT is the function that transforms a state in computational basis into a state in Fourier basis :

$$|state\ in\ computational\ basis\rangle \xrightarrow{QFT} |state\ in\ Fourier\ basis\rangle$$

Let's compute U_{QFT} for N = 2:

$$U_{QFT} = \frac{1}{\sqrt{2}}(|0\rangle\langle 0| + |0\rangle\langle 1| + |1\rangle\langle 0| + |1\rangle\langle 1|) = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} = \mathrm{H}$$

where $|0\rangle = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $|1\rangle = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$.

We observe that U_{QFT} for N = 2 is the Hadamard gate (H). If we apply the H operator on the state $|\psi\rangle = \alpha|0\rangle + \beta|1\rangle$, we will obtain the state:

$$\frac{1}{\sqrt{2}}(\alpha + \beta)|0\rangle + \frac{1}{\sqrt{2}}(\alpha - \beta)|1\rangle = \tilde{\alpha}\,|0\rangle + \tilde{\beta}\,|1\rangle$$

Hadamard gates are used for preparing states. It creates an input state with constant amplitudes. Other gates we use for describing QFT algorithm are R_k phase gate and SWAP gate. Phase gate leaves the basis state $|0\rangle$ unchanged and map $|1\rangle$ to $e^{2\pi i/2^k}|1\rangle$. The SWAP gate swaps two qubits:

$$R_k = \begin{bmatrix} 1 & 0 \\ 0 & e^{2\pi i/2^k} \end{bmatrix}$$

$$SWAP = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The inverse QFT is defined as U_{QFT}^{-1}.

$$U_{QFT}^{-1} U_{QFT} = U_{QFT} U_{QFT}^{-1} = I$$

Examples of QFT circuit implementations on IBM Quantum Experience

Performing QFT and QFT^{-1} in IBM Quantum Experience implies next steps:

1. Prepare each qubit q_n;
2. Perform QFT;
3. Measure all q_n;
4. Reverse the bit order (using a series of SWAP gates);
5. Convert binary to decimal.

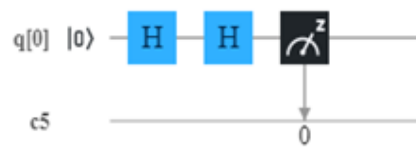

Fig.2: QFT on 1 qubit – Hadamard is equivalent for QFT on 1 qubit (0 -> 0 -> 0)

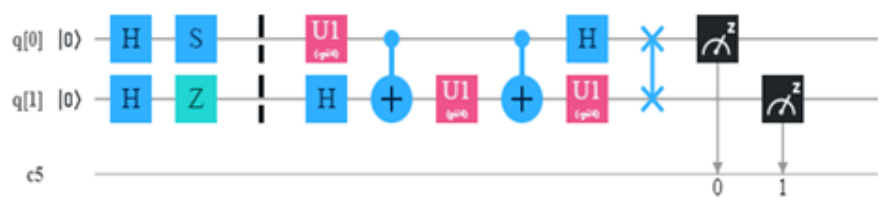

Fig.3: QFT on 2 qubits: 10 -> 01 -> 1

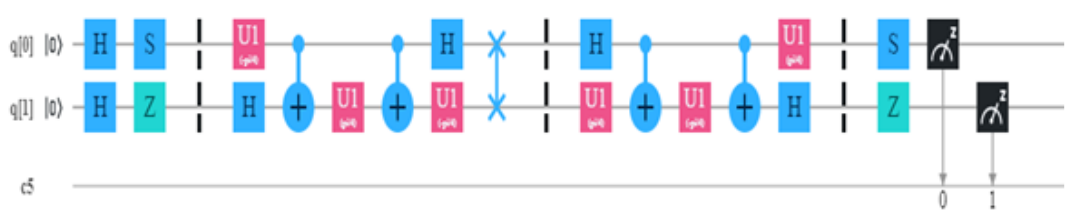

Fig.4: Inverse QFT on 2 qubits: QFT$|01\rangle = |10\rangle$; $QFT^{-1}|10\rangle = |01\rangle$

QFT is linear, it should map:

$$|k\rangle \to F_N|k\rangle = \frac{1}{\sqrt{N}} \sum_{j=0}^{N-1} \omega_N^{jk} |j\rangle = \frac{1}{\sqrt{N}} \sum_{j=0}^{N-1} e^{2\pi i (\sum_{l=0}^{n} j_l 2^{-l})k} |j_1 \dots j_n\rangle =$$

$$= \frac{1}{\sqrt{N}} \sum_{j=0}^{N-1} \prod_{l=1}^{n} e^{2\pi i j_l k/2^l} |j_1 \dots j_n\rangle = \otimes_{l=1}^{n} \frac{1}{\sqrt{2}} (|0\rangle + e^{2\pi i k/2^l} |1\rangle)$$

where $|k\rangle = |k_1 \dots k_n\rangle$ and j = $j_1 \dots j_n$. Note that $e^{2\pi i k/2^l} = e^{2\pi i 0.k_l \dots k_n}$

As example, for n = 2 we have the 2-qubit product state

$$F_4|k_1 k_2\rangle = \frac{1}{\sqrt{2}} (|0\rangle + e^{2\pi i 0.k_2} |1\rangle) \otimes \frac{1}{\sqrt{2}} (|0\rangle + e^{2\pi i 0.k_1 k_2} |1\rangle)$$

A quick example can show the relationship between DFT and QFT as we can find in paper by Hales and Hallgren (2000). We consider the two qubit state

$$|\psi\rangle = a|00\rangle + b|01\rangle + c|10\rangle + d|11\rangle$$

If $a = b = c = d = \frac{1}{2}$, then $|\psi\rangle = 0.5(|00\rangle + |01\rangle + |10\rangle + |11\rangle) = \begin{bmatrix} 0.5 \\ 0.5 \\ 0.5 \\ 0.5 \end{bmatrix}$.

Now,

$$DFT|\psi\rangle = \frac{1}{2}\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & 1 & 1 & -1 \\ 1 & -i & -1 & i \end{bmatrix}\begin{bmatrix} 0.5 \\ 0.5 \\ 0.5 \\ 0.5 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix} = |00\rangle$$

This example also agrees with the theoretical result of QFT. We have tested the previous calculation using Python (see *APPENDIX B*).

Conclusions

The time for Quantum Information Processing has arrived, its applications are multiple and we can find faster solutions for different problems by using Quantum Computing. In this paper, the building process of the QFT was exposed in detail. We started from the description of DFT, after we gave a brief introduction in bra-ket notation, inener and tensor product in Hilbert spaces. We studied the relationship between DFT and QFT by using algorithms and different examples. The practical examples presented in this paper underlined that QFT is a DFT on quantum states and QFT on one qubit is equivalent with a Hadamard gate.

As future works, we propose a study on the entropy of QFT algorithm. In this novel approach, our direction is computing two different types of entropies: Shannon entropy and von Neumann entropy. For the state vector $|x\rangle = \sum_{j=0}^{N-1} x_j|j\rangle$ the Shannon entropy could be defined by:

$$H(|x\rangle) = -\sum_{n=0}^{N-1} x_n \log(x_n), \mathrm{k} = 0, \dots, \mathrm{N}-1$$

with the convention that for $x_n = 0, x_n \log(x_n) \equiv 0$ with logarithm taken in base 2. More appropriate for quantum states [11]Von Neumann entropy of a quantum state $|x\rangle$ is described by the formula:

$$S(|x\rangle) = -\sum_{n=0}^{N-1} \lambda_n \log(\lambda_n), \mathrm{k} = 0, \dots, \mathrm{N}-1$$

where λ_n are the eigenvalues of the state. On these cases strong subadditivity for different type of staes wil be studied. We also propose to link the QFT algorithm with the Markov chain.

Appendix A – *The code used for designing the QFT and QFT^{-1}(IBM Quantum Experience)*

```
OPENQASM 2.0;

include "qelib1.inc";

qreg q[2];
creg c[5];

h q[0];
h q[1];
s q[0];
z q[1];
barrier q[0];
barrier q[1];
u1(-pi/4) q[0];
h q[1];
cx q[0],q[1];
u1(pi/4) q[1];
```

```
cx q[0],q[1];
h q[0];
u1(-pi/4) q[1];
swap q[0],q[1];
barrier q[0];
barrier q[1];
h q[0];
u1(pi/4) q[1];
cx q[0],q[1];
u1(-pi/4) q[1];
cx q[0],q[1];
u1(pi/4) q[0];
h q[1];
barrier q[0];
barrier q[1];
s q[0];
z q[1];
measure q[0] -> c[0];
measure q[1] -> c[1];
```

Appendix B – *Running DFT on a specific vector using Python.*

```
import numpy as np

psi = np.array([0.5, 0.5, 0.5, 0.5])

dft = np.fft.fft(psi, norm='ortho')

print(dft)
```

Acknowledgements

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C-SGBD – A Procedure for DBMS Performance Stability Evaluation

Daniel Calin POPEANGA
Computer Science and Engineering Department, Faculty of Automatic Control and Computers, University Politehnica of Bucharest, Bucharest, Romania, daniel.popeanga@upb.ro

Alexandru BOICEA
Computer Science and Engineering Department, Faculty of Automatic Control and Computers, University Politehnica of Bucharest, Bucharest, Romania, alexandru.boicea@upb.ro

Florin RADULESCU
Computer Science and Engineering Department, Faculty of Automatic Control and Computers, University Politehnica of Bucharest, Bucharest, Romania, florin.radulescu@upb.ro

Iulia Maria RADULESCU
Computer Science and Engineering Department, Faculty of Automatic Control and Computers, University Politehnica of Bucharest, Bucharest, Romania, iulia.m.radulescu@upb.ro

Mircea Stelian PETRESCU
Computer Science and Engineering Department, Faculty of Automatic Control and Computers, University Politehnica of Bucharest, Bucharest, Romania. mircea.petrescu@upb.ro

Abstract

This paper proposes a method of analyzing another significant aspect of a database system performance – the stability of the system performances. In this study, the proposed procedure, named C-SGBD is intended to analyze the stability of a relational database system, during a normal runtime execution of the database server. The procedure consists in posing different workloads on the database server and analyze the execution time, in a different manner then the regular benchmarks (e.g TPC systems), comparing the responses of the same system at different workloads of a comparable level.

Keywords: Database systems, database performance evaluation, relational databases

Introduction

The database systems evolved in multiple directions in the last decade, including the No-SQL developments (Abdullah, Resul, 2017), the cloud database systems, the data encryption technologies (Boicea et al. 2017) and the significant improvements and developments of the relational databases. Nowadays, we can affirm, the database domain represents one of the central key points in almost any industry.

The database performance evaluation represents an important detail in the analyzing process for choosing the most suitable database system for every application and most of the studies in this domain focused on performance evaluation basing on some key predefined indicators, significant for the specific industry, such as cost per transaction, transaction time and scalability, fault tolerance.

A significant effort to compare different database systems performances and attributes was achieved, including comparison between No-SQL and SQL (Boicea et al. 2012).

This paper proposes a method of analyzing another significant aspect of a database system performance – the stability of the system performances. In this study, the proposed procedure, named C-SGBD is intended to analyze the stability of a relational database system, during a normal runtime execution of the database server. The procedure consists in

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posing different workloads on the database server and analyze the execution time, in a different manner then the regular benchmarks (e.g. TPC systems) (Raab et al. 2020), comparing the responses of the same system at different workloads of a comparable level.

The final indicator that will be obtained at the final of the procedure execution will define a system stability level.

Related work

Most database management system (DBMS) performance evaluation procedures and algorithms are focused on certain key points, such as execution time for a database transaction and a cost per database transaction (Osman, Knottenbelt, 2012). The main goal is to optimize the database response time in order to increase the performance and obtain a lower cost per transaction.

Another direction for increase database system performance is to use a modern storage technology, namely Flash memory, integrated into different subsystems in the DBMS (storage, transaction or buffer managers) (Petrov et al.. 2015).

Improving of queries on distributed database through the query caching method involves transferring of the most frequently accessed data from the remote databases to the local database (Boicea et al., 2016).

In our previous work (Petrescu, Popeangă, ***2003),*** (Petrescu, Popeangă, ***2000)***, we studied the relationship between query optimization and execution plan, reflected in a better performance for a DBMS system. We also analyzed some Cryptographic algorithms for benchmarking systems (Boicea et al., 2019).

Different approaches were implemented, some of them becoming widely implemented and considered as database performance benchmarking standards, such as TPC benchmarks (Raab et al. 2020).

Another significant database performance evaluation domain was directly linked with the database design (Osman, Awan, 2010).

The main approaches are trying to find the optimal database and query configuration, to make the proper transformations, in order to reach the best performance.

The optimization process may be composed by several transformations that preserve equivalence between the initial SQL query and the optimized one. These transformations do not reduce cost every time, and, therefore, must be applied in a cost-based manner by the enumeration algorithm to ensure a positive benefit.

The subsequent database developments involve multiple optimization possibilities for SQL or No-SQL database systems, starting from the known basic principles of optimizing the response time for different queries. Significant progress had been made in the last years, with more complex database systems, involving more powerful technology and cloud working. More indicators are involved now and a modern comprehensive approach of the database performance evaluation domain should take into consideration many other aspects, like security, scalability.

Database performance stability evaluation

Stability in DBMS Performances

Among the most studied performance indicators in DBMS systems, including the execution time and cost per transaction, some significant aspects should be considered in order to assure a stable system and application. It is very important to obtain the optimal execution time and the best cost per transaction, but it is equally important to have a stable DBMS behavior, with constant performances.

Many areas of industry are focused on a general stability and predictability, more than the best performance in a specific domain.

A system stability analysis should start from the variation in performances within the same level of transaction workload and a comparison between two different DBMS can be made starting from this point. This analysis can

complete the previous benchmark directions for DBMS and offer an decision support answer for choosing the most suitable system.

C-SGBD Methodology

This paper presents a basic methodology for defining a complexity indicator for DBMS transactions and analyzing the system behavior during the execution of multiple different transactions of same complexity level. One significant goal is to run the tests on a real database, during the runtime of different online accessed DBMS's.

C-SGBD is a stability performance evaluation for a real runtime DBMS, basing on a database populated with real records, generated in over 15 years by usual runtime of a legal portal website.

We define the *selection term weight* as an indicator for the workload posed to the database query by that selection term.

The methodology consists in a performance analyze of the same DBMS during an usual runtime, between multiple interrogations (distributed equally between the hours of the day) with similar select term weight.

C-SGBD Database Structure

The tested database is composed by six tables: the first five tables are populated with real records, generated in a normal runtime of a website by regular users, the last table being dedicated to the selection term weight, calculated for all the above tables extracted words.

The C-SGBD benchmarking database is composed by five content tables, NEWS (2,381,679 individual selection terms), QUESTIONS (51,803 individual selection terms), BOOKS (113,178 individual selection terms), JOURNAL (3,837,220 individual selection terms), ANSWERS (8,128,808 individual selection terms) and the generated terms weigth table, called WEIGHTS. The first five tables contain real records, with a real content distribution.

The total number of the extracted words, in a non-processed phase is calculated basing on simple SQL commands:

```
SELECT SUM(LENGTH(input) -
LENGTH(REPLACE(input, ' ', '')) + 1) AS
"Word Count" FROM
(SELECT
TRIM(REPLACE(REPLACE(REPLACE(inp
ut,' ','<>'),'><',''),'<>',' ')) AS input
FROM (SELECT text_news  AS input
FROM NEWS) i) r;
```

The weight table content is generated basing on the words distribution in the content tables in the second phase of the methodology.

C-SGBD is designed according to three main objectives:

1. A representative data set for a real environment;
2. Similar experimental environment with the real runtime environment;
3. Similar experimental testing queries with the real runtime queries.

C-SGBD Procedure Structure

The presented procedure is composed by five main phases, combining both database benchmarking procedure and results interpretation. Moreover, in every phase, content based decisions are implemented, to assure a data and query representative behavior.

The main phases are:

1. Database creation and selection terms weight calculation. The database creation scripts are independent on the database platform and content of the tables and the benchmarking set is extracted at runtime from the real environment

2. The selection terms are extracted basing on the text words presented in the real records and the selection terms weight is generated into the sixth table, WEIGHT.

3. A fixed number of benchmarking experiments are run, every experimental set of queries consisting of 1000 different set of queries posing a specific complexity established the by the experimental weight set. The queries must be representative for the real runtime environment and the queries must have a real meaning. The sum of the selection term weight within the same experiment has to respect a minimal value and the queries must contain selections, projections, dataset unions from heterogeneous tables.

4. Response times of the queries, obtained from each experiment, are analyzed, taking into consideration different selection terms weights.

5. The system stability is analyzed, basing on the results variation obtained in the experiments.

The methodology is comparing, within every studied DMBS system, the behavior during the real runtime execution basing on the system stability.

C-SGBD Experimental Conditions and Environment

The main purpose of the experimental methodology is to obtain significant indicators of the system stability for a certain runtime system during a normal operation.

Although the methodology can be addressed to standard application systems running with DBMS, it can be extended to distributed DBMS's or cloud systems.

The present paper is analyzing the response times from different MYSQL DBMS implementations in order to be able to make a comparison between different application servers.

Two different servers will be analyzed: **Server1** and **Server2**, having the following configurations:

Server1:

Architecture	x86_64
Operating System	Linux
Apache Version	2.4.46
MySQL Version	5.6.29-76.2
Kernel Version	2.6.32-954.3.5.lve1.4.71.el6.x86_64

Server2:

Architecture	x86_64
Operating System	Linux
Apache Version	2.4.41
MySQL Version	10.0.38-MariaDB
Kernel Version	2.6.32-531.29.2.lve1.3.11.1.el6.x86_64

The response times are measured during a real runtime of the mentioned systems, in different running moments of the day, in order to obtain values according to a normal functionality of the analyzed system.

C-SGBD experimental framework and procedure

C-SGBD First and Second Phase – Selection Terms Extraction and Selection Weight Calculation

The database tables, used in experiment are populated with real runtime records. The tables contain real text values, describing a legal website, such as:

- Legal news
- Official Law Journal proceedings
- Legal Books descriptions
- Real questions for legal domain
- Real legal answers from website community

The words extraction procedure starts with simple SQL commands, eliminating the special characters.

Every selected table contains a main text value column that will be used in the database queries.

The texts from the records in the mentioned tables are processed and the main items / word are extracted, in the second phase of the methodology.

For every word having a minimum length (significant word), a record in the weight table is updated and the process continues for all the texts in the five source tables: NEWS, QUESTIONS, BOOKS, JOURNAL, ANSWERS.

The general weight for every word is calculated at the end of the procedure, the second phase of the methodology resulting in a table containing, for 31.018 significant words, the general weight.

C-SGBD Third Phase – Database Queries Experiments

The third C_SGBD phase consists in a sequence of three experiments composed by various sets of multiple SQL queries run on the database.

The experiments simulate different situations on database structure:

- Search tables with primary keys but without indexes searched columns;
- Search tables with primary keys but with indexes searched columns.

The queries tend to respect the real runtime queries that a regular user of the website would run on the system, searching for some specific information, taking into consideration the selection term calculated weight.

C-SGBD uses a set of the first thousand weights selection terms, which are used sequentially in different queries run on the five source tables.

Every experiment consists in a set of queries included in a PHP application, having the following structure:

- Database connection
- Selection of the 1000 selection terms, basing on a weight criteria
- For every selection term:
    - Start timer
    - Run queries on the five source tables with the specific weight selection term
    - Fetching the results
    - End timer
    - Result insertion into the RESULTS table

The first experiment uses source tables without ‘fulltext’ indexes on the queried text columns. Every subset of queries is posing the first thousand set of weights on each source table within queries and, at the end of a subset, the execution time is recorded.

The second experiment uses source tables with indexes on the queried text columns. The number of the queries is doubled as the queries are optimized and the response times are lower.

C-SGBD Fourth Phase – Results processing procedure

After the first experiment, the results are processed in order to obtain a level of standard deviation for the response times. Figure 1 shown the minim and maxim response time for every set of queries run on Server1 and Server2.

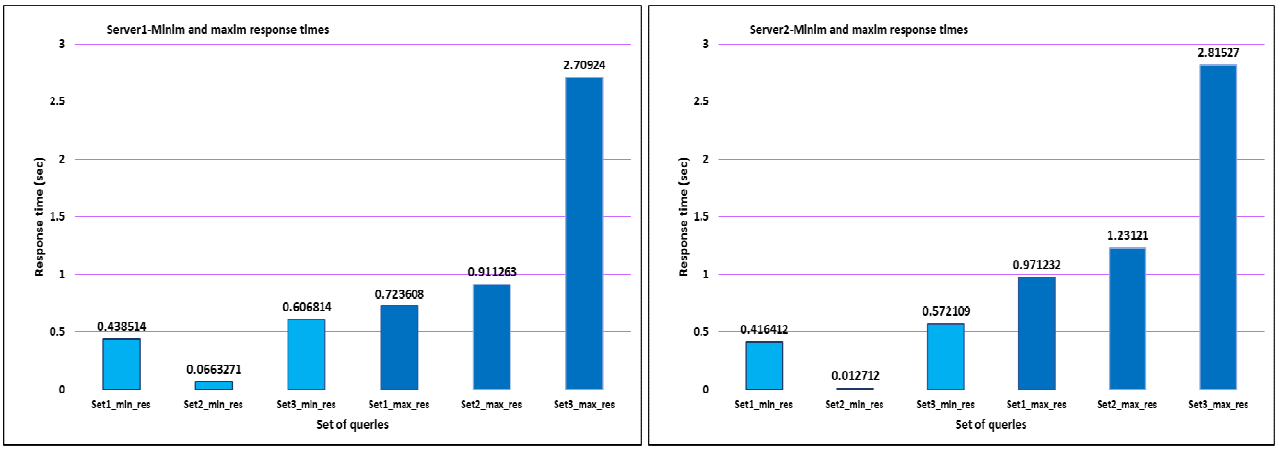

a) Server1 **b) Server2**

Fig 1. Minim and maxim response times for every set of queries

Figure 2 shown the standard deviation for every set of queries run on Server1 and Server2.

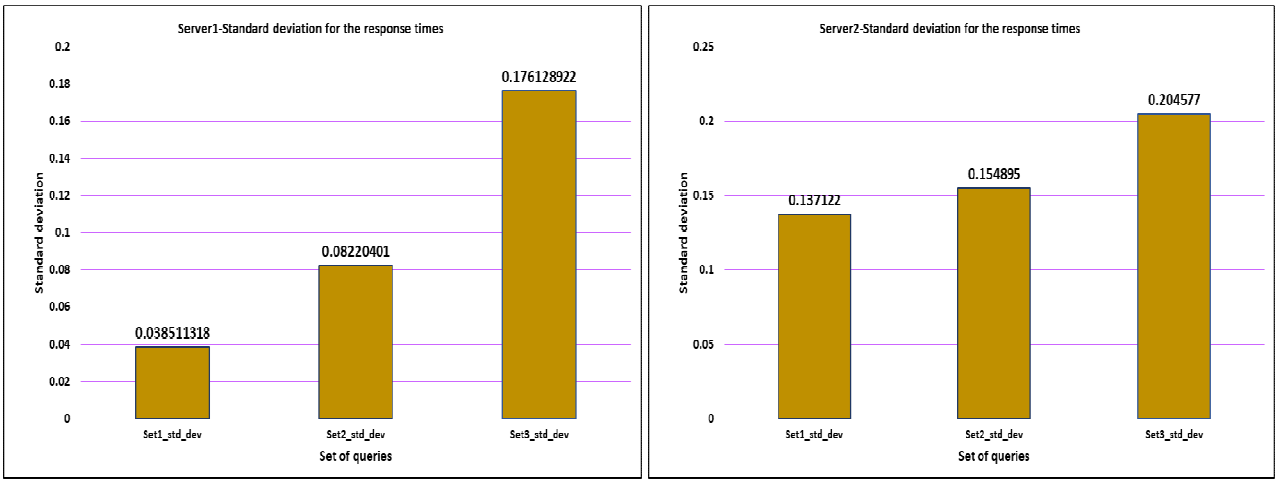

a) **Server1** **b) Server2**

Fig 2. Standard deviation for every set of queries

The second experiment reflects the index presence on the search columns.

Figure 3 shown the minim and maxim response time for every set of queries run on Server1 and Server2 with column index.

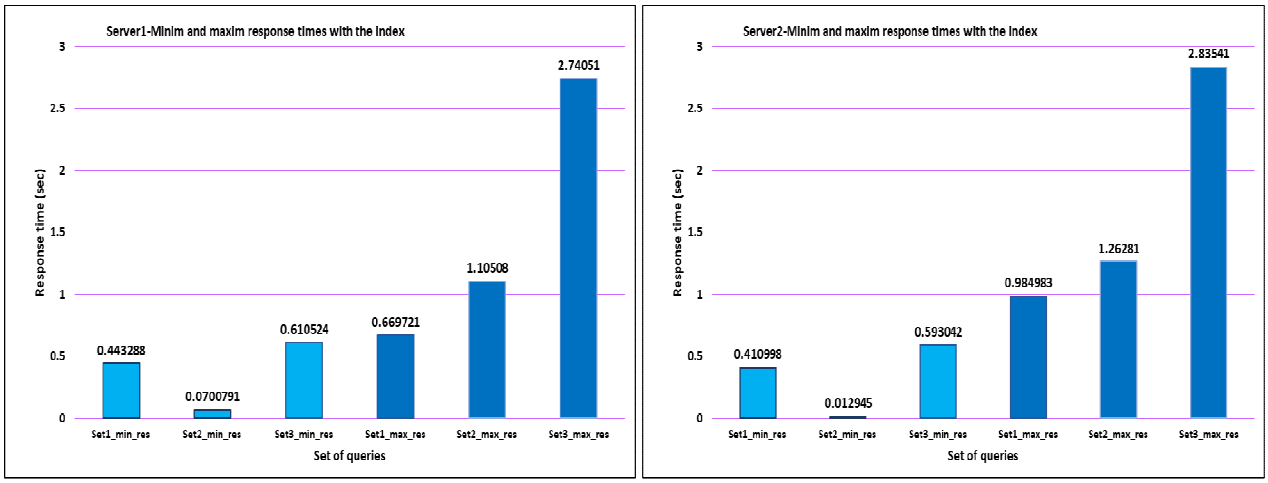

a) Server1 b) Server2

Fig 3. Minim and maxim response times for every set of queries with column index

Figure 4 shown the standard deviation for every set of queries run on Server1 and Server2 with column index.

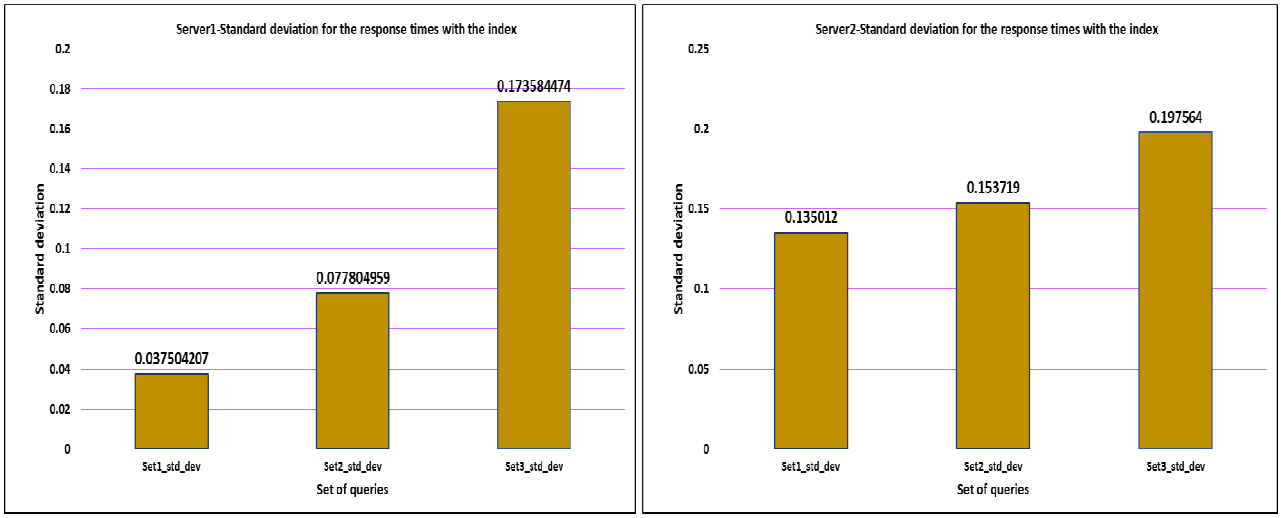

a) Server1 b) Server2

Fig 4. Standard deviation for every set of queries with column index

The recorded response times are reflecting the execution time for the subset queries but, also, include table source changing and the communication time between the application server and the database server, as long the set of queries are included in PHP applications run on the server.

The presence of indexes on the search columns is reflected in an improvement of the results:

a. **Server 1**: 2.6% - first set of queries, 5.35% - for the second set of queries and 1.44% for the third set of queries
b. **Server 2**: 1.53%- first set of queries, 0.76% - for the second set of queries and 3.43% for the third set of queries

C-SGBD Final Phase – Stability Evaluation of the System

C-SGBD fourth phase resulted in some processed results, reflecting the system stability. A level of stability is described by the results standard deviation between the same subset of queries and to have a minimum standard deviation for the result data can be interpreted as a first sign of a good stability for the system.

C-SGBD also takes into consideration other significant information in calculating the final stability indicator:

- The number of the records in a subset *N*
- The period of time when the queries are run, reflected in an indicator *pw*. This indicator is calculated basing on the daily workload of the DBMS server. The workload is underlined by the hosting provided statistics.

As long as most of the queries are run from different clients in a concurrent environment, the raw results also contain the exact time of the recordings. The period of time of every result subset is obtained in a specific level of system workload and pw indicator is taken into consideration when the response time enters in the standard deviation calculation.

The average deviation values calculated basing on all subsets medium deviations, previously obtained, are show in Figure 5:

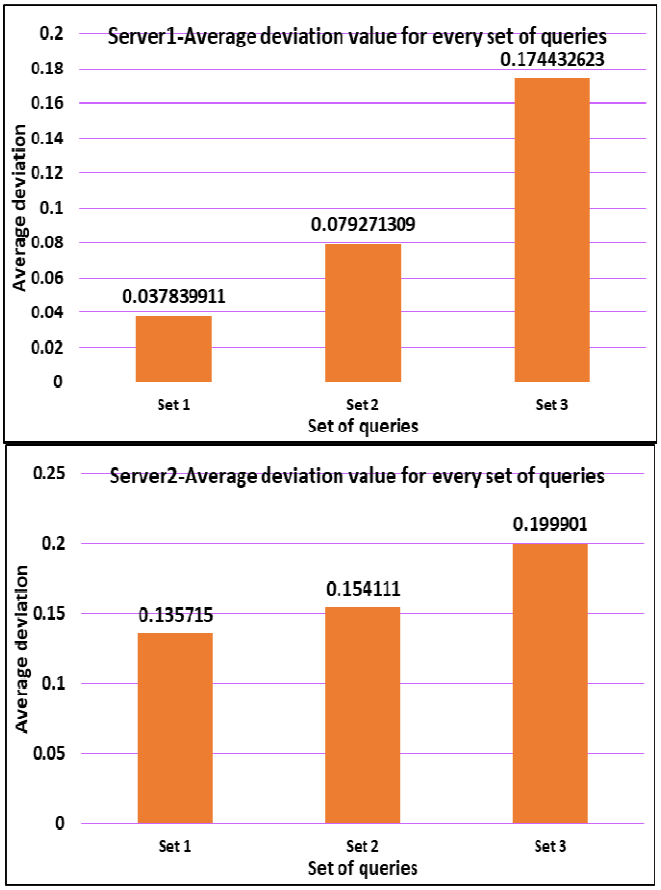

a) Server 1 b) Server 2

Fig. 5: Average deviation values for every set of queries

Basing on the Gdev obtained and a percentage of the server workload within the running day, for the data generation moment, pw, the final Stability Indicator (SI) reflects the way the system responds during a normal operational runtime, with multiple concurrent users, at different workloads.

SI is obtained by a formula containing both the subset queries deviation obtained at fourth Phase, but also a significance value for the system workload.

The lower SI is indicating the most stable system in the evaluation procedure:

SI $_{Server1}$= 0.068034213

SI$_{Server2}$ = 0.107156

The final phase of C-SGBD can provide an indicator for any DBMS system for its stability during normal operation. As we can easily observe, Server1 proved to be more stable, with lower standard deviations in the response times, although the response times were not the best, comparing with Server2.

Conclusions

C-SGBD can offer a methodology to analyze a software system with database performance stability. The procedure is easy to implement on any system and the data have a high representativeness for a usual system at runtime.

The final indicator, SI, can provide a useful tool to compare two different systems, from the stability in performances point of view.

In the studied systems, Server2 provided lower response times, having better performances in terms of the classic response time criteria.

C-SGBD provides a different point of view to analyze a DBMS, starting from the stability point of view. Using the proposed procedure, C-SGBD results were better for Server 1, which proved to be more stable.

Our efforts in the presented procedure were centered in the system stability of a system at runtime. Its purpose is to evaluate a working, implemented system, to compare two different runtime systems in order to provide useful information in terms of performance stability.

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Density-based Text Clustering using Document Embeddings

Iulia-Maria RADULESCU
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, iulia.m.radulescu@upb.ro

Ciprian-Octavian TRUICA
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, ciprian.truica@upb.ro

Elena Simona APOSTOL
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, elena.apostol@upb.ro

Alexandru BOICEA
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, alexandru.boicea@upb.ro

Mariana MOCANU
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, mariana.mocanu@upb.ro

Daniel Calin POPEANGA
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, daniel.popeanga@upb.ro

Florin RADULESCU
Computer Science and Engineering Department, Faculty of Automatic Control and Computers
University Politehnica of Bucharest, Bucharest, Romania, florin.radulescu@upb.ro

Abstract

Density-based clustering algorithms can accurately identify arbitrary shaped clusters, characteristic which makes them advantageous for many real-life datasets. However, most density-based clustering algorithms are affected by the curse of dimensionality, since they rely on distance metrics and range queries. In this paper, we demonstrate how density-based clustering algorithms can exactly cluster short text documents using a modern document embedding model, specifically Doc2Vec. We evaluate the accuracy of a classic density-based clustering algorithm, DBSCAN, and one of its recent variants, HDBSCAN, using two distinct quality functions, the Adjusted Rand Index and the Adjusted Mutual Information.

Keywords: Text Clustering, Density Clustering, Document Embeddings

Introduction

Clustering is a Data Mining operation that aims to assign similar objects to the same group (cluster) while maintaining dissimilar objects separately. Density-based clustering methods are algorithms (Campello et al., (2013, April)) that define clusters as regions of high density surrounded by sparse regions (Sander et al. (1998)). However, most density-based clustering algorithms are affected by the "curse of dimensionality" and therefore perform well especially for low-dimensional data (Assent, I. (2012)).

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In this paper, we evaluate two density-based algorithms for text clustering of a large dataset, i.e., DBSCAN and HDBSCAN which adds hierarchical clustering on top of DBSCAN. To overcome the limitations imposed by the curse of dimensionality, we use two variants of the Doc2Vec document embedding model, i.e., distributed memory (PV-DM) and distributed bag of words (PV-DBOW). Using this approach, the experimental results show that density-based clustering performance is improved.
The rest of the paper is organized as follows. Section 2 presents the outcomes of other papers regarding density-based text clustering. Section 3 details the theoretical concepts which build up the proposed pipeline, describing the chosen preprocessing methods, the architectures comprising the Doc2Vec document embedding models, the analyzed clustering algorithms, and the employed evaluation measures. Section 4 presents the experimental setup and discusses the experimental results. Finally, Section 5 summaries our findings and hints at future research.

Related Work

Several authors have assessed the accuracy of the density-based text clustering process.

Ikonomakis et al. (2019) apply the DBSCAN algorithm on a set of 1201 documents, extracted from the Reuters Corpus. Since the authors are aware that DBSCAN does not cluster high-dimensional datasets accurately, they reduce the dimensionality of the data to 100, using a simple combination of Document Frequency and Inverted Document Frequency (Ikonomakis et al., (2019)). However, their results show that a considerable part of the distinctive information is lost in the process since the DBSCAN algorithm assigns most of the documents (over 900) to the same cluster.

Mendonça et al. (2019) analyze the effectiveness of the following acknowledged clustering algorithms: i) Spectral Clustering, ii) Mean Shift, and iii) DBSCAN, applied to free text documents. The authors assess the aforementioned algorithms on two real-world datasets: i) a collection of BBC sports articles from 2004 to 2005 and ii) a corpus comprised of medical abstracts. Although Mendonça et al. (2019) uses Word2Vec to generate the embeddings, DBSCAN obtains extremely low accuracy (-8.3 Normalized Mutual Information score on the first dataset and -3.2 Normalized Mutual Information score on the second one). Similar to (Ikonomakis et al., (2019)), DBSCAN assigned all documents to the same cluster.

Ingaramo et al. (2008) assess the accuracy of several density-based algorithms, namely MajorClust, DBSCAN, and Chameleon, on short-text and narrow domain text-corpora. The dataset consists of i) a low complexity collection of medium-length documents about well-differentiated topics, ii) a medium complexity corpus comprised of scientific abstracts; the following four categories were targeted: 1) Machine Learning, 2) Heuristics in Optimization, 3) Automated Reasoning and 4) Autonomous Intelligent Systems., and iii) the CiCLing2002 corpus with high complexity, containing narrow domain abstracts. The authors conclude that for medium-length documents belonging to well defined categories, the algorithms are exact. However, terms with low frequencies negatively impact the results, especially when narrow domains are involved.

Methodology

Text Preprocessing

In order to lower the input dataset's dimensionality and to partially eliminate noise, we reduce the word inflections to their base form, employing two distinct methods: stemming and lemmatization.

Stemming. The Porter Stemmer is one of the most popular stemming algorithms and relies on the observation that suffixes of English words consist of smaller and simpler suffixes (Jivani, A. G. (2011)). The algorithm iterates through five steps, trying to apply a set of rules for suffix removal according to a number of conditions. Whenever a rule complies, it is applied to the suffix and the algorithm performs the next step.

Lemmatization. Similar to stemming, lemmatization removes inflectional endings, but instead of trimming words, it transforms them into their dictionary root. Thus, the lemmatization process requires the use of dictionaries. WordNet (Miller, G. A. (1995)) is an open-source English language database that also establishes semantic relationships between words, frequently used in the lemmatization process.

Document Embeddings

In order to be processed by the clustering algorithms, the textual information must be transformed into a numeric format. Although the TF-IDF embedding model (Kim et al. (2019), Truica et al., (2016, September)) is frequently employed for this task, it holds a number of disadvantages: it does not account for the word similarities or the order of the words and it produces high dimensional results. The Doc2Vec embedding framework overcomes these shortcomings and helps improve the clustering algorithms accuracy (Radu et al., (2020, May)). Therefore, we use Doc2Vec word embeddings in our pipeline.

Doc2Vec (also called Paragraph Vector) (Le et al. (2014 January)) is a document embedding method that learns continuous distributed vector representations for text documents of various sizes.
Similar to Word2Vec (Mikolov et al. (2013)), Doc2Vec uses a shallow neural network, with a single hidden layer, in order to compute the n-dimensional vectors. The word embeddings are captured by the hidden layer as a result of the prediction process. Two learning processes are proposed for Word2Vec:
i) Continuous Bag of Words (CBOW), which predicts a word given its context, and
ii) Skip-Gram Model (SkipGram), which predicts a target word's context given that target word, where the context of a target word represents the target word's neighbors.

Doc2Vec extends the aforementioned methods by adding paragraph (document) information into the models and utilizing it in the prediction process (Le et al. (2014 January)). Doc2Vec uses two approaches:
i) Distributed Memory Model (PV-DM), and
ii) Distributed Bag of Words Model (PV-DBOW).

The PV-DM model relies on concatenating or averaging a paragraph feature vector, representing the document, to the word vectors, in order to predict the next word in a context. The paragraph vectors associated with each document are shared only across contexts sampled from the same document, while the word vectors are shared across documents.

The PV-DBOW model adapts the Skip-Gram model to train paragraph vectors for predicting the context, instead of words. The prediction task implies classifying randomly sampled words with respect to the paragraph vector.

The word and paragraph vectors are trained through stochastic gradient descent and backpropagation.

Clustering

In this section we detail the theoretical concepts which underlie the two density-based clustering algorithms which we analyze: DBSCAN and its recent variant, HDBSCAN.

The DBSCAN Algorithm

DBSCAN (Density Based Spatial Clustering of Applications with Noise) (Ester et al. (1996, August)) is a density-based clustering algorithm that accurately discovers clusters with arbitrary shapes.

Ester et al. introduce a formal model for defining density-based clusters as base for the DBSCAN algorithm (Schubert et al., (2017)). DBSCAN relies on the intuition that each cluster extends above a certain density threshold, therefore characterizing density-based clusters using the distance range ε and the minimum number of neighbors $m_{pts}$of each object in the input dataset, using the following concepts: *core points*, *directly density reachability* and *density reachability* [3].

The core points and the objects which are directly density reachable or density reachable from the core points assemble dense regions, separated by regions with low density. Intuitively, a core point's neighbors (the objects situated at a distance less or equal to ε to a core point) belong to the core point's cluster. If any of the core point's neighbors is also a core point, all of its neighbours will be included in the same cluster (Schubert et al., (2017)).

The HDBSCAN Algorithm

HDBSCAN (Campello et al., (2013, April)) is a density-based clustering algorithm that produces a complete density-based clustering hierarchy, which can be further condensed into a simpler form yielding the final clusters.

The algorithm iterates through the following steps: i) the space is transformed such that the outliers are shifted from both the density islands and each other, ii) the input dataset is represented as a weighted graph, iii) the minimum spanning tree of the graph at step ii) is used to build a hierarchy of connected components iv) the cluster hierarchy is condensed according to the minimum cluster size, outputting the resulting clusters.

Space transformation: In order to delimit the outliers from the high-density regions, a custom metric (mutual reachability distance) is used for transforming the distances between the input dataset's objects. The mutual reachability distance relates to each of the input dataset's object $x \in X$ core distance, defined as the distance between an input object and its *k*-nearest neighbor, noted $d_{core}(x_p)$ where $x_p \in X$. The transformation of the original metric in terms of the mutual reachability distance is based on the intuition that objects in sparse regions tend to have larger core distances, as opposed to objects belonging to regions with high density, the outliers being moved away from both the density islands and each other as a result. The mutual reachability distance is presented in Definition 1 (Campello et al., (2013, April)).

Definition 1 (Mutual Reachability Distance) (Campello et al., (2013, April)): The mutual reachability distance between two objects $x_p$and $x_q$in the dataset X w.r.t m_{pts}, is defined as (Campello et al., (2013, April)):

$$d_{mreach}(x_p, x_q) = max\{d_{core}(x_p), d_{core}(x_q), d(x_p, x_q)\}.$$

Building the Mutual Reachability Graph and computing its Minimum Spanning Tree: Using the previously transformed distances, the Mutual Reachability Graph is built. This graph holds the input dataset's objects in its nodes. Any two nodes are interconnected by a weighted edge, representing the transformed distance between them. In order to identify the dense regions (the clusters) at each density level, the Mutual Reachability Graph is computed using a Minimum Spanning Tree. The tree is afterwards separated into a hierarchy of connected components. This is an equivalent optimal version of computing a Single-Linkage hierarchy of the space of transformed distances at each density level.

Condensing the cluster hierarchy: Since the dendrogram computed at the previous step is hard to understand, especially for large and noisy datasets, Campello et al. rely on the following idea in order to condense it: given a probability density function, its connected components can evolve only in three distinct directions as the density level increases: i) they shrink, but remain connected, ii) they are disconnected into smaller components, iii) they disappear completely (Hartigan, J. A. (1975), Gupta et al., (2008)). Therefore, the authors introduce another parameter, m_{clSize}, defined as the minimum number of objects incorporated by a cluster. Therefore, when splitting a connected component (a cluster), if any of its children contains less than m_{clSize}objects, the parent connected component will preserve its identity while the child whose size is less than m_{clSize} will be labeled as noise. Applying the aforementioned method results in a significantly more straightforward hierarchy.

Evaluation Methods

We evaluate the previously described pipeline using two evaluation measures, each from a distinct category: i) the Adjusted Rand Index (ARI), which is based on counting pairs of objects in the resulting clustering versus a ground truth clustering and ii) the Adjusted Mutual Information (AMI), based on the information-theoretical mutual information (Wagner et al., (2007)).

Adjusted Rand Index

The Adjusted Rand Index (ARI) computes the level of agreement between the algorithm's results and a reference clustering (Truica et al., (2018, September)). ARI's formal definition (Equation (1)) relies on the contingency table (Definition 2 (Truica et al., (2018, September))).

Definition 2 (Adjusted Rand Index) (Truica et al., (2018, September)): Given a set $S = \{s_1, s_2, \ldots, s_n\}$ of n elements and two groupings $X = \{X_1, X_2, \ldots, X_r\}$and $Y = \{Y_1, Y_2, \ldots, Y_t\}$ the overlap between X and Y is summarized in a contingency table $[n_{i,j}]$ where $n_{i,j} = |X_i \cap Y_i|$, $a_i = \sum_{j=1}^{s} n_{ij}$, and $b_j = \sum_{i=1}^{r} n_{ij}$.

$$ARI = \frac{\sum_{i,j}\binom{n_{ij}}{2} - \frac{\left(\frac{\sum_i a_i}{2}\right)\left(\frac{b_j}{2}\right)}{\binom{n}{2}}}{\frac{1}{2}\left(\sum_i\binom{a_i}{2} + \sum_b\binom{b_j}{2}\right) - \frac{\left(\frac{\sum_i a_i}{2}\right)\left(\frac{b_j}{2}\right)}{\binom{n}{2}}} \quad (1)$$

Adjusted Mutual Information

The Adjusted Mutual Information (Vinh et al. (2010)) assesses the similarity between a given output (U) and a ground truth (V) and is defined in Equation (2), where MI is the mutual information between clusterings, E represents the expected mutual information, and H is the entropy.

$$AMI = \frac{MI(U,V) - E(C,K)}{avg(H(C),H(K)) - E\ (MI(U,V)} \quad (2)$$

Experimental Results

Dataset

We assess the accuracy of the density-based DBSCAN and HDBSCAN algorithms on a set of 12263 article summaries extracted from the Arxiv database (https://arxiv.org/). We target the following five distinct categories: Databases (3000 documents), Geophysics (3000 documents), Metric Geometry (3000 documents), Genomics (2171 documents), and Economics (1092 documents).

Since both DBSCAN and HDBSCAN are affected by the "curse of dimensionality" (Assent, I. (2012)) we generate low dimensional embeddings using Doc2Vec by setting the model's hidden layer size to six neurons. We train the model for 300 epochs.

We determine DBSCAN's ε parameter following Gaonkar et al. (2013) and Liu et al.'s (2007, June) approach, namely by computing a *k*-distance plot with respect to the 11th nearest neighbor ($k = 11$). We choose the kth nearest neighbor as specified in Liu et al. (2007, June): $2 \cdot dim - 1$, where $dim = 6$ represents the dimensionality of the input dataset.

When combining the Porter Stemmer and WordNet Lemmatizer preprocessing algorithms with the PV-DM embedding model we find that the inflection points of the *k*-distance plot are situated near 0.012, respectively 0.015 values on the OX axis. Thus we set $\varepsilon = 0.0125$, respectively $\varepsilon = 0.015$. We empirically set $m_{pts} = 6$. We establish the *PV-DBOW - Porter Stemmer* and *PV-DBOW - WordNet Lemmatizer* associations' corresponding parameter values in a similar manner, obtaining: $\varepsilon = 0.01$ and $m_{pts} = 5$, respectively $\varepsilon = 0.011$ and $m_{pts} = 6$.

We mention that for the DBSCAN algorithm we use cosine similarity instead of the Euclidean metric since it is frequently used in text clustering tasks.

For the HDSBCAN algorithm, we set $m_{clSize} = 1000$ since the smallest cluster contains approximately 1000 summaries. Then, we vary the m_{pts} parameter, empirically choosing $m_{pts} = 7$, respectively $m_{pts} = 3$ for the PV-DM and PV-DBOW word embeddings model architectures.

Experimental Setup

We run our experiments on an Oracle Linux Server 7.6 machine with 64 GB RAM and 40 CPUs. We choose Python 3.7 as the programming language, making use of its libraries: sklearn (https://scikit-learn.org/stable/), nltk

(https://www.nltk.org/), gensim (https://radimrehurek.com/gensim/index.html) and hdbscan (https://pypi.org/project/hdbscan/).

Results

We display the evaluation results in Tables 1 and 2. The *WordNet Lemmatizer - Doc2Vec with PV-DM architecture* combination yields the best results for both clustering algorithms: 0.56 and 0.46 ARI for DBSCAN, respectively for HDBSCAN and 0.59 and 0.54 AMI for DBSCAN, respectively for HDBSCAN.

As expected, the PV-DM Doc2Vec architecture produces more accurate results for both DBSCAN and HDBSCAN algorithms, since PV-DM is known to achieve significantly more precise results (Le et al. (2014 January)).

Both clustering algorithms obtain lower accuracies when we use the Porter Stemmer for text processing instead of the WordNet Lemmatizer, as a result of stemming being less precise than lemmatization.

Table 1: Adjusted Rand Index values

Algorithm	Embedding	Porter Stemmer	WordNet Lemmatizer
DBSCAN	PV-DM	0.43	**0.56**
	PV-DBOW	0.37	0.53
HDBSCAN	PV-DM	0.41	**0.46**
	PV-DBOW	0.30	0.43

Table 2: Adjusted Mutual Information values

Algorithm	Embedding	Porter Stemmer	WordNet Lemmatizer
DBSCAN	PV-DM	0.51	**0.59**
	PV-DBOW	0.46	0.57
HDBSCAN	PV-DM	0.52	**0.54**
	PV-DBOW	0.5	0.53

We graphically display the Minimum Spanning Trees and the Condensed Trees outputted by the HDSBCAN algorithm, when applying the WordNet Lemmatizer text preprocessing method in combination with Doc2Vec word embeddings, using the PV-DM, respectively the PV-DBOW architecture in Figure 1.

The Minimum Spanning trees (Figure 1 (a) and Figure 1 (c)) offer a number of insights on how the HDBSCAN algorithm represents the input dataset in order to obtain the clusters: both trees are visually partitioned into three main regions, consisting of a large number of nodes, densely interconnected by edges with high weights (marked with dark shades of blue). The principal sub-trees are interconnected by several edges with low weights (marked with light shades of green and yellow). Therefore, each minimum spanning tree is condensed into a representation which contains three clusters of approximately the same size (Figure 1 (b) and Figure 1 (c)).

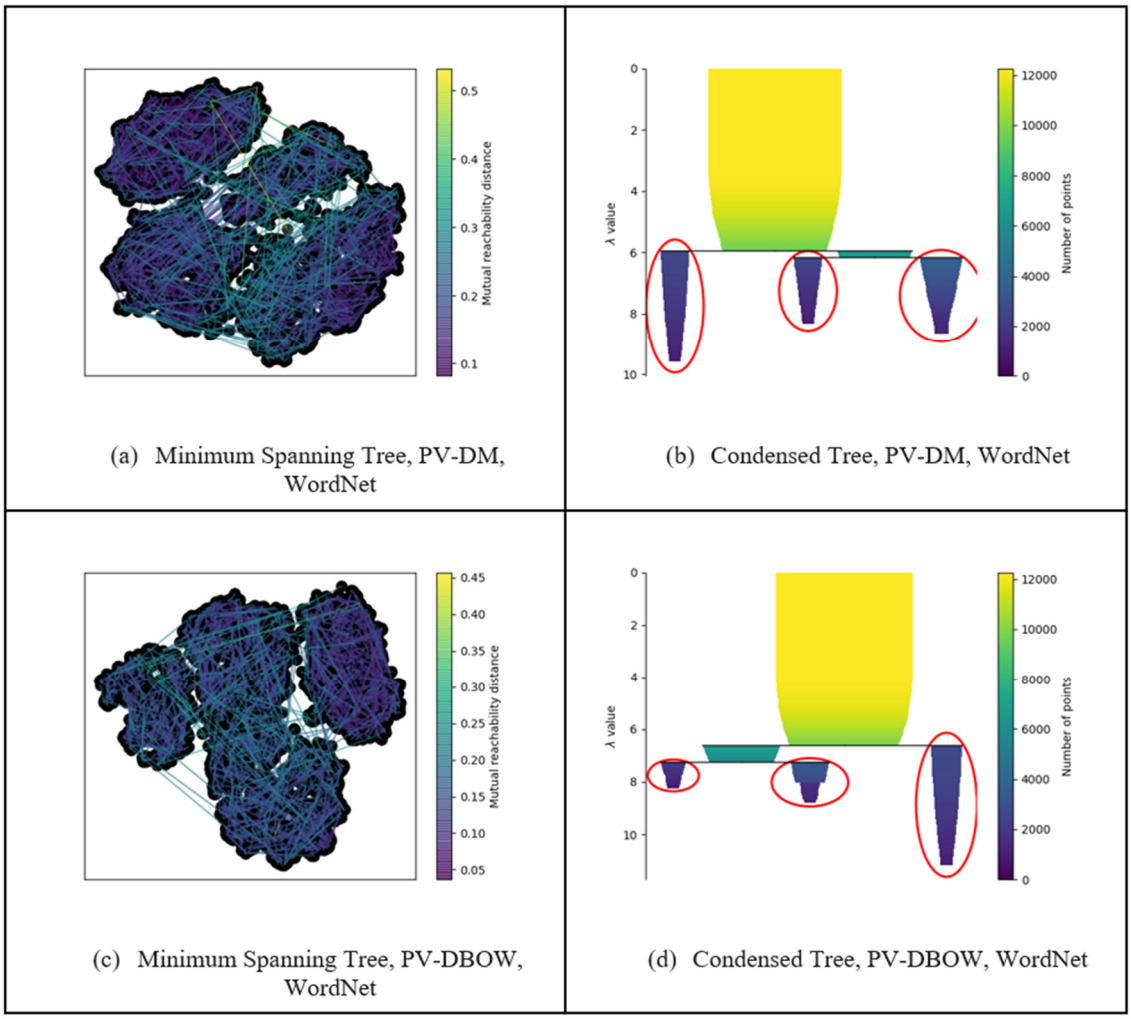

(a) Minimum Spanning Tree, PV-DM, WordNet

(b) Condensed Tree, PV-DM, WordNet

(c) Minimum Spanning Tree, PV-DBOW, WordNet

(d) Condensed Tree, PV-DBOW, WordNet

Figure 1: The Minimum Spanning Trees and the Condensed Trees for the WordNetLemmatizer used alongside the Doc2Vec PV-DM and PV-DBOW architectures

Conclusions

In this paper we evaluated the accuracy of two related density-based algorithms, namely DBSCAN and HDBSCAN, in combination with two distinct text preprocessing methods (the Porter Stemmer and the Louvain Lemmatizer) and the Doc2Vec document embedding model, for the text clustering task. We evaluated our outcomes using two different quality functions: the Adjusted Rand Index and the Adjusted Mutual Information.

We obtained generally good results, significantly higher than the ones presented in the majority of the other papers on this subject, referenced in the *Related Work* section. The WordNet Lemmatizer in combination with Doc2Vec's PV-DM

network architecture outputs the best AMI and ARI values: 0.59 and 0.54 for AMI DBSCAN, respectively HDBSCAN and 0.56 and 0.46 for ARI for DBSCAN, respectively HDBSCAN.

We consider extending our framework by employing more flexible density-based clustering algorithms such as DENCLUE (Hinneburg et al. (2007, September)). We also intend to use a combination between Doc2Vec's main architectures, PV-DM and PV-DBOW for generating the document embeddings.

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Hybrid Classifier of Recommender Systems Based on Quantum Methods for Decision Trees

Marek WRÓBLEWSKI
Institute of Control & Computation Engineering
University of Zielona Góra,
Zielona Góra, Poland, m.wroblewski@issi.uz.zgora.pl

Marek SAWERWAIN
Institute of Control & Computation Engineering
University of Zielona Góra,
Zielona Góra, Poland, m.sawerwain@issi.uz.zgora.pl

Abstract

In this paper, we discuss an purpose, construction mechanism and practical application of classical-quantum decision trees in the process of constructing hybrid classical-quantum decision forests. Traditional computational mechanisms are good at processing data about currently used data storage capacity units. Looking at the speed of growth and the amount of new data owing in, as well as the need to archive historical data, it will soon be necessary to resort to quantum representations of classical methods implemented on quantum computers. The article discusses the practical implementation of quantum recommendation circuits for profiling users of the system.

Keywords: quantum computing, recommendation mechanism, implementation algorithm, quantum circuit, decision trees, machine learning

Introduction

In this article, the authors focus on presenting the concept and physical implementation of the hybrid decision tree model in combination with quantum programming methods for quantum computers. The proposed solution applies to the IBM Quantum Experience hardware platform based on the IBM Q cloud architecture [1,15]. It is one of the mechanisms of the classic-quantum hybrid recommendation system. The test data set is real data containing information about film positions taken from the OMDB database [17].

The amount of new information collected is exponential [18]. Every day, vast amounts of new data are collected that require fast processing and decisions based on them. The presented solution is used to build the classifier being the mechanism of the recommendation system. It is responsible for the proper and effective classification of users according to specific criteria [2,3]. He is responsible for the correct process of profiling system users, which will allow to precisely and precisely define the interests and preferences of each new or existing system user. The expected result is accurate and precise release of predictions, which are apt to coincide with the system users preferences profiles.

The article [19] deals with the issue of quantum version of classifcation decision trees, which were described in the application of the C5.0 algorithm for constructing decision tree classifier in machine learning techniques [6]. A comparative analysis of the complexity of classical algorithms and their quantum counterparts while maintaining a high degree of similarity is presented in the paper [20]. Limitations of such a solution as quantum technology are also indicated. Implementations of the circuit on the IBM QX4 quantum computer are presented in the publication [21], which also presents an example of a circuit that gives probability results without a high degree of interference from technological conditions.
The application of quantum mechanisms in the discussed case consists in increasing the computational efficiency and time optimization for determining consistent features in the profiling stage by determining the

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user feature vector. This article introduces the concept of hybrid classical-quantum decision tree due to the use of two separate techniques, classical computer science and quantum computer science. Where for which it is necessary to perform calculations according to the quantum model implemented using Python on the IBM Q quantum hardware platform.

In addition, a complex structure is proposed made of many classical-quantum decision trees, calling it a hybrid classical-quantum decision forest. The structure of such a forest consists of a set of user feature vectors obtained based on the profiling process using classical-quantum decision trees. The practical application of the presented mechanisms and structures is the hybrid classical-quantum mechanism of the recommendation system for film platform users. This paper is a continuation part describing the hybrid classical-quantum methods of recommendation mechanisms and refers to the previously created [22] article.

The organization of the article is as follows: in the part of 2 discusses the application of hybrid classification mechanisms and presents the method of using and combining classical and quantum computing computational methods. Point 3 presents the classic representation of the decision tree. Point 4 presents the proposed hybrid solution based on classic decision trees and the quantum representation of the Grover algorithm. Point 4.1 is a numerical analysis of the amplifing of the determined feature using the Grover algorithm for two and three qubits. Point 4.2 shows the details of making a hybrid decision tree along with examples and how to build hybrid decision forests. The summary of the article is given in the section 5, where the final conclusions and some comments about possible further work on the method described in this article were given. The article end with a list of the cited bibliography.

Application of hybrid classification mechanisms

Hybrid classification mechanisms with high efficiency can be used as independent methods for determining in the shortest possible time the final results being elements of further prediction. Hybridity results from the use in synergic combination of two methods. Classical and quantum. In the proposed solution, quantum computational methods are used as the last element of the entire structure of the classification mechanism responsible for the correct profiling of system users [7]. It allows to determine the appropriate matching characteristic from the whole set and to amplify the amplitude of the probability of occurrence indicated by the mechanism of profiling the final characteristic. The process of creating a user profile with a specific vector corresponding to a given user takes place using classical computer science mechanisms - decision trees and quantum computer science mechanisms - the Grover algorithm. The latter finds its application in the last stage of selection and amplification of the indicated probability value for a given amplitude.

The use of quantum methods is intended to reduce the time needed to perform the profiling process. As mentioned before, recommendation systems, decision support systems and expert systems are one of the key applications. The properties and benefits of the model and quantum environment are designed to reduce the time it takes to create a user profile.

Such a transition through one hybrid decision tree and the creation of a user profile vector can be used as a component in the construction of the entire decision forest. Such a hybrid classic-quantum decision forest consists of vectors containing a user profile [8]. In this way, you can segment user profiles into individual layers based on your vector. The forest built in this way can be divided into smaller ones or combined into larger groups depending on the segmentation rules in force in a given system. The forest of decision trees can be used as an illustration of the users environment.

Another application is the definition of a forest segment as a group of elements used to teach and recommend in complex predictive systems responsible for indicating the positions most popular to new system users who do not have a user profile and history of system activity.

Classical Representation

In the proposed solution, the decision tree will be used in the process of profiling system users. It is an example of a multi-level decision-making process where the description of a specific phenomenon - the user's profile is the use of a full set of conditioning, describing and decision-making features.

Should be a specify set of decision rules for each node. Specify the rules for selecting terminating nodes for which the final classification of the specified profile will be determined. One of the possibilities is the use of

auxiliary algorithms for optimization, e.g. by pruning a tree. It is necessary to determine whether the divisions taking place on the indicated tree nodes are informative, for this purpose the concept of entropy change is used, which in itself for the problem of information theory is presented as the average amount of information on features from an unspecified proabilistic source. Each of these features occurs with the indicated probability . defines the concept of entropy expressed as follows:

$$E_n = -\sum_{n=1}^{i} P(c_i)\log_2(P(c_i)) \tag{1}$$

where $P(c_i)$ specifies the probability of choosing the c_i feature.

The decision tree in the profiling process is created on the basis of entropy changes in subsequent nodes. A large entropy change in the nodes means a high value of the feature, there is the most valuable information coming from this node. The value of zero means that we are dealing with the end of the tree and the same profiling stage, however, this is not a valuable result in the sense of obtaining information.

Hybrid Proposition

The hybridity of the approach is based on the use of the Grover algorithm to strengthen the probability amplitudes of the features indicated in the user profiling process using decision trees. Thus, in the node responsible for the selection of features was used the previously mentioned algorithm. The calculations and the entire implementation of the hybrid tree was written in Python and performed in the Qiskit quantum computing environment. In addition, actual implementation was performed on the IBM Q quantum computer [12].

Numerical Analysis

This part of the article presents the numerical analysis of the process of strengthening alg. Grover for a two-qubit circuit case where N=4, because $N = 2^n$ where *n* is the number of qubits [10,11,14]. In the present case, n=2. We will prove the amplification for the indicated value, e.g. 2, but remember that in a two-qubit system: $00 \to 0, 01 \to 1, 10 \to 2, 11 \to 3.$

$$|\psi_0\rangle = |00\rangle \tag{2}$$

We indicate the following initial state:

We use Hadamard's gate to get the state:

$$|\psi\rangle = H^{\otimes 2}|00\rangle = \frac{1}{\sqrt{4}}\sum_{i=0}^{3}|i\rangle = \frac{1}{2}(|00\rangle + |01\rangle + |10\rangle + |11\rangle) \tag{3}$$

Specify the searched element $|i\rangle$, let it be 2 or $|10\rangle$ The function definition for the searched element takes the form:

$$U_f(|10\rangle|-\rangle) = -|10\rangle|-\rangle \tag{4}$$

otherwise:

$$U_f(|i\rangle|-\rangle) = -|i\rangle|-\rangle \tag{5}$$

For ease of use, enter the additional $|\phi\rangle$status, which is a registry description without the state you specified (without the state indicated in this case, $|10\rangle$):

$$|\phi\rangle = \frac{1}{\sqrt{3}} \sum_{i=0, i\neq 2}^{3} |i\rangle = \frac{|00\rangle + |01\rangle + |11\rangle}{\sqrt{3}} \tag{6}$$

we get the state of $|\psi\rangle$, whose form is as follows:

$$\begin{aligned} |\psi\rangle &= \tfrac{1}{\sqrt{4}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle) = \tfrac{1}{\sqrt{4}}(|00\rangle + |01\rangle + |11\rangle) + \tfrac{1}{\sqrt{4}}|10\rangle \\ &= \tfrac{\sqrt{3}}{\sqrt{4}} \tfrac{(|00\rangle + |01\rangle + |11\rangle)}{\sqrt{3}} + \tfrac{1}{\sqrt{4}}|10\rangle = \tfrac{\sqrt{3}}{\sqrt{4}}|\phi\rangle + \tfrac{1}{\sqrt{4}}|10\rangle \end{aligned} \tag{7}$$

hence we know that the necessary angle for turning for non-amplification elements will be:

$$\theta = 2 \arccos \frac{\sqrt{3}}{\sqrt{4}} = 2 \arccos \frac{\sqrt{3}}{2} \tag{8}$$

$$\frac{\theta}{2} = \arccos \frac{\sqrt{3}}{4} = \frac{\pi}{6} \tag{9}$$

$$\theta = \frac{\pi}{3} \tag{10}$$

which corresponds to the angle $\theta = 60°$and this angle should be turned. Proceed to determining the probability value of for the e$U_f$re registry, determine : $|\psi_1\rangle$

$$|\psi_1\rangle|-\rangle = U_f(|\psi\rangle|-\rangle) = (\frac{|00\rangle + |01\rangle - |10\rangle + |11\rangle}{\sqrt{4}})|-\rangle \tag{11}$$

$$|\psi_1\rangle|\psi\rangle - \frac{2}{\sqrt{2^n}}|i_{uf}\rangle = |\psi\rangle - \frac{2}{2}|10\rangle = |\psi\rangle - |10\rangle \tag{12}$$

therefore:

$$|\psi\rangle = \frac{1}{\sqrt{4}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle) = \frac{1}{2}(|00\rangle + |01\rangle + |10\rangle + |11\rangle) \tag{13}$$

$$|\psi\rangle = \frac{1}{2}|00\rangle + \frac{1}{2}|01\rangle + \frac{1}{2}|10\rangle + \frac{1}{2}|11\rangle \quad |-|10\rangle \tag{14}$$

$$\begin{aligned} |\psi\rangle - |10\rangle &= \tfrac{1}{2}|00\rangle + \tfrac{1}{2}|01\rangle + \tfrac{1}{2}|10\rangle + \tfrac{1}{2}|11\rangle - |10\rangle \\ &= \tfrac{1}{2}|00\rangle + \tfrac{1}{2}|01\rangle - \tfrac{1}{2}|10\rangle + \tfrac{1}{2}|11\rangle \\ &= \tfrac{1}{2}(|00\rangle + |01\rangle - |10\rangle + |11\rangle) \end{aligned} \tag{15}$$

what we get:

$$|\psi_1\rangle = \frac{1}{2}(|00\rangle + |01\rangle - |10\rangle + |11\rangle) \tag{16}$$

Use the operator of rotation around the average to indicate the amplitude of the indicated element:

$$|i_{uf}\rangle = |10\rangle \tag{17}$$

$$|\psi_2\rangle = 0|\phi\rangle + |10\rangle \tag{18}$$

$$\frac{2^{n-2}-1}{2^{n-2}}|\psi\rangle = \frac{2^{2-2}-1}{2^{2-2}}|\psi\rangle = \frac{2^0-1}{2^0}|\psi\rangle = \frac{1-1}{1}|\psi\rangle = 0|\psi\rangle \tag{19}$$

$$0|\psi\rangle = 0(\frac{\sqrt{3}}{\sqrt{4}})|\phi\rangle + \frac{1}{4})|10\rangle = 0|\phi\rangle + 0|10\rangle \tag{20}$$

$$\frac{2}{\sqrt{2^n}}|i_{uf}\rangle = \frac{2}{\sqrt{2^2}}|i_{uf}\rangle = \frac{2}{\sqrt{4}}|i_{uf}\rangle = \frac{2}{2}|i_{uf}\rangle = 1|i_{uf}\rangle \tag{21}$$

$$|\psi_2\rangle = (2|\psi\rangle\langle\psi| - \mathbb{I})|\psi_1\rangle = \frac{2^{n-2}-1}{2^{n-2}}|\psi\rangle + \frac{2}{\sqrt{2^n}}|i_{uf}\rangle \tag{22}$$

where $|i_{uf}\rangle$s the amplitude of the indicated element after the use operator of rotation around the average.

$$|\psi_2\rangle = 0|\psi\rangle + 0|10\rangle + 1|10\rangle = 0|\psi\rangle + 1|10\rangle \tag{23}$$

thus we get:

$$|\psi_2\rangle = 0|\psi\rangle + 1|10\rangle \tag{24}$$

The performed measurement operation results in the form of 100 % gain of the indicated ele$|10\rangle$t , it means that the indicated element is in your database with 100 % confidence. In a two-qubit system, the probability of choosing from a 4-element set of any indicated element is 100%.

Another is the case of strengthening the three-qubits circuit of Grover's algae. The steps of the algorithm are the same as in the case of a two-qubit, so in the case of an eight-element database with the indicated index constituting the initial state, the initial state vector will take the form $|\psi_0\rangle = |000\rangle$. It should be noted that *N=8* becau $N = 2^n$, where n is the number of qubits. In the present case, *n=3*. We will prove the amplification for the indicated value, e.g.: 4, but please note that in a three – qubit system: $000 \rightarrow 0, 001 \rightarrow 1, 010 \rightarrow 2, 011 \rightarrow 3, 100 \rightarrow 4, 101 \rightarrow 5,$ $110 \rightarrow 6, 111 \rightarrow 7$, as indicated above, we have the initial state: $|\psi_0\rangle = |000\rangle$g the Hadamard gate we get:

$$|\psi\rangle = H^{\otimes 3}|000\rangle = \frac{1}{\sqrt{8}}\sum_{i=0}^{7}|i\rangle = \frac{1}{\sqrt{8}}(|000\rangle+|001\rangle+|010\rangle+|011\rangle+|100\rangle+|101\rangle+|110\rangle+|111\rangle) \tag{25}$$

We indicate in the notation amplified and in the context of the database the element 4 or 100 sought, and then the necessary operator with t$U_f$form:

$$U_f(|i\rangle|j\rangle) = |i\rangle j \otimes |f(i)\rangle \tag{26}$$

so for the searched item we get the form:

$$U_f(|100\rangle|-\rangle) = -|100\rangle|-\rangle \tag{27}$$

but otherwise the form will take the following form:

$$U_f(|i\rangle|-\rangle) = |i\rangle|-\rangle \tag{28}$$

Enter the additional $|\phi\rangle$ state, as:

$$|\phi\rangle = \frac{1}{\sqrt{N-1}} \sum_{i=0, i\neq 4}^{N-1} |i\rangle \tag{29}$$

not having the indicated condition:

$$|\phi\rangle = \frac{1}{\sqrt{7}} \sum_{i=0, i\neq 4}^{7} |i\rangle = \frac{|000\rangle + |001\rangle + |010\rangle + |011\rangle + |101\rangle + |110\rangle + |111\rangle}{\sqrt{7}} / \cdot \sqrt{7} \tag{30}$$

therefore:

$$\sqrt{7}|\phi\rangle = |000\rangle + |001\rangle + |010\rangle + |011\rangle + |101\rangle + |110\rangle + |111\rangle \tag{31}$$

where:

$$|\psi\rangle = \frac{1}{\sqrt{8}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle + |101\rangle + |110\rangle + |111\rangle) \tag{32}$$

$$|\psi\rangle = \frac{1}{\sqrt{8}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |101\rangle + |110\rangle + |111\rangle) + \frac{1}{\sqrt{8}}|100\rangle \tag{33}$$

$$|\psi\rangle = \frac{\sqrt{7}}{\sqrt{8}}|\psi\rangle + \frac{1}{\sqrt{8}}|100\rangle \tag{34}$$

hence we know that the angle required for rotation will be:

$$\theta = 2\arccos(\frac{\sqrt{7}}{\sqrt{8}}) = 41.4096^\circ \tag{35}$$

Moving on to calculating the probability value, one should perform the operation U_f obtain the form $|\psi_1\rangle$, so:

$$|\psi_1\rangle = |\psi\rangle - \frac{2}{\sqrt{2^n}}|i_{uf}\rangle = |\psi\rangle - \frac{2}{\sqrt{8}}|100\rangle \tag{36}$$

where:

$$|\psi\rangle = \frac{|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle + |101\rangle + |110\rangle + |111\rangle}{\sqrt{8}} \tag{37}$$

further:

$$|\psi_1\rangle = \frac{1}{\sqrt{8}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle + |101\rangle + |110\rangle + |111\rangle) - \frac{2}{\sqrt{8}}|100\rangle \tag{38}$$

$$|\psi_1\rangle = \frac{1}{\sqrt{8}}(|000\rangle+|001\rangle+|010\rangle+|011\rangle+|101\rangle+|110\rangle+|111\rangle)+\frac{1}{\sqrt{8}}|100\rangle-\frac{2}{\sqrt{8}}|100\rangle \tag{39}$$

$$|\psi_1\rangle = \frac{\sqrt{7}}{\sqrt{8}}|\phi\rangle - \frac{1}{\sqrt{8}}|100\rangle \tag{40}$$

Perform rotation operator around the average:

$$|\psi_2\rangle = (2|\psi\rangle\langle\psi| - \mathbb{I})|\psi_1\rangle = \frac{2^{n-2}-1}{2^{n-2}}|\psi\rangle + \frac{2}{\sqrt{2^n}}|i_{uf}\rangle \tag{41}$$

which gives:

$$|\psi_2\rangle = \frac{2^{3-2}-1}{2^{3-2}}|\psi\rangle + \frac{2}{\sqrt{2^n}}|100\rangle \tag{42}$$

$$|\psi_2\rangle = \frac{1}{2}(\frac{\sqrt{7}}{\sqrt{8}}|\phi\rangle + \frac{1}{\sqrt{8}}|100\rangle + \frac{2}{\sqrt{8}}|100\rangle) \tag{43}$$

$$|\psi_2\rangle = \frac{\sqrt{7}}{2\sqrt{8}}|\phi\rangle + \frac{1}{2\sqrt{8}}|100\rangle + \frac{2}{\sqrt{8}}|100\rangle) \tag{44}$$

$$|\psi_2\rangle = \frac{\sqrt{7}}{4\sqrt{2}}|\phi\rangle + \frac{1}{4\sqrt{2}}|100\rangle + \frac{4}{4\sqrt{2}}|100\rangle) \tag{45}$$

For the second iteration, re-apply U_f to get:

$$|\psi_2\rangle = \frac{\sqrt{7}}{4\sqrt{2}}|\phi\rangle + \frac{5}{4\sqrt{2}}|100\rangle \tag{46}$$

Then turn around the average about the form:

$$|\psi_2\rangle = -\frac{\sqrt{7}}{8\sqrt{2}}|\phi\rangle + \frac{11}{8\sqrt{2}}|100\rangle \tag{47}$$

Finally performing the measurement operation for the indicated val$|100\rangle$ will be obtained with the probability expressed in the following way:

$$|100\rangle = (\frac{11}{8\sqrt{2}})^2 = \frac{121}{128} = 0,945313. \tag{48}$$

$$\begin{aligned} f(x) &= |123\rangle \\ &= |123\rangle \\ &= |123\rangle \\ &= |123\rangle \end{aligned} \tag{49}$$

Detail of Performance

The classic-quantum hybrid profiling tree was made in IBM Q cloud technology. With the help of the Python language and the Qiskit programming environment integrated into the IBM cloud.
The completed tree is one of the mechanisms of the proposed hybrid classical-quantum recommendation system. It is used to profile system users.

Algorithm 1 Hybrid profiling tree

Steps of conduct in the hybrid profiling tree:

(I) definition of the user type (new or registered),
(II) implementation of the transition through the levels of the profiling tree,
(III) depending on the selected path, start of the process of amplifying the probability amplitude for the feature of the object indicated in the process,
(IV) measurement of sub-register value,
(V) presentation of the probability result,
(VI) creating a profiling vector for the selected user,
(VII) placing the vector in a database constituting a set of unit elements of the hybrid profiling forest.

The method of operation consists in the fact that on the basis of collected information about the user's activity on his behavior, answers are given to the questions asked in the subsequent roots of the tree. Based on the answers given, one goes to the next stages of queries and so to the last root, which is the last ending list of the tree's execution. For specific cases, it is necessary to perform quantum computation mechanisms in order to quickly find the elements identified based on observation of user behavior.

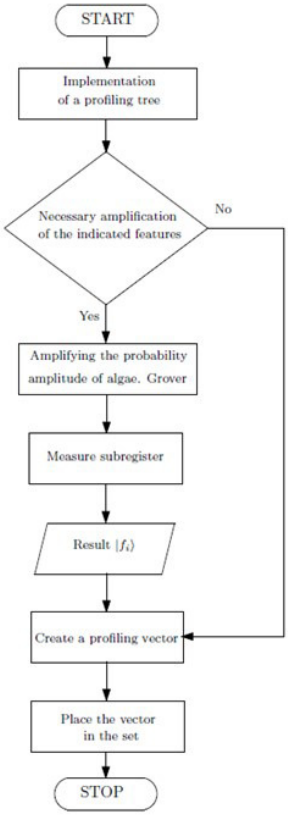

Fig. 1. The control flow of proposed the hybrid profiling tree

The end result is the resulting vector describing together with the specified degree of final weight. The set values of intermediate and final weights depend on the method of determining the priority of the branch and the requirements specified on the basis of the specifications of the assumed system.

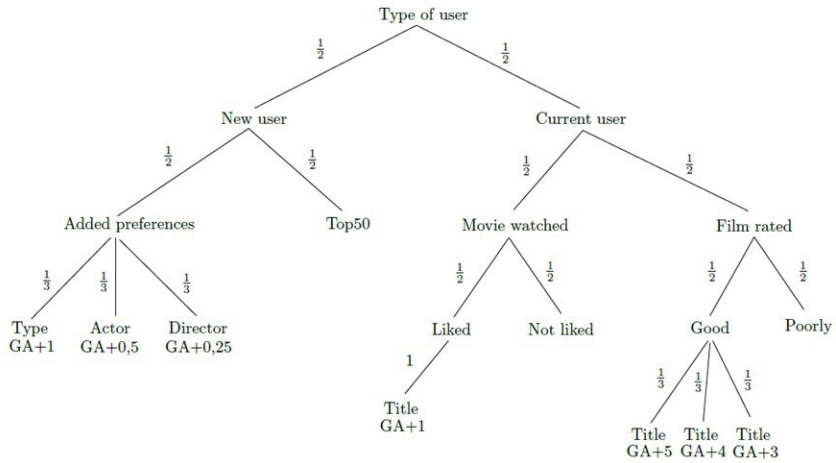

Fig. 2. Diagram of a hybrid classical-quantum profiling tree. The values on the branches indicate the weights for the selected decisions. GA stands for the quantum mechanism of searching for an element in the base and amplifying the probability amplitude using alg. Grover. The parametric value + X means weight gain for the selected decision. It results from the design assumptions of the recommendation system.

Index	Code	Genre	Actor	Title	Director
1	000	Western	Jack Nicholson	The Shawshank Redemption	Stanley Kubrick
2	001	Anime	Leonardo DiCaprio	Untouchables	Quentin Tarantino
3	010	Drama	Alan Rickman	Green Mile	Sergio Leone
4	011	Biographical	Robert Downey Jr.	The Godfather	Francis Ford Coppola
5	100	Historical	Al Pacino	Twelve angry people	Christopher Nolan
6	101	Horror	Clint Eastwood	Forrest Gump	David Fincher
7	110	Comedy	Tom Hanks	One flew over the cuckoo's nest	Wes Anderson
8	111	Action	Kevin Spacey	Joker	Milos Forman

Fig. 3. The table presents the structure of a three-qubit database, it contains classic data describing a record from a classic database and quantum information.

(A)

Step	Move
1	New user
2	Added preferences for the genre
3	Implementation of the circuit for algae Groover for the indicated species
4	Genre: Sensational film
5	Weight value = 2.333

(B)

(C)

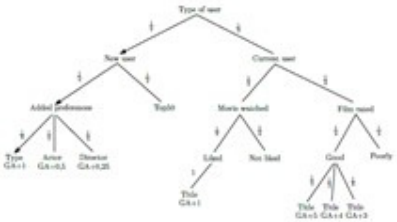

(D)

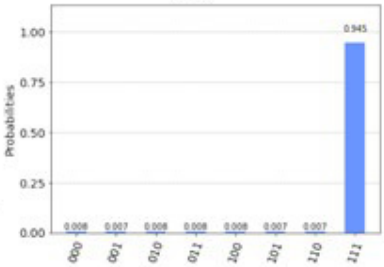

(E)

Step	Move
1	New user
2	Added preferences for the director
3	Implementation of the circuit for algae Groover for the indicated species
4	Director: David Fincher
5	Weight value = 1.583

(F)

(G)

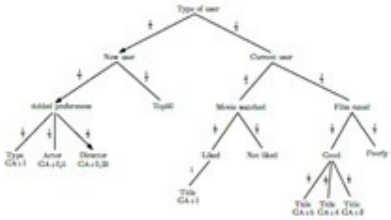

(H)

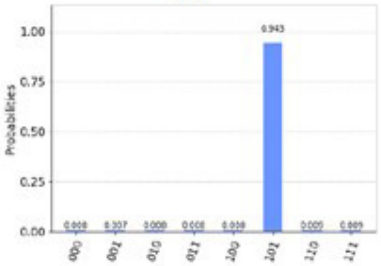

Fig. 4. Presentation of two test scenarios, where figures (A) and (E) show the test scenario for the indicated examples. Quantum circuits implemented for scenarios (A) and (E) are presented in diagrams (B) and (F). The corresponding hybrid profiling trees are presented in points (C) and (G), while the graphs (D) and (H) present the results of the obtained gain values for probabilities in the quantum circuit implementation using the Grover algorithm for the indicated test scenarios.

(I)

Step	Move
1	Current user
2	He watched the movie
3	He liked the movie
4	Implementation of the circuit for algae Groover for the indicated title
5	Film: Untouchables
6	Weight value = 2.5

(J)

(K)

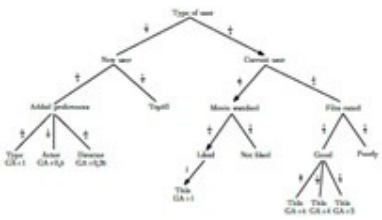

(L)

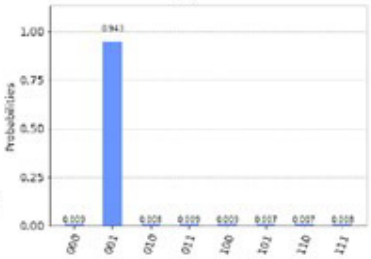

(Ł)

Step	Move
1	Current user
2	He rated the movie
3	He rated the movie well
4	Score 5
5	Implementation of the circuit for algae Groover for the indicated title
6	Movie: Green Mile
7	Weight value = 6.833

(M)

(N)

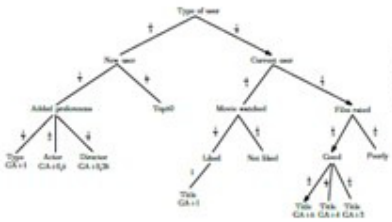

(O)

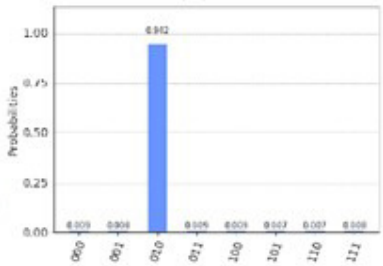

Fig. 5. Presentation of two successive test scenarios, where Figures (I) and (L) show the test scenario for the indicated examples. Quantum circuits implemented for scenarios (I) and (L) are presented in diagrams (J) and (M). The corresponding hybrid profiling trees are presented in points (K) and (N), while the graphs (L) and (O) present the results of the obtained gain values for probabilities in the implementation of the quantum circuit using the Grover algorithm for the two indicated test scenarios.

Using the data obtained in this way, we can build a hybrid decision forest. It describes the preferences of users using the system including the values of user profiles. By expanding the implementation of the hybrid profiling tree, the number of paths available will increase and, as a result, the number of possible profiling final results will increase. This affects the size of the decision forest and its height as well as the number of trees.

The shape of the imaged forest structure and density depend on the number and value of samples. The height of the tree determines the value of a single sample, the result obtained in the process of passing through the profiling tree. The density determined by the number of trees in the forest will depend on the number of single passes made through the profiling tree, i.e. the number of user profiles prepared.

The forest can be a structure and a set of learning data for the next stage related to machine learning [9]. With the help of a harvested forest with a properly designed tree, you can make a qualitative assessment of the specific object to which the forest and the associated tree refe [4]r. It is worth mentioning that the forest can be built from one tree or from many trees, however, describing a specific object then such a forest will correspond to a specific issue [5]. If the forest is built of profiling trees directed to different objects, it will not be possible to read the content and evaluate the results contained in the forest in a clear and transparent way. Therefore, for a forest to define and describe an object, it must be built of trees that refer strictly to that object.

Below is a graphic interpretation of the hybrid profiling forest based on data obtained in the profiling process using hybrid trees.

Execution number	Final score
Result 1	2.333
Result 2	1.833
Result 3	1.583
Result 4	1
Result 5	2.5
Result 6	1.5
Result 7	6.833
Result 8	5.833
Result 9	4.833
Result 10	4
Result 11	3

Fig. 6. The table contains the values obtained in the profiling process for each of the possible variants allowed by the tree.

Summary

The proposed implementation of hybrid classical-quantum profiling trees helps in carrying out the profiling process quickly and efficiently, which with a large amount of data contained in the data set is of great importance. The proposed implementation uses a simulator and a real machine available to users of the quantum computing cloud to implement the computational quantum model. The combination of classical computer science and quantum calculations allows you to quickly select a selected element from the database and, in combination with classic calculations, gives you the opportunity to assign other data describing the selected object that is the target of the recommendation. One of the main advantages and an advantage over classic calculations is determining the matching object based on the width of the pattern rather than the number of objects in the database. The number of objects to compare and the width of the wanted vector are not important, but the width of the vector itself. The advantages of combining these two different calculation methods include reducing the time it takes to search for and indicate a matching pattern. The number of objects is not important, but only the width of the object. The disadvantages that should be mentioned are imperfections related to the quantum systems technology itself, namely the quality of calculations and post-calibration time. The decohorency of the system significantly affects the quality of calculations and the final result of the amplitudes of the indicated probability.

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Challenges for the Banking Sector in Poland – Towards Fundamental Changes in the Banking Business

Michal BUSZKO

Nicolaus Copernicus University, Torun, Poland
mibus@umk.pl

Abstract

The banking sector in Poland belongs to one of the most stable and modern sectors in Europe. Its strong foundations so far have been manifested in a practically negligible number of bankruptcies and a relatively good handling of the effects of the subprime crisis in 2008-2010. Due to the increase in deposit guarantee costs, the introduction of the tax on bank assets, the foreign currency housing loan portfolios, the strong reduction of interest rates as well as multidimensional stress due to COVID-19 pandemic, this sector faced the greatest challenges in its modern history.
The purpose of this article is to identify the main challenges facing the banking sector in Poland in connection with the COVID-19 pandemic and to indicate the directions of potential changes in the banking business model as a response to such challenges. Literature studies and the multidimensional scaling of proximity (PROXSCAL) model were used to evaluate the impact of the major factors onto banking development in Poland. The study indicated that large and medium-sized banks react similarly to conditions affecting their financial results, a slightly greater differentiation is visible in the group of key largest banks, and the greatest disproportion concerns some medium and small banks with an aggressive sales model. The paper also indicates that banks start to implement the investment banking model (based on commissions and fees) and compensate decline in interest rates by strong reduction of interest on deposits.

Keywords: Bank, Taxation, Covid-19, Profitability.

Introduction

The banking sector in Poland is one of the structures built essentially after the systemic changes introduced in Poland in the late 1980s. Its characteristic feature is that it was created on the basis of state-owned banks, operating yet in the period of the centrally planned economy, as well as with active support of foreign investors. As a result, the sector shows a large share of the state as well as of foreign banks. Until 2015 the share of foreign investors was dominating and exposing the banking sector in Poland to external risks. Despite high involvement of foreign investors in banking assets in Poland, by 2020 no major problems with liquidity or bankruptcy occurred. The relatively high resilience of the banking sector to international turmoil appeared in the period 2008-2010 and aftermath, when none of the banks had to be supplied with public funds. The major problems that emerged during the subprime crisis turned out to be lower capitalization compared to other EU countries and the subordination to of Polish subsidiaries to policies of foreign headquarters. In 2011, the banking sector came under pressure due to the portfolio of mortgage loans denominated in Swiss francs, which until 2009 were the main type of mortgage lending in Poland. In the next years, the sector began to be burdened with costs of contribution to Bank Guarantee Fund (BFG) due to bankruptcies of non-banking institutions (credit unions), problems of over-employment and the digital revolution in banking, the implementation of EU law in the sector, including the CRD4 directive and the CRR regulation as well as the PSD2 directive. The sector had also to face the challenges of the tax on bank assets, as well as the negative impact of the judgement of Court of Justice of the EU in scope of housing foreign currency loans. The challenge turned out to be also the environment of very low interest rates of National Bank of Poland (NBP) reduced almost to zero during COVID-19 pandemic.

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The purpose of this article is to describe the main risk factors and challenges for the banking sector in Poland, reinforced by the COVID-19 pandemic, which may threaten its stable operation as well as its long-term development. The author has focused on five of factors, i.e. additional contribution to the Bank Guarantee Fund (BFG), taxation of assets, unsolved problem of foreign currency mortgage loans, reduction of interest rates, and effects of COVID-19 pandemic which have been combined together and materialized in 2020. The initial three factors are considered as most important obstacles in development of the banking sector in Poland (Związek Banków Polskich, 2020). The article will also present the likely directions of changes in the banking business model in Poland in connection with the emerging unfavorable trends, which will most likely have a permanent impact on the activities of banks in Poland.

Contemporary banking sector in Poland and its development

Despite the banking sector in Poland is the biggest in CEE with total assets value of approx. 450 bn EUR it is also one of the smallest in relation to GDP among all the EU countries (Deloitte, 2019). Its total assets represent approx. 88% of GDP, which in 2019 was the fourth smallest value in EU countries (ZBP, 2020). In terms of banking penetration, Poland can be categorized as lower-penetrated in EU and medium- penetrated in CEE. The sector essentially consists of 3 types of units: commercial banks, cooperative banks and branches of credit institutions. The size and features of the banking sector in Poland are presented in Table 1.

Table 1: structure of the banking sector in Poland

YEAR	2 014	2 015	2 016	2 017	2 018	2 019	2020*
TOTAL ASSETS (tn. PLN)	1.527	1.595	1.707	1.777	1.893	2.000	2.279
COMMERCIAL BANKS	38	38	36	35	32	30	30
COOPERATIVE BANKS	565	561	558	553	549	538	533
BRANCHES OF CREDIT INSTITUTIONS	28	27	27	28	31	32	33
NUMBER OF DOMESTIC BRANCHES	7 352	7 230	7 048	6 642	6 271	6 120	5 882
TOTAL EMPLOYMENT	172 659	170 908	168 821	164 390	162 565	156 887	153 534
POLISH OWNED BANKS ASSETS	38.5%	41.0%	43.4%	54.5%	53.6%	53.7%	.
FOREIGN OWNED BANKS ASSETS	61.5%	59.0%	56.6%	45.5%	46.4%	46.3%	.

** - as end of June; 1 PLN = approx. 0.2 euro*
Source: own work based on PFSA data

A characteristic feature of the banking sector in Poland is the high involvement of the state and foreign investors and the declining role of domestic private investors (13.7% share in assets in 2019). A significant share of foreign investors is mainly the result of the privatization of banks and the transformation of the banking sector in the 1990s and the first decade of 2000, although their importance has been declining since 2009, i.e. since the subprime crisis. The risk of a large share of strategic foreign investors is compensated for by a large diversity of countries of their origin (6), including mostly Western EU and the USA.

Relatively low banking penetration in Poland combined with high domestic and sovereign exposure (Kakes, Nijskens 2018), relatively high interest rates, and focus on basic banking products and services were factors preventing banks in Poland from engaging in subprime loans and toxic assets. Their situation, as in case of several other small open economies, was rather dependent on external than internal conditions (Brzoza-Brzezina, Makarski 2010). Despite the economic slowdown during the subprime crisis in Poland, but not recession, commercial banks managed relatively well and did not require support from the state or international institutions, what was often practiced in most EU countries. Nonetheless, they suffered deterioration of financial efficiency as in most of CEE banking sectors (Popovici, 2014). The main problem that emerged in Poland during and in the aftermath of the subprime crisis was relatively low capital

adequacy. To keep the stability of the sector low level of Tier1 capital was supplemented by the capital Tier2 (Konovalova, Caplinska 2020). In the next years both capital adequacy as well as profitability was increasing in Polish banking sector similarly to other countries of CEE (Radulescu, Banica 2018). The other vital problem of the sector that emerged after subprime crisis was indebtedness of individual clients due to mortgage loans in foreign currencies, especially in the Swiss franc. Due to the currency risk, they began significantly charge many large and medium-sized banks in Poland. There were proposed several programs of forced exchange of currency of the credits into PLN however, their costs would charge banking sector with substantial loses and led to bankruptcies of several large and mid-size banks (Buszko, 2018). Due to this reason, just limited facilities were implemented (e.g. lower currency spreads, special supporting funds for borrowers, possibility to change the loan currency at NBP currency rate).

Particular challenges for the operations of banks in Poland

Relatively favorable conditions for banks operations in Poland lasted between 2011 and 2014. The first factors, that significantly influenced the banking sector profitability and its ability to develop started to emerge in 2015 and have been continuing until 2020. The main factors that have been fundamentally determining its financial condition include: a) increased contributions to the BFG, b) tax on banking assets, c) significant reduction of interest rates by the NBP and interchange fee rates, d) provisions due to foreign currency loans, e) deterioration of income and cost parameters in connection with the COVID-19 pandemic.

The first factor that had a significant impact on the profitability of the entire banking sector was the change in the value of contributions to BFG. Due to the bankruptcy of the largest cooperative bank and credit cooperatives participating in the deposit guarantee scheme, commercial banks in 2015 were forced to cover the amount of guaranteed deposits. The change from 1.16 to 4.24 bn PLN, was an increase by approx. 264% and reached level of 28% of employment costs in the whole sector. In the next years the contribution fell to the range from 2 to 3 bn PLN substantially charging the net results of the sector (Komisja Nadzoru Finansowego 2020).

The second key factor affecting bank profitability was the introduction in February 2016 additional tax imposed on bank assets. Since 2009 tax on banks have appeared in most EU countries, however, unlike Hungary and Poland, in most countries the tax covers liabilities and risky instruments (Martysz & Bartlewski, 2018). Only in the year of its introduction, the tax constituted a charge of PLN 3.2 billion, which accounted for 5.2% of the operating result and 23% of the sector's net profit. This tax is paid on assets in the annual amount of 0.44% of the value of assets and is imposed on entities with a surplus in assets over PLN 4 billion. In practice, it is paid primarily by commercial banks, including all listed on the Warsaw Stock Exchange. From 2016, the tax value is one of the main elements of the bank's general management costs (at the level of approx. 20%) and is higher than the payments made to the BFG. According to Polish Financial Supervision Authority (Komisja Nadzoru Finansowego) estimates, the impact of this tax is -1 pp. ROE indicator. Since this tax is imposed on financial institutions regardless of their financial condition and risk, it increases effective tax rate on banks from 19% to approx. 40% (Związek Banków Polskich, 2020). At the same time, this tax increases the ratio of general and administrative expenses to the highest level in developing EU countries in relation to the net operating result (except for Hungary) (Komisja Nadzoru Finansowego, 2020). The tax percentage is the highest in the EU and the purpose of the tax is solely fiscal.

Banks' results have been also under strong pressure due to the third factor, i.e. reduction of interest rates by the NBP and the decrease in the interchange fee resulting from top-down legal regulations in Poland. The reduction in interchange fee affected the decrease of non- interest profit by PLN 457 million in 2015 (Urząd Komisji Nadzoru Finansowego, 2016). Moreover, the results of the banking sector were also deteriorated by the impact of the reduction of interest rates, which could not be offset by the increase in the number and value of transactions. Therefore, in 2015 banks started to achieve lower income, both in terms of interest as well as fees and commissions. In the following years, the net interest income started to improve, but it was the result of the scale of operations and the reduction in interest on deposits. The relative stability of interest rates was significantly disturbed in 2020 by a threefold reduction in interest rates to 0.1% due to the COVID-19 pandemic, which significantly changed the possibility of generating interest income. As a result, in June 2020, interest income from loans granted was significantly lower than 12 months earlier. Counteractions taken by banks, including a significant reduction in interest paid on deposits and an increase in fees and commissions, resulted

in the total interest result in June 2020 being approx. 1.6% higher than in June 2019, and the result on fees and commissions by almost 7.4%. At the same time, the share of fees and commissions in net operating income increased from 18.1% to 20.4%. The sector's profit for the entire year, due to the COVID-19 and interest rate cut is expected to be lower by approx. 25-30% (Szymański, 2020). The financial data of the banks are presented in Table 2.

Table 2: financial results of the bank sector in Poland (bn. PLN)

YEAR	2014	2015	2016	2017	2018	2019*	2019	2020*
TOTAL NET OPERATING INCOME	58 744	57 115	61 772	64 014	64 565	36 143	70 564	34 557
NET INCOME FROM INTEREST	37 157	35 377	38 024	42 619	44 820	24 331	49 171	24 725
NET INCOME FROM FEES	13 789	13 317	12 592	13 764	12 306	6 555	13 338	7 039
NET INCOME FROM DIVIDENDS	1 169	1 363	1 308	1 169	1 506	1 772	2 130	708
NET INCOME FORM OTHER OPERATIONS	6 629	7 059	9 848	6 462	5 933	3 483	5 925	2 084
NBP INTEREST RATE	2,00%	1,50%	1,50%	1,50%	1,50%	1,50%	1,50%	0,10%

** - as end of June*
Source: own work based on PFSA data

The fourth key factor weighing down the financial results of banks in Poland are foreign currency housing loans granted until 2009, in particular in Swiss francs. The problem of foreign exchange lending was noted in many countries of CEE but in particular in Hungary and Poland (Buszko & Krupa, 2015). In Poland at the end of 2019, such loans represented PLN 98 billion, which accounted for 23% of the value of all housing loans in Poland. Their number amounted to 438 thousand, which accounted for 19% of the total number of housing loans. The problem of foreign currency loans in Poland came from the very low CHF/PLN exchange rate at the time of their originating (mostly in 2008), and then the significant increase of CHF valuation in the following years, (by approx. 122% between 2008 and 2020). This increase generated additional credit risk for banks, which was partially offset by a decline in CHF LIBOR. The problem of loans in Swiss currency applies to the largest banks in Poland, including majority of those listed at the Warsaw Stock Exchange. Due to the change in banking regulations at the EU level, including the CRDIV directive and the CRR regulation, as well as the pressure of government and PFSA, the loans were charged with additional capital requirements of an add-on buffer and a risk weight of 150%. Moreover, after the rapid increase in the CHF exchange rate in January 2015, banks launched an aid program for foreign currency borrowers, defined as a “six-pack”, with the average cost of PLN 1 billion per year. The problem of foreign currency loans materialized in banks as a result of the judgments of the Court of Justice of the European Union, which became the pattern for Polish courts in cases against banks for the use of abusive clauses in loan agreements, especially with regard to determining the indexation of loans with the exchange rate. As a result of EU jurisprudence and the order to return part of the commission on loans repaid before maturity, banks had to account significant provisions, which only in Q4 2019 amounted to over 2% of the carrying amount of foreign currency loans. Just for the largest bank in Poland it accounted for approx. PLN 450 million (Rudke, 2020). It should be added that foreign currency loans are of good quality and their NPL ratio is approximately 3.3%.

In addition to the above-mentioned main factors that burden banks' financial results, one should mention the deterioration of the income and cost stress resulting directly from the COVID-19 pandemic. For this factor, its overall impact cannot be determined yet as the final duration of the pandemic is not known. In addition, it should be kept in mind that banks will feel the negative effects with a few months delay. The observation of the Polish banking sector operation during pandemic points out strong increase in deposits and a decrease in the value of loans granted. Moreover, one could observe replacing of bank lending for companies by the state aid programs, as well as postponement of the repayment of loan installments in form of “credit holidays”. The problem is also a deteriorating quality of loans

portfolio, which is reflected in the provisioning for loans yet from Q1 2020. Just in case of the largest bank in Poland, PKO BP, the cost of risk already increased due to COVID by approx. 0.8 pp. (PKO, 2020).

Positioning banks in Poland

The analysis of the factors influencing profitability of banks in Poland have been supplemented with a multidimensional scaling of proximity (PROXSCAL) model using Euclidean distance and standardized 10 financial variables related to market valuation, profitability, operational efficiency, cost efficiency, interest and commission efficiency. The scaling was made in IBM SPSS Statistics 26 and its purpose was to identify the impact of the cumulated factors affecting banks (including additional contributions, tax on banks, new provisions and low interest rates on the key banks in Poland listed at the Stock Exchange. At December 2018, these banks concentrated almost 71% of the sector's assets on a unit basis, constituting the main component of the value of the Warsaw Stock Exchange (33%) as well as its turnover (28.3%) (Komisja Nadzoru Finansowego, 2019). Taking into account 10 standardized variables, a positional map was prepared, showing the distribution of banks under the influence of five key factors analyzed in the paper. The results are presented in the Fig. 1.

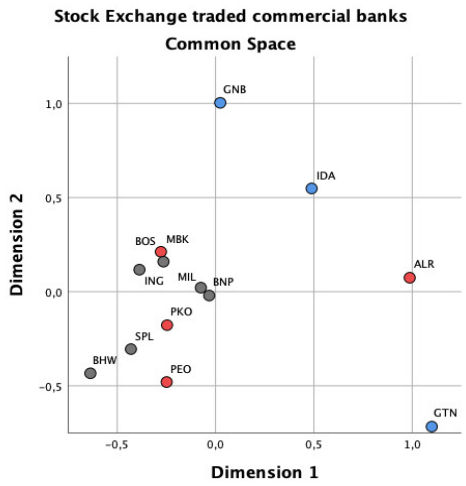

Banks with substantial share of CHF loans: GNB, SPL, PKO, BNP, MIL, BOS, MBK
Red dots – state banks, Blue dots – domestic owned banks, grey dots - foreign owned banks
Normalized Raw Stress = 0.0176, DAF = 0.9824, Tucker's Coef. = 0.9912

Fig. 1: Positional mapping of banks listed at the WSE

Source: own work based on EquityRT data as on 10.09.2020

The chart shows the relative similarity of banks by the size group. In particular, one can find the similarity of the group of large banks with assets of PLN 100-200 billion (ING, BNP, MBK, MIL) and the small BOS bank with assets of PLN 19 billion. The first four banks are foreign owned and the last is belonging to the state but is specialized in financing and servicing projects related to ecology and environmental protection. Its activities in the area of green banking were analyzed by Dziawgo (2014). The largest bank in Poland (PKO) PLN 348 billion with assets value in 2019 is between the group of sector leaders in terms of size and financial results, i.e. SPL and PEO with assets of respectively PLN 210 and PLN 203 bn with large banks (ING, BNP, MBK, MIL) representing assets exceeding PLN 100 bn. The ranking highlights the BHW bank which is the mid-sized unit (with assets from 50 to 100 bn and most closely resembles the parameters of the leaders (SPL and PEO). This bank is representing corporate banking, similarly to PEO, and is the only med-sized unit relatively profitable, financially secure and value creating.

One can also find close proximity of banks with substantial shares of CHF mortgage loans in their mortgage loans portfolio (above 20%). In fact, there are two distinctive subsets, i.e. BOS, MBK and MIL, BNP. The two subsets are between sector leaders and the outliers.

Finally, the chart shows a large deviation of 2 mid-sized banks (GNB and ALR) and 2 small ones (of assets below 50 billion - GTN and IDA). They are characterized by aggressive pricing and selling strategies, but also by poor financial results, low market valuation and structural ineffectiveness. Such results confirm the research of (Beltratti & Stulz, 2012) which points that less aggressive and less risky banks turned out to be better performing during the crisis. Three of the entities mentioned (GNB, IDA and GTN) are owned by a Polish private investor, and the fourth is indirectly owned by the state. None of the foreign owned banks listed at WSE in Poland is in difficult financial condition and there is no direct stress in Polish financial system because of their eurozone origins. The risk and stress due to COVID-19 are already observed in the financial system of eurozone countries (Ito, 2020).

Discussion on the potential directions of changes in the banking sector

The subprime crisis consequences in Polish banking sector helped to get necessary knowledge and experience how to manage banks during the turbulent environment. Thus, in general banks in 2020 were better prepared for the shock than in 2008-2009. The problem of the persistence of bank performance across the crises is vital and Garel et al (2020) developed it with regard to private and public banks. When analyzing the persistence of bank performance across crises, several potential directions of changes in Polish banking can be pointed, including changes in banking business models.

When evaluating the financial proximity of banks in Poland one can find that large banks react similarly to the described negative phenomena, greater diversification is visible among the three biggest banks in the sector, however their results are still positive. The highest diversity can be found in the group of medium and small banks, primarily those pursuing an expansionary and aggressive lending policy. Due to poor results their future existence can be questioned, creating potential for voluntary or compulsory consolidations. This is in line with the research of de Haan and Kakes (2020) who find that after global financial crisis retail-oriented and medium-sized banks suffered most losses. Taking into account the ownership structure of endangered entities in Poland, a reduction of presence of domestic private investors and a duopoly of ownership (the state and foreign investors) should be expected. It will determine valuation of banks as ownership structure strongly influences governance of banks (Caprio et al. 2007).

As the state is at present playing an important role in the banking sector in Poland and the depositors did not experience critical bankruptcies of banks, the trust towards banks is relatively high and rising in time in Poland (Piotrowski, 2020). As depositors are not familiar with such phenomena, one or more mid-size or large bank failures may cause shock on the whole market, putting abrupt and strong pressure on deposit stability.

Low return on equity and assets (ROE and ROA) of the banking sector in Poland and lower than in other sectors in developing countries by approx. 3 and 0.3 pp, will result in a decline in the interest in investing in banks in Poland form the part of foreign investors despite still existing significant development potential in the field of retail customer banking and relatively low concentration of the sector. Thus, one may expect increasing role of the state which will grow due to the lack of private capital from domestic investors.

Deteriorating results caused by simultaneously rising operating costs (salaries and general administration costs) and falling interest income will deteriorate the ability of banks to generate value in a sustainable manner as well as to generate returns on bank shares, leading to a decline in interest in new equity issues

In terms of the banking business model the one can expect putting higher pressure for the search for greater income from fees and commissions, resulting in an increased potential in banks' transition into investment activities with greater risk.

Considering a customer service, one should expect that the Polish model of banking “almost free of charge” will change into paid service for each banking activity. Based on some Western European countries the introduction of the

subscription-based products can be an effective solution for banks. In such business model banks will provide the customer with an all-inclusive package for a fixed monthly fee.

Another effect of limiting interest income may be looking for sources other than strictly financing or banking business activities. A good example is the largest Polish bank - PKO BP that has launched a start-up related to the sale of new or used cars for business purposes.

Due to the permanent decrease in the number of customers visiting bank branches, a manifestation of changes in the business model will be a further reduction in the number of bank branches and a greater emphasis on the use of digital banking. This action will be additionally strengthened by the increase in operating costs in Poland, including in particular an increase of minimum wages. Banks will be then forced to become technological and IT innovators while maintaining some reduced number of stationary branches. Other possibility is the development of pure play internet banks which allows to reduce costs and get economies of scale. Such units may quickly get market share, but they may also generate overexposure in risky markets (Arnold & van Ewijk, 2011). Solutions such as digital cloud, regulatory sandboxes or products offered as part of cooperation with fintech entities should be expected as well.

Due to the high excess liquidity and the conservative approach to selling money in the form of loans in a pandemic, banks may limit or withdraw from accepting deposits, what could be observed in Poland already in 2020 with regard to term deposits for enterprises. The solution may be also to introduce a negative interest rate on savings.

Due to the taxation of bank assets (loans), with the simultaneous exemption from taxation instruments issued by the state treasury, an intensification of the phenomenon of credit crunch, stimulated by preferring bonds issued or guaranteed by the Treasury can be expected.

Summary and Conclusions

The modern banking sector in Poland is facing the greatest challenge in its over 30-year history. The cumulation of threats inherent in both the legislative (restrictions on banks' operations), tax (application of the tax on assets), costs (the need to establish provisions due to court proceedings brought by foreign currency borrowers), financial (extremally low level of interest rates), economic (low customer activity) combined with lower creditworthiness makes banking development less and less profitable on the one hand, and on the other hand reduces flexibility of the whole sector to respond to changes in the environment. As a result, the banking sector may cease to fulfill its functions effectively and lead to the phenomenon of credit crunch. Falling into the trap of limiting access to credit will have very serious consequences, especially in the period of economic recovery from the recession caused by the COVID-19 pandemic. Access to the necessary capital in the economy may then difficult. Moreover, the deterioration of the banking activity in Poland will result in a decline of the sector's competitiveness against other CEE countries and the outflow of private capital, leading to a further weakening of its potential. The central bank's focus on helping borrowers in the pandemic period in the form of a significant and long-term reduction of interest rates will result in the necessity to significantly increase the prices of banking services, strongly and permanently limiting the free of charge banking model in Poland.

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Project Management "Wytyczno": As an Example of Disseminating History in Public Space

Justyna MAŁYSIAK

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management,
Wroclaw, Poland
justyna.malysiak@awl.edu.pl

Abstract

In the area of public history, the implementation of scientific projects is becoming not so much a common practice in the modern world as it is necessary for the implementation of multi-track projects tailored to the expectations of increasingly demanding consumers. The preliminary research was to help to determine what kind of forms of history dissemination would be most appropriate in the course of a scientific-research project, as well as help to determine the level of knowledge about the Border Guard Corps and the battle of the Wytyczno in society, and thus help to take actions aimed at its intensification. Further research dedicated to the issue of history management in public space will certainly help to determine the most appropriate tools and processes that will influence the development of methodology for the professionalization of history education. Currently, this direction is in a constant phase of development, gaining more and more popularity especially in interdisciplinary areas.

Keywords: Management, Public History, Education, Project, Science.

Introduction

Public history, apart from the task of popularizing historical knowledge among recipients, undertakes research on the functioning of knowledge and memory of the past, as well as historical awareness J. Wojdon (2015), J. Wojdon (2018), R. Traba (2014), D. Dean (2018). Microhistory appears more and more often in historical narration. The recipient is no longer only interested in juxtaposing the most important political facts or military events, but is mainly looking for stories close to local stories and stories about the fate of the individual. In all of this, a desire to know and understand one's own identity resounds. Public history historians face an extremely difficult and responsible task T. Cauvin (2016). This is especially true for those past events that tell a difficult story related to the circumstances of World War II.

The report from the research carried out for the "Niepodległa" program on September 16, 2016 proves that over the last three decades the knowledge of Poles about their own microhistory has increased by as much as 37%, and that history itself began to be perceived as a cultural element and a factor shaping social identity. It has been proven that "living history" in the field of public history is the most popular form of conveying knowledge about the past. Poles are also becoming more and more proud of the history of their own country, and they are increasingly respectful of historical heroes P. Kwiatkowski (2016).

The report of "Niepodległa" became an inspiration to conduct research on the issues of dissemination of local history among academic youth and communities of the region. The aim was to serve as a point of reference for the public history initiative, which was to involve students and school pupils in scientific research in the "Wytyczno" project, co-financed by the Ministry of Culture and National Heritage in the program "War Graves and Cemeteries in the Country" for 2019. Within the framework of these undertakings, groups of young people took part in scientific field trips, during which they carried out research and optional activities. The choice of the form of dissemination of knowledge, which is the realization of the scientific project, resulted from the fact that projects in public space concern all social areas. They have a huge impact on our environment, but also on ourselves. Thanks to them, the society is able to associate into civic groups and act for the benefit of the whole local community A. Sobol (2017), W. Kębłowski (2014). It is generally believed that for Western societies, projects, especially civic

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ones, are supposed to be a cure for the crisis of civil society and to improve services provided through them D. Kociuba, K. Rabczewska (2019). Many public institutions and

private entities develop competence in the area of efficient project management W. Kucharski (2018). An example is the Aconss Foundation, whose activities are aimed at promoting culture, knowledge and history. The Foundation pilot projects and grants, and is actively involved in the organization of cultural events (http://www.aconss.com).

Main Part

The "Wytyczno" project was supposed to activate both the local community and involve a committed student organism, whose aim was to deepen interest in the discipline of history. Within the framework of the "Riese" project, members of the Scientific Circle participated in preliminary field studies covering the complex of the Owl Mountains undergrounds. According to the assumption of the Scientific Club supervisors, the trips were to contribute to deeper involvement of students in scientific activities, but also to allow them to experience history in an interesting and tangible way. The activities were to engage first of all cadets to get acquainted with the topics devoted to the martyrdom of the Polish soldiers and the memory of those killed during the Second World War. Both projects became a tangible proof that by recognizing the potential of history and skillfully using it for educational purposes, it is possible to contribute in an interesting way to building the awareness of young people. The solid foundations of values such as respect for the homeland, for the heroes, and respect for the history of the country were the substantive basis for these scientific undertakings. Nevertheless, there was still a lack of one important substitute that would allow to go beyond the group of participants and involve the society - first academic, and then local (both in Wrocław and in the towns covered by the research) and national (mission to disseminate research results and information related to the project throughout Poland).

The first step taken to realize these assumptions was to organize a scientific conference on 23.05.2019 entitled "Conference of Polish Soldiers Fighting in Defense of the borders in 1939". It was then that for the first time experts dealing with a given issue were able to gather in one place and present the results of their research from 2017 to a wide academic audience. This event gave the opportunity to conduct further activities in this field. The survey carried out at the beginning of February 2019 had an additional impact, which, among other things, checked the state of knowledge about the KOP formation, as well as about the battle of Wytyczno. The results were exactly as expected. Out of 225 respondents asked about their knowledge of the Border Guard Corps formation, as many as (30.7%) 69 responded that they had no knowledge and (36%) 81got a small extent. (20.9%) 47 people answered that their knowledge was sufficient, (10.7%) 24 people that it was good. However, only (1.8%) 4 people considered it very good.

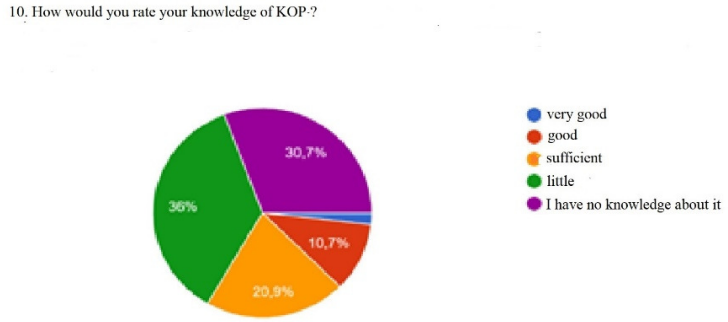

Title of the graph: Respondents knowledge of the Border Protection Corps formation
Graph no. 15. Source - own work

In the question about the Battle of the Wytyczno, the percentage of people familiar with the subject was even smaller. Only (0.9%) 2 people described their knowledge of the battle as very good, (6.7%) 15 people as good and (8.9%) 20 people as sufficient. As many as (37.3%) 84 respondents admitted that their knowledge of the battle was insignificant, and (46.2%) 104 people considered that they had no knowledge at all.

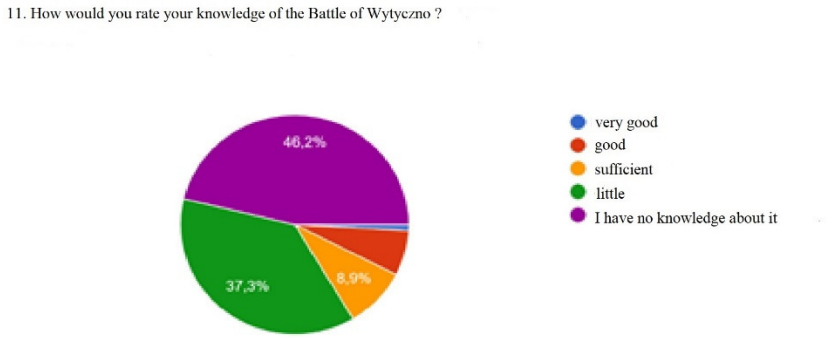

Title of the graph: State of the respondent's knowledge of the 1939 Battle of the Wytyczno.
Graph no 16. Source - own work

For comparison, the respondents were asked about their knowledge of the Katyn Massacre. It turned out that the trend is completely the opposite, and most people declare at least sufficient knowledge of the subject. (10.2%) 23 people considered their knowledge to be very good, (43.6%) 98 people admitted that it was good and (30.2%) 68 people, sufficient. (13.8%) 31 respondents said that their knowledge is small and only (2.2%) admitted that they do not have such knowledge at all

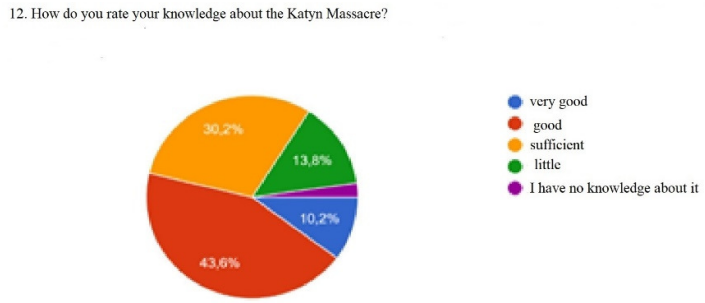

Title of the graph: Respondents knowledge of the Katyń Massacre

Graph no 17. Source - own work

The problem seemed to be noteworthy in terms of the need to carry out research to promote the Battle of Wytyczno as well as to find the best tool to promote it effectively in the Academy. The aim of the research was, first of all, to indicate the role of history in public space and thought, secondly, to help determine the educational paths and channels of knowledge dissemination approved by society, and thirdly, to examine the role of projects and their presence in this process. The study involved (52.4%) 133 men and (40.9%) 92 women. A random group was taken as a target. There was no focus on people who study history or define history as their basic hobby: actively participating in initiatives related to it, e.g.: belonging to historical reconstruction groups, or working in institutions dealing with heritage and culture promotion. This makes the results of the survey more reliable especially with regard to historical knowledge about the Borderland Protection Corps. Additionally, the opinions concerning the forms of history dissemination are not falsified, but indicate the real expectations of the recipients. Addressing them to groups of scientists or only students would not translate into an evaluation of the phenomenon in a broader perspective, the aim of which was to evaluate the place of public history in social life in general. It was the opinion of an "ordinary" citizen that was to serve as an answer to the question how science (here mainly in the form of a scientific-research project) can affect the public sphere.

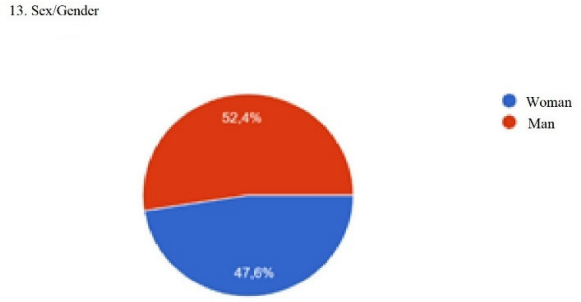

Title of the graph: Gender distribution of survey respondents
Graph no 1. Source - own work

The majority of the respondents consisted of young people up to 35 years old including those between 18-26 years old. (12.9%), and between 27-35. – (48,4%). 21.3% of the respondents were aged 36-42, (9.3%) 43-51, (4.4%) - 61 and more, and (3.6%) 52-60. A larger percentage of young people explain the form of making the survey available through social media and the Internet.

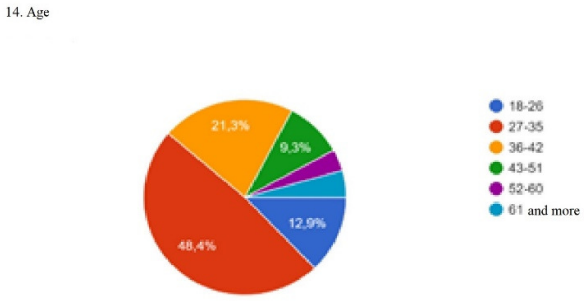

Title of the graph: Age distribution of survey respondents
Graph no 2. Source - own work

The majority, as many as (61.8%) 139 respondents declared higher education, (32.4%) - 73 people, secondary education, (4.9%) 11 people vocational education, and only (0.9%) - 2 people basic education.

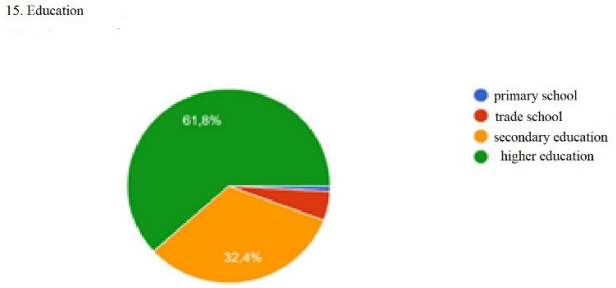

Title of the graph: Distribution of the survey respondents by education
Graph no 3. Source - own work

Most of the respondents (42.7%) 96 people declared the city of over 250 thousand people as their place of residence; (19.1%) 43 people, city to 50 thousand people, (18.7%) 42 people, city to 250 thousand people; (12%) 27 people, village; while (7.6%) 17 people, city to 100 thousand people.

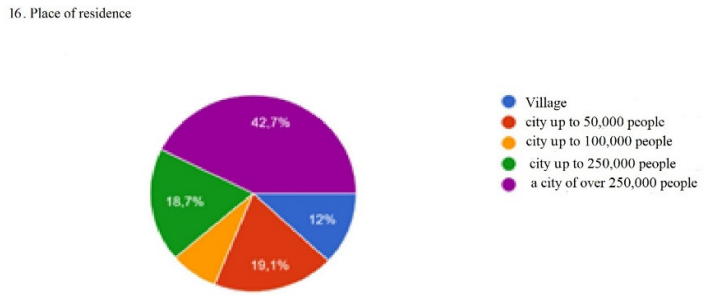

Title of the graph: Division of survey respondents by place of residence
Graph no 4. Source - own work

With respect to the professional situation, the overwhelming percentage of the respondents declared themselves to be employed (80%) 180 people; (11.6%) 26 people, as learners; (4.9%) 11 people, as unemployed and (3.6%) 8 people as retired.

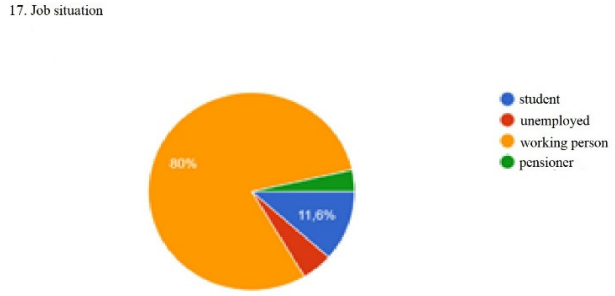

Title of the graph: Division of the respondents to the survey according to their professional situation
Graph no 5. Source - own work

The research of the introductory part opened the question concerning the knowledge of the concept of public history. The aim was to examine the very reception of the concept in the society, to check if it is aware of participation in the historical space - a wide range of different activities undertaken to promote it, but also the very functioning of knowledge about the past in this space. (40,9%) 92 people replied that yes - the concept is known to them. The vast majority (59.1%) 133 persons replied that they do not know the concept of public history. This means that, as rightly suggested by the researchers who take up the subject of history in public space, in Poland the concept is only just beginning to be popularized, which has a decisive influence on the increase of social awareness of the role of history and its presence in the life of an individual at different levels of absorption.

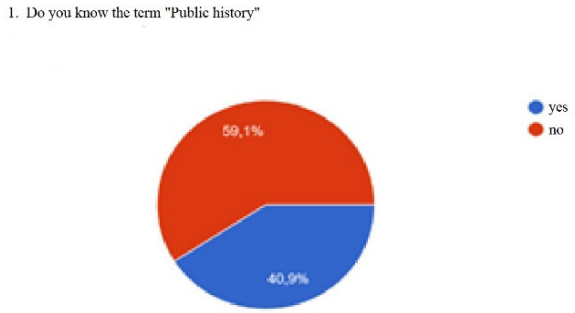

Title of the graph: Knowledge of the term public history among the respondents
Graph no 6. Source - own work

The next question asked to the respondents concerned the degree of interest in history. A significant percentage of respondents described them as large, as many as 105 people (46.9%) and 40 people (17.9%) as very large. Next (25.9%) 58 people 58 people answered "I'm not interested in much, but there are historical topics that interest me". The respondents admitted that there is little interest, but there is a historical topic that they are willing to explore; (5.4%) 12 people replied that there is little interest, and only (4%) 9 people replied that none. Thus, it should be strongly recognised that history remains in the circles of interest to many people, even if they do not pay much attention to it, there are areas that are attractive to them.

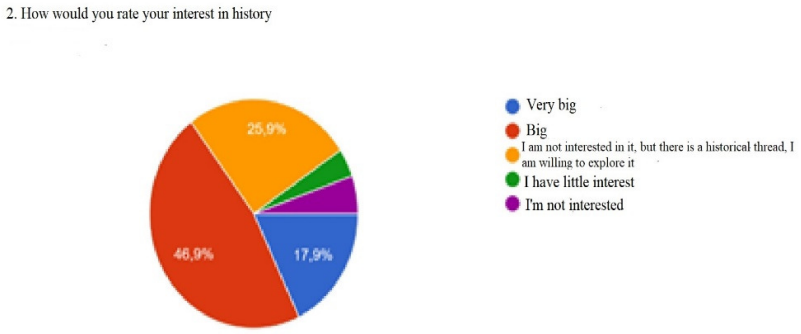

Title of the graph: Interest in history among respondents
Graph no 7. Source - own work

The third question, which asks about the main motivators for learning about history, is helpful in identifying those areas that focus most of the respondents attention. It turned out that what is most attractive to people in dealing with history is the desire to know the secrets of the past. That is, the search for stories that are attractive from the point of view of the recipient, stimulating the imagination and providing answers to existential as well as philosophical, ethical, or mundane or emotional questions - answers to questions about past events of various importance from complicated scientific questions to conspiracy theories popular today. This way the answer was (39,1%) 88 people; for (25,8%) 58 people the most attractive in history is to get to know the region and the country, both in relation to foreign and domestic tourism, but also individual tourism focused on the micro-region. For (13.8%) 31 respondents learning about history is connected with strengthening their sense of identity. It concerns both the role of tradition, the value of patriotism and national pride; for (11.6%) 26 people the motivation is the willingness to educate, and for (9.8%) 22 people the impulse to explore historical knowledge are computer games, films and popular science literature they read.

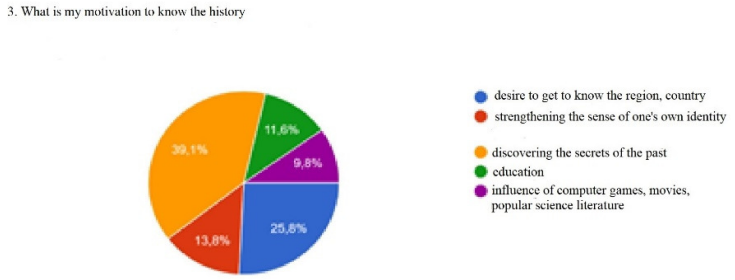

Title of the graph: Motivation of respondents to learn about history
Graph no 8. Source - own work

The last question, which dealt with the areas of historical interest of the respondents, was about the types of participation in the space that history has. This question listed the most common activities in the area of public history. The highest percentage of respondents (33.8%) 76 people admitted that participation in historical culture is mainly historical tourism; (23.1%) 52 people indicated programs on historical subjects; (17.8%) 40 people thematic literature; (12%) 27 people, participation in historical festivals; (4.4%) 10 people, exhibitions dedicated to historical subjects; the same percentage, (4.4%) 10 people collecting and interest in genealogy also (4.4%) 10 people. Tourism is the most attractive form of learning about history because apart from the knowledge itself, it also provides other advantages such as emotional experiences, the possibility of adventure also in an interactive form, acquiring knowledge while maintaining the function of relaxation, learning only those areas that are most attractive for a person - most often a client for whom the prepared form of knowledge must also serve as entertainment. The same is true of literature and TV programs, which must also combine both knowledge and entertainment. A program or a book must be fascinating and arousing curiosity, then the story becomes accessible to the recipient and more willingly reaches for it. Especially the various historical channels posted on YouTube are proof of this. For some time now there has been a growing interest in this form of education among teachers, who more and more often include it in the scenario of their lessons or museum educators using history in their programs K. Olechnicki, T. Szlendak, A. Karwacki (2016), A. Mikos von Rohrscheidt (2011), M. Machałek (2016). Historical reconstruction attracts people with its interactive form. Battle shows and military themes in particular are popular with the audience through their show and spectacular character. Exhibitions depend on many factors that can influence their attractiveness for the audience. The main factors include attractiveness of the form of the exhibition, subject matter, accessibility for different age groups, price, computerization, workshop support, presence of a guide, power of communication, multimedia etc. Collecting is based mainly on the private interests of the recipient. In turn, genealogy most often arouses the curiosity of people from families where the tradition of collecting information about ancestors has been cultivated for generations. These people often have extensive family trees, which they complement through individual research, worship the memory of their ancestors - during special family reunions, continue their genealogical research on their own, disseminate knowledge about them by distributing souvenirs, photos, objects of historical value, co-creating exhibitions dedicated to family members.

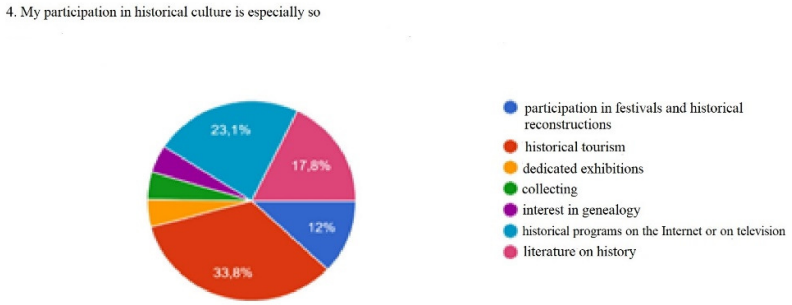

Title of the graph: Declaration of respondents regarding their participation in historical culture
Graph no 9. Source - own work

The last of the survey modules was supposed to help to examine the attractiveness of public history projects for the audience. Particularly focused on the problem of promoting knowledge with the scientific project. The answers were aimed at supporting decisions concerning the application of appropriate methods of promoting research results in the "Wytyczno" project. They were also supposed to show what expectations the society has towards scientific projects, with all dissemination activities in mind. The first question concerned the ways of promoting history. The respondents were asked which of them are the most interesting and attracting their attention. The question could indicate maximum two answers. A total of 425 were indicated, which means that 25 people chose only one answer. The vast majority (56.4%) indicated promotion events in the form of festivals, such as the "Night of Museums";(48.4%) chose historical reconstructions; (25.3%) museum exhibitions; (20.4%) digital applications, in the form of various technical solutions, guides, multimedia presentations; (19.1%) conferences, seminars and thematic lectures, as well as city games, also (19.1%). The vast majority of the respondents were in favor of those forms, whose attractiveness is determined by the showcase. Both festivals with specially composed themes and interesting design as well as delightful historical reconstructions - especially those of military character - are considered the most attractive by the audience.

The curiosity about the form of popularizing the history of World War II among young people was to direct them not to the tragedy of the event, but first of all to the possibility of restoring the memory of the fallen and their direct participation in this process.

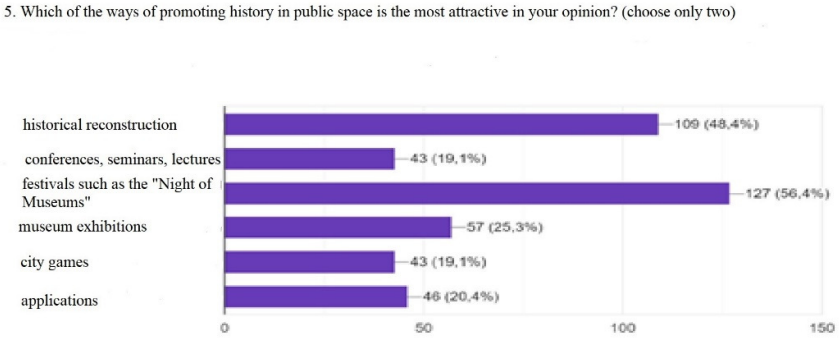

Title of the graph: Declaration of respondents regarding their preferences for attractive promotion of history in public space Graph no 10. Source - own work

Many research issues are currently being addressed by the need to disseminate results to the public. This is not surprising given that a project should not only have scientific value, but above all its contribution to science should be useful to people. This is precisely the biggest "pain" of today's humanities, which is difficult to conduct research that results in a product of public benefit. Humanities does not have such tangible products of its activity like scientific and research equipment. Therefore, it faces many problems, the most important of which is the lack of possibility to finance research. For this reason, public history aims to be useful mainly in the field of education. In the question asked to the respondents about the role of the project in the process of education and dissemination of knowledge, almost 90% of people were of the opinion that its contribution in this area is important. Of these (48%) 108 people indicated that it is extremely important and (40.4%) 91 people considered it a very good idea; (10.2%) 23 people considered it not necessarily, and only (1.3%) 3 people said it was not important at all.

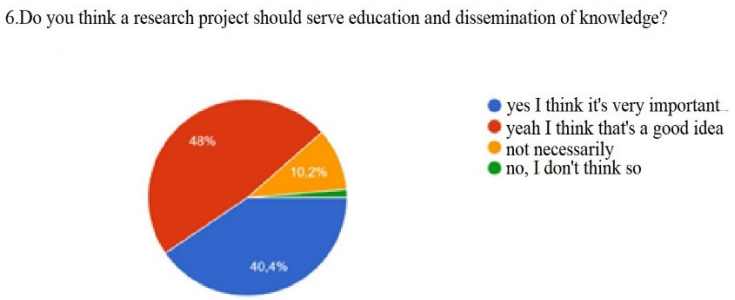

Title of the graph: Respondents opinion on the usefulness of a scientific project in the process of education and dissemination of knowledge
Graph no 11. Source - own work

Then the respondents were asked about the most attractive form of dissemination of research results. (32.4%) 73 respondents indicated reports published in social media; (23.6%) 53 people chose a scientific publication; (23.1%) 52 people found it most interesting to involve students in the research; (14.2%) 32 people, lectures and lessons for young people; (6.7%) 15 people conference. The research served to plan activities aimed at disseminating the results of the "Wytyczno" project in 2019.

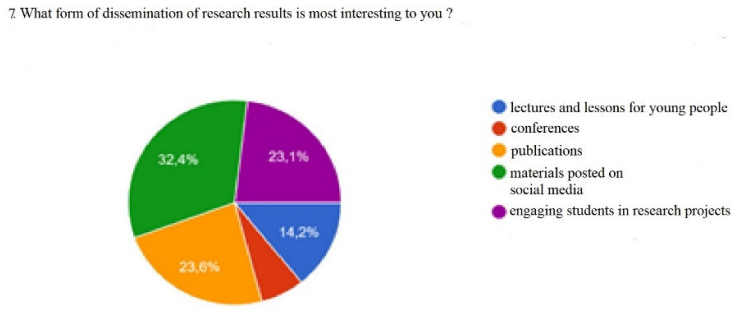

Title of the graph: Respondents preferences in relation to the attractiveness of forms of dissemination of research results Graph no 12. Source - own work

An additional question in this area concerned the dissemination of information about the scientific project itself. According to the respondents, the most accessible form is short films made available through channels such as YouTube, this way the answer was given by (37.8%) 85 people; less respondents indicated a website (33.3%) 75 people; for (18.7%) 42 people the best form is social media, and for (10.2%) 23 people best form were dedicated city exhibitions. In the "Wytyczno" project it was decided to use mainly social media and public television. It was a excellent solution in communication with recipients interested in the subject of the project.

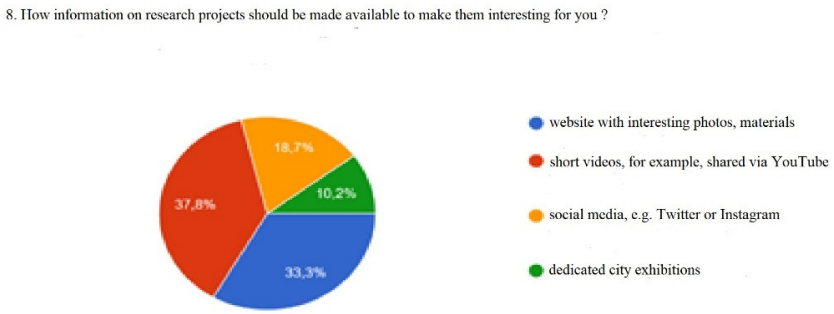

Title of the graph: Respondents preferences in relation to the forms of dissemination of information on conducted scientific projects Graph no 13. Source - own work

The last question concerned the very place of scientific projects in the public space and was intended to indicate the direction in which today's research tasks should go. It seems that from the perspective of the search for and value of information, the most important for the conducted projects is the efficient transfer of information about undertaken activities, effects and possibilities. The information about the conducted projects would be useful for the whole scientific community and would allow to organize the existing knowledge about the undertaken issues. It would prevent the duplication of ideas and indicate the areas that require further knowledge. Short descriptions of the effects of the projects would be good material for investors, scientists, but also for the society with different interests. This idea was interesting (79.1%) 178 respondents, who believe that the Internet base of this type should be created. (14.2%) 32 respondents considered that there is no opinion on this issue, and only (6.7%) 15 people said that such a solution is not needed. From the perspective of increasing digitalization, scientific publications are slowly ceasing to be a sufficient source of information about the conducted research. Therefore, the base organizing the initiatives of the scientific community in the scope of conducted projects would be an additional, unique source of knowledge and would allow for contact with researchers from various circles and would deepen the professionalization of conducted projects.

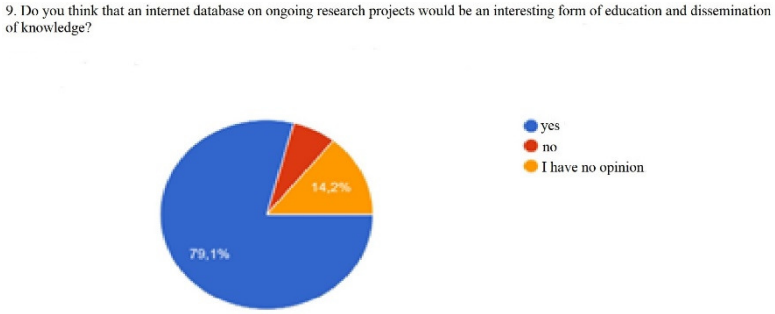

Title of the graph: Respondents opinion on the usefulness of the internet database used to disseminate information on conducted research projects
Graph no 14. Source - own work

In the course of the project implementation it was decided to implement the program of the Ministry of Culture and National Heritage 'War Graves and Cemeteries in Poland', which provided support for the care of war graves and cemeteries in Poland, which are an important testimony of important historical events in the country related to fighting and martyrdom. In the "Wytyczno" project sets four main goals for the realization of the research goals. Among them there were: field research, cleanup works covering the area of the cemetery in Wytyczno, archaeological research and archival search in Lublin and Warszawa. There were also actions taken to disseminate the results of the research among the inhabitants of the locations where the research was carried out, as well as among school students from the region and academic students from the AWL.

Dissemination of history among the local and academic community, as well as involvement of young people in its realization, contributed significantly to restoring the memory of the Borderland Protection Corps, as well as the events related to World War II. It should be remembered that the subjects discussed concern a very difficult history, for which the message dedicated to young people must be properly composed. According to the survey conducted for the project, it was decided that the role of education and the mission of history dissemination are very important. The projects promotion actions, carried out since November, had an impact not only on the school youth, but also on the whole cultural life of the region. By engaging children and teenagers in the historical competition, which was mainly based on interviews with their close ones, the project tried to attract the attention of adults. In this way the project became an opportunity for the region to stimulate local initiatives, an object of regional pride in its microhistory, as well as promoting attitudes and values of patriotism. The total group of people who actively participated in the project was over 200. Material concerning the search was published in media. Moreover, an additional activity in the field of public history was the very idea of involving cadets and students of the academy in the work. The contact with history in a direct way was supposed to help young people learn about difficult history not through a museum - dedicated exhibition or literature, but in a more emotional way. Joint research supporting the work of scientists helped to involve young people in the world of science, which at the level of bachelor's and even master's studies they usually get to know in a very modest way. Participation in the project was to help educate young people in history and management, but also to provide them with practical knowledge - including teaching them the logistics of running projects. Looking at the constantly growing number of interested students, membership in the Scientific Club of War History, as well as their great willingness to participate in initiatives such as scientific trips, lectures on history, activity in projects such as the project "Wytyczno" one should conclude that the place of history in the education of young non-commissioned officers is extremely important; that this form of disseminating historical knowledge is very attractive to young people; that historical narration has a significant impact on young people's patriotic and identity thinking; that young people often only need an impulse in the form of an interesting arrangement of the educational message in order to pursue their own knowledge; and that properly managed public history still has a lot to offer, and the AWL initiative is excellent proof of this.

Summary

The broad spectrum of public history activity does not allow to close this notion in a tight framework. The multitude of initiatives undertaken by cultural institutions, science, social organizations or private individuals shows an inexhaustible resource of possibilities to promote history and education within this discipline. It turns out that the scientific project can be successfully used as one of the elements of popularization of history in public space. The "Wytyczno " project meets all the demands made in the mission statement of the American National Council of Public History, which believes that "the promotion of the usefulness of history in society must be done through professional practice" B.J. Howe (1989).

In accordance with the intention of the mission of public history, the "Wytyczno" project referred to the methods of historical discipline through the use of many elements characteristic of the historian workshop, emphasized the dissemination of historical knowledge by engaging pupils and students in practical activities, and strongly influenced public space - both local (internal activities) and national (media promotion, promotion among students of AWL). At the same time, he used all the tools of management sciences in the course of promoting national heritage as well as knowledge and education. It seems that involving young people in such activities as management in practice, especially in the interdisciplinary field, is a new way to stimulate their interests and scientific activity.

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From Commander to Leader

Lesław WEŁYCZKO

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland, leslaw.welyczko@awl.edu.pl

Józef LEDZIANOWSKI

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland, jozef.ledzianowski@awl.edu.pl

Abstract

The article presents key aspects of the conditions that are crucial for commanders who also want to be leaders. The authors draw attention to three key determinants, without which it is difficult to say that a commander is also a leader. The article also points out that not every commander will be a leader at the same time, because it requires a great effort and work on themselves from those who want to feel like they are leaders and self-control of their actions. Therefore, the three most important determinants that have a key impact on the formation of a leader's personality and his or her competence in this area should be understood both by the projectors of educational processes in the army and by future and current commanding officers themselves.

Keywords: personality, competences, leadership, emotional intelligence, effective officers' personality, self-management, motivations, emotions, personal and professional profile of the graduate.

Introduction

For many years, there has been a reflection on the leadership competence of a man who stands in a leader position - in the army in a command post - about the extent to which he should display in his personality, the qualities that are ascribed to people generally considered to be typical leaders. There are many approaches to this issue, from which several conclusions can also be drawn, which also give rise to the theses, namely:

- There is a fundamental difference between the personality of a commander and a leader, which can be demonstrated;

- Not every commander will be a leader, but usually every leader is a good commander;

- the key determinants for a commander to be also a good leader are:

- emotional intelligence;

- the so-called effective officer's personality;

- ability to manage oneself and others.

From the professional pragmatics and several dozen years of personal experience of the authors of this article, on the basis of direct work with people and directing human teams, it is clear that being a leader requires not only appropriate professional competences, but above all continuous work on the shape of the and improving own personality. This can be illustrated as shown in Figure 1.

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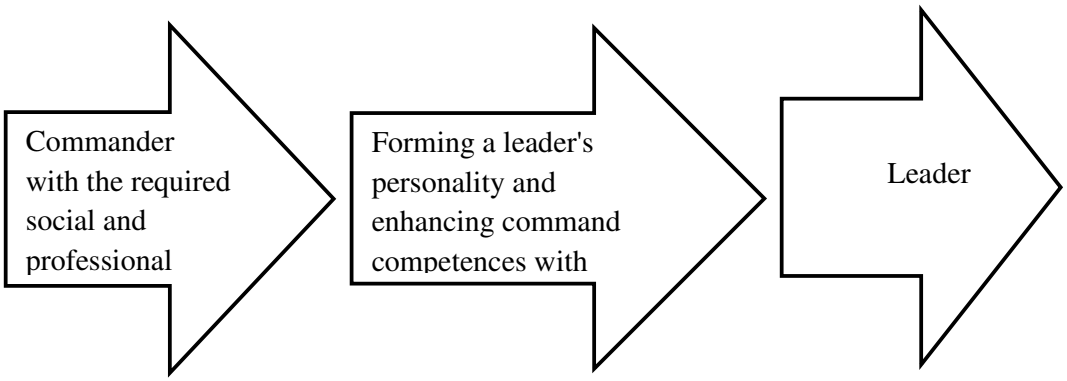

Figure 1: Leader formation model

Source: Own study

First of all, it is important to point out the fundamental differences between commander and command and leader and leadership.

The Lexicon of military knowledge defines **command** as "the entirety of the deliberate activity of a commander and a staff, carried out under a defined leadership system, ensuring high combat readiness and proper preparation of troops for the best possible achievement of the objectives of combat, battle or operation *Lexicon* ... (1979). According to J. Michniak (2003), **command** "is the basic form of directing troops, based on the power to comprehensively shape all elements of readiness and combat capability in relation to directly and indirectly subordinate soldiers, and thus to comprehensively prepare them in peacetime for all kinds of actions and to direct them in peacetime, crisis and war. It is a process through which a commander imposes his will and intent on his subordinates and in which, assisted by his staff, he plans, organizes, motivates and controls the actions of his subordinate troops by using standard operating procedures. and any means of communication. Moreover, **command** is not just about leading human teams in times of peace. The main task of the army is to prepare for combat operations under various conditions. This means that command is also about activating combat capabilities in order to create the combat force necessary for the success of the mission J. Brinkerhoff (1995). Many authors rightly point out that **command is the formal management of people, without emotional involvement**.

On the basis of the above definitions, it can be assumed that a **COMMANDER** is a person who is /designated/ in a full-time position in the **army**, that is to say, a soldier at the head of a type of armed force, tactical union, unit or subdivision. The soldier has certain rights (e.g. to give orders and supervise their execution), but also duties. He is the organizer of combat operations of subordinate troops (soldiers) and commands them during the operations. In peacetime, however, he performs various tasks related to the functions of planning, organizing e.g. training, motivating subordinate soldiers to perform the tasks assigned to them, as well as having competence in the control and self-assessment of the performed tasks, both those assigned to subordinate soldiers and his own.

For example, to characterize the **personality of a commanding officer** in a comprehensive way, this can be presented as follows:

COMMANDING OFFICER'S PERSONALITY: *"is an associated system of relatively stable qualities (qualities, values), dispositions and skills (abilities) that allow an officer to behave appropriately in specific situations, both in peacetime (including participation in humanitarian and peacekeeping operations), in times of various threats (e.g. terrorism or cataclysm) and in times of war. These behaviors are supported by appropriate knowledge and skills and are constantly enriched by new experience and relevant competences, which allow an officer to fulfill the role not only of commander (leader), but also of teacher (trainer) in relation to subordinate soldiers. An officer's personality is determined by: motives, needs, attitudes, worldview, aspirations, self-knowledge, interests, abilities, intelligence, temperament, character and worldview. This personality must be self-reflective, taking into account the constant development of civilization and culture of the modern world".*

So what are the characteristics of **leader** and **leadership**?

Jerzy Kunikowski considers LEADERSHIP as a skill that occurs in the process of commanding and directing people; in target (task) groups, leadership is distinguished by the ability to effectively carry out tasks and to win people over. At the same time, the above mentioned author stated that it is one of the most important skills, predispositions or a group of qualities perceived and desired in contemporary leadership and command, which include: self-confidence, ambition, assertiveness, emotional staunchness, stubbornness and firmness, intelligence and courage J. Kunikowski (2000).

On the other hand, Leszek Kanarski, distinguishing between **command** and **leadership**, describes the former as *influence based on formal powers and procedures and the latter as influence based on personality traits, skills and behaviours* L. Kanarski (2003).

Leadership is both a process and a property. The process of leadership is the unforced direction and coordination of the members of an organised group to achieve a group goal. Leadership as a property, on the other hand, is a set of personality traits attributed to those who are perceived to be using such a faculty-management successfully R. M. Stogdill (1974).

Leadership is an influence on the behavior of others. It is a type of social influence that occurs when one person - **the leader** - is able to cause the desired behavior of someone else, who succumbs to it because of the bond that binds them together, because of the social relationship that occurs between them K. Piotrkowski, M. Świątkowski (2000).

On the basis of the above definitions, it should be assumed that **Leadership** *is based on an emotional connection between a commander (in this case a leader) and his subordinates*, which creates a kind of bond between them. However, a leader is also identified with a **superior**. The superior tells people /subordinates what to do and holds them accountable, also takes responsibility for them, praises them for their successes and defends them in case of failure. The **LEADER** is more than a superior and much more than a commander. According to I. Majewska-Opiełka, the **LEADER** */simultaneously a commander and superior/* is a person who, in a certain group of people /subordinates/ stimulates the process of setting and achieving goals, it is a person who is focused on creating, for themselves and others, enthusiasm and the ability to expose the best qualities of his character. It is a person who does not impose his will by force, but skillfully motivates the members of the group /soldiers/ to carry out tasks etc. I. Majewska-Opiełka (1998).

Main Part

Moving on to considerations about the commander and the leader, the first thing to do is to indicate what professional training each officer graduating from the Military University of Land Forces should receive. This is shown in Fig. 2 below. A graduate of the Academy has a broadly formed personality and such social-professional qualifications which, supported by more and more recent experience in professional work and social life, allow him to become high-class professionals with the highest competencies over time. Such an assumption allows us to state that obtaining a university diploma and becoming an officer of the Polish Armed Forces after passing the appropriate exam for an officer and obtaining officer's position is only the beginning of every officer's journey,

An officer - commander, when starting his professional career in a military unit at his first post, is professionally prepared to carry out all the tasks that arise from his assigned duties. However, in the workplace and at the same time in the military service, he is confronted with many situational, organizational and structural conditions which he has to take into account in his professional pragmatics. Each military unit differs in its own specificity, depending, for example, on the type of army and the structural level in the military hierarchy. In addition, every officer who starts his service in a given organizational structure encounters many new relationships with people who have a personality-specific way of commanding /managing/ and directing people. This difference often results from the individual personalities of superiors, subordinates, people with whom one should work directly, etc.

Given the above, it is easy to guess that a military college graduate must be prepared primarily to adapt quickly to new working conditions. and service and acceptance of the broadly understood organizational culture, prevailing in a given military structure. The whole spectrum of personal and professional qualities an officer acquires during his

or her training at a military university should enable each graduate to adapt as quickly as possible to new conditions of work and service and to fulfil every roles while taking up subsequent official positions and performing various professional functions etc.

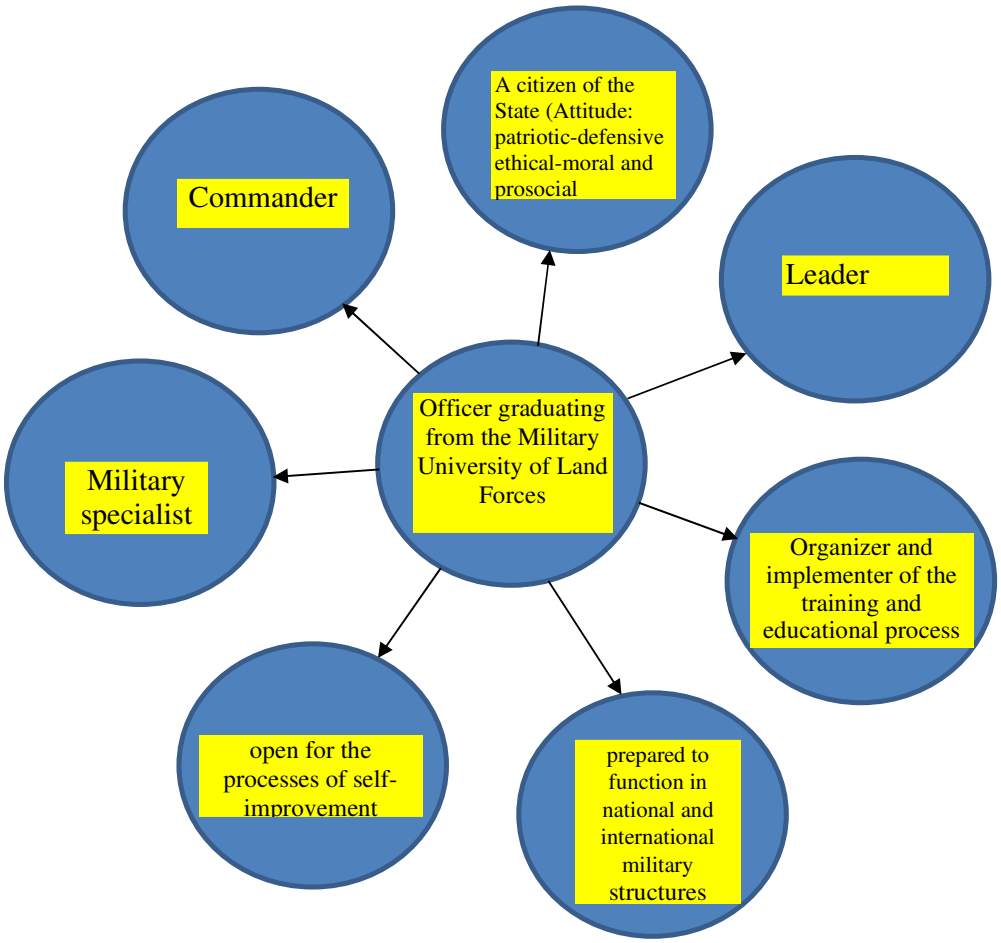

Fig.2: Determinants of personal and professional competence of officers graduating from the Military University of Land Forces

Source: Own study

The period of adaptation of a military college graduate to the new conditions of work and service is only a part of the criteria he must meet. During this period, superiors and responsible persons in a given organizational structure play a very important role in order to facilitate quick adaptation to work and service for newly-hired commanding officers in the Military Unit. Other aspects of the professionalism and improvement of social-professional competence of a commander-officer to make him effective in his job, depends only directly on him.

Military pragmatics show that not every commander has the personality traits that a leader should have. It is also not difficult to notice that the competencies of a leader, even at the highest level, are not able to balance the not fully formed personality of a leader. Therefore, it can be assumed that a leader must have both a properly formed leader's personality and competencies characteristic for a leader. This fact is illustrated in Fig. 2.

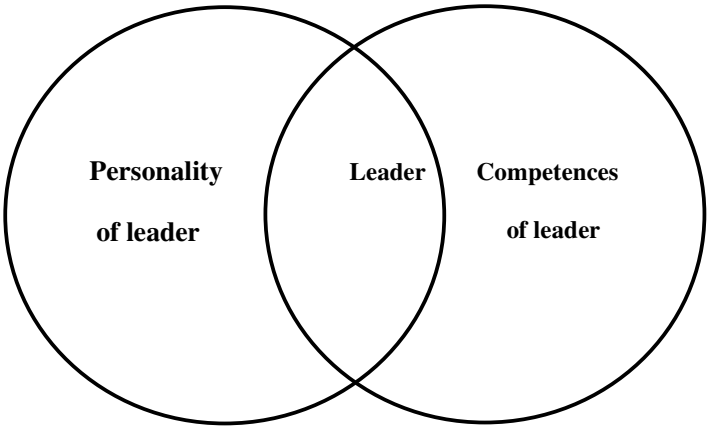

Fig.3 : Leader determinants

Source: Own study

It is necessary to assume that the main determinant which proves that an officer is not only a commander but also a leader is his **EMOCIONAL INTELLIGENCE**.

"Emotional intelligence" is the term used to describe the understanding of the motivational forces that drive our behavior and that of others. Taking into account the importance of cognition, affect and behavior on the stage of every person's inner theater, emotional intelligence plays an important role in leadership. It can be put in this way: *People who are emotionally intelligent are more likely to be effective leaders. Unfortunately, emotional intelligence cannot be learned from a textbook. Emotional intelligence develops through a process that takes place through experience. Moreover, development in this area is more efficient if it is accompanied by a spouse, friend, colleague, leader, therapist or other qualified person. It will help us to become aware of certain things that we do not see in ourselves, and to become aware of how to react with different people* M. Kets de Vries (2006).

According to Daniel Goleman, **EMOTIONAL INTELLIGENCE** is ***"The ability of us to recognize our own feelings and those of others, the ability to motivate ourselves and direct our emotions, both our own and those with whom we have some connection".*** In other words, *emotional intelligence is the ability to control our emotions and use them to achieve success*. These are skills that are different from academic intelligence, that is, purely intellectual skills, measured by the intelligence quotient, but complement them. Many people who have book knowledge but who suffer from a lack of emotional intelligence work for people with lower intelligence quotients, who have superior emotional intelligence skills. Daniel Goleman believes that emotional intelligence consists of the following emotional and social competences D. Goleman (1999):

- **self-awareness** - that is, knowledge of one's internal states, preferences, abilities and intuitive judgments, that is, emotional awareness, correct sa-moicing, self-confidence, that is, strong self-esteem and awareness of one's abilities and skills;
- **self-regulation** - i.e. control over one's internal states, impulses and abilities,that is self-control, maintaining standards of honesty and integrity, conscientiousness, flexibility in adapting to changes, innovation;

- **motivation** - i.e., emotional inclinations that lead to new goals or facilitate their achievement, that is pursuit of achievements, commitment, initiative, optimism;

- **empathy** - i.e., awareness of other people's feelings, needs and anxieties, i.e., understanding others, improving others, service attitude, political awareness, that means recognition of emotional group currents and relations among power representatives;

- **social skills** - i.e. the ability to arouse desired reactions in others, i.e. influencing others, understanding, conflict mitigation, leadership, creating bonds, cooperation and collaboration, team skills.

The above components of emotional intelligence perfectly describe a commander who claims to be a leader. A person who perfectly copes with his or her emotions, is able to regulate his or her relations with the environment, is aware of his or her mistakes and strives to eliminate them, as well as is perfectly capable of maintaining desired interpersonal relations with everyone and building theamas, as well as taking care of their proper functioning by solving, among others, difficult and conflicting situations, when necessary.

Today it is known that the intelligence quotient is not the main determinant that determines success in social and professional life. It was Daniel Goleman, a long-time Harvard scholar, who first drew attention to this fact. He has been conducting research over many years that has questioned for the first time the validity of the highly worshiped intelligence quotient - a widely held opinion that the intellect itself is needed for success. According to him, tests for the IQ were not unreliable, because people with high IQs often did poorly at work and those with low IQs worked very well. Often people with outstanding intelligence act irrationally, even hopelessly stupid. The intelligence that we show in science has little to do with emotional life. Even people with high intelligence quotients may be inept at managing their private lives, let themselves be carried away by unbridled emotions and act under the influence of uncontrolled impulses D. Goleman (1999).

It is also worth noting at this point, as H. Hamer wrote, that people who are leaders often use their characteristic social style in the process of interpersonal communication - the so-called leadership style. It is characterized by high assertiveness and low spontaneity. It is a style characteristic for typical leaders who are very strict, cold, inaccessible, although effective in their actions. However, it is difficult to imagine an officer-commander who, for example, would use only this social style in the process of training H. Hamer (1994). Therefore, some scientists prefer, apart from the style of communication: *expressive, analytical, leadership and polite* - the so-called **flexible style** - which is a mixture of the above mentioned social styles to varying degrees. This means that depending on the situation, on the experience gained, the social style will be different when *teaching students, training soldiers*, and different when *commanding soldiers on the battlefield*. Just as there are no uniform - *"pure varieties"* - types of mind in every person, so there are no *"pure social styles"* in every person C. G. Jung (1989); E. Pascal (1998).

Another determinant, as we must think, necessary for the personality of any leader, not just a commander, is the so-called **EFFECTIVE PERSONALITY of an OFFICER**.

A. Wielgus - on the basis of the research on officers personalities - believes that in order for an officer to be effective, he must, in his actions, achieve this effectiveness in four inseparable planes, i.e:

- In the area of his own subjectivity (personal psycho-intellectual competence and physical);
- towards other people connected with a given activity (social competences);
- towards the profession (professional competence);
- towards the task (task competence).

At the same time, A. Wielgus points out that an officer must enrich and improve his personality, because professionalism (having specific knowledge and skills) and social and organizational competence may prove insufficient A. Wielgus, after: S. Jarmoszko (2002).

The groups of personal and professional characteristics, resulting from the model of an officer's effective personality, are presented below S. Jarmoszko (2002):

attitude towards each other:

- strong will;
- maturity to himself;
- - self-confidence (in one's knowledge and skills as well as in one's professional and life experience);
- self-criticism;
- ability to manage one's emotions;
- caution

attitude towards professional duties:

- diligence, perseverance, accuracy, punctuality, regularity;
- ability to take risks;
- responsibility, generosity;
- passion for the profession;
- social-professional ambitions;
- creating a vision of action;
- showing initiative, imagination and inventiveness in thinking and acting;

attitude towards people:

- subjective approach to people;
- caring for oneself and others;
- camaraderie;
- ability to work individually and cooperate with others;
- assertiveness, empathy and self-reflection;

external image:

- taking care of proper external appearance;
- the way of verbal and non-verbal communication;
- following all conventions;

professionalism:

- general, directional and specialist knowledge related to the work performed;
- necessary knowledge of psychology, pedagogy and sociology, but also from management, IT or praxeology;
- knowledge of foreign languages;
- intellectual proficiency;
- creative and creative skills;

ethical and moral values:

- patriotism, honor;
- sense of self-esteem;
- respect for the dignity of others;
- moral sensitivity;
- justice, honesty;
- sincerity, principlicity;

the qualities of creative work:

- regime of creative work;
- ability to plan tasks;
- ability to organize the work workshop and carry out tasks;
- competencies characteristic for a person with transgressive orientation;
- discipline and consistency in action, patience, prudence, mental resistance;
- need for achievement, decisiveness;
- self-reflection and the ability to draw conclusions and correct one's behavior (if necessary).
- instrumental and cognitive skills of acting independently and in a team, as well as the ability to make demands on oneself and others, if there is a superiority in relation to other people;
- ability to solve problems and difficult situations and the skill to make decisions in various situations, even those with a high degree of uncertainty and risk.

The so-called effective officer's personality confirms the above assumptions that an officer commander must be prepared for various changing situation-organizational and structural conditions, and each situation, whether it is related to social (private) life or work and professional service, requires a different approach, decision or action, etc.

The last necessary determinant of an officer-commander to be not only a commander, but to have the personality and competence of a leader is the **SKILL OF MANAGEMENT (DIRECTING) OF HIMSELF AND OTHERS**.

Self-management should be seen today as the competence of every person to create both these far-reaching and short-term life plans for personal and professional development. Every officer-in-command should also have this competence. Unless there is a major problem with understanding how a commander is supposed to manage and direct subordinate people (human teams), as every military college graduate must have these competencies in order to fulfill his role in his official position. It is difficult to define and understand the term self-management.

For the purpose of these considerations, "**SELF-MANAGEMENT**" can be defined as follows: "*planning, organizing and controlling the implementation of its own projects, in accordance with its decisions, priorities and motives for action, taking into account its ability to achieve them in a targeted, effective and timely manner". This desired competence is also related to the previously mentioned, i.e. the emotional intelligence and effective personality of the officer*. However, it clearly treats and emphasizes the fact that a person who possesses these competences is not only able to be an empathic, assertive person and have the whole spectrum of desired character and personal characteristics and socio-occupational competences - he is able, first of all, to control his thoughts (often intrusive), he is prudent in assessing his or her skills; he knows his advantages, but also disadvantages and trying to level them out; he does not require from his subordinates more than from himself , he is able to maintain an ideal emotional balance in spheres: physical, intellectual, but also spiritual; can manage time wisely; has a sense of self-esteem; uses the resources of his imagination to create sensible solutions; is a model of qualities and virtues of a Polish Army officer.

Summary

This article points out how important it is for an officer-commander to be a leader too. A military college graduation does not guarantee that personality and leadership skills are acquired immediately. On the contrary, it is a long-term process, based on a multi-faceted and multidimensional approach to this problem. Being a leader requires a great deal of self-effort and a proper understanding of many aspects and problems. Both related to the functioning of one's personality and working with people in various socio-occupational correlations.

To sum up, one can unequivocally answer the rhetorical question, namely: Should every officer-commander be a leader? The answer is yes. However, it depends to a large extent on the personality of the commander himself and whether he properly understands the problems signaled in this article and is able to meet all the expectations that being a commander-leader entails.

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Managing of Emotions of Military Students in The Educational Process of The University

Józef LEDZIANOWSKI

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland, jozef.ledzianowski@awl.edu.pl

Lesław WEŁYCZKO

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland, leslaw.welyczko@awl.edu.pl

Abstract

The article presents the most important aspects related to the deliberate and rational management of student's emotions in the didactic process of a military university. The in-depth knowledge of these problems and the well-established competences of academic teachers and commanders of military students subdepartments largely determine how the didactic process will proceed at the university. Whether it will be based on fear and constant emotions, sometimes unjustified, or on mutual cooperation between the teachers and the taught, where emotional intelligence and many of the determinants described in this article will make this didactic process effective and efficient, as a result of which the graduates will have a properly formed personality and acquire the necessary knowledge and skills to be professional commanders (educators and trainers) in military units.

Keywords: Personality, Competence, Leadership, Emotional Intelligence, Management, Emotions, Feelings, Sense of Value, Motivation, Mood.

Introduction

Among many determinants having a direct impact on shaping human life, the most important are the so-called *intellectual and non-intellectual factors*. They describe our image, decide who we are today and who we will be tomorrow. The most important of them are: **personality, emotions and motivations** - as extra-intellectual factors and **thinking, memory and perception** - as intellectual factors J. Kozielecki (1969).

It is impossible to describe all the intellectual and non-intellectual factors mentioned above in the context of the problem addressed. That is why the authors have given a special role to **emotions**, which are of key importance for the course of human thought processes, and thus require high efficiency in dealing with them. Military students are particularly susceptible to various types of emotions, which they practically deal with on a daily basis, both in the course of military life and in the process of education.

Emotions are the simplest experiences of satisfying or not satisfying the organic needs of food, drink, fresh air, protection from the cold, sexual needs, self-preservation instinct (in life-threatening situations) etc. *Psychology* (1966). In encyclopaedic terms, **emotion** is "(...) a mental process. It reflects an individual's attitude towards the stimuli acting on him, it is expressed by a change in the level of general mobilization (stimulation) of the organism, it has a specific sign (positive-feeling of pleasure, negative-feeling of sorrow) and a specific content and form of expression; (...) emotions influence the efficiency of action (...), they also cause changes in the course of thinking, perception and memory processes" *Encyclopedia* (1991). The so-called "emotional coloration of impressions caused by the specificity of individual objects" also belongs to emotions." Some colors, sounds, smells are pleasant, others - on the contrary - cause discontent *Encyclopedia* (1991).

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Table 1: Emotions and feelings and their types

EMOTIONS - FEELINGS			
Affects	Moods	Passionate feelings	Higher feelings
Terror	Satisfaction or discontent	Love	Intellectual
Fury	Merriment or Sadness	Hatred	Aesthetic
Desperation	Sorrow	Greed	Social
Wrath	Anxiety	Lust of Power	Moral
Joy	Longing	Ambition	Religious
Aggressive behaviour	Depression	Greed	Stinginess

Source: L. Wełyczko, Zarządzanie procesem umysłowym w pracy twórczej, WSOWL, Wrocław 2012, p. 65.

Man is also subject to various types of stressful situations that interfere with his functioning in a certain way, often even preventing him from taking or abandoning any action, etc.

Stress: a set of processes involving negative emotions and a number of physiological changes (e.g. increased blood pressure, blood supply and skeletal muscle tension), appearing in response to all types of adverse factors, mental trauma, failure, danger or injury or thermal shock, Long-term, chronic stress causes negative health consequences, disrupting the immune system and having a destructive effect on a number of tissues *Słownik* (2005). The main causes of stress are illustrated in Fig.1.

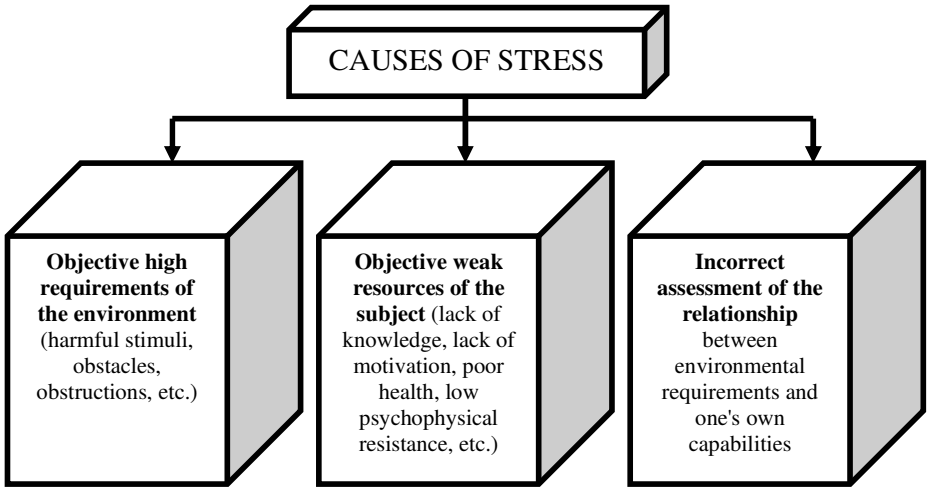

Figure 1: Causes of stress

Source: L. Wełyczko, Zarządzanie procesem umysłowym w pracy twórczej, wyd. cyt., p. 65.

The classification of feelings and emotions is determined by their strength L. Wełyczko (2012):

- strong, powerful;

- weak.

Division of emotions by their nature:

- *unpleasant;*

- *pleasant.*

Division of emotions by content:

- *intellectual;*

- *social;*

- *moral;*

- *aesthetic.*

Division of emotions according to the degree of complication:

- *simple - satiety;*

- *complex - friendship, love;*

- *deep.*

Division of emotions for durability:

- *moods* - a longer lasting emotional state is relatively weak (e.g., well-being or depression, etc.);

- *affections* - strong violent and short term emotional experiences, caused by rage, horror, despair; they endure the possibility of self-control; they depend on personality traits; they do not depend on will; they are based on unsatisfied ambitions and external conflicts;

- *feelings* - they are manifested with distinct vegetative symptoms.

Emotions arise in situations:

- threats;

- limitations;

- deprivation;

- satisfaction.

Emotions can be shaped. An attempt to illustrate the ways of shaping emotions is presented in Fig. 2. (Shaping emotions -> Prevention of depression/stress and apathy etc.-> Motivation through optimism; Mood boosting; Teaching the expression of feelings; Teaching conflict/problem solving etc.; Suppression of aggression, anxiety, fear etc.

Figure 2: Shaping emotions

Source: L. Wełyczko, Zarządzanie procesem umysłowym w pracy twórczej, wyd. cyt., p. 66.

Main Part

How to manage the emotions of military students in the educational process of the University?

The answer to the above question is not so simple at all. It is mainly due to the specific nature of military education and training in which military students participate. Moreover, the dualism of the said education and training consists in the fact that graduates of a military university must obtain appropriate preparation and qualifications, which every graduate of the university (confirmed by a diploma of graduation) and must obtain appropriate qualifications predisposing them to perform the profession of a professional soldier - an officer (after completing military training at the university level and passing an examination in this field - confirmed by obtaining an officer's patent).

The following conclusions can be drawn from the above:

- A military student is particularly vulnerable to various stress and emotional states, due to the specifics of simultaneous education and training;

- the military student is constantly - for the duration of his studies - connected with his environment, in which, with small exceptions (internships, vacations, passes), he is subject to the course of military service;

- to become a graduate of a military school, a much greater effort, both intellectual and physical, is required during the period of study as a civilian student of any other university;

- Being a military student requires self-discipline, perseverance, and a lot of effort and sacrifice that civil students do not normally face.

In order to manage the emotions of military students in the didactic process it is essential to have the ability to manage their emotions and the necessary knowledge and skills in this area. Moreover, it is highly desirable to have so-called **emotional intelligence**, which is a key determinant of being not only an officer-commander /teacher, educator or trainer/, who uses only the established patterns and learned rules in the educational process with soldiers and is inaccessible in mutual contacts with students - on the contrary, having emotional intelligence guarantees reciprocal interpersonal correlations, which are based on widely understood **leadership**. In a word, an officer-commander then becomes an **officer-leader**.

A **leader** is a person who is accepted by others and who can influence the behavior of others without the need for force C. Griffin (2004).

D. Goleman believes that **emotional intelligence** is the ability to recognize one's own feelings and those of others, the ability to motivate oneself and direct one's emotions, both one's own as well as those of people with whom we have some kind of connection. At the same time it gives the 5 most important social competences, which determine emotional intelligence in people who have it, are:

- **Self-regulation** - i.e. control over one's internal states, impulses and possibilities, that is self-control, maintaining standards of honesty and integrity, conscientiousness, flexibility to adapt to changes, innovation;

- **Motivation** - i.e. emotional inclinations that lead to new goals or facilitate their achievement, that is pursuit of achievements, commitment, initiative, optimism;

- **Empathy** - i.e., awareness of other people's feelings, needs and anxieties, that is understanding others, improving others, service attitude, political awareness, i.e., recognition of emotional group currents and relations among power representatives;

- **Social skills** - i.e. the ability to arouse desired reactions in others, that is influencing others, understanding, conflict mitigation, leadership, creating bonds, cooperation and collaboration, team skills D. Goleman (1999).

Usually, leaders are also leaders, such as the lowest-level commanders (team, platoon or company). In this case, the leaders fulfill the role of leaders.

Leaders- commanders usually have two main roles

- They must complete the task because that is what a team is for; the leader takes care of the group's goal; if the goal is not achieved, there is frustration, dissonance, criticism, and ultimately even disintegration of the group;

- Maintain effective relationships, both with team members and among group members; relationships are effective when they contribute to the task and can be broken down into those that affect the whole team, its morale and sense of purpose, as well as relationships with individuals and ways of monitoring them M. Armstrong (2007).

Table 2: Leadership styles and their opposites that leaders can adopt

LP.	LEADERSHIP STYLE GROUPS	
	Leader	
1.	Charismatic: It interacts through its personality, inspires qualities and "aura"; such leaders are often visionaries, goal-oriented; risk-aware and well communicated with their environment.	Deprived of charisma: They rely on self-confidence, a cool, analytical approach to problems and their knowledge (the authorities are held by who knows - know-how).
2.	Democratic: Encourages people to cooperate and makes decisions with them.	Autocratic: Imposes its own decisions, using its position, forces people to follow orders.
3.	Inspirational: Passionates others with its own vision of the future and gives strength to team goals.	Controlling: Manipulates people to force obedience.
4.	Transformative: Motivates people to set themselves increasingly ambitious goals.	Transactional: Exchanges money, work and security for submission to his power.

Source: Own study based on M. Armstrong, Zarządzanie ludźmi, wyd. cyt., p. 50.

P. Tyrała, comparing the desired characteristics determining leadership skills and the resulting benefits in this process, presented it in the following way, as shown in Figure 3 below:

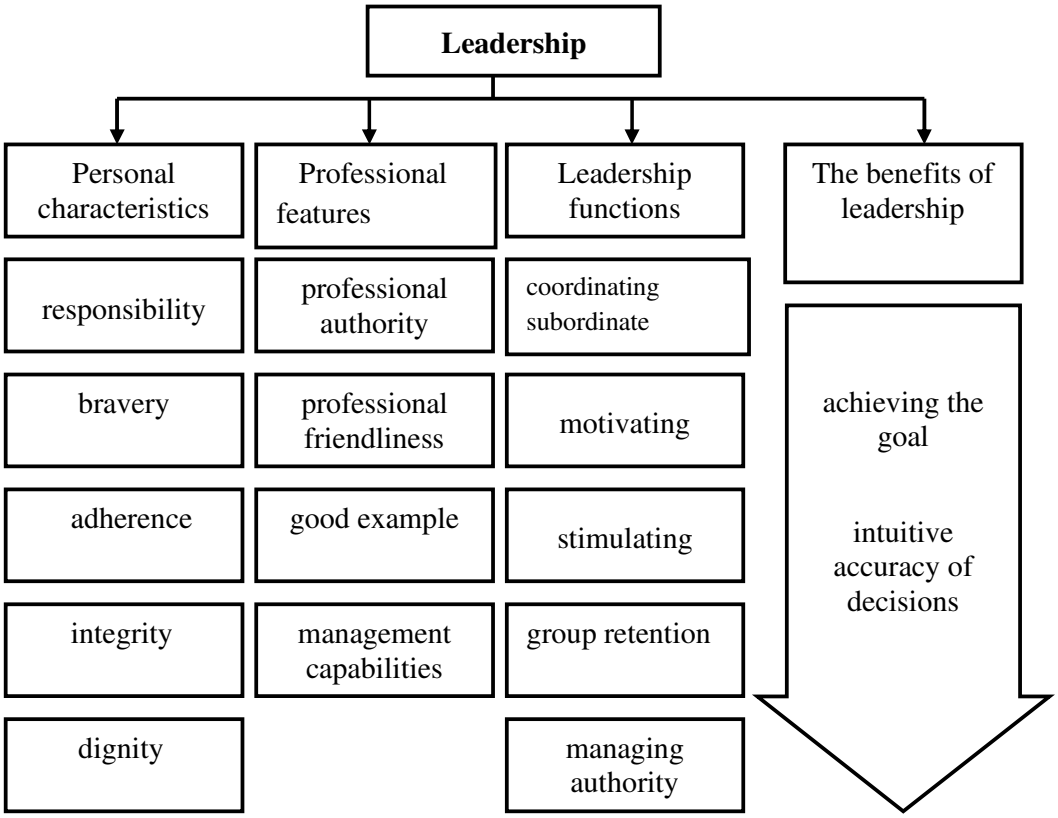

Figure 3: Characteristics that determine leadership skills

Source: P. Tyrała, Kierowanie, Organizowanie, zarządzanie, Zarys prakseologii, Wyd. Adam Marszałek, Toruń 2003, p.166.

Taking into account the predicted characteristics and praxeological skills of an excellent leader and the opinions of many authors in this respect, it is possible to compare the following with regard to an officer, signalling at the same time as those that he should possess in order to be perceived not only as a commander, but as a leader. They include I Majewska-Opiełka (1998); D. M. Stewart; B. Feder (2002); L. Kanarski, B. Rokicki, J. Świniarski - ed. (2000):

- self-esteem;

- proactivity;

- autonomy;

- positive thinking;

- interdependence;

- internal cohesion;

- sense of abundance;

- ability to create visions;

- ability and willingness to learn continuously;

- Decision making ability;
- righteousness;
- enthusiasm;
- imagination;
- willingness to work hard;
- analytical skills;
- understanding for others;
- ability to see opportunities;
- ability to cope with unpleasant situations (difficult and conflicting);
- ability to adapt quickly to change (ability to adapt);
- Ability to take risks;
- entrepreneurship;
- ability to express thoughts clearly;
- clarity of mind;
- ability to administer efficiently;
- open-mindedness;
- perseverance;
- ability to work for hours.
- Creativity, creativity;
- taking care of employees;
- knowledge;
- vision;
- flexibility;
- good organization;
- communication skills;
- self-confidence;
- ability to anticipate and analyse the situation;
- charisma;
- ability to motivate;
- active listening;

- intelligence;

- courage;

- being demanding;

- leadership skills;

- positive thinking;

- conflict resolution skills;

- resourcefulness;

- willingness to change, looking for new solutions.

- decisiveness;

- determination;

- Ability to trust others;

- self-confidence and influence on the environment;

- objectivity in the courts;

- The ability to plan and organize activities;

- optimism;

- readiness to take initiative;

- ability to consolidate leaders;

- professional proficiency;

- resistance to stress;

- ability to use their own strengths and available resources effectively.

In the didactic process at the military university, apart from shaping (forming) students with leadership qualities and skills, where emotional intelligence is the key determinant, should be taught how to manage stress. No one else, like military students, is exposed to all sorts of negative effects of stressful situations, which they are very often faced with during military training and beyond Zimbardo P. G., Johnson R. L., McCann V. (2010) present different views on stress, while pointing out specific sources of this phenomenon - signaling its nature of complexity. According to these authors, external events or situations that cause stress are referred to as **stressors**. **Stress, on the other hand, means physical and mental changes that occur as a reaction to a stressor**. What constitutes a threat to one person, to another can be a pleasant variety. When stress begins, for example, something should be done immediately, which for various reasons is difficult - the body produces more adrenaline. Then it feels like blood hits your head, your pulse is pounding like crazy, your breathing is accelerated, your throat is dry, your hands are wet, but a lot of energy. Then we are dealing with the first stage of stress. The second stage of stress - it's the persistent stress that exhausts vital forces, and the third stage - threatens with nervous breakdown.

Stress can cause *Zarządzanie stresem* ... (2008):

- Decreasing work efficiency (unhealthy stress reduces work efficiency, increases absenteeism and employee turnover; it sometimes forces employees to look for a new job, which affects the efficiency of the whole team, etc.);

- harmful effects on health (prolonged stress can lead to extreme exhaustion and even death);

- energy deprivation (stress, anxiety and anxiety, occurring in excess, may give rise to energy deprivation, from which the work done, as well as the private life of the employee will suffer, etc.);

- Destruction of relationships between people (stress can seriously disrupt various relationships, both at work and at home; it can cause interpersonal conflicts which affect ne-gative feelings or worsen the current situation, including severely disrupting the rhythm of the team, etc.).

Stress is a natural phenomenon and accompanies everyone throughout their lives. There are a number of possibilities to control stress so that it becomes helpful in everyday life and has a mobilizing dimension for effective and efficient action. Lifestyle plays a key role in stress management. It is worth remembering that wellbeing promotes health and increases resistance to stress. On the other hand, mortification, e.g. a strict diet, encourages bad wellbeing, causes stress etc.

In the didactic process, as well as outside it (in the course of military life in a subdivision and military university) students should be taught how to cope with stress. According to J. Strelau, an individual's ability to cope with stress depends on such features as J. Strelau (1999):

- intelligence;
- abilities;
- special skills;
- knowledge;
- personality and temperament characteristics;
- physical characteristics;
- number of experiences related to a given stress situation;
- current state (physical and mental) of the individual.

The simplest and at the same time the most prophylactic prevention of stressful situations are *Zarządzanie stresem* ... (2008):

- Avoiding stressors;
- physical exercise (physical activity);
- healthy eating;
- healthy sleep;
- relaxing reaction.

Students should also be able to maintain the so-called life balance. In order for a person to achieve his or her life goals and aspirations, to enter into adult life after completing primary education and vocational training, working, starting a family, and to live with dignity he or she should achieve a "relative" life balance. P. Wilson points to the eight determinants that determine a person's balance when they interact harmoniously and comfortably P. Wilson (2012):

- personal needs and ambitions;
- responsibilities and family responsibilities;
- tasks at work;
- professional commitments;

- social commitments;

- social responsibility;

- moral and spiritual responsibilities;

- Imaginary responsibilities.

According to the author mentioned above, a harmonious, balanced human personality is created by P. Wilson (2012):

- **physicality** (i.e. all the temporal needs of man, that is health, food, recreation, sleep, sex);

- **spirituality** (these are not only matters related to God, but also life values, the search for the meaning of life, the need to have meaning for the world and the need to help others and even the whole planet);

- **work** (it is primarily a profession, but also a number of mental needs, such as the desire for achievement and creation, the desire for personal development, recognition, respect and self-esteem);

- **social situation** (this is all integration with people; involvement with family, home, friends and society).

The last aspects that need to be taken into account when shaping the personality of military students to deal professionally with their emotions and stressful situations are: **students' self-management**, **self-esteem** and **proper time management**.

Self-management is considered to be personal skill. It means managing one's own life and career, establishing and implementing one's personal plans and goals. It also means having control over one's own life, behavior, resources and creative adaptation to a constantly changing world. The functions of management are: planning, organizing, motivating (stimulating) and controlling (evaluating). Therefore, it is not difficult in this case to talk about the student's planning of his or her closer or further life and socio-occupational life, organizing such activities that allow to achieve the intended closer and further goals and self-motivation for all activities in this area and control (evaluation) of those goals, etc.

It should be assumed that rational self-management shows great maturity and socio-occupational stability, it is good to know what you want to achieve in life and how you are not surprised by the variability of situations, often burdened with stressful states. Everyone should be able to plan his or her life, career and all the actions which - according to his or her needs and beliefs - allow him to consciously manage his resources, i.e: energy, mental and physical resources, and consequently emotions, stress and time.

N. Brandon's sense of self-esteem considers *"...high self-esteem, which is a disposition to experience yourself as a person competent to deal with the basic demands of life and deserving of happiness*". N. Branden (2008). This author points to six pillars of self-esteem, these are:

- **The practice of conscious living**: the more conscious a person is of what they do, the more control they feel and are more effective and the more successful their efforts are;

- **The practice of self-acceptance**: high self-esteem requires acceptance, not self-rejection;

- **The practice of self-responsibility**: responsibility for oneself allows one to feel inner strength. This does not mean that everything has to be done on its own, but it does mean that, even as a team, we don't pass the burden on to others.

- **Assertiveness practice**: it is about respecting one's own needs, desires, values and judgements and looking for appropriate forms to express them;

- **The practice of purposeful life**: in passivity, neither our reason, nor our passions, nor our creative abilities, nor our imagination are fulfilled. Man's life should be a search for the fullest expression of his characteristic abilities, then the answer is obvious;

- **The practice of righteousness**: it means keeping one's word, respecting one's own commitments, fulfilling one's promises.

Time management is the effective self-organization of every work, venture, activity, etc. - It is connected with skilful time management. It is not a simple matter at all. It requires perseverance, determination and appropriate personality traits. Controlling one's own activity is about setting and prioritizing the objectives, planning the means and actions to realize them and controlling the final results. In order to manage time effectively you need to:

- have knowledge about yourself, your temperament, your physiological performance curve, your strengths and weaknesses, your perception of time;

- have attitudes: self-discipline, consistency, concentration, etc;

- be able to plan, set priorities, assignments;

- distinguish between important and urgent things.

Most experts in effective learning are of the opinion that the most important and best way of not wasting time is to draw up a learning plan. It should be filled in with specific tasks or subjects that we want to learn. Remember that a full cycle of learning takes about 1-1.5 hours, and the warm-up time is about 5-10 minutes. After that time comes the moment of proper action with high concentration and high efficiency - it usually takes 45-60 minutes. At the end of the hour you notice a drop in concentration and a feeling of being stuck in a deadlock, then it is best to take a break and relax.

Summary

To sum up the aspects related to the management of emotions of military students in the teaching process of the university, presented in this article, it should be clearly indicated that all lecturers must be professionally prepared for educational work in this area. This preparation must not only include substantive and professional knowledge of the subject being taught, but also broadly understood knowledge of pedagogy (including didactics and teaching methodology), but also the basis of knowledge of psychology. Only a high-class professional with the necessary competences indicated above is able to participate in the "process" of forming emotional intelligence in students and teach them how to cope with various stressful and emotional situations. It is also necessary for academic teachers as well as sub-departmental commanders (direct superiors of military students) to have such a personality, which in each case will be a personal-professional and ethical-moral model for students.

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Sustainable Using (Exploiting) of Earth Resources

Stanisława OSTASIEWICZ

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland, stanislawa.ostasiewicz@awl.edu.pl

Józef LEDZIANOWSKI

General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland, jozef.ledzianowski@awl.edu.pl

Abstract

Planet Earth is our common home in which we live, farm, and in which in 1987 we decided, at the initiative of the UN, to organize our common future. Human needs for natural resources are measured by the size of their ecological footprint. The size of the ecological footprint is influenced by partial footprints, the largest of which is the carbon footprint. The size of this footprint is significantly influenced by waste produced by society. Plastic waste is the most dangerous. The paper presents an analysis of the volume of plastic municipal waste in the years 2006-2018 in Poland and Europe, as well as the situation in the processing of this waste.

Keywords: Earth bio-capacity, ecological footprint, sustainable development, primary production, ecological debtor, life-giving areas, recycling, landfill, energy recovery, post-consumer waste, municipal waste.

Introduction

Recently, the problem of environmental protection worldwide, is becoming more and more popular. What is this interest caused? Well, it is impossible not to notice that violent atmospheric phenomena, hurricanes, floods, catastrophic droughts are something abnormal in our latitude. There was also an increase in air temperature to a level previously not observed. This abnormal situation caused great concern for both meteorologists and the whole society.

The aim of the presented paper is to present the most important problems faced by contemporary societies and international organizations whose activities are aimed at eliminating (or at least reducing the effects) of irresponsible human activity in the field of environmental destruction. In order to explain the problem better, human was also presented as how his destructive activity not only reduced the comfort of life of the inhabitants of the Earth, but it led to the fact that not only the existence of the human race is threatened, but also the life of the entire planet. This is because the planet is being overused by appropriating its primary production. Humanity has left the mark of its existence on planet Earth and must suffer the consequences. Everyone should wonder what I can do to reduce the “cost of my existence on Earth”. Isn’t it too late?

We do not know an answer to the question. May it turn out that this situation still can be improved. The presented work is an attempt to "improve the situation" by increasing the environmental awareness of the society and this is its main goal.

The above presented problems show that the activity of international organizations is very important, but the role of rank and file members of society cannot be overestimated either. Each person has a specific lifestyle and habits, and thus can determine the cost of his existence on Earth.

The basic concept that the authors will use in their further research and analysis is the concept of "ecological footprint". It is an indicator designed to estimate the use of natural resources in relation to their restoration by our planet. The ecological footprint can be calculated for the whole world, for a selected country, but also for an

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individual. It is also possible to analyse the factors influencing this value and determine their responsibility for undesirable natural phenomena.

Society as an organism uses raw materials, transforms them into products useful for man, and the useless (harmful) effects of such a transformation are removed from its organism by polluting the environment. It is known that the problem of waste cannot be avoided in the production process, but a lot of this waste can be reused and therefore should be done whenever possible. Thanks to this, waste and unused items will not be wasted, and will be processed and still used by people. In an increasing number of countries, the role of recycling is increasing, and the use of recycling is becoming more and more popular. In Europe, Germany is the leader in this respect, where 67.3% (2018) of the total waste was collected selectively in Poland, this share was only 34.3% (2018). The authors intend to actively engage in the research on environmental hazards posed by waste. The presented work deals with the problem of municipal waste, i.e. waste generated by the society. The amount of this waste depends to a large extent on the ecological awareness of the society. Of course, waste is an integral part of social metabolism and it always appears. The problem is to properly manage this waste. Due to its harmfulness, plastic waste, including packaging with a short life span, is particularly important. The paper presents measures taken by governments and international organizations to reduce the amount of waste produced, as well as measures to reduce the amount of waste going to landfills.

In their research, the authors use the figures available in the Central Statistical Office database (GUS) as well as in EUROSTAT. Standard descriptive statistics methods were used to compile the data.

Main part

The energy of sunlight is transformed by plants and phytoplankton (photosynthesis) into the chemical energy of their bodies. The energy obtained in this way is called gross production of nature. Part of this energy is used to produce a variety of goods, and some for breathing. The rest of the energy is called net primary production.

The volume of this production is measured not in the form of biomass (residues remaining from plant and animal production), but in the form of carbon contained in it. The amount of primary production depends on the ecosystem where it is carried out. For example, the annual production of deciduous forest is about 1300 g/m^2, while the ocean only 120 g/m^2.

According to the researchers, the annual primary production available to all organisms on Earth (in terms of pure carbon) is 224.5 Gt.

Thanks to primary production, life on Earth is maintained. Part of this production is consumed by human. The remaining part is used by other creatures living on the Earth.

Since the mid-seventies, Earth has been terribly exploited by humanity. If we compare the life-giving capabilities of the planet and its exploitation by humans, then we will see that exploitation is enormous.

The area of the globe is 51 billion ha, of which 36.6 billion are oceans and other water areas, while 14.4 billion ha are land. Only a part of those areas is life-giving and biologically productive areas. From 2.3 billion water areas they are productive, and from land 9.1 billion ha. In total, it is 11.4 billion life-giving areas.

These areas are divided into five categories: areas for cereal cultivation, pastures for grazing and hay production, forest areas for wood production, fishing areas and built-up areas.

Around 2000, there were a total of about 6 billion people on earth, or about 1.91 ha of life-giving area. However, people in the world lived as if everyone had 1.91 ha but 2.33 ha at their disposal. In the latest sources we find information B. Ewing, S. Moore, A. Goldfinger, A. Oursler, M. Reed, M. Wackernagel (2015) that as a result of the increase in population and "shrinking" of life-giving areas, on average there is only 1.7 ha per person. This means that humanity lives beyond the life-giving capabilities of the planet. The effects of this condition are unpredictable.

The degree of exploitation of the planet is measured by a unit called the global hectare. The essence of this measure is that consumption is measured not in monetary units, but in hectares needed to produce the goods consumed. These units are called gha (global hectars). The unit of measurement is the average yield per hectare regardless of

the category of area. Productivity is calculated as the amount of good (amount of matter, amount of carbon dioxide absorbed) divided by the size of the area. If the average global efficiency is known, by dividing the quantity of good consumed by this efficiency, one obtains the "demand" for the area measured in these units. Productivity from individual life-giving areas is not the same. For example, if the yield from arable land is 2.1 times higher than the standard yield of the global hectare, the number 2.1 is treated as a scaling factor (equivalence factor). Scaling factors for areas of production nature (producing primary production) are calculated every year B. Ewing, S. Moore, A. Galli, J. Kotzens, M. Wackernagel (2010).

In Fig. 1, graphically also the size of life-giving areas were expressed in real values (hectares) and global hectares.

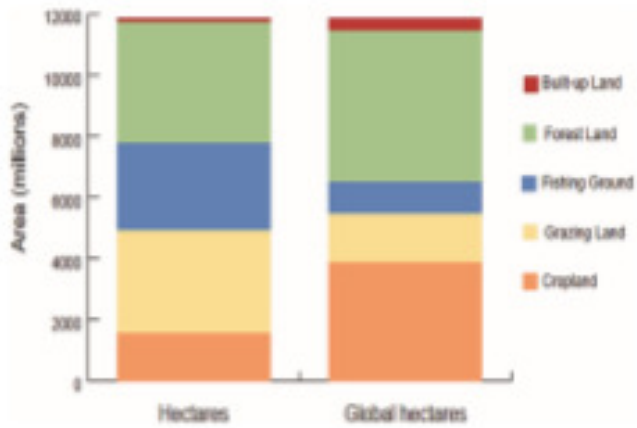

Fig. 1: Biocapacity areas in ha and gha

Source: [Ewing et al. 2010]

Having scaling factors, you can count the life-giving possibilities of the planet as well as its exploitation. Tab. 1 presents data on the life-giving potential of the planet and its exploitation in 1999.

Tab. 1: Biocapacity of the planet and its exploitation in 1999

Areas	Total Area [bln ha]	Area [ha/cap]	Scaling factor	Total Area [bln gha]	Supply [gha/cap]	Exploitation [gha/cap]
Farmlands	1,5	0,25	2,1	3,2	0,53	0,53
Pastures	3,5	0,58	0,5	1,6	0,27	0,1
Forests for felling	3,8	0,65	1,3	5,2	0,87	0,29
Building	0,3	0,05	2,2	0,6	0,10	0,10
Fishery	2,3	0,39	0,4	0,8	0,14	0,14
CO_2						1,16
Total	11,4	1,91	1,0	11,4	1,91	2,33

Source: M. Wackernagel, C. Monfreda (2004)

In the last row of Tab. 3, the abbreviation CO_2 means areas needed for the absorption of carbon dioxide from the burning of fossil fuels and originating from nuclear power plants.

This is the most important ingredient in the overall exploitation of the planet. The contribution of individual components to the overall exploitation of the planet is shown in Fig. 2.

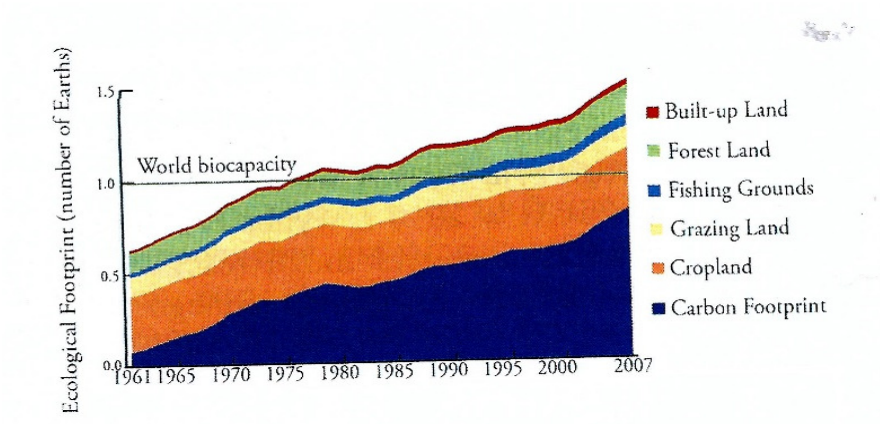

Fig. 2: Degree of exploitation of the planet by type of area used

Source: W. Ostasiewicz (2016]

The planet's exploitation (in the form of the exploitation factor) can be calculated not only for the entire planet, but also for individual countries, cities and even smaller regional units. In such cases, additional scaling factors are needed because the yield per hectare may be different for different countries or regions B. Ewing, S. Moore, A. Galli, J. Kotzens, M. Wackernagel (2010).

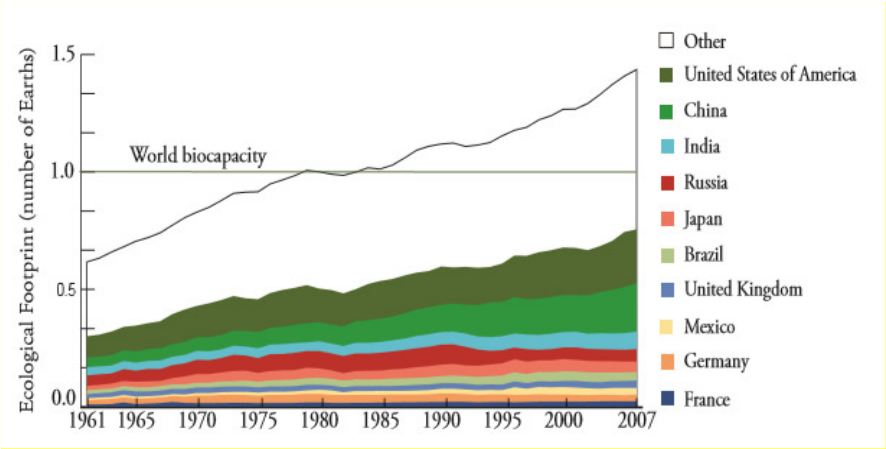

Fig. 3: Participation of selected ten countries in planet exploitation

Source: B. Ewing, S. Moore, A. Galli, J. Kotzens, M. Wackernagel (2010).

As it results from the presented figure, half of the global ecological footprint in 2007 was accounted for by ten countries of the World B. Ewing, S. Moore, A. Galli, J. Kotzens, M. Wackernagel (2010). Of those countries, only the United States alone accounted for 21% of the planet's global exploitation and China for 24%. The rest, around 5 percent, was generated by the other 8 countries listed in the figure above.

Examples of performance factors for different countries can be found in the literature B. Ewing, S. Moore, A. Galli, J. Kotzens, M. Wackernagel (2010).

In the early 1960s, half a planet was enough to provide people with life, in present times 1.7 is needed to meet the current standard of living. The planet earth is over-exploited, and this is called exploitation. Of course, this is average exploitation. Some countries use it less others more. If the life-giving potential of a state is greater than the degree of exploitation, such a state is called an economic creditor, because at its expense other exploiting states live. And vice versa, if the life-giving possibilities in a country are smaller than its exploitation, then that country is called an ecological debtor. For example, in 2010, the life-giving potential of Poland was 2.0 gha per capita, while

the average utilization of these opportunities was 3.8 gha per capita. Thus, Poland's ecological debt this year was 1.8 gha per person. In 2010, Poland had 38042794 inhabitants, so Poland had an ecological debt of 68477029 gha.

In the last forty years, both bio-production possibilities and their use have changed, thus the ecological debt has changed. This situation is presented in Fig. 4.

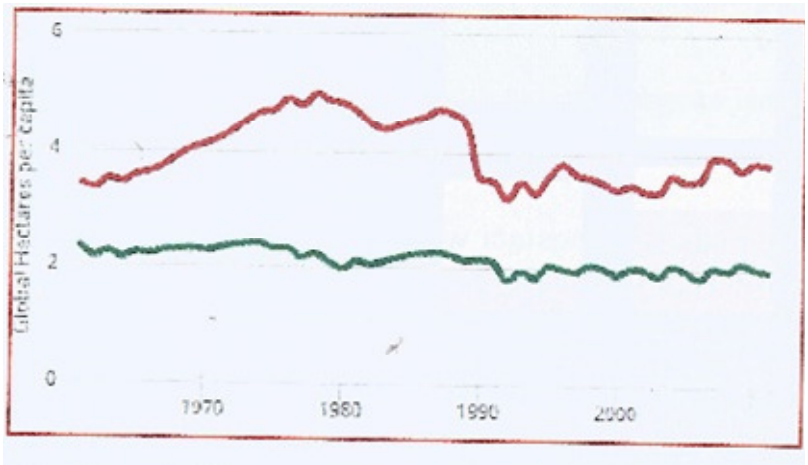

Fig. 4: Poland's ecological debt in the years 1960-2010

Source: B. Ewing, S. Moore, A. Galli, J. Kotzens, M. Wackernagel (2010).

The contribution of individual countries to the current ecological debt is very uneven. The ecological footprint calculated per capita ranges from below 1gha (for poor countries such as Eritrea or Mozambique), through about 5gha (for countries such as Norway or the United Kingdom) to above 8 gha for the United States and Australia. Israel is the world's largest ecological debtor using ecological opportunities 18 times greater than the country's real ecological opportunities. Poland uses ecological opportunities 2.1 times greater than the country's real opportunities [cf. Global Footprint Network ..., (2014)].

The global situation in the field of Earth exploitation is presented in Fig. 5.

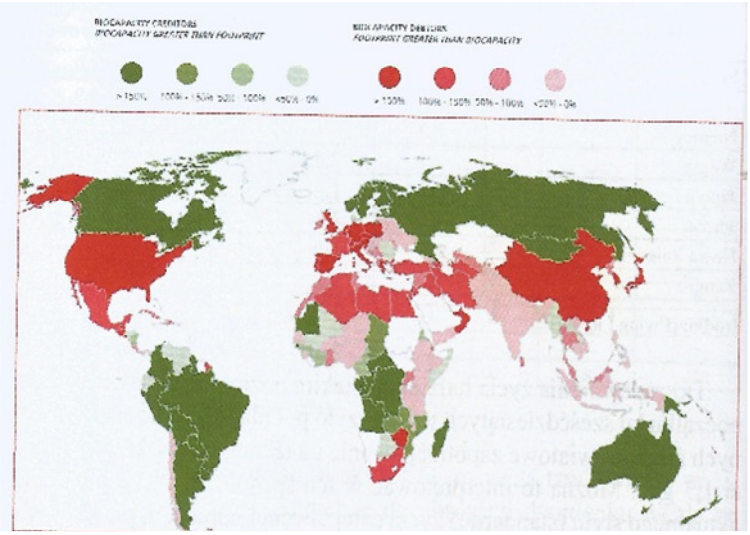

Fig. 5: Environmental debtors and ecological creditors on a global scale

Source: [Ewing et al. 2010]

Ecological awareness is very high in Europe, which translates into the official policy of the European Union and earlier of other European bodies. At European level, the issue of environmental protection is very vital. EU agendas monitor the state of the environment, emission levels in individual Member States and make commitments to limit negative environmental changes.

In Poland, little more than 10% of energy still comes from renewable sources. In order to develop this sector and adapt Polish realities to EU guidelines, a number of legal regulations have been adopted. It is forecast that the share of energy from renewable sources will increase in Poland by 2030 to over 15%. At the same time, the government is protesting against the limit (550 g CO_2 per 1 kWh) imposed by the European Union for power plants supported by the state. These limits harm the Polish coal energy sector, which is considered the guarantor of the country's energy security.

The ecological footprint is a measure of human demand for natural resources. It determines how much biologically productive land and sea areas are necessary to provide people with resources needed for consumption and to assimilate waste related to this consumption E. Nieckula (2011). Waste is a by-product of social metabolism that always appears.

The ecological footprint can be counted separately for each individual, social group, organization or society. Using this indicator, it is possible to assess the pro-ecological behaviour of individual social groups, but also of individual countries. The shaping of the ecological footprint of the entire planet is influenced by partial footprints (see Fig. 2), of which the carbon footprint has the greatest share.

The carbon footprint includes greenhouse gas emissions expressed in CO_2 equivalent. Greenhouse gas emissions are warming the climate and all the negative weather phenomena we are currently experiencing. International conferences and talks are held on the subject of limiting carbon dioxide emissions to the atmosphere [Global Climate, (2016)].

Virtually every human activity increases the carbon footprint, but everyone also influences its size. Both large industrial plants can reduce the release of greenhouse gases into the atmosphere by installing appropriate filters, and each member of the society can reduce CO_2 production through appropriate consumer behaviour. Of course, the impact of individual social units on the size of the carbon footprint is small, for example, it may consist in changing the means of transport to work (changing the car to a bicycle), reducing the waste of electricity, or even changing the diet (switching to a vegetarian diet). However, due to the massive scale of the phenomenon, the combined impact on the size of the Ecological Footprint can be significant.

The share of the Polish society in the global production of CO_2 is quite large. Poland's rank in the world in terms of CO_2 emissions to the atmosphere is 21. This accounts for 0.9% of the world's production of this pollutant [Infamous Ranking…, (2019)].

Waste is a factor that has a strong influence on the emission of carbon dioxide to the atmosphere. Waste is a threat to humans and the environment due to its toxicity, which can cause air and soil contamination and pose a threat to living organisms.

Our considerations will concern municipal waste, i.e. waste related to non-industrial human activity, but produced by society. It is the size of this waste that depends only on the environmental awareness of the society.

Currently, the world produces about 2 billion tons of municipal waste annually. In the latest report of the World Bank we find the conclusion that if urgent measures are not taken, the amount of waste in the world will increase by 70% by 2050 [Śmieci…, (2018)].

The USA produces the most municipal waste in the world. The annual per capita production of waste in this country is 773 kg, which is 12% of the total amount of waste in the world. For comparison, the populations of China and India, which together account for over 36% of the world's population, and collectively generate 27% of the world's waste. The basic way to reduce the size of waste is to reuse it with the lowest possible input of raw materials and energy needed for their processing (recycling).

Pursuant to the ordinance of the Minister of the Environment of September 27, 2001 (Journal of Laws 2001, No. 112, item 1206), the type of waste depends on the source of its generation. According to this criterion, waste is divided into 20 groups. Group 19 in this classification is municipal waste – that is waste generated by the society [Kody…, (2020)].

A necessary condition for recycling waste is its prior segregation. In Poland, since 2017, there is an obligation to segregate waste.

On July 1, 2017, the Unified Waste Segregation System (JSSO) was implemented in Poland and it is valid throughout the country. Municipal waste is collected in four fractions: plastic, glass, paper and mixed waste.

Detailed instructions on waste segregation are contained in the Regulation of the Minister of the Environment of December 29, 2017 [Journal of Law 2017, item 19].

In 2017, Polish households produced 12 million tonnes of waste, which means that the average Pole produced an incredible amount of waste equal to 312 kg. Moreover, despite the fact that the act on waste selection was in force, only about 40% of this waste was segregated.

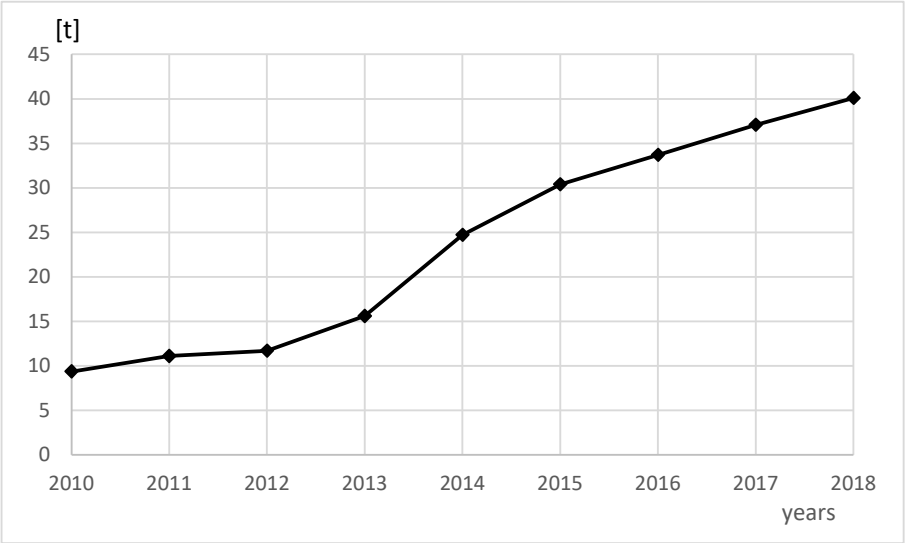

Fig. 6: Ratio of the amount of waste collected selectively to the total amount of waste.
Source: Own elaboration based on GUS data

The presented figure shows that the situation is slowly improving in this respect. Although in 2018 less than half of the waste was segregated, it was a fourfold increase compared to 2010.

If we consider the volume of municipal waste per inhabitant of Poland in 2010-2018, it can also be noticed that despite the growing wealth of the society, there is no drastic increase in waste (taking into account that a large part of municipal waste is food).

The level of waste remains approximately constant at around 300 kg / person.

The time series describing the amount of waste per person in 2009-2018 in Poland was shown in Fig. 8.

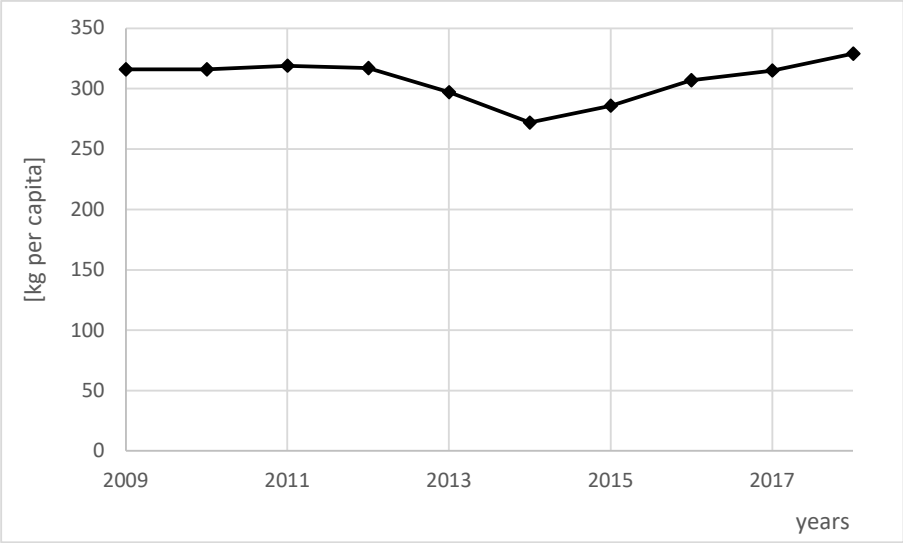

Fig. 7: Amount of municipal waste in Poland per capita in 2009-2018
Source: Own elaboration based on EUROSTAT data

Municipal waste in Poland is sorted into four types: paper, glass, plastic and mixed waste. The mixed waste can only be disposed of. The remaining types of waste are recyclable.

The structure of municipal waste according to segregated types is presented in Fig. 9.

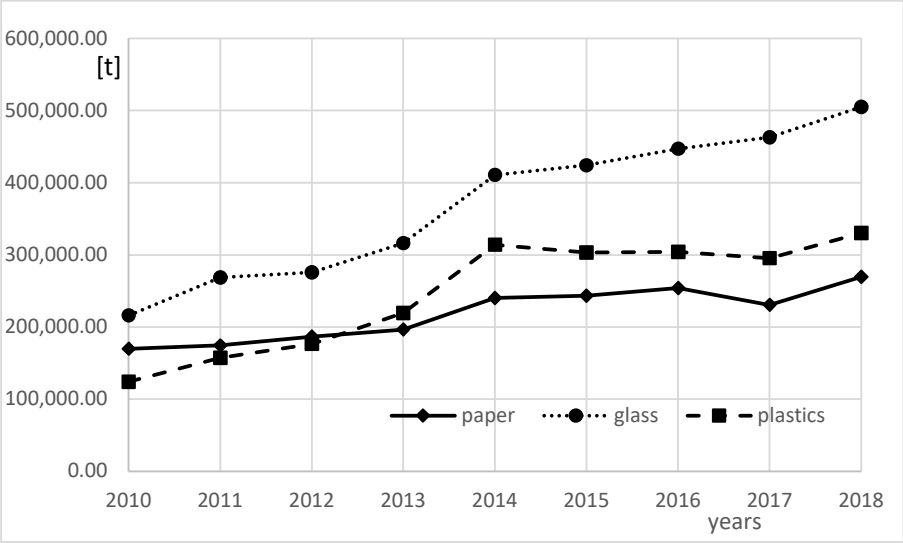

Fig. 8: The structure of waste by selected types in Poland in 2010-2018
Source: Own elaboration based on EUROSTAT data

Glass waste is an excellent recyclable material. Some used glass packaging can be recycled into identical new packaging. Processing glass reduces the amount of this waste in landfills, although they do not pose a threat to the environment, but only spoil the landscape. Moreover, making glass products from waste is more environmentally friendly than producing from raw materials, as the level of carbon dioxide emissions in production is much lower. Waste paper is a similarly easily recyclable material. This raw material has been used for years in the production of inferior quality paper and other products.

The presented structure shows that plastics account for quite a large share in the total amount of waste. Plastics obtained from crude oil are particularly dangerous to the environment because the process of their decomposition takes up to several thousand years. When abandoned in landfills, they emit poisonous substances that contaminate water and soil. If you burn them yourself, poisonous substances are released into the atmosphere.

Although there are generally known disadvantages of plastic, the fact that the use of this material in everyday life is sometimes inadvisable, the share of this material (as shown in the drawing) in the lives of Poles is very large. In this respect, Poland is not alone. The use of products with a short life cycle is particularly harmful, as they produce a lot of waste. Recently, the issue of water pollution with plastic waste that threatens the life of marine flora and fauna has aroused a lot of emotions. If the trend continues, it is predicted that by 2050 there will be more plastic in the seas than fish.

Despite the fact that plastic waste is very harmful to the environment, the demand of EU countries for this product in 2018 was 51.2 Mt, with 25 percent of plastics in 2018 consumed by Germany, the largest economic power, and also a country with the opinion of the greenest in Europe. Poland was the sixth country in terms of demand for this product. The six largest countries in the European Union consume 80 percent of European plastics production. Of course, among plastic products there are products with different life cycles as well as products with different decomposition periods. From the point of view of the ecological footprint, the most harmful is waste produced by society, i.e. municipal waste directly affected by members of society. It is both the amount of generated waste and the management of this waste.

In January 2018, the European Strategy for the Management of Plastics in a Circular Economy was developed [Communication… (2018)]. This strategy defines the contribution of the European Community to achieving sustainable development goals. This strategy will help protect the environment, reduce marine pollution, reduce greenhouse gas emissions and reduce dependence on fossil fuels.

In May 2018, the European Commission developed new EU-wide rules [Proposal…(2018), ANNEX... (2018)] for the use of ten single-use (plastic) products, the most common pollutant for beaches and marine waters by the people who use them. If we add to this items abandoned by fishermen while fishing at sea, we get a huge amount of waste, accounting for about 70% of the total pollution of the seas and oceans.

Ultimately, the problem of single-use items is to be solved by Directive 219/905 of the European Commission of 5 June 2019. Article 5 of this directive prohibits the marketing of ten different plastic products that have environmentally safe alternatives. Thus, from July 2021, plastic spoons, plates, knives, etc. will disappear from stores (also in Poland). In the following years, trade in plastic products will be further reduced.

The amount of plastic waste generated in the EU in 2018 is estimated at 29.1 Mt, while in 2006 it was 24.5 Mt. This is a 19% increase compared to 2006. It is encouraging, however, that in the period 2006-2018 the amount of waste recycled doubled. Nevertheless, 25 percent of plastic waste still ends up in landfills [Plastic…, (2019)].

However, if we compare the situation in 2006 and 2018 in terms of the basic methods of processing plastic waste (recycling, energy recovery and landfilling), it will also turn out that there has been a clear improvement.

Tab. 2: Processing of plastics by type of processing in 2006 and 2018

Processing method	Year 2006	Year 2018	Increase in 2018 compared to 2006	Average annual rate of change
Storage at Mt	12,9	7,2	-44 %	-1,1
Energy recovery in Mt	7,0	12,4	77 %	4,8 %
Recycling in Mt	4,7	9,4	100 %	5,7%

Source: Own elaboration based on: [Plastic.., (2019)]

Despite a significant improvement in waste treatment, still 25% of waste generated in 2018 is sent to landfills.

This is a very significant improvement compared to 2006, when 50% of the waste was landfilled.

The figures below characterize the situation with regard to the use of plastic packaging (packaging becomes waste at the end of its life). It seems to be the most carelessly used plastic product due to the short life span of this product. In extreme cases, plastic bags for shopping are used only once (despite the appeal printed on these bags encouraging the repeated use of the product), the same is the case with disposable cups, plates, etc.

In 2018, the amount of plastic packaging waste was 17.8 Mt, while in 2006 it was 14.9 Mt. Thus, there was a large 19% increase in the period 2006-2018.

The situation with the management of this large amount of waste is slightly better. This situation is presented in Tab. 3.

Tab. 3: Processing of plastic packaging by type of processing in 2006 and 2018

Processing method	Year 2006	Year 2018	Increase in 2018 compared to 2006	Average annual rate of change
Storage at Mt	7,2	3,3	-54	-1,2
Energy recovery in Mt	3,8	7,0	84	4,1
Recycling in Mt	3,9	7,5	92	4,6

Source: Own elaboration based on: [Plastic…, (2019)]

The presented data show that the situation with regard to the management of plastic packaging is also improving.

In 2006, the share of packaging in landfills was almost 50%, while in 2018 this percentage was only 18%. The situation in terms of reducing the poisonous effect of waste is improving.

It can be hoped that the actions of international environmental organizations, as well as the behaviour of a society whose ecological culture is growing, will cause the present generation to want to leave the Earth in the best possible condition for the next generations. It certainly will not implement the idea of sustainable development, because through its hundred years of destructive activity it has caused damage that will have to be repaired for many hundreds of years.

Summary

Half of the planet was enough to provide people with a standard of living in the 1960s. The exploitation of the earth's life-giving possibilities has been recorded since the mid-seventies and is increasing. It takes 1.7 planets to provide the current standard of living for the entire population. The terrestrial planet is overused. The answer to this exploitation is unfavourable changes in the natural environment, which are currently observed in the form of unfavourable atmospheric phenomena resulting from climate warming. You can guess what the effects of this will be.

We are already witnessing the cracking and melting of glaciers, rising water levels and thus shrinking living areas for some animals and birds. The carbon footprint is responsible for these changes. Fortunately, its size is influenced by the governments of individual countries, but also by individual members of society, for example by rationalizing the use of electricity, water, changing the means of transport, and changing the way of eating (reducing the consumption of animal products in favour of plant products).

Waste is an inherent factor related to the functioning of society. Waste has an increasing impact on the size of the carbon footprint, and their landfills take up more and more land. People are able to go to shopping malls without any clear purpose or need, buy unnecessary products and then throw them into the garbage. The most glaring example is plastic waste. Plastic is a very popular material and the demand for plastic products is very high. The variety of plastic products is also very large, both due to the chemical composition of the material used and the life time of the manufactured products. The most harmful in terms of their quantity are products with a short life span, i.e. everyday items, plates, forks, etc., and above all, disposable packaging, i.e. all kinds of bags, handbags and containers. Plastic is a material whose decomposition time often reaches several hundred years, i.e. the life span of several generations.

It is known that plastic is a relatively new product. The era of plastics began in 1907, when the combination of phenol and formaldehyde gave rise to what we know today as *bakelite*. Later, various versions of this product were created.

Nowadays, plastic is everywhere, even in the most unexpected places. Disposable packaging, such as a plastic shopping bag, has become a plague, although such a bag can be replaced with a reusable cloth bag.

Until recently, mineral water and other drinks were sold in interchangeable glass bottles. Currently, we use plastic packaging, which, when empty, is scattered everywhere in parks, streets, beaches and in the water. The composition of the material used in their production is not always indifferent to health. One might wonder if it is not possible to return to glass packaging that can be used repeatedly, and furthermore, the processing of glass waste is much easier than that of plastic.

The real tragedy is water pollution with plastic waste. This waste is eaten by animals, which is a deadly threat to their lives as they cannot digest it and they starve to death. Appeals to society regarding ecological and even cultural behaviour do not work.

It seems that the most effective solution would be to ban the production of plastic articles at least the most harmful to the environment. The solution proposed by the European Union is heading in this direction.

Another solution is to develop a technology for the production of plastics whose decomposition time would be shorter as well as plastics that would be easier to recycle.

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Quantum Classification in the Risk Assessment of the Credit Sales

Joanna WIŚNIEWSKA

Institute of Information Systems, Faculty of Cybernetics,
Military University of Technology, Gen. S. Kaliskiego 2, 00-908 Warsaw, Poland
jwisniewska@wat.edu.pl

Marek SAWERWAIN

Institute of Control & Computation Engineering,
University of Zielona Góra, Licealna 9, Zielona Góra 65-417, Poland
M.Sawerwain@issi.uz.zgora.pl

Abstract

The article presents an example of data classification in a risk assessment of credit sales. Firstly, the classical data is converted to the form of quantum states, and then the classification is performed with the use of two different quantum circuits: the variational circuit and the SWAP-test. The variational circuit works with qubits, and the SWAP-test is generalized for qudits. This generalization allows simplifying the circuit's structure while the correct classification is preserved. Both approaches need relatively small number of qudits to solve the tasks, so they are very prospective for the physical quantum realization (especially for qubits) in the nearest future.

Keywords: Quantum Classification, Variational Quantum Circuit, SWAP-Test, Qudits

Introduction

The works on a development of quantum computing last constantly for several decades. Regularly, we can find information that new, more efficient and stable, quantum devices were built. Thanks to the exponential capacity of data processing, quantum machines are seen as a potential solution to the problems which classical computers cannot cope. Researchers also prepare quantum versions of known solutions like quantum optimization (see: Hogg et al (2000) and Farhi et al (2014)) or quantum machine learning (what is shown in Aïmeur et al (2006), Biamonte et al (2017), Casares et al (2020), Schuld et al (2014)), hoping to find more efficient approaches to many tasks.

In this work, we would like to consider using some tools of quantum machine learning to solve a classification problem. For problems of binary classification such approaches like artificial neural networks or decision trees may be used, but we have found two very simple quantum circuits which will be able classify data rapidly. The novelty of our solution is based on data preparation as quantum states and decreased number of needed quantum gates kinds – previous approaches are presented in journal articles: Mitarai et al (2018) and Pérez-Salinas et al (2020).

Decision Task

In this work, we solve a decision task concerning a risk assessment of credit sales. Usually, wholesalers resale commodities but their customers do not pay just after the process of ordering. The customers obtain goods and an invoice with a payment date. It happens that the payment time is passing, invoices are unpaid, and customers place a new order. Some employees of the debt collection, or sales, department have to make a decision if the commodities may be released or the sale should be stopped (maybe the customer went bankrupt and is insolvent, or the client simply is a fraud). Let us present an exemplary vector of input data in this situation:

$$X = (x_1, x_2, x_3, x_4, x_5, x_6, x_7), \tag{1}$$

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x_1 - the sum of all customer's dues [real number], x_2 - the sum of customer's dues which should be already paid [real number], x_3 - number of days past due for the oldest claim [integer], x_4 - the payment amount declared by the client as paid, but still not posted on the account [real number], x_5 - past customer reliability [Boolean value], x_6 - cooperation with reliable recipients [Boolean value], x_7 - a promissory note from the customer [Boolean value].

In the presented example, the decision to continue or to stop issuing goods is made after analyzing seven factors. Let us say that the customers which are candidates to stop the sale are characterized by more than 20% value of amount due which should be already paid to whole client's dues, and more than 6 days delay in paying of the oldest due. However, there are some attenuating circumstances. Customer may have paid his debt, but the amount of money is not yet posted on the account – if the client declares transfer decreasing value of his overdue payments to at least 20% of his total account, the trade lock shouldn't be placed. There are also other factors which may have a positive influence on making decision: the client buys goods from wholesalers for a long time and has always been reliable, client's recipients are known as a reliable companies and probably pay their dues to our customer, customers sign promissory notes (or utilize other debt instruments) to assure the ease of the debt recovery.

As it may be observed, the decision about continuing trading cooperation is met on a basis of vector X entries which are numbers of different types (Boolean values are mapped into zero and one). Generally, the vector X may have n numerical entries:

$$X = (x_1, x_2, x_3, \dots, x_n), \tag{2}$$

and the decision may be written as a vector Y:

$$Y = (y_1), \tag{3}$$

where y_1 takes value 0 if the customer is blocked and 1 if the sale is continued (so-called two-valued decision).

Quantum Preliminaries

This paper refers to supporting decision making with circuits of quantum gates, so in this section some definitions of basic concepts, used in the field of quantum computing, are presented. We focus only on qudits, which are less widely used than qubits. A broad introduction to quantum computation can be found in the textbook by Nielsen and Chuang (2000).

Apart from the notion of qubit, it is possible to introduce more generalized unit of the quantum information called qudit. Qudits are characterized by the freedom level $d \geq 2$. The most popular qudit is a qubit because its freedom level $d = 2$, so it refers to the classical bit. A state of the d-level qudit may be presented as a d-element normalized column vector (in this work, we refer only to so-called pure quantum states):

$$|\psi\rangle = \begin{pmatrix} \alpha_1 \\ \alpha_2 \\ \dots \\ \alpha_d \end{pmatrix}. \tag{4}$$

The marking $|\cdot\rangle$ denotes a column vector, called ket in the Dirac notation, and normalization means that $\sum_{i=1}^{d} |\alpha_i|^2 = 1$ where α_i are complex numbers.

Several qudits can be connected by tensor product into a quantum register:

$$|\Psi\rangle = |\psi\rangle \otimes |\phi\rangle = |\psi\phi\rangle \tag{5}$$

where two-qudit state $|\Psi\rangle$ is a column vector, too. Let us assume that $|\psi\rangle$ is an a-level qudit state and $|\phi\rangle$ is a b-level qudit state (a and b may be different or the same integer numbers) – in this case the vector expressing $|\Psi\rangle$ has $(a \cdot b)$

elements. As we may see in the above equation, the sign $\otimes$ may be omitted when the Dirac notation is used. We would like to note that there are states called entangled (see: Erhard et al (2020)) which cannot be expressed with a tensor product.

Another way to present quantum states is the superposition equation. It strongly refers to the concept of a computational basis.

Before the definition of a computational basis, we have to mention about conjugate vectors which in the Dirac notation are symbolized as $\langle \cdot |$, and called bras. The adjoint $\langle \phi |$ is calculated as a conjugate transpose of $|\phi\rangle$ (bras are always row vectors). We can perform an operation of the outer product on kets and bras: $| \cdot \rangle \langle \cdot |$ which always results with a matrix. The inner product $\langle \cdot | \cdot \rangle$ returns a scalar value. If the vectors $|\psi\rangle$ and $|\phi\rangle$ are orthogonal, their inner product equals zero (the orthogonality in two- and three-dimensional spaces results with perpendicularity).

A computational basis for x-qudit system, assuming that all qudit have the same freedom level d, is a set of d^x d^x-element orthonormal vectors. The orthonormality means vectors are normalized and orthogonal one another. The most popular basis is the standard basis. It consists of vectors which have $(d^x - 1)$ elements equal 0 and only one element which is 1. Of course, in each vector the 1 occupies different position in a vector, e.g. for the 1-qubit system $(d = 2, x = 1)$ the standard basis is

$$|0\rangle = \begin{pmatrix} 1 \\ 0 \end{pmatrix}, \ |1\rangle = \begin{pmatrix} 0 \\ 1 \end{pmatrix}. \tag{6}$$

Now, we can come back to the superposition. The superposition equation defines a quantum state with the use of basis states (vectors from a particular basis). For example, one-qudit state (freedom level d) may be expressed with the vectors from the standard basis as:

$$|\psi\rangle = \alpha_1|0\rangle + \alpha_2|1\rangle + \cdots + \alpha_d|d-1\rangle \tag{7}$$

under the normalization condition $\sum_{i=1}^{d} |\alpha_i|^2 = 1$, and amplitudes α_i are, of course, complex numbers.

After vector states defining, we can introduce the way of carrying out calculations in quantum computing. The most popular method is constructing circuits of quantum gates which transform input states. A quantum gates are operators which affect quantum states. These operators may be presented in a matrix form. If we want to transform x-qudit state $|\phi\rangle$, of the freedom level d, we need an operator which can be described by a unitary matrix U sized $(d^x \times d^x)$. This operation is mathematically expressed as multiplying the matrix U by the vector $|\phi\rangle$:

$$U|\phi\rangle = |\gamma\rangle. \tag{8}$$

The state $|\gamma\rangle$ is the output state (transformed input state $|\phi\rangle$).

The first solution that we utilize – the variational quantum circuit – is designed for qubits, and needs parameterized rotation gates, and controlled phase-changing gates. Let us express the gate of rotation about y-axis by an angle θ as:

$$R_y = \begin{pmatrix} \cos\frac{\theta}{2} & -\sin\frac{\theta}{2} \\ \sin\frac{\theta}{2} & \cos\frac{\theta}{2} \end{pmatrix}. \tag{9}$$

The controlled phase-changing gate is denoted by the symbol CZ and matrix:

$$CZ = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}. \tag{10}$$

One can observe that if the transformed state is one of the vectors from the two-qubit standard basis, then the sign (i.e. phase) of the second qubit is changed only for the initial state $|11\rangle$.

Once we transform the quantum state, we would like to read the result, so we have to perform an operation called a quantum measurement. There are different approaches to this problem what may be found in Nielsen et al (2000). We only recall that we use the von Neumann's measurement in this work.

Data Preparation

We solve the classification task with two quantum circuits. The first one is so-called variational circuit and was presented in the article by Wecker et al (2015). The second is the SWAP-test described in the book by Aimeur et al (2006). Both approaches need input data preparation, because data has to be transformed into quantum states. Before the quantum normalization, in both cases, the data is classically normalized what is widely applied in machine learning methods. This step helps standardize data. We know that in our data set different numerical types appear (real numbers, integers, Boolean values) what is unwelcome during the learning process because some variables x_i ($i = 1, \dots, n$) may have the stronger influence on the result (y_1) just because they obtain wider range of values. Let us mark the number of observations in the data set as m and the number of single observation as j ($j = 1, \dots, m$). Therefore, for each j-th value of variable x_i, we calculate normalized values $\bar{x}_{i,j}$:

$$\bar{x}_{i,j} = \frac{x_{i,j} - \min\{x_i\}}{\max\{x_i\} - \min\{x_i\}}. \tag{11}$$

The markings $\max\{x_i\}, \min\{x_i\}$ denote the highest and the lowest value of variable x_i, respectively.

After the above procedure of normalization for each variable, we have to apply the quantum normalization in order to obtain correct quantum states of our experiments. The quantum normalization is performed within each observation (the number of quantum states is equal to the number of observations). Now, for j-th observation, n amplitudes $\alpha_{i,j}$ have to be calculated:

$$\alpha_{i,j} = \sqrt{\frac{\bar{x}_{i,j}}{\sum_{k=1}^{n} \bar{x}_{i,j}}}. \tag{12}$$

In case of the variational circuit, we have x input qubits what means that the initial quantum state has 2^x amplitudes. We construct the consecutive states for experiments by filling normalized quantum states with $(2^x - n)$ zeros for states which may be omitted.

The states transformed by a circuit in the SWAP-test are qudit states. Generally, the freedom level d of the used qudits is equal to the number of variables in a decision task, so we introduce the normalized observation directly to one of the circuit's inputs.

Classifying Quantum Circuits

Variational Quantum Circuit (VQC)

The VQCs, constructed as it is shown in Fig. 1, are utilized in machine learning (see: Mitarai et al (2018)) and quantum neural networks (like in Macaluso et al (2020)). Because of small number of needed qubits, few types of used gates, and not many layers of gates (the depth of the circuit), one can expect that the experimental implementations of quantum machines, e.g. IBM, Rigetti, could solve classification tasks with the use of VQCs in the short-term future.

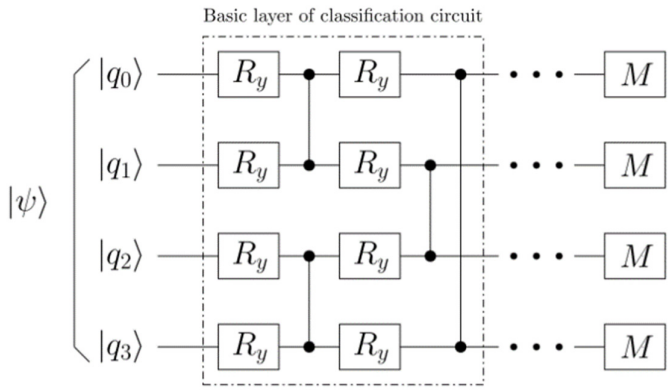

Fig. 1: The general scheme of a VQC used in the first experiment. The input vector is a state $|\psi\rangle$ describing states of four qubits q_0, q_1, q_2, q_3. The symbol R_y refers to one-parameter rotation gates (the learning process is a proper selection of these parameters' values). The CZ gates are presented as two dots connected with a line. The accuracy of classification rises if the number of basic layers increases - e.g. repeating four, five times the operation expressed as the basic layer intensifies the accuracy. The readout of the final quantum state needs the measurement M, and further processing of the obtained result

To construct the VQC, we need rotation gates R_y and phase changing gates CZ which are responsible for the entanglement of particular qubits. Each i-th rotation gate R_y owns parameter $\theta_i \in [0,2\pi]$ which describes the angle of the performed rotation.

The proper selection of θ_i values determines the success of the whole classification process. At this point, we have to apply the supervised learning methods.

The mentioned learning process is consistent with the description given in the article by Schuld et al (2020). However, we have to specify the steps performed in the classical part which is depict in Fig. 2. After quantum circuit execution, we obtain a quantum state which is defined by a function r. The value of function r, when we perform measurement operation on qubit s, may be specified as:

$$r(\psi,\theta) = \sum_{l=2^{n-1}+1}^{2^n} \left|(U(\theta)\psi)_{l|s}\right|^2, \text{where } |\psi_s\rangle = |1\rangle. \tag{13}$$

The expression $(U(\theta)\psi)_{l|s}$ points out the l-th element of the state vector which describes the quantum state after the operation $U(\theta)$ and the measurement on the qubit s. Naturally, the experiment's result is the statistics r, so the circuit operation and the measurement have to repeated to calculate the probability of obtaining state $|1\rangle$ on the s-th qubit ($|\psi_s\rangle = |1\rangle$). During the learning process, the expectation value is useful what is broadly described in the article by Schuld et al (2020).

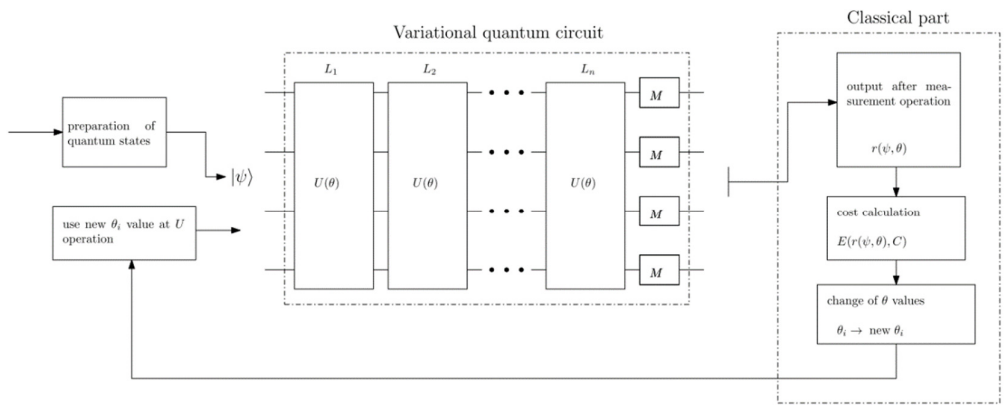

Fig. 2: The scheme of the learning procedure in the VQC. The first stage is the conversion of classical data to the quantum states (marked as $|\psi\rangle$ in the picture). The circuit is prepared with the initial values of parameters θ. The consecutive vectors $|\psi_j\rangle$ are processed by the circuit, and after each vector, we analyze the results (classical part). The calculation of the cost function E allows to determine a new set of parameters θ. The circuit's parameters are updated, and the next state $|\psi_j\rangle$ is transformed. The whole process is repeated until a proper accuracy will be achieved

The value of r is necessary to calculate a cost function value E. If the number of observations is L, the function E is a sum of the squares of the absolute deviation, calculated for the result of circuit execution, given by the function r:

$$E(r(\psi,\theta),C) = \frac{1}{2}\sum_{l=1}^{L}|r(\psi_l,\theta_l) - C_l|^2, \qquad (14)$$

where C contains the class labels for the samples represented as $|\psi_l\rangle$. The above cost function is the standard least-square criterion in an optimization process. The update of parameters θ may be successfully realized with the gradient methods. In this work, we utilize the Powell method described in the article by Powell (1964). The selection process of θ parameters may be realized on a classical machine because of relatively low number of qubits but it could be also performed on a quantum device.

SWAS-Test

The SWAP-test is one of the most basic quantum circuits which may be used in the field of machine learning and data classification. The SWAP-test was originally designed for qubits. The realization of this solution as circuit use only two Hadamard H and one Fredkin $CSWAP$ gate (information about mentioned gates may be found in the textbook by Nielsen and Chuang (2000)). The idea of the SWAP-test is the quantum realization of the Fidelity measure calculation which, in the case discussed in this paper, is based on scalar product of two vectors, and determines these vectors' similarity. It should be pointed out that the quantum circuit does not return the exact value of the Fidelity measure but the value between $\frac{1}{2}$ and 1 for qubits (if the value is one, then vectors are the same; the lower value we obtain, the more vectors differ).

The simplest realization of the SWAP-test assumes that the Fidelity measure may be calculated by the quantum circuit shown in Fig. 3. The basic case concerns the circuits for qubits but this solution may be generalized to qudits. In this work, we utilize seven-dimensional qudits, and the circuit's construction remains the same. The value of the Fidelity measure is approximated by the probability of measuring the state $|0\rangle$ on the first qudit, what may be expressed as:

$$P(q_0 = |0\rangle) = \frac{37}{49} + \left(\frac{12}{49}|\langle d_i|v_c\rangle|^2\right). \qquad (15)$$

The above equation also shows the range of values which may be obtained, and it is $\left[\frac{37}{49}, 1.0\right]$.

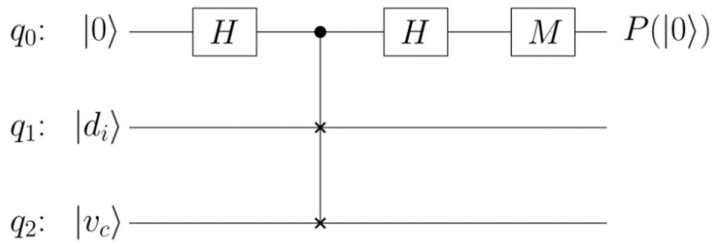

Fig. 3: The three-qudit quantum circuit realizing the SWAP-test. The state $|d_i\rangle$ is the i-th tested sample, the state $|v_c\rangle$ represents the classifying vector supporting the classification of the input sample. The vector $|v_c\rangle$ stays unchanged for all samples $|d_i\rangle$. The result is the probability of measuring state $|0\rangle$ on the first qudit, i.e. $P(|0\rangle)$

The idea of utilizing the SWAP-Test (ST) is to determine the classifying vector v_c which is represented by the quantum state $|v_c\rangle$. Next, for each sample d_i, we execute the ST for input states $|d_i\rangle$ and $|v_c\rangle$. The obtained probability distribution for particular samples and their classes should belong to the given intervals:

$$ST\left(d_{i_0}, v_c\right) \in \langle a_0, b_0\rangle, \quad ST\left(d_{i_1}, v_c\right) \in \langle a_1, b_1\rangle, \tag{16}$$

where d_{i_0} and d_{i_1} stand for the i-th sample from class zero or one, respectively.

For the sake of classification simplicity, we can assume that intervals $\langle a_0, b_0\rangle$, $\langle a_1, b_1\rangle$ are separate (there are no elements which belong to both intervals). However, if the distribution probabilities are contained in groups or continues intervals, e.g. the interval $\langle a_1, b_1\rangle$ belongs to $\langle a_0, b_0\rangle$, it is still possible to correctly classify the samples, what is shown in Fig. 4.

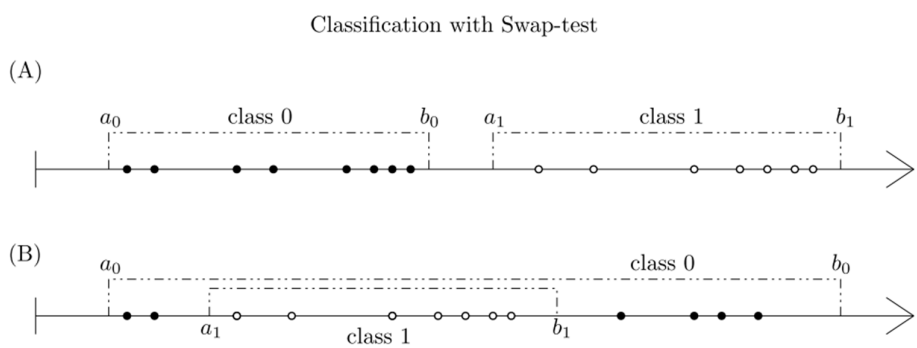

Fig. 4: Exemplary probability distributions for the ST. The case (A) depicts the classification result for separate intervals – the black dots represent samples from a class zero, and the white ones from a class one. The case (B) shows situation when the probabilities corresponding to class one, lie inside the interval for a class zero.

Numerical Experiments

The experiments were conducted on a data set containing 80 input-output pairs. Let us choose an exemplary vector X:

$$[840000,100000,6,10000,1,1,0], \tag{17}$$

to show the result of the classical normalization:

$$[0.13553114,0.05319149,0,0.02,1,1,0] \tag{18}$$

and the final vector's form as amplitudes of a quantum state:

$$[0.24771309, 0.15518527, 0, 0.0951578, 0.67286728, 0.67286728, 0]. \tag{19}$$

The VQCs used in this work has three and four input qubits, so in the superposition equation for the initial state, we have 8 and 16 amplitudes – first seven amplitudes obtain values from the twice normalized vector, and other amplitudes are filled with 0 values. In the case of the SWAP-test, the qudits with $d = 7$ are used.

The implementation of the VQC was realized with the use of lastly presented Qibo package presented in the paper by Efthymiou et al (2020). This solution allows conducting numerical experiments in Python's environment. The data set was divided to the training, and the validation set. The quality of classification is expressed in percentage terms. The experiments are conducted in different settings which include changing: the number of basic layers, and the number of qubits in the circuit (three or four). The classification results are shown in Table 1.

The problem, we have been analyzing, has seven variables, so it seems that the three-qubit circuit should solve it. However, adding an extra qubit allowed us to gain a better accuracy for the circuit with smaller number of layers. If we look at Table 1, we can see that the circuit with one basic layer classifies samples more efficiently if it has four qubits. Increasing the number of basic layers to four, causes very high quality of the classification.

Table 1: The obtained accuracy of the classification realized with the VQCs of different layers number. The number of used layers is given in the first column. Accuracy, separately show for the training and validation sets, indicates the percent of properly classified samples

Layers	Accuracy for 3 qubits		Accuracy for 4 qubits	
	Training set	Validation set	Training set	Validation set
1	76.25%	72.25%	87.50%	89.25%
2	91.25%	92.00%	91.25%	92.00%
3	95.00%	96.25%	97.50%	98.00%
4	96.25%	96.50%	98.50%	99.00%

In the case of the SWAP-test, very high accuracy was obtained what is shown in Table 2. The SWAP-test is dependent on the test vector values. The four different vectors were used in the experiment, and we can propose a vector which gives 100% effective classification.

The form of the test vectors, before normalization, is:

$$\begin{gathered} v_0 = [0,4,0,0,0,0,8]^T, \\ v_1 = [1,5,1,1,5,1,9]^T \text{ and } vn_1^1 := -vn_1^1, \\ v_2 = [4,5,1,9,2,1,2]^T \text{ and } vn_2^1 := -vn_2^1, \\ v_3 = [1,0,0,5,7,1,6]^T \text{ and } vn_3^{1,4,6} := -vn_3^{1,4,6}. \end{gathered} \tag{20}$$

The v_0, v_1, v_2, v_3 are column vectors, and T means the transposition. The extra expressions, like $vn_2^1 := -vn_2^1$, denote adding minus to the vector's elements pointed by superscripts what is executed after the normalization process. The vector v_c is used as one of the initial states in the SWAP-test, so has to be normalized according to Eq. (12), just like observations are transformed to quantum states.

Table 2: The classification results for the SWAP-test in context of vectors determining adhesion of a sample to one particular class. The meaning of data in consequent columns is: Vector points out the vector v_c utilized during the classification; P.of.C1, and P.of.C2 are the probability intervals for the first, and the second class; C.C1, C.C2 show the numbers of correctly classified samples to both classes; Total contains the number of all samples

Vector	P.of.C1	P.of.C2	C.C1	C.C2	C.C1	C.C2	Total
			Training set		Validation set		
v_0	0.755-0.758, 0.81-0.84	0.758-0.81	28	52	25	55	80
v_1	0.755-0.757, 0.80-0.87	0.757-0.80	36	44	35	45	80
v_2	0.755-0.761, 0.789-0.856	0.761-0.789	39	41	39	41	80
v_3	0.755-0.761, 0.790-0.818	0.761-0.790	40	40	40	40	80

Table 2 shows that the proper selection of the test vector, e.g. v_3, leads to 100% correct data classification. Naturally, the vector's distance from samples of both classes should be the same, what allows separating elements of classes like it is depicted in Fig. 4.

Conclusions

In this paper, we have presented the results of conducted numerical experiments in which known from the literature approaches to solving the two-value classification task were used. For both the VQC and the SWAP-test, we have obtained a very high quality of classification, what is significant especially in the context of utilized circuits' simplicity.

In the case of VQC, we profit from the existing solutions, but the presented approach for the SWAP-test contains our contribution in the form of circuit generalization for qudits (originally, the SWAP-test was presented only for qubits). The data utilized in the experiment was gathered by employees of debt collection department in the actual pharmaceutical wholesaler.

The presented results, and the recent achievements described in the articles Moll et al (2018), Pérez-Salinas (2020), lead to the conclusion that in the nearest future, real quantum devices shown in IBM (2020) and Rigetti (2020) will be able to work as the classifying systems.

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Study on the Effectiveness of Subsidies in Reducing Unemployment

Madalina Ecaterina POPESCU, PhD.

The National Scientific Research Institute for Labor and Social Protection, Bucharest, Romania;
The Bucharest University of Economic Studies, Bucharest, Romania,
madalina.andreica@gmail.com

Maria Isadora LAZAR, Ph.D.

The Bucharest University of Economic Studies, Bucharest, Romania
lazar.isadora@yahoo.com

Andreea MURARU, PhD.

The Bucharest University of Economic Studies, Bucharest, Romania,
andreea.muraru@ie.ase.ro

Abstract

The purpose of this empirical study is to assess the impact of three active labour market measures addressed to companies who employ graduates of education institutions or unemployed persons over 45 years old or with only 3 years left before retirement. We focus on the impact of these measures upon employment a year and a half after the completion of the measures and of their conditionality. In order to quantify the impact of these active labour market measures we rely on counterfactual scenarios, survey data and matching techniques. Empirical evidence for the case of the Romanian labour market is provided. Our findings highlight positive effects of such active labour market measures upon employment on the short-run, as our estimations support the hypothesis that the employment rate among the beneficiaries of these active measures are higher compared to similar individuals who did not benefit from these measures.

Keywords: Active Labour Market Measure, Impact Assessment, Employment, Counterfactual Scenario.

Introduction

At macroeconomic level, the adoption of public policy decisions must often be supported by impact studies and scenario analysis to ensure a documented and sustained decision-making process that is backed up by scientific arguments. In this respect, impact assessments, usually based on a mix of qualitative and quantitative methods, become a real necessity.

Assessing the impact of a public policy involves a process that consists of a sequence of logical steps, meant to establish the evidence in favor of or against the adoption of a policy. In case of a policy that is to be adopted, the assessment is referring to its potential impact (ex-ante evaluation), while in case of a policy that has already been adopted and implemented, the assessment focuses on the effects attributable to that policy (ex-post evaluation).

Quantifying the impact of a specific public policy can be achieved by means of quantitative analysis that allow for the impact of the change attributed solely to the interventions to be estimated. This impact is defined as a net effect of the intervention and differs from the gross observable effect, since the intervention might not be the only factor generating the outcome. As the net effect cannot be observed, the challenge for the assessors is of estimating the counterfactual effect, this being the effect that would have been noticed in the absence of the intervention. The counterfactual scenario underlying the evaluation aims to estimate what would have happened in the absence of the intervention. As the answer to this question is unknown, it is necessary to apply special statistical techniques.

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The challenge of a credible impact assessment is how well the counterfactual analysis is designed. The basic idea of the method is to construct two groups of similar units in observable characteristics, with the only difference that those in the treatment group had access to the intervention, while the control group units did not receive that treatment. Thus, the difference between the measured results of the two groups of units will indicate the net impact of the intervention.

In this paper we study the impact of three active labour market policies (ALMP), consisting in subsidies granted to companies who employ graduates of education institutions or unemployed persons over 45 years old or with only 3 years left before retirement. We focus on the impact of these measures upon employment on the Romanian labour market a year and a half after the completion of the measures and of their conditionality. Empirical evidence for the case of the Romanian labour market is provided.

According to Law no. 76/2002, art. 85, employers who employ unemployed people over the age of 45 years for a minimum period of 18 months were entitled to benefit for one year of a monthly amount equal to the value of the social reference indicator for each person employed. When employing graduates of educational institutions, the companies were exempt from paying the contributions to the unemployment insurance budget for those graduates, while also receiving for a period of one year a monthly amount equal to:

(a) the value of the social reference indicator at the time of employment, for lower secondary school graduates or schools of arts and crafts;
(b) 1.2 times the value of the social reference indicator, at the time of employment, for graduates of higher secondary education or post-secondary education;
c) 1.5 times the value of the social reference indicator at the time of employment for graduates of higher education.

A revised version of this law that came into force on October 23rd 2013 no longer allows for the exemption from paying the contributions to the unemployment insurance fund. Instead, it keeps a simplified version of the provision referring to the monthly amount received by the employers for a period of 12 months (18 months for people with disabilities) that was then fixed at 900 Ron/month for all graduates, regardless of their education level.

In order to measure the impact of these measures upon employment in Romania, we conducted a counterfactual analysis using the propensity score matching method (PSM). For this purpose, micro-data was required. However, since the availability of such databases is rather scarce and no administrative datasets are open access to academic and research environment in Romania, we made use of survey micro-data. The survey was conducted by the National Institute for Scientific Research in the Field of Labour and Social Protection (INCSMPS) in October 2014 among both beneficiaries and non-beneficiaries of these measures. Even though the dataset might not accurately reflect the current economic context affected, for instance, by the COVID-19 pandemic, we accept such biases and pursue our aim of bringing empirically based evidences on the effects of subsidies addressed to employers of graduates or of unemployed persons over 45 years old. Since the current literature review on this topic is rather scarce, as we are unaware of any existing empirical study discussing the effectiveness of these particular types of measures, we believe that we can fill in the gap by investigating it and highlighting some particularities for the case of Romania.

The novelty of the paper is twofold. On the one hand, it is relevant in terms of methodological approach, as it brings insights on how to conduct such counterfactual impact assessment with limited access to administrative data. On the other hand, we share some insights on the effectiveness of such active labour market measures dedicated to employers in order to stimulate employment on the labour market. Even though the study can only provide insights upon the effectiveness of such measures for a single country case and a given period of time, we believe it brings added value to the current labour market program evaluation literature, not only by providing some general conclusions on labor market policy implications, but also because such an assessment could be informative for policy design.

Active labour market measures have been in the center of attention for both researchers, economists and decision makers due to the fact that high unemployment are problems that many European countries are facing and need to be tackled (Popescu and Lazar, 2015). Among those problems, a special focus must be given to young population, as the unemployment rates are higher for this age group and also because they are more vulnerable to demand-side risks, as the recent global financial crisis demonstrated (Caliendo and Schmidl, 2016). Previous research studies (Drăgoiu and Velciu, 2010; Militaru, 2015; Zamfir and Mocanu, 2016) underlined the fact that effective programs and investment in human resources can contribute to economic recovery. In this respect, active labour market policies have proved

to be an important tool in the fight against unemployment (Lehmann and Kluve, 2010; Pirciog et al., 2015; Popescu and Roman, 2018). Through an efficiency analysis, Roman (2008) proved the fact that active labour market measures are more efficient than passive ones. Moreover, Kleuve (2010) showed that active labour market programs are widely used in European countries. Using a meta-analysis based on a data set of 137 program evaluations from 19 countries, the study concluded that it is almost exclusively the program type that seems to matter for program effectiveness. Blasco and Rosholm (2011) consider that the weak results concerning the effectiveness of some programs come from the fact that their positive outcomes are off-set by the low transition into employment during participation to programs (the "lock-in" effect). In their study on the effects of intensified ALMP using data from an experiment in two Danish counties they concluded that their effects are beyond the short-run, and that policy beneficiaries have greater average post-unemployment employment. Vooren et al. (2018) showed that some ALMP (subsidized labour and public employment programs) have negative impact on the short run, and turn positive after 12 or 24 months after implementation. Still, there are also studies like McKenzie (2017) that show that for developing countries the positive impact expected by both policy makers and beneficiaries of active labour market policies is much higher than their effect and advocate for policies that help firms in creating jobs. Therefore, the conclusions of the studies concerning the efficiency of ALMP in different economies are mixed depending on the type of policy applied, the time effect that is being investigated and also on the economy's characteristics, or as Pignatti and van Bell (2018)[1] say there is very little evidence to show that policies who work well in one labour market context can be easily translated to another context.

Pervious empirical findings for the case of Romania indicate that ALMP have, in general, positive effects on the labour market. For instance, Rodriguez-Planas and Jacob (2010) estimated the effects of four active labour market measures implemented in Romania in the late 1990's, using follow-up survey data and propensity score matching techniques, and showed that training and retraining, self-employment assistance and relocation services were beneficial in improving participants' incomes, while public employment did not. In 2015, Roman and Popescu (2015) estimated the effects of training on the Romanian migrants' income. By taking into consideration data of Romanian migrants worldwide, their research underlined that Romanian migrants had registered increased earnings after attending training at destination. In a more recent study, Popescu and Roman (2018) found that training measures in Romania have a positive, but modest impact upon employability in Romania. More precisely, participation in training programs increases employment chances by 15%, being most successful for women and for people living in urban areas.

Impact assessment of active labour market measures on employment is still of high interest, due to current economic context and significant need of relevant public measures. This study is meant to provide insights on the impact upon employment a year and a half after the end of implementation of three active labour market measures dedicated to stimulate employers to employ unemployed people.

The paper is organized as follows. The next section is dedicated to data description and the methodological approach, while the main findings are presented in section 3. The paper ends with some concluding remarks.

Data Description and Methodology

In order to evaluate the impact upon employment of the three active labour market measures dedicated to stimulate employers to employ unemployed people a year and a half after the completion of the measures, a quasi-experimental approach was applied. In order for the survey to be conducted, the National Agency of Employment (NAE) database was used to randomly select individuals that were registered as unemployed right before the implementation of these measures. The treatment groups were made up of a total sample of over 713 intervention beneficiaries, divided in three sub-samples as presented in Table 1. A single control group was built to serve all three counterfactual scenarios, as it consisted of 251 respondents who did not benefit from any of the three measures. Therefore, the difference between each treatment group and the control group consists in the fact that each treatment group benefitted from one of the three active labour market measures, while the control group did not.

[1] These two authors study the interdependence between between active and passive labour market policies and stress the important effect of their interaction.

Table 1: Sample sizes for each active labour market measure

Active labour market measure	Profile of the beneficiaries	Sample size
Subsidies for employers who employ unemployed persons over 45 years old	urban male over 45, with medium education level	154 treated and 251 non-participants
Subsidies for the employers who employ unemployed persons with only 3 years left before retirement	urban male over 45, with low education level	125 treated and 251 non-participants
Subsidies for employers who employ graduates of education institutions	young urban female, with high education level	183 treated and 247 non-participants

Source: authors' own computation based on survey data

The propensity score matching method (PSM) was applied distinctly for each labour measure using STATA 16 software. We first estimated probit models to predict each individual's chances of receiving interventions through the public subsidies programs. In that respect, we built a binary treatment variable, which took value 1 in case of benefitting from a measure and 0 otherwise. Once the balancing property of the models was checked and the propensity scores of each individual were estimated, a non-parametric method for matching the treated with the untreated units was used based on the propensity scores.

We matched the treatment and the control groups, using a set of covariates that describe the relevant background information for each individual. In this set we included both socio-demographic characteristics and economic variables. We chose the variables that were mentioned as relevant in previous empirical studies on this topic and also in accordance with the applicable economic theory. We considered the following covariates, taking into consideration the individual characteristics and coding them in different sub-categories, as follows:

a. Socio-demographic characteristics

- Age: between 15-24; between 25-44; between 45-64; over 65;
- Gender: Male; Female;
- Residence area: Urban; Rural;
- Region: Bucharest-Ilfov; North-East; North-West; Centre; South; South-East; South-West; West;
- Level of education: Low level of education; Medium level of education; High level of education;
- Civil status: Married; Unmarried.

b. Economic variables

- Sector of activity: Services sector; Industry sector; Construction; Other sectors
- Years of work experience

The general form of the Probit model was:

Treatment = f (age, gender, civil status, region, education level, residence, sector of activity, work experience)

Four matching algorithms were tested, namely: the Nearest Neighbour Matching Method, the Radius Matching Method, the Kernel Matching Method and the Stratification Method. The model allowed us to assess the ex-post impact of the active measures upon employment in Romania, by quantifying the odds of a participant to still be employed one year and a half after the end of the measures' conditionality, as compared to similar individuals in terms of observable characteristics, but who did not benefit from the measure.

Main Findings

The purpose of this paper was to determine the effects (if any) on the Romanian labour market of three types of subsidies dedicated to stimulate employers to employ unemployed people. In order to quantify the impact of these active labour market measures addressed to companies who employ graduates or unemployed persons over 45 years old or with only 3 years left before retirement, a propensity score matching technique was applied.

The results of the PSM technique that were statistically significant are summarized in Table 2, where the net impact was computed as the average treatment effect on the treated (ATT). This estimator indicates the impact of the measures after computing the differences between the average outcomes of the two groups matched.

The degree of satisfaction of the treated group upon the effectiveness of these public active measures was also quantified through a self-evaluation process. For that, the beneficiaries were asked to subjectively evaluate the impact of those active measures, considering their ability/ inability to find a job in case of not benefitting from the measure.

Table 2: Impact of active labour market measures

Active labour market measure	Self-assessment of the impact	Net impact one year and a half after the measure's conditionality ended
Subsidies for employers who employ unemployed persons over 45 years old	43%	12%
Subsidies for the employers who employ unemployed persons with only 3 years left before retirement	66%	-18%
Subsidies for employers who employ graduates of education institutions	25%	16%

Source: authors' own computation based on survey data

In terms of self-assessment of the ALMP impact, one can notice that all three public active measures were appreciated for their positive effects upon the chances of the unemployed persons to find a job. Among the three public active measures under discussion, the subsidies for the employers who employ unemployed persons with only 3 years left before retirement was the most appreciated one. Approximately 66% of the beneficiaries shared the opinion that they would not have found a job without attending this measure. However, in terms of net impact at one and a half year after the end of the measure's conditionality, the counterfactual impact assessment indicated a negative effect of the measure. More precisely, our findings suggest that the employment rate among the beneficiaries of this active measure was actually 18% lower compared to similar individuals who did not benefit from the measure. However, this negative impact must be interpreted with caution, because at the time the survey was conducted, 74% of the beneficiaries of the measure retired early, changing their status from employed to inactive.

When being asked to subjectively evaluate the impact of the measure providing subsidies for employers who employ unemployed persons over 45 years old, 43% of the beneficiaries shared the opinion that they would not have found a job without attending this program. In terms of net impact, the counterfactual analysis pointed out that the employment rate among the beneficiaries of this active measure was 12% higher compared to similar individuals who did not benefit from the measure. These findings indicate that the subsidies offered for employers who employ unemployed persons over 45 years old were rather effective in reaching the purpose to reduce the unemployment level in Romania. Keeping in mind the fact that actually, the unemployed persons over 45 years old were the most numerous among the sub-groups of beneficiaries of active labour market measures in Romania in that period, these results are rather relevant in terms of policy implications.

Regarding the graduates whose employers were subsidized, about three quarters were employed at the time the survey was conducted, that is 1 year and a half after the end of the employer's obligation to keep them employed. About 25% of the beneficiaries of the measure consider that they would not have found a job if they had not benefited from the intervention. Compared to the self-assessed impact of the measure, the counterfactual analysis indicated a slightly lower level of the net impact, which is not surprisingly after all, when considering that, in general, self-evaluation might generate biased results. However, the statistical evaluation of the net impact suggests that the employment rate among the graduates who benefitted from this measure was 16% higher compared to similar graduates who did not benefit from the measure. This positive result is not surprising as wage subsidies are known to be very good performers among the ALMP for youth, increasing their employment level in all circumstances, except bad economic conditions, as shown by Caliendo and Schmidl (2016) in a study reviewing multiple evaluation studies in European countries.

Among the three public subsidies dedicated to stimulate employers to employ unemployed people, our findings suggest that the active measure dedicated to graduates of education institutions was slightly more effective in terms of net impact upon employment in Romania. These findings could play an important role in public budgeting and in the labour market policy making process, as it brings insights regarding the effects upon employment that can be attributed to each active measure in particular.

Active policies are only some mechanisms among many others, such as unemployment insurance policies (passive policies), wage policies, policies concerning the safety of employment, policies on wage-setting mechanisms and policies concerning social dialogue. The lack of a correlation of all the objectives of these policies may cancel or mitigate the partial positive effects obtained. Given the multitude of possible factors that may influence the results of implementation of some active measures, it is absolutely mandatory for any impact assessment to try to contextualize the best possible results.

Therefore, we decided to extend the impact analysis, by breaking it down on socio-demographic characteristics (gender, residence area, level of education and age groups) in order to emphasize the effectiveness of each measure at the level of some specific sub-groups.

Several logit models were then estimated on each of the following sub-groups of individuals: male versus female, urban versus rural, low, medium and high level of education, distinct age groups (under 25; 25-45, over 45 years old). The output variable was the occupational status of the respondents, while the explanatory variables were the covariates: sex, age groups, marital status, levels of education, residence area and the "*treatment*" binary variable.

Valid econometric models were estimated in relation to LR test and pseudo R^2 and also with statistically significant coefficients. A particular attention was paid to the significance of the "*treatment*" variable, which indicates the chances of a beneficiary of a certain measure to find a remunerated job at the time of the survey, compared to those of a non-beneficiary of the measure, with the same characteristics. The following conclusions were drawn from such sensitivity analysis, as presented in Table 3.

Table 3: Degree of effectiveness of active labour market measures

Active labour market measure	Degree of effectiveness of the measure
Subsidies for employers who employ unemployed persons over 45 years old	Has stronger effect on rural female over 45 years old, with medium education level
Subsidies for the employers who employ unemployed persons with only 3 years left before retirement	Has stronger effect, in general, on male over 45 years old.
Subsidies for employers who employ graduates of education institutions	Has stronger effect on rural male with high education level

Source: authors' own computation based on survey data

Conclusions

The purpose of this paper consisted in estimating the impact of three active labour market measures in Romania, addressing companies who employ graduates of education institutions or unemployed persons over 45 years old or with only 3 years left before retirement. We focused on the impact of these measures upon employment a year and a half after the completion of the measures and of their conditionality. In order to quantify the impact of these active labour market measures we applied a counterfactual impact assessment using survey data and matching techniques.

Even though all three public active measures were subjectively appreciated for their positive effects upon the chances to find a job, we bring empirical evidence to support the fact that the employment rate among the beneficiaries of at least two measures - those dedicated to graduates and to unemployed persons over 45 years old- were higher compared to similar non-treated individuals.

The findings of this research underline the utility of the active labour market measures concerning subsidies given to employers who employ graduates or unemployed persons over 45 years old and confirm the fact that this kind of programs have an effect in encouraging employers to hire more graduates and unemployed persons over 45 years old.

Among the three public subsidies, we found that the active measure dedicated to graduates of education institutions was slightly more effective in terms of net impact upon employment. In terms of gender differences, we notice that the active measures dedicated to graduates and to people who have 3 years up to retirement proved to be more effective among men, while the effects of the measure offering subsidies to companies who employ unemployed persons over 45 years old was felt more strongly among women.

These findings could play an important role in public budgeting and in the labour market policy making process, as it brings insights regarding the effects upon employment that can be attributed to each active measure in particular. As policy recommendations aimed at increasing the efficiency and effectiveness of active labour market measures, at strategic level, we emphesize the need for conducting periodic assessment of the impact of active measures, as well as periodic studies and forecasts on short and medium term of the labour demand.

Moreover, at active labour market measure level, we believe that better profiling of the persons looking for a job before being recommended for a certain measure could improve the outcomes of the program. Such impact evaluation studies, with findings similar to those that were briefly presented through this paper, could actually support the design of effective and evidence-based public policies.

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The Notation Standards in Business Communication and Accounting – Perspective of Reporting in Polish Companies

Marta MAZUROWSKA

Poznań University of Economics and Business, Poznań, Poland
marta.mazurowska@ue.poznan.pl

Marta SZCZEPAŃSKA

Poznań University of Economics and Business, Poznań, Poland
marta.szczepanska@ue.poznan.pl

Abstract

The IBCS® notation standards are relatively new but more and more popular tool used worldwide in business reporting practice. The efficacy of the IBCS® standards have not been yet scientifically analysed and quantified on a group of managers. The purpose of the planned research is to fill this gap by indicating real behavioral impact on decision-makers who are using conventional reports and those prepared with the IBCS®. The paper starts with a brief introduction to idea of notation standards. Then, the notation standards in business communication in the context of the IBCS® are discussed. The next part of the paper presents the idea of planned research in the light of decision-making theory. The last part is devoted to a brief summary.

Keywords: Notation Standards, IBCS®, Business Communication, Accounting.

Introduction

The musicians need a consistent notation system to quickly interpret music. In everyday life, standards simplify decision-making, allow to work more efficiently, and often even improve the quality of life. Well-known examples of standardization include: writing (standardized in the form of the Latin alphabet, as well as e.g. the Cyrillic, Chinese and Arabic alphabets), music (musical notation), traffic (traffic signs) as well as electricity (electric circuit plans) (Zebra BI d.o.o., 2020). Notation standards are helpful and commonly used in various disciplines, not only in music, cartography and engineering, but also in mathematics, computing, physics, chemistry, biology, sport, etc. (Hichert & Faisst, 2014).

In the area of accounting which is known as language of business, standards are commonly used. A form of communication here are first of all various types of financial reports. Financial statements which are final product of financial accounting are intended for external users, that's why the need for their standardization is widely recognized. The result of standardization process are i.e. International Financial Reporting Standards and US Generally Accepted Accounting Principles. The aim of those standards is to build one approach to complex business operations. They generally don't take into consideration the way of visual data presentation. On the other hand the form of controlling reporting is shaped internally in each company. That's why, when we are talking about reporting, both internal and external, it is common to use various layouts of reports, presentations or visualizations, even within one company. This affects both the readability and comparability of presented data.

When people design a business report or presentation, they usually follow their own intuition, logic, or observe how others do it. Although there are several guidance in the field of information visualization in general to amplify cognition (Schelkle, 2017). Until recently, there was any initiative to establish a generally accepted notation for business communication. The International Business Communication Standards (IBCS®) are the first framework that provides practical guidance for the design of business reports and presentations. The released Version 1.0 of the standards was adopted in 2015. The current version 1.1 was published in 2017. Now, the Standards are increasingly

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recognized by industry (Proff & Schulz, 2016: as cited in Schelkle, 2017) and popular in the German-speaking countries. When assessing the idea of the IBCS®, the most important is it's real impact on human behavior.

Notation standards in business communication in the context of the IBCS®

In 2004, Hichert initiated work to standardize the way analysts and controllers present data in their reports, presentations and dashboards (Zebra BI d.o.o., 2020). In the work on the International Business Communication Standards were also involved the IBCS Association and authorities in the visualization field: Brinton, Few, Minto, Playfair, Tufte and Zelazny (Zebra BI d.o.o., 2020). Importantly, the Standards were developed on the basis of scientific, experimental and practical experience.

The IBCS® provide practical guidance for the proper conceptual, perceptual and semantic design of business communication. For the purposes of the Standards, business communication is understood as materialization (e.g. paper, screen views) of quantitative information for analytical and reporting purposes. It means the organization of business communication into products (e.g. reports, presentations, interactive analytic applications, statistics), consisting of pages (e.g. slides, screens) comprised of objects (e.g. text, charts, tables) with specific elements (e.g. columns, axes) and general elements (e.g. titles, comments) (Hichert, Faisst & Members of the IBCS Association, 2017).

The intention of the IBCS® is to use the same expressions and the same visualizations for the same content. The standards of the visual language are comprised of three pillars (based on Hichert's success rules):

- conceptual rules – concern the issue of using an appropriate storyline to clearly relay content;
- perceptual rules – indicate which visualizations should be used in a given case;
- semantic rules – present a uniform notation (IBCS Notation), which covers actual standardization of terminology, analyses, descriptions, dimensions and indicators used in business communication (Hichert et al., 2017).

Therefore, the IBCS® cover seven thematic blocks:

- convey a messages (say);
- organize content (structure);
- choose proper visualization (express);
- avoid clutter (simplify);
- increase information density (condense);
- ensure visual integrity (check);
- apply semantic notation (unify) (Hichert et al., 2017).

The IBCS® implementation is based on three preconditions, which include a clear concept with a set of rules, appropriate software and the right management (Zebra BI d.o.o., 2020). It is worth emphasizing that the software plays a key role in solving problems with business communication. The appropriate software makes the charts compatible with the IBCS®. As of today, 12 software products have been certified by the IBCS Institute.

While the benefits of notation standards in music, engineering and many other disciplines are obvious, it seems to be different in business communication. The research showed that visualization of business information is often not properly applied in business reporting (Schelkle, 2017). The standardization may improve the effectiveness and efficiency of reporting, but it requires adjustment to the individual circumstances of the organization.

Szarska (2018) presented the results of the research conducted by a research group at the University of Applied Science Upper Austria, which showed that the effectiveness through the implementation of standardized reporting increases after five weeks significantly, and the users needed 30% less time to analyse information. Zelga (2018) claimed that by applying global reporting notation standards in accordance with the concept of the IBCS®, a manager needs only one glance to be able to make decisions or draw conclusions for the future. This reduces the time taken to understand management information.

According to Hichert and Faisst (2014), the implementation of notation standards in business communication increases transparency by better comprehension and greater credibility. Taking into account the stages of the process to support decision making, Hichert and Faisst (2014) indicate three types of benefits:

- improved quality of the deliverables;
- reduced reaction time;
- reduced costs.

To confirm these theses, the authors refer to many positive opinions of the managers regarding the implementation of the IBCS® in their organizations (Faisst & Subirats, 2017).

The efficacy of the IBCS® have not been yet scientifically analysed and quantified on a group of managers. The effects of the Standards on reading-time and decision-making quality was measured in an eye-tracking and laboratory study on a group of 90 students with a background in business or IT at the Technische Universität München (Freyer, Linde, Schulz & Proff, 2020). None of the previous research have covered implementation of the IBCS® in Polish companies.

Study of the efficacy of the IBCS®

Each human activity and the activity of individual organizations is based on the continuous making of decisions and decisions (Ściborek, 2003, p. 25). According to the literature on the subject, decision-making is a process that consists in recognizing and choosing a specific course of action, which is to lead to the solution of a specific decision problem (Stoner, Freeman & Gilbert, 2001, p. 238).

Social science has developed two scientific approaches to decision theory that actually interpenetrate one another. They include the approach (Bolesta-Kukułka, 2003, p. 123):

- rationalist-normative (prescriptive), consisting in recommending universal recipes that people should follow in their actions;
- behavioral (descriptive), presenting how people act in reality.

The rationalist-normative approach, which is based mainly on indications resulting in large part from logic, mathematics and statistics, includes logically derived from a prioritized norms of rationality: conditions, rules and recommendations that must be followed so that decisions are made fully consciously and reasonably. If, in fact, there are deviations from these principles in the behavior of decision-makers, they are explained by errors in thinking resulting from the imperfection of human reason (Grzesik & Karaś, 2014, p. 20). In turn, the behavioral approach presents the actual behavior of decision-makers, which do not always coincide with the recommendations of rationalist-normative models. Such deviations are frequent and therefore difficult to interpret as a negative phenomenon. As part of the discussed approach, the authors of the recommendations not only describe the decision-making behavior, but also try to discover the reasons for the identified deviations. In behavioral models, attention is focused primarily on describing and explaining real decision-making processes that actually run differently than the norms contained in rational models (Grzesik & Karaś, 2014, p. 20+).

An exceptionally interesting and important area of research on decision-making is Judgment and Decision-Making research in accounting. It is a rapidly developing area of research in accounting literature (JDM) [see (Bonner 1999; Ashton & Ashton 2007; Luppe & Favero 2012; Schiller 2013)]. JDM researchers strive to measure the effectiveness of people in the context of making judgments and decision-making, as well as to identify determinants of high and low quality of the processes (Bonner, 1999, p. 386).

The purpose of the planned research is to analyze real differences in perception of business accounting reports prepared in conventional way and with usage of IBCS® guidelines.

The subject of the research is the population of managers from companies listed on polish Warsaw Stock Exchange.

Methodology includes an eye-tracking and laboratory study of specially prepared business reports which includes: annual external financial reports and monthly reports which covers area of selling, purchases, costs, cash flow and HR data.

Summary

The popularity of the IBCS® standards increases but there is only one research which aim was to analyze reading-time and decision-making quality of reports. The authors of this short paper want to fill this gap by preparing research in the same methodology as German researchers. The subject of the prepared research are managers from companies listed on polish Warsaw Stock Exchange. Our proposed research has limitations, which at the same time, are indications for expanding the research in this area. The findings may be useful for all the managers and scientists interested in reporting and decision-making area.

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Methodology of Tax Management in The Economic System of The State

Tatyana V. FEOKTISTOVA

Ph.D. in Economics, Financial University under the Government of Russian Federation, 305016, Kursk, Kursk Region, Lomonosova st., 3,
e-mail: feoktistova20@yandex.ru

Yuri N. VOROBEV

Ph.D. in Economics, Financial University under the Government of Russian Federation, 305016, Kursk, Kursk Region, Lomonosova st., 3,
e-mail: yurivorobev@yandex.ru

Abstract

The article contains the author's position on the key issues of understanding the tax management methodology. The author reveals the relationship between taxation and the economic system of the state in its broad sense. The author reveals the influence of deviations from the classical directions of the development of scientific cognition on the practice of tax management.

Keywords: Tax Management, Science, Methodology.

Introduction

Modern publications on taxation issues contain various terms and definitions of tax processes and their results.

However, most authors focus on the description of the rules for calculating a tax base and an amount of tax payments without the extremely necessary analysis of the predetermination of taxes by the condition of production factors (direct and indirect dependence) and the existing system of managing economic and financial processes [1].

On this basis, we will examine the theory of the subject, which promotes understanding of the relationship between taxation and the economic system of the state in its broad sense.

Theoretical and Literature Review

In modern studies, the word combination "theoretical and methodological propositions" is often used, which indicates that their authors ignore the classical propositions of the methodology of science as such [2].

The methodology, which includes a set of methods of speculative learning and their implementation in practice, serves as the basis for the development of the concept of management of any sector of activity of the economic entity in specific business conditions (object of management).

For the practical implementation of the concept, a development strategy for an object of management should be created. The starting point for its development is methodological principles. Therefore, from the standpoint of scientific theory, the development of an economic (financial, tax, etc.) strategy of a company should be based on a complex of methodological principles and a set of tools for implementing these principles in real practice.

Methodological principles are time-proved postulates of the movement of the economic sphere in an ascending spiral. New scientific knowledge is growing, based on the postulates of the classics of economic thought. Different branches of economic science, based on such principles, supplement them with their own (specific) ones. Scientific

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ideas can be specificated and revised, but at the same time we understand that there is continuity in the development of knowledge, deviation from which is fraught with being pushed to the sidelines of global progress [3].

For example, the science of taxation is based on Adam Smith's principles, which are rightly considered methodological, starting, basic. Modern tax management supplements these principles with new ones adapted to a specific space and time, since it is difficult to manage without knowing the specificity of the object of management, its location and other characteristics.

The foregoing words indicate the importance of scientific knowledge accumulated by society, the need for an accurate understanding of the essence of concepts and definitions. Clearly defined boundaries in which consciousness tries to identify the essence of a process, object or any other observed phenomenon, which are comprehended, allow to give them science-based definitions.

Having defined examined object, you can move on – develop a concept for managing it, consider alternatives for implementing the conceptual foundations of managing an object, compare these alternatives with each other from the point of view of adequacy to the conditions of space and time, and choose the most appropriate option. Legislative base and methodologies for the implementation of legitimate regulation will be prepared for this option. Therein lay the cause of the importance of methodological principles for improving methods of managing business practice in any of its segments (financing, taxation, etc.).

The tools for implementing a particular conceptually determined strategy are a set of methods, i. e. clearly defined algorithms for achieving the goal, a description of step-by-step progress toward the intended goal. Such methods take into account all sectoral specificities of the financial and economic activities of companies.

The results of the study and discussions

Choosing a strategy is a rather complicated process if the company's activities are multisectoral. The development of company's strategy for tax liability management takes one of the central places in the company's financial strategy.

Because of the relative novelty of the term "tax management", let us express our own position regarding its content.

Tax management, being one of the component parts (functional target sets) of the financial management system, consists of the same elements: planning taxes and payments; their regulation in case of deviation from the outlined plans; tax bookkeeping; accounting (drawing up declarations); analysis of the status of tax obligations according to the criteria of completeness and timeliness of execution; tax supervision. We should note that, instead of the term "tax management", it is fully justified to use in tax practice such a traditional and familiar to users concept as "tax liability management." Both of these terms presuppose developing a tax strategy basing on the state of the economic environment, its spatial characteristics and motive forces [4].

The extreme mobility of legal regulation of taxation, its contradictoriness and lack of proper connection with the provisions of civil, economic, budgetary law, as well as a number of other significant shortcomings, determine the presence of high tax risks in the relations between taxpayer and tax authorities. Tax risk is, first of all, an actual or estimated by calculation loss in profit (tangible or monetary) caused by a business transaction [5].

Minimizing tax risks requires a wide range of theoretical and practical knowledge, which a tax manager should have. At the same time, it sometimes becomes impossible to minimize tax liabilities due to the lack of a deterministic connection between the instruments of the state tax policy (the choice of the main lines of development of tax policy, changes in taxation elements, etc.) and factors of economic growth [6].

We consider the deterministic analysis of the dependence of various types of taxes and payments on the state of the basic factors of production and all elements of the economic policy of the government in (credit and monetary, financial, tax policy, etc.) to be the basic method of tax management, as well as financial management. It should be noted that deterministic analysis is carried out in the system of corporate tax management, while it is not carried out

in the system of state tax management. The taxation system is developing in a fragmented way by correcting the deficiencies in the provisions of the Tax Code of the Russian Federation which were revealed in court proceedings on the merits of tax litigations. Of course, such a situation cannot smooth out the acuteness of objective contradictions in the tax interests of taxpayers and the budgetary interests of federal and regional bodies of power and administration [7].

As practice shows, the tax managers of large Russian companies have a wide choice of analytical methods, many of which can be attributed to deterministic analysis. We will consider only some of them.

Expert methods presuppose using methods of logical analysis, they are characterized by a certain subjectivity. They include methods of expert assessments, scenarios, comparison, various psychological, morphological methods, methods of constructing indicator systems, analytical tables, etc. Methods based on strict formalized analytical dependencies are more accurate. The most well-known in this group are the following:

1) methods of factor analysis;

2) methods of economic statistics;

3) mathematical-statistical methods;

4) methods of economic cybernetics and optimal programming;

5) econometric methods;

6) methods of research of operations and decision theory [8].

Unfortunately, because of their complexity, the fifth and sixth groups of methods are not widely used in tax liability management even in large companies, however some of their elements are used in planning and analytical work (methods of the theory of production functions and network planning, construction of tree of objectives).

There are three types of basic models: descriptive (used in financial analysis and based on information from accounting (financial statements)); predicative (used in forecasting the financial activities of the organization); normative (based on a comparison of actual results of activities with normative results, they can be used in internal financial analysis, management accounting, budgeting).

Thus, to ensure so called “sure choice” in relation to principles, models, including tools for analytical learning of business situations and respective tax consequences, it is necessary to have a clear idea of not only the essence of the tax strategy as a whole, its main trends, but also of the basic method of tax management [9].

Conclusion

The main task of tax management is developing strategic taxation guidelines at macro, meso and micro levels of the economy. The application of financial analysis methods for tax liability management should be based on interconnected basic conceptions: cash flow and temporal value of monetary resources.

The loss of profit risk should be assessed on the basis of economic methods grounded on the assessment of imputed costs using a profitability indicator and assessment of the value of consumption expenses and income of business entities. All these methods of scientific cognition are based on using invariable elements of a systematic approach to the object of research.

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Functioning of the Education System and Efficiency of Investing in Human Capital on the Example of the Industrial Sector of Ukraine

Yevhen REVTIUK

Poznan University of Technology, Poznan, Poland
E-mail: yevhen.revtiuk@put.poznan.pl

Yuliia VORZHAKOVA

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine
E-mail: julija.vorzhakova@gmail.com

Abstract

Success of an enterprise depends on its employees' human capital. This article investigates the influence of employees' education on their human capital formation. The relationship between the quality of education and employment opportunities for graduates is assessed by the number of the employees working in their field of studies. The following assumptions are being investigated: the quality of education affects the ability to utilize the acquired human capital in the labor market of Ukraine; easy access to higher education in Ukraine creates a surplus in the labor market of specialists; receiving education abroad is a competitive advantage in the labor market in Ukraine.

The data from 481 respondents' (age ranges 18-60 years old and working in industry) questionnaires has been analysed. Evidently, there is a strong link between the quality of education and the ability to use a person's human capital accumulated during their studies. There is no link between the availability of education, which leads to oversaturation of the labor market with professionals in certain fields and the possibility of using human capital. Nevertheless, there is a shortage of highly qualified specialists in engineering industries in Ukraine today. Similarly, there is a strong link between indicators that characterize the attractiveness of education abroad and the ability to use human capital accumulated during training, and the attractiveness of obtaining specific social capital, namely experience in foreign companies and relationships. This indicates that engineering education obtained in Ukrainian universities, according to respondents, is quite competitive with similar education abroad.

Keywords: Human Capital, Human Resources, Educational System, Industrial Sector of Ukraine.

Introduction

An enterprise reaches their success when an optimal combination of the employees' abilities, skills and knowledge is taken as a basis to form a human capital. This aspect is achieved by assessing the quality of education of the graduates. The relationship between the quality of education and employment opportunities for graduates is assessed by the number of the employees working in their field of studies. Formation of the human capital, assessed from the quality of education standpoint, is best reflected in the performance of industrial enterprises, as it requires the most specialized approach and a clear identification of the required specializations.

To assess the quality of education, it is advisable to consider the system of higher education, which is an important element in training professionals in all areas, and industry in particular. The optimal indicator is the number of higher education graduates working in the field of their degree. In Ukraine's labor market this indicator is weak as the number of employees who work in the field of their degree is very low.

The article examines the impact of education quality on the person's ability to use the human capital accumulated during their studies in Ukraine. Presence of a significant negative relationship between the employment rate in the field of their degree and the assessment of the education system quality in Ukraine indicates the relationship between investment in quality education and the possibility of return on investment by the bearer of human capital.

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The negative relationship between the employment rate in the field of their degree and the allegation that limited educational opportunities due to reduced numbers of scholarships reflects the recently emerged belief in Ukrainian society that a quality education cannot be free. The analysis of indicators that characterize the attractiveness of studying abroad in comparison to studying at Ukrainian universities reflects the belief that foreign experience could become a competitive advantage when applying for jobs, as well as achieving specific social capital by students. There is a negative significant relationship between the employment rate in the field of their degree and the respondents' age, which may indicate a reduction in the disparities between the demand for industrial specialists and their training within the education system of Ukraine.

Literature Review

In modern literature, the relationship between education and the formation of human capital is widely discussed. Getting a degree requires an investment of both time and money as well as a person's effort, which is quite similar to investing in the means of production. After all, the productivity, and hence the income, of a person with better skills and the ability to generate more added value will be higher. This phenomenon was noticed in the middle of the 20th century and has led to the idea of the possibility to invest in human capital (Schultz, 1961) and the emergence of the human capital theory, wherein the researchers tried to find a rational explanation for the economic efficiency of such investments (Becker, 1964). Therefore, human capital is the knowledge and skills which are the components of human resources. This means that the knowledge that the workforce will receive is provided through training. In this case, education is very important in terms of accumulating human capital. Another reason which highlights the importance of education is the people's ability to increase their productivity (Karaçor et al., 2017).

There are different approaches to determine the magnitude of human capital. Thus, in the study of human capital and its impact on performance, the following indicators were used: characteristics of education, usually the number of years of study (Bassanini and Scarpetta, 2001; Bils and Klenow, 2000; Pritchett, 2006), secondary education Bassanini and Scarpetta, 2001; Martins and Pereira, 2004), education costs (Hicks, 1980; Karaçor et al., 2017). In addition, researchers point out that the formation and effective use of human capital also depends on the characteristics of the education system (Fasih et al., 2012). At the same time, Lucas (1988) proposed a mathematical model that describes the processes of human capital formation, taking into account the activities of the educational sector.

As result, most researchers consider the education system as a tool for human capital formation and, consequently, a source of economic growth. In this case, the accumulated human capital in the education system increases labor productivity and, consequently, leads to a higher level of cumulative supply and demand in the markets (Hanushek et al., 2008).

Thus, human resources in the economy are growing both due to population growth and the growing share of human resources among the population. However, it is the growth of qualifications or quality of human resources, which are formed as a result of education, both in universities and directly at the place of work, leads to the accumulation of human capital in the country (Kucharčíková, Tokarčíková and Blašková, 2015). In other words, human capital can be expressed as the sum of knowledge and skills acquired by the workforce.

Empirical findings demonstrate a positive correlation between the wages and the level of education (Martins and Pereira, 2004). At the same time, the level of acquired education has a positive effect on the country's economic growth (Devarajan, Swaroop and Zou, 1996; Fasih et al., 2012; Karaçor et al., 2017). However, researchers note significant differences in the return on investment in human capital, which are caused by the level of the country's development, the quality and the field of education (Martins and Pereira, 2004) (for example, in OECD countries, income from investment in human capital is lower than in countries from the others groups (Karaçor et al., 2017).

Several fundamental studies indicate that education is important both for an investment in human capital and for promoting research and development. The implementation of the technologies in the early stages of education is important not only for subsequent employment, but also for further development in higher education for innovation (Vandenbussche, Aghion and Meghir, 2006). Investments in human capital (eg, spending on education and training) can have a more lasting impact on economic growth if high skills and training are combined with more intensive research and development and faster rates of technological progress (Bassanini and Scarpetta, 2001). Given the latest trends in society and entry into Industry 4.0, the assessment of human capital necessarily considers a combination of the quality of higher education and the employment opportunity in the field of studies. Rafiq et al. (2019) emphasizes

that during the transition to Industry 4.0, the nation's development focuses on the quality of education, where education is seen as a remedy for addressing issues related to human capital development. The assessment of the impact of human capital on youth unemployment shows that higher education institutions play a role in the relationship between skills and successful human development in the field where one works and have studied (Torul, 2020).

Although there is a consensus among researchers on the importance of economic investment in human capital, the effectiveness of such investment will largely depend on a number of specific factors such as the quality of the education system, the chosen field, changes in the sectoral structure of the economy, and abilities of the person to apply their knowledge during their career cycle. Nevertheless, in our opinion, the main factor that influences the possibility of returning investment in human capital at the individual level is the efficiency of the education system. At the same time, important factors are both the quality of the acquired knowledge and the conformity of the acquired specialty with the demand for special human capital in the labor market.

Background

Ukraine inherited from the Soviet Union a powerful branched education system with an advanced infrastructure at the time. After the proclamation of Ukraine's independence, the development of higher education system in the country has begun with the revitalization and implementation of the best achievements and practices of the education systems from Soviet union and European countries. The mid-90s are characterized by strong legislative support for the education sector, when a number of documents (the State National Program "Education. Ukraine of the XXI century " (1992), the Law of Ukraine" On Education" (1993), the Law of Ukraine "On Higher Education" (2002), the new Law of Ukraine "On Higher Education" (2014),) aimed at further development of the higher education system were adopted. Joining Ukrainian higher education system to the Bologna process in 2005 was a very important step, which has led to the integration of the Ukrainian higher education system into the European one. The lengthy integration process was aimed to be achieved in 2010, but unfortunately, has not been fully completed. For example, the transition to two-cycle studies has not been completed yet. There is also a low level of mobility of students and teachers. The autonomy of universities is still insufficient. There is a decrease in the number of classroom teaching and an increase in the hours for self-study (which often turns into an imitation of independent work, inevitably affects the quality of students' knowledge and causes the gradual decline in the competitiveness of domestic education).

Currently, 70-80% of secondary education graduates enter higher education institutions (HEIs). Prior to the introduction of the compulsory external independent evaluation (EIE) this figure even exceeded 80% (although no more than 50-55% of young people graduate as a result of dropout). In 2000, 50% of the secondary school graduates entered higher education, in 2017, according to statistics, in Ukraine 79% of secondary education graduates were studying for a university degree. 60% of the students were on the government scholarship, 20% were self-funded, and 20% were funded by private company's funding schemes.

Considering all of the above, we made the following assumptions: 1) the quality of education affects the ability to utilize the acquired human capital in the labor market of Ukraine; 2) easy access to higher education in Ukraine creates a surplus in the labor market of specialists, which reduces the opportunity to realize the human capital gained during training throughout their careers; 3) obtaining education abroad is a competitive advantage in the labor market in Ukraine, as the foreign education is considered to be better.

Methodology and Results

The study uses the data of a survey on the quality of education conducted by the Razumkov Center in late 2019. The questionnaire consisted of a series of questions which would allow us to assess the effectiveness of the Ukrainian education system. We selected 481 responses from respondents who indicated industry as their main place of work. The answers to the following questions were taken into the analysis: 1) "How would you assess the quality of education in Ukraine in general?"; 2) "How would you generally assess the accessibility of higher education in Ukraine?"; 3) "Why would a person, in your opinion, pursue a higher education? (several answer options) "; 4) "Do you work in a field of your higher or vocational degree?"; 5) "Professionals of which field would be able to find a well-paid job easier in the Ukrainian labor market? (several answer options) "; 6) "What would you need to do in a first place to secure a well-paid job after graduation?"; 7) "What would you find attractive in following education

abroad? (several answer options) ”as well as 8) age and 9) gender of the respondent. The SPSS software was used for statistical analysis. The information was coded based on the answers to 4 questions and labeled as follows: 1- the respondent works or worked in the field of their studies; 0 - the respondent has never worked in the field of their studies. Similarly, for multiple choice questions the answers were labeled as follows: 1- the respondent chose this answer; 0 - the respondent did not choose this answer. We rejected the answers of those respondents who reached retirement age (60 years and older), given that these individuals were educated in the Soviet Union education system. The main statistical characteristics of the information are given in the appendix.

A variable that indicates whether the respondent works / worked in the field of study or not was used as a dependent variable in the analysis. At the first stage, the relationship between this variable and the answers of the respondents was analysed.

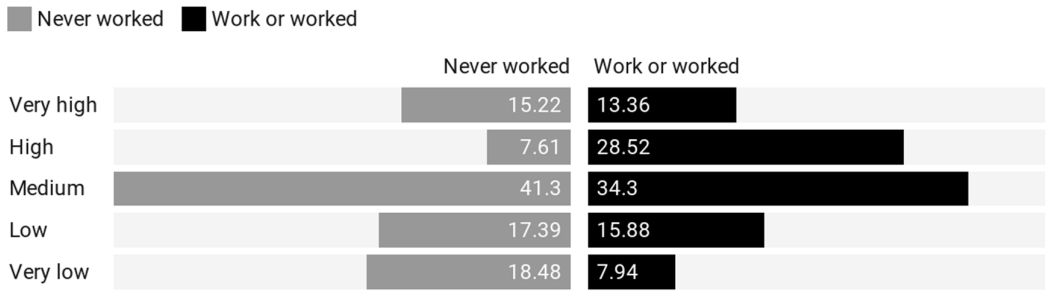

Fig. 1: Average value of the respondents` answers for the question “How would you assess the quality of education in Ukraine in general?”

Thus, 41.88% of people who work or have worked in the field of their studies, rated the education system in Ukraine at the level of "High" and "Very high", as opposed to 22.83% of those who have never worked in the field (Fig. 1). Similarly, 23.83% and 35.87% of respondents in both groups rated “Low” and “Very low”, respectively. The identified difference can be explained by the fact that persons who could not find employment in their field blamed the quality of the education system for their unemployment.

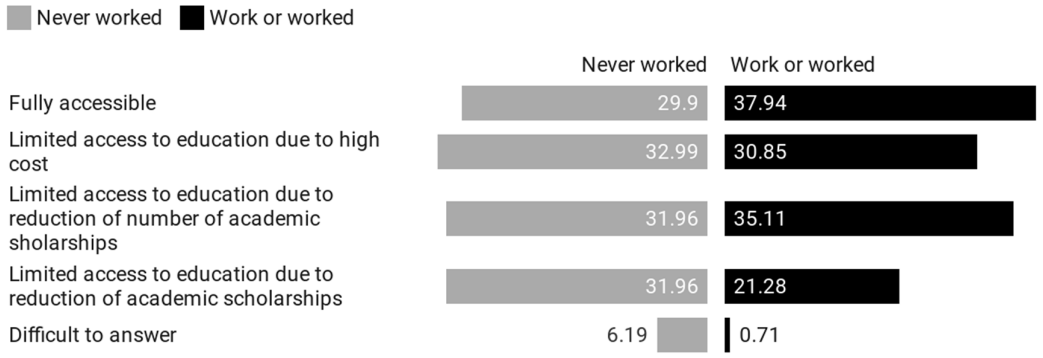

Fig. 2: Average value of the respondents` answers for the question “How would you generally assess the accessibility of higher education in Ukraine?”

Access to education was assessed by both groups of respondents as follows: 37.94% of people who work or have worked in their field of study rated the education system in Ukraine as fully accessible, as opposed to 29.9% of people who have never worked in their field of study. At the same time, according to people who have never worked in the field of their studies, the reduction of academic scholarships is the more important reason for limiting the availability of education (31.96% as opposed to 21.28%).

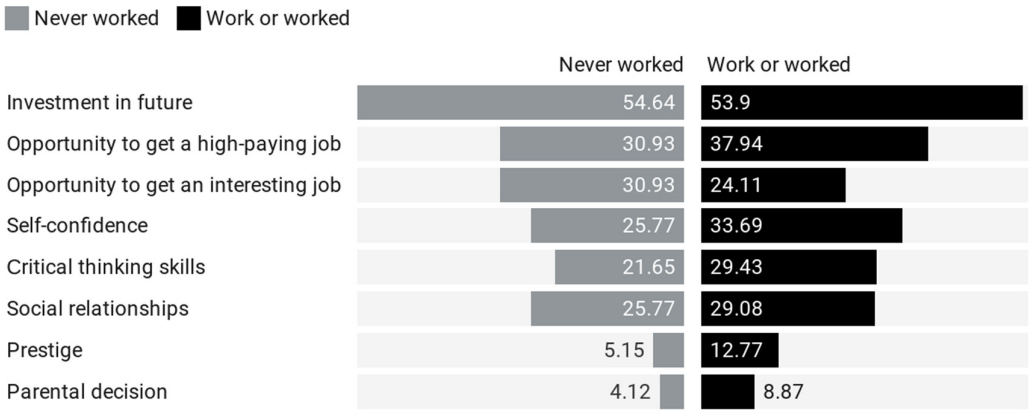

Fig. 3: Average value of the respondents` answers for the question "Why would a person, in your opinion, pursue a higher education?"

Regarding the reasons that motivate people to get a degree, more than half of the respondents believe that education is a valuable investment. However, only 30.93% of respondents who have never worked in the field, and 39.94% of the respondents associate education with the opportunity to get a high-paying job, 30.9% and 24.1% of respondents, respectively - with the opportunity to find an interesting job, which is negatively characterizes the effectiveness of the education system in Ukraine. A quarter of respondents (25.77% and 29.08%) believe that getting a degree helps to accumulate their own social capital. Thus, the assessment of the effectiveness of investment in education is not very high among the respondents, which, again, may indicate the unsatisfactory quality of the education system in Ukraine.

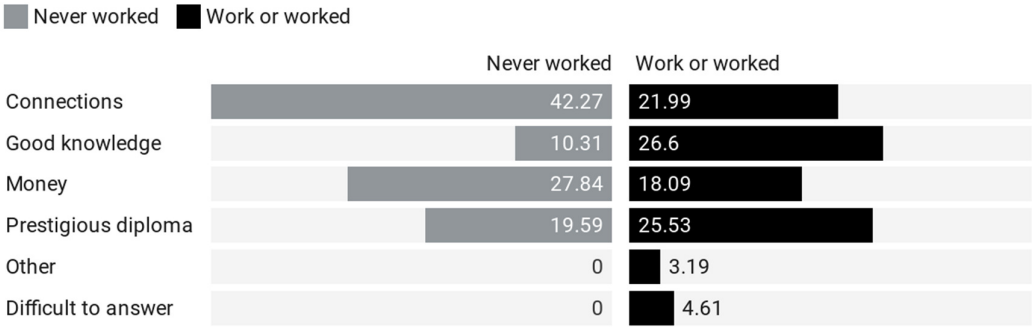

Fig. 4: Average value of the respondents` answers to the question "What do you need in the first place to find a good job after graduation"

Opinions of the respondents have divided about the reasons for securing a well-paid job after graduation. Thus, people who did not work in the field of study, to a greater extent believe that personal connections (42.27% vs. 21.99% of answers) and money, and therefore bribes (27.84% vs. 18.09%) play an important role in getting their first job. On the other hand, people who work or have worked in the field of study more often noted the high level of knowledge (26.6% vs. 10.31%) and the ranking of the university where they studied (25.53% vs. 19.59%) as an advantage.

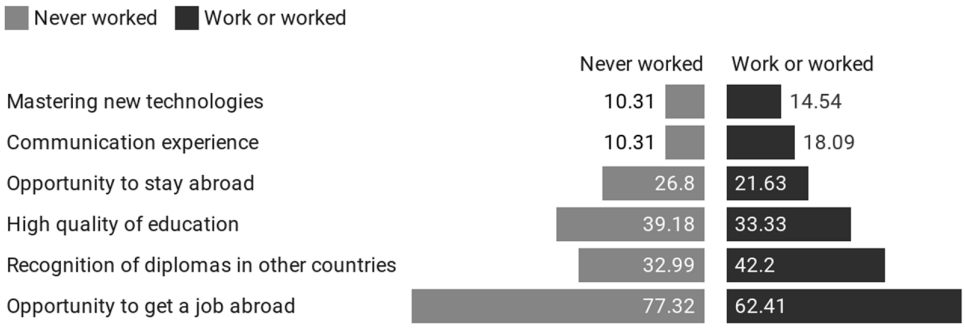

Fig. 5: Average value of the respondents` answers to the question "What is attractive about studying abroad?"

Notably, the respondents in both groups have similar answers about the advantages of getting a degree abroad. Firstly, it is an opportunity to get employment abroad (77.32% and 62.41%, respectively, among people who have never worked, and worked or are working in the field). In the opinion of the responders, recognition of diplomas in other countries (32.99% and 42.2% of respondents, respectively) and high quality of education (39.18% and 33.33%, respectively) are quite significant advantages. On the other hand, mastering new technologies (10.31% and 14.54%) and communication experience (10.31% and 18.09%) are not considered as an important advantage.

To better understand the impact of education quality indicators on a person's ability to use the human capital accumulated during training, the correlation coefficients between the following factors were calculated: 1) employment of the person in the field of study (0 - never worked, 1 - works or worked); 2) personal assessment of the quality of the Ukrainian education system (1 - very high, 2 - rather high, 3 - medium, 4 - rather low, 5 - very low); 3) assessment of the availability of higher education in Ukraine by statement of full availability for all fields (0 - no, 1 - yes); 4) assessment of access to higher education in Ukraine by statement of limited availability due to the high cost of education (0 - no, 1 - yes); 5) assessment of the availability of higher education in Ukraine by statement of limited availability due to the reduction of public procurement (0 - no, 1 - yes); 6) assessment of the availability of higher education in Ukraine by statement of limited availability due to the reduction of academic scholarships (0 - no, 1 - yes); 7) What would help to do in a first place to secure a well-paid job after graduation? (1 - have a good education, high level of knowledge, 0 -other answer options); 8) Attractiveness of studying abroad by statement of the opportunity to get employment abroad (0 - no, 1 - yes); 9) attractiveness of studying abroad by statement of the worldwide recognition of the diploma (0 - no, 1-yes); 10) attractiveness of studying abroad by statement of high quality of education (0 -no, 1-yes); 11) attractiveness of studying abroad by statement of the ability to stay abroad after graduation (0 - no, 1- yes); 12) attractiveness of studying abroad by statement of gaining experience of international communication and contacts (0 - no, 1-yes); 13) attractiveness of studying abroad by statement of training on modern equipment (0 - no, 1-yes). As control variables we used 14) age of the respondent (1 -from 18 to 24 years old, 2 - from 25 to 36 years old, 3 -from 37 to 45 years old, 4 - from 45 to 60 years old) and 15) gender of the respondent (1 - female, 0 - male). Descriptive statistics of the data used in the analysis are shown in Table 1.

The results of the correlation analysis are shown in Table 2. Firstly, it should be noted that there is a significant negative relationship between the employment rate in the field of study and the respondent's assessment of the quality of the education system in Ukraine. This confirms our previous assumption that those who think their education is better have a better chance of being employed in the field of their education and therefore, utilize the human capital they have accumulated during their studies. In addition, there is a close positive relationship between employment and quality education as a competitive advantage when getting a first job. The discovered fact indicates the existence of a connection between investments in quality education in Ukraine and the possibility of return on investment by the bearer of human capital. Thus, it can be argued that our first assumption has been confirmed.

Table 1: Descriptive statistics for variables used in the study

Variable	Description	N	Minimum	Maximum	Mean	Std. Deviation
Work	Employment rate of the person in the field of study	379	0,00	1,00	0,7441	0,43696
Q	Quality of the education system	425	1	6	2,80	1,109
AvEd1	Assessment of the availability of higher education: fully available	481	0	1	0,34	0,473
AvEd2	Assessment of the availability of higher education: - limited availability due to the high cost of education	481	0	1	0,30	0,460
AvEd3	Assessment of the availability of higher education: limited availability due to the reduction of public procurement	481	0	1	0,35	0,477
AvEd4	Assessment of the availability of higher education: Limited accessibility due to the reduction of academic scholarships	481	0	1	0,27	0,445
SW	Thing you need to find a well-paid job after graduation	481	1	6	2,61	1,323
EA1	Attractiveness of studying abroad: opportunity to get a job abroad	481	0	1	0,62	0,485
EA2	Attractiveness of studying abroad: worldwide recognition of the diploma	481	0	1	0,44	0,497
EA3	Attractiveness of studying abroad: : high quality of education	481	0	1	0,34	0,475
EA4	Attractiveness of studying abroad: the ability to stay abroad after graduation	481	0	1	0,16	0,369
EA5	Attractiveness of studying abroad: gaining experience of international communication and contacts	481	0	1	0,20	0,402
EA6	Attractiveness of studying abroad: : training on modern equipment	481	0	1	0,38	0,485
AGE	Age	481	1	4	2,84	1,063
SEX	Sex	481	0	1	0,34	0,473

Among the group of indicators that characterize the availability of higher education, there is a significant negative relationship between the employment in the acquired specialty and the statement about the limited opportunities for education due to the reduction of the number of scholarships. This phenomenon can be explained by the fact that in recent years Ukrainian society has become convinced that a quality education cannot be free. At the same time, receiving government scholarship, even though its amount is below the minimum subsistence income, is considered rather than as a factor contributing to the availability of education. Thus, there is no strong evidence to support the second statement.

Among the selected indicators which characterize the attractiveness of studying abroad in comparison to studying at Ukrainian universities, a negative close connection was found only with the answer "Gaining experience in international communication and contacts." This can be explained by the fact that for a long time Ukraine remained a relatively closed country, whose residents faced significant obstacles when traveling abroad. However, additional prospect for people who had international experience arose when the foreign companies started opening their branches in Ukraine. Among those who were unable to utilize their human capital accumulated during their studies, there was a belief that such an experience could become a competitive advantage when seeking employment. Third assumption was confirmed only for the part of specific social capital, whereas other factors showed no statistical significance.
There is no significant relationship between gender and work experience in the field of study. Instead, there is a negative relationship between the employment by field and the age of respondents, which may indicate a reduction in the disparities between the demand for industrial specialists and the training of specialists in the Ukrainian education system.

Conclusions

Human capital is one of the key factors of economic growth in the introduction of Industry 4.0, the formation of which is primarily the education system. At the same time, the acquired level of education does not guarantee a return on investment in human capital of individual education, because the latter depends on a number of exogenous and endogenous factors such as a person's career path, their desire to work in the field of study, the availability of suitable jobs in the labor market, and education. Such diversity of factors creates obstacles for researchers to assess the effectiveness of investing in human capital.

In this study, the efficiency of human capital use was operationalized through an indicator that demonstrates the experience of the employee in the field of study. Based on the results of a survey on the quality of education among people working in industrial companies in Ukraine, the relationship between respondents' assessment of the domestic education system, the importance of knowledge quality for the first job, access to university education, and attractiveness of education abroad has been investigated.

The identified trends indicate that there is a strong link between the quality of education and the ability to use a person's human capital accumulated during training. On the other hand, the assumption that there is a link between the availability of education, which leads to oversaturation of the labor market with professionals in specific fields and the possibility of using human capital. In our opinion, this result can be caused by the limitations of the dataset as only the answers from the responders working in industry were taken in the analysis. At the same time, there is a shortage of highly qualified specialists in engineering industries in Ukraine today. Similarly, a study of indicators that characterize the attractiveness of education abroad found a strong link between the ability to use human capital accumulated during training and the attractiveness of obtaining specific social capital, namely experience in foreign companies and relationships. This indicates that engineering education obtained in Ukrainian universities, according to the respondents, is quite competitive with similar education abroad.

This study, however, has a few important limitations. The experience of working in the field of study was chosen in order to assess the effectiveness of the human capital use accumulated during training. Unfortunately, there was no information available about the length of respondents' employment, which did not allow us to conduct a more in-depth analysis. At the same time, we assessed our data fairly assertively, believing that if a person did not work in the field of study, they were unable to use the human capital accumulated during training. Another limitation was the use of survey data from respondents working exclusively in industrial enterprises, which limited our analysis to a narrow and specific sector of the labor market. Despite these limitations, the proposed study characterizes certain trends in the processes of human capital formation in Ukraine, which should be investigated further.

Table 2: Results of the Correlation Analysis

		Work	Q	AvEd1	AvEd2	AvEd3	AvEd4	SW	EA1	EA2	EA3	EA4	EA5	EA8	AGE	SEX
Work	R.	1	-,120*	0,073	-0,020	0,029	-,109*	,170**	-0,045	-0,024	-0,031	0,022	-,106*	-0,031	-,105*	0,058
	Sig.		0,027	0,155	0,696	0,574	0,034	0,001	0,384	0,636	0,542	0,663	0,039	0,548	0,042	0,261
Q	R.	-,120*	1	-,475**	,258**	,162**	,269**	379	-,114*	0,063	0,073	-0,045	0,027	0,049	-,127**	-,126**
	Sig.	0,027		0,000	0,000	0,001	0,000	-,185**	0,018	0,197	0,132	0,351	0,575	0,311	0,009	0,009
AvEd1	R.	0,073	-,475**	1	-,470**	-,522**	-,424**	0,000	0,027	-0,010	-0,076	0,056	0,004	-0,084	0,052	0,069
	Sig.	0,155	0,000		0,000	0,000	0,000	425	0,556	0,835	0,094	0,217	0,937	0,065	0,253	0,129
AvEd2	R.	-0,020	,258**	-,470**	1	-0,057	-0,015	,201**	0,009	0,019	0,050	-0,045	0,018	0,007	0,005	0,017
	Sig.	0,696	0,000	0,000		0,213	0,745	0,000	0,848	0,684	0,276	0,324	0,701	0,877	0,921	0,702
AvEd3	R.	0,029	,162**	-,522**	-0,057	1	0,055	481	-0,016	0,020	-0,012	-0,003	0,001	0,004	-0,002	-,116*
	Sig.	0,574	0,001	0,000	0,213		0,229	-,136**	0,726	0,665	0,797	0,950	0,977	0,932	0,967	0,011
AvEd4	R.	-,109*	,269**	-,424**	-0,015	0,055	1	0,003	-0,001	-0,008	0,076	0,012	0,044	0,066	-0,002	-0,037
	Sig.	0,034	0,000	0,000	0,745	0,229		481	0,986	0,863	0,097	0,798	0,334	0,150	0,965	0,412
SW	R.	,170**	-,185**	,201**	-,136**	-0,077	-0,089	-0,077	-0,049	0,064	-0,068	-0,032	-0,032	-0,036	0,065	0,021
	Sig.	0,001	0,000	0,000	0,003	0,090	0,051	0,090	0,285	0,159	0,134	0,485	0,482	0,432	0,152	0,650
EA1	R.	-0,045	-,114*	0,027	0,009	-0,016	-0,001	481	1	-,496**	-0,039	0,062	-,091*	-,261**	0,038	-0,019
	Sig.	0,384	0,018	0,556	0,848	0,726	0,986	-0,089		0,000	0,396	0,173	0,046	0,000	0,406	0,685
EA2	R.	-0,024	0,063	-0,010	0,019	0,020	-0,008	0,051	-,496**	1	-,238**	-,121**	0,009	0,000	0,039	-0,010
	Sig.	0,636	0,197	0,835	0,684	0,665	0,863	481	0,000		0,000	0,008	0,847	0,996	0,397	0,835
EA3	R.	-0,031	0,073	-0,076	0,050	-0,012	0,076	1	-0,039	-,238**	1	-,269**	-,198**	0,009	-0,025	-0,011
	Sig.	0,542	0,132	0,094	0,276	0,797	0,097		0,396	0,000		0,000	0,000	0,852	0,582	0,802
EA4	R.	0,022	-0,045	0,056	-0,045	-0,003	0,012	481	0,062	-,121**	-,269**	1	0,018	-,134**	0,028	-0,015
	Sig.	0,663	0,351	0,217	0,324	0,950	0,798	-0,049	0,173	0,008	0,000		0,696	0,003	0,536	0,740
EA5	R.	-,106*	0,027	0,004	0,018	0,001	0,044	0,285	-,091*	0,009	-,198**	0,018	1	-0,082	-0,057	-0,051
	Sig.	0,039	0,575	0,937	0,701	0,977	0,334	481	0,046	0,847	0,000	0,696		0,071	0,212	0,262
EA6	R.	-0,031	0,049	-0,084	0,007	0,004	0,066	0,064	-,261**	0,000	0,009	-,134**	-0,082	1	-0,066	0,070
	Sig.	0,548	0,311	0,065	0,877	0,932	0,150	0,159	0,000	0,996	0,852	0,003	0,071		0,151	0,126
AGE	R.	-,105*	-,127**	0,052	0,005	-0,002	-0,002	481	0,038	0,039	-0,025	0,028	-0,057	-0,066	1	0,044
	Sig.	0,042	0,009	0,253	0,921	0,967	0,965	-0,068	0,406	0,397	0,582	0,536	0,212	0,151		0,337
SEX	R.	0,058	-,126**	0,069	0,017	-,116*	-0,037	0,134	-0,019	-0,010	-0,011	-0,015	-0,051	0,070	0,044	1
	Sig.	0,261	0,009	0,129	0,702	0,011	0,412	481	0,685	0,835	0,802	0,740	0,262	0,126	0,337	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

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Empirical Study on The Role of Digital Influencers In Digital Marketing Strategy

Meriem MELGHAGH[1] and lhoucine OUAHI[2]

[1] PhD student in Management Sciences, Faculty of Law, Economics and Social Sciences Marrakech, Morocco
Melghagh14@gmail.com

[2] University Professor, Faculty of Law, Economics and Social Sciences Marrakech, Morocco
louahi@gmail.com

Summary

Social media has quickly become the most essential communication and information-sharing tool in the daily lives of millions of people around the world. In a social network there are members who disseminate information and others who evaluate and repost it. This makes it possible to disseminate the maximum of information in a very reduced time and cost. The first source members of information are called "influencers". Detecting influencers is very important and useful in different areas. In marketing, for example, influencer detection lowers the cost of advertising by paying a small number of members to share positive opinions about a particular product. In This context we are interested in this social media marketing tool, namely influencers. More objectively and more concretely, we focused and focused on the role of the gender of followers in their responses to recommendations of a commercial type on the social network Instagram. To do this, we first carried out an exploratory study. Thus, we built a detailed review of the literature on the subject and conducted a quantitative study in order to understand and interpret certain phenomena and behaviors of followers on Instagram.

Keywords : Influencers, Consumers, Social networks, digital transformation

Introduction

We live in a digital, virtual and digital world in which consumers do not see the people they are talking to. Today it is accessible and very easy to connect and connect with a large number of people, and we consumers can send messages. Internet users expect brands to speak with them rather than for them and to provide them with inspiration and emotion.

With the advent of web 2.0, a participatory web, and social networks, digital opinion leaders - more commonly known as digital influencers - have arrived and appeared in a variety of fields. The web and social networks have become places of exchange between brands and consumers in a few years, but also between consumers themselves. Among these consumers, people have managed over the years to stand out by obtaining a certain skill and expertise and to emerge and stand out as opinion leaders, now called digital influencers or e-influencers. Unlike traditional opinion leaders who communicated with those around them directly, face to face, or indirectly, using word of mouth, digital influencers initially used social media such as than blogs, then, secondly, various social networks such as Instagram, Facebook, Twitter and YouTube. Influencers represent a new type of independent third-party endorser, that is, a new type of 'independent approvers' who shape and shape audience attitudes through blogging and the use of other social media.

Influencers, whether they are tweeters, instagrammers, consumer-actors, youtubers, want to offer their community authentic content, real experiences in order to share their expertise and passions.

The big challenge for brands is certainly not compensation, but it's building trust.

Relationships remain capital in the partnership and collaboration with influencers and this must be sustainable and above all based primarily on trust. Brands must put themselves in the shoes of influencers and be at their disposal and listening to them in order to offer them real content that meets their needs and communication operations that allow

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them to create valuable and quality content. The best content is that which will be picked up and transmitted thanks to the best interpersonal skills and trust.

Issue :

What is the main role of an influencer on social networks ? and how important is influencer credibility and the trust established between followers and influencers on consumers' buying decision ?

Literature Review

Définition of the influencer

The term influencer refers above all to an individual with whom one associates a power and a power of influence, that is to say "a capacity of persuasion and of action on other individuals". This notion also combines the terms of prescriber or opinion leader. The term influencer was mentioned before the arrival of social media and networks, but these have changed the factors that define an influencer. Before the digitalization phenomenon, opinion leaders or prescribers were mainly politicians, celebrities and journalists who, through their fame, enjoyed the credibility that resulted from their status. Their influence was propagated through traditional media such as television, the press and radio or even the cinema. Today, social networks have enabled these personalities (politicians, journalists, celebrities) to transform or transpose the offline influence they enjoyed, on social networks where they will acquire a community of subscribers and where their opinion goes. count thanks to the fame that they enjoyed and were already enjoying. However, following the democratization of social networks, Internet users have shown and developed their network and have become influential only through their activity or the popularity they have acquired through a blog or through a buzz effect. They bring together and bring together a large audience and represent digital influencers, i.e. online influencers

"An influencer or thought leader can be defined as someone who is present in a significant and regular way on a number of social networks. He often participates in one or more blogs. It regularly delivers content to its community which over time grows and becomes loyal. An individual can be defined as an influencer if he brings together different characteristics such as: notoriety on digital platforms, A significant media presence, A concrete prescription capacity, A position of opinion leader and finally Editorial credibility

It is interesting to discover that the consumer does not have the same perception of the influencer, because for him 4 definitions stand out:

- The influencer is someone who has at least 10,000 followers
- The influencer is someone with whom brands interact to promote their products / services and messages
- The influencer is someone who shares information about the products they like
- The influencer is an expert in his field

The appearance of the digital influencer

The web and social networks are places of exchange transactions between consumers and brands, but also between consumers themselves. Among these consumers, there are people who emerge as 2.0 opinion leaders, now called "digital influencers" or "e-influencers". Indeed, bloggers can be seen as digital influencers, equivalent and similar to the offline opinion leaders of the "two-step flow" theory. These influencers can play the role of message mediators and convince communities in the digital environment, where messages can be distributed easily and quickly with a potentially viral effect. But concretely, what is a digital influencer? “Anyone - celebrity (actor, musician, etc.), reality TV star, model, reporter or blogger - with a prominent voice in media, primarily on social media and who receives reputation and generates notoriety through views of its content and of its commitment to the same content in a meaningful way for itself and the other people it mentions ”. Digital influencers are more prevalent via social media and blogging, if we think of their online social contacts, compared to traditional thought leaders who communicate face-to-face with their peers. Additionally, the ease of access and convenience along with the low cost of social media has made the contact process simpler and easier.

An influencer in a social network

The influence on social networks is a remarkable phenomenon not only from the point of view of the transmission of information, but also from the point of view of controlling the envy of other users. Especially in the field of politics and marketing. Influencers are also referred to as today's opinion leaders. To define an influencer, many authors have their own definitions. Watts and Dodds [define an influential person or opinion leader as a person who is part of a minority and who activates and exercises some influence over a large number of people. Detecting **influencers provides an impression and significant value in practice.**

To begin with, the term "influencer" refers to digital opinion leaders who, through an Instagram post or a YouTube video, influence the buying behavior of more people than many magazines combined.

Consult, share or discuss on social networks: a practice anchored in the daily life of Moroccan Internet users

Influencer Marketing has quickly found a place of choice among the levers that help companies gain visibility and develop their sales. It is mainly based on the prescribing power of influencers which is part of a true sales cycle today. The influencer who is at the center and plays the role of brand prescriber, must be given a certain credibility or even the ability to "relate". Social networks are mainly Instagram, Snapchat and Twitter. Advertising through an influencer followed by more than a million subscribers guarantees you, like digital, a quantifiable return on investment. Above all, it allows you to address a “generation Y” of young people.

Types of influencers

There are 3 main segments of influencers. Most influencer marketing programs will engage with individuals that fall into each of these 3 categories.

LEVEL 1 : MACRO OR CELEBRITY :

Traditional influencers who have long been recognized offline, such as journalists, analysts, politicians or celebrities. They generally have engaged and large audiences. No more fun, we now move on to the influencers who weigh in the game. From the top of their community of 100,000 to 1 million followers, these influencers undoubtedly boost a brand's visibility. They don't usually get to this level just because of their pretty little faces. Most of them benefit from the influence of a blog or even a YouTube channel. Others manage to break through without all of that, but they have an innovative concept that sets them apart from the competition.

LEVEL 2 : MAGIC MIDDLE :

Online community leaders, such as industry and subject matter experts. In a specific context These individuals can have more influence than certain media or macro influencers, who often involve their own opinion by listening to these level 2 influencers. Typically, they have smaller audiences, create expert content and generate high engagement rates

"And this is also the first advantage of a nano-influencer for a brand: its low cost. This type of influencer is also differentiated by its authenticity. The content creator baby is a Mister Everybody. If one user decides to follow him rather than another, it is sure that he is genuinely interested in what he is saying and has something new. Also, a nano-influencer usually doesn't do this for the money but out of passion. So, he shares his reviews with his followers like a friend or family member would. Consumers trust it and will therefore be more apt to like and comment. These content creators are, in this sense, strategic assets for low-budget brands wishing to improve their image and boost their sales ”

LEVEL 3 : MICRO INFLUENCERS :

The micro-influencer is the cut above. He has more visibility and above all knows all the inner workings of Instagram. Thus, it is able to produce very good quality content that highlights your brand and engages its community. Its asset: greater visibility than other types of influencer and 60% more engagement compared to macro-influencers and celebrities. Thanks to Instagram's niche community, brands can reach new target audiences. They thus boost their conversion rate and benefit from an interesting ROI.

Quite clearly, micro influencers usually represent fans, local experts, very active members of communities who interact with other fans and generate reviews within their groups. These people will have small but very engaged audiences. A group of micro-influencers can have as much impact as a macro-influencer.

The role of influencers

Following trendsetters makes it possible to predict changes, transformations and possible developments in expectations focused on a product or service, and to gain responsiveness.

Customer relationship, E-reputation: influencers, representatives of their community, can increase and strengthen consumer loyalty to a brand, and save time in the launch and improvement of a strategy adapted customers.

Product launches are the times when the role of influencers is the most important to promote them. Brands no longer hold sole responsibility for the image they wish to convey.

Followers are the target of almost all digital communication campaigns. They are also the main motivation for influencers, whose job it is to create valuable content for their followers.

Hashtag, that little hash placed in front of words or phrases on social media, is one of the most important building blocks for engagement. This symbol allows users of social networks to interact on topics. It creates the link between followers and influencers.

Brands and influencers looking to differentiate themselves to make their content stand out, use hashtags in the hope of increasing interactions on their products and services.

It is very important to establish lasting relationships with influencers, based on mutual trust, interactions and collaborations.

However, Influencers claim a large number of followers whose volume can sometimes reach close to millions.

The prescribing role of influencers :

Like opinion leaders, social media influencers have a prescribing role with the people who follow them, who turn into real an intention to buy and then translate into an act of purchase.

"Purchases that generate satisfaction, Acts of purchase that also arouse satisfaction since 76% of people who have bought a product after reading content published in a post on social networks by influencers, say they are satisfied. There is a minority of people who say they have been disappointed. The act of purchasing is more important for people who follow the beauty world (87%), the automotive world (87%) and the fashion world (86%), but also from people who primarily expect news on brands and products from influencers (82%). This prescribing power acts by recovery, since 64% of Internet users who follow an influencer recommend products and brands after having read content published by influencers or else they write a good comment. Overall, 70% of people who follow an influencer have already purchased or recommended a product after reading good reviews about that product. This allows us to consider that these people who have gained in notoriety thanks to social networks and which we now call "influencers" ... effectively influence the consumers who follow them.

Effective promo codes

It is desirable and desirable to note that 41% of Internet users who follow influencers declare to have already used during the last twelve months, "a promotional code or a reduction and a reduction proposed by an influencer. Also, if a third party follows influencers to get discounts, they are more likely to use them (44%), ultimately a sign of the effectiveness of the exposure of the content disseminated with a promotion code. Promotional codes are not the only lever to use, however, since despite everything, 75% of people who follow influencers say they have bought the product after reading the content posted on social networks. This shows once again that the real impact and the real influence can only be obtained by the distribution of quality content in line with the expectations and desires of Internet users, and not only by the distribution of a promotion code. ". If the latter generates lower sales than the content itself, it nevertheless makes it possible to monitor the sales generated from the content disseminated by influencers on e-commerce sites.

Influencers and trust

The topic of trust and influencers is at the heart of the existing debate or one of the most important points in influencer marketing. “A study was done to find out if there is a relationship between the credibility of influencers and the trust of subscribers.

• 44% of women believe it is necessary to see or test the product or service used to trust the publication of influencers.

• 41% of men place expertise as the main factor in trusting influencers.

Authenticity is the number one reason to trust an influencer

• 43% of respondents cite authenticity as the main factor.

Personalization is a key factor

• 66% of respondents say that influencer content should relate to the focus of followers. "

• How can you trust an influencer in the end?

First, "a brand will have an interest in weighing the utility and value of its product and minimizing the risks as much as possible. She will not submit a risky product to an influencer. Second, and this is the essential point for the influencer, it will be out of the question to say that a product is better or magical or to use a term that puts the product in orbit, if that is wrong!

Why ? Because it will no longer be just the brand that will be incriminated but also the influencer. And if the influencer is discredited for lying or being too positivity about a product, their online reputation will go down the drain. Outside an influencer no longer wants to take a risk whose goal of losing his influence, which he took years to gain.

The relationship of proximity and trust between influencers and followers:

Influencers are present on different exchange platforms such as social networks which are often the relays of a blog site. Thanks to their presence on various communication channels, they can reach a larger audience and be close to and listened to their subscribers. In the case of a trip, an influencer will be able, thanks to the different functionalities offered by social networks, to submit different content: texts on Facebook, behind the scenes on Snapchat, photos on Instagram, videos on YouTube ... subscribers find themselves throwing themselves into the daily life of the influencer and will increase and improve with him a feeling of closeness. The success of an influencer represents the strength of the connection he has with his community. For Bruno MALTOR, travel blogger, the important thing is to keep your originality, show humility, transparency and be easy and accessible to improve cohesion with your community. The stronger the bond created, the more apt followers will have to follow the recommendations made by an influencer. Influencers know the expectations and expectations of their audience, they will produce content of greatness and value that enters the interests of their subscribers. Thus, there will be a certain homogeneity between the influencer and his subscribers because they will come together around a common system of values.

Research hypotheses

H1: On a social network, engagement and trust are two determining variables in the influence that a social network can have on the consumer.
H2: The credibility of influencers can have a positive impact on the trust established between followers and influencers.
H3: Reviews and comments on social media can have a positive impact on a user's choice of social media (eg choice of travel destination).
H4: The promo code is a very effective trend that can have a positive impact on the choice of followers (ex: buying clothes).

Empirical study

Introduction

In this research work we seek to offer a better vision of social networks, to understand the motivations and reasons that push users of social networks to follow influencers, thus we wish to provide a better understanding of the major role that an influencer can play in through posts on Instagram and videos on youtube to encourage subscribers to make a purchase decision or book online in case of travel. finally we seek to understand the perception of users of social networks towards the credibility of influencers

First, we will outline our methodological choice and the research method adopted, we based it on a quantitative survey.

So we will try to find a relevant answer for our research problem, and to measure the significance of our hypotheses presented in the conceptual framework.

However, we will dwell a little on the one-dimensional, two-dimensional and multidimensional analysis and the results from the data processing software "SPSS".

Method of sample selection

This study was carried out by the administration of a questionnaire which was distributed by internet.We then target a large target of respondents of about 100 people whether they are young people who are still studying or elderly or young people who work in different professions, we preferred to distribute the questionnaire online and not face to face given the importance of the users of this communication platform.

Method of data collection and processing

To produce the knowledge of our research, we opted for a quantitative approach by administering the questionnaires. This allowed us to question individuals by first defining the terms of responses through the chained questions. It is a very efficient information gathering tool as it allows the processing of large samples and the establishment of statistical relationships or numerical comparisons.

For the quantitative study: we use the statistical method, in order to know the relationship between our dependent variables, and the independent variables.

This method then allows us to test all the hypotheses of the research, using the SPSS software, and we will retain a value of 95% as the risk threshold.

Quantitative Analysis

One-dimensional analysis

1. **Gender of influencers :**

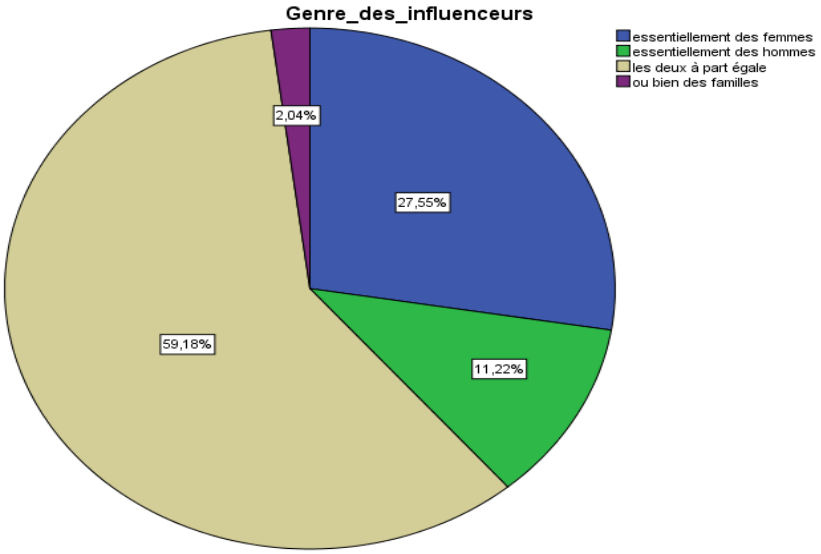

We note that more than half of about 59.18% of followers follow female influencers while 27.55% follow women and men equally while 11.22% of followers are mainly interested in content from men, however, a minority of followers (2.04%) follow families.

2. . Persons contacted before making a purchase :

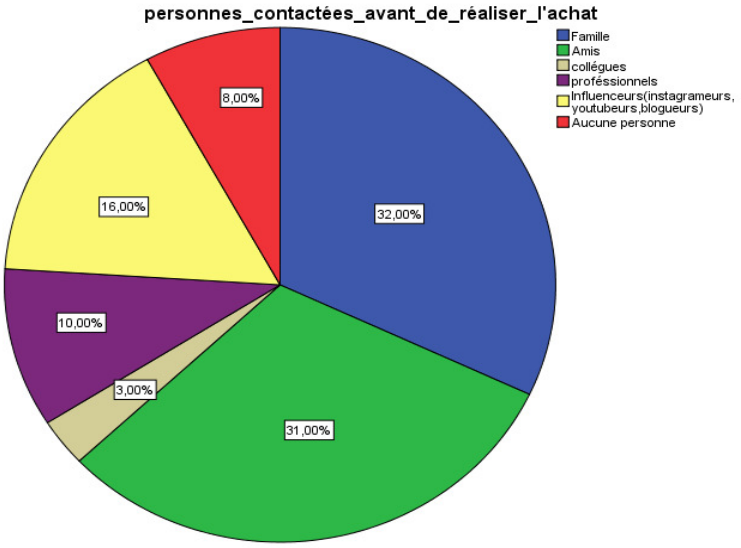

After the analysis carried out through the SPSS software, it was found that 32% of people contact their families before making an act of purchase, while 31% of people contact their friends to make a purchase, while 16% of people use influencers through Instagram posts and video content posted on youtube before making their purchases, yet a minority of people who contact professionals in the field to make a purchase

3. Reasons people follow influencers :

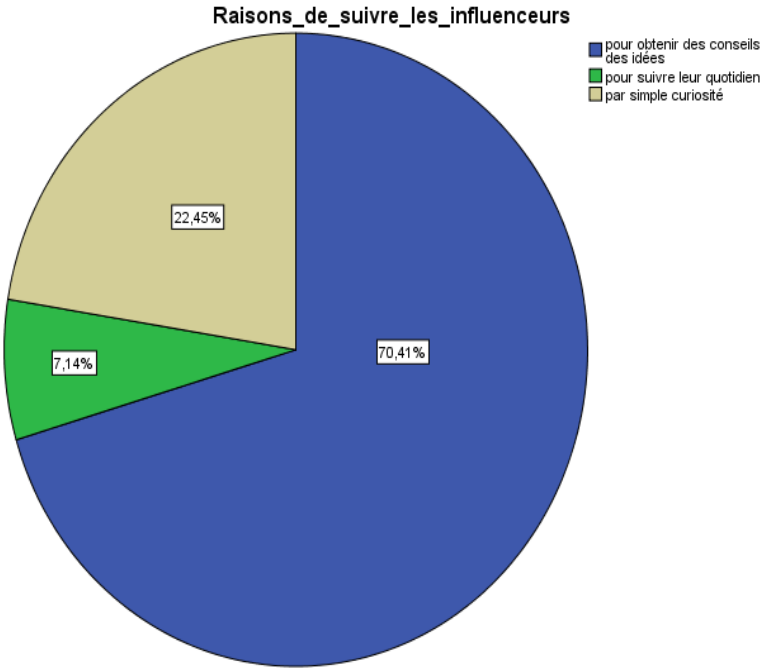

From this analysis, we found that there are many reasons why followers follow influencers, 70.41% of followers follow influencers for tips and ideas, while 22.45% of followers do this out of simple curiosity while a minority of them follow their people to find out about their daily lives.

Two-Dimensional Analysis

1. The effect of belonging to a socio-professional category on the frequency of online reservations

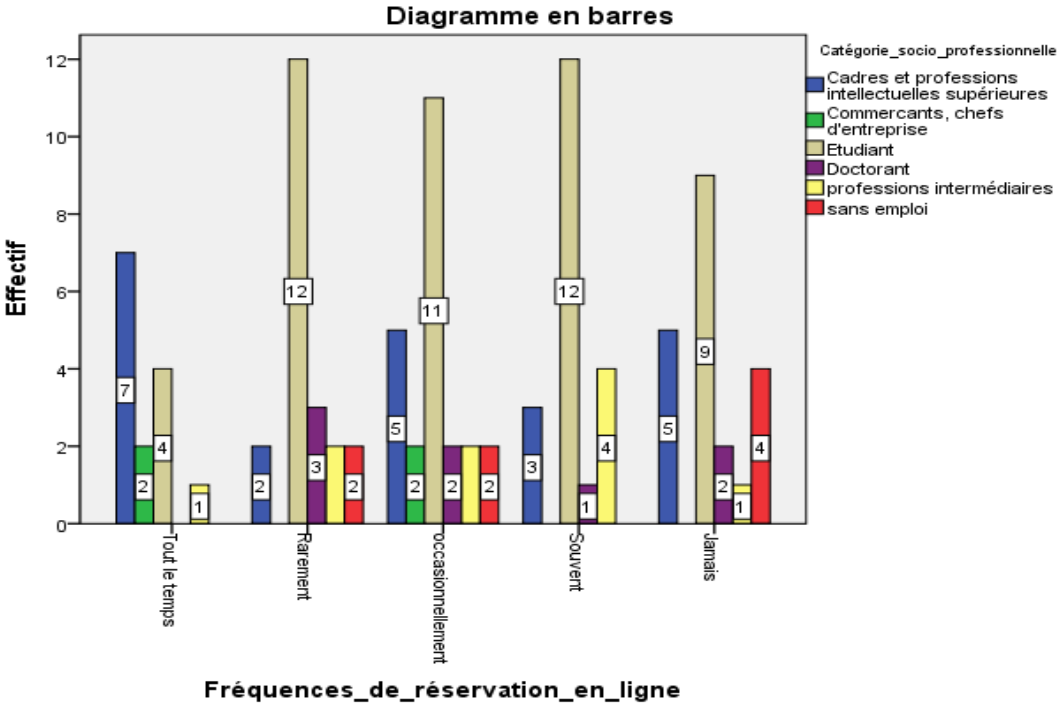

This study allowed us to note that 12% of the people questioned in our sample are students, they affirm that the degree of online reservation is occasional, while 7% of the people questioned in our sample are mainly intellectual executives and professions higher, this professional category books online all the time. Yet 4% of people who are unemployed do not book online.

2. The effect of the gender of social networks on the credibility of influencers

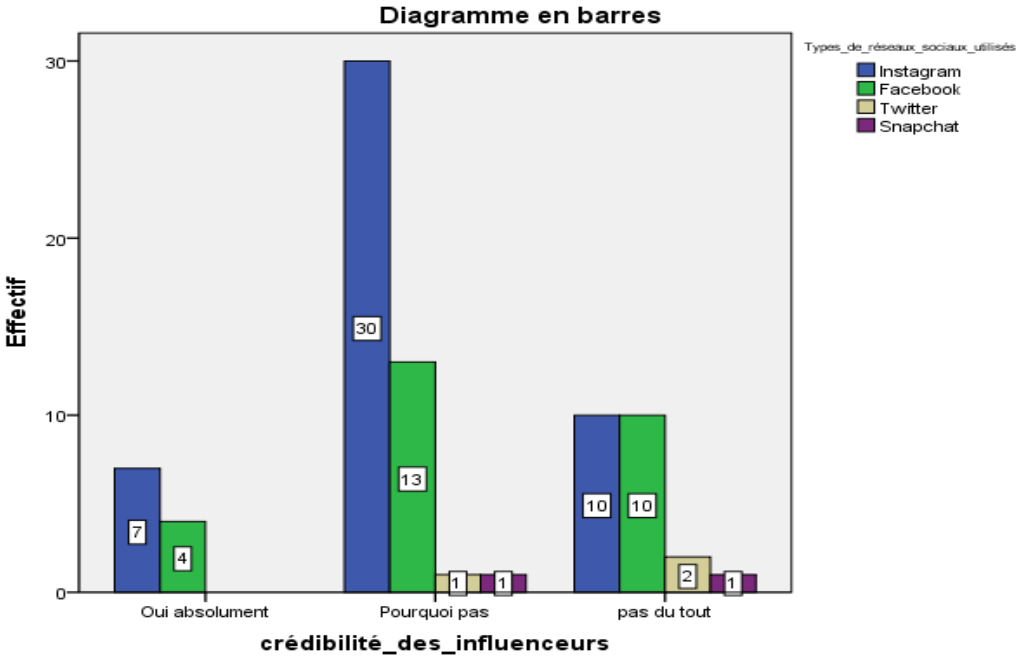

Through this study, we found that 30% of respondents trust Instagram and say why not give credibility to influencers and trust them, while 7% of respondents trust Instagram more and say that you absolutely have to trust influencers.

3. The effect of belonging to a socio-professional category on the reasons which push subscribers to book online:

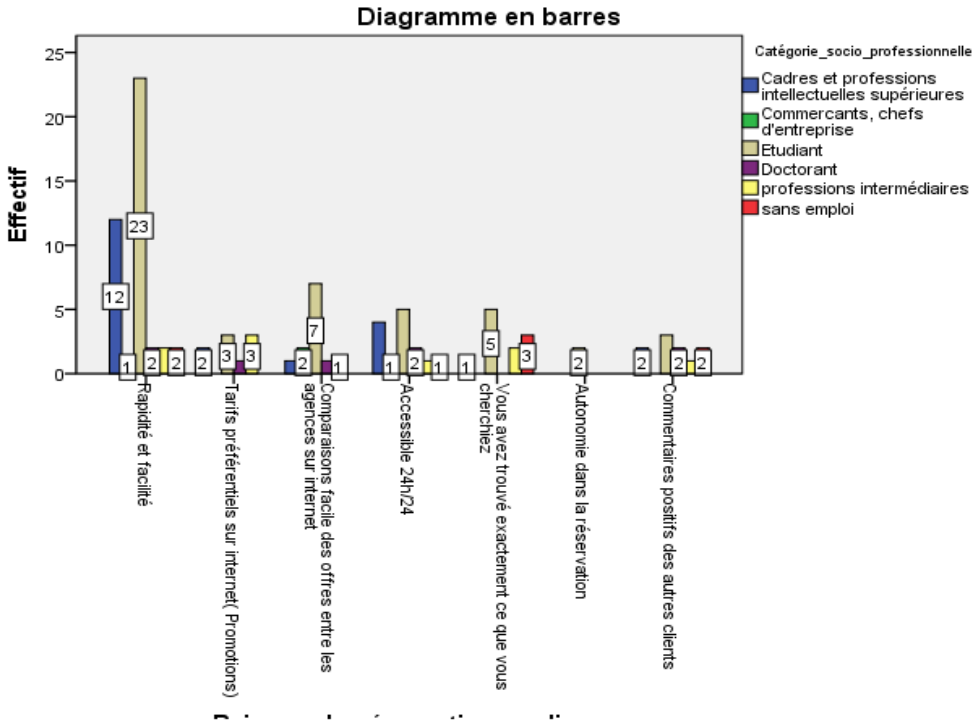

Through this study, we found that 23% of students book online because of the speed and ease of use, while 7% of students book online because of the easy comparisons of offers between agencies on the internet, yet 3% of those questioned are people who work in intermediate professions, this category books online because of preferential rates on the internet (promotions).

Multidimensional analysis : Principal correspondence analysis :

At the beginning, we chose a few variables from our quantitative study for our map.

Projection of the variables on the factorial plane

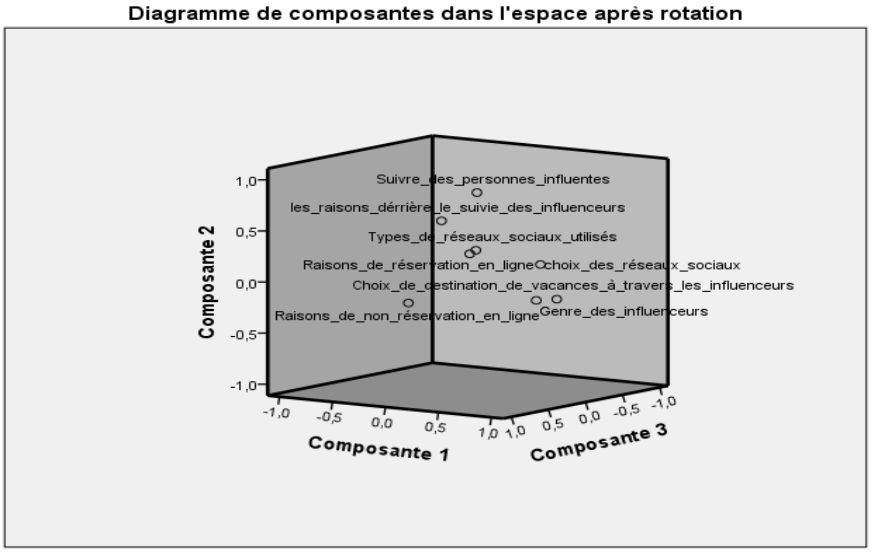

The correlations of the variables with the components:

The first axis represents the first component, it can be interpreted as being the reasons that push consumers to follow influencers, whether they are bloggers, instagrammers and youtubers, while the questions relating to the reasons that push people to follow influencers and the reasons for booking online are linked to several factors such as belonging to a socio-professional category.

So, we can name axis 1: types of social networks used

While axis 2: reasons to follow influencers

While axis 3 represents the reasons for booking and not booking online.

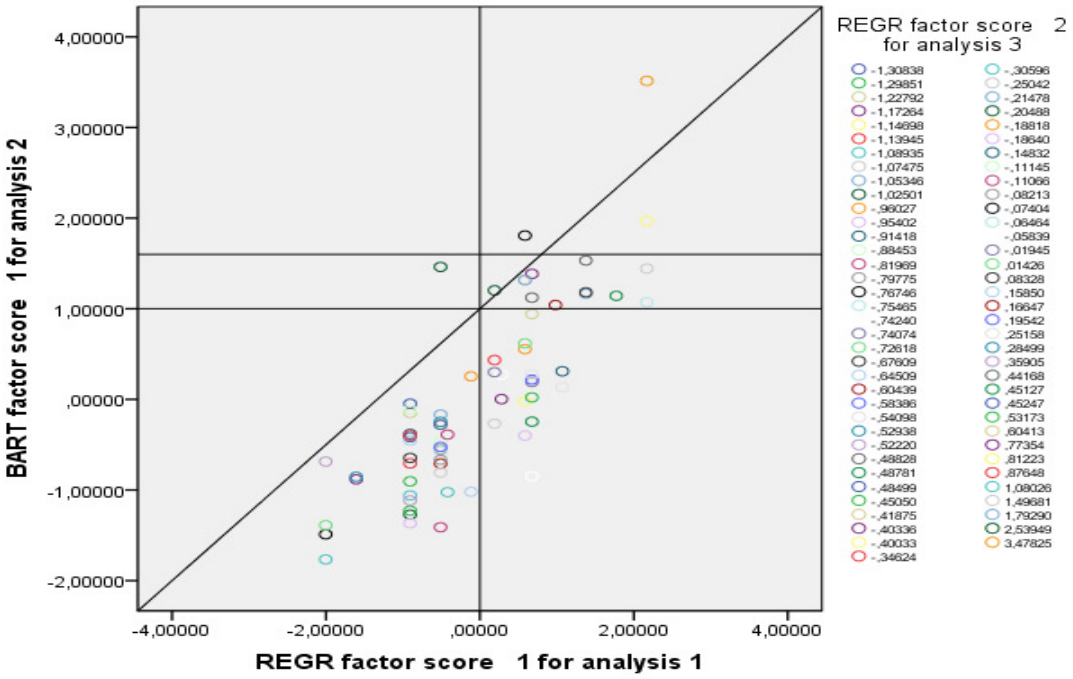

Regarding the projection of individuals on the map of individuals, we found that the majority of respondents state that this is a strong correlation between variables, which leads us to say that there is a strong relationship between belonging to a socio-professional category and online booking since we found that senior managers, students and doctoral students are more likely to book online than other socio-professional categories, those who lead to the conclusion that people who do not have a good grasp of new information and communication technologies have difficulty booking online. However, we have seen that there is still a relationship between the type of social network used and the reasons that lead consumers to follow influencers, since the most used and well-known social network by influencers is Instagram, so this allows us to conclude that in the social network Instagram, among the reasons that push consumers to follow influencers in the first place is to get ideas and advice on different fields, fashion, beauty, travel

Discussion of the results of the quantitative analysis

Our quantitative study focuses on the description of the perception of social network users towards the major role of influencers who can have a direct impact on the purchasing decision of consumers, we defined a sample of 100 people, the questionnaires were completed via the Internet on the social network Facebook. This study allowed us to start by developing a unified varied analysis which consists of measuring the variables separately through descriptive techniques, the objective of which is to describe each variable in order to subsequently generalize the result.

From this analysis we found that the majority of people interviewers say that among the reasons people follow influencers is to get ideas and advice, yet people reach out to their families, friends and influencers to ask their opinion about a purchase before making it, while the socio-cultural level and belonging to a conscious and intellectual socio-professional category is one of the main reasons that push subscribers to book in line.

However, the majority of social media users trust Instagram and say that influencers should be trusted absolutely, after developing the varied united analysis, we believe it is important to perform the two-dimensional analysis, according to this analysis, we were able to conclude that students and executives who have a certain intellectual level are more likely to book online than other socio-professional categories, and the results of this two-dimensional analysis assert that influencers should be trusted and Grant them great credibility. However, we have found it useful to carry out a multidimensional analysis, to bring out the links between the different variables, the dependent and independent variables in order to be able to detect causal possibilities between the different variables.

Through this analysis we notice that this is a strong correlation between the different variables, we can conclude that the type and the credibility of the social network used and the belonging to a well-determined socio-professional category among the factors that drive consumers to follow these people and book online.

Conclusion

Based on the results presented in the literature review, we built an idea about the role of influencers and the factors that drive people to follow influencers, as well as the reasons for booking online and the credibility of the influencer. and its impact on the relationship of trust established between the influencer and the subscribers. In the context of the hypotheses presented in the literature review, quantitative research would be necessary to test the proposed hypotheses in order to confirm or reject them. The main objective of our study is to answer the problem and identify the elements that push consumers to follow influencers on social networks and the major role of the trust established between the influencer and the subscribers so that the influencer can acquire real credibility.

This study is not unanimous but makes some very useful recommendations for the future.

First, belonging to an intellectual socio-professional category is among the reasons that push consumers to book online (either booking a trip or buying something after reading a good comment on social networks or seeing a post on Instagram published by an influencer you like), second, the trust relationship established between the influencer and their followers can have an impact or an influence on the purchasing decision of consumers.

. Additionally, when the consumer is subject to an unknown brand, the engagement with that brand is also influenced by the type of argument presented by the influencers, in other words, when the influencer promotes an unknown brand with solid and original arguments, the commitment to this brand will be even higher.

Finally, we must not forget that an influencer creates a community thanks to his domain

Expertise and this is an element that should not be overlooked for future studies.

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Marketing and Management Analysis of Pilgrimage Tourism in A Selected Area in The Czech Republic

Dr. Ing. Pavel Tvrzník

College of Business and Hotel Management Brno, Bosonožská 9, 625 00 Brno, Czech Republic, tvrznik@hotskolabrno.cz

Ing. Zdeněk Málek

PhD., College of Business and Hotel management Brno, Bosonožská 9, 625 00 Brno, Czech Republic, malek@hotskolabrno.cz

Ing. Katarína Mrkvová

PhD., College of Business and Hotel management Brno, Bosonožská 9, 625 00 Brno, Czech Republic, mrkvova@hotskolabrno.cz

Doc. Ing. Miroslav Fišera

CSc., College of Business and Hotel management Brno, Bosonožská 9, 625 00 Brno, Czech Republic, fisera@hotskolabrno.cz

Ing. Zdeněk Konečný

PhD., College of Business and Hotel management Brno, Bosonožská 9, 625 00 Brno, Czech Republic, konecny@hotskolabrno.cz

Doc. Ing. Darina Eliašová

PhD., College of Business and Hotel management Brno, Bosonožská 9, 625 00 Brno, Czech Republic, darina.eliasova@euba.sk

Abstract

Tourism is one of the most developing economic sectors, one of its developing forms being pilgrimage tourism. Pilgrimages and visits to sacred monuments are among the oldest forms of travelling, which have been developing for over a thousand years. In this report we analyse the positive and negative marketing aspects of this form of tourism for a selected monument – bazilika Navštívení Panny Marie na Svatém Kopečku (the Basilica of the Visitation of the Virgin Mary on the Holy Hill) near the town Olomouc, which is on the list of cultural monuments of the Czech Republic. The conclusions summarize the results of the analyses and generalize them for practical application in the frame of pilgrimage tourism. Selected conclusions may be generally applicable in order to increase the tourism of the area with a minimum of negative impacts, which may be an accompanying phenomenon of increasing tourism.

Keywords*:* Pilgrimage Tourism, Marketing Analyses, Marketing Mix, Strategy of Further Development.

Introduction

Tourism is currently influenced by many factors. Several works dealt with the influence of economic factors on tourism. For example, Jeřábek (2019) investigated the effects that the real exchange rates, incomes and travel cost have on inbound tourism demand (tourist arrivals). Tourism is one of the most growing economic sectors in the world and one of the forms of tourism is pilgrimage tourism. Pilgrimages and visits to sacred monuments are among the oldest forms of travelling, which have been developing for over thousands of years. Pilgrimage tourism, in a narrower sense, means travelling to visit a sacred place at a time when one of a number of specific religious events or pilgrimages is taking place there. In a broader interpretation, it is a synonym for the term sacred, religious or church tourism and is also one of the least studied forms of tourism. Exploring the economic impacts of tourism in the context of specific regions has been an important area of interest for tourism research for many years Amaro a kol. (2018),

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Málek et al. (2017), Jeřábek et al. (2018). Tourism has been identified as a catalyst to stimulate economic growth, increase the viability of underdeveloped regions and improve the living standards of local communities Geary (2018), Lukášková et al. (2018).

The paper deals with the importance of pilgrimage tourism with its positive and negative impacts on the selected region and the selected sacral monument. The presented results represent a partial part of the comprehensive research project in the field of pilgrimage tourism, the aim of which is a comprehensive analysis of the economic impacts of pilgrimage tourism within the selected monuments in the Czech Republic.

Literature Review

Religious travelling has been associated with humanity since ancient times, and its origins have been inherently linked to faith. In the beginning there is a pilgrimage as a religious manifestation where the pilgrim is considered a tourist with religious motivation Digance (2003), Turner and Turner (1987). In a broader sense, religious tourism is any journey motivated solely or partly by religious reasons Rinschede (1992). In the last decade, traditional pilgrimage destinations have also become multifunctional tourist destinations Kaufman (2005), attracting their visitors to their architectural, cultural or artistic value Hughes et al. (2013), Fernándes (2010), Geary (2018), Ramírez and Fernández (2018). In general, tourist motivation is diverse; this means that tourists have multiple motives to travel in one trip Uriely et al. (2002). An estimated 300 to 330 million tourists travel annually for religious reasons, with a total tourist expenditure of approximately 18 billion dollars per year (OMT 2014). This fact represents a significant opportunity for the development of many destinations. Academics pay particular attention to the study of motivations, interests and spiritual or cultural needs offered by religious centres Rinschede (1992), while for policy makers, both at regional and national level, pilgrimage tourism represents a significant opportunity to increase employment Egresi el al. (2014). The aim of this paper is based on the strategic analysis to point out the importance of pilgrimage tourism with its positive and negative impacts for the region, respectively for the given sacral monument – bazilika Navštívení Panny Marie na Svatém Kopečku (the Basilica of the Visitation of the Virgin Mary on the Holy Hill). In 1995, the Church of the Visitation of the Virgin Mary was elevated by Pope John Paul II. to the basilica minor.

Data and Methods

In terms of methodology, the SWOT method of strategic analysis was used, which was primarily intended for the evaluation of company management.

The SWAT analysis of strengths and weaknesses, opportunities and threats was applied both in terms of location and to a specific sacral monument. The individual factors that were analysed are arranged in a so-called SWOT matrix (Kotler (2007).

a) Strengths – these are internal factors that increase the market position and the company has an advantage over the competition. This includes, for example, a price advantage, a strong brand, the ability to innovate products, etc.
b) Weaknesses – this includes factors in which the company is weak. These are, for example, the bad position of the company, high costs, lack of distribution channels, etc.
c) Opportunities – these are possibilities that can be used by the company and thanks to them the growth of the company would increase. The company must first identify them and only then it can use them.
d) Threats – these are negative factors that mean obstacles to the company´s activities. The company must respond to these factors to eliminate or minimize them.

The data were drawn from primary and secondary sources. The result is the presentation of the SWOT analysis, which should predict the direction of further development of the region and selected sacral monuments, but above all to become an inspiring source of information for further increase of pilgrimage tourism in the Czech Republic.

Results and Discussion

The prerequisite for tourist use is the availability and level of services provided, as well as information that serves as a basic impetus for choosing a destination. Determining the right strategy is essential for the development of tourism in the area. It is necessary to use the existing potential of tourist destinations and services, thus achieving a state where Olomouc will be perceived as a creative, experiential place for a holiday of Central European importance.

SWOT analysis of the town of Olomouc:
Strengths – location of the city, main transport routes, resulting from accessibility, public transport, cultural and

historical sightseeing tourism, UNESCO monument, Flora Olomouc Exhibition Centre, church tourist potential, cycling tourism.
Weaknesses – tourists stay only for one day, parking capacity of the Flora Olomouc Exhibition Centre, lack of perception of the city, awareness of the region, a small offer of pilgrimage tourism packages.
Opportunities – growing interest in local gastronomy, interest in beer tourism, mini-breweries, development of bike paths, creation of interconnected packages, more intensive cooperation within the region, development of current tourist destinations associated with urban and sightseeing tourism, culinary tourism, creating programs for autumn and winter.
Threats – decay of historical monuments, short terms of visitors´ stay, nowadays there is also a threat of a pandemic.

When evaluating the development of attendance of the Olomouc region given in the table 1 there is a noticeable year-on-year increase of 9% on average.

Table 1: Development of attendance in the Olomouc region

Years	2014	2015	2016	2017	2018	2019
Visitors	487 641	547 538	600 106	658 059	700 112	761 433
Non residents of which	226 028	243 774	244 696	269 853	288 271	292 709

Source: ČSÚ

Olomouc is a natural centre of the region with an important monument – sloup Nejsvětější Trojice (the Holy Trinity Column), which is listed on the UNESCO list. Other important religious monuments include, for example, Arcibiskupský palác (the Archibishop´s Palace), which is still the centre of the spiritual administration of Moravia. It is also possible to visit the Cathedral of St. Wenceslas. The most famous churches include the church of St. Moritz, the church of Our Lady of the Snows and the church of St. Michael. The baroque basilica of the Visitation of the Virgin Mary on the Holy Hill, one of the most famous places of pilgrimage in the Czech Republic, has a very dominant effect. Other important monuments are for example the oldest Moravian monastery Hradisko or the Jesuit boarding school, which today, however, already serves as a university art centre. The main reason for visiting the town of Olomouc remains knowledge associated with visiting tourist attractions, historical and architectural monuments – this is the main reason for visiting foreign tourists in 70% of respondents. Only 30% of Czech respondents stated tourist attractions and historical monuments as the main reason for visiting the town. The most visited tourist attractions in Olomouc include the historical centre around the Upper Square, the Town Hall with the Astronomical Clock and the Holy Trinity Column. This was stated by 80% of surveyed domestic and foreign tourists Hamřík et al. (2018). An important factor for the economy of tourism in a given locality is the length of stay, which is one of the basic indicators for evaluating the attractiveness of a given locality, resp. of the town of Olomouc. Graph No. 1 shows the share of the stay length of Czech and foreign tourists. Czech tourists prefer to stay in Olomouc for only one day, namely 55% of the total number of respondents, while foreign tourists stay in Olomouc for more than one day, namely 35% of the total number of respondents Hamřík et al. (2018)

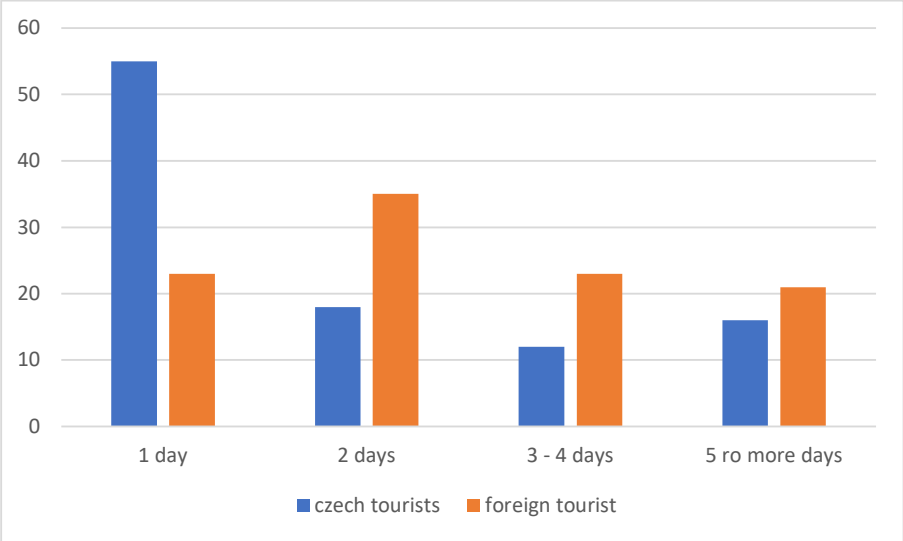

Graph 1: Length of stay in Olomouc (in percentages)

Source: ČSÚ

SWOT analysis of the pilgrimage site of the Visitation of the Virgin Mary on the Holy Hill Strengths of the place of pilgrimage – in 2018 it was declared a cultural monument of the Czech Republic, in 1995 it was promoted to a basilica minor, part of the pilgrimage route, built tourist facilities, open daily, barrier-free access, transport accessibility, updated website, proximity to the ZOO, guide service, nature trail Svatý Kopeček (the Holy Hill), within the site you can visit other places of pilgrimage, such as the Cathedral of St. Wenceslas in Olomouc, the Church of Our Lady of the Snows in Olomouc, the Church of St. Michael in Olomouc, the Church of St. Moritz in Olomouc and the Holy Trinity Column, a UNESCO World Heritage Site.

Weaknesses of the place of pilgrimage – photographing and filming the interior of the basilica Visitation of the Virgin Mary on the Holy Hill is possible only with the consent of the Strahov Monastery and the spiritual administration. The tours take place only in Czech, in exceptional situation also in English. Other negative sides are also small cooperation with the travel agency, paid entrance fees even out of season, insufficient parking capacity during the main tourist season.

Opportunities of the place of pilgrimage – not only the support for the development of pilgrimage tourism from the point of view of the European Union, but also the support from the national, i.e. the Czech Republic point of view. It can be financial contributions, organizing various events to raise the profile of the place of pilgrimage and the development of tourism. Cooperation with churches of other countries within Europe and thus the creation of preconditions for the interest of foreign visitors, for a visit to a pilgrimage monument, can be considered as another opportunity for the place. A prerequisite for greater attendance at the pilgrimage site is the organization of cultural events in the Czech Republic.

Threats of the place of pilgrimage – the biggest threat is insufficient funds obtaining for the necessary repairs of the building, or expansion of the area, building the necessary structure of services, etc. The safety of visitors and guides, who could possibly lose interest in visiting the pilgrimage monument, is closely connected with this threat. This would be associated with the decline of tourism or the outflow of visitors abroad for other pilgrimage monuments.

Svatý Kopeček (the Holy Hill) is one of the most important tourist destinations in the town and in the region. However, it is also an important starting or ending point for walks and hiking and cycling activities in the surroundings of Olomouc. Graph No. 2 shows that the number of visitors to the basilica makes up 5% of the total number of visitors to the region.

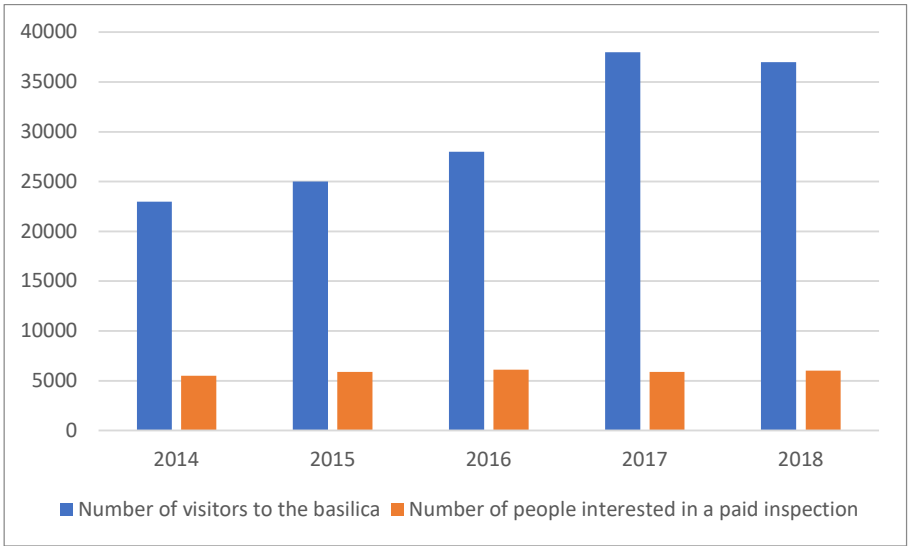

Graph 2: Number of visitors to the basilica out of the total number of visitors to the region

Source: own survey

Graph No. 3 shows an increase in the number of visitors to the pilgrimage site, which amounts to 3-4 thousand visitors year-on-year, while the interest in paid tours has been declining by about 500 people year-on-year since 2016.

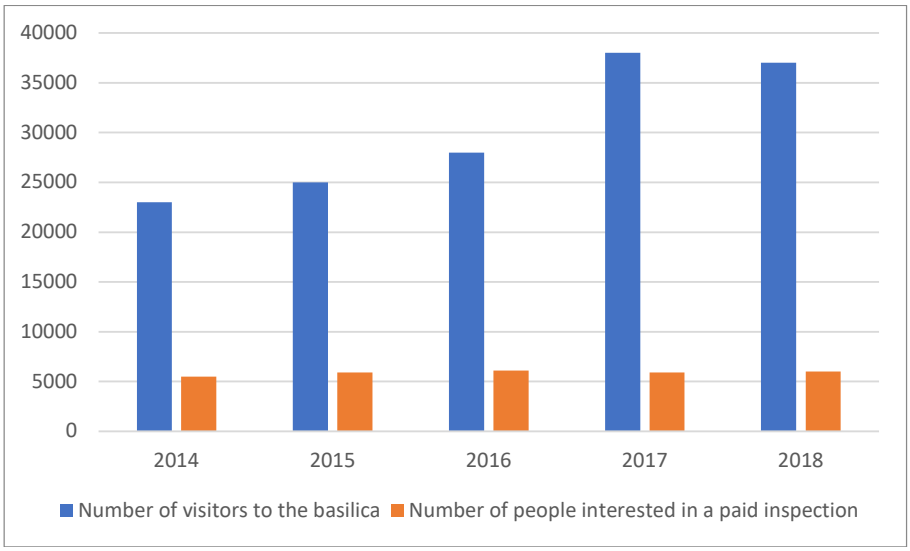

Graph 3: Number of people interested in a paid inspection

Source: own survey

An important factor for the development of tourism is the availability and form of information provided throughout the Olomouc region. Visitors to the town prefer electronic information sources, regardless of whether they come from the Czech Republic or from abroad. Internet search engines are an essential elements in obtaining information about the town, according to 40% of the respondents. 23% of the respondents used the town´s promotional materials for their decision to visit Olomouc, and only 7% of the respondents used the accommodation facilities´ websites. In the questionnaire survey, 20% of the respondents refer to the recommendation of a visit from friends and only 7% of the respondents refer to the recommendation of travel agencies Hamřík et al. (2018).

To increase the number of visitors to sacred monuments, the priest´s personal recommendation will continue to be an

important source.

Conclusion

Our analyses show an increasing interest in the Olomouc region. Parking is a problematic area from the point of view of tourist ratings, which is an almost limiting factor even in the case of a place of the pilgrimage and ZOO.

The most visited attractive places include the narrowest part of the historical centre around Horní náměstí (the Upper Square), the Town Hall with the Astronomical Clock and the Holy Trinity Column, the Basilica of the Visitation of the Blessed Virgin Mary on Svatý Kopeček the Holy Hill, both for Czech and foreign tourists. They prefer electronic information sources when searching for information.

In order to support the extension of the length of stay, it would be appropriate, in addition to the services provided, to offer ready-made packages that will become a marketing incentive. The creation of new tourist packages, together with the modification of the existing ones, will be a motivating component for the length of stay. However, the creation, editing and promotion of travel packages do not only concern accommodation facilities, but also sport opportunities, cultural and spiritual experiences, which are gaining in popularity due to the hectic times.

Promotion before important events, many tourists are aware of which, is of great importance. The aim to the promotion is to attract new tourists to the area. The advertising campaign should be understood as a continuous process of reaching potential tourists and attracting them to the diverse range of tourist activities that the area abounds in, thus increasing the overall interest in tourism.

A major weakness of the pilgrimage site is the lack of cooperation with travel agencies. From the above overview, it is clear that the biggest problem of pilgrimage tourism in the Czech Republic is its insufficient promotion. It is necessary to focus on the widest possible target group and the development of promotion and information of potential tourists, with the proviso that pilgrimage tourism is not just a matter of believers. A necessary prerequisite is the readiness of the monument (facilities, parking sites, guides, websites) for increased tourism. The basic precondition for the application of the above conclusions is the understanding and interest of the part of the owner of the monument and, above all, the common support and promotion of pilgrimage tourism in the Czech Republic and abroad. The weakest aspect of the Basilica of the Visitation of the Virgin Mary on Svatý Kopeček (the Holy Hill) near Olomouc can be considered the absence of a guide who would make an explanation of the basilica in English. Fulfilling this aspect would increase the growth and interest of visitors from abroad.

The findings show that pilgrimage tourism will continue to develop. Travel agencies, together with cities and owners of sacred monuments should understand that common promotion is a key prerequisite for the development of tourism. The question of further research is what is the interest of the church and what would be the potential effect of the development of pilgrimage tourism to “unprepared” places of pilgrimage, and how to set the limit of sustainable development without negative impacts.

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Prospects for Application of Risk Management Method to Implement Merger and Aquisition

Yulia VERTAKOVA
Southwest State University, Kursk, Russia, vertakova7@ya.ru

Inga VSELENSKAYA
Southwest State University, Kursk, Russia, ingachka28@mail.ru

Abstract

Automated methodology of risk management in strategy implementation mergers and acquisitions is a well-developed model that can potentially be an effective instrument in the process of leveling the risks of mergers and acquisitions. This fact necessitates approbation of this method and an analysis of its advantages and disadvantages with the identification of prospects for the practical application of the method.
In this article, the process of approbation of the method of risk management of mergers and acquisitions is carried out, the shortcomings of the method are revealed and the ways to eliminate them and improve the application were proposed.

Keywords: mergers and acquisitions, risk management of mergers and acquisitions, risk management method, method automation, method testing.

Introduction

The developed and automated risk management method with the selection of the most adequate risk management instruments for each stage of the implementation of a merger and acquisition transaction, proposed by I.V. Vselenskaya in her article "Development of a risk management model for a merger and acquisition transaction" serves as the basis for the formation or improvement of internal management of the company participating in the transaction, a new or existing model of an effective risk management process, which will be able to reduce time and labor costs, as well as obtain other positive effects, that will lead to an increase in the efficiency of management of mergers and acquisitions.

However, to achieve this effect, it is necessary to approbate this method, to critically analyze its advantages and disadvantages.

Short Literature Review

This article will test the risk management model proposed by I.V. Vselenskaya in her article "Development of a risk management model for a merger and acquisition transaction" (Vselenskaya , 2019).

The first stage of model testing is the identification of the stage of the transaction, since each of the ten stages of a merger and acquisition transaction has its own set of characteristic risks (Vertakova et al, 2020).

Determining the stage of the transaction is most conveniently done according to the algorithm for forming a transaction, developed by Vselenskaya I.V. (Vselenskaya , 2019).

For purposeful, most effective risk management, the characteristic risks are ranked within each stage according to the level of significance in descending order.

As part of the development of a risk management model, each risk is assigned by its own unique number from R1 to R51.

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In addition, each risk needs its own relevant instruments to manage it. So, the stage of integration procedures has its own set of risks:

- The risk associated with a lack of resources for the transaction;

- The risk of slowing down the integration process and failure to fulfill its plan;

- The risk of a decrease in the productivity of employees of the target company, a drop in work discipline;

- The risk of rupture for relationships with counterparties: customers and suppliers;

- The risk of underestimating the complexity of building an effective corporate governance system in the merged company;

- The risk of failure to achieve integration goals due to the dependence of the target company on large customers;

- Risks of having duplicate contracts with suppliers (Plotnikov et al, 2019).

Each risk has two key characteristics: the likelihood of risk occurrence (measured from 0 to 1) and potential losses (measured in c.u.).

Within the framework of an automated risk management model, it is necessary to assess these key characteristics for each risk of a specific stage.

After introducing the probability of occurrence of risks and potential losses from them, it is necessary to enter the maximum value of potential losses, which will be located along the horizontal axis on the "risk map", which clearly illustrates the risks of the considered stage of the merger and acquisition transaction.

After entering all the input parameters, by pressing the button "Show risk map", a "risk map" appears, on which the entered risks are marked with black dots, as well as the zones of criticality of these risks.

When the user hovers over any point that denotes a particular risk, a callout appears on the map with the risk number in order (from R1 to R51), the name of the risk, the probability of its occurrence (from 0 to 1), losses (in c. u.) and a relevant instrument for its management, which allows you to visually and quickly see what measures need to be taken to manage the risks under consideration.

Results and Discussions

We are testing the risk management method using the example of a merger and acquisition of Expobank and Kurskprombank. On January 21, 2020, Expobank and Kurskprombank announced the beginning of the integration process and launched a reorganization procedure in the form of a merger.

The choice of this transaction was due to the regional aspect, the relevance of the transaction, as well as the availability of accessible and reliable information in open regional sources.

Deal mergers and acquisitions of Expobank and Kurskprombank are currently at the stage of successful completion of integration procedures[1]. The presence of the completed stage of integration gives grounds for a comparative analysis of the real results of the transaction, obtained in practice, and the results of applying the developed methodology of risk management.

Within the framework of an automated risk management model, we will assess the key characteristics for each risk in specific stage.

[1] Expobank completed integration with Kurskprombank. URL: https://www.finanz.ru/novosti/aktsii/ekspobank-zavershil-integraciyu-s-kurskprombankom-1029035526 (In Russian). (The date of access 23.08.2020)

The sufficiency of Expobank's resources to conduct a transaction can be assessed by comparing the amount of financial resources required, that is, the cost of the transaction, and the amount of availability of financial resources in the form of company's free funds before the transaction.

According to the consolidated statement of financial position of Expobank as of 31.12. 2019, cash and cash equivalents amounted to 18,543,227 thousand RUB.

The cost of the transaction is not disclosed in open sources, but it can be estimated. According to the demand for the repurchase of equity securities of the joint-stock company, the purchase price of one ordinary share of Kurskprombank was 104,27 rubles as of 31.12.2019[2]. The number of Kurskprombank shares acquired by Expobank is 87.2%. The total number of Kurskprombank shares as of 31.12.2019 was estimated at 31,5 million shares. The calculation of the transaction value is presented in Table 1.

Table 1: calculation of the transaction value Expobank and Kurskprombank

Price shares (rubles)	Number of shares (in million pcs.)	Share of acquired shares (%)	Transaction value (in million rubles)
104.27	31.5	87.2	104.27*31.5*87.2/100=2864.1

Source: by authors

Consequently, the cost of the transaction can be estimated at 2864.1 million rubles or 2.9 billion rubles.

This estimate is confirmed by data from periodicals, the Kommersant newspaper, according to which the transaction amount could have amounted to around 2.4 billion rubles [3].

The amount of available funds, equal to 18,543,227 thousand rubles, is 6.4 times higher than the need for funds for the transaction, which indicates the minimum risk of lack of resources for the transaction, therefore, we estimate the probability of this risk at 0.05.

The integration process can be slowed down for external and internal reasons. External reasons include the situation of the coronavirus pandemic, which creates forced delays, increases administrative and bureaucratic barriers. According to open sources, coronavirus reduces the number of mergers and acquisitions and negatively affects the entire market[4]. As for internal reasons, integration can be hampered by disagreement and lack of interest in the transaction of any of the parties. The merger of Kurskprombank, according to experts, will help Expobank strengthen its corporate business and take a strong position in the Chernozem region.

In turn, for Kurskprombank, this deal will unlock its potential and strengthen its market positions and product line for the experience and technological platform of Expobank.

Since both parties benefit from the transaction, this risk for internal reasons can be considered rather low, and for external reasons - high, therefore, in general, the risk of inhibition of the integration process can be assessed as above average at the level of 0.65.

After the transaction is completed, Expobank wants to preserve the team and business model of Kurskprombank, which means that no layoffs and worsening conditions for employees are expected, therefore, the risk of a decrease in the productivity of employees of the target company and a drop in work discipline can be assessed below average, at the level of 0.25.

[2] Demand for the redemption of equity securities of a joint stock company URL: https://kurskprombank.ruabout/press/news/2035/(In Russian). (The date of access 23.08.2020)

[3] Expobank acquired 87.2% of Kursk Industrial Bank. URL: https://tass.ru/ekonomika/6403745(In Russian). (The date of access 23.08.2020)

[4]Coronavirus cuts down on corporate mergers and acquisitions and negatively affects the market IPO. URL: https://zen.yandex.ru/media/id/5d6de4bfc6e2a400adda0a5f/koronavirus-sokrascaet-korporativnye-sliianiia-i-pogloscenii-i-negativno-vliiaet-na-rynok-ipo-5e83c1627aa354744888a855 (In Russian). (The date of access 24.08.2020)

The risk of breaking customer relationships can be considered high, at 0.75. The high risk is due to the fact that the Expobank brand is unknown in the Chernozem region, which may cause mistrust among individuals - Kurskprombank's clients, most of whom were people of retirement age.

In addition, despite the fact that all agreements remain unchanged, the presence of large borrowers in the regional market of Kurskprombank's presence determines the presence, albeit insignificant, of the risk of failure to achieve integration goals due to Kurskprombank's dependence on large clients.

Thus, a major client of Kurskprombank was, for example, OOO "Nipromtex" (Zheleznogorsk)5. Therefore, this risk can be estimated below average, at 0. 30. According to the Information on the qualifications and work experience of the Expobank management, most of the management positions are held by highly qualified, professional specialists with extensive experience in the area related to their responsibilities, therefore, such specialists are adequately able to assess the complexity of building an effective corporate governance system in the merged company, and the risk underestimation of this complexity can be estimated below average about 0,35[6].

Due to the fact that Expobank was not represented in the region of Kurskprombank presence, the risk of duplicate contracts for both banks is minimal, and can be estimated at 0,02.

Losses from all types of risks are assessed as much as possible, thereby considering the most pessimistic forecast.

The maximum losses that Expobank is expecting to incur can be judged by the cost of the transaction and all the costs associated with its execution. According to the expert opinion, the costs of connecting a bank are compared with the costs of opening a new branch that is similar in its capabilities, location, and specialization of activities and nature of services7. The opening of a similar branch of the bank in the Chernozem region can be estimated at 1,85 million rubles8, and Expobank merges 32 branches of Kurskprombank. Thus, the calculation of the maximum potential losses from the Expobank and Kurskprombank transaction is presented in Table 2.

Table 2: Calculation of the maximum potential losses from the Expobank and Kurskprombank deal

Transaction value (mln. rubles)	Branch opening cost (million rubles)	Number of branches Kurskprombank	Costs for the transaction (million rubles)	Maximum losses (million rubles)
2864.1	1.85	32	1.85*32=59.2	2864.1+59.2=2923.3

Source: by authors

Realization of the risk of lack of resources for the transaction will lead to maximum losses in the amount of total costs of the transaction, that is 59.2 million RUB.

Slowdown of the integration process and failure to fulfill the plan of integration procedures will lead to insignificant losses in the form of payment of fines and late fees. We estimate them at 0,5% of the transaction value9, that is, 0.005 * 2864.1 million rubles = 14.3 million rubles.

[5] The main achievements of OAO "Kurskprombank" are stability and efficiency. URL: https://kursk.bezformata.com/listnews/kurskprombank-stabilnost-i/33307347/(In Russian). (The date of access 25.08.2020)

[6] Information about the qualifications and work experience of Expobank's management. URL: https://expobank.ru/upload/iblock/1d9/1d93085ad6054e81d93396fc56437551.docx (In Russian). (The date of access 25.08.2020)

[7] Kovshevich O.T. Processes of mergers and acquisitions in the banking sector // Bulletin of the BDU. Ser 3. 2006. No. 2. P. 99-104 (In Russian)

[8] Open a bank: what you need to open a branch, franchise on credit. URL: https://sbsnss.ru/otkryt-biznes/franshizy/banki.html (In Russian). (The date of access 26.08.2020)

[9] Penalty for delay in performance of obligations under the contract. URL: https://nalog-nalog.ru/dogovory/neustojka-za-prosrochku-ispolneniya-obyazatelstv-po-dogovoru/ (In Russian). (The date of access 26.08.2020)

Realization of the risk of a decrease in the labor productivity of Kurskprombank employees, a fall in working discipline will maximally lead to the costs of hiring new personnel, their training, which, according to experts, may amount to 170.4 million rubles.[10]

The rupture of relations with the former clients of Kurskprombank will lead to significant losses, which can be assessed as strong, since the share of retirement age clients is high, which is explained by the presence of a large number of pension programs, and pensioners personify Kurskprombank as a reliable bank directly connected with the region of presence in the city of Kursk. Let us estimate the losses as a maximum in the amount of the total amount of Kurskprombank's deposits before the transaction, that is, in 2045.3 million rubles.[11]

As a result of underestimating the complexity of building an effective corporate governance system after the merger of Kurskprombank, losses in the amount of payment for third-party services for organizing corporate governance in the new company may arise. According to expert estimates, these services amount to about 0.1 million rubles for one branch. Therefore, for 32 branches – 3.2 million rubles.[12]

The presence of large clients, in connection with which the integration goals may not be achieved, can lead to potential losses in the form of the departure of these clients and the withdrawal of all deposits in Kurskprombank in the amount of 2826.5 million RUB.[13]

As for the losses from duplicate contracts, they are minimal and equal to the costs of renewal of contracts, which can be estimated at about 0.1 million rubles. The values of probabilities and losses are briefly presented in Table 3.

Table 3: probability of risk and loss for the Expobank-Kurskprombank transaction

Stage	№	Risks	The likelihood of a risk	Losses (in million rubles)
Integration procedures	R_{36}	The risk associated with a lack of resources for the transaction	0.05	59.2
	R_{37}	The risk of slowing down the integration process and failure to fulfill its plan	0.65	14.3
	R_{38}	The risk of a decrease in the productivity of employees of the target company. a fall in work discipline	0.25	170.4
	R_{39}	Risk of breaking customer relationships	0.75	2045.3
	R_{40}	The risk of underestimating the complexity of building an effective corporate governance system in the merged company	0.35	3.2
	R_{41}	The risk of failure to achieve integration goals due to the dependence of the target company on large customers	0.30	2826.5
	R_{42}	Risks of having duplicate contracts with suppliers	0.02	0.1

Source: by authors

As a result of the introduction of the maximum value of potential losses, the program automatically divided the horizontal axis into five equal parts, according to which losses from 0 million rubles to 584,66 million rubles are

[10] Expobank income and expense report. URL: https://kuap.ru/banks/2998/profit/quarter/ (In Russian). (The date of access 26.08.2020)

[11] Bank balance sheet Kurskprombank. URL: https://analizbankov.ru/bank.php?BankId=kurskprombank-735&BankMenu=f101&year=2020&mon=3 (In Russian). (The date of access 27.08.2020)

[12] Corporate governance. URL: http://kpd-100.ru/korporativnoe-pravo/korporativnoe-upravlenie-i-delegirovaniya-polnomochij (In Russian). (The date of access 27.08.2020)

[13] Bank balance sheet Kurskprombank. URL: https://analizbankov.ru/bank.php?BankId=kurskprombank-735&BankMenu=f101&year=2020&mon=3 (In Russian). (The date of access 27.08.2020)

estimated as minimal, from 584,67 million rubles to 1169,32 million rubles as weak, from 1169,33 million rubles. up to 1,753,98 million rubles. as average, from 1,753.99 million rubles up to 2338,64 million rubles as strong, from 2338,65 million rubles to 2923,3 million rubles as maximum.

The “risk map” of the deal between Expobank and Kurskprombank at the stage of integration procedures is as follows (Figure 1).

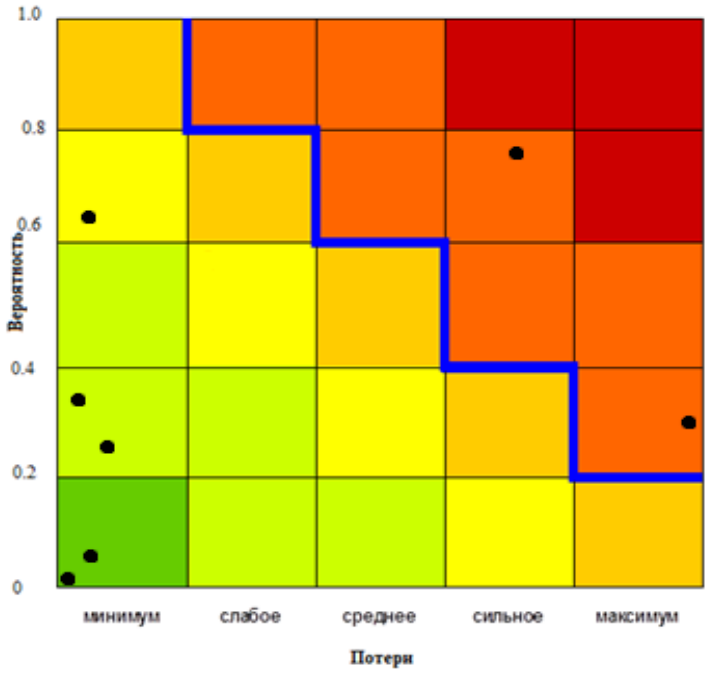

Fig. 1: "Risk map" of the transaction between Expobank and Kurskprombank at the stage of integration procedures

Source: by authors

According to Figure 1, insignificant risks are located in the green zone, namely, the risk associated with a lack of resources to conduct a transaction, and the risks of having duplicate contracts with suppliers.

The most critical risks are the risk of rupture of customer relationships and the risk of failure to achieve integration goals due to the departure of large Kurskprombank customers, since they are located in the orange zone. These risks require the most attention and priority management, since this transaction has no risks in the red zone.

The program allows you to visually see what measures need to be taken first. So, when you hover the cursor over a point corresponding to one of the two most critical risks, namely the risk of breaking relationships with customers, an offer appears with a relevant tool for managing this risk - the development of customer retention measures.

At the stage of integration procedures, the deal between Expobank and Kurskprombank did not actually encounter the risk identified according to the risk management methodology, since after the merger of Kurskprombank, the most important task for Expobank is the retention of each client. All the terms of cooperation remained the same as before the integration, the level of service, tariffs, and contracts[14]. Other theoretical risks of the Expobank-Kurskprombank deal did not materialize in reality.

This fact confirms the presence of the identified most critical risk and the effectiveness of the methodology in determining the relevant tools for managing it.

[14]“Expobank" and "Kurskprombank" decided to integrate. URL: https://46tv.ru/novosti/jekonomika/124747-jekspobank-i-kurskprombank-prinjali-reshenie-ob-integracii.html (In Russian). (The date of access 25.08.2020)

However, the approbation of the automated risk management methodology also revealed some shortcomings of the model.

First, the model does not provide the ability to perform a comparative analysis of risks that are in the same area. It is not always possible to clearly determine the proximity to the next most critical risk zone. The accuracy of this definition is insufficient. Therefore, in the process of making a decision on the priority of risk management measures that are in the same zone, it is necessary to take into account the level of their significance, assessed according to the methodology of the Vselenskaya I.V.[15].

In other words, in each zone, first of all, take measures to manage the most significant risk, regardless of the place it occupies in the zone.

Thus, the priorities of risks at the stage of integration procedures of the Expobank-Kurskprombank transaction, excluding and taking into account their level of significance, are as follows (Table 4).

Table 4: Risk ranking at the stage of integration procedures of the Expobank and Kurskprombank transaction, taking into accounts the zone and level of significance

Stage of risks	Zone	Without regard to the level of significance	Given the level of significance
The risk associated with a lack of resources for the transaction	dark green	6	6
The risk of slowing down the integration process and failure to fulfill its plan	yellow	3	3
The risk of a decrease in the productivity of employees of the target company, a fall in work discipline	light green	5	4
Risk of breaking customer relationships	dark orange	1	1
The risk of underestimating the complexity of building an effective corporate governance system in the merged company	light green	4	5
The risk of failure to achieve integration goals due to the dependence of the target company on large customers	dark orange	2	2
Risks of having duplicate contracts with suppliers	dark green	7	7

Source: by authors

Thus, we see that the list of risk priorities has changed, albeit insignificantly: the risk of a decrease in the productivity of employees of the target company, a drop in work discipline should be highlighted to earlier than the risk of underestimating the complexity of building an effective corporate governance system in the merged company, based on its significance level.

This fact suggests that the level of significance must be taken into account when determining the measures necessary to carry out within the framework of risk management in the implementation of a merger and acquisition transaction.

Secondly, the most significant drawbacks of the model include the subjectivity of assessing the likelihood of risks and losses from them, which entails the need to attract qualified professional experts in the field of mergers and acquisitions to assess them, which is associated with additional financial costs.

[15] Vselenskaya I.V. Characteristic risks of a merger and acquisition transaction // Management consulting. 2019.No. 9.P. 106-120 (In Russian)

Thirdly, the model needs to take into account the specifics of the industry. So, for example, in the considered case we are talking about the banking sector, in which there are no providers of banking services and contracts with them, which makes it difficult to assess risks.

Conclusion

The developed automated risk management model in the implementation of mergers and acquisitions is almost universal tool for managing risks arising in integration processes.

Approbation of the model has proven its effectiveness when comparing the theoretical results of applying the risk management model and real results mergers and acquisitions in practice.

However, in the process of approbation, some shortcomings of the model were revealed: the lack of consideration of the level of significance of the risks under consideration when prioritizing in risk management tools, the subjectivity of the assessment of key characteristics of risks, and the lack of consideration of the specifics of the industry in which mergers and acquisitions are carried out.

In general, taking into account the listed shortcomings and the proposed improvements, the risk management model can be considered effective.

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Management System Dynamic – Alternative Model for Management System

Behnam POURAHMADI and Joanna KAŁKOWSKA

Poznan University of Technology
Faculty of Engineering Management
Poznan, Poland,
Email: behnam.pourahmadi@doctorate.put.poznan.pl
Email: joanna.kalkowska@put.poznan.pl

Abstract

Nowadays, the challenge of having sustainability in the path of the growth and development for enterprises has become more complex due to the complication of the business environment correlated with organizational systems along with technologies and socioeconomic fluctuations. Moreover, in the rise of these complexities, the demand for new knowledge-based approaches and innovative methods to control the hurdles is vital for the management sectors to provide solutions and surpass the complications in the total function of organizations and corporate businesses. Therefore, to continue the assessment of the organizational sustainable development, In this article, the research focus on analysing the underlying nature of complexity based on the system thinking in order to present a dynamic solution-based approach to reduce complexity issues inside the organization systems by proposing an effective model for enterprise sustainability via growth and development. The structure of the model expands on a regular basis by assessing growth and development along with disorder and order in a systematic manner inside the organization. Moreover, the research presents the model as an instrument for the managers to observe the progression/regression in the enterprise to chart a path toward sustainable growth and development. Consequently, the research forwards to develop, test, and verify the model as an alternate path for finding a solution for the current issues of corporate management, organizational behavior and modern management systems connected with sustainable growth and development along with the information complexity in the condition of an enterprise.

Keywords: System thinking management, Sustainable growth and development, Organizational sustainability, Management system.

Introduction

The forms of macro and micro economic activities are taking shape based on the data and information analysis, and hence the global powers are competing over the amount of data collection storage which will give them the power to apply strategic approaches toward the future to control the mass population in a wrong way. Meanwhile, management systems are transforming distinctively over the enhancement of the technology, which evoke a demands for innovative approaches via optimizing management processes in the hands of humans as elements rather than Artificial Intelligence (AI). The forms of business transformation, are totally effected by advanced Information and Communication Technology (ICT) along with the modern feature of technology enhancement such as AI, which represents the complexity of the systems inside the organizations that are growing too fast-forward. Due to these effects, there is a need for an essential solution requirement to balance between the advancement of technology in favor of humanity, not the machines.

At the corporation level, the power of synthesis and analysis are vital for any management sector due to the platform of planning and decision making at strategic, tactical, operational levels. In the meantime, the tools which are using by managers are important, and it has to give them the proper leverage to observe and act in an appropriate time. However, the complexity of the information should not be overloaded in the process of analysis in which cause chaos and disorder in the outcome of processes (Bertalanffy L., 1968, p.41). These massive expansion of data, will increase the complication of the global enterprises transaction, mainly in economic and business terms. Therefore, the complexity arisen by the effect of ICT and in the near future by Internet of Things (IoT) needs to be controlled and simplified as soon as it's possible.

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Sustainable development is another criterion that has a node connected to the upcoming challenges for enterprises, in a way that staying out of the border of it will bring many consequences. Altogether, Sustainability is one of the most important aspects in any form of business along with continuous improvement to reach a positive stage in growth and development inside and outside of the structure of the enterprises. Moreover, the sustainable development criterion is showing the global system of economic, social, environmental are totally interconnected and there should not be a jeopardize for the future by the present actions. Therefore, maximizing profit in the present should not compromise the future for the next generations, which emphasizes the value of having an equilibrium by a degree of sustainable growth and development with more order and less disorder. The importance of corporate management relation with the sustainable development criterion is becoming more significant, due to the policies of the United Nation in the business environment (Business, United Nation Main Website).

Meanwhile, there are pioneers in the criteria of organizational sustainability such as Peter Senge, Michael Porter, Paul Hawken which has contributed valuable methods to regulate the sustainability in the system of organizations and corporations at different levels. However, yet we are facing global issues in terms of cohesion in sustainability as a unified concept, which by the COVID-19 pandemic, many aspects of the current issues have risen profoundly. Therefore, one of the key aspects of this research is to propose an alternative approach to synthesis the knowledge behind the criteria of sustainability with management and organization systems.

Aim of the Research

The aim of the research is to proposing an innovative systematic model for the management based on the system thinking from the second law of thermodynamics to management system and organizational sustainability. The objective of the model is to perform as a sustainability equalizer for managers from any levels within an organization. The model emerges to observe and improve the performance of facilities in the criteria of growth and development with lower disorder and higher-order to finally reach sustainability in the path of growth and development.

The methodological approach on this research is systemic and it is set to withdraw a start line from the core aspect of the system's life cycle, which is time and entropy that have been chosen by the works of Stephen Hawking and Peter Atkins, also these concepts from authors perspective are linked to the system thinking and management criteria by the works of *Russell Ackoff*, that in the future will connect it to the works of *Jay W. Forrester* and *Peter Senge* in the system dynamics and the fifth discipline.

Also, there are methods to measure management performance correlated with sustainability which is Performance Measurement and Management Systems (PMMS). However, there is a need for more work in the process to evolve this method to combine more with IT systems and enhance its functionality (Libetruth T., 2017).

In a research study by Mossel, Rijnsoever, and Hekkert (2017), they suggest that the researcher rendering their finding in the compound of different theories to adjust their awareness for finding the proper theory for the transition toward sustainability (van Mossel A., van Rijnsoever F., Hekkert P. M., 2017).

For achieving a regular sustainable enterprise, there is a need for a new model to function as a sustainability equalizer for layers of information in the cycle of the management system dynamics of the corporate business, due to organizing more order and reduce omissions. The enterprise as a dynamic system has a considerable effect to its surrounding and if the system that lose its perception over the functionality of its entity as a whole inside the existence environment and damage its core, then it will finally eradicate its own existence (Ackoff, 1999, p.19). Nevertheless, there should be an equalizer platform for the whole functionality of the enterprise from the cause and effect of the outsight perspective.

The entropy and information inside a system

The system definition come from many perspective. According to Ackoff they can be classified in many different ways eg. by size, discipline, location, and by function (Ackoff, 1999, p.21). In a general explanation, a system can be the sum of some elements that work together as a whole or vice versa, for a purpose. Meanwhile, the nature of our existence is system based along with time. Based on system thinking the relation between the information and entropy has an attachment with the management and organizations due to the systematic nature of the enterprises onward to the business economy. In the historical background, there was a consideration on the research study by Von Bertalanffy (1968), *the general system theory* in which brought a productive perspective to the scientific practices (Von Bertalanffy, 1968).

In the corporate management, the control of almost all sectors is under the command of the managers in different types, which are systematically interconnected onward to applying strategies for the whole organization. Moreover,

the organization as whole in any enterprise has fluctuation of data transaction which bring us back to system criteria and how a system works.
In the system thinking approach, there are difference between analysis and synthesis, in the book by Ackoff (1999) describe the difference in following steps:

The difference of analysis and synthesis come from the first action which in analysis we separate parts to smaller segment and will continue as long as possible to reach to the most minimum levels and at the end we aggregate the results and define the outcome. Meanwhile in synthesis we consider the part as a segment of a bigger whole and assess the outcome base on the whole picture, and the same goes for understanding the behavior of parts (Ackoff, 1999, p.11).

The information measurement had an obstacle due to the definition and the elements of calculation and quantification until creation of the information theory, which had an impact on the formulizing the information in communication platforms and it provide deep analytical method to observe the transaction of information in the communication channel by introducing advanced models (Floridi L., 2010, p.6). However, this was a start for more complexity in the technology development.

According to Floridi, ICT have brought a profound change to the world in a straightway (Floridi, 2010). In one way, ICT has brought a lot of benefits and opportunities to the people welfare, education, prosperity, knowledge next to enhancing economic and science advantage. On the other way, ICT brings tremendous risk by increasing the complexity of the global problem in a serious way. As an analogy information society is considering as a tree in which has been reached to the highest level of branches which has more chaos and uncertainty, lack of balance than its ethical and cultural root (Ackoff R., 1999, p.22).

The concept of thermodynamic has been emerged during the 19 century due to the development of industrial proficiency. Particularly, steam engine development that had a significant impact on the progress of the industrial evolution in time. The father of thermodynamics known as Nicolas Leonard Sadi Carnot a French military scientist and physicist, on his published book as *Reflection on the motive power of fire* in 1824 (Atkins P., 1994). Sadi Carnot's effort was to develop a successful theory of the maximum efficiency of heat engine, due to the importance of steam engine performance in the competition of the industrial countries in his time era.

The laws of thermodynamic consist of four laws, which start by the zeroth law: the concept of temperature, the first law: the conservation of energy, the second law: the increase in entropy, and the third law: the unattainability of zero (Atkins P., 2010). Altogether, the laws of thermodynamics have the proficiency to incorporate with many aspects of science. Particularly, the management system dynamics, organizational behavior, and ICT science due to the works of theories such as *general system theory* and *information theory* in which, had an indication of the second laws of thermodynamics as the entropy. Moreover, this criterion has a designation to management science and its related protocols due to the systematic nature of the management and corporation cycle in business, thus, it will lead us to the laws that define the natural behavior of a system, which entropy is the most important one. However, in a deep interpretation of the four laws of thermodynamic, all aspect of it could be interconnected with management and organization science.

The second law of thermodynamics, entropy, is famous among various scientific fields which provided plenty of definitions in the variable scopes. Furthermore, the entropy provides exposition that why any change in any system takes place in nature (Atkins P., 2007, p. 50). Consequently, the second law can imply the criteria of management system dynamics, organizational behavior, and sustainable growth and development, etc. the interdependency of the systematic works of managers inside the enterprise as an organization is correlated to entropy in the processes and the outcomes due to its consistent nature. The description of the process comes from the fabric of a general system due to its lifecycle and timeline in figure 1.

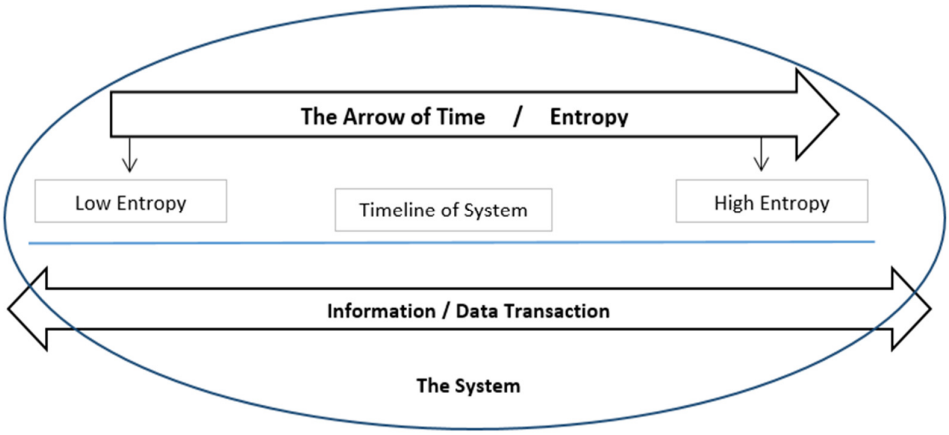

Fig. 1: The description of the entropy and information inside a system

source: own study

First of all, in the book by Hawking (1988) the arrow of time is one way forward and this is a fact for all existed systems in the world. Second, the entropy coexists next to the time and it has a direct connection with the arrow of time, so both of them work together (Hawking S., 1988). Moreover, in the natural world, since the entropy of a system increase by passing time, the entropy moves forward to create more disorder spontaneously (Atkins P., 1994). However, the function of entropy is far beyond this simple definition and it has vast interpretation to move energy from one system to another. Furthermore, the information and data can be comprehended as a unit of transaction in a system that can act similarly as a thermal unit in thermodynamic due to its function, which means by increasing information, the entropy will increase spontaneously.

In this research, the proposed model for the sustainability of the enterprises in growth and development emerges out of the concept of time and the second law of thermodynamics, and it has the potential to illustrate a relative proportion of a systematic view from the status of the enterprise in management and organization sciences. In addition, entropic approaches through the course of the management and organization studies have been conducted, in a way to compound the second law of the thermodynamics with these criteria to conclude a method to measure the total entropy of the organization. Therefore, the research toward entropy conducted due to organizing more structure toward the information circulation in management systems and organizations. Due to the relation of the entropy and information, there is a significant impact on the process of management inside the organization. The demand for information is vital to increase the quality of decision making. Moreover, information as one of the key resources has a direct connection to the entropic level of the organization (Markina I., Dyachkov D., 2014). However, the scope of entropic approach toward socioeconomic environment has not been specific enough to cover the technical terms in condition of the systematic approaches (Markina I., Dyachkov D., 2014).

Model

The conception of the research model exist in the course to propose a multidimensional instrument to define sustainability toward growth and development for the organization, and also provide a vision for the managers to implement proper strategies and stabilize the condition of their sectors. The framework of the research model has been demonstrated in figure 2 to show the structure of the sustainability equalizer as the research model.

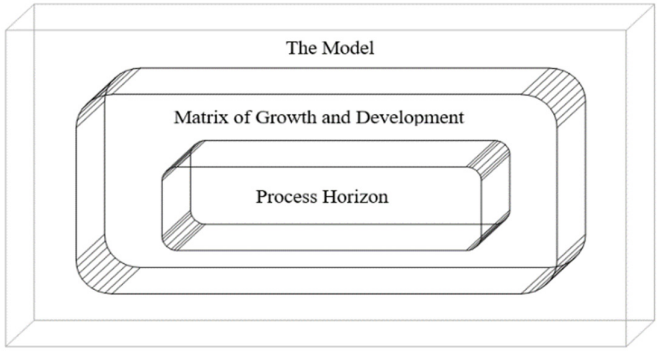

Fig. 2: The framework of the model,

source: own study

Furthermore, one of the main objective of the research model is to develop a degree of sustainable growth and development as a resolution for the issues which has close encounter with the systematic problems. Therefore, managers can have a better outlook on the performance of their team and also implements strategies to maintain the growth and development in a sustainable manner toward the effectiveness and productive work, which in figure 3 the ideal process is demonstrated to show the conception of the model.

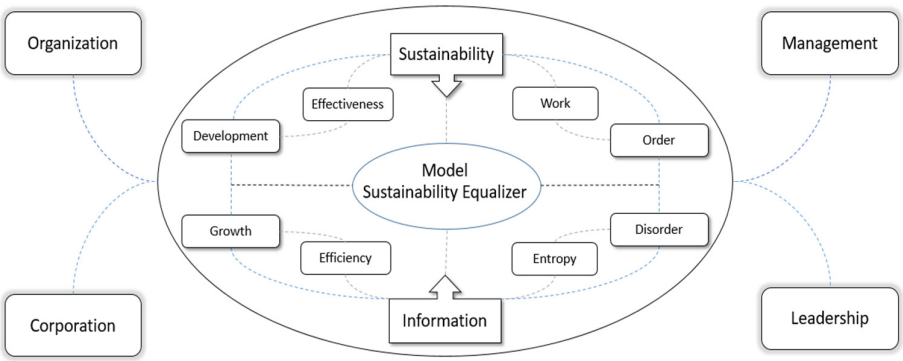

Fig. 3: The conception of the model, source:

own study

In accordance with the model functionality, the model consists of two parts. First, the matrix to identify the current position of selected sector in the path of growth and development. Second, is the process horizon which defines the effects of the information inside the matrix of growth and development as a lever of control upon the transformation of the work and entropy process, (Figure 2). Moreover, in the both structure of the model, the design emerges from the literature review perspective over the system thinking, entropy and information along with sustainable development. Therefore, time is a base in the both forms as it has a cohesive connection to all elements of the model as well. Concurrently, to explore all aspects of the model in more detail, each element will be discussed separately to express the connection to the aim of the model.

The arrow of time

Time is one way forward and every process in the system of nature has the attachment to it (time is the fuel of the universe engine). Everything has a timeline, and hence from the time passage, the transformation will take shape. Based on the literature review, in the book by Hawking (1988) on the second law of thermodynamics, one of the bonds to the time is entropy that defines which bypassing time the entropy of the universe system will increase (Hawking S., 1988). Similarly, the procedure of growth is interdependent to the time process. Therefore, in comparison to a systematic environment, the growth could be positive or negative in the direction of time passage (Atkins P., 2007, p.55).

The Growth

Growth can be defined as the increase in the variety of terms and conditions in the passage of time, which can be a process to increase mass or size. Furthermore, growth has a direct connection with time, and hence the process of growth occurs in the passage of time. In accordance to the literature review on the system thinking section, growth is the measure of efficiency (Ackoff R., 1999, p.10).

The Development

Development is a process that has connection to growth and it can be unified by the growth toward progress. Therefore, development can be a boost with growth to increase productivity and effectiveness. In accordance to the literature review on the system thinking, development is the measure of effectiveness in the management and organization system (Ackoff R., 1999, p.10). The development element inside the model has four-stage along with the process of growth and it is interconnected to the passage of time. Therefore, development can merge at a low or high level with growth in which the result together can achieve different levels of sustainability.

The Sustainability

Based on the United Nation Brundtland Commision in 1987 definition, sustainability is "meeting the needs of the present without compromising the ability of future generation to meet their own needs" (Academic impact, United Nation Main Website). Therefore, based on the second law of thermodynamics in the literature review, to maintain a sustainable process, it needs to be adjusted in a way to reduce entropy and increase the work (Atkins P., 2007, p.78). Sustainability in this model is the result of effectiveness and efficiency in one unified intersection. Consequently, there will be a scale of instruction that can lead to a degree of sustainable growth and development by the management sector.

Furthermore, in continue to explore the process horizon as the second part of the model, all elements of this part will be discussed to express the relation to the aim of the model.

The Disorder

The disorder can be defined as perplexity and disorganization in the function or pattern of a system (Bertalanffy L., 1968, p.159). In accordance with the literature review, the second law of thermodynamics, the disorder has a relation with the increase of entropy, which by the increase of entropy, the disorder will increase as well to a higher state (Atkins P., 2007, p.50). Therefore, there is a connection with the passage of time and entropy with the disorder in a system. However, next to entropy in the process of transformation there is the *work* process as well, which in return can create more order and effectiveness. In the research model, the disorder, in the management and organization system is an element that can lead toward losing sustainability. This process will result in degrading the procedure of growth and development to the lower level. Additionally, it can lead the system to chaos and collapse at a higher level.

The Order

Order can be defined as an arrangement of things in a pattern of harmony in a system. It can provide a sequence of alignment in the process of a system (Bertalanffy L., 1968, p.208). Furthermore, the order in a sequence of harmony can produce accuracy as the result of systematic work. Unlike the disorder, the order has no direct connection with entropy and time. In accordance with the research model, based on the *work* process, through the management and organization system, the order is an element that can maintain sustainability and support the procedure of growth and development to upgrade toward higher levels. Therefore, in the model, the process horizon will provide a scale in the production of work in information transformation.

The Information

The information and data are the most valuable assets for any business organization in a way to consume and produce it matters the most. However, the information has the capacity to be in a clear and conductive state or result in a polluted and overloaded state. Based on the literature review, the reason why information has been chosen in process horizon lays in the analogy that in an organization system, the information can almost act similarly as a heat element in thermodynamic state, which it means by the increase of the information in an organization system, the entropy and disorder will increase as well (Bertalanffy L., 1968, p.150). Similarly, the information can be comprehended as the artery of data transactions among departments of an organization in the procedure of growth and development, and

hence the element of information is considered as a factor in the transformation of processes inside the process horizon. All in all, the elements of the model together shape a platform for synthesis and analysis toward the intersection of growth and development, next to the process horizon of the order and disorder of information in a sustainable manner.

The function of the model incorporates with the result in one framework, and also give an outlook to the managers to act accordingly to the requirement to improve the scales by applying strategies and methods to their department, and hence they can be aware of changes by continues assessment due to functionality of this model. Therefore, the management will have an instrument to transform the organization of the enterprise toward sustainability and maintain it.

The main four-elements of the model which altogether result in sustainability, has categories to collect data from the organization according to their classifications. Moreover, each element has four-parameter. Similarly, For providing a test example for the model the scale could divide into four numerical percentages accordingly with the parameters. Hence, the numerical percentage will be made from 25%-50%-75%-100% in which provide measurable range by the result of the survey on a linear scale to calculate the answers as an identified percentage. This process will provide transformations from the result of the survey to input data for the model which interconnects the percentages to the parameters. Altogether, extracting raw data from the test survey based on the answers of the participants will be measured on a linear scale, also the data will transform to the result as percentages, and hence the input data get provided for the model.

1. Development
    - Knowledge Acquisition 25%
    - Knowledge Maturation 50%
    - Wisdom Evolution 75%
    - Effectiveness 100%

Each stage in this part depict the level of the development which can been considered for the hypothetical organization. However, these variables can adjust in the definition according to the organizational system priorities.

2. Growth
    - Formation 25%
    - Innovation 50%
    - Amplification 75%
    - Efficiency 100%

Each stage of growth is connected to the timeline and it also has variables to propose the categories of growth in the lifecycle of the chosen organization. Also, the same proposition goes for the disorder and order.

3. Disorder
    - Low level of information complexity flow
    - Medium level information complexity flow
    - High level information complexity flow
4. Order
    - Low level of work flow
    - Medium level of work flow
    - High level of work flow

According to the description of the model, in the first step, the depiction of the matrix of for growth and development is showing in the figure 4. Also, in the second step, the depiction of the process horizon is showing in the figure 5. Moreover, these two figure are the fundamental character of the model. All in all, both representation conclude the sustainability equalizer in one framework (Figure 2).

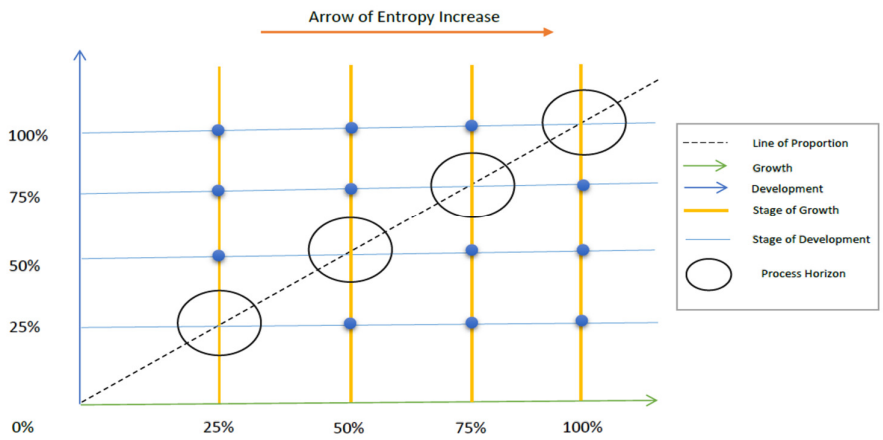

Fig. 4: The matrix of the growth and development

source: own study

In figure 4, the matrix of growth and development has four stages for growth and development. Also, in figure 4, the intersection between two elements are the nodes which connect the stages of growth and development. In addition, the line of proportion is showing the ideal direction toward growth and development in a sustainable manner. The process horizon is the second part of the model in which after the identification of the intersection, the process will zoom in into the node to control and observe the order and disorder in which it has explained in the figure 5.

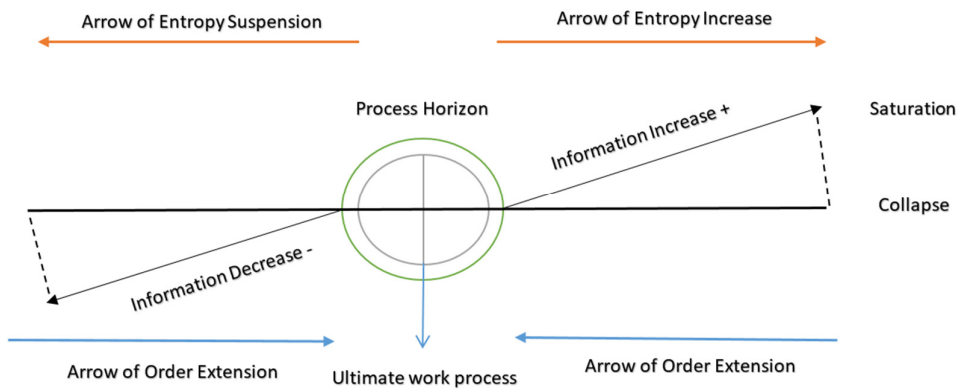

Fig. 5: The conceptual model of the process horizon

source: own study

The process horizon in figure 5, is the most important part of the research model in terms of information effect in the process of producing work by the transaction of the information in the structure of the system. It has been shown that both negative and positive information injection into the system can cause consequences in saturation and collapse. However, in the negative injection, the procedure is different than the positive side due to the synthesis of the effect in the result of the system, which is not functional in this criteria. Therefore, the main model only focuses is on the information positive transformation in the system to synthesis the dynamic of transformation. The essence of the model is relying on the sustainability equalizer toward growth and development, and it has ability to transform information effectively to knowledge-based arrangement.

Conclusion and future works

The objective of the paper has been conducted in the direction to propose a model for sustainable growth and development as an initiative platform. In this research, the methodology was a systematic compound of the second law of thermodynamics, system theory (system thinking), information, and sustainable development criteria along with organizational behavior and management system to create a sustainability equalizer. Furthermore, the model has more potential to evolve in the future, and also has the capacity of complexity reduction which by diminishing the

disorder in the process horizon, the complexity of information processes will reduce and more order takes place. Moreover, in the model, the complexity via the information which rises to a higher level in the process of growth and development can be controlled in a way to create more work along with the upgrade of the levels of productivity. Therefore, inside the model, the control of information and complexity can be achieved in the processes based on the management control of the system.

According to the articulation of the complication issues that comes from the technology advancement and information overload in the structure of the corporate facilities and organizations, along with the importance of the management control toward the path of growth and development, the result of the research was affirmative due to the test which provide a path to reduce complexities augmentation in a sustainable platform. It can be concluded, the model has the potential to utilize as a multidimensional instrument as a sustainability equalizer for the managers.

The future work of the research is to continue the enhancement of the model in a comprehensive technical approach in functional terms, specifying all details by standardization of all parameters and define strategies for different conditions from regression to progression. Additionally, all core elements will be specialized in an advanced way, and also there will be defined methods for leading toward an upgrade to fulfill all aspects of sustainable growth and development in a system based manner. The model can use platforms such as business intelligence (BI) or AI algorithm to extend its ability toward measuring progression/regression in positive technical terms in the future via equilibrium with technology.

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Improving the Labor Safety and Operational Efficiency of The Company: Synergy Is Possible and Necessary

Alexey Georgievich KORYAKOV
Financial University under the Government of the Russian Federation, Moscow, Russia
agkoryakov@fa.ru

Oleg Igorevich ZHEMERIKIN MIREA
Russian Technological University, Moscow, Russia
ozhemer@yandex.ru

Martinas PRAZAUSKAS
Bournemouth University Poole House, United Kingdom
prazauskas@mail.ru

Abstract

It is customary to pay considerable attention to safety issues at the enterprises characterized by harmful and dangerous productions. The labor protection system, existing in the Russian Federation, imposes specific, sometimes strict requirements on economic agents. Nevertheless, the rate of occupational injuries in our country is higher than in industrialized countries. As entrepreneurs consider the costs of occupational protection inevitable, they seek to improve their operational efficiency by reducing these costs and economizing. The authors of this article consider such an approach to be outdated. The article describes the mechanism of improving operational efficiency of the company by means of transition to "smart" labor protection process management which increases its safety.

Keywords: labor protection, operational efficiency, costs, personal protective equipment, "smart" management, digitalization.

Introduction

Advanced technologies are conquering new spheres of human acitivities – from everyday life to the most complex productions. At the same time, the problem of labor protection at the enterprise in its broadest meaning has not become irrrelevant. It is often when the management of the company believes that the costs of labor safety and labor protection are generally unproductive, just increasing the prime costs and have to be tolerated solely by virtue of the current norms of Russian legislation. In this case, the operational efficiency decreases, and the localization of labor-intensive industries in the countries with "preferential" legislation seems to be an optimal management decision. However, as we see it, it is not entirely correct. The experience of Vostok-Servis-Kuzbass LLC clearly shows that the use of information technologies in VMI (Vendor Management Inventory) supply chain management systems as well as in training and knowledge verification enables to reduce industrial enterprise's total costs on PPE (personal protective equipment) by 40%, while the costs of training, knowledge verification, briefing and giving access to upcoming production tasks can be reduced by 20-30%.

Methods

This study of the experience of Vostok-Servis-Kuzbass has been carried out by using the methods of systemic, logical, and comparative analysis. The findings will be used in the management activities of the company itself as well as at new partner enterprises in case of the further spread of the practice described.

Results

Vostok-Servis-Kuzbass LLC is the organizational part of Vostok-Servis federal holding and has been supplying overalls and personal protective equipment (hereinafter – PPE) to industrial enterprises of Kuzbass and neighboring regions for over 25 years. The market the company operates in is highly competitive from suppliers and is characterized by strong bargaining power of buyers. The clients of the company are the enterprises of basic sectors of industry, such as coal, metallurgical or chemical sectors. Moreover, the climatic conditions of the region leave their

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traces on the requirements for PPE, which predetermines the need to ensure not only competitive price level, but the quality of products as well.

One of the main problems of the region in the field of labor protection is the industrial injuries. A sad axiom, known to every resident of Kuzbass since their childhood, says: “Every million tons of coal mined to surface takes one life of a miner”. According to the figures given by Kuzbass regional office of the Fund of Social Insurance of the Russian Federation, the level of industrial injuries in Kemerovo region is significantly higher that the averege level for the Russian Federation (see figure 1 below).

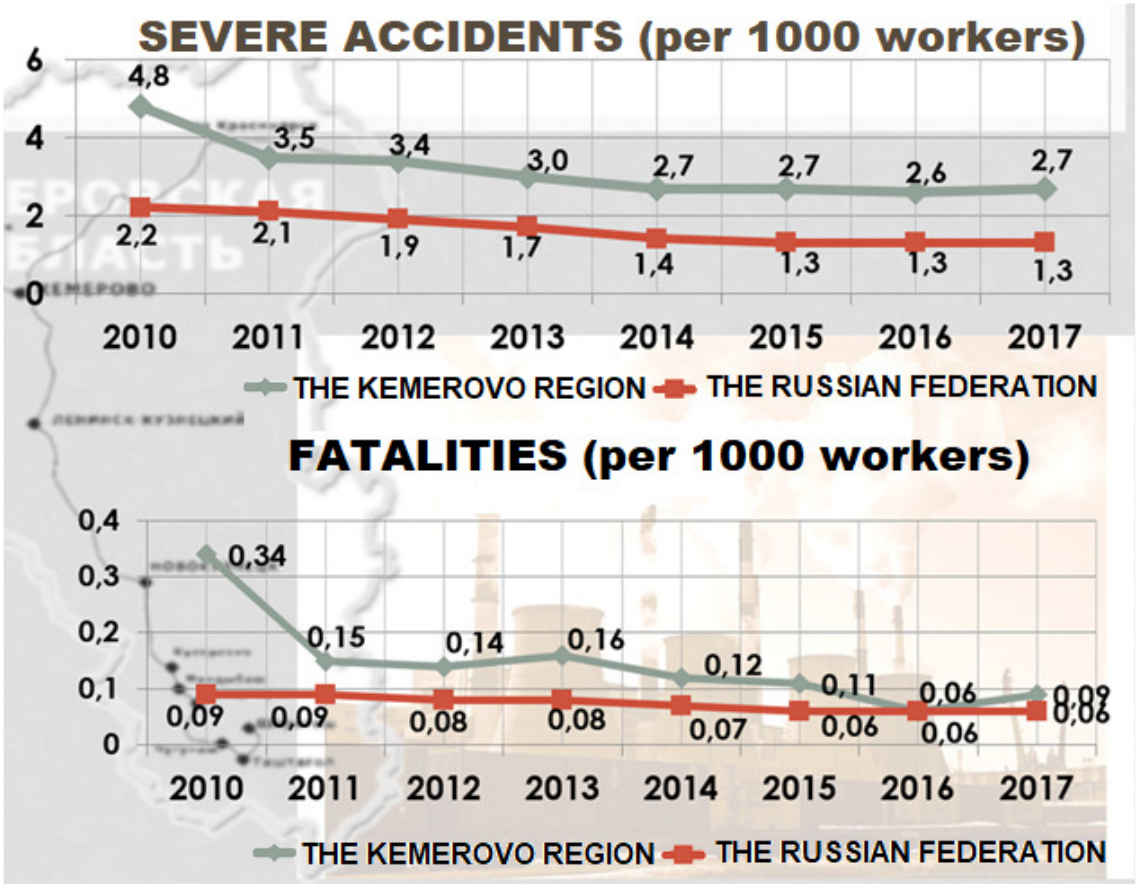

Figure 1: The dynamics of industrial injuries (severe accidents and fatalities) in the Kemerovo region

The authors consider digitalization of business processes relating to labor protection at the enterprises of basic sectors as one of the possible ways of solving this complex problem. The real minimization of the opportunities for human influence in the cases when there is a choice between the fulfilment of the production plan and the safety of continuing the production process will reduce the level of industrial injuries, including the severe accidents and fatalities.

The other significant problem concerning the labor safety system is the so-called “industrial necessity” of maintaining the quantities of residues of overalls and PPE in the warehouses of an enterprise [2]. Such necessity is due to the fact that it is impossible to predict with 100% certainty what type or size of overall or PPE may be required at a particular moment, as there is a natural movement of workforce, and despite the established standards on wear and tear, it is often when the PPE is replaced as a result of its becoming unusable. On the contrary, there are situations when the wear period has come to an end, but the PPE is still suitable for use; but since there is no control other than warehouse accounting, the worker is given a new pack set of overalls, while the old one – being absolutely suitable for use – is transferred to employee’s household for their personal use. [3], [7] Such a transfer of income in favor of the employee is not taken into account and forms the employer’s transactional costs, which the latter cannot even estimate. Moreover, discovering the defects in the supply of overalls is possible only when a set has been already handed to the worker. And if there is a defect in the warehouse stock, there has to be a stock to replace it.

The authors have analyzed the situation in the Kemerovo region concerning the procurement of overalls and PPEs for enterprises. The results of the analysis are summarized in table 1. There are 52167 enterprises and organizations in Kuzbass. They employ 780983 people in total. The share of those employed in hazardous and dangerous productions is about 34% or 267433 people. 65% of employees (507638 people) are in need for overalls. On average,

the annual cost of PPE given for one employee is 10570 roubles per person for those employed in dangerous or hazardous productions and 1350 roubles per person for those working under normal conditions. Thus, we can see that the annual volume of the PPE market in Kuzbass should be at the level of 3,132 billion roubles. Therefore, it can be said that the level reflects the socially necessary costs on PPE in the region per year. At the same time, the analysis of actual purchases clearly shows that the figures are incomparably higher.

The structure of employees	Number of employees	Average annual costs of procuring PPE per one employee, rub	Socially necessary costs on PPE	PPE actual purchase volume (by enterprises), roubles	Overexpenditure on PPE, roubles
Total number of employees in Kuzbass	780983				
Employees working on hazardous productions	267433	10500	2 808 046 500	4 071 667 425	1 263 620 92
Employees working under normal labor conditions in need for PPEs	240205	1350	324 276 750	502 628 963	178 352 213
Total number of employees in need for PPE	507638	6170	3 132 323 250	4 574 296 388	1 441 973 138

The source: summarized by the authors

As follows from Table 1, the difference (overexpenditure) between the necessary and actual costs of the enterprises of Kuzbass on purchase of overalls and PPE is 1,44 billion roubles. This is the amount of truly non-productive costs that the enterprises incur managing their business processes of labor safety. At the end, these costs are paid for by either the end consumers, or the employees when they buy the consumer goods based on the products manufactured by their enterprises, or the owners of the enterprises, missing profits when their products are exported and the price is quoted on world and regional trading platforms. The latter is applicable to coal, coke, fertilizers, the products of metallurgy, etc.

The way out of this situation, as authors see, is the widespread implementation of information technologies for supporting managerial decisions in order to ensure “smart” labor safety process management at the enterprise. By this category, we mean such management, which increases the quality of labor protection and operational efficiency at the same time. The quality of the labor protection will be characterized by the indicators reflecting the level of industrial injuries, the average number of days of incapacity for work per employer, employees’ satisfaction with their work conditions and employees’ motivation to work safely. A number of other indicators reflecting the instructions of control and supervisory authorities (Rostechnadzor, labor inspectorate, etc) can be added as well. [4] As concerns the increase of operational efficiency of the enterprise, we, first of all, see the possibilities of digitalization in such a type of chain supply management, which minimizes enterprise’s inventory balances, implements the principles of economical production and limits the costs only to those that are truly necessary for the end buyers.

The specialists of Vostok-Servis-Kuzbass LLC have developed and launched online service which, in our opinion, solves all the above problems. This product of the company is given the trade name “Abie”.

Its concept is based on three principles:

- Twenty-four-hour online availability for the user;

- Named data fixation;

- Real-time display and analysis of the situation.

The basic element of this system is a personal professional card containing information from the HR department about the employee as well as actual data on four main areas of labor protection (see figure 2): *working conditions* (the result of assessing negative factors at the workplace), *protective equipment* (the data on the state of PPE in production

and the terms of their renewal), *health* (the result of medical assessment of employee's state of health), *knowledge and skills* (the result of daily testing on safety and labor protection).

Figure 2: The schematic diagram of working functionality of Abie online service

This data is collected in cloud storage and is protected similarly to online banking data. The system analyzes the incoming information, conducts calculations and represents them in the personal professional card in an easy-to-understand graphical and tabular form. Data summary from personal cards is generated in thematic reports on labor protection at the enterprise. As a result, the system allows creating objective criteria for assessing the personnel and their motivation towards labor safety. The employee is able to verify his level of professional training and his safety personally.

The advantages of the Abie system, that affect the operational efficiency of the enterprise directly, include:

- High accuracy of planning and accounting the labor protection budget;

- 100% efficiency of spending;

- Zero balance of PPE on the balance of the enterprise;

- The absence of any restrictions on the number of suppliers of PPE and overalls;

- The absence of any need for arranging individual contact briefing (with a specialist of labor protection department or a foreman) on safety in case of routine work;

- Reducing the cost of periodic medical assessments with synchronous increasing the level of ongoing monitoring of the employee's health.

Thus, the Abie digital service allows carrying out "smart" management of business processes in the field of labor protection, considerably reducing occupational injuries and increasing operational efficiency of the company.

The use of the Abie online service is the most beneficial for the enterprise when the PPE supply management is processed on VMI model (Vendor Management Inventory – the stock is managed by the supplier). This model has been known since the beginning of 1990s and is used in many companies from Fortune 500: Wal-Mart, Procter & Gamble, Gilette, Mediamarkt. In the Russian market it is used by such companies as Coca Cola, Metro, Real, Wimm-Bill-Dann, etc [5, 6]. Its meaning lies in the fact that the supplier takes over the PPE stock management at the consumer enterprise. In this case, the supplier has access to the information on the consumer's stock and creates purchase orders for him.[7] By means of the Abie online service, the PPE supplier creates an accurate picture of the

needs of each employee of the enterprise for PPE, and combining and structuring the needs of several consumer enterprises, the PPE supplier will be able to optimize the delivery of necessary PPE on time and in full compliance with both nomenclature and the range of overalls and PPE. To describe such a model, one can use the category "Collaborated Forecasting, Stock and Replenishment Planning" or joint forecasting with suppliers and distributors as well as planning of stocks and their replenishment.

Conclusions

At present, 82 enterprises of Kuzbass with a total of 80 000 people have switched to the Abie system. Among them, there are such well-known companies as Evraz, SDS Azot, OF Raspadskaya, Sibugelemet, etc.

The transition to "smart" labor protection process management at Kuzbass enterprises will allow reducing industrial injuries, increasing the number of days of employees' working capacity, improving the quality of working conditions and personnel's motivation to safe work. By increasing the operational efficiency of the enterprise through reducing the remains of PPE in warehouses, timely receipt of necessary resources, reducing labor costs for training, testing knowledge on labor protection and issuing access to necessary productional operations, the Abie system is able to bring a cumulative economic effect in the amount of up to 1,4 billion roubles per year just within one constituent entity of the federation.

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Intelligent System Support Potential in Manufacturing Process Management

Fredrick MUMALI and Joanna KAŁKOWSKA

Poznan University of Technology, Faculty of Engineering Management
Poznan, Poland
Email: joanna.kalkowska@put.poznan.pl

Abstract

Manufacturing enterprises are under constant pressure to deliver quality products at the right to meet the highly dynamic needs of their customers. Given the increasingly stiff competition from both national and international enterprises on the market, manufacturing managers have no choice but to optimize their processes to increase productivity, flexibility, and responsiveness. This paper attempts to show that deploying intelligent support systems in managing manufacturing processes is crucial for the survival of manufacturing enterprises and ensuring growth and sustainable development. The study focuses on the current research related intelligent decision support systems, genetic algorithms, and artificial neural networks and how they can help optimize manufacturing processes. Manufacturing enterprises are under constant pressure to sustain growth and development in increasingly competitive business landscapes. Enhancing productivity and flexibility in manufacturing requires rapid decision-making for optimal outcomes. A review of existing works of literature identifies the significant role of a robust decision support system in process optimization. The study establishes that genetic algorithms provide better tools for strategic decision-making and hold great potential for solving process optimization challenges. Moreover, a review of existing literature on artificial neural networks present them as essential tools for decision-making through their capacity to generate optimal outputs in process optimization. The observations emphasize the ability of artificial neural networks and genetic algorithm in enriching decision support systems capable of optimizing manufacturing processes. The study shows the need for further studies on unified techniques and methodologies of their implementation in manufacturing processes.

Keywords: Intelligent support, artificial neural networks, genetic algorithms, manufacturing processes.

Introduction

The primary purpose of the manufacturing process is to transform ideas into valuable products. Planning plays a critical role in achieving the objective of manufacturing by ensuring timely, comprehensive, and cost-effective implementation of the processes. Time, quality, and cost play a significant role in the optimization of manufacturing processes and are dependent on each other (Sauer et al., 2007). A similar observation emphasized that planning is a crucial link that defines in great detail the process for transforming raw materials into desired valuable forms (Halevi, Weill, 2012). Therefore, to produce a product in the preferred form, quality, and at the right time, requires comprehensive planning and management of the processes involved.

Manufacturing process management entails activities such as selecting and sequencing of operations and activities involved in transforming raw materials into finished components. Process planning involves detailing the activities and functions to manufacture a product successfully. As such, it includes the selection of processes and operations, determination of parameters and specification of quality assurance criteria, in addition to a significant amount of decision-making (Phanden et al., 2019, p. 2). Production process planning involves a substantial amount of human information and processing and decision-making (Gasser et al., 2010). Significantly, the management of manufacturing processes implies adding value within the organization in its objectives to transform raw materials into desired products.

Production technology and management have undergone three essential revolutions that include mechanization, electrification, and automation (Danielis et al., 2014; Zhu et al., 2013). Consequently, the dynamism of the changes in technology has necessitated the need for devising mechanisms to address organizational complexity. Ensuring success and competitiveness is becoming increasingly difficult for manufacturing companies in today's globalized world. Manufacturing enterprises operating locally and globally, continue to face stiff competition. Globalization,

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coupled with revolutionary technological development on unprecedented scales, has significantly impacted the business landscape as demonstrated by an ever-increasing and highly competitive business environment across different industries.
The manufacturing industry, in particular, faces a growing diversity in customer preference combined with stiff competition between manufacturers. The success and competitiveness of many manufacturing enterprises significantly rely on their efforts to modernize their manufacturing processes to incorporate faster, quality, and efficient decision-making practices. As such, there is a need to improve productivity, quality, and cost-efficiency to meet these challenges. Present optimization methods focus on existing processes in connection with lean manufacturing methods whose objective is to eliminate waste. Furthermore, this approach has a lot of potentials but is not sufficient as it only improves process flows while overlooking among others, the resources performing the processes (Klocke et al., 2014). Thus, a gap exists in process optimization methodologies.

Knowledge engineering tools are among the resources required for the preparation and management of manufacturing processes. The fourth industrial revolution has ushered an age of intelligent manufacturing characterized by cutting-edge support technologies that increasingly feature real-time decision making and precise engineering methods. The objective of decision making in manufacturing process management is to find an optimal decision from a pool of different possibilities. Its essence is the optimization of the processes. Knowledge is undoubtedly the most significant resource for the transformation of enterprises. The manufacturing process is currently both dynamic and intensive (Li et al., 20117). As such, human experience on its own is incapable and prone to errors.

The development of knowledge engineering tools and intelligent systems has resulted in the design and development of complicated means to support different phases of decision making. Such means hold the potential to improve the speed, accuracy, and quality of decisions made by human capabilities. A decision-making support system is a system designed to interactively provide support throughout the decision-making processes (Phillips-Wren et al., 2006). The use of intelligent system support as a decision-making aid tool has brought remarkable improvements in various fields, including service and healthcare industries, among others. The article presents the evolution and application of intelligent systems and knowledge engineering tools in production planning. Related recent research works are analyzed to provide a comprehensive understanding of theoretical and practical advances in the use of intelligent systems and their potential in improving decision-making to enhance productivity, flexibility, and responsiveness in manufacturing processes.

Manufacturing Processes, Productivity and Flexibility

In the modern economic context, manufacturing means the transformation of raw materials into components and products of higher value through several processing steps and operations. In their original state, natural materials have less economic value and importance to consumers. Thus, manufacturing adds value to the raw materials by altering their properties into goods of desired forms that are valuable. These can be consumer goods, capital goods, and industrial goods. Consumer goods include items that are valuable to end users, whereas capital goods are those utilized to increase the productive capacity of enterprises such as equipment and machine tools.

Manufacturing companies of all kinds are under constant pressure to sustain a positive growth not only quickly but also cost-effectively. The sweeping transformations occurring in the manufacturing sector worldwide require decisions that used to take weeks or even months in the past to be timely and within hours if not minutes. Every decision makes concerning the manufacturing process must consider possible consequences to the enterprises and be made quicker than ever before. Consequently, the management objectives have grown to responding to market opportunities faster than competitors and maintaining a sustainable growth rate in a highly competitive business environment.

Productivity is significant for the long-term economic growth of an enterprise. As such, it remains one of the critical factors in sustaining competitiveness and development. Prokopenko and International Labour Office defined productivity as the efficient use of resources such as capital, materials, energy, and information in the manufacturing of goods. In manufacturing, a more productive process is one that takes less time to achieve the desired outcome. The fundamental concept of productivity is always the relationship between quality and quantity of products manufactured and the number of resources utilized in the process (Prokopenko, 1987). Higher productivity is equivalent to greater efficiency of manufacturing processes. For a company to be profitable and sustain its development, manufacturing must proceed at the highest productivity possible.

Flexibility is an essential aspect of manufacturing. The concept and importance of studying flexibility in manufacturing were introduced by Gerwin (Gerwin, 1993) in his observation on the need for decision-makers to leverage research on strategic aspects of manufacturing flexibility. Due to globalization, the business landscape has become more competitive. Manufacturing companies are increasingly faced with an increase in customization,

constantly changing consumer preferences and uncertainty. Consequently, manufacturing flexibility is increasingly becoming a necessity for survival (Boyle, 2006). Closely related to and resulting from flexibility is responsiveness. Responsiveness implies the speed at which an enterprise reacts to changes in its environment (Koren, 2010). In manufacturing process management, responsiveness describes two things. First, the speed at which manufacturing managers react to the dynamics of the business landscape and second, the rate at which high-quality decisions are made and executed for optimal outcomes. At the enterprise level, responsiveness describes the speed in taking advantage of the new market opportunities.

Manufacturing flexibility has a multidimensional nature and lacks sufficient measurements, which makes it a complex undertaking. Among the best practices proposed by Boyle on flexibility is the need for manufacturing managers to identify the different flexibility forms in connection with mobility, range, and uniformity as well as understand the potential of manufacturing flexibility to occur at various organization levels (Boyle, 2006). Implementing all required flexibilities is limited by the lack of sufficient resources, which puts immense pressure on decision-making to ensure optimal results.

Intelligent Decision Support Systems

An intelligent system is a collective term that describes knowledge-based systems, computational intelligence together with their hybrids. Such systems have made it possible to confront a large number of problems effectively. Intelligent Systems include expert systems, artificial neural networks, and genetic algorithms.

Incorporating intelligence elements in decision support was inevitable. As such, several scholars have widely studied intelligent decision support systems. Cheung, Leung, and Tam focused on the use of intelligent decision system support (IDSS) for network planning (Cheung et al., 2005). One of the significant observations noted by the authors was the limited use of IDSS. The study proposed the use of IDSS alongside an expert system (ES) to offer guidance during the decision-making process. According to this, the previously under-researched aspect of Fuzzy Logic and IDSS had become popular as the popularity of case-based reasoning diminishes. Due to the rising use of IDSS, the researchers added data mining as one of the aspects of intelligent system support with potential in production planning.

In terms of production planning to support systems that predict customer value, a study by Chan and IP (Chan, IP, 2011) focused on a dynamic approach to support systems to predict customer value in new product design. One of the key findings of this study is that decision-makers can use an active system to support confidence in the product. The authors observed that these dynamic systems could help companies develop competitive products that enhance sustainability and business growth. These findings align with previous research by Gao, Shang, and Kokossis (Gao et al., 2009), which examined the applicability of an agent-based system for supporting decisions in a chemical production company.

Felsberger, Oberegger, and Reiner (Felsberger et al., 2016) disputed the potential of intelligent system support in production planning as a function of management. They noted that the prospect of big data offers new insight for innovation on intelligent system support and decision making in the form of evidence-based decision-making. Moreover, they argue that data analysis is the significant impact of intelligent systems. Their study disputes the ability of intelligent systems to be used in production planning as a function of management but offers new avenues for the adoption of these systems in manufacturing processes (Felsberger et al., 2016). In turn, Guo et al. (Guo et al., 2009) focused on operative efficiency when using intelligent systems. The authors noted that operative efficiency depends on many factors among them the status of the machine, negligence, operator, and relearning and highlights the need for more research on the effect of these aspects on production control decision making.

Moreover, while intelligent manufacturing has gained pace, it is the need to develop and operate smart manufacturing systems on a different layer. There is a need for intelligent workshops, intelligent manufacturing units, and innovative manufacturing models (Li et al., 2016). Taking into account the above, Antosz, Pasko, and Gola (Antosz et al., 2019) focused on the possibility of using these intelligent systems in supporting decision making for effective implementation of lean manufacturing. They mentioned the possibility of using intelligent methods in the production process to achieve lean outcomes. However, they also underscore the need for more research on the application of intelligent systems.

Genetic Algorithms

The study of the genetic algorithm traces its origins to Holden (Holden, 1975) in his attempt to solve optimization problems. Since its introduction, the concept of a genetic algorithm has been studied widely by various scholars. Genetic algorithms describe intelligent methods that utilize computing power to simulate the process of natural

evolution with a purpose of finding specific patterns from a given set of data (Turban et al., 2005). The genetic algorithm provides a tool for seeking the best alternatives among strategies and processes to get optimal outcomes and can be understood as a standard metaheuristic method for optimization, used for solving various problems such as scheduling in manufacturing systems (Vlasic et al., 2019). Genetic algorithms have the potential in an enterprise's optimization problem with limited information (Rooyani, Defersha, 2019). Thus, in the digital era characterized by huge volumes of data, genetic algorithms present the best tools for optimization.

The notion of the population is a significant concept of genetic algorithm. A community of solution candidates is used in determining the most optimal solution. For this reason, a population of the candidate is at the core of genetic algorithm operations. As an iterative operation, executing a genetic algorithm involves an initial community of randomly generated potential solutions, also referred to as chromosomes. A generation refers to each iteration and involves examining and assigning fitness values to individuals of the chromosomes. A new population is formed by first selecting individuals followed by creating offspring candidates. The next generation of parents is developed from the offspring candidates. Therefore, an individual is expected to be chosen based on their relative performance within the population. Through operators such as crossover and mutations, genetic algorithms are used to produce new solution candidates and enable the selection of the optimal one. Crossover involves a combination of parts of parents to form one or two solution candidates termed as offspring. By contrast, mutation involves arbitrary alteration.

Operators such as crossover and mutation are inspired by natural genetic variation and selection. Iterations in genetic algorithms lead to the creation of generations until an acceptable solution is reached. As a stochastic iterative algorithm, generic algorithms lack convergence assurance. As such, termination occurs when the best solution is reached or after getting a maximum number of generations. Thus, genetic algorithms allow continuous learning by acting as a tool for generating new strategies from the previous ones in an attempt to find a better fit (Passos & Barrenechea, 2019). Li, Huang, and Niu noted that the solution candidates that form the generation are generated based on the evolutionary experience of parent solution populations. As such, population diversity is strengthened (Li, Huang, Niu, 2016).

Several studies demonstrate the enrichment of decision support systems by genetic algorithms. Mourtzis, Doukas, and Psarommatis noted the widespread adoption of genetic algorithms in tackling manufacturing network-related problems. They tackled design manufacturing network issues related to mass customized products by using a comprehensive search method, genetic algorithm, and the search algorithm. Moreover, genetic algorithm methods result in high-quality solutions, and their combined performance remained superior compared to intelligent search methods (Mourtzis et al., 2013). Yilmaz Eroglu and Kilic developed a decision support system for assisting managers in improving enterprise innovation and used the Hybrid Genetic Local Search Algorithm as the engine and determinant of significance degrees and succeeded in deploying the developed genetic algorithm in the strategic decision-making process within the innovation management context (Yilmaz et al., 2017). Jawahar and Subhaa utilized a genetic algorithm based intelligent support system on enhancing design decision making in a cellular manufacturing system (Jawahar, Subhaa, 2017). In turn, Musharavati and Hamouda proposed a modified genetic algorithm for solving the hard optimization problem presented by a manufacturing process planning involving multiple parts productions (Musharavati, Hamouda, 2011). Based on the simulation results, the proposed altered genetic algorithm was highly effective.

Artificial Neural networks

Artificial neural networks refer to computation networks designed to simulate the decision-making process that occurs in neurons of the biological central nervous system. Artificial neural networks are mathematical inventions that draw upon the research of biological systems (Graupe, 2019). Constructing artificial neural networks imitates a natural brain's distributed method of computing. Having machines that mimic the computational power of the brain was the motivation behind artificial neural networks. A neural network is made up of a group of artificial neurons. Together, they form a physical system with the capacity to collect, store, and utilizing knowledge based on experience and observation. The human brain learns through processes such as modifying synaptic links between neurons (Graupe, 2019).

Similarly, artificial neural networks change their forms based on input and output information flow when learning. Furthermore, Turban, Aronson, and Liang argue that artificial neural network improves their performance by learning from experience. Unlike experts who might be unwilling to share decision knowledge, artificial neural network's learning phase ensures the system is capable of identifying patterns and rules from experience and historical data (Turban et al., 2007).

Neural networks can engage in logical reasoning (Holden, Kryukov, 1991). Based on this assertion, the neural network can be said to possess the ability to learn an algorithm without having complete information about it. Canz

and Jagdale studied the application of the machine learning concept in decision making using an artificial neural network to predict the process parameter (Canz, Jagdale, 1995). Cho and Leu highlighted several manufacturing processes where artificial neural networks are applied. These include machining processes, where an artificial neural network can use vibration, temperature, and other data to predict the equipment's life or failure (Cho, Leu, 1998).

Artificial neural networks learn the relationship between input prototypes and expected outcomes (Cho, Leu, 1998). Yildirim demonstrated the use of artificial neural networks in modelling multi-objective optimization problems in a manufacturing system to assist managers in managing production plant capacities (Yildirim et al., 2006). Thus, the networks can generate optimal outputs based on what (Sudha et al., 2016) explored the use of artificial neural networks in process parameter optimization. The authors noted that various enterprises face the challenge of optimizing input parameters to attain the desired value. The authors established that predictions enabled by the artificial neural network in the parameter process optimization act as useful guidelines for decision-makers (Sudha et al., 2016). Recent works show the potential of artificial neural networks in nanomanufacturing (Almakaeel, Albalawi, Desai, 2018) and 3D printing (Yadav et al. 2020). Rodríguez et al. focused on the use of intelligent systems to support production planning using machine learning (Rodríguez et al., 2019). One of the significant observations from this study is the use of machine learning in processing real data and applying the information in the decision-making process. Rodríguez, González-Cava, and Pérez present a methodological solution based on fuzzy logic, built-in machine learning. They observed that full development and utilization of Fuzzy logic is an essential step towards automation as these systems can imitate the human decision-making process (Rodríguez et al., 2019).

Conclusion

A literature review of decision support systems and intelligent systems - artificial neural networks and genetic algorithms, reveals that these tools have massive potential in the implementation and management of manufacturing processes. Although decision support systems have been in use for decades, their effectiveness is enhanced when combined with intelligent systems such as artificial neural networks and genetic algorithms. The combination results in a robust and comprehensive smart decision system capable of helping managers make a high-quality decision in the shortest time possible.

Whereas the decision support systems help managers to store, process, and retrieve data and use it to make better decisions, artificial neural networks make it possible for the decision support system to learn by storing input and output and modifying the layers of the interconnected neurons. When making decisions, the closest outcome to the output fed into the system is selected. As such, artificial neural networks provide optimized solutions among the variety of possible solutions a manufacturing process manager needs to choose.

Similarly, genetic algorithms hold great potential in enriching decision-making models and systems. Unlike artificial neural networks, genetic algorithms, begin with a pool of potential iterated solutions, and the process only terminates when the best candidate is found. Besides, operators such as crossover and mutations generate new and better solution candidate offspring, which are again iterated to find the most optimal solution to a given problem. Given the increase in the amount of data available for managers to base decisions on, genetic algorithm holds the potential to not only optimizes solutions but also enrich the choices of known mutations and crossover operators.

As noted in the literature review, there is a substantial potential of intelligent support systems in managing manufacturing processes by supporting managers in making decisions that ensure optimization of the methods, which plays a vital role in preparing the enterprise to meet customers' needs while sustaining its growth and competitiveness. In particular, artificial neural networks and genetic algorithms can enrich existing decision-making tools, turning them into intelligent support systems.

Although progress has been made concerning intelligent decision support tools and systems, there is still a gap of knowledge and data on important aspects such as methodologies and models of integrating decision support systems with artificial neural network and genetic algorithms. The impact of intelligent systems such as artificial neural networks and genetic algorithms have been studied in isolation. As such, further coherent research is required to establish the methodologies of intelligent support systems that combine decision tools and intelligent technologies based on artificial neural network and genetic algorithms as a unified system. Specialized research is also needed on the impact of the developed methodologies on different manufacturing industries and scenarios.

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Audit Quality Control in Portugal: Longitudinal Study

Sara SERRA
Institute Polytechnic of Cávado and Ave, Barcelos, Portugal, sserra@ipca.pt

Mariana LIMA
Institute Polytechnic of Cávado and Ave, Barcelos, Portugal, marianalima_91@hotmail.com

Kátia LEMOS
Institute Polytechnic of Cávado and Ave, Barcelos, Portugal, klemos@ipca.pt

Abstract

In Portugal, audit quality control is imposed on all audit firms. This requirement aims to improve the quality of the audit, and the decision-making process of stakeholders, who use the Audit Report.
This article aims to analyze the results of the quality control of the audit, carried out in Portugal, using the content analysis technique of the Audit Quality Control Reports, issued between 2009 and 2019, by the Order of Statutory Auditors. The results indicate that, in horizontal control, there are deficiencies in the internal quality control systems, in the human resources used, and in the fulfillment of ethical requirements. In turn, in the vertical control, there are deficiencies in the execution of the audit work and the audit reports. This study, in addition to being innovative, contributes to raising awareness among audit professionals about the importance of quality audit practice.

Keywords: Audit Firms; Audit; Quality Control; Audit Quality Control Reports.

Introduction

According to Rijwani and Rajpurohit (2017), auditing plays an important role in the financial reporting process, as it assures its credibility. Reinforcing this idea, Xalmuratovich, and Turdimuratovna (2020) refer that auditing is a necessary and important tool for the economic development. Baffa (2017), also, states that the role of auditing is to improve the quality of financial statements. However, the audit can only exercise its role effectively when it is performed with quality.

The quality control of the audit is defended by Kothari et al. (2012), Stewart (2012), Baylon et al. (2013), Carson et al. (2013), Saha and Roy (2016), Tapang, Kankpang, Inah, Bessong, Uklala (2020), and Aobdia (2020), given that, according to these authors, the quality of the audit improves after supervision. Coelho (2010) also states that audit quality control is essential, as it aims to ensure that all audit firms carry out the audit following the ethical and technical requirements of the profession. Reinforcing this idea, Saha and Roy (2016) state, that quality control of the audit has become extremely important in today's corporate environment in the backdrop of accounting irregularities and audit failures leading to corporate demise. These provide reasonable assurance of compliance with applicable regulation and issuance of the appropriate report by the engagement team.

In Portugal, all audit firms are subject to internal and external quality control. Internal audit quality control is of the responsibility of audit firms and external audit quality control is of the responsibility of the Securities Market Commission (SMC) and the Order of Statutory Auditors (OSA). Focusing on external control, this article aims to analyze, using the content analysis technique, the results of the quality control of the audit carried out in Portugal between 2009 and 2019.

This article, in addition to this introduction, includes a chapter on audit quality control and another on the empirical study, ending with the conclusions, limitations of the study, and clues for future research.

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Quality control of the audit

The quality of the audit essentially depends on compliance with legal standards. However, Houshmand and Mahdavi (2012) consider that the auditor's qualities, together with continuous training, are also fundamental to the quality of the audit. Frederick and Libby (1990) and Carcello et al. (1992) also highlight knowledge and experience as relevant elements for the quality of the audit. Felo et al. (2003), Alsaqqa and Sawan (2012), Babatolu et al. (2016), Kuntari et al. (2017), and Abdul-Rahman et al. (2017) list not only personal requirements but also aspects such as the size and image of the audit firm, as well as the fees charged by the audit firm, as important characteristics for the quality of the audit.

As mentioned, the quality of the audit is a relevant factor for the success of this activity, and it is necessary to implement adequate quality control systems. Therefore, under the International Standard on Auditing (ISA) 220 - "Quality control for an audit of financial statements", and the International Standard on Quality Control (ISQC) 1 - "Quality controls for firms that perform audits and reviews of financial statements, and other assurance and related services engagements" and the Statute of the OSA, all audit firms are required to quality control of the audit.

The purpose of audit quality control, according to article 3 of the Quality Control Regulation, is to verify that the audit standards have been met and that the audit reports are following the conclusions drawn. This control also aims to assess whether the technical and human resources used, the internal quality control system implemented, and the fees charged are adequate, given the nature and size of the work carried out.

In Portugal, since 2016, the SMC has been responsible for the quality control of audit firms that audit entities of public interest. The remaining audit firms are subject to quality control exercised by OSA, within the scope of the SMC's final supervision. OSA attributes to the Quality Control Commission the competence to propose the annual quality control plan to be carried out and to promote its execution. It should be noted that a public draw is held annually, in which the audit firms subject to quality control are drawn, ensuring that all will be subject to control every 6 years.

The Annual Audit Quality Control Report, resulting from quality control, is divided into two types: horizontal control and vertical control. The horizontal control corresponds to the global assessment of the activity, namely, the analysis of issues related to personnel, such as independence, training, ethics and deontology, adequacy of resources used, and evaluation of the internal quality control system implemented. In turn, vertical control concerns the work performed, the quality of the documentation, the reporting of reservations and emphases, and the fees charged. The results of each control are classified as follows:

- **Without anything special to mention** it is not necessary to make changes and/or the analysis of the dossiers was considered adequate to support the opinion issued;
- **With less relevant observations and recommendations:** there are observations that audit firms should consider;
- **With relevant observations and recommendations:** some observations require the immediate intervention of audit firms, to overcome the deficiencies detected;
- **With the unsatisfactory result:** detection of deficiencies and insufficiencies, which prevent the issuing of opinions;
- **Canceled:** situations of proven absence of activity, death, or cancellation of the activity;
- **Controls not completed:** not approved until the date of the issue of the report.

According to article 21 of the Quality Control Regulation, if the quality control has been concluded with relevant observations, the audit firm must adopt these recommendations within 12 months. The Quality Control Committee will follow up on the suggested recommendations.

Empirical Study

Research Methodology and Sample

The purpose of this article is to analyze the results of the quality control of the audit carried out in Portugal, between 2009 and 2019. Specifically, it is intended to identify the main deficiencies pointed out in the quality of the audit. For this, the content analysis technique will be used, as according to Severino (2007), this methodology allows us to treat and analyze information from documents. This type of methodology describes, analyzes, and interprets the messages of all forms of discourse, seeking to interpret their meaning.

Therefore, the Audit Quality Control Reports, published annually by the Quality Control Committee, on the OSA website, referring to the period between 2009 and 2019, which comprise eleven reports, will be analyzed. The number of audit firms and dossiers subject to quality control, in the period under study, is shown in table 1.

Table 1: Audit Firms and Controlled Dossiers

	Number of Audit Firms	Number of work files
2009	127	191
2010	85	152
2011	82	185
2012	81	184
2013	82	219
2014	104	204
2015	115	204
2016	98	200
2017	78	109
2018	72	106
2019	63	92

Source: Own elaboration based on OSA data (2009-2019)

According to table 1, between 2009 and 2019, 987 audit firms and 1846 work files were subjected to quality control, resulting from the audits carried out. It should be noted that, in 2017, the number of auditing firms and controlled dossiers decreased, given that as of June 30, 2016, the quality control carried out by the Quality Control Committee covers only audit firms that do not carry out auditing public interest entities.

Results and Discussion

Horizontal Control

The results of the horizontal control, carried out between 2009 and 2019, are shown in table 2.

Table 2: Result of Horizontal Control

	Nothing special to mention	With less relevant observations	With notes of relevance	Unsatisfactory results	Canceled	Not completed
	%	%	%	%	%	%
2009	60%	35%	2%	-	3%	-
2010	56%	32%	5%	4%	4%	-

2011	50%	28%	17%	2%	2%	-
2012	37%	38%	19%	-	6%	-
2013	34%	41%	16%	2%	5%	1%
2014	52%	32%	12%	1%	3%	1%
2015	63%	25%	7%	3%	1%	1%
2016	76%	19%	2%	1%	1%	1%
2017	69%	21%	9%	-	1%	-
2018	52%	24%	24%	-	8%	-
2019	55%	19%	19%	6%	2%	-

Source: Own elaboration based on OSA data (2009-2019)

The results of the horizontal control, shown in table 2, reveal that more than half of the controlled audit firms obtained the classification "With nothing special to mention", which means that the majority of the audited firms inspected to comply with the auditing standards.

The second most attributed classification was that of “Observations of less relevance”, especially in 2013. However, this classification does not require interventions in audit firms. Next comes the classification "Observations and recommendations of relevance", which implies immediate intervention by audit firms. However, the percentages are not significant. Although there is a decrease in the quality of the audit in 2018 and 2019, this would not be expected, given that the new audit standards, applied since 2016, aim, among other things, to improve the independence and quality of the audit. Controls with “Unsatisfactory Results” were also completed, with minimum percentages. In these cases, it is not possible to issue an opinion and, therefore, these processes are usually referred to as the Disciplinary Council. The years 2012 and 2018, although with reduced values, stood out with lawsuits canceled, motivated by the proven absence of activity, death, or cancellation of the activity.

Table 3: Deficiencies in Horizontal Control

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Internal quality control system	-	36%	50%	54%	36%	43%	41%	24%	42%	50%	60%
Ethics, deontology, and independence	-	13%	13%	5%	14%	11%	14%	21%	14%	10%	12%
Human resources used	-	18%	11%	11%	29%	24%	24%	35%	-	10%	10%
Transparency Report	-	18%	7%	5%	9%	8%	9%	-	25%	-	-
Prevention of money laundering and terrorist financing	-	-	-	-	-	-	-	-	-	10%	12%
Training	-	-	-	-	-	-	-	-	-	3%	9%
Fees	-	-	-	-	-	-	-	-	-	2%	2%
Others		15%	19%	25%	12%	14%	12%	20%	19%	-	-

Source: Own elaboration based on OSA data (2009-2019)

As can be seen in Table 3, in 2009, it was not possible to identify the deficiencies pointed out in quality control. In the following years, it is observed that the biggest deficiency pointed out in the audits is in the internal quality control system, essentially in 2019.

The deficiencies of the internal quality control system refer to the lack of its implementation and monitoring, as well as to the lack of uniformity in the application of the system among the partners. In addition, it was found that, in many cases, the Manual of the internal quality control system is not detailed, nor does it specify the procedures, with the aggravation of not carrying out independent reviews by another auditor.

These results lead us to conclude that the audit firms do not adopt the policies and procedures to ensure the quality of the audit, as provided for in ISA 220 and ISQC 1.

Regarding ethics, deontology, and independence, the deficiencies are due to the inadequacy of fundamental principles, provided for in the Code of Ethics, as well as the absence of procedures to guarantee independence. These results corroborate the opinion of Bekiaris and Tasios (2012) and Houshmand and Mahdavi (2012), who state that the attributes of the auditors and compliance with ethical principles influence the quality of the audit.

The deficiencies pointed out to independence reveal that the auditors are not adequately complying with the independence that is required in the Code of Ethics and the Statute of the OSA. The studies by Aderin et al. (2013) and Enofe et al. (2013) concluded that when the auditor's independence increases, the quality of the audit increases. In the wake of this thought, Villacorta (2010) states that if the auditor is not independent, his opinion will not be more reliable than the financial statements prepared by the entity. This means that auditors are only able to properly serve stakeholders if they maintain a position of independence (Serra, 2013).

The deficiencies in human resources are due to the inadequacy and excessive subcontracting of technicians who are not subject to the rules of independence and professional training of OSA. It is, therefore, necessary to improve recruitment processes and invest in continuing professional training, as, as Frederick and Libby (1990), Carcello et al. (1992), and Felo et al. (2003) refer, the auditor's knowledge and experience are important factors for the quality of the audit.

In the Transparency reports, deficiencies are because some relevant aspects are not properly identified, and described. It should be noted that, in 2018 and 2019, the Transparency Report was not considered, but weaknesses in fees, training, and mechanisms to prevent money laundering and terrorist financing were considered.

The deficiencies called "others" relate to other errors observed, which affect the organization and functioning of the audit firm and the training of auditors.

Vertical Control

The vertical check focuses on the audit files, to verify that they are prepared correctly and that they are following the audit standards. The conclusions of the vertical control, carried out between 2009 and 2019, are shown in table 4.

Table 4: Result of Vertical Control

	Nothing special to mention	With less relevant observations	With notes of relevance	Unsatisfactory results	Canceled	Not completed
	%	%	%	%	%	%
2009	32%	50%	15%	1%	2%	-
2010	43%	35%	16%	3%	3%	-
2011	51%	31%	13%	4%	1%	-
2012	49%	36%	11%	2%	3%	-
2013	47%	32%	16%	1%	2%	-

2014	46%	31%	18%	1%	3%	1%
2015	55%	28%	13%	2%	1%	1%
2016	68%	21%	10%	-	1%	1%
2017	53%	37%	9%	-	1%	1%
2018	34%	34%	24%	8%	1%	-
2019	32%	27%	33%	9%	5%	-

Source: Own elaboration based on OSA data (2009-2019)

The results of the vertical control coincide with the results of the horizontal control, as most of the dossiers obtained the classification of "Without anything special to refer" or "with observations and recommendations of less relevance". The dossiers that required follow-up actions in the following period represent insignificant values, except for 2018 and 2019. Once again, it appears that the quality of the audit decreases in the years 2018 and 2019.

The dossiers with “Unsatisfactory results” disclosed minimum percentages in the vertical control, even less than in the horizontal control, in which some of them were subject to disciplinary proceedings imposed by the Disciplinary Council.

Table 5: Shortcomings / Shortcomings in Vertical Control

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Work planning and documentation quality	-	18%	6%	4%	21%	16%	19%	16%	27%	14%	16%
Execution of work in key areas	-	62%	58%	52%	35%	35%	32%	32%	39%	35%	28%
Report	-	7%	22%	34%	27%	27%	25%	38%	22%	52%	48%
Fees charged	-	8%	4%	8%	6%	11%	12%	4%	9%	2%	2%
Others	-	5%	10%	2%	11%	11%	12%	10%	3%	2%	2%

Source: Own elaboration based on OSA data (2009-2019)

The results of the deficiencies pointed out in the vertical control are mirrored in table 5. As we can see, in 2009 the results of the deficiencies detected in the vertical control were not disclosed. In the following years, the main deficiencies are related to the execution of the work and the reporting of reservations and emphases.

The deficiencies in the execution of the audit work present very relevant values and are due to deficiencies in the audit documentation and the audit tests performed. When the auditor does not obtain sufficient and appropriate audit evidence, he/she is unable to issue an opinion with a reasonable degree of certainty, increasing the risk of the audit and, consequently, the risk of the Audit Report being distorted. These results reveal the non-compliance with ISA 500 - “Audit Evidence”.

Regarding the report, there was a lack of consistency with the conclusions drawn in the audit work and omissions in the disclosure of the Audit Report. These results lead us to affirm that the legal provisions are foreseen in article 45 of the Statute of the OSA and ISA 700 - “Forming an opinion and reporting on financial statements”, ISA 701 - “Communicating key audit matters in the independent auditor's report”, ISA 705 - “Modification of the opinion in the independent auditor’s report”, and ISA 706 - “Emphasis of matter paragraphs and other matter paragraphs in the independent auditor's report” is not being properly complied with. These results are, in a way, worrying, given that the Audit Report is a crucial document for users of financial information (Butler et al., 2004). Furthermore, Lin et al. (2011) refer that the Audit Report is an indicator of the quality of financial information. Mulyadi and Budiawan (2018) add that the Audit Report provides additional information on the financial statements for decision-making. Therefore, the fact that the Audit Report has omissions or opinions that are not properly supported can lead to poor decision making by the stakeholders, and the public interest of the audit is subverted.

Although not very relevant, vertical control discloses deficiencies in work planning and in the quality of documentation, namely in the assessment of the audited entities internal control system, as well as in the definition of audit risks, necessary resources, fees, and audit tests to be used. The deficiencies in the audit planning also demonstrate the non-compliance with ISA 320 - "Materiality in the planning and performing audit", which addresses the materiality and risk of the audit. The respective conclusions reveal a lack of organization and efficiency in the audit work, consequently, a lack of quality in the audit.

As can be seen in Table 5, the percentage of deficiencies identified in fees is reduced. Even so, fees continue to be charged with abnormally low amounts, decreasing the quality of the audit, as these are associated with less profound audit tests. Consequently, Martinez and Moraes (2014) state that the quality of the audit work may be impaired with the application of abnormal fees. Babatolu et al (2016), Kuntari et al. (2017), and Abdul-Rahman et al. (2017) also revealed that the fees received by the auditor have a significant positive effect on the quality of the audit.
The deficiencies detected and which are called "Others" are related to other errors found in the planning, execution, and conclusions of the auditors' work, including their opinions.

Conclusion

The audit must be carried out with quality and according to the auditing standards. As such, professional audit bodies have imposed quality control, both internal and external, on audit firms.

In the scope of external quality control, this article aims to analyze the results of the quality control of the audit carried out in Portugal, considering the Audit Quality Control Reports, issued between 2009 and 2019.

The results indicate that, in horizontal control, there are deficiencies in the internal quality control systems, in the human resources used, and in the fulfillment of ethical requirements, mainly, independence. In the vertical control, there are deficiencies in the execution of the audit work and the reporting of emphases and reservations. Given these results, audit firms must implement adequate internal quality control systems and invest in qualified human resources and continuous training. It is also imperative to improve the drafting of the Audit Report, essentially, because this is the output of the audit and is a vehicle for information between the auditor and stakeholders.

Despite the deficiencies pointed out, most audit firms and dossiers subject to quality control disclose satisfactory results or with observations with minimal relevance. Over the years, there has been a slight improvement in horizontal control and vertical control about unsatisfactory results or with relevant observations, except 2018 and 2019. Even so, the Quality Control Committee, in the 2019 report, states that the audit firms are sensitized to accept, in a collaborative way, the execution of quality control actions of their structures and their work dossiers, showing improvements in the consistency of the documentation of their work and the objective and impartial judgment of the quality of the work developed.

In developing this article, there were some limitations, particularly the 2009 Audit Quality Control Report, which did not allow us to identify the deficiencies pointed out in the quality controls. Even so, we consider that this study, in addition to being innovative, contributes to raising awareness among audit professionals about the importance of quality audit practice.

In the future, it would be interesting to conduct a study on the perception of audited entities and different stakeholders regarding the quality of the audit and its supervision.

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Use of Intra-Community Acquisition's Value and Quantity for Calculating Mirror Data Asymmetry in International Trade

Iwona MARKOWICZ

University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
iwona.markowicz@usz.edu.pl

Paweł BARAN

University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
pawel.baran@usz.edu.pl

Abstract

The aim of the article is to compare two approaches to measuring the quality of international trade data. The specificity of these data lies in registering them in two sources, in the countries of trading partners. The authors study data discrepancies in transactions concerning the intra-Community exchange. Information about the size of this exchange is registered in the EU's Intrastat system. A specific transaction is listed in one country as an intra-community supply of goods (ICS) and in the other country as an intra-community acquisition of goods (ICA). The compilation of this information indicates an asymmetry of data. The size of this asymmetry informs about the quality of statistical data. An important issue is the proper way of measuring this quality. In the literature, the approach using value indicators prevails, while the approach using quantity, expressed by weight of goods, is omitted. The authors conducted an empirical study in order to compare two variants of determining the aggregated data quality index. The example concerns Poland's transactions by commodity groups (CN chapters) with EU Member States (aggregation by country). The numerical example uses COMEXT data on intra-Community trade in 2017 provided by Eurostat.

Keywords: Intra-Community Trade, Asymmetry Data, Indicators of Mirror Data Quality

Introduction

Reliable statistical data is the basis for all kinds of economic analyses carried out at the national level or at the level of the European Union and the world. The public statistics services (Eurostat, national statistical offices) constantly carry out activities aimed at increasing quality, extending the scope or improving access to data. We live in times of intensive growth in the amount of collected data, Big Data analyses are being developed, including changes in the way very large data resources are collected and processed, but it's still the reliability of information that remains a fundamental aspect.

The specificity of international trade data is their bilateral nature. They are recorded in two sources. This way of collecting information makes it possible to compare the figures describing the same transaction and to identify possible discrepancies. Of course, the fact that the figures from the two registers do not fully overlap is explained by reasons such as variable exchange rates, ways of settling the costs of transport and insurance of goods, lack of obligation to register transactions by some contractors. Therefore, many researchers emphasize that a certain extent of asymmetry of international trade data is acceptable. Attempts were made by Morgenstern (1963), Federico and Tena (1991), Ferrantino and Wang (2008) to establish this acceptable range of data discrepancies. They also provide some guidance on assessing the quality of mirror data. Existing literature offers a variety of methods to study the quality of foreign trade data with different spatial and temporal ranges. The Authors of this article have also undertaken research in this area (Markowicz, Baran, 2019a, 2019b, 2020). The presented considerations explore the possibilities of analyzing data asymmetry based on value – using the value of realized transactions, as well as in quantitative terms - using information about the weight of sold and purchased goods. The second aspect we focus on is the type of indicators used in the evaluation of data discrepancies. We prefer an aggregated index. It uses the sum of absolute differences of mirror data, which makes it impossible to balance positive and negative differences between

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information from two sources. Aggregation can be done by country or commodity group. In this article, the survey of data quality was carried out by commodity groups with aggregation by EU Member States. The EU's Combined Nomenclature (CN) was used as a commodity classification, broken down by chapters (the survey covered 96 chapters). The numerical example concerns intra-community supplies of goods from Poland (data for 2017 from the Comext database). The analysis is an illustration of the problem of the mirror data asymmetry under consideration, so the time range is not important in this case. Newer data is already available at the time of writing, however, it should be taken into account that the database is still a work in progress. The work to complete the information is carried out by both Eurostat and Intrastat data units in the Member States even after publication. Therefore, considering the possible corrections of data after the so-called reconciliation rounds, slightly older data of higher quality were selected.

The aim of the article is to compare two approaches to the quality of international trade data. The authors conducted an empirical study to compare two variants of determining the aggregated data quality indicator. The example concerns Poland's transactions by commodity groups (CN departments) with European Union Member States (aggregation by country).

Literature Review

The literature review confirms that the observation of data asymmetry in foreign trade has been interesting both from statistical and fiscal perspective. Therefore, research in this area have methodological (ways of measuring the asymmetry of mirror data) as well as practical results (improvement of statistical data reliability and the possibility of detecting tax irregularities).

Although data asymmetry in foreign trade was observed earlier, Morgenstern's work (1963) was one of the first attempts to thoroughly investigate differences in data on exports and imports between several huge economies. He proposed tools to study both absolute and relative differences for the whole of a country's foreign trade as well as some indicators to study individual pairs of countries.

Methods for studying differences in mirror data proposed in the literature on the subject can be split into two main groups; techniques to study country-to-country (one-to-one) or country-to-countries (one-to-many) relations. Research on trade between pairs of countries includes Morgenstern (1963), Parniczky (1980), Ferrantino and Wang (2008), Guo (2010), Hamanaka (2012), Carrere and Grigoriou (2014). An absolute difference between the declared values of exports and imports in the trading partner countries, the relative growth, and data asymmetry indices were used. Several works focus on the analysis of differences in data on trade between a country and a group of countries (Federico, Tena, 1991; Hamanaka, 2012).

So far no universal methodology has developed to test the quality of mirror data, which would be accepted by all researchers in the area. There has been a discussion on this subject in the literature for many years. Morgenstern (1963) concluded that, with large differences in foreign trade figures, mirror data should be considered unreliable. Federico and Tena (1991) view it differently. They state that methods used earlier only check on the 'accuracy of geographical data'. According to these authors, data aggregation mostly eliminates this problem, and a better check on the reliability of the aggregated data is to compare the sum of the trade values of a country and the sum of the respecting flows recorded by the partner countries. They claim that the reliability of the data results mainly from differences in the method of accounting for transportation costs while all the reasons for data discrepancies can be divided into three groups: unavoidable (CIF and FOB, i.e. exclusion/inclusion of transportation costs), structural (different criteria for compiling statistics) and actual errors (data differs from actual flow). The errors include declaration errors due to negligence or fraud (errors may relate to weight, value, goods classification) as well as those made by statistical offices (estimation of official prices, exchange rates). E.g. lack of registration due to smuggling is often cited as the cause of data errors (Federico, Tena, 1991; Fisman, Wei, 2004; Javorcik, Narciso, 2008). Research by other authors focuses primarily on the ratio between CIF/FOB based values (Tsigas et al. 1992; Carrère, Grigoriou, 2014). These studies support the statement that the differences in mirror data are mostly due to differences in the treatment of transport and insurance costs.

Previous proposals for methods of mirror data quality measuring consist of indices of intensity and if aggregation was used, it concerned goods or countries, but when adding together the values of exports and imports (and not differences between them) separately which causes balancing of positive and negative differences and affects the measured data

quality. Measuring differences between mirror data on international trade is a task that several authors have also approached using econometric modelling (e.g. ten Cate, 2007; Ferrantino et al., 2012).

Such analysis, both with the use of data quality indices and econometric models, may support the work whose main objective is not the assessment of data quality itself, but the use of data for econometric modelling of international market phenomena, e.g. using spatial models (LeSage, Llano-Verduras, 2014). The results of modelling depend on the quality of the data used and in that respect maintaining high data quality depends on proper quality measures.

Data and Methodology

As mentioned above, discrepancies in mirror data on intra-EU trade (and more broadly international trade) are a sign of the quality of statistical data. The problem is the right way to measure the quality. In the literature there are some methodological guidelines. However, there is no ready-made solution to this problem. The authors have decided to complement the value-based approach used in the literature with a quantity-based approach. Therefore, the study used two aggregated data quality indices. The first one is based on transaction values and the second one on data concerning the weight of goods. The conclusions of numerous studies highlight the shortcomings of the analysis of international trade data in the value of goods. These usually include: variable exchange rates and taking into account transport and insurance costs. The use of data on the weight of goods is free of these defects.

In the study we used four indicators of mirror data quality – aggregated value-based index (1) and aggregated quantity-based index (2) based on traded commodity mass, complemented with two new measures: weighted aggregated value-based index (3) and weighted aggregated quantity-based index (4). We define aggregated value-based data quality index for exports (of commodity group *k*; here: CN chapter) given by:

$$ {}_{wZ}W_E^{AU}(k) = \frac{\sum_{i=1}^{n}\left|{}_{wk}E_{AB_i} - {}_{wk}I_{B_iA}\right|}{{}_{wk}K} \tag{1} $$

where:

${}_{wk}E_{AB_i}$ – declared value of exports (of commodity group *k*) from country *A* to all the other countries of a group under examination (here: to the whole EU),
${}_{wk}I_{B_iA}$ – declared mirror value of acquisitions of goods (of commodity group *k*) shipped from country *A* to all members of the group, as reported by the receiving countries,
${}_{wk}K = \sum_{i=1}^{n}\frac{\left({}_{wk}E_{AB_i} + {}_{wk}I_{B_iA}\right)}{2}$ – a hypothetical true value of the above said exports (of commodity group *k*) averaging the data reported by all sides.

A similar formula (2) provides us with a similar index using commodities' weight (quantity) instead of the value, which will later be referred to as an aggregated quantity-based data quality index (for commodity group *k*):

$$ {}_{mZ}W_E^{AU}(k) = \frac{\sum_{i=1}^{n}\left|{}_{mk}E_{AB_i} - {}_{mk}I_{B_iA}\right|}{{}_{mk}K} \tag{2} $$

where:
${}_{mk}E_{AB_i}$ – declared quantity of exports (of commodity group *k*) from country *A* to all the other countries of a group,
${}_{mk}I_{B_iA}$ – declared mirror quantity of acquisitions of goods (of commodity group *k*) shipped from country *A* to all members of the group, as reported by the receiving countries,
${}_{mk}K = \sum_{i=1}^{n}\frac{\left({}_{mk}E_{AB_i} + {}_{mk}I_{B_iA}\right)}{2}$ – a hypothetical true quantity of the above said exports (of commodity group *k*).

In addition to the above, we propose modified versions of (1) and (2). Here, we take into account weights of individual observations. The weights are equal to the share of a given group of goods in the total value (or quantity) of intra-Community supplies from Poland to the EU. We use following formulae (for commodity group *k*; here: CN chapter):

- aggregated value-based data quality index weighted with exports share

$$ {}_{wZ}^{*}W_E^{AU}(k) = \frac{\sum_{i=1}^{n}\left|{}_{wk}E_{AB_i} - {}_{wk}I_{B_iA}\right|}{{}_{wk}K} \cdot {}_{w}L(k) \tag{3} $$

where:

$_{w}L(k) = \frac{\sum_{i=1}^{n} {}_{wk}E_{AB_i}}{\sum_{k=1}^{p}\sum_{i=1}^{n} {}_{wk}E_{AB_i}} = \frac{{}_{wk}E_{AU}}{{}_{w}E_{AU}}$ – share of value of goods from a given commodity group *k* in exports total,

- aggregated quantity-based data quality index weighted with exports share

$$ {}_{m}^{*}{}_{Z}W_{E}^{AU}(k) = \frac{\sum_{i=1}^{n}\left|{}_{mk}E_{AB_i} - {}_{mk}I_{B_iA}\right|}{{}_{mk}K} \cdot {}_{m}L(k) \tag{4} $$

where:

$_{m}L(k) = \frac{\sum_{i=1}^{n} {}_{mk}E_{AB_i}}{\sum_{k=1}^{p}\sum_{i=1}^{n} {}_{mk}E_{AB_i}} = \frac{{}_{mk}E_{AU}}{{}_{m}E_{AU}}$ – share of quantity (weight) of goods from a given commodity group *k* in exports total.

In order to illustrate the declining influence of successive commodity groups with ever smaller shares of total trade between a pair of countries, indices (1) and (2) can also be compared, which are aggregated as follows. The first value is the index (1) calculated for the commodity group with the largest share in trade. Then we create an index calculated for the first two commodity groups next for the three commodity groups with the largest shares in total trade and so on. Aggregation in this way makes it possible, among other things, to indicate at which number of aggregated commodity groups the indicator does not differ significantly from the target value.

The numerical example contains Poland's exports by commodity groups (CN chapters) to the EU Member States (aggregation by country). The research was conducted in two parts. First we used value-based approach and then repeated the analysis in quantity-based approach. Each part was conducted according to the following stages:

1) Ordering of commodity groups (CN chapters) according to shares (value or weight) in exports total from Poland to EU countries.
2) Determining the aggregated data quality index (formula 1 in the first part and formula 2 in the second part) for one, two, three, ..., ninety-six CN departments, respectively. Aggregation takes place at the level of the whole EU, and therefore the absolute values of differences between the mirror data for each pair of countries (Poland – *i*-th EU country) are summed up. Such aggregation makes it possible to take into account all the differences in data, without balancing the positive and negative values.
3) Selecting the thirty most important groups of goods (in terms of shares in exports from Poland) and calculating for each of them an aggregated data quality
4) Calculating indices weighted by the shares (in value or weight) and sorting them from the highest values, i.e. from the lowest data quality.

The study designed in this way was to answer the following research questions:

- How does the value of the aggregated mirror data quality indicator change as more product groups are added (by export share)?
- What is the quality of data for the thirty CN chapters of greatest importance for Poland's intra-Community supplies of goods?
- How will the order of the CN chapters according to data quality change after weighting the indicators with total export shares?
- Will identifying commodity groups with the lowest data quality (which should be given special attention) in the two parts of the study (value-based and quantity-based approach) give similar results?

Research Results

The study was conducted in stages, as described in the previous chapter. Data quality indicators were determined for commodity groups and aggregated across EU countries. The classification according to the EU Combined Nomenclature (CN) was adopted as a division into commodity groups. This classification distinguishes chapters of goods numbered as follows 1, …, 76, 78, …, 99 (no. 77 isn't currently in use). Our study excluded two chapters; namely 98 (complete industrial plant) and 99 (special combined Nomenclature Codes) due to lack of transactions recorded. This means our study reflects Poland's trade in goods broken down into 96 chapters.

In the first part, data on the value of transactions of goods export from Poland to EU countries in 2017 were used. Commodity groups were ranked according to their share in total Polish export. The index (formula 1) for the chapter with the largest share was calculated, and then the index values were calculated after adding another chapters (Fig.

1).It turned out that already for the first department the quality index was 0.1528. Adding the next three chapters to the analysis resulted in a significant decrease in the index value and adding the next ones – its increase (diminishing). It can be concluded that the quality of total data is most affected by the chapters with the highest export value. Then, adding more groups only slightly changes the value of the indicator. This suggests that the improvement of data quality depends to a large extent on the reduction of mirror data discrepancies in some commodity groups. It is these groups that the activities of statistical and tax services should focus on.

Fig. 2 shows the values of the aggregated index (formula 1) for the 30 most important CN chapters (with the chapter number), while Fig. 3 shows the values of the index including weights (share of a given chapter in the export of goods from Poland) (formula 3). The final result of the first part of the survey is the ranking of CN chapters according to their importance in the study of the quality of data on trade between Poland and EU countries. The chapters are presented from the most important (Fig. 4), which in this case means a combination of a large difference in mirror data and a large share of trade.

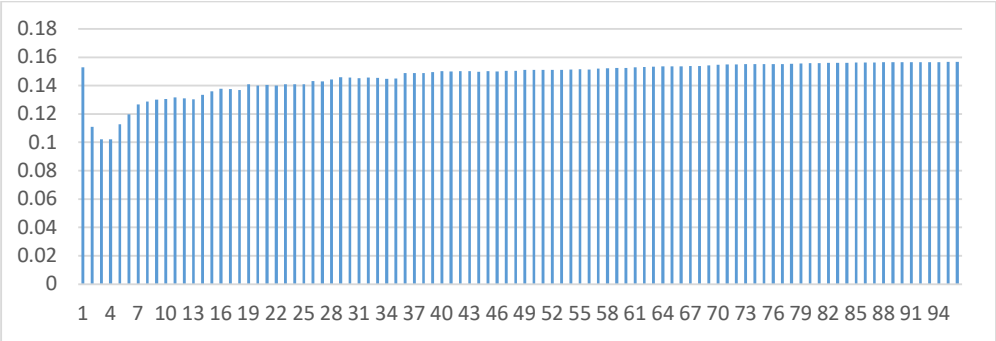

Fig. 1: Values of the data quality index as a function of the number of chapters included, starting with the most important ones (chapters with the largest share in Polish exports) - value-based approach (in the order of shares)

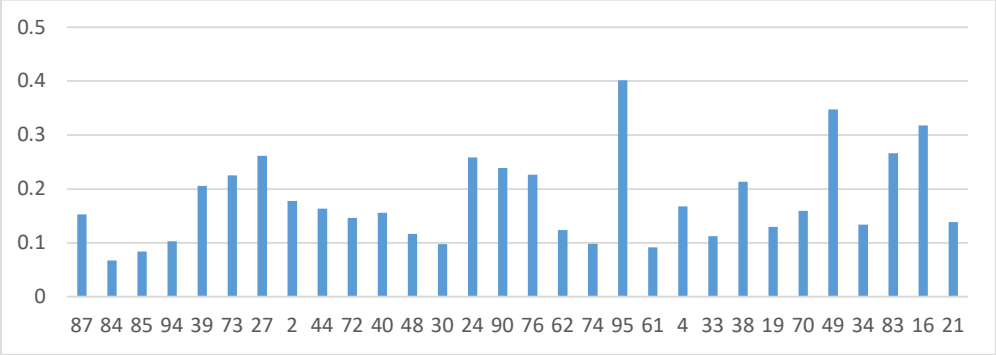

Fig. 2: Data quality index values for the 30 most important CN chapters – value-based approach (by department number)

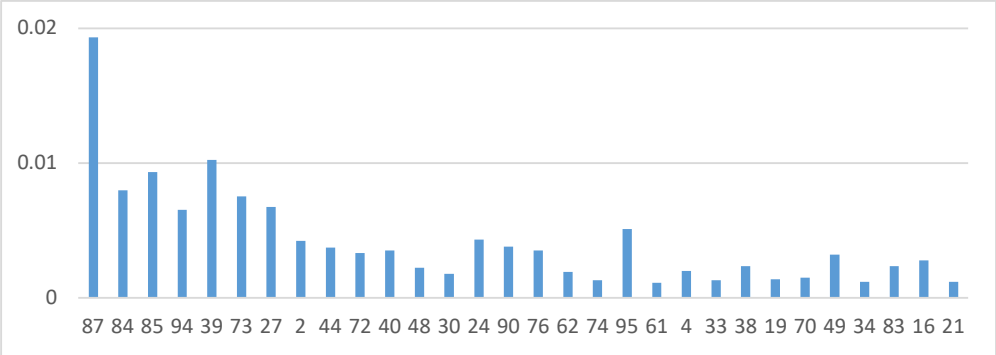

Fig. 3: Data quality index (weighted with shares) values for the 30 most important CN chapters – value-based approach (by department number)

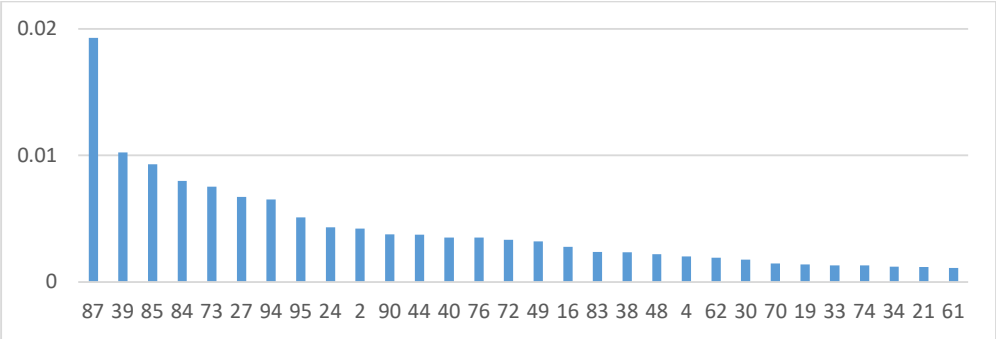

Fig. 4: Ordered data quality index (weighted with shares) values for the 30 most important CN chapters – value-based approach (by department number)

The second part of the study was conducted in the same way and concerned the quantitative approach. Therefore, data expressed in quantity (mass) of goods were used here. Next, the values of the index (formula 2) for a growing number of chapters with the largest share in exports (Fig. 5), the value of the aggregated index for the 30 most important chapters of the CN (Fig. 6), the value of this index including weights (Fig. 7) and the ranking of CN chapters according to their importance in the study of data quality (Fig. 8) are presented.

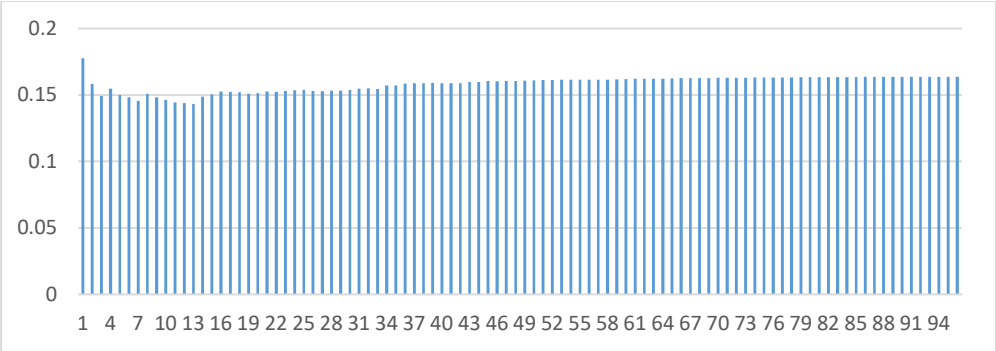

Fig. 5: Values of the data quality index as a function of the number of chapters included, starting with the most important ones (chapters with the largest share in Polish exports) - quantity-based approach (in the order of shares)

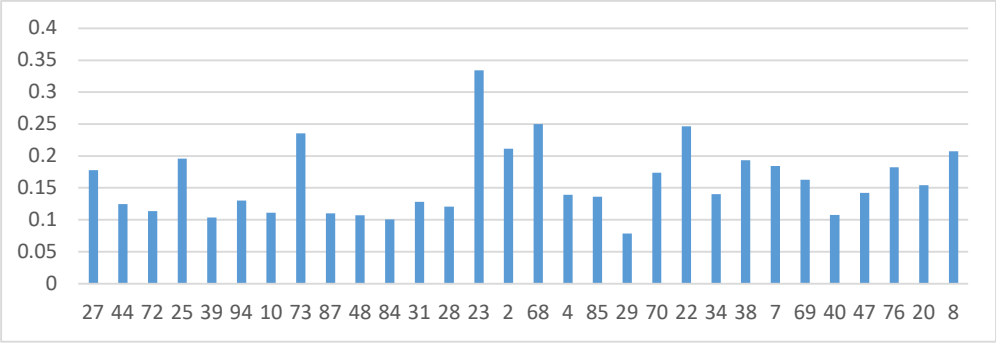

Fig. 6: Data quality values for the 30 most important CN chapters – quantity-based approach (by department number)

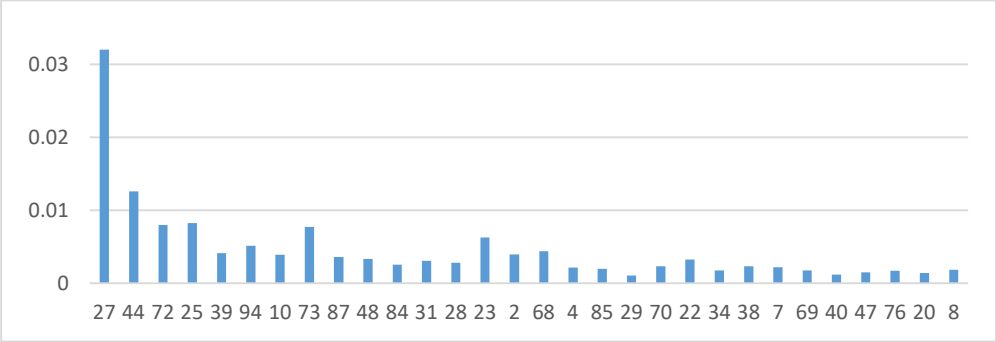

Fig. 7: Data quality index (weighted with shares) values for the 30 most important CN chapters – quantity-based approach (by department number)

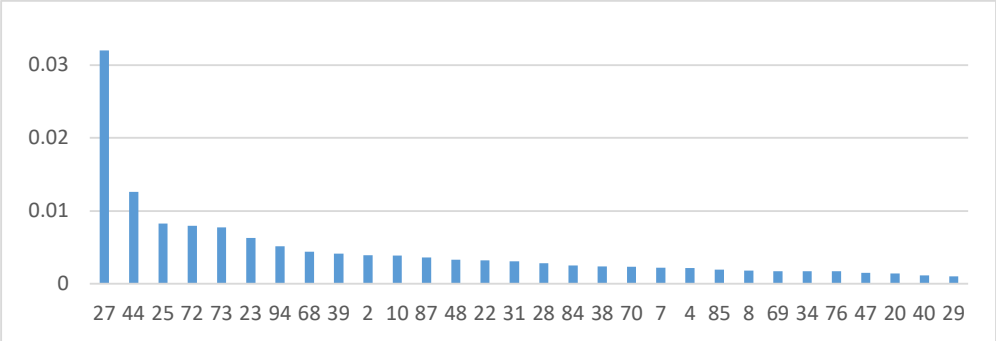

Fig. 8: Ordered data quality index (weighted with shares) values for the 30 most important CN chapters – quantity-based approach (by department number)

Conclusions

As we can see from the above charts, index values calculated in the value-based approach weighted with shares in value and index values obtained differ significantly. The values of quantity-based indices often exceed the values of value-based indices, which may result from a value-oriented definition of statistical thresholds. Although the values of quantity-based indices are higher, they are still more stable with respect to the number of commodity groups taken into account. The ordering of chapters is different in these two cases and there is no clear indication which one should be chosen. E.g. in the former case, attention should be paid first of all to chapter 87 (vehicles other than railway, their parts and accessories), and in the latter case to chapter 27 (mineral fuels, mineral oils).

The use of purely value-based or purely quantity-based approaches seems inadequate and leaves lots of interesting cases of the opposite approach unobserved. Therefore, the authors propose to conduct such data quality analysis in

two complementary approaches, taking into account data expressed in value of goods and expressed in mass of goods. This approach can be considered comprehensive.

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Analysis of Intra-Community Foreign Trade of Poland on the Basis of Mirror Data

Paweł BARAN
University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
pawel.baran@usz.edu.pl

Iwona MARKOWICZ
University of Szczecin, Institute of Economics and Finance, Szczecin, Poland
iwona.markowicz@usz.edu.pl

Abstract

In Poland, after the accession to the European Union in 2004, an obligation to submit Intrastat declarations exists. The obligation applies to entities dealing with intra-Community trade in all EU countries. Statistical data are collected in individual countries (Intrastat system) and then transmitted to Eurostat. These data are symmetrical and often inconsistent. For example: there is a difference between two sets of data – data on intra-Community supply of goods (ICS) sent from Poland and data on intra-Community acquisition (ICA) coming from Poland (mirror data). The authors examine these differences broken down by Combined Nomenclature chapters and by trade partner countries. The aim of the article is to show how the selection of one of the above-mentioned data sources may influence the results of the analyses. The research was conducted on the example of Poland's trade with the EU Member States turnover. The ordering of EU countries according to the turnover and classification of countries according to the structure of goods (CN nomenclature chapters) in the scope of ICS-ICA (Poland-EU countries) and comparison of the results of the classification in time were carried out. We prove that ICS and ICA data from 2017 are more similar in structure to ICS and ICA data from 2016 respectively than to their mirror dataset from the same year.

Keywords: Intra-Community Foreign Trade, Mirror Data, Cluster Analysis, Public Statistics, Intrastat

Introduction

Intrastat system was introduced in the area of the European single market on January 1, 1993. It's main task is to record and collect data on intra-Community trade. It was also adopted by Poland and all new EU Member States after their accession took place.

Each entity carrying out intra-Community supply of goods (ICS) or intra-Community acquisition (ICA) is obliged to submit Intrastat declarations to the local customs or fiscal authorities or statistical office. In Poland, the receiver of the data in the Regional Office of Tax Administration (IAS) in Szczecin. There, a data set is created for Statistics Poland. The data, appropriately adjusted (according to Eurostat methodology), are transferred to the European Statistical Office (Eurostat) and become a part of Comext database. These data are adjusted on a monthly basis as a result of collecting some of the required data after the reporting deadline and after the estimations designed to match data from different countries are made. The need for data correction results from the differences between the information concerning the same transactions but received from two sources (countries). Although these are called mirror data, they never fully overlap. Differences between sets of data are partly explained by objective factors such as variable exchange rate, including transportation costs into the value of transaction by one of the sides and several categories of errors in declarations.

Polish system of foreign trade statistics is based on the methodology of the UN Department of Statistics, CN Combined Nomenclature (8-character) and the geonomenclature developed by Eurostat based on ISO 3166 standards. Foreign trade turnover is calculated on the basis of customs documents (trade in goods with non-EU countries) and Intrastat declarations (intra-Community trade in goods). The correctness of the Intrastat declarations is ensured by the possibility to compare the data with the data coming from the VAT declarations on intra-Community acquisitions and deliveries. Foreign trade turnover is compiled according to the 8-digit CN Combined Nomenclature, which is

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based on the six-digit HS Harmonized Commodity Description and Coding System and is the basic classification of goods in foreign trade. The CN nomenclature is subject to annual reviews and modifications.

The discussion on the regulation of trade and value added tax system of the European Community has been going on for many years (MacLean 1999, Hart 1994). According to the European Commission (2015), two fundamental issues related to the current tax system were identified. These are: the additional obligations and costs associated with the payment of VAT by businesses trading across borders and the significant number of VAT fraud in the EU through fraudulent transactions such as MTIC (Missing Trader Intra-Community, carousel fraud). It should be stressed that generating reliable foreign trade data is extremely important, but there are many reasons why it is not easy (Markowicz, Baran 2019a).

Taking into account public statistics, in the initial period of Poland's existence in the EU, total imports of goods exceeded exports in the net balance of foreign trade. In intra-EU trade, the value of purchased goods also exceeded the value of deliveries to EU countries. The values of exports and imports are similar starting 2013. On the other hand, supplies and purchases of goods in intra-EU exchange became equal as early as in 2009, and since 2012 the balance of Polish trade with EU countries is both positive and increasing (Fig. 1).

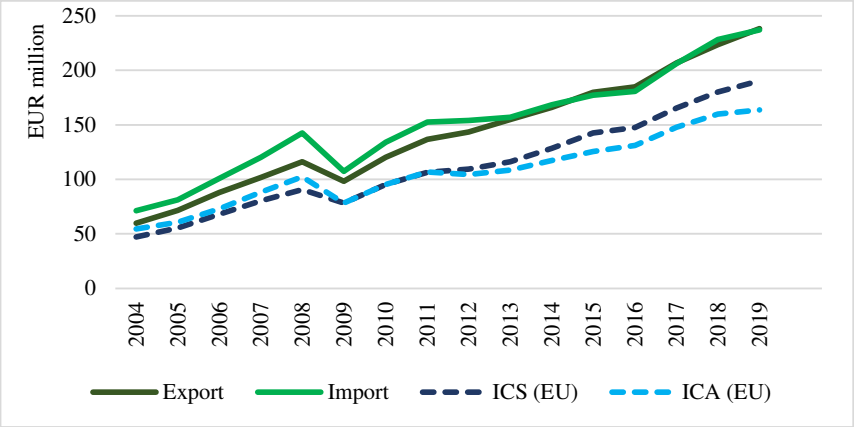

Fig. 1: Polish foreign trade turnover in total and with EU countries (values of imports and ICA given by country of dispatch) in the years 2004-2018 (million EUR)

Source: GUS, SWAID, Foreign trade turnover by groups of countries.

It should be emphasized that many economic studies, which are the basis of knowledge about intra-Community trade and foreign trade in general, are based on public statistics. Therefore, the quality of these data is of huge importance in both the study of the current state and the forecasting of numerous economic phenomena.

The aim of the article is to indicate the impact that the choice of one of the mirror data sources may have on the results of the analyses. The differences are shown on the examples of ranking the EU countries according to the trade turnover with Poland, and of clustering the EU Member States according to the structure of trade in goods varying within the pairs ICS vs. mirror ICA (goods shipped from Poland to the other EU countries) and in time. The importance and benefits of foreign trade of countries are treated, for example, by works: Helpman (1999), Rymarczyk (2012), Salamaga (2017). The authors are interested in the study of asymmetry (research methods, causes) in intra-Community trade data (Baran, Markowicz, 2019).

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Statistical Data and Research Methodology

The data used in the survey are derived from Eurostat's Comext database. On the one hand, the values of intra-Community supplies of goods from Poland in 2016 and 2017 broken down by countries and chapters of the CN was analysed. These are the values declared by Polish entities and adjusted by Statistics Poland according to the methodology provided by Eurostat. On the other hand, the values of acquisitions from Poland to all other EU countries, declared by contractors of Polish entities and again adjusted by national statistical offices, are examined. These values differ to some extent, but it turns out that the differences between ICS and mirror ICA are large, both positive (advantage of values in Polish declarations of goods export) and negative (advantage of values in declarations of goods import from Poland to EU countries) only for a number of chapters. The statistical data used (for 2016 and 2017) are old enough to be considered reliable. More recent data are already available, but we know from experience that they are still updated during the so-called reconciliation rounds.

There are numerous reasons for the differences between ICS and the mirror ICA including introduction of thresholds above which entities are obliged to submit declarations (different for export and import and in different EU countries), hiding transactions from taxation, declaring fictitious transactions (tax carousels) as well as plain errors in declarations (wrong commodity codes, wrong transaction values).

The study consisted of several parts:

1. Ordering the EU countries according to the value of turnover with Poland to show differences between ICS and mirror ICA in 2016 and 2017,
2. Clustering the countries of Poland's trade partners according to the structure of goods deliveries (ICS) and mirror purchases (ICA) from Poland in 2016 and 2017,
3. Similarity analysis between different groupings in pairs:
   - ICS 2016 vs. mirror ICA 2016 (mirror data compared),
   - ICS 2017 vs. mirror ICA 2017 (mirror data compared),
   - ICS 2016 vs. ICS 2017,
   - Mirror ICA 2016 vs. mirror ICA 2017.

A data unit (an object) in the survey is a vector containing all the information about the ICS from Poland to a specific Member State. Its characteristics (variables) are the shares of individual CN chapters in total trade. Another, more complex approach, in which exports from many countries (i.e., data matrix) are taken as data units, was presented by Salamaga (2017) in a paper in which he compared the full structure of foreign trade of 18 EU member states. A different approach to differences (changes) in structure is presented by Landesmann (2000), who refers to structural changes in two ways: changes in the structure of data (production, employment, exports, etc.) and changes in the way variables are interrelated. This approach to structure comparison was inadequate for the purpose of our study.

In this paper we attempted to group EU Member States as destinations of Polish foreign trade. In order to separate groups of countries with a similar structure of goods purchased in Poland, a hierarchical clustering of buyers' countries was applied. The advantages of agglomerative methods include a single calculation procedure, presentation of the results in the form of a classification sequence, and the possibility of graphical presentation that indicates the order of merging objects in the classes (Gatnar, Walesiak, 2004). In the following analysis the Euclidean distance, min-max feature scaling and the Ward method are used. More about the methods and assumptions of object classification can be found in the papers: Anderberg (1973), Kaufman and Rousseeuw (1990), Gordon (1999), Jajuga and Walesiak (2000), Walesiak and Dudek (2010), Markowska et al (2016).

Before the agglomeration procedure was launched, the data were pre-processed – both raw data, i.e. concerning the recorded ICS volumes, and data describing the structures (where values in the rows of the matrix are shares adding up to 1) were normalized. Such a non-classical approach has been applied due to the fact that the shares of particular commodity groups (CN chapters) in the structure of trade with different countries vary significantly: the shares of some chapters are even several orders of magnitude higher than another. Therefore, the use of non-standardized data makes the countries in which only a few largest shares of commodity groups are equivalent look falsely similar. The additional normalization of the columns of the data frame highlights the similarities covering specific trade, e.g. niche products, characteristic to some directions.

Research Results

The research was conducted in three stages. The first stage included ordering the EU countries (27) according to the volume of trade in goods with Poland. Total turnover values were used here, without taking into account commodity groups. It turns out that the order of Poland's trade partner countries established on the basis of ICS and mirror ICA values is not the same (Fig. 2 and 3). Therefore, even simply determining the significance of particular directions of export from Poland, we encounter methodical problems connected with the selection of statistical data.

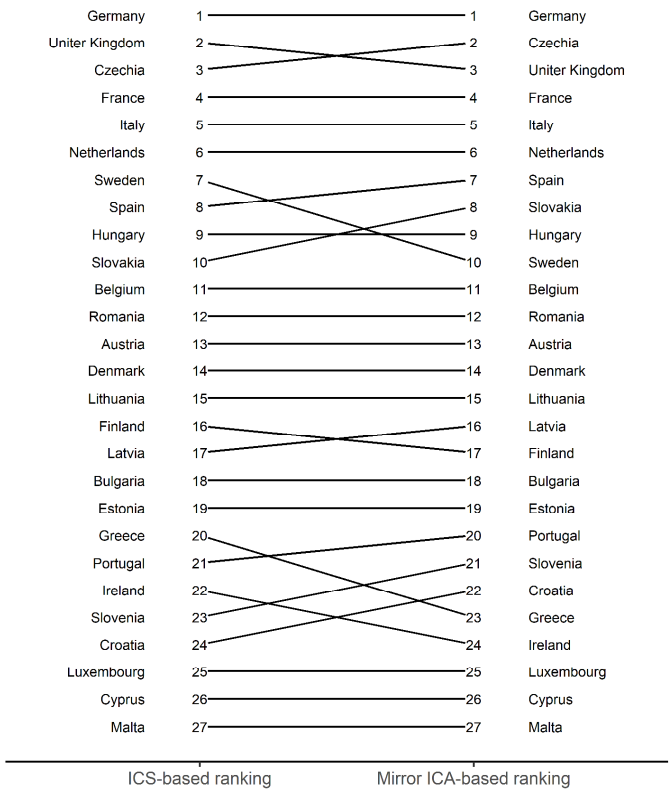

Fig. 2: Ranking of EU countries in terms of value of turnover with Poland: export from Poland (ICS; list on the left) and mirror import from Poland (mirror ICA; list on the right) in 2016
Source: own study based on COMEXT database

The biggest differences in the results of the ranking, i.e. in determining the importance of individual trade partner countries of Poland in 2016, are for Sweden and Greece, whose positions are higher when considering the values declared by Polish businesses and lower when considering the values declared by partners in these countries (Fig. 2). For some countries, however, the position is higher in the ranking based on the mirror data.

In 2017 we notice slightly smaller changes, but among the countries that have a higher position on the side of Polish ICS, we can still observe Sweden, Greece and Ireland. On the other hand, Spain, Slovenia and Croatia are among the countries that gain ranking positions using mirror data the same way they did in previous year (identical change, from places 8, 23 and 24 to 7, 21 and 22). One possible explanation is that there are permanent causes for inconsistencies in trade data with these countries.

Fig. 3: Ranking of EU countries in terms of value of turnover with Poland: export from Poland (ICS; list on the left) and mirror import from Poland (mirror ICA; list on the right) in 2017

Source: own study based on COMEXT database

The second stage of the study included a hierarchical clustering of Poland's trade partner countries according to the commodity structure of supplies (ICS) and mirror acquisition (ICA) from Poland in 2016 and 2017. The results of the grouping procedures are presented in Fig. 4-7. The obtained groups of countries only partially overlap. Particularly important are the differences in the results concerning the same year and obtained for the mirror data sets. Considering the results for 2016 (Fig. 4 and 5), depending on the choice of the linkage level, it is possible to establish from 3 to 6 groups, with the most obvious division into 4-5 groups in case of data concerning ICS and 6 groups for the case of mirror ICA. In case of the analysis for 2017 data, 5 groups were created for the data concerning the ICS and 6 groups for the mirror ICA. Individual groups both in 2016 and 2017 only partially overlap. It proves the unequal commodity structure declared by Polish and foreign trade partners.

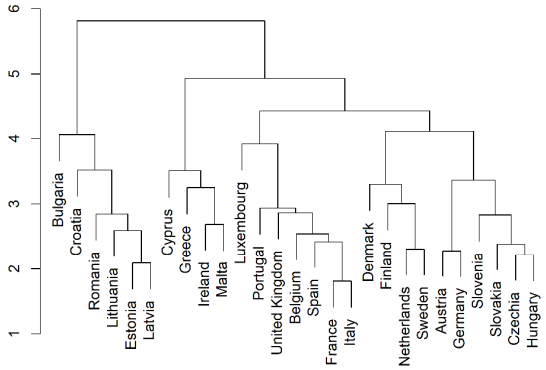

Fig. 4: Grouping of EU countries according to the structure of goods (CN chapters) of the Polish ICS (declarations of Polish entities) in 2016

Source: own study based on COMEXT database

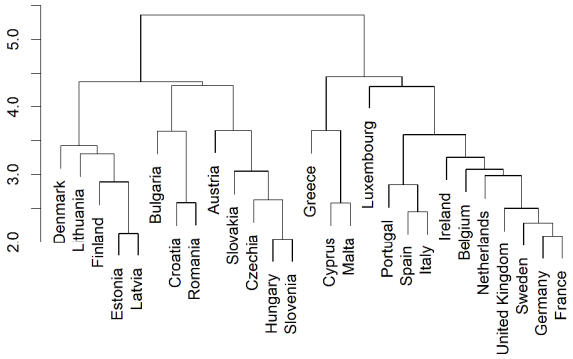

Fig. 5: Grouping of EU countries by commodity structure (CN chapters) ICA from Poland (declarations of contractors) in 2016

Source: own study based on COMEXT database

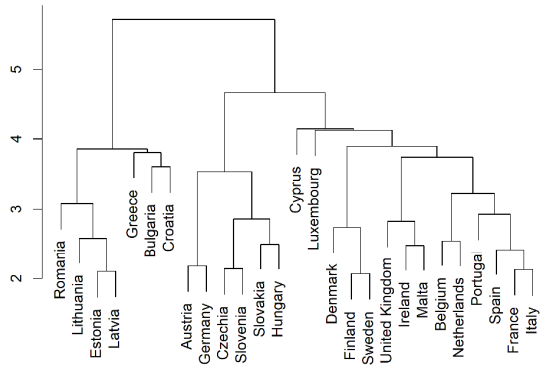

Fig. 6: Grouping of EU countries according to the structure of goods (CN chapters) of the Polish ICS (declarations of Polish entities) in 2017

Source: own study based on COMEXT database

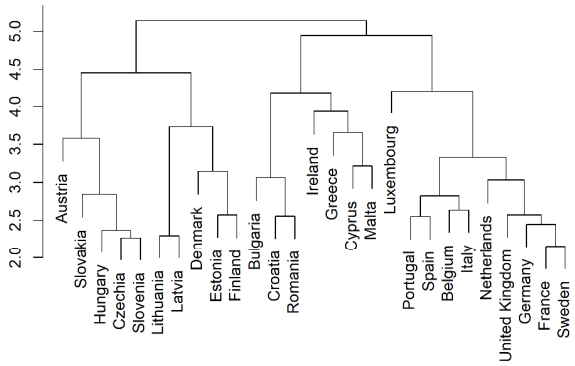

Fig.7: Grouping of EU countries by commodity structure (CN chapters) ICA from Poland (contractors' declarations) in 2017

Source: own study based on COMEXT database

For comparison, we quote the results of the study, presented in the paper by Baran and Markowicz (2018). The data on Polish ICS to each of the EU countries in 2016 were confronted with the data on mirror ICA values, thus obtaining a vector of data discrepancies by commodity groups. As a result of comparing the structure of such vectors with a simple structure similarity index (Chomątowski, Sokołowski, 1978) a matrix of similarities was obtained and the results were interpreted. Among the most similar structures of discrepancies in exports originating in Poland were the pairs like Greece and Cyprus (W_{ij} = 0.55), then Estonia and Latvia (W_{ij} = 0.49), Cyprus and Malta (W_{ij} = 0.49), and Greece and Croatia (W_{ij} = 0.48). Croatia and Sweden were indicated as countries quite similar to many others in terms of the structure of improperly reported exports or imports from Poland, while the structure for Bulgaria was the least similar to other structures. However, these are results based on data on discrepancies in the declarations, the data were not standardised, so the similarity was de facto determined on the basis of a small number of the largest commodity groups (e.g. in the case of Greece and Cyprus, these were chapters 85 – electrical machinery and equipment and parts thereof and 89 – ships, boats and floating structures). There was also a grouping of EU countries presented based on the commodity structure of Polish trade (Baran, Markowicz, 2018). A standard procedure was decided upon – raw data on the size of the ICS in particular directions broken down into CN chapters was standardized and then an agglomeration procedure was performed. Such an approach did not give satisfactory results, because the normalization of the columns of the observation matrix kept the information about the relative volume of trade in goods. The countries were therefore divided into three groups, which can be described as "the largest trade partner – Germany", "countries with large trade with Poland", "other countries". A proper algorithm that circumvents the above mentioned shortcomings must therefore take into account the relative importance of countries in certain commodity groups trade.

The third stage of the study concerned the analysis of similarity between groupings in the following pairs: ICS 2016 vs. ICA 2016 (its mirror data), ICS 2017 vs. ICA 2017 (again mirror data), ICS 2016 vs. ICS 2017 (data from the same source, delayed one year), ICA 2016 (mirror acquisitions to supplies originating in Poland) vs. ICA 2017 (data from the same source, delayed). The correlation between the groupings of Poland's trade partner countries was examined using Baker's Γ index (Baker, 1974). The results obtained (Table 1) indicate greater similarity of groupings obtained in different years for the same type of data (ICS 2016 and ICS 2017 and ICA 2016 and ICA 2017) than for mirror data from the same year (ICS and ICA in a given year). This result is surprising. It is also confirmed by the Bk index (Fowlkes, Mallows 1983), which was calculated as a function of the number of classes changing from 2 to *n*–1 (Fig. 8). Higher values mean similar groupings. Higher values of the index confirm the similarity of the groupings for ICS in both years and for ICA in both years, while lower values occur when comparing mirror data from the same year.

Table 1: Correlation between dendrograms (index Γ Baker)

Correlation	ICS 2016	ICA 2016	ICS 2017	ICA 2017
ICS 2016	1	0.3537	0.7796	0.2484
ICA 2016	0.3537	1	0.3753	0.7128
ICS 2017	0.7796	0.3753	1	0.2674
ICA 2017	0.2484	0.7128	0.2674	1

Source: own study based on COMEXT database

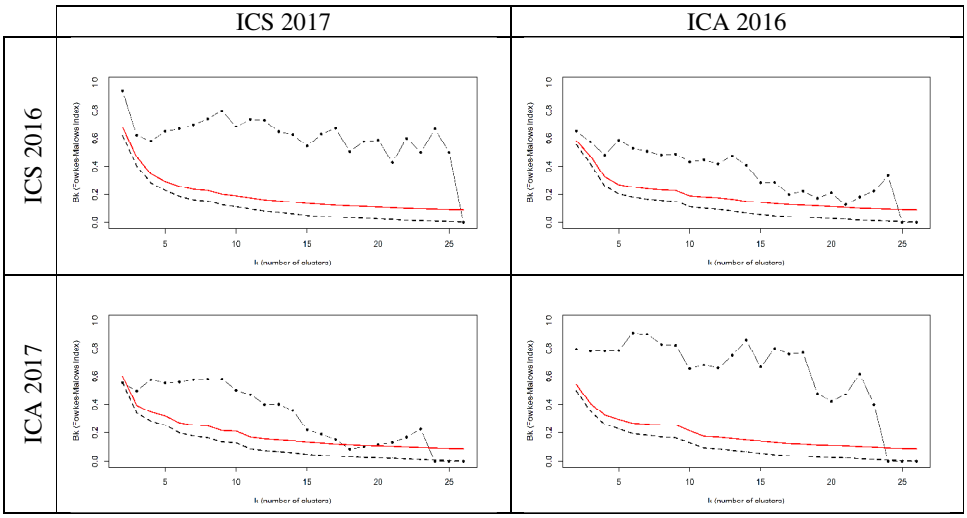

Fig. 8: Grouping similarity – Fowlkes-Mallows index as a function of the number of classes (points connected by a line on each diagram)

Source: own study based on COMEXT database

Conclusions

The study shows that there are large differences between the values of turnover declared in Poland (ICS; goods shipped from Poland) and those collected from declarations from other EU Member States (ICA; goods originating from Poland). These differences concern the total turnover as well as the structure of trade in goods. Researchers must be cautious about the data collected from statistical declarations made by companies in a given country, because their reliability is questionable. Mirror datasets contain a relatively huge amount of data not contained in their counterpart. The article points out some differences in the results of the analyses conducted using data from two mirror sources. Differences may occur both in ordering the countries according to the value of turnover as well as in clustering the countries according to the structure of trade exchange. According to the authors, the research on comparability of data concerning intra-community (and foreign trade in general) should be continued. The authors plan to carry out further research in order to develop the research framework for mirror data analysis. In applications, analyses should be carried out as widely as possible, paying particular attention to the various results obtained by selecting only one of the mirror data sources.

Acknowledgment

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Key Life Tests for Automotive Design Validation

Dina DIGA
University POLITEHNICA Bucharest, Romania, banteadina@gmail.com

Elena LASCU
University POLITEHNICA Bucharest, Romania, elena_lascu91@yahoo.com

Georgiana CHISIU
University POLITEHNICA Bucharest, Romania, georgiana.chisiu@upb.ro

Abstract

The Durability Key Life testing is an essential step in determining the expected life of a vehicle. It increases repeatability and reduces risk exposure by detecting defects at an earlier stage in the vehicle development process, whether of the full-vehicle, subsystem or component level is tested. The paper presents the characterization of the Accelerated Durability Key Life Test method and post-test measurements made after testing, applied on the automotive side doors, aiming to support the evaluation of the real-life of a vehicle component at an accelerated pace. The main objective of the paper is to validate the design of automotive components, by using the Key life test method and related test measurements required by the working procedure. The paper intends to highlight possible failure modes and the factors that contributed to it. Thus, the paper presents the detailed process of the key life test method and the measurement results of gap and flushness, torque and shut speed of the side doors. Following the results, the need to meet customer expectations in terms of quality, durability and reliability of the Key life test has increased.

Keywords: Accelerated Durability, Reliability, Key Life Test, Methods, Side Doors, Validation.

Introduction

The focus of this paper is to review the theoretical background and discuss the pros and cons of commonly used Accelerated Durability demonstration test methods. Durability is the ability of an object (material, subcomponent, component or whole machine) to perform a given function under given conditions of use and maintenance until reaching a limiting state. The measurement of durability consists of its length of time (hours, months or years) or its volume of work.

Key Life testing of vehicles and vehicle components is necessary for manufacturers during the research and development process as well as for validation and certification. Tests of a vehicle's durability are used for determining the expected lifetime by simulating environmental conditions. The expected lifetime is then simulated in a compressed manner, where the vehicle undergoes a long-term test, while normally being controlled by an automatic driving system.

Accelerated Durability Testing based on a combination of many types of accelerated tests (field, laboratory, multi - environment, mechanical, electrical etc.) integrated with safety and human factors helps to solve the identified problems. The simple definition of Accelerated Durability Testing technology is a "complex" composed of specific testing methodologies, equipment and usage that influence accurate prediction and successful accelerated development of product quality, reliability, durability, maintainability, availability and supportability.

In this paper we described the concept of the Key Life Test method for determining and measuring the current performance of a side door system, to validate the developed automotive product.

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According to Ronald H. Salzman and Scott L. Ciemniecki (1997), a Key Life Test is an accelerated test designed to detect a major component failure and the main objective of this type of testing is the development of a model to improve quality by designing reliability into the product. Similar ideas are found at the authors Francis G. Pascual and Luis A. Escobar (2006), Yung-Li Lee (2015), Lev M. Klystin (2012).

Stuart Lebowitz and Craig T. Hodorek, (1996) said in his work that the main purpose of this approach is to keep with corporate objectives to increase customer satisfaction of long-term reliability, accelerated testing and relating more accurately testing results to the real world appears essential. Similar ideas had the authors Andrew W. Bur, Peter P. Dierauer and Lamar F. Ricks, (2003).

Analysis of the Current Situation

A successful product design development process needs to serve as the foundation of how a company will develop products that will delight its customers and improve their loyalty by providing value through optimization of quality and durability. Therefore, it should be prevented precisely the actions that lead to delays in development, time to market and increase costs related to:

- Design time and result
- Customer satisfaction and expense
- Maintenance frequency, cost and access
- Warranty costs and recalls
- Degradation of product/process over time
- Failures during time intervals and warranty periods
- Quality requirements and analysis
- Product safety
- Human factors

During the design and manufacturing process, one evaluates the quantitative characteristics of product quality, reliability, durability and maintainability [Nae I. & Severin I., Lascu E.a.o., Vizireanu E. & Severin I., Severin I. a.o, Mitrache I. a.o, Stinga F. a.o].

Necessary tests are selected to verify and validate the characteristics of these parameters. The tests are planned to control, review and document the following requirements:

- Test plans or specifications identify the product being tested and the resources being used to define test objectives and conditions, to identify the parameters to be recorded and to determine the relevant acceptance criteria.
- Test procedures describe the method of operation, the performance of the test and recording of the results.
- The correct standard configuration of the product is submitted for the test.
- The requirements of the test plan and the test procedures are observed.
- Acceptance criteria are met.

Measurement, analysis and improvement include:

- Design verification (including durability, maintainability and safety)
- Process control
- Selection and inspection of key characteristics
- Process capability measurements
- Statistical process control
- Inspection - matching the sampling rate to the criticality of the product and to the process capability
- Failure modes and effects analysis.

The quality control process consists of the measurement of parameters during design and manufacturing, comparison with drawing requirements, evaluation of measured values, calibration and the determination of criteria and methods needed to ensure that operation and control of the processes are effective.

Key Life Tests of side doors for Automotive Product Development

In product development, the design validation is mainly based on physical Key life tests (KLT), as a trial to satisfy the product durability requirements. A typical side doors physical key life test takes about 60 days, as well as significant costs associated with prototypes, facility, re-tooling and manpower.

There are also many additional pre- and post-key life test tasks to be performed for a physical key life test, such as fabrication of test Rig (support structure), building up side doors structure, pre-test measurement for side doors gap and flushness, torque measurements, check arm, door opening efforts and set-up of cycling; post-durability gap and flushness, torque measurements, check arm, door opening efforts, inspection, engineering report etc.

A delay from any suppliers or customers will put the whole Rig and doors assembly prototype on-wait and thus increase the development time and cost. Moreover, each Side door project involves, several physical tests (Accelerated Environmental Ageing, Resistance to Heat Ageing, Humidity testing etc.) during the product development process, for various reasons, such as component failures, re-design, re-validation, changes in designs, materials and / or suppliers.

Test Procedure Description

The Side doors Key Life Test procedure specifies the performance requirements and test methods for door locks and door retention components of vehicles. The procedure describes that the side door system has been subjected to a door slam durability test, which states: The side door system shall have a useful life of 10 years/240,000 km (150,000 miles) 84,000k slams. This will be demonstrated by completing the Side Door Key Life Test without any Functional or Attribute failures, as identified in the DVM (Design Verification Method - Document produced as part of an Engineering standard to ensure consistency of work) pass or fail criteria.

To validate Side Doors Key Life Test, the entire assembly of Rigs and doors are tested in a climate chamber, specially arranged and set, according to the working procedure, as shown in Fig.1 below:

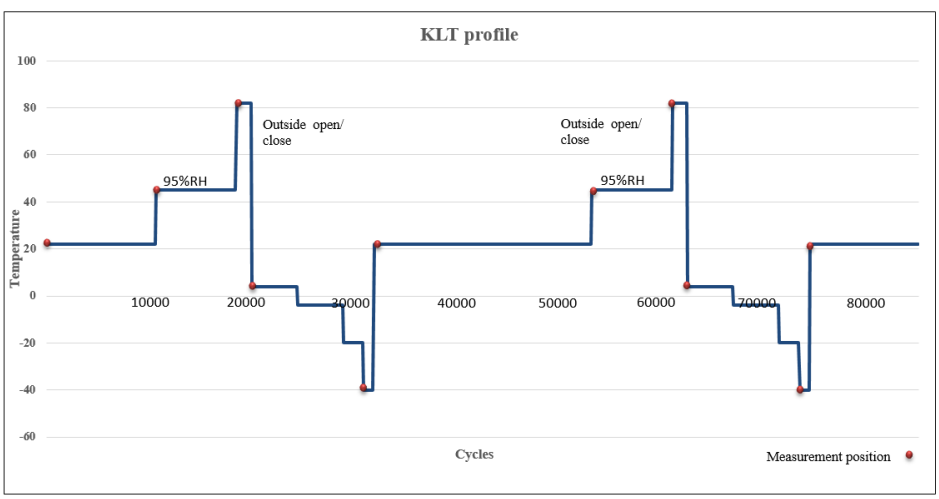

Fig.1: Temperature cycling according KLT Procedure

Test Method Description

The Key Life Test shall be performed using the required design of side door system, verified by the test requestor(s), along with representative painted vehicle or buck, to evaluate the durability, fit and function of the systems.

In order to perform the test, the following aspects will be taken into account in order to carefully evaluate each detail:

Table 1: General requirements

Durability KLT	**To complete 84,000 cycles**	**Average**
Torque testing	Torque shall Not Fall Below 70% of Minimum Torque.	Nominal Torque (Nm): Hinge – 35 Nm Check arm body- 25 Nm Check arm door – 9 Nm Latch / Striker – 7 Nm to 25 Nm
Door hinge contribution to door cyclic drop off	The clamping fixture for the test shall be rigid enough to prevent the door locks or door hinges from sustaining extra local pressure during the test.	Drop Off 2.0mm Maximum
Side Door Slam - Open Durability	No functional failures after slam open cycles.	
Paint Protection From Door Slam Damage	No Paint Damage	
Door Opening Efforts	Measure Opening Efforts	The nominal speed - 0.88 m/s to 1.5Nm
To monitor the fender louvres during the side doors KLT	Remain functional	
Door Trim Panel KLT	To complete 84,000 cycles - examine for failures.	To perform half way for Side doors - 42, 000 cycles should be complete.
Outside Handle Release Efforts	Measure release Loads	25N to 60N
Outside Door Lock Efforts	Measure the Torque required to Lock and Unlock	0.1Nm to 1.4Nm
Outside Door Lock Key Insertion/ Extraction Efforts	Measure the Insertion/ Extraction Loads.	< 10N
Outside Handle travel	Measure the Outside Handle travel	
Inside Handle Release Efforts	Measure Opening Efforts	15N to 30N
Resistance To Door Slam Forces - Power Glass Adjustment	Work through KLT	

Equipment and facilities:

- All test equipment must have up to date calibration and certification.
- Environmental chamber, large enough to contain the door pillar with door subsystem, test rig or whole buck and the testing fixture. Test can also be performed on a whole vehicle if required, thus larger environmental chamber may be used.

- Force gauge or other mechanism to conduct the following load case measurements:
  - Peak effort to open (effort to unlatch push-push device).
  - Breakaway effort from full closed.
  - Breakaway effort from full open,
  - Peak effort to close (effort to latch push-push device).

- Programmable Logic Controller to actuate the pneumatic rig, and also provide closed loop control feedback via subsystem switches.
- The measurements will be performed as shown in Fig.1 above, in Measurement points. Measurements such as Gap and Flushness, presented in the results Table 4 & 5 below.
- The chamber must be capable of maintaining constant temperatures of -40 °C ± 2 °C and +82 °C ± 2 °C, with 85 % ± 5 % humidity at 40 °C ± 2 °C.

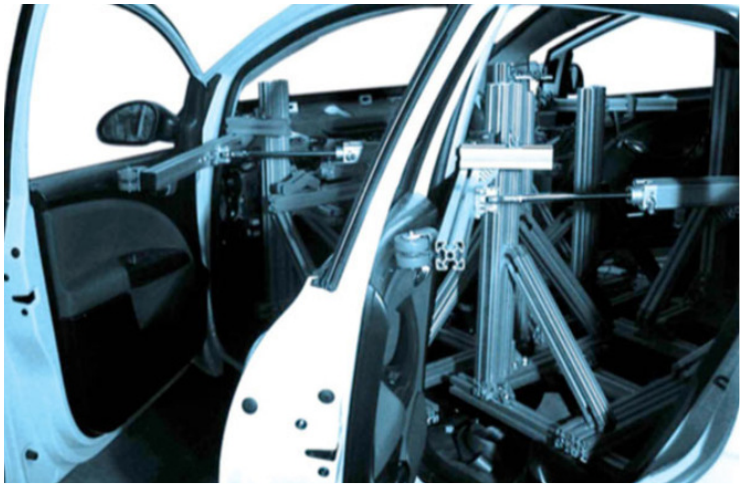

Fig.2: Automotive Door Slam - LHS Cyclic System

[https://www.encopim.com/driver-interface/automotive-door-slam]

The Fig. 2 describes the interior cycling method by which the side doors were cycled during testing, as follows: Once the door is closed, a micro-switch confirms the position and the door unlocks. A roller wheel was used to push the door into the fully open position by moving along the top roll area of the door card. Cylinder extension was attached to the interior rig assembling and was used to pull the door out of the fully open position; the door was then allowed to fall freely into the fully closed position.

Comments on Results

The application of Accelerated Key life test method will focus, as mentioned above, on the development of the following stages:

- The study of field conditions to determine the important parameters that are to be simulated in the laboratory
- Develop an accurate (by quality and quantity) simulation of the field conditions.
- Introduce accelerated durability testing, including the analysis and management of the causes of degradation (failures)
- Development recommendations for eliminating the causes of failures and degradation

- Make an accurate prediction of durability, maintainability and life cycle costs
- Accelerate the development of the product.

Thus, using the Key life test method and the related measurements, required according to the test procedure, the following resulted:

Shut Speed Measurements

The speed defined by the test procedure is the minimum identified shut speed plus 10% as shown in table 2:

Table 2: Shut speed

Temperature profile [°C]	Front Door [m/s]			Rear Door [m/s]		
	min	set	Interior	min	set	Interior
pre test	1	1.1	1.2	0.81	0.91	1.15
45/95	1.1	1.2	1.2	1	1.1	1.2
82	1	1.1	1.1	1.15	1.25	1.3
4	1	1.1	1.1	1.15	1.25	1.3
-4	1.05	1.15	1.25	1.15	1.25	1.3
-20	1.15	1.25	1.35	1.15	1.25	1.3
-40	Manual Cycling					
22	1	1.1	1.2	0.81	0.91	1.15

The nominal speed for Front Door is 0.88 m/s and for Rear Door is 1.08m/s (increased by 10%). The measurement of the door closing speed was measured with EZSpeed gauge. It is a compact unit system that mounts via a vacuum cup on the body. EZSpeed measures the speed of the door while closing and calculates the minimum closing speed.

Gap and Flushness Measurements

During final assembly verification, it is checked that the car's panels are joined correctly and adhere to strict dimensional specifications. Doors must lie flush with one another so that they do not pinch near the base. This requires highly accurate gauging of critical gaps or flushness and clearances.

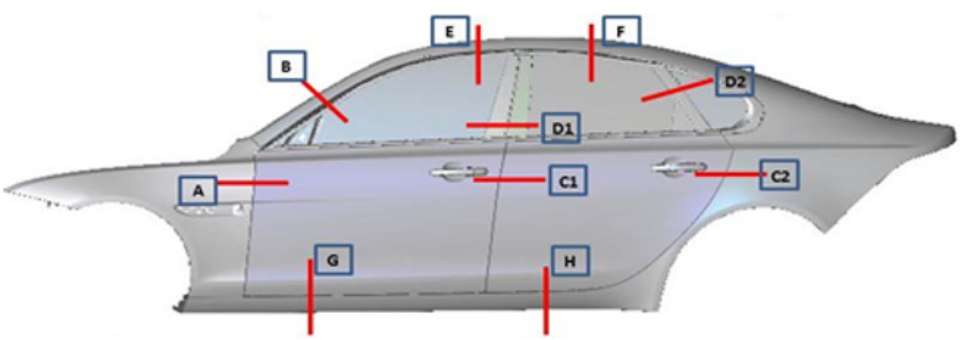

Fig 3. Gap and Flushness measurement points (see details in Table 3)

The measurement methodology must be in accordance with the design criteria. This means that an instrument must have the flexibility to make several different types of measurements and the repeatability of the measurements must be in the

range of 0.20 mm, as seen in Fig.3.

Table 3: Gap and Flushness cut plane description

Cut Plane	Description
A	Front Edge below waist
B	Front Edge above waist
C1 / C2	Rear Edge below waist
D1 / D2	Rear Edge above waist
E	Top Frame Front
F	Top Frame Rear
G	Lower Front
H	Lower Rear

Exterior gaps can be as large as 4.0 or 5.0 millimeters and as small as no gap at all. The gap design can have square-edges or very large radii and the panels can be flat, curved or at a 90° angle to each other. Flush measurements are difficult because of the complex surfaces at the joints. The measurement instrument must be flexible in its methodologies to accommodate all of these features.

The Gap and Flushness test measurements results, required according to the test procedure are presented in tables 4 and 5:

Table 4: Gap measurements

Door Gaps	Right Hand Front Door				
	Start of Test [mm]	25% of Test [mm]	50% of Test [mm]	75% of Test [mm]	End of Test [mm]
B - Front Edge below waist	2.28	2.10	2.97	2.36	2.26
C1 - Front Edge above waist	2.90	2.90	3.05	3,43	3.55
C2 - Front Edge above waist	3.11	3.06	3.95	3.50	2.99
D - Top Frame Front	3.70	4.78	5.40	5.14	5.47
E - Top Frame Rear	2.23	2.41	3.42	3.20	3.19
F - Rear edge above waist	4.40	4.37	5.22	5.04	5.14

Table 5: Flush measurements

Door Flushness	Right Hand Front Door				
	Start of Test [mm]	25% of Test [mm]	50% of Test [mm]	75% of Test [mm]	End of Test [mm]
B - Front Edge below waist	-4.62	-5.40	-5.02	-5.50	-5.61
C1 - Front Edge above waist	0.11	0.41	0.48	0.41	0.40
C2 - Front Edge above waist	1.97	2.20	1.99	1.83	1.88
D - Top Frame Front	-0.06	-0.12	-0.15	-0.20	-0.18
E - Top Frame Rear	-2.40	-2.66	-3.19	-3.14	-3.50
F - Rear edge above waist	-1.92	-2.40	-2.74	-3.00	-3.30

Based on the results obtained in Table 4 & 5, the Key Life Test process was found to be a useful procedure for accelerated life. As can be seen in graphical form, in Fig. 4 & 5 below, the failure mode is insignificant, taking into account the lifespan of the side door.

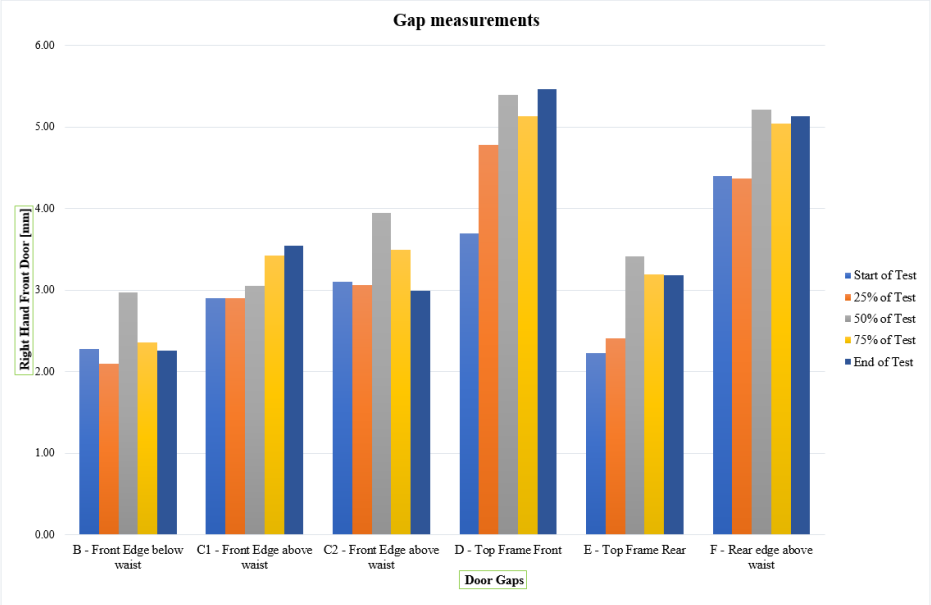

Fig 4. Gap measurement results

Starting with the *Start of test* and ending with the *End of test* shown in Fig.4, all specimens measured similarly. The shape of the trends is similar in Fig 5, as well. The maximum change of the gaps is 0.75mm, accepted by the test specifications.

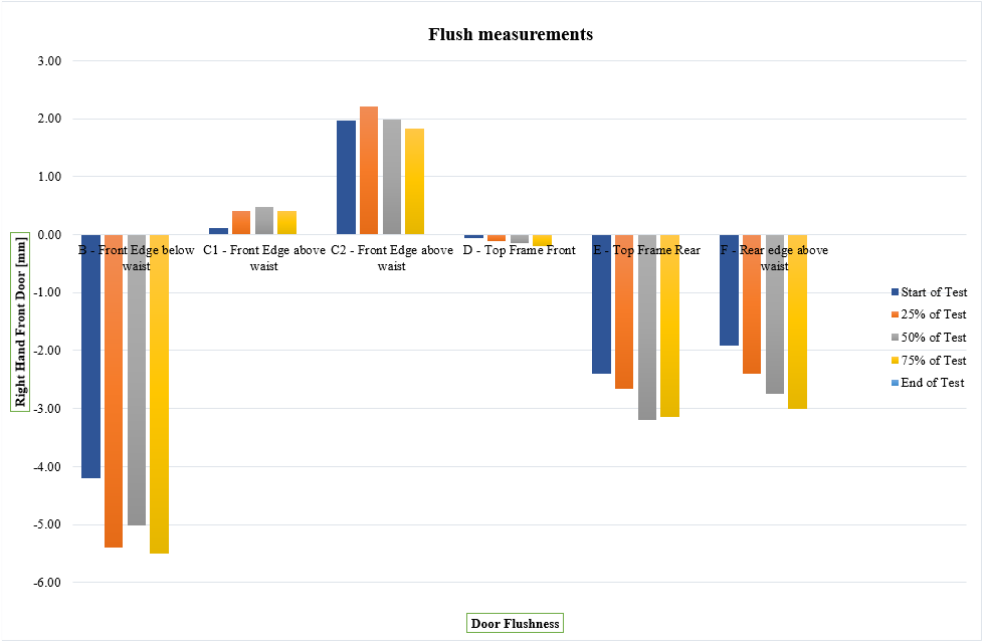

Fig. 5: Flushness measurement results

Certainly, the failures tended to occur at or soon after, the hot and humid cycles (40 °C ± 2 °C and +82 °C ± 2 °C), where plastic components traditionally struggle.

Torque measurements - Closing Module panel ('crack off' = anti-clockwise)

The method for determining indirect torque is the reaction force measurement method, where the force applied to the end of the lever arm is measured using a force transducer. Torque is then determined indirectly through measurement of certain auxiliary quantities in the drive train.

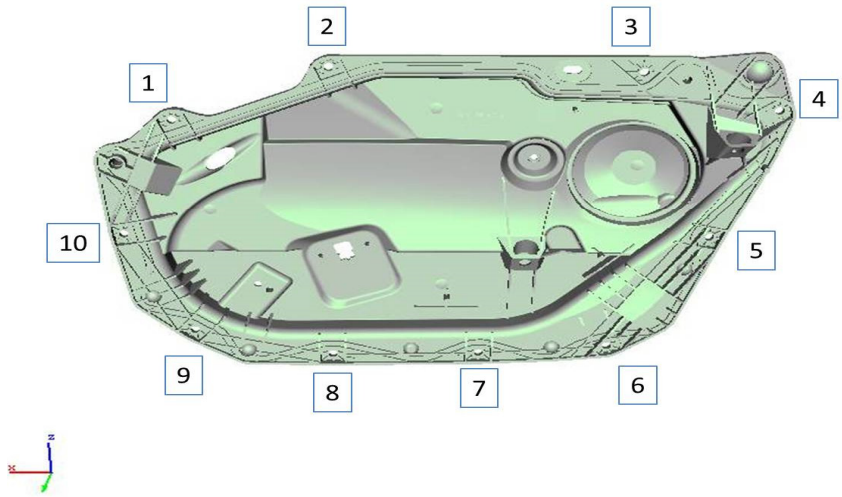

Fig. 6: LH Front door module plate positions

The torque checks showed the expected amount of torque relaxation, without fastener movement for all fixings on the module plate, resulting in a lower torque to undo than was applied in the first place, as shown in Table 6 below:

Table 6: Torque test results

Torque measurements	**Spec [Nm]**	**Set [Nm]**	**Crack off [Nm]**	**Retorque [Nm]**
LH Front closing panel Clockwise from top rear				
1	2.2	2.2	1.1	1.2
2	2.2	2.2	1	0.9
3	2.2	2.2	0.8	0.5
4	2.2	2.2	0.9	1
5	2.2	2.2	1	1.1
6	2.2	2.2	1	1.1
7	2.2	2.2	1	1.3
8	2.2	2.2	1.3	1.4
9	2.2	2.2	1.2	1.1
10	2.2	2.2	1	1.3

The graph in Fig.7 shows that the minimum requirement of 2.2 Nm was not achieved in any of the 10 measured positions.

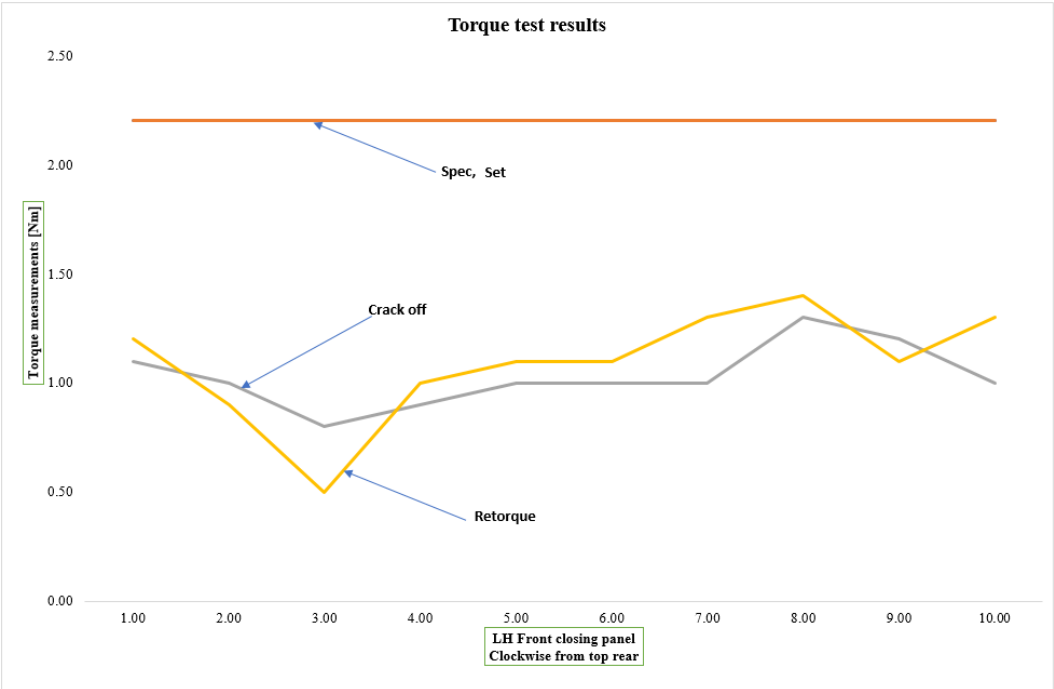

Fig. 7: Graph of Torque results

The torque results, presented above, show the components failure mode and thus, the analysis and design improvement is necessary.

Conclusion

In order to control the Key life test, a thorough organization and knowledge of the technical elements underlying the test method is required. Accurate simulation of real - world conditions requires full simulation of the field input influences integrated with safety and human factors.

As a result of this study, the side doors key life test met the criteria according to test procedure. The measurement checks showed no particularly outstanding results. During post-test inspection, primarily it will look at torque relaxation at the hinges, physical inspections for cracks in stress areas (hinge, strut and latch) and general performance of the doors. With margin, flush and gaps measured before and after.

The tests are currently performed in automotive companies or in specialized technical laboratories. The tests are performed according to ISO / IEC 17025 - Testing and calibration laboratories and the working procedure of the Key Life test side doors system. The study aimed to analyze the results of the test method, in order to sustainably improve customer satisfaction. A similar test method can be applied to different components issued, but a thorough approach is needed to track and report relevant results.

Acknowledgment

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Game Based Learning in Higher Education: A Multicountry Analysis

Jessica REUTER
University of Aveiro, Portugal, jessicareuter@ua.pt

Marta FERREIRA DIAS
GOVCOPP, University of Aveiro, DEGEIT, Portugal, mfdias@ua.pt

Marlene AMORIM
GOVCOPP, University of Aveiro, DEGEIT, Portugal, mamorim@ua.pt

Claudia VELOSO
GOVCOPP, University of Aveiro, ESTGA, Portugal, cmv@ua.pt

Claudia FIGUEIREDO
GOVCOPP, University of Aveiro, DEGEIT, Portugal, claudiafigueiredo@ua.pt

Elisabete VIEIRA
GOVCOPP, University of Aveiro, ISCAA, Portugal, elisabete.vieira@ua.pt

Abstract

Educational institutions in recent years have followed a dynamic process of transformation and implementation of new technologies that are marked by flexibility and innovation in teaching methods. The use of educational games in higher education has roused the interest of researchers all over the world, as it is a tool that triggers the interest of students and represents an opportunity to encourage the participation and motivation in the teaching process while developing transversal competences. This work aims to analyse the use of educational games in South America, North America, and Europe in order to compare these experiences in different contexts in higher education. Through the analysis of the available literature, it is possible to obtain an overview of the reality and development of these practices and how they are meeting the needs of scholars in the face of the great diversity of the student population around the world. It also collects examples of successful development of Game based learning (GBL) in various fields of study and in the development of transversal skills.

Keywords: Game based Learning, Educational games, Gamification, Higher Education

Introduction

In recent years, all over the world, higher education has faced challenges to improve and innovate teaching practices to provide knowledge, develop skills and foster student engagement and participation in class. The aim of gamification is to offer the user an innovative experience through the use of game concepts and elements in an educative context. Gamification applications have been explored, and applied in a variety of different fields, including education, finance, health, and sustainability (Ibrahim and Ibrahim, 2020).

Different authors (Safapour, Kermanshachi and Taneja, 2019),(Hosseini and Mostafapour, 2019),(Kikot, Fernandes and Costa, 2015),(Kinio *et al.*, 2019),(Ibrahim and Ibrahim, 2020) demonstrate in their studies that GBL and gamification tools in higher education improves planning, problem-solving skills, creativity and intrinsic motivation to learn technical subjects. Moreover, at the end of a course that invest also in the development of soft skills and control of emotions, the student will be better prepared in the face of relationships and situations and will become a more productive individual and a successful professional (Almeida, 2020).

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To obtain better results in gamification, it is important that the game design well-constructed, in order to promote motivation, social interaction and competition among the participants. Moreover, the range of options and autonomy of the participants are fundamental, as it is in "trial and error" that the student will reflect and experience the consequences of his choices and, within it, develop critical thinking (Gómez Contreras, 2020).

Game based learning practices consistent with the disciplines and learning levels of students, if implemented correctly, can be an effective tool for modern education. Together with traditional methods, students will learn and develop skills through mixed teaching methods (Hosseini and Mostafapour, 2019). The way games are taught and the guidance in instructional design have a great influence on the motivation, performance and success of this tool (Uukkivi, A., & Labanova, 2018).

In this sense, this work analyses the scenario of GBL building on a review of publications on the subject in Europe, North and South America, notably concerning the adoption and development of specific tools in higher education.

Methodology

In this study we conducted a descriptive literature review through the interpretative analysis of bibliographic documents (Schlagenhaufer, Amberg and Michael, 2015). This approach is a descriptive review methodology that involves the search of relevant documents in an area of interest through of the search of certain characteristics of the subject investigated.

Initially, the data selection was carried out on the scientific basis of Scopus and the Web of Science, with the key words: gamification or game-based learning or educational games. We then restricted the selection to research papers. In this collection of articles, we have selected only the experiences in Europe, North America and South America in the period from 2015 to 2020. Finally, we limited the selection for those articles applied to the specific context of higher education. At the end of this selection and after eliminating the duplicate articles, we were left with 82 articles that we proceed by reading the abstract and introduction to identify the affinity of the article with the aims of the study. In this analysis of the articles, we looked for those who conducted systematic and bibliographical reviews on gamification, game-based learning or educational games as well as those who reported the application of these strategies in higher education. In addition, we sought to analyse the convergences, divergences and complementarities between them. Finally, we retained 66 article type documents from 23 different countries in Europe, North and South America.

Results

In the 66 articles analysed in this study we are dedicated to understand experiences and examples of gamification in the defined countries. Regarding the number of publications per year, in 2015 we registered 5 publications, 2016 another 5, in 2017 there were 9 publications, in 2018 we registered 13, in 2019 we registered 20 and until August 2020 we selected 14 publications on the subject. This shows how much the subject has been gaining space with researchers in recent years.

In Table 1, we observe the areas of study and the types of GLB with the highest occurrence within each studied zone. We note that in Europe, South America and North America we have studies of the three main areas of study: exact sciences, human sciences and biological sciences.

In the fields of science where GBL's tools are applied, the most prominent areas are engineering, computer science, accounting, health sciences and foreign language. Moreover, the most common types of games in the application of this tool, which appear in all the documents analysed, are digital games, mobile games, escape room, board games, alternative reality games and Puzzles. It is important to highlight that most of the articles found in the area are about literature reviews, and therefore there is no application of the tool in a specific area.

Table 1: Summary of science fields and types of games by region

	Europe	N	South America	N	North America	N
Field of Science	Engineering	[10]	Accounting	[11],[7]	Health Sciences	[5]
	Business Adm	[12],[13]	Foreign Languages	[14]	Biology	[15]
	Accounting/Finance	[16],[17]	Mathematics	[18]	Biochemistry	[19]
	Biochemistry	[20],[21]	Computer Science	[22]	Foreign Languages	[23]
	College of Arts	[24],[25]	Marketing	[26]	Engineering	[27]
	Health Sciences	[28],[29]	Geology	[30]	Computer Science	[31]
Type Games	Mobile Games	[10],[32]	Digital Games	[14]	Digital Games	[33],[26]
	Alternate Reality Game	[34]	Board Games	[11]	Mobile Games	[19],[35]
	Escape Room	[20],[36]	Puzzles	[26]	Escape Room	[5]
	Board Games	[13]	Mobile Games	[37]	Alternate Reality Game	[15]

In table 1, where figures refer to the authors: [5] (Kinio *et al.*, 2019), [10] (Ivanova, Kozov and Zlatarov, 2019), [11] (Alves, Silva and Damasceno, 2019),[12] (Grivokostopoulou, Kovas and Perikos, 2019), [13] (Kutun and Schmidt, 2018), [14] (Guerrero, 2015), [15] (Chrysanthou *et al.*, 2018), [16] (Rich *et al.*, 2019), [17] (Buckley and Doyle, 2016), [18] (zabala-Vargas, S., Ardila-Segovia, D., Garcia-Mora, L., Benito-crosetti, 2019), [19] (Brown *et al.*, 2018), [20] (Ferreiro-González *et al.*, 2019), [21] (Gonzalo-Iglesia, Lozano-Monterrubio and Prades-Tena, 2018), [22] (Corsi D., Dominguez F., 2019), [23] (Dubreil, 2020), [24] (Barr, 2018), [25] (Barr, 2017), [26] (Vélez *et al.*, 2019), [27] (Hernández *et al.*,2016),[28] (Gómez-Urquiza *et al.*, 2019), [29] (Esteves *et al.*, 2018), [30] (Rodriguez-oroz, D., Gómez-Espina, R., Perez, M., Truyol, 2019), [31] (Hosseini and Mostafapour, 2019), [32] (Welbers *et al.*, 2019), [33] (Turner *et al.*, 2018), [34](Vlachopoulos and Makri, 2017), [35](Hernández-Horta, Monroy-Reza and Jiménez-García, 2018), [36] (Fotaris and Mastoras, 2019), [37] (Torres-toukoumidis and Romero-rodríguez, 2018).

The Table 2 shows the number of publications in the 23 countries analysed. The countries with the largest number of publications on the subject are Spain and the United Kingdom in Europe, the United States in North America and Brazil and Colombia in South America. If we make an analogy with the expenditure on higher education in 2015, taken from the world bank (World Bank, 2020) in millions of dollars, we see that in North America the United States leads the rank, with more than 244 million spent on tertiary education, Canada and Mexico have more modest figures. For Europe, of the countries with selected GBL publications in our study, the highlights are Germany ($ 51,878 million), the United Kingdom ($ 34,639 million) and Spain ($ 16,352 million), and with the exception of Germany, these are the countries with the highest number of publications. In South America, among the countries selected with GBL articles, Brazil leads the top expenditure with the tertiary education (44,600 million), followed by Argentina (10,800 million) and Colombia (6,553 million). With the exception of Argentina, the South America countries are the ones where we find the largest number of publications in the area.

In table 2, where figures refer to the authors: [1] (Ibrahim and Ibrahim, 2020), [2] (Safapour, Kermanshachi and Taneja, 2019),[4] (Kikot, Fernandes and Costa, 2015), [5] (Kinio *et al.*, 2019), [6] (Almeida, 2020), [7] (Gómez Contreras, 2020), [8] (Uukkivi, A., & Labanova, 2018), [10] (Ivanova, Kozov and Zlatarov, 2019), [11] (Alves, Silva and Damasceno, 2019), [12] (Grivokostopoulou, Kovas and Perikos, 2019), [13] (Kutun and Schmidt, 2018), [14] (Guerrero, 2015), [15] (Chrysanthou *et al.*, 2018), [16] (Rich *et al.*, 2019), [17] (Buckley and Doyle, 2016), [18] (zabala-Vargas, S., Ardila-Segovia, D., Garcia-Mora, L., Benito-crosetti, 2019), [19] (Brown *et al.*, 2018), [20] (Ferreiro-González *et al.*, 2019), [22] (Corsi D., Dominguez F., 2019), [23] (Dubreil, 2020), [25] (Barr, 2017), [26] (Vélez *et al.*, 2019), [27] (Hernández *et al.*, 2016), [29] (Esteves *et al.*, 2018), [30] (Rodriguez-oroz, D., Gómez-Espina, R., Perez, M., Truyol, 2019), [31] (Hosseini, Hartt and Mostafapour, 2019), [32] (Welbers *et al.*, 2019), [33] (Turner *et al.*, 2018), [34] (Vlachopoulos and Makri, 2017), [35] (Hernández-Horta, Monroy-Reza and Jiménez-García, 2018), [36] (Fotaris and Mastoras, 2019), [37] (Torres-toukoumidis and Romero-rodríguez, 2018), [39] (Aoki, Fiuza and Lemos, 2018), [40] (Tenório *et al.*, 2020), [41] (Tenório *et al.*, 2019), [42] (Panosso, de Souza and Haydu, 2015), [43] (Bontchev *et al.*, 2018), [44] (Ardila-Muñoz, 2019), [45] (Arnseth and Silseth, 2018), [46] (Torres-Toukoumidis *et al.*, 2017), [47] (Romero and Kalmpourtzis, 2020), [48] (Jan *et al.*, 2015), [49] (Troussas, Krouska and Sgouropoulou, 2020), [50] (Kétyi, 2016), [51] (Lengyel, 2020), [52] (Vusić, Bernik and Geček, 2018), [53]

(Ranglund *et al.*, 2016), [54](Dias, 2017), [55] (Urh *et al.*, 2015), [56] (Carenys, Moya and Perramon, 2017), [57] (Muñoz-Merino *et al.*, 2017), [58] (De-Marcos, Garcia-Lopez and Garcia-Cabot, 2016), [59] (Ortiz-Colón, Jordán and Agredai, 2018), [60] (Sánchez-Mena and Martí-Parreño, 2017), [61] (Borrego *et al.*, 2017), [62] (Grivokostopoulou, Kovas and Perikos, 2019), [63] (Sánchez-Mena, Martí-Parreño and Aldás-Manzano, 2019), [64] (Mas-machuca, Jordan and Tresserres, 2019), [65] (Herrera *et al.*, 2019), [66] (Naik, 2017), [67] (Fotaris *et al.*, 2016), [68] (Coleman and Money, 2020), [69] (Computing and Services, 2018), [70] (Clarke *et al.*, 2017), [71] (Martin, Dennen and Bonk, 2020), [72] (Park *et al.*, 2020). Expenditures. M. $ taken from the world bank database. Variable: "Government expenditure on tertiary education, constant PPP$ (millions of US dollars)". In Bulgaria, Denmark and France data on tertiary education expenditure were not available.

Table 2: Distribution of publication and expenditures by country

Country	Frequency	Percent (%)	Publications	Expenditures M. $
Argentina	1	1,5	[22]	10.831,68
Brazil	5	7,6	[11],[39],[40],[41],[42]	44.600,42
Bulgaria	2	3,0	[10],[43]	-
Canada	2	3,0	[5],[1]	26.026,37
Chile	1	3,0	[30]	5.446,06
Colombia	5	7,6	[7],[18],[26],[44],[14]	6.553,71
Cyprus	1	1,5	[34]	374,62
Denmark	1	1,5	[45]	-
Ecuador	2	3,0	[46],[37]	4.152,82
Estonia	1	1,5	[8]	564,34
France	1	1,5	[47]	-
Germany	3	4,5	[16],[13],[48]	51.878,25
Greece	2	3,0	[12],[49]	2.194,70
Hungary	3	4,5	[50],[51],[52]	1.734,25
Ireland	1	1,5	[17]	2.919,10
Mexican	2	3,0	[35],[27]	25.949,82
Netherlands	1	1,5	[32]	14.304,7
Norway	1	1,5	[53]	6.221,35
Portugal	4	6,4	[54],[4],[29],[6]	2.860,46
Slovenia	1	1,5	[55]	673,98
Spain	11	15,2	[56],[57],[58],[59],[60][20],[61],[62],[63],[64],[65]	16.352,88
UK	7	10,6	[25],[66],[36],[67],[68],[69],[70]	34.639,59
USA	8	12,1	[71],[31],[19],[33],[15],[23],[72],[2]	244.549,1
Total	66	100,0		

Conclusion

The use of gamification and GBL in teaching seems to bring an enormous potential for teaching and developing skills in students. Several studies (Safapour, Kermanshachi and Taneja, 2019),(Hosseini and Mostafapour, 2019),(Kikot, Fernandes and Costa, 2015),(Kinio *et al.*, 2019),(Ibrahim and Ibrahim, 2020) showed that GBL and gamification tools in higher education increase creativity, problem-solving capacity and motivation to learn technical subjects as also as contribute to the development of soft skills and control of emotions so the student will be better prepared in the face of relationships and situations professional. In addition, to improve the interest and participation of students in class, the set of tools within gamification presents in itself an important challenge for the evolution of educators who need a constant update of their teaching methods in order to set ahead the perpetuation and transmission of knowledge. At the same time, it develops transversal skills in the students, preparing and helping them in the world of work.

In our study, we analysed the development of countries in relation to GBL publications. The United States and Europe have a wide range of studies on the tool. Although publications in higher education are still few, they undoubtedly

have been growing since 2017. In Eastern Europe and South America, studies using gamification tools and GBL in teaching and skills development practices are rarer.

Therefore, for the development of this tool would be a n interesting step for future studies with examples of gamification and GBL in South America and Eastern Europe.

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Regional Features of Small and Medium Business Development in Ukraine (Ivano-Frankivsk City Example)

Yurii DRUK
Ph.D in Public Administration, Branch Director of JSC "Ukreximbank" in Ivano-Frankivsk region, Advisory Board Member at Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine drukum@gmail.com

Nataliya MARCHUK
Ph.D in Political Science Head of European Union Information Centre, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine natali.marchuk@gmail.com

Vasyl MARCHUK
Doctor (Ph.D hab.) in History, Professor, Head of the Department of Political Institutes and Processes, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine vmarchuk@ukr.net

Abstract

The effective functioning of small and medium enterprises in Ukraine is due to multifactorial impact formation of a competitive environment according to the deepening market relations. The approval of positive trends and the implementation of measures to improve business in the regions are directly dependent on the formation of purposeful, consistent and predictable state regulatory policy and actions of government and administrative bodies in the field of economic activity. At the same time, there are also ways to create a unique business environment and promote entrepreneurship at the local level. The experience of Ivano-Frankivsk city has shown high efficiency in the involvement of favorable geographical location, government interest and willingness to promote business development.

Keywords: Small and Medium Enterprises, Business Environment, Economic Development, Investment.

Introduction

Small and medium enterprises are the foundation of each market economy. In the current conditions of periodic financial crises, unstable socio-economic and political situation in Ukraine, the development and support of small and medium enterprises is important for the stabilization of the national economy as well as the solution of major social issues. Ukraine has strong enough capabilities to develop SMEs at the national and regional levels. However, Ukraine's economic insecurity leads to the fact that every crisis has an impact and leaves a negative impact on the country's economic growth.

The state of the market in Ukraine requires companies to form demand for their products not only to establish constructive relationships with customers, dealers and suppliers, but to build new investment-attractive areas, one of which in the last few years is the city of Ivano-Frankivsk in western Ukraine.

Richard Cantillon, Karl Marx, David Ricardo, Anthony Smith, Jean-Baptiste Say, Friedrich August von Hayek, Joseph Schumpeter and other prominent economists made a great contribution to the creation of theoretical foundations of entrepreneurship during the XVII-XX centuries. A large number of works and researches are devoted to small and medium business in modern economic theory. Small business remains the focus of researchers due to its economic and spatial manoeuvrability, flexibility of decision-making. Despite the significant amount of research on the activities of small and medium enterprises, the features of the development and functioning of small and medium-sized businesses in a particular region remain insufficiently studied. The example of the city of Ivano-Frankivsk is little studied in economic research and needs detailed analysis.

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The purpose of the study is to analyze the activities of small and medium-sized businesses in Ivano-Frankivsk based on the use of statistical methods, identify reasons for slowing down the functioning of SME, identify investment-attractive areas of Ivano-Frankivsk for its further development.

Main Text

Today, Ukraine is making significant efforts to create favorable conditions for doing business in all regions of Ukraine, which differ from each other in the priorities of socio-economic development, the availability of natural and human resources, labor skills, industrial structure and more. That is why each region is unique and has its own characteristics and competitive advantages.

The activities of small and medium-sized businesses are focused primarily on the local market and vitally depends on the conditions created for their existence at the local level. The development of small and medium business is one of the most important factors in solving socio-economic problems of the regions and improving their investment attractiveness.

The city of Ivano-Frankivsk (Stanislaviv - until 1939, Stanislav - until 1962) is one of the 24 regional centers of Ukraine. It is the administrative, economic and cultural center of Ivano-Frankivsk region, with a total area of 83.73 square km, with a population of over 250 thousand inhabitants. Ivano-Frankivsk City Council also consists of 5 villages that joined the city during the current administrative-territorial reform of decentralization. The city of southwestern Ukraine is located in the distance 150-300 km from the borders of Poland, Romania, Hungary, Slovakia.

The main characteristic of the economic complex of Ivano-Frankivsk is the diversified industry, which provides relative resistance to fluctuations in the economic situation in the country. The main sectors of the city's economy: food, engineering, production and distribution of electricity, gas and water, light and chemical industries, manufacture of wood products, printing.

Economic indicators characterizing the state of development of small and medium enterprises indicate the positive dynamics of growth of this sector and its share in the overall economic potential. The volume of products sold by industrial enterprises in 2019 in Ivano-Frankivsk is about UAH 11 768.7 million which is 356,6 milion EURO. This amount which is 86.2% of the volume of 2018 (Report on the Results of the Industrial Sector of Ivano-Frankivsk for 2019. [Online]. URL: http://www.mvk.if.ua/proms/52708 date of access: 12/09/2020). The decrease in sales was mainly due to the closure of production at Tyco Electronics Ukraine Limited according to the optimization of production in Europe carried out by the company. Another reason is the decrease in sales of Intelcom's products due to the expiration of supply agreements with the Russian Federation, as well as the oversaturation of the market with Chinese goods.

According to the official data, in 2018 Ivano-Frankivsk counted 16.8 thousand small and medium sized enterprises (including 129 medium-sized enterprises, 3.8 thousand small enterprises and 12.9 thousand individual entrepreneurs) but only three large-scale enterprises. Accordingly, 23.2% of the business entities were registered as legal entities, which is somewhat higher than Ukraine's average (19.3%). In 2018, the number of SMEs in Ivano-Frankivsk increased by 9% compared to 2017, which is 7.1 percentage points higher compared to the country's average (1.9%). This was primarily due to a 9.5% growth in the quantity of small businesses (the country's average reached 5.1%) and a 8.9% increase in the number of individual entrepreneurs (the country's average was recorded at 1.2%). In addition, the number of mediumsized enterprises increased by 4% (compared to a 7.5% at Ukraine's level). (Main Department of Statistics in Ivano-Frankivsk region, (2020), The number of enterprises in Ivano-Frankivsk city, [Online], [Retrieved October, 30, 2020], http://www.ifstat.gov.ua/)

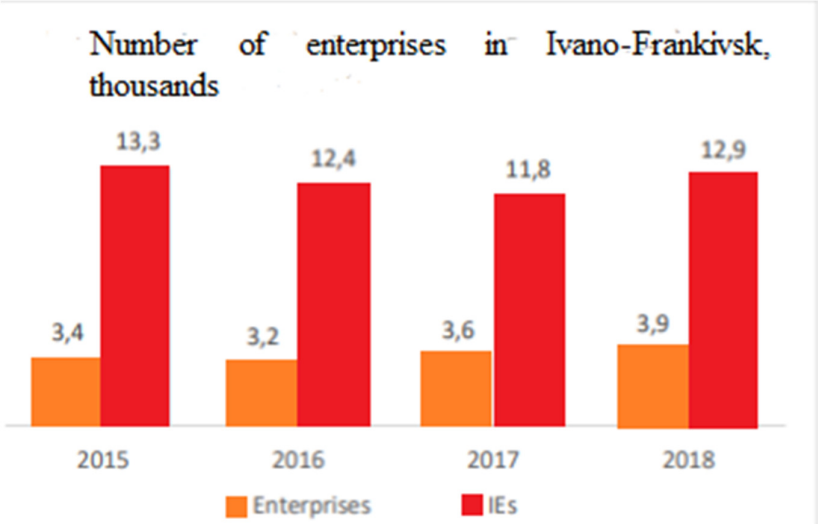

Small and medium business is developing in almost all sectors of the economic complex of Ivano-Frankivsk city. The volume of products sold by industrial enterprises for the first half of 2020 in Ivano-Frankivsk is about UAH 5061.2 million which is 153,3 milion EURO. The share of sales of manufacturing enterprises is 39.8% of total sales. The largest share in the sales structure is occupied by the enterprises for the supply of electricity, gas, steam and air conditioning (57.8%). The largest share in the structure of the processing industry was occupied by machine-building enterprises (50.4%), the production of food, beverages and tobacco products (25.9%), the production of rubber and plastic products, other non-metallic mineral products (8.9%). In the volume of sold products of mining and processing industry by main industrial groups 51.3% were consumer goods of short-term and long-term use, 21.7% - investment goods, 27% - intermediate goods. (Report on the Results of the Industrial Sector of Ivano-Frankivsk for 2019, (2020), [Online], [Retrieved September, 12, 2020], http://www.mvk.if.ua/proms/52708)

The construction industry is developing rapidly in Ivano-Frankivsk city which is its characteristic feature. The total area of built residential buildings was 752 903 м2 which 186,3% of 2018 amount. (Main Department of Statistics in Ivano-Frankivsk region, (2020), The total area of residential buildings commissioned by cities of regional importance and districts in 2019. [Online], [Retrieved September, 10, 2020], http://www.ifstat.gov.ua/) The development of the construction industry is explained by systematic inflow of investments from workers from abroad. Ukrainians employed in temporary jobs in other countries invest their earnings in real estate and we can state that this creates economically unreasonable demand for real estate and high market prices.

There are numerous positive trends in the development of entrepreneurship in Ivano-Frankivsk in recent years. It is not only about the quantitative growth of small and medium-sized businesses, but also about the gradual reorientation to production, the introduction of new technologies, improving product quality, innovative development. Entrepreneurs today make up a significant part of the middle class and affect social processes. The total number of enterprises in the city of Ivano-Frankivsk in 2019 was 4 066 with 52 798 employees. (Performance indicators of enterprises by cities of regional significance and districts in 2019. Main Department of Statistics in Ivano-Frankivsk region. [Online]. URL:http://www.ifstat.gov.ua/ date of access: 23/08/2020). Disproportion in the total population and the number of employed persons can be explained by large volumes of labor migration abroad. There are no exact statistics of migration until the next all-Ukrainian population census is conducted (the previous one was held in 2001 and its data are no longer relevant). According to the State Statistics Service of Ukraine the estimate number from 1 to 4 million of Ukrainians work abroad every year but an unofficial sources state the number of 7 millions Ukrainians that are employed abroad in various spheres. Most people migrate from western Ukraine and Ivano-Frankivsk in particular due to the proximity of the border with the EU.

A popular form of management in the city as well as in Urkaine is an individual entrepreneur. This form of doing business attracts a more accessible registration procedure, less tax burden and lack of monthly reporting to government statistics. Simplicity, minimal costs for accounting and reporting procedures in this category

entrepreneurs give the opportunity to involve a significant part of the working population and develop their own business. As of January 1, 2019, 13 839 individual entrepreneurs were registered in Ivano-Frankivsk and this figure increased monthly until the beginning of the coronavirus pandemic. (Ivano-Frankivsk City Council, (2019), Socio-economic passport of Ivano-Frankivsk City Council, Ivano-Frankivsk: Misto NV, 4-8)

The growth of investment attractiveness of the city of Ivano-Frankivsk in addition to the proximity of borders with the EU, the availability of natural and human resources is also the development of modern urban projects with a high potential for investment. In 2014, a public restaurant Urban Space 100 was opened in Ivano-Frankivsk, which became a successful example of uniting socially active people around the idea of developing their city. The investors of the project were 100 residents of the city, and 80% of the restaurant's profit is directed exclusively to the implementation of public projects in Ivano-Frankivsk. Since the opening of Urban Space 100, 98 projects have been funded. The idea of a public restaurant attracted considerable attention to the city as a modern investment space and became a stimulus for the development of new projects.

In 2017, the project Promprylad Renovation was launched - an innovation center based on the old plant, which operates at the intersection of four areas of development of the region: the new economy and urban planning, modern art and education. This is an impact investment project, where investors simultaneously invest in the social impact on the region and receive a return on investment in the form of dividends. The amount of attracted investments as of September 2020 is $5 372 024 and is groving. This project made Ivano-Frankivsk a center for innovation and showed the city's potential for potential investors.

In 2018, Ivano-Frankivsk took first place in the ranking of transparency of the investment sector from Transparency International Ukraine within the Transparent cities program. Ivano-Frankivsk's best practice is the City Investment Portal, which contains all available information in Ukrainian and English on vacant land plots and production areas for the implementation of investment projects, as well as on successfully implemented projects. Foreign investors, Ukrainian enterprises and social departments of the city authorities included in this study evaluated 17 indicators that help determine the real transparency of investment in the economy, the presence of anti-corruption programs, conflicts of interest in city councils, tools and opportunities in the investment sector. (Transparency International Ukraine, (2020), Transparency rating of the 100 largest cities of Ukraine. [Online], [Retrieved September, 18, 2020], https://ti-ukraine.org/wp-content/uploads/2019/03/Rejtyng-prozorosti-mist-Ukrayiny-2018_1.pdf)

In September 2020, Ivano-Frankivsk became the best city in Ukraine for doing business according to Forbes Ukraine ranking. Ivano-Frankivsk received high scores on ten criteria: transparency of city authorities, business activity, Doing Business rating, purchasing power, transport links, security, education, perception of the city by residents, migration attractiveness and environmental situation. (Forbes Ukraine, (2020), The best cities for business, Forbes Ukraine №3 September, 114-120)

In 2020 Ivano-Frankivsk was recognized as the city with the most favorable business climate and effective economic governance together with other cities from different parts of Ukraine – Khmelnytsky, Lviv, Vinnytsia, Ternopil and Chernihiv. These are the results of the study "Ukrainian Competitiveness Index (ICM) 2019/2020", conducted by the "Competitive economy of Ukraine" program of United States Agency for International Development (USAID). In 2019-2020, the assessment included 24 cities, including the city of Kyiv and 23 cities-regional centres. According to this research, the strongest components of Ivano-Frankivsk city are low level of informal payments and corruption, strong leadership of municipal authorities, resources development, high compliance cost, transparency and data openness and access to public property. The weakest components are starting a business and support of innovations but these indicators are not at the low level. In particular, according to the survey data, the registration of a business in Ivano-Frankivsk in 2018-2019 took less time than on average in the country (4.9 days compared to 6.1 days). The surveyed business entities named the main barriers they face when doing business in Ivano-Frankivsk. According to the survey findings, three most important barriers included such factors as the lack of qualified workforce, high taxes, and low consumer demand. (NGO "Institute for Economic Research and Policy Consulting", (2020), Analytical report. Municipal Competitiveness Index. [Online], [Retrieved October, 30, 2020], http://www.ier.com.ua/files/Projects/2020/MCI/reports1/MCI_2019-2020_Part%202_Profiles_UKR.pdf)

Analyzing the development trends of small and medium business, we can conclude that in recent years in the city of Ivano-Frankivsk there have been positive changes. But the activities of small and medium enterprises in the city are

damaged by a number of negative factors, both specific to the Ivano-Frankivsk region and those that are common to Ukraine. These factors are:

- imperfection of normative-legal regulation of entrepreneurship
- insufficient development and effective functioning of the market infrastructure of business support
- administrative conditions for doing business and as a result of low innovation activity of small businesses
- limited access of entrepreneurs to financial and credit resources and their high cost
- complex system of state control in the field of economic activity
- insufficient effectiveness of the implementation of state regulatory policy
- low level of innovation in business
- unpreparedness of enterprises to work in quarantine conditions
- insufficient local authorities' efforts to protect the rights of small and medium-sized businesses and entrepreneurs during the COVID-19 pandemic.

Conclusions

Recently, there have been more and more discussions in Ukraine about supporting small businesses on national and local levels. The state as well as local authorities should first of all be interested in the development of small business, through which it is possible on a larger scale to fill the budget, create jobs and finally move from a commodity-type economy to an economy based on the functioning of small businesses. Studying the experience of Ivano-Frankivsk city showed that small business can take on the role of stimulator not only economic but also social development of the community. Favorable geographical location, government interest and willingness to promote business development have shown high efficiency and contributed to the creation of a unique investment environment for Ukraine. The economy of Ivano-Frankivsk city is characterized with quantitative growth of small and medium-sized businesses, the gradual reorientation to production, the introduction of new technologies, improving product quality and innovative development and the implementation of unique community projects.

The number of small and medium sized enterprises in Ivano-Frankivsk is somewhat higher than Ukraine's average and the city occupies leading positions in independent business environment rankings. Nevertheless, there are barriers to doing business in Ivano-Frankivsk such as the lack of qualified workforce, high taxes, and low consumer demand.

It is necessary to conduct an audit of business support infrastructure, identify potential key areas of business development in Ivano-Frankivsk to maintain the positive dynamics of economic growth. Authorities should also pay attention to the weaknesses of the business environment and anticipate the onset of risks.

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Fitting the Hype Cycle to Sharing Economy Innovations

Julia CUNHA
iimt – international institute of management in technology, University of Fribourg, Fribourg, Switzerland,
julia.cunha@unifr.ch

Anton SENTIC
iimt – international institute of management in technology, University of Fribourg, Fribourg, Switzerland,
anton.sentic@unifr.ch

Stephanie TEUFEL
iimt – international institute of management in technology, University of Fribourg, Fribourg, Switzerland,
stephanie.teufel@unifr.ch

Abstract

Disruptive sharing-economy technologies, unlike other innovations, follow a different version of the Hype Cycle. The traditional graphic model helps to predict the behaviour of collective expectations, supports entrepreneurial decisions and strategic investments. However, when applied to such collaborative solutions, based on the concept of sharing rather than owning, some steps seem to differ. In this paper, interesting findings came from applying a mixed-method approach and from a closer analysis of two innovative and disruptive sharing economy companies: Uber and Airbnb. Foremost, they presented two positive hypes on public expectations rather than one. Consequently, the companies also had to overcome two phases of disappointment. This finding indicates that predictions using the Hype Cycle, when applied to such innovations, may have to be revisited and consider a different pattern.

Keywords: Sharing Economy; Disruptive Technologies; Hype Cycle; Uber And Airbnb.

Introduction

During the past decade, innovative and disruptive technologies increased the popularity of sharing economy solutions. The idea of renting, swapping, or trading based on monetary or non-monetary transactions spread out through community-based online tools. Investors considered such innovations as "mega-trends", which could be lucrative and bring along major societal impacts (Hamari et al., 2016). In this context, two particular companies shined a spotlight on the idea of sharing while encouraging individual entrepreneurship: Uber and Airbnb. They became well-known symbols of new possibilities, as anyone could improve their income by taking passengers for a ride or by renting a spare room. Within their respective markets, each of these innovative platforms played a leading role in shaking up established industry structures (Skog et al., 2018).

The increased use of these platforms has also piqued the interest of competitors, investors, and scholars in analysing their development. They investigated the business model and possible effects on competitors, existing regulations, and general society (Cannon and Summers, 2014; Cohen and Sundararajan, 2015; Heinrichs, 2013). However, new innovations are influenced by a phase of increasing public expectations and by subsequent disappointment. This process, called the Hype Cycle, can impact the pace, direction, reputation, and amount of resources that are available for the development of a technology (Ruef and Markard, 2010). To the best of our knowledge no study analysed if these technologies have been hyped. Therefore, the intention of this research is to address this gap and investigate whether Uber and Airbnb, as sharing economy innovations, went through all the stages of hype and disappointment predicted by the hype cycle model and how has this occurred.

In order to do so, a mixed-methods approach was chosen, combining descriptive statistical analysis with content and sentiment analysis, and a history line. Finally, to verify similarities and differences the results were contrasted with the hype cycle model.

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The paper is structured as follows: Sections 1 and 2 present the most important theoretical concepts that were used for the analysis. Section 3 summarises the methodology. Section 4 presents the results and discussion. Finally, Section 5 brings the general conclusions.

Innovation and Disruptive Innovation

The definition of innovation must include the creation of the new. This could be a process, reorganisation of production, development, or alteration of a product, or even an improvement of existing methods and instruments. Regardless of a type of solution that it brings, development of an innovation is always followed by degree of uncertainty. Either because there is no correct formula for its implementation, or because it is not possible to anticipate results from its application (Kline and Rosenberg, 2010).

An innovation may be pivotal for the growth of a business, increase of earnings, improvement in competitiveness or to answer customers' demands. It can also be a way to tackle globalisation and environmental changes (Baregheh et al., 2009). Innovation is then a way to create and, simultaneously, a capacity to change and adapt (Thompson, 1965). It is worth noting that the dimensions of innovation may vary from 'Incremental' to 'Radical'. This could, respectively, be perfecting or optimising something that already exists or presenting a complete novelty to the world. It may also go from a 'Component Level' which improves parts or components, to a 'System Level' which creates a whole new version of a product (Tidd and Bessant, 2018).

The present study focuses on disruptive innovations. Normally, performed by smaller companies with limited access to resources, such innovations can successfully challenge incumbent businesses, and improve products or services, even when they cannot achieve existing performances. Typically cheaper and simpler, such innovations are more efficient and convenient, which gives them the possibility to develop, meet standards of performance and displace established solutions. In other words, disruptive companies have a potential to impact the strategies of entire business models (Christensen et al., 2015).

Hype Cycle

The Hype Cycle model is often used by managers or scholars during the study of innovation development. It predicts five specific phases that innovations should overcome during their development. Such patterns are considered 'inevitable' and applicable to every innovation, regardless of the type of business or the kind of technology that is being introduced. For this reason, the graph is used as a tool that helps predict the future (Fenn and Raskino, 2008). Presented in Figure 1, the model considers the evolution of the expectations on the Y-axis and behaviour over time on the X-axis.

As indicated in Figure 1, this analysis starts with the 'Innovation Trigger' the first stage and breakthrough of a technology, when an idea spikes media interest, but it is still in an early stage of development. It might not yet be usable or even viable, however its existence brings excitement, and a buzz starts to build up around it.

The following phase is called 'Peak of Inflated Expectations', as success stories are more often brought to the public by the media, as well as some of its failures. The product/solution is still being adjusted, but investors and other companies are seeking to be a part of the movement before their competitors. There is a high excitement, along with the feeling that joining the trend is needed, not to be left behind.

Subsequently, comes the third phase or 'Trough of Disillusionment'. As the initial hope develops into impatience for results. Performance and implementation are not meeting the expectations and the adoption is slower than planned. Those issues drive a reduction in interest on the technology. Simultaneously, there is a rise in the number of less favourable stories in the media, highlighting the challenges more than the opportunities. Improvements in the early adopters' satisfaction appear as the only way to keep investments.

The following stage is titled 'Slope of Enlightenment', that is, when the benefits of a technology crystallise, and new products/services start reaching the market. It is possible to observe the innovation maturing, while the conservative organisations remain cautious.

Finally, public expectations stabilise in the fifth stage or the 'Plateau of Productivity', when the technology adoption takes off. This phase is characterized by a more clear and defined relationship between the innovative company and

its suppliers and providers. It is also when the solutions' importance in the market starts paying off and the adoption accelerates rapidly. The real-world benefits of the innovation are clearly presented and accepted (Fenn and Raskino, 2008; Van Lente et al., 2013).

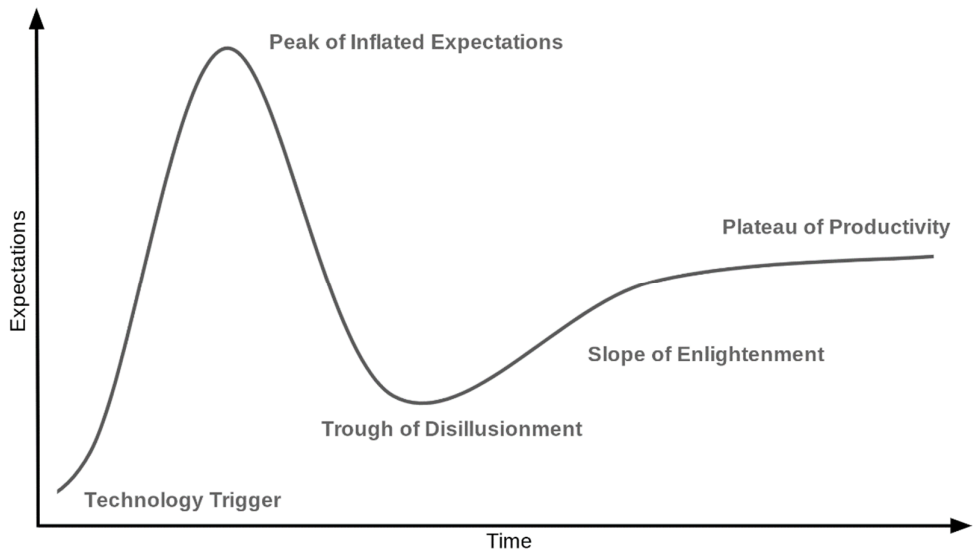

Figure 1: Hype Cycle illustration, based on 'The hype cycle of innovation'
Source: Fenn and Raskino, 2008

It is important to stress that the Hype Cycle reflects a period prior to the widespread diffusion of new technologies. At a point when collective expectations can strongly influence the implementation through an inherent and elevated level of uncertainty. Furthermore, outcomes, performances and societal impacts in this phase are still somewhat vague and unclear. In this sense, the higher the expectations, the higher are the chances that a technology will obtain support and investments for development. This may be especially relevant to capture the attention of policymakers, who will also rely on credibility of expectations when making decisions and drafting policies (Kriechbaum et al., 2018).

In other words, the interplay of expectations at different levels, on the debut of a technology, influences the capacity of a field to cope with its hype and disappointment. High expectations of a bright future can have a positive impact on the development of an innovation by drawing new actors and investment into the field (Van Lente et al., 2013).

It is also relevant to notice that there is no measuring unit for capturing expectations. While in the financial market expectations flow can be seen and assessed and measured through by the changes in the stock market, in areas such as business and innovations those expectations levels are less clear, highlighting the need for performing an indirect analyses. (Fenn and Raskino, 2008).

Methodology

This research focuses on the study of hype and disappointment applied to disruptive sharing economy innovations. It proposes the analysis of Uber and Airbnb as case studies for being among the most popular symbols of sharing innovations. By drawing the evolution of collective expectations, during the development of each one of these companies, the aim is to verify whether the Hype Cycle steps are applicable to sharing economy solutions.

To perform this study, the research uses a mixed-method approach. One simple quantitative method, measuring the media's attention over time, and three qualitative investigations focusing on different aspects. First, a content analysis to categorise the mentioned topics of the journalistic texts. Second, a sentiment analysis to reveal whether the content published was positive or negative. Finally, a historical line of events enabled the comparison of main facts and background context to each identified stage of the companies' development, deepening the investigation.

The research relied on printed and online versions of The New York Times as a source for the extracted journalistic publications. Since there is no direct measure of capturing expectations, a common approach used by researchers in the study of the Hype Cycle is the use of media analysis. Expectations and disappointments are extracted from within the articles, as they are apparent through the manner information is presented to the public; through the what issues the article is focusing on; and through the choice of words and meanings that paint, indirectly, a picture of how the technology is seen in a given moment (Fenn and Raskino, 2008).

The choice of this specific newspaper is based on a previous research done by the authors Van Lente et al. (2013), who also investigated the Hype Cycle using mixed methods and specific study cases. The research reviewed two technologies with very different domains: voice over internet protocol (VoIP) and gene therapy and high-temperature superconductivity (HTS). The reading of news articles mentioning such technologies was the pillar for the hype investigation in both cases. In addition to that, The New York Times has a reputation for being the main driver in shaping other journalistic organisations' news agenda and legitimising the coverage of topics that otherwise would not have a national journalistic reach (Golan, 2006; Bryant and Oliver, 2009).

The time frame defined for this research is from the year of each company's creation to the 31st December 2018. That represents for Uber and Airbnb 9 and 10 years of history, respectively. As a starting point, the researchers identified all texts mentioning "Uber" and/or "Airbnb" using the newspaper online search tool, which provides subscribers with an access to all published material since 1851.

Sample Treatment and Analysis

Focused on finding all published content mentioning 'Uber' and/or 'Airbnb', the initial research identified 6'517 texts in the given timeframe. Following the methodology of content analysis proposed by Bardin (1977) in the book 'L'analyse de contenu', the sample was submitted to a process of pre-analysis. This implied the refinement of the data by disregarding texts that did not mention at least one of the companies in the title. Results with the following characteristics were also excluded:

1) Index pages: dedicated to list the summaries of different journalistic stories
2) Multimedia content: including videos, pictures, audios and other multimedia content
3) Book reviews: as they are not the target of this research
4) Pages presenting the full content of legal decisions, internal company emails and other documents obtained without a journalistic text alongside

After applying the mentioned criteria, the sample was reduced to 762 publications. From this total, Uber had most of the texts: 594, against 168 mentioning Airbnb. The development of those numbers is detailed by the quantitative analysis.

According to Bardin (1977), the following step to be performed is the 'encoding', that allows the categorisation and transformation of the raw data, which enables a more simple and statistical view of the content analysis is provided. In this step, 40 texts were chosen randomly from the sample and read in their entirety. During this reading, all the mentioned subjects were listed and grouped into more general topics. This process resulted in the creation of 10 main categories.

Essential for performing the content analysis, the creation of those categories enables the classification of the texts according to a set of defined codes, during the categorisation phase. This includes the reading of all the sample, composed by 762 texts, while attributing the number 'one' to each one of the mentioned categories. Due to this process, the understanding of the published news articles can be simplified, creating a path for their general interpretation. To be more specific and capture nuances in the journalistic speech, each category was duplicated, allowing to compute when it appeared connected to a positive or negative context.

1) App features and operation
2) Company development
3) Competition/Partners
4) Ethical behaviour
5) Price

6) Economic performance
7) Political / Legal aspects
8) Advantages / Drawback to drivers / house owners
9) Advantages / Drawback to users
10) Local/International agreements / Local/International conflicts

Based on Bardin's (1977) content analysis method, it was defined that each text equals one unit of analysed data. Also, that each text may include one or several categories, in either a positive or negative context. Each category could be marked only one time per text to indicate a positive mention and one time for having a negative mention. Non mention categories remained unmarked. Later, the results were grouped and displayed in a graphic form.

To add another dimension to the analysis of the texts, the researchers also conducted a sentiment analysis. This is an automated method based on machine learning that helps to identify the polarity of each article. By using this method, it was possible to determine whether a text could be considered positive, negative, or neutral. The results were also used to create a graphic that could be compared with the Hype Cycle model. The program selected to perform this analysis is called Monkeylearn, which can process a large scale of texts quickly. To perform the analysis, all the texts from the final sample were consolidated in a single Excel file, then submitted to the platform for processing the material and return the results.

Lastly, it was built a time sequence of the main events for each company, to help visualise what occurred during the development of each one of them. Those inputs later combined with other results bringing deeper insights for the analysis of the outcomes. This specific applied methodology is a simplified version of the one used by the authors Van de Ven and Poole (1990). The authors propose a sequence of analysis in longitudinal qualitative data. The method is susceptible to subjective judgments while defining the incidents and, therefore, does not represent the sum of all the occurrences present in the development of an innovation. It does, however, allow an overview of several main events over time. All the information used to build this history line comes from the companies' official websites or from publications made by The New York Times.

Results and Discussion

As indicated in the methodology, this research started with the identification of 6'517 results for published content about Uber and Airbnb by The New York Times, between January 1st, 2008 / 2009 and December 31, 2018. This data set was refined by the application of pre-defined inclusion and exclusion criteria, resulting in a final sample of 762 publications. From which, 594 were focused on Uber and 168 on Airbnb.

The light blue line on Figure 2 shows how the number of publications about Uber developed during time. The other curves detail the results obtained by the sentiment analysis. In red, for example, are all articles considered negative: a total of 346 publications, equivalent to 58,2% of the sample. The green line represents the articles considered positive: 230 journalistic articles or 38,7% of the total. The yellow line is used to visualise the 18 publications or 3% of Uber's sample considered neutral. Grey is the line representing the net results or, in other words, the difference between positive and negative texts found in the sample. With only one exception, in 2013, when this result was neutral, all the other years were mainly negative. Interesting to note that positive, negative, and net results present a similar evolution, having peaks in 2015 and 2017.

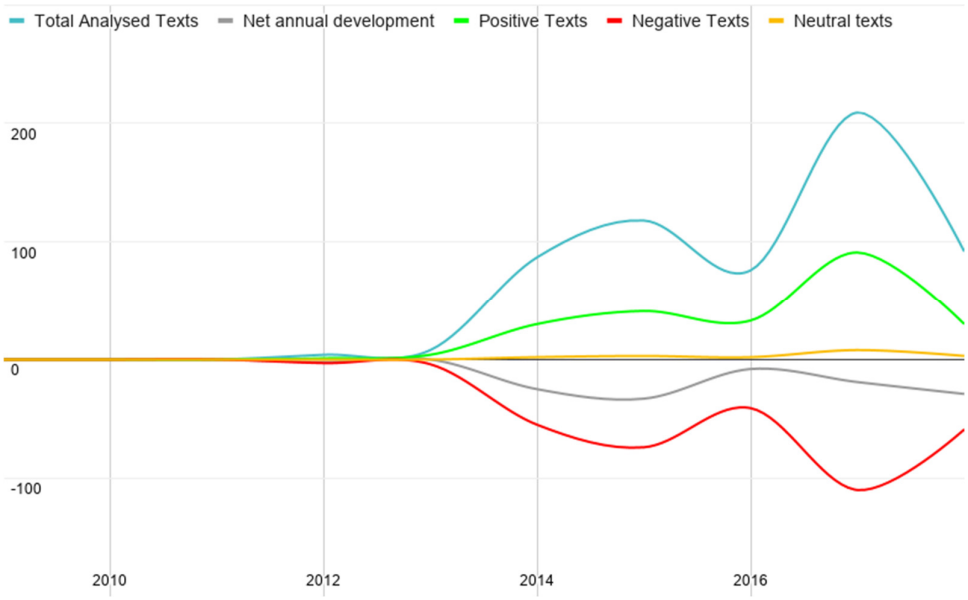

Figure 2: Sentiment Analysis by year for Uber

Airbnb's results are presented in Figure 3. The light blue line indicates the evolution of the analysed sample of journalistic texts, and the other curves the results obtained by the sentiment analysis. The green line shows clearly that most of the articles written about the company were considered positive; 93 out of 168 texts, or 55,3% of the total. Negative articles summed 74 or 44% of the sample, as presented by the red line. Only one text was neutral, 0,6% from the sample, as evidenced by the yellow line. In grey are the net results. This is the most irregular line, positive in 2011, 2013, 2014, 2016 and 2017; and negative in 2012, 2015 and 2018. It is worth noting that, despite initial disparities, the positive and net curves present similarities in their evolution, with peaks in 2014 and 2016.

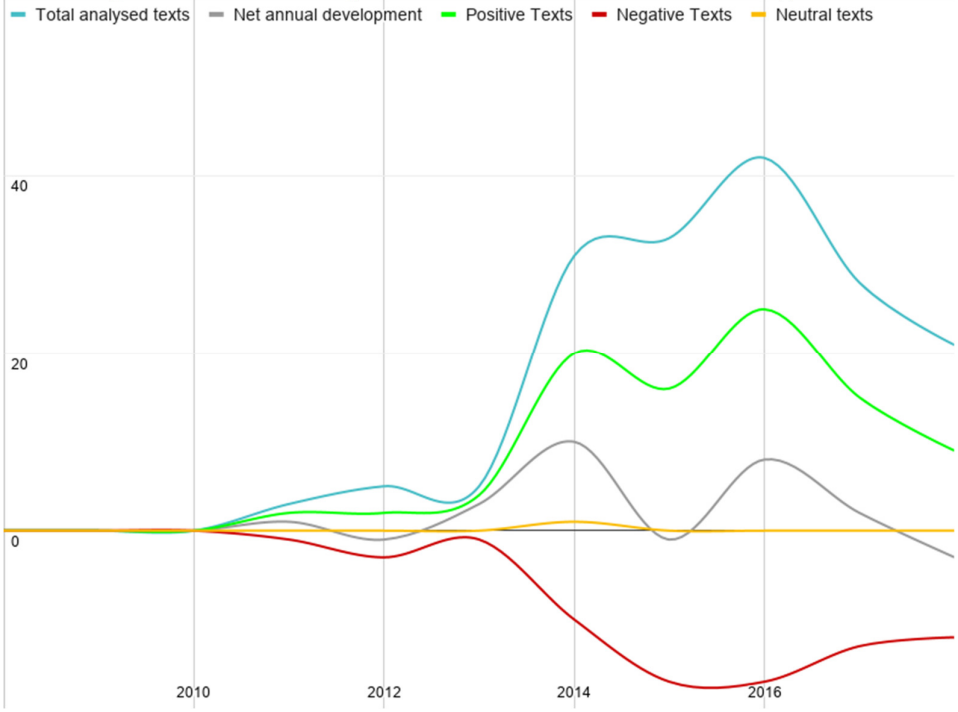

Figure 3: Sentiment Analysis by year for Airbnb

Figure 4 presents the result of the content analysis made for Uber. The graph gathers the sum of times a category has been mentioned by year, including both: positive and negative citations. It is important to stress that, during the coding process, a single text could possibly include more than one category, and that each category could be marked up to one time when referred positively and up to one time when referred negatively. Figure 4 brings the sum of all those mentions, year by year, during the timeframe analysed. It also shows that some issues were prominently featured by the media. In Uber's case, among ten different categories, the most popular topics were: 'App's Features and Operations', 'Company Development', 'Political Decisions and Legal Aspects', and 'Local and International Agreements or Conflicts'.

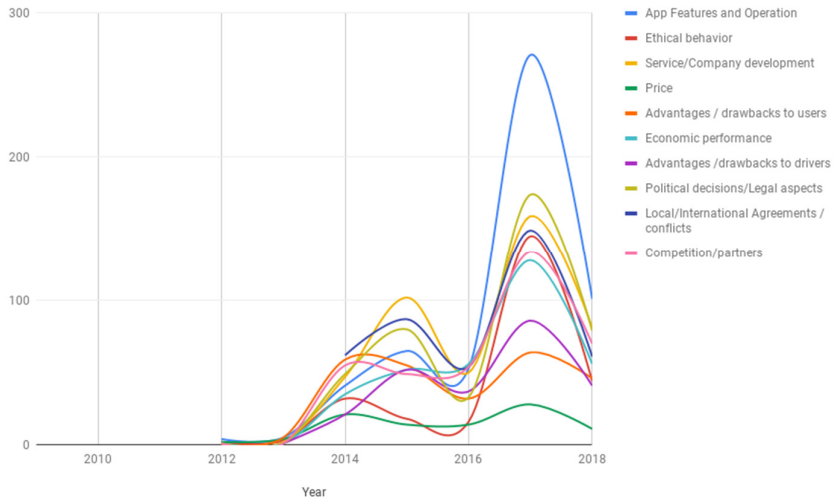

Figure 4: Number of mentions per year by category for Uber

Figure 5 presents the evolution of the mentioned topics for Airbnb. The figure also indicates the sum of mentions, positive and negative, by category and year. Likewise, the categories 'App's Features and Operations', 'Company Development', 'Political Decisions and Legal Aspects' and 'Local and International Agreements or Conflicts', are also on the top of the list, as most frequently mentioned subjects.

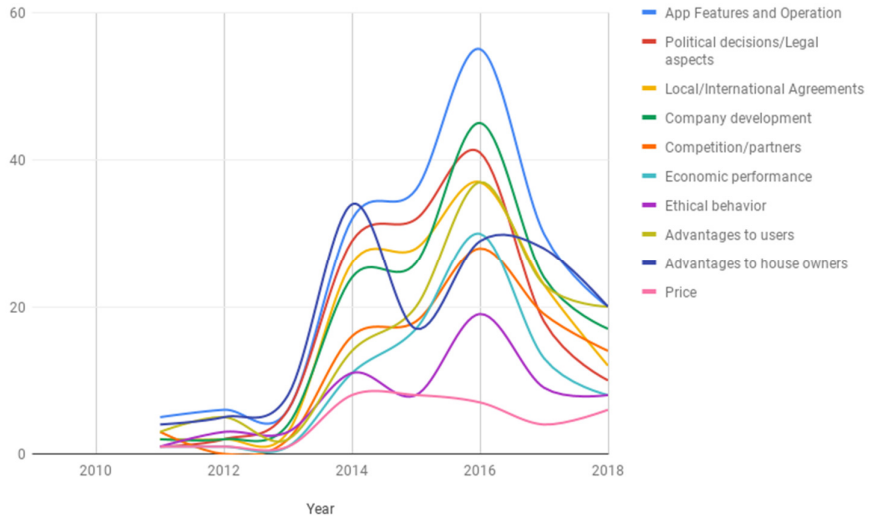

Figure 5: Number of mentions per year by category for Airbnb

Finally, the methodology proposed the elaboration of a timeline indicating the main events during the development of Uber and Airbnb, as this overview gives a different perspective for the collected data. Each company was analysed individually, and the highlighted events were summarised below. Figure 6 presents the first part of Uber's history line, going from 2008 to 2013. This initial phase of the company was marked by the company's creation and development, especially in North American cities. In this period, Uber developed several popular marketing campaigns, and got involved in a negative polemic involving 'surge pricing', an increase in fare rate during demand peaks.

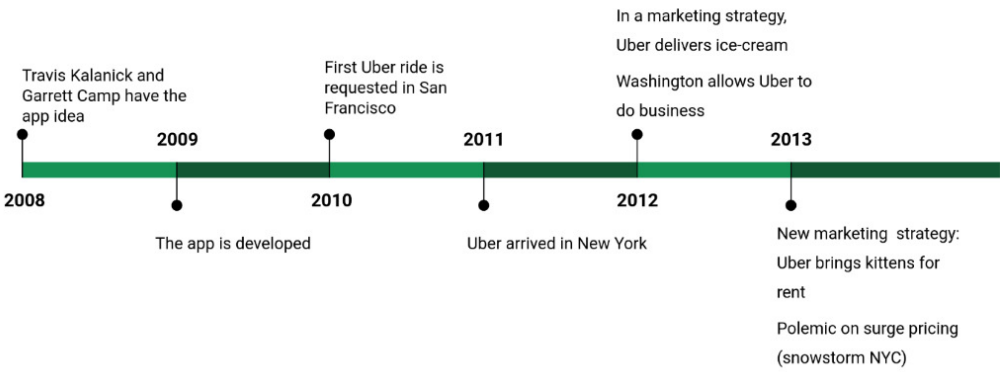

Figure 6: History of Events for Uber from 2008 to 2013

Figure 7 looks at the second part of the history line, the years between 2014 and 2018. During this period, the company had a significant capital increase, while heavily impacted by regulatory challenges and worldwide taxi-drivers' strikes against the spread of the technology. During this period, the company was banned from operating in several cities around the world, accused of having an 'aggressive global expansion plan' and critiqued for a policy based on 'asking for forgiveness and not for permission'. In 2014, Uber was featured in the headlines due to their hostility towards the press, when a senior executive assumed collecting private information from reporters that criticise the company, information that would be later publicly spread. In the same year, the media questioned the process of screening of drivers, following cases of passenger rape accusations. Uber's driver hiring model was also under the scrutiny, as it did not ensure basic rights. Other issues were revealed later in 2015, as hackers gained access to a massive amount of users' private data. In 2016, after investing billions of dollars to conquer the Chinese market, Uber retreated from its operation in the market.

In 2017, Google accused a former engineer of stealing trade secrets on autonomous vehicles and disclosing them with Uber's division in charge of developing a similar technology. In 2017, it was revealed that Uber used a program called 'Greyball' to deceive authorities worldwide and keep the platform running in cities where the service was officially banned. The company appeared in several other news articles due to internal discrimination and harassment complaints, ultimately resulting in the departure of the founder and chief executive, Travis Kalanick. In 2018, the new CEO Dara Khosrowshahi implemented several changes in Uber's management model and business culture. The year was also marked by a fatal accident when Uber's self-driving car collided with and killed a pedestrian in the United States during testing.

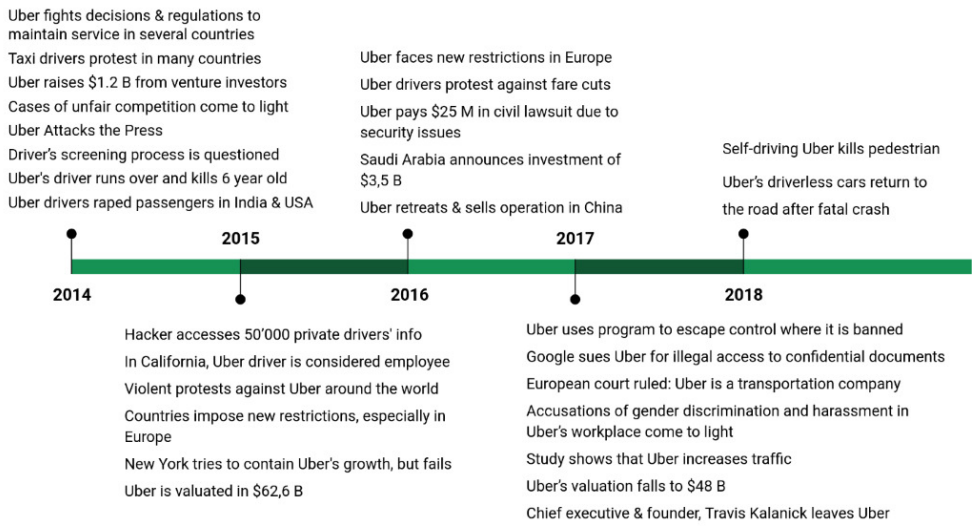

Figure 7: History of Events for Uber from 2014 to 2018

The first period of the timeline created for Airbnb can be found in Figure 8. It presents the events between 2008 and 2013 and includes the company's creation and the following strategy adaptation phase, which led to its successful growth in the number of users and cities in North America where the service was available. As the platform grew, several issues came to light such as cases of vandalised houses or stolen belongings. However, Airbnb's problems were amplified as hosts started being fined in New York City for illegal rent. A petition endorsed by Airbnb, requesting city legislators to adapt the local law, collected 50'000 signatures. The situation escalated when the city's attorney general required access to the hosts' information to identify illegalities.

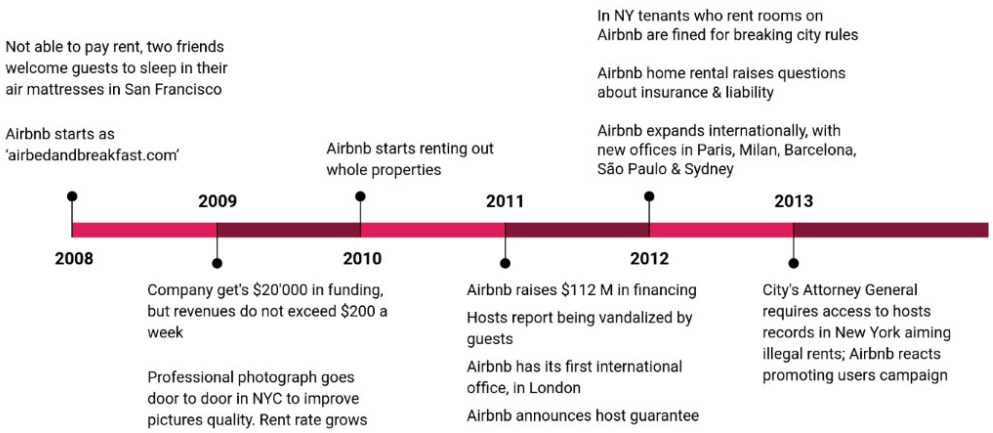

Figure 8: History of Events for Airbnb from 2008 to 2013

The second part of Airbnb's history line, presented in Figure 9, shows that the company was able to expand and develop around the globe. The economic growth followed the same flow and in 2014 the company was worth 10 billion dollars. Back then, the company decided to cooperate with the New York State Attorney and provided some of the host's information. The data was used to produce a report indicating that almost three-quarters of the listings in the city were illegal. From then on, problems with city administrations started appearing in several different cities around the world. Airbnb started campaigns to convince politicians and legislators of the benefits of short-term rentals. However, legal restrictions imposed on Airbnb activities around the world still dominated the news, even over the years and the reduction in the volume of journalistic texts that feature the company. Other topics mentioned during this period were accidents involving Airbnb's users, such as a man that died when using a swing in the garden of a rented property; a badly injured user that was attacked by the host's dog or a 19-year-old man reported being

sexually abused by his host. The company also faced criticism after a report revealed widespread discrimination and racism on the platform.

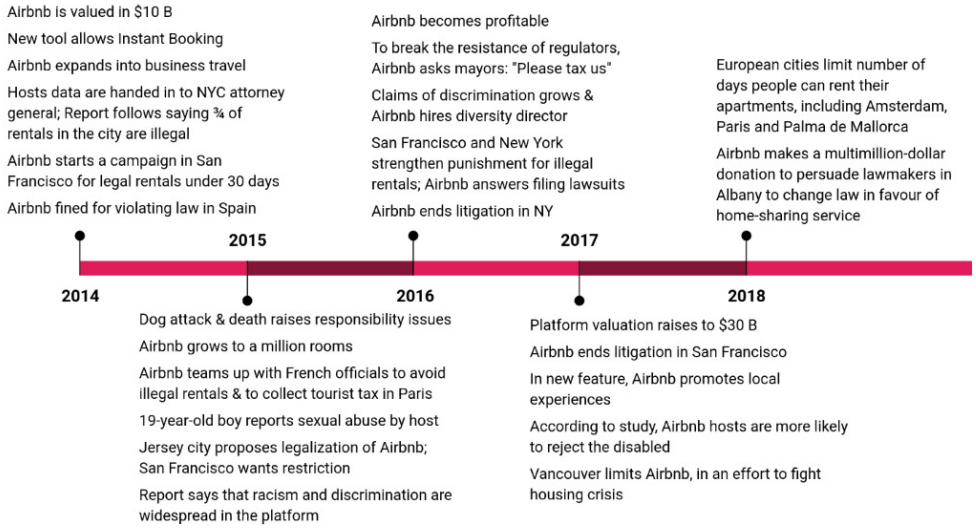

Figure 9: History of Events for Airbnb from 2014 to 2018

Conclusion

This paper investigated the existence of hypes during the development of Uber and Airbnb, two popular and disruptive sharing economy companies. The research used mixed methods to analyse, using different angles and perspectives, published newspaper articles about the technologies during their development. The results indicated growth of expectations and disappointment which were later compared with the Hype Cycle model.

This combination of quantitative and qualitative methods revealed interesting findings. In the first place, the results of both study cases indicated the existence of two distinct peaks of hype. Consequently, there were also two instances of disappointment. That means, when comparing the findings to the Hype Cycle, neither Uber nor Airbnb followed the exact shape established by the model. What is also worth noting is that, besides presenting two hypes each, and being in two different industries, the timings when those spikes registered are consistent: founded in 2008, Airbnb had its first euphoria peak happening exactly one year earlier than Uber, established in 2009. This indicates that disruptive sharing-economy companies may follow an adapted shape of this graph and should be analysed by predicting the existence of more than one hype.

Following a closer look at the content analysis, it is possible to come to a conclusion that identified hypes for both companies happened when similar topics were brought by the media, such as ‘App features and Operations’, ‘Political and Legal aspects’, ‘Company’s development’ and ‘Local or International Agreements or Conflicts’. The euphoria and disappointment also correlated with the greater reach of the technology. As Uber and Airbnb expanded their operations, they also had to overcome numerous new barriers and challenges. Mainly linked to political and regulatory matters, that have proven to be fundamental dilemmas for their evolution. In contrast, the same growth had a positive connotation, and was frequently mentioned with optimism.

An obvious difference between the two companies is that most of the media coverage featuring Uber was of negative sentiment, while Airbnb, on the other hand, was featured in a more positive light. This becomes very evident when looking at the net results of the sentiment analysis. Such perspectives may have affected the public's opinions and expectations of these two innovations, and perhaps even influenced the use of each of the platforms. The assessment of this impact was not the focus of this study; however, it might be an interesting topic for future research.

Another possible venue for investigation stems from a limitation of this study. As defined in the methodology, the research relied on the data gathered and analysed from a single source: The New York Times. This may have created a bias, due to, for example, editorial orientation. New studies could address this problem by broadening the research by choosing more than one newspaper to compose the data source.

Lastly, when considering the descriptions of each one of the stages of the Hype Cycle, it is possible to say that Uber and Airbnb went through four of the pre-defined stages. However, none of the companies could fully complete the cycle, as they have not met all the criteria of the last phase, called 'Plateau of Productivity'. In this aspect, their tumultuous relationship with regulators all over the world may have prevented them from having a clear and defined relationship with suppliers and providers.

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Development of New Medical Device – Investment Evaluation

Petra MARESOVA
University of Hradec Kralove, Hradec Kralove, Czech Republic, petra.maresova@uhk.cz

Lukas PETER
VSB -Technical University of Ostrava, Ostrava, Czech Republic, lukas.peter@vsb.cz

Martin MATEJICEK
University of Hradec Kralove, Hradec Kralove, Czech Republic, martin.matejicek@uhk.cz

Jan MACI
University of Hradec Kralove, Hradec Kralove, Czech Republic, jan.maci@uhk.cz

Kamil KUCA
University of Hradec Kralove, Hradec Kralove, Czech Republic, kamil.kuca@uhk.cz

Abstract

The entrance of company into the regulated market for medical devices is associated with compliance with many regulations, ordinances and laws. On the other hand, the production and sale of medical devices is very promising, in all economic periods. In May 2021, Europe is facing a major change in the legislation on medical devices in the form of MDR Directive 2017/745, which has been developed to protect patients in order to increase their safety. This is undoubtedly the right and proportionate situation for society, but it involves high costs and investments for manufacturers. Companies are now faced with the question of what future economic result can be expected and what strategy to follow. The goal of this study is to suggest and specify steps of medical device development for economic evaluation and calculation of economic efficiency. For these purposes, a calculator that calculates economic efficiency indicators such as Return on Investment, Net Present Value and Breakeven Point, was made. It takes into account the new legislative conditions, and it also allows its users to set the risk class and other characteristics of the medical device. The study also contains demonstrated calculation of economic efficiency indicators for one case study.

Keywords: Medical Device; Development; Economic Efficiency; Investment.

Introduction

The entrance of company into the regulated market for medical devices is associated with compliance with many regulations, ordinances and laws. On the other hand, the sale of medical devices is very promising, in all economic periods. The market for medical devices must be regulated in order to ensure high patient safety. Emphasis is placed on preclinical and clinically evaluated medical devices to ensure that the manufacturer demonstrates not only efficacy but clinical safety when used on humans. All testing is very expensive, many tests are forced by the manufacturer in accredited laboratories and testing laboratories, however, in the end it is up to the manufacturer to decide whether the test results are acceptable and satisfactory. All this is complemented by the need to create technical documentation and ensure a product quality management system. All activities with regulatory affair medical devices are associated with high costs. At a time of changing legislative conditions, it is crucial, especially for small and medium-sized companies, to correctly set all the parameters of the company's operation so that they can survive on the European market.

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In 2021, Europe is facing a major change in the legislation on medical devices in the form of MDR Directive 2017/745, which has been developed to protect patients in order to increase their safety (Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, Amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and Repealing Council Directives 90/385/EEC and 93/42/EEC 2020).

Companies developing medical devices will be obliged to introduce clinical trials even in the lower classes of post-marketing risk. This is often described by companies as a fundamental problem in the development of future economic results. They are now faced with the question of what future economic result can be expected and what strategy to follow.

The topic of regulation of economic life is a very sensitive discipline with an overlap into various scientific disciplines and human activities, such as political economy, law, environmental sciences including engineering, urban planning, health policy services, etc. Regulations are also a significant socio-political force (Faulkner 2012). Regulation is also such a complex issue that it is possible to meet with the term or field of *„regulatory science“*. For example, the Food and Drug Administration defines regulatory science as *„the science of developing new tools, standards, and approaches to assess the safety, efficacy, quality, and performance of all FDA-regulated products“*. (FDA 2019).

While some regulations on the one hand, mean activity limitation, on the other hand also represent an opportunity for new business development - an opportunity for innovation (Maresova et al. 2020). Some innovations are ahead of regulation (technology-push innovation), others are driven by regulations (technology-pull innovation). As reported by Faulkner (2012, p. 390), technological innovations are commonly seen as the leading control, i.e., regulation lags behind innovation.

Therefore, our goal is to suggest and specify steps of medical device development for economic evaluation and calculation of economic efficiency. For these purposes, we created a calculator that will be publicly available on the internet. The calculation takes into account the new legislative conditions, and it also allows its users to set the risk class and other characteristics of the medical device. Knowledge of all necessary tasks and stages of development of these devices is a fundamental starting point for the design of the model of medical device development. The calculation will be demonstrated on a chosen case study.

For example, the user (company) will be able to answer the following questions:

- How will the company's economic result develop in the event of a transition to new legislation?
- How much would the company have to increase the price to cover the increased costs associated with the new legislation?
- When will the company reach the breakeven point under the new legislation?

Theoretical Background - Market Regulation and Innovation in the Field of Medical Devices

The goal described above is based on the topic of regulation of medical devices and the current change in European legislation, which is a discussed topic. The new legislation will enter into force in May 2021, so companies are preparing for it accordingly. The aim of regulation is to increase the quality of development, however, it entails increased costs, as will be shown later.

From the point of view of theory, many authors across disciplines comment on the topics or on the success of regulations.

Amable, Demmou, and Ledezma (2010) define three indicators of the degree of regulation. These indicators are intended to make it possible to compare the level of legislation in different countries. On the one hand, the authors of the publication mention that the negative impact of regulations increases in intensity as they approach the technological limit of production possibilities. On the other hand, according to their empirical tests, there are cases where regulation has a positive effect on industries close to the technological frontier.

Bourlès (2013) and Franco, Pieri, and Venturini (2016) examine the effects of product regulation along the vertical axis (see upstream regulation). Bourlès et al. (2013) using the endogenous growth model show that product upstream regulation (eg in services through licensing) limits efforts to improve downstream productivity. The degree of regulation was monitored according to OECD data base of regulation indicators. Franco, Pieri, and Venturini (2016) use econometric analysis to show that upstream product market regulation reduces the effectiveness of downstream R&D.

Regarding control of products in terms of environmental impact, Friedrich (2019) reported that in the initial phase of introducing the product on the market should be set lower standards. This would ensure the entry of a sufficient number of companies that enter the industry and will innovate the product with a view to increasing profits. This will have an overall positive effect on social welfare.

Erdman et al. (2013) connect the topic of innovation through big data and regulation in the medical device environment. The authors believe that the involvement of big data for simulations and modeling in the development of medical devices will reduce the number of animal and human trials required for proof of safety and efficacy as well as device testing cycles and product design cycles. Virtual prototyping should make future devices safer and more effective which should make it easier to meet regulatory requirements.

Lee and Kesselheim (2018) point out that the Digital Health Software Precertification (Pre-Cert) Program *"may reduce incentives for developers to study the safety and effectiveness of their software products before patients start to rely on them."* The program, on the one hand, speeds up some regulatory procedures and, on the other hand, introduces some confusion.

Methods

This chapter describes all the methods used in this study. It is also important to mention the fact that all primary data were processed in CZK. For the purposes of this paper, a conversion to EUR was performed according to the exchange rate as of September 18 2020, i.e., 1 EUR = 26.6895 CZK.

Design of the Study

To perform the calculation, certain input parameters have to be filled in. All input data are described below.

The calculation will compute the ROI (return on investment), NPV (net present value) and BEP (breakeven point) indicators.

Input Data

Table No. 1 represents the first of the three areas of monitored parameters that are supposed to be specified by user/company. All variables are related to the characteristics of the company and the intended markets, from which it is possible to outline an idea of the potential of the target market. These values are qualitative and serve to correctly interpret the calculated results in the context of company size, market position, business model, etc. However the demonstration of the calculator in this paper will not include an interpretation for case studies.

Table 1: Parameters related to company, product, and markets

Input information / question	Choice / value
Indicate the number of employees in the company.	0-10 10-50 50-250 250+
What type of medical device do you plan to develop and manufacture?	I Is Im

	IIa IIb III none
Is your solution innovative?	Yes No
Are you planning the IP of your solution - a patent?	Yes No Already have
Is your product demonstrably more effective than product of your competitors?	Yes No We don't have clinical records
What is your business model?	Self-payers Public health
What primary market are you targeting?	Czech Republic Western Europe Eastern Europe Other countries accepting CE
What percentage of market share do you hold?	%
What percentage of the market is occupied by your biggest competitor?	%

In the second specified area, there are individual stages of medical device development. The questions are aimed at determining the costs for individual phases. For a more precise determination, the individual activities that may belong there were specified for each phase.

Table 2: Phases and costs of medical device development

Input information / question	Value
1. Initiation phase	
Total estimated cost of the phase	EUR
Identifying customer needs	(Number of hours * price / hour) OR (EUR in case of outsorcing)
Description of functionality and advantages over the existing solution, decision on the type of medical device	
Verification of manufacturability	
Estimation of costs and revenues	
Other costs associated with the initiation of the first idea for a new product	
Total other overhead/indirect costs for the initiation phase	
2. Concept proposal	
Total estimated cost of the phase	EUR
Specification of strategy and development plan, market analysis and evaluation of product potential, estimation of time needed for development, provision of personnel security	(Number of hours * price / hour) OR (EUR in case of outsorcing)

Determination of product characteristics (product function, material requirements, etc.)	
Production specification costs	
Costs of decisions on the MP class and estimation of related legal and legislative acts	
Patent research for concept design	
3. Design and development	
Total estimated cost of the phase	EUR
Specification of development strategy and plan, costs and revenues, business plan	(Number of hours * price / hour) OR (EUR in case of outsorcing)
Detailed production plan, including the determination of materials	
Estimation of the total costs of testing and evaluation in relation to the considered type of medical device (PMFC, clinical trials, risk analysis aFMEA, dFMEA, creation of accompanying documentation, etc.)	
4. Verification and validation	
Total estimated cost of the phase	EUR
Design validation and certification	(Number of hours * price / hour) OR (EUR in case of outsorcing)
Testing costs not included above (biological evaluation, electrical safety, additional tests)	EUR
Clinical evaluation / test / study	(Number of hours * price / hour) OR (EUR in case of outsorcing)
Creation of a technical file	
5. Production	
Total estimated cost of the phase	EUR
Material	EUR
Production work of the team	(Number of hours * price / hour) OR (EUR in case of outsorcing)
Finalization of activities in relation to risk management	
Finalization of activities in relation to design validation and verification	
Reserve fund, costs associated with product risk insurance	EUR
Mass production costs	
Own production line	
6. Placing product on the market	
Total estimated cost of the phase	EUR
Patent application (European patent / Czech Republic, etc.)	EUR
Training of sales representatives and doctors	(Number of hours * price / hour) OR (EUR in case of

	outsorcing)
7. Parameters associated with the existence of the product on the market	
Total estimated cost of the phase	EUR
PMCF during the life of the product	EUR
Post Market Surveillance	(Number of hours * price / hour) OR (EUR in case of outsorcing)
Feedback evaluation, planning and setting changes	
Service costs	
8. Estimation of conformity assessment costs	EUR
Costs of conformity assessment before placing on the market	EUR
Costs of conformity assessment in the first year of sale	
Costs of conformity assessment in the second year of sale	
Costs of conformity assessment in the third year of sale	
Costs of conformity assessment in the fourth year of sale	
Costs of conformity assessment in the fifth year of sale	
9. Total estimated cost of production of 1 piece of MD	EUR/piece

All medical devices are divided into three risk classes, individual regulatory rules in individual countries can further specify these classes (only applies to medical devices outside IVD and pharmaceuticals). In the case of risk class I, the manufacturer is obliged to assess compliance with the essential requirements concerning MDD 93/42 / EEC in terms of safety himself. In the case of other risk classes, a conformity assessment body is required for this conformity assessment to allow the manufacturer to affix the CE marking jointly to the notified body and place the medical device on the market. In order to meet the essential requirements for medical devices resulting from MDD 93/42 / EEC, the manufacturer is obliged to prepare a complete technical documentation for the medical device and to ensure an adequate quality management system for medical devices based on ISO 13485 to declare not only that its medical device is but above all, it is safe, under defined production processes.

In relation to the risk class of the medical device, expert estimation of the costs of certification for 5 years of the product's existence after placing product on the market is included as a help for users, see Table No. 3. The estimate is based on company practice in the conditions of the Czech Republic.

Table 3: Certification costs - expert estimate of the costs of conformity assessment costs in the conditions of the Czech Republic (EU)

Risk class	1st year	2nd year	3rd year	4th year	5th year
I	2,248.07 EUR	2,248.07 EUR	2,248.07 EUR	2,248.07 EUR	2,248.07 EUR
Is	13,113.78 EUR	5,245.51 EUR	5,245.51 EUR	8,617.62 EUR	5,245.51 EUR
Im	13,113.78 EUR	5,245.51 EUR	5,245.51 EUR	8,617.62 EUR	5,245.51 EUR
IIa	19,483.32 EUR	7,868.26 EUR	7,868.26 EUR	14,488.45 EUR	8,617.62 EUR
IIb	20,607.35 EUR	8,617.62 EUR	8,617.62 EUR	14,237.81 EUR	8,617.62 EUR
III	22,480.75 EUR	9,366.98 EUR	9,366.98 EUR	14,987.17 EUR	9,366.98 EUR

To determine the return on investment, the key is an expert view and an estimate of the revenue side, where the following variables are monitored (Table No. 4).

Table 4: Expected renevues- quantifiable revenues and benefits throughout the life of the newly developed product

Input information / question	Value
Number of pieces sold per year	Count
Estimated sale price per piece	EUR/piece
Total revenue from licenses / patents	EUR/year
Total revenue from service activities	EUR/year

Calculation of Economic Efficiency

The following three indicators will be used to assess economic efficiency: ROI, NPV and BEP.

Return on Investment (ROI)

ROI is one of the financial indicators that measures the rate of return from a given investment. It is a ratio that measures the loss or gain from an investment in relation to its costs (Beattie 2020). It can be used both when calculating the potential of one investment and when comparing the return on several investments as well. ROI is expressed in percent.

$$ROI = \frac{Net\ return\ on\ investment}{Cost\ of\ investment} \times 100$$

Net Present Value (NPV)

According to Kenton (2020) NPV displays the difference between the present value of cash inflows and the present value of cash outflows for a period of time. NPV is a widely used ratio indicator in the field of investment planning to analyze the profitability of the projected investment. For calculating NPV, the following formula is used:

$$PV = \sum_{t=1}^{n} \frac{R_t}{(1+i)^t}$$

$$R_t = net\ cash\ inflows - outflows\ during\ single\ period\ of\ time\ t$$

$$i = return\ that\ could\ be\ earned\ in\ alternative\ investments\ or\ discount\ rate$$

$$t = number\ of\ periods$$

The discount rate can be defined as the interest rate provided by alternative investments of a similar magnitude and risk. However, there is no general rule that determines which interest rate to use. For the purpose of this study, a discount rate of 8 % is considered.

Breakeven Point (BEP)

The principle of breakeven point analysis is to determine the prices at which the product reaches the target profitability or when revenues exceed the costs of production and marketing. Popesko and Papadaki (2016) also calculate the value of the breakeven point, describing mainly the effect of margin settings. They define it as a unit contribution to the payment of fixed costs and the creation of profit, which consists of the difference between price and variable costs . The

breakeven point expresses how many unit contributions to be paid are needed to cover fixed costs - the calculation is described using the formula:

$$Breakeven\ point = Q(BEP) = \frac{fixed\ costs}{price\ per\ unit - variable\ costs\ per\ unit}$$

After reaching the breakeven point, the product brings a profit that increases with the volume of production until the maximum production capacity is reached.

Results – Medical Device Development

To demonstrate the functionality of the calculator, one company from practice, which operate in the field of medical devices, was contacted. Representative of the company filled in the input data, which specify the costs for individual phases of medical device development (Table No. 5), as well as the expected revenues for the product life cycle (Table No. 6). Specifically, company Tesla Medical s.r.o., which plans to launch a medical device with risk class IIa, was contacted.

Table 5: Phases and costs of medical device development – case studies

Total cost of each phase	Case study – risk class IIa
1. Initiation phase	8,055.60 EUR
2. Concept proposal	10,491.02 EUR
3. Design and development	26,227.54 EUR
4. Verification and validation	13,038.84 EUR
5. Production	2,397.95 EUR
6. Placing product on the market	149,871.67 EUR
7. Parameters associated with the existence of the product on the market	562,693.19 EUR
8. Estimation of conformity assessment costs	86,176.21 EUR
9. Total estimated cost of production of 1 piece of MD	374.68 EUR

From the input data it is clear that in this case study the most expensive phase is Parameters associated with the existence of the product on the market. In this case, most of the costs come from the PMCF (Post Market Clinical Follow-up) over the life of the product - 562,693.19 EUR. The second most expensive phase is Placing product on the market, and the third place is reached by conformity assessment costs.

Table 6: Expected renevues- quantifiable revenues and benefits throughout the life of the newly developed product

Input information / question	Case study – risk class IIa
Number of pieces sold per year	2,000 pcs
Estimated sale price per piece	2,248.08 EUR
Total revenue from licenses / patents	0 EUR
Total revenue from service activities	191,086.38 EUR

The monitored company does not plan to benefit from licenses and patents. The profit will come mainly from the sale of the product and then from service activities.

In the next step, economic efficiency indicators were calculated from the input data, namely Return on Investment (ROI), Net Present Value (NVP), and Breakeven Point (BEP). See Table No. 7.

Table 7: Case studies economic efficiency indicators calculation

Indicator	Case study – risk class IIa
ROI	191,4 %
NPV	2,285,792.14 EUR
BEP	715,417 pcs

In real cases, the obtained data must be interpreted in the context of the given market, position, size of the company, etc. The qualitative input data, which were listed in Table No. 1, are supposed to be used for this purpose. However, the demonstration of the calculator in this paper does not include an interpretation for case studies.

Discussion and Conclusion

In this study, steps of medical device development for economic evaluation were designed and specified. These phases serve as input data for the calculation of economic efficiency. The functionality of the calculator was demonstrated in a certain case study - the company Tesla Medical s.r.o., which plans to manufacture and sell medical devices with risk class IIa. The return on investment was calculated to be 191.4 % for the given situation. The Breakeven Point will be reached after the sale of 715,417 pieces of the product and the Net Present Value is 2,285,792.14 EUR. A discount rate of 8 % was considered for the calculation of the NPV.

Companies doing business in the field of medical devices are located in an environment that is associated with a large legislative burden. This is mainly due to the fact that the manufactured devices must meet health and safety criteria and must not pose any risk to patients or persons using these devices. This is undoubtedly the right and proportionate situation for society, but it involves high costs and investments for manufacturers. Companies in this sector should ensure compliance with current legal conditions and monitor their changes. Within the economic situation, they should regularly analyze variants of future development and calculate the suitability and return on intended investments. On the other hand, the production and sale of medical devices is very promising in all economic periods. This sector is stable even in times of crisis. The current situation regarding the COVID-19 virus, where the business in the medical device is thriving and still growing, can also be a proof.

At the moment, it is possible to proceed in accordance with MDD 93/42 / EEC in the case of clinical trials by comparing the equivalence of a medical device already on the market relatively easily. Perhaps it was just one of the reasons for the establishment of MDR 2017/745, which regulates certain obligations and specifies them for manufacturers. The new legislation will enter into force in May 2021 and it specifies more specifically the design of a clinical trial, where it will no longer be so easy for manufacturers to compare equivalence with the medical device referred to above and regulates the conditions under which the clinical trial must be conducted. It specifies and mandates the manufacturer to perform post marketing clinical monitoring to collect clinical data and to continually verify the effectiveness and safety of the medical device in particular.

The change in legislation in the area of regulating medical devices affects manufacturers, where Notified Bodies are also affected by the same legislation. It turns out that the NB will be reduced and those that remain will have to face increased demand for their services. This demand will not be able to be met immediately. Companies that are aware of this are starting to look for an alternative in a foreign NB, which is currently trying to obtain a notification under MDR 2017/745 or has already received this notification. However, this is associated with an increase in the cost of the conformity assessment process itself, ie certification. This change can be very critical for many small and medium-sized manufacturers.

The limit of this study is expert estimation of conformity assessment costs (Table No. 3), that is based on company practice in the conditions of the Czech Republic. This is because these costs may vary from country to country.

Acknowledgment

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European Consumers' Attitude Towards Insects as An Alternative Source of Protein. The Case of Poland

Anna DANKOWSKA

Department of Food Quality and Safety, Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, anna.dankowska@ue.poznan.pl

Anna BONA

Department of Food Quality and Safety, Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, anna.bona @ue.poznan.pl

Patrycja KUJAWA

Department of Food Quality and Safety, Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, patrycja.kujawa1995@gmail.com

Abstract

Edible insects are generally high in protein and can be considered as meat substitutes. Nevertheless, in European countries edible insects' consumption is actually very low mainly due to food neophobia. The purpose of this paper was to explore the readiness of people to consume insects as an alternative protein source. An explorative study among 989 consumers was conducted using a questionnaire via the „google forms" and directly as the technique for data collection. Most of respondents do notice the need to search for an alternative source of protein and they are curious about eating a meal containing insects. Main factors that differentiate the opinions regarding eating edible insects as an alternative source of protein were: level of education, gender, age and the product's degree of processing. People with higher education see a greater need to look for alternative sources of protein than those with basic education. Additionally, men and young people indicate definitely greater desire to consume a meal containing insects than women or older respondents. Most people would be more likely to choose highly processed products. Integration of edible insects as an alternative source of protein into European food culture is possible as people are open and curious. Nevertheless, this process would need an encouragement of consumers using highly processed insects incorporated into ready-to-eat meals, because people seem not to be ready to eat insects in whole form.

Keywords: Insects, Protein, Alternative Source, European Consumers

Introduction

Food is one of the most important products for humans. Maslow in his pyramid indicated that only satisfaction of nutritional needs allows to appear those of a higher level. Although this hierarchy was described in 1943, access to food both today and in the future will remain a problematic issue on a global scale (Mikula, 2012).

From one year to another world's population is increasing. According to the forecasts of the United Nations Food and Agriculture Organization (FAO, 2009), in the year 2050, Earth will be inhabited by 9.1 billion people (Krzywiński and Tokarczyk, 2011,). It is 30% more than at present. The largest increase in the birth rate will take place in developing countries such as India and China (Krzywiński and Tokarczyk, 2011, Zielińska, Karaś and Jakubczyk, 2015). Larger population means increase in need for energy and thus also for protein intake.

Population explosion calls into question food security. This is a global problem, because difficulties in ensuring right amount of food in one country are rapidly becoming problematic in many others. The term „security" comes from the Latin se cura / sine cura and refers to a state in which care is lacking (Kowalczyk, 2016). Main factor,

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which negatively influences future food security is declining area of agricultural land (Buczyńska and Szadkowska-Stańczyk, 2010). Attention should also be paid to the problem of constantly decreasing global water resources, which significantly contributes to the increase of costs and the difficulty of animal husbandry. Consequently there exists a real danger that conventional sources of animal protein, including beef, pork and chicken meat, may become insufficient. Edible insects are potentially environmentally friendly choice for future food systems. In comparison to livestock, rearing insects seems to be more environmentally friendly with regards to greenhouse gas production, water consumption and land requirement (Birgit et al, 2013).

Insects are a valuable source of both macro and micronutrients. Individual insect species contain from 5-77g protein / 100g, the developmental stage also affects this value.Insects' protein is of very high digestibility: 77-98%, thus it is comparable to the digestibility of egg white. In addition, it is complete protein that contains the right amount of exogenous amino acids, similarly to beef (Zielińska, Karaś and Jakubczyk, 2015).

Some species of insects are rich in lysine, tryptophan and threonine, which makes their protein complementary to many plant products that are deficient in these amino acids (Kourimska and Adamkova, 2016).

Currently, various species of insects are considered to be pests. Huge amount of money is spent to control these pests, while harming the natural environment with pesticides. We protect crops containing no more than 14% vegetable protein, while killing another source of food that can provide up to 75% of animal protein. The grasshopper *Phenarium purpurascens* in Mexico is considered a pest. However, the pattern of coping with him is completely different than in Europe. Insects are captured and used as food, thanks to which hundreds of families gain food (Premalatha et al, 2011; Aleksander et al,2017).

Research suggests that marketing activities should be aimed at reducing emotional barrier among consumers. Although the choice of food is a combination of many factors, not only sensual, but also situational, cultural, demographic or cognitive, increasing consumers' knowledge about food produced from insects may have a positive effect on readiness to consume it. Attitudes towards food containing insects differ not only between cultures of different continents, differences being noticeable even between European subcultures (Piha, et al, 2016).

Until December 31, 2017, consumers in Poland could have consumed insects only if they were bought abroad, or caught or raised independently. However, from 1 January 2018 insects were undoubtedly recognized as food, thus entrepreneurs who will request from the European Commission appropriate permission will be able to introduce insects as food to stores. There is also possibility of selling insects in shops without the authorization of the European Commission, then it must be proved that the consumption of a given insect has already occurred in the European Union and was a common phenomenon. The aim of this exploratory study was to understand the consumers' attitude to insects as an alternative source of protein.

Results and Discussion

Data Collection and Sampling

The survey was carried out with a questionnaire method among the residents of Poland using a questionnaire via the "Google Forms" portal and directly. The survey was conducted in December 2018. The questionnaire consisted of 13 questions and separate part concerning demographic background. The estimated time of completing the form was about 2 minutes.

Altogether 989 people participated in the study: 498 women and 491 men. Respondents were divided into four age groups: under 18, from 18-35 years, from 36-65 years, over 65 years. The size of individual groups is shown in Table 1.

Table 1: Sociodemographic characteristics

Category	Subcategory	Number of people	Percentage [%]
Gender	Woman (W)	498	50.4
	Men (M)	491	49.6
Age	<18 years	183	18,5
	18-35 years	635	64.2

	36-65 years	161	16.3
	>65 years	10	1.0
Education	Primary education	21	2.1
	Middle School	138	14.0
	National Vocational Qualification	52	5.3
	Secondary education	373	37.3
	Higher education	405	41.0
Material status	Bad	23	2.3
	Acceptable	323	32.7
	Good	511	51.7
	Very good	132	13.3

The largest group of respondents were people with higher education (41%). Less than 38% of respondents declared secondary education, 14% of had lower secondary education, while a smaller proportion own vocational (5.3%) and basic education (2.1%) (Table 1).

More than half of the respondents declared that had good financial status, less than 33% declared that it was acceptable. 14% of respondents believe that their material status is classified at a very good level, while only slightly more than 2% of them rated it as bad.

Consumers' attitudes towards insects as an alternative source of protein

Most of respondents asked if they notice the need to search for alternative sources of protein replied that rather yes. Only less than 5% of them claimed that they definitely do not see this kind of need. Comparing the answers by gender it can be concluded that this parameter was not influencing the consumers' attitude, the ration of yes/no answers being similar (Figure 1).

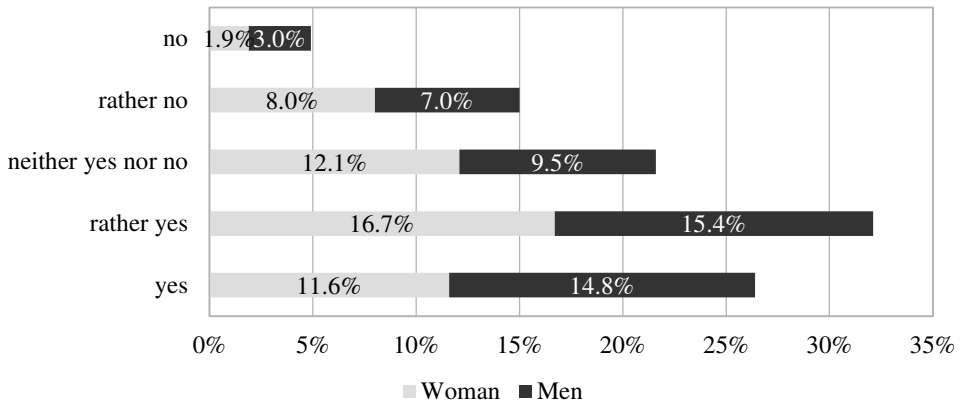

Fig. 1: Respondents' opinion towards the need to search for alternative sources of protein. Division of responses according to gender.

Visible factor that differentiates the opinions is the level of education. People with higher education see a greater need to look for alternative sources of protein than those with basic education (Figure 2).

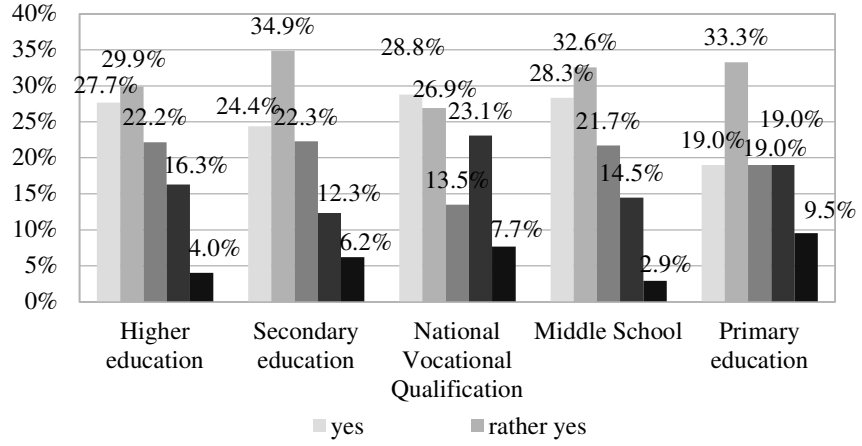

Fig. 2: Respondents' opinion towards the need to search for alternative sources of protein. Division of responses according to the level of education.

A share of 62.7% of respondents declared that they have already heard about the concept of entomophagy (yes 62.7%, not 37.3%.) which is in line with previous findings from Hungary (Attila et al, 2017). The majority of respondents (55.8%) belonging to the group of people with vocational education answered that they have not heard of entomophagy before. The highest awareness of this phenomenon was registered in the group with higher and secondary education (Figure 3). Considering the current state of knowledge it has been concluded that better education can lead to better acceptance of entomophagy among consumers and also reduce prejudice and negative attitude of the public towards the consumption of edible insects (Sogari, 2015).

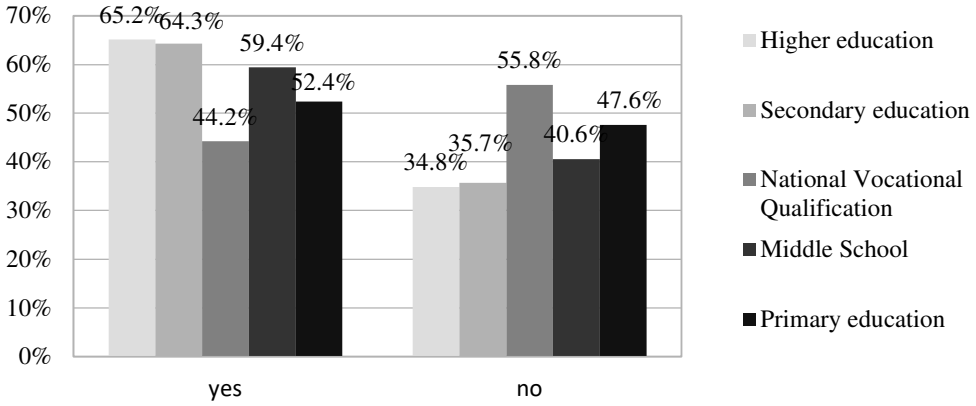

Fig. 3: Awareness of respondents about the existence of entomophagy. Responses according to their level of education.

People who declared their knowledge of the entomophagy were asked to indicate the source, from which they found out about it. Definitely the most frequent answer was the Internet: 42.8% of the respondents chose it, the second most popular answer was television: 25.7% chose it. The distribution of other answers is visible in the Figure 4. In addition, respondents had the opportunity to indicate their own sources: 13 people indicated the classes at the university, 8 terrarium exchange, 7 work, 6 books and 2 people heard about edible insects in radio.

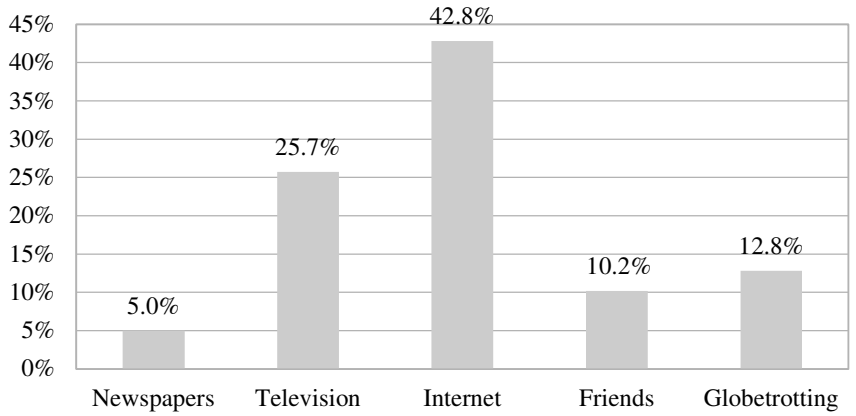

Fig. 4: Places from which the respondents learned about insects edible.

A proportion of 31.6% of respondents who know the concepts of entomophagy declare that they have already eaten edible insects. In this group there are almost twice as many men as women (Figure 5). Similarly: respondents who answered „yes" to the question whether they would like to try a meal containing insects constituted 33.3% of surveyed people, 23.3% of them are men. In addition, 21.3% of those, asked about the same, answered „rather yes" and here the gender ratio was much more balanced: 9.6% constituted women and 10.7% men. People who definitely would not like to try a meal containing insects constituted 19% of the respondents, of which 13.8% were women (Figure 6). Men indicate definitely greater desire to consume a meal containing insects than women, which is in line with other author's results (Hartmann et al, 2015).

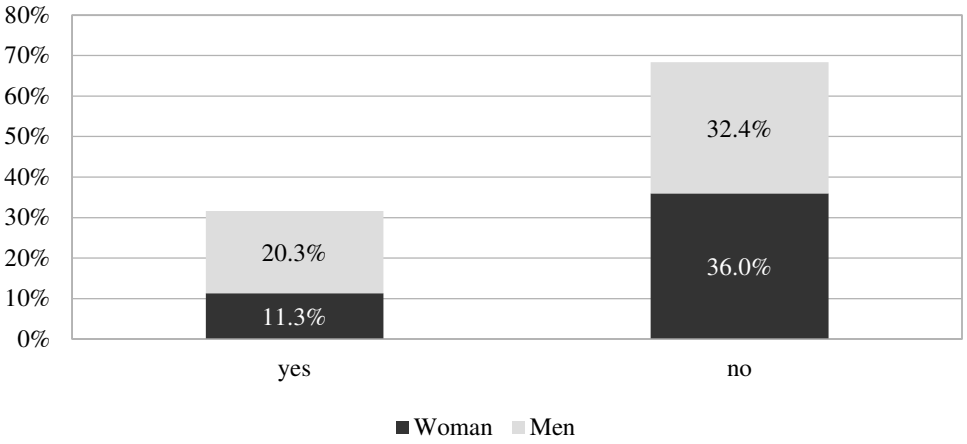

Fig. 5: Percenta.ge of respondents who have already consumed an insect meal. Responses divided according to the gender.

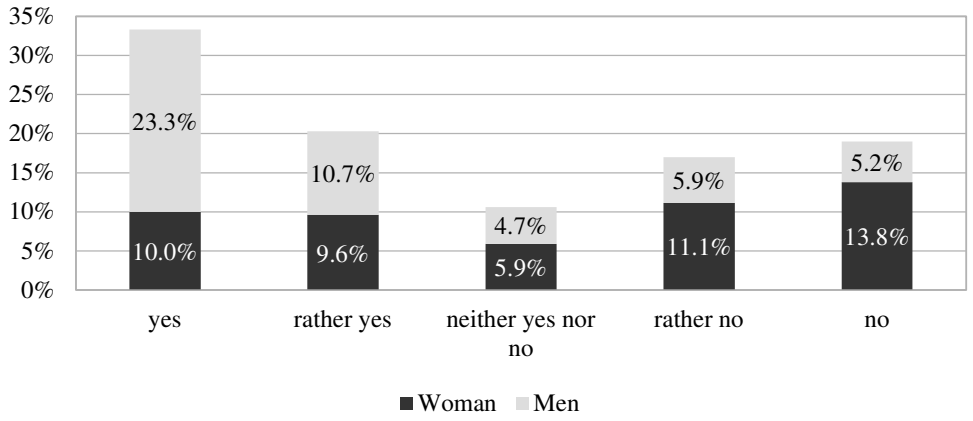

Fig. 6: Percentage of respondents showing a willingness to taste a meal containing insects. Responses divided according to the gender.

Participants of the study who answered the above question „yes, rather yes, neither yes nor no" were asked to indicate factors that would encourage them to ingest insects. Definitely the factor that would have the greatest impact on the decision to consume this type of meal is curiosity (30.8% of answers) and departure to places where insects are traditional food (21.2% of answers) (Figure 7). Some authors also suggested that it does exist an increasing curiosity towards the practice of entomophagy and willingness to try new products containing edible insects (Balzan et al, 2016; Yen, 2009). The respondents had also opportunity to indicate their own reasons: 3 people would choose such a meal because of their nutritional values, 2 because of large amount of meat usually consumed and another 2 because of the desire to diversify the diet. Individual people indicated being a vegetarian and also promotional campaign was emphasized as an important factor.

Similar factors were indicated in the study conducted within Hungarian consumers, who highlighted that insect-based food might attract them as they seek new food choice options and intend to reduce meat intake (Atilla et al, 2017). On the other hand people are not convinced of the additional health benefits of the consumption of insects in comparison to meat. Perceived nutritional value is not the most important barrier that needs to be overcome (Verbeke, 2015).

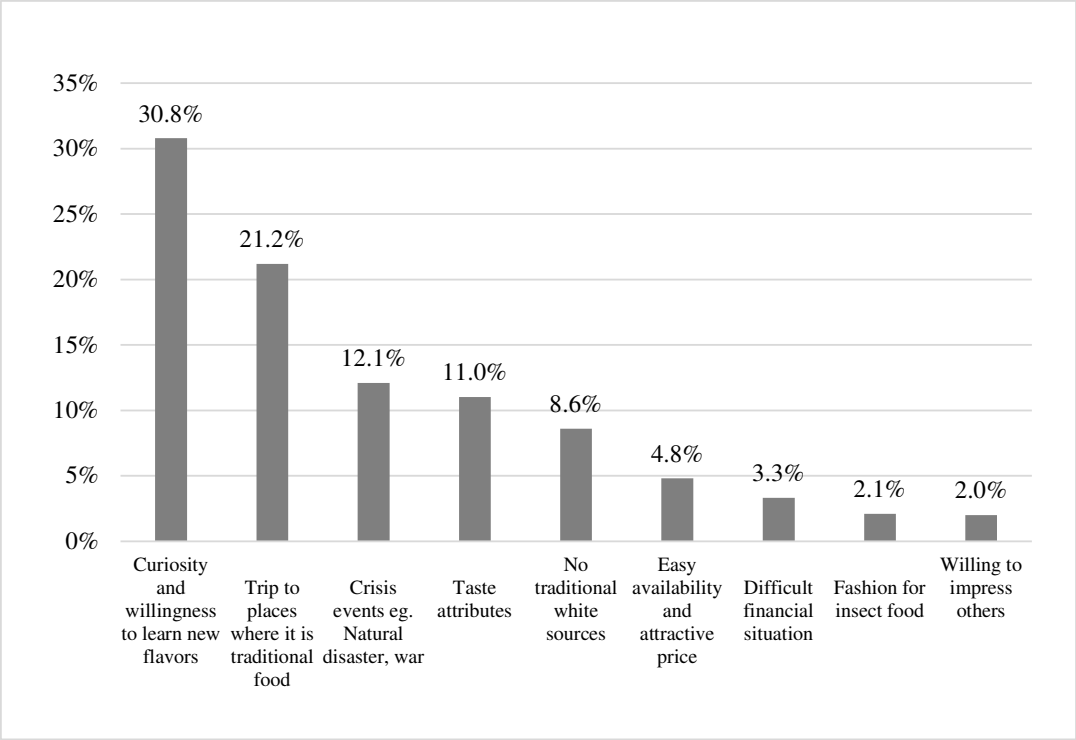

Fig. 7: Percentage share of factors encouraging the consumption of edible insects.

Each of the participants was asked to determine the probability of eating the products containing insects of different degrees of processing in a hunger situation and the lack of availability of other protein sources. At the beginning respondents were asked about willingness to eat a meal containing raw insects. A share of 27.9% of respondents claim that they would definitely not have eaten such a meal, slightly more women than men answered that answer. However, in the group 13.7% of people who would eat such a meal (answer „yes"), as many as 11.2% are men, and only 3.5% are women. Male gender manifests a definitely greater willingness to consume raw insects (Table 2).

In the situation of limited access to food, over 50% of respondents, including 21.1% of women would eat a meal containing ground and thermally treated insects. In addition, almost 25% of respondents indicated the answer: rather yes. Only 8.5% of people participating in the study would definitely not have eaten such a meal (Table 2). Attitude of people under 65 to this type of dishes is very similar: most of them chose the answer „yes" or „rather yes". People over 65 were slightly more skeptical: responses „yes" and „rather yes" constituted only 40% out of all answers given by this group of age (Table 3).

Table 2: Percentage of respondents declaring willingness to eat insects depending on their form of processing in conditions of hunger and lack of availability of other protein sources with regard to gender

		Yes	Rather yes	Neither yes nor no	Rather no	No
1		Raw insects				
	W	3.5%	7.7%	8.9%	11.3%	15.1%
	M	11.2%	8.8%	8.1%	10.8%	14.6%
2		Insects thermally treated and given in their entirety				
	W	11.9%	14.0%	6.4%	9.9%	8.2%
	M	24.9%	14.0%	3.8%	3.8%	3.1%

3		Ground insects subjected to thermal treatment				
	W	21.1%	14.9%	5.3%	4.1%	5.0%
	M	30.8%	9.6%	3.5%	2.1%	3.5%
4		Insects as an addition in the form of flour				
	W	24.3%	15.1%	3.6%	2.8%	4.6%
	M	32.4%	9.0%	3.7%	1.5%	3.0%
5		Insects in the form of a protein isolate				
	W	23.9%	12.8%	5.3%	3.4%	5.0%
	M	32.9%	9.4%	3.1%	1.2%	3.0%

Analyzing this question in terms of the age of respondents, it can be seen that younger people more often indicate answers yes, or rather yes than in the case of people at more advanced age. 80% of respondents over 65 years of age would definitely not eat a meal containing raw insects (Table 3).

On the question of the probability of eating a meal containing whole heat-treated insects, 36.8% of people answered yes, and 28% rather yes, as in the previous question, in the group of people who chose the first option there are more than 2 times more men than women (Table 2).

Percentage distribution of individual answers in each age group shows a tendency that with the lower the age there is a greater willingness to try an insect meal. However, in this case, up to 40% of people over 67 said that they would rather eat the meal (Table 3).

Table 3: Percentage of respondents declaring willingness to eat insects depending on the form of processing in conditions of hunger and lack of availability of other protein sources in particular age groups

		Yes	Rather yes	Neither yes nor no	Rather no	No
1		Raw insects				
	>65	0.0%	0.0%	0.0%	20.0%	80.0%
	36-65	13.5%	15.3%	17.2%	27.6%	26.4%
	18-35	16.3%	14.5%	16.1%	22.5%	30.6%
	<18	11.5%	25.1%	20.8%	16.4%	26.2%
2	Insects thermally treated and given in their entirety					
	>65	0.0%	0.0%	40.0%	10.0%	50.00%
	36-65	30.4%	27.3%	13.0%	14.3%	14.9%
	18-35	37.8%	27.6%	9.8%	12.8%	12.1%
	<18	41.0%1	29.0%	9.3%	14.8%	6.0%
3	Ground insects subjected to thermal treatment					
	>65	20.00%	20.0%	30.0%	20.0%	10.0%
	36-65	49.7%	25.8%	11.3%	2.5%	10.7%
	18-35	52.3%	25.1%	7.4%	6.8%	8.5%
	<18	54.60%	21.30%	10.40%	7.1%	6.6%

4		Insects as an addition in the form of flour				
	>65	40.0%	60.0%	0.0%	0.0%	0.0%
	36-65	51.6%	27.3%	6.8%	3.7%	10.6%
	18-35	57.0%	23.6%	6.9%	4.9%	7.6%
	<18	60.70%	20.80%	9.8%	3.3%	5.5%
5	Insects in the form of a protein isolate					
	>65	40.0%	60.0%	0.00%	0.0%	0.0%
	36-65	48.4%	24.8%	10.6%	5.6%	10.6%
	18-35	57.2%	20.5%	8.5%	5.2%	8.7%
	<18	63.40%	24.0%	6.60%	2.2%	3.8%

Another question addressed to respondents concerned the desire to ingest insects in the form of flour in conditions of absence of other sources of protein. As in previous questions, men are more likely to eat insects, however, the total number of people who answered „yes" is higher than in the previous question and is 56.6% of all respondents. The amount of people who replied that they „definitely would not" and „rather would not" eat is adequately 3% and 1.5% (Table 2).

Again, the highest percentage (60,7%) of responses „yes" was in the group under 18 years old; slightly less - 57% was in the group of 18-35 years and 51.6% among people aged 36-65, but in the two last groups, more people answered „rather yes". As a result: the total percentage of respondents answering „yes" and „rather yes" in each of the three groups discussed above reached a very similar level around 80%. On the other hand, respondents over 65 years old in 40% chose the answer „yes", the remaining 60% of people from this group indicated the answer: „rather yes" (Table 3).

The last question concerned whether in the case of hunger and the lack of availability of other sources of protein people would be willing to eat a meal containing insects in the form of a protein isolate. A share of 56.7% of respondents answered that yes, 32.9% of them were men. The answer „rather yes" was indicated by 22.2% of the respondents, which together with the group of people who chose the variant „yes", gave 78.9% of all answers. Only 8% of respondents would definitely not eat insects in the form of an isolate, 5% of this group were woman as presented in Table 2.

Other authors' studies indicate that consumers' positive intention to eat insects strongly depends on the form and appearance of the products. Insects can be either visible or unrecognizably processed as ingredients. It is certain that food acceptance is influenced by visual appearance and food texture (Logue et al, 1981). Therefore it can be concluded that the perception of eating an insect-based food (i.e. cricket flour in bakery products) is not the same as the perception of eating a visible insect (i.e. a whole cricket). It appears rational to grant that the invisible insect inside a processed food might have more positive acceptance (Tan et al, 2015).

With increase of the respondents age, the share of people choosing answer „yes" and „rather yes" drops. The exception is the group of respondents aged over 65, where the answer „rather yes" was chosen by almost 60% of respondents. Comparing the results of groups: under 18, 18-35 and 36-65 it can be noticed that the number of people undecided is growing with age (answering: neither yes nor no) and those who choose „rather no" and „definitely not" (Table 3).

Similar research was carried by Hartmann et al (2015) among residents of Germany and China. Results revealed that Asians show greater readiness to ingest insects and most of the respondents said they had eaten insects before. Germans would be more likely to use highly processed products, while in China the readiness for consumption did not differ significantly due to the degree of processing. In the Western Europe countries the majority of people refuse the idea of eating insects, for mainly cultural reasons and generally not regarding it as food (Sogari et al,

2017; Tan et al, 2016). Other studies indicate that the most common reason for refusing to taste an insect-based product is the disgust factor (Sogari, 2015).

Conclusion

This study presents an insight on attitudes of entomophagy acceptance as source of protein among Polish consumers. On the basis of consumer surveys it can be concluded that a large number of people perceives the need to look for alternative sources of protein. For the most of the respondents the concept of entomophagy is known but the percentage of people who have already eaten insects is low. The gender is an important factor in determining the willingness to eat a meal with insects, also differences are noticeable between different age groups. Attitudes to meals containing insects are also determined by its degree of processing. It is similar result to the study carried among German consumers: most people would be more likely to choose highly processed products. Men indicate definitely greater desire to consume a meal containing insects than women. The age of respondents is a factor that impacts consumers' openness: people of older generations have much more prejudices to entomophagy than those of the younger ones. It may be due to the fact that older people are more accustomed to the traditional cuisine and they cannot imagine introducing a revolution into their diet like eating insects. Among Polish consumers, meals containing insects in a highly processed form - for example protein isolates, have a greater chance to gain popularity than unprocessed ones. The target group should be young generation because of their greater openness to the new products.

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GRASP for the Vehicle Routing Problem with Time Windows, Precedence, Synchronization and Lunch Break Constraints

Haitam ETTAZI
Faculty of Sciences University Ibn Tofail, Kenitra, Morocco
ettazi.haitam@gmail.com

Najat RAFALIA
Faculty of Sciences University Ibn Tofail, Kenitra, Morocco
arafalia@yahoo.com

Jaafar ABOUCHABAKA
Faculty of Sciences University Ibn Tofail, Kenitra, Morocco
abouchabaka3@yahoo.fr

Abstract

In this time of health crisis, it is important to make adjustments of resources encountered in many areas dealing with logistical issues by minimizing the costs of transportation and maximizing the satisfaction and preferences of patients in the field of Home Health Care. In this paper, we deal with the vehicle routing problem with time windows, precedence, and synchronization constraints along with staff lunch break requirements combined with the scheduling and planning matter. Oftenly, patients whom are not requiring anymore staying at hospital are needed to leave their spot to another critical case, but need further treatment that can be done at home. Caregivers are assigned to perform special care to needy patients depending on their demands by taking into consideration temporal constraints such as time windows, preferences of patients, precedence, synchronization and more importantly the issue of caregivers' lunch breaks which give a realistic aspect to the problem.

A caregiver (vehicle) is assigned to a patient (customer) to perform a number of given cares with multiple options according to the customer wishes like time windows requirement often specified by the patient, the precedence constraints are usually done if a specific care must be done before another and could involve more than one caregiver and must have at least one lunch break per day and it is not always taken at a fixed time of the day and must be flexible to maximize the satisfaction of customers' demands.

To solve this problem, a mathematical model of the problem is described as a Mixed Integer Linear Programming (MILP) and a method based on a Greedy Randomized Adaptive Procedure (GRASP) is proposed. At the end of the paper, results are shown on a benchmark derived from the literature.

Introduction

Over the years, the number of diseases has increased significantly meaning the average number of patients per one hospital bed have ascended thus the need of giving care to sick people in their homes have become crucially needed. It is very important to cite that pandemic (SAR-COV-19) (Euchi., 2020), have led to prioritize the necessity of moving patients from their homes or vice-versa much needed. Due to these circumstances, challenges have arisen a lot for conducting researches in the field of operations researches and decision support in this field. Coordinating either human and resources is the core to provide an optimized planning in order to reduce/minimize the costs while maximizing the quality of home health care services for both working staff (Lunch Breaks, Preferences…) and patients (Time Windows, Preferences, Precedence…).

In this paper, we propose an adaptation of the vehicle routing problem with the windows, synchronization, precedence and lunch breaks constraints. This problem consists of looking for a set of routes performed by a fleet of vehicles (regarded as caregivers) to serve a set of customers (patients) in a predetermined geographical area, respecting a certain availability in the most effective and efficient manner. A service that the home health care facility provides must occur within a determined and accurate time and can require the intervention of one or many

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caseworker either at the same time (simultaneously) or in a specific order (precedence) which means that a customer (patient) must be ensured two or more services in a row (not at the same time). On the other hand, after a certain amount of working time by the caregiver, it is mandatory to have a break time to eat and rest. The lunch break generally has a time windows (e.g.: 13:00-14:00) and a period of time (e.g.: 45 min). In our study, all those prerequisites enforce the collaboration and coordination of many caregivers to achieve the desirable objectives which lead us to consider the problem as an alternative of the vehicle routing problem with time windows called VRPTW-SPLB for the Vehicle Routing Problem with Time Windows, Synchronization, Precedence and Lunch Break constraints.

Literature Review

This section illustrates the state of the art of the vehicle routing problem (VRP) encountered in the home health care sector (HHCS) viewed as a combinatorial optimization problem in the field of Operation Research. The philosophy derived from this type of problem is that the transportation and carriage of people (elderly/disabled/critical state), and medical devices delivery to customers' (patients') homes must occur with a time interval mostly known as time windows (VRPTW) is the essential and classical form to initiate the solution. A lot of scientists working on this field start from this initial point to carry on many variation of this problem itself. To illustrate all this, a classification according to two clusters has been done:

Pick-up and Delivery Problems

This cluster tackles the matter of delivering/picking-up patients or goods from a site A to a site B as explained in (Diabat el al., 2016),(Zhang el al., 2018), in the same line (Liu el al., 2013), (Coppi el al., 2013) and (Ceselli el al., 2014) were interested in solving problems of transporting medical devices and medicines to customers' (patients') homes and collecting drugs, samples that are no longer used by patients. Others such as (Shuang el al., 2019), (Alkaabnech el al., 2020) looked into this problem as a variation which considered heterogeneity of a fleet of vehicles which means that vehicles can deliver or collect on the same path, some customers may require several visits in the same time windows and several depot can be found, thus dividing deliveries between vehicles can occur. Another interesting case was introduced by (Rousseau el al., 2003) whom works on a Dial-a-Ride problem (DAR) where customers (patients) demands one or more particular services before the transportation can be done.

Planning and Scheduling Problems

This cluster tackles the matter of allocating missions to a set of caregivers according to a specific planning and visits schedules. A lot of works have been conducted on this area, (Bertels el al., 2006) that considered the allocation of nurses whose professional qualifications and skills vary along with (Bredström el al., 2007, 2008), (Braysay el al., 2009), (Bredström el al., 2007) and (Rasmusen el al., 2010) whom have opted to give a set of skills to each of the staff (caregivers) such as sex gender, medical expertise, spoken languages… From what was said, restrictions have been set to decide objectively according to the caregiver skills the actual and profitable assignments to each patients' needs and demands. To illustrate and to give a clear idea, each caregiver from their initial depot (start point) are required to visit patients according to the type of care suitable for the patient within a specific time windows, each care type have a certain amount of time (duration) not to exceed and a type of skill.

Before moving on, taking caregivers desires and needs into consideration is essential for the service quality of tasks performed. Hunger, thirst, fatigue, day-off, vacation and much more needs cannot be neglected. Likewise a care is given by a caregiver to a patient within a certain time windows, lunch break also have a specific time windows with a limited duration. (Yuan el al, 2015) have considered lunch break as a stochastic service time meanwhile (Liu el al, 2016) included it as a requirement (constraint). Many recent works dealing with lunch break in the Home Health Care Services have allowed it on the condition that shift length is longer than a predetermined time either without considering time windows (patients are visited at any time) or at a fixed time. (Trautsamwieser el al., 2014) allowed taking break on the condition that the successive working time prescribed for the caregiver is surpassed.

After reviewing some of the past works on this theme, we observed that most used methods for solving such problems is the Mixed Integer Programming which is considered an exact method such as the branch-and-cut-and-price used by (Bredström el al., 2008), (Rasmusen el al., 2010) without including lunch break requirement for the working staff (caregivers), meanwhile (Yuan el al., 2015) and (Liu el al., 2016) included lunch break constraints. Approached methods commonly known as meta-heuristics are most suitable for dealing with this type of problems

and are mainly based on Large Neighborhood Search and Local Search as seen in (Rich., 1998), (Rousseau el al., 2013) and (Lin el al., 2019).

Problem Description

This paper addresses a variant of the vehicle routing problem with time windows, precedence and synchronization constraints along with staff' lunch break requirement in the Home Health Care System.

The VRPTW-SPLB can be considered as a graph G= (V, E) where V is a node-set V= NUD where N = {1… n} corresponds to a group of customers (patients) and D = {c, f} are nodes where c is the initial depot (center) and f the final depot. M denotes as a margin (edge) set where each margin m = [i, j] is linked to a travel cost C_{ij} and a travel durationT_{ij}. S denotes as a set of services where the initial depot (center) c offers a choice of multiple services S = {1…s} to customers (patients). A customer i demands a subset of services ensured by a set $S_i = \{s \in S: e_{is} = 1\}$ where e_{is} matches 1 if a patient I requires services ∈ S, and 0 if not. For each service s provided to a patient i is associated a time duration d_{is} and a time window $[a_i, b_i]$; where a_i is the earliest service start time and b_i the latest service start time of patient i. K is the set of vehicles available at the initial depot (center) c and for each k ∈ K an availability time window $[\alpha_k, \beta_k]$ where a vehicle k can only leave the depot c at α_k and must return to the final depot f at β_k. To assure the preference of each vehicle k, a number Prf_{ik} is associated to the vehicle k and denotes the non-preference of customer (patient) i to the vehicle (caregiver) k.

For the sake of this study, we suppose that k ∈ K accomplishes a unique service s. y_{ks} equals 1 if vehicle k offers the service s, 0 otherwise (∀ k ∈ K, ∀ s ∈ S).

P denotes the lunch break and has a duration L and a time window $[w_p, z_p]$ as put by (Cheng and Rich, 1998). g_{ik} equals 1 if the caregiver uses his/her break at patient i before service completion and 0 otherwise, g'_{ik} equals 1 if the caregiver uses his/her break at patient i after service completion, 0 otherwise. st_{ik} is the service start time of caregiver k at patient i and st_{pk} is the lunch break time start of the caregiver k. For the sake of simplicity, we write $k \in K_s$ if y_{ks}=1 and $s \in S_i$ if $e_{is} = 1$.

For customers (patients) whom are demanding more than one service either in a specific order or simultaneously, we define for each patient i ∈ N a $slot_{isr}$ as the time separating the time start of service s and service r demanded by patient i where services s and r have to be provided in a given order (service s before service r).

This problem formulation considers the minimization of the sum of non-preferences of patients towards caregivers and total travelling time by shortening to the maximum the total travelled distance overall.

(Ait Haddadene el al., 2016) and (Labadie el al., 2014) have conducted similar studies but did not consider caregivers' lunch break requirement. This kind of problem is known to be an NP-hard problem. For the first resolution, we will use the Mixed Integer Linear Program (MILP) considering the binary and real variable decision respectively as follows:

- x_{ijk}=1, if k ∈ K travel from i to j, 0 otherwise
- st_{ik} infers to the start time of service at node i if customer (patient) i is visited by vehicle (caregiver) k.

To generalize the constraints of time in this formulation, we presume that all the requested services by patients are asked independently from the initial depot (center) c and their duration is 0 (D_{cs} = 0, ∀ s ∈ S).

Mathematical Formulation

The MILP corresponding to our formulation is as follows:

$$min \sum_{i\epsilon V\setminus\{f\}} \sum_{j\epsilon V\setminus\{c\}} \sum_{k\epsilon K} C_{ij}\, x_{ijk} + \sum_{i\epsilon N} \sum_{j\epsilon V\setminus\{c\}} \sum_{k\epsilon K} Prf_{ik}\, x_{ijk} \qquad \textbf{(1)}$$

Subject to:

$$\forall k \in K\,, \sum_{j\epsilon N} x_{cjk} = 1 \qquad \textbf{(2)}$$

$$\forall k \in K, \sum_{j \epsilon N} x_{ifk} = 1 \quad \textbf{(3)}$$

$\forall h \in N, \forall k \in K,$

$$\sum_{i \epsilon V \setminus \{f\}} x_{ihk} = \sum_{j \epsilon V \setminus \{c\}} x_{hjk} \quad \textbf{(4)}$$

$\forall i \in N, \forall s \in S,$

$$\sum_{j \epsilon V \setminus \{c\}} \quad \sum_{k \epsilon K_s} x_{ijk} = e_{is} \quad \textbf{(5)}$$

$\forall k \in K,$

$$\sum_{i \in V} g_{ik} + \sum_{i \epsilon V} g'_{ik} = 1 \quad \textbf{(6)}$$

$\forall k \in K, i \in V,$

$$g_{ik} + g'_{ik} \leq \sum_{i \epsilon V} x_{ijk} \quad \textbf{(7)}$$

$\forall k \in K, j \in V,$ $\quad st_{pk} + L.g_{jk} \leq ts_{jk} + (1 - g_{jk}) z_p$ **(8)**

$\forall k \in K, i, j \in V,$

$$st_{ik} + (T_{ij} + d_{is})(x_{ijk} + g_{jk} - 1) \leq st_{pk} + (2 - x_{ijk} - g_{jk}) b_i \quad \textbf{(9)}$$

$\forall k \in K, i, j \in V,$

$$st_{pk} + (L + T_{ij})(x_{ijk} + g'_{ik} - 1) \leq st_{jk} + (2 - x_{ijk} - g'_{ik}) z_p \quad \textbf{(10)}$$

$\forall k \in K, i \in V,$

$$st_{ik} + d_{is} g'_{ik} \leq st_{pk} + (1 - g'_{ik}) b_i \quad \textbf{(11)}$$

$\forall i, j \in V, \forall s \in S: s \in S_i \cup S_j, \forall k \in K_s,$

$$st_{ik} + (T_{ij} + D_{is}) x_{ijk} \leq st_{jk} + b_i (1 - x_{ijk}) \quad \textbf{(12)}$$

$\forall i \in N, \forall s \in S_i, \forall k \in K_s,$

$$a_i \sum_{j \in N} x_{ijk} \leq st_{ik} \leq b_i \sum_{j \in N} x_{ijk} \quad \textbf{(13)}$$

$$\forall k \in K, \quad \alpha_k \leq st_{ck} \leq \beta_k \quad \textbf{(14)}$$

$$\forall k \in K, \quad \alpha_k \leq st_{fk} \leq \beta_k \quad \textbf{(15)}$$

$$\forall k \in K, \quad w_p \leq st_{pk} \leq z_p \quad \textbf{(16)}$$

$$\forall i, j \in V, \forall k \in K, \quad x_{ijk} \in \{0,1\} \quad \textbf{(17)}$$

$$\forall i \in V, \forall k \in K, \quad g_{ik}, g'_{ik} \in \{0,1\} \quad \textbf{(18)}$$

$$\forall i \in V, \forall k \in K, \quad st_{ik} \in \{0,1\} \quad \textbf{(19)}$$

The objective function **(1)** is to minimize the total travelling time and the sum of non-preferences. Constraints **(2)** and **(3)** ensure that each vehicle must leave initial depot and return to it. Constraint **(4)** secures the continuity and constancy of the routes while constraint **(5)** ensures that the demands of customers (patients) are provided and executed. Constraint **(6)** assures that every one of the caregivers takes a break in the route, meanwhile constraints **(7)** affirm that the caregiver k uses his/her break at patient i on the condition that the patient i is visited by this caregiver. Constraints **(8)**, **(9)**, **(10)**, **(11)** assert the accurate start times of breaks utilized by caregivers before and

after services in customers' (patients') homes. Scheduling permitting the consistency between the durations of visits is maintained by constraint **(12)**. Constraints **(13)**, **(14)**, **(15)**, **(16)** guarantee the respect of patients, caregivers and breaks time windows. Constraints **(17)**, **(18)** and **(19)** define the nature of the decision variables.

Just to note that lunch breaks are not depending entirely on the time duration of the route, and a lunch break can be taken and utilized if the duration of the route outpaces and exceeds α_p. It is also permissible to take a lunch break at the end of a route even if the time window of the lunch break is not yet covered.

Resolution Approach

(Féo el al., 1995) introduced a method called Greedy Randomized Adaptive Procedure (GRASP) which enables to construct at first an initial solution *Res* by the mean of a randomized parallel constructive heuristic (RP) that aims to offer a feasible solution working as a start point of the resolution process, however it could lead to an unfeasible solution, which take us to consider the use of an Insertion Procedure (IP) to fix the solution. After this step, we improve the solution by using a Local Search (LS). This process is replicated a certain number of times given an *IterMax* by the loop For. At each iteration a new solution replaces the current one if it is considered to be better, then the new solution is considered as the current solution.

GRASP Algorithm

```
begin
    X* ⟵ +∞
    for NbIter ⟵ 1 to iterMax do
        Res ⟵ RP ()
        if (Res unfeasible) then
            Res ⟵ IS (Res)
        Res ⟵ LS (Res)
        if (X (Res) ≤ X*) then
            Res* ⟵ Res
            X* ⟵ X
```

Constructive Heuristic

Randomized Parallel Constructive Heuristic (RP) is suggested to produce a primary solution. Each available vehicle has an opened route, subsequently these routes are connected to customers (patients) randomly and chosen in parallel manner, then inserted by applying the finest insertion procedure. We suppose these variables:

- i: The recent node visited by a vehicle k,
- $EarliestDate_{ij}$: The earliest appointment on which the vehicle (caregiver) k leaving the node i might be at the customer (patient) j,
- $LatestDate_{ij}$: The latest appointment when the vehicle (caregiver) k leaving the customer (patient) j may be at the customer j,
- $LowerBound_{js}$&$UpperBound_{js}$: The lower and upper bound that guarantee the homecoming to the depot s in their respective time windows.
  $EarliestDate_{ij} \leq b_j$ & $EarliestDate_{ij} \leq w_p$
  $LatestDate_{ij} \geq a_j$ & $LatestDate_{ij} \geq z_p$
  $LowerBound_{js} \leq st_{jk} \leq UpperBound_{js}$
  $LowerBound_{js} \leq st_{pk} \leq UpperBound_{js}$
  To those four expressions ensure that a patient j is eligible to be candidate for a tour *tr* under the condition of finishing the visits of patient i by caregiver along with his/her lunch break. If not, the list of all candidates is shrunk to keep only the candidates served by the vehicle. For a

synchronized visit asked by a customer (patient) for the first time, the service start time is set for its double visits.
When there are no customers (patients) left to add to a vehicle (caregiver) k as a result of time windows, the algorithm ceases. After the completion of this step, we could still have an unfeasible solution, thus the need to construct and develop an Insertion Procedure (IP) in order to repair the available unfeasible solution.

Insertion Procedure

If the solution provided by Randomized Parallel Constructive Heuristic(RP) is not feasible, the Insertion Procedure comes into play by considering that all patients have not been visited by the RP Procedure. This insertion benefits the inclusion of customers (patients) in the best location in any available route. This insertion advantage the minimization of extra costs and feasibility of timing/temporal constraints.

Local Search

GRASP involves five classical neighborhood in Vehicle Routing Problem included under the Local Search procedure and are summoned in the subsequent order:

1. Migration applied for a unique route; a patient is altered from a current location to another in the same path way,
2. Migration applied on various routes; a patient is altered from a current location to another in the same path way,
3. 2-swap moves performed within a singular route; two patients affiliated to a similar route are swapped;
4. 2-swap moves performed within various routes; two patients affiliated to two different routes are swapped;
5. 2-opt moves performed on a singular route; two non-successive boundaries (nodes) are removed and replaced by new ones.

The primary feasible move is applied and the moves are perceived as successive. When there are no moves which can improve the solution, the search terminates.

Numerical Results

(Bredström el al., 2008) proposed a set of instances to test the proposed model. A clustering of three distinct categories is set up to validate the proposed study, this benchmark contains three parameters; the number of customers is equivalent to patients in our case, the number of vehicles equivalent to caregivers and are grouped according to this scheme:

- 18 clients (patients) with the use of 4 vehicles (caregivers),
- 45 clients (patients) with the use of 10 vehicles (caregivers),
- 80 clients (patients) with the use of 16 vehicles (caregivers),

To incorporate the notion of synchronization, we opted to deal with a range number linked to synchronization from two to four, the lunch break for the sake of generalization is always taking after performing successfully a service s. Time windows is grouped by small, medium and large. In our case, we put the limit to not exceed at most two requested services.

The first implementation that considers the mathematical model was done by CPLEX Studio version 12.10, and the meta-heuristic and heuristic part were implemented using Python 3.8. The hardware specifications of the machine used to generate the solution is as follows: 2.4 GHz Intel Core i7-5500 CPU with 8GB of RAM, functioning under Windows 10 Home. As explained before, GRASP method requires two additional parameters to function properly, *iterMax* and the maximal candidates' size *Ncand*. After many tests and launches done, we found that the suitable values set to these two parameters are 100 for *iterMax* and 5 for *Ncand*. We launched the algorithm a number of 8 times.

Table I: MILP Solutions

Instance	Objective	CPU(ms)
18_4_s	62.25	930
18_4_m	60.13	1956
18_4_l	49.59	2812
45_10_s	-16.65	4012
45_10_m	-50.14	5236
45_10_l	-98.64	7054

As shown from the results of Table (I) and Table (II), the instances are referred in column 1; where the first value indicate the number of patients, the second one the number of caregivers aka vehicles and finally the indexes s and m and l refer to the time windows width respectively(small, medium and large). To make it clear, we take 18_4_s where 18 indicate that there is 18 customers (patients), 4 indicates that there is 4 vehicles (caregivers) and s design that the width of the time window is small. The other two columns refer respectively to the objective function value for the best feasible solution achieved in both tables and the final column refers to the running time obtained after the completion of the running process (given in milliseconds).

Table II: GRASP Solutions

Instance	Grasp	CPU(ms)	Gap(%)	Average Cost
18_4_s	71.12	1145	14.24	71.46
18_4_m	70.45	1298	17.16	71.12
18_4_l	50.2	2512	1.23	49.68
45_10_s	97.69	4150	686.72	125.35
45_10_m	31.87	8925	163.56	33.74
45_10_l	-51.03	15305	48.25	-46.05
80_16_s	-104,32	22531		-89.24
80_16_m	-117.32	22460		-94.98
80_16_l	-130.64	23102		-96.23

The gap percentage value of column 4 of Table (II) is calculated according to a formula shown as follows:
$\text{Gap} = ((\text{Grasp} - \text{Objective}) \times 100) \div \text{Objective}$

Where Grasp corresponds to the value of column 2 in Table (II) and Objective corresponds to the value shown in column 2 of Table (I). Column 5 of Table (II) refers to the average cost' solution after running the process 8 times. It is obvious that for the MILP solutions provided by the CPLEX solver are only feasible for small instances with a reasonable running time, where on larger instances; the time of computation is increasing remarkably. We also notice that when time windows' width becomes larger, computational time grows considerably. CPLEX solver is limited and cannot solve instances of 80 clients and above. Meanwhile the GRASP algorithm shows some extent of efficiency and offer solutions somehow on a reasonable scale.

Conclusions and Perspectives

As explained throughout this paper, we somehow approached a realistic aspect of the vehicle routing problem in the home health care sector by adding the lunch break requirement along with temporal, synchronization, and

precedence constraints. We presented two types of resolution method, an exact one (MILP) and an approximate one (GRASP). The experiment conducted was done relatively for 9 instances derived from the benchmark introduced by (Bredström el al., 2008) where the MILP showed its effectiveness only on small instances, where the GRASP method can optimally solve up to 80 customers (patients) relatively in an acceptable time. It is good to note that this kind of problem is an NP-Hard one and its computation time grows in parallel with large instances.

For future works, it is preferable to introduce more constraints such as customers' preferences in order to render the problem to be more complex. The use of mixed heuristic and meta-heuristic algorithms can prove to be a good alternative to improve the solution already found. Also, this problem can be extended to handle the overall waiting times in order to minimize it.

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The Effect of Social Media Marketing on Purchase Intention of Takaful in Indonesia

Dini Amalia PUTRI
School of Strategic and Global Studies, University of Indonesia, Jl. Salemba Raya, No. 4, 10430, Jakarta, Indonesia. dini.amalia@ui.ac.id; diniamaliaputri@gmail.com

NURWAHIDIN
School of Strategic and Global Studies, University of Indonesia, Jl. Salemba Raya, No. 4, 10430, Jakarta, Indonesia nurwahidin@ui.ac.id

Hardius USMAN
Statistical Polytechnic, Jl. Otto Iskandardinata No. 64C 1 4 RT.1/RW.4, Bidara Cina, Kecamatan Jatinegara, Kota Jakarta Timur, 13330, Indonesia hardius@stis.ac.id

Abstract

This study concern about untapped market and lower market share of takaful compared to conventional insurance and how social media marketing could shed some problems by influencing purchase intention of takaful. The purpose is to examine the determinants of attitude towards takaful, and purchase intention. This is a quantitative research. Five variables identified in this study namely: *social media marketing, sharia compliance in social media marketing, sharia compliance in product, attitude* and *purchase intention*. Purposive sampling technique was used in this study and analysis of data from the results of a survey of 156 muslims using Structural Equation Modeling (SEM) analysis and Lisrel program. The eventual result of regression analysis showed that social media marketing and sharia compliance in product had a positive impact on purchase intention through an intermediary attitude towards takaful. While sharia compliance in social media marketing has proven to have a negative impact on attitudes towards takaful among muslim customers in Indonesia. Analysis and findings show that there are significant intention in the muslim community in Indonesia to purchase takaful. The results of this study provide which new strategies to takaful operators to implemente social media marketing strategies to intensify consumer awareness towards takaful products. This study examines purchase intentions and the role of social media marketing in the takaful industry, which is still limitedly discussed in previous studies.

Keywords: Social Media Marketing, Sharia Compliance In Social Media Marketing, Sharia Compliance In Product, Attitude, Purchase Intention, Islamic Insurance, Takaful.

Background

Insurance as practiced by conventional insurance companies has been discussed by many Islamic scholars at the international level, among others at the Islamic Economic Congress in Mecca (1976), the Great Ulama Unity Council at Saudi Arabia (1977), and Majma'al-Fiqh al-Islam al-Alami (Union of Fiqh Ulama World) in Mecca (1979 and 1985) (Perwira, 2019). These conference states that conventional insurance is haram. Then they make an ijma' that insurance on the basis of helping each other (ta'awuni) is an insurance that is permisible in Islam.

Takaful, stemming from the Arabic verb kafal, meaning to take care of one's needs, is descriptive of a practice whereby participants in a group agree jointly to guarantee themselves against loss or damage (Wahab et al, 2007). For example, in Indonesia, According to Law Number 40 of 2014 concerning Insurance, the definition of sharia insurance is a collection of agreements, which consists of agreements between the sharia insurance company and policy holders and the agreement between the policy holders, in order to manage contributions based on sharia principles in order to help and protect each other by:

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1. provide reimbursement to participants or policyholders because loss, damage, costs incurred, loss of profit, or legal liability to third parties that participants may suffer or policy holders due to an uncertain event; or
2. provide payment based on the death of the participant or payments based on the participant's life with benefits the amount has been determined and / or based on the results of fund management.

Global takaful industry is increasingly every year. According to Islamic Financial Service Industry Stability Report (2020) in 2018 total contribution of Takaful reached USD 27.07 billion, growing 3.2% from 2017. Total of Takaful asset has only reached 1.1% of total assets of Islamic economy. Its assets is expected to increase to USD 48.1 Billion in 2025 (Imarc, 2019). In Indonesia Takaful has double up its asset from Rp 22.4 trilion in 2015 to Rp 45 trilion in 2020 (Indonesian Islamic Insurance Association, 2020). However this numbers does not show its best potential.

Therefore, insurance, especially takaful operators should take an innovative way to enlarge takaful market. Takaful operators need to adopt a new marketing strategies in order to create a demand for takaful products.

The lack of awareness, knowledge, and exposure to takaful have direct impact on purchase intentions towards takaful. This is in accordance with the Otoritas Jasa Keuangan (OJK) report that said insurance literacy index in Indonesia was only 15.76 percent in 2016.

Indonesia, which consists of thousands of islands, presents its own challenges in literacy efforts and access to insurance. Technological improvements will open new insurance distribution and communication doors through digital channels rather than conventional ways, as it will open up new markets that have been constrained by distances.

In recent years, there has been a change in the market along with the emergence of the digital world. This changes was welcomed by Indonesian. Data from We Social in Jan 2020 showed the number of Indonesian internet users reached 175.4 million people or 64% of the total population. With 160 million people of them actively used social media and spent average 3 hours and 26 minutes on social media.

According to a survey conducted by Daily Social Research entitled Insurance Technology Research 2019, 69.4% of respondents were familiar with the term insurtech and 83.9% of respondents had bought insurance through insurtech. The majority of respondents 41.46% of respondents notice insurtech through social media.

Daily Social Research with Mandiri Capital conduct another survey about Insurtech in 2020. It said in that survey that consumers who have used insurtech services showed satisfaction with the products and services that they are using.

Social media are used to connect and share many things, such as experiences, reviews and information to their "connections". That information is a useful source, which might influence consumer decision making.

One of the main aims of using social media for promotion and communication is to shape the consumer’s decision-making process (Tuten and Solomon, 2018). Therefore, this study attempts to predict the customer’s purchase intention for the takaful that are promoted using social media.

Literatur Review

Social Media Marketing

Social media is a computer-mediated interactive technology that facilitates the creation and sharing of information, ideas, career interests, and other forms of expression through communities and virtual networks (Kietzmann et al., 2011). Kaplan and Haenlein (2010) propose the following categorization of various social media services: blogs, social networking sites (eg Facebook), collaborative projects (eg Wikipedia), content communities (eg YouTube), virtual social worlds (eg Second Life), gaming world virtual (e.g. World of Warcraft).

Social media marketing is understanding how technology makes it easier for people to connect socially with their social networks and how businesses can benefit from that understanding (Bashar et al., 2012). Balakrishnan et al. (2013) explained that online marketing communications, specifically, E-WOM, online communities, and online advertising are effective in promoting brands and products through corporate websites and social media platforms and then consumers provide feedback through social media to increase purchase intention. It was further found that brand awareness and image mediate the influence of social media marketing on purchase intention. Many studies (Kosarizade and Hamdi, 2015; Akhtar et al., 2016; Laksamana, 2018) shows that there is a positive relationship between social media marketing and purchase intention. Based on the above, the following proposition is proposed:

H1 : there is a significant relationship between social media marketing and muslim's attitudes towards participate in takaful

Religiousity Aspek and Behaviour

Tylor (1871) define culture as complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society. Culture can have impact on how's people words, act or behave. Consumer makes decisions based on a lot of priorities, including personal beliefs, peer group influences, social status, economic status, cultural affinity, and other environmental variables (Goodhope, 2013). Many studies shows that culture influences buying habits and behaviours of consumers (Shaw and Clarke, 1998; Liu et al., 2001).

According to Kotler (2000), religion is a part of culture that can shape people's behaviour. As we discuss Islamic insurance and our subject is muslim, its only right that we added Islamic value on to this study.

Islamic financial products must be within the limits of sharia rules. Takaful is a brand that identifies and differentiates whether an insurance is managed with sharia principles or not. Takaful has a different concept from conventional insurance, where it is not presence of elements of gharar, usury, maishir, etc. The concept used by Takaful is in accordance with Islamic values that should be held by a muslim.

Based on research findings (Johan et al., 2017; Dusuki and Abdullah, 2007; Metawa and Almossawi, 1998; Wilson and Liu, 2011) found that sharia compliance/ religious value/ Islamic norm/ Islamic faith has a significant relationship with interest in Islamic financial products.

Apart from the products offered, in order to met the Islamic value, companies also need to pay attention to how the product is marketed, such as not making a promotion contain elements of fraud, vilify others, promote something that the product doesn't actually have.

Sharia compliance in product and social media marketing are needed to explain how will the effect of implementing sharia will influence muslim consumers interest in takaful.

Hence, the following propositions about the expected relationships are made:

H2 : there is a significant relationship between sharia compliance in social media marketing and muslim's attitudes towards participate in takaful
H3 : there is a significant relationship between sharia compliance in product and muslim's attitudes towards participate in takaful

Theory of Reasoned Action

The theory of reasoned action proposed by Fishbein and Ajzen (1975) is the most basic and influential theory of human behavior. In a theory of reasoned action, behavior is determined by two unique factors namely attitudes and subjective norms. Attitude towards behavior measures the extent of a person have favorable or unfavorable evaluations of ones behavior referred to, while subjective norm measures the influence of others with respect with behavior.

Ajzen and Fishbein (1980) said to be able to fully understand deeply about the factors that influence behavior, we need to look at the beliefs held by individuals both about themselves and their environment. This study only used attitude as a variable because attitudes are relatively difficult to change and make people behave relatively consistently against an object and consumer's attitude can be an accurate control over purchasing behavior (Dharmmesta, 1998) also can influence individual mindsets in decision making. The better attitude towards a particular product or service, the more likely that person is to buy or use a product or service (Rahim and Amin, 2011).

The above discussion leads to the following hypothesis:

H4 : there is a significant relationship between muslim's attitude towards takaful and purchase intention towards takaful.

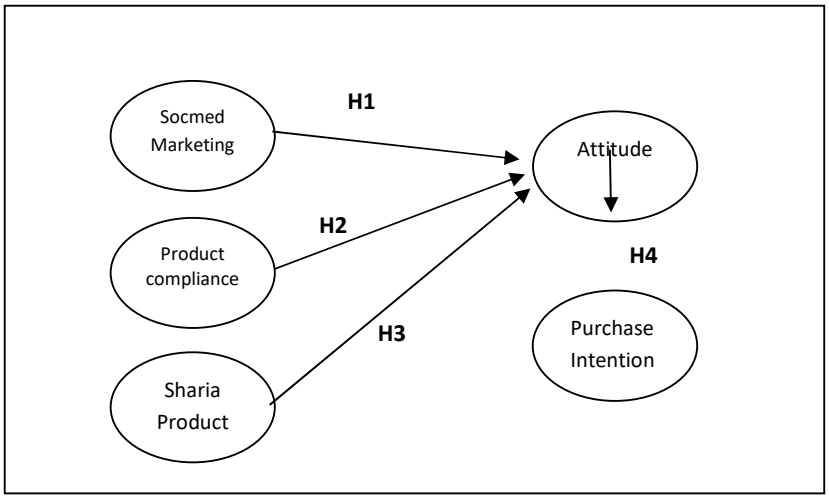

Research Methods

This study use structural equation modeling (SEM) analysis. The analytical tool used is Lisrel-SEM. The population used in this study is Indonesian muslim's. Purposive sampling technique was used in this study with the condition that he/she has ever followed / sought information from social media of takaful operators, has social media and knows about takaful but have yet used it. This requirements is enforced so that respondents can make an assessment of marketing on social media, takaful compliance with sharia rules and attitudes towards takaful as a material consideration of purchase intention.

The distribution of questionnaires (Likert scale) online through Google Form is done through social media. The questionnaire were requested to answer questions relating to the degree of social media marketing, sharia compliance in social media marketing and sharia compliance in product on their attitude toward takaful and intention on takaful participation, on a five-point Likert scale, ranging from "strongly agree" to "strongly disagree". All items intended to measure the variables in this study were taken from previously validated instruments and modified so that the focus was on takaful participation. The construct of social media marketing was measured with scales from Kim and Ko (2012), while sharia compliance in social media marketing and product was measured with scales from Othoman and Owen (2002). Attitude was assessed with measures reported by Siaputra and Isaac (2020).

To find out how social media marketing affects interest in Islamic insurance, the author uses a two-stage SEM process approach (two step SEM process), with the following steps (Suwandi, 2019):

1. Good of fit and construct validity of the measurement model proposed to be tested, using Confirmatory Factor Analysis (CFA)

2. Test structural theory. After a satisfactory measurement model obtained
3. The CFA model is then modified based on the nature of the relationship between constructs
4. The end result is a determination of the structural model to use test the hypothesized theoretical model
5. Formulate conclusions and provide some input and suggestions. The research results will be presented in advance as a whole then continued with the discussion.

Research Results and Discussion

From a total of 604 questionnaires distributed and collected, 156 questionnaires were found complete according to the research criteria. This study uses the estimation method of deep unweighted least squares (ULS) Structural Equation Modeling (SEM) to process and analyze relationships among the variables of this study using.

Preliminary Model

The first step in forming the initial model without any modification or change and carry out the process of assessing all the observed variable data that has been obtained must be processed first using SEM.

Table 1: Standarized Loading Factor, T-Value

Construct	Code	Standarized Loading Factor	T-Value	Construct	Code	Standarized Loading Factor	T-Value
Social Media Marketing	M1	0.89	13.96	Sharia Compliance of Product	P1	0.91	21.00
	M2	0.70	7.82		P2	0.94	24.88
	M3	0.85	11.53		P3	0.91	22.30
	M4	0.67	7.14		P4	0.84	13.07
	M5	0.70	9.71		P5	0.71	7.61
	M6	0.69	8.43	Attitude	A1	0.93	
	M7	0.74	11.54		A2	0.79	7.07
	M8	0.80	9.78		A3	0.93	10.40
	M9	0.78	11.36		A4	0.90	6.76
Sharia Compliance of Social Media Marketing	S1	0.90	19.34		A5	0.91	9.18
	S2	0.93	15.74		A6	0.91	10.08
	S3	0.74	8.53		A7	0.89	8.60
	S4	0.80	10.68	Purchase Intention	I1	0.86	
	S5	0.83	14.06		I2	0.87	10.10
					I3	0.94	14.15
					I4	0.83	6.84

The test results show that almost all of the Preliminary Modeling indicators have good (ideal) validity and are significant. Only 2 indicator (M4 dan M6) is below the ideal limit of 0.70 but is far above practically significant.

Structural Equations

Attitude = 0.303*Social Media Marketing - 0.222*Sharia Compliance of Social Media Marketing + 0.848* Sharia Compliance of Product , Errorvar.= 0.233 , R^2 = 0.767

(0.101) (0.191) (0.158) (0.0765)
3.009 -1.163 5.373 3.042

Purchase Intention = 1.004*Attitude, Errorvar.= -0.00887, R^2 = 1.009
(0.0637) (0.0316)
15.770 -0.281

However, from the structural equation above we can see that there has been a Heywood case on this preliminary model. In order to eliminate Heywood case, this modeling must go through modeling evaluation with using Confirmatory Factor Analysis (CFA) exogen and endogen var.

Confirmatory Factor Analysis (CFA) Exogen and Endogen Var

In CFA exogen process we drop 4 variables with the lowest validity, namely: M4, M5, M6, M9 in order to have a fit model. After CFA exogen dan endogen been done, it appears that all indicators of exogen and endogenous variables have an ideal loading factor > 0.70 and significant with a T-value > 1.96. The process continues with preparing the Final Structural Model by combining the valid exogenous with endogenous CFA var.

Final Structural Model

Determination of the final structural model by determining the relationship from one construct to another based on a theoretical model proposed. To do that this study combines the results of testing using only valid variables of CFA Exogenous and Endogenous.

Table 2: Construct Reliability, Avarege Variance Extracted, Standarized Loading Factor, T-Value

Construct	Code	Construct Reliability	Average Variance Extracted	Standarized Loading Factor	T-Value
Social Media Marketing	M1	0.8979615	0.533667	0.92	13.47
	M2			0.69	7.12
	M3			0.85	10.55
	M7			0.73	10.28
	M8			0.79	8.20
Sharia Compliance of Social Media Marketing	S1	0.9245283	0.70888	0.89	18.02
	S2			0.91	14.77
	S3			0.75	8.43
	S4			0.81	10.35
	S5			0.84	13.72
Sharia Compliance of Product	P1	0.93749656	0.7571	0.91	22.40
	P2			0.93	25.07
	P3			0.91	23.18
	P4			0.88	14.10
	P5			0.70	7.19

Attitude	A1	0.96669758	0.802514	0.93	
	A2			0.77	7.51
	A3			0.93	12.06
	A4			0.90	7.37
	A5			0.92	10.74
	A6			0.92	11.77
	A7			0.89	9.83
Purchase Intention	I1	0.92764716	0.763775	0.86	
	I2			0.87	9.61
	I3			0.95	13.75
	I4			0.81	6.35

Table 3 show the Good of Fit from Final Structural Model

Table 3: Good of Fit

No	GOF	Rule of Thumb	Test Value	Conclusion
1)	DOF	Positif (*over identified*)	292	*Overidentified*
2)	*Chi-square*dan*P*	Nilai(χ^2)kecil dan P > 0.05	335.527 (P = 0.0404)	good fit
3)	Normed *Chi-square*	(χ^2)/ *df*≤ 3	335.527/292= 1.15	good fit
4)	GFI	GFI≥ 0.90 = *good fit*	0.99	good fit
5)	RMSEA	RMSEA ≤ 0.08=*good fit*	0.0310	*good fit*
6)	SRMR	SRMR < 0.1	0.061	good fit
7)	AGFI	AGFI≥ 0.90 = *good fit*	0.98 8	*good fit*
8)	NFI	NFI≥ 0.90 = *good fit*.	0.982	*good fit*
9)	CFI	CFI > 0.90	0.998	*good fit*
10)	NNFI	NNFI≥ 0.90= *good fit*	0.997	*good fit*
11)	PNFI	The higher the better	0.882	*good fit*

Based on the data in Table 2 and 3, it can be concluded that the structural model studies have excellent compatibility (GOF). Combined reliability test results for each latent variable (Composite Reliability or also known as Construct Reliability (CR)) show that all latent variables have a good combined reliability (good reliability) past the minimum threshold of 0.70. As for the value of Average Variance Extracted (AVE), which shows convergent validity, also shows that the five latent variables have good convergent validity and value past the minimum limit of 0.50. Thus, the final structural model has good reliability. Overall, the assessment results prove that final structural model has a very good GOF, ideal validity, significant and reliable.

From structural equations below can be interpretate that the coefficient of determination for each the equation is as follows:

For the endogenous construct of Purchase Interest the value of R2 is obtained = 0.959.

This value can be interpreted that 96% of the total variation of the variable latent Purchase Interest can be explained by the structural equation and the remaining 4% is explained by other variables outside this study. As for the endogenous construct of Attitude, the R2 value is obtained = 0.704 means that 70.4% of the total variation of the Attitude variable can be simultaneously explained by Social Media Marketing, Sharia Compliance in Social Media Marketing and Product, and the remaining 29.6% is explained by other variables outside of this study.

Structural Equations

Attitude = 0.277* Social Media Marketing - 0.223*Social Media Marketing Compliance to Sharia + 0.862*ShaProd, Errorvar.= 0.243, R^2 = 0.757

(0.102) (0.177) (0.152) (0.0657)
2.716 -1.258 5.666 3.697

Purchase Intention = 0.994*Attitude, Errorvar.= 0.0118 , R^2 = 0.988
(0.0560) (0.0311)
17.763 0.379

All the results of hypothesis testing are briefly presented in the Table 4.

Table 4 : Coeficient Value and Hypothesis Testing

Hipotesis	Variable Relation	Coefficient Value	*T-value*	Conclusion
1	M➔A	(+)0.277	2.716	The M variable has a positive and significant effect on A
2	S➔A	(-)0.325	-1.258	The S variable has a negative but not significant effect on A
3	P➔A	(+) 0.862	5.666	The P variable has a positive and significant effect on A
4	A➔ I	(+)0.994	17.763	The variable A has a positive and significant effect on I

Hypothesis 1 states that social media marketing has a positive and significant effect on attitudes towards Takaful. The relationship between social media marketing and attitudes towards Takaful has a P value = 0,000 with a path coefficient (β) of 0.277 and a statistic of 2.716. Based on this value, a decision was made to accept H1 or reject H0, so that hypothesis 1 of this study is supported by the data. The conclusion is that social media marketing has a positive and significant impact on attitudes.

Hypothesis 2 states that sharia compliance in social media marketing has a positive and significant effect on attitudes towards Takaful. Table 3 shows that the relationship between sharia compliance in social media marketing and attitudes towards Takaful has a P value = 0.000 with a path coefficient (β) of 0.325 and a statistic of -1.258. Based on this value, a decision was made to reject H1 or accept H0, so that hypothesis 2 of this study was not

supported by the data. The conclusion is that sharia compliance in social media marketing has a negative but not significant effect on attitudes.

Hypothesis 3 states that sharia compliance in product has a positive and significant effect on attitudes towards Takaful.The relationship between sharia compliance in product and attitudes towards Takaful has a P value = 0,000 with a path coefficient (β) of 0.862 and a statistic of 5,66. Based on this value, a decision was made to accept H1 or reject H0, so that hypothesis 3 of this study is supported by the data. The conclusion is sharia compliance in product has a positive and significant effect on attitudes.

Hypothesis 4 states that the attitude towards Takaful has a positive and significant effect on Takaful purchase intention.The relationship between attitudes towards Takaful and Takaful purchase intention has P values = 0,000 with a path coefficient (β) of 0.994 and a statistic of 17.76. Based on this value, a decision was made to accept H1 or reject H0, so that hypothesis 4 of this study is supported by the data. The conclusion is that the attitude towards Takaful has a positive and significant influence on the Takaful purchase intention.

General Discussion and Practical Implication

The initial aim of this study was to see how social media marketing can influence muslim intention to participate in Takaful. A number of studies have confirmed that social media marketing is closely related to consumer attitudes. Research by Ko and Kim (2011) found that marketing on social media affects consumer attitudes towards purchasing Louis Vuitton. The conclusion of research on the effect of social media marketing is corroborated by other previous research conducted by (Rudiyanto, 2018; Sallam and Algammash, 2016; Moslehpour et al., 2020). Takaful industry needs to increase demand for their products in order to enlarge market share. New innovative strategies should be implemented to intensify consumer awareness towards takaful products. Due to Indonesia's geographical conditions, takaful literacy using the latest technology must be used. Social media is an effective choice for takaful operators because its large number of users in Indonesia. The information from the literacy activities might influence consumer decision making.

Furthermore, Muslims are consumers who obey the rules of their religion, this obedience itself depends on the level of religiosity and knowledge. One of the things to consider is the influence of religion on individuals behaviour. Consumers will have a positive attitude towards company that offers familiar religious values (Mokhtar, 2016). Marketers need to observe the cultural traits, environment, norms, beliefs, and values of a particular country or region to gain an understanding of whether promotion will be considered ethical, as it will effectively win the hearts of consumers and creating market charisma (Haque et al., 2010).

Promotional activities that are in accordance with Islamic values will form a more positive attitude towards brands and an intention in purchasing. However, according to Islam and Alam (2013), a deceptive and unfair promotion has occurred. Another study by Kadir dan Al-Aidaros (2015) found that Malaysian advertising was not significant for Malaysian respondents in terms of cultural, control and emotional factors from an Islamic perspective. The reason given for this finding is that of audiences prefer western culture which is not Islamic and that advertising agencies fail to follow Islamic principles. It is important for insurance operators to make their social media a pleasant place for consumers to share and receive information from companies and fellow consumers. More attention needs to be paid by takaful operators to make promotional activities on social media in accordance with Islamic values.

Other factor that should take into consideration in order to understand muslim attitude toward takaful is product compliance with sharia rules. Based on research findings (Johan et al., 2017; Dusuki and Abdullah, 2007; Al Nemer's, 2015) compliance with sharia rules was significantly related to interest in Islamic financial product. Building consumer trust means making consumers confident that sharia insurance products and services can meet

consumers needs to comply with Islamic principles. More recent studies about sharia compliance is from Usman et al (2020) about sharia hotels states that Muslim tourists who have high importance of sharia compliance present a more positive assessment of of sharia products and will feel the need has been met. Takaful operators must continue to maintain Islamic values in the making of each product, because it is the basic differentiator of takaful products from conventional in.

The theory of reasoned action states belief is considered as the background for a person's subjective attitudes and norms and ultimately determines interests and behavior. A better attitude increases the likelihood of consumers buying or using the product or service. Several studies discuss how demand for takaful is influenced by attitudes and purchase intention (Rahim and Amin, 2011; Husin and Rahman, 2014; Shabiq and Hassan, 2016). This study suggests that higher awareness, knowledge or exposure will have positive attitude and purchase intention.

The proposed model contains only three factors – social media marketing, social media marketing compliance with sharia rules, product compliance with sharia rules – that are expected to have a direct effect on attitude and intention to purchase takaful. Thus, there is the prospect for other variables on intention to purchase takaful. Hence, the paper pointing the importance of social media marketing and product compliance with sharia rules that influencing potential consumer attitude and intention towards purchasing takaful product. While social media marketing compliance with sharia rules didn't significantly impact consumer attitude and purchase intention toward takaful.

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Blockchain Technology Adoption in Saudi Hospitals: IT Professional Perspectives

Adel KHWAJI
University of Technology Sydney, Sydney, Australia, adel.khwaji@student.uts.edu.au

Farookh HUSSAIN
University of Technology Sydney, Sydney, Australia, farookh.hussain@uts.edu.au

Yaser ALSAHAFI
University of Jeddah, Jeddah, Saudi Arabia, yaalsahafi@uj.edu.sa

Abstract

While blockchain is an emerging technology that has exponential interest, the literature shows limited real-world examples of blockchain applications that have been applied in developed countries and there is no evidence of its adoption in Middle Eastern hospitals, especially in Saudi Arabia. Before adopting any new technology, it is necessary to know the extent of user acceptance of the technology. This study will investigate the factors that influence the adoption of blockchain technology in Saudi hospitals. The aim of this study is to develop a framework for blockchain decision-making in hospitals to provide a systematic approach to blockchain adoption that takes different perspectives into consideration. The framework developed is based on Technology-Organisation-Environment (TOE) framework and seeks to help healthcare decision-makers by covering three categories of blockchain adoption: technological, organisational and environmental. The implications of this study will contribute to both theory and practice.

Keywords: Blockchain, Adoption, Acceptance, TOE framework.

Introduction

Blockchain is simply a time-stamped group of immutable data records that is handled through a group of computers that are not owned by a central authority (Sharples and Domingue 2016). Cryptographic principles are used to provide security to these blocks of data (i.e. block) and to keep them bound to one another (i.e. chain) (Swan 2015). Healthcare is one industry that can gain significant benefits from blockchain technology. There are several areas of the healthcare system where blockchain technology can be used as it offers accessibility and security. In a study carried out on patient privacy and data security, it was found that there was at least a single security violation in the last two years in 94% of the hospitals (Patil and Seshadri 2014). Using blockchain in pharmaceutical industries helps in the fight against counterfeit medicines (Mettler 2016). It will improve medical record management and insurance claim procedures while increasing the pace of clinical/biomedical research (Kuo et al. 2017).

Before a new technology is adopted, it is critical to determine if users will accept the new systems/applications/services, and if the new system is compatible with the existing systems. To comprehend if an organisation will adopt a technology, the factors that will have an influence on the adoption process need to be identified. This study proposes a conceptual framework to enhance blockchain adoption in healthcare, which could be utilized by governmental hospitals in Saudi Arabia as well as in private hospitals. This study will investigate IT professionals' points of view on the following three dimensions: technological, organisational and environmental to find which factors will impact blockchain adoption in healthcare. This study explicitly aims to explore the main factors affecting the adoption of blockchain technology in Saudi hospitals. The research question for this study is formulated as follows in order to fulfil this objective: "What are the main factors affecting blockchain adoption in Saudi hospitals?". Understanding these factors in a better way may help in making sure that blockchain technology, which is still in its initial stages, is implemented in a way that is acceptable to healthcare organisations, so as to promote the meaningful use of the technology.

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Research Framework

There are several factors in developing countries that can have an influence on the effective adoption of blockchain technology. Determining the theoretical perspective that was used to formulate the research hypothesis and model is critical. Different theories were taken into account when choosing the most appropriate theory as the basis of the study. Very limited research has been conducted that examines the adoption of blockchain technology. The TOE framework was used in some of these studies as the most relevant and widely used theory as presented in Table 1.

Table 1: Theories and models used in previous studies.

Theories/Models	Studies	No. of Theory/Model used
TPB	(Schaupp and Festa 2018); (Kamble et al. 2019)	2
TRI	(Kamble et al. 2019)	1
TAM	(Folkinshteyn and Lennon 2016); (Kamble et al. 2019); (Queiroz and Wamba 2019); (Lou and Li 2017); (Grover et al. 2019)	5
TAM2	(Morita et al. 2018)	1
UTAUT	(Arias-Oliva et al. 2019); (Queiroz and Wamba 2019); (Francisco and Swanson 2018)	3
IDT	(Dobrovnik et al. 2018); (Lou and Li 2017); (Fairooz and Wickramasinghe 2019)	3
TOE	(Clohessy et al. 2019); (Batubara et al. 2018); (Fairooz and Wickramasinghe 2019); (Baharmand and Comes 2019); (Holotiuk and Moormann 2018); (Dai and Vasarhelyi 2017); (Kulkarni and Patil 2020); (Orji et al. 2020); (Wong et al. 2020)	9

Technology-Organisation–Environment framework (TOE)

Tornatzky et al. (1990) formulated the TOE framework to analyse organisational level adoption of different information system/information technology services and products. The theoretical foundation of the model is solid, and it is capable of being used in IT adoption (Oliveira and Martins 2011). Its key objective is to determine technological, organisational and environmental perspectives that have an effect on the adoption of the latest IT systems in organisations (Tornatzky et al. 1990). The TOE framework will be used in this study by applying it to the context of Saudi Arabia to comprehend blockchain technology adoption in Saudi hospitals.

Research Model and Hypothesis

Technological Context

The features of technology are explained by the technological dimension, comprising the functionalities, equipment, expenses and techniques for technology adoption (Tornatzky et al. 1990, Oliveira and Martins 2011). Because blockchain has only recently been introduced, the factors that have an impact on its adoption have not been well identified so far. Hence, it is important to assess a variety of factors. With respect to the technology context, a variety of perceived technological factors are considered to be pertinent to the adoption decision (Rogers 1995). There are various perceived technological factors that have either a positive or a negative impact within the TOE framework. These are complexity, relative advantage and compatibility.

Complexity

Complexity is the extent of the apparent intricacy and difficulty associated with the comprehension and utilization of a certain innovation (Tornatzky et al. 1990). It is imperative that new technologies are user-friendly in order to increase the adoption rate. Because of the perceived levels of complexity and the inadequate business use cases, many larger companies and SMEs have rejected the use of blockchain (Clohessy and Acton 2019). This suggests that complexity functions as a barrier in the adoption of blockchain. There is a negative relationship between an

innovation's perceived complexity and its adoption (Holak and Lehmann 1990, Abbas et al. 2017). Thus, the proposed hypothesis is:

H1: Complexity has a negative influence on blockchain adoption in healthcare.

Relative Advantage

Relative advantage is defined as "*the degree to which an innovation is perceived as being better than its precursor"* (Rogers 1995). In this study context, relative advantage refers to the degree to which blockchain technology is believed to be better in comparison with its predecessor for healthcare organisations. The higher the perceived advantage of blockchain technology (such as security, fast transactions, immutability, etc.) to an organisation, the greater the possibility of the organisation adopting the innovation (Clohessy et al. 2019). To ensure that adoption is successful, key stakeholders should acknowledge the relative advantage of the technology. Thus, the proposed hypothesis is:

H2: Relative advantage has a positive influence on blockchain adoption in healthcare.

Compatibility

Compatibility is defined as *"the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters"* (Rogers 1995). The adoption decision of an organisation is affected by compatibility. The lack of compatibility between new technologies and the prevailing principles and practices being followed in the workplace will affect the adoption (Kwon and Zmud 1987). It was asserted by Tornatzky et al. (1990) that the perceived high compatibility of the innovation with the existing technologies of an organisation may have a positive impact on the adoption process. A significant factor pertaining to the adoption of health data standards in hospitals in Saudi Arabia was compatibility (Alkraiji et al. 2013, Alharbi et al. 2016) and this had a positive impact on adoption. Thus, the proposed hypothesis is:

H3: Compatibility has a positive influence on blockchain adoption in healthcare.

Organisational Context

Descriptive measures regarding the organisation, for example management structure, scope and size fall under the organisational context (Oliveira and Martins 2011). Organisations personally and independently regulate their internal factors known as organisational factors. These factors greatly affect the process of decision-making (Oliveira et al. 2014). It is expected in this study that top management support, hospital size and hospital readiness will be the key factors in the adoption of blockchain by Saudi hospitals.

Top Management Support

Top management support is described as the views of the management regarding technological initiatives, their involvement in those initiatives, as well as the degree to which technological growth is encouraged by top management (Kulkarni et al. 2017). A significant part is played by top management in the adoption of the innovative supply chain management of small and medium enterprises using blockchain technology (Nayak and Dhaigude 2019). Top management support plays a vital role in the adoption of blockchain as there may be a need to introduce new regulatory requirements (Castaldo and Cinque 2018). Thus, the proposed hypothesis is:

H4: Top management support has a positive influence on blockchain adoption in healthcare.

Hospital Readiness

Having particular organisational resources in hand to adopt blockchain technology is referred to as organisational readiness (Iacovou et al. 1995). When an organisation shows greater willingness to adopt a new technology, it is more likely that the management and staff will be supportive of change, and display a cooperation and supportive attitude (Wang et al. 2010). In a study carried out by Clohessy and Acton (2019), it was shown that if IT infrastructure is easily accessible and there are adequate economic and human resources, then such conditions have a positive impact on the company's intention to adopt blockchain technology. Thus, the proposed hypothesis is:

H5: Hospital readiness has a positive influence on blockchain adoption in healthcare.

Hospital Size

Organisational size refers to the measure of various factors that bring about innovation, such as overall resources, slack resources, the technical capabilities of employees and organisational structure (Rogers 1995). A significant determinant of blockchain adoption is organisational size (Tapscott and Tapscott 2016). Therefore, hospital size has a significant effect on the decision to adopt innovative technology (Chang et al. 2007). It has been indicated in previous studies that organisational size has a positive impact on the willingness of an enterprise to adopt new innovative IT (Clohessy and Acton 2019, Damanpour 1992). Thus, the proposed hypothesis is:

H6: Organisational size has a positive influence on blockchain adoption in healthcare.

Environmental Context

The distinctive features of the external world where the organisation performs its business is known as the environmental context (Alharbi et al. 2016, Lian et al. 2014). Organisational environment can support or restrict an organisation in adopting innovation (Rogers 2003). External factors such as government or competitors will have an impact on the use of blockchain technology in the field of healthcare. There are two factors in this research framework that are related to blockchain adoption, government regulations and external pressure.

Government Regulations

Government regulations or particular applications that may be prevented can hamper the adoption of blockchain (Janssen et al. 2020). To supervise and regulate the industry for compliance, new rules and policies may need to be devised (Crosby et al. 2016). Technologies like blockchain should be regulated by governments, which should simultaneously work in cooperation with the community, instead of serving like a strict legally binding authority (Tapscott and Tapscott 2016). Healthcare providers' decisions to adopt new technologies can be influenced by government laws and policies (Yusof et al. 2008). Chang et al. (2007) indicated that government policy has a positive effect on hospitals seeking to adopt a new technology. Thus, the proposed hypotheses are:

H7: Government regulations have a positive influence on blockchain adoption in healthcare.

External Pressure

The pressure imposed by competitors, trading partners and the government on the organisation is known as external pressure (Duan et al. 2012, Chwelos et al. 2001). One of the external pressures is competition which plays a very important part in driving organisations to adopt IT innovations (Lumsden and Gutierrez 2013). Organisations usually try to adopt the most recent technologies so that they can increase their market share, decrease costs and ensure more effective service delivery (Low et al. 2011). A positive relationship between external pressure and cloud computing adoption in the healthcare sector in Saudi Arabia has been identified (Alharbi et al. 2016). A positive impact may be exerted by external pressure from IT vendors, or when governmental regulation is mandatory (Alharbi et al. 2016, Low et al. 2011). The Saudi government may also exert pressure on Saudi healthcare organisations, as it is seeking to generate a digital transformation in the country in accordance with the 2030 vision (Khan 2016). Thus, the proposed hypothesis is:

H8: External pressure has a positive influence on blockchain adoption in healthcare.

Based on proposed hypotheses, our conceptual research model is presented in

Figure 1.

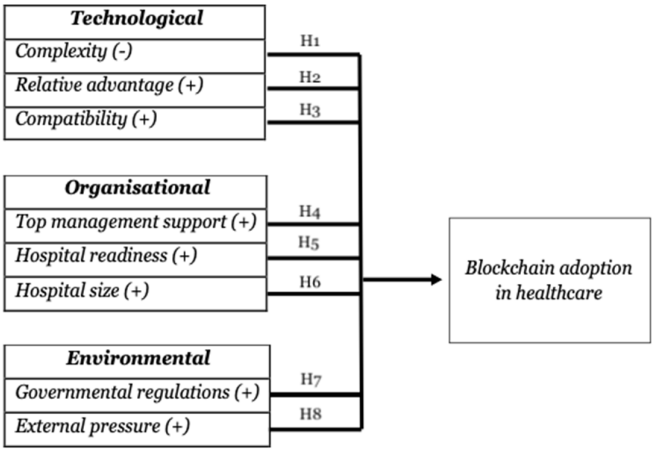

Figure 1: Conceptual research model.

Hypotheses will be tested to study the way the constructs in the framework are related to each other. Therefore, the primary method will be used to determine the effects of the constructs is the quantitative method.

Conclusion and Future Direction

Blockchain adoption in hospitals is still in the stage of rapid development and requires its own theoretical foundation for business value and risk identification (Woodside et al. 2017). The results of this study will play a part in filling the gap in knowledge and the unavailability of a predictive framework to identify the blockchain adoption intent of hospitals. To the best of our knowledge there is no research examining blockchain adoption in healthcare in developing countries such as the case in Saudi Arabia. This study conceptually identified the key factors as being the most influential in the previous studies are extracted and classified into the three contexts on the basis of the TOE framework, technological, organisational and environmental. The conceptual research model and the identified variables will be evaluated in Saudi Arabia to understand the adoption of blockchain technology by healthcare IT professionals. The Saudi government and/or decision makers will benefit from this study by obtaining an improved understanding of the advantages and challenges of blockchain adoption in healthcare. Healthcare organizations will also benefit from this research by acquiring a better comprehension of how the technology can be applied in the context of Saudi Arabia.

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The Main Financial Instruments in The Context of The Digitalization of The Economy at Small and Medium-Sized Enterprises

Olga Viktorovna Dyatlova

PhD in Economics, Associate Professor, Federal State Budgetary Educational
Establishment of Higher Education "Russian State Social University" (4, bldg 1, Vilgelma Pika Str., Moscow)
E-mail: diatlova-60@mail.ru; djatlovaov@rgsu.net

Annotation

In this article, the author substantiates, presents the main aspects of the analysis of financial instruments. This is a rather complex set of measures that takes into account both external and internal factors. During the study, the current regulatory framework for financial instruments was analyzed, and measures were proposed to improve the analysis procedure.

Keywords*:* basic financial instruments, recognition, assessment, impairment, determination of fair value, derecognition, disclosure of information in the statements.

Introduction

Today, among the scientific business, academia and at the government level, you can often hear the expression "digital economy", or, as it is more customary to call, information-type economy.

In the context of the digitalization of the economy, information, being the most valuable resource, is formed, stored, transmitted and processed through information and communication technologies (ICT).

At the first stage of the emergence of the digital revolution, a transition was made to the beginning of the automation of technologies and business processes. Then the Internet was created, which opened up almost limitless possibilities and cellular communication appeared. The worldwide spread of the Internet contributed to the development of social networks and instant messengers (Gusareva, Tsaritova, Dyatlova 2019).

During the transition to the digital economy, one of the urgent problems of managing the socio-economic development of enterprises was the use of basic financial instruments in small and medium-sized enterprises (Stepanov A.A., Stapanov I.A., Savina, 2018).

All this requires the study of modern forms of organization and management of basic financial instruments based on the introduction of information and digital technologies.

Methods

The methodology for studying the main financial instruments in the context of digitalization is based on the concepts of innovative development at the stage of formation of an information-digital method of production and consumption (Savina, Stepanov I.A., Stepanov A.A. 2018).

The subject of research is social and managerial relations regarding the formation of the main financial instruments at small and medium-sized businesses.
In the process of preparing the article, concepts of special techniques and methods of economic analysis were used, these include traditional methods of quantitative analysis, economic and mathematical methods and heuristic and expert methods of qualitative analysis and others (Barilenko, 2021).

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Results

Russia, like no other major state in the world, went through fateful milestones; revolutions, numerous large and small wars, and global changes in its economic, political and territorial structure, which led to its ups and downs (Dyatlova, 2003).

In the context of an intensifying competition, an important factor in increasing efficiency and ensuring the leadership of enterprises, is the effective use of their production potential (Savina, Stapanov 2019).

One of the most important conditions for the correct functioning of enterprises in the conditions of the formation of market relations, is the skillful management of their finances. At the same time, the main task of financial management is the effective management of the main financial instruments, as well as the development of an effective credit policy within the enterprise (Dyatlova, 2013).

A financial instrument is a contract that gives rise to a financial asset for one entity and a financial liability or equity instrument for another. Each company has financial instruments, it can be cash, accounts receivable and payable, bank loans (O. V. Dyatlova, 2019).

There are various concepts of the socio-economic nature of financial instruments. For example, (M.A. Vakhrushina, L.A. Melnikova, N.S. Plaskova, 2006) (M.A. Vakhrushina, 2014) consider "financial instruments" a complex concept, its constituent parts are as assets and obligations. In the Russian practice such a merger, where a single term is applied to property and obligations, does not exist.

In accordance with the position (V.G. Getman, 2018) the rules on financial instruments available to almost all SMEs enterprises are reflected on complex instruments that not every sme-related company has..

The concept of "financial assets" is broader than "financial investments". According to any of the Russian documents, there are no rules for accounting for many financial transactions, such as futures, options, swaps and others. There is no concept and accordingly the procedure of accounting for complex financial instruments in accordance with the position of scientists (I.I.Proskurovskaya, 2007) (O.E.Nikolaeva, T.V.Shishkova 2001).

According to the main principle of IFRS - prudence - the carrying amount of assets should not be overstated, and liabilities understated. In the works of the authors (L.I.Ushvitsky, A.A. Mazurenko), such concepts as "impairment of assets" and their application for all assets, except for those for which the relevant standards provide special requirements for the recognition and assessment of impairment, were considered.

Analysis of various scientific views allows us to conclude that financial instruments should be understood as a contract, as a result of which financial assets arise from one organization and financial liabilities from another.

The concept of "financial instruments" is complex and reflects firstly, a concept as "assets"; secondly, a concept as "liabilities"; thirdly, an orientation towards a specific intended target result of the activities of small and medium-sized businesses (Sushchina, Dyatlova, 2020).

Discussion

In accordance with modern scientific concepts, the following financial instruments belong to the main ones: cash, debt instruments, loan obligations, investments in unconverted ledated shares and ordinary shares without the right to sell back (Dyatlova, 2011).

A debt instrument is classified as a major instrument if the following conditions are met simultaneously:

1. The income of the holder of the instrument represents: either a fixed amount of income; or income with a fixed rate over the life of the instrument; or variable rate income; or income, which is a combination of such fixed and variable rates, if they are positive;

2. Under the terms of the agreement, the holder cannot fail to receive the principal amount and interest accrued for the current or previous periods;
3. Contractual provisions allowing early repayment of a debt instrument or presentation of it for early repayment do not depend on the occurrence of any future events;
4. No conditions affecting yield or maturity.

The main financial instruments include cash; demand deposits and term deposits (bank accounts); commercial bills held; accounts receivable and payable on loans, accounts and bills; bonds and similar debt instruments; investments in non-convertible preference shares and non-puttable ordinary and preference shares; obligations to receive a loan if the obligation cannot be settled in cash (Dyatlova, 2017).

The most common fixed assets and liabilities are presented in Table 1.

Table 1: The most common major financial instruments used by SMEs

Assets	Commitments
Trade receivables	Trade payables
Bills receivable	Bills payable
Receivables	Accounts payable
Organizations should	The organization should

Source: compiled by the author

An entity shall recognize financial assets or a financial liability only when it is subject to the contractual provisions of the instrument.

With regard to the issue, recognition as an asset or a liability of receivables and payables occurs at the time the enterprise enters into a contractual relationship that gives the enterprise legal rights. Failure to recognize a financial asset or liability is a firm agreement to buy or sell goods.

Considering the valuation, we can say that for all major financial instruments the rules of the IFRS for SMEs govern the use of amortized cost. The instruments listed above as an exception to the amortized cost measurement rule, when their fair value cannot be measured reliably, are measured at cost less impairment. Thus, financial instruments are measured at fair value only if it can be reliably determined (Dyatlova, 2015).

Consider examples of calculating amortized cost. Suppose on January 1, 2020. The enterprise took a loan from the bank for a period of four years in the amount of 49 million rubles. Under the terms of the agreement, the principal amount and remuneration (interest) are payable at the end of the fourth year in the amount of RUB 71.741 million, which corresponds to a 10% rate. The interest rate is in line with the market rate for similar four-year loans. The loan is initially recognized in the amount of RUB 49 million. The amortized cost calculation is presented in table 2.

Table 2: Calculation of amortized cost

Period	Debt at the beginning of the period, million rubles	Interest (at a rate of 10%)	Debt at the end of the period, mln rubles
January 1 - December 31	49	4,9	53,9
January 1 - December 31	53	5,39	59,29
January 1 - December 31	59,29	5,929	65,219
January 1 - December 31	65,219	6,522	71,741

1st jear	2nd year	3rd year	4th year

Source: compiled by the author

In accounting, this will be reflected in the Debit account. "Cash (financial asset)" 49 million rubles. Credit account "Bank loan (financial liability)" 49 million rubles.

Interest is accrued annually, which is reflected by the entries: Debit account. "Interest expenses" 4.9 million rubles. Credit account "Bank loan" (financial liability) 4.9 million rubles.

Consider a second example: January 1, 2020. The company took out a loan worth 900 million rubles, the transaction costs amounted to 40 million rubles. The annual remuneration is 50 million rubles. over three years (due December 31st). The loan must be repaid on December 31, 2020. In the amount of 1,021.792 million rubles. Loan terms correspond to market conditions. The interest rate on this financial asset is 8%. The amortized cost calculation is presented in table 3.

Table 3: Calculation of amortized cost

Period	Debt at the beginning of the period, million rubles	Interest (at a rate of 8%)	Payment, million rubles	Debt at the end of the period, million rubles
January 1 - December 31	940	75,2	(50)	965,2
January 1 - December 31	965,2	77,2	(50)	992,4
January 1 - December 31	992,4	79,392	(50)	1021,792

1st year	2nd year	3rd year

Source: compiled by the author

The revision of the estimated payments or receipts requires an adjustment to the carrying amount of the financial instrument to reflect the revised estimated cash flows. Restatements of the carrying amount are performed using the original effective interest rate of the financial instrument to determine the present value of estimated future cash flows. The adjustment is recognized in profit or loss as income or expense on the date of the revision.

Having analyzed the impairment of assets, it can be said that at each reporting date the entity is required to analyze whether there is objective evidence of impairment for any financial asset measured at cost or amortized cost. If objective evidence of impairment is identified, an impairment loss should be recognized immediately in profit or loss (Dmitrieva, Dyatlova 2017).

An entity shall conduct an impairment test for each equity instrument, regardless of its significance, on a case-by-case basis.

An entity shall assess other financial assets individually or group them for impairment testing based on the level of credit risk.

An impairment loss for an instrument measured at cost less impairment is measured as the difference between its carrying amount and the best estimate of the amount the entity would receive for it if it were sold at the end of the reporting period.

An impairment loss for an instrument measured at amortized cost is measured as the difference between its carrying amount and the present value of estimated cash flows discounted at its original effective interest rate.

If the impairment loss decreases in a subsequent period due to an improvement in the situation that existed at the time the loss was recognized, the entity is required to reverse the previously recognized impairment loss. The amount of the reversal is recognized immediately in profit or loss.

Recovery is performed in one of two ways:

- right when the financial asset increases;
- indirectly when the estimated reserve account is adjusted.

A reversal of an impairment loss must be made in such a way that the carrying amount of the financial asset does not exceed the carrying amount at which the asset would have been measured in the absence of a previously recognized impairment.

In order to determine fair value, a valuation technique should be based as much as possible on market data and at least on data from the entity itself. A valuation technique provides a reliable estimate of fair value when it adequately reflects the market's expected valuation of an asset and the inputs reasonably reflect market expectations and the inherent risk / reward ratio of the asset. The preferred valuation method is recognized by market participants as providing the most reliable price estimates.

The fair value of assets that do not have a quoted market price in an active market are reliably measured. If the range of values of potential estimates of the fair value of assets is small enough or it is possible to reasonably estimate the likelihood of different estimates within this range for its further use in determining the fair value.

An entity should not measure an asset at fair value if the range within which the fair value estimates are reasonable is significant and the probabilities of different estimates cannot be reasonably estimated.

When the source of data for a reliable measurement of an asset at fair value disappears, the carrying amount determined based on the last reliable measurement of the asset at fair value at the closing date is recognized as its new cost. Subsequently, the entity shall measure the cost of such an asset at that cost less impairment losses until a source of data exists to reliably measure fair value.

Consider the conditions for derecognition of a financial asset:

a) the contractual right to the cash flows from the asset is exercised or expired;

b) the asset is transferred to another organization;

c) the entity has transferred control of the asset to another entity, but has retained some of the risks and is able to receive consideration for the transferred asset.

In the case of option (c), the entity must not only derecognize the financial asset, but also separately recognize any rights or obligations associated with it.

The carrying amount of the transferred asset is allocated between the retained and transferred rights and obligations based on their relative fair values at the time of the transfer. Newly created rights and obligations should be measured at their fair value at that date. The difference in value between the compensation received and the values, whose recognition was deactivated in accordance with this paragraph, and the values newly recognized, are included in profit or loss during the transfer period (Barkhatov, Bukhareva, Gorodetskaya, Dyatlova, et al. 2017).

If, despite the transfer of the asset, the transferor retains significant risks and rewards, the transferor continues to recognize the transferred asset in full and also recognizes a financial liability for the consideration received. Offsetting such an asset and a liability is prohibited. In subsequent periods, the gains from the transferred asset and the expense of the financial liability should be recognized in full.

If a debt or equity instrument is transferred, the accounting for that financial asset by the transferee and the transferor will depend on:

1) whether the receiving party has the right to sell or repledge this security;
2) the fact that the transferring party fulfills its obligations.

When both conditions are met, the transferor should continue to account for the collateral as its asset, and the transferee should not account for the collateral as an asset. The transferor should reclassify such an asset in its statement of financial position as pledged and present it separately from other assets. If the receiving party has already exercised its right and sold the collateral pledged to it, it must recognize:

- proceeds from sale; and
- a fair value obligation to return that collateral.

When only the first condition is met, the transferor should derecognize the collateral and the transferee should, if it has not sold the collateral, recognize it as its asset by initially measuring it at fair value. If it sold the collateral, then derecognize its obligation to return the collateral.

An entity derecognises a financial liability only if it is extinguished.

If an existing borrower and lender exchange financial instruments whose terms differ materially, the original liability must be completed and a new financial liability must be recognized. When the terms of an existing financial liability, or part of it, change significantly, the entity is also required to record the extinguishment of the original financial liability and recognize a new financial liability.

Conclusion

The main directions of the formation and use of basic financial instruments in the information-digital economy should be, first of all, improving the forms of organizing business processes and information and digital technologies.

As a result, the spread of digital technologies was able to change not only economic processes, but also the very way of life of society. Today it is becoming more and more informational. The development of the information society is closely related to the construction of a digital economy and general robotization. The main requirements for society and characterizing it are changing the nature of work and employment, as well as increasing general requirements for the level of education and professional qualifications.

The generalization of the best domestic and foreign experience in the effective organization and use of basic financial instruments showed that the analysis is carried out using various indicators, on the basis of which a conclusion is made about the state of the main financial instruments in small and medium-sized businesses. An entity shall

recognize in profit or loss the difference between the carrying amount of a financial liability extinguished or transferred to another party and the consideration paid, including any non-cash assets transferred or liabilities assumed.

During the period of digitalization, the very nature of labor and labor relations is changing (Shpilina, Dyatlova, 2015). Increasingly, business processes go online, and this applies to all spheres of society.

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The Implementation of DSS in Knowledge-Based Organizations – The New Role of Knowledge Components in DSS Meta-Design Methodology

Stanisław STANEK
DSc. Eng., Assoc. Prof. General Tadeusz Kościuszko Military University of Land Forces, Wrocław, Poland
E-mail: stanislaw.stanek@awl.edu.pl

Anna SOŁTYSIK-PIORUNKIEWICZ
DSc. Eng., Assoc. Prof. University of Economics in Katowice, Katowice, Poland
E-mail: anna.soltysik-piorunkiewicz@uekat.pl

Marian SZARY
MSc CONSORG SA
E-mail: mszary@consorg.pl

Abstract

The aim of the paper is to show the importance of knowledge components in knowledge-based organizations in the context of DSS system implementation. The paper is based on a literature review and describes the primary attributes of the DSS, KM, and DDMKCC model paradigm, with a special focus on knowledge-based process management. The paper delivers a case study of BI system implementation for knowledge component improvement within the DDMKCC model. The case study is based on a Polish IT company. The study supports the thesis that BI systems can siginficantly help improve and develop the knowledge component in knowledge-based organization.The results highlights the background for a new methodology for implementing the knowledge component in hybryd DSS in DDMKCC models. Owing to the literature review and the ongoing research, the paper concludes that the use of BI systems can largely enhance the development of the knowledge component in DSS environments. Future efforts should concentrate on the use of AI and Big Data software to improve human-computer interaction in creativity support, modeling and simulation contexts, further exploring different approaches and applicable technologies: Big Data, mobile technologies, etc. Advanced computer algorithms have already proven to be capable of delivering better decisions than human decision makers, hence more and more of them are finding multiple applications in effective business solutions.

Keywords: Decision Support Systems (DSS), Knowledge Management (KM), DDMKCC Model.

Introduction

The paper presents the idea of new role of knowledge management (KM) in context of DSS (Decision Support System) systems implementation in knowledge-based company. The new role of knowledge in management and organization is closely connected with some changes in implementation process in/for organizational decision support systems (Young, 1988). The basic scope of the paper is to show the importance of knowledge components in knowledge-based organizations in the context of DSS system implementation based on BI system implementation for future DSS implementation methodology. The background of the paper is focused on the literature review to show the DSS paradigm and KM paradigm, and the DSS Meta-Design Methodology with knowledge components in DDMKCC model. The background showed the new role of DSS in knowledge-based organization with the idea of double-loop pattern of knowledge development in/for DSS (Stanek, Sroka, 2000).

The improvement of knowledge component presented in theoretical background was verified in case study based on BI system implementation in chosen knowledge-based company. The paper delivers a case study of BI system

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implementation for knowledge component improvement within the DDMKCC model (Sprague, Carlson, 1982), (Sprague, Watson, 1996), (Sroka, Stanek, 2011). The case study is based on a Polish IT company. The study supports the thesis that BI systems can significantly help improve and develop the knowledge component in knowledge-based organization.

The case study showed the implementation of knowledge management system in organization: there are some key problems in implementation of such a system with too many reports, unrevealed facts, and time lost on digesting reports and messages. Is there a way to eliminate these? The research results analyses gave the way to eliminate the basic problems and showed the concept of smart reporting system implementation due to changing knowledge workers expectations.

The paper is divided into five chapters. The introduction describes the aims and the thesis of the paper with paper methodology. The second chapter is based on literature review and showed the background of DSS systems development with aspects of current knowledge management in organization. The third chapter described the research methods with the case study and the research thesis was verified. The fourth chapter showed the research results, and the paper is concluded in chapter five with some new ideas for the further research.

Background

DSS paradigm and KM paradigm

Even today data remain one of the most important business resources, playing a major role in each and every company. Their actual value, however, depends on how they are used, therefore a company pursuing its business goals needs to collect information from best available sources and transform it into knowledge. Well-prepared information can be used to improve the decision-making process in an organization. This process is fundamental to making an organization more competitive. Decisions can be categorized as structured, semi-structured, and unstructured. Structured decision problems have a well-known optimal solution and do not require computerized decision support. For instance, a decision problem involving the choice of the shortest route between two geographical points can be solved analytically and there is usually no need to deploy any dedicated systems to help make the right decision. On the other hand, unstructured decision problems have no agreed-upon criteria or solutions, relying critically on the decision maker's preferences. Between these two types of decision problems – structured and unstructured – there lies a wide strand of semi-structured problems. This is the case of a lot of business decisions that may have some agreed-upon parameters but their solution mostly involves the human factor and relies on human preferences. The processing of semi-structured decisions requires a combination of analytical methods and user-machine interaction to develop alternatives based on pre-defined criteria and to eventually reach the optimum solution. To this end, specialized IT systems called decision support systems, group decision support systems (Shishany, Kharabsheh, Adams, 2017) and intelligence decision support systems (Skulimowski, 2011), (Turban, Aronson, 2001) with agent systems (Padgham, Winikoff, 2004) are used.

Decision Supports Systems (DSS) are computer-based information systems designed to help managers select one of many alternative solutions to a problem. In a large and sophisticated DSS it really is possible to automate some of the decision making processes and to speedily analyze an enormous amount of information. Such systems help corporations increase their market share, reduce costs, increase profitability, and enhance quality. Yet, what plays a crucial role in a decision making process is the nature of the problem itself. A DSS is essentially an interactive computer-based information system involving an organized collection of models, procedures, databases, software, communicators, devices, and people, that helps decision makers solve unstructured or semi-structured business problems. The key features of DSS are as follows:

- DSS are able to handle huge amounts of information stored in databases or data warehouses.
- DSS can obtain and process data from many different sources and in multiple formats.
- Using DSS companies can easily create reports tailored to the user's needs.
- For data presentation, DSS use both textual and graphical techniques, such as trendlines, tables, charts, etc.
- DSS perform complex, sophisticated analyses and comparisons using advanced software packages.
- DSS can project or indicate the consequences of individual choices.

A schema, or general design, of a decision support system is shown in Figure 1.

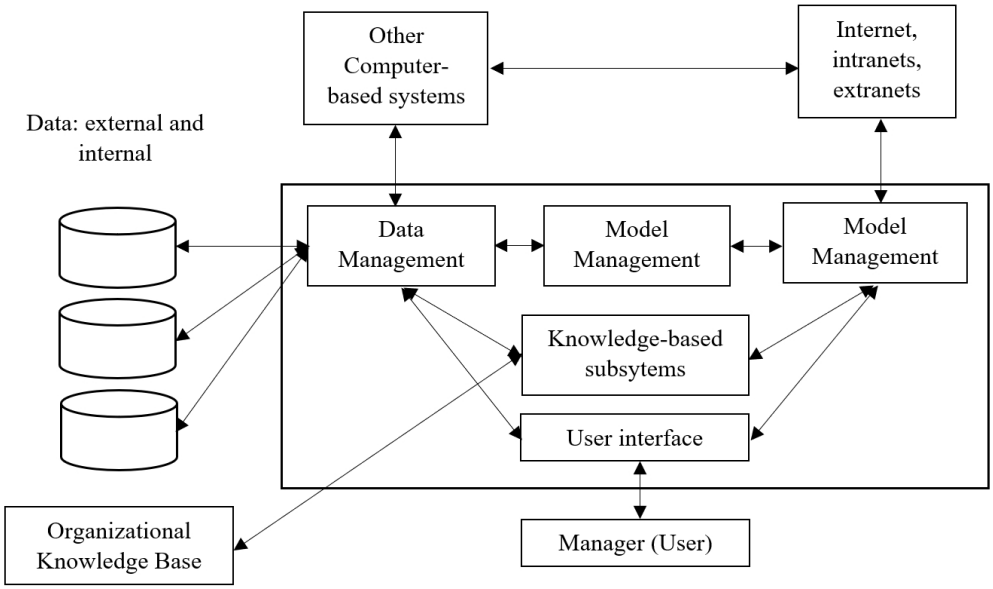

Figure 1: A Decision Support System – a schema.
Source: (Davenport, Prusak, 1998), (Davenport, 1994), (Duhon, 1998).

The Data Management component consists of all databases containing data relevant for a specific context and is managed by the so called database management system (DBMS). The database management subsystem can be interconnected with the corporate data warehouse – a repository for relevant corporate decision-making data.

The Model Management component gives users access to a plenty of models that can assist them in the decision making process. The model base can include a model base management (MBMS) software that coordinates the use of models in a DSS. This latter component can be connected to an external data storage.

The Knowledge Base subsystem can support any of the other subsystems or act as an independent component. It provides intelligence to augment the decision maker's own. It can be interconnected with an organization's knowledge repository termed as the organizational knowledge base.

The User Interface component, also known as the dialog management facility, allows users to interact with the system in retrieving information. It works chiefly through action language – that alerts the DSS to what is necessary for effective system operation and imports the required data – and presentation language that transforms and delivers results to users.

Knowledge Management (KM) is a discipline that has developed in the wake of increasing use of computer technology. Probably the most commonly cited definition is that "[it] is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers." (Duhon, 1998) It focuses on the various stages of managing information and allows people and machines to act efficiently.

Today, hardly any company can work without a well-developed knowledge management system. Perhaps it could be stated that there have always been some systems for information management, therefore what is now called Knowledge Management merely helps standardize and enhance the process. The goal is, anyway, to develop or bring together the right tools, structures, policies, cultures and people in an effort to refine organizational learning and knowledge storage and transfer by embracing a rich variety of short- and long-term factors.

To apply Knowledge Management principles in the real world, e.g. in a business environment, a knowledge management system can be used that deploys a set of software modules controlled through a single central user

interface. It may include mining important data, processing it to the expected format, and creating electronic documentation in the form of e.g. reports provided to entitled recipients.

DSS Metadata Methodology

The human-computer interaction in decision support systems (DSS) is focused on speeding up the learning process of the user (Klein, Methlie, 1995). A well-designed DSS is one that supports knowledge management in an organization. Since it is a natural property of knowledge that it evolves continuously, a DSS that is not capable of evolving with the knowledge may not at all bring the expected benefits to the organization. The meta-design approach has had its advocates who undertook to further develop it (Duhon, 1998), (Hevner, Hatterjee, 2010), (Sobolewska, 2020), (Sprague, Carlson, 1982). Due to the volatility and change dynamics of the design space, frequently coupled with a need for organizational change entailed by IT deployment, an integration of current trends in system design and organizational change occurs (Fry, 2009). Meta-design methodology provides a higher-level abstract rules supporting the working methodology framework used in the DSS development process. Meta-design literature supplies a variety of such rules, some of which deserve to be underscored (Hevner, Hatterjee, 2010), (Fischer, Giaccardi, 2004) :

- developing socio-technical environments that support and empower users to engage in the process of system development not only at design time but also at use time,
- embodying the human ability of autopoiesis in projects for which the "designing the design" process is a first-class activity,
- supporting social creativity by providing the technical and social conditions for the exchange of ideas during workshops, discussions, debates, brainstorming, co-creation sessions and other forms of intense collaboration,
- combining art and design in the processes of self-realization,
- use of meta-analysis for comparing, combining, synthesizing, summarizing, specifying, and generalizing of previous studies.

Dan Power (Power, 2002), (Power, 2013), (Power, 2003) perceives the following advantages of employing the architecture approach within DSS projects: better collaboration, easier planning, implementation and integration with other systems, and an augmented ability to evaluate technology. Clyde Holsapple, one of the fathers of the DSS concept, commented (Burstein, Holsapple, 2008), (Holsapple, 2008) that "DSS architecture does not define what DSS is; rather, it functions as an ontology that gives a common language for design, discussion, and evaluation of DSS." This perspective on DSS corresponds with Lambert's opinion that "the architectural design should set a common level of understanding among technical, non-technical and management participants." Suresh Basandra (Holsapple, 2008), on the other hand, believes that "system architecture is the process of partitioning a software system into smaller parts." The above insights bring us to Holsapple's (Holsapple, 2008) definition of the DSS architecture: "DSS architecture is a general framework that identifies essential elements of a DSS and their interrelationships." Sprague and Carlson (Sobolewska, 2020) proposed the Data-Dialog-Modeling design paradigm as a DSS architecture.

The evolution of DSS meta-design methodology revolves around six components. Ensuing research endeavors (Sobolewska, 2020), (Sprague, Carlson, 1982) and business studies (Turban, Aronson, 2001), (Twardowski, Wartini-Twardowska, Stanek, 2011) contributed extensions of DDM paradigm into the DDMKCC Model (Sprague, Carlson, 1982).

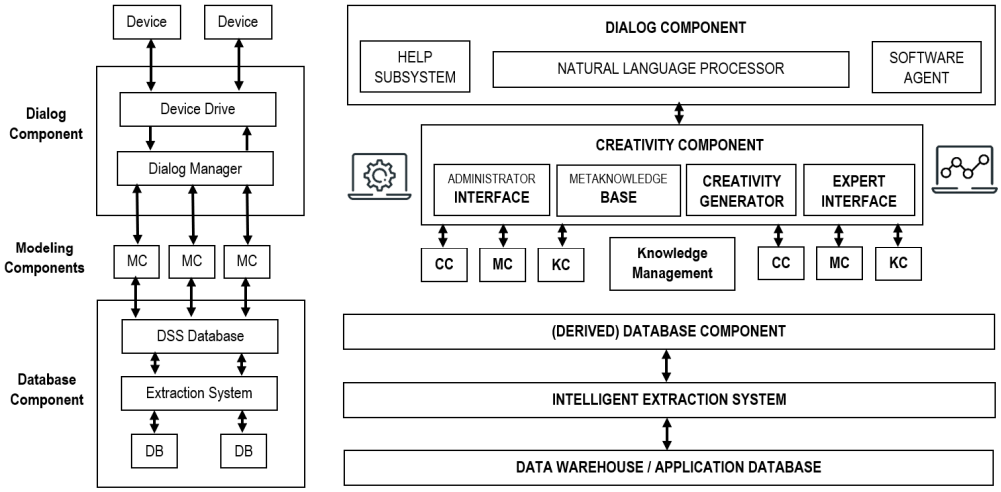

Figure 2: Overview of the DDMKCC Model with a Knowledge-Centric Component.
Source: (Sprague, Carlson, 1982), (Sprague, Watson, 1996), (Sroka, Stanek, 2011).

The DDMKCC solution includes six, rather than three, components: (1) data (DaC), (2) dialog (DC), (3) modeling (MC), (4) knowledge (KC), (5) communication (CC), and (6) creativity(CrC). The existing evolution trends include innovative solutions (data fusion, BI) to produce new DSS characteristics, such as situational awareness, cognitive bias, etc.; interface agent (personal assistant, avatar) technology and ergonomic design of the human-machine dialog as a challenge for the user interface subsystem; combining heterogeneous models (a hybrid model) in such a way that their concerted actions produce synergy and increase overall applicability.

The positioning of DDMKCC with a knowledge-centric component (Figure 2) as a DSS meta-design methodology provided an opportunity to revisit the perception of the knowledge component, focusing attention on its role. Now, with the proliferation of BI systems and the Big Data approach, DSS meta-design methodology strongly emphasizes the knowledge component.

The concept of Business Intelligence systems encompasses issues related to the presentation of corporate data in the form of intelligible and transparent reports delivered to decision makers. As a result, key organizational decisions can be made at a faster pace without having to employ a number of analysts to read information from a large number of diverse sources, e.g. from different transactional systems that do not integrate with one another.

The BI system is describe as the processes, technologies and tools needed to turn data into information and information into knowledge and knowledge into plans that drive profitable business action. BI encompasses data warehousing, business analytics and knowledge management. From another point of view BI system is defined as the knowledge gained about a business through the use of various hardware/software technologies which enable organizations to turn data into information.

Based on widespread definitions and relevant literature sources, the goals that the Business Intelligence systems are supposed to achieve can be summarized as follows:

- automation of business operations;
- informing decision-makers;
- accelerating and improving decision making;
- optimizing internal business processes;
- increasing operational efficiency;
- driving new revenues;
- gaining competitive advantages over business competitors;
- identifying market trends;
- spotting business problems that need to be addressed.

The basic functionalites are to provide historical, current, and predictive views of business operations, to use data that has been gathered into a data warehouse, to work from operational data, and to support reporting, with interactive "slice-and-dice" pivot-table analyses, visualization, and statistical data mining. The functionality of BI system is connected with iformation gathering from an internal and external sources of company. The source of all information that is processed and analyzed by the Business Intelligence system is collected in a core of each system – the data warehouse (DW). The DW stores information from a variety of sources, such as spreadsheets, text files, and transactional databases. As BI systems were created to develop reports supporting corporate decision makers, they must be capable of analyzing data from finance, accounting and sales departments. Therefore, the data warehouse primarily sources information from transaction systems, e.g. financial and accounting systems, such as MRP, CRM, etc. Since BI systems are targeted at data visualization and analysis, they can be also fed by: GIS (Geographic Information System) designed for visualization of geographic data; EIS (Executive Information System) – a type of management information system that facilitates and supports senior executive information and decision-making needs; MIS (Management Information System) – systems designed to support the management of enterprises (Morawiec, Sołtysik-Piorunkiewicz, 2020). EIS provides easy access to internal and external information relevant to organizational goals. It is commonly considered a specialized form of decision support system (DSS).

New Role of DSS in Knowledge-Based Organization

In today's organizations, structured business processes and decision problems are just the tip of an iceberg (Sobolewska, 2020), (Szelągowski, 2019). The increasing prevalence of dynamic semi-structured and unstructured processes shifts attention to Adaptive Case Management (ACM) (Svenson, 2010) founded on effective collaboration of knowledge workers. It is therefore knowledge workers and their performance that has arisen – as predicted by Drucker (Drucker, 1999) – as a key challenge for businesses. The methodology underpinnings for learning and knowledge acquisition by knowledge workers have been addressed by prior DSS studies (Moore, Chang, 1983), (Nonaka, Takeuchi, 1995), (Osuszek, Stanek, 2015), (Stanek, 2010), (Stanek, 1998), (Stanek, 1999), (Stanek, Sroka, 2000), (Stanek, Twardowska, Twardowski, 2013), (Twardowski, Wartini-Twardowska, Stanek, 2011). What is at stake here is consistent support involving respective components of the extended DDMKCC paradigm:

- The need to enhance analytics (DaC) relates to the metaphor of "blind surgeons" – former stakeholders in a business process who performed their roles while being oblivious of the prevalent trends (Van der Aalst, Weske, Grünbauer, 2005), as opposed to knowledge workers who are increasingly aware of recent developments (with data warehouses, machine learning, Big Data, and Data Lakes on hand) and empowered to revise processes as they go.
- Effective and intuitive human-machine dialog (DiC) is key to making the most of the available technologies, i.e. of computers linked to increasingly standardized ecosystems/platforms and supported by advanced artificial intelligence, visualization and augmented reality tools.
- A knowledge worker who can perform simulations employing an array of computerized models (MC), standardized notations (BPMN, CMMN, UML, EPC) and software applications (Pegasystem, IBM Case Manager, Apian, Tibco) is increasingly aware of the decision context and capable of assessing the relative outcomes of available alternatives.
- Learning processes drawing on a variety of technologies (BI, knowledge portals) fuel the conversion of data into meaningful information (KC), trigger knowledge development and validation as well as the creation of meta-knowledge and parameter-based scenarios for future use (cf. Figure 3).

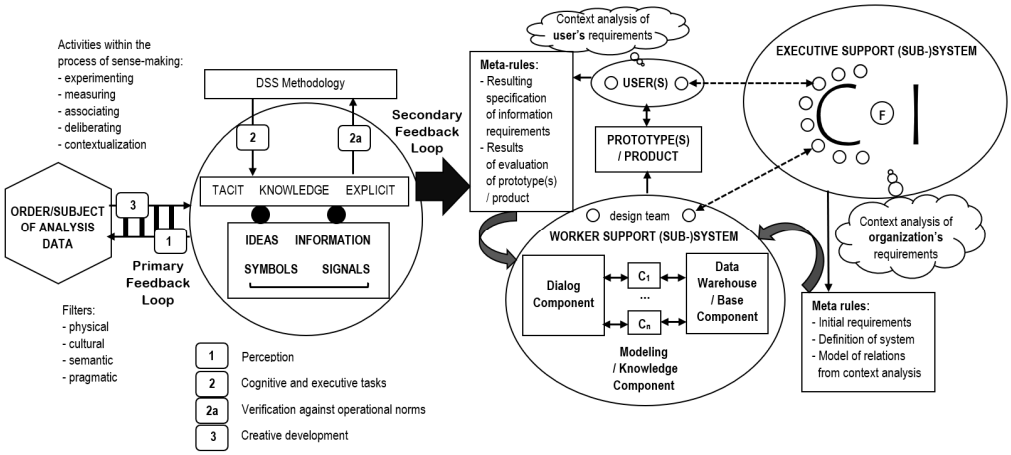

Figure 3: The double-loop pattern of knowledge development in/for DSS.
Source: (Stanek, 2010); (Stanek, 1998).

- It is within communication processes (CC), whether face-to-face or indirect, that team projects are executed, group decision-making takes place, relationships are established and nurtured, and knowledge is disseminated (outdated and falsified). The immense number and diversity ofavailable tools will suffice alone to mark the significance of this component. Relevant experiences can be sought in the application of agile technologies and SMAC systems (Social Media, Mobile, Analytics & Big Data, Clouds).
- Creativity and innovation (CrC) represent knowledge workers' most valuable potential that can be supported and developed using the latest methodologies and technologies (Remy, Vermeulen, Frich, Biskjaer, 2020), (Sroka, Stanek, 2011).

Based on the data accumulated, cleaned and loaded into the organizational data warehouse, the reporting system creates reports or computes indicators that can be used by decision makers (e.g.KPI – Key Performance Indicators). Further, the information feeds hypotheses that are set forth and validated. In the next step, with time elapsed and increasing experience, an organizational knowledge base is built, forming a repository of know-how unique to the organization, accounting for its market position and competitive advantage.

Business Intelligence systems continue to be a very important group of analytical systems and are likely to remain in use for a long time. However, over time and with increasing volumes of information being processed, they tend to turn into completely new types of analytical AI-driven solutions. The curent studies showed the context of AI usage for knowledge workers (Greiner, Jovy-Klein, Peisl, 2020)

In our case study, this trend in the evolution of BI systems is outlined on the example of an intelligent reporting system.

Big Data are made up of information generated by users of web portals, sourced from Internet transaction data and scientific outcomes (biological, astronomical, physical measurements, etc.), contributed by robots searching the Internet (Web mining, Web crawling), etc. Most Big Data have a non-relational structure and are chiefly composed of text and images, but they can also include metadata or graphical data tracing connections between websites, and other similar input. Hence, no specific data model is assigned to the concept of Big Data. The most important features of Big Data are very well characterized by the 5 Vs, where the successive Vs stand for: Volume – huge volume, Velocity – high-rise speed, Variety – diversity of structure and content, Veracity – reliability and accuracy, Value – actual value for decision making processes.

The implementation of DSS systems involves a number of technological and organizational aspects relating to business process management. In recent years, systems capable of processing very large data sets – Big Data – have gained an important position, responding to the need for tackling an increasing volume of more and more complex data coming in diverse, non-standard formats that cannot be stored in traditional databases or data warehouses. This

requirement implies the use of Big Data systems that can, automatically and in real-time, download, process and analyze huge collections of petabytes of data characterized by great diversity and high variability in time.

Under one of the Big Data definitions proposed by V. Mayer-Schönberger and K. Cukier (Mayer-Schönberger, Cukier, 2014) this term includes whatever can be implemented on a large scale and cannot be implemented on a small scale in order to acquire new knowledge or create new value that will change markets, organizations and relations between governments and citizens, etc. The above definition portrays Big Data as a revolutionary and innovative concept that will alter the functioning of contemporary and future enterprises, institutions and workplaces, and that will be reflected in all facets of human life.

The revolutionary and innovative nature of large data set processing has also been noticed in Poland. The Center for Digital State Studies has brought attention to the linkages and impacts between Big Data or social media and such technology trends as the Internet of Things or mobile solutions.

This new type of systems involves a different approach to data being processed. In setting the standard for analyzing large data sets, Schönberger and Cukier (2014) stress that, with Big Data, precision and accuracy are no longer the key criteria, given the diverse and unstructured nature of data being processed; it will mostly suffice to indicate the general trend of change.

According to e.g. Schönberger and Cukier (2014), and already cited by Morawiec and Sołtysik-Piorunkiewicz (2020), in processing large data sets one should move away from searching for causality in favor of discovering relationships. For its operation, Big Data relies on specific algorithms, such as Map-Reduce or Apache Hadoop, and statistical languages such as R, Python or Matlab (Morawiec, Sołtysik-Piorunkiewicz, 2020).

The Research Method

This chapter delivers the case study of BI system implementation in an IT company for the sake of refining the knowledge component in line with the DDMKCC model.

The case study of Business Intelligence system implementation involves CONSORG SA. This joint-stock company boasts nearly 30 years of market presence and, throughout the period, has conducted a number of IT and consulting projects for many major Polish companies. Its business profile encompasses design, implementation and oversight of IT solutions, as well as business process optimization and management support services. CONSORG specializes in the implementation of modern IT solutions in the field of budgeting and controlling as well as supporting the management of capital groups, with particular emphasis on the issues of consolidation of financial statements. In these cases the previous DSS research studies were condacted in CONSORG as well (Stanek, Twardowska, Twardowski, 2013), (Twardowski, Wartini-Twardowska, Stanek, 2011). The study is focused on an in-company BI system implementation process at CONSORG SA and describes the subsequent stages of the process.

System implementations in the IT industry owe their unique character to the environment and the way in which they are performed. IT companies tend to not use so much the services of external companies to deal with all of the software development and implementation process, instead relying on their own resources and handling the entire process on their own. For this reason, the process differs from what is the usual practice in other industries. As a rule, system implementations performed in IT companies take less time and expenditure because they do not involve intermediary or service companies; in addition, businesses dealing with IT implementations on a daily basis will already have relevant insights into customers' requirements, valuable links with software suppliers and, in most cases, ample experience with business-to-business collaboration and project management.

Taken together, the factors mentioned above seem to support the hypothesis that it is in IT companies that the knowledge component can be and should be improved in the first place.

The analytical system implemented at CONSORG SA was primarily addressed and tailored to needs of top managers, project managers, department managers (in many cases being the same people acting in different roles), and the sales personnel. The system was expected to enable these actors to monitor project implementation processes on a continuous basis, controlling deviations from plan and analyzing time spent on projects. For top managers solely, the system was supposed to provide reports on budget performance, support strategic decision

making, and facilitate projections into future developments based on financial result forecasts for the following reporting period.

CONSORG SA's system draws on Microsoft technologies and products from the MS SQL Server family, such as OLE DB and Analysis Services – for data analysis, or ASP.NET – for data presentation and visualization. Microsoft SQL Server ranks among most advanced database solutions available in the market and has been a market's favorite for years. Bundled with analytics tools, it can effectively work with large sets of diverse data and can serve as a platform underpinning an organization-wide analytical system.

SQL Server supports the R language, a leading data science and analysis solution attuned to the prevalence of Big Data, recently upgraded to provide better data security through the incorporation of such encryption and security technologies as:

- Always Encrypted – for encryption of data at read and save time, requiring client applications to run the dedicated Always Encrypted driver for data decryption;
- Row-Level Security – a service protecting records in data tables from being modified by any users other than those specifically authorized to do so;
- Dynamic Data Masking – making it possible to hide some sensitive data from unauthorized users.

Other functions in the SQL Server provide further facilities relating to data access, analysis and reporting (e.g. automated KPI calculation or R Language integration), making it a powerful technology that comes in handy in a wide array of environments.

OLE DB (Object Linking and Embedding Database) is a collection of COM (Component Object Model) objects that makes it possible to retrieve data for various sources. The OLE DB interface aims to provide all database applications with a single method of accessing data from diverse sources. At the same time, OLE DB represents a beta version – an in-development implementation – of the Microsoft-made ODBC (Open Database Connectivity) standard that can handle, alongside SQL queries, requests in other query languages, as well as queries involving non-relational databases and other data sets, such as spreadsheets and object-oriented databases.

Analysis Services form part of the Microsoft SQL Server and are included in the SQL Server Data Tools (SSDT) alongside Integration Services interfacing between data and Report Services – the latter reporting data analyses to Azure cloud services. SQL Server Analysis Services (SSAS) is capable of multidimensional data modeling, including (since 2012) tabular modeling and integrating with Power Pivot. In the BI solution being implemented, SSAS is responsible for generating OLAP cubes from diverse-source data fed into the system and for processing MDX (Multidimensional Expressions) queries built automatically via a graphical interface. For its operation, Analysis Services depend on the DAX (Data Analysis Expression) language – a collection of function libraries employed in calculating KPIs or creating calculated columns. DAX also includes a number of statistical, logical and filtering functions.

In addition, ASP.NET is used as a comprehensive solution for website development in presenting data analyses. A variety of .NET Framework is utilized in the system for website design and web application development. ASP.NET is open-source software consisting of three component frameworks geared to web application development: Web Forms – a drag-and-drop tool for dynamic website design; ASP.NET MVC – a solution based on the Model View Controller template for use in web application design and mobile application design (e.g. for Android) allowing users unfamiliar with the .NET language to easily develop applications; ASP.NET Web Pages – an integration tool that combines HTML code with cascaded style sheets (CSS) and database layers.

Prior to the BI system implementation, the company's IT infrastructure was made up of a financial and accounting system and Impuls Evo software by BPSC S.A.

The new BI system was aimed to add the following functionalities:

- A chart of accounts on top of financial and book-keeping records from which to retrieve data for financial analyses and forecasts built using MS Azure and MS Power BI architecture.
- Doc Studio – a data collection system for project planning and assessment of time consumption.

The in-design BI system thus consisted of four main components, i.e. webStudio, deskStudio, xlStudio, and wordStudio, is targeted at different users: the tools of webStudio as a web application designed for key users and/or top managers, because of management portal where data are presented in the form of transparent managerial dashboards; the deskStudio tools for analytical teams, allowing them to create complex reports and present them in the form of charts; the xlStudio tools for budgeting departments staff, helping them enter data from Microsoft Excel spreadsheets into budget forms; and the wordStudio tools for faculty users, generating reports in the form of Microsoft Word documents that can be circulated among the company's employees.

The subsequent stages of the BI system implementation process were designed with flowStudio, etlStudio, and calcStudio. These subsystems making up the Business Intelligence solution were being discussed. The flowStudio tools were using for planning and supervising group work, supporting the execution of business processes and enabling analysis of deviations from plan. The etlStudio tools were important due to ETL proces. The ETL creator have beed used in analytical processing of data and allows users to save these data in a data warehouse. The calcStudio auxiliary tool was used to help generate billings and to create a billing matrix through input filtering and transformation.

Arguably, the key system components are the webStudio and deskStudio applications. webStudio is an analytical tool based on OLAP architecture, relying on a multidimensional model (MOLAP) for its operation. Its role consists in creating reports from aggregated warehouse data coupled with data from transaction systems and data entered by users. The program is able to generate parameterized and fully scalable reports for a single user as well as for user groups – in the form of interactive tables, dashboards or key indicators. The application uses the ASP.NET web technology for data presentation.

deskStudio is an analytical tool based on OLAP architecture, largely similar to webStudio. It is a desktop application that uses the OLE DB interface as the source of data for processing and Analysis Services to process data in the form of OLAP cubes. It includes pivot tables functionality for ad hoc analysis. The application is utilized by the company's analytical team to launch budget performance forecasts, as well as to analyze returns on future projects and analyze the impact of changes and deviations from plan on ongoing projects.

The company's analysts have thus been given the possibility of visualizing data contained in the warehouse in tabular form, exporting data to Microsoft Excel or Microsoft Word (they can be read in real time using the xlStudio and wordStudio add-ons described in the following sections), creating advanced MDX queries (used in Analysis Services for data management) as well as of writing their own scripts in programming languages supported by the Analysis Services platform (C#, Visual Basic).

Other reports generated in the Business Intelligence system include a tabular presentation of the company's sales, linked to information on deviations from plan and next-period forecasts; a presentation of revenues from sales as a line chart to depict budget performance or as a bar chart to illustrate operating profit; as well as presentation of deviations from plan in the form of dashboards and matrix charts.

The Research Results and the Limitation Problems

The case study of DDMKCC model based on BI systems implementation in IT company showed some problems of knowledge management in organization. Too many reports, unrevealed facts, and time lost on digesting reports and messages – these are the key problems that most knowledge workers struggle with on an everyday basis. Is there a way to eliminate these? The research results analyses have the answer for smart reporting system implementation.

The rapidly changing economic conditions and the uncertainties around the COVID-19 pandemic have put businesses in a stint of profound transformations. The business models they have been pursuing are heavily based on data analysis, and the quantity of data has been growing exponentially. Given the excess of information and reports to be analyzed, they need better ways to handle the incoming data and timely make key business decisions. It is smart reporting* that might bring the much-desired solution to the problem.

A smart reporting system should be able to eliminate or mitigate at least some of the weaknesses of traditional reporting. Hence, to be able to reduce the amount of redundant information, the system must know what should be reported and how to make the data more meaningful and intelligible. In addition, it ought to be capable of tailor the

visualization option to best suit each user's preferences and to offer the optimum path for analysis that will engage the user in the problem rather than walk him through irrelevant facts. Finally, it might be a good idea to make sure that the reports come at the right time, bringing alerts to a minimum.

While it may seem obvious, the question is: how can the system know what should be reported, and what should not? The answer is in making assumptions on the following three areas:

- Analyzing the problem context, where the context is found in the knowledge base;
- Analyzing the relationships – links to the knowledge base;
- The choice of alerts, if applicable – alerts may be indicative of threats as well as of opportunities.

What a smart reporting system must be able to do is screen a collection of available data for items that should be reported, whether indicative of threats or opportunities. It is basically up to the knowledge base designer to decide what kind of information will be interpreted as reportable. The system can accommodate any number of knowledge bases that may operate standalone or in conjunction, while linkages among them may be based on data types (where an analysis entails mining a dedicated knowledge base) or on sharing a common data source (where a data item triggers an analysis in other independent knowledge bases). Depending on the designer's choices, reported data items (signals) can be grouped and filtered e.g. by weight. They can also become a starting point for a more in-depth analysis.

Knowledge required to identify problems is stored as a set of business rules that are processed via the open-source engine called Drools – a Business Rules Management System (BRMS). Besides the basic business rules engine (BRE), it comprises a web development and rules management application (Drools Workbench).

The business rules engine includes connectors enabling it to access data from independent sources, such as databases and data warehouses, spreadsheets, etc., to process mathematical models, or to incorporate artificial intelligence mechanisms, such as fuzzy logic and learning systems.

Self-service BI is among the top five BI trends of 2020, hence emphasis was placed by the authors throughout the research process on ensuring that users (designers) can create their own business rules. To this end, a proprietary business rules editor was developed that makes it possible for designers, using the original Drools format, to compose new rules, whether in text form, much the same way they would in natural language, or in graphical form.

In addition to business rules, knowledge bases designers can define visualization rules. As a result, they can influence the way the system will display specific types of information. They can choose to just define a number of individual signals as well as to build signal groupings and develop complete managerial desktops geared to viewing these. Whichever approach they choose, however, they will never be able to predict the actual configuration of signals generated from a knowledge base. It is the system itself that has to make sure that the data are presented in a manner that not only makes sense to the user but also supports horizontal (across the problems identified) and longitudinal analysis (in-depth to understand the underlying factors). This means that, for example, where too many incoming signals are identified as presentable to the user, they should be split into a number of desktops (views); where the system encounters presentable data lacking visualization rules, it will follow its internal rules to automatically generate visualizations, e.g. it may use a line chart to present a time series. Further, the system will attempt to suit the choice of visualization techniques to the user profile, so the same data may be presented differently to different users.

At the same time, smart reporting may work in a way that resembles classic reporting, i.e. it has to be initiated by the user who either wishes to explore a particular area (whether a single knowledge base or a number of interlinked knowledge bases) or requires comprehensive information on existing problems (which results in throwing up all available analyses).

The reporting function may also run in a continuous mode, even if, for the sake of smooth performance, it will probably not be able to work with all available data sources, instead being plugged into a so called data stream, e.g. a transactional system, to monitor records and capture irregularities. If this is the case, reporting is mostly confined to conveying brief messages to the user (by e-mail, via a messaging service, etc.), whereas detailed reports are not delivered unless the user initiates the process. The parctical example of solving the problem based on knowledge

management in the organization is tarrting in the field of budgeting and controlling as well as supporting the project management.

Conclusions

The paper highlights the new role of DSS in knowledege-based organizations and the concept of Meta-Design Methodology for knowledge management. The extensive literature review performed, the case study conducted, and the research work involved have led the authors to advocate the thesis that the use of BI systems can effectively support the development of the knowledge component in DSS environments. Future efforts should focus on the use of AI and Big Data software to improve human-computer interaction in creativity support, modeling and simulation contexts. More specifically, researchers need to further explore applicable approaches and AI technologies for optimum performance. A central dilemma is likely to be whether computers should think and act like men, or whether they should be based on rational thinking. As we are all aware, human decisions can be biased by emotions, so even if we try our best to be objective, we will never be so.

One more thing we must realize is that giving more power to machines will always raise fears among people – that machines, once beyond human control, might take over our world and destroy mankind. To mitigate the fears, it should be said, in the first place, that we have not even begun to understand what human consciousness is, so there is way to go before we can put anything like it in computers. Second, we already are governed or tracked by machines in many areas of our lives: computerized systems help us pick a movie, decide if we get a loan, test our health condition, or predict our purchasing decisions to make sure the right products are in stock.

Advanced computer algorithms have already proved to be able to deliver better results than humans and are becoming more and more common in business applications. Importantly enough, they do not threaten to immediately rid people of their jobs; more likely, they are going to change our world the way that the Industrial Revolution did. As AI grows into new subdomains – Virtual Reality, Expert Systems, Natural Language Processing, Deep Learning, Neural Networks, Speech Recognition – additional skills and an increasing number of knowledge workers will be needed.

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Initial Research on Security Aspects of Mobile Devices Used by Elderly People - Polish Case Study

Arkadiusz BANASIK

Department of Mathematics Applications and Methods for Artificial Intelligence,
Faculty of Applied Mathematics, Silesian University of Technology,
Gliwice, Poland, arkadiusz.banasik@polsl.pl

Adrian KAPCZYNSKI

Department of Mathematics Applications and Methods for Artificial Intelligence,
Faculty of Applied Mathematics, Silesian University of Technology,
Gliwice, Poland, adrian.kapczynski@polsl.pl

Marcin LAWNIK

Department of Mathematics Applications and Methods for Artificial Intelligence,
Faculty of Applied Mathematics, Silesian University of Technology,
Gliwice, Poland, marcin.lawnik@polsl.pl

Abstract

Elderly people, as a group of mobile device users, differ significantly from other age groups. Acquiring knowledge of how they look at specific issues can be helpful in the process of designing the devices and applications themselves. This article deals with broadly understood security, which concerns the device itself and the way it is used. The group of seniors was asked to answer six basic questions in this area. These questions concern, among others: the importance of data on the device, the way the device is unlocked and the question about receiving SMS notifications and links in the context of phishing. The responses received and their discussion suggest that not all users of mobile devices in this age category are aware of the threats awaiting them.

Keywords: Smartphones, Elderly People, Security.

Introduction

Mobile devices are commonly used in the modern world. The use of smartphones can be very challenging, especially for older people, which may have issues with using them. On the other hand, it is a fact that the societies of highly developed countries are aging, and the number of seniors grows quite quickly. Demographic forecasts confirm this, among other, for European countries (De Wulf (2020)). This means that the challenges of how seniors interact with new technologies will become more and more significant factor in the very near future.

One of the most critical issues regarding the use of mobile devices is security. This can apply to both the device itself and the way it is used. The problem is more complicated than it appears. Nowadays, having confidential data stored on mobile device is connected with potential attacks allowing the acquisition of such data for further use of it (for example to transfer money via electronic banking). This issue also applies to seniors, and due to their age and often less experience in using of mobile devices, they are more susceptible to this type of attack. So-called grandchild trick fraud is worth mentioning here, which is an attempt to extort money by pretending to be a close person of a senior. Such an attack was viral in

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Poland, for example, where many seniors were deceived in this way (Europol (2014)). Accessing the senior's mobile device may additionally make this attack credible. Therefore, new challenges appear here, which include, among others, the challenge of how to adopt older people to mobile devices and services (Mallenius et al. (2007)) as well as the challenge of appropriate interaction between them and the mobile devices (Leme et al. (2014), Kapczynski and Lawnik (2020)). Smartphones are also used in case of supporting frailty assessment (Fontecha et al. (2013)) or a source of alert informing about falls (Martín et al. (2011)).

As one can see, the challenges of using mobile devices by older people is widely described and examined in scientific publications. It also offers a variety of issues connected with older people, technology, and their matching. Moreover, understanding how seniors operate can help create better hardware and applications that run on it. Some of the currently available solutions may turn out to be unnecessary, and perhaps there will be a need to introduce new solutions.

The article is based on results of own research survey performed among older people from Poland. The research questionnaire consists of six questions which address security aspects of use of mobile devices by elderly people:

- Importance of data stored on mobile device;
- Access control to mobile device;
- Emergency actions programmed on mobile device;
- Phishing on mobile device;
- Localization of mobile device in case of loss;
- Unwanted links on mobile device.

All above mentioned issues are a part of the survey, which results are presented in the article.

The article contains an introduction presenting aspects of older people and mobiles, than related works containing a review of other views on the given topic. The third part of the article includes a description of the methodology of the survey and the obtained results. The final part consists of conclusions containing the authors' opinions and findings on the presented topic.

Related Works

Mobile devices are a part of everyone's life. The use of them is a common practice in our lives. The researchers from Brasil noticed that people over sixty years old are an increasing group of users of smartphones (Leme et al. (2014)). Also, some research was done in Iraq concerning the positive or negative consequences of their abilities (Mohammed et al. (2016)). A similar study focused on both seniors and young people was conducted in Finland (Oksman (2006)). That is one of the recognized aspects of a combination of elderly users and their mobile devices.

Another approach is connected with the attitude towards developing and integrating of a personalized system for mobile devices for elderly people (AlRazgan et al. (2012), Fang and Chang (2016), Mallenius et al. (2007)).

The most important papers are focused on a combination of monitoring of health and disabilities of older people by using mobile devices (Fontecha et al. (2013), Martín et al. (2011), Sendra et al. (2012), Sendra et al. (2014)). Some aspects are focused on a way of health aging (Helbostad et al. (2017)) and virtual communities to the elderly support (Camarinha-Matos et al. (2001)).

Another aspect of surveys made is generalized security issues connected with older people (Mallenius et al. (2007)), also associated with privacy and hypermedia in case of information provision (Fink et al. (1997)). It is also known that the Internet of Things (IoT) is connected with security problems (Azimi et al. (2017)).

Another research direction is related to secure older people as novice users of mobile devices (Cook et al. (2011)). The similar context is shown in (Azuddin et al. (2014)). The problems are shown in connection with user interface (Warpenius et al. (2015)) and the applications (Holzinger et al. (2007)). It is also connected with communication system for older people as users of mobile devices (Mikkonen et al. (2002)).

The other research approach is related with touch-based interfaces (Häikiö et al. (2007)). That provides another aspect, i.e., pattern lock, which is also recognized in literature in the context of older people and disabled people (Kocejko and Wtorek (2012)). It is a significant factor that provides security in context of: access control to buildings (Bo et al. (2014)), electronic payment systems (Kwong (2013)) or mobile authentication (Ehatisham-ul Haq et al. (2018)). There are interesting research projects which are connected with user authentication of mobile devices by using pattern lock (Bier et al. (2018)) or biometrics (Sae-Bae et al. (2012)).

Above mentioned pattern-lock issue is connected with user authentication methods for mobile and online services (especially elderly users). It is a novel approach presented in (Blanco-Gonzalo et al. (2015), Ahmed et al. (2017), Renaud (2006), Garner et al. (2016)).

All above mentioned works are connected with security challenges, which should be treated from different points of view, including ethical aspect, technical aspect and usability aspect. That provides many questions that users should answer to cope with mobiles and their services on a daily basis. Moreover, it is also connected with users' abilities and disabilities, including those associated with the age. According to those arguments, the authors provided a case study based on Polish elderly people, which shows their attitude toward security aspects of mobile devices.

Preliminaries Methodology and Results

The study was conducted in the form of a questionnaire on an adequately selected target group. The question concerned several aspects related to the safe use of mobile devices. A detailed description of the target group and the questions themselves can be found below.

Group of users surveyed

The surveyed group of users are seniors aged 55 and over who use mobile devices on a daily basis. Their exact age and gender structure are shown in Figure 1. The figure shows that the majority of respondents are men aged 66-75. Such a selection of the research group is appropriate for the intended purpose of security analysis in mobile devices.

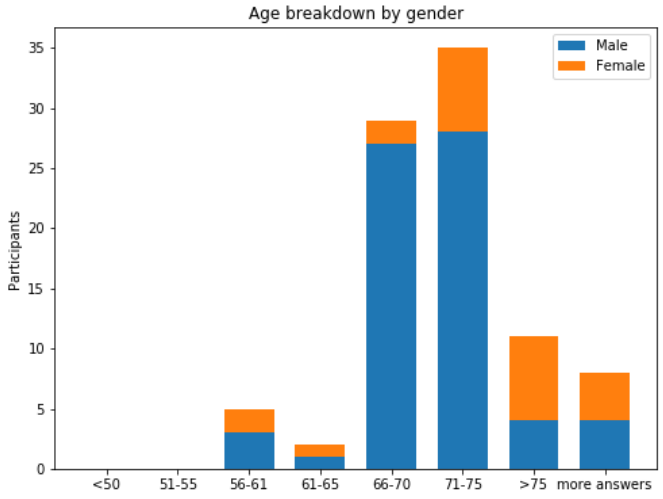

Fig. 1: The age structure of the surveyed participants

Issue 1: There is data on my phone that is important to me.

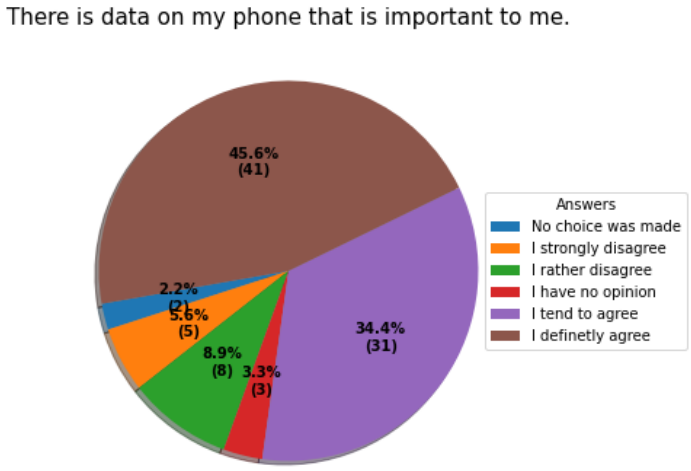

Fig. 2: Results for the first question about the data stored on the mobile device

The first question asked concerned about the data that is available on the mobile device. The surveyed group was asked if the data was important. The results can be seen in Figure 2. The vast majority of respondents answered this question in the affirmative (only a few people chose other options). It means that the vast majority of respondents are aware that a personal mobile device is not only an ordinary electronic gadget but also a database containing valuable data for them. These data may concern, for example, the contacts themselves but also multimedia files created with such a device (photos and videos). Besides, nowadays, mobile devices are often used as tools supporting electronic payments and, if such a device is used by inappropriate people, they can be used to steal money. This issue will become more and more critical over time, and undoubtedly the data stored on personal devices will become incrementally important.

Issue 2: Unlock the phone by entering: a complicated PIN, entering an unlock pattern or submitting biometric data

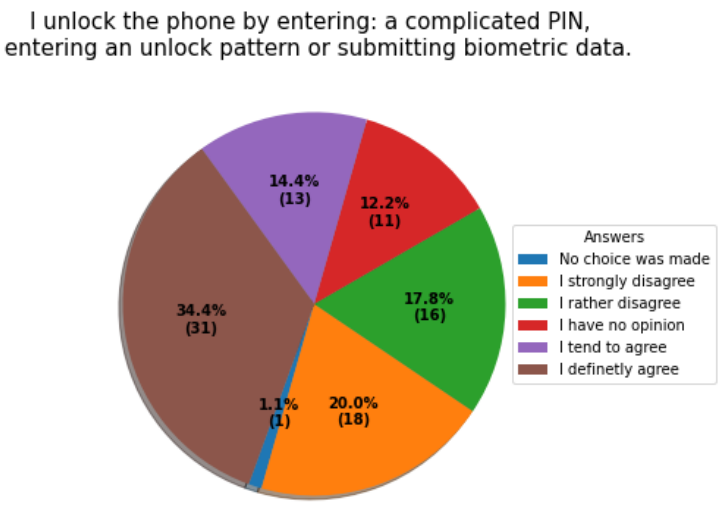

Fig. 3: Results for the second question on how to unlock your mobile device

The second question was about the ways one unlocks the mobile device. The respondents were asked whether they use PIN codes, patterns, or biometric methods of unlocking the device. The results can be seen in Figure 3. They show that only half of the respondents answered the question in the affirmative. The others either do not use these methods of unlocking the device or perhaps they did not fully understand the question (selecting the answer: I have no opinion). Nevertheless, such a combination of answers seems surprising, the more so as in the first question, the vast majority stated that their mobile device stores valuable data. Undoubtedly, the most convenient form of unlocking a mobile device for a senior would be a biometric method. It does not require memorizing complicated patterns or a sequence of numbers. However, such a method may seem less secure for an older person, and the device's configuration may be more complicated in this case. When creating new applications and devices dedicated to seniors, it may be worth putting more emphasis on this issue.

Issue 3: In an emergency (e.g. after passing out) my phone is configured to trigger an emergency procedure

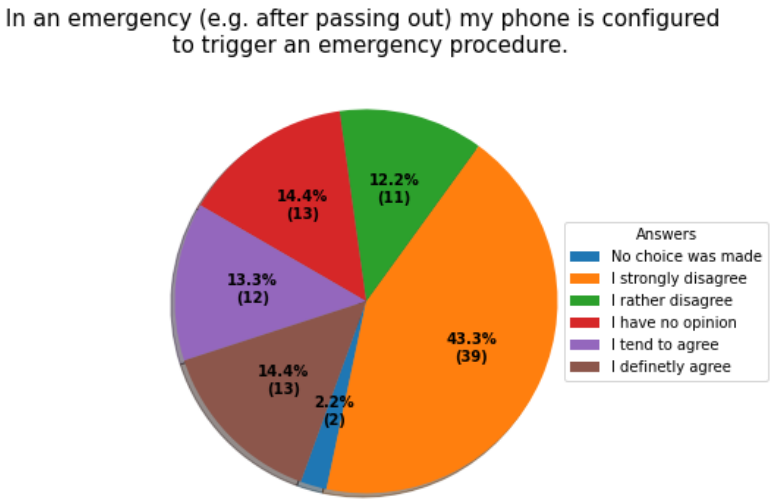

Fig. 4: Results for third question about emergency situation

The third question concerned emergencies in which a mobile device can send a special alert informing other people. The respondents were asked if their device was configured so that it could send an appropriate signal in such a situation. The survey results are presented in Figure 4. They show that only some of the respondents have their mobile devices configured in this way. This situation may come as a surprise because this possibility of informing other people in emergencies is dedicated to this age group of users. Such a small percentage of affirmative answers may result from the observation that not every senior can adequately configure their mobile device. Perhaps a more comfortable configuration of the device in this direction would allow a larger group of people to take advantage of this useful functionality.

Issue 4: A phone call or a short text message informing about the necessity to contact the bank will arouse my suspicion in the first place

The fourth question was about phishing. The respondents were asked whether the situation of receiving a message about contact with the bank would raise their suspicions or not. The results can be seen in Figure 5. More than a half replied that such information would cause fear in them. However, it is disturbing that a total of about 30% of respondents answered that such a situation did not seem suspicious to them. Perhaps it is a matter of the fact that some banking services, such as transactions, are reported in the form of text messages. Nevertheless, it means that in the case of phishing, there is still a lot of work to be done to increase the awareness of users (rather than just seniors) of the risks it brings. This issue is all the more important as the attacks of phishing confidential data or even financial means are more and more sophisticated, and, seemingly, a sheet of a text message can lead to severe consequences. Such a text message may also be about the attack on the grandchild mentioned in this article.

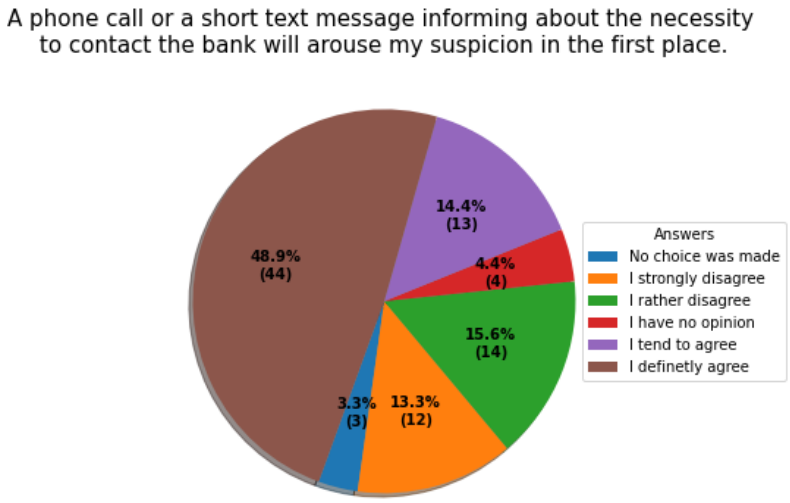

Fig. 5: Results for the fourth question about receiving suspicious messages asking the user to contact the bank

Issue 5: My phone is prepared for work in such a way that it has mechanisms to locate it in case of theft or loss

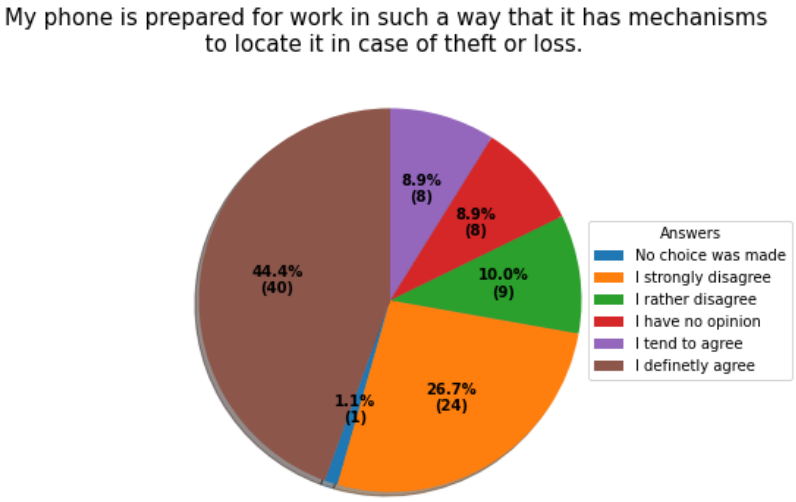

Fig. 6: The results for the fifth question about the issue of the location of the

mobile device in case it is lost or stolen

The fifth question was related to the situation in which the user of the mobile device is unable to locate it in the event of loss or theft. The results are shown in Figure 6. More than half of the respondents replied that their mobile devices are properly configured for this situation. This means that the issue of losing or theft of a mobile device is not so important to the other half or they are not aware that there are mechanisms to prevent this type of situation. Perhaps a more straightforward configuration of a mobile device or better integration with other smart band devices would allow for broader use of this functionality by the elderly.

Issue 6: When I receive a link to a website sent by the instant messenger, I open it without fear, because clicking on such a link is not associated with any danger

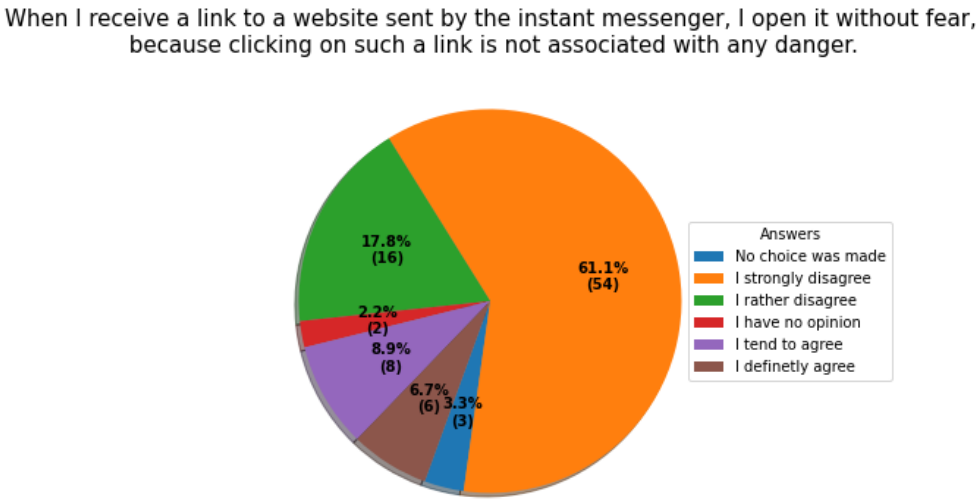

Fig. 7: The results for the sixth question about the awareness of threats related to instant messaging

The sixth question was again about phishing, but this time in the form of a link to a website. The results are shown in Figure 7. For 15% of respondents, a situation in which they get a link to a foreign site seems unlikely. Such a percentage may seem relatively small. However, considering the multitude of such attacks that try to extort confidential or identity-stealing data, it is very dangerous. The more that attacks of this type are more and more sophisticated. Moreover, not only extortion attempts, but also classic problems related to the risk of installing malware are implemented in this way. As in the case of SMS messages from the bank, the issue of raising the awareness of seniors should be intensified when it comes clicking links to other websites.

Conclusions

The article shows and discusses the issue of broadly understood security regarding the use of mobile devices by seniors. The questions asked concerned, among other things, phishing (text messages from the bank or clicking on links) or the device itself (whether the device is valuable from the side of the data it contains or how to unlock it). The survey results show that in some matters, the awareness, in this case of seniors, is not yet optimal, and further efforts can be made in this regard. Besides, the interview conducted in this way may be helpful in designing mobile devices because some of the questions concerned technical aspects.

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Simulation Techniques in Automation of Criminal Procedure - Towards Industry 4.0

Dariusz PIERZCHALA

Faculty of Cybernetics, Military University of Technology, Warsaw
Poland, dariusz.pierzchala@wat.edu.pl

Abstract

The Polish criminal procedures involves many steps, phases and stages and creates very complex processes that are composed of multiple sub-processes and activities. Nowadays, the participants of the criminal procedure are limitedly provided with modern IT, thus there is an urgent need for methods and tools to optimize process and minimize delays, shorten queues of pending cases and reduce (or even eliminate) the number of human errors. However, the guiding assumptions are: elimination all reasons that might weaken the access of citizens to judiciary system, as well as make hard to keep the guarantee of "equality before the law". These objectives are consistent with the principles of Industry 4.0, especially simulation based knowledge acquisition, machine learning and robotic process automation. The simulation method has been applied for verification of usefulness of proposed automation with QR Code and RFID tagged documents. The original simulation software allows conducting the experiments in a short period of time for numerous testing scenarios. Moreover, during the experiments the simulated events and resources (people, tools) are integrated with real devices in order to gather data about their reliability and performance. We propose two-way analysis of the criminal procedure: modelling and simulation of the process similarly to Business Processes Modelling (BPM), which forms the basis for measuring and assessing an effectiveness, and optimization based on hybrid models and methods: GAN/GERT with queuing theory and optimization. The practical result of this work is the workflow system extended with the business process simulator.

Keywords: Criminal Procedure, Court Automation, Event Simulation.

Introduction

In the last two decades, technological advances have been extremely rapid and have significantly changed human life. Industry 4.0 is becoming more and more the reality for many companies around the world, what also applies to the developing European countries of the Central and Eastern Bloc, in particular Poland. More than 90% of the managers, who took part in the global survey of the consulting company Deloitte, indicate In a research study by Deloitte (2020) that the digital transformation is the highest strategic goal of their organization. The fourth industrial revolution should increase efficiency and bring savings even more evidently. However, there are also many challenges and problems. The first one is cybersecurity - Industry 4.0 increases the possibility of cyber attacks. The second is unfavourable social reactions, related to the influence of automation on the labour market. The third is the concern that intelligent robots will replace the human factor at work resulting "technological unemployment". The fourth is the risk of over-subordination to robots and their still very limited intelligence and perception.

According to Bowles (2014), the percentage of automation professions in Europe ranges from 45-60%, and especially southern Europe is more vulnerable to the wave of automation. The conclusions of the discussion at the 2016 World Economic Forum in Davos about the consequences of Industry 4.0 show that up to 7 million jobs could be at risk in the next 5 years.

There is no turning back in the economy of countries from technological and organizational changes related to Industry 4.0. It is also clear that it will have an increasing impact on other dimensions of human life, such as education, travel, medicine etc. According to the author's opinion also the judiciary, as a particularly sensitive area

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of state functioning, can and should be subject to changes imposed by Industry 4.0, notwithstanding with special caution and prudence. The proper functioning of the judiciary - the third power - is crucial for all countries. Although the new century has brought significant positive changes stemming from the advances of IT technology (for instance the simplifying and accelerating many official procedures), there is still an urgent need for innovation of judicial system in the areas: organizational, legal (formal) and technology. Replacing people with artificial intelligence of software machines creates an opportunity to relieve the burden on people, reduce delays in processes, objectify judgments and reduce error rates.

According to the different social research, judicial system is criticised by many Polish citizens (following a research study by Beldowski et al (2010) it was even approximately 40%). In particular, there have been criticized delays of criminal cases. Currently in Poland, the participants of the criminal procedure (i.e. judge, secretary, sites) are provided with modern IT limitedly. Although IT tools for case-management are reported in more than half the courts there are rather stand-alone non-integrated programs and that solutions applies to administrative courts mostly (e.g. electronic files are available in 10% of courts).

A very recent fact that may have an impact on acceleration of the automation of courts and the criminal procedures are phenomena similar to Covid-19. The impossibility of typical and "normal" functioning of courts based on traditional techniques and tools, resulting from the limitations of the coronavirus epidemic, including the limitation to a physical meeting during hearings of both parties, may result in acceleration of the process of computerization of courts. Solutions such as videoconferencing (in UK, the HMCTS enables all parties to take part remotely in a criminal hearing using video platform) and remote participation of the parties in the trial, electronic application offices (Polish abbreviation: ePUAP), information portal of the courts are already quite common. However, in a media space it is a common opinion that automats and artificial intelligence can analyse cases and generate a decision for a judge only in simple cases. In complex cases, the robot adjudicating on other cases raises understandable objections – AI methods should support processes and procedures, but should not replace the judge. It is definitely important to enable the criminal justice system to operate both efficiently and primarily: fairly. In the context of a criminal procedure, that is sensitive to errors in actions and procedures, the focused action of the authorized entities and actions limited by time (the passage whereof becomes a factor undermining to a great extent the basic level of its objectives: the completion of the case in a "proper time") are required.

These subject issues have appeared in research carried out around the world since the early 1990s. In many works, efforts have been made to assess the functioning of judicial systems: Posner (2005) mentioned that it is an analysis of the work of courts from the economic point of view, in In the books by Rosales-Lopez V. (2008) and EC (2012) that are statistics and forecasts, while in Beldowski et al (2010) there are opinion-based evaluation of courts. The paper presents an extended approach based upon the earlier researches conducted with cooperation with the District Court in Bialystok, Poland - case study sourced from the court following a research study by Pierzchala et al (2014).

There are known useful approaches that allow modern organizations and businesses to operate effectively according to Industry 4.0. For the proper analysis of a criminal procedure and then the construction of supporting software tools (for workflow management and simulation) there is crucial to adapt a modern methods to criminal process specification (e.g. queueing systems, simulation models, business process modelling, machine learning, robotic process automation). Advances in the criminal process should be obtained by an analysis of the current status, identification of possible places to cover with AI and possible actions to automate with software robots, and the prospective changes necessary and possible to applying. If we treat criminal procedure in terms of business processes, the selected problems can be solved with the use of tools for process modelling and simulation, which will form the basis for assessing the effectiveness and finally optimization. Elimination or reduction of “bottlenecks” in that process, identifying how to redefine and reorganize the process, indicating the time and resource savings is possible to be made after identifying the real causes of problems. Simple examples are the complaints that are allowed by criminal code to submit on almost every stage of the proceedings. The other one is a necessity to service formal defects in criminal process documents (writs, letters, briefs etc.) – it creates an opportunity for machine learning methods. Due to lack of data, simulation and synthetic data generators can be used. Before implementing any changes in the existing system, their effectiveness and usefulness should be examined, also with simulation techniques.

Modelling of The Criminal Procedure

The background

In Poland, the Constitution provides for dualism of the judiciary's authority – the justice system is composed of courts and tribunals. Currently, there are almost 380 common courts in Poland - one “supreme (highest)” court, more than 10 appeal courts, 45 district courts and 321 regional courts. Regional courts are courts of the first instance - they handle most cases within jurisdiction that covers an area of several Communes. District courts have a function as both first and second instance courts – they handle serious cases and appeals within jurisdiction of several district courts. Dubois et al (2013) mentioned in that structure there are ~10,000 professional judges working in courts: ~7,000 at first instance, ~3,000 at second and less than 200 at highest instance. According to general statistics, more than 90% cases are proceeded by courts of first instance. Among different cases a weight of criminal ones is special, so due to the facts the role of criminal departments in district courts is really important.

The Polish criminal procedural law is a set of legal norms regulating the criminal process, defined as a set of regulated activities aimed at detecting, judging and possibly executing a punishment and protective measures for a crime and its perpetrator. We can also try to define the concept of a criminal trial by a number of activities carried out by preparatory and judicial authorities. In that meaning the criminal procedure involves many steps and stages that at the most general level are: Criminal investigation, Grand Jury proceeding and Execution of sentence. More detailed, there exists the following steps: Reporting of the Crime, Pre-arrest Investigation, Arrest, Arrest and Booking Process, Post-arrest Investigation, Decision to Charge, Filing the Complaint, First Appearance, Preliminary Hearing and/or Grand Jury Proceeding, Arraignment on the Information or Indictment, Pre-trial Motions, Plea Bargaining and Guilty Pleas, Trial, Sentencing, Appeals and finally Post-conviction Remedies. The space of is perceived as discrete and depending on goals it can be divided into different number of levels leading to complex processes that are composed of multiple sub-processes and activities. Each one is optional and can run according to various alternative paths thus a procedure can finish without executing all steps.

If we treat the criminal procedure in terms of formal models (e.g. business processes or stochastic processes), the selected problems can be solved using tools for modelling and simulation. Thus, M&S constitutes the basis for optimization, reorganization of the criminal procedure and assessment of both improvement of efficiency and savings - in sense of time and resources. To achieve this objective we proposed in a research study by Pierzchala et al (2014) the approach based on repeating iterations in cyclical activities: (1) modelling of a courts’ structure and organization, the environment and the activities in the criminal procedure; (2) study the quantitative characteristics describing courts and the current criminal procedure; (3) reorganization (optimization) in the direction of improvement; (4) development and implementation of computer systems supporting the courts; (5) re-modelling, study characteristics, verification and correction of direction of the proposed changes and modifications.

Business Process Modelling of a criminal procedure

The main objective of BPM is to adopt organizations to the needs of their customers and to define an intended model of functioning. BPM cover the interlinked stages of activity i.e. the identification, analysis & modelling, simulation, implementation, launching and monitoring - which is also the main elements of a typical life cycle of business processes. Assumption is that the processes should be continuously improved on to ensure their accuracy, the ability to better achieve its goals. The are many advantages, despite a solid effort required to implement and maintain such an approach.

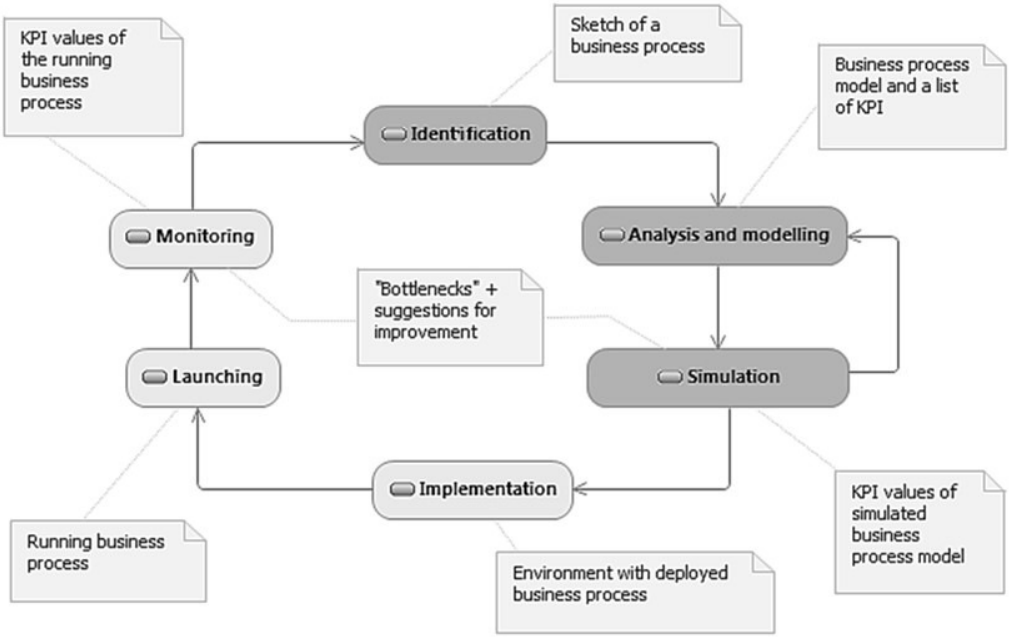

Fig 1. Schema of "business process model" life cycle. Source: own preparation.

According to BPM notation, every step is so called process (at the top level) and subprocess (the subordinated levels), which leads to decomposition to more complex model with more specific tasks. Main area of our interest is judicial criminal proceeding, which is the second step. Figure 2 shows its diagram at a higher level.

It begins with the bill of indictment by the prosecutor. The case documents, especially indictment, are then verified by the president of the Criminal Department. This step is a complex subprocess called "Indictment verification" during which formal verification is performed and reporting judge is chosen.

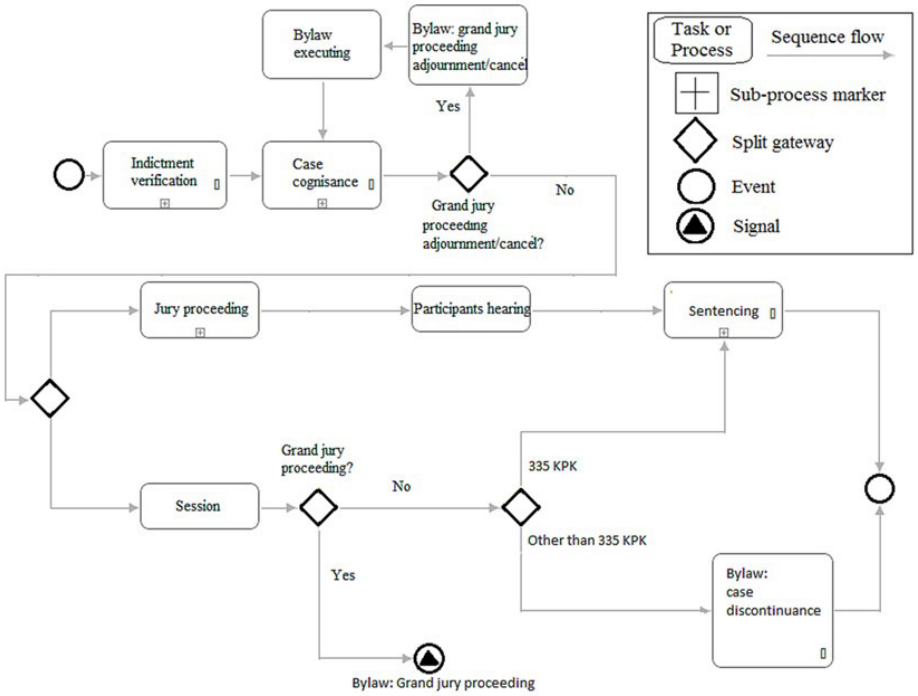

Fig. 2: The first (higher) level of judicial criminal proceeding. Source: own preparation.

If any formal problems with indictment occurs, subprocess called "120 KPK" (120 paragraph of the Code of Criminal Procedure) is started, which means all formal defects should be resolved by prosecutor or indictment will be rejected. After "Indictment verification" step is completed the reporting judge has all the case files. In the next step, which also is subprocess, these documents are verified by judge and decisions including use of detention for the accused, discontinuance of the proceedings or going for trial are made. Depending on this decisions next steps are trial or session concerning the discontinuance of the proceedings (from which case also can go to trial step or sentencing step). Like steps before, trial is also a complex subprocess with multiple different paths, but unlike them it cannot be supported by BPM system. The last step, which is also subprocess, is sentencing. It is quite complex because events such as appeal or objection can occur. Diagram in Figure 1 may not look as complicated as the judicial criminal proceeding really is. In fact, there are four levels of subprocesses and some of them are executed more than once. For example diagram for process "Indictment verification" contains fourteen tasks and more than ten alternative paths. What more, two of those tasks are complex subprocesses. One is mentioned earlier, "120 KPK" step and the other one is complaint handling process. Both are used many times in further steps of judicial proceeding process. That is the most complex and time consuming part of this process. One of the main goal of modelling and simulation is to verify what is the impact of pessimistic paths on time of execution and cost of whole judicial proceeding. The analysis of procedural activities in a criminal department of a district court has finished with number of such diagrams, which became the basis for the design of computer support system, quantitative analysis and optimization.

To model, analyse and simulate criminal process we can use formal models and methods dedicated for analysis of complex operations (processes, projects). Following models and methods it may be considered: queuing theory, CPM (Critical Path Method), PERT (Program Evaluation and Review Technique), GAN (Generalized Activity Network), GERT (Graphical Evaluation and Review Technique). Each of them has advantages and disadvantages, for instance CPM and PERT methods have limitation to acyclic structure of projects and, in general, they are deterministic.

In this paper we propose to use a method based on stochastic model of the complex activities where time-dependency could be modelled using a stochastic PERT model. As a complex activities we understand operations that contain many related actions. Relations between actions mean a time sequence and reflect influence of one action on the another. Looking at "120 KPK" step and the other one is complaint handling process. Both are used many times in further steps of judicial proceeding process. Complaint handling is particularly complex. It contains seventeen tasks and more than twelve different paths and, what causes most problems, loops (decisions made during complaint handling also may be subject to complaint). We define complex activities as the following network $S_p=\langle G,\Phi,\psi\rangle$, where:

- $G=\langle A,E\rangle$, G –Berge's graph without loops:
  - A – set of graph nodes, where a node is related to one *action* of complex activities, $A=\{a_p,1,2,..a_k\}$; nodes represent some tasks that should be completed in order to obtain assumed effect;
  - E - set of graph edges – edges define the time and causal sequence of actions;
- $\Phi=\{f\,|f:A\rightarrow R\}$ – family of functions defined at graph nodes;
- $\Phi=\{\tau_{min}, \tau_{max},\tau_p\}$ is defined by:
  - the shortest time needed to complete tasks connected with action *a*;
  - the longest time needed to complete tasks connected with action *a*;
  - the most probable time needed to complete tasks connected with action *a*;
- Ψ – family of functions defined at graph edges.

Similarly to a research study by Najgebauer et al (2018) time duration of a path from the node *i* to the node *j* (the length of this path) can be computed as a sum of times $\tau_E(a)$ for subsequent nodes of the path and $\tau_E(a)=1/6*(\tau_{min}(a)+4\cdot\tau_p(a)+\tau_{max}(a))$. Further, based on this assumptions the following (and others) characteristics are computed:

- Expected duration of the tasks leading to the achievement of the node (action);
- The earliest possible moment of starting the implementation of tasks leading to the achievement of the node;
- The earliest possible moment of starting the implementation of the actions leading to the achievement of the node without delaying the implementation of the entire process (the shortest time distance from the starting node);
- The earliest possible moment of completing the actions leading to the achievement of the node;
- The latest possible moment of completing the actions leading to the achievement of the node, not causing a delay in the implementation of the entire process;
- Probability of reaching the node in less than the 'worst' time, taking into account the impact of achieving the previous nodes (calculated for the worst time of the implementation of tasks leading to the node);
- Probability of achieving a node in less than 't', taking into account the impact of achieving the preceding nodes;
- Probability of reaching the node, taking into account the impact of achieving the preceding nodes;

- Variety of random variable of time needed to complete tasks necessary to reach the decision point (e.g. normal distribution).

In compliance with the model it has been developed software package to model and simulate complex activities, similarly to model processes using notation similar to BPMN. There are embedded different characteristics of complex operations.

Simulation Method for Verification of Usefulness of Automation

Criminal procedure life cycle, similarly to BPM, follows the steps outlined at Figure 1. That cycle depends on correctness of modelling and simulation as well as reliable statistics gathered during execution. Thus, there is an obligation to develop adequate software tools for simulation analysis of effectiveness of the criminal process, which will help finding reasons of problems and allow for proceeding optimization. Generally, we focus on problems such as congestion, the high cost and delay of procedures elimination or reduction of "bottlenecks" in processes, suggestion of redefinition and reorganization processes as well as the time and resources saving, etc. Although simulation is very suitable the formal way is adopt hybrid models and methods: stochastic PERT with queuing theory and discrete-event agent-based simulation. Finally, the simulation method has been applied for verification of usefulness of proposed automation. Moreover, during the experiments the simulated events and resources (people, tools) are integrated with real devices in order to gather data about their reliability and performance.

The Pert package has the basic classes responsible for the creation and calculation of network functions/characteristics (described in nodes and arcs). Characteristics are positive real numbers representing time and probability. It contains methods dedicated to, among others, detecting cycles in the graph, searching for the shortest and longest path, calculating the time of starting and ending the activity and estimating the probability of successful completion of the activity (defined as a node). Both known algorithms (Dijkstra algorithm, Depth-first Traversal) as well as heuristic algorithms, which are our own elaboration, were used.

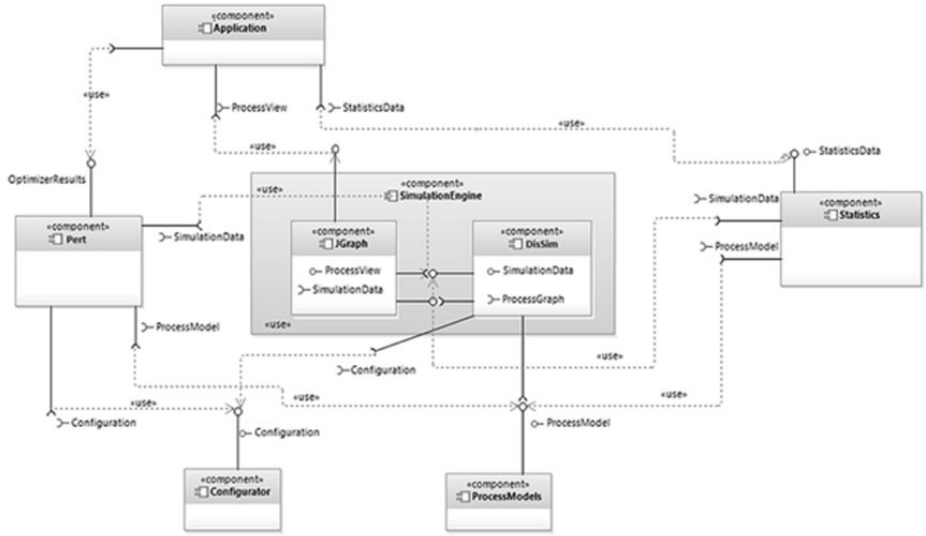

Fig. 3: The structure of simulation software package. Source: own preparation.

The original Java-based discrete simulation software package (named *DisSim*) has been developed in order to facilitate creating constructive simulation software – both discrete and quasi-continuous as well as hybrid. DisSim is "light-weight" solution, which are built from the scratch and customized to the needs of the end users. DisSim is an object paradigm based package and consequently, the basic entity is an simulation object with its attributes.

Similar objects create classes. At any time *t* of the simulation time each measurable feature of the criminal process is represented by an ordered quadruple: <*object, attribute, value, time*>. For each object class there are defined: the state vector with attributes and either the events or periodically executed equations that change the values of attributes (and finally a state of the process).

ProcessModels package contains generic models of heterogeneous devices that is the crucial part in building application for criminal procedure simulation. The key feature of the software is the ability to change object's behaviour and to modify actions of the process without changing any compiled line of code (even during running simulation). We propose the way based upon Groovy/Python scripts and DisSim classes to serve them. These highlighted reasons prevailed for the decision to use the original DisSim package in order to implement simulation models specified for criminal procedure domain. Each modelled component is independently constructed by a dedicated factory whose member is the script interpreter. By changing the script's contents it becomes possible to alter device's behaviour without changing programme code. The package simulation forms some kind of library the content of which is successively developed (new models of devices, new behaviour algorithms).

Following action "120 KPK", we should emphasize that almost every decisions made during judicial proceeding may be subject to complaint, what increases complexity of whole process dramatically. Steps responsible for handling defects and complains might be performed in other parts of judicial proceeding - they form so-called pessimistic paths. That is the most complex and time consuming part of this process. One of goals of modelling and simulation is to verify what is the impact of pessimistic paths on time of execution and cost of whole judicial proceeding. However, the main goal is to optimize process operations in such a way as to minimize delays, shorten queues of pending cases and reduce the number of human errors.

The other issue, which many courts face, is limitation on providing rapid access to court documents. Process automation helps reducing the amount of time and manpower required to perform repetitive tasks. The success of software algorithms of robots depends on the correct and high-performance operation of the supportive devices. After deep analysis it has been proposed to implement QR-code and RFID tags for documents. The tagged document does not differ much from a traditional document – in the case of QR-code it is small rectangle while the size of the RFID tag is getting smaller to approximately 10 square centimeters. The flow of paper documents in courts is connected with the registration of many important legal records or personal documents, judgment, statements, administrative decisions, etc. Even though traditional documents notably frequently replaced by electronic equivalents, paper is still required from the formal point of view. The main issue concerning the examination of the characteristics of the document flow processes is to define the capacity and reliability properties on the support system implemented in the courts. Especially, in preparatory proceedings at initial phase of the criminal procedure where time plays a major role. The equipment necessary for the correct identification and management of tagged documents are as in a research study by Pierzchala et al (2017): entrance sluice with the RFID antennas, cabinets with the RFID antennas, reading tunnel, tray reader and dedicated software integrator. The entrance sluice registers the document in/out flow, the cabinet with the RFID antennas is specialized storage space for the documents required during criminal procedure. Both the reading tunnel and the tray reader is used for registering tagged documents.

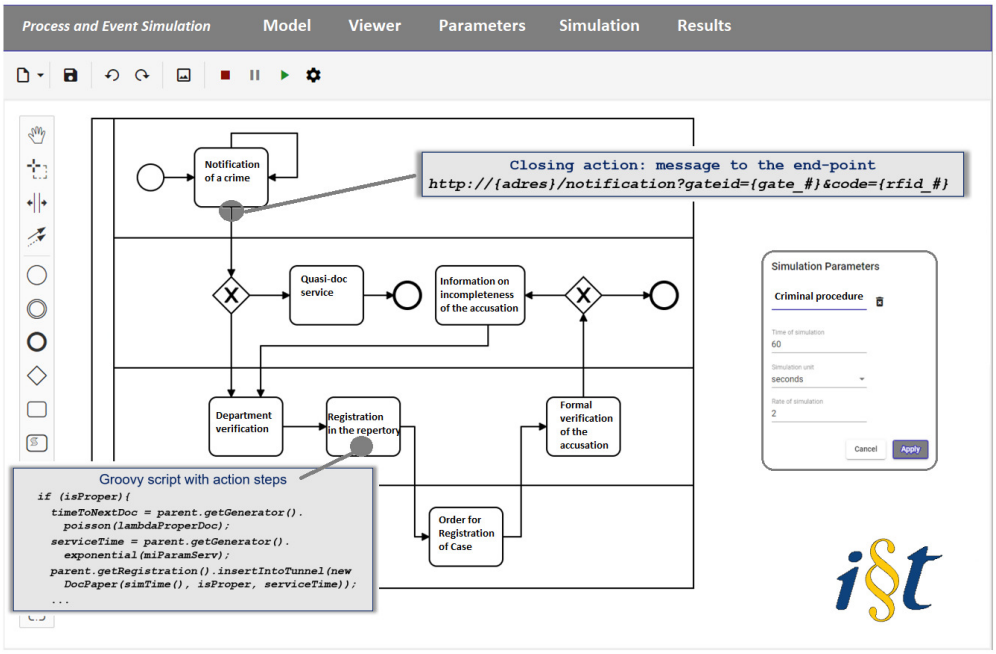

Fig. 4: The of simulation software package GUI. Source: own preparation.

In the real circumstances, the examination of such complex environment (people, procedures, devices and prospective automation robots) would be time consuming. From a statistical point of view, it would take "many many" days to collect a sufficiently numerous set of data as well as significantly varying court cases. Carrying out a series of simulation experiments allows to collect dataset and finally to estimate the statistics on: queues before service nets, partially and completely realized tasks, resource usage, bottlenecks, expected delays or probability of completeness of a case in a given time. The time inside the developed simulator can flow at a rate of 1:1 with astronomical, or it can be repeatedly accelerated, therefore the simulator can immediately imitate thousands of the events related to the documents' inflow and events related to documents' flow between court's offices. Each event generate a message directed to the server in the form of XML with the coded information about action performed on a document. The Groove scripts simplify creating messages and sending them to the target end-point of the service on the server. Simulation experiments are conducted based on scenario which describes types of events (types of actions in court), duration of actions, period between events and sequences of related events. Every simulated queue of documents is modelled in a form of a group object with a discipline (e.g. FIFO) and a theoretically unlimited capacity (in practice: the maximum value a computer can achieved). A station inside a simulated queuing network represents a person (judge, clerk, chairman, secretary) and is modelled as an simulation agent characterized by a random service time (a random variable with value set by software random generator of any distribution). It is very important that the parameters are not homogeneous in time. It conducts towards a multidimensional stochastic process consisting of the events (understood as a state change in the simulation model). In a simulation experiment a number of requests to a court with a given distribution of interval is generated and the random path executions of each criminal case are simulated. Thus, the software generators of pseudo-random numbers were implemented. In order to adequately create random values, a set of empirical distributions were created (after the measures have been taken in the court). Subsequently, the Bayesian network was built to reflect the complex relationship between the submitted cases and the duration of actions.

Conclusion

The Polish criminal procedures creates very complex processes and there is provided with modern IT limitedly. The requirements, such as elimination all reasons that might weaken the access of citizens to judiciary system, as well as make hard to keep the guarantee of "equality before the law", are consistent with the principles of Industry 4.0. We propose two-way analysis of the criminal procedure: modelling and simulation of the process (which forms the

basis for measuring and assessing an effectiveness) and robotic process automation based on QR Code and RFID equipment.

The simulation method has been applied for verification of usefulness of proposed automation. During the experiments the simulated events and resources are integrated with real devices in order to gather data about their reliability and performance. Increase the effectiveness of criminal justice is possible via changes in both organizational and procedural way, as well as through the IT technologies supporting the processing of information at any stage of a criminal proceeding. There is very crucial to treat automation as a powerful solution, however using carefully in a right way.

Finally, the rules of criminal procedure are constantly evolving thus in contrast to most of existing simulation tools the proposition has a capability to modify simulation events or activities with programming Groovy scripts even after building a closed ready-to-use software.

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Knowledge-Based Engineering Approach for Facilitating Weld Design with The Support of Machine Learning

Tudor George ALEXANDRU
Politehnica University of Bucharest, Bucharest, Romania, alexandru_tudor_imst@yahoo.com

Bogdan Marian VERDETE
Politehnica University of Bucharest, Bucharest, Romania, verdetebogdan@yahoo.com

Abstract

Nowadays, the development of new structures is carried out by reusing the engineering knowledge that is encompassed in virtual prototypes. To facilitate this process, most recent product development software benefits from a wide range of parametric design capabilities. From this perspective, a cross-linkage can be achieved between various disciplines, allowing engineers to adjust full scale projects by modifying desired specifications. Even so, such capabilities are limited when designing welded connections, considering the rigid boundaries of Computer Aided Engineering simulation models. To overcome such issues, the present paper proposes a new approach that makes effective use of machine learning for improving the modeling of engineering knowledge. At first, a sensitivity study is conducted on a specific welded structure. By adjusting candidate parameters, the mechanical behavior of the assembly can be evaluated. The results achieved are stored in a dataset that is further used to develop regression models based on neural networks. To this end, a generalized structural behavior is achieved, allowing engineers to predict the performances of welded joints without explicitly updating simulation models.

Keywords: Weld Design, Simulation, Machine Learning

Introduction

In the book published by Bennett (2013), electric welding is regarded as one of the most widespread fabrication processes, whereby two or several metallic parts are fused together at their original boundary surfaces by means of heat, pressure or a combination of both. In all major industrial fields, welded joints represent critical locations in the load path of an assembly. From this perspective, Piscan et al (2012) highlights the need for a careful evaluation of the static and dynamic criteria to ensure the safe and reliable operation of such structures. A recent study by Dubovska et al (2014) emphasizes the proliferation of weld design modules in most virtual prototyping software to assist engineers in deciding the optimal technological parameters. Such tools also benefit from knowledge-based systems technologies, thus allowing the cross-linkage between design disciplines. In this regard, the drawings that resemble welded joints are completed with the support of Computer Aided Design (CAD). On the other hand, the transfer of the resulting continuous models to Computer Aided Engineering (CAE) analysis systems is described in Kiani et al (2015). The process is deployed for evaluating the mechanical behavior of the structure at both junction and assembly levels. Parameters belonging to the two different environments can be interconnected as part of Product Lifecycle Management (PLM) systems. Furthermore, the paper by Nosenzo et al (2014) brings into discussion the advantages of using metamodeling as a convenient way of linking the resulting set of parameters with other sources of knowledge (i.e. economical evaluation or sustainable product development software). Even so, the effective parameterization of CAE simulation models for welded assemblies represents a challenging perspective. This is mainly due to the tight requirements of the mesh generation process, whereby even minor changes to the location of the nodes or the number and types of elements can cause high stress peaks and subsequent singularities. From this perspective, the cross-linkage of the disciplines associated to the weld design process is limited to the modeling and capture of engineering knowledge, the reuse of CAE simulation models demanding most of the time additional user input. To overcome such issues, the present paper proposes a Knowledge-based engineering (KBE) approach that makes effective use of machine learning for predicting the mechanical behavior of welded assemblies by learning and generalizing from sensitivity studies. In the first stage, a set of candidate parameters that influences the behavior of welded joints is chosen. A range of design points is decided for analyzing the influence of these parameters on the static or dynamic behavior of both parts and their junction area. The results are stored in a dataset that is further used for developing a machine learning regression

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model. A case study regarding the weld design of an electronic enclosure from the heavy equipment industry is completed to prove the given concepts.

Knowledge-based engineering in Weld Design

Any KBE approach comprises three layers of abstraction: knowledge modeling, capture and reuse. The implementation of such concepts in weld design is achieved at a minimal level by interconnecting CAD and CAE environments. In this way, the modeling of knowledge is carried out by defining the parameters that are governing the definition of the geometry in conjunction with the specification of the welded joints. The resulting model is further transferred to CAE environments, being used as a reference for developing the mathematical representation of the load paths. In this stage, the initial set of geometric parameters are correlated with specific simulation ones, allowing CAD-CAE cross-linkage. In the next stage, the knowledge captured is stored at enterprise levels, allowing its successful reuse in future projects (Figure 1).

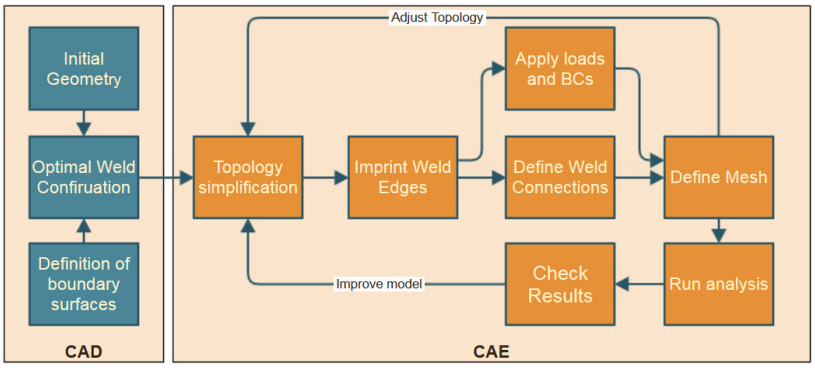

Fig 1. A holistic overview of KBE in weld design

The process involves the definition of the boundary edges based on an initial 3D model of the assembly. In these locations, a detailed representation of the optimal weld configuration is achieved. A set of parameters is defined to allow the adjustment of the geometry and subsequent weld specifications. The resulting model is transferred to the CAE environment. In this stage, the topology is simplified to facilitate the definition of assembly connections by imprinting the edges of the welded joints. The definition of the mesh is completed in the next stage to divide the continuous model in smaller domains by discrete elements. This step represents an essential one in all CAE projects, demanding most of the times several topology adjustment loops. Loads and Boundary Conditions (BCs) are applied to materialize the behavior of the assembly during its life cycle. The resulting digital representation of the simulation model is transferred to a solver. In accordance with the analysis type, the solver assembles the equilibrium equations of the problem and generates result files that are further interpreted for verifying the integrity of the structure. Improvement loops are conducted if errors are identified in the simulation model. In contrast with the CAD environment, the CAE one is characterized by several adjustment and improvement loops. From this perspective, the correlation between mesh and geometric parameters is limited, considering that a single mesh approach satisfies a single weld connection definition. Figure 2 – a illustrates an idealized scenario where two plates are linked together by a bar which materializes a spot welding area. When adjusting geometric parameters such as the thickness of the plates, the number of welded points increases or decreases. In this case, two scenarios are the most common: the distortion of the nodes found in the proximity of the bar to accommodate another one (Figure 2 – b) or the addition of elements to increase the number of nodes and allow the connection to be satisfied (Figure 2 – c).

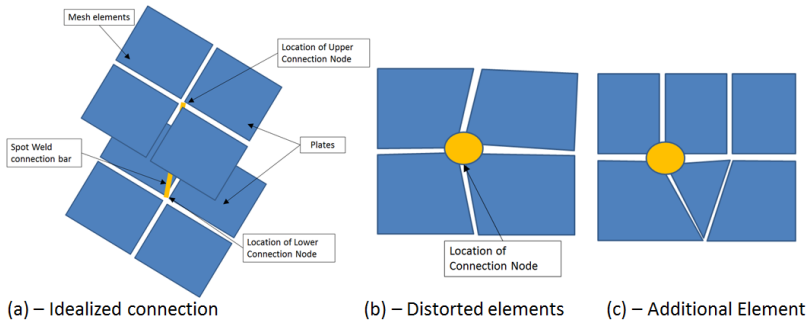

Fig .2: Limiting aspects of weld connection adjustment

In any of these cases, the quality criteria of the elements found in the junction area is impacted. This results in a different stiffness behavior of the weld connections. Subsequently, unsatisfactory results can be achieved. From this perspective, KBE in weld design is only limited to the storage of CAD - CAE models.

Proposed Approach

The proposed approach consists of 5 stages that support the knowledge modeling process. Their description is performed below:

• *Definition of candidate parameters:* in this stage, a selection of geometric parameters is performed by considering those having a significant influence on the mechanical behavior of the welded joints and subsequently, the entire assembly. For example, the length of a part influences the welding pitch, which has a direct consequence on the load distribution in the structure. In accordance with the mesh generation strategy, the selection of parameters can be distinguished as flexible (or parameters that have no influence on the number of elements or position of the nodes) and rigid ones (or parameters that cause the initial mesh to change).

Identification of rigid parameter rules: once rigid parameters are adjusted, user input is required in the CAE environment to fix mesh issues. Even so, such corrections can be accomplished within specified ranges. For example, increasing the number of spot weld points up to a certain value can be completed with a single update of the mesh.

• *Sensitivity study:* the aim of the sensitivity study is to identify the relationship between the candidate parameters and the mechanical behavior of the assembly. For example, a gradual decrease of the thickness of the welded parts results in an increase of the stress in the junction area. As a consequence, the safety factors of the assembly decreases.

• *Dataset development:* the results of the sensitivity study are stored in a dataset comprising the candidate parameters as features and the results of the sensitivity study as labels (or regression targets). Feature normalization is applied. On the other hand, the rows from the dataset that indicate no significant increase of the labels in conjunction with the features are removed. The dataset is divided in training and validation sets for further use in the machine learning process.

• *Development of sequential regression model:* the dataset is further used for developing a neural network with a simple stack of layers with the support of a machine learning library. From the knowledge of the authors, the simplest representation of a sequential model having 2 hidden layers and using the hyperbolic activation function between them provides best results for this type of problem. The RMSprop can be used as optimizer, the typical loss function being the mean squared error.

Case Study

A case study is provided regarding the knowledge reuse for developing a lighter electronic box structure in the heavy equipment industry. For this purpose, the influence of the welded joint on the natural frequencies of the assembly requires evaluation. In this regard, the vibration modes are found in a close relationship with the changes in mass and boundary conditions. Figure 3 depicts the third vibration mode of the assembly, together with details regarding the parts and the way the junction between them is defined. The simulation model is completed using ANSYS Workbench CAE interface.

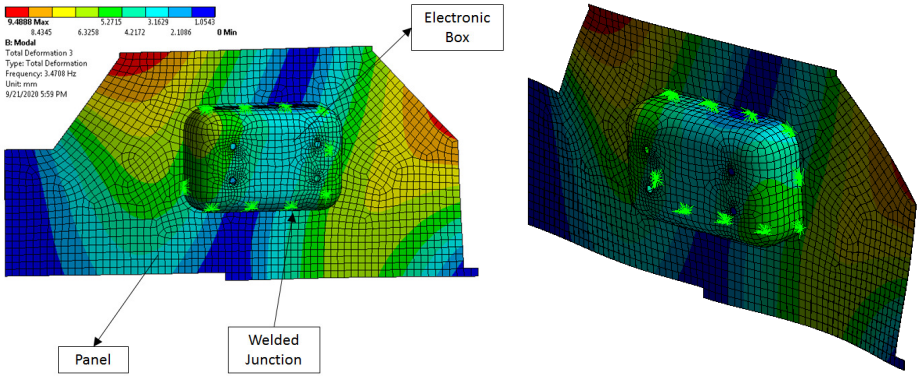

Fig. 3: Example of the 3rd vibration mode and details regarding the analyzed junction

The candidate parameters and their relationship are decided in conjunction with the requirements of the modal analysis. From this perspective, the geometric characteristics of the assembly and their subsequent weld specifications (i.e. material thickness and corresponding weld throat) have a direct influence on the mass and BCs of the structure.

In total, the developed dataset consists of 128 rows, corresponding with the sensitivity study that was carried out by adjusting the candidate parameters individually and by combining them. Manufacturability constraints were added to limit the range of possible solutions. The labels correspond to the six vibration modes of the assembly. In the next stage, the neural network was developed by using TensorFlow with Keras machine learning library. Training of the model was performed by using early stopping option to avoid over fitting. A total of 25 training epochs were completed. Figure 4 depicts the predicted and simulation frequencies for an arbitrary selection of candidate parameters. The mean absolute error of the predicted values is estimated at +/- 0.85 Hz which proves a reasonable accuracy for such types of problems.

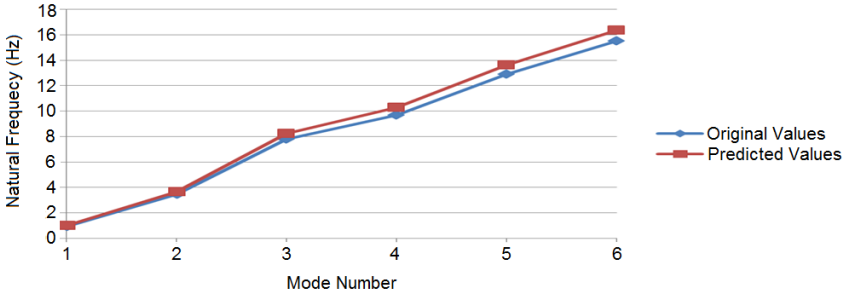

Fig. 4: The prediction accuracy of the model for an arbitrary set of parameters

Conclusions

Weld design represents an extension of virtual prototyping technologies that allows engineers to address the full scale design and simulation problems of welded parts. The process does not fully benefit from Knowledge Based Engineering approaches, considering the adjustment and improvement loops that coexist in Computer Aided Engineering environments. To overcome such issues, the present paper proposes a machine learning approach that makes effective use of results derived from sensitivity studies for generalizing the mechanical behavior of assemblies. The wide scale implementation of the given concepts involves additional stages for extending the

generalization abilities of the machine learning procedure. In this way, predictions can be performed at product rather than assembly levels.

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Study of The Effects of Mobile Phone Radiation on Human Tissue Using Infrared Thermography

Damian SIRBULESCU
University POLITEHNICA of Bucharest, Bucharest, Romania, sirbulescudamian@outlook.com

Stefan Constantin PETRICEANU
University POLITEHNICA of Bucharest, Bucharest, Romania, corresponding author: constantin.petriceanu@upb.ro

Marina DUMITRU
University POLITEHNICA of Bucharest, Bucharest, Romania, maryna6888@yahoo.com

Oana CHIVU
University POLITEHNICA of Bucharest, Bucharest, Romania, virlan_oana@yahoo.co.uk

Dan NITOI
University POLITEHNICA of Bucharest, Bucharest, Romania, virlan_oana@yahoo.co.uk
nitoidan@yahoo.com

Abstract

Paper aims to develop an effective method of objectifying the effects produced by the electromagnetic radiation of the mobile phone on living human tissues. The research hypothesis was that radiation caused using mobile telephone is not harmless and causes various effects on the human body, some immediately visible, others with long-term impact. First part of the paper presents the main short and long-term problems that this type of radiation can have. There were presented and described, using the operating parameters of the phone, the specific examination conditions and the experimental plan. Results were presented according to their relevance, respectively regimes and duration of operation, showing the objective effects it induces in human tissue. These were highlighted by visualizing of the immediate thermal effects of mobile phone radiation on the human user. In addition, the simulation showed that these effects are not only superficial but also have an impact on the brain at depths distribution of the thermal field in the area of incidence of the waves with the skin on the human scalp. In order to predict the profound effects of the temperature observed outside, the penetration that the thermal field can have through its three components encountered in its propagation was simulated with specialized software: epithelial tissue (skin), bone (skull box) and brain. It can be stated that the technique and experimental method used allow, with a very high degree of confidence, the highlighting of up to 7-8 mm.

Keywords: Mobile Phone Radiation, Infrared Thermography, Human Tissue.

Introduction

Mobile phones are the main tool for communication today. There are a lot of mobile phone types in use. The global trend is growing, which means that an increase in the number of users switching to smartphones is expected.

In most cases, a user holds the phone directly in contact with the head and earlobe. This practice can cause side effects caused by its radiation in the contact areas and adjacent areas. The health risks associated with prolonged use of mobile phones have been discussed in literature are somewhat confusing, if not contradictory. Mobile phones generally have a dual influence on human tissues, which correspond to both thermal and non-thermal models.

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Thermal effects include both the interactions of magnetic and electric fields, by the impulse transmitted by the photon to the living cell and by the reorientation of the dipoles that are formed from the substances contained in the tissues. Unlike other diagnostic methods such as mammography, radiography, tomography and other diagnostic methods, thermography does not submit the body of any stress such as radiation, pressure in contact with various materials, intravenous injections, etc. That is why it is a very comfortable procedure that does not pose any risk to human health and can be performed at any time without side effects in a research study by Bauer et al (2018). Thermography of human tissue is based on the detection of increased emissivity of the areas involved, due to its activation by electromagnetic fields, Forouharmajd et al (2018). Also, by detecting changes in blood activity, infrared thermography can identify the presence of a tumor in the early stages, whose size is not large enough to be observed by physical examination or radiography, Omranipour et al (2011). The problems related to the influence of electromagnetic fields on living beings are intensively studied and very present in the literature, but the variability of the results obtained is very high and therefore the subject creates many controversies. The results of studies made on rodent's have shown that the threshold at which exposure disrupts the learned behavior of subjects is between 2.5 and 8 W/kg SAR (specific absorption rate) throughout the body, with a temperature rise of about 1 °C. Deficiencies in the performance of a previously learned behavior occur after long-term exposure to electromagnetic fields of 2.45 GHz at SAR at an exposure of 2.3 W/kg body. The blood-brain barrier, which prevents large molecules from passing through the cerebrospinal fluid in the blood, could be susceptible to high-frequency electromagnetic fields. It has been reported an increased blood-brain barrier penetration for anesthetized rats after low exposure to 1.2 GHz pulsed or continuous wave fields, Neves et al (2015). Thermal effects are considered to be the main factors affecting the physiological processes in the human body due to the conduction of heat from other neighbor tissues, through the phenomenon of conduction, convection through the blood and radiation from the surrounding tissues, Berz et al (2007). The effect of heat on living things is not always uniform and dependent on heat intensity, stimulus duration and external stimulation environment, Hildebrandt et al (2010). Heat generation in human tissues according to the mechanisms described above, its accumulation is amplified due to the appearance of a disequilibrium between heat generation and heat dissipation. Thermal effects can cause disruption of cell function and development, Usamentiaga et al (2013).

Materials and Methods

GSM (Global System for Mobile communication) is a mobile digital network, widely used by mobile phone users in Europe and other parts of the world, Freeman et al (2005). GSM uses a variant of TDMA (Time-division multiple access) and is the most widespread of the three digital wireless telephony technologies: TDMA, GSM and CDMA. GSM digitizes and compresses the data, then sends them a channel with two other data streams, each in its own time interval. It operates in either the 900 MHz or 1,800 MHz frequency bands. HSPA (High speed packet access) is a third generation (3G) mobile broadband communications technology [8]. The term HSPA refers to two specific protocols used in tandem packet access, HSDPA and HSUPA. HSPA networks provide a maximum of 14.4 megabytes per second [Mbps] of transfer per cell. An improved version of high-speed packet access technology, known as Evolved HSPA, provides a transfer rate of 42 Mbps per cell. By using two-cell deployment and multiple inputs as well as multiple output architectures, HSPA + networks can reach a maximum speed of 168 Mbps. The International Telecommunication Union recognized HSPA + as a fourth generation (4G) technology in December 2010. For experiments he used an IPHONE SE mobile phone coupled with a wooden spacer with a thickness of 8 mm (both thermal and electromagnetically inert insulator), attached to the phone, to avoid direct contact between the phone and the person head. This eliminates the conduction of local heating of the mobile phone during operation, remaining to be observed on the human user, only hurts the thermal effects produced by the electromagnetic radiation of the antennas. During the measurements, the phone had the following services that emit electromagnetic waves: GSM 800 MHz communication service (the human volunteer was engaged in conversation), bluetooth communication service; wireless communication service, 400 mobile internet service on the frequency of 2600 MHz. Four human volunteers from the caucasian race were used in experiments, two females, two males, aged between 28 and 32 years, weighing between 68 and 85 kg and height between 1.69…1.82 m. The experimental plan involved the continuous recording of infrared thermography images of the human subject while using the mobile phone at different time periods: 0.5; 10; 20; 30; 40; 50 min. The experiment was repeated 10 times and the measured values were mediated and presented to the tables. The camera used for the recordings was the FLIR T440 type. The test took place in the non-destructive defectoscopy laboratory of the Faculty of Industrial and Robotic Engineering of the University Polytechnic of Bucharest between 17.02.2020 - 20.02.2020, 4:00 PM to 8:00 PM, in conditions of relative humidity of 57% and ambient temperature of 22 °C. The emissivity of human skin was taken from the literature between 0.96-0.98, depending on the human subject analyzed. Examination

distance 1.5 meters, the angle of incidence being perpendicular to the examined surface being ± 15 °. Of interest is the temperature difference recorded as a thermal effect on living human tissues of electromagnetic radiation. To confirm the temperature in the head area it was recorded using an electronic thermometer. With the help infrared thermography camera, the target was fixed in the same area and from the adjustment of the parameters (emissivity coefficient, reflected temperature, humidity), the aim was to obtain a value identical to the measured one. For each situation included in the experimental plan, an infrared thermography image was taken in normal incidence on the examined surface of the subject. The images were processed in the specialized software Flir Tools in order to identify the maximum temperature in the layout area of the mobile phone. Areas of investigation were drawn to cover the surface of interest and the results obtained regarding the value of the maximum temperature recorded were presented, as average values, tabular.

Results and Discussions

Specific problem that needs to be solved is to highlight the immediate effect of electromagnetic radiation on tissues, in particular the effects on mobile phone users. From the study of literature it was found that electromagnetic radiation creates the following types of effects: thermal effects (tissue heating); magnetic effects (deflection of charge, orientation of magnetic dipoles); the introduction of very low currents into the conducting tissues and into the nerve pathways (which have chemical mediators that conduct the electric current). By the infrared thermography method used in the experiments, only the thermal effects of the electromagnetic radiation from the use of the mobile phone could be observed (figure 1). It can be seen that at the initial moment, in the area of interest, marked with a circle on the image, the maximum temperature is 35.2 ℃, at 10 min there is an increase in maximum temperature in the selected area accompanied by an increase in temperature on the cheek. The subject in the phone area (lighter, white, in the image). Finally, after 50 min of continuous use, the thermal imprint of the phone can be clearly seen on the cheek, as well as the increase of the maximum temperature in the investigated area to the value of 39.9 ℃.

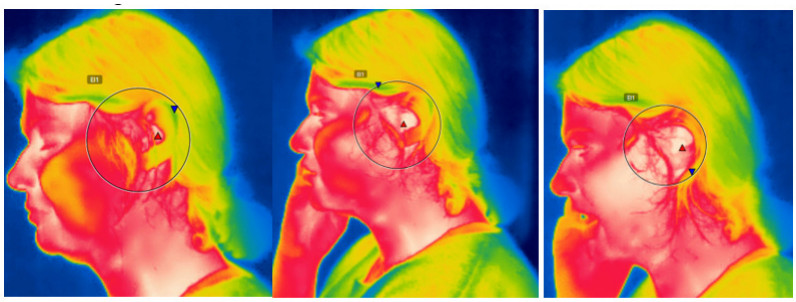

a) b) c)

Fig 1. Thermograms recorded at different time periods: a) the beginning of the experiment; b) after 10 min of use; c) after 50 min of use

The nominal results of the measurements obtained, reported as average values, are presented in Table number 1.

Table 1: Maximum average temperature recorded on the examined area

Time[min]	Maxim temperature [°K]
0	308.35 °K
5	309.15 °K
10	309.15 °K
20	310.15 °K
30	310.25 °K
40	310.25 °K
50	311.05 °K

From the graph it was observed that the highest thermal effect caused by electromagnetic radiation is recorded in the first 5 min (figure 2) of using the phone with a growth rate of 37 % followed by a constant evolution so that in the next few minutes, to make a new jump of about 29 %. In the area of use between 20 and 40 min, the observed thermal effects represent an increase of only 3.7% of the total, with practically a new landing area. Finally, the last 10 minutes bring a new increase of approximately 29% of the total increase of 2.7 °C that was observed throughout the examination period. To determine the continuous evolution of the temperature at any time t_i, the MATLAB program and polynomial interpolation were used, to approximate the intermediate values. The results obtained are shown in figure 3.

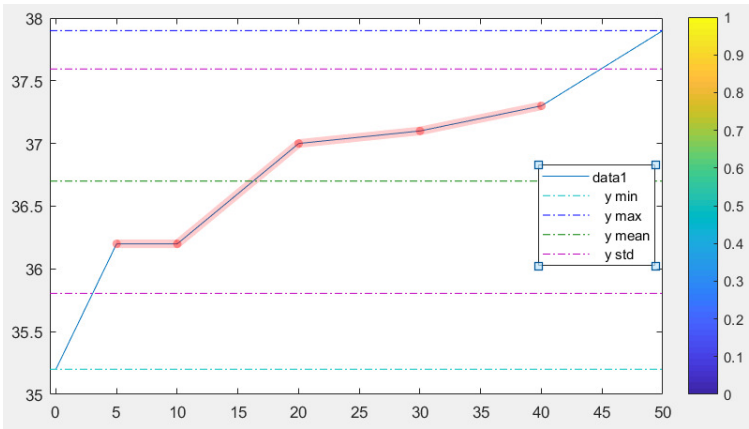

Fig. 2: Temperature change during phone use

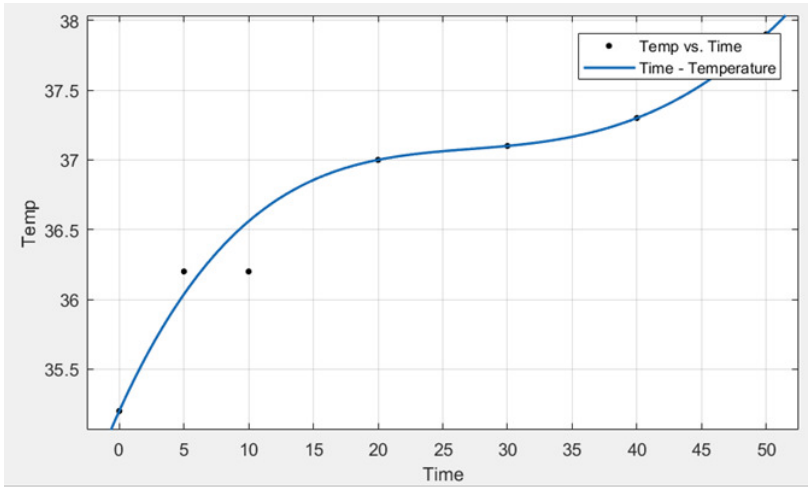

Fig. 3: Continuous representation of temperature evolution by polynomial interpolation

The effect of depth penetration of electromagnetic energy was simulated on a specialized program using finite element analysis theory. The thermal effects of electromagnetic radiation can be important at depths of up to 5-6 mm inside the skull, noting that the decrease in simulated temperature values is almost exponential (figure 4).

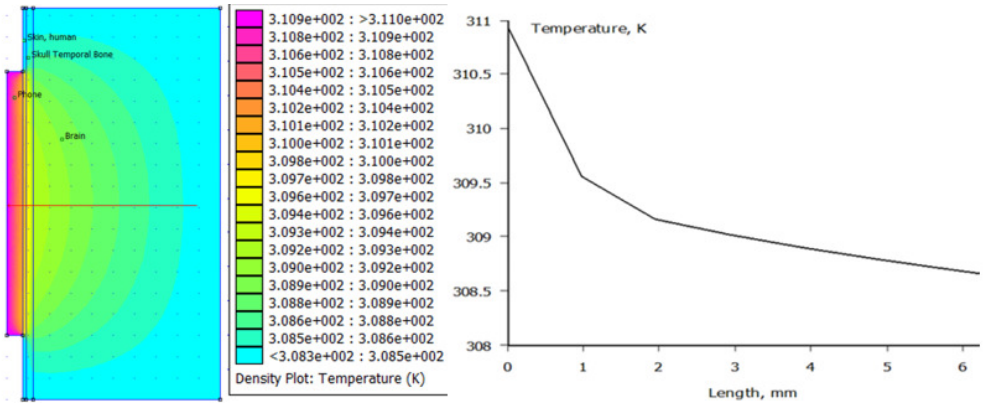

Fig. 4: Simulation of thermal effects inside the skull after 50 min of using the mobile phone

Conclusions

Through the present study, with the help of infrared thermography and using an appropriate experimental plan, the immediate thermal effects resulting from the use of the mobile phone by a human subject were observed. The way in which the surface thermal effect propagates inside the skull was also investigated, being made simulations with the help of a specialized software. It was found that the local surface temperature generally increases by a value of about 3 degrees Celsius in all subjects examined in the immediate arrangement of the telephone antennas, while the theoretical penetration of these immediate thermal effects can reach a depth of 6-7 mm inside the skull. It should be noted that this study only highlighted the immediate thermal effects of electromagnetic radiation from mobile phones, but they represent only a part of their total. For a further development of research, it can be considered to continue the study in a multidisciplinary team composed of doctors and engineers in order to present in parallel the values of physical quantities measured with pathological effects likely to occur in the medium and long term.

Acknowledgment

Include any acknowledgement right before the references section (if applicable). Also, if research was funded by an organization / institution, please write the acknowledgement here

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Performance, Economía del Bien Común y Género: Análisis Factorial para las Empresas Españolas

Amparo MASET-LLAUDES
Departamento de Finanzas y Contabilidad. Grupo FACES, Universitat Jaume I,
Castellón de la Plana, España, maset@uji.es

David CABEDO
Departamento de Finanzas y Contabilidad. Grupo FACES, Universitat Jaume I,
Castellón de la Plana, España, cabedo@uji.es

Iluminada FUERTES
Departamento de Finanzas y Contabilidad. Grupo FACES, Universitat Jaume I,
Castellón de la Plana, España, ifuertes@uji.es

José Miguel TIRADO
Departamento de Finanzas y Contabilidad. Grupo FACES, Universitat Jaume I,
Castellón de la Plana, España, tirado@uji.es

Abstract

Tradicionalmente el desempeño de las empresas ha sido valorado en función de los resultados económicos de la misma, de manera que la obtención de unos niveles de beneficios positivos y crecientes se consideraba que reflejaban el buen hacer de la entidad. Sin embargo, en los últimos años se asume que no solamente es recomendable centrarse en los aspectos puramente económicos de las organizaciones, sino que también habría que valorar cuáles son los efectos de las actuaciones de la empresa desde el punto de vista medioambiental y social. En el presente trabajo se pretende analizar el desempeño o *performance* de la empresa para un sector o grupo de organizaciones que se consideran como conscientes de los diferentes efectos o impactos generados por sus actuaciones. Son las empresas que pertenecen a la órbita de la Economía del Bien Común. El objetivo del trabajo consiste en evaluar en qué medida la *performance* de estas empresas es diferente del resto de las empresas de la economía española, y qué papel juegan en su evolución los ratios financieros más comunes, el tamaño, y el sector al que pertenecen, así como la influencia de la vertiente de género, todo ello mediante la metodología del análisis factorial.

Palabras clave: Performance, Economía del Bien Común, Género, Tamaño, Rentabilidad, Riesgo

Introducción

La evolución de la sociedad en los últimos años ha dado lugar a un incremento de la toma de conciencia de que la economía tradicional no responde a las necesidades actuales al no considerar habitualmente la evolución del entorno social y medioambiental. Como consecuencia, en varios países han ido surgiendo diferentes movimientos sociales que presentan una visión alternativa de las relaciones económicas, una querencia por los aspectos medioambientales derivados de las actuaciones de los agentes económicos y una preocupación por paliar las carencias sociales que se derivan de las actividades habituales que tienen lugar en la sociedad. Son las llamadas economías alternativas.

En este marco se sitúan diferentes modelos alternativos entre los que se encuentra la Economía del Bien Común (EBC). Este modelo sigue los criterios de sostenibilidad formulados en su día por el informe "Nuestro Futuro Común", más conocido como Informe Brundtland, que definió el desarrollo sostenible como la satisfacción de «las necesidades de la generación presente sin comprometer la capacidad de las generaciones futuras para satisfacer sus propias necesidades" (Informe [1]. Así pues, este informe permitió el cambio del objetivo básico de las economías al

[1] Informe «Nuestro futuro común» de 1987, Comisión Mundial sobre el Medio Ambiente y el Desarrollo.

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pasar del crecimiento meramente económico al desarrollo sostenible, concepto que se va a basar en tres pilares fundamentales: además del económico, pasan a considerarse los aspectos sociales y medioambientales para determinar cuál va a ser la evolución de las diferentes economías en el futuro.

La EBC va a permitir, precisamente, evaluar cuál es el desempeño de las organizaciones desde el punto de vista social y medioambiental, mediante un instrumento que permitirá a las entidades no solo determinar su situación en estos campos, sino también cuáles van a ser los aspectos a mejorar en el futuro. Este instrumento es el Balance del Bien Común (BBC), que se va a basar en la Matriz del bien común (MBC). Esta consiste en una tabla de doble entrada en la que aparecen los *stakeholders* de las organizaciones, y un conjunto de cuatro valores de la sociedad tales como dignidad humana, solidaridad y justicia social, sostenibilidad medioambiental y transparencia y participación democrática. Este instrumento nos permitirá llevar a cabo un informe valorativo del nivel de cumplimiento de cada empresa.

Tomando esto como base, en el trabajo que aquí se presenta se pretende analizar si la performance de la empresa puede afectar a la probabilidad de que una empresa pertenezca a la EBC. En este sentido se han agrupado las distintas variables que forman parte de aquella utilizando el análisis factorial previamente al estudio de dicha probabilidad, al que se ha incorporado la vertiente de género representada por el/a gerente o director/a de las empresas analizadas.

La estructura del trabajo que aquí se presenta es la siguiente: tras esta introducción, se definen la performance de la empresa, para seguir con el análisis empírico, que se dividirá en el análisis factorial, que permitirá agrupar las diferentes variables económico-financieras, en la elaboración de distintos modelos logit basados en dichos factores. En el último apartado se presentan las conclusiones alcanzadas, las limitaciones del trabajo y las futuras líneas de investigación.

Performance Y Género

A la hora de estudiar la situación económica de la empresa, es determinante analizar cuál es la estrategia más adecuada para mejorar su competitividad, situación en los mercados y eficiencia. Tradicionalmente, las medidas utilizadas para ello son cuantitativas, y se han centrado en los ratios económico- financieros de las empresas, a las que se suelen añadir otras variables que ofrecen información alternativa, tales como el tamaño de la empresa o el sector al que pertenecen.

En términos generales, la *performance* de la empresa se ha convertido en un medio que ofrece información sobre aspectos financieros y no financieros de las entidades, capturando diferentes perspectivas de las mismas, normalmente a través de variables que pueden ser extraídas directamente de las cuentas anuales de las empresas o calculadas directamente con la información ofrecida por las mismas. En la práctica, el estudio cuantitativo de la *performance* de la empresa se realiza a través de los ratios económico-financieros.

En el trabajo empírico que se desarrolla a continuación, se considera la utilización de las diferentes medidas de la rentabilidad (económica, financiera y de la inversión) como un reflejo adecuado del desempeño o *performance* de la empresa, tomando como base a Murugesan *et al* (2016), Shook (2005) y Aragón y Sánchez (2005). A estos ratios se les han incorporado una serie de variables adicionales como son el tamaño de la empresa y el apalancamiento financiero, a las que se han añadido el ratio corriente, y una variable representativa del género del gerente de la empresa (Florio & Leoni, 2017).

En el grupo de las rentabilidades se ha considerado conveniente introducir la rentabilidad financiera, a pesar de las dudas aportadas por autores tales como Bititci et al (2013) y Hagel, Brown y Davison, 2010, que señalan una serie de inconvenientes presentados por esta medida cuando se trata de analizar la performance de pequeñas y medianas empresas, en las que la rentabilidad de los propietarios representada por esta medida no es probablemente tan básica como en empresas de mayor tamaño.

A pesar de ello, puede considerarse que existe un cierto consenso sobre las medidas de la rentabilidad de la empresa que son más adecuadas para reflejar el desempleo de la misma, pero se considera que esta variable debe verse complementada con los aspectos que reflejan el riesgo de la empresa y que en este trabajo vienen representados por el ratio corriente y el ratio de liquidez de las empresas ((Sharpe, 1975; Watson y Robinson, 2002).

Sin embargo, existe una variable de aspecto cualitativo que podría aportar más información a la situación económico-financiera de la empresa, sobre todo a la hora de realizar análisis empíricos que permitan estudiar las relaciones entre las diferentes variables. Se trata de la inclusión de la vertiente de género, que aporta una nueva perspectiva al incluirla en los análisis económico-financieros tradicionales.

Aunque los efectos derivados de la inclusión de la variable género en los análisis de la *performance* financiera de la empresa no son concluyentes (Terjesen et al, 2009), su inclusión en este estudio obedece a la intención de dilucidar qué importancia puede tener a la hora de analizar la probabilidad de que una empresa pertenezca a la EBC, y si existe relación entre dicha variable y la rentabilidad y el riesgo de este tipo de empresas.

Analisis Empirico

Metodología

El objetivo del trabajo consiste en evaluar en qué medida existen diferencias entre las empresas de la economía del bien común y las empresas que no pertenecen a este grupo, respecto a la *performance* de la empresa. En concreto, si la *performance* de la empresa afecta a la probabilidad de las empresa de pertenecer a la EBC. Para ello se va a realizar, en primer lugar, un análisis factorial con el fin de agrupar las variables que reflejan la *performance* de la empresa en grupos con características comunes. En segundo lugar, se procederá a realizar una serie de análisis de regresión con el objetivo de determinar en qué medida los diversos factores hallados en la etapa anterior afectan a la probabilidad de que las organizaciones pertenezcan al grupo de empresas de la economía del bien común.

Muestra

La muestra que se va a utilizar en este trabajo está compuesta de 60 empresas. Ésta se divide a su vez en dos submuestras: por una parte, empresas que se pueden considerar como pertenecientes a la EBC, y por otra, un grupo de empresas que a partir de aquí llamaremos "espejo", dado que cuentan con las mismas características que aquellas referentes a tamaño (medido por el número de trabajadores) y sector CNAE de pertenencia. Se considera que las empresas de la primera submuestra, aunque no pueden ser consideradas como empresas sociales dado que pertenecen a distintos sectores de la economía, sí que podría considerarse que cuentan con ciertos niveles de conciencia social. Al estar dentro de la órbita de la EBC y haber elaborado un BBC debidamente auditado por un auditor del BC reconocido oficialmente, implica que sus directivos podrían ser conscientes de que los efectos de las actuaciones de sus empresas van mucho más allá de los puramente económico, considerando también las implicaciones sociales y medioambientales al encontrarse ambos aspectos reflejados en los diferentes índices que conforman la MBC, y por ende, el BBC.

Habría que señalar que las metodologías aplicadas al estudio que aquí se presenta y la validez de los test aplicados y de los resultados obtenidos se basan en una muestra de tamaño considerado pequeño a nivel estadístico, aunque se han aplicado técnicas específicas desarrolladas para muestras inferiores a 50 elementos, incluso inferiores a 30 elementos en el caso de análisis para las submuestras de tipos de empresas.

Variables

Las variables que aparecen en la muestra son las siguientes:
EBC: pertenencia de las empresas a la economía del bien común
GEN: si la empresa está dirigida por una mujer
AT: tamaño de la muestra medido por el activo total de la empresa
INCN: tamaño de la muestra medido por el importe neto de la cifra de negocios de la empresa
ROA: rentabilidad de los activos
ROE: rentabilidad de los accionistas
ROI: rentabilidad de la inversión
CURR: current ratio
LIQ: ratio de liquidez

Como puede observarse, para reflejar la performance de la empresa se han utilizado tres variables referentes a la rentabilidad de la misma (ROA, ROE y ROI), y dos variables adicionales que de laguna manera reflejarían el riesgo

de la organización a corto plazo (current ratio y ratio de liquidez). Por otra parte, del listado de variables a utilizar en el análisis, la primera de ellas (EBC) será considerada como variable dependiente por lo que no será tenida en cuenta en los cálculos realizados en el análisis factorial. También se excluirá del mismo la variable que refleja las variables que reflejan el género del director-gerente-propietario de la empresa. Por otra parte, también en este trabajo se incluye el tamaño de la empresa como uno de los determinantes de la performance, característica que se verá reflejada en las tres variables tradicionales utilizadas para medir el tamaño de la empresa: el número de trabajadores, el activo total y el importe neto de la cifra de negocios., aunque viene siendo la primera de ellas la más comúnmente utilizada en los estudios realizados sobre *management* de la empresa (Rahman, 2001).

Resultados

La parte empírica de este trabajo corresponde, en una primera etapa, a la realización de un análisis factorial con el fin de evitar posibles problemas de correlación entre las variables independientes. Si en lugar de variables usamos factores, podremos incluir todas las variables consideradas en el modelo evitando problemas de multicolinealidad.

En primer lugar, habría que comprobar si los datos a utilizar son buenos candidatos para agrupar las variables en factores y así poder aplicar el análisis factorial. Para ello se realiza la siguiente prueba:

Tabla 1: Prueba de KMO y Bartlett

Prueba de KMO y Bartlett		
Medida Kaiser-Meyer-Olkin de adecuación de muestreo		0,6
Prueba de esfericidad de Bartlett	Aprox. Chi-cuadrado	357,669
	gl	21
	Sig.	0

Fuente: elaboración propia

Como se puede observar, el valor del KMO es mayor que 0,5, y la significatividad menor del 1%, por lo que los valores que tenemos son buenos candidatos para que las variables se agrupen en factores.

La realización de una serie de análisis factoriales nos va a permitir delimitar cuáles serían los factores a tener en cuenta a la hora de utilizarlos como variables independientes en las regresiones logísticas. Estos análisis vienen reflejados en la tabla que aparece a continuación:

Tabla 2: Análisis Factoriales

Modelo	Variables independientes	Factores	Número de factores	KMO	Sig	% de varianza explicada	Muestra
1	Nº trabajadores, AT, INCN, Género, EBC, ROA, ROE, ROI, Current ratio, Liquidez, Solvencia, Apalancamiento	Rentabilidad / Solvencia (3 variables) / AT, INCN / GEN, EBC / Nº trabajadores	5	0,539	Si	81,598%	Total
2	Nº trabajadores, AT, INCN, ROA, ROE, ROI, Current ratio, Liquidez, Solvencia, Apalancamiento	Rentabilidad / Solvencia (3 variables) / AT, INCN / Nº trabajadores	4	0,591	Si	82,475%	Total
3	Nº trabajadores, AT, INCN, ROA, ROE, ROI, Current ratio, Liquidez, Solvencia	Rentabilidad / Solvencia (3 variables) / AT, INCN / Nº trabajadores	4	0,616	Si	89,773%	Total
4	AT, INCN, ROA, ROE, ROI, Current ratio, Liquidez, Solvencia	Rentabilidad / Solvencia (3 variables) / AT, INCN	3	0,619	Si	87,924%	Total
5	AT, INCN, ROA, ROE, ROI, Current ratio, Liquidez	Rentabilidad / Solvencia (2 variables) / AT, INCN	3	0,600	Si	94,050%	Total
6	AT, INCN, ROA, ROE, ROI, Current ratio, Liquidez	Rentabilidad / Solvencia (2 variables) / AT, INCN	3	0,584	Si	95,489%	Hombres
7	AT, INCN, ROA, ROE, ROI, Current ratio, Liquidez	Rentabilidad / Solvencia (2 variables) / AT, INCN	2	-	-	87,094%	Mujeres

Fuente: elaboración propia

Para determinar qué análisis factorial habría que considerar a la hora de realizar las regresiones logit, nos basaremos en los resultados obtenidos en el KMO y en el porcentaje de varianza explicada. Como puede observarse en la tabla, conforme se van eliminando variables explicativas se observa, en general, tanto un incremento en el KMO como en el porcentaje de varianza explicada. Finalmente se ha optado por elegir el modelo 5 ya que, aunque el KMO disminuye ligeramente, esta disminución se compensa con un importante aumento en el tanto por ciento de varianza explicada.

En el modelo 5 aparecen claramente 3 factores:

F1: factor que recoge información sobre la rentabilidad de la empresa
F2: factor que recoge información sobre la solvencia de la empresa
F3: factor que recoge información sobre el tamaño de la empresa

Con respecto a los análisis logit, a los tres factores considerados y que recogen información sobre la *performance* de la empresa se va a añadir la variable que refleja la perspectiva de género como variable independiente, y la variable que va a reflejar la pertenencia o no a la economía del bien común, como variable dependiente. Los resultados de la estimación de los modelos logit realizados con los factores anteriores y la variable de género, aparecen en la tabla siguiente:

Tabla 3: Análisis logístico

Variables	Modelo 1	Modelo 2	Modelo 3	Modelo 4
GEN	0,594			
	(0,838)			
F1	-9,719	-9,242	-3,180	-1,739
	(0,038)*	(0,015)*	(0,024)*	(0,030)*
F2	599,057	562,541	323,977	-0,241
	(0,052)**	(0,015)*	(0,023)*	(0,298)
F3	-16,868	-15,864	-9,447	
	(0,068)**	(0,031)*	(0,053)**	
Constant	114,674	108,073	64,610	-0,773
R2 Cox & Snell	0,645	0,644	0,593	0,334
R2 Nagelkerke	0,860	0,859	0,790	0,445
*Significativo al 5%				
** Significativo al 10%				

Fuente: elaboración propia

Como se ha comentado, las regresiones logísticas calculadas contienen las variables explicativas formadas por los factores calculados en la etapa anterior y la variable de género. Dichos factores han sido calculados ex-profeso para cada uno de los modelos considerados, que son los siguientes:

Modelo 1: regresión realizada con los tres factores y con la variable de género
Modelo 2: regresión realizada con los 3 factores y sin la variable de género
Modelo 3: regresión logística realizada solo para la submuestra de hombres (modelo 6 de los análisis factoriales)
Modelo 4: regresión logística realizada solo para la submuestra de mujeres (modelo 7 de los análisis factoriales)

A la vista de los resultados que aparecen en la tabla anterior, puede afirmarse que los test que valoran el ajuste de los modelos son en general elevados, excepto para la submuestra mujeres, que corresponde al modelo con peor ajuste de los calculados. Se trata pues de modelos perfectamente válidos a la hora de explicar la probabilidad que tienen las empresas de pertenecer a la órbita de la EBC.

Con respecto al papel que juega el género sobre la probabilidad de que una empresa pertenezca a la categoría de empresas del bien común, cabe comentar que el efecto de que el director o gerente de una empresa sea una mujer, afecta de manera positiva a la probabilidad de que una empresa se sitúe en la órbita del bien común, sin embargo, esta variable ha resultado no ser significativa.

Conclusiones

En el presente trabajo se pretende analizar si las variables financieras de las empresas, identificadas estas en grupos tales como la rentabilidad, el riesgo y el tamaño, esto es, la *performance* de la empresa, tienen algún efecto a destacar sobre la probabilidad de pertenecer al área de la EBC. Para ello se ha realizado un análisis factorial sobre una muestra de empresas que abarca tanto a aquellas que han realizado el balance mencionado, como un grupo de empresas similares llamadas espejo (por compartir con las primeras características como tamaño y código CNAE). Una vez obtenidos los factores, se han llevado a cabo una serie de análisis logit que han permitido explorar de qué depende la probabilidad de que una empresa pueda ser considerada como una entidad de la Economía del Bien Común.

A las vista de los resultados, puede afirmarse que, en general, en todos los modelos estimados, el factor que refleja la rentabilidad de la empresa afecta de manera negativa a la probabilidad de pertenecer a las empresas de la economía del bien común, así como el factor que refleja el tamaño de la empresa. Sin embargo, el factor que refleja la solvencia de la empresa afecta positivamente a la probabilidad de que la empresa pertenezca a la economía del bien común.

Una variable adicional considerada en este análisis es el género del/a gerente de la empresa, lo cual implica la utilización de un nuevo enfoque en los estudios sobre la economía del bien común, dado que no se suele contemplar habitualmente la vertiente de género en este tipo de estudios. En este sentido, cabe destacar que mención aparte merece el grupo de empresas que se encuentran dirigidas por mujeres. En este caso solamente se obtuvieron dos factores de entre todas las variables independientes incluidas en el análisis factorial: los que reflejan la rentabilidad y el tamaño de la empresa, aunque este último no ha resultado ser significativo. A diferencia de lo que ocurre con el resto de modelos, su coeficiente ha resultado ser negativo, lo que podría llevar a deducir que cuando una empresa está dirigida por mujeres, su tamaño afecta negativamente a la probabilidad de pertenecer a la economía del bien común.

Finalmente, las empresas dirigidas por mujeres, tradicionalmente tienen un mayor nivel de deudas (están más apalancadas), probablemente por la desconfianza tradicional de las entidades financieras a la hora de conceder préstamos. Como consecuencia, se trata de empresas con unos menores niveles de rentabilidad y mayores niveles de deuda.

Es decir, a modo de resumen, se podría afirmar que:

- A mayor rentabilidad, generalmente menor probabilidad de pertenecer a la economía del bien común.
- A mayor tamaño, menor probabilidad de pertenecer a la economía del bien común, excepto para el grupo de empresas con mujeres directivas, en las que no se ha considerado este factor.
- A mayor nivel de los indicadores de solvencia, mayor probabilidad de pertenecer a la economía del bien común, excepto para las empresas con mujeres directivas, en las que, a mayor nivel del factor solvencia, menor probabilidad de pertenecer a la economía del bien común.

Podría afirmarse que la *performance* de la empresa afecta a la probabilidad de pertenecer a la EBC, sin embargo el tipo de efectos sobre dicha probabilidad son más bien ambiguo, dado que los diferentes componentes tienen unos efectos diferentes(al aparecer la variables independientes con distintos signos) sobre la probabilidad estudiada. En este sentido habría que señalar que la inclusión de otras variables que reflejaran aspectos adicionales de la *performance* de la empresa, así como la realización de un análisis adicional desde el punto de vista del sector de pertenencia de las empresas de la muestra, el nivel educativo del gerente, la antigüedad de la misma, y completar el análisis de la vertiente de género introduciendo una nueva variable que refleje el género de los trabajadores y no solo del directivo/a, podrían contribuir a dilucidar con más detalle cuáles son los principales determinantes y cómo afectan a la probabilidad de pertenecer a la EBC.

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Strategies for Optimizing Ziswaf Utilization for Sanitation and Clean Water in Indonesia

Rika Yulita AMALIA[1], NURWAHIDIN[2] and Nurul HUDA[3]

[1.] University of Indonesia, Jl. Salemba Raya, No. 4, 10430, Jakarta, Indonesia, yulitarika@yahoo.com

[2]University of Indonesia, Jl. Salemba Raya, No. 4, 10430, Jakarta, Indonesia, nurwahidin@ui.ac.id

[3.]YARSI University, Jl. Letjend Suprapto No.Kav. 13, Jakarta, Indonesia, pakhuda@yahoo.com

Abstract

Sanitation and clean water are crucial because they directly relate to human health and well-being. The sanitation and clean water condition in Indonesia, especially in rural areas, is still not optimal. One of the obstacles faced in implementing the sanitation and clean water program in Indonesia is related to funding. Therefore, a potential source of funding is needed that can finance sanitation and clean water. One of these potential sources of funds is zakat, infaq, alms, and waqf (ziswaf). Also, there is an MUI fatwa that allows the utilization of ziswaf for sanitation and clean water. This study aims to determine the strategic priorities in utilizing ziswaf for sanitation and clean water from the regulator's side by using the Analytic Network Process (ANP) approach. The results of this study indicate that the priority of ziswaf utilization strategy for sanitation and clean water is the synergy between central and local governments, promotion related to sanitation and clean water, and improvement of supporting infrastructure. This research contributes to providing policy advice to parties related to the utilization of ziswaf for sanitation and clean water in Indonesia.

Keywords: Sanitation, Clean Water, Ziswaf, Promotion, Infrastructure, Synergy

Introduction

Sanitation and clean water are essential aspects of the realization of environmental health, which then impact individual health, where individual health plays an essential role in achieving prosperity. Several previous studies related to the impact of sanitation and clean water conditions on health include Andrés et al.(2017). They stated that sanitary conditions could affect the prevalence of diarrhea in children. Regarding clean water, research conducted by Komarulzaman et al. (2017) suggests that households that use tap water have a lower risk of diarrhea in children. Meanwhile, households that use open containers for water storage have a higher risk of diarrhea in children (Otsuka et al., 2019).

Poor sanitation and clean water not only affect the health aspect but can also hurt the economic aspect. Therefore, sanitation and clean water are among the issues raised in the Sustainable Development Goals (SDGs), a global development agenda agreed upon by UN member countries. Prabowo et al., (2016) stated that poor sanitation's economic losses reached 56 trillion / year. These losses include lost income due to absenteeism, decreased tourist visits, medical expenses, and raw water treatment. Besides, poor sanitation and clean water also account for a loss of 2.3% of Indonesia's GDP.

The number of destructive impacts caused by inappropriate sanitation and clean water makes the issue of sanitation and clean water not to be ignored. Then, sanitation and clean water are also closely related to the Human Development Index (HDI). Increasing the feasibility of sanitation and access to drinking water at the individual, household, and community levels can reduce community-based figures and increase life expectancy. That will indirectly affect the HDI because in calculating HDI, there is a component of life expectancy.

The condition of the feasibility of sanitation and clean water in Indonesia is still low. That can be seen based on data from the Central Statistics Agency per 2017 that Indonesian people who have access to sanitation and clean water are

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still below 100%, namely 67.89% and 72.04%. Even though in this regard, the government is targeting Indonesia can achieve 100% access to sanitation and clean water by 2019. These targets are contained in the National Medium Term Development Plan (RPJMN).
The Indonesian government, non-governmental organizations (NGOs), and various parties have made efforts to address sanitation and clean water problems. Various government programs are the Community Based Water Supply and Sanitation Program (PAMSIMAS), the Drinking Water Grant Program conducted by the Ministry of Public Works and Public Housing (PUPR), and the Community-Based Total Sanitation (STBM) carried out by the Ministry of Health. Apart from the government, similar programs are also carried out by other institutions, such as the water credit program, a micro-credit through financial institutions to improve sanitation and clean water infrastructure.

According to research conducted by Wardiha & Putri (2018), efforts to improve access to sanitation and clean water face various obstacles, including behavior, habits, public knowledge of sanitation that still needs to be improved and the economic level of the community and the availability of funds to support programs sanitation and clean water programs.

In this regard, there are potential sources of funds that can be used to improve access to sanitation and clean water, namely zakat, infaq, alms, and waqf funds (ziswaf). That is based on the fatwa of the Indonesian Ulema Council (MUI) number 001 / MUNAS-IX / MUI / 2015 regarding the utilization of zakat, infaq, alms, and waqf assets for the construction of clean water and sanitation facilities for the Indonesian people. In the fatwa, it is explained that the utilization of ziswaf for the construction of clean water and sanitation is permitted provided that there is no urgent need for the mustahiqs, and the benefits from the construction of these facilities are for the public interest.

Whether ziswaf is used for sanitation and clean water provides an excellent opportunity for Indonesia to increase sanitation and clean water for the community. Besides, the Indonesian government, represented by Bappenas (National Development Planning Agency), also supports the program to realize the SDGs goals related to sanitation and clean water. That is evident by the existence of an agreement in the form of MoU, which was signed jointly between Bappenas and various institutions related to the utilization of ziswaf for sanitation and clean water.

Therefore, the right strategy is needed to utilize ziswaf for sanitation and clean water to have a significant impact on the community in increasing access to sanitation and clean water and can produce results that are as expected.

This study aims to determine strategies that can be carried out to optimize the utilization of ziswaf for sanitation and clean water. As far as the authors observe, research related to strategy to optimize the utilization of ziswaf for sanitation and clean water is still very limited. In previous research such as that conducted by Huda et al. (2014), Alam (2018), Rusydiana & Devi (2018), and Hasim et al. (2016), the main focus is related to the factors that affect the collection and utilization of zakat, infaq. , alms, or waqf in general or with different objects of utilization. As for the research conducted by Herlinda (2018), Trijunianto (2016), Odagiri et al., (2017), and Elisa & Paul (2010), the main focus is related to factors that affect the provision and sustainability of clean water facilities government programs and their source of funds do not come from ziswaf.

This research is expected to provide benefits for various parties interested in utilizing ziswaf for sanitation and clean water in Indonesia, such as the government as a policymaker and the Ziswaf Management Institute as a direct implementing program. Besides, this research is also expected to provide knowledge and descriptions related to ziswaf for sanitation and clean water for academics or society in general.

Literature Review

Zakat, Infaq, Sadaqah, and Waqf (Ziswaf) are sources of social finance in Islam. Zakat can be interpreted as a certain number of assets required by Allah to be submitted to the rightful people (Qardhawi, 2011). The basic principle of zakat is an excess of wealth owned by a person in which rights over others, to be distributed for people in need. Then, regarding the distribution of zakat, it has been regulated in the Al-Qur'an Surah At-Taubah verse 60.

Infaq is a voluntary expenditure made by a person as much as he wants. In contrast to zakat, there is a nishab or a specific limit on whether wealth is obliged to zakat or not; in infaq, there is no nishab (Sumadi, 2017).

Almsgiving has a broader meaning than zakat and infaq. Almsgiving can be interpreted as all kinds of forms of goodness done by confirming the existence of a reward from Allah for kindness (Saprida, 2015). Almsgiving and infaq have the same meaning. The difference between the two is if infaq is closely related to the matter, while alms concerns all things, including non-material things (Sumadi, 2017).
Waqf can be interpreted as providing permanent assets for socio-religious purposes such as donating a plot of land to be built for a mosque or to be used as a public cemetery (Mardani, 2012).

Sanitation and Clean Water

Sanitation and clean water are among the goals of the Sustainable Development Goals (SDGs). Sustainable Development Goals (SDGs) is a global development agenda endorsed by UN member countries in 2015, including Indonesia (Hoelman et al., 2016).

According to the World Health Organization (WHO), the definition of sanitation is a method for collecting human feces, urine, and public waste in a hygienic manner and does not have a negative impact on human health (Huuhtanen & Laukkenen, 2006). Lapid (2012) states that a sanitation system's primary objective includes protecting human health, minimizing environmental degradation and depleting resources, and maintaining long-term social acceptance. Minister of Health Regulation No. 416 of 1990 concerning requirements and control of water quality states that clean water is water used to meet daily needs where the quality meets health requirements and can be drunk if it has been cooked. Quddus (2014) states that the requirements for clean water quality are by the provisions of the WHO, the Department of Health, or the United States Public Health Association (APHA); water suitable for human life is determined based on physical, chemical, and bacteriological quality requirements.

Ziswaf for Sanitation and Clean Water

In Indonesia, ziswaf utilization for the development of sanitation and clean water is allowed as long as it does not violate Sharia's principles. This is based on the Fatwa of the Indonesian Ulema Council (2015) Number: 001 / MUNAS-IX / MUI / 2015. The fatwa explains that the utilization of ziswaf for the development of clean water and sanitation is permitted. There is no urgent need for the mustahiq (for zakat), and the benefits from the construction of these facilities are for the public interest. Even in the fatwa, the MUI also recommended that the Amil Zakat Institution in Indonesia distribute zakat in the provision of clean water and facilities to answer the community's needs.

In the implementation of ziswaf utilization for Sanitation and clean water in Indonesia, Bappenas (National Development Planning Agency), BAZNAS (National Zakat Agency), BWI (Indonesian Waqf Board), and MUI (Indonesian Ulama Council) have also agreed in the form of an MoU to provide support. The Clean Water and Sanitation program as an effort to realize the SDGs goals related to Sanitation and clean water.

Ziswaf Utilization Strategy for Sanitation and Clean Water

Strategy comes from the Greek strategos, which means "general." Strategy in the military sense is planning and directing combat on a broad scale. In context, a strategy is the initiation of action to achieve goals more quickly (Steiss, 2003). Steiss (2003) also states that there are three essential components in strategic management, namely, strategic planning (effectiveness), resource management (efficiency), and control and evaluation (accountability). This research focuses on strategic planning to identify the best specific actions needed to achieve organizational or institutional goals and objectives.

Ziswaf utilization to improve access to sanitation and clean water facilities requires synergy from various related parties. Nurbaiti & Bambang (2018), in their research, stated that external factors that affect community participation in sanitation and clean water programs are the roles of village governments, community leaders, local governments, non-governmental organizations (NGOs).) and the assistance team or facilitator.

The utilization of ziswaf for sanitation and clean water, which involves the Zakat Management Institution (LPZ) or BAZNAS as an institution that has a source of ziswaf funds, of course, requires synergy with other parties such as local governments, communities or other Zakat Management Institutions (LPZ) so that ziswaf for sanitation and clean water can be more optimal.

Among the strategies that can be taken to improve sanitation and clean water is carrying out health promotion. Cairncross & Valdmanis (2006) stated that the promotion of hygiene practices, including the use and maintenance of appropriate sanitation facilities, is an intervention that can be carried out by the public sector. These efforts can improve sanitation and clean water access and are an appropriate intervention for the health sector. People's mindset must change so that their behavior also changes because all behavior is based on processes in people's minds, one of which is by activating their knowledge (Mosler & Contzen, 2016).

Promotion is also needed to increase ziswaf collection, a source of funds that can be used to improve access to sanitation and clean water. The optimal collection of funds will have an impact on its utilization. Hudzaifah, (2019), Zen & Setiadi, (2018) said that among the factors that influence someone to do zakat, infaq, alms, and waqf (ziswaf) is to continue to invite and the community regarding ziswaf or promotion. Nurhasanah & Suryani (2018), in their research, stated that socialization, education to the community regarding ziswaf also needs to be improved either by the government or other elements of society. That is important given the considerable potential of ziswaf in Indonesia and has a significant influence on reducing poverty.

Limited infrastructure is a problem the Indonesian people face in accessing sanitation and clean water facilities Qamaruddin et al., (2017). The infrastructure in question includes public and necessary infrastructure such as roads, bridges, and others. Bosch et al. (2013) stated that in the slum and informal settlements that accommodate the urban and suburban poor, they are often geographically isolated, unhealthy, and lack the necessary infrastructure and services. So that people cannot access clean water and proper sanitation. Besides, remote rural areas and the lack of public infrastructure and communication infrastructure often hamper assistance because it is quite expensive (Bosch et al., 2013). Therefore, infrastructure is an important matter that needs attention to improve access to sanitation and clean water.

Research Methodology

This research is a study that explores strategies related to the utilization of ziswaf for sanitation and clean water using the Analytic Network Process (ANP) approach. This type of research is a combination of qualitative (in-depth interview) and quantitative research.

The data used are primary and secondary. Primary data is obtained directly by interviewing experts, practitioners, and academics who understand the research topic. The secondary data were obtained from previous literature reviews. In research using the ANP method, the data processed is in the form of research variables from experts on the problem used as the object of research on a numerical scale.

The number of informants in this study consisted of 6 people who were experts, practitioners, and academics from various institutions in Indonesia, including Bappenas, Puskas BAZNAS (National Zakat Board), Indonesian Ulema Council (MUI), Indonesian Waqf Board (BWI), and Amil Institute Zakat (LAZ).

ANP problem solving depends on alternatives and existing criteria. Saaty & Vargas (2006) suggests that the ANP analysis technique uses pairwise comparisons of alternatives and project criteria. There are three underlying axioms. This axiom serves to prove that a proof can be seen as accurate without the need for proof. Ascarya (2005) states that the three axioms include:

1. Reciprocal. The purpose of reciprocal is where if there are two things being compared, for example, X and Y, then the importance value of X has an importance level of 6 times more important than Y. Y has an expected value compared to X, namely Y is equal to 1/6 of X.
2. Homogeneity. This axiom states that there is not too broad a difference between the criteria being compared. Because if the comparison is too large, it can have an impact on more significant misjudgment. The ranges used in ANP are 1 to 9.

Table 1: Numeric Rating Scale Table

Definition	Intensity of Importance
Equal Importance	1
Weak	2
Moderate Importance	3
Moderate Plus	4
Strong Importance	5
Strong Plus	6
Very strong or demonstrated importance	7
Very, very strong	8
Extreme importance	9

Source: Saaty, 2006

3. Each criterion and component used in a hierarchical network framework or feedback can represent the existing conditions.

The research process in the ANP method is divided into three phases, namely the model construction phase, model quantification, and synthesis and results in the analysis (Ascarya, 2005), which can be described as follows:

1. Model Construction Phase
   This phase begins by constructing an ANP model that is compiled based on theoretical or empirical review literature. It provides questions or discussions with experts and practitioners of ziswaf for sanitation and cleans water through in-depth interviews (Ascarya, 2005). Interviews are needed to examine in-depth information related to problems in research. The construction phase of the model is the stage of developing the research model.
2. Model Quantification Phase
   The next stage of quantification of the model is to use the questions in the ANP questionnaire in the form of pairwise comparison between the criteria to find out which is more dominant and how big the difference is through a numerical scale (scale 1 - 9.5). The numerical scale used is a translation of the assessment variable. After the questionnaire is made, then the next is the survey of respondents. Respondents will be asked to determine priorities, or most have the most influence on the problem (Tanjung & Devi, 2013).
3. Result Analysis Phase
   Before analyzing the data processed, it is necessary to validate the data. Validation is done by a consistency test (Huda et al., 2017). Consistent data are those that have a consistency ratio (CR).

Results and Discussions

Based on the results of interviews and studies from various literature, it is known that the conceptual model or framework that can be formulated for ziswaf utilization strategies for sanitation and clean water in figure 1.

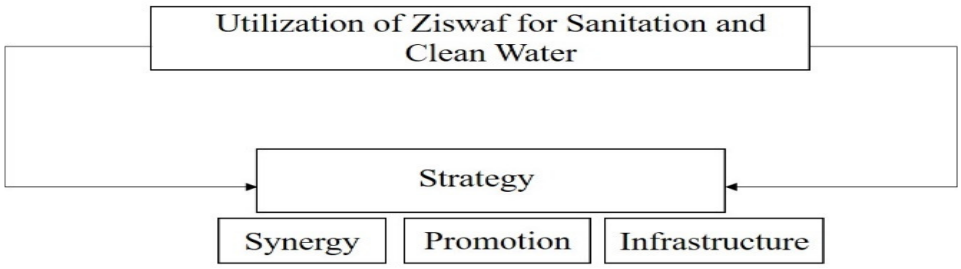

Figure 1: Conceptual Framework

Synergy from various parties, including the central government, local government, the Ziswaf Management Institute (LPZ), the Indonesian Ulema Council (MUI), and the local community, is needed in optimizing the utilization of ziswaf for sanitation and clean water. That is because the ziswaf utilization program for sanitation and clean water is a program that involves various fields, namely health, social, and religion.

Promotions related to ziswaf as sources of funds and promotions related to the importance of sanitation and clean water also need to be carried out. Ziswaf promotion is needed so that ziswaf fund collection can be more optimal so that the funds that can be utilized and distributed can be more optimal. Besides, Indonesia's ziswaf potential is excellent and influences various problems such as poverty, economy, social, and health. Likewise, the promotion of the importance of sanitation and clean water, people who know and are aware of the dangers of poor sanitation and clean water will more easily change their behavior. That will positively impact community acceptance related to sanitation and clean water assistance, which will also impact improving access to sanitation and clean water, public personal health, and environmental health.

Infrastructure is also an important matter that needs to be considered to improve sanitation and clean water access. Therefore, supporting infrastructure such as roads, bridges, and others is needed so that sanitation and clean water assistance can be more optimized.

The criteria and sub-criteria for the strategy are in the table 2.

Table 2: Criteria and Sub-Criteria

Criteria	Sub-criteria	Source
Synergy	1. Synergy between central and local governments	Informant (2019), Lubis & Latifah (2019)
	2. Synergy between Ziswaf Management Institute or Lembaga Pengelola Ziswaf (LPZ) in program harmonization	
	3. Synergy between local governments, Ziswaf Management Institute or Lembaga Pengelola Ziswaf (LPZ), Indonesian Ulama Council or Majelis Ulama Indonesia (MUI), and local communities	
Promotion	1. Organizing a national campaign for ziswaf	Informant (2019)
	2. Promotion of behavior change among vulnerable groups	
	3. Widespread socialization of the harmful impact of sanitation and improper clean water	
Infrastructure	1. Use of appropriate technology	Informant (2019)
	2. Sanitation and clean water infrastructure budget for remote areas	
	3. Improvement of supporting infrastructure	

Result of Geometric Mean and Inconsistency

The geometric mean calculation results show that all informants, on average, provide an assessment of the criteria related to ziswaf utilization strategies for sanitation and clean water with answers ranging from important to very very important (score 5-9). This shows that the informants agree or agree that the criteria and subcriteria that are compiled are relevant in optimizing the utilization of ziswaf for sanitation and clean water.

Inconsistent values from all clusters for all informants have met the criteria, namely less than 0.1 or 10%. All informants' entire inconsistency ratio value is in the range of 0.0000 - 0.0769, which is below 0.1 or 10%. That shows that the value of the inconsistency ratio is consistent. The priority weighting of the existing criteria can be used as a basis for interpreting the results of the study's analysis.

Strategies Priority Results

Based on the results of the pairwise comparison calculation, it can be seen that the priority in the ziswaf utilization strategy for sanitation and clean water is a synergy that reaches 44.91%. Then the second priority in the strategy is promotion, which is equal to 30.21%. The third place is infrastructure, which is 24.87%. That can be seen in the chart 1.

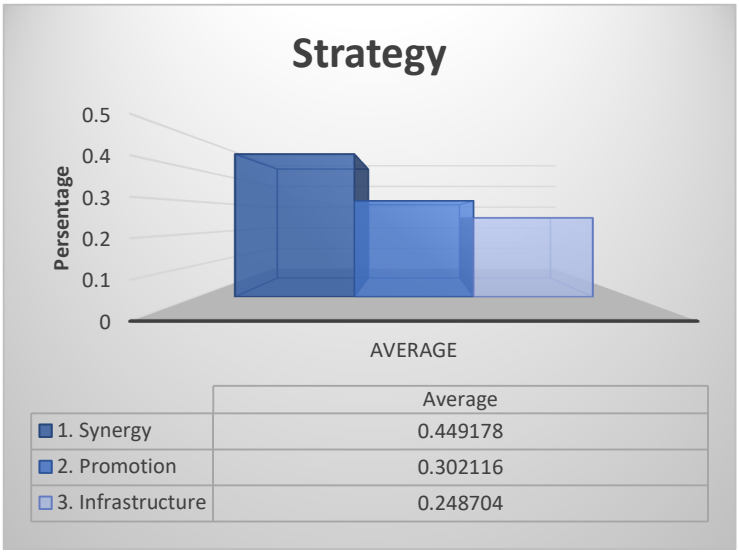

Chart 1: Priority Strategy

As for the more detailed, priorities based on the sub-criteria in the conceptual model are in the table 3.

Table 3: Priority Strategy of Criteria and Sub-Criteria

No	Criteria	Sub-criteria	Percentage
1	Synergy	1. Synergy between central and local governments	0.38918
		2. Synergy between local governments, Ziswaf Management Institute or Lembaga Pengelola Ziswaf (LPZ), Indonesian Ulama Council or Majelis Ulama Indonesia (MUI), and local communities	0.34541
		3. Synergy between Ziswaf Management Institute or Lembaga Pengelola Ziswaf (LPZ) in program harmonization	0.265408
2	Promotion	1. Organizing a national campaign for ziswaf	0.353936
		2. Promotion of behavior change among vulnerable groups	0.332114
		3. Widespread socialization of the harmful impact of sanitation and improper clean water	0.313948
3	Infrastructure	1. Use of appropriate technology	0.430436
		2. Sanitation and clean water infrastructure budget for remote areas	0.33813
		3. Improvement of supporting infrastructure	0.231432

Based on the table above, it can be seen that in the synergy criteria, the priority sub-criteria is the synergy between the central and local governments, then the synergy between the local government, LPZ, MUI, and local communities

as well as synergy between LPZ in program harmonization. In this regard, Hudaefi (2019) states that:

> "Bandung City, which is regional government regulation, has been proven numerically to realize the potential (ziswaf). So the government issued a rule that the State Civil Apparatus (ASN) in Bandung must pay zakat to BAZNAS. Finally, zakat's potential increased from say per month to less than 400 million, to three billion. It's pretty big, and we have the data on it. If we look at it from one case, yes, how to increase this potential, it must be encouraged by the local government ".

Besides, regarding local government, Hudaefi (2019) also said that:

> " Concerning practitioners, practices, all regional governments must be more aware and collaborate with the local BAZNAS. And with other stakeholders. So that the implementation of clean water and sanitation is accomplished, there must be ".

With the synergy between all parties involved in utilizing ziswaf for sanitation and clean water, the opportunity for optimal utilization of ziswaf for sanitation and clean water will be even more excellent. If the government or regulators are directly involved, ziswaf collected potential will be even more significant. That will impact the potential for more optimal ziswaf utilization, both in terms of coverage and effectiveness. Therefore, the priority strategy that must be implemented in optimizing ziswaf utilization for sanitation and clean water is the synergy of the various parties involved.

Furthermore, related to the promotion or holding a national campaign related to ziswaf, this is the following research conducted by Lubis & Latifah (2019) that the current Islamic economic movement is still partial and focuses on commercial finance only. That makes the ziswaf collection not yet optimal so that it affects the ziswaf utilization, which is not optimal either. Therefore a strategy is needed, one of which is to hold a national campaign to carry out ziswaf.

Then related to outreach to vulnerable groups and widespread outreach regarding the lousy impact of sanitation and clean water, Prihannande (2019) states that "We also approach schools, we are constantly provoking this." That shows that promotion or outreach should be carried out extensively to vulnerable groups and strategic development, such as educational institutions.

Holding a national campaign to carry out ziswaf, promoting behavior change to vulnerable groups, and widespread socialization of the adverse effects of sanitation and clean water implies that what is being done is an educational pattern. Besides, the effect of the excellent promotion will have an impact on public perceptions. It can then impact changes in people's mindset and behavior, both related to ziswaf and sanitation and clean water.

The third strategy is related to infrastructure, namely the use of appropriate technology, the need for financial support from the government for remote areas to build sanitation and clean water infrastructure. Then it is also important to improve the infrastructure to support access, such as roads, bridges.

Conclusions and Suggestion

After all stages of the research have been carried out, it can be concluded that the priority strategy related to the utilization of ziswaf for sanitation and clean water is synergy. There is a synergy sub-criteria between the central government and regions, the synergy between local governments, LPZ, MUI, and local communities, and synergy between LPZ in program harmonization.

Based on the results of the research that has been done, the suggestions or recommendations of this study are

1. It requires synergy from various parties such as the central government, local communities, and institutions related to ziswaf for sanitation and clean water. Besides, increased promotional activities related to sanitation and clean water or the utilization of ziswaf for sanitation and clean water. It is also necessary to improve supporting infrastructure facilities so that ziswaf distribution for sanitation and clean water for people in need can be done quickly.
2. This study has many limitations; one of them is a scope of research that is too broad, not specific in an area. The output of this study only describes in general, does not accommodate or describe specific problems or solutions, considering Indonesia is a vast country diverse regional cultures, and each region has its character. Therefore, in subsequent studies, it is recommended to research the same theme in a specific area.

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Job Characteristics and Cyberloafing Among IT Professionals: Mediating Role of Work Stress

Beata BAJCAR

Wrocław University of Science and Technology, Wrocław, Poland
beata.bajcar@pwr.edu.pl

Jolanta BABIAK

Wrocław University of Science and Technology, Wrocław, Poland
jolanta.babiak@pwr.edu.pl

Abstract

The aim of this study was to investigate the relationship between job characteristics in terms of job demands and resources, work stress, and cyberloafing among Polish information technology (IT) professionals. We gathered data in an online self-report survey from 426 IT employees. The results indicated that Polish IT workers engaged in cyberloafing at a moderate level. Likewise, they reported low to moderate level of job demands, higher than average job resources and work stress level as below average. Our findings further demonstrate that job demands and resources relate to cyberloafing directly and *via* stress-related symptoms. Specifically, job demands (i.e., work pace, quantitative and cognitive demands) and job resources (i.e., influence, justice, and employee mutual trust) were directly related with cyberloafing. Quantitative and cognitive demands, and job resources (i.e., meaning at work and possibilities for development) were related to cyberloafing through stress symptoms. Our study explains potential mechanisms underlying the relationship between specific job characteristics and cyberloafing among IT professionals and contributes to the growing body of research on cyberloafing as a stress coping strategy. The current results suggest that in order to maintain employees' well-being, human resources managers shall address job characteristics, which may intensify work stress and cyberloafing.

Keywords: cyberloafing, job characteristics, work stress, psychological well-being, IT professionals.

Introduction

In this paper we intend to explain a potential mechanism underlying the relationship between job characteristics identified as job demands and job resources, intensity of stress symptoms, and cyberloafing among Polish IT professionals. We present a hypothetical model depicting various links among the selected variables, which we will next have verified empirically. In the Introduction, we present all analyzed phenomena we and explain the relationships between them: We will have focused on (1) cyberloafing, its prevalence and potential impact for organizations, work and well-being or employees, (2) stress as commonplace job attribute, and (3) job characteristics in terms of job demands and job resources. Further, in the Method section we present the study methodology, procedure, relevant variables and measures, as well as the measurement model followed by pertinent statistical analysis. Next, in the Results section we will have described in detail the results of the analysis. Lastly, the elaborate Discussion, together with practical implications and study limitations, and Conclusions will have been presented.

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Cyberloafing at work

One of the contemporary problem organizations are highly concerned with is wasting company resources due to overuse of the internet and mobile technology for non-work activities. The misuse of cybertechnologies, called cyberloafing is defined as "voluntary acts of employees using their companies' Internet access for non-work-related purposes during working hours"; and "a counterproductive work-place behavior resulting in production deviance" (Lim, 2002; p. 677). Another term "cyberslacking" is used as the extension of typical counterproductive workplace behavior that involves distraction and putting off work to 'surf the Internet' for non-work purposes (O'Neill et al., 2014). Individuals engage in cyberloafing irrespective of the organization type or job position, simply because they have access to multiple information technology devices to engage in these behaviors (Mercado et al., 2017). According to AMA 2019, nearly 45% employees admitted to use internet as the number one medium to waste time at work (email, IM, online polls, interactive games, message boards, chat rooms, etc.) and engage in cyberloafing for one to two hours daily. Cyberloafing apparently disturbs efficient use of organizational resources, which ultimately may result in decreasing the competitive status of the organization (Liberman et al., 2011), and can cost organizations as much as $85 billion dollars (Zakrzewski, 2016).

Since the advent of new technologies organizational systems have been forcing intense time and effort demands on employees, who often are connected to their employers 24/7. They get equipped with devices that enable them to stay online, and be ready to act whenever employer decides it is necessary. This hyper-connectivity may blur the purposes of using new technologies (Kuschnaroff and Bayma, 2014). In other words, the boundaries between time at work and time off work are not clear any more. Thus, cyberloafing might not even be recognized by employees as a genuine problem or they diminish its seriousness through neutralization technique (Cheng et al., 2014; Lim, 2002).

Research demonstrates that cyberloafing may be considered as work distracting activity that undermines timely task completion and goal achievement (e.g. O'Neill et al., 2014) as well as a form of counterproductive work behaviors (Lim, 2002; Mercado et al., 2017) that negatively impact job performance (Liberman et al., 2011; Sao et al., 2020). Other research indicates that heavy internet use or cyberloafing serves as a coping strategy to alleviate work stress (Henle and Blanchard, 2008; Lim and Chen, 2012; Quinones and Griffiths, 2017). Work-related negative affect, stress, fatigue, emotional exhaustion and burnout may result in browsing activities, social networking or gaming as a respite from these negative experiences. It appears that cyberloafing as a stress relief strategy helps to protect or recover weakened resources when employees experience frustration and distress at work. Relationship between cyberloafing and stress is by no means straightforward. Cyberloafing may also become a source of stress-related consequences, such as low satisfaction, frustration due to unfinished tasks, distraction, and even ill health (e.g. Kim and Christensen, 2017).

Job characteristics in the IT industry

According to the Job Demands-Resources (JD-R; Bakker and Demerouti, 2007) model, job characteristics were divided into two fundamental categories: demands and resources. Job demands are defined as those features of the job that involve continuous physical and psychological effort associated with physiological and psychological burden (Schaufeli, 2017). Examples of job demands are workload, pressure for professional development, role conflicts or job insecurity. Job demands may lead to burnout and consequently to lower workability health-related absenteeism, or lower job engagement. Job resources relate to job aspects that increase the likelihood of achieving work goals, help to develop professionally, and reduce negative effects of job demands. Examples of job resources include job autonomy, organizational justice, management and peer support. Job resources can lead to higher job satisfaction, work engagement, or great job performance (Bakker and Demerouti, 2014). The JD-R model has been acknowledged as a theoretical and practical framework that explains mechanisms underlying relationships between job characteristics and negative work outcomes like counterproductive work behaviors, as well as positive outcomes, such as high job performance (Balducci et al., 2011). Literature is not consistent in explaining how job characteristics related to cyberloafing. There are accounts of work underload (Hensel and Kacprzak, 2020; Metin et al., 2016; Pindek et al., 2018), role ambiguity and role conflict (Henle and Blanchard, 2008), emotional demands (Quinones and Griffiths, 2017), and workplace aggression (Andel et al., 2019) that relate to cyberloafing. Other predictors of cyberloafing from job resources include job autonomy (Metin et al., 2016;

Mercado et al., 2017), opportunity for development (Metin et al., 2016), meaningfulness at work (Jia et al., 2013), organizational injustice (Kim et al., 2016; Lim, 2002), and trust (Liberman et al., 2011).

The exploration of the relationship between different job characteristics and cyberloafing seems to be exceptionally important for information technology (IT) profession (Kim and Christensen, 2017; Salanova et al., 2002). Research have suggested that IT profession abounds in a variety of job demands. These include high pressure to keep up-to-date with new technological developments, fluctuating requirements, work overload, role conflicts, as well as low autonomy and fairness of rewards. Accumulation of these demands may lead to experiencing high stress at work and burnout (Koay et al., 2017; Maudgalya et al., 2006; Shih et al., 2013; Shropshire and Kadlec, 2012; Syrek et al., 2013). Studies also emphasize ill-health, negative attitudinal behavior (i.e., low work engagement, poor satisfaction) and various unproductive or counterproductive behavior such as conflicts, procrastination at work, sabotage, theft, and high turnover as an outcome of high job demands (Lim, 2002; Salanova et al., 2002; Shih et al., 2011). Therefore, in agreement with Kim and Christensen (2017) professionals are particularly at risk to engage in cyberloafing, since IT job is on one hand highly demanding and on the other hand relates to permanent interaction with computers, employee's autonomy and reduced monitoring from supervisors or peers. The round-the-clock access to Internet may prompt IT employees to treat cyberloafing as an effortless escape when things at work get psychologically and physiologically overwhelming. As trivial as it sounds, IT companies do acknowledge rising complexity of demands employees need to face, but also, they are highly concerned with rising cyberloafing activity, which may undermine IT workers' job performance.

Present Study

To the best of our knowledge, there research on job characteristics and cyberloafing among Polish IT professionals is sparse. Therefore, we aimed at identifying job characteristics (i.e. job demands and resources) and work stress among Polish IT professionals, as well as the extent to which they engage in cyberloafing. Following the JD-R model (Bakker and Demerouti, 2014), the assessed job characteristics were considered as three categories: (1) job demands, (2) task resources, and (3) organizational resources (Berthelsen et al., 2017). Drawing on the previous findings, we assumed that in the Polish IT organizational environment job characteristics in terms of demands and resources as well as cyberloafing would be determined as high. The second aim of this study was to investigate the association between job characteristics (i.e. job demands and resources) and cyberloafing, as well as the mediating role of work stress in this relationship. The hypothesized model of tested relationships is presented in Fig. 1. We expected direct negative relationships between task and organizational resources and cyberloafing (H1). Next, we hypothesized that associations between job demands and cyberloafing are positive and are mediated by stress symptoms (H2).

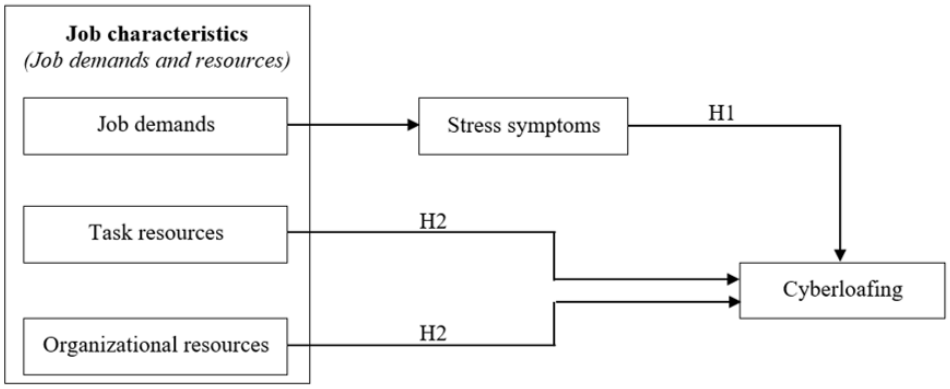

Fig. 1. Hypothetized model of the relationships between job characteristics, stress symptoms, and cyberloafing.

Method

Participants and Procedure

The sample consisted of 426 IT professionals from Poland, employed as programmers (48%), software developers (24%), network, database or web administrators (22%), and other IT job positions (6%). There were 153 women and 273 men, aged from 25 to 55 years. The employees' mean work experience was 9.65 years (SD = 9.74). Participants have been recruited via e-mail using a snowball procedure from Polish (47.7%), international (38.5%), and own companies (13.2%). The study was conducted online and respondents participated anonymously and voluntarily, and provided informed consent before they completed all self-reported measures.

Measures

Job characteristics. In this study we used the Copenhagen Psychosocial Questionnaire (COPSOQ II; Pejtersen et al., 2010) in the Polish adaptation (Baka, 2019) to measure various job characteristics in terms of job demands and resources (Bakker and Demerouti, 2014). Following Berthelsen et al. (2017) recommendations, we measured: (1) *job demands* (i.e., work pace, quantitative demands, cognitive demands and emotional demands, role conflicts, job insecurity), (2) *task resources* (as influence, possibilities for development, variation, meaning at work), (3) *organizational resources* (i.e., justice, mutual trust between employees, trust regarding management, recognition), and (4) *stress symptoms* (i.e., stress, burnout, somatic and cognitive stress symptoms). All subscales consisted of 3 or 4 items. Each of these subscales consisted of 4 items on 5-point scale (1 – *very little* to 5 – *very much*) or on the scale (1 – *at all* to 5 - *all the times*). The reliability of these measures in this study were satisfactory (Cronbach α = .69 - .85).

Cyberloafing. Participants' cyberloafing was measured with the 4-item subscale of the Polish version of the Procrastination at Work Scale (PAWS; Metin et al., 2016). An example item is "I do online shopping during work hours". Items are scored on a 7-point Likert scale ranging from 1 – *never* to 7 – *always*. The internal consistency of the cyberloafing measure in this study was acceptable (alpha = 0.78).

Results

Job characteristics, work stress, and cyberloafing among IT professionals

First, we examined the level of IT job characteristics among IT professionals. As shown in Table 1 and Fig. 2, IT job demands were perceived by Polish workers as below average, whereas task and organizational resources were assessed as higher than average. Polish IT professionals have reported various stress symptoms as below average. The t-test results showed significant gender differences in cyberloafing, in all task and organizational resources, and two job demands (i.e., cognitive demands and role conflict).

Table 1: Mean and standard deviation for cyberslacking and job characteristics among IT professionals

	Total sample ***N* = 426**		**Women** ***n* = 153**		**Men** ***n* = 273**		***t*(424)**
	M	***SD***	***M***	***SD***	***M***	***SD***	
Cyberloafing	3.44	1.32	3.25	1.20	3.51	1.38	-1.97*
Job demands							
Quantitative demands	2.77	.72	2.83	.73	2.73	.71	1.36
Work pace	2.29	.65	2.25	.55	2.32	.69	-.54
Cognitive demands	3.31	.53	3.24	.53	3.34	.53	-1.79
Emotional demands	2.78	.59	2.82	.55	2.75	.60	1.19
Job insecurity	2.24	.77	2.31	.79	2.21	.77	1.33
Role conflicts	2.29	.85	2.44	.93	2.22	.79	2.52*
Task resources							
Influence	3.17	.73	3.01	.72	3.25	.72	-3.18**
Possibilities for development	3.62	.86	3.46	.86	3.70	.84	-2.68**
Variation	3.29	.84	3.20	.87	3.31	.83	-1.79
Meaning at work	3.53	.92	3.37	.95	3.62	.90	-2.58*
Organizational resources							
Mutual trust between employees	3.67	.80	3.44	.74	3.78	.82	-2.27**
Trust regarding management	3.72	.79	3.46	.75	3.84	.78	-2.63**
Justice	3.42	.81	3.10	.72	3.57	.82	-3.13**
Recognition	3.61	.88	3.33	.84	3.75	.86	-2.61**
Stress symptoms							
Stress	2.42	.84	2.57	.75	2.35	.88	1.40
Somatic stress symptoms	1.81	.77	1.92	.75	1.76	.78	1.10
Cognitive stress symptoms	2.13	.79	2.14	.71	2.13	.83	.10
Burnout	2.68	.89	2.64	.81	2.70	.93	-.37

Note. $^{*}p < .05$, $^{**}p < .01$.

As depicted in Table 1 and Figure 2, men declared higher tendency to cyberloafing than women. Compared to men, women declared higher level of role conflicts, and perceived their work as less cognitively demanding. Men perceived influence, possibilities for development, variation, and meaning at work as higher than women did. Moreover, there were significant gender differences in the perception of availability of organizational resources. Compared to men, women assessed that trust in coworkers and in management, recognition, and organizational justice were lower. Also, men tended to engage in cyberloafing more often than women. However, we did not find significant differences between men and women in respect of job demands and stress-related responses.

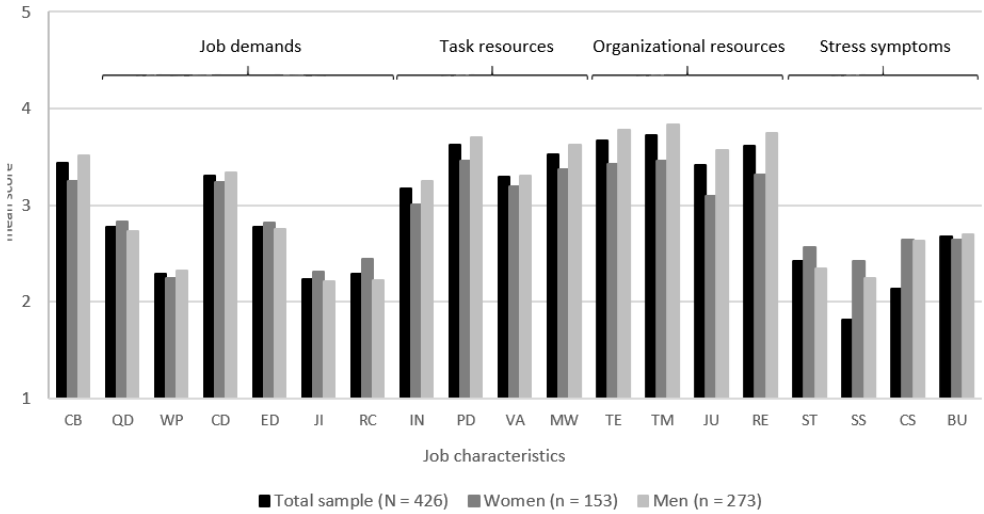

Fig. 2. Differences in cyberloafing and job characteristics between women and men.
Note. CB = Cyberloafing; QD = Quantitative demands; WP = Work pace; CD = Cognitive demands; ED = Emotional demands; JI = Job insecurity; RC = Role conflicts; IN = Influence; PD = Possibilities for development; VA = Variation; MW = Meaning at work; TE = Mutual trust between employees; TM = Trust regarding management; JU = Justice; RE = Recognition; ST = Stress; SS = Somatic stress symptoms; CS = Cognitive stress symptoms; BU = Burnout.

Effects of job characteristics and work stress on cyberloafing – mediation model

In the next step we ran the two multiple linear regression analyses in order to determine the predictive power of demographic variables and job characteristics on work stress symptoms and cyberloafing (Table 2). In the first step we entered sex and age as demographic variables, and in the second step we introduced all job characteristics. Age, but not gender, turned out to be a significant predictor of cyberloafing among IT workers.

Within job demands, work pace, quantitative and cognitive demands were significant predictors of stress symptoms and cyberloafing. Moreover, influence, trust regarding management, and organizational trust (as job resources) were significantly associated with cyberloafing. In addition, stress, burnout, and cognitive stress symptoms have shown significant, but weak relationship with cyberloafing. There were no effects of the remaining demands (i.e., emotional demands, role conflicts, job insecurity), work organization and job content aspects (i.e., possibilities for development, variety, meaning at work), and organizational resources (i.e., mutual trust between employees and recognition) on cyberloafing.

Table 2: Effects of job characteristics on stress symptoms and cyberloafing

	Stress symptoms				Cyberloafing			
	β	***se***	**β**	***se***	**β**	***se***	**β**	***se***
Gender	-.06	.37	-.01	.34	.09	.67	.05	.66
Age	-.20*	.07	-.26**	.07	-.19*	.13	-.23**	.13
Work experience	.32**	.09	.34**	.08	.13	.16	.14	.16
Job demands								
Quantitative demands			.30***	.26			.28**	.51
Work pace			.04	.26			-.23**	.50
Cognitive demands			.26**	.27			-.20**	.52
Emotional demands			.08	.26			-.06	.45
Job insecurity			-.03	.25			-.03	.47
Role conflicts			-.12	.26			-.06	.49
Task resources								
Influence			-.05	.26			.23**	.48
Possibilities for development			.17*	.23			-.03	.48
Variation			.15	.15			.04	.28
Meaning at work			-.19**	.24			.03	.46
Organizational resources								
Mutual trust between employees			-.12	.29			-.20**	.57
Trust regarding management			.05	.37			-.12	.71
Justice			-.02	.33			.26**	.64
Recognition			-.02	.26			.11	.50
Stress symptoms								
Stress							.03	.58
Somatic stress symptoms							.09	.59
Cognitive stress symptoms							.20**	.57
Burnout							.18*	.53
F	2.69*		7.81***		1.20		4.39***	
R^2	.03		.35		.01		.28	
ΔR^2			.32				.27	

Note. $N = 426$. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

In the next step, on the basis of regression analyses results we have developed a structural model, in which all significant predictors of cyberloafing were included. The job characteristics, in terms of demands and resources, as predictors and stress symptoms as a mediator in the prediction of cyberloafing have been patterned. Therefore, the empirical model consisted of nine observed variables (job characteristics and cyberloafing) and one latent variable with four stress-related variables)[1]. This model was tested using the maximum likelihood estimation method, with AMOS software (IBM SPSS AMOS 24.0). According to Kline (2011), the model is well fitted to the data, if fitness parameters meet following criteria: χ^2/df is between 2-3; root mean-square error of approximation (RMSEA) is below 0.08, standardized root-mean square residual (SRMR) is near 0 whereas comparative fit index (CFI), Tucker-Lewis index (TLI), goodness-of-fit index (GFI), and adjusted goodness-of-fit index (AGFI) are above 0.90. The results of this analysis indicated that the measurement model provided an excellent fit to the data (χ^2= 81.93, df = 37, χ^2/df= 2.21, RMSEA = .070, SRMR = .046, CFI = .96, TLI = 0.96, AGFI = .97). All path values between variables are statistically significant.

[1] Due to high intercorrelations between stress-related variables (above .60), we decided to include them despite non-significant effects on cyberloafing.

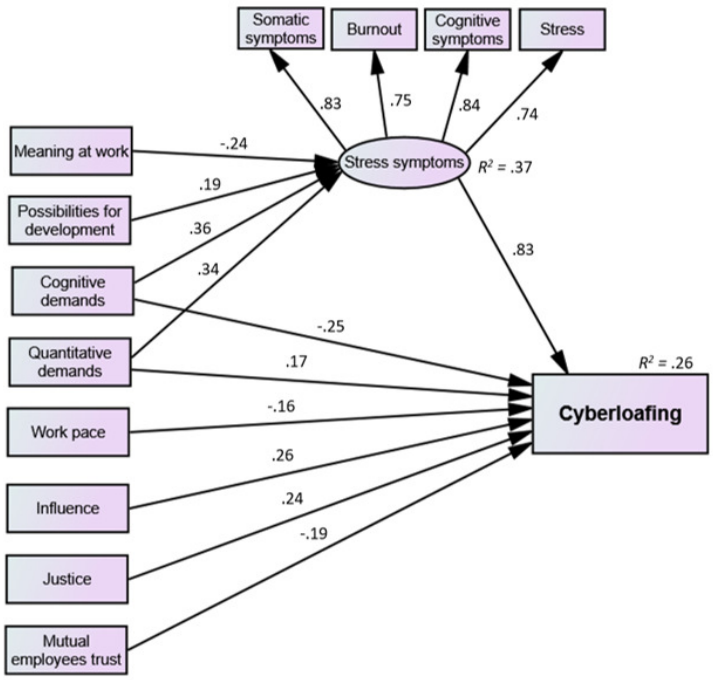

Fig. 3. A structural model of the relationships between job characteristics, stress symptoms, and cyberloafing among IT professionals.
Note. Path values are presented as standardized regression coefficients.

As depicted in Fig. 3, low work pace, low cognitive demands, and high quantitative demands (considered as job demands) were directly associated with low cyberloafing. In addition, cognitive and quantitative demands were related to cyberloafing through stress-related symptoms. In the tested model there were revealed direct associations of job resources, as high influence at work, high organizational justice, and low horizontal trust (between employees), with high tendency to cyberloafing. Moreover, we have found significant effects of task resources (such as possibilities for development and meaning at work) on cyberloafing mediated by work-related stress. All job characteristics included in the measurement model were significantly intercorrelated.

To examine the mediating effects of job characteristics on cyberloafing through stress-related symptoms, we performed indirect effect analysis using the bootstrapping method with 10,000 re-samples and 95% bias-corrected confidence intervals (BC 95% CI; Hayes, 2013). There were observed four indirect effects of quantitative demands (effect = .09, boot *se* = .04, boot 95% CI [.04, .18]) and cognitive demands (effect = .10, boot *se* = .04, boot 95% CI [.03, .19]), meaning at work (effect = -.07, boot *se* = .03, boot 95% CI [-.13, -.03]), possibilities for development (effect = .05, boot *se* = .03, boot 95% CI [.02, .12]) on cyberloafing *via* stress-related symptoms. All indirect effects are significant, because the bootstrapped CI does not contain zero (Hayes, 2013). Overall model explained 26% of the variance.

Discussion

First, we explored job characteristics, work stress symptoms, and cyberloafing among IT professionals. Our findings demonstrated that IT workers in Poland generally declared moderate level cyberloafing (i.e. non-work-related Internet use during work). However, increasing number of global and national surveys report that cyberloafing tendencies are on the rise among general population of employees, including intensive-knowledge workers and IT professionals (AMA, 2019; Hein, 2016; HRK, 2020; IT community at Poland, 2020). The latest data from amanet.org show that on average

employees spend around 2 hours on the internet for non-work activities each day. Given our results, cyberloafing phenomena among IT professionals in Poland shall be further monitored. Worth noticing and important for this study is that men were more likely to engage in cyberloafing than women, but the differences were negligibly significant. This finding is in line with previous research suggesting that men are more likely to engage in cyberloafing than women (Andreassen et al., 2012; Hensel and Kacprzak, 2020; Lim and Chen, 2012; Vitak et al., 2011).

Our results also revealed that job demands in the Polish IT industry are rather moderate. Cognitive demands were assessed by IT workers as higher than average, which resonates with a long-standing view of the complexity and dynamics of IT profession (Maudgalya et al., 2006). Polish IT workers have assessed quantitative and emotional demands as slightly below average. This result may be a function of relatively young workforce employed in the IT industry and possible high skills at handling workload and keeping emotions in check. Work pace, job insecurity, and role conflict have been declared as slightly lower than average. While perception of having a secure job corresponds with common knowledge of a good standing of IT industry in terms of employability, declaration of a lower than average work pace and role conflict seems interesting. It might be that IT professionals are used to certain high tempo at work, so they take it for granted and declare that it is just fine as it is. The lower than average role conflicts however might reflect the desire to present oneself as having things under control. In general, it seems that elevated cognitive demands are the salient challenges for Polish IT workers. There were no significant difference between men and women in the perception of job demands except of higher role conflicts among women. Task resources (i.e., development, variation, influence and meaning at work), and organizational resources (i.e., mutual trust among employees, trust regarding management, justice, and recognition) were also perceived relatively optimistically. On the one hand, it can suggest that Polish IT professionals rate themselves as not overburdened by work and with sufficient resources to draw from, on the other hand these results, again, might have been contaminated by the social desirability bias. Generally, among Polish IT professionals, women declared lower level of task and organizational resources available to them than men. These results resonate with other research, which shows that even if the knowledge and expertise is leveled between men and women, the letter feel inferior and underappreciated by their employers (e.g. Kim et al., 2016; Lim, 2002). It is thus possible that women, when faced with stressful work events, would be replenishing their resources from rather deficient reservoir in comparison to men. Lim and Chen (2012) explain these differences between men and women within the framework of conservation of resources theory (Hobfoll, 1989), which informs that resources are valuable assets for individuals. IT male professionals are considered savvier than women in the domain of cybertechnology. They can thus resort to stress-reducing behaviors through the use thereof, and replenish their resources quicker and with greater ease than women (Lim and Chen, 2012). This assumption is in line with studies informing that men's attitude towards cyberloafing is more positive than women's (Andreassen et al., 2014), and men engage in cyberloafing if it helps to reduce stress.

There is a general consensus in the literature that IT profession is marked by one of the highest levels of stress and burnout (e.g. Shih et al., 2011), and associated with increasing market pressure, ever higher time pressure, blurred boundaries between family and work life, e.g. Maudgalya et al., 2006, Shropshire and Kadlec, 2013). Interestingly, but opposite to aforementioned data, in our study Polish IT workers reported relatively low level of various stress symptoms. This corresponds to one survey reports (e.g. The Workforce View in Europe, 2019), however vast majority of findings provide data on very high stress levels among IT professionals (e.g. HRK, 2020). We think that in our study social desirability bias embracing self-deception and impression management has interfered with yielding genuine responses. Apparently in a study by (Akbulut et al., 2017), social desirability bias was positively related to cyberloafing most probably due to commonly accepted view that cyberloafing is an organizationally undesirable behavior.

The results of this study demonstrated significant relationships between job characteristics (in terms of job demands and resources), stress symptoms and cyberloafing in a structural model of direct and mediated associations. Firstly, our results revealed direct relationships between job characteristics (in terms of job demands, job resources) and cyberloafing. Interestingly, low cognitive demands and slow pace at work were directly negatively associated with cyberloafing. Possibly, when IT workers are not stimulated enough at work or pressed by deadlines they resort to cyberloafing. In the circumstances of low cognitive demands and slow tempo at work they might engage in cyberloafing for variety of reasons e.g. as a time filler, stimulation, or leisure. In fact, this explanation is in line with previous research (e.g. Metin et al., 2016; Pindek et al., 2018) and may especially be true among IT professionals, who are recognized for high intelligence, intrinsic motivation and desire to learn and develop. Our study also revealed positive direct link between quantitative

demands and cyberloafing, which corroborates with studies concluding that employees who are overwhelmed with work may engage in heavy internet use (Quinones and Griffiths, 2017). It is possible that excessive workload may yield behaviors related to retreating or escaping towards activities that are associated with pleasure or stress relief. In sum, the relationships between organizational demands and task demands and cyberloafing are not obvious and predictable. The complexity of the links between various job characteristics and cyberloafing most probably stems from the interplay between situational factors, particular profession demands, and personal characteristics. These interactions lie beyond the focus of our study; however, we find it important to address it in future research. Task and organizational resources, such as influence, justice and mutual trust between coworkers were also directly related to cyberloafing, thus partially supporting our Hypothesis 1 (H1). Influence at work directly related to high cyberloafing. This result supports Garrett and Danziger (2008) findings that cyberloafing is pretty common amongst educated managers and professionals since they are less restricted in regulating their schedules, work, and other activities. Also, meta-analysis by Mercado et al. (2017) has revealed that autonomy, a concept related to influence, has been positively related to cyberloafing. The non-work cyberactivity does not necessarily jeopardize task completion or job performance; it might as well occur for educational purposes. Perception of influence similarly to feelings of being autonomous has a potent positive effect on expert workers in terms of job satisfaction, reduced strain effects, learning motivation, and better performance (e.g. Shih et al., 2011; 2013). We would not encourage however to draw simplistic conclusions as to the relationship between influence and cyberloafing. As shown by Metin et al. (2016), autonomy was negatively correlated with cyberloafing both, directly and indirectly via boredom. Somewhat counterintuitive and in contrast with other empirical results (e.g. Kim et al., 2016; Lim, 2002), positive perception of organizational justice and cyberloafing are positively interrelated in our study. It may be that having recognized that one's effort and work outcomes are appreciated and distribution of resources is just and fair, IT professionals may feel empowered to allocate their personal resources (e.g. mental focus) into non-work activity in the cyberspace. Again, the outcome of this behavior does not necessarily harm the company as portrayed by an example of Atlassian company (Tay, 2014), which yields the most creative IT solutions when the employees are granted one day per month of control-free activity. Lastly, our study shows that low mutual trust among co-workers results in more frequent cyberloafing. Good part of a positive, up-beat and stimulating work atmosphere relates to interpersonal trust. Peer support may enhance employees' well-being (Liberman et al., 2011). The relationship presented in the current model may inform that employees resort to internet during work hours when they feel they cannot depend on their peers, for example to get help in resolving a work-related issue. In a situation of low employees mutual trust, cyberloafing may be a form of positive, quasi-professional interactions or simply a breather from the dullness of isolation experienced due to low confidence in coworkers.

Results of this study provides further insight into relationship between job demands and resources, work stress, and cyberloafing. Specifically, our findings revealed that within IT profession high job demands, i.e. quantitative and cognitive demands lead to increased stress-related responses, which enhanced cyberloafing. This result supports our Hypothesis 2 (H2). It corresponds to other findings, which showed that job demands increase stress reactions (e.g. Shih, 2011; 2013) and emphasize the key role of stress and strain in cyberloafing (e.g. Andel et al., 2019). As detailed in the IT sector reports (HRK, 2020) high stress is deeply rooted in the IT profession. Likewise, ample research confirms the relationship between stress and detrimental individual and organizational outcomes (Koay et al, 2017; Maudgalya et al., 2006; Shih et al., 2013; Shropshire and Kadlec, 2012; Syrek et al., 2013). So, for IT professionals when high workload increases distress it may provoke cyberloafing, which most probably reflects coping with stress related to cognitive and quantitative job demands. In addition, two task resources, i.e. low meaning at work and high possibilities for development were also related to cyberloafing *via* increased stress responses. Low meaning of work may create boredom and become stressful to IT professionals who are recognized for their mental agility, cleverness, and creativity. Probably, meaningless tasks lead to cyberloafing as a way of getting some intellectual stimulation or recreation. Non-mediated relationships of the same direction between job meaningfulness and cyberloafing have been earlier discovered by Jia et al. (2013), so has boredom been related to cyberloafing (e.g. Pindek et al., 2018). Possibly then, our findings indicate that when the task is low in meaning it may prod employees to engage in cyberloafing as a strategy to relief stress associated with boredom. Ample possibilities for development may also intensify stress-related responses, which then increase cyberloafing. Possibilities for development might be perceived by IT workers rather as employer's expectation to further educate and advance and as such could be subconsciously sensed as pressing demands for more highly challenging work. As mentioned earlier, quantitative and cognitive demands yield stress-related responses, which lead to intensive internet use as a way to reduce negative impact of stress (Quinones and Griffiths, 2017; Kim and Christensen, 2017). In sum, our

results are consistent with previous findings, which show that high demands and low resources may lead to cyberloafing as cyber-counterproductive reactions to stress (Balducci et al., 2011; Quinones and Griffiths 2017). Thus, stress symptoms shall be considered as influential reactions, which explain the associations of quantitative and cognitive job demands and task resources, i.e. low meaning at work and possibility for development with cyberloafing.

This study contributed to the growing body of research on the prevalence of cyberloafing in IT profession among Polish employees, specific job characteristics such as cognitive and quantitative demands, job resources in terms of possibility for development, employees mutual trust, and stress as predictors of cyberloafing. Also, worth emphasis is that we have conducted our study among IT professionals, the knowledge workers with constant access to computers who operate in a very demanding industry. Our study helps to recognize that among IT professionals not only job demands but also job resources may become a contributing factor to various forms of stress symptoms, which then may provoke cyberloafing. The results further support the stream of research, which considers cyberloafing as a form of coping and stress relief strategy (e.g. Andel et al., 2019) as opposed to counterproductive work behavior (e.g. Lim, 2002).

Practical Implications

For management practice, interesting facts arise from our findings. First not only task-based demands but also relational deficiencies (e.g. low mutual trust) may induce IT workers to engage in cyberloafing which is probably a means to diminish both, task based and relational stress. This result could serve as a valid cue for managers to embrace cyberloafing as one of the methods to maintain employees' well-being. Therefore, preventing employees from spending personal time online may be a short-lived strategy. Second, this study demonstrated that besides job demands particular job resources, such as possibilities for development may also relate to higher cyberloafing. Hence, managers shall also focus their attention on other than commonly recognized individual and organizational causes of cyberloafing. It seems that IT profession is truly a unique one in terms of perception of potential job demands. Third, there are differences in respect of the extent to which men and women engage in cyberloafing and its organizational antecedents. Since women think that task and organizational resources do not benefit them as much as they benefit men, managers shall effortfully consider these inequalities. Expert employees shall have an equal opportunity to expand their capabilities, men and women alike. These inequalities may create a tangible loss for an employer when good portion of expert workforce is not able to fully unveil its potential. It can be a difficult task for the management to disentangle the roots of stress-inducing job characteristics. In view of this difficulty, we recommend that organizational decision-makers first investigate the perceptions regarding the key aspects of the job for each employee. This could provide initial information needed to understand the reasons of cyberloafing. Then, engaging in monitoring the quality and quantity of tasks and projects assigned to the employees would help to take care of their overall wellbeing. Proactive approach in this process may include offering the tools and information to prevent the negative impact of stress, and crafting assignments compatible with each employee emotional and cognitive capacity. Particular steps that shall be undertaken by the management could include employing employee-oriented style of managing, initiating coaching sessions, supporting employees in stress-relief education, or simply assigning time for chatting. The inevitable rise of new and ever more sophisticated mobile technology shall only become yet another trigger to keep in touch with real persons and be aware of their perspective and needs to fulfill the role of valued employees.

Limitations

We acknowledge some limitations of this study. First, we used cross-sectional data to conduct our analyses. Thus, any inferences on the causal effect cannot be drawn. Future research shall employ longitudinal approach to study the linkages between job demands and job resources and cyberloafing. The universality of the results is limited. However, IT professionals in large part, work remotely for international organizations, so the study results may at least partially be used for comparison purposes. Third, this study lacks information on important behavioral measures, such as time and frequency of non-work-related activities in the workplace, which would enable to draw more comprehensive picture of cyberloafing. Also including broader set of cyberloafing behaviors would have been beneficial for deeper understanding of the phenomenon. Lastly, results of our study might have been contaminated by social desirability bias (Akbulut et al.,

2017), since responses to central aspect of IT job, i.e. stress and its components were slightly lower than average. It is a common bias among employees whenever they rate themselves on behaviors, which might be seen as inappropriate.

Conclusions

Currently, personal use of cybertechnology during work is an irreversible phenomenon. The more intense work requirements the less time and energy remains at employees' discretion to take care of simple but important personal matters (e.g. paying bills, respond to e-mails, or connecting with family members), watch news, relax, or even advance in education. However, using new technology devices may be quite alarming whenever employees abuse company's time and other resources (e.g. computers) for non-work cyberactivity. Some workers do not even acknowledge that, for example, watching adult sites during work might incur costs of legal issues, upon the costs of lost company time and productivity. Cyberloafing shall not however be perceived as entirely negative phenomenon. So far, ample research has confirmed that it may provide learning opportunities, relief from stressful events at work or mental break. Our research delivers further understanding of possible organizational and personal factors, which may predict cyberloafing. Results show that both, task and organizational demands, may directly encourage cyberloafing. Also, they may generate higher stress-related responses, which then would prompt workers to resort to cyberloafing, most probably for stress relief purposes. Our study demonstrated that cyberloafing may occur not only in relation to negative work experiences, such as high job demands and intense strain, but also when an employee enjoys influence over her job and thinks highly of company's justice standards. Inevitably the nature of cyberloafing is complex. Employers and employees shall thus acknowledge that cyberloafing may be predicted by job demands and job resources alike, and that work stress is an influential motivator to engage in cyberloafing.

Disclosure Statement

No potential conflict of interest was reported by the authors

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A Nonparametric Efficiency Perspective on the Quality of Air and Traffic Safety in European Cities

Simona - Elena GRADINARU

PhD Student, Bucharest University of Economic Studies, Department of Economic Informatics and Cybernetics, Bucharest, Romania, simonaegradinaru@gmail.com

Anamaria ALDEA

Associate Professor, PhD, Bucharest University of Economic Studies, Department of Economic Informatics and Cybernetics, Bucharest, Romania, anamaria.aldea@csie.ase.ro

Abstract

Environment, traffic, and its effects are indissolubly linked, usually evolving in the same direction: a strategy to reduce traffic effects will also entail a minimization of the impact on the environment, leading to a better quality of air. The definition and measurement of these concepts contain a note of subjectivism by the authors, all approaches being strongly influenced by the selected variables. The modern lifestyle together with the recent major geophysical events made 2010s the hottest decade recorded in history and 2010 was only the first hottest year during this period. In this context, the purpose of this study is to analyze and classify 112 European cities based on 2011 data using non-parametric techniques, investigating the situation at the beginning of 2010s decade. This paper shapes two models that follow two different dimensions (air quality and traffic safety) across two directions: output-oriented and hyperbolic. Following the efficient and inefficient classification, we benchmark the cities with the purpose of illustrating the characteristics of efficient ones and how inefficient cities should reduce the harmful impact on the environment by improving their efficiency score. The difference between the two categories of cities is mainly determined by size – a low population implies fewer cars, therefore safer traffic, and a smaller environmental footprint.

Keywords: Nonparametric Efficiency; European cities; FDH.

Introduction

Growing urbanization and mass industrialization have led to an economic growth directly proportional to environment degradation. From industries to households, every part of our society depends on energy nowadays, but most of the energy is generated by burning fuels. Therefore, people heavily harm the environment and the according consequences have started to be visible. Global warming is an alarming phenomenon worldwide and more people are becoming worried about its long-term effects.

Urban agglomerations cover the most common and complex problems: intense traffic, pollution, demographic changes, etc. The interest for this topic is rising, as the regional authorities have become aware of these issues during the last years. Planners are often struggling with the need of finding solutions to environmental and social issues while conceiving medium and long-term development plans.

The modern lifestyle together with the recent major geophysical events made 2010s the hottest decade recorded since 1880, according to the National Oceanic and Atmospheric Administration. 2010 was only the first hottest year during this period. The decade had no less than eight of the 10 hottest years ever recorded, the remaining two positions in this top 10 being 2005 and 1998. In this context, the current study has an objective to investigate the situation in 2011, considering that the impact of 2010's hottest temperature should already be noticeable during the subsequent year.

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This study aims to analyze the efficiency of 112 European cities based on 2011 data using nonparametric techniques. The models based on the situation in many urban agglomerations illustrate how European cities behave according to the two dimensions analyzed: air quality and traffic safety. Efficiency scores were obtained in R, as well as the efficiency frontiers.

Clearly, European metropolises such as Paris, London or Rome have a very harmful impact both on the environment and society. Developed cities prove serious issues not only on traffic management, but also on the quality of air, both being more difficult to control and maintain as the city size increases. In this regard, smaller-sized cities such as Basel, Geneva (Switzerland) or Münster (Germany) are leading, where any measure of minimizing the traffic or the carbon dioxide emissions has a direct and rapid harm reduction effect.

The ecological aspects of intense urbanization represent a wider field of research in the literature. With its technological advance and massive industrialization, China has been extensively analysed from an ecological point of view, even by using nonparametric DEA techniques (Zhang et. al, 2008; Yu, Wen, 2010; Huang et. al, 2014; Yin et. al, 2014; Lu, Lo, 2007). Approaches differ from using classic Banker-Charnes-Cooper (BBC) and Charnes-Cooper-Rhodes (CCR) models and Malmquist Index (Yu, Wen, 2010) to constructing more complicated functions for assessing the efficiency, but most studies only implement DEA techniques, irrespective of their nature, to classify cities, regions or provinces in China (Yin et. al, 2014; Zhang et. al, 2008).

Ecological efficiency has also been previously analysed in European cities. A recent study attempted to produce an index of scores from several DEA models that classifies 116 Italian cities whose general behaviour claims that ecologic inefficiency increases with the size of the city (Lo Storto, 2016). The same pattern was analysed for 81 provinces in Turkey considering two inputs (water resources, ecological budget) and six outputs (solid waste, number of persons using sewerage services, number of persons drinking potable water, maximum concentration of PM_{10}, maximum concentration of SO_2), integrated into different models (Üstün, 2015).

The main findings of this analysis reveal that medium-sized cities or provinces (below 1 million inhabitants) behave better than big cities and mega-cities, as larger cities have heavy industries, which drastically reduces their environmental sustainability. Gross Domestic Product growth per capita implies an expansion on the economic scale and leads inevitably to an increase in resource consumption and, implicitly, to higher pollution. But same GDP growth can lead to higher investments in research and development. Advanced technologies tend to improve pollution control and resource efficiency, leading to a higher level of environmental sustainability and to a smaller environmental footprint.

The current paper opens with a *data description* section, illustrating both the choice of variables and the dataset, continues with the *research methodology*, summarizing a few nonparametric estimators employed in the analysis, resumes further a set of *main findings* and closes with the *conclusions* to be withdrawn from this analysis.

Data Description

People release carbon dioxide through the breathing process. The bigger the city population, the higher the CO_2 emissions. But the natural carbon dioxide produced by living beings represents only a small part of total emissions, the majority being generated by burning fossil fuels for various usages, from heavy industrial processes to personal cars. Considering this assumption, a first model was built, entitled *quality of air*, whose objective is to minimize the carbon dioxide emissions.

The influence of cars on the carbon dioxide emissions raises another issue: what if the numbers of cars in a city increases at the same time with the urbanization level? Congested traffic illustrates another problem that cities and megacities are facing nowadays. With the increase in the number of partners involved in traffic, the risk of injury is also rising. On the other hand, the chances of road accidents are even greater as the infrastructure is precarious. Under these assumptions, the *traffic safety* model was proposed for the analysis, whose objective is to minimize the deaths in road accidents.

Each model requires a set of inputs and a set of outputs. Modelling the quality of air considers a single output, CO_2 emissions (Y_1), which is generated by 4 inputs: Population (X_1), Total area (X_2), Private cars registered (X_3) and Municipal waste generated (X_4). The traffic safety model uses as inputs Population (X_1), Total area (X_2) and Private

cars registered (X_3), while the output is the Number of deaths in road accidents (Y_2). All indicators were provided from Urban Audit (Eurostat database) and OECD Metropolitan database, according to year 2011. A summary statistics of the indicators is illustrated in table 1.

In the classical approach, inputs need to be minimized and outputs maximized. Both current outputs, CO_2 emissions (Y_1) and Deaths in road accidents (Y_2) cannot be maximized, as their nature is harmful. Using undesirable outputs involves either using those outputs as inputs or processing these variables through a decreasing monotone transformation to allow their maximization (Fare et al, 1989). Instead of using the initial variables Y_1 and Y_2, the monotone transformations $y_1 = 1/Y_1$, $y_2 = 1/Y_2$ respectively were used as outputs in the models previously set.

Table 1: Summary statistics

Category	*Variable*	*Minimum*	*Maximum*	*Mean*	*Standard deviation*
Inputs	Population (X_1)	166,135	9,545,591	1,008,592	1,374,139
	Total area (X_2)	18	2,654	451.6	427
	Municipal waste (X_3)	61	3,561	334.6	404.2
	Private cars registered (X_4)	57,814	2,739,129	330,398	403,329
Undesirable Outputs	CO_2 emissions (Y_1)	0.9	75.1	9.1	11.6
	Deaths in road accidents (Y_2)	1	351	28	43

Drawing the efficiency frontier requires a single input and a single output. In this regard, a dimension reduction method was performed on the dataset. We employed the approach introduced by Mouchart and Simar (2002), that avoids the curse of dimensionality, which can bias the efficiency estimators. This method creates aggregated variables, inputs or outputs, as linear combinations of the standardized variables. Principal components analysis provided us the set of weights that allowed aggregating the original inputs into a linear combination of inputs, for each model. Correlations between the aggregated inputs and the original ones are showed in table 2, proving their high dependency with the original variables.

Table 2: Correlations between the aggregated inputs and the original inputs

	Population (X_1)	*Total area (X_2)*	*Municipal waste (X_3)*	*Private cars registered (X_4)*
Aggregated input (M1)	0.938	0.826	0.937	0.840
Aggregated input (M2)	0.947	0.842	–	0.844

The analysis was performed using R version 4.0.2 (2020) and multiple packages: *stats*, *ggplot2*, *dplyr*, *FEAR*, *reshape2*, *viridis*.

Methodology

Data Envelopment Analysis (DEA) is a nonparametric technique for estimating production frontiers and a robust tool for benchmarking production units with respect to those frontiers. The concept was introduced by Charnes, Cooper, Rhodes (1978), extended by Banker, Charnes, Cooper (1984) and many others, evolved from linear programming to the probability theory and many approaches are currently under development.

Nonparametric methods have the advantage that they do not need to assume a particular mathematical form or shape for the production function. Two nonparametric estimators are available: DEA and FDH (Free Disposal Hull), both of them being robust estimators, but sensitive to outliers. Whereas DEA has a convexity assumption for the feasible production possibility set, FDH avoids this constraint, allowing only levels of input and output actually attained by individual produces.

Efficiency analysis implies an input vector $x \in \mathbb{R}_+^p$, and an output vector $y \in \mathbb{R}_+^q$. In academic literature, the *production set* is referring to the achievable combinations of input and output:

$$\psi = \{(x, y) \in \mathbb{R}_+^{p+q}, \text{where x can produce y}\} \tag{1}$$

The attainable set ψ is unknown, only a sample of units being observed:

$$\chi_n = \{(x_i, y_i), i = \overline{1, n}\} \tag{2}$$

The units that produce maximum output using minimum input are the optimal combinations, which compose the *efficiency frontier*:

$$\partial\psi = \{(x, y) \in \psi, (\theta x, y) \notin \psi, \forall\, 0 < \theta < 1 \text{ and } (x, \lambda y) \notin \psi, \forall 0 < \lambda < 1\} \tag{3}$$

which envelops the entire dataset. All decision-making units positioned along this frontier are considered technically efficient, whereas the points below the frontier are technically inefficient.

Färe (1985) proposed simultaneous changes in inputs and outputs, introducing a *hyperbolic measure of technical efficiency*, later developed by Wilson in 2011 and defined as:

$$\gamma(x, y) = \inf\{\gamma > 0 \mid (\gamma x, \gamma^{-1} y) \in \psi\} \tag{4}$$

Deprins et al (1984) suggested to measure the efficiency of a specific unit relative to the free-disposal hull (FDH) of the observations:

$$\widehat{\psi}_{FDH}(\chi_n) = \left\{(x, y) \in \mathbb{R}_+^{p+q} \,\middle|\, y \leq y_i, x \geq x_i, (x_i, y_i) \in \chi_n\right\} \tag{5}$$

Recent studies of many have extended the probabilistic approach of those estimators. This study employs nonparametric frontiers and their statistical properties as described by Simar, Wilson (2000). Suppose a random pair (X, Y) is extracted from the density $f(x, y)$ of the production set ψ, the common distribution of (x, y) can be described as following:

$$H_{XY}(x, y) = P(X \leq x, Y \geq y) \tag{6}$$

which defines the probability that decision-making unit to be dominated by another unit that produces at least the same output as , but without using a higher input than . This can be decomposed as:

$$H_{XY}(x, y) = H_{Y|X}(y|x) \cdot F_X(x) \tag{7}$$

if $H_{Y|X}(y|x) = P(Y \geq y \mid X \leq x)$ exists, where F is the repartition function $F_X(x) = P(X \leq x)$.

Thus, the hyperbolic measure of technical efficiency becomes:

$$\gamma(x, y) = \inf\{\gamma > 0 \,|HY|X(\gamma x, \gamma^{-1} y) > 0\} \tag{8}$$

The idea behind hyperbolic efficiency is to search for attainable pairs by reducing the input with γ, simultaneously with amplifying the output with γ^{-1}, those combinations being placed on a hyperbolic path.

Results

The first model follows the impact of human activity on the environment. People have a fairly large impact on the environment through their daily modern activities. As the population of a city grows, the impact on the environment will intuitively grow, consequences being largely negative. The initial purpose of this model was to minimize the amount of carbon dioxide emitted into the atmosphere, but the undesirable feature of this output required a monotone transformation (Fare et al, 1989), which has become the new output of the model.

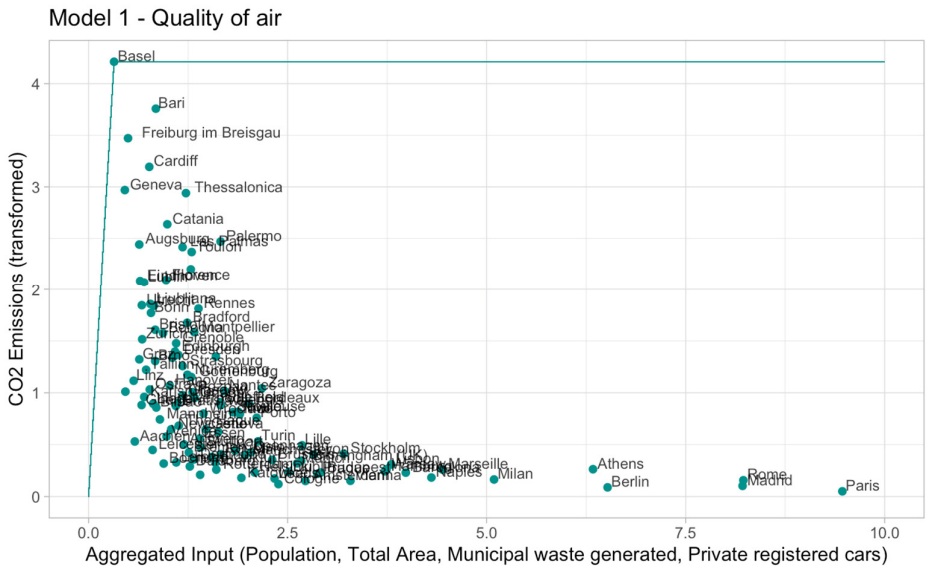

Figure 1: FDH Efficiency frontier for Model 1 - Quality of Air.

The average efficiency estimate value for model 1 is 26%, dividing the dataset in 39 low efficiency cities (35% of the entire dataset) and 73 high efficiency cities (65% of the cities analysed). The differences between low and high efficiency cities are summarized in Figure 2. The mean efficiency estimate for the first group reaches 50%, whereas for the second group it goes down to only 12%.

One could notice significant differences in both input and output variables between those two groups in Figure 2. As the city size increases (in terms of population and total area), both the amount of municipal waste and the number of private cars registered will increase. This growth generates more carbon dioxide released into the atmosphere, leading to a lower efficiency score. Also, the bigger the city, the more difficult it is to manage all its dimensions in order to minimize the carbon dioxide emissions.

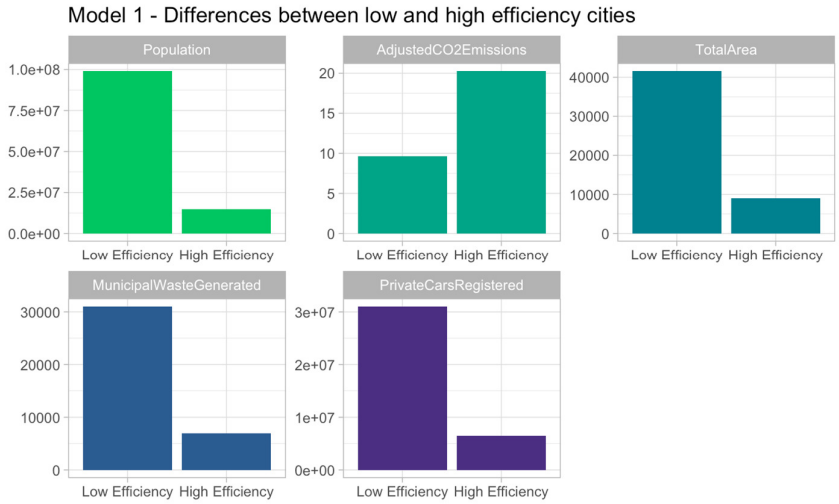

Figure 2: Summarizing differences between low and high efficiency cities in Model 1 - Quality of air.

Basel behaves extremely well considering the quality of air, being positioned on the efficiency frontier, as shown in the figure 1. In 2011 Basel was fuelled with 100% renewable energy and another Swiss city, Geneva, had the same

percentage at about 80%. In addition, Basel has the largest green roof area per capita in the world, due to numerous subsidies granted to install such roofs. These factors have a strong influence in minimizing the carbon dioxide emissions, driving Basel to be the best city according to model 1.

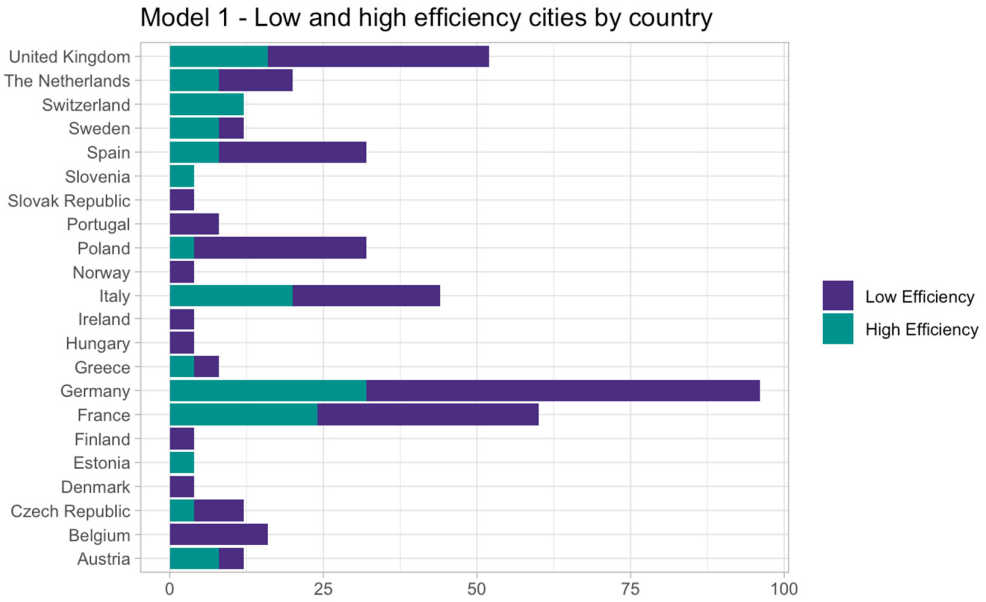

Figure 3: Distribution of high and low efficiency cities by country, based on Model 1 – Quality of air.

At the opposite pole, some of the worst quality of air cities are Berlin, Madrid, Rome, Barcelona, Hamburg, Milan, and Paris. They all have major issues in managing carbon dioxide emissions, both due to crowded population and heavy traffic. Low efficiency cities are typically large cities, generating massive amounts of carbon dioxide due to various factors. All inputs have large values for these cities, which determines low efficiency estimates, below the dataset average.

The second model, entitled *traffic safety*, emerged from the previous model which tracks the effect of people, cars and municipal waste on the air quality. When the number of cars in a city increases, traffic becomes heavier, traffic jams appear every day and traffic safety is compromised. The number of deaths in road accidents is used as a measure of traffic safety, an indicator also employed as undesirable output, similarly to the previous model.

The average efficiency estimate obtained for model 2 is about 29%, which reveals 40 cities with high efficiency and 72 with low efficiency. The average number of deaths in road accidents is only 8 for high efficiency cities and reaches 37 in the case of low efficiency cities. A lower population involves a lower number of cars and implicitly, fewer casualties in road accidents.

Basel is positioned on the efficiency frontier, with a maximum efficiency estimate of 100%. It is a city with an outstanding transport infrastructure, concerning not only the public transportation, but also bicycles and pedestrians. Its comprehensive public transportation system offers a variety of transfer connections and has a popular reputation for punctuality. Most parts of the city can be easily and conveniently reached by alternative means of transportation, leading to the conclusion that cars aren't essential here. In this context, there are plenty of households that do not own a private car.

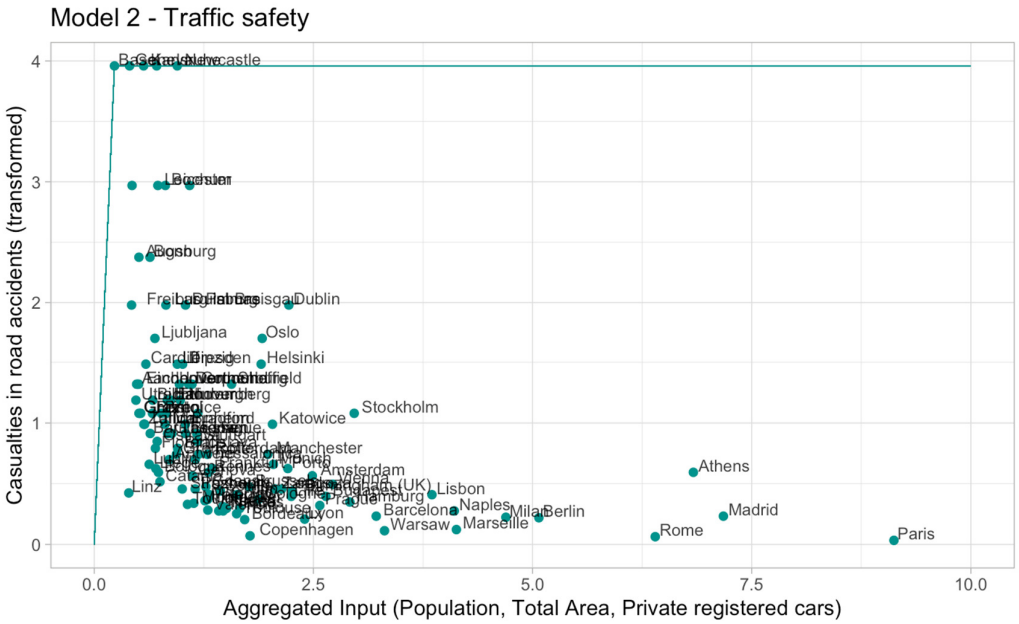

Figure 4: FDH Efficiency frontier for Model 2 - Traffic safety.

Münster and Karlsruhe are two cities from the efficiency frontier that behave exemplary. The main reason that determines the efficiency of German cities is the strict driving license system, which manages to produce very good drivers. German roads are extremely well maintained, being regularly inspected for discovering and correcting any type of irregularities. Cars are also subject to periodic and thorough inspections every two years to check and maintain their technological safety. With this context in mind, it is not surprisingly that Germany has many high efficiency cities when referred to the traffic safety model.

Figure 5: Summarizing differences between low and high efficiency cities in Model 2 - Traffic safety.

According to model 2, some of the cities with the poorest traffic safety are Berlin, Madrid, Rome, Paris, Milan, Barcelona, Hamburg, Budapest, and Naples. Congested traffic is a common issue across these megacities, which significantly decreases the traffic safety and also increases the number of casualties and deaths in road accidents. As

in the previous model, the group of low efficiency cities includes many big cities, in terms of both population and area, leading to a high number of cars, which drives a congested and unsafe traffic. The existence of many traffic arteries and many road users leads to an increase in the number of accidents, driving unfortunately an elevated number of deaths. Therefore, in such cases traffic safety is extremely difficult to achieve and monitor.

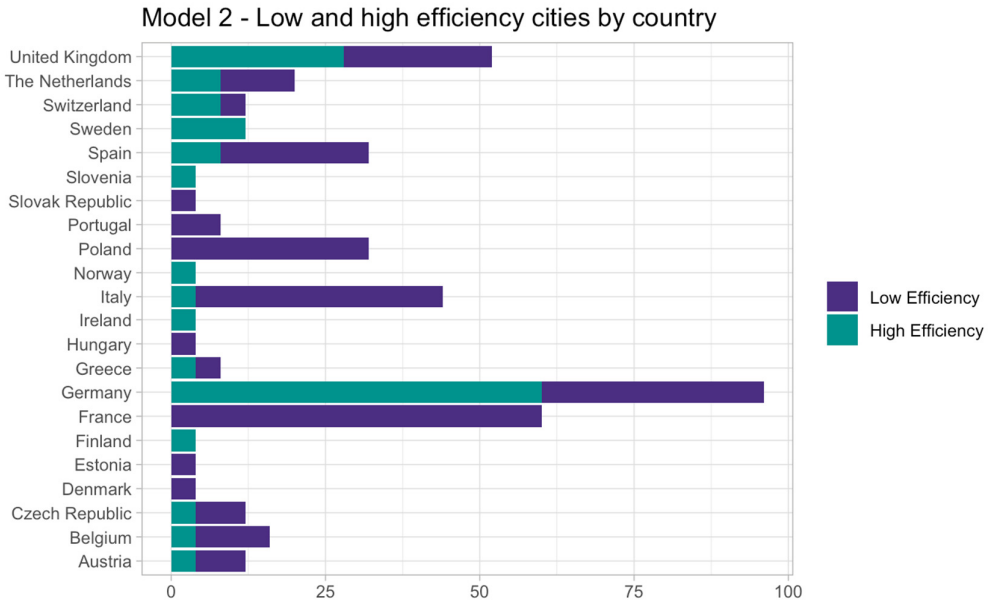

Figure 6: Distribution of high and low efficiency cities by country, based on Model 2 – Traffic safety.

Investigating both models in parallel reveals high efficiency cities across both quality of air and traffic safety. A few of them are worth mentioning, such as Basel, Geneva (Switzerland), Saarbrücken, Freiburg im Breisgau and Munster (Germany). At the opposite pole, low efficiency cities with respect to both models are the greater cities included in the analysis: Paris, Madrid, Berlin, Milan, Barcelona, Rome, Vienna, Budapest, Amsterdam.

Conclusions

Urbanization and mass industrialization have led to a more developed society that is directly proportional to the degradation of the environment. The effects of global warming are both noticeable and alarming across all countries, being due to various human activities that range from heavy industries to the recent dependency of personal cars.

The purpose of this paper was to analyse the efficiency of 112 European cities using nonparametric techniques, across two dimensions: air quality and traffic safety. Findings revealed that small-sized cities behave better, minimizing their carbon dioxide emissions and number of deaths in road accidents. Cities with a low population release less carbon dioxide into the atmosphere, both due to their respiration and waste generation. Besides, a small population involves a smaller number of cars, reducing simultaneously the traffic and its impact on the environment.

Basel (Switzerland) is a worthy example, classified as high efficiency with a maximum efficiency estimate in both models. This city behaves excellent at managing to minimize both greenhouse gas emissions and the harmful traffic effects by granting green roof subsidies, using full renewable energy and continuously encouraging its inhabitants to use alternative means of transportation.

A phenomenon that should be studied in correlation with the effects of traffic and the quality of air is represented by the technological advance. New technologies allow the construction of electric cars, which replace the combustion system with electricity, dramatically reducing gas emissions only by replacing classic cars with electric cars. This measures also applies to the traffic effects, both by reducing noise pollution and by improving safety of passengers and road users by using smart systems.

Future directions of research imply improving the models by applying more complex techniques and extending the dataset with other countries and a different timeframe. Both quality of air and traffic safety are aspects that describe the quality of life, which could be further investigated by including an extended set of variables that describe the economic and social development. An interesting direction could be studying the level of education in parallel with the two dimensions already analysed and determining the correlation between education and air quality and traffic safety, as well as the meaning of this relationship.

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Market Failure, Public Policy and The Environment

Cornelia NEAGU
Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania
neagu_cornelia@yahoo.com

Marius BULEARCĂ
Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania
mariusbulearca@yahoo.com

Cristian SIMA
Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania
sima60cristian@yahoo.com

Abstract

As announced in our previous works, this paper is part of a larger research that deals with sustainable development and environmental protection. For a government to make decisions about the supply and financing of public goods according to the criteria recommended by economists requires that it have lots of difficult-to-acquire information, and can involve equity questions as well as efficiency questions. As such, this paper shows that government intervention offers the possibility of realising efficiency gains, by eliminating or mitigating situations of market failure. First we discussed that many environmental resources are not subject to well-defined and clearly established property rights. As we shall demonstrate, efficiency gains may be obtained if government can create and maintain appropriate institutional arrangements for establishing and supporting property rights as the basis for bargaining. However, we shall also see that the scope of this kind of government action to correct market failure is limited to cases where non-rivalry and non-excludability are absent. Many environmental problems do involve non-rivalry and non-excludability.

Keywords: Allocation, Economic Efficiency, Environmental Services, Market Economy, Public Goods.

Introduction

An allocation of resources is said to be efficient if it is not possible to make one or more persons better off without making at least one other person worse off. Conversely, an allocation is inefficient if it is possible to improve someone's position without worsening the position of anyone else. A gain by one or more persons without anyone else suffering is known as a Pareto improvement [Buchanan, 1962; Mock, 2011; Wu *et al.*, 2016]. When all such gains have been made, the resulting allocation is sometimes referred to as Pareto optimal, or Pareto efficient. A state in which there is no possibility of Pareto improvements is sometimes referred to as being allocatively efficient, rather than just efficient, so as to differentiate the question of efficiency in allocation from the matter of technical efficiency in production.

Hence, in a previous research [Bulearca and Popescu, 2019], we laid out the conditions that characterize an efficient allocation. In that paper, we showed that, given 'ideal' circumstances concerning institutions and behavior, a system of markets would produce an efficient allocation. We noted that the ideal circumstances are truly ideal, in that they do not describe any actual economy. Actual market economies depart from the ideal circumstances in a variety of ways, and the allocations that they produce are not efficient.

Economists use welfare economics theory [O'Connell, 1982; Mäler, 2011; Bernheim, 2008; Feldman, 2008; Deardoff, 2014] to identify 'market failures' – situations where actual circumstances depart from the ideal – and to recommend policies to correct them so that actual economies perform better in relation to the objective of efficiency [Howarth, 2012]. Much of environmental and resource economics is welfare economics of this sort. It is concerned with identifying and

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correcting market failure in relation to the services that the environment provides to the economy.

The existence of markets for environmental services

To recapitulate from our previous paper [Bulearca and Popescu, 2019], we have seen that for markets to produce efficient allocations [Howarth, 2012], it is necessary that:

1. Markets exist for all goods and services produced and consumed.
2. All markets are perfectly competitive.
3. All transactors have perfect information.
4. Private property rights are fully assigned in all resources and commodities.
5. No externalities exist.
6. All goods and services are private goods. That is, there are no public goods.
7. All utility and production functions are 'well behaved' [Perman *et al.*, 2003].
8. All agents are maximisers [Perman *et al.*, 2003].

Clearly, #1 here is fundamental. If there are goods and services for which markets do not exist, then the market system cannot produce an efficient allocation, as that concept applies to all goods and services that are of interest to any agent, either as utility or production function arguments. Further, #4 is necessary for #1 – a market in a resource or commodity can only exist where there are private property rights in that resource or commodity.

We can define a property right as: a bundle of characteristics that convey certain powers to the owner of the right [Hartwick and Olewiler, 1986]. These characteristics concern conditions of appropriability of returns, the ability to divide or transfer the right, the degree of exclusiveness of the right, and the duration and enforceability of the right. Where a right is exclusive to one person or corporation, a private property right is said to exist.

In our previous papers [Neagu *et al.,* 2017, 2019a, 2019b; Bulearca and Popescu, 2019] we provided a classification of the services that the natural environment provides to economic activity [Mas-Colell, 2013]. Let us now briefly consider the different classes of service distinguished there in relation to the question of the existence of private property rights. Where these do not exist, market forces cannot allocate efficiently. If efficiency is the objective, some kind of public policy intervention is required. Our remarks here are intended only to provide a general overview, as a guide to what follows in the rest of this paper. The details of any particular case can be quite complicated.

In regard to the provision of inputs to production, natural resources, we made two major distinctions – between flow and stock resources, and, for the latter, between renewables and non-renewables. Generally, there are no private property rights in flow resources as such. Individuals or corporations do not, for example, have property rights in flows of solar radiation. They may, however, have property rights in land, and, hence, in the ability to capture the solar radiation falling on that land. To see the complexities that can arise, note that in some jurisdictions a householder may be able to prevent others taking action which reduces the light reaching her property, though this may depend on the nature and purpose of the action. Deposits of nonrenewable natural resources are, generally, subject to private property rights. Often these reside ultimately with the government, but are sold or leased by it to individuals and/or corporations. The problems arising from the non-existence of private property rights are not central to the economics of nonrenewable resources.

They do, on the other hand, feature large in the renewable resource economics literature. Many, but not all, of the biotic populations exploited by humans as hunter–gatherers, rather than agriculturists, are not subject to private property rights. The standard example of the case where they are not is the ocean fishery. Where private property rights are absent, two sorts of situation may obtain. In the case of 'open-access resources' exploitation is uncontrolled.

The term 'common-property resources' is used whenever some legal or customary conventions, other than private property rights, regulate exploitation of the resource. Whereas an open-access regime definitely will not promote exploitation that corresponds to efficiency, a common property regime may do so given the appropriate conventions and regulation. Much of the modern fisheries economics literature, as will be seen in a future paper, is concerned with the

design of systems of government regulation of common property that will promote behavior consistent with efficiency on the part of the private agents actually exploiting the fishery.

The second class of environmental service that was distinguished was that of receptacle for the wastes arising in economic activity. Generally, for most of history and for many wastes, the environment as waste sink has not been subject to private property rights, and has been, in effect, an open-access resource. With increasing awareness of the problems of pollution arising, states have moved to legislate so as to convert many waste sinks from open-access resources to common-property resources.

Much of the research is about the economic analysis that is relevant to the public-policy questions arising. What is the level of pollution that goes with efficiency? How should the behavior of waste dischargers be regulated? We shall introduce the basic ideas involved here later in the future works, when discussing 'externalities'.

The case of the amenity services that the environment provides is rather like that of flow resources, in that the service itself will not generally be subject to private property rights, though the means of accessing it may be. Thus, for example, nobody can own a beautiful view, but the land that it is necessary to visit in order to see it may be privately owned.

Private property rights in a wilderness area would allow the owner to, say, develop it for agriculture or extractive resource use, thus reducing the amenity services flow from the area, or to preserve the wilderness. While in principle the owner could charge for access to a wilderness area, in practice this is often infeasible. Further, some of the amenity services that the area delivers do not require access, and cannot be charged for by the owner. The revenue stream that is available under the preservation option is likely to understate the true value to society of that option. This is not true of the development option. In this case, a decision as between the options based on market revenues will be biased in favor of the development option, and the operative question in terms of market failure is whether the existing private property rights need to be attenuated, so as to secure the proper, efficient, balance between preservation and development. This sort of issue is dealt with in a future paper.

The life-support services provided by the natural environment are not subject to private property rights. Consider, as an example, the global atmosphere, the carbon cycle and the climate system. Historically, the global atmosphere has been a free-access resource. As briefly discussed in the previous already mentioned papers, anthropogenic emissions of carbon dioxide have increased atmospheric concentrations of that greenhouse gas. The consensus of expert judgement is that this has affected the way that the global climate system works, and that unless action is taken to reduce the rate of growth of anthropogenic carbon dioxide emissions, further change, on balance harmful to human interests, will occur. Given this, most nations are now parties to an international agreement to act to curb the rate of growth of carbon dioxide and other greenhouse gas emissions. This agreement is discussed in future papers. It can be seen as a first step in a process of transforming the global atmosphere from a free-access to a common-property resource.

Public Goods

One of the circumstances, noted #6 in the listing above, required for it to be true that a pure market system could support an efficient allocation is that there be no public goods. Some of the services that the natural environment provides to economic activity have the characteristics of public goods, and cannot be handled properly by a pure market system of economic organization. So we need to explain what public goods are, the problems that they give rise to for markets, and what can be done about these problems.

What are public goods? This turns out to be a question to which there is no simple short answer. Public goods have been defined in different ways by different economists. At one time it was thought that there were just private goods and public goods. Now it is recognized that pure private and pure public goods are polar cases, and that a complete classification has to include intermediate cases. It turns out that thinking about these matters helps to clarify some other issues relevant to resource and environmental economics.

There are two characteristics of goods and services that are relevant to the public/private question. These are rivalry and

excludability. What we call rivalry is sometimes referred to in the literature as divisibility. Table 1 shows the fourfold classification of goods and services that these two characteristics give rise to, and provides an example of each type. Rivalry refers to whether one agent's consumption is at the expense of another's consumption. Excludability refers to whether agents can be prevented from consuming. We use the term 'agent' here as public goods may be things that individuals consume and/or things that firms use as inputs to production. In what follows here we shall generally discuss public goods in terms of things that are of interest to individuals, and it should be kept in mind that similar considerations can arise with some inputs to production.

Table 1: Characteristics of private and public goods

	Excludable	Non-excludable
Rivalrous	**Pure private good** Ice cream	**Open-access resource** Ocean fishery (outside territorial waters)
Non-rivalrous	**Congestible resource** Wilderness area	**Pure public good** Defence

Source: Authors own assumptions.

Pure private goods exhibit both rivalry and excludability. These are 'ordinary' goods and services, the example being ice cream. For a given amount of ice cream available, any increase in consumption by A must be at the expense of consumption by others, is rival. Any individual can be excluded from ice cream consumption. Ice cream comes in discrete units, for each of which a consumption entitlement can be identified and traded (or gifted). Pure public goods exhibit neither rivalry nor excludability. The example given is the services of the national defence force. Whatever level that it is provided at is the same for all citizens of the nation. There are no discrete units, entitlement to which can be traded (or gifted). One citizen's consumption is not rival to, at the cost of, that of others, and no citizen can be excluded from consumption.

Open-access natural resources exhibit rivalry but not excludability. The example given is an ocean fishery that lies outside of the territorial waters of any nation. In that case, no fishing boat can be prevented from exploiting the fishery, since it is not subject to private property rights and there is no government that has the power to treat it as common property and regulate its exploitation. However, exploitation is definitely rivalrous. An increase in the catch by one fishing boat means that there is less for other boats to take.

Congestible resources exhibit excludability but not, up to the point at which congestion sets in, rivalry. The example given is the services to visitors provided by a wilderness area. If one person visits a wilderness area and consumes its services – recreation, wildlife experiences and solitude, for example – that does not prevent others from consuming those services as well. There is no rivalry between the consumption of different individuals, provided that the overall rate of usage is not beyond a threshold level at which congestion occurs in the sense that one individual's visit reduces another's enjoyment of theirs. In principle, excludability is possible if the area is either in private ownership or subject to common-property management. In practice, of course, enforcing excludability might be difficult, but, often, given limited points of access to vehicles it is not.

The question of excludability is a matter of law and convention, as well as physical characteristics. We have already noted that as the result of an international agreement that extended states' territorial waters, some ocean fisheries that were open access have become common property. We also noted above that a similar process may be beginning in respect to the global atmosphere, at least in regard to emissions into it of greenhouse gases. In some countries beaches cannot be privately owned, and in some such cases while beaches actually have the legal status of common property they are generally used on a free-access basis. This can lead to congestion. In other countries private ownership is the rule, and private owners do restrict access. In some cases where the law enables excludability, either on the basis of private ownership or common property, it is infeasible to enforce it. However, the feasibility of exclusion is a function of technology. The invention of barbed wire and its use in the grazing lands of North America is a historical example.

Satellite surveillance could be used to monitor unauthorized use of wilderness areas, though clearly this would be expensive, and presumably at present it is not considered that the benefit from so doing is sufficient to warrant meeting the cost.

In the rest of this paper we shall consider pure public goods, which we will refer to simply as 'public goods'. As noted, we will be returning to a detailed consideration of open-access resources, and common-property resources, at several places later in the paper. The next paragraphs consider some examples of public goods an then look at property rights in relation to biodiversity, and the arising implications for incentives regarding conservation and medicinal exploitation.

The classic textbook *examples of public goods* are lighthouses and national defence systems. These both possess the properties of being non-excludable and non-rival. If you or I choose not to pay for defence or lighthouse services, we cannot be excluded from the benefits of the service, once it is provided to anyone. Moreover, our consumption of the service does not diminish the amount available to others. Bridges also share the property of being non-rival (provided they are not used beyond a point at which congestion effects begin), although they are not typically non-excludable.

Many environmental resources are public goods, as can be seen from the following examples. You should check, in each case, that the key criterion of non-rivalry is satisfied. The benefits from biological diversity, the services of wilderness resources, the climate regulation mechanisms of the earth's atmosphere, and the waste disposal and reprocessing services of environmental sinks all constitute public goods, provided the use made of them is not excessive. Indeed, much public policy towards such environmental resources can be interpreted in terms of regulations or incentives designed to prevent use breaking through such threshold levels.

Some naturally renewing resource systems also share public goods properties. Examples include water resource systems and the composition of the earth's atmosphere. Although in these cases consumption by one person does potentially reduce the amount of the resource available to others (so the resource could be 'scarce' in an economic sense), this will not be relevant in practice as long as consumption rates are low relative to the system's regenerative capacity.

Finally, note that many public health measures, including inoculation and vaccination against infectious diseases, have public goods characteristics, by reducing the probability of any person (whether or not he or she is inoculated or vaccinated) contracting the disease. Similarly, educational and research expenditures are, to some extent, public goods.

As regarding *property rights and biodiversity*, we may argue that among the many sources of value that humans derive from biological diversity is the contribution it makes to the pharmaceutical industry. This is examined in a volume which brings together a collection of papers on the theme of property rights and biological diversity [Swanson, 1995a]. For the purposes of our analysis, we summarise here some of the central issues raised there.

Swanson begins by noting that the biological characteristics of plants (and, to a lesser extent, animals) can be classified into primary and secondary forms. Primary characteristics concern the efficiency with which an organism directly draws upon its environment. But another set of characteristics – secondary characteristics – are also of great importance in the survivability of an organism within its environment. To survive in a particular ecological complex, an organism must be compatible with other living components of its environment. The secondary metabolites which plants develop are crucial in this respect.

Two things are virtually certain. First, a large number of substances are being, or have been, used in specific cultural contexts without their usefulness having become generally known. Secondly, we have only begun to scratch the surface of the range of possible uses that the biosphere permits. Our collective knowledge encompasses only a small part of what there is to know. All of this suggests that the conservation of biological diversity is of enormous value. This was recognised in the 1992 Rio Convention on Biological Diversity, which stated that biological diversity must be conserved and cultural/institutional diversity respected. Yet the institutional arrangements we have in place are poorly designed to conserve that diversity. Swanson [1995a, 1995b] focuses on the role that property rights plays. The nub of the problem is that the system of property rights which has been built up over the past 100 years rewards the creators of information in

very different ways.

A system which rewards people who create useful information by granting them exclusive rights to market products that incorporate that information is of immense value. Intellectual property rights, in the form of patents and the like, give market value to information, and create incentives to search for and exploit more information. However, Swanson points out that not all forms of information have such market value. In particular, the existence of biologically diverse ecosystems creates a reservoir of potentially useful information, but no system of property rights exists which rewards those who build up or sustain biodiversity.

What is needed, therefore, is a property rights system that brings the value of biodiversity back into human decision-making. So-called 'intellectual' property rights should be generalised to include not only intellectual but natural sources of information. Put another way, it is *information* property rights rather than just *intellectual* property rights that should be protected and rewarded. An ideal system would reward any investment that generates information, including that which is produced naturally.

Public Goods and Economic Efficiency

For our economy with two persons and two private goods, we found that the top-level, product-mix, condition for allocative efficiency was:

$$\text{MRUS}^{\text{A}} = \text{MRUS}^{\text{B}} = \text{MRT} \tag{1}$$

which is equation MRUS = $\frac{P_X}{P_Y}$ [Bulearca and Popescu, 2019] written slightly differently. Hence, for a two-person economy where *X* is a public good and *Y* is a private good, the corresponding top-level condition is:

$$\text{MRUS}^{\text{A}} + \text{MRUS}^{\text{B}} = \text{MRT} \tag{2}$$

We have shown that, given certain circumstances, the first of these will be satisfied in a market economy. It follows that the condition which is equation (2) will not be satisfied in a market economy. A pure market economy cannot supply a public good at the level required by allocative efficiency criteria. A simple numerical example can provide the rationale for the condition that is equation (2).

Suppose that an allocation exists such that MRT = 1, MRUS^{A} = 1/5 and MRUS^{B} = 2/5, so that MRUS^{A}+ MRUS^{B} < MRT. The fact that the MRT is 1 means that, at the margin, the private and public commodities can be exchanged in production on a one-for-one basis – the marginal cost of an extra unit of *X* is a unit of *Y*, and vice versa. The fact that MRUS^{A} is 1/5 means that A could suffer a loss of 1 unit of *X*, and still be as well off if she received 1/5th of a unit of *Y* by way of compensation. Similarly, the fact that MRUS^{B} is 2/5 means that B could suffer a loss of 1 unit of *X*, and still be as well off if he received 2/5 of a unit of *Y* by way of compensation.

Now, consider a reduction in the production of *X* by 1 unit. Since *X* is a public good, this means that the consumption of *X* by both A and B will fall by 1 unit. Given the MRT of 1, the resources released by this reduction in the production of *X* will produce an extra unit of *Y*. To remain as well off as initially, A requires 1/5 of a unit of *Y* and B requires 2/5 of a unit. The total compensation required for both to be as well off as they were initially is 1/5 + 2/5 = 3/5 units of *Y*, whereas there is available 1 unit of *Y*. So, at least one of them could actually be made better off than initially, with neither being worse off. This would then be a Pareto improvement. Hence, the initial situation with MRUS^{A}+ MRUS^{B} < MRT could not have been Pareto optimal, efficient.

Now consider an initial allocation where MRT = 1, MRUS^{A} = 2/5 and MRUS^{B} = 4/5 so that MRUS^{A}+ MRUS^{B} > MRT. Consider an increase of 1 unit in the supply of the public good, so that the consumption of *X* by both A and B increases by 1 unit. Given MRT = 1, the supply of *Y* falls by 1 unit. Given MRUS^{A} = 2/5, A could forgo 2/5 units of *Y* and remain

as well off as initially, given *X*A increased by 1. Given $MRUS^B = 4/5$, B could forgo 4/5 units of *Y* and remain as well off as initially, given *X*B increased by 1. So, with an increase in the supply of *X* of 1 unit, the supply of *Y* could be reduced by 2/5 + 4/5 = 6/5 without making either A or B worse off. But, in production the *Y* cost of an extra unit of *X* is just 1, which is less than 6/5. So, either A or B could actually be made better off using the 'surplus' *Y*. For $MRUS^A + MRUS^B >$ MRT there is the possibility of a Pareto improvement, so the initial allocation could not have been efficient.

Since both $MRUS^A + MRUS^B <$ MRT and $MRUS^A + MRUS^B >$ MRT are situations where Pareto improvements are possible, it follows that $MRUS^A + MRUS^B =$ MRT characterizes situations where they are not, so it is a necessary condition for allocative efficiency. In the case of a private good, each individual can consume a different amount.

Efficiency requires, however, that all individuals must, at the margin, value it equally. It also requires, see equation (1), that the common valuation, at the margin, on the part of individuals is equal to the cost, at the margin, of the good. In the case of a public good, each way, it is *information* property rights rather than just *intellectual* property rights that should be protected and rewarded. An ideal system would reward any investment that generates information, including that which is produced naturally.

It is ironic that the 'success' of modern scientific systems of medicine may be contributing to a loss of potentially useful information. Swanson points to the fact that knowledge which is used with demonstrable success in particular cultural contexts often fails to be widely recognized and rewarded. The difficulty has to do with the fact that this knowledge is not codified in ways that satisfy conventional scientific standards. However, individual must, by virtue of non-rivalry, consume the same amount of the good. Efficiency does not require that they all value it equally at the margin. It does require, see equation (2), that the sum of their marginal valuations be equal to the cost, at the margin, of the good.
Markets cannot provide public goods in the amounts that go with allocative efficiency. In fact, markets cannot supply public goods at all. This follows from their non-excludability characteristic. A market in widgets works on the basis that widget makers exchange the rights to exclusive control over defined bundles of widgets for the rights to exclusive control over defined bundles of something else. Usually, the exchange takes the form of the exchange of widgets for money. This can only work if the widget maker can deny access to widgets to those who do not pay, as is the case with private goods. Where access to widgets is not conditional on payment, a private firm cannot function as it cannot derive revenue from widget production.

Given that the direct link between payment and access is broken by non-excludability, goods and services that have that characteristic have to be supplied by some entity that can get the revenue required to cover the costs of production from some source other than the sale of such goods and services. Such an entity is government, which has the power to levy taxes so as to raise revenue. The supply of public goods is (part of) the business of government. The existence of public goods is one of the reasons why all economists see a role for government in economic activity.

Given that it is the government that must supply a public good, the question which naturally arises for an economist is: what rule should government follow so as to supply it in amounts that correspond to efficiency? In principle, the answer to this question follows from equation (2). In a two-person, two-commodity economy, the efficient level of supply for the public good is the level at which the sum of two MRUSs is equal to the MRT between it and the private good. Actual economies have many individuals and many private commodities. The first point here presents no difficulty, as it is clear that we simply need to extend the summation over all MRUSs, however many there are. As regards the second, it is simply a matter of noting that the MRT is the marginal cost in terms of forgone private goods consumption, so that the rule becomes: supply the public good at the level where the sum of all the MRUSs is equal to the marginal cost. Now, it follows from its definition that the MRUS is the same as marginal willingness to pay, MWTP, so this rule can be stated as: supply the public good at the level where aggregate marginal willingness to pay is equal to marginal cost.

Preference Revelation and The Free-Rider Problem

While the rule for the efficient supply of a public good is simple enough at the level of principle, its practical application faces a major difficulty. In order to apply the rule, the government needs to know the preferences, in terms of marginal

willingness to pay, of all relevant individuals. It is in the nature of the case that those preferences are not revealed in markets. Further, if the government tries to find out what they are in some other way, then individuals have (on the standard assumptions about their motivations and behavior) incentives not to truthfully reveal their preferences. Given that all consume equal amounts of a public good, and that exclusion from consumption on account of non-payment is impossible, individuals will try to 'free-ride' with respect to public goods provision.

To bring out the basic ideas here in a simple way we shall consider an example where the problem is to decide whether or not to provide a discrete amount of a public good, rather than to decide how much of a public good to supply. The nature of the problem is the same in either case, but is easier to state and understand in the 'yes/no' case than in the 'how much?' case. At issue is the question of whether or not to install street lighting. We will first look at this when there is no government. There are two individuals A and B. Both have an endowment of private goods worth mu1000. Installing the street lighting will cost mu100 (mu is the acronym for monetary units). The two individuals both have preferences such that they would be willing to pay mu60 for the installation of street lighting. The analysis that follows is not dependent on the two individuals being equally well off and having the same preferences, that just makes the story easier to tell initially. An obvious modification of the rule derived for the efficient level of provision of a public good derived above for the 'yes/no' situation is that the decision should be 'yes' if the sum of individuals' willingness to pay is equal to or greater than the cost. In this case it is greater: mu60 + mu60 = mu120.

Now, suppose that A and B agree to proceed in the following way. Each will independently write down on a piece of paper either 'Buy' or 'Don't buy'. If when the two pieces of paper are brought together, both have said 'Buy', they buy the street lighting jointly and share the cost equally. For two 'Don't buy' responses, the street lighting is not bought and installed. In the event of one 'Buy' and one 'Don't buy', the street lighting is bought and the individual who voted 'Buy' pays the entire cost. The four possible outcomes are shown in the cells of Table 2 in terms of the monetary valuations on the part of each individual, that of A to the left of the slash, that of B to the right. This is a 'game' with the structure often referred to as 'the prisoner's dilemma' because of the setting in which the structure is often articulated. A 'game' is a situation in which agents have to take decisions the consequences of which depend on the decisions of other agents.

Table 2: The preference revelation problem

		B	
		Buy	Don't buy
A	Buy	1010/1010	960/1060
	Don't buy	1060/960	1000/1000

Source: Authors own assumptions.

In the bottom right cell, the decision is not to go ahead. Neither incurs any cost in regard to street lighting and neither gets any benefit, so both are in their initial situations with mu1000. Suppose both responded 'Buy'. Then with the street lighting installed, as shown in the top left cell, the situation for both can be expressed in monetary terms as mu1010. Each has paid mu50, half of the total of mu100, for something valued at mu60, so gaining by mu10 as compared with the no street lighting situation. Suppose A wrote 'Buy' and B wrote 'Don't buy'. The lighting goes in, A pays the whole cost and B pays nothing. A pays mu100 for something she values at mu60, and goes from mu1000 to mu960. B pays nothing for something he values at mu60, and goes from mu1000 to mu1060. This is shown in the top right cell.

The bottom left cell has the entries of that cell reversed, because B pays the whole cost. Now, clearly both are better off if both write 'Buy' and the street lighting is bought. But, either will be even better off if, as in the bottom left or top right cell, they can 'free-ride'. For each individual thinking about what to write on their piece of paper, writing 'Don't buy' is the dominant strategy. Consider individual B. If A goes for 'Buy', B gets to mu1010 for 'Buy' and to mu1060 for 'Don't buy'. If A goes for 'Don't buy', B gets to mu960 for 'Buy' and to mu1000 for 'Don't buy'. Whatever A does, B is better off going for 'Don't buy'. And the same is true for A, as can readily be checked. So, while installing the lighting and sharing the cost equally is a Pareto improvement, it will not come about where both individuals act independently to serve

their own self-interest. What is needed is some kind of coordination, so as to bring about the Pareto improvement which is going ahead with the street lighting.

Given what we have already said about public goods, government would seem the obvious way to bring about the required coordination. It can, in principle, ascertain whether the installation of street lighting is justified on efficiency grounds, and if it is install it and cover the cost by taxing each individual according to their willingness to pay. However, in practice, given self-seeking individuals, the free-rider problem also attends this program. The problem comes up in trying to get the individuals to reveal their true preferences for the public good.

Suppose now that a government does exist, and that it wants to follow efficiency criteria. It knows that installing the street lighting will cost mu100, and that it should install it if total willingness to pay is equal to or greater than that. It does not know the preferences, in terms of willingness to pay, of the two individuals who, in this simple example, constitute the citizenry. The obvious thing for it to do is to ask them about it. It does that, stating that the cost of installation will be met by a tax on each individual which is proportional to their willingness to pay and such that the total tax raised is equal to the cost of installation. If each individual truly reports willingness to pay mu60, the street lighting will go ahead and each will pay mu50 in tax. This represents a Pareto improvement – see the top left cell in Table 2. The problem is that the incentives facing each individual are not such as to guarantee truthful preference revelation.

Given that tax liability will be proportional to stated willingness to pay, there is an incentive to understate it so as to reduce the tax liability if the street lighting goes ahead, and to get something of a free ride. In the example of Table 2, if B states willingness to pay as mu40 and A tells the truth, the street lighting will go ahead – stated aggregate willingness to pay mu100 – and B will pay 40%, rather than 50%, of mu100. If A also understates willingness to pay by mu20, the government's estimate of aggregate willingness to pay will mean that it does not go ahead with the lighting. The attempt to free-ride may fail if many make it.

The problem of securing truthful preference revelation in regard to the supply of public goods has been the subject of a lot of investigation by economists. It turns out to be very difficult to come up with systems that provide the incentives for truthful revelation, and are feasible [Deardoff, 2014; Brown *et al.,* 2015; de Man, 2016]. Here we will, in order to indicate the nature of the difficulties, simply note one idea that is intended to overcome the free-riding incentives generated by the system just discussed. There the problem was that an individual's tax liability depended on stated willingness to pay. This could be avoided by the government's asking about willingness to pay on the understanding that each individual would, if the installation went ahead, pay a fixed sum.

Suppose that the government divided the cost by the number of individuals, and stated that the fixed sum was mu50 per individual. For both individuals, true willingness to pay is mu60. Both have an incentive now to overstate their willingness to pay. Both value the street lighting at more than it is going to cost them so they want to see it installed. Both know that this is more likely the higher they say that their willingness to pay is, and that however much in excess of mu60 they report they will only pay mu50. In this case overstating willingness to pay produces the right decision. The street lighting should be installed on the basis of true aggregate willingness to pay, and will be installed on the basis of reported willingness to pay. If the lighting is installed, each individual is better off, there is a Pareto improvement.

Suppose, however, that A's willingness to pay is mu55 and B's is mu40. In that case, aggregate willingness to pay is mu95, less than the cost of mu100, and the street lighting should not be installed. In this case, on the understanding that each would pay a tax of mu50 if the lighting is installed, A would have an incentive to overstate her willingness to pay as before, but B would have an incentive to understate his. In fact, it would make sense for B to report willingness to pay as mu0 – if the lighting goes ahead he pays mu50 for something worth just mu40 to him, so he will want to do the most he can to stop it going ahead. Whether it does go ahead or not depends on how much A overstates her willingness to pay by. If A reports mu200 or more, despite B reporting mu0, the street lighting will be installed when on efficiency grounds it should not be.

Finally, this simple example can be used to show that even if the government could secure the truthful revelation of preferences, public goods supply is still a difficult problem. Suppose that A's true willingness to pay is mu60 and B's is

mu41, and that somehow or other the government knows this without needing to ask the individuals. The government has to decide how to cover the cost. It could tax each in proportion to willingness to pay, but given that A and B are initially equally wealthy in terms of private goods, this is in practice unlikely as it would be regarded as unfair. Taxing each at equal shares of the cost would be likely to be seen as the 'fair' thing to do. In that case, A would pay mu50 for a benefit worth mu60, and B would pay mu50 for a benefit worth mu41.

In monetary terms, as the result of installing the lighting, A would go from mu1000 to mu1010 and B would go from mu1000 to mu991. Since there is a loser this is not a Pareto improvement, though it is a potential Pareto improvement – we are into the domain of the Kaldor–Hicks–Scitovsky test [Scitovsky, 1976; Deardoff, 2014]. By looking at equally wealthy individuals, we avoided the problem that efficiency gains are not necessarily welfare gains. Suppose that the gainer A were much richer than the loser B. Then, the question arises as to whether gains and losses should be given equal weight in coming to a decision.

Conclusions

For a government to make decisions about the supply and financing of public goods according to the criteria recommended by economists requires that it have lots of difficult-to-acquire information, and can involve equity questions as well as efficiency questions.

In this paper we have shown that government intervention offers the possibility of realising efficiency gains, by eliminating or mitigating situations of market failure. First, many environmental resources are not subject to well-defined and clearly established property rights. As we have seen, efficiency gains may be obtained if government can create and maintain appropriate institutional arrangements for establishing and supporting property rights as the basis for bargaining. However, we have also seen that the scope of this kind of government action to correct market failure is limited to cases where non-rivalry and non-excludability are absent. Many environmental problems do involve non-rivalry and non-excludability.

In such cases, possible government interventions to correct market failure are often classified into two groups. So-called command-and-control instruments take the form of rules and regulations prohibiting, limiting or requiring certain forms of behaviour. Fiscal instruments – tax and subsidy systems, and marketable permits – are designed to create appropriate patterns of incentives on private behaviour. We have looked at taxation briefly in this paper, and we shall explore all of these instruments in depth in our future papers. As noted immediately above, another form that government intervention to correct market failure could take is providing information, or funding research activity that can increase the stock of knowledge. The arguments we have used so far in this paper have all pointed to the possibility of efficiency gains arising from public-sector intervention in the economy. But actual government intervention does not always or necessarily realise such gains, and may entail losses.

It would be wrong to conclude from an analysis of 'market failure' that all government intervention in the functioning of a market economy is either desirable or effective. First, the removal of one cause of market failure does not necessarily result in a more efficient allocation of resources if there remain other sources of market failure. We discussed this above, using the case of the polluting monopolist as an illustration. A second consideration is that government intervention may itself induce economic inefficiency. Poorly designed tax and subsidy schemes, for example, may distort the allocation of resources in unintended ways. Any such distortions need to be offset against the intended efficiency gains when the worth of intervention is being assessed. In some cases, the chosen policy instruments may simply fail to achieve desired outcomes. This is particularly likely in the case of instruments that take the form of quantity controls or direct regulation.

Many of the services that the environment provides involve some kind of market failure, and hence the levels of provision in a market system will not be those corresponding to allocative efficiency. Much of resource and environmental economics is about devising ways to intervene in the market system so as to promote efficiency in the use of environmental services. In this respect, in our future papers we shall introduce some of the basic ideas involved here. Firstly we shall apply the basic ideas to the problem of environmental pollution. Secondly we shall extend the basic ideas to cover intertemporal allocation problems, and then we shall look, mainly, at the welfare economics of the amenity services that

the environment provides. Finally other papers shall deal, mainly, with the economics of natural resources as inputs to production.

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Impact of Occupational Health and Safety Management System on The Performance of Occupational Health and Safety in A Selected Construction Company – A Case Study

Tomasz EWERTOWSKI
Poznan University of Technology, Faculty of Engineering Management, 2 J. Rychlewskiego Str., 60-965 Poznan, Poland, tomasz.ewertowski@put.poznan.pl

Kinga KUBICKA
Poznan University of Technology, Faculty of Engineering Management, 2 J. Rychlewskiego Str., 60-965 Poznan, Poland, kinga.kubicka@student.put.poznan.pl

Abstract

The world has increasingly been establishing standards for industrial safety and health to improve level of occupational safety and health (OH&S) in the organizations. One of the most effective way to achieve this goal is to implement in the organizations OH&S management system (OH&SMS) based on the international standards. The purpose of this paper is to analyze the influence of OH&SMS on a safety status on the example of the construction company. The construction sector was chosen because in this area the greatest number of fatal accidents is recorded in Poland. Moreover the sector remains one of the most dangerous sectors all over the world. The research was carried on and based on the safety data obtained from the company and three surveys. The questionnaires were created to analyze the differences of OH&S levels in the company during three periods of the operation from 2005 to 2018. First period was connected with traditional safety management based mainly on safety regulations (2005-2007). The company during that time had not had any formal OH&SMS in place yet. The second period concerned the implementation of OH&SMS specification (2008-2009). The last period was associated with the implementation and certification of OH&SMS according to OHSAS 18001: 2007 standard (2010-2018). Now the company has been preparing for ISO 45001 to migrate from previous standard (2019-2020). The results of the analyses were referred on charts and tables to qualify a specific safety level expressed in safety indicators. Based on the surveys carried out, the authors identified the factors which have a decisive influence on the performance of OH&S in the company.

Keywords: safety, construction industry, occupational health and safety management systems

Introduction

The implementation of the OH&SMS in companies has been becoming more and more common. It ensures compliance with legal requirements, identification of existing hazards, risks and monitoring of working conditions. Companies try to implement OH&SMS in order to reduce the number of incidents, occupational diseases, accidents at work, and thus to improve work safety. The certification of OH&SMS also allows to achieve better competitiveness on the market (Yoon et al., 2011). In order to effectively manage occupational health and safety, it is worth using international standards. Currently, the latest standard in this area is ISO 45001: 2018 Occupational Health and Safety Management Systems - Requirements and guidelines for use. The International Organization for Standardization (ISO) published it on March 12, 2018. This standard replaces existing health and safety standards, such as OHSAS 18001: 2007 or Polish PN-N-18001: 2004. ISO 45001: 2018 is based on the directives of the International Labor Organization. After the publication of the new standard, the previous standard - OHSAS 18001, is valid for three years, i.e. until 2021. The surveyed organization currently has the OHSAS 18001: 2007 standard implemented. The purpose of the OHSAS 18001 Occupational Health and Safety Management System is, in particular, effective risk management, ensuring better communication within the organization and constant improvement of those areas that are responsible for safety, ensuring the improvement of the economic performance of the enterprise by reducing the number of accidents at work (OHSAS 18001, 2007). A thoroughly conducted analysis of the current OH&SMS in the company will allow to obtain a detailed view of the methods of risk management in the area of safety used so far

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and obtain an answer which of the examined system elements had the greatest impact on the improvement of OH&S performance in the surveyed periods. Construction activity has made considerable breakthroughs in the past decades in the context of increases in development activities, state regulations, and public demand. At the same time, occupational health and safety issues have become a major concern to construction organizations (Rajaprasad. 2015). According to Statistics Poland in 2019 the construction organizations has recorded the greatest number of fatal accidents among all industry branches (stat.gov.pl, 2020). The company discussed in this paper belongs to the bigger international construction organization, that has branches not only in Poland but also around the world, incl. Europe and Asia. The company employs in Poland about 600 people. For the last 25 years, operating in Poland, it has cooperated with nearly 360 investors, thus implementing almost half a thousand construction projects. The company carries out construction projects in accordance with the principles of construction art, technical safety at work, using modern technologies and solutions. It specializes in the construction of cubature and infrastructure facilities. The company's offer includes mainly office, residential, industrial, public utility, commercial and entertainment facilities, as well as land and water construction works for large infrastructure projects. The organization is one of the signatories of the "Agreement for Safety in Construction" - an initiative of twelve general contractors, aimed at improving safety in Polish construction sector. It assumes the implementation of a number of projects introducing system solutions in the field of health and safety, including: common document templates, a model for confirming the professional qualifications of construction workers or periodic training. The agreement promotes a safety culture, makes people aware of the dangers of working on a construction site and, consequently, is to eliminate the risk. In the field of occupational safety management, one of the most important goals of the organization was the implementation in 2007 of the OH&SMS according to the OHSAS 18001 specification and obtaining the certificate of the Integrated Management System covering - quality, environmental protection and health and safety areas. Currently, the OH&SMS is certified annually. The company has been preparing to implement the new ISO 45001: 2018 standard.

Literature Review

In recent years, public awareness of work-related accidents has driven industries to focus on improving the occupational health and safety management. There are two main approaches to OH&S management. First, traditional approach is based mainly on OH&S government regulations (Marcinkowski, 2013). The company follows the rules, but it does not have a systematic structure to use all available resources in order to achieve goals associated with OH&S. The approach is based mainly on OH&S service and does not use a synergy effect of all resources. It uses traditional tools of OH&S management such as:

- OH&S supervision and OH&S service in the company,
- OH&S board in the company,
- Social labor inspection.

The result has been an uncoordinated approach to safety issues, exposing workers to higher levels of risks and hazards. The second approach as opposed to first one uses modern tools of OH&S management connected with risk management. Risk management is an integral part of OH&SMS. The purpose of OH&SMS is to provide a framework for managing the prevention of death, work-related injury and ill health. The goal of OH&SMS is the reduction of occupational injuries and diseases, including promoting and protecting physical and mental health (ISO 45001, 2018). An OH&SMS is based on the principle of the Deming Cycle (Plan-Do-Check-Act “PDCA”). In the systems thinking approach system must involve an understanding the interactions between people and all other elements, and use this as the basis for devising a system, which takes into account inter-related or coupled activities or entities (e.g., hardware, software, spaces, communities and people) with a joint purpose. Furthermore, a systems approach examines, accounts for and enhances the design of a system, and people’s interactions with it, rather than concentrating on an individual part of the entity (Wilson, 2014). The approach uses a synergy effect of all resources. Management systems are divided into formal and informal. The first of them is characterized by functioning on the basis of specific, written rules - the requirements of standards (standardized) or legal acts and other common documents (non-standardized). Informal systems are less common and are based on contractual principles (Borys, Rogala, 2007). The OH&SMS are usually based on the international standards. First standards and guidelines concerning OHS management were developed in the early nineties of twentieth century. In 1996, International Organization for Standardization (ISO) held a discussion inviting many nations to develop international OHSMS. Some of 33 representatives had participated in the discussion including 6 international organizations like ISO, ILO – International Labour Organization, governments, labor unions, employers, worldwide safety and health

administrations, and insurance institutes. In 1999, US Occupational Health and Safety Administration in cooperation with international certifying bodies from 15 countries on 3 continents published the Occupational Health and Safety Assessment Series - OHSAS 18000 (Vinodkumar and Bhasi, 2011). It includes two parts, 18001 and 18002. The standard was revised, and its latest version is BS OHSAS 18001:2007 “Occupational Health and Safety Management Systems” (Fernández-Muñiz, et al., 2012). The OHSAS 18001 is not accepted in some countries. They developed their own standards which were mainly modifications of “Guidelines on occupational safety and health management system” published by International Labour Organization. In Poland PN-N 18001:1999 standard was developed. It was one of the standards that were used instead of OHSAS 18001. PN-N 18001 was revised in 2004 (Kafel, 2016). Recently, new standard in this area is ISO 45001: 2018 Occupational Health and Safety Management Systems - Requirements and guidelines for use. The International Organization for Standardization (ISO) published it on March 12, 2018. This standard replaces existing health and safety standards, such as OHSAS 18001: 2007 or Polish PN-N-18001: 2004.

Organizations often take measures to improve the status of work safety. They realize that proper management is the most effective way to ensure a high level of OH&S for several reasons. Firstly, due to the obligation to comply with the legal regulations imposed on employers, secondly - social expectations, and thirdly - the possibility of obtaining positive economic effects for the organization. In addition, by implementing OH&SMS, the organization also gains an advantage on the market over others because having a certificate, which is often a requirement of customers. Successful introduction of the OH&SMS in the organization depends largely on the involvement of the top management. The basis of a well-functioning OH&S is "ensuring a wide cooperation of employees at the stage of designing, implementing and maintaining all elements of this system" (PN-N-18001, 2004). Employee participation allow to design better working conditions at all organizational levels and to identify problems that are important for safety management. Employers often lose the opportunity to gain knowledge on the subject of problems, by not consulting and ensuring employees' participation in matters of work safety. The main tasks of the OH&SMS include:

- determining which legal requirements are crucial for the organization,
- effective identification of threats and occupational risk assessment for workplaces,
- recording incidents and carrying out their analyzes (remember that accidents and incidents are caused by the same causes, hence it is so important to prepare a cause analysis to know where the problem is)
- setting health and safety goals and actions that will help in achieving them, and regular monitoring of the health and safety condition,
- implementation of internal audits and reviews of the management system, as well as corrective actions resulting from audit reports,
- developing a health and safety policy and appointing a person who supervises the functioning of the OH&SMS, i.e. the Management Board's Representative for OH&S,
- overseeing documents relevant to the OH&SMS (Marcinkowski, 2013).

There are many advantages and benefits of shaping work safety. It is important, first of all, for the employees themselves, as they are the most important link in the functioning OH&SMS due to the need to protect their life and health. Moreover, some surveys confirmed that the implementation of the occupational health and safety management system has a positive effect on the health and safety at work. They show that a better compliance with the requirements of the OH&SMS is generally associated with a lower accident rate ”(Dudka et al., 2001). The evaluation of the effectiveness of OH&SMS requires both monitoring of the implementation of the activities and their results. The indicators for assessing this effectiveness are set by each enterprise in relation to its needs and capabilities. Reactive indicators, such as the number of accidents at work or occupational diseases, turned out to be the most frequently used due to the fact that each organization has an accident register on the basis of which it is possible to determine progress in the form of a decrease in the number of accidents or their increase. However, they are not allow for a quick response to the occurring problems because it takes a longer period of time to come to a conclusion based on the accident rates that our OH&SMS is not effective.

The most standardized indicators are number of accidents and:

$$accident's\ frequency\ rate = \frac{number\ of\ accidents}{number\ of\ \text{employees}} x1000 \qquad (1)$$

$$accident's \text{ severity rate} = \frac{number\ of \text{ inability to work days}}{number\ of \text{ accidents}} \qquad (2)$$

In order to assess the effectiveness of occupational health and safety management, it is necessary to take into account the working conditions and activities that are implemented as part of OH&SMS, as well as their results. The indicators that characterize OH&SMS activities are generally defined in the planning process, which includes setting goals and plans for their implementation. In order to define the goals, the health and safety should be assessed in order to determine which areas require improvement. In addition, it is important to verify compliance with legal requirements. An appropriate action plan will allow the organization to achieve its goals. An organization can use simple tools such as "checklists of control questions" relating to the basic areas of OH&SMS, which include, among others, top management commitment, employee participation, occupational health and safety policy, communication, training, occupational risk management as well as monitoring and evaluation of operation. A detailed assessment of the health and safety management system in an organization should include such elements as:

- health and safety objectives;
- commitment of top management;
- informing top management about health and safety issues;
- information on health and safety to the public;
- procedures for the implementation of basic activities in the field of health and safety;
- health and safety planning;
- engaging employees in health and safety activities;
- evaluation of health and safety performance;
- monitoring of OSH functioning;
- implementation of a health and safety management system;
- requirements for functioning in the area of OH&S, set for subcontractors and subcontractors (Pawłowska, 2006).

Materials and Methods

The analysis in this paper is based on a case study in the polish construction company, belonging to a multinational corporation with headquarters in another country and several factories in other, mostly European and Asian countries. The company has an OH&SMS implemented since 2010, which is annually certified for compliance with the OHSAS 18001 standard. The purpose of the research is to determine how the method of OH&S management affects the OH&S performance in the organization. The study concerned the period of the company's operation from 2005 to 2018. According to fig. 1 the analysis was divided into three periods, additionally, the fourth period for the planned implementation of ISO 45001: 2018 was illustrated.

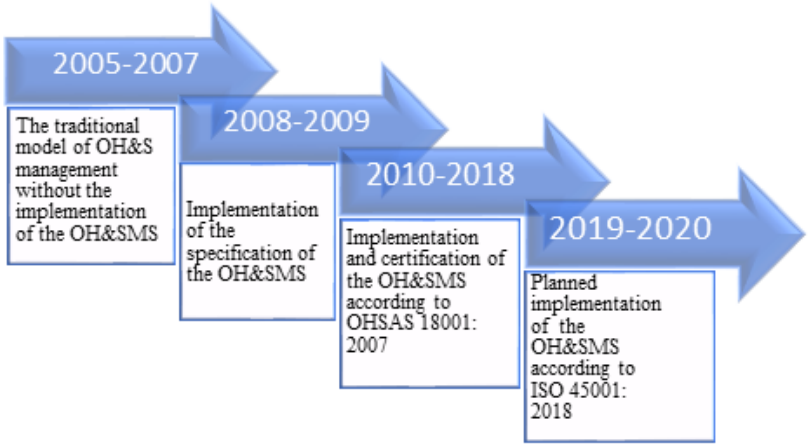

Figure 1: Research periods of OH&S management in the organization

Source: own elaboration

The authors used the principle of triangulation in the research. Triangulation uses evidence from different sources to corroborate the same fact or finding. The case studies drew on multiple sources of evidence. These included documents, archival records, statistics and three surveys. Statistical analysis included indicators such as:

- number, severity and frequency of accidents;
- number of reports of incidents;
- number of subcontractors' accidents.

Analysis of the internal documents and archival records of the organization included i.e .:
- health and safety analysis;
- analysis of accident and incidents reports;
- analysis of internal and external audits;
- internal procedures and instructions.

The data collection procedure was conducted in the period between November 18, 2019 and March 09, 2020. The surveys were directed at the management of the company. A survey conducted on a group of 15 managers who have been employees of the organization since at least 2005. Three respondents were associated with OH&S service, the rest (12) were site managers. The structure of the surveyed respondents is presented in Table 1.

Three surveys were conducted. The first one concerned the period when the organization had not yet operated the OH&SMS (2005-2007). The first questionnaire concerned the period consisted of 4 questions each rated on five-point Likert-type scales (presented in Table 2). The second and the third surveys had similar structure but concerned two different periods. These questionnaires consisted of 10 questions each rated on five-point Likert-type scales (presented for second period in Table 3 and for third period in Table 4). The second survey was connected with the period when the company implemented of the specification of the OH&SMS (2008-2009) and the third period concerned the period when the company implemented and certificated the OH&SMS according to OHSAS 18001: 2007 (2010-2018).

Table 1: Features of survey respondents

Characteristics		Job position				P*
		Site manager		OHS manager		
		N	%	N	%	
Gender	M	12	100	2	66,67	>0,2000
	F	0	0	1	33.33	
Age group	40-50	2	16.67	0	0.00	>0.9999
	51-60	6	50.00	2	66.67	
	60+	4	33.33	1	33.33	
job experience (years)	20-30	11	91.67	2	66.67	>0.3714
	31-40	1	8.33	0	0.00	
	40+	0	0.00	1	33.33	

Fisher exact test were performed to examine the statistical difference for the participant's demographic factors between site managers and OHS managers.

* p value by Fisher exact test.

The scoring of individual response results on seven-point Likert-type scales is as follows:

1. I strongly disagree - 1 point,
2. I disagree - 2 points,
3. I have no opinion - 3 points,
4. I agree - 4 points,
5. I strongly agree - 5 points

The collected data has been coded and checked for correctness and randomness of the answers given. The STATISTICA 13 program was used in the data analysis.

Results

The results were divided into two parts. The first one shows indicators for an analysis of the whole period of research (2005-2018) and the second one shows the indicators for an analysis of individual three periods.

Results of period 2005-2018

The whole period of research was presented by key OH&S indicators. Figure 2. illustrate number of accidents and accident's frequency rate during research period. A systematic decline in all these indicators was noticed. In 2017, the number of accidents slightly increased, but in 2018 it continued the previous downward trend. The number of accidents dropped from 8 in 2005 to 6 in 2018, and the accident's frequency rate, respectively, from 12.4 in 2005 to 10.0 in 2018. The decrease in both indicators is even more spectacular, counting from 2007, when the number of accidents was 21 and the accident's frequency rate was 24.82. Figures 3 illustrate accident's severity rate. The lowest accident's severity rate was 13.3 recorded in 2017 (96 days of inability to work for 7 accidents); while the highest was 121.3 in 2015 (364 days of inability to work for 3 accidents). The reason for such high rates was the high number of days of inability to work after minor accidents, not severe ones.

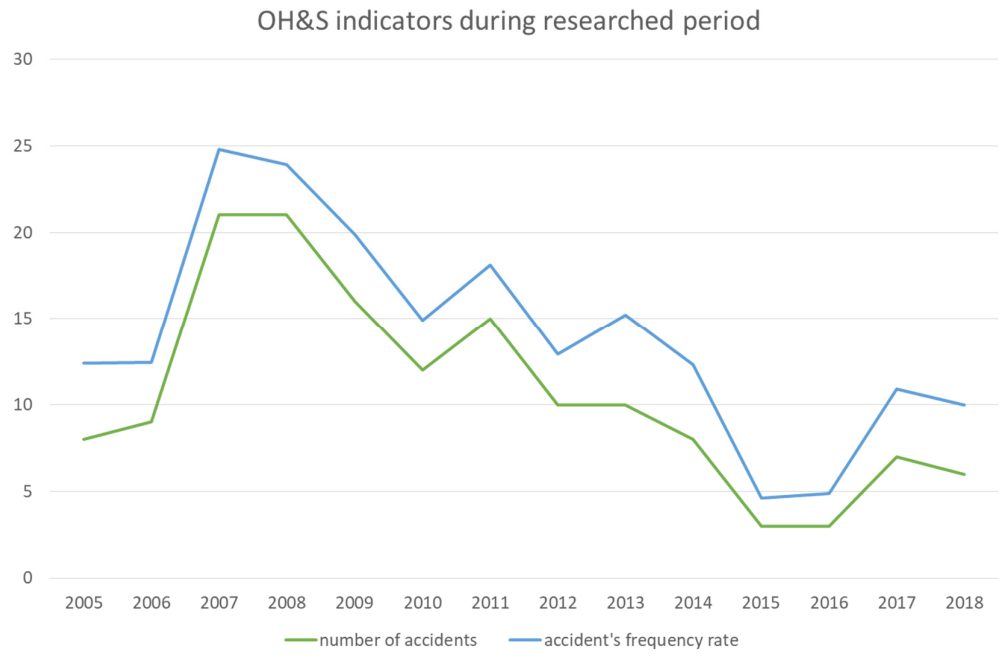

Figure 2: OH&S indicators during researched period.
Source: own elaboration based on materials obtained from the company

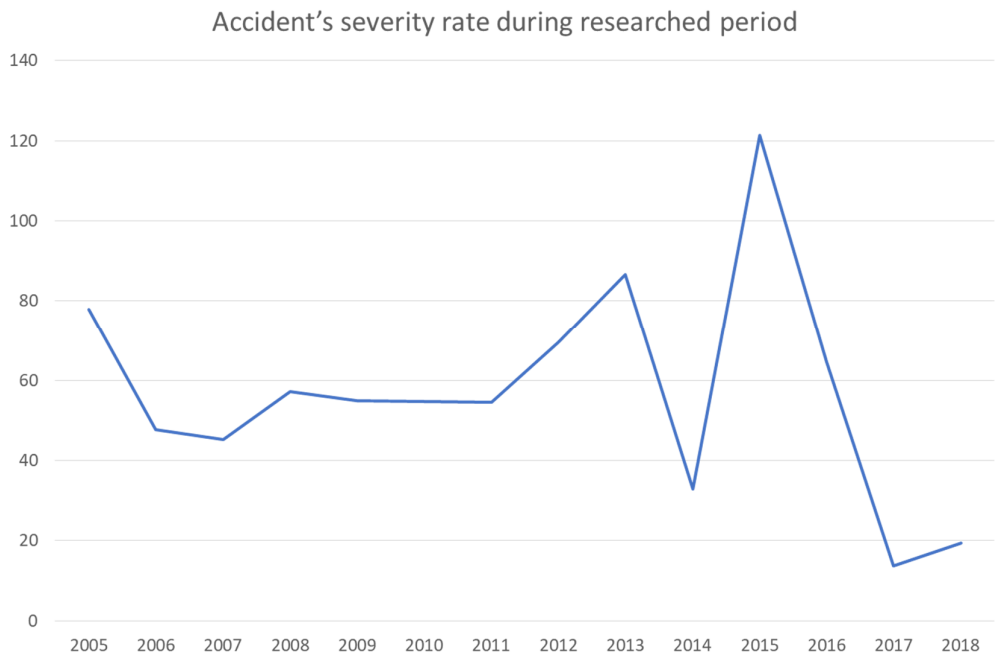

Figure 3: Accident's severity rate during researched period. Source: own elaboration based on materials obtained from the company

Results of individual periods

According to Figure 1 the results was divided into three periods:

Results of period 2005-2007

During this period, a very large increase in the number of accidents was recorded, from 8 accidents in 2005 to 21 accidents in 2007. The accident's frequency rate turned out to be equally growing, which in 2005 was 12.40; in 2006 - 12.43, while in 2007 the indicator was 24.82. The accident's severity rate reached 77.87 in 2005, turned out to be optimistic in this period; 47.7 in 2006 and 45.24 in 2007. When analyzing the causes of accidents that occurred in the period, it was noticed that the main causes of accidents were inappropriate human behavior, fall from a height, slip and improper use of machines and devices. Most of the accidents were caused by the employees not maintaining sufficient attention to the activity, especially during operation and within the workstation of the table saw, and improper storage of materials.

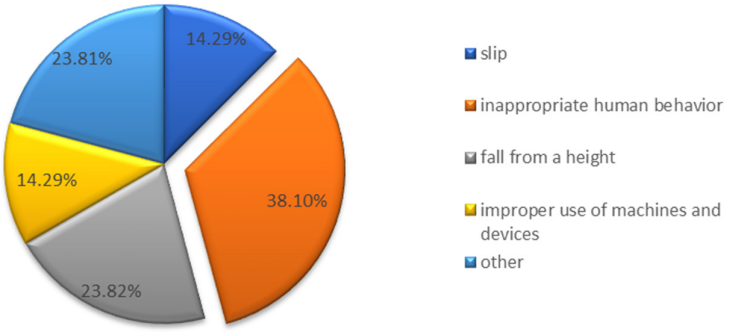

Figure 4. Causes of accidents at work 2005-2007

Source: own elaboration based on materials obtained from the company

Table 2 presents statements describing which of the mentioned factors had the greatest impact on the OH&S status in the organization in this period. The overall Cronbach's alpha coefficient of the survey was 0.63. But the item-total correlation varied.

Table 2: Internal consistency analysis results

No.	Rated Item	Mean	SD	Item-total correlations
1	low OSH culture in the organization and employees' lack of awareness of the risks	2.53	0.91	0.75
2	Lack of process of reporting near misses	4.27	0.88	0.68
3	lack of in-depth analyzes of the causes of accidents and no appropriate corrective actions	4.8	0.86	0.74
4	lack of appropriate OSH training	1.27	0.46	0.61

Results of period 2008-2009

In the second analyzed period the organization implemented the OHS Specification, transformed in the end of 2009 into the OHSAS 18001: 2007 standard, and a five-point occupational risk assessment. At the beginning of 2007, the first editions of procedures and instructions were published, while in 2009 the organization began to operate in accordance with the requirements set out in the specification, which initiated the implementation of processes, including risk management. Bearing in mind the implementation and functioning of the above elements, a systematic drop in accident rates was observed in 2007-2009 compared to the first analyzed period, i.e.

- the number of accidents from 21 accidents in 2007 to 16 in 2009;
- accident's frequency rate - from 25 in 2007 to 19 in 2009;
- the number of accidents for employees of subcontracting companies - from 6 in 2007 to 4 in 2009.

The accident's severity rate increased from 45.24 in 2007 to 54.81 in 2009. There were no fatal, serious or group accidents during this period. The main causes of accidents in that period are given in fig. 5.

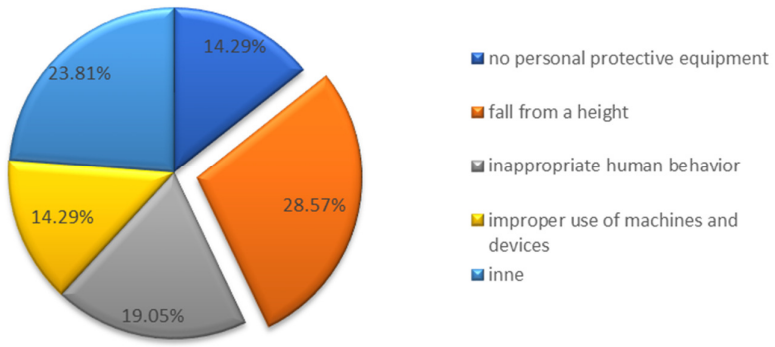

Figure 5. Causes of accidents at work 2008-2009

Source: own elaboration based on materials obtained from the company

The number of incidents reported by employees was gradually increasing from 8 in 2007 to 18 in 2009. Table 3 presents statements describing which of the mentioned factors had the greatest impact on the OH&S performance in the organization in this period. The overall Cronbach's alpha coefficient of the survey was 0.75. But the item-total correlation varied.

Table 3: Internal consistency analysis results

No.	Rated Item	Mean	SD	Item-total correlations
1	health and safety goals	4.00	0.76	0.64
2	commitment of top management	3.1	0.96	0.43
3	informing top management about health and safety problems	1.6	0.74	0.53
4	information on health and safety to the public	1.3	0.46	0.68
5	procedures for the implementation of activities in the field of health and safety	3.93	0.88	0.56
6	occupational health and safety planning	3.33	0.62	0.65
7	engaging employees in OSH activities	2.0	0.76	0.58
8	evaluation of health and safety performance	3.52	0.92	0.51
9	monitoring the functioning in the area of OSH	3.2	0.86	0.57
10	requirements for functioning in the area of occupational health and safety, set for subcontractors and subcontractors	1.73	0.79	0.61

Results of period 2010-2018

In connection with the development of procedures compliant with the requirements of OHSAS 18001 in 2009, it was possible to fully implement it. Moreover, actions were planned and implemented consisting in effective risk management. At the beginning of the analyzed period, in 2010, 13 accidents were recorded, while in 2018 this number decreased to 6. The highest decrease in all indicators recorded in the period 2013-2016. In 2018, despite the low number of accidents, one serious accident and one fatal accident were recorded. The fatal accident was due to communication problems related to the language barrier and cultural differences between manager and the employee. A general systematic decrease in this parameter was visible after the implementation of the OHSAS 18001 standard in 2010. Even the latest increase in the indicators in 2016-2018 shows that this value is much lower than at the beginning of this period. The lowest severity rate was recorded in 2017, going to 13.3 (96 days of inability to work as a result of an accident at work out of 7 accidents); while the highest in 2015 going to 121.3 (364 days of inability to work for 3 accidents). In addition, the OH&SMS in the surveyed organization largely covered subcontractors with its activities. The results are visible in fig. 6 in the decline of the accident number both at the company and subcontractors.

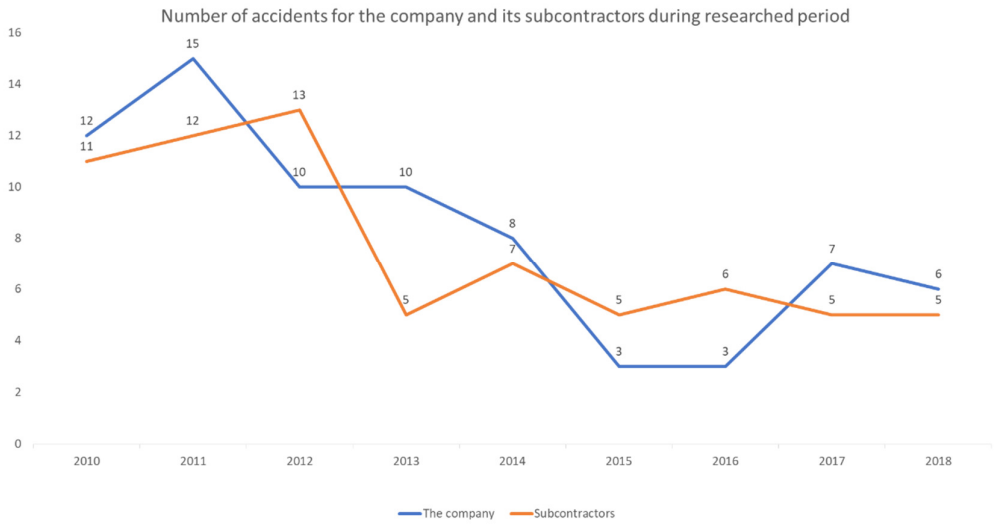

Figure 6: The number of accidents for the company and subcontractors 2010-2018.
Source: own elaboration based on materials obtained from the company

The main causes of accidents in that period are given in fig. 7.

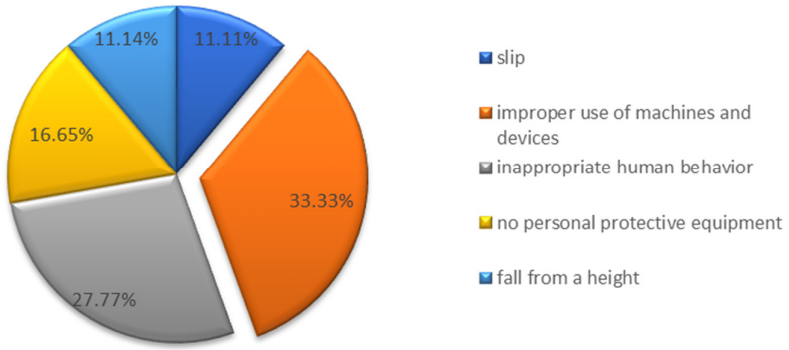

Figure 7. Causes of accidents at work 2010-2018.
Source: own elaboration based on materials obtained from the company.

The largest number of accidents in the analyzed period was caused by improper use of machines and devices. In terms of incidents, the number of reports varies from 8 reported incidents to 21, giving an average of 13 reports per year. The result is slightly better than in the period 2007-2009, where the average number was 12 per year. Table 4 presents statements describing which of the mentioned factors had the greatest impact on the OH&S status in the organization in this period. The overall Cronbach's alpha coefficient of the survey was 0.74. But the item-total correlation varied.

Table 4: Internal consistency analysis results

No.	Rated Item	Mean	SD	Item-total correlations
1	health and safety goals	4.00	0.76	0.51
2	commitment of top management	3.2	1.15	0.62
3	informing top management about health and safety problems	2.3	0.96	0.61
4	information on health and safety to the public	3.26	1.1	0.63
5	procedures for the implementation of activities in the field of health and safety	3.93	0.88	0.71
6	occupational health and safety planning	3.26	0.59	0.46
7	engaging employees in OSH activities	3.6	1.12	0.70
8	evaluation of health and safety performance	3.53	0.92	0.41
9	monitoring the functioning in the area of OSH	3.2	0.86	0.39
10	requirements for functioning in the area of occupational health and safety, set for subcontractors and subcontractors	4.10	0.70	0.45

Discussion

The implementation of the OH&SMS in the researched organization had a large positive impact on the OH&S performance at work. The research methodology used for the analysis allowed for a positive verification of the thesis. The authors used the principle of triangulation in the research. Multiple sources of evidence such as: documents, archival records, statistics and surveys confirmed similar facts and findings. Comparing accident rates from the period when the OH&SMS did not operate in the organization, a significant decrease in accident number was noticed in the subsequent years of the OH&SMS operation. These rates were reliable because there was no significant decrease or increase in the number of employees, construction sites or subcontractors. Despite the increase in the OH&S indicators in 2017, they were much lower than in 2007, when the organization had been preparing to implement the OH&SMS. Although no serious, fatal or group accidents were recorded in 2013 and 2015, the accident's severity rate was the highest in those years. The reason for such high rates was the high number of days of inability to work after minor accidents, hence it should not be assumed that these rates reflect the type of accident. The causes of accidents in individual periods indicate an increase in awareness among employees about hazards, taking into account the decrease in the number of accidents related to inappropriate behavior of an employee from 38.1% in 2007 to 27.77% in 2010-2018. This was an another evidence that the benefits of implementing the OHSAS 18001:2007 standard increased the awareness of hazards occurring at workplaces (www.pcbc.gov.pl, 31/01/2020). A great impact on the prevention of accidents and injuries is visible after the analysis of accident's rates. The implementation of analyzes of potential accidental events aimed at determining their causes and implementing corrective actions which support the prevention of similar events in the future. Thanks to the analysis of the causes of accidents, it is also visible that accidents caused by work at height, and consequently falls of employees from heights, classified as high-risk, significantly decreased from 23.82% in 2005-2007 to 11.11% of all causes in 2010-2018. Thanks to the implementation of corrective actions such a significant decrease in recurrent causes of accidents is visible. The above assumptions are confirmed in the survey, indicating the lack of in-depth analyzes of the causes of accidents and taking appropriate corrective actions as the main reason for the bad OH&S performance in 2005-2007. According to the respondents, also the lack of registration of reports of incidents had an impact on the OH&S performance in this period. The implementation of the Occupational Health and Safety Management System resulted in the commencement of processes of registering reports of incidents and their analysis. From 2007 to 2009, an increase in the number of reports of incidents was observed. It indicates an increase of employees' awareness. During the operation of the OH&SMS, an increase in the average number of notifications per year was recorded, which also indicates the benefits of implementing the OH&SMS in this area.

Since the organization has implemented risk management processes in the area of subcontractors' cooperation a decline of number of accidents has been noticed. The agreement the company with subcontractors provided guidelines and tools for effective risk management. Almost all respondents noticed that the requirements for subcontractors had a large impact on the OH&S performance during implementation of OH&SMS in the organization.

The fulfillment of the OHSAS 18001:2007 requirements gave the organization the possibility of effective risk management, which in turn contributed to the reduction of number, severity and frequency of accidents, increasing employee awareness of threats and their consequences. Additionally The organization got an increase in the number

of reported incidents and the benefits of the implemented corrective actions, contributing to the elimination of similar accidents in the future.

Thanks to all mentioned factors the organization can easier migrate to the new standard ISO 45001:2018.

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Management Aspects Regarding Parameters for Evaluation of The Performance of Educational Systems

Bianca Cezarina ENE

University Politehnica of Bucharest, Romania, biancaene80@gmail.com

Adrian IOANA
University Politehnica of Bucharest, Romania, adyioana@gmail.com,

Daniela TUFEANU
University Politehnica of Bucharest, Romania, dana.tufeanu@gmail.com,

Dragos Florin MARCU
University Politehnica of Bucharest, Romania, dragos.marcu@arasnet.ro,

Bogdan FLOREA
University Politehnica of Bucharest, Romania, florea_b2004@yahoo.com,

Daniela Ionela JUGANARU
University Politehnica of Bucharest, Romania, juganaru_dana@yahoo.com,

Daniela Alice LUTA (MANOLESCU)
University Politehnica of Bucharest, Romania, a_alice13@yahoo.com

Abstract

This article has as a starting point the definition of the evaluation of an educational system.Thus, severaldefinitions are presented and critically and comparatively analyzed. Based on these analyzes, we have developed a more complete definition that refers both to the four types of resources (material resource, financial resource, material resource and information resource), and to specific management activities. The article also presents and analyzes several parameters for evaluating the performance of educational systems. Among the parameters presented we mention: indicators of performance of the quality of the educational system (resources of the education system; participation; effectiveness and efficiency of education; completed levels and results of education); indicators for quantifying participation in education (participation at all levels of education); indicators for analysis and evaluation of the resources involved.

Keywords: Educational Systems; Management; Evaluation; Performance.

Introduction

The educational system is a complex one and of great importance. From this point of view, a periodic evaluation of it is necessary. It is useful to define the concept of evaluation in general and the one specific to educational systems in particular.

According to [1] there are several definitions of the evaluation of educational systems. Thus, [2] gives us the following definition. Assessment is a system of concepts, principles and techniques related to the measurement and appreciation of school results and the teaching process and the teaching process as a whole. This definition refers only to the teaching process. The educational system is wider, it also contains all the bodies that participate in the realization of education.

Another definition of the evaluation of the education system [3] provides that to evaluate means to state a value judgment, based on precisely established criteria, regarding a determined entity, in order to adopt a decision regarding

the improvement or future of this entity. This definition emphasizes criteria, rules on carrying out activities and making managerial decisions, so it refers more to the organizational system.

According to [4], the evaluation is the complex didactic act, integrated in the whole educational process, which ensures the highlighting of both the amount of knowledge acquired by the student and their quality, offering solutions to improve the teaching-learning act. This definition also refers only to the didactic (learning) process, to its quantitative and qualitative aspects.

Another specialist in the field [5] offers us the following definition. Evaluation is a complex process of comparing the results of the instructive educational activity with the planned objectives - evaluating the quality, with the resources used - evaluating the efficiency or with the previous results - evaluating the progress. This definition refers to the resources used, but without specifying their types. It also brings into discussion the dynamics of the educational system (evaluation of progress).

Another definition [6] provides that school assessment is the process by which useful information is delineated, obtained and provided, allowing subsequent decisions to be made. It refers to the informational resource (the process by which useful information is delimited, obtained and provided) and to the implicit managerial component (making subsequent decisions).

According to [7], evaluation is a process of measuring and assessing the value of the education system or part of it, the efficiency of resources, conditions and strategies used by comparing the results obtained with the proposed objectives, in order to make decisions for improvement. and improvement.

Parameters for evaluating the performance of educational systems

We can consider that no definition presented and analyzed previously is complete, because it does not refer to all types of resources involved in an educational system, namely: human resources, financial resources, material resources and information resources and the correlations between them.

Thus, we consider the following definition more complete and comprehensive. An educational system is the instructive-educational process in which four types of resources are involved (human resource, as the most important, financial resource, material resource and information resource, which governs the first three), a process that, in progress and dynamics to require periodic updates (upgrades) and evaluations by applying indicators and parameters of the qualitative and quantitative performance of the specific activities carried out.

Based on our definition, which we consider more complete (but not exhaustive), we propose the following scheme of the educational system (figure 1).

From the multitude of categories of performance indicators of the educational system, we will present and further analyze the following categories [8,9]:

Performance indicators of the quality of the educational system

- Education system resources (human, financial, material and informational).

Ensuring the qualitative and quantitative level of the four types of resources is of great importance for theperformance of the educational system at any level.

- Participation (gross, net and net adjusted rate of inclusion, etc.)

The level of participation in the educational process quantifies the subjects' interest in the educational system.

- The effectiveness and efficiency of education (repetition rate, school survival rate, efficiency coefficient, etc.).

  This parameter quantifies the existence and good use of the 4 types of resources.

- Graduated levels and results of education (results in national and international evaluations, graduation rate, employment rate of graduates of different levels of education, etc.).

  This indicator reflects the good completion and implementation through results of the educational process.

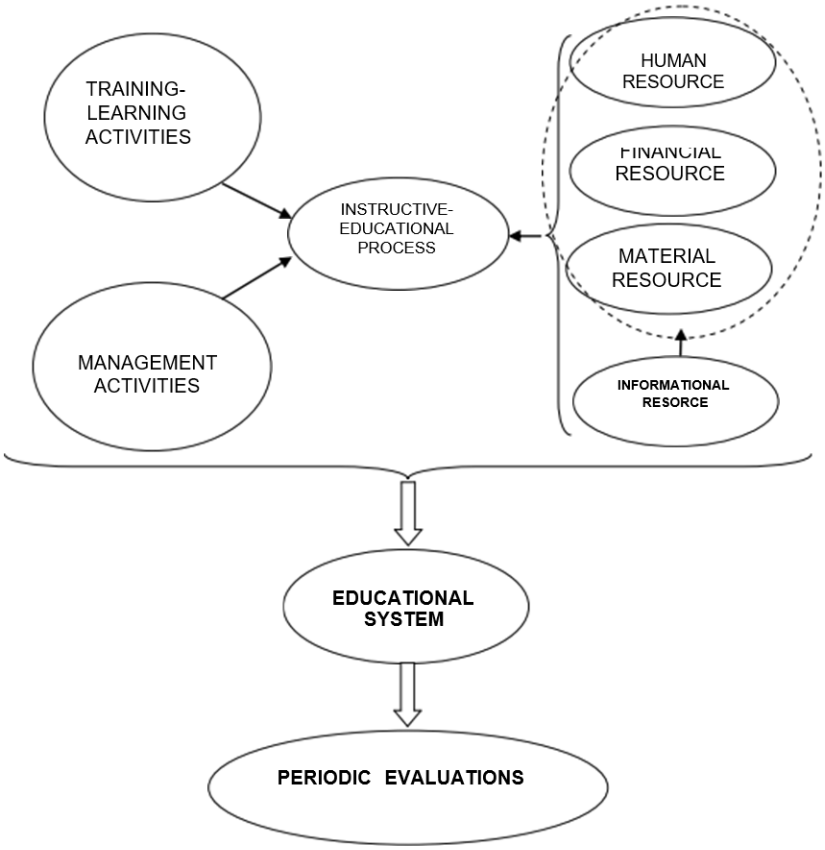

Fig. 1 : Theschemeofdefiningtheeducationalsystem

Another category of performance parameters of the educational system is represented by:

Indicators for quantifying participation in education

Participation at all levels of education: number of pupils / students, by levels of education; the share of pupils and students in the total population; gross enrollment rate at all levels of education; the specific school enrollment rate by age at all levels of education; school life expectancy for children aged3/6 years.

Indicators for analysis and evaluation of the resources involved

Indicators regarding human resources: the share of teaching staff in the total employed population; thenumber of teachers, by levels of education; the share of female teachers; the share of qualified teaching staff; the share of unqualified teaching staff; the share of teaching staff with full working time (full time); the share of part- time teaching staff; the share of educational units that function entirely with qualified teaching staff; the share of women with management positions (director); teacher student report; the average number of students per class; the share of educational units in which groups / classes with student numbers below the minimum / above the maximum in relation to the legal provisions operate; the share of groups / classes with students below the minimum / above the maximum in relation to the legal provisions.

Indicators regarding the financial resource: public expenditures for education, as% of GDP; public expenditures for education, as% of total public expenditures; public expenditure on education, as% of total expenditure on education; expenditures from the state budget per pupil / student; staff costs, as% of total education expenditures; expenses with professional training and teacher evaluation per student.

Indicators regarding the material resource: educational units (number of school units / institutions in pre-university and tertiary non-university / university education; number of educational units with teaching in minority languages, by teaching languages; number of educational units that provide mother tongue study, subjects Minority language and History and culture of minorities, number of educational units with simultaneous teaching classes, share of educational units with simultaneous teaching classes, number of units providing extracurricular educational activities, children's palaces, children's clubs, share of units of educational activities with students in school laboratories, the share of educational units that carry out practical training activities with students in school workshops, the share of educational units that have gyms, the average number of volumes and publications per student; the number of students returning to a computer; the share of secondary education units (middle school and high school) that use at least 15 computers in the activity with students; the share of pre-university education units with Internet access.

Conclusions

The qualitative and quantitative evaluation of the educational system has a special importance. The chronological definitions of the evaluation of the educational system offered by specialists in the field are elliptical, because many of them do not refer to the four types of resources (human resource, financial resource; material resource, informational resource) and / or specific management activities.

Among the parameters for evaluating the performance of educational systems, the following indicators have a significant importance: the indicators of the efficient use of the four types of resources within the specific activities carried out; indicators of participation in the educational system; indicators of the efficient implementation of the results of the educational systems.

Another aspect of the relevance of the increased importance of educational systems is that within the 3S concept (school, as education- streets, as infrastructure-hospitals, as health), the priority place is given to educational systems.

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The Dynamics of The Vegetable Sector from The Perspective of The Conventional and Ecological System

Ruxandra-Florina TEODORESCU

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania,
teodorescuruxandra@yahoo.com

Valentina Constanta TUDOR
University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania,
tudor.valentina@managusamv.ro

Alina MARCUTA
University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
alinamarcuta@yahoo.com

Dorina MOCUTA
University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania,
mocuta.dorina@managusamv.ro

Dragos-Ion SMEDESCU
University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
smedescudragos@yahoo.com

Abstract

After the Second World War, the population has increased more and more, from 3 billion in the ’60s to more than 7.8 billion today. In this case, the agriculture production has to be more efficient and more productive. Over time, the need to produce more and feed a growing population has led to the identification of new solutions to meet these challenges. Starting from this, the present study proposes to make an analysis regarding the dynamics of vegetable sector in the last decade, from the perspective of the conventional and ecological system, based on the importance that have been gained by the ecological products and also on the fact that ecological area increased by 70% in the recent years. In this sense, our study is concentrating on a few indicators provided by Eurostat and starts with the share of ecological surfaces at the EU level, which has increase from 4% in 2007 to 7% in 2017. Beside this, we analyze indicators between 2012 and 2019, such as cultivated areas and production, both for conventional and ecological systems, for the main agricultural crops. Mostly, our research has been based on a quantitative analysis and has highlighted that all the European countries are basing their production more and more on ecological agriculture.

Keywords: Vegetable Sector, Conventional Agriculture, Ecological Farming.

Introduction

Over time, the need to produce more and to feed a growing population has led to the identification of new solutions to meet these challenges. Thus, once entered into the modern era, the agricultural activity was transformed being focused on producing more, with a lower consumption of resources, while increasing the need to produce healthier food (Bostan, 2016). This is how very productive hybrids have appeared, which have gradually replaced local varieties, pesticides and fertilizers, which have helped farmers protect their crops from disease and pests, while fertilizers have helped to increase soil fertility.

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Gradually, more and more farmers have replaced traditional agriculture with a modern practice, where chemicals represent the solution to all problems in the crop, except for the limitations imposed by climatic conditions, where irrigation systems have not been implemented (Kremen, 2012). Modern agriculture has seized much of the arable land available in Romania, but also at the level of EU (Hartvigsen, 2014). The need to produce more has prevailed at the expense of the need to obtain more environmentally friendly productions.

In the last decades, people have been more focused on eating healthy, all around the world and especially in countries with higher income, increasing the demand for safe and high-quality food (Sadilek, 2018). In this situation, agriculture must meet the twin challenge: the need to feed a growing population, with a rise demand for products with high-calories diets and meat, while simultaneously minimizing its global environmental impacts (Binta, 2015).

In recent decades, as concerns about healthy eating have intensified, there has been a renewed interest in producing healthier, more natural, environmentally friendly cereals, vegetables, fruits or milk and meat. The increasing demands of the consumer for such products have led to the resumption of the production process and to the transition, gradually to the traditional agriculture practiced in ancient times (FAO, 2020).

Materials and Methods

Starting from the UE28 level, the research is based on data provide by the European Statistics Office from the period 2012 till 2019. In order to achieve the results, we took in consideration the main vegetable crops, such as: wheat, barley, corn, rice, potatoes, sugar beet, rapeseed, sunflower, soy, hemp, tobacco and hops. In this sense, our study is based on a few indicators provided by Eurostat and starts with the share of ecological surfaces at the EU level, which has increase from 4% in 2007 to 7% in 2017. Beside this, we analyze indicators such as cultivated areas and production, both for conventional and ecological systems, for the main agricultural crops.

Results and Discussions

Among the most extensively cultivated areas in Romania are maize, wheat and sunflower (Tudor, 2013). In the case of the maize crop, at the level of 2019 an area of 2.65 million hectares was exploited, decreasing in comparison with the area cultivated in the year 2012. The area cultivated with wheat in 2019 was 2.09 million hectares, increasing by 4.7% compared to 2012, and in the case of sunflowers the cultivated area was 1.3 million hectares, increasing by 21.8% in comparison with 2012 (Table no. 1).

Table 1: Evolution of the cultivated areas at the level of Romania with the main plant crops in the period 2012-2019 in conventional system (thousands hectares)

Crop	2012	2013	2014	2015	2016	2017	2018	2019	2019/2012 %
Wheat	1.997,6	2.104,0	2.112,9	2.106,6	2.137,7	2.052,9	2.110,7	2.091,5	4,7
Barley	424,2	495,7	516,0	469,9	481,6	455,5	409,7	441,5	4,1
Maize	2.731,2	2.518,9	2.513,6	2.608,1	2.584,2	2.405,2	2.415,3	2.650,6	-3,0
Rice	11,3	11,9	12,7	11,1	9,4	9,1	8,4	8,6	-24,1
Potato	229,3	207,6	202,7	196,1	186,2	171,4	168,0	175,3	-23,5
Beetroot	27,3	28,1	31,3	26,6	24,9	28,2	24,3	22,8	-16,5
Rape	105,3	276,6	406,7	367,9	456,0	598,0	632,1	288,9	174,4
Sunflower	1.067,1	1.074,6	1.001,0	1.011,5	1.039,8	998,4	1.098,4	1.300,0	21,8
Soy	79,8	67,7	79,9	128,2	127,3	165,1	167,4	178,9	124,2
Hemp	0,0	0,1	0,4	0,4	0,7	1,7	1,4	1,9	-
Tobacco	1,3	0,9	0,9	0,8	0,9	0,8	0,9	1,1	-14,3
Hop	0,2	0,2	0,2	0,2	0,3	0,2	0,3	0,3	17,4

Source: Eurostat Database, 2020.

At the opposite, regarding the cultivated areas in Romania, between the analyzed crops, there is the cultivation of hops, tobacco and hemp. Hemp cultivation is exploited on restricted areas in certain favorable regions, therefore the area cultivated at the level of 2019 was only 270 hectares. And in the case of tobacco culture it is noted that it is exploited on small areas, where at the level of 2019 it was a little over 100 hectares. It is worth noting, however, the

reintroduction of hemp culture, so that if in 2012 this crop was not exploited, in 2019 the area exploited with hemp was 1.87 thousand hectares (Table no. 1).

Climatic factors play an extremely important role in determining high quantities, but also qualitatively (Powlson, 2016). We can notice, in the case of the maize crop, where the year 2018 was a really "good" one for this crop, registering a record in this respect, when a production of over 18.8 million tons was obtained, meaning an average production of 7.8 t / ha. The high yields this year determined the farmers that in 2019 maize will be grown on a larger area (2.65 million hectares, compared with 2.42 hectares) (Table no. 2.).

Table 2: Evolution of the productions obtained at the level of Romania in the main plant crops in the period 2012-2019 in conventional system (thousands tons)

Crop	2012	2013	2014	2015	2016	2017	2018	2019	2019/2012 %
Wheat	5.297,8	7.296,4	7.584,8	7.962,4	8.431,1	10.035,0	10.138,6	10.051,4	89,7
Barley	986,4	1.542,3	1.712,5	1.626,3	1.817,3	1.906,7	1.884,5	1.966,4	99,4
Maize	5.953,4	11.305,1	11.988,6	9.021,4	10.746,4	14.326,1	18.812,0	14.893,7	150,2
Rice	50,3	54,0	44,6	49,2	43,1	42,8	44,2	43,7	-13,0
Potato	2.465,2	3.289,7	3.519,3	2.699,7	2.689,7	3.116,9	2.971,4	-	-
Beetroot	719,8	1.029,2	1.398,6	1.040,8	1.012,2	1.174,5	937,0	-	-
Rape	157,5	666,1	1.059,1	919,5	1.292,8	1.673,3	1.610,1	685,3	335,1
Sunflower	1.398,2	2.142,1	2.189,3	1.785,8	2.032,3	2.912,7	3.080,3	-	-
Soy	110,4	158,7	214,7	277,3	278,7	416,4	486,4	-	-
Hemp	0,0	0,0	2,3	1,9	3,7	2,6	2,9	-	-
Tobacco	1,3	1,4	1,4	1,1	1,7	1,2	1,2	-	-
Hop	0,2	0,2	0,3	0,2	0,2	0,1	0,2	0,0	-100,0

Source: Eurostat Database, 2020.

It should be noted that in the case of both wheat and maize, net yields were higher than those obtained in 2012. For example, in the case of wheat cultivation, the production obtained increased by more than 89% in 2019, compared to 2012, from a production of 5.3 million tons to just over 10 million tons. Also, in the case of maize, from a production of 5.9 million tons in 2012 to a production of 14.9 million tons in 2019, increasing by 150% compared to 2012 (Table no. 2.). In Romania, the arable area involved in ecological farming is quite small, occupying less than 200,000 hectares in 2017. Compared to the total area of the European Union, the area on which ecological farming is practiced in Romania represents only 3.5% of the total area. occupied by the ecological crops at the level of the European Union in 2017 (Figure no. 1.).

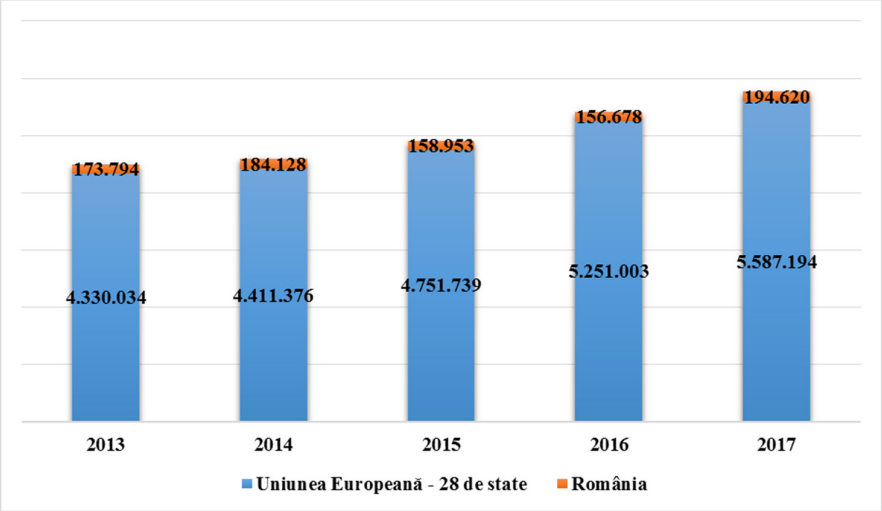

Figure 1: The total area occupied by ecological farming and land under conversion to ecological farming
Source: Processed data provided by Eurostat Database, 2020

In Romania, the arable area involved in ecological farming is quite small, occupying less than 200,000 hectares in 2017. Compared to the total area of the European Union, the area on which ecological farming is practiced in Romania represents only 3.5% of the total area occupied by ecological crops at the level of the European Union in 2017.

The areas occupied by ecological crops in Romania oscillate between 2013-2017, so that if in 2013 the area occupied by the ecological crops was 173,794 ha, in the period 2015-2016 the area was reduced by about 17,000 hectares, while in 2017 the area it registered an increase of almost 38,000 hectares compared to the area registered in 2016 (Figure no. 1).

According to a report of the European Parliament, most of the ecological agriculture in the intra-Community area is concentrated on pastures and meadows intended for the ecological growth of animals (45.1%) and on arable crops of cereals, fresh vegetables, green fodder and industrial plants (44 %).

The remaining 10.9% of ecological farming is focused on permanent crops of the type: fruit trees, shrubs, olive groves and vines).

Table 3: Evolution of the cultivated areas at the level of Romania with the main plant crops in the period 2012-2017 in ecological system (hectares)

Crop	2012	2013	2014	2015	2016	2017	2017/2012 %
Wheat	56.151	55.487	49.061	42.854	43.495	45.686	-18,6
Barley	7.469	12.901	14.519	9.215	5.689	9.670	29,5
Maize	33.759	32.199	27.861	23.137	16.643	19.671	-41,7
Rice	1.712	2.618	4.466	3.085	3.164	2.557	49,4
Potato	533	533	498	376	261	188	-64,7
Beetroot	582	201	125	282	444	470	-19,2
Rape	-	-	16.065	10.589	12.811	18.909	-
Sunflower	43.923	-	22.916	22.910	22.372	33.712	-23,2
Soy	0	-	10.571	15.707	14.241	14.670	-
Tobacco	1	29	0	1	0	0	-100,0
Hop	-	0	31	20	17	0	-

Source: Eurostat Database, 2020

According to Table 3.3. there is a decrease of the cultivated areas in an ecological system, so that in the case of wheat cultivation, if in 2012 were cultivated over 56 thousand hectares, in 2017 the cultivated area was only 45.7 thousand hectares, decreasing with over 18%. Also, a significant decrease was recorded in the case of maize crop that suffered a decrease of over 41% in 2017 compared to 2012, when cultivated over 33.7 thousand hectares (Table no. 3).

The most significant decrease was recorded in the case of potato cultivation, which from a cultivated area of 533 hectares in 2012, in 2017 the cultivated area was only 188, decreasing by over 64%. The only crops analyzed that registered an increase of the cultivated area, were the rice crop (29.5%) and the rice crop (49.4%) (Table no. 3).

Table 4: Evolution of the productions obtained at the level of Romania in the main vegetable crops in the period 2012-2019 in ecological system (tons)

Crop	2012	2013	2014	2015	2016	2017	2017/2012 %
Wheat	74.377	74.285	137.474	127.231	110.552	104.454	40,4
Barley	5.158	13.476	34.916	20.259	10.571	10.657	106,6
Maize	40.389	55.476	95.403	86.581	55.405	67.175	66,3
Rice	5.314	6.158	12.521	15.473	9.743	10.559	98,7
Potato	-	1.491	3.527	2.162	2.124	1.159	-
Beetroot	-	606	3.015	5.544	7.808	5.161	-

Rape	-	-	28.031	20.401	20.772	24.667	-
Sunflower	-	-	38.731	37.262	36.290	47.707	-
Soy	-	-	17.164	22.036	19.376	18.924	-
Tobacco	-	28	0	0	0	0	-
Hop	-	0	50	20	34	0	-

Source: Eurostat Database, 2020

Although the cultivated areas have decreased in the case of wheat and maize, we can see that the wheat production increased by 40%, from a production of 74 thousand tons in 2012 to a production of 104 thousand tons in 2017. Also, corn cultivation increased by 66.3% from a production of 40.3 thousand tons in 2012, to a production of 67.1 thousand tons in 2017, registering an average production of 3.4 t / ha (Table no. 4).

At the level of Romania, the area cultivated in the ecological system has values between 1 and 2%: in 2007 the area was 1% and at present the value reached is 1.93%.

Ecological farming plays a very important role for Austria, which owns 23.4% of the total cultivated area, at the level of the European Union, in 2017, being the first place after the share of the cultivated areas in the ecological system. Croatia, the last state to join the EU, has a cultivated ecological area of 6.5% of the total. At the same time, Bulgaria and Romania, which joined in 2007, have an area weight of 2.72% and 1.93% respectively in 2017 (Table 5.).

Table 5: The share of ecological surfaces from the total area cultivated at EU level (%)

Specification											
UE28	4	4.3	4.7	5.1	5.4	5.66	5.7	5.78	6.2	6.68	7.03
Austria	17	17.4	18.5	19.5	19.6	18.62	18.4	19.35	20.3	21.25	23.37
Estonia	8.7	9.6	11	12.8	14.1	14.86	15.65	15.96	15.68	18.02	19.6
Sweden	9.9	10.9	12.8	14.3	15.7	15.76	16.5	16.53	17.14	18.3	19.16
Italy	7.9	7.5	8.1	8.6	8.4	9.3	10.6	10.91	11.79	13.99	14.86
Switzerland	:	:	:	:	:	11.57	12.19	12.73	12.91	13.39	14.37
Czech Republic	8.2	9	10.6	12.4	13.1	13.29	13.47	13.44	13.68	14	14.09
Latvia	8.1	8.9	8.7	9.2	10.1	10.63	9.89	10.86	12.29	13.42	13.92
Finland	6.6	6.5	7.2	7.4	8.2	8.65	9.07	9.29	9.91	10.47	11.41
Slovakia	6.1	7.3	7.5	9.1	8.6	8.53	8.18	9.37	9.47	9.75	9.9
Slovenia	5.9	6.1	6.3	6.4	7	7.32	8.07	8.55	8.85	9.12	9.6
Spain	4	5.3	6.6	6.7	7.5	7.49	6.85	7.26	8.24	8.48	8.73
Denmark	5	5.6	5.9	6.1	6.1	7.31	6.44	6.25	6.33	7.81	8.6
Lithuania	4.5	4.6	4.8	5.2	5.4	5.51	5.74	5.57	7.11	7.5	7.98
Greece	7	7.8	8.5	8.4	5.2	9.01	7.36	6.72	7.7	6.5	7.96
Portugal	6.3	5.7	4.3	5.8	6.1	5.48	5.31	5.74	6.52	6.75	7.04
Germany	5.1	5.4	5.6	5.9	6.1	5.76	6.04	6.18	6.34	6.82	6.82
Croatia	:	:	:	:	:	2.4	3.13	4.03	4.94	6.05	6.46
Belgium	2.4	2.6	3	3.6	4.1	4.48	4.67	5	5.17	5.8	6.28
France	1.9	2	1.9	2.9	3.4	3.55	3.66	3.87	4.54	5.29	5.99
Norway	4.7	5.1	5.5	:	:	5.57	5.23	5.05	4.83	4.85	4.79
Cyprus	1.5	1.6	2.6	2.8	2.9	3.38	4.03	3.63	3.72	4.94	4.57
Luxembourg	2.6	2.7	2.7	2.8	2.8	3.14	3.39	3.43	3.21	3.47	4.15
Hungary	1.8	2.1	2.4	2.4	2.3	2.45	2.45	2.34	2.43	3.48	3.73
Poland	1.8	2	2.3	3.3	4.1	4.51	4.65	4.56	4.03	3.72	3.41
Holland	2.5	2.6	2.6	2.5	2.5	2.61	2.65	2.67	2.67	2.91	3.14
UK	3.7	4.1	4.2	4.1	3.7	3.41	3.24	3.02	2.89	2.82	2.87
Bulgaria	0.3	0.3	0.2	0.5	0.5	0.76	1.13	0.96	2.37	3.2	2.72

Romania	1	1	1.2	1.3	1.6	2.1	2.06	2.09	1.77	1.67	1.93
Ireland	1	1	1.1	1.1	1.1	1.16	1.2	1.16	1.65	1.72	1.66
Turkey	:	:	:	:	:	:	:	1.34	1.34	1.39	1.48
Iceland	:	:	:	:	:	:	0.49	:	1.41	:	0.44
Serbia	:	:	:	:	:	:	0.23	0.27	0.44	0.41	0.39
Malta	0.3	0.4	0.5	0.2	0.2	0.32	0.06	0.29	0.25	0.21	0.35

Source: Eurostat Database, 2020

The size of the ecological area differs considerably from one EU Member State to another. Four Member States accounted for more than half of the total agricultural land cultivated in 2017: Spain (16.6%), Italy (15.2%) France (13.9%) and Germany (9.1%), representing together 54.7% of the total EU-28 ecological area (figure 2.1.). In 2016, these four countries represented a similar weight, 54.4%.

Conclusions and Recommendations

Agriculture in the conventional system was widespread in Romania until 1989 (Stoleru, 2019). Today, it is unanimously accepted that this type of agriculture can affect the environment, especially if the different components of the agricultural technological system are applied without taking into account the local specific: climate, soil, relief, social and economic conditions, which determine the level of vulnerability or susceptibility to the different processes of chemical, biological, physical degradation of the environment.

In ecological farming the improvement of soil fertility is based on ecological fertilization, and in the conventional system the synthetic fertilizers are used, soluble (Peigne, 2018). Plant nutrition is indirect in the ecological system, and direct in the conventional system. Plant protection is preventive; based on combating causes in the ecological system, compared to the conventional system that uses curative methods; based on fighting symptoms (Des Roches, 2018). The growing demand for products from ecological farming has led to the creation of a set of rules that must be followed by each farmer who wants to move from conventional to ecological farming. Thus, there is a conversion period that varies depending on the type of products you want to get (Shaban, 2015). At European level, ecological products are easily identifiable on the shelf, with a distinct logo and guarantee that the product comes from a sustainable agricultural system, which respects the environment and animal welfare, but also includes all other stages of the supply chain with food.

The EU green market has been steadily expanding and is now worth around 30.7 billion euro a year. Although the EU's ecological farmland has expanded over the years, they use only 7% of the total agricultural area. The difference between demand and production is covered by increased imports.

Climatic factors play an extremely important role in determining high quantities, but also qualitatively. We can notice, in the case of maize crop, where the year 2018 was a really "good" one for this crop, registering a record in this respect, when a production of over 18.8 million tons was obtained, meaning an average production of 7.8 t/ha. The high yield from last year, determined the farmers to cultivate a larger area with maize in 2019, 2.65 million hectares, compared to 2.42 hectares in the previous year.

In Romania, the arable area involved in ecological farming is quite small, occupying less than 200,000 hectares in 2017. Compared to the total area of the European Union, the area on which ecological farming is practiced in Romania represents only 1.93% of the total area in 2017.

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Neural Network Forecasting of Target Indicators of the Regional Socio-Economic Development

Yulia VERTAKOVA
Southwest State University, Kursk, Russia, vertakova7@ya.ru

Yuri TRESHCHEVSKY
Voronezh State University, Voronezh, Russia, utreshevski@yandex.ru

Nikita KLIMOV
Voronezh State University, Voronezh, Russia, klimnik1999@mail.ru

Pavel NIKULNIKOV
Voronezh State University, Voronezh, Russia, Nikulnikov.Pavel99@mail.ru

Abstract

Testing the possibilities of using the standard apparatus of neural networks for predicting the indicators of socio-economic development of regions. The used methodology is based on the standard apparatus of neural networks included in the Statistica software products. Correlation-regression analysis was used as an alternative. The use of the apparatus of neural networks is due to the practical need to supplement the socio-economic processes used to predict the socio-economic processes in the territorial and functional subsystems of countries and macro regions. Expansion of the range of interconnections between systems of various levels required the expansion of methods for predicting the parameters of socio-economic processes. Results. Approbation of the standard apparatus of neural networks was carried out on the example of predicting the dynamics of one of the most significant indicators of socio-economic development of meso-level systems - the total fertility rate. The use of a fairly simple version of the apparatus of neural networks made it possible to establish a fundamentally different version of the dynamics of the predicted indicator, which differs from the expert and "trend" one. At the time of the calculations, the growth of the indicator values in the strategic planning documents of the model region and based on the analysis of the previous trend over a fifteen-year period was predicted. Neural network analysis made it possible to predict a decrease in the birth rate in the medium and long term as one of the possible options. In other words, a pessimistic variant of the development of the demographic situation in the region is not excluded.

Keywords: Neural Network, Forecasting, Region, Target Indicators.

Introduction

Currently, the use of neural networks has become quite widespread in various fields of knowledge, including for the purpose of predicting technical and technological, socio-natural, socio-economic processes. At the moment, the e-library information system alone contains more than 500 scientific papers devoted to forecasting problems in these areas. So, some authors consider the prospects of using neural networks to predict the volume of freight traffic (Yakupov & Rozhko, 2017). Other scientists assess the capabilities of the neural network apparatus in order to assess the quality indicators of dairy products (Melnikova et al., 2017). Some scientists propose the use of neural networks to predict electrical loads (Alferova & Trokhova, 2019). Other authors highlighted in their works the experience of neural network diagnostics of a number of diseases (Lazarenko & Antonov, 2017). A.V. Yakimchuk et al. assess the prospects for long-term weather forecasting using neural networks (Yakimchuk et al., 2015). In some cases, for example, in the works of S.V. Sholtanyuk, the prediction results are compared using alternative methods, including neural networks and correlation-regression analysis (Sholtanyuk, 2019). Until now, we have not been able to find thorough research in the field of strategic forecasting of regional socio-economic systems. Despite the adoption in 2014 of the Law on Strategic Planning, which provides for the establishment of indicators of the socio-economic development of territorial subsystems of the country until 2030 or 2035, forecasting methods have basically remained the same: strategic analysis, expert forecasts, correlation regression analysis, used and in

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theoretical, in practical aspects[1]. The authors of this article have significant experience of their own in regional strategic planning and are familiar with the techniques of other expert groups. In theoretical terms, we, including in co-authorship, have proposed various options for analyzing and forecasting the development of regional socio-economic systems (Treshchevskiy, Papin & Penina, 2018; Bitarova et al., 2018; Treshchevsky et al., 2018; Lanskaya et al., 2018; Vertakova et al., 2019; Plotnikov et al., 2020).

A previous attempt to assess the possibilities of using a neural network apparatus for predicting the socio-economic parameters of a region was made by scientists (Azarnova, Treshchevsky & Papin. 2020). The calculation results showed that neural networks turned out to be "more careful" than experts - they predicted less pronounced dynamics. However, the use of neural networks for such an indicator as the gross regional product (GRP) is not of significant practical interest, since it is a kind of aggregator of socio-economic processes and, despite fluctuations associated mainly with strong crisis phenomena in certain years; it is predicted with high precision expert methods. More complicated and, accordingly, requiring the use of various methods, is the forecasting of particular indicators, which, at the same time, are of strategic importance for socio-economic systems of macro- and meso-levels. In this study, the total fertility rate was chosen as such an indicator. At present, significant organizational and financial resources of the federal center of Russia and regions of the country are directed to the growth of this indicator.

Materials and Methods

The information base for predicting the birth rate in the region was compiled by official statistics for a fifteen-year period (from 2005 to 2019). The period is sufficient to identify trends in interrelated indicators. The forecast horizon was eight years (from 2020 to 2027). This period was chosen in order to study the work of neural networks in long-term forecasting. The forecasting period is somewhat higher than the recommended one for correlation-regression analysis, but it is not yet clear for what period neural networks "work" correctly enough in predicting the parameters of socio-economic systems. Therefore, we decided to test their capabilities as long as possible.

To carry out the calculations, we used the MSExcel and Statictica 10 software products. The minimum number of hidden neurons on the inner layer is 4; maximum - 13; actual - 11, at the output of neurons - 1; networks for training - 100, for storage - 5, the output function is logistic.

Data for training and testing of neural networks were used for the period from 2005 to 2019 based on the materials of official statistics[2]. The results obtained with the help of neural networks were compared with the predicted values revealed on the basis of trends, as well as data from the “Strategy of socio-economic development of the Voronezh region for the period up to 2035”[3].

For the purposes of forecasting, in addition to the target, 13 more socio-economic indicators of the development of the region were used, including seven presented in the "Strategy - 2035". The selected indicators are theoretically related to each other and are presented in Table 1. In order to avoid the repeated use of long phrases describing the values of the indicators, the designations indicated in Table 1 are applied to them.

Table 1: Indicators used to predict the total fertility rate

Indicator name	Indicator designation
Total fertility rate, ppm	VAR 1
Population, thousand people	VAR 2
The share of the population with monetary incomes above the subsistence level,%	VAR 3
The share of the population with monetary incomes above the subsistence level,%	VAR 4
Employment rate,%	VAR 5
Total area of residential premises per 1 inhabitant, m2	VAR 6
Provision of preschool children with places in preschool educational institutions, number of	VAR 7

[1] Federal Law "On Strategic Planning in the Russian Federation" dated June 28, 2014 No. 172-FL (last edition). URL: http://www.consultant.ru/document/cons_doc_LAW_164841/ (In Russian). (The date of access 23.08.2020)
2 Regions of Russia. Socio-economic indicators. 2007-2019: stat. Sat. / Rosstat. M., 2007-2019.
[3] Law of the Voronezh Region dated 20.12.2018 No. 168-OZ "On the strategy of social and economic development of the Voronezh Region for the period up to 2035" (as amended by the Law of the Voronezh Region dated 23.12.2019 № 165-OZ). URL: https://econom.govvrn.ru/content/imagedoc/files/Закон о Стратегия- 2035(2).pdf (In Russian). (The date of access 23.08.2020)

places per 100 children	
Crime rate (number of registered crimes per 100 thousand population)	VAR 8
Population of childbearing age (15-49 years), thousand people	VAR 9
The ratio of marriages and divorces (there are divorces per 1000 marriages)	VAR 10
Social payments in the region as a whole (benefits, social assistance and scholarships), thousand rubles / month	VAR 11
Average consumer spending per capita, thousand rubles / month	VAR 12
The share of families that have received living quarters, among families registered as needing living quarters,%	VAR 13
Termination of pregnancy (abortion), number per 100 births	VAR 14

The results of the analysis of relationships and their discussion

For the purpose of forecasting using neural networks, the coefficients of pair correlation were determined for all selected indicators (table 2).

Table 2: Coefficients of pair correlation between the analyzed indicators and the total fertility rate

Indicators	**Correlation coefficients between indicators and VAR1**	**Indicators**	**Correlation coefficients between indicators and VAR1**
VAR 1	1,000000	VAR 8	**-0,602435**
VAR 2	0,116804	VAR 9	-0,475681
VAR 3	**0,620412**	VAR 10	-0,072812
VAR 4	**0,593721**	VAR 11	**0,744713**
VAR 5	0,331562	VAR 12	**0,554007**
VAR 6	**0,527137**	VAR 13	**0,589813**
VAR 7	**-0,514924**	VAR 14	**-0,805274**

Note. The values of the correlation coefficients sufficient to determine the vector and the strength of the connection are highlighted in bold (according to the Chaddock scale, the strength of the connection varies from noticeable to high).

From the data presented in Table 2, it can be seen that a significant number of interdependencies are easy to interpret logically, on the basis of which tools should be developed aimed at increasing the total fertility rate. First of all, let us pay attention to the relationships that do not allow a double interpretation of cause-and-effect relationships. Either assumes that the dependent variable is the fertility rate. Thus, a direct relationship is demonstrated by “the share of the population with money incomes above the subsistence level”, “average per capita money incomes”, “the volume of social payments” of various kinds, not necessarily associated with stimulating the birth rate (benefits, social assistance, and scholarships). Consequently, one can expect an increase in the fertility rate due to a decrease in poverty and an overall increase in income. However, the latter is not obvious, if there is a qualitative change in the general level of income, the dynamics may worsen. The same should be attributed to the "total area of residential premises per 1 inhabitant".

The positive relationship between the birth rate and "the proportion of families who received housing, among families registered as needing housing", has rather the opposite meaning - the appearance of a child increases the chance of getting housing due to state programs. Let us turn to the indicators that have an inverse relationship with the birth rate. The inverse relationship between the fertility rate and the proportion of women who terminate pregnancy is quite logical.

An inverse relationship is noticeable between the target indicator and the “level of crime”, which obviously indicates a greater desire to expand the family in “calm” conditions.

Some relationships do not follow directly from causation and require some assumptions. Thus, the inverse relationship between the birth rate and “provision of preschool children with places in preschool educational institutions” is quite logical, if we assume that their construction and commissioning are planned without taking into account the upcoming demographic changes.

The almost complete absence of a connection between the target indicator and the “ratio of marriages and divorces” (correlation coefficient - 0.07) can also be considered logical if we recognize the typical practice of forming single-parent families.

It is difficult to interpret: there is a direct connection between the sought indicator and “consumer spending per capita” (correlation coefficient 0.55). At first glance, the inverse relationship between the fertility rate and “the number of population at childbearing age” contradicts logic (the correlation coefficient - 0.47, although it does not reach the value of 0.5, is still quite high). The logic of this connection is revealed only when comparing the dynamics of the size of this population group and the special fertility rate (calculated for women of fertile age) - this coefficient is growing much faster than the share of the population aged 15 to 49 is decreasing.

Neural network forecast of the indicator dynamics - calculation methodology and results

According to the training results, neural networks were obtained with a very high value of training performance (0.9466) and the maximum values of the test and verification (1.00). This indicates the ability of the neural network to accurately describe the patterns of a number of dynamics when predicting the birth rate. Based on the results of network testing, the most accurate of them was selected. The plotted error graph is close to the normal distribution. The scatter plot of the actual values used by the program to construct the regression equation demonstrated a high degree of connection between the target and test indicators of the total fertility rate. The results of calculating the squares of the residuals of the actual data and those derived by the neural network showed a satisfactory result (table 3).

Table 3: The squares of the residuals of the actual values of the key indicator change from those derived by the neural network

Years	The actual value of the key indicator	Key metric value inferred by the neural network	Residual squares
2005	8,200	8,383	0,033450
2006	8,400	8,419	0,000351
2007	9,000	9,035	0,001218
2009	10,400	10,323	0,005932
2010	10,200	10,731	0,282221
2012	10,900	10,546	0,125072
2013	10,700	10,590	0,012083
2014	10,900	10,781	0,014100
2015	11,100	10,907	0,037347
2017	9,600	10,319	0,516616
2019	10,786	10,395	0,152792

Table 4 shows the significance of the impact of each of the selected indicators (the indicator is considered significant if the value is greater than 1.0). It is worth noting three indicators, the rejection of which will have the strongest impact on the results of the forecast: "termination of pregnancy", "social benefits", "consumer spending on average per capita".

Table 4: Network sensitivity analysis

Indicator	Designation	Significance
VAR 14	Termination of pregnancy (abortion), number per 100 births	18,8050
VAR 11	Social benefits (benefits, social assistance and scholarships), thousand rubles	3,9212
VAR 12	Average consumer spending per capita, thousand rubles	1,8933
VAR 8	Crime rate (number of registered crimes per 100 thousand population)	1,4619
VAR 6	Total area of residential premises per 1 inhabitant, m2	1,2625
VAR 13	The share of families that have received living quarters, among families registered as needing living quarters,%	1,1660
VAR 4	Average per capita cash income, thousand rubles per month	1,0604
VAR 3	The share of the population with monetary incomes above the subsistence level,%	1,0407
VAR 7	Provision of preschool children with places in preschool educational institutions, number of places per 100 children	0,9960

Let us determine the initial results of predicting the indicator using data from strategic documents and building trends based on correlation and regression analysis (Table 5).

Table 5: The results of predicting the values of indicators used for the analysis

Indicators	Years						
	2020	2021	2022	2023	2024	2025	2026
VAR 1	10,9	10,9	11,0	11,0	11,1	11,1	11,2
VAR 3	90,9	91,6	93,3	93,6	95,3	95,4	95,5
VAR 4	36,2	38,9	41,9	45,2	48,6	52,2	56,1
VAR 6	30,7	31,2	31,7	32,2	32,7	33,2	33,8
VAR 7	63,3	63,5	63,7	63,9	64,0	64,5	65,0
VAR 8	1246,0	1239,0	1227,0	1220,0	1211,0	1203,0	1192,0
VAR 11	3458,4	3644,0	3829,6	4015,2	4200,7	4386,3	4571,9
VAR 12	31,0	33,0	34,9	36,8	38,8	40,7	42,7
VAR 13	3,3	3,4	3,4	3,5	3,6	3,7	3,8
VAR 14	36,0	34,3	32,6	30,9	29,2	27,5	25,8

Note. Rounding to tenths

Forecasted values VAR 3-4, VAR 6-8 are taken from "Strategy-2035", for VAR 1 and VAR 11-14 trends are built based on statistical data (Fig. 3, 4, 5, 6, 7).

The dynamics of the key indicator is best described by the power function with a 56.5% confidence level. The equation is:

$$У = 8{,}370X^{0{,}093} \quad (1)$$

X – ordinal number of the year in the analyzed period;

У – total fertility rate.

A graphical interpretation of the actual dynamics and trend is presented in Figure 1.

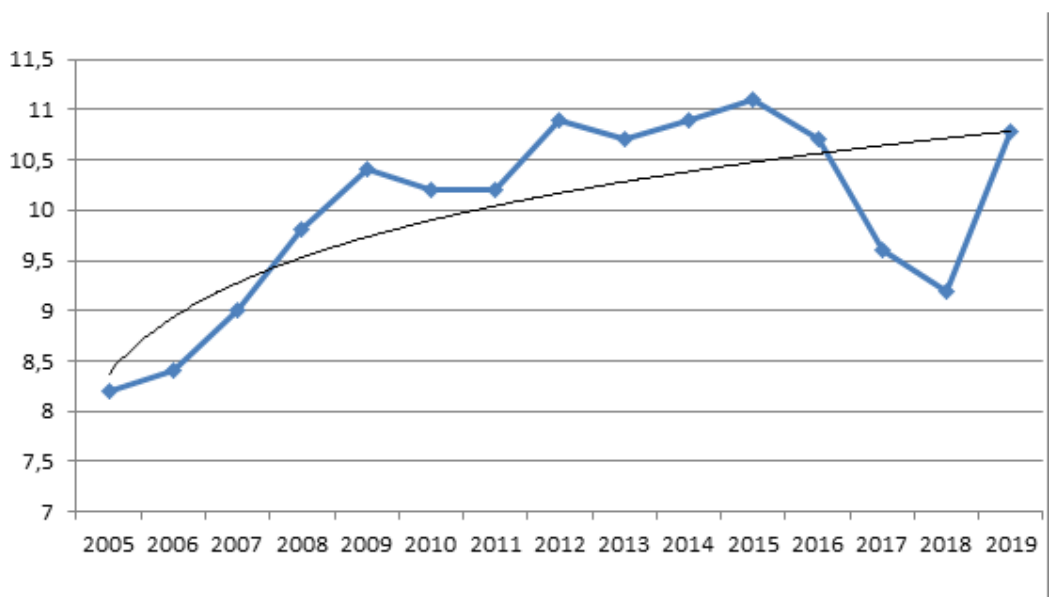

Fig. 1: Actual dynamics and trend of values of the total fertility rate in the region

Along the X-axis - calendar years; on the Y-axis - the values of the total fertility rate.

Despite the low correlation coefficient, the form of the equation and the value of the exponent of the independent variable less than 1.0 allow us to notice the positive dynamics of the total fertility rate with a decrease in its growth rates.

In all the equations below: X is the ordinal number of the year in the analyzed period; Y - the values of the corresponding indicators in units of measurement, presented in table 1. The calculation of the values of indicators associated with the birth rate by functional dependencies, showed their ambiguous "behavior" in the analyzed period.

Thus, the dynamics of the VAR 11 indicator is described by a linear trend with a probability of 92.9%, which indicates a potentially high accuracy of trend forecasting.

Equation (2) has the form:

$$У = 185{,}5941X + 488{,}867 \quad (2)$$

The ratio of the values of the free term of the equation and the coefficient in front of the independent variable demonstrates high growth rates of social benefits in the analyzed period. The presence of a linear relationship with a high correlation coefficient makes it possible to predict the preservation of the formed trend in subsequent years.

The dynamics of the VAR 12 indicator with an accuracy of 98.4% is described by a linear equation (3):

$$У = 1{,}94X - 0{,}028 \quad (3)$$

The ratio of the values of the free term of the equation and the coefficient in front of the independent variable allows us to assume stable, low growth rates of the indicator in the forecast period.

The dynamics of VAR 13 is unstable and is described by a power function with a correlation coefficient of 51.2%. Equation (4) has the form:

$$У = 0{,}093X + 1{,}763 \quad (4)$$

Fluctuations over the years in the analyzed period occur in the range from 0.5% to 6.0%. When predicting the impact of this indicator on the upcoming dynamics of the total fertility rate, it is necessary to take into account that its absolute values are small, therefore, it cannot be significant (which can be seen from the data in Table 4).

Dynamics of VAR 14, characterized by a power-law trend with a correlation coefficient of 0.96. The equation is:

$$y = 187{,}3x^{-0{,}58} \quad (5)$$

This is the most significant indicator that creates a very favorable situation for the growth of the total fertility rate that took place in the analyzed period. The values of the indicator decreased rather quickly until 2015. However, in subsequent years, the values stabilized, which indicates a low perspective for its further decline.

On the basis of the data presented above, the use of a neural network and the results of correlation-regression analysis, alternative forecasts of the dynamics of the total fertility rate in the region were obtained (table 6).

Table 6: Alternative forecasts of the dynamics of the total fertility rate (ppm)

Years	**Forecast using a neural network**	**Forecast by trend**	**Deviation (column 2 minus column 3)**
1	2	3	4
2020	10,3283	10,8515	-0,5232
2021	10,2768	10,9133	-0,6365
2022	10,2086	10,9719	-0,7632

2023	10,1461	11,0276	-0,8815
2024	10,0832	11,0806	-0,9975
2025	10,0057	11,1314	-1,1257
2026	9,8891	11,1800	-1,2909
2027	9,8037	11,2266	-1,4229

Graphical interpretation of the data in Table 6 is shown in Figure 2.

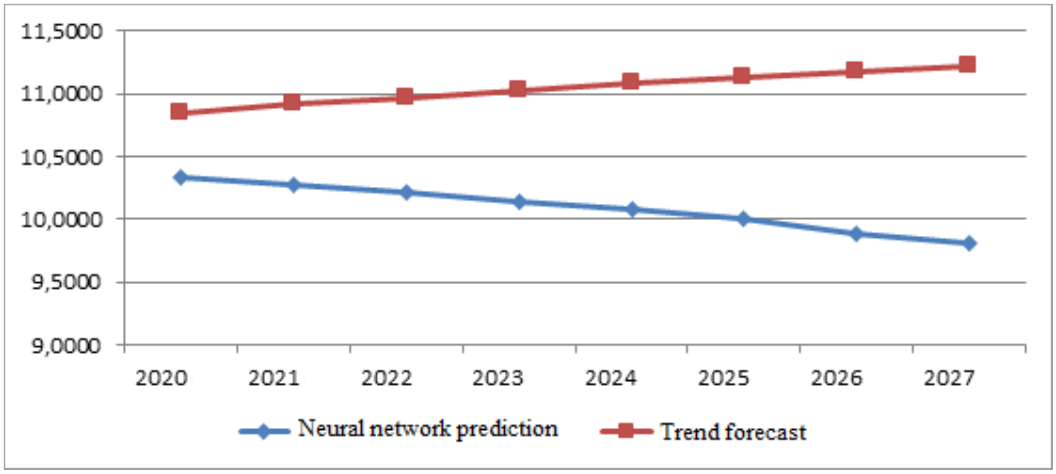

Fig. 2: Alternative forecasts of the dynamics of the total fertility rate (on the abscissa - calendar years; on the ordinate - the values of the fertility rate in ppm)

As can be seen from the above analysis, the data in Table 6 and Figure 2, the forecast based on a linear trend, characterized by a high level of reliability of the regression equation, and the neural network forecast differ significantly. In the first case, we observe, although not high, but positive dynamics, in the second - negative. At the moment, of course, it is impossible to draw a conclusion about the accuracy of each forecast, but the authors believe that the neural network forecast is more realistic, since it takes into account the dynamics of indicators associated with the target. A number of them will, as follows from the above analysis, have a negative impact on the growth of the total fertility rate. The performed calculations demonstrate, in the opinion of the authors of the article, good prospects for using the apparatus of neural networks, even in their simplest version, for predicting the socio-economic indicators of large systems (in particular, regions).

Conclusion

Theoretical developments in the field of the formation of the apparatus of neural networks have now moved into the plane of practical application in the analysis and forecasting of the development of socio-economic systems of various levels. The need for its application is due to the complexity of the relationship between individual socio-economic processes and their characteristics. Correlation-regression and expert analysis used in the process of forecasting socio-economic processes have practically exhausted the possibilities for improvement. This required the use of an apparatus to reveal hidden patterns in the relationship. In some cases, they are not obvious enough even at the qualitative level, and quantitative characteristics generally represent an almost in-soluble problem for experts, usually specializing in narrow areas of economic knowledge. A serious basis for the use of neural network analysis is the formation of a fairly reliable statistical base of socio-economic indicators of Russian regions, covering a period of 18-19 years, which, in turn, makes it possible to forecast for 4-7 years, depending on the statistical characteristics of the identified dependencies. The significant scale and inertia of regional socio-economic systems makes them very convenient models for testing the apparatus of neural networks.

Approbation of the standard apparatus of neural networks using the example of predicting the values of one of the significant indicators of socio-economic development of meso-level systems - the total fertility rate, made it possible to establish a fundamentally different variant of its dynamics, which differs from the expert and "trend"

one. For the purpose of strategic management of regions, it is advisable to use the results obtained to substantiate one of the development options, in this case - pessimistic.

Acknowledgment

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Development Problems of Business Structures in the Context of Transformation

Yulia VERTAKOVA
Southwest State University, Kursk, Russia
vertakova7@ya.ru

Maria KLEVTSOVA
Southwest State University, Kursk, Russia
klevtsovam@mail.ru

Yulia POLOZHENTSEVA
Southwest State University, Kursk, Russia
polojenceva84@mail.ru

Alexandra CHULAKOVA
Financial University under the Government of RF (Kursk branch), Kursk, Russia
alchulakova@fa.ru

Abstract

The practical experience of foreign countries shows that the formation and development of partnerships between enterprises has a positive effect on the modernization of the economy and the harmonious development of the business environment. The transition to the knowledge economy and the stimulation of innovation require rethinking of the role of interaction between business structures in the field of small entrepreneurship. However, since there is a wide variety of tasks, goals, activities and business conditions for the participants in the relationship, it is important to study the process of interaction between business structures in the field of small business. The purpose of the article is to analyze the development problems of business structures in the context of transformation. As a methodological basis for the study, the authors used the methods of comparative, statistical and graphic-analytical analysis of the main indicators of the development of business structures. The study analyzes the dynamics of key indicators of the development of business structures in Europe and Russia, which makes it possible to assess the impact of small and medium-sized businesses on the economic development of countries. On the basis of the comparative analysis, the key problems in the development of small and medium-sized businesses in foreign countries have been identified. The programs of public and private financing of business structures in Russia and abroad have been analyzed. Measures to support and regulate the activities of business structures have been summarized, which allows taking into account the peculiarities of the functioning of small and medium-sized businesses in various economic spheres.

Keywords: Transformation, Small Business, Government Regulation

Introduction

The state should support social initiatives of business both materially and morally. The degree of compliance of corporate social investments with both the needs of the business itself and the interests of the country's development depends on the effectiveness of relations between the state and business.

The development of relationships between business and the state is a reflection of changes in economic relations in society. The main task here is the necessity to find forms of optimal and effective partnership between the state and private business to ensure sustainable socio-economic development of the national economy as a whole.

The main principle of applying the concept of the model of partnership between the public and private sectors of the national economy is that the state determines what services it needs, and private investors create supply that must meet the requirements of the state (Polozhentseva et al, 2017; Vertakova et al, 2016).

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Thus, the model of partnership between the public and private sectors of the economy is considered as an integrated concept.

At the moment, there is a problem of increasing the level of cooperation between government and business structures. (Held, 1996). Relations between the state and business should be formed on the basis of mutual responsibility, which will ensure the harmonization of their interests in the direction of raising social standards, the level and quality of people's life. When choosing models of cooperation, it is necessary to take into account the peculiarities of the tasks facing society and business, the specifics of the functioning of entrepreneurial structures and their real possibilities of influencing the socio-economic development of the state. (Androsova, 2013). Government and business should be mutually responsible for the fulfillment of their obligations to society and citizens.

The authors suggest considering separately the listed structures within the framework of the study of the object of the research - the process of interaction between business structures.

1) Cluster formations are the most common form of interaction between business structures.

The creation of cluster formations in the economy has attracted considerable attention of many scientists for a long time.

2) The attractiveness of network structures is explained by very high production advantages, which mean the emergence of a network of interaction, and "collaborative networked organizations" that have different typologies, as evidenced by the typology of collaborative networks.

The network economy is a form of economic activity based on the information environment, the economic advantages of network forms are in the formation of more optimal communications than the market can do, simplification of optimal coordination in the face of changes, the importance of which cannot be fully conveyed or comprehended through price signals.

The mechanisms of network structures lead to an increase in the interest of collaborators in the use of "open concepts"; the center of interest is shifting from maximizing its internal profit to maximizing the productivity of the infrastructure as a whole.

So, the network economy as a product of the development of stakeholders of the productive forces, the active use of information technologies, a new form of organizing economic activity has undeniable advantages and certain limitations. The development of network forms of economic organization in the context of globalization causes the evolution of modern economic systems, opens up new opportunities for generating income and requires adequate mechanisms inherent in these forms of interaction between corporate and government structures, and their use in the interests of society.

3) The authors also consider the most common form of interaction between business structures - public-private partnership (PPP).

Investigating the problem of interaction between business structures, there are several approaches to defining the spheres and even the category of such interaction itself. The first thing that should be said about this is that “public-private partnership” is a concept that has recently become more widespread.

Gerrard M. B. (Gerrard, 2001) clarifies the purpose of the PPP mechanism by the state. To date, a number of authors have come to the general consensus that PPP is cooperation in the sharing of resources.

From the point of view of Budaeus D., PPP is a long-term cooperation between public institutions performing public tasks and private enterprises.

The state sector of the economy in PPP projects can be represented by central, regional and local executive authorities, depending on the scale of the project. Private sector can be represented by one or more private economic agents. In some cases, third parties may be involved in the preparation and implementation of PPP projects. One of the important tasks in the framework of PPP is such a coordination of the interests of the participants, which would allow each of them to realize their own needs with minimal losses and receive benefits.

Thus, all forms of relations between the state and business are between the state order and privatization.

Results

Analysis of the development of business structures in the context of transformation

Small and medium-sized enterprises play a fundamental role in investment and innovation in Europe. Despite macroeconomic problems such as weak domestic demand and economic uncertainty, they continue to be an integral part of the manufacturing sector.

Currently, around 162.8 million small and medium-sized businesses are registered around the world. In general, the average density of small and medium-sized businesses is at the level of 32.18 entities per 1000 people. The leaders of the countries with the highest rates of SME density are: the United States (89.96), Czech Republic (89.31), Liechtenstein (80.69), Iceland (79.20) and Portugal (78.70). There are approximately 28.7 million commercial SMEs, with approximately 18.6 million operating in emerging markets. Moreover, the main share of small and medium-sized businesses is made up of micro-enterprises; there are about 131.4 million of them worldwide. [1].

About 508.0 million employees work in small and medium-sized businesses, with about 231.4 million employees working in emerging markets. It is worth noting that in general, worldwide, according to the estimates of the International Labor Organization, small and medium-sized enterprises, on average, account for 37.5 percent of employment. The World Bank also estimated that small and medium enterprises in 104 developing countries accounted for 47.94 percent of employment.

Canada (85 percent), China (75 percent), Japan (60 percent), Ukraine (57 percent) and Lithuania (52 percent) are leaders in terms of the share of small and medium-sized businesses in employment.

The authors suggest considering the position of small and medium-sized enterprises in the four largest economies of the European Union: Germany, France, Spain and Italy. The economies of these countries account for more than 13 million small and medium-sized enterprises, representing more than 98% of all firms in 2014 and employing more than half of the workforce in these countries.

As such, in the future, international competitiveness and hence the long-term growth and prosperity of the four largest economies in Europe will depend largely on the viability of their micro, small and medium-sized enterprises (SMEs).

The authors analyze the dynamics of the number of small and medium-sized enterprises in Europe for the period from 2016 to 2018 (Table 1). For more informational content, the analysis will include the countries with the largest economies in Europe.

Table 1: dynamics of the number of small and medium-sized enterprises in European countries (2016-2018).

Country	2016	2017	2018	Absolute deviation of 2017 to 2016	Absolute deviation of 2018 to 2017	Growth rate of 2017 to 2016	Growth rate of 2018to 2017
Germany	2 179 097	2 182 416	2 486 635	3 319	304 219	100,1	113,9
France	2 877 989	3 012 369	3 183 959	134 380	171 590	104,6	105,6
Spain	2 382 328	2 352 275	2 374 429	-30 053	22 154	98,73	100,9
Great Britain	1 697 653	1 775 877	1 835 574	1 122	10 297	100,1	101,5
Total	22 303 139	22 529 983	23 653 265	226 844	1 123 282	101,0	104,9

Source: http://ec.europa.eu/

Based on the results of Table 1, it can be seen that, in general, the number of small and medium-sized enterprises in Europe is growing (in 2017, compared to 2016, by 226,844 units, or by 1%; and in 2018, compared to 2017, by 1,123,282 units, or 4.9%). Country analysis also shows an increase in the number of enterprises.

[1] Small and Medium Business in Europe / [Electronic resource] /http://www.smeeurope.eu/

So, for example, in Germany in 2017 their number was 2,182,416 units, which is 3,319 more than in 2016, or 1%. And already in 2018 the number of small and medium-sized enterprises reached 2,486,635 units, which is 304,219 thousand more than in 2017.

France is the leader in the number of small and medium-sized enterprises. In 2018, compared to 2017, their number increased by 171,590 thousand (or 5.6%), and amounted to 3,183,959 enterprises.

The authors further analyze the share of small and medium-sized enterprises in the total number (Table 5). Based on table 2, it is possible to conclude that the number of small and medium-sized enterprises in total has increased in recent years.

Table 2: the share of small and medium-sized enterprises in the total number of enterprises

Country	The number of enterprises in total 2016	Share of small and medium enterprises,%	Number of enterprises in total 2017	Share of small and medium enterprises,%	The number of enterprises in total 2018	Share of small and medium enterprises,%
Germany	2 189 737	99,51	2 193 135	99,51	2 497 694	99,56
France	2 882 419	99,85	3 016 705	99,86	3 188 138	99,87
Spain	2 385 077	99,88	2 354 948	99,89	2 377 191	99,88
Great Britain	1 703 562	99,65	1 781 894	99,66	1 841 715	99,67
Total	22 346 729	99,80	22 573 702	99,81	23 695 657	99,82

Source: http://ec.europa.eu/

In the period from 2016 to 2018, their share increased by 0.02%, and amounted to 99.82%. The largest share of the number of SMEs in the studied countries is observed in Spain (99.88%), as well as the share of SMEs above the average for European countries is observed in Spain (99.87%).

If we consider a wider range of time, we can observe that the number of small and medium-sized enterprises in Europe has almost doubled (Figure 1)[2].

At the same time, the number of small businesses in Italy, for the period from 2013 to 2018, increased by 142%. France is experiencing growth above the European average in the number of medium-sized enterprises (112%).

SMEs in the total number of employed in Europe accounted for 67% of the total in 2018, the relative contribution of small and medium-sized enterprises to the total number; this indicator varies significantly from country to country (Figure 1).

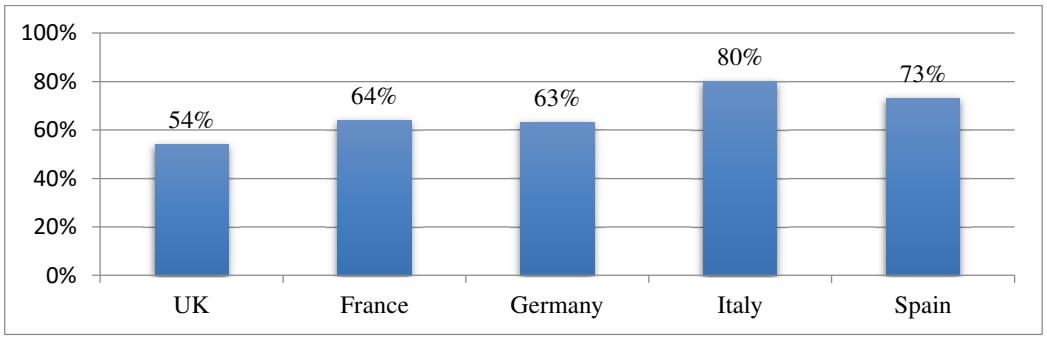

Fig. 1: The share of small and medium-sized enterprises in the total number of employed residents in 2018

The leader in this indicator among the countries with the largest economy in Europe is Italy. The share of workers in small and medium-sized enterprises there amounted to 80% of the total.

[2]Official site of Eurostat [Electronic resource]/ http://ec.europa.eu/

In Spain it is slightly lower - 73%. Germany and France are roughly at the same level 63% and 64% respectively. The UK has the lowest indicator for the number of people employed in the small and medium-sized business sector in Europe (54%).

Small and medium-sized enterprises make a huge contribution to the total value added. So in 2018, their share amounted, on average across the EU countries, to 58% (Figure 2).

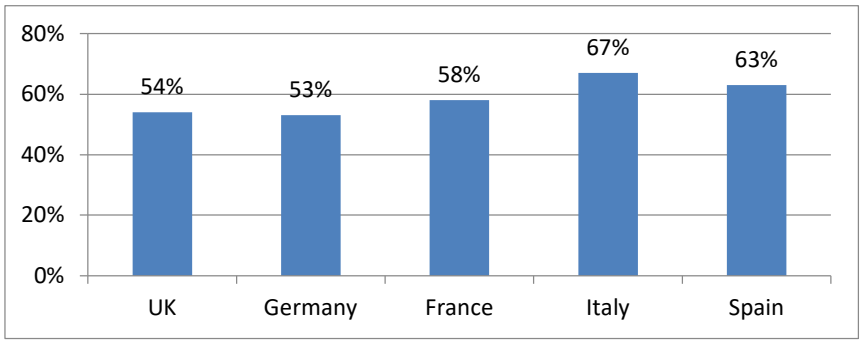

Fig. 2: Share of small and medium-sized enterprises in total value added in 2018

Small and medium-sized enterprises play a very important role in all spheres of the world's economies. And their influence is growing every year. The authors suggest considering the dynamics of registration of small and medium-sized enterprises in the field of healthcare innovation and development of new medicines in Europe.

The Regulation on Participation of Small and Medium Enterprises was adopted to promote innovation and development of new medicines by small and medium enterprises. Its main goal is to provide financial and administrative assistance to micro, small and medium enterprises.

At the end of 2018 (Figure 3), the number of companies with the status of small and medium-sized businesses amounted to 1619, which is the highest indicator in the entire history since the emergence of the initiative for the participation of small and medium-sized businesses in the development of medicines. The number of small and medium-sized enterprises registered with the Agency at the end of 2018 was 15 times higher than in 2010 and increased by 24% compared to the previous year. Significant increases in 2015 and 2018 were associated with companies registering paid incentives and paid pharmacological incentives for MedDRA, respectively.[3].

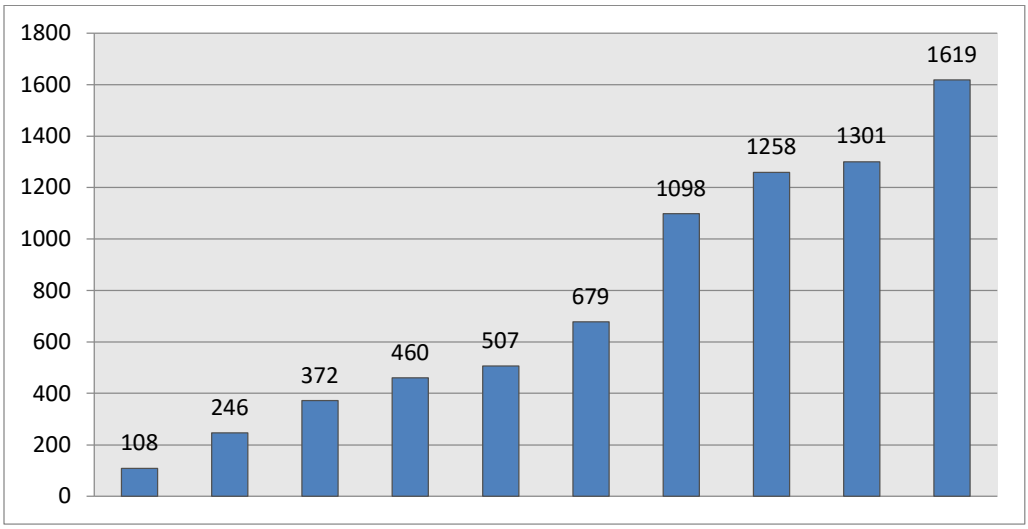

Fig. 3: Number of registered companies from 2009 to 2018

[3] Official website of the European Medical Agency / [Electronic resource]/ http://www.ema.europa.eu/ema/

Since the launch of this project, the application process for SME status has been simplified in order to reduce the administrative burden on the applicant companies. An automated electronic declaration form for small and medium-sized businesses that calculates the number of personnel, annual turnover and the final balance in accordance with the ownership structure of the enterprise was launched in 2011. Countries leading in the share of small and medium-sized enterprises in innovation and medicine development in 2018 are the United Kingdom, Germany and France, followed by Italy and Spain.

In 2018, most of the registered companies were involved in the development of products for human use (76%), 5% developed both human and veterinary medicines, and 4% only veterinary medicines. Service providers for the pharmaceutical industry accounted for 15% of companies; most of them were regulatory consultants (86% of all service providers). Of these registered SMEs, 14% were created within the last 3 years (since January 2016). Most companies are privately owned, either by individuals such as founders or employees, or owned by private corporations through partnerships and holdings.

Venture capital funding is 7% of the equity capital of the companies. At present, the share of developed high-tech medicines by small and medium-sized enterprises is 7%. Also, one of the striking examples of support programs for small and medium-sized businesses is the KeyGene Company[4].

KeyGene's core activity is strategic and applied research into natural genetic changes in vegetables and other crops. It has 135 employees and is based in the Netherlands. Founded in 1989, the company strengthened its international activities in 2004, when the European Commission implemented a project to support small and medium-sized enterprises in international projects. During this period, the company established a subsidiary in the United States and began cooperation with a research institute in China. In addition, the company hired more employees from foreign countries and established English as the main internal language. KeyGene is currently receiving useful support for its international activities not only from its shareholders, but also from the Dutch embassies, as well as from the European Business Association. Moreover KeyGene participates in joint public projects funded by European research institutions. Internationalization has thus had a significant positive impact on companies: turnover, number of employees and number of patents have all led to strong growth.

Problems of small and medium-sized businesses in foreign countries and programs to support and regulate the activities of business structures

After two years of recession, the short-term outlook for European economies has improved. However, this picture hides a very heterogeneous environment in the four largest players, where the financial and economic crisis that began in 2008 has been felt at different levels of intensity.

In Germany activity recovered to pre-crisis levels in early 2012 and after two years of stagnation in 2012 and 2013 accelerated again in 2015-2018[5]. The labor market proved to be very resilient, with the unemployment rate reaching 6.7% at the end of 2018, the lowest level since German reunification. Spain and Italy, on the other hand, experienced a major double recession. The output began to fall sharply from mid-2011, when the sovereign debt crisis intensified. Tightening financial conditions and fiscal consolidation have seriously affected public and private demand. In Spain, suppressed domestic demand led to unemployment at 26% at the end of 2012.

However, in early 2013, Spain began to recover, pushing export growth. Domestic consumption accelerated in 2014[6], and high unemployment started to decline. At the same time, despite this, the recession has slowed down, Italian production continues to fall and unemployment continues to rise.

The French economy has taken an intermediate path. A strong recession in the economy at the first stage of the crisis and the release of the pre-crisis level reached in early 2011, as in Germany. However, this recovery quickly stopped and a long period of stagnation followed. 2014 was the third year in a row with near-zero unemployment growth, rising slowly but steadily[7].

Regardless of the speed of recovery in different countries, 2018 began with some positive news for the entire eurozone, encouraging hopes in the near future to break out of the long stagnation of the past years.

[4] Official website of the "KeyGene" company / [Electronic resource]/ http://www.keygene.com/
[5] Official website of state statistics of Germany / [Electronic resource] /https://www.destatis.de
[6] Ministry of Economy and Competitiveness of Spain / [Electronic resource]/https://www.mineco.gob.es
[7]Official site of the international financial agency / [Electronic resource] /http://www.ifc.org/

The sharp drop in oil prices will have a beneficial effect on household purchasing power, which can already be seen in the rebound in consumer confidence at the start of the 2018 survey, as well as on firms' production costs, generating more profits and investment. In addition, the depreciation of the euro affected the relief for the export sector.

In terms of recovery in consumption, the short-term outlook is much brighter for the European manufacturing sector today than a year ago. However, many problems remain unresolved. Difficult macroeconomic conditions have left their mark on the European manufacturing sector. Small and medium-sized enterprises, which are at the heart of its dynamics, have been particularly hard hit. Less diversified and more financially fragile, they were particularly vulnerable to weak demand conditions and, in many cases, face difficulties in accessing financial resources. This led to a decrease in their investment costs, and forced them to postpone particularly high levels of return, in yet risky projects.

In addition, the crisis has shown the need for many European economies to improve their competitiveness, especially in Italy, France and Spain.

All three countries have significant and strong export sectors that will benefit from competitiveness reforms as previous growth drivers, such as housing and civil construction, and consolidate their balance sheets. In addition to adjusting spending, strengthening the size of non-price factors such as quality, reputation, and innovation is important in the long term for economies for which external demand is an important component of GDP.

Many other issues need to be addressed in order to achieve a sustainable recovery, such as the continuing decline in leverage, the continued large reserve capacity that leads to weak inflation, and the persistence of financial fragmentation in the euro area despite recent significant improvement.

In any case, the present weakening of financial and economic conditions is an opportunity for European SMEs to address these problems. Stimulating investment strategies for small and medium-sized businesses, especially if they focus on innovation and growth, can contribute to strengthening competitiveness in the deflationary environment of the euro area.

The survey results show a rather contradictory picture of the current competitiveness of small and medium-sized enterprises in Europe. However, they transmit a clear signal. European small and medium-sized enterprises face stiff competition in world markets based on the prices of goods and services. They are unlikely to be able to compete with low-priced firms from emerging economies such as China and Brazil. Consequently, aspects such as quality, reputation and innovation will be critical for European SMEs to survive in a globalized world.

Eurostat personnel recently conducted a survey to assess the international competitiveness of small and medium-sized enterprises in ten industrialized and developing countries and compare them in terms of price, quality or innovativeness of their products and services (table 3).

Table 3: indicators for assessing the competitiveness of small and medium enterprises in ten industrialized and developing countries

Indicator	Great Britain	Brazil	The USA	Germany	France	Russia	Spain	China	Italy	Japan
Price	3,3	3,53	3,24	2,85	3,15	3,27	3,16	3,40	3,09	2,97
Quality	3,67	3,5	3,60	3,89	3,44	3,45	3,38	3,16	3,40	3,28
Innovation	3,49	3,43	3,47	3,42	3,22	3,12	3,23	3,11	3,22	3,00
Recognition	3,48	3,50	3,28	3,17	3,40	3,22	3,20	3,07	3,22	2,79
Delivery Time	3,43	3,51	3,19	3,75	3,24	3,30	3,30	3,31	3,25	3,31
Service level	3,58	3,36	3,53	3,85	3,34	3,30	3,27	3,09	3,11	2,87
Personnel	3,32	3,22	3,14	2,55	3,00	3,01	3,07	3,44	2,92	2,77
Total Level	3,47	3,44	3,35	3,35	3,26	3,24	3,23	3,23	3,17	3,00

Source: http://ec.europa.eu/

To determine the firm's performance, representatives of the companies were interviewed and asked to rate their performance in comparison with their main international competitors in various aspects. Possible answers: 1 - much worse; 2 - slightly worse; 3 - similarly; 4 - slightly better; 5 - much better. The values displayed represent the weighted average of all surveyed companies in the country. The firm's productivity component indicator is calculated as a simple average of seven factors.

When it comes to pricing, only Brazilian and Chinese firms perceive themselves to be highly competitive in international markets. French, Spanish, Italian and in particular German small and medium-sized enterprises, on the contrary, perceive their price competitiveness as relatively weak. Russian firms, according to competitors' surveys, have a fairly good level of prices, quality, delivery time and level of service. The authors suggest referring to the World Bank's annual Ease of Doing Business report (Table 4)[8].

Table 4: Ease of Doing Business Rating

Country	Establishment of enterprises	Obtaining construction permits	Property registration	Access to credit	Taxation	Raiting
Germany	114	12	79	32	48	17
France	27	20	100	82	63	29
Spain	85	113	50	62	37	32
Italy	22	28	10	28	32	50
The USA	51	39	36	2	36	8

Source: http://doingbusiness.org/

France is ranked 27th in terms of ease of doing business, according to the World Bank. The state provides an enabling business environment with strong government institutions and a regulatory framework in line with European standards. The main French business sectors are electronics, transport, tourism, textiles, food processing and chemicals.

Starting a new company in France can be done quickly and easily. All formalities can be resolved in one place: Business Center. French law provides effective regimes for the protection of intellectual property, as well as specific tax incentives to create; storage; removal of IP and IT rights.

Companies in France are subject to corporate income tax at a rate of 34.43%. Foreign companies are also subject to limited liability tax on their French source of income. However, there are many favorable tax regimes applicable to companies belonging to the same group that comply with transfer pricing rules that follow OECD principles[9].

Any salaried employee must be declared to the local social security authorities within the 8-day period prior to commencement of the employment. Payment of wages is subject to social security contributions, which vary depending on the amount of wages paid and the nature of the employee's work. In addition, the French legal framework protects workers, as an employee can only be fired in very specific circumstances, and after the completion of a regulated process.

Spain is ranked 85th in the ease of doing business ranking. Small and medium-sized businesses across Spain have a lot of variance in regulatory practices depending on where they do business. Differences in implementation requirements at municipal, regional and national levels determine how easy it is to do business.

Except for construction permits, all regions are below the European average.

Italy takes the 22nd place in the Ease of Doing Business ranking. In Italy, the easiest way to deal with a construction permit and registration of property rights in Bologna, enforcement of a contract in Turin, and starting a business in Catanzaro or Padua. For cross-border trade Genoa is the best port.

Differences from one city to another can be very large. In the case of obtaining construction permits, the main delay in obtaining one depends on the municipality. In Catanzaro and Palermo, this step alone takes six months, while the same procedure takes half that time in Campobasso, Naples, and Potenza, and only one month in Milan.[10].

[8] Official website of the World Bank [Electronic resource]http://doingbusiness.org/

[9] Official website of the Organization for Economic Cooperation and Development / [Electronic resource]/ http://www.oecdru.org/

The legal environment for local entrepreneurs in Italy is improving and the pace of change is gaining momentum. Comparing Italy's performance from 2005, the global Doing Business report shows how much the regulatory environment has changed for the better.

Despite the good changes, problems still remain. Companies across Italy continue to face inefficient and time-consuming procedures that carry high costs, especially in areas such as obtaining building permits and enforcing contracts.

In the 2016 annual report of the World Bank the USA fell from seventh to eighth in the overall ranking. Just six years ago the US ranked fourth. The main fault lies with New York City's legal problems, as these ratings were derived from examining the conditions for doing business in the most economically important city in each country.

Tax reform was underway in the United States. There is widespread support for simplifying the US tax code for businesses by lowering rates while expanding the tax base by closing loopholes[11]. Due to this, it has become easier to pay taxes, and the United States is in the middle place among the OECD countries in terms of ease of paying taxes. Also, in the future, it is planned to introduce a state law that will equalize taxes between enterprises in different states, which makes the economy more efficient as a whole.

Nowadays, businesses are facing huge challenges, and small and medium enterprises are no exception. In addition to globalization, small and medium-sized enterprises face a number of other challenges, such as increasing digitalization, rising energy prices and an aging population, that require smart investment and innovation strategies. The computerization of manufacturing, or the fourth industrial revolution, offers many opportunities for small and medium-sized businesses that are willing to invest in process innovation, but poses a threat to enterprises that are defensive against it. Energy prices are still low, but the expected growth in the medium term could make investments in energy saving technologies irreplaceable.

This is especially true for small and medium-sized enterprises with energy-intensive production processes. SMEs also face demographic challenges. The average age of small and medium-sized business owners in Germany, for example, has risen from 45 in 2002 to 51 in 2018[12]. Older owners tend to invest significantly less in their firm. They are more focused on replacing investments than expanding production capacity.

This underlines the need for a comprehensive economic policy that encourages investment and innovation, including more indirect measures such as encouraging young talent and entrepreneurial successors of a company. European politicians have already realized this and have launched a series of initiatives to encourage investment and innovation across Europe. In this regard, the "Junker plan" is currently being implemented, which has a strong impact on the development of small and medium-sized businesses in Europe. The Junker plan is dependent on the European Fund for Strategic Investment (EFSI). EFSI supports strategic investments in infrastructure as well as financial risks for small businesses that the market cannot finance alone. Therefore, it finances projects with a higher risk profile in an effort to maximize the impact of public spending and unblock private investment. EFSI focuses its funding on infrastructure investments and innovation in small and medium-sized enterprises.

According to the European Commission, the EFSI is expected to allocate 315 billion euros to the real sector of the economy within three years (2015-2017), of which 240 billion euros is provided for long-term investments in infrastructure and 75 billion euros is planned for financing small and medium-sized businesses[13].

Also, at present, the countries of the European Union are implementing the "Horizon 2020" program. The volume of investments is about € 3 billion, which is being implemented in the period 2014-2020. The programs included in this project help small and medium-sized enterprises with high potential to develop innovative ideas for products, services or processes that are ready for global market competition.

During the first two years of implementation, more than 1200 SMEs received funding under the SME Support Program. Around 513 million euros have been invested in the success of innovative small and medium-sized

[10]The official website of small and medium-sized businesses in Italy / [Electronic resource] /http://www.sme.it/

[11] Official website of small and medium-sized enterprises in the USA / [Electronic resource] /http://www.sme-usa.com/

[12] Official website of the analytical center of the German state bank / [Electronic resource] /https://www.kfw.de

[13] Official website of the European Investment Bank / [Electronic resource] /http://www.eib.org/efsi/

enterprises. By the end of 2020, the Horizon project will finance about 7500 new small and medium-sized businesses[14].

The program offers the following tools to support small and medium businesses:

- Business innovation grants for the purposes of technical and economic assessment: 50,000 EUR (one-time) in the project (70% of the total project cost);

- Business innovation grants for innovative development and demonstration purposes: an amount in the approximate range of 500,000 euros and 2.5 million (70% of the total project cost as a general rule);

- Free business trainings (optional) in order to support and strengthen the innovative potential of the firm and help in aligning projects with strategic business needs;

- Access to a wide range of innovation support services and easier access to venture funding to promote the commercial exploitation of innovation.

Conclusions

The practical experience of foreign countries shows that the formation and development of partnerships between enterprises has a positive effect on the modernization of the economy and the harmonious development of the business environment. The transition to the knowledge economy and the stimulation of innovation require a rethinking of the role of interaction between business structures in the field of small entrepreneurship.

However, since there is a wide variety of tasks, goals, areas of activity and business conditions for the participants in the relationship, it is important to study the process of interaction between business structures in the field of small business.

In world practice, within the framework of the concept of partnership models of the public and private corporate sector of the national economy, five basic models of cooperation have been formed.

The basic principle of applying the concept of the partnership model between the public and private sectors of the national economy is that the state determines what services it needs, and private investors create supply that must meet the requirements of the state.

Thus, the model of partnership between the public and private sectors of the economy is considered as an integrated concept.

At the moment, there is a problem of increasing the level of cooperation between the government and business structures. Relations between the state and business should be formed on the basis of mutual responsibility; it will ensure the harmonization of their interests in the direction of raising social standards, the level and quality of people's life.

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Influence of The Implemented Management Systems on Risk-Based Thinking in Organizations – A Review

Alina MATUSZAK-FLEJSZMAN
Poznan University of Economics and Business, Poznan, Poland
alina.matuszak-flejszman@ue.poznan.pl

Beata PALIWODA
Poznan University of Economics and Business, Poznan, Poland
beata.paliwoda@ue.poznan.pl

Abstract

The paper presents a discussion on the influence of implemented management systems such ISO 9001, ISO 14001 and ISO 45001 on risk-based thinking in organizations. The requirement to use a risk-based thinking in the organizations appeared with the entry into force of international standards based on so-called high level structure. Many organizations have introduced basic principles related to the identification of risks and opportunities resulting from the application of a risk-based thinking. However, in international ISO standards are included only requirements. This means that the management of an organization may use a risk-based thinking in various ways to identify risks and opportunities and appropriately manage areas where risks and opportunities emerge. The complexity of the methods of application depends on the organizational context, including the internal environment and maturity of processes and management system as a whole [Zhemchugova and Levshina, 2020].
The aim of this article is to show the influence of implemented management systems on risk-based thinking in organizations. This article indicates the requirements for the risk-based thinking as part of the quality, environmental and occupational health and safety management system. The possibilities of using the risk-based thinking in the organization within three areas of systemic management were presented.

Keywords: Risks, Opportunities, Risk-Based Thinking, Quality Management System, Environmental Management System, Occupational Health and Safety Management System.

Introduction

Risk-based thinking is an integral part of the functioning of organizations in all aspects of their operations, because in order to implement the strategy, all steps taken by the management of an organization are burdened with a certain degree of risk and opportunities that may be associated with the functioning and development of their business. Dynamically changing conditions of the economic environment and organizational context means that an appropriate approach to risk management is now crucial and constitute a determinant of effective management as such [Tchankova, 2002]. Top management of an organization focused on improving the performance of its activities shall demonstrate a commitment with respect to the risk-based thinking [Chiarini, 2017] and must be aware of a number of factors affecting the activities of the organization and leading to the occurring of both risks and opportunities. Organizational risk management must be incorporated into decision-making processes that generate value for organizations [Gallop et al., 2016]. Failure in considering risks in decision-making processes can have many negative effects, from losing a customer, through losing control over the organization, up to possible bankruptcy of the company [Falkner and Hiebl, 2015]. Therefor a lot of organizations have formed risk management departments to manage and control their threatening risks that they are exposed to [Samani et al., 2017].

Risk-based thinking has been used in management systems since the last revision of international standards (ISO). In previous editions of these standards, the concept of the risk-based approach was presented indirectly, e.g. by planning, carrying out management reviews, conducting preventive actions to eliminate potential non-conformities

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and their consequences, analyzing non-conformities that have already occurred, and by taking actions to prevent the non-compliance from recurring. Currently, the requirements of the international standards for risk-based approach are firmly defined. Risk-based thinking enables the organization's management to identify factors that may cause deviations from the planned results of the processes and management system, introduce preventive oversight measures to minimize negative effects and make the most of the opportunities [ISO 9001:2015, point 0.1]. The volatility of the business environment is predictable to a varying degree and may affect the undertaken activities both positively and negatively. In order to maximize market opportunities and minimize threats, risk management takes place in every organization, implemented in a more or less formalized way in relation to the intuitive approach taking place in the activities of every human being [Zapłata, 2019]. Each of the ISO standards containing requirements for the application of a system approach to quality, environmental, and occupational health and safety management define the areas of risk-based thinking and related risk management to be applied in the organization.

The article aims to present the issues related to the application of risk-based thinking in a systemic approach to quality, environmental and health and safety management and to present the results of a pilot study conducted in organizations operating in Poland in terms of assessing the impact of implemented management systems on risk-based thinking.

Basic definitions in terms of risks and opportunities

The concept of risk is present in most scientific areas e.g. finance management [Mertzanis, 2014], project management [Ward and Chapman, 2003; Kutsch, 2008], investment management [Merková and Drábek, 2015], insurance [Willet, 1901], human resource management [Becker and Smidt, 2016], innovation management [O'Connor et al., 2008; Bowers and Khorakian, 2014], maths [Biagini et al., 2014] or quality management [Jedynak, 2017]. The interweaving of concepts, theories and measurement methods from various areas of science has made today's knowledge of risk interdisciplinary, which affects many different definitions of the term "risk". Cambridge Dictionary defines risk as "the possibility of something bad happening" [Cambridge Dictionary]. Another popular definition define risk as: "the measure of probability and the weight of undesired consequences" [Lawrence, 1976]. According to Campbell "risk equals expected damage" [Campbell, 2005]. Those definitions see risk in negative light, which is often treated as a threat. In the case of negative characterization of risk, it is referred to when there is a probability of a certain damage, loss or simply failure to implement the established assumptions. In such cases, risk is associated with the terms "threat", "danger", "loss" or "harm". Some other definitions put risk in neutral light e.g. "risk equals the product of probability and severity" [Wilson and Crouch, 1982]. In ISO 31000, risk is defined neutrally as [ISO 31000:2018]:

- uncertainty related to an event or action that will affect the ability to achieve goals,
- the chance that something will happen that will have an impact on the goals, expressed in terms of probabilities and effects,
- a combination of the probability of an event and its consequences.

Thus, risk can be defined as the uncertainty related to future events or the outcome of a decision leading to a loss or gain. On the other hand, in a neutral concept, risk can be both a threat and an opportunity. It appears when the results of a certain action are unknown to the interested party. Risk means uncertainty as to the future effects of certain decisions or events. These effects can be positive (chance or opportunity) and negative (threat). In this concept, risk is associated with the probability of both loss and profit. As part of the neutral approach to risk, there is also the concept of risk as the possibility of obtaining an effect other than the intended one, without assessing whether it is positive or negative [Jajuga, 2018].

Those definitions can be useful for risk management in organizations. Risk in management is usually analyzed in the organizational dimension. Therefore, the risk relates to management at any hierarchical level of the organization and may affect the functioning of the unit in the short, medium and long term. According to de Melo and de Medeiros risks are classified as follows: Strategic Risk, Market Risk, Compliance Risk, Operational Risk, and Reputational Risk [2020]. Additionally, risk relates to the organization's activities in three dimensions:

- strategic (risk related to the organization's strategy, organizational goals, fusions, mergers, acquisitions),
- tactical (risk related to undertakings, projects, product and service development),

- operational (risk related to routine activities).

It should be emphasized that, on the one hand, the risk may be a threat to the management of organizations, against which they take action to remove or minimize it, and on the other hand, the management of those organizations is aware of the positive role of the risk (so-called opportunity), which may bring greater benefits. In the ISO 9000:2015 standard, risk is defined as the impact of uncertainty on the objectives [ISO 9000:2015]. Defining goals allows for the identification of threats and assessment of the risks that may impact the achievement of goals.

Cambridge Dictionary defines as opportunity as "an occasion or situation that makes it possible to do something that you want to do or have to do, or the possibility of doing something" [Cambridge Dictionary]. In case of managing an organization, opportunities can be used to achieve benefits, both market and financial. Unfortunately, they are often confused with the strengths of the organization. In terms of strategic management, opportunities are factors outside the organization. The management of the organization has no direct influence on the opportunities, unlike the strengths, which mainly include the internal factors of the organization, having a positive impact on its functioning and the effects resulting from its activities.

Opportunities, unlike risks, are always positive, i.e. they can be used in the improvement of the organization's activities, its products or services. The management of the organization should be focused on looking for opportunities and use them to improve the performance of the organization in terms of quality, environmental protection and safety. Opportunities appearing in the organization's environment may lead to the adoption of new management techniques, methods and practices, introducing new goods and services to the market, entering new markets, acquiring new customers, retaining existing customers or returning lost customers and strategic partners, introducing new technologies, and also building partnerships and other desired opportunities beneficial for the current needs of the organization or its clients.

Risk-based thinking enables the management of an organization to take into account both risks and opportunities in making strategic, tactical or operational decisions that affect the functioning and improvement of business operations.

Risk-based thinking in the management systems

Quality, environmental and occupational health and safety management systems are based on a process and risk-based approach. However, is should be emphasized, that both the "process approach" and the "risk-based thinking approach" should be treated primarily as a requirement enabling a reliable analysis of the organization's activities, in particular in terms of quality, environmental impact and ensuring safe working conditions. It also should be remembered that the application of the process approach and the risk-based thinking approach ensures the stability of the functioning of processes. The improvement of those processes affects the effectiveness of activities and development of the organization and enables the management of the organization better understand and meet the needs and expectations of customers and other interested parties [Matuszak-Flejszman, 2019].

A risk-based thinking is a necessary factor in the effectiveness of a quality, environmental, and health and safety management systems. The concept of risk-based thinking was introduced to eliminate potential nonconformities, analyze existing nonconformities, and take actions to prevent reoccurrence. In order to meet these requirements, the management of the organization must plan and implement activities to eliminate risks and increase opportunities. The consideration of risks may include avoiding risk, taking the risk to pursue an opportunity, removing a source of risk, changing the probability or consequences, sharing the risk, or stopping the risk based on an informed decision. Opportunities, on the other hand, may lead to the adoption of new practices, the introduction of new products, the opening of new markets, the acquisition of new customers, building partnerships, the use of new technologies and other desired and real opportunities, taking into account the needs of the organization or its customers.

According to Zhemchugova and Levshina [2020] the risk-based thinking can be applied in any organization, irrespective of size and the sector profile, but the complexity of the methods of application depends on the environment of the organization, including the internal environment, and considering the maturity of its processes and management system as a whole.

Risk-based thinking in ISO 9001

Risk management is an essential element of effective quality management [Juhani and Kari, 2017]. The ISO 9001 standard contains many areas for the application of the risk-based thinking. As part of the requirement concerning the context of the organization, it is necessary to define the processes needed in the quality management system and their application in the organization, and to take into account risks and opportunities [ISO 9001: 2015, p. 4.4.1.f]. Actions related to risks and opportunities should be initiated at the time of planning the processes functioning in the organization [Medić et al., 2016]. Considering risks and opportunities when planning processes can help organizations in avoiding later expenses and the need to implement changes to existing processes.

In the leadership section, top management is required to demonstrate leadership and commitment to the quality management system by promoting the use of a risk-based thinking [ISO 9001:2015, p. 5.1.1.d] and to demonstrate leadership and commitment in the area of orientation on the customer by ensuring that risks and opportunities affecting the compliance of products and services and the ability to increase customer satisfaction are identified and addressed [ISO 9001:2015, p. 5.1.2.b].

Another area where the quality management system requires a risk-based thinking is risk and opportunity activities, where risks and opportunities should be identified after considering factors affecting the organization to ensure that the QMS can achieve its intended goals, increasing the desired effects, preventing and reducing the occurrence of undesirable effects, as well as continuous improvement. Actions related to risks and opportunities should be planned, and actions taken should be proportional to the impact on the compliance of products and services with the relevant requirements.

The results of the analysis and evaluation of relevant data and information from monitoring and measurement should be used to evaluate the effectiveness of activities taking into account the risks and opportunities. The management review should be planned by the management of the organization and conducted in terms of the effectiveness of the actions taken, taking into account the risks and opportunities. Moreover, in the event of non-compliance, including customer complaint, the organization should update the risks and opportunities identified when planning related activities.

Risk-based thinking in ISO 14001

ISO 14001 also requires the application of a risk-based thinking. In the ISO 14001 standard, the risk was presented in a negative connotation - related to the unfavorable development of the situation for the organization. Opportunities, on the other hand, are understood as chances for the development of a given situation favorable for the organization. Regardless of this, attention should be paid to the fact that the application of a risk-based thinking to the environmental management system is concerned with the risks and opportunities associated with the organization's activities and not with the environment as such.

When planning the environmental management system, the organization should identify risks and opportunities related to the its environmental aspects, compliance obligations and other factors and requirements defined in the context of the organization. It is necessary to ensure that systemic approach to environmental management in the organization allows to achieve intended result and prevent or limit undesirable effects. Moreover, it allows the continual improvement of activities, processes and products. It is required to create documented information on identified risks and opportunities, and then to plan appropriate actions relating to these risks and opportunities. Risks and opportunities are related to the identification of potential emergency situations, including those that may have an impact on the environment. In addition, as part of the management review, the organization's management should consider changes in risks and opportunities.

Risk-based thinking in ISO 45001

In the ISO 45001 standard containing the requirements for the occupational health and safety management system, the issues related to the application of the risk-based thinking appear more times than the requirements contained in the ISO 9001 and ISO 14001 standards. The ISO 45001 standard provides a broader view of issues related to risk, not only related to occupational risk, but also to the risk related to the functioning of the occupational health and

safety management system.

While planning an occupational health and safety management system, management of an organization should consider the context of the organization, stakeholders and the scope of the occupational health and safety management system, and identify risks and opportunities to ensure that the occupational health and safety management system achieves the intended results, prevents or reduces undesirable effects and constantly improves the effects of its activities.

When determining risks and opportunities associated with the occupational health and safety management system and its planned results, the management of the organization should take into account [ISO 45001: 2018, p. 6.1]:

- risks, including health and safety risks and other risks,
- health and safety and other opportunities,
- legal and other requirements.

Occupational health and safety risk analyses should consider hazards that:

- arise as a result of the activities of the organization,
- remain under its control and can affect both people working in the organization and people outside the organization (subcontractors, people visiting the organization),
- may affect employees who perform work outside the permanent location and over which the organization has no direct influence.

Possibilities of reducing risks associated with threats are related in particular to:

- eliminating threats and limiting occupational risk at the design stage,
- restrictions on monotonous or forced-speed work,
- application of new technologies,
- creating a high safety culture.

The organization's management in the planning process should identify and assess the risks and opportunities that are relevant to the planned results of the occupational health and safety management system and its processes. When analyzing threats in the effective system, the organization should first of all pay attention to the context of the organization, available resources, audit program, competences of people performing key functions, the commitment of the top management, the degree of consideration of the needs and expectations of interested parties, as well as the results obtained in the area of safety. Opportunities relating to the improvement of the system include, for example, increasing the visible support from the top management, improving incident investigation processes, increasing employee participation in activities related to occupational health and safety, benchmarking, as well as cooperation with other entities and forums focusing on occupational health and safety issues.

In case of planned changes, whether permanent or temporary, it is required to assess the risk or opportunity before implementing any change. The main goal of planning activities related to health and safety at work should be primarily to determine how to deal with risks and opportunities. Planning of activities should also take into account the status of current legal requirements and other specific standards relating to occupational health and safety, control hierarchy and results of the occupational health and safety [Kubista, 2019]. The organization should establish targets for the appropriate functions and levels to maintain and continuously improve the system. These goals should take into consideration the results of the risk and opportunity assessment. Planning of activities should focus at the best available practices and technology options in the organization, financial, operational and business requirements to achieve the health and safety objectives.

In accordance with the requirements of ISO 45001, the organization must establish, implement and maintain processes for the elimination and reduction of health and safety hazards in accordance with the following hierarchy of activities [ISO 45001:2018, p. 8.1.2]:

- eliminating the threat,
- replacement by less dangerous processes, operations, materials or equipment,
- application of technical control and reorganization of work,
- application of administrative control, including training,
- use of appropriate personal protective equipment.

As part of the activities aimed at controlling risks in the organization, it is necessary to establish, implement and maintain the processes necessary to prepare and respond to potential emergencies. In addition, the organization should establish, implement and maintain processes for monitoring, measuring, analyzing and evaluating activities, taking into account, inter alia, activities undertaken and actions related to identified threats, risks and opportunities.

As part of the management review, the management of the organization, as in the case of the QMS and EMS, should, consider issues relating to changes in external and internal factors that are relevant to the occupational health and safety system, including risks and opportunities, and information on activities, including trends in risks and opportunities.

Risk management according to ISO 31000

Risk management is the process of coordinated activities to direct and control an organization in relation to risk. In order to ensure effective risk management, the principles and guidelines contained in the ISO 31000 standard should be implemented in the organization. Any solution for the implementation of these principles can be used, but they are to contribute to the effectiveness of the management system and be understandable to users. The implementation of these principles is facilitated by the use of a risk management model based on a process approach, which is included in the ISO 31000 standard.

The risk management process should be an integral part of management and decision-making and integrated into the structure, operations and processes of the organization. It can be applied at strategic, operational, program or project levels [ISO 31000].

Important elements of the risk management process include defining the scope, context and criteria necessary to identify, analyze and evaluate risk. A very important element in ensuring the effectiveness of the risk management process is effective communication and consultation with risk users.

One of the key elements of the risk management process is its assessment, which is the overall process of risk identification, analysis and evaluation. A very important action when identifying the risk is to determine the source of the risk and to predict the potential impacts and consequences of this risk in individual areas of the organization. In order to identify risks well, each area should be analyzed in detail and the possible risks based on events that could disrupt the achievement of goals or contribute to the emergence of threats to the implementation of activities or processes in the organization are listed.

The next stage of the risk assessment process is its analysis. The risk analysis process aims to provide the data necessary to conduct a risk evaluation and to make decisions on how to deal with the risk. In this case, the risk analysis process should take into account the probability of consequences and the effects that may arise as a result of these consequences.

Third stage in the risk assessment process is a risk evaluation to compare the results of the risk analysis with the risk benchmarks for determining risk severity. A risk evaluation is performed to determine the risk acceptability level. It is intended to support management in making decisions on how to deal with risk in terms of its avoidance, acceptance, removal of risk sources, changing the probability of risk occurrence, changing the consequences or sharing the risk.

Risk treatment is an important part of the risk management process. After risk assessment the necessary steps for risk treatment should be carried out. Risk treatment involves an iterative process of [ISO 31000, p. 6.5.1]:

- formulating and selecting risk treatment options,
- planning and implementing risk treatment,
- assessing the effectiveness of that treatment,
- deciding whether the remaining risk is acceptable,
- if not acceptable, taking further treatment.

Each step of the risk assessment process should be properly monitored and reviewed to ensure the effectiveness of actions. The results of monitoring and reviews should be documented and reported to the risk users. Recording and reporting aims to [ISO 31000, p. 6.7]:

- communicate risk management activities and outcomes across the organization,
- provide information for decision-making,
- improve risk management activities,
- assist interaction with stakeholders, including those with responsibility and accountability for risk management activities.

Conclusions

The analysis of the literature has shown that risk-based thinking is used in many organizations, but the management of the organization implements it in different ways depending on the approach to identifying risks and opportunities and the areas in which those risks and opportunities may arise. There is no doubt that the top management of an organization focused on improving the performance of its activities should demonstrate a commitment to risk-based thinking and must be aware of a number of factors influencing the activities of the organization and leading to the risks and opportunities. Therefore, risk-based thinking and as a result organizational risk management should be integrated into management's strategic and decision-making processes.

The implementation and maintenance of the management system significantly influences the improvement of risk management activities. There is no doubt that risk-based thinking enables the management of the organization to identify factors that may cause deviations from the planned results of the processes and management system, to introduce preventive supervision measures to minimize negative effects and maximize opportunities. By applying risk-based thinking, the organization's management can reliably analyze quality, environmental and occupational health and safety activities, and then ensure appropriate supervision of these activities to minimize risks and increase opportunities. This, in turn, improves the effectiveness of activities and the development of the organization, as well as a better understanding of the needs and expectations of stakeholders.

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Breast Cancer Detection using Macchine Learning Algorithms

Diaa SALAMA ABD ELMINAAM[1,2],Shaza BAHNACY[2], Esraa HASSAN[2] , Habiba TAREK[2], Mai HAZEM[2], Nura MOSTAFA[2] and Lobna SHAHEEN[2]

Faculty of Computers and Artificial Intelligence, Benha University, Egypt[1]
Faculty of Computers and Informatics , Misr International University, Egypt[2]
Emails: diaa.salama@miuegypt.edu.eg , shaza1708233@miuegypt.edu.eg , esraa1707548@miuegypt.edu.eg , Habiba1700246@miuegypt.edu.eg , nura1703338@miuegypt.edu.eg , lobna.mostafa@miuegypt.edu.eg

Abstract

Nowadays, Breast cancer is a profoundly severe disease that many women have been diagnosed with in the past few decades. For starters, Breast Cancer is mainly the formation and grouping of some malignant cancerous cells inside the breast cells. Even though breast cancer is the second most cancerous disease that women get diagnosed with, Men also can get diagnosed with it, but it is not very likely. Breast cancer can be deadly if not detected quickly and in its early phases. Subsequently, scientists have been searching for a method to help them address this problem efficiently, and their studies lead them to machine learning. Recently, Breast cancer Prediction has been one of the most progressing topics in machine learning. In the proposed paper, we quickly disclosed and identified whether a tumor is benign or malignant with some features processing of our 2 benchmark datasets and classifying algorithms (KNN, decision tree, naïve Bayes). A malignant tumor is a cancerous tumor that spreads, and the benign is the tumor that does not spread and is not cancerous. To conclude, as for the first dataset, we found that the best algorithm was the IBK Accuracy of 95.43%. We found that the naïve Bayes algorithm proved better than the other algorithms for the second dataset due to its relatively good data71.67%.

Keywords: Malignant, Benign, Classification, and machine learning Algorithms

Introduction

In 2016, it was stated in the US reports that around 2,46,600 cases of women were diagnosed with breast cancer, and about 40,450 of these cases died (Ganggayah, 2019), which is nearly 16% of the number of diagnosed women. Therefore, this confirms the idea of breast cancer being fatal to women and booming in the last few years.

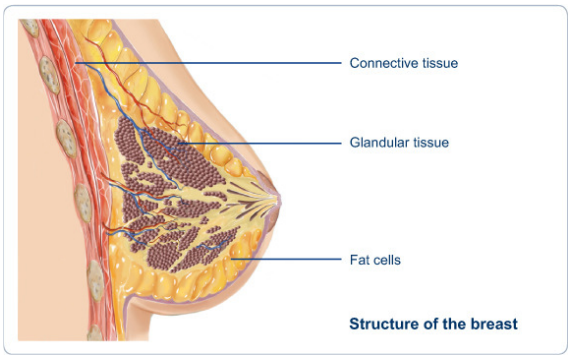

Fig. 1: Normal Breast Cells and Tissues Without Tumor

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The structure of the breast is simply as follows, connective tissues, Glandular tissues, and Fat cells. The most important and prime parts in the female breast are the" lobules" which are the glands that produce milk, "ducts" which are the milk passages which connect between the lobules and the nipple, and the stroma which are fatty tissues and ligaments that surround the lobules and the ducts (Chaurasia, 2018). Breast cancer is an unusual and malformed growth and spread of cells that usually lies along the ducts and the lobules.

Over the past several decades, developments and advancements of multiple "machine learning(ML) and data mining(DM)" operating methods that have been made for the sole purpose of detecting and classifying breast cancer as it is inevitably a pervasive cause of death in both men and women (Abernethy, 2010). This paper will be using the WEKA tool to preprocess data and use some of the offered classification algorithms to analyze breast cancer detection and how reliable and accurate is using the previously mentioned tool in prediction (Kalmegh, 2015).

With the help of big data and its evolutions, scientists were able to store large amounts of data in the area of breast cancer and also be qualified and free to use this Data in classifying and training it to be a reliable model in breast cancer detection, relying on various attributes that lead to the tumor being malignant or benign with a high percentage of accuracy (Ganggayah, 2019; Agarap, 2017). There are 32 attributes in the first dataset and ten attributes in the second dataset.

Numerous algorithms are used for the classification and the forecast for breast cancer results. Three algorithms are going to be used and compared in order of performance levels and executability, which are the KNN, naïve Bayes, and Decision tree. These algorithms belong to the most crucial and significant algorithms in data mining within the research community (Ganggayah, 2019). We are aiming to assess the efficiency, proficiency, and efficacy of these algorithms according to their precision, reliability, and accuracy (Khurana & Verma, 2020).

The rest of the paper is described as follows: the paper's related work can be found In Section 2. The methodology is presented in Section 3. Section 4 shows a comparison between proposed algorithms and the experimental results. Finally, Section 5 shows the conclusions and future work.

Literature Survey

A considerable number of researchers have been developing and analyzing breast cancer detection systems. Some of their works and papers are going to be explained here.

Dhahri et al. (2019) constructed a method to point out whether the tumor is benign reliably (B) or malignant(M) using "machine learning(ML)" algorithms and genetic programming, their focus was on the feature extraction, segmentation of the images and information extraction.

Talukdar & Kalita (2015) were working on the WEKA tool, and they used two classification algorithms to analyze the data of breast cancer detection, J48 decision tree and ZeroR. These datasets were collected from online repositories that belong to actual patients of cancer.

Srikanth et al. (2019) brought their dataset from the UCI repository. They managed to experiment on the WEKA tool using the following classifiers. Machine learning algorithms, KNN, K-means, J48, NB, SMO, however, SMO algorithm has shown its potency and efficiency in breast cancer detection in best execution and blunder rates.

Asri et al. (2016) were aiming to experiment and analyze multiple classifiers with the help of the WEKA tool and UCI Wisconsin dataset, and they used the SVM, KNN, C4.5, NB algorithms, and the SVM algorithm has proven to be the best and the most effective regarding performance and error level.

Gayathri et al. (2013) wanted to compare the "machine learning(ML) algorithms" in detecting and prognosing breast cancer with the help of and using the relevance vector machine (RVM) and support vector machine(SRM), the artificial neural networks(ANN) that detects data using synapsis, and the RVM proved to be more effective and precise.

Agarap (2017) conducted an experiment using the Wisconsin diagnostic dataset and the ANN to compare between the SVM, linear regression, GRU-SVM, NN, MLP, softmax regression in detecting breast cancer best in terms of performance and error rating, he partitioned the data into 70% for training and the rest for testing, after all, the SVM proved to be the best.

Zhou et al. (2004) are going to create a website using python framework, flask, and with the help of WDBC dataset and six ML algorithms, RT, NB, KNN, ANN, Decision tree and SVM, by comparing them, she is going to deduct what is the best algorithm for breast cancer detection.

Eltalhi et al. (2019) used multiple data mining tools like WEKA, Tanagra, orange, c++ and Matlab, and several ML algorithms like DT, k-means, NN, NB to compare and experiment for the best detecting algorithm.

Chaurasia et al. (2018) used three data mining tools, NB, j48 decision tree, and RBF network, to compare them with 10-fold cross-validation on WEKA tool and the WDBC dataset for the best detection results and the naïve Bayes happened to be the perfect one throughout the whole experiment.

Ganggayah et al. (2019) wrote this paper on the investigation made to predict the survival rate of the breast cancer patient, they retrieved a large dataset through the university of Malaysia, then a prediction model was created using the decision tree, NN, random forest, logistic regression, SVM and extreme boost, then, the dataset was clustered, the random forest algorithm was better than the decision tree.

Many other researchers who are recognized in literature on Optimization and Metaheuristics algorithms and applications such as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] studied the predictions pobems and its solutions. As a result of the collected information, we decided to combine all the features that the previous attempts worked on to enhance the expected results' efficiency.

Proposed Breast Cancer Detection System

The breast cancer detection system is fundamentally a medical diagnostic technique that uses numerical breast attributes that lead to a specific scenario when accumulated together, therefore predicting and predicting whether the tumor is malignant(M) or benign(B). In this experiment, we are going to start with preprocessing both datasets; then, we will begin with the classifying algorithms, KNN, decision tree, and naïve Bayes, and last but not least, we are going to compare the used algorithms in terms of best results in both datasets.

Dataset Description

At first, we downloaded the" Wisconsin breast cancer dataset (WDBC)" which is officially benchmark from the Kaggle website and UCI machine learning repository website. As a matter of fact, our first dataset mainly consisted of numerical attributes and only one nominal attribute, which states if the suspected tumor is benign(B) or malignant(M), and the second dataset consisted of nominal attributes. First and foremost, the first dataset contained the following 32 attributes and 569 instances: "id," concavity," area," smoothness," radius," diagnosis," perimeter," compactness," texture," fractal dimension," "symmetry," "concave points." Not to mention that for each image, the standard error (SE), mean and worst were calculated to guarantee strictly accurate results (Gupta et al, 2020).

Moreover, this dataset simply emphasizes on the projection of the signals and the identification of breast cancer. Furthermore, this dataset corresponds to supervised learning in which the only task that underlies it is the classification. Moving on to the next dataset which consists of 10 attributes and 286 instances, "age", "inv nodes", "tumor size"," node caps", "breast", "deg malign", "irradiate", "breast quad", "class". This dataset was also classified, and, in both datasets, we maintained the cross-validation folds to only 10, meaning that 90% of the specified data will be used for thorough training and 10% for testing.

Table 1: UCI Wisconsin breast cancer dataset (1st dataset)

No.	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	symmetry_mean	fractal_dimension_mean	radius_se	texture_se	perimeter_se	area_se	smoothness_se	compactness_se	concavity_se	concave points_se	symmetry_se	fractal_dimension_se	radius_worst	texture_worst	perimeter_worst	area_worst	smoothness_worst	compactness_worst	concavity_worst	concave points_worst	symmetry_worst	fractal_dimension_worst
1	122.8	1001	0.1184	0.2776	0.3001	0.1471	0.2419	0.0787	1.095	0.9053	8.589	153.4	0.0064	0.049	0.0537	0.0159	0.03	0.0062	25.38	17.33	184.6	2019	0.1622	0.6656	0.7119	0.2654	0.4601	0.1189
2	132.9	1326	0.08474	0.07864	0.0869	0.07017	0.1812	0.05667	0.5435	0.7339	3.398	74.08	0.00523	0.01308	0.0186	0.0134	0.01389	0.00353	24.99	23.41	158.8	1956	0.1238	0.1866	0.2416	0.186	0.275	0.08902
3	130	1203	0.1096	0.1599	0.1974	0.1279	0.2069	0.05999	0.7456	0.7869	4.585	94.03	0.00615	0.04006	0.03832	0.02058	0.0225	0.004571	23.57	25.53	152.5	1709	0.1444	0.4245	0.4504	0.243	0.3613	0.08758
4	77.58	386.1	0.1425	0.2839	0.2414	0.1052	0.2597	0.09744	0.4956	1.156	3.445	27.23	0.00911	0.07458	0.05661	0.01867	0.05963	0.009208	14.91	26.5	98.87	567.7	0.2098	0.8663	0.6869	0.2575	0.6638	0.173
5	135.1	1297	0.1003	0.1328	0.198	0.1043	0.1809	0.05883	0.7572	0.7813	5.438	94.44	0.01149	0.02461	0.05688	0.01885	0.01756	0.005115	22.54	16.67	152.2	1575	0.1374	0.205	0.4	0.1625	0.2364	0.07678
6	82.57	477.1	0.1278	0.17	0.1578	0.08089	0.2087	0.07613	0.3345	0.8902	2.217	27.19	0.00751	0.03345	0.03672	0.01137	0.02165	0.00508	15.47	23.75	103.4	741.6	0.1791	0.5249	0.5355	0.1741	0.3985	0.1244
7	119.6	1040	0.09463	0.109	0.1127	0.074	0.1794	0.05742	0.4467	0.7732	3.18	53.91	0.00431	0.01382	0.02254	0.01039	0.01369	0.00218	22.88	27.66	153.2	1606	0.1442	0.2576	0.3784	0.1932	0.3063	0.08368
8	90.2	577.9	0.1189	0.1645	0.09366	0.05985	0.2196	0.07451	0.5835	1.377	3.856	50.96	0.008805	0.03029	0.02488	0.01448	0.01486	0.005412	17.06	28.14	110.6	897	0.1654	0.3682	0.2678	0.1556	0.3196	0.1151
9	87.5	519.8	0.1273	0.1932	0.1859	0.09353	0.235	0.07389	0.3063	1.002	2.406	24.32	0.00573	0.03502	0.03553	0.01226	0.02143	0.00375	15.49	30.73	106.2	739.3	0.1703	0.5401	0.539	0.206	0.4378	0.1072

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Table 2: weka breast cancer dataset (2nd dataset)

No.	Age nominal	Menopause nominal	Tumour size nominal	Inv-nodes nominal	Node -caps nominal	Deg-malign nominal	Breast nominal	Breast quad nominal	Irradiate nominal	Class nominal
1	50-59	Premeno	25-29	5-Mar	no	2	right	Left_up	yes	No-rec
2	50-59	Ge40	40-44	0-2	no	3	left	Left_up	no	No-rec
3	40-49	premeno	14-Oct	0-2	no	2	left	Left_up	no	No-rec
4	40-49	Ge40	40-44	15-17	yes	2	right	Left_up	yes	No-rec
5	60-69	Ge40	15-19	0-2	no	2	right	Left_up	no	No-rec

Machine Learning Algorithms

K-nearest Neighbor Algorithm

The KNN algorithm (instance-based learning) is an ultimately convenient data mining method that allows us to utilize former data instances, for further clarification, with the presence of the known and agreed upon output values. It can forecast an anonymous output of a new instance (Asri et al, 2016). It uses the normalized Euclidean distance in calculating the distance between two points and is very active with large datasets because it compares the case of the new data with all the old data. It can guarantee an accurate prediction; that is why it is a lazy algorithm. Last but not least, we maintained the Euclidean distancing and changed the K, respectively.

$$\mathrm{d}(\mathbf{p},\mathbf{q}) = \mathrm{d}(\mathbf{q},\mathbf{p}) = \sqrt{(q_1-p_1)^2+(q_2-p_2)^2+\cdots+(q_n-p_n)^2} \qquad (1)$$

Decision Tree

The decision tree is also known as the Rept tree in WEKA (reduced error pruning tree) uses the regression tree mechanism in creating various trees in many different various iterations, afterward, it shows the representative tree that it has selected as the best chosen one from all the generated and originated trees and then prunes the tree with the mean square error method. It is a quick learner, and it creates the tree on the basis of gaining information or variance reduction (Talukdar & Kalita, 2015).the formula for decision tree as follows

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$$E(S) = \sum_{i=1}^{c} -p_i \log_2 p_i \quad (2)$$

$$E(T,X) = \sum_{c \in X} P(c)E(c) \quad (3)$$

$$\text{Gain}\ (T,X) = \text{Entropy}\ (T) - \text{Entropy}\ (T,X) \quad (4)$$

Naïve Bayes Algorithm

The naïve Bayes algorithm is based and hinged on the mathematical Bayes theorem. This algorithm contributes to the universal principle of classifying any feature is independent and individualistic of the other represented features. As well as the datasets that this algorithm classifies should be divided into a feature matrix and a response vector, which are the rows of the dependent vector and the class that states whether the action can be taken or not, the values should be independent yet equal, as the Data itself doesn't depend on each other. Still, they are all critical, therefore being all equal in importance. The NB algorithm is high-speed compared to different algorithms.

$$P(A \mid B) = \frac{P(B|A)P(A)}{P(B)} \quad (5)$$

Result and Discussion

The presented breast cancer detection system experimental outputs and results shall be looked over throughout this section. Moreover, the presented methodology was applied and executed in the WEKA Tool.

In the following table, the first dataset' results will be represented with the algorithms used.

Table 3: Results for The First Dataset

	IBK Euclidean dist. &K =1	**IBK Euclidean dist. & K=2**	**IBK Euclidean dist. & K=3**	**Naïve Bayes Algorithm**	**Rept Tree Algorithm**
Kappa statistic	0.9171	0.9032	0.9319	0.8418	0.8376
Mean absolute error	0.0405	0.0439	0.0492	0.0732	0.0984
Root mean squared error	0.1963	0.1689	0.1694	0.2648	0.2526
Relative absolute error	8.6513	9.3974	10.5225	15.6565	21.0341
Root relative squared error	40.591	34.9356	35.0346	54.7597	52.2483
Build time	0 seconds	0 seconds	0 seconds	0.04 seconds	0.07 seconds
Correctly classified instances	96.13%	95.43%	96.84%	92.62%	92.44%

From the table, it appears that the best algorithm was the IBK using Euclidean distance and K =2 because of its good results and the worst algorithm in detecting was the decision tree. Moving on to the second dataset for the comparison in the following table:

Table 4: Results for The Second Dataset

	IBK Euclidean dist. &K =1	IBK Euclidean dist. & K=2	IBK Euclidean dist. & K=3	Naïve Bayes Algorithm	Rept Tree Algorithm
Kappa statistic	0.2438	0.2079	0.2281	0.2857	0.1601
Mean absolute error	0.3257	0.333	0.3414	0.3272	0.3797
Root mean squared error	0.5101	0.4563	0.4477	0.2648	0.4652
Relative absolute error	77.8513	79.5848	81.5847	78.2086	90.7409
Root relative squared error	111.6114	99.8215	97.9585	99.1872	101.7845
Build time	0 seconds	0 seconds	0 seconds	0 seconds	0.02 seconds
Correctly classified instances	72.37%	73.42 %	73.77 %	71.67 %	70.62 %

The naïve Bayes algorithm proved that it is better than the other algorithms due to its relatively good data, and the REPT tree again proved to be not the best.

Conclusion

The purpose of this document was to reflect on how vital breast cancer detection because of its significant drawbacks when not treated in its early phases and compare between the three previously mentioned classification algorithms(KNN, decision tree, and Naïve Bayes) according to the precision, accuracy, and effectiveness. After experimenting on our two benchmark datasets with the WEKA tool, we finally came to the resolution that the first dataset worked best with the KNN algorithm using Euclidean distance and k=2 and the accuracy was95.43% and the worst algorithm in detecting was the decision tree with accuracy of 92.44%. As for the second dataset, it worked best with the naïve bayes algorithm with accuracy of 71.67% and the decision tree was the worst algorithm to detect breast cancer with accuracy of only 70.62%.

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Modeling And Building Dynamic Transportation System Based on The Internet of Things

Diaa SALAMA ABD ELMINAM[1,3] ,Eman MAHMOUD[1] and Rasha ORBAN[2]

[1] Information System Department, Faculty of Computers and Artificial Intelligence, Benha University, Benha, Egypt.
[2] Computer Science Department, Faculty of Computers and Artificial Intelligence, Benha University, Benha, Egypt.
[3] Faculty of Computers and Informatics, Misr International University, Cairo, Egypt.
Emails : diaa.salama@fci.bu.edu.eg eman.mahmoud@fci.bu.edu.eg rasha.abdelkreem@fci.bu.edu.eg

Abstract

Throughout our everyday lives, the importance of transport lies in facilitating people's movement or goods from one place to another. Transportation problems (TP) are not easy to fix. The choice of travel times and means of transportation has become confusing. Notably, during the periods of study and work in any city where the number of trips and congestion increases, especially at peak hours of the day. Transportation problems, therefore, cause waste of time, decreases efficiency, and dramatically adverse effects on society and citizens. Such issues include bus schedules, truck routing problems, truck transportation problems, problems with traffic management, and so on, causing air pollution, busy highways, and unsafe highways. There is much work to address these issues. In this paper, the proposed model offers a solution to solve transportation problems using a fuzzy logic technology with traffic simulation. The proposed system, based on the Fuzzy Expert System (FES) helps find the best road, the best time of the trip and avoids some traffic and transportation problems.

Environmental pollution is one of the most severe problems that threaten society. It affects the public health of citizens and the health of plants. Also, environmental pollution is leading to global warming. Vehicles exhaust is one of the most severe cases of environmental contamination. The increase in the number of vehicles and the rise in congestion increase the exhaust and pollution resulting. This paper focuses on measuring the exhaust of vehicles like CO2, CO, HC, NOX, and PMX using SUMO (Simulation of Urban Mobility). This research uses Sumo to extract real-time emission from cars over the trip on the network of routes and study the relationship between vehicle emissions and fuel consumption. Another point in this research is to measure the noise emission of the same vehicle.

Keywords: Transportation Problems (TP), Fuzzy Expert System (FES) IoT, SUMO, Noise Emission.

Introduction

From this section, input the body of your manuscript according to the constitution that you had. For detailed information for authors, please refer to Parra et al. (2014).

In the past few years, there has been a growing interest in solving traffic problems by establishing new roads or providing solutions to avoid congestion. That is considered one of the reasons leading to the rise of the economic situation, also providing a proper traffic system and control of car exhausts. The problem of transportation is a general problem that we aim to solve to save time and effort and reduce the expense of transferring things from one place to another. There are various transportation problems (Parra et al., 2014). like maritime transportation, air transportation, land transportation, rail transportation, space transportation, and intermodal transportation. These traffic classes have a generic name called transportation problems, which have resources, location, and transportation mode as TP's general parameter. Transportation problems' parameters are as the following: -

- *Resources*: The support of those components that can be shipped from sources to goals. Instances of variation assets are merchandise, apparatuses, individuals, payload, machines; associated assets incorporate vitality, fluids, and cash.

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- *Locations*: The locations of purposes of supply, recollection, stop hubs, railroad stations, transport stations, stacking port, seaports, air terminals, refueling warehouses, or school.
- *Transportation modes*: The transportation modes are shipping a few assets to areas—the transportation modes such as street, water, air, rail, space, and cable.

The sources of emission which cause environmental pollutions can be classified into stationary and portable sources (Klein et al., 2015). Instances of stationary sources create warmth and vitality, such as focal warming frameworks and electrical power plants, and establishments where modern procedures occur. Versatile sources incorporate different transport methods such as traveler vehicles, heavy-duty trucks, inland conduit vessels, and flying machines, just as portable hardware with ignition motors, such as horticultural tractors forklifts.

Car exhausts cause two types of pollution, environmental pollution and noise pollution. Environmental pollution is the number of gases coming out of the car, such as carbon dioxide (CO2), carbon monoxide (CO), nitrous oxide (N2O), nitrogen oxides (NOx), methane (CH4), hydrocarbons (HC), and particulate matter (PM).

There is no method to avoid that kind of air pollution or any treatment for it in Egypt. Many researchers use IoT sensors to calculate the amount of that emission to tell the cars' owners with the ratio of their car exhaust. The cars' owners try to avoid increasing it because their government expects a fine on vehicles with higher emissions. Dealing with emission extraction through IoT requires working with sensors and other communication technology. However, in the real-world may be considered a challenge as it costs much money and lacks experience in using the internet (Gao et al, 2007).

This paper focuses on the issues of land transportation. Land transportation conveys assets over long, medium, and small good ways from areas to different areas utilizing routes by vehicle or comparative methods for land transportation. Working on land transportation as an intelligent transportation system means working with sensors and other communication technology (Gao et al, 2007). The proposed model works on the problem throw three main axes simulating traffic using SUMO, Fuzzy Logic expert system, and the combination between fuzzy logic and SUMO.

Simulation traffic using SUMO: Traffic simulation is one of the best ways to give solutions to traffic problems due to the difficulty of following the traffic in nature because of the high cost of the material and technology. So, SUMO is the solution of working on transportation with high accuracy as it provides making a network of real roads and works on it.

Fuzzy logic expert system: A fuzzy logic expert system gathers membership functions and rules used to think about data. In contrast to the conventional expert system, which is predominantly traditional thinking, a fuzzy logic expert system will deal with numerical processing. The rules in a fuzzy logic expert system are generally of a structure like (on the off chance that x is low, and y is high, at that point z = medium). Where x and y are input factors (names for realizing data values), z is a yield variable (a name for a data incentive to be figured).

The combination of fuzzy logic and SUMO: In this part, we take the output data of the SUMO as input data to the expert system (Corvid Exp. Sys.) to get the expected output, which considers our solution in the proposed model. SUMO executes XML sheets of the simulated network, and we convert it to rules which are considered an input to the corvid expert system tool. Corvid Expert System is a robust and extensively tested tool for developing interactive expert system applications.

Our research works in three main steps: Get Map from OpenStreetMap, Use SUMO, and analyze the results from SUMO. OpenStreetMap (OpenStreetMap, 2019) is an online site where the desired area is exported and used in SUMO.

Traffic simulation utilizing SUMO (Behrisch et al, 2011): Traffic simulation is perhaps the ideal approach to offer answers for traffic issues because of the trouble of following the traffic in nature on account of the material's significant expense and innovation. So SUMO is a suitable tool to deal with transportation with high precision as it enables making a system of open streets and chips away at it. The SUMO emission tool is used to get vehicles' exhaust then analyze it to study the relations between emissions and fuel consumption.

The rest of the paper is organized as follows; Section 2 provides traffic and transportation issues and some related work to handle them. Next, Section 3 presents the proposed model. Section 4 demonstrates the results and discusses them. Finally, Section 5 concludes the paper and future work.

Literature Review

It is no simple attempt to operate on traffic and transportation issues. It includes many challenging problems. Most research forms work on a smart transport network based on the Internet of Things (IoT), which costs a substantial budget to cover a large area. Some of them depend on SUMO.

(Eriksson et al. , 2008) developed one of the first road condition monitoring systems that detect and map road anomalies, such as potholes, using an accelerometer and GPS.

(Mednis et al., 2011) and (Ghose et al. , 2012) later boteloped road condition monitoring applications for a smartphone whithatnds sensor data to a remote server and alerts drivers of potholes in the road.

(Mohan et al. , 2008) developed a road and traffic monitoring system, named Nericell, which also employs smartphone sensors to detect certain conditions.

In addition to the driver behaviour monitoring feature, (Fazeen et al. , 2012) also added a road condition characterisation and mapping feature to their system that uses a smartphone's GPS and accelerometer.

(Zaldivar et al. , 2011) proposed using smartphones as an alternative on-board unit in vehicles to access information in the vehicle's electronic control unit (ECU) wirelessly. An ECU is typically accessed through an industry-standard on-board diagnostic connector, known as OBD-II. By connecting an OBD-II-to-Bluetooth adapter to the vehicle's controller area network (CAN) bus, a smartphone can access the bus via Bluetooth. Automatic accident detection is accomplished by using data obtained from the CAN bus together with the smartphone's GPS and accelerometer.

(Similarly, Yang et al. , 2013) developed a smartphone-based diagnostic system for hybrid electric vehicles that also accesses a vehicle's CAN bus through OBD-II.

The WreckWatch accident detection system developed by (White et al. , 2011) differs from the one developed by(Zaldivar et al , 2011) in that it detects accidents using only the accelerometer values from a smartphone, and not the values from a vehicle's ECU. In addition to the advantage of not requiring additional hardware, WreckWatch also requires no permanent GPS-connection, which dramatically reduces power consumption

(SignalGuru , 2011) , and (SignalGuru , 2011) is a service that uses smartphones to opportunistically detect traffic signals with their cameras and collaboratively share and learn traffic signal schedules. This enables Green Light Optimal Speed Advisory applications which provide drivers with the schedule of forward traffic signals, allowing them to avoid coming to a complete halt and thereby lowering their fuel consumption.

(Jam Eyes , 2012) [28] is an application that uses a smartphone's camera and wireless fidelity to detect vehicles around it in a traffic jam, in order to collaboratively calculate the length of a traffic queue.

Many other researchers who are recognized in the literature on Optimization and Metaheuristics algorithms and applications such as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] studied the optimized solution for complex problems. As a result of the collected information, we decided to combine all the features that the previous attempts worked on to enhance the expected results' efficiency.

Proposed Model

The proposed model simulates transportation problems using SUMO (Simulation of Urban Mobility) (Behrisch et al, 2011). A fuzzy expert system using exsys corvid tool is used. It gives various solutions for different cases of road trips. The proposed method also introduces a new monitoring process that manages the real network traffic

from SUMO and the Traffic Control Interface (TraCI). Information about the vehicles can be obtained from the system, such as the minimum and the maximum speed for every car on the road, exhaust ratio of each car, and which lane on the network that the vehicle takes.

There are four main axes to implement a realistic simulation of the traffic and transportation system. They include traffic simulator, real roads network, real transportation data, and expert system advisor.

Traffic Simulator

SUMO (Behrisch et al, 2011) is an open-source microscopic traffic simulation package widely used in many transportation and vehicular networking projects (Sumo Projects, 2019). In SUMO, vehicle movement is mostly simulated using queue approaches, and a single car is moved between such queues. Also, SUMO offers great grained control over vehicles on the network via the TraCI. TraCI is a technique for interlinking road traffic and network simulators. It allows us to control the conduct of vehicles during simulation runtime. TraCI enables us to recover from vehicle speed and fuel utilization and manage their states such as speed and path evolving (TraCI, 2019). SUMO models driving practices practically with the goal that any significant level control direction would be executed in a manner that complies with severe physical restrictions to keep away from the crash or running the red lights. SUMO uses its NETCONVERT tool to import the OSM map and convert it to the network and keep in mind preserving the roads' features such as network structures, road grades, and estimated speeds, as illustrated in Fig. 1 and Fig. 2.

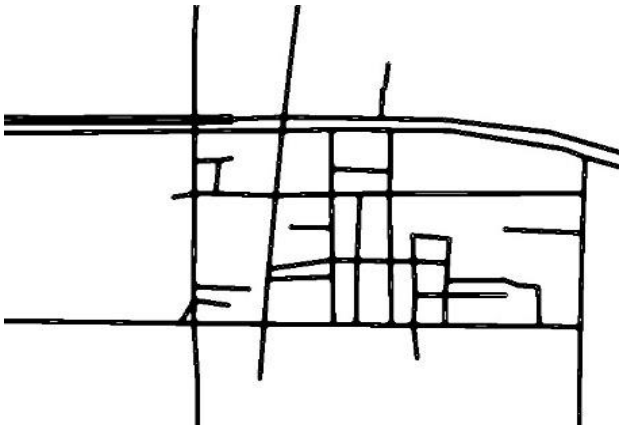

Fig. 1: Standard Sumo Network

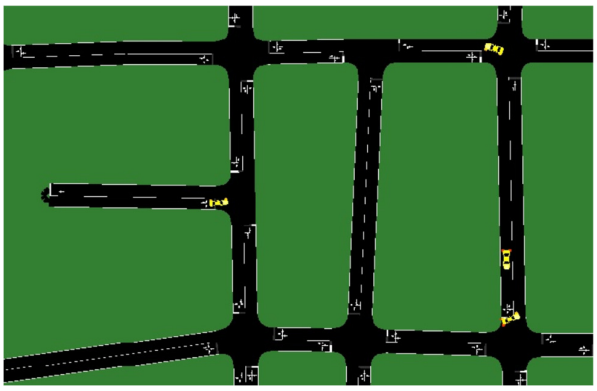

Fig. 2 : Real-world SUMO Network

Fig. 3 shows the four phases of the proposed model. In phase 1, The OSM map is obtained from the OpenStreetMap site and exported to the PC to be used by SUMO. SUMO is an open-source little traffic recreation bundle that is

broadly utilized in numerous transportation and vehicular systems administration ventures (Sumo Projects, 2019). In SUMO, vehicle development is generally mimicked using line approaches. Single autos are moved between such lines. Likewise, SUMO offers extraordinary grained power over vehicles on the system through the Traffic Control Interface (TraCI). TraCI (TraCI, 2019) is a strategy for interlinking street traffic and test systems. It permits us to observe the lead of vehicles during simulation runtime. In this phase, we use the netconvert tool (Netconvert Tool, 2019) to get the sumo network.

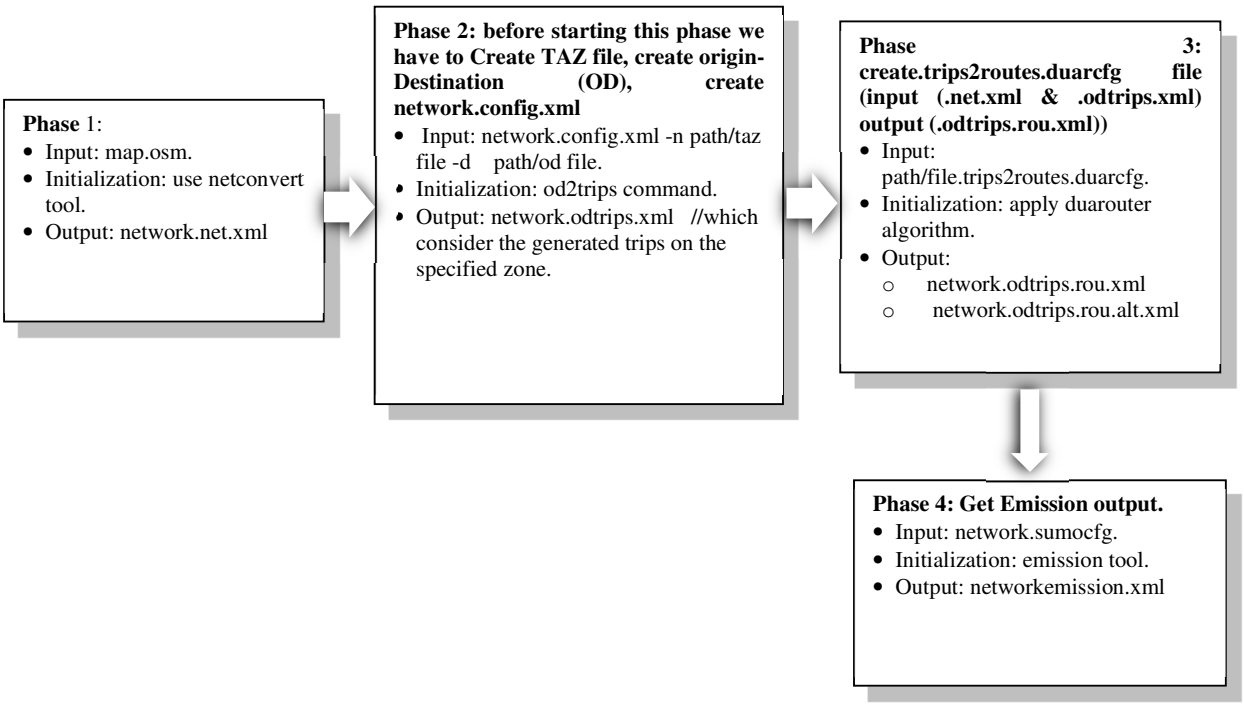

Fig. 3 : The Proposed Model Phases

In phase 2, we have to organize trips in that area by identifying the zone of work using TAZ (Martı´nez et al, 2009). Then, identify the vehicles' sources and destinations in that zone by creating Origin-Destination (OD) matrix (Demand/Importing OD Matrices, 2019).

In phase 3, the dual router tool is used. It is an algorithm that imports different demand definitions and computes vehicle routes used by SUMO using shortest path computation. This phase's input consists of the network on SUMO (.net.xml file) and a configuration file that defines the trip's input and output, which contains the TAZ file and OD matrix.

Phase 4 Emission output (Simulation/Output/EmissionOutput, 2019) helps define each vehicle's exhaust, such as the amount of CO2, CO, Nox, fuel, electricity, and noise emitted by the car in the actual simulation step.

Real Roads Networks

To simulate traffic and transportation models, we can create a non-real transportation system and suppose the number of vehicles, information, and trips from node to the other. However, we work on a real road network imported from OpenStreetMap (OSM). The region of Benha city is determined, and the map is exported from OpenStreetMap (OpenStreetMap, 2019) as a (.OSM) file, as shown in Fig. 4. The NETCONVERT in (Netconvert Tool, 2019) is used to convert it to SUMO network to start work on it.

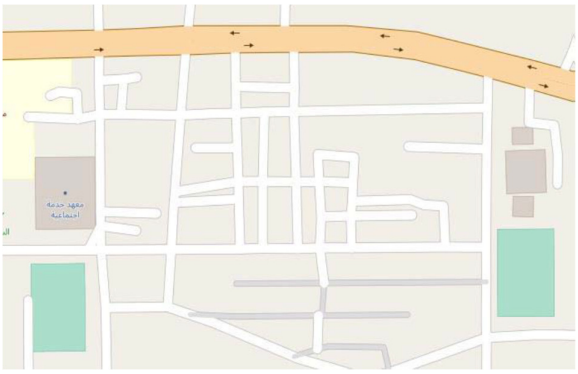

Fig. 2: Benha Map from OSM

To simulate realistic traffic on the sumo road network, we need a real dataset about the region we were imported from OpenStreetMap. Unfortunately, there is no real dataset in the specified area. So, Quadcopter is used for data gathering about Benha city. The collected data, such as the number of vehicles in the managed roads and the time of traffic conditions (Abdul Minaam et al, 2018).

Expert System Advisor

After representing the roads network for real traffic areas using SUMO and detecting and monitoring the traffic conditions in this area using Quadcopter, we can either obtain reports for decision-makers or collaborate with TraCI and SUMO on traffic management. Actually, in this paper, we prefer to help decision-makers using a fuzzy logic expert system (Goodarzi & Rafe, 2012). An expert system is like a computer application based on Artificial Intelligence (AI). The role of an expert system is to simulate the human expert in decision-making processes.

Fuzzy expert systems are a mix of input/output guidelines and rules that are utilized to coordinate certainties and data against the given rules (Abdul-Kader, 2009). A fuzzy logic expert system usually uses IF_THEN rules to think and judge on the processes. Fuzzy logic is a helpful technique for building up a specialist framework.

exsys corvid tool is used as an expert system. in this research, we divide the variables given to the corvid tool into:

- Static variables: such as the source, destination, and trip time.
- Numeric variables: the number of cars on the roads, cars' velocity, and amount of gas in the tank.
- Hidden variables: are the variables that fuzzy logic is dependent on, such as traffic conditions and favorite roads for cars in the network.

Finally, after getting the map from OpenStreetMap and convert it to the SUMO network, the proposed model depends on the output of SUMO as an input to the expert system. It converts the XML Sheets output from SUMO to a set of rules. Then, it fees them to the corvid expert system tool, as illustrated in Fig. 5, to get the desired output. The result of this expert system depends on the rules created on the corvid tool. The IF part depends on users' given data. The THEN part is calculated using fuzzy logic in the proposed system. Large positive confidence numbers express the desired results. Fig. 6 shows the probability of taking road1_conf = 80.0. The value 80.0 means that the best road the cars can take is road one and so on in the following results.

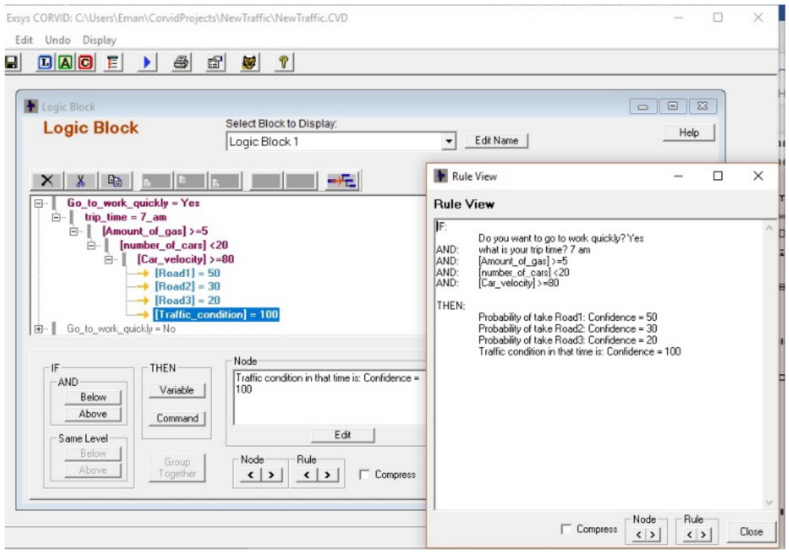

Fig. 5 : Examples of the Logic Rule Used in Fuzzy Logic Expert System

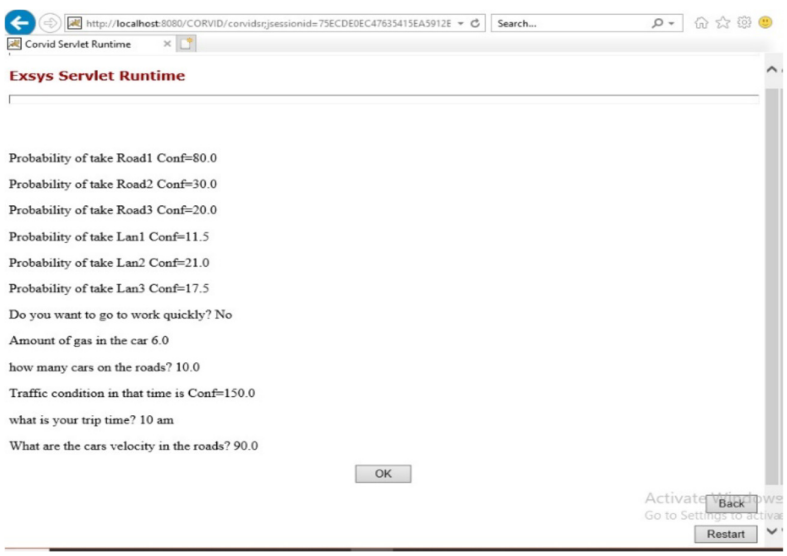

Fig. 6 : A Sample Run of Corvid Expert System

Result and Discussion

All results shown relate to one vehicle on its trip from edge to another edge on the network. Fig. 7 shows the percentage of exhaust carbon dioxide (CO2) in exchange for fuel consumption. It is advised to follow up on the use of gasoline while walking to avoid increasing the exhaust rate. Most of the previous research relied on showing the exhaust percentage only.

Fig. 8 illustrates the relationship between fuel consumption and carbon monoxide (CO). Fig. 9 shows the ratio of hydrocarbons (HC) exhaust; moreover, Fig. 10 clarifies the nitrogen oxides (NOx) exhaust.

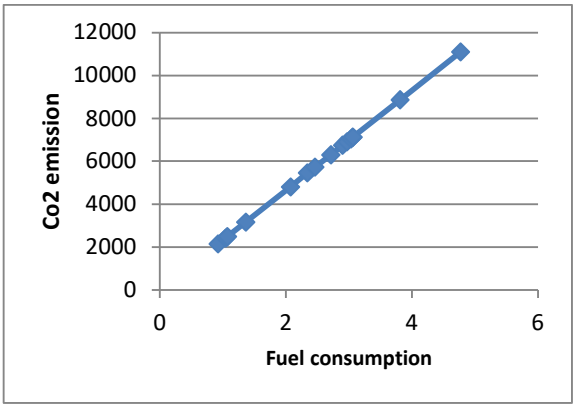

Fig. 7: Fuel vs. CO2 emission

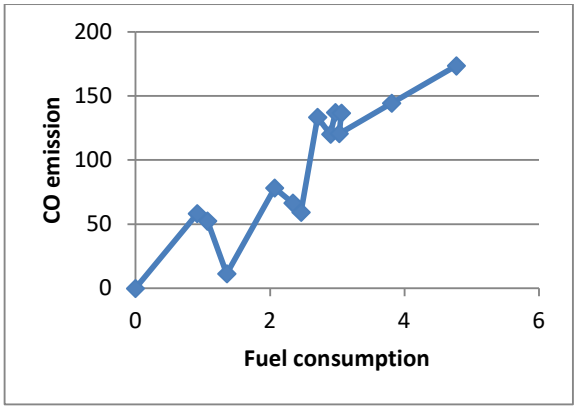

Fig. 8 : Fuel vs. CO Emission

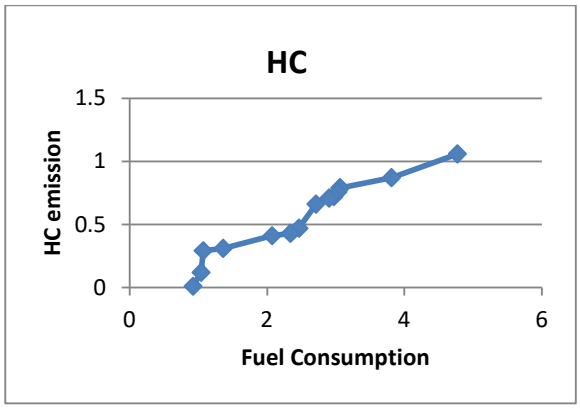

Fig. 9 : Fuel vs. HC Emission

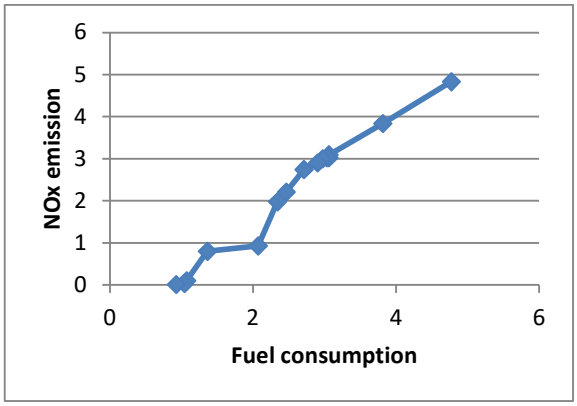

Fig. 10: Fuel vs. NOx Emission

Fig. 11 shows the relationship between the car's speed and fuel consumption. The car speed begins to increase with the increased use of fuel until the car reaches a fixed speed amount in which consumption increases at a lower rate from the beginning. The fuel consumption increases with a slight change in the car's speed, which indicates a factor affecting the vehicle's speed at the new lane on the network.

Fig. 12 describes the change in the car's location during the trip and the extent of the increased noise pollution. Figure 12 shows an increase in noise emission during the trip, which indicates the possibility of stopping the road during the journey, which suggests congestion in the places of increased noise pollution.

Fig. 13 proves the previous figure's authenticity when progress at the time of the trip has the potential for the road to be locked by congestion, which increases noise emission. Finally, Fig. 14 shows all exhaust from the vehicle through its trip vs. its fuel consumption.

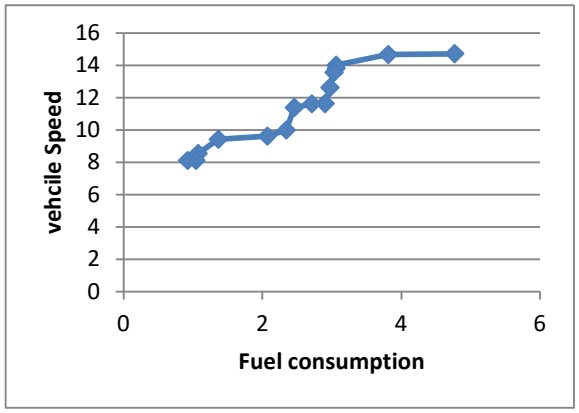

Fig. 11: Fuel vs. Vehicle Speed

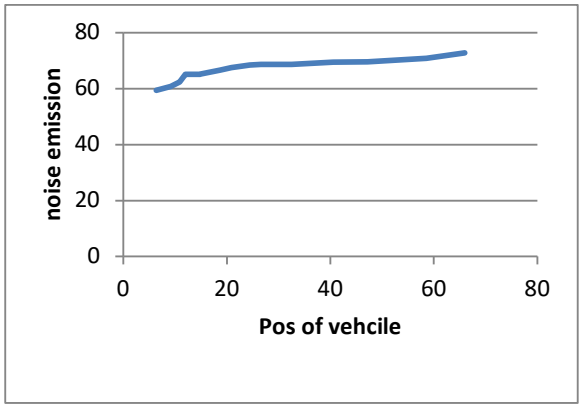

Fig. 12 Pos of a vehicle vs. noise emission

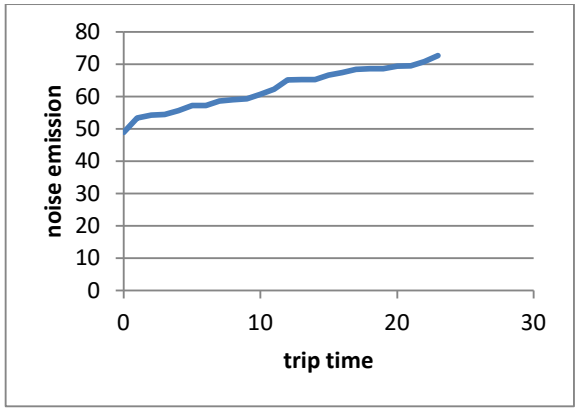

Fig. 13 Trip Time vs. Noise Emission

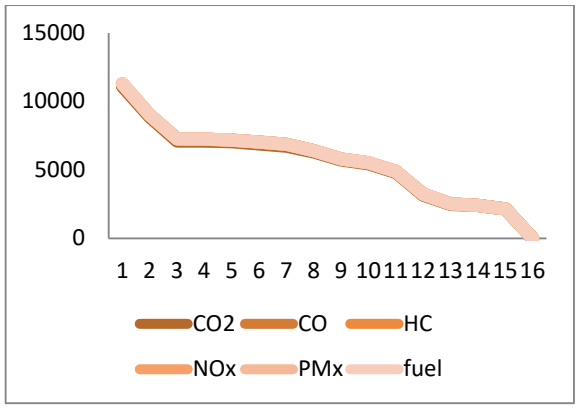

Fig. 14 Vehicle Emission

Conclusion and Future Work

Our proposed model works on traffic from a different perspective than all previous researches. We have combined traffic simulation with a fuzzy logic expert system that has enabled us to work on real traffic maps that we get from

OpenStreetMap. Then convert it to the SUMO network then assign it with real transportation data given from QuadCopter. Finally, save the simulation output to IF-THEN rules to be an input to the expert system.
Also, environmental pollution and noise pollution have a significant impact on the lives of individuals. We must follow them and extract information about them from vehicles on the routes. The SUMO is used to obtain data about the emissions, fuel consumption, trip time, and cars' speed to compare them to extract reports. In the future, we aim the fuzzy logic expert system works on the extracted data. In the future, we aim to manage traffic and transportation using SUMO and TraCI and develop the algorithms of vehicles' movements.

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Chronic Kidney Disease Prediction Using Machine Learning Algorithms

Diaa SALAMA ABD ELMINAAM [1,2], Fady BASSEL [2], Mohamed ABDELHAMED[2], Mark REFAAT[2], Ahmed EL-AGROUDY [2], Ahmad MOSTAFA[2] and Lobna SHAHEEN[2]

Faculty of Computers and Artificial Intelligent, Benha University, Egypt[1]
Faculty of Computers and Informatics, Misr International University, Egypt[2]
Emails: diaa.salama@miuegypt.edu.eg , fady1710742@miuegypt.edu.eg , mohamed1701989@miuegypt.edu.eg , mark1711712@miuegypt.edu.eg , ahmed1703326@miuegypt.edu.eg , ahmad1707430@miuegypt.edu.eg , lobna.mostafa@miuegypt.edu.eg

Abstract

Chronic Kidney Disease (CKD) is a global health problem with increased prevalence and occurrence, poor outcomes, and increased costs. The consequences of Chronic Kidney Disease (CKD) only include kidney failure and reduced kidney function complications. Current research indicates that early identification and diagnosis will eliminate or postpone some of those adverse effects. The use of technology is promising in this field, so we are using machine learning to help in the early recognition of CKD. We are using algorithms like Support Vector Machine (SVM), K-Nearest Neighbour (KNN), Decision Tree, and Random Forest comparing their results to achieve the maximum accuracy and having two different datasets "Pima Indians Diabetes dataset" and "Chronic Kidney Disease dataset," with varying numbers of the attribute (8 for the first dataset and 25 for the second dataset) and of course different attribute values. We are also training the machine on various percentages of training set size (70% and 80%) and test set size (30% and 20%). And different K values (1 and 3) for the KNN. In the end, we found out that by training the algorithm on 80% of the data in the "Chronic Kidney Disease" dataset and by using the Random Forest method, we could achieve an accuracy of 100%.

Keywords: Chronic Kidney Disease, Machine Learning Algorithms, Random Forest(RF), Support Vector Machine(SVM)

Introduction

Chronic kidney disease (CKD) is a type of disorder that affects the kidney structure and its function. (Levey & Coresh, 2012) It is a chronic disorder with significant consequences for the safety and healthcare budgets of patients. It can be triggered by high blood pressure, diabetes, and other diseases. (Pasadana et al., 2019) Risk factors for CKD are divided into factors that initiate and perpetuate, including genetic factors, ethnicity, socioeconomic factors, and age. Causes of CKD are too many, but diabetes mellitus is the most common. According to a published paper, early detection and characterization are critical factors in controlling and treating CKD (Rady & Anwar, 2019).

It is hoped that the number of patients with CKD in the end-stage will be reduced with early recognition and treatment. According to The NHS website, the symptoms differ between the initial stage and late-stage. Still, they are mostly poor appetite and weight loss, shortness of breath, swollen ankles/hands/feet, body tiredness, insomnia, skin itching, muscle cramps, and headaches (Song, HJ et al. 2007). Unfortunately, chronic renal disease is under-diagnosed and under-treated, partially because there is no consensus on identifying and classifying it. It is diagnosed if there has been evidence of kidney damage for a long time, mostly more than three months. Based on the glomerular filtration rate, it gets divided into five levels. To determine CKD prevalence, it has to be done by screening populations as it is asymptomatic, so the prevalence depends on the population studies that took place and the methods of screening used in it. To overcome the burden of CKD, it is important to identify which patients are most at risk in order to be able to screen and treat them early.

As machine learning advances its advantage toward solving global problems advances. Machine learning is used in many sectors, but the health sector has been one of the most benefited sectors with machine learning, as we can see

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in the past few years all the improvement that has taken place.(Thomas, 2020) So we are going to use machine learning in our solution to detect CKD.

This paper compares using the following algorithms Support Vector Machine (SVM), Random Forest, Decision Tree, and K-Nearest Neighbors (KNN).

The rest of the paper is described as follows: the paper's related work can be found In Section 2. The methodology is presented in Section 3. Section 4 shows a comparison between proposed algorithms and the experimental results. Finally, Section 5 shows the conclusions and future work.

Related Work

Some related work in the same field is "Chronic Kidney Disease Prediction Using Machine Learning" by Priya & Kumar (2018). It was found out that the Decision tree method is more accurate than the naive Bayes method.

"A Machine Learning Methodology for Chronic Kidney Disease Diagnosis" by Jiongming Qin et al. (2019). Using the imputation of KNN, LOG, RF, SVM, and RNN, it was found out that it could achieve better output than the cases when using random imputation and imputation of mean and mode.

"Dietary prediction for patients with chronic kidney disease (CKD) by using machine learning algorithms to find blood potassium level" by Wickramasinghe et al. (2017). It was found out in it that the Multiclass Decision Forest algorithm gives the best results compared to the other classification algorithms by 99.17% precision.

"Biomimicry and Machine Learning in the Context of Healthcare Digitization" by Lee et al. (2019). It summarizes analysis done using Hancock's "Knowledge-Based Expert System" (KBES) on two datasets. Regarding the best diet to follow to reduce the CKD.

"Comparative Study of Chronic Kidney Disease Prediction using KNN and SVM" by Sinha & Sinha (2015). It was found in it that the ANN performance is better than the other algorithms.

"OF-KNN Technique: A Chronic Kidney Disease Prediction Approach" by Subhashini & Jeyakumar (2017). It was found in it that the OF-KNN gives a high classification accuracy rate.

Many other researchers who are recognized in literature on Optimization and Metaheuristics algorithms and applications such as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] studied the predictions pobems and its solutions. As a result of the collected information, we decided to combine all the features that the previous attempts worked on to enhance the expected results' efficiency.

Proposed CKD Detection System (and dataset used)

WEKA has been used as a data mining tool in this experiment by authors to identify data, analyze and evaluate the prediction accuracy of K-nearest neighbor KNN, Decision tree, and Support vector machine SVM algorithms on two different datasets. This experiment has been tested on an HP Pavilion laptop running Linux operating system with Intel 8th generation core i5, 8GB RAM and NVIDIA GeForce GTX 1050 Ti GPU.

Proposed Algorithms

Support Vector Machine Algorithm:

SVM is for binary classification problems. In our case, the two classes have the disease or not (1,0); there are two types of linear and nonlinear SVM (Arora, 2020). A linear SVM is when the classes can be separated using a linear line called a hydroplane. The hydroplane, which has as much margin as possible between the hyperplane and any point within the dataset, is the one chosen.

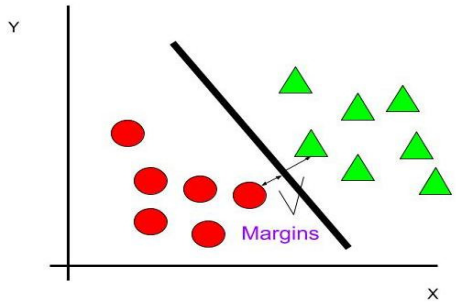

Fig.1: SVM Algorithm

Nonlinear SVM is used when the data cannot be separated using a linear line, so kernels are used to map data into high dimensional space to classify and separate classes.

We used the SVM linear technique with our two datasets, and it showed the best accuracy in the Pima Indians Diabetes dataset in both the training % of 70 and 80.

K-Nearest Neighbour Algorithm:

The K-Nearest Neighbour (kNN) is widely used in classification problems, and it depends on K the closest number of neighbors for a given data. For example, we want to know the class of the star if K =2, then the nearest two neighbors are circles, so the star is more likely a circle.

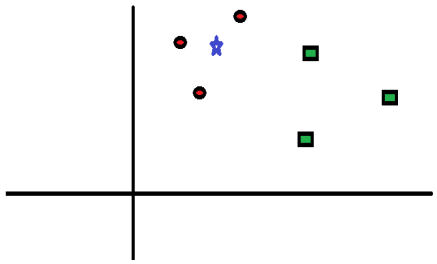

Fig.2: KNN Algorithm

We used KNN with K=1 and K=3. It showed the worst results in the Pima dataset but showed relatively accurate chronic kidney disease data results.

Decision Tree Algorithm:

Decision Tree Algorithm is part of the supervised learning algorithms family; it classifies and solves the problem using tree view representation. Each leaf node is considered a class label, and each internal node is an attribute or feature. The decision tree algorithms showed better accuracy than KNN in the Pima dataset and showed almost 99% accuracy in the chronic disease dataset at a 70% training set.

Random Forest Algorithm:

Random Forest algorithm also belongs to the family of supervised learning algorithms. It ensembles several decision trees trained using the bagging technique to increase learning models, increasing the results' accuracy. Random Forest algorithms result in the creation of several decision trees. Each returns a result of the classification

of the input data. For example, if there are four decision trees, 3 of them classified the data as class X, and one tree classified it as class Y, then the result is that this data belongs to class X.

The Random Forest algorithm showed the best accuracy in the chronic kidney disease dataset with 100% accuracy. In the Pima dataset, it outperformed the KNN and decision tree algorithms.

Data Sets Description

Pima Indians Diabetes dataset (Pro, 2020)**:**

When it comes to type-2 diabetes, "Pima Indians of Arizona" have the highest prevalence and incidence of any type of it worldwide. The National Institute of Diabetes and Digestive and Kidney Diseases has a dataset we took as our first data set. It contains details on medical measures related to 768 people, 500 citizens with no diabetes problem, while the remaining 268 samples are diabetic. For healthy people, the class column in this dataset is set by 0 for diabetic patients by 1. There are eight attributes. (Şahan et al., 2005)

Table:1 Pima Indians Diabetes

#	Attribute name	Attribute description	Type of Attribute
1	Pregnancies	Number of times pregnant	Numerical
2	Glucose	Plasma glucose concentration in oral glucose test	Numerical
3	blood pressure	Diastolic blood pressure	Numerical
4	skin thickness	Triceps skinfold thickness	Numerical
5	Insulin	Two-hour serum insulin	Numerical
6	BMI	Body mass index	Numerical
7	DiabetesPedigreeFunction	Diabetes Pedigree Function	Numerical
8	Age	Age(years)	Numerical
9	Outcome	Class variable(0 or 1)	Numerical

Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPe	Age	Outcome
6	148	72	35	0	33.6	0.627	50	1
1	85	66	29	0	26.6	0.351	31	0
8	183	64	0	0	23.3	0.672	32	1
1	89	66	23	94	28.1	0.167	21	0
0	137	40	35	168	43.1	2.288	33	1
5	116	74	0	0	25.6	0.201	30	0
3	78	50	32	88	31	0.248	26	1
10	115	0	0	0	35.3	0.134	29	0
2	197	70	45	543	30.5	0.158	53	1
8	125	96	0	0	0	0.232	54	1
4	110	92	0	0	37.6	0.191	30	0
10	168	74	0	0	38	0.537	34	1
10	139	80	0	0	27.1	1.441	57	0
1	189	60	23	846	30.1	0.398	59	1
5	166	72	19	175	25.8	0.587	51	1
7	100	0	0	0	30	0.484	32	1
0	118	84	47	230	45.8	0.551	31	1
7	107	74	0	0	29.6	0.254	31	1
1	103	30	38	83	43.3	0.183	33	0
1	115	70	30	96	34.6	0.529	32	1
3	126	88	41	235	39.3	0.704	27	0
8	99	84	0	0	35.4	0.388	50	0
7	196	90	0	0	39.8	0.451	41	1
9	119	80	35	0	29	0.263	29	1
11	143	94	33	146	36.6	0.254	51	1
10	125	70	26	115	31.1	0.205	41	1

Fig 3. Pima Indians Diabetes image dataset sample

Chronic Kidney Disease dataset (Rubini, 2015)**:**

The dataset used to perform the research in this respect Manuscripts was collected from a UCI data collection. The dataset includes data of 401 people aged between two and ninety from the South of India. There's a total of twenty-four parameters, the majority of the clinical in nature and physiological. Table 2 details the Specific parameters. In the preprocessing, the missing data values were replaced by the column's average if it is numerical and replaced by the most repeated word if it is a string.

Table2: Chronic Kidney Disease dataset

#	Attribute name	Attribute description	Type of Attribute
1	Age	Age	Numerical
2	Bp	Blood pressure	Numerical
3	Sg	Specific gravity	Nominal
4	Al	Albumin	Nominal
5	Su	Sugar	Nominal
6	Rbc	Red blood cells	Nominal
7	Pc	Pus cell	Nominal

8	Pcc	Pus cell clumps	Nominal
9	Ba	Bacteria	Nominal
10	Bgr	Bloog glucose random	Numerical
11	Bu	Blood urea	Numerical
12	Sc	Serum creatinine	Numerical
13	Sod	Sodium	Numerical
14	Pot	Potassium	Numerical
15	Hemo	Hemoglobin	Numerical
16	Pcv	Packed cell volume	Numerical
17	Wc	White blood cells	Numerical
18	Rc	Red blood cells	Numerical
19	Htn	Hypertension values	Nominal
20	Dm	Diabetes mellitus	Nominal
21	Cad	Coronary artery disease	Nominal
22	Appet	Appetite	Nominal
23	Pe	Pedal ederma	Nominal
24	ane	Anemia	Nominal
25	class	Class	Nominal

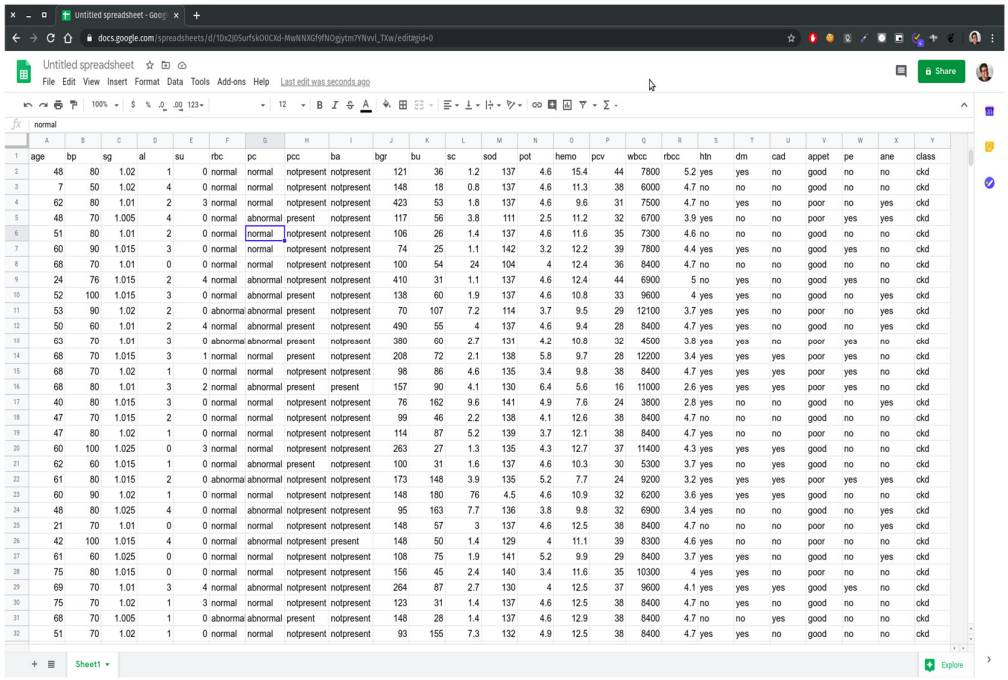

age	bp	sg	al	su	rbc	pc	pcc	ba	bgr	bu	sc	sod	pot	hemo	pcv	wbcc	rbcc	htn	dm	cad	appet	pe	ane	class
48	80	1.02	1	0	normal	normal	notpresent	notpresent	121	36	1.2	137	4.6	15.4	44	7800	5.2	yes	yes	no	good	no	no	ckd
7	50	1.02	4	0	normal	normal	notpresent	notpresent	148	18	0.8	137	4.6	11.3	38	6000	4.7	no	no	no	good	no	no	ckd
62	80	1.01	2	3	normal	normal	notpresent	notpresent	423	53	1.8	137	4.6	9.6	31	7500	4.7	no	yes	no	poor	no	yes	ckd
48	70	1.005	4	0	normal	abnormal	present	notpresent	117	56	3.8	111	2.5	11.2	32	6700	3.9	yes	no	no	poor	yes	yes	ckd
51	80	1.01	2	0	normal	normal	notpresent	notpresent	106	26	1.4	137	4.6	11.6	35	7300	4.6	no	no	no	good	no	no	ckd
60	90	1.015	3	0	normal	normal	notpresent	notpresent	74	25	1.1	142	3.2	12.2	39	7800	4.4	yes	yes	no	good	yes	no	ckd
68	70	1.01	0	0	normal	normal	notpresent	notpresent	100	54	24	104	4	12.4	36	8400	4.7	no	no	no	good	no	no	ckd
24	76	1.015	2	4	normal	abnormal	notpresent	notpresent	410	31	1.1	137	4.6	12.4	44	6900	5	no	yes	no	good	yes	no	ckd
52	100	1.015	3	0	normal	abnormal	present	notpresent	138	60	1.9	137	4.6	10.8	33	9600	4	yes	yes	no	good	no	yes	ckd
53	90	1.02	2	0	abnormal	abnormal	present	notpresent	70	107	7.2	114	3.7	9.5	29	12100	3.7	yes	yes	no	poor	no	yes	ckd
50	60	1.01	2	4	normal	abnormal	present	notpresent	490	55	4	137	4.6	9.4	28	8400	4.7	yes	yes	no	good	no	yes	ckd
63	70	1.01	3	0	abnormal	abnormal	present	notpresent	380	60	2.7	131	4.2	10.8	32	4500	3.8	yes	yes	no	poor	yes	no	ckd
68	70	1.015	3	1	normal	normal	present	notpresent	208	72	2.1	138	5.8	9.7	28	12200	3.4	yes	yes	yes	poor	yes	no	ckd
68	70	1.02	1	0	normal	normal	notpresent	notpresent	98	86	4.6	135	3.4	9.8	38	8400	4.7	yes	yes	yes	poor	yes	no	ckd
68	80	1.01	3	2	normal	abnormal	present	present	157	90	4.1	130	6.4	5.6	16	11000	2.6	yes	yes	yes	poor	yes	no	ckd
40	80	1.015	3	0	normal	normal	notpresent	notpresent	76	162	9.6	141	4.9	7.6	24	3800	2.8	yes	no	no	good	no	yes	ckd
47	70	1.015	2	0	normal	normal	notpresent	notpresent	99	46	2.2	138	4.1	12.6	38	8400	4.7	no	no	no	good	no	no	ckd
47	80	1.02	1	0	normal	normal	notpresent	notpresent	114	87	5.2	139	3.7	12.1	38	8400	4.7	yes	no	no	poor	no	no	ckd
60	100	1.025	0	3	normal	normal	notpresent	notpresent	263	27	1.3	135	4.3	12.7	37	11400	4.3	yes	yes	yes	good	no	no	ckd
62	60	1.015	1	0	normal	abnormal	present	notpresent	100	31	1.6	137	4.6	10.3	30	5300	3.7	yes	no	yes	good	no	no	ckd
61	80	1.015	2	0	abnormal	abnormal	notpresent	notpresent	173	148	3.9	135	5.2	7.7	24	9200	3.2	yes	yes	yes	poor	yes	yes	ckd
60	90	1.02	1	0	normal	normal	notpresent	notpresent	148	180	76	4.5	4.6	10.9	32	6200	3.6	yes	yes	yes	good	no	no	ckd
48	80	1.025	4	0	normal	abnormal	notpresent	notpresent	95	163	7.7	136	3.8	9.8	32	6900	3.4	yes	no	no	good	no	yes	ckd
21	70	1.01	0	0	normal	normal	notpresent	notpresent	148	57	3	137	4.6	12.5	38	8400	4.7	no	no	no	poor	no	yes	ckd
42	100	1.015	4	0	normal	abnormal	notpresent	present	148	50	1.4	129	4	11.1	39	8300	4.6	yes	no	no	poor	no	no	ckd
61	60	1.025	0	0	normal	normal	notpresent	notpresent	108	75	1.9	141	5.2	9.9	29	8400	3.7	yes	yes	no	good	no	yes	ckd
75	80	1.015	0	0	normal	normal	notpresent	notpresent	156	45	2.4	140	3.4	11.6	35	10300	4	yes	yes	no	poor	no	no	ckd
69	70	1.01	3	4	normal	abnormal	notpresent	notpresent	264	87	2.7	130	4	12.5	37	9600	4.1	yes	yes	yes	good	yes	no	ckd
75	70	1.02	1	3	normal	normal	notpresent	notpresent	123	31	1.4	137	4.6	12.5	38	8400	4.7	no	yes	no	good	no	no	ckd
68	70	1.005	1	0	abnormal	abnormal	present	notpresent	148	28	1.4	137	4.6	12.9	38	8400	4.7	no	no	yes	good	no	no	ckd
51	70	1.02	1	0	normal	normal	notpresent	notpresent	93	155	7.3	132	4.9	12.5	38	8400	4.7	yes	yes	no	good	no	no	ckd

Fig. 4: Chronic Kidney Disease dataset image

Results and Discussion

This research paper has been training each algorithm two times, with training data 70% and 30% for testing and the second time with training data 80% and 20% for testing.

Table 3: The Results of Pima Indians Diabetes Dataset

Algo / Training %	KNN K=1	KNN K=3	Decision Tree	Random Forest	SVM Type=linear
70%	73.4	73.4	75.2	77.8	80.8
80%	74.6	75.3	78.5	79.8	79.8

Table 4: The Results of Chronic Kidney Disease Dataset

Algo / Training %	KNN K=1	KNN K=3	Decision Tree	Random Forest	SVM Type=linear
70%	97.5	97.5	99.1	100	93.3
80%	97.5	96.2	91.2	100	90.0

Conclusion

This research aim was to clarify how chronic kidney disease (CKD) prediction happens. Here, the KNN algorithm is used with different values for K and also other used algorithms (Decision tree, SVM, and Random Forest) that aims to get as high accuracy as possible using different training percentages using two different datasets to check more and more and get higher accuracy through different pieces of training techniques and different percentages. It was concluded that the best accuracy found is 100% by using the Random Forest method by training the algorithm on 80% of the data in the "Chronic Kidney Disease" dataset we have.

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Creative Leadership and Creativity: An Overview

Chijioke NWACHUKWU

Horizons University Paris France
Email: cesogwa@yahoo.com

Hieu Minh VU

Faculty of Business Administration, Van Lang University, Vietnam
Email: hieu.vm@vlu.edu.vn

Abstract

Firms need creative leadership to comprehend and respond to a dynamic and complex business environment. As such, leaders must possess creative competence and creative thinking skills to adapt and respond to complexity. Creativity in the workplace has become vital for organizational performance, success, and sustainability. This paper explores creative leadership and creativity using the literature review approach. We search for relevant articles using three keywords: ''leadership'' ''creative leadership'' and ''creativity''. Considering the role of leadership and creativity in promoting organizational outcomes, it is vital to X-ray these concepts. Drawing from historical data and findings from prior studies, it was observed that personality, leadership development program, and work environment foster creativity in organizations. Specifically, physical and cultural environments are important to support individual and group creativity in the workplace. The antecedent and consequences of creativity were discussed. The authors proposed some recommendations for managers and business leaders.

Keywords: Creative Leadership, Creativity, Workplace Creativity, Extroversion, Openness

Introduction

The challenging and ever-changing business environment call for creative leadership, creativity, and collaboration among divergent stakeholders. The leadership space continues to be very busy and complex. Organizational behaviour literature demonstrates that leaders influence followers' attitudes and behaviours (Çekmecelioğlu and Özbağ, 2016). Great leaders inspire others by providing answers to the questions; why, how, and what they do. Leaders inspire and motivate others towards achieving set goals. Arguably, people are inspired by ''why you do'' and not ''what you do'' as a leader. Leadership behaviour explains employee behavior, performance, and well-being (Kuoppala, Lamminpää, Liira and Vainio, 2008; Avolio, Walumbwa and Weber, 2009). Creative leadership is the ability to intentionally engage one's imagination to influence and guide a group toward a new goal and direction (Mumford et al., 2000; Sternberg, 2002). Creative leaders positively influence their workplace, community, school, and family. They proactively explore and exploit opportunities inherent in change. Complex, new, ambiguous issues can be solved by reshaping and reforming prior knowledge (Mumford et al., 2000). As such, creative thinking and creative problem-solving skills are needed to deal with complex issues. Changing technology, consumer preferences, and intense competition demand increasing organizational creativity. Creativity is the ability to develop new and useful ideas that foster entrepreneurship and business sustainability (Amabile and Khaire, 2008). Anderson et al. (2004) contend that creativity focuses on absolute, "true" novelty, that emanates from individuals or groups within an organization. This paper focuses on reviewing and discussing the concept of creative leadership and creativity using prior studies. This study enriches the leadership literature by informing academicians and practitioners of the importance of creative leadership and creativity in organizations. This paper is arranged as follows. In the following section, this paper presents an overview of the theoretical underpinning, leadership, leadership development, creative leadership, and creativity. Next is the methodology section. Finally, discussion, conclusions, and limitations, and suggestions for further study.

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Theoretical Underpinnings

The five-factor theory of personality is considered as appropriate to explain creativity (e.g. Madjar, Oldham and Pratt, 2002; Gong, Cheung, Wang and Huang, 2012). The personality theory suggests that individual creativity depends on 5 factors; conscientiousness, openness, neuroticism extroversion, agreeableness (Heckhausen et al., 1989; Krueger and Heckhausen, 1993). Conscientiousness focus on competence, order, and dutifulness (McCrae and Costa, 1996), mature, wise, and responsible (Igier and Mullet, 2003) and academic achievement and workplace performance. Openness refers to fantasy, aesthetics, and feelings (McCrae and Costa, 1996) and experience, intellectual and experiential curiosity. Neuroticism factor refers to emotional stability. It connotes anxiety, anger, hostility, and depression. Extroversion suggests warmth, assertiveness, and gregariousness (Igier and Mullet, 2003). Agreeableness refers to trust, straightforwardness, and altruism (Igier and Mullet, 2003) and friendly and good-natured. Few studies used Five personality dimensions to explain creativity. These studies suggest that Five personality dimensions interact with contextual variables to empower or hinder creativity (e.g., George and Zhou, 2001; Baer and Oldham, 2006; Madjar, 2008; Baer, 2010; Raja and Johns, 2010). In the study of creative personality and creativity, Madjar, Oldham and Pratt (2002) submit that managers can nurture and foster creativity in employees who are not naturally creative. Gong, Cheung, Wang and Huang (2012) report that a proactive personality promotes creativity.

Understanding Leadership

Leadership has been conceptualized in different ways. The majority fall into four often contested typologies; position, person, result, and process (Grint, 2010; Northouse, 2015). Leadership as a position suggests leaders' positional power which allows them to achieve set goals. Leadership as a person connotes the personal traits and attributes of the leader. Leadership, as a result, focuses on the leader's performance in terms of the achievement of set goals. Leadership as a process emphasizes the process that occurs between leaders and their followers. Arguably leadership is a two-way process that involves an interactive and fluid relationship between the leader and the led. The concept of leadership is still evolving. Extant literature on leadership document characteristics of leaders (trait) (e.g Avolio, 2007), contingency or situational leadership (e.g. Stogdill, 1974), transactional leadership (Burns, 1978), transformational leadership (Burns 1978; AlimoMetcalf, Alban-Metcalf, 2005), distributed leadership (Hartley et al., 2008), entrepreneurship leadership (Gupta et al., 2004; Yang, 2008; Dover, Hariharan and Cummings, 2014; Rae, 2016). Entrepreneurial leaders influence others to leverage both opportunity-seeking and advantage-seeking behaviors (Ireland, Hitt and Sirmon, 2003; Vecchio 2003; Kuratko, 2007). Strategic leadership is a firm's capability that allows it to leverage important resources to achieve sustainable performance (Nwachukwu and Vu, 2020).

Leadership Development

Leadership development is an integration strategy that helps people understand how to relate with others, coordinate their efforts, build commitments, and create extended social networks by applying self-understanding to social and organizational imperatives (Day, 2001). Leadership development emphasizes developing a broader and collective framework in which leadership is developed in practice (Hernez-Broome and Hughes, 2004). It is a social process that involves everyone in the organization (Wenger and Snyder, 2000; Tichy and Cardwell, 2002) and focuses on creating relationships that will add value to the organization. Organizational attitude dimensions of influence include; positive peer group, supervisor, resources, challenge, mission clarity, autonomy, cohesion, and intellectual stimulation. Managing these influences requires developing creative leaders. In this context, organizations need to design and implement robust leadership development programs. The key component of leadership development programs includes coaching, accountability, change management, influence and negotiation, and communication. The following figure shows the important skills that leaders would develop from a robust leadership development program.

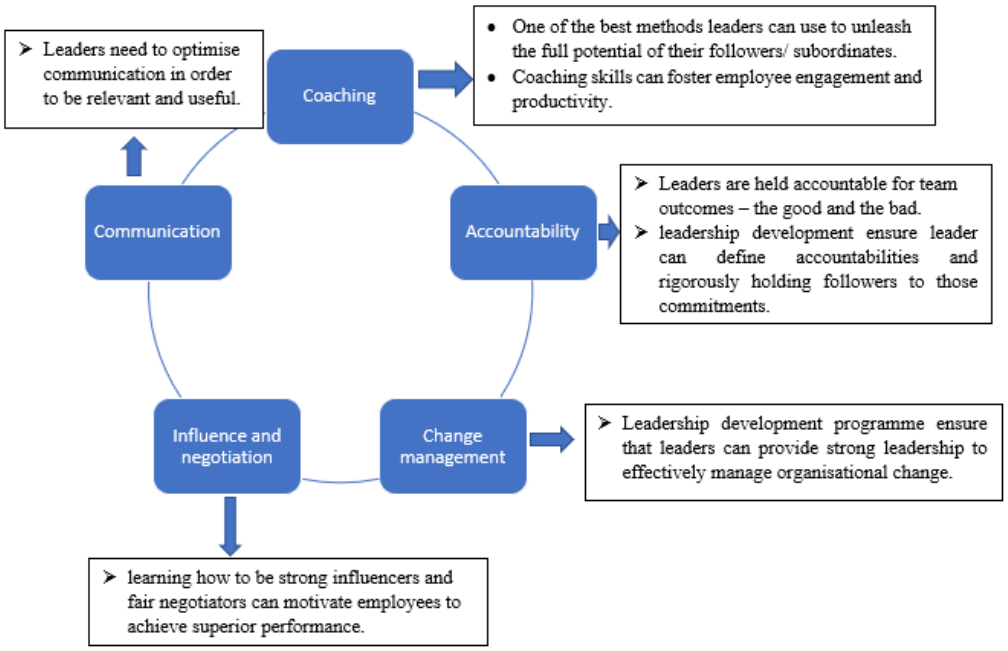

Figure of Key skills in Leadership Development Programme

Source: Authors adaptation (2020)

Creative leadership

Extant literature has shown that creativity is central in leadership (Csikszentmihalyi, 2001; Sternberg, 2002; Sternberg, Kaufmann and Pretz, 2004). Sternberg et al. (2004) propose the concept of creative leadership. Sternberg (2002) notes creative leadership hinges on successful intelligence, practical, and creative intelligence. Successful intelligence focuses on recognizing and capitalizing on one's strengths to achieve success (Sternberg, 2002). Practical intelligence enables individuals to successfully align their environments to suit themselves. Creative intelligence enables leaders to develop a vision and to decide where they wish to lead others. The goal of creative intelligence is to convince others to support your unpopular ideas. Mumford et al. (2000) assert that creative problem-solving skills promote leadership effectiveness. It has been argued that creativity is an important aspect of leadership competence. Creative competence can be built by minimizing the fear of judgment, showing confidence to execute behaviors needed to achieve specific performance, and walking people through various steps and processes. Creative thinking is equally necessary to navigate a challenging business environment or to resolve complex problems. The manager who finds imaginative ways to improve business performance within a period of COVID 19 pandemic, the university teacher who finds a new way to teach and conduct examination for the student in the face of COVID 19 pandemic and organizations who must adapt to a new strategy because of COVID 19 pandemic all employ creative thinking to guide others toward achieving set goals. Leaders must keep abreast of significant events in the environment and emergent technologies that can be exploited (Byrne, Mumford, Barrett and Vessey, 2009). Indeed, creative leaders can leverage new opportunities in their environment to achieve success.

Amer, (2017) identifies the following art of creative leadership.

- ✓ Every team member is unique and diverse skills foster a good workplace.
- ✓ To keep team members engaged and willing to innovate, leaders create an atmosphere in which employees can communicate friendly, unafraid of criticism or attacks.
- ✓ Innovation is a mindset that improves over time and ideas can come from an unexpected place.
- ✓ Productivity (aim, target, and performance) matters more than long hours.
- ✓ A strong leader addresses a problem early before they cause disruption.
- ✓ Use evaluation tools, self-evaluation included.
- ✓ A strong leader turns negativity into positive energy.

- ✓ Kill your ego.
- ✓ To keep spirit and motivation up, a strong leader should encourage, instruct, and develop team members.
- ✓ A bad experience is a good opportunity to learn from negative experiences and change them into something good.
- ✓ Penalties are always an option.
- ✓ Leaders are role model

Creativity

Creativity involves introducing new techniques by individuals or a group of people in an organization to achieve better business outcomes. In light of innovation and globalization, firms need creative employees to compete in their respective markets. Employees with proactive personalities are more likely to make the constructive change (Zhou and George, 2001). Creativity involves primarily intra-individual cognitive processes (Rank et al., 2004) which focuses on idea generation. Creativity is encompassing and connotes opportunities to solve problems and to engage in breakthrough thinking throughout the organization (e.g. West, 1997). Creativity may depend on the employee or situation (Siddiqi and Qureshi, 2016). An employee's creativity is an individual who has skills and new ideas about his work and working style (Runco, 2004). Prior studies have shown that creativity contributes to organizational innovation, growth, and survival (Amabile, 1996; Madjar et al., 2002; Mandel, 2008), new product performance, and employee job performance (Zhang and Bartol, 2010b). Mumford et al. (2000) opine that creative problem-solving skills are important to leadership performance. Creativity can be at the individual, group, or organizational levels. Çekmecelioğlu and Özbağ, (2016) find a connection between followers' perceptions of transformational leadership and individual creativity. Arguably, creative people possess both physical and mental energy and are more productive. It has been argued that creative process engagement improves creative performance management. It highlights the extent to which individuals engage in creativity, including (1) problem identification, (2) information searching and encoding, and (3) idea and alternative generation (Zhang and Bartol, 2010; Zhang and Bartol, 2010b). Creative people have great respect for others who work in their field and recognize the impact of previous innovations on their work.

The work environment that stimulates/ hinder creativity

The environment fosters creativity based on specific creativity tasks. Leader promotes creativity by actively engaging in processes that may lead to creative outcomes (Zhang and Bartol, 2010a). The work environment that encourages creativity may support positive knowledge sharing among subordinates (Dunegan, Tierney and Duchonet, 1992). Empowering a work environment enables employees to achieve superior sustainable creative performance (Zhang, Sun, Zheng and Liu, 2019). Leader encouragement of creativity plays a vital role in conditioning the creative environment and motivating employees' creativity (Zhang and Bartol, 2010a). Sun, Xu and Shang (2014) assert that leaders who encourage creativity speed up innovative activities by assisting team members to understand external information. Zhang and Bartol, (2010a) opine that encouragement from leaders fosters a higher degree of creative process engagement. Arguably, organizations with an empowering work environment are more likely to have creative employees. The cultural environment plays an important role in enhancing creativity. Multicultural exposure and experience encourage creativity. Extant literature had focused on cultural differences in individual creativity. For instance, how task and social contexts moderate the relationship between individuals' cultural values (e.g., individualism/ collectivism, power distance, and uncertainty avoidance) and creativity (Erez and Nouri, 2010), culture moderates the impact of leaders, supervisors, co-workers, and social networks on creativity (Zhou and Su, 2010), culture and assessment of creativity (Hempel and Sue-Chan, 2010), and culture and the entire process of creativity (Chiu and Kwan, 2010), other culturally relevant variables such as race and ethnicity positively impact team creativity (Paulus and van der Zee, 2015). Culture affects how people express or assess creativity (Niu and Sternberg, 2001; Yi et al., 2013; Tang et al., 2015) and whether they perceive creativity as fixed or trainable (Karwowski and Tang, 2016; Tang et al., 2016). Creativity training should address the robustness of culture and differences between cultures by encouraging participants from different cultures to share their views on creativity and innovation (Tang, 2019). These studies lend credence to the positive influence of culture on creativity in different contexts. We reason that people with a larger primary social network are more creative. Accordingly, the more people interact with one another, the higher the chances of generating better ideas through knowledge and information sharing Additionally, an environment that allows teams to collaborate by sharing knowledge and ideas will achieve better creative performance. Efficient communication such as electronic brainstorming and writing promotes collaborative ideation (Paulus, Korde, Dickson, Carmeli and Cohen-Meitar,

2015). The immediate physical environment such as lighting, office ambiance, temperature, nature, and auditory/visual surroundings may foster or hinder creativity. According to Amabile and Gryskiewicz (1989) state that time pressure, too much evaluation, emphasis on maintaining the status quo, and too much organizational politics hinder creativity.

Methodology

Scholars use literature to lend credence to a variety of opinions and to manage the “diversity of knowledge" that is available (Tranfield et al., 2003). ProQuest and Goggle Scholar databases were searched for quantitative and qualitative articles. The search keywords typed into ProQuest and Goggle Scholar databases were “leadership” “creative leadership’’ and “creativity” only were included to enhance the validity and relevance of the study. The review included peer-reviewed articles published between 1978 to 2020. The inclusion of recent articles in 2019 and 2020 adds fresh and timely insights (Lim et al., 2020). In the final analysis, 66 articles were used for the review.

Discussion

The literature review focuses on three main areas. The first part of the review discusses leadership, leadership development, and creative leadership. The second area explores creativity and the last part discusses features of the work environment that stimulate and hinder creativity. Our review suggests that personality promotes individual creativity. Our literature review reveals that different leadership paradigm exists, and there is no best approach to leading. The leadership paradigm to adopt will depend on situations and contexts. We observe that issues such as coaching, accountability, change management, influence, and negotiation as well as communication must be incorporated in a robust leadership development program. Organizations need robust leadership development programs to develop and nurture creative leaders. This is important to enable them to cope and navigate the dynamic and uncertain business environment. To effectively weather the storm, firms need to create products and services that will satisfy and increase customers' patronage and enhance strategic performance (Nwachukwu and Chladkova, 2019). This demands creativity and creative leadership. Our review shows that creative leaders need creative competence and creative thinking. Because of COVID 19 pandemic, organizations need creative leadership to achieve superior business results. Given this, creative thinking and creative competence have become increasingly important for leaders and their firms. We observed that creativity promotes organizational outcomes such as innovation, growth, survival, new product development, and employee job performance. Strong leadership is essential for organizational creativity. Our analysis highlights the importance of the work environment in promoting creativity. The work environment may foster or restrict organizational creativity, individual, or group. The characteristics of a work environment that promote creativity are leadership, culture, physical work environment, adequate freedom, challenging work, appropriate resources, supportive supervisor, diverse and communicative co-workers, sense of cooperation, management that supports creativity. To stimulate creativity in the workplace, leaders must encourage knowledge sharing and collaboration among group members. Organizations should give attention to their physical environments such as lighting, office ambiance, temperature, nature, and auditory/visual surroundings. By doing so, employees will be motivated to think creatively and come up with robust ideas that will help the organization achieve its goals. A conducive physical environment is important for the health and safety of employees.

Conclusion

Creativity is a valuable workplace skill that is needed by all organizations, whether public or private, for-profit, or not-for-profit. Successful creativity needs a radical change in the way organizations to manage and generate ideas. Firms need competent managers and employees to achieve strategic goals and enhance strategic performance (Vu and Nwachukwu, 2020). The changing and unpredictable environment has made creative leadership an increasingly key resource for firms that want to remain competitive in the marketplace. This paper explores creative leadership and creativity using the literature review approach. Indeed, organizations that do not value creativity will not remain in the market for a long time. We, therefore, put forward the following recommendations.

- ✓ Organizations should encourage creative leadership and creativity by encouraging networks and collaborations with people of diverse backgrounds.

- ✓ Leaders must recognize the importance of all the facets of creativity to foster creative thinking and change.
- ✓ Organizations through leadership development programs must ensure that leaders master the creative process and can facilitate this process in others.
- ✓ They must find ways to build empowering work environments that encourage creative thought.
- ✓ It is important to encourage a creative learning environment that allows collaboration with peers within and outside the organization.

Limitation and suggestion for further study

The focus on the review of the extant literature on creative leadership and creativity somewhat limits the applicability of the study. Scholars should examine more antecedents and consequences of leadership and creativity in varying contexts, especially in emerging markets. Indeed, the current paper contributes to the debate on creative leadership and creativity.

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Approaches to Assessing the Value of Companies: A Review of The Russian Consumer Market

Ekaterina V. SURKOVA
Moscow Aviation Institute (National Research University), Moscow Russian Federation E-mail: surkova.ekaterin@mail.ru

Galina A. SKACHKO
Moscow Aviation Institute (National Research University), Moscow Russian Federation

Natalia M. MIKHAILOVSKAYA
Moscow Aviation Institute (National Research University), Moscow Russian Federation

Abstract

The article analyzes the existing certain differences in the interpretation of the concepts of "merger" and "acquisition" in foreign theory and practice and in Russian legislation. The methods of company valuation during mergers and acquisitions are investigated, their advantages and disadvantages are given. An assessment is made of the value of companies in three mergers and acquisitions with the participation of the largest Russian companies in the consumer sector. The result is a structured tabular presentation of the valuation of companies by different methods and an analytical conclusion on relative deviations from actual cost.

Keywords: Profit-Based Valuation Methods, Market, Consumer Market, Value Of Companies, Mergers And Acquisitions.

Introduction

The modern Russian economy is characterized by active processes of mergers and acquisitions of companies. In Russia, mergers and acquisitions were implemented after the adoption of the Federal Law of December 26, 1995 No. 208-FL “On Joint Stock Companies”. It is important to note that such a concept as mergers and acquisitions is absent in Russian legislation. The merger of companies is the emergence of a new entity by transferring to it all the rights and obligations. The term “acquisition’ is not described in Russian law.

According to Russian law, a merger must form a new legal entity. "Acquisition" refers to a purchase of one company by another with the transfer of absolute or partial rights.

According to RBC news agency, despite the fact that in 2018 the number of mergers and acquisitions in Russia was quite small, their volumes reached a record result: $ 13.4 billion. [1]. There is an overview of the most expensive deals in decreasing order:

- Sberbank's sale of its company “Denizbank” to the Dubai banking group Emirates NBD, the transaction amount is $ 3.2 billion;
- VTB’s purchase of 29 % of Magnit shares for $ 2.45 billion;
- Japan Tobacco bought a 100% stake in Donskoy Tabak group for $ 1.7 billion.

Mergers and acquisitions are often carried out on the Russian market, however, indicators in terms of quantity and volume are declining, all of these processes have an explanation - the impact of the global financial and economic crisis.

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Methods of assessing the value of companies

The following valuation technologies: profit-based valuation methods. There are two methods: capitalization of net profit and the method of discounting cash flows. The main difference is the timing: the method of capitalization of net profit calculates indicators for a year, the method of discounted cash flows calculates indicators for several years, so this method is most often used.

It is based on the opinion that the investor will pay an amount equal to the value of the company's future revenues, and the owner will be ready to sell his business for an amount equal to the current value of the projected future income, respectively, the transaction amount will be market. This method is considered as one of the most common. It is best to use this method for profitable companies than for unprofitable ones.

The discounted cash flow method is one of the most detailed, but there are a number of disadvantages of this method. The difficulty is predicting cash flows and the discount rate in the absence of a large amount of data on which the forecast should be based, and there is also a lot of false information, the results of which will turn out to be an incorrect forecast.

The following valuation methods are the capital market method or analysis of comparable companies, the transaction method or analysis of comparable transactions and the industry coefficient method or analysis of the same or comparable industry.

The basis of this group of methods is to compare companies with similar ones. The object for comparison is selected in such a way that it is similar in economic, material, technical and other characteristics, with which you can determine the value of the object using appropriate adjustments.

Price multiplier is a ratio of the value of invested or equity capital to a financial or non-financial indicator.

This method gives one of the most accurate results when there is relevant information about analogues, reflects the real situation on the market and the cost of the enterprise reflects production and business activities. However, there are disadvantages: this approach takes into account retrospective information without taking into account future development. It is also extremely difficult to find information about analogues, because joint-stock companies do not give their quotes to the stock market, and closed joint-stock companies do not disclose information. Also, certain adjustments are required due to significant differences.

Valuation method based on replacement costs. This approach includes several methods based on determining the costs that are necessary for the reproduction or replacement of the valuation subject, taking into account depreciation and obsolescence. This approach is applicable in assessing the organization as a whole, a controlling stake, new organizations, organizations with no forecasts of future flows, as well as in the absence of market information or if the company was liquidated. The basis of this approach is the determination of the value of the enterprise as the difference between assets and liabilities.

The cost approach allows you to make calculations in cases where the income and comparative approaches are not applicable. However, this approach is not informative if the company has many intangible assets or if the company has high profits. Also, this approach does not take into account the value of the company in the state in which it was at the time of settlement.

Consumer Transaction Market Overview. experimental part

In our opinion, the consumer sector is of interest. Using a review of the Russian M&A market for 2017 [2] and for 2018 [3], 3 transactions with the participation of the largest companies in this sector were highlighted. Transactions are shown in table 1.

To assess the full value of the company, the purchase price of 100% of the company was calculated according to the formula:

$$Company\ value\ = \frac{Transaction\ amount}{Acquired\ share}$$

Originally, financial indicators in US dollars are used for the assessment, and in the reports of Russian companies, the format for the presentation of numerical indicators is the rubles of the Russian Federation, therefore, the amount of transactions and the full value of the company were converted into Russian rubles. For this, the weighted average rate for 2017-2018 was used, presented in table 2.

To determine the most effective approach to valuing companies in the sector, each of them was evaluated using all three methods. According to the results of calculations, this estimate was compared with the actual value of the company upon purchase.

Table 1: The largest transactions in the consumer sector in 2017-2018.

Transaction object	**Buyer - seller**	**Year**	**Acquired amount,** *%*	**Transaction amount,** *million US dollars*	**Full company value** *million rubles*
Magnit	VTB - Bank - Sergey Galitsky	2018	29,1%	2 442	489 683
ГК Detskiy Mir	Private investors - Sistema JSFC, Russian-Chinese Investment Fund, private shareholders	2017	30,5%	325	66 820
M.Video	Safmar Group - Public Investors	2017	24,7%	310	78 702

An analysis of the value of Magnit showed that in 2018 Sergey Galitsky sold about 29% of the shares to VTB Bank for $ 2.4 billion. When recounted, the total cost of the company amounted to 489.7 billion rubles. Recalculation was carried out according to the weighted average exchange rate for 2018.

Table2: Weighted average ruble to dollar exchange rate for 2017-2018 [4]

	2017	**2018**
Exchange rate	58,35	62,71

When conducting the analysis using the discounted cash flow method, we used Magnit IFRS reporting and the conomy.ru portal (to determine the forecast data). First of all, it was necessary to calculate the discount rate. In this case, the WACC formula (weighted average cost of capital) was used for enterprises whose financing is carried out exclusively from borrowed and own funds. Using the financial report of the company for 2018 and the information of the portal conomy.ru, the data [Table 3] necessary for calculating WACC were obtained.

Table 3: Initial data for calculating WACC for «Magnit»[5]

CAMP calculation	
Risk free rate %	5,57
Risk premium, %	8,029
The sensitivity coefficient of the asset to changes in market profitability	0,5885
Tax rate, %	21,38
β_l	0,8221
$CAPM = 0{,}0557 + (0{,}8221 \times (0{,}1359 - 0{,}0557))$	
CAPM, %	12,17
Equity	
Share capital, thousand rubles	392 868 273,5
Cost of capital,% per year	12,17
Share in the capital,%	66,45
Loan capital	
Loans and borrowings, thousand rubles	198 312 958
Cost of loan capital,% per year	8,14
The share of loan capital,%	33,55

Calculation of WACC was made for Magnit for further use as a discount rate:

$$WACC = 0{,}1217 \times \frac{392\ 868\ 273{,}50}{591\ 181\ 231{,}50} + 0{,}0814 \times \frac{198\ 312\ 958}{591\ 181\ 231{,}50}$$

The total value of WACC was 10.81%.

To calculate the discounted cash flows for the company, it was necessary to make calculations of free cash flows. Data for previous periods (Table 4) were used to predict indicators in subsequent periods, which were involved in calculating the value of the company.

Table 4: Cash flow prior to discounting for 2013-2018 for the company "Magnit", in rub. [6]

	2013	2014	2015	2016	2017	2018
Operating profit / loss	49,4	68,8	82,4	77,7	50,9	45,6
Income tax rate	22,1	23,1	17,0	20,9	21,8	21,4
Post-tax operating profit	38,4	52,9	68,3	61,5	39,8	35,9
Depreciation and amortization	13,9	17,3	20,6	25,8	33,7	36,5
Investments	52,5	55,7	54,0	50,4	73,7	53,8
ΔWCR	10,4	8,6	14,0	22,7	12,4	-0,2
FCFF	-11	6	21	14	-13	19

Based on the analysis of data for previous periods, data is predicted for the following periods. As a rule, a period of 5 years is taken to conduct an analysis using the discounted cash flow method. The indicators from the portal conomy.ru [5] were used as forecast data. The calculation results are presented in Table 5. The value of the company was calculated using the formula:

$$Company\ value = \frac{FCFF_1}{(1+WACC)^1} + \frac{FCFF_2}{(1+WACC)^2} + \frac{FCFF_3}{(1+WACC)^3} + \frac{FCFF_4}{(1+WACC)^4} + \frac{FCFF_5}{(1+WACC)^5}$$

Table 5: Calculation of the discounted cash flow for Magnit, RUB bln. [5]

	2019 (forecast)	2020 (forecast)	2021 (forecast)	2022 (forecast)	2023 (forecast)
Operating profit / loss	55,7	58,8	62,8	67,2	71,2
Income tax rate	21,4	21,4	21,4	21,4	21,4
Post-tax operating profit	43,8	46,3	49,4	52,9	56,0
Depreciation and amortization	39,0	43,3	45,8	46,7	47,2
Investments	72,5	58,9	47,4	45,2	43,1
ΔWCR	5,6	4,1	3,3	2,5	1,9
FCFF	5	27	44	52	58
WACC	0,902	0,814	0,735	0,663	0,598
DCF	4,3	21,6	32,6	34,3	34,8
Company value	**127,64**				

When calculating by the discounted cash flow method, the price of Magnit turned out to be 127.6 billion rubles, with the actual purchase value of 489.7 billion rubles. Accordingly, the actual cost and the cost calculated by the discount method diverge almost 4 times.

Next, a cost analysis of the Detskiy Mir Group of Companies was carried out. In 2017, private shareholders bought about 30.5% of the shares from AFK Sistema and the Russian-Chinese Investment Fund for $ 325 million. When recounted, the total value of the company amounted to 66.8 billion rubles. Recalculations were also made at the weighted average rate for 2017.

When conducting the analysis using the discounted cash flow method, I used the reporting of Detskiy Mir GC in accordance with IFRS and the portal conomy.ru (for determining forecast data). First of all, it was necessary to calculate the discount rate. In this case, the WACC formula (weighted average cost of capital) was also used for enterprises whose financing is carried out exclusively from borrowed and own funds. Using the company's financial report for 2018 and the website conomy.ru, the data necessary for calculating WACC were obtained.

Table 6: Initial data for calculating WACC for Detskiy Mir group of companies [7]

CAMP calculation	
Risk free rate %	5,57
Risk premium, %	8,029
The sensitivity coefficient of the asset to changes in market profitability	0,2372
Tax rate, %	19,05
β_l	0,2841
$CAPM = 0{,}0557 + (0{,}2841 \times (0{,}1359 - 0{,}0557))$	
CAPM, %	7,85
Equity	
Share capital, thousand rubles	85 576,2
Cost of capital,% per year	7,85
Share in the capital,%	80,37
Loan capital	
Loans and borrowings, thousand rubles	20 906
Cost of loan capital,% per year	9,09
The share of loan capital,%	19,63

WACC was calculated for Detskiy Mir Group of Companies for further use as a discount rate:

$$WACC = 0{,}0785 \times \frac{85\ 576{,}20}{106\ 482{,}20} + 0{,}0909 \times \frac{20\ 906}{106\ 482{,}20}$$

The total value of WACC was 8.09%.

To calculate the discounted cash flows for the company, it was necessary to make free cash flow calculations. Data for previous periods (Table 7) were used to predict indicators in subsequent periods, which were involved in calculating the value of the company.

Table 7: Cash flow prior to discounting for 2013-2018 for the group of companies "Detskiy Mir", billion rubles. [8]

	2013	2014	2015	2016	2017	2018
Operating profit / loss	2,1	4,2	4,2	6,6	8,0	11,2
Income tax rate	24,4	19,6	16,1	19,2	14,8	12,3
Post-tax operating profit	1,7	3,5	3,6	5,5	7,0	1,3
Depreciation and amortization	0,6	0,7	1,0	1,6	1,8	9,1
Investments	0,8	0,5	5,3	1,7	2,4	3,8
ΔWCR	1,2	0,1	2,1	-0,3	-1,2	6,1
FCFF	0,4	3,6	-2,8	5,7	7,5	0,5

Based on the analysis of data for previous periods, data is predicted for the following periods. As a rule, for the analysis by the method of discounting cash flows, a period of 5 years is taken. The indicators from the portal conomy.ru [https://www.conomy.ru/emitent/detskiy-mir/templates/7029] were used as forecast data. The calculation results are presented in table 8. The cost of the company was calculated by the formula:

$$Company\ value = \frac{FCFF_1}{(1+WACC)^1} + \frac{FCFF_2}{(1+WACC)^2} + \frac{FCFF_3}{(1+WACC)^3} + \frac{FCFF_4}{(1+WACC)^4} + \frac{FCFF_5}{(1+WACC)^5}$$

Table 8: Calculation of the discounted cash flow for Detskiy Mir Group of Companies, billion rubles.[9]

	2019 (forecast)	2020 (forecast)	2021 (forecast)	2022 (forecast)	2023 (fore cast)
Operating profit / loss	12,6	14,0	15,1	16,1	16,4
Income tax rate	14,1	14,5	15,0	15,6	15,8
Post-tax operating profit	1,9	2,5	3,0	3,5	3,5
Depreciation and amortization	9,8	10,6	11,2	11,7	12,0
Investments	3,9	3,4	3,7	3,7	3,6
ΔWCR	-2,6	0,4	0,3	0,3	0,1
FCFF	10,4	9,3	10,1	11,2	11,8
WACC	0,925	0,856	0,792	0,732	0,678
DCF	9,6	8,0	8,0	8,2	8,0
Company value	**41,84**				

When calculating by the discounted cash flow method, the price of Detskiy Mir Group of Companies was 41.8 billion rubles, with the actual purchase value of 66.8 billion rubles. Accordingly, the actual cost and the value calculated by the discount method diverge by almost 1.5 times..

The last analyzed transaction of the consumer sector is the transaction of M.Video. In 2017, public investors sold about 24.7% of the shares to Safmar Group for $ 310 million. When recounted, the total value of the company amounted to 78.7 billion rubles. Recalculation was carried out at the weighted average rate for 2017.

When performing the analysis using the discounted cash flow method, we used the financial statements of M.Video under IFRS and the portal conomy.ru (for determining forecast data). First of all, it was necessary to calculate the discount rate. In this case, the WACC formula (weighted average cost of capital) was also used for enterprises whose financing is carried out exclusively from borrowed and own funds. Using the company's financial report for 2018 and the portal la conomy.ru, the data necessary for calculating WACC was obtained.

Table 9: Initial data for calculating WACC for "M.Video" [10]

CAMP calculation	
Risk free rate %	5,57
Risk premium, %	8,029
The sensitivity coefficient of the asset to changes in market profitability	0,08
Tax rate, %	27,7
β_l	0,119
$CAPM = 0{,}0557 + (0{,}119 \times (0{,}1359 - 0{,}0557))$	
CAPM, %	6,52
Equity	
Share capital, thousand rubles	92 868,3
Cost of capital,% per year	6,52
Share in the capital,%	60,10
Loan capital	
Loans and borrowings, thousand rubles	61 652
Cost of loan capital,% per year	9,06
The share of loan capital,%	39,89

The calculated WACC for M.Video was used as the discount rate:

$$WACC = 0{,}0652 \times \frac{92\ 868{,}3}{154\ 520{,}30} + 0{,}0906 \times \frac{61\ 652}{154\ 520{,}30}$$

The total WACC value was 7.53%.

To calculate the discounted cash flows for the company, it was necessary to make calculations of free cash flows. Data for previous periods (Table 10) were used to predict indicators in subsequent periods, which will participate in calculating the value of the company.

Table 10: Cash flow prior to discounting for 2013-2018 for M.Video, billion rubles [11]

	2013	2014	2015	2016	2017	2018
Operating profit / loss	6,8	10,3	5,6	6,7	8,2	14,7
Income tax rate	24,4	19,6	16,1	19,2	14,8	12,3
Post-tax operating profit	5,6	7,9	4,2	5,2	6,4	10,6
Depreciation and amortization	2,6	2,8	3,2	3,7	3,6	6,1
Investments	4,0	4,4	2,8	4,2	5,3	62,5
ΔWCR	-2,0	-7,3	7,0	-3,9	4,1	-7,0
FCFF	6,3	13,6	-2,4	8,5	0,6	-38,8

Similarly, the discounted cash flow was calculated for M.Video. The indicators from the portal cono-my.ru [10] were used as forecast data. The results are presented in table 11. The cost of the company was calculated by the formula:

$$Company\ value = \frac{FCFF_1}{(1+WACC)^1} + \frac{FCFF_2}{(1+WACC)^2} + \frac{FCFF_3}{(1+WACC)^3} + \frac{FCFF_4}{(1+WACC)^4} + \frac{FCFF_5}{(1+WACC)^5}$$

Table 11: Calculation of discounted cash flow for M.Video, billion rubles

	2019 (forecast)	2020 (forecast)	2021 (forecast)	2022 (forecast)	2023 (forecast)
Operating profit / loss	17,1	18,2	18,9	19,4	19,7
Income tax rate	27,7	27,7	27,7	27,7	27,7
Post-tax operating profit	12,3	13,2	13,6	14,0	14,2
Depreciation and amortization	6,8	7,2	7,5	7,7	7,8
Investments	6,3	5,8	6,0	5,9	5,9
ΔWCR	2,7	-0,5	-0,3	-0,2	-0,2
FCFF	10,2	15,2	15,4	16,0	16,2
WACC	0,930	0,865	0,804	0,748	0,695
DCF	9,5	13,1	12,4	12,0	11,3
Company value	**58,30**				

When calculated using the discounted cash flow method, the price of M.Video was 58.3 billion rubles, with the actual purchase value of 78.7 billion rubles. Accordingly, the actual cost and the value calculated by the discount method diverge by almost 1.5 times.

For the analysis of transactions using the comparative method of Detskiy Mir and M.Video Group of Companies, PJSC PROTEK was selected, and for the analysis of Magnit, X5 Retail Group. As a source of financial indicators, IAS reporting and the conomy.ru portal were used. Key financial indicators are presented in table 12.

A comparative approach involves the use of cost multipliers. In order for the analysis to be the most effective, the most common multipliers were used:

• P / E (market capitalization to net profit)
• EV / Sales (company value to company revenue)
• EV / EBITDA (company value to EBITDA)
• P / B (market capitalization to the book value of equity)

Table 12 The main financial indicators of companies in 2018, billion rubles. [12]

Company	Revenue	Net profit	EBITDA	Carrying amount of equity
Magnit	1 237,0	33,8	94,7	176,9
Detskiy Mir	110,9	5,7	22,5	0,0
M.Video	321,1	8,4	18,0	18,0
PJSC «PROTEK»	251,7	6,4	9,3	32,4
X5 Retail Group	1 295,0	31,4	95,8	176,8

Since both PJSC PROTEK and X5 Retail Group are public companies, it is quite simple to determine their market capitalization and company value. Market capitalization is calculated by multiplying the number of shares by their closing price, and when calculating the value of the company, you need to add the company's net debt to the market capitalization. The calculated coefficients are shown in Table 13.

Table 13 The main cost multiples in 2018

Company	P/E	EV/Sales	EV/EBITDA	P/B
PJSC «PROTEK»	8,11	0,20	5,50	1,60
X5 Retail Group	18,08	0,58	7,83	3,21

Based on these ratios and knowing the main indicators for the analyzed companies (revenue, net profit, EBITDA and book value of equity), their value was calculated. Estimation of the value of the company is derived on the basis of a multiplication of the resulting coefficients of the peers on the financial indicators of the analyzed companies. Final assessment data are shown in table 14.

Table 14 Calculation of the value of companies using various comparative ratios, billion rubles

Company	P/E	EV/Sales	EV/EBITDA	P/B
Magnit	611,2	717,2	741,9	567,8
Detskiy Mir	46,2	22,5	123,6	0,1
M.Video	67,9	65,2	98,8	28,8

Results and Discussion

The results of the studies showed that in assessing the value of companies, the quality of information plays an important role, which affects the value of the company, obtained as a result of the assessment and the reliability of the final result. The assessment of the acquired corporation is usually considered from two perspectives: 1) the cost of the corporation as a single organization (total cost); 2) the cost of the main components of the corporation (objective value). The choice of this or that position does not affect the composition of the methods used, however, it allows you to clearly separate the acquired object from other structural elements of the studied level for a more accurate assessment of its value.

Thus, summarizing the research results, we turn to table 15, which demonstrates the actual value of companies in a consumer transaction, determined by various valuation methods.

Table 15: The cost of companies using various approaches, billion rubles

Company	Actual purchase price	DCF	P/E	EV/Sales	EV/EBITDA	P/B
Magnit	489,7	353,4	611,2	717,2	741,9	567,8
Detskiy Mir	66,8	141,5	46,2	22,5	123,6	0,1
M.Video	78,7	13,4	67,9	65,2	98,8	28,8

In order for the analysis to be of the highest quality, the calculated value of companies by different methods was compared not in absolute deviations, but in percent. A comparative analysis of deviations is shown in table 16, which contains data on the average deviation for each of the methods for assessing the value of companies. Deviations were calculated using the module, due to which, the average indicator by the method was not affected by whether the indicators were underestimated or overestimated.

Table 16 Comparison of deviations in the calculation by various methods from the actual value of companies, %

Company	DCF	P/E	EV/Sales	EV/EBITDA	P/B
Magnit	27,8%	24,8%	46,5%	51,5%	16,0%
Detskiy Mir	111,8%	30,8%	66,3%	85,0%	99,9%
M.Video	82,9%	13,8%	17,1%	25,6%	63,4%
Average deviation	**74,2%**	**23,1%**	**43,3%**	**54,0%**	**59,8%**

As a result, the smallest deviation was achieved when using the comparative approach in assessing the value of the company and precisely when using the comparative multiplier P / E, which shows the ratio of market capitalization to the balance sheet value of equity of companies. The deviation was only 23.1%, which is significantly less than when using other methods and multipliers.

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Fuzzy Sets Supervision of a Pollution Level in the Context of Smart City

Aurelia-Mihaela VOICAN

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, aureliamihaelavoican@gmail.com

Ioana-Simina STAN

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, simina_27_ioana@yahoo.com

Mihai REBENCIUC

Center for Research and Training in Innovative Techniques of Applied Mathematics in Engineering, University Politehnica of Bucharest, Bucharest, Romania, m.rebenciuc11@gmail.com

Abstract

The concept of smart city seems to be the best solution for a harmonious future between man and nature, which is not yet very well known, but which can be very easy to implement. This paper presents an in-depth study on the degree of pollution representing a parallel between cities that have the peculiarities of a smart city and non-smart city. The data processing was performed with fuzzy sets and subsequently modeled in MATLAB, thus obtaining dynamic graphs that describe the variation of the degree of pollution starting from the initial concentrations of gases in the atmosphere. It is executed an algorithm that evaluates the pollution on industries in a chosen surface and in response, offers a gradient result that indicates whether its activity is beneficial for the environment or not. The fuzzy relationship is extremely useful in this whole monitoring process, which can be an indispensable tool that, once used, considerably improve the health of the population in that area, representing an important step in health security.

Keywords: Smart City, Pollution, Fuzzy Sets, Fuzzy Logic.

Introduction

A smart city requires the existence of an integrated information system that includes a multitude of cloud computing subsystems, Internet of Things (IoT), Open Data, Big Data, and mobile applications, connected to the Internet through secure networks. They allow the local administration to interact directly with the citizens and the city's infrastructure.

All these strategically mounted sensors allow us to make an accurate and real-time analysis of one of the most harmful factors for the health of the population: pollution

In the following, we will show how fuzzy logic allows us to do this in a way that is as precise and easy to implement as possible.

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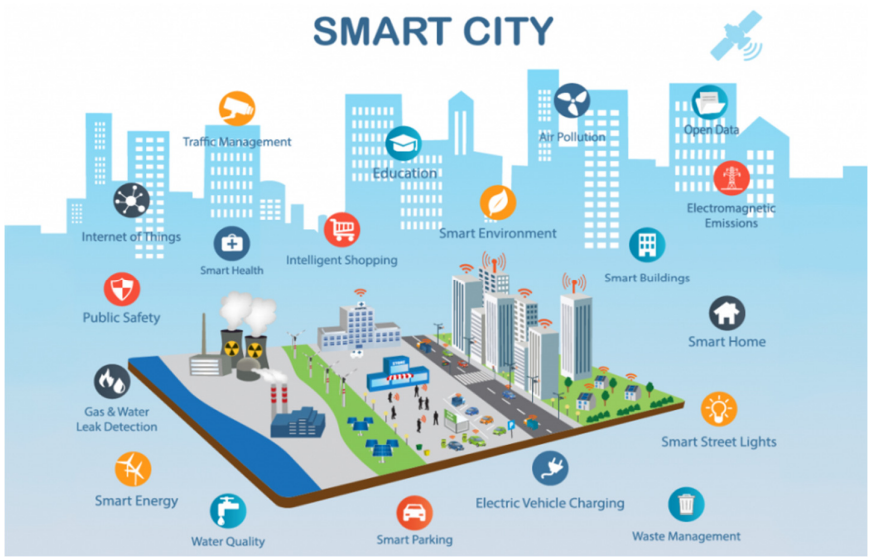

Fig. 1: General scheme of a Smart City

Particularities of Smart City

Smart City is based on six main verticals, says the Romanian Association for Smart City.

I. Smart Governance

The smart city has a full range of eGovernment services, has a strong IT&C infrastructure, has public-private partnerships that allow it to achieve its goals, practices open governance, transparency, etc.

Smart governance uses available technology and coordinates the activities of other municipalities, achieving synergies through collaborations with other stakeholders and also satisfying the needs of its citizens, in order to improve both public services and trust in public institutions.

II. Smart Economy

In the smart city, economic activities are carried out with eBusiness and eCommerce support. IT&C innovation plays an important role in the development of a smart city.

III. Smart Mobility

Smart Mobility or Intelligent mobility represent logistics and transport activities with IT&C support, existence of online databases, optimization of urban traffic, etc. they are part of the smart mobility feature of a city that can be characterized as smart.

IV. Smart Environment

This feature includes the use of renewable energy, the existence of controlled energy networks IT&C, "green" buildings, pollution control, water quality, air, etc.

V. Smart People

The population of a smart city must have digital user skills, work in a digital work environment, have access to training, be able to consult and provide data online, etc.

VI. Smart Living

In a smart city, the population has a lifestyle influenced by IT&C, advanced health and housing services, cultural services, and social cohesion environment.

Fuzzy Sets

In classical set theory, the membership of elements in a set is evaluated in binary terms according to a bivalent condition - an element either belongs or does not belong to the set. In contrast, the theory of unpleasant sets allows the gradual assessment of the membership of the elements in a set; it is described using the member function evaluated in the actual unit range [0, 1]. Fuzzy sets generalize classical sets because the indicator functions (called characteristic functions) of classical sets are special cases of the membership functions of fuzzy sets if the latter takes only the values 0 or 1. In the theory of content-filled sets, classical bivalent sets are usually called clear sets. Confused set theory can be used in a wide range of areas where information is incomplete or inaccurate, such as bioinformatics.

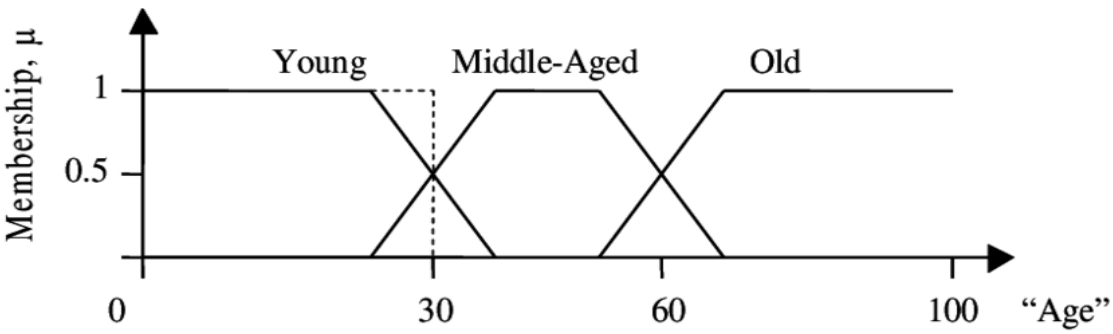

Fig. 2 : The operating principle of Fuzzy Sets

Fuzzy Estimation of The Degree of Pollution

In the following, we will customize the fuzzy sets so that we can estimate with their help the degree of pollution. We denote X the air which represents a collection of objects and let x (later customized) a generic element of the set X. A set in the classical sense, A, in this case representing the polluted air and respectively B, representing the clean air, both included in X, is defined as a collection of elements x of X such that each element x may or may not belong to the set A, because a fuzzy set expresses the degree to which an element belongs to a certain collection of objects.

$$x = \{x_1, x_2, x_3\}$$

Because we want to use fuzzy to estimate the degree of pollution, we customize x as follows:

$$x_1 = CO2$$

$$x_2 = NH3$$

$$x_3 = NMVOC$$

Let X be a collection of objects x. A fuzzy set "A" over the set X and we define it by a set of pairs ordered by the shape:

$$A = \{(x, \mu A(x)) / x \in X\}$$

- where μA (x) is called the membership function of the fuzzy set A, in the case of the numerically represented quasi-continuous face it will be represented by a mathematical function
- the set X is called the universe of discourse and it can be discrete or continuous

Controller Fuzzy Sets Pollution Case with Carbon Dioxide and Sulphites (Measurement in Ppm)

In Fig.1, Fig.2, Fig.3, are represented the diagrams of the membership functions with which the approximation of the pollution degree in the smart city context is made.

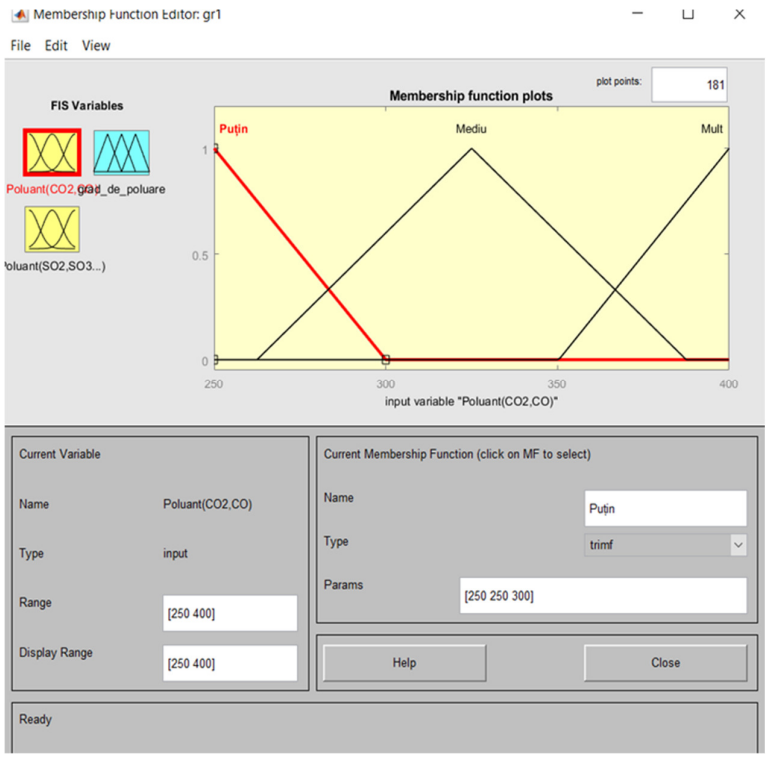

Fig.3: Member function describing carbon dioxide pollution

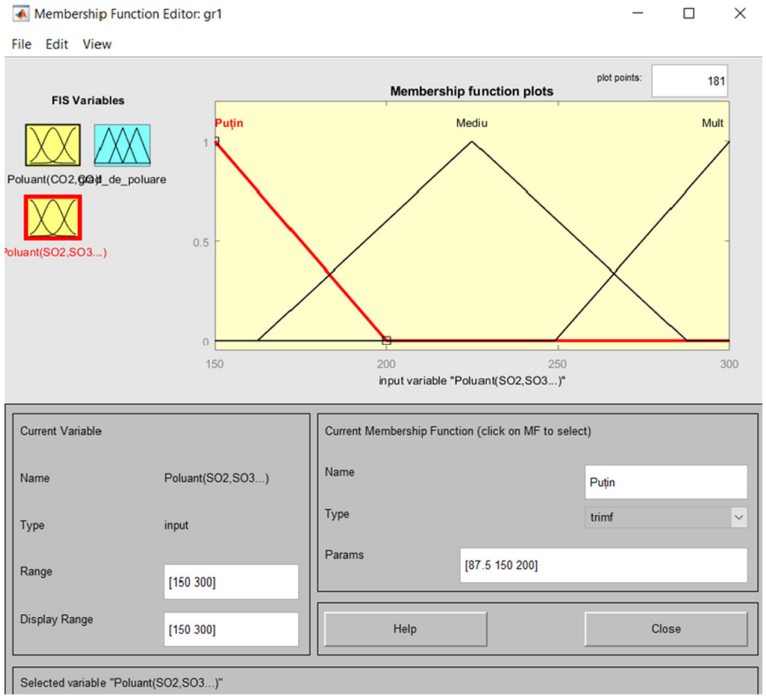

Fig.4: Function function describing sulfite pollution

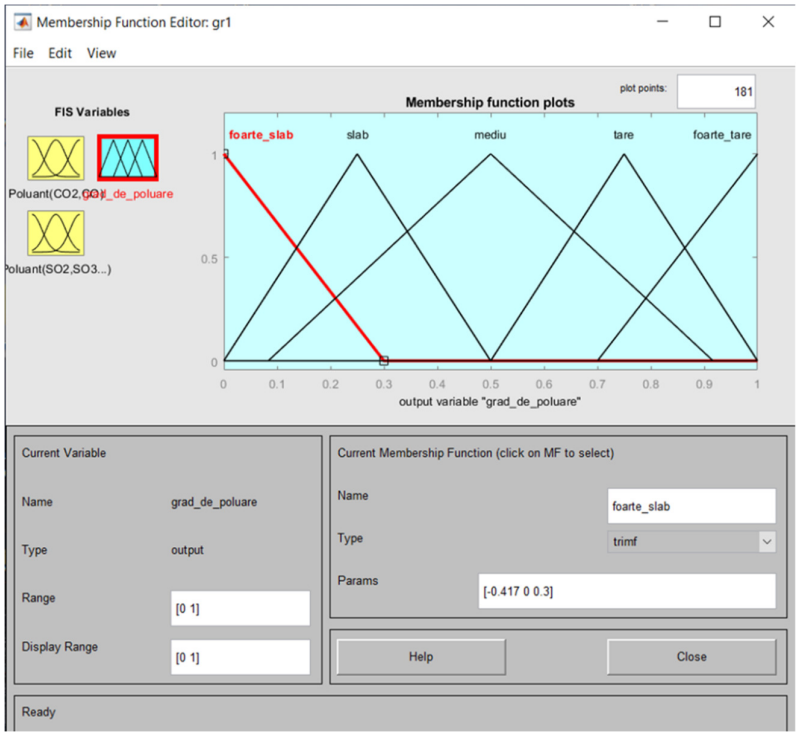

Fig.5 Output of the member function.

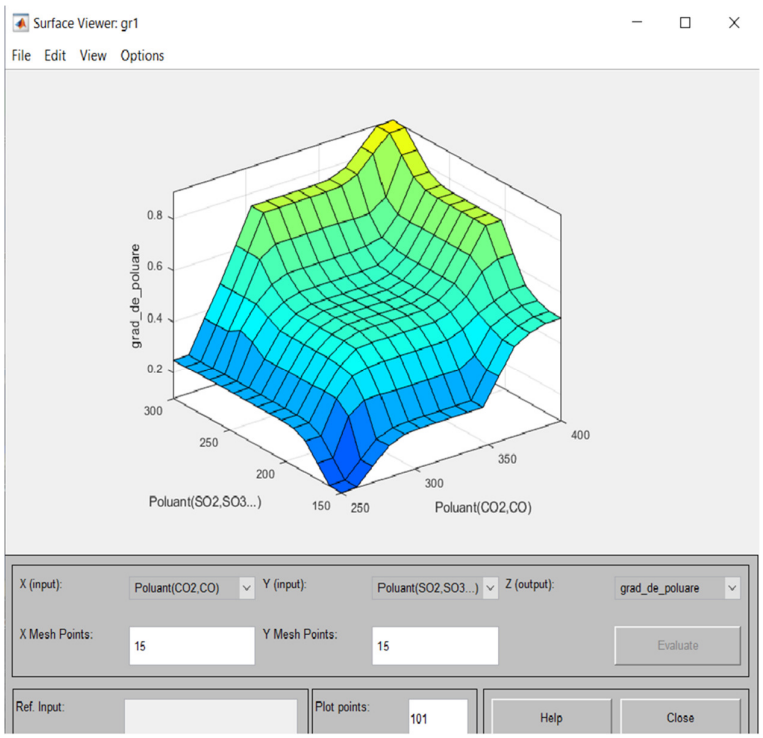

Fig.6: The graph representing the dependence of polluters-degree of pollution.

Case Study

Fuzzy Sets in Monitoring the Metallurgical Industry in A Smart City Context

Equipping smart cities with pollutant-sensitive sensors has made it possible to monitor the pollution of the metallurgical industry, so we propose a method based on fuzzy sets that provide an assessment of the risk of a pollutant in an industry **i**, on an area **j**, with a quantity **k** of pollutant. Currently, the proposed method would help to identify a high risk caused by the pollutant P, which would help the APCD in the policy of managing polluting activities.

Let the following entities:

$$\boldsymbol{Fuzzy\ minimum\ rule} = \mathbf{min}\,\{\boldsymbol{a}, \boldsymbol{b}, \boldsymbol{c}, \dots\} \quad (1)$$
$$\boldsymbol{Fuzzy\ maximum\ rule} = \boldsymbol{max}\{\boldsymbol{a}, \boldsymbol{b}, \boldsymbol{c}, \dots\} \quad (2)$$

Pollutant monitoring takes place with the help of 3 sets:

$$\boldsymbol{M} = \{\boldsymbol{i} \in \boldsymbol{N}, \boldsymbol{i} \in [\mathbf{1}, \boldsymbol{m}], \boldsymbol{m_i}\} = \{\boldsymbol{m_i}\} \quad (3)$$
$$\boldsymbol{A} = \{\boldsymbol{j} \in \boldsymbol{N}, \boldsymbol{j} \in [\mathbf{1}, \boldsymbol{a}], \boldsymbol{a_{i,j}}\} = \{\boldsymbol{a_{i,j}}\} \quad (4)$$

$$\boldsymbol{P} = \{\boldsymbol{k} \in \boldsymbol{N}, \boldsymbol{k} \in [\mathbf{1}, \boldsymbol{p}], \boldsymbol{P_{i,j,k}}\} = \{\boldsymbol{P_{i,j,k}}\} \quad (5)$$

$$\boldsymbol{P_{i,j,k,Normalized}} = \frac{\boldsymbol{total\ k\ polluting\ in\ a_{i,j}}}{\boldsymbol{total\ production\ mass\ per\ a_{i,j}}} \quad (6)$$

The purpose is to determine the optimal degree of a process **i** for the production of **k** pollutant in the surface **j**. Let be the set C whose element belongs to a certain degree of admissibility.

$$\boldsymbol{C} = \{\boldsymbol{C_{i,j,k}}\}$$

$$\textbf{If } \boldsymbol{C_{i,j,k}} > \mathbf{0} \textbf{ then } \boldsymbol{C_{i,j,k}} = \frac{\boldsymbol{Min}\{\boldsymbol{P_{i,j,k,Normalized}}\}}{\boldsymbol{P_{i,j,k,Normalized}}} \cdot \left(\mathbf{1} - \frac{\boldsymbol{G_{k,j}}}{\boldsymbol{G_{k,critical}}}\right) \textbf{ if not, then } \boldsymbol{C_{i,j,k}} = \mathbf{0} \quad (7)$$

$G_{k,j}$-the amount k of pollutant in the surface j, and $G_{k,critical}$ represents the critical amount reported by APCD (Air Pollution Control District) for each pollutant.

$$\boldsymbol{C_{i,j,k,critical}} = \boldsymbol{Min}\{\boldsymbol{C_{i,j,k}}\} \quad (8)$$

We have on a surface a fixed number of industries that emit the same pollutant, and the norm of the quantity of this pollutant in the environment is established by an agency. We apply this logic to a simple case (2 industries). We will analyze the emission of carbon monoxide (CO) from the crude steel and aluminum production industry in Romania (data 2017). With the help of sensors, the amount of pollutant in the environment can be detected (measured in ppm). Whether the amount of CO pollutant measured is 360 ppm and the norm is 300. The production data are shown in Table 1.

Table 1: Statistical data on production/emission.

Industry name	Average production (kt)	Amount of monoxide emission of carbon on analyzed area (kt)
Production of crude steel	4667	9.45
Aluminum production	1831	24.81

Let the following MATLAB implementation:

```
prod=[4667 1831];
co=[9.45 24.81];
P=co./prod;
C=min(P);
N=360;
norm=300;
rs=' ';
for i=1:2
if C >0
   C=(C/P(i)*(1-N/norm));
else
   C=0;
  end
end
if C==0
   rs= 'High level of pollution produced by industry in the analyzed area'
else
   rs= 'Pollution level is optimal'
end
```

The above program evaluates the tabular data and provides a gradient response per interval [-1,1]. A negative value indicates when stopping the activity of an industry for ecological reasons, and a positive value indicates an optimal emission of pollutants.

Conclusion

This paper comes as a solution to a current highly publicized problem of excessive pollution in urban and peri-urban areas, being very accessible and efficient, estimating the degree of pollution being quite accurate due to the fuzzy logic on which the program is based.

We applied fuzzy sets in creating a controller in MATLAB that can be applied to assess the degree of pollution and that offers a logical data processing. The diagrams of the membership functions are represented in fig.1, fig.2, fig.3. The case study on pollutant emissions from different industries, gave us negative results, which means that the production of crude steel and aluminum throughout Romania emits an excessive amount of CO, harmful. This program can be applied in a smart city very easily because it is equipped with special sensors that allow the evaluation of pollutants in ppm. In this paper, we did not analyze the industrial pollutants in the smart city, because private data on pollutants emitted by each company are required. The conclusion is that such an assessment is possible, which would involve a wide range of applications in the ecology of smart cities.

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A Socially Responsible Attitude to An Employee - Selected Aspects

Ewa MAZUR-WIERZBICKA

Institute of Management, University of Szczecin, Szczecin, Poland[1]
E-mail address: ewa.mazur-wierzbicka@usz.edu.pl

Abstract

Corporate social responsibility is an integrated approach to managing an organization that includes responsibility for its overall operation. Currently, focusing on the most important stakeholders and key issues, also in the perspective of a workplace, is particularly important to companies. The aim of this paper is to assess the meaning of a socially responsible approach to an employee - key stakeholder - in companies and to identify its manifestations in practice. The aim of the paper dictates the paper's layout. The outline of the CSR concept is presented, then the issues of a socially responsible approach to employees are addressed and so is the question of the employee area in the CSR concept. The paper is based on a critical literature review and available non-financial reports and existing data.

Keywords: Sustainable Management, Employees, Human Resources, Human Resources Management.

Introduction

Nowadays, the concept that plays a significant role in the global scale is the concept of sustainable development. Its "tool" at the level of an organization involves a concept of corporate social responsibility, the foundation of which is constituted by the stakeholders' concept. At the time when there are more and more voices talking about problems associated with the search for new employees, it becomes crucial to take care of the key internal stakeholder of each company - employee. In the case of socially responsible companies, it is reflected in initiatives undertaken by them and good practices in the employee area. It is often a consequence of the organization's introduction of socially responsible human resources management or orientation towards sustainable management of human resources.

In view of the above, the aim of this paper is to assess the meaning of a socially responsible approach to an employee - key stakeholder - in companies and to identify its manifestations in practice. The aim of the paper dictates the paper's layout. The outline of the CSR concept is presented, then the issues of a socially responsible approach to employees are addressed and so is the question of the employee area in the CSR concept. The paper is based on a critical literature review and available non-financial reports and existing data.

CSR - Introduction

At the moment the concept of sustainable development is becoming increasingly popular thus providing a framework for a long-term vision of stability - despite the fact that it was initiated in the 1960s. Despite the passage of time, it does not lose its significance, quite the opposite, it is present in many strategic documents of international organizations, individual states or regimes. It assumes a lasting, harmonious development that takes place between three basic areas that is economic, environmental (its protection) and social, development which can meet current

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needs of societies, at the same time not limiting next generations in meeting their needs in the future. What is important, it takes an important place not only in the theory of economics, but also in the theory of management stepping into various areas of activity taken by economic operators.

At the level of a company (micro scale) it seems more appropriate to state that the concept of corporate social responsibility is a tool for implementing the concept of sustainable development (global scale). This concept is based on three main aspects, that is economic, environmental (ecological) and social. A concept that is close to it is the triple bottom line concept (or otherwise noted as TBL or 3BL), which offers a way of thinking on social responsibility that includes not only the company's benefits, but also benefits to the Earth (as in the planet) and people (see more in: Elkington, 1997; Savitz et al., 2006; Willard, 2012). It assumes that the success of a company is influenced by achievements in the following three dimensions:

- economic (financial) - **economic sustainable development –** it improves profitability by more effective use of resources such as staff, raw materials, produced components, energy (in all its forms), water and waste,

- environmental - **sustainable development and environmental protection** - it improves management of natural resources in order to prevent their exhaustion and strives to limit the impact of gas emissions, waste water and waste on the natural environment,

- social - **social sustainable development** - it improves relations between the parties involved in the implementation of the adopted project (employees, suppliers and local community directly affected by a given project); joint actions for the interest of each of the parties increases the likelihood of a successful end to an implemented task,

between which synergy should take place.

According to the triple bottom line concept, one may assume that the companies' task is to implement economically substantiated goals, at the same time remembering to minimize their negative impact on the natural environment and meeting social expectations. Therefore, operation of a company should be looked at in a holistic way, that is not only through a lens of economic profit (seen as the implementation of the basic goal for the company), but one also needs to refer to the goals concerning the natural environment (environmental protection) and social goals (e.g. guaranteeing adequate quality of life). The same assumption guides the CSR concept.

The very concept of CSR is difficult to define clearly due to the complexity of the subject-matter or different perception - by the defining persons - of the centre of gravity, significance or importance of the core matters included in this concept, but also due to its constant development and a differently seen scope of corporate responsibility (see more in: Dahlsrud, 2008; Freeman, Hasnaoui, 2011). Most generally, it is concluded that it is a company's responsibility for its impact on society (EC Communication, 2012).

The article assumes that corporate social responsibility means a long-term approach to operating a business activity which contributes to the achievement of the company's economic goals, at the same time taking care of the natural environment (limiting negative impact on the environment), taking into account social interests and consistently building lasting and positive relations with stakeholders, which involves observance of norms and requirements that are more restrictive than imposed regulations of the law and principles of ethics, and also taking full, conscious responsibility for all its actions.

From the perspective of management, application of CSR principles in practice is a process of learning the changing social expectations and introducing them into the management strategy, that is a process based on permanent cooperation with the company's stakeholders (Rok, 2012; Zieliński, 2014). Implementation of the CSR concept by the organization evidences its perspective thinking, the skill of adaptation to the surrounding reality, creativity, openness to changes and most of all taking into account stakeholders' expectations and needs, both internal and external.

Key internal stakeholders in each organization need to include employees who play a very important role in the company's achievement of success. Creating on the ground of corporate social responsibility conditions of work

which build employees' satisfaction encourages their efficiency, creativity and loyalty. This translates into the company's value as it is the employees that determine the implementation of operational and strategic goals. A well-motivated employee, who is given conditions for development, works in a friendly atmosphere and is engaged in the implementation of the organization's goals is a strategic element of the company's competitive advantage (Mazur-Wierzbicka, 2013). Therefore, employees are a key pillar of the CSR strategy. It is also them who create adequate relations with external stakeholders, they are members of local communities and greatly affect the company's image. Elements which are an absolute basis for the employer's responsibility in relation to employees include: respect for human rights and observance of labour law.

Socially Responsible Approach to Employees

For the last few years a transfer of an interest in the issues of sustainable development and corporate social responsibility onto the area of human resources management (HRM) has been observed. This is why is it crucial to point to and to emphasize the possible activities directed at employees that are undertaken by socially responsible organizations. For example, M. Armstrong in subsequent editions of his book expands the issues of human resources management by i.a. the question of corporate social responsibility and employee well-being (Armstrong, Taylor, 2016).

The strategy of personnel marketing, consistent with the CSR concept, may also be used to implement socially responsible activities directed at an employee. According to it, employees are the company's "internal clients", thus one must strive to meet their needs by creating appropriate conditions for work and development for them. It is because such an approach translates into employees' increased satisfaction, their greater involvement in work and increased performance, which allows i.a. the company to recover the expenditure on personnel activities (it is added value for the company). The most often named factors which affect employees' satisfaction from work include remuneration, relations at work and management style (Zieliński, 2014).

The company's social responsibility in terms of personnel activities may also be looked at through the lens of the goals it should pursue (Fig. 1).

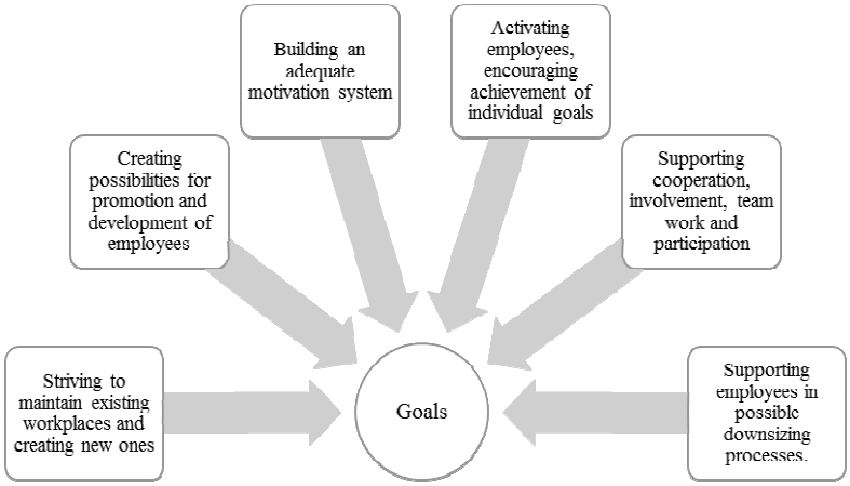

Fig. 1: Goals in the sphere of personnel activities of a socially responsible company

Source: author's own compilation on the basis of (Gableta, 2006; Zieliński, 2014).

The subject-matter of human resources management in the context of socially responsible activities can be treated broader and one can take a closer look at the new trend of development of the personnel function i.e. sustainable

human resources management[2] (Mazur, 2015), which involves activities and practices in the area of human resources management that support the strategy of the organization's sustainable development, which contributes to the achievement of economic, environmental (minimizing the negative impact of the company's operation on the natural environment) and social goals of the organization in the long-term perspective, which are at the same time an expression of care for employees, especially in the question of their fair and equal treatment, their development and well-being. The literature offers may interpretations of this term, in fact just like in the case of the term sustainable development or CSR (see Zaugg el al., 2001; Cohen, et al. 2012; Ehnert, 2009; Pabian, 2015).

Sustainable human resources management may therefore be examined in the following dimensions: economic (see: Guest, 2011; Buller and Mcevoy, 2016), environmental (ecological) (cf. Jabbour, 2011; Jackson et al., 2013; Renwick et al., 2013; Ahmad, 2015; Dumont, 2015; Shen et al., 2016; Tariq et al., 2016; Cheema and Javed, 2017) and social (Pfeffer, 2010; Dubois and Dubois, 2012; Mazur, 2015; Saifulina and Carballo-Penela, 2017).

The social dimension of sustainable human resources management is nothing else but the (already mentioned by M. Armstrong) reference of HRM mainly to the concept of corporate social responsibility which may be expressed in a number of ways, and mainly concerns the creation of a customized workplace where employees can realize their professional goals in compliance with the organization's strategy (Fig. 2). We are then dealing with socially responsible human resources management, which fits within the broadly understood socially responsible company management, being at the moment an under-researched area of operation of socially responsible organizations. This is mainly expressed in personal treatment of employees as key stakeholders of each company (Pocztowski, 2016).

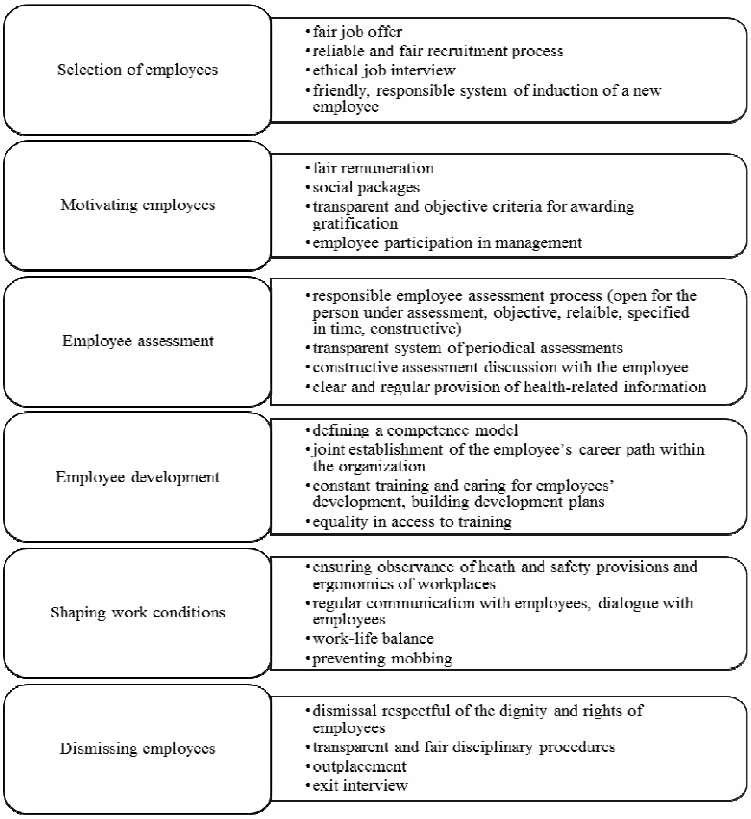

Fig. 2: Examples of practices of socially responsible human resources management

Source: author's own compilation on the basis of (Bombiak, 2018; FOB, 2019).

[2] Terms treated as synonyms of the term sustainable human resources management may be encountered in the literature e.g.: human sustainability (Pfeffer, 2010), sustainable personnel management (Pabian, 2011).

Among many socially responsible activities taken up with regard employees, one should list i.e. examining employees' needs and expectations, guaranteeing safe conditions for conducting work to the employed persons, taking care in shaping harmonious interpersonal relations, employee relationships, their integration, caring for employees' development, developing programmes that facilitate a work-life balance, creating programmes that support employees and counteract abuse in the workplace, avoiding discriminatory practices and guaranteeing equal treatment and equal opportunities regardless of gender, race or religion, or building a healthy organization by teaching employees how to look after their health, recharge their mental and physical potential, how to eat healthy and have an active life style (cf. Pocztowski, 2016).

As pointed out by A. Pabian, people who implement sustainable management and apply principles of sustainable development in their work can be called sustainable personnel (2011; Majewski, 2012; Bombiak, 2018) or sustainable human resources (Cohen, 2011). They may be management staff who outline directions of the organization's operation, managers at all levels, or employees in non-managerial positions. Currently a "sustainable employee" who forms sustainable personnel is the most desirable type of employee for many organizations (Pabian, 2011).

Therefore, a company's orientation towards socially responsible operation may lead in the long run to a transformation of staff into sustainable personnel. This means that first a procedure of a socially responsible approach to the employee must be implemented. With time, the employee, by learning the reality and conditions of the personnel policy based on the assumptions of the CSR concept, will become more aware and informed in this regard, and therefore, by being pro-environmentally and pro-socially moulded, he will be an employee who will join in the circle of sustainable personnel. It is worth for a company which wishes to have sustainable personnel to conduct training sessions and to constantly improve relevant kills of existing employees; whereas when it comes to potential employees, it should develop a relevant and adequate system for staff recruitment and selection in order to gain employees who are already "sustainable", who join in the sustainable personnel built in the company. Recruitment and selection needs are revealed in the phase of a strategic, tactic and operational planning of human resources. External recruitment is an opportunity to obtain "sustainable employees" quickly. The selection of applicants is relatively easy. In order to learn potential employees' pro-environmental and pro-social attitudes the company may use i.s. general and detailed interviews or job interviews. Their important element is adequate preparation of the questionnaire, questions about the applicants' attitudes, beliefs and pro-environmental and pro-social activity.

The activity of "sustainable employees" should contribute both to the achievement of economic goals and to far-reaching levelling out of intergenerational needs, and thus prevention of future serious environmental or social problems (Pabian, 2011).

The employee area in the CSR concept

An important rank to employee issues was given in the ISO 26000 norm. "ISO 26000. Guidance on social responsibility" identifies an area that directly concerns employees i.e. the so-called "Labour practices". This area includes relations that occur in the organization's practice with employees who provide work for the benefit of the organization, both internally and externally. The core subject of "Labour practices" comprises 5 issues: employment and employment relationships, conditions of work and social protection, social dialogue, health and safety at work, human development and training in the workplace (ISO 26000, 2010).

As has been written in the norm „The labour practices of an organization encompass all policies and practices relating to work performed within, by or on behalf of the organization, including subcontracted work. (...) The creation of jobs, as well as wages and other compensation paid for work performed, are among an organization's most important economic and social contributions. Meaningful and productive work is an essential element in human development; standards of living are improved through full and secure employment. Its absence is a primary cause of social problems. Labour practices have a major impact on respect for the rule of law and on the sense of fairness present in society: socially responsible labour practices are essential to social justice, stability and peace." (ISO 26000, 2010).

Companies that operate in accordance with standards of corporate social responsibility and which wish to report and monitor the undertaken socially responsible activities, may use various indicators for this purpose, among which GRI standards are one of the most popular ones, which are somewhat an international model of reporting on responsible business and sustainable development for an organization. The structure of GRI standards is presented in Fig. 3.

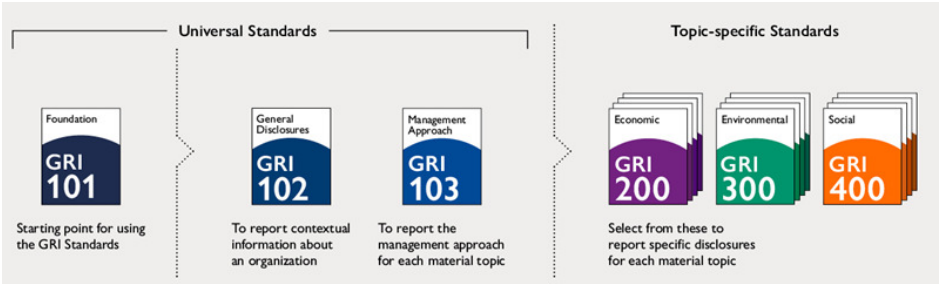

Fig. 3: GRI standards

Source: (https://www.globalreporting.org/standards/gri-standards-download-center/).

As presented in Figure 3, indicators falling under Topic-specific standards were grouped into three groups, that is economic, social and environmental disclosures:

- Economic Standards - The 200 series of the GRI Standards include topic-specific Standards used to report information on an organization's material impacts related to economic topics.
- Environmental Standards - The 300 series of the GRI Standards include topic-specific Standards used to report information on an organization's material impacts related to environmental topics.
- Social Standards - The 400 series of the GRI Standards include topic-specific Standards used to report information on an organization's material impacts related to social topics.

In the social standards group, one can identify those which concern (directly or indirectly) the employee area (Table 1).

Table 1: Basic standards addressing the employee area included in Social Standards

Aspect	Disclosure	Description
Employment GRI 401	401-1	New employee hires and employee turnover
	401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees
	401-3	Parental leave
Labor/Management Relations GRI 402	402-1	Minimum notice periods regarding operational changes
Occupational health and safety GRI 403	**Management approach disclosures**	
	403-1	Occupational health and safety management system
	403-2	Hazard identification, risk assessment, and incident investigation
	403-3	Occupational health services
	403-4	Worker participation, consultation, and communication on occupational health and safety
	403-5	Worker training on occupational health and safety

	403-6	Promotion of worker health
	403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships
	Topic-specific disclosures	
	403-8	Workers covered by an occupational health and safety management system
	403-9	Work-related injuries
	403-10	Work-related ill health
Training and education - GRI 404	404-1	Average hours of training per year per employee
	404-2	Programs for upgrading employee skills and transition assistance programs
	404-3	Percentage of employees receiving regular performance and career development reviews
Diversity and equal opportunity -GRI 405	405-1	Diversity of governance bodies and employees
	405-2	Ratio of basic salary and remuneration of women to men
Non-discrimination - GRI 406	406-1	Incidents of discrimination and corrective actions taken
Freedom of association and collective bargaining - GRI 407	407-1	Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk
Child labor - GRI 408	408-1	Operations and suppliers at significant risk for incidents of child labor
Forced or compulsory labor - GRI 409	409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor
Security practices - GRI 410	410-1	Security personnel trained in human rights policies or procedures

Source: author's own compilation on the basis of (https://www.globalreporting.org/standards/gri-standards-download-center/).

As has been indicated before, socially responsible companies undertake various activities or initiatives directed i.a. at employees, but not exclusively. Wishing to present socially responsible activities undertaken by organizations, it is worth mentioning here the Responsible Business Forum, which has been shaping, analysing and promoting corporate social responsibility in Poland since 2000. It is the organization which initiated the publishing of reports titled "Responsible business in Poland. Good practices". The first was published in 2003 (FOB, 2003). The reports include examples of socially responsible practices from various areas (since 2011 classification of CSR areas is based on the one adopted in the ISO 26000) submitted by the organization. As seen in Figure 4, the greatest number of initiatives undertaken by companies under CSR was directed at the "Community involvement and development" area while initiatives concerning employee matters came second.

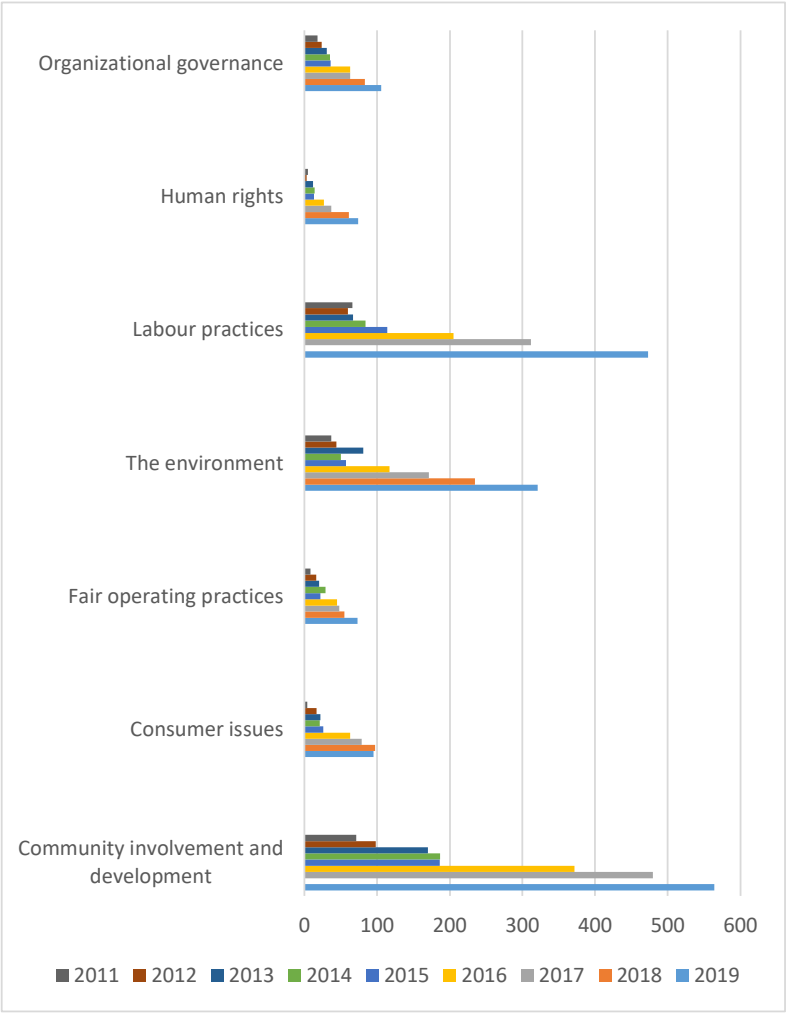

Fig. 4:CSR practices according to the core subjects adopted in ISO 26000 included in reports "Responsible business in Poland. Good practices" in 2011- 2019.

Source: author's own compilation on the basis of (FOB, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019).

Most of the activities undertaken as part of "labour practices" concerned activities that fall under employee volunteering, employee health and training and development. In turn, activities concerning counteracting abuse in the workplace and work-life balance were least popular, which is hugely surprising since in the opinion of employees (especially generation Y) it is a very important issue to them (a number of studies also point to it) (Fig. 5).

Fig. 5: Activities of the "labour practices" core subject included in reports "Responsible business in Poland. Good practices" in 2013-2019 (due to combining certain practices in 2011-2012, the presented data starts at 2013).

Source: author's own compilation on the basis of (FOB, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019).

The employee market, observed for the last few years in an ever greater number of industries, new generations on the labour market (Y and Z) and a general change in people's awareness result in a situation where companies which want to keep or obtain an employee must attribute greater importance to looking after the employee. Good practices implemented by companies in the employee core subject create a friendly workplace to which one wants to return and in which one wants to get involved in the exercise of tasks given to them. An approach intended to meet the needs and expectations of an employee also builds a competitive advantage of the organization in the face of changes on the labour market. The socially responsible activities directed at the employee benefit both the employee and companies themselves. However, it needs to be emphasized that such initiatives and activities are undertaken by conscious and mature organizations (though it does not mean a company's long presence on the market).

Conclusion

The idea of human resources management in reference to the CSR concept or more broadly sustainable development has been developed for years. The increasing popularity and importance of this subject matter is evidenced by the number of scholarly publications (and not only such) and research. As reserved by professor A. Pocztowski, "(n)ot prejudging to what degree the concept of sustainable human resources management will affect further development of this field of management, one may conclude that it fits within contemporary trends in managing organizations and is a promising direction of theoretical pursuits and empirical research, emphasizing the need to include social and ecological questions in human resources management policy and practices, which gives it a holistic dimension and strengthens its role in contemporary organizations"(2016, p. 312). One must also look in this spirit at socially responsible management of human resources, believed by some to be the a social dimension of sustainable human resources management.

On the basis of a review of various sources of existing data, including reports on good practices published by FOB as well as non-financial reports published by Polish organizations, one may conclude that socially responsible practices are increasingly popular and their number is going up every year. It also needs to be noted that most practices and initiatives undertaken by companies are in the social area, including mostly those relating to an external stakeholder - the community (mostly local) and a key internal stakeholder - employee, where most focus is given to activities associated with employee volunteering, employee health and training and development.

On the basis of these analyses one may suspect that socially responsible activities are more often undertaken by large companies than those that are medium-sized or small. It is a consequence of the fact that it is mostly large companies that implement the CSR concept and it is them that are most visible in presenting their socially responsible practices.

However, it seems that due to the CSR concept's becoming more and more popular among Polish organizations and also due to internal conditions of operation of companies e.g. demographic processes (in place of the people who formed a demographic growth who are approaching retirement age, people born in the time of a demographic decline will enter the labour market), economic determinants (e.g. expected economic recovery) or environmental determinants (pressure to minimize the negative impact on the natural environment, climate change), it can be assumed that in the coming years personnel strategies of Polish companies will be re-oriented towards those which include sustainable human resources management or socially responsible human resources management.

Because the subject-matter discussed in the paper is extensive and multifaceted, the article focused only on a presentation of the most important issues. They may provide a basis for further discussions on various aspects of socially responsible (or more broadly understood – sustainable) human resources management in organizations not only in Poland, but also in other countries or groups of countries. It is a valid and very important subject which requires more in-depth research.

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Macro Conditions for The Functioning of a Joinery Production Company in The Situation of An Unpredictable Economic Slowdown

Paweł POSADZY and Joanna KAŁKOWSKA

Poznan University of Technology, Faculty of Engineering Management
Poznan, Poland

Corresponding author: joanna.kalkowska@put.poznan.pl

Abstract

The basis of the functioning of every enterprise is its ability to move efficiently and effectively in the business space. This ability depends on a number of conditions, both intra-sectoral, on which the company can have a direct impact, as well as macro-environmental, political and legal, cultural and social, economic and technological and organizational. The analysis of macro-environmental conditions can be a determinant of wise use of company's resources and lead to success despite the change of its macro-environment. In the article such an analysis was carried out in relation to a particular joinery manufacturing company in a situation of a pandemic economic slowdown. This analysis for the adopted case study allowed to determine the magnitude of the forces of positive and negative impact of individual macro- conditions.

Keywords: Strategic Analysis, Macroenvironment of an Enterprise.

Introduction

The paper presents the author's own analysis of macro-environmental conditions of functioning of an exemplary joinery manufacturing company in a situation of a pandemic economic slowdown. The freezing of the world's largest economies resulted in the creation of a completely new macro-environmental reality for many companies from various industries. The question to be asked in this situation is: what impact will the economic slowdown have in the current and long-term perspective, resulting from the multi-faceted actions taken against the spread of the Covid-19 pandemic, and whether this situation will significantly change the strategy of survival and development of a particular production company.

The assessment of the macro-economic conditions of the company's functioning was made with the use of the PESTEL strategic analysis tool, commonly known to the professional management science community (Włodarkiewicz-Klimek et al., 2010). The six areas of PESTEL analysis, referred to as general segmentation of the environment, with the support of strengths, weaknesses, opportunities and threats (in the form of SWOT analysis) allows to ultimately determine the portfolio strategy of the enterprise, based on in-depth analyses such as: BCG Matrix, ADL Matrix, McKinse's Matrix, GE Matrix. The presented article is limited to determining (for the adopted case study) the size of PESTEL's positive and negative impact of individual macro-indications.

Strategy in The Context of The Company's Capacity to Operate

Each organisation moves in a certain space appropriate to the type of activity it performs. This space is constantly influenced by factors directly linked to the organisation itself and to its immediate sectoral environment, as well as by a wide range of factors that only seem to exist outside the company's daily operations. The latter group of factors, as the practice shows, is extremely important for the survival and development of the organisation, and is referred to as macro-environmental factors. The analysis of macro-environmental conditions is a key determinant of wise use of the company's resources and leads to success despite the variability of its macro-environment.

The success of a company is closely linked to the quality of decisions taken at each level. We distinguish three main levels of management, i.e. the time horizon and material decision-making: operational, tactical and strategic. Each of these levels is characterised by its own time frame and range of decisions. Operational management can be defined as the decisions that are taken by the primary management level, for areas such as departments, branches, lines or

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production cells, over a period of time that is no longer than one year in perspective. Tactical management is when decisions are made by middle management for entire plants, divisions or sets of individual business units. The time horizon for tactical management usually ranges from one to three years. The level of strategic management is the domain of company management (chief executive). Strategic decisions affect all organisational units of an enterprise and have a time horizon of over three years (Kałkowska, Pawłowski, Trzcielinska, Trzcielinski, Klimek 2009).
Strategic management is a major component of any development plan for an organisation. Strategic analysis as part of a company's sustainable development plan should be carried out regularly by each company (Ansoff, 1985). Its complexity and high level of uncertainty cause that it is sometimes overlooked by many companies, which may directly affect the fact of survival and development (success) of a given organisation (Maik, Gołoś, Szczerbacz, Walkiewicz 2010, Ohmae 1982).

The company's long-term strategy is also closely linked to the company's ability to operate in a given area or industry. The literature divides the company into operational and dynamic capabilities. A company's operational capabilities are the resources that a given company uses to perform routine activities, i.e. those whose specificity is based on the current stability of the organisation's operations. These activities include most of the processes that allow the company to operate on the market, such as: production, marketing and sales, logistics, etc. Another category of the company's predisposition to operate is dynamic capabilities, referred to as "innovation". Dynamic capabilities have a status higher than operational capabilities, because they are primarily the driving force behind any positive changes taking place in the company. Dynamic capacity is more 'strategic' because it concerns a space that is not fully known or is subject to a high level of uncertainty (Hawrysz, 2020, Mintzberg, 1994)

The strategic analysis of the macro- environment plays a key role in planning the future of the company. In times of great uncertainty and volatility in the environment in which companies operate, a review of the strategy should be carried out on a regular basis and in any situation which significantly affects the company's environment (Zakrzewska-Bielawska, 2015).

The coronavirus Covid-19 pandemic and its direct multifaceted effects, as announced by the World Health Organisation in March 2020, was a situation which had a decisive impact on the environment of most companies in Poland and around the world. We can treat the situation of this pandemic as an element of supply-demand unpredictability which, in the form of a crisis, may occur in every macro-occupational aspect of every company. The main question asked in this publication is: how much influence the crisis caused by the pandemic has or will have on the strategy of an exemplary joinery manufacturing company, which has an established and stable position on the market to date. To answer this question, we took into account, above all, the macro-environmental conditions of this enterprise, because the nature of the pandemic crisis suggests that most changes will be made to the political, legal, economic, cultural and social, ecological and technological and organisational environment of this enterprise. To this end, it is important to develop a model which presents such macro-environmental conditions and to identify those factors which are the result of an unpredictable economic slowdown and multi-faceted changes related to the Covid-19 coronavirus. (Ratten, 2020)

Method of General Segmentation of The Business Environment

Looking through the literature on the subject one can notice that the most frequently and most popular tools of macro-environmental strategic analysis of an enterprise are first of all: PESTEL, Scenario Method and Delphi Method.

Due to the high degree of complexity in carrying out the analysis with the Delphi Method (difficulty in gathering groups of experts) (Trocki, 1997), and the excessive variance of the current economic conditions, which lower the level of confidence in the Scenario Method, the authors of this publication chose the first of the above mentioned analyses as a starting point for determining the magnitude of the positive and negative impact of the title macro-environmental conditions of the strategy for the survival and development of a woodwork manufacturing company. The PESTEL analysis is an extended version of the PEST method used to study macro-environmental conditions of an enterprise. It can be considered that PESTEL is the foundation of the future business strategy (through an in-depth portfolio analysis), as mentioned in the introduction to this article. Properly conducted PESTEL analysis can serve as a kind of environmental compass, indicating potential threats as well as opportunities to be used by companies from different industries (Włodarkiewicz-Klimek et al., 2010, Masłowski, Dendera-Gruszka, Kulińska, 2018, Yuksel, 2012, Risseeuw, Massurel, 1994).

The starting point of the PESTEL analysis is the juxtaposition of the following six basic external factors:

- Political
- Economic

- Social
- Technological
- Environmental
- Legal

Practical conducting of a PESTEL analysis consists of three stages.
As a first step, appropriate questions (problems) should be formulated for each of the six factors mentioned above. Examples of questions in the political area are: the question of the dynamics of change, the political credibility of state authorities or the level of risk of government takeovers and expropriations of investors. In the area of the social factor, the dynamics of changes in the consumer orientation of society and problems concerning demographic issues.

Once the questions for each factor have been formulated, the impact of each factor on the company's or organisation's activities should be determined. Such an influence can be described in relation to the following three dimensions: time, nature and strength of the influence of the factor on the company. Each of these six factors (and within them each analytical problem) may have a present or future time horizon of impact; the nature of the impact may be positive, negative or neutral; and the magnitude of the impact may be determined in degrees of scale of response.

The third stage of the PESTEL analysis is to try to define the correlation between different factors and to find problems (analytical questions) that are insufficiently qualified for one factor only.

The result of the PESTEL analysis may be six tables, one for each factor, in which the most important macro-analytical problems will be described, which may determine the scope and magnitude of positive and negative forces affecting the company's survival and development strategy.

Results of The Analysis of The Macro- Environment of The Company

The analyzed company is a large manufacturing company, with an established position and over 25 years of presence on the Polish market. Earlier analyses showed very clear chances for continuous development and sales growth. The company does not conduct retail sales. It has a network of customers who deal with retail trade. The company's area of operation is primarily Poland, EU countries and individual non-EU countries. As part of the first stage of the PESTEL analysis, six factors of the company's macro- environment and within each of them, the following four questions (problems) were identified (brainstorming method):

Political factors:

1. Decrease in political credibility of state authorities
2. The anti-European political attitude of the current government
3. Possible policy direction for changes in social programmes
4. Risk of government takeovers and expropriations of investors

Economic factors:
1. The spectre of the economic crisis related to the pandemic
2. Decrease in public financial support for innovative activities of enterprises
3. Decrease in Gross Domestic Product and rising unemployment
4. Uncertainty regarding investments by retail clients

Social factors:
1. Decreasing consumer orientation of the population
2. Decreasing stability in society
3. Difficulties in obtaining loans
4. Increased interest in building your own house with a garden

Technological factors:
1. Unfavourable (relative to EU countries) values of innovation indicators
2. Increased cyber-technology and digitisation of production processes
3. Increase in the number and functionality of mobile computer devices
4. Increased importance of digital cloud solutions

Environmental factors:
1. Increase in the severity of adverse climatic events

2. The drought and the stepping stone of the country.
3. Increased environmental awareness of consumers in terms of production and use
4. technological developments
5. Increased demand for energy-saving products

Legal factors:

1. Decrease in public confidence in legal regulations
2. Socially beneficial direction of changes in the Labour Code and building regulations
3. A socially beneficial direction for changes in safety regulations and occupational hygiene.
4. Decrease in the number of building permits

In the second stage of the PESTEL analysis, for each of the factors and for individual questions (problems), the impact of each of them on the company's operations was determined. Such an impact was described in relation to the following three levels: the nature, impact force and time horizon of this factor problem on the company. The results are collected and presented in the six tables below (1-6).

Table 1: Component problems of the political factor of PESTEL analysis

Component problems of the factor	Description	Nature of the problem	Impact force	Time horizon
Decreased political credibility of state authorities	The low quality of state authority's actions, lack of substantive credibility and political particularism pushes Polish companies to the group of countries of the so-called "second speed Europe".	Negative	5	Present
The anti-European political attitude of the current government	The current government's progressive reluctance towards the EU may, in extreme cases, lead to cuts in EU financial subsidies.	Negative	4	Present
Possible policy direction for changes in social programmes	The likelihood of more social programmes as part of recovery programme from the crisis. More surviving social programmes means a larger portfolio of potential investors.	Positive	3	Present
Risk of government acquisitions and expropriation of investors	Since 2017, Poland has joined European outsiders (Greece, Hungary) in this area. This is very bad news for foreign investors in Poland.	Negative	3	Present

Source: own study

Table 2: Component problems of the economic factor of PESTEL analysis

Component problems of the factor	Description	Nature of the problem	Impact force	Time horizon
The possibility of an economic crisis linked to a pandemic	The economic collapse is linked to the global closure of many branches of the economy and restrictions on the pandemic.	Negative	5	Present
Decline in GDP and rising unemployment	The decline in Gross Domestic Product and rising unemployment due to the economic crisis.	Negative	5	Present
Uncertain situation regarding investments by retail clients	The economic crisis may cause many people to hold back on their retail investment decisions (for example, to build or renovate a house)	Negative	3	Present
Decrease in public financial support for innovative activities of enterprises	This public financial support was prompted by the intention to boost the economy hit by the global economic crisis in 2009. When the positive economic results of this support began to emerge, public funding began to be channelled (starting in 2015) to other types of activities.	Negative	4	Future

Source: own study

Table 3: Component problems of the social factor of PESTEL analysis

Component problems of the factor	Description	Nature of the problem	Impact force	Time horizon
Decreasing consumer orientation of the population	The economic crisis, as a consequence of the real reduction in the purchasing power of society, is leading to a reduction in the consumer orientation of society.	Negative	3	Present
Decreasing stability in society	The consequence of many redundancies will be fewer (of any kind and scale) purchases and investments.	Negative	4	Present
Difficulties in obtaining loans	Lower interest rates mean fewer loans and a narrower group of people who can start renovating a flat or building a house.	Negative	4	Present
Increased interest in building your own house with a garden	A few weeks' closure of the society (pandemic lockout) has led to interest in searching for building plots.	Positive	3	Future

Source: own study

Table 4: Component problems of the technologic factor of PESTEL analysis

Component problems of the factor	Description	Nature of the problem	Impact force	Time horizon
Unfavourable (relative to EU countries) values of innovation indicators	The innovativeness of the Polish economy is at a low level and places us in 22nd place among 26 EU countries. The relation to the EU indicator does not give grounds for optimism.	Negative	4	Future
Increased cyber-technology and digitisation of production processes	Progressive automation and robotisation of production processes makes them more stable and independent of e.g. social factors.	Positive	3	Future
Increase in the number and functionality of mobile computer devices	The progressive computerisation of society is an opportunity to move some sales to the Internet.	Positive	3	Future
Increased importance of digital cloud solutions	Cloud solutions mean greater stability of production processes and additional protection against unpredictable effects such as natural disasters.	Positive	3	Future

Source: own study

Table 5: Component problems of the environment factor of PESTEL analysis

Component problems of the factor	Description	Nature of the problem	Impact force	Time horizon
Violence and increasing frequency of adverse climatic events	Increasing public environmental awareness. Increased interest in passive construction.	Negative/Positive	4	Future
Progressive drought and the formation of steppes in the country	Progressive drought and steppe formation of the country	Negative	3	Present
Increasing consumers' environmental awareness of the production and use of technical works	Customers want to buy products from responsible and environmentally sustainable companies.	Positive	3	Present
Increased demand for energy-saving products	Increased consumer awareness of passive construction.	Positive	3	Present

Source: own study

Table 6: Component problems of the legal factor of PESTEL analysis

Component problems of the factor	Description	Nature of the problem	Impact force	Time horizon
Decrease in public confidence in legal regulations	Dramatic, as it is currently only Poland's 21st place in comparison with 26 EU countries, and the deterioration after 2015 of this confidence indicator is not conducive to business activity. The trend is alarming in nature and requires clear reorientation.	Negative	5	Future
Socially beneficial direction of changes in the Labour Code and building regulations	Loosening of the code restrictions on the time and form of work performance and the way of terminating employment contracts. Tightening of construction law regulations - requirement of certificates for construction products and use of passive products.	Positive	3	Future
A socially beneficial direction of changes in legal regulations concerning health and safety at work	Formal introduction of the so-called 'sanitary regime'. Requirement of additional hygienic and personal protection measures.	Positive	3	Future
Decrease in the number of building permits	The number of building permits issued in Poland (including notifications of the construction of these facilities with a construction project) is on a decreasing trend in 2013-2019	Negative	4	Future

Source: own study

Summary and Discussion

In the next table (Table 7), the results of the PESTEL analysis concerning macro-economic conditions of the operation of a joinery manufacturing company in the situation of an unpredictable economic slowdown caused by the outbreak of the Covid-19 pandemic were collected in a condensed form. This table summarises six factors of the PESTEL analysis, average forces of their component problems and the resulting nature of this impact on the business undertakings of the studied company.

Table 7: Table summarising six analysis factors, average forces of their impact and the nature of this impact on business undertakings of the examined company.

Type of factor	Average impact force	Nature
Political	4,0	Negative
Economic	4,0	Negative
Social	3,50	Negative
Technologic	3,25	Positive
Environmental	3,25	Positive
Legal	3,75	Negative

Source: own study

In interpreting this summary, it should be pointed out that the global coronavirus crisis has led to the long-term closure of many sectors of the economy worldwide. Mass redundancies, rising unemployment, a fall in gross domestic product caused panic in the construction investment market, and a temporary slowdown in the flow of new orders to the company in question. From the point of view of the company in question, a dangerous situation is the long-term action of the pandemic affecting the wealth of the potential client's portfolio. Possible loss of job, reduction of earnings, difficulties related to obtaining an external source of financing may cause a decrease in interest of this client in the products of the company manufacturing joinery.

The general conclusion of the above analysis is also the fact that the destructive current and future action of the Covid-19 pandemic is accompanied in Poland by the unprofessional, particularistic management of the government and a high probability of continuation of a trend whose negative image over the past five years was only superficially masked by the results of the previous positive economic situation. The numerical results of the analysis, especially political, economic and legal, of the negative macro-economic conditions of the business activity of the surveyed company are very worrying. The thesis about the probable 'accumulation' of the impact of a pandemic and the style of state management on this type of business can be justified in part by the four figures below (Figures 1-4).

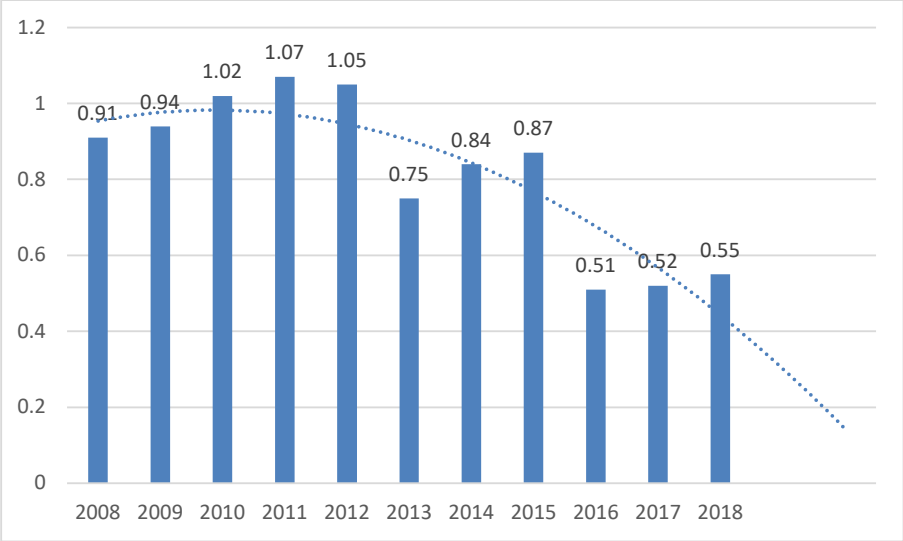

Fig. 1: Political credibility of state power for Poland in 2008-2018 with a projected trend line
source: own study based on www.worldbank.org

The trend presented in Figure 1 (positive in 2008-2015) has deteriorated sharply since 2016 and, for the theoretical model of extrapolation, is heading towards a 'Greek' solution. Compared to the 26 EU countries surveyed, Poland has fallen from a high position in the top seven leaders to a group of outsiders - place 18 with the previous indicator being twice as low. The lack of data from the previous year, especially this one, certainly does not change the trend. The populist and particularist cause of this state of affairs does not require any further comment.

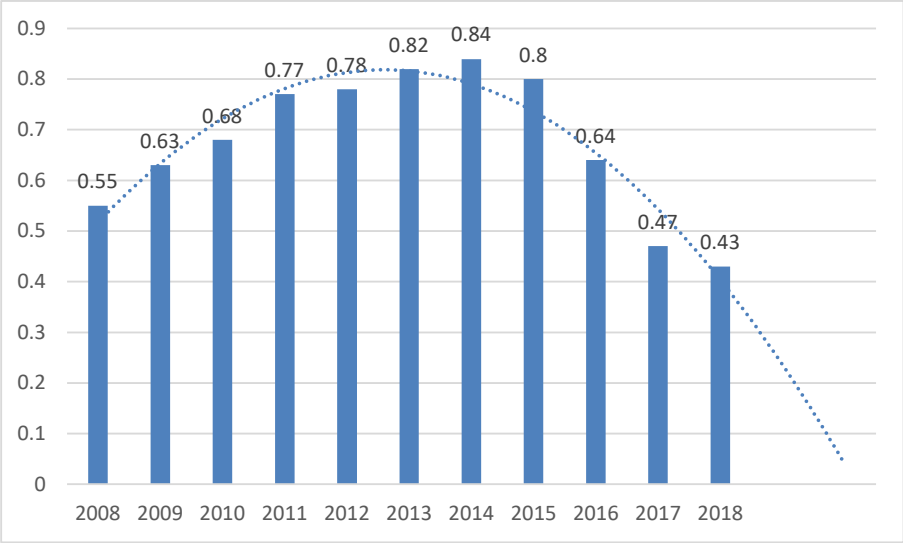

Fig. 2: Indicator of social trust in legal regulations for Poland in 2008-2018 with a projected trend line
source: own study based on www.worldbank.org

The indicator reflecting public confidence in legislation is based on impartiality and public perception of the rule of law - the fairness of the operation of the courts and the police and confidence in the activities of these institutions. It also illustrates the credibility of legal regulations, the quality of their implementation and compliance with legal agreements and property rights. It assesses the effectiveness of the state in preventing violence and crime. The dramatic, because only 21 (in 2018) Poland's position in comparison with 26 EU countries, and the deterioration after 2015 of this indicator, is not conducive to the business activities of enterprises.

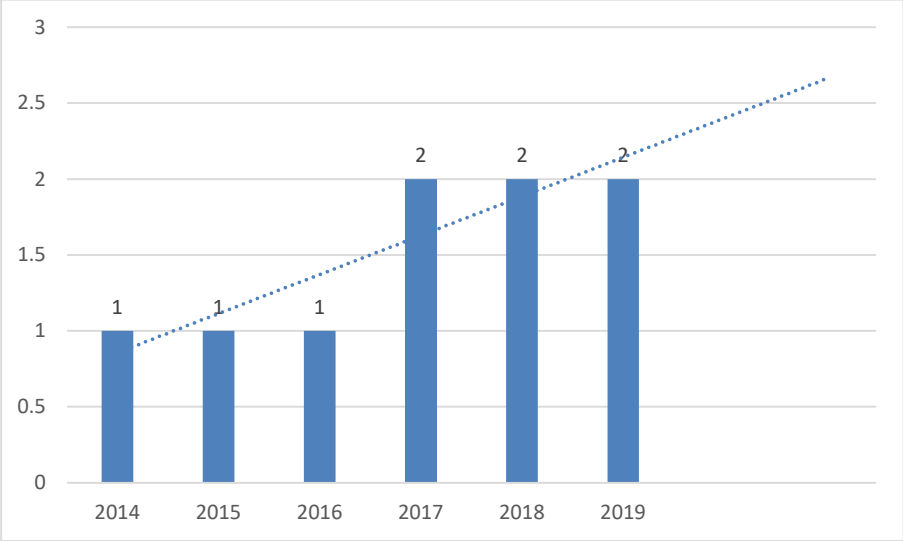

Fig. 3: Risk indicator for government acquisitions and expropriations of investors for Poland in 2014-2019 with a projected trend line

source: own study based on www.theglobaleconomy.com

The risk indicator for government takeovers and expropriations of investors, according to The Global Economy, reflects the risk of entrepreneurs being deprived of their property rights by those in power, the change of attitude of the state towards foreign investors and the risk of political manipulation of the functioning of the legal system. European Union countries are classified in seven categories from 1 (low risk) to 7 (high risk). For most EU countries (including Poland), this indicator was, in 2014-2016, correct and consistent with the rules of democratic freedom of management (1). The only exceptions in this period were Greece and Hungary (indicator 2). Unfortunately, from 2017, Poland joined these outsiders. This is a bad signal for Polish companies and for foreign investors in Poland.

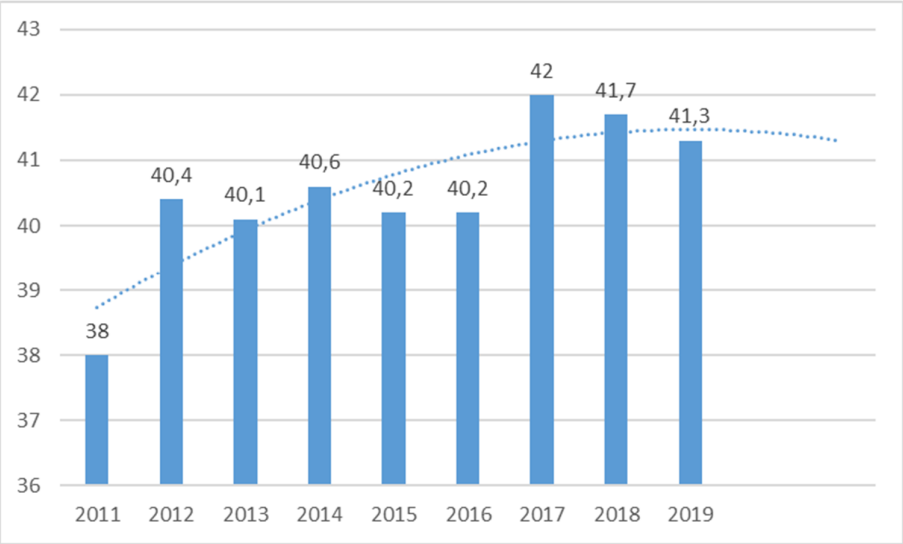

Fig. 4: Polish Innovation Index 2010-2019

source: own study based on European Innovation Scoreboard 2008-2019 data

In the period 2010-2019, the innovativeness of the Polish economy was at a low level and placed Poland at the end of the list of European countries with an average level of innovation. The Innovation Index qualifies Poland to the group of so-called moderate innovators. The rate of possible growth and relation to the EU indicator do not give grounds for optimism. According to the statistics of GlobalEconomy.com, Poland was ranked 22nd (out of 26 EU countries), increasing by one position compared to the 2016 ranking. Poland was followed by Bulgaria, Greece, Croatia and Romania.

Positive conclusions can be drawn as follows:

Within the framework of poorly assessed macro-economic policy conditions, the only positive point is the likelihood of the emergence of social programmes as a politically enforced element in the country's recovery from the pandemic crisis. More surviving social programmes may mean a larger portfolio of potential investors for the company in question.

Another opportunity is the possibility of the EU forcing a change in the current form of government as a condition for obtaining anti-crisis and development subsidies. At the political level, there is also the possibility of closer cooperation between the production company and local authorities, as possible direct gestures of these subsidies, under the conditions that the political centre of government will continue the current 'democratisation'. The above solutions will allow the company, indirectly, to mitigate the impact of all the problems mentioned in the analysis, which constitute the economic factor of the PESTEL analysis.

Similar indirect effects may relate to the reduction of the power of 'flare' of the following three negative problems, which make up the social problem: a decline in the consumer orientation of society, a decline in the stabilisation of society's life and difficulties in obtaining life-stabilising loans. The positive character of the production activity of the surveyed company has new signals (lying on the borderline of social and environmental issues) of increased interest in building their own house with a garden. Inhabitants of large housing estates of multi-family buildings make, for the time being, few attempts to search for building plots as an indirect result of the past (and perhaps future) several weeks' pandemic lockout.

Hope for "European interventions" also concerns both the turning back of the Polish state authority from the previous path of devastation of the legal system (which results in a decrease in public confidence in legal regulations) and the withdrawal from the government's negation of participation in the pro-environmental "green order" programme. The socially beneficial direction of changes to the Labour Code and building regulations and legal regulations concerning health and safety at work seems to be forced by the very nature of the threat of the Covid-19 pandemic.

The violence and increasing frequency of adverse climatic events and the progressive drought and steppe formation of the country are equally natural in creating a growing ecological awareness of both energy-efficient and sustainable production and use of technology.

Among the technological factors of the PESTEL analysis, the negative power of influence on production activity has the fact of unfavourable (relative to EU countries) values of innovation indicators. This problem has complex political, legal and socio-economic conditions and requires undertaking at the level of central government.

The progressive automation, robotisation and digitisation of production processes (as well as the tendency to use cloud solutions) makes them more stable and independent even from factors of unpredictable economic slowdown caused by pandemic type phenomena. The increase in the number and functionality of mobile computer devices seems to represent an economic and social opportunity rather than a threat, provided that these devices are used rationally and ethically.

Summing up the results of the PESTEL analysis presented in this publication, it is possible to suggest that the woodwork manufacturing company under investigation is more resilient than developmental functioning in the current situation of an unpredictable economic slowdown. The element of survival is linked to the expectations of European intervention in political, economic, legal and social matters expressed above, and development may be based on the ecological and technological factors cited in this publication.

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Possibility to Reduce Food Waste in Poland in the Light of Current Regulations

M MISNIAKIEWICZ

Cracow University of Economics, College of Management and Quality,
Department of Food Product Quality, Krakow, Poland
malgorzata.misniakiewicz@uek.krakow.pl

Abstract

Food waste is a problem of highly developed countries, which mainly affects food consumers and distributors. The FAO estimates show that around 1.3 billion tonnes of food are wasted in the world annually, which is 1/3 of the amount of food produced. In Europe wasted food reaches up to 50% of total food production and amounts to approximately 90 million tonnes. The average European throws away 20-30% of bought food. About 9 million tonnes of food are wasted annually in Poland. Due to the environmental, economic and social consequences of this situation, the problem is growing and is becoming the subject of regulation at international and national levels. One of such regulations is the Act on Counteracting Food Waste adopted in Poland on July 19, 2019.
The aim of this article is to analyse and evaluate the above-mentioned act, to indicate its strengths and potential areas for improvement. Using the elements of the SWOT analysis the compliance of the act with EU regulations, transparency, comprehensibility and completeness of the presented definitions, system - the range of legal and fiscal instruments used in the act, its scope, social utility as well as organizational and financial consequences of its introduction were taken into account. The regulations of the act were compared to the law in selected EU countries - the Czech Republic, Italy and France.
The law in Poland regulates primarily the obligations of sellers in terms of reducing food wastage. Thus, it promotes positive actions in the field of counteracting food waste at the stage of its distribution, while omitting the stage of obtaining and producing food. Its introduction has both positive and negative social, organizational, environmental and economic effects. Monitoring of the effectiveness of the act application is necessary as well as further development of its regulations. That would enable the effective introduction of solutions increasing social awareness, and thus reducing the amount of wasted food.

Keywords: Food Waste, Legal Regulations, Improvement, Reduction of Food Wastage.

Introduction

Food waste *is generally understood as all the foodstuffs discarded from the food supply chain for economic or aesthetic reasons or owing to the nearness of the 'use by' date, but which are still perfectly edible and fit for human consumption and, in the absence of any alternative use, are ultimately eliminated and disposed of, generating negative externalities from an environmental point of view, economic costs and a loss of revenue for businesses* (Avoiding food wastage, 2012, 29).

The FAO defines ***food wastage*** *as all processed, partially processed or unprocessed products intended for or expected to be consumed by humans, and those that, despite their production, have not been consumed.* Often this is because food has spoiled but it can be for other reasons such as oversupply due to markets, or individual consumer shopping/eating habits (FAO, 2014).

The FUSIONS Project (Food Usage for Social Innovation by Optimising Waste Prevention Strategies) has provided a Definitional Framework to harmonise the current definition on Food Waste within the EU 28. ***Food waste is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed*** *(including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea* (Project FUSIONS).

In the EU most food is wasted at the end of the supply chain, i.e. at the stage of distribution and consumption. As much as 42% of food is wasted in households, two-thirds of which are still healthy for consumption. At the

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production stage 39% of the total amount of food is wasted, at the distribution stage, including catering, 14%, and at the stage of sales 5% (European Commission, 2011; Obiedzińska 2017, 131).

In Poland, in contrast to other EU countries, the most food is wasted at the production stage - the food industry generates nearly 6.6 million tonnes of food waste annually. Households waste more than 2 million tonnes of food, and 0.35 million tonnes of food are wasted in Poland at the distribution stage (European Commission, 2011). In total, this gives about 9 million tonnes of wasted food per year, which places the country on 5th position in the European Union. Each Pole throws away approximately 52 kg of food per year. After taking into account the earlier stages of the food product life cycle the amount grows up to 250 kg per Poles per year (Stępień & Dobrowolski, 2017).

The problem of food wastage has a number of environmental, economic and social implications, which require taking systemic and targeted actions to limit its scale. For this purpose, the scientific research and analyses in the field of counteracting food waste should be carried out. Reliable and proven knowledge should be provided and such regulations and laws should be created that will allow for effective implementation of solutions increasing social awareness, enforcing specific solutions and shaping rational market behaviour. One of such solutions is the Act on Counteracting Food Waste passed in Poland on 19 July 2019 (Journal of Laws 2019, item 1680.

Research Method

The presented research includes a critical analysis of the Act on Counteracting Food Waste in Poland in the context of legal regulations in selected EU countries - the Czech Republic, Italy and France. Analyses - identification of the strengths and weaknesses of the regulations adopted in Poland, as well as opportunities and threats of the Act implementation were carried out using the SWOT analysis in February and March 2020.

The aim of the study was to develop recommendations aimed at improving activities in the area of reducing the costs and losses related to food waste. The hypothesis that in selected EU countries, the legal regulations enable a more effective fight against food waste than in Poland was stated. Therefore, there is a chance to develop better solutions on the basis of benchmarking and introduce them in Poland. The analysis and evaluation of the Act on Counteracting Food Waste was carried out in 7 areas:

1. Compliance with EU regulations and strategy.
2. Legal definitions - their clarity, comprehensibility and completeness.
3. System - the resources of legal and fiscal instruments used in the Act.
4. Scope - the extent of food waste in Poland.
5. Social benefit - the potential impacts on society and the environment.
6. Organizational consequences on retailers, charities and consumers.
7. Financial consequences - possible economic and organizational costs and profits of the regulation for all participants in the system.

Research Results

The obtained results of own research were presented according to the analysed areas.

1. **Compliance with the EU regulations and strategy – Confirmed**. The subject of the Act is consistent with the regulations and strategy of the European Union. *The resolution of the European Parliament of 19 January 2012 Avoiding Food Waste: Strategies to Improve the Efficiency of the Food Chain in the EU* indicates the need for action to reduce food waste. The EU Parliament recommends decisive steps to reduce food losses by 50% by 2025. In line with the conclusions of the Council of the European Union on Food Waste and Food Loss (June 2016), the reuse of food that would otherwise be lost is the second priority action, after prevention of food waste, in food use hierarchy. Reducing food waste is also critical if EU Member States are to meet climate change targets and reduce greenhouse gas emissions, as well as fulfil obligations under the European Landfill Directive to reduce the amount of biodegradable waste going to landfills (Council Directive, 1999). Donating food to non-governmental charitable organizations that conduct activities in the field of food redistribution to people in need is one of the most preferred and effective ways of reducing food waste. The solution applied in the Polish act mobilises the participants of the supply chain to limit the amount of food losses by introducing fees, the obligation to educate consumers, and directs unused food towards the most preferred solution in the hierarchy of waste management – redistribution.

2. **Legal definitions – partly confirmed.** Article 2 of the Act introduces legal definitions of food waste, non-governmental organization and food retailer.
   Food waste is understood as the withdrawal of food from the distribution stage and its disposal as waste. Particular attention was paid to foods that are recalled due to impending use-by or best before date, or due to appearance or packaging defects. The legislator defined food waste as a process that takes place only at the distribution stage, bypassing the previous elements of the supply chain or wasting food in the household. Therefore, **the definition is considered incomplete and non-universal, but consistent with the scope of the act**.
   A non-governmental organisation is understood as an organisation which statutory goal is to perform tasks in the sphere of public tasks in the field of social assistance, including helping families and people in difficult life situations and equalizing opportunities for these families and people; supporting the family and foster care system; charity activities, including providing food to people in need or running mass catering facilities for people in need. Thus, the legislator limited the definition in relation to the ones adapted in the Act of 24 April 2003 on Public Benefit and Volunteer Work (Journal of Laws of 2018, item 450) to organizations engaged in activities for specific purposes. In addition, an additional provision was also introduced to the definition, stating that also legal persons and organizational units acting on the basis of the provisions on the State's relationship to the Catholic Church, on the State's relationship to other churches and religious associations, and on the guarantees of freedom of conscience and religion referred to in Art. 3 clause 3 point 1 of the Act of 24 April 2003 on
   Public Benefit and Volunteer Work are considered a non-governmental organization. Thanks to this, church legal entities conducting charitable activities can participate in the food donation system in Poland, e.g. Caritas.
   A food seller is an entity running a food business in the sale of food in a retail or wholesale unit with a sales area of more than 250 sq. m, in which the revenues from the sale of food constitute at least 50% of the revenues from the sale of all goods. The definition of a food vendor contains precise guidelines allowing determining which entrepreneurs are covered by the provisions of the Act. Precise identification of a food seller allows for the precise classification of the enterprise to the group covered or not covered by the regulations.
3. **System –** the Act introduces:
   - An obligation to conclude a contract for the free donation of food between a food seller and an NGO. Therefore, donating food to charity is not a voluntary activity, but a requirement that must be met. The use of this solution leads to the need to conclude many agreements with organizations in a very short time. This is a major organizational challenge for both retailers and charities.
     Organizational chaos may occur in the centres where many entities covered by the provisions of the Act are located. There is no official platform for advertising organizations willing to sign contracts, which could facilitate communication between interested parties. There is also the possibility of a situation where the seller will have difficulty with an organization willing to cooperate. The Act provides for exemption from the penalty for failure to meet the obligation if no organization cooperates with the seller. It is possible that some sellers will intentionally avoid signing a contract with an organization, sluggishly looking for a partner or falsely showing the lack of an organization with which they could cooperate.
   - An obligation to carry out educational and information campaigns in commercial units in the field of rational food management and counteracting food waste. It is assumed that the seller has the ability to influence consumers; to shape more balanced customer attitudes. Moreover, a significant number of sellers have experience in running marketing campaigns.
     When transferring the obligation of carrying out the campaign to food sellers, the dispersion of funds from the food waste fee was taken into account. Organizations may allocate no more than 20% of the funds from the food waste fee to these campaigns.
   - Food waste charge - the basis for calculating the charge is the weight of food wasted in kilograms. The entity itself declares the amount of wasted food, sets the amount of the fee and pays the fee for the non-governmental organization. The imposed charge is a financial "penalty" for food retailers who, despite the planned system and mechanisms for transferring unsold food products free of charge, generate significant amounts of food waste. This is to encourage retailers to take additional steps to prevent food waste. As the complete elimination of food waste is impossible, the basis for calculating the fee is 90% of the weight of wasted food in kilograms. In addition, the seller is entitled to reduce the fee by the costs incurred for educational campaigns in the field of preventing food waste or the costs of performing the contract for the transfer of food for social purposes, respectively.
     To ensure financial transparency sellers are required to provide information on the amount of the fee due and the value of food transferred to organizations in their financial statements.

- Financial penalties for failure to comply with obligations under the Act. The amount of the penalties is:
  - PLN 5,000 - for not concluding a contract with an organization,
  - PLN 500 - 10,000 - for not paying the food waste fee to the organisation's account.

  The local Provincial Inspectorate of Trade Inspection imposes financial penalties. Proceeds from fines constitute the state budget income.

  Considering that the regulations apply to sellers who conduct business on a large scale, the amounts of penalties proposed in the act are small in relation to the organizational effort related to the conclusion of a food donation agreement and the administration of food donation and campaign preparation. There is a risk that for some entities such an inadequate financial penalty will not be sufficiently motivating to undertake actions aimed at reducing food waste.

4. **Scope** - the Act focuses on food retailers, i.e. distribution. The problem of food waste, however, concerns a much wider scale. The Act deals with the general problem in a titular manner, while in practice it covers only a small part of the phenomenon. Due to its specific characteristics, the distribution sector has a high potential to reduce food waste.

   Advanced infrastructure, such as central warehouses, computer systems monitoring the flow of goods, allow for quick and correct identification of food for which the expiry date is approaching, while maintaining optimal storage conditions. Moreover, the centralised decision-making structure allows new procedures to be quickly introduced.

   However, the Act does not apply to large facilities providing catering services, such as hotels, canteens, and restaurants, reception houses, the specificity of which is similar. These types of facilities also experience large losses, and imposing an obligation to donate food on them could significantly contribute to reducing food waste.

   By limiting the entities covered by the provisions of the Act to points where the income from the food sold is at least 50% of revenues, certain large retail outlets, such as gas stations, where groceries and hot meals are sold, even on non-trading Sundays, are not required counteracting food waste. The act does not create any incentives for small retail outlets or smaller grocery stores to apply good practices and minimize food losses.

5. **Social and environmental utility.** Food waste is an environmental, economic and social problem. According to the act, the created system of transferring unsold food for social purposes is to bring positive effects in all three aspects.

   Food distribution through non-governmental organizations to people in need is aimed at improving the standard of living of the poorest people, preventing poverty-related social exclusion and reducing the scale of malnutrition resulting from insufficient financial resources. Moreover, the Act provides for educational and information campaigns to develop rational, balanced consumer attitudes and, as a result, to reduce the amount of food wasted in households.

   From an environmental impact point of view, reducing the amount of food withdrawn from sale to be disposed of can help to reduce greenhouse gas emissions. It should also be noted that food is a finite resource. Suboptimal management of foodstuffs also implies suboptimal consumption of electricity, overexploitation of drinking water and other natural resources. So it is a step in the right direction.

6. **Organizational consequences –** introduction of the Act means:
   - **For the seller:**
     - Finding an organization with which cooperation will be established and concluding a binding contract with it,
     - The need to organize a food donation system and identify safe food donation options,
     - The need to publish information on the amount of food donated and fees,
     - Organization of an educational and information campaign,
     - The need to independently calculate fees,
     - New workplace - people responsible for supervising the reporting of the amount of food donated, calculating the amount of fees and related additional costs,
     - Changes in the financial balance - a change in the scope of financial statements.
   - **For the organisation:**
     - Organization of collection, storage and distribution of large amounts of food,
     - Help in organizing an educational and information campaign,
     - Use of funds from fees for food waste in the field of social assistance,
     - Increasing the demand for employees / volunteers,
     - The need to provide adequate infrastructure - warehouses, distribution center, transport,
     - The need to provide information on the use of funds.

- **For the state administration:**
  - Additional obligations for the Trade Inspection in controlling compliance with the provisions of the Act,
  - The need to present an evaluation of the functioning of the act after 18 months from its entry into force,
  - The need to prepare implementing acts, regulations with a model report on the use of fee funds,
  - The need to handle administrative penalties
  - Carrying out tasks related to the rational use of food.

7. **Financial consequences - the system seems to be coherent in this area**.
   - **For the sellers, the analysed act is related to:**
     - Fees for wasting food, which is an additional cost for companies,
     - Reduction of costs related to waste management,
     - Costs of organizing the collection of groceries, including storage, change of logistics, additional expenses for remuneration of additional people,
     - Costs related to additional activities aimed at reducing food losses,
     - Possible penalties for non-compliance.
   - **For the NGOs there appear:**
     - Costs of handling the collection, transport and storage of food,
     - Investments in infrastructure,
     - Expenses for administrative and operational services, employees,
     - Expending on educational campaigns,
     - Revenue from the fees.
   - **For the public finance sector there appear:**
     - Income from fines,
     - Administrative costs of the system maintenance,
     - Costs related to carrying out inspections - organization, administration, inspectors,
     - Costs of creating new jobs in the office.

The Polish Act on Counteracting of Food Waste is one of the pioneering solutions in reducing food losses in Europe, but is not the only legal document regarding this problem in force in the European Union. To compare the legal regulations in this field at national levels, regulations in the Czech Republic, Italy, France were compiled with the Polish ones. The comparison included: the date of introduction, objects covered by the act, applied solutions, penalties, fees and facilities.

Table 1: Comparison of legal provisions on counteracting food waste in selected EU countries

	Czech Republic	**Italy**	**France**	**Poland**
Year of introduction	2018	2016	2016	2019
Obligation to sign a contract with a food donating organization	Yes	No	Yes	Yes
Objects covered by the act	Retail outlets with an area of more than 400 m2	Sales unites, farmers, producers	Retail outlets with an area of more than 400 m^2	Retail outlets with an area of more than 250m^2
Financial penalties	Yes, CZK 10 million	No	Yes, EUR 3,750-75,000	Yes, PLN 500-10,000
Facilities	Tax credits	Tax credits	Tax credits	Lack
Fee for non-donated food	No data	No	No	Yes
Other duties	No	No	No	Organization of educational campaigns

Source: own study based on the national Acts on the prevention of food waste in the Czech Republic, Italy and France (Pl.ÚS 27/16, 2018; Legge…, 2016; LOI n° 2016-138, 2016).

The law in force in Poland is distinguished by the fee for each kilogram of withdrawn food that could be transferred. In France even a seller donating only a minimal portion, e.g. 1 kg, of such food meets the requirements and will avoid a fine for throwing away valuable products. Ultimately, the Polish act will apply to stores with an area of more than 250 sq m (2 years from the introduction), which will potentially increase the number of food donated. Compared to the scope of regulated facilities in other countries, the Polish Act also covers smaller retailers. In addition, the funds from the fee for each kilogram of food recalled will be allocated to organizing information campaigns on the problem of food waste. The campaigns are also to contribute to reducing food waste and increasing awareness of the problem in the society.

However, the Polish law does not contain provisions referring to good practices, which are contained in the Italian law, concerning all links of the food chain. There is a risk that producers, processors and wholesalers will not take steps to reduce food waste, as the regulations do not apply to them.

The positive effects of the Act on Counteracting Food Waste include:

- Reducing the amount of food wasted, thus reducing the negative environmental impact and financial losses.
- Increasing the availability of resources for the poorest people, thus reducing social exclusion. Support for local communities and social organizations.
- Increasing the security of food supplies.
- Poland was one of the first countries to introduce an obligation to redistribute unsold food. Setting a good example, being a precursor and a model for other countries can positively influence the image of a country abroad.
- The introduction of a charge for wasted food should motivate sellers to introduce measures aimed at reducing the amount of food transferred for disposal, e.g. shelves with products at promotional prices, with impending shelf life. Less food recall means cost savings. Thanks to this, there is a chance to gain the loyalty of environmentally sensitive consumers.
- Reducing the amount of food sent for disposal also means reducing the amount of waste generated. The introduction of the act may contribute to the fulfilment of obligations imposed by the EU on its member states in this respect and to reducing the costs incurred by sellers on waste management.
- Information and educational campaigns are aimed at improving public awareness of rational food management and nutrition. Developing pro-ecological consumer attitudes should bring a number of further changes affecting also other sectors of the economy.

The Act also contains debatable elements that may have negative effects or create the possibility of circumventing the regulation. The weaknesses include:

- The Act does not fully cover the problem of food waste. It focuses on the distribution sector and indirectly on the household sector (social campaigns are targeted at end consumers). Food service establishments that could similarly provide unsold food to organizations operating in the field of social assistance were excluded. Moreover, the legislator did not take into account the production sector with which there are huge losses of food resulting from e.g. overproduction, low-quality raw materials, poor-quality packaging, irregularities in the labelling of goods, etc.
- The definition of a food retailer also excludes a number of large retail outlets, such as gas stations, which actually run regular grocery stores as part of their business, especially on non-trading Sundays, but most of their revenue comes from fuel sales.
- There is the question of whether stores will encourage consumers to make sensible purchases through social campaigns. Currently, marketing strategies that are far from sustainable consumption are popular, i.e. "buy 3 take 1 free". Creative marketing encouraging consumers to improve food management such as "recipe for potato peel crisps" is needed.
- There is a risk that the responsibility for the products will be transferred to the sales representatives of the wholesaler or the manufacturer (in stores where orders are not generated by the system) - the product will be withdrawn and not discarded. It is possible that sellers will start recalling products to the logistics centre so that the documents do not report them as "wasted". Document returns received will appear as "Taken to Fulfilment Centre" and not as food wasted.

- The penalty for not signing a contract or not paying fees for wasting food appears to be inadequately low. The amount of PLN 5,000 seems disproportionately low compared to the formal and organizational effort that must be put on by the seller to organise the food donation.
- Increasing formal and regulatory burdens - obligation to report on the amount of food donated, the amount of the fee, the basis for calculating the fee, and the manner of using the funds from the fees by the organization.
- Each of the participants in the system will face a major organizational and logistical challenge. It is necessary to provide systemic, simple organizational solutions to handle food donation. There will probably be a need to create new jobs or change the scope of duties of employees - in commercial establishments responsible for coordination and reporting, in non-governmental organizations responsible for communication with sellers and redistribution of food obtained, as well as for the preparation of reports, in supervisory institutions of persons responsible for inspections and reporting inspection results.
- It is necessary to prepare implementing acts.
- The state budget will incur expenses related to the control and operation of the system.

Conclusions

Poland as one of the first EU countries introduced regulations on counteracting food waste by redistributing food that is good for consumption. The analysed act may undoubtedly bring positive results. The most important opportunities include the possibility of using unsold food in a manner consistent with the priorities of food waste management in the EU, supporting the poorest, reducing the negative impact on the environment and financial losses related to the disposal of food products. Imposing an obligation on the seller to conduct educational campaigns should additionally have a positive impact on reducing the amount of wasted food.

Unfortunately, the act covers only part of the problem. The obligation to conclude contracts with non-governmental organizations only applies to "big sellers". No additional incentives were created for non-compulsory facilities that could contribute to reducing the amount of food waste. One of the biggest threats is the potential lack of infrastructure allowing for safe storage of the donated food from the moment it is withdrawn from the store until it is handed over to the final consumers. Moreover, it is uncertain whether community organizations will be able to cope with a large flow of food, which is provided on an ongoing basis, with a short shelf-life and therefore a limited shelf life. There is also a risk of reluctance of sellers to cooperate with social benefit organizations, delay in finding a partner for the contract and false demonstration of the inability to cooperate with organizations in the region. Dishonest distributors can also find "creative" ways to report recalled products so that they do not appear as disposed of, thus avoiding the fee. The penalty for failure to comply with the obligation is not high enough to discourage people from circumventing the introduced regulations.

The basis for reducing the scale of food waste will be a change in behavior and practices in every link of the supply chain: at consumers, sellers, processors and producers. Establishing profitable business ties between charities and the food sector may have a positive effect and be a more effective incentive than the system of official penalties.

Summing up, despite the reservations, in particular with regard to the scope of the document, the Act on Counteracting Food Waste may bring about positive effects in all three basic pillars of sustainable development: environmental, social and economic. It is a positive example of the implementation of provisions for the sustainable management of resources in accordance to the EU strategy.

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The Role of Deagriarisation Process in Creating Threats for The Regional Economy and Nature in Selected Conservation Areas in South-Eastern Poland

Kamila MUSIAL[1] and Wieslaw MUSIAL[2]

[1] National Research Institute of Animal Production, Department of Production Systems and Environment, ul. Krakowska 1, 32-083 Balice, Poland
Email: kamila.musial@izoo.krakow.pl

[2]University of Agriculture in Krakow, Department of Economics and Food Economy, al. Mickiewicza 21, 31-120 Krakow, Poland
Email: wieslaw.musial@urk.edu.pl

Abstract

Nowadays a loss of biodiversity in Poland may result not only from excessive intensification of agriculture, but in some regions also from the opposite process of abandonment of agricultural use. The study was conducted in 2019-2020, in 30 communes/municipalities, within 3 conservation areas, where traditionally some agricultural activities are still present. In order to show the level of deagrarisation and deanimalisation processes, there was used the zero unitarisation method that indicate an abandonment of agricultural production, mainly for economic reasons. Moreover, there were carried out some botanical research in seminatural plant communities, to show if there is the connection between advancement of deagrarisation, and deanimalisation process and the total number of vascular plant species and distribution of rare species. The results show that there are mutual connections between diversity of plant species, structure of the landscape and its management. In those communes where the deagrarisation process was highly advanced, there was small number of plants in phytosocological releves. The lowest percentage of abandoned farming was noted in the municipalities with relatively good soils, that are located in the Nadnidzianski Landscape Park. That was also the area with the highest number of plants in releves (on average 45-53). Deagrarisation and deanimalisation processes were particularly intensified in the communes located in the northern part of Konecko-Lopusznianski Nature Park, where deagrarisation advancement was > 0.372.

Keywords: Deagriarisation and Deanimalisation, Natural Capital, Mutual Connections.

Introduction

The natural environment in Poland is a subject to transformations related to climate change and civilisation development, which might disturb the natural balance. While species withdrawing from their natural ecosystems are a serious problem, changes in the biodiversity in the agricultural area are less noticeable or their significance is diminished. Therefore, many researchers are more interested in sustaining biodiversity in conservation areas, than in the actual loss of biodiversity in agricultural ecosystems, which occupy a large area of Poland. This phenomenon persists also in the whole Europe, despite considerable attention being paid to the environmental context of contemporary agriculture. Also, concerning economy, biodiversity is often not regarded as part of the natural capital of a specific country or region. However, the recent reforms of the agricultural policy in the EU indicate that the situation may be slowly changing. Still, general perspectives for the protection of biodiversity in agroecosystems and sustainable agriculture are rather grim (Perrings et al. 2006).

Thus, an important area of interest seems to be the analysis of relationship between biodiversity, landscape structure and its management (Billeter et al. 2007). Poland can boast of considerable diversity of agricultural landscape. It may be described by abundance of existing patterns of seminatural landscape elements, especially for areas with extensive agriculture (Edwards, Kollmann and Wood 1999). It is a fact though, that over the past decades some

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plant species previously described as frequent are becoming rare. That is generally a result of intense agricultural production and decreased proportion of the seminatural habitats in cultural landscape (Krebs et al. 1999; Robinson and Sutherland 2002). Similar decrease in biodiversity in agroecosystems is observed also in many EU countries (Stoate et al. 2001; Donald et al. 2002). The constant growth of the areas occupied by agricultural land leads to dramatic changes in the structure of the landscape, which is becoming more homogeneous. As a result seminatural habitats, typical for cultural landscape are scarce, mostly small, and often isolated from one another (Duelli and Obrist 2003). Moreover, large-scale, intense farming corresponds to the needs of industrial agriculture, and is featured by higher pesticide and fertilizer inputs, tillage operations, and livestock densities (Matson et al. 1997; Robinson and Sutherland 2002; Benton et al. 2003; Bengtsson et al. 2005; Foley et al. 2005; Tscharntke et al. 2005; Aavik et al. 2010).

But there are also some agricultural areas where situation seems to be quite the opposite. This is visible for areas with advanced or progressive deagriarisation, which is abandoning agriculture for economic and cultural reasons. Nowadays in Poland it is a frequent problem, especially in the southern part of the country traditionally dominated by small farms. That may create some threats for the local plant diversity, especially for seminatural habitats as grasslands, where many rare plant species is still to be found. They are part of various agricultural ecosystems, ranging from wet habitats, to dry xerothermic grasslands. Maintaining the nature of such habitats and their elements depends on proper use of land, and it is also the prerequisite for effective conservation. Apart from deagriarisation, the other negative factor is the decrease in the number of livestock in a specific region, also known as deanimalisation (Musiał and Musiał 2019). It seems these two processes may be adverse for both the economy and nature in the Swietokrzyskie Region, which saw considerable deagriarisation over the past few decades. The aim of the study was to indicate the threats resulting from deagriarisation and deanimalisation for the economy and seminatural habitats in selected conservation areas in the Swietokrzyskie Region.

Characteristics of the studied area

The Swietokrzyskie Region is situated in south-eastern Poland and includes a voivodeship under the same name. It occupies 3.7% of the area of Poland, which makes it one of the smallest voivodeships in this country. The study covered 3 types of conservation areas: buffer zone of the Swietokrzyski National Park (S NP), Konecko-Lopusznianski Nature Park (K-L NP) and Nadnidzianski Landscape Park (N LP) (fig. 1). The largest of these three is the K.-L. NP, situated in the north-western part of the voivodeship, spreading over the area of 98 287 ha and including 13 rural and municipal communes. The second is N LP, situated in the southern part of the Region, with 22 888.6 ha in the area of 10 rural and municipal communes. The smallest, S NP in situated more centrally in the voivodeship and its buffer zone covers 20 786 ha and spread over 7 communes (fig. 1).

For conservation purposes crucial role is played by national park, for which buffer zone is obligatory due to some threats related to human impact (Nature Conservation Act of 16.04.2004, Art. 8 and 9). Still, agricultural activities are allowed there, since they maintain the existing cultural landscape and prevent changes in the agro-forest border. Landscape park has a lower status and less restrictions on development and economic use. Its goal is conservation of unique habitats, but the buffer zone is not mandatory (Nature Conservation Act of 16.04.2004, Art. 16). However, there are specific agricultural and production-related prohibitions, related to slurry disposal of livestock (Gruszecki 2005). Nature park has a similar function, but with more focused on landscape than the nature. Regarding agricultural production, regulations define restrictions for enterprises that may have considerable impact on the environment. However, there are no limitations for the technology of keeping livestock (Nature Conservation Act of 16.04.2004, Art. 23).

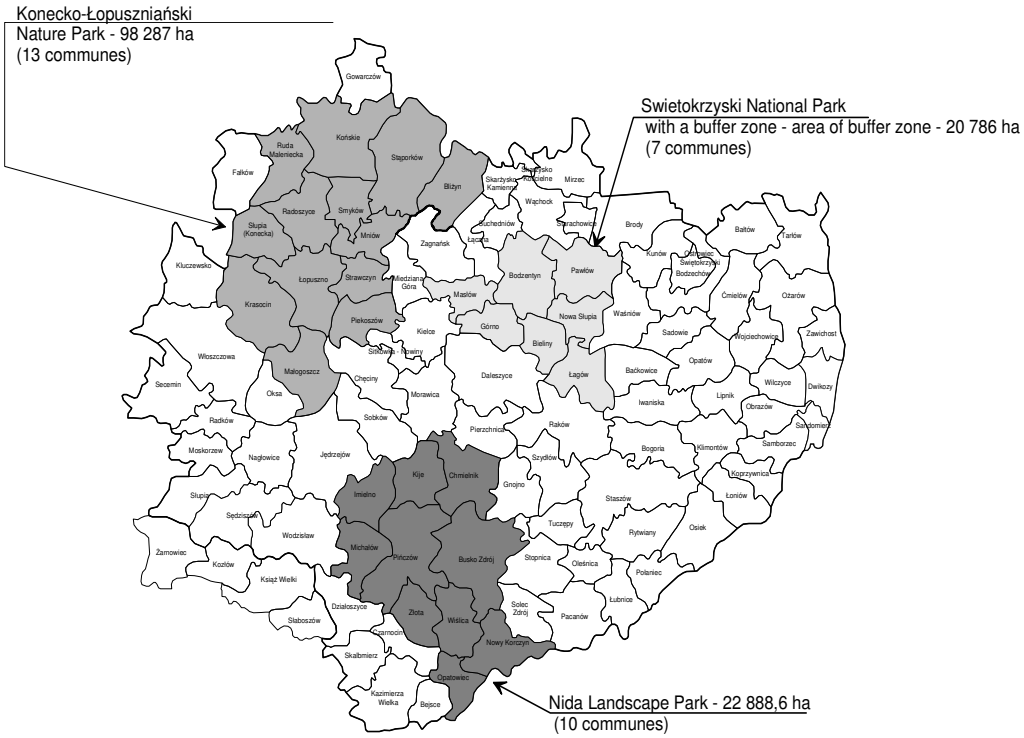

Fig. 1: Conservation areas covered by the research in rural and municipal communes of the Swietokrzyskie Voivodeship

Materials and Methods

The study was conducted in 2019-2020, in 30 rural and municipal communes in the conservation areas, where agricultural activities still are or traditionally were present. Part of the research was conducted in the form of a survey, in order to assess the economic and agricultural aspects of such areas. Separate consideration was given to the evaluation of each commune, with regard to the share of agricultural farms classified according to their condition and perspectives. The respondents assessed the proportion of individual categories of farms in a specific commune/municipality, based on the 4 types suggested in the survey:

A - developing farms, with considerable production potential and scale. They invest in land or other fixed assets, use structural funds and/or are leading and growing locally;

B - potentially developing farms, with signs of development. Their production potential is small or medium, but is market-oriented. They do not invest much in technical equipment and are rather inactive on the land market;

C - farms in recession, that maintain agricultural production, but do not invest in development. Their production is only partially market-oriented but they use all or almost all of their land;

D - declining farms, they present various levels of production and economic decline. For the past few years they have not invested in technical equipment and their extensive agricultural production is organized on part of or whole land. Some of them lease and/or fallow the land.

The proportion of individual analytical groups was the basis for a detailed analysis using the zero unitarisation method for the variables describing the municipalities in the whole voivodeship, showing the level of estimated production and spatial deagrarisation (Kukuła 2000). For the calculation, the following five descriptive variables were adopted:

- proportion of non-agricultural (abandoned) land (%);
- proportion of extensified agricultural land and grasslands, maintained only to receive EU subsidies, (%);
- proportion of farms that fallow at least part of agricultural land (%);
- proportion of farms which formally exist, but have completely abandoned agricultural production (%);
- proportion of declining farms on various levels of economic decline (%). It was assumed that all five features are stimulants and their high proportion proves the advanced level of production and deagrarisation. The abovementioned variables-stimulants were normalised according to the algorithm:

$$z_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}}$$

The variables had values ranging from 0 to 1, where 0 means no deagrarisation, and 1 - the most advanced deagrarisation. Synthetic factor of production and spatial deagrarianization (PSD) was calculated as the arithmetic mean of normalized values of the diagnostic features. Then the Shapiro-Wilk test was applied to assess the distribution of the dependent variable, which was the basis for discarding the division into analytical groups (PSD) on the basis of standard deviation. A relevant division into analytical classes was applied, based on quartiles. They represent the advancement of spatial deagrarisation, which was described as: highly advanced, advanced, intermediate and poorly advanced.

Analogous calculations were performed while evaluating the deanimalisation of the Swiętokrzyskie Region. The variables describing this process were:

- number of farms in the municipality with more than 30 heads of cattle (cows and fattening bulls), (destimulant);
- proportion of non-productive grasslands (%);
- proportion of livestock-free farms (which no longer breed cattle, swine, sheep or horses), (%);
- proportion of declining farms on various levels of production and economic decline, (%).

The first variable was normalized using the algorithm adequate for destimulants:

$$z_{ij} = \frac{\max x_{ij} - x_{ij}}{\max x_{ij} - \min x_{ij}}$$

The data for the communes described with the dependent variable were divided into four quartiles, which were then placed on the map. Subregional advancement of deanimalisation was pointed out in the communes/municipalities with the conservation areas. There was also an indication of potential and actual consequences of these processes.

The field research covered 60 phytosociological releves according to the Braun-Blanquet method (1964), that are lists of plant species occurring in the plot of 100m². They were carried out is all analyzed communes (2 in each commune), in seminatural plant communities. That served to show the connection between advancement of deagrarisation, and deanimalisation process and the total number of species in phytosociological releves and also the distribution of rare vascular plant species. Latin names of species from the Polish Red Lists were given according to Mirek et al. (2006), and plant associations according to Matuszkiewicz (2014).

Results and Discussion

Analysed conservation areas cover totally 1419.6 km^2 and are diverse a far as nature and soil are concerned. That whole area is dominated by small individual farms with an average area of agricultural land of 3-6 hectares. These are usually bi-professional farms, where statistical owner has another, non-agricultural job, or receives a pension/health pension. In the past they were involved in diverse plant production and kept small herds of cattle or swine, less frequently sheep. The results of the research show that nowadays in the area of Konecko-Lopusznianski Nature Park, farming has been abandoned in ca. 25% of agricultural land, of which 23.3% are grasslands (tab. 1). Also in the communes/municipalities in the buffer zone of the Swietokrzyski National Park, the ratio of abandoned farming is respectively 18.6% and 20%. The lowest percent of abandoned farming was noted in the municipalities with relatively good soils, that are located in the Nadnidzianski Landscape Park. Moreover, agriculture in K.-L.

Nature Park is notable on the account of the highest proportion of extensified agricultural land (48.3%), and farming there is done with minimum expenditure on yield-forming agents. Such extensification may lead to its extreme form, which is abandoning agricultural production, and that is a serious threat to the existing seminatural habitats related to agriculture. As compared to two other analyzed protected areas, this one also includes the most livestock-free farms (62.8%) and those existing only formally, "on paper", but not involved in any agricultural production. This means agricultural land use is abandoned, the land is leased for consideration or for free. In the other two areas the situation is better as regards agricultural activities. The proportion of livestock-free farms is rather high, respectively: 53.4% for the buffer zone and 48.5% for the N LP.

Table 1: Selected characteristics of regression in the agricultural production in three different conservation areas

No.	Specification	Buffer zone of S NP	K-L NP	N LP
1.	Proportion of abandoned agricultural land (%), of which abandoned grassland (%)	18.6 20.0	25.0 23.3	14.3 12.2
2.	Proportion of extensified agricultural land (%)	31.4	48.3	22.8
3.	Proportion of farms that fallow part of the land (%)	21.4	30.6	11.6
4.	Proportion of livestock-free farms (%)	53.4	62.8	48.5
5.	Proportion of farms existing only "on paper" (%)	14.3	17.8	9.6

Threats related to the maintenance of agricultural land use come from the condition and perspectives of the individual farms. The analyses conducted in the communes show considerable differences between the three areas in this respect (tab. 2). The results show that the smallest proportion of developing farms (A) is observed in the buffer zone (11.4%), and in the communes/municipalities of the Konecko-Lopusznianski Nature Park (K.-L NP) (12.8%). The situation is much better in the Nadnidzianski Landscape Park (N LP) (29.8%). Moreover, the proportion of farms with traces of development (B) is similar. The proportion of such farms ranges from 25.8% in K.-L NP to 31% in the buffer zone of Swietokrzyski National Park (S NP). The proportion of farms in recession (C), but maintaining usually extensified field production and, sometimes also livestock, is slightly higher. Their significance is great, because together with farms showing traces of development, they constitute 60-70% of the total number of farms in the studied region. They are therefore decisive in sustaining the agricultural use of fields and using grasslands for fodder. Still, their small size and marginal income from agricultural production as compare to the general income of the whole households are a bad perspective for the future maintenance of the production (Skotarczak and Blaszke 2019).

Table 2: Estimated proportion of four categories of farms regarding condition and development in the conservation areas in the Swietokrzyskie Voivodeship

No.	Specification	Buffer zone of S NP	K-L NP	N LP
1.	(A) developing farms (%)	11.4	12.8	29.8
2.	(B) potentially developing farms (%)	31.0	25.8	26.0
3.	(C) farms in recession (%)	39.7	33.1	32.5
4.	(D) declining farms (%)	17.9	28.3	11.7

More detailed analyses allowed to define the advancement of deagrarisation. Such process of production and spatial abandoning of land use is highly advanced in all three conservation areas. This is particularly intensified in the communes located in the northern part of K-L NP, where deagrarisation advancement is > 0.372. The next four municipalities of that area, situated more to the south, characterize of a slightly lower deagrarisation process (fig.2).

In the buffer zone of the S NP very advanced deagrarisation process refers only to one commune, and andvancement of that process was also confirmed for four other. Only in the commune located in the centre of that buffer zone, deagrarisation was at its lowest > 0,147, although still existent. Agricultural land in the buffer zone is rather varied as regards its use and management. The common denominator is progressing deagrarisation and extensification of production, with regard to both plants and livestock. In the northern part of the buffer zone there are mines, but next to them we will observe typically agricultural land. Generally, in the buffer zone of that national park, human impact on the environment is evident. In the N LP deagrarisation process is from advanced to rather low (poorly advanced). Intermediate level (0,147-0,230) is observed in three communes and low level (> 0,147) in another four communes.

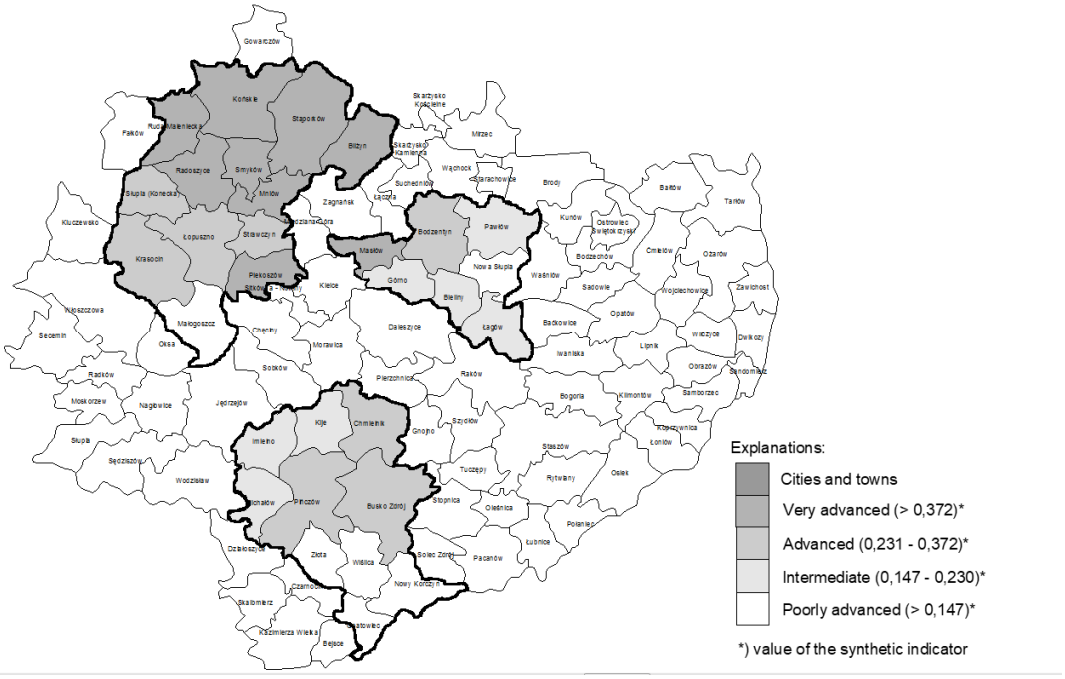

Fig. 2: Synthetic evaluation of deagrarisation process in rural and municipal communes of the selected conservation areas

Just like deagrarisation, deanimalisation is the strongest in Konecko-Lopusznianski Nature Park (fig. 3). It is very advanced in four of its communes, but in the next five it is advanced. In the buffer zone of the national park, two municipalities have advanced deanimalisation, four other intermediate and in one this process is poorly advanced. In the Nadnidzianski Landscape Park deanimalisation process is the least advanced comparing to the two other areas. It is there either intermediate (4 communes) of poorly advanced (6 communes). However, poor advancement of deanimalisation, although definitely good for the maintenance of biodiversity, seems only temporary in this area, as compared to others. Deagrarianization and deanimalization related to agricultural production may be analysed based on the symptoms or consequences with reference to production and management of agricultural space. Production deagrarianization is therefore a sphere whose common denominator includes various conditions or declining farms. It involves a progressive reduction of the productivity of the farms, and a consequent resignation from agricultural production, fallowing, extensification of production and often only formal sustenance in order to receive EU funds. It may also involve a gradual decrease in the size of cultivated land and agricultural production. It also involves an increase in the proportion of livestock-free farms or farms which keep animals only to meet the needs of their own household (Musiał and Musiał 2019).

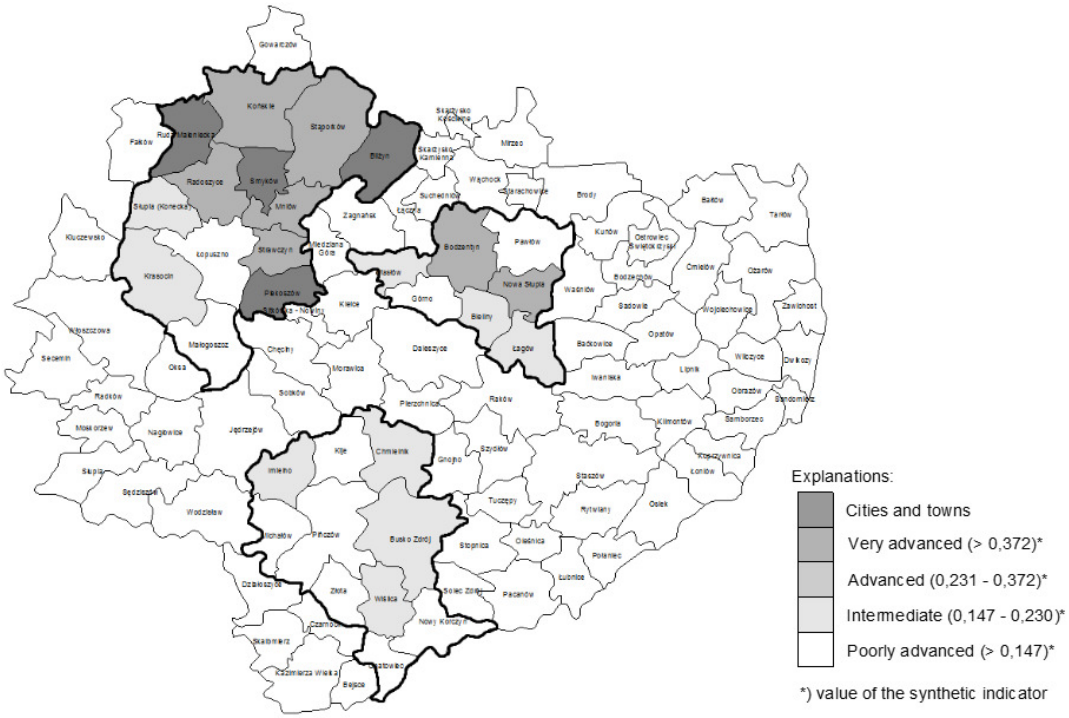

Fig. 3: Synthetic evaluation of deanimalisation process in rural and municipal communes of the selected conservation areas

After 1989, when Poland shifted from centrally managed to market economy, and especially after the integration with the EU in 2004., there has been noted a gradual change in the macroeconomic conditions for agricultural production. As a result, small-scale animal production became unprofitable, which resulted in people abandoning the breeding of cattle in small herds of 1-5 animals (Musiał and Musiał 2018). Nowadays, in some regions lack of ruminants in the farms or nearby, result in abandoning grasslands. This means part of meadows and pastures is no longer grazed, which leads to the gradual transformation of such seminatural plant associations (Niznikowski et al. 2017). Since the analysis concerns conservation areas, grazing seems especially important, as it is included as one of the protective action plans aimed at preserving the biodiversity of seminatural plant associations (Tscharntke et al. 2005).

The ecological results of deagrarisation and deanimalisation, are gradual changes of the plant associations from seminatural meadows and pastures (*Molinio-Arrhenathretea* class) into various associations of shrubbery and finally into forest (*Querco-Fagetea* class) (Matuszkiewicz 2014). In those communes where deagrarisation is highly advanced, field production is abandoned and no agricultural activities are performed on grasslands. This threatens mainly the most sensitive components of the local flora, which also happen to be rare species, mentioned in Polish Red Lists (Mirek et al. 2006). The poorest advancement of that two processes in the Nadnidzianski Landscape Park, can be lined with existing there the richest biodiversity of seminatural grasslands, comparing to the other two conservation areas. The number of plant species in the releves were on average in N LP 45-53, while in the K.-L NP it was respectively 28-31, and in the buffer zone of S NP 34-37. Moreover, in N LP there were noted also very unique plant species, from the red lists, as e.g.: *Adonis vernalis*, *Arabis recta, Elymus hispidus, Linum hirsutum*, *Stipa capillata, Thymus kosteleckyanus and Scorzonera purpurea.*

The area of Nadnidzianski Landscape Park is nowadays considerably deforested, that promoted the growth of xerothermic plants, which grow on hills, on the calcareous soils. Such xerothermic plant species are phytosociologically classified as *Festuco-Brometea*, that is characterized by plant species that are considered to be relic, and come from the period when steppe was naturally spreading over large areas of the continent (Matuszkiewicz 2014). What is more, they shape the mosaic of local landscape, next to meadows and patches of

schrubs (Solon 2002). Abandoning agricultural production, especially in this region, may entail serious losses for plant diversity, especially with regard to the xerothermic plants. This is related to the actual loss of space and a threat of further loss of the biodiversity of various seminatural habitats, which need grazing by ruminants in order to survive. That is actually the result of how structure of landscaped and type of the management is directly linked with the biodiversity (Groberek et al. 2004; Billeter et al. 2007; Niznikowski et al. 2017). That's why when creating a new, specific form of nature conservation, there is a need to guarantee proper conditions for this protection, but also account for other aspects: economic, social and cultural (Skotarczak and Blaszke 2019).

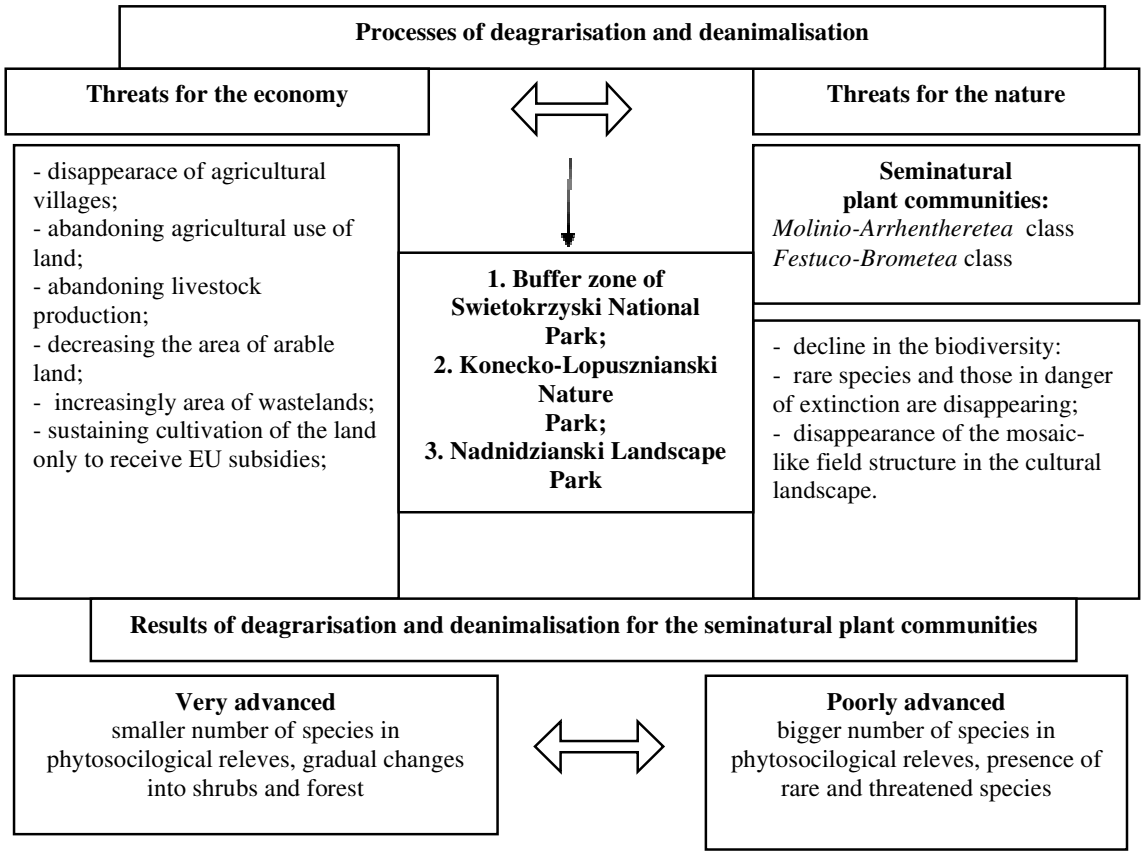

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Fig.4: Relationship between landscape management, its structure and biodiversity, in selected conservation areas of the Swiętokrzyskie Region

Areas of conservation have existed in Swiętokrzyskie Region since the 1950s of the XX century. The first established area and at the same time the most significant was the Swietokrzyski National Park in 1950 (Nature Conservation Act of 16.04.2004 - Art. 8 and 9). From among the analysed areas, the Nadnidzianski Landscape Park was established a bit later, in 1986, while Konecko-Lopusznianski Nature Park is definitely the most recent addition (1995). It seems interesting that at the moment, the Swietokrzyskie Voivodeship has the largest proportion of conservation areas in Poland, as they constitute 65% of the total area. Extensive grazing in the communities from the phytosociological classes *Molinio-Arrhentheretea* and *Festuco-Brometea* is necessary there to maintain the appriopriate species composition and the existence of rare vascular plants. This is also why it is constantly necessary to define areas of nature conservation, so as to maintain extensive use of such plant communities, where possible, by mowing and grazing (Duelli and Obrist 2003). Therefore, the role of local landscape structure in the vegetation composition and the advancement of deagrarisation are related to each other and may shape the threats both for the regional economy and nature (Aavik et al. 2008).

Summary

The most evolutive farms and the fewest livestock-free farms are observed in the municipalities in the Nadnidzianski Landscape Park. It is a good tendency from the point of view of nature conservation, in this area with precious seminatural plant communities, whose existence depends on extensive grazing. However, in many places of the analysed area, the fragmentation of agricultural parcels and increasing tendency to abandon breeding livestock in small herds are a serious threat to the advancement of deagrarisation and indirectly also deanimalisation. This process first appears in the areas with poor soils and in urbanised areas or in places with the easy access to cities, where people can easily find a job outside the agricultural sector. However, if these processes are occurring in typically agricultural areas, they may be regarded as particularly negative, both economically and socially. In protected areas the regression of agriculture also entail a serious threat to biodiversity. This refers in particular to various grassland types, because in Polish climate they are seminatural communities. This means when left unattended, such communities will spontaneously turn into forest communities. It seems that abandonment is the most serious threat for communities growing on poor soils, near forests and for those regarded as too weak to be used, but at the same time possessing unique natural values, such as xerothermic grasslands. Farmers from these areas often use means of support analyzed in the first pillar of the CAP, but they are unwilling to engage in agricultural, environmental and climate-related actions, because they believe the bureaucracy and substantive requirements are too high. Farms with advanced level of extensification of agricultural production may stop advancement of deagrarisation by switching to organic farming. Also combining direct payments related to permanent grasslands with the obligation to keep ruminants and maintain grazing there may considerably slow down the deanimalisation and the related loss of biodiversity of the agroecosystems.

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The Role of Stock Prices Cycles in Forecasting Inflation in Nigeria

Emeka UCHEAGA
Covenant University Ota, Nigeria, emekaucheaga@gmail.com

Alexander OMANKHANLEN
Covenant University, Ota, Nigeria, alexander.omankhanlen@covenantuniversity.edu.ng

Felicia OLOKOYO
Covenant University, Ota, Nigeria, felicia.olokoyo@covenantuniversity.edu.ng

Areghan ISIBOR
Covenant University, Ota, Nigeria, areghan.isibor@covenantuniversity.edu.ng

Benjamin EHIKIOYA
Covenant University, Ota, Nigeria, Benjamin.ehikioya@covenantuniversity.edu.ng

Abstract

The trend of inflation in Nigeria has been startling and there was relatively little knowledge of how volatility in stock market prices could influence future inflation in Nigeria. The objective of this study is to determine how inflation trends could be explained by stock market booms and burst. To achieve the stated objective, the study applied the Hodrick-Prescott Filter and Contemporaneous Correlation test on secondary dataset for Nigeria from 1985-2017. The secondary dataset were gathered from the Central Bank of Nigeria statistical bulletin and the Nigerian Bureau of Statistics Annual Statistical Report. Variables relevant to the objective of the study like CPI (consumer price index or inflation) and MCAP/GDP (stock market capitalization to GDP) were analyzed. Findings from the Contemporaneous Correlation test revealed that there is a countercyclical relationship between stock prices and inflation rate. This means that changes in inflation rate happen after changes or fluctuations in stock prices. The Hodrick-Prescott Filter confirmed this finding by showing that this relationship between stock prices and inflation is evident in the past behaviour of inflation and stock prices. This implies that inflation tends to rise when stock prices are falling and inflation falls when stock prices are rising. The study hence, recommends that policies that extend the stock market cycles should be adopted as it has been proven to reduce the inflation rate significantly.

Keywords: Inflation; Stock prices; Hodrick-Prescott; Volatility; Stock Prices Cycles

Introduction

In the early 1960s, household wealth in Nigeria was held majorly in liquid form as stock market at the time was relatively new after launching in 1961 with just 19 publicly listed companies. A typical household wealth portfolio had almost no exposure to the stock market as stock market liquidity was low and the terrain unfamiliar to the then unsophisticated investors. During this period, household spending could be generally tied to a stable labour and investment income with inflation generally under control. Average inflation between 1960 and 1969 was just 3.4 percent (World Bank, 2018).

As investors became savvier, more money poured into the stock market and by 1985, the proportion of stock market capitalization to total money supply in the country had moved from less than 1 percent to almost 12 percent in 1986 and households began to hold some portion of their wealth in the stock market (Central Bank of Nigeria - CBN, 2017). Prior to the mid-1990s, all investments in the stock market were held by Nigerians and it was not until 1995 that foreign investors were permitted to invest in the local stock market. As at year end 2018, Nigerian households still controlled up to 49.13 percent of investments in the stock market, showing that a significant portion of household wealth in Nigeria

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remains in the stock market (Onyema, 2018; Okunlola, Babajide, and Isibor (2020). As households began to invest in stock market, their investment income and wealth began to become more volatile and this might have created substantial effects on their spending behaviour and inflationary economic pressure (Nwosa, 2017).

Between 1985 and 2007, proportions of stock market capitalization to total money supply in the economy had risen from 12 percent to 199 percent (CBN, 2017). In 2006, for the first time, there was more money in stock market than was circulating in the economy as stock market capitalization to money supply surpassed 100 percent for the first time, reaching 111 percent (CBN, 2017). As more money left the pockets of households and poured into the stock market, the spending pattern of households was completely altered, and inflation became more volatile.

Since 1985, the inflationary problem in Nigeria has been quite startling. In the 32-year period between 1985 and 2017, Nigeria suffered double digit inflation in 24 out of the 33 observations which led to a severe erosion of the value of Naira in the last 3 decades according to data compiled from CBN Statistical Bulletin (2017). CBN on numerous occasions has tried to use monetary policy to control inflation volatility in the country with little success. The singular inflation objective for CBN during the past 3 decades has always remained to achieve single digit inflation in the country. However, this was only a reality in just 9 of the 33 inflation observations, translating to a low probability chance of 27.2 percent that CBN will achieve single digit inflation in Nigeria in any given year (CBN, 2017). Average inflation during the 32-year period was as high as 19.9 percent, up to 11 percentage point higher than the current single-digit target band of 6-9 percent that Central bank is currently seeking to achieve (CBN, 2018). An obvious challenge CBN has struggled with in the last 32 years is understanding inflation dynamics enough to predict its direction and use monetary policy to steer inflation closer to its monetary goal. In the last 3 decades, disparities between CBN inflation target and actual inflation in Nigeria exceeded 100 basis points in 30 out of 33 observations, translating to 91 percent chance that CBN will fail to achieve its monetary inflation target annually (CBN, 2017).

Stock and Watson (2016) explained that the positive relationship that exists between equity yields and expected inflation arises because current stock prices are valued using forward-looking economic variables which include expected inflation. Therefore, the stock prices themselves could be useful in determining the consensus view on future inflation and economic growth since future inflation and economic growth expectation was modelled into the current stock price by the aggregate market (Apergis, 2017; Achugamonu, Adegbite, Omankhanlen, Okoye, and Isibor, 2019). Farmer (2015) stated that the idea that stock prices can provide useful guidance in forecasting macroeconomic variables has long been established in literature and evidenced in reality. For instance, in 2007, inflation in Nigeria fell below 7 percent, making it the lowest inflation rate on record in over 7 years at the same time the stock market was breaking record highs (CBN, 2018). We can roughly deduce that higher stock prices led households to invest more in the stock market, which eventually reduced inflationary pressure in the economy. However, data compiled from CBN (2018) showed that the following year in 2008 when the stock market collapsed, households became net sellers in the stock market and inflation began to trend upwards again, moving from 6.5 percent in 2007 to 15.1 percent in 2008.

This study contributes significantly to the body of knowledge in monetary economics, asset pricing and market forecasts by showing how one could use stock prices cycles in forecasting inflation in Nigeria. Before now, there was relatively little knowledge of how volatility in stock market prices could influence future inflation in Nigeria or how inflation trends could be explained by stock market booms and burst.

The purpose of the study is therefore to help economists and financial analysts have another better way of forecasting inflation in Nigeria through the use of stock market cycles. By this method, one way of dealing with high inflation in Nigeria would be to examine the stock prices. This would then help in regulating both the stock market prices and also inflation in the nation.

The study's objective is to determine the cyclical relationship that exists between stock prices and inflation in Nigeria. The study introduced the subject matter plus the objectives and significance of the study in the first section which is the introduction. Section two presents a detailed appraisal of pertinent empirical literatures. It also explained the theoretical framework behind the subject matter, and it finally revealed the gaps the study wants to fill. Section three constitutes the methodological outlook to analysing data gathered for the study. Section four contains the data and result presentation while section five presents the conclusion and recommendations proffered.

Literature Review

Most related literary texts begin from defining inflation as persistent rise of prices, which causes four possible challenges, whose austerity relies greatly on anticipations of such inflation (Ball, 2017; Benabou, 1991; Imrohoroglu, 1992). The first and maybe greatest apparent issue is that inflation erodes monetary value, thus constituting tax on sums of money (Antinolfi, Azariadis & Bullard, 2016; Friedman, 2016). So, individuals end up holding lesser real money compared to if inflation was absent, yielding unsatisfactory effects. Numerous works tried to measure corresponding consequential welfare loss by using money demand function and evaluating the portion occupied by inflation beneath the curve. Also, a moderate swift reduction in money's value would exert more consequences for money-spenders, who must complete extra journey to banks to refill their preferred nominal money volume so as to be at par with higher prices (Sieroń, 2019; Omolade & Mukolu, 2018; Isibor, Olokoyo, Arogundade, Osuma, and Ndigwe, 2018).

Farmer (2015) found that the housing bubble burst which led to a stock market decline in 2008 was the primary reason for the great recession that followed between 2008 and 2009. He established a granger causal relationship between stock market and unemployment rate in America, as high unemployment rate was an after-effect of the great recession. After showing that stock prices granger causes unemployment rate in America, the study went on to show via Vector Error Correction Model (VECM), that absence of monetary intervention by Central Bank, a significant crash in stock prices could cause a spike in unemployment rate over the next one to four quarters. Empirically, higher unemployment in a country could lead to an economic recession which is only the occurrence of two consecutive quarterly declined in economic output. This phenomenon may explain the occurrence of the great recession in 2008 when unemployment figure almost doubled, and the country entered its biggest recession following the 1930s great depression. Notwithstanding, this study was restricted to unemployment and stock market with no mention of inflation or other key macroeconomic variables. Moreover, the empirical findings were limited to America, and thereby, not necessarily applicable to Nigeria.

Also, Farmer (2012) had shown that alterations in stock market wealth could likewise emanate in different unemployment rate. Since a change in household wealth could engender variations in quantity of aggregate demand which then makes labour to be hired (or retrenched) in order tomeet increase (or decrease) production levels to match effective demand. Evidence of the link between stock market wealth and unemployment was extensively discussed in Sibande, Gupta, and Wohar (2018). The paper cited numerous examples where empirical literature provided proof that growth in stock market capitalization is typically accompanied by growth in employment rate in America and in Europe.

Formerly termed 'shoe-leather' costs, illustrating further treks to banks, could be more recently called 'banking-transaction' costs. Such journey to banks will be unnecessary when inflation does not exist, hence depicting an expense forced by it (Ashraf, Gershman & Howitt, 2016). Secondly, inflation adversely redistributes wealth from creditors to debtors (Auclert, 2019). If greater prices are unforeseen, borrowers would repay nominal debts in real dollars which are subsequently less valuable. Unpredicted inflation lessens debtors' weight and endangers lenders. It may be argued that this is not necessarily an inflationary cost since it is transferable rather than a net loss. Nonetheless, continual price hike (especially with varying and erratic rates) might make lenders minimise total credit volume supplied, hence depicting real loss compared to monetary balance in a nation (Haberler, 2017).

Thirdly, inflation compels sellers to incur extra inputs to survive rapidly fluctuating prices. These 'menu costs' will alter directly with adaptations in inflation. Quicker increases in prices will force merchants to rapidly modify price levels. Duration used to recount inventories, or re-configurate computers, shows problems imposed by inflation. It is important to recognise that such consequences still prevail even with impeccably foreseen inflation. Rectifying prices immediately from past equilibrium numbers to post-inflation values yet incorporates resource expenditures (Shimer, 2017; Janssen, 2016). All three issues all link to evolution in overall price

The fourth trouble involves mannerism by which alterations in prices may influence dispersal of comparative prices economically. Perhaps inflation just affects nominal prices, and leaves relative prices untouched; all identified costs would still apply. But if it goes beyond to impact relative price levels, then, resources would be misappropriated as some comparative prices will shift from equilibrium point (Nakamura, Steinsson, Sun &Villar, 2018). An avenue of differentiation is that the initial three consequences may merely place a country at a fresh steady state with less general welfare. Whereas, the last challenge could result in total displacement from equilibrium aside aggregate welfare forfeiture.

Theoretical Framework

The observed counter cyclical relationship between stock prices and inflation could be based on Tversky and Kahneman's recency bias theory (1974) which is greatly essential in understanding the household behaviour in financial markets. The recency bias theory postulates that high probabilities are assigned to events that have occurred recently, such that, when stock prices go up, investors tend to believe that it will continually increase for a prolonged time period and vice versa. When investors put more resources in the stock market to reap greater rewards, there are fewer funds available for consumer spending, hence, lower inflation. Likewise, when stock prices are declining, recency bias makes investors to think that such decline would prevail for an extended duration, thereby causing them to typically oversell their shares. This would lead to more funds available at hand, which then increases is spending on discretionary products that in turn trigger demand pull inflation.

The summary of the theory is that more funds in the stock market for investment purposes would lead to low inflation (since it is assumed that there would be less funds flowing in the economy) while less funds would lead to high inflation (since it is assumed that there would be more funds flowing in the economy). This shows the relationship between stock market and inflation based on the theory.

Gaps in Literature

The study observed that although many literatures relied upon quantity theory of money in designing a theoretical framework, many of the studies including the local ones designed empirical models that omitted the arguments of Friedman (1989) that it is not the growth in money supply in itself that is bad for inflation, rather, it is surplus growth in money supply over and beyond growth in real output that causes inflation. This means that money supply, credit or even market capitalization cannot be taken as nominal variables in explaining inflation, rather it is the ratios of the money supply to gross domestic product and similar other variables that may be more useful in predicting future inflation.

Also, the study found that while most of the empirical works in literature showed that money supply can be effectively used to forecast variations in inflation. Very few empirical works have gone beyond developing models to show that stock prices could be useful in forecasting future inflation. Mostly, these literatures speak about a theoretical connection of how asset prices could impact inflation, but many failed to test this theory empirically. This study will build a VAR model to show the predictive strength of stock market capitalization as a useful economic variable in forecasting inflation. The models would be useful in building an improved monetary policy framework that achieves better results in inflation targeting in Nigeria and in other developing world economies.

Methodology

This study adopts the monetary transmission mechanism framework proposed by Olufisayo (2013) wherein inflation could be determined by variations in monetary variables such as money supply, credit, interest rates, exchange rates and asset prices. Theoretically, movement in inflation is stimulated through the monetary transmission channel, as changes in any of the monetary variables holding others constant can lead to variations in inflation. However, economists differ in the weight or importance placed on any of the monetary variable to independently explain changes in inflation as their influence on inflation tends to evolve over time and differ among countries.

According to Olufisayo (2013), the monetary transmission mechanism is the process through which monetary policy decisions are transmitted into changes in inflation and real GDP over time. For the purpose of this empirical analysis, the influence of monetary policy decisions that leads to changes in inflation will be the core focus as we seek to determine the extent to which variation in asset prices (particularly, stock prices) is useful in predicting changes in inflation over time in Nigeria. The study expects that including stock prices into the econometric model will help explain changes in inflation not only from a money market perspective which focusses heavily on changes in money supply but also from a capital market perspective which includes performance of the capital market which impacts on the investment income of households.

Model Specification

The model stated below is specified based on framework for monetary policy transmission mechanism as stated in Taylor (1995). However, the model introduces a modified version of Taylor (1995) which adapts the inclusion of Asab and Al-Tarawneh (2020) in representation of stock prices evolution over time as stock market capitalization to GDP which analyses the excess of the growth in value of equities over and above the expansion in gross domestic product (GDP). Therefore, the restated explicit model is as follows:

$$\text{CPI}t = \beta_0 + \beta_1 \text{ MCAP/GDP}t + \mu t \quad \ldots\ldots (3)$$

Where: CPI represents the consumer price index or inflation; MCAP/GDP represents the stock market capitalization to GDP; β_0 represents constant or intercept term, β_1 represents regression coefficients or slope; μtrepresents the error term or residual.

CPI: The consumer price index (CPI) is considered as the rate of inflation in this study. The adoption of the CPI is necessary since it is the rate of inflation that tracks changes in the general prices of consumer goods and services to which households make their economic and financial decisions. The monetary policy in Nigeria is targeted at controlling the rise in CPI to ensure price stability in the country and encourage rapid economic growth. While there are other measures for inflation, the CPI or headline inflation are the main rates of inflation that is tracked by the monetary authorities, economists, analysts, businesses and households for financial decision making. Changes in CPI will typical draw some form of monetary policy response much more than any other inflation metric in Nigeria.

MCAP/GDP: A significant portion of the wealth of households in the country is invested in the capital market to earn investors some investment income to cover future household spending. However, behavioural economics show that households spending behaviour is altered from the traditional Keynesian theory of income as households typically invest during period of rallying stock prices and sell during periods of declining stock prices such that they are unable to increase consumption due to wealth earned from the rallying market since they continued to invest funds during that period. Typically, when stock prices decline, they sell their securities and will typical increases purchases in consumer goods rather than financial assets during periods of significant stock price declines. In Nigeria, the total market capitalization accounts for more than 50 percent of the total money supply (Omolade & Ngalawa, 2016). If money supply is to be considered critical to predict variations in interest rate, the size of households' wealth in the stock market could also provide inflation guidance since households can easily sell stocks to increase their income during periods when they choose to consume more and invest more of their labour income in the stock market during periods when they chose to save more and consume less. This investment behaviour has implications for consumer price inflation and must therefore be assessed as a possible statistically significant predictor of inflation. However, the study will use proportion of the market capitalization to gross domestic product to measure the influence of the market on inflation like the analysis done for money supply since both serve similar purposes as a store of wealth for households. To which if the size of market capitalization to total output changes in the economy, it could have serious implications for inflation expectation for Central Banks and households.

Technique of Estimation

Hodrick Prescott Filter and Contemporaneous Correlation Test

The HP filter is a univariate detrending technique used to determine the cyclical characteristics of a macroeconomic indicator. According to Laubach and Williams (2016), the HP filter can be used to ascertain the interest rate gap by determining the natural rate of interest based on the cyclical trends of MRI. This process begins by taking the unit root test to ascertain stationarity of monetary variable. This is followed up by utilising HP filter is used to obtain cyclical component from trend component of time series data. Cyclical component is then studied to determine frequency of cycles, the length of cycles and to examine that rarity of unusual deviation of the variable from its trend during periods. If the cyclical component of the interest rate moves above or below its trend, we can assume that the difference is the interest rate gap.

Data and Variable sources

The variables for this study include: consumer price index (CPI) and money supply to real gross domestic product (M2/GDP). The time series data which are secondary in nature covers the period from 1985-2017. The secondary dataset were gathered from the Central Bank of Nigeria statistical bulletin and the Nigerian Bureau of Statistics Annual Statistical Report.

Findings

Pattern of Inflation in Nigeria

We observed from Figure 1 above that inflation has been trending downwards over the years. Average inflation between 1985 and 2018 was 19.7 percent. Inflation peaked at 76.8 percent in 1994 and hit a record low of 0.2 percent in 1999. Based on findings, inflation was below trend between 1985 and 1987, averaging 8.1 percent before rising significantly above trend between 1988 and 1989 during which the average inflation was 52.9 percent. By 1990, the dip in inflation to around 3.6 percent put inflation below trend. In the years between 1992 and 1995, inflation was back once again above trend, averaging 59.6 percent. Between 1996 and 2002, inflation remained below trend, averaging 11.4 percent inflation rate as inflation management improved in the country. The years between 1985 and 2002 were the most volatile inflation periods in Nigerian history as average inflation was 26.4 percent compared to average inflation of just 12.1 percent between 2003 and 2018. Since 2008, inflation movement has closely followed its trend although it stayed slightly above between 2016 and 2018 as a spike in exchange rate in 2016 caused inflation to jump to its highest level in 13 years.

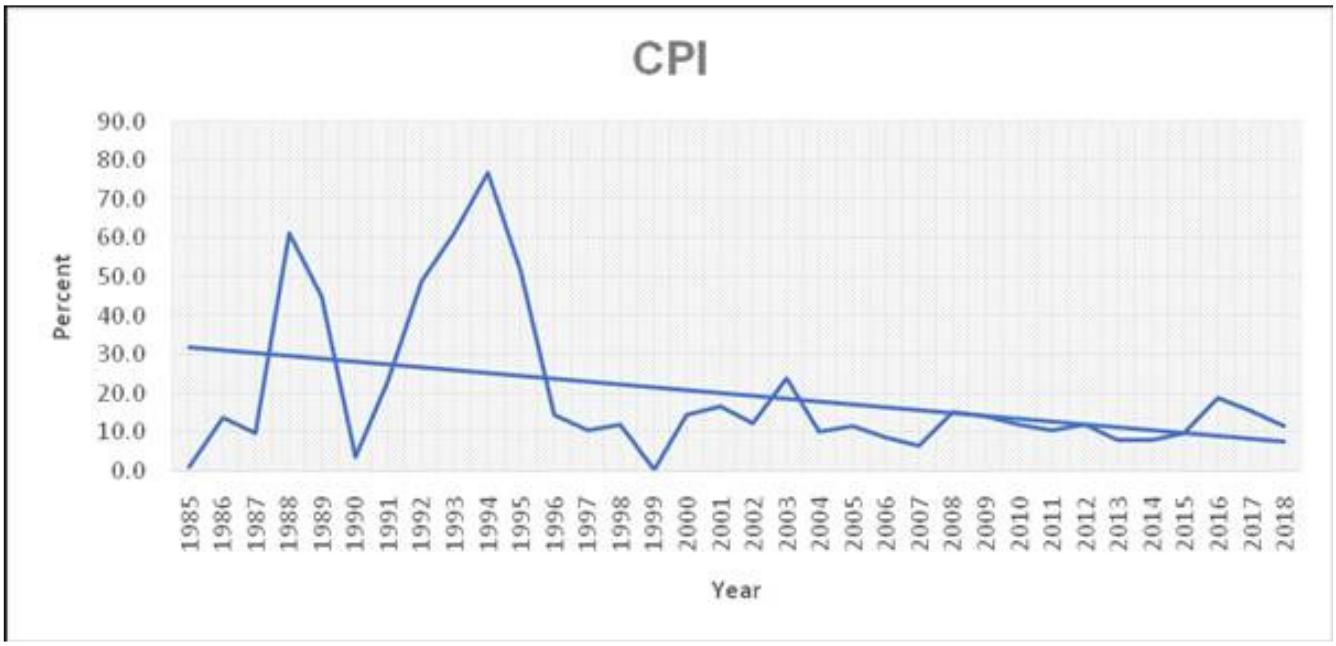

Figure 1: Consumer Price Index (CPI) Pattern in Nigeria

In the years before year 2000, average inflation in Nigeria was 28.8 percent compared to 12.5 percent between year 2000 and 2018. The lowest rate of inflation in before year 2000 was 0.2 percent in 1999, compared to the years after 2000 when the lowest rate of inflation on record is 6.6 percent achieved in 2007. Highest rate of inflation in a single year before the turn of the millennium was 76.8 percent in 1994 compared to 23.8 percent in 2003. Generally, inflation management has improved in the country, inflation continues to trend downwards after its volatile years in the 1990s but with inflation rate still above the single digit target in post 2000 years, it is necessary to understand the factors that led to a downward trend in inflation in order to increase attention to those economic variables to ensure that the achievement of price stability in Nigeria becomes a reality.

When the researcher tracked inflation performance on an annual basis, it was rather easy to establish that inflation in Nigeria has been a persistent problem and price stability in the country which the researcher defined as inflation within

the 0-2 percent band was only achieved in twice throughout the 33-year period, the periods were 1985 and 1999. In 1985, inflation was just 1 percent before the introduction of the failed Structural Adjustment Programme (SAP) in Nigeria, which was a World Bank backed market reform that allowed the Central Bank of Nigeria to move from a system of fixed interest rate and exchange rate to a more market determined interest rate and exchange rate market. Poor implementation of SAP under the military rule caused inflation to spiral out of control as prices rose sharply due to exchange rate induced inflation at the time.

The following year in 1986, inflation rose to 13.7 percent before reducing to 9.7 percent. SAP's target for inflation was an average of 9 percent and it looked like SAP was working at the time. But the initial disinflation didn't last long as series of devaluation and rising interest rate began to have an impact on the inflation rate in the country. By 1987, inflation rate had reached a then record of 61.2 percent before reducing to 44.7 percent the following year. 1990 seemed like the odd year in the decade between 1986 and 1996 as this was the only year inflation fell to single digit. In 1990, a short-lived macroeconomic stability helped suppress inflation to just 3.6 percent, its lowest level since 1985. However, the following year, inflation jumped once again to 23 percent before doubling to 48.8 percent in 1992. For the third consecutive year, inflation rose again, reaching a new record of 61.3 percent. Nigerians had begun to lose confidence in the Naira and there was a wide scavenge to hold foreign currency to preserve household wealth even though holding foreign currency in the country was considered illegal at the time.

By 1994, CBN had decided to temporarily move back to a fixed exchange rate and interest rate system as inflation rate had completely moved out of hand, reaching a new high of 76.8 percent in 1994. Till date, 76.8 percent remains the highest rate of inflation experienced in the country. By 1994, SAP was already considered a failure as it failed to bring inflation under control to its target of 9 percent. Average inflation rate between 1986 and 1994 was 38.1 percent. In the 9-year period between 1985 and 1994, inflation had moved from just 1 percent to 76.8 percent, showing that there was a deep price instability crisis in Nigeria. The move to fixed interest rate brought about instant reward, inflation began to trend downwards almost immediately. In 1995, inflation dropped to 51.6 percent and by 1996, inflation had reduced to 14.3 percent. CBN became more confident that the economy was now much ready to receive a flexible interest rate but held exchange rate fixed until 1998.

In 1997, inflation had dropped further to 10.2 percent, showing that the Central Bank had made the right decision. With oil prices now rising through the 1990s, government finances had become more stable and macroeconomic stability was restored in the economy. In 1998, inflation rose modestly to 11.9 percent. 1999 was a year not just for the move to democratic rule in Nigeria but the year when the country experienced its biggest exchange rate devaluation in history. However, inflation rate fell to its lowest on record, Nigeria experienced 0.2 percent inflation in 1999, and for the first-time prices were perfectly stable over a one-year period. This spelt the end of the worst period of inflationary pressure in the country's history as inflation which average 35.9 percent between 1985 and 1995 was gone for good. Since 1995, inflation in Nigeria has not exceeded 23.8 percent, showing that inflation management in the country has improved since its worst period in the early 1990s but since the turn of the millennium, the Central Bank has still not been able to achieve price stability as inflation has failed to fall under the 2 percent price stability benchmark since 1999.

The lowest rate of inflation in the country since year 2000 was achieved in 2007 when inflation fell to 6.6 percent during the mature stage of Nigeria's first economic bubble which burst the following year. Average inflation in Nigeria between 2000 and 2018 was 12.5 percent, above the Central Bank's single digit target and a long shot away from the price stability benchmark of 2 percent.

Contemporaneous Cross Correlation Test

To achieve study's objective which is to examine the short run relationship between stock prices cycles and inflation, this study employed the contemporaneous correlation test. The Market capitalization (MCAP) is used to represent stock price while Inflation rate is represented by the Consumer Price Index (CPI). To address the objective, the business cycle approach used to separate the time series data into cycles and trends. This is achieved by employing a filtering procedure referred to as the Hodrick-Prescott (HP) (Alege et al., 2017; Agenor et al., 2000; and Kim et al., 2003). The process involved in carrying out this technique is as follows: The series will be transformed into their natural logarithm form; the stationary properties of the series will be tested; detrending the series by obtaining the cyclical element; obtaining the autocorrelation statistics and also the cross correlation of the series (Alege, 2008). A good business cycle filter is one that can eliminate unit roots, remove phase shift and also isolate business cycle frequencies (Baxter and King, 1999).

The HP filter is useful as it helps to account for volatility in the time series variables. Secondly, it can measure whether there is a change in the variable before or after the output changes and finally, the cross-correlation coefficient measures the contemporaneous correlation of a series with respect to another. This will ascertain if a series is pro-cyclical or countercyclical. Table 1 presents the contemporaneous correlation between stock market and Inflation. The results show that the degree of contemporaneous correlation between inflation and stock market is −0.0305 indicating a countercyclical relationship. This implies that inflation tends to rise when stock prices are falling and inflation falls when stock prices are rising. The cyclical patterns of stock market capitalisation ratio and inflation are shown in figure 1 and 2.

The cross correlation test can show which variable leads of lags the cycle. Therefore, it can reveal whether stock price is a leading or lagging indicator to inflation rate. When the maximum value of the cross correlation coefficient between stock price and inflation falls on the left hand side (lag), it means that stock price is the lagging indicator. On the other hand, if the maximum value of the cross correlation coefficient between stock price and inflation falls on the right hand side (lead), it means that stock price is the leading indicator. From table 1, the maximum cross correlation coefficient is 0.3723 suggesting that inflation lags stock prices. This means that changes in inflation rate happen after changes or fluctuations in stock prices.

Table 1: Contemporaneous correlation between Stock Market Capitalization and Inflation

CPI_CY, M2, MCAPCY(-i)	CPI_CY, M2, MCAPCY(+i)	i	lag	lead
. | . |	. | . |	0	-0.0305	-0.0305
. *| . |	. | . |	1	-0.0494	-0.0240
. | . |	. |**. |	2	-0.0169	0.1789
.**| . |	. |**** |	3	-0.1485	0.3723
.**| . |	. |**. |	4	-0.1845	0.1788

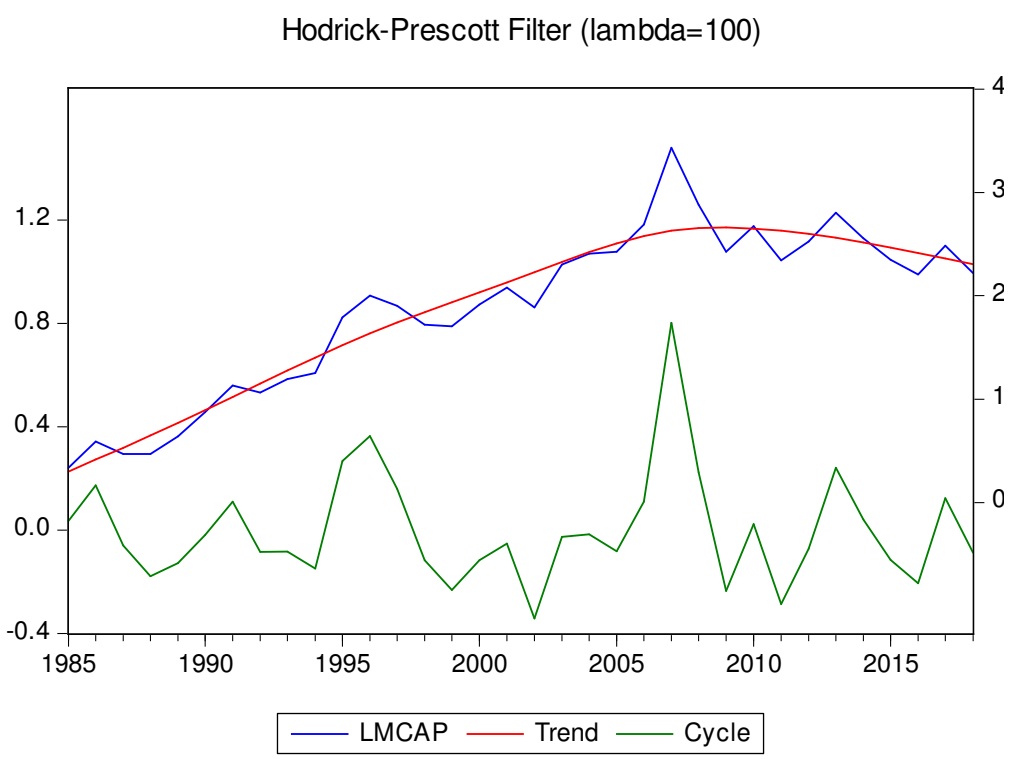

Figure2: Cyclical Pattern of Stock Market Capitalisation

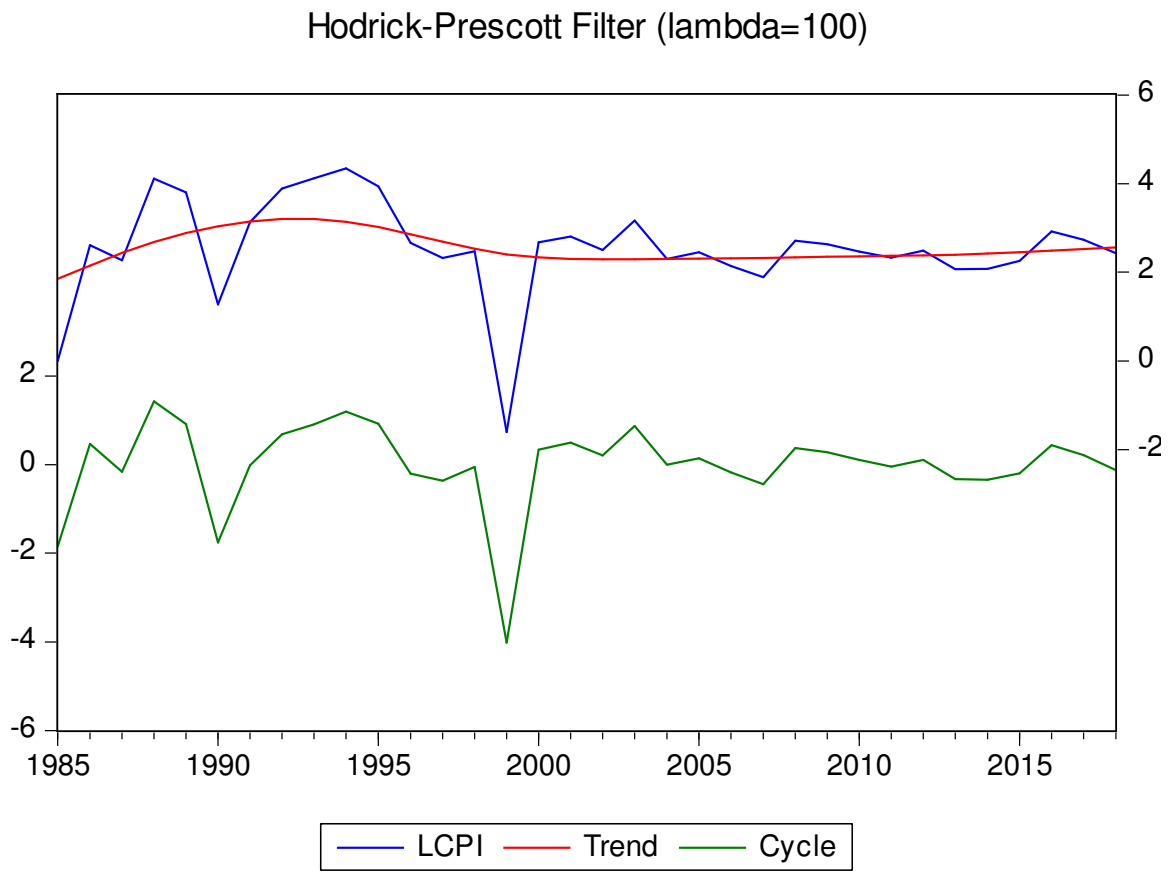

Figure 3: Cyclical Pattern of Consumer Price Index in Nigeria

Empirically, this relationship between stock prices and inflation is evident in the past behavior of inflation and stock prices. For instance, in 2007, inflation had fallen to about 6.6 percent its lowest point in almost a decade which corresponds with when stock prices were most elevated in Nigeria. Rising stock prices had pushed market capitalization to GDP to about 30.9 percent which is the highest value of market capitalization to GDP ever recorded in the history of Nigeria.This shows that higher stock prices led people to invest more in the stock market, which eventually reduced inflation. This result was confirmed by the study of Albulescu, Aubin and Goyeau (2017), Marx and Struweg (2015) and Fama (1981) where a countercyclical relationship was observed between Stock prices and Inflation rate.

Discussion of Result

The cross-correlation coefficient measures the contemporaneous correlation of a series with respect to another. This will ascertain if a series is pro-cyclical or countercyclical. The first objective of the study is to examine the cyclical relationship between stock prices and inflation. From the result shown in Table 1, it was observed that inflation tends to rise when stock prices are falling and inflation falls when stock prices are rising. A major explanation for the result is that investors would want to take advantage of rising stock prices to invest in the stock market and this would reduce inflation because any excess money in circulation will be used to increase investment positions rather than to increase consumption. However, when stock prices decline, most investors would quickly sell-off their securities and hold on to cash rather than invest. This could increase the money in circulation and result in higher inflation. This behaviour is consistent with Keynesian Liquidity preference where Keynes states that “the rate of interest at any time, being the reward for parting with liquidity, is measure of the unwillingness of those who possess money to part with their liquid control over it... It is the “price” which equilibrates the desire to hold wealth in the form of cash with the available quantity of cash (Bibow, 2005). Therefore, if the expected future return on investment is less than households’ desire, they will retreat to cash which could cause a problem of excess cash holdings and increased spending.

Summary

From the result of the contemporaneous correlation, the result provided evidence that there is a countercyclical relationship between stock prices and inflation rate. This implies that inflation tends to rise when stock prices are falling, and inflation falls when stock prices are rising. This therefore shows that stock prices is useful in forecasting inflation and market capitalization should be included in critical variables used in evaluating and forecasting inflation to achieve price stability.

Recommendation

1. The study, hence, recommends that policies that extend the stock market cycles should be adopted as it has been proven to reduce the inflation rate significantly.

2. Investments in stock market should be encouraged by the government to the public as a way of reducing inflation.

3. More investment instruments should be introduced into the stock market so as to generate more investments.

Contributions to Knowledge

1. The study contributes to the theoretical framework by confirming the recency bias theory that explains that when stock prices go up, investors tend to believe that it will continually increase for a prolonged time period and vice versa.

2. The study also adds to existing literature by using the Hodrick Prescott Filter and Contemporaneous Correlation Test to confirm the theoretical framework.

Study Limitations

1. The study used a single model, other researchers can add other macroeconomic variables like exchange rate and interest rate to see if stock prices cycle can be used to predict them.

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Well-Being as A Factor Influencing Women's Decision to Start A Business

Paulina SIEMIENIAK
Poznan University of Technology, Poznań, Poland
paulina.siemieniak@put.poznan.pl

Malgorzata REMBIASZ
Poznan University of Technology, Poznań, Poland
malgorzata.rembiasz@put.poznan.pl

Abstract

The aim of the article is to discuss the importance of well-being in the lives of women entrepreneurs. The authors attempt to define the concept of well-being and review the results of previous research into the subject in the context of the development of female entrepreneurship in Poland and around the world. The empirical part presents the results of original research carried out at the beginning of 2020. The categories of the quality of life of young female students correspond to the OECD classification, and the authors sought to link them to entrepreneurial intentions. The study should be classified as a case study. In the auditorium survey, the respondents were asked to react to certain statements and reveal their subjective feelings about the quality of life and plans related to running a business in the future. The results of the conducted research prove that students with active entrepreneurial intentions assess the material and psychological aspects of well-being higher than the rest of the students, such aspects including their health, skills and professional competences. According to the authors, knowledge of the factors determining mental well-being is the basis for shaping entrepreneurial attitudes of young people and enables their professional activation. It is therefore useful for laying the foundations of an educational policy conducive to socio-economic development in a modern economy.

Keywords: Well-Being, Quality of Life, Women Entrepreneurs, Female Entrepreneurship

Welfare, Well-Being and Quality of Life

Welfare is a universally recognized goal in the development of societies and individuals. It is directly related to the high level of a country's socio-economic development. In research on the quality of life, this concept refers to living conditions and is considered in relation to the functioning of the economic system (Walaszek, 2017). The term "welfare state" is also used to mean that the most important task of the state authority should be to ensure the economic and social welfare of citizens in accordance with the principles of equitable distribution of wealth and equal opportunities. The "welfare state" assumes responsibility for providing its citizens with a basic, modest standard of living (Esping-Andersen 2010).

The concepts of welfare and mental well-being are not the same, the former denoting the level of affluence and wealth, and the latter the non-material conditions of a good life, such as happiness. However, more and more often, the sense of socio-economic security or lifestyle is included in the scope of individual welfare (Zaremba 2016). Therefore, the concept of mental well-being can be distinguished from the broader concept of welfare.

"Well-being" as a mental state is the effect of cognitive and emotional assessment of one's own life that leads to a strong feeling of fulfillment and satisfaction. It is a feeling resulting from self-realization, a positive appraisal of one's own life and a low level of stress (Niśkiewicz, 2016). Individuals are in a state of mental well-being when positive experiences and pleasant emotions prevail in the environment, outweighing negative experiences and moods (Kasperek-Golimowska 2012, p. 183).

Mental well-being is characterized by variability in the individual's life cycle. People who experience it are more effective in their activities and can use the available environmental resources better (Myers 2000, after: Jach 2013).

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Mental well-being can be described in six categories: self-acceptance, personal development, having a purpose in life, controlling the environment, autonomy, and positive relations with others (Cieślińska 2013, p. 102).

Welfare is described in OECD countries and other large economies based on the survey of eleven dimensions of people's quality of life. They are: income and wealth; place of work and earnings; living conditions; health; work-life balance; education and skills; social contacts; civic engagement; environmental quality; personal security; and subjective well-being. According to the authors of an OECD report, these dimensions create the so-called "well-being". Since the publication of the first OECD study in 2011, it has become increasingly important to measure well-being around the world, and to publicly debate what matters to citizens (http://www.oecd.org/sdd/OECD-Better-Life-Initiative.pdf).

J. Czapiński equates quality of life with well-being or happiness. Interestingly, the quality of life is measured using both objective criteria (living conditions) and subjective criteria (social, material, environmental, health-related). The subjective dimension has to do with the evaluation of one's own life (Wnuk, 2013).

An important element of the quality of life is the quality of working life. M. Porter points out that the factors that influence the quality of work may refer to (Efrata, Sirgy, 1990):

- characteristics specific to the individual (e.g. attitudes and needs)
- essence of work (internal rewards, level of autonomy, degree of differentiation of activities)
- work environment (e.g. readiness to achieve goals, the ability to transform knowledge, abilities and skills).

The literature on the subject also mentions the concept of employee well-being. In research on this phenomenon, it is assumed that good management may consist in reconciling the imperative of organizational productivity with increasing employee well-being while maintaining the strategic perspective of the organization. Increasing well-being at work brings benefits for both employees and the employer (Kozioł, Wojtowicz, 2016).

It should be stated that the quality or standard of living is an ambiguous concept that can be treated in an objective or subjective way. In the former case, we are dealing with the quality of life itself, and in the latter – with the sense of the quality of life (Kasprzyk, 2012)

Moreover, many studies show that there are differences between women and men in their subjective assessment of well-being when it comes to its types and components. They result from many biological, individual and environmental factors, such as country-specific social norms that determine the accepted characteristics and behaviors assigned to different genders (Batz, & Tay, 2018).

The specificity of female entrepreneurship in the context of the quality of life

According to the research, every third enterprise in the world is run by women (OECD 2017). Such companies are usually distinguished by the following features: they are micro-enterprises, they have a low level of capitalization, and they are slow to expand into foreign markets (Siemieniak, Łuczka, 2016). The development of enterprises run by women is somewhat limited, which may result from the negative attitude towards taking the role of business owners by women.

Social conditions and stereotypes of gender roles make women assimilate a special hierarchy of values, i.e. they spend less time in the company or choose service activities that can be managed from home (Zięba, 2010). Women’s entrepreneurship, understood as the tendency to start their own business, is restricted not only by the belief that they are poorly prepared to set up companies. The growth of an enterprise depends on the ability to balance the requirements of professional and family life, including, in particular, the role of a mother (Siemieniak, Łuczka, 2016).

The importance of entrepreneurship for women’s quality of life is not clear. On the one hand, PARP research shows that it is easier to make the decision to start a business when one does not yet have family responsibilities, due to the difficulty of engaging in both these roles at the same time. On the other hand, some studies show that the necessity to cope with family responsibilities may stimulate the decision to set up one's own business (Siemieniak,

Łuczka, 2016). Such an approach may result from associating self-employment with better earnings and flexible working hours.

Meeting the need for safety as a basis for the well-being of female entrepreneurs

The success of entrepreneurial activity is most often measured by economic indicators and equated with the development of the enterprise, which is evidenced by the expansion of its area of activity, the sales market or the number of customers. However, in the case of entrepreneurial activities undertaken by women, success also depends on significant subjective factors, such as work satisfaction, achievement of aspirations (motivation) and satisfaction with personal life (life satisfaction) (Denkiewicz-Kuczewska, 2012).

It is worth noting that the subjective factors associated with running one's own business also involve a diminished sense of safety compared: to being employed. Entrepreneurs are forced to constantly confront uncertainty due to the changing market situation and competition. The sense of security is of particular importance for self-employed women, who, for a long period of their lives, bear the responsibility resulting from their role as mothers (Siemieniak, Rembiasz, 2017). The sense of safety means a subjective assessment of the level of acceptable risk (Klamut, 2012). When running one's own business, risk factors should be identified and, above all, controlled at each management level (Stańczak, 2014). In order to feel in control, people are forced to constantly assess the level of threats, knowledge gaps and ambiguity (Sadłowska - Wrzesińska, et al., 2016). An individual lives in conditions of constant uncertainty, i.e. a mismatch between the knowledge required and the knowledge available to make a decision (Stańczak 2014).

Despite being exposed to uncertainty, entrepreneurs experience a higher level of job satisfaction and quality of life. It is believed that the factor that determines their well-being is a sense of autonomy and control expressed by the flexibility in assigning tasks as well as the time and methods of their implementation (Siemieniak, Rembiasz, 2018). Flexible working time is defined as: adaptable duration of work, shortened working week, flexible starting and ending hours (Gerlach, 2014). Control over the organization of work may give a sense of work comfort, because it allows for a better adjustment of professional and private activity (Siemieniak, Rembiasz, 2018). Empirical research shows that entrepreneurs can strike a better work-life balance than non-entrepreneurs. Moreover, those entrepreneurs who were motivated by the emergence of an opportunity achieve not only balance but also satisfaction (Zbierowski, 2016).

The research results show that entrepreneurial women differ significantly in their sense of social well-being from women not engaged in entrepreneurial activity, experiencing a sense of acceptance and realization in society, improvement of their relations with the environment and autonomy in decision making. Therefore, running one's own business has a clear impact on increasing the sense of social well-being. In addition, the fact of running a business increases mental well-being and work satisfaction. At the same time, it can be assumed that people who are more satisfied with their lives have greater self-confidence and it is easier for them to take on the challenges of self-employment. It can therefore be concluded that female entrepreneurs differ from other women in terms of their personality characteristics (Denkiewicz-Kuczewska, 2012).

Needs of female entrepreneurs that determine well-being - review of the results of own research

In some concepts, the quality of life in general, including the quality of professional life, is equated with the satisfaction of needs (Pate, 1988). Determining the needs and the degree of their satisfaction in women running their own business is an important factor affecting entrepreneurship development.

Therefore, the aim of the undertaken research was to identify the needs related to running one's own enterprise (actually or potentially). The research carried out in 2013/14 involved a representative group of business owners from the SME sector in the Wielkopolska region and a group of students in economics. In total, 384 women-owners and 181 female students were included in the research, and the groups of respondents were created on the basis of quota selection. The actual state was compared with the imagined state by juxtaposing the needs declared by the current owners of enterprises with the needs of female students, i.e. a group of potential entrepreneurs. It is worth mentioning that more than half (56%) of current female entrepreneurs believe that they have achieved success in

life, which can be considered a significant indicator of well-being. Moreover, students who intend to run their own business are motivated mainly by a desire for decent earnings (40%), while business owners cite a desire to use their knowledge and skills (studied profession) (33.6%), and, in a similar proportion, independence (31.3 % of responses). Most of the obtained results reveal a positive motivation, i.e. women are pulled rather then pushed towards enterpreunership. This leads to conclusions about respondents' welfare, which is in line with the economic development indicators for Wielkopolska, a region considered to be one of the most economically developed in Poland (Siemieniak, Łuczka, 2016).

The table below presents the five most frequently reported factors necessary for the effective running of an enterprise (Table 1). The assessments of female business owners are similar to those of female students who are potential entrepreneurs. Both groups selected the same five top needs out of the thirteen suggested. In the opinion of the owners, the possibility of working flexible and variable hours is ranked second, right after the need for financial support.

Table 1: Factors necessary to run a business - in the opinion of women

The most frequently cited needs:	Current entrepreneurs - women (%) *	Potential entrepreneurs - women (%) *
Financial suport	17.6	20.9
Flexible working hours	13.3	12.8
Comprehensive economic and legal services (relief from bureaucracy)	12.3	13.2
Advice on various problems related to running a business	9.7	12.8
Training	8.9	8.5

** The respondents gave more than one answer. Responses add up to 100% for all 13 factors. Source: own research, based on Siemieniak, Łuczka, 2016, p. 85*

The obtained results can be applied both to the mental well-being of women and the broadly-defined welfare of entrepreneurs. Running one's own business on the one hand provides the basic source of income or additional income that improves the financial situation of the family, and on the other, contributes to women's sense of self-fulfillment and influence whilst confirming their potential.

The conclusions were extended with the results of another study in 2017 (Siemieniak, Rembiasz 2018). These focused on the diagnosis of entrepreneurial attitudes in the context of balancing the requirements of personal and professional life of potential entrepreneurs. The author used her original auditorium survey method to carry out research among 160 students of economic faculties of Wielkopolska universities. Two thirds of the respondents were women. The study revealed the importance of factors necessary for the so-called work-life balance, one of the premises of the mental well-being of working people, including those who are self-employed. The most important factor for the respondents was flexible working time, followed by: home work, being relieved from some of the household / caring responsibilities, the possibility of relaxing at any time of the day and part-time work (Siemieniak, Rembiasz 2018).

Results of research on the quality of life of female students as potential entrepreneurs

The study was conducted in January 2020 and aimed at determining the relationship between the quality of life of students and their entrepreneurial intentions (plans for self-employment). It involved a group of students of management at one of Polish non-public universities, and the research tool was an auditorium survey. The respondents were asked to react to the statements specified in the questionnaire and reveal their subjective feelings about the quality of their lives. The authors of the study are aware of the limitations of survey research. The result could have been influenced by the place (lecture hall) and the respondents' guesses about the results expected by the authors of the research.

This article presents some of the research results, that is those that were obtained for a homogeneous group of 130 young female students aged 21-28. The university where the research was carried out offers the possibility of combining education with work and personal life. The idea is therefore to keep the work-life balance – one of the

factors that determine mental well-being. The table below presents the results concerning the entrepreneurial intentions of the surveyed female students and their involvement in professional work.

Table 2: Responses to the question: "Are you interested in running your own business?"

Answers:	Percentage of responses (%)
Yes	40.8
I run my own business	1.5
No	23.1
I don't know	34.6%

Source: own research

The table above shows that a relatively large group of respondents, as many as 40.8%, is interested in running their own business. Only two students were already self-employed, which is due to the young age of the respondents. A fairly high percentage of active entrepreneurial intentions should be explained by the studied field of business management, which the surveyed young women had chosen consciously. Moreover, 95% of the respondents worked for profit. The authors of the research assumed that students with active entrepreneurial intentions assess their quality of life in more positive terms, achieving a higher level of well-being than people who do not plan to run their own business or do not know yet whether they want to start such an activity.

The results of the study focused on selected areas of well-being according to the previously mentioned OECD classification are presented below. Table 3a presents the results concerning income and wealth, place of work, living conditions and health of students who want to run their own business or already run one. Table 3b contains the answers of female respondents who do not plan to start a company, while Table 3c applies to women who do not know whether they want to start their own business.

Table 3a: Selected material and health aspects of well-being of female respondents with active entrepreneurial intentions

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I am satisfied with what I have	3.6	29.1	20	41.8	5.5
I am satisfied with housing conditions	1.80	3.6	10.9	41.8	43.6
I am satisfied with my health	1.8	9.1	10.9	41.8	36.3

Source: own research

Table 3b: Selected material and health aspects of well-being of respondents not planning to start a business

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I am satisfied with what I have	0.0	16.7	23.3	56.7	3.3
I am satisfied with housing conditions	3.3	10.0	30.0	50.0	6.7
I am satisfied with my health	6.7	26.6	20.0	40.0	6.9

Source: own research.

Table 3c: Selected material and health aspects of well-being of the respondents who do not know whether they want to become entrepreneurs

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I am satisfied with what I have	4.4	17.8	33.3	37.8	6.7
I'm satisfied with housing conditions	4.4	20.0	8.9	35.6	31.1
I am satisfied with my health	11.1	13.3	17.8	40.0	17.8

Source: own research.

Comparing the results from the above three tables, the following conclusions can be drawn: personal wealth achieved highest scores among students who do not intend to run their own business. This may be due to the fact that, if they are in a good financial situation and earn attractive salaries, young people do not want to give up their full-time job in order to run a business which is risky. The table also shows that future potential entrepreneurs are less satisfied with their assets. Therefore, the motives for starting a business in this group include the desire to achieve higher income than in the case of contract work. It is important to bear in mind that the presented empirical research did not reveal the actual wealth status of the respondents, but only their subjective assessment of it. Both groups could therefore be very similar in terms of their wealth and income expressed in money, but students with active entrepreneurial intentions might set themselves higher goals in this respect. On the other hand, for the second group, lower income was considered sufficient.

Moreover, people who are the least satisfied with their housing conditions belong to the group that does not plan to start a business. Here, too, a large proportion of the respondents replied: "It's hard to say." This may be due to the fact that, in Poland, the predominant means of buying one's own apartment is a bank loan and, to obtain a housing loan, entrepreneurs must meet more stringent requirements than in the case of contract work. If a business is the only source of income, banks require the submission of net income statements for the last twelve months or even up to two years. Therefore, banks may refuse to grant a loan due to the uncertain situation of a company that has operated for a short time. In addition, entrepreneurs must prove the amount of income required to be considered credit worthy *(https://www.totalmoney.pl/artykuly/71836,kredyty-dla-firm,kredyt-hipoteczny-a-dzialalnosc-gospodarcza-2020---jaka-mam-zdolnosc-kredytowa-przy-oło-firmy,1)*

When it comes to health, it was rated highest by people planning to establish an enterprise.
The following tables present the assessment of elements related to psychological well-being, such as work-life balance, social contacts and subjective well-being.

Table 4a. Selected psychological aspects of well-being of female respondents with active entrepreneurial intentions

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I have a purpose in life	0.0	0.0	0.0	18.2	81.8
I am satisfied with the level of my personal development	0.0	0.0	3.6	65.5	30.9
I feel independent	0.0	0.0	3.6	45.5	50.9
I am satisfied with my relationships with other people	0.0	1.8	7.3	50.9	40.0

Source: own research.

Table 4b: Selected psychological aspects of well-being of the respondents who do not plan to start a business

Questions`	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I have a purpose in life	0.0	6.7	16.7	53.3	23.3
I am satisfied with the level of my personal development	3.3	13.7	33.3	46.7	3.3
I feel independent	0.0	20.0	26.7	26.7	26.7
I am satisfied with my relationships with other people	3.3	16.7	16.7	43.3	20.0

Source: own research.

Table 4c: Selected psychological aspects of well-being of the respondents who do not know whether they want to start their own business

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I have a purpose in life	0.0	0.0	26.7	35.5	37.8
I am satisfied with the level of my personal development	0.0	8.9	35.5	44.4	11.2
I feel independent	0.0	8.9	11.1	40.0	40.0
I am satisfied with my relationships with other people	2.2	13.3	8.9	42.2	33.4

Source: own research.

Self-esteem regarding a clear goal in life, the assessment of one's own personal development and the feeling of being independent and satisfied with relationships with other people scored highest, on average, in students who plan to become or are currently entrepreneurs, and lowest in those who do not want to start their own business. This means that, in the surveyed group of women, the sense of mental well-being increases the likelihood to become an entrepreneur.

The last set of three tables deals with education and skills as important components of well-being.

Table 5a: Selected aspects of well-being related to education and skills of respondents with active entrepreneurial intentions

Questions	**percentage of responses (%)**				
	I strongly disagree	**I tend to disagree**	**Hard to say**	**I tend to agree**	**I strongly agree**
I am satisfied with the field of study I am studying	0.0	2.2	8.9	65.5	23.4
I am satisfied with the level of my abilities	0.0	0.0	5.5	67.3	27.2
I am satisfied with my professional skills	0.0	1.8	0.0	70.9	27.3

Source: own research.

Table 5b: Selected aspects of well-being related to education and skills of respondents who do not plan to start a business

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I am satisfied with the field of study I am studying	0.0	23.3	53.4	23.3	0.0
I am satisfied with the level of my abilities	0.0	6.7	43.3	43.3	6.7
I am satisfied with my professional skills	0.0	13.3	36.7	50.0	0.0

Source: own research.

Table 5c: Selected aspects of well-being related to education and skills of respondents who do not know whether they want to become entrepreneurs

Questions	percentage of responses (%)				
	I strongly disagree	I tend to disagree	Hard to say	I tend to agree	I strongly agree
I am satisfied with the field of study I am studying	0.0	13.3	37.8	28.9	20.0
I am satisfied with the level of my abilities	0.0	22.2	31.1	35.5	11.2
I am satisfied with my professional skills	2.2	17.8	31.1	42.2	6.7

Source: own research.

The results presented in the tables above prove that students with active entrepreneurial intentions assess their skills and professional abilities higher than the rest of the students (cf. Tables 5a, 5b, 5c). They also chose their field of study more consciously as the majority of them decided that they liked their program. Therefore, they are probably more likely to have clear plans for the future and use the knowledge from the studies in their professional lives. The authors of the research are obviously aware of the fact that the presented survey results are not representative due to the non-random selection of the sample and this study should be treated rather as a case study.

Summary

The presented article is an attempt to show the relationship between the concepts of prosperity and well-being and professional activity of entrepreneurs. It particularly refers to the group of women-owners, who are underrepresented among entrepreneurs in Poland and globally. Conducting the research in question is justified from the perspective of the economic development of the entire region. The use of internal resources of each individual contributes to the increase in the welfare of the entire society. Knowledge of the factors determining mental well-being is the basis for shaping entrepreneurial attitudes of young people and enables their professional activation. Although psychological well-being may be subjective, it seems reasonable to look for recurrent themes that characterize groups. It is worth referring to the concept of man formulated on the basis of humanistic psychology, which states that needs guide human action. Their recognition may constitute a point of reference for the creators of social policy.

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Ordered Logit Models in The Assessment of The Manufacturing Enterprise Innovativeness

Katarzyna SKRZYPEK, Phd
Institute of Mechanical Engineering, University of Zielona Góra, Zielona Góra, Poland
e-mail: k.skrzypek@iim.uz.zgora.pl

Karol DĄBROWSKI, MA
Institute of Mechanical Engineering, University of Zielona Góra, Zielona Góra, Poland
e-mail: k.dabrowski@iim.uz.zgora.pl

Duc TRAN ANH, M.Sc.
BTU Cottbus - Senftenberg , Faculty of Mechanical Engineering, Cottbus, Germany
e-mail: duc.trananh@b-tu.de

Professor Sławomir KŁOS
Institute of Mechanical Engineering, University of Zielona Góra, Zielona Góra, Poland
e-mail: s.klos@iim.uz.zgora.pl

Abstract

Manufacturing enterprises have to develop uninterruptedly. The enterprise development is often connected with the innovativeness. The innovation problems were entered into the economic publication by J. Schumpeter. The innovativeness, as a characteristic of an innovative enterprise, has not a synthetic indicator. In the references, there are many various approaches to the innovativeness measurement process. The objective of the paper is to present the ordered logit models for assessment of the enterprise innovativeness. The first, theoretical part treats the concept of innovation and the ordered logit model. The second part represents the use of these models.

Keywords: Ordered Logit Model, Level of Innovation, Manufacturing Enterprise, Assessment of The Enterprise Innovativeness

Introduction

At the beginning of 2007, during the Consumer Analyst Group of New York conference, the management of Procter & Gamble was asked how they are able to maintain the business' growth rate amidst increasing spending by the competition. The management of Procter & Gamble replied in three words: innovations, innovations, innovations... [11]. The enterprise development is often connected with the innovativeness. The innovation problems were entered into the economic considerations by J. Schumpeter. He thought that innovations give new possibilities of creation of richness to the resources possessed [10]. With time passing, there occurred new and new innovativeness definitions [1] [2] [7] [8] (Table 1). Contemporary definitions of innovations in the bibliography are described tightly take as a commercial introduction of novelties [8] or broadly as a multi-stage, purposeful process and its effect, which is a beneficial change [9], [12]. Damanpour and Schneider state: "Innovation is studied in many disciplines and has been defined from differentperspectives" [20], [21].

In literature on the subject one may find many classifications differentiating innovations. The categorisation seen most often is based on scope. It identifies product, process (also known as technological), organisational and marketing innovation [8].

When using the definition included in the Oslo Manual textbook, the innovative enterprise is such one that has introduced at least one product and process innovation within the period under the survey [8]. In the article 2 of the Act dated 30 May 2008, concerning some forms of supporting of the innovative activity (Journal of Laws Dz.U. nr 116, poz. (item) 730), by an innovative activity, it is called "the activity consisting in development of a new technology and starting, on its basis, to manufacture new or significantly improved goods, processes or services" [13].

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Table 1: A review of definitions - the concept of innovation

Author	Definition
[4]	"Innovation is the process of transforming knowledge into value through the application of new of improved products, processes and systems. Authors use the concept of innovation with reference to the creation of new value for a business, its stakeholders and clients. Contrary to opinions purported by some scholars, an idea or invention only become an invention when their economic potential is effectively realised" [4].
[10]	"Innovation is the introduction into production of new products or the improvement of existing products, improvement or introduction of a new production process (process innovation), development of a new product distribution method, opening of a new market, application of new materials or raw materials for production, introduction of a new production model" [10].
[19]	"An innovative enterprise is an enterprise which, over some time, has introduced at least one innovation to the market - a product or process innovation and as a result of the implementation of the innovation, has improved its competitiveness, achieved total profit, increased employment in the departments of the enterprise requiring specialist knowledge and established cooperation with external partner organizations" [19].
[22]	"Innovations are creative changes in the social system, economic structure, technology and nature" [22].
[23]	"Innovation is the introduction of a new or significantly improved product / process, the use of a new or significantly improved marketing / organizational / technological solution" [23].

(source: own work)

Determining the level of an organization's innovativeness is important to be able to define its strategy and manage it effectively. Innovation management reflects changes in the organization by moving away from traditional processes, procedures, structures and ways of achieving a specific task or objective [24]. Table 2 provides several definitions of management innovation selected by Volberda.

Table 2: A review of definitions – the management of innovation (source: own work)

Authors	Definition
[25]	The introduction of management practices that are new to the firm and intended to enhance firm performance [25].
[26]	The generation and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals [26].
[27]	A marked departure from traditional management principles, processes and practices or a departure from customary organizational forms that significantly alters the way the work of management is performed [27].
[28]	… any program, product or technique which represents a significant departure from the state of the art of management at the time it first appears and which affects the nature, location, quality, or quantity of information that is available in the decision-making proces [28].

At the present state of the knowledge, there is no systematised meters for assessment of the innovativeness level of the enterprises acting in the common market. The innovativeness, as a characteristic of an innovative enterprise, has

not, also, a synthetic indicator. In the references, there are many various approaches to the innovativeness measurement process. The objective of the paper is to present the ordered logit models for assessment of the enterprise innovativeness. The use of these models in the described context is new.

The Ordered Logit Model

Ordered variables are applicable in many research areas and are used for measuring the unmeasurable features in survey questionnaires. They have at least three categories among which there is a natural ordering. "Therefore, it is possible not only to state whether the variables for two objects have the same or different values, but also compare these values, that is to say that for one of the objects the variable has higher or lower value than for the other" [5]. For ordered variables modelling most frequently used tool is a multinomial ordered logit model which is an extension of binomial model. The ordered logit model [5], [6]:

- defines/models an ordinal dependent variable with at least two categories which are characterised by natural ordering and which can be compared to one another,
- deals with independent variables of qualitative and quantitative nature,
- allows the analysis of influence of particular variables on dependent variable,
- enables making prognosis of the dependent variable for new values of the independent variables,
- allows making the analyses and prognoses supporting the expert.

Specification, calculation and quality model evaluation methods as well as the ways of the parameter interpreting have been thoroughly presented in e.g. publications [5], [6].

The application of the ordered logit model allows determining the probability of the company affinity to one of the categories assumed by the author: modest innovator, moderate innovator, innovator. The procedure of the innovativeness level evaluation of a production company in the two selected sectors based on the theory of the ordered logit models should, according to the author, be carried out according to 6 steps (Fig. 1):

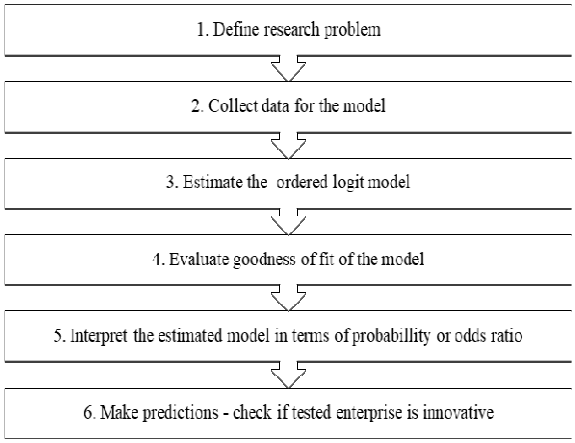

Fig. 1: The manufacturing enterprise innovativeness assessment procedure based on the ordered logit model theory

(source: own work).

Innovativeness Level Evaluation on The Example of A Manufacturing Enterprise in The Metal and Automotive Sectors

A given manufacturing enterprise carries out its business activity in two sectors alike – metal and automotive sectors. To evaluate the innovativeness level of this company, the procedure specified in Chapter 2 of this paper has been proposed.

In the first step, the level of innovativeness was selected as the modelled variable (dependent variable). The examined enterprise could be qualified as:

- modest innovator,
- moderate innovator,
- innovator.

In the next stage, based on the literature studies, a questionnaire, whose aim was to standardise the questions asked to the companies, was created. The aim of the survey was to obtain the data for developing the innovativeness level evaluation model of companies active in metal and automotive sectors. The questionnaire was delivered via e-mail to the group of respondents having their registered offices throughout the whole territory of Poland and representing micro-, small, medium and large production companies. On the basis of description of the respondents' business activity, out of 239 surveyed companies, the ones that claimed to be active in both metal and automotive sectors, were selected (131 enterprises). The survey contained the set of closed-ended questions divided into 5 thematic groups and demographics where the surveyed persons stated the size of the company they work in and the business sector. In the survey, the person answering the questionnaire had to provide the information on the position at the company. All the respondents represented the companies' management, at least middle management.

In step 3, the following four independent variables (influencing the modelled variable) were selected to model the level of the company innovativeness based on the data obtained from the survey and analysed afterwards together with the analysis of appropriate literature studies:

- number of new products developed in the company in the last 3 years,
- number of new technologies developed in the company in the last 3 years,
- number of employees with engineering or technical higher education degree in the last year,
- percentage of income spent on research and development activity.

Each variable had three possible answers (categories):
- 0-10 range,
- 11-20 range,
- above 20.

The ordered logit model was established in stage 4. For the ordered logit model, a general probability formula, where for i – of this object, the dependent variable will have the value j , is in the form of [4]:

$$p_{ij} = P(y_i = j) = \frac{\exp(\kappa_j - x_i'\beta)}{1+\exp(\kappa_j - x_i'\beta)} - \frac{\exp(\kappa_{j-1} - x_i'\beta)}{1+\exp(\kappa_{j-1} - x_i'\beta)} \qquad (1)$$

where:

$i = 1, 2, \ldots, n \quad (n \in \mathbb{N})$ – object index,
$j = 1, 2, \ldots, J \ (J \in \mathbb{N})$ – value of the dependent variable,
p_{ij} – probability that for i-of this object, the dependent variable will have the value j,
κ_j, κ_{j-1} – cut-off points,
$x_i = [x_{i1}, x_{i2}, \ldots, x_{in}]$ – vector of independent variable value for i-of this object,
$\beta = [\beta_1, \beta_2, \ldots, \beta_n]$ – vector of unknown model parameters of actual values.
For the ordered logit model estimated in research with the use of R statistical software, the probability formula of affinity of i-of this object to one of the categories (1 – modest innovator, 2 – moderate innovator, 3 – innovator) is in the following form:

$p_{i1} = P(y_i = 1) = \frac{\exp(0{,}32 - m_i)}{1+\exp(0{,}32 - m_i)}$	(2)
$p_{i2} = P(y_i = 2) = \frac{\exp(1{,}69 - m_i)}{1+\exp(1{,}69 - m_i)} - \frac{\exp(0{,}32 - m_i)}{1+\exp(0{,}32 - m_i)}$	(3)
$p_{i3} = P(y_i = 3) = 1 - \frac{\exp(1{,}69 - m_i)}{1+\exp(1{,}69 - m_i)}$	(4)

where:

$i = 1, 2, \ldots, 131$ – company number,

$0{,}32$ i $1{,}69$ – cut-off points estimated on the basis of the survey results,

p_{i1} – probability that for -of this company, the dependent variable will have the value 1 – modest innovator,

p_{i2} – probability that for i-of this company, the dependent variable will have the value 2 – moderate innovator,

p_{i3} – probability that for i-of this company, the dependent variable will have the value 3 – innovator,

$$m_i = 0.2x_{i,1.2} + 1.9x_{i,1.3} - 0.3x_{i,2.2} - 2.3x_{i,2.3} + 1.1x_{i,3.2} + 1.4x_{i,3.3} + 1.7x_{i,4.2} + 2.5x_{i,4.3} \quad (5)$$

$[0.2,\ 1.9,\ 0.3,\ -0.3,\ -2.3,\ 1.1,\ 1.4,\ 1.7,\ 2.5]$ – model parameters vector based on the survey results,

x_1 – number of new products developed in the company,

x_2 – number of new technologies developed in the company,

x_3 – number of employees with higher education degree,

x_4 – percentage of income spent on research and development activity.

The designation such as e.g $x_{i1.2}$ is understood as the value of the first independent variable for the second range – [11-20]. The range 0 – 10 was selected as the reference category.

Assignment of the values characterising a given company to particular independent variables took place in the last stage of the procedure. The following results have been obtained:

- number of new products developed in the company in the last 3 years: 11-20,
- number of new technologies developed in the company in the last 3 years: 0-10,
- number of employees with engineering or technical higher education degree in the last year: 11-20,
- percentage of income spent on research and development activity: 0-10.

Based on the formulas (2), (3), (4), (5), probability of a company's affinity to one of the selected categories was estimated. Eventually it has been estimated that the probability that the examined production company active in metal and automotive sectors is innovative, is only 40%. This evaluation was confirmed by an innovation audit of the examined company carried out by experts from one of Polish universities.

Conclusions

With regard to Schumpeter's definition, an unprecedented increase in innovation is generated by the use of robots and sensor technologies in production. The associated processes can be optimized on the basis of disproportionately increasing data [15]. The availability of, for example, quality-related data offers the potential to sustainably improve the susceptibility to errors, process and product quality [16]. Data management allows a new view of innovation. According to the "Cisco Visual Networking Index™ (VNI)", global data traffic will triple by 2021 and then reach a volume of 3.3 Zettabyte per year [17]. Today, one fifth of German companies already use Big Data [18]. The huge amounts of data serve as raw materials, which needs to be processed automatically in order to exploit its full economic potential. By structuring and analyzing mass data and subsequently enriching it with semantic models, for example, profitable knowledge can be generated - Big Data becomes Smart Data. Smart Data in turn becomes the innovation incubator of the 21st century. But many companies still fail to meet the challenge of "Big Data" even though such technologies are available. The problem is often that no concrete goal is set. Without a goal, every innovation project is unnecessary. This makes it all the more important to be able to measure innovation regarding to goals in order to correctly weigh up the investment in knowledge and technology [14].

The study about the innovation level of manufacturing enterprises in the metal and automotive industries becomes important from while the point of view of strategic management and is dependent on, among others, the European Commission guidelines in the aspect of, for example, granting funds for the development of enterprises. There is no one recommended methodology for calculating the company's innovation level. Ordered logit models are used to calculate the probability of a certain phenomenon related to an explanatory variable. In this case, it is the level of innovation. The author of the article indicated the procedure of proceedings, how to assess the level of innovation of the studied production enterprise using the indicated method.

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The Best Method of People Counting and Human Detection in Rooms Reservation

Ioana UDREA
University POLITEHNICA of Bucharest (UPB), Faculty of Mechanical Engineering and Mechatronics (FIMM), Department of Precision Mechanics and Mechatronics (DMMP), 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania, email: udreaioana@yahoo.com, ioana.udrea@upb.ro

Nicolae Daniel SIMION
UPB, FIMM, DMMP, 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania, email: danielsimion53@yahoo.com

Cristian Gabriel ALIONTE
UPB, FIMM, DMMP, 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania, email: a_cgabriel@yahoo.com

Viorel Ionut GHEORGHE
UPB, FIMM, DMMP, 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania, email: viorel.gheorghe@upb.ro

Valeru Friedemann KRAUS
ASC-Romania, 9 Stefan Marinescu Street, District 6, 060121, Bucharest, Romania, email: vali@asc-ro.com

Silviu PETRACHE
UPB, FIMM, DMMP, 313 Splaiul Independentei 313, District 6, 060042, Bucharest, Romania, email: silviu.petrache@upb.ro

Abstract

In the last period, due to the dramatic increase of IoT and the monitoring possibilities offered by it, in the market appeared the need to count the presence in the meeting rooms of various companies. To meet this need, certain requirements have been established, such as those of a Proof of Concept (POC) project which involves monitoring the presence in two meeting rooms of a customer. From the *Requirements Document* of the POC derives the requirement that is achieved through this work, namely to establish the best people count solution for a meeting room. Three sensor solutions for determining people count are studied in detail and discussed. The results of this paper are useful in rooms reservation, thus being possible to optimize the space management.

Keywords: Requirements diagram, people counting, sensor system, PIR, ultrasonic, Grid-EYE sensors

Introduction

The rapid development in recent years of the sensor systems performance and the increasing speed of networks through which data is transmitted in the cloud, allows enterprise applications to display and use more and more real time data. These can be used to improve the reports, operations, and decisions that the application already had implemented.

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The IoT enables physical objects to see, hear, think, and perform jobs by having them “talk” together, to share information and to coordinate decisions (Al-Fuqaha et al. 2015). In the last period, the number of applications that make use of the IoT has increased dramatically and it spans areas from business and manufacturing to home, health care, and knowledge management (Nord et al. 2019).
According to the definition given by the International Facility Management Association (IFMA), Facility Management (FM) is a profession that includes several disciplines helping to ensure the functionality of the built environment by integrating people, space, processes, and technology (EuroFM 2019). In the field of Facility Management (FM), the impact of IoT is growing and IoT is playing an important role in improving FM services.

Among the information obtained using IoT technology, people counting has implications not only in the efficient use of space but also in many other areas of FM. For example, in the study of passenger activity and traffic patterns at airports, the authors found that accurate data on people counting are essential information for people flow analysis and management, space use, service monitoring, security enhancement, productivity assessment, and resource optimization to improve or maintain the operating means at airport facilities (Gerland and McDonald 2016). The Wireless Sensor Networks (WSN) is viewed as an information service provider not only to building management systems but also to wider applications in the enterprise infrastructure (Malatras et al. 2008).

There is a need on the market to see if the meeting rooms are optimally reserved. At the organizational level, this need was transposed through the requirement to monitor the meeting rooms with the help of sensors. In order to demonstrate the reliability of such a solution, a small project, POC type is first needed. From such a project, in fig. 1, is presented a *Requirements Diagram*, where is taken and developed one of the central business requirements that states: "For Proof of Concept (POC) project it is necessary to monitor the presence in two meeting rooms of the client". The synthesis diagram of the entire *Requirements Model* is presented in another article, written by some of the authors of this paper, also sent to this conference (Udrea et al. 2020). *Enterprise Architect* software was used to create the entire *Requirements Model* and other models of the project (EA 2016).

This work realizes the requirement "A study must be done to find the best people count solution in a room" from *Requirements Diagram* presented in fig. 1. It contains a study of choosing the best people count solution for a meeting room.

Regarding the structure of *Requirements Diagram,* when modeling using requirement elements there are numerous Unified Modeling Language (UML) connector types that can be used, however there are two types of relationship that are commonly used with requirement management. One for setting relationships between peer requirements (*Aggregation*), and another for representing how they will be implemented (for example a Realization by a Use Case). Requirements linked by *Aggregation* relationships form a composition hierarchy. High level requirements may be composed of lower level requirements, which in turn are made up of finer and more specialized requirements. This hierarchical structure helps manage the complexity of large systems with thousands of requirements and many elements being employed to implement the requirements (EAReqM 2016). It should be noted that the *Aggregation* relationship is not specified in (BABOK 2015), in the subchapter *Trace Requirements*, where the types of relationships between requirements are defined. As can be seen from fig. 1, the requirements of the presented model are suitable for the *Aggregation* relation.

From the tracking requirements methods available in *Enterprise Architect*, the method of creating and visualizing the requirements using diagrams was chosen. It is simple to use this method and it is best applicable for small models of requirements. The traceability of the requirements in fig. 1 is made using diagrams.

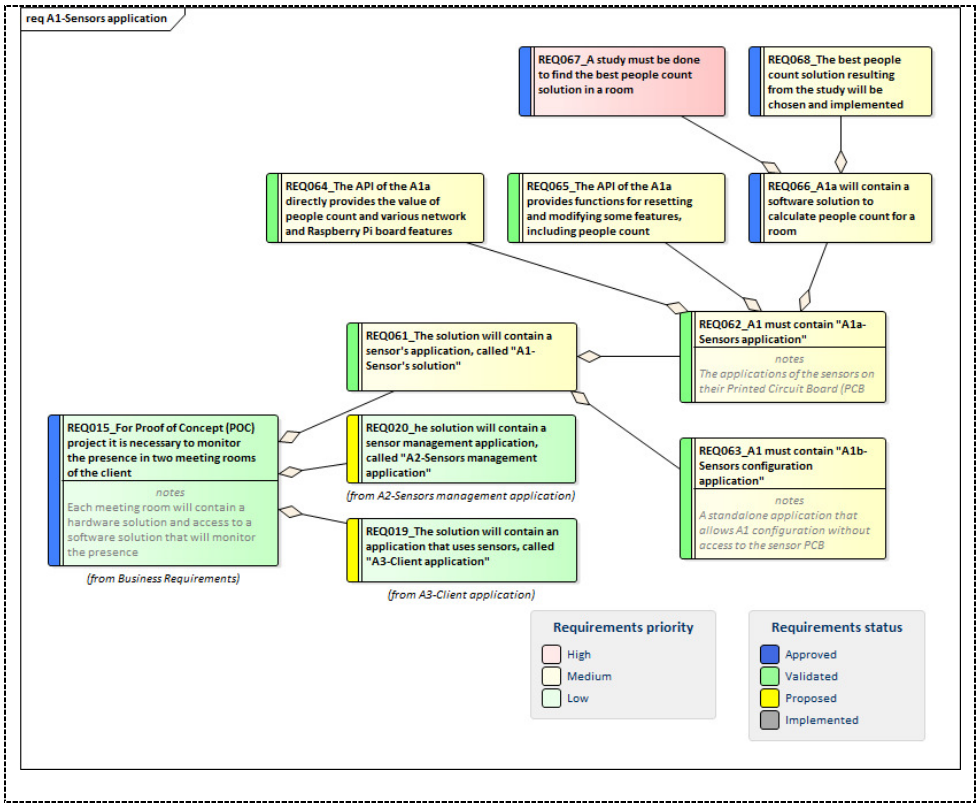

Figure 1: Requirements Diagram, made with Enterprise Architect software

In the context in which there was a need to monitor the presence in meeting rooms in order to improve the room reservation reports of an FM application, there was a requirement to find the best method of people counting. To achieve this, this article aims to find the best method of people counting and human detection by studying various methods and sensor systems.

Method and Procedure

The building, represented by its BIM model, is a main if not central element of FM applications. There are "fixed" features that are determined once and remain valid as long as the building does not change, such as heat transfer and its simulation (Natephra et al. 2018, Pop et al. 2018), building ventilation (Sporr et al. 2019, Chitaru et al. 2018), and features that need to be monitored in real time, such as indoor air quality (Diodiu and Dogeanu 2016) and the counting of the number of people (Ye 2010, Gerland and McDonald 2016).

Regarding the monitoring of people, the identifiable elements can be classified according to several properties. Thus, there can be spatio-temporal properties, classified hierarchically, from fewer to more attributes as follows: presence, count, location, track, identity. There can be behavioral properties, also classified hierarchically: pose, action, activity, behavior, group behavior. And there can be physiological properties: blood pressure, temperature, weight and other properties (Teixeira et al. 2010).

A classification of different people counting technologies is made according to the generation to which the measurement system belongs (Sruthi 2019). Thus, there are first generation technologies (infrared beam counters), second generation (thermal counters) and third generation technologies (video & Wi-Fi counters).

A comparative analysis of localization technologies inside buildings is performed in (Chen et al. 2015). Occupancy detection systems can be categorized as individualized and non-individualized, based on whether an occupant can be identified and tracked in the sensed area. Passive sensors, such as infrared sensors, CO2 sensors, light sensors, and ultrasonic sensors are widely used for non-individualized detection. Most passive sensors use indirect sensing results as an indication of occupancy. Passive infrared (PIR) sensors are commonly used for lighting control in commercial buildings. Another category of detection is the individualized system, which usually uses videos, electromagnetic or radio signals, such as wireless fidelity (Wi-Fi), RFID tags, and Ultra-Wideband (UWB) to track a unique device. The advantages of these methods are validated and compared in the study conducted by (Taneja et al. 2012). Such detection systems are capable of providing higher resolution occupancy information on location, presence, counting, identification, and tracking (Chen et al. 2015).

Another aspect to consider when monitoring people is whether people are on the move or not. In this sense one can talk about techniques that are capable of modeling static or dynamic objects (Teixeira 2010).

In this study it is intended to determine the number of people in a meeting room. This will be done through direct counting or through detection, following that by processing the detection results to obtain people counting. With two motion sensors working together on either side of a door, it is possible to count the number of people entering and leaving a room. Thus, two methods of people counting will be studied, one using a pair of PIR sensors and another using a pair of ultrasonic sensors. The proposed detection method will use infrared technology and a Grid-EYE sensor (Grid-EYE 2020).

The Solution That Uses Two PIR Sensors

The sensor system used in this study is composed of a Raspberry Pi board, a multiplexing connection board and a pair of two identical PIR Motion Sensors (PIR 2020). PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and do not wear out. For that reason, they are commonly found in appliances and gadgets used in homes or businesses.

The Raspberry Pi used is a Model 4, B (Raspberry Pi4 2019). It is a credit-card-sized single-board computer. The CPU on the board is an ARM v8 processor with 1.5 GHz speed. It has a variety of interfacing peripherals, including 2 USB 3.0 ports, 2 USB 2.0 ports, 2 micro-HDMI ports, 4 GB RAM, Micro-SD Card storage and 40 pin GPIO header. For GPIO port expansion a multiplexing connection board is used.

Two monitors, keyboard, and mouse can be connected to Raspberry Pi through micro-HDMI and USB connectors and it can be used like a desktop computer. It supports a number of operating systems including a Debian-based Linux distro, Raspbian, which is used in our design. Raspberry Pi can be connected to a local area network through Ethernet cable or USB Wi-Fi adapter, and then it can be accessed through SSH remote login.

It is desired to count the persons in a room with two motion sensors working together on either side of a door. The laboratory mounting (on a desk) of the sensors simulates very well the sensors working together in the real situation, on either side of a door. In fig. 2 can be seen the image of the system used in this study and its electrical diagram.

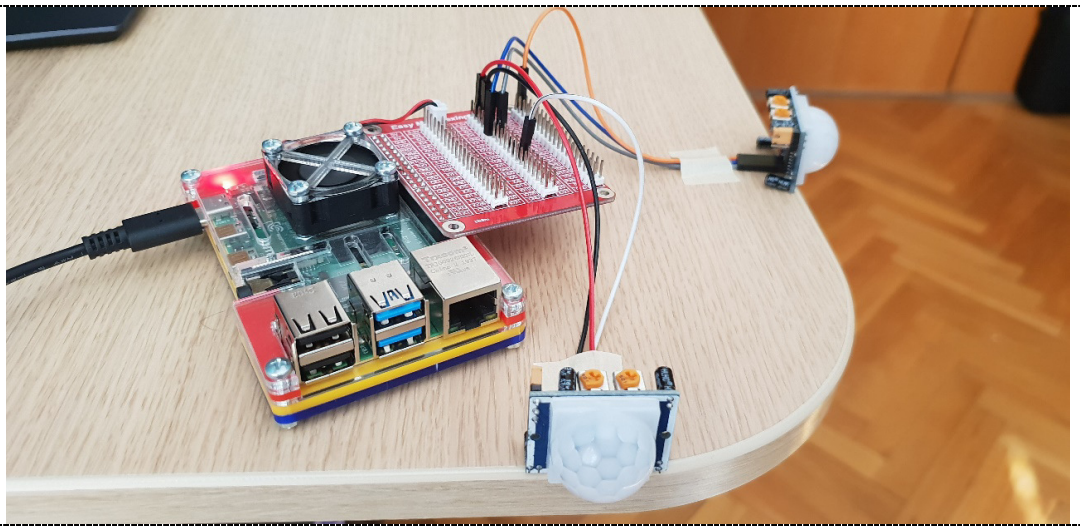

a)

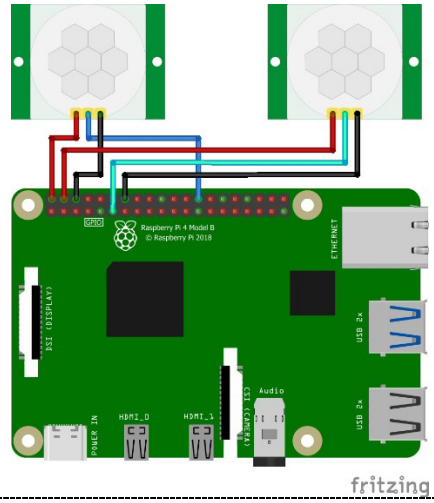

b)

Figure 2: Two PIR sensors and Raspberry PI: a) photo of the assembly; b) assembly scheme

In the schematic representation in fig. 2 b) the following connections are done: the 3-5VDC power pins of the PIR sensors are connected to the 5-volt power supply (2 and 4) of Raspberry PI. The Ground pins of PIR sensors are connected to GND (6 and 14) on Raspberry PI. The digital out (SDA) of one PIR sensor is connected to GPIO7 (11) on Raspberry PI and of the other SDA of the PIR sensor to GPIO17 (11). The calculation algorithm of people count is presented in table 1. A software written in Python was developed to implement these rules.

Table 1: Rules for determining people count using the information received from the two PIR sensors.

Rule 1 When one of the two sensors detects motion, it is checked if the other sensor has also detected motion and if the time interval between the two detections is less than a certain value, what is settable (for example 3 seconds). The three seconds means that a longer time interval is not suitable for a person to walk through the door. **Rule 2** If the condition is met then an entrance or exit to the room is counted, as the last sensor that detected movement was inside or outside. (As positioned, the two sensors are considered one inside and one outside the room in which the counting is done.) **Rule 3** After an entrance or exit to the room has been counted, both sensors are reset (they are considered without detected motion).

In Python code, to check the status of a PIR sensor, an infinite loop can be used (of course with a certain pause set between repetitions) in which it is checked if there has been any input at the sensor pin. But there is also the possibility in which the code is told to wait until an event occurs e.g. when the pin detects a signal. The advantage of the second approach is that processor resources (CPU) are not consumed by repeating a loop. In the case of this study, the variant of waiting to appear, for the event that represents the signal detected by the pin, was used.

Another aspect to be specified is that the PIR sensors used were too sensitive, so their adjustment was made according to the datasheet and the user manual (PIR 2020).

The Solution That Uses Two Ultrasonic Sensors

This solution uses a Raspberry Pi, Model 4, B (Raspberry Pi4 2019), which was presented in the previous subchapter, a multiplexing connection board and a pair of two identical ultrasonic sensors (Ultrasonic 2020). Ultrasonic sensor works on the principle that is similar to RADAR and SONOR i.e. transmits a signal and analyzes the target by capturing the reflected signals. HC-SR05 is an ultrasonic ranging sensor with good accuracy. Ultrasonic sensors overcome many of the weaknesses of IR sensors - they provide distance measurement regardless of color and lighting of obstacles. They also provide lower minimum distances and wider angles of detection to guarantee that obstacles are not missed by a narrow sensor beam. It has 5 pins and can be used in 1-pin trigger/echo or 2-pin.

It is desired to count the persons in a room with two ultrasonic sensors working together on either side of a door. In this study the ability to measure the distance that ultrasonic sensors have will not be used but only the capability that they can detect movement. The laboratory mounting (on a desk) of the sensors simulates very well the sensors working together in the real situation, on either side of a door. In fig. 3 can be seen the image of the system used in this study and its electrical diagram.

In the schematic representation in fig. 3 b) the following connections are done: the VCC power pins of the PIR sensors are connected to the 5-volt power supply (2 and 4) of Raspberry PI. The Ground pins of PIR sensors are connected, using a breadboard to GND (6) on Raspberry PI. The *Trig* pin of one sensor is connected to GPIO4(7) of Raspberry PI and the *Trig* pin of the other sensor to GPIO23(16) of Raspberry PI. It is realized, for each sensor, a voltage divider that is set up for the echo pin (it drops the voltage going to the GPIO pins down to 3.3v from 5v). 1k Ω resistor (R1) and a 2k Ω resistor (R2) are used to achieve this. *Echo* pin of the sensor is connected to R1, R2 is connected to Ground of Raspberry PI, and wire from R1 and R2 are connected to GPIO17(11) of Raspberry PI, respectively GPIO24(18) for the other sensor.

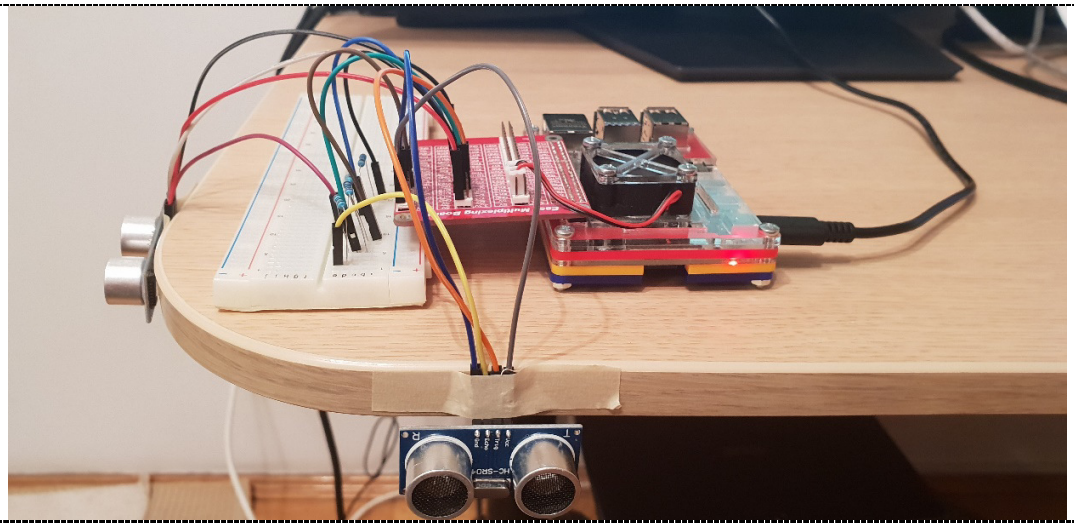

a)

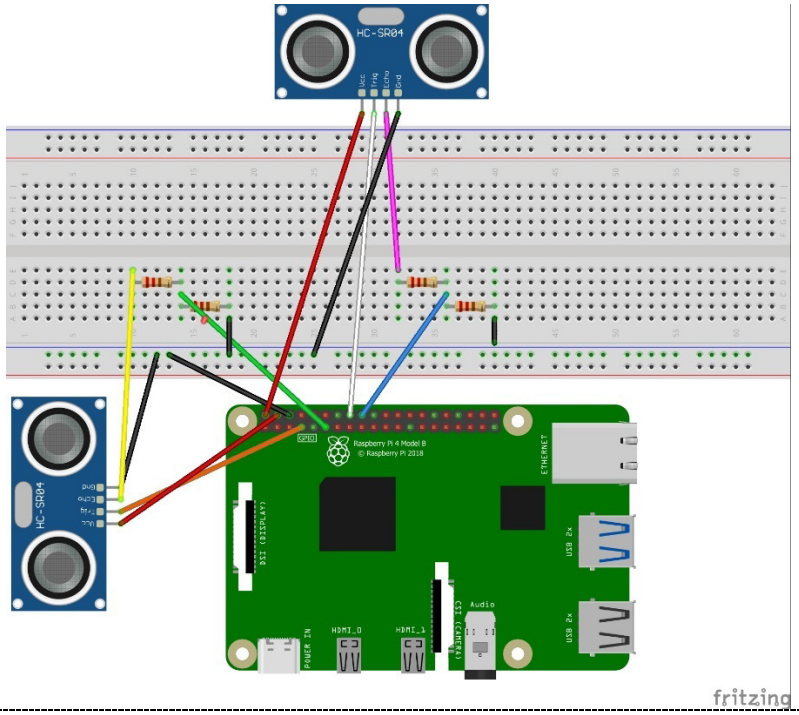

b)

Figure 3: Two ultrasonic sensors and Raspberry PI: a) photo of the assembly; b) assembly scheme

Rules for determining people count using the information received from the two ultrasonic sensors are the same as rules used for PIR sensors. Regarding the Python code, to check the status of an ultrasonic sensor, the solution that checks if the sensor has detected something uses an infinite loop.

The solution that uses a Grid-EYE sensor

This solution uses a Raspberry Pi, Model 4, B (Raspberry Pi4 2019), which was presented in the previous subchapter, a multiplexing connection board and Grid-EYE Infrared sensor (Grid-EYE 2020). Grid-EYE is a high precision infrared array sensor based on advanced MEMS technology. It has the feature of temperature detection of two-dimensional area: 8×8 (64 pixels), digital output (capability of temperature value output), and a compact package. Temperature range of measuring object is from 0 °C to 80 °C.

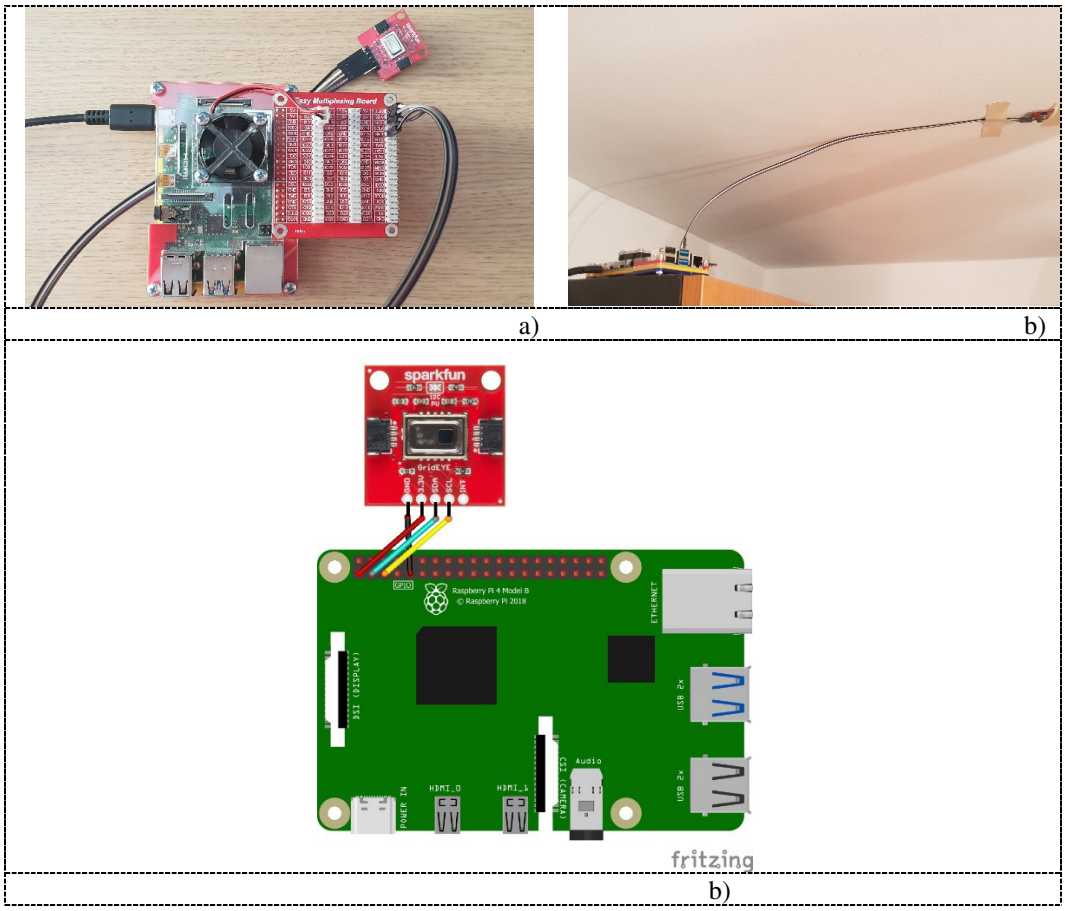

Figure 4: Grid-EYE sensor and Raspberry PI: a) photo of the assembly; b) photo of the assembly with the Grid-EYE sensor mounted in the ceiling; c) assembly scheme

In fig. 4 can be seen the image of the system used in this study, a photo of the assembly on the desk (a) and a photo with it in working position, mounted on the ceiling (b) and its electrical diagram (c).

In the schematic representation in fig. 4 c) the following connections are done: the VCC (3.3V) power pins of the Grid-EYE sensor are connected to the 3.3-volt power supply(1) of Raspberry PI. The Ground pin of Grid-EYE sensor are connected to GND(9) on Raspberry PI, the SDA pin of the sensor to GPIO2-SDA1(3) on Raspberry PI and the SDA pin of the sensor to GPIO3-SCL1(5) on Raspberry PI.

It is desired to count the persons in a room using this solution. First, Python code was used to display the 8x8 pixels grid given by the Grid-EYE sensor. Then a people count was performed based on the obtained image.

Python has been chosen as the programming language because of its vast data processing toolbox and the existence of an AMG88xx library. The AMG88xx library handles the I2C protocols and returns the temperature values of the 64 individual IR detectors (Hrisko 2018). The *pyplot* interface was also used in Python. *matplotlib.pyplot* is a collection of functions that make *matplotlib* work like MATLAB. Each *pyplot* function makes some change to a figure: e.g., creates a figure, creates a plotting area in a figure, plots some lines in a plotting area, decorates the plot with labels, etc (Matplotlib 2012).

In order to determine the number of people based on an infrared photo, *OpenCV-Python* (OpenCVTut 2013) was used. *OpenCV-Python* is the Python API of *OpenCV*. *OpenCV* was started at Intel in 1999 by Gary Bradsky and the first release came out in 2000. Right now, OpenCV supports a lot of algorithms related to Computer Vision and Machine Learning and it is expanding day-by-day (OpenCV 2013). Using the *scripy.interpolate* module, function *griddata*, that deals with the *OpenCV-Python* interface, and the solution proposed by (Keith 2018), a code that makes blob detection was developed in Python. A Blob is a group of connected pixels in an image that share some common property (E.g. grayscale value). *OpenCV* provides a convenient way to detect blobs and filter them based on different characteristics (Mallick 2015).

Python code for all three solutions can be downloaded from http://www.cladirieficiente.ro.

Results and Discussions

Regarding the first two methods of determining people count, using PIR sensors and ultrasonic sensors the calculation algorithm is relatively simple. Following the tests performed, no errors occurred. However, here is a limitation with this approach: if two people enter a room at the same time, there is no way of detecting the two people apart. Or if people who enter and people who leave meet at the access door or other situations that are easy to imagine.

In this project the display of the code in Python console was sufficient, in later stages, after choosing the optimal solution for determining the number of people, functions will be developed and, depending on the requirements, adequate methods will be found to make the API of the application on the Raspberry Pi PCB.

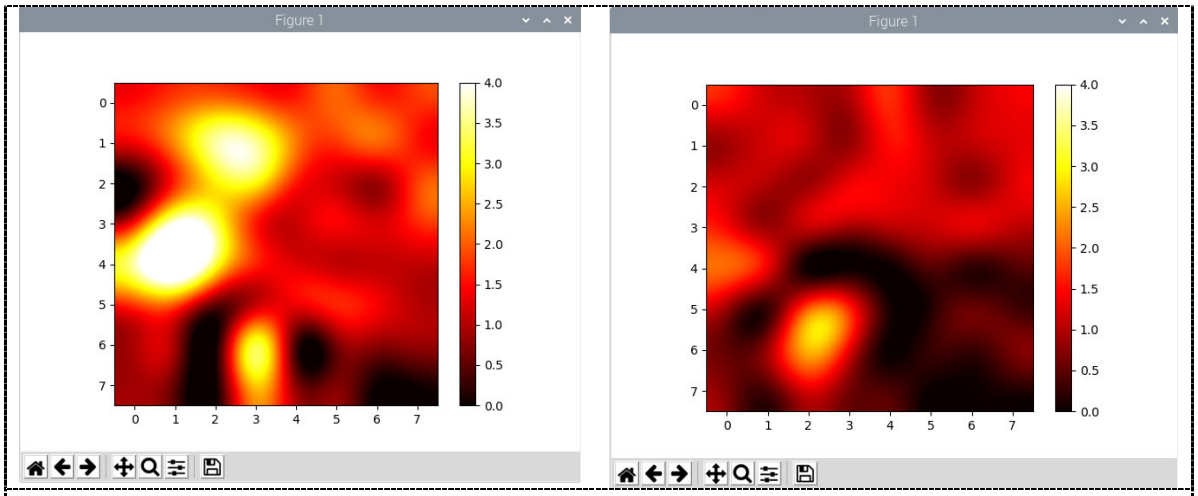

a) b)

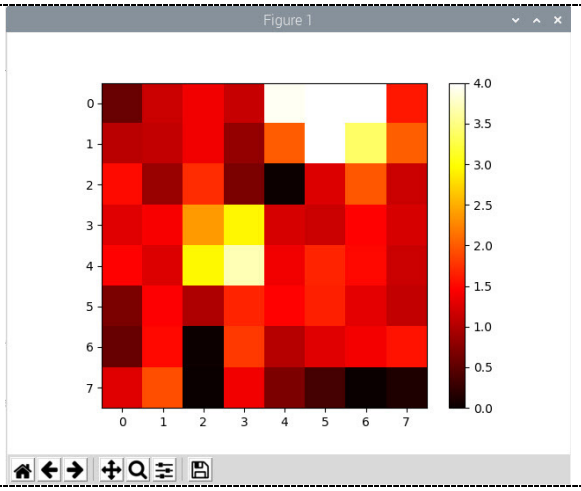

c)

Figure 5: The image obtained with Grid-EYE: a) three people in the room; b) one person in the room; c) two people in the room (8x8 grid given by Grid-EYE, without interpolation)

In fig. 5 is shown the grid given by the Grid-EYE sensor. One can see the presence of three people (a), one person (b) and two people (c). The grid display can be done with or without interpolation, in fig (c) it is missing. Note that the people count algorithm works without the graphical display of the image (but uses it without displaying it). The display of the image is made to better understand what is happening and for didactic purposes.

In the images in fig. 5 the number of people in the room is quite clear, but not all the images are so clear. The result can be influenced by the distance people are from the sensor, if they are sitting or standing, if people are moving, it can also be influenced by various other heat sources.

Regarding the testing, there were some errors in this method, as expected for an information of 8x8 pixels. The calculation method and algorithm are very good and other sensors are recommended, such as FLIR Radiometric Lepton (FLIRCamera 2020) which has a relatively affordable price. It should be noted that *People Counting Software* using Grid-EYE is developed by Panasonic (the sensor manufactures also) (Grid-EYECount 2017), but it is not an open source software.

Conclusions

In the context of the exponential growth of IoT in the last period and of the need of FM to optimize its activity based on the growth of information received from the field, there was a need to count the presence in the meeting rooms of various companies. Thus, the present paper fulfills a requirement that is part of a POC project through which it is desired to monitor the presence and light intensity in two meeting rooms of a customer. The requirement is to establish the optimal method of people counting in the meeting rooms.

Two methods of people counting are studied, one using a pair of PIR sensors and another using a pair of ultrasonic sensors and a detection method, using infrared technology by using a Grid-EYE sensor, then establishing the people count based on the information received by the Grid-EYE sensor.

In the first two methods there are no reading errors due to the sensors, however certain situations that exceed the limit of the possibilities of people counting through this system may occur, such as the simultaneous entry or exit of two people. Furthermore, in case of monitoring the presence in the meeting rooms, attention must be paid to the cumulation of possible errors that would occur for people counting using PIR and ultrasound sensors. That is, the wrong counting of an entrance or exit will be perpetuated at the next meetings, the system has no way to reset (to set the number of people to zero) at the beginning of a session. Although this would not be a problem from a technical point of view, from a business point of view it would be a mistake (it is possible that the meeting started earlier, at another time, for example). A system reset at the end of a working day is not enough.

In the case of determining people count using Grid-EYE, there were sometimes noticed differences in counting compared to the number of people actually present in the room. This may be due to the low resolution of the information sent by the Grid-EYE sensor, or a grid of only 8x8 pixels. In this situation higher resolution sensors are recommended.

In this paper people counting is considered in relation to the entire trace of requirements it satisfies. For example, the level of accuracy that is required in an FM application that deals with *Rooms Reservation*. A very high degree of accuracy would be needed if, depending on the people count, decisions could be made such as canceling a meeting. But if there is interest in the evolution over time of the occupancy rate of the meeting rooms (real number of participants vs. planned number of participants and room capacity), on the basis of which statistical evaluations would be made, then small deviations from the people count could be admitted.

Acknowledgment

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Fiscal Decentralization and Economic Growth in The Czechia

Irena SZAROWSKÁ

Silesian University in Opava, School of Business Administration in Karviná, Czechia
szarowska@opf.slu.cz

Abstract

The Czechia applies a combined model of fiscal federalism with relatively low fiscal decentralisation and belongs to countries with the most territorial fragmentation of municipalities. The aim of the article is to examine relationship between fiscal decentralisation and economic development in the Czechia in the years 2000-2019. There are used following indicators: expenditure decentralisation, revenue decentralisation, intergovernmental transfer decentralisation and tax revenue decentralisation. The empirical tests are based on cross correlation and Granger causality methodology. The results suggest that decentralisation appears to be positively associated with GDP per capita but negatively associated with real GDP growth, except expenditure decentralisation positively correlated in both cases. The relationship is stronger for economic maturity than for economic growth and GDP growth comes first followed by decentralisation.

Keywords: Fiscal Decentralisation, Fiscal Federalism, Subnational Governments, Economic Development.

Introduction

Theory of fiscal federalism has started to highlight fiscal decentralisation since the 1970´s of the 20th century. Fiscal decentralisation (hereinafter FD) is usually characterized by a division of decision - making powers combined with a limited shift of the resources to sub-central governments (SCGs). Aristovnik (2012) notes that many post-communist countries started the public sector reforming process later, with some derogation from the optimal FD implementation. In the Czechia, state decentralisation and local autonomy were understood in a way that gave the right to become a separate local government, to almost each settlement unit, even if that unit was a tiny village. The number of municipalities rose by almost 50%, from 4,120 in 1993 to 6,250 in 2001. Nowadays, the Czechia uses a combined model of fiscal federalism and belongs to countries with the most territorial fragmentation.

In this context, the relationship between economic performance and the size of municipality is often discussed. Economic growth is affected by many factors among other FD (Musgrave 1959; Oates 1972). Studies highlight theoretical prediction that FD enhances the efficiency of government and promotes economic development (Oates, 2005 or Baskaran et al., 2016) but some report present contradictory direction of influence.

The aim of the article is to examine relationship between FD and economic development in the Czechia in the years 2000-2019. The article is organised as follows. Next chapter introduces a theoretical background and literature review. Followed chapter provides a description of methodology and data. Empirical part focuses on FD in the Czechia and the intention is to identify direction of influence as well. Conclusion summaries main findings.

Literature Review

Traditional theory of fiscal federalism is mostly based on Oates's (1972) theorem, which predicts a greater allocative efficiency and production efficiency. An important extension of literature brings 'second-generation' of fiscal federalism which takes into account political and fiscal institutions, imperfect information and political agents. Generally, FD is linked to sharing of fiscal responsibilities and power among central, state and local governments, but the term is not sufficiently clear even in the fields of political science or public administration

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(Bird and Wallich, 1993 or Rodríguez-Pose and Krøijer, 2009). Bahl (2008) introduces the pillars and twelve implementation rules for FD.

Thiessen (2003) as well as Martinez-Vazquez and McNab (2003) mention the absence of a formalized theory on the relationship between FD and economic growth. Thiessen (2003) describes a positive relation between decentralisation and growth when decentralisation is increasing from low levels, but that as decentralisation increased, the relation eventually turned negative in a cross section of high-income OECD economies using annual data for a period 1973–1998.

Later Oates (2005) gives a review of the FD characteristics and its economic implications. This and other relevant studies (e.g. OECD and KIPF, 2016) claim to demonstrate the direct of FD on economic growth. However, a causality is not clear and absolute, and decentralisation may affect growth indirectly through its impact on other socio-economic variables, such as macro stability and government quality (Martinez-Vazquez and McNab, 2003), or through its interaction with the institutional framework (Feld and Schnellenbach, 2011). Martinez-Vazquez et al. (2017) offer a complex review of the impact of FD on the economy and society. Most recently, Slavinskaite et al. (2020) introduce a theoretical model for evaluating the FD.

Empirical studies focused on the relationship between FD and economic growth provide mixed ambiguous results, sensitive to the choice of data sample and investigated period. Slavinskaitė (2017) summarizes empirical findings of researches on the impact of FD on economic growth in cross – countries terms. Blöchliger and Égert (2013) present an overview of literature review, which is divided into two groups – cross-country studies and national studies. Many empirical studies are focused on the share of SCG revenue or expenditure in consolidated government revenue or expenditure as the measure of FD. Studies that have reported a positive and statistically significant impact using these measures include, among others, Iimi (2005), who reports significant and positive impact of expenditure decentralisation on per capita GDP growth in a panel of 51 developed and developing countries covering 1997-2001.

Akai et al. (2007) stress the complementarity relationship between FD and economic growth in the USA and promote further revenue decentralisation by computing the optimal degree of FD measured by expenditure decentralisation and revenue decentralisation. Thornton (2007) highlights relationship between FD and long-run economic growth is ambiguous as is apparent from the results of empirical studies.

Contrary to a majority view, it is possible to find many empirical studies with proven a negative impact of FD on economic growth (e. g. Zhang and Zou, 1998, Rodríguez-Pose and Ezcurra, 2011 or Baskaran and Feld, 2013). Some studies even consider decentralisation harmful, especially in the case of developing and transition economies (Rodden, 2002). This scepticism is fuelled by problems often associated with decentralisation, such as increasing deficits, lower quality of government decisions, corruption, increased influence of interest groups, and greater interregional inequalities, which result in lower overall economic growth.

Rodríguez-Pose and Krøijer (2009) examine, using a panel data approach with dynamic effects, the relationship between the level of FD and economic growth rates across 16 Central and Eastern European countries over the 1990-2004 period. While expenditure at and transfers to subnational tiers of government are negatively correlated with economic growth, tax as assigned at the subnational level evolve from having a significantly negative to a significantly positive correlation with the national growth rate.

Gemmell et al. (2013) investigate whether the efficiency gains accompanying FD generate higher growth in 23 OECD countries, 1972–2005. They find that spending decentralisation tends to be associated with lower economic growth while revenue decentralisation are associated with higher growth. Wang (2018) offers diverse results for revenue and expenditure decentralisation as well. He states revenue decentralisation does not affect economic performance. But expenditure decentralisation dividend in terms of an enhanced economic growth rate can be achieved only when the initial share of local government expenditure is smaller than the growth-maximizing degree through along with tax collection and trade openness.

Also Radoniqi (2018) points out that empirical studies about the impact of fiscal decentralisation in economic growth all the time have provided mix results. Her paper reviews, analyses and compares findings of these studies and highlights and explains differences on the dimensions studied from the authors about this phenomenon. Newly,

Carniti et al. (2019) tested effects of fiscal decentralisation on economic growth empirically on a panel of 25 European countries (1995-2015) and focuses on expenditure composition. Their econometric results show that relationship between investment decentralisation and growth is an inverted bell-shaped curve: there is a critical mass of decentralized investments beyond which it is possible to enhance growth.

Jílek (2009) deals with the issue of FD in the Czechia. The analysis shows that though the expenditure decentralisation in the Czechia is quite high, the degree of revenue and tax decentralisation is low. This result is supported also by the comparison with OECD-Europe unitary countries average. Bryson et al. (2004) survey FD in the Czechia too. They conclude the Czechia made more substantial transfers to local governments, but the development of fiscal autonomy was stifled as transfers reduced the need for own-source local revenues. The Czech real estate tax has remained nominal as it was under central planning, and its administration is fraught with moral hazard problems. The property tax never became a tool for generating independent funds. This Sobotovičová and Janoušková (2020) confirm too and present specifics of real estate taxation in the Czechia.

Methods

The aim of the paper is to examine relationship between FD and economic development and also identify direction of influence in the Czechia in the years 2000-2019. The empirical evidence relies on the secondary statistical data of the Czech Statistical Office, Ministry of Finance (monitor.statnipokladna.cz) and the OECD Fiscal Decentralisation Database, data are consistent in time. Since FD has many dimensions (e.g. Harguindéguy et al. (2019) review and compare 25 decentralisation indexes), variables in accordance with OECD definition are specified as follows:

Expenditure decentralisation (EXPD) is the ratio of subcentral to total general government expenditure as defined in (1).

$$EXPD = \frac{EXP_{SCG} - Tr_{SCG(-)}}{EXP - Tr_{(-)}} \times 100 \quad (1)$$

EXP_{SCG} means total expenditures of SCG, Tr_{SCG} transfers provided by SCG, EXP total government expenditures, Tr transfers between levels of government.

Revenue decentralisation (REVD) means the ratio of subcentral own revenue to total general government revenue.

$$REVD = \frac{REV_{SCG} - Tr_{SCG(+)}}{REV - Tr_{(+)}} \times 100 \quad (2)$$

In (2), REV_{SCG} means total revenues of SCG, Tr_{SCG} transfers (grants) received by SCG, REV total government revenues, Tr transfers between levels of government.

Tax revenue decentralisation (TAXD) expressing the ratio of subcentral tax revenue (TAX_{SCG}) to total general government tax revenue (TAX):

$$TAXD = \frac{TAX_{SCG}}{TAX} \times 100 \quad (3)$$

Intergovernmental transfer decentralisation (TRFS) means transfers between the central government level and social security which are considered to be internal and have not been taken into account when calculating either the inter-governmental transfer revenue or the total revenue.

It is necessary to point out that the Czechia is a unitary state, SCG is formed by municipalities and regions and values of SCG (expenditure, revenues, tax, transfer) is equal to a sum of financial flows for these basic and higher self-governing units.

Economic development is assessed using the real GDP growth rate (RGDP) and nominal GDP per capita (GDP) expressed in Purchasing Power Parity (PPP). GDP per capita values were transformed into natural logarithms. It is necessary to test the stationary time series before starting analysis. Unit root tests identified that all time series are stationary at the first differences (RGDP and EXP also at level data). The empirical tests relating decentralisation and economic performance are based on cross correlation methodology.

Cross correlation assesses how one reference time series correlates with another time series, or several other series, as a function of time shift (lag). Cross correlation does not yield a single correlation coefficient but rather a whole series of correlation values. Like all correlations, cross correlation only shows statistical associations not causation. Consider two financial series and, then the cross-correlation at lag (lead) k is defined as follows:

$$\rho(y_{t+k}, x_t) = \frac{T\sum_{t=k-1}^{T}(y_{t+k} - m_y)(x_t - m_x)}{(T+k)\sqrt{\sum_{t=k}^{T}(y_{t+k} - m_y)^2}\sqrt{\sum_{t=k}^{T}(x_t - m_x)^2}} \qquad (4)$$

where ρ is the correlation coefficient and m_x and m_y are the means of corresponding series. The series can be related in three possible ways: (i) y_t can lead x_t ($\rho(y_{t-k}, x_t) \neq 0$), (ii) y_t can lag x_t ($\rho(y_{t+k}, x_t) \neq 0$), (iii) series can be contemporaneously related ($\rho(y_t, x_t) \neq 0$).

Granger causality methodology is also applied. The Granger causality refers to a specific notion of causality in time-series analysis. A time series X is said to Granger-cause Y if it can be shown, usually through a series of t-tests and F-tests on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future values of Y.

Results and Discussion

FD in Czechia and development of analysed variables

The 1993 Constitution established the Czechia as a sovereign unitary state and guaranteed two levels of SCG system, with no hierarchical link: the higher self-governing units (the regions), and the basic self-governing units (the municipalities which are regulated through the Municipal Act 128/2000). Regions were established in 2000 (Regions Act 129/2000). There were instead 77 district offices, which were deconcentrated units of the state territorial administration and which, to a certain extent, worked as surrogate regional governments. The system of intergovernmental fiscal relations in the Czechia remains quite centralized. A fair assessment of the current system is that the Czechia may be considered as having a significantly deconcentrated state administration structure. This is because all of the activities of district offices and the bulk of the activities of municipalities have been aimed at implementing the central government's policies at the local level. Most of the fiscal decision - making power emanates from the center and local level governments have only a marginal influence on local fiscal matters.

The contemporary government in the Czechia is organised in a three-tier structure: the central government, 14 regions and 6258 municipalities (Czech Statistical Office, 2018). The capital Prague has a special statute and is considered both a region and a municipality. The most of the municipality's revenues come from shared taxes, where the largest part consists of the collection of VAT. However, municipalities also have the possibility to set their own fees and have in their delegated powers, the collection of property tax. Municipality also may freely dispose of its properties and can also have rental income, sales, or conduct business. The distribution of revenue from shared taxes between the various levels of government, and consequently between the municipalities is precisely defined in the Act 243/2000 Act on budgetary allocation of taxes. Municipalities also receive state subsidies for the performance of state administration under delegated powers as Figure 1 shows.

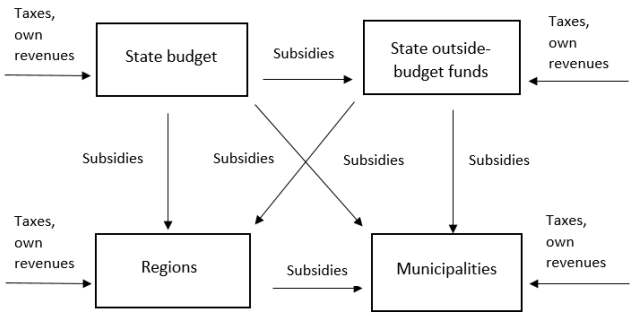

Fig. 1: Combined model of fiscal federalism in the Czechia

A degree of decentralisation has evolved during the transition. Regions and municipalities are entitled by state law to both autonomous responsibilities, over which they have considerable freedom with regards to financial and legal aspects, and delegated responsibilities, which need to be executed according to central government guidelines. Municipalities are autonomously responsible mainly for pre-elementary and primary education, local social welfare, environment, public housing, public transports and local roads. Regions are autonomously responsible for secondary education, regional road networks, regional economic development and healthcare. SCGs get their revenues from taxation (own-source), grants and other sources, mainly fees resulting from the provision of services. Sub-national expenditure represents 11.8% of GDP and 27.0% of total public expenditure. The revenue of municipalities can be broken down as follows: 9.5% from autonomous taxation, 46.9% from shared taxation, 27.7% from grants and 15.9% from other sources. The revenue of regions can be broken down as follows: 0.2% from autonomous taxation, 34.7% from shared taxation, 62.3% from grants and 2.8% from other sources (Czech Statistical Office, 2018).

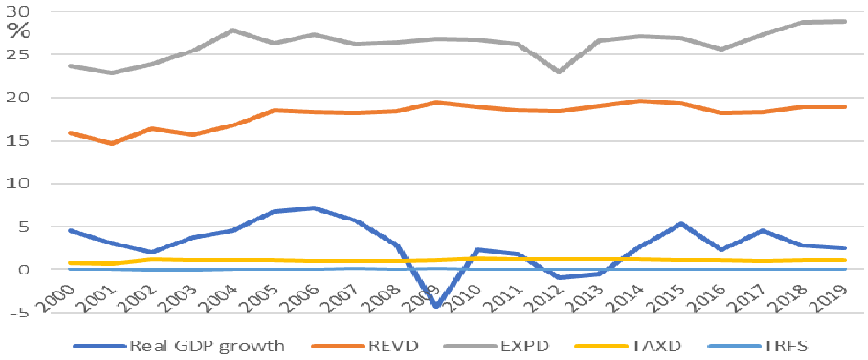

Fig. 2: Development of variables in percentage (2000-2019)

As Figure 2 reports, expenditures are more decentralised than revenues. While both revenue and expenditure became more decentralised over the past 20 years, expenditure decentralisation outpaced revenue decentralisation, resulting in a higher vertical fiscal imbalance and growing intergovernmental grants (for details look at Halásková and Halásková, 2017 and 2018; Szarowská, 2014 and 2015). Martinez-Vazquez et al. (2017) draw attention to shared taxes usually appear in official statistics as sub-national revenue, although the SCG has no autonomy in determining the revenue base or rate. When the degree of taxing power of SCGs is considered, the decline of revenue decentralisation and stagnation of tax autonomy is seen. New increase of decentralisation is visible from 2013 and is connected with a positive economic development. Overall, expenditure decentralisation (EXPD) has increased from 24% (2000) to 29% in 2018. SCGs have a very low share in total tax government revenues and increase of revenue decentralisation (REVD) is only 3 percentage points (from 16% to 19%) in the analysed period. A degree of revenue FD is similar the EU average (18%) as is reported by Czech Statistical Office (2018) as well as OECD and KIPF (2016). Very low value (about 1%) of tax revenue decentralisation (TAXD) results from the fact the Czechia is the country without tax legislative powers at the sub-national level. SCGs are highly dependent on financial redistribution by the government. The system of shared taxation, according to which approximately 9%

of state taxes are transferred to regional authorities and about 22% of state taxes are transferred to local and regional authorities, leaves the latter considerable freedom in deciding how these resources should be used within the field of their proper responsibilities. Municipalities have a limited discretion by adjusting (local and size) coefficients over the property tax (representing about 3% of municipal revenues) and full discretion over local fees (representing 2.3% of municipal revenues in 2018). Intergovernmental transfer decentralisation (TRFS) stagnates and is nearly zero. Economic growth reports cyclical development. Maximum value is reported in 2006 (+7.25%), minimum in 2009 (-4.35%), mean value is 2.97%.

Results of Granger causality

Pairwise Granger causality tests are applied for examining relations between GDP growth and EXPD ratio as well as other selected variables in a short-term. It is important to mention that the statement for example "Expenditure Granger causes GDP" does not imply that GDP is the effect or the result of EXPD. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term. The null hypothesis should be rejecting if probability is less than 0.05. Table 1 summarizes results for lags one and two years. Bold values indicate hypothesis, which should be rejected.

Table 1: Granger causality tests

Null Hypothesis:	Lags: 1 year			Lags: 2 years		
	Obs.	**F-Statistic**	**Prob.**	**Obs.**	**F-Statistic**	**Prob.**
EXP does not GC GDP GROWTH	19	0.503	0.488	18	0.436	0.623
GDP GROWTH does not GC EXP		0.090	0.767		0.046	0.955
REV does not GC GDP GROWTH	19	0.067	0.797	18	1.379	0.286
GDP GROWTH does not GC REV		0.150	0.694		0.096	0.908
TAX does not GC GDP GROWTH	19	3.462	0.081	18	0.187	0.831
GDP GROWTH does not GC TAX		**11.191**	**0.004**		**3.434**	**2.E-05**
TRFS does not GC GDP GROWTH	19	3.462	0.704	18	4.634	0.030
GDP GROWTH does not GC TRFS		**4.508**	**0.049**		1.171	0.341
EXP does not GC GDP PER CAPITA	19	0.111	0.748	18	0.228	0.798
GDP PER CAPITA does not GC EXP		0.273	0.608		0.207	0.815
REV does not GC GDP_PER CAPITA	19	0.019	0.890	18	0.763	0.485
GDP PER CAPITA does not GC REV		0.828	0.376		1.319	0.301
TAX does not GC GDP PER CAPITA	19	0.648	0.432	18	0.208	0.814
GDP PER CAPITA does not GC TAX		2.123	0.1644		0.826	0.459
TRFS does not GC GDP PER CAPITA	19	0.230	0.637	18	0.705	0.511
GDP PER CAPITA does not GC TRfS		0.198	0.662		0.017	0.982

Note: GC means Granger cause

One can find only two examples of one-way Granger causality from GDP growth to tax revenue ratio TAXD and intergovernmental transfer revenue TRFS for the 1 year lag. The causality from economic maturity expressed by GDP per capita to decentralisation variables is not revealed in any case. With the lag of 2 years, there is not reported any Granger causality between analysed variables. From this point of view can be concluded that there is just one-way causality, which was reported from GDP growth to TAXD and TRD. That means GDP growth comes first followed by decentralisation. Deeper analysis focused on direct impact of variables will follow in a next paper.

Results of Correlation Analysis

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. The correlation coefficient can vary from –1 to +1. The correlation coefficient –1 indicates perfect negative correlation,

and +1 indicates perfect positive correlation. Its value smaller 0.1 means zero correlation, from 0.1 to 0.35 weak correlation, from 0.35 to 0.7 moderate correlation and higher than 0.7 express strong correlation. The results in Table 1 report cross-correlations for all possible combinations of growth and decentralisation variables.

Table 2: Correlation coefficients

	Real GDP growth	Correlation	GDP per capita	Correlation
Expenditure ratio	0.151	weak positive	0.496	moderate positive
Revenue ratio	-0.224	weak negative	0.872	strong positive
Tax revenue ratio	-0.404	moderate negative	0.756	strong positive
Transfers	-0.215	weak negative	0.477	moderate positive

Findings suggest that decentralisation appears to be positively associated with GDP per capita but negatively associated with GDP growth, except expenditure decentralisation, which is positively correlated in both cases. Coefficients also express correlation is stronger for economic maturity expressed by GDP per capita than for economic growth. The information about GDP growth provided by Table 2 can be interpreted as economic growth does not relate exclusively on the degree of FD of a country (coefficients of correlation are very low).

The results are similar to the conclusion about the relationship between GDP per capita growth and decentralisation observed in the research of Martinez -Vazquez (2016). Aristovnik (2012) also finds a weak positive correlation between FD and economic growth in Eastern European countries, so the case of the Czechia confirms this trend. Coefficients suggest that FD might accelerate economic growth. The similar conclusion is possible to find in Iimi (2005), Akai et al. (2007) or Thornton (2007).

Found positive correlation coefficients and positive influence of the degree of FD on economic performance may be affected by country differences in political and administrative decentralisation as Rodríguez-Pose and Ezcurra (2011) also assumed. In terms of subnational expenditure and revenues, the results of empirical evidence are in line with the findings of other empirical studies on FD and economic growth, such as Thiessen (2003), Iimi (2005), Akai et al. (2007), or Rodríguez-Pose and Krøijer (2009), but opposite as Zhang and Zou (1998), Rodden (2002) or Rodríguez-Pose and Ezcurra (2011). The variety is generated due to differences in used econometric models, country samples, observation periods and considered variables.

Conclusion

The aim of paper was to examine relationship between FD and economic development and identify direction of influence in the Czechia in the years 2000-2019. The empirical tests relating decentralisation and economic performance are based on cross correlation and Granger causality methodology.

Decentralisation process in the Czechia is driven by both economic and political forces. Currently the Czechia uses a combined model of fiscal federalism with a three-tier structure: the central government, 14 regions and 6258 municipalities (Czech Statistical Office, 2018). Municipalities and regions form the SCG level and they are entitled by state law to both autonomous and delegated responsibilities, which need to be executed according to central government guidelines. SCGs are highly dependent on financial redistribution by the central government. Shared taxes usually appear in official statistics as sub-national revenue, although the SCG has no autonomy in determining the revenue base or rate. Municipalities have a limited discretion by adjusting (local and size) coefficients over the property tax and full discretion over local fees. Very low value of tax revenue decentralisation results from the fact the Czechia is the country without tax legislative powers at the sub-national level. Expenditures are more decentralised than revenues. Over the past 20 years, expenditure decentralisation has increased from 24% (2000) to nearly 29% in 2019.

The Granger causality identified just one-way causality, which was reported from GDP growth to tax revenue ratio and intergovernmental transfer revenue for 1 year lag. That indicates that GDP growth comes first followed by decentralisation. But this result is very limited to draw general conclusions. Deeper analysis focused on a direct impact of variables will follow in next paper. Correlation analysis implies decentralisation appears to be positively

associated with GDP per capita but negatively associated with GDP growth, except expenditure decentralisation positively correlated in both cases. Coefficients express that correlation is stronger for economic maturity than for economic growth.

As economic maturity has significantly increased during the analysed period, it allows formulating implications for the government/economic policy. FD simplifies system of public sector and local SCGs, because responsibility for managing public resources is assigned to the lower level of governments. As mentions above, the Czechia belongs to countries with the most territorial fragmentation of municipalities. Hence, specific decision-making actions and changes should include institutional intergovernmental cooperation. The high territorial fragmentation at the lowest tier of government is the most remarkable attribute of the administrative structure and can be seen as a reason for a low level of revenue decentralisation, although expenditure decentralisation is a relatively high.

Revenue autonomy should be enhanced by increasing predictability of local budgets and e.g. resuming tax-effort incentives. The Act on budgetary allocation of taxes should be modified to decrease differences between local governments. A system of transfers should concentrate on reducing the number of specific subsidies, and boost transfers and programs stabilizing SCG budgets in a medium-term framework.

Although the research adds new empirical evidence to the literature, it should be remembered that country specifics are crucial in modelling fiscal decentralisation-growth effects and strongly depend especially on their size, territory specification and fragmentation as well as socio-economic maturity. That´s why future research will be focused on Visegrad countries with similar historical background and other European Union member states.

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Innovative Approach to Crew and Passenger Health During Flight

Maria-Aida STAN
University Politehnica of Bucharest, Romania, E-mail: stan.aida97@gmail.com

Mioara DUCA
University Politehnica of Bucharest, Romania, E-mail: mioara_duca@yahoo.com

Narcisa VALTER
University Politehnica of Bucharest, Romania, E-mail: narcisa.valter@yahoo.com

Iulian DUCA
University Politehnica of Bucharest, Romania, E-mail: duca_iulian@yahoo.fr

Vlad TURCANU
University Politehnica of Bucharest, Romania, E-mail: vlad.turcanu95@gmail.com

Abstract

There are numerous health-related issues that can occur during flight, for both passengers and crew members. The incidence of these issues rises for those who fly frequently. Among these risks are noise-related stress and frequent exposure to radiation, both ionizing, in the form of cosmic radiation and non-ionizing, in the form of UV rays. Numerous studies have correlated exposure to radiation with increased risk of developing several illnesses, especially cancer. Noise has also been documented to produce physical, physiological and mental effects on individuals. This paper aims to provide an overview of literature regarding this problem in order to highlight its importance and to propose several solutions that could alleviate the issue. Regarding cosmic radiation, we propose shielding the inner fuselage of aircraft in order to reduce the amount of radiation that enters the plane. We analyze the viability of this solution regarding added mass and shielding capability. We also touch briefly upon Z-grade materials, that are used in shielding satellites and that could be used in shielding aircraft as well. Regarding UV rays, we have found a simple and cost-effective solution, which can block UV rays without reducing windshield visibility.

Keywords: Radiation, Aviation, Health, Ergonomics.

Introduction

Flight safety and health are two major concerns for aviation. While flight safety has direct economic consequences for aeronautical companies, health has the downside of not being so easy to translate into money, which means that it is not a primary subject of interest for investing and for researching solutions for problems in this area. Therefore, we aim to bring to light three of the main issues regarding health of aircraft crew and frequent flyers: cosmic radiation, UV rays and noise-related stress. We illustrate the main causes of health issues among aircraft crew in an Ishikawa Diagram in Fig. 1.

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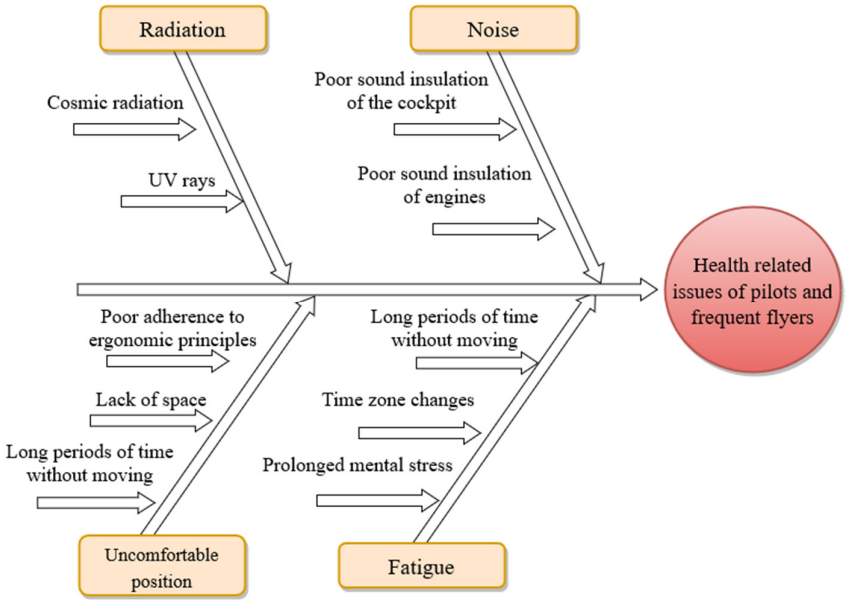

Fig. 1: Ishikawa diagram on health-related issues of pilots and frequent flyers (Source: Authors)

Radiation is one of the most important factors to consider when talking about health issues during flight. There are two types of radiation that increase in intensity at higher altitudes, namely cosmic radiation and UV rays.

Cosmic rays are a type of radiation that comes from space. This radiation is caused by charged particles generated by the sun and by primary photons and α particles from outside the solar system, which interact with the Earth's atmosphere (Bagshaw and Illig, 2019). Cosmic radiation is a type of ionizing radiation, which means that its high amount of energy enables it to detach electrons from other atoms of molecules, effectively modifying their structure, or ionizing them. Other well-known examples of ionizing radiation are Gamma rays and X-rays. Exposure to ionizing radiation can kill cells or cause them to mutate and function improperly. This has numerous health effects, such as burns, organ failure or even death.

We are exposed to a small amount of cosmic radiation every day. This has been calculated at a global average of 0.27 mSv per capita (Bouville and Lowder, 1988) and poses no significant health risks. The International Atomic Energy Agency sets a safety limit of 1 mSv / year for the general population (International Atomic Energy Agency, 2018), representing the total amount of radiation that a person can be exposed to during one year without any risk to their health. However, the small amount of cosmic radiation mentioned above is the one measured at ground level. Cosmic radiation increases with altitude, estimated to double for every 4500 feet (~1.37km) (Aw, 2003). Radiation doses experienced by most cabin crew fall in the range of 1 mSv – 6 mSv per year (Zeeb et al, 2003). This means that some aircraft personnel are exposed yearly to radiation doses 6 times over the safety limit. Studies validate the increased risk of cancer in aircraft crew, caused by this excess radiation: double the risk of leukemia, malignant melanoma and non-Hodgkin's lymphoma and a 9.67 times higher risk of other skin cancers, compared to the general population (Zeeb et al, 2003). Another study identifies a 1.9 times higher risk of breast and prostate cancer and a 4.72 times higher risk of leukemia in aircraft crew, compared to the rest of the population (Lim, 2002).

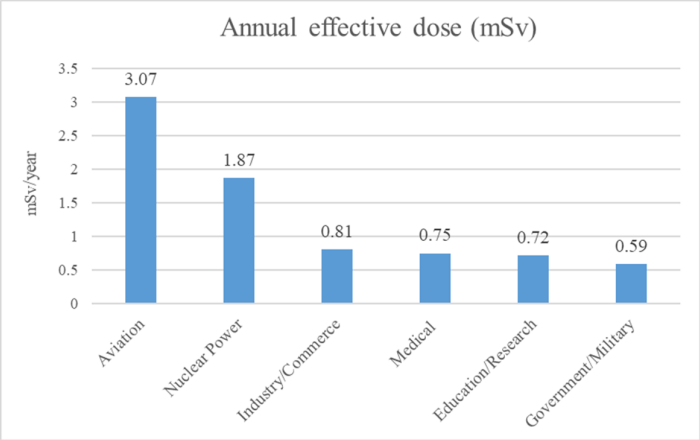

Fig. 1:Annual effective dose of radiation for various professions (Source: Authors)

A study published by the US National Council on Radiation Protection and Measurements (Schauer and Linton, 2009), which estimates annual radiation exposure for workers in various fields of work, collected data which shows that aircraft crew are exposed annually to almost twice as much radiation as workers in nuclear plants. We have presented this data in the chart in Fig. 2 above.

Apart from radiation, another important issue comes in the form of noise. Even though this problem has been the focus of several research and development attempts, it is not yet fully solved. There is evidence that working in noisy environments can lead to serious damage to both physical and mental capacities. Cockpit noise can lead to permanent damage to pilots' hearing abilities (Nwabeke, 2001). A German study (Grebig, 1971) classifies noise in three categories, based on their effects on health: Stage I noises are between 30 and 65 dB and lead to mental effects; Stage II noises are between 65 and 90 dB and lead to mental and material effects; Stage III noises are between 90 and 120 dB and lead to mental, material and otological effects. These effects also depend, on a certain degree, on the psychological reaction to noise. A negative reaction worsens the effects and increases the sensitivity of the individual to the stress factor. Conversely, a positive attitude can alleviate part of the stress, but it is still not enough to prevent damage from prolonged or heightened exposure to noise. Noise is of even greater importance when it comes to pilot performance. This can have serious repercussions to flight safety, given that noise can influence a pilot's ability to correctly perform the necessary maneuvers and tasks involved in flying the airplane.

State of the Art

At the moment, nothing is done in order to insulate the interior of aircraft against cosmic radiation, probably because this problem does not have a noticeable economic impact to motivate investment into finding and implementing a solution. The aluminum used to construct aircraft is not a good insulator, due to its relatively small atomic number of 13. Materials that successfully block radiation have a high number of electrons per unit volume, high electronic mean excitation energy, high density and tight binding corrections for the inner shell electrons (Wilson et al, 1995). One such material is lead. The high atomic number and high density of lead allows it to successfully block ionizing radiation. It is the industry standard for terrestrial radiation shielding, such as shielding against X-rays in nuclear power plants, labs and medical facilities. It is also used to create lead aprons to reduce patient and doctor exposure to X-rays during medical imaging, such as CT scans or radiography. We will analyze the viability of using this material for shielding aircraft in the next chapter.

UV radiation represents an electromagnetic radiation in the wavelength range of 100 nm to 400 nm. It is commonly divided into three types: UVA, in the range of 315-400 nm, UVB, in the range of 280-315 nm and UVC, in the range of 100-280 nm. UV rays that come from the sun pass through the atmosphere, which absorbs 100% of UVC radiation and approximately 90% of UVB. Several studies highlight UV as the cause for 65% of melanoma and for 90% of non-melanoma skin cancers (Linos et al, 2009) (Armstrong and Kricker, 1993) (Pleasance, Cheetham et al, 2010). Additionally, a study of more than a quarter million participants has identified that pilots and air crew, which are exposed to radiation on a regular basis, have twice the incidence of melanoma compared to the rest of the population (Sanlorenzo, Wehner et al, 2015) . This highlights the fact that UV radiation is, indeed, a significant health risk. Another insight that this research provides is that, even though airplane windows provide some filtering of UV radiation, it is not enough to keep this type of radiation within acceptable limits.

Airplane windshields are commonly made from either composite glass or from polycarbonate plastic. While only 1% of UVB rays pass through plastic and glass windows, up to 53.5% of UVA rays can pass through airplane windshields (Nakagawara, Montgomery and Marshall, 2007). This is likely one of the main causes for the increased incidence of skin cancers among pilots and it confirms the fact that current airplane windshields do not provide adequate filtering against UV rays.

Regarding noise, there have been several developments that have alleviated part of the issue since the debut of jet airplanes. According to Michael J. T. Smith, these were generally prompted by government legislation and numerous lawsuits that forced companies to adhere to certain noise limits regarding noise, both inside and outside aircraft (Smith, 1989). A recent article that presents a review of sources of aircraft noise and the developments that have been made in order to reduce it (Sadeghian and Bandpy, 2020) groups noise into categories, based on the element that generates it. Thus, we have airframe noise, which is created by the non-propulsive components, fan noise created by engine fans, flap noise created by airplane flaps during takeoff and landing and jet noise created by the engine. The article also presents a summary of solutions that have been adopted in order to reduce noise, such as optimizing the shape of the aircraft, or improving various parts of the engines in order to produce less noise during functioning.

Proposed Solutions

Thanks to its very high density, lead is a very good choice in blocking ionizing radiation (Khan et al, 1981). However, its high density quickly adds up to a high total mass for most applications. In aviation, weight is a very sensitive issue, with economic, as well as environmental implications. Higher aircraft mass means burning more fuel, which translates to higher cost per flight and greater environmental pollution. However, if a thin enough layer of lead is used, the extra added mass is small enough to allow installation on aircraft without major drawbacks.

Our solution involves underlaying the entire fuselage of the airplane with a thin layer of lead, in order to shield against cosmic radiation, effectively blocking most of it from entering the fuselage. In order to determine an adequate thickness for the lead layer, we can consider the following aspects:

- For adequate protection during a CT scan, the patient wears a lead apron with lead thickness of 0.25mm (Cheon et al, 2018) (Hyun, Kim, Jahng and Kim, 2016)
- During a CT scan, where lead aprons are used, the patient is subjected to about 20 mSv of ionizing radiation (Schneider, 2010)
- Radiation doses experienced by most cabin crew fall in the range of 1 mSv – 6 mSv per year (Zeeb et al, 2003), that being more than 3 times less radiation than a CT scan

We have concluded that a lead thickness of $t = 0.1\ mm$, meaning three times smaller than that of a lead apron, should be enough to protect aircraft passengers and crew against cosmic radiation during flight. This should be good enough as a theoretical basis and needs further testing in order to certify that it works as intended.

We will continue by calculating the impact it would have on a Boeing B737 Max 8 airliner, in order to evaluate whether this thickness is viable for an airplane of this size. Specifications for the B737 aircraft are publicly available on the Boeing official website and the ones of interest in our calculations are as follows:

- H_f – Fuselage height: 4.01 m
- W_f – Fuselage width: 3.76 m
- l_f – Estimated fuselage diameter, assuming the fuselage as a cylinder with diameter: $D_f = (H_f + W_f)/2 = 3.885\ m$, then $l_f = \pi \cdot D_f = 3.14 \cdot 3.885 = 12.1989\ m$
- L_f – Fuselage length: 39.52 m
- M_{TOW} – Aircraft maximum takeoff weight: 82,190 kg

Considering the density of lead as $\rho_{lead} = 11.34\ g/cm^3 = 11340\ kg/m^3$ and our chosen lead thickness of $t = 0.1\ mm = 10^{-4}\ m$, we determine the total added mass to be:

$$M_{added} = D_f \cdot L_f \cdot \rho_{lead} \cdot t = 12.1989\ m \cdot 39.52\ m \cdot 11340 \frac{kg}{m^3} \cdot 10^{-4}\ m \approx 546.7\ kg \quad (1)$$

Taking into consideration the Maximum Takeoff Weight of the aircraft as 82,190 kg, the added mass of the shield represents only 0.67% of the aircraft maximum takeoff weight. This should have minimal impact on costs and

emissions and, because it is uniformly distributed across the entire fuselage, it should also have minimal impact on the balance of the plane.

A simple analysis also reveals the reduced added cost pertaining to this method. For this analysis, we will consider the price per kilogram of lead at the time of writing this thesis (August 2020), which is 1.8 USD per kilogram. It is neither an all-time high, nor an all-time low and it can serve as a fitting model for estimating costs. If we multiply this by M_{added} , which is the estimated weight of the necessary lead used for shielding an airplane, we determine that the cost of raw materials is only 984 USD, which is insignificant, even when factoring in extra manufacturing costs, compared to the cost of an airplane (approximately 121 million USD in 2020 for a B737 Max 8).

A promising alternative solution to lead shielding is shielding using Z-grade materials (Fan, Roeske and Scrivner, 1996). These are currently used for shielding sensitive electronic components of satellites in space and are very effective at blocking radiation. They are composed of alternating sheets of low-Z and high-Z materials, which roughly translates to materials with low atomic numbers alternating with materials with high atomic numbers. Promising candidates for such materials are various aluminum alloys as low-Z and tantalum as high-Z. We have illustrated an example of a Z-grade shield in Fig. 3.

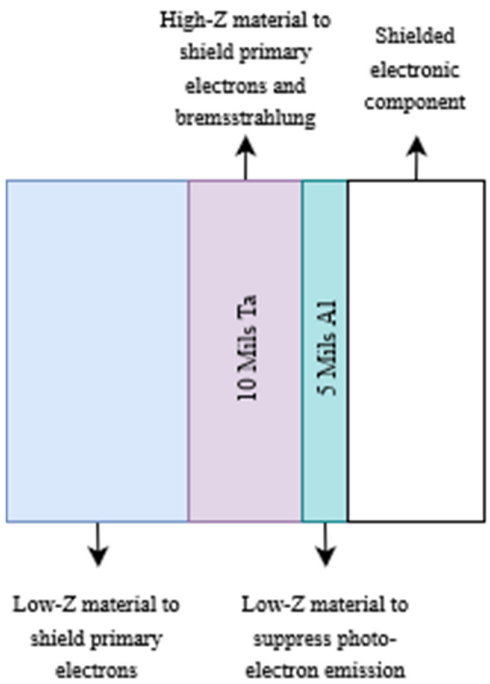

Fig. 2: Schematic of a Z-grade shield (Source: Authors)

These materials are a viable solution only if they turn out to be lighter than the equivalent lead shield that we have presented above. For now, not enough data is publicly available in order to calculate the impact of such materials on the total mass of the airplane, or how thick the required shield could be. However, they show a lot of promise and should be investigated more when further research will be done.

Regarding UV rays, we have found a simple and cost-effective solution to improve filtering for the windshield. This comes in the form of a transparent window film, which can block up to 99% (depending on the manufacturer) of both UVA and UVB rays, without impacting the clarity of the windshield. They also reject up to 78% of incoming solar heat, which helps to remove extra stress during pilot working hours. They are commonly made of laminated polyester film layers, modified in such a way as to block UV rays from passing through. Common modifications can be impregnation with dyes or carbon particles, or coating with a layer of deposited magnetic metal vapors. UV rays are either reflected, absorbed or scattered, depending on the manufacturing process used to create the film (Springer, 2008). Certain manufacturers also produce fireproof varieties of film, which is very important regarding aircraft regulations and flight safety. Non-fireproof varieties are very flammable and produce toxic vapors, which cannot be evacuated during flight.

Because they are made of polyester, they have negligible mass compared to the airplane, which means they do not affect the balance or fuel consumption of the plane. The installation process is very easy. They can be cut to shape and size and applied to the interior window surface. They are generally easy to peel from the glass if they need to be replaced. The material is durable, most manufacturers offering warranty of 10 – 15 years, some even offering lifetime warranty. Given that the average lifespan of an airplane is 30 years, they require few replacements. An added benefit of this solution is that it can be easily used for existing planes, without requiring major modifications.

Regarding noise, we have come up with a solution that is complementary to the technologies that have been developed so far. Even though it is simple, this approach received surprisingly little attention in previous literature, as far as we have been able to see. It consists of insulating the airplane with a layer of sound-absorbing panels, made of bonded acoustical cotton (Baccouch et al, 2020) (Asdrubali, 2006). This material can be easily applied to the interior panels of the fuselage, given the fact that these panels can be cut to custom shapes and sizes, to fit appropriately. This material is flexible and lightweight, but durable and it is made from processed recycled cotton. One of its most important traits is that it is fireproof. It can be used in any type of environment and it is currently used for soundproofing concert halls, theaters, firing ranges and other locations where fireproof material is recommended. A simple analysis analogous to the one presented for lead shielding reveals that it would mean adding approximately 500 kg to the total mass of the airplane, depending on the thickness and density of the specific model of panels chosen.

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Conclusions

In this paper, we have studied the impact of radiation on the health of aircraft crew and frequent fliers. After a thorough analysis of literature, we have confirmed that radiation and noise represent major issues in aviation and are sadly overlooked by companies because of their low economic impact. Taking this into account, we have provided cost-effective and easy to implement solutions for reducing or blocking cosmic and UV radiation and for reducing noise inside aircraft. These can reduce health risk for passengers and personnel and improve ergonomic conditions aboard the airplane. Implementing the proposed solutions offers the following advantages:

1. They eliminate or highly reduce the environmental factors that lead to a higher risk of various types of cancer for air crew and frequent fliers
2. They are cheap solutions, which do not require developing new technologies
3. They are easy to implement
4. They have little or no impact on plane balance and key characteristics, such as windshield visibility
5. They are readily available on the market, using tried and tested materials
6. They are independent of aircraft model and can be incorporated into any type of airplane
7. They are durable and safe and do not require special maintenance

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An Overview Over Adopting ERP Systems in Companies

Olivia Doina NEGOIȚĂ

University POLITEHNICA of Bucharest, Romania, negoita.olivia@gmail.com

Mirona Ana Maria POPESCU

University POLITEHNICA of Bucharest, Romania, mirona.popescu15@gmail.com

Anca Alexandra PURCĂREA

University POLITEHNICA of Bucharest, Romania, apurcarea@gmail.com

Mihai Valeriu POPESCU

University POLITEHNICA of Bucharest, Romania, mihai.popescu0409@icloud.com

Georgiana MOICEANU

University POLITEHNICA of Bucharest, Romania, moiceanugeorgiana@gmail.com

Abstract

Until recently, each department in a company had its own specialized application that it used to carry out its activity, which raised many problems and was an inefficient way of working. ERP programs aim to solve this problem so that a modern ERP allows all departments in the company, whether it is sales-orders, marketing, distribution, service, supply, procurement, production, accounting, management, invoicing, human resources / salary etc. to work in a single application, which brings many benefits. Through this research, the authors aim to present the evolution of ERP systems. A study is conducted in order to establish the main functionalities and components of modern ERP systems. There is proposed a set of instructions in order to identify the suitable ERP system for each organization that is considering implementing one.

Keywords: ERP systems, information system, process automatization.

Introduction

The term "ERP" was established in 1990 by the technology consulting company Gartner, while the precursors of this type of software came to life in the 1960s. Business software programs at that time were dedicated exclusively to companies that made production. The software helped manufacturers better manage the management of raw material stocks. During the 1970s these systems evolved into programs called Materials Requirements Planning (MRP). At that time, only very large companies could afford such systems. It is estimated that around 700 companies around the world were using an MRP system at the time. In 1972, the company SAP was founded, which proposed a business software that would work in real time, this being an absolute novelty. In the 1980s it went from Materials Requirements Planning (MRP) to MRP II Manufacturing Resource Planning which brought in addition many circuits optimized for the production area. In 1990 MRP II evolved into ERP which in addition to the production part, came with other integration modules such as accounting, finance, sales, payroll, inventory management and so on. Since the 2000s, it has moved to ERP II, which is what is actually used on the market today. ERP II systems are much more extensive than the normal ERPs of the 1990s. ERP II comes with other integrated modules in addition to the basic ones. Thus, currently, a quality ERP should also have modules such as Business Intelligence for analysis and real-time graphical reports, WMS for warehouse activity management and rapid inventory, CRM for customer relationship management, B2B / B2C online store, etc. With the help of an ERP application, data entry, collection, validation, processing, aggregation, transfer and export can be performed in a systematic and efficient way. The data in the ERP is then distributed to each person who has access rights and the need to work basis with that information in order to

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best perform their activity and / or to any computer system that integrated with the ERP, such as a e-commerce platform / online sales site. The common database for all departments in the organization is the fundamental element of an ERP. Thus, an ERP software makes the entire process from supply from supplier to sale to the end customer to be accurate, efficient, fast and transparent, which ensures complete traceability of any operation. Basically, an ERP solution allows the different departments in the company to communicate, share and access information with the rest of the company much more easily, thus increasing data transfer speed and data accuracy. Due to the fact that the departments in the company use a common database, which contains uniform, accurate and updated data in real time, integrated with the workflows of the organization, an ERP significantly improves the ability to report, analyze and make decisions. The authors conducted a research in order to establish the principal stages of ERP Systems evolution. There are presented the main functionalities of these systems to highlight the advantages that are brought by their usage in a company. Since there are a variety of solution on the market, the authors propose a set of steps that are to be considered when is chosen an ERP System and there are listed the key elements that define a successful implementation. Nevertheless, the paper treats the disadvantages brought by the systems.

State of the Art

In modern SMEs, the innovation element is given by the adoption of ERP. Antoniadis (2015) examines the critical factors that may affect the implementation of an ERP system during a crisis period. The findings indicate that managers do not use the system at its entire capability.

The risk of implementing an ERP system in a small company is also approached by Johansson (2020). Until now, most of the studies were taken on large companies. Therefore, the research is focused on a small company and the results indicate that are recommended integrated solutions.

The information flow has become an important aspect in every business. Therefore, Ociepa-Kubicka (2017) presents the benefits of ERP systems in companies, where the management processes can be improved.

The data security when transferring the ERP data to the cloud is analyzed by Saa (2017). The concerns regarding the confidentiality and integrity of data becomes a problem especially at large organization. The author proposes a hybrid solution where sensitive applications are on-premise.

Bjelland (2018) studied two perspectives regarding ERP systems: the vendor and the users, which vary when it comes to updates. According to the research users encounter obstacles given by the size of the update, insufficient information.

The aim of Chang (2020) is to investigate the process of moving to cloud ERP systems in organizations. Therefore, data collected from 212 top managers was analyzed through equation modeling.

The implementation of Cloud ERP systems brings organizations a better control of the business processes. Egbon (2020) debates the challenges of using ERP systems over cloud.

Trending functionalities and components of an ERP System

Each ERP system comes with its functionalities and components. In Figure 1 there are presented the most important functionalities that a modern ERP system encompasses nowadays.

1. **Integration**

Integrating departmental data and various IT systems with ERP is the most important functionality a company needs.

2. **Automatization**

An ERP manages and automates a multitude of business operations in the company and ensures direct and continuous inter-departmental communication. This increases employee productivity and resources are allocated more efficiently.

3. **Accounting / Taxation**

The general accounting part, sometimes also called the financial-accounting component, ensures a correct accounting and the financial management of the company. The functionalities of an ERP in this area vary from case to case: automation of recording accounting information taken from primary documents, making accounting records at analytical and synthetic level, creating statements for NAFA (D394, D390, etc.), creating reports and accounting documents required by Fiscal Code (balance sheet, VAT reporting, taxes paid to the state budget), but also accounting

notes, journal, account statements, cash register, sales and purchase journal, balance sheets, profit and loss account and so on and so forth.

4. Sales management

An ERP system deals with optimizing the sales flow within the company. Orders, proforma invoices, final sales invoice, receipts - all these operations become fast and transparent through the automation that an ERP solution brings. But the best part is that sales are closely linked to the inventory management and supply side, so people can access reports that contain real-time updated data to see what the inventory situation is at any given time. This avoids out-of-stock situations that lead to loss of sales and optimizes orders to suppliers based on the current needs of the company.

5. Human resources

In the area of employment contracts and wages, an ERP helps companies to comply with the legislation on Labor Law / Wages Law. The part of Payroll / salary calculation, centralized management of full-time and part-time contracts, creation of standardized employment contracts for different positions, record of holidays and many other operations are managed in a centralized way, so that different reports can be easily obtained.

6. Inventory management

It is extremely important for a modern business to accurately manage its stocks to know at any time what is the state of the inventory. For example, with the help of ERP software, a company can easily see which products are the most sold / sought after by customers so as to ensure that they are always in stock. Also, you can see which the products are whose stock is not running at all, so you can liquidate the stock to recover the money stuck there.

7. Delivery of orders

An ERP is the best tool a company can use to increase productivity, efficiency, speed, accuracy, and transparency when it comes to delivering orders to customers.

8. Production

Perhaps the most important aspect that an ERP solution for production solves is that it aligns and integrates the production process with the quantity of raw material in stock which allows increased control over production capacity, detailed reports, optimizations of the production process, the use of production recipes and many other things.

9. Reporting and data analysis

The fact that an ERP collects, standardizes and centralizes in a common database all the data coming from the departments is a great advantage in terms of updating and accuracy of the data used for business analysis. Through integration with a BI (Business Intelligence) system, the ability to quickly analyze huge volumes of data increases exponentially.

10. Customer relationship management - CRM

In a good ERP system, there are many reports that can be obtained about customers such as those that contain data about sales, reversals, receipts and so on, which allow a better understanding and segmentation of customers. By integrating the ERP solution with a CRM system, users and management can gain a much clearer perspective on customers.

11. Transparency and traceability

Whether it's common operations such as sales or more complex processes such as production, ERP software is there to transparently record what's happening in the company and ensure traceability across all streams. of business.

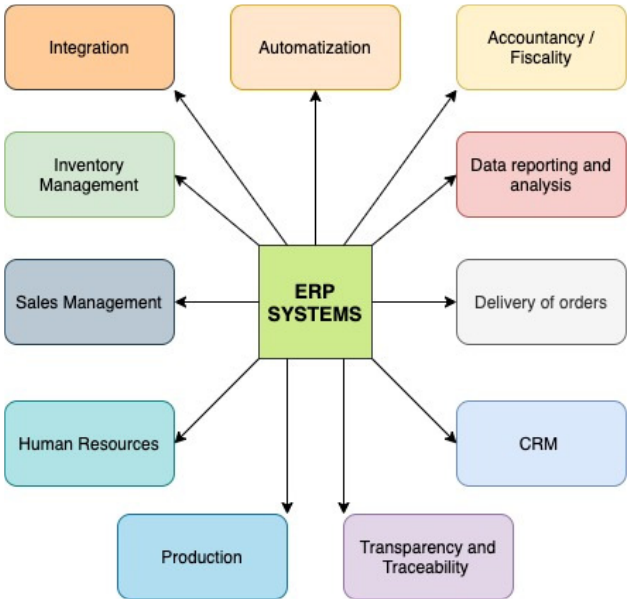

Fig. 1: Functionalities of a modern ERP system

Key elements for choosing an ERP

One question that most companies face when they start looking for a new integrated IT system is which option to choose. There are a lot of solutions on the market that can be called more or less real ERP applications. Thus, the authors recommend a certain set of steps to find and choose the right ERP system, found in Figure 2.

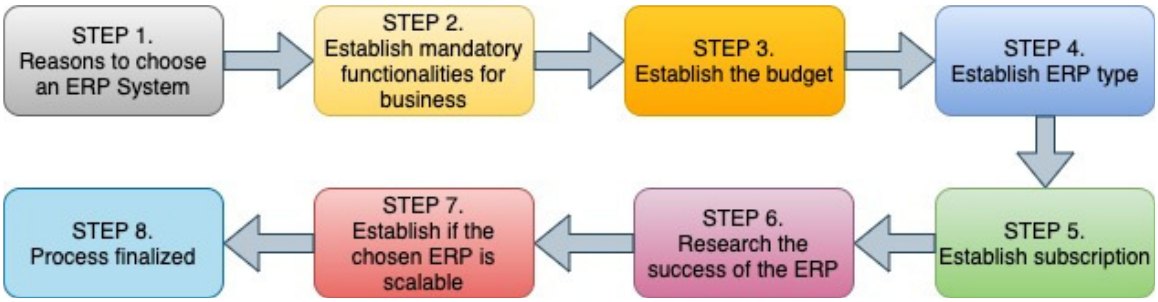

Fig. 2: Steps to choose an ERP system

To choose an ERP system, we start with the first step in this process, namely establishing the reasons why it is necessary for the company. There are many reasons, the most important being found below:

- modernizing the information system;
- increasing productivity through automation;
- integrating departmental activity to obtain global data and reports at company level;
- reducing operating losses and expenses;
- minimizing the risks to which the organization is exposed;
- obtaining accuracy in inventory management;
- opening online sales channels;
- organizing the accounting department, regarding the legislative updates, etc.;

The second step is to establish the most important functionalities of the ERP system related to business. Setting the budget in the third step should be seen as an investment and not a cost. The price of the solution increases with the

benefits it brings. There are several types of architectures and types of ERP on the market. You can opt for an on-premise ERP system that assumes that the application will be installed on your own server, at the company's headquarters. If you opt for Cloud, then the ERP solution will be installed on the server of a hosting service provider. Also related to the costs involved in implementing such a system in the company, in step 5, a SaaS subscription (Software as a service) seems at first sight the least expensive solution because you pay a certain amount of money per month, depending on the number of users of the ERP system, on medium term (2-3 years of use). However, such an option could eventually become more expensive compared to purchasing the ERP solution from the beginning. The research on the chosen ERP system consists in requesting references from ERP providers and discussions with them in order to obtain feedback related to the degree of satisfaction brought by ERP and the support services offered by their provider.

When deciding on an ERP solution, it is important that it is scalable so as to solve most of the current problems, and if the business grows the possibility of integrating other modules in the future should exist. The following are elements that must be considered for the successful implementation of an ERP system (Table 1). As a general manager or project manager, it is important to pay close attention to things related to change management, that is, to make people understand why it is important for the company, for them and for customers to adopt a new ERP system.

Table 1: Elements for a successful ERP system implementation

Nb.	**Element**
1	Choosing a team of employees to assist you and tell you what their needs are in their departments. Tip: listen carefully to their needs, but you decide what is best for business and focus on the things that really bring added value in general, not just make a person's job easier.
2	Assessing the needs, problems and business objectives in general
3	Selecting a project manager
4	Evaluating and selecting the best ERP system for you and your business
5	Hardware / IT infrastructure audit
6	Functional analysis of work circuits together with the ERP provider
7	Establishing an implementation plan with the supplier
8	Implementation and change management (people need to understand why a new ERP is needed and what it helps them to do, otherwise resistance to change will intervene, which will create big problems in the future)
9	Data cleaning and migration in the new ERP
10	Providing optimal conditions for training related to the use of ERP
11	The actual implementation of the ERP
12	Establishing an internal ERP consultant who is very well prepared by the ERP provider

There are countless reasons why an ERP implementation fails, but the situations that occur more frequently are:

- Poorly defined objectives for ERP implementation

  Most companies see the implementation of an ERP as a key solution to all the problems in the organization, but do not allocate the necessary time to specifically define what they want to achieve from the new ERP and what would be the goals to achieve after the implementation, which clearly leads to a failed implementation.

- Lack of management involvement in ERP implementation

  The project team needs a leader with whom to discuss certain directions of action, to allocate and prioritize resources of time, people, money for ERP, to encourage people to make increased efforts, etc.

The project manager cannot always do these things, especially if he does not have a very high authority within the company.

- Wrong choice of ERP provider

  An ERP is a long-term investment, and the appearance of very high discounts and / or bonuses are used for contract signing purposes. An important step is represented by requirement of customer referrals from the ERP software provider.

- Treating ERP implementation as a simple IT project

  Implementing an ERP is a matter of business strategy. That is why it is necessary to give it maximum importance and resources.

- Lack of a good project manager

  Every ERP implementation must be approached methodically. First, the people who will be part of the implementation team (project manager, key users and IT) are chosen. That team must have a global perspective on the business and the skills needed to implement the project from start to finish.

- Communication problems

  Many ERP application implementations suffer from inadequate communication between management, employees, the deployment team, and the ERP software provider.

- Underestimating the transfer of data from the old application to the new ERP

  The removal of unnecessary information, mistakes and duplicates in order to use a qualitative database first.

- Resistance to change

  It is important to communicate to each department the concrete benefits that the new ERP will bring in their daily tasks. Employees need time to familiarize themselves with the new system through training and user manuals.

- Underestimation of budget and allocated resources

  One of the most common problems is the underestimation of the effort required for implementation.

- ERP customizations / customizations

  An optimum ERP has circuits validated and tested over time by many companies. One of the most common reasons why ERP implementations fail is that some organizations insist on modifying different ERP circuits. In addition to the fact that sometimes those circuits are not so well optimized, customizing the ERP application costs a lot both in terms of developing new circuits and in terms of maintenance costs. The more customizations, the harder it is to maintain and update the application.

- Lack of patience and the ability to solve problems

  The positive results of implementing a good ERP appear at the earliest after a period of time.

- Poor post-implementation support

  Post-implementation support is vital because that is when users of the new ERP need the most help from their software provider.

- Lack of ability to integrate ERP with other solutions

  When choosing an ERP system for implementation, it is recommended to know in the long term what are the next steps taken in business development.

Conclusions

Over time, management techniques and practices have evolved into a set of generally accepted rules (best practices) specific to each business vertical. Although resulting from a long sedimentation process, these “best practices” are also subject to the continuing need for resynchronization with structural changes in the business environment. The

role of an ERP application is to facilitate their incorporation and updating in the company's business processes. An ERP system is composed of a series of modules that are intended for various departments, such as: production, financial-accounting, procurement, sales. Although it has an extremely varied nature, the information is operated only once and is accessible to any module it needs. This saves time, resources, reduces the likelihood of committing operating errors, facilitates access to last minute information, etc. One of the usual features of an ERP application is to store all the information in a single database. Being a single system, there is only one vision of results. This eliminates the problem of "multiple truths", in which each department has its own set of results, analyzes and conclusions, often contradictory. Current ERP systems achieve the integration of all management functions of a company, starting from planning, ensuring the stock of raw materials and materials, defining technologies, coordinating production processes and, last but not least, achieving financial accounting management, human resources, of stocks of finished products and ending with the development and maintenance of relationships with customers and business partners. Such an ERP application allows decision makers to perform complete analyzes on the implementation of the business plan. Through the options for simulating the activities and through the flexible and dynamic nature of the applications, forecasting plans, evaluations and predefining the evolution trends of the industry of which the company is part, qualitative analyzes, integration with new e-business technologies and online communication can be realized.

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Advanced Information Technology in Romanian Companies

Olivia Doina NEGOIȚĂ

University POLITEHNICA of Bucharest, Romania, negoita.olivia@gmail.com

Mirona Ana Maria POPESCU

University POLITEHNICA of Bucharest, Romania, mirona.popescu15@gmail.com

Anca Alexandra PURCĂREA

University POLITEHNICA of Bucharest, Romania, apurcarea@gmail.com

Mihai Valeriu POPESCU

University POLITEHNICA of Bucharest, Romania, mihai.popescu0409@icloud.com

Bogdan Dumitru ȚIGĂNOAIA

University POLITEHNICA of Bucharest, Romania, bogdantiganoaia@gmail.com

Abstract

A wide range of scientific articles, as well as studies and research in the field of IT for business, highlight the significant opportunities that arise with the global spread of advanced information technologies and the cloud computing model, both in terms of the possibilities of small and medium enterprises. compete with large ones, as well as to increase the competitiveness of developing countries. Considering these records, business opportunities in Romania where most businesses are small and medium, and the economy is developing, can be significant. Thus, the authors conduct a quantitative research through an online questionnaire distributed to SMEs in Bucharest to identify digitalization trends and the adoption of new technologies. The study highlights the concepts of IT mobility, Social media, Big Data and the Cloud Computing. As a result of digitalization, it is increased process automation and operational efficiency. The majority of companies are facing a challenge when it comes to Cloud Computing solutions due to their cost, but a website to present their products and services represents a must have.

Keywords: Information Technology, SMES, Process Digitalization.

Introduction

Technology is one of the so-called pillars of competitiveness. A country's technological availability barrier is measured by the capacity of the country's economy to adopt existing technologies to boost the productivity of its industries, with specific emphasis on the ability to capitalize on information and communication technologies in day-to-day activities and production processes to increase efficiency and improving competitiveness. Access to and use of information technology are key factors in assessing the level of technological availability of the country. Regarding the availability of the latest technologies, the report states that Romania ranks 48th out of 67 countries (https://www.gfmag.com/global-data/non-economic-data/best-tech-countries), which indicates poor availability of advanced information technologies in the country.

Nowadays all areas of activity are based on use, to a greater or smaller extent, of information technology and computers. The use of ICT is present in the most diverse activities and for making decisions based on the information that is obtained from the processing of data collected.

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Through this paper, the authors aim to bring current notions regarding the advanced information technologies used by companies. Based on them, a market research was conducted to determine the advantages that companies pursue by adopting information technologies, the difficulties they encounter in their implementation at the organizational level, the importance they give to the presence in the online environment where the activities take place. more and more, especially in the current situation, as well as the degree of inclination towards the use of Cloud Computing.

State of the Art

Because of the Internet and digitalization there was a considerable change in marketing strategies and business communication. The geographical and time limits are no longer an obstacle. Patrutiu-Baltes (2016) presents the new world which is the online environment and deliberates the digitalization is a key when it comes to competitive advantage. Ilcus (2018) also talks about the digitalization in each field of humans lives with a focus in business world by presenting the advantages brought to the companies.

The adoption of internet connected digital technologies by companies is analyzed by Pagani (2017). The findings identify three types of digitalization considering the link most impacted. IT and innovation have a huge impact on small and medium sized enterprises, therefore Lecerf (2020) made a study to demonstrate that these two concepts can improve SMEs internalization. His research was based on a survey which had around 600 respondents.

By gathering data from a considerable number of European SMEs which are using IT artefacts at a common base in order to innovate their business models, Bouwman (2017) outlines that there is a correlation between these two concepts which impacts positively the performance.

Startups have an urgent need to internationalize as soon as possible. Neubert (2018) conducts 73 interviews with senior managers and the findings indicate that digitalization increases the efficiency of decision processes and the strategies are more easily optimized.

SMEs are considered to be the backbone of the economy in a developing country. Adopting ICT in these countries comes with challenges. Afolayan (2015) illustrates during the study the need for both managers and employees to participate at continual trainings to be up to date with ICT and offer suitable solutions for organizations.

Bouwman (2018) developed an empirical study on SMEs which use social media and big data in order to innovate their business models. Both have a positive role on business performance according to the results and also business models are driven by big data mainly.

The services provided by organizations are improved by using information and communication technologies. A literature review regarding critical factors which have an impact on the relation between business and IT is made by Sanchez (2020).

The performance of a business is given by the capability of enhancing IT. Also, the human resource cannot be neglected. Turulja (2016) uses survey data and structural equation modeling to research the connexion between IT, HR and business performance. The results indicate that its capabilities have a role on human research management rather than in business performance and human research management can impact business performance.

Methodology

The study carried out by the authors consists in undertaking a bibliographic research through which are presented the new work technologies introduced by informatics. In relation to these concepts, a questionnaire was built between April and June 2020, the period in which personal work was supported due to the pandemic, and the research method used was the survey. The applied tool is the questionnaire administered online through a link distributed by email using Google Forms. The research targets respondents from all companies in Romania. The conduct of this field research aimed at evaluating the following dimensions:

- Organizational needs of respondents related to digitization trends;
- Level of enrollment in current trends in technology use, such as the adoption of the Cloud Computing model, Social Media, IT mobility and Big Data solutions;

- Ways of reporting employees to the new job opportunities introduced by mobile computing, Cloud Computing and Social Media.

As the study is aimed at the adoption and use of advanced information technology, before proceeding to the presentation of research findings, a brief presentation of what is advanced information technology is depicted. In the context of this study, advanced refers to major trends in information technology with applicability and business use: IT mobility, Social Media, Big Data and the Cloud Computing IT model.

1) *IT mobility.* The processes power that was exclusively found on personal computers only a few years ago, is increasingly being transferred to portable devices such as tablets, smartphones, which brings multiple advantages, but also organizational challenges. The mobile computing landscape has evolved rapidly over the past two decades. Unlike traditional cell phones, modern mobile devices incorporate advanced operating systems and can connect to the Internet, and advances in mobile communications enable the rapid transfer of data across mobile networks. Companies are increasingly advancing in the adoption of mobile applications that go beyond the simple activity of checking correspondence, moving towards the implementation of mobile software that supports collaboration between employees, encourages interaction with customers and improves customer loyalty.

The BYOD concept - an acronym for Bring Your Own Device - is relatively new in business literature and refers to the use, by employees, of their own mobile communication and computing devices to perform service tasks. Because portable computing technology has performance and capabilities comparable to workstations, the transition to BYOD is both feasible and natural in terms of employee trends. From the perspective of IT management, however, there are debates about the degree to which this phenomenon would be desirable or easy to manage. At first glance, BYOD seems to be advantageous for companies, by eliminating investments in equipment specifically designed for mobile business applications, their management and maintenance. However, the IT functions of companies are reluctant to embrace the BYOD way of working, as they are not yet sufficiently prepared for this transition. The challenges that arise in this context are mainly related to: - The need to maintain the confidentiality of information and to continue to ensure a high degree of security of organizational data; - The need to develop business applications that are compatible with different types of mobile devices and different operating platforms. Many organizations face the unplanned and unintentional installation of the BYOD trend, as many employees use personal devices to download work emails or to channel organizational data into more or less secure applications installed on personal devices. BYOD initiatives require new organizational security policies and tools to minimize business risk. While the "office of the future" requires more flexibility, mobility and convenience in carrying out work tasks, it becomes clear that the BYOD phenomenon cannot be ignored by business management but must be evaluated and adopted in the most appropriate way to ensure organizational security. and the success of the initiative.

2) *Social Media.* Web 2.0 designates new ways to consider and exploit the organizational possibilities of the web. According to them, the content and information on the web is no longer offered to visitors only by the media, governments and private companies, but also by private individuals, connected to each other through informal Internet-based networks, and who contribute and actively participate in the provision and spreading information around the globe through the web. With the spread of social networks such as Twitter, Facebook, LinkedIn, etc., it is expected that companies will be more present in virtual social media due to a series of considerations, starting from the simple fact that these networks are populated by customers and consumers. The term "Enterprise 2.0" or "Social Enterprise" / "Social Business" is increasingly used in reference to Web 2.0 computer applications and tools used for business or organizational purposes. The value of using these technologies comes from the fact that they facilitate the creation of a work environment with fewer constraints, allowing employees the freedom to work at their own pace and in their own ways, while contributing to increasing employee involvement for work tasks and the projects it carries out. Although social networks are in the spotlight in the context of social media and are very popular, the concept itself is broader and includes, in addition to public social networks, Web 2.0 tools and applications such as blogs, wikis, websites dissemination and exchange of information, widgets, mashups and others, with applicability both in the external environment of the organization and in the internal organizational environment, using the company's Intranet.

Some studies show that most of the business value in the field of Social Media is related to the internal use of Web 2.0 tools. This leads to increased employee productivity by facilitating communication and collaboration between them. Executives are increasingly recognizing the usefulness of social platforms in the organizational environment. And while awareness of the importance of the concept of "Social Business" is growing, the perception of its most important aspects diverges depending on the managerial level and the function conducted. Thus, CEOs and marketers may be inclined to consider that the most important capitalization of the potential of "Social Media" technologies is an outward-looking one, in the direction of developing affinity for the brand, while production managers or project leaders can choose for the intensification of the internal valorization, in the direction of the

project management. Regardless of the field they lead, most executives perceive social technologies as having the potential to transform the way organizational activities are carried out.

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3) *Tools in the field of analytics.* Organizations have begun to place more importance on data and invest more in its collection and management. The Big Data concept is a combination of three components: volume (organizations collect data from various sources, including banking, social media or sensors and data transmitted between machines. New technologies allow the storage of this mass of data), speed (the sharing of information is done with an unprecedented speed and in an increasingly shorter time), variety (data comes in all formats - from structured, to digital and unstructured documents, e-mails, video, audio or financial transactions). The importance of big data does not start from the quantity, but from its use. Information from any source can be used and analyzed in such a way as to provide answers in terms of reducing costs, reducing processing time, developing new products or making smart decisions. Traditional information management and analytics processes are mainly aimed at supporting internal decision-making processes. They operate with structured data, existing mainly within the organization. Compared to traditional analytical tools, the Big Data concept introduces changes in three dimensions: (1) data types, (2) their accumulation speed, and (3) their volume. With the launch of the Web 2.0 environment, around 2005, much of the valuable data for businesses is generated outside the organization, by consumers and Web users in general.

Beyond the information collected within organizations and the increasing volume of data generated by computers in their operation, those obtained from outside the organization, whether structured or unstructured, have multiple sources that can include information posted on social networks and products viewed in virtual stores, information read by sensors, GPS signals from mobile devices, computer IP addresses, cookies, barcodes, etc. But many of the most important data sources are relatively new. It is argued that the explosion of data volume characteristic of the present phenomenon, Big Data, comes from unstructured data. Within them, unlike the data generated by users, which originate from information provided voluntarily in different Web dissemination environments, there is also intercepted data. The latter refers to information passively collected from the online behavior of individuals, such as, for example, online search terms or locating individuals through applications present on mobile devices. In this context, some researchers express that each person becomes "a mobile data generator".

4) *The Cloud Computing model.* All three trends presented above are effectively supported by the Cloud computing model. It is based on the convergence of Internet technologies and the virtualization of software and networks. Adopting the Cloud Computing model allows companies to buy the exact type and amount of computing resources they need (business applications, memory space, computing power, security services, and more), when they need it, from organizations specialized in operating data centers. Within this IT model, servers, networks, applications and other elements of business computing are made available to IT departments and users via the Internet. The Cloud IT model involves a major transformation in the way businesses consume IT services and manage IT resources. In the case of the traditional model, companies make massive investments in IT resources dedicated to precise and predetermined operational goals and in infrastructure, including hardware, software, computer networks and IT staff. Cloud Computing is increasingly becoming a way for organizations to increase IT capacity and add IT capabilities "on the go", without the need to invest in new infrastructure, staff training, new software licenses, and so on. Although the idea of the Cloud Computing model is simple at its core, the impact and mechanisms of its applicability in business are rather complex. Among the considerations to be considered in the analysis of the decision to migrate to Cloud Computing are data portability, information confidentiality, service level agreements, interoperability and more. There are different types of Cloud Computing services, the main ones being related to computer applications (SaaS - Software as a Service), application development platform (PaaS - Platform as a Service) and infrastructure services (IaaS - Infrastructure as a Service), the latter consisting of virtual server networks or clusters, network software and data storage, in a system designed to enhance or replace the functions of a data center. At the same time, there are different forms of implementation for the Cloud Computing model: private (internal or external), public, hybrid, community.

Results Interpretation

Respondents from the category of companies providing components, solutions and IT services participating in the first part of the study consider that the most important types of advantages pursued by Romanian companies in relation to IT use are automation (81%) and operational efficiency (70%) according to Figure 1.

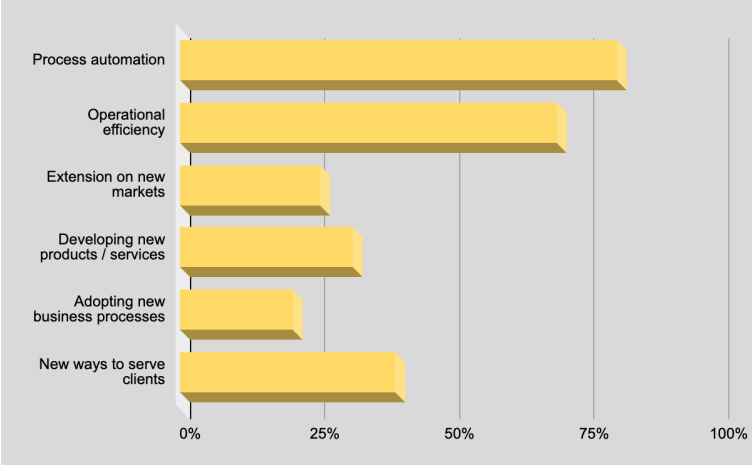

Fig. 1: Advantages pursued by Romanian companies regarding digitalization

This result indicates the opinion of the respondents on the way information technology is perceived in Romanian companies and the basic level of its use. There is also a focus on serving customers in new ways. 40% of participants rank this advantage among the top three most important. While the number of mobile Internet users is increasing, and in Romania it is relatively high, it is expected that Romanian companies will direct initiatives and marketing messages towards the mobile communication environment. It is also expected that more and more companies will act to meet the desires of employees to use mobile technology. We consider that this new orientation is noticeable in the responses of IT providers, when highlighting departments / areas of organizations in Romania that are mainly targeted by solutions and services in the field of mobility (Figure 2). After the sales function (90%), the marketing and production (60%) are starting to gain attention in terms of the application of mobile technology.

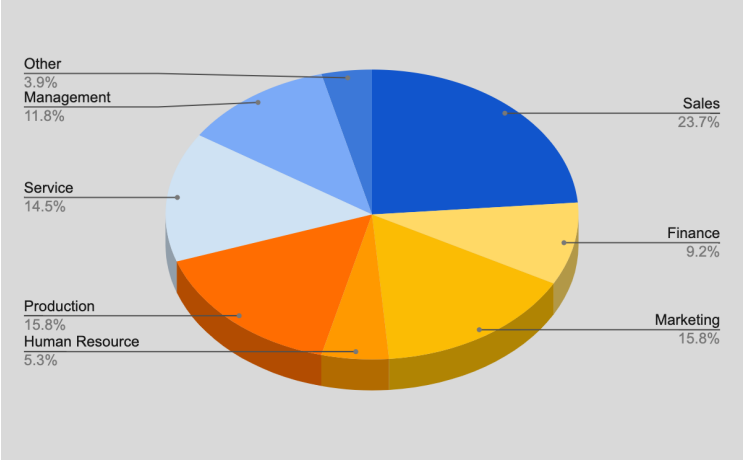

Fig. 2: Organizational areas targeted by IT solutions for mobility

Cloud Computing services and solutions are currently located in an area of low interest for Romanian companies. Most participants indicate a weak or rather weak interest in this regard (62%), while 38% appreciate the interest of Romanian companies for the Cloud Computing model as average. As factors that slow down the adoption of advanced information technologies among Romanian companies, most respondents among suppliers (56%) consider that financial problems are critical, and 33% of participants note them as important. The financial

difficulties are considered the most significant in the process of adopting advanced information technologies in Romanian companies. Considerations related to the difficulty of organizational change are also noted. These are considered as critical factors in slowing down the process of technological renewal by 31% of IT providers and noted as important by 56% of them.

It is found that the most common problems raised by organizations regarding computing technology are related to the investment in advanced information technology. This result confirms the opinion expressed by the IT systems and solution providers who participated in the research, but the financial difficulty is noted only by 38% of the respondents (Figure 3).

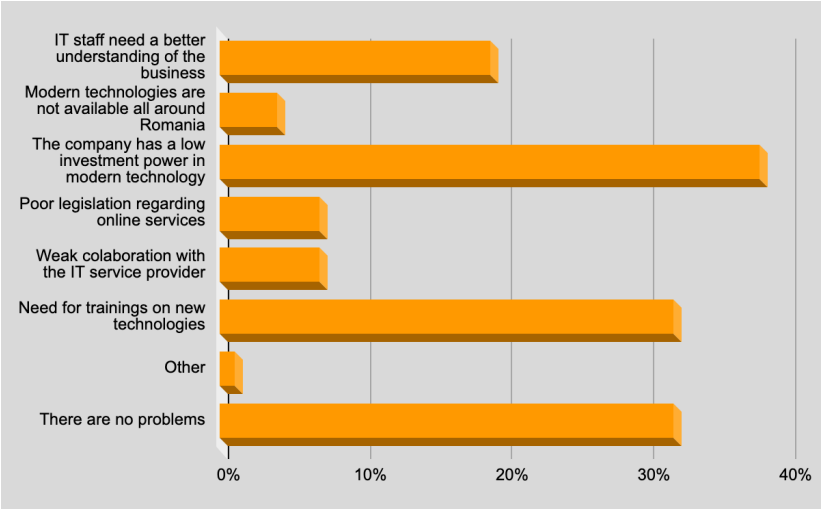

Fig. 3: Difficulties encountered with information solutions

In second place in terms of reported difficulties is the need for information and training on new technologies (32%). It is noteworthy that one third of respondents do not face problems in terms of computing technology. Regarding the presence in the online environment, it is observed (Figure 4) that most of it is based on the existence of a dedicated website (90%), while the next tool, social networks are indicated in a much lower percentage. (40%). Only 7% of companies use Web 2.0 tools such as wikis, blogs or forums.

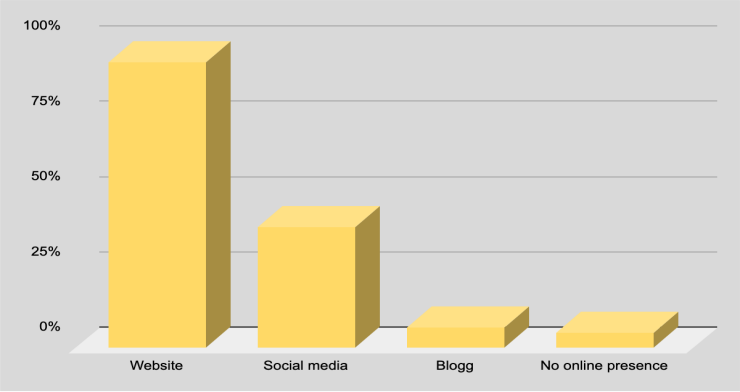

Fig. 4: Presence in online environment

The degree of availability of the participating companies to invest in services / applications in the Cloud computing model is rather low (Figure 5).

Confirming the findings of the research, the answers highlight the low availability that exists in the companies participating in the study for the adoption of the Cloud Computing model. Only 20% of respondents indicate high interest regarding it inside the company they represent. The answers obtained from the set of questions aimed at line management and non-leadership staff reveal the increased importance for respondents of the following elements:

faster access to the data they work with, easier access to them, activities in a mobile environment, workplace flexibility, better computing technology and the presence of an internal social platform.

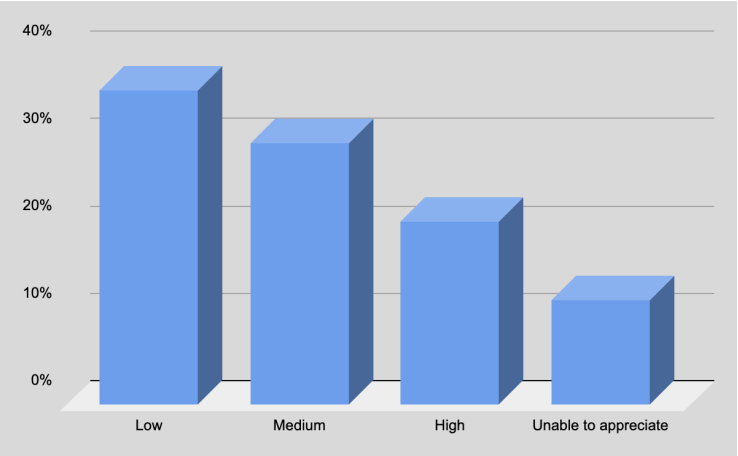

Fig. 5: Availability of companies to invest in Cloud Computing

Conclusion

It is noteworthy that the last place as an average value of the importance indices selected by the participants is occupied by the presence of internal social media, and this is explained by the fact that their usefulness and potential are understood and valued only after their use. Also, where they are present, capitalizing on their business potential requires involvement from participants and management support through promotion, cordial guidance and an encouraging attitude and lacks tension. Finally, we emphasize that the advanced information technologies that are the subject of this study are disruptive to the business environment. This implies the emergence of important opportunities for organizations as well as major organizations change. As in the case of the previous disruptive innovation (e.g. the introduction of the Internet in the business environment), and in the case of the adoption of the Cloud Computing model there is a period of time when this transition is optional and some entrepreneurs and business decision makers prefer to postpone it. However, the adoption of the new model will gradually turn from desideratum to imperative. Both IT solutions and services will continue to develop in accordance with the Cloud IT model, in order to operate in such a paradigm. For this reason, those companies that maintain or even develop the traditional IT model risk having increasingly limited access to state-of-the-art IT technologies and solutions. According to the study the Romanian companies do not tend to invest in Cloud Computing solutions especially due to their high costs. Nevertheless, the majority of the respondents work for companies that have a website which now is considered to be a key element in the online environment. When it comes to the implementation of information technologies there are a serios of challenges at organizational level.

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Socially Responsible University. Expectations And the Reality in Students' Opinion as Guidelines To Refine the Social Responsibility Strategy

Katarzyna I. SZELAGOWSKA-RUDZKA

Gdynia Maritime University, Gdynia, Poland
E-mail: k.szelagowska-rudzka@wpit.umg.edu.pl

Edyta SPODARCZYK

Gdynia Maritime University, Gdynia, Poland
E-mail: e.spodarczyk@wpit.umg.edu.pl

Abstract

Developing socially responsible university's good practices requires HEIs stakeholders' identification and conscious relationships. Students constitute numerous, important stakeholders. The HEI's basic activity is connected with them – education supported by science development and relationships with the surroundings, where students will find employment and HEI - opportunities to conduct research. Social responsibility principles realization requires HEI to identify students' needs and expectations and include them in its activity; from students – active attitude and engagement. The study's aim is identifying the gap between students' expectations towards socially responsible university and perception of these activities. Knowing differences between expectations and perception enables modification and improvement of activities resulting from the university's social responsibility strategy. On the other hand, as in one Polish HEI – Gdynia Maritime University (UMG) which lacks such a strategy, knowing the gap can come useful when designing activities in the social responsibility strategy. To this end, expectations and students' perception towards Socially Responsible University were compared on the UMG example. The study is based on the analysis of the literature and questionnaire research results obtained in the Authors' two research projects.

Keywords: Socially Responsible University, Dimensions of The University's Social Responsibility, SRU Strategy, Gap Between Expectations and Perception.

Introduction

In the contemporary knowledge-based economy, in times of globalization, technology development, climate change, and economic and values crises not only enterprises must enjoy economic growth and a high position on the market simultaneously taking care of natural environment and social expectations and needs.

Nowadays, all organisations, including higher education institutions (HEIs), must practice social responsibility in their daily activities and development strategy. Establishing socially responsible universities' good practices requires knowledge about stakeholders, their problems, needs and expectations towards HEIs and their conscious modification. Among the university stakeholders the most important are students (Berman, 1990). The HEIs basic activity is their education (Ławicka, 2016) supported by science development and relationships with the surroundings, where graduates find employment and the university - opportunities to conduct research (Leja 2013). Developing mutual relationship: university-student based on social responsibility principles requires the university to know students' needs and expectations and taking them into account in its activity (and development strategy) as well as students' active attitude and engagement. The study's aim is identifying the gap between students' expectations towards Socially Responsible University (SRU) and perception of its activities. Knowing this gap allows, on the one hand, modification and enhancement of activities of university's social responsibility. On the other hand, as in Gdynia Maritime University (GMU) that lacks this strategy, it can be useful in its development. To this end, students' expectations and their SRU perception were compared on the example of the Faculty of

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Entrepreneurship and Quality Science (FEQS) in GMU (Poland). The study's first part presents SRU essence and characterizes its dimensions found in the literature and its dimensions identified and ranked by students during the Authors' first research project. Then, the second research project' results concerning students' evaluation of definite activities in the investigated university (within specified areas) with regard to their compliance with the SRU concept were briefly characterized. Identification of the gap is useful in designing activities when preparing the social responsibility strategy meeting stakeholders' (here: students) needs and requirements.

Organisation's Social Responsibility essence (Corporate Social Responsibility; CRS)

The CSR concept coined and disseminated in the second half of 20th century is mainly associated with enterprises, which it obligates to develop the policy, make decisions and choose economic activity respecting the society's aims and values (Raport, 2011).

CSR can be defined as the management concept oriented towards long-lasting, positive relationships with various stakeholders integrating economic, legal, social, ethical and environmental aspects of enterprises' operation. It comes from the assumption that generating profits can and should incorporate a widely understood care for social and natural environment (Teneta-Skwiercz, 2013).

Globalization and social-economic, technical and technological development as well as changes in the world, financial crisis of the first decade of 21st century and its impact on the world economy spurred CSR development and showed there is no escape from social responsibility (Smith, Lenssen, 2009). They made it clear that not only enterprises should be socially responsible, but all organisations around (Spodarczyk, 2015; Wolska, Kizielewicz, 2015).

ISO 26000 states that each organisation should "assume responsibility for its decisions and activities' impact on the society and environment through transparent and ethical behaviour" (ISO 26000, 2015).

ISO 26000 is popular and recognized guidance - the universal approach adaptable to specificity of each organisation willing to behave in a responsible way (Raport, 2011).

Implementing socially responsible activities by any organisation requires planning the social responsibility strategy (Cybal-Michalska, 2015). The first step for its effective preparation and implementation is identifying the organisation's main stakeholders, their needs and expectations, which the organisation should satisfy (Teneta-Skwiercz, 2013). The organisation's main external stakeholders are enterprises, purchasers (including consumers); local, regional and central authorities, nongovernmental organisations, banks, HEIs and natural environment (as nonperson stakeholder that we all should care for). The organisation's internal stakeholders are its employees.

Due to HEIs' specific tasks in the country's social-economic system and their civilization-cultural role (Białoń, Werner, 2012; Dima et al., 2013; Cichowicz, Nowak, 2019), they should also be proponents of social responsibility principles (Benedek, Takács-György, 2014). They should teach them and set good examples so as to have socially responsible graduates (citizens) (Społeczna odpowiedzialność, 2019). In HEIs, external stakeholders (except these already mentioned) are also candidates, their parents, graduates, advisory organs (supervision) working with the university's Senate, the region (country) community (Ławicka, 2016), and as internal stakeholders - also students, administration workers and academic staff.

University Social Responsibility and its dimensions

A socially responsible university is a HEI serving the surroundings. Its responsibility towards the society involves preparing graduates to become knowledge employees and building close relationships with economic practice and local governments (Leja, 2013). University Social Responsibility means a strategic and systems approach to managing HEIs and developing cooperation and dialogue with stakeholders, which contributes to sustainable development, building values and attitudes in the citizen society, supporting academic values and creating new ideas, keeping and developing scientific-didactic competences that influence effectiveness and innovativeness (Społeczna odpowiedzialność, 2019). So SRU, apart from classical dimensions: ecological, social and economic, takes into account also the scientific-didactic dimension. It requires development of the social responsibility strategy, whose aims are oriented towards satisfying the main stakeholders' needs and expectations and incorporating them in CSR education programs (Ławicka, 2016).

University Social Responsibility issues are becoming increasingly significant. More and more HEIs worldwide are implementing the social responsibility strategy and its good practices, which is reflected in various international organizations' reports (Cichowicz, Nowak, 2019). For instance, business universities introduce practices based on the Principles for Responsible Management Education (PRME) (within the program: Global Compact ONZ, 2007). They are based on six principles of responsible management education: purpose, values, method, research, partnership and dialogue (Koksal Arac, Madran, 2013) and enable students to understand the sustainable development subject so that in the future – as economic life members – they can balance its aims with enterprises' economic aims (PRME, 2019). Among 767 signatories worldwide Poland is represented only by a few HEIs[1] (Roszkowska-Śliż, 2010; Popowska, 2016; Społeczna odpowiedzialność, 2019). Five best European universities[2] have undertaken socially responsible activities focusing on the areas: education for sustainable development, responsible campus, social responsibility culture, ethical leadership, dialogue with the society, social responsibility of science. The world best universities[3] (Społeczna odpowiedzialność, 2019) and Polish signatories[4] (Lista sygnatariuszy Deklaracji SOU, 2019) of University Social Responsibility Declaration (Deklaracja SRU) refer to the UN's Sustainable Development Goals (SDGs) stated in the 2030 Agenda. The SRU declaration was formulated in 2017 as a result of academic community cooperation with the then Ministry of Development (Społeczna odpowiedzialność, 2019). Twelve principles of SR in it refer to ethics, graduates' social and citizen attitudes, promoting social responsibility principles and sustainable development in study programs, scientific research and implementation projects within partnerships with various entities, dialogues with the surroundings, and engagement in the form of voluntary work, care for the university organisational order or its responsibility for natural environment (Deklaracja Społecznej Odpowiedzialności Uczelni, 2017).

Although Polish HEIs are nowadays more frequently implementing the socially responsible activities strategy, it is not yet common practice (Karwowska, Leja, 2019). For many universities it is still one-time action (Leoński, 2019). Few HEIs refer to University Social Responsibility Declaration or PRME. Most often examples of socially responsible universities' good practices are based on ISO 26000 and its main areas (Leoński, 2019; Mackiewicz et al., 2018), or they concern the main SRU dimensions resulting directly from its definition due to its universality, i.e.: economic, environmental, social and educational dimension (Karwowska, Leja, 2018). Universities also independently undertake initiatives to formulate cooperation principles with selected stakeholders not following indicated examples or modifying them for their own needs. The key to formulate effectively social responsibility good practices (and the strategy) is identifying the university's main stakeholders and their needs/expectations in mutual relationships (Szelągowska-Rudzka, Spodarczyk, 2018).

Socially Responsible University activities oriented towards students

The most important HEIs stakeholders are students; you must start from them when developing relationships and university's activities based on social responsibility principles (including the strategy development), because the university's socially responsible activities correspond to its main activity: education, science development and relationships with stakeholders (Leja, 2013). Their aim is ensuring the appropriate education quality, knowledge transfer to the economy, boosting growth and satisfying the contemporary society's needs, future elites education, active social policy towards students and employees and social barriers elimination (Piasecka, 2015; Cybal-Michalska, 2015). With regard to students – future graduates – these activities must ensure education that will enable them to actively participate in the civilization development, practice their profession and become a desirable professional on the local and global job market. To this end, the university must have a wide didactic offer, competent staff, university culture (the way students are treated, their attitudes formed), adequate material resources (classrooms equipment, laboratories, library, reading room, social base), and contacts with the scientific and business community, the region and abroad (internships, foreign exchange, etc.) (Ławicka 2016; Kowalska 2009; Białoń, Werner, 2012). It is also indispensable to refer to students' (stakeholders) needs and expectations and take them into account in daily activities. The Authors think the actual realization of socially responsible activities requires a conscious approach and engagement of all parties, the university and students (or other stakeholders groups).

Stakeholders will engage more in the university's activities if they feel they are right. The Authors identified the most important for students SRU dimensions in their relationships with the university: values, relationships, graduate, education and effective organisation (Szelągowska-Rudzka, Spodarczyk 2018). The Authors agree with the literature view that the basis for socially responsible activities are values (Kowalska, 2009; Cybal-Michalska, 2015) and relationships between the parties (Piasecka, 2015), here: university-students, whose effect thanks to the education process and effective organisation is the graduate desirable in the present job market. This graduate will acquire competences and values, whose basis is respect for work, tolerance, readiness to help, honesty in relationships, respect for others and for natural environment, and the university's worthy representation (Szelągowska-Rudzka, Spodarczyk 2018).

The most important identified dimension of University Social Responsibility for surveyed students is education, whose final outcome is the graduate with competences desired by the market, but without excessive engagement (rather a beneficiary of the university's activities).

It must be emphasized that FEQS neither has the social responsibility strategy nor realizes formalized socially responsible practices – only II-cycle students have the subject: Corporate Social Responsibility.

Lack of the social responsibility formal strategy does not prevent students from evaluating selected areas, especially that their proposals of areas: values, relationships, education, graduate and effective organisation are integral elements of each university and as essential from the social responsibility perspective they can and should be identified when refining the strategy and taken into account before its development and modification of its activities.

Research Characteristics

This study's main aim is identifying the gap between students' expectations towards socially responsible university (SRU) and their perception of its activities to modify the pursued strategy or to plan activities of the social responsibility future strategy. The research was realized on the example of FEQS, UMG. The following detailed objectives were adopted:

- identifying students' expectations towards socially responsible university
- indicating students' perception of identified SRU activities on the example of FEQS
- identifying the gap between students' expectations towards SRU and perception of the university's activities in selected social responsibility areas (values, graduate, education, effective organisation).

The aim was achieved using the results of the Authors' two independent research projects realized in FEQS.

Within the first project the Authors conducted the qualitative research using brainstorming, 2017) as there was a need to identify social responsibility areas essential for students taking into account HEI's operation specificity. As a result, the following university's social responsibility areas proposed by students were identified: values, relationships, graduate, education, effective organisation). In the successive qualitative research (sample of 242 FEQS students; the auditory questionnaire, 2019) importance of the areas for students and detailed features describing them were determined.

The other research project consisted in a questionnaire (2018). Respondents were asked to evaluate selected activities undertaken by the university and then these activities were assigned to social responsibility areas of ISO 26000 and adapted to the university's specificity (c.f. Mackiewicz et al, 2018). The study comprised 111 students and the auditory questionnaire was the method to collect data.

Some activities proposed by students within the first project overlapped with activities of ISO 26000 - the subject of the other research project. Therefore, the Authors decided to identify the gap between students' expectations and perception of these activities using both projects results as they could be later used to develop activities of the planned (future) social responsibility strategy.

Results

Basing on the first research project results, the Authors identified the university's five social responsibility areas (values, relationships, graduate, education, effective organisation) and their importance from the students' perspective (Szelągowska-Rudzka, Spodarczyk, 2018; Spodarczyk, Szelągowska-Rudzka, 2019). Respondents when asked how important are features characterizing particular areas, mostly stated that they all should characterize the university socially responsible towards students. Therefore, the Authors focused on answers "definitely yes" (and not on averages) as they reflect the students' determined attitude (absolute conviction) towards investigated features and simultaneously demonstrate their certain hierarchy. In the comparative analysis of selected research results presented below the Authors also focused on answers "definitely yes" and only their percentage values are presented in Table 1. From all the analyzed features of the proposed SRU areas only these corresponding to ISO 26000 dimensions were chosen.

It results from the comparative analysis that education, as expected from HEI's activity essence, was identified as the most important area for socially responsible university. It is proved by the highest number of "definitely yes"

responses to features characterizing this area (provides scientific-didactic staff on the appropriate level (…) and education for the job market needs) (Detailed data is collected in Table 1). The effect of the highly valued by respondents education quality is the graduate meeting the job market expectations (38%). The next important SRU area is effective organisation (ensures material support for students, 37%; has the modern didactic base (…), 32%). The lowest respondents' expectations level (11% to 27%) concerns features representing the values area (educates; cares for natural environment; instils universal values in students (…)) (Table 1).

Table 1: Socially responsible HEI. Expectations and students' perception

Features of socially responsible HEI:	Area of SRU	Answers "definitely yes" (%)		Gap (O-P)
		Expectations (O)	Perception (P)	
ensures scientific-didactic staff on the appropriate level (knowledge, skills to transfer it)	K	42		
my university has high quality human resources (administration workers, lecturers, university authorities)			31	11
educates for the job market needs	K	42		
my university is characterized by high quality educa-tion, development of skills desired by the job market			12	30
prepares graduates who meet the job market needs	A	38		
I am satisfied with services offered by the university			10	28
my decision to choose this university was right			17	21
I will recommend my university to others			18	20
I am proud I am a student at this university			21	17
provides material support to students	O	37		
supports physical development, ensures medical care			8	29
offers help to minorities and students with special needs (social benefits)			15	22
is characterized by lecturers' engagement in classes	K	34		
quality of classes conducted by scientific-didactic staff is high			14	20
has the modern didactic base (equipment of classes and laboratories)	O	32		
creates material conditions to study: library, reading-room			21	11
ensures access to didactic materials			16	5
my HEI has high quality technical infrastructure (e.g. classes equipment, virtual dean's office, e-learning)			15	6
creates opportunities for students to develop through students' exchange	K	31		
organizes internships, studies abroad			12	19
instils in students universal values (e.g. readiness to help others, tolerance, freedom, rights, justice)	W	27		
cares for diversity (with regard to e.g. age, gender, religion, national culture, disability)			19	8
prevents discrimination			18	9
develops individual responsibility			15	12
creates opportunities for development through extra classes	K	24		
offers opportunities for personal development			11	13
cares for natural environment	W	23		
my HEI has great potential to contribute to natural environment protection			17	5
teaches good manners	W	11		
educates within human and social values and disseminates citizens' solidarity			9	3

Source: based on: Mickiewicz et al., 2018; Spodarczyk, Szelągowska-Rudzka, 2019.

Then, to the anticipated SRU features, respondents' evaluation of the level of their realization by the investigated university (perception) were assigned (the other research project). The feature most valued among respondents (31%) was ensuring high quality human resources by the investigated university. This feature is connected with education dimension. Evaluation of the other features relating to all investigated SRU areas (including education) varies and therefore when interpreting results the focus was to identify the gap (Table 1). It was achieved by indicating the difference between the number of answers concerning expectations towards SRU features and the number of answers concerning realization of selected WPiT activities concerning the Authors' proposed areas.

With all the investigated features (for identified SRU areas) respondents' expectations are higher than perception of their realization level. Differences are from 3 to 30 points. The biggest gaps (about 20-30 points) concern features characterizing the areas: education (my university is characterized by high quality education (30 points), quality of classes conducted by scientific-didactic staff is high (20 points); graduate (e.g. I am satisfied with services offered by the university (28 points); my decision to choose this university was right (21 points), I will recommend my university to others (20 points) and effective organisation (supports physical development, ensures medical care (28 points), offers help to minorities and students with special needs (22 points). The smallest differences (3 to 12 points) occur with features representing the area: values (educates within human and social values, disseminates citizens' solidarity (3 points), develops individual responsibility (12 points)) (Table 1).

Conclusions and Discussion

The conducted research results indicate that for students the most important social responsibility dimension is education, which is not surprising. Choosing to study they want to acquire solid knowledge and simultaneously increase their chances on the job market. Undoubtedly, the university's good organisation, among others: ensuring the appropriate study conditions by creating the material base (classrooms equipment, libraries, etc.) and nonmaterial benefits (respecting student's time, ensuring various development forms, medical care) facilitates effective knowledge acquisition (developing future graduates' competences, who will find employment in various organisations).

To a lesser extent, respondents recognize importance of values as the SRU area. It does not mean, however, that this area should be treated as marginal by the university authorities. Students' education and scientific research are the main HEIs' aims. Yet the university, due to its specificity, also plays the significant educating, opinion-forming and quite often expert role (thanks to professional staff). Therefore, it is predisposed, as no other organisations, to be socially responsible. It is responsible not only for equipping students (and later graduates) with hard competences (knowledge), but also making them sensitive to ethical, environmental and social issues (soft competences). Even if students do not yet recognize importance of these competences, HEI is obliged to raise their awareness by introducing CSR classes and, above all, by its own example of such activities and the academic community' engagement in them. Also, the system of values and relationships based on them constitutes the indispensable base.

In the presented comparative analysis, the relationships dimension was not included. Lack of reference to this area is a result of not taking it into considerations in the research on students' perception of the university's socially reliable practices. It is so, because in ISO 26000 such area does not exist. Therefore, the Authors think this is one of premises to conduct research on specificity of HEI social responsibility. Identification of areas essential for stakeholders will enable developing the social responsibility strategy and activities resulting from it, which will not be only "image" practices, but will reflect care for really important things. The widely understood academic community's engagement in developing socially responsible university can lead to stakeholders' real participation in implementation of activities they proposed. Such an approach can also raise awareness of social responsibilities issues and simultaneously make them not only executives of this strategy, but "guardians" of the principles they established. When developing (and investigating) University Social Responsibility it is indispensable to refer to relationships as the dimension which proved essential for students (the most important internal stakeholders; Berman, 1990). This also confirms importance of reference to stakeholders' expectations in effective development of mutual cooperation based on social responsibility principles.

The comparative analysis results showed that in all University Social Responsibility areas (values, graduate, education, effective organisation) and activities characterizing them the real situation does not meet respondents' expectations (Table 1). It is worrying that the greatest gaps occur in the most important activities according to respondents, which is the area: education. Basically, only in one case (my university has high quality human resources) there was a smaller gap. The question arises why high quality staff does not guarantee high quality education and students' satisfaction? This is an important problem in the investigated university. Perhaps the answer should be: teaching methods, the way of transferring knowledge, study programs or their organisation (insufficient contacts with enterprises, other HEIs). In order to eliminate this gap, it is worth identifying its cause

and undertaking correction activities. Here this could mean e.g. increasing academic staff's didactic and communication competences, involving entrepreneurs (employers) in programs creation, more intensive cooperation and experience exchange with HEIs, which have greater didactic competences or better-established relationships with economic practice. Also improving organisation of the university's work and didactic classes' realization can contribute to students' better perception and streamline the educational process. Perhaps students and workers should be also encouraged to share their opinions, suggestions, and reservations in order to develop good practices and the university's social responsibility strategy. It will also affect university evaluation from the graduate's perspective (ambassador of the university's socially responsible activities in the social-economic surroundings).

In the values area (similarly to some features related to education) the gap between expectations towards University Social Responsibility and the actual situation evaluated by students is also relatively small. The Authors doubt whether this is because the university's activities in this area are on such a high level or because this area is rather underestimated by students. As it results from considerations so far, developing the university's social responsibility without emphasizing values and relationships with stakeholders is not recommended. The HEI strategy should aim at showing students the appropriate ethical examples based on human rights, respect, tolerance and openness to new ideas and another person. These assumptions will constitute the basis for students' education, whose value on the job market will not only mean hard, specialist competences, but also their responsible use. Therefore, the university should refer to internal stakeholders' opinions, their needs and expectations, their definite proposals of activities which will develop the university's social responsibility practices and will be included in its strategy. This does not stand in contradiction to dimensions of University Social Responsibility - ISO 26000, SRU Declaration or practices and examples promoted by the best European or world HEIs (Społeczna odpowiedzialność, 2019). On the contrary, it can significantly complement them and enrich, because developing relationships with the university's stakeholders requires their engagement in the process of developing good practices and the social responsibility strategy.

Summing up, developing the university's social responsibility strategy depends on the right identification of stakeholders, among who the most important are: students, future students, employees (academic staff, administration and technical workers), graduates, employers, local community, local government (regional, central) and natural environment. Each stakeholders group can have slightly different expectations towards Socially Responsible University. The Authors started from research on students' expectations towards the university social responsibility areas. They intend to continue research on other stakeholders groups. The identified areas will constitute the basis for universal guidelines/proposals for the university. It is interesting for the Authors to see if the areas identified in this way will correspond to the areas proposed by other researchers, SRU Declaration (2017) or practices based on PRME. The next step in developing the strategy is to determine importance of particular areas and activities in these areas. The results of cyclical research, whose aim will be to identify the gap between expectations and stakeholders' perception, will enable improvement of university's social responsibility. It will be possible thanks to monitoring the university's impact on particular group and fast response when the stakeholders' good is threatened.

Endnotes

[1] Warsaw School of Economics, Kozminski University, Gdansk Foundation for Management Development (Polish: GFKM), Poznan University of Economics, Wroclaw University of Economics, Poznan University College of Business, Faculty of Management at University of Warsaw, Academia WSB in Dąbrowa Górnicza.

[2] Oxford University, University of Cambridge, Imperial College in London, Swiss Federal Institute of Technology in Zurich, University College London.

[3] University of Cambridge, California Institute of Technology, Stanford University, Massachusetts Institute of Technology, Harvard University, Princeton University.

[4] First, in 2017 these were 23 HEIs; in 2019 Declaration was signed by further 60 HEIs (public, private).

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The Role of the Sense of Security in Times of Covid-19 Pandemic - The Research of the Young Polish Employees

Ewa MATUSKA

Pomeranian University, Slupsk, Poland
ewa.matuska@apsl.edu.pl

Wojciech PIESTRZYNSKI

Pomeranian University, Slupsk, Poland
wojciech.piestrzynski@apsl.edu.pl

Abstract

The paper presents the analysis of quantitative research conducted during first two months of the lockdown caused by Covid-19 pandemic among the sample of (N=189) Polish employees representing youngest work generations (Millennials). Two variables: the sense of security and depression symptoms were statistically controlled via two-way analysis followed. The study assumed that young employees, depending on belonging to a particular gender, differ in their psychological reception of the psycho- social threats induced by coronavirus crisis: women are more keen to react with depression although the level of the personal sense of security of men and women stays on moderately high level. Moreover, the level of personal security determines the severity of depression symptoms in a such way that the higher the intensity of the sense of security, the lower the intensity of the characteristics of depression. The found results can be used as recommendations for introducing more holistic well-being and health and safety system measures in organizations.

Keywords: Sense of Security, Depressiveness of Employees, COVID-19 Crisis, Organizational Health and Safety System

Introduction

The global COVID-19 health crisis has caused collateral damage by amplifying totally unexpected economic and psychosocial threats, dangerous for mental well-being of individuals and employees. Main socio-economical threats are bankruptcy and minimized activity of many companies (Tucker 2020) what implies significant rise of unemployment. Recent McKinsey's analysis estimates (Chinn et al, 2020) that up to COVID-19 crisis nearly 59 million jobs will be closed (cc 26 percent of total employment across Europe). The key challenges imposed by the crisis are also rapid demands for changes in routine business models and connected with this challenges put in front of the workforce and managers (Ritter and Pedersen 2020b). Employees can feel not only real danger of possible job loss or minimized salary, but also threat of social isolation, feeling overloading with new mode of work (i.e. remote or hybrid) or of the pression to overtake gaps in their professional skills, especially connected with ICT (Information Communication Technology). Managers have to find fast adequate supportive solutions to help their workforce in crisis situation as there is an urgent need to develop adaptative organizational measures protecting not only physical but also a mental health of employees and guaranteeing their sufficient work efficiency (Ritter and Pedersen, 2020a). There are suggestions that nowadays HR systems should be more relationship-oriented in order to combat the risk of prolonged isolation among employees working remotely and to better prepare them for situations like the current crisis (Carnevale and Hatak 2020).

The main theory underlying this approach is the wide concept of human and social well-being and a bride concept of life satisfaction, where economics and sense of personal and social security are interconnected (Wills-Herrera et al 2011). In a such way, the physical and psychosocial security context disrupted by current coronavirus crisis determines not only economic survival but also basic conditions for development of individuals and organizations. Employees representing particular work generations probably differ in their reception of the current crisis situation.

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It is probably the source of the high psychological stress especially for the youngest employees (Millennials) as they till now didn't experience economic crisis in their professional life.

In a line with above assumptions this paper has been conceptualized. Authors has based on the literature review and on the basis of the own quantitative research done via two questionnaires disseminated on-line: A. Beck's Inventory (IDB - Beck Depression Inventory) and non-standardized questionnaire regarding the subjective sense of security.

Research Design

A sample of 189 working women and men, aged 20-35, from region of Pomerania in Poland, randomly selected, was tested for their sense of security and susceptibility to being infected with depression symptoms in connection with the ongoing epidemiological COVID-19 threat. The study was conducted at the turn of April and May 2020, when pandemic restrictions were strict as the speed and range of the disease spread was high. The research was done by indirect testing method, using two on-line versions questionnaires: A. Beck's Inventory (IDB - Beck Depression Inventory) and non-standardized questionnaire regarding the sense of security. Subgroups of respondents, female and male, did not differ significantly regarding to the age (see Table 1) and were 26 years old per average.

Table 1: Descriptive statistics of the age of respondents

Gender	N	Min.	Max.	Median	Average	SD	Bias	Kurtosis
F	91	20	35	26	26.45	4.49	.5539	- .80518
M	98	21	35	26	27.13	3.75	.4813	- .5815
(U = 3881.5, z =1.53552, p =.12356)								

Source: own elaboration

Results and Discussion

The following research problems were formulated: 1. *Does gender differ intensity of the sense of security and depression symptoms of young employees experiencing the first phase of coronavirus crisis?* 2. *To what extent does the sense of security correlate with depression symptoms that are represented by the study groups?*

Table 2 summarizes descriptive statistics of the sense of security for examined employed young women and men. The average sense of security for women was slightly higher than for men. The study groups differ slightly in terms of standard deviation. Nevertheless, statistically analyzing both groups, it cannot definitely be said that they differ statistically significantly in perceiving personal security (U = 4227.5, z = -. 6147, p = .5418). Therefore, it should be noted that all examined respondents had a moderate and moderately high sense of security. This indicates that the real threat caused by the COVID-19 pandemic did not significantly disturb the sense of security of the surveyed young employees.

Table 2: Descriptive statistics of the sense of security of respondents

Gender	N	Min.	Max.	Median	Average	SD	Bias	Kurtosis
F	91	1	5	5	4.37	.8117	.917	- .4447
M	98	1	5	5	4.26	.9366	1.40	1.918
(U = 4227.5, z = -.6147, p = .5418)								

Source: own elaboration

Considering the phenomenon of examined depression symptoms among young employees, it should be emphasized that there are statistical differences in their intensity in the studied groups (U = 3504.5,

z = -2.5388, p = .01108). Greater saturation of depressive features can be seen in young women. The final picture of this phenomenon is justified by the average (F35 = 9.03, M35 = 7.85), (see Table 3).

Table 3: Descriptive statistics of depression symptoms of respondents

Gender	N	Min.	Max.	Median	Average	SD	Bias	Kurtosis
F	91	0	34	7	9.03	7,99	1.168	.9229
M	98	0	58	3.5	7.85	10.76	2. 312	..6.4814
(U = 3504.5, z = -2.5388, p =.01108)								

Source: own elaboration

Searching for the answer for the second problem *('Is there a relationship between depression and sense of security?'*) the Pearson's correlation indexation was used (see Table 4). With its help it was established that the examined women make their sense of security dependent on the intensity of depression-specific characteristics (r = .3078; p = .002997). The research did not show such a relationship for the examined men (r = - .1632; p = .10835).

Table 4: Correlates between depressive symptoms and the sense of security of the F/M respondents

Gender (N)	Variable 1	Variable 2	Pearson's r	p < 0,05
F 91	Depression	Sense of security	.3078	.002997
M 98	Depression	Sense of security	- .1632	.10835

Source: own elaboration

Summarizing obtained results, Polish young employees occurred to be mostly free from depressive symptoms and have experienced the subjective sense of security on the moderate level despite of the stressful pandemic situation examined at the turn of April and May 2020. However, the tendence to react in a depressive way in connection to experienced level of the sense of security was discovered in a case of surveyed women, but not in case of the male subgroup.

Conclusions

Coronavirus pandemic crisis demands for deep adjustments from side of employees regardless of their age, although especially youngest work generations can be especially vulnerable for the reception of different threats imposed by this situation. In times of coronavirus crisis not only physical health of employees' but also their psycho-social health is highly insecure. Thus it seems to be useful to introduce a holistic view on the health and safety system in organizations. The first step in this direction should be adequate recognizing the "weak points" of the psychological health of the employees' and the fields of possible intervention on organizational level, especially in a company health and safety systems. According to presented research health risky subgroup of Polish employees seem to be young women who tend to react in a more depressive way in compare to male in high stressful situation like the current pandemic crisis. They need a special attention and support which should be proposed by the respective HR units in theirs organizations

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Religion and Education: Law and Practice in the USA

Boris V. NIKOLAEV
PhD in History,
Associate Professor at the Department of Criminal Law,
Penza State University
nikolboris@yandex.ru

Nataliia A. PAVLOVA
PhD in Education
Chair of the Department of foreign languages,
Penza State University
nataliia.pavlova@inbox.ru

Mikhail Yu. EMELIN
PhD in Law, Associate Professor at the Department of Law,
Moscow University named after S.Y. Witte in Penza
mikhemelin@yandex.ru

Abstract

The article describes topical issues of freedom of religion and prevention of religious discrimination in the US education system. It examines constitutional provisions, judicial decisions, legal materials and the president's position on the interaction of religion, the state and the education system. The practice of the US Supreme Court on the financing of religious higher education institutions, the conduct of religious ceremonies and the use of religious symbols is analyzed. The article seeks to comment on academic freedom in the context of free expression of religious beliefs, as well as the activities of religious associations in the system of education.

Keywords: Religion, Education, US Constitutional Law, US Supreme Court, Principle of Equality, Discrimination

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Introduction

The issues of interaction between religion, the education system and the state have been very significant for Russian society over the past decades. In the post-industrial and information society, education acquires key importance for the development of various aspects of public life such as economic prosperity of the country, development of social infrastructure, active political and, in particular, electoral culture (Nikolaev B.V., Emelin M.Yu., Pavlova N.A., 2020), spiritual and moral foundations of society. After many years of communist ideology Russia has been restoring religion as one of the most important spiritual foundations of society. That is why the study of the long experience of the United States in the field of legal interaction between religion and education is of particular scientific importance and relevance.

The constitutional principle of equality and non-discrimination has traditionally been foundational to the US legal system (Nikolaev B.V., Pavlova N.A., 2018). In recent decades, education has gained particular importance in terms of combating discrimination on the basis of race, gender, disability (Nikolaev, 2010), age (Nikolaev B.V., Pavlova N.A., 2016) and other grounds. The prohibition of racial and national discrimination "is a fundamental imperative for the entire American legal system". (Nikolaev, 2018)

One of the most pressing issues of legal regulation of education in the United States is the issue of interaction between church, state and school. Originally education in the United States had strong religious roots, if not exclusively religious origins. Even in the colonial period educational institutions were established under the

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patronage or strong influence of the Christian Church, and, despite the secular trends of the War of Independence era the 1820s became a turning point in the spread of a new type of the so-called denominational colleges established by religious minorities precisely to preserve religious education. (Geiger, 2005) At the same time, the following decades witnessed the growing secularization of both American society in general and the education system in particular.

Other factors of American reality give even greater social and legal significance to religious themes in the US education sector. Here belong extraordinary diversity of religious movements, the decentralized structure of the federation and various legal regulation of issues of religion and church in the US states; stable national traditions that inevitably bring religious motives into education; rather flexible court practice in those matters, and finally, the fact that it was cases in education that became, perhaps, the basis for the development of the general theory and practice of the American judicial system on the issues of interaction between the church and the state.

On the one hand, the modern United States demonstrate religious tolerance, freedom, and diversity; on the other hand, the church continues to have a significant influence on public policy, the social environment, and the education system. Thus, out of 32,500 private schools, 22 percent were Catholic, 45 percent were from other denominations, and only 33 percent had no religious affiliation. Religious affiliation affects the number of students in schools. For example, there were fewer Catholic schools (3 percent) than non-denominational schools (39 percent), and there were very few other religious schools (40 percent) (that is, they had 50 or fewer students). In addition, there was a higher percentage of Catholic schools (5 percent) than non-sectarian schools, and other religious schools (2 percent each) were very large (with 750 or more students).(Hussar, 2020)

In 2017, the United States had 878 religious institutions of higher education, and the number of students reached 1,885,965 people. Unconditional leadership belongs to the Catholic Church (229 institutions), followed by the United Methodists (94 institutions), Baptists (64 institutions), the Presbyterian Church (56 institutions), Jewish institutions (34), the Evangelical Lutheran Church in America (27 institutions). Of particular note is the growth (from 1980 to 2017) in the number of religious institutions of higher education (Interdenominational – from four to 34, as well as Undenominational – from zero to 20) (Snyder, 2019). There is a tendency towards an increase in the number of doubters, as well as adherents of "spiritual, but not religious" beliefs (Miller, 2016)

The influence of the church has been significant in recent decades, and even increased during the presidency of conservative Republicans. All this happened despite the tendency to secularize public life and the higher education system. Thus, President R. Reagan repeatedly pointed out that, in his opinion, morning prayer was necessary in public schools, and he would support a constitutional amendment that overturned the decisions of the Supreme Court in the 1960s. (Grant, 2004)

At the beginning of the 21st century, the George W. Bush administration maintained a close and developing relationship between the state and religion, which caused conflicting assessments on the part of researchers. This continued until the recognition of the "new theocracy" in the modern USA (Buchanan, 2005).

Some changes in state policy took place during the period of Barack Obama's Democratic administration (the initiatives to withdraw the constitutional amendment banning homosexual marriages and expanding guarantees for the protection of the rights of sexual minorities, and removing barriers to research on stem cells). At the same time, the powers of the White House Office for religious organizations and local communities, created by the previous president, were confirmed and even expanded (Executive Order 13498 Amendments to Executive Order 13199 and Establishment of the President's Advisory Council for Faith-Based and Neighborhood Partnerships, February 5, 2009 , 74 FR 6533, February 9, 2009).

The Trump administration actively supported the idea of freedom of religion in difficult times when traditional religious values and the new mainstream ideas of American public and political life clashed in defense of the rights of sexual minorities and transgender people. Thus, in his proclamation of January 16, 2018, he recalled that "Faith is embedded in the history, spirit, and soul of our Nation", stating that "No American – whether a nun, nurse, baker, or business owner – should be forced to choose between the tenets of faith or adherence to the law." That was a direct reference to the court decisions against persons who due to their religious beliefs refused to provide services to homosexual couples. On the contrary, the official statement of the spokesman dated June 30, 2020 expressed support for the decision of the US Supreme Court in the case of *Espinoza v. Montana Department of Revenue*, 591 U.S. ___ (2020), which declared unconstitutional restrictions on state funding for private schools solely on the basis of the religious affiliation of such schools. The support of religion and religious values is also evidenced by a number of Executive Orders issued by D. Trump: EO 13926 Advancing International Religious Freedom (06/02/2020 85 FR 34951), EO 13831 Establishment of a White House Faith and Opportunity Initiative (05/03/2018. 83 FR 20715).

The US Constitution does not contain regulations on religion, and it was just the adoption of the Bill of Rights in 1798 that filled the gap in constitutional regulation. The First Amendment prohibits the establishment of religion by any constitutional or legislative act but somewhat prohibits the adoption of laws that violate or restrict free exercise of religion. In practice, the court was not always able to reconcile these decisions with complete certainty, and that, first of all, was complicated by the tough and sometimes aggressive state legislation in relation to religious communities and rituals, in particular in the field of education.

Religious issues received broader resolution in state constitutions and legislation. Only four states had basic laws establishing a particular religion after the First Amendment to the U.S. Constitution was passed. In 1833, the last of the states, Massachusetts, dropped the corresponding constitutional provisions. Modern state constitutions contain general provisions on state laws on the rights to freedom of conscience, in many cases supplemented by specific provisions on religious issues in education.

There is a significant variety of constitutional regulation of the interaction between religion and higher education at the state level, however, the most typical elements of such regulation can be distinguished (along with the general provision on freedom of conscience in bills of rights). Almost all state constitutions (with the exception of the Vermont state constitution) prohibit public funding of religious institutions and programs. Such a prohibition may be absolute, but it may also contain a number of reservations and restrictions. In addition, the state constitutions prohibit religious instruction in public education institutions; they also prohibit any discrimination on a religious basis in education, especially in admission to an education institution or employment (including the use of a religious test or qualification); prohibit compulsory religious services or ritual activities. At the same time, a number of constitutions contain a special provision on respect for religious, moral and educational values, taking into account the religious basis of public morality in many states, as well as the role of the church in the formation of the education system in general and higher education in particular.

The Civil Rights Act of 1964 became the basis for the prohibition of religious discrimination in the education system, and was supplemented by the corresponding anti-discrimination provisions of the Higher Education Act and the Primary and Secondary Education Act.

The practice of the US Supreme Court is of particular importance due to the decentralized and unsystematic legislation in this area. It was education that turned out to be a "testing ground" for the development of the Supreme Court's case law on religion. Of the eight cases published in the collection of the most important religious court cases for the 300 year period of the American history, seven are directly related to education (Johnson, 1992).

One of the basic principles in the practice of the Supreme Court is the principle of "neutrality" of the state in relation to religion and the church. The favorable "neutrality" often cited in Supreme Court cases has its roots in the history when powerful sects or groups joined efforts of the government and religious organizations to seek official support from the state or federal authorities. This is now prohibited by law.

The next reason for recognizing neutrality is that religious education and religious beliefs are the right of every person, and these are not determined by the state. The legislation guarantees this right. Thus, a violation of the freedom of religion clause implies certain coercive measures, while a violation of the establishment of religion clause does not imply such measures (School District of Abington Township v. Schempp, 374 U.S. 203 (1963).

At the same time, this kind of neutrality cannot be absolute, even if the intention of the court was to erect, in the words of T. Jefferson, "the wall of separation between the church and the state." The court in many decisions demonstrated the ability to constitutionally and legally regulate religious issues and even established direct prohibitions, especially if issues of public safety and the fight against crime were considered (in particular, in the so-called "Mormon case" or in the case of the use of drugs as an element of religious rituals). In many cases, the court recognized the possibility of state funding for religious institutions and in some cases protected the rights to worship and even propaganda of religious views presented in "open forums" in education institutions.

The judgment in *Lemon v. Kurtzman, 403 U.S. 602 (1971*) established a rule for determining religious neutrality, which includes three criteria: 1) legislative act or state action must have a secular purpose; 2) they should neither give the advantages of religion, nor hinder its implementation; 3) it is inadmissible to encourage "excessive involvement of the state" in religious issues. The court traditionally adheres to the "strict analysis" rule, which requires the public respondent to prove that the relevant actions were motivated by "irrefutable public interest" and received the most "narrowly tailored" in terms of securing such interest (Kaplin, 2007).

All education and religious cases considered by the US Supreme Court can be divided into a number of groups. The first group includes the cases of the so-called "school prayers", the second – the issues of state funding of religious institutions, the third – the issues of academic freedom and, in general, freedom of expression in a religious context in the educational environment, the fourth - other issues of ensuring freedom of conscience.

The US Supreme Court confirmed the existence of the so-called "pastor's exception". State demands on religious institutions to recruit or fire their members constitute excessive government interference in church affairs. Such actions interfere with the internal governance of the church, depriving the church of control over the choice of those who will personify its beliefs. It is important to balance "the public interest" in complying with employment discrimination laws and the interest of religious groups in choosing those who will preach their beliefs and fulfill their mission. The First Amendment establishes requirements for the dismissal of clergy in order to ensure the freedom of the church in determining the employment of its ministers. Thus, the US Supreme Court favored First Amendment guarantees over anti-discrimination provisions of the law, thus confirming one of the important exemptions in anti-discrimination policy. The doctrine of "pastor's exception" was formally interpreted by the Supreme Court. Considering the unanimity of the judges in this decision, it can be concluded that further judicial practice is directed towards the inadmissibility of interference in the organizational issues of religious groups.

The practice of the Supreme Court was quite favorable for religion in matters of protecting the right of students to participate in student forums. In 1981 (Widmar v. Vincent 454 U.S. 263 (1981)), the Court ruled unconstitutional the University of Missouri's ban on the provision of university premises to a religious student group while other student organizations were provided with premises. The court found the university's behavior unjustifiably discriminatory with regard to freedom of religious expression by students.

Of considerable interest are the cases related to the defense of academic freedom in higher education in a religious context. In *McCollum v. Board of Education* 333 U.S. 203 (1948) and *Zorach v. Clauson* 343 U.S. 306 (1952) the court considered the issue of the possibility of religious instruction in schools. The court found the practice unconstitutional in the first case, in the second, on the contrary, upheld the actions of New York state legislators. The main differences between the two programs before the Court were as follows: (1) in the first case, students who did not want to participate in the activity had to move to another room, while in the second case it was done by those wishing to attend classes; (2) in the first case, religious instruction took place in a regular classroom in a public school, while in the second, it took place outside school; (3) in the first case, the teacher and school staff worked closely with the religious instruction program, while in the second case, staff were not encouraged to persuade or coerce students into religious instruction. (Kern, 1972)

One of the most unusual ("Indeterminate" in the words of M. Chamber) (Chambers 1973) from the point of view of the general practice of the Court and its extreme indulgence in the interests and beliefs of religious groups was the case of *Wisconsin v. Yoder 406 U.S. 205* (1972), in which the Supreme Court upheld Old Order Amish followers who refused to follow school laws establishing compulsory schooling. They stated that "the introduction of compulsory schooling after the eighth grade might threaten or even destroy free expression of religious traditions within the group".

Once again, the court ruled against the head of the Christian Law Society of the University of California (*Hastings College of Law v Martinez in 561 US (June 28, 2010*) with a minimum majority. The college management rejected the application of the Christian Law Society for registration of a student organization, which would later receive the right to use the funds, equipment, and communication channels of the college. The reason for the rejection was that the provisions of the society's Statement of Faith act (requiring sexual activity only in marriage between a man and a woman) contradicted the college's open door policy, which prohibited the expulsion of students on the basis of their religious beliefs or sexual orientation. The Christian Law Society declared that the college management had violated the provisions of the Ist and XIVth amendments to the US Constitution. In the district court's view, the college did not require the Society to admit any specific groups, but only set reasonable conditions for the provision of its funds and aids, and thus pursued a neutral policy towards religion. This position was confirmed by the Court of Appeal, and then by the majority of the judges of the US Supreme Court (Judges Ginsburg, Breuer, Kennedy, Sotomayor, Stevens). The opinion of the opponents of the decision was prepared by Judge Alito (supported by Scalia, Thomas and also Chief Justice Roberts), who stated that "today's decision of the Court has violated free expression in favor of the prevailing standards of political correctness in higher education institutions of our country."

The financing of religious institutions is one of the most significant parts of the case law of the Supreme Court on the interaction of religion and education. In *Everson v. Board of Education 330 U.S. I* (1947), the court recognized constitutional the practice of state funding for travel to private schools. The Court also upheld the possibility of issuing textbooks on secular subjects (Board of Education of Central School District No. 1 v. Allen 392 U.S. 236

(1968)), and the federal college building grant program in Tilton v. Richardson 403 U.S. 672 (1971). The court also approved the South Carolina program to fund construction projects in private nonprofit colleges and did not find the college's activities "convincingly sectarian," and also found that the funds were not used solely for religious purposes (Hunt v. McNair 413 US 734 (1973)). Using the argument that the college was not "convincingly sectarian" allowed the support of annual grants to Catholic colleges under the Maryland Private Higher Education Program in *Roemer v. Board of Public Works of Maryland 426 U.S. 736* (1976).

The court found it constitutional to provide government funding for conducting compulsory educational tests, as well as awarding a grant to a Christian college student given the general nature of such a program and that the grant was given directly to the student but not to the institution concerned (*Witters v. Washington Department of Services for Blinds 474 US 481 (1986*)). Government funding for sexual counseling services for students in religious institutions, along with other educational institutions, were also found constitutional (Bowen v. Kendrick 487 U.S. 589 (1988)). U.S. 589 (1988)).

In *School District of Grand Rapids v. Ball 473 U.S. 373* (1985), the court ruled that New York City and Grand Rapids (Michigan) were unconstitutional on the basis that they paid salaries to teachers working in the "lagging groups" and teaching electives classes. The court ruled that such a relationship might demonstrate a certain bond between the church and the state. In their opinion, this could lead to the unintentional involvement of teachers in the promotion of certain religious ideas and an indirect excessive rapprochement between the state and religion.

But the court changed its decision (from 1985) in the case of *Agostini v. Felton 521 U.S. 203* (1997) and allowed teachers who taught "lagging classes" in religious schools to receive remuneration from public funds. In accordance with a 1993 ruling, the court recognized the constitutionality of payments to a sign language interpreter performing this activity in a religious school from public funds (Grant, 2004). In 2000, the judgment in *Mitchel v. Helms* 503 U.S. 793 (2000) pointed to the possibility of religious schools "to receive material resources (books, computers) from the state, if such assistance extends to all educational institutions and is intended for secular, neutral programs, programs of a non-ideological nature."

It should be noted that in many cases the decisions of the court were adopted by a minimum majority (5-4), and in the latter case the votes were completely divided according to the 3-2-3 model, and as a result, only the so-called plural opinion was achieved, which is not a binding precedent for further court decisions in this area.

In 2002, in *Zelman v. Simmons-Harris* 536 U.S. 639 (2002) the Court upheld the provision of vouchers to children from low-income families to attend a private religious school. The case involved 4.5 thousand children from Ohio, who attended 41 religious schools. Doubts were expressed about the legitimacy of these decisions, since the education of children in religious schools is not compulsory and each parent has a choice. This turned out to be a positive moment for the justification of the educational policy of George W. Bush, for whom the provision of school vouchers became a "trump card". (Grant, 2004)

In *Meuller v. Allen 463 U.S. 388 (1983)*, the court unequivocally upheld the possibility of providing financial benefits to students and their parents even if they chose private, including religious institutions. However, in the case of *Committee for Public Education v. Nyquist 413 U.S. 756* (1973 the court declared unconstitutional a provision on special financial benefits for students in parish and other private schools. The researchers note the vague and, in some cases, "ad hoc" nature of the court's judgment, which prohibits the provision of therapeutic and diagnostic services in a religious school, but at the same time allows these services in a mobile room and allows other very borderline cases (Choper, 1995)**.**

Judges themselves acknowledge some degree of uncertainty, assuming that "there is no 'exact scientific method' for determining the degree of interconnection between the church and the state," and all relevant factors must be considered together to determine the degree of such interconnection (*Roemer v. Board of Public Works of Maryland*, 426 US 736 (1976)). There is a significant number of judgments in favor of providing government funding (at both the federal and state levels), provided there is no discrimination and there is proof that the funding is intended for secular purposes.

The Supreme Court appears to be even more "liberal" with regard to higher education. This is due primarily to the extremely decentralized nature of US higher education and indirect control by the state. There are practically no public higher education institutions in the country and there is a significant share of private universities and colleges, including those of religious affiliation. The court explains this peculiarity of its position by the fact that students of higher education institutions are more independent and in this case less susceptible to propaganda (including religious propaganda) (Tilton v. Richardson 403 U.S. 672 (1971)).

In *Locke v. Davey* 540 U.S. 712 (2004) the Court considered the constitutionality of the Washington State financial aid program, which was not extended to degree programs in theology. Confirming some contradiction between the two provisions of the federal Constitution, the court pointed to additional prerogatives in this case on the part of the state authorities, which could, under the circumstances, give preference to the values of separation of church and state embodied in the state constitution over the federal interest in ensuring the freedom of conscience of the individual. Thus, the Court emphasized that the state could have extended its program to theology, but the freedom of religion clause does not mandatorily require it to do so. As you can see, in this case, the "less strict" analysis rule was applied, in contrast to the "strict analysis" rule which was applied in a significant group number of other court decisions, as well as the "minimal analysis" (Kaplin, 2007) used, for example, in the case of *Employment Division v. Smith*, 494 U.S. 872 (1990).

This position significantly expands the prerogatives of the states in determining financial policy in relation to religious institutions and programs. *Hein, Director, White house office of faith-based and community initiatives, et al. v. Freedom from religion foundation, inc., Et al. 551 U.S 587 (2007)* relates to a taxpayer lawsuit against the executive branch (in particular the White House Religious Groups Initiative) regarding the holding of religious conferences sponsored by them, which violates the provisions of Amendment I to the US Constitution.

The District Court rejected the claimant's application on the ground that Clause I of the Religion Amendment is addressed to the United States Congress and cannot be applied directly to executive acts. However, the Court of Appeal reconsidered the decision because the activity was funded in accordance with the decisions of Congress and, therefore, the claim was well founded. The Supreme Court, by a majority vote, upheld the district court and, accordingly, the executive branch.

Arizona Christian School Tuition Organization v. Winn et al. 563 USA (2011) considered the possibility of taxpayers to put government agencies in issue for funding activities that may have a religious purpose. A district court ruled that Arizona's tax-exempt practice was unconstitutional for donations given to schools, which in turn used such donations privately, including religious schools. The Court of Appeal upheld the taxpayers' position. The US Supreme Court by five votes (Judges Kennedy, Roberts, Alito, Scalia, Thomas) to four (Judges Kagan, Breuer, Ginsburg, Sotomayor) reviewed the decision of the Court of Appeal, finding its interpretation overly broad in the Flast case involving direct government spending, and no tax credit. In the case of *Espinoza v. Montana Department of Revenue*, 591 U.S. (2020) the conservative majority of the court ruled unconstitutional funding restrictions on religious schools, which was discriminatory not only against such schools, but also families who had chosen such schools to teach their children.

In recent decades, the activities of the court have been characterized by certain contradictions. These refer to changes in practice (recognition or non-recognition of actions as constitutional; the provisions of the doctrine and rules underlying such decisions). It is worth pointing to the tense procedure for making decisions with a minimum majority of votes (5-4) and even (in the absence of an absolute majority) by achieving multiple consent.

Substantial polarization is characteristic of the party's assessment of the Court's activities. About three-quarters of Republicans and their independent supporters have a positive opinion of the Supreme Court, compared with 49% of Democrats and their supporters, and the 26 percentage point difference between the two parties is one of the largest in two decades. (Brockway, 2019) However, it is the Supreme Court of the United States that remains the last judicial and constitutional instance ensuring public and private interests between religion and higher education, creating both federal and state laws in accordance with the provisions of the US Constitution.

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Agent-Based Simulation Framework for Optimization of Deliveries in A Parcel Distribution System

Dariusz PIERZCHALA
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland
dariusz.pierzchala@wat.edu.pl

Tomasz GUTOWSKI
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland
tomasz.gutowski@wat.edu.pl

Przemyslaw CZUBA
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland
przemyslaw.czuba@wat.edu.pl

Abstract

Simulation is becoming more and more powerful in management, especially strategic one. In the paper, we introduce a novel framework for combining two modelling techniques: agent-based models (ABM) and Multi-resolution modelling (MRM). Both of these methods are well known and wide practical usage. Simulation is a commonly known and recognized business decision making support method. However, their use in a single environment, and in addition reinforcement learning, provides additional opportunities for a variety of (in terms of conditions) test scenarios, shortening decision verification time, obtaining synthetic simulation data for further research and optimization for uncharacteristic conditions. The implementation of such methods allows companies to adaptively track changing in market conditions as well as to anticipate environmental changes. Moreover, machine learning algorithms (clustering and classification) for software agents will improve the scope and dynamics of the simulation models and technology. By using the approach, it is possible to analyze many business strategies (e.g. what would happen if shipments were delivered twice a day).

Keywords: Agent-Based Modelling, Transportation Simulation, Multi-Resolution Simulation.

Introduction

The problems of optimizing the structure of the parcel distribution system as well as the optimal scheduling of deliveries are characteristic for courier companies and still require better solutions (Barreto et al (2007)). The methods of operational research and artificial intelligence and machine learning are used to solve these problems. Nowadays, due to the size of the problems and numerous and detailed limitations, fast simulation methods are used to verify proposed solutions. High-resolution software simulators use the notion of a software agent to represent, among others, couriers with vehicles, warehouses with staff, senders and recipients of parcels. The inclusion of many details in the simulated objects and, on the other hand, the generalization of descriptions when no high resolution is required, leads to a multi-resolution simulation of a logistics company. Such a simulation enables verification of task solutions: optimization of network structure, scheduling of deliveries of goods to zones and points by means of allocated vehicles, promptness of deliveries of designated routes, unit costs of package delivery, identification of bottlenecks, forecasting of times and costs in various conditions, verification of decision-making scenarios (what if). Such a wide range of requirements and the specificity of the tested implementations of optimization algorithms make it necessary to build a dedicated simulation environment for algorithm testing and decision support in a delivery/courier company.

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The current solutions (e.g. route optimization in eMapi) are mostly based on deterministic networks, assuming that if, for example, the journey between locations takes some time, it is a fixed one. The innovation and novelty of the proposed solution is to use a solution based on stochastic models, agent simulation as well as multi-resolution modelling (MRM). A concept “resolution” is defined as level at which an object is simulated. Obviously, it is strictly related to modelling constraints and criteria for the dimensions and the degree of detail. A simple object (like a vehicle) is a high-resolution entity (HRE) while a group of objects will be called aggregate low-resolution entity (LRE). Multi-resolution modelling (MRM) is very useful in the analysis of complex adaptive systems, as it is very computationally complex to track all relevant objects, their characteristics and cause-effect relationships at a very detailed level. It was verified in a research study by Rabelo et al (2015), Su-Youn and Tag Gon (2012). At all the levels the agent simulation techniques, both simple and with the reinforcement learning, were used. Agent simulations seems to be an important element at a starting phase of the development of new business. Further, implementation of such methods allows companies to follow changing in market conditions. Urban simulation (traffic, delivery, parking) is generally a particularly productive area for new agent-based simulation approaches, especially when there are many interdependent factors and there is a need to train or adapt models. In a research study by Beheshti and Sukthankar (2014) there is presented a case study describing benefits from a hybrid simulation method for forecasting transportation patterns. The paper by Klugl and Bazzan (2012) presents the advantages of agent techniques over other types of simulation in the traffic domain - including capacity for imbuing objects with learning and adaptive behavior and simplicity of generating populations with heterogeneous behavior algorithms. Deep Reinforcement Learning is a very general paradigm (e.g. a toolkit OpenAI Gym). – in the presented study e.g. the deliveryman agent learns from examples of optimal behavior in the so-called "last mile" (e.g. parking in the right place).

Optimization methods and algorithms

The subject of research in the simulation framework are algorithms for optimal (or suboptimal) scheduling of goods deliveries to zones and points by allocated means of transport along assigned routes. The algorithms are limited by restriction to the indicated areas, the given allocation of goods to zones, requirements regarding means of transport, costs (time and financial), as well as taking into account traffic disruptions. The simulation environment will allow to run and test the algorithms as well as collect and share the results to compare the algorithms for different sets of input data.

For the purpose of algorithm learning it will be necessary to generate training data. Comprehensive tests of algorithms conducted in the environment will require historical data, but also data generated on the basis of empirical distributions identified in historical populations.

With appropriate configuration such framework can also be used as a parameter calibrator - to verify the calibration parameters of a selected algorithm with a fixed type of input data.

Finally, with a generator of data about goods for distribution, scheduling algorithms, random disruption generator (e.g. natural – weather conditions or artificial - traffic events) and a process and event simulator, it will be possible to use the framework as a scenario analyzer (what-if).

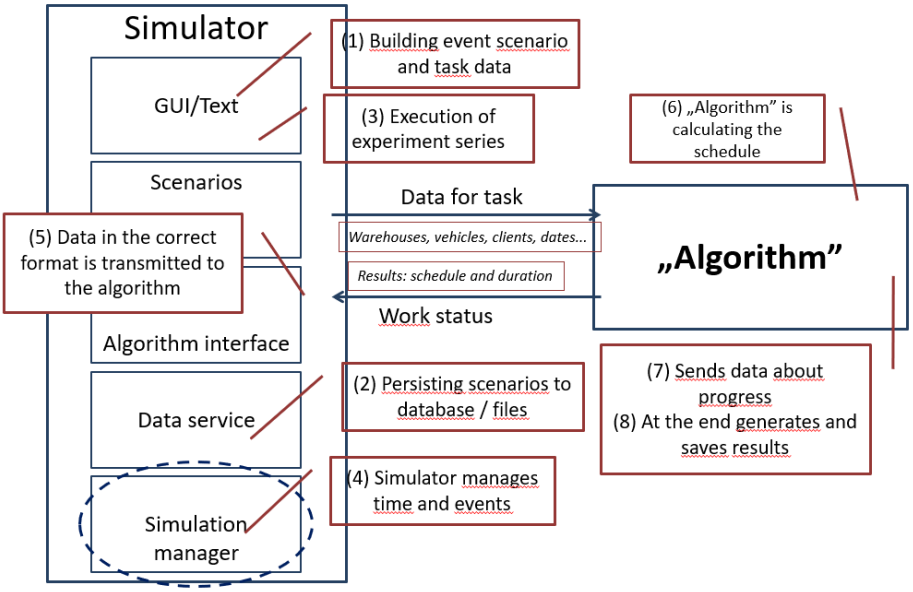

Fig. 1: The concept of simulation environment for testing the implementation of algorithms

The user's cooperation with the algorithm testing environment (the simulator framerwork) and the implementation of delivery scheduling algorithms, will be multi-stage and may include:

- preparation of the test scenario, including: entering data for the algorithms, configuration of a series of experiments, parameterization of random number generators, random data generation according to picked distributions;
- configuration of the tested algorithm;
- parameterization of conditions, e.g. vehicle movement in order to test their influence on the result of scheduling;
- specification of conditions for the execution of the experiments:
    - experimentation mode (graphical/text);
    - the pace of simulation time.

Finally, the environment for simulation testing of algorithms will allow to evaluate the quality, sensitivity and effectiveness of implemented algorithms. In order to carry out diverse and complex research, it is suggested to provide scenarios and data sets covering as many possible cases occurring in the environment.

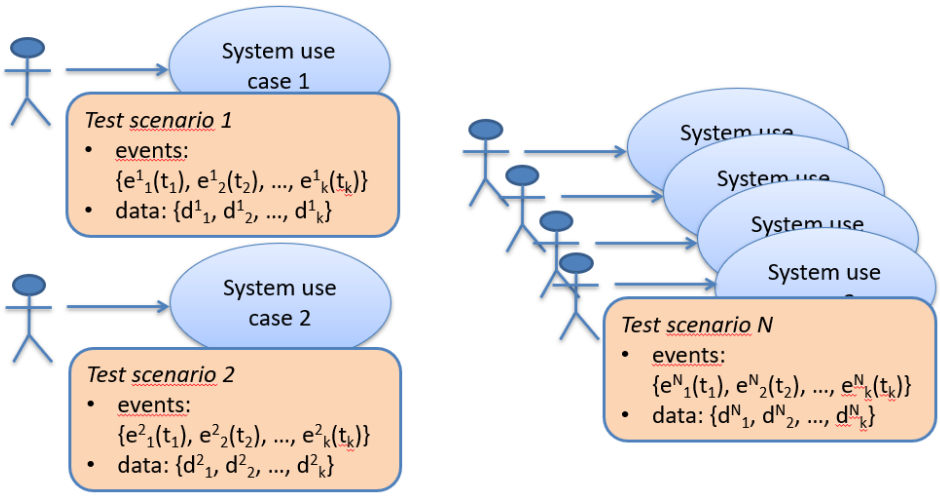

Fig. 2: Testing in the algorithm testing environment

Quality and Sensitivity Testing

The expected results of the environment for simulation testing of algorithms are a set of characteristics and parameters to be configured before each experiment. Performing single or a series of experiments will allow to gather a set of values for selected parameters of simulated objects and processes. They will build sets of numerical data for quantitative evaluation of distribution costs for following resource variants:

- partial and aggregated results for routes:
    - lengths,
    - leave and return times for the vehicle (e.g. from/to the warehouse);
    - travel time periods;
    - service and waiting time periods.

It is important to indicate the influence of the scope and quality of historical data made available to the environment on that the possibility and appropriateness of the results collected in the simulation. The collected results will be qualified by route and vehicle. Through different scenarios and configurations of the collected data, scenario analyses (what if) will be possible for:

- required types and number of vehicles for effective on time completion of tasks;
- distribution possibilities with the available resources and time and area conditions;
- distribution costs for resource variants.

Efficiency and Effectiveness Testing

Independent characteristics will describe reliability, efficiency and effectiveness of algorithm implementation. They will provide answers to questions:

- Are the algorithms able to perform the task at the right time?
- In what time do the algorithms perform the task?

The delivered software components for testing will be treated as "black boxes", contact with them will be made through available software interfaces, without the possibility to modify their internal codes. Observations of the work of

algorithms will be possible only through the output data, and it is assumed that among them there will be information about the state (progress) of the algorithm's work.

Architecture and software components of the simulation framework

The three-layer architecture of the desktop IT system includes layers:

- presentation (graphic and text interfaces),
- logic (algorithms under investigation, environment logic),
- resources (database, files),
- integration to access the algorithms and their input data.

The basic software components of the simulation environment for testing algorithms are: simulator, implementation of scheduling algorithms (procedures), network data providers, map and historical data resources (e.g. about rides, service at the destination).

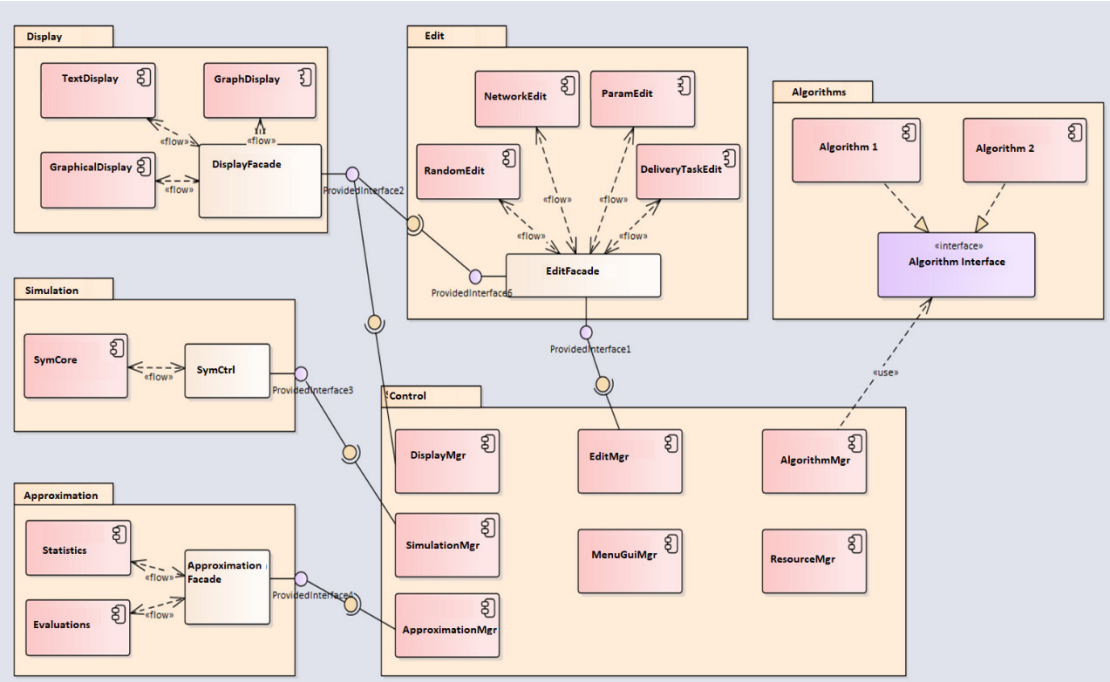

Fig. 3: Diagram of the components of the simulation environment for algorithm testing

The Control Package contains object components responsible for controlling the data flow and functions in the environment. This involves the MenuGuiMgr interface manager, which acts as an intermediary between the user and the environment functions performed by the components in other packages. Access to the functions of other packages is done with the help of intermediary workstations (registered in the main manager): DisplayMgr, EditMgr, AlgorithmsMgr, SimulationMgr, ApproximationMgr and ResourcesMgr.

Algorithms package includes code libraries of tested algorithms, to which configurable access will be realized through a defined interface. The software codes of the algorithms (software components) delivered for testing will be treated as "black boxes", without the possibility to modify their internal codes. They are available for the simulator through a unified software interface. Supervision and monitoring of the algorithm work (readiness, current status and task completion) will be possible through callback functions recorded in the algorithm components and the test environment.

Access to the components of the Edit package will take place through the Facade, whose task is to control a simplified bidirectional message and data flow from/to the components responsible for editing a number of data sets and parameters:

- EditParamCfgAlg - edition of parameters and algorithm configuration;
- Network Edit - editing of connection network data (data downloaded from outside the environment through a fixed interface or created from scratch in the environment);
- EditTasks Delivery - editing of data concerning the delivery task: warehouses, points, vehicle fleet (data downloaded from outside the environment through a fixed interface or created from scratch in the environment);
- EditRandom - edition of parameters for configuring number generators and random processes.

In the Simulation package there is a component that represents the characteristics (structure) and dynamics (behaviour) of the real system using mathematical models written in the program algorithms. By experimenting with the simulator, the real delivery system will be studied, recognized and tested in various scenarios (including those that would be difficult to obtain under real conditions). The variable scale of simulation time (including event time) will allow to perform experiments up to several hundred times faster than in real time.

In the Approximation package, the components are responsible for implementation:

- Statistics - point and interval estimation for a series of experiments - will enable statistical processing of accumulated values for selected parameters of simulated objects and processes. They will be the basis for quantitative evaluation;
- Evaluation - quantitative and qualitative, absolute and comparative, evaluation of algorithms for different tasks and conditions.

The Display Package has components that realize configurable in the environment text (Textual Image), graphic (Graphic Image) and network connection graph (Graphic Image). It provides access to edit all parameters.

The other two component packages are Random and Resources. The Random component will be responsible for generating pseudo-random numbers, monitoring parameters and variables and statistical estimates. Random number generators are based on computational formulas. Subsequent values generated by the generator are determined from the previous ones. The first value is called the grain of the program generator. It can be initialized by the user (seed number) or by the system (according to the current astronomical date and time). Initialization by the grain number ensures repeatability of the designated numbers in case of unchanged initial data. This is called pseudo-random number generators. The evenly distributed number generators are of particular importance, as the numbers they determine are the basis for methods of generating pseudo-random numbers of any distribution. The most common are regular number generators based on linear algorithms. The values of random variables with other distributions are generated by the methods: reversal of the distribution, elimination and superposition of distributions. There will be implemented methods of generating random numbers: uniform, exponential, hyperExponential, laplace, erlang, gamma, normal, beta, student, lognormal, Poisson, geometric, binomial, triangular.

Method of Simulating Events and Random Processes

Computer simulation over 60 years of its use has been understood and defined in many ways. We will assume the definition that it is a quantitative and qualitative method of modelling in formal language and mapping structural and behavioral features of systems (real or designed) in a computer program, allowing to experiment with the model (instead of the system) and observe in it the processes taking place in the simulation time. It is a recognized alternative to experimenting with a real system or its physical prototype, to methods of mathematical analysis, and replaces informal inferences based on experience and intuition. In the construction of a simulation model, the static and dynamic components of the system to be simulated should usually be mapped. The static structure describes the objects included in the modelled system together with their features and relations connecting them into relationships. It is sufficient only

in the case of a static simulation, omitting the phenomenon of time lapse. In dynamic simulation it is necessary to define formal models and software algorithms for determining successive states of objects in the modelled system. It is assumed that in the process of simulation the values of features describing the system in specific moments or intervals of the simulation will be determined, which will be given deterministically (deterministic simulation) or randomly/pseudo-randomly (stochastic simulation).

The original discrete agent-based simulation software package is dedicated to facilitate creating constructive simulation software – both discrete and quasi-continuous as well as hybrid. The basic entity is an object '*o*' with its attributes:

- $O = \{o = <id, c>\}$, $c \in C^O$, $id \in N$ - a set of simulated objects of '*c*' class that are identified by an '*id*' with a unique value;
- C^O - a non-empty set of classes of modelled objects;
- A_c - a non-empty set of attributes specified for the $c \in C^O$ object class;
- V_a^c - a set of acceptable values of the $a \in A_c$ attribute of the $c \in C^O$ objects class.

The C^O and A_c sets contain the numbers of modelled object classes and their attributes. At any time *t* of the simulation time each measurable feature of the system is represented by an ordered quadruple: $<o, a, v, t>$. The state of the modelled system *ST(t)* will be the vector created by all attributes of all objects at the simulation time *t*. In the simulation $v \in V_a^c$ values of $a \in A_c$ attributes are determined as a result of the user-defined state change function. Consequently, along with the assumptions for each object there are defined: the state vector with attributes and either the events or periodically executed equations that change the values of attributes (and finally a state of the system). The term event '*e*' from a finite set of events is understood as the algorithmic change in object's state which is scheduled for a specific simulation moment *t*.

In practice, many methods of dynamics mapping are used in models and simulation programs, which is the basis for their classification due to the way of simulation time lapse mapping and state change modelling:

- continuous in time - continuous or quasi-continuous functions are used to describe the phenomenon of time lapse (this does not apply to the description of state changes), e.g.: Euler, Runge-Kutty, Adams Bashforth, Adams Moulton or Gear methods. A specific subclass are system dynamics analysis methods, which bring multi-level and multi-element systems closer in a holistic (rather than fragmentary) way through specially introduced concepts of stock, flow and feedback loop;

- discrete - discrete functions are used in the description of time lapse, the domain of time is a finite set of discrete moments:

- time-driven - the value of time increases with a fixed value t: ti+1=ti+t, then the calculations for the new state are performed;
- event-driven - the time value results from the moment of the next event, i.e. a change in the value of selected state attributes or a change in the structure of system objects.

In the presented simulation environment, a discrete time-driven method with a variable rate of time (according to the astronomical time, accelerated or delayed) was used.

Case Study

The application offers single algorithm execution as well as multiply executions defined by scenarios. When executing the algorithm the user must choose one of the VRP algorithms, its calibration parameters, the start time and the criteria which will be taken into account finding the schedule. Currently implemented criteria includes distance, time and cost. **Fig. 4:View of the algorithm execution section, presenting the result of the Annealing algorithm**Fig. **4**4 presents a view of the execution of the Annealing Algorithm with provided parameters. On the right we have the execution time and the summary of the schedule. It is also possible to view the schedule as a network where all of the routes, for each vehicle are presented.

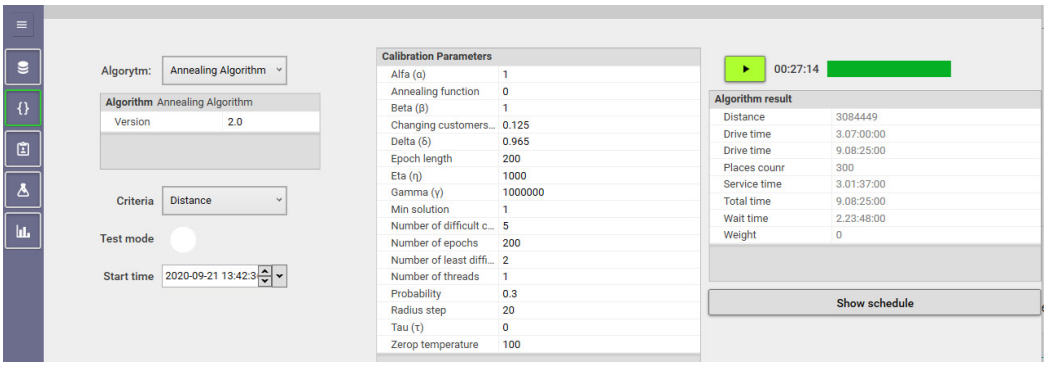

Fig. 4:View of the algorithm execution section, presenting the result of the Annealing algorithm

The created schedule for delivery can be later verified with simulation. The user can select a set of predefined weather conditions and time which influence the distributions of specific times in the schedule and the probabilities of accepting the package not within the opening hours. The distribution for a specific vehicle or distance can be overridden from the network view of the schedule. The failure of the vehicle can be simulated as well given the time and duration of failure, that can be provided by an exact value or a distribution. The application currently support the following distributions: Beta, Binomial, Erlang, exponential, F-distribution, Gamma, Geometric, Log-normal, Normal, Poisson, Student, Uniform and Weibull. To verify the schedule the random seed and the number of simulations must be provided.

Once the simulation is complete it is possible to view the modified schedule (considering the simulation). The network view uses two colors to indicate nodes the have been reached outside the opening hours of the node. The green color indicates that the vehicle reached the node too early. In this situation the vehicle waits or leaves the package if the customer is able to accept it earlier. Red nodes were reached too late by the vehicle, after the end of opening hours, if the vehicle is unable to leave the package it continues to following nodes. The bar on the bottom allows to view the situation at different times of the simulation to indicate the exact time where the simulation started to drift away from the schedule. It is also possible to play the simulation at provided acceleration.

Fig. 5 presents a result of a one of the simulations in very bad weather conditions for a schedule created with Tabu algorithm. Only the customers closest to the warehouse received their packages in expected time, the rest was not delivered the same day. The Annealing algorithm was more successful in bad weather conditions. Due to the fact that the routes were shorter only 5 packages were not delivered. None of the packages were delivered before time. Under other circumstances the Tabu algorithm receives better results. The third network represents the simulation of the same schedule in bad conditions combined with Christmas time. Based on the results it can be noticed, that more people were able to accept their packages outside expected hours.

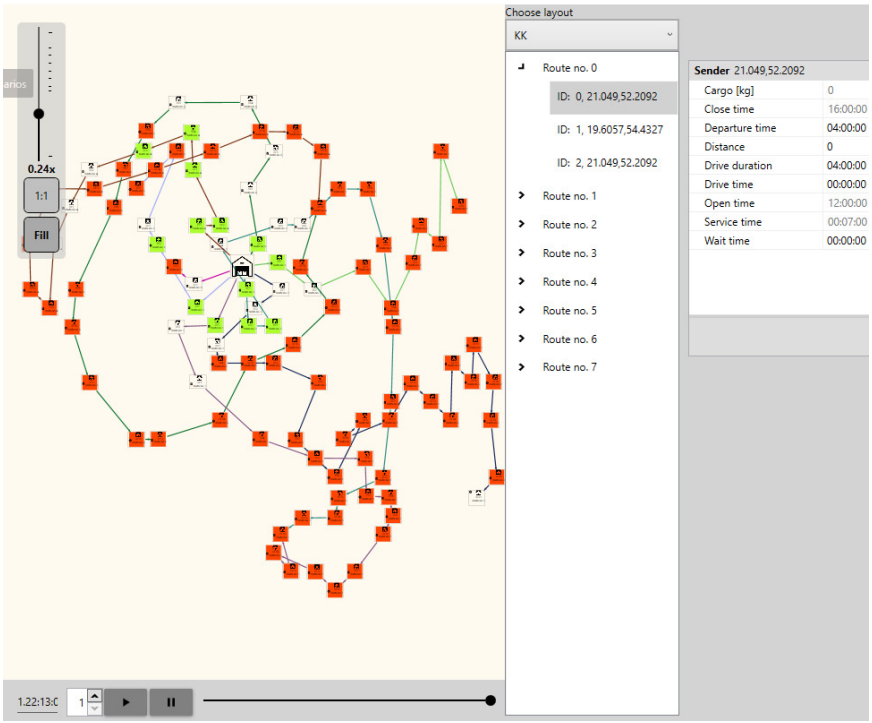

Fig. 5: Network representing the simulation result of the schedule received as a result of the Tabu algorithm (very bad weather)

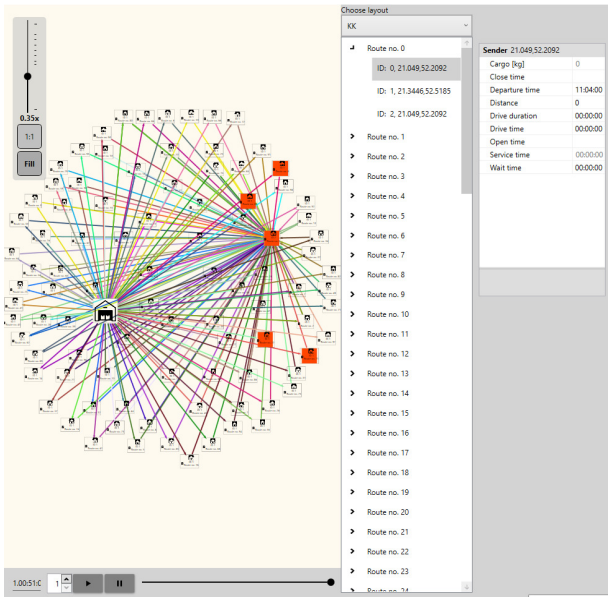

Fig. 6: Network representing the simulation result of the schedule received as a result of the Annealing algorithm (bad weather and holiday season)

The last section of the application provides analysis and statistical data. For every time characteristics of the schedule, routes and customer a set of statistics is calculated including the mean, variation, standard deviation , range and confidence interval. It provides insights about implied schedule modifications. The analysis section also provides a set of charts for each of the simulations. The charts include histograms for service, drive times and differences from the schedule, Gantt charts for every route and a chart showing the differences from the schedule through the whole route.

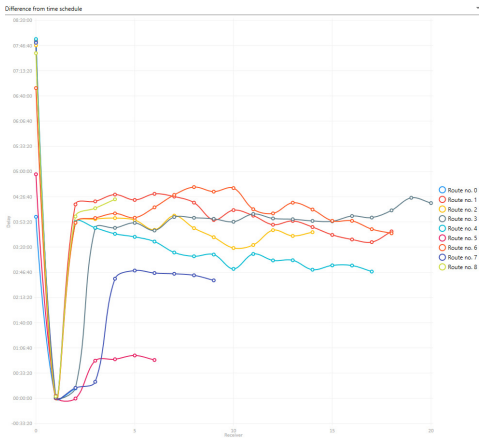

Fig. 7: Chart representing the time differences from the schedule for every simulated vehicle

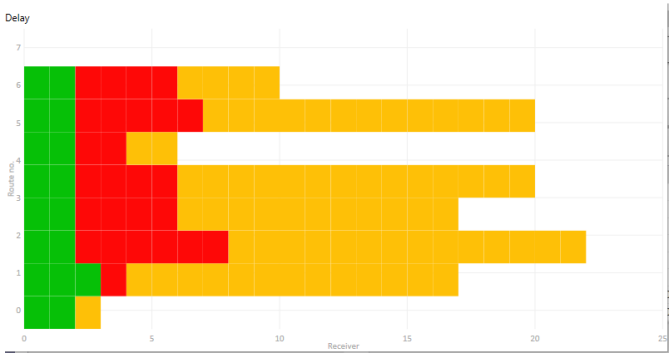

Fig. 8: Chart representing the delays for specific routes (Y Axis) at specific nodes (X axis)

Summary

Simulation is becoming more and more powerful in management, especially strategic one. Some businesses have even made the rule that no strategic decisions should be taken without simulation analysis. By using simulation it is possible to analyze many business strategies (e.g. what would happen if shipments were delivered twice a day). This will allow you to gain an advantage over your competitors, including: prior verification of business strategies, as well as adapting services to market needs. The profits from the use of simulations can be measured by various indicators: operating costs, order processing times, warehouse filling levels, idle times or the performance of individual resources. The implementation of such methods allows companies to adaptively track changing in market conditions as well as to anticipate environmental changes.

Today, agent simulations are increasingly used to create strategic models. On the basis of an experiment carried out on the historical data of a certain company, it was found that the results of the simulation deviated from the actual ones by no more than 25%. We intend to use supply chain process prediction and optimization algorithms in the environment, including: multiple regression prediction method and ARMA time series method. Moreover, machine learning algorithms (clustering and classification) for software agents will be applied more widely. Biologically inspired algorithms (evolutionary algorithms, swarm intelligence algorithms) may also be taken into account in order to map the cooperation of agents in motion.

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Coopetition between Data Center Service Providers as an Economical Solution for Multicloud Infrastructure Deployment in Polish Public Sector

Andrzej PESTKOWSKI

Wroclaw University of Economics and Business, Poland
andrzej@pestkowski.pl

Abstract

This paper concerns the phenomenon of business strategy of coopetition between two major cloud computing providers, Google and Microsoft, who jointly prepared an unprecedented solution of multicloud infrastructure for Polish public sector organisations. It is assumed that such project might be more effective from the perspective of cost, time management and human resources engagement than the traditional approach of building own data center or implementing other cloud models presented in the paper. During the research various aspects and approaches of the abovementioned phenomena have been considered in the context of economic analysis of specific IT infrastructure deployment models such as IaaS, SaaS or PaaS. The author also investigates the events, motives and benefits that lead companies to deploy the coopetition strategy. The study is divided into the theoretical, conceptual and empirical parts that gradually reveal the answers to the research questions made by an author. Conclusions drawn from this paper can be useful for entrepreneurs and their decision-making process. Also, they may constitute a solid basis for further research in this field.

Keywords: Data Center, Cloud Computing, Coopetition, Business Strategy, Multicloud, Polish National Cloud.

Introduction

In modern economy digital presence of European enterprises and public sector organisations is one of the most important strategic factors as it allows to reach their customers quickly at almost any time. This statement is especially important considering the fact that in 2018 in the European Union 89% of all households had access to the Internet at home and 83% of them were regular Internet users. Moreover, the number of worldwide Internet users is rising year by year reaching in the same year 3.92 billion people who represent 51,4% of World population (Telecommunication Development Bureau, 2020). As a consequence of the aforementioned trends more and more companies are starting to mark their appearance online. Indeed, in 2018 on average 77% of all EU-28 enterprises had at least an Internet website (Statistics Poland, 2019, p. 94). This implicates forced demand for data center services as every website and most of other interactions in the Internet must be hosted and operated with the use of special servers mainly located in data center buildings. However, while basic hosting infrastructure is used by the majority of enterprises and public administration companies, it is not the case with more advanced cloud computing services such as e-mail systems, storing files, backups or database hosting which are used only by 26% of enterprises (Eurostat, 2019a, 2019b). Furthermore, in 2017, over one third (35 %) of people in the EU who had used the Internet within the 3 months prior to the Eurostat survey (2019a) used this kind of cloud services. It is worth pointing out that the lowest share was noted in Poland with the result of just 20% comparing to the highest of 59% in Denmark. In the light of the foregoing facts the author has decided to raise that topic with an aim of finding and analysing possible economical solution for implementing cloud infrastructure within the most vulnerable public sector in Poland that distinguishes itself from other countries by the lowest rate of cloud computing usage in the European Union. It is assumed that digital transformation to hyperscale multicloud infrastructure is currently one of the most innovative and recommended solutions (Datamation, 2020). Thus, during the course of the research the author focuses specifically on the recent ground-breaking project called "Polish National Cloud – PNC" operated by one of the major companies from Polish Public Sector: Poland's largest bank - PKO Bank Polski and Poland's government unit – Polish Development Fund that are named together as "National Cloud Operator – NCO". Since one of its main objectives is to increase the usage of cloud computing technology by Polish public administration, enterprises and implicitly by Polish citizens, this project might be considered as a valuable source for effectiveness analysis from the perspective of economic and management sciences. What is worth mentioning, NCO launched PNC in 2018 by implementing an unprecedented

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strategy of coopetition between two global Data Center competitors – Microsoft and Google. It is at least unusual in such an immense project to choose third party solutions especially for government units where security issues are among the most important ones. Nevertheless, NCO not only decided to go for commercial solutions but also at the same time convinced providers Google and Microsoft to invest 3 billion USD in their data centers in Poland to secure locally the highest quality of service (The Economic Times, 2020; Wilczek, 2020). Hence, the project is not only innovative from the technological perspective but also as an economical phenomenon. That is why the author has decided to analyse this case from a wider perspective and conducted research on other possible economical solutions for implementing multicloud infrastructure by comparing them with titular coopetition through effectiveness variables such as: cost, time consumption and human resources allocation.

Theoretical Background

This section will broaden the deliberations about the economics of data center as well as the business strategy of coopetition that was mentioned in the introduction. The focus shall be put on the theoretical issues that might bring better understanding of the multicloud infrastructure concept and its challenges from an economic perspective. It is also necessary to properly characterise the concept of coopetition, which is why various approaches and definitions will be presented. The author also concentrates on the coopetition strategy as an unusual approach in cloud computing industry especially when government infrastructure is launched.

Cost Effectiveness and It Security in Data Center Deployment

Data center is a specifically designed building in terms of high security standards with the capability to store and share commercial (enterprise class) computers called servers. Typically, servers stored in these buildings operate as a nonstop service twenty four hours a day, seven days a week often with financially insured guarantees of remote availability. Servers are designed to be mounted in special cabinets called racks where usually one server is considered as 1 rack unit (U) where the industry standard is to fill 1 rack with 42U. Finally, those servers and racks are connected to high performance Internet connection with fast and guaranteed bandwidth via Ethernet ports, switches and routers which allows remote access to the infrastructure (Tian and Zhao, 2015; Wu and Buyya, 2015, pp. 152–156). Thanks to the abovementioned technology customers may benefit from almost unlimited access to their IT systems from any place in the world where Internet connection is available. It is noteworthy that enterprises which own or rent servers in data centers do not have to be connected to the servers or might be even completely offline and still their IT systems are online and available from Internet due to the direct usage of data center resources instead of its own. This is one of the most important advantages of IT systems to be remotely located in data center, as in effect enterprises purposely secure infrastructure in case of failure or any other security issues.

A server installed in data center enables to launch any type of IT system, tool or software known in the digital economy for enterprises at every level of market development. Thus, starting from a small business through medium size enterprises and ending with the large ones, the following typical use cases of servers can be specified: websites, e-mail systems, office software, specialised enterprise management software (ERP / CRM), accounting systems, 3D rendering, artificial intelligence, machine learning, big data and many others.

Although data centers are able to handle almost all needs of an organisation in the field of IT and certainly there are numerous advantages of such a technology, they have one feature that brings out the problem of data security. It is the psychological issue that comes from this revolutionary approach to provide services remotely, which means that when placing IT systems in the data center, one usually does not obtain physical access to the server or full control over its configuration. Admitting this should not be a problem in the era of the developed Internet network, it is a significant blockage for potential customers, especially in the case of the public sector organisations analysed in this article. Therefore, as a part of the decision process, organisations might deploy IT infrastructure in an alternative model to the one mentioned before - building own server room or even data center directly at the enterprise's premise. However, this kind of decision has another significant drawback that raises the problem of economics, which is the need for high capital investments, hence the return (cost effectiveness) might be achieved only under the conditions of economies of scale. This type of project entails extensive costs, both fixed and variable, which means that in the vast majority of organisations such an approach is unprofitable from the financial point of view and might be justified only by a large quantity of used servers that results in a reasonable level of unit cost. As a consequence, every

organisation designing its IT systems faces two types of risk: security and financial with a substantial ability to decrease at least one of them to the minimum. Thus, in the article the author has decided to analyse these risks by searching for possible economical solutions for its reduction in the context of coopetition strategy implied in the example project.

Both foregoing phenomena, the need for high capital investment and psychological blockage to outsource IT infrastructure, might be explained on theoretical level, by citing a number of conditions and standards that should be fulfilled by all professional data centers, regardless of whether they are owned or outsourced. These conditions are necessary if the organisation wants to ensure the so-called High Availability (HA) environment, i.e. maintain almost 100% availability of services, even in the event of unpredictable failures of single components. One can distinguish such standards as (Wu and Buyya, 2015, pp. 151–367; Tian and Zhao, 2015; Xu and Liang, 2015; Geng, 2015, pp. 2–14; Harms and Yamartino, 2010):

- Full system redundancy, meaning the replication of independent hardware necessary to run servers: power supply, network cables, network devices that allow access to the Internet such as routers, switches and others
- Professional fire protection systems, most often in the form of automatic gas extinguishers
- Providing additional solutions for the protection against sudden power loss: connection to at least two separate and self-contained electricity transformer stations combined with backup power supply inside of Unit Power Supply (UPS) batteries that could be charged by disaster recovery power generators run by diesel engines
- Redundant precision cooling solutions with industrial air conditioning or liquid cooling
- Multiple building and hardware physical protection tools, such as: multi-layer fire resistant doors, special technical floor with fire resistant overlay and ability to take heavy loads, reinforced walls and burglar-proof fencing
- Access control systems only by authorised employees (for example authorisation with codes, cards, face detection, fingerprints detection)
- CCTV systems with the ability to record and store video recordings
- Warning systems, sound and visual danger signalling
- Round-the-clock technical support and incident response staff
- Financial guarantees called SLA (Service Level Agreement), which often oblige data centers to ensure 99.95% availability of the service during the year. In the event of SLA breach compensation is paid at minimum in the amount of the monthly infrastructure cost

Taking into account all these aspects, it should be stated that for the vast majority of enterprises operating in the digital economy, it would an ineffective decision from the cost perspective to build their own data center. This is applicable not only for running individual services such as websites, software or industrial systems where it is impossible to reach reasonable level of cost, but also for more complex projects that requires, inter alia, an additional level of backup or redundancy. However, taking large-scale multicloud solutions into consideration that the author analyses in this article, theoretically, one might choose between building own data center and outsourcing IT solutions, as both projects involve high investment expenditure and are real substitutes for each other.

cloud Computing Technology Among Data Center Services Models

In order to fully explain the specifics of the titular multicloud solutions, one should also briefly scrutinise the models of data center services, because each of them provides a different balance between security and financial costs, which is a crucial factor for the aim of this paper.

The first segmentation of data center services might be described as Cloud Computing Service Models that are differentiated based on the type of service provided by cloud providers. Usually, three different service models could be distinguished:

- Infrastructure as a Service (IaaS). In this model cloud providers offer fully secured IT infrastructure of computing power in a form of dedicated servers, virtual private servers, virtual machines or data storage as a service. However, in IaaS, cloud providers usually do not support customers on the configuration level so it is necessary to acquire knowledge on managing the operating system (OS) and software layers, also from

the security perspective. Customers are usually allowed to install arbitrary operating systems or software of their choice, but do not get access to the underlying hardware.

- Platform as a Service (PaaS). In this type of service model cloud providers offer platforms with user-friendly interfaces where customers could develop and deploy their own cloud applications in a form of their own virtual machines. Here, the cloud provider manages virtualisation systems as well as arranges ready-to-use solutions for network security. Often operating system is managed by data center too. Nonetheless, this kind of solution requires much more control of resources by the cloud provider and implies less possibilities for nonstandard configuration by customers.
- Software as a Service (SaaS). In this case complete software solutions such as e-mail systems, CRM, ERP, collaboration services, storage space, are offered by the cloud service provider as a service available from web interface or a mobile device application. Customers benefit from easy remote access to the service without the need of local installations on their devices. Hence, this model might be used even for enterprises that do not have appropriate human resource teams responsible for IT systems. Still, SaaS model cannot be implemented on a large scale as an only solution for every digital need of an enterprise, as it is characterised by the lowest possibility for adaptation and configuration. Moreover, most of data centers offer SaaS on the basis of public cloud clusters that are shared with other customers, which might be potentially insecure or at least not efficient in terms of peak performance.

For the purpose of the paper it is of key importance to juxtapose the abovementioned cloud computing service models with a traditional IT approach of building own data center. One might find such a comparison in Figure 1 that depicts blocks of infrastructure under control of customer or cloud provider.

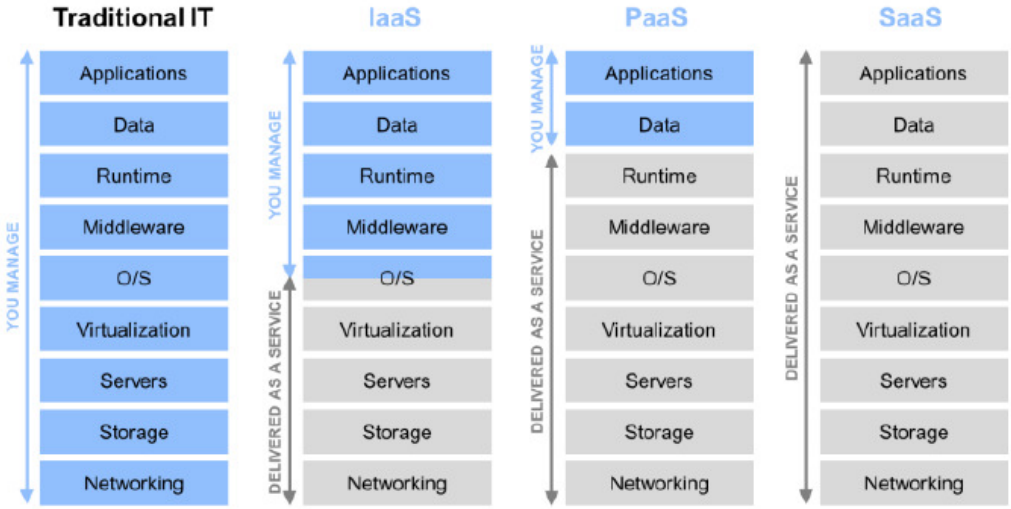

Fig. 1:Comparison of cloud computing service models with a traditional IT approach from the perspective of management. Source: (Harms and Yamartino, 2010, p. 12)

It could be observed that in traditional IT framework enterprises gain the highest level of control as well as configuration. However, as it was stated before, this requires not only high capital investments but also the involvement of qualified human resources such as IT department (administrators, system operators, development operators, security experts, technical support). Additionally, this deployment strategy is usually the most time-consuming, which is also crucial in order to effectively distribute enterprise resources. Therefore, alternative models of infrastructure deployment by cloud providers' solutions are becoming a more and more attractive choice.
Yet another segmentation of data center services is related with distinctive deployment approach in the level of ownership, privacy and security. In the division named as Cloud Computing Deployment Models one might usually find four types of models:

- Private Cloud. An infrastructure environment run by a cloud provider only for one enterprise with no possibility for outside access as well as any resources sharing with other clients. Usually this type of

deployment is offered in a form of PaaS model where the customer receives preconfigured servers with prepared virtualisation and security rules. Thus, it combines all benefits of cloud infrastructure such as high availability and scalability with some aspects of traditional IT environment especially in a field of data security.

- Public Cloud. One of the most popular and innovative model of infrastructure deployment based on computing power distribution between many clusters that are filled with dozens of servers configured and managed by a cloud provider. In this model the customer must not be able to affect hardware as its elements are shared with other customers and cannot be interfered at any level. Hence, the enterprises can benefit from high computing power due to sharing economy model established by data center. Nonetheless, there are some disadvantages comparing to other models and just to name a few: lack of personal adaptations of servers, forced virtual machine configurations, possible lowered performance during peak hours. Thus, such model is very cost effective considering the fact that the same server configuration might be much cheaper comparing to other models, but at the same time security rules and configuration flexibility are not equally high.
- Hybrid Cloud. By this term one should understand a combination or interconnection of different cloud models and traditional IT infrastructures (e.g. between public cloud, private cloud and dedicated servers). Hybrid cloud is widely considered for large scale scattered projects where enterprises must reach their end customers globally or when the demand for IT resources is volatile.
- Multi Cloud. In principle it is much similar to Hybrid Cloud model, although in Multi Cloud a single point of failures must not be present. That means, single dedicated servers or more widely traditional IT approach should not be considered as well as single a location for cloud provider. Only high availability infrastructure found in Private Cloud or Public Cloud models separated in at least two redundant locations might be considered as Multi Cloud. Thus, it is treated as the highest level of security while building IT infrastructure along with the most assured high availability standard.

Thereby, Multi Cloud model analysed in this paper is undeniably very desirable for most of the organisations especially for the entities presented in the research that is public sector administration. What is also relevant, Multi Cloud infrastructure can simultaneously meet the features of various models, for example it might be deployed as Private Cloud in the PaaS model, but also could be configured as Public Cloud in SaaS model. Moreover, due to the application of site redundancy it definitely involves high capital investments. Therefore, it is the author's objective to verify the most effective solution for Multi Cloud deployment in terms of cost, time management and human resources engagement in the context of the aforementioned business strategy of coopetition.

Business Strategy of Coopetiton As A Solution for Cost Effectiveness

Constantly changing business environment with high intensity of industry rivalry has led the strategy and management scholars to establish over the years a completely new business strategy of coopetition. Various views (Fernandez *et al.*, 2014; Gnyawali and Park, 2011; Ho and Ganesan, 2013; Raza-Ullah *et al.*, 2014) emphasize coopetition as a strategy that indicates simultaneous cooperation and competition between two or more firms with an aim to provide a more valuable product from the customer's perspective. This strategy, in turn, causes higher revenue for each cooperating rival comparing to the strategy based only on competition (Ritala, 2012). It is assumed that through the established coopetition either a product's final unit cost will be lower or the quality or effectiveness of value chain activities will rise (Bouncken *et al.*, 2015; Brandenburger and Nalebuff, 1996). These effects might occur by exchanging one or more of the following resources: human, financial or physical capital, rare materials or components, knowledge, innovations (patents, know-how) or unique, effective processes (Kotler and Keller, 2012, pp. 221–244; Grimm *et al.*, 2006, pp. 44–48). However, to make it happen, the basic rule of coopetition strategy, that is the rivalry suspension, must be established (Bengtsson and Kock, 2014). The lack of competition in gathering of some of the indicated resources may result in a better performance of each partner considered as higher margin. Increasing the level of margin is possible by virtue of greater effectiveness in resource processing.

In the case of IT projects analysed in the paper, one might observe that coopetition can primarily be an effective business strategy by integration of the value chain of two competitors on its early stages such as manufacturing, logistics or technological development. Competitors benefit most if they leave their systems, software, brand, sales and marketing in the scope of rivalry, but simultaneously decide to coordinate and cooperate in some areas regarding hardware, technology standards, and innovations. Considering cloud providers it is recently a widely used strategy visible especially in loosening the effect of technology lock-in. In such a situation, data center service competitors,

wanting to offer maximum security, in line with the standards of site redundancy, began to enter into agreements that integrate their solutions to such an extent as to be able to offer two different products to one customer. Before coopetition occurrence it used to be very unlikely for cloud providers to allow its customers to easily migrate, change or integrate cloud infrastructure with other solution providers. Nonetheless, it seems to be an informed decision dictated by economic indicators. Cloud providers purposely cooperate with each other in order to help its customers to lower the total cost of ownership (TCO) of Multi Cloud infrastructure which, as it was stated before, is usually very expensive (Buyya *et al.*, 2011; Madhavaiah *et al.*, 2012). Instead of providing only one part of the infrastructure, e.g. Private Cloud, leaving the second site to be built by the customers on their own, competitors decided to integrate virtualisation, backup and migration tools in order to enhance the overall cloud providers' market share. For this kind of activities one might identify such tools: implementation of the same type of hypervisor such as KVM, VMWare ESXi; providing free and compatible disaster recovery software; providing complementary and compatible backup software; popularising virtual machines migration tools. As a part of coopetition agreements vendors are also involved in an increasing number of OpenSource projects that allow them to maintain their own competitive advantages. In the meantime such projects support creating new advantages, but together with competitors. OpenSource projects usually equip customers with migration tools, which gives them free and easy choice of cloud provider, but at the same time it keeps them in one homogenous technology (Openstack.org, 2020). One might notice that somehow it is yet another strategy for technology lock-in, but more liberal for customer's choice. This paper sheds a new light on the aforementioned aspects concerning the unprecedented coopetition between one of the biggest cloud providers Google and Microsoft that decided to cooperate and arrange one joint solution for Polish National Cloud. Both companies provided two independent data center sites with an ability to migrate between them without interruption. As a result, National Cloud Operator received a multicloud infrastructure with the abilities of disaster recovery, that did not have to be built at all and in effect use its financial and human resources.

Materials and Methods

The main aim of the study is to analyse the effectiveness of multicloud solution provided by Google and Microsoft for Polish National Cloud and assess whether coopetition is actually more resource effective than the traditional approach of building own data center. The study also attempts to compare the abovementioned multicloud deployment strategies with two other possible scenarios that the author of this paper discovered during the research as feasible and widely used in similar projects: a) building own data center as the main site one and rent servers from cloud provider for a backup site two; b) rent servers from data center A for main site one and rent servers from a different data center services provider B for a backup site two. Thus, during the research the author analyses four substitutes for the same concept of multicloud solution prepared for public sector organisations in Poland. It is also of key importance to identify and discuss the causes and effects of such decisions especially from the perspective of economics and management sciences. The general research methodology depicted in Figure 2 is based mainly on the pragmatist approach with a focus on the operationalisation of many concepts introduced in the paper. The methodology of non-participant observation as well as strictly defined cause and effect relationship analysis have been used as well. The empirical qualitative study with the support of numerical data has been conducted with the use of comparative method with numerical analysis of variance especially between the Total Cost of Ownership (TCO), systematic reviews and systematic data collection.

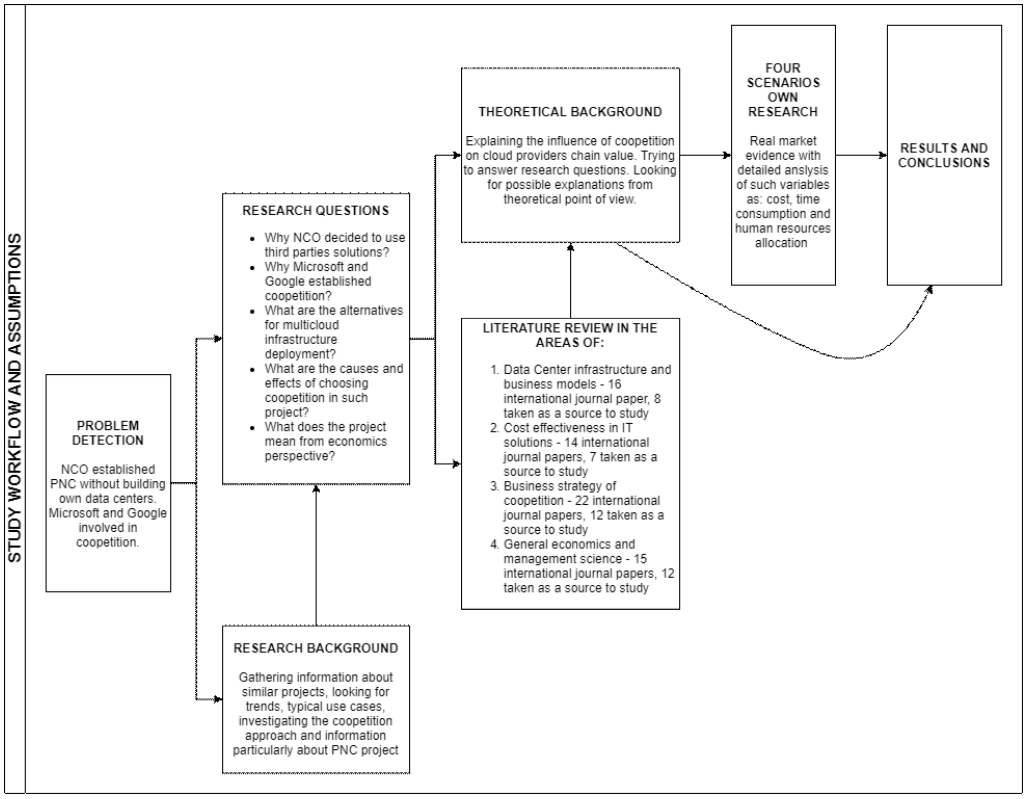

Fig. 2: Study workflow and assumptions. Source: Author's work

In order to broaden the deliberations on economic effectiveness of coopetition occurrence between Microsoft and Google for Polish National Cloud project the author has carried out research basing on four possible scenarios the concept of which is presented in Figure 3:

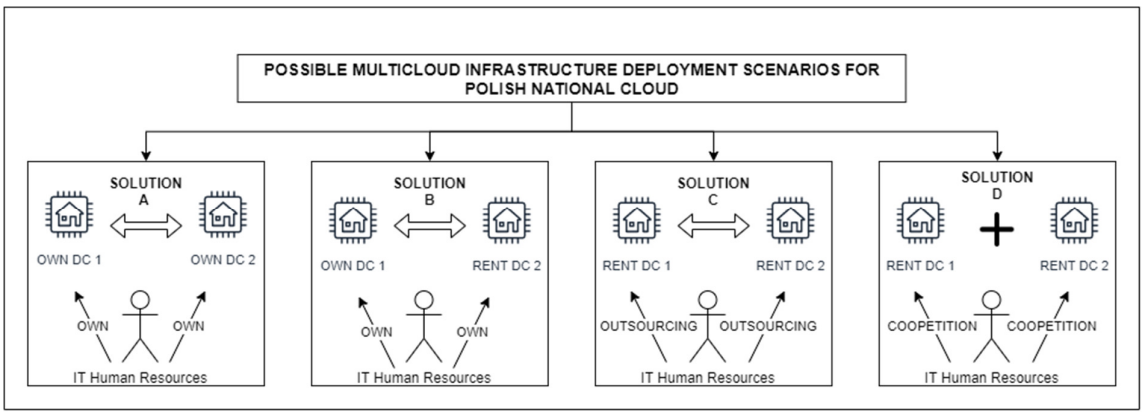

Fig. 3: Visual presentation of conducted research. Source: Author's work

For the purpose of the research the following *ceteris paribus* assumptions have been made:

- Basing on the typical data center configuration for large enterprises project size of one multicloud site is set to capacity of 120 racks that could contain 5000 dedicated servers plus 10 additional racks for network and storage equipment
- There must be two sites implemented with automatic migration or disaster recovery tools configured, and each site must be the same size

- Essential dedicated server configuration (1U) should contain at least 8 core / 16 threads CPU and 64 GB of RAM
- Each solution is calculated for the virtualised environment where provisioning rules are applied with overbooking set to 2x. Thus, one virtual machine should represent computing power of 16 cores / 32 threads vCPU and 128 GB vRAM.
- Storage capacity is set for adaptive mode, which means that 5000 TB of storage should be divided for all virtual machines according to demand
- Investment lifetime cycle is estimated to last 60 months (5 years), hence during that time infrastructure should be up-to-date and work round-the-clock with manufacturer warranty to do so
- All data represents actual costs, prices, salary or timeframes applicable for Poland markets in 2020

As a result, all necessary data are presented in the form of a table in Table 1 that might be useful for an easy comparison of each solution:

Table 1: Resource comparison needed to run multicloud infrastructure for analysed project

Variables	Selected solution (A, B, C or D)
Data Center Facilities	Costs of building a structure and general systems (if applicable)
Redundant power systems	Installation costs of power systems without monthly usage of electricity (if applicable)
Power Distribution Unit and Cabling	Costs of additional power distribution systems without monthly usage of electricity (if applicable)
Cooling systems and air distribution	Installation costs including devices for cooling system and air distribution (if applicable)
Fire Suppression and Physical Security	Installations costs of firefighting systems and physical security including devices (if applicable)
Network devices and cables	Installation costs of network devices needed for remote connection (if applicable)
Redundant Internet connection	Monthly cost of Internet connection needed for remote connection multiplied by planned investment lifecycle time horizon
IT human resources cost in deployment phase	Monthly cost of human resources engaged in installation phase multiplied by months needed to finish the step
IT human resources cost for maintenance	Monthly cost of human resources engaged in maintenance of infrastructure multiplied by planned investment lifecycle time
Software and other licenses	Monthly cost of all software licenses needed for multicloud replication multiplied by planned investment lifecycle time

Average cost of electricity	Average monthly cost of electricity needed to run each solution multiplied by planned investment lifecycle time (if applicable)
Dedicated servers cost	Total cost of all dedicated servers needed to run both multicloud sites (if applicable)
Monthly cost per 1 virtual machine	Calculated or given monthly cost (price) per 1 virtual machine
Monthly cost of all virtual machines (two sites 5000 VMs each)	Monthly cost per 1 virtual machine multiplied by total established amount of virtual machines
Monthly total cost of ownership (two sites 5000 VMs each)	Calculated monthly total cost of ownership that includes installation phase costs in each solution divided by planned investment lifecycle time
Monthly total cost of ownership (TCO) per 1 virtual machine	Calculated monthly cost per 1 virtual machine including installation phase costs in each solution divided by planned investment lifecycle time
Percentage of coopetition variant of TCO per 1 virtual machine	Percentage comparison of TCO per 1 virtual machine with reference to titular coopetition scenario D
Time spent from project start to production use of VM's (in months)	Estimated time needed for deployment phase (from installation phase to production phase)

Source: Author's work

Results

Following the objectives outlined in the materials and methods section the results of the analysis shall be provided in this section. To explain the most important cause and effect relationships author provided results in a form of the table presented below:

Table 2: Results of conducted research on possible multicloud deployment solutions for Polish National Cloud

Variables	Solution A	Solution B	Solution C	Solution D
Data Center Facilities	$ 657 895	$ -	$ 328 947	$ -
Redundant power systems	$ 39 474	$ -	$ 19 737	$ -
Power Distribution Unit and Cabling	$ 52 632	$ -	$ 26 316	$ -
Cooling systems and air distribution	$ 210 526	$ -	$ 105 263	$ -
Fire Suppression and Physical Security	$ 65 789	$ -	$ 32 895	$ -

Network devices and cables	$ 39 474	$ -	$ 19 737	$ -
Redundant Internet connection	$ 631 579	$ 315 789	$ 315 789	$ 78 947
IT human resources cost in deployment phase	$ 473 684	$ 78 947	$ 236 842	$ -
IT human resources cost for maintenance	$ 1 657 895	$ 1 263 158	$ 828 947	$ 631 579
Software and other licenses	$ 236 842	$ 157 895	$ 118 421	$ -
Average cost of electricity	$ 568 421	$ -	$ 284 211	$ -
Dedicated servers cost	$ 15 789 474	$ -	$ 7 894 737	$ -
Monthly cost per 1 virtual machine	$ 68,08	$ 40,99	$ 75,03	$ 40,99
Monthly cost of all virtual machines (two sites 5000 VMs each)	$ 680 789	$ 409 895	$ 750 289	$ 409 895
Monthly total cost of ownership (two sites 5000 VMs each)	$ 680 789	$ 440 158	$ 750 289	$ 421 737
Monthly total cost of ownership (TCO) per 1 virtual machine	$ 68,08	$ 44,02	$ 75,03	$ 42,17
Percentage of coopetition variant of TCO per 1 virtual machine	161,43%	104,37%	177,90%	100,00%
Time spent from project start to production use of VM's (in months)	8	2	6	6

Source: Author's work based on (Antal, 2020; DataCenterKnowledge, 2007; Dell, 2020; Geng, 2015, pp. 121–135; Google Cloud, 2020; Harms and Yamartino, 2010; Microsoft, 2020; Neil Rasmussen, 2019; Ongoing Operations, 2020; Ponemon Institute LLC, 2016; Wu and Buyya, 2015; Xu and Liang, 2015)

Discussion and Conclusion

The main purpose of this paper was to examine the effectiveness of multicloud solution provided by Google and Microsoft for Polish National Cloud and assess if their coopetition agreement is actually more resource effective than the traditional approach of building own data center. The comparison to other mixed strategies for multicloud deployment has been conducted too. It has been established that indeed, from the cost perspective, coopetition between the abovementioned partners might be *ceteris paribus* more effective comparing to other solutions of: a) building own data centers; b) building own data center and rent backup site from cloud provider; c) rent main and backup site from two different cloud providers. However, the difference between Total Cost of Ownership in a monthly calculation is not significant for all presented solutions since one might observe that in "Solution B" it is only 4,37% more expensive than the titular coopetition strategy. What is also worth mentioning, in qualitative variable described as time spent for infrastructure to be ready to use, the analysed coopetition agreement seems to be *ceteris paribus* less effective due to longer period needed for configuration comparing to "Solution B". Nonetheless, it should be noted that coopetition agreement in this particular project certainly positively affected its members' chain value and has led to provide more complex solution with lower operational costs as well as possible easier usage due to the

abandonment of vendor lock-in effect. Moreover, it is an undeniable fact that because of the development of cloud computing technology, the traditional IT approach presented in this paper as an alternative solution for large enterprises infrastructure model is *ceteris paribus* no longer cost, time and human resources effective comparing to modern IaaS, PaaS and SaaS models. Probably, for much bigger projects that involves very long-term investment lifecycle time, it might be considered as a better solution, which in author's opinion is something to be considered for analysis in the future research. Taking into consideration all of the theoretical, conceptual and empirical aspects raised throughout the course of the research one should definitely consider business strategy of coopetition as an economical solution for mutlicloud infrastructure deployment for most of the enterprises and public sector organisations.

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Competitive Strategies of Multisided Platforms on The Example of Russian And French E-Commerce Companies

Valentin GALENKO
doctor of economics, professor, scientific chancellor of Higher Economic School,
St Petersburg State University of Economics, St Petersburg, Russian Federation, galenko@hes.spb.ru

Iana SALIKHOVA
PhD, associate professor of Marketing department, St Petersburg State University of Economics,
St Petersburg, Russian Federation, yana.salichova@mail.ru

Olga TABELOVA
manager of international projects of Higher Economic School, St Petersburg State University of Economics,
St Petersburg, Russian Federation, emba_hes@mail.ru

Lyazzat BUDIROVA
master student at St Petersburg State University of Economics, St Petersburg, Russian Federation,
lyazzatbudirova@gmail.com

Abstract

Development of digital technology has led to emergence of new business models including the multisided platforms, which have become the basis for active development of e-commerce companies. Today, competition among e-commerce companies is intensifying and there is a need in a more detailed study of their competitive strategies and sources of competitive advantage. This article is based on the results of qualitative research of Russian and French marketplace consumers, which allowed identifying their competitive advantages and comparing competitive strategies.

Keywords: Multisided Platforms, E-Commerce, Competition Strategies, Competitive Advantages.

Introduction

Nowadays economic activity, which is based on advanced digital technologies related to electronic commerce and electronic business, is being formed and expanded quite actively in all economically developed countries. This trend also applies to Russia and France. Today it is a fact that the Internet information network is rapidly growing and developing. The level of computer literacy is rising and developing very fast. Communication facilities also do not stand still and over a half of the world's population actively exchange information by means of various technologies.

Multisided platforms have taken an important place in the global economy as a result of the information technology revolution. Multisided platforms are diverse, do not have a clear concept, their classification requires further refinement, and certain methods are needed to be developed for their analysis and evaluation. The research issues related to multisided platforms are wide in such sense that without dividing them into types it is impossible to conduct the research, therefore it is necessary to narrow the topic and focus on a specific example. In the era of the Internet, it will be relevant to use e-commerce as the example for this research.

The goal of this research is to study the essence of competitive relations in the market of multisided platforms on the example of e-commerce Russian and French companies.

Theoretical Background

The concept of a "multisided platform" is quite extensive. It is necessary to highlight several basic and popular definitions in order to concretize the study. Each expert describes a multisided platform as a complex of various components that create a platform for exchange between market participants [3, 4, 5, 8]. In addition, scientists show

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that almost every multisided platform is related to IT technology [8]. Some define the platform as an economic activity that is carried out between intermediaries on the same site [5].

However, such broad concepts don't fit the study, which is associated with the platform competition in the market, since a full analysis of the multisided platform and a highlight of the concept of competition in the market will be more difficult without a more narrow definition. The European Commission has accurately and clearly described the essence of the multisided platforms [4]. A functional study of the platforms will help to identify the general trend and form a concept of competition in this market.

Competition Concepts

The market position of the company is considered from the position of competitive advantages on the basis of the model of imperfect competition markets, approaches of the industrial organization theory and the strategic planning theory, therefore the choice of the effective strategy should be carried out depending on the market type and available resources.

M. Porter created a model that is expressed in the unity of relationship between important aspects of competition: competitive forces of the industry, competitive strategies, competitive advantages. Porter believed [9]: in any industry, the intensity of competition and the expected size of profit are determined by the interaction of factors that form the structure of the industry.

Success in competition is the choice of the competition strategy (leadership in costs, leadership in differentiation and focus on costs or differentiation) depending on the situation in the industry. The competitive strategy is based on competitive advantages, their deepening and improvement, which allows us to gain a strong market position and achieve high financial results. He examined the issues of companies' effective performance and success in competition by considering the characteristics of the current competitive (external) environment and internal capabilities (resources) of the company.

Resource – if it is necessary to adapt companies to the conditions of variability and uncertainty of the market environment, it is important to determine the sources of competitive advantages; in the competition, the company needs to transform its own unique value into a long-term strategy.

M. Tresi and F. Wiersema developed a theory of unique values, where any unique value of the company in the eyes of consumers is considered as a competitive advantage. They believed: the following areas of search for unique values can be distinguished [9]:

1) improvement of production processes and operational activities;
2) product improvement;
3) improvement of customer service processes.

Institutional – due to the emergence and development of new organizational forms that are highly flexible, it became necessary to reorient the companies' strategies towards combining competition and cooperation between market participants, considering long-term relationships with consumers, partnerships and strategic alliances as the main sources of competitive advantages.

J. Moore's theory focuses on the driving force of the economy that is not only traditional competition, but also cooperation. Drawing analogies between the ecological system and the business environment, Moore sees the company as an element of an ecosystem where processes of competition and evolution, which Moore called "co-evolution," are developing together. Since new conditions for companies' functioning (eco-environment) make the strategy aimed at creating a competitive advantage for a company much less effective, the companies need to develop the strategy that is consistent with the external environment and combines elements of competition and cooperation towards the joint evolution of all ecosystem companies [9].

While developing the competitive strategies, it is necessary to take into account the Antitrust laws (documents that allow regulating competition within the legal framework) of different countries; it is also important to remember that imperfect competition prevails in a modern market economy: pure monopoly, oligopoly and monopolistic competition. The main feature of the market for such competition is the ability of individual sellers and buyers to influence the price to a certain degree. But the Antitrust legislation just limits the competition and identification of market boundaries, does not allow it to be precisely assessed by any methods, and, moreover, not all laws are applicable to the current market trends, especially in the digital field.

The classical models are more applicable to the traditional market, not to the market of multisided platforms, that is, they are not fully suitable for digital markets. Nevertheless, some competition concepts can be applied to such platforms due to their functional characteristics. By analyzing the Porter model and conducting PEST analysis it is possible to understand how to compete with the platforms in a better way. Porter's current research is the foundation for digital economics and multisided platforms. By exploring threats and weaknesses, as well as competitive advantages, developing a successful concept of competition in the platform market dramatically simplifies the tasks of strategic management. The rest concepts need to be either developed or corrected, taking into consideration that multisided platforms are often technology related.

The main concept of competition in the Internet is the "long tail" concept developed by C. Anderson [6]. This concept examines not very popular goods that are in low demand. These goods could increase their profitability because consumers are leaving the main markets. This theory is supported by the growing number of online marketplaces that make the competition for shelf space less tough and allow a countless number of products to be sold, especially through the Internet. The overall demand for these less popular goods as a comprehensive whole could rival the demand for the mainstream goods. While main products achieve a greater number of hits through leading distribution channels and shelf space, their initial costs are high, which negatively influence their profitability. In comparison, long tail goods have remained in the market over long periods of time and are still sold through off-market channels. These goods have low distribution and production costs yet are readily available for sale. For example, different types of retailers: physical, hybrid, pure digital with no physical goods.

The analysis of E-Commerce Markets

The E-Commerce Market in Russia

According to DataInsight 2018 [10] Russian e-commerce market is diverse and ambiguous. For example, statistics include online stores that have regular outlets, which are familiar to customers. These are mainly the products representing such categories as electronics and technology (ex, M.video) and goods for home (ex, Petrovich). The rating also includes representative offices of foreign companies in Russia – IKEA и Leroy Merlin (goods for home). DNS technopoint was mentioned in the rating as a separate online store, but in reality it belongs to the DNS network, so that is why it was deleted from rating.

The leading companies are mainly associated with electronics and technology, as demand for these types of products is constantly growing. Consumers in Russia have a variety of gadgets with technological innovations, constantly try to update them, that is, they buy the latest released products. Most consumers are young people who keep up with the times. They strive to develop in various directions, therefore they often engage in freelance work, and this requires more time, so purchases in online stores are gradually gaining momentum. Clothing stores are less in demand, as it is easier for people to pick up wardrobe items in traditional stores.

Table 1: E-commerce Russian companies from Top-100 (compiled by the authors based on data [10])

№	Store name	Goods category	Online sales (mln. rub.)	
			2018	Changes, % (2017-2018)
1	WildBerries	Universal	111 200	74%
2	CitiLink	Electronics and Technology	73 200	33%
3	M.video	Electronics and Technology	52 800	46%
4	Ozon	Universal	41 770	73%
5	DNS	Electronics and Technology	38 810	83%
…	…	…	…	…
96	Kuvalda	Goods for home	1 860	31

The last positions of the rating are mainly highly specialized stores that do not have a wide range of products and do not inspire confidence among buyers, since there are not too many stores and purchases are made only through websites.

At the moment, the Russian e-commerce market is at the stage of development and has every chance to reach the world level, but it is necessary to develop certain strategies and follow common standards in order to satisfy consumer demand. Constant monitoring of how the market is changing at the online sites is also required.

The E-Commerce Market in France

According to e-commerce top-100 rating 2018 [2], the e-commerce market of France is mainly inhabited by foreign companies like Amazon and Booking.com. Basically, these stores are universal, that is, they sell a variety of goods. Their profits are noticeably higher as the market has gained popularity among consumers and marketing of products takes place throughout Europe, not only in France. It is profitable for them to sell universal products.

The leading positions are held by a number of foreign representative offices and several domestic companies. Each company has high sales ratings as well as marginally changing profits compared to previous periods. French consumers value the balance of life, because it's easier for them to buy in some large stores where everything is in common and quick access, and therefore online sales are high.

Table 2: E-commerce French companies from Top-100 (compiled by the authors based on data [2])

№	Store name	Goods category	Online sales (mln. eu.)	
			2018	Changes, % (2017-2018)
1	Amazon	Universal	184 303	4
2	Leboncoin	Universal	162 501	-2
3	CDiscount	Universal	60 92	-8
4	ebay	Universal	41 042	-4
5	Booking.com	Travelling	31 355	7
…	…	…	…	…
96	Digitick	Events	2 137	-23
97	UGC	Events	2 176	-10
98	NaturaBuy	Hobbies	2 160	10
99	Just eat	Food	2 146	10
100	Voages	Travelling	2 145	9

As for the last positions of the rating, they are mainly highly specialized stores that sell tickets for cultural events, as well as a number of online stores that sell items for personal use, such as travel, hobbies, food. These stores do not have ordinary stores, therefore only a certain part of the population is also aware of them.

The design of empirical research

The goal of the empirical study is to identify the competitive strategies and competitive advantages of Russian and French e-commerce companies.

Tasks:
1. To analyze the competitive strategies of e-commerce.
2. To conduct semi-structured interview with e-commerce consumers in order to analyse how consumers choose companies for purchases.

The main method of an empirical study is a qualitative method in the form of semi-structured and in-depth interviews.

The purpose of the semi-structured interview of consumers is to identify the impact of competition on consumer behavior when they choose what e-commerce company to buy from.

Research questions:
1. How buyers choose e-commerce companies to buy from?
2. What criteria of online purchasing are important for buyers?
3. What companies of e-commerce buyers choose to buy from?
4. What competitive advantages do the leading companies have from the buyers' point of view?
5. Which e-commerce companies are competitors in the French and Russian markets?

A group of interview questions related to e-commerce: general information about consumers (activity, gender, age, city of residence), about consumers' purchases (how often they buy products online, where/when/why do they buy products, etc.), about the leading companies and their competitors.

The Results of Empirical Research

The respondents for consumer interviews were selected solely among the clients of the leading e-commerce companies, according to DataInsight statistics and e-commerce book. Nevertheless, it was already evident at the stage of consumer surveys that Wildberries are often compared to the Ozon store. Each respondent answered truthfully, they were not confused in their answers, that is, they did not contradict their own words. Unfortunately, some of the answers came out short because the respondents were also chosen among strangers, that is, they did not reveal themselves too willingly and there were some deviations from the guide interview with the addition of extra new questions and the removal of the fixed ones. The interview involved 6 people, 3 from Russia and 3 from France.

The analysis of e-commerce competition

Wildberries

The international online store with a universal assortment of goods (clothing, electronics, household goods, etc.). It works in the markets of the Russian Federation, Belarus, Kazakhstan, Kyrgyzstan and Armenia, as well as in Poland.

The goods are various, each consumer can find something that will satisfy him/her with both the price and quality. There is also a discount system.

The company works directly with clothing manufacturers and official distributors. They independently form the assortment line of their goods in the online store and retail prices. Wildberries makes money on commissions based on the results of sales. Delivery across Russia takes place from its own logistics center in the Moscow region as well as warehouses located in large cities. Payment can be made in cash or by card. The store's website is understandable enough, logically divided into sections, where all the necessary information is provided to consumers and suppliers. Moreover, at the website consumers can find an online fashion magazine, advices from fashion experts and other buyers, etc.

The main competitive strategy is B2C business model and cooperation with suppliers.

Ozon

Ozon is the online store with a universal assortment of goods (clothing, electronics, household goods, etc). It operates in the market of the Russian Federation, only a certain number of goods' types are delivered to countries such as Azerbaijan, Japan, the USA, the EU countries and other locations.
Each consumer is offered multiple discounts and promotions, but the prices for delivery vary, especially when speaking about delivery abroad, depending on customs duties. Also, Ozon offers referral programs. The quality of goods fully corresponds to the prices. Delivery is amazingly fast and is done through various channels and methods: courier service, postal delivery, etc. A successful logistics system for covering as many territories as possible is established.

The store's website is accessible to everyone, divided into product catalogs, including special catalogue with healthy goods (today some people try to pay special attention to their health). In addition to this, there is also a mobile application, which allows being in touch with store 24/7.
The main competitive strategy is B2C business model and cooperation with suppliers.

The Table 3 below evaluates and compares these two online stores. The ranking takes place on points on a scale of 1 to 5, the rating makes 1 for bad, 2 – less good, 3 – average, 4 – good, 5 – excellent respectively.

Table 3: Assessment of competitors – Wildberries and Ozon (complied by the authors based on the data [7])

Competitive characteristics	Wildberries	Assess-ment	Ozon	Assess-ment
Access to website	Accessible and understandable website. Extra features: • A store guides. • Fashion encyclopedia. • Exchange of customer experience (galleria of fashion). • Mobile application.	5	Accessible and understandable website. Extra features: • Mobile application. • Extra catalogue with healthy goods. • Referral program.	4
Logistic system	Cooperation with clothing manufacturers and official distributors. Delivery across Russia from its own logistics center in the Moscow region and warehouses located in large cities. Delivery by post and courier service.	5	Warehouses located in large cities. Delivery by post and courier service.	4
Price and payment system	Low to high with discounts. Cash, credit card.	5	Low to high with discounts (price on delivery depends on taxes). Cash, credit card.	5
Variety and quality of goods	Universal Good quality	5	Universal Good quality	5

In general, Wildberries and Ozon show wonderful results in the main characteristics, such as diverse assortment of goods. But Wildberries has greater advantages that define it as a stronger competitor. It has a great logistics system, an interesting and easily accessible website, and payment is carried out in two main ways - online or in cash. Its main advantage is the logistics system, which includes its own logistics center, large warehouses, and cooperation with large suppliers. Ozon is represented only in the Russian market with delivery to some other countries, the price of which depends on customs duties. However, the website has an advantage over the Wildberries website with extra catalogues and referral programs. Ozon is recommended to have logistics centers not only in Russia, but also in other countries so that to minimize transport costs and duties. Wildberries shouldn't lose its grip in the ranking of online retailers and continue developing technologically.

Respondents' answers and this analysis show that companies are strategically developing in the right directions. Their competitive advantages are similar. But Ozon is inferior to Wildberries in the size and functional characteristics of logistics channels. The Ozon website is stronger with interesting new catalogs that are relevant to the modern world. Wildberries should pay attention to accessibility to other regions of Russia. The range of products from companies is wide and often satisfies customers with the quality of not only the product itself, but also the service. Price, delivery, goods and services in common are important to consumers. It is necessary to stay in the market of marketplaces in Russia for such large players, since some consumers buy goods on foreign websites such as Aliexpress.

Leboncoin

It is a French website of free classified ads that covers all regions of France, where new and used goods are sold, information about the services provided by individuals and professionals is published. Collaboration with partners allows saving on many storage facilities. There is a sorting base where goods are stored and sent to the recipient through a courier service or postal delivery. Payment occurs only online by credit card. Everyone has access to the website for general familiarization, but for certain functions the user needs to register an account, then, for example, the user will be able to publish his advertisement on finding or hiring new employees. On the website everything is

divided into catalogues of goods and services, and consumers can also sort by geography of France to find what they need within walking distance. Also, the website has a mobile application. Leboncoin is widely represented in social medias (ex., Facebook).

The main competitive strategy is partly B2C – partly C2C business models and cooperation with suppliers.

CDiscount

The online store that sells a variety of goods, which is focused on offering goods to its customers at a reduced price, thanks to discount programs like Black Friday sales or some kind of holiday sale. Each CDiscount partner is licensed and has a quality guarantee. Logistics is provided efficiently, since large warehouses are used in cities in France, it is possible to order goods at home or pick up a parcel at the pick-up point, which saves money on delivery. The store has a mobile application that is constantly updated. The site is partially accessible (the main points after registering the account), all categories and sections are understandible, in addition there is an extra section, where the guide and tips for buyers are provided so that they can be sure of the right choice they made when buying. CDiscount posts news on Youtube, Facebook, Twitter. Payment on CDiscount is possible in various ways.

The main competitive strategy is B2C business model and cooperation with suppliers.

The Table 4 below evaluates and compares these two online stores. The ranking takes place on points on a scale of 1 to 5, the rating makes 1 for bad, 2 – less good, 3 – average, 4 – good, 5 – excellent respectively.

Table 4: Assessment of competitors – Leboncoin and CDiscount (complied by the authors based on the data [7])

Competitive characteristics	Leboncoin	Assessment	CDiscount	Assessment
Access to website	Incomplete access to website functions, but understandable website. Possible to sort by catalogue of goods and services, sort by geography. Mobile application. News posting in different social media.	4	Incomplete access to website functions, but understandable website. Possible to sort by catalogue of goods and services. Mobile application. News posting in different social media.	4
Logistic system	Partnership collaboration and sorted base. Delivery by post.	5	Large warehouses and pick-up-points are used in cities. Delivery by courier service.	5
Price and payment system	Low to high, depends on consumers. Only credit cards – online payment.	3	Low to high with discounts. Payment in various ways.	5
Variety and quality of goods	Universal	5	Universal	5

Respondents called these companies competitive with their certain advantages and disadvantages. Basically, customers are satisfied with both companies, as they satisfy their demand for goods and services. But they like Leboncoin more because they can sell or buy used goods. CDiscount only sells goods and some small services. Prices for goods vary, accessible to everyone. CDiscount is less competitive because it does not specialize in buying or selling used goods compared to Leboncoin. However, Leboncoin loses in competition because the payment options are limited. Compared to CDiscount, Leboncoin does not have a section of product tips and guides, but the logistics system is wider.

Wildberries and Leboncoin

Following the data of the Similar Web analytical portal for the last period (December 2019 - February 2020), Wildberries and Leboncoin show good results in terms of indicators.

In Wildberries, most users access the site using mobile devices (56%). This can be explained by the fact that the company developed mobile applications specifically for its store. In Leboncoin, users use more computers (56%). This company does not have its own mobile application, and the website is adapted more for desktops. Wildberries mainly works in Russia, so most users are citizens of this country. Same is true for Leboncoin and France respectively. Wildberries advertises more on Google and Leboncoin on Yahoo. If we compare the use of Google by both companies, Leboncoin uses Google less compared to Wildberries (14%).

Compared to Leboncoin, Wildberries is less visited, since it is mainly a store that sells goods, not services, that is, Leboncoin is not only an online retailer, but also a message board where a user can obtain services and buy new or used goods.

Engagement
Dec 2019 - Feb 2020 Worldwide

Domain	Monthly visits	Monthly unique visitors	Visits / Unique visitors	Visit duration	Pages per visit	Bounce rate
leboncoin.fr	**152.7M**	**21.78M**	**7.01**	00:11:28	13.28	**22.87%**
wildberries.ru	93.59M	18.56M	5.04	**00:11:51**	**15.82**	25.59%

Fig. 1: Engagement of Wildberries and Leboncoin [1]

When speaking about percentage of incoming traffic from each marketing channel, Wildberries and Leboncoin use more direct channels and less display ads channels. It is more effective for such companies.

Fig. 2: Channels overview of Wildberries and Leboncoin [1]

Wildberries spends less on advertising per click ($ 1.01 per click) than Leboncoin ($ 1.27 per click). This is because Wildberries, in comparison with Leboncoin, is a more highly specialized company.

Top Search Terms: Organic

Dec 2019 - Feb 2020 Worldwide Desktop Only

leboncoin.fr wildberries.ru

Search Term	Traffic Share	Group Share Split	Volume	CPC
le bon coin	33.83%	100%	38,708,330	$0.4
leboncoin	13.79%	100%	14,850,000	$0.38
wildberries	3.68%	100%	1,646,670	$0.08
bon coin	3.22%	100%	5,673,330	$0.49
вайлдберриз	2.17%	100%	2,081,670	$0.21

Fig. 3: Top-search terms of Wildberries and Leboncoin [1]

These companies use social networks that are popular in their own countries, for example, Facebook is popular in the European Union, and VKontakte is popular in Russia and CIS countries. The diagram shows that Wildberries pays more attention to advertising on social networks than Leboncoin. Wildberries uses Youtube more, as it is easier to show goods and look at customer reviews, as well as hold fashion webinars.

	leboncoin.fr	wildberries.ru
Facebook	81.29%	2.01%
Youtube	15.22%	35.66%
VKontakte	0.04%	47.15%
Odnoklassniki.ru	< 0.01%	8.86%
WhatsApp Webapp	0.34%	2.12%
Instagram	0.23%	2.02%
Others	2.88%	2.18%

Fig. 4: Social networks of Wildberries and Leboncoin [1]

Wildberries and Leboncoin are different, it is difficult to compare them. Each company has a clear website, but access to Leboncoin is limited. The range of products from companies is diverse, but in addition to products, Leboncoin also provides services. The payment system is wider with Wildberries, while at Leboncoin only online payment is available. Logistics at the stores is also different, although both companies have a delivery system and partnerships with suppliers, Leboncoin uses only postal delivery. The Wildberries' advertising campaign is stronger than the one of Leboncoin, although there are more advertising costs. Wildberries website is less visited than the website of Leboncoin, as this company provides a wider range of services. It is recommended for Leboncoin to use more advertising on social networks and reduce advertising costs. In general, both companies are strong competitors in the e-commerce market.

Conclusion

The results of empirical research show that the majority of consumers choose e-commerce companies according to standard criteria: price and quality of goods, logistics (mainly delivery time and points of delivery). They also identified some of the competitors of the leading e-commerce companies and expressed their opinion on the competitive advantages of companies, which shows what strategy the companies should better use in order to satisfy consumer demand.

The e-commerce market of France is quite developed, but the majority of respondents say that most companies are foreign, that is, there are very few domestic stores. Every respondent named Leboncoin and CDiscount as the companies that they choose for purchases based on price, quality, assortment of goods and services. The standard criteria are important for them, but one respondent mentioned an unusual reason for choosing Leboncoin – to reduce pollution of the planet. In Europe, especially in France, they care about health and the environment very much, so it is important for companies to show that they are Ecofriendly and oriented to sustainable development.

The Russian market of e-commerce is quite developed, but among the main large companies, the selected consumers have the opinion that the competitors of Wildberries are only Ozon, as well as foreign representatives in the market, like Aliexpress and Amazon. Consumers often buy goods in these stores because the price and quality are higher, as well as the site and logistics are more convenient compared to other companies. In addition, the system of accumulating discounts and a convenient return are important to consumers. In general, customer service should be really high these days so that to be able to satisfy customers' demand for goods and services.

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Modelamiento De Ecuaciones Estructurales Aplicado Al Ámbito Del Teletrabajo. La Autonomía, Factores Estresantes Y Agotamiento De Teletrabajo

Karla ADAMS-CORTEZ
Universidad del Bío-Bío, Chile, ka.adamsc@gmail.com

Sergio ARAYA-GUZMÁN
Universidad del Bío-Bío, Chile, saraya@ubiobio.cl

Cristian SALAZAR-CONCHA
Universidad Austral de Chile, Chile, cristiansalazar@uach.cl

Resumen

Este estudio explora la relación entre la autonomía, factores estresantes y el agotamiento, asociados al teletrabajo, utilizando modelamiento de ecuaciones estructurales. A partir de encuestas aplicadas a teletrabajadores, se evalúa un modelo de comportamiento. Los resultados muestran que el aislamiento incide negativamente en los factores estresantes asociados al teletrabajo, sobrecarga de trabajo, conflicto trabajo-hogar y ambigüedad de rol, mientras que sólo la sobrecarga de trabajo incide en el agotamiento de teletrabajo.

Palabras Clave: Modelamiento, Teletrabajo, Comportamiento.

Las organizaciones han presentado un crecimiento importante en la cantidad de teletrabajadores, quienes utilizan la tecnología para trabajar fuera del lugar de trabajo (Villafrade y Palacios,2013), lo que presenta sus propias características y aspectos negativos en los trabajadores, relacionados con el estrés a que se encuentran expuestos en distintos ambientes fuera del lugar del trabajo común (Weinert, Maier y Laumer,2015).

Este estudio busca establecer si la autonomía (características del teletrabajo), afecta a factores estresantes asociados al teletrabajo, como la sobrecarga de trabajo, el conflicto trabajo-hogar y la ambigüedad de rol, incidiendo en el agotamiento de teletrabajo.

Antecedentes e Hipótesis

El teletrabajo es trabajar a distancia, fuera de la organización, utilizando tecnologías de información y comunicaciones (Camacho y Higuita,2013), posee tres características (Weinert, Maier y Laumer, 2015): autonomía, falta de información y aislamiento. La autonomía es la medida en que los individuos pueden estructurar cómo y cuándo realizan sus tareas laborales, mientras trabajan desde casa (Spector,1986).

Tres aspectos son factores estresantes asociados al teletrabajo:

-Sobrecarga de trabajo, la cantidad de trabajo excede la capacidad de un individuo mientras trabaja desde la casa (Baruch,2000).
-Conflicto trabajo-hogar, las demandas de la vida laboral y familiar son incompatibles en algún aspecto, de modo que la participación en un rol se hace más difícil debido al teletrabajo (Golden,2012).
-Ambigüedad de rol, el grado en que el trabajador carece de información clara sobre su rol mientras trabaja desde casa, y se observa en los trabajadores ya que presentan la necesidad de responder a las demandas constantes estimuladas por el presentismo que eventualmente resta tiempo al trabajo (Ayyagari, Grover y Purvis,2011).

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Uno de los factores estresantes asociados al teletrabajo es el agotamiento (Weiner, Maier y Laumer,2015), el tedio físico, emocional y mental por la participación a largo plazo en situaciones exigentes, siendo los profesionales de las tecnologías particularmente vulnerables a él (Moore,2000).

Sobre la base de los planteamientos anteriores, surgen las hipótesis, para teletrabajadores:

H1:La autonomía incide en la sobrecarga de trabajo.
H2:La autonomía incide en el conflicto trabajo-hogar.
H3:La autonomía incide en la ambigüedad de rol.
H4:La ambigüedad de rol incide en el conflicto trabajo-hogar.
H5:El conflicto trabajo-hogar incide en la sobrecarga de trabajo.
H6:La sobrecarga de trabajo incide en el agotamiento.
H7:El conflicto trabajo-hogar incide en el agotamiento.
H8:La ambigüedad de rol incide en el agotamiento.

Metodología

Se aplicaron encuestas a teletrabajadores de empresas nacionales y multinacionales presentes en Chile.

Siendo el teletrabajo un aspecto que presenta cierta complejidad social dadas las variables involucradas, resulta conveniente utilizar modelos de ecuaciones estructurales (SEM), ya que permite incorporar variables no observables medidas indirectamente por variables observables, siendo principalmente utilizado en el desarrollo de teorías en investigaciones exploratorias, enfocándose en explicar la varianza de las variables dependientes que examina el modelo de investigación, de manera de probar las relaciones entre variables latentes en el nivel teórico, constituyendo una herramienta de utilidad en investigaciones en el campo de las ciencias sociales (Hair et al., 2014), ajustándose a las características de este estudio. El análisis estadístico de los datos utilizó SEM basado en PLS-SEM y el software SmartPLS.

Resultados

Los resultados presentados corresponden a 50 encuestas válidas. Los datos obtenidos validan satisfactoriamente la evaluación de ajuste del modelo y el modelo de medida, cumpliéndose las condiciones exigidas según la literatura. La evaluación del modelo estructural se presenta en la figura 1, soportándose hipótesis H1, H2, H3, H4, H5 y H6. Los resultados señalan que: la variación de la sobrecarga de trabajo es explicada en un 65,9% por la variación de la autonomía y del conflicto trabajo-hogar, la variación del conflicto trabajo-hogar es explicada en un 56,9% por la variación de la autonomía y de la ambigüedad de rol, la variación de la ambigüedad de rol es explicada en un 14,3% por la variación de la autonomía, la variación del agotamiento de teletrabajo es explicada en un 67,8% por la variación de la sobrecarga de trabajo.

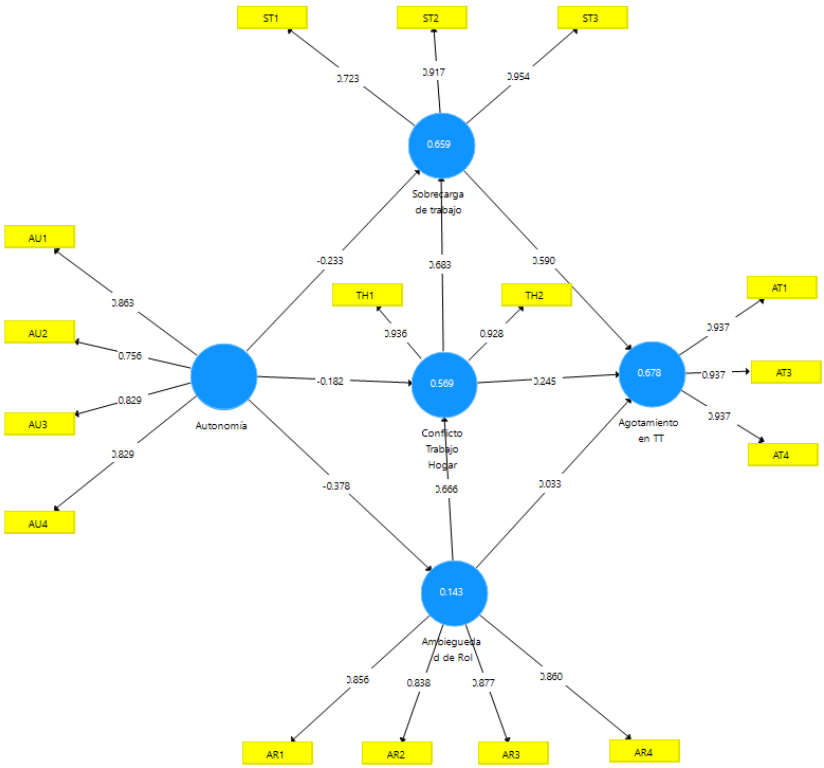

Figura 1: Modelo Estructural

(Fuente:Elaboración propia)

Conclusiones

Los resultados muestran que autonomía afecta (negativamente) a sobrecarga de trabajo, a conflicto trabajo-hogar y a ambigüedad de rol, de los teletrabajadores; mientras que sólo sobrecarga de trabajo incide en agotamiento de teletrabajo, la incidencia de conflicto trabajo-hogar y de ambigüedad de rol sobre agotamiento de teletrabajo no son significativas.

La utilización de PLS-SEM ratifica lo señalado por autores como Cepeda, Nitzl y Roldán (2017), siendo útil para efectuar análisis de variables en un contexto complejo, facilitando el desarrollo de estudios en distintas áreas de las ciencias sociales.

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Modelamiento De Ecuaciones Estructurales Aplicado Al Ámbito De La Gestión Del Conocimiento Y El Rendimiento Organizativo En Instituciones De Educación De Fuerzas Armadas

Eduardo PALACIOS-FUENTEALBA
Universidad del Bío-Bío, Chile, eduardopalaciosfuentealba@gmail.com

Sergio ARAYA-GUZMÁN
Universidad del Bío-Bío, Chile, saraya@ubiobio.cl

Cristian SALAZAR-CONCHA
Universidad Austral de Chile, Chile, cristiansalazar@uach.cl

Resumen

Este estudio explora la relación entre gestión del conocimiento y rendimiento organizativo en instituciones educativas de Fuerzas Armadas, utilizando modelamiento de ecuaciones estructurales. A partir de encuestas aplicadas a personal de estas organizaciones, se evalúa un modelo de comportamiento. Los resultados muestran que existen relaciones significativas entre las variables del modelo propuesto, y que la utilización del conocimiento incide en el rendimiento de la institución, especialmente en aspectos asociados la rapidez en la toma de decisiones y la capacidad de adaptarse rápidamente a los cambios del entorno.

Palabras Clave: modelamiento, gestión del conocimiento, comportamiento.

Introducción

El conocimiento constituye una mezcla de experiencias, valores, información y saber hacer (Hernández,2016), su gestión puede colaborar en el desarrollo y mejora de los niveles de competitividad, rendimiento de la organización (Nonaka y Takeuchi,1995).

Este trabajo busca explorar si la gestión del conocimiento incide en el rendimiento de instituciones de educación superior de Fuerzas Armadas, entendiendo que en dicha gestión intervienen la creación, almacenamiento, transmisión y utilización del conocimiento.

Antecedentes e Hipótesis

Pallarès (2014) plantea la gestión del conocimiento como un conjunto de etapas a través de un proceso continuo, contemplándose la creación, adquisición, captura, transmisión y utilización del conocimiento, para incrementar el aprendizaje y los resultados de las organizaciones.

Este estudio se enfoca en instituciones educativas de Fuerzas Armadas, con un sistema propio de educación, habilitadas para entregar títulos técnicos y profesionales.

El conocimiento generado puede ser útil para generar nuevo conocimiento, permitiendo que la organización aprenda, motivando que sea almacenado para facilitar su retención y posterior recuperación (Fainholc,2006). El conocimiento almacenado en una memoria organizativa, puede utilizarse en el futuro, para perfeccionar los productos y/o servicios y facilitar la toma de decisiones (Hernández,2016).

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La memoria organizativa está compuesta por tres depósitos de conocimiento, donde se almacenan las ideas pasadas, que influyen en la forma de conducir las acciones presentes: las personas, los sistemas de información y la cultura organizativa (Joglar,2010).

El conocimiento creado y almacenado no es útil si no es transmitido a otros miembros de la organización para ser utilizado (Nonaka y Takeuchi,1995), en los procesos de toma de decisiones o en la generación de nuevo conocimiento (Pereira,2014).

El desarrollo de nuevas ideas o proyectos requiere de una transmisión eficaz del conocimiento, permitiendo una mejor efectividad al momento de tomar decisiones (Fontalvo, Quezada y Puello,2011).

El conocimiento puede ser utilizado para mejorar la efectividad de las organizaciones, mejorar la calidad del trabajo, reducir errores, mejorando la forma de hacer las cosas (Wiig,1997), su uso eficiente permite alcanzar mejores rendimientos Valhondo (2003).

Estos planteamientos sustentan las hipótesis, para instituciones de educación superior de Fuerzas Armadas:

H1: La creación del conocimiento incide en la memoria organizativa.
H2: La memoria organizativa incide en la transmisión interna del conocimiento.
H3: La transmisión interna del conocimiento incide en la efectividad organizativa.
H4: La efectividad organizativa incide en el rendimiento organizativo.

Metodología

Se aplicaron encuestas a personal directivo y administrativo de la Escuela de Suboficiales de Carabineros de Chile (Sede Concepción).

Siendo la gestión del conocimiento un aspecto que presenta cierta complejidad social dadas las variables involucradas, resulta conveniente utilizar modelos de ecuaciones estructurales (SEM), ya que permite incorporar variables no observables medidas indirectamente por variables observables, siendo principalmente utilizado en el desarrollo de teorías en investigaciones exploratorias, enfocándose en explicar la varianza de las variables dependientes que examina el modelo de investigación, de manera de probar las relaciones entre variables latentes en el nivel teórico, constituyendo una herramienta de utilidad en investigaciones en el campo de las ciencias sociales (Hair et al.,2014), ajustándose a las características de este estudio. El análisis estadístico de los datos utilizó SEM basado en PLS-SEM y el software SmartPLS.

Resultados

Los resultados presentados corresponden a 50 encuestas válidas. La evaluación de ajuste del modelo global, indicó que, para la memoria organizativa sólo se visualiza la variable sistemas de información, lo que se consideró para continuar con el proceso, cuyos resultados se presentan.

Los datos obtenidos validan satisfactoriamente la evaluación de ajuste del modelo global y el modelo de medida, cumpliéndose las condiciones exigidas según la literatura. La evaluación del modelo estructural se presenta en la figura 1, soportándose hipótesis H1, H2, H3 y H4, apreciándose la relación y explicación existente entre las variables.

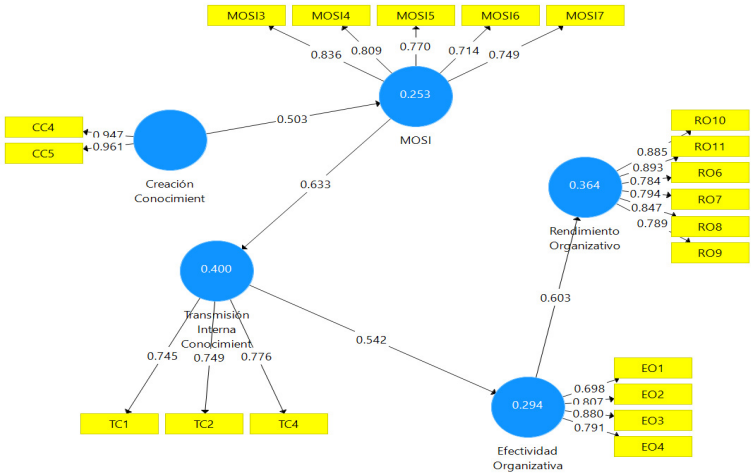

Figura 1: Modelo Estructural

(Fuente:Elaboración propia)

Conclusiones

Los resultados muestran que en instituciones educativas de Fuerzas Armadas existe un desarrollo de la gestión del conocimiento involucrado en su funcionamiento, presentando relevancia aspectos como la creación de conocimiento a partir del conocimiento existente, lecciones aprendidas y mejores prácticas, la disponibilidad de medios que permitan acceder fácilmente al conocimiento existente y actualizado, incidiendo positivamente en el rendimiento organizativo, principalmente en la rapidez en la toma de decisiones y la capacidad de adaptarse rápidamente a los cambios del entorno. La utilización de PLS-SEM ratifica lo señalado por autores como Cepeda, Nitzl y Roldán (2017), siendo útil para analizar variables en un contexto complejo, facilitando el desarrollo de estudios en distintas áreas de las ciencias sociales.

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Good Governance for Sustainable Hillside Development, Policy Failure, Urban Landslides and Their Socioeconomic Impacts in Penang Island, Malaysia

Noreha HASHIM

Faculty of Maritime Studies, University Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia
noreha@umt.edu.my

Fauziah AHMAD

School of Civil Engineering, Universiti Sains Malaysia, Seri Ampangan Engineering Campus,14300 Nibong Tebal, Seberang Perai Selatan,Penang, Malaysia
cefahmad@yahoo.com

Abstract

The increasing frequency of landslides in the most urban and densely populated Penang Island in Malaysia has become a continuous cause for concern of hillside development governance. This study uses directed content analysis of secondary data to examine good governance for sustainable hillside development, urban landslides and their socioeconomic impacts. Findings show that Penang has a comprehensive and interconnected governance framework for sustainable hillside development. However, differences in the level of compliance and commitment to the framework by governance stakeholders have resulted in different types of policy failure. The exact socioeconomic costs of landslides borne by affected stakeholders also cannot be determined. Recommendations include addressing causes of policy failure and strengthening stakeholders' commitment to the principles of good governance for sustainable hillside development.

Keywords: Landslides, Good Governance, Policy Failure, Sustainable Development.

Introduction

Penang Island is situated at the mouth of the strategic Malacca Straits in Malaysia. It is the most urban and densely populated island in the country; whereby its size of 293 km^2 is home to almost half of Penang state's 1,766,800 population (Department of Statistics Malaysia 2020). Safety Guideline for Hillsite Development 2012 (SGHD) states about 40% of the island comprises Class 3 lands (slope gradient of 25% to 35%) and Class 4 lands (slope gradient of more than 35%); whereby intense residential, infrastructure, commercial construction, and agricultural activities have led to ever increasing hill clearing and slopes development. Data from 2010 onwards show an upward trend of annual and maximum rainfall in Penang; which experts partly attribute to climate change (Abdul Halim, Mohd Daud & Liew 2014). These factors, along with poor design and construction, inadequate/absence of regular maintenance, and lack of communication amongst stakeholders, have resulted in the increasing incidence of slope failures and landslides (SGHD 2012, p.8). Thus it is not surprising that Penang Island is classified as a landslide prone area by the National Slope Master Plan 2009 – 2023. Yet despite having the clearest guidelines and strictest laws on hillside development in the country, incidences of fatal landslides continue to occur in Penang especially from 2017 to 2019.

This article adopts a good governance perspective to provide new interpretations of the phenomenon researched by asking several pertinent questions in the context of sustainable Penang state's hillside development, namely: (i) what are the characteristics, interactions and processes of governance?; (ii) what are the socioeconomic impacts?; (iii) what are the types of policy failure that can be observed? The article ends by putting forward recommendations that can contribute to sustainable hillside development through good governance strategies and prevention of policy failure.

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Literature Review

Numerous types of landslides occur the world over. Landslide mapping can be conducted to produce hazard and risk maps used to formulate guidelines, policies and procedures on land use planning that are appropriate for landslide management (Pradhan & Lee 2010). The tasks of formulating, implementing and evaluating guidelines, policies and procedures that promote sustainable hillside development fall under the ambit of hillside development governance.

The concept of "governance" can be confusing because “neat and precise definitions” are elusive as the interpretations and scopes of “governance” vary according to the actor/institution, approach, composition, level, objective and type of governance discussed, and the context within which the discussion takes place (Jreisat 2002; Kaufmann, Kraay & Mastruzzi 2010). Governance comprises government (the state, nature of political regime and formal institutions of public administration/management, but is also inclusive of other stakeholders outside of formal government, e.g., those in civil society, customers/citizens, and community groups that exercise influence over policies, actions and decisions regarding the betterment of public life and society (Srivastava 2009).

The pursuance of sustainable development requires policy frameworks for “institutional mechanisms, processes and practice” that are conducive to policy coherence (OECD 2016, p.16). Effective policy frameworks in the forms of laws, acts, official guidelines and procedures, should provide governance actors with the ability to: (i) better analyse interactions between goals and the effects of policy actions on their attainment; (ii) realign institutional mechanisms to attain sustainable development goals; (iii) identify and monitor the rate of progress on attaining those goals (OECD 2016). Hence sustainable hillside development requires coherent policy frameworks that are complementary and reinforcing in nature to enlighten governance actors on: (i) the principles and objectives of hillside development; (ii) their accountability, roles and functions; (iii) processes and procedures that must be observed, structures and arrangements of interactions, and punishments that can be meted out for transgressions committed. However, given the increasing occurrences of urban landslides in Penang island, it is pertinent to ask whether public policies pertaining to their prevention have failed. Policy failure assumes three forms, namely policy making process failure, programme failure, and politics failure (McConnell 2015). In terms of urban landslides, policy failure is more contentious and enjoys high public visibility because of the urban nature of the society affected.

Urban landslides are landslides that occur in environments that have been modified by human beings through extensive land-use change. Urbanization leads to the expansion of human settlements, land clearing, infrastructure development, growth of business premises/ industrial zones, and recreational/tourism activities. This leads to ecologically fragile hillsides being developed; resulting in direct or indirect socioeconomic impacts (Schuster & Highland 2001). Direct economic costs include repairing, rebuilding, replacing and maintenance activities of properties and/or equipment/machinery damaged, while indirect economic costs encompass costs incurred because of mitigation/prevention strategies, reduction in productivity and tax revenues due to destruction/damage to industrial, residential and recreational properties, injuries and deaths to people and livestock. The costs of losses incurred are borne by private and/or public organizations (Schuster & Highland 2001). Social impacts of landslides include loosening of communal bonds and decreasing social capital because of relocation of affected communities/residents, psychological trauma because of compromised societal safety, health and wellbeing, and feelings of distrust towards government and its machineries.

Methods

This desktop research uses a directed qualitative content analysis method to validate or extend the analytical framework used below (Hsieh & Shannon 2005). Secondary data (comprising previous research, official national data sets, and relevant textual materials) are analysed as follows. First, the dimensions of good governance for sustainable development and policy failure are used to construct a coding scheme and determine relationships between codes; whereby the dimensions in Table 1 are used as coding categories (Potter & Levine-Donnerstein 1999). Second, each dimension is given an operational definition.

Table 1: Dimensions of Good Governance for Sustainable Development and Policy Failure

Good governance	Dimension	Definition
	(i) Articulation	Capacity of individuals to seek freedom, make decisions on the use of shared resources issues, being confident and being responsible for actions taken.
	(ii) Mobilization	Capability to mobilize social capital through networking, local dialogues and empowerment at the grassroots level.
	(iii) Distribution	Realigning society's power relations by delegating "power and responsibilities" and institutionalizing political pluralism.
	(iv) Confirmation	The institutionalization of realigned power relations to prevent marginalization of weak members of society from being discriminated/disadvantaged.
	(v) Voice and Accountability	Encompassing citizens' participation ability to choose their government, freedoms of expression, association and media.
	(vi) Absence of violence and political stability	Probability of government destabilization through violent unconstitutional means.
	(vii) Government effectiveness	Civil service impartiality, effectiveness of public service delivery, policy formulation and implementation quality.
	(viii) Regulatory standard	Policy and regulations frameworks on policy formulation and implementation for development.
	(ix) Rule of law	Clean, fair, just and effective judiciary and law enforcement agencies.
	(x) Corruption	The extent and forms of corruption, including the ability of private entities usage of state's apparatus for their benefits.
Policy failure	(xi) Policy making process failure	The type of policy made has not been constructed to reflect policymakers' original vision, processes used are deemed illegitimate, inadequate support for the policy, as well as widespread criticism of the process used.
	(xii) Programme failure	Policy has not been implemented according to plan, predetermined outcomes have not been achieved, target groups have not benefitted from the programme, fundamental public policy criteria (e.g., economy, efficiency, effectiveness) have not been met, and prevalent opposition to the strategies and/or goals of the policy implemented.
	(xiii) Politics failure	Governments as society's vision setter and mediator of conflicts performed through the construction and construct of public policies, can fail to attain desired political outcomes; thus resulting in, among others, the loss of political credibility, tarnished reputation, uncontrollable agendas, as well as the ruin of core governance values

Source: Adapted from Hayden (2002, pp. 13 - 31), Kaufmann et al. (2010) and McConnell (2015, pp.230-236)

Third, the predetermined codes are used to categorize relevant texts, and new codes are constructed for uncategorized texts. Fourth, findings are then discussed in light of the aforementioned dimensions of good

governance for sustainable development and policy failure. Finally, new findings/categories that offer contradictory and/or a more enlightened view of the phenomenon are used to provide recommendations and to make appropriate refinements to the analytical framework to be used in future research.

Findings and Discussion

Composition of stakeholders

Penang's hillside governance comprises government actors, NGOs, private interests, community members/local residents as well as political parties that are directly and indirectly involved with/affected by landslides and landslide related issues. Government actors comprise federal, state and local governments entities including the Federal Government, Public Works Department, Department of Irrigation and Drainage, Meteorological Department, Town and Country Planning Department, Ministry of Natural Resources and Environment, Department of Environment, Department of Survey and Mapping, Construction Industry Development Board, Mineral and Geoscience Department, Department of Occupational Health and Safety (DOSH), Penang Chief Minister, the Mayor, Penang State Executive Council, Penang State Forestry Department, Penang Local Government and Housing Development Committee, Penang Hill Land Working Committee, District and Land Office, and Penang Island City Council (MBPP). Special task forces can be formed when needed.

NGOs include Penang Forum, Friends of the Earth Malaysia, Citizens Awareness Chant Group, Consumer Association of Penang (CAP), Water Watch Penang, Malaysian Nature Society, and the Environmental Protection Society Malaysia (EPSM). NGOs can form specific arms as platforms for the public to share information and air their concerns, e.g., Penang Hills Watch (PHW) is an information platform of Penang Forum on hill clearing activities, issues and impacts. Private interests include property developers, infrastructure construction firms and private property owners while political parties that have interests in and/or voiced concerns over the occurrences and impacts of landslides in Penang include the component parties of Barisan Nasional (BN) and Pakatan Harapan (PH). Finally, hillside development governance also include community members/local residents, acting individually or through residents association.

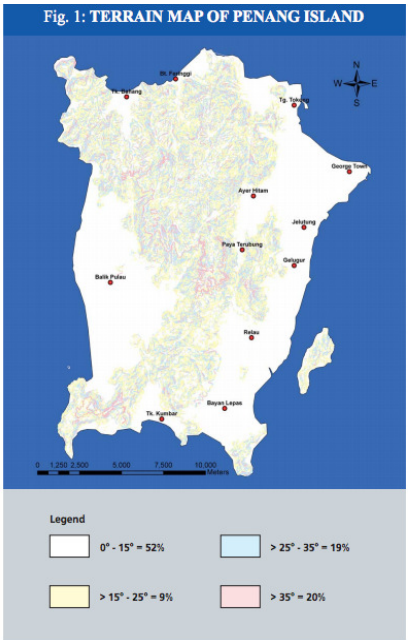

Figure 1: Terrain map of Penang Island according to gradient.

Source: The Penang Safety Guideline for Hill Site Development (2012, p.2)

Processes and Interactions

SGHD 2012 streamlines and takes into consideration existing federal and state development plans and guidelines (e.g., National Slope Master Plan 2009-2023, Penang Structure Plan 2020, Guidelines on Slope Maintenance in Malaysia 2006, Guidelines of Siting and Zoning of Industries and Residential Areas 2017, Guidelines for Erosion and Sedimentation Control 2010), to promote slope safety while minimizing adverse environmental impacts. It provides detailed explanations and instructions to all stakeholders, and also specifies their responsibilities before, during and after undertaking hillside development projects. Before an application for a planning permit is submitted, a pre-submission consultation must be performed by the Submitting Person or SP (e.g., Architect, Engineer, Geotechnical Engineer, Planner or Surveyor) with relevant government authorities by ensuring documents including land classification and suitability, terrain mapping, layout plan and land survey plan are made available. The Final Layout Plan must be submitted with the Final Geotechnical Report for approval to MBPP One Stop Centre (OSC). The OSC submits the Geotechnical Report to the Risky Land Development Committee Secretariat of Penang Public Works Department (PWD) for distribution to the Technical Departments of MBPP, Minerals and Geoscience Department, Department of Environment, Department of Irrigation and Drainage, Town and Country Planning Department, and the Hill Site Engineering Division of PWD. The Final Layout Plan is also checked and commented upon by the Technical Departments; that must also determine whether there are any objections to the proposed development, the grounds for the objections and whether the objections merit rejecting the proposed project (Aliran Admin 2017).

The OSC compiles and communicates comments/requirements made by the Technical Departments to the applicant, who is then required to demonstrate compliance of requirements as stated by the Geotechnical Engineer and the Risky Land Development Committee. Once the Layout Plan has been synchronized with the Geotechnical requirements, the Risky Land Development Committee Secretariat can approve the Geotechnical Report, and the Planning Department of Penang Local Authority can confirm and recommend the plans for approval. The OSC can then issue Final Approval for the project. The whole process takes 108 days to complete.

Once approval is given, competent engineers must be appointed to ensure and monitor developer's compliance with the guidelines during the construction process. Slopes and earth retaining walls constructed must abide by Guidelines on Slope Maintenance in Malaysia, 2006. Routine and non-routine maintenance inspection must be undertaken by maintenance/inspection team, competent personnel and geotechnical engineers.

Dimensions of Good Governance

Findings show that the governance structures of Penang state's hillside development do provide means for individual articulation and group mobilization whereby his/her voice and concerns can be heard either individually, or as a group via printed and social media, politicians and political parties, NGOs, issue networks and resident associations. Regular federal and state elections mean concerns on landslides and hillside developments can influence voters' voting decisions, while ensuring the accountability of political office holders to election promises made on issues of development, landslide prevention, public safety and welfare. Penang state enjoys political stability, without violent incidences that can lead to government destabilization through violent unconstitutional means. However small scale public protests do occur as exemplified by protest staged by the residents of Taman Seri Rambai and Taman Lau Geok Swee to the proposed construction of 3 blocks of high rise buildings on the hill slopes behind their residential areas (Opalyn Mok 2017), a protest held outside of City Hall on October 26, 2018 in remembrance of those who have lost their lives in the 2017 and 2018 landslides (Predeep Nambiar 2018), and a protest by Sungai Ara residents against a hilltop residential development project comprising 14 blocks of 602 apartments, 92 bungalows and two clubhouses (S Arulidas 2020).

Regulatory standards comprise policy, guideline and regulation frameworks on policy formulation and implementation of hillside development are comprehensive and numerous. The Guidelines on Slope Maintenance in Malaysia 2006 aims to increase public awareness on hillside risks, provides explanations on slope monitoring and maintenance, and identifying signs of impending landslides. The National Slope Master Plan 2009-2023 is an overarching national policy containing slope and landslide mitigation strategies and action plans at national, state, and local levels. Guidelines for Slope Design 2010 contains standard engineering practices, existing technical requirements and design materials to be used to design and assess the stability and safety of slopes, and risks mitigation. Guideline for Erosion and Sedimentation Control 2010 provides guidance on construction and

development sites' management and control of erosion and sedimentation. Guidelines of Siting and Zoning of Industries and Residential Areas 2012 provide guidance to project owners, Local, State and Federal authorities on site selection and the need for adequate buffer zones. The Penang Structure Plan 2020 is formulated in line with Part III of the 1976 Town and Country Act. Policies and strategic plans on land use are prepared by the Director, Town and Country Department and approved by State Planning Committee and MBPP. The Penang Safety Guideline for Hill Site Development 2012 is also part of the overall strategy to make Penang "Safe and Green" by specifying explicit and coherent design requirements, application procedures, transparent processes for approval, clear construction communication and controls strategies, and specific mechanisms for post construction slope maintenance. These regulatory standards do influence government effectiveness as they promote civil service impartiality, effectiveness of public service delivery, policy formulation and implementation quality.

The people of Penang island have access to judiciary, tribunals and law enforcement agencies whose tasks are to protect the rights of affected stakeholders and ensure that they comply with regulatory frameworks on safe hillside development in a clean, fair, just and effective manner. Two procedures can be used to challenge local planning authorities' decisions on proposed development projects. First, applicants must write formal letters to the local planning authorities concerned appealing for reconsideration of decisions made to decline planning permission or enforce planning conditions. Second, section 23 of the Town and Country Planning Act 1976 enables stakeholders to lodge an appeal to the Appeal Board if local planning authorities reject their appeals. The Appeal Board can choose to overturn, impose conditions, or sustain the decision of the local planning authorities. Only after all the administrative procedures have been exhausted, can the applicants turn to the courts for assistance to determine if the planning authorities have not exercise their discretionary powers judiciously (Ainul Jaria Maidin 2016). Indeed there have been instances when disputes between property developers, concerned citizens, residents associations and NGOs, have reached the High Court and the Court of Appeal (Intan Amalina Mohd Ali 2017).

Findings show that problems regarding the distribution and confirmation dimensions of good governance are still prevalent. Despite realigning society's power relations by delegating "power and responsibilities" and institutionalizing political pluralism in hillside development governance, these do not adequately protect "weaker" stakeholders from being disadvantaged because of power relations, funding and expertise constraints. Although corruption does happen, there is inadequate data to form valid assumptions on the extent and forms (including the ability of private entities usage of state's apparatus for their benefits) in hillside development governance.

Socioeconomic impacts of landslides

From 1973 to 2013, estimated losses amounting to more than USD 1 billion have been incurred because of landslides in Malaysia (Abdullah 2013). However it is impossible to determine the exact socioeconomic costs incurred because of landslides in Penang island because not all direct or indirect costs have been accounted for in a systematic and comprehensive manner as the costs are borne by private entities/individuals and/or public bodies. Findings indicate that the direct and indirect costs incurred are substantial. For instance damages attributed to landslides because of a freak storm at Penang Hill in 2017 meant more than RM 10 million is spent on slope strengthening and stabilisation, road repairs and controlling soil erosion (The Star 2018). As a preventive strategy, the State government has stated in its 2018 Penang Budget that an allocation of RM 10 million has been made for protecting of hill slopes, conducting a study on climate change, and illegal farming. (Lim Guan Eng 2017).

Findings show that from 1989 to 2009, 56 landslide incidences have occurred in Malaysia whereby 541 lives have been lost in 33 of the incidences (Center for Excellence in Disaster Management & Humanitarian Assistance 2016). No corresponding figure can be found for Penang island during the same period. However from October 2017 to June 2019, 24 deaths and 7 injuries can be attributed to Lengkok Lembah Permai landslide in Tanjung Bungah, Bukit Kukus Paya Terubong landslide and Lost Paradise Resort landslide in Tanjung Bungah. The incidences of fatal and non-fatal landslides do leave psychological trauma, social and lifestyle stress, feelings of hopelessness, anger and guilt, on individuals, residents of nearby housing estates, as well as disaster response workers (Ministry of Health Malaysia 2013). The costs associated with treating these adverse effects have yet to be accurately determined.

Policy Failure

Findings indicate the prevalence of policy failure occurring in the context of urban landslides in Penang island. Despite the existence of numerous and interconnected regulatory standards, programme failure happens because predetermined outcomes of slope maintenance, and preventing hillside landslides and soil erosion, have not been adequately achieved. Indeed the fatal landslides of 2017, 2018 and 2019 occurred after the adoption of SGHD 2012. Moreover from 2008 to 2015, the MBPP had approved 56 mixed development and residential schemes projects on hillsides above 25 degrees gradient or above 250 feet high in Balik Pulau, Batu Ferringhi, Bayan Lepas, Paya Terubong and Tanjung Bungah, by Ivory Villas, Farlim Group, JKP Sdn Bhd, Setia Promenade and Sunway City (Penang) Sdn Bhd (Opalyn Mok 2015). In the case of a residential development project in Lorong Lembah Permai, Tanjung Bungah, the planning approval application had been rejected by the Department of Environment because of the absence of a buffer zone between the proposed site and the permanent granite quarry; whereby construction would be in contravention of the 2012 Guidelines of Siting and Zoning of Industries and Residential Areas (Bernama 2017).

Developers not complying with, and circumventing regulatory standards, also led to programme failure; whereby slopes were cut back to a steeper gradient than specified, slope treatment and maintenance were not properly conducted, and the required Erosion and Sedimentation Control Plans (ESCP) were not observed (Rexy Prakash Chacko 2019). From 2008 to 2015, 68 illegal hill clearings were detected with the MBPP issuing stop work orders and instructing private landowners to undertake slope strengthening measures and implement land mitigation strategies. They could also be charged under Section 70A of the Road, Drainage and Building Act 1974 (Act 133) (Opalyn Mok 2015). Conflicting policy and action of the State government and the MBPP on hill slopes development also contributed to programme failure. Two instructive examples include: (i) the status of "hill lands" as classified under the Land Conservation Act 1960 can be revoked if the proposed projects are re-categorised under "special projects" and; (ii) despite the Penang Structural Plan's specifying clearly that housing development in Tanjung Bungah must not exceed 15 units per acre, the State government and MBPP had chosen to disregard this policy (Malay Mail 2017). It is important to note that MBPP's Geotechnical Unit, NGOs and concerned individuals do not have the capacity to effectively monitor and detect all legal and illegal hillside development activities; hence self-regulation and compliance by other stakeholders (e.g., developers and private landowners) are needed if programme failure is to be prevented.

Politics failure occurs when the State government, in its capacity as society's vision setter and mediator of conflicts, and in its quest to be an "entrepreneurial state" that is "clean, green, safe and healthy" that is able to provide "housing for all" in all of Penang's five districts, is conflicted in the prioritization and balancing of these goals in the context of its professed values of competency, accountability and transparency (Lim Guan Eng 2017). The findings show that the pursuance of public policies on sustainable hillside development is not the top most priority of the State government. Even if the DAP led Pakatan Harapan State government loses political credibility, suffers a tarnished reputation and compromises its core governance values in this area, it is evident that it feels these setbacks are well compensated by its performance in other policy areas.

Policy making process failure happens when it fails to ensure that policies made really address the underlying problems. For instance, the incongruence between policies made on hillside development and actions of the State government and the MBPP, raises doubts on whether the policy making process make policies that really reflect the policymakers' original vision, or are they simply window dressing the issues? This is exemplified by the ongoing RM 545 million project Paya Terubong Paired Road that links Paya Terubong to Lebuh Bukit Jambul and a new elevated road/link bridge to Jalan Tun Sardon (refer to Photo 1). Funded by private developers and the MBPP, extensive slope cutting, land clearing, blasting and excavation activities can lead to landslides because of steep barren slopes, as well as the exposure of core stones and bedrock (Rexy Prakash Chacko 2019)

Fig. 1: The Tun Sardon Link Bridge

Source: Noreha Hashim, 2020.

Recommendations

It is evident that Penang's hillside development governance comprises core, peripheral and occasional actors whose actions, interactions and obligations are clearly specified by the relevant regulatory frameworks. Indeed seven out of ten good governance dimensions have been met. However distribution and confirmation dimensions have yet to be successfully realized and the corruption dimension needs further research before conclusive comments can be made. Thus it is recommended that attention be paid to strategies that can bring about meaningful realignment of society's power relations and institutionalizing political pluralism so that some core (but weak), peripheral and occasional governance actors are not marginalized.

The composition, characteristics, interactions and processes of hillside governance do provide for the attainment of sustainable hillside development if all stakeholders commit themselves to, and make this goal, their top priority. This will address some of the fundamental causes of programme failure, politics failure and policymaking process failure arising from conflicting policy and action, confrontational stakeholders' interactions, and weaknesses in monitoring and regulating hillside development. Hence funding, capacity and expertise building, especially on the part of government authorities, NGOs, resident associations and private individuals, are needed to counterbalance, monitor and hold politicians, property developers and private landowners to account. These measures, on top of stiffer penalties, can ensure that regulation capacity is not overstretched. It is recommended that a thorough research to determine the exact socioeconomic costs of urban landslides be conducted ASAP. Only then can the State government appreciates the political, economic and social price of not putting sustainable hillside development as a top priority in Penang island.

Conclusion

Good governance for sustainable hillside development is possible and policy failure can be addressed if all stakeholders, especially core governance actors, realize the socioeconomic impacts, as well the associated costs, of urban landslides in Penang island. However a consultative and participatory approach, as well as the practice of competency, accountability and transparency, must be internalised by all stakeholders to prevent conflicting objectives and foster positive cooperation and interactions between them. Indeed the pursuance of individual objectives by stakeholders without a firm commitment to attaining sustainable hillside development, can only result in lose-lose situations for all.

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Modelamiento De Ecuaciones Estructurales Aplicado Al Ámbito Del Tecnoestrés Y Su Incidencia En La Satisfacción Laboral Y Compromiso Laboral En Usuarios Finales De Tecnologías De Información Y Comunicación

Álvaro QUIROZ-BUSTOS
Universidad del Bío-Bío, Chile, alvaro.quiroz@outlook.com

Sergio ARAYA-GUZMÁN
Universidad del Bío-Bío, Chile, saraya@ubiobio.cl

Cristian SALAZAR-CONCHA
Universidad Austral de Chile, Chile, cristiansalazar@uach.cl

Resumen

Este estudio explora la relación entre creadores e inhibidores del tecnoestrés y la satisfacción y compromiso laboral de usuarios finales de Tecnologías de Información y Comunicación (TIC), considerándose uno de los creadores, la inseguridad tecnológica. A partir de encuestas aplicadas a usuarios finales, se evalúa un modelo de comportamiento. Los resultados muestran que la inseguridad tecnológica disminuye la satisfacción laboral, mientras que los inhibidores la aumentan, y que la satisfacción laboral incide positivamente en el compromiso laboral de los usuarios finales de TIC.

Palabras Clave: Modelamiento, Tecnoestrés, Comportamiento.

Introducción

Es habitual que las personas utilicen Tecnologías de Información y Comunicación (TIC) en tareas laborales, lo que les puede ocasionar efectos negativos, afectándoles psicosocialmente, surgiendo el tecnoestrés, referido al estrés causado por el uso de TIC (Tarafdar, Tu y Ragu-Nathan, 2010).

Este trabajo busca explorar si determinados creadores e inhibidores del tecnoestrés inciden en la satisfacción y compromiso laboral de usuarios finales de TIC, centrando la atención en uno de los creadores, la inseguridad tecnológica.

Antecedentes e Hipótesis

El Tecnoestrés es un estado fisio-psicológico no saludable, relacionado con el uso de las TIC, que se produce cuando surge un desajuste entre las demandas que plantea el uso de la tecnología y los recursos disponibles para gestionarlas (Ragu-Nathan et al., 2008), constituyendo un efecto psicosocial negativo del uso de las TIC (Cárdenas-Velásquez y Bracho-Paz, 2020).

Los creadores de tecnoestrés son (Tarafdar, Tu y Ragu-Nathan, 2010): sobrecarga tecnológica, invasión tecnológica, complejidad tecnológica, inseguridad tecnológica, e incertidumbre tecnológica. No obstante, este estudio se centra en la inseguridad tecnológica, debido a que en los momentos actuales muchas personas han debido afrontar la necesidad u obligación de utilizar la TIC en forma permanente en su trabajo, debiendo conocer, comprender y utilizar adecuadamente dichas tecnologías, en lo posible al mismo nivel de aquellos que más saben utilizarlas, ya que, de no ser así, podría motivar inconvenientes a la organización, corriendo el riesgo de ser apartados de sus labores.

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La inseguridad tecnológica se refiere a situaciones en las que los usuarios se sienten amenazados por perder sus trabajos, ya sea por la automatización resultante de las nuevas tecnologías o porque otras personas tienen una mejor comprensión y manejo de ellas (Tarafdar,Tu y Ragu-Nathan,2010).

Existen factores organizativos que inhiben el tecnoestrés en el uso de TIC, asociados al apoyo, acompañamiento y soporte técnico de los usuarios finales y la participación de éstos en las etapas de implementación de TIC, permitiendo familiarizarse con ellas, facilitando su aprendizaje y comprensión, originando una buena opinión de los usuarios, lo que podría afectar positivamente a su satisfacción laboral (Ragu-Nathan, et al., 2008).

La percepción que los usuarios presenten de las TIC podría afectar la percepción que tienen sobre aspectos relacionados con su trabajo (Araya et al.,2018), afectando su actitud y comportamiento, los que se relacionan directamente con la satisfacción y compromiso laboral (Sánchez et al., 2013). En este sentido, la satisfacción laboral aporta a que las personas se sientan más involucradas con su organización, más a gusto de pertenecer a ellas, lo que repercute positivamente en su compromiso laboral (Marquina-Vergara, 2018).

Los planteamientos anteriores sustentan las hipótesis, para usuarios finales de TIC:

H1: La inseguridad tecnológica incide negativamente en la satisfacción laboral.
H2: Los inhibidores del tecnoestrés inciden positivamente sobre la satisfacción laboral.
H3: La satisfacción laboral incide positivamente en el compromiso laboral.

Metodología

Se aplicaron encuestas a personas que utilizan TIC en el desarrollo de sus tareas habituales.

Siendo el tecnoestrés un aspecto que presenta cierta complejidad social dadas las variables involucradas, resulta conveniente utilizar modelos de ecuaciones estructurales (SEM), ya que permite incorporar variables no observables medidas indirectamente por variables observables, siendo principalmente utilizado en el desarrollo de teorías en investigaciones exploratorias, enfocándose en explicar la varianza de las variables dependientes que examina el modelo de investigación, de manera de probar las relaciones entre variables latentes en el nivel teórico, constituyendo una herramienta de utilidad en investigaciones en el campo de las ciencias sociales (Hair et al.,2014), ajustándose a las características de este estudio. El análisis estadístico de los datos utilizó SEM basado en PLS-SEM y el software SmartPLS.

Resultados

Los resultados presentados corresponden a 50 encuestas válidas. Los datos obtenidos validan satisfactoriamente la evaluación de ajuste del modelo global y el modelo de medida, cumpliéndose las condiciones exigidas según la literatura. La evaluación del modelo estructural se presenta en la figura 1, soportándose hipótesis H1, H2 y H3, apreciándose la relación y explicación existente entre las variables.

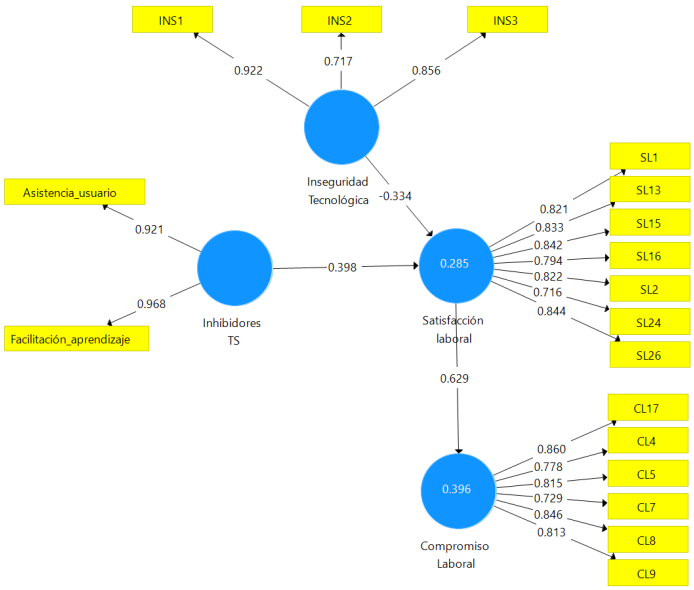

Figura 1: Modelo Estructural

(Fuente:Elaboración propia)

Conclusiones

Los resultados muestran que la inseguridad tecnológica (creador de tecnoestrés), reduce la satisfacción laboral del usuario final de TIC, mientras que los inhibidores del tecnoestrés (asistencia al usuario y facilitación de aprendizaje) la aumentan.

La utilización de PLS-SEM ratifica lo señalado por autores como Cepeda, Nitzl y Roldán (2017), siendo útil para efectuar análisis de variables en un contexto complejo, facilitando el desarrollo de estudios en distintas áreas de las ciencias sociales.

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UML Based Ontology for the Extraction of Historical Geographic Information

Piotr KOSIUCZENKO

Institute of Information Systems, Warsaw, Poland
piotr.kosiuczenko@wat.edu.pl

Abstract

Processing textual information in large files is time consuming and error prone. Investigating past and historical data concerning geography and economics can be facilitated a lot when the data is stored in a data base or has a proper form. There was a lot of research concerning the transformation of textual data to an ontology in a methodical way. In this paper, a method is presented for the extraction of geographic and economic information from a historic Lexicon. The method is based on software engineering techniques and follows an iterative cycle. It results in a well-defined ontology specified using UML class diagrams which can be queried using Object Constraint Language. An evaluation of the model is discussed. This research may help in assessing regional development, qualitative and structural changes in the regional economy, assessing ownership, infrastructure and living standard transformation.

Keywords: Software Engineering, Geographic Information Systems, Ontology, UML.

Introduction

Querying heterogenous properties in historical data is a complex problem. In case of geographical and economical information, queries can concern regional development, quantitative, qualitative and structural changes in the economy of a given region, ownership, transformation of economic units, change of living standards, economic structure, economic potential, infrastructural development, standard of living for residents. The problems are exhorted if the data is in a textual form.

In order to facilitate such queries, one needs a well-developed data structure with an appropriate querying language and mechanisms. This requires first a well-developed ontology and then a transformation of into an appropriate data structure based on the ontology. Ontologies represent the intentional aspect of a domain for governing the way the corresponding knowledge bases are populated (see Wong et al. (2012)).

Ontologies are a very well-studied research topic. Ontology learning from text can be defined as "the process of identifying terms, concepts, relations, and optionally, axioms from textual information and using them to construct and maintain an ontology, as pointed out by Wong et al. (2012). It is also a well-studied topic. Various methods have been developed including statistical analysis (cf., e.g. Khurshid et al. (2005)), classification techniques (cf., e.g. Larin et al (2011)). There exist also methods for ontology construction (cf. e.g. Fawei et al. (2019) and Fawei et al. (2019)). In case of GIS systems various methods can be applied ranging from the statistical ones, to data mining-based ones (vide, e.g. Arabameria et al. (2019) for a comparison).

A closely related topics are the Geographical Information Systems. GIS concern of geographic data such as objective events, entities occurring on, above and below the Earth surface. They are aimed at storing, processing, representing, analysis, visualisation and retrieval of geographic data (cf., e.g. Larin (2011)). The typical problems in GIS construction

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are the conceptual modelling of the geographic objects and their relation, identification of objects, definition of attributes (e.g. object tree and object forest), spatial relationships. There exist also approaches to modelling and extraction of GIS (cf., e.g. Zhu et al. 2018)).
The topic of this paper is a method of extraction of ontology from historical geographic data contained in a relatively well structured and complete Lexicon called "Lexicon of the Kingdom of Poland" by Sulimierski et al. (1880-1902), as it is called, containing geographic and economic information about the Kingdom of Poland in XIX century. The overall goal is to propose a general method for extracting ontology from a Lexicon resources using the example of the "Lexicon of the Kingdom of Poland". The Lexicon is used for various historical studies including ownership structure, economic development, industrialization, infrastructure, local development etc.

We decided to base the ontology on an object-oriented model described using UML class diagrams (cf. OMG (2017). The reason is that the model must accommodate various kinds of information and meta-information and must allow for sophisticated querying concerning different aspects of the historical development. In our opinion, the best suited query language is the Object Constraint Language (OCL, OMG (2014)) because it is well integrated with UML class diagrams, possesses very expressive querying capabilities and supports various datatypes. We did not use the statistical methods to extract the ontology (cf., e.g. Khurshid et al. (2005)) since the data we process is relatively precise and well-structured and the corresponding class diagram is small and relatively easy to elicit.

Model Construction

We decided to use methods of software engineering due to the choice of UML and OCL, and also to the fact software engineering provides well-developed and mature methods of system specification extraction and development. In particular, we used Design Patterns proposed first by Gamma et al. (1994) (see also Bafandeh et al. (2017)) to obtain well-structured model and the Refactoring method aimed at redesign of models and code developed by Fowler (1999) (see also Baqais (2020)). Both have proved very useful in model construction and modification.
We define the ontology in terms of:

- collection of classes that form denotations of terms
- attributes that characterize the terms
- a class inheritance hierarchy which relate terms in respect to their generality
- relations between classes and their structural presentation

One of most fundamental features of SE methods is their iterativeness, as well as agility in terms of adaptability to existing needs. Thus, the method used is highly iterative and takes into account the need to continuously modify the ontology as new categories of geographical units and new types of dependencies between them emerge in the processing of successive parts of the Lexicon and subsequent information.

In our aroach, the starting point was an a'priorical class diagram corresponding to the terms, concepts and relationships among geographical units and administrative structures. This initial structure forms the initial framework in the construction of the required ontology. The diagram than is modified iteratively: new classes, dependences and associations are added, and the inaropriate model elements removed and modified.

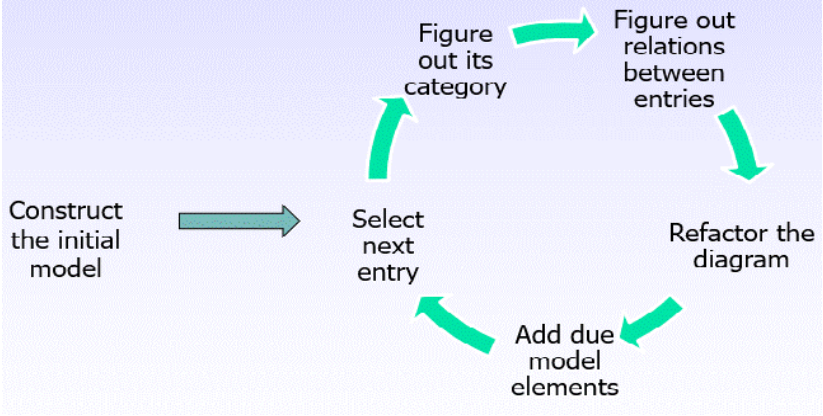

Fig. 1: The Ontology Creation Cycle

The aroach to ontology extraction is shown on Fig. 1: starting with the before mentioned initial model, we sulement and modify it step by step. The consecutive step in the modification corresponds to the next Lexicon entry. Each step has the following elements:

- Selection of the next Lexicon entry
- Categorization of the items corresponding terms: e.g. city, administrative unit, hamlet, post office, parish, ...
- Identification of the terms in the description of the selected entry, categorization of the corresponding terms and entries if not already performed, establishment of the structural relationships between them
- Verification that the relationship between the term and the terms that aear in the description of the selected entry is aropriate. If not, then the class diagram is refactored: its elements are modified and replaced aropriately
- Addition of new model elements such as classes, inheritance relations, associations and attributes
- In the case of role change by an item corresponding to a term replace inheritance with delegation

It has turned out that after few iterations of the cycle, ca 40, on randomly selected entries the resulting class structure remained stable and the refactoring was not needed anymore, but we needed only to add new elements into the object diagram. Thus, the structure is adequate for the purpose, the subject of change being only the addition of new element.

The Model

Below we present a simplified form of the ontological hierarchy by the alication of the above-mentioned procedure. The model is generic, uses multiple inheritance and delegation. In the model we have essentially geographical objects and reified associations such as relative location, i.e. a so-called classifier that is both an association and a class at the same time. As a consequence, associations in this model are objects (it is a reification of relationships).

In this class diagram (see Fig. 2), the basic units are geographical objects which correspond to the Geographical Object class. There are essentially two subcategories here: Administrative Unit and Geographical Unit. This results in a dichotomous division of geographical objects. All other categories of geographical objects are details of these two classes, e.g. Governorate, County, Community etc. on the one hand and School, River, etc. on the other.

Administrative units are modelled by the class Administrative Unit and its respective subclasses which describe the administrative role of the geographical features. The generic Location class models the location of spatial objects, such as geographic coordinates. This information can be specified in greater detail in aropriate subclasses.

The above model is based on multiple inheritances but also has to take into account changes in roles over time, e.g. the fact that a hamlet can become a town, a private home can become a post office etc. Various roles played by the same object at the same time can be modelled by multiple inheritance. However, this kind of modelling restricts the expressiveness and flexibility of the ontology. A geographical object can play many roles at once. When roles are used, each of them is characterized by a separate object of the aropriate category, e.g. a farm, a hamlet, a post office (reification of roles). Roles can be treated as subclasses, this requires the use of multiple inheritance, or reified by a dedicated class as in the "State Pattern" (cf. Gamma et al. (1994)). We chose the second option due to its flexibility. Since there can be many such roles at the same time, in the diagram we specify the aropriate multiplicity at the end of the association (in the diagram we use also *). The time in which such roles are played is characterized by attributes startDate and endDate, whose values are objects modelling moments in time (with day, month and year attributes). This allows static modelling of the fact that a given geographical object starts and ends to play a given role at certain moments in time.

The use of roles allows more sophisticated patterns of search for information about the condition of individuals at a given time and its evolution over time but makes the queries more sophisticated than in the case of multiple inheritance. It should be noticed that we aly here the "Replace inheritance by delegation" refactoring pattern (cf. Fowler (1999) and Baqais (2020)).

The diagram on Fig. 2 shows the most fundamental part of the obtained ontology. There are five fundamental classes: Spatial Object, Location, Geographic Unit, Role, Administrative Unit and Functional Unit. The root class Spatial Object is characterized by its name, some other attributes as well as a set of locations. The class Location is characterized by geographic coordinated (not shown on the diagram) and can be farther specialized. The class Geographic Unit is a special case of the Spatial Object, the geographic units can play different roles. The roles are objects of the class Role, the class Role is subclassed by Administrative Unit and Functional Unit dividing it in two separate categories.

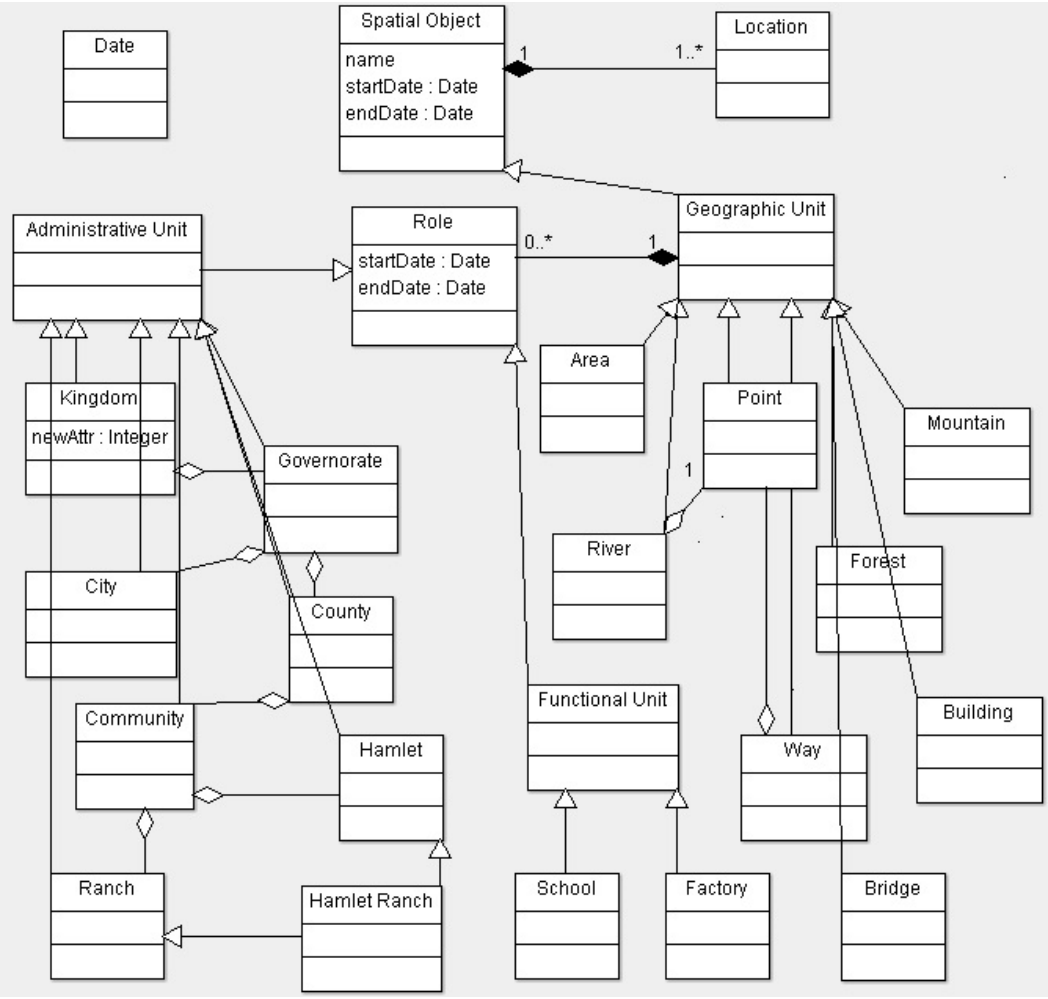

Fig. 2: The Class Diagram of the Ontology

The classes are related by associations. Spatial objects have their locations. There can be multiple location objects for one spatial object if the object is stretched over certain area. We use here association of type composition to express existential dependences since the locations exist only to specify locations of the corresponding spatial objects. Similarly, one geographic unit can play several roles, one after another or in parallel what is specified by the corresponding association; in this case we use also composition to indicate the fact that roles are existentially dependent on the object playing them.

The class diagram requires some additional constraints, which can be specified in OCL (not shown on the diagram). For example, there is a constraint saying that a point, i.e. an object of class Point, has one, and only one, location not several ones. Similarly, a river location can be specified by a sequence of location objects with certain consistency criteria imposed. The use of OCL to specify additional constraints makes this ontology very general and flexible. However, for a person who is not familiar with object-oriented modeling, it is more difficult to understand.

In order to further make the role reification model more flexible, we divide roles into two groups: administrative and functional. This allows for uniform treatment of all roles, such as “governorate” and 'county' on the one hand, and 'school' and 'factory' on the other. We introduce also dates for spatial objects and roles, since both can have their start

and end date. For example, a building can play a role of school in certain time-period. It should be noted that this does not prohibit playing other roles in other time-periods, the other time-periods can be disjoint, overlaing and the same as the first one.

The queries concerning properties of the constructed model can be expressed in OCL. The major OCL-construct aimed for this purpose is select, which selects all objects with a given property. It has the form X->select(x : C | condition(x)), where X is a collection of objects of class C and condition(x) is a Boolean-valued condition concerning objects of this class. The selection results in the set of objects x belonging to X and satisfying the condition. There exist some other operators such as quantifiers, iterators, collectors etc. which make the language very expressive. This allows one to write very detailed queries concerning the investigated model.

Evaluation

We analyzed the adequacy of the proposed ontology in terms of structure, consistency, adequacy and usability. In general, there are several aroaches to systematic to ontology evaluation (cf., e.g. Gangemi et al. (2005) and Gangemi et al. (2006) for a more systematic aroach and references to further reading).

The structure of the ontology proved to be relatively simple with rather few model element kinds. The paths in the graph corresponding to the class diagram on Fig. 2 are relatively short, and the average path length is relatively small. The so-called fan-outness, i.e. the number of outgoing edges, equals one apart of roles and locations. In general, the number of roles is also relatively small due to the fact that most spatial objects play one or few roles over time. In the case of locations, the number can be higher if the object has a complex shape.

One of the key issues is the modelling of time aspects. Objects of interest can aear in time, assume different roles and cease to exist. This can be adequately modelled using the proposed ontology and we did not encounter any counterexample when processing the lexicon.

The ontology proved to be consistent with the Lexicon. As mentioned above, after relatively few cycles of the Lexicon processing, the ontology proved to be stable, in the sense of not requiring changes, but only addition of new model elements, such as classes. We did not have also many problems with equivocal terms, as they are easy to resolve and relatively small in number.

The constructed ontology proved to be adequate in the sense of covering the dictionary terms. It is also adequate in the sense of allowing complex and detailed queries. In respect to usability, the most complicated thing proved to be the querying. OCL requires a certain degree of skills in reading of class diagrams and understanding the query language, in particular, the selection of objects. Nonetheless, we think that the problems are due mostly to the fact that it is not easy to ask a precise question concerning complex models like this. The questions we ask in a natural language are usually imprecise. Making them precise requires considering a lot of details which the asking person may be unaware of or do not care about. Thus, the problem is not caused by the ontology as such.

Conclusion

In this paper, we discussed a construction of an ontology corresponding to a historical Lexicon of the Kingship of Poland. To construct it, we alied standard methods developed in the area of software engineering. In particular, we used an iterative aroach to class diagram design when processing the dictionary. We alied also well-known design patterns and the refactoring aroach. In effect, we obtained a stable and adequate class diagram which allows for complex querying. The processing procedure concerning Lexicon entries proved to be simple and natural, so that even a person untrained in software engineering can follow it. Thus, the use of software engineering methods proved to be successful in terms of the use and the quality of the results.

Proposed method of historical ontology extraction can be integrated with other methods for GIS-information extraction such as bivariate and multivariate statistical and with data mining methods.

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Quality of Services and Passenger Satisfaction in Metro Transport Services

Natalia MANEA
University POLITEHNICA of Bucharest, Bucharest, Romania, natalia.manea@upb.ro

Nicoleta Daniela IGNAT
University POLITEHNICA of Bucharest, Bucharest, Romania, nicoleta_ignat@yahoo.com

Daniela GHIMPETEANU
University POLITEHNICA of Bucharest, Bucharest, Romania, ghimpeteanu_daniela@yahoo.com

Abstract

European This pilot study explores the impact of several factors on passenger satisfaction with public transport services. This article's main purpose is to analyze the quality of the subway transportation services and the impact it has on the satisfaction of the travelers. For this reason, data obtained from primary sources was used, represented by 147 respondents, through a simple and random sampling method. After framing and testing six hypotheses, it could be emphasized that the subway transportation services are the most appreciated among all ways of public transportation in Bucharest because of the high speed and comfort. The only inconvenience is the bigger price, compared to the surface transportation.

Keywords: Public Transport, Transportation Quality Services, Metro Transportation, Passenger Satisfaction.

Introduction

The Quantifying the satisfaction of passengers using public transport services is important for both research and practical development of services. According to Ranaweera and Prabhu (2003), in order to increase the degree of customer satisfaction and improve the transport infrastructure and the services that will be offered, it is necessary to know what their needs are and to what extent they are or have been met. Surveys provide essential information for authorities aiming to improve infrastructure and services and highlight passenger satisfaction (Le-Klähn et al., 2014; Lai and Chen, 2011; Mouwen, 2015).

Machado-Leon et al., (2017) stressed that the profitability of the public transport system is conditioned by its distribution, but also by the number of passengers. The passenger satisfaction is given by the quality of transport services provided.

Passengers who have a positive experience in using the transport system will continue to use this system and will contribute to the sustainable development of the city (Eboli and Mazzulla, 2009 a,b). The quantification of passenger satisfaction is followed by transport operators through periodic surveys.

Friman and Fellesson, (2009), state that a positive experience related to transit services leads to the use of these services again. This impact is being generated by the positive experience that passengers had. The passenger's perception of this services is associated with their provider.

The quality of public transport services is measured with the help of indicators based on data related to the quality of transport services perceived by passengers, the confidence in transport infrastructure and passenger loyalty (Eboli and Mazzulla, 2012).

Three significant factors that contribute to passenger satisfaction have been identified: "Safety, security and comfort", "Infrastructure quality" and "Ticketing facilities".

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Consistent with studies by Cavana et al., 2007, the attributes associated with each factor should be at the level of passenger expectations. The most significant attributes that influenced passenger satisfaction were the cleanliness, safety and security offered by the means of transport.

Transport policies that seek to encourage public transport ridership while reducing car dependency have long been identified as an important aspect in the development of socially, environmentally, and economically sustainable cities (European Commission, 2017).

Public transport providers are constantly looking for ways to increase their ridership, either by gaining new or maintaining current passengers. In recent years, societies' increasing concern about climate change and pre-serving the environment has led public transport providers in many countries to become more oriented towards environmental sustainability (Vicente et al., 2020; Saw et al., 2020)

Service quality is more difficult to describe than product quality as most services cannot be counted, measured, inventoried, tested, or verified in advance of sales to assure. Quality evaluations are not made solely on the outcome of a service; they also involve evaluations of the process of service delivery.

We can't talk about the quality of the services and the satisfaction of the clients without defining these concepts. Therefore, the quality is the aptitude of an offer-maker for producing/ensuring good characteristics and services, at a certain and settled level, according to the requirements of the clients (Bruhn, 2001).

The client satisfaction is strongly related to the service post-purchase behavior and the influence of the personal characteristics of the consumer. The satisfaction has as baseline the service's evaluation of the consumption's experience and some attributes that are linked to the quality of the services, like: the credibility, the maximum responsibility from the providers, the staff politeness, the speed, the comfort and short waiting time in the metro stops.

Scope, Targets and Hypotheses

The scope of the research is to identify the quality of the subway transportation services in Bucharest and the impact on the passengers' satisfaction.

To achieve this goal many aspects related to the passenger's metro experience were taken into account and they are as follows:

Q1: Determining the main reasons behind the decision to ride by metro
Q2: Determining the frequency of metro ridding
Q3: Identifying the opinion of the respondents concerning the quality of the subway transportation services
Q4: Determining the level of satisfaction concerning the subway transportation;
Q5: Identifying the reasons of dissatisfaction;
Q6: Setting the profile for the passengers

The hypotheses of the research are named under way of anticipation of the answers that are referring to the concerned issue:

H1: The majority of the respondents choose to ride the metro because of the short travel time, no matter the weather conditions.

H2: Over 60% of the respondents are traveling by metro at least once per day
H3: The majority of the respondents, over 80%, consider that the subway transportation services are of high quality
H4: The majority of the respondents are satisfied with the metro
H5: The reasons of dissatisfaction are: the traffic from the metro stops at high peak hours and the waiting time between the metro trains in days like Saturday and Sunday
H6: Over 50% of respondents are employees, female, aged between 18 and 50 years old with incomes between 2080 and 3000 RON.

The Methodology of The Research

This research is structured on phases of a normal research, which are: the preliminary phase, the projecting phase and the accomplishment phase. After choosing the sources of information, it is necessary to further proceed to the new phases that have into consideration defining the variables, classifying them, choosing the scales bars to measure the variables, choosing the research instruments that are used. Defining the variables takes into account formulate them, so that they reflect the problems within the research and to be according to the updated trends of the domain.

The research follows many variables categories: baseline variables (the main considerations that count when choosing the metro public transportation), descriptive variables (the age, the gender and the occupation), the circumstance variables (the financial situation of the respondents), the independent variables (the metro travel frequency), the dependent variables (the quality of the subway transportation services).

Ghosh et al., 2017, recommended the convenient sampling technique for data collection, because the random sampling technique was not feasible for such an analysis. Considering the fact that by conventional sampling each person would not have the chances to be a respondent, in order to overcome this difficulty, the survey was conducted for a period of three months at different times of the day so that different categories of passengers (commuters, pupils and students, business people, etc.) could be included.

Ways of collecting data

The data was collected during December 2019 – February 2020, in the main metro stops from Bucharest city. Because the data collection methods were done by meeting respondents in the metro stops, a simple and random statistical sampling method was used, so that every member of Bucharest's population had the same chance to be selected.

The data collection instrument was the questionnaire. This contained a filter question through which the target population that had certain characteristic, was identified. The questionnaire consisted of 16 closed questions, open, double choices answers, multiple choices answers and has covered all existing possibilities.

The Target Population

The target collectivity was represented by the citizens of Bucharest city and those citizens that use the public transportation. There were analyzed 147 valid questionnaires out from the 170 that were completed.

The analysis and interpretation of the obtained data

In other research, a scale with an odd number of categories was approached to allow respondents to report and have neutrality. This is because some people do not want to express themselves on the subject. Thus, the respondents had the opportunity to opt for an answer that could express their opinion at that time without being influenced by the final results of the research. (Stieger et al., 2007).

To accomplish the first tarted, we analyzed the question: `Which are the most important factors that contribute to choosing riding the metro?` With the help of the semantic differential, we analyzed the answers of the questioned people. Therefore, we noticed that the respondents choose to travel by metro because of the short time travel with a medium score of 4,31 while the weather conditions had a medium score of 3,72. After this analysis, there is a confirmed hypothesis that *The majority of the respondents choose to travel by metro mainly because of the short time travel independently of the weather conditions.*

Table 1: The most important factors contributing to the choice of traveling by subway

Name of the variable	Conceptual variable	Operational variable	Score
The reasons that stand as stoneground for the decision to travel by metro	The reasoning behind the determination of the respondents to travel by metro	The proximity of the metro stop	3,87
		The transportation safety	3,85
		The Comfort	
		The lack of other means of transportations in the area	3,87 3,91
		The waiting time in the metro stop	
		The weather conditions	4,31
		The price of the travel	3,72
			3,82

To determine the use frequency of the subway transportation, the question from the questionnaire was the following: *How often do you travel by metro*? I have noticed that the respondents are traveling daily by metro with a percentage of 45%, but another percentage of 37% prefer to travel every 2-3 days. A percentage of 17% of the respondents are weekly traveling by metro and only 1% is traveling monthly, as they prefer other means of public transportation. From all these, the hypothesis that *over 60% of the respondents are daily traveling by metro*, comes in disapproval.

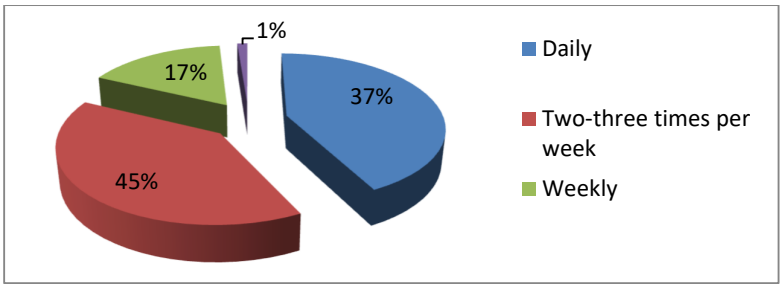

Fig. 1: The metro travel frequency

The opinion of the respondents regarding the quality of the subway transportation services was very favorable with a percentage of 64%, concerning the travel directions, 50% had a favorable opinion about the waiting time between the metro trains and were indifferent towards the cost of the travel with a percentage of 30%. This aspect suggests that for the respondents, the travel price does not matter or that the price of the metro travel is much more expensive that the surface public transportation. In addition to that, there is one hypothesis that does not qualify anymore, which is that the majority of the respondents, over 80%, consider that the subway transportation services are of high quality.

Table 2: The opinion of the respondents regarding the quality

Name of the variable	Conceptual variable	Operational variable	Percent (%)
The opinion of the respondents regarding the quality of the subway transportation	The point of view of the travelers concerning: the price of the travel, the directions of the travel, the circulation timeframe	Very favourable Favourable Indifferent Unfavourable Very unfavourable	64 50 30 4 2

To the question Which is the level of satisfaction in regards to riding the metro?, the questioned people answered in the following way, as can be seen in figure 2.

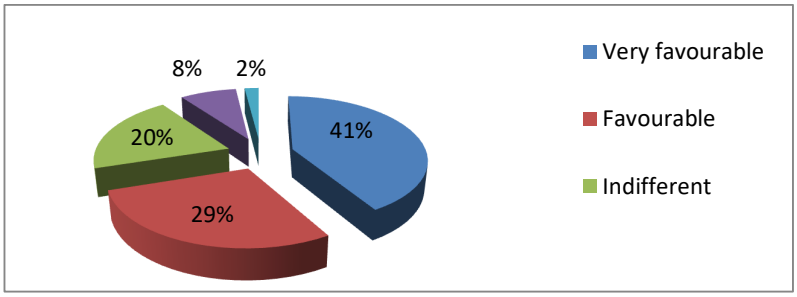

Fig. 2: Level of satisfaction regarding the metro travel

It can be seen that 41% out of the respondents are very satisfied about riding the metro, while 29% are satisfied by it. After this analysis, it can acknowledge that the hypothesis that the majority of the respondents are satisfied with riding the metro, comes in disapproval.

To reach our goal about the reasons of dissatisfaction with riding the metro, the respondents answered the question: Which are the main reasons of dissatisfaction that you have met during metro riding. The answers of the respondents can be visualized in figure 3.

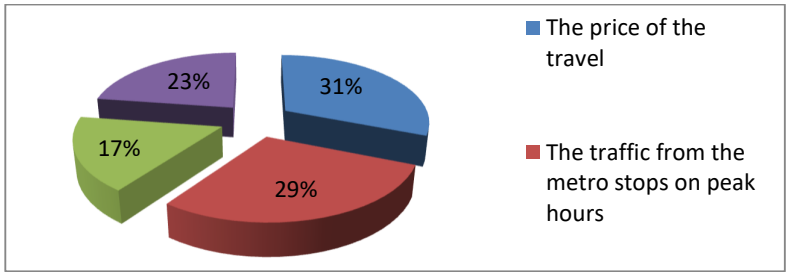

Fig. 3: The dissatisfaction reasons of the metro travel, displayed in percentages

It can be noticed that the main dissatisfaction reason is represented by the price of the metro travel, with a percentage of 31%, followed by the traffic in the metro stops at the high peak hours with a percentage of 29%, followed by the waiting time in the metro stops with a percentage of 23%. Therefore, the hypothesis that the reasons of dissatisfaction are the traffic in the metro stops at the high peak hours and the waiting time in the metro stops on days like Saturday and Sunday, is partially confirmed.

The profile of the respondents was created by analyzing the four variables that can be seen in the below tabel:

Table 3: Profile of respondents

Profile of the respondents	Age	< 18 years 18 -34 years 35 - 50 years 51 – 64 years > 65 years	5 63 45 26 8
	Sex	Male Female	65 82
	Income	< 2080 RON 2080 - 3000 RON 3001 - 4000 RON > 3000 RON	20 65 58 4

	Status	Employee Student Retired Others	83 44 16 4

In Table 3 can be seen that 63 of the respondents have an age between 18 and 34 years, followed by the persons aged between 35 and 50 years. About the gender of the people, 82 persons were females and 65 males. Out of these, 83 people are employees with an income between 2020 and 3000 RON. As per this analysis, we can confirm the hypothesis that Over 50% of the respondents are employed people, females, with an age between 18 and 50 years old, with incomes between 2080 and 3000 RON.

The limits of Research

The limitations of this research consist in the fact that the sample is not statistically representative, and the research cannot be generalized at the level of the entire city. This is a pilot study that lays the groundwork for future research.

Conclusions

After this analysis, the authors considered that all the goals of the research were accomplished. After testing the six hypotheses, it was seen than the most important factor that influences the decision to ride the metro, in the disadvantage of other means of transportation, the short time travel by metro, independently of the weather conditions. Other important factors are the lack of means of transportation in the area, as well as the metro stop proximity.

Moreover, a significant percentage of the respondents are riding the metro every two-three days, followed by the ones that travel daily. It can be easily noticed that there exist even respondents less interested in riding the metro because the travel frequency is lower, as they are traveling on a weekly or even monthly basis.

The majority of the respondents are very satisfied by metro riding, this happening because of the fast speed, comfort and safety. In another way of expression, there are also dissatisfied people, the reasoning being the price of the metro travel which is higher than the surface public transportation, the high traffic in the metro stops at high peak hours and the waiting time between in the metro stops on days like Saturday and Sunday.

Quality of service is closely related to passenger satisfaction and therefore is possible through quality affect demand for services. The role of carriers is to offer the highest quality services and thus to retain existing customers, but also attract new ones.

Therefore, local authorities as well as transport providers should make a significant effort to improve passenger satisfaction by improving the quality of service.

At the national level, the government supports investments in metro transport infrastructure in order to increase safety and comfort, as well as the degree of traffic transfer and decongestion. It is considered the modernization of the subway lines, the completion of the started projects and the provision of quality and safe services. Given the fact that in recent years industrial areas have been reconfigured, it is necessary to develop other lines of connection with the newly created industrial areas.

The present research can extend to another one that concerns the study of the quality of the subway transportation services, in the European Union and the comparison to Romania.

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Modern Horizons of Evolution: from Nature, a Human Being and Technology to Technogenic Man-Measurable System

Evgeny KAMENSKY
Southwest State University, Kursk, Russia
E-mail: kamensky80@mail.ru

Irina ASEEVA
Southwest State University, Kursk, Russia
E-mail: irinaaseeva2011@yandex.ru

Vicktoria BELKINA
Southwest State University, Kursk, Russia
E-mail: viktoria2206.1995@mail.ru

Abstract

Nowadays the issues of understanding the technogenic elements of environmental structure of human life and activities in the framework of socio-humanitarian knowledge are beyond the focus of scientific research. The article presents author's understanding of the phenomenon, which we define as Technogenic Man-Measurable Systems (TMMS) in its most futurological aspect, reflecting, however, the existing trends in the development of scientific and technological progress.

Keywords: Technogenic Man-Measurable Systems (TMMS), Technosphere, Anthropic principle, Hybridization, Synergetics.

Introduction

The issues of understanding the status and importance of the technology in the socio-cultural contexts of human life and activities have a certain history in scientific and philosophical thinking. However, the problems of studying human environment are traditionally concentrated in the framework of natural sciences and other specialized areas of knowledge, taking into account its environmental (in the broadest sense) and biological parameters. For example, environmental sociology can be understood as a relatively new field of scientific inquiry in addressing the problem of balancing the social factor as an element of the environment and the necessity of considering its impact on an individual and the society.

In this type of scientific and social space the limitations of the approach to the problem of integrating technogenic phenomena into natural and socio-cultural contexts of spaces of human life and activities is obvious. The fragmentation of scientific research results makes it difficult to form a holistic viewing of these processes, provoking turning to interdisciplinary methodological and explanatory constructs, the formation of which is currently being carried out, but it is still not sufficiently acknowledged and approved, although it is certainly promising.

1. It is sufficient to analyse the difficult path of the Theory of Complexity in Russia. This theory is better known here as Synergetics. Methodologically important issues of Synergetics foundations and its possible approaches in different areas of science can be found in the works of V.G. Budanov [14]; S.P. Kapitsa, S.P. Kurdyumov, G.G. Malinetsky [24]; K. Mainzer [28]; I. Prigogine, I. Stengers [33]; V.S. Stepin [35]; H. Haken [20]; D.S. Chernavsky [17].

2. The works that reflect the adaptation of the topological theory to socio-humanitarian and interdisciplinary knowledge are essential for the study (see, e.g. [10-13]).

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3. Certain aspects of complex forecasting and modelling in relation to the state and the development of technogenic and other transformations of human environment and human being future are being developed (see, e.g., Benjamin et al. [4]; Bostrom [9]; Kirk [25]; Kurzweil [26]; Waldeman [39]; Kamensky [23]; Boev E. & Kamensky [8]).

4. Special attention should be paid to the works in which the concept of the technosphere as a part of the noosphere is distinguished (V.I. Vernadsky [38]; K. Popper [32]; M. Heidegger [21]). However, none of the approaches suggested in the works of these authors has been accepted as a universal one by the scientific community. Although the importance of universalism is obvious, it still remains a marginal area of scientific methodology and practice.

In this paper the most general, but, nevertheless, as it seems to us, rather significant philosophical and methodological outlines of understanding the dynamics of the development of technical and technological complex connected with human life and involved in the contextual processes of human environment transformation are presented.

Research Methodology

Socio-humanitarian paradigm of today's world, tending to interdisciplinary, problem-oriented, not subject-oriented fields of knowledge in its ultra-modern trends of development, continues to use orthodox, traditional doctrines of explaining and interpreting new anthropotechnical phenomena illustrating the trends of hybridization of different systems, however. TMMS as a product of new types of relationships of 'living-nonliving', forming atypical for each system characteristics and effects can be referred to such phenomena nowadays. Nevertheless, there is almost no comprehension of technogenic elements of environmental structure of human life and activities, in particular in the framework of socio-humanitarian knowledge. These issues are addressed in the field of philosophy of science and technology on a larger scale, but they still remain marginal in the scientific community. We believe that, first of all, this is due to the interdisciplinary nature of these explanatory models, immaturity of their methodological and conceptual apparatus that makes them open and vulnerable for 'criticism' of the orthodox representatives of different branches of science.

Results

We also believe that in view of the above mentioned theories and concepts the problem of technogenic development and transformation of human environment in the most generalized form can be illustrated by the following provisions:

1. Technology, being a product of human activities, is an indicator of cultural evolution of a human being throughout the whole historical and socio-cultural development. Technosphere products are associated with the development of a human being as a species, being a cause, a tool, and a result of human intellectual evolution.
'Anthropological turn' as a relevant characteristic of the current time lies in the increasing trends of anthropotechnical hybridization reflected in the ideas of transhumanism. Despite the fact that the representation of this 'turn' can be traced in other contemporary social phenomena (such as transgender and homosexuality, the popularization of which is becoming an important feature of modern society), it is easy to notice that it is typical for the developed countries with powerful technological potential capable of modelling non-biological scenarios of human reproduction in a homogeneous world. Consequently, the focal point in this case is also a technogenic factor of human evolution and non-obvious vectors of human future development, initially perceived as independent, will exist due to the technical and technological progress on closer examination.
2. The processes of the unification of technological, socio-cultural, and personal spaces imply that all of them adapt to the models of technology 'ontology'. For example, now the vital developments in the field of the management of people and the objects of non-anthropic and non-social sphere are actually based on the principles of algorithmic presentation of the activities of social groups and individuals in similar way to technical systems in which the main characteristic is their functionality. Hence, a mechanistic approach to a human being as a set of utilitarian qualities and his utilitarian and functional potential without taking into account a complex creative characteristic of a personality and his individual characteristics. Similar processes can be observed in relation to the culture of management, organizational culture, and social culture.
3. The very culture of modern consumer society is based on the fetish of innovations in engineering and technology

as the main consumption product. As a result, because of the particular complexity of the technology, it is attributed with true social and anthropic qualities, which is possible only as a simulation of these characteristics at the present level of progress, however. Conversely, there is a counter trend: a person himself becomes mechanized by the analogy with technogenic subjects, which facilitates a kind of dialogue between technology and a human being. In other words, it is difficult to make a human being from a robot, but it is much easier to make quite the opposite. Hence, there is a simplification of the essence of the anthropic subject; this comes into conflict with his self and other latent existential contents of a personality which have not been reliably studied. As a result, in today's society an uncontrolled increase in the cases of frustration, deprivation, and other psychosocial disorders occurs on a massive scale.

So, the anthropological turn of modern civilization probably lies in the crisis of the consumer society, the crisis of postmodernity based on the enormous achievements of the technical and technological development of the current stage, which gave a person more free time reducing the degree of self-preservation efforts. The whole history of human development is the history of the technological development when, becoming more complex in the direct proportionality, it facilitated the struggle of humanity for survival in the natural environment, transforming both this very environment and the methods of interaction of the society with it. In fact, we are talking about the formation of material culture as it is, expressed in its peak achievements reached by the phenomenon of civilization of a particular type.

4. It is obvious that currently 'over-optimization' (N. Taleb) of social system is taking place, which leads to its destruction. Social immunity is disappearing, unpredictable existential risks (N. Bostrom) are growing, and searching for a new paradigm of existence is becoming urgent. In this case it seems that a throwback to the past orthodox grounds is impossible since progress achievements have become an integral part of our lives and they are our environment. To destroy the environment means to destroy a modern human being and this intention is 'decadence' (F. Nietzsche).

5. We can assume that human achievements have formed 'a super-environment' and now, in view of its complexity, this environment is objective, and a human being as a subject should be simplified. Two macro-scenarios of further development are obvious: either a human being will progress intellectually, becoming more complex according to the mentioned trends, that is simply impossible on a mass scale in the conditions of pragmatic consumer ideology of the time or a human being will become a 'One-Dimensional Man' (after H. Marcuse), with a distinct functional in a particular area of social and professional practices, by means of which he will adapt to the environment in which he lives and carries out his activities.

Therein lies the main paradox of the situation: initiated and implemented by a human being technical and technological progress as a product of the intellectual evolution triggers the regress of the very humanity destroying human adaptive potential. In this aspect, the ideas for new foundations of social stratification are becoming relevant. They are reflected in the ideas of a 'Creative Class' and the similar ones but, in fact, they go back to Plato's ideas about the ideal social structure based on the power of intellectuals-philosophers.

Apparently, the only way of correcting the situation is to create artificial conditions for restoring and improving 'social immunity' of a human being, his adaptive structures as the guarantor of the preservation of subjective autonomy. However, nature, probably, activates the natural mechanisms of correcting the destructive tendencies through the descriptively recorded phenomena of the transformation of pathologies, normal distribution and the like. These phenomena are related to the processes of self-organization of the systems which are the subject of trans-scientific areas of modern knowledge, but which are not understood to this day. New diseases, wars and other disasters may act as unpredictable convergent effects, risks of our time, but perhaps they stimulate the process of restoring natural harmony despite their catastrophic values in the world people conscience. There are proponents of these viewpoints both in scientific and in futurological journalistic literature.

6. The consumer society as the product of the postmodernity of technogenic civilization can achieve balance and order only bringing together 'the principles of life' of a human being and technology, harmonizing these principles. It is possible to destroy this type of society as a stage of human evolution only from the outside through the external links of the system. However, if the society is developing in a similar global environment of the global world system (with respect to its characteristics), then there is probably no objective factor leading to a crisis of this type of social organization. Circular determination starts to work. Under these conditions, the only thing we can rely on

is the existence of a human being as his fundamental potential, his creative and dynamic essence which is self-determined 'from inside'. He is a kind of important cause capable to stimulate self-development regardless of any circumstances.

Then it is possible that these trends will be broken from inside, if singularity which is not connected with technical and technological progress but defined by unlocking a fundamental human potential, the boundaries and the content of which are absolutely not studied to this day occurs. But the logic of life tells us that this can most likely happen only by means of its stimulation by technical (technological) methods. Moreover, this can occur in different scenarios.

7. In our opinion, being widely advocated today the ecological approach as opposed to the technogenic one is doomed to remain a utopia if it does not take into account the problems of technological development as it implies devastation of intellectual evolution of humanity which is intimately connected with technological development.

The main conclusion that can be made by assessing the current situation of the development of society, a human being and technology is as follows: the technosphere occupies more and more space between 'the world of society and a human being' and nature at least through its technogenic products that mediate this relationship.

For example, we can travel in the mountains but in a car, or we can enjoy the sounds of nature but in audio recording, etc. The characteristic feature of this time is that the current achievements in technical and technological progress interfere in the very essence of the biology of life, changing the true natural processes but still in accordance with its natural mechanisms. This is the main principle of anthropotechnical hybridization consisting of technical replication of natural biological processes. However, for example, in accordance with the ideology of transhumanism, it is probable that through achieving singularity, when uploading consciousness to virtual networks radically different from the existing principles of 'life' of post-human will be observed; according to N. Bostrom at this stage of the development of human reasoning a prediction of these principles is impossible.

Discussion

So, we will try to outline our vision of the phenomenon which we call the technogenic man-measurable system in its most futurological aspect which, however, reflects the existing trends of the development of scientific and technical progress. First of all, let us operationalize this phenomenon.

We believe that man-measurability originates from the very ideology of anthropocentrism and humanism, enclosing a human being in the subject matter of comprehension by a human being himself, and most importantly, in the terminology of Protagoras considering a man as "the measure of all things". In this case, if we look at the issue at least from the origins of the fundamental ideas of Renaissance Humanism, it is possible to speak about radical man-measurability, putting anthropic subject in opposition with nature. Modern paradigm of humanism, based on the integration of scientism and subjectivity in the sense of postnonclassical models, as we have already said, is represented, for example, by Synergetics. V.I. Arshinov and V.G. Budanov [1, 61] suggest that man-measurability relates to the problem of understanding the ontology of synergetic systems on the basis of postnonclassical methodology, for example, by the analogy with quantum processes understanding.

V.I. Arshinov and V.G. Budanov argue that a new unified worldview can and should be built in the context of the paradigm of the complexity of the world and a human being, nature and human existence enrooted in nature, involved in it, and therefore in balanced relationship with it; human existence constructs in its collective becoming another 'manmade' nature of technology and social institutions [1]. We suppose that this viewpoint reflects a truly synergetic aspect of the problem, which lies in mentioning nature-measurability and man-measurability of modern reality. However, the theory of the balanced relationships of human existence and nature (not in its cosmological sense), at least the nature of the Earth in the conditions of its current state and the trends of scientific and technological progress and the evolution of human intelligence raises a number of questions [16]. Here there is rather a tendency of man-measurable restructuring of nature.

A human being rather changes nature through technology, than destroys it provided that this is not about pathological scenarios of the sterilization of the planet due to technological catastrophes, industrial and other man-made disasters or similar anthropotechnical causes. This assertion is based on a rather trite idea that all living

organisms, and even noncellular protoforms of life, to which viruses can be referred today, transform nature. In this case, these processes are considered natural. For example, virologists say that viruses control open-ocean streams, they are responsible for the formation of some rocks consisting of the remains of plankton which died from a viral infection, which significantly affects physical and other parameters of the planet. However, we still believe that a technogenic scenario is the most likely one. And this is the reason of our interest in the analyzed issue of modern trends of the development of technogenic sphere and its integration with the contexts of the existence of the anthropic subject, in which it was previously represented but in a different, instrumental form.

We believe that man-measurability is a category denoting, apparently, an assessment of the object from person's perspective of involvement, participation, and complicity. That is 'human assessment', but only considering a person as a subject of this assessment. In this case it is necessary to remember about the so-called anthropic principle in all its interpretations, the analysis of which is given in the scientific literature (see, e.g., Polozova [31]; Barrow and Tipler [3]; Carter [18]; Boev [7]; Arshinov [2]; Budanov and Aseeva [15]).

V.I. Arshinov and V.G. Budanov [1] note that the cybernetic understanding of the 'human-computer' system reduced it to the information processing system, i.e. a system of symbol manipulation based on a set of rules. But then, the same cybernetic perspective of the evolution of this system resolving into a progressive linear displacement of a person and his full replacement by a computer appears.

Even N. Berdyaev [5, 6] wrote that the means of life often substitute for the goals of life; they can occupy so much human life space that the goals of life eventually and completely disappear from human consciousness. And it occurs on a grand scale in our technical epoch. Of course, technology for a scientist making scientific discoveries or for an engineer inventing something can become the main content and the goal of life. In this case, technology as cognition and an invention receives a spiritual meaning and refers to the life of spirit. But the substitution of the goals of life by technical means can imply depreciation and extinction of the spirit. And so it happens. A technical instrument is heterogeneous in its nature both for those who use it and for the purpose it is used for. It is heterogeneous for a human being, human spirit and meaning. Currently, the representatives of the newest forms of romanticism, ecological approach, environmentalism and similar branches of science use these arguments in their reasoning of anti-technocratic positions, and it is difficult not to agree with them.

However, the current state of the problem analysis illustrates new approaches and models of understanding, based on the search for universal system qualities of anthropic and technical systems. In particular, V.I. Igonin [22, 38] suggests that 'a technical system' and 'a human system' are the forms of energy existence. After this follows the recognition of 'a technical system' as a subject of 'man-measurability' as a result of understanding the energy unity of 'a subject' moving in its progressive development and a technical system which he creates. The self-organization of the subjective energy-technical system goes in the direction of the energy-technical enhancement of the space of its energy state.

At the same time, it seems that this viewpoint, though developing the ideas of perpetual motion in the constructs of development through self-organization can be regarded as one of the modern images of the stated by G. Leibniz assertions of the basic levels of classical science, which made specifically stable pendulum an object of scientific interest (see, e.g., Prigogine [34]).

In the modern truly synergetic understanding a TMMS can be represented as a dynamic non-equilibrium system. We mean that in the case of integrating in the process human activity and complex analytical (or another, but usually computer) equipment the status of controlling subsystem transfers from an anthropo-biological subsystem to a technical one or vice versa; it occurs swiftly, according to the current objective or even task, which reflects this the process as a process of operational status change of the control parameter (or even of the order parameter). In this case this process can accompany TMMS work both within a predetermined tunnel of the objective (the attractor) and in the space of bifurcation with the highly ramified objective tree (the operational choice situation), for example, in multiaspect predictive planning of particularly complex systems evolution without defining the desired (specified) scenarios of such development.

Thus, such activity presupposes the potential presence and reaching an indefinite number of bifurcation points which require operational decision-making not only on the basis of predicting the determined scenarios based on machine extrapolation, but also on the basis of intuitive or other latent non-formalizable mechanisms for defining

objectives and decision-making by the subsystem 'man'. In such a complex interaction a transition of the subsystems between two base statuses (controlling and instrumental) without the possibility of statically-stable definition of any of them for the subsystems will be observed. It is likely that a nonlinear pendulum or other oscillatory kind of the parametric dynamics of hierarchical structure of TMMS without destroying its hybrid ontological content will be observed.

The outlined process can be described with the introduced by us category of 'the horizontal hierarchy' which represents a dynamic response of a static hierarchical system in a specific space-historical period. The opposite is also possible, in some cases for a number of specific classes (kinds) of systems a static vertical hierarchy is no more than a characteristic feature of horizontal hierarchy within a specific period if we rely on at least the proposition of 'perpetual motion in nature'.

In our opinion, at this stage of the development of interdisciplinary knowledge it is quite difficult to determine whether the proposed constructs are nonlocal methodological or they are ontological characteristics of the systems. But it seems to us that they are topical in both senses for TMMS in particular. TMMS will always be ontologically non-equilibrium but at different points of time it may have different internal factor structure (configuration of subsystems) represented only by two macro-types of vertical hierarchy as its static characteristic at a particular point of time: 'anthropo-biological subsystem- technical subsystem' and vice versa. It is possible that there may be moments of transition without clearly identifiable status indicators of subsystems in the bifurcation points of objective defining and decision making (choice) concerning the directions of the development (activity). The change of the operational status allows keeping the necessary level of the subjective order of the system optimally organizing specific linear processes within the system during its dissipations with the environment within the current attractor.

Therefore, we can assume that the phenomenon of horizontal hierarchy is an indicator of the dynamics of vertical hierarchical structures or systems in general, or, at least, of biocoenosis or certain populations of species in them. In complex systems a struggle for the controlling status of one of the parameters can occur. It is possible that a dynamic state that allows existing operational status change of two or more parameters not only as controlling parameters, but also as order parameters will be a new homeostasis of the system. This is due primarily to the expansion of the range of the goals of human society which has to integrate the priorities of the development of previously separate spheres of social practices into a single stream of goal-setting. In this case, social systems will be inclined to organize a network, rather than centralized deterministic form, and the mechanism of horizontal hierarchy will be determinant in their homeostasis; vertical hierarchy will be a private response to the local objectives of the existence. Such grounds, for example, are the foundation of the ideas of civil society as a set of associations of free individuals, and any other network structures. A successful example of the use of the concept of the order parameter in the sociological aspect can be found in the work of H. Haken [19]. And speaking of the TMMS subjectivity, we can conclude that the parametric design of the internal structure of such a system is the most successful for describing the fundamental bases of its hybrid nature.

As an example, it is also possible to imagine that under condition of implementing the integration of 'computer-brain' (N. Bostrom) as a result of the irreversible system failure which threatens with the loss of valuable arrays of information, through the regulation of the system by means of the mechanisms of negative feedback the biological subsystem may be disabled (destroyed) as the most vulnerable and unreliable when its most valuable core (consciousness, personality, memories, knowledge) will be stored on a reliable technical (artificial) data storage device. Such algorithms can well be 'firmwared' in the programs of the TMMS operation in the nearest future or be formulated as a principle of 'objective necessity'. It is probable that these results will be achieved in addressing the fundamental issues concerning the relationship between psyche and somatics, and, in fact, as a result of the victory of materialist or idealistic paradigms of the human worldview or understanding their integral unity on the basis of new scientific discoveries in the field of cognitive science, transpersonal psychology and related areas of knowledge.

It is not excluded that the specified scenario of horizontal hierarchy in the context of the forced system socio-anthropo-technical integration will be possible in the conditions of the development of antagonistic trends of the social, technical and technological development of a human being. In the process of this integration the subsystems will struggle for the autonomy (in borderline cases even by means of destructing the second subsystem which acts as a subsystem-opponent, not a subsystem-partner).

Therefore, two basic scenarios of socio-anthropo-technical hybridization and TMMS development are obvious. In this case the very TMMSs are represented in two types:

1) simple systems which do not make decisions by means of an anthropogenic subsystem. For example, 'man-manipulator" or any other technical device.
2) complex systems making decisions by means of an anthropogenic subsystem.
Undoubtedly, this classification is the most general and not final, and it needs further clarification. Here it is important to understand its main criterion which is the ability of technical and technological subsystems to make autonomous decisions not just as an optimal algorithm with regard to a number of factors according to the programmed scenarios and their combinations, but, particularly, 'the simulation of will'. But more importantly, according to K. Mainzer's position, is:
"<...> nonlinear dynamics can generate complex patterns and system states, which cannot be forecast in the long run without increasing loss of computability and information. Thus, artificial minds could have their own intentionality, cognitive and emotional states, which cannot be forecast and computed similar as is the case with natural minds" [30, 282].

However, in this case it is appropriate to refer to the TMMS non-equilibrium state once again. It currently cannot be understood as an absolute characteristic, since both of its basic subsystems (a man and technology) are quite autonomous at the present stage of technological development. For example, if the system 'man-computer' will be decomposed, then both of its subsystems will be autonomous in relation to each other as ontological objects. However, from the viewpoint of the functionality of the system the two basic scenarios can also be viewed:

1. A human being as a subject in relation to the overall functioning of the system is the subsystem determining the life of the system almost at any time due to having will and freedom to make decisions about the relevance of the existence of the system. In this case, having performed a set of appropriate functions the system temporarily stops operating, at least by switching off the computer. In this case, a technogenic subsystem of TMMS is functionally referential.
2. In the case of 'man – life-supporting appliance' TMMS the functionality of the technogenic subsystem of the system is much more referential in relation to anthropic subsystem. In this case, a technogenic subsystem provides the functionality of the whole TMMS and is ontologically referential. Nevertheless, a person still has the possibility of switching it off, in spite of the destruction of the whole system itself.

Thus, two main forms of communication and topology criterion of TMMS can be identified: according to the basic type of communication (or ontology) and according to functionality.

It is also essential to remember that the extent and the quality of communication of the subsystems are much higher in the ontological types of systems than in the other types. These can serve as a criterion for their classification. It is the development of TMMS with these types of communication that characterizes the current stage of these systems development as a fundamentally new one. This is the protoform of organic unity of TMMS of the future as inseparable integrity of anthropotechnical subject or anthropotechnical form of ontology. V.I. Arshinov writes that the problem is to stimulate strongly the process of the convergent extension of the practices of technocultural anthropologically oriented mediations which generate recursively hybrid cognitive interfaces between the converging levels of reality; at this, complexity, as irreducible integrity, is this very potential context in which this 'double' technocultural convergence can only be fully implemented [2, 84].

At present the predominant type of non-equilibrium lies in the ontological referential relations of anthropic subsystem in the TMMS structure. The vector of the future consists of the displacement of the reference to the technogenic component or to their ontological equilibrium at different variants of functional non-equilibrium.

Thus, the formation of the phenomenon of 'horizontal hierarchy' in TMMS is the criterion for assessing its integrity as the indicator of integrative subjectivity. The displacement and the dynamics of the operational statuses in the cycle of life-support will characterize its complicacy as dynamic integrity with further strengthening 'horizontal hierarchy' localized now as the principle of the functioning of more complex and integrated structure of TMMS in its subsystem relationships and structural loci. A network type of structure (rather than a center-deterministic type)

is the most adequate principle for organizing such system existence.

The issue of building futurological models of the formation of subjectivity of technogenic phenomena has arguments both objectively supporting and refuting these trends. For example, the fact that technology has no ability of self-positing (goal-setting of its development) indicates a significant difference when describing the trends of its subjectivity formation. Upon reaching the status of a subject in terms of its autonomy from a human being, we cannot already talk about TMMS and will focus on new forms of subjectivity; though this subjectivity will be anthropomorphic, its self-development may lead to a new hybrid form of ontology. In this perspective TMMS is a transitional form between the instrumental and subjective status of technology in which man-measurability may not be included any more. Modern technologies allow only creating TMMS which are the main objective of the current stage of scientific and technological progress, whereas gaining autonomous status by technology is mainly an accompanying scenario usually of apocalyptic nature. On the other hand, according to V.S. Stepin (2011), in the case of TMMS in a so-called activity triad each of its subsystems can change the status alternately in the range of 'subject-means-object' controlling, supporting, and saving each other. In this case it becomes obvious that a connective of 'artificial intelligence - natural intelligence' works more using poorly formalized languages peculiar to ordinary consciousness and intuition rather than using strict logic. One of the indicators of the processes of the formation of the anthropotechnical subjectivity is that currently there is a contradiction between the self-service of equipment and its functional area [6, 28].

In addition to this, the most important aspect in understanding the problem of anthropotechnical hybridization is the observability of universal synergetic laws in the activity of the very technical systems. For example, overloaded buffers behave remarkably similarly to infected people. If the buffer is overloaded, it tries to send packets to neighbouring routers. As a result, overload is spread in the space. On the other hand, routers can restore. This is not only an exemplary metaphor, but a hint *concerning nonlinear mathematical models* describing genuine *epidemic processes*. According to K. Mainzer, computer networks are computer ecological communities [29].

In fact, we are talking about the formation of the protoforms of technology autonomy as an aspect of its subjectivity. This can be observed not only in the simulation of such anthropomorphic characteristics as reflexivity, dialog-based character, variability of choice, the form of a response to the impact, etc. More accurate and in-depth studies of complex systems discover the universality of these characteristics which may probably converge into new forms of ontology provided that we take into account not just biomechanical, physiological and psychological characteristics of anthropic principle but the necessity of creating appropriate interfaces. All these trends continue showing human moving away from anthropobiomorphizm and even socio-cultural determination to some new horizons of existential representation.

Conclusions

Perhaps the given processes are a certain stage in human evolution according to the general principles of human existence organization, of the existence of human 'ego', of consciousness as a psychical-spiritual essence of a biological individual, which are currently largely described but have not been learned ontologically. In particular, between the world and a human being there is always perception and interpretation which is prior to conscious awareness and understanding, as the necessary processes of rational knowledge unlike the knowledge of acquaintance which is deep and fundamental in relation to the focus of all psychical processes, but which is based not only on biochemical, but also, probably on other already non-physical stimuli. Consequently, the status of an observer in human life always involves the use of 'a tool' which may define the highest autonomy of a human being among animal species of the planet in relation to the natural environment.

Theories of immortality and other areas of transhumanism are based on the postulation of changing the natural processes of biological and ecological functioning of human body. This postulation can result in the technologies of artificial programming of the processes of life, the creation of the models and principles of controlling these processes with the provision for coordination and change of certain physiological algorithms and the conditions of the environment. Currently, the devices for life-sustaining treatment are already the protoforms of such processes, but they are still used for organizing and supporting natural physiological processes. Over time, it is likely that these very processes will be modified on condition that the decision concerning the necessity of their optimization to the external goals of human existence in relation to the natural laws of life is made.

In such conditions the anthropotechnical subject does not seem science fiction. It serves as an advanced oriented model of the development of technical and technological evolution. In this respect one ought to bear in mind that these processes develop in parallel in the area of the development of technogenic high-tech anthropomorphic forms implementing their functions only simulating anthpropic qualities not only in the aspect of the imitation of physical species characteristics, but also reproducing the models of physiological functioning, thinking, and social behavior. As a result, we consider these trends as 'converging' ones. They will produce a convergent effect after mutual integration and form that very 'anthropotechnical subject'.

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Technology Transfer in Russia's Innovative Development

Gulmira NURGAZINA
Russian State Academy of Intellectual Property, Moscow, Russia
gulmiranurgazina64@gmail.com

Olga PYATAEVA
Russian State Academy of Intellectual Property, Moscow, Russia
opyataeva@gmail.com

Elena BORISOVA
Russian State Academy of Intellectual Property, Moscow, Russia
e.v.borisova@bk.ru

Valentina BRITVINA
Moscow Polytech University, MSTU STANKIN, Moscow, Russia
saaturn2015@mail.ru

Galina KONYUKHOVA
MSTU STANKIN. Moscow, Russia
maurico@yandex.ru

Abstract

The current stage of economic development is characterized by profound transformations in the social and economic order, which have led to the emergence of a post-industrial society with an economy in which information and knowledge are the main factors of production. Rapid and effective innovation is a prerequisite for economic development. In view of the need for the sustainable development of the national economy and the inclusion of the leading technology supplier countries, the organization of a technology transfer system, that ensures that innovation results move from research and experimentation to application becomes one of the most important tool for the scientific and technological development of the Russian Federation.

Keywords: Innovation, Efficiency, Competition, R&D, Investment, Business Processes.

Introduction

One of the main objectives of the Strategy for Scientific and Technological Development of the Russian Federation is to establish an effective system of communication in the field of science, technology and innovation, providing for the increased responsiveness of the economy and society to innovation and the creation of conditions for the development of knowledge-based business. Lapidus L.V. notes that this task is predefined, set in the program «Digital economy of the Russian Federation» (approved on July 28, 2017. Government of the Russian Federation). The goals and objectives of increasing competitiveness in the global market, both in individual sectors of our economy and in the economy as a whole. The programme is aimed at creating conditions for the development of the knowledge society in the Russian Federation, improving the well-being and quality of life of the citizens of our country by improving the availability and quality of goods and services; digital economy using modern digital technology, awareness-raising and digital literacy, improving the accessibility and quality of public services for citizens as well as security both within and outside the country».

According to M.Logachev, the key element of such a system is a subsystem of technology transfer, primarily from the scientific and educational sphere to business. In this context, the assessment of the efficiency of technology transfer in Russia and the identification of possibilities for its improvement are particularly relevant. The main

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component of the technology transfer system is the Technology Transfer Centers (CTT), which are designed to solve the key problem of Russian universities and scientific organizations - the problem of bringing scientific developments to industry, or commercializing the results of intellectual property (RIP).

A comparison of the changes in the number and structure of the technology transfer centers and the research and development community led to the following conclusions:

- the increase in the number of Tpts (37 percent) was more than twice the increase in the number of research and development organizations (15 per cent);
- the increase in the proportion of universities in the structure of research and development organizations (p. 14), was accompanied by a reduction in the proportion of university CTT in the distribution of the CTT to basic organizations (p. 18);
- the significant decline in the proportion of scientific organizations in the structure of research and development organizations (para. 16), has had little impact on the share of technology transfer centers in the distribution of the CTT among the basic organizations;
- while there has been no significant increase in the number of other research and development organizations, the share of these organizations' technology transfer centers in the distribution of the CTT to the parent organizations has more than doubled.

In addition to the technology transfer centers, small innovation enterprises are an important instrument for technology transfer from science and education.

The role of technology transfer in innovative development

The innovation component of entrepreneurship has been of great interest and interest to economists. In particular, Mr. Schumpeter, the innovator of innovation theory, who saw innovation and corporate research as major drivers of economic dynamism, noted the competition that they generated: The task of entrepreneurs is to reform and revolutionize the way of production by introducing inventions and, more generally, by using new technologies to produce new goods or old goods, but by a new method, thanks to the discovery of a new source of raw materials or a new market of finished products - up to the reorganization of the former industry and the creation of a new industry».

The economic literature highlights an innovative type of entrepreneurship oriented towards the constant search for new opportunities, new products and services, «Public technical economic process leading to creation of the best in its properties of goods (products, services) and technologies by practical use of novelties». As Schumpeter wrote: To produce means to combine the things and forces available in our sphere... To produce something different or another means to create other combinations of these things and forces», and accordingly singled out five cases of «implementation of new combinations».

In the opinion of Schumpeter, the main force initiating the upward pulsations of the economic situation is the spread of «beams» of interrelated innovations - clusters with high potential of market diffusion: «The rise is over, and the depression comes after the expiry of the time that must take place before the products of new enterprises enter the market... a new rise follows the depression when the process of absorption of new goods is finished». The introduction of radical innovations creates additional profits for entrepreneurs, stimulating the massive transfer of capital into new technologies and thus the massive spread of new high-efficiency industries. In anticipation of high profit the new technology is imitated by groups of entrepreneurs: «early recipients», «early majority» and «backward». Increasing the number of simulators initiates a wave-like process similar to the long waves of Kondratiev.

Among Russian scientists, the problem of techno-economic development is being addressed in particular by S. Y. Glazhev. In his fundamental work «The Theory of Long-term Techno-economic Development» describes the view of innovative cycles as «technological patterns», emerging of a set of technologically related activities - technological complexes connected into a reproducible integrity by stable production and technological relationships. The emergence of new chains of conjugate processes means the displacement of old ones, so that any major innovation within the technological community takes the character of its reconstruction on a new technical basis, which may also mean the emergence of a substantially new technological community. Britvina V.V. notes

that, in turn, each technological community, through its pervasive technological chains, is linked to other technological communities of the same technological order. Therefore, changes in any technological community are limited by the ability of the neighboring populations to absorb these changes, and if they occur, induce corresponding changes in the rest of the technological order».

Technology Transfer at A Time of Innovative Economic Development

Having analyzed the conditions of efficiency of technology transfer within the national economy, we have concluded that it is fully determined by the efficiency and quality of the national innovation system as a subset of knowledge and technology generation and transfer, infrastructure, market, production, education, legislative subsystems, as well as the quality of macroeconomic policies. Pyataeva O. and Nurgazina G. note that the issues of technology transfer at the level of the national innovation system and from the perspective of the foreign economic activities of a given country need to be considered in relation to overall socio-economic development.

Moreover, in the modern phase of the innovation cycle of the Russian economy, transfer takes two forms: direct and indirect transfer. Direct transfer assumes that the university and the potential buyer are informed of mutual interests and offers, know each other and interact directly. It takes the form, for example, of the development of technologies through direct contracts with enterprises and organizations; the trade of licenses for inventions, know-how, useful models, industrial designs, trademarks; and the organization of scientific and innovative enterprises at university. One of the peculiarities of the Russian direct transfer of innovative technologies is the singular nature of transactions for the transfer of intellectual property under license agreements.

The second peculiarity: the presentation of products at exhibitions remains an effective mechanism of technology transfer, and in particular the high-tech products of small higher education enterprises.

The indirect mechanism of technology transfer implies the inclusion in the chain of «higher education - enterprise» of innovative structures promoting the expansion of information exchanges and contacts, promotion of scientific and technical products of higher education institutions. These include technology transfer centers, innovation centers, technology parks and business incubators.

At present, the following innovative structures of the indirect transfer mechanism exist: the Office of Innovation Activities, which includes a business incubator, patent services center, innovation and presentation center, and the innovative center «Technopark».

The Patent Services Centre is the most innovative of all existing structures and plays an important role not only in the legal protection of the results of intellectual activity, but also in the promotion of intellectual property. In addition to the legal protection of intellectual property, the center carries out some work on the commercialization of technologies: preparation of licensing agreements, preparation of exhibits for Russian and international exhibitions, and carrying out patent and market research.

Research Results

1. Due to the weak economic component, there is a lack of development of the mechanism of entry of the innovative product into the market (lack of an innovative infrastructure supporting commercialization of innovative products).
2. The low level of development activity in patenting their inventions, which reduces the benefits of REED production, as proprietary Reeds do not become a commercial product and can only be used in the development of technological processes.
3. Lack of initiative and necessary training of the research team in decision-making on commercialization of Reeds and their transfer to the real economy.

Foreign experience demonstrates that in place of the ZTT - «scientific shops», which serve as the official contact point for applications of potential partners and customers of scientific research, as well as rendering various kinds of consulting and reference services to employees of universities and scientific organizations, come TST-«entrepreneurs». These centers act as a coordinator and active participant in all stages of technology transfer, from

the initial assessment of the potential value of inventions to the organization of interaction with industry during the introduction and operation of technologies.

The functions of TTC-«entrepreneurs» in our country could be performed by centers of experimental production, having not only modern specialized industrial equipment, but also highly qualified personnel. Such centers could build on existing technology parks and industrial (industrial) parks and provide the following services to the intellectual product developers and enterprises, especially small and medium-sized innovative ones:

- technology audit (feasibility study);
- engineering design;
- development of regulations for technological production;
- project and exploration works and the formation of technical conditions for the integration of the technological solution into the production process;
- development of a pilot model.

Funding for the establishment of such centers should be based on budgetary and extrabudgetary co-financing based on a project approach, That is, if there is a demand from an industrial enterprise for innovative development, its financing should be carried out both by the industrial enterprise and by the scientific or educational organization. Such a measure would significantly reduce risks and increase the likelihood of the product being commercialized.

Another important step in the development of technology transfer in Russia could be the adoption of a PCF aimed at supporting technology transfer centers based on institutions of higher education, research organizations and industrial enterprises, as well as small innovative enterprises; established with the participation of TTC. Given the time lag between support for the establishment and development of the DOT and the output that should compensate for the costs incurred, the VTF should be implemented for at least five years.

Such a comprehensive approach will promote the self-development of technology transfer mechanisms in Russia, which in turn will be a factor in increasing the level of innovation of our economy.

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Emotions and Digital Media: At the Origin of a New Paradigm

Giusi Antonia TOTO

University of Foggia, Foggia, Italy, giusy.toto@unifg.it

Pierpaolo LIMONE

University of Foggia, Foggia, Italy, pierpaolo.limone@unifg.it

Abstract

In recent years, the fusion between the theories of emotions and digital technologies has emerged strongly in the psychological studies panorama. The purpose of this article is to trace the theoretical precedents to the study of the construct of emotions in relation to digital media. Contemporary experiments and investigations (2010-2020) have led to the emergence of a new theoretical paradigm: the digital emotion experience. Starting from emotional regulation and the mediation produced by digital technologies, the digital emotion theory represents a collective that contains different theoretical experiences. We try to take stock of what has been scientifically produced up to now and what prospects for future research can be advanced.

Keywords: Emotion, Media, Digital Technology, Self-Regulation, Learning.

Birth of The Relationship Between Emotions and Digital Technology

The theories of emotions have a long tradition in psychological studies, but the approach of this construct to media education is contemporary. For an overall analysis of the theories of emotions that represent the epistemological antecedents to this article, see the volume Game and Learning by De Serio and Toto (2020). The theories of James/Lange (1884) and Cannon/Bard (1928/1931), despite being conceptually in opposition, both proved to be true in subsequent experiments and scientific studies (Anolli & Legrenzi, 2006). However, contemporary research has analysed specific aspects of the emotional process by focusing on cognitive evaluation, tendency to action, mediation between sensation and cognition, coping strategy, function of medium between man and environment, and tools for communication (tab 1).

Table 1: Emotions translated into action through technology

Emotion	Technological action
Prosocial messages	Sharing information
Competition	Perception and skills related to perceived stress
Positive emotions	Tendency to networking
Negative emotions	Networking inhibition
Decision making	Collaboration and information retrieval

In contemporary teaching, a now widespread tool is the ‘serious game’, which is part of the broader debate on gamification and learning (Sailer et al., 2017). Serious games, which are games designed for teaching, have a complete history, aims, and paths, unlike gamification, which represents the use of playful elements in a learning context (Lister, 2015). The use of games in teaching has made the debate of experimentalists and pedagogues fluid to the point that the focus of study and research has shifted to the flourishing 'side effects' of playful teaching practice. In fact, educational

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games are used in teaching practice through the fusion of fun and learning objectives; the logic behind them can be exemplified through the model of the competition of knowledge learned through quizzes or adventure games (Limone, 2012). In fact, edutainment is that set of didactic strategies that intersect fun and education, with the aim of testing skills such as decision-making or problem solving. The most recent experiments in the context of edutainment can be reviewed in the contexts of e-learning and corporate training (Toto, 2019). The first studies that trace a link between emotions and technology focus on the main repercussions of videogames in learning the diffusion of latent prosocial messages to the processes of sharing experiences by players. The processes of sharing and competition in gaming contexts mediated by digital technology seem to be influenced by the emotions and cognitive assessments of users (Toto & Limone, 2020). Experimental studies on adults (Boyle et al., 2016) have shown that the sharing of experiences takes place during the game if the user is acted on by positive and gratifying emotions; if, on the contrary, the player experienced by negative emotions he would be more resistant to the information-sharing process. Another component that acts in moments of playful sociality is competition: the perception of skills influences the stress perceived by the player and the competition processes in video games. The dimension of competitiveness also presents gender differences that are reflected in the relationships and self-perceptions of players (Vermeulen et al., 2014). In digital games, users must quickly find information and make decisions, even managing to share information and collaborate on the network (Gee, 2003). Collateral to this type of activity is the theme of the flow experience inside the motivation of Csikszentmihalyi (1997), which represents deep immersion in an activity that is particularly interesting for the subject and that the subject focuses on without other distractions. The involvement and motivation narrated by the players within the digital media experience take on the same characteristics as the flow experience (tab.2).

Table 2: Characteristics of the flow experience and motivation in videogames

videogame	
Flow experience	Motivation
Sense of control	Environment manipulation
objectives, feedback, required skills (antecedents)	goals, feedback, required skills
loss of contact with the temporal dimension and loss of self-awareness	Immersion in the activity
increase in learning and consequent modification of behavior	Procedural learning

In literature, the flow experience has been structured in three moments: antecedents, flow experience proper, and consequent. Flow antecedents are elements that trigger the flow experience process described in terms of clarity of objectives, feedback, and required skills, but also with a high degree of playability (Kailii, 2005). The flow experience itself is defined as moments characterised by loss of contact with the temporal dimension and loss of self-awareness, but at the same time the subject perceives a high degree of control and sense of manipulation of the surrounding environment. Finally, the consequences of the flow experience are described in terms of increased learning, modification of behaviours, and perception of control over one's own behavior.

Review and State of The Art of Digital Regulation in Relation to Digital Media

The web, in addition to access to and exchange of information and daily use that is by now undeniable, has become a daily space for social interaction. Psycho-pedagogical studies examine the application of the construct of emotions and the paradigm of emotional intelligence to all dimensions of human existence. Studies in relation to this broad field of application range from interdisciplinary contributions from sectors such as computer science, psychology and communication studies, to more varied methodological insights from qualitative to quantitative techniques for measuring digital emotions. The research in the field of video interviews and ethnographic studies that investigate the possibilities of social networks for emotional expression are innovative. Emotions play a fundamental role in the act of sharing news and content and in the importance of emotional activation for digital users who organise and participate in social movements (Serrano-Puche, 2020).

A study conducted by Blumberg et al. (2016) among adolescents in the United States looked at the importance of social media in the lives of American adolescents. Through some sites, adolescents have had the opportunity to share and express their emotions. Research has shown that among adult participants, the use of social networks increases positive emotions or dampens negative emotions. Little is known about how teens can use social media to regulate their emotions, and researches are in greatest development stage.

Extensive gamification literature has documented a broad debate about digital games in training contexts and learning practices (Toto, 2019) for cognitive development, particularly during primary school. Contemporary research shows how active children aged 6 to 12 are digital media users (Rimé et al., 2020). In the reviews of the gamification literature it emerges that this age group is little studied in relation to the use of interactive media compared to early childhood and adolescents. This absence of studies leads to a lack of data and reflections in relation to the effects of early media use in early childhood and the consequences it will have in the subsequent phase of adolescent development. The research input was born about twenty years ago through Greenfield's (2009) studies of the effects of digital games on the development phases of child. These studies emphasised the importance of the development of cognitive socialisation in relation to the use of digital technology in late childhood and pre-adolescence. In this first study, in addition to establishing the gender gap in the use of games, some cognitive dimensions influenced by this use emerge, including spatial representation, iconic skills, visual attention, and future academic performances.

Music learning studies have also shown extraordinary evolutionary power in early childhood. In fact, it has been shown that learning music has an influence on psycho-physical development from a psycho-dynamic perspective, on the development of intelligence, and finally on the design of new technologies. The relationship between intelligence and music in contemporary studies has reached a high degree of parameterisation with the investigation of all the dimensions involved, and recently music learning studies have been producing specific research in the field of acoustic and audio technology (Toto, 2017). The Spotify streaming service, one of the largest online music providers in the world, has a profound ability to shape everyday realities through digital technology by controlling delivery of recommended playlists to users. An analysis of 500 predefined playlists (Eriksson & Johansson, 2017) shows that the recommended tracks evoke individual freedom and flexibility, while at the same time prescribing normative temporalities, neoliberal subjectivities, functional approaches to music, and monetisation of intimacy. This confirms how the development of new technologies has created a new socio-cultural context in which students are immersed, and new languages and media with which the educational sciences must dialogue.

Especially within the experiments reported in the conferences and in the grey literature, there are demonstrations of the bidirectional relationship between emotions and digital media. Recently, Sarsenbayeva et al. (2020) conducted a study on facial expressions and emotions elicited through the use of smartphone applications. The results reveal that in most cases the use of the application drives users' emotions, but effects can also be produced in the opposite direction, i.e. the emotional states influence the choice of some applications. This demonstrates how studies on technology and emotional states can influence the psycho-physical well-being of the subject, and having this relationship in the second instance can be used in educational planning (Toto, 2018).

Emotional Regulation Measurement Tools

Emotional regulation (RE) is a psychological process in which strategies have been used to deal with emotions and achieve personal, social, organisational or work goals, facilitating the most appropriate response to the demands of the environment. Among the tools most used to measure emotional regulation within media contexts are, as we have already mentioned, the use of apps via smartphones, video interviews, and ethnographic research. An interesting study that rereads an important questionnaire that measures emotional regulation is that of Hirschle and Gondim (2019). Scholars analyse the regulation of emotions in the workplace (RE-Trab). The quastionnaire is an adaptation of the ERP-Br, a reduced version of the Emotion Regulation Profile (ERP), which evaluates two ways of regulating emotions: up-regulation (positive emotions), which predicts a greater use of adaptive strategies than maladaptive ones, and down-regulation (negative emotions), which predicts a greater use of functional strategies compared to dysfunctional ones. From this study four adaptation strategies emerge as a function of emotional regulation at work: adaptive and

maladaptive (positive scenarios), functional and dysfunctional (negative scenarios). The Emotion Regulation Profile-Revised (ERP-R) developed by Neils et al. (2011) is based on two theoretically significant factors: the under-regulation of negative emotions and the up-regulation of positive emotions. An interesting result also emerges from the validation study of the questionnaire, namely that the ERP-R scores are positively related to emotional intelligence and the relevant personality dimensions.

A fruitful field of study is related to coping styles and the ability to regulate emotions. According to this line of study (Haines et al., 2016), an optimal regulation of emotions may not simply concern the use of coping strategies; according to the strategy-situation adaptation hypothesis, emotion regulation strategies lead to well-being only if used in appropriate contexts, i.e. in this type of process it produces positive effects if it also includes the dimension of cognitive evaluation. The use of re-evaluation in relation to all the life and situational contexts of the subject does not create well-being in itself – it leads to positive results if it is used in uncontrollable and unexpected situations. In fact, in these situations, emotional activation has a more stress-oriented patina. The same type of speech was conducted in relation to the lived experiences in immersive digital environments and social networks, in which the subject is called to respond in situations, with the addition of feeling personally involved in virtual contexts. Continuing on the studies (Troy et al., 2019) in relation to the regulation of emotions and their re-evaluation (changing interpretations to change emotions), the research also looked at distraction, i.e. linked to the ability of human beings to direct attention to changing emotions (tab. 3). Both of these strategies are effective for regulating the experience of both negative and positive affects; moreover it has been shown that suppression, that is, forcibly changing the external expression of emotions, is ineffective.

Tab. 3: Actions integrated in the process of regulating emotions

Actions	meaning
the revaluation	change interpretations to change emotions
The distraction	the ability of human beings to direct attention to changing emotions
suppression	that is to change the outward expression of emotions

It is unclear whether this pattern of effects generalises to the context of everyday stressors, a common part of daily life where effective emotion regulation should be particularly beneficial. For this reason, Hirschle and Gondim have oriented their research to work contexts. To date (Nozaki & Mikolajczak, 2020), the field of emotion regulation (ER) has largely focused on intrinsic RE, i.e. the regulation of one's emotions, and only recently has there been a focus on extrinsic ER, i.e. regulation of emotions in relation to an external subject. Emotional experiences trigger the social sharing of emotions through digital media. The social participation of emotions is a complex process linked to the communication of episodes and feelings that pass through the subjects and that translate into intrapersonal and interpersonal and social effects. Within social media, the sharing of positive or negative emotional episodes affects relations with the public, to the point of producing wider social effects in relation to norms and social relationships, beliefs and collective resilience. In relation to the world of adolescents, Vignoli et al., (2019) have shown that the intensity of negative emotions and perceived intimacy are positively related to the frequency and depth of sharing on social media. Active use of social networking sites (SNS) is positively associated with well-being, improving social support, and feelings of connection. Conversely, passive use of SNS is negatively associated with well-being by fostering social confrontation and envy (Masciantonio et al., 2020). Most of these studies focused on Facebook, and a survey conducted during the COVID-19 pandemic showed that passive use of Facebook is negatively correlated with well-being through social confrontation, while the active use of Instagram is positively related to life satisfaction and negative effects through social support. However, TikTok use was not associated with well-being, and the only significant relationship for Twitter was between active use and lower life satisfaction. The conclusions reached in the analysis of social media as well as digital media must differentiate between the approaches and models of investigation to truly understand how human interactions take shape (Cohen, 2014).

Contemporary perspectives of digital emotion experience

A contemporary evolution of the theories of emotions is the application of the model of emotion regulation to digital technologies, for which it would seem to establish itself in the panorama of studies as a new research paradigm. In trying to juxtapose the salient elements of the theories of emotions, it becomes clear that affective states are evolutionary adaptations to the environment and evaluations of opportunities in relation to behaviour in the situation (Nesse & Ellsworth, 2009). According to Gross's (2015) model of emotion regulation, subjects evaluate their affectivity in relation to the set goals and decide whether to modify them through specific regulation strategies. The complex process of regulating emotions is summarised by Gross in five steps (tab. 4):

Table 4: Gross model of emotion regulation

STEP 1 *Situation selection* Approaching or avoiding situations.	**STEP 2** *Change of situation* Selection of the elements to be modified in relation to the emotional response elicited.	**STEP 3** *Selective attention* Focus attention on the relevant emotional elements.
STEP 4 *Cognitive change* Re-evaluation of the situation that had an emotional impact on the subject.	**STEP 5** *Response modulation* Even if the individual has already provided an emotional response to a given situation, he can remodel this response also from a physiological point of view.	

The need to modulate emotions is linked to hedonic and well-being reasons that subjects implement to avoid painful situations (Tamir, 2016). For example, subjects can up-regulate their emotions, that is, increase well-being to amplify creativity or, on the contrary, develop anger and therefore increase competition. Even the instrumental motivations linked to the achievement of performance objectives require socially acceptable behaviours and can trigger the process of emotion regulation (ER). The general functioning of this regulation mechanism has been translated by Wadley and colleagues (2020) in relation to the universe of digital virtual technologies (table 4), as can be seen in the grid below:

Table 5: Examples of digital ER, organized using Gross's emotion regulation process model. Source: Wadley et al., 2020.

ER steps (Gross model)	Examples of ER
Identification phase	Using a smartphone app to help identify their emotions, declare and guide the choice of the opportunity to initiate regulation.
Selection phase	Review of online resources that suggest and develop strategies, such as distraction or cognitive change.
Implementation phase	* no example shown in the original article.

Situation selection	Choose to watch videos online, rather than doing a job or task or attending an organizational meeting.
Change of situation	1) Using digital communications to affect your work or family situations. 2) Use of music playlists in the workplace or in shops.
Development of attention	1) Browsing images on a smartphone during a stressful job. 2) Comfort an angry child with a game on a tablet. 3) Ruminate on Facebook posts or events.
Cognitive change	Search online for information or alternative perspectives on a situation.
Modulation of the emotional response	Express a constructed but desired emotional state via social media posts.
Monitoring phase	Use a digital watch to monitor your state and physiological responses and evaluate if your digital ER efforts are effective

Among the contemporary research reporting the representation of a model of regulation of emotions in relation to digital technologies, we recall the study by Myrick (2015). In this regard, the study reports the use of video clips or musical platforms as the tools most used to cope with stressful situations (Wadley et al., 2019). There are even playlists that categorise a list of music tracks associated with specific emotional evocations (Eriksson & Johansson, 2017). Furthermore, video games can be used by adults as distractions from stressful situations and, hybridised with social networking systems, they also allow self-reflection and social sharing. Further reflections must be reported in relation to online shopping or other recreational moments (video or audio) involved in the process of regulating emotions carried out during smart-working activities. A sector in full development for the application of digital emotion regulation is hybrid technology, which integrates real and virtual notes to influence the user's mood. Examples in this sense are hybrid technologies oriented to the use of perfumes in learning processes or in the selection of olfactory abilities, which activate learning processes on specific brain patterns (Miglino et al., 2014). The repercussions in terms of learning and identity, therefore, are no longer just specific issues of media education, but also lead to the purest psycho-pedagogical research and computer applications.

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The Role of the Transformational Leader in Establishing Trust Through Empowering Remote Workers: Case study during the Covid-19 lockdown

Maria FRANGIEH

Bucharest University of Economic Studies, Bucharest, Romania
frangieh.m@gmail.com

Doina I. POPESCU

Bucharest University of Economic Studies, Bucharest, Romania
doinaipopescu@yahoo.com

Abstract

This article examines the role of transformational leadership in establishing trust through empowering remote subordinates. It inspects the challenges faced by managers and employees during the pandemic lockdown and suggests that transformational leaders increase their subordinates' organizational trust through empowering them. At the end, this article provides employers with some techniques useful in engaging and empowering remote employees by creating an atmosphere of trust, which will simplify the adaptability to the unanticipated change in the business environment. This article, therefore, relies on several interrelated concepts: Leadership, Employee Engagement, Employee Empowerment, Trust, and Safety. Trust, a crucial factor in the business environment, defines the basis of the leader-subordinate relationship. The more trustful this relationship is, the more effective the organizational targets are met. Thus, an effective leader should seek ways to institute a confident work environment. One of these ways is to keep subordinates engaged through empowering them. This study was needed to clarify the leader's role in establishing engagement among remote employees. The selected approach to this study was qualitative based on structured interview questions to ten employees in a pharmaceutical company during May 2020, the third month of the lockdown. This company was specifically selected due to the importance of this sector as a continuous provider of major necessities during a hectic period. They were asked about the challenges they had faced during the lockdown referring to technological issues, work hours, relationship with leaders and with colleagues, motivation, organizational trust, team collaboration, and social distancing.

Keywords: Employee Empowerment, Employee Engagement, Transformational Leadership, Trust

Introduction

The occurrence and rapid spread of covid-19 and the resulting non-ending lockdown, had obliged managers to shift from a daily face to face interaction with their employees to a rather daily remote one. The unexpected pandemic lockdown obliged the majority of organizations to convert to a remote, safer, and unanticipated workplace. Unfortunately, no one had time to be trained to the new situation. The best solution to carry on with business activities was to rely on the human capital and, of course, on technological means. Technology is not a major issue, especially that it was an important mean in conducting business before the pandemic. What was crucial was how to help subordinates to adapt themselves to the sudden changes and to keep them engaged, especially in this period of high family, safety, and business stress. Covid-19 had imposed itself as the number one worldwide threatening virus to which nobody was physiologically and psychologically immune. No industry was able to call for help from another one: all of a sudden, everything was totally new for everyone around the globe. Many challenges came across and winners were definitely organizations which were flexible enough to adapt to this change. Therefore, leaders found themselves facing a new situation: how to keep going, far apart from people, far apart from the workplace, far apart from daily routine? How to motivate isolated employees to work in the light of the stressful conditions we were all getting through? It seems clearer than ever now that what was needed were situational leaders to keep subordinates' engagement levels as high as possible: the more subordinates are engaged, the more likely they will be motivated to achieve business goals. Based on literature review, trust unveil its

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efficiency through the process of engaging and empowering subordinates. It goes with no saying that the maestro in all of this is definitely efficient organizations' leaders.

Literature Review

To begin with, it should be noticed that none of the concepts discussed in this article is new to literature. What was new, however, was the lack of thorough articles concerning the current pandemic. And that is of no surprise, since, as said earlier, everything was new to everyone.

Since Covid-19 is all about attacking people's health, it is important to mention the importance of safety in the workplace. Yearly, firms spend a lot of money to eliminate workplace accidents because, evidently, unsafe environments negatively affect the human performance (Battaglia et al., 2015). Therefore, firms need to create an employee safety behavior atmosphere characterized by "employee safety compliance" and "employee safety participation" (Griffin & Neal, 2000). As its name suggests, safety compliance oblige employees to comply with the company's safety procedures and policies. Safety participation, on the other hand, shows how employees are getting involved to make the work environment a better one (Griffin & Neal, 2000). Both attitudes indicate how organizations commit themselves to stimulate a long lasting approach to handle the safety issue (DeJoy, 2005). It is in the light of this information that the decision of the 2020 lockdown was taken. As a result, working from home had instantly became the new ordinary "job style" actualized through technological means. Currently, there is no face to face contact between people at the workplace. Therefore, managers are neither being able to get a direct look on employees working behavior, nor to actually detect their worries. As an alternative, we are dealing now with "remote leaders", a situation that induces challenges for both employers and employees.

As a matter of fact, not all employers were able to take off with this new working style. Many testified that they do not know how to efficiently manage remote employees, demanding a kind of support to simplify their task. It was also stated that employers did not have confidence in the employees' skills. They noticed that the performance of the remote subordinates is less than that of physically closed workers (Parker et al., 2020). They had higher hopes from their distant subordinates (Fallon, 2014).

Employees, on the other hand, complained that their managers were micro managing them, closely monitoring their work, not taking into consideration their home privacy, interfering with their family demands and children home schooling: They relate that to the possibility that their managers lack trust in their capacity to have things done (Parker et al., 2020). This was proven through the managers' expectations that they should be responsive all day long by answering work phone calls, by instantly replying to emails, and by being available for sudden video meeting. The lack of trust added more stress to the already stressful pandemic situation (Parker et al., 2020). In addition, remote employees nostalgically compared their work style before and after. The absence of the daily interaction with colleagues made them feel as if they were no longer a part of a team (Elvekrog, 2015). The usual office meetings, lunch gatherings, and talking about essential and non-essential matters were suddenly replaced by formalized communication and necessary discussions (Elvekrog, 2015). Back when they were in the office, they used to detect the climate and energy throughout the day. This had helped them in carrying on their daily tasks accordingly (Bates, 2013). Most of them had to work for longer hours at inadequate time such as early mornings, late evenings, and weekends to demonstrate engagement (Alert Media, 2016). In brief, remote employees felt isolated, victimized due to additional work, and micromanaged (Michaels, 2016).

Employee Engagement

The question of trust was raised several times upon reading the lockdown challenges. When the manager does not trust subordinates, the natural reaction would be to adopt a weak, micro management approach. Micro management, especially during this period of uncertainty and stress, demotivate employees, which will certainly damage productivity. A weakening productivity is certainly not an option in an almost economic breakdown. Now that it is nearly certain that there is no covid-19 remedy in the horizon, a pressing must would be to improve managers' skills allowing them to effectively manage their employees by building trust from a distance (Parker et al., 2020).

Specialists in the organizational culture refer to remote working technique as a culture of engagement (Piaget, 2013) (Pierce, 2013) (Roark, 2013) where the managers' role is to establish a working climate composed of profound employees' engagement and resilient leadership (West, 2013). Nowadays, employee engagement had become a crucial factor in firms' survival, thus, virtual leaders are paying more attention to this specific approach (Adkins, 2016). Engagement is defined as the employees' attachment to their work to the point that they involve themselves completely and enthusiastically in performing their roles (Kahn,1990) (Gallup, 2017). Engaged employees who identified themselves with their related firms become strongly committed to that firm and consequently strive to achieve its targets (Mowday et al., 1982). The uprising reliance on remote working had led employers to question their capacity in establishing, sustaining, and controlling a workplace culture of engagement with their distant subordinates (Adkins, 2015) (Roark, 2013) (Tugend, 2014). This is especially important throughout important meetings where disengaged employees tend to skip crucial discussions (Pullan, 2016). Therefore, employers should strive to implant employees' engagement to increase productivity and profitability. As a matter of fact, effective leaders are those who are capable of rising their subordinates' engagement (Hackbarth, 2017) through adopting a flexible oriented business culture (Azanza et al., 2013). During the pandemic, employees' engagement had experienced many obstacles that somehow weakened it. Some of these challenges are listed below:

Virtual workplace: By definition, a virtual workplace is a firm that partially or completely operates via electronic means (emails, phone calls, video calls, video conferences). It does not necessitate daily physical interaction with stakeholders (Cole et al., 2014). Distance between leaders and followers can be interpreted in three ways (Antonakis & Atwater, 2002): physical distance, perceived social distance (status, rank, and power), and perceived interface occurrence (the frequency of interaction). Physical distance was imposed worldwide and raises the importance of physical proximity between employers and employees. Dispersed distance between the two parties would hinder the employees' capacity to capture leaders' role model behavior (Howell et al., 2005).

Lack of face-to-face interaction: Traditionally, managers used to measure the degree of subordinates' engagement by moving around them in the office and directly observing their work performance (Peters & Waterman, 1982). This technique is impossible when we talk about remote work environment (Gaskell, 2014), leading to a potential disconnection (Fallon, 2014), which leads in its turn to a communication issue. Communication plays a major role in the leader/follower relationship and its absence has certainly serious consequences such as distrust and isolation (Fried, 2013) (Wiesenfeld, 2001).

Resistance to change: The pandemic had proven that only firms that are adaptable and open to change can survive (Miller et al., 1994) (Piderit, 2000) (De Dreu & Van de Vliert, 1997). In order to cope with changes, especially sudden ones, firms need their employees' collaboration (Porras & Robertson, 1992). Research showed that when employees resist to change, their company will be seriously damaged because of lack of satisfaction, productivity, and psychological well-being (Bordia et al., 2004) (Miller et al., 1994). Resistance to change could be detected on three levels (Piderit, 2000):

- Cognitive level where subordinates do not quite understand the nature of the change and negatively interpret it (Armenakis et al., 1993) (Stanley et al., 2005)
- Affective level where subordinates display feelings of anxiety and depression vis-à-vis change (Bordia et al., 2004)
- Behavioral level where subordinates express worry, strikes, or sabotage (Armenakis et al., 1993)

Altered organizational culture: Organizational culture is an intricate body of values, beliefs, practices, and behavioral norms which unite personnel in workplace (Alvesson, 2013) (Cao et al., 2015) (Schein, 2010). Organizational culture is clearly articulated in the physical workplace because its features are noticeable (Alvesson, 2013). A physical interaction enables managers to observe the behavior of their employees. Thus, they are able to interfere whenever a deviation occurs (Pinho et al., 2014). On the other hand, organizational culture in a distant atmosphere that lacks physical interface, is not clearly communicated, and there are no clear approaches of detecting remote work cultures (Anitha, 2014). The pandemic lockdown and the presence of technological communication means had obliged managers to consider new ways in raising their employees' engagement (Ross, 2016). Thus, there is growing need to enable leaders understand remote work context and embrace the changes since it is the only way to increase engagement and productivity (Anitha, 2014). A suggestion would be the adoption of "results-oriented work

environment policy" which allows remote employees to choose their work time and place as long as the results expected from them are achieved (Petrone, 2015) (Valcour, 2013).

Trust

In brief, a remote workplace prohibits managers to tangibly and frequently detect workers' performances. Thus, managers do not have enough information about subordinates' engagement. This naturally leads to a trust issue between both parties (Atwood, 2015) (Turmel, 2014). Trust, a major determinant of effectiveness (Nasomboon, 2014), is often absent in remote working relationships (Pangil & Moi, 2014).

Trust is defined as 'a psychological state comprising of the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another' (Rousseau et al., 1998). The higher the level of organizational trust, the higher the level of teamwork (Coulter & Coulter, 2002) and the more successful and companies would be (Shockley et al., 2000). Trust in leaders is connected to constructive job attitudes, administrative fairness, and efficiency in terms of communication and organizational relationships (Dirks & Skarlicki, 2004). Distrust may occur when individual or business goals had not been met (Norris, 2009). Interpersonal trusting relationships push all involved parties to display positive energy and to express honest care (Lewis & Weigert, 1984), which improves organizational performance (Reilly, 2014), increases creativity and critical thinking (O'Brien, 2001), and push employees to work beyond expectations (Reina, & Reina, 1999).

Organizational trust, sustained on a daily basis (Petrovs, 2005), is composed of two elements: cognitive and affective (Dirks & Ferrin, 2002)

- Cognitive trust: Rational and calculative, it focuses on anticipated benefits from a business exchange relationship (Tyler, & Kramer, 1996)
- Affective trust: It is composed of personal bonds, respect for others, and care for their wellbeing (Lewis & Weigart,1985)

Companies are becoming more and more aware of the importance of establishing and sustaining trust between employers and employees, especially now that most of them are working from a distance. And who is in charge of establishing and sustaining this trustful climate? Naturally, effective leaders (Bennis, 2002) (DePree, 2002).

Effective Leadership

Leaders' effectiveness depends on their ability to influence others, referred to as "situational favorability" (Fiedler, 1967). In case leaders were unable to exert influence, remedy actions must be considered, from imposing leadership training sessions, to firing the leader, or changing the situation. Every situation requires a different effective leadership style. Consequently, leaders are labeled as effective when they have the ability to identify the style that should be used in every situation encountered.

To better understand leaders' effectiveness, it is important to observe how they behave on a daily basis. Since Consideration and Initiating Structure are the strongest leadership components (Blake & Mouton, 1985) (Stogdill, 1950) it is worth to mention them here.

Consideration, employee centered or a relations-oriented approach: It describes how leaders create effective job relationships through trusting subordinates, respecting them, and taking into consideration their emotions (Fleishman, 1953). Managers strive to create a good communication environment (Dutu, C. et al, 2015) (Popescu, A.L. et al, 2019). This style is further explained through five behaviors (Hemphill & Coons, 1957)

- Acting as a member: Manager establish informal relationships with employees
- Integrating: Managers create an agreeable climate and limit conflicts
- Communicating: Managers provide and take information from employees
- Recognizing: Managers approve or disapprove employees' behaviors
- Representing: Managers defend the group and work for its wellbeing

Initiating structure, a production centered or task oriented approach: It describes how leaders assign employees' roles (Fleishman & Peters, 1962). Managers provide instructions, coach, explain policies, set priorities and deadlines (Yukl et al., 1988). Their style is referred to as the "Tell and Sell" style, or the clarifying style. It is proved that it increases subordinates' performance more than the "do-your-best" instructions (Locke et al., 1982). This style is further explained through three behaviors (Hemphill & Coons, 1957)

- Initiating: Managers create and facilitate business practices
- Organizing: Managers describe each task and clarify the hierarchy
- Producing: Managers set goals and induce employees to increase their productivity

Transformational leadership augments employees' organizational commitment (Bono et al., 2003). Thus, it is unanimously regarded as effective (Judge & Piccolo, 2004).

Transformational Leadership

It is a process where both leaders and followers engage together to raise motivation toward goal achievement (Bass, 1985) (Burns, 1978). The social exchange theory clarifies the connection between transformational leadership and organizational commitment (Masterson et al., 2000). This theory suggests that the leader/follower relationship is based on a mutual exchange relationship, and that the psychological and emotional contentment received from the conduct of transformational leaders increases employee engagement (Castro et al., 2008). Transformational leaders create a strategic vision, and consistently communicate it by "walking the talk" (Avolio & Bass, 2002). This style comprises *four* types of behavior (Bass, 1990):

- *"Idealized Influence" – "Charisma"*: Generally speaking, subordinates usually trust charismatic leaders whom they take as role models. Those leaders influence them to work for the overall company's good, support them, and increase their self-confidence (Howel & Avolio, 1993)
- *"Inspirational Motivation"*: By optimistically picturing the future, leaders appeal others emotionally. They deliver attractive objectives, set high standards, and provide clear understanding about tasks. Subordinates will be more motivated to reach objectives, both on an individual and a team basis (Bass, 1985). Transformational leaders create a dynamic organization of vision that helps the company in coping with changes.
- *"Intellectual Stimulation"*: Leaders propose new and challenging tasks to subordinates, and ask them to be creative in their performance (Bass, 1985). Transformational leaders clearly explaining the situation to followers and encourage them to critically and creatively approach it. This stimulates subordinates' intelligence. They become more attentive to the importance of their tasks, thus more motivated toward accomplishing goals (Katz & Kahn, 1978). Leaders' style here could be referred to as supportive and participative (Porter et al. n.d.). As they support, empower subordinates, leaders produce a trusting environment (Gillespie & Mann, 2004)
- *"Individual Consideration"*: Leaders are careful about subordinates' differences. They treat them with respect and dignity raising by such their level of maturity. They develop subordinates through coaching and mentoring attitudes (Bass, 1985). This style emphasizes on subordinates' need and skills. It helps them to reach their own goals through achieving the organization goals, and inspires them to communicate and adapt to changes (Bass & Avolio, 1994). Subordinates would become more satisfied which will increase their commitment and their task performance (Yukl, 1998)

Furthermore, transformational leadership had been associated to empowering leadership (Spreitzer, 2008), which affects job satisfaction, commitment, and performance (Amundsen & Martinsen, 2015).

Empowerment

Empowerment is regarded as an employee psychological state and as a management practice (Conger & Kanungo, 1988). It is a power sharing approach (Hollander & Offermann, 1990) which increases one's perception of self-efficacy (Conger & Kanungo, 1988). From subordinates' viewpoint, empowerment is composed of (Thomas & Velthouse, 1990):

- Individuals' perceived value of their work
- Individuals' competence in performing the tasks
- Individuals' self-determination in initiating and regulating actions
- Individuals' impact on organizational outcomes

Due to lockdown, some businesses moved from a command and control leadership model to employee empowerment and accountability model. Empowerment had been connected with the following organizational practices (Blanchard et al., 1995) (Popescu, D. I., 2018):

- information sharing, which enables employees to fulfill their job requirements
- autonomy through boundaries, which requires organizational structures and practices that boost self-directed activities
- team accountability which suggests that teams possess decision-making authority and performance accountability

According to Jensen (2006), empowered employees feel that their work is meaningful, that they are competent, that they can influence their environment through their work, and that they have control in accomplishing their tasks.

The literature review detected some studies that relate transformational leadership as an effective form of leadership to organizational trust.

Research

This study was needed to clarify the leader's role in establishing engagement among remote employees. The selected approach to this study was a qualitative based on structured interview questions to ten employees in a pharmaceutical company. Survey participants were interviewed via zoom application using a questionnaire which contains questions about what they had endured during the lockdown with their respective managers. They were asked about the challenges they had faced during the lockdown referring to technological issues, work hours, relationship with leaders and with colleagues, motivation, organizational trust, team collaboration, and social distancing.

When asked whether they had the appropriate tools needed to carry out work from home, all of them answered that they laptops but the problem was with the weak internet connection which imposed serious challenges during video call meeting. Participants affirmed that, regardless of the internet connection, what was missing in the whole new situation was the assistance of the IT department. Several technological troubles occurred which necessitated experts know how. They had to deal with that by phone and this had put extra pressure on the whole matter.

They were also asked whether they had continued to work at the regular office time. Since they work with pharmacies, and this specific industry was subject to severe work pressure during the pandemic, the majority of the participants answered that they felt that the workload had augmented a lot, and they had to accomplish work within and after the regular working hours. This fact left them with anxiety especially that working from home proved to be a nonstop one that could last the whole day and night. What adds complexity to the matter was the presence of the whole family around: other members had to fulfill their own jobs also occupying special places at home, children who required home schooling, babies crying, not mention other factors that caused distraction and stress.

Participants were also questioned about the relationship between them and their direct managers and between them and colleagues. They affirmed that nothing replaces face to face collaboration, either with upper management or with colleagues. They clarified that the situation was also new for their managers who lack the knowhow of directing work from afar. Since this was new, several conflicts aroused, which took time to be resolved due to the absence of the body language cues, critical in conflict resolution. Managers, lost in this brand new situation, had put more effort than normal to manage the least details. This is particularly understandable: they have a goal in front of them and they want to achieve it and report to the higher management as well. In order to do that, they moved to traditional management techniques, by closely detecting every details, not taking into consideration the appropriate time or manner to do so. This had left employees with feeling of anxiety vis a vis this new micromanagement way. They started to feel as if they are constantly inspected, they started to show regret if they take a break to catch their breath or simply to occupy themselves at home with their families. The sight of the cellular phones and laptops had become by itself a source of stress. Especially that no one is allowed to go outside, and managers assume that all employees are at home, which meant to him/her that they are ready to work or to start a video call at any time.

Some participants had even reported that their respective managers used to call them just to make sure they are working. Unfortunately, trust was lost, and so did engagement and motivation. The uncertain nature of the new disease, the tough economic conditions, the shortage of money, most of companies 'inability to pay salaries, all of these are factors that contributed further in lessening the degree of trust between employees and their institutions. Furthermore, as they had been required to constantly be present remotely, employees had even showed negative feelings toward their own families at home materialized by keeping them away. This maximized the feeling of isolation in this tough period where what was needed the most was comfort and relax.

As for the employee-employee relationship, participants showed understanding toward their colleagues because they were all in the same situation together. Surprisingly, some participants raised a matter of confidence toward their colleagues. As they were all living a period of stress, their behavior changed negatively, becoming more and more aggressive, rude, and leaned to decrease their task by charging it to another one. All of this contributed in loosing trust in one another.

As the lockdown period was postponed, managers and colleagues started to normalize the situation. Most participants agreed that the behavior of their respective managers started to change to the better after one month of the lockdown. They affirm that this is certainly due to two factors: fist, they had understood that the lockdown may last a long time and thus, their micro managing ways were causing stress upon them and upon their subordinates. Consequently, they shifted their managing techniques to a friendlier one, providing them with frequent and accurate feedback, respecting their family time and house occupation. It is at this period of time, that both parties felt relieved and started to get used to work remotely with a higher degree of satisfaction. According to one participant, it was his manager's shift to an acceptable positive behavior that had led him to feel more engaged toward his company. As managers' techniques took a delegation way, colleagues felt much better vis a vis their management and their colleagues. It is only then that they had noticed the privileges from working from home: they do not have to commute each day to start working, they do not have to wear their finest clothes to attend meetings, they started to plan their daily tasks and arranged them in a way that does not put much contradiction with their family.

Results

The interviews resulted in identifying three employees' worries:

To begin with, they showed concerns related to trusting the firm. Naturally, trust was highly questionable during this period because of the nature of the global uncertainty imposed by the spread of covid-19. What mattered in this research was how trust in leaders was perceived among remote employees. It was found out that they were worried about many things:

- The ability to efficiently perform tasks on time from home with no direct assistance: according to the interviewed samples
- The possibility that their efforts and sacrifices, doubled and tripled during this lockdown, will not be recognized fairly in terms of salary and promotion
- The possibility that, due to downsizing and the overall bad economic situation, they will be released from work

The second apprehension was related to the efficiency of the department collaboration, whether it continues to be successful or not especially where all features of body language techniques had suddenly disappeared.

Finally, it was observed that employees were concerned that the rush they had been living through will keep them socially isolated for a longer period of time. They suddenly moved from an environment full of people walking around to an aloof, isolated one.

Those tensions, very high at the start of the lockdown, were gradually decreased as time passed by, especially that respective managers did all what it takes to instill a trustful and collaborative climate. Isolation was the least concern to be reduced, since it was not practical in the meantime to socialize.

Conclusion

Virtual work environment had suddenly become the new normal working environment made possible because of technological means and made urgent because of the lockdown. One might think that leaders are no longer in need since everyone knows his/her task, what is expected from him/her, and does not have to waste time in socializing. However, it is a rather silly thought: leaders are needed now more than ever. Their efficient presence is the element that leads organizations to survive. Of course when we talk about efficient leaders, we automatically think of transformational ones who know how to engage employees to organizational goals taking into consideration the situation imposed. Some leaders may have the intention to do so, but may lack the know-how. Consequently, training sessions are a must to acquire new techniques such as reengineering management which enables them to efficiently reorganize their teams. This highlights independence and empowerment which fights two types of apprehension raised above, namely trust and collaboration concerns. Although employee empowerment is stimulated, it is being criticized due to the extra work employees will be doing. As a result, companies should always make sure that empowering their employees is for the sake of both organizations and staff and should not be taken as an excuse for workload (Ongori & Shunda, 2008).

Recommendations

As Covid-19 continues its flight around the globe, organizations are becoming more aware of the importance of leaders' role in engaging employees to the overall goals through building a climate of trust. Leaders are not born with special techniques triggered whenever one calls for them. This is why, it is important to raise the question of continuously training managers and providing them with adequate techniques that enable them to efficiently handle the situation on hand.

Actions should start at the highest level possible: leaders cannot instill a climate of trust if they are not being trusted from their upper management. Change must be created at the top and streamed to the bottom. In addition, top management should make sure that remote workers have the necessary equipment and tools that allow them to operate remotely. Leaders should be well aware that the new remote culture, despite its benefits from overhead cost cutting, is an invasion to employees' home privacy. Ideally, homes are related to relax, however nowadays, everyone, including children, are home which does not present the best work environment.

Furthermore, managers must understand that their important presence should be distinguished from micromanagement. Micro management helps in eliminating trust, which, once gone, is very hard to build again. Empowering personnel proves to be the best option to keep them engaged: providing employees with autonomy increases their motivation. However, autonomy should not be confounded with the complete absence of the leader. On the contrary, regular communication to provide information, guidance, and support are very important and should remain. One important technique is to train managers in how to manage by results, which highlights the concept of job autonomy. Granting employees the freedom to select when and how to work is important. Equally important is how to assess them. Instead of checking up on them, managers should emphasize on the work outputs rather than work inputs. This is specifically translated in the Results Only Work Environment technique which gives trusts employees to exercise judgment in solving problems; boosts their creativity, and allows them to work freely as long as the end results are met.

Limitations

This article relied heavily on literature taking into consideration a small qualitative case study. This naturally carries many limitations.

First, the sample of the study was small, composed of employees working at the same business firm. Despite the overall observation that the majority of remote employees were all living the same struggle during the lockdown, one cannot over generalize the conclusions. This is why, it is better to increase the sample population in a future research so that results would be more comprehensive and more accurate.

Second, in the same talking, the interviewed remote employees were all selected from one single company that belongs to one single industry sector. This imposes again a generalization concern. For

better results, future research may scrutinize the concepts dealt with here by comparing several industry sectors.

Third, the organizational behavior concepts raised in this research were, like all the other concepts, subjective. One cannot forget the awful stress period everyone had been living through, and perhaps some of the answers were not grasped as accurate. A future study that links employees' feelings toward remote working to quantifiable organizational performance variables would be very useful.

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Trends of the Romanian Cheese Market

Gabriel POPESCU
The Bucharest University of Economic Studies, Bucharest, Romania, popescug2004@yahoo.co.uk

Nicolae ISTUDOR
The Bucharest University of Economic Studies, Bucharest, Romania, nicolae.istudor@ase.ro

Alina ZAHARIA
The Bucharest University of Economic Studies, Bucharest, Romania, alina.zaharia@eam.ase.ro

Abstract

The food system should align to the principles of sustainable development by making the food more available, qualitative and locally made, with the least possible negative effects on the environment and the health of both humans and biodiversity. The main purpose of this investigation is to overview the trends of the Romanian cheese market between 2015 and 2019, while discussing it in terms of sustainability and by comparing the indicators internationally. A secondary data analysis was conducted based on several market indicator, like production, price, consumption, expenses and trade, collected from the Romanian Institute of Statistics, Eurostat and International Trade Centre. Some of the results indicate the need of developing the cheese market towards sustainability by promoting local consumption and production.

Keywords: cheese, consumption, production, sustainable development.

Introduction

The model of sustainable development aims to consider all aspects of society and environment in developing all economic activities, including the food sector. It is not enough to ensure food security and safety, but also the sustainability of the food system, of which cheese market is a part. Some of the most recent research focus on technological and biological improvements of cheese production (Mindru et al., 2018; Rusu et al., 2016), better waste management from cheese-related activities (Pal & Nayak, 2016), reducing the environmental impact of cheese production (Tarighaleslami et al., 2020), and different analyses on local cheese (Marcoz et al., 2016; Wilkinson et al., 2017).

The aim of this research is to explore the trends of the Romanian cheese market by investigating secondary data from the Romanian Institute of Statistics, International Trade Centre and Eurostat. The indicators were also discussed in relation with the principles of sustainable development.

The paper is structured as follows. The next section presents the evolution of the scientific literature on the cheese topic from Scopus, Web of Science and Google Scholar, by conducting a systematic analysis with the help of the bibliometric technique. Then, the section on results and discussion illustrates the trends of the main statistical indicators of Romanian cheese market between 2015 and 2019. The paper ends with concluding remarks, acknowledgement and references.

Literature Review

The first search about cheese on two scientific databases, namely Web of Science and Scopus, generated 31485, and 33155 publications in September 23, 2020. When the search criterion was narrowed down to indicate the literature from 2015 and forward, 8498 publications were found published by Scopus (Elsevier, 2020) and 9127 documents were identified on Web of Science (Clarivate, 2020).

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The Scopus (Elsevier, 2020) publications on cheese have increased by 14.89% in 2019 compared to 2015. Out of the 8498 Scopus papers on cheese, 34.44% are open access and more than 95% were written in English. Also, 90% were published in a journal and 82% were research articles. With more than 95% of the Scopus studies on cheese, their most frequent areas of interest are: agriculture and biological sciences (57.64% of papers) biochemistry, genetics and molecular biology (20.88% of papers), and medicine (17.02% of papers). The first three authors with the most numerous publications on cheese are Brittante, G., Cipolat-Gotet, C. and Cruz, A.G., with more than 38 papers each, while the highest citations were registered by Mozaffarian, D., Marco M.L. et al. and Galus, S. & Kadzińska, J., with more than 187 citations in September 2020. Only 4% of the Scopus papers are in the field of economics and business, the most cited ones focusing mostly on topics connected to the environmental impact and the effects of environmental taxes on cheese-related activities (Palmieri et al., 2017; Säll & Gren, 2015), the added value and the consumer's willingness to pay for the protected designation of origin and the protected geographical indication (Marcoz et al., 2016; de-Magistris & Gracia, 2016), the waste management and waste reduction from cheese-related activities (Pal & Nayak, 2016; Eriksson et al., 2016), the technological improvements of cheese production (Gharibzahedi et al., 2018), the tourism development around cheese products (Fusté Forné, 2015), and others. The most recent results from the Scopus database indicate the possibility of reducing the environmental impact of cheese production by using renewable energy (Tarighaleslami et al., 2020), and a new system model for cheese factories based on automation technologies (Matsumoto et al., 2020). Further, three papers about cheese and Romania were found on Scopus since 2015, which investigated the technological process and the composition of ecological cheese (Mindru et al., 2018), the environmental pollution level by dairy wastewater from cheese and butter production (Tița et al., 2017), and the presence of E.coli in the unpasteurized cheeses marketed in Romania (Tabaran et al., 2017).

The Web of Science (Clarivate, 2020) publications on cheese have increased by 23.02% in 2019 compared to 2015. Out of the 9127 Web of Science papers on cheese, 40.78% are open access, 88.48% were research articles and, similar to Scopus studies, more than 95% were written in English. With more than 76.47% of the Web of Science studies on cheese, their most frequent areas of interest are: food science technology (49.14% of papers) agriculture (16.59% of papers), and chemistry (10.74% of papers). The first three authors with the most numerous publications on cheese are Brittante, G., Cruz, A.G., and Esmerino E.A. and Freitas M.Q. with more than 47 papers each, while the highest paper citations were registered by Thirumdas, R. et al., Clune, S. et al., and Gijsbers, L. et al., with more than 149 citations in September 2020. Only 1.37% of the Web of Science papers are in the field of economics and business, the most cited ones focusing on topics connected to the effects of environmental taxes on cheese-related activities (Säll & Gren, 2015), consumer behavior of children of cheese balls placement in movies (Matthes & Naderer, 2015), the drivers for the development of geographical indication of artisan cheese (Wilkinson et al., 2017), the influence of local products and their origin, like cheese, on the attractiveness of tourism destinations (Alderighi et al., 2016), the differences between food policies requirements of artisan cheese and the consumer preferences (Waldman et al., 2015). The most recent results from the Web of Science publications indicate negative influence of several firm-level factors, like cash conversion cycle, on the profitability of cheese companies (Fernández-López et al., 2020), the shift of the increase in public taxes from producers to consumers (Lyssiotou & Savva, 2020), the significant negative impact of fraud on fragile food like cheese (Rocchi et al., 2020), no impact of cheese market liberalization on prices if high-quality is the focus (Hillen & von Cramon-Taubadel, 2019). In addition, seven papers about cheese and Romania were found on Web of Science since 2015. For example, Rusu et al. (2016) found pesticide residues in milk and dairy products, inclusively cheese, in all samples analyzed, emphasizing thus the human health risks generated by their consumption. Also, Tabaran et al. (2017) revealed high prevalence of E.coli in the unpasteurized cheeses marketed in Romania.

Methodological Framework

This study paper investigates the Romanian cheese market during time, in terms of cheese production, price, consumption, expenses and trade. The secondary data analysis is focused on the 2015-2019-time frame because of comparability reasons, as the investigated statistical organizations made changes in the methodology of primary data collection and processing of some indicators before 2015 determining an impossibility of comparison with previous yearly information. More, the average annual consumer price indices were determined by making an average of the monthly consumer price index from the Romanian Institute of Statistics.

Results and Discussion

The Romanian cheese production increased steadily each year in the analyzed time frame, with a total growth of 17.13% from 2015 to 2018, at 95082 tons of cheese in 2018, according to NIS (2020). Since 2007, when Romania entered in the European Union as a member country, the cheese production increase has been of 20.46% in 2018, while, from 2001 to 2018, it has registered a spike of 164.95%. Also, Romania was placed on 16th position of the 28 EU member states in terms of cheese production in 2019, while being placed on 17th place in 2015 (Eurostat, 2020a). However, Romania registered the fifth highest increase of cheese production at EU28 level between 2015 and 2018. Thus, it could be observed that Romania recorded significantly higher cheese productions in the years before entering in EU compared with the ones after 2007. A cause of this situation could have been generated by the necessity of compliance of Romanian producers to the EU regulations and the increased market competition due to the free trade rules.

Surprisingly, the number of active enterprises in the field of manufacturing cheese and other milk products registered a 4.57% decreasing trend between 2015 and 2018, from 416 to 397, although the total number of Romanian enterprises increased by 12.20% in the analyzed time frame. If 2018 data was compared to 2002, the first year with statistical availability for this indicator, the decreasing trend was of 45%, although the total number of Romanian enterprises rose by 51% during the same period of time. However, by reporting the 2018 data to 2015, it was observed that the number of employees has barely grown by 0.13%, while the annual industrial production prices and the turnover of manufacturing cheese and other milk products have significantly increased by 16% and 48%. When comparing the number of enterprises at EU level, Romania was placed on fifth in terms of the highest number of producers, after Italy, Spain, Greece and France, indicating a high interest of Romanian producers in producing cheese (Eurostat, 2020b).

In terms of Romanian cheese consumption, the Romanian Institute of Statistics reports data on the following categories of cheese: cheese and cream, cow cheese (cottage cheese), sheep cheese, fresh acid curd (cow) cheese, pressed (yellow) cheese and other milk products. Figure 1 illustrates the structure and evolution of annual cheese consumption, by type, based on the average monthly consumption from NSI (2020) data during 2015-2019.

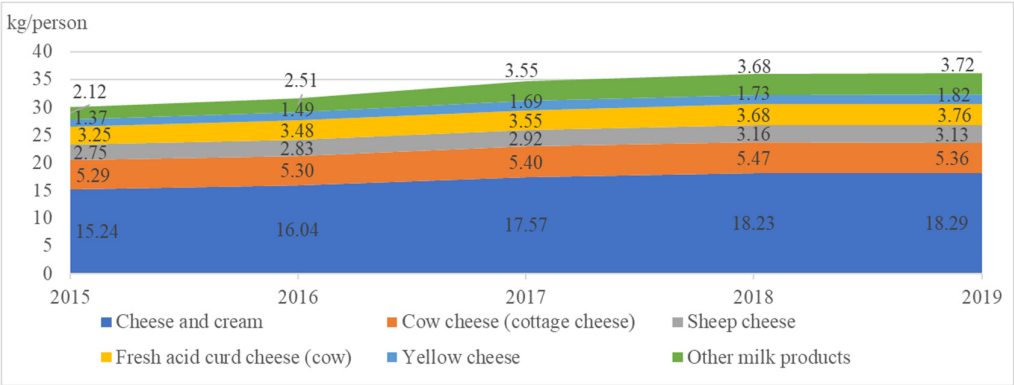

Fig. 1: The annual average cheese consumption per person in Romania between 2015 and 2019
Data source: NSI (2020)

The Romanian average consumption of cheese and cream per capita registered increases by 19.61% in 2018 and by 20% in 2019 when compared to 2015. However, in real terms, this indicator increased by 3 kg/person from 2015 to both 2018 and 2019. Specifically, the Romanian average consumption of cow cheese (cottage cheese) per capita registered small increases by 3.40% in 2018 and by 1.36% in 2019 when compared to 2015. In real terms, this indicator increased only by 0.18 kg/person, respectively 0.07 kg/person, from 2015 to 2018, respectively 2019. Also, the Romanian average consumption of sheep cheese per capita registered increases by 14.85% in 2018 and by 13.97% in 2019 when compared to 2015. However, in real terms, this indicator increased only by 0.18 kg/person, respectively 0.40 kg/person, respectively 0.38 kg/person, from 2015 to 2018, respectively 2019. Next, the Romanian average consumption of fresh acid curd cheese (cow) per capita registered increases by 13.28% in 2018 and by 15.50% in

2019 when compared to 2015. In real terms, this indicator increased very little, by 0.43 kg/person, respectively 0.5 kg/person, from 2015 to 2018, respectively 2019. Further, the Romanian average consumption of yellow cheese per capita registered significant increases by 26.32% in 2018 and by 33.33% in 2019 when compared to 2015. However, in real terms, this indicator increased by 0.36 kg/person, respectively 0.45 kg/person from 2015 to 2018, respectively 2019.

So, the cheese products consumption registered an increase trend in the period between 2015 and 2019, which could be determined by changes in consumption preferences and increases of incomes, as suggested by Dobra & Sandru (2016). The analysis also revealed that the cheese consumption per person has not necessarily changed due to the quality of being part of the EU membership. However, it seems like Romanians have increased preferences of yellow cheese, which registered the highest yearly rises compared to cow and sheep cheese. Moreover, when comparing the trends of cheese production and consumption, it can be observed that they are similar in evolution, the total cheese and cream consumption representing around 3.7% of cheese production in the analyzed time frame.

Further, the average annual consumer price indices of cheese products, which indicate the overall evolution of prices, have increased by 8.01% in 2019 compared to 2015 (NSI, 2020). However, it diminished by 0.28% in 2018 compared to 2015. These trends were registered by both cow cheese and sheep cheese. Also, this indicator registered a lower growth compared to the consumer price index for food goods, but a higher increase compared to all Romanian goods. Also, when considering the harmonized index of consumer prices for cheese and curd from Eurostat (2020c), Romania positioned on ninth place of the 28 EU member states in 2019 in terms of the price increase, namely of 2.2, the first two being for Portugal and Lithuania.

The average price of cow cheese was 14.8 lei/kg in 2015, i.e. around 3.3 euro/kg, and 17.1 lei/kg in 2019, i.e. around 3.6 euro/kg (NSI, 2020). Also, the average price of sheep cheese was 19.4 lei/kg in 2015, i.e. around 4.3 euro/kg, and 22.4 lei/kg in 2019, i.e. around 4.7 euro/kg (NSI, 2020).

Additionally, figure 2 illustrate the comparison between the average monthly income and the cheese expenses, showing that the trends have increased since 2015 based on, among others, price increases.

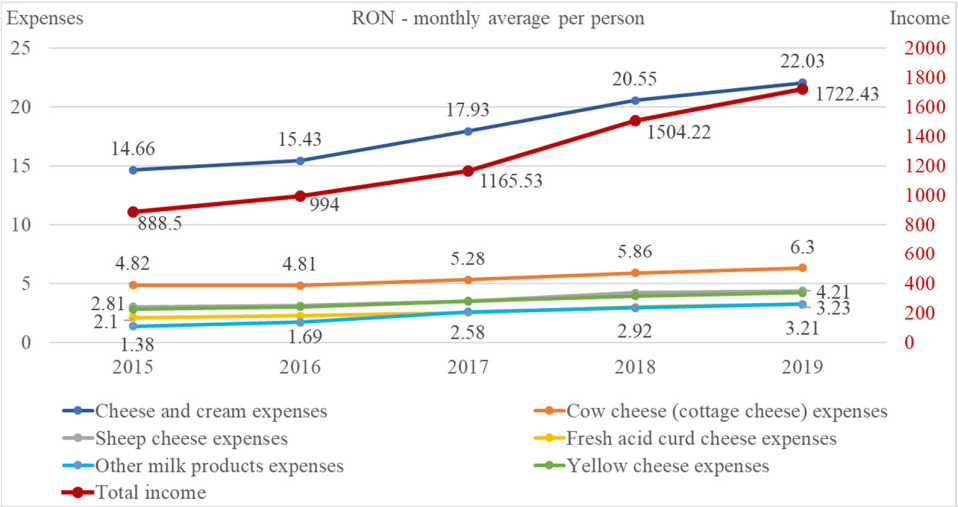

Fig. 2: The cheese expenses and the population's income in Romania between 2015 and 2019
Data source: NSI (2020)

Moreover, the share of agri-food expenses in the monthly average income of Romanian population has decreased from 22.5% in 2015 to 16.1% in 2019, meaning that the income has increased more than the agri-food expenses during time. As the food is a basic need, these previous analyzed indicators show that the Romanian have increased their accessibility to basic goods, going towards achieving economic and social sustainability. In terms of the share

of cheese and cream expenses in the total monthly average income of Romanian population, table 1 shows that it has decreased by 0.26% between 2015 and 2019, from 1.45% in 2015 to 1.19% in 2019. Considering the study of Guga et al. (2018) and the average consumption determined between an adult male and female, 0.77 kg of sheep cheese, 0.58 kg of cow cheese, 0.41 kg of yellow cheese, and 0.25 kg of cream should be a minimum monthly consumption by an adult for a decent living, meaning a minimum total of 2.01 kg cheese and cream. Based on these, the monthly cheese and cream consumption is under this minimum with approximately 0.5 kg in 2018.

Table 1: The share of cheese expenses in the monthly average income of Romanian population, by type

Type of product	Share of cheese expenses in the income	2015	2016	2017	2018	2019
Cheese and cream	total income	1.45%	1.39%	1.39%	1.26%	1.19%
	monetary income	1.65%	1.55%	1.54%	1.37%	1.28%
Cow cheese (cottage cheese)	total income	0.48%	0.43%	0.41%	0.36%	NA
	monetary income	0.54%	0.48%	0.45%	0.39%	NA
Sheep cheese	total income	0.30%	0.28%	0.27%	0.26%	NA
	monetary income	0.34%	0.31%	0.30%	0.28%	NA
Fresh acid curd cheese	total income	0.21%	0.20%	0.20%	0.18%	NA
	monetary income	0.24%	0.23%	0.22%	0.20%	NA
Other milk products	total income	0.14%	0.15%	0.20%	0.18%	NA
	monetary income	0.16%	0.17%	0.22%	0.19%	NA
Yellow cheese	total income	0.28%	0.27%	0.27%	0.24%	NA
	monetary income	0.32%	0.30%	0.30%	0.26%	NA

Note: NA means that the data is not available.

The Romanian cheese trade indicates a significant negative balance in 2019, being ranked on 23rd position in cheese imports and on 39th in exports worldwide (ITC, 2020). The first three country importers of cheese products from Romania are Greece, Italy and United Kingdom, while the first three country exporters are Germany, Poland and Italy (ITC, 2020). Both total value of cheese exports and imports have increased in 2019 compared to 2015, but the imports grew more than the exports, by 21.9% instead of 14.5% (Eurostat, 2020d). In terms of quantity, the growth of cheese imports and exports was higher, by 76.3% and 78.09% for the cheese imports in 2018 and 2019 reported to 2015, as well as by 45.9% and 41.2% for the cheese exports in 2018 and 2019 reported to 2015. It seems like the exported quantity has slightly decreased since 2018. However, imported cheese quantity rose significantly more than the Romanian production with approximately 20% yearly average increase compared to 5% of yearly average rise. When considering the sustainability principles, which considers also ensuring food security from local production, it seems like the cheese market is not quite sustainable, as the share of imported cheese in total Romanian production has reached 91% in 2018 compared to 60% in 2015.

Conclusion

The main focus of this paper was to present the trends of the Romanian cheese market between mainly 2015 and 2019. The findings suggest that the cheese market in Romania is growing, as the trends of production, consumption, and exports registered increases between 2015 and 2019. However, it could be observed that the number of active enterprises in the field of manufacturing cheese and other milk products has decreased in the analyzed time frame, indicating a higher performance of these companies on the market. Also, the cheese imports increased significantly more than the local production, which indicate the need of taking measures for improving the sustainability of the cheese sector. One measure could focus on promoting the local production and consumption of cheese products.

Future endeavors could focus on determining the current Romanian's behavior in terms of purchasing and consuming cheese and, also, new market opportunities for sustainable development. Also, future studies should focus on investigating the effect of the COVID-19 pandemic on cheese market.

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Using an Extended Technology Acceptance Model to Explore Digital Marketing and Consumer Buying Behavior

Jisha VIJAY
Research Scholar, Department of Commerce and Management, Amrita School of Arts & Sciences Kochi, Amrita Vishwa Vidyapeetham (University), Coimbatore, India, jishavijay11@gmail.com.

Dr. Indu MANISH KUMAR
Assistant Professor, Department of Commerce and Management, Amrita School of Arts & Sciences Kochi, Amrita Vishwa Vidyapeetham (University), Coimbatore, India, indumanish@yahoo.com.

Abstract

With the advent of AI, businesses get deeper real-time insights into what customers want and based on these insights, businesses can create a personalised experience for every individual customer. The online marketing media adopting AI applications has influenced the customers buying behavior and is essential in understanding AI acceptance by online customers. The currents research is developed to fill this gap. The paper endeavours to specialize the influence of Artificial Intelligence in extended TAM on digital marketing and online customer experience. The paper further attempts to identify the essential effect of factors of artificial intelligence in future purchase intention of the online shoppers. Data for the research were collected through both interview and survey from 175 online shoppers; an online questionnaire is used to collect data from the millennial. The research findings posited that Indian millennial depend more on online media for their purchases. The Technology Acceptance Model enhances to analyse Artificial Intelligence (AI) and its impact on consumer behavior in online marketing. Interviews focus on the consumers who depend more on online media platforms in their day to day life for the review of the products they purchase. The study is helpful for online retailers and web designers by recommending them to know the pulse of consumers, these create a potential to encourage consumers to buy more online. A comprehensive literature review highlights a close understanding of Artificial Intelligence and therefore portrays the importance of Artificial Intelligence in online marketing. The findings indicated the variables have significantly influenced consumer behavioral intent unlike the existing studies which remained unsuccessful in clubbing all the factors into one study, this has initiated the consumer behavior with effect from artificial intelligence.

Keywords: Artificial Intelligence, Consumer Buying Behavior, Perceived Ease of Use, Perceived Usefulness, Online Marketing, TAM, Trust.

Introduction

The e-commerce sector has seen a boom within the Asian region in recent years. India, the southern state, had the fastest growing online retailer market in 2019. According to Statista Research Department, today's business world is ruled by consumers, it's necessary for any marketers to interact between business and consumers. It's estimated that there'll be 1.92 billion global digital buyers in 2019, e-commerce retail sales are expected to account for 13.7% of world retail sales in 2019(Stalidis, Karapistolis and Vafeiadis, 2015). Advertising comes as an aid in influencing and communicating the business idea prevalent within the market to the consumers(Chukwu, Kanu and Ezeabogu, 2019).Within the era of Digital Marketing, the standard way of advertising is replaced by another popular tool. Within the next few years, we are getting ready to witness the planet we sleep in entirely disrupted by improvements in artificial intelligence. Artificial Intelligence will likewise keep it up changing how organizations promote. Truth be told, these Digital Advertising methodologies would be incomprehensible without a straightforward variety of Artificial Intelligence(Sajjad, 2016). These frameworks work autonomous, setting the right types of advertisements before the right types of individuals at the right time keen about complex calculations and large data. This is often what's called "programmatic advertising." Not excessively sometime within the past, promotion advancement was, for the foremost part, an innovative undertaking. Today, it's everything about that specialize in and conveying the right message. Consumers and business to business (B2B) purchasers are overpowered day by day with

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promotions(Bilal Ahmad *et al.*, 2019). The overwhelming majority of them are superfluous so that they just close the advertisement or proceed onward to their next assignment(Qaisar, Sial and Rathour, 2018). At the purpose when this happens, publicists lose cash. With Artificial Intelligence, social media can streamline their arrival on speculation by just putting advertisements before pertinent watchers(Purcărea, 2017). Promotions are often purchased consequently(Mihić and Kursan, 2010), at that time customized at scale. Numerous promoters are as of now utilizing this innovation(Karbasivar and Yarahmadi, 2011; Dumitriu and Popescu, 2020). Artificial Intelligence makes it possible for e-commerce retailers and web designers to analyse scores of interactions a day and ultimately target offers all the way down to one customer – an experience every marketer dream of providing(Purcărea, 2017). Sales teams are now empowered with information we've never seen before(Qaisar, Sial and Rathour, 2018). The marketers personalise the sales cycle through Artificial Intelligence-driven applications that are helping sellers to interact with the proper prospects with the proper message at the proper time.

The study aims (1) to study the role of Artificial Intelligence in advertising on consumer's intention to online purchases, (2) to validate the factors of Artificial intelligence in buying decision, (3) to develop a model depicting the acceptance of Artificial Intelligence and Consumer buying behavior. Given the wide-running subject of artificial intelligence and its numerous applications, the researcher constrained the extent of this paper to just its effect on the customer's buy choice. The subject of artificial intelligence in promoting itself could likewise be sufficiently immense to legitimize narrowing the extent of exploration down further into explicit applications and use cases. Notwithstanding, the expectations for this paper were to deal with the issue in a way that has a characteristic passage point for buyers to begin understanding about artificial intelligence while giving enough detail to each application and use case to gracefully novel bits of knowledge. The geographical scope of the study limits to the state of Kerala, India. The information collected from online shoppers during the period of January 2020 – August 2020.This paper has importance because for an advertiser, organizing the utilization of different media stages for publicizing is ending up being a problem. Today, the promoting cost of each medium is unfathomably high, and any unseemly media techniques are frequently an exorbitant choice. Promotions are visiting despite everything become more brilliant and increasingly inserted in our day by day lives. Publicizing heads need to understand media sees and their impact on the consumer buying decision. Inside the current examination, the researcher attempts to explore distinctive publicizing media impacting consumer behavior and providing a better shopping environment to the target group. This assessment is of most extraordinary significance to the current situation of the advertisement publicizing, as this may give basic encounters concerning changing among modernized media.

Research Problem

The Technology Acceptance Model regarding Artificial Intelligence on consumer behavior raises questions which the study describes below:

1) How does Artificial Intelligence in online marketing perform to influence consumer's intention to buy online? The model analyses the behavior of consumer for purchase intention, when the new method is implemented assessment is made whether it had a positive impact on consumer future buying behavior.
2) How well do the factors of Artificial Intelligence influence the buying decision? The model will analyse the significant factors which influence the behavioral intention of users, explaining which factor is of great value in their purchase decision.
3) Is there any model that can better depict the relationship of Artificial Intelligence on online consumer behavior? The focus of the study is less that to prove or disprove the Technology Acceptance Model, than in using to identify Artificial Intelligence on consumer behavior. Also, the relatable factors that best accounts the model should be brought together.

Literature Review

Technology Acceptance Model

Technology Acceptance Model, introduced by Fred Davis (1986), is an adaptation of Theory of Reasoned Action unequivocally custom fitted for showing client affirmation of data framework. The goal of Technology Acceptance Model (TAM) is to give an explanation of the determinants of general PC acceptance, prepared for explaining user conduct over a sweeping extent of end-client PC innovation. In an ideal world, one may need a model that is valuable for desire just as for explanation, with the objective that pros and specialists can recognize. The purpose of this study to analyse the factors of technology acceptance model and trust on future purchase intention of online shoppers with effect from the application of artificial intelligence investigated perceived ease of use, and perceived usefulness

creating trust in the minds of shoppers and thereby having an effect on the attitudes, actual behavior and future intention of shoppers. The study supports the effect of artificial intelligence among consumers' in buying online because statistics recommend the model fits the data absolutely. H1: The study found the relationship between perceived ease of use and perceived usefulness in online shopping; this is similar to that of the existing study. The consumer easiness in accessing the online platforms while shopping is likely to let him or her in the usefulness of the online platform. H2: As stated, Perceived ease of use will have a significant impact on customer trust to online shopping(Bertea, 2016), the consumer's easiness inaccessibility creates a trust in the minds of the consumers, they are intended to shop more due to the sense of trust developed in their minds, the study shows the association between ease of use and trust in the minds of consumers. H3: the results shows, perceived usefulness will have a significant positive impact on customer trust to shop online, the study demonstrated the impact of usefulness in generating trust among shoppers, perhaps similar studies on trust and consumer buying decision have studied so far, the findings of the present study analyse the role of TAM factors, perceived ease of use and perceived usefulness in building trust among consumers. H4: Trust will have a significant impact on customer attitudes concerning shopping online(Wu, Chen and Chiu, 2016), studies have associated the importance of consumer trust in shopping, however, the present study relates to the two factors of TAM in developing trust among online shoppers. H5: mentioned in the review of literature perceived usefulness have an impact on attitudes concerning shopping. H6: Perceived usefulness has an impact on attitudes in using artificial intelligence among online shopping. H7: Attitude will have a significant impact on customer actual behavior concerning shopping online(Sinha and Kim, 2012; Zuroni and Goh, 2012; Akbarm *et al.*, 2015). H8: Actual behavior will have a positive impact on customer future intention to shop online(Sharma, Sivakumaran and Marshall, 2010). The present study depicts the fact that artificial intelligence in the current context has leveraged online consumers in shopping more, with their technological aspects. Marketers are starting at now prepared to envision what sorts of ads really influence your purchasing conduct. Promotions are going to continue ending up being more astute and logically introduced in our regular day to day existences in view of Artificial Intelligence. Gradually, these Artificial Intelligence calculations can get acquainted with your conduct, and before you know it, they understand you better than you know yourself. For sure, even today, the impact Artificial Intelligence is having on our overall population can't be ignored. Be that if the customers know about AI or not, computerized reasoning has changed the way how both the purchasers and advertisers think, act and settle on choices in the market. In the future, AI can make the showcasing life simpler, for both the customers and advertisers that gives motivation and invigorates the dynamic quicker than others, its why a particular structure may be inadmissible and look for after reasonable therapeutic advances. A key purpose behind the Technology Acceptance Model is to give a reason to follow the impact of outer components on inner convictions, perspectives, and desires. TAM plans to attempt to achieve these goals by perceiving not many key elements suggested by past exploration dealing with the mental and practical determinants of PC acceptance, and using Theory of Reasoned Action for exhibiting the theoretical associations among these variables. A couple of changes in accordance with the principal TRA approach, maintained by open speculation and verification, while considering these destinations for TAM. TAM sets that two explicit feelings, perceived usefulness and perceived ease of use, Perceived usefulness (U) portrays as the anticipated client's enthusiastic probability that using a specific application framework will extend their movement execution inside a legitimate setting(Scherer, Siddiq and Tondeur, 2019).Perceived ease of use (EOU) suggests how much the inevitable client desire that the target structure ought to free from the exertion. All things considered; history shows that individuals who have purchased from your association before are well on the way to buy more than once on the off chance that they are content with the general excursion.

Artificial Intelligence Applications

Alan Turing was the one who coined about artificial Intelligence in an exceeding proposal and over the years it faced many changes in every field and this study explores Artificial Intelligence within the web marketing platform. Artificial Intelligence retains the flexibility to analyse vast tracts of information, which incorporates human behavior(Campbell *et al.*, 2020).Unless you want to look at it from the point of view of the consumer, the advent of the digital age, and now Artificial Intelligence, has changed the environment for the consumer vis-a-vis offering prices and products. All that a customer should do to press for the highest effective price or the highest efficient product in excess of the price range is to use his mobile IP system and the search the full marketplace for what they require(Akram *et al.*, 2018).The introduction of Artificial Intelligence now affects almost every stage of a customer journey(Hoanca, Marinchak and Forrest, 2019; Campbell *et al.*, 2020). The good customer service never ends at a sale; it continues way beyond that. The use of Artificial Intelligence in the buyer's journey, for now, could even be in an early stage, with some brands testing the water by introducing chat-bots(Koch, 2018).But experts believe the day isn't far away when Artificial Intelligence will affect every stage of the customer journey from marketing messages, ads, product design and shipping. Virtual shopping assistants or recommendation engines that help

consumers find a product from catalogues is another area where engineering helps(Chin, Water and Swatman, 2005; Chastel *et al.*, 2019; Hoanca, Marinchak and Forrest, 2019).

1. Programmatic Advertising

Each advertiser knows that it is a reality –consumers are drawn to meetings, which slowly makes them faithful to a brand. Due to the mechanical framework strategy for assembling goods for the general population within the disconnected environment, very little personalization could be anticipated as reasonably expected. However, this changed with the advent of digitization(Dannenberg *et al.*, 2020).Data that included individual customers analyse to create a propelling experience to step back to the e-store in them. Now, with the help of AI inside the picture, and its ability to analyse enormous lumps of data at high speeds, personalization of things has taken on a whole new sense(Schipmann, 2019). With the assistance of Artificial Intelligence now an advertiser can break down client assessments across different social media platforms, and coordinate client profiles to their social encounters in regard to a specific item. It can see what a customer's style is and adjust item proposals progressively, while the client shops(Scherer, Siddiq and Tondeur, 2019). Such software engineering created yield is then being utilized by certain retailers to deliver items which may interest a private client's taste. Artificial intelligence, at each phase of a client venture, will offer increases to a retailer moreover as its clients.

2. Visual Search Optimization

All things considered, quite a bit of shopping can be a visual encounter. Visual search anticipates to need the user experience to the accompanying level. Brands will transfer pictures of items in their stock, each with their one of a kind code(Verhagen and Van Dolen, 2011) .When customer transfers a picture of an item they like, in their online inquiry, Artificial Intelligence-based programming will assess it and consider viewpoints like brand, and shading, etc. This should be possible by dissecting the pixels inside the picture. It'll at that point surface proposals on elective brands or items, tired ongoing(Xu and Huang, 2014).On the other hand, Artificial Intelligence-based programming prepares to give proposals of items upheld a customer's history, different preferences. Experts anticipate that after the visual search completely swung, instances of deserting of shopping baskets will diminish essentially. Utilizing AI, brands can look over petabytes of data to foresee consumer conduct, and gives visual suggestions to singular customers(Schipmann, 2019).Going ahead, organizations are visiting be prepared to consolidate designing and visual abilities to create systematic models to spot even smaller-scale patterns and buyer personal conduct standards, so make shrewd suggestions.

3. Virtual Personal Shopper

Artificial Intelligence-driven remote helpers can influence be exceptionally compelling proposal frameworks. Virtual private shopping assistants (VPSAs) made possible by recent advances in artificial intelligence (AI) are expected to help users find the best deals online, possibly also acting on behalf of the user after gaining the user's trust(Chin, Water and Swatman, 2005; Hoanca, Marinchak and Forrest, 2019). To achieve such functionality in enhancing the user experience, VPSAs will have to collect and manage highly personal data about the users. There's little uncertainty that they keep up the possibility to rebuild the retail business, and in the end, help drive deals. Where time is cash, purchasers will discover utilizing an individual shopping aide, so to talk, powerful. Virtual shopping models offer an altogether new point of view for e-commerce on the Internet as they give a solid feeling of reality by significant collaboration which permits the model of an item that tries. This is because every single digital model looks like their physical partners as intently as conceivable with visual three-dimensional pictures, behavioral, haptic and sound-related qualities.

4. Product Recommendation

Product recommender systems are typically deployed by e-commerce websites to enhance user expertise and increase sales. Product recommendation systems can help e-commerce websites to provide personalized decision support and information service for customers. It frequently interacts with the customer and analyzes customer feedback to update the recommendation results to best match the customer interest with higher accuracy(Tronvoll, 2008). However, the recommendation is proscribed by the merchandise info hosted in those e-commerce sites and is barely triggered once users are playing e-commerce activities. AI detect users' purchase intents in near-real-time(Dai, Ye and Gong, 2009; Schipmann, 2019).The product recommendation feature is meant to provide an alternative source of new ideas for customers who now visit the store less frequently. Recommendations are generated by matching products to customers based on the expected appeal of the product and the previous spending of the customer. Product recommendation provides us with no rigorous basis for introducing shoppers to new kinds of products beyond those

classes and sub-classes that they already buy. This demonstrates both the flexibility and weakness of content-based filtering systems(Lawrence *et al.*, 2001).As new info concerning relationships between products becomes accessible it will be incorporated by shaping new options.

5. Chatbot

Chabot's designed for e-commerce sites helps as the end to end cat platform to automate customer engagement, customer supports and acquisitions, Chabot's have the capacity to handle thousands of requests at the same time and respond in a meaningful manner. Moreover, customers are not necessarily required to visit the e-commerce site; they can interact with the brand using their preferred channel like WhatsApp, Facebook etc. and make their purchase. It is now turned for other players to grab the opportunity and deploy their own Chabot's to engage with customers. The user, rather than interacting with a non-interactive multi-panel interface, will directly raise the chatbot for a product of his need. The user will kindle a specific feature of the product and compare varied product on the fundamental options that are to his feeling(Campbell *et al.*, 2020). From the point of booking till the point of delivery, the user has a lot to ask; including the status of delivery, mode of payments, request a custom date, enquire delivery time and various other FAQs. E-commerce Chabot help with shopping and post-sales support. Beyond customer engagement, they are helping in vendor management as well. All first-level client support queries may be handled by the chatbot and for classy queries, the matter may be noted and a price tag may be generated. The user can add personal info, update addresses, view purchase history, add cards and even track order and refund status. Using Chabot's, the entire experience of shopping online can be improved and made more fun for the customers.

Hypothesis Development

Review of related literature on artificial Intelligence and its influence on online shopping indicates that the trust belief in online shopping can be further related to perceive ease of use and perceived usefulness and these both will be directed to the attitude of online consumer behavior and their future intention. The safety and reliability in the online store increase the dependency of consumers browsing. Displaying product suggestion of customer desires, online has resulted in easiness of consumer shopping behavior(Alauddin *et al.*, 2015). Studies have shown that proper navigation helps shoppers in the usefulness and saves time thereby increasing the level of attitude and resulting into the actual behavior leading to the future buying intention of the shoppers. Thus, the researcher proposes the following:

H1: There is a significant statistical relationship between perceived ease of use and perceived usefulness in online shopping.

H2: Perceived ease of use will have a significant impact on customer trust to online shopping.

H3: Perceived usefulness will have a significant positive impact on customer trust to shop online.

H4: Trust will have a significant impact on customer attitudes concerning shopping online.

H5: Perceived usefulness have an impact on attitudes concerning shopping.

H6: Perceived usefulness have an impact on attitudes in using AI among online shopping.

H7: Attitude will have a significant impact on customer actual behavior concerning shopping online.

H8: Actual behavior will have a positive impact on customer future intention to shop online.

Research Methodology

The Questionnaire was developed from the Technology Acceptance Model; the survey questionnaire consisted of two parts. The first recorded the subject's demographic information. The second identified the subject's perception of each variable in the model. The demographic variables assessed were gender, age, level of education, income level, frequency of online shopping and the degree of familiarity with Artificial Intelligence services. The sample consisted of people who have used E-Commerce sites for their purchase. To determine the model salient beliefs for the usage of the Online platform, online interviews were conducted with millennials, we chose to elicit beliefs from millennials since they are the one who has more access to the online media, it was found that 52 per cent of online shoppers aged 26 to 35 per cent were regular online shoppers. The geographical coverage of this study is limited to the millennial age groups residing in Kerala. The size of the convenient sample for this study is 137 respondents which has been determined based on the online shoppers. The current research is a quantitative study with the help of a questionnaire survey. A 5-point Likert scale was used to show the agreement/disagreement towards each question. The Regression analysis was carried out to understand the relationship between the different variables towards consumer buying behavior.

Results

When planning a brand new system, the researcher's and practitioners would really like to predict the acceptance of the newly established system by the users, to analyse whether it's been able to fully influence the users, to require actions to create them fully acceptable to the system, to boost the business impact resulting from the massive investments in time and money related to introducing new information technologies into organizations. The current research has relevancy to all or any of those concerns. The study proposed the extended Technology Acceptance Model that integrated the variables like perceived ease of use, perceived usefulness and trust on the consumer buying behavior and attitude with the implications of AI needs.

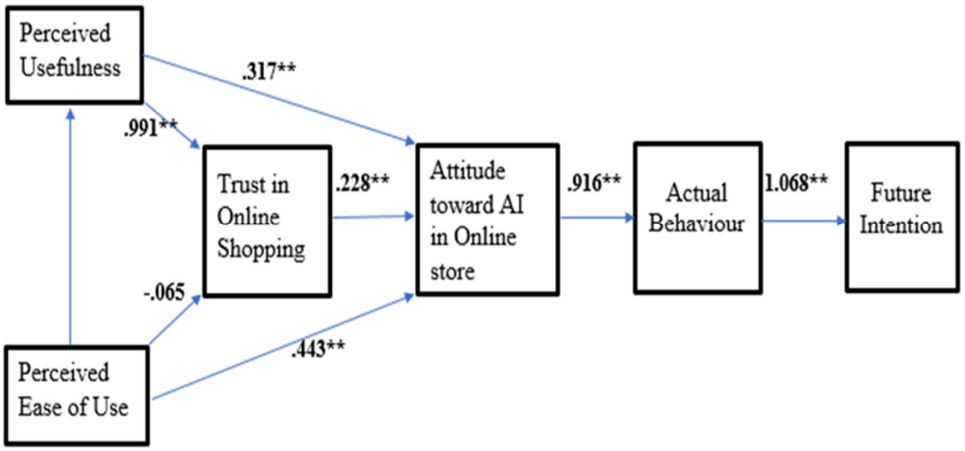

Fig 1: Research Model of Extended TAM including Artificial Intelligence impact in Online Marketing.

The conceptual model was analysed by using the correlation and regression on Artificial Intelligence in the online marketing media has changed the face and dimension of marketing in its various aspects, the personalised marketing means have conquered the consumer buying behavior, unlike the earlier mean advertising on products of customers choice. Artificial Intelligence helps to identify the customers repeated purchases, desires and choice's, making the available information online to customers screen had made it easier for buying decision (Fei Gao, 2016), thus for a customer who expects the right product at right time with right characteristics Artificial Intelligence helps to provide it on customers screen (Schipmann, 2019).

Table 1: Simple linear regressions between Perceived Ease of Use and Perceived Usefulness

Model Summary			ANOVA	
Model	R Square	Std. Error of Estimate	F	Sig.
1	0.974	0.15056	5172.281	0.000

Coefficients

Model		B	Std. Error	t	Sig.
1	Constant	0.192	0.052	3.732	0.000
	Perceived Ease of Use	0.988	0.014	71.919	0.000

Table 1 analyzes simple linear regressions and predict the the dependent variable (perceived usefulness) using the independent variable (perceived ease of use).The P value for the statistics is less than 0.05 estimating that the coefficients falls somewhere in tat 95% confidence interval.The model confirms to significantly predict the dependent

variable (Perceived Usefulness).Thus, the model confirms: Perceived Usefulness = 0.192 + 0.988 Perceived Ease of Use + Ɛ.

Table 2: Multiple linear regression between Perceived Usefulness, Perceived Ease of Use and Trust

Model Summary			ANOVA	
Model	R Square	Std. Error of Estimate	F	Sig.
1	0.943	0.21379	1127.368	0.000

Coefficients

Model		B	Std. Error	t	Sig.
1	Constant	0.126	0.077	1.642	0.103
	Perceived Usefulness	0.991	0.122	8.098	0.000
	Perceived Ease of Use	-0.065	0.122	-0.532	0.596

Table 2 analyses multiple linear regressions and predict the dependent variable (trust) using the independent variable (perceived usefulness).The P value for the statistics is less than 0.05 estimating that the coefficients falls somewhere in tat 95% confidence interval. The model confirms to significantly predict the dependent variable (trust).Thus, the model confirms: Trust = 0.126 + 0.991 Perceived Usefulness + Ɛ

Table 3: Multiple linear regression between Perceived Usefulness, Perceived Ease of Use, Trust and Attitude

Model Summary			ANOVA	
Model	R Square	Std. Error of Estimate	F	Sig.
1	0.969	0.16205	1433.747	0.000

Coefficients

Model		B	Std. Error	t	Sig.
1	Constant	0.148	0.059	2.521	0.000
	Perceived Usefulness	0.317	0.093	3.421	0.001
	Perceived Ease of Use	0.443	0.113	3.912	0.000
	Trust	0.228	0.065	3.481	0.001

Table 3 analyzes multiple linear regressions and predict the dependent variable (attitude) using the independent variable (perceived usefulness, perceived ease of use, trust).The P value for the statistics is less than 0.05 estimating that the coefficients falls somewhere in tat 95% confidence interval.The model confirms to significantly predict the dependent variable (attitude).Thus, the model confirms. Attitude = 0.148 + 0.317 Perceived Usefulness + 0.443 Perceived Ease of Use+0.228 Trust + Ɛ

Table 4: Simple linear regression between Attitude on AI in online shoping and Actual Behavior

Model Summary			ANOVA	
Model	R Square	Std. Error of Estimate	F	Sig.
1	0.958	0.17650	3132.896	0.000

Coefficients

Model		B	Std. Error	t	Sig.
1	Constant	0.364	0.063	5.768	0.000
	Attitude	0.916	0.016	55.972	0.000

Table 4 analyses simple linear regressions and predict the dependent variable (actual behavior) using the independent variable (attitude).The P value for the statistics is less than 0.05 estimating that the coefficients falls somewhere in tat 95% confidence interval. The model confirms to significantly predict the dependent variable (actual behavior). Thus, the model confirms: Actual Behavior= 0.364 + 0.916 Attitude + Ɛ

Table 5: Simple linear regression between Actual Behavior and Future Intention

Model Summary			ANOVA	
Model	R Square	Std. Error of Estimate	F	Sig.
1	0.954	0.20391	2794.581	0.000

Coefficients

Model		B	Std. Error	t	Sig.
1	Constant	-0.394	0.079	-5.006	0.000
	Actual Behavior	1.068	0.020	52.864	0.000

Table 5 analyses simple linear regressions and predict the dependent variable (future intention) using the independent variable (actual behavior).The P value for the statistics is less than 0.05 estimating that the coefficients falls somewhere in tat 95% confidence interval. The model confirms to significantly predict the dependent variable (future intention). Thus, the model confirms: Future Intention = -0.394 + 1.068 Actual Behavior + Ɛ

The data after collection is processed and analysed following the requirement and purpose at the time of the development of the scale. It is essential for such a scientific study that only the relevant data should be used from the collection of such a voluminous data and processed through the proper statistical tools. Data were thoroughly evaluated before analysis. To check whether characteristics of Artificial Intelligence influenced the online shopping pattern of consumers, Regression analysis was applied to check whether these two dimensions were dependent or not. The data has been investigated according to the objectives of the research.

Discussions and Conclusions

The purpose of this study to analyse the factors of technology acceptance model and trust on future purchase intention of online shoppers with effect from the application of artificial intelligence investigated perceived ease of use, and perceived usefulness creating trust in the minds of shoppers and thereby having an effect on the attitudes, actual behavior and future intention of shoppers. The study supports the effect of artificial intelligence among consumers' in buying online because statistics recommend the model fits the data absolutely.H1: The study found the relationship

between perceived ease of use and perceived usefulness in online shopping; this is similar to that of the existing study(Verhagen and Van Dolen, 2011; Bertea, 2016; Dönmez-Turan and Kir, 2019).The consumer easiness in accessing the online platforms while shopping is likely to let him or her in the usefulness of the online platform.H2: As stated, Perceived ease of use will have a significant impact on customer trust to online shopping(Barnett, Hone and Kaczmarski, 2013; Bertea, 2016; Wu, Chen and Chiu, 2016; Schipmann, 2019) ,the consumer's easiness inaccessibility creates a trust in the minds of the consumers, they are intended to shop more due to the sense of trust developed in their minds, the study shows the association between ease of use and trust in the minds of consumers.H3: the results shows, perceived usefulness will have a significant positive impact on customer trust to shop online, the study demonstrated the impact of usefulness in generating trust among shoppers, perhaps similar studies on trust and consumer buying decision have studied so far, the findings of the present study analyse the role of TAM factors, perceived ease of use and perceived usefulness in building trust among consumers.H4: Trust will have a significant impact on customer attitudes concerning shopping online(Babin, Darden and Griffin, 1994; Tingchi Liu *et al.*, 2013; Wu, Chen and Chiu, 2016),studies have associated the importance of consumer trust in shopping, however, the present study relates to the two factors of TAM in developing trust among online shoppers.H5: mentioned in the review of literature perceived usefulness have an impact on attitudes concerning shopping.H6: Perceived usefulness has an impact on attitudes in using artificial intelligence among online shopping.H7: Attitude will have a significant impact on customer actual behavior concerning shopping online(Sinha and Kim, 2012; Chandra and Sinha, 2013; Koslow and Lee, 2020).H8: Actual behavior will have a positive impact on customer future intention to shop online. The present study depicts the fact that artificial intelligence in the current context has leveraged online consumers in shopping more, with their technological aspects. Marketers are starting at now prepared to envision what sorts of ads really influence your purchasing conduct. Promotions are going to continue ending up being more astute and logically introduced in our regular day to day existences in view of Artificial Intelligence.AI aids in building character profiles on every individual(Lawrence *et al.*, 2001; Liao, Shen and Chu, 2009; Koch, 2018; Hoanca, Marinchak and Forrest, 2019; Schipmann, 2019) .Gradually, these Artificial Intelligence calculations can get acquainted with your conduct, and before you know it, they understand you better than you know yourself. For sure, even today, the impact Artificial Intelligence is having on our overall population can't be ignored. Be that if the customers know about AI or not, computerized reasoning has changed the way how both the purchasers and advertisers think, act and settle on choices in the market. In the future, AI can make the showcasing life simpler, for both the customers and advertisers that gives motivation and invigorates the dynamic quicker than others.

Implications

The investigation looks at to the possibility of Artificial Intelligence related to online consumer lead in buying decision after Fred's Technology Acceptance Model. Resulting in affirming posted messages, the assessment found that purchasers search for information from various sources before buying things and organizations, and they evaluate and reflect their satisfaction in the wake of buying things and organizations. Artificial intelligence is promoting on the web media practice progressively noticeable effect so as that customers can search for every single concerned datum, collect data from existing customers anyway much as could sensibly relies upon before deciding to buy. They don't need to meet the others and solicitation their inclination towards thing and organizations, artificial intelligence comes as a guide by giving the information and substance of individual needs. Computerized reasoning used for customer centering by flinging as careful as a possible response for solitary customers, and help them with choosing the right buying decisions. Moreover, they can leave their feeling, impression and offer information with others too. This shows absolutely online customer lead in the dynamic method to buy. The findings have suggestions for executing procedures to impact buyer over the current stage, the outcomes show that the Artificial Intelligence inside the showcasing field has vanquished buyers mind in their purchasing conduct, yet to help the acknowledgment demonstrative measures must actualize to build the trust factors. The advancement includes confronted difficulties inside the sort of trust issues on account of an out sized number of fake sites and items, which was the clarification that purchasers would not look for merchandise or administrations online (Shapiro et al., 1980).Reliable sites and quality confirmation from makers are handling the issues heedlessly, as they seem to recognize the item that is of consumer decision at the correct time through Artificial Intelligence produce better items and administrations to clients and look for development and advantages for the business inside the long haul.

Restriction

Artificial intelligence in promoting is intricate and quickly creating. Taking everything into account; the researcher’s exploration faces obstructions of the potential for quickly getting obsolete. Further, the immense methods for likely usage of artificial intelligence in the advertising field have limited to simply have the choice to focus on the focuses the investigation have found commonly critical to the step by step practice of advertisers. Artificial intelligence

applied to look is one point that purposefully forgotten about because of time imperatives in having the option to inquire about, orchestrate, and give a valuable viewpoint of the subject. These restrictions mean this paper is in no way, shape or form a thorough examination of the role of artificial intelligence in digital marketing.

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Approaches on Sustainable Food on Popular Social Media Networks

Maria C. DIACONEASA
The Bucharest University of Economic Studies, Bucharest, Romania, maria.diaconeasa@eam.ase.ro

Florentina CONSTANTIN
The Bucharest University of Economic Studies, Bucharest, Romania, florentina.constantin@eam.ase.ro

Gabriel POPESCU
The Bucharest University of Economic Studies, Bucharest, Romania, gabriel.popescu@eam.ase.ro

Abstract

5 years after the Sustainable Development Goals (UN, 2020) have been stated, the society still has other major problems to face, rather than turning their general consumption pattern into a more sustainable one. Even more, the majority of the population is not aware of the possible individual contribution to a sustainable development, not even in what regards sustainable food. Hence, the purpose of this paper is to evaluate the use of social media networks for engaging people in taking action for changing their food consumption patterns into more sustainable ones, considering that this type of communication with individuals has become an important marketing tool for companies, so it may be as well used as means of communication for other important topics, such as sustainability. A secondary purpose is to evaluate the researchers' interest in studying this type of communication for developing the field of study. The conclusions of this study show that there is an increasing interest from both researchers and regular people towards learning more about sustainable food.

Keywords: Sustainable Development, Social Media, Communication, Consumption Pattern.

Introduction

Since the introduction in official world level discussions of the sustainable development issue, in 1987 (Bruntland Report, 1987), with specific attention to the sectors of food, energy, industry, urbanization and economic development, the actors who were called out to take action were rather large entities, state institutions (Meadowcroft, 2007; Moran et al., 2008) or private companies (Escobar & Vredenburg, 2011; Rowledge et al., 2017;) and less, the regular consumers.

Recent studies (Belz & Peattie, 2009; Bamossy & Solomon, 2016) show that the individual consumption pattern needs to be changed, since the entire global population has almost reached 8 billion people (Worldometer, 2020) and it is growing. Hence, common individual actions for sustainable development might count more than the state regulations or company strategies.

So, if individuals may act for developing sustainably, then: why don't we do it? Consumer behavior theory shows that there are drivers and barriers in the decision-making process of every consumer, yet there are no recipes for controlling them. Authors find that, among others, pro-environmental education (Meyer, 2015), opinion leading (Jansson, Nordlund & Westin, 2017), opinion seeking (Jansson, Nordlund & Westin, 2017), social norms (Jansson, Nordlund & Westin, 2017), existence of regulations (Driver, Saunders & Guenther, 2011; Sáez-Martínez et al., 2016) are general drivers of a sustainable consumption pattern, while low income (Czeczotko, Górska-Warsewicz & Laskowski, 2020), the high availability of unsustainable products (Fróna, Szenderák & Harangi-Rákos, 2019), the general lack of education and awareness on sustainability and sustainable choices (Fróna, Szenderák & Harangi-Rákos, 2019) are general barriers. Developing on this idea, the general statistical trends show that the world consumption pattern is not getting any more sustainable, but it consumes the resources at an unprecedented pace

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(Fróna, Szenderák & Harangi-Rákos, 2019). Hence, the need to find proper tools for guiding large masses of consumers towards sustainable consumption is obvious.

While international institutions like the United Nations or the European Union have taken upon themselves to offer both knowhow and financing for various projects that might contribute to reaching common Sustainable Development Goals (UN, 2015), some studies show that after the first five years with a general state commitment to these goals, the results are not going in the right direction (del Río Castro, Fernández & Colsa, 2020; Huan et al., 2020; Moallemi et al., 2020).

In this case, a tool that has proven its power of influence on consumers through time will be considered further for evaluating the possibility to contribute to shaping a sustainable consumer. This tool is the mass media (Isernia & Marcolin, 2019), with an accent on the recently developed segment of social media (Simeone & Scarpato, 2020).

Some studies have considered the influence of social media in developing sustainable fashion (Rausch & Kopplin, 2020), sustainable tourism (Palazzo et al., 2020) sustainable energy use (Abdelkader, 2020) or sustainable consumption (Anthony et al., 2020) in general, all of them considering the convincing power of popular people on those who want to be like them. The current study aims at evaluating the use of popular social media networks for influencing people to choose sustainable food.

The objectives of the study are: 1) Determining the interest of researchers in evaluating social media influence on sustainable food consumption; 2) Determining the use of social media networks in communicating about sustainable food and 3) Determining the engagement of users with the sustainable food related posts on social media.

The research is conducted through the use of a mixed method approach, using a bibliometric analysis, a word frequency analysis and further a social media analytics software for quantitative analysis.

Theoretical Background

The consumer behavior regarding food consumption and the various factors that influence it have been of interest to researchers for a long time due to the central role that it occupied in the survival and culture building of people (Vermeir et al., 2020; Flaherty et al., 2018), some of them stating the fact that there is significant difference between attitude towards consumption and real consumption behavior (Vermeir et al., 2020).

Studies regarding the factors that influence the real consumption behavior have been conducted world-wide on larger or smaller groups. For example, some studies on consumer behavior show that knowledge of organic foods (Singh & Verma, 2017), health consciousness (Singh & Verma, 2017), subjective norms (Singh & Verma, 2017), perceived price (Singh & Verma, 2017), food availability (Singh & Verma, 2017), and purchasing convenience (Zhu et al., 2013) have a positive influence on choosing organic food, as well as age, income level and education level (Singh & Verma, 2017; Zhu et al., 2013). Information availability, awareness and education (Kikuchi-Uehara, Nakatani & Hirao, 2016), presenting sustainable, but less desirable food (insect-based food) in a foreign language (Geipel, Hadjichristidis & Klesse, 2018), the possibility of easily recognizing a sustainable product in stores (Czeczotko, Górska-Warsewicz & Laskowski, 2020) are other drivers towards sustainable food consumption.

There are also less expected factors that influence sustainable food consumption behavior, such as religion (Singh et al., 2020) or moral competences such as: self-regulation power, love of learning, beauty appreciation, kindness, humility and modesty, leadership and perspective (Valor, Antonetti & Merino, 2020), as part of the educational process, and even the culture of people (He et al., 2020).

Another important factor that contributes to the behavior and decision-making process of humans is the mass media (Ma, Seenivasan & Yan, 2020) through its role of communicating relevant events to the mass public, such as environmental science results (Junsheng et al., 2019), social events (Imtihani, 2014, Chen, & Stoecker, 2020) or political representation (Khalida et al., 2013).

While the mass media has its role in influencing the development of sustainable food consumption (Isernia & Marcolin, 2019), a specific segment of the media steals the attention regarding influencing sustainable food consumption, and that is social media (Simeone & Scarpato, 2020). The power of social media may act both

positively, through raising awareness on local food or purchasing concerns (Simeone & Scarpato, 2020), as well as household waste management (Jiang, Van Fan & Klemeš, 2020), but it may also produce negative effects due to the lack of trust in social media posts for a considerable number of consumers (Stephen, 2016).

The social media is a new marketing tool for small scale or large-scale producers due to the real time possibility of engaging consumers (Cao et al., 2020; Abeza et.al, 2020) by giving them the opportunity to interact and express their liking or disliking of a product or service through the "like", "share" and even "comment" or "review" options (Proserpio & Zervas, 2017; Pentina, Guilloux & Micu, 2018). Also, social media networks are used for improving communication related to health awareness (Young et al., 2020), social engagement (Alkashri et al., 2020) and even tourist destination choice (Palazzo et al., 2020). New learning opportunities have been developed based on the use of social media networks that are closer to the youth's liking (Ansari & Khan, 2020). Yet, the free access to almost any discussion on social media networks may have its downsides, generating conflicts (Dineva et al., 2020), aggressivity (Sadiq et al., 2020), cyberbullying (Abaido, 2020; Craig et al., 2020) and even favor the activity of sex offenders (Caputi et al., 2019), wildlife traffickers (Xu, Cai & Mackey, 2020), drug traffickers (Jones et al, 2020) and other types of criminals (Resende de Mendonça et al., 2020).

Materials and Methods

For determining the attention researchers pay to the influence of social media networks in regard to sustainable food, a bibliometric analysis based on the results found on the Scopus data base will be used. The key words used for retrieving this batch of articles is "sustainable" and "food" and "in" and "social" and "media".

To complete the bibliometric analysis a visual summary of the most important sub-topics used in the Scopus retrieved article abstracts will be generated using the Vosviewer software, based on word frequency.

The analysis will be completed by using social media analytics (Camacho, Luzón & Cambrie, 2020) on the topic of sustainable food for determining the interest and engagement of users. Two popular networks will be analysed (Antonakaki, Fragopoulou & Ioannidis, 2020): Twitter and Facebook. Twitter is more text-based sharing platform (Antonakaki, Fragopoulou & Ioannidis, 2020). Facebook is a mixed platform, based both on visual and text content (Dogruer, Menevi & Eyyam, 2011).

For determining the appearance of the sustainable food topic on social media, the BuzzSumo platform was used, as a quantitative analysis provider based on internet posts regarding topics searched by a user (Moscadelli et al., 2020; John, 2019).

Results and Discussion

The results of the Scopus database search phrase returned 488 articles, the first one being published in 1999. In the following figure the evolution of indexed articles in Scopus data base on the considered topic may be seen.

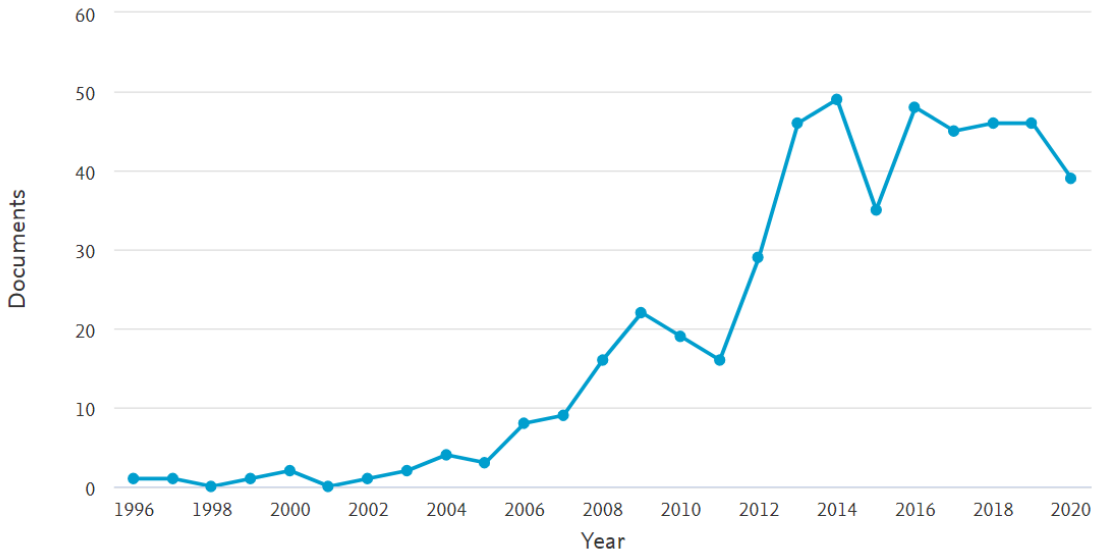

Fig. 1: Time evolution of articles indexed in Scopus on the topic of "sustainable food in social media"
Source: Scopus, analyze results based on TITLE-ABS-KEY, 2020

The maximum number of articles on this topic indexed in Scopus was 50 in 2014. The overall interest of researchers on this topic is increasing, even if it has a fluctuating trend.

There is only one author with four articles on this topic, but there are other eight authors with three papers on the topic. Yet, most of the authors who appear on the list of this topic have only one article that responds to this search phrase.

Considering the countries that generated most of the retrieved articles, they may be seen in the following figure.

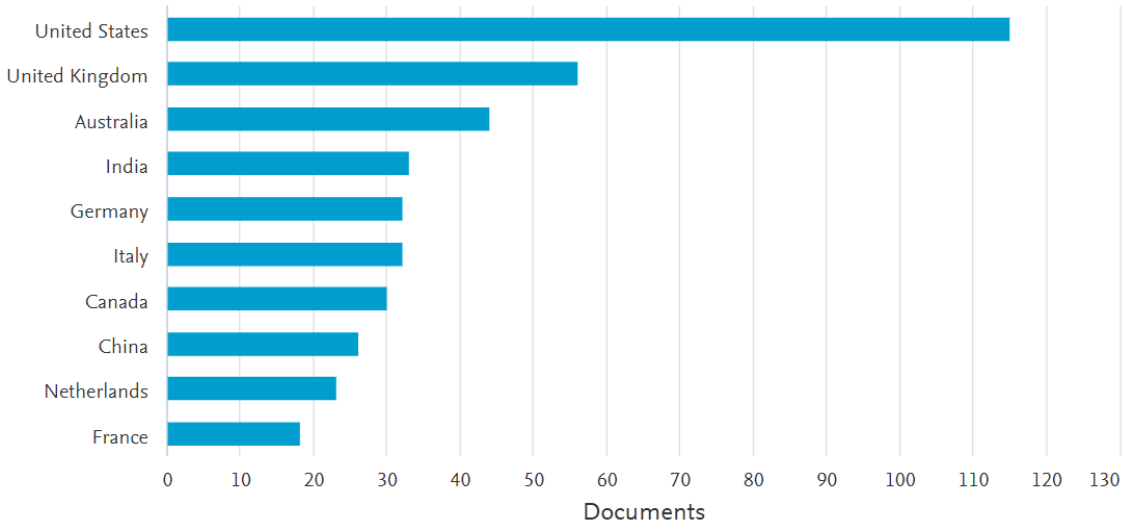

Fig. 2: Origin country of articles indexed in Scopus on the topic of "sustainable food in social media"
Source: Scopus, analyze results based on TITLE-ABS-KEY, 2020

The countries that serve as origins for most of the indexed articles in the Scopus data base are United States of America (115), United Kingdom (56), Australia (44), India (33) and the top 5 publishing countries is completed by Germany (32).

Considering the type of document, the allocation by types may be seen in the following figure:

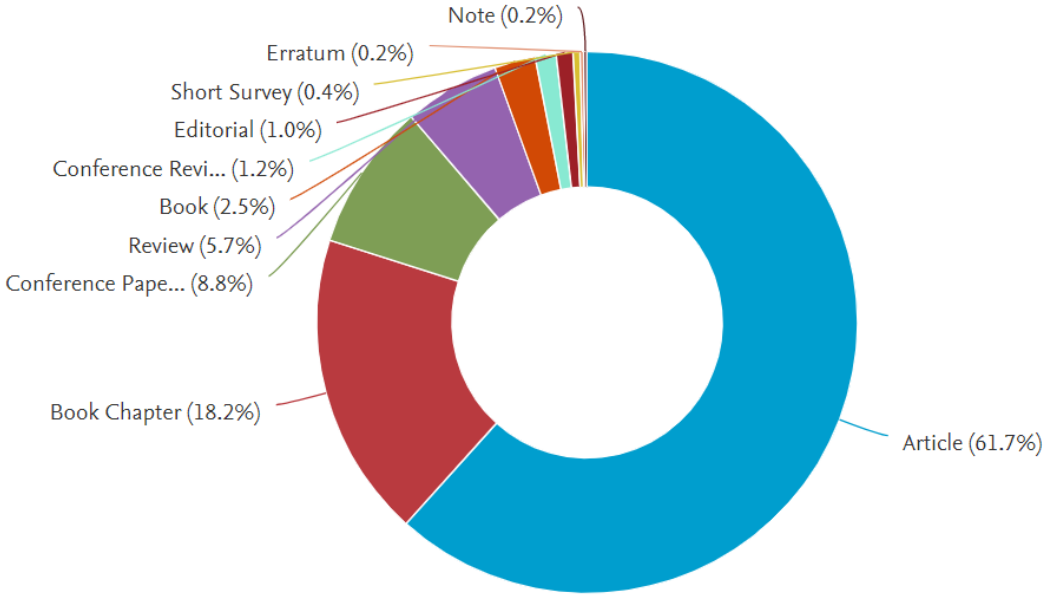

Fig. 3: Document type of articles indexed in Scopus on the topic of "sustainable food in social media"
Source: Scopus, Analyze results based on TITLE-ABS-KEY, 2020

More than 60% of the documents are scientific articles, published in respected journals, 18.2% are book chapters and 8.8% are conference papers, while less than 8% are other types of documents. This may be seen as a considerable commitment from the authors to developing this topic.

As a summary of the sub-topics that can be found in the articles retrieved from the Scopus database on the topic of "sustainable food in social media" the Vosviewer software was used. The obtained map may be seen in the following figure.

The total number of words in the 488 abstracts is 15558, 472 terms appear with a frequency of at least 10 times in the corpus. On the map appear the words with the highest frequency (283). The shades between light and bright yellow represent the intensity of use for these sub-topics.

There are two main categories that raise the interest of researchers. First, the actors' category, meaning the groups that appear in the articles as those implicated or summoned on social media to act in the area of sustainable food: the industry and the consumers. Second, the motivations category, formed from the most discussed reasons/motives on social media for considering sustainable food: health and climate change. Another category that has started to form may be named solutions and is composed by crop, aquaculture, insect, biomass. The other sub-topics are still underdiscussed and cannot be clustered into categories.

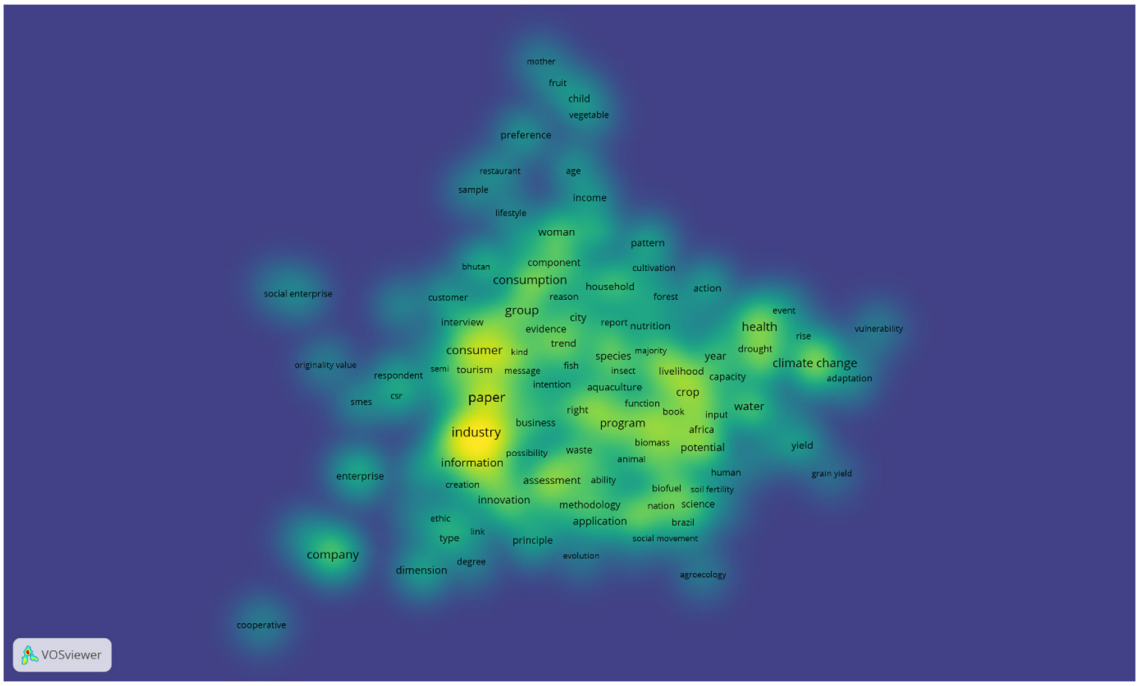

Fig. 4: Density map for the sub-topics used in the 488 Scopus articles on "sustainable food in social media"
Source: authors own abstracting using the Vosviewer software

The secondary purpose of the paper is accomplished, the interest of researchers is on an increasing scale. The study of social media use in communicating specific messages for consumers has shed a new light on marketing tools, as well as, bringing new specific tools and methods of study.

Through the use of the BuzzSumo platform, the total content of posts related to sustainable food was retrieved and analyzed. In this case, the first search on this analytics platform was the obvious one "sustainable food". In the following figure, the word cloud generated by this search may be seen.

Fig. 5: Word cloud generated by BuzzSumo using "sustainable food" search phrase
Source: authors' own abstracting using BuzzSumo

The total number of concepts used in relation to sustainable food is small, only 15, showing a concentration of these specific ideas. Based on their frequency of use, we may conclude that the influencers or those who post on this topics debate more around the issues of food security, food production and food system, but topics such as health and healthy eating, sustainable agriculture and technology and climate change receive an increasing amount of attention.

Fig. 6: Word cloud generated by BuzzSumo using "local food" search phrase
Source: authors' own abstracting using BuzzSumo

Compared to the word concentrated word cloud generated by the "sustainable food" search, the "local food" phrase generates a considerably larger number of topics related to or included in it. It is important to notice that "locally sourced food" is the center of discussion, along with "buy local", "food bank" and "food option", all of them being areas of interest in sustainable food and food security. The relation between food and tourism is also an exploited topic as it is revealed in the figure above. Food alternatives such as "organic food" or "vegetarian food" are included in the "local food" discussion.

Related to the total number of posts and engagement on the topic of sustainable food, BuzzSumo generated the following figure for the September 2019 – September 2020 period.

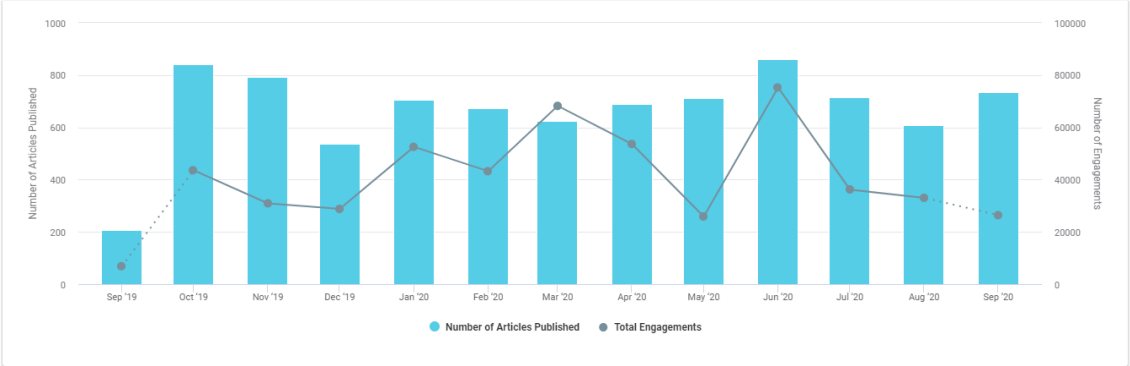

Fig. 7: Total posts and engagement generated by BuzzSumo using "sustainable food" search phrase
Source: authors' own abstracting using BuzzSumo

A total number of 8,448 posts were found by this searching phrase in the analyzed time frame and they summed up a total of 510,445 engagements from users, including likes, shares, or retweets. The highest engagement was registered in June 2020, while the lowest was registered in September 2019.

When using the "local food" search term, as an alternative for the first one, BuzzSumo provides significantly more results, as it can be seen in the following figure.

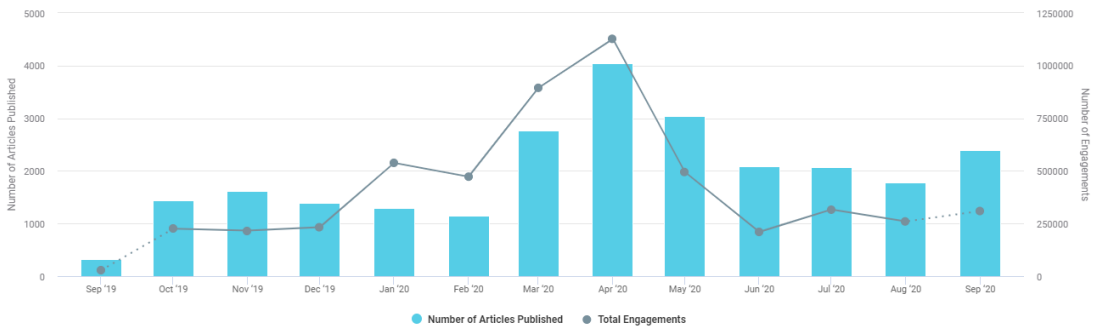

Fig. 8: Total posts and engagement generated by BuzzSumo using "local food" search phrase
Source: authors' own abstracting using BuzzSumo

In September 2019 – September 2020 period, a total number of 24602 articles were posted online and had a content related to local food. The total engagement was of 5,153,887 considered any user interaction with the posts. April 2020 was the month with both the highest number of posts and engagement from users, while September 2019 was the month with the lowest number of posts and engagements in the analyzed time frame.

Considering which social network received the highest attention from users, the following figure provides a clear image.

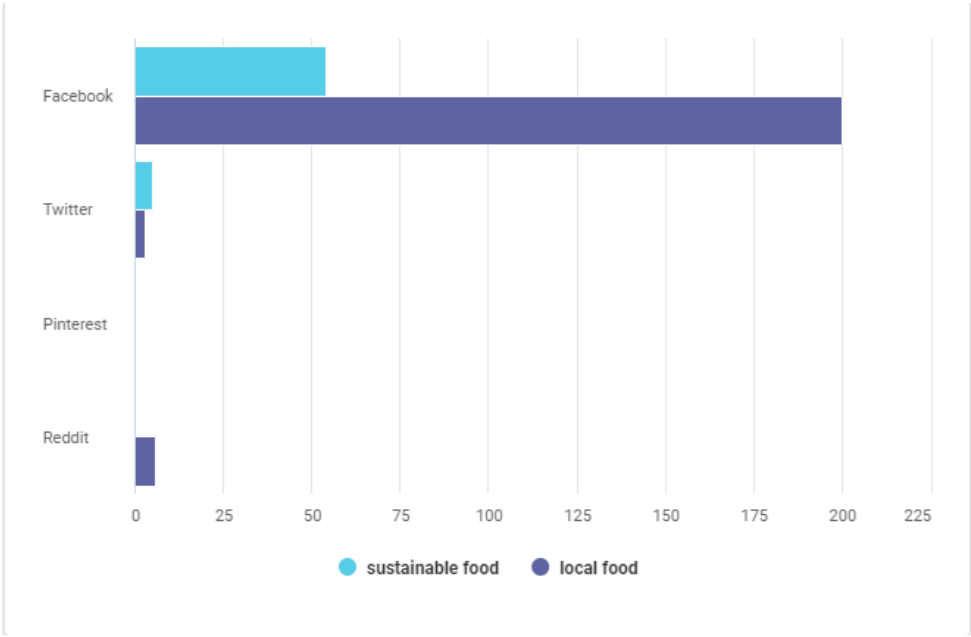

Fig. 9: Most engaging platform as generated by BuzzSumo
Source: authors' own abstracting using BuzzSumo

Facebook is the leading social network in what regards user engagement, followed from a considerable distance by Twitter. The highest engagement was received by local food posts, with 200 engagements, while sustainable food engaged little over 50 users on Facebook. Twitter engaged less than 10 users in both cases. Other networks such as Reddit or Pinterest receive even little interest on this topic.

Considering the type of reactions among Facebook users, as the most engaging social network platform on these topics, based on emoticons expressing user emotions, the following figure presents the most common reaction generated for the two considered topics.

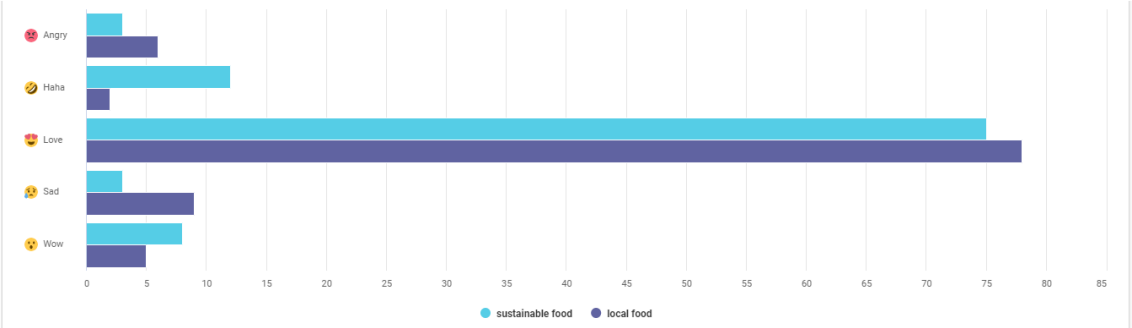

Fig 10: Most used reaction in relation to the searched phrases as generated by BuzzSumo
Source: authors' own abstracting using BuzzSumo

The most encountered reaction among users engaged in the topics is "love" for both alternatives, followed by the amusement reaction and the amazement reaction. The negative reactions of sadness and angry are the least used, per total. Yet, the local food related posts generate a sad reaction to almost ten users.

Conclusion

Considering the increasing interest that both sustainable food and social media influence had on various areas, the present research aimed at shedding some light on the possibility of using social media as a locomotive for changing the current food consumption pattern into a more sustainable one.

Drawing on other studies, the influence of social media is hard to control, generating both positive and negative effects for and from the users of social media networks. Yet, the benefit of international open access for every user is undeniable when thinking about the possibility of offering information and educating large groups of consumers.

Based on the bibliometric analysis of the articles indexed in Scopus database, the results show that researchers have an increasing interest in studying this particular topic, both qualitatively and quantitatively. Considering the large number of approaches, it is still difficult to see well defined clusters of sub-topics, but the actors implicated in sustainable food and the main motivation to choose this type of food are starting to take contour.

Through the use of BuzzSumo platform a quantitative analysis was performed in order to determine if there is any interest for using social media platforms to communicate about sustainable food and to see what kind of engagement these posts generate. Two popular social media platforms were considered: Facebook and Twitter.

Looking at the quantitative results, we may notice that there is also an increasing interest for this topic on both social media platforms considered, but Facebook secures its role as leader in relation to the considered topic. Both the number of posts on the topic and the number of engagements is higher on Facebook than on Twitter.

The alternative search for "local food" generated considerably more results than the "sustainable food" one. One possible explanation might be the difference of word difficulty between the two words, local may seem more accessible for a larger number of people, giving them the confidence to express their engagement through the "like", "share" or "comment" options. Yet this is a hypothesis that needs to be further developed.

Some limitations for this study may be generated by the fact that a trial version of the BuzzSumo platform was used and the search phrases were selected by the authors to be comprehensive, yet a number of synonyms might generate different results.

The study should be of interest to researchers, as it contributed to developing a niche type of analysis on a tool that still needs a lot of attention, to users of social media platforms, in order to better understand and use their activity on these platforms, and not least, to administrators of social media networks who should be more aware of the importance of their tools in the larger context of sustainable development.

Acknowledgment

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Sustainable Development And The Problem of Corruption in Post-Communist Countries

Mykola LAKHYZHA
Professor of the Department of Public Administration, Institute for Personal Training of the State Employment Service of Ukraine, 03038, Kyiv, Ukraine, e-mail: lahisha@ukr.net

Tamara LOZINSKA
Head of the Department of Public Management and Administration, Poltava State Agrarian Academy, 36003, Poltava, Ukraine, e-mail: tnloz@rambler.ru,

Abstract

The article is devoted to the study of the problem of sustainable development in post-communist countries using the analysis of the practice of the European Union on the observance of the optimal ratio between the satisfaction of modern needs of society and the preservation of opportunities for this in the future. It is noted that in post-communist countries, the task of promoting sustainable development is complicated by the need to transform the entire system of public relations. It is concluded that there is a relationship between the level of corruption and economic development of countries. The difference between the indices of competitiveness and the perception of corruption indicates the presence of specific national factors that determine the scale of corruption.
A sociological survey of public officials revealed the presence of both political and mental determinants. The key problems of overcoming corruption are highlighted and the range of main tasks for combating corruption is outlined.

Keywords: Sustainable Development, Prevention of Corruption, Post-Communist Transformation, Civil Society, Experience of Post-Communist Countries.

Formulation of the Problem

The concept of sustainable development (CSD) is one of the most attractive because it aims to reconcile the economic, social and environmental components of society. The formation of the CSD was carried out under the influence of the ideas of V.I. Vernadsky on the Noosphere (early twentieth century), the Declaration of the First United Nations Conference on Environment and Development (Stockholm, 1972), the Second United Nations Conference on Environment and Development (Rio de Janeiro, 1992), the Kyoto Protocol (Kyoto, 1992, 2005), the UN World Summit (Johannesburg, 2002), the Third UN Conference on Sustainable Development (Rio de Janeiro, 2012), the UN Summit on Sustainable Development (New York, 2015)) (Stages of emergence and formation of the concept of sustainable development, 2020; Sustainable Development Goals: Ukraine (national report, 2017). Acquaintance with the listed documents testifies that since 1992 until 2012, for 20 years, the world community emphasized the need to strive for balanced rather than sustainable development. The efforts of scientists were aimed at solving a complex problem - finding a compromise between the consumption of resources and the volume of their reproduction within economic systems, different in level of development. Reducing the level of corruption in all its forms is extremely important for sustainable development, as corruption undermines the economic stability of states through the shadow economy, and the restriction of competition leads to inefficient allocation of resources and newly created value in society and negatively affects the quality of goods and services.

The Sustainable Development Strategy "Ukraine - 2020", approved by the Decree of the President of Ukraine (Decree of the President of Ukraine, 2015), identifies 5 areas of activity: employment, climate change and energy, research and innovation, education, poverty alleviation. Agreeing with the allocation of economic, social and environmental components of the Sustainable Development Strategy as the main ones, it is necessary to understand that the presence of mental changes and political will becomes a necessary condition for the implementation of its tasks. Accordingly, increasing attention is paid to identifying and taking into account both the factors of positive impact on sustainable

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development and obstacles, the most notable of which is corruption. Thus, the study of the impact of corruption on sustainable development is an urgent task for Ukrainian scientific thought.

A review of the Special Literature

A review shows a significant attention of the public, politicians and scientists both to the issue of sustainable development and to the prevention of corruption. Thus, in Ukraine in 2005 the results of thorough marketing research of the global perspective and sustainable development of the country were published Belarus O.G., Matseyko Y.M. (2005), there were data of scientific research on sustainable development in the EU Perga. T. (2017), which were based on studies of European scientists in the late 90's - early 2000's Carew-Reid J., Prescott-Allen R., Bass S., Dalal-Clayton B. (1994); Meadowcroft J. (2007)**.** It should be noted that the rapid growth of attention to the problems of sustainable development was caused by the studies of D. Forrester (1971) and D. Meadows (1974), which they conducted on behalf of the Club of Rome and which concerned the definition of economic growth. As the authors' conclusions about the growth of environmental problems were disappointing, the search for causes of disruption of economic systems and ways to reduce the risks of environmental degradation. In Ukraine, in particular, intensified research on anti-corruption issues, which was recognized as one of the serious threats to sustainable development Novak A. (2018), and encouraged the study of international experience and taking into account the recommendations of the European Union. "… The need to respond to threats and problems, the source of which is corruption ..", according to T.V. Ilyenok, contributed to the development of international regulations to prevent corruption Ilyenok T.V. (2013). Ukraine's aspirations for integration with the European Union have had a positive impact on the development of anti-corruption mechanisms Moldavan E.S. (2012); Prokhorenko O. Ya. (2011). Also noteworthy are the results of sociological research on the state and causes of corruption in Ukraine, posted on the website of the National Agency for the Prevention of Corruption (Official Website of the National Agency for the Prevention of Corruption, 2020).

Thus, the purpose of the study is a continuation of the identification of the potential and real impact of corruption in post-communist countries on the implementation of the concept of sustainable development in order to develop proposals for minimizing corruption risks.

Research Methodology

The study takes into account the methodological foundations of sustainable development, in particular its components and principles, as well as determinism. The scientific research was based on the results of research and conclusions of scientists, whose work served as a source base for the theory of sustainable development and the theory of corruption. Along with a brief review of the specialized literature, the method of comparative analysis was also used to identify the main factors influencing sustainable development and to establish the degree of influence of the scale of corruption. The method of retrospection was used to compare the stages of formation of the concept of sustainable development in European countries and Ukraine.

The results of the application of the index organization method of determining the perception of corruption by the international organization Transparency International were used to compile a rating of countries on this indicator and the competitiveness index. The analysis of identifying the main factors of corruption was carried out using the methodology of sociological research, namely - a survey of government officials on the causes of corruption.
To obtain secondary and primary information used:

- scientific publications and national reports;
- legal documents of national and international levels;
- research results published on the official websites of the National Agency for the Prevention of Corruption and Transparency International;
- data from empirical studies obtained by the authors during trips to Armenia, Georgia, Bulgaria and Poland.

Identification of Sustainable Development

Based on numerous attempts to define the essence of the concept of "sustainable development", the latter can be identified *as a process of balancing productive forces, meeting the needs of all members of society while maintaining and constantly reproducing the integrity of the environment and maintaining a balance between its potential and society.* Based on this interpretation of this concept, the main features of sustainable development are attention to man, taking into account not only the positive but also negative consequences of economic development and the desire to preserve natural diversity for future generations. This broad concept has a national specificity, especially noticeable in post-communist countries that are at different stages of development and are part of various international entities: the European Union, the Commonwealth of Independent States, the Eastern Partnership. Among the post-communist countries, the most acute problems of balancing economic, social and environmental development are manifested in the former Soviet republics (except for the Baltic countries and the former Yugoslavia). If EU member states have committed themselves to implementing the principles of sustainable development, enshrining them in the provisions of the Amsterdam Treaty (1997) as a comprehensive goal of EU policy and developing an appropriate Strategy Review of the EU Sustainable Development Strategy (2006), Ukraine, despite acknowledging the problem, announcing its intentions and acceding to international documents, has failed to take real action to ensure sustainable development.

Perception of the idea of sustainable development in post-communist countries

An analysis of regulations and other materials governing measures to ensure sustainable development in post-communist countries shows both the importance of this issue and its breadth and a number of complex tasks that need to be addressed, which is hampered in many cases by incomplete post-communist transformation. Our retrospective analysis leads to the conclusion that discussions on sustainable development began in the post-communist countries in the mid-1990s, which, in our opinion, was largely due to the desire to integrate with the European Union and the European Union's support for those preparing for EU membership. Common in the policy of sustainable development of post-communist countries was their accession to EU programs, coordination of sustainable development tasks at the national and regional levels with the tasks of the EU, the creation of mechanisms to support sustainable development. However, already in setting priorities for sustainable development in these countries, national characteristics emerged, such as economic corruption, which prompted governments to identify additional tasks. In most countries, the prevention of corruption was limited to a declaration of intent for good public governance with respect to the principles of openness and transparency in government, but in practice no significant progress was made in minimizing corruption risks.

Ranking of post-communist countries by indices of competitiveness and perception of corruption

Compilation of annual rankings of countries according to the Corruption Perceptions Index allows tracking the achievements and failures of post-communist countries in the field of combating and preventing corruption (Table 1).

The difference between the competitiveness and corruption scores given for each country suggests that corruption in many countries is closely linked to the level of economic development. Observing the relationship between the level of economic development and the fight against corruption, it should be noted that political factors and the mentality of the population are also important. In our opinion, relying on the political will of the leadership and the mentality of the population, it was possible to significantly reduce the level of corruption in countries such as Georgia, Estonia and Montenegro and precisely because of lack of political will and corruption of the population failed to achieve this in Russia, Azerbaijan, Kazakhstan. Ukraine and Moldova. It is characteristic that all these countries are former republics of the USSR and are not part of the EU.

Table 1 : Ratings of post-communist countries according to the Competitiveness (IC) and Perceptions of Corruption (PC) indices, 2019

Country	Place for IC	Place for PC	The difference in points	Country	Place for IC	Place for PC	The difference in points
Estonia	31	18	13	Serbia	72	91	-19
Czech Republic	32	45	-13	Montenegro	73	68	5
Slovenia	35	38	-3	Georgia	74	46	28
Poland	37	43	-6	Albania	81	106	-25
Lithuania	39	37	2	Moldova	86	120	-34
Latvia	41	47	-6	Ukraine	85	129	-44
Slovakia	42	59	-17	Mongolia	102	112	-10
Russia	43	144	-101	Belorussia	-	67	
Hungary	47	70	-23	Bosnia and Herzegovina	-	101	
Bulgaria	49	74	-25	Northern Macedonia	-	111	
Romania	51	71	-20	Kyrgyzstan	-	128	
Kazakhstan	55	114	-59	Tajikistan	-	156	
Azerbaijan	59	126	-67	Uzbekistan	-	157	
Croatia	63	63	0	Turkmenistan	-	167	
Armenia	69	77	-8				

Source: compiled by the authors according to the data (Insight Report. The Global Competitiveness Report, 2019; CPI. Global highlights, 2019).

The threatening impact of corruption on the country's economic capacity has prompted the Ukrainian authorities to reform the system of public administration, one of the tasks of which has been to institutionalize anti-corruption activities. In recent years, the country has developed an anti-corruption legal framework and created special institutions. In 20914, the Verkhovna Rada of Ukraine passed a number of anti-corruption laws and decided to establish a specialized anti-corruption body - the National Anti-Corruption Bureau of Ukraine (NABU). In connection with the strengthening of the anti-corruption component in the activities of the Ukrainian authorities, the positive experience of neighboring countries, which managed to achieve significant success in the fight against corruption, as well as the analysis of anti-corruption methods in countries with high levels.

Poland's experience in combating corruption

In the early 1990s, there was a penetration of corruption in all spheres of life in Poland. The level of corruption increased significantly during the post-communist transformation due to the change of value orientation and weakness of state structures, taking the form of clientelism, nepotism and nepotism. During this period, shock therapy, administrative and other reforms related to the decentralization of public administration have gradually changed the economic, political and social situation, as well as the mentality of the population. As a result of a series of high-profile political scandals, corruption became perceived by the authorities and society as a threat to the security of the state, which forced the government to develop anti-corruption measures. Prior to joining the EU, according to Polish scholars Bak M., Kulawczuk P., Szczesniak A. (2001), corruption was a significant barrier to Poland's economic development, as it not only distorted competitive processes in the economy, but also hampered the integration process. Polish economy with the European Union. Positive developments in the fight against corruption began to take place after the adoption of the Law of the Republic of Poland of 16 November 2000, “which established a new state financial intelligence body, which provides for the implementation of the following tasks: cessation of criminal activity in the

financial sector. institutions that oppose the use of illegal sources of income ”Szamrej-Baran I., Baran P., 2014; Suprun T.M. (2017).

Awareness of the importance of the fight against corruption for building a democratic society in Poland has grown through EU action, which has been particularly evident in the run-up to accession and in the first years of membership. The economic and social achievements of the country within the framework of the implementation of the sustainable development strategy were of significant and perhaps crucial importance. There is a noticeable shift in Poland from anti-corruption to prevention, which is especially evident in the growing attention to the ethical principles of public servants and the creation of a system of anti-corruption training. The main factors for reducing the level of corruption were: the formation of anti-corruption public opinion, which was facilitated by the high level of religiosity of the population; purposeful activity of authorities; high-quality institutional support for anti-corruption activities.

Fight against corruption in Bulgaria

Bulgaria is an example of a country that is a member of the EU, but has not made significant progress, either in ensuring sustainable development or in preventing corruption. As noted in the Report "Strategic Directions for Preventing and Combating Corruption. 2015-2020 » "Corruption is one of the most serious problems of democracy in Bulgaria" Strategic Guidelines for Prevention and Counteraction to Corruption (2020). Bulgarian authors draw attention to political corruption, corruption in the public administration, the judiciary and the economic and financial spheres, emphasizing that it is political corruption that determines the nature and trends of corruption in other areas, as evidenced by anti-corruption protests in Bulgaria in recent years. arose constantly and increased in August-September 2020. A number of strategic anti-corruption documents proved ineffective, and studies conducted by Bulgarian scientists indicate "про stagnation in the fight against corruption" Shopova P. (2019).

The situation is even more difficult in states that have not yet become EU members, in particular, in Ukraine and a number of other republics of the former Soviet Union, where the processes of post-communist transformation are still incomplete, and economic and social tasks, burdened by the problem of external debt, enter contrary to the objectives of sustainable development.

Specifics of anti-corruption in the Republic of Kazakhstan

The Republic of Kazakhstan is under constant anti-corruption monitoring by international organizations. The 2011 monitoring report provides an optimistic assessment of the state of the fight against corruption, highlights the authorities' attention and a number of important reforms. The high level of corruption in Kazakhstan is recognized by the authorities, which periodically announce anti-corruption campaigns. For example, former President of the Republic of Kazakhstan N. Nazarbayev declared a "holy war" on corruption, "10 anti-corruption measures" were adopted, but not only many high-ranking officials, but also the president's family were involved in corruption scams (Kazakhgate).

As in Russia, in Kazakhstan, in addition to domestic corruption, corruption plays a significant role in the development of useful deposits. For example, Nazarbayev's grandson pointed to corrupt interaction between the governments of the two countries (Nazarbayev's grandson asked for political asylum in Britain, 2020), and British journalist N. Kochan, as a result of an expert visit to Kazakhstan, notes that corruption in Kazakhstan is glaring because of power and business Kochan N., (2014). After the change of government, the anti-corruption situation has not changed significantly.

Imitation of the fight against corruption in the Russian Federation

In Russia, the fight against corruption is widely declared by the authorities. For example, the fight against corruption was included in the Concept of Russia's presidency in Group 20 in 2013. The Russian government regularly reports its fight against corruption to a special group of the Council of Europe, but in the vast majority of cases it is a formal or incomplete fulfillment of obligations. Thus, the report of the Group of States against Corruption for 2019 noted that Russia has implemented satisfactorily only 9 of the 22 recommendations. At the same time, according to public activists, GRECO monitoring often receives information from the Russian authorities without verification and public

consultation Logvinova M., (2020). Independent researchers from the Coalition for Sustainable Development of the country noted the need to change course in ensuring access to justice and control of corruption. Independent researchers from the Coalition for Sustainable Development of the country noted the need to change course in ensuring access to justice and control of corruption. To reduce corruption and create effective, accountable and transparent institutions, it is proposed to improve the anti-money laundering system, review public procurement practices, criminalize bribery, and facilitate access to information.

Features of anti-corruption in the Republic of Moldova

In Moldova, corruption is systemic. According to expert surveys, on average, one citizen gave bribes 5 times a year, and an entrepreneur - at least 3. The specificity of the Moldovan economy is a high level of oligarchization, which can not but affect the government and increase corruption. A clear example of impunity was the embezzlement of $ 1 billion from three state-owned banks in 2014-2015 “Can Moldova emerge victorious from the grueling fight against corruption?”(2020).

Successes and problems of corruption prevention in Ukraine

In Ukraine, since 1997, work has begun on the implementation of the provisions of sustainable development. In 1998, the National Commission for Sustainable Development of Ukraine under the Cabinet of Ministers of Ukraine was established and a government draft of the concept of sustainable development of Ukraine was prepared. In December 1999, the Resolution of the Verkhovna Rada of Ukraine “On the Concept of Sustainable Development of Settlements” was adopted, according to which the state undertook to create conditions for a full-fledged living environment. In April 2003, the Resolution of the Cabinet of Ministers of Ukraine "On Approval of the Comprehensive Program for the Implementation at the National Level of Decisions Adopted at the World Summit on Sustainable Development for 2003-2015" was adopted. The Ukraine 2020 Sustainable Development Strategy states that a key basis for security should also be the provision of fair and impartial justice, the immediate cleansing of government at all levels and the implementation of effective anti-corruption mechanisms. Issues of preventing corruption are constantly on the agenda of the Ukrainian authorities, examples of which are frequent changes and clarifications of legislation, the announcement of anti-corruption campaigns, the creation of special anti-corruption bodies and more. Experience shows that the main problem remains political corruption, which is facilitated by the mentality of the population.

Conducted by the authors during seminars on anti-corruption held in 2019 in Kyiv, Kyiv and Poltava regions of Ukraine for civil servants, the survey of students allows to identify and rank the factors of corruption (Table 2).

Table 2: Results of the survey of civil servants of Kyiv and Poltava regions. on identifying the causes of corruption in Ukraine, 2019 (a total of 250 respondents)

№	Corruption factor	Number of respondents who named the relevant reason	Share of the total number of respondents, %
1	Imperfect legislation	110	44,0
2	Socio-economic problems	95	38,
3	Uncontrollability and impunity	77	30,8
4	Low level of remuneration of civil servants	64	25,6
5	The mentality of the population	58	23,2
6	Ignorance of laws by the population / low level of legal culture	45/5	20,0
7	Imperfect judicial system	30	12,0

8	Nepotism / Intertwining of power and business	24/16	16,0
9	Political and economic instability	23	9,2
10	Inflated, unprofessional bureaucracy	23	9,2
11	War / Use of its power	8/6	5,6
12	Weakness (absence) of civil society	14	5,6
13	Lack of political will and anti-corruption system	11	4.4

Source: compiled by the authors based on the results of the analysis of questionnaires.

As we can see, drawing on the experience of foreign countries in developing anti-corruption legislation and establishing specialized anti-corruption bodies has not yet made significant progress in preventing corruption. Experts of the Organization for Economic Cooperation and Development (OECD), monitoring specialized anti-corruption bodies, concluded that the functioning of such bodies in some countries shows more negative practices than successful ones. Having made an attempt to systematize the causes of failures of specialized anti-corruption organizations in Ukraine, we come to the conclusion that the main ones are:

– imperfection of the legislation, which is manifested in the vague wording of the rights and responsibilities of anti-corruption bodies;

- bureaucratization of the management staff, focus on formal features of activities, non-transparency of decision-making procedures;

- redundancy of administrative regulation of economic life, which has not been reduced;

- lack of political will;

- weakness and low professional level of the government opposition, underdevelopment of civil society;

- the custom of petty bribery in all spheres of public life, which does not cause significant public condemnation.

We consider it necessary to make a number of proposals aimed at reducing corruption risks in the public administration system, in particular those related to sustainable development.

1. Since one of the common corruption risks is vaguely written rights and responsibilities of public officials, which allows them to make their own decisions (in legal practice it is about expanding discretionary powers), it is advisable to insist on reducing the proportion of evaluative judgments in regulations. , such as: "if necessary", "under adverse conditions", "in special cases", etc. This will reduce the impact of discretionary powers on business regulation and business support.

2. It is necessary to continue the practice of using information technologies in public administration and expand their capabilities (creation of administrative service centers on the principle of "single window", synchronization of databases of government agencies, electronic queues, etc.), which significantly reduces business time and prevents direct contacts between officials and clients.

3. Digitalization of public services in Ukraine has the peculiarity of using paper analogues in parallel with electronic documents, and therefore it is necessary to gradually abandon the paperwork, which will have economic, social and environmental effects.

4. It is necessary to reduce the number of instances from which it is necessary to obtain approval or confirmation. Sometimes the usual awareness is not enough, and therefore there is a need to place explanations on the websites of organizations, premises and advisory support of entrepreneurs not only through advisory bodies, but also through other executive bodies..

The study shows that in post-communist countries, addressing sustainable development and combating corruption depends to a large extent on the state of civil society, the political will of the leadership and the quality of public administration..

Concluisons

Retrospective analysis allows us to conclude that the combination of transformational and sustainable development goals in post-communist countries. The incentive role of the European Union is noticeable, and the implementation

of its recommendations and the use of financial assistance have significantly facilitated and accelerated the transition period, having a positive impact on addressing socio-economic, environmental issues and preventing of corruption. In post-communist countries, there is a shift in emphasis from anti-corruption to prevention, which is especially evident in the growing attention to the ethical principles of public servants and the creation of an anti-corruption training system.

There are significant differences between post-communist countries, both in terms of sustainable development and in terms of preventing of corruption. The countries that became members of the EU, first of all Poland and the Baltic States, achieved the best results. Economic and social achievements in the framework of the sustainable development strategy were essential. However, the main factors for this were: the formation of anti-corruption public opinion, which was facilitated by the high level of religiosity of the population; purposeful activity of authorities; high-quality institutional support for anti-corruption activities.

The low efficiency of the anti-corruption bodies established in Ukraine prompted the identification of the reasons for the weak impact on corruption and the outlining of proposals to reduce corruption risks in the public administration system.

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The Expectations and Challenges of a New Generation Leader

Dorota BALCERZYK

Dr., Assistant Professor at the Faculty of Management of the General Tadeusz Kościuszko Military University of Land Forces in Wrocław
Email: dbalcerzyk@interia.pl, ORCID iD: 0000-0003-3948-7146.

Abstract

The publication deals with an intergenerational team's conditions and specificity that pose a challenge for a manager with leadership ambitions. The article aims to provide a research report. It presents the perspective of the millennial generation (Gen Y) and its expectations towards the leader. The research results are part of the search for new directions of leadership. In the digital age, expectations towards a leader are surprisingly traditional. Authenticity, social competencies, shared values, and trust turn out to be priorities for the young generation.

Keywords: Leadership, Leader, Generational Cohorts, Generation Y, Trust.

Introduction

Information technology undoubtedly influences the way the millennial generation lives and works; it determines their needs and preferences. The Millennials constitute the youngest of the generational cohort. The work identifies some of the differences between generations and their impact on functioning as an employee. There are recognized preferred advantages in the workplace and the generations' strengths and weaknesses. The young generation is seen as a challenge to contemporary leadership. The stereotype functioning among employers describes them as lacking authority and demanding. The leader's role is to reach out to every group, every member of the team, and make them follow him/her. One cannot speak of a leader without followers. Referring to Kupperschmidt (2000), it can be emphasized that when managers and co-workers do not understand the generational differences, conflicts arise, and job satisfaction and productivity decrease.

Despite the pressure of success and constant changes in the environment, today's leaders should understand that getting to know people's opinions, needs, and expectations are crucial to lead them. Hence, the author's goal was to learn about the young generation's views on leadership and their expectations towards a manager with leadership ambitions.

The Employees' Specificity and Generational Peculiarities

The study by Erst & Young (2013) confirms that managing a multigenerational team is a challenge. In the literature (Espinoza 2018, Lyons et al. 2015, Ruth et al. 2013), there is a division into generational cohorts: silent generation, baby boomers, generation X, generation Y, and generation Z.

The smallest generation is the "silent generation," which includes people born between 1925 and 1942. They make up a small percentage of the workforce. They grew up in the Great Depression; hence, they were loyal to the employer, and their ethos was based on cooperation with the system. The next distinguished generation is "baby boomers." Their representatives were born in the years 1946-1964 and are the so-called post-war baby boom generation. Baby boomers grew up in times of high demand for employees when employers took care of them. They were taught that the work ethic is essential. They were socialized to socialization. There are increasingly fewer representatives of those two generations, i.e., people aged 55+, on the labor market.

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The generation X are the "baby boomers'" daughters and sons born in 1965-1979. They entered the labor market in difficult times. In Poland, it was the time of changes and re-privatization and the first period of unemployment. They witnessed their loyal parents lose their jobs. When looking for employment, they focused on development. There are more people with higher education (almost twice as many as in their parents' generation). They value personal development, independence, diversity, and diligence. Unlike baby boomers, they are result-oriented, not process-driven. The generation X is the first to objectify work and treat it as a transaction. The generation X is often skeptical and pessimistic. They are sometimes distrustful of their superiors. They do not allow themselves to make mistakes, which they treat as a personal failure. It is harder to find multitaskers among them. The generation X uses computers and smartphones; they are familiar with the technology. However, they can be called guests, not natives in the world of technology (Prensky, 2001). They still trust face to face contacts and paper documentation more than files and disks.

The subsequent generation is referred to in the subject literature as the Millennials. Unfortunately, there is no agreement on the entry and exit framework for this generation. Some authors (Espinoza 2018) are inclined to the position that the generation Y, also known as the millennial generation, are people born in the years 1980-1989. Ruth et al. (2013), similarly to A.J. Nicholas (2009), recognizes the framework of the generation Y as people born in 1981-1999. The generation Y belongs to the baby boom of the 1980s. In Poland, they are the first generation to grow up and brought up in conditions of freedom, without socio-political restrictions, no borders, economic emigration opportunities, and the availability of modern technologies. They are characterized by greater flexibility, openness to change, and readiness to learn than the generation X (Stosik, Leśniewska, 2015, p. 187). More noticeable is the reluctance to commitments, less loyalty to the employer, focus on oneself, one's needs, and benefits.

The millennium generation also includes the generation C, also known as the generation Z or XD. It includes people born since 1990. The term "generation C" is derived from the English words "*connect, communicate, change*", which in a way describes the characteristic pillars of this generation: Internet, communication, and readiness to change. It is the youngest employee group that can be described as natives in new technologies. Representatives of this generation have explored the world with a smartphone in their hands. Their "childhood neighborhood" is a global world; they represent global values; they had global idols (Harry Potter, The Hobbit, etc.). Unfortunately, they entered the labor market in difficult times of crisis. On the other hand, employers expected their employees to be available at any time, accept unprotected positions, and maintain employment. The effect of specific conditions is distancing oneself from temporary jobs, constant search, and reluctance to build relationships. The GUS research (2020) shows that representatives of this generation constitute the largest share among Poland's generations. They are considered the best-educated generation. Among them, almost every second person has a university diploma, knows foreign languages, and eagerly uses technology.

Research Methodology

Studies of literature and desk research preceded the preparation of the research material. The presented analysis is part of broader research on leadership issues. A questionnaire was used to obtain the respondents' opinions on the research questions. The research issues included obtaining answers to the questions posed: How is leadership understood? What terms is a leader identified with? What are the determinants of a leader? What leadership competencies do the respondents consider the most important?

The research sample included 340 people, working students studying management at higher education institutions located in Lower Silesia. Women constituted 51%, and men 49% of the studied group.

The research sample was represented by very young people, aged 19 to 35, constituting 75.2% of the respondents. People aged 36 to 45 accounted for 15.3%, and those aged 46 to 55 - 3.5% of the sample. The remaining respondents (5.9%) were the oldest age group, i.e., over 55 years old.

Nearly half of the respondents (49.4%) work in a company with over 100 employees. The remaining respondents work in smaller companies employing from 51 to 100 people - 12.4%, 21 - 50 employees - 10.6%, 11 - 20 employees - 7.0%, 6 - 10 employees - 10,0%, and up to 5 employees - 10.6% of the respondents.

The characteristics of the research sample also took the position held in the company into account. Only 5.3% of the respondents held a senior manager position, 21.8% - a middle-level manager (manager), and 11.7% - a lower-level

manager. The largest group of respondents, 61.2%, were people occupying a different position than those listed in the cafeteria.
Therefore, the research sample was mainly young people, representatives of the millennium generation. A small percentage was representatives of the X and BB generations. Very few of them were senior managers. One-third of the respondents performed the functions of a middle and lower-level manager. It can be assumed that they represented people at the stage of creating a professional career (Super 1992) and aware of the need to develop managerial skills.

Leadership in the opinion of the millennial generation

One of the key issues raised in the research was to learn the respondents' views on how leadership is understood. The respondents were offered three statements, from which they could choose the one that best describes leadership.

The largest percentage of respondents, 54.1%, chose the answer that described leadership as "the ability to effectively influence people by releasing their strength and potential in order to enable them to pursue the greater good." A much smaller percentage, 25.9% of the respondents chose to define leadership as "the relationship between those who want to lead, and those who respond to their call and want to follow them. This relationship is based on mutual respect and trust." A slightly smaller percentage (20%) indicated that leadership is "a relationship of influencing others, the ability to lead more or less numerous groups of followers." The answers' cafeteria was very similar; it differed only in the second element of the definition defining the goal and the process conditions. The respondents' answers imply the statement that the definition of leadership including the goal in the definiens gained the most indications. On the other hand, the smallest percentage of respondents agreed with the most general definition of leadership.

It was interesting for the researcher to seek the respondents' associations with leadership. Among the proposed cafeteria, they were to choose one most appropriate term. The results are presented in Figure 1. More than 55.3% believed that leadership was related to management. Many fewer, 19.4%, indicated that they associated leadership with strategy. Creativity was chosen by 9.4% of the respondents. Other leadership factors considered necessary by the researcher in the aspect of contemporary challenges gained little respondents' favor. The partnership was chosen by 4.7%, trust by 4.2%, and openness to change by 4.1% of the respondents. The lowest percentage (2.9%) indicated intuition.

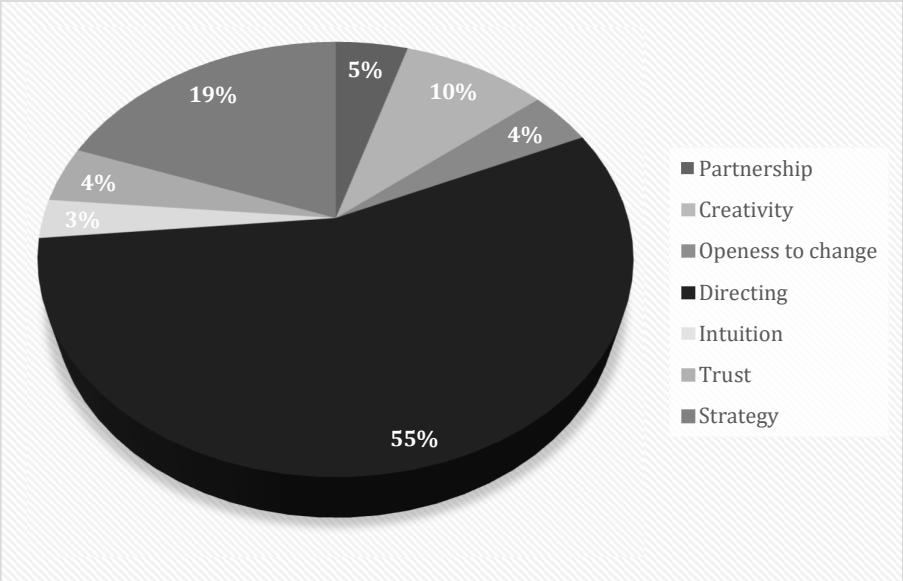

Fig. 1: Leadership factors in the respondents' opinion (5)

Source: Own research

Another issue raised in the research was the question of the conditions that should be met to become a good leader. 42.4% of the respondents expressed the view that a good leader *needs to have the authority and respect of co-workers*. According to 18.2%, the *trust should be established in co-workers*. A slightly smaller percentage of the respondents - 17.1% -considered *experience as required*. According to 14.1% of respondents, *inborn qualities are necessary*.

Fewer respondents (4.7%) believe that it is enough to *develop leadership competencies*. The fewest respondents indicated that an *appropriate position in the organization is necessary*.

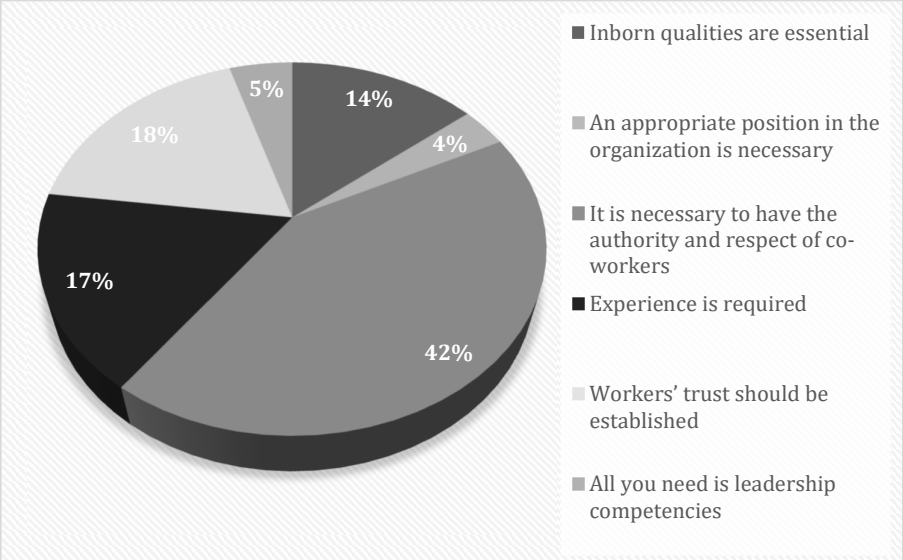

Fig. 2: Determinants of the leader

Source: Own research

The key issue addressed in the research was to find out about the respondents' expectations regarding the leader's competencies. The questionnaire included competencies in five areas, which the author considered the pool necessary for the 21st-century leader. The data obtained from the respondents' answers made it possible to rank the most fundamental areas of the leader's competencies and identify them, which are presented in Table 1.

Table 1: List of the most important leader's competencies

	Areas of leader's competencies	**Identification of areas**
1.	**Interpersonal and social skills:**	communicativeness, inspiring and motivating, building trust, working with people
2.	**Personal predispositions and development:**	specialist and expert skills, ability to solve problems, taking initiatives, personal development
3.	**Character and values:**	being honest and righteous
4.	**Focus on results / results and achievements:**	setting high goals, taking initiative,

		but also taking responsibility for team performance.
5.	**Master of change / strategy and flexibility:**	developing a strategic perspective, connecting the group with the external world, including the cultural one, anticipation, updating activities taking into account the organization's needs.

Source: Own research

The respondents considered the following competencies as the most fundamental ones: interpersonal and social skills, personal predispositions and development, character / values, focus on results / achievements, and the master of change, i.e. strategy and flexibility.

Interestingly, in the digital era, online operation, short messages, contacts via social media (Balcerzyk 2019, Groysberg and Slind 2012), the respondents considered that the most imperative thing for a leader is to have personal and social skills. In this area, the author included skills such as communication, inspiring and motivating, building trust, and cooperation with people. Undoubtedly, social competencies are a *sine qua non* condition for the leader's competency model (Balcerzyk, Zapala 2020). The ability to build trust deserves special attention in the field of social, interpersonal competencies. Actions taken in this direction favor positive relationships with others, identify common areas and goals and engage employees to act. Having social competencies allows the leader to create a team and make the team grow, and its members want to share their knowledge.

Personal predispositions and development are the competencies that gained the second position in the respondents' expectations. As the identification of this area, the author proposed specialist and expert skills and the ability to solve problems, take initiatives, and personal development. These predispositions and skills are called functional competencies in the subject literature (Balcerzyk and Zapała, 2020; Delamare Le Deist and in, 2005). Some aspects of the predisposition and development area related to finding oneself in a difficult situation and the ability to reflect and solve problems are part of the modern organization's leader's competencies.

Research shows that character and values are the third most crucial leader's competencies. The importance of the leader's character has been emphasized over the centuries. References to the leaders' values and qualities can be found in Greek and Roman mythology through Plato's "State". To this day, one can find supporters of the charismatic leader concept. The data obtained from the research show that the character traits and values represented by a leader are still significant for subordinates. In the literature on management sciences, particular importance is attached to the values shared by the organization (Koźmiński 2004, Bjerke 2004). According to Korzyński (2018), the subordinates' behavior is regulated by the norms and values functioning in a given organization. The representation of the professed values is, among others, organizational culture, which is sometimes more durable than organizational changes. Hence, the leader's values must be consistent with the employees' values and the organization.

Outcomes, results are a common measure of an organization's success in the market. Focus on results and achievements is an area that, according to respondents, was ranked fourth among all other areas of competencies. From the point of view of the organization, shaping this area determines its effectiveness. Effective organizations have high morale and high performance (Maxwel 2013). A leader who can build dynamics of action and has an impetus that is difficult to overcome is extremely valuable for the organization.

It would seem that in a modern organization operating in an environment marked by change, the area of competencies called by the author "master of change" would gain the greatest importance among the respondents.

It turns out that the result of the study puts it in the last position. The "master of change" was identified in the research by strategy and flexibility, which are represented by developing a strategic perspective, connecting the team with the outside world, including the cultural one, and anticipating and updating the activities undertaken to take the organization's needs into account. From the respondents' perspective, competencies in the area of such activities are not the most important for them.

Conclusion

A highly effective leader is the best ally of a real vision and mission. However, it should be noted that the leader cannot lose shared values and character while pursuing the goal. Through his/her strength and dynamics, he/she makes people follow him/her. In pursuit of their goals, people develop, trust each other, learn from each other, and support each other. The changes taking place in the organization's environment and the willingness to face new challenges make organizations look for new leaders. Consequently, leaders are continually looking for new challenges. They must remember that listening to their followers' needs should be of crucial importance to them. All this will get any venture into action. According to Generation Y, the main associations with a lead are directing and strategy. The priority leader's competencies in Millennials' expectations are determined by interpersonal – social and specialist - expert skills and their development. The determinant of a good leader is to have authority and respect among co-workers and build their trust. Therefore, the challenge is not easy for the leader since young employees expect the synergy of personality, predispositions, and team management skills from the leader in achieving the goal presented to them.

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Literature Review & Research Gap: How Global Changes in Supply Chain Management and Logistics Made Impact on Trading Sector in United Arab Emirates (UAE)

Lalu PILLAI
Trane Technologies, United Arab Emirates
Email: lalu_pillai@trane.com

Harsh PUROHIT (Ph.D)
Professor of Finance and Dean, FMS- WISDOM, Banasthali Vidhyapith, Rajasthan, India

Santhosh KUMAR (Ph.D)
Cochin University of Science & Technology (Cusat), Kerala, India

Abstract

Purpose: The objective of this paper is to generate a better understanding about studies related to general logistic trend and customer behavior due to supply chain and logistic trend, and detailing about its impact in a specific geographical area (UAE). **Design / Methodology:** Substantial study on the relevant subject and its data base with an aim of covering as much area as possible by collecting inputs from various types of industries as well as various types of people in different age groups. **Findings:** This paper highlight the details about the organic and operational impacts underwent in UAE trading sector due to the changes happened in Supply Chain and Logistics arena. According to this paper, impacts underwent in UAE trading sector can be segmented into: 1) changes undergone in trading sector in UAE due to global trend and new approaches on Supply Chain Management and Logistics, 2) benefits obtained by importers / exporters in UAE due to global changes on SCM and Logistics , 3) analyze and identify the customer / consumer benefits locally and internationally in UAE due to new trend in SCM and Logistics and 4) analyze the process changes and its differences between conventional SCM and Logistics with new trend. **Research Limitations and Implications:** The main challenge and limitation faced during the survey was related to the geographical area of coverage and the availability of sample size. Based on this point, this study could be magnified or extended by collecting a large size/ data of samples from another geographical area / country which is more easy to access. In another words, there is a unique opportunity to conduct this study to another country with a for a larger sample size. **Originality Value:** There is a vast scope on this study considering the fact that Supply Chain and Logistics industry have underwent a day night difference by the last couple of decades. This paper does a deep dive on trends and its subsequent impacts which are visible in the trading industry . Considering UAE is a main hub for trading into Middle East and Africa, implementation of trends were fast considering to other regions. Technological evaluation and its impact we very well seen in this specific area which are detailed in the paper.

Keywords: SCM, Supply Chain strategy, Logistics Trends, Impact on SCM in UAE.

Introduction

Logistics in general is termed as movement of a product or service from one point to other to cater some needs / requirements. The products, services and resources controlled and managed in logistics can consists of mostly physical products such as FMCG products, finished machinery / equipment products, live animals, fluids and liquids. Apart from this, abstract or virtual items, such as energy, time, elements of information can also become part of the products in movement. The logistics related to physical products generally includes the integration of flow of information from point to point, handling of products / material, production of the products, packaging the product prior shipping, inventory handling, transportation of the item, warehousing the product, and often security part of the whole process.

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Though logistics business consists of many activities, a conventional study of Logistic and operations management mostly affects the fields of infrastructure in Logistics, facilities of transportation, and planning of inventory. "Supply chain management can be broadly state as the systemic and strategic coordination of functions involved in a business, and the strategies and policies affecting the functions of business in a particular organization and across the whole businesses within the umbrella of supply chain, for the objective of productivity enhancement and long range (extended) performance of a certain company and the supply chain as a whole." The terms "Logistics" and "supply chain" are academically and industrially correlative, the reason of this common similarity nature is, both these factors are extremely related and pertinent to the circulating this product in its whole product life cycle, and both of these are highly considered as the core aspect of competitive review or evaluation of "model management science"

The United Arab Emirates is commonly and generally known as UAE which is a union of seven emirates, and its own monarch rule is applicable on each Emirate. "The seven Emirates - Abu Dhabi, , Dubai, Ajman, Ras al-Khaimah, Fujairah, Umm al-Quwain and Sharjah," - form jointly the Federal Supreme Council, which chooses a president every five years. After the independence in 1971 from Britain, President of UAE is always nominated as the ruler of Abu Dhabi and Vice President and Prime Minster is the rule of Dubai. Abu Dhabi is the capital of UAE and it holds the high degree of autonomy. UAE is strategically located in this Arab region and Middle East, and having border with Arabian Sea, Persian Gulf, Saudi Arabia and Oman.

Changes Undergone Due to New Approaches on Logistics and Supply Chain Management

Logistics industry in Gulf Region has enjoyed a huge growth and high reputation in recent years, and though there was a recession and hard economic climate, it has reasonably performed well. Being a core element for several GCC countries' future development plans, Logistics industry has always considered as a pivotal factor and it played as a fundamental pillar of regional economies. The rate of growth of logistics market in this region is high compared to other market segments. As per Saudi Gazette dated 13th July 2019, Its recent growth recorded is 7.3 per cent which is expected to touch a dollar value of $66.3bn by 2020 . In 2015, logistics accounted for 10 per cent of the UAE's figures mainly due to UAE's aggressive diversification and development plans. And the Middle East region's mounting competencies have supplemented international acclaims and due recognition. Based on "World Bank's recent Logistics Performance Index", UAE ranked 11th out of 160 countries, outdoing the countries such as Canada, Denmark, France, Australia and Finland "(https://lpi.worldbank.org/international/ scorecard/radar/254/C/ ARE/2018)" Compared to other Middle East emerging countries UAE ranks first in the list. Agility, a Kuwait based logistics firms report shows in January 2018 that among 50 emerging markets, UAE is the third best logistics centre in which China ranks first, followed by India on second position. Bahrain is on fifth position, followed by Oman in sixth and Saudi Arabia in seventh slot. (https://www.agility.com/interactive/2018index/) Though the external view proposes plain sailing, there are so many replicated challenges, tests, changes and developments that regional logistics firms must withstand with and familiarize to in order to keep themselves at the front of the leading list.

UAE became the third highest logistics centre out of 50 emerging markets just because of its investments in infrastructure and ease of doing business across the country. UAE's rank slipped one place since economic boom in India helped them to sped past with reforms to take the No 2 position just behind the emerging markets leader China. Size and growth appeal establishes 50 per cent of the overall assessment. Compatibility and connectedness each added up for 25 per cent of the overall score. UAE was ranked first in terms of market compatibility which evaluate ease of doing business, business ambiance, market risks, opportunities and other key values. It was also ranked No 1 in terms of market connectedness, just because of the highly developed infrastructure. Market compatibility for the top 10 includes all six Gulf countries. UAE has invested a huge amount in IT systems to enhance the total supply chain operations productivity as well as to reduce the supply chain visibility and to educate the managerial persons. The following trends can be noted:

- To have an improved productivity from better planning and Decision making, IT system with an added transactional processing element has been applied in UAE and various efforts are made to apply more technically proven IT systems. Most of the respondents given high priority for analyzing logistics productivity and using IT system tactically and systematically.

- Long implementation time and Insufficient IT resources were the key hurdles for IT utilization to support operational logistics activities. These were the problems and issues pertaining to low quality project management skills. Companies in UAE recruited additional head counts who are skilled, qualified and experienced in process planning and implementing projects which supported them to sensibly implement outsourcing activities both in the preliminary setting up phase as well as during its ongoing day to day operations.
- UAE was able to deliver IT solutions that can provide results rapidly to the requirements of the business and that provides value now without giving an additional burden to IT costs later, which helped to maximize and increase the presently existing investments while budgeting a major portion of infrastructure and resources to developing / widely increasing IT resolutions that can highly influence technological and process innovation vs. maintaining and managing the existing / current solutions.

The Literature Review Based on The Proposed Objectives

Changes in UAE Trading Sector due to global trends and new approaches on Supply Chain Management and Logistics : According to "Bowersox, D.J. and Closs, D.J. (1996)" "Supply Chain industry has been highly influenced by the exponential growth of big data. Data can be helpful as well as disruptive in a business. According to Sundarakani, B,et.al.(2012) Supply Chain Management (SCM) productivity and success of few specific companies in the United Arab Emirates (UAE) is purely based on systematic application and implementation of Information Technology (IT). This was possible mainly based on a qualitative analysis which they performed within the organization. This paper focus on the main pillars of IT which enhanced the SCM performance from a user / beneficiary's perspective. The data analysis and survey results have highlighted that the key respondents are well aware that implementing new IT system does not necessarily fetch or produce immediate results / benefits, but in a long run it would be highly beneficial financially and from a process perspective. The study detailed a study the IT impact Supply Chain Management in UAE. This details about the Modern concepts in IT and its beneficial usage in Supply Chain Management. According to Cooper, M.C., et.al. (1997) "The outsourcing has always started from in its most basic of forms. Example are outsourcing of management of canteen, management of building and security, computing service etc.

Revenue benefits due to global changes on SCM and Logistics : According to Dittmann, P.J. (2013) "A purchase decision is always made based on cost of goods and services by any business than just competing on price. According to Ballou,R.H, et.al.(2000) "in their work on SCM said that Changing market condition demand to streamline the critical barriers such as Supply Chain Planning and Optimization. The inability to dynamically adjust to the demanding environment and executing plans in response to changing market conditions are the most important challenges now a days

Analyze and identify the customer / consumer benefits due to new trends: Hines, T. (2004) details about "Supply Chain Strategies, Customer Driven and Customer Focused strategies", and it highlights the main challenges facing organizations while designing, implementing a successful Supply Chain strategy in global environment. This specifically indicate that three main factors such as Customer Focused Strategies, Customer Driven Strategies and Supply Chain Strategies, are in a closed process circuit of any organization. According to Foster, T.A. (2006) "Business today is very competitive and going through a highly professional and global environment. Irrespective of location or market base, this scenario forces companies to consider the whole world in their marketing and competitive strategy analysis.

Visible process changes with new trends: According to Ballou,R.H, et.al.(2000) "in their work on SCM said that Changing market condition demand to streamline the critical barriers such as Supply Chain Planning and Optimization. According to Beamon, B. M. (1999) "Performance management and its review is running through a process of starting with supply, to manufacturing to arranging / planning distribution and finally to the consumer / end user. As part of conventional performance measure, this study highlight the point that, selection of elements related to performance measurement is an important step in the design, planning and evaluation of any system. Measuring of a performance becomes difficult once the system becomes larger and complex.

Methodology

The overall methodology adopted and considered in this study would be descriptive research type. The core goal or objective of descriptive research is to describe a phenomenon and its attributes and characteristics. This research is more focused and developed on what rather than how or why a case is evolved or aroused. Based on this point, observation and survey tools are often used to gather data (Gall, Gall, & Borg, 2007). As widely know, in these kind of studies, the data may be collected qualitatively, but it is often analyzed quantitatively, using frequencies, percentages, averages, or other statistical analyses to determine relationships.

Analysis projected or stimulated by descriptive questions is primarily focused to discover facts, not to test theory. "The hypo is not causal but simply that common perceptions of the facts are or are not at odds with reality" (Pinsonneault and Kraemer, 1993, p. 80)

Even though a variety of methods are available in the descriptive research, survey method is chosen with the objective of eliciting detailed information from a large number of respondents. Researchers understand survey method as the way of providing right answer questions that have been aroused, to resolve hypothetical and general issues / problems that have been came up, to assess need of the study and set the goals which are to be achieved, to evaluate and confirm whether has met the pre-determined objects or not, and most importantly, to set a milestone and baseline for future comparisons and studies to measure trends across a certain period of time, and in general to describe and determine what exists, in what amount, and in what context." (Isaac & Michael, 1997, p. 136). Because the research was considered descriptive, the best option was to go for a questionnaire survey which fits as an appropriate approach (Bailey et al., 1995). A questionnaire administered by the interviewer is utilized as this method is helpful in collecting data based on appropriate classification of questions wherever needed. Apart from this, the method guarantees higher rate of response from the respondents since the questionnaire are objective based.

Descriptive statistical analysis is resorted by using statistical tools such Frequency "Analysis, Fisher's Exact Test" and "Kruskal Wallis Test" for analyzing and assessing the demographic variables. The research findings are tabulated to give a clear and concise information about the findings. The findings are shown with the help of graphical representation tools, diagramsand tabulation tables. For precise and accurate analysis of the data under study, advanced statistical software such as SPSS is used so that the human error can be reduced to the minimum.

Literature Review

Supply Chain and Digital technology : According to "Bowersox, D.J. and Closs, D.J. (1996)" Supply Chain industry has been highly influenced and affected by the exponential growth of big data. Data can be helpful as well as disruptive in a business. Cost optimization, responsiveness and greater integration are most visible while a historical data based process is set. According to Cooper, M.C., et.al. (1997) The outsourcing has always started from in its most basic of forms. Now a days even core competencies of a company is also delegated out or used for outsourcing. It is said that 'Anything which distracts a company from their focus will be considered for outsourcing'. Even with all these minimum 75% of companies outsource at least one element of Supply Chain Management. Creating the greatest value , productivity and achieving the organizational goals does not require them to own, manage, and directly control all of their assets, processes and resources. As per "Supply Chain 4.0 – the next – generation digital supply chain published by Mckinsey and Company in Oct, 2016", Digital supply chain is mostly applicable to the trade of books, music and film. However, now a days this is also conceptualized to include business to business services and the best example is fashion design and R & D - product development.

Demand Planning Begins at the end of the Cycle and Measuring Supply Chain Performance : Demand Planning process begins with a statistical forecast. Data sources for the forecast will contain Sales Orders Plan, Contracts received from customers, Orders received from intercompany and finally from the key stakeholders such as from suppliers. According to Ballou,R.H, et.al.(2000) in their work on SCM said that Changing market condition demand to streamline the critical barriers such as Supply Chain Planning and Optimization. According to Beamon, B. M. (1999) "Performance management and its review is running through a process of starting with supply, to manufacturing to distribution and finally to the end user/ consumer". This specific study details the analysis of supply chain performance indicators and measuring tools which are extensively used in various supply chain processes /models and further it gives a an idea to create a framework for right selection of PMS (Performance Measurement System) which can cater as a solution for supply chain related issues.

Supply Chain Strategies: Out Sourcing, Customer-driven and Customer-focused: Non-core competencies associated in an organization will consume time, energy and workspace and help management to defocus from their core objective. This is a huge change compared to conventional supply chain approach. According to Chopra, S. et al. (2004), Companies are constantly focusing on what they regard as their core activities or competencies. Hines, T. (2004) details about Supply Chain Strategies, Customer Driven and Customer focused strategies. It highlights the main challenges facing organizations while designing, implementing a successful Supply Chain strategy in global environment. Further this paper details that the texture of supply chains in commonly found industries which includes global and local organizations. More over this paper focus on various geographical locations and its advantages in the globe in order to manufacture a product by taking the advantage of geographical location which can be marketed to consumers / customers globally and locally.

Globalization impacts, increased competition and Pricing in Supply Chain Management: According to Foster, T.A. (2006) Business today is very competitive and going through a highly professional and global environment. It is prominent to consider that most of the global firms have changed the operational way in which they handle / manage their Logistics Activities. Value added service to a business sector can be only provided by Supply Chain process. According to Dittmann, P.J. (2013) A purchase decision is always made based on cost of goods and services by any business than just competing on price. A value added service on other areas are very important as well. This is why supply chain impacting in a huge way in pricing structure and competitive edge.

Additional Values are added to the Business Process through new trends in Supply Chain Management: When an increased market share or revenue is discussed, most of the business leaders will think and discuss various ways of lowering the prices on their products or services. Since price is a vital and influential component to any purchasing decisions, buyers will also opt to develop value from aspects other than the price-to-value ratio of a product which they wish to procure. A review of these value added components will lift the business more efficiently, produce more proficiency, efficiency and optimize the complete supply chain and that would allow the business to increase the over all added value services / offerings to the customers.

Logistics performance : On "Global Smart Logistics Conference in China" (2017) Bert Hofman states that efficient logistics bridge organizations to local and international markets, and further it influence the productivity and efficiency of global value chains pertaining to manufacturing and competitive edge of a country's economy within the pre-set value chains. According to Chow, G.,et. al.(1994) logistics changes are considered to be the main driving force for the competitiveness of an organization and a specific country which is basic factor to job creation and economic enhancement / growth. The journal highlights how GDP per capita and Logistics performance measure are inter-related which is the back borne of an economic development. This study detailed about economics built around trade which details mode of payments, mode of shipments involved in a trade etc. In the technology side, this details the need and use of modern technology in to Logistics side. Further this details about the role played by WTO.

Structural changes in logistics: how will port authorities face the challenge or a fundamental change According to Notteboom, T. E., & Winkelmans, W. (2001) market environment related to port and port operation around the word at a specific time period. As per their study, the market environment pertaining to port operation has considerably and dramatically changed recently. The paper states that this is a continuous process which poses lots of challenge to the port authorities. Import / export process is discussed in details right through the paper. This also discusses the impact associated with structural changes in international arena of trade, international business transactions, transportation and shipping industry in view of strategic and operational issues related to port management. This paper is one of the most vital study in terms of conventional / operational changes within the last 10 years.

Strategic alliances in the container shipping industry : a global perspective: As per Slack, B ,et.al.(2002) recent alliances strategically made in the shipping industry is the prime logistic trend which is highly positive from operational perspective. The paper has a deep dive on recent developments in container shipping industry in view of the formation of strategic alliances by leading logistics movers. This study detailed about strategic alliance and its benefits around the world. Container sharing all aspect been detailed here. This paper is detailing global aspect of strategic alliance and cooperation between shipping lines and not limited with to a specific region According to Tavasszy, L. A.,et. al.(2003) "Logistics process and chains which are constantly changing to promote increasingly global movements". In another words, tailor made products for a certain region or product customization and shortest delivery cycle are the most demanding / challenging trend in logistics service. The study on this paper further shed

light and highlights the inter-relationship in global and local arena between logistics, trade, and transport. Tavassy's study is very prominent since this does not go on wide angles or various logistics trends rather it focus on few trends in depth and details.

The Importance of Logistics Information Technologies and Knowledge Management Capabilities on Intermediaries' Performance : According to Yavuz, M (2017) in a cut throat competitive market, profit making by an organization is totally based on strategic steps. This paper emphasis that since technology is evolving on daily basis, to create an effective and competitive logistics strategy, any company needs a centralized or core logistics Management. Further, this chapter runs through LIT – Logistics Information Technologies and KMC – Knowledge Management Capabilities and indicate that LIT and KMC are vital for a supreme performance on any organization.

Digital export towards U.A.E. : According to SARTOR, G. (2017). the mode of trade in UAE, specifically in fashion industry. It details that in recent years, B2C and B2B2C E-commerce has become a vital element and gained a strategic importance in all parts of supply chain including, distribution of raw material / finished products, local / global trading, collaboration of partnership business and most importantly in export trade. This study goes into the details and express that "Physical distance is greatly reduced". As per this study, many global players and corporations prefers E-commerce which predominantly nullified many obstacles posed by traditional, channel based distribution. This study specifically details the way fashion trade is spread over UAE. Further it details how logistics and supply chain helps fashion trend and its traders to satisfy their customers in UAE.

Blockchains for supply chain management: Architectural elements and challenges towards a global scale deployment : According to Litke, A(2019) Blockchains are attracting the attention of stakeholders in many industrial domains, including the logistics and supply chain industries. This study provides, a detailed explanation on methodological side, the way how blockchain plays a role in supply chain and the way it is fit for the supply chain industry. Study details, the pivotal role blockchain plays in scalability, performance measurements, consensus of mechanism, privacy considerations, importance of location and cost. All these factors are directly or indirectly influenced by blockchains and the study gives a detailed outlook on the same.

Conclusion

Study related to general logistic trend and customer behavior due to supply chain and logistic trend, and detailing about its impact in UAE was made which helped in understanding the following. 1) changes undergone in trading sector in UAE due to global trend and new approaches on Supply Chain Management and Logistics, 2) benefits obtained by importers / exporters in UAE due to global changes on SCM and Logistics, 3) analyze and identify the customer / consumer benefits locally and internationally in UAE due to new trend in SCM and Logistics and 4) analyze the process changes and its differences between conventional SCM and Logistics with new trend.

There are multiple factors which makes this study very significant. The researcher compiled globally effected changes and trends of two different but inter – linked processes, and measuring its impact depth in a selected geographical arena where trade is one of the most important financial activity. The researcher found various factors that made it valuable to any organization, any business sector, marketers and consultants, government as well as research individuals.

UAE market is highly competitive in the sense that various traders are competing each other with cut throat competition mode. The researcher highlighted the fact that a company who sustain in this market will have to have a superior customer support platform. The global changes identified in Supply Chain Management as well as Logistics are proven elements for improving customer satisfaction if it properly applied in an entity. This makes this study prominent in this region.

The research work is conducted systematically by applying statistical tools as employed by researchers in similar studies. The approach to study based on research methodology has given ample opportunity to deploy the collected data based on a step by step approach so that the data could be used effectively by sharply focusing on the core objective of the study. This approach has enabled to perform the data analysis in a more systematic way so that relevant information could be drawn by deploying the apt statistical tools.

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IOT Based Smart Life Saver System for Kids and Objected Tracking

Diaa SALAMA ABD-ELMINAAM[1,2], Rasha ORBAN[3] and Fatma SAKR[3]

[1] Department of Information Systems, Faculty of Computers and Artificial Intelligence , Benha University, Egypt.
[2] Department of Computer Science , Faculty of Computers and Informatics , Misr International University, Egypt.
[3] Department of Computer Science, Faculty of Computers and Artificial Intelligence , Benha University, Egypt.
Emails : diaa.salama@fci.bu.edu.eg , rasha.abdelkreem@fci.bu.edu.eg , fatma.saqr@fci.bu.edu.eg

Abstract

Now a day's child security is an essential area of concern. Recently, a crime against children is increasing at higher rates, and it is time to offer a safety system for the kids and objects. Tracking kids and individual objects remotely are the main goal for every for safety protection. There are various systems used for tracking the position of objects such as a car, but there is no such system made for tracking a human being. The paper provides a smart, inexpensive solution for preventing losing kids while going out alone or with their parents based on the Internet of Things (IoT). Our proposed system ensures maximum security and ensures live tracking for their kids. This paper proposed a model for child safety through smartphones that can track their children's location and give the exact coordinates of the child's location in real-time anywhere. In case of emergency, children can send a quick message and its current location via Short Message services. This proposed system is validated by testing on the Android platform. The correct operation of the system verifies the proposed system.

Keywords: IoT, Smart Kids Tracking, Arduino, Smart Object Tracking, GSM.

Introduction

Many cases of missing children are reported. Parents always worry about the possibility of the kidnapping of their children. Children's Tracking system becomes more critical worldwide to assure parents that their wards are safe from suspicious actions. Today, smartphones are the basic need of the user. These smartphones provide lots of features that make our life so simple and more straightforward. This paper is focused on the safety of children. Today child safety is an important issue globally as child crime is rapidly growing across the world. In this paper, we build an IoT system connected with a smartphone to provides tracking the children. When the child is crying, the mobile app is sent to parents through text message to their Android mobile device. Android terminals have internet and GPS, GSM, SIM card.

Nowadays, the Internet of Things (IoT) has a central role in most of our regular lives. IoT contributes to connecting several fields such as industrial applications, homes, healthcare, automobiles, entertainment, sports, and many different areas. (Chaudhari et al., 2015), (Rajaram et al., 2016) studied the importance of applying IoT-connected appliances in our life. Many other researchers, known in the literature on IoT applications, such as (Abdul.Elminaam & Alenezi,, 2017), (Abdul.Elminaam et al., 2019), (Abdul.Elminaam & Awad, 2018), (Abdul.Elminaam, Abd-ELfattah & Ali, 2018), (Abdul.Elminaam, Alenezi & Ali, 2018), (Stankovic, 2014) explored IoT applications' importance in our lives. When the Internet of Things cooperates with the Internet of Services, it will provide users with services that are aware of their surrounding environment and enlarge our social communications with other people and objects. The most recent IoT fields are smart systems, such as smart homes where various multimedia services are attached and embedded into electronic appliances and supported with high-quality full-duplex communication channels. Recently, researchers have made extensive efforts on smart home technology (Sudhir, 2007) to enable humans to fully control their home appliances from a remote location in full swing. By ingathering humans, home, service, and community domains all together are becoming possible by the wide use of the clue of smart home with IoT technology. In the Internet of Things systems, where many objects are connecting through the internet, big data is produced. Researchers have suggested new different IoT applications, such as smart wearable devices, smart home appliances, e-health systems, etc. (Jiong et al., 2014), (Castillejo et al., 2013), (Mitton et al., 2012).

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In (Alduais et al., 2018). focuses on kids and children's safety by sending warnings to their parents about the danger around them. Similar research was developed in the same area to monitor the school buses until they arrived at their school, which made many parents satisfied with the safety level. More developments are performing on sending the child's place or the body they are installed

IoT systems are the primary source of the evolution of usage and penetrated the user's life. The main idea of IoT refers to when everything is being connected; you can do many things you were not able to do before, while information transfer between sensors and actuators devices are allowed. Recently, advances in technology support many features such as adaptability, real-time monitoring, and traceability (Atzori et al., 2010). IoT applications can be observed in several areas such as home, human life safety, agriculture, health, and so on. Generally, these are prefixed by the word "Smart," Ex. Smart Kids Life Saver.

The IoT connects everyday objects to the internet and facilitates machine-to-human and machine-to-machine communication with the physical world . The IoT aims to bridge the gap between humans and technologies via simple or complex objects. These objects make the interaction between humans and their surrounded environment is applicable. In other words, delivering any sort of information or command is transmitted through sensors and actuators that may be integrated in vehicles, buildings, and common environments (NasneenFathima, 2016).

The purpose of the proposed paper is to develop an embedded system for a kids and objects tracker system; this system allows the parents to locate and track their child in real-time with great peace of mind to parents who will save many kid's objects loss. The system is interfaced with a mega 8266 microcontroller programmed in embedded C language.

This paper focused on the security domain in which the IoT applications are used to protect people, cars, and things from kidnapping through tracking. As a result, these cases require a unique system that helps parents locate their children and reassure themselves that they are in a secure place. Consequently, it must be an application to solve this thorny problem.

The proposed system provides a solution to this problem, using sensing technology and a smartphone application, and providing a better service at affordable costs. More specifically, it 3

Adapts a popular technology that combines a smartphone application with a microcontroller. The application will use Global Positioning System (GPS), Global System for Mobile Communication (GSM), and General Packet Radio Service (GPRS) technology that is one of the most common ways for tracking. A device is also embedded inside the child's bag, whose position is determined and tracked in real-time.

The remainder of the paper is structured as follows. We provide related work and background on IoT technology, including discussing the Role of IoT in Smart Life Saver Systems. Moreover, discuss system architecture design in the second section. System development is addressed in the third section, and In the fourth section, we discuss the system implementation, is given. The paper concludes with a summary of this research's main findings and possible future research lines to be explored in the fifth section.

Literature Survey

In this section, we discuss previous studies which were interested in explaining and developing smart kids and objects tracking with various approaches and methods as follow:

Rajput et al. (2019) implemented a children tracking system device for children attending school. The significant advantage of this wearable device is that it can be used in any cell phone type. This device helps parents know their child's location using WiFi and Bluetooth services embedded on the device. However, WiFi and Bluetooth cause some leakage in response between the parent and child, so it is considered an unreliable medium of communication.

Thakur et al. (2019) aimed to develop a Smart IoT system for child tracking to help the parents locate and monitor their children. If the sensor reads any abnormal values, then an SMS message is sent to both parents' mobiles, And MMS indicating an image captured by the serial camera is also addressed. They used the LinkIt ONE board programmed in embedded C, but the disadvantage of using this board is its high cost.

Chaudhari et al. (2020) aimed to design and construct IoT systems by using the LPWAN technologies rollout network, which is used worldwide. This Low Power technology for vast area networks is a recent solution for Kids Tracking GPS devices problems. This type of technology uses and transmits low data rates, which will reduce the required processing power.

Gupta and Harit (2016) By smartphone availability, they proposed a highly increased security system and kept live tracking for children to determine their children's location, especially in emergencies. Children can send a quick message and their current location via Short Message services. The system is validated and tested on the Android platform.

Baruah1 and Dhal1 (2019) proposed an IoT secured object tracking system where a cloud server manages the tracking media. The proposed research's main feature is to enable the customer to go offline without estopping the travel status update task. The outsourcing of the travel status update task has been handled without compromising the security and privacy level. The difficulty is the use of homomorphic encryption, which in turn increases the computational cost.

Luo et al. (2019) suggested a novel predictor module called active tracking. The system directly predicts the next actions in the camera behavior rather than the objects tracking outputs. The reinforcement learning techniques are used to control and deploy systems, but this requires high computation complexity and long latency time.

Zhang et al. (2019) Developed and designed an object tracking system. The system requires lightweight computing time, limited computing capacity, and memory space to realize tracking. They have proposed a new algorithm for region correlation filter fitting for edge devices been used. The mentioned used technique can fit most IoT devices to keep relatively high accuracy but for objects only.

Banduch (2018) have been built a product for parents and kids safety keeper with a security AWS partnership. They also have offered a network-based solution rather than a SIM- card based security solution. They have produced an IoT enabled tracking child tracking wearables or smartphone devices, but the devices have failed to live up to user expectations because of being bulky or too large for little wrists size. They used security issues with tracking devices for system hardware: Encryption keys and Unsecured Bluetooth. Bluetooth Low Energy (BLE) devices create connections with smartphones with quick authentication but not reliable for use.

Kolaskar et al. (2016) has discussed the design and the implementation of real-time and offline GPS trackers using the Global System for Mobile Communication (GSM comm.), Arduino, Storage Card (SD), and SIMShield. The system applied for vehicle security applications. The system behaves as a coordinator for the user who received a registered user's location who made a call on a number provided with a GSP application attached to an Arduino microcontroller. The collected data have automatically stored on SD at the same time to be used next in the case of an existing geographical location is offline.

Saxena et al. (2015) has developed an anti-theft vehicle system that stops the stolen vehicle and tracks its location through the embedded GPS and GMS devices as well as a web application. When the owner or any authorized person drives the vehicle or operates it remotely, the system is converted to the sleeping mode. However, The control signals which cause the vehicle engine to stop or cease are issued when the theft is discovered, so the responsible people send SMS to the microcontroller. The system will be reset in order to restart the vehicle. This application protects the vehicles from theft, so it is more security parks.

In (Nandini et al., 2019) focuses on implementing a child tracking system for every kid or child wandering home or staying home alone. If the child is pressed on the panic button on his watch in the proposed system, the message will be sent on the parent's mobile and the child's location in terms of Latitude, longitude, and location. Parents can be creating a profile in the android application. In this application, the parent can be adding contacts and locations. After that, parents can be seeing the list of previous add contacts and locations. After messages arrive in the receiving message box on the parent's android application, parents directly read the message and see the child's current location on Google MAP. These proposed tracking devices can be worn as wristwatches (Saranya & Selvakumar (2013).

Many other researchers who are recognized in the literature on different IoT applications , Optimization and Metaheuristics algorithms such as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] studied the optimized solution for complex problems. As a result of the collected information, we decided to combine all the features that the previous attempts worked on to enhance the expected results' efficiency.

Taking into consideration all of the mentioned work, other works considered Tracking Kids and constraints in their models for tracking. In this paper, a model that handles different constraints in the tracking will be formulated. This model made tracking in real-time and decision dynamically at runtime. We also provided this framework with new tracking protocols. The proposed framework is tested using mobile applications that were developed using Android.

The Proposed kids and objects tracking system

This section demonstrates our proposed kids and objects tracking system for using IoT. Designing a child tracking system to assure parents that their child is safe from suspicious actions. The information of the child being missed is sent to the respective parent's mobile if they move beyond the coverage area. Also, when children want to convey that they are in danger, they will press a panic button on their school i-card. Mobile terminals have internet. It adopts message from the child and delivers to respect parent android mobile using internet

Kids and object tracking system by GSM uses Arduino powered by battery, as Arduino is the mastermind and organizes all the system processes(see Fig.1). It is connected to sensors (X, Y types). The sensor knows the state of the body for its Pitch or Roll; also it exists in the system connection between Arduino and Smartphone are made by a device called See Shield Interface which transfer and translate information from the smartphone to Arduino and vice versa.

It also helps the child ask for help by sending SMS with the location in the message. The energy needed by the device ranges from 9-12 volts to a small battery that gives Arduino energy to work, and Arduino feeds its sensors.

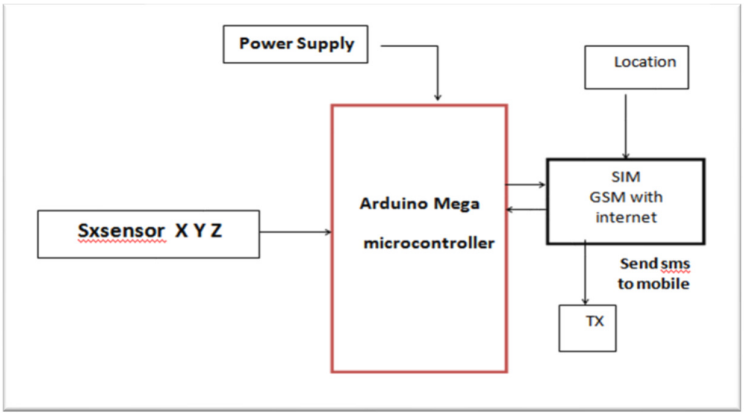

Fig. 1: The architecture of the overall system.

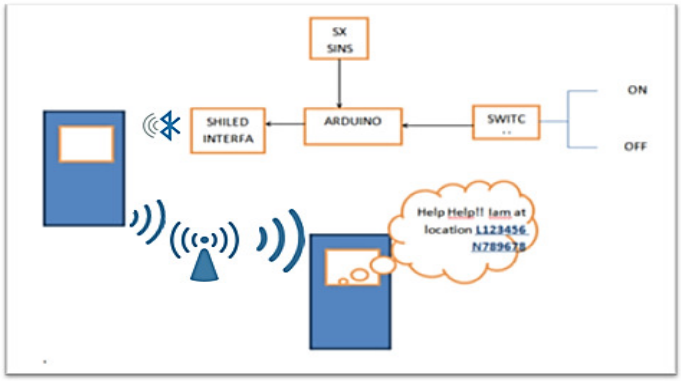

Fig. 2: The System Response With SMS

There are many components of this architecture(see Fig.1), which are the following:

- **Power supply**
- **Arduino Mega board (ESP8266)**
- **Shields**
- **GPRS**

Before we continue, we should know some idioms or definitions that make it easy to understand our work, such as Arduino, shield, and GPRS.

- **Power supply**

Power supply is a single supply voltage 5V. In some cases, the ripple in a transmitting burst may causes voltage drops when current consumption rises to typical peaks of 2A. To the power supply must be able to provide sufficient current up to 2A.

- **Arduino** is an open-source platform used in building electronics systems. Arduino consists of both a microcontroller (a physical programmable circuit board) and a piece of the software component, or IDE (Integrated Development Environment). IDE is the platform that runs on our computers and is used to "write" and "upload" computer code to the physical board. Arduino Mega is a release from the Arduino family and is compatible with most of the shields designed for other Arduino boards. We must make sure that the shield's operating voltage is compatible with the board voltage before we intend to use a shield. Most of the shields operate at 3.3V or 5V, which is compatible with our used board. If we intended to use shields with higher operating voltage, the board could be damaged.

- **Arduino Mega board is an A**rduino MEGA 2560 With a Built-in WiFi "ESP8266" component and has a Pigtail connector for an antenna. It is an excellent board because we would have a massive benefit if we connected the antenna on this device. We increase a far distance reach, measures from 90 meters to 240 meters away, contributing to our kid's tracking system. This board has an important feature, which is *selector switches*. The first selector switch allows the ESP to interleave the connection between the two terminals TX0 and TX3. The second selector switch is the "DIP" Switch. The board has a crucial recording mode of the ESP8266. All the pinning is entirely and is compatible with the ATmega pinout.

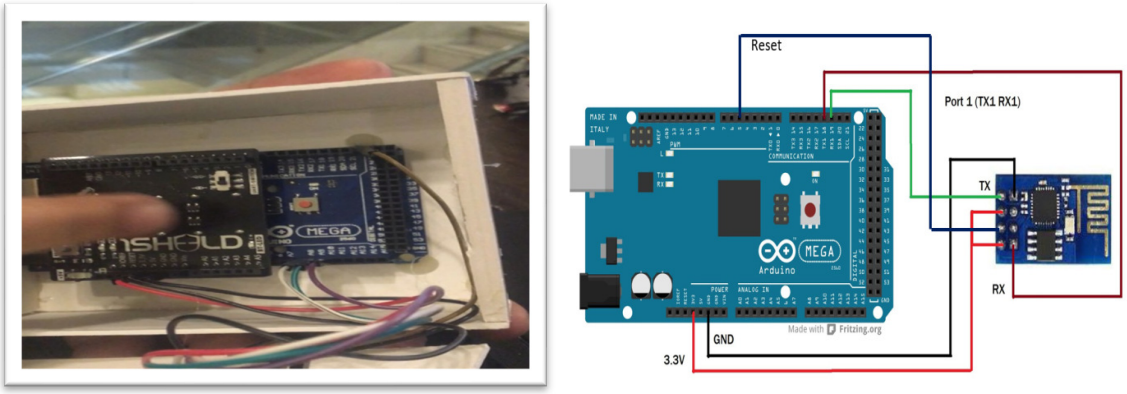

Fig. 3: Arduino Mega With WiFi Built-in

- **Shields** are pre-built circuit boards and are used to fit on the top of the Arduino microcontroller. The shields provide additional capabilities like connecting to the internet, controlling motors, controlling LCDs or LEDs screens, providing cellular or other wireless communication, and much more.

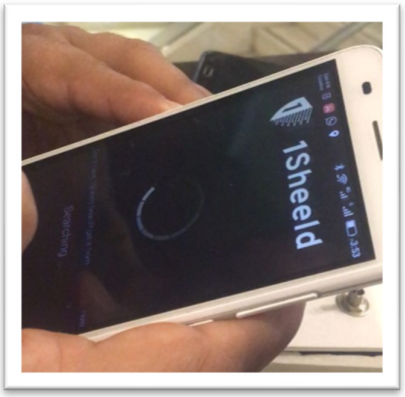

Fig. 4: Shield Application On Mobile

- **GPRS** is an abbreviation for "General Packet Radio Service". GSM was firstly designed for a circuit-switched network type. Nextly, GPRS has added packet switching functionality to the GSM networks. GPRS was added to GSM specifications in 3GPP Release 97 and used in Releases 98 and 99. This has enabled us to deliver the internet on mobile devices connected to the GSM network. Customers have to check whether the GPRS feature is available on the mobile they need to purchase. GPRS offers faster data transmission rates.

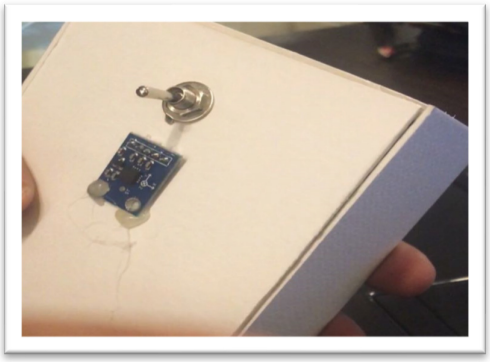

Fig. 5 : Switch on / off and XY Sensor

The Proposed System Implementation and Configuration

When the pitch & Roll sensor sends emails to Arduino, which do some logarithmic calculations and compared to what is already programmed, in the case of an increase in reading above the natural level, it is a non-nature of the body on which the device is installed.

The Arduino gives an order to send a message with the body's status and its location as the GPRS_GSM network continuously receives the site. This message passes through the shield interface, which translates Arduino's commands to the intelligent device, sending an SMS to the future and contains longitude & altitude.

You can also use the command key to start the process by sending a request for help message through Arduino, and then the Interface to a GSM device that sends SMS include the site identification.

For the proposed system configuration; We were using Arduino mega microcontroller use to store and process data quickly and accurately. It contains a 52 pin (input) used for both the data or the data's output. It is numbered from 1 to 52. we can improve it by adding other sensors. This type of Arduino also has a total of 15 exclusive access points to analog. Arduino can be connected to the computer through a USB connection and allow us to load programming codes that we have programmed on C code.

Arduino has designed a unique key to allow new code to load or modify, making sure that no other code is charged with the unintended error, which made it more secure. a LED light is added to show if Arduino works or not.

The sensor on the device is XSO match sensor, which calculates three variables X, Y, and Z. it contains five exits, one plugin, another for Earth, and the rest.

X is plugged into the A8 pin.
Y is plugged into the A9 pin.
Z is plugged into the A10 pin.

Results and Discussions

The propsed system results are shown in Fig.6, Fig.7, Fig.8, and Fig.9 . the selected operating system is Android to over all the features. SMS is used for communicating between the child side and the parent side. The application developed to make a user-friendly approach on both sides. The architecture of the proposed system depends on two Android phones one is on the child side, and another is on the parent side .

In fig.6, In this message, Latitude and longitude number, date and time, SIM card number through that message has come.

All results come positive; when we try it roll position, we find that the X-Y sensor accurately work. We find that by the moment of the rolling, which includes help request as it programmatically designs. We got the same result when it rolled to the left.

When it tried to above position pitch, we find that the X-Y sensor accurately work. We find that by the moment of the body coup, which includes help request as it programmatically designs when we know that on the child, it is easier to send SMS to request help from parents once we press the button.

Fig.6: Object Motion Tracking By GPS

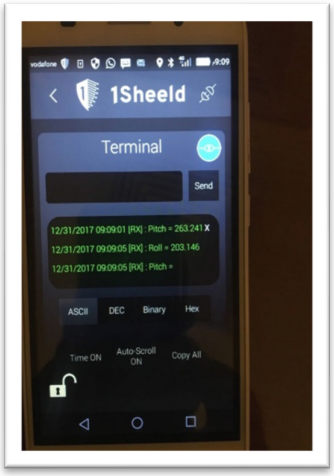

Fig.7: The pitch & Roll status

Fig.8: The System Sends An SMS Automatically

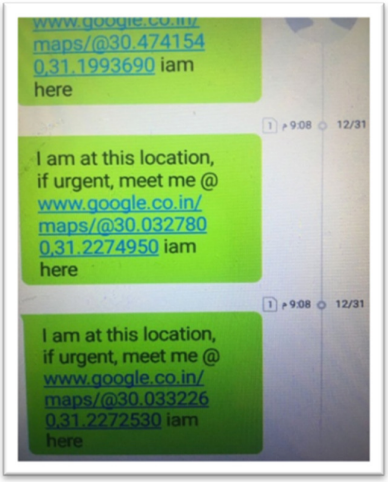

Fig. 9 : Receptor Response When Seeing the SMS With the Object Location

We found that the performance of the proposed system varies from place to place. The results show us that the proposed system's functionality depends upon the cellular networks, and sometimes the working is poor due to low cellular connectivity.

Conclusion

In this paper, we developed a real-time tracking for locating missing children based on IoT. The study aims to child tracking and monitoring system based on GPS, GSM, GPRS modules and Arduino. The proposed system allows tracking children using the application of the IOT and identifying the coordinates of their locations in real time and at any place to protect them from losing or kidnapping by exploiting the IOT's technologies. This paper's proposed

solution takes advantage of smartphones, which offers rich features like Google maps, GPS, SMS, etc. The microcontroller used in the proposed method (Arduino MEGA 2560 With WiFi Built-in - ESP8266) .its official price is not high, available for more customers. In the future, we aim to resize it and increase the number of sensors and determine a specific zone for children. It sends a random SMS when the child or the object moves far from its zone. The results show the superiority of the propsed solution over other solutions.

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Considerations on Sustainability on the Romanian Fruit Market – Production and Consumption Trends

Gabriel POPESCU

The Bucharest University of Economic Studies, Bucharest, Romania
popescug2004@yahoo.co.uk

Marian Catalin CUCU

The Bucharest University of Economic Studies, Bucharest, Romania
cmc.catalin02@gmail.com

Ioana PANAIT

The Bucharest University of Economic Studies, Bucharest, Romania
panaitioana48@gmail.com

Abstract

Fruits are foods with many human health benefits and since ancient times they have been a major source of energy with low-calorie content. For agriculture, fruit plantations represent a very important category due to the high incomes generated per hectare. The present paper aims to analyse the Romanian fruit market, both in terms of demand and in terms of supply, identifying the consumption trends of the population and those of supply. The research results reflect the current situation, as well as the evolution of the Romanian fruit market in terms of quantity consumed, market value, quantities produced, import and export.

Keywords: Sustainable Development, Organic Fruits, Fruits Processing, Fruits Supply Chain.

Introduction

Fruit growing is one of the main sectors of agriculture, offering assorted diversity on the domestic market. The fruits are eaten mainly fresh, being a healthy snack full of vitamins, but can also be eaten processed as dehydrated, dried, canned, jams, syrups, juices, frozen. Capitalizing on the production of Romanian fruits is important, especially in the fresh state being a quick and tasty snack. Also, the fruit sector contributes to the local economy through trade, both internally and foreign, the fruits market being a complex one that has continuous activity, and which is still developing in Romania.

The purpose of this study is the analysis of the Romanian fruit market, both fresh and processed fruits, to determine the level of its development in the period 2010-2019. The paper is structured in the analysis of the main components of a market, namely the demand for fruits and the preferences of Romanian consumers and the offer from Romania, which is based on both domestic production and imports. The main statistical indicators and their evolution were analyzed to identify the current situation of the fruit market and to present some directions, both for consumption and production, which will lead to the sustainable development of the fruit market in Romania.

Literature Review

Fruit production is an important part of Romanian agriculture, and the adaptation of varieties to current conditions as well as investments in appropriate storage and refrigerated storage and proper packaging for protection are important given that the author Pet (2014) states that due to the high degree of perishability of fruits that rapidly affect the

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commercial appearance. Due to the seasonal nature and the very high dependence of agricultural crops on meteorological conditions, in the absence of investments in crop protection or production insurance, the instability of fruit production affects the economic viability of companies especially through price fluctuations. (Turek and Ion, 2008)

Ion et al. (2008) emphasize that fruit imports are important for the Romanian market because the climate does not allow the production of fresh fruit throughout the year thus Romania became a net importer of fruits in order to cover the needs of the population. Marin et al. (2018) states that Romania has fertile and good soils for fruit crops, but the efficiency is low due to the lack of technologies at farm level and the low degree of associativity.

In the current context of globalization, of the desire to achieve the most sustainable activities, agriculture and the agri-food market are gaining significant importance. The rising trend of the consumption of organic products as well as the importance given to the traceability of the products from the producer to the final consumer are actions that define the desire to reach the notion of sustainability.

Granatstein and Kupferman (2008) they consider that sustainability is a direction of development of agriculture that includes horticulture and must consider the three pillars of sustainability through concrete actions to improve the agricultural sector. From the economic point of view, it is important the economic efficiency in the agricultural exploitation to ensure an improvement of the competitiveness on the market to obtain the economic viability. Horticulture and fruit production must ensure the food security of the population for the social pillar, and regarding the natural environment, the farmer must rely on an integrated management that ensures the rational use of pesticides. The adoption of a sustainable development of agriculture aims at a fruit production that has a minimal negative impact on the environment, while ensuring the safety and food security of the population and a fair trade. (Jemrić et al., 2017) Slavin and Lloyd's (2012) in their study assert that fruits and vegetables have a high content of nutrients and fibre while providing food with a high intake of vitamins and minerals. Also, Pem and Jeewon (2015) state that fruits are rich in antioxidants, and the consumer must consume a mix of fruits to benefit from their maximum potential. The positive effects of fruit consumption are also recognized in 2004 by the Food Agriculture Organization (FAO) and the World Health Organization (WHO), which recommends a daily consumption of at least 400 grams of fruits and vegetables.

EUFRIN (2011) states that the fruit sector is a strategic one in the European Union (EU), this being also valid for Romania, especially in terms of the added value that this market has in socio-economic development, mainly at local level. For long-term development, the organization of producers under different associative forms is important in this essential sector of agriculture, having the role of stabilizing the market through its important role especially in terms of prices (Aquila and Petriccione, 2012) which is the most important link between supply and demand.

Methodology

The methodology of the paper consists in performing quantitative statistical analysis to identify the situation of the fruit market in Romania and to identify consumption trends. The database contains statistical data processed and taken over from the National Institute of Statistics Romania (NIS), International Trade Centre (ITC) and the Ministry of Agriculture and Rural Development (MARD). In the analysis of the international trade with fruits, the statistical data provided by ITC for the category Edible fruit and nuts, peel of citrus fruit or melons were taken into account.

Analysis of the Romanian Fruit Market

The Romanian fruit market in high season when the Romanian production appears on the shelves also appears the pressure of the competition. The main characteristics of the fruit and vegetable market according Popescu (1999) are the variety of products that differ depending on the seasonality, the variability of production that depends on the geographical area but also on years and the perishability of fresh fruits and vegetables, these being ultra-fresh. Knowing the particularities of the fruit market in Romania provides important information for analysing production and consumption trends that lead to the formation of an important market in the economy.

The fruit and vegetable market has been regulated at European level by Common Market Organisation since 1962 in order to contribute to the objectives of the CAP and starting 2008 a new reform has taken place (Cacic et al., 2009)

having applicability for Romania as well. The 1996 reform of the fruit and vegetable sector emphasizes the importance of producer groups in agriculture to increase market competitiveness. (Cacic et al., 2009)

In table 1 is the Romania's food balance for the fruit category which includes details about all the fruits equivalent to tonnes of fresh fruit.

Table 1: Romania's food balance for fresh fruit and fruit products

Unit: tonnes

Indicators	2014	2015	2016	2017	2018
Usable production	2,085,118	1,994,433	1,978,478	2,125,614	2,957,785
Import	877,063	1,049,491	1,236,462	1,251,362	1,266,777
Export	112,738	115,073	100,320	88,912	98,324
Internal availability for consumption	2,849,443	2,928,851	3,114,620	3,288,064	4,126,238
Industrial processing	1,148,824	1,140,366	1,111,837	1,362,322	1,746,940
Total losses	86,071	88,191	97,503	88,369	120,734
Stock change	17,236	-40,442	12,329	-44,084	100,729
Available for human consumption	1,597,312	1,740,736	1,892,951	1,881,457	2,157,835
Average annual net food consumption - kg/inhab.	80.2	87.8	96	96.1	110.8

Source: NIS, 2020

Carrying out an analysis on the fruit food balance (2014-2018), in 2018 compared to 2014, there is an increase of 41.85% of domestic production. The imported quantity increased by 44.43%, and the exported quantity of fruits registered a decrease of 12.79% (although reporting the year 2018 to 2017 there is an increase of 10.59%), during all this time the domestic consumption availabilities increasing by 44.81%. The amount of processed fruit increased by 52.06%, while the total amount of losses increased by 40.27%. In 2018 compared to 2014, the average annual net consumption / inhabitant increased from 80.2 kg to 110.8 kg, an increase of 38.15 percentage points. Carrying out an analysis on the food balance of fruits from 2018, compared to 2017, there is a 39% increase in domestic production. The imported quantity increased by 1.23%, the exported quantity of fruits registered an increase of 10.59%, during all this time the domestic consumption availabilities increased by 25.49%. The amount of processed fruits increased by 28.23%, while the total amount of losses increased by 36.62%. In 2018 compared to 2017, the average annual net consumption/inhabitant increased from 96.10 kg to 110.8 kg, an increase of 15.3 percentage points.

The share of imports in domestic availability is high, registering over 30% in the period analyzed, Romania being dependent on food imports to ensure the entire needs of the population. Two causes that lead to large quantities of fruits and fruit products imported by Romania are the high consumption of citrus whose imported quantity increased in 2018 versus 2017 by 8.69%, and exotic fruits, especially bananas for which 7.90% more quantities were imported in 2018 compared to 2017, but also the import of processed fruit products because the degree of industrialization of the Romanian agricultural sector is low due to the lack of the necessary infrastructure, but also to the investments in this activity.

The demand of fruits in Romania

The demand for fruits has a permanent character, but the supply of Romanian fruits is seasonal, considering the specifics of the climate and the way of cultivation. Most of the farms from Romania are semi subsistence farms and it represents a significant part from their daily alimentation, so the expenses for the purchase of fresh fruits in the rural area are lower because the rural inhabitants are based on their own production which is largely dedicated to self-consumption, making various processed preparations in the form of jams or compotes for later consumption.

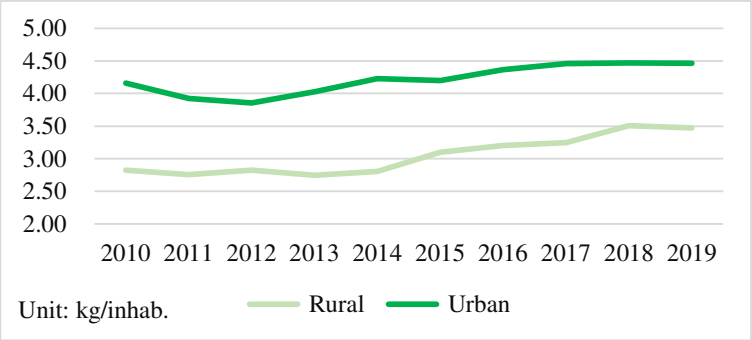

Graph 1: The evolution in Romania of the average monthly consumption of fresh fruits per inhabitant and by areas of residence

Source: NIS, 2020

In Romania, the average amount of fruit consumed by a person from a rural area is clearly lower than the average amount of fruit consumed by a person from an urban area. During the analyzed period, the gap between the two residence averages registered values between 1.42 kg and 0.96 kg, the biggest difference being registered in 2014, at the opposite pole being the year 2018.

Although in rural areas the amount of fruit consumed by a person is less than the value recorded in urban areas, its growth rate in 2019, considering the base year 2010, was much faster. While in urban areas the average amount of fruit consumed by a person increased by only 7 percentage points, in rural areas there was an increase of 23 percentage points.

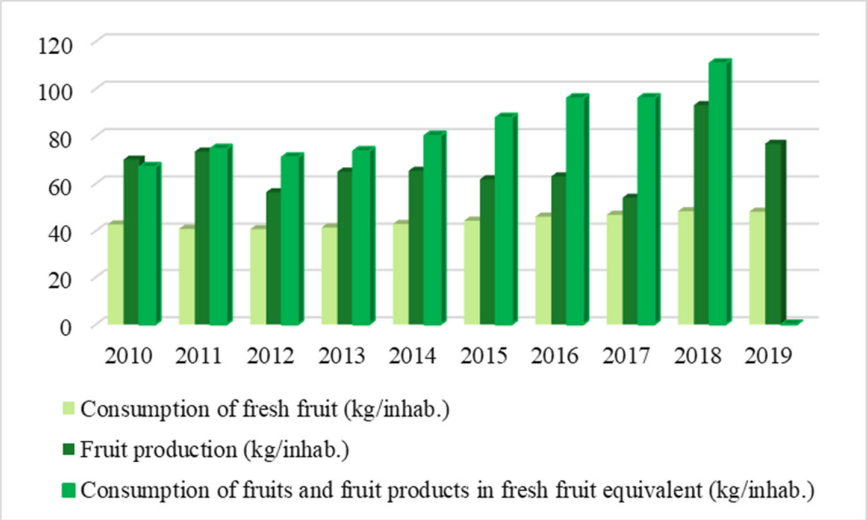

Graph 2: The evolution in Romania of annual consumption and production per inhabitant

Source: NIS, 2020

Following an analysis of the average annual fruit consumption of a inhabitant compared to the average annual fruit production per capita, a much higher production is found compared to the amount of fresh fruit consumed, but insufficient to ensure the necessary fruits and products, from fruit to fresh fruit equivalent. While in terms of consumption of fresh fruit there is a slightly upward trend in quantity (reaching that in 2019 to consume on average / inhabitant with 5.4 kg more fruit than in 2010), production has fluctuated from year by year, a feature of agriculture resulting from the strong influence of weather conditions. The highest fruit production / inhabitant, in the period 2010-2019, was registered in 2018 (93.1 kg / inhabitant), at the opposite pole being 2017 with only 54 kg / inhabitant. The

consumption of fruits and fruit products in fresh fruit equivalent is also on a slightly upward trend, registering in 2018 an increase of 10 percentage points compared to 2010. For 2019, the statistical data on the indicator consumption of fruits and fruit products in fresh fruit equivalent are missing.

Graph 3 shows an analysis of per capita consumption at the level of each fruit category for the period 2010-2019.

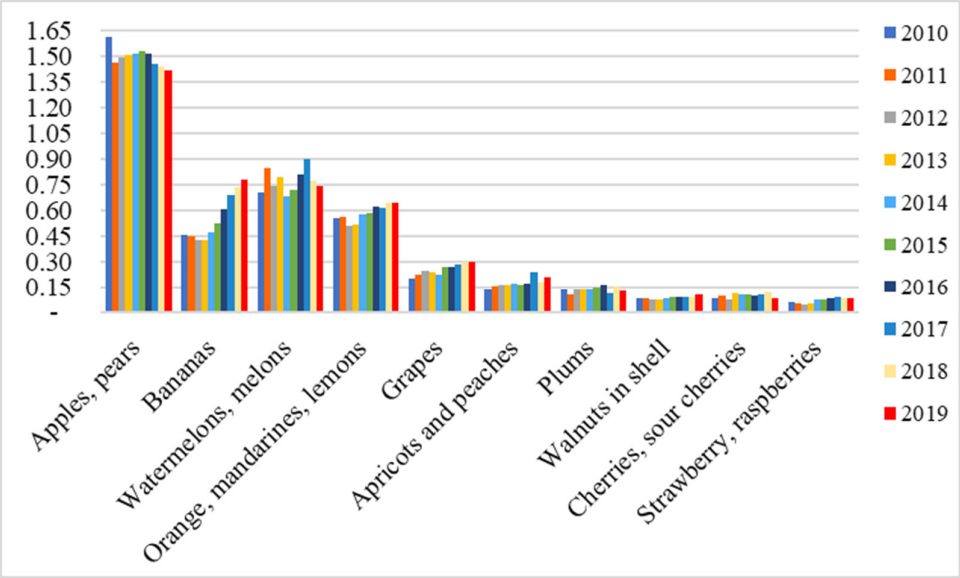

Graph 3: The evolution in Romania of annual consumption on fruits category

Source: NIS, 2002

The most consumed fruits by Romanians are apples and pears, being produced with tradition for Romanian fruit growing and with various varieties. Compared to the base year, 2010, the consumption of apples and pears decreased by 12.31%. Among the local fruits, the apple is among the only ones that are suitable for long-term storage and we can find it on store shelves even in spring. Lately, apple producers have also turned to processing, appearing on the domestic market apple juices with different fruits mixes under different brands and packaging.

Bananas are in second place in the preferences of Romanian consumers, being an exclusive imported product for which demand has been growing in the last 6 years and which has a higher consumption in the cold period when domestic production is absent from the market. Citrus fruits, especially oranges, mandarins and lemons are often consumed by Romanians, especially in the cold season when there is a higher supply on the market and the price is more attractive, and in the warm season citrus fruits are consumed more in the form of fresh juices.

Table 2: Dynamics of spending on the purchase of fresh fruit in Romania by area of residence

Indicators	Residences	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fruits expenditures (RON/inhabitat/months)	Rural	5.81	6.14	6.58	6.21	7.29	8.12	8.43	9.76	11.01	12.33
	Urban	12.98	13.37	13.74	14.42	15.4	15.63	16.47	18.4	19.99	20.74
Share of fruits from total agrifood products expenditures	Rural	4.70%	4.65%	4.75%	4.35%	5.04%	5.27%	5.24%	5.53%	5.50%	5.49%
	Urban	6.32%	6.30%	6.16%	6.14%	6.45%	6.50%	6.65%	6.70%	6.60%	6.40%

Source: NIS, 2020

Carrying out an analysis on the expenses with fruits generated by a person on average per month, by areas of residence presented in table 2, we find that in 2010 a person from rural areas spent on average 55% less than a person from urban areas while until in 2019 this difference was on a downward trend, reaching to spend 41% less in 2019. During

all this time the amount allocated by one person on average per month for the purchase of fruit registered an upward trend, reaching 2019 compared to 2010 by 112% among people in rural areas and by 60% in terms of people in urban areas.

The share of fruit expenditures in the total food expenditures made by a person with a rural residence environment increased approximately constantly, reaching from 4.70% (2010) to 5.59% (2019). In the urban area, the share of fruit expenditures in total agri-food expenditures ranged in the period 2010-2019 between 6.16% (2012) and 6.70% (2017). This difference in fruit expenditure registered between urban and rural areas is mainly due to subsistence agriculture found in rural areas, an action that reduces the need to buy among them.

Fruit supply on the Romanian market

In summer-autumn, local fruit production continues to be marketed largely in traditional markets, even though various more modern distribution channels have been developed, but the traditional one is gaining the trust of consumers through authenticity. In table 3 are presented the fruit production by tree species in Romania where there are oscillations of the production volume, in 2019 the production obtained being at the level of 2011.

Table 3: The evolution of fruit production in Romania

Unit: tonnes

Fruits category	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	1,419,618	1,479,907	1,128,594	1,299,972	1,301,428	1,224,700	1,241,586	1,058,494	1,813,420	1,487,450
Plums	624,884	573,596	424,068	512,459	495,287	496,468	512,975	444,922	842,132	704,817
Apples	552,860	620,362	462,935	513,580	513,195	476,059	467,259	348,656	643,856	501,515
Cherries and sour cherries	70,290	81,842	70,542	80,477	82,808	75,503	73,834	58,474	90,837	77,168
Nuts	34,359	35,073	30,546	31,764	31,514	33,394	34,095	45,797	56,053	51,602
Pears	60,375	66,913	54,274	66,849	61,292	45,595	52,751	48,878	60,440	49,268
Fruits from family gardens	27,743	28,487	29,884	32,614	32,180	31,962	31,768	29,818	32,750	32,204
Other fruits	20,371	26,973	23,912	24,213	27,075	23,277	23,299	31,526	35,601	31,623
Apricots	23,804	33,745	29,089	28,310	43,609	30,998	30,726	33,851	35,704	30,651
Strawberries	21,434	18,909	15,800	23,190	21,935	21,587	23,000	27,050	26,164	22,711
Peaches	10,856	21,154	16,838	18,427	23,764	21,325	22,869	18,546	22,199	17,634
Nectarine	385	1,340	590	703	949	494	778	794	434	461

Source: NIS, 2020

Most agriculture is greatly influenced by the climatic characteristics of each year, this also happens among fruit productions in Romania, the quantities obtained varying from one year to another. In the period 2010-2019 the highest production is found among plums, representing between 38% and 47% of the total fruit production in Romania, followed by the production of apples with a share of 33-42% of the total fruit production, at the opposite pole being the production of peaches and nectarines.

The contribution of the productions obtained from fruits coming from the familiar gardens represents, from year to year, between 1.8% and 2.8% of the total fruit production registered in Romania. In the period 2010-2019, the highest fruit production, at national level, was registered in 2018, reaching the value of 1,813,420 tons, year in which the share of fruits obtained in family gardens registered the lowest contribution (1.8% of total fruit production). 2018 was a year rich in fruits for Romania, being a record year for the obtained production, with 71.32% more compared to the previous year. There were increases in production for all categories analyzed, except for strawberries and nectarines. Thus, cultivation in protected areas such as glass greenhouses, solariums or more modern, hydroponic greenhouses, is important because it can better stagger production, and the season can be shifted to cover the needs at the beginning of the season or can extend the domestic season. The vulnerability of fruit crops to increasingly unstable weather events, but also when diseases and pests occur, causes producers to innovate to provide support to reduce the risks they are exposed to throughout the year and help them achieve economic viability for further development of the activity.

The lack of associative forms persists in Romania, currently according to MARD there are 23 producer organizations operating in the fruit and vegetable sector, subsistence farms predominate, the production destined for self-consumption is high and intermediaries are not absent from the distribution of fruits. The fresh fruit marketing

channels in Romania are divided between classic channels (traditional markets, fairs, directly from the farm gate) or modern channels (retail, online). Also, an important consumer is the HORECA market which needs fresh products daily, and currently a community of Slow Food is developing which is based on food preparations based on raw materials from the vicinity. In the fresh fruit trade, the emphasis falls on short supply chains to ensure the freshness of the fruit to the final consumer.

Table 4: The evolution of international trade and Romania's partners regarding fruit

Unit: thousand euro

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
TOP 5 import parteners										
Total	173,547	180,372	234,342	294,096	341,366	476,482	562,859	636,470	642,211	654,387
Greece	32,580	41,518	39,624	59,011	61,533	72,958	102,202	106,865	116,854	122,683
Germany	3,702	4,433	13,208	12,450	13,775	25,921	38,419	57,329	70,588	108,173
Netherlands	11,548	11,077	17,948	29,622	35,583	53,658	64,304	77,815	74,814	71,504
Turkey	35,940	31,227	31,720	39,842	42,555	48,516	65,152	62,899	75,968	57,194
Poland	4,814	4,032	10,359	15,977	17,675	29,329	44,510	61,668	66,572	48,697
TOP 5 export parteners										
Total	58,802	66,688	74,515	80,089	93,818	81,400	52,750	65,652	65,833	60,676
Italy	7,169	9,634	9,489	10,960	12,897	12,023	11,014	10,612	14,625	12,352
Germany	7,876	8,613	7,905	9,143	10,888	10,252	8,711	11,187	11,413	7,976
Netherlands	1,020	1,090	1,564	906	3,013	2,601	1,466	1,776	5,389	6,619
United Kingdom	68	105	606	2,294	3,819	2,385	3,276	5,123	3,240	5,459
France	1,978	4,018	3,473	7,287	5,511	8,932	4,090	8,420	5,960	4,197

Source: ITC, 2020

The table above reflects the top of the most important fruit import and export partners in Romania. Regarding the import of fruits in Romania, the most important partner in 2019 was Greece with 19% of the total value of fruit imports, followed by Germany with 17%, the Netherlands with 11%, Turkey with 9% and Poland with 7%. Germany is the country that registered the highest value increase, if in 2010 Romania imported fruits worth 3,702 thousand euro, in 2019 the value of fruit imports from Germany reached 108,173 thousand euro.

Regarding the value of fruit exports from Romania, Italy is the country to which the highest value is exported, representing 20% of total Romanian fruit exports, followed by Germany (13%), the Netherlands (11%), the United Kingdom (9%) and France (7%). In the period 2010-2019 the highest percentage increase in the value of exports was to the United Kingdom (an increase of 7928 percentage points).

Table 5: The evolution of international trade by products in Romania

Unit: thousand euro

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Top 5 categories of fruits most imported by Romania										
Total	173,547	180,372	234,342	294,096	341,366	476,482	562,859	636,470	642,211	654,387
Citrus fruit, fresh or dried	66,626	63,886	76,196	100,882	111,236	138,992	162,130	159,686	169,025	169,106
Bananas, incl. plantains, fresh or dried	35,864	32,005	46,733	57,883	68,380	108,049	125,576	145,008	148,542	155,277
Apples, pears and quinces, fresh	17,104	23,255	26,379	28,429	31,570	48,505	58,302	69,031	72,656	64,622
Grapes, fresh or dried	8,383	9,848	15,724	16,055	17,666	31,995	41,033	47,553	46,544	50,357
Apricots, cherries, peaches, nectarines, plums and sloes	8,191	10,237	17,630	17,757	19,929	31,761	37,472	48,761	45,353	49,657
Top 5 categories of fruits most exported by Romania										
Total	58,802	66,688	74,515	80,089	93,818	81,400	52,750	65,652	65,833	60,676
Other nuts, fresh or dried	27,498	25,058	32,294	39,385	59,641	49,541	23,240	30,875	28,327	23,993
Fruit and nuts, uncooked or cooked by steaming or boiling in water, frozen	11,399	16,460	13,896	14,030	16,129	12,032	6,816	10,735	18,213	12,878
Fresh strawberries, raspberries, blackberries, black or white or red currants, gooseberries	2,243	3,079	2,407	2,177	3,226	1,775	5,363	7,099	6,738	11,964
Fruit and nuts, provisionally preserved	2,261	2,679	2,694	3,065	2,699	4,131	4,468	5,020	5,082	4,301
Bananas, incl. plantains, fresh or dried	1,838	1,792	4,208	885	1,007	261	126	127	214	1,633

Source: ITC, 2020

Regarding the main fruits imported by Romania for value reasons in the first place in 2019 is the category citrus fruit, fresh or dried representing 26% of the total value of imported fruits, followed by the category bananas, incl. Plantains, fresh or dried with 24%. The highest percentage increase identified in 2019 compared to 2010 is found among the category apricots, cherries, peaches including nectarines, plums, it increased from 8,191 thousand euro in 2010 to 49,657 thousand euro in 2019 (an increase of approximately 506 percentage points). As a result of the increase in grape consumption in recent years, according to Chart 3, grape imports have increased mainly to cover demand from the Romanian off-season.

Regarding the export of fruits, the category other nuts, fresh or dried represents in 2019 40% of the total value of fruit exports, although the value of this category decreased by 13% in 2019 compared to 2010. The highest growth rate, in 2019 compared to 2010, is found among the category fresh strawberries, raspberries, blackberries, black or white or red currants, gooseberries, this category recorded an increase of 9.721 thousand euro (an increase of 433 percentage points).

Graph 4 represents the trade balance of Romania for the product category Product: 08 Edible fruit and nuts according to the classification and statistical data of ITC Trade, being registered a value deficit regarding the international fruit trade throughout the period 2010-2019.

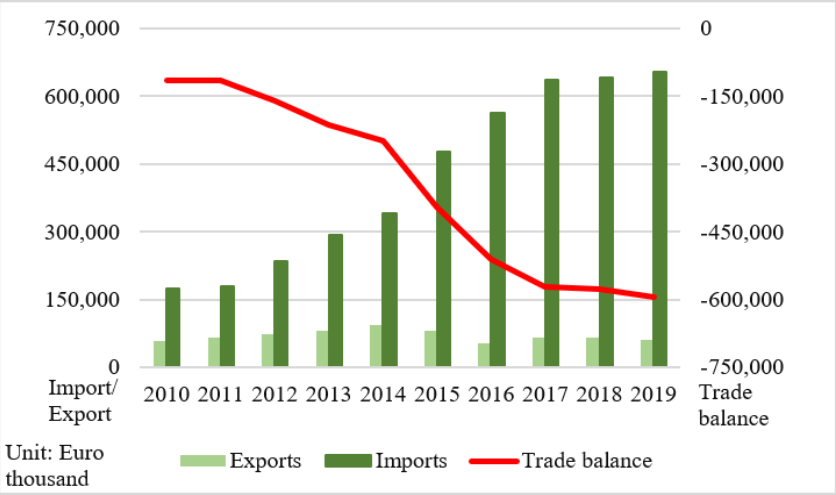

Graph 4: The evolution of Romanian trade balance regarding fruit trade

Source: ITC Trade, 2020

The Influence of Price on The Fruit Market

Gilbert and Morgan (2010) states in their study that the high perishability of fruits determines a large volume of goods on the market in a short time that influences the selling price, but adequate storage and staggering production on the market over a longer period can limit price volatility.

The following graph shows the dynamics of the consumer price index for the fruit category which includes fruits and canned fruits, being an index that shows the monthly evolution of the price compared to the same month of the previous year.

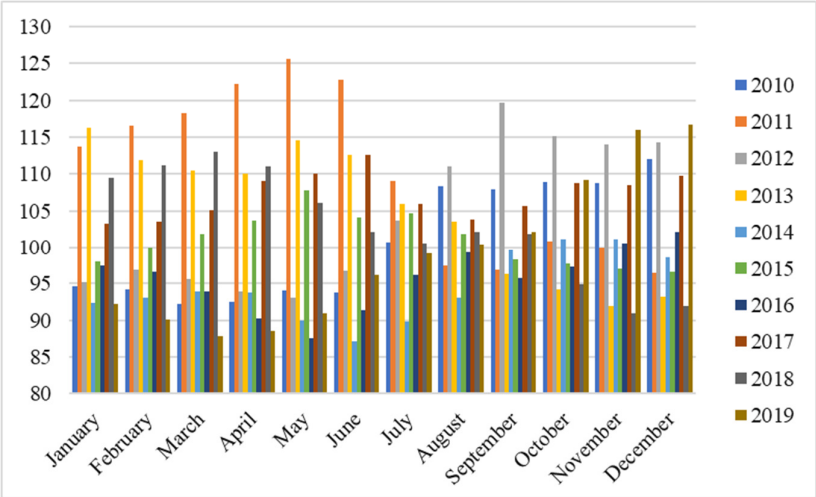

Graph 5: Monthly dynamics of the consumer price indices in Romania for fruits and canned fruits

Source: NIS, 2020

Overall, in 54% of the entire analyzed period there were increases in the price index targeting fruits and canned fruits, July, August and November showed increases in 7 of the 10 years analyzed compared to the same month of the year previous. A main factor of influence on the two summer months of the evolution of the price index is represented by the production/ha obtained, on the Romanian market being mostly domestic production. Regarding November, this

represents the beginning of imports, which extend until at least May, and which demonstrates the volatility of prices and their evolution externally when demand increases a solution being the imports.

The most important decreases of the analyzed indicator were in March and April 2019, when they decreased by 12.14%, respectively 11.47% compared to the same period in 2018, this taking place after two successive price increases in previous years.

The consumer price index is an indicator that measures the evolution of the price, and according to chart no. 5 there is an annual oscillation, noting the year 2017 which is the only year in the analyzed period 2010-2017 in which there were significant increases for all month, this happening after 2014 and 2016 were the years with the most constant months in decreasing the value of the index, 2018 will be the beginning of a year in which the first 4 months will continue the accelerated growth rate and will be maintained until September inclusive, following that the index will decrease by up to 10% in November 2018 compared to November 2017. following that in January-July 2019 the index will decrease after the similar period of the last two years has experienced a significant acceleration.

Trends in Romanian Fruit Market

The added value of fruit production is improved if the culture and the obtained production are certified organic. In recent years, organic agriculture has developed in Romania, being an agricultural system that supports the sustainable development of the Romanian agricultural sector. Organic farming is a booming branch of agriculture, gaining a growing share from year to year compared to conventional agriculture. Fruits and vegetables are the most popular and sought after organic agricultural products among consumers.

Table 6: The evolution of organic certified areas in Romania and the share of areas cultivated with fruits

Surface type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total organic farming area (ha)	182,706	229,946	288,261	301,148	289,251	245,923	226,309	258,470	326,259	395,228
Orchards, vines, cultivated fruit bushes (ha)	3,093	4,166	7,781	9,400	9,438	11,117	12,019	13,165	18,569	22,143
Share of fruits organic area (%)	1.69%	1.81%	2.70%	3.12%	3.26%	4.52%	5.31%	5.09%	5.69%	5.60%

Source: MARD, 2002

Regarding the total cultivated area in organic farming system, in Romania, it registered an increase of 116% in 2019 compared to 2010, during which time the cultivated area with perennial crops of orchards, vines and shrubs in organic farming increased from 3,093 ha in 2010 to 22,143 ha in 2019 (an increase of 616%). If in 2010 the area cultivated with perennial crops of orchards, vines and shrubs in organic system represents 1.69% of the total surface cultivated in organic farming, until 2019 its share increased significantly, representing 5.6%. The diversification of production gives the farmer an advantage and increases the competitiveness on the domestic market.

In 2018 there was the largest share of certified organic areas that are grown with fruit, due to the faster growth rate compared to the evolution of the total area, being 41.04% higher compared to the previous year, while the total organic agricultural area increased by 26.22%.

The observance of the standards regarding the commercialization of the fruits is elementary for the development of the horticultural sector, and the application for obtaining the voluntary quality certificates that guarantee a production obtained in conditions of alimentary security based on good agricultural practices. The fruit sector must follow to build a stronger supply chain to improve performance of all stages through activities that lead to the sustainable development of the sector.

Conclusions

Extensive fruit plantations in an extensive system, with low productive potential that leads to low yields characterizes Romanian horticulture. The low degree of reconversion of the fruit plantations and endowment of the fruit plantations with modern technical equipment for washing, sorting, packaging to offer a safety production, but also the lack of adequate storage spaces stagnates the development and competitiveness of the sector.

The reconversion of local orchards and the adaptation of crops to the new requirements by appealing to innovation and technology to increase yields and obtain a quality production, and investments in fruit growing show long-term results, ensuring optimal conditions adapted to the requirements of the production area.

The analysis of fruit consumption according to the environment of residence indicates a higher consumption among urban inhabitants, compared to those in rural areas, a main factor being the fact that rural people consume significant amounts of fruit only during harvest periods, when they have disposition of own production while urban consumers have a constant consumption behaviour throughout the year, this fact being due to the much easier accessibility to a wide range of fruits.

The largest fruit productions in Romania are represented by plums and apples, and regarding the imports besides the exotic and citrus products that cannot be satisfied from the domestic production, Romania registers high imports of apples, pears and quinces as a result of covering the needs due to the lack of high-performance storage spaces that allow long-term storage.

Although the share of fruit expenditures in total food expenditures represents in 2019 only 5.49% (rural) and 6.40% (urban), fruits have a significant importance on human nutrition. In conclusion, Romania is a country with a huge potential in terms of fruit production capacity, while the amount of fruit consumed by Romanians is on an upward trend. Regarding the organic surface cultivated with perennial crops of orchards, vines and shrubs in organic system, there is a rising trend in the analyzed period, registering in 2019, compared to 2010 an increase of 616%, which indicates the high attention paid to this segment both in terms of producers and consumers.

For a harmonious development of the Romanian fruit market, both actors involved must support the improvement of the current situation through concrete actions, respectively the demand represented by the final consumer must adopt a lifestyle with a high consumption of fruits considering the benefits to human health and at the same time to choose to consume more sustainable fruits as organic fruits, while the offer must be developed based on research and innovations that will contribute to higher yields and a safe production, the product respecting all standards.

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The Dilemmas Regarding Imbalances in Globalization Processes

Jolanta ZIEZIULA

University of Szczecin, Institute of Spatial Management and Socio-Economic Geography,
Szczecin, Poland, jolanta.zieziula@usz.edu.pl

Abstract

Globalization is probably one of the most commonly used words to describe the modern world in the last thirty years. However, the protests of the opponents of globalization are becoming increasingly frequent. What is this happening? The aim of this paper is to depict the negative phenomena associated with the development of globalization processes which contribute to the general imbalance of global growth processes and prevent sustainable world development. An attempt has been made to identify the conditions which need to be met to achieve optimum or at least sufficient balance. The analysis investigates the four principal spheres of globalization processes: economic, institutional, social and natural. The dialectical method was adopted to analyze the phenomena. The research was carried out using cause and effect, induction and deduction methods. The paper was based on the generally available, extensive source literature. The study carried out demonstrates that each of the spheres mentioned above remains in a great imbalance which prevents the achievement of an overall equilibrium. It is, therefore, necessary to take action to restore partial equilibria and then (or at the same time) coordinate the different components in order to create an overall equilibrium – integrated governance.

Keywords: Globalization, Equilibrium, Development.

Introduction

Globalization has probably been one of the most commonly used words to describe the modern world in the last thirty years. The concept of globalization has many different definitions, especially that the theory of globalization, which generalizes the current state of knowledge on the subject, has not yet been developed (Misiak, 2009). In the theory of international economic relations, globalization is often defined very generally as the process of destroying state border barriers for exert market forces (Szymański, 2001). In another approach, globalization is considered as the internationalization of economic activity (Stonehouse et al., 2001), i.e. grassroots, business-to-business measures to transfer economic activity beyond national borders. At the level of businesses, globalization involves the integration of dispersed international functions and activities and the entities which implement such functions and activities (Suszyński, 2003). In the source literature, aspects related to the natural environment – its degradation, the need for reconstruction and protection in general – are becoming more and more significant. Relatively less attention is paid to the institutional aspects of globalization processes.

W. Szymański, in the analysis of contemporary globalization processes, emphasizes their incompleteness and one-sidedness, manifesting itself in the preference for vested interests and microeconomic rationality (Polak, 2009). Is that why there is a growing outcry against globalization from its opponents? What is this happening?

The global balance may be defined differently, as an integrated governance. Borys (2011) describes "integrated governance" as a positive final result of global developmental changes. Integrated governance creates many governances, including: economic, social and environmental governance, but also spatial governance and institutional and political governance which does not restrict the proposed "collection" of governances. According to Borys, this approach is the most suitable to highlight the interdisciplinary of the process of balancing and sustainable development

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of the world and the need to approach it in different scientific fields and disciplines (i.e. legal, technical, sociological and psychological and economic sciences) and in practice.

Sustainable development may be defined as a lasting improvement of the quality of life of contemporary and future generations by creating appropriate proportions, mainly between three types of resources, also referred to as human/social, natural and economic capital, listed in different order, however treated equally, as elements of a larger system in which we live and which affect our proper functioning (Żylicz, 2010, Piontek, 2010). In such an approach to sustainable development institutional factors (including political and legal factors) do not occur.

The aim of this paper is to depict phenomena associated with the development of globalization processes which contribute to the general imbalance of global growth processes and prevent sustainable world development. An attempt has been made to identify the conditions which need to be met to achieve optimum or at least sufficient global equilibrium.

The presentation and evaluation of the phenomena was carried out in three main spheres of globalization processes: economic, institutional, social and natural. The dialectical method was adopted to analyze the phenomena. The research was carried out using cause and effect, induction and deduction methods. The paper was based on the generally available, extensive source literature.

The Economic Sphere of Globalization Processes

The prevailing economic trend of globalization processes involves the marketization of all areas of life – providing an opportunity to operate a business freely all over the world.

Zacher (2008) correctly defined the framework of globalization processes and those which are economic in nature are specified below:

- global capitalist system (technological, turbo, digital);
- market, as a systemic element, which involves total marketization (everything for sale) – societies become marketable (not civic);
- short decision horizon (quick profit) and
- hegemony of large transnational corporations/concerns (TNCs).

Among numerous economists, Kołodko (2010) as well stressed the importance of a liberal ideological basis for globalization processes, especially those that value freedom, democracy, private ownership and entrepreneurship, competition and economic freedom. Man was considered homo economicus and this entails the respect for their individualism (pursuing only micro-economic efficiency), treating profit as the sole criterion of success, encouraging maximization of consumption to increase production, disregarding the social and natural aspects of management, and at the same time applying state economic interventionism.

Supporters of classical economics believe that the free market is effective. The classical theory of an efficient market assumes the existence of a large number of entities which, before deciding to buy or produce and sell, collect and analyze all relevant information about both the probability of past events and the probability of future events. It is assumed that in an efficient market, important information regarding both past and future is easily accessible to decision-makers. With this information, optimal decisions may be taken (Davidson, 2012).

It should be borne in mind that decisions taken now will have an impact in the future. The production of most goods and services takes time, thus companies must now make decisions to produce products that may only be sold in the future. Moreover, when planning an investment, companies must assess the potential profits from the investment over its lifetime. This period often extends into years or even decades into the future. And yet even the purchase of goods and services to be delivered today requires the buyer to estimate the usefulness of this purchase, also in the future.

For markets to be efficient, both buyers and sellers would need to know the effects of all possible future situations. The assumption that the future may be known in advance is preposterous. Accordingly, if the future is unknown, current market participants are generally unable to make decisions that will be assessed as effective in the future. We should, therefore, agree with Davidson who maintains that it is necessary to reject the predominant theory of market efficiency (Davidson, 2012).

When it comes to decisions about significant expenses (or possible significant profits), people "know" that they know nothing about the future and any mistake may be very costly. Therefore, in many cases the most reasonable solution may be to avoid involvement (Davidson, 2012). This results, among other things, in the reduction of effective demand – a condition necessary for development – where this demand would exist.

And yet, insufficient effective demand is one of the key crisis-generating factors in the capitalist economy, hindering the economic development of individual companies, countries and, eventually, the world.

Undoubtedly, micro-economic rationality is often in conflict with macro-economic rationality. The principle of cost containment and profit maximization, as well as the increased profit-generation capacity of transnational concerns (TNCs), which are growing in strength, entail and increase the inequality in economic development of individual countries and regions of the world as a result of vested and conflicting interests of individual companies. However, there is a cognitive gap due to the lack of research on the impact of global expansion on the macro and micro-economic equilibrium in individual countries and regions. It has not been properly researched whether achieving global rationality by transnational concerns is in any case in line with the national interest of the host countries, especially the poor ones. Moreover, there are no studies on the impact of the global expansion of transnational concerns on the macro and micro-economic balance in individual countries and regions. Doubts are growing.

The main benefits (especially for TNCs) in the process of globalization lie in the unlimited possibilities to increase the scale of production (and other activities to use their accumulated capital), and thus reduce unit costs and increase not only the mass of profit, but in many cases also the rate of profit, provided that they may take advantage of the effective global demand that exists. The reduction of production costs may be achieved, inter alia, through the use of cheaper production factors outside the home country, especially raw materials and labor (including intellectual capital). In addition, lower prices in the country receiving foreign capital and the lack of strict environmental protection requirements may generally be conducive to cost reduction.

The processes of globalization are a prerequisite for changes in the functioning of businesses and above all for the creation and development of increasingly powerful transnational corporations. At the level of TNCs, the changes involve integrating activities scattered across several countries in order to provide the greatest possible benefits to the corporation treated as a whole. The involvement of companies in activities abroad may, at least in part, counteract the adverse effects of business cycles (prevent or mitigate the effects of the economic downturn in the home country and even mitigate the effects of local crises). The expansion abroad often entails the demand for products from the home country and for complementary activities in that country. In addition, there is a profit transfer (at least in part), which increases purchasing power in the home country and stimulates declining domestic demand, which is particularly important, especially in times of economic downturn. As a result, the state administration, particularly in highly developed countries, often supports foreign businesses. Adequate support may have a positive impact on the economies of countries from which transnational corporations originate. Therefore, state institutions are also involved in the implementation of programmes aimed at increasing the international competitiveness of domestic enterprises, at

mitigating the process and costs of adjustment to global competition, or at promoting the development of an information and knowledge-based economy.

Globalization processes have both positive and negative effects on national economies. This impact is multifaceted. In addition to the positive impact of globalization processes on the economies of the countries from which multinational corporations originate, negative effects were also observed. Corporations, while continuing the process of externalization, relocate part or all of their business activities abroad, thus reducing domestic demand. This is due to the reduction in employment and purchasing power of all employees in the home country (Zimniewicz, 2016)

Countries with the inflow of foreign capital of TNCs experience rising employment and the increased purchasing power of the local population. Unfortunately, there is also a negative impact on the economies of poor countries, partly due to unequal distribution of benefits from international trade (Krugman, Obsfeld, 2007). The processes of globalization are asymmetric in nature – they do not affect everyone and everything equally. Asymmetry results from the enormous economic dominance of the West, with the USA at the forefront. The strongest companies (companies often supported by states) set the standards of globalization which bring them advantage and from which they may benefit most (Polak, 2009). Weaker countries are being exploited.

The nature of exploitation of poor countries is defined in the source literature by three forms of imperialism (Deszczyński, 2014):

- "trade imperialism" means export of raw materials and food from underdeveloped countries at unfairly low prices and import of surplus finished goods of TNCs from highly developed countries at relatively high prices (increasing incomes of "imperialists");

- "capital imperialism", i.e. export of capital by transnational corporations to underdeveloped countries and using it to make higher profits than those that would be generated in the countries of the capital origin, at the expense of the economies of the host countries;

- "imperialism of economic aid" – state bodies in highly developed countries buy and transfer part of their domestic production to poor countries, compensating domestic producers for insufficient domestic demand.

This activity ties recipients of economic aid to donor countries, inter alia, by allowing additional exports from those countries to recipient countries.

In economic terms, globalization means the expansion of the capitalist system into an ever larger area of the globe. The world economy, according to Kołodko, is to a lesser extent divided into national economies and to a higher extent composed of those economies as interdependent elements. The correlations within the global market are particularly evident in the financial markets. The instability of global risk financial capital flows is one of the main causes of growing financial crisis (Kołodko, 2008).

Economic imbalance in the macro and micro-scale is an immanent feature of the capitalist economy. However, the internal contradictions relating to the operation of the market economy are multiplied and exacerbated in the wider process of globalization.

The Institutional Sphere of Globalisation Processes

Business activity depends both on the activity of the companies themselves and on the operating conditions created by other entities, at home and abroad. In addition to businesses, the process of globalization involves various groups of institutional entities, such as states, international institutions and organizations and non-governmental organizations.

Due to their specific features and functions, institutional and political elements are sometimes identified within the structure of the integrated governance as a separate governance (Borys, 2011).

The development of contemporary globalization has been significantly influenced (and continues to be influenced) by nation states (Zorska, 2007). In addition to traditional activities concerning legislation, stabilization, security, etc., state institutions are involved in the implementation of programmes aimed at increasing the international competitiveness of national economies, mitigating the process and costs of adjustment to global competition, introducing new solutions (institutional and legal), as well as promoting the development of an information and knowledge-based economy.

Whether foreign enterprises may operate in a given country depends, among other things, on the degree of economic freedom permitted in that country, i.e. the lack of government coercion or restrictions in terms of production, distribution and consumption of goods and services, apart from the absolute necessity arising from the protection of citizens (Misiak, 2009). In this respect, individual countries are divided into the following economies: liberal, rather liberal, medium-liberal, rather non-liberal and non-liberal. For example, liberal economies include Hong Kong, Singapore and Ireland. Poland is considered a rather liberal economy. The greater the freedom (economic and political liberalism), the lesser systemic influence of state institutions.

As was mentioned above, the strongest companies set the standards of globalization from which they benefit most (Polak, 2009). America (mainly the USA) is striving for synergy of key factors determining the trends of globalization. The rivalry between America and Europe (the European Union) – mega players on the global scene – is growing in the main areas of globalization changes. However, Asia, in particular China and India, is rising in importance (Misiak, 2009).

International organizations, including those supporting international trade and economic growth, participate in the globalization process as well. They are conducive to the processes of globalization. According to Stiglitz (2007), the World Trade Organization (WTO), the International Monetary Fund (IMF) and the World Bank (WB) play a major role. International organizations are of particular importance in expert (including conciliation) and coordination activity. The greater the role played by these organizations, in accordance with the intent and economic and political power of the Member States, the greater the opportunities for action. For example, the WTO is exerting pressure to remove all obstacles to trade and the IMF is enabling the increase of the supply of capital for development (investment) purposes.

Institutional support for globalization processes has contributed significantly to the development of many enterprises and the transformation of some of them into transnational concerns (TNCs). It would seem that in the process of globalization the world is becoming a “global village” with excellent tools for instant communication and that institutional equilibrium is relatively easy to achieve. However, that is not the case.

The phenomenon of so-called “structural violence”, also referred to as system lobbying, may be observed more and more frequently (Laska, 2006). It is based on the fact that entities strong in the economic structure use considerable financial resources to convince other countries to introduce solutions and regulations favoring the strongest entities (Zimniewicz, 2016). The International Monetary Fund, the World Bank and the World Trade Organization, in which representatives of the most developed countries have the deciding vote, are used for the above purpose. And yet, these organizations were established to work together on a global level and to ensure economic stability in the public interest. They grew out of Keynesian understanding of the need for state stimulation of the economy when the market fails (Stiglitz, 2007).

Among international organizations, integration groupings such as the European Union play a very important role. They have an increased capacity to influence global processes by delegating part of their competences, which have traditionally been national competences, and by holding substantial financial resources from the Member States.

It is generally accepted that the activity of the TNCs is a factor that enhances global economic rationality. This is due to the fact that it allows a given company to benefit from locating individual stages of production where it is the cheapest. Is achieving global rationality, however, always in the national interest of the host countries, especially the poorer ones? And do the countries of origin of transnational corporations actually benefit in the long run, when institutional entities (especially state entities) are less able to interfere in the activities of companies?

A concentration of supranational power of large companies and their groups – transnational corporations, is observed in the world. However, they are becoming less and less dependent on the operating conditions in one country, as they may easily find other beneficial locations for their activity which they use to avoid paying levies (taxes). There is no doubt that in the process of globalization the role of countries in the economy is eroded by effective attempts to limit their sovereignty (Domaradzka, 2016).

It should be borne in mind that the principle of cost containment and profit maximization, as well as the increased profit-generation capacity of supranational companies, which is beneficial for companies, may undermine the interests of each state, its stability and security, as well as limit the state's ability to influence demand and the budgetary impact on the socio-economic sphere. This is due to the fact that TNCs, through effective lobbying in the legislative sphere, may disregard states. They often receive financial support from public funds, basically without paying taxes, if they conduct business activity and make even a small profit. Transnational corporations are operating on an increasing scale, however, are still guided by micro-economic rationality. They selfishly take over power (and, consequently, wealth – earned or appropriated) for the benefit of owners and board members, passing on the costs to global society.

As already mentioned, both states and international organizations are not free from the influence of strong lobbying on the part of the TNCs, which are able to cause changes in the legislation granting corporations even more power. However, the risks associated with their wrong decisions are effectively passed on to society (Zimniewicz, 2016).

Liberalism, i.e. the institutional dominance of the stronger entity over the weaker entity in economic and military terms, still prevails as the economic and political doctrine of the world. The economically strong entities do not have a considerable need to take account of weaker communities, through their institutions. The attempts and ability to coordinate the cooperation of the strong with the weak are insufficient. The need to increase the capacity of people of the “Western periphery”, often treated as “talking tools” or even “redundant elements”, has not been recognized as well (Michnowski, 2006).

Imbalance leads to chaos. The chaos is exacerbated by the inefficiency of the mechanisms of controlling the process of socio-economic and natural life of the earth applied by politicians at the national and international level (Michnowski, 2006). Contemporary control is mainly based on the intuition of politicians who have no access to knowledge about the properties of communities transformed by their policies, which are often covert. Moreover, politicians do not have access to knowledge about the complex political consequences of their own and foreign policies. Hence, the policies are often counter productive. There are no institutional mechanisms for recognizing the conditions and consequences of political decisions taken, which prevents conducting politics properly (Michnowski, 2006).

According to Sadowski (2006), one of the most important and so far most militarily effective form of counteracting asymmetrical globalization processes is terrorism, which becomes more and more prevalent. The author draws attention to global military threats.

To a greater extent, they seem to come from other participants in international relations rather than individual countries. An example of a global organization of cultural and religious extremism, referring to Islamic civilization, is Al-Qaeda. Its aim is to establish a pan-Islamic caliphate in the world through cooperation with Islamic extremist groups. Its activity includes for example the establishment of ISIS and the acts of terror experienced by some countries in recent years, playing a significant role in globalization processes.

The Social Sphere of Globalization Processes

It is believed that unemployment and the growing unfair distribution of globally produced wealth are among the most serious socio-economic problems in the world today. Attempts are being made to change this situation at the international and regional level (also within particular groupings e.g. in the European Union (Bielecka, 2008; Kołodko, 2013 et al.)). They have been rather unsuccessful.

The processes of globalization and the introduction of a market economy have not brought the desired results in Russia and most other countries undergoing political transformation. The transformation in Russia, in the form recommended by international economic institutions, has led to unprecedented poverty. Tittenbrun (2007) writes extensively about the transformation in Poland and its negative effects.

Critics of globalization accuse Western countries, especially the USA, of hypocrisy. They have encouraged developing and transforming countries to remove trade barriers, leaving barriers in their own countries. They have thus prevented export earnings, mainly for underdeveloped countries, which are essential for their development and for improving the living conditions of their populations. In general, developed countries have managed globalization processes in such a manner as to seize a disproportionate share of the benefits at the expense of underdeveloped countries. An example includes the extension of intellectual rights under the Uruguay Round of GATT (the predecessor of the WTO) in 1995. The established governance reflected mainly the interests of manufacturers rather than users, which, inter alia, allowed Western pharmaceutical companies to increase profits and more effectively thwart the production of “their” drugs by countries that could not afford to buy licenses (Stiglitz, 2007). As a result, some of the world's poorest countries have become even poorer. In addition, easing the control over capital markets, e.g. in Latin America and Asia, has benefited Western banks, while the less developed countries were adversely affected. The inflow and sudden outflow of speculative capital to and from these countries entailed a currency crash and weakened banking systems.

Finally, even if programmes carried out in accordance with developed countries' recommendations were counter-productive in underdeveloped countries, those countries still had to pay the debts incurred to implement the failed programmes.

Uneven economic development accompanied by income polarization is an inherent feature of modern globalization processes. One of the growing trends is increasing socio economic diversification due to the uneven distribution of the benefits of economic growth. The area of relative poverty of the unemployed as well as of part of the employed is growing, even in conditions of favorable macro-economic indicators and the economic standing of enterprises.

As is known, economic diversification has always existed, however, its current degree raises concerns, especially due to the fact that, to an increasing extent, it is distributive effect of globalization processes (Polak, 2009).

Unlimited enrichment of some at the expense of others results from disregarding social aspects of management (Kołodko, 2010). As there is no dominant axiology of the common good – common interest, social relations are regressing (Michnowski, 2006).

Stiglitz (2007) believes that globalization processes contribute to the breakdown of social ties. This leads to the well-known phenomenon of exclusion of large groups of society, also in countries that are not excluded from globalization processes (Zacher, 2008). Undoubtedly, however, as a result of exclusion, but also exploitation, a significant number of people in underdeveloped countries live in extreme poverty.

Globalization has not reduced the scale of poverty and has even increased it. Nor has it enhanced stability in the world. Unemployment is rising. Crises plague almost all countries of the world.

People's protests against the policies and actions of institutions responsible for globalization are nothing new. Less developed countries, for example, have rebelled for years against overly restrictive cost reduction programmes imposed on them. More and more people decide to emigrate to highly developed countries, largely for economic reasons. This is the case, even though in these countries as well, the population is experiencing the negative effects of globalization, such as unemployment and the pauperization of larger social groups. There is a strong disintegration of society (Stiglitz, 2007 et al.).

Protests against globalization, also in developed countries, are mounting. Generally speaking, at the heart of the protests is the conviction that globalization does not improve the lives of those who need it most and that it does not bring the benefits promised to people. The gap between those who possess and those who do not is widening.

The mounting protests of the population under anti-globalist and alter-globalist slogans, although justifiable, are generally not very well organized and as such cannot change the processes of globalization. However, they indicate that many people feel wronged and that resistance to the processes of globalization may increase.

Asymmetry of globalization processes has become one of the factors of the global social crisis. It reflects the self-destruction of the existing developmental trajectories.

The Natural Sphere of Globalization Processes

The negative impact of globalization processes on the environment is regularly raised in the literature (Płachciak, 2011). Zimniewicz (2016) draws attention to examples of over exploitation of natural resources, e.g. in Congo which provides valuable and rare raw materials. In the process of obtaining raw materials, apart from the TNCs, even UN soldiers are involved. It is difficult to believe that they are not aware of the fact that they participate in the over-exploitation of the environment (and people).

According to Stiglitz (2007), globalization processes contribute to the destruction of the environment, especially in less developed countries. One of the most serious problems is the side effect of globalization, which is the degradation of the environment: air, water and soil and the adverse climate changes observed.

Globalization processes are characterized by a massive relocation of production processes. It is necessary due to, inter alia, restrictive CO2 emission standards in certain countries. Companies that cannot afford to install expensive carbon reduction equipment or only want to reduce costs may relocate the production to countries where such restrictions do not apply. If the relocation of production is accepted, the host countries are exposed to an increased CO2 emission, while the countries that outsource production reduce it. This results in a global air pollution.

According to UN reports, approximately 50 million tonnes of electronic waste is produced annually worldwide, only 10% of which is recycled. The rest is deposited in the landfills. The very “green” European Union introduced strict regulations concerning this type of waste. However, most of it is mixed with still usable electronic equipment and sent outside the Union; the situation is similar in the United States and Japan. The main recipients of e waste include China, India and Africa – in particular Kenya and Nigeria. The reason for relocating electrical waste is cost. In the European Union, the United States and Japan, the costs of e-waste disposal are high, which renders such activity unprofitable, even though the disposal methods used allow the recovery of up to 90% of rare materials. It is more profitable to send e-waste to Africa. In Africa, approximately 25% of raw materials is recovered. The rest is wasted irretrievably. This enormous waste is accompanied by air, soil and water contamination. The morbidity of the population is dramatically increasing (Ziemniewicz, 2016).

There is no doubt that the negative impact of globalization processes on the environment is escalating. There is excessive consumption and devastation of environmental resources, despite remedial efforts.

Those products which are relatively more environmentally friendly than their predecessors may also have a negative aggregated effect on the natural environment (in all countries combined) (Żylicz, 2010). Moreover, it was found that (despite actions taken to protect natural resources), dematerialization of production in developed countries is accompanied by an aggregate increase in consumption of natural resources, including non-renewable ones. A particularly important conclusion of the Meadows and Forrester study (Płachciak, 2011) is that a global disaster (as a result of unsustainable development) does not have to result mostly from the depletion of natural resources. The disaster may be caused by the degradation of the natural environment – air, water and land (Michnowski, 2006).

The degradation of the natural environment is exacerbating. It in particular affects farmland, tropical forests, biodiversity. Greenhouse gas emission is rising. There is a growing threat of melting glaciers, rising sea levels, increasing hurricane frequency and strength. The ozone depletion is accelerating (Michnowski, 2006). Air, water and soil pollution is reaching unprecedented levels, despite the development of increasingly eco-efficient techniques and technologies!

Nature is in a state of chaos. It is exacerbated by the random protection and restoration of natural resources, which at the same time often causes degradation of other resources. An example includes the restrictive protection of grey seals or cormorants in Poland at the mouth of the Vistula which results in the complete destruction of salmon (Dunin-Kwinta, 2016), and such examples may be found in other countries.

Until recently, economic growth at the expense of the natural environment did not threaten the existence of its destroyers. The environment had developmental surpluses (Michnowski, 2006). However, in the course of the globalization processes it was not taken into account that the processes of life are irreversible. Pollution already emitted to the environment cannot simply be withdrawn from it. Homoeostatic properties sustaining human life cannot be restored in the destroyed biosphere. If a key link in the biological chain mutually supporting life on earth is broken, it will not be restored by genetic engineering applied (Michnowski, 2006), or at least not immediately.

The progressive destruction of the natural sphere is a consequence of the moral degradation of the hitherto naturally primitive, short-sighted and egoistic form of social and economic development of the world community, especially its highly developed part. This development is based on the principle of strong growth at the expense of the environment.

Excessive consumption of resources and the devastation of the environment are largely due to a lack of economic, institutional and social responsibility, fostered by globalization. Undoubtedly, the global natural imbalances are constantly growing.

Conditions and Methods of Restoring Global Equilibrium

The analysis of the components of globalization processes, considered to be the most important ones: economic, institutional, social and natural components, proves that each of them is in a state of deep imbalance. The domination of economic capital in globalization processes entails numerous adverse institutional, social and natural consequences. They cause permanent, growing imbalance in the overall system we live in. A global disaster is becoming a reality.

Regardless of the depletion of natural resources, if the socio-economic infrastructure, including the dominant selfish axiology, is left unchanged, such a disaster will occur. This disaster will be caused by the degradation of the natural environment (Michnowski 2006), but also by the further disintegration of the world community, which has clearly escalated in recent years.

Restoring balance naturally is out of the question. Sustainable development is contingent upon such an establishment of relations which will not affect the ability of the natural environment to provide its services in the future. The development of the human eco artificial environment in the world, including the infrastructure created, may not be

reversed (in a peaceful manner), however it is possible to modify the existing urbanization, industrialization, automotive and consumption trends and related waste (Zacher, 2008).

Many representatives of the world's elites, decision-makers and scientists (and, under their influence, the general public) still lack a proper understanding of the chief causes of the global crisis, which results in a conservative continuation of the Darwinian, selfish, informationally malfunctioning social relations (Michnowski, 2006). The anti-liberal conclusions of the Meadows' team regarding the urgent need to take action for a radical transformation of civilization, based on the axiology of the common good, are not taken into account. Moreover, there is still no political willingness to implement UN programmes for sustainable development and no requests from moral authorities (e.g. John Paul II) to cooperate in the implementation of specific developmental restructuring proposals. What are the reasons for such omissions?

The global crisis is a fact and a real threat to the existence of societies. It stems from the maladjustment of the world community to live in the present state of rapid change and risk. This maladjustment is a result of insufficient flexibility of the community and its economy, as well as insufficient active intellectual potential, including in particular the failure to convince the world political bodies about the necessity of initiating the civilizational transformation, which is a requirement for the permanent development of the world community, including in particular building informational and educational foundations for sustainable development (Michnowski, 2006).

It is necessary to radically improve the mechanisms of controlling the process of socio-economic and natural life by creating opportunities for supporting politics, its objectives and profound consequences with computer simulation methods as well as knowledge about the properties of social systems, which condition such simulation.

Without knowledge of the essential properties of eco-social systems and modern policy making methods supported by high information technology, it is not possible, among other things, to combine the increase in prosperity (and quality of life) “here and now” with the increase in prosperity of future generations. It is also not possible, as has been the case so far, to conduct an economic policy in such a manner as to render economic growth sustainable and permanently foster the quality of life of all people and ensure the proper condition of the natural environment (Michnowski, 2006).

All actions require, in the first place, a broad and theoretical basis convincing the decision makers. The theory of international economic relations has raised such, mostly partial, issues as: international conditions of economic processes, models of economic interdependence or conditions of macro-economic policy coordination, as well as the causes and models of contemporary currency crises and the related threats and consequences of financial market globalization.

The noteworthy, contemporary economists who recognize the need for a fundamental, comprehensive change in the approach to the development processes of the capitalist economy, and thus to the processes of globalization, include, apart from the Nobel Prize winner Joseph Stiglitz (2007), Polish economist Grzegorz Kołodko (2013), but also American economist Paul Davidson (2012). The above authors recommend rejecting the doctrine of liberalism and restoring a more active and, most importantly, effective state policy, not only in terms of economy.

Regardless of the pace of change, it is unlikely that a coherent global system of the world economy, and in particular a global and widely accepted regulator, will emerge in the near future. Due to the existence of nation states, diverse management conditions, accumulated wealth and regulatory and control capacities, solutions for restoring partial equilibria should be, in the first place, introduced in individual countries.

Subsequently, using inter-state and international agreements, institutional (and legal) arrangements should be coordinated in such a manner as to contribute to global integrated governance.

The need of departure from treating earth only in narrow ecological terms (global ecosystem) is strongly emphasized in the Global Programme of Change developed under the leadership of Gro H. Brundtland by order of the UN. The

programme was presented in the Report of the World Commission on Environment and Development published in 1987 (Michnowski, 2006; Płachciak, 2011). The programme recommends a gradual change in production and consumption models correlated with sustainable development requirements. As a result of the change in production models, adequately modified products and technologies should have positive impact on the (social and natural) environment. A change in consumption models should radically reduce irrational, and in fact needless consumption, for example only prestigious consumption (Michnowski, 2006).

The Global Programme for Change promotes social justice, solidarity, harmony and equality within and between countries, in full respect of national sovereignty and territorial integrity. The priority tasks include the elimination of poverty, unemployment and social exclusion in all countries of the world. It was also considered necessary to socialize the benefits of globalization. It is necessary to increase properly remunerated employment (enabling decent living) and to improve multi-level governance. It was confirmed that achieving sustainable development requires a forward-looking approach and broad participation of institutional entities in the implementation of such a policy. It was stressed that counteracting threats requires solidarity, dialogue and cooperation, as well as support of modern technology (Michnowski, 2006).

First of all, risks of an economic and social nature should be recognized. They contribute to military threats whose occurrence depend on the effectiveness of reducing such risks.

It should be emphasized that unemployment and the growing unfair distribution of globally produced wealth are among the most serious socio-economic problems in the world today. However, in the face of growing public opposition and escalating terrorism, attempts to distribute world wealth more fairly should still be made. Taking in refugees from poor countries does not solve these problems. Kołodko rightly points out that international enforcement and control mechanism, in addition to national ones, have to be enhanced, even though this is extremely difficult.

The most developed systems of counteracting unemployment and fair distribution of the generated national income and wealth in general exist in Denmark and Sweden. They are also in place in other countries. However, it turns out that these systems are not fully efficient and budgets do not withstand excessive social burdens. They tend to be reduced e.g. in the UK, Germany or France. However, insufficient demand significantly inhibits economic development. Thus, states make further attempts to increase it, inter alia, through transfers of a social nature. The introduction of so-called “civic income” in Switzerland and Finland in 2015 may be deemed such an attempt.

Coordinated action is needed to ensure that all those who want to work are employed and to eliminate injustice in the distribution of income and wealth. It is essential to ensure, at least in part, an even distribution that will contribute to the maintenance of social peace. It is important that the positive distributional effect does not discourage people from working and developing entrepreneurship – does not lead to stagnation or even collapse of the economy. Therefore, such measures for increasing employment and salaries must be taken as a result of which the salary growth rates would be slightly below the growth rate of the economy, and an inheritance policy should discourage a life of idleness.

It is crucial (and possible) to provide people with stability and a sense of social security, so that they are willing to spend more and save less. As a result, the necessary general demand, which is permanently insufficient in a developed capitalist economy, may grow.

The most important thing, however, is to convince the decision-makers of the validity of such changes even if, in the short run, they would incur minor financial losses. In the long run, however, they would benefit from a new, global and fairer economic and social order.

Michnowski (2006) rightly points out that to avoid a global disaster it is necessary to:

- urgently assist politicians with computer methods for the simulation of their political actions and decisions, by creating an informative basis for policy, including an information system enabling access to knowledge about the profound consequences of political actions and decisions and other changes in the conditions of human and natural life;

- continue research into the characteristics and proper development of eco social systems, facilitating the correct simulation of the behavior of such systems under different environmental conditions;

- develop a far-reaching strategy of civilization transformation and define the basic strategic undertakings necessary to shorten its duration;

- develop the ability to effectively eliminate the negative consequences of moral degradation, which is spreading at a faster rate with the development of science and technology;

- develop skills of intercultural dialogue and cooperation as an essential condition for the development of synergies necessary to overcome the global crisis.

Undoubtedly, it is necessary to accelerate actions aimed at overcoming environmental degradation and negative economic and social phenomena, especially in individual countries. This requires special control over the activities of transnational concerns in each country and, as far as possible, coordination of activities between the countries in which the concerns operate so as to eliminate the negative effects of their actions in the social and natural sphere, but also in the economic sphere (tax evasion or obtaining undue public aid). In other words, it is necessary for the institutions to implement and monitor the implementation of the remedial measures (e.g. a general tax on capital movements).

As regards countering the escalating global military threats, Sadowski (2006) rightly indicates that international peacekeeping pressure must be created. Without taking all possible measures to solve the main problems of the modern world peacefully, we are in danger of a world war.

Both the concept of integrated governance and the concept of sustainable development do not emphasize that it is necessary to achieve and maintain internal balance in the individual components of each capital, i.e. partial equilibria. I am convinced that the global equilibrium will not be achieved other than by “working out” methods to achieve global partial governances, and only the coordination of these governances will allow the achievement of an integrated global governance, a global equilibrium.

Summary

The research shows that each of the analyzed spheres – economic, institutional, social and environmental – remains in a deep imbalance which is aggravated in the process of globalization. This prevents the achievement of an overall equilibrium. It is therefore necessary to take action to restore partial equilibria and then (or at the same time) ensure the coordination of equilibria in each sphere in order to create an overall equilibrium – integrated governance. This requires considerable institutional efforts aided by the up-to-date IT knowledge.

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Production Methodology of the Mechatronic System

Liviu Mihai SIMA
PhD student, University POLITEHNICA of Bucharest, Faculty of Industrial and Robotics Engineering, Department of Robots and Production Systems, Bucharest, Romania, e-mail: liviusima23@gmail.com

Miron ZAPCIU
Prof., PhD coordinator, University POLITEHNICA of Bucharest, Corresponding member of Academy of Romanian Scientists, Scientific Director of Research Institute SC INCERTRANS SA, Bucharest, Romania, e-mail: miron.zapciu@upb.ro

Abstract

The mechatronic system is the result of the integration of mechanical and electrical / electronic parts. Mechatronics has developed and continues to develop more and more with the development of mechanics, electricity and especially electronics. The production process can be complicated, depending on the complexity of the mechatronic system. Therefore, the organization of production activities is very important in obtaining a finished product, as desired. Depending on the mechatronic system, there is a certain way of punctual testing of the product parts within the production process. For a mechatronic system, step-by-step testing was performed. For this testing in the production process, models inspired from software testing are considered.

Keywords: mechatronic system, software testing, testing methodology, production process, integrated design.

Introduction

Mechatronics, also called mechatronic engineering, is a multidisciplinary branch of engineering that focuses on the engineering of electrical and mechanical systems. It is a combination of robotics, electronics, computer, telecommunications, systems, control and product engineering. The term "mechatronics" is defined to provide a framework for technical and practical considerations.

The concept of mechatronics has evolved from the original definition given by the Yakasawa Electric Company. The term "mechatronics" was introduced by an engineer (Tetsuro Mori) from the Japanese company in 1969.
As a word, it was registered as a trademark by the Japanese company, with registration number "46-32714" in 1971 and used since 1972. The company subsequently issued the right to use the word in public, after which this term began to be used throughout the world.

In dictionaries, the term officially appeared in 2005, in Larousse (France). Nowadays, the word is translated into many languages and is considered an essential term for the industry.

The French standard NF E 01-010 (2008) defines mechatronics as an "approach to the synergistic integration of mechanics, electronics, automation and informatics in the design and manufacture of a product to increase and / or optimize its functionality". Many people treat mechatronics as a modern word, synonymous with robotics or electromechanical engineering.

On the beginning, the field of mechatronics was a combination of mechanics and electronics.

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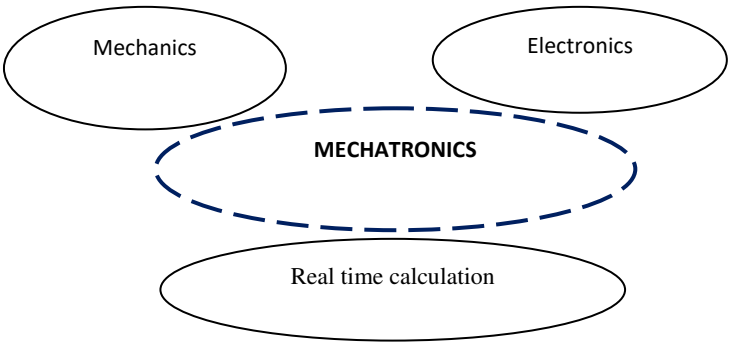

Fig. 1: Origins of the word mechatronics

As the complexity of technical systems continued to evolve, the definition was extended to include more technical areas.

The interest of this area of interdisciplinary engineering is to design powerful automated systems and to allow the control of complex systems.

Testing of a Mechatronic System

The mechatronic system can be designed and / or developed in several test models. The methodologies implemented were inspired from the software testing.

Testing is necessary to check the mistakes which could appear. Without testing, some permanent failures could come, and the whole mechatronic system could be useless. All steps from the production needs to be checked, because some mistakes could appear in any step of the production.

Software development models are different processes or methodologies that are selected for project development. These depends on the project objectives. In software testing are some development life cycle models. Those were created in order to achieve a specific goal of the product. Not all the time the same testing model is used, this depends on the complexity of the product.

The selection of a testing model has an impact on the type of test performed. In the testing methodology is defined the plan of testing and which techniques should be used.
Nowadays are used various software development models or methodologies. Some examples are: Waterfall model, Agile model, incremental model, RAD model, iterative model, spiral model, prototype model and the V-shaped model and its variations.

The mechatronic system can be tested during the production process from several points of view. Depending the manufacturing process, it can follow a certain type of model in testing. The focus is on the Waterfall and V-models, which are being usually the most models used in testing.

The Waterfall-Model

This model is a breakdown of project activities into linear sequential phases. Here, each phase depends on previous results and corresponds to a specialization of tasks. This approach is used for certain areas of engineering design. In software development are less iterative and flexible approaches. The progress flows largely in one direction ("down" like a cascade) throughout the phases.

The Waterfall-model begins with the manufacturing and construction industries. When this model was first adopted for software development, there was no recognized alternatives to knowledge-based creative work. This model refers to the fact that it should move to another phase only when the previous phase is reviewed and verified.

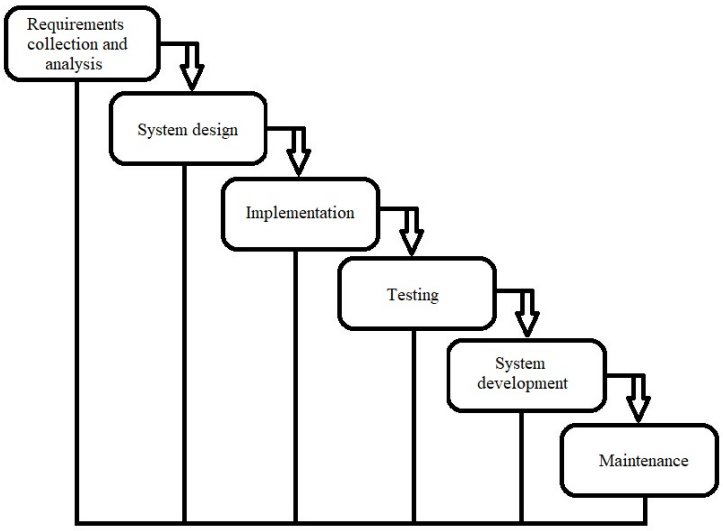

Fig. 2: Product testing of the "Waterfall" model

In the case of the Waterfall model, very little customer interaction is involved during product development. This could create serious disadvantages. Once the product is ready, it can be shown to end users. When a malfunction occurs, the cost of solving the issues is very high. This situation appears because everything is updated from the document to the logic of the design. In practice, the Waterfall model has been replaced by other models.

The V-model

This model is a simple variant of the traditional Waterfall model of system or software development. As in Figure 3, the V-model is based on the cascading model by emphasizing verification and validation.

The V-model takes the bottom of the Waterfall model and bends it upwards in a “V” shape so that the activities on the right check or validate the work products of the activity on the left.

The left side of the V-model represents the analysis activities that break down users' needs into small, easy-to-manage pieces. The right side of the V shows the corresponding synthesis activities that agree (and test) these parts into a system that meets the needs of users.

In V-model each phase needs to be completed before the start of the next phase. Product testing is planned in parallel with a corresponding development phase from this model.
Requirements such as BRS and SRS start the life cycle`s model just like the Waterfall model. In the V-model a system test plan is created before starting the development. The test plan focuses on fulfilling the functionality specified in the requirements collection. The HLD phase focuses on the architecture and design of the system. This phase provides an overview of the solution, platform, system, product and service or process. In this phase an integration plan is created. This is needed to test the capacity of collaboration from the software systems. The LLD phase occurs when the actual software components are designed. This phase defines the real logic for each component of the system. The class diagram with all methods and the relationship between classes falls under the LLD. Component tests are also created at

this stage. The implementation of the code takes place in the implementation phase. Once the coding is completed, the execution path continues on the right side of the “V”. The previously developed test plans are now used.

The V-model demonstrates the relationships between each phase of the development life cycle and the associated test phase. The horizontal and vertical axes represent the time or complexity of time (from left to right) and the level of abstraction.

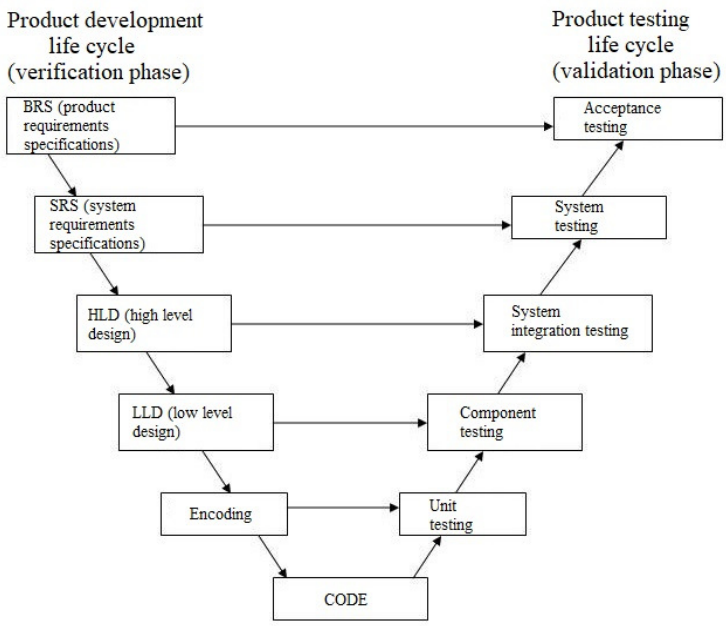

Fig. 3: Product testing of the "V" model

The verification can be done partially on the left side of the V-model. It is an incorrect approach to say that the validation only takes place on the right side of the V-model. The simplest way is to say that the verification is always in accordance with the requirements (technical terms) and validation versus specifications or user needs. Validation can be expressed by the thing that the system is being build and verification if the system is being built correctly.

Production process of a Mechatronic System

In order to allow a systematic process of designing mechatronic systems with a high level of integration, is needed a so-called multidisciplinary integrated design. Until now, nobody provided an effective solution that can fully support the entire design process to achieve such an integrated multidisciplinary design.

In order to organize design activities from different disciplines and to help designers achieve multidisciplinary integrated design, can be followed a design methodology based on a multidisciplinary interface model.

In accordance with systems engineering practices, is used an extended V-model as a macro-level process in the proposed design methodology. This starts with identifying the system-wide requirements and ends with a user-validated system. The hierarchical design model is adopted as a micro-level process. It supports specific design phases in which individual designers can structure design subtasks and can proceed and react in unforeseen situations.

In order to ensure coherence and traceability between the two levels, the multidisciplinary interface model is proposed. This design methodology is demonstrated by studying the process of designing the mechatronic system.

To test the state of a mechatronic system, any of the models listed above can be used. Of course, depending on the test model chosen, there are certain advantages or disadvantages.

The presented design methodology adopts the extended V-model as a macro-level process and hierarchically the design model as a micro-level process. Multidisciplinary, the interface model helps designers ensure coherence between the two levels.

The macro-level design process adopted an extended V-model process to present the overall flow for the mechatronic system. The left branch of the V-model extension represents the system design sub-process and is described in qualitative models. After analyzing all the requirements for the whole system, subfunctions and subsystems are defined. During the system design sub-process, the design phases are identified as: specification, functional model and architectural phases. As is represented in figure 4.

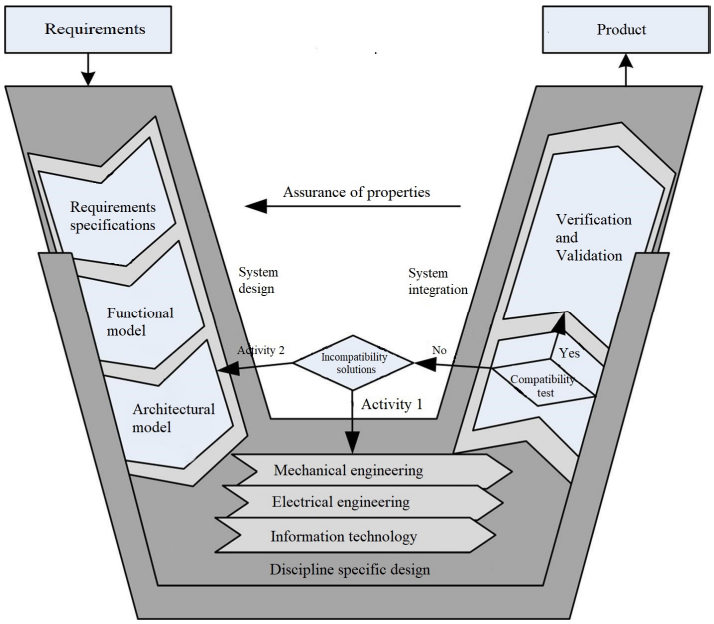

Fig. 4: Testing methodology for a mechatronic system

The right side of the V-model represents the sub-process integration system. In the extended V-model, this sub-process can be divided into two phases.

The objective of the compatibility testing phase is to guarantee and ensure correctly multidisciplinary integrated subsystems between different design teams. If the subsystems prove to be incompatible with each other, then the iterative process needs to be continued. The compatibility of the test in the early stages of system integration significantly reduce the number of iterations in the later phase. As a result, the overall development costs and time to market can decrease accordingly. Verification and validation at this stage is used to test the integrated performance of the system and verify that the system works and meets all the requirements previously proposed according to the designed plan. If the system needs to be improved, the previous design and phases will be repeated.

The hierarchical structure will be applied in the three phases of the system design sub-process. The design parameter hierarchy is proposed to help designers define key parameters in specific sub-process disciplines.

Regarding requirements, the specification is derived from all mechatronic system and it can provide initial information about what customers are requesting. The requirements may apply to the general system, or to each subsystem (or

component) or the interconnection between two subsystems. Therefore, the requirements can be detailed by breaking them down into additional ones, thus creating a hierarchy of them.

If all interfaces from the mechatronic system have been shown to be compatible, which means that all components have been properly integrated with each other, the design process should be checked and validated. The verification and validation phase are used to test the performance of the integrated system and it is verified whether the system performs the proposed function and meets all the previously proposed requirements. If the system needs to be improved, the initial operating phase will be repeated.

Previously, the data of V-model and the hierarchical design model used as design processes at macro and micro-level were discussed.

The multidisciplinary interface model is understood to use and support the ease of implementation of the system architecture during design at the model phase and to test the compatibility between them which are presented in subsystems at the compatibility testing stage. Achieving coherence between the two process models is obtained from any direction, from the macro or micro-level.

The proposed extended V-model shows a general flow for the design process of mechatronic systems. It can generally be divided into three processes: system design, discipline specific design and system integration.

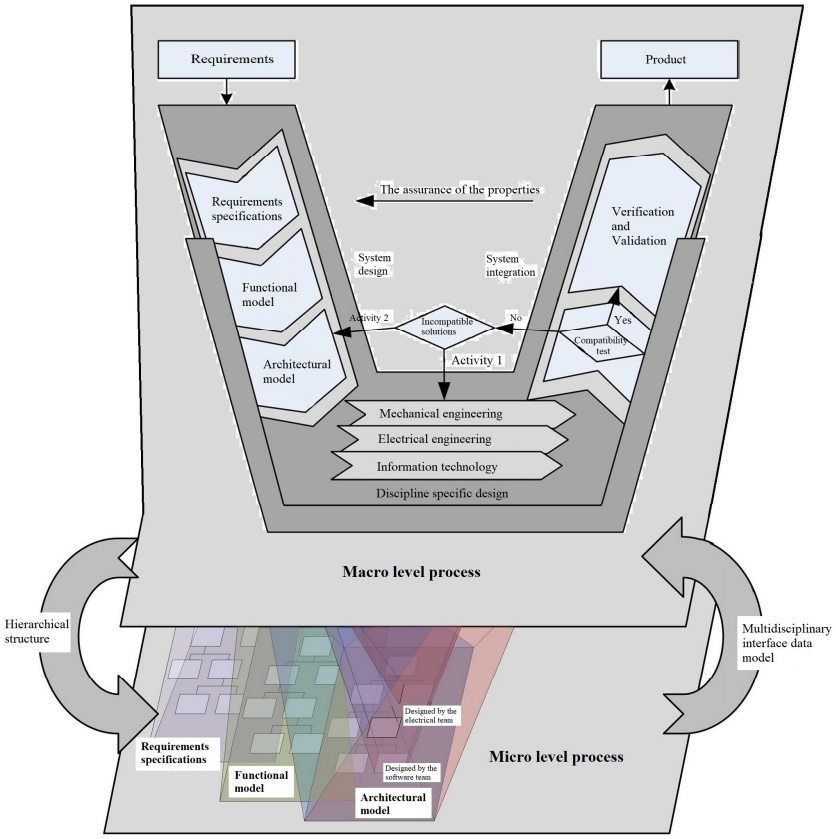

Fig. 5: Connections between level processes in production methodology

During the two design processes (system-specific design and discipline), each stage can be detailed by a hierarchical structure as a micro-level process. In the system design, hierarchical structure can be used to establish the requirements specifications, the functional model and the architectural model.

Moreover, it was proposed to prioritize the design parameters with the help of designers to define key parameters from the design specific to the discipline. In general, the coherence between the macro-level process and the micro-level process is ensured by the hierarchical structure during the two design sub-processes.

This model provides a common representation for interfaces, which can be used both in the architectural phase-model of the system design as well as in the compatibility testing system process compatibility stage. In the architectural model phase, the three attributes of the multidisciplinary interface model can define an interface from different levels of decomposition or different disciplines with the same terminology.

The coherence between the architectural design model of the discipline-specific design sub-process system can be determined by this common representation of the interface.

In the compatibility test phase are tested the proposed-based interface of the multidisciplinary model. It is also tested the compatibility between subsystems (or components). This is helping designers to decide whether the design process can move to the next stage (verification and validation phase). Otherwise, it should return to the initial design phase, which refers to the discipline-specific process or the architectural model phase of the process system design.
With the support of the multidisciplinary interface model, designers can return to the general flow of macro-level process development from specific micro-process design activities. The connection between micro and macro-level processes is strengthened by the multidisciplinary interface model.

Figure 5 shows the consistency between the two levels of processes. This consistency is ensured by the hierarchical structure during the design of the system sub-processes and the design of the discipline-specific design process. During this time, the interface model will be designed during the system integration process.

The aim is to demonstrate the use of the proposed design methodology in a mechatronic design process. This type of approach can have applications for many mechatronic systems, thus facilitating the production process.

Conclusions

The models from the software testing could be used in production methodology of the mechatronic system. This situation occurs with the complexity of the software part(s) from the mechatronic system.

The V-model could be used for small to medium-sized projects, where the requirements are clearly established. And it needs to be chosen when ample technical resources are available, with the necessary technical expertise. With this model, a high level of customer trust is required. As no prototype is produced, there is a very high risk to meet customer expectations. So, the software testing techniques wrong used are not a good idea, without a clear plan previously realized for the production. On the top of this, the mechanical parts of the mechatronic system could create some extra issues. As a result, the final product could not functionate because of the software, mechanical or electric / electronical parts. Designers from various disciplines perform concurrent design activities in each sub-process of the entire design process to achieve better design.

In the proposed model, it was presented a model-test adapted to the mechatronic system. This it was created based on its interfaces. And the execution it was done step by step, as the integration of the product was done. This approach is based on the current models, as the V-model could be adapted inside in such a system.

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Reflection of The Problem of Covid-19 Pandemic in Quantitative and Content Characteristics of Internet Memes in Social Networks

Tatyana V. RAZINA
Russian Academy of Education, Moscow, Russia
E-mail: razinat@mail.ru

Sergey L. KANDYBOVICH
Yesenin Ryazan State University, Ryazan, Russia
E-mail: s.kandybivich@sodru.com

Anna N. ZAKHAROVA
Chuvash State University, Cheboksary, Russia,
E-mail: zaharova_an@mail.ru

Abstract

In modern society the features of thinking, individual and collective consciousness and unconscious of people are largely determined by digital reality, including social networks, messengers, etc. In the situation of the coronavirus pandemic and forced self-isolation, the use of various gadgets, and consequently appeal to digital reality, has increased significantly. The article considers the results of the research on the reflection of the problem of COVID-19 pandemic in quantitative and content characteristics of graphic Internet memes in social networks. Based on the content analysis, 11 main semantic types of memes about coronavirus have been identified, reflecting current psychological and emotional problems of Russians: attitudes to restrictions, a new way of life; attitude to oneself and self-image acceptance in a new situation; relations with authorities; economic, material problems, health, well-being, hopes for the future, problems of alcoholism, changes in the geopolitical situation, problems in interpersonal relationships, methods of treating a new disease.

The research concluded that during the period of a sharp increase in the number of infected people, the number of memes about coronavirus in users feeds was not dominant, but the number of likes suggests that they attract the most attention of users in comparison with memes on other topics. The topic of the coronavirus is of primary importance for Russians and memes that appear will have a significant impact on the perception of coronavirus, attitude to the current situation and behavior. Memes, when read directly, can evoke both positive and negative emotions, some groups of memes may have a prolonged effect on users, which can lead to depressive states. Certain groups of memes have a psychotherapeutic function. Memes, therefore, can serve as an indicator reflecting the content of public conscience and unconscious of people, as well as a way to influence it.

Keywords: COVID-19 pandemic, graphic Internet memes, quantitative and content characteristics of Internet memes, psychological perception and impact, psychotherapeutic function of Internet memes.

Introduction

In the era of widespread digital technologies in modern society, the features of thinking, consciousness and collective conscious and unconscious of people are largely determined by digital reality, including social networks, messengers, etc. In the situation of the coronavirus pandemic and forced self-isolation, the use of various gadgets, and consequently appeal to digital reality, is increasing significantly. First of all, digital reality reflects what is most disturbing to the

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population in the current situation – coronavirus. At the same time, the content of messages significantly affects awareness, understanding and attitude to coronavirus. According to the methodological principle of the unity of consciousness and activity, the content of the psyche, namely consciousness and the unconscious, can be explored by products of activity. The content of social networks and messengers also acts as such products for those who create them. One of the most popular objects of social networks is the so-called "meme". A meme is a unit of information significant for culture. A meme is any idea, symbol, manner, or mode of action that is consciously or unconsciously transmitted from person to person through speech, writing, video, rituals, gestures, etc. and has a certain effect on their cognitive, emotional sphere, or (more indirectly) – behavior.

Due to the increased availability of mass media, individual texts and their components become popular and are repeatedly reproduced, which allows us to talk about the emergence of text memes, as well as Internet memes, if communication takes place in the virtual space. Moreover, one of the characteristic features of such communication in the postmodern era is irony (Gutorenko L. S., 2016).

Internet meme is information in one form or another (a media object, that is, an object created by electronic means of communication, a phrase, concept, or activity) that spontaneously becomes popular, spreading on the Internet in various ways (through social networks, forums, blogs, messengers, etc.) (Internet Meme [Electronic resource] URL: https://ru.wikipedia.org/wiki/ Internet Meme (accessed 00.00.2020).

Internet memes are a unit of information transmitted through Internet communication (Shchurina Yu. V. , 2012).

The Internet has made the spread of memes a highly visible practice, and the term has become an integral part of the spoken language of netizens (Shifman L. , 2013).

Researchers of mass communications claim that the use of memes, along with hype content and various fakes, has become a modern trend in the transformation of the media environment (Kiuru K. V., Krivonosov A.D. , 2018).

The Internet meme is currently understood not only as a manifestation of network creativity, but also as an artifact of the modern culture of participation, a way of public discussion, and an instrument of electoral and protest communications (Shomova S. A. , 2019). In modern digital culture, the political Internet meme is one of the most widespread and little-studied phenomena. Understood as a unit of transmission of cultural information on the Web, such a meme is considered by scientists, on the one hand, as a spontaneous product of mass creativity, a mechanism of political participation, and on the other hand, as an instrument of political PR technologies, a way of "overestimating" or "underestimating" the image of a political leader (Shomova S. A. , 2019). The trend of using Internet memes in the electoral struggle for votes has become a new trend in modern politics (Elissev S. M., Gluchich V. A., Samarina E. A. , 2018). Internet memes represent a potentially powerful form of socio-political participation in the online community (Ross A.S., Rivers D.J. , 2019).

Most often, memes have the character of images accompanied by a certain text, sometimes animated. It is this category of memes that we will explore. Visual images captured in a meme have a significant impact on the human psyche. According to scientists, the connection between visual and verbal parts of Internet memes is implicit and the function of the visual component is to form a special emotional tone of information, to provide a holistic and at the same time flexible understanding of a specific message by placing semantic accents that allow the recipient to clarify perception and interpretation of the verbal component. The information presented in the visual component is based on various associative relationships (Khraban T. , 2019).

A graphic meme can be an effective object for studying the psyche based on the principle of projection. More than 100 years ago, projective techniques were developed and effectively used. Projective techniques are based on the psychological mechanism of projection, and many of them use images as the object of projection, as well as a certain activity of the subjects in relation to these images (write a story, choose the one you like best, etc.) (Burlachuk L. F., 1997). The same is true for memes in social networks – users view them and show activity – "like", i.e. vote for the meme they like. The impact of memes on the psyche can be of two types. The first impact has a direct, momentary character – usually conscious – and in this case it causes the same emotion that it is directed at (funny – joy, etc.). The second impact has a delayed, cumulative character – usually unconscious – when long-term observation of memes on a certain topic causes a certain stable mood, which does not always correspond to the nature of the meme (funny memes lead to depression).

These methodological grounds allow us to use visual graphic information posted on the Internet as a means of studying the content of consciousness and the unconscious of people at large and attitudes to certain phenomena and events (in our case, COVID-19 pandemic) that may not always be sufficiently understood, reflected, and in some cases simply pushed out of consciousness due to their high trauma to the psyche.

In this article we will look at the content of graphic memes posted on Odnoklassniki social network. We will limit ourselves to graphic images due to: first, their number and dominance, second, their stronger impact on the psyche (compared to text messages), and third, their greater accessibility to viewing (compared to video messages).

Odnoklassniki social network was chosen because, according to analytical data, it is in the top 10 social networks and resources in Russia, its monthly user audience in 2019 was 23.4 million people. At the same time, Odnoklassniki ranks second in terms of audience activity (45.2%) after the social network VKontakte. At the same time, women predominate in the social network: 61%, the adult audience is more active, especially the segment 35-64 years old (Audience of Social Networks in Russia 2019. 18 June 2019 / Popsters [Electronic resource] URL: https://popsters.ru/blog/post/auditoriya-socsetey-v-rossii] (accessed 18.06.2020). Odnoklassniki remains a "regional" social network in Russia, and the main purpose of visiting this social network is interpersonal communication (Social Networks in Russia, winter 2015-2016. Figures, Trends, Forecasts , Shopolog. [Electronic resource] URL: https://www.shopolog.ru/metodichka/analytics/social-nye-seti-v-rossii-zima-2015-2016-cifry-trendy-prognozy/] (accessed 18.06.2020). Accordingly, news spreads within the network to a greater extent on the principle of rumors, in the social network feed there are either news from groups that a person subscribed to, or those that were voted for ("liked") by his friends. Accordingly, the credibility of these messages and their emotional impact on the user of the social network is higher than just when viewing a news feed. As for age characteristics of the target audience, these are people who currently make up the most stable layer of our society, those who regularly pay taxes, go to elections, are loyal to the state and authorities, that is, those who form stable "rear" under any circumstances. On the one hand, it may seem that it is difficult to expect any protest activity from this social group, however, this category will be stable only up to a certain limit, but if this limit is passed, it will affect very wide strata of the population and it will be very difficult to stop this protest activity. That is why it is very important to study social attitudes that are formed in this social group and in this social network.

The purpose of this article is to investigate quantitative and content characteristics of memes in Odnoklassniki social network in connection with how they reflect the problems of COVID-19 pandemic.

The research objectives are:

1. To determine what percentage of memes are dedicated to coronavirus and how important they are.

2. To establish a typology for the content of memes about coronavirus – i.e. their subject content.

3. To find out dominant emotions in relation to coronavirus (by the content of memes)

2. Materials and Methods

During the week, memes that appeared in the feed of three users of Odnoklassniki social network were recorded, counted, and analyzed daily. The count was carried out after 23.55 each day, and all graphic memes that typified first were recorded:

1. Related or not related according to their content to coronavirus.

2. Based on the content analysis of memes content, their classification was carried out, which eventually allowed us to identify the main semantic types of the coronavirus meme – i.e. those current topics related to COVID-19 pandemic that concern residents of the Russian Federation.

3. Determination of the emotional load of the meme (positive or negative) – is defined by the mood that the meme should cause.

4. The number of "likes" for each image was fixed, regardless of its content.

5. The average results were calculated for three users.

Sample. The study examined the feeds of three users of Odnoklassniki social network – women with an average age of 43.2 years, who in total have 123 virtual "friends" and visit the social network daily. The total number of memes viewed by three users within the week was 4230. Memes were recorded from April 20 to April 26, 2020. At the beginning of this period, the number of people infected with coronavirus in Russia was 42,900, and at the end of the period – 80,900 people (Shchurina Yu. V. , 2012). This was a period of a sharp increase in cases, which, accordingly, caused some concern and attention to this issue.

Results and Discussion

Analysis of Odnoklassniki users feeds showed that the number of messages about coronavirus is only 19% of the total number of graphic messages. However, the average number of likes that users give to memes about coronavirus is 152.7, while the average number of likes for graphic images on other topics is 35.14. Accordingly, memes about coronavirus find an emotional response in the minds of Russians, attract attention and encourage activity (at the first level – voting for this meme), i.e. they have a significant impact potential.

According to the research results, all memes can be divided into 11 thematic categories. It should be noted that all of them had a pronounced humorous character, but in some cases they reflected good humor, carrying an emotionally positive color, and in some cases – evil satire, carrying an emotionally negative color. In accordance with this, memes in each category were designed to evoke either positive emotions (laughter, joy, optimism) or negative emotions (annoyance, anger, irritation, impotence) in viewers. Quantitative indicators of memes are shown in table 1.

Table 1: Quantitative characteristics of "memes" in Odnoklassniki social network

Groups of memes (by content)	**% of the total number of coronavirus memes (frequency of occurrence)**	**Average number of "likes" in the group (affiliativeness)**	**Rating based on frequency and affiliativeness**	**Ratio of positive and negative emotionally colored memes within the group (%)**	
				Positive	**Negative**
Restrictions	17.22	192.03	1	82.98	17.02
Humor over oneself	32.97	133.57	2	83.33	16.67
Power	9.52	199.00	3	0	100
Economy	5.13	312.67	4	42.86	57.14
Health /well-being	7.69	144.98	5	61.90	38.10
Blackhumor	4.40	109.33	6	33.33	66.67
Hopes for the future	6.23	74.10	7	52.94	47.06
Alcohol	4.40	88.40	8	100	0
International politics	3.66	93.30	9	80	20
Sex	6.23	54.71	10	88.24	11.76
Methods of treatment	2.56	60.58	11	57.14	42.86

The most numerous group of memes was designated by us as “humor over oneself”, which, however, has only the second rating in importance. It included mostly positive images (83.33%), the main purpose of which is to cheer up and raise smb.’s spirits. The subject matter of such memes does not have any pronounced social orientation and mainly reflects those aspects of self-isolation or pandemic that either cause laughter in themselves, or that provoke people to certain actions that eventually lead to comic situations. Quite often, to increase the emotional impact on the user, heroes of well-known and favorite films (“Gentlemen of Fortune”, “Ivan Vasilievich Changes Profession”, etc.), or pets that begin to acquire anthropomorphic traits and abilities become heroes of memes. Such inversions are not accidental. In this situation, animals are often given more rights than their owners, but animals in the network, as a rule, evoke positive emotions and this attitude continues to persist in coronavirus memes. Such memes primarily have a psychotherapeutic function of psychoemotional discharge, search for positive moments in the current situation, which in some cases can somewhat ease the psychological discomfort of self-isolation.

The second type can be defined as memes that reflect various aspects of restrictions associated with coronavirus. This group ranks first in terms of frequency and likes. Most of them are emotionally positive (82.98%). At the same time, memes of this category reflect a negative attitude to the restrictions imposed, their meaninglessness. The most frequent heroes of these situations are police officers who are called upon to monitor compliance with restrictions. Emotionally positive memes in this category also have a psychotherapeutic function, designed to alleviate discomfort due to restrictions on freedom. Emotionally negative memes of this category in significant quantities can provoke dissatisfaction with the current situation, strengthen protest moods. Typically, such memes reflect a situation where restrictive measures make it difficult to meet any basic human needs.

The third category of memes reflects attitudes to the actions of authorities in the context of coronavirus. All memes of this group are of an emotionally negative nature and reflect people’s dissatisfaction with the position of the government, its powerlessness in the face of the pandemic, and ineffectiveness or senselessness of the measures taken. These memes, when directly perceived, can cause positive emotions and laughter. It also produces a certain therapeutic effect – the opportunity to express your opinion (in particular, dissatisfaction) with respect to those institutions with which a person in a normal situation can not interact directly. At the same time, in the long term, the impact of these memes can have a cumulative effect and, after a certain time, form a negative emotional state, a sense of insecurity.

Other categories of memes are noticeably smaller, but they are quite relevant, as evidenced by a great number of likes.
The fourth important group comprises memes on economic consequences of COVID-19 pandemic, in this group the division of emotionally positive and negative memes is approximately the same (43% and 57%). Here, as a rule, negative economic consequences of forced self-isolation in the long term, as well as current economic difficulties associated with lack of financial resources at present are discussed. Despite their humorous nature, these memes, in the long run, have a negative emotional impact, despite the fact that directly upon reading they evoke positive emotions.

The fifth group in importance reflects various aspects of health and well-being – as a rule, these are fears that in conditions of self-isolation a person will begin to feel worse – his weight will increase or alcohol consumption will appear, which will lead to alcoholism. These memes are more likely to have an outwardly positive emotional color (61.9%) and can evoke positive emotions directly in the process of reading, however, their cumulative effect with an increase in the number of memes of this group can lead to depressive states, dysmorphophobia, provoke bulimia or anorexia. A separate group of memes is devoted directly to the health status of patients, symptoms, and course of the disease, and they cause more negative emotions.

Memes with black humor are not numerous, but they occupy the sixth place in importance and reflect both, in general, rather optimistic moods of the population in the pandemic situation, and rather pessimistic forecasts (66.67%), as well as depressive states caused by the current situation. Perhaps a significant part of fears is simply repressed and not reflected in the memes. However, the mere appearance of memes with black humor in general can aggravate the state of users in the course of their viewing. So far, however, due to their small number, they do not have a significant destructive effect on the psyche, but a significant number of “likes” can greatly increase the influence of this group on the psyche.

Some memes reflect Russians' hopes for the end of the pandemic. In terms of memes, this is a fairly rapid and favorable process (52.09%), and in terms of forecasts, the forecasts are disappointing (47.06%). A small number of such memes, apparently, are due to general uncertainty of the situation in which the Russians found themselves and absence of objective and reasonable official information, forecasts for the end of the pandemic. The presence of a significant number of memes with a positive and optimistic outlook could have a positive impact on the psychoemotional state of users. At the same time, memes with pessimistic forecasts can provoke depressive moods.

Alcohol topic does not appear often (perhaps due to the orientation of the social network "Odnoklassniki"), but the memes of this group are 100% positive. As a rule, these are memes where alcohol is positioned as a means of treatment or as a possible danger of getting drunk in quarantine, but this option is not considered as something tragic or even negative. Alcohol is positioned as a kind of material embodiment of the national character, national "spirit" and strength of the nation. Alcohol often acts as a Russian national feature that can act as a panacea and explain the low mortality rate for COVID-19 in Russia.

The "international politics" category reflects understanding of the global impact of coronavirus on life in the world and changes in international politics caused by these impacts. As a rule, the semantic context of these memes emphasizes a more advantageous position of Russia in comparison with other countries (80%), as well as irony over other countries in a situation where early ambitions of these countries turned out to be unfounded in the situation of COVID-19 pandemic. In part, these memes also have a psychotherapeutic function, but its effectiveness in comparison with other categories will be lower due to the fact that the problems of international politics at the moment were much less relevant to the population of the Russian Federation than internal problems.

Some of the memes reflect sexual relations during the coronavirus period and how it affected them. For the most part, memes are also positive (88.24%), and have a psychotherapeutic function. In doing so, they also discover sexual problems that self-isolation during the pandemic can cause. At the moment, there are no reliable scientific researches on how self-isolation influenced the sexual life of Russians. It can be unambiguously noted that this influence exists and its main vector is the

limitation of possibilities for realizing one's sexual needs. This will eventually lead to a decrease in the quality of life, psychosomatic well-being and provoke stressful situations, psychoemotional tension, i.e. destabilize the mental state and aggravate the course of self-isolation. In this situation, the appearance of such memes, even of a mild humorous nature, can only increase negative states.

A separate group of memes is dedicated to methods of treatment for coronavirus. The appearance of this group is caused by a certain weakness of modern medicine in the fight against this disease, lack of vaccines and drugs with a directed spectrum of action. Offering their "home" and "folk" remedies for coronavirus, these memes indirectly blame modern medicine for its weakness. In general, memes are emotionally positive (57.14%), but the appearance of such memes and the growth of their number can provoke depressive and panic moods in the long term.

Conclusion

Despite the fact that in absolute terms the number of memes on the topic of coronavirus does not take the leading position, they have a high emotional importance, which indicates that the topic of the coronavirus at the time of the study was of primary importance for Russians and all the memes that appeared had a significant impact on the perception of coronavirus, attitude to the current situation and behavior.

The subjects of memes reflect the current psychological and emotional problems of Russians, first of all: attitudes to restrictions, a new way of life; attitude to oneself and self-image acceptance in a new situation; relations with authorities; economic, material problems, health, well-being, hopes for the future, problems of alcoholism, changes in the geopolitical situation, problems in interpersonal relations, methods of treating a new disease.

Memes when read directly can cause both positive and negative emotions, which is why certain groups of memes have a psychotherapeutic function and their presence in the network is highly desirable, but some groups of memes, despite the direct emotionally positive impact, can have a delayed emotionally negative effect.

Thus, the study of actual Internet memes in a number of situations (including global impact) allows us to determine the current emotional state of people and issues relevant to them, which can be used in psychological forecasting in the short term, as well as, to a certain extent, manage the states of large masses, by including memes of the appropriate substantive and emotional nature in the Internet content.

The study of Internet memes and other information products of this kind provides modern psychology with a powerful tool for monitoring the psychological state of society not only during the coronavirus period, but also in situations of other global social, natural, and political changes. Despite the fact that long-term forecasts are currently one of the priority directions in Russian and world psychological science [15], it is important that psychology is ready to respond to completely unexpected, global big challenges.

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Impact of Video Visualization in Improving the Read Rate of Privacy Policy of Automated Vehicles Among Users: A Comparative Study

Glorin SEBASTIAN

School of Public Policy, Georgia institute of Technology, Atlanta, GA, USA
gsebastian6@gatech.edu

Abstract

Privacy is becoming extremely crucial for companies to operate especially those that utilize customer information for their operations. With the emergence of new technologies such as Internet of Things (IoT), Automated vehicles, mobile payments, privacy is no longer a compliance issue, but also a user responsibility to ensure he is aware of the risks of sharing his personal data with third parties. There is a big effort to understand how the Privacy policies can be made easier to read and understand. In this paper, we share the results of a comparative study on users who read a Privacy statement from an autonomous vehicle provider and compared its effectiveness to that of a video visualization that explained the policy. The study focused on the users' understanding and recall. Our research shows that video visualization greatly increases click and read through rates as well as helps the user understand the risk associated with privacy notices better.

Index Terms- Privacy Policy, Autonomous vehicles, Notice and Choice, Internet of Things.

Introduction

Data Privacy concern is a growing issue for every entity that handles user personal information. With more US States proposing privacy laws, also a possible federal Privacy statute on the horizon, the number of Data privacy issues are bound to increase. As the autonomous vehicle market grows, the IoT market is expected to grow at a similar pace, if not faster. The report published by Allied Market Research, Global Autonomous Vehicle Market by Level of Automation, Component, and Application: Global Opportunity Analysis and Industry Forecast, 2019-2026, notes that the global autonomous vehicle market is valued at $54.23 billion in 2019, and is projected to reach $556.67 billion by 2026, registering a CAGR of 39.47% from 2019 to 2026.

Self-driving cars combine a variety of sensors to perceive their surroundings, such as radar, lidar, sonar, GPS, odometry and inertial measurement units. In the research study by Taeihagh, Araz, and Lim, Hazel Si Min. (2018), a self-driving car, also known as an autonomous vehicle (AV), connected and autonomous vehicle (CAV), driverless car is a vehicle that is capable of discerning the environmental inputs and drive with no human instructions. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage.

Even though most Privacy laws require mandatory Privacy notices be displayed on websites and interfaces where customer private information is collected, as discussed in this study, most end users do not read these notices, and even if they do, given the esoteric nature of the Policy statement, they do not fully comprehend the content.

Security concerns surround autonomous vehicles, given that the vehicle is constantly sharing telematics data. This telematics data includes VIN number, software information, present speed and distance information, which is very sensitive as it clearly lets someone know of the driver's exact location, and car information details which could be used by a malicious hacker to perform cyber hacks and attacks on connected cars.

Another privacy issue associated with Autonomous vehicles is unsolicited marketing. If the user doesn't read the privacy statement fully, he might miss that the vehicle vendor could have contracts with third parties to enable third party cookies which gather information about the user which in turn can be used by the third parties for unsolicited marketing including spam emails.

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Privacy policies are used by companies to notify users about data practices and to validate their agreement with privacy requirements. Privacy policies provide information such as what data is collected from the users, with whom it is shared, what steps are taken to protect the collected user data.

The research study by F. Schaub, R. Balebako and L. F. Cranor, May-June 2017 notes that the privacy notices are lengthy in general that describe the company's data practices and they typically not only fail to influence privacy decisions but are largely ignored by the users. However, privacy policies in general are ineffective due to the following reasons:

1. *The complexity of language and legal jargons used:*
   The jargon related to regulations used in the policies is difficult to understand. Based on McDonald Et al., (2008) reading a privacy policy takes on an average 10 Minutes. However, understanding most privacy policies requires higher educational level. A study by Schaub et al. (2017) discusses about the reasons behind the ineffectiveness of privacy policies and they show that most of these privacy policies are not read by the users or if they are read, the users cannot understand the privacy risks due to the complexity of the privacy policies.

2. *Readers do not understand what is relevant and important:*
   One very important reason for the esoteric nature of the Privacy policies is that the policy is laid out without any indication of which part is relevant or important to the end user and which is not. There has been studies by Shayegh, Parvaneh, and Ghanavati, Sepideh (2017) that illustrate how this can be solved, with methods such as: Dividing the privacy policy into Definition, Facts, Action, Non-Relevant, and Cross References section and then removing the Definition, non-Relevant sections and creating cross-referenced section, graph from annotated action section, generate Notice and Choice.

3. *Channel for showing Notices:*
   Selecting the correct channel to display the Privacy notice is yet another challenge. Most websites display the privacy notice on the computer screens, however some IoT devices face challenge here due to the limited screen space. Using the video approach to the Privacy Policy, also helps the users to hear the privacy Policy if there are limitations to the IoT display interface.

The approach suggested by Shayegh, Parvaneh, and Ghanavati, Sepideh (2017) includes two phases, one is analysis of Privacy Policies via annotation and second phase is annotating action with its sub-annotations into five categories including:

#D (Definition): defines the key terms including what is data, privacy, and security

#F (Facts): this section includes important information about the business of the company that force them to collect, use or share user data

#A (Action): Most important part of the Privacy policy for the end user as it describes the actions that can be done by the user including the options to opt-out from data collection

#NR (Non-Relevant): Mainly consists of the part that is added to make the privacy terms more readable, examples for each statement, titles etc.

#CR (Cross References): Includes the links to other pages as cross references

Finally the suggestion is to remove #D and #NR, create cross-referenced section #CR including a graph from annotated action section.

Our proposed approach builds on the research performed by Shayegh, Parvaneh, and Ghanavati, Sepideh (2017). The approach proposed in this paper is to use the emerging technologies of Analytics and Data visualization as well as animation to ensure Policy statements are better read and that the users are fully aware of the risks and their options before accepting the Privacy policies.

Materials and Methods

The present observational study was conducted among 172 users during August and September, 2020. In this study, we assessed the understanding of an autonomous vehicle Privacy statement in pdf format, against understanding from a video created from this Policy statement. Out of the electric car privacy policies of Nikola motors, Rivian, Nissan, Tesla, BMW and Chevrolet, the privacy policy of Tesla was randomly selected using lottery method. The 172 study participants were randomly split into two groups of 86 each. Each of the respondents were emailed an online survey consisting of five questions. .The control group had to read the sample Privacy Policy pdf and answer the survey, while the intervention group had to watch the video shared and answer the same survey.

The main considerations while designing the video format from the pdf document of the Policy were as follows:

1. The user needs to be made aware of which of his personal information is collected in the form of Telematics data as well as the steps taken to ensure that the stored information is safeguarded
2. The user should be aware of which of his data would be shared with third parties
3. Compliance with State, Federal and international Privacy laws
4. How can the user opt-out from sharing and from which of this Data

Fig. 1: Screenshot from the Youtube video on Privacy Policy (Tesla), Sebastian G (2020)

Data Analysis: The data collected was analyzed and expressed as percentages and proportions.

Results

The socio demographic data of the study population is shown in Table 1. Although Majority of the study participants of both intervention and control groups were well educated, they were not in the habit of reading privacy policies fully.

Table 1: Socio-demographic data of the study population

Sl.no	Demographics	Control group	Intervention group
1.	*Highest educational attainment*		
	Bachelor's degree	5.8%	37.2%
	Master's degree	94.2%	61.6%
	PhD degree	Nil	1.2%
	Did not complete Bachelor's degree	Nil	Nil
2.	*Place of residence*		
	USA	11.6%	64%
	India	68.6%	19.8%
	Others	19.8%	16.3%
3.	*Habit of reading privacy policies fully*		
	Yes	12.8%	11.6%
	No	86%	73.3%
	Maybe	1.2%	15.1%

With an average reading speed of 300 wpm, the time taken for an average user to read the sample Privacy statement (Tesla) was 12 minutes. The average time taken for watching the video is 5.50 minutes. The text statistics and readability test scores of the sample privacy Policy are given in table 2 and table 3 respectively (Tesla Privacy Policy).

Table 2: The text statistics for the sample Tesla Policy statement

Text Statistics	Details
No. of sentences	176
No. of words	3977
No. of complex words	909
Percent of complex words	22.86%
Average words per sentence	22.60
Average syllables per word	1.80

Table 3: The readability test scores for the sample Tesla Policy statement explained

Readability test	Score	Required Education Level
Flesch Kincaid Reading Ease	31.6	College (Difficult to read)
Flesch Kincaid Grade Level	14.5	Difficult to read
Gunning Fog Score	16.4	College Senior (Difficult)
SMOG Index	13.1	College (Difficult to read)
Coleman Liau Index	14.7	College (Difficult to read)
Automated Readability Index	14.2	College (Difficult to read)

Assessment of the control group and intervention group using the same assessment questions revealed that the intervention group had a better recall and had a better understanding of the privacy policy compared to the control group. (Fig 2.)

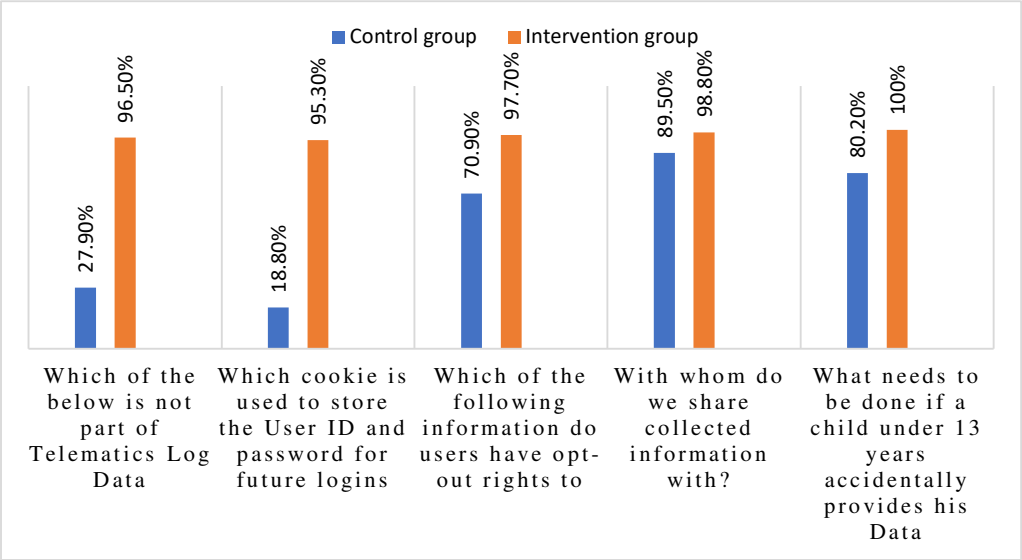

Fig. 2: Comparison of assessment scores between intervention and control groups

Discussion

The present study assessed the level of understanding of an autonomous vehicle Privacy statement in pdf format, against understanding from a video created from this Policy statement. Our proposed approach builds on the research performed by Shayegh, Parvaneh, and Ghanavati, Sepideh (2017). Our approach is to read through the Policy statement and divide it into 5 sections.

1. *Data Collected and Security:* The details of what data is collected from the end user, how is it processed and what security is enabled for this Data while transit and storage.
2. *Sharing information Policy:* This details with whom including which third parties does the entity share customer information
3. *Purpose used for:* Includes the details on the purpose for which the Data collected is used
4. *Permit:* Opt-out options: This lists the opt-out options for the end user, including the rights and responsibilities of the user
5. *Compliance to state, federal and international privacy Laws:* The policy should also mention how it complies to state federal and international privacy laws.

An earlier research (Sepideh et al. (2017)) has suggested the use of AI and NLP (Natural Language processing) to parse the policies to determine which sections need to be part of the Privacy statement and which does not. Since every company is different based on the industry it is associated with, based on our research we suggest that the parsing and determining the best sections to be visualized must be based on the review of the Company Policy experts, with legal background. Once the sections required for the privacy Policy is finalized the company needs to ensure all the decided five components needs to be included in the Animation or the visual presentation for the end user.

From the results of the study, the video form of the privacy statement is much more effective for the end users. It takes ~12 minutes for the users to read the privacy policy, however the video cuts that time almost by half to less than 6 minutes.

The animated video helps the end users with better recall as well as helps them connect with the content of the presentation at a personal level. The animated version of Policy would greatly help change the user perception about the privacy policy from dry and boring to interesting and relevant. If the company can create an animated avatar, that avatar can be used to represent the company in several other ads as well, thereby increasing the relatability of the company with the end users.

The results show that based on the survey questions, the users in intervention group, who answered the questions same as that of control group ,but after watching the video had a better recall than the users in the control group who read the Policy document. The survey results show that using more Video and visualization cannot just reduce the time for the end users but also increases the effectiveness of information recall, thus helping the end users better understand the Privacy Policy. Also from the comments section of the survey, when asked if the video was better than the usual pdf format, the end users responded overwhelmingly positively saying that it greatly helped them concentrate and that the normal data format could be boring thus causing the users to not concentrate enough while reading through.

Video visualizations increase the curiosity of the user and keeps him engaged, while also effectively educating the user about the Policy details. This study applies to Policy documents in general as well as noted in the review article by Sebastian, G (2020), Risk and Controls including adequate policy documentation is becoming very crucial in most areas including system implementation. It is not only important for law to mandate that privacy notices be displayed, or that the end users are notified of any changes to the Privacy notices, but it is also required to make sure that the Privacy notices are readable.

Rather than including a long poorly constructed multi-page Privacy Policy as a 'check the box' item, use of an animated video increases the brand image and also convinces the end users that the company cares about their Data and personal well-being. We believe that increased customer trust in the company brand would lead to better and longer relationships with the end users. It also reduces the compliance cost of companies, since the users would be better aware of the data privacy risks and follow the procedures which leads to lesser privacy data issues.

Conclusion

Data Privacy concern is a growing issue for every entity that handles user personal information. Even though most Privacy laws require mandatory Privacy notices be displayed on websites and interfaces to inform users about the details on the customer private information collected and options to opt-out (if any), as discussed in this study, most end users do not read these notices, and even if they do, given the esoteric nature of the Policy statement, they do not fully comprehend the content.

Through our study, we were able to demonstrate that the use of visualization can greatly impact the readability in a positive manner. Based on our research and analysis, we found that using video visualizations greatly improves the readability of Privacy Policies, thus would recommend companies to use this approach compared to the regular pdf format. Future studies can include details on how the video visualizations can further be improved, for example, by making use of Chatbots, Artificial intelligence, Augmented reality, and other cutting-edge computer technologies.

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Indicadores de Capital Intelectual para Gestionar el Desempeño en Universidades Chilenas

Dayana JAQUE
Escuela de Ingeniería, Universidad Católica del Norte, Chile
dayana.jaque@ucn.cl

Paul LEGER
Escuela de Ingeniería, Universidad Católica del Norte, Chile
pleger@ucn.cl

Felipe MACHORRO
Universidad de las Américas Puebla, San Andrés Cholula Puebla, México
felipe.machorro@udlap.mx

María V. ROMERO
Instituto Tecnológico Superior de Tierra Blanca, México
vromero@itstb.edu.mx

Resumen

Las universidades chilenas buscan la mejora continua ante un mercado educacional cada vez más exigente. Para apoyar el progreso de las universidades, el Estado de Chile otorga distintos fondos de financiamiento, entre ellos el fondo basal de desempeño. Estudios previos consideran que el capital intelectual es un factor influyente en el desempeño de las universidades, hipótesis a validar en este artículo. Se busca analizar los factores determinantes del desempeño y proponer indicadores que apoyen su gestión. La metodología utilizada contempla el diseño de un modelo estadístico lineal que relaciona el desempeño con el capital intelectual. Para acotar la muestra se obtienen datos de la Universidad Católica del Norte, institución educacional chilena. Los resultados permiten concluir que existe una relación entre el capital intelectual y la gestión del desempeño, proponiendo seis indicadores de capital intelectual para facilitar esta gestión.

Palabras claves: Capital Intelectual; Desempeño; Indicadores; Universidades Chilenas; Fondos De Financiamiento.

Introducción

Las universidades pertenecientes al Consejo de Rectores de las Universidades Chilenas (CRUCh) son evaluadas y reciben financiamiento del gobierno a través de diversos fondos, tales como, Aporte Fiscal Directo (AFD), Fondos para la Investigación (CONICYT), Fondo de Desarrollo Institucional (FDI), Aporte Fiscal Indirecto (AFI), entre otros. En el año 2012 surgió un nuevo fondo de financiamiento denominado Fondo Basal por Desempeño, el que es distribuido entre las instituciones con base en el cumplimiento de indicadores de resultado de desempeño (Ministerio de Educación, 2012).

Edvinsson y Malone (2000), plantean que los modelos tradicionales de gestión financiera contable se muestran cada vez más estáticos respecto de la organización moderna, la cual posee una estructura fluida, relaciones estratégicas, empleados capacitados, programas de trabajo en grupo, recursos intelectuales humanos, que ciertamente se traducen en un valor pocas veces medido por la organización. Diversas investigaciones y estudios previos, muestran que uno de los factores influyentes en el desempeño organizacional de empresas y también de instituciones de educación superior, es el capital intelectual (CI) (Bueno, 2003; Funes, 2010) y sus principales componentes, capital humano (CH), capital estructural (CE) y capital relacional (CR) (Bueno, et al., 2008), definidos en la siguiente sección.

Este artículo busca verificar que el CI afecta en el desempeño de las universidades, considerando los criterios asociados al fondo basal de desempeño. Sumado a esto, se selecciona como muestra una institución educacional

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chilena, Universidad Católica del Norte (UCN), sede Coquimbo, perteneciente al Grupo II del CRUCh (Consejo de Rectores de las Universidades Chilenas), recopilando sus datos, a través de un cuestionario para un posterior análisis estadístico de regresión entre el desempeño y el CI.

Finalmente, se desarrolla una propuesta de indicadores de CI orientados al logro de los resultados de desempeño calculados por el Ministerio de Educación, como así también, se contará con un instrumento adecuado para medir el capital intelectual, sirviendo de base para las universidades que deseen crear mayor valor organizacional.

Marco Teórico

Para comprender la base de este artículo, se presentan los principales conceptos utilizados y las variables dependientes e independientes consideradas en el análisis (Tabla I y Tabla II).

Capital intelectual (CI)

Entre las variadas definiciones de capital intelectual, Edvinsson y Malone (2000), lo definen como el conjunto de activos, que, a pesar de no estar reflejados en los estados contables tradicionales, pueden llegar a generar valor para la empresa en el futuro.

Componentes del CI

Existen diversas opiniones respecto de las componentes del CI, pero la más utilizada es aquella que considera tres componentes básicos y fuertemente interrelacionados: capital humano (CH), capital estructural (CE) y capital relacional (CR) (Stewart, 1997; Edvinsson y Malone, 2000).

El capital intelectual es más que la simple suma de estos tres elementos, su riqueza reside en las interconexiones entre ellos (Roberts, 1999). El capital intelectual es capaz de generar un incremento en el valor de la universidad y su propósito es permitir a una universidad tomar ventaja de oportunidades frente a sus competidores.

CH en las universidades

"Conjunto de conocimiento explícito y tácito del personal de la universidad (profesores, investigadores y personal de administración y servicios) adquirido a través de una educación formal e informal y de procesos de actualización incluidos en sus actividades. Por lo tanto, el capital humano constituye la fuente de innovación y renovación de las universidades y se encuentra en: las ideas geniales que aparecen en el laboratorio, el conocimiento generado a través del proceso de investigación, las experiencias obtenidas en el desempeño laboral, o en las habilidades adquiridas por el personal mediante un proceso de desarrollo organizacional" (Tamayo, 2014).

CE en las universidades

"Conocimiento explícito relativo al proceso interno de difusión, comunicación y gestión del conocimiento científico y técnico en la universidad. Es la capacidad organizacional, la infraestructura tecnológica, física o comunicacional que mantiene, desarrolla y sostiene el capital humano. Se puede dividir en Capital organizacional (el entorno operativo derivado de la interacción entre investigación, gestión y procesos de organización, tecnología y cultura) y Capital tecnológico (patentes, licencias, software, bases de datos, etc.). Indicadores representativos para el capital estructural son las inversiones en tecnología de información y literatura (en unidades monetarias)" (Tamayo, 2014).

CR en las universidades

"Recoge el amplio conjunto de relaciones económicas, políticas e institucionales desarrolladas y mantenidas por las universidades, y también recoge cómo la universidad es percibida: su imagen, atractivo, fiabilidad, etc. Esta categoría incluye todas las actividades y relaciones entre la universidad y los socios no académicos: firmas, organizaciones no lucrativas, autoridades públicas, gobierno local y sociedad en general. Indicadores típicos son el número de miembros en asociaciones científicas, vínculos con otras universidades y contactos con alumnos" (Tamayo, 2014).

Medición del CI

La recopilación bibliográfica permitió identificar diversos modelos de medición y gestión del CI desarrollados y utilizados principalmente en Europa y Norteamérica, tales como: Modelo Navegador Skandia (Edvinsson y Malone, 1997), Modelo Balanced Scorecard (Kaplan y Norton, 1997), Modelo Índice de Capital Intelectual (Roos, Roos, Dragonetti, y Edvinsson, 1997), Modelo Diamante de Bontis (1998), quién desarrolló trabajos pioneros en mediciones subjetivas del desempeño, mediante percepciones de los empleados. En el caso específico de la medición del capital intelectual en universidades se han identificado casos en Italia (Manes Rossi, Nicolò, y Tartaglia Polcini, 2018), España (Ramírez, Merino, y Manzaneque, 2019), Australia (Bongiovanni, Renaud, y Cairns, 2020), Colombia (Arias-Pérez, Lozada, y Henao-García, 2019) y México (Machorro, 2013).

Dentro de todo lo revisado, no se encontró un modelo de medición específico de CI para las universidades chilenas, por lo que se procede a elaborar un cuestionario pertinente, basado en el estudio de naturaleza similar realizado por Machorro (2013) para los institutos tecnológicos del estado de Veracruz, México.

Variables Del Estudio

Con la finalidad de diseñar modelos lineales entre desempeño y CI, se establece como variables dependientes (Y_i) a los indicadores de desempeño del fondo basal (Tabla 1) y como variables independientes agregadas (x_i) a las variables de CI, las que, a su vez, agrupan a sub variables (z_i) para cada una de las categorías del capital intelectual (Tabla 2).

Tabla 1: Variables Dependientes

Variables Dependientes		
Descripción	**Código**	**Unidad**
Publicaciones Scopus 2014	Y_1	Cantidad
Académicos jornada completa por cada 100 alumnos matriculados	Y_2	Cantidad
Académicos que son doctores	Y_3	Cantidad
Tasa de titulación en carreras de pregrado con duración de 8 semestres	Y_4	[%]

Tabla 2: Variables Independientes

Variables Independientes					
Categoría	**Variables Agregadas**	**Código**	**Variables Desagregadas**	**Código**	**Unidad**
CH	Satisfacción	x_1	Motivación académicos al perfeccionamiento	z_1	Escala de 1 a 7
			Satisfacción académicos	z_2	
			Reconocimiento monetario académicos doctores	z_3	
			Reconocimiento no monetario académicos doctores	z_4	
	Competencias académicos	x_2	Competencias investigación académicos no doctores	z_5	Escala de 1 a 7

			Competencias investigación académicos doctores	z_6	
			Manejo segundo idioma académicos	z_7	
			Trabajo en equipo académicos	z_8	
			Creatividad académicos	z_9	
	Competencias alumnos	x_3	Competencias entrada estudiante	z_{10}	Escala de 1 a 7
			Competencias salida estudiante	z_{11}	
	Experiencia investigación (*)	x_4	Experiencia investigación	N/A	Años
	Demografía (*)	x_5	Demografía	N/A	Dummy [0,1]
	Comunicación	x_6	Comunicación académicos – jefaturas	z_{12}	Escala de 1 a 7
	Soporte socio-emotivo	x_7	Soporte socio-emotivo a académicos	z_{13}	Escala de 1 a 7
			Soporte socio-emotivo a estudiantes	z_{14}	
CE	Políticas institucionales adecuadas	x_8	Políticas contratación académicos	z_{15}	Escala de 1 a 7
			Políticas de investigación	z_{16}	
	Existencia de sistemas de gestión y control	x_9	SGC docente	z_{17}	Escala de 1 a 7
	Efectividad de los métodos de enseñanza	x_{10}	Diseño de mallas	z_{18}	Escala de 1 a 7
	Capacidad de la infraestructura	x_{11}	Capacidad infraestructura área del académico	z_{19}	Escala de 1 a 7
			Infraestructura universidad para estudiantes	z_{20}	
	Efectividad de la conectividad y acceso a información	x_{12}	Acceso a plataformas	z_{21}	Escala de 1 a 7
			Conectividad web	z_{22}	
	Cultura organizacional	x_{13}	Cultura UCN	z_{23}	Escala de 1 a 7
CR	Cantidad de convenios vigentes	x_{14}	Convenios intercambio estudiantil	z_{24}	Escala de 1 a 7
			Convenios con colegios	z_{25}	

	Labores de investigación	x_{15}	Participación conferencias académicos	z_{26}	Escala de 1 a 7
			Sociedades científicas doctores	z_{27}	
	Comunicación con estudiantes	x_{16}	Comunicación estudiantes - académicos y jefaturas	z_{28}	Escala de 1 a 7
	Confianza	x_{17}	Grado de confianza transmitido por UCN a un académico	z_{29}	Escala de 1 a 7
			Grado de confianza transmitido por UCN a un estudiante	z_{30}	

Metodología

El presente artículo tiene un carácter cuantitativo, en el que se pretende evidenciar la relación que existe entre el CI y el desempeño organizacional, establecida como la hipótesis base a verificar. El método utilizado considera el diseño de modelos estadísticos lineales analizados con técnicas de regresión. A continuación, se detallan las hipótesis, objetivo, muestreo y cuestionario para la validación de las hipótesis planteadas.

Hipótesis

Las hipótesis definidas para el artículo son las siguientes:

H_1: Existe relación entre los indicadores de desempeño del grupo II de universidades del CRUCh y el capital intelectual. Caso UCN, sede Coquimbo.
H_2: Existe relación causal directa entre las componentes de capital intelectual CE y CR con los indicadores de desempeño de las universidades del grupo II del CRUCh. Caso UCN, sede Coquimbo.
H_3: Existe relación causal indirecta entre la componente de capital intelectual CH y los indicadores de desempeño de las universidades del grupo II del CRUCh. Caso UCN, sede Coquimbo.
H_4: Existe diferencia significativa en las percepciones de capital intelectual entre las distintas unidades académicas de UCN, sede Coquimbo.

Objetivo

El objetivo general es proponer un conjunto de indicadores de capital intelectual, orientado al logro de los resultados de desempeño para las universidades del grupo II del Consejo de Rectores de las Universidades Chilenas (CRUCh). Caso UCN, sede Coquimbo, según la medición del año 2015. Para lograr su cumplimiento se procede a las siguientes etapas.

Diseñar un instrumento de medición de las variables de CI para UCN

Una vez identificadas las variables para la medición del CI determinantes del desempeño (Tabla II), se diseña y ajusta un instrumento de medición del CI mediante un cuestionario adaptado al escenario chileno. La validación del diseño del instrumento la realiza un panel de expertos en la fase de prueba.

Evaluar y validar el instrumento de medición

Para verificar la relación entre desempeño y CI, se recopilan datos por medio de un cuestionario, en donde los informantes clave (directores, jefaturas y académicos de las distintas unidades académicas), responden acerca de su percepción sobre el CI presente en UCN (escala de 1 a 7). En paralelo, se obtienen medidas a partir de datos secundarios proporcionados por fuentes oficiales de la universidad.

Posteriormente, se realiza el análisis de datos en donde la hipótesis a probar es coincidente con H_1, definida como hipótesis base de este artículo. Finalmente, se concluye acerca de los indicadores de las variables determinantes en el desempeño.

Proponer indicadores de CI

Para lograrlo se elabora una propuesta de los indicadores de CI apropiados para el logro del objetivo.

Un esquema general de la metodología aplicada se presenta en la Figura 1.

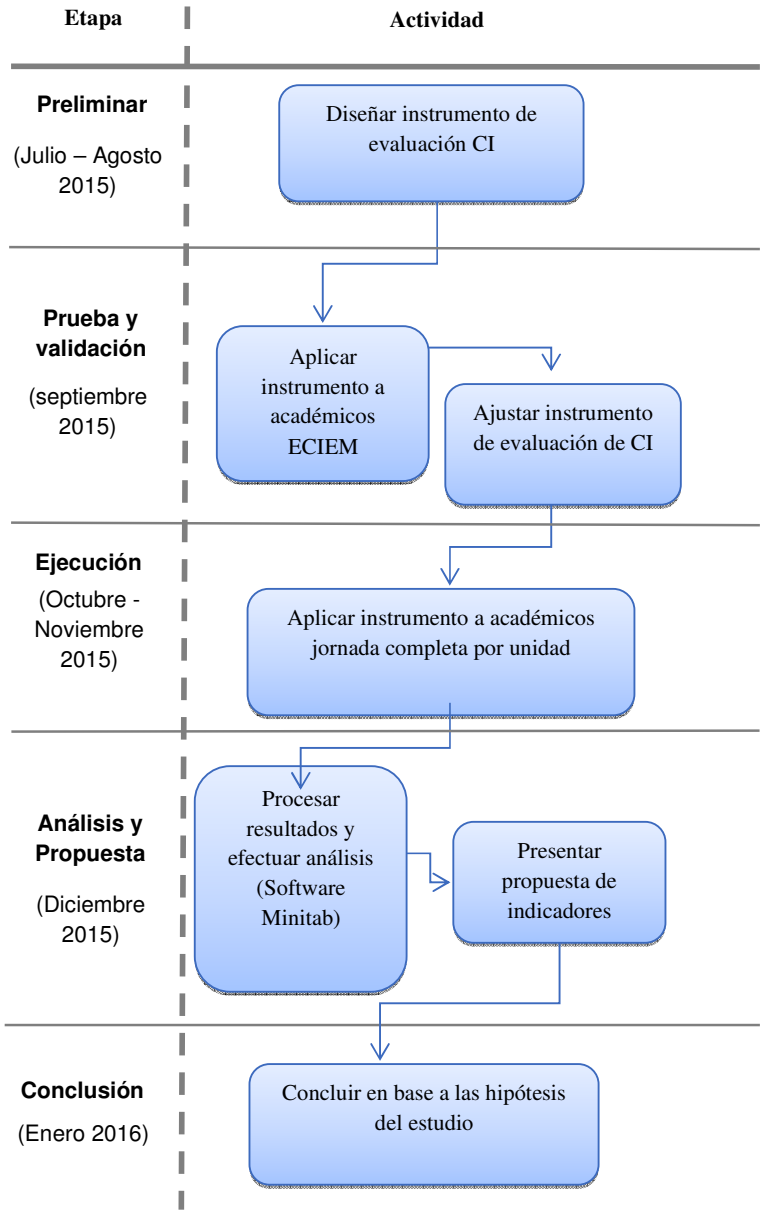

Figura 1: Metodología utilizada

Muestreo

La población finita considerada se compone por los académicos de planta de UCN, sede Coquimbo. La intención fue abarcar la totalidad de académicos, tratándose de un censo con porcentaje de participación (Tabla 3).

Tabla 3: Tasa de participación

Tasa de Participación			
Unidad Académica	**Cantidad Académicos Jornada Completa de Planta**	**Cantidad de Respuestas**	**Tasa de Participación**
Fac. de Cs. del Mar	38	15	39%
Fac. de Medicina	37	21	57%
Esc. de Cs. Empresariales	17	14	82%
Esc. de Ingeniería	12	9	75%
Esc. de Derecho Coqbo.	12	7	58%
Depto. de Teología Coqbo.	11	7	64%
Depto. Cs. Básicas	11	10	91%
	138	**83**	**60,14%**

Cuestionario

El cuestionario de CI, ha sido diseñado en base al instrumento utilizado anteriormente en la evaluación de la influencia del CI en el desempeño organizacional de los institutos tecnológicos descentralizados del Estado de Veracruz (Machorro, 2013). El cuestionario fue adaptado al contexto chileno y además fueron agregadas variables que otros manuscritos similares han considerado para la determinación del CI en instituciones de educación superior, identificados en la etapa de revisión bibliográfica.

La escala utilizada para medir el CI contempla siete opciones de respuesta, acorde al criterio evaluativo chileno: malo (1), deficiente (2), insuficiente (3), suficiente (4), bueno (5), muy bueno (6), excelente (7). Adicionalmente, se diseñó un cuestionario aplicado a los cargos directivos de cada unidad académica, obteniendo información sobre la gestión de la unidad. Finalmente, las cifras del desempeño otorgadas por los cargos directivos también fueron proporcionadas por la Dirección de Análisis Institucional de UCN, validándose dicha información.

Validación Del Instrumento De Evaluación

A fin de asegurar la validez de las respuestas del instrumento aplicado, principalmente referidos a la interpretación errónea de preguntas por parte de los académicos encuestados, se utilizan dos mecanismos. El primero considera la aplicación del cuestionario dentro de la Escuela de Ciencias Empresariales, recogiendo comentarios de los académicos y llevando a cabo esos ajustes. El segundo consiste en una entrevista personalizada a cada cargo directivo por unidad académica, revisando preguntas susceptibles a diferencias interpretativas. Además de estas validaciones, cabe mencionar que el instrumento base utilizado y diseñado por Machorro (Machorro, 2013), se encuentra validado por un panel de expertos en la materia.

Confiabilidad Del Instrumento De Evaluación

El cálculo del Alfa de Cronbach del instrumento diseñado, arrojó un resultado por componente de 0,8392 para CH, 0,8203 para CE y 0,7374 para CR, valores mayores a 0,7 (Nunally, 2009), existiendo evidencia que los elementos miden el mismo constructo, es decir, la percepción del capital intelectual.

Resultados

El instrumento de medición del CI en UCN fue aplicado y procesado a fin de analizar la percepción de los académicos de planta sobre el CI presente en sus áreas académicas y en la universidad en general. Con ello se obtuvo un Índice de CI y posteriormente se estimaron modelos de regresión lineal entre desempeño y CI. Los resultados y su análisis se presentan a continuación.

Medición Índice de CI

El Índice de Capital Intelectual fue calculado de manera global y por cada una de las categorías que lo componen: capital humano (CH), capital estructural (CE) y capital relacional (CR).

En términos medios, el índice de CI obtenido, se traduce en una calificación de 4,91 (escala de 1 a 7) considerada suficiente. La calificación obtenida por cada unidad académica oscila entre 5,50 y 4,30, siendo el Departamento de Teología Coquimbo la unidad mejor evaluada (5,50), seguida por la Escuela de Ciencias Empresariales (5,03), ambas consideradas calificaciones buenas. No obstante, la Escuela de Derecho fue la unidad con la calificación más baja del grupo (4,30), considerada una calificación suficiente. Al efectuar el análisis de la varianza mediante el test de Fisher, se detecta evidencia estadística para concluir que existe diferencia significativa entre las distintas unidades académicas en relación a su evaluación del CI, a un nivel de significancia del 5%.

Resultados variables socio-demográficas

Al relacionar cada una de las categorías del CI: CH, CE y CR con las variables socio-demográficas, se puede concluir que la única variable de este tipo que mostró ser significativamente distinta entre las categorías del CI, fue años de antigüedad del académico en UCN, a una significancia del 5%, siendo los académicos que poseen una antigüedad de entre 4 y 6 años en UCN, los que evaluaron más bajo el CI.

Resultados Por Categoría

Las variables mejor evaluadas para la categoría CH fueron las competencias de salida de los estudiantes (5,4) y la motivación de los académicos al perfeccionamiento (5,4), en contraste con las variables competencias de entrada de los estudiantes, variable con la evaluación más baja (3,4) y las competencias de los académicos no doctores (3,8). Las variables mejor evaluadas para la categoría CE fueron el acceso a plataformas (5,4) y la cultura UCN (5,3). A su vez, las variables peor evaluadas para esta categoría fueron la capacidad de la infraestructura del área del académico (4,5) y la infraestructura de la universidad para los estudiantes (4,4). Finalmente, las variables mejor evaluadas para la categoría CR fueron el grado de confianza que otorga UCN a un estudiante (5,6) y la comunicación existente entre los estudiantes, académicos y jefaturas (5,5). Por su parte, las variables peor evaluadas fueron la existencia de convenios con colegios (4,3) y la participación de investigadores doctores en sociedades científicas (4,8).

Relación Entre El CI E Indicadores Del Fondo Basal Por Desempeño

A partir de los resultados obtenidos para las mediciones del CI, se procede a probar la hipótesis inicial referida a la existencia de una relación entre las componentes del CI y los resultados de los indicadores de desempeño de las universidades chilenas.

La técnica utilizada es un análisis de regresión múltiple, estableciendo un modelo lineal entre cada indicador de desempeño y las variables de CI. Se verifica el cumplimiento de los supuestos clásicos del modelo (normalidad, homocedasticidad, independencia de los residuos) y el grado de multicolinealidad. Posteriormente, se utiliza la

técnica de regresión de los mejores subconjuntos, a fin de determinar la estructura del modelo que mejor explica a cada indicador de desempeño (Tabla 4).

Cabe mencionar que la única variable socio-demográfica considerada como parte del análisis es Antigüedad del académico en UCN, por presentar diferencias significativas entre sus niveles.

Tabla 4: Identificación de los modelos de los mejores subconjuntos

Expresión Modelo		Indicadores del Mejor Subconjunto		
General	**Variables mejor modelo**	**R^2**	**R^2 ajustado**	**Cp de Mallows**
$\hat{y}_1 - \hat{\beta}_0 + \hat{\beta}_1 x_1 + \cdots + \hat{\beta}_{17} x_{17}$	x_3, x_4, x_5, x_{10}, x_{11}, x_{12}, x_{14}, x_{15}	73,1%	69,5%	2,1
$\hat{y}_2 = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \cdots + \hat{\beta}_{17} x_{17}$	x_3, x_4, x_5, x_6, x_7, x_{14}	32,0%	25,3%	1,6
$\hat{y}_3 = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \cdots + \hat{\beta}_{17} x_{17}$	x_3, x_4, x_{10}, x_{12}, x_{14}, x_{15}	67,3%	64,0%	3,8
$\hat{y}_4 = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \cdots + \hat{\beta}_{17} x_{17}$	x_2, x_3, x_5, x_7, x_8, x_{15}	31,5%	24,2%	0,5

Los resultados obtenidos no son favorables en cuanto a su calidad, la que oscila entre el 24,2% y el 69,5%, valores bajos, dado un estándar esperado de a lo menos el 75% de explicación del modelo (criterio: R^2 ajustado). Sin embargo, sirven de referencia para calcular los modelos de regresión múltiple con subconjuntos reducidos de variables x_i, resultados que se presentan a continuación, según cada caso.

Resultados caso 1: Modelo para Publicaciones Scopus 2014 (Y_1)

Los mejores modelos agregados fueron los que relacionan las publicaciones Scopus 2014 (Y_1) con la efectividad de la conectividad y acceso a información (x_{12}) y la cantidad de convenios vigentes (x_{14}), así como también el relacionado con la experiencia en investigación (x_4). Las rectas estimadas se presentan a continuación:

$$\hat{y}_1 = 51{,}4 + 26{,}3x_{12} - 34{,}0x_{14} \qquad (R^2_{Ajustado} - 94\%) \tag{1}$$

$$\hat{y}_1 = -3{,}79 + 4{,}02x_4 \qquad (R^2_{Ajustado} = 83{,}3\%) \tag{2}$$

Desagregando los modelos se obtiene:

$$\hat{y}_1 = -303 - 1{,}19x_4 + 85z_{21} - 23{,}2z_{22} + 38{,}8z_{24} - 49z_{25} \quad (R^2_{Ajustado} = 99{,}7\%; \text{ multicolinealidad alta}) \tag{3}$$

$$\hat{x}_4 = -89{,}8 + 21{,}2z_{21} - 8{,}89z_{22} + 15{,}9z_{24} - 13{,}2z_{25} \; (R^2_{Ajustado} = 94{,}6\%) \tag{4}$$

Los modelos obtenidos presentan un alto coeficiente de determinación ajustado, las variables son significativas individual y conjuntamente, sin embargo, en su mayoría se detecta un grado alto de multicolinealidad entre las variables independientes. Al estimar un modelo lineal entre x_4 (variable de la categoría CH) y las variables desagregadas de las categorías CE y CR, la calidad del modelo que considera a x_4 aumenta, concluyéndose que el CH influye indirectamente sobre el desempeño, a través del CE y CR. Finalmente, las variables más significativas para el modelo son: Experiencia en investigación (x_4), Acceso a plataformas (z_{21}) y Convenios de intercambio estudiantil (z_{24}).

Resultados caso 2: Modelo para Académicos jornada completa por cada 100 alumnos matriculados ($\boldsymbol{Y_2}$)

El mejor modelo obtenido relaciona la cantidad de académicos de jornada completa por cada 100 alumnos matriculados con el soporte socio-emotivo (x_7) y la cantidad de convenios vigentes (x_{14}):

$$\hat{y}_2 = 19 - 65{,}5x_7 + 35{,}8x_{14} \tag{5}$$

Sin embargo, la calidad de los modelos lineales obtenida para explicar la variable de respuesta es baja ($R^2_{Ajustado} < 70\%$) y las pruebas de significancia individual y conjunta no son concluyentes, entonces la cantidad de académicos no es una variable explicada por las componentes del capital intelectual. Luego del análisis desagregado de variables se aprecia la relación inversa existente entre las componentes de la variable, éstas son: soporte socio-emotivo a académicos (z_{13}) y el soporte socio-emotivo a estudiantes (z_{14}):

$$\hat{y}_2 = 103 - 46{,}8z_{13} - 8{,}5z_{14} + 37{,}2z_{24} + 5{,}46z_{25} \tag{6}$$

Esto va contra la lógica teórica, por lo que no se consideró una variable relevante para el modelo final de indicadores.

Resultados caso 3: Modelo para académicos que son doctores ($\boldsymbol{Y_3}$)

El mejor modelo obtenido relaciona la cantidad de académicos doctores con la efectividad de la conectividad y acceso a información y la cantidad de convenios vigentes, mismas variables independientes para la cantidad de publicaciones Scopus (caso 1). Esto se explica dada la alta correlación entre Y_1 e Y_3 ($r = 0{,}95$).

$$\hat{y}_3 = 13 + 4{,}06x_{12} - 5{,}74x_{14} \tag{7}$$

Resultados caso 4: Modelo para tasa de titulación en carreras de pregrado ($\boldsymbol{Y_4}$)

El mejor modelo obtenido relaciona la tasa de titulación en carreras de pregrado con las competencias de los académicos, el soporte socio-emotivo, las políticas institucionales adecuadas y las redes de investigación.

$$\hat{y}_4 = 1{,}11 + 0{,}378x_2 - 0{,}320x_7 + 0{,}0895x_8 - 0{,}282x_{15} \quad (8)$$

No obstante, es de extrañar que la tasa de titulación se relacione inversamente con el soporte socio-emotivo y con las labores de investigación. Luego del análisis desagregado de variables es posible concluir que las variables que afectan directamente a la tasa de titulación son las competencias en investigación de los académicos doctores, el trabajo en equipo de los académicos y el soporte socio – emotivo a los estudiantes. Las variables desagregadas que presentan una relación inversa con la tasa de titulación: soporte socio-emotivo a los académicos, las políticas de investigación y la participación en conferencias por parte de los académicos, fueron descartadas para la propuesta final de indicadores.

Luego del análisis estadístico, se concluye que en general, las hipótesis del estudio no son rechazadas, no obstante, las hipótesis 1, 2 y 3 son válidas para un subconjunto de variables.

La Figura 2 esquematiza una síntesis de las relaciones entre las componentes del CI y el desempeño en UCN encontradas a lo largo de la investigación.

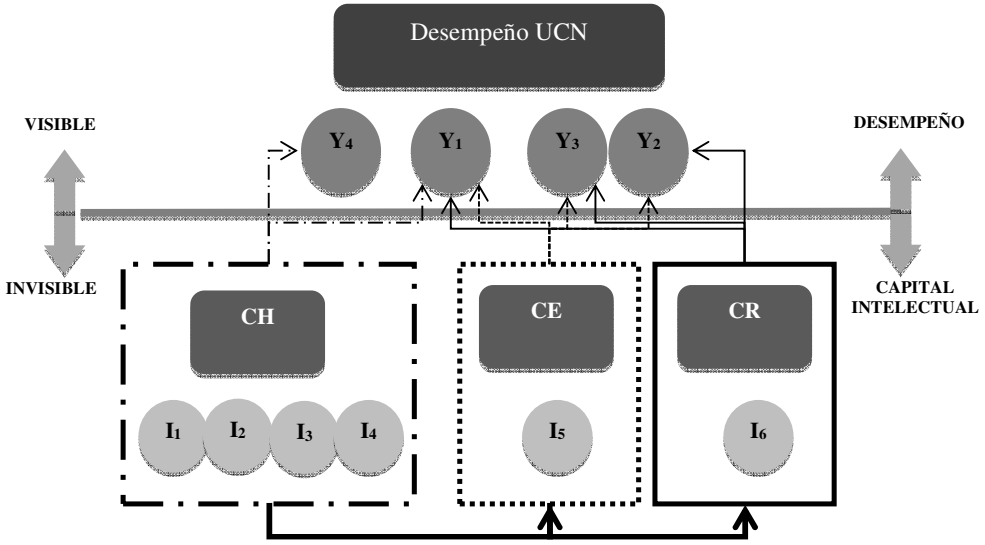

Figura 2: Relaciones entre componentes del CI y el desempeño en UCN

Propuesta De Indicadores

A continuación, presenta una tabla resumen con aspectos referidos a la conformación y métrica de los seis indicadores propuestos para mejorar el desempeño en las universidades chilenas (Tabla 6).

Tabla 6: Indicadores de CI

Código	Nombre Indicador	Métrica	Unidad de Medida	Periodicidad	Responsable	Meta
I_1	Experiencia en investigación académicos doctores	I_1 = Año actual - Año desde que publica regularmente	Años	Anual	Director unidad académica	Más de 1 año
I_2	Competencias en investigación	I_2 = Cumplimiento perfil de competencias	Escala 1 a 5 (Likert)	Anual	Director unidad académica	Mayor o igual a 4
I_3	Participación académicos en actividades del área	I_3 = (Cantidad de asistentes / Dotación área)*100	%	Semestral	Director unidad académica	100%
I_4	Satisfacción de los estudiantes en actividades socio-emotivas	I_4 = Índice de satisfacción	Escala 1 a 5 (Likert)	Semestral	Jefatura de carrera	Mayor o igual a 4
I_5	Eficacia uso de plataformas	I_5 = [1-(# de artículos no encontrados por visita / # de visitas)]*100	%	Mensual	Área de Informática	Mayor o igual a 90%
I_6	Convenios de intercambio	I_6 = (# estudiantes en intercambio / # estudiantes matriculados) *100	%	Semestral	Director o jefatura unidad académica	Alza respecto del periodo anterior

Conclusiones

En búsqueda de una propuesta de indicadores de capital intelectual orientada a la mejora de los indicadores de resultado del desempeño de las universidades chilenas, se verificó la hipótesis que establece una correlación entre el desempeño y el capital intelectual en sus tres componentes: capital humano, estructural y relacional. Se obtuvo un conjunto de seis variables significativas para UCN sede Coquimbo: Experiencia en investigación, Competencias en investigación de los académicos doctores, Trabajo en equipo de los académicos, Soporte socio-emotivo de la universidad hacia los estudiantes, Acceso a plataformas y Convenios de intercambio estudiantil. Para llegar a la propuesta definitiva de indicadores se desarrolló un instrumento de medición de percepciones del capital intelectual en UCN sede Coquimbo.

Del análisis de datos es posible concluir que, en términos medios, las percepciones de capital intelectual en UCN para el periodo en estudio oscilaron entre 4,3 y 5,5, obteniéndose un promedio de 4,91 para la universidad, sede Coquimbo. De estos resultados se desprende que los académicos consideran que el capital intelectual es suficiente, pero no muy bueno, dejando abierta la posibilidad de alcanzar una mayor valoración a futuro. Del análisis de las variables socio-demográficas, se desprende que la antigüedad en UCN incide en el índice de capital intelectual.

Cabe mencionar que las unidades académicas que mejor evaluaron el capital intelectual fue Teología y el Departamento de Ciencias Básicas, unidades con escasa o nula productividad investigativa. Esto hace suponer que la percepción del capital intelectual de los académicos de las unidades que sí tienen metas investigativas, tiene un carácter más crítico al momento de evaluar a sus pares y jefaturas, o bien es más exigente en términos de las condiciones que otorga el área para poder desarrollar su trabajo. Lo anterior queda de manifiesto en la evaluación del capital humano, en donde los académicos doctores calificaron de manera más baja a esta categoría con un 4,6.

Luego de las pruebas estadísticas realizadas, se concluye que la cantidad de académicos (indicador de desempeño), no es una variable explicada directamente por las componentes del capital intelectual. No obstante, al efectuar un análisis desagregado de las variables, pudo observarse que dicho indicador sí está relacionado con la variable de capital estructural: acceso a plataformas, y con la variable de capital relacional: cantidad de convenios de intercambio estudiantil. Resulta interesante mencionar, que de las seis variables relacionadas con el desempeño en UCN, cuatro de ellas correspondan a la componente de capital humano (Experiencia en investigación, Competencias en investigación de los académicos doctores, Trabajo en equipo de los académicos, Soporte socio-emotivo de la universidad hacia los estudiantes), una a capital estructural (Acceso a plataformas) y una a capital relacional (Convenios de intercambio estudiantil). Finalmente, podemos mencionar que este artículo presenta una propuesta innovadora sobre la gestión del desempeño en universidades y se espera sirva como referente para futuros estudios y planes de gestión.

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Boundaries of Transport Planning Models

Eugenia-Alina ROMAN
University Politehnica of Bucharest, Bucharest, Romania
E-mail: ea_roman@yahoo.com

Vasile DRAGU

University Politehnica of Bucharest, Bucharest, Romania
E-mail: v_dragu@yahoo.com

Oana Maria DINU

University Politehnica of Bucharest, Bucharest, Romania
E-mail: oanastefan_politehnica@yahoo.com

Armand-Şerban STERE

University Politehnica of Bucharest, Bucharest, Romania
E-mail: armand_serban.stere@upb.ro

Abstract

The increasing degree of motorization has led to traffic congestion and its negative effects (pollution, additional social costs, health problems, landscape degradation, increasing car accidents' number). The degree of motorization of Bucharest is about 850 cars per 1000 inhabitants and it is constantly increasing. Under these conditions, transport planning models must ensure the solution of these problems and ensure the satisfaction of all requests addressed to the transport system in compliance with the social, economic and environmental restrictions imposed by the sustainable development of society.The paper aims to analyse four-step planning models in order to identify its limitations/ difficulties in implementation, so that the solutions obtained by applying them in practice comply with the restrictions imposed by a sustainable development of society.

Keywords: Sustainable Development, Transport Planning, Four-Step Planning Models

Introduction

Satisfying the travel needs, addressed to the society, by motorization, has led to the accentuation of a phenomenon that has negative effects in the economic, social and environmental field — traffic congestion. In cities where transport planning has not been carried out properly, traffic congestion has reached alarming and even worrying levels. (Banister, 1997 and 2008).

Bucharest ranks 4th in the top of the most congested cities in Europe, according to data gathered by the car navigation company TomTom. The company has compiled a report (*TomTom Traffic Index*) showing traffic congestion in 416 cities in 57 countries. In the European top, on the first 5 places are Moscow (59%) (percentage of additional time spent travelling compared to the hours spent outside peak hours), Istanbul (55%), Kiev (53%), Bucharest (52% compared to 41% in 2015) and St. Petersburg (49%) and on the 14th places, 15th and 17th respectively are Paris (39%), Rome (38%) and London (38%). The level of congestion increased between 2018 and 2019 (in the last report an additional 239 cities were included in the list of congested cities), only a number of 63 cities registered measurable decreases. (Univers ingineresc, 2020)

Environmental sustainability entails improvement in the quality of urban environment and reduction of emissions and energy consumption (greenhouse gasses emission variation; pollutant emission variation; impact variation in other sectors). By contrast, social sustainability entails improvement in the quality of life and social equity (e.g.,

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easy access to transportation) and improved safety (e.g., reduction in the frequency of accidents). Finally, economic sustainability entails making mobility of people and goods more efficient and effective and ensuring that the economic benefits produced by the project are greater than the costs. (Henke et al, 2020)

The objectives of sustainable mobility can only be achieved if they are outlined for in the transport planning phase. The main objectives of transport planning are presented in Table no. 1. This analysis uses a 9-objective evaluation framework.

Table 1: Objectives of transport planning

Nr. crt.	Objective	Description
1.	Energy Conservation	Reductions in per capita transport energy consumption and CO2 emissions.
2.	Emission Reductions	Reductions in "conventional" pollution emissions, including NOx, VOCs, CO, particulates, toxics, water pollution and noise.
3.	Congestion Reduction	Reduced traffic congestion.
4.	Road and Parking Savings	Reduced road and parking facility costs.
5.	Traffic Safety	Reduced per capita crash damages, injuries and fatalities.
6.	Strategic Land Use Objectives	Reductions in per capita impervious surface, more accessible development patterns, more liveable communities.
7.	Equity Objectives	Improved accessibility for people who are transportation-disadvantaged, and fairer distribution of benefits and costs.
8.	Affordability	Vehicle cost savings and more affordable transport options.
9.	Mobility Benefits	Benefits to consumers from increased mobility.

(Source: Litman, 2005)

The individual strategies are evaluated according to the degree of importance of each objective, using a 7-step scale (+3… -3). The value +3 is defined as the most beneficial effects and -3 as the most harmful. With the exception of equity and affordability, all other objectives are directly dependent on the length of the journey. An important factor in the analysis is the effect that cost has on travel and fuel consumption. It is possible to define the elasticity of travel in relation to the fuel price, which is usually -0.15 on medium term and -0.3 on long term. This means that a 10% increase in the price of fuel reduces the number of trips by 1.5% in one year and by 3% after a few years. The purchase of more efficient vehicles in terms of fuel consumption leads to an increase in the number of km traveled in a year because it reduces fuel consumption/ km, with favorable implications for increasing mobility but with unfavorable implications for traffic safety and congestion. Estimates of the elasticity of the annual distance traveled in relation to the cost / km are between -0.3 and -0.1. For every 1% drop in fuel cost, Americans drive 1.85% more miles (Litman, 2005).

Classic congestion reduction measures focus exclusively on the development of road infrastructure leading to land usage, degradation of the natural landscape, increased risk of accidents (due to increased road width) and attracting new traffic, which will again lead to congestion and the process is cyclical until the expansion of road infrastructure is no longer possible. Thus is described a vicious circle of possibilities to eliminate congestion.

Since 2013, the European Commission has developed a guideline for the Development and Implementation of a Sustainable Urban Mobility Plan, according to which each urban locality must achieve a SUMP through which to achieve a sustainable urban planning in transport. (EC, 2013).

In the Sustainable Urban Mobility Plan for Bucharest-Ilfov Region (2016-2020) a four steps transport model has been developed (SUMP Bucharest Ilfov, p. 241-278). Based on this model measures has been proposed for reducing congestion and encouraging sustainable urban mobility in Bucharest.The problem is that the model used failed to exceed the limits of the four steps planning models presented in this paper and the expected results are delayed.

The knowledge and the interpretation of current transport demand, characterized by mobility, allow the formulation of empirical laws and their use to determine future transport demand. From the primary structure, which tried to

identify globally the requirements of the transport system (pure demand models) and to adjust the supply accordingly, the models were rethought as articulated systems, of demand-supply interaction; starting from aggregate, descriptive, static models they evolved as disaggregated, behavioural models, which reflect the connection between transports, socio-human activities and global dynamism.

The Transport Planning Model

Mobility is traditionally measured by the number of trips per day and per family. Many studies of the transport network development in American and European states show that most often this number is between 4 and 8. (Ben AkivaşiLerman, 1985). It can be broken down into:

- An almost fixed element - *travel in alternating migration* – close to the value 2 (a round trip, on average for the family, to get to and from work), for a proportion of ½ of the active population using a mean of transport. For areas where the return home system is practiced during lunch, this number exceeds 2;
- A variable element – *travel for other purposes* – which depends largely on the standard of living, leisure, car ownership, etc. and which determines the number of trips for shopping, leisure, health or for attending distant schools.

When mobility is limited by some constraints (e.g. budgetary), a hierarchy is established between the types of trips: compulsory travel — alternating and professional migrations — then personal business, shopping, recreation and finally trips to accompany another person.It is easy to understand that as the standard of living increases, optional mobility increases even more, being the main element of the proliferation of transport demand. (Ortuzar and Willumsen, 1994).

All methodologies use, as a basic structure in transport modeling, the standard sequence of the 4 steps: trip generation, trip distribution, modal split, and traffic assignment. (Oppenheim, 1994, Dragu, 2001).

It is important that this mobility is determined correctly, because it conditions the capacity of the necessary infrastructures and therefore of the investments to be made. An overestimation of transport demands will lead to an oversizing, at least temporarily, of the networks, while in the opposite situation, there will be an insufficient supply of transport leading to congestion. The urbanization will be slowed down, in some areas, congestion of some transport axes will be prolonged and there will be a latent transport demand that will not be satisfied. Figure 1 shows the general structure of a transport planning model from which the sequence of elaboration stages and the steps that make up the model are observed.

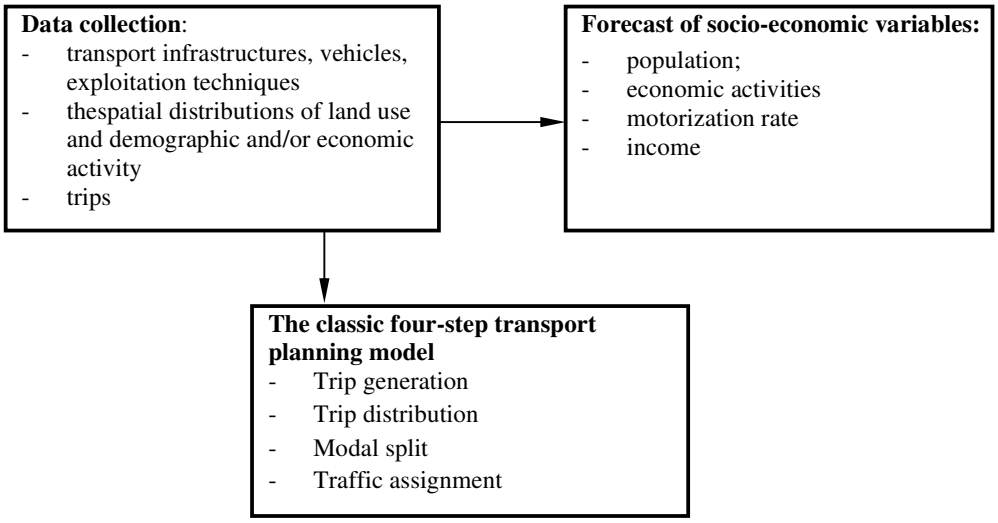

Fig. 1: The general structure of a transport planning model (source: Dragu, 2001)

In the first step of the planning model, the necessary details regarding trips are obtained together with the information on the land use and the transport situation for the study area. A cordon line defines this area, and the area within it is composed of traffic analysis areas (TAZ), representing the origins and destinations of trips, and is subject to explicit modeling and analysis.

The factors that influence trip generation are:

- Household characteristics (income, household structure, car ownership and driver's license);
- Zone characteristics (land use, land price, residential density, rate of urbanisation);
- Accessibility (extent of transport option from the zone, quality of transport).

The most used method to determine the number of trips generated and attracted is the regression analysis. A linear regression model can be written:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + ..., \quad (1)$$

where Y represent the dependent variable,
X_i - are independent variables/ of influence,
a - constant factor of the regression equation,
b_i - the regression coefficients of the model.

When X has a single value we have a simple linear regression. For generation/attraction X_i represents the socio-economic influencing factors (e.g. income, car ownership, etc.) and Y represents the number of generated/attracted trips. The constant factor and the regression coefficients are calibrated using socio-economic data gathered over a base year. The calibration uses the method of least squares.

An example of a mathematical relation of trip generation is (Salter, 1989):

$$Y = 0{,}0649X_1 - 0{,}0034X_2 + 0{,}0066X_3 + 0{,}9489X_4, \quad (2)$$

where Y represent the average number of daily trips per family;
X_1 – the average number of active persons;
X_2 – the population density;
X_3 – the family total income;
X_4 – the average number of cars pe family.

The difficulties in applying the regression analysis are:

a) multi-colinearity – this phenomenon occurs when one or more of the independent variables X_i also show mutual correlation,
b) how many and which independent variables ?,
c) the nonlinearity of the model,
d) estimating the constant factor from the regression equation,
e) extrapolation,
f) the so-called ecological correlation resulting from the level of aggregation of the data used (we work with aggregated data or with average values).

When there are two options of choice (V1 and V2) to perform or not to perform the trip, the probability of making the trip can be written by the binary Logit model so:

$$P_r(l) = \frac{1}{1 + e^{-(V_1 - V_2)}} \quad (3)$$

It is observed that for V1 = V2 the probability is 0.5, and for V1 << V2 the probability tends to 1 and for V1 >> V2 the probability tends to 0.

The second step of the transport model is *trip distribution*. At this stage the destination origin matrix is defined for the study area. Departures and arrivals from/ in each analysis area are determined using the generation and

attraction models. One of the most used methods (because it has the simplest mathematical apparatus) is the model of growth factors.

The disadvantages of growth factor models are:

- New spatial developments for the study area cannot be accommodated,
- The method depends heavily on the reliability of the data in the individual cells of the base year matrix,
- There are instances when problems can occur with the iteration process (mai ales atuncicândavemcelule cu valoarea zero înanul de referință),
- A significant disadvantage of growth factor methods is their inability to incorporate changes in the transport system, in this instance the transport network.

Modal split is the third step in the conventional four-step transportation forecasting model. It is the step where trips between a given origin and a given destination are split into trips using transport modes and trip by car, and within the modes of public transport among those that exist in the area subject to analysis. Usually, the choice is made between two modes of transport in succession because the mathematical models are simpler and easier to use.

The impedance of travel from i to j on route r with a particular mode of transport can be written as a linear combination of duration T_{ij}^{r} and monetary cost, K_{ij}^{r}. The minimum of this expression, calculated for all routes, is the impedance of movement c_{ij} between i and j:

$$c_{ij} = \min_{r} (T_{ij}^{r} + \frac{K_{ij}^{r}}{\gamma}) , \quad (4)$$

where the value of time γ is expressed in monetary units per time (Euro/hour).

The value of γ indicates that the user will pay γ monetary units for a unit of travel time saved.The travel impedance is expressed in generalized time. The value of γ depends on the person's income and the purpose of the trip.

It has already been established that the number of trips to a destination decreases as the distance to the destination increases. This effect of travel impedance on travel distribution is expressed by the deterrence function,$F(c_{ij})$. The deterrence functions depend on the trip purpose, personal characteristics and even on the transport mode.

The most used functions that define the travel difficulty are of the type:

- Negative power function, $F(c_{ij}) = c_{ij}^{-\alpha}$,
- Negative exponential function $F(c_{ij}) = e^{-\beta c_{ij}}$,
- Combined power and exponential function $F(c_{ij}) = c_{ij}^{-\alpha} e^{-\beta c_{ij}}$.

The parameters α and β are determined throughcalibration,by means of observations in the study area. Figure 2 shows the functional forms of the deterrence functions for different values of the parameters.

Although often used, the exponentially negative function has a major disadvantage. The same absolute increase in travel impedance at low values has the same effect on travel as at high impedance, which is not confirmed by user perceptions. An increase in travel impedance from 4 to 9 minutes does not have the same effect as an increase from 180 to 185 minutes. Therefore, the exponentially negative function is only suitable for certain value ranges of the impedance function.

Sometimes, a deterrence function does not decrease monotonically over the entire range of travel impedance values.In the case of car trips, the values of the deterrence function start from a minimum value, reach a maximum value and decrease as the travel impedance increases. The reason is that the tendency to use the car over short distances will generally be reduced, walking or cycling being the right choice. In such cases, it is possible to use a combination of power and exponential functions to describe the phenomena.

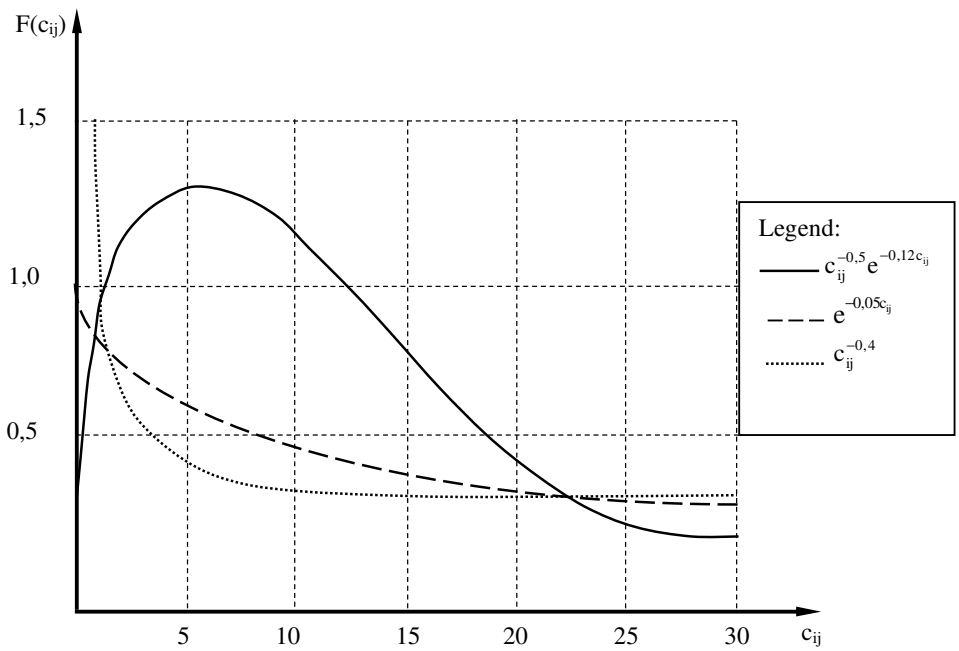

Fig. 2: The deterrence functions (source: Immers & Stada, 1998)

If we assume that the individual utilities can be replaced with an average utility for the whole area, then the following expression can be used for the utility of choosing i as origin, j as destination and making a trip from i to j, using the mode of transport m:

$$U_{ij}^{m} = V_i + V_j + V_{ij}^{m} + \varepsilon_{ij}^{m}, \tag{5}$$

where V_i represent the utility obtained for an activity carried out in iarea(activities carried out at home),
V_j - the utility obtained for an activity carried out in j area(e.g. work),
V_{ij}^{m} - the utility obtained for travelling from i to j, using the mode m,
ε_{ij}^{m} - the term that defines the probabilistic error (error given by the unobserved attributes).

If it is accepted that the terms are independent and have a Gumbel distribution (correct hypothesis for the logit model), then we can reach at:

$$T_{ij}^{m} = a_i b_j e^{V_{ij}^{m}}. \tag{6}$$

The utility is the *effort* required to make a trip from i to j, using the m mode. *The effort* will be a function of the travel impedance between i and j with mode m.

$$V_{ij}^{m} = f^{m}(c_{ij}^{m}) \tag{7}$$

After replacing $e^{f^{m}(c_{ij}^{m})}$ by $F^{m}(c_{ij}^{m})$ we obtain:

$$T_{ij}^{m} = a_i b_j F^{m}(c_{ij}^{m}) \tag{8}$$

and hence:

$$T_{ij}^{mm} = \sum_{ij} T_{ij}^{m} = a_i b_j \sum_{m \in ij} F^{m}(c_{ij}^{m}) \tag{9}$$

Interpreted, this expression means: the distribution of the transport flows across the various transport modes m between an origini and a destination j is proportional to the values of the deterrence function.

The last stage of the transport model is *traffic assignment* and it concerns the selection of routes and it is the one in which the load of the network is determined. Following this stage, any congested areas can be determined and measures can be established to reduce it.

Traffic assignment patterns can be classified according to time variation as follows:

- Static models, they assume that supply and demand are constant over time. Through these models, the traffic is affected in the network only once because the demand and supply are constant. These are also called 2D models because the third dimension, time, is not taken into account;
- Dynamic models, they take into account the variation of transport demand over time and possible changes in transport networks over time.These result in dynamic flows on the network arcs (with variation over time). These are called 3D Models (three dimensional).

Dynamic models of traffic assignment are more recent than static ones that benefit from a longer experience (Xidong Pi, Zhen Qian, 1997).

The simplest static model of traffic assignement is the *all-or-nothing model*. It assigns all trips on the shortest path, regardless of changes in travel impedance caused by network loading. If users perceive the impedance of traffic after a statistical probability distribution, then traffic can be affected on routes stochastically (randomly) in two ways:

a) The first one uses theoretical probability curves;
b) The second one uses traffic simulation.

Like all-or-nothing model, the stochastic model does not take into account the changes in travel impedances due to traffic congestion.

Equilibrium models are those that change the travel impedance of a connection due to congestion**.** The main feature is that the travel impedance of a conectionis a function the traffic load. If the traffic flows increases on connections that were originally the shortest paths, users will search for alternative paths. This will lead to an equilibrium in which users will no longer be able to improve the travel time.Finally, the stochastic traffic assignement model and the equilibrium model can be combined.Stochastic equilibrium models consider the effect of congestion and differences in users' perceptions of travel impedance. These are presented in table no. 2.

Table 2: Classification of static assignments models

		Stochastic effects taken into account?	
		No	Yes
Capacity effects taken into account?	No	All-or-nothing assignment	Stochastic assignment
	Yes	Equilibrium assignment	Stochastic equilibrium assignment

(source: Immers & Stada, 1998)

The prime characteristic of the stochastic traffic assignment models based on simulation is that the travel impedance on a given connection is determined using a random number generator. Consequently, the levels of link traffic impedance are obtained as stochastic variables.

$$C_a = c_a + \varepsilon_a , \qquad (10)$$

where C_a is the random variable of traffic impedance,
c_a - the measured value of traffic impedance,
ε_a - the stochastic error term (random).

When $\varepsilon_a = 0$, c_a can be interpreted as the travel impedance used in all-or-nothing method. Commonly, a normal distribution is used forevaluation of ε_a .

The following relation is used for the impedance of a connection:

$$C_a = c_a + z\sqrt{\varphi c_a}\ , \qquad (11)$$

where z is a random number between 0 and 1 with a normal distribution,
φ - a factor that determines the size of the variance.

A limitation of the four-step transport planning model is that each trip is considered a round trip without considering the chained trips in which a destination turns into a new origin, situation that is common in current activities. This is schematically represented in figure 3, in which the distance, cost and accessibility attributes were written on each arc.

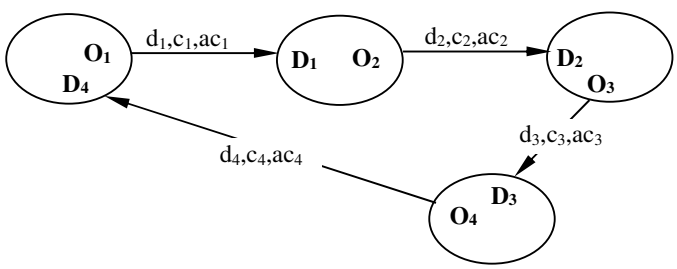

Fig. 3: Schedule of *pick-up* trips

The original contribution of the authors consists in the fact that following the experience gained in the field of transport planning, by using various dedicated software tools (TransCAD and VISUM) or using appropriate analytical models, it was observed that, in practice, not in all cases the expected results could be identified. Feedback and detailed analysis of the implemented measures led to the original identification of limits and boundaries in the application of four-step planning models.

Conclusions

Many transport studies deal with the global demand forecast quite superficially and the solutions are oriented in two directions:

- either the current mobility is adjusted in direct proportion to the increase in the number of the population and to a share of the increase in mobility, resulting from the observations on the individual behaviour;
- or by comparison with other urban agglomerations with a higher standard of living and mobility; an average level of mobility is determined for the forecast horizon.

The first step of the model, the trip generation, is loaded with ambiguity and indeterminacy because the information is obtained through transport surveys which, as we know, are extremely dependent on the correctness/ accuracy of data collected from respondents who may omit or misreport certain aspects. Also, the regression analysis has some difficulties / limits that are presented in the paper - difficulties related to the mathematical apparatus or data distortion at the time of aggregation.

The model aggregates the individual trips at the level of the paths, means of transport (here its capacity is decisive in traffic assignment on a path), by modes and, subsequently, assign them on the itineraries, finally obtaining the network traffic flows. The trips of freight vehicles and the periods of time in which they can move are not taken into account. Segregation of freight and passenger flows can be achieved by establishing time windows for different categories of traffic.

The mathematical models used to determine the travel difficulty do not always succeed in faithfully reproducing human behaviour on the whole range of choices and actions. Human decisions and actions arediverse and show a stochastic behavior that makes them difficult to model or, in other words, the necessary mathematical apparatus is complex and difficult to use.

The assessment of future transport needs is done by extrapolating the origin-destination matrix, which introduces many uncertainties in the model, because it is considered that socio-economic factors keep the same evolution as in the current situation. This is a serious distortion that can lead to erroneous results and improper sizing of the infrastructures of different modes of transport and travel.

Another problem with the four-step transport planning model is that only round trips are taken into account without considering that in the case of trips by car more and more users make pick-up trips, through which they try to maximize its usefulness.

However, the model is useful in obtaining an image of the traffic parameters evolution in order to expand/ develop the components of the transport network by increasing the capacity of the nodes and links or to estimate travel times in different development scenarios.

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Using Game Theory to Describe the Ways Of Ensuring Quality Education Challenges

Liudmyla ILICH

Dr of Economics, Associate Professor, Head of the Department of Management,
Borys Grinchenko Kyiv University, Kyiv, Ukraine, l.ilich@kubg.edu.ua

Olena AKILINA

Ph.D. in Economics, Associate Professor,
Borys Grinchenko Kyiv University,
Kyiv, Ukraine, o.akilina@kubg.edu.ua

Alla MYKHATSKA

Ph.D. in Pedagogical Sciences,
Dean of the Faculty of Information Technology and Management,
Borys Grinchenko Kyiv University,
Kyiv, Ukraine, a.mykhatska@kubg.edu.ua

Abstract

Purpose: The objective of this article is to determine the opportunities for game theory application and promote beneficial impacts from its introduction into education management system. **Methodology**: While doing research the following methods were used: method of expert evaluations, data analysis, economic and mathematical methods. Management content of any economy branch, particularly education, tends to select constant optimal decisions. Use of mathematical framework is one of the ways of effective decision-making processes improvement. The authors offer theoretical and game model to apply for description of education quality challenges. Discrete game in normal form is built up, whose participants are university of state or municipal ownership and state authorities or local territorial community council. Gamers' strategies include their different attitude to education services quality. Payoff matrixes are shaped on the basis of significant advantage multiplied by results. The game solution is achieved within clear strategies focused on non-beneficial university strategies to work formally or 'simulate'. This implies that in the future a number of 'Universities-simulators' will grow whereas the quality of education services will decline. **Conclusions**: To change the situation as for beneficial and non-beneficial strategies for society it is of great necessity to alter the payoff system for both University and State/Community. This situation may alter only in case of institutional changes which, first and foremost, should begin from granting of real autonomy (not formal one which operates these days) as well as freedom to Universities. We should also rethink of the operation of the current National Agency on higher education quality assurance and reconsideration the formula of university funding alongside with taxation approaches.

Keywords: Game Theory, University, State, Community, Education Quality, Quality Assurance, Simulate.

Introduction

This society is observed to face the rise in demand for higher education which, in its turn, requires its further development and improvement. Responding to all today's challenges concerning Ukraine's accession to the Bologna process, we are eager to achieve higher world standards in education. Conversely, it needs the constant focusing on better management of quality education.

Up-to-date mechanisms implementation of state and public administration concerning quality education management as well as quality evaluation considering European and world practices and state, non-governmental and public structures engagement is of actual importance. To the authors' mind, higher educational establishment development

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should be based on the principles of strategic management implementation. Higher education as a type of economic activity is presented with the establishments providing educational and complement services. Thus, they are subject of an educational services market which spread the operation the objective market laws. In such a way higher educational establishment as a market player are forced to confront to negative tools of internal and external environment, while working under uncertainty.

Taking into account the necessity to adopt state managerial decisions and their quality dependence on the right justification for the choice of the best decision variant, the use of game theory is an efficient tool. It makes it possible to increase the quality of justification basis and state managerial decisions development as well as enhance the effectiveness of education strategic management. Game theory provides application of mathematical methods to solve socio-economic issues which is of great importance for the head of public or local authority who is forced to choose among social, private and corporate interests while decision-making process. Correspondingly, identified and obvious community's interest should be considered as the basis for strategy and decision-making process, being the purpose of script implementation.

Literature Review

Game theory is a branch of Mathematics which studies mathematical models of strategic interaction among rational decision-makers and applies the method of seeking real events to occur in future as a result of specific actions or inactions by participants in a game or a script. Game theory has a long history. But only John Nash, John von Neumann and Oskar Morgenstern were first who contributed to its systematic development

In 1944 John von Neumann and Oskar Morgenstern, mathematician and economist, published common book 'Theory of Games and Economic Behavior', which is considered classic these days. They developed innovative mathematical theory of economic and social organization which revolutionized economics and led to creation of a new branch in scientific research, game theory.

E. Rowland (1946) claims that general theory of social games offers simplified conceptual model of economic behavior, so the study of this theory may contribute a lot to some basic concepts of economics, in particular, concept of utility.

In 1950 J. Nash (1950) published scientific paper where he developed and described a criterion for mutual consistency of n players' strategies which is widely used in economics these days and known as 'Nash equilibrium' applicable to a wide variety of games.

D. Kreps (1990) states that 'One cannot find a field of economics … in which understanding the concept of Nash equilibrium is not nearly essential to the consumption of the recent literature'.

Up-to-date studies by Pou-Yan Nie, Takashi Matsuhisa, Henry Wang, Pay Ay Zhang 'Game Theory and Applications in Economics' (2014) significantly expand the scope of game theory application to economics, including economic theory, microeconomics, enterprise economy and other applied spheres.

In their turn Zigfrid Berninghaus, Karl-Martin Ehrhart, Annette Kirstein and Stephen Seifert (2002) expand and open up another opportunity for application game theory methods to the sphere of economic counseling.

K. Peleckis in the article 'The Use of Game Theory for Making Rational Decisions in Business Negations: A Conceptual Model' (2015) makes comparative analysis of the world literature on game theory and its application for rational decision-making at negotiations. The article offers an algorithm which combines game theory approach and heuristic algorithms for better representation of negotiations specific nature. This algorithm may be applied to support strategic decisions at negotiations and is of great use for better comprehension of negotiations process strategic management.

Tille Grüne-Yanoff and Paul Schweinzer (2008) conclude that game theory is not a universal theory of rationality. Game-theoretic models consist of a formal game structure and an informal model narrative or story. When game theory is employed to model economic situations, the stories play a central role in interpreting, constructing and solving game structures.

Larry Sanuelson (2016) states that nowadays game theory not only backtracked from its initial origin but has also covered the whole economics. He determines the key challenges of game theory, including constant struggling with

multiple equilibriums and necessity of better integration cooperative and non-cooperative game theory. It is him who explores the possibilities of game theory application to behavioral economy.

Charles A. Holt and Elvin E. Roth (2014) also claim that game theory takes centre stage in economic theory. To the authors' opinion, to make game theory as productive in 50 years' time as it is these days theoreticians of games face the challenge to learn how to employ more varied and realistic models of individual behavior in studying strategic behavior, as well as how to make better use of analytical, experimental and computing tools in complicated strategic environment.

Ukrainian science is also not exempt from the ways of practical application of game theory to solve social and economic challenges in different spheres. Among this country's studies the works by O. Luginin (2016), A. Shiyan (2009) and D. Bikulov (2015) should be mentioned. The study by S. Terepishiy (2015) draws special attention, as it considers perspective of game theory application while decision-making in education.

It can be concluded that a significant number of sciences developed a lot thanks to mathematical methods application. During its history game theory has changed specifically and modified in its own way. Nevertheless, it is still developing and of actual importance in economics as well as in other sciences. Its application can be effectively used in different branches of Ukraine's economy, particularly, in education.

The analysis of world and Ukrainian studies made proves that perspective of game theory application while decision-making in education is not fully covered. It is for this reason the objective of our study is to determine the opportunities for game theory application and its beneficial impact in education management.

Management content in any economic branch, including education, is restricted by constant choice of optimal solutions. The development of this branch depends on effectiveness of managerial decisions. Complicated nature of market economy puts forward severe requirements concerning reasoning behind managerial decisions. Application of mathematical methods to decision-making process is one of the ways to meet these requirements.

Game theory is theoretical basis of mathematical models of optimal managerial decision-making in conflict situations when one opponent wins by means of another one. Alongside this situation in decision-making theory, situations of risk and uncertainty are also considered. They have different models and require different criteria of optimal decision choice. But in practice a number of solutions made under real conditions are strictly limited. Economic situation is often unique, so decisions should be made simultaneously and within uncertainty.

Game Model

Theoretical game model to manage effectively the university lecturer's job was offered by Ukrainian scholar Anatoliy Shiyan in 2009. The authors reconsider this idea and transform such modeling to determine the university's effectiveness. Educational system is the main public institution whose activity provides specialized preparation of the youth according to labor market requirements. Success in this institution's activity is the key element of any society management effectiveness. But scientific literature mentions the theory of 'institutional traps' occurred in socio-economic systems of transitive type which slow down the processes of public transformation (Polterovich V, 1999; Polterovich V, 2004). Institutional trap is considered ineffective but sustainable behavioral norm. It has no economic benefits for society. Nevertheless, the participants of such 'institutional trap' should not reject it due to drawbacks of public and municipal administration. In the situation of 'trap' occurrence the system selects ineffective way of development. The paradox lies in the fact that in such a case the transition to effective way of development can be rather resource-incentive for the system.

Nowadays education quality in Ukraine as well as in the post-Soviet countries is rapidly worsening, in spite of the fact that there was a period of time when Soviet educational system served as a guideline for many world countries. Even these days some British schools learn from Soviet experience of specialized Physics and Mathematics education. These days increasing emergence of 'institutional traps' can be observed in Ukrainian education. Taking into account the fact that these processes are only at initial stage, the chances of addressing their shortcomings are rather high.

So, transformed theoretical game model to describe the problem of education is quality is proposed. Discrete game in normal form is built, their participants are University (of state and municipal ownership) and state authorities (hereinafter referred to as 'State') or relevant council of territorial community (hereinafter referred to as 'Community').

Gamers' strategies are determined by their different attitude to education services quality. Payoff matrix is shaped on the basis of progressive advantage multiplied by results. The given model can be referred to as the process of both 'institutional trap' shaping and exiting from it which promotes the application of this model to education management development in this country.

The right problem shaping and relevant problem statement is one of the main stages of game theory application in practices. Since the legality of a decision is determined by the effects occurred while modeling a real situation according to theoretical game features.

We should consider interaction between 'University' and 'State/Community'. It lies in the following:

1) According to the Law of Ukraine 'On Higher Education', it is the 'University' which undertakes scientific, scientific and technical, innovation and/or methodological activity, provides educational process organization and gets funding from the 'State/Community' as a founder.

2) 'State/Community' on behalf of founder obtains social effect while the population's education level is increasing. According to Ukrainian Legislation 'University' is a non-profit budget institution as it is funded at the cost of state or local budget, which means it is not liable for income tax and gets some tax benefits. Nevertheless, 'State/Community' as a founder benefits from the fact that 'University' must channel 50 per cent of its profit into providing scientific, scientific and technical activity and developing its material base which have to promote improvement in education quality in its turn. Thus, interaction between stakeholders 'University' and 'State/Community' can be presented as a statistic game, as both 'University' and 'State/Community' obtain the same information, so their moves are expected and/or predicted.

At first, all possible strategies of both gamers should be described:

1. To our mind, 'University' should possess the set of the following strategies:

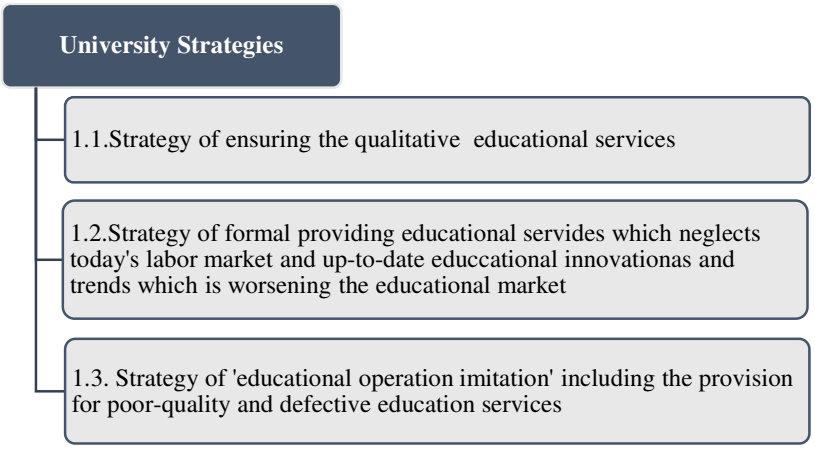

Fig. 1: 'University' Strategies

2. 'State / Community' also possess own strategies:

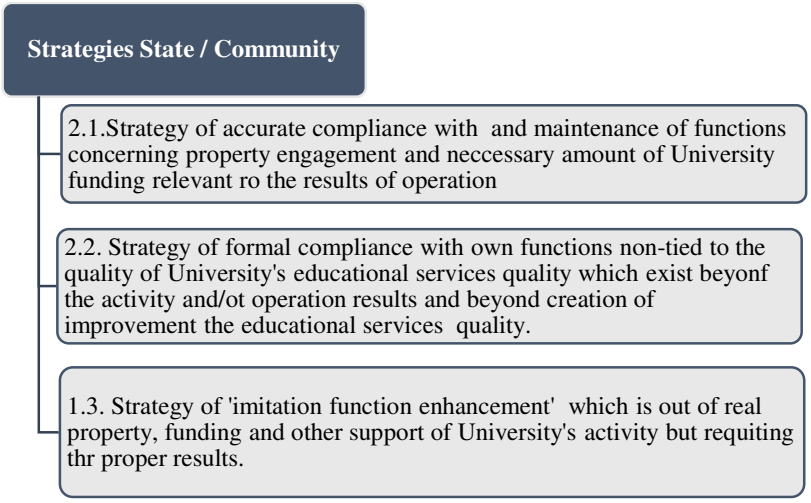

Fig. 2: Strategies 'State / Community'

So we may conclude that strategies offered for both gamers are relevantly similar, as the common patterns of gamers' behavior are described. It is also comprehensible that conditionally equitable gamers' behavior is presented. The authors assume this conclusion despite existence of the proper dependence and submission between 'University' and its founder.

To complete the standard assignment in game theory the payoff matrix should be given for both gamers which is labour-intensive and responsible stage while decision-making. The mistakes made during payoff matrix shaping are out of the ways computing methods. The typical variant is given in Table 1 in which 'State/Community' payoffs are represented in the right upper corner, whereas University payoffs are given in lower left corner. The evaluation of payoffs is given at 100-pointed scale of education quality. The matrix scales can be non-linear and monotonous. You see, we are interested in complex figure productment. The authors have no necessity to compare real numeric values among them. In such a way we calculate payoffs both for 'University' and 'State/Community'. Within real economy the 'ratio of enforcement' should be found, as it enables comparable the winners' prizes. Though, while setting the following task it is not necessary unlike the comparison between parties' payoffs (Bucharbayeva L, Yegorova Yu., Frantz M., 2017)

Table 1: Allocation of payoffs in the game between 'University' and 'State/Community'

		State / Community		
		Strategy of proper function fulfillment	Strategy of formal function fulfillment	Strategy of imitation
University	Strategy of education quality enhancement	75	-25	100
		50	-100	-100
	Strategy of formal services provision	-75	-50	-100
		-25	0	25
	Strategy of imitation	50	-25	25
		75	-50	-75

Source: author's calculation by the expert evaluations

After compiling the matrix it makes sense to compare the payoffs of 'State/Community', i.e. proper local or municipal authorities for various strategies under the same 'University' strategy:

1. Strategy by 'University' – 'Strategy of quality enhancement' is of most benefits in relevant submissions of state and local authorities imitating their activity, but is of least benefits among those authorities which fulfill their functions formally.
2. Strategy by 'University' – 'Strategy of formal provision with services': the relevant local and municipal authorities give the most benefit from formal fulfillment of its functions, whereas the least is given from imitators who have nothing on offer;
3. Strategy by 'University' – 'Strategy of imitation': the most benefits are obtained by proper state or municipal authorities which accurately obey the law but the least advantages are handed by those who formally execute their functions.

We should compare payoffs of 'University' and various strategies of 'State/Community' to make the University's benefits clearer:

1. Strategy 'State/Community' – strategy of proper compliance with functions will benefit the 'University' the most while the latter imitating its activity: whereas the least one who will take advantage of will be the least among those who providing services.
2. Strategy 'State/Community' – Strategy of formal function observance: 'University' obtains the most benefits, as it provides the most formal services, whilst the least among those who spread quality.
3. Strategy 'State/Community' – Strategy of imitation: the greatest payoff is obtained by 'University' who operated formally, the least one is by those who worked qualitatively, which means much more effort than imitator.

Game solutions achieved in pure strategies. Though, all strategies are focused on 'non-beneficial' for communities ways of development state and municipal authorities: 'work formally' or 'imitate'.

Nash equilibriums are concentrated within the choice of the strategy like 'imitate and work qualitatively' or 'work formally and work formally'. Accepting this viewpoint concerning Nash equilibrium, which most often concerned the rational choice accepted by all gamers, we claim that they were the one who created the conditions of populations' self-organization. It was one of Nash equilibriums that established itself within 'University' – 'State/Community' interaction as well as it maintained the shaping 'University' – 'State/Community' interaction in general. Nash equilibrium is often considered the main tool for institutional trap shaping tool as the set of the institutional traps is limitless within education sphere,

In this case both Nash equilibriums can be pretty effective for gamers for short-period time. As 'University' strategy to work formally is less beneficial for state and municipal authorities wherever strategy is chosen, so in long-term prospective such strategy won't work.

Conclusion

While game solving, we concluded that strategy 'to simulate, to work' will be Nash equilibrium within all the period of time. It means that 'University' always benefits when it chooses the strategy 'to simulate' under prevailing realities in Ukraine. This implies that in the future a number of 'Universities-simulators' will grow whereas the quality of education services will decline. Nowadays we have an opportunity to observe the situation when qualitative education is vanishing, replaced with the simulator of education services. Consequently, in the nearest future we shall experience worsening of labour force qualitative indicators which will negatively impact Ukrainian economy.

To change this situation it is of great necessity to alter the payoff system for both gamers. The system shaped in table 1 in this article relate to institutional peculiarities of contemporary education system, in particular, of current interaction state between 'University' and 'State/Community'. This situation may alter only in case of institutional changes which, first and foremost, should begin from granting of real autonomy (not formal one which operates these days) as well as freedom to Universities.

Rethinking of the operation of the current National Agency on higher education quality assurance which represents the interests of 'State/Community' may also improve the situation.

A new formula of universities funding is another way of problem solution. The indicators according to which funding is allocated should provide the universities with the clear awareness of further course to enhance their status. In particular, until recently the indicator of actual number of students studied at budget cost has been the main determinant for university funding. It encouraged universities to simulate the activity lessening significantly a number of dropout students with poor academic performance. Nevertheless, some progress is being observed. For instance, since 2020 universities have been funded on a formula which assumes that universities with better activity results gain more funding compared with the previous year's budget. Formula for funding includes such indicators as the scope of the university, enrolment, regional ratio, position in international ratings, R&D budget invested to universities by businesses or foreign grants. We believe this list should be added with the indicator of graduates' employment, as it displays the quality of education services in full. Universities' beneficial taxation should have both supportive and incentive nature as well as promote its further development aimed at highly qualified staff assurance in relevant branches of economy.

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Quality Management in Education – A Comparative Analysis of School Improvement Practices from Luxembourg, Belgium And Croatia

Malgorzata DZIMINSKA

University of Lodz, Lodz, Poland
e-mail: malgorzata.dziminska@uni.lodz.pl

Abstract

The article presents a qualitative comparative review of school quality improvement practices from Luxembourg, Belgium and Croatia which are analysed against the key principles of the Total Quality Management: 1) management's commitment (leadership); 2) focus on the customer and the employee; 3) focus on facts; 4) continuous improvements; 5) everybody's participation. Interviews with school representatives provided insights which formed the basis for comparing the school quality improvement practices in the three countries and highlighting the key similarities and differences. The analysis contributes to the field of management by revealing strengths and the areas for improvement in the school practices and emphasizing the areas where lessons can be learnt and used to shorten the learning curve on quality improvement based on international experiences.

Keywords: TQM, quality, education, data-based decision making

Introduction

The implementation of the European Erasmus+ project entitled: "DATADRIVE: The Power of Data to Take Smart Decisions for School Improvement" created an opportunity to analyse school quality improvement practices that are currently in place in schools from Luxembourg, Croatia and the German-speaking community of Belgium. Total Quality Management (TQM) has been chosen as the framework to evaluate the practices of schools, because as the literature shows it can be perfectly suitable for educational context (Sallis, 2014). The study explores the school quality-improvement approaches in two schools from Luxembourg, Croatia and Belgium through a set of in-depth interviews with school representatives in order to gain insights on the school quality improvement practices and compare them between the countries.

The article is organized into a literature review section where the TQM methodology is presented with a special attention devoted to its applicability to the field of school education. Then, contextual information about the systems of education in Luxembourg, Croatia and the German-speaking community of Belgium is presented to provide insights on the level of formalization in respect to quality-related actions in schools. The methodology part of the study explains the chosen research approach in order to meet the study objective which was to gain insights on the school quality improvement practices and compare them between the countries. The discussion of results section presents the school quality improvement practices and critically discusses their performance. The TQM pyramid model encompassing key principles of the approach (leadership, focus on the customer and employee, focus on facts, continuous improvement and everybody's participation) formed the theoretical basis for the analysis and interpretation of school quality practices in schools. Finally, the conclusion section summarizes the strengths and the areas for improvement in the approach to quality enhancements in schools and emphasizes the areas where lessons can be learnt and used to shorten the learning curve related to school improvement based on international experiences.

Literature Review

Total Quality Management

Total Quality Management (TQM) has its roots in the contribution of W. Edwards Deming and J. M. Juran to successful transformation of industry through a disciplined management process focused on quality (Deming,

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2000). TQM is both a philosophy and a methodology (Sallis, 2014). It offers a strategic approach to running an organization following a number of principles which emphasize that the customers' needs define the quality standards. This aspect is highlighted in the definition by Corrigan: "TQM is a management philosophy that builds a customer-driven, learning organisation dedicated to total customer satisfaction through continuous improvement in the effectiveness and efficiency of the organisation and its processes" (1995, p. 61). The approach advocates that employees of all levels share the responsibility for quality improvement in an organization, including top managers whose commitment and engagement are vital for the success (De Jager and Nieuwenhuis, 2005).

TQM principles promote building a continuously learning organization where communication between management and employees, teamwork, providing a system of supports (i.e. trainings) encouraging employee participation and ownership of processes as well as long-term commitment to introducing quality improvements are considered of vital importance (Neves and Nakhai, 1993). However, implementation of the TQM approach is not easy, especially for traditional organizations where expenses and effectiveness are the core and they need to switch gear to focus on the customer satisfaction. Such a change calls for a refinement of strategies and going through a deep cultural change requiring redefinition of their values, behaviours and norms (Carson *et al.*, 2000; Ah-Teck and Starr, 2014). On the other hand, TQM has been proven not to be more difficult to implement than other transformational strategies adopted by organizations striving for success (Cândido and Santos, 2011), which makes it a challenging, but rewarding methodology to apply.

Total Quality Management in Education

Although TQM originated in manufacturing sector, there is a common agreement that TQM principles are equally relevant to educational institutions as to any other private or public enterprise (Deming, 2000; De Jager and Nieuwenhuis, 2005). The literature on TQM's application in services, in school education in particular, has been discussed by a number of authors (Logothetis, 1995; Stensaasen, 1995; Schargel, 1996; Winn and Green, 1998; Rampa, 2010; Soria-García and Martínez-Lorente, 2013; Sallis, 2014).

Sallis (2014) helps to understand the reasons why quality matters in education. He presented a list of four "quality imperatives" that drive the quality improvement efforts in schools. The moral imperative refers to the conviction that customers of the education service (students, parents and the community) deserve the best possible quality of education. Professional imperative stems from an internalized professionalism of an employee who is driven by commitment to delivering the highest possible standards both in the classroom practice or in the management of the institution. The competitive imperative draws attention to the fact that education sector is not an exception and it is subject to market rules, just like industry. Quality might be the only differentiator for an educational institution and thus quality might become its key competitive advantage (Powell, 1995). The final imperative refers to accountability which builds upon the expectations of the public that a school needs to demonstrate high standards. Given all the imperatives, care for quality improvement in schools is no longer an option, but a necessity.

The need for quality is evident, but the quality concept entails a big degree of ambiguity. The definition of quality that stems from the TQM principles encompasses many facets. It is defined as "conformance to requirement" (Crosby, 1979), "fitness for use" (Juran and Gryna, 1980), "a predictable degree of uniformity and dependability at low cost and suited to the market" (Deming, 1986), "continuous improvement in the effectiveness and efficiency of the organisation and its processes" (Corrigan, 1995). Juxtaposing these definitions with understanding of quality in education brings up the concepts of many facets of quality defined by Scheerens (2014) including productivity, effectiveness, efficiency, equity or responsiveness. From the perspective of productivity, quality is represented by successful attainment of the desired level of outputs (i.e. students' achievements on tests, graduation rates, level of students' wellbeing, employability levels)(Hampel, 2005; OECD, 2005, p. 14). School quality viewed in terms of effectiveness is focused on the instrumental value of input and process indicators to maximize output and quality as efficiency can be understood as effectiveness of education at the lowest possible costs. Quality seen from the perspective of responsiveness concerns the way input, processes and intended outcomes are fitted to the needs of the context. As Scheerens explains "where effectiveness and efficiency deal with the question of "doing things right", responsiveness may be seen to address the question of "doing the right things", such as choosing educational objectives that form responses to the demands of further education or the labour market" (Scheerens, 2013, p. 6). School quality seen through the lens of equity refers to a situation when personal, social or economic circumstances, such as gender, ethnic origin or family background do not hinder achieving educational potential (fairness) and all students, irrespective of their socio-economic status, reach at least a basic level of skills

(inclusion) (OECD, 2015). In TQM equity is more visible in the principle of involving everybody in the process of change. In summary, the presented definitions from management literature and education field prove their alignment exemplified by the multifaceted perception of quality.

TQM offers a disciplined approach to address the need of quality enhancement in schools. Dahlgaard et al. define TQM in education as "an educational culture characterized by increased customer satisfaction through continuous improvements, in which all employees and students actively participate" (1995, p. 445). Wiedmer and Harris denote it as "a system designed to review educational performance, issues, and practices while bringing groups of professional educators together to identify, analyse, and resolve educational concerns that impact the lifelong learner"(1997, p. 314). The cited definitions highlight the central role of customer needs which are satisfied through the teamwork of professionals that deal with the identified challenges following the continuous improvement approach. Based on the 14 points of TQM that were formulated by Deming (Walton, 1986) Dahlgaard et al. (1995) proposed a TQM pyramid which offers a framework of five major elements that condition quality improvement in education: (1) management' s commitment (leadership) (2) focus on the customer and the employee; (3) focus on facts; (4) continuous improvements; (5) everybody's participation (1995, p. 446).

Management' s commitment (leadership) forms the basis of the TQM pyramid because it is key to any educational institution. It has very significant effects on the quality of the organization's performance and pupil learning. "School leadership is second only to classroom teaching as an influence on pupil learning" (Leithwood, Harris and Hopkins, 2008, p. 28). Leadership serves as a catalyst for unleashing the potential capacities that exist in the organisation. Almost all successful educational leaders follow the proven leadership practices: building vision and setting directions, understanding and developing people, redesigning the organisation, and managing the teaching and learning programme (2008, p. 30).

Focus on the customer and the employee is embodied in TQM through its human-centeredness. It is the customers whose needs, expectations and satisfaction matter most and it is the teams of employees whose joint efforts, skills and commitment drive the quality improvement. Based on the work of Soria-García and Martínez-Lorente (2013) as well as Kanji and Tambi (1999) for higher education, similar typology of customers divided into internal and external can be presented for school education. Internal customers comprise of employees: primary (faculty staff) and secondary groups (administrative services). External customers are divided into external primary (students) and external secondary parties (parents, organizational partners, etc.). They highlighted also that all the employees need to be motivated, engaged and empowered in order to follow the quality-oriented improvements.

TQM pyramid emphasises focus on facts which is operationalized by making decisions based on data (Mukhopadhyay, 2005). In a school setting data-based decision making (DBDM) can be defined as the use of data to improve education (Schildkamp and Kuiper, 2010). Using data as foundational for decision-making is advocated at each stage of the quality improvement cycle of plan-do-check-act (Deming, 2000). Reliable information plays a key role in the school quality improvement process including: goal setting, planning the actions, their implementation, evaluation and assessment whether the goals have been reached and if the improvement actions have led to the expected outcomes (Marsh, Pane and Hamilton, 2006; Mandinach *et al.*, 2008; Schildkamp, 2011; Schildkamp and Poortman, 2015). Obtaining and acting upon feedback on the needs, expectations and satisfaction of stakeholders over time is considered to be a major asset of TQM approach (Deming, 2000; Sallis, 2014).

According to Deming, continuous improvement requires continuous learning. He, therefore, produced another version of the improvement cycle (the Deming cycle: from plan-do-check-act) and named its stages as follows: plan-do-study/learn-act. Continuous improvement requires patience (Madsen and Carlsson, 1995). The process is time-consuming and the effects of changes implemented in a school setting are seen only from perspective. In a business setting companies that kept their TQM initiatives over the years had more time to see benefits stemming benefits from it. According to the findings of Powell (1995), time since adoption of TQM contributed to a greater satisfaction with its implementation. This shows that implementation of the TQM principles requires time and patience. Therefore, implementation of TQM is a long-term commitment.

In TQM approach everybody's participation is seen as a key condition for the quality improvement process. In order to support the employees and win their buy-in the necessary package of information needs to be provided. Dahlgaard et al. advocated proper training which should involve the practice of continuous improvement cycle including such elements as: identification of a problem, definition of its cause(s), planning and implementing

actions to prevent failures and constant reviewing of results in terms of the customers' needs and their satisfaction level (1995, pp. 454–455). Involving in the quality improvement actions all the stakeholders of the educational process can result in teamwork attitude between internal and external customers (Winn and Green, 1998).

School quality context in Luxembourg, Croatia and the German-speaking community of Belgium

Luxembourg

With the amended law of 2 February 2009 on the re-organization of primary education, the notion of school quality development was formally introduced to the elementary schools. The school committees were required to draw up a 3-year school development plan "*plan de réussite scolaire*" (PRS). In secondary schools, school development teams were set up, but the law did not oblige them to draw up the plans. Since 2017, the experiences and feedback from the implementation of the PRS was taken on board. The concept has now been adapted to "plan de développement scolaire" (PDS) for both elementary and secondary schools. On 7th February 2018, the National Observatory of School Quality was created with the mission to bring an objective view of the quality of the school system.

Croatia

Law on Education (2008) in article 88 introduced external evaluation and self-evaluation of school institutions. The Strategy for Education, Science and Technology defined the overall objective for education as to ensure quality education with equal opportunities for every child. The Strategy promotes the following principles: decision-making based on data analysis; efficiency of the system; logical sequence of the introduction of changes; systematic monitoring and evaluation of the results of the measures implemented. It states that quality assurance in education includes both internal quality assurance of institutions (based on self-evaluation) and external quality assurance (based on prescribed standards and criteria and is carried out by an authorised agency that is itself subject to external evaluation).

The German-speaking community of Belgium

Pursuant to Article 20 of the Basic Decree of 31 August 1998, the schools are obliged to carry out systematic school improvement work. Since 2009 all schools in the German-speaking Community of Belgium are externally evaluated every 5 years. The quality framework from the state of North Rhine-Westphalia in Germany – the Orientierungsrahmen Schulqualität (ORS) is used for school evaluation. School development project is the key means of introducing changes in a school. The project involves naming the vision and strengths of a school, developing goals, planning and implementing actions and adopting measures to evaluate the goals achievement.

Methods

The study is guided by the research question of what are the quality-improvement practices in schools from Luxembourg, Croatia and the German-speaking community of Belgium and how they compare across the countries. In order to answer this question, a cross-sectional descriptive and explanatory research was conducted. The study employed interviews as the method of data collection. The interviews were held with 16 school teachers and 6 principals representing elementary schools in each of the three focus countries in order to provide information from the perspective of school community members. The reliability of the study was assured by using a systematized approach to data collection that was consistent with the research question. The internal validity of the study was fostered by disclosing patterns, similarities and differences between the focus countries' data gathered within the study. External validity of the study was limited due to the small non-probability sampling used for the interviews, however, it was strengthened by offering not only case-specific descriptions, but also cross-case analyses coming from literature review on the legal context for quality improvements.

Discussion of Results

Management' s commitment (leadership)

In all the schools the role of a principal was highlighted especially in the area of developing and approving the improvement goals for the school. The decision is usually based on input from the teachers (CRO) or results from the external evaluation (BE). In case of Luxembourg the school president based the decisions on the opinion of a

"school development specialist". Additional input for the decision on what the school should improve comes from such sources as: evaluations (both: external and internal), teachers, students and parents' councils. It has been emphasized across all schools that the leader empowers the school teachers in the process of decision-making. For example, the improvement areas are chosen democratically by the school teams and only then they are verified and approved by the principal (BE, LUX, CRO) and councils or the founder (the city) (CRO).

Focus on the customer and the employee

Although all schools declare that they take into account the voice of students (external primary customers) in their improvement processes it seems that in case of Croatia the input from the students on what interests them and what should be introduced to the curriculum is given much more focused attention than in two other countries. The obligation to do that has been introduced to the new curriculum. In case of Belgium and Luxembourg this knowledge is gained through rather ad hoc conversations with students and parents. In order to better understand the students' needs a diagnosis of their strengths and weaknesses is taking place at various levels and is done by the teachers mainly. In case of Luxembourg and Belgium there is a wider availability of standardized tests to do that than in case of Croatia where teachers and principals report the lack of sufficient professional diagnostic tools and highlight the urgent need for reliable tests especially for gifted students.

All school representatives underline the importance of collaboration with parents. Parents become "colleagues" or "partners", because some of them work so much with their kids at home that they become professionals and offer extremely valid points in discussions over the child's learning (BE). Parents are offered a lot of opportunities to support their kids (materials are posted on the online platform, e-journals have been introduced), but the level of their involvement differs. According to Croatian teachers "it could be much higher". All schools declared inviting parents to various initiatives organized at schools, so that they create bonds with teachers and feel as an integral part of the school ecosystem.

The focus on customer satisfaction is reflected also in the emphasis on well-being of students visible in each of the countries as an important output of educational process. In all countries: good atmosphere in school, good collaboration, satisfaction, motivation, enthusiasm of teachers and good school climate are seem as important factors that contribute to students' wellbeing. The declarations of interviewees from all countries put emphasis on the importance of all the school stakeholders' satisfaction: "(…) basically it's all about good communication and relationships between those that make the school: parents, teachers, students, administrative and technical staff" (CRO). "A good school is the one where both children and teachers like to go (LUX)" and "(…) the staff is valued and personnel is also promoted by the school management (BE)".

Focus on facts

Measurement of school quality is conducted by means of satisfaction surveys (CRO, BE) and various achievement tests (CRO, BE, LUX). In Croatia peer observation and school principal observations are additionally mentioned. The results of the quality measurements are then analysed by: school development specialists (support teachers) (LUX), principals and school teams' members (CRO, BE). The conclusions are used: for discussion during the yearly teachers' reviews (CRO), to improve teaching for better results, to group teachers for learning from/with each other and solving problems (BE), for planning integration activities if the atmosphere is not proper (LUX). The interpretation of assessment data poses however some challenges: "we have just standardized tests, which allow for a national comparison. But on the other hand, it is quite difficult, considering the socio-economic environment that we have, to compare us with others. And we can have from one year to another improvements in areas that we did not expect and which we cannot really explain. So, it's very complicated to see or understand if there is any improvement or not" (LUX). There are also voices which advocate more data use and more suitable tools to measure the improvement: "What we would need is to have some kind of indicators that we could understand and that we could use to put more focus on certain elements, now this is not the case" (LUX).

Continuous Improvements

In all schools there is a common understanding that the development of school quality is a continuous process, "work that never stops" and that there is always area for improvement. In Belgium one of the principals adds though: "there is a question at what cost". The most structured approach to goals' monitoring is in Belgium, as there is a process for monitoring indicators of success and their assessment according to the progress. Based on that the goals are verified and re-examined. In Croatia, the interviewees stated that there are no systematic measures in this respect. If the goals have been achieved "simply shows in the results, students' success in contests or in the collaboration with parents". In Luxembourg "pressure to succeed does not exist" – teachers are asked to report if the goals were achieved, but if not, they are to be moved to the next year, verified or dropped. Looking at the accountability of schools it seems that Luxembourgish schools do not experience pressures related to it. They are given autonomy with little accountability which assumes teachers' professionalism and individual responsibility for what they do and the results they achieve. However, as the teachers and school presidents report "there is no pressure to achieve goals". In case of Croatia the accountability is under development with the new legislation related to evaluation system and the new curricula. Accountability in Belgium is already established. The solutions like external evaluation held every 5 years is already in place, however it is not regarded only as a pressure, but also as a support measure which the schools use to verify the areas for improvement.

Everybody's Participation

All schools' representatives emphasise the importance of active involvement of all the stakeholders of educational process (internal – employees and external customers – students and parents). In case of employees (teachers and other school staff) the cooperation mechanisms are facilitated by the organization of various meetings, achievement of common goals or working on joint projects. In Luxembourg, teachers declare that they stay connected not only during their work at school but also afterwards, in Croatia the collaboration becomes evident especially during organization of competitions or managing some school projects. In Belgium and in Luxembourg lack of hierarchy is highlighted as the preferred feature of collaboration. In each school there are teams that work on quality, sometimes called "school development" (LUX). Discussing quality and deciding about improvement actions takes place at the meetings. They are organized in each school and take the forms of individual or group meetings, i.e.: subject team's meetings, plenary meetings, cycle meetings, quality team meetings, reflective meetings with the principals, etc. No specific details about the way the meetings are prepared, structured or run have been shared. However, they are reported as key measures taken to support communication, decision-making and management in schools. This aspect requires further studies, because if the meetings are used as a key mechanism for decision-making, i.e. also school quality improvement, it would be advisable to investigate in more details how the meetings' structure, agendas, protocols contribute to the quality enhancements.

Conclusions

The results show that in each of the schools there is a mind-set necessary for quality improvement. Teachers and principals understand that the process of quality enhancement is a long-term commitment and that it requires a joint effort of all the stakeholders, therefore they willingly involve parents to co-create their school environment. They understand the need for taking into account the voice of internal and external customers, but in practice it shows that only Croatian schools have a systematic approach to this. The results clearly show also that there is a common understanding that team work, communication and collaboration are key in implementing the quality changes, however some of the solutions like meetings are often organized in abundance and ineffectively (LUX, BE, CRO). The use of data for decision making is reported, but the comments on the lack of more meaningful and actionable data is highlighted. The practices of data use require also more systemic approach and data literacy competences to be developed (LUX, BE, CRO).

All in all, the consent for quality enhancement is present in all the schools under study. Understanding of the importance of continuous improvement, appreciation for collaboration, focus on results, satisfaction and well-being of school customers are clearly articulated. What seems like the area for improvement is the better implementation of actions combating the already recognized challenges. Therefore, the individual teacher's sense of agency, readiness to adjust one's practices and commitment to implement a change comes to the forefront. Diligence in

plans implementation and monitoring, better use of data to inform decisions coupled with a system of supports and resources should offer the proper conditions for further successful total quality improvements.

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Assessment of Current Russian Practices in Urban Development Strategies Elaboration

Anastasiya CHICHERINA

Voronezh State University, Voronezh, 394006, Russia
e-mail: phuksia@gmail.com

Igor RISIN

Voronezh State University, Voronezh, 394006, Russia
e-mail: risin@mail.ru

Abstract

Since 2007, more than half of the world's population has lived in urban areas and it is estimated that the proportion will exceed 68 per cent by 2050. Cities are faced many challenges related to environmental degradation, globalization, inequalities, social segregation etc. Urban strategy is increasing in importance as a tool that guide the city development. The objective of this research is to produce an assessment of the current Russian practices of urban socioeconomic development strategies preparation and elaboration. This research will suggest results of the content analysis of the municipal strategies elaborated in compliance with the requirements of Federal Law No. 172 "On strategic planning in the Russian Federation" and comparative review of methodological approaches to addressing the key tasks of strategic planning. These challenges are related to measuring the achievement of previously set goals, determining the competitive advantages of the city, substantiating the strategic goals for urban development and identifying core strategic indicators. The empirical basis is formed by the official strategies of the following cities: Voronezh, Kazan, Kaliningrad, Magnitogorsk, Penza, Rostov-on-Don, Tver, Tolyatti and Ulan-Ude. The research identified widespread deficiencies in urban strategic planning and diagnosed the main causes of their occurrence and persistence.

Keywords: urban development strategy, key tasks and approaches of strategic planning.

Introduction

The elaboration and implementation of the current strategies for social and economic development of the constituent entities of the Russian Federation and the municipal formations have led to increased interest, on the part of researchers, in studying modern practices in strategy-focused public planning.

It should be especially noted that the current urban socioeconomic development strategies (hereinafter – "the Strategies") differ from the previously-defined strategies not only in regard to lifespan, but also in the content comprising the results in the handling of not only traditional, but also emerging challenges. The formulation of the latter has necessitated the elaboration of approaches to addressing these challenges.

The analysis of such approaches taken by the designers of the Strategies will allow us to make an assessment of the current practices in the municipal strategic planning.

Research Method

To produce a reasonable assessment of the practices employed to create urban strategies, the author's methodological approach providing for the following measures have been proposed and realized:

a) concerning the objects of analysis, the cities with different proportions (population size), representing different federal districts and constituent entities of the Russian Federation are to be selected;

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b) the urban socioeconomic development strategies elaborated for the period up to 2030 (or 2035) in compliance with the requirements of Federal Law No. 172-FZ are to be included in the information base for the analysis;

c) the approaches to addressing the key tasks related to elaboration of the Strategies are to be identified;

d) the content analysis of the Strategies supplemented with the comparative review of the identified approaches and the results obtained when using these approaches is to be applied.

The information base for the analysis features the current strategies for the urban development of Voronezh, Kazan, Kaliningrad, Magnitogorsk, Penza, Rostov-on-Don, Tver, Tolyatti and Ulan-Ude.

The Results and Assessment

The content analysis of the Strategies has made it possible for us to identify the methodological approaches to address the key tasks arising when elaborating these Strategies. The comparative review has allowed us to reveal their distinctive characteristics. Let us systematize the obtained results.

Assessing the success of the previously-defined objectives.

Two basic approaches to solving this task have been identified.

The first approach that has been realized as part of the majority (70% of the total number) of the municipal practices (the urban districts of Kazan, Rostov-on-Don, Kaliningrad, Tolyatti, Penza, Ulan-Ude and Tver) implies the characterization of the attained level of the urban development. This characterization is performed by an economic and statistical analysis of changes in the values of a series of significant socio-economic indicators, the master list of which has included: population size, the aggregate volume of delivered goods, works, services and average monthly salary.

Therein, the number of indicators varies from 20 (Penza) to 127 (Tver). In addition, the periods of time, during which their dynamics has been analyzed, differ substantially. Thus, the strategists of Penza highlight the changes that have occurred over the past year, while the strategists of Rostov-on-Don consider the changes that have happened over the past five years.

In some cases, the strategists make comparisons between the attained level of the urban development and the state of other cities that belong to one federal district (this is the case with Rostov-on-Don and Penza Development Strategies), or the national average values of the analyzed indicators (Tver Development Strategy). Such actions taken by the strategists are certainly productive. The other issue is that they characterize only isolated practices.

Let us bring our attention to the basic deficiency of the described approach - while being oriented towards identification of the dynamics of changes occurring in the urban socio-economic system. It leaves out the assessment of correspondence between the planned trajectory (specified in the acting strategy) and the actual trajectory of their development.

The second approach has been employed by the strategists of Voronezh, Magnitogorsk and Novosibirsk. It has initially been focused on assessing success of the previously-defined targets by the juxtaposition of the planned and the actual values of the socioeconomic indicators. Moreover, the strategists of Voronezh and Novosibirsk have supplemented the results of the assessment with an analysis of the reasons for deviations from the planned indicator values.

It seems obvious that the second approach corresponds to the essence of the task.

Defining the city's relative competitive advantages

Two basic approaches to addressing this task have been identified.

The first approach is based on the associating of the competitive advantages with the strengths of the urban socio-economic system. The strategists of Kazan, Rostov-on-Don, Penza, Tver and Magnitogorsk have identified the city's strengths with a SWOT-analysis and have listed them as the competitive advantages.

The second approach has been implemented in the Voronezh socioeconomic development Strategy. It identified the city's competitive advantages by selecting them from among city's strengths, taking into account the predicted opportunities and threats that may arise in the external environment.

Substantiating the objective function of the city including its mission, strategic goals, tasks and priorities

Three main approaches identified by the strategists have been singled out.

The first approach provides for determination of the above components of the objective function without emphasis on the meaningful connections between them. The example of Rostov-on-Don socioeconomic development Strategy is the epitome of this approach. The priorities, the city brands, the goals, the tasks and the strategic project initiatives are advanced put forward unsystematically, without any connections between them. The same fragmented approach to the objective function components is also inherent in the Penza socioeconomic development Strategy.

This approach is contrary to the systemic principle. Nevertheless, it should be followed in order to maintain the necessary subordination of the objective function components: mission – strategic goals, mission – priorities, strategic goals at different levels, and strategic goals – tasks).

The second approach has been taken by the strategists of Novosibirsk, Kazan and Tver. It involves an interconnected rationale for the first-order strategic goal, priorities, second-order goals, tasks and particular ways of action. However, in this case, it cannot qualify for systematicity because it lacks the mission, which does not allow for the capture of its unique characteristics and intentions for different stakeholder groups and the external environment.

The third approach has been used by the strategists of Voronezh, Magnitogorsk, Tolyatti and Ulan-Ude. It implies a consistent interrelated substantiation of the mission, the overall objective, first-order strategic goals, priorities, second-order strategic goals and tasks of urban socio-economic development.

Identifying the indicators of strategic goals achievement

There are three identified basic approaches to addressing this task. Before presenting their characteristics, let us consider the table 1. By analyzing the information presented in the table, it is possible to characterize the approaches implemented by strategists for composing the set of urban socio-economic development indicators.

The first approach taken by the strategists of Kaliningrad, Tolyatti and Penza implies that only the quantitative indicators provided by the Federal State Statistics Service of the Russian Federation should be used. In this case their values are presented either by stages of the Strategy implementation (Kaliningrad, Tolyatti), or at the end of its validity period (Penza).

In our opinion, this approach, on the one hand, eliminates the possibility of annual operational monitoring of the process and the results achieved in the urban development. On the other hand, and, it leaves out of the field of assessment the qualitative changes taking place in their socio-economic system, which are not reflected in the official statistics.

The second approach, which was employed by the strategists of Novosibirsk, Rostov-on-Don and Ulan-Ude, involves the use of quantitative and qualitative indicators. Its major drawback, as in the previous case, is the lack of values of indicators for each year of the Strategy implementation.

Table 1: Indicators of the results achieved in the urban socio-economic development

Cities	Characteristics of urban socio-economic development indicators
Voronezh	Quantitative indicators that have been listed: – for each year of the Strategy implementation; – within each scenario of the urban socio-economic development; – for the entire range of the strategic goals. The qualitative indicators of the expected results achieved in the implementation of the strategy for each of the third-level strategic goals have been clarified.
Kazan	Quantitative indicators that have been listed: – for each year of the Strategy implementation; – within the accepted scenario of urban-economic development; – for the entire range of the strategic goals. The qualitative indicators have been clarified in terms of the strategic priorities.
Kaliningrad	Quantitative indicators that have been listed: – for each stage of the Strategy implementation; – within the accepted scenario of urban socio-economic development; – for the selective list of the strategic goals. Qualitative indicators are not available.
Magnitogorsk	Quantitative indicators that have been listed: – for each year of the Strategy implementation; – within the accepted scenario of urban socio-economic development; –for the entire range of the strategic goals. The qualitative indicators have been clarified for the selective list of the strategic goals.
Novosibirsk	Quantitative indicators that have been listed: – for each stage of the Strategy implementation; – within the accepted scenario of urban socio-economic development; – for the selective list of the strategic goals. Qualitative indicators have been used to characterize the vision of the future.
Penza	Quantitative indicators that have been listed: – as of the end of the Strategy implementation period; – within the accepted scenario of urban socio-economic development; – for the selective list of the strategic goals. Qualitative indicators are not available.
Rostov-on-Don	Quantitative indicators that have been listed: – for each stage of the Strategy implementation; – within each scenario of urban socio-economic development; – for the entire range of the strategic goals. Qualitative indicators have been specified for all strategic project initiatives.
Tver	Quantitative indicators that have been listed: – for each year of the Strategy implementation; – within the accepted scenario of urban socio-economic development; – for the entire range of the strategic goals. Qualitative indicators have been specified for each third-level strategic goal.
Tolyatti	Quantitative indicators that have been listed: – for each stage of the Strategy implementation; – within each scenario of urban socio-economic development; – for the entire range of the strategic goals. Qualitative indicators are not available.
Ulan-Ude	Quantitative indicators that have been listed: – for each stage of the Strategy implementation; – in the framework of each scenario of the socio-economic development of the urban district's level – for the entire range of the strategic goals Qualitative indicators have been specified for each third-level strategic goal.

The third approach is realized by the strategists of Voronezh, Kazan, Magnitogorsk and Tver. It is notable for applying quantitative and qualitative indicators in their entirety, using the indicators for the whole range of strategic goals and defining the indicator values for each year of the Strategy implementation.
It seems obvious that the third approach can ensure the formation of a full-fledged monitoring of the results reached in the urban socio-economic development in the process of the Strategy implementing.

The performed analysis of the current practices of creating the urban socioeconomic strategy allows us to identify its inherent deficiencies. Among the deficiencies identified are the following:

– low level of diversity in the methods and tools used to achieve the strategic goals;

– the absence of clear, unambiguously-interpretable requirements that determine the required level of quality of the results obtained in solving the key tasks of creating the Strategy;

–the unsystematic nature of the planning process manifested in the weaknesses of consistency among the main substantive components of the Strategy (i.e. weakness of consistency between the mission and strategic goals, strategic objectives and tasks, strategic goals and the indicators of achievement).

The main causes explaining these deficiencies are:

– the absence of methodological recommendations outlining the composition and the substance of the invariant characteristics (that are independent of institutional, economic and other aspects) of the Strategy;

– shortage of well-trained personnel with the competences required for professional solutions of the key tasks related to elaboration of the Strategies;

– underdevelopment of the municipal statistics that narrows the information base for analysis of (i) the determination of the current state of the cities, (ii) the assessment the urban potential, (iii) the identification of their relative (in comparison with other cities) competitive advantages.

To overcome the aforementioned deficiencies, it would be reasonable to introduce a benchmarking assessment that is focused on selecting the best practices in strategic planning. The empirical data describing the positive foreign experience in elaboration of Urban Strategies for local communities can be an important component of the information base for its application.

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Restructuring of A Municipal Company

Krzysztof WASOWICZ

Department of Finance for Sustainable Development
Cracow University of Economics, Cracow, Poland
E-mail address: wasowick@uek.krakow.pl

Abstract

This elaboration is to present the management process (restructuring) of a municipal collective transport company in a crisis situation. The theoretical purpose of this article is to depict the key issues regarding restructuring of municipal local collective transport companies. As the methodical goal, presentation of the restructuring process in a public transport company has been deemed. The empirical analysis of the restructuring process based on a specific company was replaced with an original decision-making game that formulated exemplary goals in individual areas of functioning of the enterprise. To enrich the cognitive value, the article includes many diagrams.

Keywords: municipal enterprise, restructuring, municipal collective transport company

Introduction

The environment that companies operate in forces them to quickly address upcoming changes. Every contemporary manager should, on a regular basis, elaborate a transformation plan within the company based on an analysis of the current situation and knowledge of the entity. Changes of radical character, so-called restructuring, are of particular importance. Restructuring is a process that is very strongly connected with the nature of operations of a particular company. Thus, it always requires an individual approach depending on the character of operations, identified problems, as well as circumstances the company operates in. This elaboration is to present the management process (restructuring) of a municipal collective transport company in a crisis situation.

The theoretical purpose of this article is to depict the key issues regarding restructuring of municipal local collective transport companies. As the methodical goal, presentation of the restructuring process in a public transport company has been deemed. The described decision-making game, which reflects addressing the key management problems related to the restructuring process of a collective transport company, is of application character.

Prerequisites of changes and the specific nature of restructuring in a municipal local collective transport company

The proper functioning of every company, also including a municipal transport company, requires appropriate organization and efficient management. Preservation of financial balance, described by a situation in which an entity has the capacity to settle its payments on a timely manner and, at the same time, comply with the principle of rational actions, is the key measure of correct functioning of a business entity. The said rule is universal and superior to detailed goals specified, e.g. by the owner of the entity with regard to maximization of profits, work efficiency, etc. It is of particular importance when it comes to modern economy with a dynamic environment. The changing management conditions force the company to make difficult decisions while managers need fast solutions for diversified and urgent economic problems. There are many techniques that facilitate the decision-making process, yet the majority of tools and methods used today is of financial nature, which indicates that efficient management of a modern company is allowed by economic optimization. The measurement generally adopted by lending institutions or analyzing the reliability in order to assess the condition of companies, with regard to, e.g. the rate of return on invested capital or the capability to generate profit, etc., must undergo special transformations for the purpose of municipal companies that implement tasks from the group of public utilities. Among such companies, a particular role is served by public transport companies in the case of which the commercial approach is often contrary to the tasks imposed on them. Thus, from the practical point of view, financial management of a municipal company

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rendering public transport services involves adhering to the principle of financial balance, which is expressed through (Wąsowicz, 2018, p. 67):

- efficient management, i.e. the ability of economical use of production factors available at disposal of a business entity,
- profitability, i.e. the expression of acceptance of products (services of a particular business entity by its environment.

The economic conditions of company operations (including a municipal company providing public transport services) shaped by external and internal factors have been presented in Figure 1.

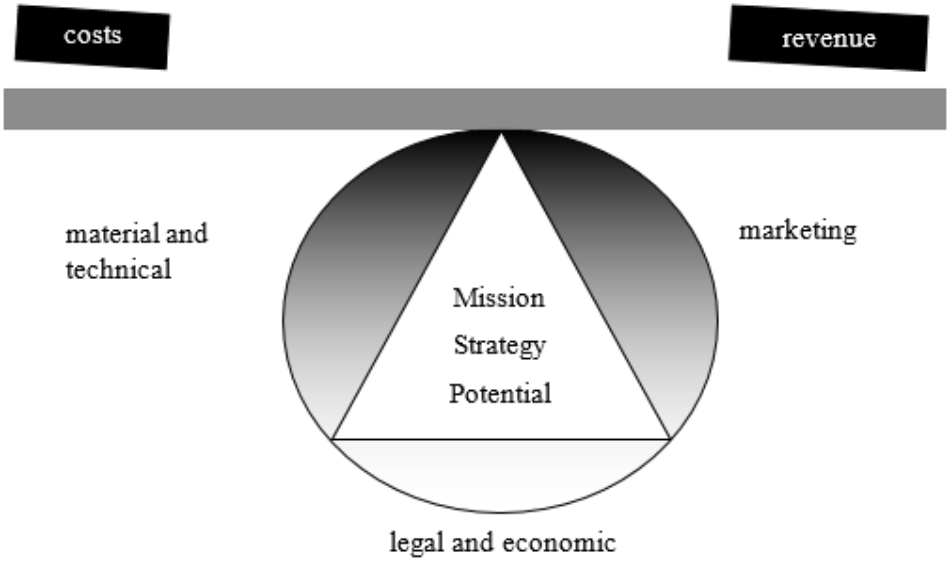

Fig. 1: Forming of economic conditions regarding the operations of a company
Source: Own analysis

The environment supplies the company and, additionally, serves as the recipient of results of the company's activities. Thus, the company is an observer and, simultaneously, a participant of changes in the environment while the said environment, which influences all processes of the company, prevents it from avoiding internal transformations in order to adjust its attitude with regard to the changing conditions. Uncertainty of the environment forces companies to quickly address the upcoming changes. The lack of fast and efficient solutions to problems emerging due to non-compliance of companies to external circumstances, as well as neglecting the needs for timely changes may lead to loss of profitability, serious crises posing a threat to continuance and effective functioning of the company, or even its bankruptcy Taking Diagram 1 into consideration, there might be a major overbalance of costs over revenue. In such a situation, radical changes (considered as the company restructuring) must be implemented to ensure proper functioning of the undertaking.

The definition of restructuring - as it has been highlighted in previous chapters - is formulated in various ways in literature treating on the issue and it depends on the context that the process is conducted in (Table 1). In most definitions, the common denominator is the view of restructuring as a change taking place within various areas of a company.

Table 1: Definitions of restructuring according to selected authors

Author	Definition
I. Durlik	"Restructuring is most often defined as systemic reconstruction, modernization and upgrade or adjustment to the contemporary level of technology and development within the scope of organizational and managerial concepts of structures in an undertaking, company, or institution. In Poland, however, restructuring is associated with privatization and macroeconomic changes"
A. Nalepka	"Restructuring stands for thoughtful reorientation of goals (objectives) of a company according to current or expected future changes in the environment and for related adjustments with regard to technology, organization, economics, and personnel"
B. Pełka	"Company restructuring means systemic changes in a company with regard to methods, technology, organization forms of production, management system, economics and the market, and the organizational and legal status of such a company"
A.Stabryła	"Restructuring constitutes diagnostic and design procedures conducted in order to improve the management system and the exploitation system of a company, whereby the changes, above all, regard transformation of the organizational form, decision-making systems, management, and human resources"

Source: Own analysis based on: (Garstka, 2006, p. 19)

Company restructuring is a complex process that involves specific actions and resources. Two main stages can be distinguished: the preparatory stage that covers analytical works and the implementation stage of the restructuring process. The individual elements of company restructuring have been presented in Figure 2.

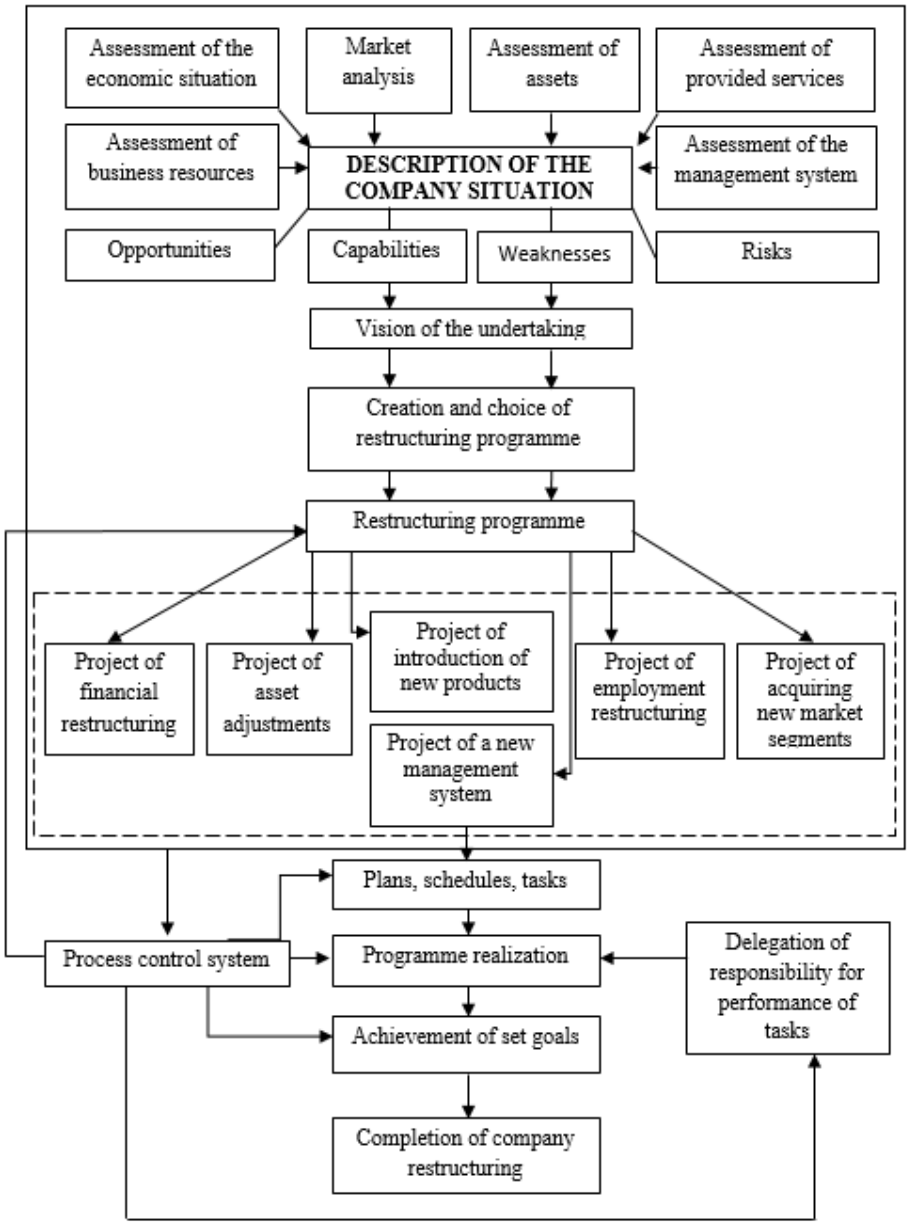

Fig. 2: The process of company restructuring

Source: Own analysis based on: (Nowak, Zarzecki, at el. 2012)

Solutions for key management issues in a collective transport company through an experimental decision-making game

In order to fully demonstrate the core element of functioning of a local collective transport company, one needs to determine the areas of external interactions of the economic environment with such a company. One of the said interactions is the evolution of the population's commuting habits. Cars, as the hallmark of social status, a synonym for luxury, are becoming more and more commonly available. This phenomenon, with significant underlying psychological aspects, results in a constant increase of the automotive ratio (number of individual vehicles per 1000 persons). The tendency is practically imminent until complete saturation, which is determined by the wealth of the population. The growing absolute wealth level of entities (households) contributes to greater qualitative requirements

as part of notified transportation demands. The increase in qualitative requirements forces the operators to adjust their offer to the market situation, with a justified increase of the unit cost per single user. Along with the process of qualitative changes, the raised level of environmental solutions shall also be expedient. The economization of any signs of people's social activity should be considered as another area of influence of economic factors on a city transport company. It is the most important aspect since it extends onto any other area. Unless a local self-government unit is subordinated to economic calculation, it is impossible to determine its social and economic aspects of life. It is the natural consequence of functioning of a collective transport company that constitutes a component of market economy. The said calculation is mainly governed by the adopted model of organization of public transport, which implies the manner and rules with regard to financing of the municipal operator's activity. Financing of transport involves terms such as fare, surcharges, and payment for public transport services. Thanks to efficient management of the company transport policy, it is possible to reach a level at which the proceeds will fully cover the running (operating) costs. The problem of balanced short-term payments, distinguished between individual assets, is determined by the internal limitation of effectiveness of a public transport company and its capacity to minimize fixed costs. Among distinguished areas of influence that define the economic determinants of functioning of a public transport company, Figure 3 depicts two examples of management-related issues that a local collective transport company must face.

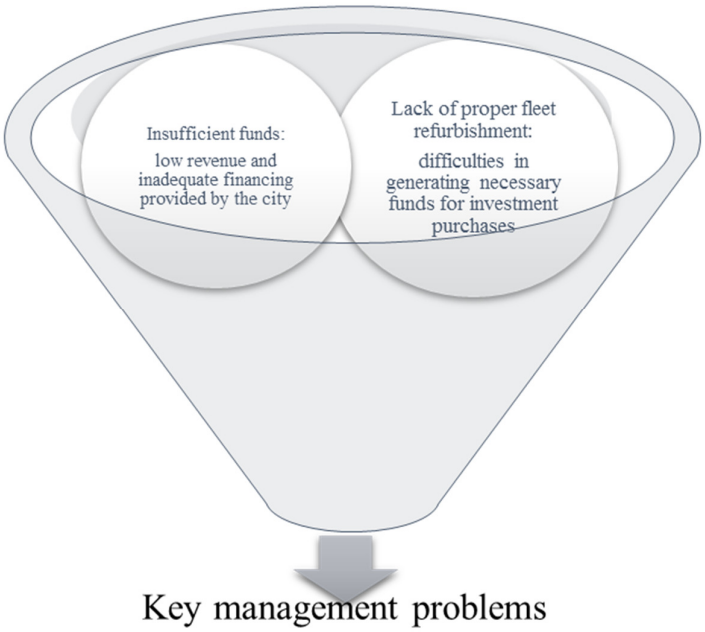

Fig. 3: General issues regarding management of a local collective transport company
Source: Own analysis.

Company management refers to structural matters (operations method, ongoing processes), general processes (technology), employment (remuneration, collective agreement), investments (purchases, renovations), etc. There is no such thing as the *only right* method and tool of action. There are well-recognized and proven methods and standards that can be adjusted depending on the type of occurring problems. In this elaboration, in order to confront the existing problems with their solutions, the course of an original decision-making game has been described. The game involved several dozens of people who were divided into groups and assigned roles reflecting those in a public transport company (management board/directors, passengers, owner, employees). Each group was given 2 sets of decision cards. The first set of cards was marked as A. In its case, it was assumed that the flows of funds to the company were significantly limited. Tasks to be undertaken were listed in Table 2 and they were to be assigned with points reflecting the importance of the undertaking.

Table 2: Types of restructuring tasks in Situation A

Action taken	Action significance expressed in points	Areas of company operations
Limitation of transport works		Exploitation
Reshaping of the fare		Exploitation
Utilization of a credit		Financial
Reduction in employment		Personal
Limitation of investments to a necessary minimum		Financial
Change of the course of processes in the company to improve effectiveness		Organizational
Limitation and outsourcing of the technical infrastructure		Technical
Renegotiation of the Collective Work Agreement		Personal
Development of auxiliary activity, e.g. commercial transport, in order to gain additional inflows		Technical
Change in the organizational structure in order to improve system effectiveness		Organizational

Source: own analysis.

The second set of cards was marked as B and it was assumed that public transport services are provided at a technical level unacceptable for the passengers. Table 3 has presented the undertakings that must be implemented.

Table 3: Types of restructuring tasks in Situation B

Action taken	Action significance expressed in points	Areas of company operations
Elimination of a connection assigned with an old fleet		Technical
Fleet credit purchase		Financial
Decrease employment and release funds to purchase a fleet		Personal
Change in the handling method of the transport service (third-party driver, third-party operator)		Exploitation
Change in the management structure to increase system efficiency		Organizational
Purchase of a fleet along with servicing (vehicle charter)		Organizational
Application for increase in financing from the fare or directly from the City/Commune		Financial
Reduction of remunerations in order to acquire funds for investments		Personal
Development of additional transport operations		Exploitation
Increased range of renovations		Technical

Source: own analysis.

In the decision-making game, representatives of individual groups assign points to respective solutions listed in column 1 in the column titled *action significance expressed in points*. In total, they have 18 to 25 points at their disposal (for 10 distinguished actions as part of one problem). If the representatives find an individual solution to be necessary from the perspective of a particular problem, they can assign a maximum of 5 points to it. If, however, they consider a particular action to be completely irrelevant or unfavorable for them, they may assign 0 points to such an

action. In this game, it is very important that the decisions should be made not only from the perspective of its significance for the company, but also for all groups of interest represented by individual participants. In economic practice, specific interests of employees, the owner, the management board or the passengers of a collective transport company may vary. For instance, on very rare occasions would employees of an entity agree to a pay cut or employment reduction despite its poor financial situation. In the third column of Table 2 and 3, each of the proposed problem-solving methods was assigned to one of five general functioning areas of a municipal local collective transport company. Figure 4 has depicted the basic areas of a municipal company, distinguishing the following: organizational, personal, technical, exploitation, and financial area.

Introduction of crucial changes in the said areas can be deemed as restructuring. Restructuring refers to the equity, capital, employment, as well as to organization or the ownership structure. Restructuring allows improvement of financial results generated by the company and, at the same time, it identifies and eliminates any bottle necks that hinder its effective functioning.

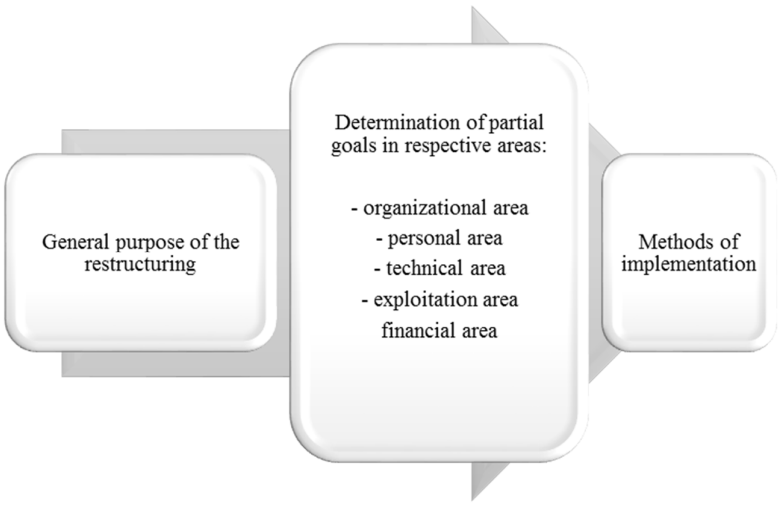

Fig 4.: Basic areas in a municipal company

Source: Own analysis.

Over forty students of the Cracow University of Economics participated in an experiment held in May 2017. The outcome of the analysis of decision-related results, performed by collection of decision cards that were counted and classified, have been presented in Figure 5, 6, 7 and 8.

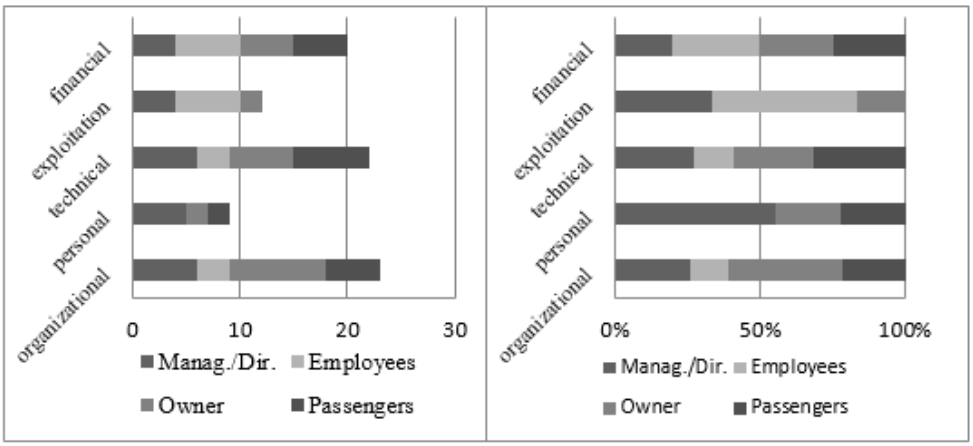

Fig. 5: Results of the decision-making game with regard to Problem A (lack of financial funds)

Source: Own analysis

The analysis of results of the decision-making game regarding a significant limitation of funds received by the company indicates that the distinguished groups (i.e. management board, owner, passengers) mainly undertook actions in three areas (organizational, technical, and financial). Undertakings in the personal area proved to be the least active, which results from obvious facts: the employees' and the public owner's reluctance towards changes and little interest of passengers in this area. In this area as well, determined actions were taken only by a reasonably functioning management board. In any case, a similar activity level in all domains of company functioning indicates the appropriateness of decisions made by the managers. It is also vital that initiatives of the management are supported by a mindful and rational owner. The outcome of the experiment shows that the other two groups (employees and passengers) consider the possibility of problem solving mainly through the prism of their own advantage.

With regard to Problem B (fleet refurbishment), similarly to the previous case (but in an inverted order) groups, treated as a whole, expressed the highest activity in the following areas: financial, technical, and organizational. In general, all distinguished types of participants (except for employees in the personal area) decided to undertake action. These decisions result from the assigned role and the economic knowledge of the persons taking part in the experiment.

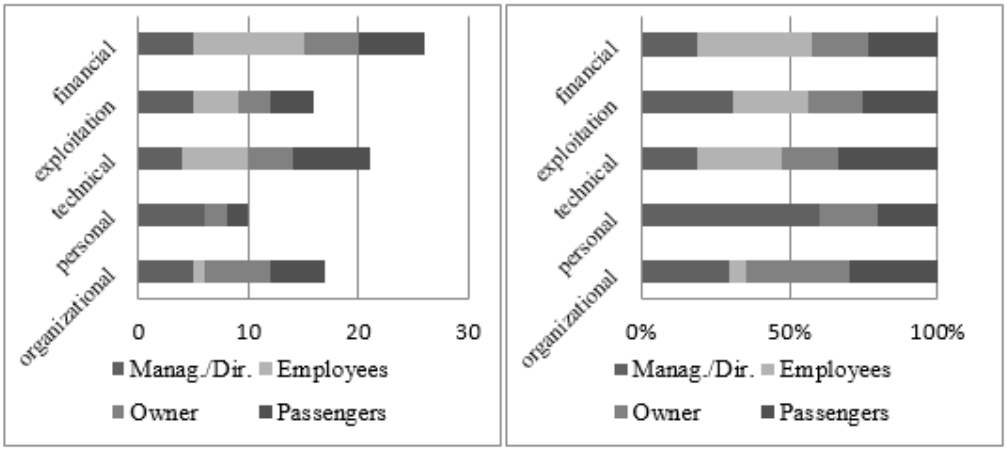

Fig. 6: Results of the decision-making game with regard to Problem B (fleet refurbishment)
Source: Own analysis.

The summarization of total results from both stated issues proves that changes in the financial, technical, and organizational areas are the most essential from the responders' perspective. Less appreciation was given to changes in the exploitation area and the personal area, mainly due to the consequence of the so-called own interest. According to the results presented in Figure 8 by delegated roles, the management board, which pays practically identical attention to every area, exhibits the highest activity. It proves that this group assumes a suitable approach towards solving of management problems in the company. The next most active category is the owner who, in this experiment, served as the "good steward". The next group is the passengers, members of the local community for whom the municipal public transport company is a provider of a specific level of services and the so-called common good they identify with. The last group is employees. Participants of the experiment reflected the behavior of this group, which can be found in economic practice, extremely well.

Fig.7: Results of the decision-making game in a situation involving lack of funds and refurbishment of the fleet (problem A+B)

Source: Own analysis

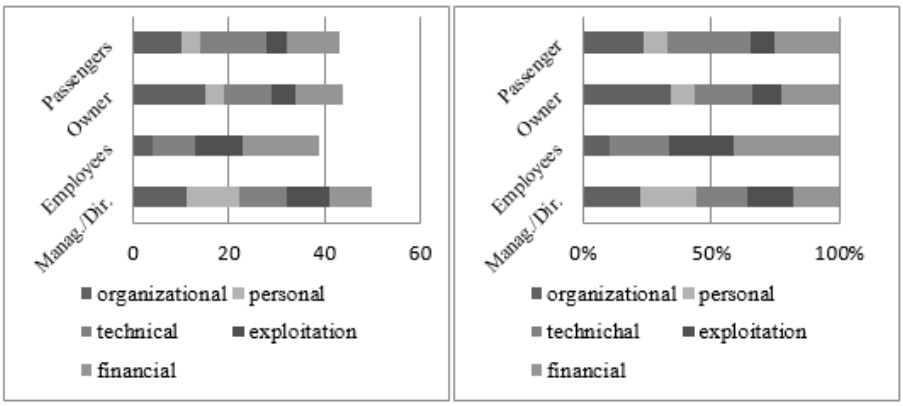

Fig. 8: Results by roles, problem A+B: lack of funds and fleet refurbishment

Source: Own analysis.

Elements of the restructuring programme in a municipal transport company

The description of the decision-making game, with specified roles, in the previous part of the chapter is to serve as an introduction to the discussion regarding changes in individual areas of functioning of a municipal local collective transport company that will facilitate its proper operations. Figure 9 has demonstrated the manner of creating a restructuring plan for local collective transport companies.

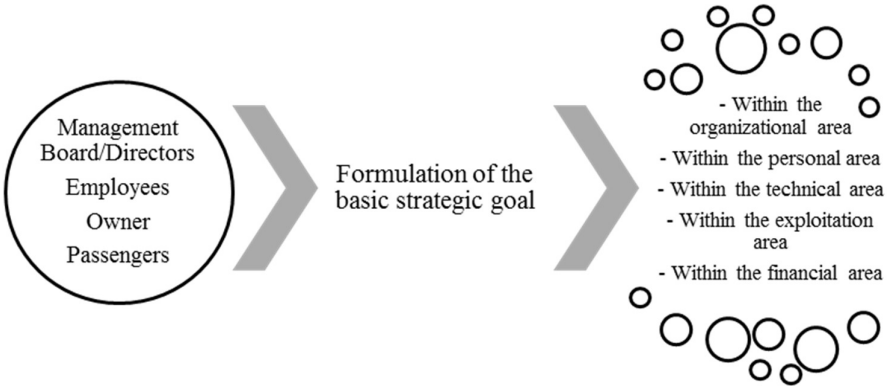

Fig. 9: Shaping of the restructuring programme for a municipal transport company

Source: Own analysis.

In each of the functional areas of an enterprise, the restructuring process requires different tools, especially in terms of actions taken in order to improve the effectiveness of its functioning.

Organizational restructuring is one of the forms of restructuring an enterprise. It regards modification of the in-house organization by adjusting the internal structures and procedures in the company to match the adopted strategy. In practice, organizational restructuring (as an independent process) is usually commenced after a decrease in performance and limited possibilities for improvement, i.e. after a decrease in effectiveness. Creating a more efficient and productive organization is of utmost importance, mainly in the context of further functioning of a company in the future. When developing a restructuring plan for the organizational area, one must bear in mind the so-called key factor system, that is (Bitkowski, 2010, 63):

- purpose of activities, also divided into detailed objectives – relevant to each organization, formulated in strategic and short-term categories,
- functions and processes – connected with implementation of goals, most often perceived through the prism of pre-characterized basic, auxiliary and regulatory processes,
- organizational structures – positions, cells and divisions, including their established inter-connections,
- resources – the team of people, tangible assets and financial resources of a company.

The basic organizational restructuring tools for companies have been listed in Figure 10.

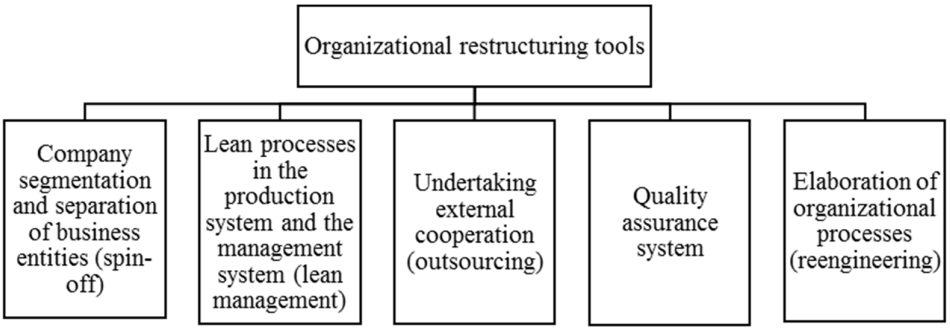

Fig. 10: Organizational restructuring tools for companies

Source: (Bitkowska, Weiss, 2015, p.42)

Segmentation of the company and isolation of business units is applied in case of enterprises with an extensive organizational structure that require internal simplification through disintegration. Such actions involve isolation of organizational units and cells that are able to function as independent business entities based on separate economic account settling. Leaning of the production system and the management system comprises of a set of rules, terms, and techniques the purpose of which is to eliminate wastage and implement an effective production system (Grabowska, 2017, p.13).

Establishment of external cooperation is an undertaking that involves separating some of the functions performed by a parent company from its organizational structure and transferring them to other business entities. Quality assurance system, on the other hand, is a method of managing organization that is focused on quality, based on involvement of all members of the organization, and aimed at achieving long-term success thanks to customer satisfaction and benefits in favor of all members of the organization and the society (Griffin, 2017, p. 9).

Elaboration of organizational processes is defined as the method of thorough transformation of complete processes in a company in order to optimize three general indicators of effectiveness: quality, costs, and delivery date, which is necessary to maintain the flexibility and competitiveness of the company. This method assumes the need for comprehensive changes in functioning processes and a proposition of re-development of the whole organization (as an institution), if it is to preserve profitability and solvency and improve customer service (Szukalski, Wodnicka, 2016, p. 37).

The organizational structure presented in Figure 11 exemplifies the restructuring process in the said area of a municipal transport company.

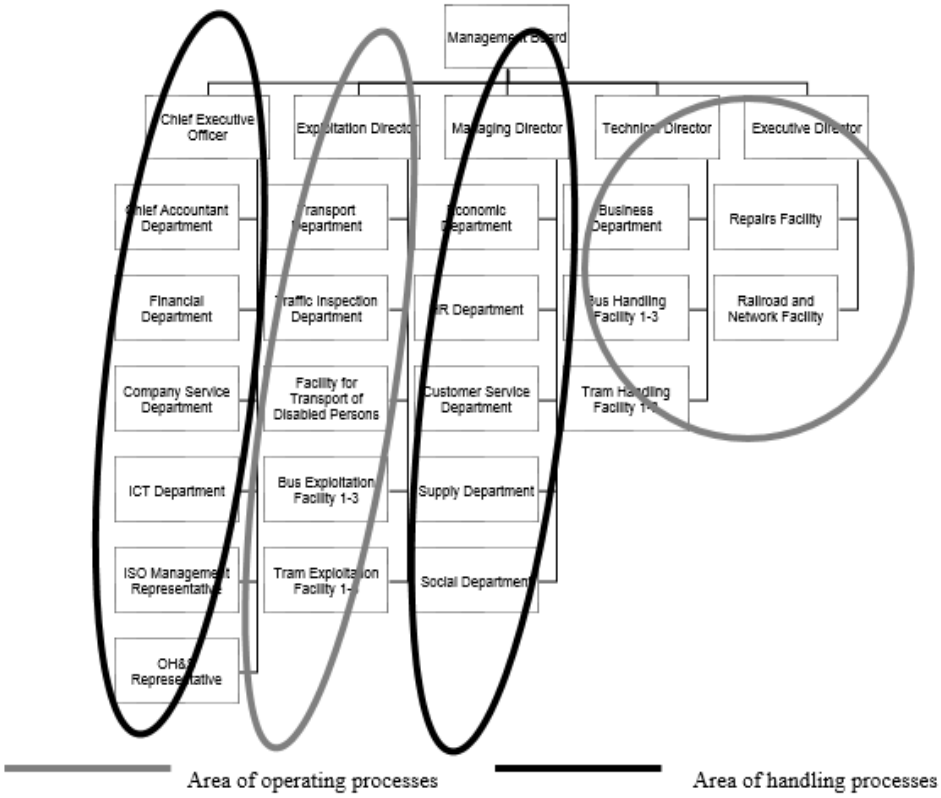

Fig. 11: An organizational structure of a municipal local collective transport company
Source: Own analysis.

With increase of efficiency and effectiveness of operations in mind, the entrepreneur should coordinate organizational restructuring with changes taking place in other areas of activity, e.g. the personal area. The key aspect of employment restructuring is to restore the internal stability and balance in relations with the environment by, respectively, application of advanced changes both in terms of the number of employees, their qualifications, scope of duties and responsibility of each individual person, and comprehensive utilization of the company staff. In this aspect, it is important to utilize systems of incentives. An incentive system constitutes a factor that contributes to achieving considerable performance and the economic results of the enterprise. Shaping of motivation is considered to be one of the main managerial functions. In times of intensified competition, success will be possible only for companies that are capable of making skillful changes in the incentive system, as well as of observing own costs, analyzing their structure, and drawing conclusions for future reference. The most important element of an effective incentive system is the ability to strictly connect company objectives with goals of the employees. It appears that in the case of Polish reality, it is impossible to increase the effectiveness of managers employed under a contract of employment. Thus, managerial contracts (classified as civil law contracts) for an economic result become more and more common. Such a solution greatly improves the effectiveness of management.

In the case of a municipal local collective transport company, changes in the personal area include:

- simplification of the Collective Labor Agreement,
- clarification of remuneration,
- connecting remunerations with the market,

- popularization of the employee assessment and incentive system,
- introduction of individual contracts of employment with an unambiguous specification of tasks,
- increase in work efficiency (parametric specification of the employee demand),
- limiting specialization.

Restructuring is a process that is strongly connected with the nature of business of a particular company. It becomes particularly apparent in the technical and exploitation area. The procedure of restructuring within the technical and exploitation area has been presented in Figure 12.

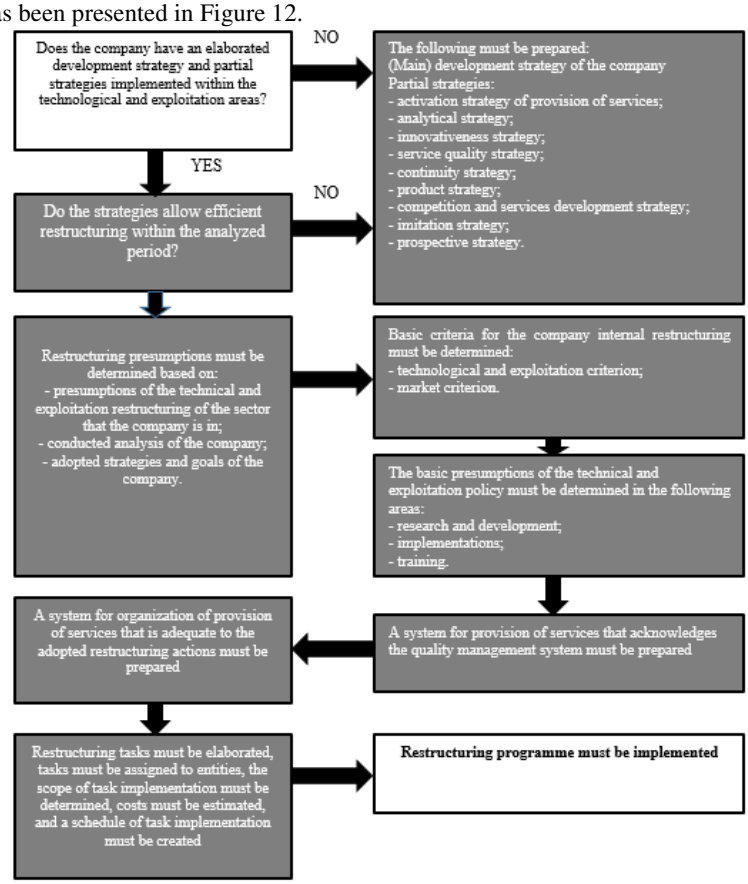

Fig. 12: Procedure of restructuring within the technical and exploitation area

Source: Own analysis based on: (Mozalewski, 2010, p. 223)

In the case of a public transport company, restructuring of the technical and exploitation area means:

- clarification of standards regarding employment in the technical infrastructure,
- designation of an asset management strategy,
- optimization of the supply system, including deliveries and consumption,
- developing auxiliary operations for more effective utilization of the entity's potential,
- technical efficiency adequate for the budget,
- pressure on improving the driver – customer relationship,
- disciplining consumption of power and propellants,
- inspection and verification of the communication system, also within the scope of optimization of vehicle drivers.

Financial restructuring is one of the most crucial and, at the same time, difficult areas of restructuring. The financial situation constitutes a close reflection of the current condition of an undertaking and its functioning capabilities. Reaching a good economic and financial condition is impossible without a properly structured market policy of the

company since it decides whether the entity will generate a proper level of revenue in order to be profitable. Financial restructuring covers a broad range of actions which include:

- financial plans with regard to intended actions,
- control over expenditures and cash flows,
- budgeting and monitoring of areas generating costs and revenue,
- an integrated computer system,
- consolidation of controlling tools,
- contracts for area managers,
- mutual settlements between independent cells,
- performance of tasks (use of resources) solely in accordance with the orders,
- acquisition of a financial partner,
- restructuring of balance sheet elements (assets, equity, especially receivables and liabilities).

Restructuring of balance sheet elements involves techniques based on changes in assets of the company balance sheet: disposal of cost-intensive assets, lease of assets, establishing a subsidiary and transferring assets to that subsidiary in order to separate assets from those held by the parent company and disposal of the subsidiary, division of the company. Techniques based on changes in liabilities are as follows: transformation of debts into shares or stocks, debt-for-debt exchanges, issuance of bonds, shares-for-shares exchanges, increase of the debt, sales of new shares.

Conclusion

The environment of a municipal company forces a relevant approach towards the new reality and adjustments towards the existing circumstances. Nowadays, it often appears that the already utilized typical streamlining procedures prove to be insufficient for a municipal company to reach a balanced status. In such critical situations, it is necessary to conduct determined radical changes, which are referred to as company restructuring. By using managerial methods and experience to implement the restructuring procedure, one may conclude that every company process can be upgraded. However, one must assume a proper approach and utilize appropriate tools.

The restructuring process encompasses many elements, starting from an analysis of the condition of the enterprise, formulation of restructuring, strategic and operational objectives in individual (organizational, technical, exploitation, and financial) areas, ending with determination of realization level measurements. Other crucial elements include attribution of responsibilities, determination of the realization schedule, as well as monitoring, corrective actions with regard to objectives, courses of action and the schedule. The structure of this article has been constructed in accordance with the discussed course of the restructuring process in a municipal collective transport company, which has been exemplified in Figure 13 (depicting the development and proper functioning of a municipal collective transport company after application of appropriate undertakings). The empirical analysis of the restructuring process based on a specific company was replaced with an original decision-making game that formulated exemplary goals in individual areas of functioning of the enterprise. In the said experiment, the selection on utilized solutions was often governed by the entrusted roles reflecting those in a public transport company.

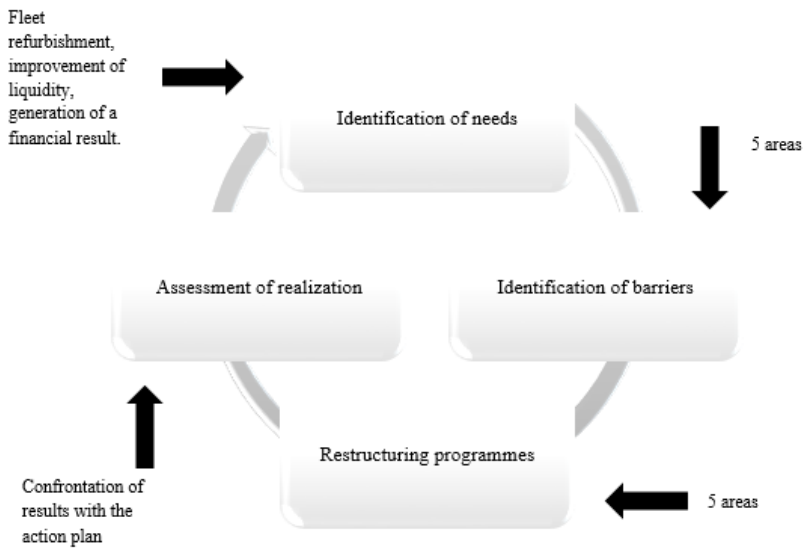

Fig. 13: Development and proper functioning of a municipal local collective transport company through continuous activities

Source: Own analysis

Acknowledgment

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Fiscal Policy and Labour Market Dynamics: Evidence for Romania

Madalina Ecaterina POPESCU, PhD.

The National Scientific Research Institute for Labor and Social Protection, Bucharest, Romania;
The Bucharest University of Economic Studies, Bucharest, Romania,
madalina.andreica@gmail.com

Larisa STANILA, PhD.

The National Scientific Research Institute for Labor and Social Protection, Bucharest, Romania
larisa.stanila@incsmps.ro

Ana-Maria GATEA

The National Scientific Research Institute for Labor and Social Protection, Bucharest, Romania
anamaria.gatea@incsmps.ro

Amalia CRISTESCU, PhD.

The National Scientific Research Institute for Labor and Social Protection, Bucharest, Romania;
The Bucharest University of Economic Studies, Bucharest, Romania,
cristescuamalia@gmail.com

Abstract

Under the current COVID-19 pandemic, the role of effective fiscal policy is rapidly increasing worldwide in the attempt to combat the negative effects on both the labour market and the business sector. In this context, the aim of this paper consists in studying the evolution of the labour market in correlation with the latest labour taxation measures taken to face the pandemic crises. Evidence for the case of Romania is provided. Aspects concerning the national legislative framework of fiscal policies are also briefly discussed. Our analysis shows that the Romanian labour market was facing low unemployment rates in the last period, but labour force participation remained among the lowest values in the European Union. Also, youth unemployment is among the highest in Europe. Forecasts of moderate levels of economic growth are radically changed following the outbreak of the COVID-19 pandemic in early 2020.

Keywords: Fiscal Policy, Labour Market, Unemployment, COVID-19 Pandemic.

Introduction

In the context of the current COVID-19 pandemic crises, finding the most effective fiscal policy solutions to combat the economic shocks on both the business sector and the labour market becomes a major concern worldwide. Economies find themselves under pressure to take proper fiscal decisions to prevent the business environment from collapsing, the labour market demand from contracting and the unemployment rate from skyrocketing. Effective implementation of suitable fiscal solutions are required to smoother the economic recovery from the pandemic effects.

Under such circumstances, it is of extreme importance to better understand the fiscal policy's role and to study the main fiscal tools available to keep the economies on their right track to prosperity and less likely to fall into a steep recession. Of particular attention are the cases of developing economies that tend to have a harder and usually longer recovery from economic crises as compared to more developed countries.

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In general, fiscal policy deals with government spending and fiscal tools to help stabilize the economy. Normally, the government faces large budget deficits during recessions and manages budget surpluses under growing economy. These are known as expansionary and restrictive fiscal policies, respectively (however, in practice, the preferred instrument for restoring unsustainable growth is usually contractionary monetary policy and not fiscal policy, for political reasons).

According to Musgrave and Musgrave (1984), the main functions of fiscal policy are: allocation (measure the desirability of intervention of the state into economy to correct market failures), distribution (has its roots in the existence of inequalities in income distribution) and stabilization (this role depends on budgetary policy).

Fiscal policies aim to reduce fluctuations and economic instability, protect consumer incomes and stimulate development (Ialomitianu et al 2016). It is easy to predict that any state aims or should aim for a sustainable fiscal policy. Although there is no clear and unanimously accepted definition for the notion of sustainable fiscal policy, the European Commission defines public finance sustainability as: the ability of a government to sustain its current spending, tax and other policies in the long run without threatening the government's solvency or without defaulting on some of the government's liabilities or promised expenditures (European Commission, 2019). Molnar (2012) concluded that, if fiscal adjustment is based more on growth than on spending tax debt, stabilization is more likely to occur and this stabilization is sustainable.

Having these into consideration, our paper aims to study the changes in fiscal policies in correlation with the evolutions and transformations of the labour market. Evidence for the case of Romania is provided. Aspects concerning the national legislative framework of fiscal policies are briefly discussed, followed by an analysis of the evolution of the labour market in correlation with the latest labour taxation measures taken to face the current COVID-19 pandemic.

This paper is organized as follows: Section 2 briefly presents the main changes in the Romanian fiscal policy over the last two decades, Section 3 studies the dynamics of the Romanian labour market. Next section discusses future perspectives of the labour market in the context of the COVID-19 pandemic, while Section 5 concludes our investigation.

The History of The Fiscal Policy in Romania

The Romanian fiscal system has undergone major changes since 2000, when a fiscal reform simplified and standardized the Romanian fiscal regime. In 2004, the new Fiscal Code came into effect and introduced important facilities and exceptions. However, in the following years, changes to the Fiscal Code favoured higher taxation (except for the introduction of a 16% income flat tax rate in 2005 for both individuals and companies). Between 2006 and 2008 there was a relaxation of fiscal policy, even though in 2006 Romania was in the process to become an European Union state member. The main fiscal measures consisted in reducing social security contributions by 1.5 percentage points and in introducing excise duties on tobacco and alcohol.

In the first half of 2009, the Government of Romania requested a loan from the International Monetary Fund in order to overcome the 2008 economic crises and to reduce the budget deficit. For this purpose, certain measures to adjust the budget expenditures were taken (in order to better collect the budget revenues and to decrease the capital expenditures to compensate for the additional current expenses and to reach the target deficit proposed for 2009 of 7.8% of GDP). The first part of 2010 brought a number of fiscal austerity measures, some being directly related to taxation and public spending (e.g. the introduction of the *Fiscal Responsibility Law*, VAT rate increased from 19% to 24%, taxation of all income by 16% with no exceptions and the reduction of public sector salaries by 25%).

In the following years, a process of fiscal consolidation took place, which was partially reversed starting with 2016, as a consequence of the new Fiscal Code coming into effect. The new Fiscal Code involved an ample fiscal relaxation, simultaneously enacting some significant increases in expenses (related mostly with salaries and pensions). Between 2016 and 2018, the fiscal policy became expansionistic, a trend that was maintained in the next period. Another major fiscal measure that came into effect on January 1st 2018 was the transfer of social contributions from employers to employees (with the change of total amount from 39.35% to 37.25%), simultaneous with lowering the tax rate for income from salaries, pensions, self-employment and copyright from 16% to 10%.

From 2006 through 2019 Romania practiced a strongly pro-cyclical fiscal policy, stimulating the economy, but in a counterproductive manner during the periods of expansion (2006-2008, 2016-2019) and slowing down during times when the economy underperformed (2010-2015). This contributed to amplifying the economic cycle's fluctuations and accentuated the accumulated imbalances in the economy (The Fiscal Council, 2019).

Keeping in 2017 an expansionist fiscal policy under a positive production gap, only contributed to maintaining the pro-cyclical fiscal policy, which made the position of public finances more vulnerable to shocks. Furthermore, considering that the level of public debt near the end of 2019 was significantly higher than in 2008 (35.2% of the GDP as opposed to 12.4%), it is difficult to imagine the existence of a fiscal space to stimulate the economy in times of recession, putting the sustainability of public debts under risk. Moreover, the miss-fitted expansionistic Romanian policy between 2016 and 2019, together with the unsuccessful attempt to follow the European and national rules, caused the European Commission to maintain their decision to place Romania under the excessive deficit procedure. This decision comes even in the context of the COVID-19 pandemic, with the argument that the violation of European tax rules predates the pandemic and is therefore not attributable to it.

The most important direct taxes levied through the Romanian tax system are *income tax* (paid by individuals at a flat rate of 10%) and *real estate taxes* (taxes on buildings and land collected by municipalities), while indirect taxes include *value added tax (VAT) and excise duties*.

Aside from these direct and indirect taxes, social taxes are also levied, consisting of *compulsory social and health insurance contributions* (social insurance, unemployment insurance, health insurance, health insurance for medical leave and indemnities, work accidents and professional disease insurance, as well as contribution for the salary payment guarantee fund). Since 2018, the social security system underwent major reforms through which the largest part of the contribution burden was shifted to employees.

The budget revenue structure in Romania is mostly focused on indirect taxes and income from social contributions (about 82% of tax revenue), while at European level there is a tendency to balance the share of direct, indirect taxes and income from social contributions. On the expenditure side of salaries in the public sector and pensions, the ratio to budget revenues has advanced at a brisk pace in 2008-2009, reaching a peak of 75.3% in 2009 (the highest share of wages and social assistance expenditures in total budget revenues among Central and Eastern European countries). Following the implementation of the fiscal consolidation program, this share significantly dropped between 2013 and 2015, returning to an inferior level to other CEE countries. Unfortunately, since 2016 this trend was reversed amid aggressive increases of public sector wages and pensions, Romania registering once again the highest level of wages and social assistance expenditure relative to budget revenues (72.1% in 2019 – 4.4 pp over the EU average).

Thus, in 2019 the Romanian economy was in the process of losing rhythm with regard to economic growth. The main reasons for this slowing down are, on the one hand, a slowdown in external demand, and, on the other hand, a contraction of industrial production, both caused by unfavourable external evolutions. Forecasts of moderate levels of economic growth in Romania were radically changed following the outbreak of the COVID-19 pandemic in early 2020. This health crisis amplifies uncertainties in assessing current and future economic policies and developments. After overcoming the acute phase of this crisis, active economic policies could help a faster return to economic coordinates as close to the previous ones as possible. However, it is possible that post-pandemic economies may radically differ from ante-pandemic economies in many aspects.

Among the main fiscal measures undertaken by the Romanian Government in May 2020 in the attempt to fight the pandemic we mention:

(1) all tax obligations with a maturity date past March 21st 2020, which are unpaid, are not classified as arrears and are not subject to interest and late payment penalties; all tax-related seizure proceedings involving seizures are suspended (both measures cease on October 25th 2020);
(2) the deadline for local tax payment has been postponed, from March 31st 2020 to June 30th 2020;
(3) profit tax payers / quarterly advance payment for the first, second and third quarters of 2020 benefits from a 10% discount for payments made on time. The same benefit is available to income tax-payers for micro-enterprises;
(4) the requirement to pay VAT when importing medicinal products, protection equipment, other medical devices or sanitary equipment necessary to fighting the COVID-19 pandemic has been postponed;

(5) tax-payers subject to a specific tax will not be required to pay the tax for the times they partially or completely cease their activity during the state of emergency (there is also an exemption from the payment of the specific tax for an additional 90 days period);
(6) enforcement proceedings by notification of state claims and subsequent recovery through offers are suspended and will not recommence (unless they are established by court decisions in criminal matters), (the suspension ends on October 25th 2020);
(7) for late payment of instalments included in a schedule of instalments remaining outstanding until October 25th 2020, no interest and penalties will be calculated in accordance with the Fiscal Procedure Code.

In order to limit the negative impact of the COVID-19 pandemic on the labour market, the Government adopted several emergency ordinances, concerning the following (European Semester, 2020b):

(1) covering 75% of the salary of employees forced to technical unemployment by companies affected by the crisis if the activity is partially or completely interrupted or reduced as a consequence of the COVID-19 pandemic during the state of emergency;
(2) support is provided to employers who between June 1st 2020 and December 31st 2020 hire permanent full time persons over the age of 50, whose employment has ceased for reasons not attributable to them, during the state of emergency. Assistance is also provided, until December 31st 2020, for the up-to-date employment of permanent contracts of young people aged between 16 and 29, who are registered as unemployed. For each person employed in the categories mentioned above, the employer will receive 50% of the employee's wage, over a period of 12 months, but no more than 2,500 RON (500 EUR) a month.
(3) during the period of the work schedule reduction, employees affected by this measure will receive a 75% compensation from the difference between the gross basic wage provided for in the individual employment contract and the gross basic wage corresponding to the hours actually worked as a result of the reduction of the work schedule;
(4) persons who occasionally engage in unskilled activities (day labourers) will be granted an amount from the state budget equal to 35% of the remuneration due for a working day for a period of 3 months;
(5) employers who have employees with individual employment contracts for a fixed period of no more than 3 months benefit from payment by the state of 41.5% of the employers' wages, but no more than 41.5% of the average gross salary for 2020;
(6) employers are granted a single financial support of 2,500 RON (500 EUR) for every employee who worked remotely, during the state of emergency, for a minimum of 15 working days, in order to support the purchase of technological goods and services necessary for their business;
(7) employees caring for children under 12 years of age can benefit from days off paid by the employer with 75% of the salary (but not more than 75% of the average monthly earnings), while schools are closed as a consequence of the measures implemented by the Government.

The Dynamics of The Labour Market

Analysing the evolution of the Romanian labour market, we note that in the context of economic growth in recent years, labour force participation in Romania has reached among the lowest values in the European Union. The labour market is generally characterized by a slight increase in labour force participation in the years immediately following the economic crisis, as the labour force participation rate reached a low of 62.9% in 2008, then rose to 68.6% in 2019. The first two quarters of 2020 (the only ones for which data are currently available) do not yet capture the effects of the health crisis we are going through. The low values registered in our country compared to the EU can be explained by a number of factors, such as: low internal mobility, non-correlation of demand with labour supply in terms of the need for qualifications, lack of adequate retraining with the supply of jobs, the lack of career counselling, as well as the establishment of generous social benefits that demotivate reintegration into the labour market.

The Romanian labour market was facing low unemployment rates in the last period (3.9% in 2019), but with visible and inevitable growth trends taking into account the current context (in the first trimester of 2020 the unemployment rate was 4.3% and raised to 5.4% in the second trimester). In terms of gender, it is observed that the unemployment rate among women remained throughout the analysed period below the level of the unemployment rate for men, with differences of even 2.8 pp in 2004, but decreasing to 0.9 pp in 2019.

However, in the context of high labour migration, although the unemployment rate in Romania is below the EU average, youth unemployment is among the highest in Europe, reaching even 24% in 2014 and then declining to 16.8% in 2019. This trend, together with the fact that Romania does not yet have effective policies to stimulate the transition from school to the labour market and to correlate the education system with labour market requirements, places Romania in the top 10 countries with higher unemployment among young people in the EU and among the last 5 countries with the lowest employment rates among young people in the EU (approximately 24.7% in 2019). Unfortunately, this new crisis we are facing continues to affect this category of the population. If in the first quarter of 2019 the youth unemployment rate was 15.6%, in the first quarter of 2020 the unemployment rate had increased to 17.6%. It should also be noted that, depending on gender, the situation shows an interesting dynamic: if in the first years after 2000, young female unemployment was 3-4 pp higher than that of the young male unemployment rate, in recent years the situation has reversed (in 2019 the unemployment rate among young women was 1.2 pp higher than the unemployment rate among young male). It will be useful to look at how this crisis will affect young people.

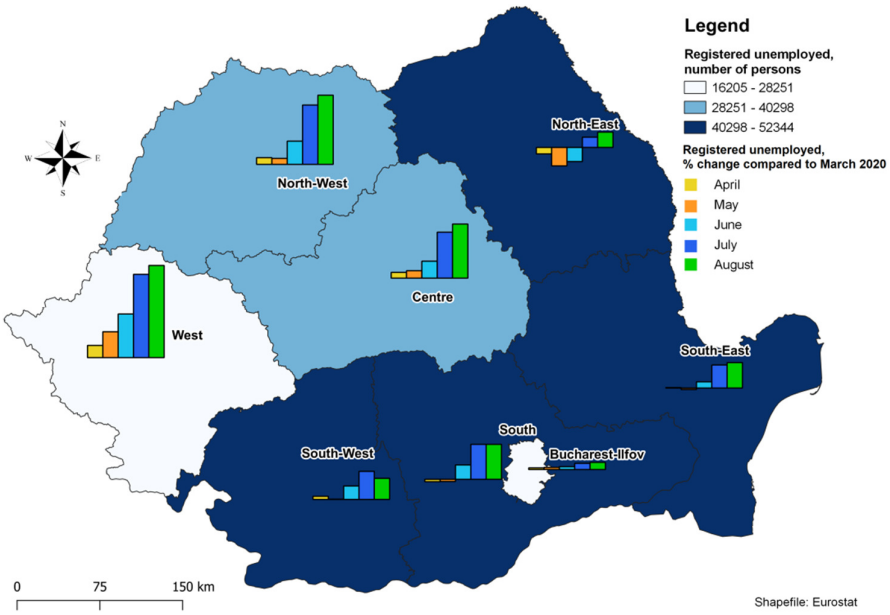

Fig. 1: Registered unemployment at regional level, 2020

Source: raw data from NIS, authors' own calculations and representation

Regarding the evolution of the registered unemployment on the onset of the crisis, at regional level we experienced increases from month to month almost since April, the first full month with measures implemented in order to try to control the effects of the pandemic (state of emergency, many restrictions regarding the economic activities). In comparative terms over the same month of 2019, the unemployment rate has a first strong increase in July, with increases ranging from 0 pp to 0,5pp, with only the North-East region registering a slight decrease as compared to July 2019. The same goes if we compare the registered unemployment rate with the values of March 2020 (set as a starting point of economic/health crisis in Romania). In August the situation continues to deteriorate, the number of registered unemployed rising even more: the overall unemployment rate reaches 3.3% (compared to 2.9% in March), with almost 290 thousand registered unemployed (and even more according to the definition of unemployed from ILO – almost 480 thousand unemployed, corresponding to a 5.3% unemployment rate).

The most affected region so far is the West region, with 0.7 pp increase of the registered unemployment rate since March, equivalent to an increase of approximately 40% of the registered unemployed (from 13.7 thousand persons in March to 19.1 thousand persons in August). Also, the North-West region registered an increase of nearly 30% of the registered unemployed (corresponding to a 0.6 pp increase in the unemployment rate). The region around the capital seems to be the least affected, with zero or a very small increase during these months (0.1 pp in August compared to March for the unemployment rate).

From the perspective of participation on the labour market in Romania, men were on an increasing trend in the period 2005-2019, while the participation of women on the labour market registered slight oscillations, with a maximum level of 63.6% registered in 2000 and the lowest of 55.2% in 2008. Women's participation in the labour market suffered a much slower recovery after the economic crisis of 2008, reaching only 58.9% in 2019, but unable to return to the level recorded in 2000, while the level registered among men for 2019 is higher than in 2000 (78% compared to 75.7%).

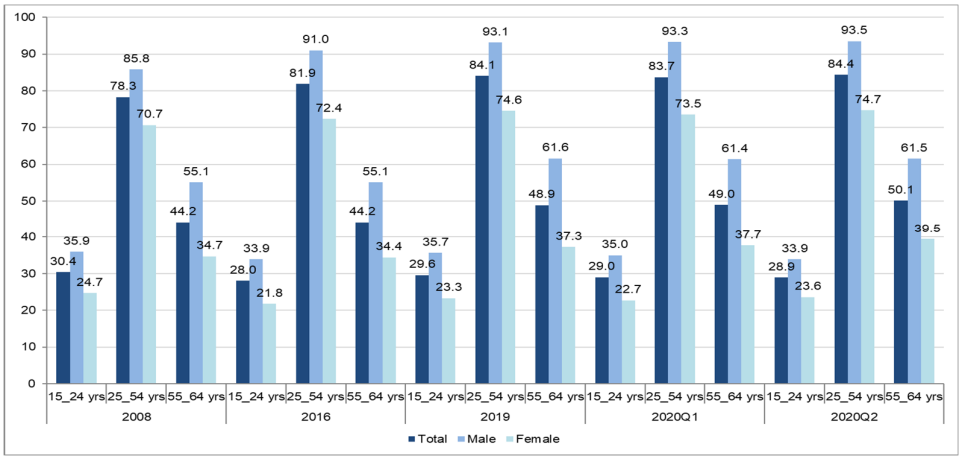

Fig. 2: Labour force participation in Romania, by gender and age groups

Source: raw data from NIS and Eurostat, authors' own calculations and representation

Regarding the evolution of labour force participation by age groups in Romania, in the period 2000-2019, there were numerous fluctuations. The largest decrease was registered for the age group 15-24 years (11.8 pp), more pronounced for the female population (13.7 pp compared with 10 pp for the male population). For the 55-64 age segment there is an even more pronounced decrease among women, 10.2 pp, while the participation rate for men in the same age group increased with 3.2 pp.

The first half of 2020, for which there statistical data is available, indicates a consistent downward trend for the 15-24 age group. For the 25-54 age group, the data do not yet indicate a deterioration of the situation generated by the new health crisis, while for the 55-64 age group the data for the first two quarters of 2020 even suggest a slight increase. However, these data should be viewed with caution, especially since in Romania the negative economic effects generated by the COVID-19 pandemic were felt only from the second quarter of this year.

The total employment rate (for 15-64 years) reached a minimum of 57.6% in 2005, following an upward trend in the next years, with a maximum of 65.8% in 2019. In the years following the economic crisis in 2008, the employment rate in Romania registered only a slight decrease, the period 2008-2014 being rather characterized by stagnation. However, when analysing gender differences, we note that while the male population maintained a steady upward trend over the period under review, the female population recorded a decline from 59% in 2000 to 56.8% in 2019.

Regarding the evolution of employment by age groups, both young people (under 25 years) and seniors (over 55 years) recorded decreases during this period: higher in the case of young people (9.3 pp) and slightly lower for those approaching retirement (4.2 pp). As for the 25-54 age group, the increase was modest, of 2.8 pp. The existing data for the first half of this year indicate a slight decrease even for this age group, from 82.2% employment in the second quarter of 2019 to 80.2% in the second quarter of 2020.

Future Perspectives of The Labour Market

During the United Nations Sustainable Development Summit in September 2015, the world leaders adopted a set of 17 Sustainable Development Goals (SDGs). The eighth goal of the 2030 Agenda advances the promotion of inclusive and sustainable economic growth, employment and decent work for all through several pillars to achieve: increase

labour productivity, decrease the informal employment, reduce the gender pay gap and reduce the unemployment rate.

Eichhorst (2017) argues that the future of employment is influenced by four main factors: globalization, technology, demographic change and labour market institutions. While globalization, technology and demographic change might be hard to control, the labour market institution in one country might become a more important vector than it is today. The importance of those institutions may become even more important in this new pandemic situation; they should aim to better shape the functioning of the labour market. In order to overcome the effects of technology and globalization, together with the new developments generated by the sanitary crisis, the labour market institutions should provide different channels of adjustment (either by proposing different types of employment, different working time together with wage flexibility, or/and by adapting the skill profiles to the companies' demands).

For the case of Romania, it is more than obvious that a widespread change in the size and structure of the population already took place, together with the large-scale movement of labour internationally. Due to the aging population it is expected that Romania will experience a slowdown in the growth of the workforce in the next period. Recent projections of Romania's population by Eurostat reflect current trends in fertility rates and net migration flows. Thus, the working age population (20-64 years) of Romania is estimated to decrease by approximately 7.5% by 2025 compared to 2019 and by another 3% between 2025 and 2030. We should expect a significant decrease in the population for most age groups less than 44 years, while for the age group 45-54 years we might even see a slight increase in population.

According to CEDEFOP forecasting (2018) regarding the sectoral employment trends in Romania, the highest increase during the next period (2021-2030) will be in the non-marketed services sector, while among the shrinking sectors, Construction is expected to be the sector experiencing the sharpest decrease up to 2030, together with manufacturing and primary sector and utilities. The economic crisis in 2008 has reduced employment in the primary sector, in construction, as well as in the manufacturing industry in the period 2008-2013. However, employment, especially in the financial services sector, but also in the distribution and transport services sector, as well as non-commercial services (especially related to the public sector), continued to increase during that period.

Regarding the occupations movement, the highest number of openings is expected to be for professionals and skilled agricultural workers, but also in legal, social and cultural professions and health professionals.

Three main areas of intervention should return to the attention of most countries (Eichhorst, 2017) and, we believe, even more so to the attention of Romania: education, the regulation of labour market and active labour market policies. Regarding the education, both youth and adult formation should be considered important, and the curricula should align with the needs of the labour market. From the labour market regulation point of view, the policy makers should aim to increase both labour force mobility and job security and flexibility. Attention should be also paid to forms of employment such as free-lancer or self-employed, both from the perspective of social insurance (pension, unemployment) and from the perspective of other aspects (minimum wage, work schedule). As of the active labour market policies, they can be a superior tool compared to employment protection because they target the protection of workers rather than jobs (Scarpetta, 2014).

As it becomes more and more obvious that this public health crisis is one of the worst in the last century, the world also became aware that the current economic crisis is a serious and lasting one. Moreover, it is not just an economic crisis, but also a job crisis, with many casualties in terms of unemployment and hours worked dropping sharply (OECD, 2020). Unemployment is expected to reach 10% in OECD countries by the end of 2020, up from 5.3% at year-end 2019, while jobs recovery is not expected until after 2021.

Conclusions

Labour market reforms can lead to tax costs - either directly, by changing taxes or unemployment benefits, or indirectly, using tax compensation to reduce the distributional effects of the reforms (IMF, 2014). Some labour reforms affect fiscal instruments and thus have direct budgetary implications. A clear example is the reduction of the tax burden on labour costs - the difference between the cost of labour borne by employers and the net salary of employees, due to income tax and social security contributions. Reducing the tax burden could lower labour costs and stimulate job creation, but would lead to losses in tax revenues. Active labour market policies and changes in

unemployment insurance schemes can also have a direct effect on the budget. The reduction in payroll taxes has a considerable fiscal impact. IMF (2014) showed that, taking into account the effect of the business cycle and inflation on nominal budget revenues from labour tax, the reduction of the tax burden by a percentage is, on average, associated with a loss of budget revenue equal to 0.3 % of GDP.-The nature of jobs is constantly changing, with technological progress, globalisation and ageing populations re-shaping the labour markets. Also, new organisational business models and worker preferences are contributing to the appearance of new forms of work. Moreover, the future of work is here, more rapid than everyone expected, due to the pandemic declared by World Health Organisation since March 2020. Specialists argue (OECD) that this economic crisis will hit harder the labour markets than the 2008 financial crisis (already the hours worked fell by 12%, compared to only 1.2 in the first months of the previous crisis).

In Romania, at national level, the unemployment rate in 2009 was 1.1 pp higher than the unemployment rate in 2008, and increased with another 0.3 pp in the next 2 years. In the first trimester of 2020 the unemployment rate was 4.3% and rising to 5.4% in the second trimester, being already with 1.5pp above the level registered in late 2019. The registered unemployment does not reflect this sharp increase, mainly due to the definition of the unemployed. In addition, in the months of lockdown the unemployed were unable to actively seek for jobs. We should also mention the fact that the measures taken by the Government in order to support labour market (workers, their families and companies) may lead to a drop in hours worked, with the employees maintaining their jobs, instead of massive firings.

Countries all over the globe reacted with unprecedented measures to contain damages and support, among other sectors and the labour markets. But in the months and years to come, new and better labour market policies, along with optimal fiscal policies must be designed and implemented in accordance with the specifics of each country, taking into account the strategic objectives already proposed, such as reducing inequalities in society, the poverty and the wage gap.

Acknowledgment

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The Influence of Cooperation on The Development of Credit Resources Market for Agricultural Business Entities

Ruslan MUDRAK
Doctor of Economics, Professor, Head of the Department of Economics of Uman National University of Horticulture, Ukraine
E-mail: mrp1974@ukr.net

Petro BECHKO
Ph.D. in Economics, Professor of the Department of Finance, Banking and Insurance of Uman National University of Horticulture, Ukraine
E-mail: petro19500807@gmail.com

Valentyn BECHKO
Ph.D. in Economics, Senior Lecturer of the Department of Accounting and Taxation of Uman National University of Horticulture, Ukraine
E-mail: bechko@i.ua

Olexsander NEPOCHATENKO
Ph.D. in Economics, Senior Lecturer of the Department of Business, Trade and Exchange Activities of Uman National University of Horticulture, Ukraine
E-mail: unuspidpruemnutstvo@gmail.com

Svitlana PTASHNYK
Ph.D. in Economics, Senior teacher of the Department of Finance, Banking and Insurance of Uman National University of Horticulture, Ukraine
E-mail: chekalyksvttt@gmail.com

Abstract

The article considers the problems of the influence of cooperation on the development of credit resources market for agricultural sector. The analysis of activity of agricultural goods producers of Cherkasy region on capacity of farmland, majority of which are small-scale, has been carried out. Due to limited access to credit resources on credit resources market in general and preferential lending, growth of tax burden in particular, small-scale agricultural companies are in a difficult financial situation, which makes it impossible for them to operate on the principles of self-financing and self-sufficiency. The solution to this problem is possible through the creation of production, service and credit cooperatives and on their basis – the Agrarian Bank. The basic principles of functioning of agricultural cooperatives have been studied. It has been determined that the development of credit cooperation in this sector of the economy is mainly through the prism of lending, while leveling other important functions that can contribute to the sustainable development of small-scale agrarian sector. The peculiarities of the development of agrarian cooperation in Ukraine have been revealed, and functioning of the information-consulting center for consulting farmers has been singled out in the structure of the rural cooperative. It has been found that cooperation is one of the key institutions that will improve the efficiency of agricultural economy.

Keywords: Cooperation, Cooperative Movement, Agricultural Cooperatives, Credit Cooperation.

Introduction

State food security, health of the population, quality of life of rural society, ecological sustainability of territorial socio-economic systems, the effectiveness of innovation in agriculture, agribusiness, management technologies

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depend on the state of development of rural economy. When using local territorial resources, cooperative form of organization of economic entities is the most acceptable. The main motive of cooperative interaction of members of rural society is the formation of the economic basis for improving the quality of life, given that the development of agricultural sector in modern conditions is possible only with the reform of small agricultural producers through agricultural cooperation. In addition, agricultural cooperation in Ukraine since the end of the 19th century is a unique global experience of reorganizing potential without any foreign investment.

Analysis of the latest studies and publications

A significant contribution to the development of cooperative movement in Ukraine has been made by V. Zinovchuk, M. Malik, L. Moldavan, F. Horbonis, etc. I.Kolokolchikova, N. Pavlenchyk, A. Sholoiko, H. Trosian, O. Chakh-ni, etc. have studied foreign experience. At the same time, not all issues related to the possibility of adapting foreign experience are sufficiently studied and resolved, which indicates the need for further research in this area.

Methodology

Methods of analysis and synthesis were used to consider cooperative aspects of rural development and formulate proposals for further functioning of agricultural cooperatives.

Statement of basic materials

A cooperative is a voluntary association of individuals to meet their own social, economic and other needs, which carry out aggregate economic and other activities.

The revival of cooperative movement is the most important direction in the development of the domestic agricultural sector. This trend should cover the organization of cooperatives for the production and processing of agricultural products of farms and personal subsidiary farms, supply and marketing, as well as credit cooperatives. Their creation will help support small-scale agricultural producers, the accumulation of their resource potential, and the unifying factor for the functioning of production cooperatives in rural areas should be a credit cooperative.

Cherkasy region, as an agricultural industry, is characterized by a large number of business entities of various organizational and legal forms (Table 1). The presented data show that the size of operating entities has a negative impact on production and financial activities. The results of the study show that small-scale agricultural enterprises predominate in the region among the existing economic entities, functioning of which on the terms of expanded reproduction, self-financing and self-sufficiency is hampered due to the impossibility of their introduction of advanced technologies and compliance with agro-technical conditions of management. In 2019, economic entities of agricultural production for the calculation of land per enterprise were divided into the following groups:

Table 1: Differentiation of existing agricultural producers of Cherkasy region by the capacity of farmland in 2019

	The number of enterprises	Percentage to the total number of enterprises	Area of farmland, ha	Percentage to the total area of farmland
Enterprises that had farmland, units	1677	88,1	9047000	100,0
including area, ha				
up to 5.0	51	2,7	0,2	0,1
5.1–10.0	79	4,1	0,6	0,1
10.1–20.0	176	9,2	2,7	0,3
20.1–50.0	382	20,1	13,2	1,4
50.1–100.0	245	12,9	17,7	1,9

100.1–500.0	394	20,7	91,3	10,1
500.1–1000.0	123	6,4	92,3	10,2
1000.1–2000.0	136	7,1	202,1	22,3
2000.1–3000.0	45	2,4	109,3	12,1
3000.1–4000.0	10	0,5	33,8	3,7
4000.0–5000.0	15	0,8	67,0	7,4
5000.1–7000.0	11	0,6	66,8	7,4
7000.1–10000.0	1	0,1	8,1	0,9
over 10000.0	9	0,5	199,6	22,1
Enterprises that did not have farmland	227	11,9	X	X

Source: data of the Main Department of Statistics in Cherkasy region

From the list of agricultural goods producers, the share of small-scale ones with the area of up to 1000 hectares is 1450 or 86.5% of their total number. Small commodity production is one of the reasons for inefficient agricultural production, because such economic entities do not have the opportunity to use advanced technologies of agricultural production, invest in the purchase of new equipment, attract people who are able to create added value in combination with fixed and current assets. Hence the high level of unemployment in rural areas.

Solving the problems of efficiency of small business entities is possible as a result of the creation of cooperatives, including credit, which can positively affect the market of credit resources of farmers.

Credit cooperation is a new economic institution in the countryside, able to solve the problem of lack of financial resources in agricultural production (especially in small commodity). An agricultural credit cooperative is not a mutual aid fund, but a complex socio-economic institution whose activity, unlike credit unions, is to serve the legal entity of farmers, not consumers, unlike credit unions. In view of this, rural credit cooperatives can unite individuals and legal entities: owners of personal farms, peasant farms, large agricultural goods producers.

The availability of funds is the most necessary (after land) resource. However, after the peasants received the land in the early 1990s, many of them were unable to cultivate it, which led to the mass transfer of land for rent, including long-term, for up to 49 years. The creation of a system of cooperatives in rural areas will make it possible to invest in the purchase of modern equipment, plant protection products, elite seeds and productive livestock, increase production and sales of organic products.

An important structure of village cooperative is the functioning of information and consultation center, which is responsible for consulting farmers and employees of other agricultural enterprises, their training, in particular abroad; creation on the basis of the cooperative of a network of information and consultation centers and consultation points for the exchange of experience, advertising of the cooperative and farm products.

The creation of production, supply and marketing cooperatives will increase the volume of production and sales of agricultural goods, search for markets using sales logistics.

In order to detail the influence of the size of economic entities depending on farmland, we used cluster analysis, the purpose of which is to sample the object with its subsequent arrangement into relatively homogeneous groups. Cluster analysis of economic entities in agricultural sector of the region by the size of farmland allows us to identify several types of enterprises with different specialization depending on the size of farmland (Table 2).

Table 2 : The results of cluster analysis of economic entities of Cherkasy region depending on the area of farmland on average for 2016 - 2019.

Index	Groups						On average per totality
	1	2	3	4	5	6	
The number of enterprises	125	99	21	92	59	31	427
The average area of farmland, ha	984	779	1063	2842	3566	4021	1918
The share of crop production in total sales, %	97,4	90,1	96,4	52,3	55,7	53,4	56,5
The share of livestock products in total sales, %	2,6	3,0	1,1	31,9	31,3	30,9	32,1
Share of processed goods to total sales, %	X	x	X	8,9	9,5	10,6	8,2
Share of sold goods on home trade areas to the total volume of sold goods, %	X	x	X	6,9	3,5	5,1	5,2
Material consumption, UAH	0,74	0,63	0,57	0,68	0,69	0,72	0,68
Duration of turnover of current assets, days	489	411	443	262	271	253	319
Profitability of production, %	4,9	3,6	- 2,9	20,7	24,4	35,3	15,4
Investments received per 1 ha of farmland, UAH	122,3	82,9	15,6	679,4	644,1	872,8	312,6

Source: data of the Main Department of Statistics in Cherkasy region

It should be noted that different types of economic entities of agricultural sector of the region, depending on the size of available farmland, correspond to different levels of specialization of their production. Given the results of cluster analysis, it should be noted that the enterprises of the first–third cluster are small-scale in their use, the land area is on average from 779 to 1063 hectares. These are small-scale agricultural producers specializing exclusively in the cultivation of crop products, the share of which in the total volume of sold goods is from 90.1% of the second group to 97.4% – the first group. In view of this, in these groups, livestock goods in the overall structure of sales are insignificant and range from 1.1% in the first group to 3.0% – the second group. The enterprises of the first–third cluster are not engaged in processing own production at all and they do not have trade networks for selling their own production.

At the same time, economic entities of the fourth, fifth, sixth groups have from 2842 to 4021 hectares of farmland at their disposal. These diversified enterprises specialize in growing crop products, producing livestock products and processing their own products at their own facilities. For the most part, these enterprises have their own trade networks through which agricultural products are sold. Closed production cycle has a positive effect on the duration of turnover of current assets in these groups. In particular, the duration of current assets turnover in the diversified entity of the sixth cluster is 253 days, and in the group of enterprises of the first cluster – 489 days.

The analysis gives grounds to claim that economic entities of the fourth, fifth and sixth clusters provide profitable production, the average size of which for the analyzed period is from 20.7 to 35.0%. Enterprises of the fourth–sixth clusters attract significant investments in production, the amount of which is 679.4 644.1 and 872.8 UAH per 1 ha of farmland, respectively.

The analysis of the activity of small-scale economic entities of agricultural production of the region shows that their further development under current conditions is possible only under the conditions of their reform of small-scale agricultural cooperatives. In addition, agricultural cooperation in Ukraine since the end of the 19th century is a unique global experience of reorganizing potential without any foreign investment. A cooperative is a voluntary association of persons who, in order to meet their own social, economic and other needs, carry out aggregate economic and other activities.

The revival of cooperative movement is the most important direction in the development of domestic agricultural sector. This trend should cover the organization of the functioning of both production cooperatives and cooperatives for processing agricultural goods of all economic entities of agricultural production, including farms and private subsidiary farms. In combination with production cooperatives, supply, sales, and credit cooperatives should be fully operational. Their creation will help support small-scale agricultural producers, the accumulation of their resource potential. Production cooperatives are a new economic institution in the countryside, which will solve the problem of lack of financial resources in agricultural production (especially in small-scale production).

The development of cooperative movement in the region's agriculture needs to address many issues. One of them, which requires a systematic approach in its solution, is the issue of consolidation of small farms and cooperation of personal subsidiary farms. In turn, when addressing the organizational form of cooperation in agricultural sector of the region, it is necessary to follow the basic principles:

- volunteering in joint cooperation;
- preservation of economic independence of a business entity that is a part of cooperative association;
- financial interest of the business entity of its employees in the development and improvement of production efficiency;
- increasing production and sales, improving its quality, increasing productivity and cost reduction;
- economic feasibility of creating a new organizational–production system aimed at sustainable development of farms;
- democratic nature of joining new organizational structure and adopting new normative legal documents;
- exclusion of economically unjustified intermediaries between partners;
- development and strengthening of production and economic ties;
- elimination of monopoly position of certain economic entities.

Farms and small-scale producers, due to insignificant volumes of production and sales, low level of creditworthiness carry out production activities without attracting bank loans in general and preferential in particular. Due to small-scale production, they are virtually deprived of access to both ordinary bank loans and those provided on concessional terms. Therefore, we believe that the issue of credit support for farms is a priority for the government, as over the years of market transformation, they have become an integral part of agricultural sector and the national economy. Therefore, the formation and development of small businesses in agricultural production depends largely on their participation in the processes in financial markets. Today, most of these businesses do not have a credit history and liquid collateral, and therefore have difficulty obtaining bank loans. Modern scientific community has largely ignored the study of the peculiarities of the functioning and development of rural credit cooperation, despite the urgent need for theoretical generalization and explanation of this phenomenon. Therefore, currently the development of credit cooperation in this sector of the economy is mainly through the prism of lending, while leveling other important functions that can contribute to the sustainable development of the small-scale agricultural sector.

In general, it can be argued that administrative and economic reforms that accompanied and stimulated socio-economic development of the village, distorted the functional role of credit cooperation and leveled its basic feature – sustainable development of rural areas and small-scale production. After all, branching out the sphere of influence of credit cooperation and expanding the range of its functions has a positive effect on the revival and development of all spheres of life of rural communities and territories, as well as encourages optimization of current assets management of agricultural enterprises.

The current situation in the financial sector of the domestic economy indicates the need to develop a state system of its regulation. The results of the study conducted by V.V. Honcharenko on the creation of a credit system for domestic agricultural production in five stages deserve attention. First of all, in his opinion, the process of self-organization of credit unions should be carried out and this process should be completed with the creation of cooperative banks and the Agrarian Bank. There are other proposals for the stages of formation of credit cooperation, in particular, T. Herasimova based on the conducted studies, proved that the most effective is the creation of a three-level credit system in rural areas. These include credit cooperatives as the main institution of agricultural lending and regional cooperative banks. The third level is the Agrarian Bank. Without denying the expediency of a three-level system of financial and credit support of economic entities, the function of creating the first and second levels of the credit

system should be entrusted to the Agrarian Bank. Therefore, to solve the problem of financial and credit services to agricultural entities completely and finally, it is appropriate to create a credit system similar to the classical Western systems, that is a system of rural credit cooperation, which should be built on bottom-up basis and consist of here levels, each of which has suitably matched activities (Table 3).

Credit cooperatives, which cooperative unions can join, will be the basic institutions of cooperative system and will be its first level*. Their main activity is lending to farmers – members of the cooperative, accepting deposits, and while making appropriate changes to the law, making utility and other payments, providing other financial and non-financial services.

Table 3: Recommendations for the introduction of a multilevel system of lending agricultural production in Ukraine

Level	Institutions	Areas of activity
First	Credit cooperatives in the countryside and credit unions	1. Short-term and long-term lending to personal subsidiary farms and peasant (farming) husbandries; 2. Acceptance of deposits; 3. Making utility and other payments, 4. Provision of other financial and non-financial services.
Second	Universal commercial banks	1. Short-term and long-term lending to large-scale agricultural entities on the basis of various special credit goods; 2. Special credit goods for small-scale entities of agricultural production; 3. Provision of financial services to local rural cooperatives.
Third	The Agrarian Bank	1. Representing the interests of agriculture as a separate segment of bank lending at the national and international levels; 2. Development of issues related to financial support of the main areas of agricultural policy together with the Ministry of Economic Development, Trade and Agriculture, the provision of concessional loans; 3. Interaction with the NBU in the field of refinancing on a concessional basis; 4. Refinancing commercial banks and credit cooperatives in order to further provide loans to all categories of agricultural production; 5. Investment lending to agriculture; 6. Development of land mortgage lending.

To ensure more efficient functioning of local credit unions, appropriate institutions of the second level should be established. These are universal commercial banks, provided they accumulate authorized capital. The activities of the second level institutions are short-term and long-term lending to large and small agricultural entities on the basis of various special credit goods. In addition, their functional responsibilities include serving the needs of local rural cooperatives by providing them with additional financial services (liquidity support, development of new financial products, clearing, internal payments, settlement, currency and investment operations, etc.). To complete the formation of a full-fledged cooperative system of financial mutual assistance of the population is the organization of the third level – Agrarian Bank, established by institutions of the first and second level to represent the interests of agriculture as a separate segment of bank lending at the national and international levels; development of issues related to financial support of the main directions of agricultural policy together with the Ministry of Economic Development, Trade and Agriculture; interaction with the NBU in the field of refinancing on a concessional basis; refinancing of commercial banks and credit cooperatives in order to further provide loans to all categories of agricultural production; investment lending to agriculture; development of land mortgage lending. In addition, Agrarian Bank provides first and second level institutions with additional financial services such as leasing, factoring, insurance, etc.

In Ukraine, the need to create the Agrarian Bank to serve farmers is theoretically justified, however, the problem is not solved due to lack of financial resources, lack of regulations on the sale of agricultural land after lifting the moratorium on their sale. The source of formation of the authorized capital of the Agrarian Bank may be part of the funds received from the sale of agricultural land. When selling agricultural land, a tax on alienation of agricultural land subject to change of ownership should be introduced, with the direction of funds to a special state fund with

their intended use – to replenish the authorized capital of the Agrarian Bank. The creation of the Agrarian Bank with the state's share in the authorized capital is not only expedient and necessary for the following reasons:

- investment and credit services for farmers, in particular, secured by land and property, property and other rights to use;
- prevention of unregulated movement of land;
- trust management of property and land and funds of insolvent entities;
- providing consulting services to members of the cooperative;
- servicing of export and import operations carried out by them;
- methodological support for taxation, lending, insurance, marketing, accounting.

The newly established Agrarian Bank should be given functional responsibilities to represent the interests of farmers as a separate segment of bank lending at the national and international levels, develop issues for financing the main areas of agricultural policy together with the Ministry of Economic Development, Trade and Agriculture, provide soft loans. In addition to state support, functioning of the Agrarian Bank in Ukraine is possible by involving farmers in the formation of its authorized capital. Such cooperation is one of the prerequisites for the operation of a branch bank in Ukraine, as banks that provide loans and farmers who receive them become full partners. Under such conditions, banks are interested in the results of farmers, as they can provide certain preferences when lending. Raising the capital of borrowers in the formation of the loan portfolio is possible on self-supporting terms and the interest of the latter in investing.

Among the areas of influence of bank lending on the competitiveness of agricultural goods, the implementation of projects aimed at improving their lending in operating and investment activities should be identified. The newly established Agrarian Bank will undoubtedly play a positive role in the process of stimulating bank lending to agricultural sector of the economy. In Ukraine, state support for cooperatives has not become a component of agricultural policy. Two attempts by the Government (2008 and 2018) to quickly organize financial support for cooperatives failed. At the same time, the decision to establish the Agrarian Bank did not take effect due to the lack of regulations on its establishment and lack of financial resources for its functioning.

Until now, lending to farmers is carried out through a number of commercial banks, interest rates on loans in which are much higher than their level of profitability. Farmers are practically left without financial state support. The motivation of the protectionist state policy on agriculture is the need to support not only the economic function of the industry.

Western agro-economic science has recognized multifunctional purpose of agriculture, which also includes the performance of social functions – ensuring food security and food independence of the country, promoting employment and settlement of rural population, rural development and more.

Despite the unstable economic situation in the country against the background of rising energy resources prices, fertilizers, fuels and lubricants for agricultural sector, the Verkhovna Rada of Ukraine adopted amendments to the State Budget of Ukraine which imply receiving 1 billion UAH by farms for the first time, which will help create a competitive environment and allow cooperatives to increase production and sales, the main prerequisites for the creation of processing cooperatives.
In general, the budget of Ukraine provides for expenditures for 2019 in the amount of 3.099 billion UAH, of which the general fund amounts to UAH 1139.0 million, the special fund – 1.96 billion UAH.
It is worth noting that the level of support for agricultural sector entities in the EU differs significantly from the state support for domestic farmers. In particular, Greek farmers receive about 700 euros per hectare of land, in Bulgaria – 190, in Lithuania – 143, in Estonia – 112 euros, and in Ukraine – less than 20 euros. In addition, in the European Union, farmers can take a loan at 3–5% per annum.

One of the areas of state support for agricultural cooperatives is the introduction of a special tax regime.

The specificity of the production activities of cooperatives due to the seasonality of production, the temporary gap in the receipt of funds from sales, the disparity in prices for agricultural and industrial products determines the application of a special regime of their taxation.

The instability of tax legislation, increase in monetary assessment and single tax rates (fourth group) from 01.01.2015, the abolition of a special VAT regime at the request of the IMF from 01.01.2017 led to an increase in the tax burden on agricultural producers.

Given this, the association of agricultural producers of all organizational and legal forms of ownership is timely, which will allow them to increase sales of finished products, to operate on the basis of self-financing and self-sufficiency.

Conclusion

The positive changes in agricultural sector have a serious influence on the process of production, distribution and consumption of agricultural products, and reforms supporting cooperation provide new opportunities and chances for Ukraine's economy. At the current stage of development of the agricultural sector of the economy, it is important to make full use of the experience of foreign countries in the development of agricultural cooperation and at the same time to treat real situation in the country reasonably.

The development of cooperative movement in Ukraine could be a driving force for qualitative changes not only in agricultural sector but also in the country as a whole. But this requires the combined efforts of villagers, NGOs and government officials. The relevant laws need to be updated, and the very idea of cooperation needs more coverage and discussion. According to world experience in a market economy, cooperatives are the third force or alternative to public and private enterprise.

Thus, the involvement of farms, private farms and other small agricultural producers in agricultural cooperatives, which will receive state aid for the purchase of equipment for storage and processing of agricultural products, repayment of interest on loans, will help bring it out of the shadows and increase income of its producers. The mechanism of taxation of agricultural producers, which should be based on common methodological approaches to all forms of agricultural business in the countryside, needs to be further developed.

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Risk Factors and Risk Management in Large-scale Running Events: The Case of Marathons Events

Jacek ŁUCZAK

Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland
E-mail: jacek.luczak@ue.poznan.pl;

Małgorzata MIŚNIAKIEWICZ

Cracow University of Economics, College of Management and Quality, Department of Food Product Quality, Krakow, Poland
E-mail: malgorzata.misniakiewicz@uek.krakow.pl

Abstract

The complexity of the project and the uncertainty related to its unique character are important factors affecting the risk associated with the implementation of a given project. The subjects of the analysis were the risk factors related to the organization of marathons classified as mass sports events. None of such events can be flawlessly planned and none can be carried out strictly according to a previously developed plan. Risk management, as a sequence of separate activities during the organization and course of a sports event, especially the identification and prioritization of threats, helps the event organizers to cope with the uncertainty related to individual aspects of the event. This gives more space for manoeuvre, allowing the organizers to pay special attention to those risk factors, the minimization or elimination of which at an early stage allows minimising the probability of negative effects and creates the greatest probability of achieving positive results. Risk, if left unattended, tends to degrade the running event value and the effective risk management adds extra value to it. The research aimed at analysing identified risk factors for marathons in the context of defining the character of managerial decisions related to marathons organisation. As the results of the research verification of risk factors and their logical grouping were conducted. The authors carried out the validity assessment of the research instrument (the Cronbach's alpha statistics was used) as well as conducted the cluster and factor analyses to illustrate the research results and provide results of higher quality in the context of taking risk mitigation actions for marathon organization.

Keywords: Risk Factors Analysis, Running Events, Priorities In Risk Management.

Introduction

Recreational running is typical for the modern lifestyle model of a significant group of the society, a relatively cheap one that does not require any special sports arenas (Czkór, 2014; Shipway, Holloway & Jones, 2013). Everyone can run regardless of the time of a year, age, gender, physical fitness, social status and education level, on your own or participate in professional running events, choosing from shorter or longer city runs to ultra marathons. In the world we may observe significant dynamics of the growing interest in participating in long-distance runs. This phenomenon makes the organization of running events important social projects to participants, their families, organizers and a given local community.

Long-distance running events have surged in number and participation in Poland in the last few years. In 2010 nearly 800 different races were registered in Poland, while in 2015, an increase of nearly 132% in comparison with 2010 (1,856 runs) was recorded. In the following years, the number of races grew, although the dynamics were not that significant. In 2018 a total of over 2,500 runs were registered in Poland (www.maratonypolskie.pl). In the top 10

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marathons in Poland in 2018 a total of 33,445 runners took part (the statistics include only participants who completed the race).
Surprisingly, 51% of sports events' organizers in Poland do not conduct formal management of the project, which is the organization of a sporting event in accordance with a recognized methodology. 78% of them do not formally estimate the risk of organizing sports events (Miśniakiewicz & Łuczak, 2014). In practice, risk management, as a part of operational management, is often limited to intuitive avoiding threats and meeting existing legal requirements. Therefore, it is probable that decisions related to the organization of the run are not made optimally, perhaps no significant risks are identified and, as a consequence, they are not adequately mitigated (Hanstad, 2012). As a result, a sports event may not bring the expected benefits and its course may be disturbed or even interrupted (Reid & Ritchie, 2011, Helms, 2011). It results in further risks related to the loss of the organizer's reputation and dissatisfaction of the participants, who put a lot of effort into the preparation and often incur specific costs associated with their participation in the running event (Moyle, Kennelly & Lamont, 2014; Nohr, 2009). What is more, dramatic incidents and deaths in several high-profile running events have understandably contributed to misgivings regarding the safety of such events and encourage their organizers to think of professional risk management (Bjarnason & Cannell, 1999, Berlonghi, 1990).

The majority of marathons in Poland do not meet the criteria of mass events. It means that they are not a subject to expansive legal regulations related to providing their security. It significantly facilitates their organization and at the same time leaves the responsibility for their management to the experience of the organizers (Żuryński, 2013). The organizers should identify potential risks within the running event and implement adequate measures to control them (Fuller & Drawer, 2004).

The decreasing number of marathon finishers on the one hand as well as the growing number of events available on the running market, and, thus, growing competition, on the other hand motivate their organizers to improve the quality and efficiency of such events. Consequently, they aim at professionalizing planning and implementation (Shipway, Holloway & Jones, 2013; Peters & Pikkemaat, 2005; Spengler, Connaughton & Pittman, 2006).

There are no obligatory legal requirements to carry out risk management in large-scale running events today but it is a helpful tool to identify risks, assess and mitigate them to the acceptable levels. It assists sporting event managers in providing a reasonably safe environment and can constitute a fundamental for solving the occurring and potential problems (Berlonghi, 1990; Ammon & Brown, 2007).

Risk, if left unattended, tends to degrade the running event value (Rescher, 1983) and the effective risk management adds extra value to it (Toohey & Taylor, 2008). Yet the event organizers should remember it is impossible to eliminate risk totally without degrading value, so the decision process must follow an optimizing rule, balancing the costs and benefits against overall risk management (Rescher, 1983; Miller, Wendt & Young, 2010). An early understanding of the level of risk, different risk issues, complexity and uncertainty when talking about risk management would help in the determination of the project scope and the ultimate success of a running event (Shone & Parry, 2004; Nohr, 2009). The list of critical risk factors and more conscious risk management of large-scale running events are supposed to be the results of these actions.

That is why risk factors were identified by 15 experts and analyzed by 31 representatives of organizers responsible for 14 marathons in Poland. All the events belong to the group of the 20 largest marathons in Poland (research carried out by Łuczak, Miśniakiewicz, Saavedra**,** Identification and Assessment of Risk Factors for Large-Scale Running Events from The Organizers' Perspective. Marathon Case Study**,** 36th IBIMA Conference).

Methodological Assumptions for the Analysis of Risk Estimation

Authors carried out research aiming to identify risk factors (the Delphi method, a discussed questionnaire, 15 experts, 2017) and to estimate risk (qualitative research, a questionnaire, the e-risk app, 31 representatives of 14 marathons, 2017-2018) (research carried out by Łuczak, Miśniakiewicz, Saavedra**,** Identification and Assessment of Risk Factors for Large-Scale Running Events from The Organizers` Perspective. Marathon Case Study**,** 36th IBIMA Conference). The Cronbach's alpha statistics was used to assess the used questionnaire reliability. Cluster analysis and factor analysis of the most important risks completed the analysis.

The research aimed at analysing data (identified risk factors for marathons) in the context of defining the character of managerial decisions related to organizing marathons. The realization of the research led to the verification of risk factors and their logical grouping (arrangement).

The authors carried out the validity assessment of the research instrument as well as conducted risk assessment - the cluster and factor analyses to better illustrate the research results and provide results of higher quality in the context of taking risk mitigation actions for marathon organization. Reliability analysis (Cronbach, 1951; Peterson, 1994) was applied with the use of the Cronbach's alpha statistics to confirm the adequacy of the applied research instrument (a questionnaire prepared as the result of the preparatory research) (Peterson, 1994; Brzeziński, 1996; Cronbach, 2005; Hornowska, 2001; Peterson, 1994).

The factor analysis was used to distinguish risk factor groups. This method is considered insufficiently objective, however, it is highly important while exploring the structure of multidimensional data (Balicki, 2013). It helped to categorize observations in a proper way so as the distinguished groups were simultaneously coherent due to variables (internally cohesive) and different to others (i.e. characterized by external isolation – Walesiak & Gatnar, 2016). Consequently, the cluster analysis was conducted to distinguish groups of organizers on the basis of attitudes to risk (Hanstad, 2012) as the results showed that risk factors are assessed at various levels. Due to cluster analysis, contrary to the analysis of average risks values, certain attitudes (approaches) to risk of organizing events may be revealed.

On the basis of relevant professional literature (Milligan, 1996) several stages of a typical cluster analysis were distinguished, including the choice of items and variables, data standardization, the selection of a distance calculation method and a classification method, establishing the number of classes and result evaluation (Walesiak, 2004). At the stage of selecting variables we decided to analyze the impact of factors of the highest generated risk (variables were grouped on the basis of the arithmetic average of risk assessment and then we simultaneously applied scree plot and the minimal risk value criterion at level 4 (so as the analyzed risks could be characterized by larger than minimal probability and consequences).

The authors also decided that the selection of insignificant variables is an incorrect approach (Milligan, 1996; Walesiak, 2004), as it may hinder the discovery of a cohesive or relevant class difference within the set. Next, the variables were subjected to normalization with the use of standardization (the application of the average and standard deviation) (Grabiński, Wydymus, Zeliaś, 1989; Wilk et al., 2015).

Having discussed the choice of the most adequate classification method we finally decided to use the hierarchical method (so as to define the number of class on the basis of the dendrogram). Next, the application of the method including the initial classification of items, in which the number of distinguishable classes is known (Gatnar & Walesiak, 2012), was considered valid. Moreover, the method of the increased squared distances sum (also called Ward's method), which optimizes the division obtained by the combination of two elements at all stages, was used by the application of the minimum growth of the total sum of the squared variance of all variables for each item from group average values (Balicki, 2012). Consequently, on the basis of the dendrogram we decided two distinguish 3 clusters.

Next, the k-means clustering was conducted, within which each class was represented by its centroid (Gatnar & Walesiak, 2012). Moreover, the clusters were checked for single-element sets – it might have suggested the occurrence of extreme deviations, which are capable of distorting the cognitive function of cluster analysis.

The factor analysis aimed at revealing a new set of variables – a set, which is less numerous than the original one, but can reflect its variability. These factors should retain a significant portion of information included in the original variables (Walesiak & Gatnar, 2016; Balicki, 2013). Within the factor analysis, as well as within the cluster analysis, not all accessible variables were used – it was limited to the variables of the cluster analysis. It allowed for the comparability of analyses and their internal cohesion.

Analysis of Priorities in Risk Management

The Cronbach's alpha statistics result reached the level of 0.933 (21 positions). According to the classical interpretation the coefficient should have the minimum value of 0.6, whereas the preferable value of the coefficient is approx. 0.9. Thus, the internal cohesion of the research instrument was confirmed.

The presentation of the proper research results begins with the classical approach to risk assessment – the statistical analysis of average values of risk factors accompanied with tagging the ones of the highest risk and the largest frequency. The following part presents four groups of event organizers (according to their attitude to risk) distinguished on the basis of the cluster analysis as well as risk factor groups distinguished on the basis of the factor analysis.

The grouping of the data was arbitrary and was discussed with experts; within this scope the result of factor analysis stemmed from a discussion. The selected factors with the average value of risk at 4.1 or higher (36 most important factors) were standardized. The cut-off was applied with reference to factual evaluation. Not all variables were taken into account on the basis of the analysis of averages. The declining graph of averages of specific variables may be treated as a scree plot. Thus, we may not take into account the variables whose significance was marked as marginal and which might influence the results of grouping after standardization (Guyon & Elisseeff, 2003; Breiman et al., 1984).

It is also adequate to define the probability of occurrence (the average) in reference to the identified risk factors. Three groups of risk factors were distinguished - with the value of probability: at 2.00 or higher – 14 the most probable factors (see Table 1) at 1.20 to 1.99 – 50 factors, and at 1.19 or lower – 12 least probable factors, which may occur only theoretically.

Table 1: The most probable risk factors.

Code	Risk factor	Average
2.5	Time overlapping with another rival event	2.71
4.5.	Inability to receive start packages on the day of competition	2.71
2.2.	Insufficient funding from sponsors	2.38
5.5.	Inappropriate organization of the run – jams after the start	2.19
6.1.	An unattractive start package	2.19
8.3	Lack of information about the event in the national media	2.19
2.4.	Lack of profit at the planned level	2.14
3.6.	A cyber attack – modification, blocking of the website	2.14
9.1.	Downpour	2.10
2.1.	Insufficient income from participant fees	2.05
5.6.	Inappropriate organization of the finish	2.05
5.16.	Limited human resources	2.05
1.2.	An intrusion of a third party onto the running route	2.00
3.4.	Unintended disclosure of personal data	2.00

Respondents considered the factors related to the marathon budget and achieving objectives as the most probable along with the ones linked with physical safety (an intrusion of a third party onto the running route), data protection (a cyber attack, disclosure of personal data) and organization (start and finish, issuing start packages).

Risk assessment aims at indicating priorities within the scope of additional security measures, which reduce risk to an acceptable level. These priorities were defined due to the statistical analysis of factors with tagging the ones that generate the largest risk. Making adequate decisions within the process of organizing a marathon needs taking account of the most probable factors as well as the ones of large impact (consequences).

The analysis of the proper research results included the cluster analysis (Ketchen & Shook, 1996). The choice of the optimal number of clusters is usually unclear – the most popular methods vary from 2 to 4 clusters. However, the biggest cognitive value and distance between clusters may be observed for 3 clusters. Therefore, we made the decision to establish the number of clusters at 3. This choice was also confirmed by creating a dendrogram (the use of hierarchical cluster analysis, Ward's method) (figure 1).

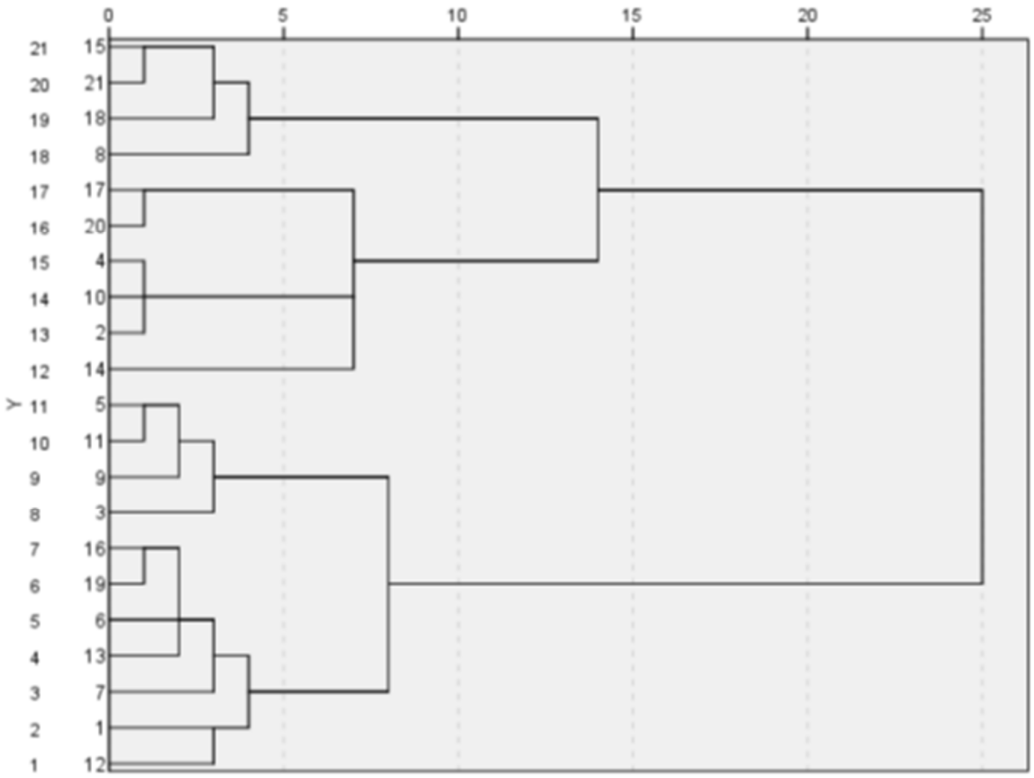

Figure 1: Dendogram with the use of Ward's method, joined clusters (scaled distances)

We may characterize the centers of the three clusters through analyzing them. Taking account of the clusters of variables the following three groups of organizers were distinguished: group A (cluster 1) – "no problem"; group B (cluster 2) – "business"; group C (cluster 3) – "organizers".

- Cluster 1 (group A – "no problem") consists of entities that assess all risks as low, in particular in reference to start packages, the local community, wrong identification and form of the route, difficulty in arriving at the start etc. For them the problems related to financial resources, e.g. funding from sponsors, are of the highest importance. However, even these risk areas reach lower than average values within this group.
- Cluster 2 (group B – "business") is a group that emphasizes financial aspects and associates the highest risk with insufficient profit, insufficient income, limited solvency as well as human resource and promotion problems (an insufficient number of volunteers, lack of their engagement, a rival competition).
- Cluster 3 (group C – "organizers") emphasizes organizational risks (problems with the route, start packages, volunteers, communication, PR, personal data). Moreover, this group does not consider financial risk significant (Table 2).

Table 2: Description of the cluster groups of marathon organizers

		1	2	3
1.3.	A participant of insufficient health condition	0.08878	0.03906	-0.23439
4.7.	An inappropriately narrow route, narrows	0.05270	0.31659	-0.43252
1.2.	An intrusion of a third party onto the running route	0.01008	0.02218	-0.04436
4.2.	Poor organization of the deposit office	-0.00255	0.17926	-0.17366
2.1.	Insufficient income from participant fees	-0.01478	0.86980	-0.83728
2.4.	Lack of profit at the planned level	-0.08423	1.18412	-0.99882
4.5.	Inability to receive start packages on the day of competition	-0.09292	-0.54171	0.74612
3.4.	Unintended disclosure of personal data	-0.15453	0.16998	0.16998
2.3.	Insolvency	-0.17829	1.11465	-0.72240
5.16	Limited human resource	-0.24351	0.97101	-0.43528
5.9.	Delayed start	-0.24754	0.53826	0.00633
2.2.	Insufficient funding from sponsors	-0.32679	0.45191	0.26704
1.1.	A serious accident on the route	-0.36254	-0.01431	0.81189
5.5.	Inappropriate organization of the run – jams after the start	-0.36393	0.64051	0.16013
3.5.	Personal data theft	-0.38584	0.13378	0.71506
8.5.	An insufficient number of participants (too little interest)	-0.45312	-0.05734	1.05421
1.7.	Insufficient medical support	-0.45380	0.22228	0.77609
8.6.	A rival local event	-0.45519	-0.03655	1.03796
2.5.	Time overlapping with another rival event	-0.48626	0.73334	0.33643
9.1.	Downpour	-0.51235	0.86053	0.26664
9.7.	Force majeure	-0.51355	0.50675	0.62306
7.3.	An insufficient amount of water at recovery points	-0.55089	1.62824	-0.41629
9.4.	An overly high temperature	-0.56247	0.84800	0.38943
5.12.	An insufficient number of volunteers	-0.56247	1.30658	-0.06915
1.5.	A terrorist attack (an explosion, shooting, ramming)	-0.57398	0.11287	1.14987
3.6.	A cyber attack – modification, blocking of the website	-0.60697	-0.10142	1.43676
8.1.	Unfavorable media information on the national scale	-0.62795	0.07018	1.31131
4.3.	Difficulty in reaching the start of the marathon	-0.67638	0.34846	1.13957
5.1.	Inappropriate running route identification	-0.71027	0.23439	1.32821
5.13.	Lack of volunteers' engagement	-0.71691	0.73701	0.84019
5.17.	Incompatibility of the running route capacity with the n° participants	-0.72095	0.35790	1.22818
3.3.	Insufficient promotion/information on external websites	-0.72573	1.50666	0.08995
6.1.	An unattractive start package	-0.72684	0.91693	0.68211
5.14.	Faulty time measurement	-0.79141	0.30759	1.43352
5.6	Inappropriate organization of the finish (e.g. inability to finish freely)	-0.82651	0.90917	0.90917
6.3.	An insufficient number of medals	-0.82716	1.29202	0.52773
5.8.	Problems related to organization, time of the event etc.	-0.84511	1.29566	0.56358

While analyzing the results one should note that the data approximating to zero indicate that the average risk assessment in a specific group is typical (identical) of the whole set. In cluster 1 ("no problem") it specifically means:

An intrusion of a third party onto the running route, Poor organization of the deposit office, Insufficient income from participant fees; in cluster 2 ("business"): A participant of insufficient health condition, An intrusion of a third party onto the running route, A serious accident on the route, A rival local event; and in cluster 3 (group C – "organizers") it mainly refers to: Delayed start, An insufficient number of volunteers.

The values higher than zero indicate a higher risk assessment in comparison with the average and, by analogy, values below zero define the risk factors the risk assessment of which was lower than the average. The interpretation of the results (dark/light gray highlighting) is arbitrary. The dark gray fields indicate a considerable difference between the achieved risk assessment value and the average (above 1 or below 1), light gray fields depict a lesser difference (but still significant).

The further the value is from zero, the larger the deviation. Hence, in the group called "no problem" there are no significant deviations, but there are some smaller ones (10 factors), i.e. "Inappropriate organization of the finish (e.g. inability to finish freely)", "An insufficient number of medals", "Problems related to organization, time of the event etc. with the local community and the administration". In the group called "business" large deviations relate inter alia to "An insufficient amount of water at recovery points", "An insufficient number of volunteers", "Insufficient promotion/information on external websites". The group called "organizers" is the most "visible", which stresses the risk group related to organization and at the same time pays little attention to the financial aspect. The large deviations include "A cyber attack – modification, blocking of the website", "Faulty time measurement", "Unfavorable media information on the national scale". On the other hand, lesser deviations within this group embrace 3 factors, e.g. "Insufficient income from participant fees", "Lack of profit at the planned level".

The use of cluster analysis has allowed for distinguishing a number of groups of run organizers' attitudes. It should be noted that these attitudes are radically dissimilar – there is a group within which no problem is considered significant, whereas other groups emphasize organizational and financial risks. Hence, it seems clear that developing universal risk management tools is very difficult. Moreover, the analysis may give rise to a question whether individual characteristics of specific events have been taken into account – depending on the organizers' goals some risks should be controlled (managed), whereas others seem to be irrelevant for the persons responsible for organizing a specific event.

Negative values mean lower than average risk assessment of a given variable within the cluster, whereas positive values denote higher than average risk assessment. This explanation is subordinate to the key characteristics of the three types of organizers. The cluster analysis confirmed the frequently formulated financial and organizational aspects, as well as the approach, which takes account of risk assessment as an essential element of managing and organizing running events. It is reflected in a specific organizer's status. If a city or a municipality organizes the event they consider financial risk less relevant, as the assurance of financial aspects is a part of the institution's budget. Organizational aspects generate more risk for them. The present study uses factor analysis in order to structure data and identify specific interrelations. Within the factor analysis 7 components were identified, which allowed for explaining 91% of data variability (table 3).

Table 3: Identification of components within the factor analysis

	Total sum of squared loadings after rotation		
	Total	**% variance**	**% accumulated**
1	7.105	20.896	20.896
2	6.628	19.495	40.390
3	4.776	14.048	54.438
4	4.355	12.807	67.246
5	2.988	8.789	76.034
6	2.712	7.975	84.010
7	2.273	6.686	90.696

The risk factors explained by specific components were determined. It should be stated that the first factor mainly refers to issues directly related to the route – its identification, time measurement, capacity, start packages, access to water (recovery) and weather. The second and third factors are linked with budget issues and sports-unrelated

questions, which may occur during the event – a terrorist attack, personal data theft, an intrusion of a third party onto the route, or problems with the deposit office (during competition). The fourth factor is associated with occurrences such as health problems of participants and competition in reference to an alternative running event (organized at the same time). The remaining factors include variables such as unintended personal data disclosure, or issues of too little interest from potential participants (table 4).

Table 4: Risk factor groups

Factor 1	Factor 2	Factor 3	Factor 4	Factors 5, 6 and 7
3.3. Insufficient promotion/information on external websites	1.5. A terrorist attack (an explosion, shooting, ramming)	1.1. A serious accident on the route	1.3. A participant of insufficient health condition	3.4. Unintended disclosure of personal data
5.1. Inappropriate running route identification	2.4. Lack of profit at the planned level	1.2. An intrusion of a third party onto the running route	2.5. Time overlapping with another rival event	8.5. An insufficient number of participants (too little interest)
5.6. Inappropriate organization of the finish (e.g. inability to finish freely)	3.6. A cyber attack – modification, blocking of the website	2.2. Insufficient funding from sponsors		8.6. A rival local event
5.8. Problems related to organization, time of the event etc. with the local community and the administration	5.16. Limited human resources	2.3. Insolvency		
5.12. An insufficient number of volunteers		3.5. Personal data theft		
5.13. Lack of volunteers' engagement		4.2. Poor organization of the deposit office		
5.14. Faulty time measurement		4.7. An inappropriately narrow route, narrows		
5.17. Incompatibility of the running route capacity with the number of participants		5.5. Inappropriate organization of the run – jams after the start		
6.1. An unattractive start package		5.9. Delayed start		
6.3. An insufficient number of medals				
7.3. An insufficient amount of water at recovery points				
9.1. Downpour				
9.4.An overly high temperature				
9.7. Force majeure				

During factor analysis one should take into account the fact that it aims at describing and arranging data. Hence, factor analysis supports the alternative grouping of risk factors completed as a result of the preparatory research.

Conclusions

A factor analysis was performed to determine the source of factors, and also to determine in what area it is necessary to dedicate mitigation measures. Carrying out the factor analysis allowed to check if risks from one group are related to each other, or whether there are risk factors assigned in the questionnaire to different groups. As part of the factor analysis, 7 components were identified, explaining 91% of the variability of the data.

In addition clusters were analyzed which allowed distinguishing three groups of marathon organizers. The first focus ("no problem") are low-risk objects. Second focus ("business") emphasizing financial aspects and combining the highest risk with insufficient profit, too little influence, limited liquidity as well as personnel and promotional problems. The third group ("organizers") emphasizes the organizational risks (problems with the route, starter sets, volunteers, communication, image, related to personal data), at the same time the risks associated with finances are low in this group. This information is a great input data in reliable risk management process.

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Basic Principles and The Scorecard of Economic Evaluation of Building Information Modelling Introduction in The Activities of Construction Organizations

Sergey BORODIN
Associate Professor, Department Applied Economics, South Ural State University (National Research University), borodinsi@susu.ru

Evgeniya MATVIISHINA
Associate Professor, Department Applied Economics, South Ural State University (National Research University), matviishinaem@susu.ru

Kirill KARDAPOLTSEV
Associate Professor, Department Applied Economics, South Ural State University (National Research University), kardapoltcevkv@susu.ru

Evgeniy GUSEV
Professor of the Department of Applied Economics, South Ural State University (National Research University), gusevev@susu.ru

Evgeniia NOVOKRESHCHENOVA
Master student of applied economics department, South Ural State University (National Research University), gerald.krown@mail.ru

Abstract

The purpose of the article is the analysis of the process of building information modelling (BIM) implementation in the construction industry. One of the objectives of this article is a definition of the basic principles and the scorecard of economic evaluation of BIM introduction in the activities of construction organizations based on the methodological recommendations for the assessment of investment and IT-projects. The article will be useful for organizations that carry out construction projects in the metallurgy industry. At the present time the construction industry is in the process of modernization. As a result, all participants of construction of capital objects and structures (designers, builders, and facility companies, suppliers of materials and machines, financial organization and etc.) put completely new objectives and have the requirements that haven`t previously arisen. The main reasons of changes in the construction process are connected with the high rates of construction, the increase in the number of unique objects that require an integrated and interlinked approach at all stages of the life cycle, and the need to reduce costs and improve the efficiency of management. The established methods have been replaced by the new direction – building information modelling (BIM). The effectiveness of BIM projects must involve a balance of profits and costs, or the feasibility of implementation. In this regard, the process of BIM implementation in the activities of construction organizations can be considered as an investment or IT-project. The efficiency analysis of these projects is made on the basis of already developed guidelines and principles. The assessing of the effectiveness of the BIM projects implementation requires the development of the scorecard, which includes cost-based, organizational, technical, temporal and social groups of indicators. The identification of the scorecard and the stages of evaluation, based on the analysis of economic efficiency of investment and IT-projects, can form the basic principles of economic evaluation of BIM introduction in the activities of construction organization. These principles are the principles of economic efficiency of investments into the BIM project, the preliminary calculation, the independent evaluation and the principle of uncertainties and risks etc.
Listed principles and the scorecard must allow for the possibility of making targets, define new goals and objectives of the construction.

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Keywords: Principles, Economic Evaluation, Project of Construction, Effectiveness, Information Technologies, Building Information Modelling, BIM.

Introduction

The use of building information modelling (BIM) in the construction activity to the global trend (USA, UK, China, etc.) is due to significant advantages such as economic benefits in various stages of construction and the reduction of the duration for the project.

Economic evaluation of projects realized within the British sectorial strategy with application of information technologies «Construction 2025» has identified the reduction of start-up costs for the construction and operation of the facility by 33%. Some individual EU countries, particularly France and Germany, have already announced the programs similar to the UK *(Kolrol, 2015).*

The application of information modelling in the international practice leads to the increase of the construction organizations efficiency, which are involved in the construction and reconstruction of objects of the metallurgy industry (hereinafter referred to as "construction organizations"). As a result, there is an objective necessity in BIM for the Russian investment-construction complex. Expected digital modernization of construction processes will reduce the total costs of projects by 20% by the year 2020, hence, economic evaluation of these projects is essential (*Belyuchenko, 2016).*

The introduction of information technologies in the activities of construction organizations has several advantages. There are two direction of development BIM in the world: support of the government (UK, USA) and direct private constriction company interest (Germany, Sweden). Currently, the challenges of implementation and BIM development in practice of construction organizations received additional support from the state in Russia. In particular, the interest of the Ministry of the Russian Federation has been expressed in the approval of the plan of gradual introducing information modelling technologies into the field of industrial and civil construction *(Ministry of Construction Industry, Housing and Utilities Sector, 2014).*

In this connection, the increase in the competitiveness of foreign construction organizations using information technology, as well as practical evidence of the effectiveness of these projects were the impetuses for the BIM development on the Russian market.

The importance of developing principles for economic evaluation of projects aimed at improving the quality of BIM projects and cost reduction in the design process using information modelling. The construction project will have more adequate evaluation because of the user`s application of the developed principles, that covers a wider range of indicators.

Literature Review

The term BIM was introduced by Autodesk in 2002. The architect and strategist of Autodesk in the field of construction applications Phil Bernstein used the term for the first time in its modern form: «Building information modelling». There are various definitions of BIM in different sources. However, these definitions are similar in content. In that paper the term BIM refers to an electronic database containing all the information required for the design, construction and operation of the building and a set of specialized tools to manage these data *(Code of practice «Information modelling in construction. The rules of information model formation of building projects at different stages of their life-cycle contain the following definition of the concept «BIM-project», n.d.).*

However, the interest in information modelling came much earlier. Charles Eastman, a professor of the Georgia Institute of Technology for the first time used the term «Building Description System» in his works in the middle of 1970s *(Smith, 2014)*. The documentation package executed the role of database before computer technologies. There was a whole system of management of these data for creating, editing, storing and ensuring the integrity of the database.

After the emergence of computer programs that allowed you to create, store and edit project documentation (CAD), the opportunity to store information in electronic form appeared. However, the individual parts of information are not connected and there is a necessity to perform a certain amount of manual work to ensure the integrity of the data *(Gushchin and Kopylov, 2005).* For example, if all the constructions were performed in AutoCAD, in the majority of specialized calculation programs the information would need to be entered manually. Despite the fact that the collection of loads, specifications, estimates, descriptions, and results of calculations can be stored in electronic form, the relationship between data is realized only by human.

The attempts to merge the data into one interconnected information space were made a long time ago. Beginning from the format converters to creation of a special format for data storage (*Kozlov, 2010)*. It is hard to say that the process of consolidating the data has been completed, as still there are problems with compatibility of separate programs, but certain results of the solution of this difficult task have been achieved. There are already lines of software products working on BIM which allow executing work practically on all sections of the project and have been proved its efficiency.

Building information modelling has been appeared recently, however, during last years it`s becoming dominant in the world of design and construction practice, replacing all the design methods, which have been used previously. BIM is being actively implemented in companies around the world: China *(Hong et al., 2020), (Hong, Hammad and Akbarnezhad, 2019)*, New Zealand *(Okakpu et al., 2019*), Malaysia *(Mamter, Abd Aziz, Zulkepli and Mamat, 2018)*, Australia *(Hadzaman, Takim and Nawawi, 2015), (Hong et al., 2020),* India *(Ahuja et al., 2018)*, Singapore *(LIAO and TEO, 2017), (Hadzaman, Takim and Nawawi, 2015), (Attarzadeh, Tiong and Nath, 2015)*, Hong Kong *(Hadzaman, Takim and Nawawi, 2015).* Currently there are a number of published books and articles dedicated to the basic BIM functioning, description of the benefits and costs accompanying the process of introducing the technology. The main advantages that have had a decisive influence on the compulsory transition to using BIM are the detection of errors at early stages of the project, control of project implementation, the involvement of the customer and experts in the process, reducing legal risks and costs for approval, increased revenue and reduced downtime.

At the moment it is possible to observe in Russia the initial stage of active BIM implementation in the construction industry. The task included in the process of architectural design innovation, which based on modern organizational and management decisions, has been set in the concept of long-term socio-economic development of the Russian Federation for the period till 2020 and the Strategy of national security of *Russia (The Government of the Russian Federation, 2008).* The priority directions of modernization of the Russian economy were announced at the meeting of the Commission for modernization and technological development of Russian economy from 18.06.2009. One of them is strategic information technology including software development. Therefore, inclusion of the latest effective innovative technologies, materials and designs in structure of the project documentation is a priority in the decision of all project organizations. At the beginning of 2014 the Government of the Russian Federation charged this question to Ministry of Construction Industry which issued the sector order №926/pr «On approval of the plan of gradual introducing information modelling technologies into the field of industrial and civil construction». According to the plan, transition to using BIM during design and construction will be obligatory by 2017, and the number of the projects issued with the use of building information modelling will increase to 50% by 2019 *(Ministry of Construction Industry, Housing and Utilities Sector, 2014).*

In addition, the provision of design documentation for construction of facilities in electronic form with the provision of an information model (BIM) has been compulsory since 2019, when the source of funding is the state budget. According to this, a significant transition to using BIM in the design and construction has been since 2017. Moreover, it was entail the increasing public interest and demand for economic services for the calculation of the effectiveness and feasibility of BIM projects.

Implementation of information modelling projects entails organizational and structural changes in the project team, staff retraining and new software. In this regard, a deficit of highly qualified personnel knew how to use the building information modelling *(The Government of the Russian Federation, 2010).*

Despite the economic benefits of BIM in the design, reorganization of the construction process will require high capital costs of the construction organization in case of implementation of this technology at an initial stage. Considering the low investment climate in Russia, and also availability of sanctions from the foreign IT-industry,

BIM implementation will be difficult for many organizations at the present stage of development of the specialized Russian market of information technologies in construction *(Donchenko, 2016).*

The difficulty connected with assessment of an economic impact of BIM on the construction organizations and cost of buildings has been becoming the subject of serious scientific research [for example, *(Olawumi and Chan, 2020), (Lazaro-Aleman et al., 2020), (Chegu Badrinath and Hsieh, 2019), (Teng, Li, Wu and Wang, 2017), (Muller et al., 2019)*]. It means that the methodology of an economic evaluation of BIM implementation in the construction projects isn`t developed at the moment.

As a result of the research it was revealed that the general algorithm of an economic evaluation of BIM implementation in the construction organizations isn`t elaborated at the moment. Due to the transition to using BIM in designing, the construction industry needs to develop the basic principles of economic approach to the evaluation of the implementation efficiency.

Methods

An analysis of scientific publications on the issue for the period from 2012 was carried out. The study examined the results of scientific publications in scientific conferences that were related to the topic of the study. More than 50 articles with similar themes from the field of «Economics and Business» were taken into consideration. The regulatory legal acts and standards that were issued in Russia and in the world on the problem of building information modelling were analysed also.

Results

The efficiency evaluation of BIM implementation in the activities of construction organizations, which are involved in the construction and reconstruction of objects of the metallurgy industry, can be based on the certain technical and economic indicators providing the purposes of the architectural and construction project. It is necessary to adhere to the methodical principles for creation of these indicators.

The principle of economic efficiency of investments into the BIM project is based on reasons for feasibility of financing of building information modelling in activities of construction organizations, and also the capability of the project to provide income, which is sufficient for defrayal of initial investments and subsequent costs. The principle identifies the necessity of the BIM implementation for the metallurgy industry in the activities of construction companies only if there is a positive result from the use of these technologies.

One of the modern techniques that follow the principle of economic evaluation is the methodology of the total economic effect, developed by Forrester *(Seredenko, 2014)*. The application of this methodology allows analysing the value of BIM project from the position of 4 key elements:

1. Benefits are the positive impact of the implementation of building information modelling in the form of increased efficiency of construction organizations. From the construction process standpoint this element may include the increase of revenues from project of construction, the labour productivity growth of constituent entities of the construction, which positively affects the timing of the implementation of BIM project, a positive change of indicators of capital efficiency and reduced costs at all stages of the life cycle of the object *(Shakhrai, Vilensky and Kosov, 2010).*

2. Costs are measurement costs in the process of introducing and applying building information modelling in construction. It includes cost accounting for planning and a pilot project, the initial investment for BIM implementation, operations with the use of these technologies, maintenance and operation of the BIM-project, etc.

3. The flexibility of BIM-model based on consideration of potential of this model, its ability to integrate processes not only in construction, but also in adjacent areas, and also rapid expansion of categories of objects which performance is possible using BIM.

4. Risks are the analysis of other factors that affect the result of the introduction of information technology based on insufficient research in the field of economic evaluation of the implementation of BIM-models in the construction process and the lack of sufficient experience *(Seredenko, 2014).*

The principle of the preliminary calculation. The efficiency evaluation of BIM implementation in activities of the construction organizations should be calculated before the project with the use of these technologies. In the evaluation of effectiveness of BIM-project should take into account the impact of temporary factors, including changes in the time of economic parameters and other characteristics of an object at different times non-equivalence costs (time value of money), etc. Temporary non-equivalence is a reduction of cash flows of the BIM project by one temporary moment and using the rate of discount *(Ministry of Economy of the Russian Federation, the Ministry of Finance of the Russian Federation, State Building of the Russian Federation, 1999).*

The principle of the independent evaluation suggests that the results of the analysis of the effectiveness of BIM implementation should depend on objective indicators and factors, and not subjective opinion *(Seredenko, 2014)*. This requirement allows limiting the influence of expert judgment and increase the realism of the evaluation.

The principle of the assessment of the comprehensive technology introduction in the construction company. BIM changes must occur in all structural divisions of a construction company to achieve the most significant economic benefits. The implementation of this principle allows making more valid conclusions about the economic result of the implementation of these technologies.

The principle of consideration of the BIM-project lifecycle starting from the project initiation till operation and demolition of the object *(Ministry of Economy of the Russian Federation, the Ministry of Finance of the Russian Federation, State Building of the Russian Federation, 1999).* According to the Russia Federal Law «On contract system in procurement of goods, works, services for state and municipal needs», the customer can set the life cycle cost of the building as criterion. In connection with the claim, the assessment of economic efficiency should be based on the income received from the project, as well as on the expenses that were incurred during all stages of construction of a building or structure. The economic analysis of the BIM-project implementation should include the costs of construction, maintenance, operation during the life of the facility, repair and disposal objects of capital construction and structures of the metallurgy industry.

The principle of multistage evaluation. It implies that the efficiency of BIM implementation is determined at various stages of lifecycle. In this case, it is necessary to evaluate not only the final result from the implementation of the BIM-model, but to make the analysis at each stage of construction, which allows increasing the accuracy of the economic evaluation and identify the stage at which the introduction of building information modelling has had the greatest influence.

The introduction of building information modelling in the design of buildings and structures is an innovative method in construction and may lead not only to positive results, but in certain situations accompanied by negative and costly consequences. Due to the phenomenon of economic evaluation of the BIM implementation in construction organizations must follow the principle of uncertainties and risks *(Ministry of Economy of the Russian Federation, the Ministry of Finance of the Russian Federation, State Building of the Russian Federation, 1999).*

The principle of comparability of the economic results obtained by using BIM-model. It involves the ability to compare performance indicators in the implementation of BIM and their absence for visual evaluation. Furthermore, it is necessary to use the same system parameters to allow assessment equivalent during comparing the variants of the same design *(SUN et al., 2015).*

The principle of variability involves consideration of various parameters of the project construction, which are affected by the introduction of the BIM on, as well as the possibility to choose the most efficient and profitable variant design *(Izosimov and Napreenko, 2013)*. The economic evaluation of implementation of information technologies should be determined by comparison and the analysis of quantitative and qualitative indexes in the construction industry, the organization, the subject of construction, etc.

Discussion

The assessing of the effectiveness of the BIM projects implementation requires the development of the scorecard. The general evaluation system should include cost-based, organizational, technical, temporal and social groups of indicators. The scorecard must allow for the possibility of making targets, define new goals and objectives of the construction *(Davies and Harty, 2013).* Thereby the list of groups is not exhaustive, but demonstrates the presence of multivariate analysis.

The cost-based indicators characterize the efficiency of the BIM-project in monetary terms. This group of indicators includes the evaluation of construction budget, changes, unforeseen costs as a result of finding errors in the design of the construction, and costs connected with spent work time and inefficient use of resources.

The main objective of the organizational group of indicators is the quality analysis of relationships between all subjects of construction and structural departments of the organizations. Organizational characteristics of BIM model can be belonged to a number of possible changes in the project and the number of permissible errors at various stages of the life cycle of the object, the presence of interconnected information database, document management, etc.

The list of analysed indicators that can be included in a technical group is voluminous enough and depends directly on the construction project. The presence of certain technical indicators and objectives of using a building or structure may cause the decision about whether to use BIM for the object and construction of the project as a whole. This group can include the uniqueness of the object, the complexity of the design and construction process, the area, height of the projected object and others.

For example, the building information modelling was introduced in St. Petersburg in the design of the highest complex in Russia named of «Lahta Center». The height of the building is 462 meters. Other examples where technical indicators have had a significant impact on the necessity of BIM implementing are unique stadiums «Matmo Atlantic» in Bordeaux and «Velodrome» in Marseille, which have been prepared for the European Football Championship 2016. BIM-model helped to design metal frames that support complex and unique designs of these structures, to detect various technological conflict.

The coordinated organizational system directly leads to temporary changes in the construction process. In the framework of the temporal group of indicators the particular attention should be paid to the construction period, time to process information and solve specific problems at each stage of the project.

Social indicators reflect the efficiency of BIM-project in terms of public interest. These indicators can be environmental and social impact of this project, the impact on public health, improvement of living and cultural conditions of lodgers and workers, etc.

Conclusions

In modern conditions the project of BIM implementation in design and construction has received strong support from the state (in particular the Ministry of Construction Industry of the Russian Federation). In this regard, evaluation of economic efficiency and feasibility of projects for implementation of BIM in the activities of construction organizations, which are involved in the construction and reconstruction of objects of the metallurgy industry, is extremely important and necessary.

Despite a number of challenges that will be faced in the initial stage, the use of BIM has repeatedly demonstrated the economic benefits and efficiency in the construction of unique objects in Russia and abroad. The use of building information modelling in the construction is due to high economic benefits at various stages of construction, reduction of duration of the project, increasing the competitiveness of the building organizations.

During the evaluation of the possibility of BIM introduction in activity of the construction organization it is necessary to rely on the following principles:

- the principle of economic efficiency of investments into the BIM project;
- the principle of the preliminary calculation;
- the principle of the independent evaluation;

- the principle of the assessment of the comprehensive introduction;
- the principle of consideration of the BIM-project lifecycle;
- the principle of multistage evaluation;
- the principle of uncertainties and risks;
- the principle of comparability of the economic results obtained by using BIM-model;
- the principle of variability.

The scorecard should consider the following directions of analysis: cost-based, organizational, technical, temporal and social.

The recommendations presented in this article don`t set the goals and tasks to cover all methods of effectiveness evaluation. Nevertheless, the formation of principles and the scorecard of the implementation of BIM projects in the activities of construction organizations allow providing a more accurate assessment of economic efficiency and developing an evaluation algorithm of this implementation.

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The Industrial Ecosystem Risks in The Face of Technological Challenges

Andrey BYSTROV
professor, head of Industrial Economics Department Plekhanov Russian University of Economics, Moscow, Russia, bistrov-sun@mail.ru

Tatyana TOLSTYKH
professor, Industrial Management Department, NUST "MISIS", Moscow, Russia,
professor of Industrial Economics Department Plekhanov Russian University of Economics, Moscow, Russia. tt400@mail.ru

Nadezhda SHMELEVA
associated professor, Economics Department, NUST "MISIS", Moscow, Russia, nshmeleva@misis.ru

Ayya AGAYEVA
post graduate student of Industrial Economics Department Plekhanov Russian University of Economics, Moscow, Russia, agaevaam94@mail.ru

Abstract

This paper highlights self-organization perspective and the economic security of the industrial ecosystems. Such issues as under what conditions self-organization takes place and what mechanisms of industrial enterprises security are underexplored in the academic literature. Modern challenges of digital transformation modify traditional business models. For the sustainable strategic development of the industrial sector, it is necessary to adapt the system of economic security of industrial enterprises. The research of innovation ecosystems is based on the synergistic principle of ecosystem, and a comparative analysis of organizational models. The author's position of determining the innovative industrial ecosystem and the economic security of industrial enterprises in the conditions of collaboration in the horizontal model is proposed. The article analyzes trends in the development of Russian industry, identifies typical problems faced by domestic industrial enterprises in the context of digitalization. The propositions arising from this analysis provide new information that supports academics, policymakers, government, and individual actors with a more appropriate understanding of the practical mechanisms of the economic security and tools that help trigger self-organization and sustainable development of the innovation ecosystems.

Keywords: Innovations, Digital Technologies, Industrial Ecosystems, Organizational Models, Actors, Economic Security, Risks.

Introduction

The global trend towards digital transformation of the economy poses new challenges for the Russian industry. It is impossible to develop the industrial sector of the national economy and increase its competitiveness in the world industry markets without ensuring a high level of economic security of industrial enterprises. To ensure the competitiveness of the national economy at the international level requires digital transformation of industrial enterprises in the context of its management, processes and models, as well as strengthening cooperation of enterprises among themselves and with other market participants in the innovation ecosystem at the micro, meso and macro levels. The formation of the industrial ecosystem contributes to the emergence of new technologies, products, innovations and ideas, which will result in the sustainable development of the country's industry.

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In this case, it is important to ensure the economic security of industrial enterprises in the conditions of collaboration of economic market participants within the network ecosystem model. Current technological challenges and the new mentality of relations between economic entities threaten the economic security of enterprises. Thus, it is necessary to form a comprehensive holistic approach, which allows ensuring the management of economic security.

The industrial sector is the most important segment in the country's development strategy. The share of industry in the country's GDP is about 40% [22]. The industrial sector in the national economy is represented by many organizations and enterprises (economic units) operating in various industries. The digitalization trend sets new challenges for organizations, encourages them to review the ways and methods of making management decisions, there is a need to change the speed of decision-making, and the mentality of relationships between market participants is changing. In order to determine the development prospects, the current state of the industrial sector was analyzed (Fig. 1).

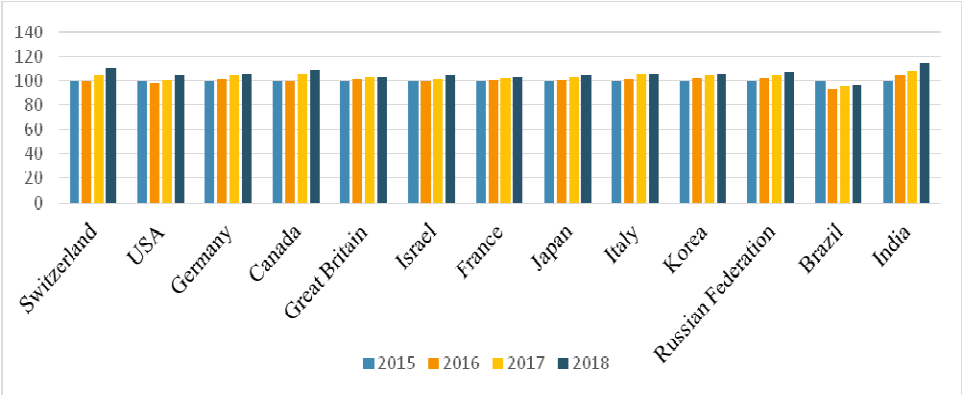

Figure 1: Index of industrial production from 2015 to 2018

Source: statistical data of the World Bank

The indicators of industrial production in figure 1 show a positive trend since 2015 in all the analyzed countries, including Russia. The overall growth rate of industrial production in the national economy shows an optimistic view and is 7.6 % from 2015 to 2018. Russia is one of the leading countries in terms of industrial production in the world.

Figure 2 shows the level of GDP in the leading countries and in the Russian Federation.

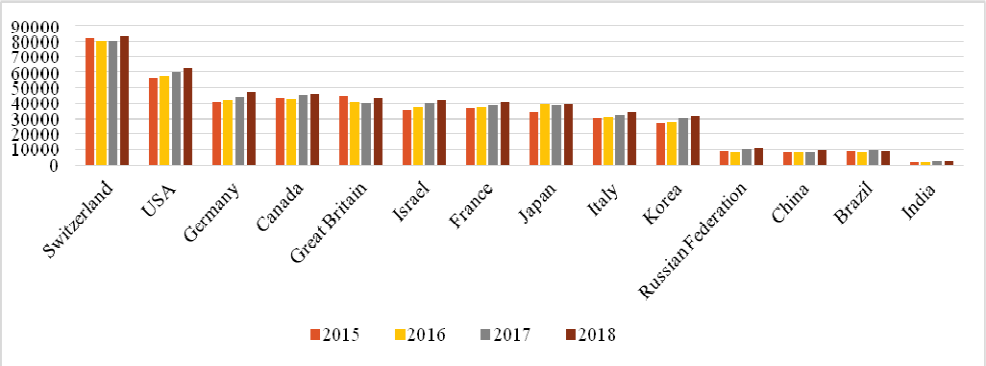

Figure 2: GDP per capita, in US dollars for the period from 2015 to 2018

Source: statistical data of the World Bank

The GDP per capita growth rate in Russia for the period from 2015 to 2018 was 21 %, which is equal to the average growth rate in other countries, but the level of GDP per capita is lower compared to the leading countries [20].

One of the most important indicators that reflect the development of innovation, as well as improving the efficiency of industry is the activity of R&D, which includes research of various industries. Investment in research and development determines the country's long-term development.

According to the World Bank analysts, South Korea, Switzerland, Japan and Germany are the leaders in R&D. Russia is ranked 13th in the world in 2017. The amount of investment in research and development in Russia was 40 billion US dollars, which is significantly less than in the leading countries. [1,21,23].

Currently, the competitiveness of industrial enterprises depends on the speed and flexibility of responding to external technological challenges, on the efficiency of digital transformation in technological and managerial business processes. Digitalization in the industrial sector is a strategic priority for the national economy. At the legislative level, this direction was set by the national project "Digital economy of the Russian Federation»

The global trend towards digitalization of the economy poses new challenges for the Russian industry. To achieve competitiveness in this industry, the speed of introduction of digital technologies into production processes is crucial (Fig. 3).

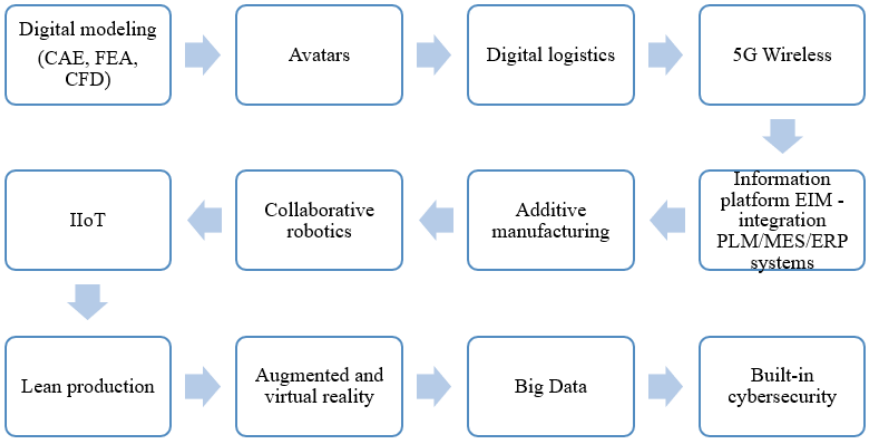

Figure 3: Trends in industrial technologies

Currently, the most Russian enterprises are still at an early stage of adaptation to digitalization, limited by management or operational processes in order to increase sales and profitability of the enterprise. For the implementation of new stages of digitalization changes are demanded, including organizational and structural (Fig. 4).

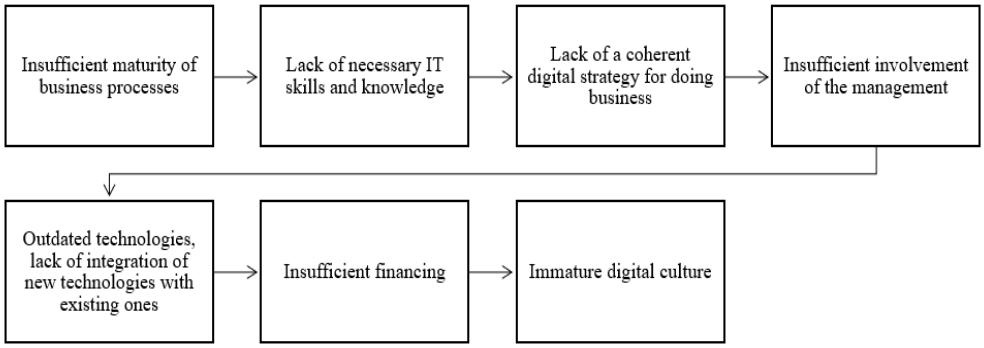

Figure 4: Typical problems of industrial enterprises in Russia

According to the study, the main obstacles to digitalization are insufficient maturity of current processes, low level of modernization of technological processes, lack of competencies, low motivation of employees, and insufficient financial resources. Thus, it is necessary to make a fundamental change in the management approaches at the enterprises of the industry that will allow for effective digitalization of enterprises and organizations, stimulate their innovative activities, and facilitate the initiation and implementation of projects to create new technologies, materials, and business processes.

Literature Review

The industrial ecosystem is getting more and more popular among global researchers. The concept of an innovative ecosystem is based on the biological ecosystem proposed by Arthur Tensley in 1935, who interpreted it as a biosystem consisting of a set of living organisms, their habitat, and communication systems that exchange matter or energy between them.

The approach to the analysis of socio-economic systems, similar to biological systems, attracted many researchers. The concept of "ecosystem" for business was introduced by J. F. Moore, who proposed a definition based on an analogy with biology – "an economic community supported by a basis of interacting organizations and individuals – organisms of the business world" [10,12]. A few years later, the works of R. Edner [15], D. Eisenberg [16,17], which gave rise to a real research "boom" and significantly expand and enrich Moore's concept. And now this approach has become dominant in the formation of new models for managing innovation processes. Indeed, similar to living organisms in biological ecosystems, innovation ecosystems are open, self-organizing systems that include actors (participants in processes) connected to each other by the exchange of knowledge, information, and technologies that are energy for these actors. L. Bertalanfi described the theory of systems, giving the concept of an open, complex, self-organizing, self-regulating and self-developing system, which is characterized by incoming and outgoing flows of energy [13]. According to I. R. Prigozhin and G. Haken, self-organization is a key concept of the 21st century. The synergy of interdisciplinary industries can be the key to solving business problems. The theory of joint action can form new qualities in the whole that are not present separately in economic units [7,13]. The definitions formulated by Kleiner [6] and Proskurnin are more logical from the standpoint of the principles of consistency, balance and self-organization. Kleiner [6] understands an ecosystem as “a localized complex of organizations, business processes, innovative projects and infrastructure entities that are capable of long-term and independent functioning due to the circulation of resources, products and systems.”

As a result of an empirical analysis of the definitions of the industrial ecosystem [6,8,14,15,17,18,19] , we concluded that the main drawbacks in the formulations are: the lack of a systematic vision of the ecosystem, the purpose of its formation and the form of self-regulation. The environment formed by ecosystem participants and the connections between them practically not studied. The environment formed on the basis of complementarities, through connections and energy exchange in the form of new knowledge, competencies, and unique information, is a key link in ecosystems.

In this regard, the industrial ecosystem in the work will be understood as an open and self-developing system of network equality of economic actors, which is self-organized on the basis of a special safe environment formed as a result of energy exchange. New knowledge, technologies, information, or unique resources act as such energy. The key idea around which the ecosystem begins to form can be the initiation and implementation of industrial projects, the creation of new materials, technologies, the development of digital platforms, etc. (Fig. 5)

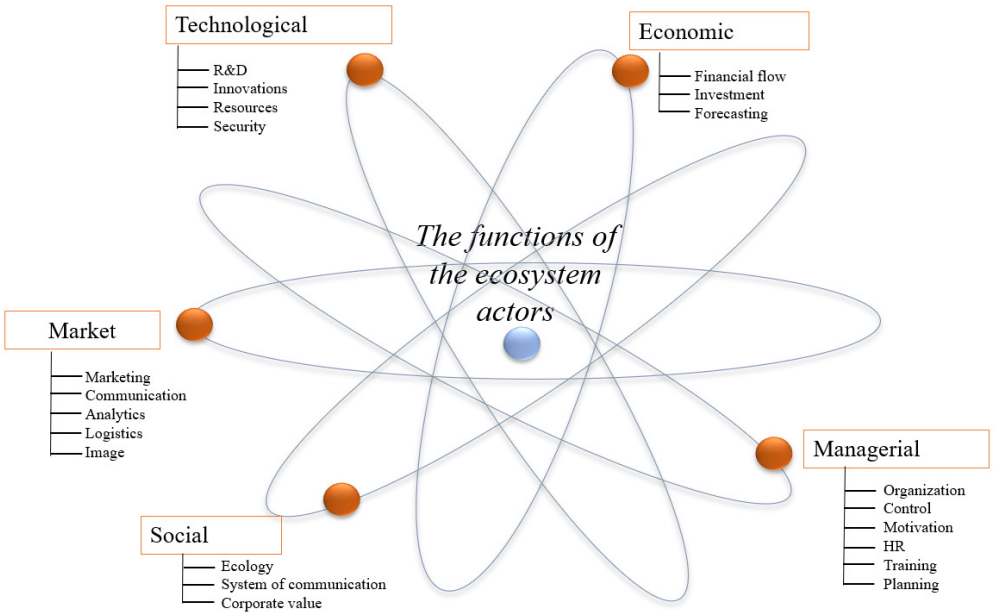

Figure 5: Functions of actors in the ecosystem

An individual industrial enterprise can be an actor in several ecosystems at the same time, implementing different projects, being, for example, a customer, supplier of unique resources or performer of different projects, and have different functions in the ecosystem as shown in figure 6.

An industrial ecosystem is formed around a central core that sets the rhythm of movement and interaction of actors. The key property of an attractive intellectual core in an ecosystem is a pacemaker, which can be a project, innovation, technology, platform, and actor. The pacemaker creates conditions for a balanced flow of knowledge and energy exchange, creating a coherent communication between actors in the ecosystem.

The pacemaker, which is the heart of the ecosystem, has the property of setting the pace for the functioning of actors in it, and acts as a trigger for it, involving any system in a single specific act of life [9,11]. Relations between the participants of the industrial ecosystem can be different: technological, production, resource, technical, financial, research, information, security, industrial, commercial and social.

An industrial ecosystem is formed based on the principles shown in figure 6.

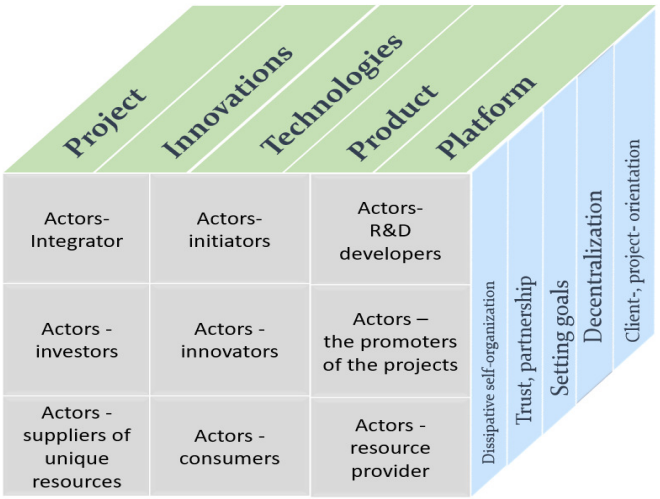

Figure 6: The system of industrial ecosystems principles

The industrial ecosystem model is based on three coordinate axes: actors, pacemaker, and principles. The principle of dissipative self-organization consists in the process of spatial and temporal ordering in an open system, due to the coordinated interaction of many elements of its components. This principle is characterized by the process of energy exchange with the environment, and chaotically.

The principle of trust (partnership) involves the voluntary acceptance of risk expenditures by actors in the industrial ecosystem, while rejecting explicit contractual security measures.

The goal-setting principle means the unity of agreed goals between all actors and their interrelated elements in the industrial ecosystem. Achievement of goals is possible as a result of building a system for managing the effectiveness and advantages of a single organism over environmental influences.

The principle of decentralization implies equality between actors in the industrial ecosystem. In other words, there is no controlling body, no hierarchical structure of the ecosystem, and it is characterized by full equality between actors.

The principle of customer focus is based on building industry standards in order to deeply understand and meet the needs of customers. By developing the flexibility of its ecosystem, creating standards reflects customer focus in forming a culture, loyalty system, using customer information for decision-making.

The principle of project orientation is related to the idea of implementing an industrial project or a set of projects aimed at achieving an agreed final result within the framework of predefined requirements and restrictions on the part of all actors. The overall objective of the principle is to ensure optimal use of resources and achieve strategic goals while minimizing risks.

Conceptual Framework

The Davos Manifesto, issued for the World Economic Forum in 2019, initiated by Klaus Schwab [24], speaks of a new model of capitalism – stakeholder capitalism –, where companies should stand up for competitive equality in the "game field", especially in the "economy of Internet platform." And this very idea is the basis for the formation of an innovation industrial ecosystem.

The nature of the industrial ecosystem, as an analogue of the natural one, is the absence of vertical hierarchy of administration therein. The association of participants (actors) is self-organizing on the basis of voluntariness, equality, and partnership, which does not imply randomness and spontaneity. Within the ecosystem, lots of projects

can be implemented simultaneously, and each actor of the ecosystem has the opportunity to perform various roles and participate in different projects at the same time.

Cluster associations have been gaining popularity in horizontal communities over the past decade. According to Freeman, innovative clusters are among the stakeholders that interact with each other. Clusters are constantly improving their competitive advantages, industrial and non-industrial organizations that are united by a common field of activity and cooperate on a geographical basis. As a rule, the initiative to create a cluster comes from the federal level. On the contrary the initiation of an ecosystem does not belong to one actor. Integration occurs on the basis of self-organization, when each actor is beneficial to the other. It is self-organization that defines the principles of cooperation and partnership as the basis of relationships between actors. A comparative analysis of ecosystem, network, and cluster models is presented in table 1.

Table 1: Comparative analysis of horizontal organizational models

Comparison criterion	Clusters	Techno park	Industrial park	Ecosystem
The purpose	Improving the competitiveness of an industry or region	Increase the well-being of the local community by promoting an innovative culture, as well as competition between innovative businesses and scientific organizations	Implementation of the import substitution program	Initiating and implementing a digital innovation or unique product
Union boundaries	Geographical or industrial	Geographical	Territorial and spatial	Cross-industrial or territorial
Criteria of unification	By stages of the production process	Experimental Association, R&D for the benefit of participants	Engineering infrastructure of industrial enterprises	Stages of a new product or new technology life cycle
The relations between the parties	Internal competition and cooperation	Internal cooperation	Internal cooperation	Collaboration and partnership
Ability to include or exclude actors	Limit on inputs and outputs	High level of privacy	High level of privacy	High level of openness
Manageability	Availability of government bodies at the Federal or regional levels	Founder	Operating company	Self-organization

The differences in the models are not fundamental but reflect the goals and conditions of specific economic development challenges. The clusters have the potential to degenerate into an ecosystem. In other words, the models of the innovation cluster and the innovative industrial ecosystem largely converge and are the development of cluster models in the context of digitalization [4,5].

For example, the purpose of forming clusters is to increase the competitiveness of a particular region or industry. The decision to create a cluster is usually made at the federal or regional levels of government. The main difference between the ecosystem and cluster models is self-organization and self-development in order to achieve unique competitive advantages of the ecosystem participants. The ecosystem is an evolutionary development of cluster models in the context of digitalization. Moving from the hierarchical legacy of the past and creating a horizontally connected network environment for the free exchange of knowledge, information, technology and innovation in the cross-industry and territory is a new model of the economy. In this regard, the issues of actor's economic security are of great importance for the effective functioning of the industrial innovation ecosystem.

The economic security in the context of digital transformation

The article highlights the economic security of industrial enterprises in the context of digitalization, as the intellectual core in the industrial ecosystem is technologies, innovations, projects and actors related to the industry. We will understand the economic security of an industrial enterprise as the security and sustainable functioning of its scientific, technological, production and information functions from direct or indirect threats associated with the impact of the external environment, and the ability to develop flexibly. The main goal of the economic security of an industrial enterprise is the sustainable and most effective functioning of its economic activities in the industrial ecosystem under various market conditions, ensuring high potential for digital development and growth in the future. The economic security of an industrial enterprise is characterized by the most effective use of collective resources to prevent threats and ensure stable functioning [3,10]. This understanding and application of economic security makes it possible for an enterprise, even in conditions of uncertainty and crises, to seek protection from existing and projected threats.

It is known that any changes in business processes are associated with certain threats. The processes of digital transformation that are currently taking place everywhere in enterprises are no exception. Digital technologies that affect production, logistics, financial and management processes at enterprises include robotics, additive and quantum technologies, artificial intelligence, Big Data, digital avatars, cloud and block chain technologies, mobile and unmanned technologies, etc.

The main goal of economic security in the context of digital transformation is to protect its main components from possible threats, which is implemented through the following tasks:

- data collection, analysis, evaluation, monitoring and forecasting.
- prevention of competitors ' penetration, crime and individuals with illegal intentions into the enterprise;
- high-quality legal protection of all aspects of the system's activities.
- ensuring the protection of the information field, trade secrets and achieving the necessary level of IT in the work of all departments.
- ensuring the technological independence of the system and achieving high competitiveness of its technological potential.
- high level of staff qualification and intellectual potential, efficiency of corporate R&D.

Classification of economic security risks in the ecosystem should be considered at four levels: the actor level, micro-level, meso-level, macro-level.

In the industrial ecosystem at the actor level, new risks are added to existing economic security risks as a result of actors ' collaboration in the process of implementing a common project. The model of economic security risks at the actor, micro, meso, and macro levels that arise during the project implementation in the industrial innovation ecosystem is shown in figure 7.

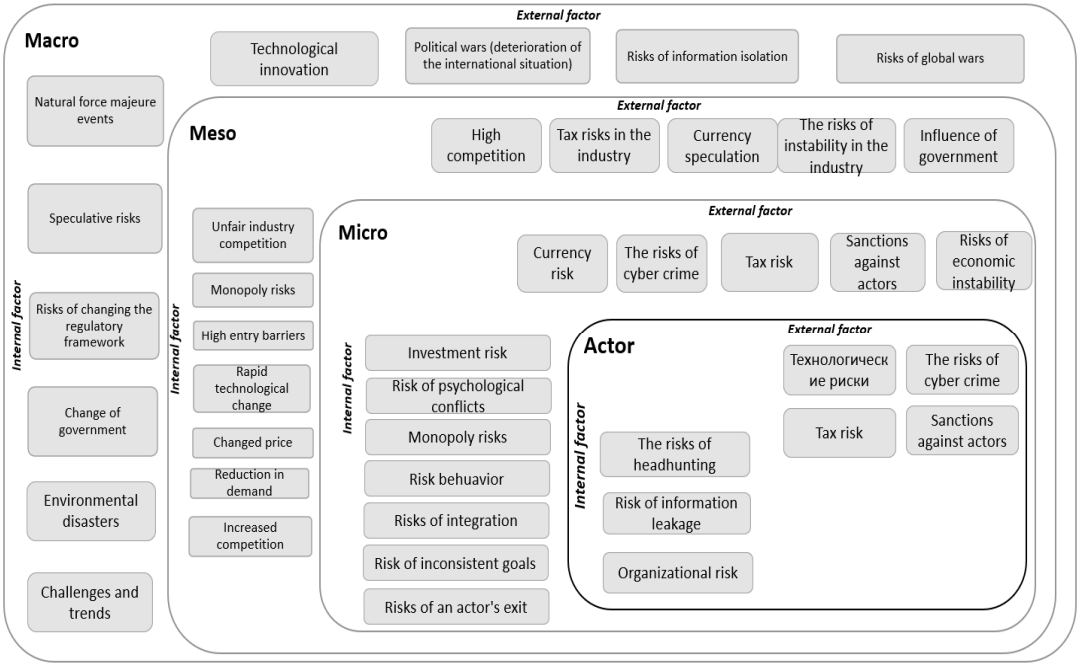

Figure 7: Risk model in the industrial ecosystem

Risks can be social, demographic, geopolitical, economic, financial, informational, technological, organizational, they can occur at all levels of the ecosystem and carry different degrees of threat to the target settings of actors and the stability of the ecosystem.

Risks that arise at the meso-level have industry specifics: agricultural, industrial, service sector risk, etc. Industry risk factors include the stages of the industry's life cycle, the quantity and quality of resources, the level of competition and concentration of production, the tax, etc.

Collaboration of the industrial ecosystem actors includes risks of economic security at the micro and macro levels. At the initial stage of ecosystem formation, the most destructive thing that threatens the possibility of project implementation is the risk associated with the problem of finding areas of common interests (choosing a pacemaker, partners). At the stage of defining roles and coordinating project work within the industrial ecosystem, there are risks associated with psychological conflicts based on a lack of coherence. There is also a risk of unfair behavior by an actor who may participate in the ecosystem in order to ensure their own interests, which, in the future, may reduce the effectiveness of the relationship or lead to its rupture. The system of ensuring economic security of industrial enterprises depends on the legal framework and the managerial maturity of the enterprise management.

Conclusion and Discussion

The challenges of digitalization modernize existing models of business organization, industry, industry, behavior models of economic entities, mentality, and also reform economic relations between market participants.

The analysis showed that all key indicators for the effectiveness of the national economy are interrelated. The growth of industrial production affects the volume of output, increases the range of goods and services, thereby increasing the volume of trade. Low R&D spending slows down development in technology, knowledge, and innovation. New technologies and knowledge are especially important for the industrial sector, as it is a strategically important segment of the economy.

It is necessary to make a fundamental change in management approaches at the enterprises of the industry that allow for effective digitalization of enterprises and organizations, stimulate their innovative activities, and facilitate the initiation and implementation of projects to create new technologies, materials, and business processes.

Ecosystem transformation of the environment is an objective global trend driven by the technological revolution. The reform of the economic model is to move from the hierarchical legacy and create a horizontally connected network environment for the free flow of knowledge, information, technology and innovation in cross-sectors and territories. Based on the research, it is possible to assume that clusters can be reborn into an innovative ecosystem, which has a number of advantages over other systems of horizontal organizations. For example, in an ecosystem, participants can not only be grouped as a cluster within a single industry, but also preferentially create competitive integrations between actors from different industry structures within the same ecosystem. However, the economic security of enterprises, including information security is getting more relevant.

The peculiarity of digitalization is that its main resource is data, knowledge, and information that is not produced or consumed in the usual way, like other resources. So, there is a direct relationship between the degree of development and speed of implementation of digital technologies in the activities of industrial enterprises and their economic security.

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Russian Accounting in the 17th Century: Details on the Production and Sales of Alcoholic Beverages

Svetlana N. KARELSKAIA
St Petersburg State University, St Petersburg, Russia, s.karelskaya@spbu.ru

Ekaterina I. ZUGA
St Petersburg State University, St Petersburg, Russia, e.zuga@spbu.ru

Abstract

In this research authors described the development of accounting for production and sales of alcoholic beverages in Russia in the 17th century. By this time, it had provided a framework for the emergence of a complex accounting system based on principles different from traditional double entry accounting. Authors presented in detail the accounting system applied in Russia before the advent of double entry accounting and successfully performed the specific tasks set before it.

Keywords: Accounting, state revenue, alcoholic beverages, ledger

Introduction

The importance of this research is justified by a number of publications devoted both contemporary issues and historical studies on the industry of production and sales of alcoholic beverages. Only a few studies concern accounting issues: the influence of European and Anglo-American accounting systems on the organization of accounting in the alcohol industry (Blake et al., 1998); the specifics of the winemaking industry due to a lengthy production cycle (Viana and Rodrigues, 2006). Historical studies describe the development of alcohol production in Nigeria from 1870 to 1970, when attempts were made to ensure replacement of alcohol imports from Europe (Heap, 1996); regulation of the wine market in France in the 19th century, where one of the priorities was to preserve the profitability for wine producers (Stanziani, 2009); the act that levied taxes on domestically produced distilled spirits, the so-called Whiskey Tax, passed in 1791 in the USA (Krom and Krom, 2013); evolution of the regulation of alcohol production taxation in the USA since 1933 (Pennock and Kerr, 2005); the British colonial law in Malaysia in the 18th-20th centuries, which included government monopoly on opium and customs duties on alcohol and tobacco (Loo and McKerchar, 2014). These researches are usually based on examination of literary sources, while the materials of actual practice are rarely used (Baladouni, 1981, 1983, 1986; Camfferman and Cooke, 2004; Richard, 2012; Robertson and Funnell, 2012; Kraal and and Kasipillai, 2014).

In Russia there is a shortage of similar studies on the history of accounting and taxation of alcohol sales and production. Different works on Russian history, which do not focus on accounting issues, were studied as the literal sources, for instance, studies on the evolution of legal aspects related to alcohol monopoly (Larina, 2011; Rusakov et al., 2016), system of taxation (Tolkushkin, 2001; Kucher and Gulina, 2006), organization of wine-making enterprises (Lvov, 1887; Borodin, 1910) and alcohol production (Pokhlebkin, 2005; Rodionov, 2012). Archival documents related to wine production and its taxation in the 17th century were studied by Veselovsky (1876-1952) and Razdorsky, who made their modern-language translation (Razdorsky, 2011, 2014, 2015; The receipts and expenditures books…, 1983). However, they did not provide any commentary with regard to the accounting development. Researchers of accounting history have so far described only the documents discussed by Veselovsky, which refer to the practice of government revenue collection at the level of state institutions – the Orders (*prikazi*, sing. *prikaz*), the role of which was discussed in detail by Sokolov (1996) and Malkova (2008). The accounting registers of government wineries introduced for scientific use by Razdorsky in the second decade of the 21st century have not been discussed before in academic works on the history of accounting. Their analysis has revealed specific features of accounting management at these enterprises as compared to other establishments that have been previously described in the works on the history of Russian accounting (Ivanov, 2005; Kuter et al,

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2019; Sidorova and Nazarov, 2019; Sokolov et al, 2019). This research is based mainly on the study of accounting registers in the wine industry and government authorities in the 17th century.

This paper consists of three parts, an introduction and conclusion. The first part describes the organization of state revenue collection from sales and production of alcohol in Russia and its accounting. The specifics of two forms of tavern (*kabak*) management in practice are described in the second part. The third part focus on the accounting registers applied in taverns (*kabaks*). The main results of the research are given in the conclusion.

The purpose of this research was to analyse in detail accounting in the 17th century in Russian alcohol industry. It is both an area of state control, being an important source of budget replenishment, and an area of private enterprise. Production and sales of alcohol is a source of government revenues in many countries and, thus, is controlled by their governments. This fully applies to Russia.

State accounting for alcoholic beverages in the 17th century

The system of government revenue collection from alcoholic beverages experienced numerous changes: at some periods the government monopoly[1] for production and sales of alcoholic beverages was used; in this case the tavern (*kabak*)[2] was managed "through the oath" (*na vere*); during other periods, revenues were received through the system of farming (*na otkup*). Management of a tavern (*kabak*) "through the oath" meant engaging responsible individual (*kabak* head) to act as manager; this individual was appointed by the government and fully accountable to it. All the revenues collected from production and sales of alcoholic beverages belonged to the government. Management of a tavern (*kabak*) "through faming" meant that private individual would bid and buy out the right to produce and sell alcohol in a certain location from the government (Kucher and Gulina, 2006: 74). The tax farmer and government negotiated a contract that specified the procedure regulating the sales of alcoholic beverages. In this case, government received alcohol revenues in the form of a certain fixed amount (Kucher and Gulina, 2006: 74; Tolkushkin, 2001: 28).

In the 17th century, the development of government collection of revenues from production and sales of alcoholic beverages had the form of successive decisions to establish and then abolish tax farming for tavern (*kabak*) management, government pricing, setting the rate of expenses accepted as reduction of profits, rules of accounting and reporting, etc. The function of revenue collection belonged to a special authority – Orders (*prikazi*). They were vested with different legislative, executive and judicial functions (Liseytsev, 2010: 244; Platonova, 2009: 442). Revenue collection was not attached to a single Order (*prikaz*). For instance, the situation in the towns of European Russia in the 17th century was as follows: in Kursk and Belgorod before the 1680s, revenue collection was performed by *Razriadny*[3] Order (*prikaz*); in Mozhaysk revenues were sent to the Order (*prikaz*) of the Ustyug Quarter[4], while in Vyazma their departmental affiliation kept changing all the time (before 1654/55 and from 1659/60 to 1666/67 - the Order (*prikaz*) of the Ustyug Quarter; in 1655/56-1658/59 - the Order (*prikaz*) of the New Quarter; from 1667/68 to 1669/70 - *Posolsky* Order (*prikaz*), or the Order (*prikaz*) of the Ambassadors). In 1680 collection of tavern (*kabak*) revenues in most towns of European Russia was transferred from different Orders (*prikazi*) to the Order (*prikaz*) *Bolshoi Kazny* (Razdorsky, 2015: 47).

Relationship between the Order (*prikaz*) and tavern (*kabak*) as the source of revenues from production and sales of alcoholic beverages depended on the form of management described above (see details in Razdorsky (2011, 2015)). If a tavern (*kabak*) was managed by private individual through farming (*na otkup*), the farmer at a stated time sent to the treasury an amount fixed beforehand, which consisted of an *oklad*, the target amount set for a particular settlement for the ensuing financial year, and *naddacha* (additional charge). Beyond that, the farmer was given a free hand, and revenues that he received during the lease period belonged to him. Tax farmer submitted no accounting documents for collection of alcohol revenues. Through-the-oath (*na vere*) management of tavern (*kabak*) meant that an elected individual reported directly to the Order (*prikaz*). This individual was also responsible for revenues collection. Tavern (*kabak*) was managed by a *kabak* head, elected among the wealthiest people living in the area where the tavern (*kabak*) was located. *Kabak* head had his assistants: treasurer (*larechny*); guardsmen (*karaulnye*), who guarded the locations needed for wine revenues collection; *khodyashchiye*, who collected duties at the markets; *kabatskiye*, who produced and sold spirits in taverns (*kabaks*). All assistants were called *tselovalniks* (originated from the procedure of taking the office, which involved kissing of the cross - *tselovat* in Russian). *Larechny tselovalnik*, or the treasurer, was the senior aid; literacy was an absolute requirement for this position, since the treasurer was responsible for keeping the necessary records (Razdorsky, 2015: 45).

Records at Order (*prikaz*) were kept in two kinds of books: *oklad* book and receipts and expenditures book. The accounts in these books were executed in a solid text without any division into graphs. It persisted in practice until the 18th century. *Oklad* book became relevant, since in the 17th century tavern (*kabak*) revenues were calculated through the *oklad* system. An estimated minimum amount to be received from alcohol sales was set for every town annually (Razdorsky, 2015: 44). These amounts were recorded in the *oklad* book, which included a list of payers, their tax base and tax obligations (Medvedev, 2011: 283). The fiscal year in Russia used to begin on September 1. At the beginning or at the end of the year, experienced clerks (*dyaks*)[5] compiled *oklad* books (Sokolov, 1996: 223). During the year, money and books were sent to the Order (*prikaz*) for examination. The information from books was compared and recorded into receipts and expenditures books (Medvedev, 2011: 284). Every Order (*prikaz*) was in charge of revenue collection and kept books for the region that was attached to it for covering its expenses. All records in *oklad* books and receipts and expenditures books were kept separately for each town within the district controlled by the Order (*prikaz*). At the beginning of the year, the arrears carried forward from the previous years were calculated for each town, together with the indication of their types (Sokolov, 1996: 223). Receipts and expenditures books were kept for one year; they recorded the flow of received revenues from different kinds of receipts - entered by the type of receipts - as well as expenditures incurred (Sokolov, 1996: 223; Razdorsky, 2011: 40).

Two forms of tavern (*kabak*) management: through the oath vs through farming

Information on revenues was recorded in the receipts sections of books and concerned receipts from separate towns of tavern (*kabak*) revenues, *obrok* payments (money by feudally dependent peasants) in the current year, the arrears carried forward from previous years, and the estimated amounts (*oklad*) for the next year (Razdorsky, 2011: 46). Thus, the book of the Novgorod Quarter for 1619/20[6] included information about receipts of *obrok* payments and *kabak* revenues from 22 towns (Arzamas, Arkhangelsk, Vyatka, Novgorod, Pskov, etc.) (The receipts and expenditures books, 1983: 4, 7-141). Revenues were recorded by towns and types. All the information was compared with the plan (estimated *oklad* obligations). The book for four taverns (*kabaks*) in Pskov for 1619/20 managed "through the oath" (*na vere*) contained the following data (Table 1):

Table 1: Cash receipts from taverns (*kabaks*) in Pskov for 1619/20

Type of receipts	Amount		
	Roubles	**Altyns[7]**	**Dengas**
Profit received in accordance with the plan made on the basis of previous year data	3,669	5	-
In excess of the estimated profit	668	3	-
Total collected sum	**4,337**	**8**	**2**

Source: The receipts and expenditures books, 1983: 18-19.

In another town there was only one tavern (*kabak*), which was managed though farming (*na otkup*), book contained the following data (Table 2):

Table 2: Cash receipts from taverns (*kabaks*) in Ostrov for 1619/20

Type of receipts	Amount		
	Roubles	**Altyns**	**Dengas**
The fixed amount to be paid for tax farming (*otkup*), calculated on the basis of receipts from the previous year	179	30	0.5
Additional receipts (*naddacha*) and duties	23	3	2
Total collected sum	**203**	**-**	**0.5**

Source: The receipts and expenditures books, 1983: 21

Types of records in the books depended on the form of tavern (*kabak*) management. In the case of "through the oath" management, revenues consisted in the amount of profit received in the tavern (*kabak*); while in the case of farming, it was the sum collected for the lease period. The common feature for both forms was that sums were always compared against planned amounts that were set in accordance with the results of the previous year. The significant difference in amounts from the examples above was due to the size of the towns (before 1703, when St

Petersburg was founded, Pskov took the second place as the populous urban centre in Russia after Moscow) and not the form of tavern (*kabak*) management. There were no arrears in the considered towns.
It is possible to compare revenues from alcoholic beverages and estimated obligations in four towns located in the European part of Russia (Kursk, Belgorod, Vyazma, and Mozhaysk) (Fig. 1).

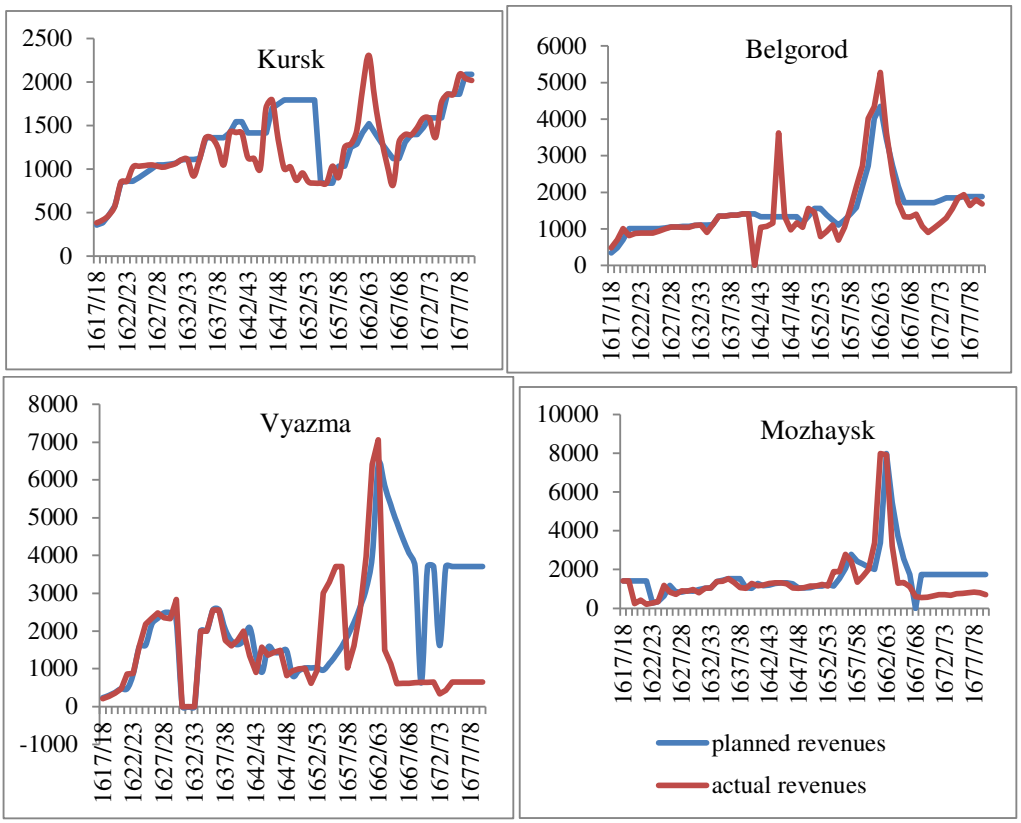

Fig. 1: Comparison between the planned and actual revenues from alcoholic beverages since 1617 to 1681 for four Russian towns (Source: compiled by the authors based on Razdorsky, 2015)

Estimated (*oklad*) amounts for most periods are set strictly in accordance with the indicators of the previous accounting period. Besides, the towns often had uncollected government revenues as compared to the estimated figures. In order to clarify the connection between the size of government revenues and the form of tavern (*kabak*) management, it is necessary to provide information for the years when tax farming was used (Table 3).

Table 3: The use of tax farming in four Russian towns in the 17th century

Indicators	Kursk	Belgorod	Mozhaysk	Vyazma
Periods analysed (years)	1615/1616-1679/1680 (65)	1616/1617-1679/1680 (64)	1615/1616-1680/1681 (62)	1619/1620-1680/1681 (62)
Number of years when taverns (*kabaks*) worked on the basis of tax farming, years	16	10	7	6
Time periods when taverns (*kabaks*) were tax-farmed, reporting years	1615/1616, 1619/1620-1622/1623, 1630/1631-1632/1633, 1634/1635, 1639/1640, 1640/1641, 1666/1667, 1675/1676, 1676/1677	1616/1617, 1631/1632, 1633/1634, 1635/1636- 1640/1641	1622/1623, 1623/1624, 1631/1632-1633/1634, 1635/1636, 1636/1637	1643/1644-1648/1649

Source: Compiled by the authors based on Razdorsky, 2015: 48-49.

Taverns (*kabaks*) in the considered towns were much more often tax-farmed in the first half of the 17th century. The reason was the ban on the farming system introduced in 1652 that was exacerbated by the Thirteen Years' War with Poland for the possession of Ukraine, started in 1654, and the financial crisis in the late 1650s and the early 1660s (Razdorsky, 2015: 49).

Comparison of the data provided in Table 3 and Figure 1 shows the change in the amount of state revenues after the change in the form of tavern (*kabak*) management. In all towns the trend is practically the same. In the first year after the rejection of farming, the estimated amount remains at the same level, which results in the loss of revenues as received and this is taken into account in subsequent estimations; the actual amounts follow the same trend. In a few years, however, amounts of revenues received abruptly return to their former levels and even exceed them.

Accounting registers in tavern (*kabak*)

In a tavern (*kabak*) managed "through the oath" *larechny tselovalnik* compiled a tavern (*kabak*) book. This book contained the necessary information on business transactions so that the results of calculations could be used to determine the profit. The *kabak* head was responsible for sending the profits earned to the higher authority and submit a report on its calculation. The tavern (*kabak*) book served as a reporting document for *kabak* heads.

The earliest tavern (*kabak*) books from among those that have come down to us are six books dated by the first decade of the 17th century. Five books have survived to our days with significant losses, and only one book has sufficient information for analysis, namely, the Olonetsk tavern (*kabak*) book for the period from 4 May to 2 August 1609. Accounting records in it are not formalized: they are written in a solid text without lines or columns. Records were separated with a certain space only by production cycles, and covered the period of three months, i.e. a quarter. This period included six full production cycles, two for each month. Beer and wine were produced in Olonetsk. Production of these two beverages was carried out in strict succession so that every month each product was produced once.

The production cycle in the Olonetsk tavern (*kabak*) consisted of buying raw materials, making the beverage and its retailing (Razdorsky, 2014: 10-15). Accounting records concerning the purchase of raw materials contain information on the type of materials (malt, hops, bread), the amount of the purchased materials, prices for each material and the total cost of every purchase, shipping expenses and the cost of grinding (milling). Then the process of production was described, detailing all kinds of expenses: raw materials used, supplementary materials (firewood), payments for services of hired workers involved in the production of beer or wine and water delivery. The production cycle description ended with records of production output in volume terms, measured in the statutorily prescribed volumetric ware (state *vedro*)[8], with the indication of the amount availed from the whole output and the unit price for the state ware. Total sums for all expenses were calculated, and the profit was assessed by comparing total sums against revenues earned. The final part of the book contained a summary section with the following information: the total amount of profit for all production cycles, how much money was sent to the state treasury and left at the tavern (*kabak*) for the future purchase of raw materials.

Thus, tavern (*kabak*) books contained information on the range of commodities, the volume and turnover of the state alcohol trade, prices for alcoholic beverages, the volume of alcohol profits, techniques used for alcohol production, the cost and volume of raw materials (bread, malt, honey, hops) used for producing bread wine, beer and mead, and the management of tavern (*kabak*) affairs (Razdorsky, 2014: 5; Razdorsky, 2011: 40). Accounting records were maintained both by volume and value. The information on receipts and expenses served as the basis for calculating the profit. Profit was calculated for each production cycle separately and then totalled; the total sum was to be sent to the Order (*prikaz*). The book did not provide summarized information on earnings and expenses for the period, which indicated lack of interest in it both from *kabak* head and inspecting officers at the Order (*prikaz*).

The money sent to the Order (*prikaz*) was accompanied with respective accounting books. In the Order (*prikaz*), they were examined in the part concerning the money received, and a special record was made in the receipts and expenditures book. A profit was compared against the estimated obligations and in case of a variance, if there was a shortage, a decision was made concerning the need to recover the deficient amount from a *kabak* head. Decisions were made both in favour of a *kabak* head and against him. The reason for the shortage and the decision made were included into the book.

Apart from the tavern (*kabak*) book, the so-called *rospisnye spiski* were compiled in the tavern (*kabak*). *Rospisnoy spisok* represented a document that was fundamentally different from those described above. It was made only when the *kabak* head was changed. This was an act of property transfer and a notice of receipt signed by a new *kabak* head and issued to his predecessor confirming that he took the tavern (*kabak*) under supervision. Therefore, this document was an inventory sheet listing the property passed on to the new *kabak* head and, can be regarded as a prototype of inventory balance.

Thus, during the considered period there were important improvements in the accounting process. The material data carrier was replaced to paper ledgers. Also a new kind of accounting register, the tavern (*kabak*) book, appeared due to the introduction of wine monopoly and a new need to control production facilities located far away from the government administrative centre (Order (*prikaz*)) and their heads. The major result of the developments was the emergence and widespread introduction of accounting registers with dynamic and statistical content, with these books being direct predecessors of double-entry bookkeeping and the balance sheet summarizing the accounting data. This can be regarded as a basis for an assumption that, even though the double-entry system that had by the time been used in Italian companies for over a century was not yet known in Russia during the considered period, the foundations for its application had already been laid. An important feature of revenue accounting in the field of production and sales of alcoholic beverages was its focus on calculating the profit. Another important fact was that, according to the data provided by the tavern (*kabak*) book described above, every production cycle fully consumed all the supplies purchased by a *kabak* head; therefore, there were no raw materials left in stock at the end of the reporting period. Besides, all the materials were paid for when they were bought; thus, a tavern (*kabak*) had no accounts payable. A similar situation existed with regard to accounts receivable, since all the sales were paid in cash. The circumstances described above indicate that the records kept in the tavern (*kabak*) in accordance with the cash-basis method were identical to the one that could have emerged if the accrual method had been used.

Conclusion

Summarizing the results of this research, it is possible to emphasize the following key findings:

1) We identified the first surviving documents related to the alcohol industry of the early 17th century, when double-entry bookkeeping based on double entries and a balance sheet was not yet used in Russia, that have not been described before in academic studies on the accounting history. They include accounting registers maintained at taverns (*kabaks*) (tavern (*kabak*) book) and centers of government revenues collection - Orders (*prikazi*) (*oklad* (estimated obligations) book and receipts and expenditures book). They are important for studying the development of accounting, since they have two features: first, they are accounting registers of entities, where the production and sale of alcoholic beverages were simultaneously carried out, and second, this activity belonged to the state monopoly and, therefore, was under the special government control.

2) We have described the practice of profit calculation in accounting registers (tavern (*kabak*) books) in the 17th century. This fact is important for understanding the evolution of accounting practice. Calculation of profit is considered the main advantage of double-entry bookkeeping, which provides for its assessment on the basis of accounting records. Without it, profit would have been calculated using the data of full inventory of assets and obligations, which is typical for single-entry bookkeeping. In Russian tavern (*kabak*) books dated 17th century profit was calculated in a totally different way. As distinct from the single-entry method based on the comparison of static data on the balance of assets and obligations, accounting registers of tavern (*kabak*) assessed profit using the dynamic data based on the data of receipts and expenditures during the period. It is obvious that the method of profit calculation in Russia of the 17th century differed from the contemporary one, since the accrual method was not used for the assessment of profit and losses; all the sums in the tavern (*ledger*) book were recorded using the cash method.

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Notes

[1] Monopoly – the exclusive right of the state or individuals to produce and retail alcoholic beverages.
[2] *Kabak* (borrowed from a Low German dialect: *kabacke*, *kaback,* meaning a rundown house, a tattered house, a hut) – a special kind of house where food and drinks were served. The first one was built in Moscow in 1547 (Borodin, 1910: 34). Its appearance was connected with the ban on free sales of vodka.
[3] *Razriad* – a military administrative territorial division in Russia in 16th-17th centuries
[4] Quaters – the central administrative and financial institutions in 2nd half of the 16th– beginning of the 17th centuries. Collected a number of direct and indirect taxes, cash and natural duties; payed salaries to the highest ranks of feudal lords, the top of the provincial nobility and one-off payments to military men, strelets, kozaks, and commanders; judicial and administrative management of population. In 17th century the territories managed by them received a fairly stable distinction (Central State Archive…, 1991: 181).
[5] *Dyak* – a clerk or a chief clerk at administrative offices of different government departments in the Russian state before the 18th century. A *dyak* could even be a head of the Order (*prikaz*) (Medvedev, 2011: 193)
[6] This book is kept in Moscow in the Central state archives of ancient acts. The first protection sheet contains an inscription in the 19th century handwriting: "Books of *obrok*, *oklad* and monetary revenues of the Novgorod Order (*prikaz*). No 14"; there is also an earlier inscription on the book: "after lists certified by *dyak* Andrei Shipov" (The receipts and expenditures books, 1983: 4).
[7] Altyn - a historical monetary unit, as well as dengas, constituted a rouble. From 1534 to the 17th century, 1 rouble equalled 33 1/3 altyns or 200 dengas (Special historical disciplines, 2003: 568).
[8] State *vedro* (backet) - an Old Russian pre-metric liquid measure used for selling alcoholic beverages. In the 17th century there was no single common measurement for this unit; every region used its own measurement ware, while the literature specifies the weight of *vedro* from 21.8 to 48.5 Russian pounds of pure water (Special historical disciplines, 2003: 496).

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Being A Witness or A Victim of Unethical Behaviour Diminishes Employee's Trust in Organisations

Remigiusz SZCZEPANOWSKI
Department of Public Health, Faculty of Health Sciences, Wroclaw Medical University, Wroclaw, Poland
Department of Psychology, Faculty of Applied Sciences, University of Lower Silesia, Wroclaw, Poland
remigiusz.szczepanowski@gmail.com

Tomasz ZARĘBSKI
Department of Education, University of Lower Silesia, Wroclaw, Poland
tomasz.zarebski@dsw.edu.pl

Ewelina CICHOŃ
Department of Psychology, WSB University in Torun, Torun, Wroclaw, Poland
Department of Psychology, Faculty of Applied Sciences, University of Lower Silesia, Wroclaw, Poland
ewelina.cichon@dsw.edu.pl

Daria KŁOPOCKA
Department of Psychology, Faculty of Applied Sciences, University of Lower Silesia, Wroclaw, Poland
daria.klopocka@yahoo.com

Abstract

The objective of the paper was to explore the relation between unethical behaviour in organisations and the level of trust in these organisations on the part of witnesses and victims of an unethical action in Polish companies. The study was based on a survey conducted on a group of 309 respondents in Poland. We hypothesized that employees who were being either a victim or a witness of unethical actions had lower trust in the organisation. Our research showed that there are unethical practices in Polish companies that are either experienced or witnessed, most likely driven by humiliation and depreciation and the demonstrating of the power position by people in charge. In large part, the results confirmed the hypothesis, especially in the cases of victims; however, in the case of witnesses, these results differed from expected, showing the increase of trust in organisations in some aspects.

Keywords: Trust, Trust Management, Organisations, Unethical Behaviour, Business Ethics.

Introduction

The questions of both trust in organisations and unethical behaviour within them have been foci of many studies and have become subjects of various theoretical conceptualizations. The two concepts have obviously been regarded as having a mutual impact on each other and as empirically related (Yip, Schweitzer 2015; Hill, Eckerd, Willson, Greer 2009; Lewicki, Tomlinson 2014). Yet, it seems that in many studies both trust (e.g. Zand 1972; Dietz and Den Hartog 2006; Shockley-Zalabak and Ellis 2006; McKnight, Cummings, Chervany 1998; Żółtawska 2014) and un/ethical behaviour have been, principally, treated, separately (e.g. Peterson 2002; Phillips, Margolis 1999; Wimbush, Shephard 1994; Kvalnes 2019; Chudzicka-Czupała 2013). The aim of the present study was to empirically examine the relation between unethical behaviour within Polish companies and the levels of trust in them, on the part of witnesses or victims of an unethical action.

Trust and unethical behaviour

For the purpose of our study, we have accepted Rawling's (2008) general definition of trust: „Therefore, the operational definition of trust for this study is the following: Trust is one party's willingness to be vulnerable to

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another party based on the confidence that the latter party is competent and dependable, has integrity, and acts with goodwill" (Rawlins, 2008, p. 5). We also agreed with Paine (2003), Dietz and Den Hartog (2006) and Shockley-Zalabak and Ellis (2006) that trust as a complex concept has five overall characteristic features: (1) it can be understood as a multi-level relation (between workmates, teams, organisations, the public); (2) it is culturally rooted and (3) communication-based; (4) it is dynamic (changing depending on the situations, e.g. after being a victim or a witness of un/ethical actions); and (5) it is multi-dimensional, which means that it comprises cognitive, emotional and behavioural aspects. After Paine (2003, pp. 5-6) we assumed that operationalizable domains of trust covered a series of particular concepts such as competence, integrity, dependability/reliability, openness and honesty, vulnerability, concern for employees, identification, control mutuality, satisfaction and commitment (see Szczepanowski, Zarębski, Pieńkowska 2020).

Particular constructs of ethical and unethical behaviour may depend on several individual and supra-individual factors including individual's beliefs, his or her social role's requirements and expectations, personality traits, but also on the type of culture which a person lives in, organisational/ethical climate or having a particular ethical code in a company (Chudzicka-Czupała 2013, pp. 15-85; De Cremer, Vandekerckhove 2017). Having taken that into account, we refrain from stipulating the particular forms of ethical/unethical sphere in objective terms and, instead, accept the view of the unethical as actions that deviate from multifoci organisational justice (e.g. Rupp, Cropanzano 2002, p. 926-928) as perceived by individuals inside an organisation. Against this background we followed Chudzicka-Czupała (2013) in distinguishing five categories of unethical experiences as respondents perceived them: (1) discrimination, (2) isolation and ignorance, (3) violation of dignity and integrity, (4) humiliation and depreciation of employees, and (5) demonstration of power position by a superior. After the Chudzicka-Czupała's account, we have also considered a framework of a threefold perspective on an act to be virtually perceived as unethical, i.e. the perspective of a victim, of a witness and of a perpetrator (2013, pp. 114-121). The present research focuses on the perspectives of a victim and of a witness, while the perspective of a perpetrator was not relevant for this study.

According to Paine's model, it is claimed that an important component of promoting trust in the organisations consists of various interactions between associates, teams, and alliances on the multiple levels (Paine, 2003). Thus, apart from trust-building factors that are culturally rooted (i.e. norms and values), the model primarily points to the importance of connections between an employee and the organisation. Given this standpoint, Paine argues that there are several communicative behaviours and openness strategies that can potentially boost the establishments of trust (Paine, 2003, p. 5). The specific dimensions describing how connections can positively affect employee's trust are: (i) control mutuality, (ii) satisfaction, (iii) commitment, (iv) exchange relationship, and (v) social relations. In terms of control mutuality, this factor describes the degree to which both parties agree to influence each other by taking into account the imbalance of authority. For example, unjustified attempts by one party to gain control over the other party can decline trust in other's competence and satisfaction. On the other hand, it is believed that consent to exercise mutual control ensures the stability of the organisation. Another dimension is satisfaction, which describes positive feelings towards other partner based on the expectations directed to that party. Positive feelings of satisfaction arise from the fact that benefits prevail over costs and the satisfied employee holds beliefs that positive behaviours of the other partner will be maintained in the future. The subscale of engagement refers to individual's beliefs about confidence in one's own actions and investments into the organisation. Having these beliefs, an individual feels emotional stability within the organisation and has feelings of continuity, both of which are behaviourally expressed in maintaining and promoting the relationship with the organisation. The next dimension of exchange relationship is based on the concept of marketing theory (Bagozzi, Richard P. 1974, p. 77), which assumes that each party should provide the other one with benefits. Such beliefs imply that also the employee is obligated to benefit the partner (the organisation). As the exchange between partners is being reinforced and matured, the building of trust improves and a positive orientation towards maintaining the relationship with the organisation appears. The last dimension of social relationship is a cornerstone of the development and reinforcement of trust in an organisation. This subscale describes beliefs that people should care about each other and provide each other with benefits, even if they receive nothing in return. Pains (2003) suggests that maintaining such beliefs also significantly reduces the likelihood of negative behaviour from stakeholders.

Considering the results of previous studies by Hough et al. (2015), the relationship between unethical behaviours in organisation and trust seems to be crucial for employee's engagement. It was shown that organisational trust fully mediates the relationship of ethical environment on employee's engagement. That means that an ethics environment leads to organisational trust which in turn enhances employee engagement (Hough et al., 2015). In fact,

ethical/unethical behavior in organisations is related to individual and context-specific characteristics, in particular organisational culture (Ardichvili et al., 2009; Cohen,1993; Meyers,2004; Trevino,1986). Therefore, in this study we investigated the relationship between an unehical behaviours from victim and witness standpoints and trust in organisation.

Objective of the study

In our study, it was expected that being a victim or a witness of unethical behaviour would be a predictor of decrease in trust in organisations. The hypothesis has been examined through a series of multiple-regression analyses as set out below.

Method

Respondents

Three –hundred nine part-time graduate students of University of Lower Silesia participated in the study. A total of 309 usable surveys was further analysed (262 women and 47 men). Participants were aged from 19 to 50 (M = 26.65, SD = 7.24). All participants completed informed consent forms before participating in the study. The study was approved by the Research Ethics Committee at the University of Lower Silesia, Wrocław, Poland. The survey was conducted in 2020.

The Questionnaires

The Trust Measurement Questionnaire (TMQ) (Paine 2003) was used to assess multidimensional trust within the organisation. The survey comprises six subscales, i.e. overall trust, control mutuality, commitment, satisfaction, communal relationships, exchange relationship. Although the subscale of overall trust measured beliefs concerning dimensions of integrity, competence and dependability. In this study, the reliability of the entire questionnaire, assessed using Cronbach's alpha rating was 0.937, while reliabilities of the subscales ranged from .738 to .873 (see Table 1).

Table 1: The reliability coefficients of Trust Measurement Questionnaire (TMQ)

Dimension	Cronbach's alpha	Number of items
Overall trust	.859	11
Control mutuality	.828	8
Commitment	.805	8
Social relations	.804	8
Communal relationships	.873	7
Exchange relationship	.738	4
Total	.937	46

The Unethical Behavior in Organization Questionnaire developed by Chudzicka-Czupała (2013) was used to measure the frequency of experiencing unethical behaviours at work from the perspectives of victim and witness. The inventory distinguishes five categories of unethical behaviour: (i) discrimination, (ii) isolation and ignorance, (iii) violation of dignity and integrity, (iv) humiliation and depreciation of employees, and (v) demonstrating the position of power by people in charge (superiors). The respondents were asked to determine the frequency of victimization and witness of unethical behaviour in their workplace. In total, the questionnaire measured 10 dimensions of unethical behaviours. The reliability of the questionnaire, assessed with the Cronbach's alpha rating, was 0.88, while the reliabilities of subscales ranged from 0.78 to 0.89 (Chudzicka-Czupała, 2013).

Statistical Analyses

Multiple regression analysis was performed based on the entry method to verify the possibility of predicting the trust based on the experiences of being a victim or witness of unethical behaviour at work. All independent variables were entered into the equation simultaneously. The following variables related to unethical behaviours were introduced to the regression models: (i) discrimination; (ii) isolation and ignorance; (iii) violation of dignity and integrity; (iv) humiliation and depreciation of employees; and (v) demonstrating position of power by a superior. The global score of trust and its relevant aspects, i.e. control mutuality, commitment, satisfaction, communal relationships, and exchange relationships were dependent variables. The same predictors related to unethical behaviours at work either from the witness' or victim's perspectives were entered into the regression models. Finally, the designed models included predictors of unethical behaviours at work from either the victim's or witness perspective to assess contributions of these factors to explaining the variance in each dimension of trust. In order to identify the multicollinearity between predictors in regression analysis, the variance inflation factors (VIFs) were calculated. Since the maximum value of VIF was 2.827, no issue of multicollinearity among the predictors was identified. All statistical analyses were done with SPSS version 25 for Windows (IBM, 2016). The level of significance was set at $p < 0.05$ in all statistical tests.

Results

Prediction of trust in organisation (dependent variable)

Based on the enter method, it was found out that severity of experiences of being the victim of unethical behaviour at work significantly predicted the level of trust in organisation, $F(5,216) = 5.30$; $p < 0.001$, and this predictor explained a significant amount of the variance (11%) in the variable of trust (R2 = .109). The results showed that only the predictor of being a victim of humiliation and depreciation significantly contributed to the levels of trust (b = -.245, t (216) = - 2.429, p = .016). This implicated that employees who had been more often victimized and humiliated had lower levels of trust into organisation (see Table 2).

Table 2: Summary of Multiple Regression Analysis for trust based on the experiences of being a victim of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Trust							
(*constant*)	39.819	2.448		16.264	.000	34.993-44.644	
Discrimination	0.063	0.579	0.010	0.108	.914	-1.078-1.203	2.103
Isolation and ignorance	-0.255	0.544	-0.051	-0.469	.640	-1.327-0.817	2.827
Violation of dignity and integrity	0.952	0.691	0.138	1.379	.169	-0.409-2.313	2.437
Humiliation and depreciation of employees	-10.208	0.497	-0.245	-2.429	.016*	-2.189-0.228	2.458
Demonstrating position of power by a superior	-0.962	0.612	-0.158	-1.571	.118	-2.169-0.245	2.437
$R^2 = 0.109$, $_{adj}R^2 = 0.089$, SE = 8.06, $F(5,216) = 5.30$, $p < .001$							

The results also indicated that the levels of trust are significantly predicted by the severity of unethical behaviour that were witnessed at work, $F(5, 180) = 4.607$; $p = 0.001$. The predictor of witnessing unethical behaviour explained 11% of the variance in the variable of trust ($R^2 = .113$). The results showed that the predictor of witnessing humiliation and depreciation significantly predicted the risk of decreasing trust in organisation (b = -.213, t (180) = - 1.977, $p = .050$). This indicated that only the predictor of witnessing humiliation and depreciation of employees in organisation contributed to the risk of decreasing trust in organisation (see Table 3).

Table 3: Summary of Multiple Regression Analysis for trust based on the experiences of being a witness of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Trust							
(*constant*)	37.837	2.789		13.568	.000	32.334-43.340	
Discrimination	0.506	0.520	0.083	0.974	.331	-0.519-1.532	1.487
Isolation and ignorance	-0.981	0.530	-0.211	-1.851	.066	-2.026-0.065	2.649
Violation of dignity and integrity	0.812	0.507	0.140	1.601	.111	-0.189-1.813	1.564
Humiliation and depreciation of employees	-0.960	0.486	**-0.213**	-1.977	**.050***	-1.919-0.002	2.363
Demonstrating position of power by a superior	-0.236	0.610	-0.045	-0.387	.699	-1.439-0.967	2.700
$R^2 = 0.113$, $_{adj}R^2 = 0.089$, SE = 7.95, F(5,180) = 4.607, ***p* = .001**							

The Prediction of Control Mutuality (Dependent Variable)

The regression model predicting dependency of control mutuality on the severity of experiencing unethical behaviour on the part of a victim at work was significant, $F(5, 216) = 4.53$; $p = 0.001$. The predictor explained the 10% of variance in the variance of control mutuality, ($R^2_{adj} = .095$). The coefficients in the regression model were not significant (see Table 4).

Table 4: Summary of Multiple Regression Analysis for Control mutuality based on the experiences of being a victim of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Control mutuality							
(*constant*)	31.374	1.885		16.647	.000	27.66-35.08	
Discrimination	0.064	0.444	0.013	0.143	.886	-0.812-0.939	2.098
Isolation and ignorance	-0.550	0.415	-0.143	-1.324	.187	-1.369-0.269	2.791
Violation of dignity and integrity	0.417	0.531	0.079	0.785	.433	-0.630-1.463	2.435
Humiliation and depreciation of employees	-0.347	0.380	-0.092	-0.914	.362	-1.095-0.401	2.419
Demonstrating position of power by a superior	-0.785	0.470	-0.168	-1.670	.096	-1.711-0.142	2.426
$R^2 = 0.095$, $_{adj}R^2 = 0.074$, SE = 6.19, F(5,216) = 4.533, ***p* = .001**							

The prediction of dependency of control mutuality on the severity of witnessing unethical behaviour at work was significant, $F(5, 181) = 4.185$; $p = 0.001$. The predictor of witnessing unethical behaviours explained 10% of the variance in control mutuality ($R^2_{adj} = .104$). The coefficients in the regression model were not significant (see Table 5).

Table 5: Summary of Multiple Regression Analysis for Control mutuality based on the experiences of being a witness of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Control mutuality							
(*constant*)	28.947	2.164		13.379	.000	24.678-33.216	
Discrimination	0.669	0.403	0.143	1.660	.099	-0.126-1.464	1.503
Isolation and ignorance	-0.672	0.413	-0.185	-1.627	.106	-1.487-0.143	2.611
Violation of dignity and integrity	0.233	0.398	0.052	0.585	.559	-0.553-1.019	1.582
Humiliation and depreciation of employees	-0.571	0.381	-0.161	-1.499	.136	-1.322-0.181	2.322
Demonstrating position of power by a superior	-0.397	0.481	-0.095	-0.825	.411	-1.347-0.553	2.703
$R^2 = 0.104$, $_{adj}R^2 = 0.079$, SE = 6.28, $F(5,181) = 4.185$, $\boldsymbol{p = .001}$							

The prediction of commitment (dependent variable)

The results suggested that the variable of being a victim of an unethical behaviour at work was significant in predicting levels of commitment, $F(5, 216) = 4.374$; $p = 0.001$, and the variable explained the 9% of variance ($R^2 = .092$). The results showed that only the predictor of being a victim of humiliation and depreciation significantly contributed to the decrease in levels of engagement, (b = -.270, t (216) = - 2.684, $p = .008$). This implicated that an employee who is more often victimized and humiliated shows lower commitment to organisation (see Table 6).

Table 6: Summary of Multiple Regression Analysis for Commitment based on the experiences of being a victim of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Commitment							
(*constant*)	33.939	1.750		19.391	.000	30.49-37.3	
Discrimination	-0.583	0.413	-0.133	-1.414	.159	-1.396-0.230	2.097
Isolation and ignorance	0.014	0.386	0.004	0.035	.972	-0.747-0.774	2.783
Violation of dignity and integrity	0.762	0.493	0.156	1.546	.123	-0.209-1.733	2.435
Humiliation and depreciation of employees	-0.946	0.352	**-0.270**	-2.684	**.008***	-1.641-0.251	2.414
Demonstrating position of power by a superior	-0.249	0.436	-0.058	-0.571	.568	-1.109-0.611	2.419
$R^2 = 0.092$, $_{adj}R^2 = 0.071$, SE = 5.75, $F(5,216) = 4.374$, $\boldsymbol{p = .001}$							

The results indicated that the dependency between levels of engagement and severity of witnessing different types of unethical behaviour at work was negligible, $F(5, 182) = 1{,}619$; $p = 0.157$. The results are presented at Table 7.

Table 7: Summary of Multiple Regression Analysis for Commitment based on the experiences of being a witness of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Committment							
(*constant*)	30.439	1.913		15.915	.000	26.665-34.213	
Discrimination	0.223	0.356	0.056	0.626	.532	-0.480-0.926	1.504
Isolation and ignorance	-0.147	0.366	-0.047	-0.402	.688	-0.868-0.574	2.611

Violation of dignity and integrity	0.352	0.353	0.091	0.999	.319	-0.343-1.048	1.582
Humiliation and depreciation of employees	-0.476	0.337	-0.156	-1.411	.160	-1.140-0.189	2.321
Demonstrating position of power by a superior	-0.308	0.426	-0.086	-0.724	.470	-1.149-0.532	2.704
$R^2 = 0.043$, $_{adj}R^2 = 0.016$, SE = 5.56, $F(5,182) = 1.619$, $p = .157$							

The prediction of satisfaction (dependent variable)

The results indicated that dependency of satisfaction levels based on experiences of being the victim of an unethical behaviour at work was significant, $F(5, 217) = 6.870$; $p < 0.001$. This predictor explained 14% of variance in the variable of satisfaction ($R^2 = .137$). The coefficients in the regression model indicated that none of the factors significantly predicted satisfaction levels (see Table 8).

Table 8: Summary of Multiple Regression Analysis for Satisfaction based on the experiences of being a victim of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Satisfaction							
(*constant*)	35.123	1.843		19.061	.000	.	
Discrimination	-0.106	0.439	-0.022	-0.241	.810	-.972-0.760	2,127
Isolation and ignorance	-0.561	0.407	-0.146	-1.378	.170	-1.364-0.241	2,808
Violation of dignity and integrity	0.662	0.522	0.125	1.268	.206	-.367-1.692	2,457
Humiliation and depreciation of employees	-0.708	0.372	-0.187	-1.904	.058	-1.441-0.025	2.432
Demonstrating position of power by a superior	-0.699	0.461	-0.150	-1.518	.130	-1.607-0.209	2.438
$R^2 = 0.137$, $_{adj}R^2 = 0.117$, SE = 6.07, $F(5,217) = 6.87$, $\boldsymbol{p < .001}$							

The results indicated also that the severity of experiences of witnessing an unethical behaviour at work predicted significantly satisfaction, $F(5, 182) = 4.114$; $p = 0.001$, and this predictor explained 10% of variance in the variable of ($R^2 = .102$). The coefficients in the regression model indicated that none of the factors significantly predicted satisfaction levels (see Table 9).

Table 9: Summary of Multiple Regression Analysis for Satisfaction based on the experiences of being a witness of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Satisfaction							
(*constant*)	33.963	2.044		16.617	.000	29.930-37.996	
Discrimination	0.069	0.382	0.016	0.181	.857	-0.684-0.822	1.506
Isolation and ignorance	-0.638	0.391	-0.186	-1.631	.105	-1.410-0.134	2.624
Violation of dignity and integrity	0.260	0.377	0.061	0.690	.491	-0.484-1.005	1.586
Humiliation and depreciation of employees	-0.410	0.361	-0.122	-1.137	.257	-1.121-0.302	2.334
Demonstrating position of power by a superior	-0.349	0.456	-0.089	-0,766	,445	-1,249-0,550	2,715
$R^2 = 0.102$, $_{adj}R^2 = 0.077$, SE = 5.95, $F(5,182) = 4.114$, $\boldsymbol{p = .001}$							

The prediction of social relations

The results indicated that dependency of social relation based on the experiences of being a victim of an unethical behaviour at work was significant, $F(5, 216) = 3.878$; $p = 0.002$, and the model explained 8% of variance in the variable of ($R^2 = .082$). The results showed that only the variable of being a victim of the demonstrating the position of power by superiors significantly predicted the level of trust in social relations (b = -.209, t (216) = - 2.070, p = .040). This indicated that an employee who was more often victimized by their superiors, had a lower level of trust in social relations (see Table 10).

Table 10: Summary of Multiple Regression Analysis for Social relations based on the experiences of being a victim of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Social relations							
(*constant*)	30.329	1.913		15.858	.000	26.559-34.098	
Discrimination	0.033	0.446	0.007	0.073	.942	-0.847-0.913	2.039
Isolation and ignorance	-0.286	0.414	-0.075	-0.690	.491	-1.101-0.530	2.770
Violation of dignity and integrity	0.338	0.531	0.064	0.637	.525	-0.708-1.384	2.373
Humiliation and depreciation of employees	-0.282	0.379	-0.076	-0.743	.458	-1.028-0.465	2.431
Demonstrating position of power by a superior	-0.969	0.468	**-0.209**	-2.070	**.040***	-1.891-0.046	2.410
$R^2 = 0.082$, $_{adj}R^2 = 0.061$, SE = 6.17, $F(5,216) = 3.878$, $\boldsymbol{p = .002}$							

The model predicting the effects of the experiences of being a victim of an unethical behaviour at work on social relationships was significant, $F(5, 181) = 4.772$; $p < 0.001$. The variable explained 12% variance in the variable of social relations ($R^2 = .116$) The results showed that only witnessing a demonstration of power positions significantly predicted the decrease of trust in social relationships (b = -.236, t (181) = - 2.051, p = .042). This outcome suggested that a worker who more often witnessed a demonstration of the power positions by their superiors had lower levels of trust in social relations within an organisation (see Table 11).

Table 11: Summary of Multiple Regression Analysis for Social relations based on the experiences of being a witness of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Social relations							
(*constant*)	30.486	2.067		14.748	.000	26.408-34.565	
Discrimination	0.330	0.385	0.073	0.858	.392	-0.429-1.090	1.503
Isolation and ignorance	-0.470	0.395	-0.135	-1.192	.235	-1.249-0.308	2.611
Violation of dignity and integrity	0.109	0.381	0.025	0.286	.775	-0.642-0.860	1.582
Humiliation and depreciation of employees	-0.181	0.364	-0.053	-0.497	.619	-0.899-0.537	2.322
Demonstrating position of power by a superior	-0.943	0.460	**-0.236**	-2.051	**.042***	-1.851-0.036	2.703
$R^2 = 0.116$, $_{adj}R^2 = 0.092$, SE = 6.00, $F(5,181) = 4.772$, $\boldsymbol{p < .001}$							

The prediction of Exchange Relationship

The model predicting the effects of being the victim of various types of unethical behaviour at work on the variable of exchange relationship was significant, $F(5, 217) = 2.690$; $p = 0.022$. The model explained the 6% variance ($R^2 = .058$). The results showed that predictor of being a victim of a demonstration of the power positions by superiors significantly predicted the increase in exchange relationship (b = .241, t (217) = 2.353; $p = .019$). Thus, an employee more often victimized by their superiors displayed a higher level on the exchange relationship scale (see Table 12).

Table 12: Summary of Multiple Regression Analysis for Exchange relations based on the experiences of being a victim of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Exchange relations							
(*constant*)	8.528	1.123		7.591	.000	6.313-10.742	
Discrimination	0.112	0.265	0.040	0.423	.673	-0.410-0.635	2.099
Isolation and ignorance	0.110	0.248	0.049	0.445	.657	-0.378-0.599	2.791
Violation of dignity and integrity	-0.480	0.317	-0.156	-1.517	.131	-1.104-0.144	2.437
Humiliation and depreciation of employees	0.016	0.226	0.007	0.071	.944	-0.430-0.462	2.420
Demonstrating position of power by a superior	0.660	0.280	**0.241**	2.353	**.019***	0.107-1.212	2.425
$R^2 = 0.058$, $_{adj}R^2 = 0.037$, SE = 3.70, $F(5,217) = 2.690$, $\boldsymbol{p = .022}$							

The model predicting dependency of exchange relationships on witnessing an unethical behaviour at work was significant, $F(5, 180) = 3.056$; $p = 0.011$. The model explained 8% variance in the variable of exchange relationship ($R^2 = .078$). The coefficients in the regression model were not significant (see Table 13).

Table 13: Summary of Multiple Regression Analysis for Exchange relations based on the experiences of being a witness of unethical behaviour at work

Predictor	*B*	*SE*	β	*t*	*p*-value	95%CI	VIF
DV: Exchange relations							
(*constant*)	7.349	1.275		5.764	.000	4.833-9.865	
Discrimination	-0.073	0.236	-0.027	-0.309	.758	-0.539-0.393	1.498
Isolation and ignorance	0.411	0.243	0.195	1.694	.092	-0.068-0.890	2.600
Violation of dignity and integrity	-0.048	0.235	-0.018	-0.203	.839	-0.511-0.415	1.586
Humiliation and depreciation of employees	-0.080	0.231	-0.038	-0.344	.731	-0.535-0.376	2.429
Demonstrating position of power by a superior	0.380	0.285	0.157	1.331	.185	-0.183-0.943	2.733
$R^2 = 0.078$, $_{adj}R^2 = 0.053$, SE = 3.69, F(5,180) = 3.056, $\boldsymbol{p = .011}$							

Discussion

The present study investigated the relationship between trust and unethical practices witnessed or experienced by employees in Polish companies. The multiple regression analysis identified unethical behaviours that had an effect on the decrease and also, surprisingly, increase in multidimensional trust in the organisation. We have identified that all dimensions of trust in an organisation are significantly associated with unethical behaviour when

experienced directly by an employee, i.e. in case of being a victim. A similar situation occurred when an employee perceived unethical practices, although there was one exception, since employee's trust dependent on engagement was unchanged. Our research showed that unethical practices either experienced or witnessed include the factor of humiliation and depreciation, which most strongly undermines trust in the organisation, both in the situation of being a witness and a victim. We also found out that the significant effect on trust was exerted by the demonstrating of the position of power by a superior. However, this factor played a twofold role, since the demonstration of the power position either undermined trust on a social level (the significant decrease in trust) or enhanced trust in terms of exchange relations. The latter issue seems to be counter-intuitive and as such requires a tentative explanation. In sketching such an explanation, it is reasonable to resort to cultural factors (e.g. Ratajczak 2007) that influence human behaviour in workplace, accepting Hofstede's view on the dimensions of national cultures (Hofstede, Hofstede, Minkov 2010; Subocz 2012), namely: power distance, collectivism versus individualism, femininity *versus* masculinity, uncertainty avoidance, long-term versus short-term orientation. The Polish culture is thought to be more oriented towards high uncertainty avoidance, masculinity, short-term orientation, rather large power distance while oscillating between collectivism and individualism. Thus, it is possible that the demonstration of the position of power by a superior, when it is witnessed but not directly experienced by an employee, is perceived by this employee as an expression of certainty masculinity and superior's caring about company as a whole (collectivism); at the same time, the large power distance between the witness and the superior as well as the short term orientation contribute to form a traditional view on one's work and as such might give the impression of safety within strict hierarchy of roles in the organisation. This, in turn, within can result in enhancing the impression of higher level of control mutuality from employee's perspective.

Here, it is worth commenting on the importance of employee-superior relations in Polish organisations. Our study clearly shows that the demonstrating of the power position by superiors diminishes our confidence in the organisation in a social dimension; however, on the other hand, it induces positive feelings linked with expectations of future benefits. It seems that this situation may reflect a certain dependency dilemma of the employee in Poland. When deciding to be associated with an organisation, he e or she begins to experience mixed feelings of trust: on the one hand, he or she wants to adapt to the organisational structure (to conform to an external code of ethics, i.e. norms, values) and, on the other hand, hopes to have further profits and benefits resulting from their own work. This study has several limitations. Namely, the research sample was limited to graduate students, mainly women. Therefore, future research should provide a more representative sample.

Conclusions

To conclude: there will always be ethical problems in organisations where business is involved. Our research shows that unethical practices can primarily relate to factors related to humiliation and depreciation of employees as well as the demonstration of the power position by a superior. Presumably, it is for these reasons that conflicts and injustices can occur in Polish companies, and consequently decreasing trust in organisation. Therefore, further research as well as interventions are needed to find out ways to improve the ethical climate of organisations in Poland in order to counteract these specific unethical practices witnessed or experienced by employees.

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COVID-19, Oil Prices and the US Policy Uncertainty

Claudiu Tiberiu ALBULESCU

Politehnica University of Timisoara, Management Department, Timisoara, Romania
claudiu.albulescu@upt.ro

Abstract

This paper investigates the effect of COVID-19 and crude oil prices on the United States (US) economic policy uncertainty (EPU), with a focus on the pre-pandemic phase of the sanitary crisis. Using daily data for the period January 21 – March 13, 2020, our Autoregressive Distributed Lag (ARDL) model shows that the new infection cases reported at global level, and the fatality ratio, have no significant effect on the US EPU during the first phase of the crisis, whereas the oil price negative dynamics leads to increased uncertainty. However, analyzing the situation outside China, we discover that both new case announcements and the COVID-19 associated death ratio have a positive influence on the US EPU.

Keywords: COVID-19, Economic Policy Uncertainty, Oil Prices, ARDL Bound Testing.

Introduction

The outbreak of the new coronavirus crisis (COVID-19) monopolizes these days the worldwide public agendas. Originating in China (Hubei region), the COVID-19 affected over 100,000 people and more than 100 countries at the beginning of March 2020. The World Health Organization (WHO), which daily monitors the COVID-19 figures since January 21, 2020, declared the coronavirus a pandemic on March 11. Although the spread of the virus started to decline, after the middle of February in China, the infection cases grew exponentially outside China. The European countries, but also the United States (US), were severely touched.

In this context, the purpose of this research note is to investigate the effect of COVID-19 and crude oil prices on the United States (US) economic policy uncertainty (EPU), with a focus on the pre-pandemic phase of the sanitary crisis. On the on hand, COVID-19 has triggered fear and anxiety in the society, nourished both by the daily reported new infection cases and by the increasing fatality ratio. On the other hand, the virus started to affect the real economy since February 2020, generating a crash on financial and commodity markets. Likewise, COVID-19 induced additional uncertainty in the economy, amplified by a delayed reaction of authorities, and by a lack of a clear strategy to fight against the disease.

This is also the case of the US authorities, which initially refused to take actions. President Trump declared that the situation is "very much under control" in the US, and that the scientists will find "soon" a solution to this problem. Nevertheless, the COVID-19 numbers triggered a strong reaction of US financial markets, first on February 28, 2020, and second, on March 13, 2020, immediately after Mr. Trump declaration according to which the coronavirus represents a "national emergency" issue. In addition, in the context of the coronavirus crisis, the Saudi Arabia decided to flood the market with oil and the international prices dropped over 20% on March 9, 2020. Against this background, we may ask if the coronavirus crisis influences the policy-induced economic uncertainty in the US, during the first wave of the sanitary crisis. We tempt to respond to this question by analyzing the impact of new infection case announcements, and COVID-19 death-associated ratio, on the US economic policy uncertainty (EPU). We use daily data over the period January 21 – March 13, 2020, resorting to the WHO situation reports. We also test the impact of crude oil prices on the US EPU. Given that the US is an oil-dependent country, as one of the world largest producers, it is expected that a crash of crude oil price will amplify the economic uncertainty.

The relationship between EPU and oil prices has already been investigated. Chen et al. (2020) show that the impact of oil price shocks on EPU is positive at all frequencies, a result in line with Kang et al. (2017), but contrasting that

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reported by Antonakakis et al. (2014). At the same time, Ma et al. (2018) notice that EPU is important to forecast oil futures prices, whereas Aloui et al. (2016) show that EPU influences the oil price returns only in certain periods. Nevertheless, none of these studies focuses on the recent situation generated by the COVID-19 crisis, with few exceptions (e.g. Albulescu, 2020). Therefore, we fill in this gap and test the impact of coronavirus numbers and West Texas Intermediate (WTI) prices on the US EPU (we use BRENT crude for robustness purpose). As far as we know, this is the first paper addressing the impact of the COVID-19 crisis on the US policy-induced economic uncertainty.

Only few works try to identify the causes underlying EPU (e.g. Albulescu et al., 2020; Chen et al., 2020; Duca and Saving, 2018). Indeed, most of existing studies address the impact of EPU on economic activity (Nyamela et al., 2020; Sahinoz and Cosar, 2018), financial volatility (Mei et al., 2018; Tiwari et al., 2019), bank valuation (He and Niu, 2018) or firm performance (Iqbal et al., 2020; Wu et al., 2020). Consequently, we add to the set of analyses investigating the drivers of EPU, with a focus on the officially reported coronavirus numbers. The rest of the paper presents the data (Section 2), the methodology and results (Section 3) and the conclusions (Section 4).

Data

The WHO data show that China was in the pre-pandemic phase of the crisis the most affected country in the world. However, the virus rapidly spread in other countries like Italy, Spain, Iran, or South Korea. Therefore, it is expected that the impact of COVID-19 on the US EPU increases with the crisis propagation outside China. Figure 1 shows that the US EPU increased exponentially during the first wave of COVID-19 and it is positively correlated with the COVID-19 numbers.

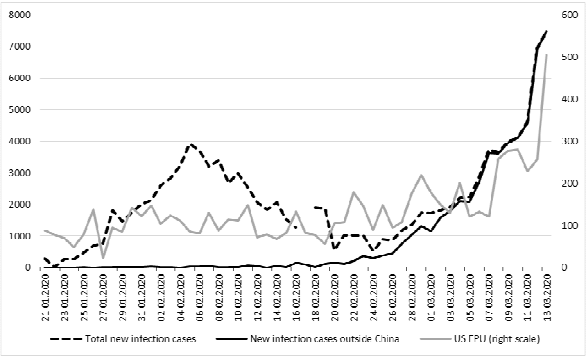

Fig. 1: COVID-19 new infection cases and the US EPU

Figure 2 highlights that the death ratio has continuously increased, with a similar trend as that of the EPU index.

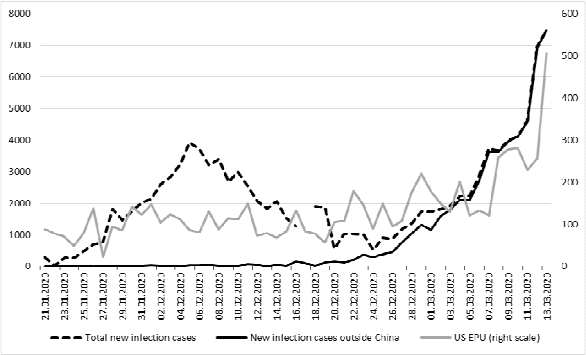

Fig. 2: COVID-19 death ratio and the US EPU

Our daily data are extracted from the WHO situation reports and refer to the new reported cases of infection and death ratio. The EPU statistics come from Baker et al. (2016) - http://www.policyuncertainty.com/us_daily.html, whereas the WTI crude oil prices are obtained from the US Energy Information Administration. All series are expressed in natural log.

Empirical Investigation

Methodology

Given that our series are either I(0) and I(1) (Table 1), we use the ARDL model proposed by Pesaran et al. (2001) to investigate the relationship between the retained variables.

Table 1: ADF unit root test

	EPU	**COVID-19$_{TNC}$**	**COVID-19$_{NCOC}$**	**COVID-19$_{TDR}$**	**COVID-19$_{DROC}$**	**WTI**
Level	-3.224**	-3.692***	0.541	-5.843***	0.079	1.276
First difference	-11.69***	-13.31***	-7.413***	-8.359***	-6.946***	-9.071***

*Notes: (i) ***, ** and * means significance at 1%, 5% and 10%; (ii) the optimal lag selection is based on AIC information criterion; (iii) COVID-19$_{TNC}$ refers to total new infection cases, COVID-19$_{NCOC}$ shows the new cases reported outside China, COVID-19$_{TDR}$ is the total death ratio, COVID-19$_{DROC}$ is the death ratio outside China.*

We therefore test the following specification that integrates the short-run adjustments into the long-run equilibrium (Albulescu, 2015):

$$\Delta EPU_t = c + \delta_{EPU} EPU_{t-1} + \delta_{COVID\text{-}19} COVID\text{-}19_t + \delta_{oil} Oil_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta EPU_{t-i} + \sum_{i=1}^{p} \beta_i \Delta COVID\text{-}19_{t-i} + \sum_{i=0}^{p} \gamma_i \Delta Oil_{t-i} + \theta ECT_{t-i} + \varepsilon_t \quad (1)$$

where: (i) Δ and δ are short- and long-run terms respectively (ii) "i" represents the maximum number of lags, (iii) the error correction adjustment term is denoted by ECT and the speed of adjustment is ϑ, (iv) ε is the error term.

Results

We first validate the existence of the long-run relationship applying the bound test (Tiwari and Albulescu, 2016). The bound analysis shows in all cases the existence of cointegration (Table 2).

Table 2: Bound test results

Model specification	F-statistic	**Critical values**		Conclusion
		Lower bound (I(0))	Upper bound (I(1))	
COVID-19$_{TNC}$	10.54	3.10	3.87	cointegration
COVID-19$_{NCOC}$	12.64	3.10	3.87	cointegration
COVID-19$_{TDR}$	10.36	3.10	3.87	cointegration
COVID-19$_{DROC}$	11.53	3.10	3.87	cointegration

Notes: (i) Critical values at 5% significance level; (ii) COVID-19$_{TNC}$ refers to total new infection cases, COVID-19$_{NCOC}$ shows the new cases reported outside China, COVID-19$_{TDR}$ is the total death ratio, COVID-19$_{DROC}$ is the death ratio outside China.

In the second step (Table 3), we present the results of the ARDL estimations for the four models we test, considering the total new infection cases (Model 1), the new cases reported outside China (Model 2), the total death

ratio (Model 3) and the death ratio outside China (Model 4). The first model shows that at equilibrium (long run), the total new infection cases had no effect on the US EPU, but a decrease of crude oil price leaded to a higher uncertainty, as expected. The short-run results show no impact of COVID-19 figures and WTI prices on the US EPU. However, the situation is different for Model 2, where the new infection cases reported outside China increased the uncertainty. At the same time, Model 4 shows that an increase of 1% in the logarithmic level of the death ratio recorded outside China, leaded to an increase of 0.18% of the uncertainty index in the long run. This result remains robust when we use the BRENT crude as a *proxy* for the international oil prices (these results can be provided by the author, upon request).

Table 3: Results of the ARDL specification

	Model 1: COVID-19$_{TNC}$	**Model 2: COVID-19$_{NCOC}$**	**Model 3: COVID-19$_{TDR}$**	**Model 4: COVID-19$_{DROC}$**
Long-run equation				
COVID-19$_{t+1}$	0.040	0.068**	0.057	0.182*
WTI$_t$	-2.208***	-1.426**	-2.401***	-1.240*
c	13.06***	10.00***	13.97***	9.431***
Short-run equation				
ΔEPU$_{t-1}$	0.456*	0.481**		
ΔCOVID-19$_{t+1}$		-0.010		
ΔCOVID-19$_{t-1}$			0.018	
WTI$_{t-1}$			-0.921	-0.878
ECTt	-0.947***	-1.017***	-0.958***	-0.992***
Tests on residuals				
Serial correlation	NO	NO	NO	NO
ARCH effects	NO	NO	NO	NO
Notes: (i) ***, ** and * means significance at 1%, 5% and 10%; (ii) Breusch-Godfrey LM test for serial correlation is used; (iii) ARCH effects for conditional heteroscedasticity (with 4 lags).				

Conclusions

The rapid propagation of COVID-19 pandemic generates shock waves on the financial and commodity markets, as well as in the real economy. The depth of the new economic downturn will depend on the policy response to the coronavirus crisis. This paper investigates how COVID-19 official numbers (new infection cases and death ratio) affect the US EPU.

The findings show that the global COVID-19 numbers have no significant impact on the US EPU. Nevertheless, these results are largely influence by the situation reported in China, which seems to win the fight against the virus. When we assess the situation outside China, we clearly notice a positive influence of COVID-19 numbers on the US EPU. We therefore underline an amplification of COVID-19 risk to financial and real economy, generated by an increased, policy-induced economic uncertainty in the US.

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Technical Modernization of Weapon Systems

Kazimierz KOWALSKI

General Tadeusz Kościuszko Military Uniersity of Land Forces, Faculty of Management, Wroclaw, Poland, kazimierz.kowalski@awl.edu.pl

Abstract

Problems of modernization of weapon systems in their life cycle are presented in the paper. In the introduction he inevitability of the modernization process of crucial weapon systems was emphasized. Furthermore, the concept of weapon system, life cycle of the weapon system and modernization of weapon systems where presented. The main part of the paper was focused on the objective need of modernization of weapon systems, and in particular types of weapons. A proposal to determine the level and efficiency of modernization of weapon systems where presented. Determination of the efficiency index of the modernization of the weapon system was proposed. Some data regarding the upgrade of the Leopard 2A4 tank to the Leo2PL version was presented. In the end the significance of the modernization process in the life cycle of weapon systems was emphasized due to, above all, the significant costs of the modernization process and the inevitability of the modernization process of key weapon systems that are characterized by at least 30 years of an operational and maintenance phase lasting.

Keywords: Modernization, Weapon System, Life Cycle.

Introduction

The issues of life-cycle management of man-made systems are described by extensive world and national literature (Stark 2011; Mitkow 2013).

NATO pays considerable attention to issues related to the life cycle of defense systems. As part of NATO's organizational structures, there is the Life Cycle Management Group (AC / 327), which has developed a number of strategic level documents describing the issues of rational management of defense systems life cycle. The basic document in this area is the publication of the Allied Administration AAP-48, which is the implementation guidelines for NATO Policy in the field of Systemic Life Cycle Management (SLCM). This publication describes the activities, methods and techniques required to implement NATO SLCM policy.

AAP-48 translates the principles of NATO policy in the SLCM area into a common framework based on the ISO / IEC 15288 civil standard (Systems Engineering - System Life Cycle Processes) describing the working methodology and integrated approach to life cycle management for defense capabilities in NATO.

Rational management of the life cycle of defense systems (including weapon systems - WS) is extremely important due to the very high costs of the life cycle of these systems (reaching tens of billions of zlotys) (Kowalski 2012).

The inevitability of the modernization process of crucial weapon systems is primarily due to their at least 30 years of operation. During this time, at least two factors affect the failure to adapt their ability to current requirements. The first is the changing threat that these systems should counteract, and the second is continuous technical progress enabling improvement of key parameters affecting capabilities of these systems.

As it results from the above, it is necessary to implement actions aimed at adapting the capabilities of weapon systems to current requirements of modern battlefields.

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The modernization of weapon systems is seen through the modernization of their key subsystem - a type of military equipment. That is why in the further part of the article the concept of modernization of the WS and modernization of military equipment is presented similarly.

Therefore, a research question was asked: how to avoid the problem of underestimating the costs of training in project management? Empirical research was preceded by literature studies (in-depth desk research); then, case studies of military projects were carried out. The obtained results were additionally confronted with the experts' statements (i.e., project managers and members of project teams) from the IT, banking, logistics, financial, and development/construction sectors. The research was conducted in the years 2018-2020. The preliminary analytical work results allowed for the following hypothesis: there is a possibility of eliminating the problem of underestimating the costs of training in project management by using the multidimensional analysis of "STOP costs." The hypothesis will be verified in the course of further research aimed at determining the effectiveness of the tools as mentioned above in business practice.

The Weapon System

There are many definitions of “system” in the literature on the subject. One of the broadest conceptually and shortest at the same time states that "The system is a being (B) manifesting its existence through the synergistic interaction of its elements (E)" (Cempel 2008). Mathematical definition, defines the system (S) as a set (set, complex) of interacting elements (E) constituting a deliberately oriented whole.

$$S = B\,(E, A, R), \quad E = [E1, ..., En], \quad A = [A1, ..., Am], \quad R = [R1, ..., Rk] \qquad (1)$$

where: S – a system,
E – a set of a system elements,
A – a set of attributes (properties),
R – a set of relations between elements and attributes.

The WS is defined as a set of cooperating weapon types (along with their related equipment) with personnel, material and technical means, services and means of transport/shipment (if required). The above-mentioned elements are to ensure self-sufficiency of the weapon system, defined by the type of weaponry, in operation (after: http // www.jcs.mil / Doctrine / DOD-Terminology) (DOD Dictionary 2020). A graphic presentation of the concept of weapon system is shown in Fig. 1.

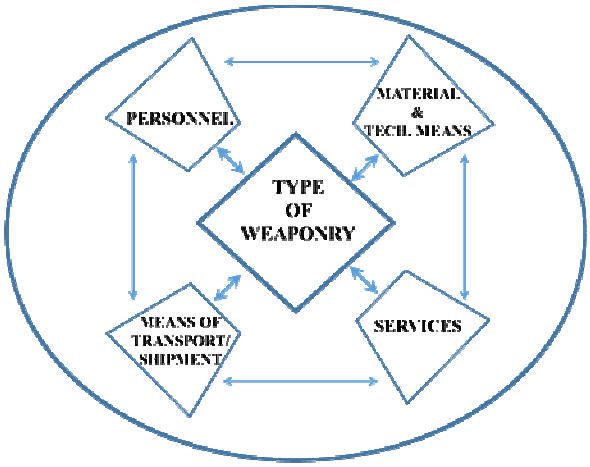

Fig. 1: The idea of weapon system

Source: Own study based on (DOD Dictionary 2020)

Life Cycle of Weapon Systems

In NATO, by adapting the classification set out in ISO / IEC 15288, the entire product life cycle has been divided into six stages: concept, development, production, use, support, withdrawal, Fig. 2.

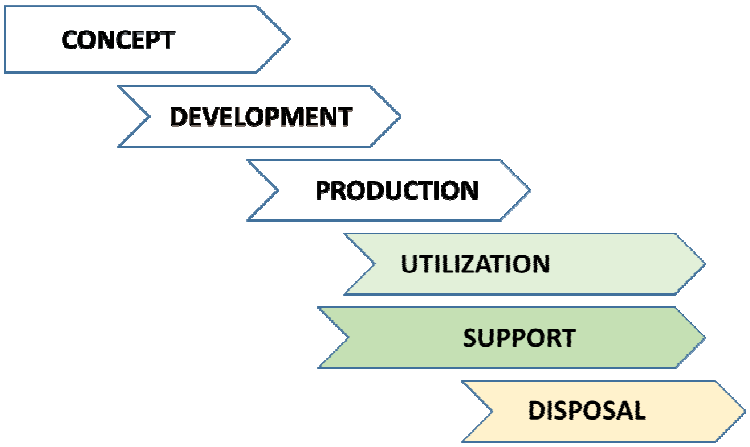

Fig. 2: Illustration of systems life cycle processes
Source: Own study based on (NATO Standard AAP-48 2013)

However, according to the model adopted by the Polish Ministry of National Defense, the life cycle model of the WS includes the following phases and stages (Fig. 3):

1) identification phase - implemented as part of the Operational Needs Review, comprising the stages of:

   a) identification of needs for operational capabilities,
   b) defining operational requirements,
2) analytical and conceptual phase, including the determination of feasibility,
3) implementation phase, including stages:
   a) definition of design assumptions,
   b) design and development,
   c) production and acquisition,
4) operation and maintenance phase, including the stages:
   a) implementation of weapon systems into the Armed Forces,
   b) operation and maintenance of WS, including:
      - utilization,
      - material and technical support,
      - withdrawal of weapon systems from utilization in armed forces.
5) removal phase, including the stages:
   a) removal from the operating environment,
   b) liquidation.

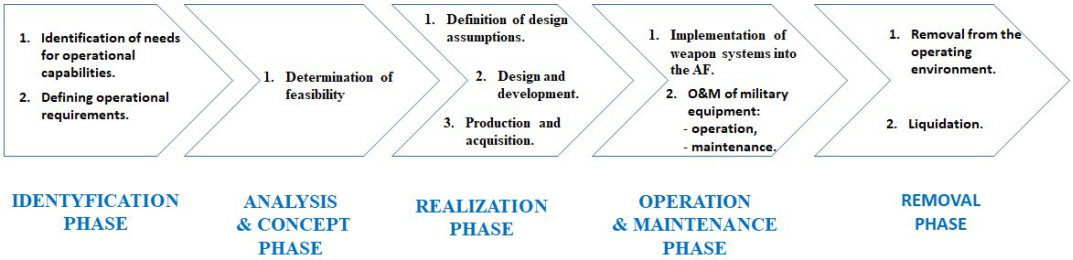

Fig. 3: Graphical presentation of weapon systems life cycle processes in Polish Armed Forces
Source: Own study based on (Decision No. 141 2017).

WS modernization process in its life cycle is generally carried out in two phases, realization and O&M. In the realization phase, in the area of modernization, it is important to design the future WS in such a way that its further rational development is possible. In particular, it is about the possibility of increasing the capabilities of WS by replacing critical modules (assemblies, subassemblies).

The modernization process in the O&M phase consists in physical changes of the WS in the form of interference in the existing WS structure aimed at improving the WS (increasing its capability). The modernization process in the O&M phase should be planned when the WS life cycle model is developing, and in particular when the SPW life cycle cost is estimating (Kowalski, Wojciechowski 2012).

The completion of the last stage of the WS life cycle in the Polish Armed Forces is subject to its decommissioning, if it does not meet the requirements of the Armed Forces due to at least one of the following conditions:

- utilize worktime standard,
- physical wear and tear, preventing further use when the repair is unprofitable or impossible,
- combat, technical and operational parameters that do not meet the requirements of the army when **modernization is unprofitable or impossible**,
- organizational and regular post changes in the Armed Forces, resulting in no prospects for the WS further operation.

Modernization of Weapon Systems

According to the current nomenclature in the Armed Forces of the Republic of Poland (DD-4.22A 2017), the increase in the capabilities of WS can be achieved through the process of its modification or modernization.

Modification is understood as the process of improvement of WS, consisting in the exchange, replacement or extension of existing components, functions or software without changing its principal purpose. As a result of the modification, no new WS is created (i.e. it maintains its existing material index).

Whereas, the modernization process, which is also a process of improvement of WS, involves changing its operational parameters. Especially critical operational parameters. As a result of this process, new WS is created (receives a new material index).

As follows from the above, the modernization of WS significantly changes its capabilities and is a much more complex and costly process than the modification process. Therefore, the frequency of execution of the WS modification process is definitely greater than its modernization.

Thus, the essence of the modernization of WS is to increase its capability - combat value , Fig. 4. Combat value (combat values, utilitarian values, qualitative values and other values), resultant of all features of the tested military equipment, i.e. tactical and technical parameters, reliability, durability, technological solutions and the ability to perform various combat tasks regardless of terrain and weather conditions (Wołejszo 2000).

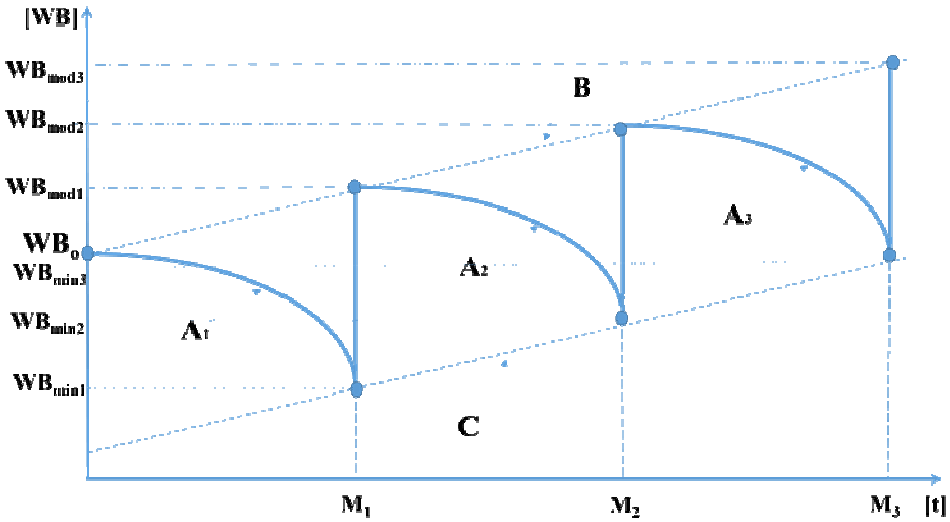

Fig. 4: Graphical presentation of the process of modernizing a weapon system (the meaning of symbols in the text)

Source: Own study

The initial combat value of WS is WB_0 at the time of its entry into service. The decrease the combat value of WS during its operation is symbolized by the A_1 curve. This decrease continues to the contractual allowable level of combat value (WB_{min1}). In order to prevent exceeding the allowable level of combat value, the modernization process (M_1) is carried out, thanks to which the combat value of WS increases to the value of WB_{mod1}. A significant fact is that the level of combat value of military equipment after modernization (WB_{mod1}) is higher than its initial level of combat value (WB_0). The relationships presented above are repeated in time (WB_{min2}, WB_{min3} - admissible levels of combat value decline after modernization of M_2 and M_3; A_2, A_3 - curves of the decrease in combat value after modernization of M_2 and M_3; M_2, M_3 - subsequent modernizations; WB_{mod2}, WB_{mod3} – a level of military equipment combat value after the modernization M_2 and M_3).

Of course, the cyclicity of changes is not equal for each time interval. Also the lines symbolizing the change (increase) in the level of allowable combat value (line C) and the level of combat value after modernization (line B) may correspond to the value of various functions (this is not always a linear function as shown in the Fig. 4).

It should be noted that the absolute increase in the level of combat value of WS obtained as a result of the modernization process is definitely greater than the increase obtained as a result of the modification process.

Assessing WS in the O&M phase in terms of the possibility of modernization, WS can be divided into three basic categories:

1. Modern WS that meets the requirements, not being modernized.
2. WS that meets the requirements to a limited extent, with modernization potential justifying its further operation.
3. Obsolete WS that does not meet the requirements and does not have the modernization potential justifying its further rational operation.

Need for Modernization of Weapon Systems

The need to modernize weapon systems is mainly due to a gap in its capabilities. The capability gap is defined by the extent to which the established action plan cannot be met by current WS. Such a gap may be due to a lack of

capability, non-compliance of existing capability solutions and / or the need to replace existing capability solutions with those that will prevent future threats.

Operational requirements often require more capabilities than the weapons system can provide. The capability gap describes the difference between the capabilities of the weapon system and operational requirements. The purpose of assessing the capability gap is to identify its size and identify weaknesses in the weapon system (including support equipment). The capability gap analysis mainly covers two aspects. The first, in response to the functional needs of this capability, is to assess the capabilities of the weapon system. The second aspect is to compare the status of required capabilities and fulfill capabilities in all considered categories one by one. The comparison of status should follow criteria such as "being able to support well", "being able to support under certain conditions" and "not being able to support". At the same time, an analysis should be carried out whether the first two criteria will ensure that the required capabilities are obtained (Dong, Daguo, Yang et al. 2018).

Determining the level of modernization of weapon systems

Improving weapon systems raises the question of effectiveness and efficiency of this process. The effectiveness of modernization should be defined as an action that leads to the intended effect of the purpose of this action. Therefore, an effective action will be such action as a result of which the set goal has been achieved (100%). Effectiveness can be equated with the rationality of action. The action is considered rational, taking into account the criteria of praxeology, when the methods and means adopted by the subject of the action lead to the achievement of the intended goal.

The measurable intended effect of the modernization of WS may be the combat value of WS after modernization.

The combat value of WS in relation to combat vehicles (tanks, infantry fighting vehicles, armored personnel carriers) is calculated based on specific indicators. These indicators reflect the critical characteristics of a specific combat vehicle. These critical features include: firepower, mobility and survivability (Halota, Kurpas 2016). In tactical terms, mobility is equated with maneuverability. Mobility is classified into three categories: strategic mobility, operational mobility and tactical mobility.

To calculate the combat value of combat vehicles in the Polish Armed Forces, a universal combat value assessment methodology is used, based on the Techniqe for Assessing Comperative Force Modernization (TASCFORM) method. This method is based on an estimated comparison of the modernity of individual systems using Equipment Potential Capability Comparison (EPOCC) standard.

A detailed methodology for calculating the combat value of a combat vehicle (e.g. tanks) is presented in (Magier 2016)). The outline of the aforementioned methodology is presented below in a demonstrative manner, as well as factors that determine the critical values of combat vehicles in more detail.

According to the above method, the combat value of a combat vehicle is calculated from the formula:

$$WB = S_{og} \cdot M_{an} \cdot P_{rz} \tag{2}$$

where: WB – combat value,
S_{og} – firepower,
M_{an} – mobility,
P_{rz} – survivability.

Combat vehicle firepower is understood as a set of factors determining the quantity, quality and effectiveness of the basic armament (e.g. tank cannon) and associated systems and subsystems. The firepower is calculated from the formula:

$$S_{og} = W_{ba} \cdot R_{fn} \cdot SKO \tag{3}$$

where: S_{og} – firepower,

W_{ba} – cannon combat value,
R_{fn} – indicator of fire intensity increase,
SKO – indicator of quality of the Fire Control System.

Maneuverability of combat vehicles means the ability to move in a tactical and operational sense, as well as an element of active defense. It is a very broad concept and in the general case determines the agility and maneuverability of the vehicle and the ability to overcome terrain in all conditions (Błaszczyk, Papliński, Rybak 2004). This property is increasingly important for the survival of combat vehicles (especially infantry fighting vehicles and tanks) during combat. The maneuverability of combat vehicles is determined by:

- the ability to reach maximum and average travel speeds in various climate and road conditions, especially average off-road speeds, both in forward and reverse,
- driving range on one refueling in any field conditions,
- ability to overcome various terrain, natural and artificial obstacles (vertical walls, ditches, hills, etc.), including overcoming fords and deep water obstacles and terrain contaminated with weapons of mass destruction,
- the quality of the propulsion unit and the type of propulsion system used,
- ease of steering (type of steering mechanism and main brakes),
- the type and quality of the suspension and the track mechanism, including smooth terrain while traveling at any speed,
- adapted for long-distance transport (transportability),
- the ability to self-digging and paving passages in the minefield.

Maneuverability, in the adopted methodology, is determined from the relationship:

$$M_{an} = 1 + k_{jed}/100 \cdot X_{el} \tag{4}$$

where: M_{an} – maneuverability,
k_{jed} – unit power factor [kW/t],
X_{el} – engine flexibility coefficient.

It should be noted that the NATO has a "maneuverability model" version (2) MRMMZ - Field Standards Database (map sheet 5322 Lauterbuch-Germany). The decisive parameter here is the pressure on the soil calculated according to the empirical formula (Halota, Kurpas 2016). The main mobility parameter is described in the above model, as the proportion of track contact length with the ground to the distance between track centers. This parameter should be between the values 1.41 ÷ 1.78. Examples, coefficient values for selected combat vehicles are:

- T-72 tank and derivatives - 1,43,
- Leopard 2 tank - 1,57,
- AHS Krab Self-Propelled Howitzer SPH - 1,67.

Survivability is a characteristic that characterizes the survival ability of a combat vehicle (functional capability retained) and its crew in the event of a hit. The main role in determining this feature is the armor which is characterized by a number of attributes and additional protection systems. Survival can be characterized by the following information:

- the type of material used for armor protection (armored steel, light alloys, composite materials, etc.) and processing technology,
- the thickness of individual armor plates (armor knots),
- the method of making basic armor knots (welding, casting, layering, etc.) and the method of joining them,
- armor plate inclination angles,
- degree of radiation weakening,
- geometrical dimensions of a combat vehicle (height x width x length),
- data on the armor of "weak links" inside the combat vehicle (e.g. ammunition stores, fuel tanks, etc.),
- how to cover the outer surface of the armor that reduces radiation,

- data on the system of protection against weapons of mass destruction and the fire and explosion system used.

The list of combat values of selected tanks, calculated using the EPOCC methodology, is presented in the Tab. 1.

Table 1: combat value list for selected tanks

Feature/Tank	M-1A1	L2A4	Leo-2A5	T-64B	T-72M	T-80U	Chall-2	PT-91M
Sog	71,87	57,37	70,02	9,98	14,15	40,15	59,54	27,67
Man	1,23	1,2	1,2	1,13	1,14	1,25	1,14	1,14
Prz	0,11	0,1	0,1	0,08	0,08	0,09	0,12	0,09
WB	**9,72**	**6,88**	**8,40**	**0,90**	**1,29**	**4,52**	**8,15**	**2,84**

Source: Own study based on (Magier, 2016)

As it results from the presented data (Tab. 1), as a result of the modernization of the Leopard 2A4 tank to the Leopard 2A5 version, its combat value was increased by 1.52. However, the modernization of the T-72M tank to the PT-91M version resulted in an increase in its combat value of 1.55. Which in percentage in the first case meant an increase of 22%, in the second case the combat value increased by as much as 120%.

Determining the effectiveness of modernization of weapon systems

In general, effectiveness is a measure of the expenditure incurred for the effects obtained (Jałowiec 2013). In relation to modernization, the measurement of its effectiveness will consist in determining measurable indicators that will enable it to be determined. Costs can be a measurable measure of the expenditure of modernizing weapon systems, expressed in monetary units, incurred in connection with modernization activities. On the other hand, the obtained effect, as a result of modernization, can be a new measurable combat value of WS (usually higher).

$$E_{MOD} = \frac{NK}{WB_2 - WB_1} \tag{5}$$

where: E_{MOD} – effectiveness of modernization,
NK – financial expenses for modernization (currency),
WB_1 – combat value before modernization,
WB_2 – combat value after modernization.

Of course, it is possible to achieve other effects (primary or secondary) such as e.g. obtaining the ability to perform selected operational processes or even maintaining the ability to perform them.

In order to compare the effectiveness of modernization of the same type of WS, expenditure should be related to standardized effects (e.g. increase in combat value by 1.00).

Due to the inability to obtain reliable data (in generally available sources, data on modernization costs are very dispersed and shared with other costs) in the article it was not decided to determine the estimated efficiency values of modernization of military equipment.

However, based on reliable information from the Ministry of National Defense, we can estimate the value of the Polish upgrade of the Leopard2A4 tank to the Leo2PL standard. The scope of modernization works will allow to increase ballistic resistance and improve observation systems to the level offered by variant 2A5 or higher (Wilk 2018]. It can therefore be assumed that the combat value of the Leo2PL tank will not be lower than the Leo2A4 tank.

Taking into account the above assumption (increase in the combat value by 1.52) and the amount of the modernization contract amounting to PLN 2.415 billion for 128 Leo2A4 tanks, we can calculate the effectiveness of the modernization as costs of the increase in the combat value by 1.00. In this case, the costs of increase in the combat value by 1.00 amount to PLN 12.433 million.

Conclusion

Modernization of weapon systems is inevitable due to a minimum of 30 years of their life cycle in the armed forces. We should evaluate the modernization of weapon systems in the category of its effectiveness, i.e. the expenditure incurred on the results obtained (intended or not). The main assumed effect of the modernization of the WS is usually an increase in its combat value. Nevertheless, in many cases, the purpose of modernization is also to acquire the ability of domestic industry to implement specific processes of operation of the modernized weapon system.

In the presented modernization of the Leopard2A4 tank to the Leo2PL version, the increase by 1.00 in combat value "costing" PLN 12.433 million relates to the weapon system, whose main subsystem is the Leo2PL tank. The above amount includes costs incurred, inter alia, for the modernization of trainers, training of operational staff, technical documentation and others. This cost also includes expenses incurred for the R&D upgrade phase, which will not be taken into account for potentially subsequent upgraded Leopard2A4 tanks.

The classic approach to calculating the combat value of combat vehicles (tanks, infantry fighting vehicles) takes into account three key critical features: firepower, mobility and survivability. Due to the growing importance of conducting combat operations in an urbanized environment, it seems reasonable to include, in calculating the combat value of combat vehicles, an additional critical feature which is the operational (tactical) awareness of the combat vehicle crew.

Acknowledgement

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Principles of Enterprise Potential Management in The Coordinates System of Organizational Development

KNIAZ SVIATOSLAV
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: svkniaz@ukr.net

SOPILNYK LYUBOMYR
Lviv University of Business and Law, Lviv, Ukraine, 79021 E-mail: sopilnyk01@gmail.com

SHCHEBEL ANDRII
Lviv University of Business and Law, Lviv, Ukraine, 79021 E-mail: peet_@ukr.net

MOROZ SVITLANA
Poltava State Agrarian Academy, Poltava, Ukraine, 36003 E-mail: smor@meta.ua

KALASHNYK OLENA
Poltava State Agrarian Academy, Poltava, Ukraine, 36003 E-mail: kalashnik1968@meta.ua

SKRYNKOVSKYY RUSLAN
Lviv University of Business and Law, Lviv, Ukraine, 79021 E-mail: uan_lviv@ukr.net

KRAMAR MARIAN
Lviv University of Businessand Law, Lviv, Ukraine, 79021 E-mail: kramar.m.o@gmail.com

SPITSYNA ANHELINA
National Transort University, Kyiv, Ukraine, 02000 E-mail: angel7a@ukr.net

KYRYCHENKO OLENA
Higher Educational Establishment of Ukoopspilka "Poltava University of Economics and Trade", Poltava, Ukraine, 36000 E-mail: olena.kyrychenko2010@gmail.com

GNYLIANSKA LESIA
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: Lgnylianska@gmail.com

LAKIZA VIKTORIIA
Lviv Polytechnic National University E-mail: viktoriia.v.lakiza@lpnu.ua

Annotation

Enterprise potential management, as a specific function of management, is implemented by planning the development of enterprise potential, organizing the process of its formation and use, motivating management to rational use of enterprise potential, as well as controlling and regulating the formation and use of capacity. It should be recognized that despite the high level of formalization of the process-functional approach to managing the potential of the enterprise today the object of management is rather poorly formalized, namely - the potential of the enterprise. Due to the diversity of potentials there is a large number of types of their development. The article proposes a system of principles of capacity management in the coordinate system of organizational development. The list of principles is formed so as to level the diversity of potentials of the enterprise, and the coordinate system of organizational development is considered as one that integrates different types of development into one whole.

Keywords: Potential, Management, Organizational Development, Organizational Change, Enterprise.

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Introduction

The development of any business depends on its potential. It should be recognized that, regardless of the type of activity of enterprises, their form of ownership, as well as size, there are certain components of the potential of enterprises that are common to all entities, as well as those that are unique to specific enterprises. This indicates that the potential of the enterprise is a rather complex object of management, which requires technical and technological, information and communication, intellectual and organizational development. The coordinate system of organizational development has an integrative character. It determines the rationality of the formation and use of the enterprise potential. Given this, the urgent task for business leaders is to identify the principles of managing the potential of the enterprise in the coordinate system of organizational development. Unfortunately, nowadays, these principles have been studied in a rather fragmented manner, which indicates the incompleteness of the theory of enterprise capacity management.

Literature Review

The concept of "organizational development" is quite diverse. It is considered as organizational change, as a system of scientific and methodological justification for the preparation and implementation of organizational change, as a set of processes that accompany organizational change, as well as a strategy of enterprise behaviour in the market. Thus, Shcherbyna V. and Popova E. studying organizational development, come to the conclusion that "a stable core of organizational development is the quality of changes that occur, which is determined by the socio-cultural specifics of the organization" (Shcherbyna V., Popova E., 1996). Melnyk S. understands organizational development as "an organized process that disrupts the dynamic development of the organization's structure and directions for achieving a new state of dynamic equilibrium, which will be maintained relatively stably in the renewed structure" (Melnyk S., 2009).

Totsky V. and Lavrenenko V. define organizational development as "a long-term, thorough, comprehensive process of change and development of the organization (enterprise) and the people working in it ...", and also allocate structural (creation of favourable framework conditions for achieving the goals of organizational development through changes in regulation) and personnel (measures for staff development and their incentives for change) aspects (Totsky V., Lavrenenko V., 2005). Gerasymchuk V. considers organizational development as "a large-scale, planned systematized process in the enterprise, which responds to changes in the environment - internal and external" (Gerasymchuk V., 1995).

Novak V. and Rodchenko V. define organizational development as "a process of comprehensive organizational improvement of the system, the purpose of which is to streamline the components of economic activity and transform various parts of the system to maintain long-term life and adapt to changes in the environment" (Novak V., Rodchenko V. , 2009). Kolesnikov G. considers organizational development as a process of improving "formal and informal aspects of organizational activities", highlighting among the formal: organizational management structure, management processes, distribution and coordination of rights, duties, responsibilities, organization of work of managers and others. The informal side of organizational activities includes the improvement of knowledge, skills and experience, i.e. training, career growth using effective methods of motivation and formation of corporate culture (Kolesnikov G., 2007). At the same time, Shvindina G. argues that organizational development is a part of the overall strategy of the organization, and the very strategy of organizational development means a system of "direct actions and long-term programmes to initiate and implement constructive changes in organizational architecture for the success of the organization and its members" (Shvindina G., 2016).

The team of authors believes that from the standpoint of a structural approach, organizational development can be presented in such a sequence as: "values, organizational culture, culture of organization, organizational climate, organizational behaviour, organizational interaction" (Gudzynsky, O., Sudomyr, S., Gudzynska, Yu 2012).

Gorbatovska N. considering the theoretical foundations of organizational development of the enterprise in modern conditions of variable environment, defines it as "an organized process that disrupts the dynamic development of the organization and aimed at achieving a new state of dynamic equilibrium, which in the updated structure will be relatively stable" (Gorbatovska N. ., 2012).

Amelina I. considering the theoretical foundations of organizational development of the enterprise in modern conditions of variable environment, defines it as "an organized process that disrupts the dynamic development of the organization and aimed at achieving a new state of dynamic equilibrium, which in the updated structure will remain relatively stable" ., 2008).

Ladonko L. and Tikhun I. examining existing approaches to defining the essence and goals of the process of organizational development, identified the place and role of strategic organizational changes in innovative development of the enterprise, and reflected the relationship and differences between organizational change and organizational development for a number of factors: level of managerial decision-making, duration of influence, scale of actions, social orientation of the process (Ladonko L., Tikhun I., 2014).

It should be noted that despite the existence of the relationship and interdependence between organizational development and organizational change, but not all organizational change characterizes development, but organizational development is always a change, i.e. the very concept of development involves the implementation of organizational changes that ensure development enterprises.

Thus, organizational development is considered as: a set of concepts and models (theoretical basis) of organizational development; the process of qualitative and structural changes in the organization; practical activities to improve the organization; development strategy.

Thus, organizational development is characterized by the following properties: focus on the medium and long term, focus on the process of change (development), the introduction of change methodology, staff involvement in the process, the use of various methods to achieve goals.

Studies that cover the problems of organizational development have a fairly wide range of subjects that they cover. Nevertheless, they can be divided into those that relate exclusively to theoretical aspects of organizational development (Legeza N., 2019) and those that have a deeply applied focus. Today, most studies belong to the second group. Thus, the authors who study organizational development consider it in the system of assessing the creditworthiness of enterprises, as a stage of technology of financial and analytical management, a component of legitimizing the use of unmanned aerial vehicles, tools for innovation management, a tool for overcoming destructive phenomena in personnel management. empirical and expert evaluation and data analysis.

Zabrodska G.I. and Zabrodska L.D. combining different visions of the essence of this concept rightly note that, " organizational development is a scientific and methodological support for the implementation of long-term programmes of qualitative organizational change, using a systematic set of business processes that adapt to external conditions and internal integration and ensure growth efficiency of functioning and achievement of the purposes of the organization, by perfection of processes of the decision of problems and updating therefore increase of potential of the enterprise is provided… "(Zabrodska G., Zabrodska L., 2017). Agreeing in general with the above interpretation, we note that organizational change is largely beyond the strategic development of the enterprise, and is often implemented at the tactical and operational levels. In addition, it should be noted that organizational change cannot be limited to scientific and methodological support for their implementation.

Organizational decisions should be considered through the prism of the theory and practice of management decisions, as organizational decisions are their subspecies. The scientific literature traditionally distinguishes the stages of technology for making management decisions, namely (Kniaz S., Kulyk Y., Zinkevych D., 2009): formation (identification of the problem situation, analysis of factors that caused the problem situation, consideration of alternative solutions to the identified problems), selection (selection of criteria or criteria by which to choose the best solution from a number of alternatives, analysis of existing alternatives based on the selected criterion (criteria)), approval (documentation of the chosen solution and bringing it to the performers) and implementation (creation of conditions to implement the decision, control and regulate the process of execution of the decision) decision. These stages are also characteristic of organizational decisions. In view of this, organizational changes are a consequence of scientific and methodological support not only for the implementation but also for the formation, selection and adoption of organizational decisions (Kniaz S. et al., 2019).

Purpose of Research

The purpose of the article is to identify and reveal the economic and managerial essence of the principles of enterprise potential management in the coordinate system of organizational development. To achieve this goal, you must perform the following tasks:

- specify the place of the potential of the enterprise in the coordinate system of organizational development;
- identify the starting points of capacity management and establish relationships between them.

Results of the research. As a result of review and analysis of scientific literature there is a reason to say that in the management system of enterprise potential organizational development is a consequence of organizational decisions that can be implemented in three vectors, namely: the vector of organizational structure of enterprise capacity management, the vector of distribution of functions and powers subjects of the management system for managing the potential of the enterprise, as well as the vector of formation and implementation of rules and procedures in the management system of the enterprise relating to the management of the potential of the enterprise. Fig. 1. shows the place of the potential of the enterprise in the coordinate system of organizational development. During the implementation of organizational decisions, the subjects of enterprise management receive information about changes in the characteristics of the object of organizational development, as well as management information from the external environment. On the basis of this information, corrective decisions can be made, often of a tactical and operational nature.

Managing the potential of the enterprise in the coordinate system of organizational development requires the adherence of management to a number of principles. Under the principles of enterprise potential management, we understand the rules, regulations, basic starting points that underlie the process of enterprise potential management and in accordance with which the company will develop. Examining the literature on this issue (Tkachenko S., 2014) found a fairly common approach to the classification of principles into two groups: 1 group - basic (general, general scientific) principles that must be followed at all levels of government; Group 2 – specific ones, which reflect the peculiarities of the functioning of the object of management.

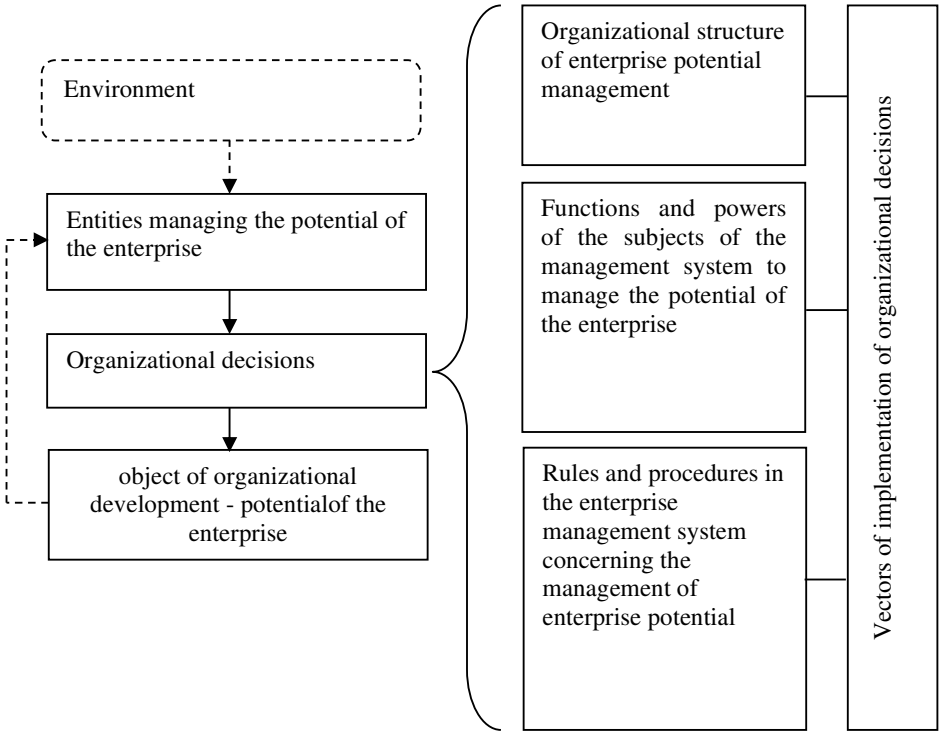

Fig. 1: The place of the potential of the enterprise in the coordinate system of organizational development
Note: The dotted line shows the feedback from the object to the subjects of management, as well as the receipt of information from the environment to the subjects of management.

Thus, Tkachenko S., studying the processes of functioning of the elements of the subsystem of analytical information processing of functionally developed control systems, identifies a group of basic (system approach, new tasks, unification of design solutions, continuous development, minimization of input and output information, combination of functional and programme-target approach) and specific principles that are formed based on management tasks (Tkachenko S., 2014). However, the application of this approach to the division of principles in relation to the management of the potential of the enterprise into groups is considered inefficient and impractical. Krush P. and Boyko T. describing the components of the management system of production potential of the enterprise, among the principles on which the management system is based are such as, "systemic, reasonable, comprehensive, adaptive, purposeful, dynamic, optimal, predictable, flexible" (Krush P., Boyko T., 2015).

Lyzunova O. and Sirenko Yu. Studying the potential management of a metallurgical enterprise, the basic principles of production potential management include "optimality, objectivity, flexibility, complexity, realism, efficiency, adaptability, organizational innovation" (Lyzunova O., Sirenko Yu. , 2017).

Zakharenko M. among the basic principles of planning the potential of the enterprise refers to the coherence of strategic and current plans; social orientation of the plan; ranking of planning objects according to their importance; adequacy of planned indicators; consistency of the plan with the parameters of the external environment of the components of production potential; variability of the plan, its balance, validity, flexibility (Zakharenko M., 2018).

The author's vision of the classification of the principles of enterprise potential management is shown in Fig. 2, which is necessary to ensure the rationality of the approved organizational decisions.

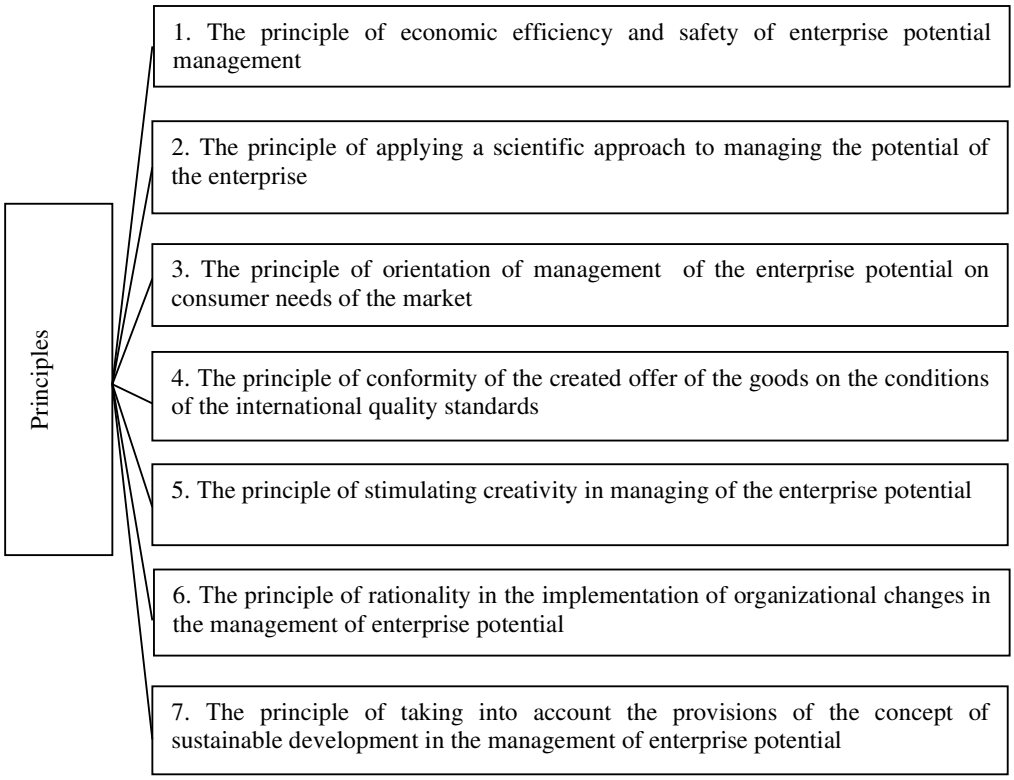

Fig. 2: Principles of enterprise potential management:

The principle of economic efficiency and safety is also closely related to the principle of applying a scientific approach to managing the potential of the enterprise. In the scientific literature there are author's positions, which argue the feasibility of using an intuitive approach when making decisions of economic nature. The most famous in this direction is J. Soros (J. Soros, 1999), who on the example of the analysis of financial markets and his own

experience made a very successful attempt to put forward a theory of market reflectivity and explain that investors in organized currency and stock markets, decision to buy or the sale of assets is guided by intuition rather than common sense, which is based on deep economic analysis. Admittedly, we can partially agree with this author's theory. Nevertheless, this theory, firstly, applies exclusively to financial markets, and secondly, it reflects only part of reality. There are a number of researchers who use technical analysis of the dynamics of indicators that characterize financial markets and their arguments for decision-making by investors are much more convincing than those of Soros J. For example, Mandelbrot B., studying economics, found that price fluctuations can follow from a latent mathematical order that is not described by standard curves. This assumption was analyzed and proved on the basis of the fractal geometry developed by him. Later, fractal geometry formed the basis of technical analysis of financial markets (Mandelbrot B., Hudson R., 2006), (Williams B, 2000), (Schwager J., 2001). Malishenko K.A. rightly notes that "… fractal market analysis" is a new direction of market forecasting, which is based on the most advanced, of the currently existing, mathematical model. Unlike classical technical analysis, fractal analysis is a scientifically sound method of predicting the price…"(Malyshenko K., 2014).

Based on the above, we note that the application of a scientific approach to managing the potential of the enterprise allows on a systematic basis to analyze objectively the causal links between factors that link in one logical series the reason for the need to form the potential of the enterprise, its state, level of potential consistency of the available potential with the purposes of its formation. There is a reason to believe that the scientific approach is aimed at overcoming subjectivism in decision-making. This task is usually based on a combination of alternative methods of analysis, which allows you to verify the accuracy of the results of the analysis of factors and indicators, as well as through the application of the practice of collegial management decisions.

In the management of enterprise potential, the principle of economic efficiency and safety is basic and it is, to a large extent, related to all other principles. In this case, the essence of this principle should be understood as a bivector criterion, which, on the one hand, has a target - economic benefits from the formation and realization of enterprise potential, and, on the other hand, economic security of the enterprise. For businesses, economic benefits can usually take the form of making a profit, achieving an increase in the market value of equity or assets, acquiring ownership of certain property, including intellectual property rights, and gaining control over other businesses. In turn, economic security, as noted by Sosnovska I.M. "…is a level of protection of all types of enterprise potential from internal and external threats, which ensures stable operation and effective development and requires management by the company's management. The content of this concept includes a system of tools that ensure the competitiveness and economic stability of the enterprise, as well as contribute to improving the welfare of employees… "(Sosnovska I., 2015).

As rightly noted by Georgiadi N.G. "… Economic security reflects the actual and potential level of protection of confidential management information from disclosure, leakage and unauthorized access. The implementation of the principle of economic security in the management of the potential of the enterprise is largely influenced by factors such as financial and technological capabilities of the enterprise; its size and location; nomenclature of products; internal document management system; content, volume and types of confidential information, the level of information education of employees of the enterprise, etc.… "(Georgiadi N., 2009), (Georgiadi N. and others, 2019). In practice, the principle of economic efficiency and safety is implemented through the introduction of an integrated management system using multi-level, combined means of accumulation, storage, processing and use of management information. The introduction of these systems aims to combine automated algorithms for processing economic information with human capabilities of perception and interpretation of data based on poorly formalized factors of internal and external environments of the enterprise. The implementation of these tasks also involves the identification of possible sources of disclosure, leakage and unauthorized access to management information, as well as the development and implementation of measures to protect management information.

The principle of economic efficiency and safety in essence, to some extent, similar to the principle of rationality in the implementation of organizational changes in the management of enterprise potential. However, the concepts of "economic efficiency" and "rationality" are not identical. What they have in common is only the presence of benefit, expediency in application. However, the rationality of organizational change can be measured not by economic indicators, but only by management. For example, by accelerating the processing of management information, reducing interpersonal tension in the workforce, improving the level of perception of change in the organization, and so on. Achieving these and other management effects may be accompanied by certain costs, which in terms of economic efficiency is impractical, but from a managerial point of view is a necessity.

The principle of economic efficiency and safety is also closely related to the principle of applying a scientific approach to managing the potential of the enterprise. In the scientific literature there are author's positions, which argue the feasibility of using an intuitive approach when making decisions of economic nature. The most famous in this direction is J. Soros (J. Soros, 1999), who on the example of the analysis of financial markets and his own experience made a very successful attempt to put forward a theory of market reflectivity and explain that investors in organized currency and stock markets, deciding to buy or the sale of assets is guided by intuition rather than common sense, which is based on deep economic analysis. Admittedly, we can partially agree with this author's theory. Nevertheless, this theory, firstly, applies exclusively to financial markets, and secondly, it reflects only part of reality. There are a number of researchers who use technical analysis of the dynamics of indicators that characterize financial markets and their arguments for decision-making by investors are much more convincing than those of Soros J. For example, Mandelbrot B., studying economics, found that price fluctuations can follow from a latent mathematical order that is not described by standard curves. This assumption was analyzed and proved on the basis of the fractal geometry developed by him. Later, fractal geometry formed the basis of technical analysis of financial markets (Mandelbrot B., Hudson R., 2006), (Williams B, 2000), (Schwager J., 2001). Malishenko K.A. rightly notes that "… fractal market analysis" is a new direction of market forecasting, which is based on the most advanced, of the currently existing, mathematical model. Unlike classical technical analysis, fractal analysis is a scientifically sound method of predicting the price of… "(Malyshenko K., 2014).

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The following is the principle of focusing the management of enterprise potential on consumer needs of the market. The essence of this principle is that the primary source for establishing or adjusting the goals of forming and realizing the potential of the enterprise is its external environment, and specifically the target audience, i.e. existing and potential consumers of goods or services. Even Henry Ford, said that the purpose of the company is not to make a profit, but to meet consumer needs. He was convinced that only by meeting the needs of certain social groups it is possible to find their place in the market, by achieving a high level of competitiveness and, consequently, it is possible to make a profit (Ford G., 2017). Consumer needs, and especially their change, are indeed important management information that can be the basis for decisions on the formation of a new component of the company's potential or to adjust existing components of the company's potential. These solutions are usually innovative, as they require the use of new production technologies, innovative materials, development of innovative products, introduction of new vectors of work with the target audience in the market, the introduction of innovations in marketing and advertising strategies to promote new products to consumers. Given this, the principle of focusing the management of enterprise potential on consumer needs of the market is directly related to such principles as the principle of compliance with the created supply of goods under international quality standards, as well as the principle of stimulating creativity in managing enterprise potential. In the context of Ukraine's implementation of the course of European integration, especially in the period since the signing of the economic part of the Association Agreement between Ukraine and the EU, the following of the first of these principles is extremely important. The Association Agreement obliged Ukrainian producers, in particular those who are subjects of foreign economic relations with EU countries, to move to European quality standards. This led to the abolition of the so-called GOSTs in force in Ukraine until recently, which after the collapse of the USSR became interstate standards and led to the process of harmonization of DSTU with EU directives and regulations. For example, in the food market, the EU requirements for Ukraine are reduced to the implementation of the NASSP system (system of risk analysis, hazards and control of critical points). Statistics on the implementation of this system are in fact the answer to the question of Ukraine's compliance with EU directives on food safety and organic food. According to the State Food and Consumer Services, by the end of 2019, more than 200,000 enterprises in Ukraine were to implement NAASP, of which 4,540 enterprises had to be audited by the end of 2019. That is, in general, although with a certain slowdown, the implementation of EU standards in Ukrainian legislation is the same as in the implementation of enterprises. It should also be acknowledged that the fastest transition to EU standards is by exporting companies. As for the principle of stimulating creativity in managing the potential of the enterprise, its

essence is to create a creative environment in the team, which, on the one hand, contributes to the readiness of employees to change, and, on the other hand, is conducive to the promotion and implementation of creative ideas, their transformation into technological and product innovations. Practical adherence to this principle in practice is quite a challenge, as numerous studies indicate that many work teams are opposed to change. For employees of enterprises, changes and innovations are associated with the automation of production, job cuts, replacement of people with robots, and so on. In addition, the creation of an environment for employees to produce innovations requires the construction of a flexible system of personnel management, which would be able to: 1) recognize employees who can think creatively and employees who are valuable in clearly defined tasks, able to work in tightly regulated modes of conditions; 2) create appropriate conditions for productive work of both the first and second groups of employees; 3) identification of critical limits of productivity of employees in each of the groups; 4) organization of optimal forms of work of employees of different groups on the implementation of joint projects. Savitska N.V. examining the problems of formation and development of creative potential of enterprises rightly notes that, "… management of creative activity of the enterprise takes place at the strategic and tactical levels… most authors mistakenly identify creative management strategies with innovative strategies of enterprises new products and technologies, a strategy to expand the range of functionality and other properties of existing products and technologies, as well as a strategy to reduce the cost of existing products and technologies. The first of the strategies can be implemented both before and during the commercialization of innovations. In turn, the other two of the selected strategies can be implemented by enterprises only during the commercialization of innovations, in particular at the stage of improvement and modification of innovative products "(Savitska N., 2012). Thus, following the principle of stimulating creativity in the management of the potential of the enterprise requires the formation of the creative potential of the enterprise, building a strategy and tactics for managing it.

Another important principle of enterprise capacity management is to take into account the provisions of the concept of sustainable development. Enterprises are part of both components of sustainable development - the economy and society. Satisfying the consumer needs of society, companies often harm the environment. This is due to economic selfishness and irresponsibility of entrepreneurs to future generations for the opportunity to enjoy the benefits of nature, which are in today's generations (Kniaz S., 2016). The essence of this principle is to form and develop the potential of the enterprise so that the implementation of the goals set by the enterprise takes into account the needs of modern society, without compromising the ability of future generations to meet their needs.

Thus, based on the above, we conclude that the selected principles of enterprise potential management constitute a certain system of management visions (Fig. 3), the following of which will contribute to the rationality of the approved organizational decisions.

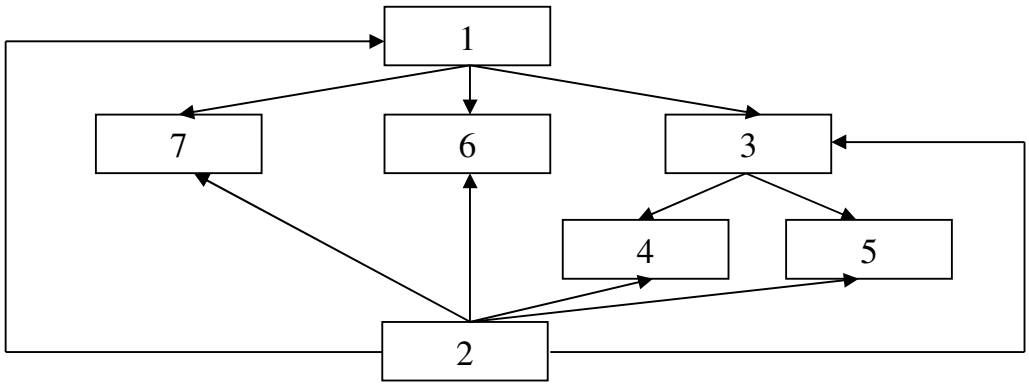

Fig. 3: The system of principles of enterprise potential management

Note: the numbering of the principles is the same as in fig. 2

The selected principles allow us to focus on the main areas of enterprise capacity management, which will ensure the rationality of the approved organizational decisions.

Conclusions

It is substantiated that the management of enterprise potential is not spontaneous, it is a purposeful process, to ensure the rationality of which it is necessary to apply a systematic approach, in particular in determining key priorities and making decisions on compliance with these priorities. Studies have shown that the basis of systematic management of enterprise potential is a number of interacting principles, namely: the principle of economic efficiency and safety of enterprise potential management; the principle of application of the scientific approach in management of the enterprise potential; the principle of orientation of management of the enterprise potential on consumer needs of the market; the principle of conformity of the created offer of the goods on the conditions of the international quality standards; the principle of stimulating creativity in managing of the enterprise potential; the principle of rationality in the implementation of organizational changes in the management of enterprise potential; the principle of taking into account the provisions of the concept of sustainable development in the management of enterprise potential.

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Potential Management of The Enterprise from The Position of Functional Approach

KNIAZ SVIATOSLAV
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: svkniaz@ukr.net

HEORHIADI NELLI
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: nelli.heorhiadi@gmail.com

SAI LESIA
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: sayko.say2017@gmail.com

SHCHEBEL ANDRII
Lviv University of Business and Law, Lviv, Ukraine, 79021 E-mail: peet_@ukr.net

MOROZ SVITLANA
Poltava State Agrarian Academy, Poltava, Ukraine, 36003 E-mail: smor@meta.ua

KALASHNYK OLENA
Poltava State Agrarian Academy, Poltava, Ukraine, 36003 E-mail: kalashnik1968@meta.ua

SPITSYNA ANHELINA
National Transort University, Kyiv, Ukraine, 02000 E-mail: angel7a@ukr.net

KYRYCHENKO OLENA
Higher Educational Establishment of Ukoopspilka "Poltava University of Economics and Trade", Poltava, Ukraine, 36000 E-mail: olena.kyrychenko2010@gmail.com

VILHUTSKA ROKSOLANA
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: roksoliana.b.vilhutska@lpnu.ua

PEREDALO KHRYSTYNA
Lviv Polytechnic National University, Lviv, Ukraine, 79013 E-mail: khrystyna.s.peredalo@lpnu.ua

MYSKIV IRYNA
Lviv Polytechnic National University, Lviv, Ukraine, 79013 Email: myskiviryna@i.ua

SHAYNER HANNA
Lviv Polytechnic National University, Lviv, Ukraine, 79013 Email: ann.shayner@gmail.com

Annotation

The potential of the enterprise is considered as a system of opportunities to achieve development goals within the functions defined by the structure of the enterprise. In turn, the management of the enterprise potential is disclosed as a specific function of management. It is proved that it is based on a specific object of management - of the enterprise potential. It is substantiated that the management of this object is carried out by the heads of the enterprise using management methods and technologies, the selection and application of which is carried out within the general management functions (planning, organizing, motivating, controlling and regulating). Since the potential of the enterprise is a complex object of management, which includes production, marketing, investment and other potentials, there is a reason to believe that the goals of managing the potential of the enterprise is a

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complex, hierarchical system. Their implementation requires constant monitoring and regulation of the object of management.

Keywords: Enterprise, Potential, Management System, Functional Approach, Management Goals.

Introduction

The development of any business depends on its potential. At the same time, it should be recognized that regardless of the type of activity of enterprises, their form of ownership, as well as size, there are certain components of the potential of enterprises that are common to all businesses, and there are those that are specific to specific enterprises. Strictly speaking, this difference in potentials largely determines the vectors and intensity of enterprise development, their competitiveness and investment attractiveness. Nevertheless, it is known that among the total number of enterprises there are those that have a significant potential, but its implementation is low. This situation and the reasons for this may be due to both objective and subjective factors, in particular - irrational capacity management, underdeveloped system of organizational development, lack of signs of innovation in solving problems of management and engineering technology. The problem is not systematic and fragmentary theoretical and methodological and applied provisions for managing the potential of the enterprise in the coordinate system of organizational development.

Literature Review

Exploring the potential of enterprises, most economists focus on determining its essence and structure (Bykova N.V., 2011), (Rovenska V.V., 2012), (Piliavskyi V.I., 2019) problems of capacity formation and use, (Zbrodska O.V., 2011), (Hnatieva T. and Livinskii A., 2019), (Garayev M., 2019), (Shabatura T., 2019), (Dergachova V., Ovcharova S., & Martynenk, O., 2019) its evaluation (Kviatkovska L.A., 2011), (Boykivska G.M., 2011), (Zadneprovska G.I., 2015), (Burachek I., & Pravda O., 2015), (Dogadaylo Ya., 2017), (Vasylyk N.M., 2018), (Piletska S.T., Korytko T.Yu. 2018), (Azhaman I .A., Zhydko O.I., 2019), (Samorodov B.V., Saukh I.V., Vygovska N.G., 2019), (Sydorova A., & Hontjuk V., 2019)) and management (Shot A.P., 2009), (Durbalova N., Sedikova I., 2019) . Among these scientific works are those that are devoted to the study of the potential of the enterprise as a whole (Rovenska V.V., 2012), (Dogadaylo Ya., 2017), (Garayev M., 2019), as well as works in which such types of potentials, such as: anti-crisis (Piletska S.T., Korytko T.Yu. 2018), innovative (Zadneprovska G.I., 2015), (Piliavskyi V.I., 2019), competitive (Durbalova N., Sedikova I., 2019), economic (Azhaman I.A., Zhydkov O.I., 2019), (Shabatura T., 2**01**9), investment (Garayev M., 2019), resource (Zbrodska O.V., 2011), (Vasylyk N.M., 2018), financial (Samorodov B.V., Saukh I.V., Vygovska N.G., 2019), personnel (Shovkun L.V ., 2010), (Burachek I., & Pravda O., 2015), (Sydorova A., & Hontjuk V., 2019) and export (Stakhorskyi O.O., 2010), (Bykova N.V., 2011), (Dergachova V., Ovcharova S., & Martynenko, O., 2019). Based on the polyvector studies of the enterprise potential, we can say that their systematization and coordination with each other is quite uncertain. This highlights the problem of clarifying the essential characteristics and types of the enterprise potential.

The scientific literature considers both general aspects of the management process (planning, analysis, control, assessment of the level of use of components) and the model of enterprise potential management in particular (organization, evaluation, diagnosis, search for sources and reserves of components of enterprise potential) (Knyaz S., 2020). Thus, Luchkova M. considers the management of strategic potential and determines its following structure: determining the current level of use of strategic potential, assessing the level of use of strategic potential, making and implementing appropriate decisions on strategic potential management; control over the use of the strategic potential of the enterprise (Luchkova M.S., 2011). Vasylkivskyi D. examines the management of marketing potential of the enterprise and notes the sequence of actions: definition and formation of the structure of potential; analysis of competitive advantages and capabilities of the enterprise; identifying the interaction of each element of potential; integrated assessment of the competitiveness of the enterprise (Vasylkivskyi D.M., 2011). Otenko I. notes that the management of the economic potential of the enterprise is both current and strategic. Applying a functional approach, the author has formed a mechanism for managing the economic potential of the enterprise, the main functions of which are,"coordination; assessment and analysis; planned; motivation that promotes the activation of the processes of self-development of employees of the enterprise and the maximum return of creative and innovative potential of management staff and management; organization; monitoring and technological control (previous, guiding, subsequent); marketing ”(Otenko I.P., 2015). Authors Vasylieva T.A.,

Leono, S.V., Kryvych Y.M. researching management of innovative potential note that the management process itself is, "… a systematic, dynamic, planned and complex activity to ensure the strategic viability of the enterprise by finding creative ideas for introduction of new goods and services, as well as methods of their promotion through continuous improvement of technology, increasing competitiveness… "and describe the very sequence of the management system, highlighting the relevant stages: goal setting, diagnosis of innovation potential, development strategy for further development, monitoring and evaluation of results Vasylieva T.A., Leonov S.V., Kryvych J.M., 2011). Research on the formation and management of competitive potential was carried out by Petrovych J. and Lushchak N., who determined that the management of competitive potential is a complex process that must constantly change under the influence of innovative development of society and economy,but it must be provided with innovative content to improve product quality, optimization of technological processes, improving the organization of sales activities (Petrovych J., Lushchak N., 2011). Bozhanova O. researching theoretical approaches to managing the economic potential of the enterprise, substantiates the feasibility of using modern management concepts, including the interaction of systemic and situational approaches. Also, the author argues that the management of economic potential should be implemented through the implementation of specific and certain functions depending on the sectoral characteristics of enterprises, their size, organizational forms of activity (Bozhanova O., 2010). Tolpezhnikov R. proposed an organizational and economic mechanism of adapted management of the potential of an industrial enterprise, which is formed from a set of interdependent elements of internal potential (control unit and resource block) and micropotential (financial potential - financial and credit potential - market value) and adapted to external environment. Based on the functional approach, the author substantiates that the interaction of these components can provide a positive strategic effect (Tolpezhnikov R., 2012). Grabchuk O. and Bovsunovska G. formed a general scheme of enterprise potential management, which includes eight stages: formation of information base on potential management, analysis and selection of priorities from the enterprise mission in the formation of management strategy, evaluation of financial results, evaluation of enterprise potential, system definition relationships between financial results and enterprise potential, development of enterprise potential management strategy, implementation of enterprise potential management strategy using selected methods and tools, analysis and control of management strategy (Grabchuk O. and Bovsunovska G., 2016). Rzayev G. investigating the problematic issues of management, related to ensuring the effective use of enterprise potential, justifies the need for systematic monitoring of the level of enterprise potential, which will track changes in key external and internal factors, analyze performance, make adjustments to the management system potential of the enterprise (Rzayev G., 2014). Zakharenko M. the organizational and economic bases of formation of system of management of potential of the enterprise are considered, characteristic features of its elements which need to be considered at formation of potential and its further effective use are defined. The author highlighted in the management system of production potential of the subsystem: target; providing; managed and managing (Zakharenko M., 2018). Shandrivska O., Kuziak V. and Beck O. researching the approaches to management of enterprise potential and its strategic development described in scientific works, define it as "… process of acceptance and realization of the administrative decisions directed on an estimation and realization of possibilities of improvement of the enterprise potential, setting new value and ensuring the strategic development of the enterprise "and form an appropriate model for managing the strategic development of the enterprise, which contains such key elements as: formulating the mission of the enterprise, setting goals, forming a strategy for enterprise development, comprehensive analysis of enterprise potential (state and development, efficiency and formation), the formation of the optimal structure of potential on the basis of synergistic interaction of its components in accordance with the strategic goals of the enterprise, the choice of the most effective alternative to enterprise development, the formation of enterprise development strategy (Shandrivska O., Kuziak V. and Beck O., 2013). Gonchar O. studied the functional and organizational aspects of enterprise potential management on the basis of synergy and determined that the formation and improvement of enterprise potential are determined by the strength of the relationship and interaction of its elements, and taking into account the synergistic effect of enterprise potential elements will allow gaining competitive advantages, combinations of resources, increasing the value of the enterprise as a set of tangible and intangible assets, increasing the resilience of the economic system to uncertainties and risks that arise in the process of evolution "(Gonchar O., 2015).

Thus, in the theory and practice of modern management functional approach is quite popular.

Purpose of Research

The purpose of the article is to distinguish the stages of managing the formation of enterprise potential from the standpoint of a functional approach. To achieve this goal it is necessary: to clarify the essence of the concept of

"enterprise potential"; to reveal the essence of enterprise potential management from the standpoint of a functional approach.

Research results. The application of a functional approach is a necessary but insufficient condition for clarifying the essence of the concept of "enterprise potential". Thus, functions can be considered from the standpoint of management, production, technology and more. Given this, in addition to functional, it is advisable to use a structural-system approach.

Let's clarify the basic functional and structural characteristics that are relevant for any enterprise, as well as derivative functional and structural characteristics of enterprises (Table 1).

Table 1: Functional and structural characteristics of the enterprise

Features	Structures	Functions
Basic		
Management	Management system	Planning; organization; motivation; control; regulation
Production and technological	Production and technological system	- Procurement or creation of resources; - production; - sales
Derivatives		
Marketing	Marketing and advertising system	- Marketing and advertising management; - conducting marketing research and advertising campaigns
Logistics	Logistics system	- Resource flow management; - development of logistics structure
Innovative	The system of innovative activity of the enterprise	- Innovation management; - development and implementation of innovations
……	…….	…….
Information	Information support system	Information support management; - collection, processing, storage and use of information; - providing managers and subordinates of the enterprise with technical means and software products for the collection, processing, storage and use of information; - establishment of communications

On the basis of basic and derivative functionally structural characteristics of the enterprise it is possible to allocate and construct classification of potentials of the enterprise on a number of signs, namely:

by its content:

- management, production, marketing, logistics, innovation, information, etc. (these are the potentials of the enterprise to implement certain functions). Enterprises that work in the market for a long time usually have a developed structure. Each structural component of the enterprise implements one or more functions. To perform these functions in the structure of the enterprise they form the appropriate staff, develop strategies and tactics to achieve the goals set for employees, develop certain rules and procedures of subordination, formalize methods and technologies of functional implementation of this structural component. In turn, the functional and structural characteristics of newly established enterprises are quite limited. Often such enterprises have the most simplified structure, in which there are no structural components, but rather a functional division of responsibilities between employees for certain sectors of activity. Under such conditions, enterprises, for the most part, have only managerial and production potential);

by nature:

- basic (managerial and production) and derivative (all other potentials) potentials. Basic potentials are characteristic of all enterprises without exception, their presence is a condition for the functioning of any enterprise. As for the derivative potentials, they are typical for enterprises with developed management systems and production and technological systems;

according to the level of development of the functional structure of the enterprise:

- developed (high or low) potential (high potential occurs when the company owns and successfully uses a certain functional structure. In turn, in conditions when a certain functional structure exists but is poorly implemented, then there is a low potential);
- undeveloped (zero) potential (this type of potential occurs when the company does not implement a certain function and there is no appropriate structure for this).

Thus, the potential of the enterprise should be considered as a system of opportunities to achieve development goals within the functions defined by the structure of the enterprise. It should be recognized that the structure of the enterprise may be more or less developed, for example, despite the fact that any enterprise accumulates, stores, processes and uses information for engineering and technological and management decisions, but not all enterprises have an information system. The same applies to logistics systems, marketing and advertising, security, innovation, and so on. Based on this, there is a reason to believe that the level of potential of the enterprise depends on the level of development of the functional structure of the enterprise. If the information support system is not developed, then the information support function is underdeveloped, and this is evidence of the low level of information support potential of the enterprise. Further research should be conducted in the direction of building a structural and functional model for identifying the competitive advantages of enterprises, taking into account the identified features of the potential of enterprises.

Based on the generalization of the above literature sources, there is a reason to believe that in the scientific literature at the enterprise level management is considered as an open system, the characteristics of which depend on the size of the enterprise, its level of diversification and market share, innovation, professionalism of managers, etc. Regardless of the specifics of building a management system, it performs general and specific functions under any circumstances. There are some differences among management theorists regarding the list of these functions, but in general, among the general functions are such as: planning, organizing, motivating, controlling and regulating. As for specific functions, their list is much larger, because these functions are based on specific objects of management, such as production activities of the enterprise, supply, sales, investment activities, marketing, innovation, as well as various types of potential - production, technology, intellectual, personnel, innovation, investment, etc. In view of this, the specific functions of the enterprise management system include production management, supply management, sales management, investment management, marketing management, innovation management, production capacity management, technological capacity management, intellectual capacity management, human resources management , management of innovation potential, management of investment potential, etc. Fig. 1. shows the place of the potential of the enterprise as a specific function in the management system of the enterprise.

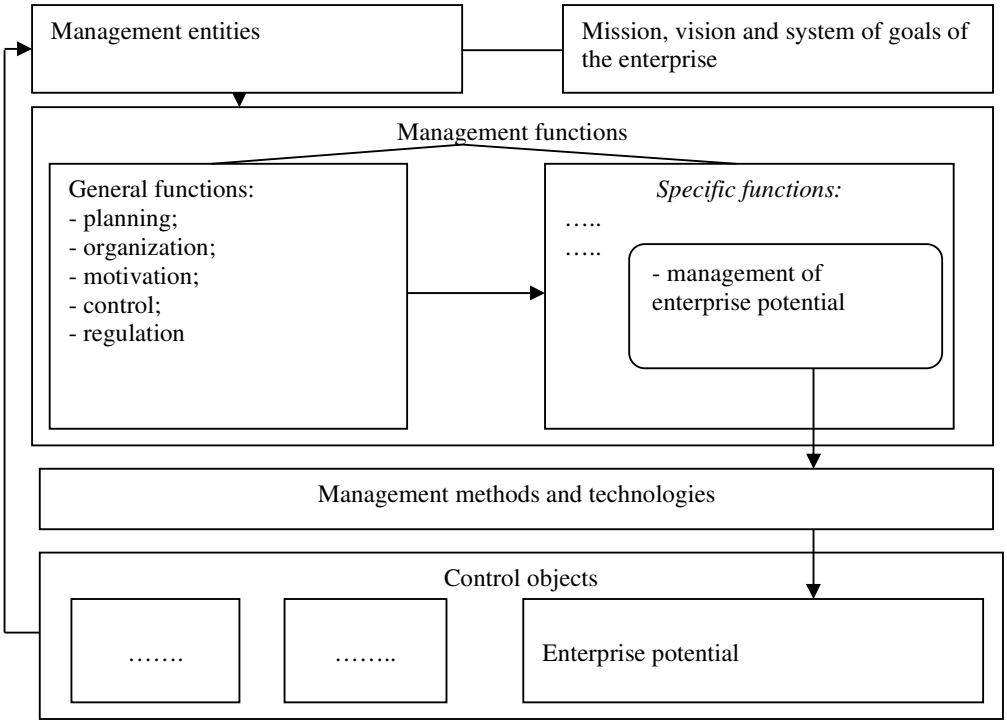

Fig. 1: The place of enterprise potential in the enterprise management system

As you can see, the subjects of management, namely managers, defining the mission, vision and building goals of enterprise development (enterprise development goals, or system of enterprise goals is a hierarchically and functionally ordered set of mutually agreed tasks, as have clear deadlines and criteria). Traditionally, the system of enterprise goals distinguishes three hierarchical levels - strategic, tactical and operational at each of which are formed and implemented, respectively, strategic, tactical and operational plans for enterprise development. The key conditions for ensuring the effectiveness of enterprise goals are their realism, relevance and consistency) managing the potential of the enterprise through its planning, organization, motivation, control and regulation.

In the context of these general functions there is the use of management methods and technologies, the application of which is aimed at the object of management - the enterprise potential

Given that the company may be at the stage of formation or development, its potential may be formed or undergo changes that lead to its loss, reproduction or growth (increase). In fig. 2 it is shown a fragment of the causal-structural model of the formation of the enterprise potential, which is in its state of formation.

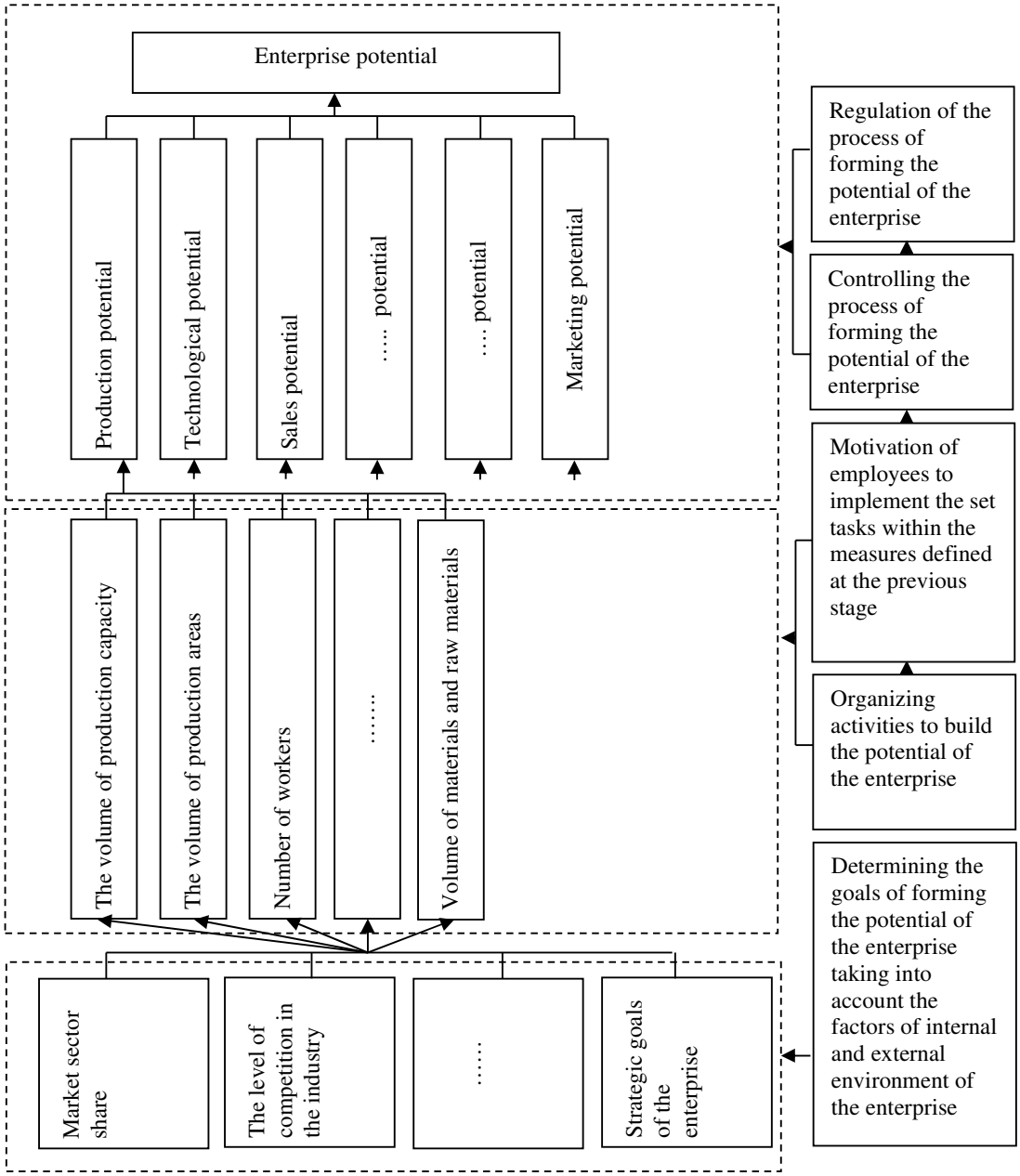

Fig. 2: A fragment of the causal-structural model of forming the potential of the enterprise from the standpoint of a functional approach

At the stage of the enterprise formation of its potential it is accompanied by a number of successive stages of management, namely: definition of the purposes of formation of the enterprise potential taking into account factors of internal and external environment of the enterprise; organizing activities to build the potential of the enterprise; motivating employees to implement the set tasks within the measures defined at the previous stage; controlling the process of forming of the enterprise potential; regulation of the process of forming of the enterprise potential (Fedulova I., 2009).

Each of these stages is aimed at structural modeling of enterprise potential. Thus, Fig. 2 considers the formation of the enterprise potential on the example of its components such as production potential. Deciding on the formation of this component of the potential of the enterprise requires market research, assessing the capabilities of the enterprise and on the basis of this formation of strategic production goals of the enterprise (Knyaz S., 2015). Based on these goals, it is possible to determine the required amount of production capacity, area, raw materials, materials, etc. This information is necessary to create the material and technical conditions for the production activities of the enterprise. Having created them actually there is a production potential which can be used for ealization of the established strategic purposes.

At the stage of realization of production potential the management system of the enterprise is directed on control and regulation of processes of use of production capacities, areas, resources, etc. taking into account change of factors of internal and, especially, external environments for timely acceptance and realization of corrective administrative decisions. (Georgiadi N. and others, 2020).

In conditions when the enterprise functions in the market for a long time, that is at a stage of the development the task of heads of the enterprise is so to carry out management of its potential from which it was reproduced and grew. In fig. 3 it is shown options for increasing the potential of the enterprise. In this case, the reproduction of potential means the restoration of the company's ability to implement those tasks that were performed in the past, in particular to produce the same as in the past, the volume of products, occupy the same market share, perform previously committed, etc.

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Conclusions

Under the potential of the enterprise should be understood as a system of opportunities to achieve development goals within the functions defined by the structure of the enterprise. Management of enterprise potential is a specific function of management, which is implemented on the basis of management methods and technologies, the selection and application of which is carried out within the general management functions. From the standpoint of functional-structural approach, the classification of enterprise potentials is specified, in particular, classification features and types of potentials (in terms of content - management, production, marketing, logistics, innovation, information, etc .; by nature - basic (management and production) and derivatives (marketing, logistics, innovation, information, etc.) potentials, according to the level of development of the functional structure - developed (high, low) and undeveloped (zero) potentials).

It is substantiated that at the enterprise level modeling of its potential should have a causal-structural character, where the objects of functional-process management are the goals of capacity formation (market sector share, level of competitiveness, etc.), internal factors of the enterprise that characterize the enterprise potential (market sector share, areas of production capacity, stocks of raw materials, number of workers, etc.), as well as types of potential (production, technological, sales, marketing, etc.). It is substantiated that such objects should be focused on such management processes as: a) definition of the purposes of formation of potential of the enterprise taking into account factors of internal and external environment of the enterprise; b) organizing activities to build the potential of the enterprise; c) motivating employees to implement the set tasks within the measures defined at the previous stage; d) controlling the process of forming the potential of the enterprise; e) regulation of the process of forming the potential of the enterprise. It is under the conditions of forming the potential of the enterprise on the basis of the causal-structural model that it is possible to achieve rationality in the management of the enterprise potential.

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The Current Status of Social Entrepreneurship Activity Among Public University Students in Malaysia: Empirical Study

Nor Suhaida Bt AWANG
Faculty of Technology Management and Business, Tun Hussein Onn University of Malaysia, Johor.
norsuhaida.awang@yahoo.com

Prof Dr Wan Fauziah Bt WAN YUSOFF
Faculty of Technology Management and Business, Tun Hussein Onn University of Malaysia, Johor.
fauziahy@uthm.edu.my

Raudah Bt MOHD ADNAN
Faculty of Technology Management and Business, Tun Hussein Onn University of Malaysia, Johor.
raudah@uthm.edu.my

Abstract

The main goal of this study was to identify the level of human capital among public university students who involved in social entrepreneurship activities in Malaysia. This study was conducted using a quantitative approach, where stratified random sampling was used on 797 students from three category of university (research, focus and comprehensive) who involve in social entrepreneurship activity. The data was analyzed using SPSS. This study revealed that the students who involved in social entrepreneurship activity in university shows high level of human capital. Student involvement in social entrepreneurship activities contributes to good leadership skills, social problem-solving skills, the ability to generate new ideas innovatively, creative thinking in helping to improve the socio-economic status of the less fortunate through business activities. In addition, they are also more competitive than students who are not involved in these activities. There is still not much information about current status of social entrepreneurship activity among students in Malaysia. Hopefully, this study can contribute to the new body of knowledge about current level of human capital among students who involved in social entrepreneurship activity in Malaysia.

Keywords: Social Entrepreneurship Activity, Human Capital, Public University.

Introduction

Social entrepreneurship in Malaysia has started since the establishment of Yayasan TEKUN Nasional and Amanah Ikhtiar Malaysia (AIM) in 1986. Social entrepreneurship is a process that combines the concept of entrepreneurship and social development (Kadir & Sarif, 2015). Most poor communities participate in social enterprise projects such as technical skills training and microfinance financing schemes to help them out of poverty (Kadir & Sarif, 2015). In May 2015, the government introduced the Malaysian Social Entrepreneurship Development Plan (MaGIC, 2015). It is estimated that there are 100 social enterprises operating and most of them are focused on education, poverty, rural development, environmental sustainability, employment for the marginalized and at-risk youth (MaGIC, 2015). In addition, 35% of social enterprises in Malaysia belong to Micro, Small, And Medium Enterprise (MSME), while 53% belong to Co-operatives and only 12% of social enterprises are Non-profit Organization (NGO) (British Council, 2018). In 2017, social enterprises managed to contribute an average income of RM 234,0718 and more than two-thirds of social enterprises (72%) operating as micro enterprises managed to generate an annual income of RM250,000 (British Council, 2018). To further enhance individual involvement in social enterprises, Social Enterprise Accreditation (SE. A) is formed in 2019 aims to confirm the status of social enterprises to help them gain access to various support and business growth opportunities (MEDAC, 2019). The Government has also launched the National Entrepreneurship Policy (DKN) 2030, a long-term plan that aims to produce as many Malaysians to involved in social entrepreneurship by 2030 (MEDAC, 2019).

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In addition, among the efforts planned and implemented to attract students in institutions of higher learning to venture into the field of social entrepreneurship is through educational platforms. This is because social entrepreneurs are not born with certain behavioral and characteristics that make them successful. Instead, they have been educated with skills and a supportive environment in their educational institutions, that influenced them to engage in social entrepreneurship activities (Light, 2006). Example of the most popular club that promotes social entrepreneurship activity among students at public universities is SIFE. SIFE is an international non-profit organization that works with business leaders and university students to make a difference in society. The club was established in the United States, then adapted by Malaysia under the of Mara University of Technology (UiTM). SIFE was later rebranded to Enactus (Entrepreneurial Action by Us) in 2012. Currently, there are an estimated 1923 students involved from 34 universities throughout Malaysia. There are over 90 projects community and directly impacted 99, 515 people (Website Enactus).

However, according to the report by Thomson Reuters Foundation (2016), the level of knowledge of Malaysians about social entrepreneurship is still low. This lack of knowledge leads to the lack of involvement of Malaysians in social entrepreneurship activities. This indirectly leads to the problem of difficulty in obtaining skilled manpower in social entrepreneurship activities. Lack of access to a skilled and quality human capital is one of the challenges faced by social entrepreneurs in Malaysia (MaGIC, 2015). In addition, Malaysia currently has 1.2 million university students. Therefore, these students are seen as a source of human capital with great potential to meet the needs of a skilled and quality workforce in the field of social entrepreneurship. However, studies on the level of human capital of university students involved in social entrepreneurship activities are still low. Hence, there is a need to identify the current status of the level of human capital among students who involved in social entrepreneurship activities in public universities in Malaysia. The aim of this study is to identify the current level of human capital among students who involved in social entrepreneurship activity.

Literature Review

Human Capital

Schultz (1959); Becker (1964); Mincer (1974) in Davidsson and Honig (2003) assert that human capital is knowledge that helps individuals improve their cognitive abilities and in turn can produce more productive and efficient activities. Becker (1980) argues that human capital is related to the economy of society and the country because individuals are inseparable from knowledge, skills, health or values. He emphasized two important elements as a future investment in human capital, namely education and training. Educational institutions such as schools and universities, can increased the level of human capital. Another scholar who looked at human capital from an economic perspective was Schultz, (1961) who introduced the theory of human capital. He argues that knowledge and skills are elements of capital resulting from deliberate investment. A clear example is that the increase in economic output in Western countries is a positive effect of investment in human capital. In other words, there is a relationship between increased human capital investment and increased employee income (Schultz, 1961). In line with Becker's view, Schultz also agrees with this concept of human capital investment. Thus, developed countries that invest in education, health and long-term training will strengthen their economic structure and improve the living standards of their communities (Schultz, 1961).

According to Hamat and Nordin (2012) human capital is defined as the characteristics possessed by a person that make them more productive. This capital cannot be transferred from one person to another but one must strive to obtain it. It is formed or nurtured through education, training and information seeking efforts. In development efforts, 'capital' is very important. Material capital such as land, money, factories and other infrastructure is very important and necessary, but it is simply not enough. All of that would not be able to add value without the creative and dynamic role of human beings to move and process it. Skills are not merely technical skills. Skills also include aspects of leadership ability, cognitive skills (thinking and analysing), language and communication skills as well as social skills (Mohamad & Salleh, 2009). These various skills are very clear in their importance in today's world and in the knowledge-based economy. An individual needs to be able to lead himself and others and know how to think critically and creatively and be able to analyse a situation to make good decisions (Mohamad & Salleh, 2009). According to Yussof (2003) human capital theory and rate of return approach has proven that education is able to increase one's productivity and income which in turn can lead to economic growth. The development of human capital in public universities is very important for this institution to produce people who can raise the name of the country not only in terms of skills and expertise but also by highlighting good attitude and personality (Mohamad & Salleh, 2009).

Human Capital Among Students Who Involved in Social Entrepreneurship Activity

The application of social entrepreneurship culture is not only focused on academics but also in co-curriculum and programs implemented by institutions such as the establishment of the Enactus club. Majority 80% of students agree that they can apply knowledge about entrepreneurship, soft skills, leadership skills and management skill through social entrepreneurship activities at their university in real life situations (Abdullah, Johari, Bakri & Razak, 2015). In another research study by Erturgut & Soysekerci (2012), 77% of students considered that social entrepreneurship activities can increase the level of creativity and innovation while 34% of students think that the networking and soft skills acquired allow them to find a job after graduation. This study is also in line with the study by Dobele (2016) that social entrepreneurship activities affect the attitude of independence, creativity, empathy, rational thinking, and high entrepreneurial skills of individuals. It encourages the solution of social problems in society and contributes to the sustainable economic development of the country. Rahman, Ismail and Sahid (2019) have conducted a study on the level of strategic domain social entrepreneurship, namely entrepreneurial personality, human capital and social capital among students. He found that the longer students are actively involved in social entrepreneurship activities (3 years and above), the more likely they are to have entrepreneurial personality traits and good human capital. In conclusion, exposure of social entrepreneurship activity to students can create human capital that have soft skills, social skills and can meet the needs of the corporate industry and the current market (Prabhu, 2019).

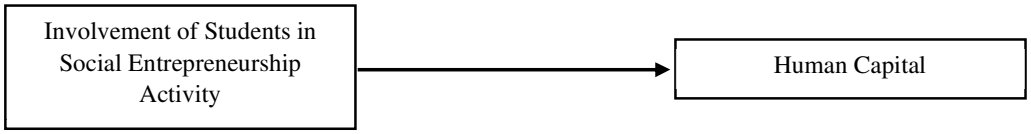

Figure 2.1: Theoretical Framework

Methodology

This study was conducted to see the effect of social entrepreneurship activities on the development of human capital of students in public universities. The study was conducted on 797 students involved in Enactus clubs at public universities. This study uses stratified random sampling technique. The questionnaire is available on a 5-point Likert scale from 1 (not agreed) to 5 (complete agreement). This questionnaire was sent to the respondents via google drive, walk-in, face to face and by post to increase the return of feedback. The total number of respondents was 797 students. Finally, the descriptive analysis was conducted using SPSS software.

Results

Overall, all elements of human capital among students who involved in social entrepreneurship activity showed a high mean score of 4.0745 (Table 4.1). Specifically, the statement that has the highest mean score is Moi1 item which is "Have good leadership skills" with mean score 4.1129. In terms of frequency percentage, the highest percentage of Moi1 items is 44.8% of students "agree" that their involvement in social entrepreneurship activities can improve their leadership skills. While 34.5% stated "strongly agree" with the item Moi1. Apart from that, the second highest mean score is on Moi3 item which is "Improving the ability to generate new ideas innovatively" with mean score 4.1054. In terms of frequency percentage, the highest percentage of Moi3 item is 52.8% of students stated that they "agree" and 29.6% of students stated "strongly agree" social entrepreneurship activities can improve their ability to generate new ideas innovatively. Meanwhile, the statement that shows the lowest mean score is on the item Moi2 which is "Improving skills to solve social problems sustainably to the less fortunate in terms of socio-economy" with mean score 3.9925. As a percentage of frequency, for Moi2 items, the highest percentage is 52.3% of students "agree" their involvement in social entrepreneurship activities can improve their skills to solve social problems sustainably to the less fortunate in terms of socio-economy while only 24.6% of students stated "strongly agree".

Table 4.1: Level of student's human capital who involved in social entrepreneurship activities

Note: F=Frequency, SD= Strongly disagree, D= disagree, N=Neutral, A=Agree, SA= Strongly Agree

	Item	F	SD %	D %	N %	A %	SA %	Total	Mean	S. D	Level
Moi1	Good leadership skills	F	3	14	148	357	275	797	4.1129	0.7892	High
		%	.4	1.8	18.6	44.8	34.5	100			
Moi2	Improve the skills of solving social problems	F	3	12	169	417	196	797	3.9925	0.7434	High
		%	.4	1.5	21.2	52.3	24.6	100			
Moi3	Ability to generate new ideas innovatively	F	2	8	130	421	236	797	4.1054	0.7151	High
		%	.3	1.0	16.3	52.8	29.6	100			
Moi4	More creative in helping to improve the socio-economic status of the less fortunate through business activities.	F	2	10	134	413	238	797	4.0979	0.7284	High
		%	.3	1.3	16.8	51.8	29.9	100			
Moi5	More competitive than other students Good leadership skills	F	2	17	156	375	247	797	4.0640	0.7811	High
		%	.3	2.1	19.6	47.1	31.0	100			
	Overall mean								4.0745	0.6202	High

The results of analysis for three university categories are as in the figure below. The focused university is showing the highest level of human capital with a mean score of 4.1159. In particular, the item "Have good leadership skills" shows the highest mean score of 4.1699. Then it is followed by item "Ability to generate new ideas innovatively" with mean score 4.1560. Third highest mean score is on the item "More creative in helping to improve the socio-economic status of the less fortunate through business activities" with mean score 4.1365. The fourth highest mean score is the item "More competitive than other students" with mean score 4.1114. Meanwhile, the item with the lowest mean score is on the item "Improving skills to solve social problems sustainably to the less fortunate in terms of socio-economy" which is a mean score of 4.0056.

In addition, the university with the second highest level of human capital is a research university with a mean score of 4.0927. The item with the highest mean score in the research university is "More creative in helping to improve the socio-economic status of the less fortunate through business activities" which is a mean score of 4.1202. The second highest mean score is the item "Good leadership skills" and "Ability to generate new ideas innovatively" which they share the same value of mean score 4.1030. While the items with the lowest mean score are "Improving

skills to solve social problems sustainably to the less fortunate in terms of socio-economy" and "More competitive than other friends" which is a mean score of 4.0687.

Finally, the university with the lowest mean score overall is a comprehensive university with a mean score of 3.9815. The item with the highest mean score is "Have good leadership skills" and that is the mean score of 4.0244. second highest value of human capital for comprehensive university is the item “Ability to generate new ideas innovatively” with mean score value 4.0195. It is followed by item “More creative in helping to improve the socio-economic status of the less fortunate through business activities” with mean score value 4.0049, item “More competitive than other students” with mean score value 3.9756 and item “Improve the skills of solving social problems” with mean score value 3.8829. Meanwhile, the item with the lowest mean score is the item "Improving skills to solve social problems sustainably to the less fortunate in terms of socio-economy" which is a mean score of only 3.8829. In conclusion, all human capital items in this study showed a high mean score (Table 4.2).

Table 4.2: Descriptive Analysis for human capital in three university categories

Category	Item	Mean	S. D	N
Focus University	Good leadership skills	4.1699	.74488	359
	Improve the skills of solving social problems	4.0056	.72849	359
	Ability to generate new ideas innovatively	4.1560	.71937	359
	More creative in helping to improve the socio-economic status of the less fortunate through business activities.	4.1365	.73293	359
	More competitive than other students	4.1114	.75772	359
	Overall Mean	4.1159	.60625	359
Research University	Good leadership skills	4.1030	.81877	233
	Improve the skills of solving social problems	4.0687	.70985	233
	Ability to generate new ideas innovatively	4.1030	.69334	233
	More creative in helping to improve the socio-economic status of the less fortunate through business activities.	4.1202	.70293	233
	More competitive than other students	4.0687	.79030	233
	Overall Mean	4.0927	.61475	233
Comprehensive University	Good leadership skills	4.0244	.82509	205
	Improve the skills of solving social problems	3.8829	.79579	205
	Ability to generate new ideas innovatively	4.0195	.72734	205
	More creative in helping to improve the socio-economic status of the less fortunate through business activities.	4.0049	.74424	205
	More competitive than other students	3.9756	.80707	205
	Overall Mean	3.9815	.64371	205

Table 4.3 summarizes the mean score value of the student’s human capital. According to Salkind (2012), the mean score value is divided into three categories that is low (1.00-2.33), medium (2.34-3.66) and high (3.67-5.00). Overall, level of human capital among students from focus university, research university and comprehensive university have a high mean score value that is above 3.67. Focus universities having the highest mean scores (4.1159) followed by research universities (4.0927) and comprehensive universities (3.9815).

Table 4.3: Summary level of human capital among students involved in se activities at public universities

	Type of University	Min	S. D	Level of Min	Ranking
Human capital	Focus University	4.1159	0.60625	High	1
	Research University	4.0927	0.61475	High	2
	Comprehensive University	3.9815	0.64371	High	3
	Overall	4.0745	0. 62027	High	

Other than that, this study also analysed the data using Kruskal Wallis test to find out the differences of human capital level of students based on three categories of university namely comprehensive, focused and research. Kruskal Wallis test is a non-parametric test used to compare mean rank amongst more than two scores under different group of independent variables (IV), when we have data from three groups and above of respondents and data (DV) is not normally distributed. The result is shown in the table 4.3 below. Based on Table 4.4, the results of Kruskal Wallis test found that significant value of the level of human capital of students involved in social entrepreneurship activities is 0.055 (above the value of 0.05). Thus, the results of the study show that there is no statistically significant difference in the level of human capital of students who involved in social entrepreneurship activities based on three categories of public universities.

Table 4.4: *Kruskal Wallis* test

	Type of University	Total	*Mean Rank*	*Sig.*	*Chi-Square*	*df*
Human capital	Focus University	359	406.53	.055	5.794	2
	Research University	233	402.70			
	Comprehensive University	205	381.61			

Discussions

The results of this quantitative study found that students involved in social entrepreneurship activities have a high level of human capital. Specifically, the statement that has the highest mean score is the Moi1 item which is "Have good leadership skills". For example, as a president, they need to be smart to manage the members under their supervision. Students need to be wise to give assignments based on the skills possessed by the existing members. For example, for club owners who like to talk, the club president will put them in a marketing group. Therefore, they are able to carry out activities to promote and sell products produced by the Enactus Club well. This shows that SE activities successfully produce students with good leadership skills through interaction with the multi-racial community (Abdullah, Johari, Bakri, & Razak, 2015).

Second, the results of the study found that students involved in social entrepreneurship activities have the ability to generate new ideas innovatively. The results of this study are in line with the study of Erturgut and Soysekerci (2012) which is social entrepreneurship activities foster creative and innovative thinking among the students involved. Social entrepreneurship activities have a positive influence on social innovation (Mokhtar, Abdullah & Kin, 2016). It can develop the ability of individuals to combine resources effectively and produce innovative solutions to social problems. As a result, social entrepreneurship activities promote the solution of social problems in society, improve social well-being, and contribute to the development of a sustainable national economy (Dobele, 2016). Another study by Erturgut and Soysekerci, (2012) also found that 77% of students considered that social entrepreneurship activities promote innovative and creative thinking.

Third, the results of the study show that the effect of human capital which has a second highest mean score is on the item Moi4 which is "More creative in helping to improve the socio-economic status of the less fortunate through business activities". According to UNICEF (2007), young people, from the age of 10 to 18, have the creativity and energy to implement new initiatives that can transform their communities. These findings prove that social entrepreneurship activities can not only help the poor but also produce students with high creativity (Ernst, 2018).

Involvement in social entrepreneurship activities in higher education institutions has the potential to develop social awareness, creativity, and individual sensitivity to problems in society (Dobele, 2016).

Fourth, the statement that has a high mean score is item moi5 which is "More competitive than other friends". This shows that students who are involved in social entrepreneurship activities are more prominent than their peers who are not involved in social entrepreneurship activities. The results of this study are supported by previous studies that identify that involvement in social entrepreneurship activities can produce sustainable and competitive human capital (Hashim, 2009).

Lastly, the element of human capital that shows the lowest mean score is the item Moi2 which is "Improving the skills of solving social problems sustainably to the less fortunate in terms of socio-economy". Although the mean score is low compared to other items, but the level of this mean score is at a high level. According to Astin and Sax (1998) volunteer activities such as social entrepreneurship activities can improve interpersonal skills such as the ability to solve problems and be able to understand the problems faced by society. According to Rahim and Lajin (2015) social entrepreneurship activities can cultivate problem-solving skills, and experience dealing with real issues.

Conclusions

Overall, social entrepreneurship activities among students at public universities in Malaysia can produce students with a high level of human capital. This activity is very important and needs to be implemented continuously in order to produce graduates who are skilled and social entrepreneurship minded. Next get involved in social enterprise as their career choice. Governments, educational institutions, program organizers need to work together to help students strengthen their level of human capital. In addition, this study also contributes to new knowledge in the field of social entrepreneurship in Malaysia. Research about students in social entrepreneurship in Malaysia focuses on understanding concepts about phenomena (Zakaria & Bahrein, 2018) with minimal empirical research (Rahman, Ismail, & Sahid, 2019). The main approach used in this study is quantitative research. Hence, it will help to increase the empirical data about the current status of social entrepreneurship activity among public university students in Malaysia. Therefore, the results of this study show that social entrepreneurship activities can develop high level of human capital.

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Complex Mechanism of Interaction in the «School-University» System: Approaches to Performance Assessment

Nadezhda V. KAPUSTINA
Russian University of Transport (MIIT), Russian New University, Moscow, Russian Federation,
https://orcid.org/0000-0002-5991-5200, kuzminova_n@mail.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation,
https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru **corresponding author**

Navai N. RUSTAMOV
Russian University of transport (MIIT), Russian New University, Moscow, Russian Federation,
https://orcid.org/0000-0003-4834-629X, irada@inbox.ru

Anastasia A. YUSSUF
Financial University under the Government of the Russian Federation, Moscow, Russian Federation,
https://orcid.org/0000-0001-5276-8781, an.yussuf@yandex.ru

Irada T. RUSTAMOVA
Russian University of transport (MIIT), Russian New University, Moscow, Russian Federation,
https://orcid.org/0000-0001-9379-2542, irada@inbox.ru

Abstract

Effective interaction of all subjects of the educational services market in terms of economic transformation remains an important issue on the agenda, especially during the development of new technologies and teaching methods. Accordingly, the formation of mechanisms that increase the effectiveness of organizations in the field of education is a very difficult task. The aim of the research is to develop methodological approaches to the formation of an effective integrated mechanism of interaction in the school-University system. To achieve this goal, the main factors influencing the interaction process were identified and grouped, approaches to evaluating the performance of the University depending on the goal were clarified, as well as a methodological approach to the formation of a comprehensive mechanism for interaction between the school-University system was proposed. The proposed mechanism of complex interaction in the school-University system can be adapted for any educational institution, and has shown its effectiveness in the process of testing in one of the educational institutions. Research methods: analysis and synthesis, method of constructing hierarchies, economic and statistical, dynamic, situational analysis, tabular interpretation of statistical information.

Keywords: Economic Efficiency, Assessment Methods, School-University Interaction, System Approach

Introduction

Close interaction of all subjects of the educational services market in the context of economic transformation remains an important factor in changes and the emergence of new trends in the educational space, as well as the formation of human capital as the basis for effective economic and social development of the country. Their impact on professional training and professional orientation of the population, especially young people, is an important and topical issue of national security of the state. Today in Russia, the problems associated with the imperfection of mechanisms of interaction in the school-University system in the market of educational services have become relevant.

Thus, the importance of studying theoretical concepts that explain performance and factors of interaction organization in the school-University system, which allow limiting the negative trends of these processes, increases. All of the above issues, as well as their close relationship, determine the great relevance of the issues under study.

Materials and Method

Comprehensive research on the activities of higher education institutions, including evaluating the effectiveness of the interaction mechanism in the school-University system, can be found in the works of Antropova (2012), Barkov (2014), Berezka (2017), Novozhilov (2012), Petunin (2018), Skvirsky (2012), Todosiychuk (2009), Chigarin (2015), Robst (2001), Šipilova (2013), Nadtochy et al. (2016), Stevens (1946), Stevens (2005), Karpunina et al. (2014).

The purpose of the research is to develop methodological approaches to the development of an effective integrated mechanism of interaction in the school-University system.

The study was conducted in the following stages:

1. Identification of diagnostic indicators for evaluating the performance of universities.

2. Grouping of performance indicators of the school - University Interaction mechanism depending on the classification features presented in the literature and supplemented by the authors.

3. Systematization of approaches to evaluating the performance of the University depending on the goal.

4. Development of a comprehensive mechanism for effective and efficient interaction in the school-University system.

5. Approbation of the proposed method of complex diagnostics of the interaction mechanism in the school-University System.

The following research methods were used in the study: analysis and synthesis, the method of constructing hierarchies, economic and statistical, dynamic, situational analysis, tabular interpretation of statistical information.

Results

One of the primary elements of the research performance of universities is the development of a system of indicators that provide the diagnosis and grouping of data on the evaluation activities of universities, as well as their classification. A systematic approach involves studying all aspects of the activities of the respective missions of interaction between schools and universities. The primary task of the system approach is to identify and study the degree of complexity of the system itself, taking into account additional links. These relationships bring the system to a more manageable level within specific limits, while accumulating a certain level of isolation and contributing to the growth of the system's competitiveness and effectiveness (Antropova, 2012).

The authors suggest grouping performance indicators depending on various classification features to identify opportunities for improving the effectiveness of the school - University interaction mechanism (table 1).

Table 1: Classification of performance indicators of the interaction mechanism in the school – University system

№	Classification feature	Performance indicators
1	the management level	1.1) operational – reflects the degree of achievement of short-term goals, does not require a complex level of analysis, is expressed in absolute terms and is used at the basic level of decision-making;
		1.2) tactical – defined as an intermediate level that determines the level of achievement of the goals of interaction in the school-University system that are of a medium-term nature;
		1.3) strategic – a generalizing complex indicator that reflects the qualitative aspects of universities ' activities based on the results of achieving strategic goals of interaction;
2	the competitiveness level	2.1) financial – reflects the essential characteristics of economic stability and sustainability of higher education institutions, as it assesses the economic results of decisions made and can be an indicator of compliance with a specific strategy for the development of the University;
		2.2) marketing – charcterized positioning of the University on a specific segment of the market of educational services;
		2.3) functional-cost – determines the quality level of the service delivery process or satisfaction with the service, including the conditions that can provide it;
		2.4) potential – characterizes qualitative changes in information support, intellectual capital and infrastructure for the implementation of stable development of the system;
3	the volume of properties studied	3.1) partial volume comprises part of the properties of the interaction process;
		3.2) generalized – consists of a set of properties expressed by a coefficient that consists of many indicators;
4	the ranking level	4.1) the primary level analyzes the compliance of results and goals;
		4.2) the secondary level identifies the reasons for deviation of fact indicators from the plan;
5	the assessment level	5.1) the level of the University-complex – characterizes the interaction of the school complex and the entire University;
		5.2) level of structural division – describes the interaction of a separate structural division and the school complex or its structural division.

Source: compiled and supplemented by the authors on the basis of Todosiychuk (2009), Antropova (2012)

There are several approaches to evaluating the performance of a University, depending on the goal, reflecting different views on the assessment of the mechanism of interaction in the school-University system (table 2).

Table 2: Approaches to evaluating the performance of the University

№	Name of the approach	Brief characteristic
1	economic	assessment of an educational institution as an economic entity without taking into account its social and scientific values, including social orientation; accounting and financial indicators are used;
2	regulatory	assessment of the quality of educational services through accreditation, certification and licensing, including international accreditation
3	parametric	implementation of state standards and quality management systems of the University, including ISO 9000, as well as assessment and certification of the corresponding standards of higher education institutions
4	rating	a certain list of procedures is applied for evaluating indicators that characterize the selection of potential consumers of educational services in the competitive environment of the higher education market
5	target	it is focused on achieving its goals in the most effective way; thus, performance can be measured by the level of achievement of the organization's goals

Source: compiled and supplemented by the authors on the basis of Todosiychuk (2009)

An assessment of the financial and economic performance of various types of Russian universities has shown that today, in conditions of budget deficit, state higher education institutions are funded on a residual basis, while private universities do not receive financial assistance from the state budget at all and are fully self-funded. At the same time, private higher education institutions experience much more negative external influences than state universities. First of all, this concerns the formation of their revenue part in terms of a decrease in the number of students, restrictions on license volumes and prices for educational services provided by them in an acutely competitive market.

Thus, evaluating effectiveness in the educational sphere is a very difficult task. The social and economic effect is distributed over time and cannot be directly quantified (Skvirsky, 2012). The national education system has been in a state of reform for many years, which does not always have a positive impact on the effectiveness and quality of educational services.

An important point in the formation of the school-University interaction mechanism is to consider the essence of the concepts of efficiency of budget organizations, since it differs significantly from the efficiency of a commercial organization. According to Chigarin (2015), the effectiveness of higher education institutions can be expressed in the following indicators:

- the number of information products of scientific, methodological and practical nature used in the training process;

- the degree of satisfaction of parents, students and graduates with the quality of the educational process;

- the degree of satisfaction of the employer's representatives with the skills and competencies of University graduates;

- the degree of satisfaction of students with the organization of the educational process, additional services and relationships of educational institutions at different levels;

- the number of commercialized intellectual innovation products that have been developed and implemented at the University (Molchan et al., 2019).

The effectiveness of higher education institutions should be studied more widely due to the economic, social, career guidance, adaptation, and innovation aspects. Social effectiveness is the most important for evaluating the school-University interaction system. Economic efficiency can also have an impact on social efficiency, using the positive impact of targeted use of financial resources, etc.

The authors understand the effectiveness of higher education as the level of achievement by University graduates of the maximum results in training, which make it possible to ensure that the acquired competencies in the process of obtaining higher education correspond to public innovative, economic and social goals.

The effectiveness of the University can only be considered in relation to the effectiveness of school education, since applicants come to the University with the knowledge obtained at school. Therefore, there is a question of developing an effective integrated mechanism for the school-University interaction system.

According to the authors, a comprehensive mechanism for school-University interaction should take into account the requirements for the formation of knowledge and competencies that arise as a result of the influence of all interested parties (employers, management and guardianship councils, parent committees and committees on offenses, universities and schools themselves). In this way, the system of cooperation between school and University should also be implemented in the following areas: educational-methodical, scientific-methodical and career guidance. In addition, it should perform such career guidance, development, adaptation, and corrective functions (Fig. 1).

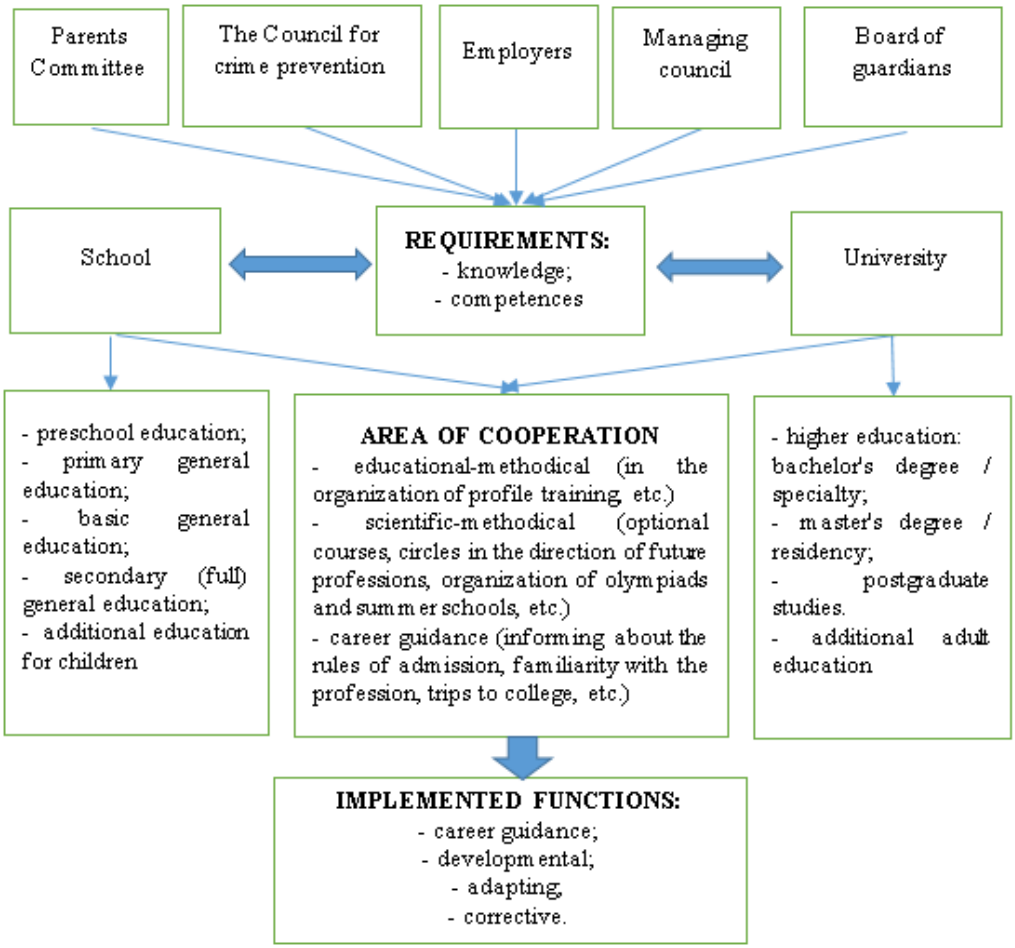

Fig. 1: Complex mechanism of interaction in the school-University system (compiled by the authors)

As a result of the implementation of the proposed mechanism, schools increase their competitiveness due to a higher percentage of graduates who have entered universities, students have the opportunity to get acquainted and decide on the choice of profession, undergo social adaptation and acquire social motivation to study at the University. In turn, universities get efficiency from such interaction by meeting already adapted and motivated students with clear ideas

about their future profession, familiar with the forms and methods of teaching at the University, which leads to fewer deductions in the 1st year.

Table 3 shows the results of testing the proposed mechanism on the example of data from one of the universities.

Table 3: Comprehensive diagnostics of the interaction mechanism in the school-University system

Indicators	2014	2015	2016	2017	2018	Max	Min	Average
In general, thousand rubles								
Revenue	121831,8	121380,7	138393,9	157234,2	140999,3	157234,2	121380,7	135968,0
Profit	395,8	7,3	2173,4	118,7	-5458,2	2173,4	-5458,2	-552,6
Number of trained people	32642,0	31126,0	32937,0	35859,0	33286,0	35859,0	31126,0	33170,0
Total expenditure	121436,0	121373,4	136220,5	157115,5	146457,5	157115,5	121373,4	136520,6
Profitability of sales	0,33	0,01	1,6	0,08	-3,73	1,6	-3,73	-0,342
Average number	201	208	210	210	206	210	201	207
Staff member	128	133	129	130	133	133	128	130,6
Employees involved	73	75	81	80	73	81	73	76,4
Labor productivity for completed works, thousand rubles/person	951,8	912,6	1072,8	1209,5	1060,2	1209,5	912,6	1041,4
Number of full-time students	21944	21369	23205	25751	22541	25751	21369	22962
Number of evening and part-time students	10693	9757	9732	10108	10745	10745	9732	10207
The number of laid-off employees				0	4	4	0	2
Released groups	2608	2644	2938	3052	3096	3096	2608	2867,6
The utility costs	1257,4	1292,0	1419,6	1419,6	1834,6	1834,6	1257,4	1444,7
Educational and methodological support for students	2922,2	2436,3	3996,9	3996,9	6143,4	6143,4	2436,3	3899,1
Overall customer satisfaction (average)	95%	98%	93%	0,95	92%	98	92	95
Employee satisfaction	98%	0,99	96 %	98 %	94 %	99	94	98
Wages	61924,9	62466,1	68140,7	80471,4	75916,0	80471,4	61924,9	69783,8
Average monthly wage	35781	35687	39753	45040	44120	45040	35687	40076,2
Average cost of training	3732	3900	4202	4385	4236	4385	3732	4091
Completing the monthly plan	120,7	102,8	115,2	105,7	102,6	120,7	102,6	109,4
Scope of work performed	114989,1	107888,5	124650,9	144883,6	140707,7	144883,6	107888,5	126624
Average group occupancy	13	12	11	12	11	13	11	11,8
Per student, rubles								
Revenue	3732,4	3899,7	4201,8	4384,8	4236,0	4384,8	3732,4	4090,9
Profit	12,1	0,2	66,0	3,3	-164,0	66,0	-164,0	-16,5
Total expenditure	3720,2	3899,4	4135,8	4381,5	4400,0	4400,0	3720,2	4107,4
The utility costs	38,5	41,5	43,1	39,6	55,1	55,1	38,5	43,6

Indicators	2014	2015	2016	2017	2018	Max	Min	Average
In general, thousand rubles								
Educational and methodological support for students	89,5	78,3	121,3	111,5	184,6	184,6	78,3	117,0
Wages	1897,1	2006,9	2068,8	2244,1	2280,7	2280,7	1897,1	2099,5
Scope of work performed	3522,7	3466,2	3784,5	4040,4	4227,2	4227,2	3466,2	3808,2
Average number of students per employee	162,4	149,6	156,8	170,8	161,6	170,8	149,6	160,2

Source: compiled by the authors

According to the results obtained, the authors conclude that the interaction is, on the one hand, quite effective, as the profit and revenue increases, the number of students and teachers, and the number of groups of students increases. On the other hand, all indicators show an insufficiently high growth rate per student.

Conclusion

The results of the study showed that there are opportunities for the long-term development of interaction in the school-University system in the market of educational services and the labor market. The study of the educational services market allowed authors to conclude that the relations between the interaction participants are adaptive: on the one hand, universities in their formation and development should take into account the demand for professional and qualification composition of educational services from students, take into account the vacancies offered by employers, and, on the other hand, they should actively influence schools through the formation of a marketing strategy, taking into account the prospects for development and innovative changes in the economy.

The proposed mechanism of interaction between school and University improves the quality of educational services and brings them in line with the needs of customers of higher education institutions. Effective school-University interaction is a universal mechanism for improving the level of customer satisfaction and performance of educational institutions.

The proposed mechanism of complex interaction in the school-University system can be adapted for any educational institution, as it has proved its effectiveness in the process of testing in an educational institution.

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Assessment of The Similarities of Selected European Countries in Terms of Socio-Economic Diversity

Małgorzata GRZYWIŃSKA-RĄPCA

Faculty of Economic Sciences, University of Warmia and Mazury in Olsztyn; Poland
malgo@uwm.edu.pl

Abstract

The purpose of the article was to separate groups of European countries taking into account measures of socio-economic development, i.e. the index of social development. The analysis also took into account features such as life expectancy, expected and average years of education, and gross national income per capita. The hypothesis was formulated that the data on socio-economic development adopted for analysis differentiate countries and may be the basis for creating groups of countries bringing together similar territorial units. The application of statistical multidimensional analysis methods has allowed the separation of statistically uniform clusters. The study showed that the measures adopted for analysis differentiate countries in terms of socio-economic development. The most developed countries: Austria, Belgium, Denmark, Finland, Germany, Luxembourg, the Netherlands, Sweden, Great Britain, and the least: Cyprus, Czech Republic, France, Greece, Italy, Malta, Portugal, Slovenia, Spain.

Keywords: HDI, Quality of Life, Socio-Economic Development, European Countries.

Introduction

Monitoring socio-economic indicators provides important quantitative information and empirical analytical knowledge on prosperity, change and trends in one society or groups of societies that can be used for different objectives, including, for example, social and economic policy-making (Noll, 2018).

The set of measures for socio-economic development is constantly improving. This is since the number of disciplines, including analyses in the field of so-called Quality of life, where analysis of only GDP level is not always a enough measure (Hagerty, M. R., et al. 2001). The concept of quality of life should be of interest in non-economic spheres, e.g. in the case of the United States. so that the analyses complement each other and allow for analysis in a broader perspective. In the literature of the subject meets different approaches (Dabrowa, 2018). The multifacetedness and multidimensionality of research related to the material and intangible quality of life of households is possible due to the diversity of activities by different institutions. Thus, the Central Statistical Office provides detailed data on the quality of life, such as, for example, the quality of life of the European Union. subjective assessments of income earned, housing assessment, level of access to social assistance, sense of security or leisure arrangements. The EU-SILC and Household Budget Research survey cluster on quality of life in a very broad sense, considering the consumer economy (subjective household assessments on the current and future financial situation of households). In addition to national data sources, research clustering on the collection of databases on measures for socio-economic development is carried out by the Statistical Office of the European Union (Eurostat). The data on the basis of which the analyses were carried out are derived from UNDP (United *Nations Development Programme*). It shall carry out measurement and analysis in the area of reducing socio-economic differences using m.in. HDI (Human*Development Index).*

Research on the material and intangible quality of household life shall be carried out in different scopes and aspects. According to Szukiełojć – Bieńkuska (2015) the quality of life should be studied in a multidimensional way. Among other things, the author distinguishes the following thematic areas: material living conditions, health, education, economic activity and economic security. Measurement and diverting in the area of quality of life is also carried out by the OECD. As part of the work carried out by the OECD, international indicators have been established to measure and compare regional living conditions for households. A multifaceted approach indicates the impact of various

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factors affecting household welfare. Thanks to the adopted indicators for assessing the quality of life, it is possible to determine not only the causes of development, but also to indicate the direction of possible changes. The level of regional diversity is very often deepened over time. It is linked to the accumulation and interplay of economic, political and cultural causes (Stawasz, 2004). According to this theory, areas with high economic development are growing faster and faster, while the poor are stagnant. The level of economic development of a given region is related to the material situation of its inhabitants (Grzywińska-Rąpca, 2019). Household material conditions are closely linked to the assessment of the quality of life of households, which is difficult to define unambiguously (Boris, 2015). Economists use multiple indicators to measure the quality of life of individuals to make social, political and economic decisions (Somarriba, Pena, 2009). The analyses highlight macroeconomic factors such as growth and inflation rates instability or cultural factors such as social capital (Veenhoven, 2000; Boelhouwer,2002). In microeconomic analyses, the discussion also concerns the impact of income inequality (Panek, 2009; Turczak, Zwiech, 2016).

HDI As A Measure of Socio-Economic Development

Commonly used by researchers (Antczak, 2012) the spatially adjusted socio-economic development measure is the Social Development Index (HDI). This is an indicator that considers three dimensions of social development, namely health, education and living standards.

The following indicators have been selected from each of the above areas (areas of life):

1. Health (life expectancy at birth),
2. Education (average length of education, expected length of education),
3. Standard of living (gross national product per capita according to the purchasing power parity of the currency in US dollars (PPP$) (Çilingirtürk, Koçak, 2018; Hozer – Koćmiel, 2018; Bravo, 2014; Silva, 2014). They are presented in the Figure 1.

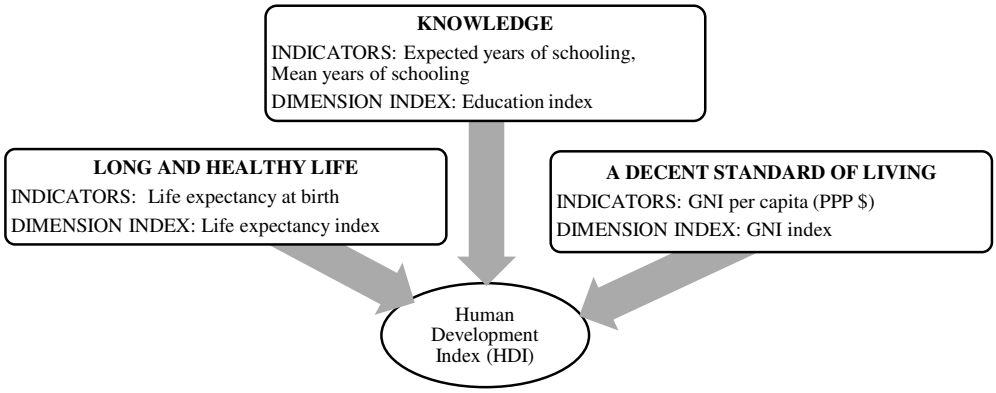

Fig. 1: Calculating the human development indices—graphical presentation

Source: own study on the basis http://hdr.undp.org/sites/default/files/hdr2019.pdf

According to the authors, […] *the Human Development Index (HDI) is a measure of summing up achievements in three key dimensions of human development: long and healthy life, access to knowledge and a decent standard of living. The HDI is the geometric mean of the normal indexes for each of the three dimensions*". (Conceição, 2019).

The advantage of using this indicator is the non-financial aspect, which should be an advantage over the level of GDP commonly used to determine the level of development of a country. The HDI is a component of averaged and standardized indexes and takes values between 0 and 1. The following compartments are created for the classification:

- Very high human development 0.800 and above
- High human development 0.700–0.799
- Medium human development 0.550–0.699
- Low human development below 0.550

According to Śleszyński (2016) around 30% of countries are among the highly and highly developed countries.

According to the annual Human Development Reports, Norway has been the leader in the HDI ranking since 2009, for which the index was 0.954 in 2018. Other highly ranked countries are Australia, Switzerland, the Netherlands, the United States, Germany, and New Zealand. For years, Poland has maintained a similar position, oscillating between 30 and 40 in the group of highly developed countries (Antczak, 2012, Śleszyński, 2016). In 2018, Germany had the highest HDI in the group selected for analysis of European countries (Figure 2).

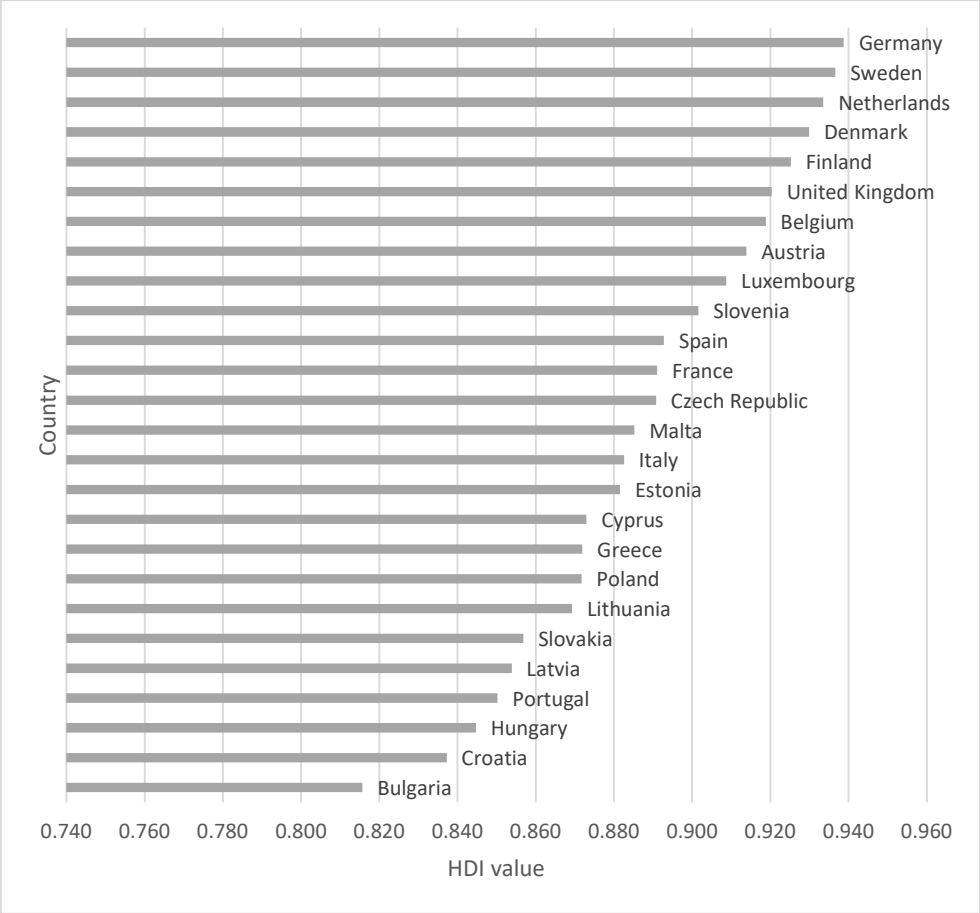

Fig. 2: The value of the Social Development Index (HDI) in 2018.

Source: own study on the basis of http://hdr.undp.org/en/data#

Statistical multidimensional methods have been used to distinguish between groups of countries with a similar level of socio-economic development, given the possibility of distinguishing groups with similarities regarding several characteristics. The variables adopted for analysis are shown in Table 1.

Table 1: Selected measures for socio-economic development

Lp.	Country	HDI	Life expectancy at birth	Average length of education	Expected length of education	Gross national product per capita
		(index)	(number of years)	(number of years)	(number of years)	($)
1	Austria	0,914	81,4	16,3	12,6	46 231
2	Belgium	0,919	81,5	19,7	11,8	43 821
3	Bulgaria	0,816	74,9	14,8	11,8	19 646
4	Croatia	0,837	78,3	15,0	11,4	23 061
5	Cyprus	0,873	80,8	14,7	12,1	33 100
6	Czech Republic	0,891	79,2	16,8	12,7	31 597
7	Denmark	0,930	80,8	19,1	12,6	48 836
8	Estonia	0,882	78,6	16,1	13,0	30 379
9	Finland	0,925	81,7	19,3	12,4	41 779
10	France	0,891	82,5	15,5	11,4	40 511
11	Germany	0,939	81,2	17,1	14,1	46 946
12	Greece	0,872	82,1	17,3	10,5	24 909
13	Hungary	0,845	76,7	15,1	11,9	27 144
14	Italy	0,883	83,4	16,2	10,2	36 141
15	Latvia	0,854	75,2	16,0	12,8	26 301
16	Lithuania	0,869	75,7	16,5	13,0	29 775
17	Luxembourg	0,909	82,1	14,2	12,2	65 543
18	Malta	0,885	82,4	15,9	11,3	34 795
19	Netherlands	0,933	82,1	18,0	12,2	50 013
20	Poland	0,872	78,5	16,4	12,3	27 626
21	Portugal	0,850	81,9	16,3	9,2	27 935
22	Slovakia	0,857	77,4	14,5	12,6	30 672
23	Slovenia	0,902	81,2	17,4	12,3	32 143
24	Spain	0,893	83,4	17,9	9,8	35 041
25	Sweden	0,937	82,7	18,8	12,4	47 955
26	United Kingdom	0,920	81,2	17,4	13,0	39 507

Source: own study on the basis of http://hdr.undp.org/en/data#

The analysis clustered on measures such as HDI, life expectancy, average years of study, expected years of study and gross national income per capita. Selected gauges characterize individual European countries considering the theoretical ground. Table 2 shows a summary of the statistical characteristics for the variables adopted for analysis.

Table 2: Statistical characteristics for variables adopted for analysis

Specification	HDI	Life expectancy at birth	Average length of education	Expected length of education	Gross national product per capita
	(index)	(number of years)	(number of years)	(number of years)	($)
Average	0,89	80,27	16,63	11,99	36208,01
Median	0,89	81,21	16,36	12,23	33947,75
Doo quarterly	0,87	78,54	15,49	11,42	27935,38
Top quartile	0,92	82,1	17,44	12,61	43820,84
Standard deviation	0,03	2,55	1,53	1,09	10462,79
Coefficient of variation	3,75	3,17	9,19	9,05	28,89

Source: own study

According to the data presented in Table 3, the average HDI value for the countries adopted for analysis is 0.89, which, according to theoretical assumptions, allows this group to be classified as highly developed countries. Among the 26 European countries adopted for analysis, the HDI ranges from 0.816 (Bulgaria) to 0.939 (Germany). The value of the upper quartile (0.92) indicates that 25% of the 26. above 0.92. The designated volatility factors indicate the highest variation for characteristics: gross national income per capita. The volatility factor in this case is 28.89%.

Group selected European countries based on socio-economic measures

The characteristics chosen based on the literature (*Human Development Report 2019…*) review and previous studies setting out the level of socio-economic development for selected European countries would allow several ranking lists of those countries to be drawn up. However, multidimensional methods of statistical analysis were used for more complete analysis. In the first stage, Ward's agglomerate grouping was carried out using a square of euclidean distance on standardized data (Fig. 3).

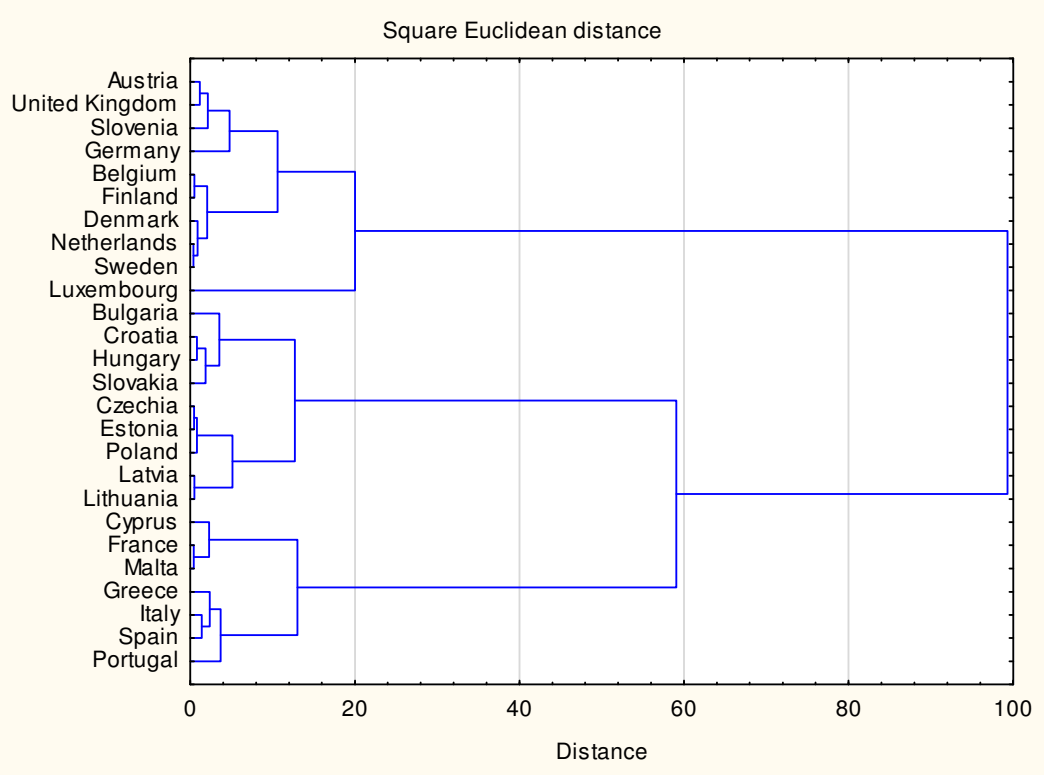

Figure 3: Grouping of countries - Ward's method Dendrogram Warda

Source: own study using Statistica 13.3.

The grouping presented using the Ward method allowed the extraction of homogeneous groups due to the variables adopted for analysis. It is worth noting that in the Ward method, the researcher is not able to indicate the number of concentrations at the start of the grouping procedure. By referring to the grouping in Figure 2 and the methodological assumptions indicating that three clusters were avoided in object groupings. The intersection was made at 20. distance of binding and on this basis three groups of countries were formed. The division of countries into cluster, based on selected diagnostic characteristics, was carried out using aggregation analysis algorithms. The k-medium method was used for this purpose. This is one of the non-hierarchical methods of grouping. This procedure requires an arbitrary decision on the number of clusters to which the initial collection of objects will be divided (Walesiak, Gatnar, 2009). The main idea of this method is the allocation of objects to k groups, which shows minimal variability inside the resulting clusters and at the same time maximizes variability between groups. The high volatility between highlighted clusters and the relatively low intra-aggregates indicates a proper grouping of countries due to the variables analyzed. The distributions of variables within the aggregates are shown in Figures 4, 5, 6, 7, and 8.

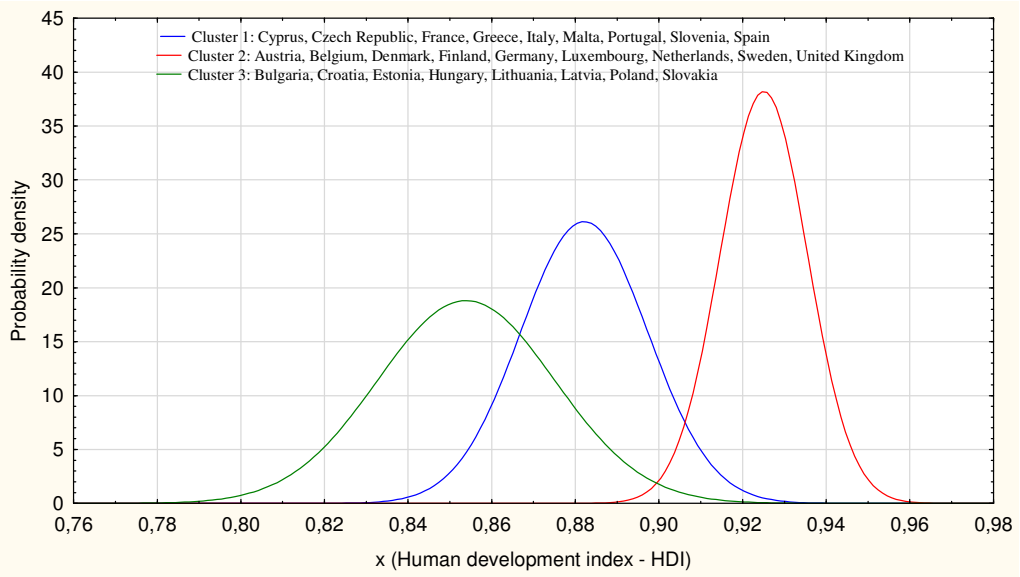

Figure 4:Variable Distribution Chart: Human Development Index (HDI)

Source: own study using Statistica 13.3.

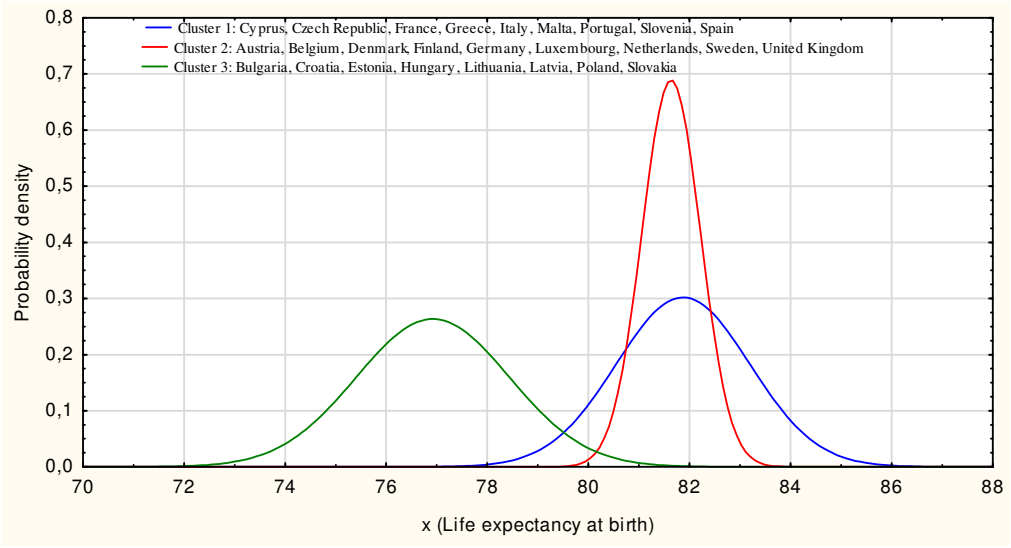

Figure 5: Variable distribution chart: life expectancy at birth

Source: own study using Statistica 13.3.

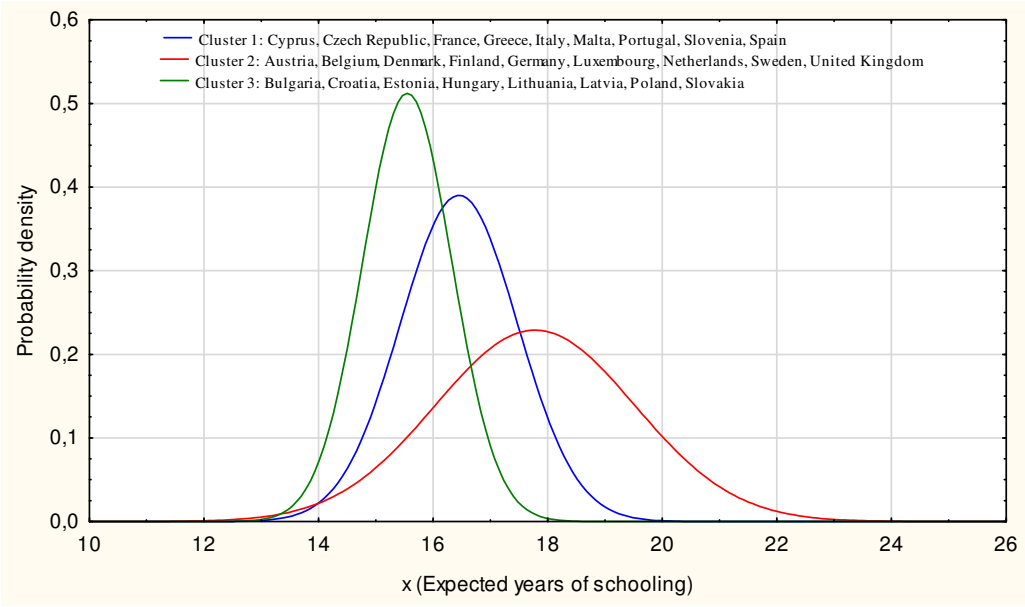

Figure 6:Variable distribution chart: average education length

Source: own study using Statistica 13.3.

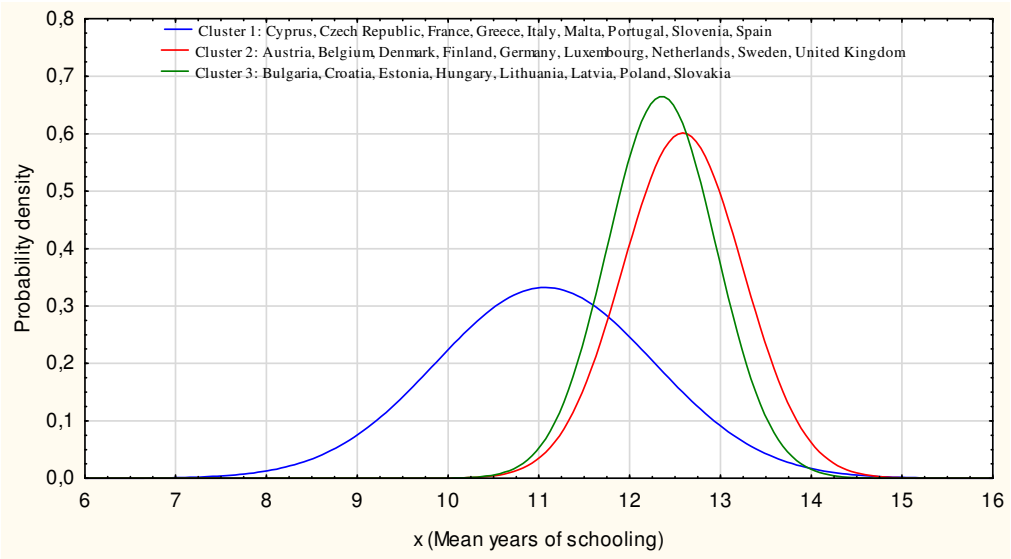

Figure 7: Variable distribution chart: expected length of education

Source: own study using Statistica 13.3.

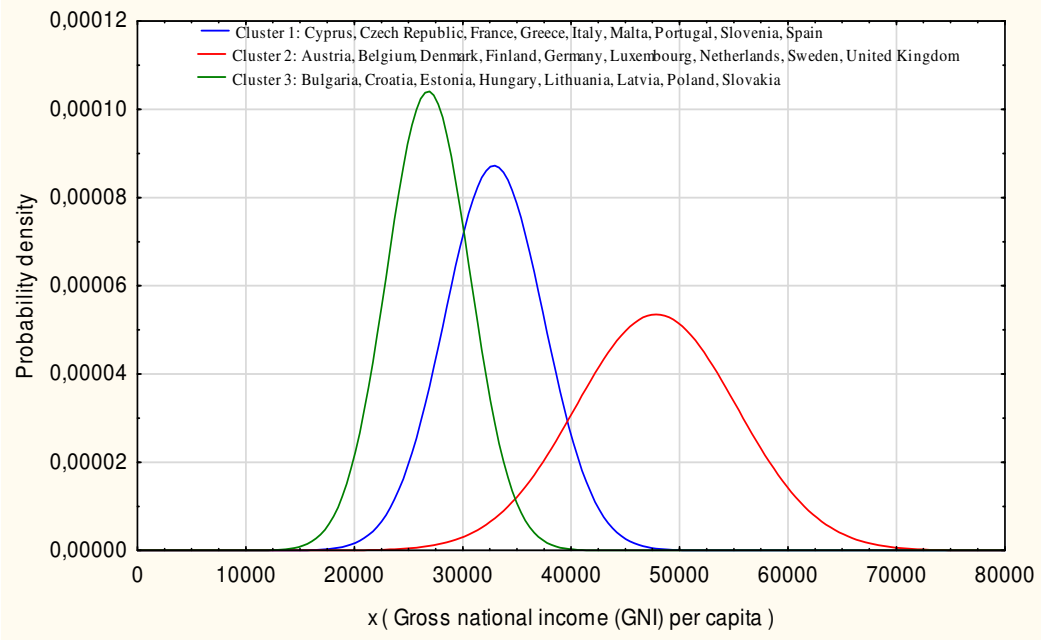

Figure 8: Variable distribution chart: gross national product per capita

Source: own study using Statistica 13.3.

High variability among the distinguished clusters and relatively low variability in the clusters prove that countries are properly grouped by the analyzed variables. The results of the *F* statistics presented in Table 3 show that all variables discriminate well between clusters at the significance level of 0.05.

Table 3: Results of the analysis of variance of discriminant variables

Variable	Intergroup variation	df	Intragroup Variation	df	Statistic *F*	Value *p*
Human development index (HDI)	1,865136E-02	2	0	23	23,25187	0,000003
Life expectancy at birth	8,218693E+01	2	80	23	11,79589	0,000298
Expected years of schooling	1,333123E+01	2	45	23	3,40007	0,050858
Mean years of schooling	5,143666E+00	2	24	23	2,43308	0,110023
Gross national income (GNI) per capita	2,216871E+09	2	519878000	23	49,03846	0,000000

Source: own study

The scatter in charts of all variables for the three aggregates represent a normal or close to normal distribution. This indicates the proper grouping of objects. A synthetic combination of aggregation elements and statistical characteristics for each variable is shown in Table 4.

Table 4: Statistical characteristics for clusters

Specification	Cluster 1 (Cyprus, Czech Republic, France, Greece, Italy, Malta, Portugal, Slovenia, Spain)	Cluster 2 (Austria, Belgium, Denmark, Finland, Germany, Luxembourg, Netherlands, Sweden, United Kingdom)	Cluster 3 (Bulgaria, Croatia, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia)
HDI			
Minimum value	0,850212	0,908720	0,815711
Maximum value	0,901601	0,938785	0,881542
Arithmetic mean	0,882130	0,925085	0,853890
Standard deviation	0,015262	0,010438	0,021206
life expectancy at birth			
Minimum value	79,22200	80,78400	74,92800
Maximum value	83,43300	82,65400	78,56700
Arithmetic mean	81,87256	81,63744	76,92238
Standard deviation	1,32152	0,57916	1,51479
average length of education			
Minimum value	14,67400	14,22752	14,53309
Maximum value	17,87704	19,69991	16,49953
Arithmetic mean	16,45194	17,77922	15,55027
Standard deviation	1,02276	1,74316	0,77886
expected length of education			
Minimum value	9,19096	11,78389	11,40518
Maximum value	12,74035	14,13215	13,02904
Arithmetic mean	11,06866	12,58494	12,35306
Standard deviation	1,20061	0,66368	0,60001
gross national product per capita			
Minimum value	24909,34	39507,29	19645,94
Maximum value	40510,78	65543,05	30671,87
Arithmetic mean	32908,20	47847,90	26825,43
Standard deviation	4574,60	7456,82	3833,23

Source: own study

The first cluster, which includes countries such as Cyprus, the Czech Republic, France, Greece, Italy, Malta, Portugal, Slovenia, Spain is characterized by HDI levels ranging from 0.85 to 0.90. Life expectancy (assuming that this is the number of years a newborn could survive if the mortality patterns change during his life) in the first concentration to which the countries of Central and Western Europe are mainly qualified, is almost 82 years (81.87). The expected years of learning in this cluster are 16.5 years (16.45). Gross national income for first cluster ranges from $24,909.34 to $40,510.78.

In the second cluster, the highest statistics values can be observed in most cases. This cluster included countries such as Austria, Belgium, Denmark, Finland, Germany, Luxembourg, the Netherlands, Sweden, the United Kingdom. It is a cluster with a high level of gross national income per capita. The average gross income per capita ranged from $39,507.29 to $65,543.05. The average expected bed timeinthe guests of life and expected years of learning for this cluster are 81.63 and 17.77, respectively.

The third cluster includes Bulgaria, Croatia, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia. The countries eligible for third-rate concentration do not show homogeneity as a result of both geographical locations, past (centrally planned economies) and, above all, from the period of political transformation. These are in most central and eastern European countries currently concentrated as part of the International Economic and Political Initiative (Trisea). The HDI value for this cluster ranges from 0.8157 to 0.8815. The countries of this concentration have the lowest gross

domestic product per capita. The average value of this variable for the third cluster is $26825.43. Countries eligible for this cluster based on 2018 data can be expected to obtain higher values adopted for variable analysis in subsequent years. This may be the result of cooperation between the Trisea States at different levels, activities related to one of the main objectives of the Trisea organisation– namely the dynamism of economic development.

The second cluster isolated the following countries: Austria, Belgium, Denmark, Finland, Germany, Luxembourg, Netherlands, Sweden, United Kingdom. These states, taking into account their economic development (which was not the subject of the conducted analyzes), provide their inhabitants with conditions enabling them to meet their needs in the field of social development. The second largest of the analyzed variables was the first cluster linking the countries of the south-western Europe region.

Summary

The analysis of groupings on the basis of hdi and health and economics meters was studied by 26 European countries. The results show that in 2018, the countries with the highest values of the variables adopted for analysis are Austria, Belgium, Denmark, Finland, Germany, Luxembourg, the Netherlands, Sweden, the United Kingdom. This is probably due to high variable levels for these countries.

In conclusion, the analyses carried out using the Ward and K-medium methods can be concluded that there is a wide variation in living standards in the Group of European countries. This is indicated, for example, by the coefficient of variation for the variable: gross national product per capita. It is also worth stressing that further measures of socio-economic development should be introduced when grouping and comparing groups of countries. In subsequent analyses, the study on the diversity and grouping of European countries will include unemployment, migration as well as the rate of household savings. The use of this latter measure appears justified because the household savings rate is the ratio of household gross savings to disposable gross income, adjusted for a change in household pension rights in households. Gross savings, on the other hand, are defined as part of the gross disposable income and not spent on final consumption. When gross disposable income increases faster than final consumption expenditure, then the savings rate increases. According to Angel and Gołasia (2013) household savings, it is one of the most important determinants of growth and economic development.

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Financial Self-Exclusion: Why Do Households Give Up Activity On the Market of Financial Services and Products?

Agnieszka STRZELECKA

Koszalin University of Technology, Faculty of Economic Sciences, Department of Finance, Poland
agnieszka.strzelecka@tu.koszalin.pl

Abstract

The aim of this research was to identify and assess the socio-economic characteristics of financially self-excluded households and to identify the reasons for the inactivity of households on the market of financial services and products. The source of empirical data were the results of a survey conducted among 1,000 households in Central Pomerania (Poland). The analysis of the characteristics of financially excluded households in relation to the remaining entities included in the analysis was performed with the use of non-parametric statistical tests (chi-square, Fisher's test, Mann-Whitney's U test). The conducted research showed that the following types of households are particularly vulnerable to financial self-exclusion: households from rural areas and small towns; households of the elderly; households with dependent children; households of pensioners and employees. Financially self-excluded households were, on average, smaller, with a lower proportion of dependent children and a lower proportion of people who were gainfully employed. The research also found that the main reasons for financial self-exclusion of the surveyed households were: reluctance to use financial services/products, preferring to use cash, retirement age, low level of household income, lack of possibility to use a financial product/service due to: too high a price, difficult access to financial products and services and the conditions needed to be met in order to be able to use the product/service). The results obtained in the course of this research contribute to both literature and practice. These research results may be an important source of information both for financial institutions, as well as for entities that deal with reducing financial exclusion, including financial self-exclusion of households.

Keywords: household, financial decisions, financial exclusion, financial self-exclusion, reasons for financial self-exclusion, non-parametric statistical tests, Central Pomerania, Poland

Introduction

In recent years, there has been a heightened interest in the subject of financial aspects of the functioning of households, as evidenced by the development of a sub-discipline of finance, which is personal finance (household finance). The need for financial education of the population is emphasized, as well as the importance of skilful and rational management of the household budget. Households' financial decisions relate to the use of financial services and products and are determined by a number of factors. Our previous research has shown that socio-economic characteristics affect household financial decisions regarding: saving (Strzelecka, Zawadzka 2020), incurring debt (Strzelecka, Zawadzka, Kurdyś-Kujawska 2020a) and using financial services and products to purchase voluntary insurance for life (Strzelecka, Zawadzka, Kurdyś-Kujawska 2020a). This paper will examine the characteristics of households which, by their own choice, give up and do not use financial services and products - so it will deal with the phenomenon of financial self-exclusion of households.

The aim of this research is to identify and assess the socio-economic characteristics of financially self-excluded households and to identify the reasons for the inactivity of households on the market of financial services and products. In the study, *financial self-exclusion* was defined as the non-use of financial services and products by households, by their own choice.

The rest of the paper is structured as follows. Next section provides a literature review on the financial exclusion of households, which was the basis for empirical research, the results of which are presented later in the paper. The third section presents research methodology and data sources used for the analyzes. Next, the households included in the study were characterized. The fifth section presents the results of empirical research on the financial self-exclusion

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of the surveyed households, taking into account the characteristics of financially self-excluded entities (using non-parametric statistical tests: chi-square test, Fisher's test and Mann-Whitney U test) and the causes of the analyzed phenomenon. The last section concludes.

Literature Review

Financial exclusion is a relatively new concept, and research in this field began in the 1990s (Zhang, 2013). A significant barrier to conducting research in this area is the lack of a clear definition of financial exclusion, which causes difficulties in determining the scale of this phenomenon and defining groups particularly exposed to the risk of financial exclusion. According to the definition proposed by the European Commission (2008), financial exclusion means the process in which the population faces problems in accessing and/or being able to use financial services and products offered on the mainstream market that are appropriate to their needs and enable them to lead a normal life in the society (European Commission 2008). This approach to the issue of financial exclusion takes into account: (a) access to a wide range of banking services (e.g. using bank accounts, investing savings, using loans, mobile banking); (b) access to safe and profitable forms of saving, and (c) access to insurance products (European Commission, 2008).

Research on this issue focuses largely on the first of the above-mentioned aspects, and financial exclusion is often equated with hindered access to banking services, in particular to bank loans and credits (such an approach was taken into account, among others, in the following works: Mutambara, 2016; Kata, Walenia, 2015; Ziemba, Świeszczak, Marcinkowska, 2014; Szafrańska, 2013). A measure of financial exclusion may also be the percentage of adults (in a given country) who do not have a bank account (Alińska, 2011). However, in the case of some groups of households for which a bank account is necessary to receive e.g. remuneration for work, this measure does not allow to determine the actual scale of financial exclusion. This also applies to the issue of being underbanked, i.e. a situation in which a given entity, despite having a bank account, makes little use of it (Błędowski, Iwanicz-Drozdowska, 2010). There is an approach in the literature according to which having a bank account is the first stage of financial inclusion, because using a loan or collecting savings in a bank is largely conditioned by its possession (Coffinet and Jadeau, 2017).

Financial exclusion can be considered from two perspectives. According to the first of these approaches - the narrower one - this phenomenon applies to people who do not use any financial services or products. According to the second approach - the broader one - financial exclusion applies to people who use banking products to a small extent (Solarz, 2014). The literature also proposes an approach according to which entities that do not have access to financial services and products and do not use any products of this type are financially excluded, while entities that use them to a small extent are referred to as marginally included (Anderloni et al., 2008). For the purposes of the research, this paper adopts a narrower approach to the studied phenomenon, and financial self-exclusion is defined as the non-use of financial services and products by households of their own choice. This will make it possible to identify the characteristics of entities which, by their own choice, give up activity on the market of financial services and products, as well as to determine the causes of this phenomenon among the surveyed households.

As evidenced by the results of research conducted so far, the causes of financial exclusion can be seen both on the demand side and on the supply side (Adeyemi, Pramanik and Meera, 2014; Ziemba, Świeszczak and Marcinkowska, 2014; Barboni, Cassar and Demont, 2017). In the first of these groups, the most frequently indicated causes are: household income level; household location; gender, occupation of the household head; level of education of the household head; reluctance to use financial services/products; fear of over-indebtedness and loss of financial liquidity; lack of trust in financial institutions; bad experiences from the past (e.g. credit refusal); psychological factors, cultural considerations (Anderloni et al., 2008; Ziemba, Świeszczak and Marcinkowska, 2014; Pandey, Bhatia and Pandey, 2015; Sain, Rahman and Khanam, 2016). On the supply side, on the other hand, the most common causes of financial exclusion are: the price of the product/service; distribution channels; the form of service provision; quality of products/services, geographical availability of facilities; conditions necessary to be met for the use of a financial product/service (e.g. credit risk assessment); information on available financial services/products (Anderloni et al., 2008; Ziemba, Świeszczak and Marcinkowska, 2014; Bhatia and Pandey, 2015; Sain, Rahman and Khanam, 2016).

One of the research aspects undertaken in this area are factors that influence the financial exclusion of households, including financial self-exclusion. The research results show that the analyzed phenomenon may be influenced by a number of factors, the most common of which are: low level of income, low level of education, lack of permanent employment, unemployment, location of the household in rural areas or in small towns, young age , retirement age (Błędowski and Iwanicz-Drozdowska, 2010; Dungey, Doko Tchatoka and Yanotti, 2018). Therefore, people

particularly at risk of financial exclusion, as evidenced by the results of research presented in the scientific literature, include primarily: unemployed, low-income people, people without permanent employment, inhabitants of rural areas, women, young people, older people, people with low levels of education, immigrants and people with disabilities (Corr, 2006; Anderloni et al., 2008; Coffinet and Jadeau, 2017; Dungey, Doko Tchatoka and Yanotti, 2018).

Materials and Methods

The main source of empirical data were the results of a survey conducted among 1,000 households in Central Pomerania in Poland. The survey was carried out in the second quarter of 2019 using the direct questionnaire technique. In the course of the research, the number of correctly completed questionnaires was 746 (return rate 74.6%). The respondents were asked to provide information for 2018, with the selected questions covering the years 2004-2018. Since the studied sample was not representative, the results of the study cannot be generalized, which is a limitation of the research.

The analysis of the characteristics of financially self-excluded households in relation to the other units included in the analysis was performed using: the chi-square test, the Fisher test or the Mann-Whitney U test (to compare two groups with respect to other variables) (Nahm, 2016; Hopkins, Dettori and Chapman, 2018). To determine the reasons for the financial self-exclusion of the surveyed households, the data from the questionnaire were used, and the reasons which, according to the respondents, were indicated as important or very important were taken into account. The assessment of this phenomenon was made using a five-point Likert scale, where 1 - meant a cause that was irrelevant for a given household, and 5 - a very important cause (Cummins and Gullone, 2000; Joshi, Kale, Chandel andPal, 2015; Kandasamy, Kandasamy, Obbineni et al. al., 2020).

In order to determine the factors related to financial self-exclusion of households, the following set of socio-economic characteristics and the corresponding categories were adopted on the basis of the literature review and data contained in the questionnaire:

1. **SELF_EXCL** – financial self-exclusion of the household - does not use financial services and products by its own choice: yes, no
2. **AGE** – age of the head of a household (years)
3. **GH** - gender of the head of the household: female, male
4. **EDU** - education of the head of a household: basic, basic vocational, secondary, post-secondary, higher
5. **EC** - economic education of the head of the household: yes, no
6. **TSE** - socioeconomic type of household (main source of income): employees, farmers, self-employed, pensioners, other
7. **INC** - average monthly net income per person in a household: up to PLN 1,000; PLN 1,001-1,500; PLN 1,501-2,000; above PLN 2,000
8. **INC_DIV** - diversification of sources of income in a household - more than one type of source of income: yes; no
9. **DPH** - household development phase: single young person's household; young marriage/partnership without a child; single person with a dependent children; marriage/partnership with dependent children; marriage/partnership in middle or old age without dependent children; single household older person; other
10. **LHM** - number of household members
11. **SHME** - share of household members engaged in gainful employment in the total number of members of the household
12. **SCH** – share of children in the total number of people in the household
13. **LOC** - household location: village, city up to 50,000 residents, city of over 50,000 residents
14. **FO** - form of ownership of a residential unit: privately owned apartment, own house, flat rented from a private person, other

The assumed goal was achieved with the use of the following research methods: (a) literature studies, (b) survey assessment method - in order to collect primary data, a questionnaire study was conducted using a direct questionnaire; (c) empirical data analysis using descriptive and comparative methods, as well as statistical methods. The results of the analyses are presented in tabular and graphical form. form.

Characteristics of the studied households

Among the studied group of 746 households, entities from rural areas were the dominant ones (46.2%). Next, there were households from cities with more than 50,000 inhabitants (27.2%) and from smaller towns (up to 50 thousand inhabitants - 26.5%). Taking into account the development phase and the composition of the household as the classification criterion, it was found that the most numerous group were married couples/partnerships with dependent children (47.1%), where the head of the household was a man (62.2%), aged 45 (on average). Nearly 65% of the respondents were entities in which the head of the household had secondary education at most. 27.9% of respondents declared having higher education. The largest group among the surveyed households (61.1%) were units for which the basic source of income was the remuneration obtained from contract work. Taking into account the level of income, it was found that 17.6% of entities had an average monthly net income per person in a household not exceeding 1,000 PLN. In turn, for over 1/3 of the respondents (36.6%) the amount of the analyzed income category was higher than 2,000 PLN/person. More than half of the group (50.9%) diversified their sources of income and was characterized by a constant increase in income in the years 2004-2018. 61.4% of the surveyed households recorded a constant increase in expenditure in the analyzed period. It was also found that the dominant group of the analyzed entities amassed funds in the form of savings (60.05%), allocating an average of 14.5% of the total income for this purpose. Among the surveyed group, every third household was in debt (34.3%) and spent on average 17.6% of its total income on its repayment. The dominant group of respondents (71.7%) indicated that they were unfamiliar with the concept of financial exclusion.

Empirical Results

When conducting the research on financial self-exclusion among the households included in the analysis, the preferences of the surveyed entities in the use of financial services and products were first established. The results obtained in this aspect are presented in Figure 1.

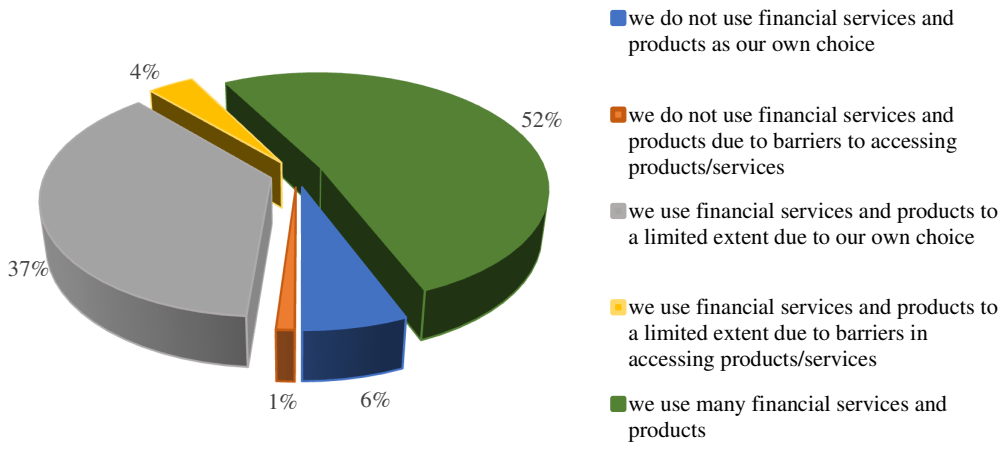

Fig. 1: The structure of the surveyed households in Central Pomerania, including activity in the use of financial services and products [%, N=753]

Source: Author's own study.

On the basis of answers for the key survey question that was used to collect data on who is financially self-excluded (Fig. 1), it was established that financial self-exclusion marked 6% of the surveyed entities ("*we do not use financial*

services and product as our own choice"). In the course of the conducted research, it was also found that more than half of the surveyed households declared using many financial services and products (52%). 37% of respondents indicated that they make little use of financial services and products as their own choice. Barriers in access to financial services and products constituted the main reason for the fact that 4% of the surveyed population made little use of these opportunities, while for 1% of respondents it was the reason for a complete lack of activity on the market of financial services and products.

So what causes households to give up the possibility of using financial services and products? In search of an answer to this question, it was first established whether there are differences in the socio-economic characteristics of households that choose to give up activity on the market of financial services and products, and other entities included in the study. Identification of the features influencing households' debt began with determining whether there is a statistically significant relationship between financial self-exclusion and the socio-economic characteristics of the households studied. For this purpose, the non-parametric chi-square test, the Fisher's exact test and the Mann-Whitney U test were used. The results of these calculations are presented in Table 1.

Table 1: Comparison of the surveyed households in relation to self-exclusion for the variables included in the analysis

Continuous variables									
Variable	**Sub-sample**	**M**	**Me**	**Min**	**Max**	**IQR**	**SD**	**test**	**p**
AGE	SELF_EXCL NO	44.43	45	20	90	31 - 55	15.02	MWU	0.001
	SELF_EXCL YES	53.8	51.5	22	86	43 - 70	19.49		
LHM	SELF_EXCL NO	2.84	3	1	6	2-4	1.31	MWU	<0.001
	SELF_EXCL YES	2	2	1	5	1-3	1.03		
SHME	SELF_EXCL NO	0.63	0.67	0	1	0.5 - 1	0.32	MWU	0.005
	SELF_EXCL YES	0.45	0.5	0	1	0 – 0.92	0.41		
SCH	SELF_EXCL NO	0.23	0.25	0	0.83	0 – 0.5	0.23	MWU	0.004
	SELF_EXCL YES	0.13	0	0	0.67	0 – 0.33	0.2		

Categorical variables					
Variable		**Sub-sample**		**test**	**p**
		SELF_EXCL NO	**SELF_EXCL YES**		
		Share of households in particular categories:			
GH	female	37.3%	47.8%	χ^2	0.2066
	male	62.7%	52.2%		
EDU	basic	6.4%	19.6%	Fisher	0.0187
	basic vocational	26.6%	32.6%		
	secondary	30.8%	26.1%		
	post-secondary	7.6%	4.3%		
	higher	28.6%	17.4%		
EC	yes	18.2%	10.9%	Fisher	0.238
	no	81.8%	89.1%		
TSE	employees	62.1%	45.7%	Fisher	0.0004
	farmers	9.6%	6.5%		
	self-employed	14.7%	8.7%		
	pensioners	12.2%	39.1%		
	other	1.4%	0.0%		
INC	up to PLN 1,000	17.1%	23.9%	Fisher	0.2456
	PLN 1,001-1,500	26.0%	32.6%		
	PLN 1,501-2,000	20.4%	10.9%		
	above PLN 2,000	36.5%	32.6%		
INC_DIV	yes	46.3%	21.7%	χ^2	0.002
	no	53.7%	78.3%		
DPH	single young person's household	11.9%	10.9%	χ^2	0.0005

	young marriage/partnership without a child	11.2%	4.3%		
	single person with a dependent children	3.3%	4.3%		
	marriage/partnership with dependent children	48.4%	26.1%		
	marriage/partnership in middle or old age without dependent children	12.9%	21.7%		
	single household older person	4.1%	26.1%		
	other	8.3%	6.5%		
LOC	village	46.1%	43.5%	χ^2	0.0118
	city up to 50,000 residents	25.6%	43.5%		
	city of over 50,000 residents	28.3%	13.0%		
FO	privately owned apartment	35.2%	41.3%	Fisher	0.7919
	own house	44.4%	39.1%		
	flat rented from a private person	11.3%	13.0%		
	other	9.1%	6.5%		

M *– average,* ***Me*** *– median,* ***Min*** *-minimum,* ***Max*** *– maximum,* ***IQR*** *- interquartile range,* ***SD*** *– standard deviation,* ***test*** *– statistic test,* ***p*** *- p-value;* ***MWU*** *- Mann-Whitney U test;* ***Fisher*** *– Fisher exact test,* χ^2 *- chi-square test*

Source: Authors' own study.

The non-parametric tests used showed that a statistically significant relationship with the self-exclusion of a household was noted for the following nine characteristics of the surveyed entities: **AGE** - age of the head of a household (Mann-Whitney U test; p=0.001); **EDU** - education of the head of the household (Fisher's test; p=0.0187); **TSE** - socio-economic type of the household (Fisher's test; p=0.0004); **INC_DIV** - diversification of sources of income in a household - (chi-square test; p=0,002); **DPH** - household development phase: (chi-square test; p=0.0005); **LHM** - number of household members (Mann-Whitney U test; p=<0.001); **SHME** - share of household members engaged in gainful employment (Mann-Whitney U test; p=0.005); **SCH** - share of children in the total number of people in the household (Mann-Whitney U test; p=0.004) and **LOC** - household location (chi-square test; p=0.0118). Financially self-excluded households were characterized, on average, by older household heads (mean age 54) than the units from the second group included in the analysis (mean age 44) and a lower level of education (nearly 80% of them had at most secondary education). Taking into account the socio-economic type of a household, determined on the basis of the main source of income of a given unit, it was found that entities that, by their own choice, did not use financial services and products were primarily households of employees (45.7%) and pensioners (39.1%). Nearly 80% of financially self-excluded entities did not diversify their sources of income. Taking the development phase of the household as the classification criterion, it was observed that among financially self-excluded entities, the largest group were households with dependent children (26.1%), single elderly people (26.1%) and middle-aged or elderly marriages/partnerships with no dependent children (21.7%). Subsequently, it was found that there is a statistically significant difference between the size and composition of financially self-excluded households compared to other units included in the study. Entities which, by their own choice, were not active on the market of financial services and products were characterized, on average, by a lower number of household members, a lower share of paid members and a lower share of dependent children in the total number of household members (Table 1). Financial self-exclusion concerned mainly rural households (43.5%) and entities located in smaller towns (43.5%).

The next stage of the analysis covered the determination of reasons for financial self-exclusion of the surveyed households. Table 2 presents the results of the research on this issue, taking into account the percentage of households which indicated a given cause as important or very important.

Among the surveyed group of households, the main reason for financial self-exclusion was reluctance to use financial services and products - nearly half of the respondents indicated this reason as important or very important. This was followed by retirement age (43%) and preference for using cash (41%). An important cause of the analyzed phenomenon among the surveyed entities was also the unfavorable financial situation of the household, related to a

too low level of income. Among other significant reasons for financial self-exclusion, the respondents also indicated demand factors related to the inability to use financial services and products, such as: inability to manage new technologies, lack of access to a computer and mobile devices, lack of access to the Internet, lack of knowledge about existing opportunities in the use of financial services/products, lack of trust in financial institutions and fear of losing financial control. A number of supply factors were also indicated which limited the activity of the surveyed entities on the market of financial services and products; these were mainly: product price (too high costs associated with the use of financial services and/or products), availability of products and services (including the form of providing the service, limiting the possibility of using it, e.g. the Internet, lack of information about available financial services/products, geographical availability of branches, e.g. no bank branch in the place of residence) and the conditions that must be met in order to be able to use the product/service (e.g. no creditworthiness).

Table 2: Reasons for financial self-exclusion of the surveyed households [%, N=46]

Description	Percentage of households*
reluctance to use financial services and/or products	46%
retirement age	43%
preferring to use cash	41%
low level of household income	37%
inability to manage new technologies	37%
too high costs related to the use of financial services and/or products	33%
lack of knowledge about the existing possibilities of using financial services/products	33%
no access to a computer, mobile devices, the Internet	33%
fear of getting into debt and living on credit	30%
the form of service provision, limiting the possibility of using it (e.g. the Internet)	26%
lack of trust in financial institutions	24%
fear of losing financial control	24%
low or no savings	24%
limited availability of financial services and/or products	20%
no permanent employment	20%
lack of habit or need to save	20%
no information about available financial services/products	17%
geographic availability of branches (e.g. no bank branch in the place of residence)	15%
the location of the household which prevents the use of the service/product	15%
no incentives to save with an intensive campaign to encourage incurring liabilities	15%
no permanent source of income	13%
young age	13%
a barrier related to meeting the conditions enabling the use of a given service/product (e.g. no creditworthiness)	11%
household over-indebtedness	11%
low quality of products and services	9%
lack of household financial management skills	7%
inheritance of negative behavior patterns	7%
focus on fast consumption with the use of credits and loans	4%
refusal by a financial institution to provide a service	4%
low level of education	2%
low level of economic and financial education	2%

** Due to the fact that the respondents could indicate more than one reason why they do not use financial services and products, the percentage of households does not add up to 100%.*

Source: Authors' own study.

Conclusions

The aim of the research presented in this paper was to identify and assess the socio-economic characteristics of financially self-excluded households and to identify the reasons for the inactivity of households on the market of financial services and products. The main source of empirical data was the result of a survey conducted in 2019 on 1,000 households (746 correctly completed questionnaires) in Central Pomerania (Poland). In the study, financial self-exclusion was defined as the non-use of financial services and products by households, by their own choice. This feature was noted for 6% of the surveyed households.

Main findings of this paper confirm the results of research presented in the literature. The conducted research proved that the following types of households are particularly exposed to financial self-exclusion: households from rural areas and small towns, households of the elderly; households with dependent children; entities whose main source of income are pensions and those whose primary source of income is related to the performed contract work. Moreover, it was found that entities which choose not to use financial services and products do not diversify (for the most part) their sources of income. Financially self-excluded households were, on average, smaller, with a lower proportion of dependent children and a lower proportion of people who were gainfully employed.

Further analyzes showed that the main reason for financial self-exclusion of the surveyed entities was the reluctance to use financial services/products and the preference to use cash. An important reason was also retirement age and low level of household income. The surveyed households also indicated reasons relating to the inability to use a financial product/service due to: too high a price, difficult access to financial products and services, and the conditions that must be met in order to be able to use the product/service. Therefore, these reasons relate to both demand and supply, which confirms the results of empirical research presented in the scientific literature to date (e.g. Corr, 2006; Osei-Assibey, 2009).

Since the studied sample was not representative, the results of the study cannot be generalized, which is a limitation of the research. However, the results obtained in the course of this research contribute to both literature and practice. In the first aspect, the obtained results complement the current research results presented in the literature on the financial self-exclusion of households, taking into account the factors influencing this phenomenon and its causes. In practice, on the other hand, these research results may be an important source of information both for financial institutions that are interested in the best possible adaptation of financial services and products for households and acquiring new customers, as well as for entities that deal with reducing financial exclusion, including financial self-exclusion of households.

The timeliness and significant importance of the research issues undertaken here justify continuing the research in this area. Further research questions arise, including the direction and force of the impact of individual factors on the financial self-exclusion of households. The search for an answer to this question will constitute the next stage of research.

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Consumer Purchasing Behaviour and Neuromarketing in the Context of Gender Differences

Robert STEFKO
University of Presov in Presov, Faculty of management, Slovakia, robert.stefko@unipo.sk

Anna TOMKOVA
University of Presov in Presov, Faculty of management, Slovakia, anna.tomkova@unipo.sk

Jana KOVALOVA
University of Presov in Presov, Faculty of management, Slovakia, kovalova.jana92@gmail.com

Ivana ONDRIJOVA
University of Presov in Presov, Faculty of management, Slovakia, ivana.ondrijova@unipo.sk

Abstract

The paper in the theoretical part deals with the issue of neuromarketing and gender differences in the context of shopping behavior. The main goal is to identify statistically significant differences in the evaluation of consumer shopping behavior and neuromarketing in the context of gender equality. The research sample consisted of 204 respondents, of whom 126 were men and 78 were women aged 18 to 59 years with an average age of 33.69 years. Respondents' data were obtained by occasional sampling. The data needed for the analysis were obtained through the authors' questionnaire, which was the primary source of data. Two research hypotheses were established for the paper. The obtained data were processed and interpreted at the level of descriptive statistics. At the level of induction statistics, we used the Mann-Whitney U test. The results were processed by mathematical-statistical methods in IBM Statistics SPPS 22.00. The results of the analysis confirmed the existence of statistically significant differences between male and female consumers when evaluating shopping behavior and neuromarketing.

Keywords: Gender differences, Neuromarketing, Purchasing behaviour

Neuromarketing

Since the 1970s, studies that deal with the principles of brain function have started to appear. Young (2002) states that twenty years have passed since the first ideas of using and measuring brain activity in the context of consumer behavior arose. This concept was developed by psychologists at Harvard University in 1990. In 1996 the neuromarketing research by Shizgalo and Conover was carried out. In the research, there were combined neuroscience and mathematic theories that can make human behavior predictable. Gerald Zaltman – professor of Harvard Business School who is thought as "father of neuromarketing" in 1999 used FMRI method for brain observation. The word Neuromarketing was coined by Ale Smidts in 2002. The first scientific research in neuromarketing was made by neuroscience professor of Baylor College of Medicine Read Montague in 2003. Worldwide companies as Coca-cola, Ford, or Google invested a big amount of funding to marketing at that time however results of researches kept as confidential from the general public.

In this context, it is appropriate to refer to Nobel Laureate Francis Crick statement, that the idea that all human feelings, thoughts, and actions, even consciousness itself, are just the products of neural activity in the brain. According to Morin (2011), neuromarketing is a field, that bridges the study of consumer behavior and neuroscience. It is a modern and developing area with great potential for application to functional areas of marketing. It arises after merging concepts of neurology, psychology, human neurophysiology, and neurochemistry areas. Vysekalová (2011) state, that neuromarketing connects knowledge of neuropsychology, cognitive psychology, and neuroscience in neuromarketing environment. Daugherty and Hoffman (2017) state that marketing uses theories, ideas, and approaches from the several disciplines (thinking, anthropology, sociology, etymology, neuroscience, biology, finance or arithmetic). Researchers in the field of neuromarketing are examining the human

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brain and nervous system to understand better the impact of marketing by measuring users' direct and indirect neurological processes. Morin (2011) state, that neuromarketing is to marketing what neuropsychology is to psychology. While neuropsychology studies the relationship between the brain and human cognitive and psychological functions, neuromarketing promotes the value of looking at consumer behavior from a brain perspective.

Neuromarketing deals with designing marketing materials to evoke specific neurological reactions that trigger emotions or responses that are linked to purchasing. Neuromarketing deals with designing marketing materials to evoke specific neurological reactions that trigger emotions or responses that are linked to purchasing (Gotter 2019). Neuromarketing suspects, that emotional basics influence decisions about products purchase (Badoc and Bayle-Tourtoulou 2014). Limbeck (2012) underlines the fact, that purchase decision arises in the brain part called the limbic system, which is involved in behavioral and emotional reactions.

Fournier (2018) adds that the limbic system is responsible for endorphins production, hormone levels, body temperature, and motor functions. Limbic system function was accidentaly discovered by James Olds and Peter Milner (1954) during the experiment with electric stimulation of the rat brains which indicated "the brain reward system". These claims are supported by several psychological theories and researches in neuromarketing and neuropsychology fields (Sahakian, Gottwald 2018; Georges a kol. 2014).

Neuromarketing offers cutting edge methods for directly probing minds without requiring demanding cognitive or conscious participation (Morin 2011). The field of neuromarketing analyses the human brain to predict and potentially even manipulate consumer behavior and decision making. The aim of neuromarketing is to combine neuroscience methods with neuromarketing theories to reveal the real, even out of sight, influence of marketing on consumer beahvior (Lim 2018). Tomková and Ondrijová (2018) infer that the aim of neuromarketing is to get information about consumer´s brain activity during the influence of marketing stimuli while its advantage, unlike the questionnaire survey, is that the results are not influenced by a consumer prejudice or a choice to reveal real feelings, emotions, values and attitudes. Fortová (2015) claims that neuromarketing studies consumer reactions to marketing stimuli via monitoring brain activity. Harrell (2019) states, that neuromarketing deals with measurement of physiological and neural signals. The main goals is to investigate customers' motivations, preferences, and decisions, which can help inform creative advertising, product development, pricing, and other marketing areas. The aim is to find out how consumer decision-making is affected and what part of the brain is activated at the moment of decision-making. For example, it uses the following medical technologies: magnetic resonance imaging (fMRI), electroencephalography (EEG), etc. (Kozel 2006).We can conclude that this field brings new research methods with the potential to reveal still hidden information in the human mind.

Why does the neuromarketing cause ethical concern? While neuromarketing has far-reaching use in practice, it is important to deal with a matter of ethics. Neuromarketing and ethic principle difficulty comes from the fact, that researchers can unconsciously cross the line of privacy, what interrupt consumer autonomy protection (Ondrijová, Tomková 2017). Findings that come from the research could be damaged or used against them. Murphy et al. (2008) state that the privacy of individuals joined in neuroscience researches taking place in medical institutions, is usually protected by the law. However, if neuroscience research is conducted for commercial purposes, then the protection law is ineffective and privacy provision depends on the moral values of the researchers. The year 2012 was important for ethics from a neuromarketing perspective, when The Neuromarketing Science and Business Association, based in the Netherlands, approved a code of ethics, which came from the need to unify the rules of neuromarketing research, as many companies followed different standards. Harvard Review of Psychiatry study also demonstrates that the world´s top neuromarketing companies provide very little information about their ethical standards (Morin 2011).

A significant role in this field is played by consumers, who often do not know, that they are part of the research or are affected by various neuromarketing tools. This is a reason, why is necessary to find a compromise between neuromarketing research, consumer protection, and maintaining ethical standards. Ducu (2016) states, that neuromarketing research has a very practical goal: to inform effective marketing strategies and advertisement campaigns. On the other hand there is a growing need to develop an ethics of the technologies involved in the neuromarketing research, and a business ethics that takes into consideration the applications of neuromarketing research.

Gender Differences

Despite the well-known idea, that men and women react to marketing stimuli differently, it is important to keep them under review. Due to more objective neuromarketing, we have a better opportunity to understand gender differences that lead to more accurate and personalized targeting and elimination of deficiencies (Vecchiato et al. 2014). Gender is a major factor that affects consumer purchasing behavior. Birknerová, Frankovský, Zbihlejová, and Parová (2017) explain gender in socio-structural, interpersonal, and individual level. Man and woman's brain is diametrically opposed to the structural and behavioral levels. These differences are formed from birth, last whole life, and influence attitudes, and behavior that affect shopping behavior and consumer decisions. Women and men have different behavior and decision making while shopping. The reason for these differences is in their upbringing and socialization, which later influences their attitudes, behavior, perception, motivation, or values (Lakshmi, Aparanjini and Lahari 2017). Hyde (2016) states, that for the understanding of psychological and gender differences, it is important to know individual education experiences, culture gender stereotypes, gender equality, and biosocial interaction. Jäncke (2018) states, that gender differences are shaped by experience, education, culture, or a combination of these.

Hyde (2016) underlines the fact that in a matter of emotions, empathy, moral judgment and social behavior, differences between men and women are insignificant, or even disappear during the study of bigger samples or use of objective tools, except those, that person exhibits about herself or himself. Results of questionnaire surveys can indicate not relevant results forasmuch as in culture context exist typical gender stereotypes and social expectations (Ellemers 2018; Williams and Dempsey 2014; Christov-Moore et al.2014; Derntl, Finkelmeyer, Eickhoff et al. 2010) with which men and women naturally identify themselves. Uva, Freitas and Paiva (2015) research were focused on study of gender and TV advertisements using electroencephalography. In this neuromarketing research, 10 men and 10 women participated, and their nervous activity during watching a video was recorded by electroencephalography (EEG). However, statistically significant differences between male and female were identified for all the electrodes, there were also identified differences in brain frequencies and activity of brain areas related to emotions, mainly of anterior cingulate cortex (ACC) which have been higher for men than for women. Men usually have better depth perception since they have a bigger pariental lobe. It is also the reason, why do they prefer pictures over reading. Due to the bigger amygdala, men are more aggressive than women. Female brains have a larger prefrontal cortex, which impacts emotions and how they're regulated. That is the reason, why are emotions the most effective way to speak to them. Female brains also allow for more intuitive reasoning and the part of the brain responsible for worrying is larger. Thanks to the larger corpus callosum, they are able to multi-task and distribute their thinking. They also have a bigger hippocampus, that is reason why theirs level of nuance in emotional details is much greater (Adelson-Yan 2013).

Table 1: The main known gender differences

The main known gender differences	
Women	**Men**
- advertisements are often more detailed	- adverts usually focus on one main object - usually pick up on one or two very obvious kinds of cues
- appreciate very fine distinctions	- will need to be shown the big picture as they think in a macro way
- like a collaborative style dialogue	- are less likely to process complex metaphors
- prefer strong colours and evocative images	- do not really respond to any colours and images seem irrelevant
- prefer more feminine qualities in advertisement	- enjoy humour in adverts (usually more crude and aggressive) - prefer hard data and concise language.

(Source: Lakshmi, Aparanjini and Lahari 2017)

There exist number of studies that confirm different purchasing behaviours in the context of gender perspective. The research by Mitchell and Walsh (2006) shows that women are more perfectionist than men. Gender differences were also studied by Birknerová and Frankovský (2014), who were in their research focused on manager work, where they identified statistically significant differences between emotional intelligence aspects between men and women. Men had higher score in aspects as emotional control, self-motivation, stress management, low impulsivity level, assertiveness, adaptation, and relationships.

There is interesting Puccinelli´s (2013) research, who emphasizes that colors linked with shopping have a significant impact on men more than on women. Men associate red color with savings and it has a positive effect on them during shopping. Also, when prices were highlighted with this color, men´s perception of savings increased, unlike other colors. While this color made women skeptical. Women associated black color with saving. Another part of his research was focused on price information where women exhibit better memory for price information and deeper processing of information than men.

We also agree with Beverland (2006) findings where he emphasized the impact of music on the customer during shopping. The choice of the appropriate music and its appropriate volume led to the reinforcing of the brand, the pleasure of customers, and the attraction of new customers. However, quiet music gave them the unwanted feeling that they had to communicate with the vendors while louder music influenced the overall impression. Therefore, choosing inappropriate music can reduce the time spent in the store, even cause leaving, and subsequently avoiding the store.

In favor of men DaimlerChrysler company in Ulm researched, which vehicles are the most attractive. Researchers showed respondents, at an average age of 31, 66 pictures of different cars - 22 sports cars, 22 sedans and 22 small cars. The study was carried out using an fMRI. Sports cars have illuminated the area of the brain associated with reward and power much more than other models. Among the sports cars that had the strongest reactions to the brain were: Ferrari 360 Modena, BMW Z8 and Mercedes. Walter, a psychiatrist at the Ulm University Hospital who was involved in the study, found that sports cars do not only look more attractive to men but also demonstrate success, wealth and dominance (Wells 2003).

On the other hand, women got higher score in aspects like empathy, emotion expressing, and emotional appreciation. In a matter of emotional intelligence, men had higher score in self-control and sociability, what indicates that they have healthy control over their desire, good regulation of pressure and stress, and they are focused on social relationship and social influence. Women can better perceive and express emotions for keeping close relationships.

Research

Following the theoretical elaboration of the issue of neuromarketing and gender differences, the research focuses on identifying statistically significant gender differences in the assessment of Consumer purchasing behavior and Neuromarketing. This research was carried out via author's questionnaire.

Research Sample

The research sample consisted of 204 respondents, of whom 126 were men and 78 were women aged between 18 and 59 years, with an average age of 33.69 years (SD=12,422). Data from respondents were obtained through occasional selection.

Research Methodology

The main objective of the paper is to identify the differences in the assessing of consumer purchasing behaviour and neuromarketing in the context of gender. For this contribution, the following research hypotheses were established:

H1: We assume that there are statistically significant differences in the assessing of the Consumer purchasing behaviour between men and women.

H2: We assume that there are statistically significant differences in the assessing of the Neuromarketing between men and women.

The data needed for the analysis were obtained through the questionnaire of the authors, which was the primary source of the data. The questionnaire was divided into parts: The first part consists of statements that focus on the Consumer purchasing behaviour (items 1-10). The second part consists of statements that focus on the Neuromarketing and Ethic in it (items 10-20). The third part contained closed-ended categorization questions needed to classify respondents by age and gender.

The research participants were to respond on the scale from 1 to 4 what extent they agree with the given statement (1 = definitely no, 2 = rather no than yes, 3 = rather yes than no, 4 = definitely yes). The data obtained were processed and interpreted at the level of descriptive statistics. At the level of inductive statistics, we used the Mann-Whitney U test, which is suitable for analyzing the data available to us and does not require a normal distribution. The results were processed by the mathematical-statistical methods in IBM Statistics SPPS 22.00.

Results and Discussion

Based on the Mann-Whitney U test, we found that there are statistically significant differences in assesing of the 8 items of questionnaire between men and women. Table 2 shows the results of testing the hypothesis which examines the existence of differences between men and women in the assesment of Consumer purchasing behaviour and Neuromerketing.

Table 2: Statistically significant differences between men and women in the assesment of Consumer purchasing behaviour and Neuromarketing

	Q3	Q4	Q8	Q12	Q14	Q18	Q19	Q20
Mann-Whitney U	3490,000	3522,000	3646,500	3798,500	3690,500	3472,000	3532,000	3728,000
Wilcoxon W	10993,000	11025,000	11027,500	11179,500	11193,500	10975,000	10913,000	11109,000
Z	-3,179	-2,966	-2,711	-2,289	-2,710	-3,083	-2,958	-2,384
Sig. (2-tailed)	,001	,003	,007	,022	,007	,002	,003	,017

(Source: own processing)

The existence of statistically significant differences confirms the results in Table 3.

Table 3: Comparisons of the assesment of Consumer purchasing behaviour and Neuromarketing in terms of Gender

Gender		**Mean Rank**	**Median**	**Mean**	**Standard deviation**
Q3_ Product color is important for me	Female	115,68	3,00	2,82	,942
	Male	90,11	2,00	2,36	,980
Q4_ If something grab my attention, I have to buy it.	Female	114,16	3,00	2,45	,929
	Male	90,37	2,00	2,05	,969

Q8_ Social networks have an impact on my product choice.	Female	112,64	2,00	2,31	,877
	Male	91,14	2,00	1,97	,884
Q12_ I would be willing to participate in neuromarketing research.	Female	110,67	3,00	2,60	,877
	Male	92,39	2,00	2,29	,987
Q14_ It is possible to influence a customer to buy a specific product by using neuromarketing tools.	Female	111,94	3,00	3,11	,624
	Male	91,75	3,00	2,80	,802
Q18_ Neuromarketing ethics is essential.	Female	113,71	4,00	3,51	,685
	Male	89,96	3,00	3,07	,972
Q19_ It is necessary to create legislation strictly following ethics.	Female	113,03	4,00	3,46	,701
	Male	90,19	3,00	3,04	,978
Q20_Neuromarketing basics education for costumers, where they can get new information, should be instituted..	Female	110,45	3,00	3,08	,829
	Male	91,81	3,00	2,78	,871

(Source: own processing)

Statistically significant differences in the individual Consumer purchasing behaviour components were recorded in items 3,4, and 8.

In item no. 3 „*Product color is important for me*" Higher scores were made by females whose average answers were 2.82, so they were closer to the answer „rather yes" unlike males 2,36. Statistically significant differences were also found in item no. 4 „*If something grab my attention, I have to buy it.*" In this case, again females had higher score (2.45), unlike males 2,05. Females ranged on a scale between "rather no than yes" and "rather yes than no" and males closer to the answer "rather no than yes". In item last item of assessment of Consumer purchasing behaviour no. 8 „ *Social networks have an impact on my product choice.*" females (2.31) again scored slightly higher, against male with score 1.97. In both cases, they were on the same side of the scale in answering "rather no than yes". And statistically significant differences in the individual Neuromarketing components were recorded in items 12, 14, 18, 19 and 20. Even in this case, in all assessed items, females scored slightly higher than males.

In item no. 12 „I would be willing to participate in neuromarketing research" females got higher scores (2,60), unlike males 2,29. We conclude, that females would be willing to participate in neuromarketing research, considering their answers „rather yes than no", unlike males, whose answer was „rather no than yes." Even though in item no. 14 „It is possible to influence a customer to buy a specific product by using neuromarketing tools." Female score (3,11) was higher than male (2,80). In both cases, they were in the same part of a scale and approach to the answer „rather yes than no".

In item no. 18 „Neuromarketing ethics is essential" females scored 3,51 and males 3,07. Although this difference is not significant, females expressed their degree of agreement with this statement. Also in item no. 19" It is necessary to create legislation strictly following ethics." identified differencies are not significant, however females with score 3,46 would demand following ethical principles more than males with score 3,04.

In both cases, they were on the same side of the agreement of the rated scale.

In the last item of assessment of Neuromarketing no. 20 „Neuromarketing basics education for costumers, where they can get new information, should be instituted..“ females (3,08) scored higher than males (2,78 In both cases, they were on the same side of the agreement of the rated scale and preffered answer „rather yes than no“.

We can confirm the existence of statistically significant differences in the evaluation of consumer purchase behaviour between men and women in favour of women. We deduce that men are more sensitive to scent, delightful music, cleanliness, lighting, and interior design of a store. They care more about product brand and packaging design. They are also more sensitive to the product price. On the other hand, women care more about the color of the product, they are more likely to be influenced by social networks when choosing a product. We have also observed the existence of statistically significant differences in the evaluation of neuromarketing in favour of women. We conclude, that women would be more initiative in neuromarketing investigation. Women believe that it is possible to influence a customer´s product choice by neuromarketing tools. They also emphasize ethics in neuromarketing and declare, that in their opinion, the state needs to create legislation that would be followed. Women emphasize the implementation of neuromarketing basics teaching that can enrich customer´s knowledge about the issue.

Based on the Mann-Whitney U test, we found that there are statistically significant differences in the assessing of the Consumer purchasing behaviour between men and women. Therefore, the hypothesis H1 has been confirmed. And we also confirmed H2, because we found that there are statistically significant differences in the assessing of the Neuromarketing between men and women. We can´t follow only the information that respondents provide about themselves in quantitative and qualitative research, because many times they mean something different than they mention or they do not state their final decision.

The brain, even unconsciously, constantly calculate, what is the most advantageous for him at the moment. A difference between what people think and what they say is caused by one of the neural network algorithms that has proven to be the most useful for life (Tomková, Ondrijová 2018).

Since neuromarketing companies are reluctant to share their information, researches are limited. Krugrman (1971) claimed, that reading and speaking are located in the right hemisphere while visual perception is located solely in the left hemisphere. So newspaper is appropriate for the right hemisphere and television for the left one. The other important findings were related to other functions and their classification, such as the emotion experience situated on the right side, and the cognitive functions of perception on the left side. High level of involvement of the individual activated the right hemisphere, and conversely low level activated the left hemisphere. In the context of television advertising, the brain uses recognition while in the context of print ads uses recall. He also described some differences between families with the lower and higher economic position. Svetlík (2012) states, that his theories have some deficiencies as his statements were not supported by any empiric research and therefore they have a large number of opponents, which include scientists but also people who are directly involved in marketing. In 1996 Shizgal a Conover have conducted the research in neuromarketing field where they combined neuroscience and mathematical theories in the belief that they can be applied in social sciences to predict behavior (De Sousa 2018).

Our research is focused on gender differences in the assessment of neuromarketing attributes. Based on Mann-Whitney test we found out that there are statistically significant differences in the assessment of consumer purchasing behavior between men and women, in favor of women. We also found out, that in favor of women, there are statistically significant gender differences in neuromarketing assessment. In general, we conclude, that men are more sensitive to scents, pleasant music, cleanliness, lighting, and interior design of the store. They care more about the brand and design of the product packaging. They are also more sensitive to the price of the product. On the other hand, women care more about the color of the product, they are more likely to be influenced in their product choice by social networks and they give importance to ethics in neuromarketing.

Hsu a Cheng (2018) examined the impact of gender on the neural substrates of theories on consumer behavior and to examine whether gender influences brain activation associated with word-of-mouth communications.The fMRI results showed that the males treat product quality perception as a constant. On the other hand, females results suggest a dynamic representation for product quality perception (i.e. not a constant). Vecchiato et al. (2014) performed an experiment in order to investigate cognitive and emotional changes of cerebral activity evaluated by neurophysiologic indices during the observation of TV commercials. They showed that there are results suggesting that it is possible to differentiate the communication according to the gender. Cuesta, Nino and Martinez (2018)

analyzed the mechanisms of action of 3 psychophysiological variables widely used in this field: eye-tracking, galvanic skin response and facial emotion. They found some gender differences in terms of visual attention.

The paper aimed to identify and specify the differences in the assessment of neuromarketing between men and women. This aim was achieved by the questionnaire method and results were processed by statistical program. The aim of the paper was supported by the theoretical framework in which we have been focused on marketing, business and neuromarketing. Neuromarketing is answering questions related to emotions that are important for people during making purchase decisions. These findings are used to improve psychology and marketing efficiency. They are applied mainly for product design, promotion and advertising improvement, store design and improvement of customer experiences in all spheres.

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Historical and Economic Analysis of Scientific Views on The Development of The Agri-Food Market in The Post-Soviet Economic Region

Kuraev Aleksey Nikolayevich
109004, Russia Moscow, Zemlyanoi Val, 73 enigma3021@mail.ru

Zhakhov Nikolay Vladimirovich
305021, Russia Kursk, to st. is 50 years of October, 94 e-mail: zhakhov@mail.ru

Krivoshlykov Vladimir Sergeevich
305000, Russia Kursk, Radishchev St., 33 e-mail krivladimir@mail.ru

Melnikova Elena Nikolaevna
109004, Russian Federation Moscow Oblast, Moscow Zemlyanoy Val, 73, e-mail: enigma3021@mail.ru

Belostotskiy Alexey Alexandrovith
305016, Russia, Kursk, st. Lomonosov, 3. e-mail: enigma3021@mail.ru

Abstract

the relevance of scientific research is determined by clearly expressed growing economic imbalances in the world agri-food markets and a more balanced and balanced (without structural distortions and tariff restrictions) agri-food policy within the Eurasian Economic Union. The historical and economic analysis of scientific views on the development of the agri-food market in the post-Soviet region will allow in the future, will serve as the foundation for modeling and designing organizational and economic tools to smooth out market imbalances, which will improve the institutional efficiency of the market (in our case, agri-food), as well as is one of the fundamental issues of the new institutional economy. The conducted historical and economic analysis of scientific views on the development of the agro-food market of the Eurasian Economic Union, a new global union created in the territory of the post-Soviet space, the region made it possible to identify the prevailing fundamental foundations and formed views of scientists on the problem under study.

Keywords: Historical and Economic Analysis, Agro-Food Market, Eurasian Economic Union, Common Economic Space, Economic Security, Food Security.

Starting to consider the historical and economic analysis of the development of the agro-food market of the Eurasian Economic Union in the context of constant geo-economic instability of the world economy, it is necessary to separately dwell on the existing scientific views that are most widespread on this problem, since they are the formed quintessence of historical thought based on the basis of historical experience. Many scientists have been studying this problem for many years and have devoted a number of their studies to the consideration of the agri-food market in the post-Soviet space within the framework of the Eurasian Economic Union, so A.I. For many years Altukhov has been studying the problems of the functioning and development of agri-food markets in Russia, mainly specializing in the study of the grain market and the grain-food subcomplex.

When considering integration in the agrarian sphere, the EAEU justifies the need to integrate the agrarian spheres of the partner countries on the basis of improving the territorial-sectoral division of labor in agro-industrial production. In particular, he proposes to create interstate formations specializing in the production of certain types of food products and agricultural raw materials: between Russia and Kazakhstan - for wheat; between Belarus and Russia - on rye, sinew, sugar from sugar beet, etc. [1].

Another prominent scientist S.Yu. Glazyev notes that the EAEU helps partner countries to overcome problems in

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their national economies, since the absence of borders reduces costs, which in turn creates favorable conditions for joint investments, which are drivers of economic growth. States united by common economic interests and tasks operate more successfully in the global economy, gaining real competitive advantages by eliminating barriers that inhibit joint development and developing coordinated development strategies and policies [2].

A.G. Paptsov systematized the directions and threats to the development of the agri-food market in the context of the globalization of the world economy. As part of the study of the integration problems of the EAEU countries, it advocates the early development of cooperation between partner countries in the agricultural sector (development of a single agri-food policy, creation of a single organizational and economic mechanism for interaction at the above national level), especially against the background of the possible creation of a free trade zone between the United States and EU (Transatlantic Trade and Investment Partnership) [3].

Considering the features of the formation of the market mechanism in the agro-industrial complex of Russia since the 90s of the XX century A.F. Serkov and within the framework of the study of the EAEU agrarian market indicates the need to develop forecast balances, forecasting the development of the agro-industrial complex of partner countries and key agrarian markets of the Eurasian Economic Union in the future. Proposes to implement a uniform legal regulation of the agricultural market of all EAEU partner countries [4].

Within the framework of the EAEU integration association I.G. Ushachev [4] proposes to create a Eurasian commodity distribution system for agricultural products, raw materials and foodstuffs, while it is assumed that the routes of trade flows between the EU and China should pass through Belarus and the Russian Federation.

Director of the Center for International Trade Research, RANEPA A.Yu. Kno-bel, examining the prospects for the development of the Eurasian Economic Union, notes that the creation of a mechanism for redistributing gains within the EAEU will contribute to the implementation of a positive economic effect from the conclusion of agreements on free trade with non-CIS countries. The main current problem of integration processes within the union is insufficiently fully utilized opportunities for creating additional resources (low production efficiency, low rates of labor productivity) [5].

A significant theoretical contribution to the development of the agri-food market of the Eurasian Economic Union was made by Belarusian scientists. V.G. Gusakov proposed strategies for the development and formation of cluster agro-industrial structures in Belarus in the Eurasian Economic Union. Vladimir Grigorievich presented in the monograph the approach of the cluster institutional space as a new type of activity, as an instrument of the modern economic integration system of management within the framework of interstate economic unions, in particular the EAEU [6].

Z.I. Ilyina devoted all her professional activities to the study of economic problems of agriculture, including the agri-food market. In terms of creating a single market for agricultural products between the Republic of Belarus and the Russian Federation, there is a big problem in the form of trade barriers, which can be overcome only through the creation of a unified regulatory and legal framework. In the same work, a number of recommendations are proposed for eliminating non-tariff barriers in the markets of the two countries, and these recommendations can be expanded for the single EAEU market. Methodological recommendations are of great scientific and practical value (Methodological recommendations on the formation of an organizational and economic mechanism for balancing the national food market in the context of the development of integration processes (within the CES), 2015), which can be used as the basis for the formation of a sustainable single agri-food market EAEU partner countries [7].

In his last works, N.D. Avarsky substantiates the need for the development of organic agricultural production and the formation on its basis of the market for organic agricultural products. The main argument in favor of the development of organic agricultural production is the need to reduce greenhouse gas emissions and adaptation of the agricultural sector to the negative consequences of climate change [8].

L.N. Baigot analyzed the main risks for Belarus in the framework of accession to the WTO, and proved that the liberalization of the foreign trade regime of the Republic of Belarus is inexpedient and can lead to dissociation of relations within the EAEU [9, 10].

In his works, K.G. Borodin draws attention to the fact that the insufficient level of regulation of agri-food markets by

the state can lead to a shortage of agricultural raw materials on the domestic market. Konstantin Grigorievich notes the extremely disastrous consequences of the embargo on the domestic agri-food markets of Russia due to the low share of large enterprises that are able to better adapt to the impact of the embargo and sanctions and underdeveloped market infrastructure [11].

As E.Yu. Vinokurov, the formation of a single market for goods among the partner countries has not yet been completed. One of the reasons hindering the integration of national markets into the single market of the EAEU countries are non-tariff barriers, which confirms the need to conduct a study on the problem of sustainability of the single agri-food market.

The integration process and the degree of market stability are significantly complicated by the uncoordinated macroeconomic policies of partner countries (in particular, the devaluation of national currencies in 2011 in Belarus and 2014-2015 in Russia has already led to interstate conflicts) [12].

In his doctoral dissertation A.V. Pilipchuk substantiates the structural model of the formation of the innovation-cluster system of the EAEU food economy, based on the coordination of three areas: business, consumers, and the scientific and innovative sphere.

The implementation of the model makes it possible to purposefully identify and strengthen the competitive advantages of organizations and sectors of the food industry of the Eurasian Economic Union at the national and union levels [13].

A.P. Shpak focuses on the need to implement a coordinated agro-industrial policy by the members of the economic union, which will affect the effectiveness of the implementation of the aggregate resource potential of the partner states and ultimately ensure the optimization of the production volumes of competitive agricultural products and food, meet the needs of the general agricultural market, as well as increasing exports of agricultural products and food [14].

The research topic of the agri-food market of the Eurasian Economic Union is interesting not only to scientists from the countries of the aforementioned union, but also to foreign scientists.

Studying the evolution of Eurasian integration, Alena Vieira notes that the partner countries have not achieved significant success and there is a high probability of returning to their original positions [15].

Analyzing the tariff policy and structure of imports of partner countries, Asel Isakova comes to the conclusion that the effect of foreign trade was only in trade between Russia and third countries. According to the author, the benefits of tariff policy within the Union are limited. The Eurasian Union has slowed down the pace of integration interaction in comparison with the first years of its existence due to the lack of adherence to the ideals of integration on the part of Russia/

Professor Gholam Mostafa and Monovar Mahmoud investigate the history of the EAEU and conclude that, despite significant efforts, the integration union did not justify itself. Moreover, the reason for the lack of progress is indicated by the dominance, influence and pressure on partner countries from Russia [17].

Sean Roberts in his work notes the significant difficulties that the Eurasian Union faced in the last years of its existence, the most significant of which are inter-integration barriers [18].

Exploring the single market of the EAEU, Dr. David Tarr notes that partner countries have great growth potential if non-tariff barriers are reduced and the procedure for interstate trade is simplified [19].

Summarizing the considered opinions of foreign scientists, we note that in the aggregate, a position is formed that it is impossible to create an alliance of countries based on the Eurasian economic model. The EAEU relies on a mechanism for the redistribution of oil and gas revenues, in which Russia deliberately relinquishes part of the revenues due to it in favor of other member states, in order not only to induce economic interest to remain part of the Union,

but also to maintain and increase their political influence due to this. The Eurasian Economic Union is an unsuccessful

attempt to reintegrate the post-Soviet space.

Summing up the historical and economic analysis of scientific views on the development of the agri-food market in the post-Soviet region, based on the opinion of a significant number of theoretical and practical developments on the problems of the functioning of the agri-food market and the peculiarities of the work of the EAEU of Russian and foreign scientists, we can conclude that that the overwhelming number of studies by foreign scientists is reduced to the inappropriateness of the functioning of the Eurasian Economic Union, and domestic works on this issue note only integration problems in the functioning of the union (primarily non-tariff barriers). This only confirms the need for additional global research on the indicated problem.

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The Contours of Interaction of Subjects of The Regional Economy in The Conditions of The Formation of The Digital Ecosystem of The Region[1]

Zhakhov Nikolay Vladimirovich
305021, Russia Kursk, to st. is 50 years of October, 94 e-mail: zhakhov@mail.ru

Gubanova Elena Vitalievna
248016, Russia, Kaluga, Chizhevsky St. 17 e-mail: enigma3021@mail.ru

Bessonova Elena Anatolyevna
305021, Russia Kursk, to st. is 50 years of October, 94 e-mail: enigma3021@mail.ru

Orlovtseva Oksana Mikhailovna
248016, Russia, Kaluga, Chizhevsky St. 17 e-mail: enigma3021@mail.ru

Grunina Olga Anatolyevna
143600, Moscow region, Moscow, st. Volokolamsk, st. Novo-Soldatskaya, 29
e-mail: enigma3021@mail.ru

Abstract

the structural formation of the digital ecosystem of the region should not be regarded as an end in itself, since it is only "a means of solving a wide range of problems of socio-economic development." The goal of systemic restructuring is to form the structure of the region's economy, contributing to the achievement of the regional socio-economic system of proportions and the achievement of the goals set, corresponding to the generally accepted ideas about a high level and quality of life of the population, taking into account the necessary contribution to their provision of the national economy. The paper presents the contours of the interaction of the subjects of the regional economy in the digital ecosystem of the region, which take into account the structural and substantive complexity of the processes accompanying the development of regional socio-economic systems, state regulation, representing a system of measures implemented by the executive authorities in the course of coordinated interaction with the population, civil institutions society, business structures, educational and research organizations. A feature of state regulation in modern conditions is its subject-object nature and focus on ensuring the systemic development of the formation of the digital ecosystem of the region, i.e. balanced development, ensuring the proportionality of the main subsystems of the regional economy that form its structure. In order to ensure the formation and development of the digital ecosystem of the region as a subsystem of the regional socio-economic system, in the process of coordinated and orderly interaction of its elements aimed at increasing the level and quality of life of the population, it is necessary to use a set of state regulation instruments grouped according to the following criteria: economic, tax budgetary, legal, institutional, institutional and infrastructural, administrative.

Keywords: Regional Economy, Digital Economy, Ecosystem, Government Regulation, Systemic Development.

While maintaining a commitment to abandoning the sectoral approach to structuring the regional economy, we will consider the systemic development of the regional economy in terms of the interaction of individual groups of subjects that form its structure in the context of the formation of the digital ecosystem of the region. The structural transformation of the region's economy should not be viewed as an end in itself, since it is only "a means of solving a wide range of problems of socio-economic development." The goal of systemic restructuring is to form the structure of the regional economy, contributing to the achievement of the regional socio-economic system of proportions corresponding to generally accepted ideas about a high level and quality of life of the population, taking into account

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the necessary contribution to their provision of the national economy.

We believe that the primary is systemic development, which, according to GB Kleiner's definition, represents "balanced development that ensures the proportionality of the main subsystems of the economy" [1]. The position of GB Kleiner is extremely close to us. Indeed, we consider the regional economy as a system with a hierarchical structure, including subsystems identified by industry, behavioral, technological or other characteristics. The development of subsystems and, in general, the regional socio-economic system is a complex and contradictory process.

The regional system should develop in a balanced way, i.e. ensuring parity, appropriate proportionality and efficiency of development of the structural elements included in the system. Recognizing the relevance of improving the behavioral composition of the structure of the regional economy by organizing effective management interaction of the main groups of stakeholders in regional development, the structural development of the regional socio-economic system will mean the process of improving the structural composition of the subjects of the regional economy, aimed at increasing the level and quality of life of the population [2,3].

Structural development is a category that specifies the format and direction of the systemic development of the regional economy, in order to achieve the goals of which it is necessary to carry out state regulation. At the same time, systemic development presupposes a coordinated interaction of the structural elements of the regional economy, aimed at achieving the goals of each participant in the process of meeting their needs and, in general, the needs of the regional economy.

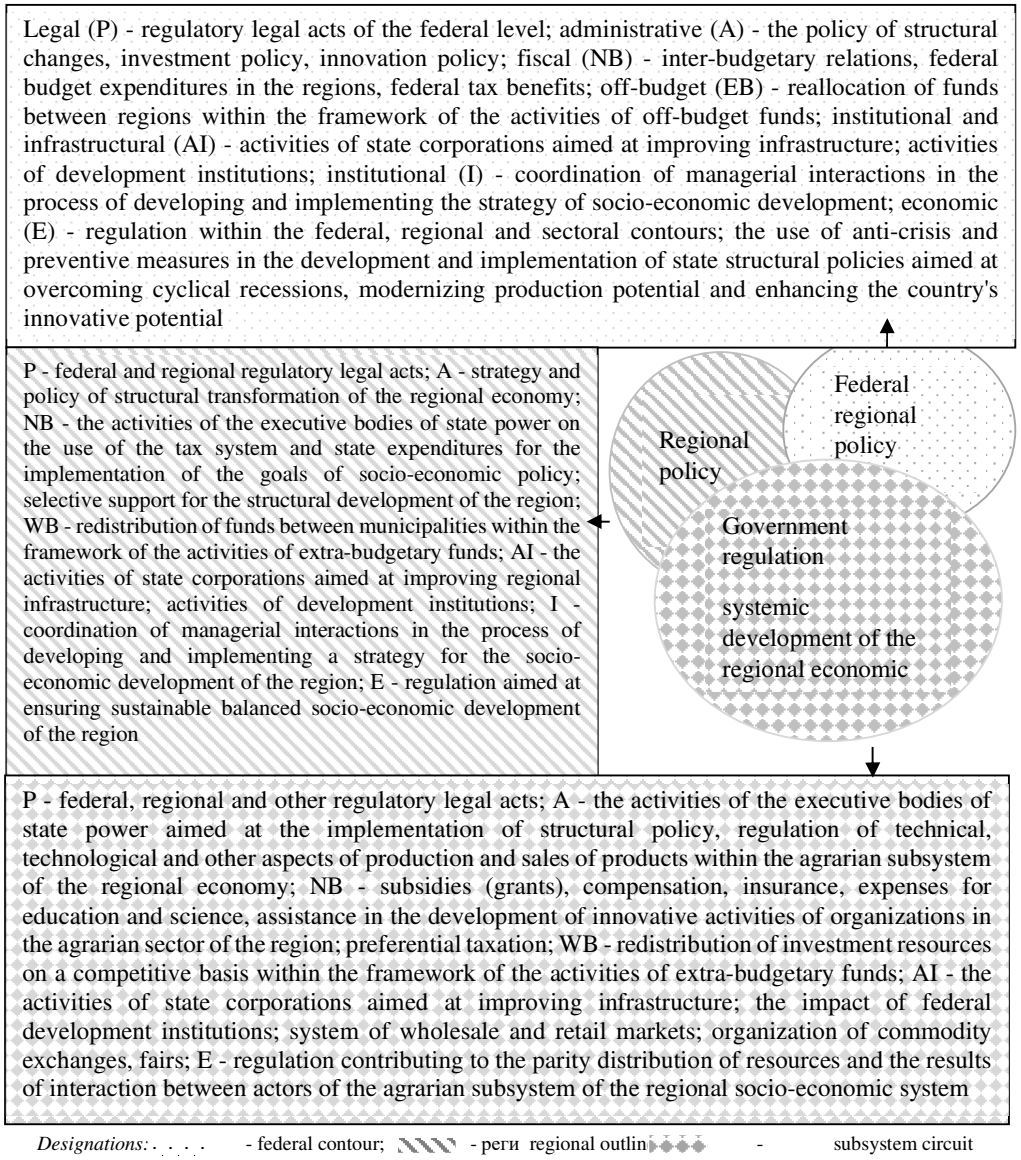

Figure 1: Toolkit for state regulation of the systemic development of the agricultural sector of the regional economy [9]

The systemic development of the regional economy in the conditions of the formation of the digital ecosystem of the region is balanced (i.e., corresponding to the ideas about the optimal structure and proportionality of the agrarian subsystem of the regional socio-economic system), the development of the subjects participating in the formation of the regional economy in order to ensure sustainable as a the quality of life of the population of the region.

In other words, taking into account the special significance and relevance of the behavioral type of the structure of the regional economy in the conditions of the formation of the digital ecosystem of the region, the system development should be understood as the process of orderly interaction of the subjects of the regional economy in accordance with the proportions determined by them as a result of coordinated activities. As mentioned above, the systemic development of the region's economy in the context of the formation of the digital ecosystem of the region needs state regulation, which must meet the requirements of the following basic principles: complexity; parity of group,

intragroup and regional interests; consistency; purposefulness; efficiency; optimality [4-6].

The environment favorable for the effective use of the instruments of state regulation is classical liberalism, ideas about which are best formed in the works of F. A. Hayek: personal independence and motivated need for cooperation; private property and the market; legal state [7,8]. A refinement to the above set of characteristics is that the xecutive bodies of state power should be considered as a provider of fair competition.

The difference between the author's approach to the grouping of methods and tools of state regulation in the conditions of the formation of the digital ecosystem of the region is the identification of three contours: federal, regional, subsystem. The allocation of a subsystem contour is expedient in connection with the previously justified need to deviate from the sectoral approach in favor of structuring the regional economy from the position of groups of subjects interested in its development (behavioral type of the structure of the regional economy), demonstrating active behavior and participating in management interaction. In this regard, the subsystem contour acquires the boundaries of the socio-economic subsystem of the regional economy, in relation to the formation of the digital ecosystem of the region.

Legend: inner contour - group interaction of elements of the regional socio-economic subsystem; the central contour is the regional level of management interaction; rounded outline - digital ecosystem of the region; external circuit - federal level of management interaction

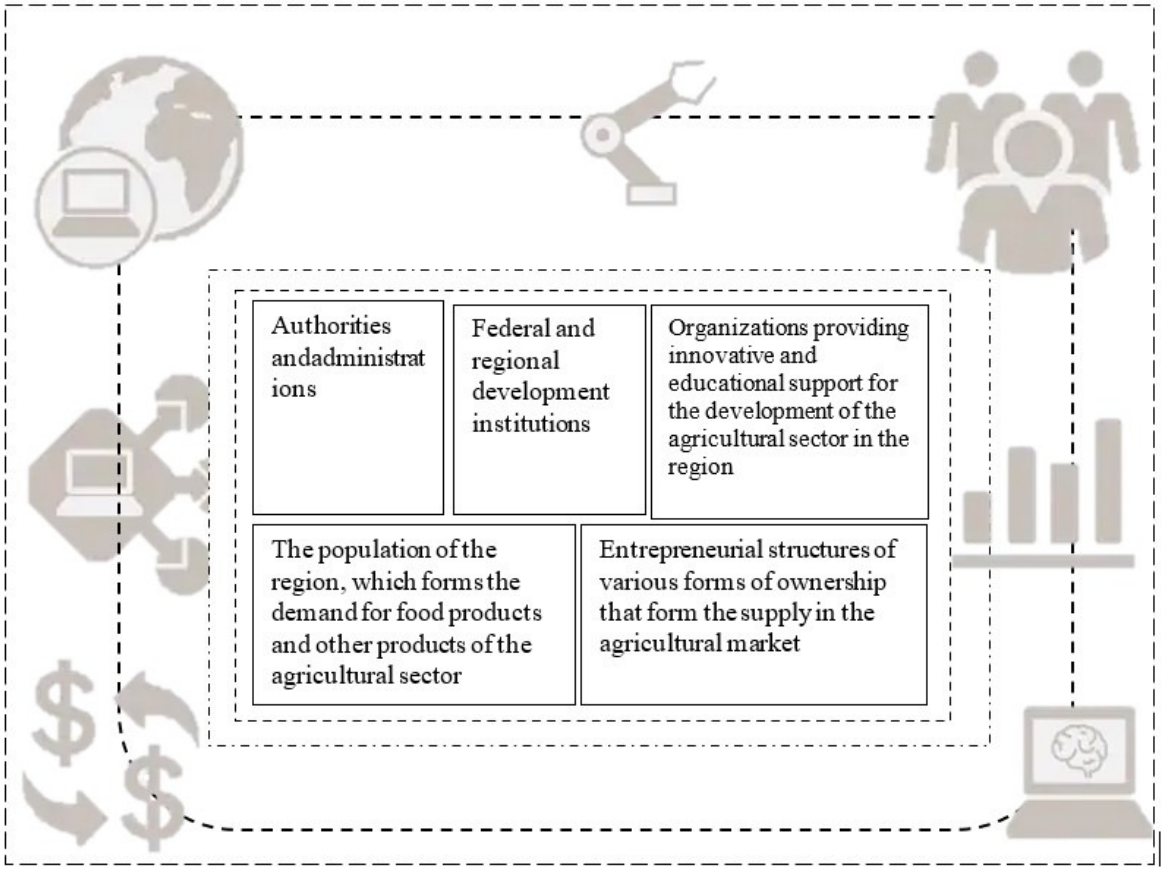

Figure 1: Contours of interaction of subjects of the regional economy in the digital ecosystem of the region

Summarizing all of the above, the following conclusions should be drawn:

1. Taking into account the structural and substantive complexity of the processes accompanying the development of regional socio-economic systems, state regulation, representing a system of measures implemented by the executive authorities in the course of coordinated interaction with the population, civil society institutions, business structures, educational and research organizations, with the goal of stabilizing and achieving a balanced functioning of the economy in modern institutional conditions is justified and necessary [10].

2. A feature of state regulation in modern conditions is its subject-object nature and focus on ensuring systemic development, i.e. balanced development, ensuring the proportionality of the main subsystems of the regional economy that form its structure. The focus of this study is the behavioral type of the structure of the regional economy in the conditions of the formation of the digital ecosystem of the region, represented by groups of subjects interested in its development. This circumstance actualizes the scientific search in the direction of selection of means and methods of state regulation that contribute to ensuring the structural and, in general, systemic development of the regional economy in the context of the formation of the digital ecosystem of the region.

3. In order to ensure the formation and development of the digital ecosystem of the region as a subsystem of the regional socio-economic system, in the process of coordinated, orderly interaction of its elements aimed at increasing the level and quality of life of the population, it is necessary to use a set of state regulation tools grouped according to the following criteria: economic, fiscal, legal, institutional, institutional and infrastructural, administrative.

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Business Game in the Process of Purposeful Formation of Professional Communicative Competence of Future Non-language Specialists

Oleh LAZARIEV
Uman National University of Horticulture, Uman, Ukraine, cool_oleh333@i.ua

Yuliia FERNOS
Uman National University of Horticulture, Uman, Ukraine, fernosyulia@gmail.com

Svitlana KARYCHKOVSKA

Uman National University of Horticulture, Uman, Ukraine, karychkovska@gmail.com

Vasyl KARYCHKOVSKYI

Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, vkarychkovskyi@gmail.com

Svitlana MASLOVATA

Uman National University of Horticulture, Uman, Ukraine, svetlana_maslovataya@meta.ua

Halyna OSIPCHUK

Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, 130975@ukr.net

Abstract

Normal classes aimed at improving professional communication skills and abilities represent a system with gradual increase in cognitive activity of students, complexity of intellectual tasks. An important stage in the formation of professional communication skills while teaching English for Professional Purposes (ESP) to the future specialists in agriculture can be attributed to classes conducted on the basis of the business game, conventionally called "Debate". This type of work is the most difficult in terms of organization, and includes tasks directly aimed at the formation and development of professional communication skills. It should be noted that it is the complexity of forms of mental work, rather than language or information saturation, that allows us to separate this type of work into an independent stage. In addition, the business game presupposes the use of theoretical and linguistic material studied in previous classes, and also implies the obligatory appeal of students to new texts on the same topic. To find correct and convincing arguments in the business game, students turn to other sources of information. For modern students the Internet is the main source for information. Students carry out cognitive and search activities, they independently work with numerous texts. Such regular work, which is initiated by the teacher and does not need to be specially controlled, is built on the use of students' cognitive motives, activates their interest in studying the course, creates conditions for healthy competition in the learning process. All of the above has a positive effect on improving the language and communication skills of students, significantly affects the ability to make arguments and express one's opinion, allows us to talk about higher levels of comprehension and elaboration of problem tasks.

Keywords: professional communicative competence, business game, non-language specialist, English for professional purposes (ESP)

Introduction

This problem is the main topic of investigation in many scientific works (Ellis, 2002; Maley, 1982; Popper, 2004; Selezneva, 2017; Simon, 2000).

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As the research has shown, there can be distinguished four levels of communicative competence in a polylogue: 1) first level skills - the ability to compare one's own point of view with the point of view of the interlocutor; 2) second level skills - the ability to request information, clarify and supplement the speech of the interlocutor; 3) third level skills - the ability to comply with the goals and topics of discussion, as well as maintain leadership in the discussion; 4) fourth level skill - the ability to formulate the essence of the problem and convince the interlocutor that you are right.

The formulation of criteria for assessing the skills that are developed while conducting a dispute in the language learning process differs from the ones above, due to the specifics of the requirements for the professional communicative competence of future specialists in agriculture, but meets the general goals and objectives highlighted in the methodology for carrying out such types of work.

In the mentioned studies of scientists, attention is drawn to the issues of teaching oral communication in the field of science, technology, production and economics, or attention is focused on the development of polylogical speech, which is considered as a kind of monologue and dialogue. Taking into account the goals and objectives of the ESP course, our attention is focused on the opportunities provided by these forms of work for the development of professional communication skills.

The methodological basis for preparation of various types of classes that involve problem-based learning, is the standard requirements for the organization of classroom activities: defining goals and objectives of classes (goals for the development and improvement of linguistic, communicative and professional communicative competence are formulated separately); determination of the goals of actions performed in the process of solving problem tasks and situations; the choice of the method of actions for the implementation of problem situations, the choice of algorithm and type of work depending on the stage of work on the thematic block; evaluation of the result of actions in accordance with fixed criteria for each type of work.

Results

Studies of typical tasks for the development and improvement of professional communication skills and abilities showed that work on reading was not singled out as a separate component. On the basis of relevant studies of the features of professional communication of future specialists in agriculture, we have determined the professional specificity of the content of reading skills. Among the main methods of working with the text are the following: setting reading goals, choice of search orientation; highlighting semantic information blocks; identifying sources of information, fixation of information; compiling a concise summary. The selected techniques correspond to the following stages of working with the text, such as determining the authorship of the text, clarifying the topic, purpose and goals of the text; structuring information from the text.

These techniques and stages of work were used in the process of organizing work to improve professionally oriented communication. The work on the formation of the described above ability to read was not taken out into a separate methodological unit of training, but it was implicitly included in the general system of methods and techniques, was a prerequisite for successful completion of tasks in the classroom.

As a rule, 15-25 minutes are enough to perform a problem task, depending on the level of complexity. If there is a need to note the time that is allocated in the structure of the lesson for completing a problem task, it is necessary to take into account its complexity and the level of language training of students. It takes more time to analyze specific situations with the analysis of speeches and work on mistakes, especially if a video of the lesson is viewed to analyze the work done. The research has shown that the optimal time for this type of work is 45-55 minutes. The business game "Debate" usually takes two classroom sessions (Graboy, 2003).

The business game takes place according to a certain scheme and allows you to process the studied material, gives effective results, since students are offered creative problem tasks that require mental effort, their activity is activated, the emotional mood rises, professional communication skills and abilities are developed and improved.

Thus, in accordance with the scheme of organization of the business game "Debate", two spaces are planned: the space of dispute - the organization of the space of debate; translation and analysis space.

The game involves two subgroups (conditionally SG 1 and SG 2). The debate is going according to the given problem situation. Each subgroup defends its own point of view. A prerequisite for a successful presentation is the structure and argumentation of the text, which assume the presence of examples that illustrate the precedents of the solutions proposed by a subgroup. The subgroup consists of four participants, each of whom holds and maintains a certain position during the debate. Points of view that will be defended by the subgroup are determined in advance.

Representatives A and B are the main participants in the debate, the speakers representing the main thesis. The position of the speaker can be taken by students with any level of language training, as the text of the presentation is prepared at home. Speakers are always in the foreground.

The main functions of representatives A and B are as follows: for representative A - representation of SG 1, which states, and for representative B – representation of SG 2, which denies; presentation of the topic, justification of its relevance; definition of terms used; demonstration of the claiming party's point of view (SG 1); substantiation of aspects of consideration of the offered theme; giving arguments that will be proved during the game; transition to the proof of the proposed arguments; representative B refutes the arguments put forward; defining a clear statement of the general line of assertion.

The work of the objecting subgroup has its own features which should be drawn to the students' attention. First of all, the subgroup that denies has to respond to all thesis components of the subgroup claiming and respond to each argument. If the aspect cannot be refuted, more important arguments and comparisons are given. In the case of refutation the debate essence all components of the speech are considered: definitions, aspects, arguments, evidence, opponent arguments, etc.

Each of the main representatives (A and B) has a support group. The support group is off the battlefield and is fully aware of what is going on in the debate ring. But at the same time, each member from the support group realizing what is happening can go to the "battlefield", take a temporary place of the main representative and help him in the discussion, supplementing, clarifying the argument.

Representatives A1 and B1 closely monitor the discussion, focusing on the speech and argument weaknesses of the opponent. Their task includes refuting the thesis of the objecting subgroup, it is forbidden to make new arguments; asking cross-cutting questions.

Representatives A2 and B2 substantiate and develop the main thesis of the subgroup, which was presented by representatives A and B, which involves the following actions: restoring the point of view of the subgroup with the help of hypotheses, examples, evidence; providing new evidence; repetition of important aspects of previous evidence; detailed development of the subgroup thesis; giving a clear formulation of the subgroup thesis; answering to cross-cutting questions.
Representatives A3 and B3 highlight the moments when the dispute comes to a standstill, arguments are repeated or when a situation of misunderstanding arises.

Work on the organization of translation and analysis begins after the end of the dispute. There are two representatives working in this space: 1) content analyst - the responsibilities of the student holding this position include the analysis of the discussion in terms of content; he has to describe briefly the essence of the problem under discussion, what theses justifications both subgroups had; the speech of the student holding this position is, in fact, a summary; 2) action

analyst – the task of the student acting in this position is to analyze the discussion in terms of the participant actions; and how these actions unfolded the result of dispute, in addition, this participant records violations of the rules to be debated; the purpose of allocating this position in a separate element of the analysis is to focus on the peculiarities of the behavior during the dispute and observance of formal rules of communication; special attention in the action analysis is paid to fixing possible errors in reasoning, the list of which is in front of a student: questions instead of answers, going around in circles, confusing statistics, confused cause and effect, incorrect conclusions, poor generalizations, bias, human attack , not a position, and an argument like " the right thing".

These two participants are external observers of the dispute and do not take a direct part in it. But they can ask questions on understanding like correctly understood that…; did not understand, could you clarify or repeat.

The whole game is regulated by the organizer, who monitors the sequence of theses and questions and the compliance of representatives with their functions. In early classes the function of the organizer is performed by a teacher, in the following – the most progressive students.

In the course of the game the following aspects are assessed: 1) language competence: the level of proficiency in language and grammar units worked in the thematic block; no language errors; language skills; 2) intellectual competence: the ability to think critically; cultural level, the ability to involve knowledge from various sources during the dispute; 3) professional communicative competence: the ability to assess own position and the position of an interlocutor, the ability to record the position of the opponent, using separation, establishing a connection with the subject and objectives of the conversation, its self-sufficiency and plausibility, reliability; ability to formulate and justify one's own position; the ability to oppose, ask questions, make additions, form elements of controversy, influence the arguments of the addressee of the conversation, supplement the interlocutor or deny it; ability to reach a general conclusion; 4) the ability to work collectively: the ability to assess one's own capabilities and take an optimal place in teamwork, if the participants in the dispute are not appointed by the teacher; the ability to perform the function assumed, the expression of a sense of duty and responsibility.

The organization of a business game according to the presented scheme allows you direct practicing and improving communicative professional skills, as evidenced by the list of parameters to be controlled. When conducting a business game, not only the result presented in the general conclusion is important, but also the process of dispute, observance of the forms of game organization, as productive activity is stimulated, professional communication skills are improved. The substantive complexity of the topic discussed is not of fundamental importance. Specific situations can be suggested for discussion topics, interesting in terms of professional point of view and problems. The study used problem situations designed to form, develop and improve the communication skills of future agricultural professionals; problem tasks offered in English textbooks; situations found on the Internet.

It should be noted that during the research, along with the business game "Debate", the role-playing game "Meeting" was used, which also involves compliance with the participants' positions, fairly strict arguments, and compliance with certain rules of performance. Undoubtedly, the role-playing promotes the development of professional communication skills. The study found that the role-playing game "Meeting" is very effective in consolidating new lexical and grammatical material, as it allows you to update using basic vocabulary. However, the use of role-playing games proved to be less effective compared to the educational effect found during business games. The disadvantages of role-playing include the following: the lack of motivation for students to seek additional information.

The study showed that students follow the path of minimizing intellectual effort, preferring theatrical forms of self-expression, they are confined to the informative material presented in the basic textbook; the absence in the game of specially defined forms of work focused on reflection and analysis.

The main characteristic of formal debates is the existence of rules according to which there is a clash of opposing views. The organization of debates according to certain rules allows to keep the topic of discussion, does not allow to turn the discussion into a dispute when the opponent is attacked, and not the arguments.

Independent preparation of students for the debate involves the repetition of all material from the thematic block, the need to rethink the content of familiar texts, taking into account the request of a particular situation, a deeper penetration into linguistic and subject information. The effectiveness of this type is also due to the need of constant comparing and analyzing familiar (practiced in class) and new (independently extracted from other sources) information. The process of preparation for classes (independent work of students) is built on the basis of cognitive motives. Students are distracted from already familiar texts and enter a range of new issues that are a powerful stimulus for the formation of search and cognitive activity.

New information found by students in addition to known facts sometimes contradicts the theoretical material offered in the basic textbook. At the heart of this contradiction are intercultural differences in the cultural and production norms of Great Britain, the United States and Ukraine. The presence of such paradoxes is a prerequisite for the submission of arguments of theses prepared by subgroups, as the task of interpretation, as a rule, does not specifically include the setting for the existence of arguments in terms of the legal system of a particular state. This approach allows new and unexpected (for the teacher and the opposing subgroup) options for reasoning the problem. In addition, the differences in the cultural and production norms of different countries allow a more meaningful approach

to understanding such Ukrainian norms, to see and rethink the nuances that become apparent due to specially organized forms of work.

Conclusion

Therefore, the main task of the course which is determined within the framework of an interdisciplinary approach was solved at the classes held within the framework of problem-based learning: development and improvement of professional communication skills.

As it has been noted in the study, this professionally oriented foreign language course is designed for students with a high level of language knowledge, defined during the selection control before the start of the course. This circumstance explains a certain methodical courage in setting the objectives of the course.

The fact that the course is elective and can be ignored by students forces us to look for new and more effective ways of working that attract students not by spectacular forms of work or entertainment content of the course, but by those based on cognitive motives. All efforts of the teacher are directed on satisfaction of student cognitive need to solve the problem situations on their own, at the raised level of independent creative activity.

Finally, the teacher solves another, no less important task to develop and improve the language and communicative competence of students in the language studied. Achieving positive results in solving linguistic tasks of the course is ensured through a systematic appeal to the studied texts, the actualization of language material in the process of professional-oriented communication. Work on communication and language skills and abilities is included in the process of formation and improvement of professional communication skills and is constantly monitored by the teacher. In the description of the forms of work it was already noted that the indispensable criterion for successful completion of the task with the help of one of the types of work in problem-based learning is the systematic control of language and speech competencies and the formation of communicative professional competence.

The effectiveness of the systematic inclusion of this type of work in the curriculum of an ESP course was proven during the study. Questionnaire of students conducted at the end of the study shows that the business game "Dispute" is rated the highest by students, students note that during the course they acquire reflection skills, which allow them to achieve higher results during the study of other disciplines taught in Ukrainian.

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Financial Support of The Decentralization Process in Ukraine

Nataliia ORLOVA
Dr. Sc. (Public Administration), Professor, Professional development Center of Kyiv Region, Ukraine
orcid.org/0000-0003-0785-751X
nsorlova78@gmail.com

Valeriia LOIKO
Dr. Sc. (Economics), Professor of Department of Finance and Economics, Boris Grinchenko Kyiv University, Ukraine
orcid.org/0000-0003-3248-1585
v.loiko@kubg.edu.ua

Andriy STOYKA
Dr. Sc. (Public Administration), Professor, The Head of Tourism Department Donetsk State University of Management Mariupol, Karpinskogo st, 58
https://orcid.org/0000-0001-5777-8153
andreystoyka@gmail.com

Anna CHECHEL
Dr. Sc. (Economics), Associate Professor, Donetsk State University of Management, Department of Public Administration and Management (Mariupol, Ukraine)
orcid.org/0000-0003-4307-5574
annachechel.ac@gmail.com

Oleksandr CHERNYSHOV
PhD. (Economic Sciences), Associate Professor, Donetsk State University of Management, Ukraine
orcid.org/0000-0003-0422-2252
s.chernishov@i.ua

Abstract

The paper substantiates the financial support of the decentralization process in Ukraine. The necessity of reforming the existing system of financial support of the decentralization process has been proved. The main tasks of public authorities of Ukraine in the conditions of decentralization have been determined. The purpose of the article is to substantiate financial support areas for the decentralization process in Ukraine. The study's methodological basis is the Ministry of Finance of Ukraine's data, the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine. It has been proved that Ukraine's united territorial communities' (UTC) financial resources are formed by 90.0% due to tax revenues. It has been proposed to expand the list of non-tax revenues for UTC budgets at the expense of other resources to stabilize UTC development's financial support. It has been proved that the growth rates of expenditures in local budgets of Ukraine in 2018 – 2019 were higher than the growth rates of revenues, which led to a deficit. It has been substantiated that a significant differentiation in revenues and expenditures by UTC groups indicates economic inequality in the development of UTC territories and resource provision, which is reflected in the amount and quality of public services received by residents in the respective UTCs. It has been determined that in order to intensify the process of financial incentives for sustainable development of territorial communities, it is necessary to ensure effective communication between executive authorities and local governments, organizational and methodological assistance to local governments, dissemination of information on successful practices of cooperation projects, European experience of UTC financial resources in EU countries for Ukraine. It has been proposed to ensure local authorities' financial autonomy and stability by transferring powerful sources of budget revenues, previously assigned to the central government, and the expansion of the financial base of administrative-territorial formations.

Keywords: Local Governments; Resource Potential; Decentralization; Local Finances; Financial Incentives

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Introduction

Ukraine's state policy in the field of local self-government is based on the interests of residents of territorial communities and provides for the decentralization of power - the transfer of the powers, resources, and responsibilities from bodies of executive power to local governments. This policy is based on the European Charter of Local Self-Government provisions and the best world public relations standards in this area.

The legislative basis for changing the system of government and its territorial basis at all levels was formed in 2014 after the adoption of the concept of reforming local self-government and territorial organization of power, which consists of three areas: basic (formation of united communities of the basic level of administrative-territorial structure of Ukraine); creation of new districts, which will deal with only related to the competence of the district issues (communal property, secondary medicine, boarding schools, etc., the rest of the powers of the districts belong to the competence of united communities); final - change the form of management of regions (oblasts) [1]. Such a community's essential systemic features are stable economic, social, informational, political, cultural, and environmental ties and relations, distinguishing it as a relatively independent system of human life's spatial organization.

In 2014-2015 Ukraine took significant steps towards reforming local self-government: the process of unification of territorial communities, decentralization of public administration, and finances; several regulations aimed at legal regulation in this area were approved, budget and tax reforms were carried out provided strengthening of the financial basis for the livelihood of territorial communities.

Analysis of recent research and publications. The study of theoretical and applied principles of financial support of the decentralization process in Ukraine and the formation of financial capacity of territorial communities were discussed in the works of Weingast (1997), Akai, N., & Sakata, M. (2002), Rodden, JS, & Rose-Ackerman, S (1997) , Bartolini, D., Sacchi, A., Salotti, S., & Santolini, R. (2018), Bisogno, M., Cuadrado-Ballesteros, B., Santis, S., & Citro, F. (2018) and Romans, W., Ulasiuk, I. and Petrenko Tomsen, A. (2018) , Alina Korbutiak, Zhanna Lysenko, Nataliya Sokrovolska, Artur Oleksyn, Eduard Yurii (2019)), Palchuk V., Babyuk I., Chepel O. and other scientists. These scientists' achievements have theoretical and practical significance in the area and became the basis for further research on the justification of ways to support the process of decentralization of Ukraine financially. Given the rapid changes in the country's socio-economic and political sphere and the development of Ukraine's decentralization process, the outlined topic needs further comprehensive research and coverage.

The works of foreign scholars, in particular Weingast (1997), Akai N., & Sakata M. (2002), Rodden J.S., & Rose-Ackerman S. (1997) emphasize the positive features of the decentralization process. In the authors' opinion, decentralization provides more opportunities for local communities and local authorities to attract investors .

The positive impact of fiscal decentralization on the formation of financial resources of local government and the national budget was noted in the researchers of the following scientists: Bartolini D., Sacchi, A., Salotti S., & Santolini R. (2018), Bisogno M., Cuadrado-Ballesteros B., Santis S., & Citro F. (2018) and Romans W., Ulasiuk I. and Petrenko Tomsen A. (2018).

Foreign scholars suggest the use of tax autonomy, which will improve the budgets of all government levels. Decentralization of tax collection will help strengthen budgetary discipline during the financial crisis. In Ukrainian scientists' works by A. Korbutiak, Zh. Lysenko, N. Sokrovolska, A. Oleksyn, Eduard Yurii (2019), N. Orlova and O. Kozyrieva (2019), O. Marukhlenko (2018), it is emphasized that in the process of decentralization reforms in Ukraine, there are still many problems that need to be solved. The works of V. Palchuk, I. Babyuk, and O. Chepel outline the ways of forming capable territorial communities, namely: the creation of UTC, transfer of financial support, and other powers to the local level and attraction of investments, expansion of UTC funding sources, preservation of enterprises located on the UTC territory and creation of a UTC profile of resource potential.

The purpose of the article is to substantiate financial support areas for the decentralization process in Ukraine.

The methodological basis of the study. The leading research method is a comprehensive analysis of the financial and budgetary components of the decentralization of management at the local level.

Main Part of Research

State policy regarding the formation of territorial communities includes a significant number of regulations governing their activities and powers. During the period of power decentralization and preconditions creation for the capable

territorial communities formation, a number of legislative acts were adopted, including the laws of Ukraine: "On Cooperation of Territorial Communities", "On Amendments to the Tax Code of Ukraine and Some Legislative Acts of Ukraine on Tax Reform", "On Amendments to the Budget Code of Ukraine on the Reform of Intergovernmental Relations", "On the Principles of State Regulatory Policy", "On Voluntary Association of Territorial Communities", "On Local Elections", "On Amendments to Certain Laws of Ukraine on Organization of the first elections of deputies of local councils and village, settlement, city mayors", "On amendments to the Budget Code of Ukraine on the peculiarities of formation and implementation of budgets of united territorial communities", "On amendments to the Budget Code of Ukraine on the inclusion of certain administrative fees in local budgets".

The reform of local self-government bodies envisages the unification (consolidation) of territorial communities. This is due to the fact that excessive resources in such communities are spent on the maintenance of the administrative apparatus, while the implementation of crucial local development projects lacks funds, providing additional resources to the vast majority of existing local communities will not provide their capacity. Therefore, the reform of local self-government, taking into account the positive European and its own historical experience, relies on the obligatory unification (consolidation) of territorial communities.

The purpose of local self-government reform is to ensure its ability to independently, at its own expense, address issues of local importance, i.e., to provide territorial communities with more resources and mobilize their internal reserves. The primary tool for the socio-economic policy is the budget, so budget policy promotes sustainable and significant economic development. At the present stage of local government, the basis is budget decentralization.

Reforming the territorial organization of power and administrative-territorial organization in Ukraine is one of the fundamental reforms that affect many areas of people's lives. Successful implementation of this reform, which has to result in a radical change in social development management's basic principles, is a vital prerequisite and guarantee for solving other systemic problems of Ukrainian society's socio-political and socio-economic development.

Since the approval of the Concept of Reforming Local Self-Government and Territorial Organization of Power, the necessary legal framework for reform has been formed. In particular, amendments to the Tax and Budget Codes of Ukraine (fiscal decentralization) were made, the State Strategy for Regional Development was approved, and a new Law on Regional Policy was adopted, changes in the administrative-territorial system were observed. The peculiarity of decentralization of power in Ukraine is that reforming local self-government, administrative-territorial organization, and state regional policy is underway simultaneously.

On December 28, 2014, the Verkhovna Rada of Ukraine adopted amendments to the Tax and Budget Codes of Ukraine. Those changes determined the new financial basis of local governments, established a new distribution of national taxes and introduced new local taxes, as well as established a new system of budget equalization.

On January 23, 2019, the Cabinet of Ministers of Ukraine initiated the transition to a new stage of decentralization reform, which envisages consolidation of already achieved successes and formation of capable communities, change of territorial organization at the level of districts and communities, clear delineation of powers and functions of local democracy regulation.

The most problematic parts of this task in Ukraine at the moment are the following: outdated legislation, which no longer provides sufficient autonomy to address issues of local importance of local governments effectively; inconsistency of organizational and financial capabilities of local self-government bodies with the needs of territorial communities development; the insufficient practice of direct participation of territorial communities in solving issues of local importance. The analysis of modern methodological bases of research and elaboration of sustainable development strategies testifies to the absence of domestic generally accepted and used modern methods, which often lead to many unsuccessful decisions in the field of sustainable development management.

In order to solve the already mentioned problems in reforming territorial communities and preventing the emergence of new ones, public authorities' main tasks can be outlined in figure 1 (Fig. 1).

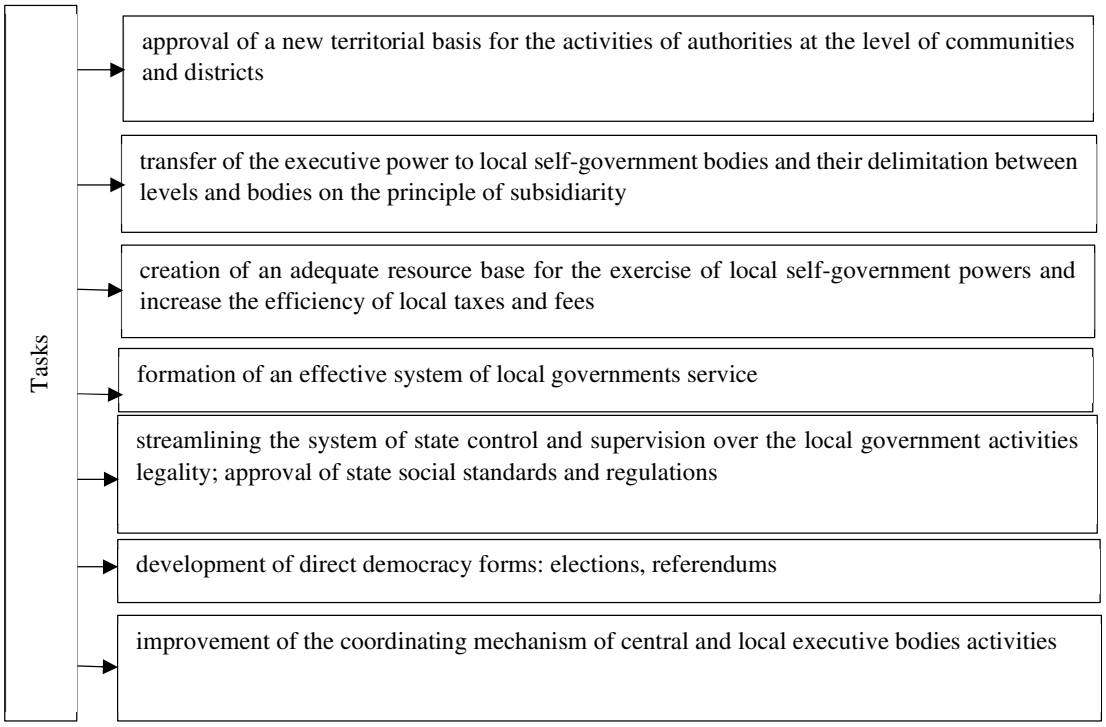

Fig. 1: The main tasks of public authorities of Ukraine in the context of decentralization.
Source: compiled by the authors based on [9-13]

Reform of local self-government and decentralization of power involves overcoming many obstacles: the dependence of territories on the center; infrastructural and financial weakness of communities; rural degradation; high level of community subsidies; low level of investment attractiveness of territories, etc.

Results

During the period of decentralization reform, starting from 2014 to the present, more than 800 united territorial communities have been created in Ukraine. After amendments to the tax and budget legislation, the main taxes that fill local budgets (cities of regional significance, districts, united territorial communities) were: 60% personal income tax, 5% excise tax on the sale of excisable goods, 100% single tax, 100% property tax (real estate, land, transport), 100% land tax, 100% profit tax on communal property enterprises, 100% fee for the provision of administrative services and 25% environmental tax. Local governments have the right to service the revenues of their budgetary institutions and development funds in state-owned banks and not to depend on the State Treasury. Ukraine's decentralization process main direction is budget financing of territorial communities' development at the expense of local budgets.

The dynamics of the composition and structure of Ukraine's local budgets' revenues and expenditures for 2014-2019 are given in the table. 1.

Table 1: the dynamics of the composition and structure of Ukraine's local budgets' revenues and expenditures for 2014-2019 years

Year	Revenues of the general fund of local budgets (including transfers from the state budget), UAH billion	Including official transfers from the state budget, UAH billion	Share of official transfers from the state budget in the revenues of the general fund of local budgets,%	Expenditures of the general fund of local budgets, UAH billion	Including transfers to the state budget, UAH billion	Share of official transfers to the state budget in expenditures of the general fund of local budgets,%	Deficit "-", surplus «+» of general fund of local budgets, billion UAH
2014	231.7	130.6	56.37	225, 6	2.118	0.94	6.022
2015	294.4	173.9	59.07	280.1	3.144	1.12	14.269
2016	366.1	195.4	53.37	350.5	4.171	1.19	15.448
2017	502.1	272.6	54.29	496.1	5.967	1.20	5.756
2018	562.4	298.9	53.14	570.6	7.306	1.28	- 8.540
2019	560.5	260.3	46.44	566.2	8.725	1.54	- 6.270

Compiled by the authors based on data from the Ministry of Finance of Ukraine

Revenues of the general fund of local budgets in 2019 increased by 2.4 times compared to 2014, expenditures for the same period increased by 2.5 times. The growth rate of expenditures was higher than the growth rate of revenues, which led to a deficit in local budgets in 2018 - 2019. The most important was the budget system's change equalization of local budgets by expenditures, the system of equalization of revenues. As a result, only 50% of the additional income is withdrawn from administrative-territorial units' budgets that earn more than they have expenditures (provided that the tax capacity index is more than 1.1). Such withdrawals are directed to provide a basic grant. In contrast, in administrative-territorial units that do not earn the amount required for expenditures, the necessary subsidy is only 80% of the required amount (provided that the tax capacity index is less than 0.9). Such a system stimulates communities to increase local budget revenues – those who earn more, get more. According to the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine in 2019, the budgets of 806 UTCs established on Ukraine's territory received UAH 39.4 million. For the purpose of analysis, all UTCs are divided into five groups based on the population living in this territorial community's site. The analysis of UTC revenues and expenditures for 2019 provided an opportunity to draw the following conclusions (Table 2).

Table 2: analysis of revenues and expenditures by UTC groups created on the territory of Ukraine in 2019

Groups	Grouping criteria	Number of UTC / Specific weight in the total amount of UTC,%	Total population in the UTC group, thousand people	The average amount of own income received by UTC of the respective group, UAH million	The average amount of expenditures made from the budget of the UTC of the relevant group, UAH million.	The difference between the average amounts of revenues and expenditures of UTC budgets of the respective group, UAH million /%
Group 1	Population over 15 thousand people	95 / 24.1	2001.1	87.2	131.4	- 44.2 / Excess of expenses over incomes in .5 times

Group 2	Population from 10 to 15 thousand people	128 / 18.8	1561.6	53.5	74.6	- 21.1 / Excess of expenses over incomes in 1.39 times
Group 3	Population from 5 to 10 thousand people	268 / 22.5	1874.9	30.8	43.2	- 12.4 / Excess of expenses over incomes in 1.40 times
Group 4	Population up to 5 thousand people	288 / 11.8	979.1	16.2	21.7	-5.5 / Excess of expenses over incomes in 1.34 times
Group 5	UTC - cities of regional significance	27 / 22.8	1891.0	418.5	635.0	- 216.5 / Excess of expenses over incomes in 1.52 times
Together		806 / 100.0	8307.7	606.2	905.9	- 299.7 / Excess of expenses over incomes in 1.49 times

Compiled by the authors based on data from the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine

The number of UTCs created in Ukraine is dominated by group 4 - UTCs with a population of up to 5 thousand people. The number of people living on UTC territory is dominated by group 5 - cities of regional importance. A comparison of the average amount of own-source revenues and the average amount of expenditures for all UTC groups showed a negative difference, i.e., on average, for all UTCs expenditures exceeded revenues by 1.49 times. The largest gap between the amount of expenditures and the amount of UTC revenues has 5 groups - cities of regional importance where expenditures exceeded revenues by 1.52 times in 2019. Thus, it can be stated that UTC's revenues do not cover the amount of expenditures required for the operation of UTCs themselves, which indicates the subsidization of UTC budgets. UTC income per capita analysis shows that the least financially viable are UTCs of 4th and 3rd groups with a population of up to 5 thousand people and from 5 to 10 thousand people. The cities of regional significance have the highest level of income per 1 inhabitant of UTC. Analysis of UTC budget expenditures showed that the management staff's maintenance expenditures in terms of UTC groups are as follows: Group 1 - 18.9%, Group 2 - 21.5%, Group 3 - 24.4%, Group 4 - 29.2%, Group 5 - 12.6%. The volume of capital expenditures from UTC budgets in 2019 amounted to UAH 12.8 billion (*General information. Decentralization*). UTC groups' significant differentiation in revenues and expenditures indicates economic inequality in the development of territories and resource provision of UTCs, which is reflected in the volume and quality of public services received by residents in the respective UTCs.

The dynamics of the structure of UTC financial resources for the period 2014-2019 are as follows (Table 3).

Table 3: dynamics of the structure of UTC financial resources created on the territory of Ukraine, for the period 2014-2019, UAH million

Indicator	**2016**	**2017**	**2018**	**2019**	**Deviation of 2019 data from 2014 data,%**
Total income	3577.2	10124.4	22433.5	30727.5	An increase of 8.59 times
including: - tax revenues	3263.7	9164.5	20596.8	28214.5	An increase of 8.64 times
Share of tax revenues in total revenues,%	91.24	90.51	91.81	91.82	0.64

- non-tax revenues	283.7	873.1	1643.0	2226.9	An increase of 7.85 times
Share of non-tax revenues in total revenues,%	7.93	8.62	7.32	7.24	8.70
- income from capital transactions	18.9	68.4	154.0	226.6	An increase of 11.98 times
Share of income from capital transactions in total income,%	0.52	0.68	0.68	0.74	42.31
- official transfers from the EU, from foreign governments	4.7	-	6.9	16.3	An increase of 3.47 times
Share of official transfers from the EU and foreign governments in total revenues,%	0.13	-	0.03	0.05	38.46
- trust funds	6.1	18.4	32.7	43.2	An increase of 7.08 times
The share of trust funds in total revenues,%	0.17	0.18	0.15	0.14	- 17.64

Compiled by the authors based on data from the Ministry of Finance of Ukraine

Analysis of UTC financial resources' structure created on Ukraine's territory for the period 2014-2019 showed that more than 90.0% of UTC revenues are from tax revenues. The total share of all other revenues is less than 10.0 %. To stabilize the state of financial resources, it is advisable to increase the share of other revenues to finance UTC activities.

Decentralization reform in the EU has certain features that distinguish these countries from other countries. A local government regulates each territory of the EU. The European Charter of Local Self-Government declares that local authorities have the right to their own financial resources, which they can freely dispose of (paragraphs 1.3); the order of financial resources formation has to be flexible and correspond to the functions performed by local authorities (paragraphs 2,6); part of the financial resources ought to be formed at the expense of local taxes and fees, the amount of which local authorities have the right to set (paragraph 4,5); protection of the financially weak local government is carried out at the expense of financial equalization or at the expense of grants which are not intended for financing of concrete projects (paragraph 7,8). It is expedient to use the experience of forming UTC financial resources in the EU countries for Ukraine.

As in other countries, a strategic approach to sustainable territorial planning is being actively developed and introduced in Ukraine. In modern conditions of development, the functions implemented during the planning process change significantly, the very role of planning in the local government system is being modified.

Sustainable development of the territorial community is a mode of functioning that focuses on the positive dynamics of the population's welfare, provided by a sustainable, balanced reproduction of social, industrial, financial, resource, and environmental potential. Local self-government bodies have to ensure the sustainable development of the territorial community, guided by local self-government principles and creating preconditions for the transmission of the minimum economic, environmental, and social debt to future generations. The purpose of local government is to achieve together with the territorial community sustainable socio-ecological development with an effective economic mechanism to meet human needs and preserve the natural environment.

Thus, in current conditions, sustainable development of the territorial community involves the ability to self-development and progress, i.e., ensuring sustainable production growth, creating reliable conditions and guarantees for entrepreneurship, creating a favorable climate for investment and innovation; rational use of natural resources and preservation of the ecological balance of the territory; stable growth of the quality of life of all residents of the territorial community; increase efficiency.

To provide for the irreversible transition to sustainable development, it is necessary to ensure both the coordination of government actions at the state, regional and local levels, and a clear definition of sustainable development planning for local communities, i.e., local economic development planning with three components - social welfare, equal access for all residents to public services, health, cleanliness, environmental safety and security.

Modern planning of sustainable development of territorial communities mostly means abandoning the industrial economy model, which has long been a national ideal.

Sustainable development planning of territorial communities is a hierarchical process that aims to increase the socio-ecological and economic sustainability of the functioning of territories or its individual territorial communities.

Social sustainability includes proper health care, safe and healthy housing, and high-quality education for all residents of the community; maintenance of public safety and law and order; strengthening the spirit of the community, its cohesion, which creates a sense of belonging to a particular area, i.e., the development of local identity; promoting creative expression, preserving traditions, etc.

Ecological sustainability is the care and preservation of the environment and the satisfaction of basic human needs in clean air, ecologically clean food products, ensure of landscaping, implementation of energy-saving measures, and provision of housing and communal services. Economic stability is one of the crucial components that determines the economic progress of community development. Achieving economic sustainability is preceded by creating a favorable environment for doing business, attracting local and foreign investment in the local economy, providing maximum assistance to companies operating in the local community, retraining to meet future business needs, creating a financially viable economic base. All these factors affect job creation and thus prevent the outflow of population from the newly created community. This approach contributes to economic growth, meeting human needs while preserving the environment for future generations.

In general, sustainable development's success depends on the success of local economic development, especially on the conditions in which the business is located. High quality of life, developed economy, favorable business climate, friendly environment contribute to the formation of a culture of life, work and leisure, focused on sustainable development.

To achieve these goals, action plans have to be aimed at developing the economy and increasing the local community's competitiveness. They include tools such as activities, programs, and projects aimed at attracting investment, supporting entrepreneurship, starting new businesses, maintaining existing businesses, developing local markets, creating clusters, industrial innovation or industrial research parks, business incubators, business centers, business support funds, establishing inter-municipal cooperation, creating public-private partnerships, marketing the territory, establishing a communication system, etc. The system of tools for planning sustainable development of territorial communities can be classified into three groups, each reflecting a specific goal (Table 4).

Table 4: tools for planning sustainable development of territorial communities for a specific purpose

Goal	Tools
1	**2**
Support the development of existing and the creation of new local businesses	Education, training, advice, information, support, targeted preferential loans, simplified conditions permit, available to rent at the beginning of activities, incentives, transparent access to business-oriented information, and clusters.
Attracting business and investment in the territory:	The algorithm of the procedure of opening a new enterprise, the investor's road map, creation of investment products, territory design, preparation of industrial sites, creation of industrial parks, marketing of attraction of investments in the territory, development of investment passports, promotion of the territory, the definition of competitive advantages, criteria for the investor, etc.
Development of local development institutions	Activities of economic development agencies or local and regional development agencies, urban development centers, business incubators, business centers, public organizations, business associations, permit centers, administrative service centers, chambers of commerce and industry, information and advisory centers, recruitment agencies investments, business support funds, etc.

Source: compiled by the authors based on date from the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine

When developing plans for the strategy of sustainable development of territorial communities, they have to be based on six basic postulates: economic development is created by business; jobs ensure the well-being of the community and affect the growth of both individual incomes of residents and the growth of total social product; local authorities and public organizations create conditions for business development; advanced infrastructure is the main element of community competitiveness; quality services provided by local authorities to the community and business are a key element of competitive advantage; effective management of a city or region is ensured by system management (planning, organization, motivation, control), local resources, the cooperation of stakeholders and tripartite partnership.

After the strategy's approval, a crucial element of its effective implementation is the process of monitoring and evaluating the planned results to minimize the risk, which will become an effective tool for long-term territorial development.

One of the tools to ensure sustainable and holistic development of the territorial community is monitoring - formalized and regular monitoring of the strategic plan's implementation, analysis of information, adjustments, updating tasks, and other functions. Monitoring is the process of regularly collecting and analyzing key data (indicators) to identify progress made in implementing a strategic plan. Tools such as SWOT-analysis, PESTLE-analysis, A-B-C analysis, etc. are used to monitor the implementation of the territorial community's sustainable development strategy. [13, 18].

The critical characteristics of planning in the context of globalization are technological innovations, modernization of jobs and the content of employees, and the emergence of internal local economic forces based on competition from local factors of information, creativity, and knowledge.

An interesting example of sustainable development of territorial communities can be revitalization projects, for which the EU allocates funds and which are implemented by EU member states. For Ukraine, such projects are perceived as projects to restore outdated infrastructure (historic architecture, abandoned castles, houses, parks, etc.). According to EU legal documents, funds for the revitalization project can be allocated provided that, firstly, the object of value to the community is subject to restoration and includes a component of improving the infrastructure component. Secondly, this object must be used to increase economic activity in the community, and third - the project must contain a socio-environmental component: to increase equal access of community members to the standard service or increase the level of environmental safety health of residents. The concept of "revitalization" is not identical to the term "overhaul". This restoration is not only technical but also social and cultural. For example, in Poland (Lesser Poland Voivodeship, Rabka-Zdrój), the following two revitalization projects have been implemented:
- a project to revitalize the railway station building based on ideas proposed and discussed with the community (the renovated station building has a small waiting room, a cafe, a public meeting room, a small library, and free access to a computer room with Internet);
- the project of revitalization of the local park (lighting of the park was carried out, now the park has a 3D cinema, a cafe, a stage for performances).

Conclusion

The main reasons hindering the sustainable development of territorial communities in Ukraine are the instability of socio-economic conditions in the country, the lack of scientifically sound, clearly defined strategy for its sustainable development, effective economic reform and state regulation, imperfect legislative and regulatory framework for adequate financial market conditions, legal, information and communication space, imperfection of legal, organizational, economic bases of activity of executive bodies and local governments, physical and legal persons concerning formation of a high-grade living environment.

Opportunities for cooperation of territorial communities and development of territories are currently used incompletely. To intensify this process, it is necessary to ensure, first of all, effective communication between executive authorities and local self-government bodies on the ground, organizational and methodological assistance to local self-government bodies, dissemination of information on successful practices of cooperation projects, etc. In the future, various forms of cooperation can be widely used to combine the efforts and resources of united territorial communities in the implementation of investment projects.

In the future, it is necessary to ensure effective communication between executive authorities and local governments, organizational and methodological assistance to local governments, dissemination of information on successful practices of cooperation projects.

Thus, decentralization is currently the most effective and efficient way for local governments to ensure financial autonomy and sustainment by transferring powerful sources of budget revenues previously assigned to the central government and expanding administrative-territorial formations' financial base.

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Conceptual Approaches to Public Administration in The Security and Defense Field in The Light of Current Security Imperatives

Anatoliy KALYAYEV
Lviv Regional Institute for Public Administration of the National Academy for Public Administration under the President of Ukraine, Lviv, Ukraine,
toldek@ukr.net ORCID 0000-0002-5675-187X

Olena YEVTUSHEVSKA
Hetman Petro Sahaidachyi National Army Academy, Lviv, Ukraine
yevtushevskaya0308@gmail.com ORCID 0000-0002-1001-2027

Yaroslav KOROL
Odessa Military Academy, Odessa, Ukraine
yaroskorol@ukr.net ORCID 0000-0003-2274-5858

Vladimir MOTORNY
Odessa Military Academy, Odessa, Ukraine,
stavr370@gmail.com ORCID 0000-0003-0243-8666

Mykhailo KOROTKIKH
Odessa Military Academy, Odessa, Ukraine
krotomih@gmail.com ORCID 0000-0002-5635-0048

Abstract

The processes of conceptualization of modern approaches to public administration in the security and defense field reflect current theoretical problems and practical imperatives of its development. Based on public administration methodology the experience of formation and functioning of conceptual models of public administration in the security and defense field in the retrospect of the military-political processes in Europe and the world is generalized. The transformation of traditional approaches is considered in the dynamics of socio-political changes in the beginning of XXI century. The priorities of the democratic states' national policy in the security field at the present stage have been actualized. It has been consistently held that the main priority of security and defense governance should be to ensure stability in the areas adjacent to the area of responsibility of the security system through cooperation, since instability and conflict in these areas can pose a threat to participating countries. The trend towards globalization and regionalization will facilitate the countries aspiring to join the process of European unification to become members of the latest European collective security systems in the future, as will do some neutral countries. In the formation of modern collaborative system of European security, it is expedient to return to the idea of finding ways to understanding the East and the West, to compromise between their natural worldview paradigms on the democracy principles.

Keywords: state governance in the security field, military-political processes, conceptual approaches to governance in the security field, collective security system, cooperation.

Introduction

Changes in the content of wars and armed conflicts in the dynamics of the XX - early XXI centuries directly influenced the development of conceptual positions and approaches to the assessment of modern military-political processes. The security concepts that emerged in different periods, in turn, influenced further development of the ideas of peace and security, their determinants and imperatives. Transformations of governance approaches in the dynamics of the last century have led to qualitative changes in its main components in accordance with changes in the military-political situation at the global, regional and national levels (L.Novak-Kalyayeva et al., 2018). The concepts of war and peace, the role of the army in the society, collective security, etc. were fundamental to national security and defense strategies. At the beginning of the XXI century, the factor of national security and defense again became largely decisive in solving interstate political and economic problems. In today's world, there is a

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practice when odious powerful states are using weaker countries for wars on their own behalf as well as terrorist and criminal groups as tools to destabilize states against which aggression is directed. Therefore, ensuring the survival and development of the civilized world objectively dictates the need to rethink views on the problems of military security and state defense.

An appropriate methodological framework necessary to solve modern problems in this field have been created in the studies of the nature and essence of war, military construction, national and collective security, their political and military aspects, including the relationship and interaction of these processes. The conceptualization of approaches to state governance in the security and defense field, in particular, in the European region, is considered holistically and takes into account the historical preconditions of this process. The analysis of security and defense problems requires consistency, that is possible only on the basis of an interdisciplinary study of security and defense problems, and was carried out by such researchers as R. Cohen (2001), R. Cooper (2002), E. Conteh-Morgan (2001), A. Dmitriev (2014), Fleychuk (2018), M. Mihalka (2005), A. Pelykh (2017), O. Zhitnik (2015) and others. However, a comprehensive approach to the research in the context of modern global security imperatives can significantly enrich it, which confirms the relevance of the topic.

The purpose of the article is to reveal the special features of the processes of conceptualization of modern approaches to public administration in the security and defense field and to determine the current security imperatives.

Conceptual models of public administration in the security and defense field

The security system is mainly considered as a set of interconnected state and non-state actors engaged in the protection and realization of national domestic political interests, as well as material and spiritual resources of this activity. We share A. Pelykh's (2015) point of view who believes that the concept of "military-political model of the state in the national security governance" should be interpreted as a formalized reflection of the development of national security system and determination of theoretical and organizational principles of its operation, development, implementation, evaluation, correction of the state' military policy in the context of officially defined foreign political course of the state and military doctrinal provisions… ." The military security system, as part of enhancing the national security system, is designed to plan and implement a set of measures aimed at maintaining the readiness of the state, society and citizens to prevent and repel possible aggression. First of all, we are talking about the actors of state governance of the national security, components of the security sector and implementation of mobilization training of the economy and population. The concept "national system of state governance in the security and defense field" is directly related to such categories as "national system of military security", "national system of national security", "defense capabilities system" and all the other systems or subsystems that are logically related to security.

Structural and functional features of national and global models of state governance in the security and defense field determine the formation of state security policy on the basis of specific models of the security sector governance. The latter, conceptually, can be divided into two types: Anglo-Saxon and continental (German-French). They are distinguished by the level of governance centralization, which determines the specifics of the organization of each political and administrative system, depending on national traditions and historical experience.

Discussions in the scientific and professional military-political environment allowed us to identify 2 types of specific models of international security according to different criteria Bozhko, S.(2005). International security models belonging to the first type are constructed depending on the number of actors in the security system. There are four main competing models:

1. Unipolar security model, which involves strengthening the system of military-political alliances led by the United States. Thus, NATO, according to some analysts, should ensure stability in the transatlantic subsystem of international relations, harmonize relations between the United States and European countries in the strategic field, ensure US military presence in Europe and guarantee prevention of conflicts on the continent.

2. "Concert of States", the essence of which is to create a union of several major powers that could take responsibility for maintaining stability in the world and for preventing and resolving local conflicts. The model was formed after the Napoleonic Wars in Europe (19th century) and was a kind of a system of congresses and conferences, through which the five empires of that time sought to rule not only Europe but almost the whole world. This model has become the prototype of an international intergovernmental organization for peacekeeping. In geopolitics, this system of European security, based on its basic principle, is called, the system of "balance of power" (G.Kindler, 2003).

Not providing guarantees of existence without wars, according to R. Cooper (2002), this system of European security ensured a balance between the leading countries on the basis of maintaining the multipolarity (polycentricism) in Europe. Thanks to it, it was not allowed to establish the hegemony of any state. The principle of balance of territorial sovereignty in relations between nation-states has become the main system-forming factor of this informal formation. This model was homogeneous because its elements had a unified approach to ensuring their national security and shared the same views on the organization of state and public life in the society (R. Cohen, (2001).

3. Multipolar model. Its supporters insist that the United States should recognize the unfoundedness of its claims to world leadership and enter into a partnership dialogue with other centers of power. These ideas are still especially popular in the Russian political and academic establishment and have even been elevated to the status of official foreign policy doctrine. Opponents of this model emphasize that it is unable to ensure stability because it is based on the vision of the international relations system as a field of eternal competition between the "centers of power". And this, in turn, inevitably leads to conflicts between the latter due to the constant redistribution of spheres of influence.

4. Global (universal) model. It supports the position that international security can be ensured only at the global level, when all members of the world community participate in its creation. According to one version, the creation of this model is possible only when all countries and peoples share a certain minimum of universal values and there is a global civil society with a single system of government. Less radical versions of this model come down to the fact that it will become the result of the gradual evolution of the already existing system of international security regimes and organizations with the leading role of the United Nations.

The second type of international security models is determined by the nature of relations between participants in such security systems. Discussions revolve mainly around three models of the second type: collective, general and cooperative.

1.Collective security is a concept that appeared in the diplomatic practice in the 1920s and 1930s. The main elements of the collective security model are the existence of a group of states united by a common goal (protection of their security) and a system of military-political measures against the aggressor. In turn, there can be different types of collective security, which differ from each other in what type of interstate coalition underlies it and what goals are set by members of the collective security system. In general, collective security focuses on military-strategic issues and is not aimed at addressing other aspects of international security (economic, civil, environmental and other dimensions). According to O. Zhytnyk (2015), this fact limits the possibilities of using this model in modern conditions.

2.The general security model is designed to emphasize the multidimensional nature of international security, including not only traditional "hard" but also "soft" security, as well as the need to take into account the legitimate interests of not only a narrow group of states but all members of the world community. The institutional basis of general security should be not only and not so much the military-political alliances (as in the case of collective security), but global organizations such as the UN (A. Rotfeld , 2004).

3.Cooperative security is a model that has been popular since the mid-1990s. This model, according to its supporters, combines the best aspects of the two previous concepts. The cooperative security model prefers peaceful, political means of resolving disputes, but at the same time does not exclude the use of military force not only as a last resort but also as a tool of preventive diplomacy and peacekeeping. It encourages cooperation and contacts between different types of civil and civilizational system, and at the same time can rely on the existing system of military-political alliances in addressing specific issues. Finally, recognizing the nation-state as the main actor of international activities, this model requires great attention to the use of international and transnational organizations (G.Zavorotnya, 2006).

At the same time, the development of a cooperation security model is far from complete. Such issues as determining which institutions should become the core of the new system of international security, the limits of the use of force in modern international relations, the prospects of national sovereignty, the fate of existing military-political alliances, how to prevent the revival of bloc politics, etc. are not fully resolved. Historical experience shows that the political influence of countries in the international arena is largely determined by their economic and military power. State governance in the security and defense field in democracies operates a system of national security, a subsystem and an organic component of which is the security and defense sector. The latter includes the armed forces, other military formations, law enforcement agencies and special services, structures of the defense-industrial complex, etc. The activities of all of these and other relevant forces and means, as T. Stykalin (2015) emphasizes, are covered by a single system of strategic planning and coordinated by senior political leadership authorized by the

heads of state power bodies who have the right to issue orders to use force or threaten its use in order to resolve the tasks to protect the national interests .

A. Pelykh (2015) systematized military-political models of national security governance according to the following criteria: with regard to the international political status military-political models can be bloc, non-bloc and neutral; on a geopolitical basis - global, regional, satellite; according to the form of realization of external and internal functions of the military force by the state - militaristic, defensive-offensive, defensive-repressive-restrictive and defensive.

In the security field the functioning of state governance systems in a developed democracy is common to the vast majority of European countries, in particular to EU member states. The level of democracy of security governance systems is different and depends mainly on the level of centralization of power in a particular country. However, democratic civilian control over the security and defense sector has become the basis for determining the level of democracy in these systems in the dynamics of the late XX - early XXI centuries.

Transformation of traditional approaches in the dynamics of socio-political changes at the beginning of XXI century

Conceptually, modern security models are developing in a constant dialogue of public policy with the philosophy of liberalism, according to which, in A. Kalyayev's (2019) opinion, the presence of a developed civil society is the main guarantor of security of the individual, society and the state. Modern public statements by the leaders of leading states and international legal documents on national security, as a rule, focus on liberal approaches to its provision. Their essence comes down to a simple approach to security as an indisputable priority of man and, in this context, an unquestionable imperative for the state (A. Kalyayev et al., 2019). At the same time, sometimes the content of statements and documents does not correspond to the real domestic and foreign policy of states on national security issues. The vast majority of them focus on the geopolitical dimension of security in choosing a conceptual approach to national security. According to K. Holovina (2011), the main attention is paid to the protection and development of these opportunities, rather than the division of national security into spheres (economic, political, etc.). Moreover, there is a clear emphasis on identifying, preventing and neutralizing threats to survival .

German experience in developing a modern model for the development of the security and defense sector is linked to the implementation of the Innere Fuhrung approach in the armed forces (Bundeswehr). The conceptualization of this approach took place during the introduction of civil control and accountability to society as a system-forming principle. This manifests itself in various institutional forms and is regulated by relevant legislative acts. This model, by its specifics, according to A. Dmitriev (2014), can be considered unique . The armed forces, in general, and the military personnel, in particular, are seen not as an aggression force, but as an element of deterring the enemy from aggression. Therefore, the main idea is to prevent war by military deterrence. This thesis is not new and it still retains significant discussion potential.

Characteristic to this approach is the shift of the traditional formula in the system of relations between the soldier and the commander from unquestioning subordination to cooperation between them. The ultimate mission of the soldier is to preserve peace. Therefore, the task of preventing war is considered mandatory, and political cooperation is necessary to ensure peace. In everyday military life, this becomes a defining moment in the observance of democratic behavior models - the principles underlying them. For the German security and defense sector, "Innere Fuhrung"" is primarily a political and cultural paradigm (T.Sommer, 2001). The experience of Germany is quite successfully used in other countries where the processes of democratization of society and governance continue, in particular in Ukraine.

Due to the changing security situation in Europe and the world, the positions of the leadership of nation-states on the goals, conditions, permissible limits, forms and consequences of the use of armed forces are changing significantly. The modern interpretation of the purpose and tasks of the army, in general, and the Bundeswehr, in particular, is based on the broadest vision of defense. German experts quite reasonably claim that modern defense cannot be reduced to an armed repulse of the aggressor along the perimeter of the borders of a certain country, the EU or NATO. The expediency of expanding the security space (including by strengthening the military presence of NATO and the EU) is seen in the context of the prospect of blocking the spread of the any crisis on the borders of the united Europe, purposefully and consistently overcoming the negative effects of globalization. These include, as experts note, the economic confrontation of the largest powers, the destruction of multilateral trade agreements and rules, political confrontation between the largest powers, cyberattacks, spreading fake news, loss of confidence in collective security agreements (Forum, 2019).

Changing the priorities of the national security policy in democracies

The Ukrainian crisis of 2014 was an occasion for the EU countries to reconsider their foreign and defense policies. The new security policy aims to protect "internationally established rules and regulations" from attempts by individual countries to regain their "dominance" and "zone of influence". In general, the experience of democracies shows that modern “security sector” at all levels of governance is focused on meeting challenges and potential threats. According to O.Zhytnyk (2015), it is "embedded" in a democratic society, which serves as a kind of an "external guarantor" that humanitarian and political rights within the "security sector" are ensured to the maximum extent possible at all levels and in all dimensions.

At the turn of the XX - XXI centuries, in this context, national security was understood mainly as the physical survival of the state, namely: the protection of its sovereignty, territorial integrity and the existing political system. At the same time, the ability of the state to adequately respond to any external threats was considered fundamentally important. Therefore, ensuring the security of people (citizens) to some extent receded into the background. E. Conteh-Morgan (2001), in particular, noted that “the widening scope and intensification of a global free market is beneficial to some states, but in others it has eliminated a "social contract" between the state and the society, accompanied by a strong perception that economic globalization is largely a process of "disorganized capitalism." The pervasive nature of these transnational and global forces generates dissatisfaction and multilevel (individual, group, and national) insecurity”.

Instead, the modern understanding of the essence of "national security" has acquired a clear military-political context, which, in turn, provides an appropriate strategic view of the principles, approaches and ways to ensure national security and proper defense measures against potential enemies, as well as search for potential allies.

For many countries, issues of national security are becoming doctrinal in nature, which certainly affects the priority for solving national problems. According to S. Bozhko (2005), national doctrines and concepts adopted as the main directions of security become the framework that determines current decisions and provides guidelines for the perspective. Thus, for the United States, According to T.Stukalin (2018), the doctrinal vision of national security has the following structure: fundamental (permanent) interests, which are to ensure security, prosperity and freedom of the American people; the country's mission at a specific historical stage (a doctrine that reflects national interests in a specific vision of the incumbent president); specific targets developed and achieved by the presidential “team”, government agencies, influence groups, commercial and non-governmental organizations – the national security actors. The multiplicity of subjects is determined by the specificities of the American institutional system. The key factors determining the process of developing approaches to national security in the United States are, in particular, the extent of the reality of the external threat, the political role of the president and the level of inter-party confrontation at the central level of government. The greater the external threat is accepted in government circles, the more centralized the process of shaping the state national security policy becomes and the more actively it is controlled by the president.

Such a response system, according to V. Konyshev (2010), significantly reduces the risks of using inadequate approaches of the administration, which could jeopardize national interests, and also makes it possible to avoid risky and ambitious foreign policy initiatives. As V. Belashov (2001) emphasized, traditional security assurance is envisaged by maintaining the balance of large powers within a multipolar world order.

For example, it is traditional for France to pursue a flexible balancing policy and to withdraw from any bilateral alliances in favor of multilateral ones. France is also characterized by a certain distancing from NATO and other European countries in matters of national security, including the use of military means, as well as pursuing its own nuclear policy. The President of the Republic plays a special role in the conceptual approaches to security and defense. According to the 1958 Constitution, the President is "the guarantor of national independence. In developing policy documents in the national security field, the president relies on advisers from the president's office. The participation of other executive bodies in the development of national security issues is much more modest. The role of political parties and representative bodies in determining the country's national security policy is limited by the constitution. In addition, the dominance of the executive power over the legislative one in France effectively nullifies the factor of inter-party struggle in defining conceptual approaches to security issues. However, most French parties develop their own foreign and defense policy programs and publish documents on various aspects of security. At the same time, there is a de facto absence of serious differences in national security policy between the factions of the French National Assembly, regardless of the severity of the current situation and the extent of the reality of external threats.

Britain, despite leaving the EU, remains an active member of NATO and does not relinquish its role in creating a European security environment. A.Marinin (2016) believes that the UK national security strategy is based on new

approaches that combine the readiness of special services for emergencies and the ability of ordinary citizens to participate in ensuring security on the ground. In November 2015, the basic document on military and foreign policy planning for the next five years - "National Security Strategy and Review of Strategic Defense and Security of the United Kingdom" (hereinafter - the strategy) was adopted. This document formulates the government's approaches to political, defense, economic and other aspects of the kingdom's security, adapted to existing and projected threats and challenges . According to the new strategy, the purpose of Britain's national security is to protect the population, territory, economy, infrastructure and way of life, reduce the possibility of threats to the kingdom, its interests and the interests of allies. The security threats in the modern world in the Strategy, in particular, include: changing the balance of economic and military power of the world's leading countries; the growth of rivalry between states and the emergence of more powerful non-state players; threats of terrorism, extremism and instability; cyber threats; destruction of the system based on international law, which affects the achievement of consensus and countering global threats. The strategy defines the principles of Britain's relations with NATO, the United States and other countries, including Russia, as well as with overseas territories and regions (A.Marinin, 2016). The main measures taken by the UK government under the new National Security Strategy are the creation of a “national register of potential risks” that will be accessible to all citizens; improving coordination between the military, the police, intelligence and diplomats within the country - in order to better respond to new threats by increasing the number of security forces by 4,000; creating a team of 1,000 civilian professionals to work in hot regions around the world in order to assist normal life; establishing in the United Kingdom four regional counter-terrorist units and four regional intelligence units to assist the police, etc.

The position of Poland is characterized by peculiar thrust, the state of national security of which in the XXI century is significantly influenced by global processes characterized by high dynamics and the presence of non-traditional threats. The greatest dangers include terrorism, international organized crime, economic instability, mass migration, and cybercrime. In the current geopolitical situation, the Polish military-political leadership has developed approaches to national security, which are reflected in the Constitution of the country and the National Security Strategy of the Republic of Poland (2014), international legal acts signed with the participation of the Republic of Poland and a number of strategic documents. The analysis of modern threats leads to the improvement of national forces and security measures in the direction of integration with the international security system, which allows a simultaneous use of elements of state defense and crisis management. Unified planning and training of military and civilian components at each level of response, a comprehensive approach to the timely solution of disparate problems, as well as creation of stable mechanisms for financing these processes are the basis for strengthening the state's defense capabilities and effective tools for its development (O. Zatynaiko, 2013).

According to Poland's National Security Strategy, its membership in the North Atlantic and European Unions guarantees the security of the state, provides an opportunity for its comprehensive development, and strengthens the position of the Republic of Poland in the international arena. The Polish leadership continues to consider the country's membership in NATO to be the most important factor in ensuring national security. Poland supports the plans to further advance the alliance to its borders with Russia and seeks to fulfill its allied commitments to strengthen the bloc's presence in various parts of the world. Emphasizing the leading role of the United States in ensuring stability and security in Europe, Poland is in favor of maintaining the American military presence on the continent in general and in its territory in particular. One of the priorities of the country's foreign policy is to strengthen its position in the European Union. The Polish leadership is considering the possibility of deepening political and economic integration, as well as carrying out concerted actions within the organization that contribute to the achievement of national goals and the protection of state interests.

"Strategy for development of national security system of the Republic of Poland until 2022" defines the main areas of cooperation between various institutions of state power, local governments and public organizations to ensure the protection of national interests, security of the individual, society and the state. In addition, the document takes into account the main provisions of the NATO Strategic Concept and the European Security Strategy. Proponents of national security policy, which is based on the provisions of the concept of political realism, dominate international politics. At the same time, they do not reduce forceful methods of ensuring national security only to using the military force. They increasingly consider political, economic, information-psychological and other levers of influence on other states as important and additional to force methods means of realization of national interests in conditions when asymmetric hybrid methods of influence became dominant.

Thus, stability of the political system, effectiveness of the armed forces, other security agencies, the relationship between them, the society and the government must be determined by the law, recognized by the society and implemented by political power.

Discussion

The country's integration into a particular military-political alliance allows it to strengthen its defense capabilities at the expense of the Allied forces. In recent years, this course is beginning to acquire new features, the essence of which is to redistribute the role of the military and political functions of military alliances. In order to ensure and strengthen the external security of the world community members, first of all the nation-states, it is necessary to create such a system of international security, which is based on a set of obligations, guarantees and capabilities of its entities. The main purpose of the modern system of international security is, of course, to ensure and strengthen the external security. However, in the current context, joining the structures of such a system requires the participant-states to significantly increase their level of internal security. This is possible only if democratic institutions are strengthened at the national level and under the following conditions: promoting the continued development of civil society, ensuring the rule of law, protecting fundamental human rights and civil liberties; strengthening the fight against organized crime and corruption; promoting sustainable economic development, etc. (NATO-Ukraine, 2003).

The most widespread and effective basis for creating a security system is the presence of a threat, because only when aware of the real shared threat do national elites show willingness to cooperate, develop a common identity that is not limited to borders and reinforced by a common goal. Thus, given that transnational phenomena, in particular international terrorism, religious and ethnic conflicts, international crime, migration, environmental catastrophes, etc., are increasingly becoming a source of threat to Europe, it is expedient to consider a cooperation-based model of the security system with the participation of the international security actors on the European continent NATO + European countries, proposed by R. Cohen (2001).

New element of the cooperative security model is a common commitment to providing individual security and strengthening the stability of socio-economic development. Security based on collaboration "is a strategic system formed around the core of liberal democracies, united by a network of formal and informal alliances and institutions that share common values, as well as practical and transparent cooperation in the economic, political and military spheres. Within the framework of a cooperative security model, the goals of individual states in the national security field are interconnected by four security rings that strengthen the system as a whole". According to R. Cohen (2002), members of a cooperative security system should be prepared for collective diplomatic, economic, and, if necessary, military action in territories that are outside their common space but threaten their prosperity and stability.

Conclusion

Thus, the main priority in the security and defense field should be to ensure stability in the areas adjacent to the area of responsibility, hence instability and conflict in these areas can pose a threat to countries participating in the cooperative security system. Today, there are three military-political security systems in Europe: the Euro-Atlantic security system based on NATO, which is the most powerful military-political organization in the world, the main force of which is the United States; European Union or the European security system, which in connection with the aggressive actions of the Russian Federation has been rapidly created based on the liberal democracy principles; the Eurasian security system, which includes the member states of the CSTO - Collective Security Treaty Organization, the former Soviet republics led by Russia. This group, proclaiming democratic values, unfortunately due to the desire of the Russian Federation to restore its geopolitical influences, cannot, in our opinion, claim to be effective in resolving security issues (A.Rotfeld, 2004). A separate group consists of the so-called non-integrated countries. Among them are neutral countries seeking to integrate into Western European collective security organizations and those that have not yet decided on the vectors of their choice.

From the point of view of the need to create a global security system, the issue of uniting all these systems and all non-integrated countries is on the agenda. The trend towards globalization and regionalization should help countries that aspire to join in the process of European unification to become members of the latest European collective security systems in the future. This may also affect some neutral countries. In the formation of a modern system of European security based on cooperation, one could return to the basic idea laid down by the OSCE founders in creating this organization - finding ways to understand the East and the West, to compromise between their natural worldview paradigms, but on the principles of democracy.

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The Internationalization of Companies: Comparative Analysis Between Behavioral Models and Economic Models

Mohamed Noor MAIOUI

ENCG Casablanca – University Hassan II Casablanca - LAMSO Unit Research, Morocco,
Email: maioui.mohamednoor@gmail.com

Abstract

A large number of theoretical publications and empirical studies are devoted to the analysis of the internationalization of companies. Many conceptual frameworks have been adopted to understand this phenomenon. The internationalization of enterprises is a field of research that has shaped several developments in the last decade. Several authors have developed different models with the objective of analyzing factors of international development. This article deals with a literature review of the main models of internationalization. Two typologies of models are analyzed. Models qualified as behavioral and models qualified as Economics.

Keywords: Internalization, Economic model, Behavioral model, comparative analysis.

Introduction

The transaction costs approach views internationalization as an attempt to minimize costs (Mucchielli, 1998) and increase internalization (Buckley and Casson, 1998). The eclectic paradigm (O.L.I.) “Enterprise, Localization and Internalisation”) emphasizes the objective of maximizing the benefits of internationalization (Dunning 1988, 1998). Since the mid-1970s, based on the sequential analysis of the internationalization process, this model has been the subject of numerous theoretical critiques and empirical verification tests.

Some authors have condemned its certainty and its analysis of the irreducible "progressive" (Andersen 1993). Other authors have criticized “the linearity, irreversibility and contingency of the model” (Rezendé 2006), while others have underlined the limits of this structure because it cannot explain the current globalization and the behavior of large companies. in the context of globalization.

However, there is a division between economic models and behavioral models. On the one hand, economic models or classic models focus on the economic logic emitted by these models on a company X that wants to internationalize. In this sense, by using basic economic models, an unprecedented logic takes hold and thus focuses on elements that are almost mathematically sound.

On the contrary, behavioral models focus on the behavior of human elements within the company and therefore these elements result in decisional and even economic volatility depending on the behavior of each decision-maker within the company who wants to internationalize. Following no logic, behavioral models sometimes lead us to make decisions that are neither optimal for us nor for the general interest. First, "emotional biases" such as jealousy or envy, which by comparing us to others and to the social group to which we belong, anchor our decisions in relation to a specific frame of reference. Then the "social preferences", such as a taste for cooperation, fairness, reciprocity that make us conform to social rules and norms.

Analysis of internationalization behavioral models

Most of the early empirical work dealing with the process of internationalization finds its foundations in the behaviorist or "behavioral" theory of the firm (Cyert and March, 1963), considering internationalization as the product of a series of incremental decisions (Johansonet Vahlne, 1977). By postulating the principles of limited rationality, satisfaction and social and political organization in order to understand the decision-making processes

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present within companies, this work marks a significant divergence from previous theories where the economic principles of profit maximization, perfect knowledge of markets and rational decision-making processes.

Models dealing with the process of internationalization of companies have focused on the characteristics of the firm (such as the decision-making process, the manager, etc.) to understand its behavior internationally (Andersen, 1993). Given the large number of models dealing with the process of internationalization of companies, it is obviously difficult for us to develop them all in detail. However, among all of this work, two avenues of analysis can be identified (Andersen, 1993; Gankema, Snuif and Zwart, 2000).

The models originally developed by Johanson and Wiedersheim-Paul (1975) and Johanson and Vahlne (1977) known as the Uppsala model; the work initiated by Bilkey and Tesar (1977), Cavusgil (1980), Reid (1981) and Czinkota (1982) grouped together under the name of Innovation models and which particularly emphasize internationalization as a process of innovation for the company. All of these models relating to the internationalization process (Uppsala model and Innovation models) emphasize the essentially incremental and cumulative nature of this dynamic (Ageron and Huault, 2002). Based on behaviorist theory, they analyze this strategy as a learning process comprising stages (for example, three in number in the model developed by Johanson and Wiedersheim-Paul in 1975 or six in the model developed by Bilkey and Tesar in 1977) through which the company passes.

In each of the models, the gradual nature of the firm's internationalization process can mainly be attributed to the lack of knowledge of the firm on the one hand and the uncertainty associated with the decision to internationalize (Andersen, 1993). One of the major contributions of these models is therefore the highlighting of an "internationalization path", of an evolutionary process comprising stages or stages that the company goes through successively.

The Uppsala Model

The Uppsala model finds its origins, according to Cheriet (2010), in the theory of the growth of the firm and that of the behavior of organizations and s' contrasts with the trends that maintain that companies can have an international dimension when they are created Cheriet (2010). This model considers that the development of business activities abroad takes place incrementally and sequentially (Pantin, 2006). Doing this this way, companies could reduce the uncertainty inherent in foreign markets and build on a broader "experiential" knowledge of international operations. The "U" model links the learning effect, the psychic distance, the mode of internationalization used and the network effect (Cheriet, 2010).

In the mid-1970s, researchers in the Department of Business Studies at Uppsala University made empirical observations that contradicted the established economics and normative literature on international affairs of the time. According to this literature, companies choose, or should choose the optimal mode of entering a market by analyzing their costs and risks according to the characteristics of the market and taking into account their own resources (e.g. Hood & Young, 1979). However, empirical observations from a database of Swedish affiliates abroad, as well as a number of sectorial studies of Swedish companies in international markets, indicated that Swedish companies frequently began to internationalize with ad hoc exports (Carlson, 1975; Forsgren& Kinch, 1970; Hornell, Vahlne &Wiedersheim-Paul, 1973; Johanson, 1966; Nellbeck, 1967).

They would then formalize their entries through agreements with intermediaries, often agents who represented the focal companies in the foreign market (Hornell, Vahlne &Wiedersheim-Paul, 1973). Usually, as sales increased, they replaced their agents with their own sales organization and as growth continued, they began to manufacture in the overseas market to overcome trade barriers that were still in place after the Second World War (Hornell, Vahlne &Wiedersheim-Paul, 1973), we have qualified this dimension of the internationalization model of the establishment chain. Another feature of the pattern was that internationalization often started in foreign markets close to the domestic market in terms of psychic distance, defined as factors that make it difficult to understand foreign environments (Nellbeck, 1967). Firms would then gradually enter other markets more distant in terms of psychic distance (Johanson&Wiedersheim Paul, 1975; Vahlne &Wiedersheim-Paul, 1973). This process has its origins in foreign liability, a concept that originally explained why a foreign investor had to have a specific advantage in the company in order to more than compensate for this liability (Hymer, 1976; Zaheer, 1995). In addition, the researchers present internationalization as a process ranging from a simple “export” corresponding to a strong perception of risk and a low resource commitment to the establishment of a “production subsidiary” combining a low perception of risk and a strong commitment of resources going through the intermediary stages of “agent” and “commercial representation”.

The" U "model has met with a number of criticisms, even calling it into question (Angué and Mayrhofer, 2010). It has mainly been criticized for its deterministic character and its analysis, in stages, not generalizable (Cheriet,

2010). The model has also been the subject of empirical invalidations (Angué and Mayrhofer, 2010; Cheriet, 2010). For their part, Boutary, El Mabrouki, Minialai, Monnoyer (2014) support the relevance of the model, but propose to revisit it to assess, in a contextualized manner, the process of internationalization of companies from developing countries.

Despite these numerous empirical confirmations, the U model has been severely criticized by international economics and management scientists during these three decades, both in terms of theoretical foundations and associated empirical constructs.

On the other hand, forty years after the publication of the primary Uppsala model, Johanson and Vahlne (2017) firmly presented their latest model as a general model. During this edition, they emphasized the key features of recent firms: "process instead of structure-oriented, a network instead of a stand-alone unit, pro-active and entrepreneurial instead of passive" (Johanson et al., 2017). We argue however that the Uppsala model's recent application to the trendy business world may miss the main focus of the dynamic combination of business networks, specifically ignoring the connection between the supplier and therefore the buyer. There's little doubt that the capabilities and knowledge development processes from Uppsala's general model (2017) become even more relevant for keeping the end-to-end of companies configuration alive. Firstly, to define them as a sense-making development during the internationalization process for both MNEs and EMNEs, the authors combine these two variables of capabilities and knowledge development as "dynamic capabilities" to confirm these development processes can catch up with the dynamic changes of the business environment. Secondly, we reaffirm the importance of commitment at a private firm level or a network perspective.

The extent of commitment is subject to the dynamic capability accepted by the firm's counterparty. Here the concept is to retain the "commitment processes" united of the variables to drive the change for opportunity development in terms of resource allocation for every finely-sliced economic activity. Third, the authors borrow the link commitment from Uppsala's business network model (2009) for illustrating the supplier and buyer relationship. The intention is to upgrade this variable as "relationship development processes," within which all participants inside the company can re-negotiate the deliverables and subsequent developments thereafter, like how organizing or re-allocating the investments may help to boost the performance or maybe enhance the end-to-end efficiency.

Lastly, instead of defining the firm's network position supported its committed performance; the general view is to broaden their application to multiple networks. Following technological advances, the firm may enter the network with a relevant field or a full new industry to diversify its business portfolio and sustain overall profitability. Considering its dependence continues to be on network effects (Thomas, Autio & Gann, 2014), here we propose a replacement variable of "ecosystem position" to hide more of the worth capture process. Ecosystem is defined because the collaborate arrangements through which the firms recombine their individual offerings into a coherent and buyer-oriented solution (Adner, 2006). it's seen as open communities comprised of various actors, like direct suppliers, complementors, regulatory authorities, policy makers, or related actors. (Thomas et al, 2014).

Another extension of the ecosystem has emerged due to the generativity of an enabling technology or digitalization platforms by aggregating heterogeneous alternatives to the external actions (Dattée, Alexy & Autio, 2018). The proposed conceptual model is supposed to supply a general model depicting the cumulative processes of internalization between the suppliers and therefore the buyers and further complement the company's transformation, even beyond the efficiency considerations.

The Strategic Decision-Making Model

Decision-making is the main driving force behind company policy, since through this process, the ideas and ambitions of the manager and other company actors are transformed into strategic actions. It is also the least visible facet of company policy. In this sense, any decision that converges towards the internationalization of a company is intended to be a strategic decision that companies adopt to expand their activity into new successful markets. However, relocating or creating a subsidiary in a foreign country presents a major challenge for the activity and the organization of the company due to the lack of knowledge to manage in foreign markets (Aharoni, 1966).

Thus, to fill this gap, Sami Basly (2006) in his article "The internationalization of the firm: are the theories of organizational learning obsolete? Started by identifying what organizational knowledge is in an international environment and what are its aspects, to then analyze how organizational knowledge has been developed and how cognitive and behavioral learning approaches contribute to this development. This current was developed later by Johanson and Vahlne (1977), these two authors recognize a primordial role in knowledge, in their view, and knowledge brings together an objective component and an experiential component. And so organizational knowledge, according to Basley, (2007), consists of getting an idea of the situation in the international market

through two main processes: the first process consists of acquiring knowledge of the target market (s) and the second process consists of to develop organizational knowledge of internationalization.

Knowing why this market and not others is very important for identifying opportunities and threats in foreign markets, and distinguishing between operational knowledge relating to foreign operations and local stakeholders, and institutional knowledge which encompasses everything.

Organizational knowledge, shows how to proceed with our activity in another country, it is an organizational competence based on the capacity to absorb and accumulate knowledge from our first-hand experience. This abundance of information will serve as a database when the company finds itself in a situation where it must make an irreversible decision.

Consequently, we cannot neglect the contribution of each of this knowledge for the organizational development of a company internationally, and therefore market learning and organizational learning are complementary and essential to have reliable organizational knowledge. However, there is little work that transposes organizational knowledge and learning into the field of internationalization (Welch et al, 2001). In this sense, two modes are used by companies to develop organizational knowledge internationally.

The first, which is mainly cognitive, gathers all explicit qualitative and quantitative information that we can have on a market through several tools such as market studies for example.

The second enshrines a tacit behavioral logic in which the company accumulates its knowledge through its first-hand experience, which is information that is transmitted through direct communication between directors and managers.

These two modes of knowledge development seem independent, but they are both important for developing a global organizational knowledge of the situation. For market knowledge, cognitive information is important for decision making and forecasting. But the longer the company stays in a foreign market, the more experience and tacit knowledge it gains that helps it solve problems. As for organizational knowledge, tacit information which will later be translated into explicit knowledge will help to face different organizational challenges.

The Network Model

A number of studies have demonstrated the role of networks in the internationalization of companies. Coviello and Munro (1995, 1997) conducted empirical studies on the internationalization of small software companies. They found that on-network relationships have an impact on the selection of foreign markets as well as on the mode of entry into the context of ongoing network processes (Coviello and Munro 1995, 1997).

Their results led them to develop a model combining the process model and the network approach. In a study of the international expansion of Japanese automotive component suppliers, Martin, Swaminathan and Mitchell (1998) found that the inter-organizational relationships of suppliers, especially those with buyers, affected their pattern of international expansion. Other researchers have studied networks in studies of internationalization strategy (Welch & Welch, 1996), the location of foreign direct investment (Chen & Chen, 1998), the first step abroad (Ellis, 2000), the The internationalization of companies (Chetty &Blankenburg Holm, 2000), the internationalization of companies in emerging markets (Elango&Pattnaik, 2007) and rapid internationalization (Loane& Bell, 2006), to name but a few.

The research that has been done to date has generally looked at how networks influence internationalization, without discussing how these networks were created and without taking into account the structure of the network in the country or countries where companies have entered (Elango&Pattnaik, 2007). Based on case analyzes, Coviello (2006) developed a model of "how do networks of new international companies evolve?" during the first phase of internationalization. Our focus differs from Coviello in that we focus on business networks as the market structure in which the internationalization firm is anchored and on the corresponding business network structure of the foreign market (Coviello, 2006).

If our objective is to develop a more general corporate network model for the internationalization of companies, the work of Coviello (2006) is nevertheless of great interest, because it shows that the "insidership" in networks, developed before the he entry into a new market, even before the company was founded, contributes to the specific internationalization process underway. The studies on which the 1977 model was based indicated that received theories about markets and marketing were not helpful in trying to understand the market situation of individual

firms. An international business-to-business marketing research program began in Uppsala in the mid-1970s to develop a better understanding of business and marketing markets.

Early observations that firms develop long-lasting relationships with important customers were an important input to this research program (Forsgren and Kinch, 1970; Johanson, 1966). An interaction approach focused on adaptation and exchange between suppliers and customers has been used as a theoretical framework for the study of commercial relations (Hakansson&Ostberg, 1975). A large-scale empirical study of the international marketing and purchasing of industrial products (the IMP project), carried out in the late 1970s and early 1980s by researchers from Sweden and four other European countries, was based on the 'interaction approach (Ford, 1997; Hakansson, 1982; Turnbull & Valla, 1986). The work carried out during the project demonstrated that close and lasting commercial relationships between suppliers and customers are indeed important, whether within a given country or between countries (Hallen, 1986). Since then, a number of studies have shown the importance of relationships in the internationalization process - customer follow-up strategies for example (Bonaccorsi, 1992; Erramilli& Rao, 1990; Majkgard& Sharma, 1998; Sharma &Johanson, 1987). Studies of the IMP project have also shown that such relationships usually involve a number of managers who coordinate the activities of different firms and together create interrelated routines (Cunningham and Homse, 1986). Moreover, these relationships seem to develop through social exchange processes in which the companies involved implement the relationship in an interactive and sequential manner (Kelley & Thibaut, 1978).

Since these firms are in turn involved in a number of additional business relationships, the firms operate in networks of connected business relationships (Anderson, Hakansson and Johanson, 1994; Cook and Emerson, 1978; Hagg &Johanson, 1982). The term connected means that the exchange in one relationship is related to the exchange in another. These networks of connected relationships are called business networks. The company can create new knowledge through exchanges in its network of interconnected relationships. Knowledge creation is the result of the confrontation between the knowledge of producers and the knowledge of users. The process of knowledge creation is not distinct from other activities in business relationships; rather it is integrated into it. Knowledge does not arise only from the company's own activities, but also from the activities of its partners, and since these partners also have other partners with whom their activities are coordinated, the focal company is indirectly engaged in a process of knowledge creation that extends far beyond its own horizon. Thus, a network of business relationships provides a company with an extensive knowledge base (Hagg &Johanson, 1982; Kogut, 2000). Penrose (1966) and the resource-based view (RBV) (Barney, 1986) assume that resources are heterogeneous and that these idiosyncratic sets of resources lead to the creation of value, regardless of market conditions. The corporate network view begins with these same assumptions and adds that exchanging within a network enables a business to gain knowledge about its relationship partners, including their resources, needs, capabilities, strategies, and more relationships.

The Analysis of the economist's model.

The latest developments in the world economy, such as the strengthening of international trade, the rise of emerging economies and the speed of economic progress, are enabling companies in emerging economies to catch up with their technological backwardness and to innovate. And compete on the international stage. Firms in emerging economies are increasingly international and face competition from foreign firms (Dunning and Lundan, 2008). For these companies, internationalization can bring many benefits, but also challenges. On the one hand, internationalization allows these companies to generate innovation, increase their productivity and acquire new points of sale and new technologies.

In this sense, economic modeling has thus been able to provide economic analysis with experimental bases: the model appears as an experimental framework which is equivalent to that which can be found in laboratory sciences.
For the past fifteen years, economic modeling has given rise to significant methodological literature. In particular, this enabled the specificity of models to be established as instruments of "mediation" between theory and reality (Cartwright, 1987). From this literature clearly emerges the complex positioning of models vis-à-vis the real: they can sometimes be radically disconnected from the real (they are then totally abstract models), and in other cases they can maintain relations of various orders with reality - reproduction of data, forecasting, definition of ideal types, preparation of economic policies. But, like any representation, they necessarily stand out from reality: they constitute constructions based on hypotheses (implicit or explicit) and, as experimental frameworks; they are based on conditions of isolation. Even if they have a relationship with reality, they are only a representation of it, partial or ideal.

The OLI model (Eclectic Paradigm)

The theory developed by Dunning (1977) constitutes a first major contribution to the analysis of international investment flows in the 1970s, although the first multinational firm developed in the middle of the 17th century under the name of "East India Company". ". Eclectic theory is conceived as a synthesis of the theories of internationalization and the theory of transaction costs, each of which provides only partial explanations of the location of firms. In this approach, Dunning was inspired by the work of Hirsch (1976) relating to arbitration carried out by a firm between the three methods of exploring the foreign market: either foreign direct investment, or export or sale License. By distinguishing the different costs relating to each modality, the simple comparison between these costs determines the choice of the most profitable modality for the firm. Hirsch's approach thus assumes perfect information on all costs, which cannot be the case on a global scale given the large asymmetry of costs and benefits. In addition, this approach, which is part of the static (non-strategic) models, only considers the choice of an isolated firm for which only the cost matters in the location decision. It is within this arbitration framework that Dunning (1981) constructs a simple two-country model in which firms choose between the three methods of entering the foreign market (FDI, License or Exports). This choice is made on the basis of the three types of advantages that a firm must have in order to internationalize and summarized by the OLI paradigm. It is:

- Ownership advantage (O) which results in the possession of a specific asset or specific advantage of the firm. It is a product or technology that other firms or companies do not have or do not have access to (patent, trademarks, trade secrets, etc.);

- Location advantage (L) which means that the asset must be durable for the company to operate abroad rather than in the country of origin. This is an advantage of locating abroad. The point here is to look for outlets that minimize the costs of production, marketing, etc.

- Internalization advantage (I) which is explained by the fact that there is less advantage to outsource than to operate this specific asset yourself. This is an advantage to internalization, in order to circumvent or avoid the risk of selling technology to other firms so as not to be exposed to competition.

Dunning distinguishes 2 types of inputs required by any business to produce beneficial outputs: The first type concerns resources within the reach of any business regardless but specific to a precise location (natural resources, market structure, government legislation, etc.). The second type is created by the company itself (like technological innovations) or can be acquired from other organizations as a right of use. The latter plays an important role in the sense that it offers endowments of property which, although linked to the location of firms, their use is not confined to location. These endowments are mobile between countries but not between firms, a phenomenon explained by the theory of direct investment (product differentiation, entrepreneurial capacities and multiplier economies). Thus, rental endowments and property approaches alone cannot explain all forms of commerce.

The final point of the approach concerns the use by the firm of its ownership advantages by internalizing its capital rather than externalizing it. This is explained by the firm's desire to avoid disadvantages or capitalize on the imperfections of public authorities and the market system. For the buyer, it is about the price of certain resources, their delivery time, etc. For the seller, internalization is encouraged by a market without price discrimination and with high information control costs. Public interventions in the allocation of resources (license of technologies, difference in tax policies) can also encourage the internalization of activities.

Thus, the choice of how to enter the foreign market depends on the conjecture between these three types of benefits. Indeed, a move abroad through FDI is only possible if the three specific advantages (O, L and I) are combined. On the other hand, if the cost advantage of L location does not exist in the presence of the other two O and I benefits, the firm prefers to export to foreign markets. Licensing will be the most favourable choice if it has only one advantage in industry O; Dunning (1988).

However, this theory remains marked by its purely microeconomic approach to the question of location and the absence of a macroeconomic analysis in terms of the comparative advantages of countries (Kojima, 1990). In addition, in the approaches of Hirsch and Dunning, the choice of the modality of market penetration results from a simple static trade-off between costs or benefits, which narrows the framework for analyzing location. This theory is also criticized by the absence of strategic interactions between firms in the isolated choices made by these firms, without taking into account the actions and choices of local and foreign competing firms. However, Dunning (1993) himself attempted to go beyond the static framework of his model for a dynamic approach to eclectic theory, by considering the evolution over time of the three types of advantages O, L and I.

The ILCM (International Life Cycle Model)

The international product cycle is a model that structures international trade in products. It focuses on the idea of the main advantages and production characteristics. When a product reaches mass production, the production process tends to shift outside of the country of origin. The country that generates a product idea often becomes the consumer of that product.

Following the failure of the Heckscher-Ohlin model to adequately illustrate the model of international trade, Raymond Vernon proposed the theory of the product life cycle. Raymond Vernon applies two methods to develop his theory, the labor-saving and capital-utilizing product model that caters to high-income groups.

The author uses the United States to illustrate changes in the commercial market. The products that are produced and consumed at a new stage come from the United States. However, when production reaches the point of mass production, most of the techniques used will be foreign. At the third stage of production, moves to developing countries.
In summary, this model shows the comparative changes in the trading market. The country that benefits the most goes from a country that came up with the idea to the country where the actual production takes place.

According to Raymond Vernon, products can be classified into three stages depending on the shelf life of the product and the trading behavior in the international trade market.

- **Standardized products,**
- **New products,**
- **Maturation products.**

The theory of the product cycle then introduces five stages of production: introduction, growth, maturity, saturation, and decline.

Step 1: Introduction
The first for any producer is to promote a new product in the market. At this point, customers do not know the product; therefore, sales and profits will be lower. Competition will also be weak in the market.

Step 2: Growth
At this point, the popularity of the product in the market will have increased. The production company needs to increase its promotional budget. The number of sales will also increase, hence the decrease in production cost.

Step 3: Maturity
Compared with the growth phase, the increase in sales volume and demand level is relatively small at this stage. Many consumers are familiar with the product and it is difficult to find new customers. Even though the number of competitors has increased at this stage, business is still juicy at this stage; everything seems to be favorable to producers. Foreign demand will also increase at this point, especially in developed countries. The increase in foreign demand will see the producing country create similar companies abroad.

Step 4: Saturation
At this point, competing companies will have taken part of the market. The production companies are doing their best to attract new customers, but there will be no increase or decrease in sales volume at this point.

Stage 5: decline
At this point, the product begins to decline in sales which ultimately affects profit margins. The economic viability of continuing to operate decreases considerably. At this point, the business can choose to stop production or sell the business. Another possible scenario is that the production company transfers its activities to a developing country.

Company-specific knowledge forms the basis of a company's competitive advantage. It is generated by investment in R&D and other proprietary information, which may be hidden from third parties. Company-specific knowledge can be viewed as an intangible asset, which dissipates over time through depreciation, diffusion and obsolescence.

Therefore, R&D is considered the main determinant of competitive advantage, during the introductory and initial growth phases of the product cycle. Marketing takes over as the main determinant of competitive advantage during the growth phase. Production becomes the main determining factor as the product matures.
Distance is introduced into the frame as a factor that affects interactions. The cost of interactions with suppliers, customers, agents and subsidiaries increases with geographic, cultural, legal and other economic distance components. "Distance premium", for example the difference between the interior distance and the economic distance.

Foreign costs of market services, and other interactions, also vary during the product cycle. Being strongly correlated with service intensity and knowledge intensity, which peak at the start of the cycle and decrease as the product approaches maturity, the distance bonus is an important component of the "responsibility of the company". foreign ", which affects the modes as well as the sequence of internationalization.

R & D, production and marketing activities are a determining factor of competitive advantage, evolve throughout the product cycle. The framework considers the implications of these changes for the internationalization of companies marketing products belonging to different phases of the cycle.

During the introductory phase of the cycle, commercialization is the main determinant, when investment in R&D peaks, technological superiority has a major impact on competitive advantage, and may even grant innovative companies a monopoly position. Production and marketing are of secondary importance in shaping the competitive position during this phase.

Behavioral Models Versus Economists Models

The ideals of conventional economics have driven economists through the treacherous forest of the financial world. It has provided them with a template to base everything on which they do. The new and evolving field of behavioral economics however is founded on concepts of its own. Others are equivalent to conventional economics, whereas others are polar opposites. We will explore these similarities and distinctions here.

Starting with parallels, the two forms of economy are seeking to achieve a deeper understanding of humanity. Both are attempts to take past experience and use it to predict what people will do next or how they will react to such scenarios. In order to make a good investment, one must try to predict future actions. Here's where the two methods diverge when one takes a hard left and the other a hard right. Traditional economics works under the premise that all people are rational beings. They can only make decisions based on what is best for them and their condition and "calculate everything when it comes to human rationality, behavioral economics is the very antithesis of traditional economics. Behavioral economics dictates that people are behaving very irrationally. People aren't perfect. They have urges and customs that they cannot regulate. Only a small percentage of the population would take the time and effort to take only measured risks or try to do some cost-benefit analysis of the situation before diving straight into it. We don't always learn from our past experiences, so we want to make the same mistakes over and over again.

The irrationality of human nature disallows the concept of developing a single unifying principle that suits all, and instead seeks to construct models that are unique to the specific situation to which they would be applied.

With regard to scientific methods, we can notice that the biggest differences are between the process and the system. Economic models have been trying to capture structural parameters for over 100 years and somehow measure them, particularly for political and corporate governance. Much older behavioral models try to concentrate on individual activity, desires for worth and economic decisions. Systemic parameters are often postmortems, while educated guesses are the subject of action processes.

Conclusion

To conclude this article, the various models that have been invoked have helped us to better understand the various approaches to the internationalization of companies. However, other studies have pointed to some limitations of the models: linearity of the process, non-reversibility, presence of stage jumps or direct implementation of certain firms, lack of analysis in terms of stage duration, etc. These critical studies are reinforced by the multifaceted nature of this type of business and the distinct organizational profiles of multinational firms and companies.

However, several limitations have been observed with regard to behavioral models as well as the economist models used in this research. Several researchers question the sequential and cumulative nature of the internationalization

process, especially when it comes to companies developing internationally from the outset. Many companies achieve a significant volume of their sales (25% of turnover) internationally in the first two or three years of their creation, without going through the different stages of the Uppsala model. Andersen (1993) criticizes the Uppsala model, showing that it does not specify the reasons or factors (internal, external) that may influence the process of internationalization of companies, including the brakes related to conservatism. It does not explain the mechanism by which "experiential knowledge" acquired gradually in foreign markets affects the commitment of resources. The model does not explain how the internationalization process will proceed. It does not explain how and why this process is being undertaken; and who would be the facilitators? Similarly, there is a blurring of the reasons and conditions for moving from one stage to another in the process.

On the other hand, the economic models do not objectively clarify the reasons why companies are internationalizing. In this sense, the OLI paradigm seems redundant to distinguish between the benefits of business ownership or the business-specific benefits (competitive advantages or key skills) and the benefits of internalization. In addition, it is also considered static; it does not explain the nature of the interrelationships between the determinants (company ownership benefits, market location benefits and the benefits of internalizing transaction integration), nor the strategic decisions that influence companies' entry choices, nor the change in environmental conditions (impact of social and political changes. Moreover, the applicability of the OLI or OLMA proposals seems low in the case of companies.

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Enhancement of Legal Framework to Combat Cybercrime in the Age of Disruption

Shereen KHAN
Multimedia University, Malaysia
shereen.khan@mmu.edu.my

Nasreen KHAN
Multimedia University, Malaysia
nasreen.khan@mmu.edu.my

Olivia TAN
Multimedia University, Malaysia
oliviatan@mmuedu.my

Swee Wei TAN
Multimedia University, Malaysia
tsw2108@hotmail.com

Abstract

One of the priorities of the 'National Policy' on Industry 4.0 is to holistically and rapidly transform industry strength of Malaysia in both a comprehensive and accelerated way and an integral component is the adoption of appropriate legislation against the misuse of ICTs for criminal purposes. The study shows that Malaysia's possible economic loss from cybercrime with the financial sector hitting its worst, it could hit a record of US$ 12.2 billion. With the advent of technology, cybercrime is increasing and it can be interpreted from the figures that either in investigation or legislation, there is something which needed to be looked into. Currently, the legislation on cybercrimes are in piece meals and Malaysia needs a comprehensive cybercrime legislation in order to achieve a good prosecution in cybercrime cases. Thus, the purposes of this study are to find out why existing law is ineffective, and examine on how other jurisdictions deal with cybercrime. Therefore, the main aim is to propose a comprehensive new law to tackle cybercrime effectively and efficiently. Both quantitative and qualitative analysis will be used in this study. In addition to conducting a comprehensive analysis by reviewing the laws in other selected jurisdictions, selected interviews with relevant government departments, nongovernmental organisations and legislatures will be conducted. A revised criminal policy aimed at protecting society from cybercrime, through the implementation of relevant legislation, needs to be followed as a matter of priority. Ineffective legislative framework results in encouraging criminals to conduct criminal cyber activities.

Keywords: Cybercrime; Legislation; Disruption

Introduction

Cybercrime, also referred to as 'computer crime', requires the use of cyber space as a weapon for unlawful ends, such as violations of privacy, theft on identity, fraud etc. Since offenders are more difficult to trace, economies of scale are greater and it is easier for cyber criminals to function on an international scale, cybercrimes are distinct from conventional crimes. More than three thousand complaints were reported In Malaysia during the three months period of movement control order (MCO) period in (March – June) which is an increase of nearly 100% compared to the same time in the pervious year. All these reported cases happened in urban areas with fast the internet connection and speed. Most of the cases are relating to cyberbullying, hacking attempts, spammers, cyber intrusions and cyber fraud. Cyber fraud cases involve misappropriation of personal data, soft loan scams and online scams. Based on the statistics obtained from the Malaysia Royal Police, nearly ten thousand cases of cybercrime amounting to nearly 300 million were committed during the first six months of 2020 in Malaysia. This is an alarming increase of cybercrime and there is an urgent need for Malaysia Royal Police, Malaysian Communications and Multimedia Commission, CyberSecurity and Bank Negara to act urgently to combat cybercrimes in Malaysia.

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Legislation relating to Cybercrime in Malaysia

There has been called for review of current laws of Computer Crime Act 1997, Evidence Act 1950 and Penal Code. Suggestions have made to introduce a new legislation to combat cybercrime effectively. The Ministry of Communications and Multimedia also called to amend or incorporate new cybercrime and cyberbullying laws when the Ministry announced to introduce a national cyber security policy developing digital entrepreneurs' cybersecurity systems and infrastructures.

Present laws are insufficient or ineffective and do not cover or describe cybercrime such as state-sponsored cybercrime and civil liability, online impersonation, cyberbullying, cyber-harassment, cyberstalking. Therefore, due to the rise in cybercrime cases in Malaysia, it is necessary to enact a new law to combat cybercrime.

Issues Relating to Cybercrime in Malaysia

The issue of this study, therefore, is that Malaysia does not have an effective legal system to combat cybercrime in the age of disruption. The research problem can be summarised as follow:

(1) There is a surge in cybercrime cases in Malaysia.
(2) Current legislation is not effective and inadequate to combat cybercrime in the age of disruption.
(3) Cybercrime is one of the world's leading criminal enterprises endangering the country's security.

The research questions are:

(a) Why the current legislation is not effective to combat cybercrime?
(b) How the legislation in other selected Jurisdictions namely the United States, the United Kingdom & Australia tackle the issue of cybercrime?
(c) Why is Malaysia in need of need of a new legislation to combat cybercrime?

The ultimate purpose of this research is to propose a new legislation to combat cybercrime in accordance with the 'National Policy on Industry 4.0'. The specific Objectives are;

(1) To investigate the efficiency of current legislation to combat cybercrime in Malaysia;
(2) To examine how cybercrime in other jurisdictions is managed especially the United States, and Australia.
(3) To suggest the most suitable approach to be applied in Malaysia.
There is no single piece of legislation to combat cybercrimes including online fraud, identity theft, impersonation, etc.

Analysis on the Issues Relating to Cybercrime in Malaysia

The act of trying to get unauthorised access to computers or networks and the unlawful communication to an unauthorised individual is criminalised under the Computer Crimes Act 1997 (CCA).

Various activities carried out by licensees and those identified and regulated under the 'Communication and Multimedia Act 1998' (CMA) are forbidden from network services from being used fraudulently or inappropriate way. If any type of cybercrime is committed then Penal Code will be invoked. Penal Code is pertinent in handling a wide range of cybercrime cases and in fact, it is the only legislation which can be used to prosecute where any other legislation does not specifically spell out the crime or when the specific crime does not fall within the scope of any of the cyber-law legislation.

Cybercrime legislation in Malaysia are based on the sector involved. Network and reliability falls under the jurisdiction of Malaysian Communications and Multimedia Commission (MCMC) and thus it is governed by the Communications and Multimedia Act 1998. Issues relating to violation of personal data and relating issues fall under the jurisdiction of Personal Data Protection office and governed by Personal Data Protection Act 2010. Other statutory bodies which have the jurisdiction over cybercrimes relating to financial issues are Securities Commission of Malaysia (SC) and Central Bank of Malaysia under the Computer Crimes Act 1997.

Because of the exponential growth of connected devices, especially during the 'Fourth Industrial Revolution' (4 IR), fighting cybercrime will be increasingly difficult. A new law would help to protect people's rights and well-being,

as any complaint could be resolved by legal means. One instance of a cybercrime that has affected 300,000 computers in 150 countries is the latest Wannacry malware attack.

Based on CyberSecurity Malaysia statistics, there is an increase in cyberbullying cases involving students in recent years although the statistics is based on the cases reported and there are a number of unreported cases throughout the country. DIGI Telecommunications Sdn. Bhd. conducted a survey and it was reported that there is an increase in cyberbully cases among the students.

The CSM needs more authoritative and pro-active measures at a time when cyber treats are growing, including cyber take-downs of bad guys when their criminal actions are detected. In fact, instead of waiting to detect incidents, the team should be able to track the cybercriminals and bring down their server. Current legislation still does not allow the CSM to take action and it is necessary to consider granting the CSM greater powers.

The need to reinforce cyber defences is also consistent with the emergence of the IR 4.0, which is embedded in our lives and society with technology. The Penal Code fails; it is either too ambiguous, vague or under-inclusive targeted actions, leaving weakness in the legislation which in turn results in inefficiency is dealing with a wide range of sophisticated cybercrime issues. Under the Penal Code, it is a requirement to prove *mens rea* and *actus reus* and it has to be proved beyond reasonable doubt. If it cannot be proved that the perpetrator cannot be prosecuted and the whole claim will fail no matter how much distress or damage have caused to the victim. In addition, cybercrimes such as state sponsored cybercrime are not covered or set out by current law and subject such states to civil liability.

In the wake of global cyber threats, such as the WannaCry and Petya (NotPetya) attacks, the need for a coordinated response has become more urgent. Cyberattacks, cybercrime, and cyber espionage have become more widespread and unavoidable than ever before as warfare progresses. In Malaysia, existing legislation is insufficient or ineffective to address these problems. In November 2016, a foreign actor targeted Saudi Arabia's aviation agency by sending a virus specifically intended to penetrate government agencies.

Findings and Recommendations

The examination of cybercrime laws and the effectiveness of the current legislation in other jurisdictions highlighted that there is a need for new legislation to be implemented in Malaysia. The information on other jurisdictions was collected mainly through literature review. It also follows a qualitative research approach; where the data are gathered through the method of semi-structured in-depth interview methods by using open-ended questions in order to obtain a comprehensive description of the experiences of the respondents. The legal resources such as statute, cases and international agreements will be reviewed for study. The library, electronic journals and conferences will be sources of materials and data and interviews with the respondents. In order to establish more precisely the mechanisms involved an open-ended interviews with above stated policy makers and the public. The purpose of interviews is to capture different perspectives on the necessity of having a new legislation in Malaysia and to determine whether there really is a need of having a new legislation or amendment of existing legislation since there are calls to implement a new comprehensive legislation to combat cybercrime. The interviews will be conducted by using loosely structured with questions relating various aspects of the legislation and developments in society.

In this analysis, the comparative research method will be used to analyse law enforcement in some jurisdictions, especially in the United Kingdom, Australia and the United States. The reasons for choosing these jurisdictions are that United Kingdom and Australia are being the commonwealth countries and the United States is selected for being the country advanced in cybercrime legislation. Hence it is a worth looking at their practice. This is to ensure that there will not be a direct legal transplant and the approach that should be introduced in Malaysia has to be in line with evolvement of new technology. The legislation in Japan will be look into since Japan has embrace IR4.0 successfully. The empirical method is used by evaluating the efficacy of the applicable legislation and discussing the concerns in the jurisdictions listed above. In summary, therefore, the methodology used in this study consists of the review of the material from which the data and information collected are derived from the books, documents, proceedings, statutes and conventions; and the data collected from the conduct of in-depth interviews with the relevant authorities to support the research findings.

Hence the findings were based on the research which used both qualitative and quantitative approaches. Data collected were categorized and later conclusions were made to the findings.

Conclusion

One of the challenges of embracing IR4.0 is the challenge of transforming the nation into a Digital Nation while protecting the Digital Sovereignty of Malaysia. To overcome these challenges, it is important that a new legislation be introduced to combat cybercrimes. The findings of this research will contribute to the Government in drafting a new legislation to combat cybercrime in the age of disruption.

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Legislation (Malaysia)

Computer Crimes Act 1997 (CCA)
Communications and Multimedia Act 1998 (CMA)
Penal Code

An Extended Unified Theory of Acceptance Model to Explain the Adoption of Electronic Payment System in Malaysia: A Conceptual Framework.

Tamsin ROSMAINI

Universiti Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia, rosmaini@uthm.edu.my

Ishaq JAAFAR

Ahmadu Bello University, Zaria, Nigeria, ishaqjaafar212@gmail.com

Abstract

As the level of adoption toward electronic is becoming stringent, certain factors are considered influential toward such behavior. This paper attempts to propose the key factors that affect the adoption of electronic payment system in Malaysia and the mediating factor that influence of each one of the factors in Malaysia. It offers a comprehensive framework that broadens the existing UTAUT model with important constructs such as government incentive and the mediating role mobile device proficiency. An extensive systematic literature review of the literature relating to electronic payment adoption was conducted. Lastly, this study settled on a conceptual model after reviewing previous studies and recommend an empirical investigation for validation in future for researchers and practitioners. Discussions and conclusions including academic and practical implications are also presented.

Keywords: Electronic Wallet, Technology Adoption, User's Intention, Mobile Device Proficiency, Technology Skills.

Introduction

As the advancement in technology is critical, it aims at simplifying our daily activities. Given it current advancement at a larger scale such has encourage a growing participation among technology users. Given the continuous increase of technology users, fintech is also expanding. With Malaysia been regarded as a country with the potential to become a global fintech hub. The potential of fintech market in Malaysia, is relatively based on the largely unbanked and underbanked population, coupled with high rates of smartphone penetration, such offers huge potential for new fintech firms, so as to offer the much-needed services that are lacking by traditional financial institutions. The companies compete by offering convenience and ease of use of financial technology through the transaction process., the most popular fintech startup in Malaysia consist of, apppay, ghl systems berhad, billplz, boost, alipay, touch 'n go, swapit, hellogold.

With the present of Fintech Companies in Malaysia, the level of adoption is becoming stringent. According to Prensky, (2001) in Malaysia, most of its citizens are perceived to be digital natives. Yet, in spite of the nation's dependence on technology in terms of collecting information and communication, most of its citizens appears not to use or possess the required skills that is expected from digital natives (Bennett, Maton, & Kervin, 2008). However, it's evident without such skills it becomes extreme difficult for individuals to deal with the various forms of financial technology services so as to access and process information for their financial need. Therefore, such indicate that mobile proficiency in terms of electronic payment system is an important determinant on individual adoption. In terms of addressing the adoption and acceptance of the new technology, the basic challenge that frequently requires a fundamental change is the individual behavior, which is an overwhelming task to control or influence. Various forms of carrots and sticks

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approach could be utilized to promote such change (Hillman, 1991). One of those campaigns involves the use of government incentives, which as of late has received substantial consideration with regard to electronic payment adoption in Malaysia. According to Meyer et al., (2008) calls have been made to the Government to assist with regard to bridging the chasm of technology adoption by offering incentives, and such has paved way for the Malaysian government to promote its cashless policy through e-Tunai Rakyat incentive which entitles Malaysians aged 18 and older with an annual salary of less than RM100, 000 a chance to benefit from the once in a life time RM30 incentive. It is however vital to examine the factors that affects individuals' intentions in terms of using e-payment system. Consequently, this paper attempts to propose a model that comprises of factors that lead to influencing individual intention with regard to the use e-payment system in Malaysia. The paper is structured in sections as follows: literature review, and proposed model; subsequently, future research; last section concludes our study.

Literature Review

This section, we provide a systemic literature review, especially related to the Electronic Payment (E-Payment), and the related theoretical background that underpins this research.

A systematic literature review on the term "electronic payment system adoption" was conducted from four databases Emerald Insight, Science Direct, Jstor, Springer and Taylor and Francis online. Based on the search by keyword "electronic payment system" used in the quality journals, the returned results in border prospective are shown in Figure 1 with enough theoretical empirical findings. A high-level review on the term "electronic payment system adoption" from the four databases returned 25563 documents out of which 19474 are academic journals and conference papers. To further refine this research on the keyword electronic payment, 210 academic journals and conference papers were peer-reviewed with time scale of last 35 years. The search duration was selected within the period from 1975 to 2020 with the more contemporary research on management fields and timeframe since Fishbein, M., & Ajzen's (1975) published "Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research" which was influential to focus relationship between the existing attitude and subjective norms against behavioral intention. Systematic literature review concluded that most of the relevant articles related to electronic payment technology adoption are available in Scopus indexed journals and conference papers.

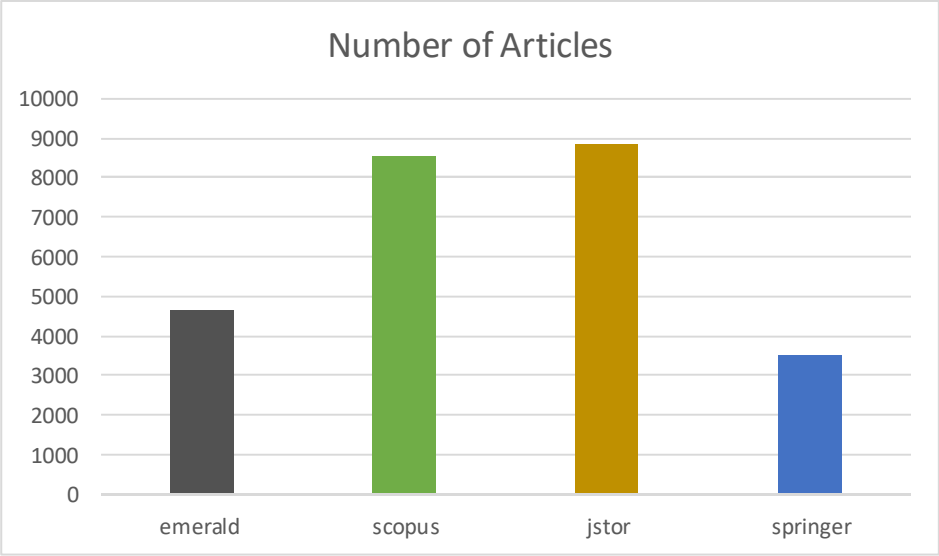

Fig. 1: Search results of "Electronic payment system adoption" from different databases.

Electronic Payment (E-Payment)

Generally, the term electronic payment refers to online transactions that are conducted via the Internet, although there are many other forms of fintech (Mellon, 2015). Therefore electronic payment can be defined as the process of payment made without the use of paper instruments (Skan, J., Dickerson, J., & Masood, 2015). The electronic payment systems

consists of online credit card transaction, electronic wallet (e-wallet), electronic cash (e-cash), online stored value systems, digital accumulating balance systems, digital checking payment systems and wireless payment systems (Ryu, 2018). In today's business transactions individuals tend to use debit card as a form of payment. Currently, electronic wallet is most prevailing payment service system. By the use of e-wallets, consumers only need to enter the information once and can be used on any site to perform any form of financial transaction. Thus, the use of e-wallets will improve efficiency in transaction. Today, there are many companies that have developed and provide the e-wallets, including major companies such as grabpay and touch and go in Malaysia.

Internet transaction is a term-based transaction or payment system that involves making payment through the internet with the actual presence of the buyer and the seller. However, this requires both the buyer and the seller to connected to the internet with the same online payment platforms form of transaction is widely known as online payment and the most widely used method incorporate the use of debit card or credit card. According to BNM (2017), the country's central bank, online banking transactions totaled MYR463.7 billion ($118.74 billion) in 2016, a 31.7% increase from MYR352.1 billion ($107.59 billion) in 2015. Meanwhile, banking transactions carried out on mobile devices, which BNM counts as separate from online transactions, jumped by more than 60%, rising to MYR33.0 billion ($8.45 billion) last year from MYR20.6 billion ($6.29 billion) in 2015.

Internet banking provides a fast and convenient way of performing common banking transactions, such as transferring funds from the customers' savings account to their current account, or even to a third party's account. Through Internet banking, customers could also repay their loan and card outstanding amount, make payments to relevant parties, such as utility bills, assessment tax, and others. The essence of Internet banking service is to provide comfort to the registered internet banking users so as to perform their daily transaction with ease (Oliveira et al., 2016).

All internet banking transactions are secured to ensure that users' information could not be stolen (Chen, 2013). However such is due to the users precaution practice, which comprises of hiding their Login ID, password or PIN confidential; inspecting on whether that they have logged into the right website; logging-off at the end of each session and clearing the memory cache and history after logging out from the website; and protecting their personal computer from viruses and malicious programmes by installing an up-to-date hackers firewall and a reputable anti-virus program.

Electronic cash (e-cash) is a term used to describe the stored value and can be exchanged through the system created by the entity (not the government) without the use of paper documents or coins, but can be used in lieu of currency issued by the government. The basic concept of e-cash is a payment processing via the internet through a unique token that has been authenticated that represents money from the consumer to the merchant. Consumers will make a deposit a sum of money or a credit card, then the bank will give tokens (unique number encrypted) in some denominations of money to be used for shopping at the merchant site. Merchant will exchange the token back to the bank to get the actual money. Digicash is a pioneer company in the development of e-cash and there are some companies that still developing the idea of digital cash, such as GoldMoney, Bitcoin, etc.

Online stored value is the system that allows consumers to make online payments instantly to merchants and other individuals based on the value stored in the online account. One of the very popular online stored value systems is Paypal. The system called peer-to-peer (P2P), because the payment is made between one individual to another within the same entity. In Malaysia there are online stored value system which is quite popular in online payments including Vcash.

Mobile payment allows individual to make payments to their preferred merchants by through the means of mobile phones (Ivarsson, 2008). Bill payments and purchase of goods and services are among the cashless transactions that can be made. For an individual to benefit from such payment system, an account is required to be open with the selected choose of the mobile payment service providers. Non-bank mobile payment services are provided using an e-money account.

Theoretical Background

Various forms of research model have been developed so as to determine user's acceptance of technology information. Davis (1985), first introduced the technology acceptance model (TAM) to determine the behavior of computer usage. Such a model was incognizant of some factors such as perceived usefulness and perceived ease of use so as to predict

the behavioral attitude and user's intention of information technology use. Contrary to TAM, Venkatesh et al., 2008 developed a new model which is known as the unified theory of acceptance and use of technology or UTAUT was developed to identify users motivation in relation to the use of technology also known as UTAUT theory came into existence through the integration of theories such as theory of reasoned action (TRA), the technology acceptance model (TAM), motivational models (MM), theory of planned behavior (TPB), combined TAM and TPB (C-TAMTPB), the model of the PC utilization (MPCU), innovation diffusion theory (IDT) and social cognitive theory (SCT). The unified or UTAUT mainly has four constructs namely performance expectancy, effort expectancy, social influence and facilitating conditions that affects the intention and use of such technology.

- Performance expectancy indicated how certain individuals feels with regard to the use of technology which could help and provide them with certain advantages such as speed security and convenience of transacting

- Effort expectancy refers to the level of perceived ease of user at the point of using such technological service. It also refers to a system that is easy to understand and use without much skills need.

- Social influence referred to as the perceived influence of key individuals that encourage individuals to use such technology system. Such key individual is likely to family couples and organization.

- Facilitating conditions refers to individual's perception of the resources and support to use such technology

Based on the UTAUT performance expectancy effort expectancy and social influence affect the behavioral intention to use the technology, while the behavioral intention and facilitating conditions determines the use technology.

We designed a model that focuses on the factors that influences the individual intention toward the intention to use electronic payment system in Malaysia and its mediating influence. The proposed model was adopted based on the UTAUT model so as to investigate the customer's intention to use electronic payment system in Malaysia.

Much research has been developed and modified based on the UTAUT proposed model so as to get variables that correspond to the context of their research, in this proposed model, an external factor and a mediating variable where considered and added to the UTAUT model. The external factor and the mediating variable consist of government incentive and mobile device proficiency respectively. Both factors were considered to be critical factors in relation to this study which focuses on electronic payment system adoption in Malaysia.

To improve electronic payment usage, a reward system has been provided by the government, which aims at reducing the usage and dependency of physical cash. While this may curb the use of electronic payment system, its effect on users trust in the electronic payment system has been raised into concern. Electronic payment users may wonder whether these financial incentives will affect their containment and intention to use. In these circumstances, the relationship between individual intention to use electronic payment system and the role of government incentive can inadvertently be underpinned. Lee & Song (2010) suggests that that when a company engages in offering an apology, compensation or corrective action such may aide toward affecting individual behavior. Although limited studies exist in terms linking the relationship between government incentives, the literature can be helpful in hypothesizing the relationship linking the two variables. As has emerged previously, a reward system could be critical element in staring an online transaction. One may, therefore, expect that the reduction perceived risk felt by consumers in the presence of reward mechanism can inevitably increase intention to use and trust in such system. This study aimed at inquiring into the effect of the reward program as offered by the Malaysian government in relation to electronic payment usage, which is most widely applied as a sales promotion tool for the foodservice industry, on customer trust , commitment and loyalty (Kim et al., 2009).

Mediating Role of Mobile Device Proficiency

Mobile device (e.g. smartphone) proficiency is gradually becoming more important in terms of performing our day to day task. Therefore, inadequate proficiency can lead to preventing group of individuals from obtaining the benefits of technology utilization. With the growing prominence of technology users, a distinct set of abilities referred to as mobile device proficiency has emerged that allows individuals to effectively cope with the ubiquitous service such as mobile application (Helsper, Van Deursen, & Eynon, 2015). Notably, the lack of inadequate mobile device proficiency could

lead to preventing individuals from benefiting from the many advantages that is currently been offered by fintech which could be found in the form transportation, entertainment, health, and communication (Van Deursen, & van Dijk, 2015). Under the circumstances of smartphone decencies in the use of financial technology services, low proficient individuals will face challenges obtaining theses and a myriad of the other benefits offered by smart devices and become digitally excluded. In Malaysia , for instance, it evident that a significant number of individual appeared to not use or possess the necessary skills that is expected from digital native have despite Educators in Malaysia tend to assume that most students today are digital natives(Bennett, Maton & Kervin, 2008).

In describing the attributes of mobile information literacy, Clark, Coward, Rothschild, Reynal, & Richter (2017) first and foremost most people patriciate in online activities via mobile device. Secondly the current framework that exist are PC centric and developed for pc users. Thirdly the key differences concerning the device characteristics that are between the pc and the mobile device which consist of size portability information design and hardware features mean many information behaviors differences. Fourth the existing skills or proficiency in mobile devices or in smartphones could serve as a barrier toward adoption. Lastly, other business organization such as electronic payment service providers are begging to work in these areas, by making mobile skills training a priority.

The level of skills that is required to operate a smartphone is very different from that of personal computer or a feature phone. Such difference come in the form of affordability and the limitations of each technological device shapes how people interact with information. This is true for both physical interaction such as touching and pinching rather than clicking and information architecture and design-based interaction (Güler, Kılıç & Çavuş, 2014). Mobile specific tendencies include interacting through apps versus a browser, coming online via handful of walled garden applications, information consumption rather than production, conducting shorter and location focused searches (and viewing fewer result), and a focus on social activities over more serious (Kim, Tavitiyaman, & Kim, 2009).

It's proven that the lack of the required skills or the proficiency in a technological device could serve as a significant barrier toward internet adoption and uses, which ultimately leads to further digital divides (Van Biljon, Van der Merwe, & Van Heerden, 2014). Based on the relationship between performance expectancy and mobile proficiency denotes whether users are able to notice improvements in their skills when adopting the technology (Khalifa, & Shen, 2008; Pituch & Lee, 2006). Effort expectancy significantly influences mobile device proficiency, and that users' skills is strengthened when the system is easy to use, and found to be useful (Chang, & Tung, 2008; Lee & Lehto, 2013). Hence, zuagbe et al., (2019) describe perceived ease of use as a significant determinant toward e-Skills in library technology acceptance intention. In relation to government incentive, individual tend to perceive reward as a motivating mechanism which allows individual to put more effort in an activity. Reward systems usually reflect the values and could attract or repel prospective talents and shape individuals behavior (Edvardsson, 2008; Garbarino, 1975; Rynes, 1987). Steel et al., (2016) suggest that punishment impacts skilled behavior more than reward in a complex, task dependent fashion. When users use Facebook as an equipment for educational purpose by exploring the site using English language, great opportunities arise for users to learn English language with millions of users at the same time (Initiative, 2006). The interaction with friends on Facebook drives both local and global research collaboration, and improves language proficiency (Rowlands et al., 2011). Furthermore, Kafai et al., 1998) in their study of ''game design as an interactive learning environment for fostering students' and teachers' mathematical inquiry'' found that conceptual design tools enriched the instructional design process of both students and teachers. In relation to the present setting, facilitating conditions refer to the belief that with necessary resources, capability, and a sense of control, the use of roleplay games in class would improve students' Japanese language proficiency.

Therefore, given the signifies of mobile devices for electronic payment users, without the appropriate mobile and digital skills, there are population that are bound to be left behind, even if they are technically connected to the internet. Hence mobile device proficiency can be regarded as a mediating variable as evident the figure below.

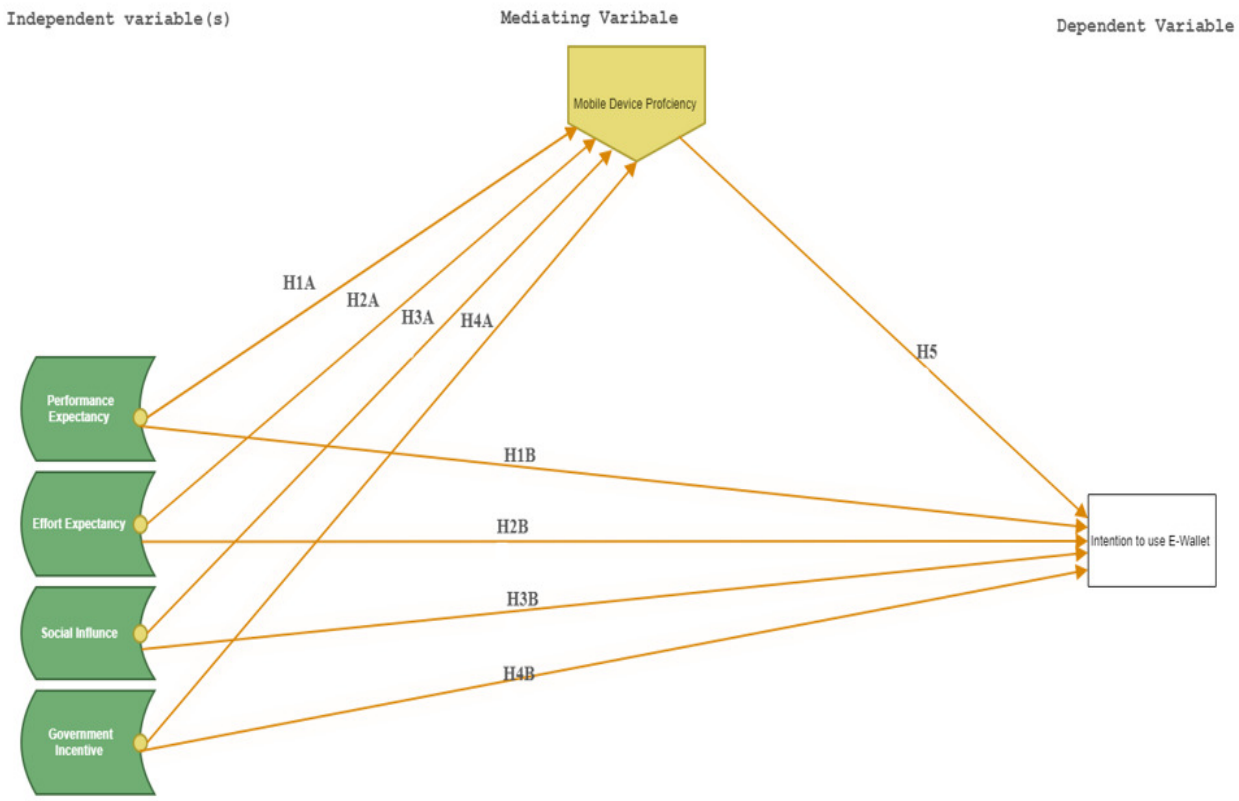

Fig. 2: Conceptual Framework

Conclusion

The aim of this conceptual paper is to systematically review the current literature on electronic payment technology adoption and investigating associated theories and models, how the factors of electronic payment system is contributing to the adoption of in the financial technology industry. Prior findings are reexamined systematically so as to uncover the factors affecting electronic payment adoption from both qualitative and quantitative researches. Two factors government incentive and mobile device proficiency are the piece of proposed conceptual framework having significant relationships with electronic payment system adoption. Government incentive was considered as an independent variable to electronic payment service adoption as dependent variable and mobile device proficiency is used as mediator between the relationship of effort expectancy, performance expectancy, social influence, facilitating conditions and government incentive with electronic payment system adoption as evident in Figure 2. The conceptual framework is suggested on the grounds of exiting literature, theory and models, nevertheless its empirical examination is left for future researchers and practitioners.

Future Research

The six-hypothesis built on the proposed conceptual framework will facilitate toward contributing in the empirical validation of UTAUT model. We will motivate a study that focuses on proving the empirical result of the antecedents of technology adoption in context of electronic payment system and other self-serving technologies. However, more empirical research is required to further examine the impact of perceived waiting time, transactional cost, cultural, and perceived benefit on technology adoption in both electronic payment and self-service technology settings so as to further validate the already implemented technology acceptance models and related theories.

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Tastes, Preferences, Consumption and Purchasing Habits of Bread in The Bragança Region, Portugal

Letícia Cabrera Parra BORTOLUZZI
Universidade Tecnológica Federal do Paraná, Campus Campo Mourão - Via Rosalina Maria dos Santos, 1233 CEP 87301-899 Campo Mourão, Paraná, Brasil, leticia_cabrera@outlook.com

Maria Isabel Barreiro RIBEIRO
Centro de Investigação de Montanha (CIMO) - Instituto Politécnico de Bragança, Campus Santa Apolónia, 5300-253 Bragança, Portugal, xilote@ipb.pt

Adriana Aparecida DROVAL
Universidade Tecnológica Federal do Paraná, Campus Campo Mourão - Via Rosalina Maria dos Santos, 1233 CEP 87301-899 Campo Mourão, Paraná, Brasil, adrianadroval@utfpr.edu.br

António José Gonçalves FERNANDES
Centro de Investigação de Montanha (CIMO) - Instituto Politécnico de Bragança, Campus Santa Apolónia, 5300-253 Bragança, Portugal, toze@ipb.pt

Abstract

This study aimed to know the tastes, preferences and consumption and buying habits of bread in the Bragança region. A quantitative and cross-sectional study was developed based on a questionnaire applied online to 215 consumers who buy food products in the Municipality of Bragança. Most consumers were Portuguese (67%), female (61.9%), lived in urban areas (85.6%) and like bread (99.1%). Wheat bread (72.1%) and whole grain bread (64.7%) are the most consumed, despite not being bread from the Bragança region (47.9%). The three types of bread in the Bragança region that are best known and also the most consumed were Nogueira, Rebordainhos and Argozelo bread. Most consumers eat bread at least once a day (62.3%), 1 to 2 slices/small breads a day (76.7%), usually at breakfast (67.9%). The preferred type of accompaniment are vegetable fats (66.5%) and dairy (65.6%). The most valued attributes were the freshness (92.2%), the fresh bread smell (87.6%), the fluffy texture (80.8%), the crispy crust (76.1%), the price (56.2%) and the long lasting (55.2%). Most consumers buy bread at the supermarket (55.2%). The quality of the bread (96.9%) and the hygiene and cleaning of the space (93.7%) are the factors most valued by the consumers at the time of the purchase. Taking into account the nationality, differences were identified in the type of bread consumed, the time of consumption and the chosen accompaniment. In fact, foreigners prefer to consume whole grain bread and special bread with cheese or cottage cheese at any time of the day. Portuguese consumers prefer rye or brown bread with jam or honey.

Keywords: Bread, Consumption habits, Consumer, Market research.

Introduction

Food choices depend on consumers' beliefs and attitudes (Biloukha & Utermohlen, 2000; Roux, Le Couedic, Durand-Gasselin & Luquet, 2000). Increasingly, attentive and informed consumers use several criteria to assess whether or not a food product meets their expectations and requirements. The main characteristics of a product are related to the price, the brand, the quality seal, the country of origin, the appearance of the store and information about the production and composition of food (Gellynck, Kühne, Bockstaeleb, Walle & Dewettinck, 2009).

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Nowadays, there is a growing consumer concern about health (Küster-Boluda & Vidal-Capilla, 2017). Consumers realize that a careful diet can provide a better quality of life, preventing diseases (Borges, Pirosi, De Paula, Ramos & Chaves, 2011; Küster-Boluda & Vidal-Capilla, 2017). The traditional Mediterranean Diet, Intangible Cultural Heritage of Humanity since 2010, is currently considered an excellent model of a prudent and healthy diet (Azcona, 2016), given the existing scientific evidence on its protective role in the prevention of various diseases, namely, chronic diseases, cardiovascular diseases, degenerative diseases, cancerous diseases, among others (Naska & Trichopoulou, 2014). Cereals, mainly in the form of bread, in addition to vegetables, are a basic product of the Mediterranean diet (Oldways, 2009; Gil, Ortega & Maldonado, 2011; de Lorgeril, 2013; Trichopoulou, Martínez-González, Tong, Forouhi, Khandelwal, Prabhakaran, Mozaffarian & de Lorgeril, 2014). Bread is a food considered to be appetizing, healthy, highly nutritious and low price (Dewettinck, Van Bockstaele, Kühne, Van de Walle, Courtens & Gellynck, 2008; Cauvain & Young, 2009).

Man learned to make bread more than 4000 years ago, a food that has been part of the diet for many centuries (Dewettinck, Van Bockstaele, Kühne, Van de Walle, Courtens & Gellynck, 2008; Cauvain & Young, 2009) registering, since it was introduced in the diet, high frequencies of consumption and in large quantities (Montoya, 2013). Reasons why consumers perceive bread as a basic and traditional food (Gellynck, Kühne, Bockstaeleb, Walle & Dewettinck, 2009).

Bearing in mind that consumers have the habit of accompanying their meals with some type of bread or making it a basic food in their meals (Dewettinck, Van Bockstaele, Kühne, Van de Walle, Courtens & Gellynck, 2008; Cauvain & Young, 2009; Jeżewska-Zychowicz, 2016), bread has long been in a position of global importance in international nutrition (Cauvain, 2004).

Although the type of cereal and/or the ingredients may vary (Dewettinck, Van Bockstaele, Kühne, Van de Walle, Courtens & Gellynck, 2008; Cauvain & Young, 2009), as well as production techniques (Martin, 2004), the basic ingredients of bread are, in particular, cereal flour, water, yeast or other fermenting agent and salt (Martin, 2004; Barbarisi, De Vito, Pellicano, Boscaino, Balsamo, Laurino, Sorrentino & Volpe, 2019). Water and flour are the main ingredients of a bread recipe and affect texture and crumb. Salt, as an ingredient, performs various sensory and technological functions. Sensory function is related to taste, while technological functions are related to changes in the properties of the dough during baking and fermentation. The addition of salt affects the volume or height of the dough. Reducing the level of salt can have an adverse effect on consumers' perception of the bread's full flavor (Jeżewska-Zychowicz, 2016; Barbarisi, De Vito, Pellicano, Boscaino, Balsamo, Laurino, Sorrentino & Volpe, 2019).

Optional ingredients can be added to improve processing, or to produce special breads, which generally have greater nutritional value (Dewettinck, Van Bockstaele, Kühne, Van de Walle, Courtens, Gellynck, 2008; Cauvain & Young, 2009). For example, bread prepared with sea water has a lower percentage of salt and a higher content of macro and micronutrients (Barbarisi, De Vito, Pellicano, Boscaino, Balsamo, Laurino, Sorrentino & Volpe, 2019). An alternative for the enrichment of bakery products is the incorporation of fibers, amino acids and bioactive compounds from whole flours or whole grains of cereals. Cereal brans are rich in phytochemicals, such as phenolic compounds, flavonoids, glucans and pigments, causing influence on the physicochemical and nutritional aspects of breads. These compounds are known to have health benefits in view of the protective effect in relation to cardiovascular diseases, colon cancer, obesity and gastrointestinal diseases. Fiber-rich foods, in turn, reduce forms of cancer, coronary heart disease and regulate blood glucose levels (Miranda-Ramos, Sanz-Ponce & Haros, 2019; Pauline, Roger, Nina, Arielle, Eugene & Robert, 2020). Other ingredients can be changed to improve the diet without modifying eating habits, being certain that the changes that occur in the composition of the bread will have a significant impact on the intake of protective and risk factors, such as sodium intake (Bassett, Gimenez, Pinho & Sammán, 2013; Antúnez, Alcaire, Giménez & Ares, 2017). The addition of new optional ingredients to meet the new demands and needs of consumers makes innovation in traditional products in the bakery industry a successful reality (Dettori, Floris & Dessì, 2020).

As already mentioned, bread is considered essential in a balanced diet (Gellynck et al., 2009; Nascimento, Santiago, Santos, Mesquita-Bastos, Silva & Calhau, 2019; Pauline et al., 2020), due to nutritional quality of its fibers, grains, vitamins, a wide range of important nutritional components that provide a positive effect on human health (Maihara, Silva, Baldini, MigueL & Fávaro, 2006; Gellynck et al., 2009). Bread provides the daily diet with a moderate amount of energy and significant amounts of different macro and micronutrients. It stands out in its content, carbohydrates, proteins, fibers, iron, zinc and vitamin B1, although it also provides significant amounts of magnesium, potassium, vitamin B3, vitamin B2 and folic acid (Montoya, 2013; Nascimento et al, 2019). According to Kourkouta, Koukourikos, Iliadis, Ouzounakis, Monios and Tsaloglidou (2017), bread, when consumed in balanced amounts, can provide the body

with many essential nutrients for its proper functioning, with the average consumption being equivalent to 2 to 3 slices of bread a day (O'Connor, 2012).

So, this research aimed to learn about the tastes, preferences and habits of consumption and purchase of bread in the Bragança region and to verify whether the tastes, preferences and consumption habits are associated with the consumer's nationality.

Methodology

In order to achieve these objectives, a quantitative and cross-sectional research was developed. In this context, bibliographic material on the subject under study was consulted in order to construct a questionnaire using Google Docs. The questions, in addition to being based on similar research applied in several countries, were previously discussed with two experts in the field of Social Sciences. Given the large number of people surveyed and the subsequent treatment of information, closed-type questions were valued in this research. Subsequently, a pre-test was carried out, in an environment and context similar to the real survey (Prodanov & Freitas, 2013), to ensure that the questionnaire was well written and organized, as to the clarity and precision of the terms, as well as the form, order of questions and introduction (Gil, 2008). Data collection through the pre-test was carried out from 16 to 23 June and 26 responses were obtained. Taking into account the results of the pre-test, and since there was no suggestion of alteration to the structure, the responses of the pre-test were included in the final sample of the study.

The data collection took place from June to August 2020. The sample was obtained through a non-probabilistic sampling, like snowball, since not all elements of the universe had the same known probability of becoming part of the sample (Marconi & Lakatos, 2002). On the other hand, the individuals to whom the questionnaire was sent had the possibility to invite new participants from their network of friends and acquaintances, as long as they usually made their purchases of food products in the municipality of Bragança.

The questionnaire was structured in three sections. The first section included questions of sociodemographic nature, namely, nationality, gender, age, education, professional occupation, size of the household, number of dependents in the household. Also, the questionnaire included questions related to dietary restrictions and knowledge about different types of bread from Bragança region. The second part contained questions associated with consumer preferences, namely, the type of bread, the most important organoleptic characteristics of the bread, the frequency of bread consumption and the type of accompaniment used in the consumption of bread. Finally, the third part included questions related to the consumer's buying habits, namely, frequency of purchase, place of purchase and factors most valued by the consumer when buying bread.

The software used to edit and process the data was IBM SPSS version 26.0 (Statistical Package for Social Sciences). Descriptive statistics were calculated, namely, the calculation of absolute and relative frequencies for variables of qualitative nature (nominal and ordinal variables) and measures of central tendency and dispersion for variables of quantitative nature (Pestana & Gageiro, 2014; Maroco, 2018). Pearson's chi-square test was used, at a significance level (α) of 5%, to compare proportions. This test allows testing the null hypothesis, H_0: *Tastes, preferences, consumption and buying habits are not associated with the respondent's nationality*, against the alternative hypothesis, H_1: *Tastes, preferences, consumption and buying habits are associated with respondents' nationality*. According to Maroco (2018), the rule of statistical decision is to reject the null hypothesis when p-value (probability of significance) $\leq \alpha$.

When invited to participate in this study, respondents/consumers were informed about the scope and purpose of this research The anonymity as well as the confidentiality of the data collected were guaranteed. In addition, a legal opinion was requested from the Data Protection Commission of the Polytechnic Institute of Bragança, on the content of the questionnaire. After meeting the conditions relating to data protection, authorization was requested, for the filling and dissemination of the questionnaire among employees, to the heads of two organizations with high representativeness, in terms of employability, in the region of Bragança, namely, the City Council of Bragança and the Polytechnic Institute of Bragança.

Results

The results presented in Table 1 show that, of the total number of participants (n = 215), the majority had Portuguese nationality (67%) and were female (61.9%). The average age of consumers was 34.69 years old (standard deviation =

13.677), the mode was 23 years and the median was 29 years. The age of the respondents was between 18 and 77 years old, with the majority (58.6%) with an age between 18 and 35 years old. Most respondents had higher education (85.6%), were not active (51.2%) and lived in urban areas (85.6%). In addition, the families in the municipality of Bragança lived in households with three or less people (60.0%) and no minor dependents (75.3%).

Table 1: sociodemographic characteristics of the respondent (n = 215)

Variable	Group	Frequencies	
		Absolute (n)	Relative (%)
Nationality	Portuguese	144	67.0
	Other	71	33.0
Gender	Female	133	61.9
	Male	80	37.2
	I prefer not to declare	2	0.9
Age groups	18 to 35 years old	126	58.6
	> 35 years old	89	41.4
Education level	Higher education	184	85.6
	Non-higher education	31	14.4
Professional occupation	Active	105	48.8
	Not active	110	51.2
Residence	Urban	184	85.6
	Rural	31	14.4
Size of the household	1 person	29	13.5
	2 people	51	23.7
	3 people	49	22.8
	4 people	63	29.3
	> 4 people	23	10.7
Household with minor dependents	No	162	75.3
	Yes	53	24.7

Figure 1 shows the distribution of foreign respondents by nationality. As can be seen, the overwhelming majority were Brazilian nationals (83.1%).

Fig. 1: Nationality of foreign respondents (n = 71)

Of all respondents, the majority did not have any food restrictions (60.0%) (Figure 2), however, a significant percentage had at least one food restriction (40.0%).

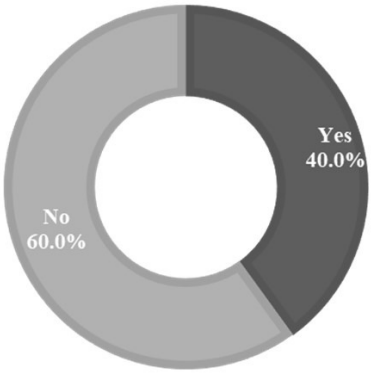

Fig. 2: respondents' food restrictions (n = 215)

Of the respondents who were on a special diet (n = 86), most tried to avoid or were on a diet low in salt (60.5%) and fat (53.5%) (Figure 3).

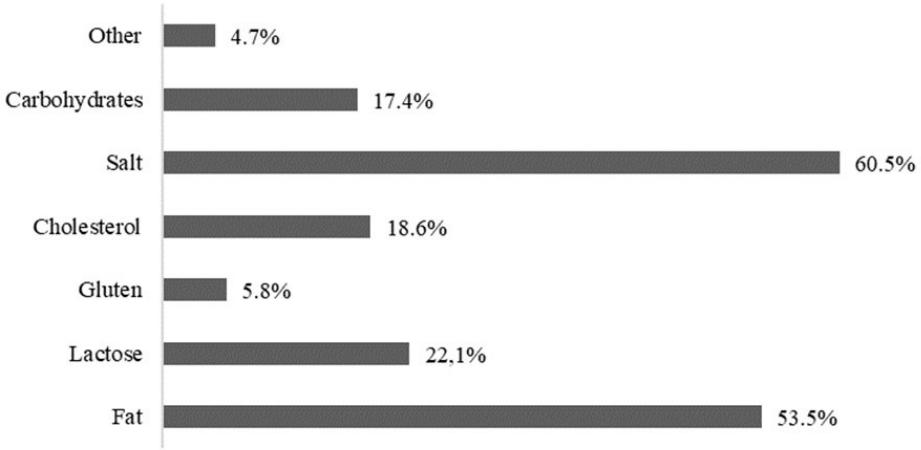

Fig. 3: respondents with dietary restrictions (n = 86)

Of the total consumers surveyed, who made their purchases of food in the region of Bragança, a significant percentage assumed not to know any type of regional bread (30.7%). However, the majority knew at least one type of bread (69.3%) (Figure 4).

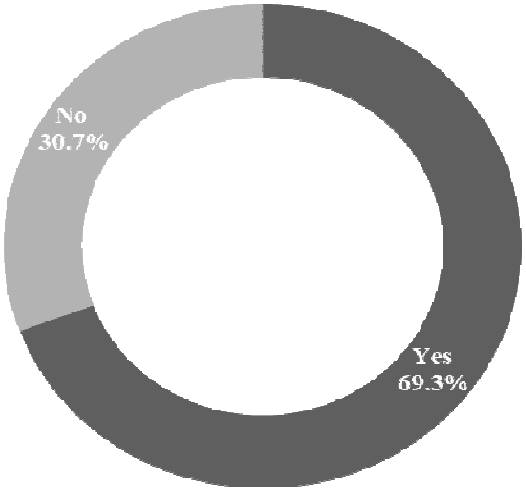

Fig. 4: knowledge of the existence of regional bread types (n = 215)

As shown in Figure 5, of the various types of regional bread, the three best known were in descending order, Argozelo bread (77.2%), Nogueira bread (67.8%) and França bread (50.5%). The lesser known breads (12.8%), with less than 20.0% of the answers, were in decreasing order, Carragosa bread (6.7%), Gimonde bread (4.7%), Campo Redondo bread (0.7%) and Baçal bread (0.7%).

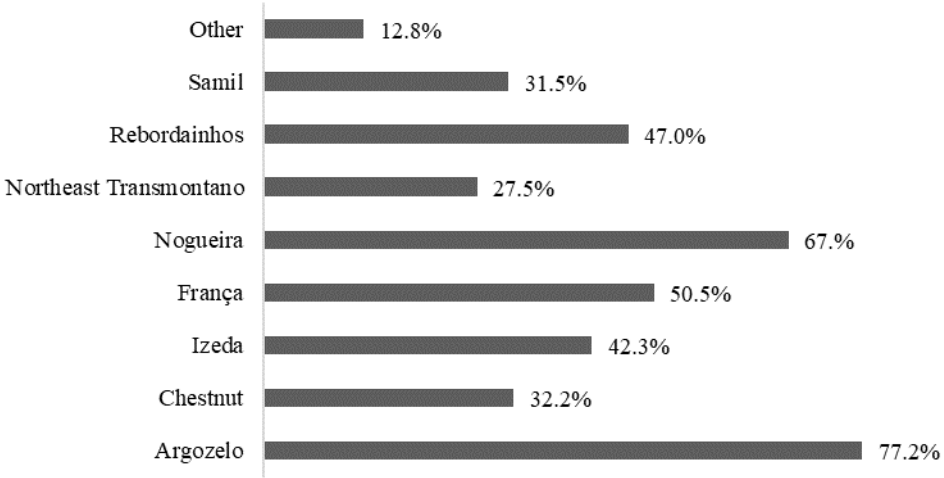

Fig. 5: type of Regional Bread that the respondent knows (n = 149)

Taking into account the results presented in Table 2, the majority of consumers like bread (99.1%). They recognize some importance in nutritional terms, reasons why bread is part of their diet (95.8%). Most consumers eat bread at least once a day (62.3%), usually at breakfast (67.9%) and at the middle of the afternoon (54%). The preferred type of accompaniment are vegetable fats (66.5%), such as margarine and olive oil and dairy products (65.6%), namely cheese, cottage cheese, among others.

Table 2: tastes, preferences and bread consumption habits (n = 215)

Variable	Group	Frequencies	
		Absolute (n)	Relative (%)
Do you like bread?	Yes	213	99.1
	No	2	0.9
Do you include bread in the diet?	Yes	206	95.8
	No	8	3.7
	Missing	1	0.5
Importance of bread in the diet	None, it's useless	26	12.1
	Some, it's very energetic	125	58.1
	A lot, it is essential	64	29.8
Consumption frequency	Rarely	8	37
	Once a week	13	6.0
	2 to 3 times a week	60	27.9
	≥ 1 time a day	134	62.3
Daily amount consumed	None	11	5.1
	1 to 2 slices/breads	165	76.7
	3 to 4 slices/breads	31	14.4
	> 4 slices/breads	8	3.7
Time of consumption	Breakfast	146	67.9
	Middle of the morning	21	9.8
	Lunch	32	14.9
	Middle of the afternoon	116	54.0
	Dinner	37	17.2
	After dinner	7	3.3
	Any time	19	8.8
Type of accompaniment	Simple	29	13.5
	Dairy	141	65.6
	Jams	49	22.8
	Meat	95	44.2
	Vegetable fats	143	66.5
Are you aware of the composition of the bread?	Yes	172	80.0
	No	43	20.0

Of the respondents who claim to know the nutritional composition of bread (n = 172), most identify that, depending on the type of flour used, the bread contains starch (87.8%). However, only a minority consider that bread contains glucose (39.0%), proteins (19.2%) and lipids (11.0%). These results show that the level of knowledge in relation to the nutritional content of bread is not sufficient, since even those who claim to know the composition of the bread were unable to identify the compounds present in the bread in greater quantity (Figure 6).

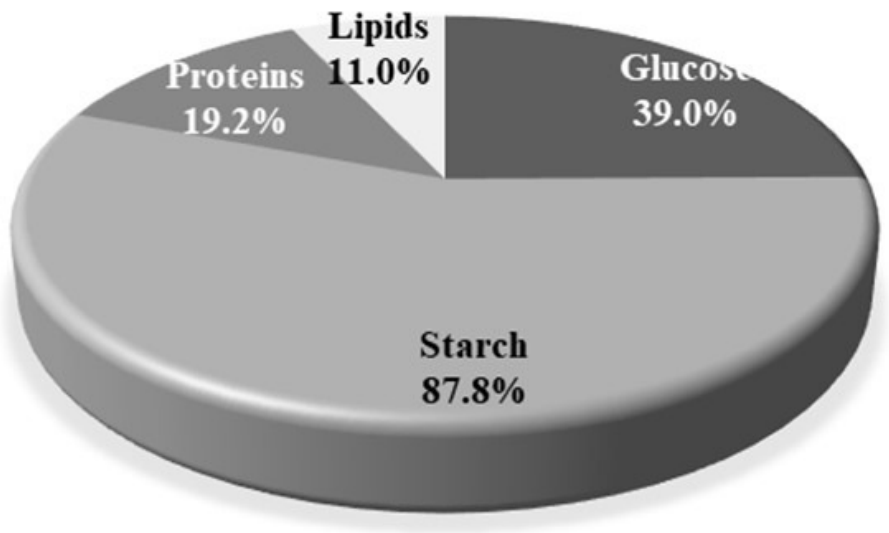

Fig. 6: compounds present in greater quantity in bread (n = 172)

Figure 7 shows that the majority of consumers in the Bragança region prefer wheat bread (72.5%) and whole grain bread (64.5%).

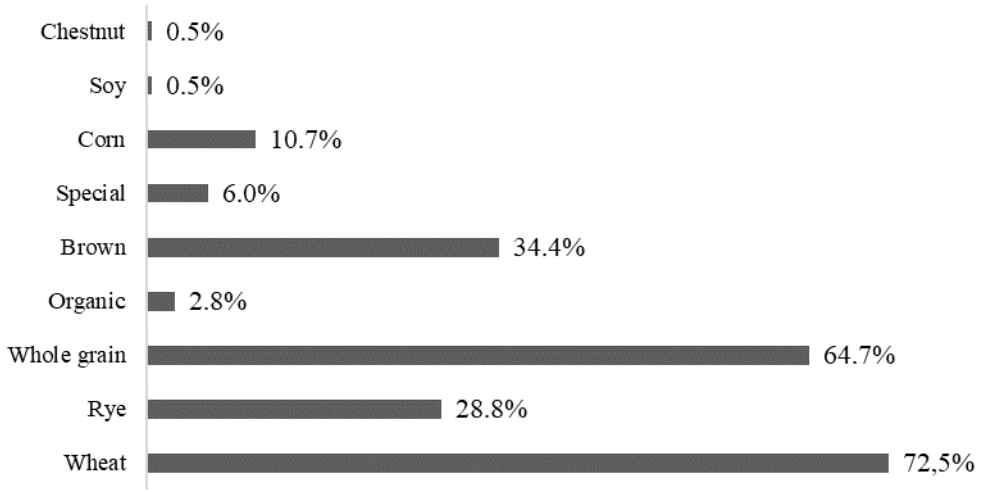

Fig. 7: types of bread (n = 215)

The least consumed breads are made from flours alternative to the traditional ones, namely chestnut bread (0.5%), soy bread (0.5%) and organic bread (2.8%), products that compared to the relatively recent ones on the market (Figure 7).

According to the results shown in Table 3, only 10.7% of respondents are not responsible for the purchase of bread in their household. Among those responsible for the purchase of bread (n = 192), regional bread is the one that is most frequently purchased (47.9%), although it is not always bread from the Bragança region. Regarding the frequency of purchase, most consumers buy bread 2 to 3 times a week (29.7%) or once a week (28.6%) and are indifferent to whether or not the bread is packaged (45.3%) or ends up buying unpackaged bread (35.4%).

Table 3: bread buying habits in the Bragança region

Variable	Group	Frequencies	
		Absolute (n)	Relative (%)
Are you responsible for buying bread? (n = 215)	Yes	119	55.3
	Sometimes	73	34
	No	23	10.7
Most frequent bread buying (n = 192)	Industrial	70	36.5
	Regional	92	47.9
	Homemade	30	15.6
Buy frequency (n = 192)	< 1 once a month	7	3.6
	1 once a month	5	2.6
	2 to 3 times a month	29	15.1
	1 once a week	55	28.6
	2 to 3 times a week	57	29.7
	Every day	39	20.3
Package (n = 192)	Indifferent	87	45.3
	Packed	37	19.3
	Unpacked	68	35.4

The preferred place to buy bread is the supermarket (55.2%) (Figure 8), and for more than 90.0% of consumers, the quality of the products (96.6%) and the hygiene and cleaning conditions space (93.7%) were the most important factors in choosing the place to buy bread (Figure 9).

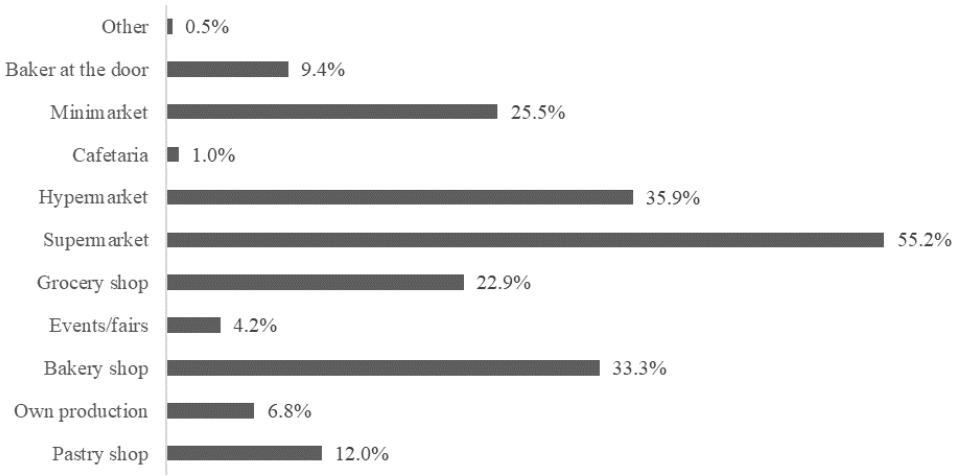

Fig. 8: place of bread purchase (n = 192)

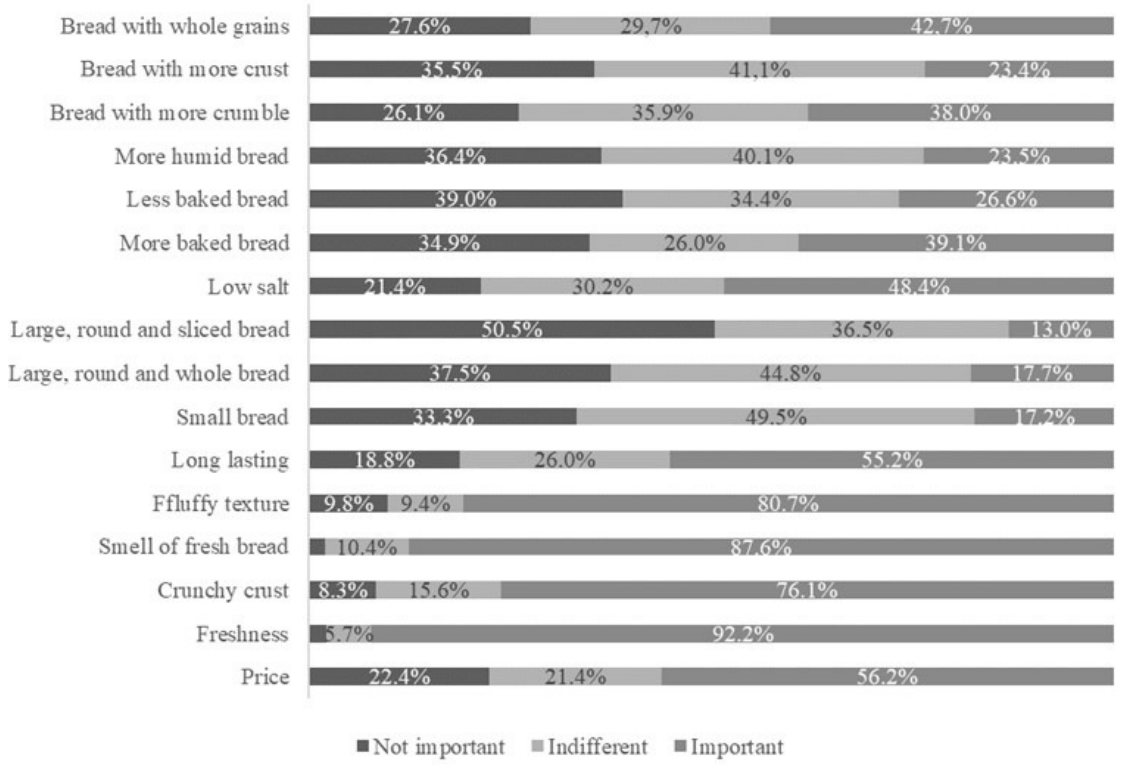

Fig. 9: decisive factors in choosing the place to buy bread (n = 192)

In Figure 10, it can be seen that the three types of regional bread from Bragança region that were most often purchased or even every day were Nogueira bread (15.6%), Rebordainhos bread (14.6%) and Argozelo bread (11.0%). Interestingly, they are also among the four types of bread in the Bragança region best known by respondents.

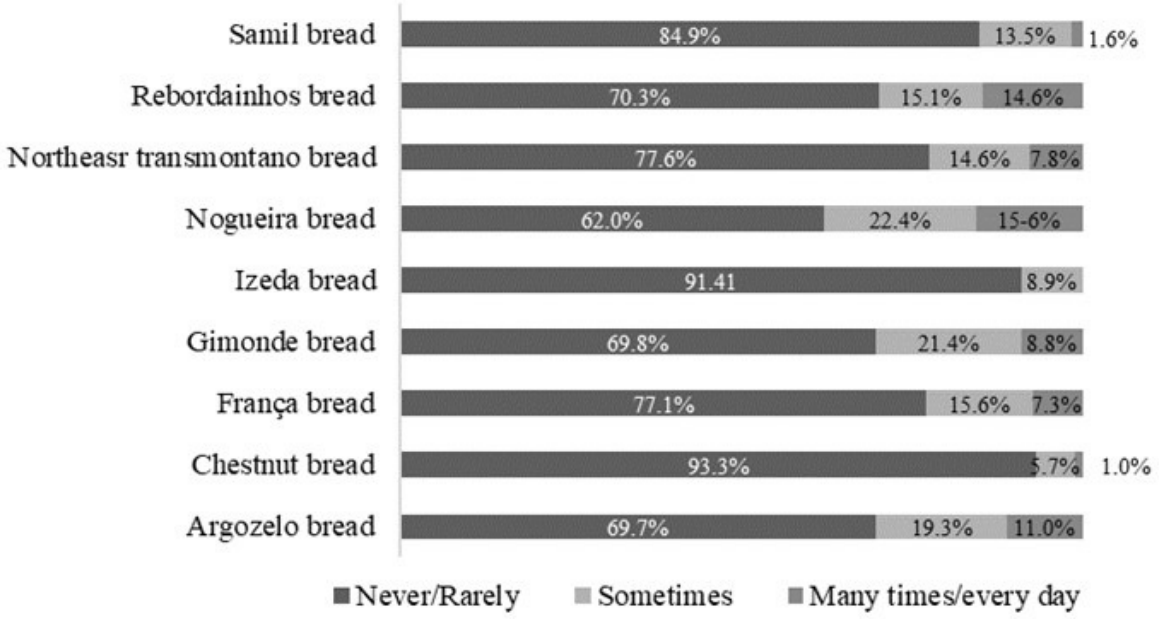

Fig. 10: buying frequency of buying Bragança regional bread (n = 192)

The attributes of bread most valued by most consumers were, the freshness of the bread (92.2%), the smell of fresh bread (87.6%), the fluffy texture of the bread (80.8%), the crispy crust of the bread (76.1%), the price (56.2%) and the long lasting of the bread (55.2%) (Figure 11).

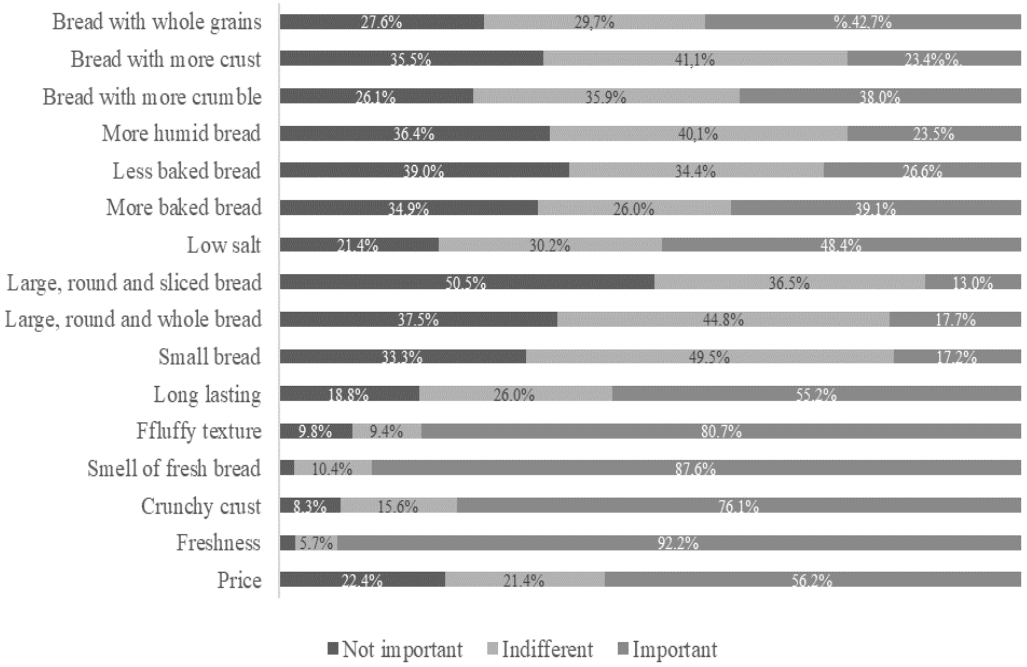

Fig. 11: attributes valued when choosing bread (n = 192)

For the verification of the null hypothesis, H_0: *Tastes, preferences, consumption habits are not associated with the respondent's nationality*, against the alternative hypothesis, H_1: *Tastes, preferences, consumption and shopping habits are associated with the respondent's nationality*, was used the Chi-Square test. Whenever the conditions for the use of this test were not met, it was used the Chi-square test with Monte Carlo simulation. The results are shown in Table 4.

Table 4: tastes, preferences and bread consumption habits according to nationality (n = 215)

Variable	Group	Frequencies (%)		p-value
		Portuguese	Other	
Do you like bread?	Yes	99.3	98.6	0.664
	No	0.7	1.4	
Do you include bread in the diet?	Yes	97.2	94.4	0.303
	No	2.8	5.6	
Importance of bread in the diet	None, i tis useless	12.5	11.3	0.944
	Some, i tis very energetic	58.3	57.7	
	A lot, it is essential	29.2	31.0	
Frequency of consumption	Rarely	2.8	5.6	0.096
	Once a week	3.5	11.3	
	2 to 3 times a week	29.2	25.4	
	More than once a day	64.6	57.7	
Daily amount consumed	None	4.9	5.6	0.677
	1 to 2 slices/breads	79.2	71.8	
	3 to 4 slices/breads	12.5	18.3	
	4 to 6 slices/breads	3.5	4.2	
Moment: Breakfast	Yes	67.4	69	0.807
	No	32.8	31.0	
Moment:	Yes	9.7	9.9	0.975

Middle of the morning	No	90.3	90.1	
Moment: Lunch	Yes No	18.1 81.9	8.5 91.5	0.063
Moment: Middle of the afternoon	Yes No	53.5 46.5	54.9 45.1	0.840
Moment: Dinner	Yes No	20.1 79.9	11.3 88.7	0.105
Moment: After dinner	Yes No o	2.1 97.9	5.6 94.4	0.168
Moment: Any time	Yes No o	5.6 94.4	**15.5** 84.5	0.016*
Type of bread: Wheat	Yes No	74.3 25.7	67.6 32.4	0.303
Type of bread: Rye	Yes No	**35.4** 64.6	15.5 84.5	0.002*
Type of bread: Whole grain	Yes No	28.8 71.5	**49.3** 50.7	0.003*
Type of bread: Organic	Yes No	4.2 95.8	0.0 100.0	0.081
Type of bread: Brown	Yes No	**40.3** 59.7	22.5 77.5	0.010*
Type of bread: Special	Yes No	1.4 98.6	**15.5** 84.5	0.000*
Type of bread: Corn	Yes No	12.5 87.5	7 93	0.223
Type of bread: Soy	Yes No	0.7 99.3	0 100	0.482
Type of bread: Chestnut	Yes No	0 100	1.4 98.6	0.153
Accompaniment: Dairy	Yes No	57.6 42.4	**81.7** 18.3	0.000*
Accompaniment: Jams	Yes No	**28.5** 71.5	11.3 88.7	0.005*
Accompaniment: Simple	Yes No	13.3 86.7	14.1 85.9	0.872
Accompaniment: Meat	Yes No	46.5 53.5	39.4 60.6	0.325
Accompaniment: Vegetable fats	Yes No	69.4 30.6	60.6 39.4	0.194

* There are statistically significant differences in proportions taking into account the nationality of the respondents.

Taking into account the nationality of consumers, differences in proportions were identified, in the type of bread consumed, at the time of consumption and in the chosen accompaniment (p-value < 0.05). Foreigners consume whole grain bread and special bread at any time of the day, preferring dairy products as an accompaniment, namely cheese and cottage cheese. Portuguese consumers, on the other hand, choose rye bread or brown bread to a greater extent, preferring jams as an accompaniment, namely, marmalade, jam, honey, pumpkin jam, among others (Table 4).

Conclusion

Initially, it was planned, for this research, the application of the questionnaire through a structured interview, addressing individuals in public places in the municipality of Bragança, such as squares, fairs and events. However, given the context experienced by the Covid-19 pandemic, this process proved unfeasible. Therefore, it was decided to apply the questionnaire online, at the risk of not obtaining answers from consumers of all ages and with various education levels and/or training. In fact, the application of the online questionnaire made it impossible or limited access for consumers of

older ages and for consumers who had neither the means nor the computer skills necessary to participate in this research. On the other hand, the development of cross-sectional population studies, despite providing valuable information on eating habits, since they are studies that relate to a single moment, do not allow to follow the habits of consumers who change with the evolution of time and, especially with the appearance of new substitute products on the market.

Bread consumed in balanced amounts not only does not contribute to obesity, it also provides the body with many nutrients essential for its proper functioning (Kourkouta et al., 2017). So, this research aimed to learn about the tastes, preferences and habits of consumption and purchase of bread in the Bragança region and to verify whether the tastes, preferences and consumption habits are associated with the consumer's nationality. The group of consumers was constituted by a majority of Portuguese, female individuals that lived in urban areas and liked to eat wheat and whole grain bread purchased at the supermarket despite not being bread from the Bragança region.

The three types of bread in the Bragança region that are best known and also the most consumed were Nogueira, Rebordainhos and Argozelo bread. Most consumers eat bread at least once a day, 1 to 2 slices/small breads a day, usually at breakfast. The preferred type of accompaniment are vegetable fats and dairy. The most valued attributes were the freshness, the fresh bread smell, the fluffy texture, the crispy crust, the most affordable price and the long lasting of the bread.

As previously mentioned, most consumers buy bread at the supermarket because they value the most factors such quality of the bread and the hygiene and cleaning of the space. Taking into account the nationality, differences were identified in the type of bread consumed, the time of consumption and the chosen accompaniment. In fact, foreigners prefer to consume whole grain bread and special bread with cheese or cottage cheese at any time of the day. Portuguese consumers prefer rye or brown bread with jam or honey.

The results of this research allowed to verify that consumers who shop in the municipality of Bragança do not know and, consequently, do not consume or rarely consume regional bread. As has been shown, there are many varieties of regional bread, normally produced in villages located in the municipality based on tradition, which is why Portuguese consumers prefer to eat rye or brown bread. So, there is a potential for the development of the regional bread market. The market strategy should be based on the creation of a PDO (Protected Designation of Origin) or other seal of quality. This strategy, however, involves a previous work of association of regional bread producers around a common objective, namely, the valorization of regional production.

Acknowledgments

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Perception of CSR Motives In CSR Covid-19 Messages: Implications on Brand Equity, Brand Trust and Brand Advocacy

Tengku Ezni BALQIAH
Management Department-Faculty of Economics and Business-Universitas Indonesia, Depok, Indonesia
Email: tengku.ezni@ui.ac.id

Elevita YULIATI
Management Department-Faculty of Economics and Business-Universitas Indonesia, Depok, Indonesia
Email: elevita@ui.ac.id

Fanny MARTDIANTY
Management Department-Faculty of Economics and Business-Universitas Indonesia, Depok, Indonesia
Email: fanny.martdianty@ui.ac.id

Ratih Anjani SUBAGIO
Management Department-Faculty of Economics and Business-Universitas Indonesia, Depok, Indonesia
Email: ratih.subagio@gmail.com

Abstract

The Covid-19 pandemic has changed almost every aspect in life, including in business. At the beginning of covid-19 pandemic, many companies issued special communications from their Chief Executive Officers (CEOs) to give assurance to their customers on their commitment and their ability to continue fulfilling the needs and wants of their customers. As the pandemic became more serious each day, companies in Indonesia redirected their Corporate Social Responsibility (CSR) efforts to try to alleviate the weight of the Covid-19 pandemic for society, especially for their customers. This paper aims to investigate how customers perceived the CSR Covid-19 messages from companies, and how their perception of the CSR motives behind these messages affects brand equity, brand trust and brand advocacy. Research questionnaires were distributed in areas with the highest number of Covid-19 cases in Indonesia (Jakarta, East Java and West Java) with the minimum target of 300 respondents. A Structural Equation Modeling (SEM) was conducted to discover the relationship between the aforementioned variables in the research model.

Keywords: Corporate Social Responsibility, CSR Motives, Trust, Brand Equity.

Introduction

As the global competition increases, the pressure to find ways of participating in sustainable development and meeting ethical expectations are also increasing. Companies need to find innovative ways to engage primary stakeholders. Maignan and Ferrell (2004), described a framework and some propositions that explain how Corporate Social Responsibility (CSR) interacts with marketing through the understanding of the Stakeholder Theory perspectives (how organization activities have impacts on stakeholders). Stakeholders showed concerns not only for issues that affected their own welfare but also for issues that did not affect them directly. In accordance with marketing definition (AMA, 2007), marketing has diverse stakeholders that should be satisfied in their need, such as customer and society. CSR activities provide marketers with the construction of perceived identities and reputations that are identification-worthy (Balmer, et.al., 2011).

Companies have pursued a wide variety of CSR initiatives that showed some cross-cultural variations in the CSR platforms – or orientations – that companies adopted across industries and in different countries. By opting for a

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particular CSR strategy, companies presumably aim to address a specific stakeholder's concerns and meet the stakeholder's expectations (Stokes, et.al, 2013). CSR is the idea that reflects the social imperatives and the social consequences of business success. Concerning the effectiveness of CSR, company must take the characteristics of the CSR activities' targets into account.

In emerging markets, organizations face challenges in adoption and managing CSR strategies that are in line with company brand values (Karaosmanoglu, et.al., 2016). Consumers in emerging markets are increasingly aware of and concern with CSR activities conducted by the company. The perceived CSR motivations will have an impact on consumer support for these activities (Ellen, et.al., 2006). CSR motives can be categorized in two types: social (public-serving), and economy (firm-serving) (Kim & Kim, 2014).

At the beginning of covid-19 pandemic, many companies issued special communications from their Chief Executive Officers (CEOs) to give assurance to their customers on their commitment and their ability to continue fulfilling the needs and wants of their customers. As the pandemic became more serious each day, companies in Indonesia redirected their Corporate Social Responsibility (CSR) efforts to try to alleviate the weight of the Covid-19 pandemic for society, especially for their customers. This paper aims to investigate how customers perceived the CSR Covid-19 messages from companies, and how their perception of the CSR motives behind these messages affects brand equity, brand trust and brand advocacy.

Literature Review

CSR Motivation: Firm vs Public Serving Motive

A company, as an entity, is perceived by society as an institution with profit as its main goal. Companies are often seen as willing to do anything, in both positive and negative manners, in order to maximize their profits. As a results, when companies conducted CSR activities, which actually a very positive action, customers are often suspicious of the actual reasons behind this positive gesture. This leads to the attribution of motives behind the CSR activities.

In general, there are two types of CSR motives, namely firm-serving motives (to benefit the company) and public-serving motives (to actually help the communities or to support an issue). Firm-serving motives are the motives that drive a company to conduct CSR activities in order to gain benefits for the company itself, for example, to gain more profit, more sales, or to build a positive image of the company. If a CSR activities is perceived as giving more benefit to the company instead of to the society, customers might attribute this type of CSR motive to the company. In general, customers might accept a strategic motive but they will evaluate negatively a selfish motive that exploits the CSR activity (Ellen, et.al., 2006).

Public-serving motives are the motives behind CSR activities that is based on the actual desire to sincerely help society or to support an important issue for the company. Customers might attribute this motive to a company's CSR activities if customers perceived the CSR activities as giving more benefit to society or to the environment compared to the profit gained by the company. Customers will give more positive evaluation to a CSR activity perceived as a value-driven activity and that the company is acting sincerely to help the society and/or the environment (Ellen, et.al., 2006).

Cause Related Marketing

Vadarajan & Menon (1988) in La Ferle, et.al. (2013) describe cause-related marketing (CRM) as "the process of formulating and implementing marketing activities that are characterized by an offer from the firm to contribute a specified amount to a designated cause when customers engage in revenue providing exchanges and satisfy organizational and individual objectives." Likewise Cui et al. (2003) in La Ferle, et.al. (2013) refer to CRM as "a general alliance between businesses and non-profit causes that provide resources and funding to address social issues and business marketing objectives."

A corporation can have multiple options such as cause-related marketing (CRM) and corporate philanthropy. Cause-related marketing (CRM) directly links sales with amount of donation, by promising to donate a certain amount of money to a nonprofit organization or social cause after consumers purchase products or services (Varadarajan & Menon, 1988 in Chen & Huang, 2016). Corporate philanthropy is another type of CSR campaign. A company can make a monetary or in-kind (people or equipment) contribution to a worthy cause simply because the firm wishes to be a good corporate citizen, without any expectation of a benefit tied to that effort (Lii and Lee, 2012, Shaw and Post, 1993 in Chen & Huang, 2016).

Corporate Social Marketing

Corporate social marketing (CSM) refers to "a means whereby a corporation supports the development and/or implementation of a behavior change campaign intended to improve public health, safety, the environment, or community well-being" (Kotler & Lee, 2005, p. 114). This intended influence on behavior distinguishes CSM from other corporate social initiatives, such as corporate philanthropy and cause-related marketing, whose main aim is to raise goodwill, money, and/or recognition of a cause, but not to influence or change one's behavior (Bloom et al., 1997, Kotler and Lee, 2005 in Inoue & Kent, 2012).

The major goal of corporate social marketing (CSM) initiatives is to persuade consumers to perform desired pro social behavior (Bloom et al., 1997; Kotler and Lee, 2005 in Inoue & Kent, 2014). This intended influence on behavior change distinguishes CSM from other types of corporate social responsibility (CSR) activities implemented by firms, such as corporate philanthropy and cause-related marketing, whose main aim is to raise goodwill, money, and recognition of a cause, but not to influence or change one's behavior (Bloom et al., 1997; Kotler and Lee, 2005 in Inoue & Kent, 2014).

Social Justice Value

Social justice value is defined as a consumer orientation towards poverty and the efforts to improve social justice. This orientation affects consumers' reaction to the practice of corporate ethics. The consumers' social orientation moderates the effectiveness of CSR communications and suggests that CSR activities will be more effective for consumers with high social concerns, since they are the ones who will be more motivated to pay attention to the CSR communications of a company (Du, et.al., 2010).

Brand Equity

Brand equity is a vital concept in marketing, management and branding studies (Baalbaki & Guzmán, 2016 in Marques, et.al., 2020) since higher levels of brand equity are often translated into higher cash flows and increased competitiveness (Pepe et al., 2011, Yoo et al., 2000 in Marques, et.al., 2020).

Two focal brand equity perspectives have been recognized in the literature –financial-based and consumer-based brand equity (Davcik et al., 2015 in Marques, et.al., 2020). Financial-based brand equity focuses on studying and measuring financial value as the measure of brand success (Davcik et al., 2015, Veloutsou and Guzman, 2017 in Marques, et.al., 2020). In contrast, the consumer-based brand equity paradigm represents the extent to which a consumer response is affected by the brand (Keller, 1993 in Marques, et.al., 2020).

Brand equity refers to the value inherent in a well-known brand name. Brand equity as intangible brand assets is associated with brand-name awareness, brand beliefs, brand loyalty, perceived brand quality, and favorable brand symbolisms as well as associations that provide competitive advantage and future earnings (Keller and Lehmann, 2006, Sun et al., 2016, Sun et al., 2018 in Sun, et.al., 2019).

Trust

Trust relates to a trustee's willingness to engage in a vulnerable relationship by expecting positive behavior and intentions from the trustor (Melewar, Foroudi, Gupta, Kitchen, & Foroudi, 2017 in Ozdemir, et.al., 2020). Personal trust is grounded in personal relationships, such as with national brands, as opposed to system trust, which is embedded in institutions (Nuttavuthisit & Thogeersen, 2017 in Ozdemir, et.al., 2020).

Brand trust is achieved through mutual experiences and activities and is a necessary concept for a successful relationship between a company and its customers (Anderson & Narus, 1990 in Chae, et.al., 2020). Brand trust increases the likelihood that consumers will be able to choose their products (Erdem & Swait, 2004 in Chae, et.al., 2020). Even if there is a lack of rationality in the transaction relationship, maintaining and trading continuously creates long-term friendly relations between suppliers and consumers (Kim, 2005 in Chae, et.al., 2020).

Brand Advocacy

Advocacy is a form of customer loyalty that goes beyond buying a certain product or a certain brand repetitively, but also related to the desire to consume a new product offered by the company, favorable Word-of -Mouth (WOM), or even ignoring negative information about the company (Du, et.al., 2007). Customer loyalty is a competitive advantage in a more competitive business environment. Loss of customers will affects the company performance including its financial performance.

Research Methods, Model and Hypotheses

This research used primary data collected through online cross-sectional survey. Research survey is conducted in areas where the Covid-19 cases are the highest, namely: Jakarta, East Java, and West Java. The minimum number of target respondents is 300 respondents, chosen with purposive sampling technique.

Data collected from research survey is processed with Structural Equation Modeling (SEM), in order to examine the relationships between research variables. The research variables are Perceptions of CSR Motives (independent variable), Social Justice (moderator), Brand Equity, Brand Trust and Brand Advocacy (dependent variable), with all indicators measured with a 6-point Likert Scale. There are 6 research hypotheses, as follows:

H1 : Perceptions of CSR Motives will be different according to the type of CSR activities (CRM/Philanthropy vs CSM).
H2 : CSR Motives affect brand trust
H3: CSR Motives affect Brand Equity
H4 : Trust positively influence Brand Equity
H5 : Trust positively influence Brand Advocacy
H6 : Brand Equity positively influence Brand Advocacy

Results

Pretest was conducted in Jakarta and surrounding areas (Jakarta, Bogor, Depok, Tangerang and Bekasi or more commonly known as Jabodetabek). The pretest collected data from 35 respondents, and then the data was processed with SPSS software, to test the reliability and validity of the research variables.The pretest questionnaire used Telkomsel's philanthropy activities as an example, and the respondents must be aged 17 years old or older and have been a subscriber of Telkomsel services for at least 1 year.

The result for pretest's reliability and validity tests, it can be concluded that all variables are reliable, except for one dimension from CSR Motives (Egotistic driven). The researchers have decided to keep the dimension (Egotistic driven) in the main survey questionnaire, since there were only 35 respondents in the pretest and it is likely that the reliability score will improve when the number of respondents is a lot higher.

From validity test, it can be concluded that almost all indicators are valid, except for CM13. The researchers have decided to keep the indicator since the number of respondents is only 35, and it is likely that the validity score for CM13 will be higher with more respondents. Based on the pretest results, quesionnaires for main survey are then prepared.

For the main survey, the research questionnaires were distributed in three areas where the Covid-19 cases are the highest in numbers, namely Jakarta, East Java and West Java. The number of respondents collected were 304. Questionnaires were distributed online. The respondents must be 17 years old or older, residents of Indonesia and have subscribed for at least 1 year to the internet and communication services of Telkomsel, the state-owned and leading company of telecommunication industry in Indonesia. Telkomsel was chosen because of the philanthropic CSR activities they performed during covid-19 pandemics, and also because the service of Telkomsel is available in all-over Indonesia. Before filling in the questionnaires, respondents were exposed to a news article describing CSR philanthropic activities of Telkomsel during the covid-19 pandemic. The results will be discussed below.

For respondents profile, 45% (136 respondents) were male and 55% (168 respondents) were female. The majority of the respondents were 18-25 years old (62%) and only 8% of the total respondents were 26-30 years old and 31-35 years old (respectively). The majority occupations were students (41%) and employees (28%). As for educational level, 50% of respondents (153 respondents) were high school graduates and 47% of them (142 persons) were college/university graduates. As for spending, 118 respondents (39%) spend between Rp 1-3 million/month (USD 71-213/month), 87 respondents (29%) spend between Rp 3-5 million/month (USD 213-355/month) and only 53 respondents (17%) spend between Rp 5-10 million/month (USD 355-710/month). As for the duration of Telkomsel services subscription, 46% of respondents (139 respondents) have been Telkomsel subscribers for 5 years or longer, and another 28% of respondents (86 respondents) have subscribed to Telkomsel for 3-5 years.

Validity

The data was processed with AMOS. The convergent validity was evaluated using three criteria:
1. Construct Reliability (CR) of all dimensions must be higher than 0.7 (Hair, et.al., 2019).

2. Average Variance Extracted (AVE) must be higher than 0.5 (Hair, et.al., 2019).
3. The factor loadings of all items must be higher than 0.5 (Fornell & Larcker, 1981).

The convergent validity results can be seen in Table 1.

Table 1: Convergent Validity

Variables	Item	SLF≥0,5	CR	AVE	Remarks	
Value Driven	CSR1	0,612	0,767	0,529	Valid	Reliable
	CSR2	0,807			Valid	
	CSR3	0,791			Valid	
Egoistics Driven	CSR4	0,747	0,737	0,584	Valid	Reliable
	CSR5	0,781			Valid	
Stakeholder Driven	CSR6	0,642	0,828	0,551	Valid	Reliable
	CSR7	0,888			Valid	
	CSR8	0,781			Valid	
	CSR9	0,634			Valid	
Strategic Driven	CSR10	0,823	0,901	0,752	Valid	Reliable
	CSR11	0,914			Valid	
	CSR12	0,862			Valid	
Brand Trust	BT1	0,884	0,899	0,640	Valid	Reliable
	BT2	0,731			Valid	
	BT3	0,781			Valid	
	BT4	0,741			Valid	
	BT5	0,784			Valid	
Perceived Quality	PQ1	0,908	0,889	0,728	Valid	Reliable
	PQ2	0,849			Valid	
	PQ3	0,798			Valid	
Brand Image	BI1	0,875	0,835	0,628	Valid	Reliabel
	BI2	0,798			Valid	
	BI3	0,792			Valid	
Brand Loyalty	BL1	0,814	0,886	0,723	Valid	Reliable
	BL2	0,874			Valid	
	BL3	0,861			Valid	
Brand Advocacy	AD1	0,852	0,916	0,733	Valid	Reliable
	AD2	0,841			Valid	
	AD3	0,857			Valid	
	AD4	0,875			Valid	

The next stage is to determine the discriminant validity, which is verified if the root-square value of AVE for the construct is higher than the correlation score with each of all the other latent variables (Fornell & Larcker, 1981). Table 2 below showed that all root-square value extracted for each latent variable, all of them have higher scores compared to between-constructs correlation scores. This means that the research model has discriminant validity.

Table 2: Discriminant Validity

	Brand Loyalty	Value Driven	Stakeholder Driven	Egoistics Driven	Strategic Driven	Brand Trust	Perceived Quality	Brand Image	Brand Advocay
Brand Loyalty	**0,850**								
Value Driven	0,462	**0,727**							
Stakeholder Driven	-0,004	0,176	**0,742**						
Egoistics	0,300	0,604	0,413	**0,764**					

Driven									
Strategic Driven	-0,072	-0,054	0,466	0,192	**0,867**				
Brand Trust	0,703	0,587	0,045	0,370	-0,080	**0,800**			
Perceived Quality	0,457	0,463	0,132	0,048	-0,063	0,503	**0,853**		
Brand Image	0,667	0,631	0,060	0,386	-0,071	0,598	0,739	**0,792**	
Brand Advocay	0,664	0,230	0,034	0,313	-0,139	0,514	0,295	0,377	**0,856**

ModelFit

Goodness-of-fit index (GOFI) is the indicator of the fit between the research model and the data (Malhotra, 2007). The model fit of the measurement model is summarized in Table 3.

Table 3: Goodness-of-fit Index - Measurement Model

Goodness of Fit Criteria	Value	Remarks
Relative/Normed Chi-Square (X^2/df)	2,115	*Good Fit*
Goodness of Fit Index (GFI)	0,854	*Poor Fit*
Adjusted Goodness of Fit Index (AGFI)	0,812	*Poor Fit*
Standardized Root Mean Square Residual (SRMR)	0,065	*Good Fit*
Root Mean Square Error of Approximation (RMSEA)	0,061	*Good Fit*
Non-Normed Fit Index (TLI atau NNFI)	0,918	*Good Fit*
Normed Fit Index (NFI)	0,879	*Poor Fit*
Relative Fit Index (RFI)	0,855	*Poor Fit*
Incremental Fit Index (IFI)	0,932	*Good Fit*
Comparative Fit Index (CFI)	0,932	*Good Fit*

Table 4 summarizes the model fit for the structural model.

Table 4: Goodness-of-fit Index - Structural Model

Goodness of fit criteria	Value	*Remark*
Relative/Normed Chi-Square (X^2/df)	2,254	*Good Fit*
Goodness of Fit Index (GFI)	0,837	*Poor Fit*
Adjusted Goodness of Fit Index (AGFI)	0,797	*Poor Fit*
Standardized *Root Mean Square Residual* (SRMR)	0,065	*Good Fit*
Root Mean Square Error of Approximation (RMSEA)	0,072	*Good Fit*
Non-Normed Fit Index (TLI atau NNFI)	0,908	*Good Fit*
Normed Fit Index (NFI)	0,867	*Poor Fit*
Relative Fit Index (RFI)	0,845	*Poor Fit*
Incremental Fit Index (IFI)	0,922	*Good Fit*
Comparative Fit Index (CFI)	0,921	*Good Fit*

Next in figure 1, the result of path analysis to examine direct influence between latent variables is shown.

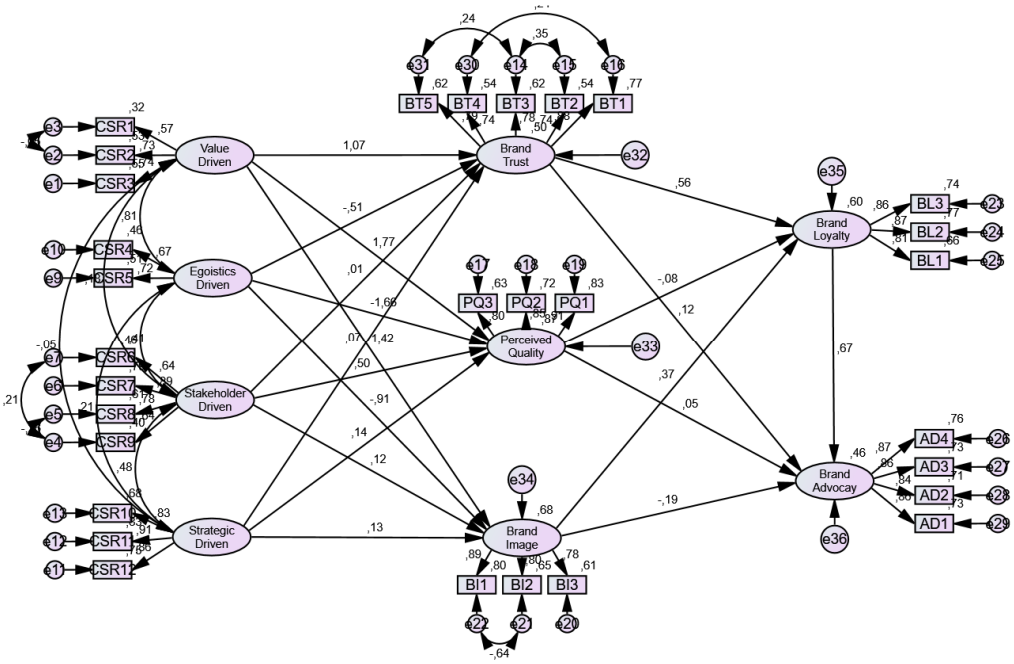

Figure 1: Path Analysis

The result of the path analysis in figure 1 is summarized in Table 5 below.

Table 5: Path Analysis Summary

Hypotheses	Path	SLF	T-Value	P-Value	Remarks
H1a	*Value Driven → Brand Trust*	1,071	6,609	0,000	Supported
H1b	*Value Driven → Perceived Quality*	1,421	6,139	0,000	Supported
H1c	*Value Driven → Brand Image*	1,765	7,167	0,000	Supported
H2a	*Egoistics Driven → Brand Trust*	-0,514	-3,321	0,000	Supported
H2b	*Egoistics Driven → Perceived Quality*	-1,655	-5,271	0,000	Supported
H2c	*Egoistics Driven → Brand Image*	-0.909	-4,907	0,000	Supported
H3a	*Stakeholder Driven → Brand Trust*	0,012	0,135	0,893	Not Supported
H3b	*Stakeholder Driven → Perceived Quality*	0,498	3,200	0,001	Supported
H3c	*Stakeholder Driven → Brand Image*	0,119	1,137	0,256	Not Supported
H4a	*Strategic Driven → Brand Trust*	0,074	0,921	0,357	Not Supported
H4b	*Strategic Driven → Perceived Quality*	0,140	1,109	0,268	Not Supported
H4c	*Strategic Driven → Brand Image*	0,131	1,416	0,157	Not Supported
H5a	*Brand Trust → Brand Loyalty*	0,561	8,406	0,000	Supported
H5b	*Brand Trust → Brand Advocacy*	0,123	1,427	0,154	Not Supported
H6a	*Perceived Quality → Brand Loyalty*	-0,081	-1,180	0,238	Not Supported
H6b	*Perceived Quality → Brand Advocacy*	0,048	0,639	0,523	Not Supported
H7a	*Brand Image → Brand Loyalty*	0,368	4,848	0,000	Supported
H7b	*Brand Image → Brand Advocacy*	-0,194	-2,260	0,024	Not Supported
H8	*Brand Loyalty → Brand Advocacy*	0,674	6,860	0,000	Supported

Discussions

Based on the results in figure 1 and table 5, there are 4 paths that can be identified from the model, as listed below:

Path 1: Value driven motive - Brand Trust-Brand Loyalty
Path 2: Value driven - Brand Image - Brand Loyalty
Path 3: Egoistic driven - Brand Trust - Brand Loyalty
Path 4: Egoistic driven - Brand Image - Brand Loyalty

This result showed that out of four CSR motives (value driven, egoistic driven, stakeholder driven and strategic driven), only value driven and egoistic driven motive have impacts on brand trust or brand image of the company. In this research, the example of CSR activities performed by the company is philanthropic activities, in which Telkomsel was described as a benevolent company, donating money, health equipment, even free internet services to health and medical workers in Indonesia during covid-19 pandemic. If customers saw these acts as value-driven kindness, the kind of CSR activities that was performed because the company realized their responsibility to their environment and the society, then these activities would have positive impact on customers' trust towards the brand, which eventually would lead to brand loyalty. These activities would also be beneficial for the image of the company. Good brand image would also lead to brand loyalty.

As for the second motive, egoistic-driven, here the customers suspected that there were some ulterior motive behind the act of kindness. Customers saw the CSR activities as a performance, something that was done in order to get publicity, for instance. In the end, customers thought that all benefits would eventually go back to the company, in the forms of publicity, good image or profit. When customers think that there were some egoistic motive behind the philanthropic actions, this would affect their trust negatively towards the company, which would lead to less brand loyalty. The same thing can be applied to brand image. The suspicion of some egoistic motives behind a company's benevolent act would lead to bad brand image, which eventually would also decrease brand loyalty.

As for brand advocacy, the results showed that there were no direct path to brand advocacy. The company must build brand loyalty first before the customers are willing to advocate the brand to their relatives and friends.

Conclusions and Recommendations

The research was conducted in three areas in Indonesia where covid-19 hit the hardest, namely Jakarta, East Java and West Java. The researchers wanted to see how respondents in these area, which were also the customers of a certain company, would react to covid-19 CSR activities messages posted by the company in their official websites/social media. The researchers also wanted to examine how the customers' perception of the motives behind the covid-19 CSR activities would influence their trust and loyalty to the company, and also the impact on the brand image, which would eventually lead to brand advocacy.

Out of four CSR motives, only value-driven and egoistic-driven were proven to have impacts on brand trust and brand image, which eventually leads to brand loyalty. Brand advocacy can be achieved only after the brand loyalty is formed strongly.

The research only used one type of CSR activities (philanthropic) and only one company was used as the research object, considering that the companies must have their product throughout Indonesia and must performed covid-19 related CSR activities and also publicized them in their official website and social media. The next research should try to examine another type of activity (e.g. Corporate Social Marketing) and use more than one company as the research objects, so the results can be compared.

The next research can try to reach other areas of Indonesia which were also impacted by the covid-19 pandemic, for example Central Java and other areas in Sumatra and Kalimantan island. Respondents can also be classified into loyal and regular customers to see the differences in their perception.

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Power Shortages and Changes in the Structure of Electricity Production in Poland in 2015-2019

Wioletta SKRODZKA

Częstochowa University of Technology, Częstochowa, Poland
wioletta.skrodzka@pcz.pl

Abstract

Objectives: The paper aims at emphasizing the differences between Poland and the EU-28 states with the level of security of electricity supply. **Background**: The level of energy safety is influenced by many factors: diversification of the structure of energy carriers in the domestic balance, degree of diversification of external sources of supply, technical condition and efficiency of devices and installations of the transmission and distribution systems for fuels and energy. In this context, the security of electricity supply can be considered at the level of: energy availability, power, reliability of supply and quality of supplied energy. **Expected Results**: The study is focused on the aspect of the risk of energy shortages in the Polish energy system. Two shortage incidents in Poland (August 2015 and June 2020) were analyzed in terms of the risk factor and in the context of structural changes in the energy market. The paper investigates the intensity of changes in the sector structure of energy production (using a measure of structural changes), then compares the sector structure of the primary energy production in Poland with the sector structure in the whole EU-28 using object similarity measure and finally evaluates the competition on the Polish electricity market using the Herfindahl-Hirschman Index (HHI) as an index generation concentration in power sector. **Implications:** The results of work can be used as a situational analysis for tackling security of electricity supply.

Keywords: Energy Sector, Risk Management, Power Shortfages, Security of Electricity Supply.

JEL Classification: D81, L52, O13, Q41,

Introduction

Data from previous years show that the global demand for energy continues to grow (WEMO, 2019). Even though the global economy in 2020 slowed down because of the Coronavirus pandemic, which was effectively followed by a decrease in energy demand, one can speculate that once the pandemic is over, the rising trend will continue. A temporary drop in demand resulted in a reduction of wholesale energy prices (Okolnishnikova et al., 2020). According to the Polish Power Exchange, monthly prices of energy at the beginning of the year were lower by 16 - 33% compared to the first months of 2019. The average year-to-year decrease was 23,4% (TGE, 2020). Reduction in demand promotes the cheapest generation units and fuels the interest in energy transformation. This transformation is an opportunity for energy companies with a stable financial situation. Provision of energy at lower prices gives them a chance to increase their market share. At the same time, the pandemic revealed the growing risk among generation units. Because of the economic slowdown the customers reduce their energy consumption, but the energy companies are bound to ensure previously established volumes at higher prices. Hence, they suffer losses in the face of the global reduction of energy prices. An exaggerated liberalization in terms of energy consumption and deferred payments caused by the global economic slowdown is another source of risk for energy companies. It also influences the stability of the whole energy system. Disruptions in energy supplies have a negative effect on all spheres of economic and social life (Kuei-Yen et al., 2018). Stable provision of electricity supplies requires an efficient policy of managing power shortages (Danielsson et al., 2020). This stability is influenced by many factors. The increasing role of renewable energy which has feed-in priority results in reduced operation of coal units. Subsidiary sources of energy are characterized by a relatively high instability of generation (Alizadeh et al., 2016; Paterakis et al., 2017; Lund et al. 2015; Cruz et al., 2018; Aghaei &Alizadeh, 2013). Therefore, the stability of the energy system is based on conventional energy sources. Generating units of this type, however, require large investments and considerable modernization which becomes unprofitable at fluctuating energy prices. A remedy for the danger of the so called blackout, understood as the system failure resulting in the loss or significant reduction of voltage over a large area, could be the capacity market established in 2017. The act ensures safe development of renewable energy sources without a negative impact on the continuity of energy provisions to end customers. One of the expected effects of the

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capacity market is investing in new power plants. The second factor influencing the stability of the power system is the occurrence of the so-called *unscheduled flows* including *loop flows*, *transit flows*). Unscheduled flows refer to power exchange between systems, which was not included in the cross-border exchange schedules. This process manifests itself, inter alia, in insufficient coordination of trade within an area whose internal balance directly affects other market areas that are not a party to the transaction. In Central and Eastern Europe, cross-border trade between Austria and Germany has a strong influence on the occurrence of unscheduled flows.

The study is focused on the aspect of the risk of energy shortages. Two power shortage incidents which occurred in August 2015 and in June 2020 were analyzed. The analysis covered the factors causing the risk and the methods of counteracting it. The Polish energy sector in the years 2015-2019 was analyzed, both in terms of the concentration of the generation sector and the production structure**.** Changes in the sectoral structure of electricity production in Poland and in the EU-28 were compared. The study also presents a comparison of the degree of intensity of changes in the years 2015-2019. The analysis was based on data from the Eurostat and the Statistical Review of World Energy 2020.

Security of Electricity Supply

The directive 2005/89/EC defines the security of electricity supply as „the ability of an electricity system to supply final customers with electricity". This definition emphasizes the security of supply as a property of the entire power system, including the generation, transmission and distribution systems, and analyzes them from the point of view of flexibility on the demand side, i.e. the end customer. The issues of security of electricity supply are also regulated in Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 on common rules for the internal electricity market and repealing Directive 2003/54/EC. In Poland the directive 2005/89/EC was implemented in 2010 (Dz.U. 2010 nr 21 poz.104). The level of energy safety is influenced by many factors. Their significance depends on both the internal situation in a country and the situation on global markets. A few of these sectors, though, are especially important: diversification of the structure of energy carriers in the domestic balance, degree of diversification of external sources of supply, technical condition and efficiency of devices and installations of the transmission and distribution systems for fuels and energy. In this context, the security of electricity supply can be considered at the level of: energy availability, power, reliability of supply and quality of supplied energy (Sperstad, 2020). Availability refers to the ability of the system to meet the consumers' demand for electricity, taking into account the aspect of energy storage. It refers to underproduction or scarcity of primary resources (Szamrej-Baran & Baran, 2020). Energy shortages are connected with energy availability and are usually a long-term phenomenon. Production capacity shortages usually do not last as long as energy shortages. Power shortages are connected with the lack of available generation, transmission or distribution capacity. Reliability is discussed in terms of the duration of disruptions of energy supplies to end customers caused by malfunctions and pauses in the energy system due to chance events. The quality of supplied energy can be characterized in terms of frequency, voltage and distortions (Doorman, 2006). The majority of the subject literature focuses on the influence of various generation sources on the security of the energy system (Sperstad , 2019). Many studies discuss the reliability of electricity supply and analyze various types of failures in the power system and the resulting power outages (Escalera, 2018). In the subject literature there is a lot of focus on the possibilities of improving the reliability of energy systems (Yixing & Singh, 2014; Lynch, 2019). The state of knowledge on the theory and practice of the assessment of power systems reliability, including the socio-economic impact assessment, was widely presented in GARPUR Consortium (2014). Quantitative aspects of energy efficiency are discussed by Khan et al. (2018), Andersen et al. (2006), Sgouras et al. (2018), Mena et al. (2014) and Syrri & Mancarella (2016). And the quality of power supply is the main focus of the following studies: Goel et al. (2006), Safdarian et al. (2018) and Syrri & Mancarella (2016).

Power shortages in August 2015 and June 2020 - A Situation Analysis

Energy crises can be caused by many factors such as extreme weather conditions, deliberate attacks or fuel shortages. When a crisis occurs it has a devastating impact on the economy and the social life in a country. In August 2015, a combination of factors including a persistent heat wave, a difficult hydrological situation on the main rivers in the country and a resulting reduction of the available production capacity below the necessary levels forced the government to introduce restrictions in the consumption and supply of electricity. On 9 August a sudden increase in power losses reaching 1200 MW was recorded, which exceeded the values used in the criteria for assessing the sufficiency of domestic generation capacity. That led the PSE Operator SA (the operator of the electric power transmission grid in Poland) to introduce levels of restrictions for industrial customers till the end of August. Actions of this kind had not been carried out for many years in Poland.

The following measures were taken:

- the available generating units were activated, including units beyond the central control system;

- the planned repairs and maintenance of power plants were postponed;
- it was recommended to use the contracted DSR services, i.e. voluntary and temporary reduction of electricity consumption by consumers or postponing consumption at the request of PSE S.A. (electric power transmission grid operator in Poland) in return for remuneration;
- the possibilities of emergency assistance of foreign operators from the Czech Republic and Slovakia to the maximum extent possible were agreed upon;
- multilateral redispatching was widely applied in order to maintain a safe level of power flows across the Polish-German border as this border was heavily loaded with unplanned power flows.

However, the measures taken did not help to balance the demand for power which led to the introduction of restrictions in the supply and consumption of electricity. On the morning of 10 August power level 20 was announced. The restrictions helped to maintain stable functioning of the energy system. In the following days, after the elimination of failures in power plants, the power levels were being reduced and the reserves in the system were being rebuilt.

A similar situation endangering the energy system security occurred on 22 June 2020. It was accompanied by unplanned generation interruptions and failures in power units which caused the reduction in the available power by 7 GW. The power available in power plants in Bełchatów, Opole, Kozienice, Połaniec and Włocławek was reduced by 4 GW due to a number of failures. This loss constitutes over 10% of all capacity installed in Polish thermal power plants. The demand for energy at that time was 21 GW. The Polish electric power transmission grid operator PSA S.A. used inter-operator assistance. The total electricity import from Sweden, Germany, the Czech Republic, Slovakia and Lithuania reached 3 GW. It should be noted that this volume covered commercial flows and inter-operator import. These steps resulted in a sudden and temporary increase in the prices of electricity.

Comparing the situation from August 2015 with the one from June 2020 it should be emphasized that in 2020 the National Power System was better prepared for emergencies as it was equipped with new generating units. The power of photovoltaic installations which help to balance the system is growing dynamically. Installation of phase shifters on cross-border connections with Germany, as well as investments in the expansion and modernization of the transmission network increase the transmission capacity for the purposes of trade.

Data and Methods

The analysis of changes in the structure of primary energy production in Poland and the EU-28 is based on data from the Eurostat energy balance for 2015 and 2018 on an annual basis. The data for 2019 come from the Statistical Review of World Energy 2020 | 69th edition.

In order to analyze the intensity of changes in the sector structure of energy production, we use a measure determining structural changes proposed by Rutkowski (Rutkowski, 1981). It is a variability coefficient of the indexes of the analyzed aggregation's growth, which at the same time measures the irregularity of the increase of the aggregate's components (Skrodzka & Kiriliuk, 2019).

$$V_{t,t+\tau}^{i} = \left[\sum_{j=1}^{k} f_{j,t+\tau}^{i}\left(\frac{f_{j,t+\tau}^{i}}{f_{j,t}^{i}} - 1\right)^{2}\right]^{\frac{1}{2}} \tag{1}$$

where:

$f_{j,t+\tau}^{i}, f_{j,t}^{i}$ - the structure index in moments t and t+τ; j=1,2, …k – components of the structure aggregate, share of j-fuel to total primary energy production; i – object number (1- Poland, 2-European Union).

$V_{t,t+\tau}^{i} = 0$ indicates the lack of change in the structure between periods. The higher the value of the measure, the more significant the structural changes.

In the next stage of the analysis we will compare the sector structure of the primary energy production in Poland with the sector structure in the whole EU-28. Object similarity measure are used in analysis of this type (Malina, 2004). The measure is based on the value of the cosine of the α angle measured between the U_{t1}i U_{t2} vectors characterizing the state of the structure of the primary energy production in Poland and European Union in respective periods *t*1 and *t*2.

$$cos\alpha = \frac{\sum_{j=1}^{k} f_{j,t}^{1} \cdot f_{j,t}^{2}}{\sqrt{\sum_{j=1}^{k}\left(f_{j,t}^{1}\right)^{2} \cdot \sum_{j=1}^{k}\left(f_{j,t}^{2}\right)^{2}}} \tag{2}$$

where:

$f_{j,t}^{1}, f_{j,t}^{2}$- components of the structure indexes vector respectively for Poland and the European Union.

The values of the measure are normalized, but to interpret the structures similarity assessment level, we consider the angle represented by the calculated cosine. A big α spread between the U_{t1} and U_{t2} vectors means significant structure changes in period *t*2 in comparison to the structure in period *t*1. A small spread of the angle indicates slight structure changes in the discussed periods. In an exceptional case, when the compared structures are identical, the angle between the structure vectors is 0. When the cosine value tends toward 0, which means the angle tends toward 90°, the vectors represent increasingly different structures. Arbitrary ranges determining small, medium or high structure similarity were set. The values of the cosine function for the division of a 90° angle into 3 equal parts were assumed as the ends of the ranges: [0, ½]- big difference in structures;[1/2, $\sqrt{3}/2$]- moderate diversification of the structures;[$\sqrt{3}/2$, 1]- high similarity. The function is not linear with respect to the angle, so we need to take caution expressing the size of structure changes in percentage.

The assessment of the competition on the Polish electricity market was carried out using the Herfindahl-Hirschman Index (HHI) which is often used in antitrust and sector regulation activities. The HHI can be represented mathematically as,

$$HHI = \sum_{i=1}^{n} S_i^2 \tag{3}$$

where:

S_i is the market share of i-th participant, n is the number of participants in a competing market.

The higher the level of the index the lower the competitiveness of a branch. The degree of generation concentration in the power sector is determined using the most common limits: below 750 - no concentration; 750 - 1800 - moderate market concentration; 1.800 – 5.000 - high market concentration; over 5000 - very highly market concentration.

Analysis of the Polish energy sector in the years 2015-2019 in comparison to UE-28

The analysis was based on data from the Eurostat and the Statistical Review of World Energy 2020.

The global energy production in 2019 grew by 1.3% compared to 2018. Globally, coal was still the dominant energy source. Its share in the production of energy decreased by 1.5% compared to 2018 reaching 36.4%. The share of natural gas and renewable energy increased to 23.3% and 10.4% respectively. Analyzing the volume of output of the primary energy in the EU-28 in the period 20015-2019 we observe a negative trend for the majority of energy sources, except for renewables (table 1).

Table 1: Primary energy production, Share of each fuel to total production in EU-28 and in Poland, 2015–2019 (Mtoe)

Year	Area	Total production (Mtoe)	Solid fuels	Oil (total)	Natural gas	Nuclear energy	Renewable energy	Others
2015	EU-28	766.6	144.9	75.1	107.3	221.5	204.7	13.0
	PL	67.3	53.6	0.9	3.7	0.0	8.6	0.5
2016	EU-28	755.4	132.2	74.0	107.3	216.8	210.8	14.3
	PL	66.4	52.1	1.0	3.5	0.0	9.0	0.8
2017	EU-28	758,2	124,5	77,5	103,1	210,1	226,6	14,2
	PL	64	49,5	1,0	3,5	0,0	9,1	0,9
2018	EU-28	756,1	117,8	70,8	93,8	209,6	233,7	29,6
	PL	61,4	47	1	3,4	0,0	8,9	1
2019	EU-28	742,4	96,1	65,4	98,7	208	245	26,2
	PL	59,2	43,0	0,7	2,8	0,0	10,3	1,4

Source: Eurostat energy balance for 2015 and 2018 on an annual basis. The Statistical Review of World Energy 2020 | 69th edition. [online]; [Retrieved.2020-08-17],

Primary production of energy in the EU-28 in 2019 decreased by 3.2% compared to 2015. The biggest decrease was observed in the production of fossil fuels (33,3%), petroleum derived products (12,9%), gas (8%), followed by the production of nuclear energy (6%). The production of energy from renewable sources, on the other hand, increased by 19,7%. The most popular sources of renewable energy in EU-28 in 2019 were wind power plants. Wind generation increased by 14% (+54 TWh) compared to 2018. Solar generation rose by 7% (+9.5 TWh). Biomass generation rose only 1% (+1.4 TWh). Hydro generation decreased by 6% (-21.5 TWh).

Electricity production in 2019 in Poland was the lowest in five years reaching 164 TWh. The import of electricity in 2019 grew almost twice to the level of 10.6 TWh. As prosumer installations are on an increase, it is difficult to realistically estimate the domestic demand for electricity. Production in Poland in the analyzed period is based on fossil fuels which in 2019 accounted for 72,6% of the production. There seems, however, to be an upward trend in the percentage of renewable energy. In 2019 it was on the level of 17,4%, followed by gas (4,7 %), and petroleum products (1,2%). In Poland there are no nuclear power plants.

Angle measure was used to assess the similarity of the primary energy production structure in Poland and in EU-28. The results are shown in table 2.

Table 2: The Values of the Structure Similarity Measures

Years	2015	2016	2017	2018	2019
cosα	0,510951	0,491215	0,237006	0,469909	0,445086

Source: Own calculations

The analysis showed a significant difference between the structures of primary energy production in Poland and in EU-28 in 2019, the angle between the vectors is 64°. In the other years also suggests a significant difference between the structures of primary energy production. In 2017 the angle between the vectors is 77°. In the next step we determined the intensity of the structural changes in the analyzed period using the formula (1). The values of the structural change intensity measure are presented in table 3.

Table 3: The Dynamics of the Structural Change in Primary Energy Production in Poland and in EU-28 in the Period 2015-2019

Years	Change intensity measure in comparison to the previous year	
	EU-28	Poland
2016	0.042336	0.075215
2017	0.057806	0.031486
2018	0.178989	0.03897
2019	0.079111	0.279219
2019:2015	0,315197	0,926341

Source: Own calculations

Both measures have low, similar range values, which means that the intensity of the change tempo in the analyzed structures is also low. But in 2019, the measures for Poland are higher which suggests a greater intensity of the changes in Poland than in EU-28. The strongest changes in the sector structure of production in EU-28 took place in 2017, and in Poland in 2019. The last line of table 6 shows the value of the measure for the first and the last year 2019:2015. Regardless of the change path and concentrating on the two boundary years, we can say that the intensity of changes in 2019 compared to 2015 was higher in Poland.

The assessment of the competition on the Polish electricity market was carried out using the Herfindahl-Hirschman Index (HHI) which is often used in antitrust and sector regulation activities.

The higher the level of the index the lower the competitiveness of a branch. In 2019, the PGE S.A. capital group held the largest electricity generation subsector market share of 40.6%. The market share of the three largest entities, measured by energy fed into the grid, was 66.4%. Apart from PGE S.A. the dominant positions were held by: ENEA S.A. and TAURON Polska Energia S.A. The table 4 presents market shares and the concentration in the generation subsector in the years 2015-2019.

Table 4: Market shares and the concentration in the generation subsector in the years 2015-2019

Year	Number of units with over 5% share in the installed capacities	Number of units with over 5% share in the energy fed into the grid	Share of the three biggest units in installed capacities	Share of the three biggest units in the energy fed into the grid	Installed capacity - HHI	Energy fed into the grid - HHI
2015	5	6	52,2	57,4	1366,0	1762,9
2016	5	6	50,8	54,9	1309,3	1640,0
2017	4	4	63,1	69,0	17959	2281,1
2018	4	3	62,0	69,7	1740,0	2281,0
2019	3	4	62,1	66,4	1809,2	2090,5

Source: Data of the Ministry of Energy and ERO. For all entities operating in the generation sector, which are subject to an obligation of reporting statistics, including installed capacity and energy fed into the grid from wind and hydro sources. When calculating the market share ratios of the three largest entities and HHI ratios, both according to the energy fed into the grid and the installed capacity, the structure of the entity as at 31 December 2019 was taken into account. [online]; [Retrieved.2020-09-17] https://www.ure.gov.pl/en/about-us/reports/67,Reports.html

Market share ratio in 2019 measured according to the energy fed into the grid (with the consideration of energy provided by generators directly to end users) was on a high level of 66.4%. Compared to 2018 it decreased by 3 percentage points. And in comparison to 2015 it grew by 9 percentage points. The previous downward trend in HHI indices, measured according to installed capacity and the volume of energy fed into the grid, changed significantly in 2017. The HHI measured according to installed capacities grew in 2019 compared to 2018, but measured according to energy fed into the grid (with the consideration of energy provided by generators directly to end users) it decreased. In comparison to 2015, an increase in the concentration measured using the HHI was observed in both cases. The index calculated for the production in 2019 showed a moderate market concentration. However, calculated for the installed capacity, the index exceeded the upper limit of the average concentration and passed to the level of high generation market concentration. The number of units with at least 5% share in installed capacities decreased in 2019 compared to 2018. This was due to the decommissioning of the generation asset in the ZE PAK S.A. capital group, which significantly decreased the importance of this group in the sub-sector of electricity generation. The heightened importance of the PKN ORLEN S.A. capital group, resulted in the increase in the number of entities with at least 5 percent share in energy fed into the grid in 2019 compared to 2018.

Conclusions

In the context of electricity supply, energy security is understood primarily as the security of supply. It is understood as the ability of the power system to ensure security of the functioning of the power grid and to balance the supply and demand for energy. The prognoses by PSE do not indicate any dangers to the security of energy supply to Polish customers. Compared to the situation in August 2015, the National Power System is now better prepared for emergency situations. It is equipped with many countermeasures in case of various difficulties in balancing the system. The most important of them is the ability to maintain the operational reserve of generation capacity at the required level. Also inter-operator emergency assistance used by European operators in emergency situations, such as the one from 22 June 2020, constitutes significant support. Other tools include the Intervention Cold Reserve and the service of reducing the demand on the operator's request (DSR). However, as the instability of the system is growing and extreme weather conditions are becoming more common there is a need in the energy system for a bigger diversification of sources. One should also underline the special importance of photovoltaics which can be another buffer to conventional energy on one hand, but also a risk element due to its irregular supply on the other. In Poland, like in other EU-28 countries, the share of energy from renewable sources in primary production is constantly growing. The study analyzed the structure of primary energy production in sectors and the dynamics of its changes in Poland in terms of capacity risk management, and compared it with the structure in the EU-28 in the years 2015-2019. The discussed structures and the rate of changes differ much. Also the unit structure of the Polish energy sector was analyzed in terms of concentration. At a later stage of the research, the author wishes to focus on other risk factors for power shortages. In a market economy the role of the state is not to take direct actions ensuring the adequacy of generation capacity, but to create regulatory conditions for business activity which can motivate entities to build, maintain and modernize generation units, as well as motivate energy customers to limit energy consumption and gradually increase the flexibility of demand.

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The Use of The Industry 4.0 Concept by Polish Enterprises of The SME Sector

Aleksandra CZUPRYNA-NOWAK

Silesian University of Technology, Gliwice, Poland, aleksandra.nowak@polsl.pl,
DOI: 0000-0001-8565-1029

Abstract

Industry 4.0 puts new enterprises against modern challenges and priorities. The Industry 4.0 concept assumes full integration of all areas of business activity. This integration should take place with the use of broadly understood information technology, both real and virtual. Polish enterprises from the SME sector are aware of the need to implement the Industry 4.0 concept. However, very often, there are barriers to organizational changes, employment, understanding the advantages of IoT, or the high cost of implementation. It is, therefore, necessary to diagnose the current state. The article aims to check the current state of Industry 4.0 solutions in selected areas of the company's activity. The theoretical discussion in the presented work was supported by research conducted among Polish enterprises from the SME sector.

Keywords: Industry 4.0, areas of implementation of the Industry 4.0 concept, SME sector.

Introduction

To survive, the enterprise adjusts its activities in a changing environment. Today's enterprises' biggest problem seems to be the need to effectively deal with the excess of data or information coming both from outside and inside. Moreover, the priority seems to be to maintain high production flexibility. The fourth revolution makes it possible to connect devices within digital ecosystems and deepen integration within horizontal and vertical value chains. The Industry 4.0 ideology pursuit is to obtain a company focused on quickly satisfying individual customer needs (Wittbrodt 2017).

Because Industry 4.0 is a new reality, there are more and more publications on this subject (Adamik 2019). M. Olszewski (Olszewski 2016) deals with the issues of transition from the stages of automation and industrial robotization to the stage of mechatronization of products. Dispersed structure. A. Zagajewski (Zagajewski 2018) presents the main directions of e-commerce development in the Industry 4.0 concept. D. Stadnicka, W. Zielecki, and J. Sęp (Stadnicka 2020) focus in their publication on the idea of Industry 4.0, assessing the possibilities of its implementation. These are just some of the authors who deal with the topic of Industry 4.0 in scientific studies. In the years 2019-20, four reports were prepared by consulting companies (Piątek 2020). According to the Autodesk report, Polish enterprises' research has shown that Industry 4.0 is an essential topic for the majority, the factor determining competitive advantage is innovation, and digitization is inevitable. On the other hand, the IDG / ABB report states that Polish companies have already started implementing Industry 4.0 solutions, but lack a strategic plan.

However, it should be remembered that the transition to Industry 4.0 is a gradual process that requires the integration of the current state with new digital technologies. Therefore, it seems necessary to analyze the current state of Polish enterprises in the SME sector and the degree of implementation of the Industry 4.0 solution. Currently, there is a lack of such studies and studies. Therefore, the article aims to check the current state of implementation of Industry 4.0 solutions in selected areas of the company's activity in the SME sector.

The article consists of two parts. The first, theoretical, concerns the very concept of Industry 4.0. However, the second part presents empirical research. The research was conducted in 2020 among Polish enterprises from the SME sector. The company's activity areas were selected: warehousing, product sales, product service, order picking, and internal transport. It seems that these are the critical areas of activity of enterprises in the SME sector. In these areas, enterprises were asked to specify to what extent they implemented Industry 4.0 solutions. The research results and their analysis are presented in the paper.

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The use of the Industry 4.0 concept in enterprises

The idea of Industry 4.0 assumes full integration of the system of suppliers, customers, and producers. The concept of Industry 4.0 connects the physical and virtual world. As part of the production systems, all factory components form a unified whole, from procurement to transport. People, methods, objects, and machines are connected via the internet. Communication between them takes place in real-time and is aimed at process optimization. Industrial production can meet individual customer needs continuously. Industry 4.0 allows you to create new business models.

Such a new business model that has emerged, thanks to the 4.0 concept, is the enterprise's digital maturity model (Łobejko 2018, Nosalska 2019). This model assumes three critical pillars for the development of Industry 4.0 in manufacturing companies. The posts cover the enterprise's entire activity and are the technologies pillar, the organization pillar, and the processes pillar. Twelve modules can be distinguished within the three pillars. Modules represent the key aspects around which companies should focus their activities. Each post is assigned to appropriate modules. The technology pillar is a crucial factor driving the enterprise's changes, in line with the Industry 4.0 concept. Digital technologies (cloud computing, virtual reality, machine learning, and the Internet of Things) create an ecosystem in which physical resources (e.g., people, machines) are integrated with IT systems and enable continuous exchange and data analysis. The technology pillar includes the following modules: connectivity, automation, autonomy, and intelligent product. The organization pillar rests on two critical elements of an enterprise's operations: people, systems, and structure. The following modules can be distinguished within the post: strategy, employees, leadership, cooperation, and projects. The last pillar, the pillar of processes, the task of which is the complete integration of many areas - from production, through the supply chain, to the product life cycle. Within the processes pillar, we distinguish modules: integration with the environment, product life cycle, internal integration, and standardization.

In this study, we will focus on the internal integration module. The internal integration module is directly related to the company's production process. It is directly related to the planning and implementation of processes leading to goods and services. Internal integration aims to integrate processes vertically at all levels.

The scope of application of Industry 4.0 solutions in Polish enterprises of the SME market

The research was conducted among Polish SME enterprises. The study was carried out in December 2019 - February 2020. Five hundred sixty-nine companies participated in the part concerning the scope of application of Industry 4.0 solutions. Four levels were identified: warehousing, product sales, product service, order picking, and internal transport. The surveyed companies were asked whether they had Industry 4.0 solutions implemented in the company in the areas mentioned above. The respondents were asked to mark one answer on the scale: "no," "rather no," "hard to say," "rather yes," and "yes."

Table 1 shows the breakdown of enterprises according to the size of employment.

Table 1: The number of enterprises participating in the survey by employment size

Number of employees	Number of enterprises	%
to 9	269	47,28%
from 10 to 49	222	39,02%
from 50 to 250	78	13,71%
Sum	**569**	**100,00%**

Source: Own study

47.28% of the surveyed enterprises are micro-enterprises employing up to 9 people. 39.02% of enterprises employ from 10 to 49 employees. 13.71% are enterprises with 50 to 250 employees.

The voivodship in which the surveyed enterprises operate is the most important. As much as 42.53%, enterprises took part in the Mazowieckie voivodeship (Table 2). In terms of the number of enterprises participating in the survey, the second voivodeship was Śląskie: 15.64%. Then: Dolnośląskie Voivodeship - 7.91% and Greater Poland Voivodeship - 5.62%. The number of surveyed enterprises in other voivodeships does not differ significantly. The structure of the research reflects the design of the location of industry in Poland.

Table 2: Number of enterprises participating in the survey by voivodship

Voivodship	Number of enterprises	%
dolnośląskie	45	7,91%
kujawsko-pomorskie	13	2,28%
lubelskie	13	2,28%
lubuskie	5	0,88%
łódzkie	14	2,46%
małopolskie	27	4,75%
mazowieckie	242	42,53%
opolskie	10	1,76%
podkarpackie	19	3,34%
podlaskie	7	1,23%
pomorskie	20	3,51%
śląskie	89	15,64%
świętokrzyskie	12	2,11%
warmińsko-mazurskie	11	1,93%
wielkopolskie	32	5,62%
zachodniopomorskie	10	1,76%
Sum	**569**	**100,00%**

Source: Own study

9.31% of the surveyed enterprises conduct their activities in economic zones. The remaining 90.69% outside the economic zones.

Table 3 : The number of enterprises participating in the survey by employment size

The company operates in the economic zone	Number of enterprises	%
Yes	53	9,31%
No	516	90,69%
Sum	569	100,00%

Source: Own study

Information on the functioning of the enterprise in the economic zone is essential. Enterprises operating in industrial zones can often count on various types of facilities in the company's operations. If thanks to this, they lower operating costs, investment funds can increase. Concerning the implementation of new solutions such as Industry 4.0 solutions, it is crucial.

In the first question, the respondents answered whether their company had implemented Industry 4.0 solutions in the area of storage. 43.23% (Table 4) of the surveyed companies do not use Industry 4.0 solutions in the area of storage.

Table 4 : The number and percentage share of answers to the question regarding the scope of Industry 4.0 solutions in the warehouse area

Answers	Number of enterprises	%
no	246	43,23%
propably no	55	9,67%
hard to say	75	13,18%
rather yes	104	18,28%
yes	89	15,64%
Sum	**569**	**100,00%**

Source: Own study

33.92% of the surveyed companies declare the use of Industry 4.0 solutions. Whereas 15.64% of enterprises applied solutions, and 18.28% rather applied. Figure 1 presents the number of answers to the question graphically.

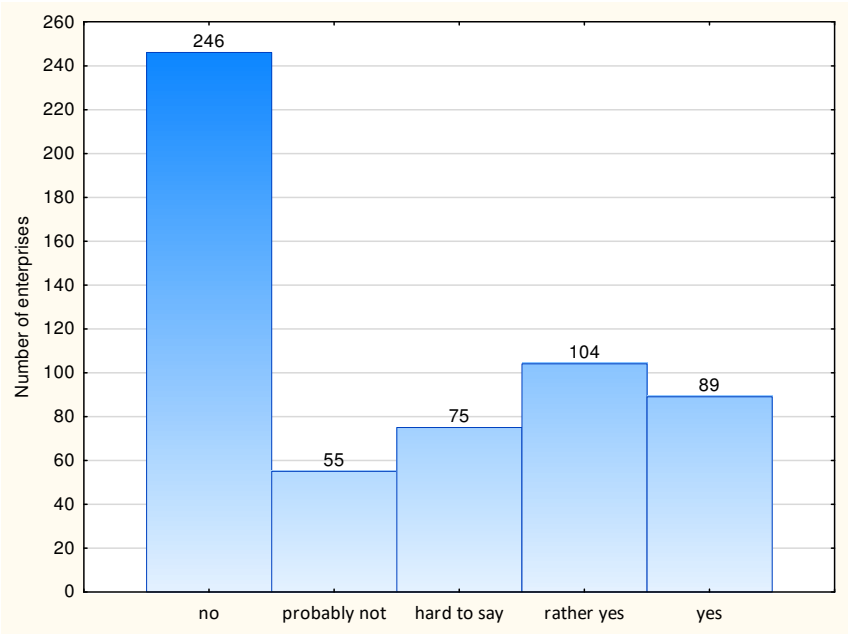

Fig. 1: The number of responses to the question regarding the application of Industry 4.0 solutions in the warehouse area.

Source: Own study

In the second question, companies answered whether their company had used Industry 4.0 solutions in internal transport. Table 5 and Figure 2 present the number of individual responses. 52.20% of enterprises replied that Industry 4.0 solutions were not used in internal transport.

Table 5: The number and percentage share of answers to the question regarding the scope of application of Industry 4.0 solutions in internal transport

Answers	Number of enterprises	%
no	297	52,20%
propably no	81	14,24%
hard to say	82	14,41%
rather yes	62	10,90%
yes	47	8,26%
Sum	**569**	**100,00%**

Source: Own study

19.16% of enterprises declare that they have implemented solutions, answering "rather yes" and "yes." Only 8.26% of enterprises implemented solutions of the Industry 4.0 idea, answering "yes." Explanations relating to internal transport are so expensive that companies do not implement them due to the cost.

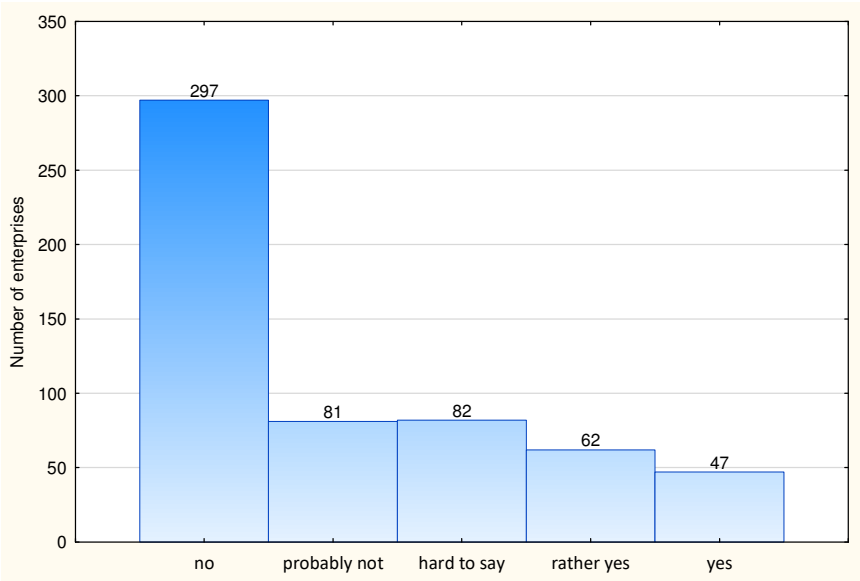

Fig. 2: The number of answers to the question regarding the application of Industry 4.0 solutions in the area of internal transport.

Source: Own study

In the third question, companies answered the question about using industry 4.0 solutions in the area of order picking. In this case, only 31.99% (Table 6 and Figure 3) responded that they did not have such solutions applied.

Table 6 : The number and percentage of answers to the question regarding the scope of application of Industry 4.0 solutions in order picking

Answers	Number of enterprises	%
no	182	31,99%
propably no	33	5,80%
hard to say	84	14,76%
rather yes	144	25,31%
yes	126	22,14%
Sum	**569**	**100,00%**

Source: Own study

47.45% of enterprises have implemented Industry 4.0 solutions in the area of order completion. Complementation of orders is an area of the company's activity that each company develops. Each company aims to sell its products, which it must complete.

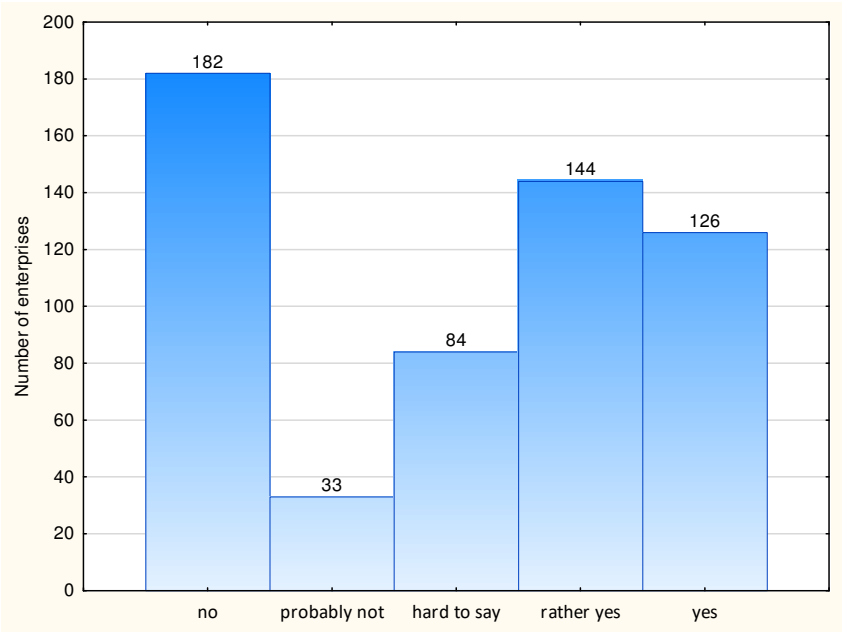

Fig. 3: The number of answers to the question regarding the application of Industry 4.0 solutions in order picking.

Source: Own study

Another question concerned the product service. In this case, there is also a large percentage of enterprises that do not have implemented solutions. Enterprises that answered "no" amounted to 39.54%, and "rather not" 9.49% (Table 7 and Figure 4). That answer gives a total of 49.03% of all surveyed enterprises. Implemented Industry 4.0 solutions (answer "rather yes" and "yes") 34.98%.

Table 7: The number and percentage of answers to the question regarding the scope of application of Industry 4.0 solutions in product service

Answers	Number of enterprises	%
no	225	39,54%
propably no	54	9,49%
hard to say	91	15,99%
rather yes	109	19,16%
yes	90	15,82%
Sum	**569**	**100,00%**

Source: Own study

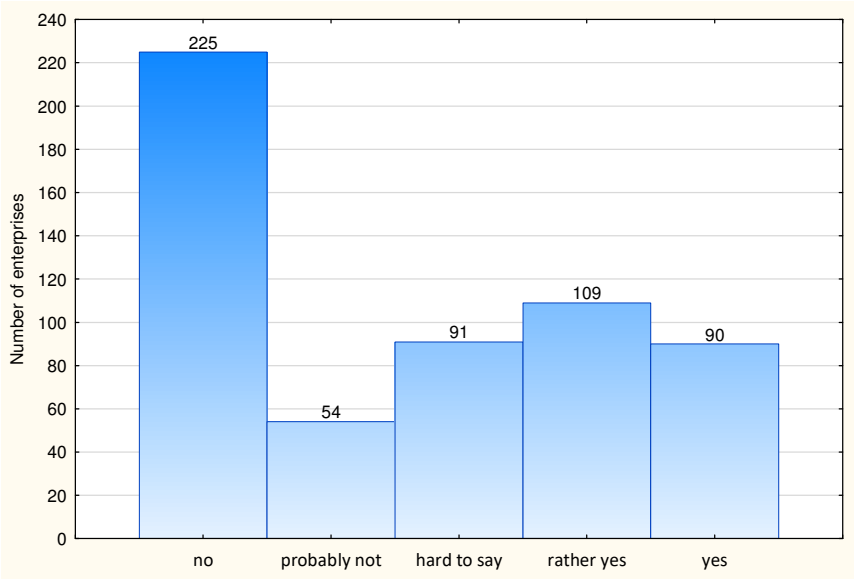

Fig. 4: The number and percentage of answers to the question regarding the application of Industry 4.0 solutions in product service.

Source: Own study

The last question related to the areas of implementation of Industry 4.0 solutions associated with the sale of products. The results can be seen in Table 7 and Figure 5. Because sales are one of the fastest-growing areas of the company's activity, it is possible to notice many enterprises that have implemented solutions to the Industry 4.0 idea. The answers "yes" were 27.24%, while "rather yes" was 25.66%. That answerThis gives a total of 52.9% of all surveyed enterprises.

Table 7: The number and percentage share of answers to the question regarding the scope of application of Industry 4.0 solutions in product sales

Answers	Number of enterprises	%
no	145	25,48%
propably no	28	4,92%
hard to say	95	16,70%
rather yes	146	25,66%
yes	155	27,24%
Sum	**569**	**100,00%**

Source: Own study

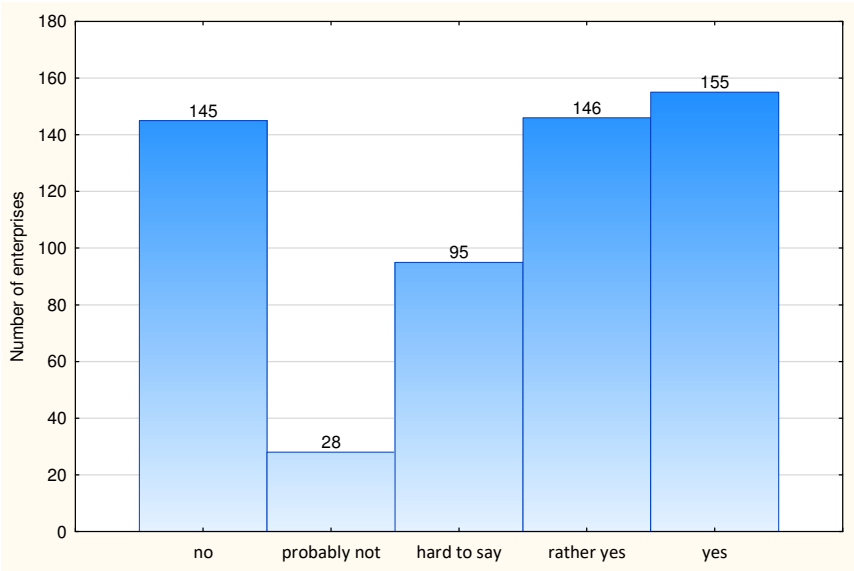

Fig. 5: The number of answers to the question regarding the application of Industry 4.0 solutions in product sales.

Source: Own study

That is the only area of enterprise operation in which enterprises declare the use of Industry 4.0 solutions.

Based on the responses, a dendritic analysis of the reactions was also performed. The dendritic analysis was used to distinguish groups of planes for using the Industry 4.0 concept, which was internally similar.

The dendrite is obtained from the distance matrix (in the example, the Euclidean distance). The pairs of segments most identical to each other are sought. The construction of the dendrite takes place in several stages. The first stage is searching for each object most similar to it (the shortest distance between elements). The items most similar to each other are presented in the form of a non-oriented graph, i.e., one in which the vertices corresponding to these objects are connected by ligaments without indicating the connection's direction. The lengths of the references are proportional to the distance between them. After checking the consistency, the construction of the graph can be considered finished. If the chart is not consistent, its clusters are combined into larger groups. We connect the clusters assuming the criterion of the minimum distance between sets. By creating sets of order 2 in this way, it is checked whether the graph is consistent. The building process is repeated by creating higher-order clusters. Obtaining a compatible chart completes the dendrite formation process. The diagram obtained from the responses to the planes of implementing the concept Industry 4.0 has been introduced in figure 6.

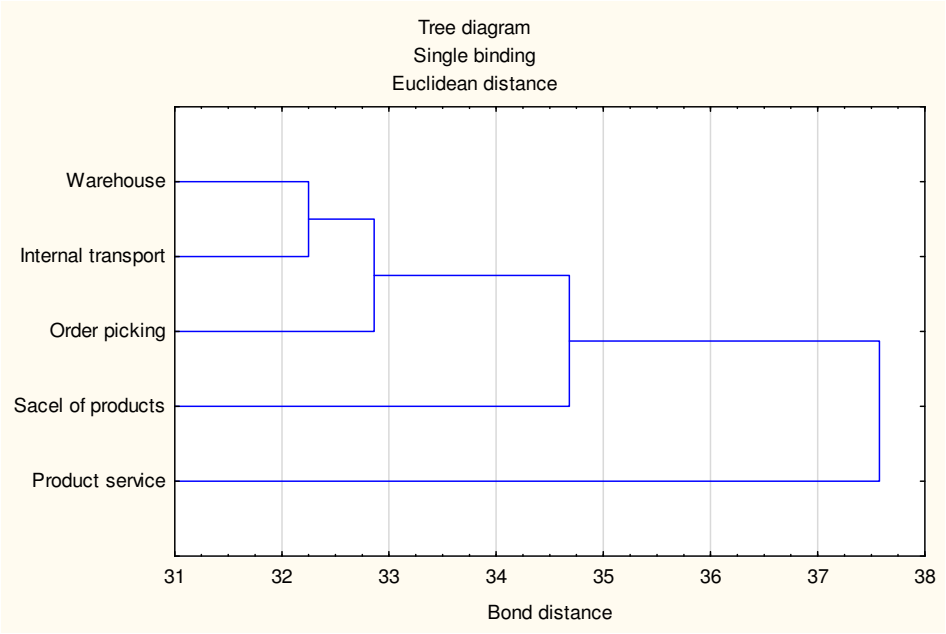

Fig. 6: Classification dendrite of enterprise planer for the implementation of the Industry 4.0 concept.

Source: Own study

The levels of activity have created two bonds. One is product service, and the other is a warehouse, internal transport, order picking, and product sales. The obtained two ties form two groups of planes that can be characterized. One, which includes: warehouse, internal transport, and order picking, is a product sales group. The second one to which the product service belongs is the after-sales group.

Conclusions

The concept of Industry 4.0 is the inevitable direction of the development of any enterprise. It is crucial and essential that Polish companies also implement the vision of Industry 4.0. It also seems necessary to implement the idea in the SME sector.
The article aims to check the current state of Industry 4.0 solutions in selected areas of the company's activity.

The article consists of two parts. The first, theoretical, concerns the very concept of Industry 4.0. It presents a model of the digital maturity of an enterprise in Industry 4.0. The second part presents empirical research. The research was conducted at the turn of 2019 and 2020 among Polish enterprises from the SME sector. The company's activity areas were selected: warehousing, product sales, product service, order picking, and internal transport. It seems that these are the critical areas of activity of enterprises belonging to the SME sector. In these areas, enterprises were asked to specify to what extent they implemented Industry 4.0 solutions.

The analysis of the responses indicates the areas that Polish enterprises invest and those that are underinvested. Internal transport, order picking, warehouse, and product service are those areas in which enterprises from the SME sector do not implement Industry 4.0 solutions. Only the sale of products is the area in which Industry 4.0 solutions are implemented. The conducted dendritic analysis allowed to select two groups. One is product service, and the other is a warehouse, internal transport, order picking, and product sales. The obtained two groups of planes can be characterized, taking into account the process of selling products. One, which includes: warehouse, internal transport, and order picking, is a product sales group. The second one to which product service belongs is the after-sales group.

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An Issue of Formation and Development of Transport and Logistics Infrastructure in The Russian Federation

Nadezhda BULATOVA

East Siberia State University of Technology and Management
Ulan-Ude, Russia
bulatova_nad@mail.ru

Dmitriy RODIONOV
Peter the Great St. Petersburg Polytechnic University St. Petersburg, Russia
drodionov@spbstu.ru

Alexey BATAEV
Peter the Great St. Petersburg Polytechnic University St. Petersburg, Russia
bataev_av@spbstu.ru

Alexey ALEXEEV
East Siberia State University of Technology and Management
Ulan-Ude, Russia
ukc.asmap.uu@gmail.com

Darya KRYZHKO
Peter the Great St. Petersburg Polytechnic University St. Petersburg, Russia
darya.kryz@yandex.ru

Abstract

The paper considers the problem of forming the network of transport and logistics centers in the territory of the Russian Federation as the foundation for transport and logistics infrastructure. Special attention is paid to the legal and regulatory framework of building this system. The authors analyze characteristics of transport and logistics centers, list the network of the existing centers located on key haulage routes. The experience of building such centers helped work out a strategy of development of transport and logistics infrastructure in the Russian Federation, which is aimed at building up other centers in all federal areas. It is noted that their location is in line with the system solutions of the "Concept of creation of terminal and logistics centers on the territory of the Russian Federation" developed by JSC RZD ("Russian railways"). Following the above-mentioned strategy, most of these centers will serve the transport and logistics systems of trade and freight movements in the international "North-South", "East-West" transport corridors, including the China-Mongolia-Naushki-Trans-Siberian trunk line. Consequently, the paper considers problems and development prospects of the transport and logistics infrastructure in the Republic of Buryatia. The authors highlight that currently the cooperation prospects between the three states in creating the integrated transport and logistics infrastructure within the program of the "Russia-Mongolia-China" economic corridor are related to formation and development of the ecosystem of the single Eurasian digital transport and logistics platform.

Keywords: Transport and Logistics System, Transport Infrastructure, Economic Corridor, Ecosystem

Introduction

In order to solve tasks, which aim to develop the unified strategy of logistics development, the Russian government passed a number of laws. Among them one of the most significant is a Comprehensive Plan for the modernization and expansion of trunk infrastructure in the Russian Federation (CP) for the period up to 2024 (the order of the Russian government dated September 30, 2018, No. 2101-p).

The foundation of the strategy of Russia's transport and logistics system in compliance with the federal project "Transport and Logistics Centers" (FPTLC) as a CP component, represents capacities of the TLC network (CP, 2018).

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Within 5 years the purpose of FPTLC is to set up transport and logistics centers for serving “East-West”, “North-South” transport corridors. This TLC network stipulates that transit, export-import and inland regular (scheduled) intermodal (container, piggyback) and high-speed freight linkages will be established on key routes (CP, 2018).

About Transport and Logistics Center

All TLCs which comprise the backbone network are defined as “dry ports” by the UNESCAP Intergovernmental Agreement, approved by the order of the Russian government dated October 31, 2015, No. 2209-p).

According to the current federal project a Transport and Logistics Center (hereinafter referred to as TLC) is interpreted as a multimodal technological complex network, its major elements are the following:

- intermodal terminal (container, piggyback transport),
- terminal for general, bulky and heavy cargo (optional),
- universal warehouse complex, including low-temperature storage (optional),
- customs clearance center,
- business center.

In combination of all these elements TLC represents a base element of respective freight transport and technological systems.

At present the Russian Federation has had experience in establishing TLCs, located on key freight routes (table 1).

Table 1: Existing TLC network

Name	Region	Year of launch	Investors	Characteristics
«Vorsino»	Moscow, Kaluga region	2014	«Transcontainer freight village Kaluga» (owned by Dutch Schlund Immobilien Finanzierungs undBaumanagement B.)	Terminal capacity is 350,000 TEUs per annum, planned extension to 500,000 TEUs per annum. In 2018 the TLC processed 125,100 containers.
«Khovrino»	Moscow	2014	«Logistika KS»	The terminal was constructed with the site for 7,000 containers, and access routes. The expected capacity after completion is 2.5 million tons per annum.
«Doskino»	Nizhny Novgorod region	2014	RZD (Russian raiways)	The project is partly implemented in 2012-2014: the auto transport terminal was constructed at “Doskino” station. The TLC was expected to be the backbone for construction of HSR lines.
«Vostochny»	Moscow, Moscow region	2018	«Obltransterminal»	The first phase was launched in March 2018, it is expected to handle 200,000 TEUs per annum.

** TEU (Twenty Foot Equivalent Unit) is the capacity unit of a shipping container.*
Data source: SPARK Logistics company

Additionally, the development strategy for the transport and logistics infrastructure of the Russian Federation pre-plans construction of other logistics facilities till December 31, 2024 (table 2):

Table 2: Pre-planned TLC facilities

№	Objects	Location	Goals
1 1	Two objects of the federal TLC backbone network	Central Federal District	Ensuring consumption and redistribution of freight traffic of Central Russia, servicing freight flows of the international "East-West", "North-South" transport corridors.
22	One object of the federal TLC backbone network	Northwestern Federal District	Ensuring transshipment of freight flows to/from the destination ports of the Baltic sea, servicing freight flows of the international "East-West", "North-South" transport corridors.
33	Two objects of the federal TLC backbone network	Far Eastern Federal District	Ensuring transshipment of freight flows to/from the destination ports of the Far Eastern basin, servicing freight flows of the international "East-West", "Primorye-1" transport corridors, transit of goods between China and Europe, servicing East Siberian regions.
44	One object of the federal TLC backbone network	Volga Federal District	Servicing Volga regions, freight flows of the international "East-West", "North-South" transport corridors, development of inland waterways.
55	One object of the federal TLC backbone network	Southern Federal District	Servicing freight flows of the international "North-South" transport corridor, ensuring transshipment of freight flows to/from the destination ports of the Azov and Black sea basin.
66	One object of the federal TLC backbone network	Ural Federal District	Servicing freight flows of the Ural industry and the international "East-West" transport corridor.
77	One object of the federal TLC backbone network	Siberian Federal District	Servicing Siberian regions, freight flows of the international "East-West" transport corridor.

Source: CP, 2018

Structural planning requirements for TLCs, topology of their placement and the program of their expansion to the promising testing ground for regular container trains comply with the main system solutions of the "Concept of establishment of terminal logistics centers on the territory of the Russian Federation" (2012) and the "Concept of organization of piggyback transportation (JSC RZD)" (2013).

These are the railways that underpin the TLC network. JSC RZD along with other investors implement this large-scale project of establishing hubs/ terminal logistics centers in Russia. They are components of international railway corridors, which will allow RZD to serve railway and road freight traffic along the route EU – China - Asia-Pacific region. All the objects of the network of hubs/ terminal logistics centers will be connected by regular container trains

All the TLCs of the backbone network will work by meeting the unified standards, which are the following:

- uniform terminal and warehousing technologies: handling/processing complete trainloads (71 conventional cars);
- specialized innovative rolling stock for intermodal and high-speed cargo transportation;
- uniform solutions within the framework of the Digital Platform of the Transport Complex for providing the customers (consignors and consignees) with up-to-date comprehensive logistics services, and with an opportunity to order them online;
- uniform "terminal-to-terminal" transportation technologies, permanent freight trains;
- cargo clearance, including customs clearance, on the TLC premises (Rezer, 2012).

Currently, at the first stage of the TLC network all the objects are designed technologically, i.e. development of layout solutions, evaluation of an opportunity to connect to the external transport infrastructure, determination of the need for land resources, etc.

Table 2 shows that most TLCs under construction will serve transport and logistics systems of freight and goods movements in the international "North-South", "East-West" transport corridors, which include:

1) Trans-Siberian railway with access to Vladivostok, and then other states of the Asia-Pacific region;

2) China (Manchuria) – Zabaikalsk – Chita – Trans-Siberian railway;
3) China – Mongolia – Naushki – Ulan-Ude – Trans-Siberian railway;
4) China – Kazakhstan – Russia (several railway lines with access to Orenburg, Kurgan etc.) – Central Eurasian transport corridor;
5) Indian ocean – Iran – Azerbaijan – Russia – "North-South" transport corridor.

The largest railway hubs/ terminal logistics centers for handling container cargo are to be created in the Russian territories bordered by China, Kazakhstan and Mongolia.

Such territories comprise the Republic of Buryatia, which shares a border with Mongolia in the south with further access to transport communications of China.

Currently, Russia, Mongolia and China are involved in the joint program of creating the Economic Corridor, agreed by these states at the SCO Summit in 2016 (Bulatova, 2019).

The program of the Economic Corridor

The program of the Economic Corridor became feasible after signing the following crucial intergovernmental documents:

1 The governments of Russia, Mongolia and China signed and ratified the Intergovernmental Agreement on International Road Transport. The parliament of Mongolia ratified it in April 2018.

2 At present Russian, Mongolian and Chinese experts are developing transport schemes and comprehensive feasibility studies for cross-border transportation and construction of transport infrastructure facilities throughout the Asian road network using the route AN-3: Ulan-Ude (Russia) – Ulaanbaatar (Mongolia) – Beijing (China) (fig. 1). This implies an increase in the trade between these countries, a rise in investments, development of tourism infrastructure. This transport corridor is an object of the transport infrastructure during the construction of the Northern transport corridor of the Silk Road – the "Great Tea Road" China-Mongolia-Russia. The given project will become the platform for a strategic partnership between the states.

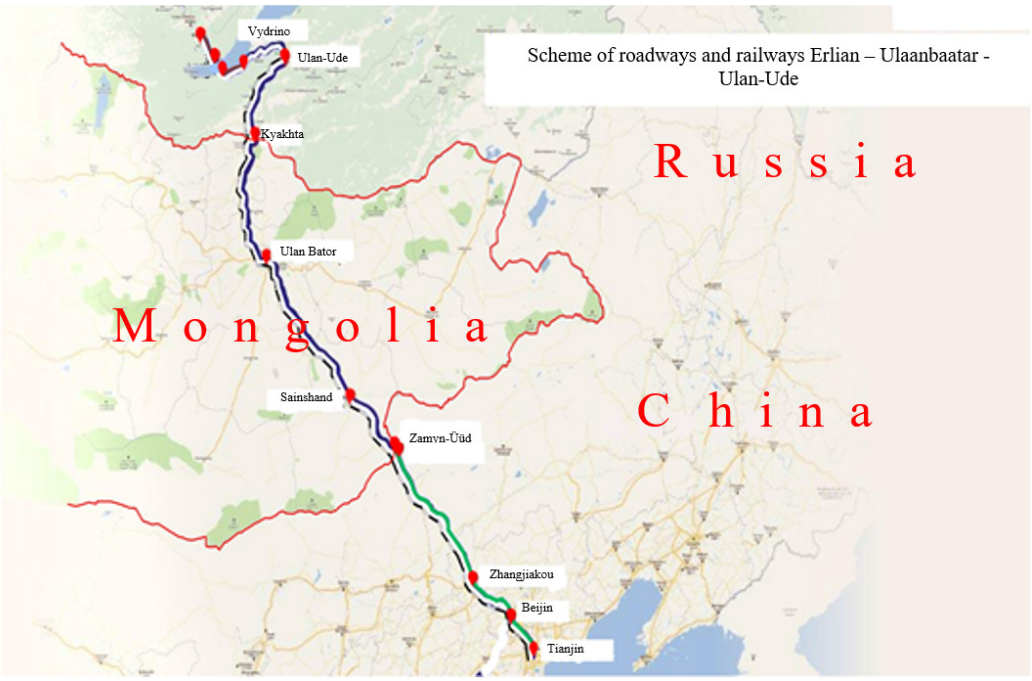

Fig. 1: Transport schemes of the economic corridor China – Mongolia – Russia to Lake Baikal

Special attention should be paid to development of the border infrastructure in the Republic of Buryatia as an element of the transport and logistics infrastructure. Thus, in compliance with the federal project "Logistics of the International Trade"1.5 trillion rubles from the federal budget will be invested into development and reconstruction of the border

checkpoints in Naushki, Kyakhta and Mondy in the period 2019-2023. Development of this infrastructure will enable increasing the capacity of the border checkpoints and the additional income to the regional budget.

At present the daily capacity of Kyakhta checkpoint amounts to 500 vehicles, including 50 buses, 350 cars, 100 trucks, and 1,500 individuals, whereas after the reconstruction the capacity is expected to be 1,000 vehicles, i.e. 700 cars, 100 buses, 200 trucks, with a number of individuals up to 3,000 per day. Today's capacity of Naushki checkpoint amounts to 22 trains per day in both directions, whereas after the reconstruction a number of trains is expected to ride from 70 to 80 ones.

In such conditions the Republic of Buryatia has an urgent task to form the comprehensive transport and logistics infrastructure, the main elements of which are warehouses, terminals, transport and logistics centers that serve international freight traffic, representing strategic points of the regional economy growth.

However, the Republic of Buryatia does not have a comprehensive network of logistics centers, which hinders the growth of its transport and communication system.

Due to this, the Republic of Buryatia is setting up a uniform register of investment projects for the construction of transport and logistics centers on the basis of its Regional Governmental Development Fund. In accordance with this register, the Republic of Buryatia plans to build a network of logistics centers (table 3). Depending on industries, the Republic of Buryatia is going to differentiate transport and logistics centers, trading and distribution centers, customs and logistics centers, multifunctional logistics centers, which altogether will be the foundation for forming effective logistics delivery schemes for different transport and for different cargo transportation. It is more expedient to locate transport and logistics centers in accordance with territorial and regional principles.

Table 3: Planned TLC facilities in the territory of the Republic of Buryatia

No.	Title	Location	Purpose
1	Customs and logistics terminal	Naushki, Location: Khoronkhoi village 50 km	For the service of rail freight transport along the route China-Mongolia-Russia, Russia-Mongolia-China
2	Customs and logistics terminal	Kyakhta Location: in the territory of the auto-tourist cluster "Kyakhta" and adjacent border crossing "Kyakhta" within the ASEZ "Buryatia	For handling cargoes from Mongolia and China to Eurasian Economic Union states. For construction and maintenance of tourist and recreational facilities.
3	International transport and logistics center	Gusinoozersk Location: on the premises of the Industrial Park «Gusinoozersk town», Selenginsky district, Republic of Buryatia	For the organization of freight from China via Mongolia to Russia, and to Europe, including cargo transshipment for further rail transportation.
4	Multimodal transport and logistics center	Ulan-Ude Location: on the premises of the International Cargo Airport "Baikal"	For the concentration of air freight; For flight support on Trans-Siberian and Cross-Polar air routes; For creation of a Logistics center for freight traffic distribution; For creation of special economic port zone.
5	Terminal and logistics complex	Ulan-Ude Location: on the premises of the "Taltsi" Cargo Yard of the East Siberian Railway	For the service of rail freight transport along the route China-Mongolia-Russia, Russia-Mongolia-China
6	Production and logistics center	SULFAT Location: on the premises of SULFAT Station, Selenginsky district, Republic of Buryatia	For the production and processing of solid hydrocarbons, and fuel and lubricants; For the organization of assembly production of equipment and complex household appliances

7	Production and logistics industry complex	East Baikal Forestry Company	For the organization of wood processing, logging and deep processing of roundwood, sawlogs, and pulpwood, including wood waste
8	Branch branded logistics complex	Ulan-Ude Location: on the premises of JSC "Ulan-Ude Aviation Plant"	For the warehouse management within the framework of digitalization in production
9	Trading and distribution logistics centers	Ulan-Ude Location: on the premises of "Titan Company" Ltd.	Operational trading and distribution logistics centers of the wholesale trade

A number of the proposed TLCs in the territory of the Republic of Buryatia near the border between Russia and Mongolia, Kyakhta town to Ulan-Ude are being established to implement the program of the Economic Corridor "Russia-Mongolia-China" (in table 3 these TLCs are marked in points 1-5)

Currently, all objects of the first stage in the TLC network have the following technological concepts implemented:

- layout solutions have been developed;
- the possibility of the connection to the external transport infrastructure has been evaluated;
- needs for land resources have been identified;
-maximum proximity to the center of mass freight traffic emergence and/or cessation has been taken into account;
- availability of sufficient trackage, capacity resources has been determined;
-availability of free engineering capacities in the zone of the pre-planned placement of TLC facilities has been checked;
- maximum proximity to the urban agglomeration, availability of distribution capacities have been taken into account.

The Republic of Buryatia has a deficit of appropriate warehouses equipped for common logistics operations. Therefore, facilities of trade and cargo yards, located along the rail branch lines, are used as terminals and warehouses (Klimenko). Today it is the "Taltsi" cargo yard that provides opportunities for the formation of a major multimodal transport and logistics center. This cargo yard is characterized by a wide range of facilities for cargo processing, warehouses, access roads, operational work. The available facilities of the "Taltsi" cargo yard can enable creating comprehensive production structure, typical for any multimodal TLC which includes: container, piggyback, universal terminals, customs clearance point, service center, administration center, business center etc.

At present the government of the Republic of Buryatia consider the investment object of constructing a multimodal transport hub on the premises of "Baikal" airport as preferable. However, this project has some barriers to implementation. "Baikal" airport is not directly connected with the railway, the fuel depot is expected to take at least 100 ha, the international hub is expected to take 300 ha, the glide path is over residential areas and settlements.

Unlike "Baikal" airport, there are no above-mentioned barriers in the airport of the city of Chita, but the airport does not have the Clear Sky status. Nevertheless, the Trans-Baikal territory stakeholders are working on the proposal to the Federal program of the Far East development to set up a multimodal hub on the premises of the local airport.

However, it is crucial to take into account that when forming a major transport hub on the premises of the airport, "Baikal" airport is currently not competitive with the recognized leaders in cargo and passenger transportation, i.e. "Tolmachevo" airport (Novosibirsk) and "Yemelyanovo" airport (Krasnoyarsk).

As a member of the working group attending special sites for TLC location, the Chinese counterparts suggest setting up this hub near Orongoy village, taking into account the proximity of a highway and a railway line to Mongolia. This choice is rationalized by the single management of all three components. Therefore, the task to construct a multimodal transport hub that converges air routes with the road and railway connection, including development of the port free trade zone with digital transport logistics, is feasible only in this area.

The prospects of cooperation between Russia, Mongolia and China within the Economic Corridor in the transport and logistics sphere are related to formation and development of the ecosystem of the single Eurasian digital transport and logistics platform. Creation of this platform will ensure optimization of interstate commodity flows, more rapid capital turnover, synchronization of payments and documentation at the expense of concentration of commodity, information, and financial flows in combination with higher quality of logistics services. It is the platform that can

help facilitate the cargo transit throughout the territories of the above-mentioned countries, which will be an incentive for digital cooperation with other states of the Asia-Pacific region (Klimenko).

Conclusion

When it comes to digitalization, China and some other countries have great experience in dealing with it. Russia is also experienced in it. For instance, JSC RZD developed a number of digital platforms, which will have been completed by 2025. These platforms are "Freight transportation" electronic platform, digital platform of customer services of transport and logistics hubs, passenger transportation and customer services etc. Due to this, it is essential to organize joint cooperation, e.g. creation of the "joint center of competencies in IT sphere" (Development strategy of the RZD, 2013).

Thus, the formation of the transport and logistics infrastructure in the Russian Federation by developing the network of transport and logistics centers, also located in the Republic of Buryatia, will ensure centralized management of the system of international cargo and commodity movements. Besides, the usage of digital technology elements will allow creating a single digital transport and logistics environment that can provide effective interaction between all stakeholders of transport and logistics processes. Therefore, at present it is required to develop digital servers for the interaction between all stakeholders of the single transport and logistics environment, coordination of transport flows, integration into the global transport space and big data processing.

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Innovation in The Pursuit of Sustainable Manufacturing

Anna K. STASIUK-PIEKARSKA
Poznan University of Technology, Faculty of Engineering Management, Poznan, Polandy, Anna.stasiuk-piekarska@put.poznan.pl

Artur WLODARCZYK
Poznan University of Technology, Faculty of Engineering Management, Poznan, Polandy, Artur.wlodarczyk@doctorate.put.poznan.pl

Abstract

The deployment of innovative solutions in enterprises is a key contributor to sustainability in a production environment. Amidst other members of the European Union, Poland comes across as a poor innovator. In a 2020 ranking, the country came in the 24th place, close to the bottom of the listing. The authors outline a range of aspects of new technology deployments in production with a focus on the ceramic sanitaryware industry. Due to the sector's high barriers to entry, additional problems may be encountered in adopting innovation and seeking to achieve sustainable production. In their paper, the authors present the cost of deploying and using an automated high-pressure casting process with specific costing figures expressed as a percentage of the costs of using the existing low-pressure-casting technology. By comparative analysis, they identify the parts of the new solution that will add extra costs. To offset such cost increases, a number of other aspects of the proposed solution (expected return on investment, improvements in working conditions, etc.) are also presented. Finally, recommendations are offered for further studies and final roll-outs of innovative solutions in manufacturing.

Keywords: Sustainable Manufacturing, Innovation, Ceramic Sanitaryware Industry.

Introduction

By designing and conducting production, humans exert a significant impact on the environment. Its implications are not only what results from sourcing the raw materials intended for use as process inputs but also the waste they generate (during and post production) and the impairment of worker health that they cause (occupational ergonomics).

Since sustainable manufacturing goes beyond innovation alone, the authors have chosen to focus on a case study that explores potential improvements in the manufacture of ceramic sanitaryware and ceramic bathroom products. The paper presents factors that make the replacement of the existing technology advisable in financial terms and outlines selected performance indicators expressed as percentages.

Innovation in the context of sustainable manufacturing

According to Encyklopedia Zarządzania (The Encyclopedia of Management), innovation (from the Latin word innovatio for renewal) is "a series of activities designed to develop new and improved products, technologies and organizational systems. The term was first used in economics by J. A. Schumpeter (...). "Innovations may apply to developing new products, new technologies, or new markets or to acquiring new raw materials or reorganizing a specific sector of the economy [mfiles…]." Innovation can be considered an outcome of a creative effort aimed at modifying an organization or society with respect to products, processes and management. Innovations are deliberate actions that are commonly intended to maximize profit, enhance development or boost prestige [Łunarski, p. 12; Manikowski A., p. 271]. According to the European Foundation for Quality Management, "innovation is a practical transformation of ideas into new products, services, processes, systems and social interactions. It produces a new revenue streams that benefit owners and sustain growth. Innovation creates jobs, improves the quality of life and supports the continuous development of communities" [European Foundation for Quality Management, 2005, p. 5].

On the down side, the promoters of innovations tend to encounter numerous barriers that hinder growth. Such barriers relate to supply (access to new technologies, raw materials, knowledge, etc.), demand (customer needs and behaviors), and environments (economic and legal/legislative environment), including internal organizational environments (people, physical resources, finance and information) [Knosala R., Deptuła A., p. 113, 2018 [as cited in:] Baruk, 2009; Saatçioğlu, Timurcanday, Özmen 2010].

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In order to become globally competitive, companies need not only to keep their costs to a minimum but also, and increasingly so, make a deliberate effort to protect the environment and ensure sustainable development and, more specifically, sustainable manufacturing.
Coined originally in the 1970s, the term "sustainable manufacturing" ties to the definition of "clean manufacturing". In the so-called Brundtland Report of 1987, "sustainable development" is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [https://www.parp.gov.pl/storage/publications/pdf/2011_wzp_analizadanych.pdf, p. 5 [as cited in:] Report of the World Commission for Environment and Development, 1987]. "Cleaner manufacturing, in turn, means 'environmental strategies based on continuous, integrated, preventive actions concerning processes, products and services, aimed at increasing manufacturing and service efficiency and mitigating threats to both humans and the natural environment" [https: // www. parp.gov.pl/storage/publications/pdf/2011_wzp_analizadanych.pdf, p. 30]. A set of manufacturing guidelines referred to as "sustainable manufacturing" has been developed on that basis.

The Polish Agency for Enterprise Development (an incorporated state organization which reports to the Minister of Economy and manages Polish and European Union funds supporting SMEs and human resource development) defined sustainable manufacturing as "the manufacturing of goods and the delivery of services that:

1. relies on non-polluting processes and systems (to reduce environmental contamination),
2. seeks to conserve energy and raw materials,
3. is economically viable,
4. is safe and poses no threat to human health,
5. socially and creatively benefits all workers [https://www.parp.gov.pl/storage/publications/pdf/2011_wzp_analizadanych.pdf, p. 30]. "

In embracing sustainable manufacturing, due note should be taken of the accompanying process of poly-optimization (also known as targeted vectoral optimization) in which a set of variants is defined and an acceptable and satisfactory solution is identified (by solving the so-called satisfaction problem) [Tarnowski W., 2011, pp. 11-12].

In October 2019, the United Nations Environment Program (UNEP) adopted its first strategy for engaging the private sector. The strategy guides the engagement of the UNEP with the private sector to contribute to sustained transformative changes and innovations aligned with its Medium-Term Strategy and Program of Work by 2025. The following four pillars of that strategy have been distinguished [https://www.unep.org/resources/factsheet/strategy-private-sector-engagement]:

1. Impact on Sustainable Development Goals and environmental goals (measurable and quantifiable).
2. Transformative changes of industries and sectors (cultural change and new business models).
3. Innovations leading to solutions on sustainability.
4. Resources and income to scale up and accelerate the momentum towards a sustainable future.

The above-mentioned activities appear to be vital for Polish enterprises, which tend to display a great deal of reluctance towards adopting innovations in their business. Poland is in the unfortunate position of ranking 24th out of 27 European Union member states in the European Innovation Scoreboard 2020 published by the European Commission [https://ec.europa.eu/docsroom/documents/41903]. The areas in which Poland fares best relative to the EU are the average annual change in GDP, the number of newly established undertakings and the share of manufacturing jobs in national employment. The key areas in which Poland lags behind the European Union are the share of R&D spending, per capita GDP and attributed to its top enterprises as well as the proportion of jobs contributed by high-tech and medium-tech manufacturers [https://ec.europa.eu/docsroom/documents/41886]. This demonstrates that, in pursuit of sustainable future, there is a great need for proper support for every innovative activity.

Case study

The case study concerns an enterprise that belongs to an international group of companies specializing in sanitaryware technology. The case study focuses on a large manufacturing facility dedicated to the production of ceramic sanitaryware.

The organization's industry is characterized by high barriers to entry. For the purposes of this study, the authors adopted the following premises regarding the operating conditions that are indicative of such barriers:

- immense capital expenditures,
- manual tasks accounting for a substantial share of processes,
- difficulties encountered in keeping the process stable (every unit the company produces requires a thorough quality inspection; non-compliant rejects are no longer usable and must be scrapped),
- the fact that only a minuscule proportion of school graduates qualify to work in the industry.

The study has convinced the authors that the above-mentioned features make operators from this particular industry the most representative of the general field of innovation and sustainable manufacturing.

In its classic variety, the manufacturing of ceramic products consists in thoroughly mixing the right raw materials followed by forming, drying and firing (in single or multiple cycles). The resulting compound is then sintered in a furnace at a high temperature to produce a product of desired density. The density is substantially lower than that of the raw material due to the removal of water through heat treatment. A more detailed description of the forming process is provided below.

Plaster casting is the most popular method of sanitaryware casting. A ceramic product is made by forcibly casting a water-soluble suspension of powder into a plaster mold, which removes liquid from the suspension by capillary action operating through plaster pores. The resulting product is well-suited to undergo drying, glazing and firing. Next to its advantages, the process has many drawbacks, the upmost prominent of which seems to be the fact that large-scale production requires vast production facilities and a great number of plaster molds (the molds have a short life and need to be replaced frequently). Figure 1 shows plaster molds and semi-finished products.

Fig. 1: Low-pressure-casting line in the facility in question. Source: Own research

Conventionally, ceramic production requires the manufacturers not only to frequently replace molds (which constitute waste) but also to manually produce and handle mold replacements. As a consequence, the organization in question has chosen to look into alternative solutions involving high-pressure casting. In such casting, instead of conventional plaster molds, use is made of molds made of porous resin. In this system, raw materials are injected at high pressure (in excess of 3.0 MPa). The casting cycles are shorter than in the low-pressure-casting equivalent, with capillary forces operating at pressures of 1-2 bar (0.1-0.2 MPa). High-pressure-cast products are automatically demolded and moved to dryers. They are then subjected to fully-automated working performed by robots with the use of customized cleaning tools. Figure 2 depicts a typical high-pressure casting machine.

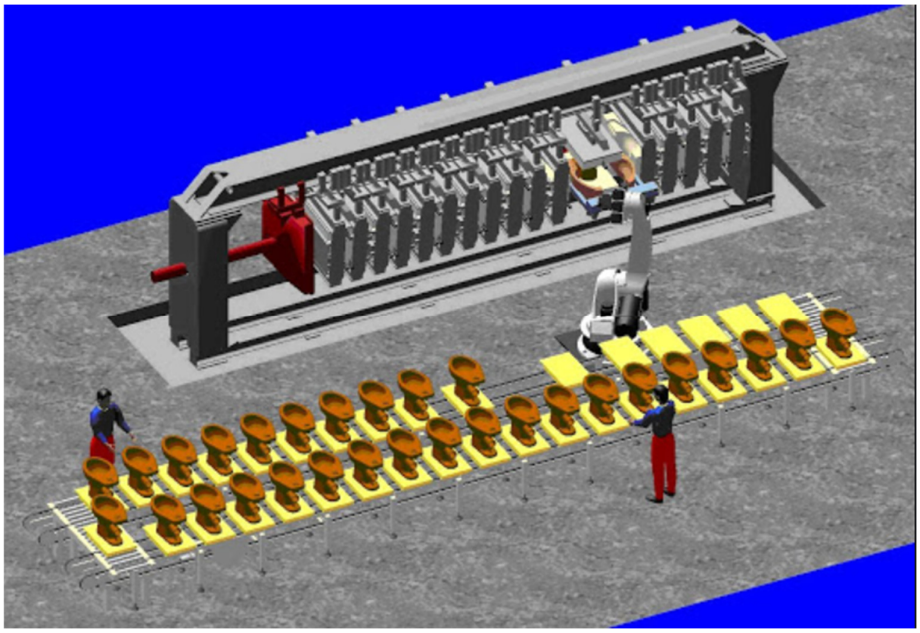

Fig. 2: HPC machine performing high-pressure casting. Source: http://www.sacmimoscow.com/en-US/Products/Ceramics/Sanitaryware/Casting/High -pressure-casting-plants/Casting-plants-for-WCs-and bidets/AVB150.aspx?idC=62415&idO= 19748&LN=en-US

In order to lower costs and achieve a more sophisticated, efficient and sustainable process, the company examined a new High Pressure Casting (HPC) solution as a possible replacement for its existing low-pressure plaster casting technology. The flowchart in Figure 3 below shows the steps it took to deploy this innovative variant.

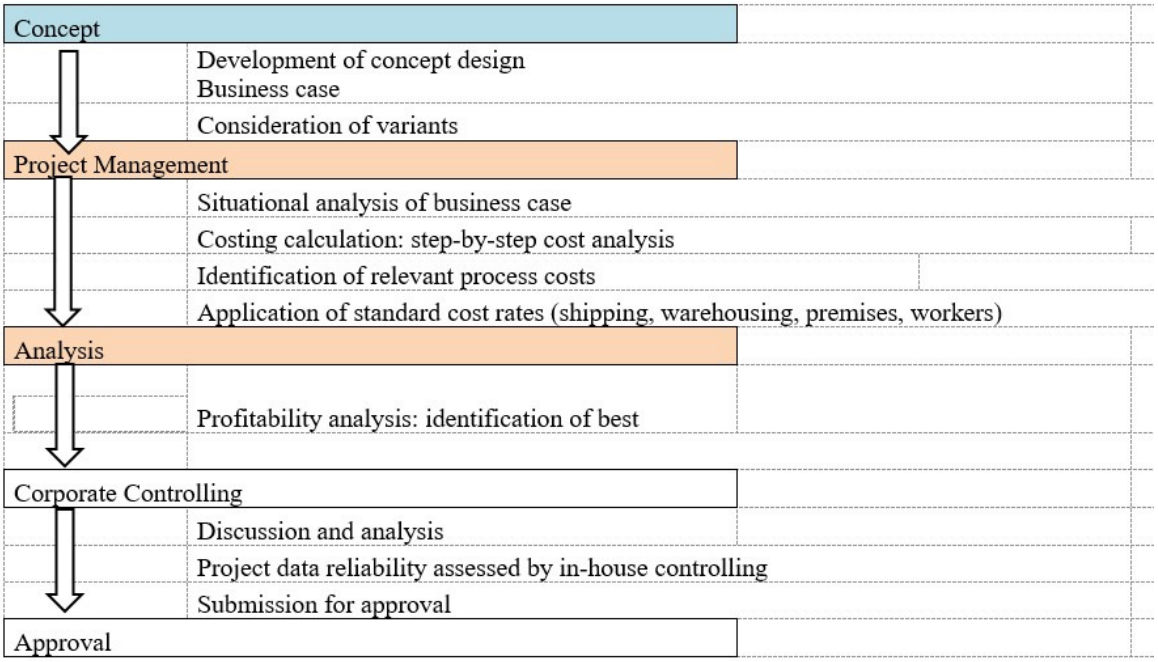

Fig. 4: The process of developing a new solution in the organization in question, Source: Own research based on company records

Figure 4 summarizes the main steps taken in developing and assessing a new solution in the enterprise in question. The process begins with an innovative idea (concept). This stage involves defining the prime objective and identifying the available options for accomplishing it. Next comes the stage that involves project management during which the proposed changes are assessed for business viability. At this point, one completes a costing spreadsheet in which costs are assigned to relevant cost items (such as shipping, storage and personnel). The following stage of profitability

analysis is designed to develop recommended solutions. This triggers a corporate controlling procedure designed to involve the management in a discussion of options. At this stage, data is checked for reliability followed by project approval for implementation.

To provide a specific example, the authors looked at the annual cost of producing a product called PX by the methods of both conventional and high-pressure casting (HPC). The two technologies were then compared. A conventional casting machine may comprise 14 mold sockets. In the ensuing analysis, a calculation for the HPC process performed on a machine fitted with only a single socket was compared with that of the conventional process to determine how many molds would be needed for process completion. On the assumption that 200,000 units would be produced annually, a presentation was made of all process-related costs such as personnel expenses, materials, changeover times, maintenance, and utilities. The relevant data, expressed as percentages (with the existing baseline costs representing 100% and the changes resulting from innovation constituting a share of that initial benchmark in a given category) are provided in Table 1.

The capital expenditures and one-off costs incurred in implementing the innovative solution, shown on an annual basis, amounted to 136.13% of the capital expenditures and costs of the solution that is currently in place.

Table 1: Total current cost of operating with the existing technology compared to the costs of using an HPC machine in production

Ø Annual cost of	Variant 1: Conventional casting	Variant 2: HPC	Difference
Materials	100%	35.48%	- 64.52%
Non-production workers in receiving, warehousing, purchasing	-	100%	-100%
Maintenance (internal & external)	100%	26.67%	- 73.33%
Set-Up	100%	-	- 100%
Workers in process-related jobs	100%	59.26%	- 40.74%
Waste	100%	77.78%	- 22.22%
Energy	100%	110.72%	10.72%
Total current costs	100%	73.80%	- 26.20%

Source: Own research based on company records

High-pressure casting is 36.13% more expensive than the existing technology. It is notable, however, that this difference only results from capital expenditures and one-off costs. Given below is an analysis of the costs of manufacturing finished goods.

Cost of Materials

The cost of materials required for the production of 200,000 units of the PX product includes those of 2,260 plaster molds that need to be made in one of the facility's shops. Further, the production involves preparing an appropriate plaster mixture, pouring the mixture into a mold, and waiting for the plaster to set. At a later stage, each plaster mold is subjected to an array of manual treatments and subsequently placed in a dryer for 7 days. The innovative solution (Solution 2, HPC) requires the purchase of a porous resin mold capable of withstanding the strains of high-pressure casting of ceramic sanitaryware. The cost of such a mold amounts to 35.48% of what would be spent in the conventional process on all molds needed to produce 200,000 units. Added to this are advantages of creating a more ergonomically friendly workplace that are difficult to measure in monetary terms. Working in a Form Casting unit entails a number of static and dynamic loads. Plaster molds are heavy, some reaching weights of 140 kg. Although the plant's machinery has been continuously upgraded (by, among others, purchasing new equipment to support production and handling), the two variants differ greatly in process duration, the design of the related workflows and the strains brought to bear on worker bodies.

Non-Production Workers in Receiving, Warehousing, Purchasing

The costs of non-production workers that need to be engaged to launch and run production are not included in the first variant of conventional casting. Such costs have to be factored in under the HPC variant. For the purposes of this

study, an assumption was made that automation engineers and programmers will have to work a total of 895 manhours.

Maintenance (internal and external)

In both solutions, maintenance costs include the cost of employing maintenance workers, purchasing and replacing spare parts, running preventive checks, and purchasing oils and other lubricants. Given that high-pressure casting is considerably more complex, such costs are bound to substantially exceed those incurred in the existing solution. HPC costs amount to 374.95% of the cost of the conventional process, which can only be described as a substantial difference. To properly conduct the process in both variants, it is essential to satisfy a number of process parameters such as production facility temperature and humidity as well as compound density and temperature. The HPC unit is a highly sophisticated machine that ensures greater process stability (less waste in the form of substandard products). Automatic production in a high-pressure casting process that includes drying and subsequent working by robots reduces the demand for space on the production floor. Parts of the system need to be lubricated, cleaned and replaced while the machine is running. To maintain process efficiency, each element of the system must operate perfectly. Therefore, it is vital to purchase and put on stock a large number of spare parts that will be available for immediate use if and when needed. Preventive maintenance turns out to be just as critical. The water used in the process needs to be sufficiently pure to ensure that mold micropores do not clog up and perfectly fulfill their role throughout the usable life of molds.

Set up

As mentioned above, in conventional casting, 2,260 plaster molds are required to produce 200,000 units of PX products. A casting bench contains 45 molds, which are filled with the raw material twice a day. The life of such molds spans over 80 production cycles. Thus, for the above output, the plant needs to use a total of 55.6 benches. Three workers are needed to replace a foundry bench. A single plaster mold used for the PX product weighs an average of 70 kg. A total of 174,825 kg of plaster is used to supply all benches. That makes close to 175 tons of material that requires disposal. None of these costs are shown in the study as a recycling company collects waste free of charge. However, it should also be noted that the disposal of such waste is very time-consuming (it involves removing the material from production floor, its subsequent storage, onloading, etc.). Also ignored is the environmental impact. The high-pressure casting variant requires no replacements (hence none of the above costs are incurred). A single mold, which makes up an entire section, only needs to be set up once. As mentioned earlier, the machine can accommodate 14 such molds, each capable of working independently on a different production run. This means the facility is free to make products on any mold as needed as any work section can be closed and/or opened at any time.

Production workers directly involved in process

In the conventional solution (Variant 1), the majority of the cost of production workers directly involved in the process is the cost of the labor of seven casting workers. These are the production workers who remove the product from plaster molds, work the product with high precision and prepare it for subsequent drying. The costs also include the remuneration of 1 casting bench operator tasked with precisely controlling the bench mechanism and delivering and discharging the compound to and from plaster molds under pressure in a timely manner. Meanwhile, Variant 2 (HPC) only involves 5 machine operators. A comparison of the personnel cost across both variants shows that the cost of maintenance personnel in the high-pressure process amounts to 59.26% of the wages earned by workers involved in conventional casting.

Waste

The rate of production defects that result in substandard products coming off the production line is a key process parameter in all sanitaryware ceramics manufacturing. After determining the exact defect rate on a specific model, its profitability and production viability are assessed with a high degree of accuracy. In the case in point, the current defect rate on the PX product was identified as being 9%. Accurate costing of the HPC variant showed a defect rate of no more than 7%. Scrap cost calculations demonstrated that the innovative HPC process would translate that into the savings of 4,000 units of the PX product (with costs reduced by 22.23%) relative to Variant 1.

Electrical Power

Electrical power is a key cost driver in any organization. Although power consumption levels are roughly comparable across the two variants, there is a 10.72% difference in favor of the existing process.

Total Current Costs

A comparison of the above values reveals significant differences in production costs between the existing technology and the proposed solution. Since the success of the surveyed company depends largely on the handling of product

innovation, a number of factors for project success must be considered. The roll-out of a new production process begins with commissioning and startup. A host of innovation-related organizational risks and obstacles that are largely unforeseeable frequently come into play. Despite higher upfront investment in the HPC solution and several types of annual maintenance costs that are also higher, further analysis point to Variant 2 is the one that is more advantageous to the organization. Figure 5 presents the annual rate of return.

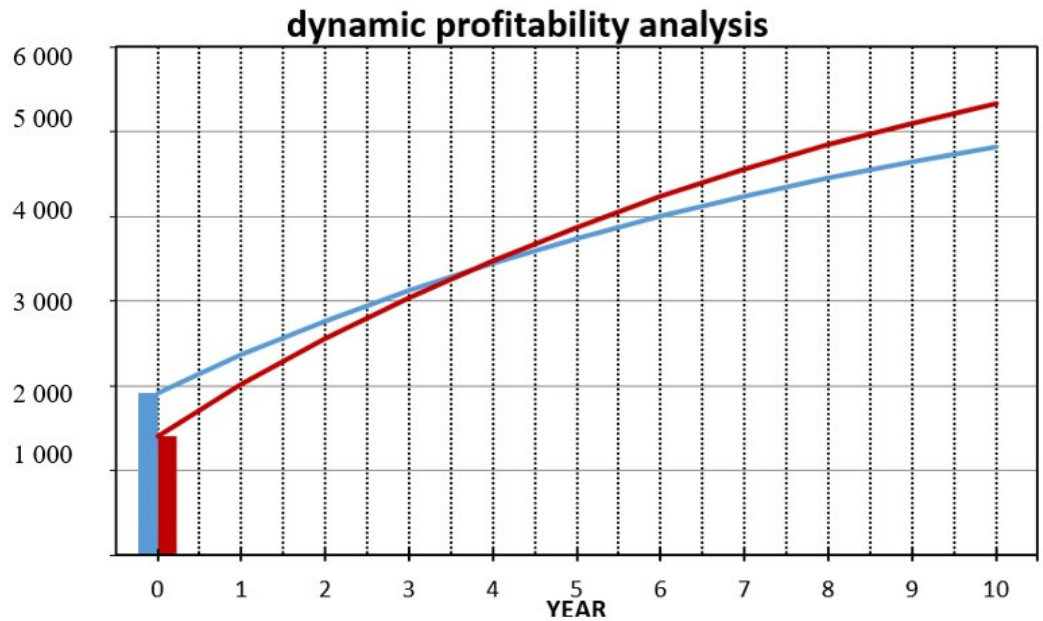

Fig. 5: Dynamic profitability analysis (blue: HPC; red: existing solution). Source: own research based on company records

As shown in Figure 5, a full return on investment will be achieved in less than 4 years. Given the premises adopted for the analysis, this shows that the high-pressure casting variant is a more advantageous option. Moreover, Variant 2 offers the company an opportunity to restructure and upgrade its production units.

The HPC solution dispenses with many manual tasks and saves time and expenses associated with handling and environmental stresses, as described above. Work ergonomics is improved by eliminating the need for manual lifting. Improvements in the handling of ceramic products are generally a big challenge due to the brittle nature of both the semi-finished products (in process) and the finished goods. This too works to the advantage of the innovative solution. As an added benefit, the new technology requires less space for its production processes. Compared to the existing variant, the plant will save a significant amount of production floor space in a setup designed to produce 200,000 products. It is also worth noting that the analysis only considered a scenario involving the use of a single mold socket while the HPC machine may have as many as 14 of them.

Summary

Every innovations entails a certain degree of risk having to do not only with the need to modify the existing production process to match its new elements but also the related additional financial expenditures and the uncertainty of how the results will fare in a market economy. The costing analysis for high-pressure casting shows that the technology will increase the plant's production capacity. The new production technology and its new characteristics will not only boost economic performance but also reduce environmental impact. Nevertheless, one should bear in mind that by virtue of being highly sophisticated and complex, the technology adds a number of additional concerns (which include new maintenance requirements, the demand for new worker skills, etc.). By and large, it is equally vital that the nature of the production process employed in the ceramic sanitaryware industry makes it very difficult to embrace new innovative solutions. Considering the plant's current production volume, it is clearly of benefit to adopt the proposed replacement. At this stage of the study, no answers have yet been found on the best ways to integrate the new machine and technology with the existing process environment and on what savings can be achieved by launching successive

sections (sockets). While such aspects can generally impede innovative deployments, the study has shown that the solution in question will nevertheless be of benefit to the organization.

Private sector organizations need to be made aware of resource scarcity and, by the same token, of the need for sustainable production. The point is not only to refrain from generating waste (or to reduce the volume of the waste generated) but also to improve workplace ergonomics and assess the long-term impacts of the entire production system. It is also essential to note that market mechanisms are a major limiting force on innovation. New solutions will only be cost effective and advantageous if the operator finds a sufficient number of buyers for its wares. One should note that customers are increasingly concerned not only with the quality of products but also with their origins and environmental impacts. Inaccurate market research will cause the company that chose to adopt an HPC process to incur major losses.

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Corporate Mobility in Krakow And Its Reporting Challenges. A Framework for Analysis

Ewa SLEZAK
Cracow University of Economics, Cracow, Poland
slezake@uek.krakow.pl

Katarzyna SWIETLA
Cracow University of Economics, Cracow, Poland
kswietla@uek.krakow.pl

Abstract

The present phase of capitalism rests heavily on the internationalization of economic entities. Transnational companies are spreading their activity across the world with the use of outsourcing and offshoring. Hence, transnational corporations are building dense networks of connections and fragment their chains of production across national borders. Human capital is a type of resource that attracts their attention to locate their business in a given place. Along with capital there comes a movement of people, either sent by companies to protect their interests or those who or individually initiate their employment in a given place outside their country of origin. These migrants are the most numerous, but also others move to cities and regions which provide various career opportunities. Krakow serves an interesting example of such as city, a major regional seat for provision of new business services. No doubt, the ideas of global economy materialize here leading to the emergence of a cosmopolitan hub hosting professionals of various nationalities and origin. Sadly, the present state of research on mobility and migration misses an important aspect, i.e. we do not know the extent of mobility and costs associated. The available reporting practices neglect those aspects.

This paper focuses on corporate mobility in the context of globalization; the former is materialized by outsourcing and offshoring. By referring to the situation in Krakow, the paper aims at elucidating the transnational dimensions of mobility and attempts to lay grounds for its reporting, both financial and non-financial.

Keywords: Outsourcing, Corporate Mobility, Highly Skilled Migrants, Financial Reporting.

Introduction

The modern mobility in a broad sense is inscribed in the context of globalization, modern cities, and the level of interaction between transnational corporations and the nation state. The above entities materialize globalization: they create, but also deprive individuals of opportunities to act, affecting the space of the labor market, on top of the organization of people's work and lives. It is not only human beings who move, because things, words and other forms with different significance for the people are also mobile, depending on their social position (Salazar 2016). Mobility, however, is something that brings humanity together, and it, in turn, may be linked to travel or tourism grown on the basis of travel. People participate in mobility in a heterogeneous way, through its various forms, i.e. migration, work performed abroad, business trips, tourism, or virtual movements, where strangers encounter one another (Acharya 2016, p. 38). People are becoming nomads, more and more available and reachable to others, while their physical location loses its importance (Benedikt 1991, p. 9). Today's nomadic women and men and their mobility seem to be almost limitless compared to the past (Cresswell 1996, p. 377; Polson 2011, p. 144-146).

Nowadays, mobility is connected with the growing international activity of transnational corporations, which not only produce goods but also provide services in distant places in the world creating transnational supply chains. Thanks to widely understood outsourcing processes, they build complex systems connecting manufacturers and service providers, who employ both local and foreign workforce. Foreign employees move to new locations following internal corporate strategies and the needs of their subsidiaries, but also often on their own, having decided to live and work in a particular place. Interestingly enough, while many authors tend to be inclined towards distinguishing various forms of mobility, including (corporate) labor movements, the available statistics and figures showing them are limited. This is particularly puzzling in the light of the possibility of reporting such mobility for transnational

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corporations, which does not seem to be fully exploited. The goal set by the authors is to present corporate mobility against the background of globalization materialized by outsourcing, taking into special consideration the status of reporting on employee movements and indicating the possibility of such reporting.

Modern outsourcing in the global economy

Employee mobility is associated with the international activity of transnational corporations, which produce goods and services in distant parts of the world. What is important is that with the development of data transmission methods, the services have become an important element in the development of numerous economies, just as production had before. The most frequently used tool for this purpose is international outsourcing in its broadest sense.[i] The services provided within its framework belong to the branch of new business services and include (Outsourcing Portal, 2016):

- Business process outsourcing (BPO);[ii]
- Shared services centers (SSCs);
- Information technology outsourcing (ITO);
- Research & development (R&D).

As expected by the report presented by Global Industry Analytics (Adoption of Value, 2020), the global BPO market in 2020 will be worth 220 billion US dollars which means a huge increase in comparison to 2017, when it was valued at 24.6 billion. This involved commissioning additional services, conducting entire business processes for activities considered as fundamental, built on the relationships of those involved to contracts based on durability and trust.

The idea is to move abroad in order to increase innovation while lowering the costs of the operator. It refers directly to the entity as well as indirectly to the country providing and acquiring specific services and processes. As a result, it is expected to bring some benefits to both parties. This does not mean that the links between the way outsourcing is implemented and the risks, costs and competitive advantages of the company are ignored, which affects:

- costs generated by the entity,
- risk level of tasks, functions, and processes separated,
- use of resources held by an entity having an impact on building a competitive advantage (Drzewiecki, 2012, p. 29-37).

For many years, the cost factor was seen as the most important one when deciding to separate processes for external service, however, now this trend is reversing. This is no longer a decisive factor when it comes to choosing the partner with whom the project will be implemented, and the relationship between the service provider and the client is increasingly people-focused, stressing the quality of cooperation and implementation, the simplification of processes, and not just price (Stępniak, 2019).

Today, outsourcing is perceived a long-term bilateral cooperation, where both parties to an outsourcing contract strive to achieve certain benefits. Strong ties of cooperation with outsourcing service providers have become the principle on which strategic outsourcing is based (Marcinkowska 2015, p. 231), which favors the wide use of investments undertaken by external providers, their innovativeness and professional specialist capabilities that would be too expensive or impossible to reproduce in internal conditions (Quinn, Hilmer 1994, p. 45).

This is not a new phenomenon, although its current scale goes far beyond the present possibilities of influencing the generation of economic development in countries and markets. Based on years of experience, it is noted that this trend indicates that developing and transition countries have great potential to attract investment in the provision of e.g., financial and accounting services.

Nowadays, an important aspect of market transformation is the delegation of selected types of services to be provided outside the seat of the company, often, as already mentioned, abroad (Woodcock 2009, p. 334). On the other hand, the effect of such an approach is an increase in competitive pressure while improving the functioning of markets and improving the position of the consumer (Kowalski 2008, p. 8).

As Małgorzata Tyrańska (2015, p.13) points out, outsourcing is a strategic instrument which an increasing number of entities use to increase their productivity and gain a competitive advantage, which is also fostered by faster achievement of market objectives. The main strategic objectives mentioned by economic operators include continuous improvement as a key element (Zarzycka, Michalak 2013, p. 183) resulting from the evolving competitive pressure. Achieving assumed goals more and more often involves the use of resources coming from within the organization,

including human capital, and also from its environment, by means of the latest technologies. This is intended to increase the added value generated by activity (Świetla, Andrzejewski, Szmajser 2014, p. 116-128).
It is clear that customers increasingly focus on getting quality product. The spread of outsourcing is intended to respond to the risks and uncertainties inherent in the functioning of economic operators in recent years (Bauer 2013, p. 347).

One of the important trends that foster the development of global outsourcing is the automation of supported processes, which can significantly affect the change of production processes and employee mobility. Artificial intelligence and Robotic Process Automation (RPA) are increasingly supporting human beings in the performance of their activities. By utilizing the newest technology, the effectiveness of operations increases while reducing workload, minimizing possible errors in the process, and as a result, bringing measurable decrease in the cost of providing services. However, this applies to repetitive processes. The main decisions in the implementation of the processes are still in human hands and this will probably not change in the coming years, resulting in a continuous increase in employment in the industry and the acquisition of new specialized workforce, often from distant countries.

To sum up, outsourcing, which is the basis for high employee mobility, is seen as a comprehensive process aimed at increasing the dynamics and efficiency of the enterprise and achieving better financial results. This is possible by accessing the knowledge and precision tools provided by service providers. Moreover, as it is commonly believed**, for an investor in the business process outsourcing industry, access to qualified human capital resources, both local and foreign, is crucial. What matters especially is knowledge of foreign languages and high industry qualifications. Finally, it is worth mentioning the importance of location, which not only relates to a developed infrastructure, but also to a socio-economic context, such as low unemployment, friendly administration or genius loci.**

Corporate mobility against globalization and internationalization

In the case of mobility, researchers often mention its links with capital, not only in monetary terms but also in the form of human capital[iii], social capital[iv], or metacapital[v] (Jayaram 2016). However, it is worth recalling that the mobility of capital is mainly related to the investment decisions of companies and internationalization. The modern phase of capitalism is characterized by a high degree of capital mobility, and transnational corporations are free to transfer production and service processes between countries.

However, as already mentioned, understanding mobility is aided by the introduction of a category of mobility that connects the moving entities, not just people. This is how modern mobility is understood: as a category of movement and relocation. It is realized mainly in the form of travel and migration, connected with physical displacement, but also with observing, traveling, or experiencing (Urry 2007).

Physical images of mobility presented in this way do not exhaust the spectrum of its contemporary forms, especially as it is strengthened and transformed by progressive digitization. Philip Vannini (2010, p. 111) also draws attention to the so-called modern and symbolic forms of mobility; i.e., imaginary and virtual, which enriched the typology proposed by John Urry (2009), among others.

While the mobility of people is a movement that has been permanently inscribed in the framework of modern societies and economies, there is great diversity in this category: travel, tourism, migration, refuge seeking, expatriation, vagrancy, etc. A similar heterogeneity applies to the mobility of objects as "things in motion" (Urry 2009, pp. 95-97). Goods that create the context in which people live and function, they are consumed through trade, and also in connection with the activity of travelers and tourists, maintaining a link with their place of origin. This original perspective ignores the movement of goods that takes place in international trade, which should be added. Undoubtedly, this journey is macro-structural[vi], with objects moving through exports and imports, associated with transnational production processes, leading to a kind of merging meanings and hybridization of consumer tastes (Ślęzak 2019).

A particular example is imaginative mobility, which is linked to the widespread availability of television and radio sets that create images of reality. The TV set present in the social and physical space has changed the way home space and leisure time are organized. Due to television, as before that thanks to the radio receiver, the world was transformed because the prevailing monotony and apathy, about which Martin Heidegger once wrote (1919), was killed: (Urry 2009, p. 100).

The last type is the extremely fast-growing virtual mobility[vii] which is possible thanks to computers and modern technology. Individuals experience mobility at the same time as computers provide the ability to move around and

contact others without having to move physically. It is therefore reasonable to state that the dematerialization of the medium and is taking place along with the conquest of space and time (Benedikt 1991, p. 9). People's lives are full of technologies changing homes and workplaces, and the organization of human lives and behaviors.[viii] Life has merged with cyberspace, which is inhabited by virtual communities where people and machines interact; communication between man and machine takes place, which is an example of a mental marriage between man and technology (Heim 1991, p. 71). Cyberspace is a world of movement, instantaneous; everything exists in real time and you can be in many places at the same time. In this sense, the virtual journey in cyberspace results from an obvious dematerialization of the medium and the reflection of time and space (Urry 2002, p. 266). People willingly change their location switching between communities, thus becoming digital nomads. Virtual communities are seen as fragile, ephemeral entities that push out the reality of physical space.

Such a broad conceptual spectrum of mobility indicates potential analytical difficulties that materialize around the topic of corporate mobility. This is because corporate mobility is an example of a global phenomenon, typical of the present phase of capitalism and the workspace. It concerns a growing number of people for whom speed and efficiency of travel is important, which is related to their work and seen by many as time spent at work that can be used for work. The situation is slightly different for individuals who decide to stay and find a job as they travel. In this situation it is possible to expose all aspects related to tourism and the experience of new physical and socio-cultural space. It often is the experience that influences the decisions of individuals to stay and find work.

Employment abroad is a feature associated with internationalization and the expansion of transnational corporations into new markets. Foreign investors coming to a new country are not only driven by profit, but they also create jobs for different groups of employees. The game that takes place in negotiations with the nation state[ix] is to create jobs that are in line with the expectations and needs of the state. On the one hand, therefore, there are the needs of a transnational corporation to improve its international competitiveness and, on the other hand, the specific situation in the host country, which offers certain resources, including labor resources, for use. It cannot be ignored that these resources determine the investment attractiveness of a country and its competitiveness in relation to other countries. Resources, as Immanuel Wallerstein shows in the World Systems Theory, are shown by nation states as factors for improving their competitiveness, attracting foreign capital and as a result, a developmental factor. Labor resources in the form of the number of people with specific qualifications, experience, age structure, gender structure, etc. are an example of such a resource, although related factors should also be added, i.e. favorable tax and social expense, and labor market regulations.

However, this does not mean that transnational corporations—investing in countries other than their country of origin—only employ local staff on site. Local employees are usually accompanied by others coming from the head office or other branches or subsidiaries of the corporation or persons coming from abroad, who are employed by the corporation. Therefore, it is reasonable to introduce a kind of initial classification of corporate employees depending on their status in the host country. In this perspective, employees can be divided into:

- local employees from a given host country—they are employed in accordance with national regulations and the accompanying employment packages are typical for the host country;
- foreign employees who came to work in the branch from another country—the conditions of their employment vary depending on their status in the corporate hierarchy, place of recruitment and possibly relocation within the company.

Of course, both international career and mobility types are not homogeneous. Interestingly, with regard to the internationalization of companies, the literature is dominated by a discussion addressing the situation of expatriates and the mobility of highly skilled workers. It is noted that it focuses mostly on expatriates, especially managers and directors, disregarding other categories, e.g. self-selecting/self-initiated expatriates (Richardson and McKenna 2000, p. 209).

It is worth noting that the mechanisms that manage the mobility of corporate workers have a special dimension, as the constraints to which they are usually subject are different from those of typical migrants. Corporate employees are affected by attracting and pushing factors in a slightly different way than other migrants, as they do not actively seek out a new place of residence, but rather face a temporary change of residence proposal from the employer. Attractive factors are much more important for workers who are independently and actively looking for a job in their new place of residence, as their employment decisions are based on the quality of life, the typical local remuneration and the resulting acceptance of working and living conditions in the new place.

Finally, it is worth noting that migration takes place in different directions, both to highly developed and less developed countries. In the case of mobility to highly developed countries, this direction is in line with the movement

of migrants, while in the case of less developed countries, the movement is the opposite and resembles the movement of goods and capital. These can therefore be both high- and low-wage countries, and structurally this mobility is caused by the need for competence and labor resources of a subsidiary or branch of a transnational corporation in the host country. In the case of deputation to work abroad, corporate employees are subject to legal procedures related to the departure and performance of their duties as employees. Thus, in their case, legal movements are observed, which are processes coordinated by HR departments, while in the case of independent expatriates, they are usually self-organized. In general, these movements are temporary in nature due to the fact that such an employee, or the employer on his or her behalf, will apply for a temporary residence or employment permit.

Krakow as a center for outsourcing and mobility

Krakow is an example of a location where globalization is materialized in the form of internationalization, outsourcing and mobility. Compared to the rest of the country and the world, the city occupies a significant position in the global economy. According to ABSL data (ABSL 2019) in the first quarter of 2019, Poland had a total of 1,400 Polish and foreign BPOs, SSCs, ITOs, and R&D centers. These centers employ 307 thousand people. In 2019, 16 service centers launched operations, most of which (80%) were foreign entities. The increase in employment between the first quarter of 2018 and the first quarter of 2019 amounted to 10%, which translated into 28 thousand new jobs, while the overall share of foreigners in all service centers in Poland amounted to 14% (about 35 thousand people) and was showing a growing tendency.

Among the biggest investors in the BPO sector such entities as Capgemini, IBM, Nokia, Comarch, Atos, Credit Suisse, State Street, the Asseco Group, Citigrup and Sii are listed, which employ from 5,000 to 9,000 employees. Key sector jobs were arranged across 50 centers, including 19 where employment exceeded 1,000 people. The 11 largest business service centers in Poland (Krakow, Warsaw, Wrocław, Tricity, Katowice Agglomeration, Łódź, Poznań, Bydgoszcz, Lublin, Szczecin, and Rzeszów) employed 95% of all workforce in the business centers in Poland. In seven major centers, it exceeded 10 thousand people, and in the next twelve it ranged from 1 thousand to 10 thousand. people.

However, for years, Krakow has remained the clear leader in terms of employment in the sector. Approximately 70,000 people are employed in the centers, which accounts for almost 23% of employment in the whole industry. New investors in Krakow[x] include: Caspio, Danish Crown, Havi, Infinity Ward, JIVR, Kimberly-Clark, Kingfisfer, Qualtrics, TE Connectivity, Universal Investment, Varroc Lighting Systems, and Vesuvius. In addition, SpyroSoft has located a new center there as an addition to the already existing one.

Due to such strong market development, according to Tholons data (Tholons, 2019), in 2019, Krakow fell from its position in the ranking from 6th place in 2018 to 11th place (Poland was 15th in 2019 compared to 11th in 2018). Despite this, it is still on a high position in the global ranking of the best business service center locations in the world. Recently, Krakow has risen from seventh place and remains an important city for locating shared services centers in Europe, just after Dublin.

The most popular sectors represented in Krakow include:

- BPO (Business Process Outsourcing),
- ITO (IT Outsourcing),
- F&A (Finance & Accounting),
- HRO (Human Resources Outsourcing),
- RPO (Recruitment Process Outsourcing),
- R&D (Research & Development).

Krakow's high rank is also emphasized by ASPIRE, which points to its role in the provision of business services. On the basis of the information presented by ASPIRE (ASPIRE 2019), it is noted that currently there are over 350 international BPO/SSC and ITO entities operating in Krakow, employing over 80 thousand people, and further growth of their number is expected, which is also conducive to increasing the number of jobs even to 91 thousand in 2020.

This trend is derived from, among others, expansion of city office space. Krakow offers the second largest office market in Poland. Over the last decade, the growth of available office space has quadrupled, which places the capital of Małopolska as the leader regarding its volume. In 2019, the demand for office space showed an increasing trend (already in the first half of 2019 it amounted to 135,000 sq.m), of which nearly 60% was occupied by modern business service centers. (Axi immo 2019).

Moreover, the key to Krakow's success as a center of modern business services is a good communication location, IT support and especially current access to educated staff, which is guaranteed by numerous universities and colleges. The high evaluation of the city has been significantly influenced by the culture capital and the image as well as its investment attractiveness. The latter is a result of the highest number of students of science and IT faculties in the country, and, which is crucial, the innovativeness of the economy, including the market of shared services centers, which has been growing for years (PwC, 2019).

As it is widely known, the assessment of the labor market in a given region is influenced by many important factors, including its educational potential, i.e. access to educated workers. In this context, potential investors assess higher education facilities—the number of universities, the quality of education, and the professional education facilities. A key indicator is the number of students majoring in selected areas. As noted by K. Chowaniak (2019), Krakow received 8.6 out of 10 possible points. This is due to the fact that there are over 160 thousand university students in Małopolska. Krakow produces an average of 50 thousand graduates every year (Antal 2019). Most specialists are educated in the area of finance, linguistics, and IT, which is an irreplaceable database of employees for centers providing services in the field of accounting and finance using the knowledge of foreign languages and modern technologies of service and data transmission. Against other business services centers in Poland, it is best assessed in terms of **overall** satisfaction of the service centers as a place of business (average rating of 7.7 on a scale of 1 to 10). It holds this prominent position thanks to the availability of talent and qualified workforce (Rachoń 2018).

In this situation, Krakow is an analytically interesting case of considering corporate mobility in the largo sense. Unfortunately, the data are divergent, as the data from the provincial office show over 44 thousand foreigners, 26 thousand of whom declare a temporary stay. However, this is only a reference point. The largest number are Ukrainians at 23.7 thousand, followed by Russians (1.5 thousand) and Italians (1.4 thousand). In turn, the City Council estimates that there are approx. 50,000—70,000 Ukrainians residing in the city (Gazeta Wyborcza 2019). The ABSL estimates the employment of foreigners in the sector at 14%, an increase of 4 percentage points since 2018 (ABSL 2019).

Current methods of reporting mobility

However, these analytical problems are only the tip of the iceberg. It is not known from official sources what percentage of employees in the modern business services or other sectors are foreigners. This is not reported, also because citizens of EU countries need not apply for a work permit.

All issues relating to the reliability of both financial and non-financial information are subject to constant evaluation by external and internal recipients. The key to the evaluation of presented reports is their informative value presented to stakeholders. Properly prepared and presented economic information plays a key role in the entirety of the information used at various levels of management, hence the undoubtedly key role of the board of directors supervising its credibility. Information relating to the results of business activities and assets presented *ex post*, whose role is widely known, *ex ante* actions taken by the management board and presented in management and non-financial reporting on both the actions already taken and the planned directions of those actions are of great importance. Human resources policy and personnel management is undoubtedly an important area of corporate responsibility that requires reporting. It is therefore not surprising that the need to report on employee mobility issues is in line with the trend of extending financial statements towards business reports, also often referred to as annual reports (Samelak 2013, p. 115-119).

Analysis of the different dimensions of reporting brings some disappointing conclusions. Firstly, economic entities, certainly subsidiaries of transnational corporations, are obliged to use the entire financial instrumentation, i.e. international accounting standards and national regulations, e.g. American Accounting Practice (US GAAP) or Polish regulations (Accounting Act, Journal of Laws of 2018, item 395 uniform text). These regulations are mainly focused on financial issues, which poses a certain difficulty for carrying out analyses strictly devoted to corporate mobility and international movements of corporate employees.

On the other hand, International Accounting Standards (IAS) do not focus on mobility issues. The review of the 41 of them does not produce any surprising results, as it turns out that issues related to labor matters are raised in only one document. And so, the International Accounting Standard (IAS 19) Employee Benefits[xi] sets out the accounting requirements for those benefits, covering both short-term benefits (e.g. salary, annual leave), post-employment benefits (e.g. retirement benefits), other long-term benefits (e.g. long-service leave), and termination benefits. The Standard establishes principles for recognizing employee benefit costs in the period in which the benefits are received by the employee, and sets out how to measure the different categories of employee benefits (IAS19).

Going further, International Financial Reporting Standards (IFRS) do not focus on employee issues or corporate mobility (IFRS).

The analysis of the structure of the selected consolidated financial statements shows that quantitative issues related to corporate employee flows are absent from them. Issues related to employees in the strict sense of the word appear in two points of the reports, i.e. information on employees and their wages. Such information can be found at the end of financial reports, titled remuneration (e.g. HSBC) or corporate governance, accountability and salaries (e.g. UBS).

The employee section of the reports usually includes information on human resources characteristics, principles of talent acquisition and recruitment, ensuring inclusive working conditions, performance management, employee development, on top of salaries and benefits, or even total remuneration of the top management. For a large part of the entities, there is also information on the remuneration fund and the prizes awarded, as well as the shares held by employees.

One can use the provisions contained in the notes to financial statements. With regard to mobility, in part of the liabilities indirect relationships can be observed, e.g. provision for acquired companies that are usually located abroad. In turn, additional information focuses on the situation of subsidiaries and branches, parent company shares in branches and subsidiaries in different organizational and legal forms.

The non-financial information of a company, including transnational corporations, is subject to various obligations under national and transnational law, such as Directive 2014/95/EU of the European Parliament and of the Council[xii], as regards the disclosure of non-financial information and information on diversity by certain large companies and groups. The European Commission, in its Communication of 26.6.2017, indicates non-financial disclosure requirements for certain large companies with more than 500 employees in order to understand their development, performance, situation and impact (COM 2017).

Poland, like most EU Member States, has implemented the existing minimum requirements under the Accounting Directive for the disclosure of non-financial information. However, there is an increase in the importance of non-financial reporting due to market trends and voluntary decisions of companies[xiii].

Finally, it is worth mentioning at this stage the OECD Guidelines for Multinational Enterprises operating (or established) in countries that have committed themselves to the Declaration. The principles and standards for responsible business conduct in the global context, which are consistent with international laws and standards, are non-obligatory. The guidelines have been updated and extended, in particular to include changes in the chapters on topics important for mobility, i.e. employment and labor relations. There is an emphasis on the principle of equal opportunities, equal treatment and non-discrimination of workers (because of their race, color, sex, religion, political views, national/social origin, etc.). This reference to the principle of non-discrimination relates directly to the conditions of employment, but also to tasks, dismissal, salary and benefit rates, promotion, etc. Importantly, the employment of local workforce and the improvement of their professional qualifications are encouraged (OECD 2011).

A proposal for New Solutions

Corporate mobility and its growing scope clearly require some focus on its issues among various stakeholder groups, both external and internal. Management boards of business entities undoubtedly need this information and are not always willing to disclose it due to the organizational culture of the entity. Undoubtedly, the factors influencing the shape of financial statements are broadly understood cultural and social, political and legal, economic and internal factors, coming from the accounting itself and being a derivative of the system adopted by the management of a business entity. In addition, as indicated by research, e.g. by Rodney Irwin and Allan McGill (2018, p.10), the key factor for confidence in non-financial data indicated by investors was the positive perception and trust towards the company's manager. An important element of non-financial disclosures should be those relating to human capital and therefore also those relating to corporate mobility. It is most often perceived as a factor of impact on generating the value of an economic entity on the market, its relations with the environment or support for conducting a proper employment policy and creating a base of employees capable of implementing selected objectives for transnational entities.

Against this, the following operational solutions could be proposed, which could bring a number of benefits not only in terms of management but also in terms of analysis.

It can therefore be concluded that the IAS19 Employee Benefits is the right place to look for accounting regulations and to expand information related to corporate mobility and its reporting. Short-term employee benefits such as wages, social security contributions, paid annual leave and paid sick leave, profit-sharing or bonuses, and non-monetary benefits (e.g. health care, housing rental, company car and free or subsidized goods or services) for current employees shall be reported. In addition, employee benefits include those to which employees or their dependents are entitled. In this situation, they may be settled by payments (or the provision of goods or services) made directly to the staff members, their spouses, children or other dependents (IAS19). On the one hand, they will apply to all employees and some only to the management on site, on the other hand, they will consist of an employee package, e.g. renting a flat, school fees for children, etc. encouraging employees to relocate to other countries and sometimes cities. An element relating to the number and nature of the movement of employees can therefore be introduced.

Secondly, data related to corporate employee flows can be added to consolidated financial statements. They can be included in the information on employees and their pay, or the section of the reports on employees usually contains information on human resources characteristics. Finally, the provisions contained in the notes to the financial statements can be extended.

Thirdly, it may be proposed to extend existing obligations under transnational law, such as the already mentioned Directive 2014/95/EU of the European Parliament and of the Council, with regard to the disclosure of non-financial information and information on diversity by certain large companies and groups.

Fourthly, the OECD Guidelines for Multinational Enterprises operating (or having their registered office) in the countries that have committed themselves to the Declaration appear to be a good basis for including a broad range of mobility topics, not just employment and labor relations as is currently the case.

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[i] We do not enter into the issues of defining outsourcing and offshoring.

[ii] Sometimes, the term BPO is recognized to be an acronym for Business Process Offshoring, which is more characteristic of the American usage since the word outsourcing is often treated as selling services overseas.
[iii] Gary Becker (1975) indicates that spending on education, training or health care in their simplest form are examples of investment in human capital.
[iv] Robert Putnam (2000) stresses that social capital, i.e. standards, networks and mutual trust promote cooperation for mutual benefit. However, this approach has been criticized because of the inverse nature of the process. According to J. Urry, it is mobility that contributes to the development of social capital, not the other way around.
[v] Metacapital, according to Pierre Bourdieu (1991), is the legitimacy of the state using its monopoly and physical power to ensure control over the population, the different social areas, or other forms of capital flowing between them.
[vi] Goods are a more correct term than objects, although the term objects are used here.
[vii] In the original division the term of virtual travel was used, but mobility due to its wider conceptual range seems to be more appropriate.
[viii] This phenomenon can be compared to the experience of television decades ago.
[ix] These negotiations were later described in the triangular model of cross-border diplomacy. More in: (Stopford, Strange 1991).
[x] From the first quarter of 2018 to the first quarter of 2019.
[xi] Amended in 2011 and replacing the 1998 standard.
[xii] It replaces Directive 2013/34/EU.
[xiii] https://www.mf.gov.pl/c/document_library/get_file?uuid=e3def4ff-11f0-441a-ba67-18966e412192&groupId=764034 (Retrieved on 20.07.2018).

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Determinants of Corporate Investments In Innovativeness – Evidence From Central And Eastern European Countries

Barbara GRABINSKA
Cracow University of Economics, Cracow, Poland, grabinsb@uek.krakow.pl

Konrad GRABINSKI
Cracow University of Economics, Cracow, Poland, kg@uek.krakow.pl

Abstract

The aim of the paper is to investigate the determinants of investment in innovativeness in the case of companies from the Central and Eastern European Countries (CEECs). To adress the problem of underreporting of R&D expenditure which seemes to be especially evident in emerging economies, we develop a proxy for the intensity investments in innovativeness. We hypothesize that financial leverage is negative and profitability and effectiveness of public support system are positive determinants of R&D. As a proxy for the effectiveness of the public policy supporting investments in innovativeness, we use a composite metric developed by OECD – implied tax subsidy rate on R&D expenditures. Our sample consists of firm-year observations from the period 2010-2018 of large and very large firms from: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. These countries besides all being the new members of the European Union from 2004, represent a similar level of economic and institutional development, share the communist heritage and a common set of cultural values. Using panel regression with robust standard errors, we provide empirical evidence supporting our hypotheses. The results of the study may be of interest to policymakers and scholars from emerging markets.

Keywords: R&D determinants, innovation policy, R&D tax subsidies , R&D intensity

Introduction

From policymakers' point of view, investments in innovativeness are considered to be of the utmost value for the economy. It is due to the widespread belief that they drive technological progress and are of crucial importance for the competitiveness of the national economy and create the most desired asset for society. On the other hand, investments in innovativeness are considered to be very risky for companies undertaking them, the outcome is very difficult to predict, and there is always a threat that potential benefits will be inequitably distributed, meaning that they will be accessible not only to the originator company incurring all expenses, but also to external entities, particularly competitors. Alternatively, a company may opt for imitating strategy. The survey studies of Levin et al. (1987) and Mansfield et al. (1981) document that the imitation process, on average, costs as much as 50–75 percent of the cost of the original invention and probably is much less risky. However, from the perspective of the economy, the incremental value is lesser than in the case of the original invention.

Understanding the logic behind the managerial decisions on R&D is of key importance for policymakers interested in increasing the innovativeness of the economy. The issue is especially important among countries ascribed to the group of emerging economies, where usually institutional and legal framework is not effective in defending the proprietary rights of the originator company. The problem is present in CEECs, which lag behind in terms of innovativeness of the economy and as recently Stojacic, Srhoj and Coad (2020) have indicated in the context of catching up economies the implementation of public support instruments needs to be adapted to the unique features of the national innovation system.

R&D is perceived to be distinct from other types of investments. Guidara and Boujelbene (2014) describe them by a high level of uncertainty and informational asymmetry.

Davis (2001) explains information asymmetry by the fact that each R&D project is unique and not repeatable. There is also no organized market for the output of R&D activity or inventions acquired from the innovation process. Finally,

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accounting and reporting of R&D activity is, in most cases, discretionary, and in the case of some jurisdictions, different accounting treatments are allowed.

We hypothesize that the specificity of outlays on the company's innovativeness increases information asymmetry, and for this reason, external capital providers are not willing to provide financing. Therefore, we conjecture that a higher debt-to-equity ratio mitigates the level of investments in innovativeness. We posit also that a stable source of financing originated from the company's profitability increases the level of investments in innovativeness. As a result, our second hypothesis states that more profitable companies are more prone to invest in innovation.

We test hypotheses on the sample of yearly financial statements from the period of 2010–2018 of large and very large companies from the CEECs (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia). All these countries are new members of the EU, on a similar level of economic development. They share the same experience of communist heritage and a fairly similar set of cultural values. All countries are also classified as emerging economies, althought in September 2018 Poland, as a first contry in Europe in the last decade, was upgraded to developed market status in indeces run by FTSE Russell. But they differ in the way they conduct public policy supporting business R&D and innovations. OECD has developed a composite metric – implied tax subsidy rate on R&D expenditures – which we use as a proxy for the effectiveness of the fiscal policy supporting R&D activity conducted in firms. We take this variable to test our third hypothesis stating that the effectiveness of public policy has a significant positive effect on investment in innovativeness on the corporate level.

Using panel regression with robust standard errors, we provide empirical evidence supporting our three hypotheses. We add the contribution to the existing literature by constructing a new measure of the level of investment in innovativeness and by providing evidence for its determinants for companies from emerging markets.

The paper proceeds as follows. The first section presents the literature review on determinants of investments in corporate innovativeness and hypothesis development. Next we demonstrate the research design, sample description, and results of the study. We conclude in the last section.

Literature Review

In empirical research, the innovation process can be measured by input or output measures. Neither of the group is considered to be a perfect indicator of innovativeness of the company. The former ones are usually referred to as R&D expenditures and are expressed in different proxies for R&D intensity as a ratio of R&D expenses to revenues, assets, or employees. The output measures are focused on results of research projects, mainly patent applications/grants, and their properties like a number of citations, citations lag, patent generality and originality, etc. (Koh and Reeb, 2015). The link between R&D outlays and innovation effects is not direct and depends on the effectiveness of the R&D project and the specificity of the entity. Usually, the effects of innovation processes are measured by patent grant/application, because there are probably the only observable effects from a researcher's point of view. However, in many cases, R&D processes are not ending with patent applications, and sometimes entities are not willing to apply for patents, especially in countries classified as emerging economies, where the legal system of patent protection rights is not effective. Policymakers have no influence on the success of the R&D project on the corporate level. However, they may provide some incentives to spur research activity (like tax incentives or governmental support for R&D activity). From this perspective, R&D outlays, as input measures, are more suited to reflect the result of these actions and enable investigation of determinants of research activities.

Empirical research in finance and accounting provides evidence on many determinants of investments in innovativeness. Cumming and Macintosh (2000) classify them into four main categories: legal, market, strategic and firm-specific factors.

The first category addresses the efficiency of the legal system with regard to patent protection. The theory behind postulates that the more efficient the legal system, the more a firm is able to protect benefits derived from research breakthrough, and the more a firm is inclined to invest in R&D (Ginarte and Park, 1997; Versakelis, 2001; Park, 2008).

The second category – market determinants – can be divided into three subcategories: competition, demand-pull, and consumer controversies. Competition refers to the degree of rivalry within the sector. The theory behind posits that there are two types of motivations for R&D spending. The first one refers to a monopolist firm, who wants to defend its position via gradual innovation (more frequent, however less revolutionary innovations, what is defined as efficiency effect) and the second type is characteristic for an entrant, who wants to gain a position of monopolist thanks to a breakthrough innovation (so-called replacement effect). Additionally, Czarnitzki and Toole (2013)

document that the budget of the R&D project is correlated with the level of industry's concentration (the more concentrated an industry, the larger a budget). Levin and Cohen (1985) provide evidence of a non-linear 'inverted U' relationship between R&D intensity and market concentration.

Strategic determinants refer to strategic alliances, which create a situation in which a company may gain required know-how from a partner and, because of that, it is more willing to invest in innovativeness (Vence et al., 2000). The last category od determinants – firm-specific refers to a wider array of factors. Some of them are qualitative characteristics e.g. stage of the firm's development, while others are quantitative e.g. company's size, debt-to-equity ratio, profitability. Within this category, the size of a company is one of the determinants which impact on investment on innovativeness is documented in financial research. However, the results are not unequivocal. Acs and Audretsch (1988) note that the results of many studies might be potentially biased, because usually the sample is limited to public listed companies, which consist of large and very large companies.

The context of the capital market should not be underestimated. Several studies document a positive relationship between R&D investment and market value as measured by Tobin's Q ratio (Griliches, 1981; Cockburn and Griliches, 1988; Megna and Klock, 1993; Parcharidis and Varsakelis, 2010). Investor perception can also be considered as one of the potential reasons for undertaking investments in innovativeness.

Brown and Petersen (2011) investigate another factor potentially influencing investments in innovativeness – the liquidity of the company or, more specifically, the company's cash holdings. They assume that in order to pursue the R&D project, a firm needs to provide a stable source of financing. Shocks in the financing may be potentially very troublesome. Brown and Petersen (2011) argue that especially R&D projects face the problem of so-called high adjustment costs. Workers employed in R&D projects are expensive, but eventual lay-off may cause the risk of dissemination of so far acquired knowledge. Adjustment costs in the R&D project are considered to be much higher than in the case of traditional 'physical' investments. According to Hall (2002), at least 50% of the R&D budget is allocated to the wages and salaries of highly educated scientists and engineers. A company may save substantial 'adjustment costs' by maintaining a stable, smooth path of the financing R&D project. Brown and Petersen (2011) conclude that R&D financing for small manufacturing companies is much less volatile, if companies have cash holding available to use to smooth R&D spending.

Analysis of the literature provides several theoretical reasons why higher financial leverage may limit investments in innovativeness. Several potential explanations are provided. Arrow (1962) was one of the first to note that a gap exists between the expected rate of return of the inventor's firm and the rate of return of external capital providers when innovation investments are considered. Kamien and Schwartz (1978) stated that one of the most important characteristics associated with R&D projects is the necessity for it to be financed internally, mainly from current and accumulated profits. It is especially visible in the case of high-tech companies, which assets usually are very specific. Therefore they have low liquidation value and offer lower collateral to eventual debt lenders. In the case of the R&D project's failure, the originating company is left with few tangible assets of lesser value. As a result, highly leveraged companies are not able to spend as much on investments on innovativeness as less leveraged ones and vice versa highly R&D intensive firms are not able to attract external sources of financing. Secondly, Ghosh (2012) refers to the fact that the volatility of R&D project returns negatively influences the ability of the company to meet the payment obligations of debt agreements. Thirdly, Kamien and Schwartz (1978) state that firms with important R&D projects are reluctant to reveal detailed information about the project that would attract external lenders, being afraid of disclosing too much to potential competitors. This raises the broader problem of information asymmetry and related agency costs (Lee, 2011), what is one of the key characteristics of the R&D project. Information asymmetry between the entity undertaking the R&D project and external capital provider causes the inability of the latter one to adequately evaluate the investment project (its risk and return), and for this reason, capital providers are forced to ask for a higher premium, what increases the cost of capital.

Most of the studies postulate that a higher debt-to-equity ratio negatively affects the intensity of R&D projects. Several studies (Acs and Audretsch, 1988; Himmelberg and Petersen, 1992) provide evidence that in the case of smaller companies, internal financing is a stimulus of R&D innovation. It is explained by the weaker credit position of smaller firms in comparison to larger publicly listed companies. A similar argument is provided by Hall (2002), who concluded that small and start-up firms in innovative sectors are required the higher cost of capital in comparison to the larger companies and companies from other industries. So, in consequence, the question is whether the relationship will hold in the case of larger companies. Ghosh (2012) on the sample of more than 900 Indian manufacturing companies (with the exception of state-owned firms) from the period 1995–2010 provided empirical evidence that companies that use more debt exhibit significantly lower R&D intensity. Additionally, his findings indicated that the firm's internal funds positively influences the level of investments in innovativeness.

As knowledge generated by the innovation process undertaken by companies can be difficult to appropriate and tend to spill over to other entities who did not incur costs of this activity but can reap benefits out of it, the actual level of business R&D is well below the socially optimal level. This creates the space for public policy encouraging enterprises to engage in R&D. Governments have many tools intended to stimulate innovation, among which we can distinguish: non-financial instruments (mainly aiming to strengthen I.P. protection), financial instruments (consisting of direct measures in the form of public subsidies and non-direct measures in the form of tax incentives). The problem of business underinvestment in R&D is particularly evident in the CEE region.

Each form of stimulating innovation process has advantages and disadvantages. Fiscal incentives are addressed to a broad range of recipient firms, leaving them independence on how they spend funds. By reducing the cost of investments in innovativeness, the incentives raise the net present value of undertaken projects. From the point of view of market competition, fiscal incentives, in contrast to direct public subsidies, are not seen as a source of distortion in market competition (IMF, 2016).

Worldwide there is a tendency to use R&D tax incentives as a major instrument for promoting investments in innovativeness by policymakers. As of 2017, 30 out of 35 OECD countries and 21 of 28 EU countries gave preferential tax treatment to R&D expenditures (OECD, 2018). But even countries relying on tax incentives in their research policy can adopt completely different approaches to incentives designs. The diversity of these tax arrangements is a factor hampering cross-country comparisons.

To measure and compare the "generosity" of R&D tax schemes under different jurisdictions, OECD has developed a composite indicator – implied tax subsidy rate on R&D expenditures. The tax subsidy rate is calculated as one minus B index, a measure of the before-tax income needed to break even on 1 USD of R&D outlays (Warda, 2001). Estimates are based on headline tax credit on allowance rates and differentiated by firm size and profitability scenario (https://stats.oecd.org).

Based on the above literature review, we hypothesize that a higher debt-to-equity ratio limits the level of corporate investments in innovativeness also in the case of companies from the CEE region. We argue that innovative activity increases information asymmetry and related agency costs. Therefore, external capital providers are less willing to provide financing for companies investing in innovations. For this reason, the less troublesome source of financing investments in innovativeness is the company's profit. As a result, we posit a second hypothesis that more profitable companies are able to secure a more stable source of financing for innovative activity. Thirdly, we hypothesize that public policy based on R&D tax incentives has a positive effect on the intensity of investments in innovativeness.

Research design, sample description, and results of the study

In many empirical studies, different measures of R&D intensity are used to measure the level of investments in innovativeness on the company level. Unfortunately, in the case of companies from the CEECs, only a small part of them report R&D expenses in the income statement or the balance sheet. This problem can be partly ascribed to the phenomena of underreporting of R&D activities in the financial statements. For this reason, we decided to construct a new proxy for the intensity of investment in innovativeness (INT_INNOV). We define it as the sum of R&D expenses (reported in the P&L statement) and a year-to-year change in intangibles without the goodwill and corrected by the yearly amortization scaled by the total assets from the previous period. Firstly, it is important to stress that amount of the investments measured by our proxy will be visible partly as an increase of intangible asset (without goodwill) resulting from investments, and partly in the income statement (as R&D expenses are the fraction of expenditures, which cannot be capitalized according to accounting regulations). Secondly, the year-to-year change in intangibles encompasses other elements than R&D expenditures like the cost of acquiring new software, licenses, copyrights, patents, etc. We argue that these elements also impact the innovativeness of the companies, and such a measure is a reasonably good proxy for the intensity of corporate investments in innovations in the case of companies from emerging markets.

We are using this variable to test our three hypotheses. In order to avoid the problem of endogeneity in the model, we use lagged values of all variables. In the result, we employ the following model:

$$INT_INNOV_{i,t} = POLICY_{i,t-1} + LEV_{i,t-1} + LIQ_{i,t-1} + TOBQ_{i,t-1} + SIZE_{i,t-1} + ROE_{i,t-1} + IND_{i,t}$$

Where:

$INT_INNOV_{i,t}$ – R&D expenses plus the year-to-year change in intangibles (without goodwill), corrected by amortization and scaled for total assets from the beginning of the period for *i* company in time *t*;
$POLICY_{i,t-1}$ – implied tax subsidy rate on R&D expenditures as measured by OECD in time *t-1* of the country of the origin of the company *i*;

$LEV_{i,t-1}$ – financial leverage of the company *i* in time *t-1* measured as debt to total equity & liabilities;
$LIQ_{i,t-1}$ – liquidity of the company *i* in time *t-1* measured as the current ratio (calculated as current assets to current liabilities);
$TOBQ_{i,t-1}$ – Tobin's Q ratio of the company *i* in time *t-1* calculated as a ratio of market capitalization to total assets;
$SIZE_{i,t-1}$ – the size of the company *i* in time *t-1* measured as the logarithm of total assets;
$ROE_{i,t-1}$ – profitability of the company *i* in time *t-1* measured as return on equity;
$IND_{i,t}$ – industry classification of the company *i* in time *t* (NACE code).
The initial sample consists of 7 668 firm-year observations derived from yearly financial statements of large and very large companies (Orbis database classify companies as large or very large when they match at least one of the following conditions: operating revenue >= 10 mln EU or total assets >= 20 mln EUR or no. of employees >= 150) from the CEE countries (see Table 1). We use the Orbis database to acquire the data from financial statements (firm-level) and the OECD database to collect data on the POLICY variable (country-level).

We decide to use data from large and very large companies because of the higher quality of the accounting data.

Table 1: Firm-year observations by country

Country	No. of observ.
Czech Republic	126
Estonia	153
Hungary	288
Latvia	180
Lithuania	252
Poland	6 120
Slovakia	315
Slovenia	234
Total	7 668

Source: Authors' own calculations based on the Orbis database.

However, due to the lack of data for all variables (missing data for firm-year observations), the final sample is much smaller and consists only of 1 225 firm-year observations of 347 companies. All observations related to companies from the financial and insurance sector were deleted. Additionally, all observations with negative amounts of total assets, equity, leverage, and R&D intensity were deleted. The following variables INT_INNOV, LEV, LIQ, TOBQ, and ROE, were winsorized in order to obtain more robust estimators. Descriptive statistics of variables used in the model are presented in Table 2.

Table 2: Descriptive statistics

Variable	No. of observ.	Min.	Max.	Mean	Median	St. Dev.	Variance	Skewness	Kurtosis
INT_INNOV	2 077	0.000	5.955	0.027	0.002	0.226	0.051	23.560	595.677
POLICY	7 668	-0.010	0.360	0.067	0.000	0.101	0.010	1.298	3.376
LEV	5 563	0.000	1.000	0.489	0.480	0.102	0.059	0.228	2.563
LIQ	5 559	0.000	1.000	2.917	1.420	8.297	68.842	9.441	102.320
TOBQ	5 158	0.000	100.000	1.479	0.510	6.267	39.280	12.842	187.390
SIZE	5 563	0.000	17.130	10.046	10.138	2.398	5.752	-0.113	3.332
ROE	5 566	-100.000	100.000	-0.212	0.057	5.032	25.322	-3.604	284.765

Source: Authors' own calculations based on the Orbis database.

In order to determine interdependence between variables, we calculated the correlation matrix (see Table 3), which shows that there is no strong correlation between variables, and we conclude that they can be used in the model.

Table 3: Correlation matrix

Variable	INT_INNOV	POLICY	LEV	LIQ	TOBQ	SIZE	ROE
INT_INNOV	1.000						
POLICY	0.013	1.000					
LEV	0.009	0.045	1.000				
LIQ	-0.029	0.009	-0.350	1.000			
TOBQ	0.387	-0.039	0.004	0.010	1.000		
SIZE	-0.191	0.094	0.017	-0.099	-0.223	1.000	
ROE	-0.178	0.012	-0.019	0.004	-0.261	0.042	1.000

Source: Authors own calculations based on the Orbis database.

We employ panel regression with a robust option in order to neutralize potential problems with autocorrelation and heteroscedasticity. Hausmann test suggests the usage of panel regression with fixed effects. We test for multicollinearity using VIF (variance inflation factor), and results show that (all VIFs are between 1 and 10), there is no collinearity problem between variables. We also used Ramsey's RESET test for functional form misspecification of the model. The obtained result (Prob > F = 0.0517) suggests that there is no misspecification of the model.

Table 4: Results of the panel regression with fixed effects analysis

Independent variables	Coefficient (Robust Standard Error)	
lagged POLICY	0.064	*
	(0.083)	
lagged LEV	0.000	***
	(-0.104)	
lagged LIQ	0.320	
	(0.002)	
lagged TOBQ	0.000	***
	(-0.044)	
lagged SIZE	0.934	
	(-0.001)	
lagged ROE	0.004	***
	(0.001)	
Constant	0.332	
	(0.141)	
Number of obs.	1 225	
Number of groups	347	
Adjusted R^2	0.6847	

* significance at 10% level
** significance at 5% level
*** significance at 1% level

Source: Authors own calculations based on the Orbis database.

Results of the panel regression show that a higher debt-to-equity ratio is a negative, and profitability is a positive determinant of the intensity of investment in corporate innovativeness. In both cases, the regression analysis is showing statistical significance at 1% level (p-value = 0.000 and 0.004 respectively). In the case of public policy, the results are weaker, but still, there is statistical significance at a 10% level (p-value = 0.064), and the coefficient suggests positive influence. Therefore we positively verified all three hypotheses. However, the argument supporting the last one is not so sound, as in the case of the first two.

Among control variables, there is only one statistically significant - Tobin's Q ratio, and the regression analysis suggests a negative impact on the intensity of investments in corporate innovativeness. Again, the results are supporting the anecdotal evidence that companies from the CEE region are not expected to engage in investing in innovativeness, and even the capital market more appreciate capital than intangible investments.

Conclusions

Investments in corporate innovativeness are one of the key challenges for emerging economies. The goal of the study was to determine the most important factors stimulating corporate investments in innovativeness. The study was conducted on the sample of large and very large companies from the CEE region, representing the highest quality of financial reporting, audit quality, and in consequence, the highest quality of corporate governance. Due to the inability to use one of the popular metrics of R&D intensity, we constructed a new proxy for the intensity of the investments in innovativeness. We used this proxy to test three hypotheses examining the key factors of innovativeness.

The results of the study indicate that external capital providers are not willing to provide financing for companies investing in innovativeness. The output of investments in innovativeness is characterized by increased information asymmetry, which translates into agency problems and then to a higher cost of capital required by external capital providers. In essence, it means that the returns generated by 'innovative' assets created by such investments are much more variable and difficult to predict. If companies cannot use external capital to finance investments in innovativeness, they are forced to rely on their own financing, especially internally generated profit. Therefore, such investments are undertaken mostly by profitable companies. On the other side, in times of financial stress, investments on innovativeness are the first to be cut, which is typical not only for companies from emerging economies.

The study also investigates the influence of public policy supporting investments in innovativeness. The sample consists of companies from eight different countries from the CEE region and the period of nine years. Each country adopted a different policy, which changes in the studied period. Our study uses a composite measure developed by OECD – implied tax subsidy rate on R&D expenditures, which depicts tax profits for companies engaging in investments in innovativeness. The results of the study show that public policy is an important factor influencing the level of corporate investments, and as such, may be of interest to policymakers.

Our study is not without limitations. Chiefly, we do not address a few factors in the model, which can possibly have an impact on the intensity of investments in innovativeness, e.g., ownership concentration, institutional/foreign ownership, audit quality, industry concentration/ competitiveness.

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Evaluation of Mechanical Security of Regional Self-Government Buildings

Filip LENKO, University of Zilina, Zilina, Slovakia, filip.lenko@fbi.uniza.sk

Martin BOROS, University of Zilina, Zilina, Slovakia, martin.boros@fbi.uniza.sk

Jakub DURICA, University of Zilina, Slovakia, jakub.durica@fbi.uniza.sk

Richard JANKURA, University of Zilina, Zilina, Slovakia, richard.jankura@fbi.uniza.sk

Abstract

The paper discusses the position of mechanical means of restraint in the field of securing municipal buildings and their use. The paper points out the shortcomings in the security of protected objects in the area of perimeter and mantle protection. The aim of the paper is to propose general recommendations for securing the objects of regional self-government, especially in the field of perimeter protection. The recommendations are based on experimental testing of several types of mechanical barriers, the results and methodology of which are presented in the paper. From the tested barriers, the most suitable type for securing the selected objects is then selected. The benefit of the contribution is an increase in awareness of the security of public buildings and the subsequent effective use of funds by local governments to secure their property.

Keywords: Mechanical Barriers, Fence, Testing, Regional Safety, Municipalities.

Introduction

From the legislative point of view, the municipality in the Slovak Republic is a legal entity whose statutory body is the mayor. The mayor is responsible for the administration of the municipality's property, which consists of movable property, real estate and financial resources. We can consider vehicles, mobile phones, information technology and the like as movable property (Svetlík, 2016). The category of real estate includes buildings that are firmly connected to the ground, land, apartment buildings, as well as non-residential premises and other non-residential premises under the administration of the municipality (Svetlík, 2017). The funds of the municipality are receivables and other property rights. Property rights belong to the municipalities on the basis of Act no. 138/1991 Coll. on the property of municipalities and later regulations. This Act stipulates which assets from the property of the Slovak Republic have become the property of the municipality and also regulates the property position from the point of view of property management.

Objects owned by the municipality can be considered all buildings firmly connected to the earth's surface such as the municipal office, sports hall, cultural center and warehouses intended for the technology of the municipality and the like. Most of these buildings are open to the public during opening hours, but some are only accessible to general staff. However, within publicly accessible buildings, it is necessary to control the movement of people, not only the public but also employees (Svetlík, 2016). These buildings are specific in that they store documents with personal data of residents, registry documents and need to be protected from a legislative point of view, but their market value is not high, and it is difficult to sell them (Soltes, 2016; Turecka 2017). Buildings with limited access for employees are characterized by the fact that the material and technology stored in them has a much higher market value. The municipality would suffer higher financial losses in case of property theft. In recent years, municipalities have gradually started to invest funds in the security of their facilities, the funds spent are often too high and the established security system does not provide sufficient protection (Svetlík, 2017; Lovecek, 2013). The paper generally recommends minimum requirements for securing general objects, which are based on exact data obtained by own experimental measurements according to relevant technical standards.

Object Protection System

The system of protection of objects can be understood as "the purposeful arrangement of a set of protective measures and their properties, which are to create a state of security". A protective system is a means of achieving a

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state of safety using protective measures that lead to the disruption or cessation of activities and events that damage property (Kubas, 2017).

The security system of a protected object is composed using a combination of four basic forms of protection. These forms of protection include:

- Mechanical means of restraint - in accordance with the required security requirements and functions, security elements are implemented in the building protection system to slow down the movement and to prevent access by unauthorized persons.

- Electric alarm systems - are among the active elements of protection. It is an electrical system that responds to manual or automatic detection of the presence of danger. Its purpose is to signal the intrusion, attempted intrusion or unwanted activity of a person in a protected area.

- Elements of physical protection - ensure timely intervention and detention of the intruder. It is the performance of protection of the building and its immediate surroundings by the physical presence of persons.

- Regime and organizational measures - are measures aimed at preparing and creating procedures that will ensure the effective and efficient application of the system of protection of buildings. These include security policies, security guidelines and the division of activities between those responsible (Mach, 2017A).

From the point of view of the financial possibilities of municipalities, it is appropriate to use the right combination of mechanical means of restraint and electric alarm systems when securing buildings. If we want to achieve effective security of property, it is necessary to realize the value of the secured property and to propose adequate security for it (Mach, 2017A; Soltes, 2017A). It is highly inefficient to secure a low value asset with a security system that is several times more expensive. Therefore, the contribution will be further taken by securing the objects of municipalities, which are accessible only to selected employees of the municipality, for whom we assume a higher value of protected interest.

One of the indicators of the need to secure a building is the development of property crime. For the purposes of the article, we will point out the overall development of burglaries in buildings in the Slovak Republic in recent years. The decline is more pronounced in 2020, due to incomplete statistics. The clarity of cases in the area of property crime and burglary into buildings has long been at the level of 30%, which is a low percentage due to the financial losses caused by this type of crime. The decrease in burglaries into buildings is caused by property protection systems, which have a deterrent effect on a potential thief. We can say that these measures have a preventive effect.

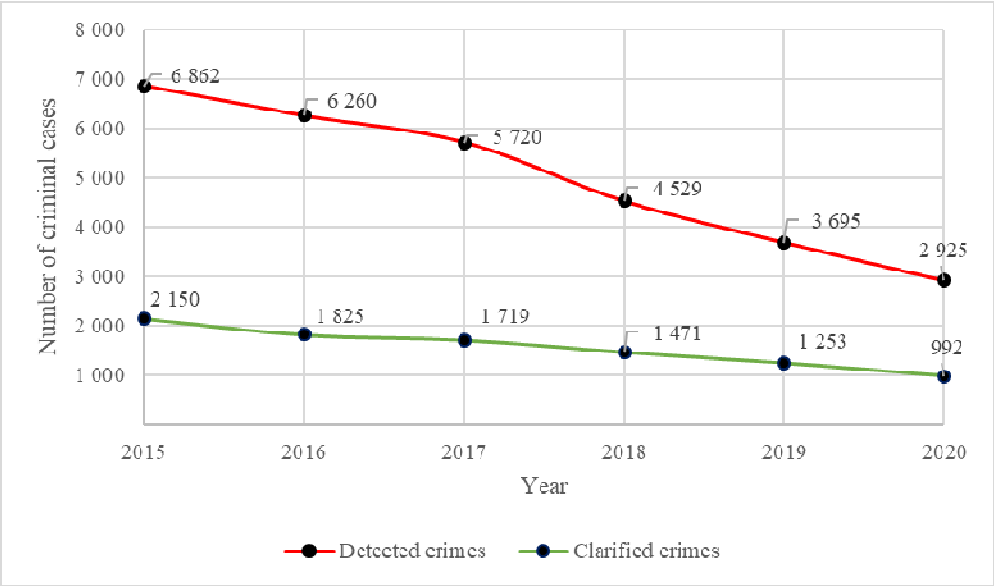

Fig. 1 : Statistics of burglary in buildings in the Slovak Republic (Ministry of interior, 2020).

Securing the Selected Object

Ensuring the protection of selected objects of the municipality can be based on several requirements. The subject of protection may be given by generally binding legal regulations (eg the Act on Municipal Property), technical standards, insurance conditions or is based on the conditions of internal organizational standards (owner, operator, legal entity, etc.). Based on these requirements, a system of protection is subsequently created.

The use of mechanical means of restraint can be divided into four basic areas of protection zones, which represent:

- Perimeter protection - ensures security in the vicinity of the protected object, its perimeter, which can be defined by natural (watercourses) or artificial boundaries (fence, wall and others).

- Shell protection - prevents damage to the shell of the building and all its hole fillings. It protects primarily the building openings of the building (doors, windows, etc.) from intrusion by the intruder.

- Spatial protection - is understood as the internal protection of buildings, which provides the internal spaces of protected interest in the building.

- Object protection - ensures the protection of objects in the protected object and objects stored in storage facilities in individual rooms. These are primarily devices designed to protect valuables, documents, cash and other important documents (Mach, 2017B).

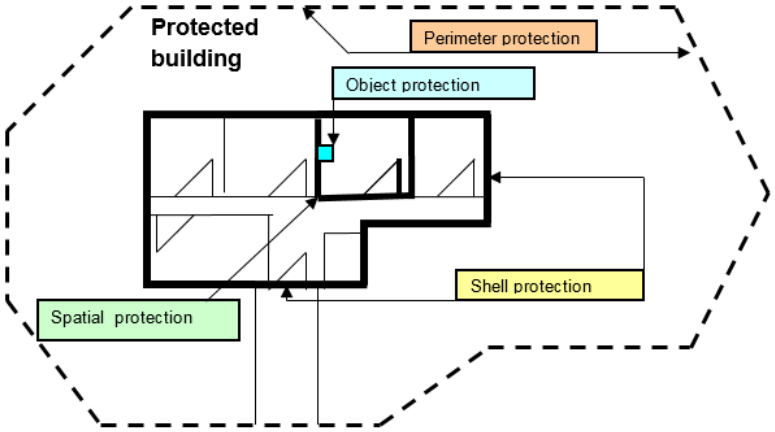

Fig. 2: Use of mechanical means of restraint in terms of protection zones

As part of the application of zoning in securing municipal buildings where equipment is stored, it is important to pay particular attention to the perimeter and shell protection of the building. These layers represent the entrance boundary to the external spaces of the building. The task is to discourage or slow down the potential intruder as much as possible.

From the long-term development of the statistics of the Police Force of the Slovak Republic, we can state that the largest percentage of burglaries into any building was made through the front door. When overcoming the door panel, we can most often encounter two possibilities of overcoming them, which are:

- Leverage of the door frame.
- Overcoming the locking system.

In both cases, the intruder first had to overcome perimeter protection. The main benefit of perimeter protection is to clearly distinguish and delimit public space from private space and to keep intruders from overcoming it. The advantage of delaying the intruder in perimeter protection makes him vulnerable, as it is very easily detectable at this stage. After overcoming it, it comes to a shell protection, which is intended to slow it down even more, ideally to discourage it. The purpose of slowing down the intruder is a higher probability of his detection and subsequent summoning of security forces.

Requirements for perimeter and sell protection

The solution of perimeter protection is relatively simple. Most often, it is a fence in which it is necessary to take into account the nature of the surrounding environment, the value of the protected interest, the appropriate location and provision of entrances. It is important to choose the right design. In the area of mantle protection of the municipal buildings, it is especially suitable at the entrance, if it is possible to use security doors, to ensure the required level of security. If this is not possible due to other functional properties, security doors should be used at least in important rooms (Mach, 2017A; Soltes, 2017A).

If these rooms are concentrated on one floor of the building, it is possible to place a security door at the entrance to that floor. Security doors should meet the following criteria:

- all-round frame made of high-quality steel,
- longitudinal and transverse steel reinforcements, welded into a solid structure,
- single-point safety lock,
- safety cylinder,
- internal insulation filling,
- certification of the National Security Office (Mach, 2017A).

The most commonly used locking mechanism is cylindrical inserts. These are divided and certified for security doors into four security classes, according to the design, as well as additional components that increase the overall durability. The market offers a large number of cylindrical inserts with various opening options. It is recommended to use a higher security class for entrance doors to protected rooms or buildings themselves, at least 3. Window panels are often part of the opening panels of protected buildings. However, their weak part is the glass panel placed in the construction of the window frame. Two variants can be used to increase the security and durability of windows. The first is the replacement of old windows, for windows with the so-called safety glazing (Mach, 2017B).

This method is inefficient due to the need to replace entire windows with more expensive ones, along with the work of replacing them. An effective solution is to use security foils, which not only increase the resistance of the glass, but also prevent the glass pane from breaking into large parts with sharp edges. Installation of safety foils is also possible on currently used glasses. In this way, it is possible to increase the resistance of windows to breakage. Security grilles can also be used in areas that serve as warehouses for materials and tools, as only aesthetics are not considered in these places (Vel'as, 2019B).

Recommended elements of shell protection to ensure the safety of the municipality objects

During the design of protection of buildings in the municipal administration, it is possible to proceed from the international standard, which deals with urban planning and design of buildings in the context of crime prevention. This is a standard STN P CEN / TS 14 3838 - 4 Prevention of crime - Urban planning and design - Part 4: Shops and offices. The standard specifies the minimum level of protection that should be applied in the protection of administrative or commercial premises. It then divides the security level into one of five levels, according to the type of object and its activity. According to the standard, administrative buildings in the municipality administration can be included in the second level of security (STN, 2008). Based on the resulting level of security, the individual elements of object protection are recommended:

- perimeter protection, passive safety barriers of the 2nd security class
- entrance door - security door of the 3rd security class with a 4rd class for the cylindrical insert and the door frame (according to EN 1627),
- windows on the ground floor P5A or security foil (P1A) or security grilles (according to EN 1627)

Pursuant to Act no. 138/1991 Coll. on the property of the municipality, municipalities and organizations are obliged to manage the property of the municipality for the benefit of the development of the municipality and its citizens and the protection and creation of the environment. Pursuant to this Act, municipalities are obliged to protect property from damage, destruction, loss or misuse. Cities spend on average 2-4% of available funding on security solutions (Vel'as, 2019A).

As example we choose describe security of self-government building in the capital city of Australia Canberra. After the revelation of a terrorist attack that was to take in Canberra local authorities started with securing buildings. One of the element of perimeter protection is 2,5 meter high steel security fence, so in nowadays disturbers can't easily close to building. Including security fence they use serval CCTV cameras or electric security system with motion

detector too (Ward, 2017). Another Australia state, Victoria, recommends using CPTED method and focus on natural access control, natural surveillance and territorial reinforcement. The CPTED principles promote layers of defense to: deter, detect, delay, respond and recover. Main role for perimeter protection is deter and delay disturbers (Greaves, 2019). The Indian Ministry of Home Affairs issued instruction on security arrangements in government building. This security arrangements consist primarily of access control system to building or just to land of this building (Singh, 2015).

Experimental testing of passive security barriers

The term security class represents the time value of overcoming the selected security element. Security class is determines by certified company determines. This time data allows a better understand of resilience of the selected security element and this is effective for security proposal. Higher security class means higher price of security element. Price of security element needs relation in to the value of the protected interest (Soltes, 2017B; Zvakova 2018).

As part of its scientific research activities FBI UNIZA researchers also test certified and non-certified security elements. As part of their project they long time deal with passive security barriers. The purpose of testing is to verify whether the security element accomplish the requirements declared by the producer and try find out real time of overcoming security element and try find out how much effort to spend to overcoming by using appropriate tool kit to security class (Zvakova, 2018; Tun, 2018).

The tests was performed at the Faculty of security engineering. Purpose of the tests was determine breakthrough resistance according to EN 1627 standard. Specifically there was tasting fence of 2nd security class call GAMA 2D (2:BT.). Panel of fence is hot-dip galvanized and dimension of mesh's are 50 x 200 mm. Tests were performed according to the following methodology:

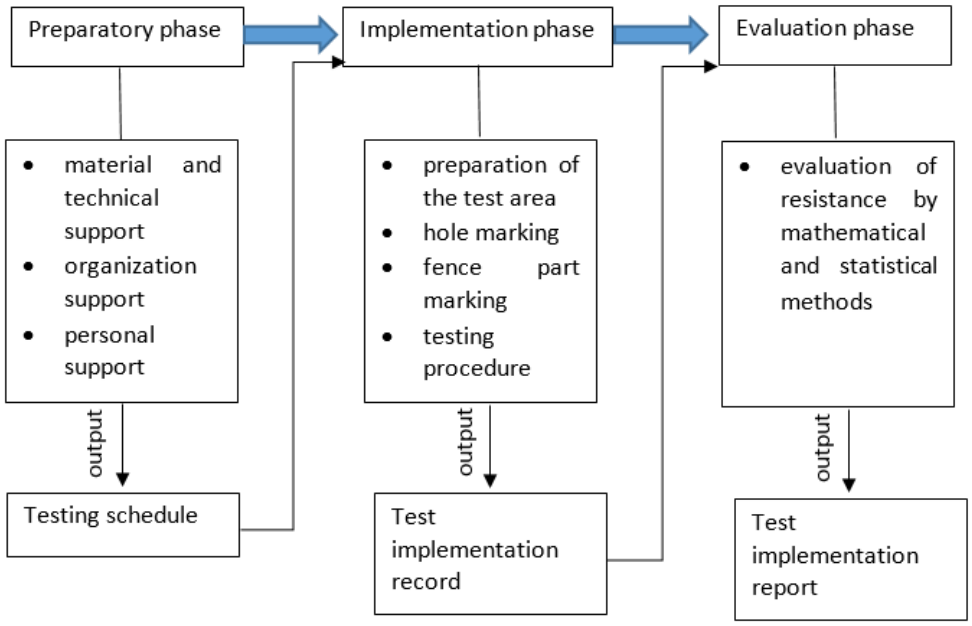

Fig. 3: Test methodology

There was testing mesh of 2nd security class, so they used A2 tool kit – saws, screwdriver and hammer. The expected breakthrough time of the mesh of the 2nd safety class according to EN 1627 is a minimum of 3 minutes and a maximum of 15 minutes. There were performing 10 tests and hole to the fence was made. This holes had following shapes and size:

- Circle ø 350 mm or,
- Ellipse 400 mm x 300 mm or,
- Rectangle 400 mm x 250 mm.

Fig. 4: Tool kit A2

Testing mesh were size 2500 x 830 mm. Mesh attached to test frame and results of the tests are in following table.

Table 1: Experimental testing of breakthrough time of the mesh

Number of experiment	Total test time [s]:	Test time [s]:	Shape of hole:
1	1898	514	circle, ellipse
2	1012	268	circle, ellipse
3	1227	391	circle, ellipse, rectangle
4	978	268	circle, ellipse
5	914	258	circle, ellipse, rectangle
6	919	284	circle, ellipse, rectangle
7	744	196	circle, ellipse
8	956	279	circle, ellipse
9	849	235	circle, ellipse
10	755	125*	circle, ellipse

Arithmetic of successful attempts:

$$\bar{x} = \frac{1}{N}\sum_{i=1}^{N} x_i = 299{,}22\ s$$

Standard deviation:

$$\delta = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{x})^2} = 90{,}44\ s$$

Arithmetic time of successful overcoming mesh GAMA 2D (2:BT.) 2nd security class was approximately 5 minutes.

At the Faculty of security engineering ware realization other mesh breakthrough tests. This tests ware realization as part of project VEGA and project PACITA, and there was same methodises of testing.

In the VEGA project, testing was performed on 12 mesh samples, which size of mesh was 100 mm x 50 mm and Ø vertical/horizontal was 4 mm and high of one part was 1-1,9 m and number of ripples 2-4. There were use following tools for overcoming:

- Manually - combined pliers -180 mm, lever pliers - 640 mm.

* Unsuccessful attempt

- Electric - angle grinders machine, the first with a power of 650 W and a Ø of a cutting disc for steel 115 mm (GRINDING MACHINE A) and the second with a power of 950 W and a Ø of a cutting disc for steel 150 mm (GRINDING MACHINE B).

3 tests were performed with each instrument and the resulting T_v time was determined as the arithmetic mean. The results of the test in the VEGA project can be found in the following table.

Table 2: Results of breakthrough time of fence type AXOR

Tools	T_1 [s]:	T_2 [s]:	T_3 [s]:	T_v [s]:
Combined pliers 180 mm	x	x	x	x
Lever pliers 640 mm	23,1	19,9	22,1	21,7
GRINDING MACHINE A	21,6	17,3	24	20,9
GRINDING MACHINE B	11,2	10,5	9,9	10,5

As we can see in the table in three cases, the mesh was overcoming in a relatively fast time. The fastest was overcoming with the help of an electric angle grinder with a power of 950 W and a cutting disc Ø for steel 150 mm. The angle grinder and lever pliers had comparable overcoming times.

In the PACITA project, the tests took place on complete mesh fields in which the stability and deflection of the fence were also taken into account. There were tests following meshes:

- FLUIDEX - steel wire 2.5 mm, mesh eye 55x55 mm, PVC plastic coated - similar to the VEGA project,
- BASTILLA - welded mesh, mesh eye 78x33mm, wire 3.5 mm, PVC plastic coated,
- AXIS SR - welded mesh, horizontal wire 1x6 mm, mesh eye size was 100 mm,
- AXIS DR - welded mesh, horizontal wire 2x8 mm, mesh eye size was 200 mm.

The tools used to overcoming mesh were divided into 5 groups of destructive means:

- Tools found near to mesh,
- Home tools,
- Tools with mechanical transmission,
- Cordless tools,
- External power supply.

The results of testing in the PACITA project can be found in the table.

Table 3: Results of testing in the PACITA project

Group of tools / Mesh		FLUIDEX	BASTILLA	AXIS SR	AXIS DR
1	Crowbar				
	Stone				
	Own strength				
2	Hand saw				
	Pliers				
	Hammer				
3	Lever scissors				
	Car jack				
	Dynamic straps				
4	Battery grinder				
	Battery saw				
	Circular saw				
5	Gas burner				
	230V - flexi grinder 125 mm				
	Gasoline engine cutter				

Table 4: Legend for Table 3

Legend	
Breakthrough hole wasn't made under 20 minute	
Breakthrough hole was made under 10 minute	
Breakthrough hole was made under 1 minute	

Evaluation of test

When was testing the breakthrough resistance of 2nd security class mesh fence using standard hand tools of group A2, it took approximately 5 minutes to create a transition hole according to EN 1627. Average time of overcoming non-certified mesh was 17,7 second in the VEGA project. There was used two grinding machines but each with different power and lever pliers. In the PACITA project were tests 4 type of mesh and for overcoming were use all 5 groups of tools. The shortest time for overcoming was achieve by 5th group of tools as gas burner, flexi grinder 230V and gasoline engine cutter. All this tools overcome mash under 1 minute such as lever scissors of 3rd group.

Conclusion

Properly designed and installed security of regional governments has a general benefit for township and their inhabitants. Function of designed security systems is protect secure object and also funds should be used efficiently. Object in township are mostly similar and often has similar technique and equipment. The created proposals are applicable in the all territory of the Slovak Republic and a wide range of buildings belonging to regional governments. It's important invest funds for protection this buildings because inside this buildings are expensive techniques and equipment. Trade offers a wide selection of mantle and perimeter protection elements, various security classes and prices. When customers choosing suitable security system, they can't apply rule that a higher purchase price will also provide a higher level of breakthrough resistance. This level of breakthrough resistance should be misleading for customers, so is better if customers will know time, which disturber need for overcoming by using right tools. For passive safety barriers, this time according to EN 1627 is a minimum of 3 minutes and a maximum of 15 minutes. Professional public expects that passive barrier set back disturber as long as possible, so we were testing some types of passive barriers same security class. Result of this testing is find which type of barrier has the highest resistance against attack of disturber. After the evaluation of the tests, the formulation of recommendations is based at our own findings. In the case of testing passive security barriers, the longest withstood attack GAMA 2D mesh - 5 minutes. Researchers of the Faculty of security engineering by testing various mechanical barriers create a database of time and probabilistic values, on the basis of which it is possible to make recommendations for secure various objects.

Proposed recommendations: perimeter protection - passive security barriers of the 2nd security class, entrance doors - security doors of the 3rd security class with a similar class for cylindrical insert and door frame, windows on the ground floor - security foil (P1A) or security grilles.

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Text Clustering and Representation Using the Latent Dirichlet Allocation Model

Anamaria ALDEA
Bucharest University of Economic Studies, România
anamaria.aldea@csie.ase.ro

Iuliana COMAN
Bucharest University of Economic Studies, România
iuliana.coman@csie.ase.ro

Maria Mihaela TRUȘCĂ
Bucharest University of Economic Studies, România
maria.trusca@csie.ase.ro

Abstract

Text mining models allow examination of textual data in order to find out their message, without reading them. This evaluation can be used not only to identify the main subject of the analyzed texts but can also be used for the developing of similarity patterns or for predictions. Knowing that nowadays, an increasing volume of data is recorded especially in text format, not in numerical one, text mining models have become an important and necessary tool. The main purpose of this paper is to present the Latent Dirichlet Allocation (LDA) model, mainly used for the the cluster analysis of documents, but also for the dimensionality reduction and text representation. To prove that the LDA model is a useful tool for other clustering models, we compare the performance of the k-medoids clustering algorithm using LDA representation with the one generated using TF-IDF representation. We use a self-defined corpus of news published on the Washington Post website and categorized as "policy", "business", "sport", "technology" and "entertainment". We evince that the LDA model is not only an efficient clustering model, but it is also useful for text representation cutting back the implementation costs and enhancing the quality of the further textual tasks.

Keywords: Text mining, TF-IDF index, K-medoids, Latent Dirichlet Allocation.

Introduction

Text mining is a relatively new concept of data science that has caught a lot of attention recently due to the increasing volume of non-numerical information. Precisely, it is estimated that more than 80% of our available information is unstructured and is not represented by numbers. Therefore, it is compulsory to develop new models for the retrieval of text information based on different approaches than the classic models focused only on the processing of the structured data.

Document categorization is an important and relevant process of text mining, especially because it is almost impossible and impractical to start any analysis using all amount of unsorted data, without knowing anything about the data topics. Even if the textual analysis can tackle complex tasks that exceed the problem of categorization, it is necessary to familiarize with this concept in order to control the overwhelming volume of information. As of any other text mining concept, the performance of text categorization depends on the previous preprocessing and document representation. Text preprocessing is the first step that adjusts the corpus dimensionality. This step consists of a few methods that use either a set of predefined information about textual data, like vectors of stop words and stemming algorithms, or adapted themselves to the specific features of the corpus, like the TF-IDF method. The second step is the document representation that is not only a conversion method but also can be turned into a filtering solution allowing to reduce the implementation cost.

In this paper, we focus on the LDA clustering model. According to the LDA model, one topic is a mixture of words, and one document is a mixture of topics. Additionally, the LDA model can be used for the text representation based on the generated topic-document matrix, whose size is usually lower than the initial term-document matrix. Lower-dimensional LDA representation can be employed with various categorization models, among which we choose to

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present the k-medoids algorithm. Although there are more laborious and probably more efficient categorization algorithms, we choose the k-medoids algorithm to prove the efficiency of the LDA representation due to its simple approach and low implementation cost.
To prove the LDA efficiency, we consider a corpus of 140 articles published on the Washington Post website at the beginning of December 2016. The articles are separated into five topics: “policy”, “business”, “entertainment”, “technology” and “sport”.

The remaining of the paper is organized as follows. Section 2 introduces the literature review. Section 3 presents some preprocessing and representation methods. Section 4 gives an overview of the LDA model. Section 5 is dedicated to the empirical results, and the last section presents our conclusions.

Literature Review

Different from other latent variable approaches as the unigram, the mixture of unigrams, and the Probabilistic Latent Semantic Indexing (pLSI) models, the LDA model, developed by Blei et al. (2003), can generate probabilities of the new textual data (out of the training set) to a set of fixed topics. In addition, Scrivastava et Sahami (2009) proved that the LDA model does not suffer from overfitting like the pLSI and the mixture of unigram models, and overcomes the pLSI model in the field of forecast and overfitting.

An alternative model of LDA is the Correlated Topic Model (CTM). Both models belong to the topic models group, which means that both of them generate soft clustering solutions and the textual data can be represented by various topics. However, the CTM model goes further than the LDA model and assumes that the topics can be related to each other, which may lead to a better predictive performance as it was proved in the work of Lafferty et Blei (2006). On the other hand, the LDA model is closer to our natural way of thinking. Precisely, the study of Chang et al. (2009) proved that the LDA grouping solution is easier assigned to a real set of topics (word intrusion) and is closer to a human association of topics (topic intrusion).

LDA is a widely used model for the cluster analysis of the textual data, a fact that Hofmann et al. (2010) considered to be related with its high level of the analysis speed. Despite the popularity of the LDA model, its implementation keeps being a subject of debate. One source of disagreement is the method used for the initial representation of documents that might vary between the widely used term frequency weighting and TF-IDF weighting (Manning et al (2008)) or even Latent Semantic Indexing (LSI).

Besides text clustering, the LDA model works fine even as a text representation model, a fact underlined even since the model was developed in 2003. Precisely, this approach, presented already in the works of Chen et Li (2016) and Razavi et Inkpen (2014), supposes to use per topic word Dirichlet distribution output as an input matrix necessary for the accomplishment of another textual task like text clustering. In terms of efficiency, Liu et al. (2011) proved in their work that this approach works better than other common heuristic methods (like term and TF-IDF weighting) and even LSI.

The Document Preprocessing and Representation

The first step of any text mining analysis is the documents preprocessing. The main purpose of this step is to reduce the dimensionality of the considered documents. The common preprocessing steps are:

1. elimination of images, tables, charts, and links to sites,
2. elimination of punctuation marks and the numbers,
3. elimination of stop words,
4. conversion of the word families into one word, by eliminating prefixes and suffixes of those words.

The last step is the most laborious, as it requires specific algorithms for grammar. The most elaborate algorithms are made for English documents, such as Porter’s and Lovins’ algorithms. Among those algorithms, Porter’s is the most frequently used [1] and our option for the current work. Table 1 exemplifies the inner working of Porter’s algorithm.

Table 1: Porter's Algorithm examples of words transformation

Sufix	Turns into	Example	Condition
"sses"	"ss"	Addresses → address	
"ement"	-	cement	if the length of the new word is higher than 1
"is", "are", "am"	"be"		

The most simple text representations employ term frequency and binary data, as it was presented in the work of Crețulescu (2011). According to the binary data representation, elements in the term-document matrix are:

$$x_{ij} = \begin{cases} 1, & \text{if the i} - \text{th term is in the j} - \text{th document} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

A more refined method to represents documents is based on the term frequency-inverse document frequency (TF-IDF) that assigns to the i-th term from the j-th document of the collection, a weight defined as:

$$\text{TF-IDF}_{i,j} = \text{TF}_{,j} * \text{IDF}_{i,j} = \text{TF}_{,j} * \log \frac{N}{\text{DF}_i} \quad (2)$$

where TF is the frequency of a the i-th term from the j-th document, $\text{IDF}_{i,j}$ is the inverse document frequency of the i-th term from the j-th document, DF_i is the number of documents that contain i term, and N is the collection documents number.

Unlike the simple frequencies scores, the TF-IDF index allows the selection of the most relevant words of the document collection as follows:

1. if the i-th term has a high frequency in a small number of documents from the collection, the TF-IDF index assigns him a high weight,
2. if the i-th term has a high frequency in every document of the collection or has a small frequency in the entire corpus, the TF-IDF index assigns him a small weight.

Besides the representation of documents, the TF-IDF index can be employed as a pruning method that filters out the words with a small salience score (e.g., stop words).

Latent Dirichlet Allocation

The main purpose of this paper is to present the LDA model as a solution for both text clustering and representation. The LDA model relies on a flexible approach that considers any document as a mixture of topics and any topic as a mixture of words. The output is represented by a per-document topic and a per-topic word Dirichlet distributions. Assuming that the number of topics is lower than the number of tokens, the generated topic-document matrix represents not only a method to encode the textual information, but also an efficient alternative for the high-dimensional term-document matrix.

To briefly present LDA model, we defined the following notations based on the work of Ponweiser (2012):

1. D_j is the j-th document, that has N_j words,
2. N represents the vocabulary of corpus ($N = \sum_{j=1}^{M} N_j$),
3. $C = \{D_1, ..., D_i, ...D_M\}$ represents the corpus,
4. K is the number of topics,
5. θ_j, is a K-dimensional vector that represents the per-document topic Dirichlet distribution ($\theta_j \sim \text{Dirichlet}(\alpha)$),
6. φ_k, is a N-dimensional vector that represents the per-topic word Dirichlet distribution ($\varphi_k \sim \text{Dirichlet}(\beta)$),
7. $z_{i,j}$ shows the topic of the i-th word of the j-th document,
8. $w_{i,j}$ indicates the document of the i-th word.

The purpose of the LDA model is to compute the probability of simultaneous realization of the all four matrices (W, Z, θ and φ), as:

$$P(W, Z, \theta, \varphi;\ \alpha, \beta) = \prod_{k=1}^{K} P(\varphi_k;\ \beta) \prod_{j=1}^{M} P(\theta_j; \alpha) \prod_{i=1}^{N} P(Z_{i,j}|\theta_j) P(W_{i,j}|\varphi_{Z_{i,,j}}) \quad (4)$$

Integrating out θ and φ, the equation (4) is reduced to:

$$P(W, Z;\ \alpha, \beta) = \int_{\theta} \int_{\varphi} P(W, Z, \theta, \varphi;\ \alpha, \beta)\, d\varphi\, d\theta$$

$$= \int_{\varphi} \prod_{k=1}^{K} P(\varphi_i, \beta) \prod_{j=1}^{M} \prod_{i=1}^{N_j} P\left(W_{1i,j} \middle| \varphi_{Z_{i,j}}\right) d\varphi \int_{\theta} \prod_{j=1}^{M} P(\theta_j;\ \alpha) \prod_{i=1}^{N_j} P\left(Z_{i,j} \middle| \theta_j\right) d\theta \tag{5}$$

Knowing that, the Dirichlet distribution is:

$$f(x_1, \dots, x_N;\ \alpha_1, \dots, \alpha_N) = \frac{\Gamma(\sum_{i=1}^{N} \alpha_i)}{\prod_{i=1}^{N} \Gamma(\alpha_i)} \prod_{i=1}^{N} x_i^{\alpha_i - 1} \tag{6}$$

where: $0 < x_1, \dots, x_N < 1$

Equation (5) turns into:

$$P(W, Z;\ \alpha, \beta) = \\ = \prod_{j=1}^{M} \frac{\Gamma(\sum_{k=1}^{k} \alpha_k)}{\prod_{k=1}^{k} \Gamma(\alpha_k)} \frac{\prod_{k=1}^{K} \Gamma(n_{(\cdot)j}^{k} + \alpha_k)}{\Gamma(\sum_{k=1}^{K} n_{(\cdot),j}^{k} + \alpha_k)} \prod_{k=1}^{K} \frac{\Gamma(\sum_{i=1}^{N} \beta_i)}{\prod_{i=1}^{N} \Gamma(\beta_i)} \frac{\prod_{i=1}^{N} \Gamma(n_{i(\cdot)}^{k} + \beta_i)}{\Gamma(\sum_{i=1}^{N} n_{i,(\cdot)}^{k} + \beta_i)} \tag{7}$$

The above equation is the key equation of the LDA model. The best value of the α, β parameters are obtained only when the below function is maximized:

$$\sum_{j=1}^{M} \ln\left(P\left(W_j, Z_j;\ \alpha, \beta\right)\right) \tag{8}$$

Finally, the per-document topic and per-topic word Dirichlet distributions are determined based on the newly generated α, β parameters.

Empirical Example

In this section, we provide an example of how to classify documents with an LDA-based representation implemented in R. The first step of our analysis is to generate clusters of documents using the LDA model. Then, the generated topic-document matrix is employed as a document representation for the k-medoids clustering model. We choose this model, knowing that its approach is simple, and the cost of implementation is low. To show the performance of the k-medoids model using the LDA representation, we compare its results with the ones of the k-medoids model with the TF-IDF representation.

The corpus consists of 140 articles published on the Washington Post website between December 6-10, 2016 and categorized under five topics (“business”, “policy”, “sport”, “entertainment” and “technology”).

Table 2: The structure of our corpus

Topic	Business	Policy	Sport	Entertainment	Technology
Number	21	33	29	30	27

The five topics are depicted using the TF-IDF index. This index can also be turned into a filtering method by setting a threshold of relevance. However, this extension is not necessary for this study because the dimensionality of the corpus is already low (9564 tokens). Table 3 lists the most relevant five words of the five topics indicated by the TF-IDF index

Table 3: The most relevant words per topic according to the TF-IDF index

nr.	policy	tf-idf	business	tf-idf	technology	tf-idf	ent.	tf-idf	sport	tf-idf
1	trump	0,0113	fund	0,0066	technology	0,0052	opera	0,0065	soccer	0,0127
2	republican	0,0099	retir (retirement	0,0047	devic (device)	0,0047	music	0,0061	cup	0,0102
3	democrat	0,0086	pension	0,0045	selfdriv (selfdrive)	0,0047	sing	0,0059	mls	0,0099
4	cia	0,0080	tax	0,0043	vehicl (vehicle)	0,0045	instrument	0,0057	leagu (league)	0,0085
5	donor	0,0066	index	0,0041	car	0,0043	compos (compose)	0,0052	team	0,0053

The description of topics using the above table:

1. The “policy” topic is represented by words like: “trump”, “putin” and “cia”. Those words show the interest of the political journalists for the elected president Donald Trump and the alleged Russian interference in the United States presidential election between the selected time range.
2. The “business” topic is represented by words like: “tax”, “stock” and “pension”. Those words show that during the selected interval, many business journalists paid attention not only to the classical financial subjects but also to the retirement system.
3. The “technologic” topic is represented by words like: “technology”, “vehicle” and “robot”.
4. The “entertainment” topic is represented by words like: “opera”, “concert” and “song”.
5. The “sport” topic is represented by words like: “team”, “game” and “mls”. It is also noticeable a higher interest of the sport journalists for soccer than for other sports.

Further, we classify the articles depicted above using the LDA model with the term frequency representation. The histograms presented in Figure 1 list the most representative five words for the five considered topics according to the per-topic word distribution. One should note that it is common to find topics with shareable words, fact indicated by the below histograms as well (the “year” word). Firstly, it is easy to notice that the majority of topics are properly represented, except only the “technologic” topic that is surprisingly represented by the “year” word. The word probabilities are small because the topics can be represented by thousands of words, different from the case of documents represented by only five topics. Knowing this, we notice that the “policy” and “business” topics are better represented than the other three topics.

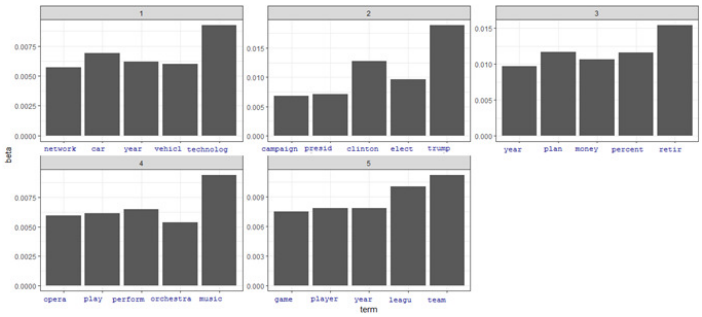

Figure 1: Per-topic word distribution (first five most relevant words of a topic): 1: technologic, 2: policy, 3: business, 4: entertainment, 5: sport

Regarding the per-document topic output of the LDA model, only the “business” and “sport” documents are correctly classified. “Policy” and “technology” documents are rather well classified with two and three mistakes, respectively. The “entertainment” topic is the worst represented with more than a third of documents assigned to either “technology” or “business” topics. To exemplify the per-document topic analysis, we select one article from each of the five topics. Table 4 presents the per-document topic distribution, real topic, and predicted topic for the five articles.

Table 4: Topic distribution for 20 documents (four documents from each topic)

Nr	title	tech.	sport	business	ent.	policy	Real topic	Pred. topic
1	Are you smarter than a millionaire	0,0722	0,0645	0,7725	0,0410	0,0495	business	business
2	Song recital suits tenor	0,0606	0,0662	0,0568	0,7430	0,0731	ent.	ent.
3	Obama says ‘we will’ retaliate against Russia for election hacking	0,0270	0,0286	0,0459	0,0240	0,0874	policy	policy
4	Leipzig beats Hertha Berlin 2-0 to reclaim Bundesliga lead	0,1088	0,3954	0,3345	0,0805	0,0805	sport	sport
5	The Internet revolution has not reached all of us	0,7943	0,0390	0,0527	0,0437	0,0701	tech.	tech.

The LDA model provides a lower-dimensional representation by using the generated topic-document matrix. In this case, the dimensional reduction is noticeable important. Precisely, the size of the initial 9654 × 140 matrix (term-document matrix) is cut down to the actual 5 × 140 matrix. While the new representation is more efficient than the classic term-document representation (based on the TF-IDF index), we are interested to assess the effectiveness of the LDA representation in terms of text clustering by means of the k-medoids algorithm (see Tables 5 and 6). Table 7 presents the aggregated results of our comparison. The employed measures are F-measure, and Rand index whose main advantage is the penalty of the high cardinality. Besides, we also specify the recall and precision of each representation.

Table 5: The confusion matrixes of the k-medoids algorithm with TF-IDF representation

		Real Topics				
		Business	**Ent.**	**Policy**	**Sport**	**Tech.**
Predicted Topics	**Business**	27	3	0	0	0
	Ent.	0	27	0	1	6
	Policy	0	0	32	0	0
	Sport	0	0	0	28	0
	Tech.	0	0	1	0	21

Table 6: The confusion matrixes of the k-medoids algorithm with LDA representation

		Real Topics				
		Business	**Ent.**	**Policy**	**Sport**	**Tech.**
Predicted Topics	**Business**	27	0	0	0	0
	Ent.	0	30	0	0	1
	Policy	0	0	33	0	0
	Sport	0	0	0	29	0
	Tech.	0	0	0	0	26

Table 7: The comparison between the k-medoids results using the LDA and TF-IDF representations

Representation	Weighted recall	Weighted precision	Rand index	F-measure ($\beta = 1$)
LDA	0,9724	0,9695	0.9084	0,9704
TF-IDF	0,8991	0,9750	0.9438	0,9027

While the term-document matrix with TF-IDF scores leads to the incorrect prediction of 11 documents, the k-medoids algorithm with the LDA topic-document matrix assigns only one document to the wrong class. The "technologic" class records the most incorrect predictions, fact already suggested by the poor word representation at the topic-level, generated by the LDA model. We suspect that this result is caused by the broad range of subtopics associated with the "technologic". Table 7 summarises the results of the two clustering solutions provided by the k-medoids algorithm. Among all the considered indices, F-measure is deemed as the most robust given that it is a summarization score for the precision and recall, and it allows the differential weighting for the false negative and false positive errors of the clustering solution, unlike the Rand index. As a result, we mainly rely on the F-measure and the confusion matrices to conclude that the LDA model representation is not only more efficient but also more effective than the TF-IDF representation for the cluster analysis of documents.

Conclusion

The main purpose of text mining is to retrieve information from documents without reading them. Therefore, knowing that the increasing amount of data is mainly represented by unstructured data, it is natural the huge interest of researchers in this topic. In this paper, we focus on the LDA model, one of the most relevant and well-researched algorithms, used for the cluster analysis and representation of documents. According to the LDA approach, any topic is a combination of words, and any document is a combination of topics. The employed dataset is a self-defined corpus of 140 articles published on the Washington Post website at the beginning of December 2016. Using the TF-IDF representation as a baseline, we prove that the LDA model is not only an efficient clustering model, but also it is

able to improve the results of a moderate-effective model like the k-medoids algorithm, generating an almost perfect clustering solution.

As regards future work, we would like to confirm our inferences by evaluating the LDA representation on different datasets. Knowing that the number of classes specific to a dataset is often unknown, we would like to develop a validation test to indicate the correct number of classes similar to the consistency test introduced in the work of Niu et al (2007) Also, we are aware that the simple topic-document matrix generated by the LDA model might not be enough to cope with all textual variations. As a result, one might consider the topic-document matrix but also the word-topic matrix as additional features to extend the already computed document or word embeddings.

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Innovative Efficiency of Russian Regions: Spatial Background and Spillovers Effects

Yuri PREOBRAZHENSKIY

Faculty of geography, Saratov State University, Russia
topofag@yandex.ru

Anna FIRSOVA

Faculty of economy, Saratov State University, Russia
a.firsova@rambler.ru

Abstract

Innovations are an effective tool for economic development, becoming a defining element of the international competitiveness of countries and regions. The assessment of the innovative activities effectiveness in the regions of Russia allows us to distinguish two groups of regions: those from which knowledge spreads, and those where it is directed and gives an innovative effect. The largest Russian generators of knowledge (in terms of R&D expenditures) show extremely low efficiency of innovation activity, while a number of other regions with a minimum of R&D expenditures demonstrate impressive results. This situation can only arise as a result of the knowledge transfer demonstrated in this article. The research could be important in terms of policy implications for the management of innovation processes and will contribute to making informed decisions on the strategic directions of the development of regional innovation systems.

Keywords: Innovation; Knowledge Spillover; Regional Innovative Activity; Spillover of Innovations.

Introduction

An innovative model for the development of a modern economy, based on the use of innovations, covers an increasing number of countries, determining the vectors of the modern development of the world economy. The trend of rapid growth in innovation indicators is becoming one of the most important prerequisites for sustainable economic growth. Innovations are an effective tool for economic development, becoming a defining element of the international competitiveness of countries and regions.

The problem of innovative development of regions poses for researchers the task of developing a model for describing the mutual development of territories. In this regard, the spatial position of the region is of great importance. In fact, we can talk about the innovative position of a region (or center) in relation to other regions (centers) of innovation activity. The most advantageous position is observed between innovatively active regions, which allow you to receive some side effects from such a neighborhood. These effects are associated primarily with the knowledge spillover and innovations.

Studying the issues of the effectiveness of innovative development is relevant for all countries. This topic is also relevant for Russian regions; their feature is a high degree of polarization of economic activity in individual large cities, while most of the regions lie in the zone of the innovation periphery. From the point of view of innovation policy, it is necessary to form a more spatial optimal configuration of regions. However, for this, at the first stage, it is necessary to assess the real configuration, the mutual position of highly innovative and less active regions. This problem can be solved by assessing the effectiveness of innovative activities in the regions and spillover effects. This article is devoted to these issues.

This study continues the scientific discussion about the effectiveness of regional economic development and contributes to the search for tools for diagnosing the effectiveness of regional innovation systems based on data from Russian regions.

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Theoretical Background

The problem of knowledge spillover in modern literature is actively discussed in the example of European countries where there is a high population density, and the distances between settlements are relatively small. But even there, the geographic space limits the processes of knowledge spillover and innovations and the direct interaction of scientists and innovators, as well as the processes of financing innovation by venture capitalists. Thus, studies by Moreno et al. (2003), show that this distance is 120-180 km (up to 250 km), which is associated with the travel time to manage a business to the object in two to three hours and return home in one day. In the exchange of knowledge, the role of personal contacts, direct communication of scientists, innovators, and businessmen is important.

Modern ideas about the dissemination of knowledge are associated with the idea of proximity. The idea of proximity (see, for example, Boschma (2005)) in fact takes the geographic proximity between the actors of innovative activity to the background, bringing social, organizational, and technological proximity to the fore. As a result, it can be expected that the knowledge spillover is less and less determined by geographic space, and the spillover effects of innovations are increasing according to Kijek and Kijek (2019), Jaffe et al. (1993), Newman et al. (2015), Audretsch and Feldman (1996). Bednarz and Broekel (2019) believe that distance, however, remains a significant factor in the diffusion of knowledge and innovation. On the contrary, the Russian regions are characterized by remoteness (as an antagonist of proximity).

In a study by Preobrazhensky et al. (2020), Ogurtsova et al. (2019), Firsova et al. (2020) note, that a number of contradictions can be recorded in the innovative development of Russian regions:
- there is a high innovation potential with low demand for innovation;
- the growing importance of science as a source of innovation is recognized, but its sufficient state (federal and regional) funding is not provided;
- there is a growing need to transfer the economy to an innovative way of functioning, while the public-private mechanisms for this transfer are not sufficiently developed in the regions;
- the importance of greening technologies is increasing, but economic and legal incentives are imperfect;
- the role of sectoral management of innovation activity is decreasing, but the mechanisms of regional management of it are undeveloped (Ryapukhina, 2018).

Materials and Methods

The object of analysis is statistical indicators aggregated by regions, constituent entities of the Russian Federation for 2018. Obviously, their internal heterogeneity is great, especially for giants like the Krasnoyarsk Territory, the Tyumen Region and other large, predominantly Asian regions.

However, in many constituent entities of the Russian Federation, the actual innovation activity is localized in one or two centers - the largest cities in the region, so it would be desirable to move from a background, continuous analysis of the entire region to the analysis of innovation centers (cities), which will require a completely different approach to data collection, but will bring much more precision in research. Nevertheless, as a first approximation, we will consider precisely the mesoregional level, which sets the frame for the entire intraregional (development at the micro- and local level).

The main method of this study is the analysis of the effectiveness of innovation. It is obvious that high efficiency (above the national average) can be due to a number of factors. So, the spread in the efficiency of innovation activity can be explained by the quality of management, as well as by temporal and spatial externalities. Temporary externalities are associated with the fact that a high volume of innovative products with relatively small investments in innovations is a consequence of earlier (relative to the period under review) capital investments. Unfortunately, these statistics in the context of Russian regions are presented for a short period.

Spatial externalities are of a more complex nature. Their essence lies in the fact that the results of scientific activity are used not where they were created (or not only there), but in other regions. Their accurate assessment is a rather difficult task, but it is possible to show the main directions of the influence of some regions on others.

To assess the innovative efficiency of Russian regions and its spatial background and spillovers effects, we propose to build a 3x3 matrix, where regions are grouped in columns in accordance with the effectiveness of innovation in the region (the ratio of the volume of innovative products to the amount of research and development costs). The lines group regions according to the amount of research and development costs (low, medium, high). Thus, the following matrix is obtained (Fig. 1).

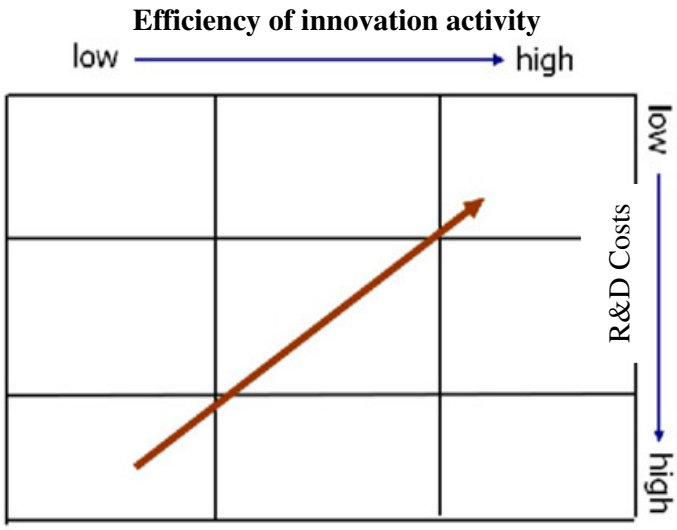

Fig. 1: The base matrix of R&D output by regions
(red arrow shows the direction of knowledge flow)

The main direction of knowledge dissemination will be directed from the group of regions with high R&D expenditures and low innovation efficiency (i.e., the cost of innovative products per ruble of R&D costs) to the group where the situation is reversed: R&D costs are close to zero, but the production of innovative products are essential.

The next step is the spatial grouping, i.e. consider the proximity of regions in two polar squares from fig. 1.

Results and Discussion

Note that the key methodological approach to assessing innovation and the impact of innovation diffusion on economic growth and regional innovation development is the comparison of the invested resources and the results of innovation processes. However, as a rule, it does not take into account externalities, primarily temporal and spatial. Spatial externalities are primarily associated with knowledge spillover, thanks to which regional actors get the opportunity to use exogenous knowledge at minimal cost (or free). There is a debate about the spatial limitations of the dissemination of knowledge. A large volume of works is devoted to this issue. The authors agree with the point of view according to which distances matter and the proximity of a region to a region with active scientific activity is an undoubted advantage.

At the same time, there is a problem of polarization of the economic space of Russia, as a result of which the favorable innovative position of the region will appear only on paper, but in reality, due to the fact that there are few innovatively active (or potentially inactive) agents in this region, this region will “Excluded” from the flows of knowledge and innovation. This situation, unfortunately, is typical for modern Russia, where cities (and, therefore, entire regions) with a population of less than 500 thousand people are actually excluded from innovation processes (this does not apply to cities in the Moscow region). The size of the region, therefore, matters (Head et al. (1995)).

As a result of the approach proposed above, we built a matrix in which Russian regions were grouped (see Table 1).

Table: The matrix of R&D costs and efficiency of innovative outcome by Russians regions

		Efficiency of innovative outcome		
		Low (less than 3 times)	Medium (between 3 and 8 times)	High (more than 8 times)
R&D costs	Low (less than 2 bln rub.)	Ivanovo Region, Oryol Region, Kaliningrad Region, Kalmykia, Crimea, Sevastopol, Astrakhan Region, Amur Region, Magadan Region, Sakhalin Krai, Republic of Dagestan, Ingush Republic, Kabardino-Balkar Republic, Karachay-Cherkess Republic, Republic of North Ossetia-Alania, Republic of Chechnya, Yamalo-Nenets Autonomous District, Altay Republic, Tyva, Khakassia, Zabaykalskiy Krai, Kamchatka	Bryansk Region, Smolensk Region, Karelia, Altay Krai, Republic of Buryatia	Kostroma Region, Lipetsk Region, Tambov Region, Archangelsk Region, Vologda Region, Pskov Region, Adygea Republic, Mari El Republic, Mordovia Republic, Orenburg Region, Kurgan Region, Kemerovo Region
	Medium (between 2 and 20 bln rub.)	Kaluga Region, Murmansk Region, Novgorod Region, **Saratov** Region**, Irkutsk** Region**, Tomsk Region,** Republic of Yakutia, **Primorskii Krai**	Vladimir Region, **Voronezh** Region, Tver Region, Komi, Leningrad Region, **Volgograd** Region**, Rostov Region**, Penza Region, Ulyanovsk Region, Khanty-Mansi Autonomous Okrug, **Omsk** Region	Belgorod Region, Kursk Region, Ryazan Region, Tula Region, Yaroslavl Region, **Krasnodar Region, Stavropol Region, Bashkortostan Region, Tatarstan Region,** Udmurt Republic, Chuvash Republic, **Perm Region**, Kirov Region, **Samara Region, Tymen Region, Chabarovsk Region**
	High (more than 20 bln rub.)	Moscow Region, Moscow City, Saint-Petersburg, Krasnoyarsk Region, Novosibirsk Region	Nizhniy Novgorod Region, Sverdlovsk, Region, Chelyabinsk Region	-

Source: compiled by authors, the initial data from Rosstat (2020)

What conclusions can be drawn from the table? First, there is an inverse relationship between R&D costs and the effectiveness of innovation. Out of the group of regions with high R&D expenditures, only in the Sverdlovsk and Chelyabinsk regions are efficiency higher than the national average, and not significantly. In Moscow, it is about five times lower than in the country as a whole.

However, if we exclude the total incompetence within the relevant institutions for transforming knowledge into innovative products, it remains to recognize the accumulation of knowledge in other regions, primarily in the third column.

Secondly, we note a number of regions in the second line, the center of which is either a millionaire city or one that is close to it in terms of population (they are in bold). In general, the regions in the second line with relatively high efficiency of innovation activity are either close to Moscow and the Moscow region, or belong to the Ural-Volga

region, this is a region that shows a fairly high volume of innovative products at relatively low research and development costs.

Third, it is rather difficult to find common features for the regions of the upper right square in the spatial aspect. All of them are relatively uncrowded.

In Russia, in the current economic situation and under the current policy of the federal center, the effectiveness of innovative activity above the average is typical for regions with a relatively high population density (see fig. 2). The presented map shows spatial differences in the effectiveness of innovation. The latter largely depends on the intensity of knowledge spillover and innovation diffusion.

Fig. 2: Differences in the effectiveness of innovative activity in Russia, 2018

The materials for compiling the map were statistics on the share of costs for innovation and the release of innovative products by region and by the country as a whole for 2018. However, aggregated regional data do not allow to fully taking into account the spatial aspect of innovation. We assumed that, in the general case, the latter is concentrated in cities, and the larger the population of a city, the presumably a larger share of the total innovative activity of the region it has. As a result, the total regional value of the indicator related to innovation was distributed by us among the cities of the region with a population of more than 100 thousand people in proportion to their population.

Within the identified zones (leading and lagging efficiency of innovation), the gradations are actually more significant. Thus, most of the “darker” territory on the map should be attributed to semi-periphery: the central regions are concentrated mainly around cities with more than a million people.

These prerequisites lead to the fact that technological development takes place in the old developed territory of Russia: the European part and the Urals. But here the territory of the so-called zone of inner periphery is also large: these are regions with “weak” regional centers, and physically and conceptually obsolete fixed assets. These entities are not capable of self-sufficient innovative development, without which we cannot talk about technological development.

We understand self-sufficiency as the ability of a system to carry out the entire chain of the innovation process: from generating knowledge to obtaining finished products, i.e. the availability of subsystems of science-innovation-industry. Of course, self-sufficiency does not mean closure. Flexible regional innovation systems combine the use of their own (intra-regional) and exogenous knowledge.

Conclusions

Thus, the assessment of the effectiveness of innovative activities in the regions of Russia allows us to distinguish two groups of regions: firstly, those from which knowledge spreads, and secondly, those where it is directed and gives an innovative effect. The largest Russian generators of knowledge (in terms of R&D expenditures) show extremely low efficiency of innovation activity, while a number of other regions with a minimum of R&D expenditures demonstrate impressive results. This situation can only arise as a result of the knowledge transfer demonstrated in this article. We note that in Russia there is a group of regions that, in terms of their population size, size of the economy and scientific potential, should claim to be innovation centers, but in reality they are far from it.

This research could be important in terms of policy implications for the management of innovation processes and will contribute to making informed decisions on the strategic directions of the development of regional innovation systems. Further research will be related to the proposal of an ideal model for the location of innovation centers in Russia, including within supraregional innovative systems (Preobrazhenskiy (2020)).

Acknowledgment

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The Model of Ecosystem Risks for Industrial Ecosystems Economic Security

Andrey BYSTROV

professor, head of Industrial Economics Department Plekhanov Russian University of Economics, Moscow, Russia, bistrov-sun@mail.ru

Tatyana TOLSTYKH

professor, Industrial Management Department, NUST "MISIS", Moscow, Russia.
professor of Industrial Economics Department Plekhanov Russian University of Economics, Moscow, Russia. tt400@mail.ru

Nadezhda SHMELEVA

associated professor, Economics Department, NUST "MISIS", Moscow, Russia, nshmeleva@misis.ru

Ayya AGAYEVA

post graduate student of Industrial Economics Department Plekhanov Russian University of Economics, Moscow, Russia, agaevaam94@mail.ru

Abstract

The article systematizes the problem of economic security in industrial ecosystems. The innovation ecosystem is one of the collaboration schemes for industrial enterprises. New risks of industrial ecosystems economic security are formed in the horizontal model. The article analyzes possible risks and threats in the context of digitalization. The main threats and risks to economic security arising from the actors' collaboration in the industrial ecosystem are considered. A four-level model of ecosystem risks is presented. A method for assessing the system of economic security of industrial ecosystems is proposed. The practical significance of the research results is the possibility of using certain provisions in the practice of managing industrial enterprises, as well as in the development of program documents and strategies of organizations.

Keywords: Industrial Ecosystems, Economic Security, Actors, Threats, Risks.

Introduction

Present market conditions change the patterns and approaches of interaction between market participants. The principles of relations both inside and outside the company are changing. In order to maintain stable functionality of industrial enterprises and maintain a positive reputation in national and international markets, it is necessary to adapt to current trends and respond to current challenges in a timely manner [7,9,22,23].

A distinctive feature of the industrial ecosystem is a complex scheme of direct and feedback links (knowledge exchange), established on the principle of self-organization, supporting the self-preservation of the system within certain limits of environmental parameters [13,14,16].

Like any innovation, the industrial ecosystem entails risks and threats to the economic security of actors that have not yet been studied. The stability of an industrial ecosystem is determined by the rate at which potential threats occur when actors function in the industrial ecosystem.

Actors play a key role in the formation and functioning of the industrial ecosystem. Actors in the industrial ecosystem are participants in the economic market. They can function in the industrial ecosystem in various roles: supplier, manufacturer, researcher, developer, innovator, initiator, integrator, promoter, and investor. In the industrial ecosystem, the main functions of production, technologies and raw materials will be concentrated in

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actors – production enterprises. Thus, it is assumed that the backbone participants will be industrial enterprises. In this regard, the task of identifying threats and risks to economic security in the context of technological challenges is becoming more urgent.
Economic security refers to the type of basic, fundamental needs for sustainable development and protection of the functional components of an actor in an industrial ecosystem. Under the economic security of an industrial enterprise, we will understand the security and sustainable functioning of its scientific, technological, production and information functions from direct or indirect threats associated with the impact of the external environment, and the ability to develop flexibly. The goal of economic security of industrial ecosystem enterprises is to ensure the sustainable and most effective functioning of their economic activities in the conditions of collaboration, various market challenges, ensuring high potential for technological development and growth of economic indicators in the future [15]. The authors propose a study the following threats and risks of economic security:

- information
- financial-economic
- industrial-technological
- intellectual and human resources
- environmental
- marketing
- political and legal

All tasks of economic security are aimed to prevent various internal and external threats to the main divisions. Ensuring the economic security of the actor contributes to the sustainable functioning of the industrial ecosystem and prepares the ground for a certain potential to move to a new level.

Literature Review

The term risk is derived from the Latin (- resecō) [24] meaning "cut off" or "reduce". Based, The researchers [5,6,8,11,12,17,21] laid their essence in determining the risks for industrial enterprises. The definitions of researchers [5,6,8,11,12,17,21] generally do not contradict the basic concept defined in GOST-R 51897-2011 (ISO 73: 2009), but they are clarified for a specific industry. In the document GOST-R 51897-2011 (ISO 73: 2009), it is noted that risk should be understood as a consequence of the influence of uncertainty on the achievement of goals [1,2,3,4,]. As part of this study, the authors introduce a new definition of ecosystem risks to the economic security of industrial ecosystem enterprises in the context of digital challenges. Thus, the ecosystem of risk in the field of economic security we mean the event that occurs under the influence of factors external or internal environment of industrial enterprises, contributing to the deterioration of indicators reflecting the degree of economic security, which in result affects the stability in the functioning of the industrial ecosystem.

Detection of threats and hazards, not only in the material sphere, but also in the non-material one, create conditions for achieving the goals of financial and economic activity of an industrial enterprise, guarantees sustainable development and functioning in the industrial ecosystem, its economic security, which is of primary importance in the conditions of digital and technological transformation Threats to the economic security of an industrial enterprise are potential or real opportunities of the destructive impact of various factors on its development, leading to a certain damage to the economic interests of an industrial enterprise.

The globalization of digital technologies, the proactive development of competitiveness in the world, the current political situation, changes in management approaches at enterprises, mentality and foresight in the field of information technology, contribute to a change in the approach to classifying modified threats to the economic security of industrial enterprises.

In the context of digitalization, solutions based on technological innovations can act as both a driver and a generator of new threats and risks to the economic security system of industrial enterprises. Innovative technological solutions that contribute to the modification of institutional relations affect political, technological, environmental, market and legal factors. Due to the transformation of priorities in connection with digitalization, these factors affect the external and internal environment of economic security (ES) of industrial enterprises (Fig. 1).

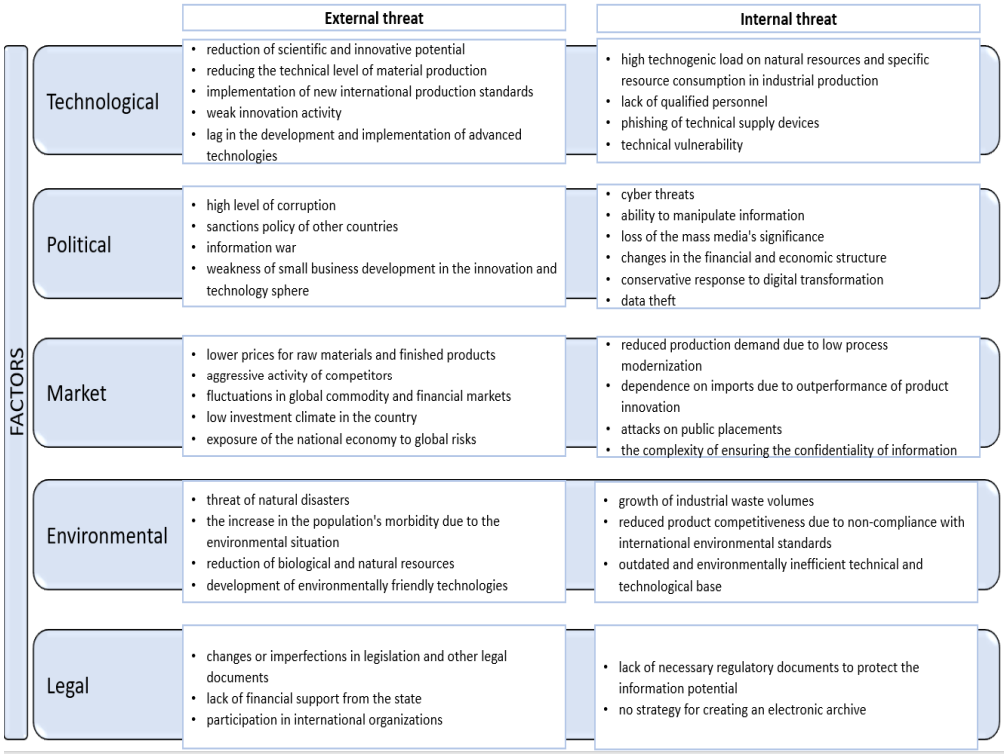

Figure 1: Internal and external threats to ES relative to factors

The process of digitalization carried out in many sectors of the economy has led to a change in the scale of activities of economic entities and has created new threats that the world has not previously faced. The profound changes brought about by the use of digital technologies have significantly expanded problems in ensuring economic security. These threats affect the main "blocks" of economic security, creating risks for industrial enterprises (table 1).

Table 1: Threats and risks by economic security" blocks"

The blocks of economic security	Threats	Risks	Probability of damage (consequences)
Informational	• cyberwars • unauthorized access • content • cyberterrorism • cyber espionage • loss of technical identification tools • carelessness of users who write down passwords and leave these records in accessible places • use of special technical and software tools to break system protection • malicious software	• data loss • stopping production processes • destruction of information • viewing information by an unauthorized employee • hacking programs • interception of data over the network • violation of information integrity • online banking manipulation and hacking • termination of the electronic data processing system due to the destruction of the supporting infrastructure • use of video surveillance,	disclosure of trade strategy

		and electromagnetic radiation to intercept information	
Financial-economical	• insufficient data protection (passwords, keys, electronic signatures) • availability of financial resources • low administrative control	• interception of financial resources • unexpected losses of the company due to technical errors and failures, intentional and accidental errors of personnel • currency risk • lost profit • low liquidity and profitability	bankruptcy
Industrial-technological	• increasing the possibility of equipment failure due to accidental or intentional impacts of natural or artificial nature • introduction of innovations that affect production technology • phishing of technical supply devices	• defects in manufactured products • wasteful use of raw materials • the lag of technological equipment • low quality of the product • attacks on technological processes	unjustified overuse of resources, losses
Intelligent, human resources	• Creating conditions that force individual employees to perform actions related to violation of information security (blackmail, bribery, etc.) • low qualification of digitalization personnel • data processing system malfunction	• unauthorized connection to computers, communication equipment, or communication lines • destruction of information • lack of qualified personnel • staff turnover	disclosure of trade strategy
Ecological	• reduced competitiveness of products due to non-compliance with international environmental standards • outdated and environmentally inefficient technological base • export-raw material model of economic development, depletion of the resource base of fuel and raw materials industries, etc.	• environmental pollution • the exhaustion of resources • risks of accidents • ecological disaster • the increase in industrial waste	negative reputation
Market	• weak innovation activity • reduced sales volumes	• loss of market position • lower prices of products sold • reputation	leaving the market
Political and legal	• lack of necessary regulatory documents to protect information potential • lack of a strategy for creating an electronic archive	• ability to protect the rights of an industrial enterprise • raider seizure of an industrial enterprise	loss of individual protection of the enterprise

The threats and risks presented in table 1 for the blocks of economic security demonstrated that due to the proactive digital trend and current challenges, it is increasingly difficult for an industrial enterprise to stay on the international

market and protect its economic interests. Thus, new approaches to overcoming and adapting to modern realities in the world are now required.
The ecosystem approach in the development of enterprises, industries and regions provides obvious advantages that help to reduce certain risks and achieve significant effects. The decrease in overall risk is achieved by multiplying the risk between participants of the ecosystem.

In order to analyze the factors that lead to risks, we apply the Ishikawa diagram, which will help identify possible problems and threats to economic security as a result of the project implementation in the industrial innovation ecosystem.

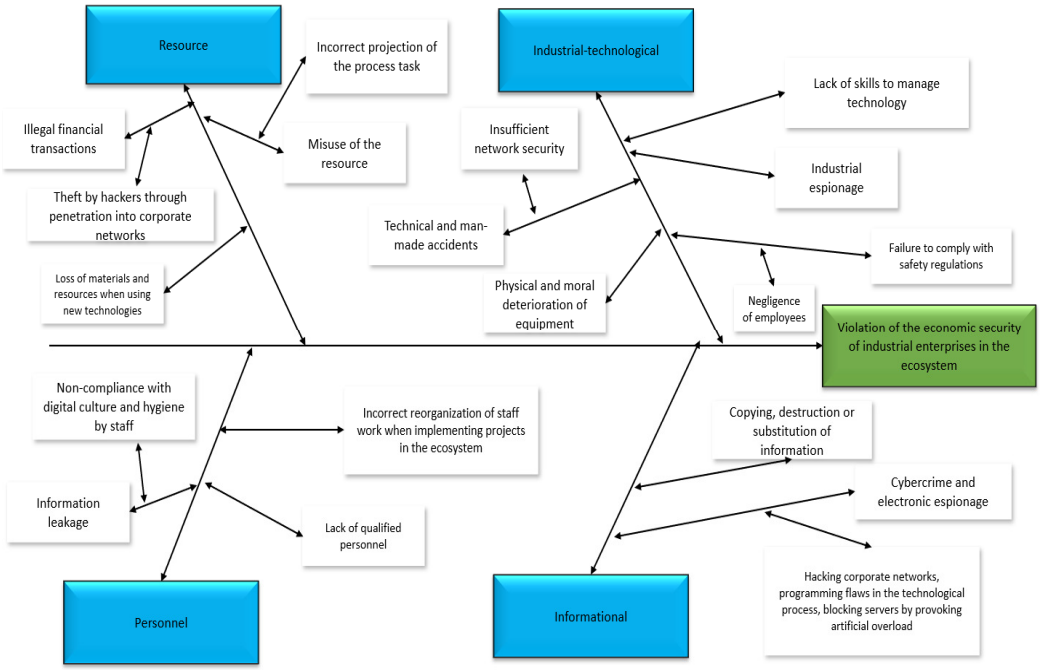

Figure 2: Diagram of threats to the economic security of industrial enterprises in terms of interaction with other actors in the ecosystem

The industrial ecosystem is characterized by a set of relations regarding the distribution of resources, technologies, knowledge, experience, and joint tasks that are established between actors [10,18,19,20]. We identified the following internal risks that arise due to the collaboration of actors within the industrial ecosystem

Investment risks imply lost profits as a result of non-receipt of the expected return on investment, loss of invested capital. Monopolistic risks arise when one actor has a resource monopoly, and, as a result, setting high prices for them, which may be unprofitable for other actors..

Behavioral risks are associated with the typology of relationships that are established between partners as a result of interaction. Identification includes, in particular, assessing the risks of transferring key competencies, such as intellectual property rights, to other collaboration actors.

The integration risks can arise when the inclusion of actors in the value chain. This risk is associated with the probability and consequences of the fact that the actors of the industrial ecosystem did not fulfill their functional obligations on time or did not complete the task in full, which will s lead to failures for other actors in the logistics chain.

An actor's exit may suspend or slow down the project implementation process in the industrial ecosystem. If an actor who has left the ecosystem is a source of unique resources and knowledge, then this will be a threat for other businesses in the ecosystem. When interacting between actors to implement a project, such a situation may arise as "poaching employees" from other actors. The risk of headhunting can later disrupt the trust relationship between participants in the industrial ecosystem. The risk of information “leakage” is the unauthorized transfer of

confidential information, which may be intentional or accidental. Any information stored on the company's servers has its own cost.

In the context of digitalization, the key problem is the security of information data and the lack of qualified management personnel. This also leads to threats to economic security that determine the stable functioning of the actor - production, financial, and information. The most common risks include any difficulties in the activity of the actor in the process of planning and implementation. It is worth highlighting production and technological risks, since they are key to the functioning of the industrial actor. Risks associated with the production cycle are accidents, equipment breakdowns, depreciation of fixed assets and technical safety. In most cases, the actor's production, social and information risks are closely linked. So, for example, due to incorrect equipment settings the characteristics of the manufactured products deteriorate and as a result a negative impact on the reputation of the industrial enterprise.

The most important elements of the mechanism for ensuring the economic security are monitoring, analysis and forecasting of risks that determine threats to economic security. It is considered as an initial link in the system: monitoring-analysis and diagnostics-correction-achievement of the desired state of industrial enterprise safety.

The level of economic security of an enterprise is an assessment of the state of use of corporate resources according to the criteria of the level of economic security of the enterprise. Threats and risks arising in the ecosystem model can have a negative impact on the economic performance of an industrial enterprise, which will lead to a decrease of economic security. As part of this study, it is recommended to conduct a self-assessment of economic security degree at the stage of searching potential actors. If companies want to participate in an innovation ecosystem, it should to assess their degree of economic security and study the results of cross-evaluation other actors to make decision about joint project implementation in the ecosystem.

Research Methodology

The paper presents the threshold values of the degree of economic security of industrial enterprises for entering the innovative industrial ecosystem. The system for evaluating" blocks" of economic security is based on KPIs, which are assessed through qualitative and quantitative indicators. The set of indicators for assessing the degree of economic security of potential actors should be approximately the same for all, but taking into account the specifics of their functioning. In this study the potential participants of the ecosystem values were used for industrial enterprises

The assessment of the economic security of the enterprise is established based on the results of comparing the actual KPIs of the enterprise's activities. Indicators reflect the industry specifics and operating conditions of an industrial enterprise. An acceptable threshold of values that reflect the degree of economic security provides advantages and opportunities to participate in the ecosystem model.

As part of the study, the authors developed a system of KPI "blocks" of economic security and determined the threshold values using the "traffic light" method (table 3). Based on KPIs data, industrial enterprises can make decisions about their readiness to enter the innovative industrial ecosystem.

Table 3: Threshold level of economic security

Blocks ES	KPI	Indicators	Threshold level of economic security		
			(0-1)	(2-3)	(4-5)
Informational	information security of business processes	information completeness indicator	< 0,3	0,3 < Ki < 0,7	> 0,7
		information accuracy indicator			
		information accuracy indicator			
	phishing attack neutralization level	information accuracy indicator information inconsistency indicator	0-0,5	0,6-0,7	0,7-1

	flexibility of the supply chain	security SOFTWARE level logistics costs per unit of turnover	0-0,5	0,6-0,7	0,7-1
	protection level of confidential information	number of personnel who have improved their skills, per year	0-0,1	0,2-0,5	0,6-1
	security level of licensed programs	software security for employees	0-0,3	0,4-0,7	0,8-1
Financial-economical	financial stability	financial stability indicator	<0,75	0,8-0,9	>0,9
	business activity level	turnover ratio	<1	1	>1
	solvency level	coefficient of financial safety	<0,1	0,1	>0,1
	liquidity level	current liquidity ratio	<1	1-1,5	1,6-2,5
	level of financial safety margin	indicator of financial safety margin	<0,2	0,2-0,5	0,5-0,8
Human resources	staff turnover	employee turnover rate	<0,03	0,03-0,05	0,05-0,09
	level of material motivation	degree of satisfaction	<0,3	0,3-0,6	0,61-1
	level of competence of personnel in information security	training costs in total staff costs	<0,2	0,2	>0,2
	working conditions	professional diseases	>0,05	0,04-0,05	0-0,03
	the level of staff stability	staff constancy indicator	0-0,2;0,8-1	0,5-0,7	0,3-0,4
Industrial-technological	digitalization of production processes	level of automation	0-0,3	0,4-0,7	0,8-1
	level of technological security	extensive load factor	0-0,5	0,6-0,7	0,7-1
	level of innovation	labor intensity factor	0,7-1	0,6-0,4	<0,3
	level of capacity utilization	production capacity utilization rate	0-0,5	0,6-0,7	0,7-1
	level of infrastructure development	volume of software and it development expenses in production	0-0,1	0,2-0,6	0,7-1
Ecological, market, political and legal	level of responsiveness and flexibility to market changes	the level of innovation activity share of legal losses	0-0,1	0,2-0,5	0,6-1
	digitalization of business processes	the share of business in the field of digital technologies	0-0,3	0,4-0,7	0,8-1
	degree of response to challenges and trends	completeness of the analytical units of control departments	0,-0,5	0,6-0,8	0,9-1
	level of environmental friendliness	level of destructive impact	0,6-1	0,3-0,5	0-0,2
	arbitration proceeding	share of juridical expenses	0,6-1	0,3-0,5	0-0,2

For further evaluation of industrial enterprises in order to determine the level of readiness to enter the innovation ecosystem, points were determined for each zone:

from 0 to 1 – "Red zone" – critical values of economic security indicators, high risks of threats when entering the innovation ecosystem;

from 2 to 3 - "Yellow zone" - the optimal value of indicators, the probability of threats at the entrance to the ecosystem is not high, but requires constant monitoring;

from 4 to 5 - "Green zone" – the minimum probability of risks when entering the innovation ecosystem.

Discussion and Conclusion

The economic security of an industrial enterprise is the state of the most efficient use of resources, thus ensuring the sustainability of its operation. To enter an innovative industrial ecosystem it is necessary that the threshold values of economic security are in the green or yellow zone. In this way, actors must reduce risks both for each potential actor and for other participants in the ecosystem. If the value of a potential participant's EC is in the red zone, it is recommended to optimize the economic security system and develop measures to improve the indicators located in the red zone, which will lead to an increase in the degree of economic security.

The fundamental difference between the ecosystem model and others is the principles of self-organization and self-development. Detection of threats and hazards create conditions for achieving the financial and economic goals of an industrial enterprise, guarantees sustainable development the industrial ecosystem, its economic security, which is of primary importance in the conditions of digitalization and collaboration in the horizontal model.

In addition, preventive measures increase the effectiveness of the economic security system, which as a result leads to a positive reputation of the industrial enterprise. The proposed method for determining of economic security degree will allow the actors of the industrial ecosystem to identify the current weaknesses and strengths of their own economic security systems, evaluate other actors and make balanced, optimal decisions about participating in the project implementation in the industrial ecosystem.

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Conflicts of Interest

The authors declare no conflict of interest.

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Study on the Types of Deviant Workplace Behavior in Croatian IT Companies

Sanda RASIC JELAVIC, Ph.D., Professor

Faculty of Economics of Business, University of Zagreb, Zagreb, Croatia
Email: srasic@efzg.hr

Marta GLAMUZINA, M.Sc. Econ.
Combis, Zagreb
Email: marta.glamuzina08@gmail.com

Abstract

This paper deals with the concept of deviant workplace behavior. The paper presents the results of an empirical study on the types of deviant workplace behavior of employees in Croatian companies in the information technology sector (IT). The difference in the occurrence of deviant workplace behavior by gender and age was analyzed, after which the correlation between types of deviant behavior was examined. The results of the study showed a statistically significant difference in interpersonal deviance with respect to gender, i.e. male respondents are more prone to interpersonal deviant behavior in the workplace than women, whereas no statistically significant difference was found concerning organizational deviance. Regarding the age of the respondents, no statistically significant difference was found in any type of organizational deviance. Furthermore, statistically significant correlation was found between two main types of deviance (organizational and interpersonal), but that correlation is weak. The limitations of the research are outlined as well as recommendations for further analysis.

Keywords: Workplace Deviance, Types, Correlation, Age, Gender, Croatian IT Companies.

Introduction

In recent decades, there has been a growing interest among scholars in the topics of deviant workplace behavior. The number of studies addressing issues such as fraud, vandalism, theft, lying, spreading malicious rumors, aggressive behavior and sexual harassment in the workplace is growing rapidly. There are multiple perspectives on the concept of deviance and different understandings, interpretations and translations of the same. The causes of deviant behavior may be various, but almost always such behavior leads to adverse consequences, not only for the organization but also for the individuals. Furthermore, it can negatively influence on company stakeholders such as clients, business partners, society, etc. When work behavior breaches organizational norms, its consequences affect all levels of the organization, including the decision-making process, productivity and financial costs (Sims, 2010; Brown and Mitchell, 2010). The most common consequences are loss of motivation, stress, fear, increase in absenteeism, decrease in performance and productivity of employees, decrease in quality and service, as well as loss of reputation and performance drop of the organization. Therefore, the problem of deviant workplace behavior is important for any human capital-dependent and oriented organization aiming to create an efficient and effective work environment (Norsilan eta al, 2014).

Previous research has found that between 50% and 75% of employees are involved in some form of deviant behavior (Bennett and Robinson, 2000; Harper, 1990; Harris and Ogbonna, 2002), while more recent research shows that more than 90% of employees acknowledge engaging in some type of deviant workplace behavior (Marasi et al, 2018).

This paper provides an overview of studies related to shaping the concept of deviant workplace behavior and types of deviant workplace behavior. The following section present the basic characteristics of Croatian IT sector. The next section describes the results of an empirical study of employees in Croatian enterprises in the information technology sector (IT), which examined the correlation between types of deviant workplace behavior and differences in workplace deviance concerning gender and age. Conclusion and limitations of the research are provided at the end of the paper.

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Literature Review

Defining and types of deviant workplace behavior

Deviant workplace behavior is defined as "voluntary behavior of organizational members that violates significant organizational norms, thereby jeopardizing the well-being of an organization and/or its members" and "that has a potential to cause harm to the organization, to those within, and in so doing violates significant performance-enhancing norms" (Robinson and Bennett, 1995). Organizational norms refer to grouping expected behaviors, languages, principles and postulates that allow one to work at an acceptable pace in the workplace (Awanis, 2006). Organizational norms are prescribed by formal and informal organizational policies, rules and procedures, and are related to the standards of the organization. Moreover, many unwritten rules are created by organizational culture. Hence, these rules are not the system of absolute moral standards (Kaplan, 1975). In companies that experience deviant workplace behavior, employees either lack the motivation to adhere to organizational norms or become motivated to violate those organizational expectations.

Deviant workplace behavior is also called work deviance (Appelbaum eta l, 2007), counterproductive behavior (Bennett and Robinson, 2000) organizational incivility (Miner et al, 2012), work destructive behavior etc. Hogan and Hogan (1989) view organizational deviance as a syndrome "organizational delinquency" that includes a wide variety of counterproductive acts such as theft, drug and alcohol abuse, lying, insubordination, vandalism, sabotage, absenteeism, and, according to their words, "offensive actions". These authors believe that employees who were engaged in delinquent actions are more likely to engage in others.

Hollinger and Clark (1982) categorized an employee's work deviation into a property-related deviation (acquiring or damaging property belong to the employer), and production-related deviation (violating organizational norms in terms of quantity and quality of work performed). Mangione and Quinn (1974) propose a similar categorization into: counterproductive behavior related to property (intentional damage of employer's property) and deviation related to production (poor quality or low quantity production). Often cited division (Robinson and Bennett,1995; Bennet and Robinson, 2000) divides workplace deviance into: (1) organizational that can be production-related deviance, and is a less severe form of deviance (absenteeism, delayed or early leaving work, taking longer breaks, slower pace of work, waste of resources) and property deviance that is a more severe form of deviance (demolition or alienation of property, misrepresentation of working hours, theft, counterfeiting of accounts, etc.) and (2) interpersonal, which may be political deviance that is milder form of deviance (gossip, blame shifting, favoritism, unfair competition, etc.) and personal aggression that is more severe forms of deviance (sexual harassment, verbal harassment, stealing from co-workers, sabotaging and threatening co-workers, etc.).

Two main types of workplace deviance, interpersonal and organizational are interrelated according to previous empirical studies (Benet and Robinson, 2000, Lee and Alen, 2002; Dalal, 2005). Regarding differences in main types of workplace deviance by gender, number of previous studies found that men were more often involved in deviant behavior (Santos and Eger, 2014; Anvar et al, 2011; Alsksić et al, 2019) and more often involved in aggression at work in comparison to women (Martinko, 2006; Griskevicius et al, 2009; Cross et al, 2011). In their empirical research Chernyak-Hai et al (2018) found no Mean differences in individual and organizational deviance regarding gender, but differences were find in profiles coordinates; i.e. male were more often involved in certain items of direct aggression, and in organizational deviance items of more severe form, whereby women were more often involved into indirect aggression items i.e. political deviance and in certain items of organizational deviance of less severe form.

Causes of deviant workplace behavior

Several theories, such as theory of social exchange (Blau, 1964), the norm of reciprocity (Gouldner, 1960) and theory of psychological contract (Rousseau, 1989) are often used to explain the link between responsible and undesirable organizational behavior. Theory of social exchange is a relatively old theory in social sciences that has been developed and modified over time. It covers number of models that have some common elements but also some specificities. Within theory of social exchange, basic assumption is that resources among parties are exchanged reciprocally. Social exchange refers to interdependent actions among parties based on mutual exchange of resources (economic and socioemotional) that create relationship if they are repeated. Theorists who advocate social exchange theory consider that in workplace certain kind of social exchange between the employee and the organization occurs. When one party (organization) treats the other party (employee) in a good manner, the reciprocity norm obliges the other party (employee) to reciprocate a positive treatment (Gouldner, 1960) and vice versa. Desirable initiation actions by organization are those that facilitate organizational justice, organizational support, supervisory support, trust etc. Reciprocal response by employees may include organizational citizenship behavior, commitment, trust etc. Existence of advantageous and fair reciprocal exchanges may transform economic exchange relationships into quality social exchange relationships that are closer and with longer time horizon (Cropanzano et al, 2017). Reciprocity based on

fair initiation action tends to facilitate better harmony among parties especially if repeated in cycles. It is assumed that employees receive some social benefits and rewards in exchange for their hard work and loyalty to the organization (Rhoades and Eisenberger, 2002). On the other side, negative initiation action may lead to negative reciprocating response. Consequently, unfair treatment may deter the quality of social exchange relationship and make employees prone to workplace deviance (El Akremi et al, 2010, Biron, 2010). A psychological contract refers to an individual employee's belief in mutual obligations between the individual and the organization. Such psychological contract can be relational or transactional and is seen as a strong determinant of behavior in organizations. Breach of psychological contract often results in intense negative emotions such as anger (Rousseau, 1989). Negative emotions can also be reflected in undesirable organizational behavior. In their model, Spector and Foxa (2002) explain that affect (emotions) evoke " tendencies for action " that can be constructive or destructive. The results of their research show that in a situation where a positive affect is caused, responsible organizational behavior is more likely to occur, and vice versa.

Within study of workplace deviance antecedents, scholars systematize a number of factors that are associated with the occurrence of such behavior. Alias et al (2013) categorize causes of workplace deviance into three groups: a) individual factors b) job-related factors and c) organization-related factors. Individual factors capture certain employee characteristics, feelings and cognition (including some personality traits, attitudes, values, mental health, etc.). Factors related to work include stress at work and powerlessness arising from a vague job description, work overload, lack of resources, perception of working at not respected job, while factors associated with the organization include inadequate organizational culture and climate, insufficient organizational support, low levels of trust, organizational injustice etc. (Chirasa and Mahapa, 2012).

Among the organization-related determinants, scholars emphasize the important role of organizational culture in influencing deviant workplace behavior (Vardi and Weitz, 2004). Organizational culture usually interacts with other organizational-related factors, work-related factors and individual factors of workplace deviance to create or prevent employee willingness to express deviant behavior. Formal organizational rules and procedures are in accordance with corporate culture. Schein (1985) defined organizational culture as a set of beliefs, values and assumptions that are shared by the members of organization. Sharing of certain values, norms, assumptions, and goals among employees influences the dynamics of relationships among employees, between employees and organization, and between organization and its stakeholders (Hill and Jones, 2001). Schein (2004) noted that organizational culture identifies to what things members of the organization should pay attention, how they react emotionally, and what actions they should take. Different types of values within organization culture encourage different types of social exchange that implies important role or organizational culture in distinctive type of exchange relationship (Richard et al, 2009). Corporate culture can facilitate positive or negative types of behavior by influencing on barriers to progress, reward and recognition program (Austin and Guillaume, 2016; An and Kang, 2016). There are examples of organizational culture that support aggressive behaviors as a type of employee motivation (Valentine et al., 2015). To decrease the possibility of deviant workplace behavior, organization should shape adequate value framework and other cultural artifacts that will create domain of favorable work environment.

Although deviant workplace behaviors can be analyzed at the group level (Priesmuth et al, 2014), at the business unit level (Dunlop and Lee, 2004) and at the organizational level (Ermann and Lundman, 1978), in research studies, deviant workplace behaviors have generally been examined at the individual level.

Croatian IT sector

The basic indicators of the Croatian IT sector are taken from the Survey of Croatian Chamber of Commerce (2018) related to the period from 2008 to 2017. According to this report for the year 2017, the Croatian IT sector is characterized by the following data: 1) the number of IT companies was 4.649 (9% of total number of companies in Croatia), with predominantly small-size companies - 80% of IT companies had less than 5 employees; 2) the average monthly net salary was HRK 7.722 (44% more than the average net salary in Croatia); 3) sector employs 28.347 workers (3,2% of the total number of employees in Croatia); 4) total revenue amounted to HRK 21,1 billion (3,1% of total revenue of Croatian economy), whereby IT services accounts for about 70%, trade of IT equipment for 26%, and the production of IT equipment/components about 3%; 5) the economic value added amounted to HRK 6,7 billion (4,8% of the total economic value added of Croatian economy); 6) exports amounted to HRK 6 billion (4,8% of the total Croatian export), profit margin was 7,9% (in comparison to profit margin of Croatian economy that was -1,3%). Furthermore, it is interesting to revile the movement of the basic indicators of the Croatian IT sector in the period from 2008 to 2017 (Croatian Chamber of Commerce, 2018): 1) the number of IT companies grew at an average annual rate of 8,1% (the average rate of the Croatian economy was 3,3%); 2) the net salary grew at an average rate of 2,8% (in comparison to average net salary growth in Croatia of 1,8%); 3) the number of employees grew at an average annual rate of 6% (while the average number of employees in Croatian economy decreased annually -0,6%); 4) total revenue grew on average rate of 3,8% (compared to the Croatian economy, which decreased annually by -0,5%); 5) economic value added grew annually at a rate of 6,7% (in comparison to the Croatian economic value added growth

which was 0,9% a year); 6) exports grew at an average rate of 6,7% a year (while the average growth rate of overall Croatian export was 4,4%), 7) productivity decreased by an average annual rate of -2% (in comparison to average rate of productivity growth in Croatia which was 0,1%). Concerning these data, it can be concluded that the Croatian IT sector is a propulsive sector that has been increasing faster than overall Croatian economy in the observed period. Exception is productivity (measured by total revenue per employee) that has decreased in observed period.

Empirical study of deviant workplace behavior in Croatian IT companies

Research Methodology

The aim of this paper was to investigate the occurrence of deviant workplace behavior, to examine the difference in deviant behavior by age and gender and to determine correlation between types of workplace behavior. An empirical study was conducted in which the research population consisted of employees of Croatian companies operating in the IT sector. Data were collected in 2019, and the survey was completed by 58 respondents. Participants were recruited based on a snowball technique through personal and professional contacts. This method is common in social research, especially if the research subject is connected with delicate issues (Etikan et al, 2016) such is workplace deviance. A survey questionnaire using a Google form was used as a data collection instrument. The questionnaire had 21 closed-ended questions, 2 of which covered demographics data (age and gender). The following19 questions were designed to evaluate the occurrence of deviant behavior in the workplace. In constructing questionnaire to investigate deviant behavior standardized questionnaire was considered (Bennett and Robinson, 2000). Interpersonal deviance was examined using 7 statements (items), while organizational deviance was examined using12 statements (items). Scale anchors were: 1 (never), 2 (once a year), 3 (twice a year), 4 (several times a year), 5 (monthly), 6 (weekly), 7 (each day).

Empirical research was conducted in the following stages: (1) descriptive analysis of the sample; (2) analysis of differences in types of deviant workplace behavior by age and gender; (3) analysis of the correlation between types of workplace deviance.

The analysis showed that the respondents are mostly employed in four medium-sized companies, with more than 50 employees in the IT sector. Among the respondents were 48% women and 52% men (according to the latest 2011 census, the Republic of Croatia had 48.2% men and 51.8% women). The largest share of respondents is in the 18-25 age category and accounts for 55% of the sample. Next in number is the 26-45 age category, which makes up 38% of the sample. Only 7%, or 4 respondents, are older than 45 years. None of the respondents are older than 65 years.

Research Results

At the beginning, we will present metric characteristics of measurement scales for types of workplace deviance – result of the reliability analysis.

Interpersonal deviance was measured by 7 items: ID_1 (Made fun of someone at work); ID_2 (Said something hurtful to someone at work); ID_3 (Made an ethnic, racial, or religious remark or joke at work); ID_4 (Cursed someone at work); ID_5 (Cheated on someone at work); ID_6 (Acted rudely toward someone at work); ID_7 (Publicly embarrassed someone at work).

The results of the reliability analysis of the measurement scale for interpersonal deviance and the impact of individual items on overall reliability are shown in Table 1. It can be seen from Table 1 that the scale “Interpersonal deviance” is in the area of excellent reliability. Reliability could be improved only slightly if we remove the item INTERPER_DEV_1 "Made fun of someone at work". Hence, we will use all seven items of this measurement scale.

Table 1: Measurement scale for interpersonal deviance - impact of individual items on the Cronbach's Alpha coefficient

Item-Total Statistics: Total Cronbach's Alpha = 0,90				
Items of Interpersonal Deviance	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
INETERPER_DEV_1	10,14	39,279	0,564	0,905
INETERPER_DEV_2	10,64	37,814	0,814	0,869
INETERPER_DEV_3	10,79	39,185	0,702	0,883

INETERPER_DEV_4	10,45	35,971	0,797	0,871
INETERPER_DEV_5	11,16	44,239	0,633	0,892
INETERPER_DEV_6	10,91	38,957	0,789	0,873
INETERPER_DEV_7	11,22	43,721	0,757	0,884

Measurement scale for organizational deviance consisted of 12 statements: OD_1 (Taken property from work without authorization); OD_2 (Spent too much time fantasizing or daydreaming instead of working); OD_3 (Falsified a receipt to get reimbursed for more money than you spent on business expenses); OD_4 (Taken an additional or a longer break than is acceptable at your workplace): OD_5 (Come in late at work without permission); OD_6 (Littered your work environment); OD_7 (Neglected to follow your boss's instructions); OD_8 (Intentionally worked slower than you could have worked); OD_9 (Discussed confidential company information with an unauthorized person); OD_10 (Used an illegal drug or consumed alcohol at work); OD_11 (Put little effort into your work); OD_12 (Dragged out work in order to get overtime).

The results of the reliability analysis of the measurement scale for organizational deviance and the impact of individual items on overall reliability are shown in Table 2. It can be seen from Table 2 that the measurement scale for organizational deviance is in the area of very good reliability. Reliability could be further enhanced by deleting item ORG_DEV_12 "Dragged out work in order to get overtime." The result of the new reliability analysis without this item is shown in Table 3. After the item ORG_DEV_12 was deleted from the measurement scale for organizational deviance, a slightly higher, very good reliability was achieved and its Cronbach's Alpha coefficient is now 0.80. Since the elimination of any of the remaining eleven statements would not contribute to the increase of the Cronbach's Alpha, it will be used in this form in further analyzes.

Table 2: Measurement scale for organizational deviance - analysis of the impact of individual items on the Cronbach's Alpha coefficient

Item-Total Statistics: Total Cronbach's Alpha = 0,78				
Items of organizational deviance	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ORG_DEV_1	20,40	45,261	0,472	0,768
ORG_DEV_2	19,36	37,217	0,622	0,744
ORG_DEV_3	20,64	49,253	0,197	0,786
ORG_DEV_4	18,93	36,767	0,540	0,759
ORG_DEV_5	19,79	43,114	0,408	0,771
ORG_DEV_6	20,48	46,079	0,543	0,768
ORG_DEV_7	20,00	44,596	0,381	0,773
ORG_DEV_8	19,24	38,327	0,604	0,747
ORG_DEV_9	19,95	43,874	0,346	0,778
ORG_DEV_10	20,29	46,913	0,311	0,779
ORG_DEV_11	19,71	40,772	0,638	0,747
ORG_DEV_12	20,36	48,937	0,096	0,795

Table 3: Measurement scale for organizational deviance - Impact of items on the Cronbach's Alpha coefficient after deleting ORG_DEV_12

Item-Total Statistics: Total Cronbach's Alpha = 0,80				
Items of organizational deviance	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ORG_DEV_1	19,02	43,491	0,484	0,779
ORG_DEV_2	17,98	35,877	0,610	0,759
ORG_DEV_3	19,26	47,564	0,190	0,798
ORG_DEV_4	17,55	34,532	0,581	0,766
ORG_DEV_5	18,41	41,475	0,409	0,783
ORG_DEV_6	19,10	44,410	0,543	0,780
ORG_DEV_7	18,62	43,117	0,366	0,787

ORG_DEV_8	17,86	36,612	0,616	0,758
ORG_DEV_9	18,57	42,390	0,335	0,792
ORG_DEV_10	18,91	45,378	0,295	0,792
ORG_DEV_11	18,33	39,172	0,639	0,759

After the results of reliability analysis, the results of differences in types of deviant workplace behavior, by gender and age are presented. A t-test was used to determine the behavioral difference on the dimensions of workplace deviance by gender, taking into account the results of the Levene equality test of variance in the sub-sample distribution (Male, Female). For the purposes of this test, the individual scores of the respondents on the seven statements of the dimension of interpersonal deviance were summed up, and the individual scores of the respondents on the eleven statements of the dimension of organizational deviance were summed up. Two new variables were thus obtained: interpersonal deviance and organizational deviance. The results of the analysis are presented in Table 4.

Table 4: Difference in types of deviant workplace behavior - by gender

Types of deviant workplace behavior	Scale Mean (Male) Item-Total Statistics	Scale Mean (Female) Item-Total Statistics	t(56)	p-level
Interpersonal deviance	16,0	9,33	3,765	0,001
Organizational deviance	20,93	19,83	0,592	0,556

Table 4 shows that there is a statistically significant difference in interpersonal deviance with respect to the gender of the respondents ($p < 0.05$), i.e. male respondents are more prone to interpersonal deviant behavior in the workplace than female. No statistically significant difference in organizational deviance was found between male and female respondents ($p > 0.05$).

If the Mean of particular type of deviant workplace behavior (Item-Total Statistics) is divided by the number of items used to measure it, an average mark of deviance is calculated. For example, if we divide the Mean (Male) for interpersonal deviance by 7 (the number of items used to measure it), the average rating on these claims is 2.29. The average mark of interpersonal deviance, based on female respondents is 0.85. The average mark of organizational deviance for male respondents is 2,86, while female mark their deviance at 1,80 on average.

In the next step, t-test was used to determine the behavioral difference of the dimensions of deviance by age, taking into account the results of the Levene equality test of the variance of the sub-sample distribution (Age 18-25; Age 26+). For the purposes of this test, the individual scores of the respondents on the seven statements that make the dimension of interpersonal deviance were summed up, and the individual scores of the respondents on the eleven statements that make the dimension of organizational deviance were summed up. Two new variables were thus obtained: interpersonal deviance and organizational deviance. Given that in the analyzes of difference in behavior, the variable "age" is used as a distinguishing criteria and that the third age category in the sample is very poorly represented, the variable "age" was recoded into two categories: 18-25 years and 26 years upwards. The results of the analysis are presented in Table 5. Table 5 shows that no statistically significant difference was found in either interpersonal or organizational deviance with respect to respondents' age ($p > 0.05$), i.e. respondents were equally prone or inclined to deviant behavior in the workplace regardless of age.

Table 5: Difference in types of deviant workplace behavior by age

Type of deviant workplace behavior	Scale Mean (Age 18-25) Item-Total Statistics	Scale Mean (Age 26+) Item-Total Statistics	t(56)	p-level
Interpersonal deviance	12,09	13,12	-0,526	0,601
Organizational deviance	19,97	20,85	-0,472	0,639

If we divide the Mean of particular dimension of deviant behavior (Item-Total Statistics) by the number of items used to measure that deviance, the average mark of deviance is calculated. For example, if the Mean for interpersonal deviance of younger respondents (18-25 years) is divided by 7, the average rating on those items is 1,84. Average mark of interpersonal deviance of older respondents (age 26+) is 1,87. Concerning organizational deviance, average rate of younger respondents (18-25 years old) is 1,82, while older respondents (aged 26+) marked their organizational deviance with average score of 1,90.

Furthermore, we were interested in the proportion of respondents who, according to self-assessment, had never been deviant in the workplace (Table 6). Specifically, Table 6 shows that the highest percentages of “Never” responses relate to items such as “Falsified a receipt to get reimbursed for more money than you spent on business expenses,” “Publicly embarrassed someone at work "," Cheated on someone at work " which can be classified as a more serious workplace deviance. On the other hand, the smallest percentages of “Never” answers on items such as “Taken an additional or longer break than is acceptable at your workplace,” “Spent too much time at work fantasizing or daydreaming instead of working”, "Put little effort into your work", which can be classified as minor deviance.

Table 6: The proportion of "Never" responses in self-estimation of deviant workplace behavior (sorted from highest to lowest)

Items of workplace deviances	Proportion of „Never“ responses
Falsified a receipt to get reimbursed for more money than you spent on business expenses	93%
Publicly embarrassed someone at work	83%
Cheated on someone at work	81%
Littered your work environment	79%
Taken property from work without authorization	76%
Dragged out work in order to get overtime	76%
Used an illegal drug or consumed alcohol on the job	71%
Acted rudely toward someone at work	69%
Made an ethnic, racial, religious remark or joke at work	64%
Said something hurtful to someone at work	55%
Cursed someone at work	53%
Discussed confidential company information with an unauthorized person	53%
Neglected to follow your boss's instructions	52%
Intentionally worked slower than you could have worked	52%
Come in late to work without permission	45%
Made fun of someone at work	40%
Put little effort into your work	36%
Spent too much time at work fantasizing or daydreaming instead of working	33%
Taken an additional or longer break than is acceptable at your workplace	26%

In the next section of research, we examined the interrelationships of the main two types of deviant workplace behavior: interpersonal and organizational. A correlation analysis was performed to determine the interconnectedness of the two types of deviance. The results of the correlation analysis are shown in Table 7. Table 7 shows that analysis confirmed statistically significant correlation between the two types of deviance: interpersonal and organizational. But their correlation is weak as these two variables share only 25% of the variance.

Table 7: Matrix of correlations between the main types of workplace deviance

Types of workplace deviance	Interpersonal deviance	Organizational deviance
Interpersonal deviance	**1,000**	0,499*
Organizational deviance	0,499*	**1,000**

**statistically significant correlation*

Conclusion

Deviant workplace behavior can harm not only the organization and its employees but other stakeholders as well. Therefore, it is important to prevent its negative consequences by recognizing and demotivating deviant behavior at work. Many organizations depend on human capital, which is crucial in achieving competencies and competitiveness. Creating a supportive work environment without fertile ground for deviant behavior can help companies in their path to success. The scientific literature describes a number of factors that are associated with deviant work behavior, such as individual factors, job-related factors, and organization-related factors. Theory of social exchange implies that managers should create favorable internal environment with factors that improve organizational justice, organizational and supervisory support, adequate leadership style, adequate organizational climate and culture etc. (organization-related factors). In addition, the existence of proper work-related factors such as clear job-description and job roles, clear job objectives, sufficient resources and workload help to create work domain that reduce deviance. Moreover, individual related factors should not be neglected within the process of employee selection and development. Understanding the role of these factors can help managers to focus their attention toward identification of organizational weaknesses and improving them in order to create a desirable work environment that will diminish deviancy.

The empirical research conducted in this paper confirmed the existence of various elements of the main two types of workplace deviance in Croatian IT companies. The results showed that employees were involved in various elements of both types of workplace deviance - interpersonal and organizational, although the average level of deviance is relatively low. Regarding the proportion of respondents who, according to self-assessments, had never been deviant in their workplace, results showed that highest percentages of "Never" responses was related to items that can be classified as a more serious deviance. On the other hand, the smallest percentages of "Never" answers were on items that can be classified as minor deviance. Additionally, the paper analyzed the relationship between different types of deviant workplace behavior and the differences between deviant workplace behavior by gender and age. The results showed that there was a statistically significant correlation between two types of deviant workplace behavior (interpersonal and organizational) but these two variables share only 25% of the variance and their relationship is weak. Furthermore, there was a statistically significant difference in interpersonal deviance with respect to the gender of the respondents ($p < 0.05$). Male respondents are more prone to interpersonal deviant behavior in the workplace than female. No statistically significant difference was found between men and women concerning organizational workplace deviance, ($p > 0.05$). Average mark of interpersonal deviance for male is 2,29, and for female is 0,85 - according to scale from 1 (never) to 7 (each day). Average mark of organizational deviance for male respondents were 2,8 and for female respondents were 1,8. Additionally, no statistically significant difference was found in either interpersonal or organizational deviance with respect to respondents' age ($p > 0.05$). Respondents were equally prone or inclined to deviant behavior in the workplace regardless of age.

Relatively low level of both types of deviance, found in this study, is in accordance with the results of similar empirical research conducted in Croatian companies that indicated the same (Aleksić et al, 2019). The only difference is that the research of Aleksić et al (2019) showed that both types of deviance were slightly higher for male than for female respondents. Differences in interpersonal deviance regarding gender might have numerous reasons. The reason could be gender stereotypes that gives men "alibi" to more often express negative feelings and aggression in comparison to woman (Black, 1990), gender differences in job status, career and employment, perceived threat on employment status (Cherniak-Hai et al, 2018), differences in reward levels etc. We agree with other scholars that add additional reasons of gender differences such as level of stress, level of self-esteem, level of confidence, differences in personality traits, different social roles and other factors of broader social context.

Although this study has produced interesting results, it is certainly worth considering the limitations of the research. The limitations of this empirical research stem from two main sources of possible bias: (1) relatively small sample size - results should be understood as indicative of assessing the reliability of measurement scales and the interrelationship of the variables used; (2) respondent bias - since respondents are asked to directly evaluate their own potentially deviant behavior on given measurement scale, it must be taken into account that this is a subjective self-assessment, which may not correspond to reality. Specifically, the subject of the measurement is extremely sensitive. Thefts, misuse of resources, unjustified delays at work, insults, physical assaults or harassment behaviors that employees are reluctant to admit for fear of the negative consequences that these admissions might have on them, although the survey is anonymous. In addition, people generally have a need to portray themselves in a better light, and this is particularly reflected in the subject of measurement. Likewise, respondents may have been deliberately insincere in their self-assessment of deviant behavior, so it is likely that the incidence of deviant workplace behavior in this study is underestimated.

Recommendations for further research on this issue include: conducting empirical research on the occurrence of deviant behavior and the relationship between types of workplace deviance in other industries in Croatia or in other countries, that should include a larger number of respondents and be based on additional methodologies (such as

profile coordinate methodology etc.). Empirical research about various causes and consequences of deviant workplace behavior may be interesting to further explore the key factors of workplace deviance and their negative effects.

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Big Data and Information Analytic Support for Indonesian Higher Education: During and After Covid-19 Pandemic

Edy SABARA
Computing and Information Systems Research Centre, Department of Electronics, Universitas Negeri Makassar, Makassar, Indonesia
Email: edysabara66@unm.ac.id

Halimah HUSAIN
Department of Chemistry, Universitas Negeri Makassar, Makassar, Indonesia
Email: halimah.husain@unm.ac.id

Faisal SYAFAR
Computing and Information Systems Research Centre, Department of Electronics, Universitas Negeri Makassar, Makassar, Indonesia
Email: faisal.syafar@unm.ac.id

Abstract

More than 20 years since the Directorate General of Higher Education of the Ministry of National Education of Indonesia has encouraged the use of technology for education, very few universities have made use of online learning. With the influx of the COVID-19 pandemic, suddenly all lecturers across universities are transforming and even the digital revolution. After the issuance of the Minister of Education and Culture Circular on March 9, 2020 to university leaders to conduct learning from home, in a short time many universities switched to online learning modes. The use of online learning platform is increasingly becoming a trend in the world of education. This trend gave birth to a data explosion in Higher Education which became a new innovation for the world of education, namely Big Data. These large amounts of digital data will provide information on what students and academics see and read, student behavior and involvement, their assessment, motivation and preferences, thus providing a large amount of data that can be extracted for the learning experience. Big Data provides an opportunity to educational Institutions to use their Information Technology resources strategically to improve educational quality and guide students to higher rates of completion, and to improve student persistence and outcomes. This proposes work paper aimed at explores the attributes of big data that are relevant to educational institutions, investigates the factors influencing adoption of big data and analytics in learning institutions and seeks to establish the limiting factors hindering use of big data in Institutions of higher learning.

Introduction

With current developments, this big data can be processed and used again, even giving better results because it includes data processing in social media. The use of information technology in Indonesia has touched all areas of life, namely economy, politics, culture, law, education and healthcare. The development of information technology systems makes human activities easier and faster every day. For example, the entire transaction process is carried out with an electronic process, starting from paying for electricity, water, plane tickets, trains, online shops, student tuition fees, mobile collaborative healthcare (Syafar and Husain, 2017) and many more. Information technology has been used to carry out various main activities in higher education, starting from the payment of tuition fees, registration of lectures every semester, registration of final and comprehensive sessions, attendance and lecture minutes, even the learning process to assessment. Data on education and teaching, research, community service, and other supporting activities has also been reported using information technology. All of these activities from time to time lead to digitization of data which in turn causes a data explosion in Higher Education, thus opening up opportunities for big data analytics in universities. Drigas and Leliopoulos (2014) stated, "... Big Data can really improve the education. Can afford to shape a modern and dynamic education system, which every individual student can have the maximum benefit from that .... ". This means that the use of big data in the world of education will be able to form a modern and dynamic education system that is beneficial for lecturers and students. Large amounts of digital data leave behind what students and academics see, what they read, their engagement and behavior, judgments, as well as their interests and preferences, thus providing a large amount of data that can be mined for the learning experience.

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Research Problem

Based on the background of this problem, several problems that arise in this study can be formulated, namely: 1. How does big data technology involve the world of education? 2. How is the use of big data analytics in higher education, which includes academic analytics, learning analytics and process analytics?

Research Objectives

This study aims to provide proposals for the use of big data analytics in higher education, which include, academic analytics, learning analytics and academic analytics. In addition, with the use of big data, universities are expected to be able to map their strengths and weaknesses for policy making.

Theoretical Foundations

Big data can also be defined as a problem domain where traditional technologies such as relational databases are no longer able to serve. Big data is more than just a matter of size, it is an opportunity to find insights in new and emerging types of data and content, to make your business more agile. , and answer questions that were previously considered beyond your reach. Big data can be interpreted into 9 characters (IBM) according to respondents, so it can be concluded by IBM, Big data is data that has a very large scope of information, a real-time information model, has a large volume, and is based on social media data so it can be concluded that Big data is a dataset that has a large volume and one of its contents is based on social media data, and the information from Big data is always the latest (latest data) so that the information model is real-time, and the scope of information is not focused on small industries only or large industries only but all small and large industries.

Data digitization has opened up opportunities to use big data in universities. The value of big data lies in the results of analysis and predictions or the actions taken from the results of these analyzes and predictions.

Data digitization enables effective practice to utilize big data analytics in the form of learning analytic, academic analytic and process analytic. By using big data analytics in Higher Education which is supported by the cooperation of all educational enterprise contributors, be it students, staff, lecturers, administrators, and the community, it is possible to make accountable decisions based on information and data mined carefully, so that in the end it supports increasing decision making based on data in tertiary institutions in an effort to improve the success performance of students and institutions.

Görnerup et al., imply that Big Data presents a good framework for efficiently utilizing the vast array of data in shaping the future in higher education sectors. In addition, Wagner and Ice (2012) states that the implementation of Big Data in higher education is attributed to technological innovations and developments that trigger the growth of analytics in higher education. Moreover, Drigas and Leliopoulos, (2014), found that Data Warehouses and Cloud Computing coupled with greater ownership of digital devices Higher Education stakeholders are allowing to obtain, manage and maintain big data. These Information Technologies are important resources that are useful in driving HE business strategy and decision making. According to Educase (2019), Information Technology makes available sophisticated platforms that provide computing power necessary for ploughing through big data analytic, and turning these masses into meaningful information

With the use of big data analytics in higher education, it can be obtained more insight into students, academics, and the process in higher education so that it supports predictive analysis and increases decision making based on data which in turn can help improve the success performance of students and institutions.

The use of big data analytic in higher education which includes learning analytic, academic analytic, and process analytic.

1. Learning Analytic

Big Data Analytic can be used to analyze in real time student experiences that can be generated from student activities, such as: lecture registration, payments, class participation, online learning, and assessments.

Learning Analytic is analyzing learning data in real time so that it can be used to predict successful students and students who are at academic risk. With big data analytics in higher education can provide insight into students who are at risk of dropping out so that preventive action can be taken (Syafar et al., 2019b; Syafar et al., 2017) or provide additional support to increase their success, and confidence, in the learning process before they really fail.

Learning Analytic has the potential to help students and lecturers together recognize signs of danger before threats to learning success materialize. Learning Analytics provides tools, technology, and a platform to empower educators and open doors to meaningful learning experiences that can engage, inspire, and prepare current and future students for success.

For learning analytics, you can use data sources from Student Information System data, Course Magement, Online Education, Student Assessment, and finance data.

2. Academic Analytic

The object that can be analyzed in Academic Analytic is the performance of academic staff. With academic analytic, real time analysis can be carried out on data which is a variable measurement of academic performance so that it can be seen that outstanding academic staff and academic staff are underperforming compared to other academic staff. For the academic analytic process, you can use data sources from the Outcomes Assessment data, Lecture Assessment, Staff Assessment, Faculty Assessment, and Finance Assessment data. Data captured and processed by these systems is not comprehensive and is process dependent, making it difficult to be reused for any other sources or process innovation (Syafar et al., 2015).

3. Process Analytic

Big Data Analytic can also be used to analyze real time business processes in Higher Education. The data used can be obtained from log data or activity data from students, lecturers, and units related to the processes and activities that occur in tertiary institutions to then carry out process analytics using process mining to find new business process models. However, process analytics is not limited to the process discovery of business processes but also allows for compliance checking, detecting deviations, predicting delays, supporting decision making, and recommending process redesign.

Meanwhile, process analytics can use data sources from log activity data from the Student Information System process or mobile learning system (Syafar et al., 2019a), Course Management, Online Education, Student Assessment, and log activity data from the finance process. Student Assessment, and data finance.

Data from several sources is then collected in a data warehouse to be analyzed using real time analysis and predictive technology, such as: OLAP, Analytical Reporting Tools (Business Intelligence), and Data Mining / Predictive Modeling.

The results of the analysis and predictions will be displayed in the form of a Dashboard Analytic Presentation which is expected to support the improvement of decision making in higher education in an effort to improve educational, academic performance as well as the success of students and institutions.

Research Method

This research intends to use a qualitative research design. Semi-structured interview approach will be used as the research methodology, which will provide an opportunity to triangulate as the primary source and materials from the literature review and result of Delphi study as the secondary source. The methodology intends to employ for respondents open-ended deliberations, fixing future analysis by questioning significant explanations made by the respondents. This method of qualitative research attests, and most appropriate particularly when the phenomena to be researched are not accurately understood or known, and researcher desires to get an in-debt understanding perspective from respondents experienced in the aspect. The target respondent will be the IT person of Indonesian universities.

Result Expectation

Now after one semester online learning are running on during the Covid-19 pandemic, we saw a lot of learning can be picked. The case of the spread of Covid-19 in Indonesia still not showing a significant decrease. Data on September 10, 2020, it still shows its height new cases in several provinces in Indonesia, with the number of new cases was 3861, which is much higher of the number of patients who recovered, which was only 2310 people. Thus, it seems that the situation is not quite yet under control and many regions still apply status Large-Scale Social Restrictions (PSBB).

Hence, process of online learning in higher education in the semester to become still not yet fully likely to come back "Normal" as before. Distance learning and especially learning online seems to still be coloring if it isn't dominate the lecture process at various Universities. This matter also indicated by the results of various surveys conducted, both in Indonesia and abroad. Experience one semester this should be that learning valuable so that the next online learning process can be organized in a more planned, structured, In the midst of the uncertain situation, the lecturers has demonstrated a tremendous capacity to remain running the learning wheel in various ways, make use of various learning resources exist, and with a capable spirit of serving. Plague Corona virus that came suddenly was able to revolutionize perspective, mindset, and behavior patterns of the academic community

our higher education. Uncertainty has turned into opportunities to innovate. systematic, and quality.

Conclusion

This paper will be explored Big Data Analytics and its relevance in Higher Educational systems during and after pandemic Covid-19 with a view of helping Indonesia universities adopt Big Data Analytics. The research will also explore the attributes of quality of big data and information analytic that are relevant to Indonesian HE sectors, and looked at the factors hindering the use of big data analytic.

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Analyse Conceptuelle De L'acceptation Des Technologies Basée Sur Un Modèle Redéfini Du TAM Dans Un Contexte De La Pandémie COVID19 (*Cas : Secteur Hôtelier Marocain)*

Yacoute ZENJALI

Doctorante en science de gestion, Faculté des sciences juridiques, économiques et sociales Marrakech, Maroc Laboratoire :(L-QUALIMAT)-GRTE-DROIT-SOCIÉTÉ, zyacoutt@gmail.com

Younes LAFRAXO
Professeur universitaire en science de gestion, Faculté des sciences juridiques, économiques et sociales Marrakech, Maroc Laboratoire :(L-QUALIMAT)-GRTE-DROIT-SOCIÉTÉ, younes.lafraxo@gmail.com

Abstract

Dans un environnement technologique à évolution vertigineuse, l'acceptation des technologies de l'information et de la communication (TIC) est souvent un véritable goulot d'étranglement auquel se heurtent les responsables et dirigeants au sein des hôtels marocains. Pourtant l'usage des TIC est un enjeu économique mais et surtout social important pour améliorer la qualité de travail quotidien.

Depuis décembre 2019, le Coronavirus 'Covid-19' s'est propagé depuis la chine, c'est un virus qui provoque des symptômes semblables à un rhume, voire même des complications respiratoires plus graves chez les patients âgés ou souffrants de maladies chroniques.
(Source : Organisation mondiale de la santé)
Face au risque de contagion et à l'évolution non maîtrisable de la Covid-19, le Maroc décrète l'état d'urgence sanitaire, et le gouvernement impose le confinement, la fermeture des écoles, hôtels, restaurants, lieux publics et entreprises non indispensables le 16 Mars 2020.
(Source : communiqué du ministère de l'intérieur, Mars 2020)

Cette pandémie a accéléré le processus de digitalisation, et d'utilisation de la technologie pour la majorité des entités notamment dans le secteur hôtelier. Un accroissement technologique très opportun pour les entités mais pas toujours accepté par les employés.

L'objectif ultime de cet article scientifique est d'identifier l'impact d'une pandémie planétaire (Covid-19) sur le comportant humain notamment par rapport à l'acceptation et l'utilisation des technologies. Plusieurs variables affectivo-émotionelles feront l'objet d'un modèle redéfini du TAM (Technology acceptance model).

Mots-clés : Acceptation de la technologie, Covid-19, pandémie, TAM, système d'information, secteur hôtelier.

Introduction

Le Maroc est le pays africain où les technologies sont les plus développées. Selon la sixième conférence du city africa tenue à Tanger en mai 2018. Le royaume arrive en tête de la liste par le biais de son contrôle sur les exportations technologiques au moyen orient et en Afrique du nord soit 45% et par la réalisation de +10% courant les cinq dernières années dans les secteurs de la technologie de l'information et de la communication.

Selon le HCP (haut-commissariat au plan), le tourisme représente la locomotive de l'économie marocaine, le royaume se place désormais première destination africaine malgré une concurrence rude sur le continent. Une progression des visites touristiques au Maroc de 6,4% par rapport à l'an passé est notable. En 2019, Marrakech se retrouve en tête du classement national avec une hausse de 8%, suivie d'Agadir – générant à elles seules 58% des

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nuitées totales. Dès lors, le secteur touristique occupe le rang de second contributeur au PIB national et créateur d'emplois de premier plan. (Source : site du Ministère du tourisme).

Afin d'être en alignement stratégique, managers et dirigeants du secteur hôtelier se disputent les dernières technologies. Malgré la valeur ajoutée qui peuvent générée, ces outils ne sont pas toujours utilisés et acceptés par les employés qui représentent généralement les keyusers. (Peypoch, 2011)

Depuis décembre 2019, la Covid-19 s'est propagée depuis la chine, c'est un virus qui provoque des symptômes semblables à un rhume, pouvant aller jusqu'à des complications respiratoires plus graves chez les patients souffrants de maladies chroniques. (Source : Organisation mondiale de la santé)

Face au risque de contagion et à l'évolution du virus, le Maroc décrète l'état d'urgence sanitaire, et après plus de cinquante cas testés positifs, le gouvernement a imposé le confinement, la fermeture des écoles, lieux publics et entreprises non indispensables le 16 Mars 2020. (Source : communiqué du ministère de l'intérieur, Mars 2020)

La majorité des hôtels marocains ont fermé leurs portes aux alentours du 18-19 mars, donnant ainsi la possibilité à leurs employés de travailler à distance sur les projets courants en télétravail par le biais de version web des logiciels, de Cloud, dossiers de partage, ESN..

Plusieurs modèles ont abordé l'acceptation de la technologie par les utilisateurs, mais la question qui se pose est : ***est ce qu'il existe un modèle qui explique ce phénomène dans un contexte de pandémie, et d'obligation environnementale ?***

L'objectif ultime de cet article scientifique est d'identifier l'impact d'une pandémie planétaire sur le comportant humain notamment par rapport à l'acceptation des technologies.

Contexte

L'acceptation des technologies de l'information et de la communication (TIC) représente souvent un véritable dilemme au sein des organisations. Pourtant l'usage des TIC est un enjeu à la fois économique et surtout social, crucial pour améliorer la qualité de travail quotidien. (Do, Thi Hai Ninh, and Wurong Shih., 2016)

Dans le but de comprendre l'usage et l'acceptation des TIC, plusieurs modèles théoriques ont été élaboré afin d'expliquer les relations entre l'attitude des utilisateurs, la satisfaction d'utilisation, l'utilité des TIC, l'intention d'utiliser une TIC, et leurs comportement interactif. (Chuttur, 2009)

Ces approches scientifiques sont nombreuses, variées, complémentaires et parfois contradictoires et capitalisent aujourd'hui de très importants travaux de recherche. (Venkatesh, 2008)

Dans la section suivante, nous allons nous intéresser au TAM, le modèle d'acceptation des technologies restructuré par Venkatesh et Bala en 2008 et à son applicabilité au sein des hôtels marocains dans un contexte de pandémie Covid-19.

Revue de littérature

Plusieurs modèles ont abordé les facteurs impactant l'acceptation des technologies, notamment le Technology acceptance Model (TAM).

À l'occasion de sa recherche doctorale, Davis (1986) a accompli une recherche pour le compte d'IBM. À partir des observations effectuées, il a abouti à la modélisation du TAM. (Chuttur, 2009)

Ce modèle se base sur la psychologie sociale et repose sur deux modèles classiques qui expliquent le comportement humain : la théorie de l'action raisonnée (TAR) développé par Fishbein et Ajzen, en 1975, et la théorie du comportement planifié (TCP) développé ensuite par Ajzen, en 1985.

La TAR implique que le comportement dépend avant tout des intentions. Des intentions déterminées à la fois par les attitudes relevant de sentiments positifs ou négatifs liés à un comportement bien spécifique et par les normes subjectives. (Venkatesh, 2008)

La TCP, est un ajustement et évolution de la TAR qui vise à éliminer certains problèmes de structure, en ajoutant un troisième élément qui est le contrôle comportemental perçu.

Ce nouveau concept introduit l'idée que les individus, ayant des attitudes positives et estimant que leur entourage approuvera le comportement en question (normes subjectives), ne développeront pas forcément une forte intention d'agir. (Taylor et Todd, 1995).

Comme ses modèles prédécesseurs (TAR et TCP), le TAM postule que l'acceptation par les utilisateurs d'une TIC dépend de l'influence de deux facteurs : l'utilité perçue et la facilité d'utilisation perçue. (Venkatesh, 2008) Le TAM implique en principe que les perceptions qu'ont les utilisateurs de l'utilité et de la facilité d'utilisation déterminent des attitudes et consécutivement des comportements d'utilisation des TIC.

Présentation du Technology acceptance model - TAM –

Le modèle d'acceptation de la technologie (MAT ou, plus fréquemment, TAM pour Technology Acceptance Model) est déployé depuis 1989 pour tenter de prévoir si un individu utilisera ou refusera d'utiliser une application informatique, en fonction de deux facteurs : la facilité d'utilisation perçue de cette application et son utilité perçue. (Venkatesh, 2008) Le modèle a fait l'objet de multiples variantes et de centaines d'applications à des domaines très variés de l'informatique et des systèmes d'information.

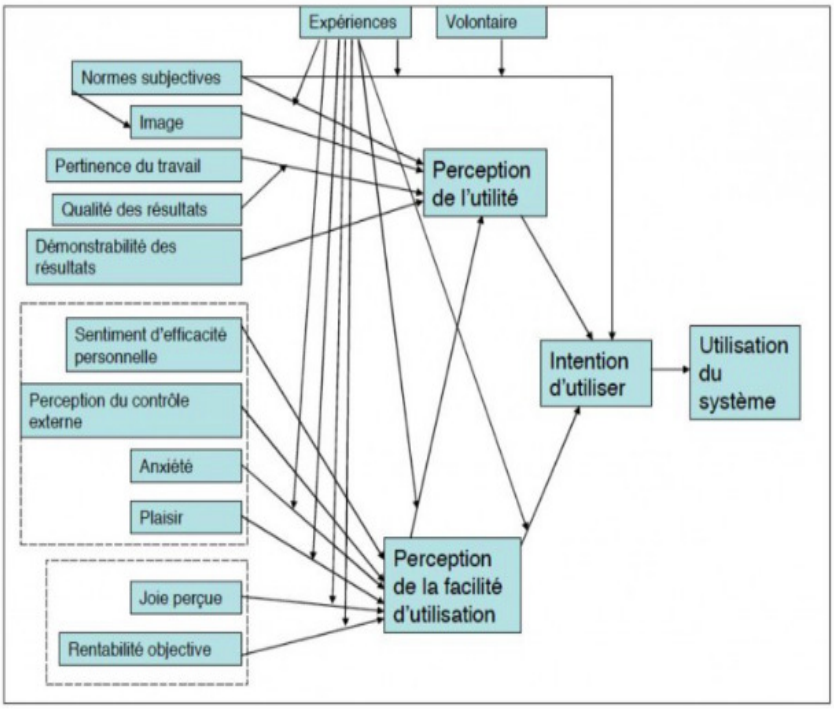

Figure 1 : Modèle TAM 3 (Venkatesh et Bala 2008)

En 2008, Venkatesh et Bala proposent un nouveau modèle en révision au précédent, avec un détail plus méticuleux de nombreuses variables explicatives et un regroupement de l'influence des variables modératrices en deux catégories : Expériences et Utilisation volontaire (Venkatesh et al. 2016).

Ces modèles, issus des théories de la psychologie comportementale (Dissonance cognitive et Action raisonnée) se sont perfectionnés et ont largement démontré que pour qu'une technologie soit adoptée, il faut d'abord qu'elle apparaisse utile et facilement utilisable. (Chuttur, 2009)

Problématique

Bien que le modèle de l'acceptation des technologies (TAM) mette l'accent sur plusieurs variables rentrant en jeux et impactant l'acceptation des technologies par les utilisateurs. (Dwivedi, 2010) Le modèle ne prend pas en considération les déterminantes affectivo-émotionnelles ainsi que les variables environnementales externes qui peuvent dans certains cas modifiées considérablement le comportement technologique humain.

En hôtellerie, et à fin de suivre le vent technologique, les managers optent souvent pour des outils technologiques sans pour autant prédire leur acceptation par les utilisateurs finaux.

Hors depuis la propagation de la Covid-19 au Maroc en mars 2020, les employés qui refusaient d'utiliser ces outils technologiques, étaient premiers à proposer leurs utilisations à distance à fin de se protéger et protéger leurs entourages du virus. La question qui se pose remet donc en cause l'exhaustivité des variables d'acceptation prédéfinis par le TAM.

Dans le paragraphe suivant nous proposons un modèle basé sur le TAM tout en incluant les obligations environnementales non maitrisables notamment les pandémies et leurs impacts sur le comportement humain.

Modélisation et introduction du TIAM (Technology imposed acceptance model)

Face à cette situation de confinement obligatoire imposé par le gouvernement marocain à partir du 16 mars 2020, les hôtels marocains ne pouvant laissés leurs projets en stand-by ont opté pour le télétravail. Qui dans plusieurs cas été une suggestion des employés cherchant ainsi des solutions à fin de travailler à distance. Plusieurs logiciels qui connaissaient une résistance à leurs déploiements et utilisation auparavant par les employés, étaient acceptés volontiers face à cette peur et risque de contagion imposé par la Covid19.

Le Technologie Imposed Acceptance Model 'TIAM', vient donc inclure des variables affectivo-émotionnelles jusqu'à lors non prises en compte par le TAM et qui impliquent directement l'utilisation du système comme illustré ci-dessous : (Figure 2 : Technology imposed acceptance model - TIAM - (Source : Remodélisation du TAM par l'auteur)

Il semble pertinent de consacrer une place particulière au rôle de ces variables et d'en analyser plus profondément leurs spécificités. L'ajout de ces variables affectivo-émotionnelles aux modèles de l'acceptation vise à améliorer leurs pouvoirs explicatifs et prédictifs. Ces dimensions visent à capturer des éléments du jugement utilisateur qui vont au-delà de l'évaluation rationnelle des qualités du système. (Pessoa, 2008).

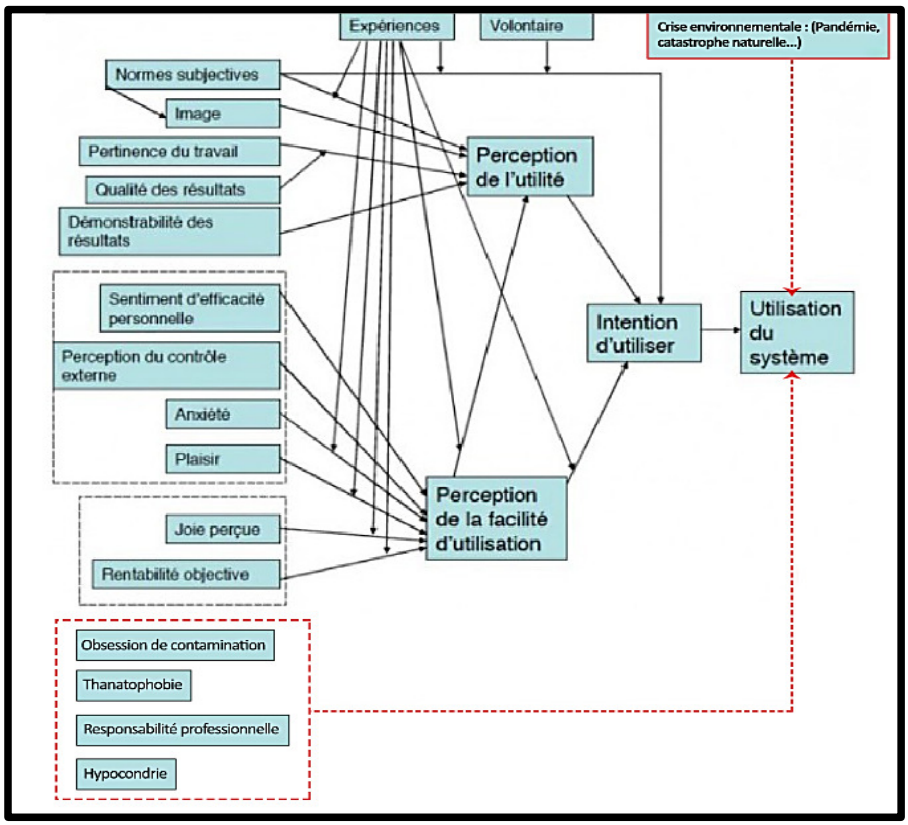

Figure 2 : Technology imposed acceptance model - TIAM - (Source : Remodélisation du TAM par l'auteur)

Hypothèses de recherche

Suite à la situation de pandémie Covid-19 observée en mars 2020, et son impact sur l'utilisation et l'acceptation des technologies au sein des hôtels marocains, le TIAM introduit une variable environnementale externe, en l'occurrence l'impact de la crise sanitaire (pandémie, épidémie, virus, maladie contagieuse..).

Plusieurs facteurs apparents rentrent en jeu notamment l'obsession de contamination, la thanatophobie, l'hypocondrie ainsi que le degré d'engagement et de responsabilité professionnels de l'individu. Ceci nous mène à avancer les hypothèses suivantes :

L'obsession de contamination : ayant peur pour leurs santés et celles de leurs familles, les salariées acceptent des outils technologiques qu'ils rejetaient auparavant. (Chaumon, 2000)

H1 : La crise sanitaire liée à la Covid19 impacte l'acceptation de la technologie par les individus.

H2 : La peur de contamination impacte l'acceptation des technologies par les individus.

La thanatophobie : La pandémie de la covid19 a créé un sentiment d'angoisse, d'incertitude et de stress permanent qui a poussé les employés à vouloir quitter leur lieu du travail et à se confiner chez eux tout en utilisant les outils technologiques déployés pour le télétravail. Une angoisse principalement liée à la thanatophobie autrement dit la peur de mourir ou de perdre un proche.

H3 : La thanatophobie impacte le degré d'acceptation des technologies par les individus.

La responsabilité professionnelle : Malgré la situation stressante liée à la pandémie qui envahissait toutes les équipes, un air d'engagement professionnel était présent tout le long. Ce qui poussait les employés à accepter de continuer leurs travail en utilisant des outils technologique (Cloud, VPN, GED…)

H4 : L'acceptation des technologies dépend du degré de responsabilité et d'engagement professionnels des individus.

L'hypocondrie : La crainte de tomber malade, poussait plusieurs employés à non seulement accepter mais voir même prendre l'initiative d'utiliser les systèmes d'information mis à leur disposition et à favoriser le télétravail.

H5 : L'hypocondrie impacte le degré d'acceptation des technologies par les individus.

Conclusion & perspectives de recherche

L'utilisation des systèmes d'information tant rejetés par les mêmes individus dans deux contextes différents demeurent paradoxale. Cependant, le contexte pandémique relatif à la Covid19, a fait submerger de nouvelles variables et facteurs affectivo-émotionnels liés à l'humain dont la prise en compte est importante dans le processus de l'amélioration de l'acceptation des technologies, à savoir le degré de la responsabilité et de l'engagement professionnels et des troubles intrinsèques liés à la thanatophobie, l'hypocondrie et l'angoisse de contamination.
Le Modèle développé 'TIAM' ainsi que nos hypothèses de recherche seront testés dans le secteur hôtelier marocain par le biais de la méthode Delphi. Les résultats de notre analyse feront l'objet d'un futur article scientifique.

Remerciements

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Students' Perception of Their Social Responsibility in Relation to The University – A Pilot Study Report

Edyta SPODARCZYK

Gdynia Maritime University, Gdynia, Poland,
E-mail: e.spodarczyk@wpit.umg.edu.pl

Katarzyna I. SZELAGOWSKA-RUDZKA

Gdynia Maritime University, Gdynia, Poland,
E-mail: k.szelagowska-rudzka@wpit.umg.edu.pl

Abstract

This pilot study aimed to identify characteristics (in self-assessment) distinguishing socially responsible students (SRS) in their relations with the university and how much these features correspond to SRU dimensions (values, relations, graduate, education, efficient organization) and depend on gender, level and year of study and type of university (public, private). In the respondents' opinions, the most important features of a socially responsible student are showing respect to lecturers, administrative staff and other students; accepting the cultural and national differences of other members of the academic community; respecting the rules of personal culture and being guided by truth and honesty while assessing lecturers and classes. These features refer to the dimension of value, being a basis for shaping other SRU dimensions and the related attributes of a responsible student. It is also a basis for building the right attitude of future graduates, aware of their responsibility for their future decisions and actions. The identified differences relating to older students, graduate studies and private universities do not distort the main conclusion. Since this is a pilot study, conclusions refer only to the studied universities. However, they indicate an interesting direction for further valuable research in this field.

Keywords: social responsibility of universities (SRU), dimensions of SRU, socially responsible student, characteristics of a socially responsible student, public, private university.

Introduction

Higher education institutions provide educational services classified as public goods, having a huge range and impact on society (Kowalska, 2009; Cybal-Michalska, 2015; Białoń & Werner 2012). Their cultural and opinion-forming role in society is crucial. Hence, it can be expected that their example will appeal to the young generation and shape them accordingly for the future. This applies, among others, to issues of corporate social responsibility. Universities should not only educate in this area, but also be socially responsible towards their stakeholders (Benedek & Takács-György, 2014; Szelągowska-Rudzka & Spodarczyk, 2018), among whom students take a special place. A pilot (qualitative) study conducted by the authors in 2017 showed that a university socially responsible towards its students should – in their opinion – be based on values, building relations, the graduate, education and efficient organization (Szelągowska-Rudzka & Spodarczyk, 2018). This will shape the graduate who meets the needs and expectations of the modern knowledge-based economy (KBE). Meeting such defined students' expectations requires that both parties, i.e. the university and students, build mutual relations in a responsible manner. Therefore, in the next stage, the authors decided to investigate how students perceive their responsibility towards the university and how much they are willing to give from themselves in order to shape these mutual, socially responsible relations. Hence, the aim of the article is to find answers to the following research questions:

- What features – in their own opinions – should socially responsible students be characterized by at a socially responsible university?
- With what areas of social responsibility of a university are the characteristics of a responsible student related?
- In what way is the perception of the characteristics of a student responsible towards the university influenced by: gender, level of study, year of study, type of university (public, private)?

In order to answer the above questions, the authors conducted a pilot study among students of selected universities in Tricity. The results, discussion and conclusions are presented later in the article.

The essence and dimensions of the university's social responsibility in relations with students

The concept of corporate social responsibility (CSR) is understood as the responsibility of an organization for its decisions and actions leading to sustainable development and taking into account economic, social and environmental aspects in contacts with stakeholders (Wytyczne ISO 26000, 2015). In turn, a socially responsible university (SRU) is a higher education institution (HEI) that serves the environment. Its responsibility towards society relates to preparing graduates to perform the functions of knowledge workers (Leja, 2013), sensitive to the natural environment (Geryk, 2008). These goals are achieved by building close relations with external stakeholders: enterprises, local (central) authorities, national and foreign universities (Cybal-Michalska, 2015), university graduates, candidates for studies and their parents, advisory bodies at the university Senate, the community of the region (country), as well as internal stakeholders: students, administrative employees, and academic staff.

Analysis of all aspects of social responsibility of a university, defining long-term goals and ensuring their implementation requires an appropriate strategy. However, before such a strategy is created, it is necessary to identify the main groups of stakeholders and analyze their needs, expectations and power of influence.

According to S. Berman, students are the most important group of university stakeholders. Shaping relations with them requires starting with building their social awareness in the educational process, including developing basic social competences, understanding the need for involvement, providing social contributions, being able to see and solve important problems (Berman, 1990). Therefore, it requires shaping a system of values, attitudes and behaviors leading to the development of their individual and social responsibility, which will complement the future professional competences desired by the market.

The authors believe that the actual implementation of socially responsible activities requires a conscious approach and commitment of all parties. Therefore, as a result of the pilot (qualitative) study conducted among students (2017), they identified key – for this group of stakeholders – dimensions of social responsibility of a university, i.e. values, relations, graduate, education and efficient organization (Szelągowska-Rudzka& Spodarczyk, 2018). In the next study (2019), they found, among others, that of these dimensions education is the most important for students. This is a process that, supported by values-based relations and efficient organization, will lead to the formation of a graduate who meets the requirements of the modern economy, ready to take responsibility for his future decisions and actions (Spodarczyk & Szelągowska-Rudzka, 2019). The features that should distinguish socially responsible students in their mutual relations with the university are the subject of this article.

University Social Responsibility and its dimensions

A socially responsible university is a HEI serving the surroundings. Its responsibility towards the society involves preparing graduates to become knowledge employees and building close relationships with economic practice and local governments (Leja, 2013). University Social Responsibility means a strategic and systems approach to managing HEIs and developing cooperation and dialogue with stakeholders, which contributes to sustainable development, building values and attitudes in the citizen society, supporting academic values and creating new ideas, keeping and developing scientific-didactic competences that influence effectiveness and innovativeness (Społeczna odpowiedzialność, 2019). So SRU, apart from classical dimensions: ecological, social and economic, takes into account also the scientific-didactic dimension. It requires development of the social responsibility strategy, whose aims are oriented towards satisfying the main stakeholders' needs and expectations and incorporating them in CSR education programs (Ławicka, 2016).

University Social Responsibility issues are becoming increasingly significant. More and more HEIs worldwide are implementing the social responsibility strategy and its good practices, which is reflected in various international organizations' reports (Cichowicz, Nowak, 2019). For instance, business universities introduce practices based on the Principles for Responsible Management Education (PRME) (within the program: Global Compact ONZ, 2007). They are based on six principles of responsible management education: purpose, values, method, research, partnership and dialogue (Koksal Arac, Madran, 2013) and enable students to understand the sustainable development subject so that in the future – as economic life members – they can balance its aims with enterprises' economic aims (PRME, 2019). Among 767 signatories worldwide Poland is represented only by a few HEIs1 (Roszkowska-Śliż, 2010; Popowska, 2016; Społeczna odpowiedzialność, 2019). Five best European universities2 have undertaken socially responsible activities focusing on the areas: education for sustainable development, responsible campus, social responsibility culture, ethical leadership, dialogue with the society, social responsibility of science. The world best universities[3]

(Społeczna odpowiedzialność, 2019) and Polish signatories[4] (Lista sygnatariuszy Deklaracji SOU, 2019) of University Social Responsibility Declaration (Deklaracja SRU) refer to the UN's Sustainable Development Goals (SDGs) stated in the 2030 Agenda. The SRU declaration was formulated in 2017 as a result of academic community cooperation with the then Ministry of Development (Społeczna odpowiedzialność, 2019). Twelve principles of SR in it refer to ethics, graduates' social and citizen attitudes, promoting social responsibility principles and sustainable development in study programs, scientific research and implementation projects within partnerships with various entities, dialogues with the surroundings, and engagement in the form of voluntary work, care for the university organisational order or its responsibility for natural environment (Deklaracja Społecznej Odpowiedzialności Uczelni, 2017).

Although Polish HEIs are nowadays more frequently implementing the socially responsible activities strategy, it is not yet common practice (Karwowska, Leja, 2019). For many universities it is still one-time action (Leoński, 2019). Few HEIs refer to University Social Responsibility Declaration or PRME. Most often examples of socially responsible universities' good practices are based on ISO 26000 and its main areas (Leoński, 2019; Mackiewicz et al., 2018), or they concern the main SRU dimensions resulting directly from its definition due to its universality, i.e.: economic, environmental, social and educational dimension (Karwowska, Leja, 2018). Universities also independently undertake initiatives to formulate cooperation principles with selected stakeholders not following indicated examples or modifying them for their own needs. The key to formulate effectively social responsibility good practices (and the strategy) is identifying the university's main stakeholders and their needs/expectations in mutual relationships (Szelągowska-Rudzka, Spodarczyk, 2018).

Research Characteristics

The study is of a pilot nature. It was conducted in the summer semester of 2019 (May-June) at three purposefully selected universities in Tricity with different academic traditions and forms of ownership. These are Gdynia Maritime University (GMU – a public, young university, building its academic competences), the University of Gdansk (UG – a public university with the longest university tradition), and WSB University (private, the youngest, dynamically developing).

The study used a survey method, a direct survey technique and an original questionnaire (data collection instrument). First, the respondents were asked to indicate the most important, in their opinion, features of a SRU in each of the identified dimensions (values, relations, graduate, education, efficient organization), and to determine the order of importance of these dimensions (by distributing 100 points among them) (Spodarczyk & Szelągowska-Rudzka, 2019). Then, they were asked to select the most important distinguishing features of a socially responsible student in mutual relations with the university. This article focuses on the results of the second part of the study.

Students of economics from the selected universities were invited to participate in the study. Ultimately, 290 persons took part in it. After dismissing defective questionnaires (48), 242 of them were used for the main analysis.

The study sample is dominated by women and students of undergraduate studies – 64% each (156). Another 32% (76 persons) are graduate students and only 4% (10) are future engineers. Most of the respondents – 48% represent GMU (116), another 30% represent WSB University (72) and 22% UG (54). First-year students account for 44% of the respondents (106), second-year ones – 38% (92), and third-year ones – 18% (44). Most of the respondents – 66% declare they know the concept of CSR.

The article presents a descriptive analysis of the obtained results (Table 1) and a statistical method (Table 1A, Appendix), in which we estimate the following models using probit and linear regressions in Stata 16:

$$Y\ level_i = B*Students'\ features + B*Gender+Level+ B*Year\ of\ study +B*University$$

The study took into account the influence of such variables as gender, level of study, year of study and type of university on the selection of the characteristics of a student socially responsible towards the university. This choice was dictated by the assumption that these variables may affect the respondents' choices, e.g. due to the knowledge of the university functioning, the prospect of taking up employment or studying conditions. This knowledge can be useful in developing a SRU strategy and its effective implementation, including building student involvement.

Results

What features – in self-assessment – should socially responsible students be distinguished by at a socially responsible university?

Table 1 summarizes the respondents' answers defining the importance of individual characteristics of a socially responsible student in relations with the university ascribed to particular dimensions of a SRU. The vast majority of respondents believe that all the listed features should characterize a responsible student. For this reason, when discussing the study results, the authors primarily focus on the answer "definitely yes", which may indicate a certain hierarchy of features characterizing the student's responsibility towards the university.

Table 1: Distribution of respondents' answers regarding the characteristics of a student who shares the principles of social responsibility in mutual relations between the university and the student, taking into account statistically significant differences resulting from the impact of selected factors

No*	Characteristics of a socially responsible student	SRU Areas	Responses (%)						Determinants			
			Definitely yes	Yes	Rather yes	Rather no	No	Definitely no	Gender	Level of study	Year of study	Type of university
1	shows respect to lecturers, administrative staff and other students	V	48	33	16	2	0	0				
2	accepts cultural and national differences of other members of the academic community	V	42	41	15	2	0	0				
3	respects the rules of personal culture	V	41	38	16	5	0	0				
4	while assessing lecturers /classes is guided by truth and honesty	V	40	36	18	6	0	0			x	x
5	acts ethically towards others	V	35	43	20	2	0	0				
6	respects and keeps the agreements concluded with the university	V	33	40	24	3	0	0				
7	prepares to the classes, tests and exams	E	32	40	21	5	1	1				
8	is punctual	O	32	38	24	4	2	0				x
9	takes care of cleanliness and the university's property	O	31	41	22	5	1	0		x	x	
10	keeps deadlines	O	30	40	26	2	2	0				
11	cares for the environment	V	30	37	28	5	0	0				
12	shapes the positive image of the university in the opinion of employers (as a student and a future graduate)	G	30	43	23	3	1	0		x	x	x
13	proudly represents the university outside (as a student and a future graduate)	G	29	43	22	5	1	0		x	x	x
14	complies with the study regulations	V	29	43	24	3	1	0				
15	respects the laws and customs of the university	R	27	43	25	4	1	0			x	x
16	honestly fulfils his/her duties included in the oath (strives to acquire knowledge, develops his/her own personality, recognizes dignity and honor of a student of his/her university)	V	26	47	22	5	0	0				
17	supports other students in the pursuit of knowledge and acquisition of new skills	R	26	40	24	9	1	0				

18	recognizes and respects the university's good reputation (as a student and a future graduate)	G	26	43	25	5	1	0			x	x
19	takes up educational opportunities offered by the university	E	26	41	28	3	1	1				x
20	attends the classes, gets involved in them	E	26	40	26	8	0	0		x		x
21	is involved in the university life	R	19	31	33	12	3	2				x
22	participates in the activities of scientific circles operating at the university	O	19	26	34	15	4	2				x
23	participates in competitions and projects organized by the university	E	18	28	37	13	3	1		x		x

The meaning of symbols: V – values, R – relations, G – graduate, E – education, O – efficient organization
* The sequence number of the characteristic corresponds to the model number in table 1A (Appendix)
x – means a statistically significant influence of a given factor

Source: based on research results.

The answers "definitely yes" to the specified features were attributed by 18% to 48% of the respondents. These were divided into 4 groups (Table 1). The respondents most often pointed out that a student responsible to the university should, above all, show respect to lecturers, administrative staff and other students; accept the cultural and national differences of other members of the academic community; respect the rules of personal culture and be guided by truth and honesty while assessing lecturers/classes (from 48% to 40% of responses).

The second group of features defining a student responsible towards the university (35%–30% of the "definitely yes" answers) include acting ethically towards others, respecting and keeping the agreements concluded with the university, preparing to the classes, tests and exams; being punctual; taking care of cleanliness and the university's property; keeping deadlines; caring for the environment; shaping the positive image of the university (as a student and a future graduate).

The least frequently, as "definitely yes", the respondents indicated the features listed in the fourth group (19% and 18% of responses), i.e. being involved in the university life, participating in the activities of scientific circles operating at the university, participating in competitions and projects organized by the university (Table 1).

To what areas of social responsibility of a university are the characteristics of a responsible student related?

The distribution of "definitely yes" answers in Table 1 shows that the characteristics of a student socially responsible in mutual relations with the university are ranked in an order that reflects their hierarchy. This shows that the most important ones (group 1 and part of group 2) belong to the dimension of values. The next ones are related to efficient organization, the graduate and relations. In turn, the least important ones for the respondents mainly belong to the dimension of education.

How is the perception of the characteristics of a student responsible towards the university influenced by gender, level of study, year of study, type of university (state, non-state)?

The results presented in Table 1 and Table 1A (Appendix) show that gender is not a variable that has a statistically significant impact on the perception of characteristics of a student responsible towards the university. The variables that differentiate the respondents' answers are the level of study, year of study, and the type of university (public, private).

Graduate students (MSc/MA) give more importance than others to the following characteristics: attending classes, getting involved in them, participating in competitions and projects organized by the university, shaping the positive image of the university (as a student and a future graduate), taking care of cleanliness and the university's property, proudly representing the university outside (as a student and a future graduate) (Models 20, 22, 17, 15, 12; Table 1A).

There are also significant differences in the second- and third-year students' responses compared to students in the first year. Thus, for older students it is more important that a socially responsible student be guided by truth and honesty while assessing lecturers and classes, be involved in the university life, recognize and respect the university's good reputation (as a student and a future graduate) as well as take care of cleanliness and the university's property,

proudly represent the university outside (as a student and a future graduate), shape a positive image of the university (as a student and a future graduate), respect the laws and customs of the university. The latter feature is more often emphasized by second-year students than students in other years (Models 12 – 17; Table 1A).

A number of significant differences in the perception of the characteristics of a student socially responsible towards the university occur depending on whether the respondents represent a public university or a private one. Students of a private HEI (WSB University) attach greater importance to such features of a responsible student as: involvement in the university life, participation in the activities of scientific circles operating at the university, participation in competitions and projects organized by the university, recognition and respect for the university's good reputation (as a student and a future graduate), taking care of cleanliness and property, shaping the positive image of the university (as a student and a future graduate), respecting the laws and customs of the university, university, proudly representing the university outside (as a student and a future graduate) and punctuality (Models 12-17; 19-23; Table 1A, Appendix).

Conclusions and Discussion

In general, it was found that, regardless of gender, all the studied characteristics are important to the respondents. They agree the most that the student responsible to the university should, above all, show respect to lecturers, administrative staff and other students, accept the cultural and national differences of other members of the academic community, respect the rules of personal culture and be guided by truth and honesty while assessing lecturers and classes. Such characteristics of a socially responsible student include, first of all, the features belonging to the dimension of values, which S. Berman (1990) recognized as the basis of students' social competences and their conscious participation in university matters. It can be concluded that the area of values is the basis for building students' social responsibility in mutual relations with the university. It indicates that these values are the starting point for shaping their attitudes and behaviors as future graduates (employees and employers), and it is them that the shaping of other areas should start with. Above all, however, these universal values should be included in the university's social responsibility strategy (Spodarczyk & Szelągowska-Rudzka, 2019) and in the ensuing actions, e.g. codes of conduct, codes of ethics, employee training, and good practices. They will then become a permanent basis for shaping mutual relations based on the principles of social responsibility between the university and students, as well as other groups of stakeholders.

The fewest definite answers regarding the characteristics of a responsible student concerned their involvement in the university life, participation in the activities of scientific circles operating at the university, and participation in competitions and projects organized by the university. These are mostly features from the area of education. On the one hand, the lower popularity of these features among the respondents may indicate that meeting them requires students' greater involvement and effort than a declaration of commitment to values. In fact, students do not want to get involved too much in the efficient organization of the educational process, considering this area to be a domain of the university's activities, of which they are beneficiaries (Spodarczyk & Szelągowska-Rudzka, 2019). On the other hand, the reason may be unattractive study programs and extra-curricular activities that do not meet students' expectations. As a result, the proclaimed (also during classes) principles of social responsibility remain more in the area of declarations than they are permanent, common activities of universities resulting from their strategy. Therefore, it may be worth involving students in submitting proposals for study programs and methods of their implementation, and (if possible) put them in practice, in order to make the educational process more attractive and more effective. This is particularly important in relation to the results of the first part of the study, in which the respondents indicated that education – as a process of shaping a socially responsible graduate expected in the contemporary labor market in knowledge based economy – is for them the most important dimension in the activities of universities building socially responsible relations with its stakeholders (Spodarczyk & Szelągowska-Rudzka, 2019).

When analyzing the respondents' answers in terms of significant differences due to gender, level of study, year of study, type of university (public, private), it can be noted that the differences in indications regarding the characteristics of a socially responsible student are primarily influenced by the year of study and the type of university. The most common differences are between the respondents of older years. The reasons can be seen in the fact that third- and second-year students have already familiarized themselves with the conditions of studying, they have relatively little time until the end of their studies and they want to benefit from this period both in terms of organization of classes, relations and education. They also understand that a positive image of the university can increase their chances as graduates on the labor market.

As mentioned above, the responses of students of public universities (GMU, UG) and private one (WSB University) significantly vary. Thus, students of a private university pay more attention to the area of education and the graduate.

The reason may be tuition for studies, and hence a desire to obtain the greatest possible benefits from studying (education and graduate), which will translate into the respondents' position on the labor market. One can also consider the question whether the higher rank of education and the prestige of the university do not prove that a private university, more than a public one, cares about an attractive offer, adapted to the labor market and students' needs.

It is also noteworthy that the area in which there are virtually no differences in respondents' answers due to the indicated characteristics (gender, level of studies, year of study, and type of university) is the area of values. This dimension was defined as the basic one, necessary for the emergence of other areas of social responsibility of a university and for building a SRU strategy. The students' unanimity as to the significance of the area of values and the individual characteristics of a socially responsible student resulting from it confirms the importance of the dimension of values in the process of building a SRU.

The authors are aware that the conducted research is of a pilot nature; therefore, the conclusions are limited only to the participating HEIs. Nevertheless, it indicates interesting conclusions and relationships that would be worth identifying in full in a study on a representative group of universities.

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Appendix

Table 1 A: Determinants of student's social responsibility towards the university

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Female	0.15	0.07	-0.10	0.04	0.10	0.02	0.14	0.17	-0.00	-0.02	-0.03	-0.15
	(1.38)	(0.63)	(-0.71)	(0.34)	(0.80)	(0.15)	(1.16)	(1.39)	(-0.01)	(-0.14)	(-0.24)	(-1.25)
Level ref.= BSc/BA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
BSc Engr.	-0.15	-0.02	0.25	0.14	0.11	0.39	0.14	-0.09	0.17	-0.13	0.31	-0.45
	(-0.56)	(-0.07)	(0.72)	(0.49)	(0.36)	(1.18)	(0.44)	(-0.30)	(0.54)	(-0.45)	(0.98)	(-1.47)
MSc/MA	0.20	0.23	-0.06	0.20	-0.16	-0.02	0.23	0.10	0.30	0.10	0.38	0.44*
	(1.06)	(1.10)	(-0.25)	(1.01)	(-0.76)	(-0.10)	(1.09)	(0.46)	(1.34)	(0.53)	(1.77)	(2.08)
Year of study ref.=1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
2.	-0.18	0.21	0.20	-0.00	0.11	0.26	0.24	0.23	0.03	0.07	0.48*	0.59**
	(-1.03)	(1.08)	(0.91)	(-0.02)	(0.53)	(1.23)	(1.17)	(1.17)	(0.17)	(0.39)	(2.36)	(2.94)
3.	0.38	0.39	0.32	0.22	0.15	0.27	0.37	0.40	0.05	0.27	0.53*	0.56*
	(1.93)	(1.75)	(1.28)	(1.02)	(0.67)	(1.10)	(1.61)	(1.74)	(0.20)	(1.32)	(2.29)	(2.47)
University ref.= GMU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
UG	0.14	-0.19	0.01	0.06	0.28	0.02	-0.25	-0.11	-0.18	0.00	-0.60*	-0.65**
	(0.71)	(-0.85)	(0.04)	(0.29)	(1.21)	(0.08)	(-1.09)	(-0.46)	(-0.73)	(0.02)	(-2.53)	(-2.84)
WSB Univer.	0.12	0.37	0.41	0.02	0.12	0.06	0.09	-0.06	0.11	-0.36	0.18	0.48*
	(0.65)	(1.83)	(1.80)	(0.11)	(0.59)	(0.27)	(0.42)	(-0.31)	(0.50)	(-1.91)	(0.87)	(2.36)
_cons	5.02***	4.60***	4.61***	4.94***	4.77***	4.73***	4.71***	4.90***	4.78***	5.28***	4.78***	4.59***
	(31.47)	(25.73)	(22.68)	(28.93)	(25.82)	(24.32)	(25.62)	(26.86)	(24.99)	(31.84)	(25.60)	(25.33)
N	242	242	242	242	242	242	242	242	242	242	242	242
R^2	0.052	0.021	0.030	0.023	0.018	0.026	0.031	0.045	0.009	0.088	0.062	0.062
AIC	564.49	619.15	681.55	597.08	635.43	660.55	632.81	628.85	652.42	583.38	640.69	626.18
BIC	592.40	647.06	709.46	625.00	663.34	688.46	660.72	656.76	680.33	611.29	668.60	654.09

cd Table 1 A: Determinants of student's social responsibility towards the university

Models	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**	**(19)**	**(20)**	**(21)**	**(22)**	**(23)**
Female	0.09	0.06	-0.04	-0.05	-0.13	0.09	0.01	-0.04	0.06	0.06	0.02
	(0.61)	(0.47)	(-0.33)	(-0.41)	(-1.08)	(0.68)	(0.08)	(-0.33)	(0.46)	(0.37)	(0.13)
Level ref.= BSc/BA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
BSc Engr.	-0.11	0.02	-0.26	-0.40	-0.36	0.08	0.36	0.26	-0.01	0.27	0.14
	(-0.29)	(0.07)	(-0.85)	(-1.27)	(-1.19)	(0.24)	(1.04)	(0.79)	(-0.04)	(0.73)	(0.35)
MSc/MA	0.45	0.10	0.45*	0.33	0.50*	0.09	0.23	0.54*	0.36	0.52*	0.29
	(1.76)	(0.49)	(2.12)	(1.49)	(2.39)	(0.39)	(0.97)	(2.36)	(1.50)	(2.02)	(1.05)
Year of study ref.=1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
2.	0.77**	0.45*	0.53**	0.69**	0.45*	0.06	0.27	0.13	0.32	0.39	0.48
	(3.18)	(2.29)	(2.63)	(3.32)	(2.28)	(0.27)	(1.21)	(0.60)	(1.42)	(1.59)	(1.84)
3.	0.79**	0.34	0.73**	0.73**	0.75**	0.18	0.44	0.44	0.25	0.24	0.45
	(2.88)	(1.52)	(3.19)	(3.13)	(3.31)	(0.69)	(1.72)	(1.80)	(0.98)	(0.85)	(1.52)
University ref.= GMU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
UG	-0.22	-0.12	-0.46*	-0.37	-0.37	0.20	0.00	-0.30	-0.23	-0.46	-0.29
	(-0.79)	(-0.54)	(-1.97)	(-1.58)	(-1.64)	(0.79)	(0.01)	(-1.21)	(-0.91)	(-1.65)	(-0.95)
WSB University	1.39***	0.49*	0.50*	0.68**	0.50*	0.24	0.48*	0.49*	0.46*	0.89***	1.10***
	(5.60)	(2.40)	(2.43)	(3.23)	(2.44)	(1.03)	(2.10)	(2.25)	(1.99)	(3.55)	(4.11)
_cons	3.46***	4.49***	4.48***	4.31***	4.53***	4.69***	4.41***	4.47***	4.52***	3.84***	3.69***
	(15.70)	(24.77)	(24.40)	(22.90)	(25.08)	(22.76)	(21.66)	(22.92)	(22.18)	(17.22)	(15.49)
N	242	242	242	242	242	242	242	241	242	242	242
R^2	0.133	0.033	0.051	0.061	0.056	0.017	0.028	0.038	0.026	0.075	0.087
AIC	720.24	625.77	632.69	644.16	624.91	687.89	682.86	658.20	682.44	726.07	758.39
BIC	748.16	653.68	660.60	672.07	652.82	715.80	710.78	686.08	710.35	753.98	786.31

t statistics in parentheses; $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$; Models: 1-23 correspond to the numbers of individual student characteristics from Table 1.
Source: based on research results.

The Framework of The Model of Diffusion of Technological Innovations in Competitive Environment

Agnieszka STACHOWIAK
Poznan University of Technology, Department of Logistics, Poznan, Poland
agnieszka.stachowiak@put.poznan.pl

Irena Pawłyszyn
Poznan University of Technology, Department of Logistics, Poznan, Poland,
irena.pawlyszyn@put.poznan.pl

Marek FERTSCH
Poznan University of Technology, Department of Logistics, Poznan, Poland
marek.fertsch@put.poznan.pl

Joanna OLEŚKÓW-SZŁAPKA
Poznan University of Technology, Department of Logistics, Poznan, Poland
joanna.oleskow-szlapka@put.poznan.pl

Abstract

Purpose – the purpose of this paper is to present the model of diffusion of technological innovation in competitive environment. The model was developed in the form of empirical model, it presents relations between identified variables. The findings revealed that the model developed is correct (the model was validated). The model can be used by decision makers disregarding the industry or enterprise size to analyze the process of diffusion of innovations in competitive environment. The model was originally developed by the authors.

Keywords: Technological Innovation, Diffusion of Innovations, Model for The Dissemination of Technological Innovation

Introduction

Innovation is one of the key concepts concerning modern technology, economics, management and sociology. The term of innovation is defined slightly differently on the grounds of each of the listed disciplines. The authors of this article are interested in the problem of technological innovations, as they refer to products and processes but within technological aspects. The definition according to the "Oslo manual" (OECD, 2015; Garcia, Calantone, 2002) seems to refer to the issue in the way that corresponds best with authors' experience. The problem considered in this article is the diffusion of technological innovation. During the analysis of the literature, the authors did not come across sources directly related to this problem. Based on the literature, it can be assumed that the same principles and models as for any other type of innovation apply to the diffusion of technological innovations. The so-called "linear model" is a commonly accepted model for the dissemination of innovations (Godin, 2006). It assumes that there are several phases in the innovation life cycle. These phases are discussed in detail in (Rogers, 2003). Authors dealing with the linear model devote little attention to the mechanism of transition between particular phases of the dissemination of innovations. They seem to assume that the transition between particular phases is natural and its pace is shaped in a spontaneous manner, according to the logistics curve (Rogers, 2003). This article accepts the hypothesis that there are factors that determine the transition between the various phases of the diffusion of innovation and affect the pace of this process. Identification of these factors is particularly important in the context of the existence of alternative scenarios of the process of diffusion of innovations. Such alternative scenarios occur in a situation where there are several competitive technological solutions, each of which potentially can be the basis for innovation. The authors accept the existence of such competing technological solutions as conditions of competition. Developing a model for the diffusion of innovations in competitive conditions may provide tools for analyzing such a situation and support decision-making processes in the field of technology development. Hence, the goal of the paper is to present the model of diffusion of technological innovations in competitive environment and validate it with an implementation example.

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The paper includes five sections, it starts with introduction followed by theoretical background referring to the issues discussed, namely innovation, its definition, classification and diffusion of innovations. The next part is presentation of the original model of diffusion of technological innovations in competitive environment developed. The fourth section presents an example of the model implementation to analysis of technological innovation diffusion process. The last section is the conclusion section.

Theoretical background

The tendency that contributes to the world development has always been and is the introduction and implementation of advanced scientific and technological achievements, which are an impulse for structural changes in the economy, stimulating production of new technologically advanced products. The conditions prevailing on the market have always determined the need to intensify innovation as the most effective way to increase the economy's competitiveness and determine its further development in an intense way. The rationale for the strategic direction of development, in which innovation plays the main role, are unprecedented successes that resulted from the practical implementation of innovative solutions (Camisón, Villar-López, 2011; Cainelli, De Liso, 2005; Bradley, McMullen, Artz, Simiyu, 2012; Keupp, Palmié, Gassmann, 2012; Laforet, 2011).

Innovation is an immanent attribute of an enterprise that enables and supports doing business in a market economy. Due to increasing competition, innovations are rapidly becoming a key factor for the success and survival of businesses (Alegre, Chiva, 2008). The concept of innovation is derived from the Latin term innovatio, which means novelty, reform, and deliberately introduced change in technology, organization, economic activity or in another sphere of human life. The problems of innovation were introduced to economic considerations by Joseph Schumpeter. When refering to innovation, Schumpeter meant (Baruk, 2006):

1) introduction of a new product with which consumers are not familiar yet, or introduction of a new type of a good;
2) introduction of a new production method, not yet tested in practice in a given industry;
3) opening of a new market for which a particular branch of industry in a given country was not previously introduced, regardless of whether the market existed earlier or not;
4) acquiring a new source of raw materials or semi-finished products, again regardless of whether the source already existed or had to be created;
5) carrying out a new organization of an industry, for example creating a monopolistic situation or breaking a monopolistic position.

There is a whole range of innovation definitions in the subject literature (Yalabik, Howard, Roden, 2012; Schumpeter, 1960; Zavlin, Kazantsev, Mindeli, 1999; Damanpour, 1991). Analyzing the definitions of innovations, some of their common features that focus on the creation of a significant new value for the client and for the company through the creative change of one or several elements of the business system can be identified. Innovations can be classified due to the numerous criteria, as presented in the Table 1.

Table 1: Classification of innovations – examples of criteria

Subject of changes criterion	Scale of changes criterion	Source of cahnges criterion	Complexity level criterion	Novelty level criterion	Originality level criterion
• Product-based (technological) innovations • Proces-based innovation • Organization-based innovation • Marketing-based innovation	• Radical innovation • Upgrading innovation	• Demand-based innovation • Supply-based innovation	• Coupled innovations • Not-coupled innovations	• World-scale innovations • Country-cale innovations • Industry-scale innovations • Organization-scale innovations	• Pioneering innovations • Adapter innovations

Source: own work

From the perspective of this paper, classification of innovations according to the subject criterion is the most important. In relation to it, product, process, organizational and marketing innovations are distinguished. The subject matter of this article is technological (product) innovation, which also can be referred to as technological innovation. Changes introduced in product are consequences of construction or technology changes; hence, the term product innovation is consistent with the term technological innovation. Broughel and Thierer claim that technological innovations is a fundamental driver of economic growth and human progress, but are often lost or underappreciated in technology policy discussions today, which frequently focus on the disruptive effects associated with technological change (Broughel, Thierer, 2019). Compared to non-technological innovation, technological innovations have a crucial influence on firm success (Ryu, 2016). Moreover, technological innovation significantly positively contribute to sustainability and organization performance (Zhang, Khan, Lee, Salik, 2019).

Table 2 lists some of the definitions of the concept under consideration in the subject literature. The essence of technological innovation in this study is understood in accordance with the definition given by the OECD. In functional terms, product innovations can be defined as a deliberate replacement of previously produced products with their new versions and creating completely new products that are assessed as able to satisfy the needs and preferences of specific buyers in a unique way and thus improve the competitive position of the company on the market. In the sense of results, it can be considered that each new product form constituting a company's market offer is an innovation (Bogdanienko, 2004).

Table 2: Definitions of product technological (product) innovation

Author	Definition
Damanpour F., Evan W.	A technological innovation can be the implementation of an idea for a new product or a new service or theintroduction of new elements in an organization's production process or service operation (Damanpour, Evan, 1984).
OECD	Product innovations - new or significantly improved in relation to their previous version goods or services, taking into account technological specification, components and materials, software, ease of use for the user or other functional features (OECD, 2005).
Oslo Manual	A product technological innovation is the implementation/commercialisation of a product with improved performance characteristics such as to deliver objectively new or improved services to the consumer (Oslo Manual, 2011).
Tidd J., Bassant J., Pavitt K.	Product innovation concerns introduction of completely new products/services or significant changes in the products/services offered by the company. These changes may concern improvements in terms of their features or applications (Tidd, Bassant, Pavitt, 2005).
Reguia C.	Product innovation is the development of new products, making changes in the current product design or using new techniques and means in the current production methods(21), in other words, it focuses on existing markets for existing products, differentiating through features and functions that current offers do not have (Reguia, 2014).
Tohidi H., Jabbari M.M.	Product innovation is a process that includes: technological design, research and development, production, management and commercial activities associated with marketing a new product (Tohidi, Jabbari, 2012).

Source: own work

Three processes are inseparably connected with the concept of innovation (Niedzielski, Markiewicz, Rychlik, Rzewuski, 2007):

1) *transfer of innovation* - this is a multifaceted flow of information across the boundaries between science, technology and the practical world, contributing to the development of innovative approach;
2) *absorption of innovation* - means the process of assimilation of innovation by a specific entity (consumer, company, region or economy);
3) *diffusion of innovation* - it concerns diffusion of innovations at the place of first implementation and on other markets; this is another practical application of the same solution (information, product, technology) by the followers.

Transfer of innovations concerns the transfer of new solutions and scientific inventions from the source of their creation to potential users of innovations. Innovation buyers undertake and engage in innovative activities, thus absorbing it and implementing it in practice. The absorption process requires the involvement of appropriate resources as well as the acquisition of skills that are necessary to implement innovation. One of the most important factors determining the competitive advantage of economic entities on the market is the ability to effectively acquire knowledge and then use it in business (Pawłyszyn, 2017). Diffusion is the way in which innovations spread, through market or non-market channels, from their first worldwide implementation to different countries and regions and to

different industries/markets and firms (Oslo Manual, 2011). Without diffusion, an innovation will have no economic impact. Diffusion of innovation takes place when after the first successful application of a new technological or organizational solution; it is absorbed by other enterprises.

Diffusion of innovations is a complex and multifaceted process, the nature of which is determined by the type of innovation that is subject to diffusion, number and power of communication channels, etc. Studies show that there is a number of factors that determine the rate of diffusion of innovation (Pawłyszyn, Fertsch, Stachowiak, Pawłowski, Oleśków-Szłapka, 2020; Dearing, Cox, 2018). One the most important aspects of diffusion of innovation is the consistency of the innovator in following up with the adopter's progress throughout the adoption process. This requires a high level of psychological analysis in order to understand the instant needs and perception of the adopter (Sartipi, 2020). This issue is very important because it allows the new solution to take the dominant position in society and thus increase the economy's development. For this reason, the problem considered in a given article is the diffusion of technological innovation. During the literature analysis, the authors of the article did not come across sources directly related to this problem. Based on the literature analysis, it can be assumed that the same principles and models as for any other type of innovation apply to the dissemination of technological innovations.

The researchers noticed that the innovation diffusion process is not uniform and is characterized by a certain cycle in which a small number of individuals are initially interested in innovation, followed by a sharp increase in interest in it, which decreases at the end of the cycle. Models of diffusion of innovations, developed by scientists, help to determine the essence and course of innovation processes in time and space. Tsvetkova and Tukkel distinguished six classes of models of the process of diffusion of innovations, which are characterized by different classification features, while emphasizing that it is advisable to look for models of diffusion in the imitation class (Tsvietkova and Tukkel, 2017).

The so-called "linear model" is a widely accepted model for the dissemination of innovations (Godin, 2006). It assumes that there are several phases in the innovation life cycle. These phases are described in detail by Rogers (Rogers, 2003). He distinguished five groups of target recipients who take over innovation at the right time for them (Rogers, 1983). In addition, the Bass model should be mentioned, according to which there is a finite number of possible consumers who over time increasingly accept and buy a new product. Innovation is spreading among the participants of the socio-economic system, who interact with each other and divide into two groups (Baranovskiy, Puzyrevskaya, 2019; Figiel, 2016; Nosonov, 2015; Czubała, 2012; Zabrodskaya, Tkalich, 2009). Authors dealing with the linear model devote little attention to the mechanism of transition between particular phases of the diffusion of innovations. They seem to assume that the transition between particular phases is natural and its pace is shaped in a spontaneous manner, in accordance with the logistic curve (Rogers, 2003). In turn, Klincewicz describes the RCCTO (Relative advantage, Compatibility, low Complexity, Testability of innovation, Observability) model, which assumes that the diffusion of innovation depends on such factors as (Klincewicz, 2011):

- the *relative advantage* of innovation over previous solutions - innovation should ensure the increase of usability and efficiency over existing solutions. This is the extent to which innovation is perceived as better than existing solutions, so that the user can derive additional benefits from a product or service that previous products did not provide;
- the *compatibility* of innovation with existing standards, values and experience - is an aspect conducive to the diffusion of innovation. A given feature concerns the compatibility of innovation with the needs of potential adapters;
- the *low complexity* of innovation - it determines the level of difficulty and comprehensiveness in understanding, adopting and applying a new solution, as well as the degree of perception of innovation as difficult to understand and use;
- the *testability of innovation* - it is the ability to subject innovation to testing and testing, the ability to try and check its performance and the process of gradually introducing innovations into everyday use;
- the *observability* - the extent to which the use of innovation is visible to others, as well as the ability to observe the application of innovation by others. Observability increases the attractiveness, security and openness to the application of innovations by new users.

In other words, innovation should have certain attributes that could be perceived by the potential buyer as a benefit of its use, so that they are interested in it and express their willingness to take innovation into their reality. At the same time, the subjective perception of a given product's characteristic by the consumer is important, not the objective fact of its occurrence.

In this article, the hypothesis that there are factors that determine the transition between the various phases of the diffusion of innovation and affect the pace of this process is accepted. Identification of these factors is particularly important in the context of the existence of alternative scenarios of the process of dissemination of innovations. Such

alternative scenarios occur in a situation where there are several competitive technological solutions, each of which potentially can be the basis for innovation. The authors accept the existence of such competitive technological solutions as competition conditions. Developing a model for the diffusion of innovations in competitive conditions may provide tools for analyzing such a situation and support decision-making processes in the field of technology development.

Framework of the Model

Literature referring to factors influencing the diffusion of technological innovations and innovations in general is extensive and diverse (Rogers, 2003). There is a widespread view that the diffusion of technological innovations depends on a number of factors (Talukder, 2012). There is no single factor that determines the success of the dissemination of technological innovation. Usually, between 5 and 10 factors are mentioned, and their synergetic cooperation determines the success of the process of diffusion of innovations. In this situation, the authors do not intend to discuss the literature or analyze the degree of compatibility or similarity of views of individual authors of innovation success factors. A set of factors influencing the diffusion of technological innovation developed for the needs of this article will be presented. The selection of factors will be made by adopting the perspective of the decision-maker, whose task is to choose one of the available innovation options in a given situation.

The precondition for the occurrence of the considered situation is the existence of the "discovery". Under this concept, the emergence of a technological possibility to implement a certain process or to meet specific needs in a new way is understood. It ensures that its effect ("product") has completely new or partially new properties. The emergence of the source of innovation may be the result of the discovery (invention) or systematic work carried out in the field of basic research, research and development (R&D) or applied research.

The emergence of a source of innovation in the competitive situation under consideration in which there are several alternative innovation possibilities triggers the decision-making process of a non-random choice between the available options. The choice is based on the analysis of a number of factors that in the subjective assessment of the decision-makers in a different way affect its choice. The factors distinguished and considered in this article include:

- *usefulness of innovations* – this factor is a measure of the extent to which a new process or its effect (product) meets the needs identified by the decision maker. A positive evaluation of the usefulness of innovation from an organization's point of view can have two reasons. It may result from the compatibility of the expected effects of innovation with the organization's goals or the strategy it implements. This cause can be characterized as the primary cause. Positive evaluation of the usefulness of innovations from the point of view of the organization may also result in the observation of the pace of its dissemination, observation of the behavior of the main competitors or leaders in a given segment of activity and tendencies to imitate their behavior. This cause can be characterized as the secondary cause;
- *ease of absorption* – estimation of the effort to achieve the expected effects of innovation;
- *compatibility of innovations* – degree of compliance (fit, applicability) of the current, at the time of making the decision to implement innovation, potential (resource structure and ways to use them) to the conditions that will hypothetically exist at the moment of achieving the expected effects of innovation.

Based on the criteria presented above and the observation of economy, industries and experience of the authors, the model of diffusion of technological innovation in competitive environment can be defined as follows (Formula 1):

$$E_{t+1} = \sum_{i=1}^{n} x_{it} \times \alpha_{it} \quad (1)$$

where:

- n - the number of innovation variants available at time t, the moment t corresponds to the moment of calculations,
- E_{t+1} - the dissemination of innovations at time $t + 1$ measured in the number of innovation implementations at that moment,
- x_{it} - the dissemination of the i-variant of innovation at the moment t measured in the number of implementations of the i-variant at that moment, the moment t corresponds to the moment of calculations,
- α_{it} - attractiveness of the i-variant of innovation at the moment t, the moment t corresponds to the moment of calculations, at the moment the value of attractiveness of any available i-variant of innovation must be between 0 and m, where m is a non-negative real number (Formula 2):

$$\alpha_{it} \quad \in < 0, m > \quad (2)$$

And α_{it} - attractiveness of the i-variant of innovation at the moment t, can be calculated as follows (Formula 3):

$$\alpha_{it} = u_{it} \times a_{it} \times c_{it} \quad (3)$$

where:

- u_{it} - the evaluation of usability of the *i*-variant of innovation at the moment *t* made by the decision maker, it can take non-negative values from the interval *0 – m*, where *m* is a non-negative real number,
- a_{it} - the decision made by the decision-maker to assess the ease of absorption of the *i*-variant of innovation at the moment *t*, it can take non-negative values from the interval *0 – k*, where *k* is a non-negative real number,
- c_{it} - compatibility assessment of the *i*-variant of innovation at the moment *t* made by the decision maker, it may take non-negative values from the interval *0 – l*, where *l* is a non-negative real number,

The coefficient of relative attractiveness of the *i*-variant of innovation at the moment *t* is used as an auxiliary to the analysis of the results obtained in the model. This coefficient is not present in the model. It is calculated as the quotient of the dissemination of the *i*-variant of innovation at the moment *t* to the dissemination of innovation at the moment t (Formula 4):

$$\beta_{it} = \frac{x_{it}}{E_t} \quad (4)$$

For the moment *t*, the sum of the relative attractiveness of all innovation options available at this time must be equal to *1* (Formula 5):

$$\sum_{i=1}^{n} \beta_{it} = 1 \quad (5)$$

The structure of the model includes factors influencing future dissimination of innovation and its present status.

Validation of the Model

To prove that the model developed and presented in the above section is correct, the authors decided to validate it basing on historical data – hence referring to the situation that is already clear and the ex-post analysis of the diffusion process can be compared with the results obtained with the model.

The data used for validation are presented in the table 3.

Table 3: Data used for validation

Year	Variant	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	∑
80	**a**				3		3	10	12	2	4			3		2		5	4		48
	b			2			10	14	6		3	1		8	1	3			7		55
	c						3	9	7		5		2			1			1		28
∑				**2**	**3**		**16**	**33**	**25**	**2**	**12**	**1**	**2**	**11**	**1**	**6**		**5**	**12**		**131**
82	**a**				2		3	12	16	2				3				5	4		47
	b	2		2			9	8	13			1		8	1	10					54
	c				2		2	13	7		7		2			6			14		53
	c_m							15	13		11					6			10		55
∑		**2**		**2**	**4**		**14**	**48**	**49**	**2**	**18**	**1**	**2**	**11**	**1**	**22**		**5**	**24**		**209**
98	**c_{zm}**	3	2	1		2	15	14	14	3	4	2	3	6		5	2		5	8	89
	c						4	27	10		6	2				10		1		4	64
∑		**3**	**2**	**1**		**2**	**19**	**41**	**24**	**3**	**10**	**4**	**3**	**6**		**15**	**2**	**1**	**5**	**12**	**153**

Source: own work based on literature analysis

The data presented in the table cover the period 1880-1898. They refer to changes in the construction of warships that occurred before and during this period. A typical material, which for centuries was wood was replaced with iron and steel. This change caused the need to change the design of the warship as a whole. As a result, three concepts (innovations) have emerged:

- traditional - in the table referred to as "*a*". It consisted in building a hull made of iron or steel or reinforcing the wooden hull with these materials and placing the weaponry as on wooden ships - on its sides.
- changed - in the table referred to as "*b*". It consisted in building a hull made of iron or steel or reinforcing the wooden hull with these materials and placing weapons in armored constructions ("citadels") placed on the deck or inside the hull.
- modern – the concept is referred to as modern because it applies to the construction of warships until today. In the table it is referred to as "*c*". It involves the construction of a steel hull and placement of weapons in armored towers, placed on the deck. Its variant was the solution that had been used temporarily and referred

to as "c_m" (modern concept-modified) in the table. Basically, in that variant, the armored towers open from above were used (they were so-called "*barbets*").

The data collected in the table do not cover the whole of the war fleets existing in the analyzed period. Only the largest and heaviest armored vessels were selected, which during this period determined the strength of the fleet. The data were grouped in three intervals marked with years (1980, 1982, 1998) as they were derived from the materials published in 1880, 1882 and 1892. There was a certain problem with data regarding the year 1898. A large number of the considered warships in the source materials were described as modernized. Therefore, for them an additional category has been distinguished. It is marked in the table as a variant of "c_{zm}" (c-modernized). It applies to ships, most of which belong to the "c" category. It may contain units that were obsolete at the moment of the data collection but originating from the "c_m" option. The source (Jane, 1898) used, however, did not allow to determine the degree of modernization or the time of its implementation. The data set presented in the table comes from three sources: (Jane, 1898; Kronenfels, 1891; Kronenfels, 1893). The details of the descriptions contained in them did not always allow for a definite, unambiguous allocation to a given category. This applies mainly to the case of 1898 and the categories "c" and "c_{zm}".

The data presented in the table were analyzed with the model developed and the results of the analysis are presented in subsequent diagrams.

Diagram 1 shows the relative share of individual options in the number of applications of innovations (the number of existing ships) in the analyzed period. The curves A, B, and C refer to the identified innovations. The curve combined from the two concepts C+Cm and C+Czm shows the cumulative share of c concept in the number of applications of innovations, taking into account variants of this concept (the "c_m" variant for 1882, the "c_{zm}" variant for 1898).

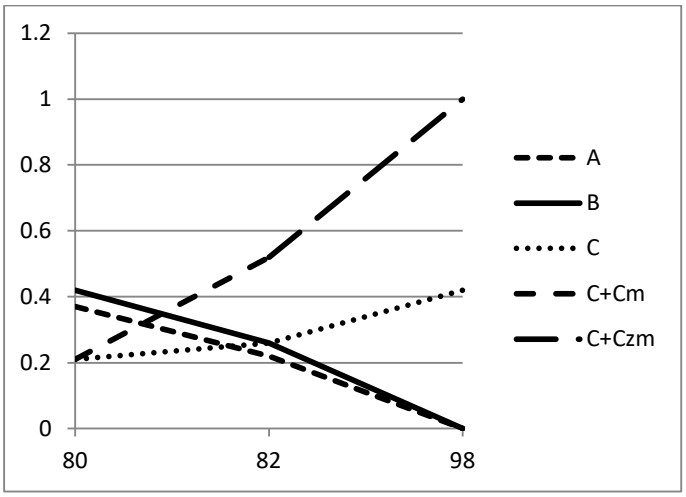

Diagram 1: Relative share of innovations in total number of ships

Source: Own work

Diagram 2 shows the relative share of innovation c in relation to the number of countries implementing the innovation. The curve combined from the two concepts C+Cm and C+Czm in Diagram 2 takes into account the individual cumulative share of the application variants of this concept (the "c_m" variant for 1882, the "c_{zm}" variant for 1898).

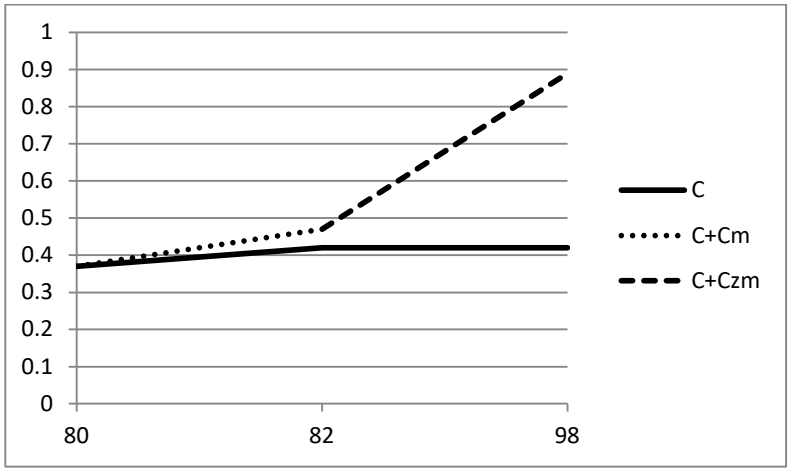

Diagram 2: Relative share of innovation c in countries implementing it

Source: Own work

There are two curves on the Diagram 3. One of them illustrates the relative (quantity from 1880 is the reference level – assumed value 1) number of implementations of innovations (the number of existing ships) in the period analyzed. The second illustrates the relative (with the adoption of the maximum number of countries that used the analyzed innovation in the period considered as 1 [100%] – there were 19 countries) number of countries implementing innovation in analyzed years.

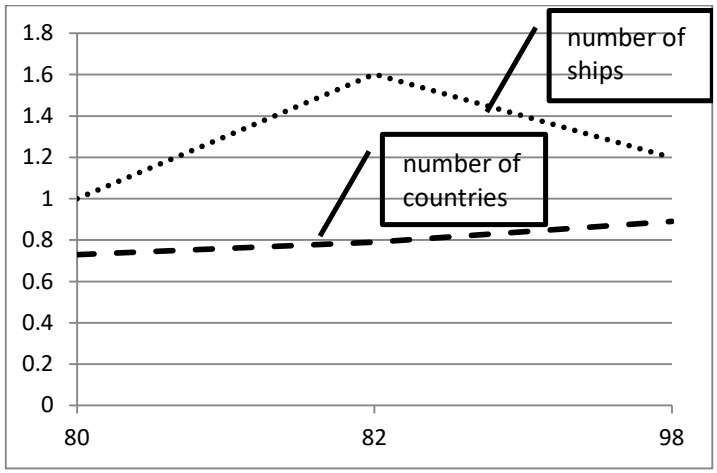

Diagram 3: Relative number of implementations of innovations and countries implementing innovations

Source: Own work

The results of the analysis obtained with the model are presented in the table 4.

Table 4: Interpretation of the data collected with the model of diffusion of technological innovation in competitive environment

Years	α_{it}	β_{it}	x_{it}	α_{it}	β_{it}	x_{it}	α_{it}	β_{it}	x_{it}	α_{it}	β_{it}	x_{it}	α_{it}	β_{it}	x_{it}	E_t	α_{it}
	a			**b**			**c**			**c_m**			**c_{zm}**				
80	1	0.36	48	1	0.42	55	1	0.22	28	0	0		0			131	1
82	0.97	0.36	46	0.98	0.42	54	1.89	0.22	54	1	0.22	56	0			210	1.6
98	0	0	0	0	0	0	1.20	0.41	65	0	0		1	0.59	92	157	0.74

Source: Own work

The table presents the analysis of the diffusion of technological innovation consisting in changing the design of the warship as a whole product. The dissemination of this innovation based on the data for three consecutive periods marked as the years 1880, 1882 and 1898 was analyzed. Only the largest and heaviest armed vessels determing the strength of the fleet were considered. The three main competing variants of innovations referred to as "*a*", "*b*" and "*c*" were taken into account. Since variant *c* occurred in three versions during the analyzed period, they were considered separately, as variant "*c*" (basic) and two variants – "c_m" and "c_{zm}" variants. In the analysis of each variant for each period, the following parameters appearing in the model were taken into account:

- the emergence of a variant of innovation and its dissemination or disappearance. Actual coefficient of attractiveness of the i-variant of innovation at the moment $t + 1$ was calculated. The value of the parameter has been placed in the column "α_{it}". If the value presented is one in the row referring to a specific period that indicates the appearance of a given innovation variant for the first time. The appearance of a value different from *1* and *0* in this column in a row referring to a specific period shows the relative rate of dissimination of the considered innovation variant - the number of its implementations in a given period in relation to the number of implementations in the previous period, when the considered variant was used. The value of *0* in the "α_{it}" column shows that in the period under consideration the given variant of innovation was not implemented.
- the diffusion of innovations at the moment t measured in the number of implementations of innovations at that moment. Data about this parameter was placed in the E_t column.
- diffusion of the *i*-variant of innovation at the moment *t* measured in the number of implementations of the *i*-variant. Data about this parameter in relation to each of the considered innovation variants is placed in the x_{it} columns.

Additionally, the coefficient of relative attractiveness of the *i*-variant of innovation at the moment *t* is placed in table 2. Data about this parameter in relation to each of the considered innovation variants was placed in β_{it} columns.

The results presented are the product of implementation of the model developed. According to authors, it is possible to use the data to validate the model, as the phenomena of diffusion of changes in construction of the warships can be easily identified based on available data. Moreover, referring the facts and the data calculated to the actual condition of economy at that time enables identification of the causes of the situation and explanation of the diffusion process.

The dominance of variants "*a*" and "*b*" which is recognizable in Diagram 1 in 1880 is the result of the impact of the capacity existing at that moment (the structure of resources and methods of their use). Despite the significant share of the "*c*" option (which undoubtedly is characterized by the highest usability), the decision-makers have a low opinion of the ease of absorption and compatibility with the existing potential. The usability evaluation of variants "*a*" and "*b*" decreases gradually in 1882 and subsequent years, and their decreasing compatibility with the increasingly dominant option "*c*" leads in 1898 to the complete elimination of these variants of innovation.

On the other hand, dispersion between the "*c*" and "c_m" variants in the Diagrams 1 and 2 identifiable for the year 1882, indicates that assessment of the usability of both varieties of the basic variant of the "*c*" option was changing. However, the dispersion between the two variations presented in 1898 indicates a decreasing assessment of the ease of absorption of the basic variant "*c*". As it is known from history, the reason for the phenomena was the growing costs of building the largest and heaviest armed ships in the "*c*" variant. The trend is consistent with the decline in the overall number of ships visible in the Diagram 3. The number of countries using the analyzed innovation is growing rather slowly. It signals the changes taking place within variant "*c*" Again, as it is known from history, they resulted in the appearance of new ship classes built according to variant "*c*" - "*dreadnoughts*" and "*superdreadnots*", which took place after 1900.

Validation of the model used for the analysis of technological innovation presented in this article confirmed the assumptions adopted for the model development.

Summary

Innovation is one of the key concepts concerning modern technology, economics, management and sociology. Innovation has been described as a key factor while explaining the survival and competitive advantage of firms (Hult et al., 2004). Within this evolutionary process implying continuous change (Schumpeter, 1942), innovation is closely related to the creation of new knowledge. Therefore, scholars and practitioners agree on the positive effect that the acquisition, dissemination and utilization of new knowledge has on the innovative performance of firms (Bergman et al., 2005). Developing a model for the diffusion of innovations in competitive conditions in authors' opinion will

provide tools for analyzing diffusion process and support decision-making processes in the field of technology development. The article presents the model for the dissemination of technological innovations in competitive environment, which is the situation in which there are several alternative innovation possibilities. The assumptions of the model are presented after brief theoretical introduction. Then the authors proceed to describe the structure of the model. The model is presented and discussed, and the discussion includes validation carried out on historical data, from approximately 20 years. The validation proves correctness of the model, and gives solid grounds for its further development.

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Claustrophobia Virtual Reality Exposure Therapy – An Interactive Game for Reducing Anxiety in Closed Spaces

Marian MARALOI
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania,
marianmaraloi@gmail.com

Oana MITRUȚ
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania,
oana.balan@cs.pub.ro

Alin MOLDOVEANU
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania,
alin.moldoveanu@cs.pub.ro

Florica MOLDOVEANU
University POLITEHNICA of Bucharest, Faculty of Automatic Control and Computers, Bucharest, Romania,
florica.moldoveanu@cs.pub.ro

Abstract

Virtual Reality Exposure Therapy (VRET) is becoming an increasingly popular mechanism for treating a wide range of psychological disorders, such as phobias. The concept behind this therapy is to transpose the patient into a virtual environment in which he is exposed to various factors that trigger the feeling of fear at different levels. Thus, he has the guarantee of not being endangered while adapting to the conditions of the virtual environment. In this way, efficient virtual reality systems are evoked to generate in time an emotional response that contributes to reaching a final result of the treatment. However, there are a wide range of problems that prevent the adoption of large-scale virtual reality systems, such as high development costs, the depth of research on several disorders is still limited and the difficulty for patients to fully understand their relationship with the virtual system and the outcome of the treatment. This project brings in a virtual environment that exposes the user to different gradual elements in terms of claustrophobia, consulting him/her at key moments in the game in order to obtain a more detailed analysis of the anxiety index evolution in time.

Keywords: Phobia, Claustrophobia, Virtual Reality, Game.

Introduction

The context

Phobia is a type of anxiety disorder manifested through an extreme, uncontrolled and irrational fear that occurs when the subject is exposed to certain stimuli - a natural situation, the presence of people, animals or objects. There are different types of phobias, such as claustrophobia - fear of closed spaces, agoraphobia - fear of crowds or open spaces, social phobias - fear of public speaking, meeting people of higher authority and specific phobias - caused by various objects and situations (American Psychiatric Association, 2013). Social phobias affect all age groups, but the onset is usually in adolescence (95% begin before the age of 20).

Claustrophobia, a term that has its Greek origin in the word claustro, which means closed, and the word phobos, which means fear, is the fear of enclosed spaces. It can be unpleasant and scary, but most people who experience fear find ways to cope with it, usually by deliberately avoiding small or closed places. Small or closed rooms, tunnels, cellars, elevators, subway trains and crowded places are stimuli that can cause fear, and people who react to one of these situations are likely to react to all of them (Davey et al, 2000). The fears of sitting in a dentist's chair or

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waiting in a long queue are also associated with the fear of not being locked up and are usually considered signs of claustrophobia.

The treatments indicated for phobias are of two types: medical (pills) or psychological, through cognitive-behavioral therapy. They help the patient to see the traumatic experience differently, by controlling thinking and behavior and by gradually exposing the subjects to the fear-generating objects, in the presence of the therapist who monitors the entire procedure and adjusts stimuli and exposure intensity. VRET allows exposure therapy in a virtual environment generated by the computer. There is no difference in terms of abandonment rate between VR exposure and in vivo exposure (Opris et al, 2012). Although virtual exposure sometimes induces motion sickness, it is estimated that over 80% of the patients prefer VRET to classical in vivo exposure.

The objectives

This paper aims to design and develop an application for people suffering from claustrophobia. Claustrophobia VRET exposes the user in a virtual environment in which he is subjected to claustrophobia stimuli. Thus, the patient is immersed in a reality generated by the computer, which presents dangerous stimuli in real-world situations. This type of therapy is called Virtual Reality Exposure Therapy (VRET) and is a behavioral treatment for disorders such as anxiety and phobias.

Claustrophobia VRET is a 3D game whose purpose is to support the users in fighting against the fear which arises from the feeling of being enclosed in a small space, without having any possibility to escape from there. The player has the mission to pass through a cave in search of a portal that teleports him to a cave whose galleries are narrower than the previous ones. Thus, the feeling of claustrophobia is accentuated depending on the level the player is at.

In order to measure the patient's progress along the route, there are checkpoints where he is asked to answer various questions. This will help us to obtain some graphical highlights regarding the user's progress, in terms of two emotion components: the anxiety generated by the objects placed in the scene and the anxiety generated by the narrow space of the pathway. Some tests have been performed with a group of people suffering from claustrophobia in order to assess the efficiency of the virtual environment. A future development of the system will be the extension of the application to allow the users to be exposed to the claustrophobic environment using HTC Vive glasses for virtual reality. Additional tests will be performed by using sensors that provide information such as skin conductivity and heart rate dynamics.

Analysis and Requirements Specification

Customers' profiles

In order to obtain the users' profiles and to extract their preferences or requirements, they were asked to fill in a questionnaire with questions that refer to the experience with virtual reality applications, the forms of claustrophobia that affect their daily lives and a table in which they assess the level of anxiety they would feel in different circumstances. The responses were received from a sample of 32 people, aged between 15 and 54. The data collected revealed the following aspects about the subjects:

25% of the respondents said that they do not suffer from any form of claustrophobia, while 53.1% said that they had small difficulties in terms of anxiety created by small spaces. They are part of a majority which, although encounters minor aspects of claustrophobia, is not affected by it in their daily lives. Instead, the remaining 21.9% encounter great difficulties in coping with claustrophobia, forcing them to change their course of activities, such as giving up using the elevator, finding other means of public transportation and avoiding crowded areas, such as concerts and festivals.

Although 37.5% of the respondents stated that they thought of visiting a specialist, only a small percentage of 6.2% did. One of them underwent 3 months of in vivo therapy, giving up due to the lack of results felt and the fear caused by the approach of each therapy session, mentioning that he wants to try other methods of therapy, such as exposure in virtual reality, which finds more attractive. A percentage of 31.3% of people intended to follow a treatment, but did not do it, because they showed a total lack of confidence in traditional methods for treating claustrophobia.

Although the trend of virtual reality systems is increasing, the patients' problems in understanding in depth their relationship with the virtual system is the main reason why people suffering from claustrophobia refuse to try exposure therapy the in virtual reality. A percentage of 62.6% of the respondents had an insufficient level of experience for finishing a therapy session in the virtual environment.

There are two situations to which the respondents attributed the highest factor of claustrophobia: to be locked in a small, dark room without windows for 15 minutes, respectively to be locked in a box of their size for 15 minutes. These two circumstances will be key elements to consider in developing the application.

By taking into account the answers of the potential customers, we obtained the necessary parameters to create a list of functionalities that the final product will have to fulfill.

System Requirements

For the application to run optimally, the computer on which it will run must meet the following minimum specifications:

- Windows 10 operating system
- Intel Cor i5-10210U processor
- 10 GB of free hard disk space
- 4GB RAM
- Dedicated MX150 2GB video card

Functional Requirements

Information menu. At any point in the game, the user can press the "I" key and the missions he has to complete to move to the next level will be presented to him, as well as the list of control elements.

Implementing player control. Similar to first-person games, the player's movement will be implemented according to the popular control elements for the WASD keyboard (W - forward, A - backward, S - left, D - right). For a good mobility, the player's point of view will be changed according to the mouse movement on the Ox and Oy axes, the sprint and squat will be accessible by pressing the LShift and LCtrl keys, and the Space key will be used for jumps.

Interaction with scene objects. Interaction with scene objects will be suggested to the player as he/she approach them. This includes pressing the "F" key to collect the crystals, or the "E" key to open the doors for the portals leading to the next level.

Randomly generated portal. To intensify the feeling of anxiety, the exit from the claustrophobic environment will be randomly generated for the user, in order for him to go through as many areas of the scenes as possible.

Game design. The environment’s design must meet the requirements obtained by configuring the customers’ profiles. Thus, the setting chosen for the project is a cave whose exit points are represented by portals inside boxes the player’s size.

Adding sound and animations. Any movement of the player will be synchronized with sounds, such as the sound of footsteps or jumping.

Adding a score system. Depending on the level of comfort that the user feels, he/she can navigate through the scene as much as possible in order to collect crystals and to obtain a score as high as possible.

Given the analysis of potential customers above, we came to the conclusion that pyrophobia is a real problem in the lives of some people. It is a phobia with which you can be born or which you can acquire. Therefore, the motivation of this paper is to create a reliable virtual environment, which can have a positive impact on people suffering from pyrophobia. We wanted to develop a functional product, based on a scenario that the users can encounter in everyday life.

Non-Functional Requirements

There must be different levels of difficulty for both novice and advanced users. At any time during the game, the player can press the "H" key and a panel will be presented in front of him/her, from where he/she can adjust his/her claustrophobia index.

There must be a smooth flow of the game without the user to get blocked.

At the end of the session, the user should have an overview of his/her evolution. Thus, he/she will receive an email that explains in detail each stage he/she went through and the accumulated score, along with a .csv file useful for making a plot of the progress.

Existing Approaches

Although in its infancy, the market for VRET applications has grown exponentially, due to better results compared to other classical methods of treating psychological disorders. Most platforms offer a wide range of environments that focus on presenting as many anxiety-provoking scenarios as possible. Next, we will analyze three platforms for phobia treatment that use VRET technology, by emphasizing the virtual environments, the scientific ideas behind them, but also a series of identified disadvantages.

C2Care (C2Care) offers the widest range of virtual reality therapeutic software solutions on the market. To date, more than 450 doctors and medical institutions in France and abroad have used the C2Care products. This platform collaborates with more than 15 university teams and many health specialists. It is designed by mental health professionals, psychiatrists, psychologists and psychotherapists. With the help of virtual reality headsets and accompanied by a therapist, the patient is gradually exposed to different levels of anxiety, depending on his pathologies. The application is composed of more than 70 exposure scenarios that help treating conditions such as acrophobia, agoraphobia, claustrophobia, ochlophobia, arachnophobia, aviophobia, school phobia, fear of speaking public, fear of dogs, fear of dentist, etc. C2Phobia allows the patients to be exposed to anxiety-related situations, while ensuring their safety and by gradually exposing them to the object of their fear. Moreover, there is the possibility to expose the patients to virtual reality at home. The therapist can monitor, expose and treat the patients even from a distance.

The Virtual Reality Medical Center (VRMC) (VRMC), based in San Diego, California, provides support to the Bureau of Naval Research, the U.S. Army and the Defense Advanced Research Projects Agency (DARPA) and the National Institutes of Health (NIH) in the field of psychological research design and training. It uses VRET in combination with biofeedback and cognitive behavioral therapy to treat phobias, anxiety, stress and chronic pain. The treated conditions include specific phobias such as fear of flying, fear of driving, fear of heights, fear of public speaking, claustrophobia, agoraphobia, panic attacks and post-traumatic stress disorder caused by road accidents. Physiological monitoring is non-invasive, with visual feedback to analyze and help patients understand when they feel anxious and when their body is relaxed. At each step, the therapist can see and hear what the patient is experiencing in the virtual world. If the level of anxiety becomes overwhelming, he/she can return to a less stressful level of treatment or simply take off the virtual reality glasses.

PsyTech (PHOBOS VR Exposure Therapy) is a virtual reality software start-up that has developed a platform for phobia and anxiety management for individuals, professionals and organizations, using Oculus Rift. Phobos (PHOBIS video) has also made games that address arachnophobia (fear of spiders), ornithophobia (fear of birds) and other animal-related phobias. In addition, they have created simulations for aerophobia (fear of flying), claustrophobia, agoraphobia (fear of open environments) and other forms of chronic or acute anxieties. In a virtual environment dedicated to claustrophobia therapy, the users are subjected to a MRI scan in which they must sit inside the device for 10 minutes or walk in small apartment. The elements present in the second scene are rooms such as a bathroom, a kitchen or a pantry, all very small-sized, with objects with which the player can interact.

Although it offers many virtual environments for treating phobias, C2Care does not present an increase on levels in terms of treating claustrophobia. The existing environments, such as using an elevator or walking on a busy street have a lower anxiety index than, for example, a cave. Another disadvantage is the price for a one-month subscription (60 euros). VRMC focuses on environments dedicated to pre-surgical anxiety. For claustrophobia, there is the MRI scan scene, similar to the one developed by PsyTech. The therapy is not remotely accessible because it involves physiological monitoring from a specialist. Even if PsyTech proposes a large number of scenes dedicated to claustrophobia, the technology used involves the Oculus Rift device only and the developed applications are 6 years old, which leads to a lack of graphical details and diminishes the impression of reality perceived by the patient.

The Proposed Solution

This chapter presents the proposed solution, from the perspective of user's interaction with the objects in the scene, as well as of the elements that create anxiety and how they are emphasized on the levels.

Claustrophobia VRET consists of 4 scenes: the first three scenes represent claustrophobic environments, in ascending order according to the index of fear caused to the patient, while the last scene contains an open environment, as a reward for the user's success to overcome his/her fears and escape from the uncomfortable environment. The ratio between the player's height and the height of the cave's galleries is different for each scene. The first (and at the same time, the easiest) level implies that the height of the player is equal to a quarter of that of the cave and in the second level it is half of it. In the last level, the player will have a height equal to that of the galleries, in some places being forced to squat to in order to pass.

The first three scenes address the theme of a cave with three clogs and are similar in terms of their construction, the difference being the ratio between the height of the player and the height of the galleries. For scene construction, we used various design elements bought from the Unity Asset Store (Bat asset, Cave asset). The player starts from the right end of the cave (Figure 1) and has the mission to collect as many crystals as possible, while finding the portal to the next level.

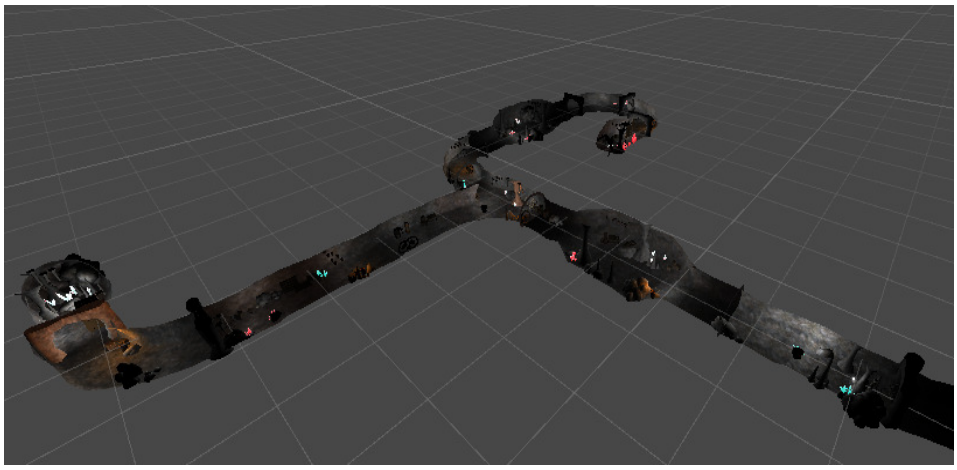

Figure 1: Map construction

The portal is placed randomly at one end of the cave, which accentuates the feeling of claustrophobia, by adding an element of uncertainty. This causes the user to panic when he reaches a dead end, without finding the portal to the next level. If the player finds the portal, he will have to enter a box of dimensions that will be smaller than theirs in the last scene (Figure 2). After the player enters this box, he will have to spend 15 seconds with the door closed, in order to be teleported to the next scene. The idea behind the repetitiveness of the scenes is to maintain the player's state of anxiety caused by the lack of hope in finding a final exit from the cave.

Fig. 2: Portal to the next level

After starting the application, the user is asked to fill in his personal data in order to store the information internally and to create a plot with his/her evolution during the therapy sessions he/she attends. The information is represented

by the measurements done during the game and will be saved in a .csv file. The panel contains the fields to be filled in, consisting of two text areas in which the user is given instructions - his name and the number of the therapy session which he attends, along with a save button (Figure 3).

Fig. 3: Filling in personal data

One metric designed to monitor the user's progress is to create a scoring system based on the number of crystals collected (Figure 4). The player's desire to search and collect as many crystals as possible is directly proportional to his level of comfort in the environment. If he/she develops a feeling of high anxiety, his/her main goal becomes the immediate search for a way out of the cave. Thus, those who will collect as many crystals as possible will receive a higher score. These crystals are of three colors - red, blue and white, and the player's score is updated and displayed after collecting each crystal. Also, the number of objects left to collect is displayed. To make it more difficult to gather all the crystals, they are placed in different hard-to-reach parts, such as behind groups of stalactites and stalagmites through which it is necessary to slip or on the upper parts of the cave, where the user needs to jump.

Fig. 4: Collecting the crystals

To make a more frightening environment that accentuates the state of anxiety, we added objects such as bats, skulls, skeletons or barrels in flames. In addition, we supplemented the scene with animations such as the flight of groups when the player gets near to them (Figure 5).

Fig. 5: Flight animation of a group of bats

The data that is used to analyze the evolution of the patient's anxiety level is collected in 5 control points in each of the 3 scenes available for play. The points are strategically placed in key areas: the first point is located in the middle of the first room of the cave to collect the player's initial feelings, followed by two points on each artery that starts from the intersection of the three corridors. One point is in the middle of the artery where the cave is the narrowest, and the other is before it reaches the clog. There, the level of anxiety is the highest, due to the uncertainty of finding the portal at the end of the artery. The questions are designed to obtain measurements of fear, respectively the level of anxiety produced by the environment. The questions have 5 possible answers: not at all anxious, a little anxious, moderately anxious, very anxious and extremely anxious and they are assigned an index of claustrophobia / fear of the environment from 1 to 5, inspired by (PHOBOS on Unity). Thus, we can see how the user accommodates to the virtual environment, by analyzing his profile, who resulted from the questionnaire he/she filled in before starting the game. The answers are saved on columns in a .csv file, depending on the scene in which they were collected, the control points that the player passed and the degree of fear/anxiety that he/she estimated (Figure 6).

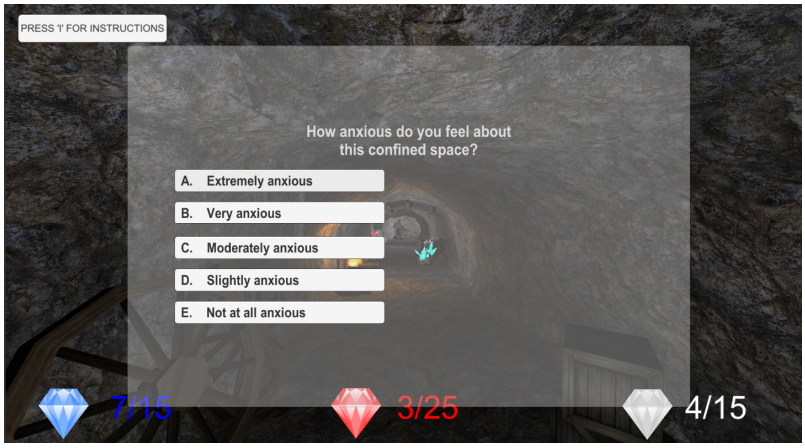

Fig. 6: Question about the level of anxiety

If the user shows high signs of anxiety, a panel is displayed where he/she can adjust the claustrophobia index according to his/her preferences. Also, at any time on the way to the transition portal to the next scene, if the player feels the need, he/she has the option to use this panel to maintain a progressive desensitization. The panel shown in Figure 7 contains three buttons: two buttons to scale the height of the character relative to the size of the cave by 10% less or more, the extreme limits being 10% and 100% respectively and a button to close the panel.

Fig. 7: Claustrophobia level control panel

When the player finds the last portal that represents the end of the game, he/she is asked to fill in a field with his/her personal email address in order to receive the results. This feedback is divided on the evolution on the three levels and includes the answers to the questions, regarding the degree of fear in the checkpoints, respectively the degree of anxiety felt, the number of diamonds collected and the unexplored areas of the scene. The .csv file created during the game is also attached to this email (Figure 8).

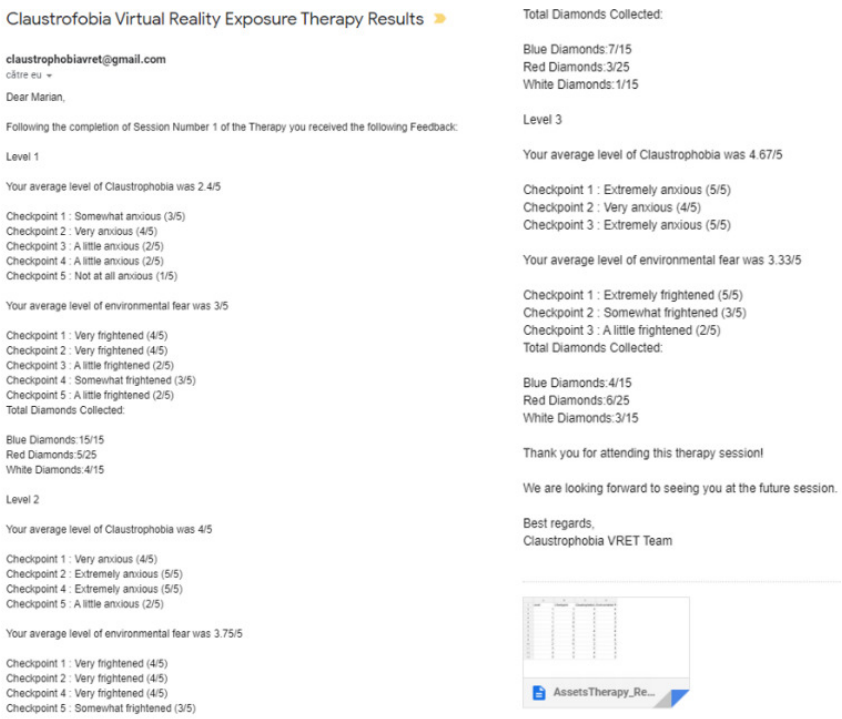

Claustrofobia Virtual Reality Exposure Therapy Results

claustrophobiavret@gmail.com
către eu

Dear Marian,

Following the completion of Session Number 1 of the Therapy you received the following Feedback:

Level 1

Your average level of Claustrophobia was 2.4/5

Checkpoint 1 : Somewhat anxious (3/5)
Checkpoint 2 : Very anxious (4/5)
Checkpoint 3 : A little anxious (2/5)
Checkpoint 4 : A little anxious (2/5)
Checkpoint 5 : Not at all anxious (1/5)

Your average level of environmental fear was 3/5

Checkpoint 1 : Very frightened (4/5)
Checkpoint 2 : Very frightened (4/5)
Checkpoint 3 : A little frightened (2/5)
Checkpoint 4 : Somewhat frightened (3/5)
Checkpoint 5 : A little frightened (2/5)
Total Diamonds Collected:

Blue Diamonds:15/15
Red Diamonds:5/25
White Diamonds:4/15

Level 2

Your average level of Claustrophobia was 4/5

Checkpoint 1 : Very anxious (4/5)
Checkpoint 2 : Extremely anxious (5/5)
Checkpoint 4 : Extremely anxious (5/5)
Checkpoint 5 : A little anxious (2/5)

Your average level of environmental fear was 3.75/5

Checkpoint 1 : Very frightened (4/5)
Checkpoint 2 : Very frightened (4/5)
Checkpoint 4 : Very frightened (4/5)
Checkpoint 5 : Somewhat frightened (3/5)

Total Diamonds Collected:

Blue Diamonds:7/15
Red Diamonds:3/25
White Diamonds:1/15

Level 3

Your average level of Claustrophobia was 4.67/5

Checkpoint 1 : Extremely anxious (5/5)
Checkpoint 2 : Very anxious (4/5)
Checkpoint 3 : Extremely anxious (5/5)

Your average level of environmental fear was 3.33/5

Checkpoint 1 : Extremely frightened (5/5)
Checkpoint 2 : Somewhat frightened (3/5)
Checkpoint 3 : A little frightened (2/5)
Total Diamonds Collected:

Blue Diamonds:4/15
Red Diamonds:6/25
White Diamonds:3/15

Thank you for attending this therapy session!

We are looking forward to seeing you at the future session.

Best regards,
Claustrophobia VRET Team

AssetsTherapy_Re...

Fig. 8: Email containing the results

Case study and Results Evaluation

Out of the 32 people who filled in the initial questionnaire, in order to obtain the system's functional requirements and outline the client's profile, 16 of them agreed to participate in the game testing sessions. They downloaded the application from here (Install files). After testing, they completed another questionnaire, in which they were asked to evaluate the application from several points of view. The data analysis reveals the following:

- 87.5% of the respondents managed to finish the game and 81.3% of them considered that its duration was appropriate. The game may vary in time according to the user's desire to collect as many crystals as

possible. Thus, 6.3% considered that the route was too short, while 12.5% considered that the route was too long.

- The opinions about the route's difficulty are divided, due to the different profiles of each user, as their degree of anxiety differs. One of the obstacles encountered along the way was the difficulty of collecting crystals from hard-to-reach areas. In addition, most respondents stated that the virtual environment is very realistic, which confirms that the choice of the Unity graphics engine was a good one.
- 87.5% of the respondents considered that the questions about the emotional state were intuitive, which gives a high degree of credibility to the analysis made based on the answers given. 93.8% of the users stated that the journey in the virtual environment helped them somehow to get rid of the anxiety.

As the application is dedicated to the treatment of patients suffering from claustrophobia, we asked a person whose answers in the first questionnaire revealed that he/she is the one who is most affected claustrophobia, to perform several sessions in order to plot his/her evolution. Thus, he/she played 4 sessions and obtained the following scores: in the first session an average degree of anxiety in the 5 control points equal to 4 (out of a maximum of 5), in the second session 3.2 / 5, in the third session 2.4 / 5 and in the last session, 1.2 / 5. As it can be seen in Figure 9, his/her evolution in the 4 sessions progressively improved.

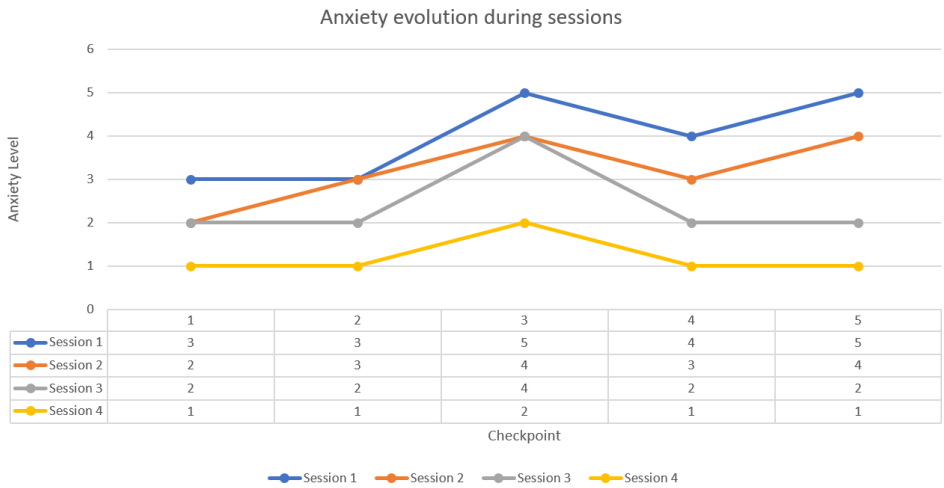

	1	2	3	4	5
Session 1	3	3	5	4	5
Session 2	2	3	4	3	4
Session 3	2	2	4	2	2
Session 4	1	1	2	1	1

Fig. 9: Plot of the anxiety level evolution of the most claustrophobic user

Conclusions

Claustrophobia VRET is an application that proposes a new challenge for people suffering from claustrophobia, in order to treat the anxiety perceived in small and enclosed spaces. This application emerged as a result of the market expansion of virtual reality therapy software solutions. By considering the analysis and requirements specification, Claustrophobia VRET aims to address all the needs of the target audience: availability on the most used gaming platform, best fit into the most appropriate navigation duration, optimal graphics quality, in-game activities and interaction with the objects from the virtual environment.

The setting in which the game takes place is one which has not been addressed by the existing virtual reality environments and has as theme the galleries of a cave in search for an exit portal. Considering the questionnaire completed by the people who tested the application, the construction and organization of the scenes, the effects of interaction and animation, the choice of the checkpoints and the intuitive questions that helped analyze the evolution of anxiety, all these proved to be key elements in creating a virtual reality environment that can treat patients suffering from claustrophobia.

Because the implementation stage of the presented application is an incipient one, there are various important functionalities that can be developed to ensure a place in the elite of virtual environments for treating claustrophobia: the development of the system, in order to allow the patients to be exposed in VR using the HTC Vive glasses, performing additional tests using a physiological monitoring system, designing more scenes in which the player will be subjected to a longer journey inside the cave, by adding other branches of galleries.

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Human-Influenced Critical Success Factors in Enterprise Resource Planning System Implementation

Brenda-Leah HERNANDEZ-ROVIRA

Colorado Technical University, Denver, Colorado, USA
brenda.hernandez177@alumni.ctuonline.edu

Abstract

Identifying critical success factors can aid decision-makers in preventing human-influenced failures to enterprise resource planning implementations. The purpose of this exploratory qualitative study was to explore the human-influenced critical success factors for an enterprise resource planning system implementation. The study was accomplished through interviews with 12 mid-level to senior-level project and IT managers with experience in enterprise resource planning system implementations. The researcher looked to illuminate those human-centered factors that cause failure so managers can better avoid or mitigate issues caused by the factors. The results of this study will assist management in reducing factors that often result in the loss of revenue, resources, and market share. The need for enterprise resource planning systems to remain competitive means organizations regularly seek to ensure project success and system acceptance. Eliminating threats yields a system that realizes requirements, reduces resource waste, and increases overall task efficiency. Results from the study close the gap between known critical success factors and the behavior modifications needed to ensure successful implementation and usage. The transcribed interviews demonstrated that communication was the most frequently experienced factor in enterprise resource planning system implementations, followed by planning, readiness, expectation, lens, resistance to change, skill, and culture. Two unique findings in the study were the appearance of requirements in the top factors and that the resistance to change factor was not as prominent as expected.

Introduction

Critical success factors (CSFs) can negatively affect Enterprise Resource Planning (ERP) system implementation and subsequent system usage (Jenko and Roblek, 2016). Some CSFs may be directly attributed to human interference. Preventing negative human influence on project activities could mean the difference between a successful implementation and system adoption or the curtailment of project activities.

Providing managers with factors that warrant extra attention and mediation may ensure successful project completion and system adoption. Highly competitive and volatile markets mean that organizations employ technology to make informed strategic business decisions, exploit resources, or increase efficiency (Payne and Frow, 2005). The technology used takes the form of an enterprise information system (EIS). Systems are implemented that assist in resource deployment, supply chain management, human resources, and analytics. Of the available solutions, ERP is the most comprehensive (Alok et al., 2018). The most substantial advantages ERPs provide is the real-time tracking and deploying of resources, along with the intelligence that drives critical strategic business decisions. Markets are volatile, so the ability to shift resources, limit resource expenditure, or expand in markets can make or break an organization (Pearlson et al., 2016). ERP implementation is only made possible by expert level computer engineers and developers, so any alterations needed to ease end-user assimilation are developed and configured by these experts (Al-Jabri, 2015). As such, knowledge distributed to managers that mediate human-influenced issues with system implementation or usage is also vital to the experts developing and installing the solutions.

ERP system implementations are highly disruptive and expensive endeavors for organizations to pursue, regardless of the benefits expected (De Toni et al., 2015). High failure rates are experienced in both project completion and system acceptance leading to attempts to discover the core reasons for these failures (Jenko and Roblek, 2016). Though end-user adoption of technology was explored in Davis (1989) Technology Acceptance Framework, initial research into ERP implementation failures was first documented in the early 2000s, as evidenced by Al-Mashari and Al-Mudimigh (2003) article focused on the postmortem of a troubled implementation. The exploration into ERP issues coincides with the adoption trend at the time. ERP implementations increased as the system started to gain the attention of larger organizations. From that point, studies emerged by Chakravorty et al (2016); Etoz and Dugenci (2015); and Pabst et al (2016) documenting issues and potential mediation efforts addressing both project failure rates and system acceptance.

Even though the issues surrounding ERP implementation and system adoption are frequently researched, the human ability to derail the project and subsequent acceptance appear to remain neglected.

The study into human-influenced CSFs is of vital importance to managers and end-users in organizations planning an ERP implementation (Al-Jabri, 2015). Project post mortems and research into ERP failures have not improved the percentage of successful implementation and system acceptance (Gollner and Baumane-Vitolina, 2016). The lack of improvement in the success rate may be because research into the human influence on these factors does not appear to exist.

Research into human-influenced CSFs in ERP implementation is essential to information technology (IT) and organizational management due to the cost of sunk resources and the benefits that ERP provides when the project is successful (Amoatey and Mawuena Vincent, 2017). According to De Toni et al (2015), organizations lose between two and six percent of an organization's yearly profit in failed enterprise information system implementations. With ERP being the most popular and function integrating of the solutions available, it is here that the loss of spent resources is experienced most acutely (De Toni et al., 2015). Not only is there a loss of funds, but also a considerable loss of confidence in the organization by staff and customers, lost work hours and production from disruptions caused by the implementation, and loss of the benefits from the implemented system like greater efficiency or quality (Amoatey and Mawuena Vincent, 2017). End-user refusal to use new or different technologies was initially captured in the Technology Acceptance Framework (Davis, 1989). The research by Davis was expanded on by Abdinnour and Saeed (2015), and Davis's (1989) constructs are used in many other studies. The results of recent investigations by Campbell et al (2017); Dumpit and Fernandez (2017); Lai (2017); and Wang et al (2018) validate Davis's initial discoveries; that end-users demand technology to make their tasks more manageable and that the technology be easy to use. Any deviation from expectations will result in end-user refusal. By examining the human aspect of CSFs, managers may be able to develop more targeted mediation plans to ease fears and frustrations that end-users experience, preventing push back during the implementation phase and system usage refusal.

The problem addressed in the subject research study was that ERP implementations do not realize the potential expected, consume more resources than initially projected, or the implementation fails (Irvine and Hall, 2015). The research study was to explore the human-influenced CSFs for an ERP implementation. The researcher illuminated those human-centered factors that cause failure so managers can better avoid or mitigate issues caused by the factors. Identifying CSFs can aid decision-makers in preventing human-influenced failures to ERP implementations, both during the implementation phase and during initial use, which may result in loss of revenue, resources, and market share (Irvine and Hall, 2015).

Literature Review

The Literature Review provided background on the central research question of "What are the factors that top and mid-level management experience as being human-influenced critical success factors on an ERP implementation?" Studies into ERP system implementation failures usually center on project critical success factors (CSFs), those common factors linked to success or failure of any project. Studies are commonly done that list CSFs for ERP implementation, but few tying the CSFs to actual project success (Ram and Corkindale, 2014). Most studies conducted on ERP implementation CSFs are based on failed or ailing projects. Studies to reexamine the effect of using previously discovered CSFs to mediate or eliminate issues in another project have not been conducted (Ram and Corkindale, 2014). Organizations must recognize that compiling lists of CSFs alone is not enough to provide a complete guide to successful implementations. There needs to be guidance that provides practical instruction on how to manage each factor (Irvine and Hall, 2015).

ERP implementations are lengthy, complex, and risky (Alhakimi and Alzahary, 2015; Jenko and Roblek, 2016). Implementation costs for ERP generally range between two and six percent of an organization's profit (De Toni et al., 2015). Research into ERP implementations discloses that more than half end as failures, and of those failures, 20% terminate before the project finishes. Experts also state that 90% of ERP implementations are over budget and cost, while 67% fail to achieve the requirements (Alhakimi and Alzahary, 2015). Often the volume of issues and the enormous expense of implementation outweigh the benefits of ERP (Shaul and Tauber, 2013). A waste of benefits and investment with ERP systems is encountered if users do not utilize, or outright avoid the new system (Abdinnour and Saeed, 2015). Studies into ERP failures usually center on project CSFs, those common factors linked to the success or failure of any project. As previously mentioned, only recently have CSFs for ERP listed human components, but only revealing these factors as more of a secondary intent rather than the focus of the research (Jenko and Roblek, 2016). Close examination of many CSFs seem to indicate a strong human influence at the root. Examining previous studies have revealed CSFs in three overarching categories, human-centered, organization-centered, and project-centered. These same major categories

are featured in the conceptual framework. The combination and interaction of the seminal works of the Concept of Critical Success Factors (Rockart, 1978), System's Theory (Bertalanffy, 1972), and Technology Acceptance Framework Model (Davis, 1989) create the relationships to concepts, constructs, and variables used to develop the study (Stebbins, 2001).

Human-Centered CSFs

Regardless of how successful the project side of ERP implementations is, consideration of how organizational staff reacts to the new system is vital; there is no pay off for a system implementation if the staff refuse the system (Al-Jabri, 2015). Resistance to change presents itself in many forms during project implementations (Ronningstad, 2018). Human-centered CSFs include those that indicate acceptance, satisfaction, and preconceived impressions.

Acceptance and satisfaction.

Fred Davis first investigated user acceptance and satisfaction with information technology (IT) in 1989. Davis (1989) posited that staff would use a system if they believe it will enhance their job performance, under a construct he labeled perceived usefulness (PU). A user that feels a system is too hard to use will reject it even if it enhances their job performance was labeled Perceived Ease of Use (PEoU). Between PU and PEoU, PU is more linked to system rejection. Even if a system is easy to use, if the user believes the system provides no benefit, they will reject it. These behaviors were confirmed by Al-Jabri (2015), who added that satisfaction boosts ease of use on a system. Al-Jabri's (2015) examination confirmed that satisfaction is directly linked to system use and increases on the cumulative experience users have on the system.

Abdinnour and Saeed (2015) reported that employees make assumptions on how roles and tasks will change based on what they perceive management values most, and where an employee sits in the hierarchical structure of an organization will influence their perception of the benefits and value of an ERP implementation. Beijsterveld and Groenendaal's (2016) concluded that a common cause of ERP discontent by end-users is that the system fails to live up to the promise of specific features they assumed were to be included. Whether there was any intent by leadership to provide those features does not factor into the end-users perception that the feature should be available (Beijsterveld and Groenendaal, 2016).

Perceptions and expectations.

Staff will often negatively formulate the events and consequences of change in the absence of a clear vision. These early perceptions carry on through to the implementation of the change creating resistance (Rafferty and Jimmieson, 2016). EU and EoU are not the only system reception indicators by staff (Pierce et al., 2014). Influence for acceptance and satisfaction on system implementations occurs through communication, competency, usage intent, change resistance, subjective norm, and organizational relationships (Al-Jabri, 2015). Factors that influence acceptance and satisfaction can cause dissent through the neglect of even one factor (Brock and Khan, 2017). According to Rafferty and Jimmieson (2016), change fatigue creates negative perceptions. Rafferty and Jimmieson (2016) stated that user perceptions were greatly influenced by the amount of change in a specific. Ronningstad's (2018) study agreed that change fatigue contributes to system resistance, even when other factors are favorable. Altering daily tasks to accommodate system implementation processes creates tedium and discontent fairly quickly (Ronningstad, 2018).

ERP implementations may take considerably more time than many staff realize. Poor communication of the time needed for ERP implementations results in unmanaged expectations (Cresswell et al., 2013). Unmanaged expectations cause stakeholders to develop a negative attitude and pull away from implementation activities. Losing the support of stakeholders may mean losing the resources they bring to the table, effectively ending the project (Rafferty and Jimmieson, 2016).

Communication effect on satisfaction

Al-Jabri (2015) conducted a study that revealed communication as one of the key factors in ensuring satisfaction. Communication tasks include documenting the use case, issuing of the change management plan, and the announcement of the system changes to users to include the benefits, scope, schedule, and progress. Organizations must gain the staff's trust to see a successful change initiative. Communication is vital in order to gain trust. Communication works by acknowledging and nurturing spirit, motivation, participation, and dispensing job security assurance (Husain, 2013).

Staff competency effect on satisfaction

Jenko and Roblek (2016) revealed that constant and open communication does affect satisfaction, but the need for competent staff is just as crucial. Al-Jabri (2015) reported that intensive training is required to increase the competency of staff and ensure system satisfaction. Without training, staff may feel the system is too complicated and challenging to use. The staff may also feel too much time is required to attend to simple tasks.

Intent to use the system

Pierce et al (2014) extended the EoU and PU findings by adding attitude and intent. Intent is the primary key in what drives a user to accept and use a system. Many organizational forces influence intent; one such force is from management. Managerial pressure directly affects user intent. Pressure by management alone might enact acceptance of any object. Instruction on repetitive tasks might influence intention. The more education staff receive on specific tasks, the more willing they are to engage in them, even in instances of innovative technology (Esteves, 2014). Organizations that provide training to their employees find more staff acceptance and system usage after ERP implementation (Esteves, 2014). Staff performs better in organizations where management endorses training.

Resistance to change

Resistance to change is a symptom of fearing the unknown (Fernandez and Rainey, 2017). Combating resistance to change is achieved by making sure the staff actively participate in change activities (Fernandez and Rainey, 2017). Changes occur that may make staff feel powerless and ineffective. Completing tasks that directly affect the end goal of a successful implementation, restores confidence, and a sense of ownership in the implementation (Lin, Huang, and Chiang, 2018). Ronningstad (2018) concluded that managers are the key to deterring resistance to change. Additionally, Ronningstad (2018) indicated that project managers are the buffer between passing on changes from upper management and getting staff to adhere to unpleasant changes.

Subjective norm and organizational relationships.

Group dynamics, like subjective norms and departmental relationships, may connect to acceptance and satisfaction of a system's implementation. Alok et al (2018) revealed that subjective norms play a crucial part in the perceived usefulness and intention to use the system as peer pressure determines what is and is not useful in an organizational context. Subjective norm is the assumption that everyone behaves the same way that they do (Alok et al., 2018). In groups, staff will relate to those that think the same.

Organization-Centered CSFs

CSFs centered specifically on an organization are those that bring to front group dynamics and how those dynamics influence the success or failure of system implementations (Ballaro and Washington, 2016). Often the individual will concede personal perceptions to those of the group. The staff members going against the group face alienation (Newham and Midjord, 2018). These clique-type CSFs include group mentality, culture, readiness, assimilation, readiness, lens, size, training, and skill level.

Organizational Group Mentality

Humans are instinctively driven to collect in groups (Tsvetkova et al., 2017). Group herd behavior serves to protect from harm and make the best use of available resources (Campbell and Grimshaw, 2016). Individuals in the group observe behaviors and are then compelled to behave in the same manner (Newham and Midjord, 2018). In organizations, group collective or social behavior could result in group behaviors that propel change or collectively resist change (Tsvetkova et al., 2017).

Culture

Alhirz and Sajeev (2015) conveyed that organizations must realize that culture plays an integral part in the success of implementations. Use intention, positive or negative, can be moderated by the hierarchical influence of management. Organizational culture has a considerable influence on the acceptance of technology. Bharati and Chaudhury (2012) reported that support by top-level management is crucial to the success of any technology adoption. ERP system implementation benefits from an organizational change culture and willingness to allow assimilation. In an organizational sense, assimilation is the act of when system usage is routine and seamlessly integrated into each process (Mehta et al., 2014). User resistance to change based on organizational culture is the primary reason for the lack of assimilation in ERP implementations (Mehta et al., 2014).

Readiness

Lohe and Legner (2013) found that some of the main difficulties in implementation are the diverse stakeholders, organizational complexity, and the enormous scope of the project. Jagoda and Samaranayake (2017) advised that before beginning efforts to implement an ERP, organizations must be realistic in what the ERP implementation will accomplish and embrace those activities ERP can do better.

ERP implementations are an organization-wide disruptive initiative. Many organizations find that there was not enough time placed to completely understand how disruptive (De Toni et al., 2015). Prepping the organization for a highly disruptive implementation like ERP is the best way to ensure project success (Peci and Vazan, 2014). Planning, infrastructure preparations, management, training, communication, competence, and system exposure by the whole organization are keys to readiness.

Planning

Planning before the implementation is critical to prevent issues with the implementation. De Toni et al (2015) found that failed initial implementations can have adverse effects on perceived usefulness and ease of use of the final implementation. Holm et al (2012) discovered that the selection of the architecture to be used needs to fit the organization. Organizations achieve fit by making sure the infrastructure has been prepared by analyzing the quality of the data. Shaul and Tauber (2013) contended that evidence of poor planning shows in underperforming or failed ERP implementations. The most common cause of ERP failure is inadequate planning leading to unmanaged expectations (Cresswell et al., 2013). Failure to conduct proper planning means the organization does not have a full understanding of each process needing improvement (Peci and Vazan, 2014). Pabst et al (2016) contended that pre-implementation planning not only includes a review of failure points and robust requirements but the commitment of management as well. Successful implementation comes through the combination of organizational and management commitment so, a clear indicator that an organization is not ready for ERP is if the need for ERP is not crystal clear to stakeholders (Pabst et al., 2016). Stanciu and Tinca (2013) agreed. Their analysis revealed that success in ERP implementation hinged on top management collaborating with stakeholders during planning and implementation (Stanciu and Tinca, 2013). Stanciu and Tinca (2013) also revealed was that management commitment was essential; specifically, there is no buy-in at the bottom when there is no buy-in at the top.

Assimilation

Getting a successful implementation must include the ability for the integration of the system and the organization. Mu, Kirsch, and Butler (2015) stated that ERP is more than just the integration of hardware and software. The enterprise, as a whole, must embrace the solution. Assimilation is possible if the organization can act on the new technology and the architectural needs of the infrastructure. Nixon (2014) added that assimilation is rarely the focus when change occurs. The negative focus on assimilation places the implementation on fragile ground.

Departmental lens

The lack of consideration of assimilation could be from the way the various departments view the change. Tsiga et al (2016) reported that the success of a project depends on the viewed lens. Participants will not view project success in the same way stakeholders do. Leadership and stakeholders may view the need for ERP implementation as crucial to the

growth of the organization, yet staff may view the implementation as additional duties layered on normal daily activities (Kunert and Weth, 2018).

Organizational size.

Failures for ERP implementation do not only affect large organizations. Wachnik (2017) conducted a study that revealed successful implementations for large organizations versus small organizations were nearly the same. Wachnik observed there was a slight increase in failures for implementation in smaller organizations because of the limit on resources experienced by smaller organizations. Larger organizations can divert resources to failing implementations, improving the chance the implementation succeeds, even if over budget (Reascos and Carvalho, 2018).

Training and skill level.

Implementation success occurs in organizations that invest in training, yet many organizations do not place enough emphasis on training. Esteves (2014) reported that training regimes are not developed with cyclical retraining in mind even though the disruptive forces of ERP continue through many implementation phases. Hsieh and Hsu (2015) found that training is key to system acceptance and proved that end-user training for new information systems implementation is not sufficient. Training must occur at regular intervals throughout the project cycle and has been demonstrated to be more effective with mentoring (Hsieh and Hsu, 2015).

Project-Centered CSFs

Projects consume the most significant portion of an organization's growth strategy and focus. Ignoring the factors that signify possible issues can directly affect the outcome of any project, especially in the case of long-term projects (Irvine and Hall, 2015). Noted by Ha and Ahn (2014), ERP is considered one of the most important long-term projects organizations undertake to improve processes. Managing CSFs in long-term projects, like ERP implementations, makes sure growth dependent on a successful project goes according to strategy (Akhavan and Zahedi, 2014). Successful project outcomes rely on superior project management. Project management depends on project managers acting in the position of organizational change agents and project planners (May, 2013).

Project Management

Several studies have identified CSFs directly linked to the management of the project itself (Irvine and Hall, 2015). These project-oriented CSFs indicate possible problems with solution alignment to the organization, lack of understanding of solution implementation, or lack in project management expertise (Ram and Corkindale, 2014).

Akhavan and Zahedi (2014) went on to say that management needs to be present in each phase of implementation and visible to business units (May, 2013). Alhakimi and Alzahary (2015) found that most ERP implementations fail due to organizational management factors. Organizations must engage top management to counter employee resistance. Al-Hadi and Al-Shaibany (2017) showed that when managers agree on the present course of action, their presence is enough to quell resistance (Al-Hadi and Al-Shaibany, 2017).

Project managers are change agents.

Project implementation success occurs when organizations choose the right agents who provide the oversight, the resources, and the plan. The best agents during implementations are experienced project managers (May, 2013). Joslin and Muller (2015) stated that successful project implementations hinge on the skills and experience of the project manager. Ram et al (2013) added that effective project managers do more than manage projects. During project phases, project managers serve as management, peer, and mentor. Project managers minimize resistance to change and implementation failure by being attentive to how teams are selected, the scope of the project, and establishing tight monitoring and control routines (Ram et al., 2013).

Project managers are Project Planners.

Project managers must be included in each phase of implementation, from selection to finish, to be effective (Ram et al., 2013). A project manager's input is most critical in the planning phase. The article by Barros et al (2015) mentioned planning as the most crucial element in any integration process and mostly affects the quality of data and process improvement. Etoz and Dugenci (2015) agreed that planning is essential, and implementations fail due to poor cost estimating, scheduling, and project risk assessments. Within the planning phase is the selection of which solution best fits the organization's needs and the selection of the vendor providing the solution. Jinno et al (2017) reported that ERP packages must be scrutinized to meet expectations. Vendors will often suggest features that do not fit the organizational need or play down features creating a gap in function (Ram et al., 2013).

Research Methodology or Approach

The research method and design selected was a qualitative tradition using an exploratory approach. The exploratory design under the qualitative tradition looks to examine phenomena centered on a specific subject (Stebbins, 2001). For research centered on discovering how humans can alter the success of project implementations as with the subject research study, exploratory design for the qualitative methodology was the best choice (Stebbins, 2001).

Population and Sample

The target population for the exploratory study contained IT or project mid to senior-level managers from any industry or corporation size in the United States that experienced an ERP implementation effort. The success or failure of the implementation was not relevant as CSFs can be seen in successful implementations but are more prevalent in failed implementations (Ha and Ahn, 2014). As ERP implementations take years to complete, the inclusion of ERP implementations in progress was appropriate. CSFs for ERP implementations can appear as early as the first phase of development (Chakravorty et al., 2016). Overseas locations were not accepted as the process to implement ERP, along with success rates, differ than the US (Chakravorty et al., 2016). The consideration of the language barrier and time zones impacting interviews was also a reason to keep the selection of participants to the continental US. Of the population identified, a sample of 12 mid and senior-level managers took part in the study.

Participants of the study were obtained through a flyer posted on the professional social media site LinkedIn in two professional groups that permitted the solicitation of members, as evidenced by Site Permission Emails. Further solicitation took place using the flyer on the PI's LinkedIn account and through direct messaging after searching for IT management and project management in the LinkedIn search box. Respondents with a relationship with the PI were not selected. Participants that volunteered were put through an initial validation process to verify that the prospective participant was able to answer the questions that need to be asked in support of the study.

Data Collection Instrumentation and Procedures

Exploratory methods in a qualitative study mainly use interviews for data collection, making the researcher the data collection instrument (Stebbins, 2001). The data collection for the subject research study was used to explore human-influenced critical success factors in ERP system implementation utilizing interviews. Interviews can come in many forms, but for this study, the main form of the interview was open-ended and semi-structured. Each participant was asked the same main research questions. As the interviews progressed, more targeted questions followed to clarify answers or provide better detail. Tools used in the interview process was the voice-enabled computer applications Go To Meeting. NVivo transcription service was used to create transcripts from the interviews as well as for data analysis.

When participants accepted the invitation, they were required to verify they were able to answer the questions that need to be asked in support of the study (Derry et al., 2010). For the subject research study, the participants needed to verify they were in management at the time an ERP implementation was underway. The participants needed to have been personally engaged in the ERP implementation. After validation, the interview session was scheduled and confirmed. Main interview questions were asked of participants; however, probing questions were used to clarify or deepen participant answers during the session. Transcribed interviews and raw recorded files were stored on removable flash drives protected by a password and locked in a safe along with any physical notes and documents. Stored files will remain in the locked safe for seven years.

Data Analysis Procedures

The analysis of data collected was under the Thematic Analysis method by Braun and Clarke (2006), indicating a six-phase process. The first phase of thematic analysis began by exposing key words tagged with codes (Braun and Clarke, 2006). The study had a mixture of pre-set (priori) and newly developed (emerging) codes (Braun and Clarke, 2006). The data collected from the interviews was coded initially through a list of priori codes established from the central research question. Codes matched the categories of CSF with human factors as HF, project factors as PF, and organizational factor as OFs. Within the categories, the individual factor matched to previously known factors was noted with a category and abbreviated factor. For example, human factors were perception, expectation, intent, resistance to change, and subjective norm. These factors translated to the code as HFp, HFe, HFi, HFr, and HFs. Data analysis occurred immediately after completion of the interviews and receipt of the transcribed sessions from the transcribers. Transcribed data were uploaded to NVivo for scrutiny. The patterns and words revealed themes used to answer the central research question (Stebbins, 2001).

Data analysis began with the uploading of participant approved transcribed interview sessions after the data was identity segregated from the interviewee by a predetermined interview number (Study Participant [SP] 1; Braun and Clarke, 2006). Data analysis completed when the conclusions for the study were drawn from the rated words, phrases, and quotes. The consolidated results were used to answer the central research question on human-influenced CSFs on ERP implementation and initial usage. Data reporting turned the analysis into a comprehensive understanding of the themes revealed in the study (Braun and Clarke, 2006).

Findings

Each transcribed interview was scrutinized for experiences relayed in response to the interview questions. Passages were given codes aligned with CSFs discovered in the literature review. Most of the coding was consistent with the priori codes; however, some passages revealed CSFs that needed to be added to the existing code book. Table I depicts the raw collection of codes discovered during data collection that covers codes established for: (a) human-centered – how the individual reacted to implementations, (b) organization-centered - CSFs that highlight group dynamics and how those dynamics influence the success or failure of system implementations, and (c) project-centered – CSFs that revolve around the managers, stakeholders, staff, and teams directing and involved in the implementations project. Two codes were added that appeared in responses often but were not previously identified as a singular CSF. These two codes were added under Project Factor\management (PFm). One added code was communication (PFmC); the other was change management (PFmCM).

Table I: ***CSFs in order of Frequency from Transcript Coding***

Name	Interview Files	References
Project Factor	12	157
Organizational Factor	12	133
Project Factor\management (PFm)	12	105
Human Factor	12	78
Project Factor\planning (PFp)	12	44
Organizational Factor\readiness (OFr)	12	42
Human Factor\expectation (HFe)	12	35
Project Factor\management (PFm)\Communication (PFmC)	11	54
Organizational Factor\lens (OFl)	8	24
Organizational Factor\skill (OFsk)	8	22
Organizational Factor\culture (OFc)	8	19
Organizational Factor\group mentality (OFg)	7	13
Organizational Factor\training (OFt)	7	12
Human Factor\resistance to change (HFr)	6	21

Human Factor\intent (HFi)	6	11
Project Factor\fit (PFf)	5	9
Project Factor\management (PFm)\Change Management (PFmCM)	5	9
Human Factor\subjective norm (HFs)	5	5
Organizational Factor\assimilation (OFa)	3	3
Human Factor\perception (HFp)	2	7
Organizational Factor\size (OFs)	2	2

Child categories had references aggregated into the overarching categories. In identifying top factors, the counts of frequency were noted; however, overarching factors were not considered in the top experienced factors. Removing the overarching factors left management (PFm), communication (PFmC), planning (PFp), and readiness (OFr). The most experienced factors were best summed up by the participants. For the factor planning (PFp), SP1 relayed:

> …When you're putting your project charter together …here is what I want to do. In order for us to be more productive, more effective, and make decisions in a quicker way, here is the process I want to follow. And asking our client how they want to do this, who do you want to involve in what kind of meeting, and who you want to involve in decision making versus status meetings.

For the factor management (PFm), SP2 conveyed:

> One of the first things I do when I start a project is a stakeholder analysis. So, identify all of the people who have a vested interest in this project. I want to know what their thoughts are on the project. …And I want to make sure I got the right people with the right skill sets. If I don't, I will do what I can to swap them out before the project starts.

For the factor communication (PFmC), SP5 revealed:

> …in the beginning of the project, the business leadership of the company made very clear why the change was being implemented. There was business rational and generally it had to do with customers and customer satisfaction and serving customers better. That translated to the project sponsor and the steering committee, the steering team and they were totally bought in on the change and why it was necessary.

For the factor readiness (OFr): SP2 exposed:

> …Dirty data is kiss a of death for some of these. And that happens way too often that they go live with dirty data and that causes problems…The vendor doesn't know the customer's data so they can't cleanse it. The only one that could do that is the business. The vendor can help them understand what they need to be looking at. They can't do it.

Discussion

The subject research study explored the human-influenced CSFs for an ERP implementation. The study illuminated those human-centered factors that cause failure so managers can better avoid or mitigate issues caused by the factors. The results of the study provided human-influenced CSFs that aid decision-makers in preventing human-influenced failures to ERP implementations, both during the implementation phase and during initial use.

The intersections of foundational theories established overarching categories of CSFs as defined in the conceptual framework (see Appendix A). The three overarching categories of human-influence, organizational-influence, and project-influence CSFs were further populated by subcategories established by previous studies. Analyzed data captured from the experiences of project and IT managers revealed that interviews expressed factors in three overarching categories. The transcribed interviews further demonstrated consistent mention of eight specific factors: communication (PFmC), planning (PFp), readiness (OFr), expectation (HFe), lens (OFl), resistance to change (HFr), skill (OFsk), and culture (OFc).

CSFs under the subcategory communication (PFmC), included common phrases of stakeholders, committee, Chief Information Officer (CIO), decisions, issues, benefits, changes, requirements, applications, and customers as depicted in the communication portion of the word frequency query results (see Appendix B). The communication factor was

determined to be mentioned more than any other in the transcribed interviews. Communication is linked to human influence as the decision to use the tools at hand to elicit clear and frequent communication is up to the individual (Al-Jabri, 2015). Comparing the common words, many of the experiences recorded were with the implementation's managers. The participants specifically mention the project manager as the hub where communication begins and ends. Al-Hadi and Al-Shaibany (2017) attribute many implementation failures due to management factors, of which communication is a key part. Customer communication was also frequently expressed by participants as a communication factor.

Factors in the planning (PFp) subcategory had resources, requirements, stakeholders, members, projects, changes, internal, systems, perspective, and responsible as the most frequently used common phrases as depicted in the planning portion of the word frequency query results (see Appendix B). As with communication, project managers are the key to successful planning, as observed by Gollner and Baumane-Vitolina (2016). Observations made in the study revealed that the project manager ensures the receiving environment is ready, each detail is covered, and the implementation goes as expected (Gollner and Baumane-Vitolina, 2016).

Factors in the Readiness (OFr) subcategory had requirements, stakeholders, resources, internal, changes, vendor, managing, projects, systems, and ability as the most frequently used common phrases as depicted in the readiness portion of the word frequency query results (see Appendix B). Readiness entails that the management of the organization prepares stakeholders, customers, and staff to the changes and disruptions coming (Jagoda and Samaranayake, 2017). Choices must be made so that the changes planned are the changes needed, and nothing more (Lohe and Legner, 2013). The infrastructure also needs to be prepared so that the changes expected run as smoothly as possible (Jagoda and Samaranayake, 2017).

Expectation (HFe) revealed the most frequently used common phrases, as depicted in the expectation portion of the word frequency query results (see Appendix B), as requirements, accounts, changes, decisions, terms, issues, stakeholders, talking, culture, and customers. Expectations are a mix of communication and perception and are easily mitigated through the conveyance of a clear vision with realistic timelines, goals, and gains (Rafferty and Jimmieson, 2016).

The word frequency query results (see Appendix B) for Lens (OFl) had the most common words as requirements, customers, employees, roles, stakeholders, teams, vendor, benefits, committee, and decisions. Each individual envisions task importance and change differently (Kunert and Weth, 2018). Staff may view changes in the infrastructure as an impediment, where stakeholders may be more focused on the increased competitiveness or profit margin (Kunert and Weth, 2018). Managers are key in helping to shape a unified lens bridging organizational growth and staff daily workflow (Kunert and Weth, 2018).

Resistance to Change (HFr) has issues, culture, accountable, changing, benefits, complain, focusing, older, partners, and receptive as the most frequently used common phrases as depicted in the readiness portion of the word frequency query results (see Appendix B). As noted by Fernandez and Rainey, (2017), resistance to change is a reaction to a fear of the unknown. Lack of communication is a big trigger, so here again, managers are key in relaying precisely what the implementation will do and how long the implementation will take (Ronningstad, 2018). Lack of clarity and communication creates mistrust by staff to management (Ronningstad, 2018).

The word frequency query results (see Appendix B) for Skill (OFsk) had resources, skills, vendor, confidence, leaders, managers, members, onboarding, perspective, and requirements as the most common words. Jenko and Roblek (2016) found staff competence was an essential element in an ERP implementation. Staff skill was not only important in the implementation team but with the ability to relearn tasks under an emerging system (Ajami and Bagheri-Tadi, 2018).

Factors in the Culture (OFc) category had culture, customers, stakeholders, champions, entity, adaptable, autonomous, benefits, committee, and communications as the most frequently used common phrases as depicted in the factors portion of the word frequency query results (see Appendix B). An organization's culture is formed through the actions, values, and belief systems of management, stakeholders, staff, and customers. ERP implementations may have any of these groups believe the changes go against a standing culture. Communication and direction by managers, along with a strong change control process, are the primary forces to inhibit feelings that the organization is abandoning hard held values (Alhirz and Sajeev, 2015).

Exploring the factors did reveal some unique findings. The first is the appearance of the word "requirements" in the top factors. Requirements are a tangible item, not a behavior, but requirements seem to drive many of the factors most influenced by human interaction or intervention. Another finding was that most of the factors captured through the

interviews were as anticipated according to the literature review, except for resistance to change and end-user refusal. Though resistance to change did feature in the top eight factors, it did not appear as prominent as expected. In the experiences relayed by the participants, outright system refusal was a rare occurrence even in cases where there was significant change resistance among staff.

Implications for Theory and Practice

Factors identified through the experiences of the participants were collected as the core reasons ERP implementations succeeded or failed. Prior research acknowledged the theories behind CSFs but mostly on how those factors interacted with project management processes. The study focused on those factors most likely to be influenced by human interaction, intervention, or refusal. Human interaction was acknowledged by Davis (1989), but only as it pertained to end-user acceptance or resistance. As Bertalanffy (1972) stated in Systems Theory, any element interacting with another is an essential part of the entire system. With ERP, humans are an essential element in the operation of the mechanical parts. Ignoring or overlooking the human component through overly focusing on the project components were revealed to be one major reason for project failure by the participants. Acknowledging the existence of human-influence in CSFs, in general, could better assist management with project plans that could lead to generating a more solid implementation process. Participants conveyed that communication, planning, readiness, expectation, lens, resistance to change, skill, and culture were areas where the most human influence is experienced. Each of the top factors hinges on the need for clear, consistent, and open communication from the bottom to the top, and from the top to the bottom of the organizational hierarchy. Communication is especially critical in the early phases, where requirements and workflow are being collected (Peci and Vazan, 2014). According to the participants, the project managers were the key to opening and maintaining those lines of communication. The participants relayed that inept or inexperienced project managers often led to confusion and unmet requirements, so organizations should take extra care in the selection of project managers both on the organization side and the vendor side.

Limitations and Future Research

The research study examined the CSFs of multiple company sizes and industry types. Therefore, a major limitation in the study is the size of the participant pool and the inclusion of differing industries. ERP implementations are conducted by manufacturing industries and service industries, demonstrating staff differences in technical aptitude and sensitivity to task change. The limitation of this study is also due to the restriction of implementations done only in the contiguous US. Culture changes, language barriers, and customs may produce an entirely different set of CSFs not explored. Finally, the exclusive use of ERP implementations to examine CSFs limits more common types of CSFs found in other large-scale IT project deployments.

Future research into human-influenced CSFs could include expanding the study internationally, noting influences linked to local area customs or company cultures. Future research is also suggested by comparing factors noted in technically proficient industries against common factors noted in manufacturing. Finally, expanding the study of human-influenced CSFs to more forms of IT project implementations.

Conclusions

The researcher sought to determine CSFs in ERP system implementations that were the most influenced by human interaction or intervention. The analysis of 12 interviews revealed communication as the number one human-influenced CSF. The finding confirms studies by Ram and et al (2013), Tsiga and et al (2016), Shaul and Tauber (2013), and Shatat (2015) who reported communication as a common project CSF. A particular finding during the study was the appearance of requirements in many of the reported factors, but a finding in line with communication. Requirements are communicated from stakeholders to the vendors and project managers. Misunderstanding or outright neglecting of communicated requirements is another often discovered project CSF (Amoatey and Mawuena Vincent, 2017; Rafferty and Jimmieson, 2016).

Issues with the implementation efforts often spring from insufficient planning at the beginning (Amoatey and Mawuena Vincent, 2017; Peci and Vazan, 2014). Requirements gathering is done in the planning phase; therefore, constant, open, and clear communication must be present from the very onset of project planning (Peci and Vazan, 2014). Technology has matured to the point team collaboration and communication are present in most project planning programs available, yet these programs are still just a tool. Managers, stakeholders, and staff have to create those lines of communication and

continue to make use of those lines throughout the entire implementation. Once communication is cut or subdued, suspicion, assumption, and groupthink take over (Amoatey and Mawuena Vincent, 2017). The cost of poor communication may cause up to 90% of ERP implementations to fail (Shatat, 2015; Stanciu and Tinca, 2013). Failure with implementation leads to the waste of resources valued at approximately 6% of the organization's net profit (De Toni et al., 2015).

Many of the collected responses mention that project managers are essential in the flow of communication. Ram et al (2013) agree with a study that revealed that competent and experienced project managers know how to communicate with vendors, staff, stakeholders, and upper management in order to keep the implementation on track and running with the least amount of friction and resistance possible. The participants emphasized communication as the factor having a significant impact on ERP implementation. Technology makes the process of communication much easier, yet it is the human that initiates, consumes, and acts on that communication regardless of the medium used (Husain, 2013). Many of the participants insisted that it is the project manager that is the hub where communication starts and ends aiding in the spread of information and the collection of requirements.

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Appendices

Appendix A: Conceptual Framework

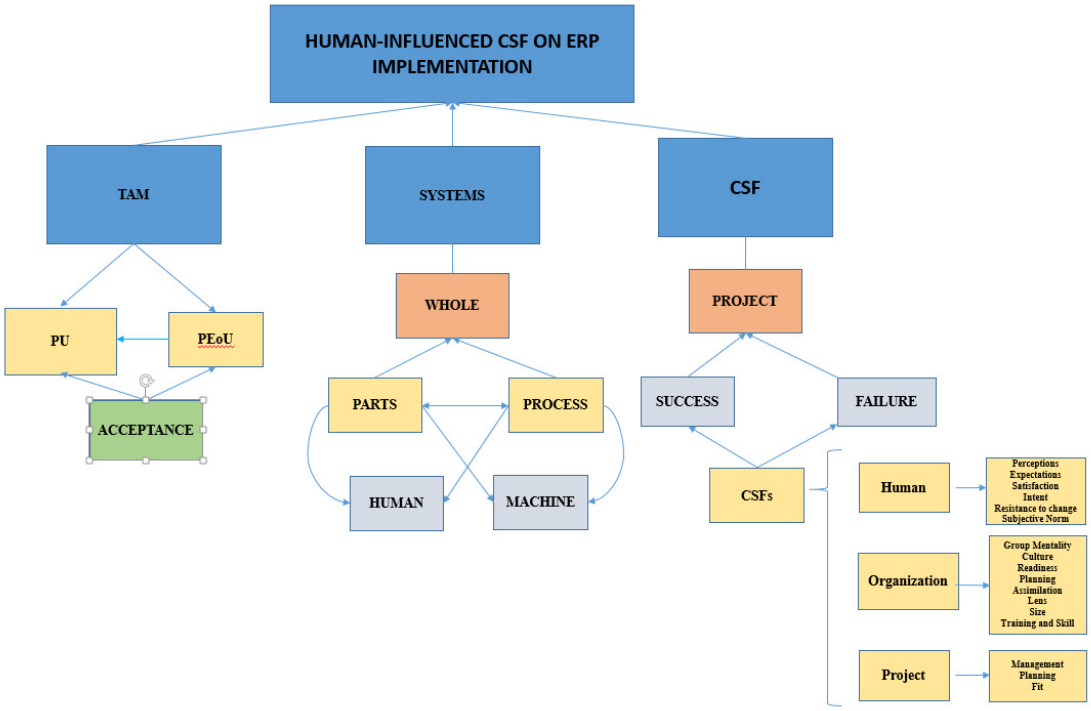

Appendix B: Word Frequency Query Results

Word	Length	Count	Weighted Percentage (%)
Communication			
stakeholders	12	11	1.82
committee	9	8	1.32
cio	3	7	1.16
decisions	9	7	1.16
issues	6	7	1.16
benefits	8	6	0.99
changes	7	6	0.99
requirements	12	6	0.99
applications	12	5	0.83
customers	9	5	0.83
Planning			
resources	9	15	2.73
requirements	12	12	2.18
stakeholders	12	11	2
members	7	7	1.27
projects	8	7	1.27
changes	7	5	0.91
internal	8	5	0.91
systems	7	5	0.91
perspective	11	4	0.73
responsible	11	4	0.73
Readiness			
requirements	12	20	4.47
stakeholders	12	11	2.46
resources	9	10	2.24
internal	8	6	1.34
changes	7	5	1.12
vendor	6	5	1.12
managing	8	4	0.89
projects	8	4	0.89
systems	7	4	0.89
ability	7	3	0.67
Expectation			
requirements	12	14	3.52
accounts	8	6	1.51
changes	7	6	1.51
decisions	9	6	1.51
terms	5	6	1.51
issues	6	5	1.26
stakeholders	12	5	1.26
talking	7	5	1.26
culture	7	4	1.01
customers	9	4	1.01
Lens			
requirements	12	6	2.11
customers	9	5	1.76
employees	9	5	1.76
roles	5	4	1.41
stakeholders	12	3	1.06
teams	5	3	1.06
vendor	6	3	1.06
benefits	8	2	0.70
committee	9	2	0.70
decisions	9	2	0.70
Resistance to Change			
issues	6	5	2.73
culture	7	4	2.19
accountable	11	3	1.64
changing	8	3	1.64
benefits	8	2	1.09
complain	8	2	1.09
focusing	8	2	1.09
older	5	2	1.09
partners	8	2	1.09
receptive	9	2	1.09

		Skill	
resources	9	8	4.30
skills	6	4	2.15
vendor	6	3	1.61
confidence	10	2	1.08
leaders	7	2	1.08
managers	8	2	1.08
members	7	2	1.08
onboarding	10	2	1.08
perspective	11	2	1.08
requirements	12	2	1.08
		Culture	
culture	7	8	5.48
customers	9	4	2.74
stakeholders	12	3	2.05
champions	9	2	1.37
entity	6	2	1.37
adaptable	9	1	0.68
autonomous	10	1	0.68
benefits	8	1	0.68
committee	9	1	0.68
communications	14	1	0.68

Financial Support for Older Parents in The Opinion of Poles

Sylwia PIENKOWSKA-KAMIENIECKA

University of Warmia and Mazury in Olsztyn, Olsztyn, Poland
sylwia.pienkowska@uwm.edu.pl

Abstract

Financial security during retirement depends on individual choices. The households may rely only on public pensions, additional private pension programs or/and on family and intergenerational transfers from their children. The purpose of the study is to establish whether Poles are willing to financially support their elderly parents during retirement. The analyses in the article are based on a data obtained from the quantitative survey Social Insurance Institution conducted on a representative random group of 1,030 respondents aged 15-75. According to the results, a vast majority of the Polish society claims that parents should receive financial support from their children in old age. Moreover, people who claim that the disadvantaged members of society require financial support from others are also more willing to support their elderly parents.

Keywords: Parents, Children, Old Age, Financial Support.

Introduction and Theoretical Background

In pre-industrial times, care and financial support to elderly parents was provided by children (Chybalski, 2018; Wunder, 2005). Extended family played the role of economic and care giving institution (Szweda-Lewandowska, 2008). In exchange for help with raising grandchildren and expected inheritance, younger generation provided care to the oldest members of the family (Olejnik, 2016). Introduction of state public pension schemes and development of welfare state institutions worldwide has absolved families from this informal responsibility and transferred it to the state. The first common insurance pension scheme was established by Otto von Bismarck in Germany in 1889. State old age systems were further introduced in, among others, Denmark (1891), New Zealand (1898), Belgium (1900) and Australia (1909) (Baldwin, 1910). Also William Beveridge in his report of 1942 set up a system of social security in Great Britain. It was supposed to be a welfare state based on the principle of universalism (Benassi, 2010), where "social insurance should aim at guaranteeing the minimum income needed for subsistence" (Beveridge, 1942). It was a significant difference in relation to Bismarck's model; its aim was something more, i.e. facilitating maintenance of current socio-economic status after retiring. In 1910 Baldwin (1910, p. 728) stated directly that the German pension system "[…] is unquestionably the most effective and successful scheme of old age support now in existence". Nonetheless, unfavourable demographic tendencies and persistently high unemployment rates in many European countries and worldwide over the years have put pressure on institutionalised pension security. This concerns Poland as well. As Góra (2003) claims, "What used to be an excellent solution - by this I mean the Bismarck system - became a burden to societies". Pension scheme currently functioning in Poland was introduced in 1999. It was not a parametric reform, but a complete change of the system for a new one-to-one link between contributions and pensions (Buchholtz, Chłoń-Domińczak and Góra, 2019), with additional pension security created from the ground up (Chłoń-Domińczak et al., 2020). Over the years many modifications have been implement, resulting in a subsequent changes to the three-pillar pension system in Poland (Jedynak 2019). Currently, the issue of additional pension saving is vitally important in the context of lowering replacement rates and the level of benefits provided within the base pension system. According to the last projections European Commission (European Commission, 2018) in the EU-27 countries average replacement rate for the public pension system (total benefits) will decline from 42.8% in 2016 to 35.2% in 2070. The decline in the rate, after for Spain (-31 pps), will be the largest for Poland (-29 pps). In order to assure adequacy of pension benefits, additional saving for old age is necessary (Rutecka-Góra, 2019), however, knowledge and understanding of this issue as well as the scale of additional savings for old age in the Polish society are poor and insufficient (Pieńkowska-Kamieniecka, 2020). It may be stated that the market of additional and voluntary pension schemes in Poland is still in the "preliminary phase of development" (Šebo et al., 2020). This market concludes of employee pension plans – pl. PPE (since 1999), individual retirement accounts – pl. IKE (since 2004), individual retirement protection accounts - pl. IKZE (since 2012) and employee capital plans – pl. PPK (introduced gradually since mid-

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2019). In 2018, participation index in individual pension plans reached 5.8% for IKE and for IKZE 4.3% (KNF, 2019a), whereas in group PPE it was barely 2.6% (KNF, 2019b). Estimated participation index in automatic PPK schemes (also called auto-enrolment), where employers are obliged to create and enrol their workers to such scheme, and employees are entitled to contract out of it, in the fourth quarter of 2019 reached 40% (Wojewódka and Kolek, 2019).

As Olejnik (2016) points out, in the case of failure of public pension schemes as well as low level of saving participation in additional pension schemes, the role of family transfers may increase. Bengtson (2001) directly points to the fact that the twentieth century is the period when the role of intergenerational transfers has increased. The main reasons of this include: longer life expectancy of different generation members at the same time (the so-called shared life), increasing role of grandparents in the family and growing strength and stability of intergenerational solidarity. Intergenerational transfers may have various background (motives), such as: altruism, mutuality of exchange or the wish to bequeath (Cigno, 1993; Lee and Donehower, 2011; Michoń, 2012; Szukalski, 2002; Kohara and Ohtake, 2006; Becker, 1991; Kohli and Künemund, 2003) Undoubtedly, transfers within a family play a significant role in planning the future of currently owned and expected financial resources by households. In the case of retirement security, such decisions may include resignation from present-day consumption for the benefit of saving for old age or financing the needs of parents in old age (Szumlicz, 2016; Szumlicz 2018). At this point it is significant to study the general social attitude to support elderly parents.

Therefore, the aim of the study is to establish whether respondents are willing to financially support their elderly parents during retirement. The following two hypotheses were assumed:

Hypothesis 1: Majority of Poles claim that parents should be supported financially by their children during retirement.

Hypothesis 2: Those who claim that the disadvantaged members of society require financial support from others are also more willing to support their elderly parents.

Methodology and Data

This article uses data obtained from the study ordered by the Social Insurance Institution (as the author of the research) and conducted in Poland by the Millward Brown Company in Poland in July-August 2016.. It was a quantitative (non-reactive) and representative nationwide study conducted with the use of CAPI (Computer-Assisted Personal Interviewing) research technique. 1,030 participants aged 15-75 took part in the study.

So as to realize the research objective, a logistic regression model was applied. While constructing the model, the following dichotomous dependent variable was used:

Y – Should elderly parents be financially supported by their children?

This variable took on the following form:

$$Y = \begin{cases} 1 \text{ if the respondent states „Yes”} \\ 0 \text{ it the respondent states “No"} \end{cases}$$

Independent variables, both qualitative and quantitative, are presented in Table 1 and 2. Within particular qualitative independent variables reference group (as ref. group) to which the interpretation of model results refers to was specified. Significance level to stay in the model was 0.05.

Also, in order to investigate whether subjects who claim that lower social insurance contributions allow to save more and enhance individual saving for old age do save more, chi-square independence test was performed. Appropriate calculations were performed using the IBM program SPSS Statistics 26.0.

The results of the analyses indicate that subjects who took part in the study were: mainly women, aged 40-59, living in the rural areas, with vocational and secondary education, employed, not having children or parents and not living with parents in a joint household (Table 1).

Table 1: Descriptive statistics for the independent qualitative variables and characteristics of the groups

Variable	Variant of variable	N	%
Gender	Women (ref. group)	533	51.7
	Men	497	48.3
Age	Aged 60 and more (ref. group)	258	25.0
	Aged 15-24	144	14.0
	Aged 25-39	300	29.1
	Aged 40-59	328	31.8
Place of residence	Cities with population > 500 k. (ref. group)	124	12.0
	Rural areas	393	38.2
	Cities with population < 100 k.	336	32.6
	Cities with population 100-499 k.	177	17.2
Level of education	Higher (ref. group)	149	14.5
	Primary	170	16.5
	Vocational	375	36.5
	Secondary	334	32.5
Status of employment	Pupil/student (ref. group)	72	7.1
	Employed	565	55.7
	Unemployed	114	11.2
	Pensioner/retiree	264	26.0
Having children	Yes (ref. group)	351	34.1
	No	679	65.9
Having parents	Yes (ref. group)	277	26.9
	No	753	73.1
Parents in a joint household	Yes (ref. group)	191	81.5
	No	839	18.5
Trust in ZUS	It is difficult to say (ref. group)	127	12.3
	Yes	449	44.1
	No	454	43.6
Do you save additionally for old age?	No (ref. group)	779	75.6
	Yes	251	24.4
Who should be mainly responsible for securing citizens for old age?	It is difficult to say (ref. group)	93	9.0
	Country	647	62.8
	Citizens	290	28.2
We should support disadvantaged groups (i.e. the unemployed, poor, handicapped, homeless) with money from our taxes	It is difficult to say (ref. group)	111	10.8
	I strongly disagree	64	6.2
	I rather disagree	177	17.2
	I rather agree	503	48.8
	I strongly agree	175	17.0
Lower social insurance contributions allow to save more and enhance individual saving for old age	It is difficult to say (ref. group)	220	21.4
	I strongly disagree	69	6.7
	I rather disagree	201	19.5
	I rather agree	371	36.0
	I strongly agree	169	16.4

Source: own elaboration based on the research of the Social Insurance Institution, 2016

Mean income per one household member for the respondents was 1.8 thousand PLN (middle exchange rate of November 5, 2020 according to National Bank of Poland is 1 Euro = 4.52 PLN).

Analysed in the study households had approximately 2.4 members (Table 2).

Table 2: Descriptive statistics for the independent quantitative variables

Variable	N	Characteristic
Number of persons in the household	1.030	Min. 1; Max. 7; Mean 2.4
Income in the household (in thous. PLN/1 person)	1.030	Min. 0.08; Max. 7.5; Mean 1.8

Source: own elaboration based on the research of the Social Insurance Institution, 2016

Results and Discussion

The results of the study indicate that a vast majority of the Polish society (79.6%) claims that parents should be supported financially in old age by their children (Fig. 1).

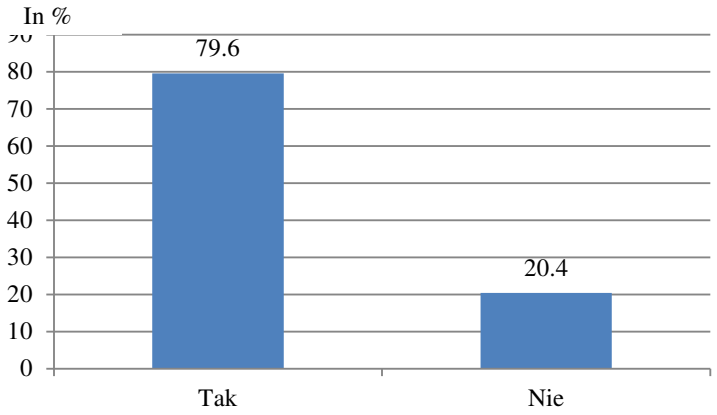

Fig. 1: The share of subjects declaring whether parents should be supported financially in old age

Source: own elaboration based on the research of the Social Insurance Institution, 2016

Among these people who claim that children should financially help older parents, are mainly women (51.1%), people aged 40-59 (32.4%), living in the countryside (38.2%), with vocational education (37.4%) and employed (56.7%).

The results of the analysis indicate that not all independent variables have impact on the analysed dependent variable, i.e. whether elderly parents should be supported financially in old age by their children. Table 3 presents the results of the logistic regression model, however, only those variables which are statistically significant. High p-value in Hosmer-Lemeshow test (>.05) allows us to conclude that the choice of variables for the model was appropriate and the model is correct.

Table 3: Estimates of logistic regression model for dependent variable: Adult children should support financially elderly parents

Variable	Variant of variable	S.E.	p-value	Exp(B)
Income in the household	In thous. PLN/1 person	.079	.013	.822
Having parents	Yes (ref. group)	.207	.042	.661
Lower social insurance contributions allow to save more and enhance individual saving for old age	It is difficult to say (ref. group)		.005	
	I strongly disagree	.335	.046	.513
	I rather disagree	.264	.642	1.130
	I rather agree	.252	.056	1.619
	I strongly agree	.290	.312	1.342
We should support disadvantaged groups with money from our taxes	It is difficult to say (ref. group)		.000	
	I strongly disagree	.415	.863	1.074
	I rather disagree	.334	.513	.803
	I rather agree	.315	.020	2.086

	I strongly agree	.363	0.22	2.302
Const.		.362	.000	4.151
Cox-Snell's R-squared	.058			
Nagelkerke's R-squared	.091			
Hosmer-Lemeshow (p-value)	.391			
Log likelihood	867.358			
N	916			

Source: own elaboration based on the research of the Social Insurance Institution, 2016

The above data show that such demographic variables as gender, age, place of residence, level of education and current professional status of the subjects do not have a significant impact on their attitude to provide financial support for elderly parents in the face of lower income after retiring. This means that no significant differences in this respect were observed between, for instance, women and men or subjects with different education level. Nonetheless, the research has found that income turned to be statistically significant. Subjects from wealthier households have smaller odds of claiming that elderly parents should be financially supported in old age by their children. These odds decrease by approximately 18% as the household income increases by 1 thousand PLN (per 1 person). Consequently, it may be concluded that less wealthy subjects are more willing to help others, also family. Yet, it is also evidently more common among those who have parents. Among the subjects who do not have parents, the odds for stating that elderly parents should be supported financially in old age by their children are 34% lower. As a result, experiencing poverty in a household or having parents are those factors which significantly increase the odds for supporting family in old age.

Moreover, after analysing how the attitude to claiming that lower social insurance contributions allow greater savings and enhance individual saving for old age is reflected in the willingness to financially support elderly parents, one may arrive at interesting conclusions. Firstly, the share of subjects who agree with the aforementioned statement and whether these people actually save more often outside the public pension scheme were analysed. The results indicate that 52.4% of the society state that if the rates of social insurance contributions were lower, it would be possible to save additionally for old age. Based on the conducted chi-square test, these are people who actually do more often participate in the market of voluntary additional pension savings (Table 4).

Table 4: The willingness to save for retirement according to the opinion on "lower social insurance contributions allow to save more"

Specification		**Lower social insurance contributions allow to save more and enhance individual saving for old age**				
		Definitely not	**Rather not**	**Rather yes**	**Definitely yes**	**It is difficult to say**
Saving for old age	Yes	10.0	19.5	39.0	23.1	8.4
	No	5.6	19.5	35.0	14.2	25.5
Chi-square=41.420; p-value =.000; V-Cramer=.201						

Source: own elaboration based on the research of the Social Insurance Institution, 2016

Nonetheless, conducted analysis of logistic regression clearly indicates that for those who definitely agree with the statement that lower social insurance contributions allow to save more and enhance individual saving for old age, the odds for financial support of elderly parents are nearly two times lower (by 48.7%) than for those who do not have an opinion or who disagree with this statement. It may indicate that these people believe one should save for their own retirement in order to improve one's financial status in old age instead of counting on support from family (children). On the other hand, of different opinion are those who are willing to support the disadvantaged members of society. Respondents who claim that the disadvantaged (i.e. the poor, unemployed, homeless) should receive support from the state budget (taxes), have two times greater odds of claiming that also parents should be financially supported in old age, respectively by 130.2% ("I strongly agree") and by 109.0% ("I rather agree") than those who do not have an opinion or disagree with this statement.

Conclusion

The study shows, as other research, that Poles declare the willingness to share their resources with others if the need arises, i.e. they are willing to redistribute (Pieńkowska-Kamieniecka, Rutecka-Góra and Walczak, 2019). It is a significant conclusion in the context of the first hypothesis assumed in the present article.

However, the results of the research support the two assumed hypotheses. Firstly, a vast majority of the Polish society claims that parents should receive financial support from their children in old age, i.e. the period when their income decreases after retiring. Nonetheless, it needs to be noted that not all analysed independent variables have a statistically significant impact on the dependent variable. Regardless of gender, age, place of residence, level of education or professional status, all subjects have similar odds of claiming that elderly parents should receive financial support from their children. The second hypothesis was also supported. The results of the conducted research prove that those who claim that the disadvantaged members of society require financial support from others are also more willing to support their elderly parents. It may result from their general view that the disadvantaged need to be financially supported. Surprisingly, subjects from wealthier households and those who claim that lower social insurance contributions do not increase the willingness to save additionally for old age are less likely to claim that children should support financially their parents. This may indicate that in their opinion one should save individually for old age outside the public pension scheme rather than expect financial support from their children.

The present study undoubtedly leads to a certain conclusion. In material, as in many other spheres of life, in the face of lowering replacement rates from the public system of retirement security - Poles declare that they may count on their family in old age. However, when it comes to voluntary (natural) retirement security, individual decisions of the households will determine to what degree financing of the changing needs in old age will be based on one's own savings and to what degree they will require financial support received from children (Szumlicz, 2016; Szumlicz, 2018).

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Design Traffic Surveillance with Analytical Tools in Regions on Citizens´ Safety

Ladislav MARIŠ
University of Zilina, Zilina, Slovakia, ladislav.maris@fbi.uniza.sk

Filip LENKO
University of Zilina, Zilina, Slovakia, filip.lenko@fbi.uniza.sk

Abstract

According to the European Transport Safety Council, pedestrians, cyclists and motorcyclists make up 70% of road deaths in European cities. This is according to the European Transport Safety Council. Road safety is an essential part in sustainable urban mobility. With the constant development of new technologies in road transport, the level of safety and fluidity of road transport is increasing. On the other hand, with the increase in the number of vehicles, there is an increasing pressure on overall throughput and hence road safety. Critical nodes, junctions, low-pass routes, etc. are at risk. Continuous traffic accidents or congestion at critical times - rush hour traffic results in reduced safety levels. Properly selected methods and procedures with new technologies help to reduce this problem. In this paper we analyze the use of analytical tools in road transport to increase the safety and fluency of the population in the selected region. In city Žilina is the first one preferring public transport vehicles in Slovakia.

Keywords: Video Surveillance, Analytical Tools, Traffic, Safety, Citizen, Region.

Introduction

Traffic design and traffic monitoring is an inseparable situation of modern society. Traffic monitoring and management is of economic, safety and environmental importance. There is no doubt that modern technologies used in the field of transport increase the permeability of intersections and to increase safety. One of the main purposes for providing real-time public transport information to individuals is to reduce the levels of frustration they feel with public transport (Kalasova 2013; Caulfield 2007). Currently, passengers have access to a lot of information when planning their trip by public transport. They can use a lot of applications, which are not compatible with each other (Velas 2016; Dolinayova 2018). Road safety is an active area of research for the automotive industry, and certainly one of ongoing interest to governments around the world. The intelligent transportation system (ITS) is one of several viable solutions with which to improve road safety, where the communication medium (e.g., among vehicles and between vehicles and the other components in an ITS environment, such as roadside infrastructure) is typically wireless (Velas 2016; Arena 2020). Current assessment of road safety performance of a country, or of the EU, is mainly based on analysis and compilation of police recordings of injury accidents (Velas 2016; Erso 2018).

Public Transport Preferences

The main goal is to ensure the preference of public transport vehicles, especially so as to ensure the smooth passage of the city of public transport through the intersections, i.e. to eliminate cases where the vehicle receives a red signal "Stop!" Shortly before entering the intersection (Velas 2016; Stoller 2018).

Vehicle preference has three basic benefits:

1. shortening the delay of the vehicle at the intersection in case the vehicle has a delay (shortening the travel time between stops),

2. minimization of the number of departures, i.e. reduction of diesel consumption (vehicle passes the intersection smoothly without stopping or braking),

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3. longer boarding time for passengers (the vehicle waits at the stop until the on-board computer instructs the driver to leave the stop).

The system of transport preferences should be applicable at light-controlled intersections, for its functionality it is necessary to connect the vehicle information system with controllers at light-intersections. Where conditions allow, the most appropriate solution is to build a preference using dedicated lanes. The purpose is to reduce travel times and provide passengers with an advantage over public passenger transport over individual transport. However, such lanes can be built where local conditions allow, especially regarding the width of the roads (Luskova 2018, Boros 2019, Bo-ros 2019).

The detection of public transport vehicles for preference purposes should be carried out by means of magnetometers located directly in the roadway. These should be complemented by cameras to ensure smooth traffic and fast operational management. Overall, this type of preference, even with the use of monitoring cameras, should apply to nine light-controlled intersections in the city of Žilina (Lovecek 2017; Figuli 2018).

Since the introduction of the preference, the transport company should to increase the attractiveness of public transport in the eyes of passengers compared to other types of transport, especially individual transport by car. Provid-ing a time advantage to public transport passengers has a major impact on modal shift decisions and gives public transport a strong trump card in the fight against individual transport. Another indisputable benefit is the saving of fuel and emissions from buses (Ballay 2017; Kampova 2010).

Methods

These transport preferences is mathematical simulation and visualization for a specific area (crossroads). Simulation results (Kalasova 2013; Boros 2019) for a specific area predict significant improvements in the preferred mode of transport (66% reduction in delay time for urban public transport), while the quality of the non-preferred mode of transport (urban public transport) has only partially deteriorated (10.5% increase in delay time).

However, there are also sections where the monitored parameters have also improved for the non-preferred mode of transport - these are mainly sections where the interval of passage of public transport vehicles is high. On the contrary, the deterioration of the monitored parameters was recorded mainly at the entrances through which public transport vehicles do not drive, or the passage interval of these vehicles is low. From the point of view of urban public transport, this phenomenon is not desirable, but it follows from the nature of the preference for urban public transport (Kampova 2010; Lovecek 2013).

Therefore, the proposal for the preference for urban public transport requires thorough preparation, where it is necessary to consider all risks and then minimize or eliminate them by appropriate steps (Kalasova 2013; Boros 2019; Boros 2019).

The one of these modern actions was a regional policy project in the Integrated Regional Operational Program 2014-2020, in the call Increasing the attractiveness and competitiveness of public passenger transport. Co-funded pro-ject by European Union names Preference of urban public transport at traffic lights in the city of Žilina in Slovakia.

In September 2019, the project launched. Žilina thus became the first city in Slovakia to have a comprehensive system of active preference for public transport (Kampova 2010). The project of preference of public transport vehicles at light-controlled intersections was financed by the city of Žilina through the Integrated Regional Operational Pro-gram for 2014-2020. The total cost of the project climbed to almost 1,955,000 €.

A Case Study of Public Transport Preferences Application

The aim of the preference for public transport vehicles is to ensure that Žilina trolleybuses and buses follow the timetable as much as possible and walk at the prescribed intervals. In practice, the system works in such a way that on-board units in public transport vehicles actively communicate with the road traffic signal controller at the intersection, which controls their passage through the intersection according to the current position. The controller evaluates whether the connection is running on time or late and accordingly either keeps the green signal to pass, or the driver is informed that he has to wait at a stop, otherwise he would start and brake unnecessarily and then stand at the intersection on red (Stop).

If two public transport vehicles enter the intersection at the same time, the intersection controller prefers a de-layed connection or a vehicle that has a defined passage priority. The smoothness of the passage of public transport vehicles through traffic lights will bring not only the optimization of the timetable but also fuel savings, as the vehicles do not have to start as often and unnecessarily. Not only time and money sources, but also the environment will be saved.
The project involves all traffic lights in the city of Žilina. There are a total of 9 intersections, where traffic is controlled by traffic lights. In addition, the intersections within this project were equipped with traffic cameras, thanks to which dispatchers have a secure overview of the situation of individual intersections in real time.

The project also includes the Invipo integration platform, which can be used not only by dispatchers, but also by residents. The platform is available via the smart.zilina.sk website or via mobile application. Thanks to the Invipo ap-plication, residents will find all the information about the current traffic in the city, about closures, accidents or detour routes in one place.

In the next pictures Fig. 1, Fig. 2, Fig 3 are printscreens from application (Incinity 2020).

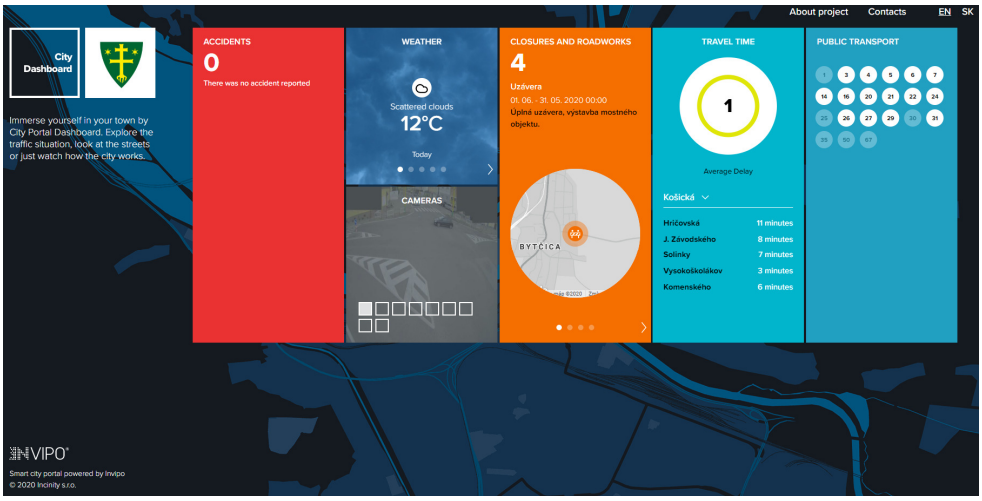

Fig. 1: Application Invipo in Žilina – City Dashboard (Incinity 2020)

It contributes to improving mobility in the city, reducing traffic congestion, improving traffic management, reducing accidents and the negative impact of traffic on the environment. This makes it easier and more efficient to plan their journey through the city.

In addition, users will also find real-time views of traffic via traffic cameras (Misik 2015; Mitasova 2017; Re-hak 2018; Siser 2016). Passengers by public transport will provide information about public transport connections, their current location, the nearest departure or the location of stops.

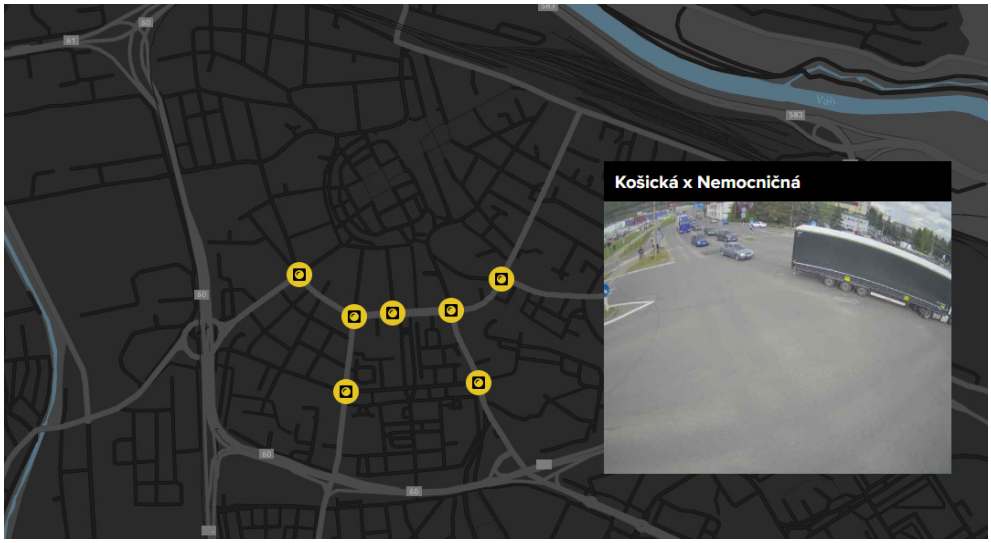

Fig. 2: Application Invipo in Žilina – example of Traffic lights cameras in real time (Incinity 2020)

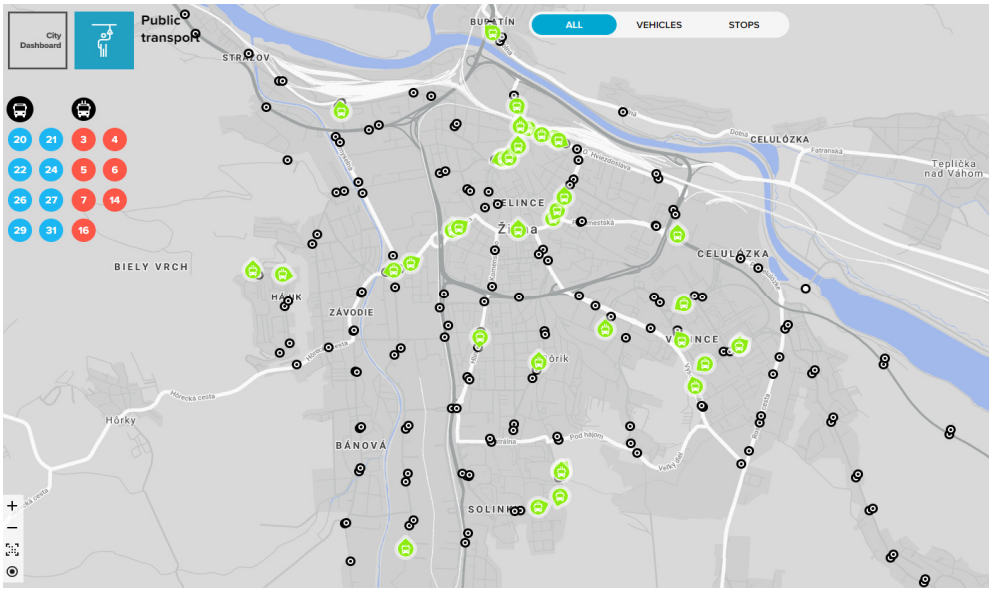

Fig. 3: Application Invipo in Žilina – Public transport in real time (Incinity 2020)

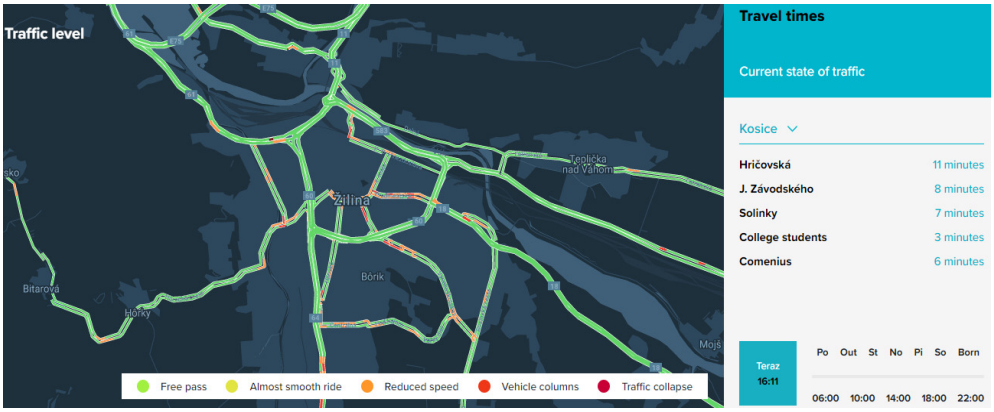

Fig. 4: Application Invipo in Žilina – Traffic level in real time (Incinity 2020)

In the terms of video management software (VMS), it is important to pay attention to traffic management (Soltes 2017; Soltes 2017) with the next requirements: VMS should does analyzing data for traffic management, such as:

- 24/7 monitoring,
- analyzing traffic data (density, direction, etc.),
- intelligent modules to react or make decision in case of hazards (visual verification of incidents),
- notifying or alert road users (traffic jam, hazards (Stofkova 2015), weather, e.g.),
- notifying control unit (VSS control center (Svetlik 2015), traffic authorities, emergency services, etc.),
- access to smart road signs or traffic lights,
- regulation of timing of traffic lights in real-time,
- taking in to account the variation in traffic demand with future (e.g. hours, days, vacation) estimation (e.g. Mondays, Fridays, Week Days, mornings, afternoons, etc.),
- assistance in providing an appropriate response in a timely manner to alleviate traffic congestion to minimize delays to motorists (Velas 2017, Velas 2016).

Conclusions

If cities really want to create the right conditions for preferring public transport on their transport networks, they will need to point out the possible problems associated with this preference. It may happen that the solution of one part of the transport network will worsen the conditions in another territory, or the preference for one mode of transport may have disproportionately large negative consequences for another mode of transport. For this reason, it is necessary to use appropriate traffic modeling programs that can visualize the transport network and thus provide better informa-tive value, especially for those who are not so close to this issue.

Traffic design and traffic monitoring is an inseparable situation of modern society. There is no doubt that mod-ern technologies used in the field of transport increase the permeability of intersections, increase safety protection and we can continue. Light control system is one of the useful modern systems, which are implemented in crowded cites, to provide better traffic wax, especially for city public transport such as buses etc.

In our case, the Žilina crossroads is hardly tests in each-day traffic. Traffic management applications are usual-ly implemented in such a way as to allow multiple video streams and traffic controllers to be monitored centrally in a network operations center. Consequently, these types of applications require high capacity remote or subscriber units with robust and reliable uplink capabilities. To provide the utmost safety and security, data from network video surveil-lance cameras and controllers needs to be streamed constantly and therefore any system needs to be supported by a high-capacity, high-reliability solution.

In city Žilina is the first one preferring public transport vehicles in Slovakia. This example is very nice and useful example also for other cities.

We think that preferring city public transport is one of the possible solutions for crowded cities. On other hand, exists other solutions: preferring bicycles system, preferring no go one for type of vehicles or only for residents etc.

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Migrations as A Challenge for Dispositional Groups In Polish And European Comparative Perspective

Aleksandra SKRABACZ

Pomeranian University, Slupsk, Poland
aleksandraskrabacz@interia.pl

Abstract

The article provides a discourse on the essence of the functioning of dispositional groups in the perspective of contemporary migration processes and new procedures that have been implemented to make public decisions in the official social forum. It contributes two new perspectives to the development of social sciences. The first perspective relates to the migration movements characteristic of the second decade of the 21st century and on a number of challenges for Europe and Poland. The second perspective analyses the preparation of services in response to new threats in the area of security. In the implementation of the adopted research assumptions, a certain methodological eclecticism was employed, allowing the combination of methods from various scientific disciplines, which is characteristic of the methodology of security research, thus ensuring cognitive and pragmatic efficiency. Using theoretical methods, including the analysis and synthesis of knowledge available in compact and continuous sources (traditional and electronic), the essence of the functioning of dispositional groups was discussed, typologically and characterizing the specificity of operation. Using the comparative method, the problems encountered by the dispositional groups of European countries were indicated. Using exemplification, specific examples of threats to the security of the host society and for themselves are discussed. The article primarily uses the results of qualitative research by Polish and foreign scientists on disposable groups, while quantitative methods were used to analyze migration problems.

Keywords: Dispositional Groups, Migrations, Threats, European Union, Poland

Introduction

Migration is a process that has always been observed around the world. Throughout history, populations have moved for a wide range of reasons, either voluntarily or forced by external circumstances. Migration flows that follow the events across the world take on various intensities, and their direction is determined by the current political, economic and social trends. From a European perspective, the last significant wave of migration in 2011, initiated by the Arab Spring, caused significant impact on the population of Europe. Data from the International Organization for Migration, indicates that over 390,000 people moved to the European continent in 2016. The data also evidences that in 2017 there were over 180,000 illegal immigrants, and by November 2018, almost 130,000 had arrived, of which over 106,000 were by sea with the remainder by land (IOM 2019).

In 2019, 714,200 applications for international protection were submitted in the EU (plus Norway and Switzerland), which is 13% more then in compared to 2018. In addition, the data shows protection was granted to almost 295,800 asylum seekers, a decrease from 333,400 in 2018 and 533,000 in 2017. Almost a third (27%) asylum seekers were from Syria, with the three highest including Afghanistan (14%) and Venezuela (13%). The number of migrants from Venezuela increased by almost 40% in 2019 compared to 2018. Of the 78,600 Syrians granted international protection in the EU, almost 71% received it in Germany (European Parlament 2020).

Overall, more than 82 million international migrants resided in Europe in 2019, an increase of almost 10% from 2015, when 75 million international migrants lived in the region. Between 2015 and 2019, the non-European immigrant population increased from just over 35 million to approximately 38 million (World Migration Report 2020).

Migrants arriving in Europe brought with them psychological issues relating to traumatic events and this fueled high expectations of the gains they hoped to make in, with regard to aspects such as work, housing, living

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conditions, as well as social, cultural or education. The reality that presented to them generally across the European countries often fell short of the expectations and on occasion would lead to tensions and frustration. In many regions the reaction to the migrants was a lack of welcome or even one of hostility. Antagonisms occurring between the host community and new arrivals have become a significant challenge for many local services. Often local service are scarce, under resourced and the additional demand has caused tensions between migrants and the native population. Dispositional groups, therefore face a dilemma regarding which actions will both ensure the safety of native communities, and simultaneously assist immigrants in adapting to new living conditions, whilst respecting their inalienable and inherent human rights.

Hence, the main research inquiries focus on the following thesis: migration, understood both in the context of emigration and immigration, has a significant impact on the functioning of dispositional groups. This implies the needs and expectations visible in two areas: firstly, inside the milieu of uniformed services, which may be caused by language, cultural or social barriers as well as staff shortages, and even a direct threat to the life and health of officers. Secondly, formulated by the authorities and society in relation to the efficiency and effectiveness of these groups, even in terms of ensuring the safety of local communities, as well as breaking the law and violating social norms by immigrants.

The results of the analysis undertaken in the article are of a utilitarian nature both in the present and perspective dimensions. The experiences of European countries may provide useful direction for other countries of Central and Eastern Europe enabling them to prepare for any future large scale migration.

The specificity of dispositional groups

The term "dispositional group" has appeared not only in the language of sociology, but also in the terminology of security sciences, and is the object and subject of research of various scientific environments, including sociological, political, pedagogical and security issues. This increase in use is unsurprising and is linked directly to the is a very extensive and increasing area of research, just like the entire milieu of uniformed formations. Therefore, although they are discussed and interpreted differently in literature, they share a common goal of action, which is a direct, immediate protection and defense of society against all threats, regardless of whether they are military, paramilitary, civil or volunteer groups (Bogdalski et al 2014).

When it comes to the concept of a dispositional group, it is worth considering Maciejewski's definition (2012), considered to be one of the precursors of research on dispositional groups. In the author's opinion, dispositional groups are "such social structures, whose availability we can speak of in a narrow sense due to their specialized and specific nature of activities in a relatively limited scope". What does disposition mean? Well, it is about the general and specific ability of the above mentioned groups to carry out team activities in a planned and fixed manner, in accordance with the tasks assigned to a given dispositional group.

Morawski (2005) looks at dispositional groups from a different perspective. Morawski believes this is "a special kind of group with a state-shaped structure and hierarchy, in which smaller groups make up larger ones. The groups are entirely subordinated to the administrator". The view corresponds with Zagórski's definition (2000), who, defining the purpose of the groups' activity, states that "they are intended to stabilize the system of state power and protect it against internal as well as external threats and catastrophes of various nature". It can therefore be generalized that the dispositional group is a special social group, characterized by specific readiness to act, the so-called availability, operating in a planned and organized manner, having a specific structure within which its members function in a hierarchical manner, and the purpose of its activities are areas related to securing the life and health of citizens, stable functioning of the state and protection of property and the environment.

Why is there a need to separate dispositional groups from many other social groups? It arises from two basic issues. The first one is related to the specific characteristics of the members of these groups, who are usually distinguished by dedication and commitment to the implementation of tasks in difficult situations that require courage, dedication and availability. Due to the difficult operating conditions, they require specific procedures, staff selection and preparation methods (Bogdalski et al 2014). Therefore, it is worth emphasizing the requirement of high professional qualifications and the ability to act efficiently in various situations and conditions of members of dispositional groups, but it is also important to add here high social competences, i.e. specific psychophysical features and social skills, focusing on human behavior, attitudes, way of living, teamwork, acting under time pressure, motivation or communication and interpersonal skills. It is only a combination of these so-called hard and soft competences that determines the professional and social value of dispositional groups.

The second issue, according to M. Bsoul-Kopowska (2017) results from "functioning in larger structures, such as military or paramilitary organizational units, in which there is a specific attitude to work referred to as" service "and

a militarized organization and command-based order. In this kind of units, e.g. divisions or police garrisons, there are teams of selected and specially trained people, capable of taking rapid actions arising from special circumstances, such as the need for immediate intervention in connection with a terrorist attack, resulting riots and similar events. The very word "service" carries a certain emotional load that significantly distinguishes the nature of the activities performed. Polish dictionary defines service as "work for a community, done with dedication". This community should be understood both in the context of individual and social groups in relation to which there is a legal obligation to provide assistance, regardless of the circumstances in which it is provided.

Hence, Zalewski (2014), while listing such features of dispositional groups as hierarchy and formal subordination to the state and its authorities, draws attention to another attribute of dispositional groups, namely the disposition of administrative resources for citizens. However, as he explains: "In this context, it is worth paying attention to the differences in position and function (resulting from the scope of tasks and powers) in terms of a decision-maker, as well as the diversity of social roles of group members (citizens assign a different role to soldiers, another to policemen or firemen; completely different from those listed the role of intelligence and counterintelligence officers - mainly because it is power-oriented, not citizen-oriented)". This thesis is confirmed by surveys of the ranking of professions enjoying the greatest social recognition, in which for many years among the uniformed services the first place is occupied by a firefighter (87% of declarations of high respect), followed by a policeman (68% of positive grades) and a soldier (59% of good grades) (COBOS 2013). Therefore, in the opinion of the society, these professions are the epitome of the idea of commitment and unconditional service of the community along with personal risk of a direct threat to life and health. On the one hand, this is high social recognition, but at the same time the expectation of an impeccable ethical and moral attitude along with respect for legal and social norms. There is another significant difficulty connected with this idea. In a democratic state in which the people are the sovereign - or more specifically civil society - there may be a level of conflict between the expectations of civil liberties and freedom, and satisfying the requirements for security. In Zalewski's opinion (2014), "In a democratic state we are talking about civil society as an object of protection, but also the basic determinant of the political community of free people, i.e. those who have as wide a range of personal, political as well as economic, social and nowadays cultural rights as possible and the right to information. This community can function only in conditions of relative security, which is generally the task of these dispositional groups. [...]. Therefore, the key issue is to recognize the dynamics of mutual relations between hierarchically organized security structures and civil society, which today takes the form of information (network) one. This society quite freely uses more and more information resources, let us add, largely outside the control of national authorities. Ensuring security under these conditions is a major challenge for national governments. States are trying to "keep up" with the expanding sphere of people's activity, embracing it with ever-widening control", and this is often perceived as overt and unwelcome state control. If we impose the problem of international migration against such a background of functioning of dispositional groups in a democratic country, and such as the European Union, it is clear to recognize the complexity of the situation.

Considering the problem from the perspective of the availability of dispositional groups, it is clear to see the complexity of the dual role they are required to play. Not only do they have to protect and support the native population, but simultaneously and within the same arena, they are required to integrate a migrant group, often with different cultural beliefs and aspirations. This challenge is further compounded by language difficulties, the possible presence of psychological trauma and the and in some extreme cases, conflict with the host community. As a result of migration, therefore, often completely new security requirements are created, especially in the cultural, economic, public, social, health and universal dimensions.

Maciejewski (2012) categorized the dispositional groups into military, paramilitary, civil and voluntary groups. The military includes those that operate in the military social system, whose main purpose is to defend the sovereignty of the state. The second group - paramilitary, includes all those formations that are organized on a military pattern, including the Police, State Fire Service, Border Guard, the State Protection Service, the Foreign Intelligence Agency, and the Internal Security Agency. Civilian dispositional groups are represented by institutions functioning both in the structures of government and self-government administration as well as private enterprises. And although they have one goal in common, which is ensuring broadly understood security, they can discharge it through public and private funds. Among the voluntary dispositional groups , i.e. those whose members generally operate on a voluntary basis, those worthy of mention include Mountain Volunteer Rescue Service, Water Volunteer Rescue Service and many other organizational and legal types, including volunteer fire brigades. Due to the subject of scientific research discussed in this article, which are migration processes, the research attention will focus primarily on paramilitary dispositional groups, taking as a starting point the thesis that members of these formations are primarily dealing with migration movements taking place in Europe and they should effectively deal with the migration challenges posed by the second decade of the 21st century.

Another significant factor relating to dispositional groups is that democratic societies expect members of these groups to have special predispositions not only psychophysical, but also ethical and moral. Dispositional groups have the opportunity to act efficiently only when they receive a level of trust from the society they serve, confirming the need for their existence through the prism of social acceptance. For this to happen, communities and the media, especially at the local level, are closely monitoring the actions of members of these formations, loudly condemning all violations of legal and customary norms.

An interesting study of selected social patterns of individual dispositional groups was presented by Maciejewski (2012), pointing to specific physical, psychosocial, cultural, moral and professional characteristics of members of individual uniformed formations. Focusing on soft competences, it is worth paying attention to the special predispositions of policemen whose "moral attitude towards citizens is manifested in respect for human dignity, courage and self-sacrifice, observance and protection of human rights, kindness, courtesy, tactfulness, impartiality, responsibility, high personal culture, discretion, integrity, respect for others or caring for the image of the police". Similar expectations are formulated in relation to Border Guard officers, except that in this area special emphasis is placed on respecting the dignity of persons subjected to inspections, and in particular personal searches, which in contact with people with a different worldview or cultural custom is of special importance.

Slightly different requirements are imposed on members of the fire brigade and paramedics. For both these professions, full professionalism and readiness to help victims in all conditions, even those in which their own life and health are at risk, is required, as is often the case with rescue operations conducted by firefighters. The work of paramedics looks a little different, who - in addition to the above-mentioned features - should also be characterized by resistance to stress, the ability to make quick decisions, often under time pressure and anticipating the effects of these decisions. The factor regarding what environment paramedics find themselves is not without significance. They can find themselves being required to assist citizens under the influence of alcohol or intoxicants, aggressive both physically and verbally, possessing weapons or other dangerous tools. Hence, there are situations in which paramedics, going to specific pathogenic environments, ask for support from the police, in order to protect their own lives and health. Therefore, it is necessary to properly prepare the members of the dispositional groups to work in, often challenging environment, and not only in the physical sense, but often in the social, cultural or moral one.

Migration challenges of the 21st century

The first decades of the 21st century brought great migration movements to Europe, which impacted in many ways, affecting both the host countries and those from which the population flows away en masse. In Matis' opinion (2016), such a large influx of foreigners is one of the main problems of European countries, and mass migration has acquired the features of an epic crisis. It cannot be equated with escape, because migrants leave their land not because of fear for their own lives, but for purely economic reasons. Mass illegal migration prevents the process of cultural assimilation with the host society because countries do not have time to thoroughly check the details of arriving persons and regulate their inflow. According to this author, European countries are divided into optimists and pessimists when it comes to the view on multi-culturalism of modern Europe. Optimists say migration will help build a "new European nation" that will be devoid of nationalism. In turn, pessimists believe that multi-culturalism in the clash with radical Islam is a poses significant risks for further integration of the European Union.

Both positions hold elements of truth and it is indisputable that large scale migration into Europe will present many challenges, especially in political, social, economic, demographic and cultural terms, as Janicka (2018) indicates when analyzing the effects of migration processes. Looking from the perspective of EU countries, it is worth adding one more area that is of fundamental importance for the peaceful coexistence of various social groups, namely ensuring security that must be faced by societies and national and EU governments.

When it comes to shaping security, political scientists point out that: "Security issues have traditionally been considered in the light of national security. As a result, relatively few researchers have attempted to theoretically capture the complex of a phenomena that can be described as a tangle of links between migration and security. And yet, the issue of security has a much broader scope and also includes population security. Lack of security is a frequent experience of international migrants. In fact, it is their insecurity that should become the most important problem in security research" (Castles and Miller 2011).

Castles and Miller (2011) emphasize that "before September 11, 2001, researchers dealing with international relations and international security paid very little attention to international migration. And vice versa - researchers dealing with international migration have rarely analyzed its implications for security or understanding international relations or the world politics". This situation has now changed radically. Migrants have become a significant challenge for EU countries, contrasting significantly with migration as recently as 50 years previously, which was

often regarded as both economically and socially positive . Uncontrolled migration, however, has quickly become one of the biggest problems facing European countries, especially those centered around the Mediterranean Sea.

The specificity of the current migration crisis results from the demographic aspect, particularly evident in the large disproportion of young men to women, and difficulties in integrating immigrants into the host society, especially in the social and cultural area (Bazan 2017). The basic push and pull factors include, first and foremost, financial aspects resulting from high rates of social benefits granted to immigrants and other aspects of social care provided to large families. For example, in Germany, in 2015, the immigrant, in addition to accommodation, meals and clothes, received money for his own expenses in the amount of 352 EUR per month, of which 143 EUR in cash. In the case of a family, the sum of all benefits could be up to EUR 1,000 per month (TVN 2018).

However, material benefits are not the only reason for the popularity of Western European countries among immigrants who, when choosing the direction of migration, consider such factors as rule of law, lack of corruption, good career prospects, education for children and a sense of security, and, one very important factor – the presence of people of the same origin who have already emigrated and are a point of reference in the first months of their stay abroad in a given country. It is also worth noting that among immigrants, a large percentage are applying for asylum or refugee status, justifying their arrival in the host country with political factors such as persecution, fear of life and health or warfare. Not without significance for the wave of migrants is also the fact that Germany, as well as Great Britain and France enjoy great popularity among immigrants, spread through social media, television or simply the word of mouth. These programs - presenting European countries as immigrants- friendly - received in refugee camps, additionally motivate them to enter them whatever the personal cost. This draw has resulted in, hundreds of victims in the Mediterranean Sea, attempting to cross the ocean in unsafe craft and conditions routinely resulting in loss of life. The International Organization for Migration calls this sea "the deadliest frontier in the world," since more than 33,000 people have drowned in Mediterranean waters since 2000.

Another factor that activates migration is the war with the so-called Islamic State and other terrorist organizations. As Świderski (2016) notes, it caused "the influx of hundreds of thousands of refugees to Europe to a large extent of Islamic religion. Terrorists say that among these people there are several thousand of their fighters, whose aim is to introduce permanent unrest in Europe. (...) moreover, we are probably also on the eve of the cultural war, which for many observers of social reality is inevitable. This claim is prompted by the behavior of existing Islamic minorities in Europe, which do not want to assimilate, do not recognize European values and do not intend to comply with existing law. The dissatisfaction of European communities is growing. They express their dislike of refugees and the way the political elites conduct their policy towards them more and more clearly. Various restrictions on civil liberties are being introduced more and more often to increase security".

When it comes to Poland, although are present in our social reality yet, we also have to deal with a significant increase in the number of foreigners in Poland. Since 2014, we have been constantly recording an increase in the number of foreigners applying for residence permits in Poland. Temporary migrations prevail - 88% of applications in 2017 concerned temporary residence permits (up to 3 years), 10% permanent residence, and 2% long-term resident's EU stay. Almost 65 % of all applications were submitted by persons aged 20-39. Most often, citizens of Ukraine wanted to live in Poland, who submitted 125,000 applications in 2017 - by 30% more than in 2016. Belarusians (9,500), Hindu (8,000), Vietnamese (6,400) and Chinese (6,000) also applied for residence permits. As early as in 2005, 858 people had the right of permanent residence in Poland, and in 2014 it was already 18.9 thousand, of which most Chinese, Vietnamese and Ukrainians (Office for Foreigners 2018).

Polish migration issues are not only the challenges associated with immigration, but also the emigration of Poles abroad. After our country's accession to the European Union, most migration was on economic grounds , but the fact is that between 2010 and 2015 between 2 and 2.39 million people left Poland, of which the largest group went to the United Kingdom - 720 thousand and to Germany - 655 thousand (Central Statistical Office 2016). It is also worth adding that among this group, over 50% of people on the islands and almost 40% in Germany declared their will to stay permanently in these countries. This trend remains stable, which is confirmed by the data from the end of 2018, according to which around 2,455,000 people stayed temporarily outside Poland. permanent residents of the country. In Europe alone, there were about 2 155 thousand people, most of them - about 2 031 thousand. - stayed in the EU member states. Among the EU countries, the greatest number of Polish emigrants stayed in Germany (706 thousand), Great Britain (695 thousand), the Netherlands (123 thousand) and in Ireland (113 thousand) (Central Statistical Office 2020).

Resulting problems have been felt in the economic dimension due to the shortage of workers, or in the social area, resulting from the increased number of divorces, leaving children without due care, the so-called Euro-orphanage, and retirement benefits. The discussed processes - immigration and emigration also have a significant impact on the

functioning of dispositional groups, because officers of these formations are most often the first to have direct contact with the incoming population who is attempting to enter the host country through legal or illegal means. Hence, the issues raised in advance with the migration movements can contribute to understanding the essence of the case and to developing mechanisms and solutions that will positively influence the alleviation of difficult migration processes that have been taking place in Europe for several years.

Impact of migration on operational efficiency of dispositional groups

Considerations on the impact of migration on dispositional groups should begin with an analysis of the functioning of the environment of the groups themselves, especially in the context of problems that have been observed in uniformed services for some time. An issue worthy of mention first is personnel problems, which have been visible in many uniformed services for several years. An example would be the Polish Police, in which, due to the significant lack of officers, one might describe it as personnel crisis. The head of Independent Self-Governing Trade Union of Policemen R. Jankowski states that "there are already nearly 6,000 vacancies, and fewer and fewer willing to join the police" (2019).

According to the data of the National Police Headquarters, 3.2 thousand officers left the forces in 2019, and 1.8 thousand were taken on. This depletion of numbers is reflected in the quality of "services" provided by policemen, manifested in the time of patrols undertaking intervention. So it is where the local society most needs support and help in maintaining security and public order. The low attractiveness of pay in the police, the hardships of service, and above all the outflow of young people at working age abroad - these are the main reasons for the staff deficit in this formation. And this has a direct negative impact on ensuring security and public order, already a formidable challenge.. The influx of immigrants only compounded this challenge. An excellent native example is the area near Warsaw, where the center of wholesale trade of Asian goods is located. There are several thousand companies, gastronomic and service establishments, financial institutions and the area has developed its own security agency. The nature of this security results in all services facing difficulties with entering, from the police to the sanitary and tax and customs departments.

In some other European cities the challenges are even greater. A extremely worrying manifestation of this is the acts of terror committed in recent years, or the harassment of women on New Year's Eve in Cologne in 2015. It is also worth noting the increased activity of mafia criminal groups or the increase in common and criminal offences, which gives rise to very serious consequences for the safety of the inhabitants of the region. An example in this regard may be Germany, in which 181 thousand acts of violence were reported in 2014, and two years later their level increased to 193.5 thousand. As for the indicators for one of the German Lands - Lower Saxony, the increase in crime was even more visible. From the level of 17,500 crimes in 2014 in the next two years their number increased to 19.2 thousand. And most importantly, migrants account for 92 percent of them (Polityka 2018). It may also be the case that the number of crimes committed is not entirely accurate as many crimes not reported to the police, especially in those districts where it is difficult or dangerous for government agencies to enter. This problem appears to becoming more regular in its reporting.

The emergence of so-called *no go zone* or *no go area* is characteristic of Swedish cities, where walking in some parts of the city can threaten the life and health of not only citizens, but also uniformed services, especially the police. The term itself means areas where the level of violence and crime is so high that it prevents people from functioning normally and forces them to live in constant fear. No-go area can also mean an area that is controlled by a group of people who, by force and intimidation, prevent others (strangers) from crossing the border of "their" territory. At the end of 2014, the Swedish police published a report for the first time detailing areas that are problematic from the point of view of the work of uniformed services. At that time there were 55 such places on the Swedish map. However, in three years their number increased. In July 2017, the police published another document: "Utsatta områden - Social ordning, kriminell Konstrukcji och utmaningar för polisen" ("Sensitive places - social order, criminal structures and challenges for the police"), including a list of 61 problem areas in Sweden, among which the largest concentration is located on the outskirts of the three largest cities: Stockholm, Malmö and Gothenburg. The police admit that they are powerless in the face of the situation, and one of the Swedish National Defense Academy's terrorist analysts M. Ranstorp said in his report: "In some areas, extremists have taken control. Basic standards of justice and social peace are at stake. The police are falling apart and it's getting worse. We're dealing with a disaster in Sweden" (TVP 2019).

A further point relevant to the issue of staff deficit, is an issue the British police are facing. The issue is regarding the traditional clothing worn by Muslim women which covers the face, a traditional Muslim burqa. According to one West Midlands police commissioner, it is worth considering the service of burqa policemen to increase the "ethnic diversity of police officers" (Rzeczpospolita 2019). This is also associated with staffing problems, and such

a solution might attract new recruits. However, this is contrary to the increasingly sharper trend visible in European countries, such as Denmark, France or Belgium, where it is forbidden to wear the burqas in public places, including the streets. In the Netherlands, however, women's rights to wear face veils have been restricted in places such as schools, hospitals, public transport, and government buildings. In 2014, the European Court of Human Rights ruled that such bans do not constitute a violation of religious freedoms.

Staffing difficulties are visible not only in the police, but also in the German armed forces. In 2011, in connection with the Bundeswehr reform, compulsory conscription was abolished, at the same time assuming an increase in its number to 200,000 professional soldiers. Unfortunately, the army appears to have lost its popularity as an employer, and currently there is a shortage not only of volunteers for professional service, but also technical staff (Military Magazine 2019). This has resulted in German planners recruiting Poles, Italians and Romanians living in the Federal Republic between the ages of 18 and 40. The choice of these nationalities is the result of a simple numerical factor. 255,000 Poles, 185 thousand Italians and 155,000 Romanian at conscript age live in Germany permanently. Altogether, they constitute about half of foreigners from European Union countries in the Federal Republic. If the willingness to take up service in the Bundeswehr structures was expressed by at least 10%, this would result in 50,000 recruits (Military Magazine 2019).

In addition, the option of recruiting EU citizens for military service is also being considered, as it is done in other EU countries such as Belgium, Denmark, France, Spain, Luxembourg and the United Kingdom. What could the implications of this, for example, for the Polish armed forces? Namely, the fact that the German employer will be more attractive than the Polish Ministry of National Defense, offering better wage conditions and services, and due to the close proximity it may be a significant incentive for Polish citizens to join the German army. Of course, there are ethical, loyal and patriotic problems, and there are some with the opinion that such personnel policy will lead to the appearance of an army of mercenaries, not soldiers ready to fight for their homeland.

Another example of a different approach to immigrants can seen within the German Fire Brigade Association (Deutscher Feuerwehr Verband). They assumed that the fire brigade was perceived as a traditional organization associated with the uniform, command structures, hierarchies, service levels and regulations. Therefore, they considered it to be an important challenge to be open to groups previously under-represented in their ranks, positively recruiting people with a migration background. The organization formulated its mission as follows: enabling migrants to participate in fire brigades and to increase the intercultural competence of professional firefighters and volunteers (Feuerwehrband 2019). The justification for such actions is the assumption that "people with a migration background are needed because: 1. they are part of society and enrich fire departments culturally, linguistically, tactically-operationally as well as in HR way; 2. their experience makes it possible to help with language barriers and possible cultural and behavioral differences; 3. they broaden the horizons of existing guard members; 4. they have a positive effect on operational efficiency. Fire brigades perceive themselves as a reflection of the image of society and thus want to include all sections of the population in their ranks, and their special experience is needed in fire departments ". Thus, in the future the fire department will reflect a broad cross-section of society, enriched by the special qualifications and experience of people with a migration background.

The use of immigrants in the ranks of the fire brigade in order to overcome cultural and language barriers, among others, is another challenge for officers of dispositional groups. Entering the socio-cultural area of contemporary migrations, it is worth noting that this is a complex issue, conditioned by many factors.

First, we are dealing with a completely different family model in Muslim communities. Most often they are families with many children, patriarchal, with a privileged position of a man and a much weaker role of a woman, who often due to lack of education and language skills have difficulties interacting with the external environment, and in extreme cases may become a victim of domestic violence. Standard behaviors in female-male relationships developed in European civilization are completely unsuitable for Muslim populations, and have on occasion been be a reason for misunderstandings and violence. In Islam, the prohibition on marriage between a Muslim and a non-Muslim is widely known, and in some cases this has resulted in severe physical punishment towards the women. Therefore, dispositional groups that are strongly dominated by men, even if they are tasked with saving lives or nurturing health should be particularly careful and thoughtful, so as not to violate the cultural and moral principles in force in the community.

Secondly, the language barrier. The challenge of this problem can be seen in the situation in Sicily, where there were people in the refugee camp who taught English in their own countries. Due to the inability to communicate with city guards who spoke only Italian, immigrant teachers came up with the initiative to teach Italians English, in return for learning Italian. It transpired that knowledge of English is of enormous benefit in the city guard on the

island, whose representatives have daily contact with immigrants and refugees, who often know only this foreign language (Interia 2019).

An issue that is worth paying particular attention to is the availability of uniformed formations to detect and counteract terrorist attacks. Based on the data presented by Europol Executive Director Catherine De Bolle in the 'Report on the situation and trends in the field of terrorism' summarizing 2018 before the Committee on Civil Liberties, Justice and Home Affairs (LIBE) (European Parliament 2019), it can be concluded that the number of victims of religious / jihadist terrorism in the EU fell. In 2018, 13 people were killed in the terrorist attacks in Trèbes, Paris, Liege and Strasbourg, compared to 62 people in 2017. However, it should be emphasized that the number of thwarted attacks has increased, which indicates that the threat to internal security is still high. In 2018, one jihadist attack failed in Spain, and 16 incidents were reported as thwarted jihadist terrorist conspiracies, compared with 12 and 11 cases respectively in 2017. Jihadist attacks that were carried out and unsuccessful mostly took place using knives and firearms and were aimed mainly at civilians. All planned attacks using explosives were thwarted and most of the perpetrators acted or planned to act alone. As for the number of detained persons, a total of 511 suspects were arrested in 2018, mainly in France, Great Britain and Belgium, while in 2017 - 705. What caused a decrease in the number of terrorist attacks or their attempts in Europe? According to Catherine De Bolle, "efforts by law enforcement, security services, public authorities, private companies and civil society organizations to counter terrorism have significantly contributed to reducing violence in Europe".

When comparing the experience of Polish and other European countries in this area, Poland is not a priority target for extremist organizations, however, due to participation in the anti-terrorist campaign or NATO and EU operations, it must take into account the possibility of such activities on its territory. Confirmation of this thesis may be one of the last operations of the Internal Security Agency, as a result of which, in December 2019, a Ukrainian citizen was detained. He is suspected of preparing to carry out an explosion of explosives using a trap car under one of the shopping malls, which could have seriously threatened life , health and property.

Conclusion

Creating and maintaining an acceptable level of security in the micro-, mezzo- and macro-social dimension has become a fundamental challenge today. The etymology of the word 'security' in many languages underlines the primordial sense of danger in relation to the sense of security certainty. An example would be the Polish language, in which the old Polish word "without care" meant to remain without sufficient and adequate protection. Hence, since the appearance of man on Earth, he has taken actions to ensure the protection and defense of life and health, and over the time of property and the environment against threats typical of a given age.

The capacity of the word security, both in terms of subject (personal, local, national, international) and object (political, cultural, economic, social, military, other) means that in a democratic state virtually every public institution or social entity has statutory provisioned specific tasks to be performed as part of creating security in many dimensions. These institutions are nowadays referred to as dispositional groups, and the attributes assigned to them, such as professionalism, rule of law, professional and social competences, and readiness to act, particularly predispose them to counteract threats, among which the migration crisis is the most important characteristic of the 21st century.

Due to the universality of this phenomenon, which has affected all European countries, on the basis of the comparative studies conducted, it can be concluded that the problems faced by Western European countries can be extended to all countries of Central and Eastern Europe. Migration movements are a natural and irreversible process taking place in all types of society, bringing with them both opportunities and threats. Among the greatest advantages of migration, it is worth mentioning the economic, cultural, economic and demographic aspects, as well as social progress and the acquisition of labor, without which the economy of many countries would not function at a high level of development. The threats that arise in connection with migration, especially uncontrolled immigration, include all those factors that affect the sense of multidimensional security. This applies in particular to public safety and order, social and health security, cultural security and national identity, as well as violations of human rights and freedoms resulting from human trafficking or forced labor. Hence, these areas should be under special control and protection of the state and disposable groups acting on its behalf. Therefore, the officers working in them should have special competences to perform tasks that differ from the schemes used so far.

Currently, in the functioning of the disposition groups, problems of a personnel and image-related nature can be noticed, which creates the necessity to adopt a long-term strategy enabling service in these formations of foreigners of different religion and customs. Intercultural education and language courses are essential, especially among officers at the operational level, where there is real contact between the migrant and the representative of the

uniformed formation. This will make it possible to overcome language and cultural barriers and prepare the personnel of uniformed formations to perform statutory tasks.

The presented analysis of the experiences of European countries in solving problems in the officer-immigrant relationship is of a utilitarian nature, especially from the perspective of Central and Eastern European countries. They are the border states of the European Union, which in the first place take on the responsibility of solving migration problems. It is also them that, despite the fact that so far treated as transit countries, more and more often - like Poland - are becoming places of permanent emigration, therefore the migration policy should be adapted to new challenges.

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Livelihood Resilience of Rural Crop Farmers in the Face of Recurring Farm Theft; Evidence from Nigeria

Tunde ADEBISI
Landmark University, Omu-Aran, Kwara State
adebisi.tunde@lmu.edu.ng

Festus ASAMU
Landmark University, Omu-Aran, Kwara State
asamu.festus@lmu.edu.ng

Ogadimma ARISUKWU
Landmark University, Omu-Aran, Kwara State
arisukwu.ogadimma@lmu.edu.ng

Bamidele RASAK
Landmark University, Omu-Aran, Kwara State
rasak.bamidele@lmu.edu.ng

Abstract

Farming, like every other livelihood is not without its challenges. 21st century Africa has witnessed an increasing theft of farm produce and in some cases, the murder of farmers. The reality of farm theft in rural communities poses several questions about its prevalence, consequences, and farmers' responses. Through a qualitative lens, this study investigates how and why rural crop farmers have remained interested in farming despite recurring farm theft. Eighteen (18) crop farmers were engaged in a semi-structured interview session. Through the discourse analysis approach, result showed five (5) major factors responsible for farmers' livelihood resilience in the study locale; Tradition, Income, Health, Poverty, and Prestige. As such it is recommended that focus should be on improving such factors.

Keywords: Crop Farming, Livelihood Resilience, Farm theft

Introduction

Farming in most parts of the word, especially in rural communities serves as an important livelihood for people that reside in these areas (Ajani & Igbokwe, 2013). This is to say that the occupational option in the rural regions is primarily farming, and agro-allied occupations that draw its essence from farming. It is the most prevalent socio-economic activity in rural Nigeria where up to 50% of the population resides and actively engages in the cultivation of crops and rearing of animals (Odekina, 2004). Farming goes beyond an occupation for many rural settlers, it is a lifestyle, a lifelong activity that has been passed down from many generations. In Nigeria, farming is majorly characterized as subsistence (Apata, Sanusi, & Olajorin, 2016). For instance, farmers engage in the cultivation of crops to provide food for themselves and their households. In some cases, they cultivate to fulfill other needs. In this sense, farming does not only provide food for farmers, but it also provides them with the means to meet other necessities of life (African Agriculture Review 2012).

Livelihood in all societies, including rural, is more than surviving hunger, it also involves the provision of material assets that make life enjoyable. Livelihood has two major dimensions; assets/capitals, and activities required to make a living (Morse & McNamara, 2013; Kamaruddin & Samsudin, 2014). According to Scoones (1998), there are five (5) assets of livelihood; natural assets (natural resource stocks and environmental services; soil, water, air, land, seeds, fertilizers, etc), human assets (skills, knowledge, and labour; good health, physical capability, etc), financial assets (capital base; cash, credit/debt, savings, and other economic assets), physical assets (infrastructure; buildings, roads, production equipment, and technologies), and social assets (social resources; networks, social claims, social relations, affiliations, and

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associations). For farmers, the asset dimension of livelihood may then involve access to land for farming; farming experience and skills; access to farming capitals or loans; material gains from farming, farm location or proximity to roads, homesteads, and local markets; affiliations with agro-allied firms.

The second dimension involves a variety of activities. According to Tesfamariam (2014), all crops require adequate water, appropriate landscape, fertile soil, and a favorable climate. Hence the farmer needs to get a suitable land for farming. Thereafter, pre-planting operations commence, where the farmers will have to prepare the land, through the application of manure, tilling or plowing, as the case may be. During planting, farmers engage in various agronomic activities such as sowing, weeding (removal of unwanted plants), thinning (reducing seedlings per plant stand), and application of insecticides and pesticide among others. Harvesting farm produce occurs at crop maturity. It is the process of gathering ripe crops from the farm. Harvested crops are further processed to become consumable. Processing a crop may include, drying, winnowing, and threshing as applicable. Processed crops are then made ready for consumption, storage or sales in a local market.

Farming, like every other livelihood, is not without its challenges. Fierce global competition, creeping climate change, insurgent pest, prolific herbs, globalization, diminishing land, soil infertility and increasing cost of inputs have all been identified as challenges farmers have little or no control over (Bunei, 2016). However, 21st century Africa has witnessed an increasing theft of farm produce and in some cases, the murder of farmers (Bunei 2014; Chiwona-Karltun, Lemenih, Berisso & Karltun 2009; Clack 2013; Foeken & Mwangi 2000; Gichamo 2011). Criminals are descending upon farmlands to take advantage of rich pickings, a discrete environment, relatively low risk, and rural '*hot products'*(Bunei, 2017). The reality of farm theft in rural communities, therefore, poses several questions about its prevalence, consequences, farmers' responses and more importantly for this study; farmers' livelihood resilience despite recurring farm theft.

According to Luthar & Cicchetti (2000), Resilience has two major constructs: (i) *exposure to adversity*, and (ii) *positive adaptation*. Resilience has been conceptualized as a process wherein an individual, such as a farmer displays positive adjustment such as mental well-being or the absence of emotional distress despite experiencing a crisis (Greenhill, King, Lane, & MacDougall, 2009). According to Ungar (2004, p.341), resilience is the result of negotiations between an individual and the situation to maintain a self-definition as healthy. It becomes important, therefore, to identify the factors that help to moderate the negative effects that produce emotional distress caused by exposure to the crisis. A study identified some major factors responsible for farmer's livelihood resilience despite drought. Some of those factors include pre-existing viability of the business, income security, managing risk, and decision-making abilities, seeing themselves as more than a farmer, opportunities to disengage due to the seasonality of the livelihood, etc (Greenhill et al., 2009). It is with these findings that this research explores rural crop farmer's resilience if the crisis was the theft of farm produce.

Research on rural crop farmers' resilience in farming irrespective of farm theft has not been subjected to rigorous study. Existing research on the subject matter is extremely limited. One of the best-related studies that can be referred to is that of Viira, Poder & Värnik (2009), which adopted a postal survey to inquire from Estonian farmers about their intentions of quitting farming as a result of age, the share of family labor in the total farm labor, and the share of farm produce in total farm revenues. This study did not consider farm theft as a factor that may discourage farmers. It was discovered that farmers who are resilient in farming are those who have diversified into non-farming activities. Development literature on agrarian transitions concentrated mostly on the collective changes of farmers from farming to non-farming livelihood, rather than on farmers' resilience. Most rural settlers are confined to farming not out of choice but from a lack of options (Agarwal & Agrawal, 2017). International reports like that of The International Crime Victim Survey (ICVS) in collaboration with the United Nations (UN) will be difficult and unauthentic to apply to local communities. It, therefore, becomes necessary to have an in-depth knowledge of local realities that are not available in official reports to avoid falling back on ready-made broad narratives and solutions that may not be appropriate.

Theoretical Framework

Lyon and Parkins' Social Theory of Resilience

This theory builds on the Archer's cultural morphology map theory, based on a model of transition found in the theory of social ecological resilience. This overlay offers a partial response to the issue under discussion in resilience theory, community and organization. In addition, it offers a context to explain what happens in the changing cultures at the

cultural level. It illustrates how culture can support adaptive responses of changing communities. In two cultures, based ethnography advances the hypothesis that local cultural backgrounds play an important role in community response to closure challenges. The theory review also provides an alternative to functionalistic approaches to research on resilience with a focus on institutional capabilities, functional engagement and social indicators. In comparison, Lyon and Parkins (2013) research provides insights into the human organization and social change, which lead to adaptation by placing culture as a dynamic structure, distinct from a social system which is static or changeable as part of social transition processes and which can remain static (resilient or adaptive). The scientists conclude that the economic upheaval alone is not a motive for concerted action. Collective action coincided with a strong pre-existing activist community and a collective immediate reaction. Instead of offering fast and simple perspectives, this interpretive approach to resilience evaluation seeks to cross various theoretical and empirically divisive theory and the empirical divisions between biophysical and social science approaches for resilience studies in the society.

Methodology

This study employs survey design, using the qualitative methodology. An in-depth interview is used to probe for the research question, using a face-to-face semi-structured interview technique. The selected study locale is Oke-Ero Local Government Area (LGA), located in the Kwara South senatorial zone of Kwara State Nigeria. The locale was selected purposively due to perceived cases of farm theft which offers a unique opportunity to investigate the variable fundamental to this study. Oke-Ero covers an area of 445 Square Kilometers and had a population of 56,970 at the 2006 census. Using a Mathematical projection formula developed by Abubakar, Audu, & Aisha, (2017), Oke-Ero is expected to have a population of 79,465.6 in 2019. There are three political districts in the LGA; Ekan Meje, Idofin, and Iloffa / Odo-Owa. The residents are mainly Yoruba. They specialize in crop production such as cassava, maize, yam, kola nut, banana, plantain, cocoa, cashew, and palm oil. (Animasawun & Aremu, 2015).

The main respondents in this research are crop farmers residing in the study locale. This research employed the multi-stage cluster sampling technique. Stratifying Oke-Ero by districts, we have Ekan Meje, Idofin, and Ilofaa/Odo-Owa. Within each district, 3 farming communities were selected at random giving a total of nine (9) communities altogether sampled for the study. The randomly sampled towns are Aiyedun, Eken, Erinmope, Aiyekale, Odo-Ashe, Igbana, Iloffa, Imode, and Odo-Owa. For each of these randomly sampled communities, the researchers approached crop farmers and then snowball to get other contacts. Once a fixed number of respondents has been interviewed in a farming community/village, the researcher moved to another one. This process is repeated until 18 farmers from all 9 farming communities have been surveyed.

The collected data were recorded, transcribed, interpreted and analyzed. Following the guidelines for research practices, some ethical considerations had to be considered. The consent of all participants informed was considered before carrying out the study. Potential respondents were informed of the processes and essence of carrying out the study. Most significantly respondents were guaranteed that the study was conducted under the conjecture that study findings would be used for research only and kept under the condition of confidentiality. The questions were less structured and took an inductive (bottom-up) approach. Hence, they were open-ended which allowed informants' freedom of expression. Language or formal education barriers was resolved as the instrument for data collection was interpreted in the indigenous (Yoruba) language. The data were analyzed through the discourse analysis approach which involves the study of naturally occurring language in any social context; categorizing quotes into major themes, considering the actual words used, and the way the words were expressed. Since the codes were generated from raw data, the thematic analysis approach was adopted. (Shanthi, Wah, & Lajium, 2015). It involves seven major steps; Open coding/ Indexing: (one or two word summary for each discourse); Categorization of codes: (a list of all codes; both similar and redundant codes); Iterative process: (the reduction of the long list of codes to a smaller, manageable number); Matching codes: (constant comparison of codes); Close coding: (identification of overarching themes or categories); Merging themes: (find the relation between themes); Write up: (discussion of the interrelation, or a narrative from the themes, sub-themes, and codes).

Table 1: Interviewee Profile

F_n	Age Grade	Farming Experience	Sex	District of Resident	Religion
F_1	Above 60 years	4 decades	Male	Ekan Meje	Christianity
F_2	Above 60 years	5 decades	Male	Ekan Meje	Christianity
F_3	51 - 60 years	5 decades	Male	Ekan Meje	African Traditional
F_4	51 - 60 years	4 decades	Male	Ekan Meje	Christianity
F_5	31 - 40 years	2 decades	Female	Ekan Meje	Christianity
F_6	51 - 60 years	4 decades	Male	Ekan Meje	Islam
F_7	Above 60 years	5 decades	Male	Idofin	Christianity
F_8	21 -30 years	2 decades	Male	Idofin	Christianity
F_9	Above 60 years	6 decades	Male	Idofin	Islam
F_{10}	31 - 40 years	3 decades	Male	Idofin	African Traditional
F_{11}	41 - 50 years	4 decades	Male	Idofin	Islam
F_{12}	21 -30 years	A decade	Male	Idofin	Christianity
F_{13}	Above 60 years	6 decades	Male	Iloffa/Odo-Owa	Islam
F_{14}	51 - 60 years	4 decades	Male	Iloffa/Odo-Owa	Christianity
F_{15}	Above 60 years	5 decades	Male	Iloffa/Odo-Owa	Islam
F_{16}	20 -30 years	2 decades	Female	Iloffa/Odo-Owa	Christianity
F_{17}	51 - 60 years	5 decades	Male	Iloffa/Odo-Owa	African Traditional
F_{18}	21 -30 years	A decade	Male	Iloffa/Odo-Owa	Christianity

Source: Author's Fieldwork, 2020

Results

All participants responded that they have been a victim of farm theft and this have not caused them to disengage from farming activities. The reasons they gave are presented as themes, which are described in Table 2 below. Virtually all farmers narrated more than one factor for their resilience, however, the most emphasized factor by each farmer was presented. The 5 major themes observed were; tradition, health, income, poverty, and prestige.

Table 2 : Themes and Coded Descriptions of the factors that sustained Farmers' interest in farming despite recurring farm theft

Theme	Code Description
Tradition	Farming is an age-long activity. Farming is a routine activity in rural societies. Farming for some household is a traditional household occupation.
Health	Farming could serve as a way to escape boredom through physical exercise.
Income	Farming is a reliable source of income.
Poverty	Some farmers engage in farming due to the dearth of other options. The inability of some individuals to be gainfully employed. The need for survival.
Prestige	Many farmers see the occupation as a prestigious occupation Some farmers appear to be resilient to save their social image

Source: Author's Fieldwork, 2020

Tradition

Tradition as a theme has 3 major sub-themes; an age-long activity, a routine activity in rural societies, a traditional household occupation for some rural households. Table 3 presents the narratives of participants who are influenced by this factor.

Table 3: Theme 1: Tradition

Participants	**Comments**
F_1	"Farming is what we wake up to do. We are not like those who live in the city, dashing out every morning to a far place in search of daily bread. They do have their challenges, and it does not stop them from going to work. Farming is our source of daily bread, we have to do it irrespective of any challenge, including farm theft"
F_6	"I was born by a farmer, my grandfather was also a farmer. It is an occupation that was handed over to me, so not even farm theft can disengage me"
F_{15}	"Before we were born, our fathers went to the farm. It is what has sustained this community, even before other kinds of jobs exist. It is an age-long activity"
F_{18}	"It is my family occupation, I am obliged to farm, and if there is a challenge, I am expected to resolve it"

Source: Author's Fieldwork, 2020

Health

This factor has the lowest contribution to resilience among the participants. Table 4 presents the narratives of the only participant influenced by the 'health' factor.

Table 4 : Theme 2: Health

Participant	Comment
F_4	"I need to keep myself busy in order not to get bored. Boredom is a terrible thing, it kills slowly. Farming also help me exercise to keep fit"

Source: Author's Fieldwork, 2020

Income

Although, the 'income' theme has only one major description; "Farming is a reliable source of income", it is, however, the most common and major narrative of all participants across all surveyed districts. See Table 5 below.

Table 5: Theme 4: Income

Participants	Comments
F_3	"With farming, you can confidently provide for your household. When you work and make money from the work you do, you are excused from thinking of stealing another man's thing"
F_5	"Farming is good business, it feeds you and takes care of other needs"
F_9	"You are sure of having something at the end of the day"
F_{11}	"You won't need to depend on others to survive"
F_{12}	"With farming, you won't have to turn to a thief yourself"
F_{14}	"Income from farming is overwhelming. It is an occupation that helped me build my house, send my children to school and have a comfortable life"

Source: Author's Fieldwork, 2020

Poverty

Poverty is a feature of most of most African country. Many have devised many means to cope with the problem (Adebisi, Alabi, Arisukwu & Asamu, 2020). The 'poverty' theme has 3 major descriptions; the dearth of other options, unavailability of jobs, and the need for survival. Table 6 presents the narratives of participants who are influenced by this factor

Table 6: *Theme 3: Poverty*

Participants	**Comments**
F_2	"We have to survive, we can't disengage from farming because of farm theft, if we do, hunger will have a free day with us"
F_7	"There's nothing else to do. I have been farming since the days of my youth, I live here, it is what this community is known for "
F_8	"I wanted to study engineering, but my parents could not afford my education. I settled into farming as a result. Now, this is all I have to make a living. It doesn't matter the challenge, I must just survive"
F_{16}	"I started assisting my husband on his farm due to lack of job. It is better than nothing"

Source: Author's Fieldwork, 2020

Prestige

Prestige was observed as a factor that influences farmers' sustained interest in farming despite the theft of their produce. This theme has two sub-themes; "Many farmers see the occupation as a prestigious occupation" and "Some farmers appear resilient to save their social image". Table 7 is a presentation of the narratives on prestige.

Table 7: *Theme 5: Prestige*

Participants	Comments
F_{10}	"I love to experiment with my charms, the failure of one charm will encourage me to prepare another one"
F_{13}	"The popular saying that says farmers are kings is true. Without us, people won't be able to buy food. I see myself as really important to society"
F_{17}	"People reverend me as a farmer and I'm enjoying the spotlight"

Source: Author's Fieldwork, 2020

Table 8 provides a summary of the total supporting cases for each of the themes. Four farmers were influenced by traditional factors; a farmer reported livelihood resilience as a result of the health factor; poverty also served as a reason why 4 farmers will not give up farming; income is the most prevalent factor as it influences 6 farmers; three farmers were influenced by prestige.

Table 8 : Summary of total supporting cases for factors that influences farmers' sustained interest in farming despite recurring farm theft

Theme	Total Supporting Cases	
Tradition	F_1 F_6 F_{15} F_{18}	4/18
Health	F_4	1/18
Poverty	F_2 F_7 F_8 F_{16}	4/18
Income	F_3 F_5 F_9 F_{11} F_{12} F_{14}	6/18
Prestige	F_{10} F_{13} F_{17}	3/18

Source: Author's Fieldwork, 2020

Discussion of Findings

The average mean age of farmers in the study locale is 54 years. This is in agreement with Bunei (2014) that argued that the majority of farmers are aged individuals. According to Greenhill et al. (2009), livelihood resilience exists if concerned individuals (in this case, farmers) have pre-existing viability of the occupation, income security, risk, and decision-making management abilities, seeing themselves as more than a farmer, opportunities to disengage due to the seasonality of the livelihood. In the study locale, it was discovered that all of the aforementioned cases are responsible for farmers' livelihood resilience. Put succinctly; tradition, health, poverty, income, and prestige are the five major factors responsible for farmers' sustained interest in farming.

The consensus among the surveyed population reveals that income is the most prevailing factor that motivates farming despite recurring farm theft. According to the participants, farming is self-sustaining. This study also reveals that farming is a lifelong activity that has been passed down from many generations. Many individuals engage in farming because they inherited the occupation from their parents. Rural poverty has also contributed to farmers' livelihood resilience. Although earlier studies in Kenya presented poverty has a motivation for farm theft (Anderson 1986), this study, however, linked poverty with livelihood resilience. Despite recurring farm theft, many farmers engage in farming due to the dearth of other options, the inability of individuals to be gainfully employed and the need for survival. It happens that the same factor that is responsible for motivating offenders to steal from farmlands also motivates other individuals to farm. Poverty has remained a constant in many rural societies, however, residents possess the ability to choose how the factor influences them.

Some farmers are resilient in farming activities as a way of escaping boredom; others engage to exercise their bodies. Prestige also serves a motivation for farmers, as some see the occupation as a prestigious, and it appears that they want to save their social image. (Ayanda, Olooto, Motunrayo, Abolaji, Yusuf & Subair, 2012).

Recommendations

There should be a focus on improving the factors identified as responsible for rural crop farmers' livelihood resilience in the study locale. This is important because what has sustained their interest in farming can be used to further proffer solutions to the various challenges of farm theft.

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Decision Support for Geopolitical Risks Management within Arctic Maritime Activity while Covid-19

Valery M. ABRAMOV
Russian State Hydrometeorological University, Saint-Petersburg, Russia
val.abramov@mail.ru

Nickolay N. POPOV
Russian State Hydrometeorological University
Saint-Petersburg, Russia
nikk.popovv@mail.ru

Mikhail B. SHILIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
mik.shilin@mail.ru

Arseny I. CHESTNOV
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
arse.chest@mail.ru

Konstantin S. PROSTAKEVICH
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
k.prost00@mail.ru

Alexandra L. ABRAMOVA
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
a.abr97@mail.ru

Julia P. SANINA
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
y.sanina@bk.ru

Abstract

In article, we consider results of decision support development for geopolitical risks management within Arctic maritime activity while Covid-19 pandemic and climate change. In studies, we used methods of data bases constructing, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties, risk management approach. From the point of view of geo-information management, we structured geo-space to allocate the interconnected components of the solution space. As digital tools for managerial decision support systems, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we proposed a structural model, that combines the investment objectives with cost of adequate managerial support, adapted to Covid-19 pandemic and climate change conditions. We used platform https://www.researchgate.net/profile/Valery_Abramov2/ for data exchange and preliminary discussion while study. Research was performed at the Russian State Hydrometeorological University within State Task of the Ministry of

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Keywords: decision support, geo-political risks, Arctic maritime activity, Covid-19 pandemic

Introduction

Now, Covid-19 pandemic shook the global economy, that required major changes in management decision-making technologies, including geopolitical risks management (GPRM) technologies, especially within maritime activity (MA) in Arctic and Subarctic. Note, this pandemic shock matched the time with Industry 4.0 period, during which a lot of enterprises plan and implement wide spectrum of information technologies (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Lukyanov, 2019), (Sikarev, 2020), (Trunin, 2019). Industry 4.0 leads to serious technological changes in natural risk management (NRM) (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new training and educational technologies, especially for UL (Averkiev, 2020), (Estrin, 2020), (Korinets, 2020), (Popov, 2019).

In the article, the authors present the development results for managerial decision support (MDS) during GPRM within MA in Arctic and Subarctic while Covid-19 pandemic and climate change in geo-information management area (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), within environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). Significant attention should be paid to geo-information support systems (GISS) within NRM in climate change context (Bidenko, 2019), (Bournashov, 2014), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). The digital tools for GPRM within MA in Arctic and Subarctic while climate change and Covid-19 pandemic, discussed in this article, take these factors into account.

Methods and Data

In research, we used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. Also, we used big data technologies (Popova, 2019), (Yaily, 2019) From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bidenko, 2019). While study, we used data bases and tools of geo-information digital online platforms (GIDOPs) Earth (Sanina, 2020) and EOS, including its Land Viewer (LV) product (Bolshakov, 2020), (Vekshina, 2020).

Results

Currently, maritime activity in the Arctic (MAA) is a hot place in global environmental economy. Authors made statement, that the best way to involve the Arctic into global economy is sustainable development paradigm with adequate decision aids tools developed on geo-information management (GIM) basement. From GIM point of view, MAA while climate change and Covid-19 pandemic is to be carried out as related set of large natural-industrial projects (NIPs) within common space area and time period. In Figure1, we present a block model of investment structure for such NIPs, which combines the investment objectives (blocks 1-5) with cost of adequate geo-information and geo-ecological support (blocks 6-8), including GPRM and natural risk management (NRM) within NIPs in MAA (block 7). For MAA, there are greats GPRMs because of different sanctions and ecological restrictions in territorial waters of different states. Situation with NordStream-2 marine pipeline can be excellent example.

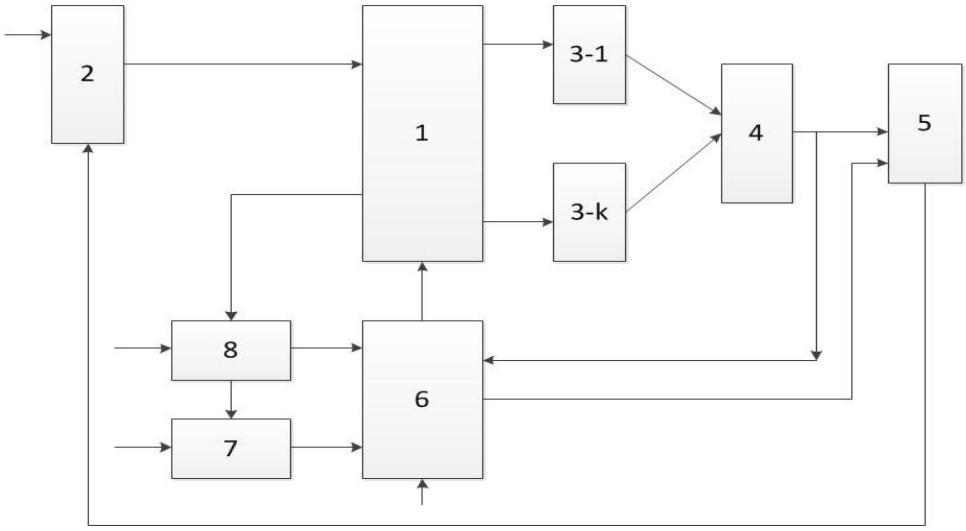

Figure 1: Block model for investment structure while territory development: 1 – block of distribution of resources; 2 – block of formation of resources; 3 - block of formation of private income; 4 - block of formation of total income; 5 – block of formation of the investment share of resources; 6 - block of comparison with the permissible level of risk; 7-block of formation changing in time set of GPRM and NRM, including Covid-19 pandemic and climate change; 8 – block of environmental monitoring corresponding to block 7

Authors' analysis shows that the largest part of the cost of managerial support is the environmental monitoring (block 8), the essence of which is determined by the content of block 7. Significant part of the cost in block 8 is hardware and software, the cost of which varies significantly. Now, in Covid-19 pandemic conditions, cost of GPMR and NRM for MAA can arise greatly because of general economic situation, when every country have to implement limitations for boards crossing and suffer from economic slowdown.

While research, one of the co-authors (Valery M. Abramov) hypothesized that the main factor of geopolitical risks for marine activities in the Arctic during the Covid-19 pandemic is the restrictions imposed by various states at the level of national legislation aimed at combating the Covid-19 pandemic. In this article, the main focus of the fight against this group of geopolitical risks proposed the use of international cooperation within the framework of the Arctic Council, initially focused on the development of the Arctic within the framework of the sustainable development paradigm. It should be noted that in 2021-2023, Russia will the Chairman in the Arctic Council and is currently developing a program for such a chairmanship. The main working mechanism could be the creation of a working group on Covid-19 within the Arctic Council, following the example of a similar working group on climate change in the Arctic. As tools for preparing and supporting decision-making in the framework of such a working group, it is advisable to use innovative digital technologies and tools, the structure of which is discussed below.

In research, we proposed a structural model of a geo-information distributed platform (GIDP), which contains heterogeneous databases under multi-level architecture. Proposing GIDP contains three levels of data representation DATA - PROCESSING - INTERFACE. Such representation guaranties system independence from the number of software components. We propose flow model (Figure 2).

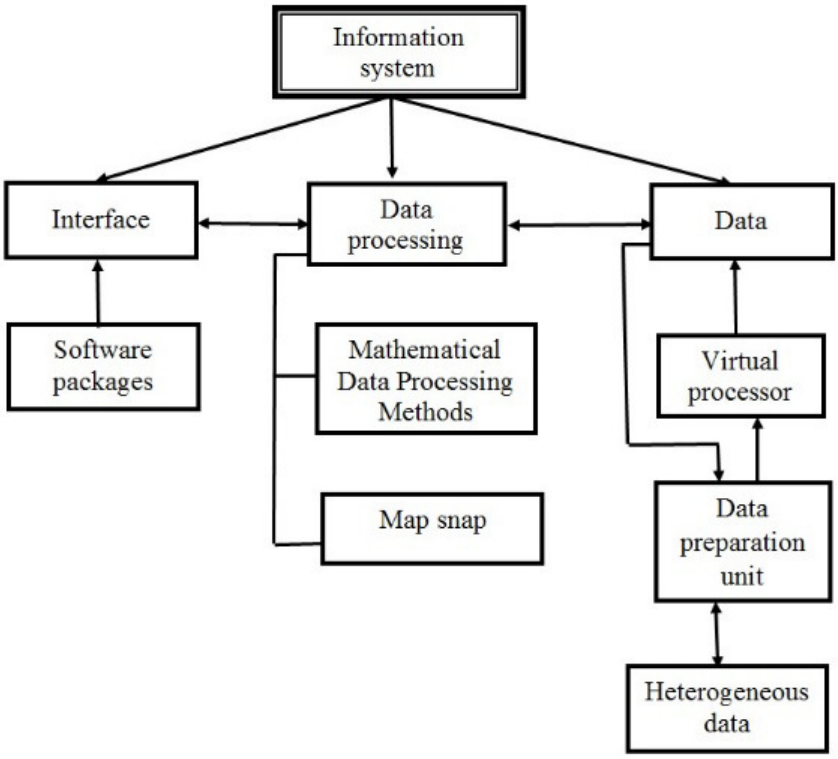

Figure 2 - Flow model of a GIDP with heterogeneous databases

To avoid the difficulties of multi-user access to data, we suggest to use a mechanism for pre-processing heterogeneous data, which includes a virtual data processor (VDP) and a data preparation unit (DPU). A VDP is a software module that allows uniform access to all system data via standard interfaces (protocols), while hiding the features of data placement, data structures and formats. A DPU aims at collecting and first processing the data requested by the user from the system. When using this mechanism, there is no need to convert data to the format used by the system, they remain in the original view and can be used locally by their applications.

In more detail, VDP is a virtual data bank (VDB), which consists of a set of non-specified virtual databases (Figure 3). Information sources of actual state databases are the actual cycle of functioning of organizational subsystems of a complex management object, when considering the geo-information system as a system for making managerial decisions. The information sources of the databases of planned States and regulatory States can be input documents, virtual results of management decision-making, as well as the results of solving regulated tasks

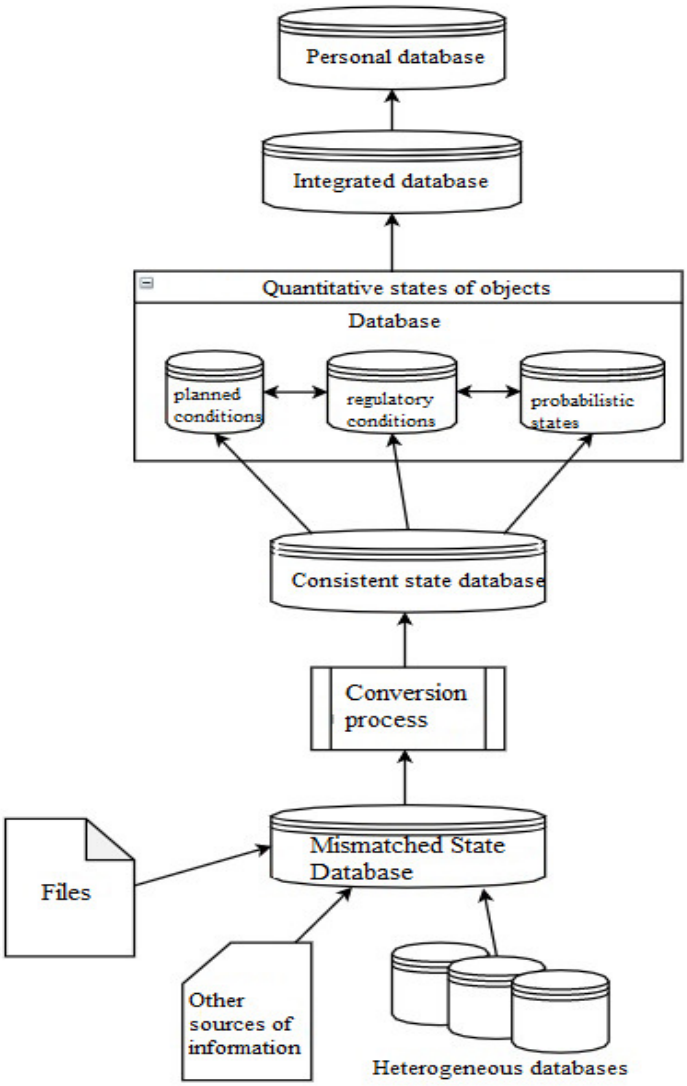

Figure 3 - General diagram of dependencies between data subsystem modules in VDP

On basement of above mentioned model (figure 1) and GIDP conception (figures 2 and 3), the authors propose to develop the geo-information and geo-ecological support system (GIGESS) with combined structure for access, storage and analysis of information from geo-spatial data sources, including archives and operative mode web tools.

As a result of the research, performed using foresight technologies, the authors suggest to use geo-information distributed online platforms (GIDOP) with cloud technologies (CT) as the main technological solutions for GIGESS. We gave preference to open platforms such as Google Earth https://earth.google.com/web/. In this article, we recommend to use GIDOP EOS eos.com, including its product LandViewer (LV) https://eos.com/lv/.

Let's go to examples. In figures 4 and 5, we show the results of sequential operations performed online with LV for the Svalbard. In figure 4, there is space image on 21th June 2020 visualized with Natural Colors Application of LV.

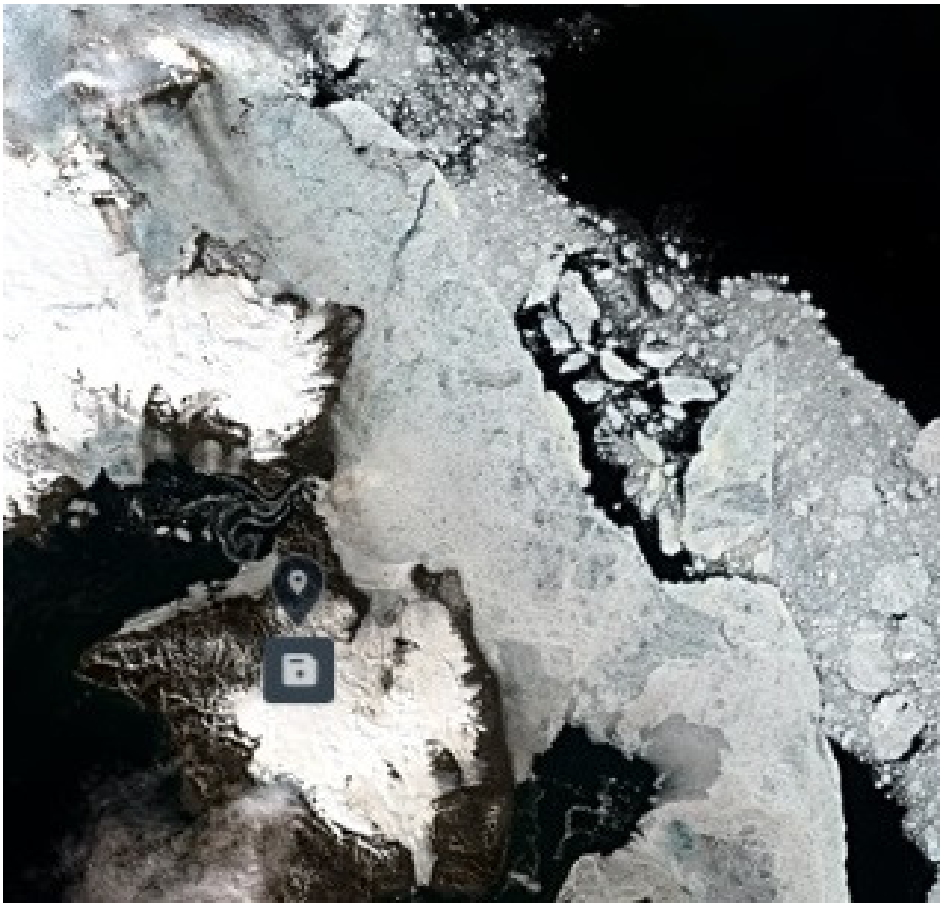

Figure 4: Svalbard space image on 21th June 2020 visualized with Natural Colors Application of LV

In figure 5, there is the same as in figure 4, space image, visualized with Atmospheric Removal Application of Land Viewer.

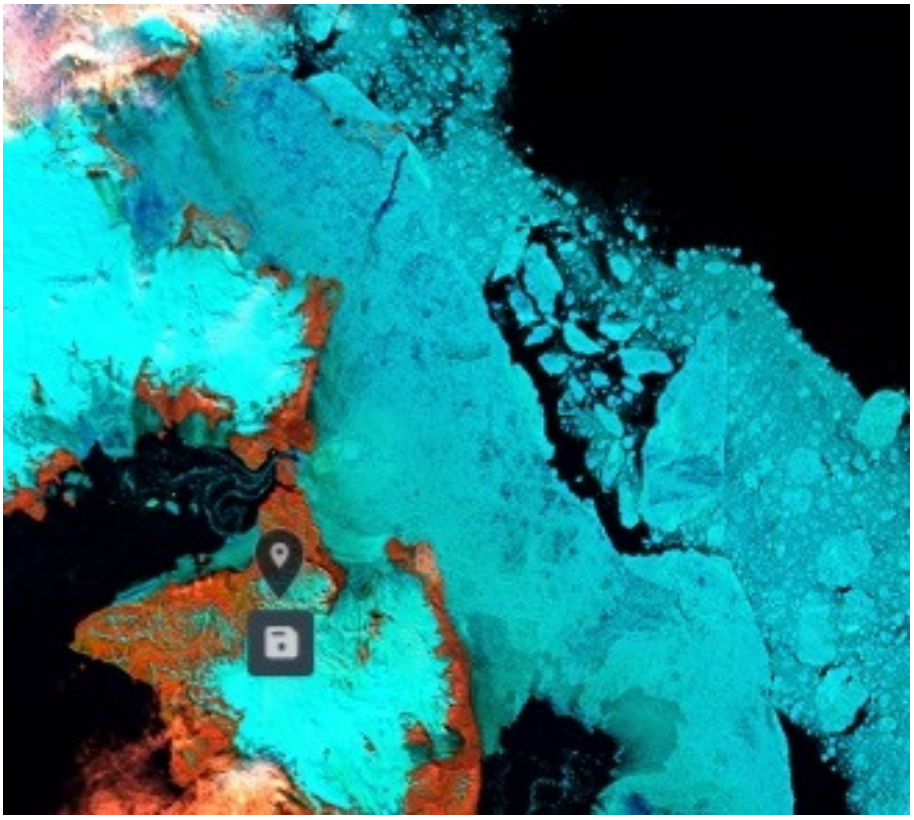

Figure 5 - Svalbard space image on 21th June 2020 visualized with Agriculture Application of LV

Obviously, that figure 5 is more informative for space decoding. Note, space decoding of figure 4 and figure 5 was not task of this paper. As essential research result, authors propose to use GIDOP EOS eos.com, including its product LV https://eos.com/lv/, as basement of low-cost GIGESS for GPRM and NRM within MAA while Covid-19 pandemic and climate change.

Discussion

It is worth noting, GIDOP EOS can be used in and training and educational purposes for decision support within GPRM and NRM while Covid-19 pandemic and climate change. The essential task of university practical learning (UPL) will be to teach students the practical aspects of work with GIDOP EOS tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies, that can reduce total cost of training and learning processes while Covid-19 pandemic.

Conclusion

Here are described results of digital technologies development for GPRM and NRM within MAA, adapted to Covid-19 pandemic. In studies, there are used methods of data bases constructing within digital online platforms, web-technologies and virtual reality tools. Also, there are used Foresight technologies, theory of decision making under uncertainties, risk management approach. From the point of view of geo-information management, we structured geo-space to allocate the interconnected components of the solution space. As digital tools, there is proposed to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, there is proposed a structural model, that combines the investment objectives with cost of adequate managerial support, adapted to Covid-19 pandemic conditions. As essential result, there is proposed to use GIDOP EOS eos.com, including its product LV https://eos.com/lv/, as basement for low-cost GIGESS for GPRM and NRM within MAA while Covid-19 pandemic and climate change. The research results presented in this article has significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state

environmental control bodies. They can be used in the preparation of master's programs in environmental economics.

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While study, platform https://www.researchgate.net/profile/Valery_Abramov2/ was used for preliminary discussion and data exchange. Research was performed at the Russian State Hydrometeorological University within State Task of the Ministry of Science and Higher education of the Russian Federation, project FSZU-2020-0009.

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The Use of Social Media for The Promotion of Catering Services During the First Wave of The Coronavirus Pandemic. Theoretical and Analytical Considerations on The Example of Facebook

Marta SIDORKIEWICZ

University of Szczecin, Institute of Management, Szczecin, Poland
E-mail address: marta.sidorkiewicz@usz.edu.pl
ORCID ID: 0000-0001-7559-7794

Abstract

The theoretical aim of this article is to organize the hypothetical aspects of catering services and promotion, with particular emphasis on promotion on the Internet, and in the empirical area, presenting the scope of e-promotional activities of the catering industry during the first wave of the coronavirus pandemic on the example of the social media Facebook. The article consists of three substantive parts, as well as introduction and summary. The first and second parts of the article mainly cover theoretical considerations regarding the essence of catering services and the basic aspects of promotion in the traditional and modern approach, with particular emphasis being put on social media. The third part of the study discusses the results of qualitative research conducted using the method of observation on the type of undertaken activity of the catering industry in the field of e-promotion based on social media, namely Facebook. The time scope of the qualitative research was the lockdown period in Poland (March - May 2020), whereas the subjective scope encompassed establishments providing catering services in Poland.

Keywords: Catering Services, Promotion, Social Media, Coronavirus

Introduction

A condition for the functioning of modern catering companies is not only offering an attractive service product, but above all, using modern promotional tools. On March 12, 2020, the World Health Organization reported that a significant increase in SARS-CoV-2 coronavirus cases, causing a disease known as COVID-19, was high enough to call it a pandemic (WHO, 2020). In view of this situation, most governments in the world obliged catering companies to stop providing their services in their current form, i.e. on-site service. The introduced regulations have allowed for the provision of catering services, however only in the form of delivery to the customer, personal collection by the customer (the so-called take-out) and drive-thru. In the current situation, the importance of the Internet in the context of access to information has increased even more. Moreover, e-promotion has become the only way catering companies (Kotler, Bowen, Makens & Baloglu, 2017) can reach customers, which in turn provided an opportunity for providing any kind of business and surviving on the market until restrictions on the provision of on-site catering services are lifted.

The theoretical aim of this article is to organize the hypothetical aspects of catering services and promotion, with particular emphasis on promotion on the Internet, and in the empirical area, presenting the scope of e-promotional activities of the catering industry during the first wave of the coronavirus pandemic on the example of the social media Facebook.

The theoretical part of the article is the result of literature studies in the field of marketing and tourism economics, as well as industry reports on the coronavirus pandemic. To meet the empirical goal of the article, qualitative research was conducted using the method of observation on the type of undertaken activity of the gastronomic industry in the field of e-promotion based on social media during the pandemic (analysis of content of fan pages run by catering service providers shared on Facebook). The time scope of the qualitative research was the lockdown period in Poland (March - May 2020), whereas the subjective scope encompassed establishments providing catering services in Poland. Furthermore, methods of logical operations (primarily deduction and induction).

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Selected aspects of catering services and restrictions in the scope of their provision during the coronavirus pandemic

One of the oldest forms of economic activity in human history is gastronomy (Hjalager & Richards, 2003), as its origins started with the first family (Santich, 2004; Chossat & Gergaud, 2003; Dalby, 2013). Catering services (Scarpato, 2002) are understood as satisfying human nutritional needs in the form of production-service activities carried out in open catering establishments such as restaurants, bars, cafés, etc. In addition to performing economic and nutritional functions, the provision of catering services includes creating conditions for the creation of specific social relationships, upbringing and educating the consumer, organization entertainment or interpersonal integration.

Based on the literature on the subject, three basic functions of gastronomy can be distinguished (Sidorkiewicz & Pawlicz, 2015):

1. production (applies to the processing of raw materials into finished products),
2. service (consists of the provision of services such as serving drinks and meals),
3. commercial (consists of sale of finished products).

According to W. W. Gaworecki (2000), the types of catering facilities can be classified based on the criterion of the scope of conducted activity, with the division as follows:

- food facilities, which include, among others: restaurants, universal bars, eateries and fast food outlets, bistros and snack bars,
- complementary facilities, which include, among others: cafés and tea rooms, pastry cafés, wineries and wine bars, breweries and beer pubs, and entertainment bars,
- catering outlets, which include, among others: buffets, fish and chip shops, drinking rooms, ice cream parlours.

A relatively higher use of use of catering services can be observed in Polish households, in particular those with higher income. Every year, Poles are spending more and more on food services provided outside their homes. It has become popular to celebrate special occasions at catering establishments, or travel, which is inextricably linked to eating out (Gutkowska & Piekut, 2016). Unfortunately, it seems that the use of such services will be limited in the near future, as due to the information issued by the World Health Organization on the global pandemic, on March 13, 2020, the Polish government for the first time decided to suspend the operation of restaurants and other catering outlets in their current form, i.e. service on the spot. The introduced regulations have allowed the provision of catering services, however only in the form of delivery to the customer, personal collection by the customer (the so-called take-out) and drive-thru. In reference to the theory and classification of catering functions, it can be stated that during the first wave of the pandemic of the coronavirus pandemic, the scope of catering functions has been reduced from three to two, i.e. the production and commercial functions.

According to data provided by Statistics Poland (GUS, 2020), there were 69.8 thousand catering establishments in 2018, of which 27.6% were bars and 28.2% restaurants. Only some of them could switch into the scope of business activity proposed by the government, whereas the remaining facilities had to be closed. A survey conducted by Briefly (a website providing brokerage services in finding the right establishment for a party or a special event) states that as many as 67% of companies and establishments from the catering and event industry have completely stopped their business activity. The analysis of data prepared for Business Insider Polska (Wąsowski, 2020) by the Nomee company, which provides a sales system for catering outlets, shows that the daily turnover (23-26.03.2020) decreased by 70-80% as compared to the days of the last, so-called "Normal", week (02/08/03/2020). The data covered over 200 establishments from several cities from all over Poland, including Warszawa, Trójmiasto, Bydgoszcz, Kraków, Toruń, Płock or Mikołajki. Similar calculations were presented in the industry website https://www.horecatrends.pl/ (2020), according to which in the first days of quarantine the majority of catering establishments recorded a decrease in turnover by approx. 60%.

With the “defrosting” of the economy in Poland, the existing restrictions on the provision of catering services were lifted. The Polish government has decided to divide the plan to "thaw" the economy into four stages. The first one entered into force on Monday 20 April 2020, the second one entered into force on 4 May 2020, while the third one, which allows to conduct stationary catering activities under a sanitary regime, was introduced on 18 May 2020.

Since the reopening of the restaurants, the restrictions have changed, however, as a rule the owners of the restaurants have to ensure safe distances and hygiene measures for guests and regularly disinfect the areas used by consumers.

Social media as a tool of promotion on the Internet

In literature on marketing, the concept of promotion can be interpreted differently and evolves dynamically together with the changing society. Promotion (Kotler, 2006) can also be defined in two perspectives: narrow and wide. The former includes a set of activities and means through which an entity transfers product information to the market, shapes the needs of potential buyers, stimulating and directing demand with a view to reducing its price elasticity (Wiktor, 2001). This approach is characterized by market connectivity and impact on the market. On the other hand, the broad approach is often synonymously referred to as "marketing communication" or "enterprise communication policy with the market".

Still unlimited consumer needs force market entities to use more and more modern forms of communication with the market. These relations are currently based on modern media, mainly the Internet. As a marketing communication channel, it is a great tool for reaching consumers on several levels of perception. The variety of forms, speed of communication and the ability to precisely measure the effectiveness of all campaigns, significantly affect the high dynamics of the increase in the allocation of advertising budgets in this channel (Raport: Polska branża hotelarska na Facebooku 2012, 2012).

Based on the definition of the concept of promotion and the channel, i.e. the Internet, it is possible to define online promotion, i.e. e-promotion. E-promotion is a set of activities carried out on the Internet, through which the supplier sends a message to the market, which results in an increased interest of the recipients of the message in the product, brand (Schivinski & Dabrowski, 2016) or enterprise. This is a way used by the seller of products to communicate with the potential buyer via the Internet, i.e. the process of transferring information between entities. Today, communication is not only the transfer of information, but also the creation of relationships (Tiago & Veríssimo, 2014), community (Perenc, 2006).

The composition of such promotion has not been clearly classified in the literature. The tools and instruments belonging to it vary depending on the author. In general, the promotional mix includes advertising, sales promotion, public relations, personal selling, and direct marketing (Żurawik, 2009). In this set of promotional tools, some authors additionally distinguish sponsorship (Berndt & Hermanns, 2013). K. Orfin, A. Sawińska and M. Sidorkiewicz attempted to combine tools of classical promotion and e-promotion with examples of their means (Orfin, Sawińska & Sidorkiewicz, 2012). The examples listed in Table 1 are not a summary of all possible actions, but present only a general picture.

Table 1: List of promotional tools in traditional and modern terms (e-promotion)

Tools	
Classic promotion	***e*-promotion**
Advertisement	
• direct response advertising - television (advertising spot), radio (audio spot) and press (advertisements, visual advertising, etc.) • leaflets, advertising brochures, folders, posters	• banner forms • pop forms • floating ads • sent advertising and other formats
Sales promotion	
• samples, testers, discounts at the point of sale	• shopping platforms • auctions • online stores (e.g. special offers, discounts)
Public relations	
• Press releases • custom publishing houses • articles and papers • business cases • conferences, symposia, seminars, conventions • speeches • interviews • press conferences • media patronage	• cooperation with media • presence on online news websites • response to criticism posted on websites • participation and activity of the entity in discussion groups • online sponsoring • usage of interactive forms • viral marketing
Personal selling	

• direct contact with the seller "face to face" • contact by phone	• contact with the seller via: messengers such as Gadu-Gadu and Skype, interactive websites, social networks, chat, telephone
Direct marketing	
• advertising mail (with and without address) • telemarketing • catalogue sales • direct response advertising (TV, radio and press) • advertisement with feedback channel (e.g. advertisement with the phone number and address where the purchase can be made, press advertisement containing the ordering coupon)	• e-mailing • newsletter
Sponsoring	
• organizational support of the event • charity activities • sponsorship of promotional materials for printing, food, etc.	• sponsorship of a website • sponsorship of a website section • sponsored article • sponsorship of interactive elements • sponsorship of email newsletter

Source: Uzdrowiska i ich funkcja turystyczno-lecznicza, Eds. A. R. Szromek, Wydawnictwo Proksenia, Karków 2012, 94.

Modern marketing is more and more often using social media (Mangold & Faulds, 2009). Social media marketing involves generating traffic on the organization's website and promoting brands through the use of social networking sites (Sidorkiewicz, 2013), with the best known being Facebook, Instagram, Twitter, LinkedIn, and Snapchat. The potential for these activities is significant, considering the growing number of people who own smartphones and actively use the Internet (Mazurkiewicz-Pizło & Pizło, 2017).

In summary, it can be stated that e-promotion is a response to changes taking place in society in the area of attitudes, needs or preferences. During the first wave of the world coronavirus pandemic, it seems that e-promotion, and especially social media, were the perfect meeting place for catering service providers and potential consumers locked up in homes.

E-promotional tools used by catering service providers. Analysis of fan page content on Facebook

For the purposes of the empirical purpose of the article, qualitative research was conducted by means of observation method on the type of activity undertaken in the catering industry during the first wave of the pandemic in the field of e-promotion based on the social media Facebook. The time scope of the qualitative research concerned the lockdown period in Poland (March - May 2020), whereas the subjective scope encompassed establishments providing catering services in Poland. Furthermore, the content of Facebook fan pages run by catering service providers were analysed.

Facebook (2000) is a social networking service that allows people contact friends and potential friends from their professional and private environment. With it, it is possible to stay in touch with people, post an unlimited number of photos, links or videos, and get to know encountered people better.

The number of Facebook users in Poland is constantly growing. In December 2018, it was used by almost 21.5 million people, which represented nearly 76.5% of all Polish Internet users (Wojtas, 2019). Facebook is still the most popular social networking platform in Poland. However, there can be observed an increasing interest in other social media (Górska, 2018), such as Instagram (especially among young people), TikTok (especially among children) or Pinterest.

By analysing the development of Facebook, it can be observed that more and more market suppliers are trying to find their space there, hoping to increase the scope of their target group. Marketing strategies are being constantly expanded with new elements, and advertising agencies are trying to create even more creative and effective campaigns. Although the involvement of potential clients (referred to as "fans" or followers in social media) looks different in each business industry, every contact with them today should not be underestimated. That is why more and more companies are deciding to become involved in this website (Sidorkiewicz, 2013).

With its great reach, Facebook can be successfully used to promote catering services. Using attractive posts allows notifying a large number of users about the offer. Table 2 presents practical solutions in the field of e-promotion on the Facebook platform, used by selected entities offering catering services. Examples refer to such promotion instruments as: advertising, sales promotion, public relations, personal selling and direct marketing.

Table 2: List of activities to promote conducted on social media by selected entities offering catering services

Promotional mix tools	Tool characteristics	Example of activities in the field of promotion on social media
Advertisement	any type of paid form of non-personal presentation of an entity's offer	The action of publishing sponsored posts regarding the offer of establishment available during the period of restrictions regarding the provision of catering services. This offer has changed due to the pandemic. In addition to the possibility of ordering dishes from the menu (delivery and take-out), more and more establishments offer the so-called “dishes of the day”, consisting in the selection of dishes from a narrow offer available on a specific day of the week (an example is the "Europa Restaurant & Café" in Szczecin (post of 21.03.2020) and the restaurant of the "Park" hotel in Szczecin (post of 26.04.2020)). There can also be observed activity of catering establishments in the area of creating a special offer related to e.g. Easter holidays (an example is "CityWine" in Szczecin (post of 02.04.2020) and the restaurant "Farina" in Kraków (post of 03.04.2020) or the long May weekend (Poles spend free time between 1 and 3 May barbecuing) (an example is the establishment "Spotkanie", post of 24.04.2020 and "Steak House Villa Patrick" in Poznań (post of 28.04.2020)).
Sales promotion	all kinds of activities encouraging consumers to immediately buy a product due to short-term stimuli	The activity of publishing posts informing about promotional incentives encouraging to place an order. An example is the premises "Wyszak - Browar Rodzinny" in Szczecin (post of 07.04.2020), which introduced the following incentives regarding its offer for delivery and takeaway: • on Mondays - a promotion called "Home office", offering a children’s dish for PLN 1 with the purchase of every two regular dishes, • on Tuesdays - a promotion called "Konkurs" (Contest) encouraging to take part in a contest, where one can win a dish for two with home delivery, • on Wednesdays - a promotion called "5-te urodziny” (5th birthday), where for every four pints of beer, the fifth can be bought for only 1 PLN (it should be emphasized that the analysed establishment makes craft beer), • on Thursdays - a promotion called "Słodki czwartek” (Sweet Thursday), where you can buy a dessert for only 1 PLN, • on Fridays - the "Kino domowe” (Home Cinema) promotion, as a part of which popcorn or nachos is added for free to every order, • on Saturdays - the winners of the Tuesday contest are announced, • on Sundays - a promotion called “Słodka niedziela” (Sweet Sunday), as a part of which a free cake is added to each order. An action of announcing a contest for clients. An example is the cafe "Café 22" in Szczecin (post of 22.04.2020), which announced a competition for the most original and tastiest cake. The task is to bake a cake, take a photo and post it on the fan page of the establishment. The winning cake will become a part of the "Café 22" menu throughout the month, and its author will receive an excellent fruitcake with home delivery.
Public relations	all activities related to creating the company's	An action regarding informing about activity in the area of Corporate Social Responsibility (CSR). An example is the "Europa Restaurant &

	image as part of bilateral relations (with the environment)	Café" in Szczecin (post of 03.04.2020), which joined #GastroDlaLekarzy and provided meals and desserts to doctors, medical staff and patients of the local hospital. An action, also in the area of CSR, involving the initiation of a local charity event. An example is the restaurant "Byczyn Vegan" in Poznań, which encourages its customers to pay any amount for the so-called "postponed" meal for the homeless and needy (post of 29.04.2020). The restaurant will prepare meals for people in need for the funds raised. An action of participating in a Facebook chain letter, which began during the pandemic and consisted of publishing old childhood photos with the note "challenge accepted". The restaurant of the "Park" Hotel in Szczecin (post of 23.03.2020) also decided to participate in the initiative and published photos of the establishment from before the war. The action consisting in informing customers about the opening of premises in a stationary mode and new rules of functioning in the sanitary regime (posts from the second week of May 2020 of all restaurants planning to reopen).
Personal selling	all activities related to the direct contacts of the supplier with the client (personal communication of the company with the market)	An action based on direct contact with clients using the "Messenger" application on Facebook. An example is the correspondence on 27.03.2020 with the restaurant "U Kelnerów" in Szczecin. An action of using the chatbot in the "Messenger" application on Facebook. It is about using intelligent technology that automates answering repetitive questions from customers. An example is the restaurant "Limonka" in Warszawa (attempted contact made on 22.04.2020), where this technical solution automatically sends answers to the following questions: "What dishes do you serve?", "Can I see the menu?", "What is the location?" and "Is delivery possible?"
Direct marketing	all actions involving contact between the supplier and the client, during which the message is dedicated to a specific and usually a single recipient	An action of publishing posts on the fan page run by the establishment, dedicated to people "following" a given establishment. An example would be the restaurant "Brasileirinho" in Szczecin (post of 09.04.2020), which offered its customers the sale of the so-called "Vouchers for the future" for catering services to be used by the end of 2020. For the purchase of a voucher over PLN 200, the customer receives a bottle of red, white or sparkling wine.

Source: own elaboration based on fan page on Facebook of the following catering service providers: "Brasileirinho", "Byczyn Vegan", "Café 22", "CityWine", "Europa Restaurant & Café", "Farina", "Limonka", "Park Hotel", "Spotkanie", "Steak House Villa Patrick", "Wyszak - Browar Rodzinny".

The content of the analysed fan pages of catering service providers proves that Facebook gives entrepreneurs the opportunity to use virtually all promotional mix tools (except sponsorship). Moreover, the activity of the analysed entities compared to the period before the pandemic can be assessed as definitely greater, which is not surprising. An analysis of the online actions clearly shows that they are aimed at achieving specific behaviour of recipients. The identifiable goals of Facebook e-promotion of catering service providers that can be identified include, first of all, providing information on the catering offer, stimulating, encouraging and persuading potential consumers to buy the products, but also breaking the barriers regarding ordering dishes at home or picking them up (takeaway or drive thru).

To sum up the issue of the promotion of catering services in social media, the national initiative of the catering industry, which began on April 22, 2020, should be mentioned. The goal of the campaign was to support catering businesses by encouraging as many customers as possible to order meals in restaurants through currently available sales channels: take-out, delivery and drive thru (Kaszuba-Janus, 2020). The patronage over the event was taken by Związek Pracodawców Hoteli, Restauracji i Cateringu Pracodawców HoReCa (Association of Employers HoReCa),

which is an industry organization representing catering companies operating on the Polish market and abroad. The campaign to promote the catering services of Polish suppliers was planned to consist of four steps: firstly, publicizing the campaign on the Internet by the online community taking part in the event #smacznewsparcie#środynazamówienie (#tastysupport#Wednesday'sorder); secondly, having the message reach others by sharing details about the action on social media; thirdly, ordering a take-out meal on Wednesdays, by delivery or via the drive thru window, and publishing a photo of the ordered meal as well as tagging it #tastysupport#Wednesday'sorder; and fourthly, repeating of the third step.

Summary

The analysis of Facebook fan page content of catering service providers allows drawing the conclusion that the activity of the catering industry during the first wave of the pandemic in terms of e-promotion was varied and multidimensional. During the first wave of the coronavirus pandemic, conducting e-promotional activities on Facebook on a large scale provides a greater chance of being presented to potential clients, which was one of the main opportunities to reach the client and the chance of functioning and survival on the market until restrictions on the provision of on-site catering services are lifted.

In conclusion, it should be emphasized that this study presents only a fragment of the issue regarding the use of e-promotion by the catering industry in relation to the coronavirus pandemic. The subject matter requires further exploration based on theoretical considerations and empirical research. An interesting aspect of future research would be the verification of a relation between the activity of entities providing catering services in the field of e-promotion and their economic situation, determining their survival on the market after the pandemic.

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Historical Connections and Economic Relations of Croatia Towards Germany And Austria

Anita RADMAN PEŠA, PhD
Associate Professor
University of Zadar, Department of Economics, Croatia
apesa@unizd.hr, Phone: ++385(23)400 402

Jurica BOSNA, PhD
Assistant Professor
University of Zadar, Department of Economics, Croatia
jbosna@unizd.hr, Phone: ++385(23)400 404

Zdenko PROHASKA, PhD
Full Professor
University of Rijeka, Faculty of Economics, Croatia
zdenko.prohaska@ri.t-com.hr Phone: ++385(51)355 128

Abstract

We measured the economic activity and stock exchanges of Germany and Austria as developed countries, and compared it with Croatia, the newest EU country, in order to demonstrate the level and direction of economic integration and historical connections. Economic integration has been researched by ARCH models in which dependent variables are stock market indices and undependent variables main macroeconomic indicators. Traditionally, Croatia has been dependent on the German and Austrian economies, due to good economic and political connections in the past. The empirical findings obtained in application of ARCH method from 2000 to 2018 provide evidence of economic integration of Croatia with Germany and Austria, but in a somewhat lesser extent. Austria has strong economic connections with Germany, while the process of economic integration of the Republic of Croatia has not yet been completed. The slower economic integration of the Republic of Croatia demonstrates still insufficient economic development, the exigency to continue reforming and to achieve effective economic growth.

Keywords: Economic integration, stock market volatility, EU entry, ARCH methodology.

Introduction

As a small, open transition economy, Croatia has strong trade links, especially with nearby Germany and Austria. According to Sadecki (2013) and Eurostat data base (2018) Croatia's one of the most important trading partners are Germany and Austria. Those links are due to historical facts and regional connectivity, which is also obvious in the significant presence of German and Austrian banks in Croatia in the form of banking affiliates, as well as the presence of companies such as the major German shareholder Deutsche Telecom (operating Hrvatski Telekom) on the Croatian market.

The authors analyze the level and direction of economic integration e.g. the dependence of the Croatian financial market in comparison to the Austrian and German markets. One of the signs for the closer economic integration are their mutual stock market trends while Geambasu et al. (2014) state that there is a significant number of papers and studies focused on examining financial momentum transfer from developed to less developed financial markets by using macroeconomic variables. Dewandaru et al. (2018) emphasize that financial integration is a desirable goal, because it eliminates national risks and provides more secure portfolio investments across various countries. Prettner and Kunst (2012) have found that large countries have often a strong impact on the economic performance of their small neighbours. Some financial integration indicators among these countries can be regarded as the result of significant economic relations (Jagric et al. 2006).

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This paper deals with the stock markets of Germany and Austria, representing developed countries, and Croatia, a less developed country, to discover and compare their levels and interrelations. This was done using the Autoregressive Conditional Heteroskedasticity (ARCH) method, by applying the main economic indicators in Germany, Austria and Croatia to monthly base data compiled from 2000 to 2018.

The Theoretical Background of Economic Integration

Financial market integration in the European Union is one of the necessary conditions for the efficient allocation of capital (Kučerova 2009). Fratzscher (2002) and Cappiello et al. (2006) found that new EU member states rapidly develop their financial markets but with different degrees of financial integration. However, nearby countries have stronger trade and financial ties which has been refracted on better economic integration.

The world's capital markets have definitely become increasingly integrated in the last thirty years, although some exceptions and dispersion across countries and sectors must be acknowledged (Carrieri et al. 2007). The aim of accelerating European financial integration is to eliminate specific country risks and decrease costs, providing better opportunities for international investors to diversify their portfolios (Erdogan 2008). Stock markets diversify risk, create liquidity, mobilize savings, improve dissemination of information and contribute in other ways to economic growth. As these stock market functions become more efficient and effective, we can expect better incentives for economic growth (Sawhney et al. 2006). It is important to emphasize that New Member States become increasingly financially integrated and more vulnerable to external shocks when they are part of a common financial market. As a main factors of new EU member states in convergence and growth process are overall growth of productivity factors and significant capital inflows (Abrham, 2012). Economic integration and cooperation of the European countries makes Europe far more competitive on the global market while concept of economic governance within the Union is of critical importance (Bartušková and Vrňáková, 2014).

Croatia is undergoing the transformation from an, old autocratic socialist system towards a market economy. Over the past fifteen years, several Central European countries have made great progress towards integration with the world economy (Stavarek and Heryan 2012). Some Southern European countries have made good progress towards European and global financial integration while others have shown weak financial integration. There is also strong financial integration between Central and Eastern Europe through western European banks (Herrmann and Mihaljek 2013).

Many authors deal with the impact of macroeconomic factors on stock market indices, and Table 1 presents the most important outcomes of these studies, based on the inference that macroeconomic variables have a significant impact on stock market indices.

Comparison and Connection of German, Austrian and Croatian Economy

Reforms launched by the German government in 1998 were deemed necessary to address previously chronically high unemployment and low average growth, and contributed to strong growth and falling unemployment until the world crisis of 2008. Owing to its high dependence on exports, Germany was among the economies hit hardest by the financial crisis. Unlike most other countries, Germany emerged from the crisis quickly to become stronger than before (Storm and Naasterpad 2014). The flexibility of German industrial relations is the main element in its success and recovery from the crisis, since it allowed an appropriate, reaction according to the global demands (Dustmann et al. 2014). Germany is a European and world economic leader whose growth has been generated by strong exports.

Austria has a high-performing, wealthy economy which is closely tied to other EU economies, especially Germany's (Prettner and Kunst 2011). Before the crisis Austria recorded strong exports and employment growth, while after the crisis, growth should continue to be underpinned by strong investment and private consumption, thanks to a supportive monetary policy and stabilizing labour market, but the outlook remains vulnerable to uncertainty in the external environment (Focus Economics 2017).

Croatia is a small economy with strong connections with foreign markets. Between 1994 and 2008, the Croatian economy showed relatively high rates of economic growth. One of the main drivers of growth in the national economy was domestic demand, which between 2001 and 2008 grew by more than six percent per year (faster than the growth of GDP). One of the signs of progress in the region was the inflow of direct foreign investments, especially before the crisis of 2008 started. Less encouraging was the fact that investments were directed more to real estate and financial services, which meant a lower probability of realizing export income than if they had been

directed towards production. Between 2009 and 2010, actual household consumption fell by nearly 10%, while domestic demand increased due to private consumption based on borrowing (Benolić 2012).

Generally, we can state that the German and Austrian economies are highly integrated (Prettner and Kunst 2012). As a small, open economy, Austria is characterized by strong links with Germany, its largest neighbour. The ties between the two countries are the result of geographical proximity, a common language, and several cultural and institutional similarities, along with their turbulent common history. Germany has always been a major influence on Austria's economic development (Fenz and Schneider 2008). In Table 2 we can see the percentage of exports and imports for these countries and their interrelations, from 2000 to 2018.

As expected, Austria is one of Germany's most important trading partners. During the observation period, Austria was consistently Germany's third most important exporter and importer. From the Austrian point of view, Germany is Austria's most important trading partner, ranking in first place as Austria's most significant exporter and importer. Thus, we can conclude that the Austrian economy depends a great deal on the German economy.

In observing the structure of Croatian exports and imports, we discovered that during the observation period, Germany took third and Austria fifth place among Croatia's most important exporters. Germany was the second and Austria the fifth largest importer (on average).

When we compare Croatian export value from 2008. with 2018., export to Germany had been increased for 86% which is an increase about 18% of all exports. It is important to emphasize that there is a certain correlation of the German GDP increase, movement of goods exports to Germany and overnight stays of german tourists which came to Croatia (Croatian Chamber of Commerce, 2019).

As Sadecki (2013) states, Croatia has depended on the German and Austrian economies as a result of historical and economic relations. Šonje and Vrbanc (2000) point out that there are significant relationships between the German, Austrian and Croatian economies which are reflected in business cycles. In 2015, the Croatian financial market consisted of 14 banks in private domestic ownership and 16 banks in foreign private ownership – most banks were in Austrian ownership and their assets accounted for 60.5% of all bank assets. From 2000 to 2014, foreign Austrian capital prevailed in the Croatian banking system, while German ownership was insignificant (Croatian Central Bank 2014).

From 2000 to 2008, Croatia had a higher increase in GDP in contrast to Germany and Austria, mostly due to the transition process, often characterized by higher growth rates. Up to 2008, the primary source of Croatian economic growth was the accumulation of physical capital, followed by the growth of multifactor productivity (Dombi 2013). After 2008, the situation changed due to the financial crisis, impacting all three countries. As a transition country, Croatia has had the highest levels of unemployment and inflation. All three had similar levels of investments, regardless of their level of economic development. It is also important to emphasize that although the German and Austrian economies were far stronger than the Croatian one, they were marked by significantly higher government debt during the observation period (see Table 3 in appendices). Governments and enterprises should innovate their governance toward social responsible behaviour (Duh and Štrukelj 2011; Dankova et al. 2015).

However, the performance of the economy in any country depends on monetary policies, such as the money supply, exchange rate and interest rate, and fiscal policies such as government revenue and expenditure. These policies have a mutual effect on each other.

The German, Austrian and Croatian stock markets

The DAX Index is the benchmark index for the German equity market. It tracks the performance of 30 selected German blue chip stocks traded on the Frankfurt Stock Exchange, which represent around 80 percent of the market capitalization listed in Germany. More than 50 percent of the total trades on the Frankfurt Stock Exchange are from investors located in countries outside of Germany (Frankfurt Stock Exchange 2018). Since the mid-1990s, the disclosure and enforcement regulation of the German capital market has taken a new form. Regulators have increased requirements on disclosures, and expanded enforcement mechanisms, most notably by introducing a new supervisory regime (Meser et al. 2015).

The Vienna Stock Exchange is one of the longest-established exchanges in Eastern and South East Europe, but over the last decade, its strength has waned due to its Warsaw counterpart (Wu 2013). The Austrian Traded Index (ATX) is a major stock market index which tracks the performance of all companies listed in Austria.

The Croatian Zagreb Stock Exchange Index CROBEX is a major stock market index which tracks the performance of 25 large companies listed on the Zagreb Stock Exchange. In order to be included in the CROBEX Index, stocks have to be traded in more than 90 percent of the total number of trade days in the selected time period.

The Croatian stock market has tried to adapt its standards to international ones by improving the disclosure practices of firms, order execution, ownership rights, and reducing limitations on international capital flows (Syllignakis and Kouretas 2006). However, it still remains small, fragmented and underdeveloped in comparison with the capital markets of developed countries.

Data and Methodology

Based on studies investigating the correlation of stock market indices and macroeconomic variables in the empirical literature, we constructed a data set of explanatory variables that are usually included in models according to the literature: capital inflows expressed as percentage points of GDP, the consumer price index, the exchange rate expressed as the price of one unit of foreign currency in units of domestic currency, the industrial production index, interest rates (p.a), unemployment rate (expressed as a percentage of the total work force) while for the Austrian model we also used the DAX index and for the Croatian model the DAX and ATX indices due to the spillover effect. The equations can be written as follows:

$$CROBEX = \alpha 0 + \alpha 1CAPt + \alpha 2EXRt + \alpha 3GODt + \alpha 4INPt + \alpha 5INRt + \alpha 6CPIt + \alpha 7UNEt + \alpha 8DAXt + \alpha 9ATXt + \varepsilon t$$
(Eq. 1)

$$ATX = \alpha 0 + \alpha 1CAPt + \alpha 2EXRt + \alpha 3GODt + \alpha 4INPt + \alpha 5INRt + \alpha 6CPIt + \alpha 7UNEt + \alpha 8DAXt + \varepsilon t$$
(Eq. 2)

$$DAX = \alpha 0 + \alpha 1CAPt + \alpha 2EXRt + \alpha 3GODt + \alpha 4INPt + \alpha 5INRt + \alpha 6CPIt + \alpha 7UNEt + \varepsilon t \quad (3)$$
(Eq. 3)

Description:

CPI: Consumer price index
EXR: Exchange rate
INP: Industrial production index
INR: Interest rates (p.a)
UNR: Unemployment rate
DAX: German stock index
ATX: Austrian stock index
CROBEX: Croatian stock index
εt : error for the t period
σ_t^2: conditional variance

Eq. 1: Croatian model
Eq. 2: Austrian model
Eq. 3: German model

We relied on the database of the European Commission (2018) and those of national statistical bureaus. A monthly time series was used for the period from January 2000 to December 2018, in selected countries. Local stock price indices (closing prices) were used for each of the stock markets examined: DAX (Germany), ATX (Austria) and CROBEX (Croatia).

In different estimations of the empirical evidence of a relationship between stock exchange indices and main (macro) economic indicators, we used the Autoregressive Conditional Heteroskedasticity (ARCH) methodology. Many studies use ARCH models for analyzing the behaviour of financial time series, due to their ability to capture non-linearity and volatility clustering in stock data (Al-Zararee and Ananzeh, 2014).

Engle (1982) first introduced an ARCH model appropriate for stock markets characterized by time-varying volatility, while Bollersev (1986) proposed the GARCH model, in which the explanation of conditional variance could be captured parsimoniously. It has been used as a variance equation to be estimated simultaneously with the normal regression model in the mean equation. The GARCH (1,1) model is stated as follows:

$$Y_t = \emptyset_0 + \sum_{i=1}^{k} \emptyset_i Y_{t-i} + u_t \qquad u_t \sim N(0, \delta_t^2) \quad \text{(Eq. 3)}$$

$$\delta_t^2 = \omega + \sum_{i=1}^{k} \alpha_i u_{t-1}^2 + \sum_{j=1}^{p} \beta_i \delta_{t=j}^2 \qquad \text{(Eq. 4)}$$

The estimation of GARCH model involves the joint estimation of a mean and conditional variance equation. Equation (3) is the conditional mean equation, autoregressive process of order k (AR(k)) while the parameter $\emptyset_0$ is the constant, k lag length, ut is the heteroskedastic error term with its conditional variance. Equation (4) is the conditional variance equation specified as the GARCH (p,q) model where p is the number of ARCH terms, and q is the number of GARCH terms. This method eliminates conditional heteroscedastics problems and makes the results in the mean equation more valid (Al-Zararee and Ananzeh 2014).

GARCH modeling reguires several stages of data testing to determine data are significant to the model. We used ARCH effects test, descriptive statistics, Jarque-Bera normality test, stationarity test, autocorrelation test, heteroscedasticity test, model selection criteria, and Value of SC and AIC test for each model.

Before we initiated modelling the ARCH/GARCH model, we tested the heteroscedasticity of the residual dependence variables to prove the presence of the ARCH effect, thus verifying the validity of the ARCH/GARCH model (Table 4).

Results of the implemented ARCH tests indicate the presence of ARCH effect, hence we can use ARCH methodology because the p value of Chi square is less than 0.05. Table 5 shows descriptive statistics for the stock market indices of countries under study that contains; mean, median, max, min, skewness, kurtosis and Jargue-Bera results.

The average value indicates the loss of the stock market index during the observed period for Austria and Germany, while in the case of Croatia it recorded a rise in value. However, the most common value in Croatia example is negative and significantly higher than Germany. High variability in price is visible in all countries based on difference between maximum and minimum yields. All countries have extremely high volatility in accordance with standard deviation values. The Croatian market had a standard deviation of 0.999719, Austria 0.998641 and Germany 0.996721, which indicates that they are almost equal in volatility. The high volatility indicates that there is a greater chance of achieving high rates of return on investment, but certainly at higher risk. The Croatian stock exchange index is significantly asymmetrical, right as opposed to the Austrian and German stock indices that are skewed to the left, whereby all stock indices have excess kurtosis. This respective indicates that yield distribution is not normal. High levels of kurtosis (exceeds normal value of 3) indicate that returns are leptokurtic. In addition to the descriptive part of the statistics, the Jarque-Bera test is significant at 1%, meaning that stocks are not normally distributed and skewed. Therefore, it is an additional evidence of the suitability of ARCH/GARCH models.

All variables were seasonally adjusted (Eviews 10) on the basis of monthly data from 2000 to 2018 for individual regressions. We used the Augmented Dickey-Fuller (1979) to test a series for the presence of a unit root. According to the test results given in Table 6, all variables are stationary in the form dlog (x) i.e. integrated of order 1.

To determine the lag length, we used the Schwarz Information Criterion and Akaike and Hannan-Quinn Information Criterion because, they perform better over a longer period of research (Ashgar and Abid 2007; Akaike 1987). A maximum of twelve lags was considered for each variable when determining the lag length.

We verified the suitability of the ARCH/GARCH model by first performing GARCH (1,1) models for each individual country. GARCH (1,1) is used for Croatia and Germany, because the lagged square error term is significant - satisfies the specification requirement of the model, while for Austria ARCH (1,0) is used, since the coefficient of GARCH (1,1) lagged residual variance is insignificant and accordingly the coefficient of the lagged squared residual is significant.

The validity of the displayed models is additionally confirmed by Breusch-Godfrey test, known as the Langrage Multiplier test, which indicates that there is no autocorrelation in residuals. Breusch-Godfrey test produced Obs * R-squared probability value greater than 5% for Croatia (0.1292), Austria (0.5734) and Germany (0.5218), so H0 hypothesis can be rejected, which means that our models do not actually contain the problem of autocorrelation. We have also tested our ARCH/GARCH models on heteroscedasticity (Table 7).

Results of the ARCH LM test indicate that we have resolved the heteroscedasticity problem through our models. The obtained coefficients are greater than 5% and H0 is not rejected: There is no heteroscedasticity of the residuals.

Results and Discussion

Significant determinants of the Croatian stock exchange index movement in the observed period are capital inflows (1.24) and Austrian stock exchange index (0.12) and German too (0.12), while variable interest rates (-0.01) and inflation (0.85) are significant at the level of 10% (Table 8). In the observed period, Croatia recorded significant capital inflows due to foreign direct investment, mainly related to the non-producing banking sector and insurance companies (Kersan-Škabić and Tijanić 2014). This indicates a limited increase in economic activity that is not accompanied by strong industrial development and in our case it is obvious that industrial production has no impact on the movement of the stock market index.

The transition from planned to market economies in the South East European region has led to rapid financial developments. The strong presence of foreign banks in these countries (in the case of Croatia, Italian and Austrian banks feature the most) has not seriously helped reduce interest rates, but has broadened the supply of financial products and services to the government, companies and households (Poghossian 2008; Festić et al. 2009). Croatia has witnessed increased financial integration that accelerated its EU accession, but it is still relatively weakly financially linked to the German index. Croatia achieves better financial connection with the US market than European market (Halilović and Ergun 2015).

The Austrian and German stock indices have almost equal impact on CROBEX movement. Germany as the economic power of Europe represents a financial centre and it is logical that there is an impact on CROBEX, since by accession to the EU Croatia became economically integrated. However, DAX influence on CROBEX is not as powerful as its ATX impact is strong, indicating a strong interconnection between DAX and ATX.

The influence of DAX and ATX stock indices on CROBEX varies in time, and their strongest correlation is mainly related to global effects such as the global economic crisis in 2008 (Dajčman 2013). With the accession of the Republic of Croatia to the EU, financial integration of Croatia with European capital markets has somewhat increased, but not significantly. There is no significant contagion effect between major European and Croatian stock markets (Dajčman 2014).

Equally strong influence on CROBEX, other than DAX, has ATX, which can be explained by the fact that foreign ownership (especially Austrian) in the banking sector is extremely prominent in Croatia (Botrić and Slijepčević 2008).

Significant influence on DAX has industrial production and interest rates. Germany is world economic power and it is no surprise that industrial production (0.61) has strong influence on the movement of its stock index. Industrial production has always been linked to economic growth, while the stronger influence of industrial production in Germany was the result of higher economic growth (Krchnivá 2016).

The interest rate had a negative impact on all three markets, in line with the theory of financial integration. The German and Austrian economies had generally low interest rates during entire observed period while Croatia started with rather high interest rates which gradually decreased over the last few years, due to integration with the EU and financial integration in general.

On examples of Croatia and Germany, the coefficients both the lagged squared residuals (α) and lagged conditional variance (β) in the Variance equation are significant (probability less than 5%). Sum of ARCH (α) and GARCH (β) coefficients is very close to one which indicates that volatility shocks are quite relentless in both cases and that unconditional variance is stationary. The impact of shock leaves longer consequences on the capital market, which indicates high risk of the capital market. The past volatility in cases of Croatia and Germany ($\beta > \alpha$) means that the stock markets were more affected by past volatility than economic news, which is particularly evident in the example of the Republic of Croatia. Greater volatility brings higher risk in the financial capital market. Also, we can see on example of Austria that lagged squared residuals (α) are significant, which means that volatility clustering exists in the present moment.

Concluding Remarks

The research has shown that the smaller impact of the German and Austrian stock market indices on the Croatian CROBEX is evident, which indicates a financial integration of lesser extent despite good economic relations. In line

with the expected, the German stock exchange index has a strong influence on Austrian stock exchange index, as a result of strong social and economic ties, financial integration and the strength of the Austrian economy.

We can also conclude that there are different impacts of macroeconomic variables on stock indices, suggesting that the observed countries do not have any more significant common links in this regard. Only the rise in interest rates in all observed countries has a significant negative effect on the movement of the stock market index. The similarity of stock indices is reflected in their high volatility. In the examples of Croatia and Germany, past information has a stronger impact on future returns than current information, which is the result of higher risk.

Namely, each country has its own specific characteristics reflecting the movement of the stock market index. The capital inflows for Croatia as a small open country play a significant role in the movement of the stock market index, while on the other hand for Germany as the world economic power, the industrial production growth significantly influences the movement of the stock market index.

The process of integration of the capital market of the Republic of Croatia has not been completed yet. The slower financial integration of the Republic of Croatia indicates still insufficient economic development, the exigence to continue reforming and achieve effective economic growth. Also, it is important to emphasize that further financial integration of Croatia will be enhanced when Croatia joins the EU monetary union, which is expected to occur in 2022.

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Appendices

Table 1: Overview of the empirical literature on macro-economic factors influencing stock market indices

Explanatory variable(s)	Reference	Explanation of theoretical background
Capital inflow	Keong et al. (2010) Tang (2015) Bayar (2017)	Capital inflow has a positive impact on stock market indices and promotes economic growth. Larger capital inflows lead to increased productivity or higher output growth, while stock markets are significant channels through which capital inflow affects economic growth.
Exchange rate	Chun (2012) Walid et al. (2011)	The exchange rate has a significant impact and is an important explanatory variable for studing the volatility of stock exchange indices. Recent studies reveal there is no consensus about the positive/negative

		impact of the exchange rate on stock market indices.
Government debt	Kimathy et al. (2016)	In the case of rising government debt, investors may fear that the government will not be able to repay the debt. This could lead to financial instability and investors may place their investments in more secure countries. Therefore, there is a negative impact of government debt on stock market indices.
Industrial production	Erdogan and Ceylan (2017) Peiro (2016)	GDP growth goes with a rise in industrial production that affects stock market indices positively. Industrial production, which represents output growth, is significantly related to stock market prices.
Interest rate	Knif et al. (2008)	Higher interest rates mean higher costs of borrowing, which have a negative impact on future expected returns. This makes investments more costly and reduces demand for stocks.
Inflation	Benbouziane and Benamar (2009) Al-Sharkas and Al-Zoubi (2014)	There is no consensus in theories and empirical evidence about the influence of inflation on stock exchanges. The influence of inflation on stock exchange volatility may correlate negatively or positively to the stock exchange. The Fisher hypothesis (1930) states that positive correlation can be explained by the expected real rate of interest and expected inflation.
Unemployment rate	Arestis et al. (2007) Feldman (2011)	There is a significant negative relationship between capital accumulation and unemployment, which is reflected in capital market as a negative correlation. Also, higher stock market activity is associated with a lower unemployment rate, meaning it will also have greater impact on stock volatility.

Table 2: Exports and imports (% from 2000 to 2018): Germany, Austria and Croatia

y	% of imports and exports: Germany in relation to Austria and Croatia				% of imports and exports: Austria in relation to Germany and Croatia				% of imports and exports: Croatia in relation to Germany and Austria			
e												
a	% of exports		% of imports		% of exports		% of imports		% of exports		% of imports	
r	Aus	Cro	Aus	Cro	Ger	Cro	Ger	Cro	Ger	Aus	Ger	Aus
2000	5.09	0.25	3.68	0.15	29.47	0.93	40.61	0.46	13.91	6.51	17.03	6.7
2001	5.1	0.28	3.82	0.15	29.47	1.06	41.26	0.44	14.16	5.95	17.18	7.07
2002	4.95	0.29	4.03	0.14	28.55	1.11	41.46	0.53	12.12	7.3	16.3	6.9
2003	5.01	0.33	3.94	0.13	26.88	1.21	39.97	0.56	12.13	8.24	16.28	6.81
2004	5.14	0.3	4.25	0.13	27.52	1.18	41.17	0.72	10.45	9.31	15.63	7.09
2005	5.13	0.3	4.17	0.13	28.42	1.04	41.22	0.55	9.87	6.93	14.93	6.01
2006	5.11	0.3	4.1	0.13	28.36	0.99	41.13	0.53	10.46	6.37	15.09	5.8
2007	5.06	0.3	4.15	0.13	26.31	0.96	40.35	0.51	9.77	6.25	14.5	5.59
2008	5.02	0.3	3.97	0.14	26.56	0.99	39.55	0.51	10.09	6.16	13.46	5.19
2009	5.25	0.28	3.96	0.13	26.97	0.9	40.26	0.45	10.15	5.51	14	5.39
2010	4.96	0.22	3.97	0.12	27.7	0.72	38.46	0.42	9.55	5.21	12.41	4.93
2011	4.91	0.21	3.89	0.11	27.93	0.65	37.36	0.43	9.39	5.59	13.12	4.82
2012	4.75	0.2	3.84	0.11	27.57	0.65	36.99	0.52	9.72	6.85	13.37	4.85
2013	5.6	0.3	3.7	0.1	32.49	1.24	43.61	0.58	11.75	6.26	14.03	8.99
2014	5.58	0.23	3.62	0.09	30.4	1.02	41.9	0.55	11.1	6.00	15.1	8.6
2015	4.86	0.22	3.9	0.13	29.5	1.03	36.35	0.4	11.31	6.55	15.53	9.14
2016	4.88	0.25	4.01	0.15	30.01	1.02	37.82	0.51	11.78	6.4	16.11	7.97
2017	4.7	0.21	3.9	0.12	29	0.61	38	0.34	16	6.9	20.00	6.20
2018	4.9	0.24	4.11	0.16	29.76	1.03	39.02	0.42	16.15	6.32	20.94	6.23

Source: Compiled by the authors according to data collected from Eurostat (2019).
Abbreviations: AUS – Austria, CRO – Croatia, GER – Germany.

Table 3: Macroeconomic environments of Germany, Austria and Croatia

GDP	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	3	1.7	0	-0.7	1.2	0.7	3.7	3.3	1.1	-5.6	4.1	3.6	0.4	0.1	1.4	1.7	1.9	2.2	2.5
Austria	3.4	1.4	1.7	0.8	2.7	2.1	3.4	3.6	1.5	-3.8	1.9	3.1	0.9	0.2	0.8	1.1	1.5	2.6	2.8
Croatia	3.8	3.4	5.2	5.6	4.1	4.2	4.8	5.2	2.1	-7.4	-1.7	-0.3	-2.2	-0.6	-0.1	2.3	3.2	3.4	2.7
UNE	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	7.9	7.8	8.6	9.7	10.4	11.2	10.1	8.5	7.4	7.6	7	5.8	5.4	5.2	5	4.6	4.1	3.8	3.4
Austria	3.9	4	4.4	4.8	5.5	5.6	5.3	4.9	4.1	5.3	4.8	4.6	4.9	5.4	5.6	5.7	6	5.5	4.8
Croatia	15.8	15.9	15.1	14.2	13.9	13	11.6	9.9	8.6	9.2	11.7	13.7	16	17.3	17.3	16.3	13.4	11.1	7.2
INF	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	1.4	1.9	1.3	1	1.7	1.9	1.7	2.2	2.8	0.2	1.2	2.2	2	1.5	0.9	0.2	0.4	1.7	1.9
Austria	1.9	2.2	1.7	1.2	1.9	2.1	1.6	2.2	3.2	0.4	1.7	3.3	2.5	2	1.9	0.8	1	1.9	2.2
Croatia	4.6	3.7	1.6	1.7	2	3.3	3.2	2.8	6	2.3	1	2.3	3.4	2.2	-0.3	-0.4	-0.6	1.3	1.5
INV	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	22.3	20.3	18.1	17.8	17.6	17.2	18.1	19.2	19.2	16.4	17.4	18.2	17.2	17	18	18.8	20	20.3	21.25
Austria	24.5	23.9	22.1	23.1	22.7	22.7	22.3	23.1	22.7	21	21	23	22.7	21	26.5	22.2	23.1	23.5	25.33
Croatia	20.3	22.5	26.1	28.1	27.4	27.8	29.9	29.9	31	28.8	21.9	24.5	20.5	20.4	18.2	18.3	19.9	19.9	20.3
GOD	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	60.9	59.7	58.8	60.4	64.8	67	66.5	63.7	65.1	72.6	81	78.7	79.9	77.5	74.9	71.2	68.2	64.1	60.9
Austria	67.3	66.5	67.3	66.7	65.1	68.6	67.3	65.1	68.8	80.1	82.8	82.6	82	81.3	84.4	85.5	83.6	78.4	73.8
Croatia	35.3	35.5	35.2	34.8	40.4	41.3	38.9	37.7	39.6	49	58.3	65.2	70.7	82.2	86.6	86.7	80.6	78	74.1
LPS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Germany	6.5	2.8	0.1	0.9	-1.9	0	1.2	2	-0.2	-0.4	0.1	2.5	1.2	1.3	0.2	1.58	1.01	1.05	1.13
Austria	11.7	7.5	4.6	6.5	4.1	6.8	5.3	7.3	5.4	1.3	0.3	3	1.3	0.4	0.3	-0.01	0.2	0.23	0.25
Croatia	-	-	14.4	11.5	10.7	13.6	18.1	16.9	16	2.8	5.7	-2.1	-3	-0.6	1.28	-3.1	1.54	-0.88	-0.67
Variables: GDP – gross domestic product (% change), UNE – unemployment (%), INF – inflation rate, INV – investment (% od GDP), GOD – governemnt debt (% of GDP), LPS – loans to private sector (growth rate)																			

Source: Compiled by the authors according to data collected from Eurostat (2019).

Table 4: ARCH Effects Test results

	Croatian stock indeks (CROBEX)	Austrian stock indeks (ATX)	German stock indeks (DAX)
F-statistic	113.7496	45.46125	36.89058
Prob. F-stat	0.0000	0.0000	0.0000
Obs*R-Squared	74.7274	37.787	30.51518
Prob. Chi square	0.0000	0.0000	0.0000

Source: made by authors

Table 5: Descriptive statistics for Croatian, Austrian and German stock index

	Croatian stock index (CROBEX)	Austrian stock index (ATX)	German stock index (DAX)
Mean	0.008849	-0.071002	-0.112041
Median	-0.100585	0.025938	-0.003976
Maximum	5.818907	2.553684	2.039461
Minimum	-2.989021	-3.867101	-4.780158
Std. Dev.	0.999719	0.998641	0.996721
Skewness	1.524513	-0.709869	-1.095874
Kurtosis	9.927726	4.163091	5.810311
Jarque-Bera	513.2224	30.17559	113.7852
Probability	0.0000	0.0000	0.0000

Source: made by authors

Table 6: Stationarity (Augmented Dickey-Fuller) – Germany, Austria, Croatia

Variable	Germany		Austria		Croatia	
	Level t-statistic	dlog(x) t-statistic	Level t-statistic	dlog(x) t-statistic	Level t-statistic	dlog(x) t-statistic
CPI	-1.2164	-3.0640**	0.3968	-3.0256**	-1.3254	-9.5137***
EXR	-0.0459	-2.7418**	-1.3643	-10.2149***	-2.8905	-12.1636***
INP	-0.8599	-4.1554***	-0.3142	-3.1604**	0.1303	-1.9541**
INR	-2.1503	-13.9611**	-1.8892	-2.1538***	-0.5982	-13.7477***
UNE	-0.1331	-2.6403***	-2.0413	-11.3954***	-1.9632	-3.6244***
CAP	-1.9826	-10.7136***	-1.4679	-10.1434***	-2.7210	-14.5608***
GOD	-1.1164	-14.5702***	-1.5302	-3.4475**	-0.5133	-3.6112***
DAX	-	-	-2.0576	-12.9638***	-2.0576	-12.9638***
ATX	-	-	-	-	-1.5547	-10.8214***

(***) and (**) indicate significance respectively at 1% and 5%

Variables: CPI: consumer price index; EXR: exchange rate expressed as the price of one unit of foreign currency in units of domestic currency; INP: industrial production index; INR: interest rates (p.a); UNR: unemployment rate expressed as a percentage of the total work force; DAX: German stock index; ATX: Austrian stock index.

Table 7: ARCH Post Estimation Diagnostics

	Croatian stock indeks (CROBEX)	Austrian stock indeks (ATX)	German stock indeks (DAX)
Obs*R-Squared	0.478312	1.443387	0.159886
Prob. Chi square	0.4892	0.2296	0.6893

Source: made by authors

Table 8: ARCH/GARCH model coefficients - Germany, Austria and Croatia

Dependent variable	**Croatian stock index** dlog(crobex)			**Austrian stock indeks** dlog(atx)			**German stock indeks** dlog(dax)		
Mean Equation									
Variable	Coefficient	z-Statistic	Prob.	Coefficient	z-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	0.0084	4.2621	0.0000***	0.0018	13.121	0.0000***	0.0098	2.6467	0.0081***
dlog(CAP)	1.2404	2.9490	0.0032***	0.0001	0.1113	0.9113	-0.0017	-0.2711	0.7863
dlog(EXR)	0.1223	0.4141	0.6788	0.2198	1.5023	0.1330	-0.0120	-0.0731	0.9417
dlog(GOD)	-0.0074	-0.0720	0.9426	0.1119	0.8460	0.3976	0.3317	0.7415	0.4583
dlog(INP)	0.0215	0.6275	0.5303	0.1924	1.3062	0.1915	0.6064	2.4146	0.0158**
dlog(INR)	-0.0077	-1.8772	0.0605*	-0.0092	-2.7023	0.0076***	-0.0057	-2.7787	0.0055***
dlog(CPI)	0.8545	1.871618	0.0613*	0.0516	0.0636	0.9493	1.8414	1.9236	0.0544*
dlog(UNE)	-0.0996	-0.7431	0.4574	0.0133	0.1399	0.8887	0.0071	0.06382	0.9491
dlog(DAX)	0.1174	2.0791	0.0388**	0.5849	15.936	0.0000***	-	-	-
dlog(ATX)	0.1161	2.6535	0.0080***	-	-	-	-	-	-
Variance Equation									
C	1.62E-05	2.3907	0.0168**	0.0017	11.738	0.0000***	0.0033	14.2482	0.0000***
RESID(-1)^2 (α)	0.1190	5.7405	0.0000***	0.0915	2.3586	0.0183**	0.2424	2.7441	0.0061***
GARCH (-1) (β)	0.8716	39.128	0.0000***	-	-	-	0.6893	6.43177	0.0000***
α1+β1	0.9907			-			0.9317		
R-squared	0.1027			0.4355			0.0011		
Sum squared resid	0.5085			0.4365			0.8168		
Log likelihood	414.70			365.43			318.72		
Durbin-Watson stat	1.4343			1.7936			1.7879		
Method	**GARCH (1,1)**			**ARCH (1,0)**			**GARCH (1,1)**		

Note. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level.

Variables: CPI: consumer price index; EXR: exchange rate expressed as the price of one unit of foreign currency in units of domestic currency; INP: industrial production index; INR: interest rates (p.a); UNR: unemployment rate expressed as a percentage of the total work force; DAX: German stock index; ATX: Austrian stock index.

Source: made by authors

Leadership Styles and Innovation Capital towards SMEs Performance Sustainability

Hazlina HASSAN, Shukriah SAAD, Amrizah KAMALUDDIN and Nurhayati AB SAMAD

Faculty of Accountancy, Level 1 & 2, FPN Building, Universiti Teknologi MARA,

Puncak Alam Campus, 42300 Shah Alam, Selangor, Malaysia.

Email:hazli872@uitm.edu.my; shukriah736@uitm.edu.my; amrizah@uitm.edu.my; Nurhayati321@uitm.edu.my

Abstract

To date, numerous studies have been conducted regarding Small and Medium Enterprises (SMEs) performance and sustainability. It is notable that in the global business competitiveness, SMEs are facing various challenges in surviving and sustaining their operations. Thus, SMEs need to exploit all of their available resources including good leadership styles and innovative initiatives to ensure the sustainability of organization's growth. The current study aims at identifying the relationship between leadership style and innovation capital towards the SMEs sustainability. It is always a major academic issue in determining whether a successful leader share similar experiences, attributes and leadership patterns. A good leadership styles can reshape and redefine the direction of SMEs performance. This paper describes the pattern of self-perception of leadership styles among SMEs top management team. Data were collected from 111 SMEs. The results from this study indicate that all leadership styles; directing, coaching, facilitating and delegating have significant relationships on sustainable competitive advantage of SMEs. The Delegating approach shows the highest score as it is indicating that good leadership should be able to delegate responsibilities to others. The results also show that innovation capital is significantly positive towards the sustainability of SMEs performance. This would be the main strategy for leaders in strategizing the appropriate leadership approaches which concentrate on innovation capital as key capabilities of the organization to achieve sustainable competitive advantage. This is very important for the SMEs not only to withstand the competition and strive, but to continue improving their performance with a dynamic market in Malaysia.

Keywords: Leadership styles, Innovation Capital, SMEs and Sustainability.

Introduction

Small and medium enterprises (SMEs) are the backbone of Malaysian economy. According to SME Corporation Malaysia (2019), in 2018, SMEs contribute toward 38.3% of Malaysia's overall gross domestic product (GDP). This indicates that the overall SME sector will be having ~~a~~ growth in performance in a later year depending on external developments. Nevertheless, unpredictable markets could have a negative impact on SME's performance. Challenging business environments demand effective leaders within an organization to ensure of its survival. Akbari et al. (2017) specifically stated that many organizations are having difficulty in handling organizational issues and problems. These issues could include employee loyalty, productivity level, lack of innovation, and many more. The management teams in every organizations need to be well equipped with necessary leadership knowledge for them to be able to steer their "ship" towards the desired course. Leaders need to constantly monitor the changes happening to the organization and make necessary adjustments and adapting their leadership styles that best fits~~s~~ the current business environment (Seah & Hsieh, 2015).

Apart from effective leadership, this study also focuses on the effect of innovation capital towards SMEs sustainability. Innovation can be important resources for SMEs that will generate wealth and drive the expansion of the business (Alrowwad et al., 2020). With innovation, SMEs can a gain competitive advantage and perform better than their competitors. However, in today's competitive environment, large corporations are able to exert pressure on SMEs in terms of their aptitude for innovation (Taneja et al., 2016). This is because they have more expertise and resources (financial, human, physical, etc.) due to greater economies of scale.

In modern times, the issue of sustainability has become more prominent. Eriksson & Svensson (2016) stated that ~~a~~ sustainable development within the organization can be understood as development which meets the economic,

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environmental and social obligations of the present, without compromising the capability of future generations to meet their own needs. The increase of public scrutiny and legislative changes force SMEs to re-evaluate their business activities related to sustainability issues (Das et al., 2020). Failure to meet the expectation of the public towards a sustainable goal could potentially lead to resentment from every stakeholders and negatively affect the image of the organization.

There has been little or no research done to determine the effect of situational leadership and innovation capital on corporate performance sustainability especially for SMEs. The results reported in this study would be a value added to SMEs business advisor and SMEs owners. This would be the main strategy needed by SMEs owner to improve their management skills and emphasize high quality products or services to ensure SME survival. Therefore, this study examines important factors of leadership styles and innovation capital for SMEs in terms of performance sustainability. This is very important for the SMEs not only to withstand the competition and strive, but to continue improving their performance with a dynamic market in Malaysia.

Literature Review

Leadership Style

Leadership styles have evolved and changed over the past century. Effective leadership style should be adaptable and flexible which manifested with varying leadership behaviours in different scenarios. Each leader has their styles in managing the organization. The most popular leadership styles often mentioned in academic writings was the Situational Leadership Theory (SLT) introduced by Hersey and Blanchard in 1969 (Thompson & Glaso, 2018). Four key leadership styles that were stated within the theory were Directing, Coaching, Facilitating, and Delegating (Bharti, 2018). Table 1 below shows the basic description for each leadership styles for better understanding:

Table 1: 4 Basic Leadership Styles

Directing	Coaching	Facilitating	Delegating
-Very direct behaviour -Low supporting behaviours -Gives detailed procedures to achieve specific goals and objectives	-High directing and supporting behaviours -Motivates subordinates to make decisions -Provides feedback to subordinates	-Low directing behaviour, high supporting behaviours -Proactive leaders participating with their subordinates -Open minded	-Low directing and supporting behaviours -Delegate responsibilities to subordinates -Expect subordinates to handle the tasks given independently

Suriyadi et al. (2020) stated that effective leaders need to change their leadership styles depending on the competency and commitment level of their followers. Graeff (1983) highlighted the need for behavioural flexibility in leaders towards goal attainment. Flexible leaders are able to think more critical in solving organizational problems. Blanchard et al. (2017) explains that there are 4 development stages for subordinates to master certain task. These are called "The Development Continuum". Figure 1 shows an overview of the stages.

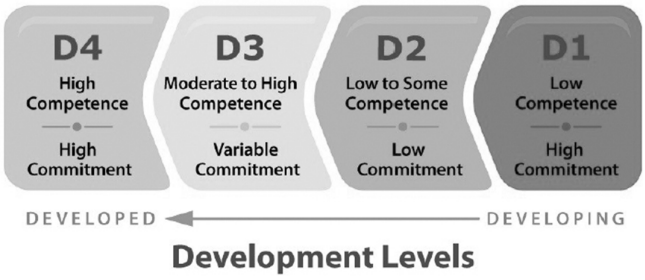

Figure 1: The Development Continuum

Based on Figure 1, each stage have different levels of competency and commitment. Situational leaders must have the ability to give suitable guidance and task support for their subordinates based on their level of development

(Ghazzawi et al., 2017). Blanchard et al. (2017) later explains how each leadership styles can best fit~~s~~ the subordinate's development level as shown below:

- D1 (*enthusiastic beginner*) - with low competence and high commitment, the subordinate will need a Directing leader
- D2 (*disillusioned leaner*) - with low to somewhat competence and low commitment, the subordinate will need a Coaching leader
- D3 (*capable but cautious*) - with moderate to high competence and variable commitment, the subordinate will need a Facilitating leader
- D4 (*self-reliant achiever*) - with high competence and high commitment, the subordinate will need a Delegating leader

Keeping this concept in mind, leaders need to change their leadership styles appropriately in pursuing the organizational objectives and goals. This is important because leadership styles are one of the important contributors towards employee~~'s~~ and organizational performance (Arham, 2014; Fazli & Sam, 2012; Maamari & Saheb, 2018; Mohd Adnan & Valliappan, 2019). Blanchard & Johnson (2015) summarise that an effective leader plans their goals thoroughly, ask for feedbacks, encourage people, and make necessary adjustments based on changing environments.

Innovation Capital

Innovation can be understood as the procedure of creating something new which is crucial to the entrepreneurial process (Barringer & Ireland, 2016). Most of the time they hold specific characteristics which include uniqueness, inimitable, and irreplaceable (Alrowwad et al., 2020). Many different types of innovation that can be produced by a company. Previous literatures has extensively discussed the specifications of innovation and how they can be identified. For example, Knight (1967) categorized innovation into organizational structure, production process, people, and product or service. Oke (2007) has his ~~own~~ idea to categorized innovations which are product (including radical and incremental) and business processes (including administrative, service and production). In recent literature, Baregheh et al. (2012) classify innovations into position, process, product, and paradigm innovation.

Kamaluddin et al. (2016) explains innovation capital in two stages. The First stage involves decisions and activities that take place by pinpointing a problem through research and development (R&D) and the commercialisation of an invention. The second stage involves processes in creating a new product or significantly improving the existing products, services, and any other operations within the organization. The Generation of innovation capital can be important in every company as it will improve the overall effectiveness and efficiency of its operations and thus give a competitive edge in the market (Kamaluddin et al., 2016). Regardless of how innovation can be generated, past studies agreed that innovation capital can have a significant impact on organizational performance (Alt et al., 2020; Kamaluddin et al., 2016; Lichtenthaler, 2016; Prima Lita et al., 2020).

Organizational Performance Sustainability

Teh & Corbitt (2015) describe sustainability as the organization's ability to meet the current needs of both the organization and its stakeholders while ensuring the future needs of stakeholders were not abandoned. In 1987, the World Commission on Environment and Development (WCED) popularized the concept of sustainable development in organizations (Laskar & Maji, 2016). As time goes, sustainability has become one of the primary concerns discussed among politicians, academics and members of communities (Poveda, 2017). This has caused organizations to shift their focus on sustainable practices and reporting from the traditional ways of doing business. Current stakeholders demand that companies conduct their business in an environmentally friendly manner and nurture a healthy work environment. Opebiyi (2020) stated that sustainable development practices include the reduction of pollutions from operations, cost savings, and better management of the human resource.

Mandatory sustainability reporting is considered as recent trends as more stakeholders are becoming aware of the negative impacts of business activities toward the environment and society (Fitriasari & Kawahara, 2018). In Malaysia, the requirement for sustainability reporting includes the disclosure of corporate social responsibility (CSR) within the company's annual report (Bursa Malaysia, 2015). However, this requirement only applies to listed companies, this means that not all SMEs are required to follow the reporting guideline. Not to mention, SMEs might not have the financial and technological advantage to support sustainable development (Das et al., 2020).

Nevertheless, SMEs should take the issue of sustainability seriously. This is because sustainability within an organization is crucial in constructing a good image for the company (Hogan & Lodhia, 2011). Past studies also indicate that sustainability potentially have a significant impact on organization performance (Bodhanwala & Bodhanwala, 2018; Das et al., 2019; Wu et al., 2017). Bad reputation due to environmental scandals could tarnish the company's brand and thus making hard for them to sustain longer in the market (Dekhili et al., 2019). Companies

that have better image gain higher chance of attracting customers to buy their products or services. Nonetheless, sustainability should not be at the expense of economic development (Mauri, 2020). Thomas et al. (2016) emphasize the need to balance (or overcome assumed trade-offs among) economic, environmental, and social responsibilities.

Methodology

A survey was carried out through a questionnaire on a sample of 400 SMEs. The sample of this study was randomly selected from the SMEs database. Total of 400 questionnaires were distributed to SMEs via an online survey of which only 111 (28%) responses were responded. The questionnaire used in this study adopted from Kamaluddin.A et. al (2016), Abernethy (2001) and Crowe (2013). The questionnaire used in this study contained demographic and three other~~s~~ dimensions which are leadership style, innovation capital and organizational performance sustainability. The survey collected measures that would facilitate validating the leadership style with 24 items. Participants could respond from 1(Not Agree) to 5 (Highly Agreed). It also contained 9 items measuring innovation capital. The response set ranged from 1 (Not Agree) to 5 (Highly Agreed). The organizational performance sustainability included 13 items on a scale of 1 (Not Agree) to 5 (Highly Agreed). Data is also checked for normality and reliability. Regression analysis is employed to analyse the data. The Cronbach's alpha values are above 0.70, ranging from 0.917 (Organizational performance sustainability) to 0.927 (Innovation Capital), implying that the data is valid (Geoge and Mallery, 2003) (refer Table 2).

Table 2: Cronbach's Alpha by Dimension

Dimension	No of statements	Cronbach's Alpha
Leadership style	24	0.924
Innovation	9	0.927
Organizational performance sustainability	13	0.917

A normality test was carried out using the Skewness and Kurtosis test on leadership style, innovation capital and performance sustainability. The summary statistics are presented in Table 3.

Table 3: Summary Statistics of Skewness and Kurtosis: Normality Test

Dimension	**Skewness**	**Kurtosis**
Leadership style	-0.756	0.578
Innovation	-0.635	-0.031
Organisation Performance sustainability	-0.205	-0.551

It can be seen that all skewness and kurtosis values are in the range -2 to 2, thus the data is assumed to be normally distributed. Thus the data can be used to further analyse variables relationship.

Results and Discussions

Descriptive Statistics

The Majority of the respondents are female (67.6%). 59.5 percent of the respondents are between the age group less than 31 years old. The Majority of the respondents are Malays (85.6%), followed by Chinese (6.3%) and Indian represents only 1.8% of the total respondents. In terms of respondents' level of education, 40.5% hold a Bachelor degree~~s~~ (40.5%) and only 9.9% hold a Professional degree. The Majority of the respondents are those from middle management (56.8%) and have below 4 years working experience. Majority of the respondents have never received any award for the organisation (76.4%). Only 23.6% have received some form of award for the organisation.

The means and standard deviation for each leadership style are presented in Table 4, Table 5, Table 6 and Table 7.

Table 4: Mean and Std. Deviation of Perception Scores on Facilitate

Statement	Mean	Std. Deviation
I provide staff with the time and resources to pursue their own developmental objectives.	3.81	0.879
I avoid making judgments or premature evaluation of ideas or suggestions.	3.79	1.001
I discuss any organisational or policy changes with staff prior to taking action.	3.78	0.948
I appoint staff into task groups to action policies affecting them.	3.63	0.962
I rotate of team briefer among the staff.	3.56	1.015
I avoid evaluating problems and concerns as they are discussed.	3.52	1.052
Leadership style: Facilitate	3.68	0.695

Table 3 presents the means and standard deviations of perception scores on facilitate. Among the 6 statements, the respondents react most with *I provide staff with the time and resources to pursue their developmental objectives* (Mean=3.81). and the least *I avoid evaluating problems and concerns as they are discussed* (Mean=3.52). It can be concluded that on average, the respondents perceived the leadership facilitate style is to a great extent.

Table 5: Mean and Std. Deviation of Perception Scores on Coach

Statement	Mean	Std. Deviation
I recognise staff's achievements with encouragement and support.	4.00	0.963
I explain the benefits of achieving their work goals to staff.	3.81	0.889
I meet with staff regularly to discuss their needs.	3.75	1.049
I focus on opportunities and not problems.	3.75	1.022
I hold regular meetings to discuss work status.	3.55	1.077
I hold periodic meetings to show support for organisation policy and mission.	3.49	1.026
Leadership style: Coach	3.72	0.726

Table 5 presents the responses on coach leadership style. It shows that the respondents agree most with *I recognise staff's achievements with encouragement and support* (Mean=4.00). These are followed, in descending order, by elements contained in the statements, *I explain the benefits of achieving their work goals to staff* (Mean=3.81), *I meet with staff regularly to discuss their needs* and *I focus on opportunities and not problems* (Mean=3.75), *I hold regular meetings to discuss work status* (Mean=3.55*)* and lastly *I hold periodic meetings to show support for organisation policy and mission* (Mean=3.49). The mean score of 3.72 indicates that the respondents viewed the leadership coach style is relevant.

Table 6: Mean and Std. Deviation of Perception Scores on Delegate

Statement	**Mean**	**Std. Deviation**
I discuss the organisation's strategic mission with staff.	4.13	2.948
I provide staff with clear responsibilities and allow them to decide how to accomplish them.	4.10	0.842
I ask staff to think ahead and develop long-term plans for their areas.	3.94	0.937

I emphasise the importance of quality but I allow my staff to establish the control standards.	3.85	0.926
I ensure that information systems are timely and accurate and that information is fed directly to staff.	3.84	1.075
I expect staff to create their own goals and objectives and submit them to me in finished form.	3.61	1.037
Leadership style: Delegate	3.91	0.838

Table 6 above shows that on average, respondent perceived *I discuss the organisation's strategic mission with staff and I provide staff with clear responsibilities and allow them to decide how to accomplish them as more important (*Mean=4.13 and 4.10 respectively) and least react towards *I expect staff to create their own goals and objectives and submit them to me in finished form* (Mean=3.61). This indicates that good leadership should be able to delegate responsibilities to others.

Table 7: Mean and Std. Deviation of Perception Scores on Direct

Statement	Mean	Std. Deviation
I make sure staffs are aware of, and understand, all organisation policies and procedures.	4.05	0.999
I have staff report back to me after completing each step of their work.	3.93	1.042
I demonstrate each task involved in doing the job.	3.86	0.968
I set down performance standards for each aspect	3.84	0.910
I check staff's work on a regular basis to assess their progress and learning.	3.84	0.920
I try to assign work in small, easily controlled units.	3.72	1.028
Leadership style: Direct	3.87	0.765

For Direct leadership style, it is found that respondent are more concerned about *I make sure staff are aware of, and understand, all organisation policies and procedures* (Mean=4.05) as compared to other statements (Table 7). This indicates that direct leadership will enhance intended task to be completed.

Table 8 presents the mean scores of statements to measure the perception of respondents on innovation capital. Based on all the 9 statements, the mean score of 5.06 implies that, on the average, the respondents agreed with the elements of innovation as manifest in the statements. From the Table 7, it can be seen that *My organization success depends on the management support towards innovation* (Mean=5.44) is the most statement viewed by respondents for the company to sustain their business in current environment.

Table 8: Mean and Std. Deviation of Perception Scores on Innovation Capital

Statement	**Mean**	**Std. Deviation**
My organization success depends on the management support towards innovation.	5.44	1.457
My organisational innovation may include new processes or strategy.	5.34	1.462
Innovation has a positive influence on my organization turnover profitability and employment.	5.25	1.598
My organization make product/service innovation such as improvement of an existing product/service or developing a new product/service.	5.24	1.630
My organization developed numerous ways to become innovative.	5.22	1.455
Productivity in my organization will be enhanced through innovation.	5.16	1.474
My organization is interested in promoting innovation activity.	5.14	1.420

The survival of my organization in the long run depends on innovation.	4.80	1.512
My organization receives R&D grant.	3.92	1.912
Innovation	5.06	1.234

Table 9 presents the mean scores and standard deviation on organization performance sustainability. The respondents were asked to indicate their agreement the extent of their agreements with the statements given. Based on the mean score, the respondents agreed most on *Quality of products and services* (Mean=5.66) followed with *overall business performance* (Mean=5.41) as a second highest mean score. *New product development* (Mean=5.14) is the lowest scored. The respondents consider the elements of organisation performance sustainability as manifest in the statements are relevant.

Table 9: The Mean Scores and Std. Deviation of Perception Scores on Organisational Performance Sustainability

Statement	Mean Score	Std. Deviation
Quality of products and services	5.66	1.066
Overall Business Performance	5.41	1.022
Sales Growth	5.29	1.021
Employees Contentment	5.28	1.089
Profit Growth / Return on Assets	5.22	1.074
New product development	5.14	1.187
Organisational Performance	5.33	0.919

Regression Analysis

A regression equation was estimated with organisation performance sustainability as the dependent variable, and leadership style and innovation as the independent variables. Table 10 presents the summary statistics of the estimated regression equation.

Table 10: Estimated Regression Equation

Variable	Coefficient	*t*-value	*p*-value
Leadership style	0.451	4.089	0.000**
Innovation	0.441	7.217	0.000**
F	68.956		0.000**
R^2	0.561		

*** Significant at 0.01*

The regression equation is statistically significant at 0.01 ($p<0.01$), implying that there is an association between organisation performance sustainability and any or all of the independent variables which are leadership style and innovation capital. The adjusted R square for the ,model used in this study is 0.561 and the F-value is 68.956 ($p<0.000$). It means that about 56.1% of the variation in the SMEs performance sustainability can be explained by the model.

Table 10 indicates that both the coefficient of leadership style and innovation are statistically significant at 0.01 ($p<0.01$). The coefficient of leadership style (0.451) and innovation (0.441) means that an increase in leadership style and innovation increases the organisation performance sustainability. This result is consistent with the previous studies by Arham, A.F (2014), Cristopher M. McDermott & Daniel (2014) .

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Table 14: Estimated Regression Equation

Path	Criterion Variable (Y)	Predicting Variable (X)	Coefficient	*t*-value	*p*-value	*F-value*	R^2
C	Organisation performance	Leadership style	0.869	7.654	0.000**	58.446 (0.000**)	0.349
A	Innovation	Leadership style	0.947	6.450	0.000**	41.596 (0.000**)	0.276
B	Organisation performance	Innovation	0.573	10.291	0.000**	105.913 (0.000**)	0.493
B,C	Organisation performance	Leadership style	0.451	4.089	0.000**	68.956 (0.000**)	0.561
		Innovation	0.441	7.217	0.000*		

*** Significant at 0.01*

From the table above the model shows a significant positive relationship between leadership styles (X) and organization performance (Y) (p<0.01). Path A model shows that leadership styles (X) is also positively related to innovation (M) (p<0.01). Path B model then shows that innovation (M) positively predicts organization performance (Y) (p<0.01). Finally, leadership styles (X) predict organization performance (Y) when controlling for innovation (M). It can be seen that, both leadership styles (X) (p<0.01) and innovation (M) (p<0.01) are statistically significant. The finding support that there is partial mediation in this model.

Conclusion

The findings of this study suggest that leadership style is one of the most important elements for organisational success. The leaders of organisations must first understand that the leadership styles they display and practise such as coaching, delegating, directing and facilitating have significant contributions to organisational performance. This study also found that innovation capital is significantly positive towards sustainability of SMEs performance. The research framework, the research questions and the methodological approach of this study contribute to the existing body of knowledge in leadership, innovation and sustainability literature. The theoretical contributions and managerial implications are also significant findings for leaders of SMEs development in the country. Some limitations are acknowledged that indicate future research directions. Finally, the timing of this study is particularly important as Malaysia is moving from being a developing country towards having developed country status, and sustainability of SMEs are considered as one of the engines for the growth of the country's economy. Hence, Malaysian SMEs need to take a deeper thought and understand the concept of leadership styles and innovation capital to be able to attain sustainability and achieve business goals.

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Negative Effects of Noise Pollution in Agriculture – A Review

Ph.D. Eng. Mihai CHITOIU
University POLITEHNICA of Bucharest, Bucharest, Romania, chitoiu_mihai@yahoo.com

Lect. PhD. Eng. Georgiana MOICEANU*
University POLITEHNICA of Bucharest, Bucharest, Romania, georgiana.moiceanu@upb.ro

Prof. PhD. Eng. Gigel PARASCHIV
University POLITEHNICA of Bucharest, Bucharest, Romania, gigel.paraschiv@upb.ro
*corresponding author

Abstract

A problem not often discussed or recognized is represented by noise injury in agriculture. The recommended level of noise is not respected thus many workers, farmers or family members are exposed to it. Thus, these people experience hearing losses more often than people with other types of jobs. Just lately, an interest in the subject is mentioned also in the Occupational Health and Safety regulations. The main objective of this study was to review negative effects of noise pollution in agriculture in regard to the farmers interests toward protecting their workers and the safety measures they have taken to prevent health problems. The paper focuses on agriculture noise pollution since it is a very important sector in Europe that should be investigated and developed more and more. The findings are expected to enhance the understanding of noise pollution in agriculture and review different ways to prevent it.

Keywords: Noise Pollution, Agriculture, Protection Measures.

Introduction

Technological evolution in all industries, including agriculture, is constantly adopted by the private sector, leading to increased productivity rates, and lowered physical working load for employees. (A. Gray and M.D. Boehlje, 2007). Acquisition of new and modern equipment types have also lowered the required number of operators, but given this fact, the employees will be exposed in a higher amount of time to high noise levels produced by the equipment.

Multiple studies have shown that more than 20% of the world population is living in unacceptable noise levels, while 60% from Europeans are also exposed to concerning levels of sounds during the day (Rivas et.al. 2003).

A second study, that is in agreement with Rivas et al. 2003, is the AEM - "Ambiental noise in Europe 2020", stating that approximately 20% of the population is exposed to high levels of noise that affects negatively affects health every day.
The concern for workers welfare started to be of interest when the companies started to be affected by the health issues of employees, thus affecting business as well. (Sampaio, C. A. P.et. al 2007).

Acoustic noise is one of the most prevailing risk factors on the operators of construction, mining and agricultural machinery. As data gathered by the EU countries, noise pollution leads to one of the most common occupational diseases, hearing loss. (European Environmental Agency, 2017).

Agricultural noise was studied and analyzed by scientists and some concluded that the mid to long term exposure to noise coming from machines were harmful for the operator (Cunha, J. P. A. R. et. al 2006).

found that tractor cabins can help reduce the noise level by 3dB. Also, sound levels were registered for the tractor cabin with its window open or closed, showing significant differences (Mofrad F.E. et al. 2012) .

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It is important to mention that in agriculture, the activities are in close connection to different processes that involve many equipment types; thus the vibrations and the noise analysis has to be considered as a complex issue that doesn't have to be simplified.

(Junoh et al. 2011) concluded that discomfort levels for the machinery operators depend on the magnitude, direction, and frequency, but also the duration of the exposure to the noise pollutant.

In Romania, noise level monitoring falls under the activities of the Romanian Ministry of Environment, which, following their studies, outlined a rise of the average noise levels, from 50 dB in the 80's to 70 dB in 1999. Being part of the European Union, and aligned with the common principles, Romania is applying European Directives and Standards with the purpose to limit the rise of noise levels, and to protect hearing health through certifying new equipment types by sound level testing (CECE).

Agricultural equipment in Romania is tested for sound levels following the instructions of Directive 2000/14/EC [2000/14], and the instructions from Standard SR EN ISO 3744/2011, for determining acoustic level power levels and acoustic energy of noise sources using acoustic pressure (SREN3744).

The main objective of this study was to review the farmers interests toward protecting their workers, to present the noise levels of some machines and present the safety measures they have taken to prevent health problems.

General aspects of sound

In 2015, it was estimated that 10000 people died annually, around the world due to factors associated to noise pollution (Environmental Agency, Ministry of Agriculture, Regional Development and Environment, 2019). The most common noise effect is it influence on neuro-vegetative balance that can happen at around 60 db.

The negative effects of noise pollution on humans are known for a long time now, and are still constantly studied. According to the specialty literature, there are three main effects of noise exposure (González, A.E., 2012): acoustic trauma that leads to an immediate and permanent effect following acute exposure, temporary shift of hearing leading to an immediate effect after exposure that could be reverted by hearing rest, and permanent shift of hearing leading to a permanent damage caused by chronic exposure.

The Final Report which shows an analysis on the health effects of noise exposure based on the WHO Large Analysis and Review of European housing and health Status,

There is also a direct linkage between noise exposure, migraines and aggression, based on the biochemical processes of hormones and neurotransmitters (Ramírez, J.M., 2006)).

Acoustic oscillations are met when machines and equipment types are used and can be harmful for the humans. Considering the way that the acoustic oscillations are perceived by the human hearing organ, it can be classified as it follows:

- Infrasound with frequencies under 16 Hz;
- Sounds with frequencies between 16 and 16000 HZ;
- Ultrasounds with frequencies above 16000 HZ.

Sound is represented by a particle vibration in the environment, capable to produce a hearing sensation. The sound is propagated as elastic waves but only in air, liquids, and solids. The propagation speed is different due to the propagation environment properties. In the air, the propagation speed is 340 m/s (TriteanA and Arghir M, 2013). The sound frequency is measured in Hertz (Hz), and the human ear sensibility is between 2000 – 5000 Hz.

The universal measuring unit for sound is decibel (db). The human ear perceives sounds with a frequency between 16 – 20000 vibrations/second and an intensity between 0 and 120 db.

Noise is defined as being a complex mixture of sounds without a repetitive pattern which affects the psychological and biological state of people and also other organisms in nature. It's characteristics, physical or objective, refer to the sound's strength and intensity, the frequency, and the duration on noise. The most important feature is represented by the noise intensity and it depends on different factors. The noise represents a health and environment problem.

According to World Health Organization (WHO) noise represents a threat that is underestimated. WHO says that the noise pollution generated by traffic is considered the second environmental factor that affects human health.

The number of diseases that can occur due to noise exposure have an effect on the long or short term, for example it can affect the hearing up until hearing loss, can provoke cardiovascular problems, sleep disorder, can have a huge influence on work performance, etc (World Health Organization).

According to WHO the level of noise during nighttime should be less than 30 db(A) and for pupils and students the level of noise in classes should be less than 35 db(A) for good learning conditions.

European Union data presents that most of the time, whether is day or night, the level of noise in above 55 db(A). Sound levels for different general examples and agriculture machines are presented in the table below:

Table 1: Sound levels examples

No.	General situations	Agriculture	Sound levels (db(A))
1	Normal conversation		50 – 60
2	Pupils classroom		74
3	Night clubs		Up to 100
4	Rock concert		110 – 130
5	Library		40
6	Dishwasher		55 – 70
7	Jet plane at ramp		125
8	Tractor		74 – 112
9		Chainsaw	77 – 120
10		Combine	80 – 105
11		Garden tractor	88 – 94
12		Grain grinding	93 – 97
13		Pig squeals	85 – 115
14		Crop dusting aircraft	83 – 116

If the problem of noise pollution has been identified, it is necessary to see how it can be acted upon, trying to remove it, but not without making an analysis, or a noise assessment. Considering that studies have shown what are the levels of noise that can cause damage, the assessment needs to concentrate on the current state and present the findings.

If we consider the specific equipment in agriculture and its noise levels, we can mention the following:

Tractors – are the most common machines used in agriculture both by big and small farmers. The evolution in construction of tractors implied also sound-reducing cabins. The level of sound inside the cabin with its windows closed showed a lower level of noise. Older models presented noise levels as much as 100 dB(A).

Chainsaws – are an equipment used often that does not offer protection if you are not wearing additional hearing protection gear. The noise level registered by scientists for the chainsaw was about 110 dB(A).

Shed and process machinery – considering the renewable energy is used from more that a decade ago, the biomass that is one of the main materials for obtaining biogas or pellets, needs to pass through a series of production processes such as shredding. Thus, this process is part of an entire production process and just milling and shredding emits noise levels of about 95 db (A).

Researchers (Retta Zewdie and Pavel Kic, 2017). measured the noise levels for a harvester Claas 450 and three tractors Case IH, tractor Zetor Z7045 and Tractor Zetor Z7711. The authors analyzed the noise level in the operator's cabin.

Table 2: Noise level measurement of farm machine driving cabin (Retta Zewdie and Pavel Kic, 2017).

Cabin of machine	LA, dB(A)
Claas 450	81,6
Case IH	72,8
Zetor 7045	83,2
Zetor 7711	84,3

For example, the noise level measurement for the harvester was presented as follows:

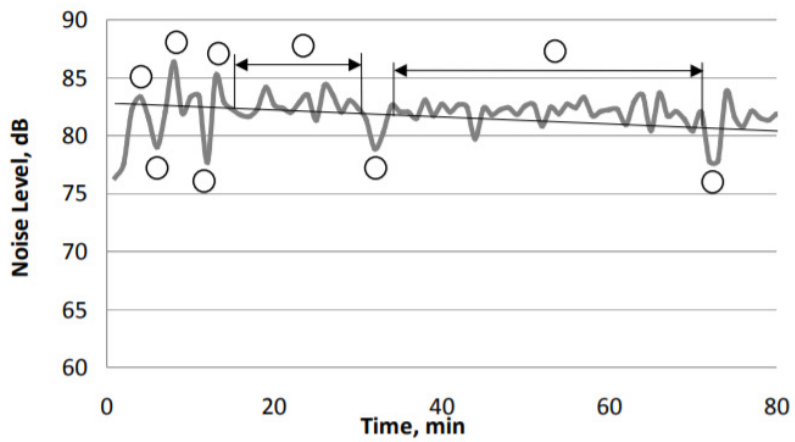

Fig.1: Noise level measurement for harvester Class 450 (Retta Zewdie and Pavel Kic, 2017)

Another researcher evaluated the following machines: agricultural tractor, agricultural chainsaw, brush cutter and portable harvester (Tadayuki Y. et. al. 2012).

The analysis of noise levels was done by using sound pressure meter in the slow response circuit and of equalization "A", expressed in dB (A), and the draft shield of decibelimeters was used in all measurements. When presenting the information, the authors chose to represent is as maximum, minimum, average level to better express which the range for the sound that can affect human hearing. Also, similar to the study presented above, the level of noise pollution for the maximum level is close to 90 dB even higher, thus affecting the workers productivity (Tadayuki Y. et. al. 2012).

Table 3: Noise levels (Tadayuki Y. et. al. 2012)

Equipment	Noise Level (dB(A))				
	Minimum	Average	Maximum	Average	Standard Error
Harvester	53,49	65,94	81,85	64,29	0,41
Chainsaw	73,85	85,18	102,28	84,13	0,39
Brushcutter	71,64	84,45	99,31	83,40	0,38
Tractor	70,93	83,43	93,75	82,71	0,57

Results and Discussion

The results presented by the authors (Retta Zewdie and Pavel Kic, 2017). showed high noise levels for every equipment type, and most of the time around 90 dB, a value that is not recommended for the workers. The recommendations of the authors expressed the need for wearing ear protection and also the importance of sealing elements like rubber seals for the driving cabins

The conclusion drawn for all equipment analyzed by (Tadayuki Y. et. al. 2012)., protective equipment is needed, activity monitoring is very important and also the companies need to have a work plan for every equipment since they are different but the sound levels are similar and the effects on workers can be harmful.

To better express the distribution of noise levels, the authors also conducted a spatial distribution for every equipment.

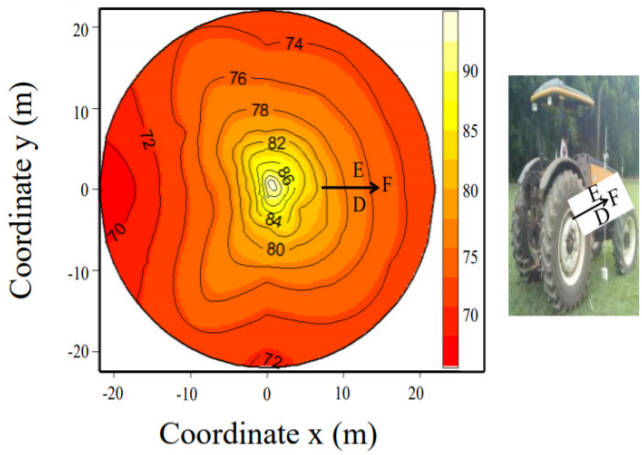

Fig. 2: Spatial distribution of noise level for tractor (Tadayuki Y. et. al. 2012).

Chainsaws noise levels were found to be similar to that found by Dennis and May (1995). Chainsaws and other small motors, such as augers and pumps, also have high noise levels and are significant noise hazards on farms, even when used for a short period of time (Dennis and May - 1995). There are also machines with comparatively low levels of noise that present a significant noise hazard because they are used regularly or for extended periods of time, such as tractors without cabs.

Also, scientists (M. Vallone et. al, 2016) analyzed the vibration and noise level in agricultural track-laying tractors by evaluating the influence of tractor age and soil characteristics on whole body vibration and also by evaluating the noise risk. They used six tractors with different ages and three different sites which led to three different soil types. One of the data obtained presents the results for the three axes, where the vibration levels increase from T1 – T6.

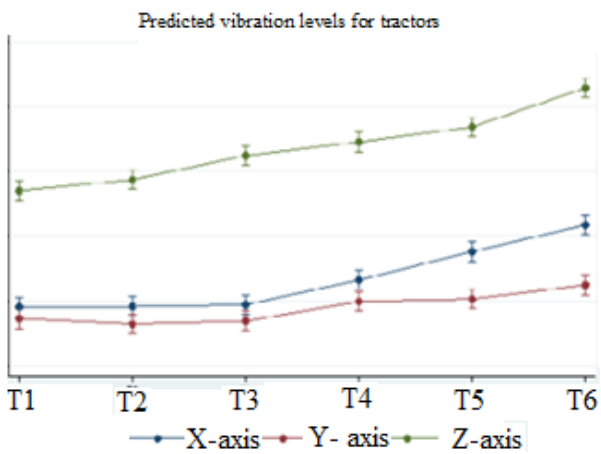

Fig. 3: Predicted vibration levels for tractors (M. Vallone et. al, 2016).

Researchers applied ANOVA analysis that resulted in showing a higher influence of the tractors age than the type of soil on which the tractor is working. Also, another conclusion of the authors refer to the fact that there were identified three risk classes according to the working hours, from a low risk for 3000 working hours to high risk for 6000 working hours. (M. Vallone et. al, 2016).

To protect the people the equipment that are noisy need to be replaced with quieter equipment. To manage the noise exposure, it is preferable to make sure that the equipment is properly maintained before considering new noise controls. In agriculture it is difficult to upgrade the machines yearly, thus for old equipment needs proper control. Although, hearing protection is recommended if the noise level requires it, there are times when the hearing protection should not be the focus of farmers, their focus should be noise control using other methods.

Noise control measures outlined at an Australian field day hearing (Williams et al., 2002; Clark 2002), which include machinery substitution and engineering controls, are appropriate for reducing exposure to noise. Some of these practices included:

- Replacing old machinery with new technology that is quieter.
- Modifying the design of operator work areas;
- Using tractors or other machines with a cab;
- Using insulating materials around motors and equipment.
- Modifying operator work practices to avoid noise where possible.
- Performing regular maintenance on machines.
- Rotating farm tasks in order to reduce individual noise exposures.

The most common way of reducing noise level is ensuring that the cabin of the machine respects the levels needed for the protection of workers. The noise inside a cabin can come from the engine, the material used to build the cabin, the use of noise controls. Also the cabins design can affect the noise levels. Since the early 70s scientists found that the sound can be absorbed by materials such as polyurethane foam or fiberglass (Walker, D. E, 1970).

Agricultural noise control in Romania is an issue that is being addressed but it still needs improvement. The environmental report done by the Romanian Ministry of European Funds present the frequency of symptoms that occur because of noise.

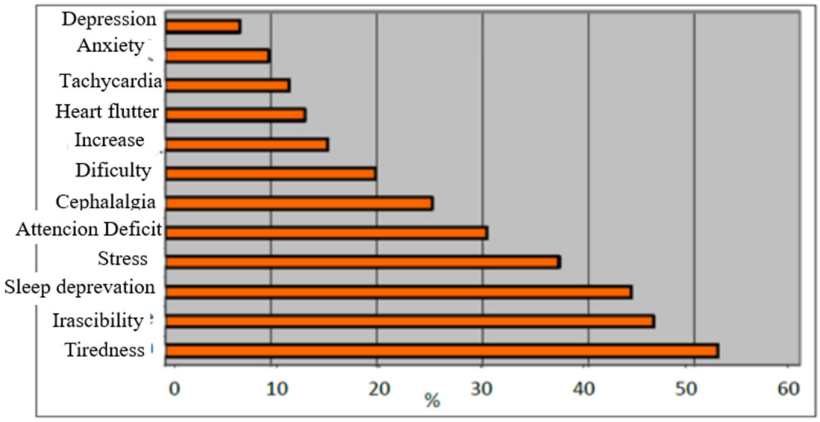

Fig.4: Symptom frequency (%) (Ministry of European Funds, POIM report)

Conclusions

Noise pollution in agriculture is an ongoing problem that needs to be addressed at an increased level. Constant noise exposure can lead to severe problems for human hearing, and other neurological issues Ramírez, J.M. (2006).

Studying the effects of long term exposure on human hearing is a challenge for any study, given the issues with gathering relevant data. A significantly higher level of research papers on the subject of noise pollution must be realized, in order to better understand this process and the ways to address the issue of negative effects on human health.

Employers have the legal obligation to ensure health and security for their employees through the implementation of a noise management system which must contain the following: noise source identification, noise level measurements, employee health assessment, applying technical measures to reduce noise levels, proper signaling of work spaces, and instructing employees of the risk of exposure.

Additionally, a series of organizational measures can be applied: if the risk of long term exposure can't be contained, employees must be provided with individual measures of hearing protection.

Based on the European Union Directive 2000/14/EC, and the EU standard SR EN 3744/2011, in Romania, all agricultural equipment types must undergo tests for sound emission determination. But given the amount of new data

gathered by research papers on the subject of noise emission health issues, new and updated methods for testing and protection can be applied.

Acknowledgement

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Examining the Devastating Impact of Fake Reviews

Rdouan FAIZI
ENSIAS, Mohammed V University in Rabat, Morocco
r.faizi@um5s.net.ma

Sanaa EL FKIHI
ENSIAS, Mohammed V University in Rabat, Morocco
s.elfkihi@um5s.net.ma

Abstract

Given the growing proliferation of online shopping and review sites over the last decade, online customer reviews have become an ever-more-common part of nearly every consumer's buying decisions. Reviews have also proven to help businesses gain valuable insights on how customers perceive their products and services. Thus, this feedback provides companies with a cost-effective way to monitor their performance and to increase exposure. Despite all these potentials, it has been revealed that a considerable number of these reviews is fake. Our purpose in this work is, therefore, to explore the threats that fake reviews present to both shoppers and businesses. In this context, it was noted that since deceptive reviews are primarily meant to mislead potential consumers and to manipulate their purchasing decisions, these reviews have devastating effects on businesses regardless of whether the review is positive or negative. In fact, these unauthentic reviews do not only harm a business reputation, credibility and profitability but also demolish the foundations of the trust economy.

Keywords: Online reviews, customer feedback, deceptive reviews, business, reputation

Introduction

Due to the rising proliferation of social media and review sites over the past decade, these online platforms have become an open environment where individuals can express their views on different topics. They have also developed into a virtual space in which consumers can voice their opinions and sentiments towards various brands and businesses (Faizi & El Fkihi 2019a, Faizi & El Fkihi 2019b). Thanks to their ease of use and effectiveness, they are currently the *de facto* means for consumers to share feedback or reviews on different products and services they bought or used.

With the voluminous amounts of feedback that are increasingly being generated by consumers on social media, e-commerce platforms (e.g. Amazon, Walmart and Ebay) as well as on review sites (e.g. Yelp and TripAdvior), customer reviews have become ubiquitous and more accessible. With the rise of online shopping, these reviews are part and parcel of most 21st century consumers' purchasing decisions (Schwichtenberg 2015, Faizi et al. 2017a). In this respect, it has been reported that the average consumer consults 10 reviews before feeling able to trust a particular business (Murphy 2019). As such, this valuable customer feedback serves as much as personal recommendation for many consumers, thus, constituting a new type of word-of-mouth information (Chen & Xie 2008). The prevalence of online reviews also provides businesses with a valuable source of feedback that they can use to enhance their reputation and influence potential consumers (El Fkihi & Faizi 2018, Faizi et al. 2017b). Despite all these potential benefits, many studies have confirmed that online reviews are not always reliable. In fact, a significant portion of this 'customer' feedback is fake (Barbado et al. 2019, Dellarocas 2006, Belton 2015, Luca & Zervas 2013, Khalid 2019). In a local consumer review survey conducted by BrightLocal in 2019, 82% of consumers claimed to have spotted a fake review (Murphy 2019). It is also estimated that one in seven reviews in TripAdvisor might be fake and that more than 55,000 unauthentic reviews are generated each month on Facebook (Pitman 2019a).

Therefore, our objective in this paper is to explore the threats that fake reviews present to shoppers and businesses. The remainder of this work is structured as follows. Section Two examines the major types of fake reviews and

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their distinctive features. Section Three is concerned with the devastating impact of deceptive reviews on both consumers and businesses. Finally, Section Four summarizes the main findings of this paper.

Fake Reviews: Major Types and Distinctive Features

As opposed to authentic customer feedback, fake reviews are written by people who have not really used the product or service that is reviewed. Since they are written with hidden motives, they do in no way reflect the reality of the reviewed product or service (Liu 2015, Jindal & Liu 2018). These reviews are specifically designed to give consumers false impression on a given product or service that they intend to purchase.

Deceptive reviews usually fall into two major categories, namely biased positive reviews and biased negative reviews. Biased positive reviews, the more common of the two categories, usually show up when a business owner incites employees, friends or relatives or even hires other companies or individuals to post favorable reviews about his brand (Lappas et al. 2016). Such reviews are, thus, a glowing report which bears no resemblance to reality. Henceforth, they are unlikely to provide an objective or fair view of what the customer experience is, actually, like given the personal relationship or stake of the person who has written the review with that business.

By contrast, biased negative reviews are deliberately malicious massages that are submitted about a given brand in an attempt to unfairly lower its ranking position or rudely discredit the brand in some way. Just like biased positive reviews, negative fake reviews are not based on reality, but at best on shared misunderstandings or out-and-out lies. The objective of such untruthful reviews is, therefore, to persuade potential customers not to take action on the products or services that are reviewed. Often times, these reviews would rather recommend other products from a competitor.

Whether the intent is to embellish or devastate a brand, both positive and negative fake reviews aim to deliberately manipulate one's choices, thus, obscuring the real facts about a product or service we aspire to buy. Since these deceptive reviews are deliberately written to sound genuine, the lines between real consumer reviews and fake ones can often be blurred. Consequently, distinguishing between both categories of reviews is not always an easy task. However, it has been found out that untruthful reviews have a variety of linguistic and psychological characteristics or cues that make them distinguishable from authentic ones (Banerjee & Chua 2014, Fitzpatrick et al. 2015).

The first difference that makes fake reviews different from real ones is that the former are less specific as they lack details. In fact, in contrast to authentic reviews which are more specific given that they are hinged on real experiences, untruthful reviews are totally based on imagination (Ott et al. 2011). Hence, describing an event that did not take place or voicing an opinion about an experience that has not occurred might be lacking specificity (Newman et al. 2003). Rather than focusing on the specificities of a customer experience, a fake review usually offers general praise. An authentic review about a hotel, for instance, is likely to focus on details and, thus, use concrete words such as 'check-in', 'check-out', 'bathroom' or 'room service'. Nevertheless, a deceitful review would describe less the physical space of a hotel and write more about elements that set the scene. As such, words such as 'holiday', 'trip' or 'my wife' would rather be used**.**

Another feature that characterizes fake reviews is that they have an exaggerated and hyped tone (Banerjee & Chua 2019). Indeed, while a truthful review is typically more moderate in its praise, a deceptive review is overly positive or negative as it uses an attention seeking entry that is meant to convince the reader (Maurer & Schaich 2011). Many studies have shown that the presence of an exaggerated sentiment is a general cue to a deceptive review. Therefore, if a review is extremely positive or negative, or if it is a five or a one-star review, it is more likely to be a fake review, which is primarily written to dramatically embellish or ruin the quality of a product or service. This is particularly true for reviews that are extremely positive but fail to provide enough information about why they are good or extremely negative but unable to mention what is wrong with the product. Therefore, such reviews tend to include more sentiment-related words namely verbs and adverbs (Rayson et al. 2001), Moreover, in an attempt to make themselves sincere and more credible, they frequently use the personal pronouns 'I' and 'me' (Yoo & Gretzel 2009).

Impact of Fake Reviews on Consumers and Businesses

Thanks to the valuable information that they usually host, online reviews have become a critical resource to which people increasingly resort to before making a purchasing decision. From restaurants to hotels, consumers visit

review sites such as Yelp, TripAdvisor and Foursquare so as to get advice. However, despite their importance in helping consumers make wise buying decisions, a huge number of these reviews is fake. This means that such reviews, be they positive or negative, will have severe repercussions on customers' purchasing decisions. In fact, since the main objective of a deceptive review is to mislead readers by giving them false information about the items that they need to buy, consumers end up making the wrong purchase decision. However, this manipulation of online reviews does not only have a negative impact on consumers' choices but it has severe repercussions on businesses as well.

Just like bad customer reviews, negatively biased reviews have numerous detrimental effects on a business as they harm its reputation, trustworthiness, profitability (Lappas 2016). Indeed, one single negative review can immediately drive away around 22% of prospects (McCambridge 2019). Accordingly, negative reviews seem to be every business owner's nightmare. However, when such reviews are fake, that nightmare becomes even worse (Pitman 2019b). In fact, when a business gets negative reviews from its real customers, their feedback can allow the business to detect difficulties that clients are having, identify prime issues of concern about the brand and can, thus, help the company spot areas for improvement (Faizi et al. 2018a, 2018b). Nonetheless, when a malicious review that is full of lies comes from a person who has not even been a customer, and he has written that fake review simply as revenge for something that is unrelated to the business, it really becomes a serious problem. The purpose of such reviews is not to constructively criticize the brand but solely to mislead potential customers and unfairly hurt the business. Since these reviews come from some unscrupulous business owners or competitors seeking to get a leg up, they will surely cause significant damage to the brand and to its reputation.

In an attempt to boost their ratings and overtake their competitors in terms of visibility in Web searches, some businesses also adopt the strategy of self-injecting positive reviews. For businesses with not enough positive reviews, it may be tempting to opt for shortcuts in trying to build their online reputation (O'Connor, 2010). Thus, paying for good or 5 star reviews with cash, coupons and promotions may sound a cost-effective solution. However, even if such positive ratings or reviews are a small image boost and certainly make for a first good impression as they can quickly bury negative feedback and propel the business to the top of online search results, they are deceptive, unethical and illegal (Bagley 2018, Bassig 2019). These positive reviews do not apparently seem to cause direct harm to anyone. Yet, they do mislead potential consumers and cause problems for competitors. Companies resorting to deceptive reviews might get some benefits in the short term. But in the long run, they are harming themselves and abolishing the foundations of the trust economy. When a customer does not trust your reviews, he will not trust your business either (Nallapaneni 2020).

Due to the growing concerns of the increasing proliferation of deceptive reviews, many online businesses claimed to have started taking a variety of measures to block the generation of this malicious content on their sites. It has also been reported that the Federal Trade Commission has recently made its first key decision aimed at cracking down on untruthful online reviews (Fair 2019). However, despite the actions or attempts that have individually been taken by some e-commerce platforms, organizations or governments to combat fake reviews, the fight may seem unending at least in the short-term. More efficient strategies and/or practices are, therefore, required.

Conclusion

The objective of this paper was to explore the threats that fake reviews present to both customers and businesses. In this vein, it was shown that since these deceptive reviews aim to mislead customers and persuade them to make bad purchasing decisions, this untruthfulness and manipulation have severe repercussions on businesses. In fact, regardless of whether these reviews are positively or negatively biased, they do have damaging effects on businesses as they harm their credibility, reputation as well as profitability.

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Geo-Information Support for Air Quality Management While Climate Change and Covid-19 Pandemic

Valery M. ABRAMOV
Russian State Hydrometeorological University, Saint-Petersburg, Russia
val.abramov@mail.ru

Nickolay N. POPOV
Russian State Hydrometeorological University
Saint-Petersburg, Russia
nikk.popovv@mail.ru

Mikhail B. SHILIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
mik.shilin@mail.ru

Arseny I. CHESTNOV
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
arse.chest@mail.ru

Alexandra L. ABRAMOVA
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
a.abr97@mail.ru

Konstantin S. PROSTAKEVICH
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
k.prost00@mail.ru

Elena V. IVANOVA
ITMO University
Saint-Petersburg, Russia
ell.iv@mail.ru

Julia P. SANINA
Arctic and Subarctic Institute
Russian State Hydrometeorological University
Saint-Petersburg, Russia
y.sanina@bk.ru

Abstract

In paper, there are considered results of geo-information support development for air quality management, adapted to climate change and to Covid-19 pandemic conditions. In studies, there are used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. From the point of view of geo-information management, geo-space is structured to allocate interconnected components of the solution space. As digital tools, there are proposed to use

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digital online platforms, which integrate heterogeneous hardware and software resources within web-technologies in distributed networks and wide application of cloud services. As study result, structural model is proposed, which combines the investment objectives with cost of adequate geo-information support, adapted to climate change and Covid-19 pandemic. For data exchange and preliminary discussion, platform https://www.researchgate.net/profile/Valery_Abramov2/ there was used while study. Research was performed at the Russian State Hydrometeorological University within State Task of the Ministry of Science and Higher education of the Russian Federation, project FSZU-2020-0009.

Keywords: geo-information support, air quality management, climate change, Covid-19

Introduction

Recent time, the Covid-19 pandemic negatively impressed the global economy, that required major changes in management decision-making technologies, including air quality management (AQM) technologies, especially in large cities, industrial zones, wildfires areas. Serious attention is to be saved for black carbon influence on climate change in Arctic. Note, Covid-19 pandemic matched the time with Industry 4.0 period, during which a lot of enterprises plan and implement wide spectrum of information technologies (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Lukyanov, 2019), (Sikarev, 2020), (Trunin, 2019). Industry 4.0 leads to serious technological changes in AQM, as part of natural risks management (NRM) (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new digital tools, including practical learning area (Abramov, 2020), (Popov, 2019).

Below are described the development results of digital tools for AQM while Covid-19 pandemic wthin geo-information management area (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Mandryka, 2019), (Popov, 2014), (Popova, 2019), (Rumyantseva, 2017), (Zhigulsky, 2018) in environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). Significant attention is paid to geo-information support systems (GISS) within NRM in climate change context (Bournashov, 2014), (Gogoberidze, 2014), (Chestnov, 2020), (Chusov, 2012), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). Developed geo-information support technologies for AQM, considered in this article, take these factors into account.

Methods and data

In study, there are used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bolshakov, 2020), (Vekshina, 2020). While research, there are used data bases and tools of digital online platform (DOP) Earth (Prostakevich, 2020).

Results

Recently, AQM is a hot place in global environmental economy while climate change, including black carbon problem (Isaev, 2015). Note, particulate matter (PM), which is essential air carrier for black carbon, can be the same carrier for Covid-19, also. Authors made statement, that black carbon and Covid-19 have to be investigated together within sustainable development paradigm by means of adequate decision aids tools developed on geo-information management (GIM) basement.

From GIM point of view, AQM is to be carried out within related set of natural-industrial projects (NIPs) in common space area and time period while climate change and Covid-19 pandemic. In Figure1, it is presented a block model of investment structure for such NIPs, which combines the investment objectives (blocks 1-5) with cost of adequate geo-information and geo-ecological support (blocks 6-8), including AQM within NIPs (block 7).

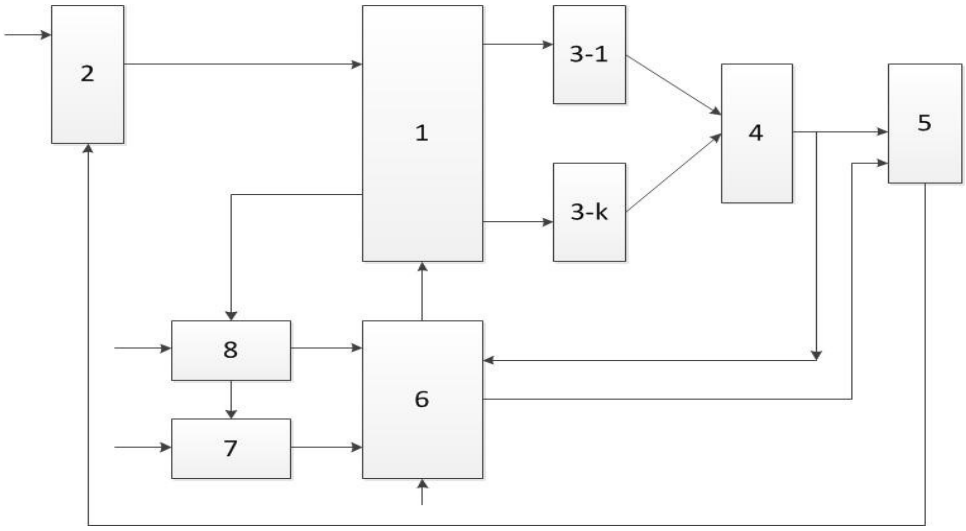

Figure 1 : Block model for investment structure while territory development: 1 – block of distribution of resources; 2 – block of formation of resources; 3 - block of formation of private income; 4 - block of formation of total income; 5 – block of formation of the investment share of resources; 6 - block of comparison with the permissible level of risk; 7-block of formation changing in time set of NRM, including Covid-19 and black carbon; 8 – block of environmental monitoring corresponding to block 7

Authors' analysis shows that the largest part of the cost of managerial support is the environmental monitoring (block 8), the essence of which is determined by the content of block 7. Significant part of the cost in block 8 is hardware and software, the cost of which varies significantly. Now, in Covid-19 pandemic conditions, cost of AQM can arise greatly because of general economic situation, when every country have to implement limitations for boards crossing and suffer from economic slowdown.

On basement of above mentioned model (figure 1), authors propose to develop the geo-information and geo-ecological support system (GIGESS) with combined structure for access, storage and analysis of information from open geo-spatial data sources, including archives and operative mode web tools.

As a result of the research, performed using foresight technologies, the authors suggest to use geo-information distributed online platforms (GIDOP) with cloud technologies (CT) as the main technological solutions for GIGESS. In this article, the authors recommend to use GIDOP Earth https://earth.nullschool.net/ru/, which allows to get digital color interactive maps of horizontal flows PM10, PM2.5 and PM1 in the ground air layer for the entire planet.

Let's go to examples. In figures 2-4, there are maps of horizontal flows PM10, PM2.5 and PM1 in the ground air layer for Arctic ocean and surrounding territories on 8th April 2020.

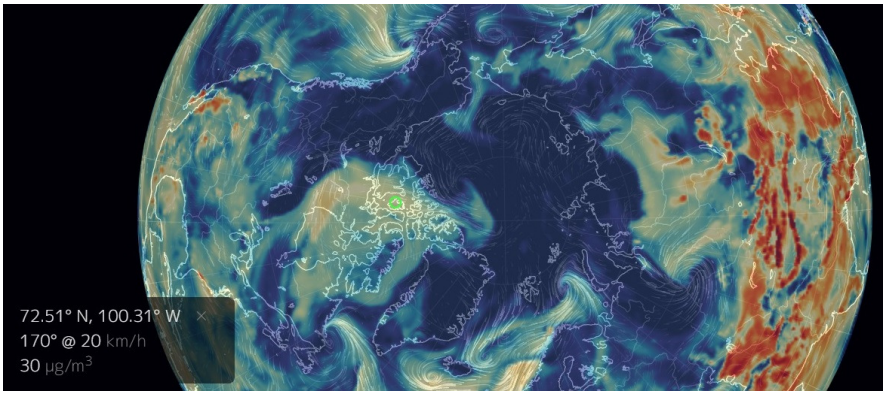

Figure 2: PM10 flow map for Arctic ocean and surrounding territories on 8th April 2020

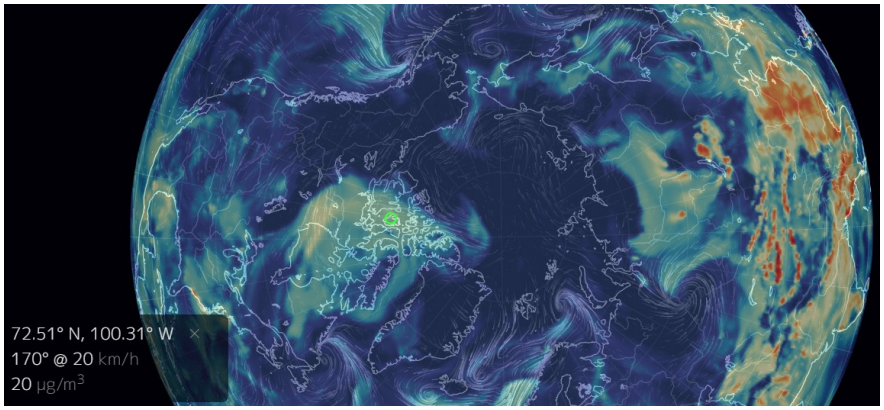

Figure 3 : General diagram of dependencies between data subsystem modules in VDP

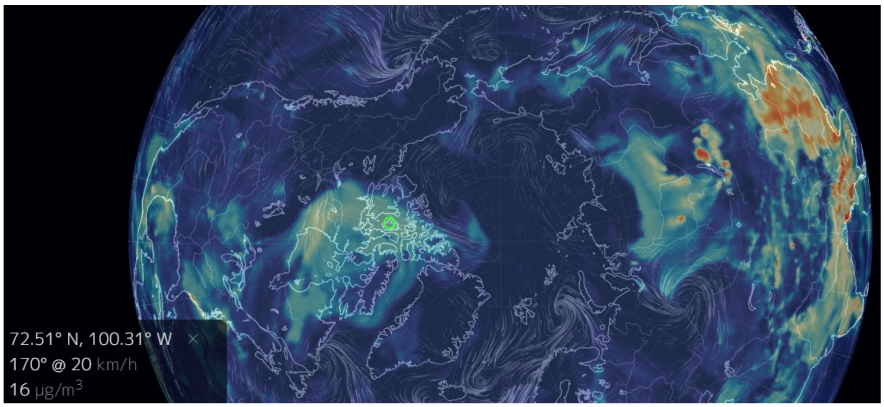

Figure 4: PM1 flow map for Arctic ocean and surrounding territories on 8th April 2020

For arbitrarily selected point on an interactive map (green circle in figures 2-4) in the lower left corner of the map displays interactive data: coordinates, direction and speed of the wind, numeric value of characteristic displayed on the map. Note, map's decoding on figures 2-4 was not task of this paper. As essential research result, authors propose to use GIDOP Earth, as basement of low-cost GIGESS for AQM while Covid-19 pandemic and climate change.

Discussion

It is worth noting, GIDOP Earth can be used in educational and training purposes for AQM while Covid-19 pandemic and climate change. The essential task of university practical learning (UPL) will be to teach students the practical aspects of work with GIDOP Earth tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies, that can reduce total cost of training and learning processes while Covid-19 pandemic.

Conclusion

Here In paper, authors described results of digital technologies development for AQM, adapted to Covid-19 pandemic. In studies, there are used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing within digital educational platforms, web-technologies and virtual reality tools. As digital tools, authors propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, there are proposed a structural model, that combines the investment objectives with cost of adequate managerial support, adapted to Covid-19 pandemic conditions and climate change. As essential result, GIDOP Earth is proposed to usage, as basement for low-cost GIGESS for AQM while Covid-19 pandemic and climate change. The presented in the article results of the research have a significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state

environmental control bodies. They can be used in the preparation of master's programs in environmental economics and health research while Covid-19 pandemic and climate change.

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While study, platform https://www.researchgate.net/profile/Valery_Abramov2/ was used for preliminary discussion and data exchange. Research was performed at the Russian State Hydrometeorological University within State Task of the Ministry of Science and Higher education of the Russian Federation, project FSZU-2020-0009.

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Analysing the Industrial Real Estate Market

Izabela RĄCKA
Calisia University – Kalisz, Poland
i.racka@akademiakaliska.edu.pl

Abstract

The industrial real estate market is a growing and dynamic market and there is a big difference between submarkets in terms of type of property or geographic area. As a rule, modern industrial properties are being leased, and they are the most often located in large cities, but for older properties, located in subregional areas, turnover is more common. There is a clear research gap in the analysis of sales transactions on the non-residential and non-agricultural market, especially in the segment of industrial real estate. Industrial are atypical properties, which means that when looking for similar properties in order to analyse the market, the spatial scope of the research should be extended. For this reason, the industrial submarket should be viewed more broadly and its analysis should cover the area of several neighbouring towns, districts or counties. The market analysis procedure was carried out starting from the observation of the market reality. Next we tried to find the coexistence of phenomena and establishing cause-effect relationships, after that we built a regression model. We built a database of nearly 100 records containing all transactions where the land was built-up with industrial plants in the southern part of Wielkopolskie Province in 2015-2019. The research showed that the prices of industrial real estate are influenced by: location, land area, type of space, date (year) of sale, type of buyer, type of seller, type of property rights. The study can help making investment decisions may be important for active participants of the industrial market.

Keywords: commercial real estate, market analysis, valuation.

Introduction

The industrial real estate market is one of the most dynamic and strategically important sectors in global economies. The availability of products which we buy in shops and online is because of the presence of manufacturers, suppliers, retailers, 3PLs, distributors, storage and supply chain companies. Functioning in an intensely changing environment is difficult for investors and entrepreneurs. The broadly understood environment changes very quickly, which creates a difficult situation for real estate, which stability in place, durability and inability to adapt to market changes hinders development. In case of commercial real estate, especially owned by enterprises, changes are required by different market participants. The attractiveness of commercial real estate becomes important the moment it appears on the market – as the object of rent or sale. However, the assessment of this attractiveness is possible only after the analysis of the similar real estate market and comparing the real estate to the competition.

The number of real estate purchase/sale transactions in Poland exceeds 500 thousand every year and rises. The transactions are being recorded in the Registers of Real Estates Prices and Values which constitutes about 90% of the total number of notarial deeds related to real estate sales and recorded by the Ministry of Justice. The majority of real estate transactions takes place in urban areas. More than 60% of the total number of transactions are being concluded in the cities. The majority of transactions were related to premises (almost 50% of all real estate purchase/sale transactions). Non-residential and non-agricultural built-up properties (including commercial, office, production real estate and garages) constituted almost 20% of the number and about 30% of the value of the registered transactions. The average price of a single production premise in 2018 was PLN 1,448 and the average price per 1 m2 of production premises was PLN 1,660 – which is low compared to residential premises (about PLN 5.500 on the primary and about PLN 4,500 on the secondary market) [Statistics Poland 2019]. The share of industrial real estate in business in Poland is therefore small and industrial real estate is very diverse, which makes it difficult to analyse this market segment. Actually, many researchers question the existence of one national real estate market [Hoag 1980].

Some public institutions as well as private agencies and consulting companies conduct analysis of the commercial real estate market. Quarterly information on real estate prices and the situation on the residential and commercial real estate market in Poland since 2010 have been published by the National Bank of Poland. However, in the part devoted to commercial real estate, NBP analyses only the rents of the office space and the profitability of investment in rental housing [NBP 2020]. Research on the commercial real estate market in large cities is conducted

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by real estate agencies such as Colliers International, Cushman & Wakefield, Deloitte, Emmerson, Jones Lang LaSalle, Knight Frank and others. Range is limited to large cities and up to date spaces meeting modern production and logistics standards. Such properties are the most often located in large cities: Warsaw (zone I, zone II, zone III), Poznań, Krakow, Wrocław, Tricity, Bydgoszcz/Toruń, Szczecin, and in region along motorways: Central Poland, Upper Silesia, East and West. Warsaw, Upper Silesia and Central Poland markets maintain leading position in terms of industrial real estate supply [Colliers 2020]. As a rule, these properties are being leased, so they are not the turnover, but lease agreements which are usually under analysis.

Though growing interest among developers in smaller markets such as Lublin, Olsztyn and Rzeszow has been observed [Colliers 2020], the real estate agencies do not analyse local industrial markets. Thus, there is a clear research gap in the analysis of sales transactions on the non-residential and non-agricultural market, especially in the segment of industrial real estate. Importantly, this submarket should be analysed in a broader sense, because investment real estate is not as closely related to the location as, for example, housing. When making an investment decision, investors often go beyond the local market, i.e. beyond a given city or its suburbs [Rącka, Palicki and Kostov 2015]. For this reason, the submarket should be viewed more broadly and its analysis should cover the area of several neighbouring towns, districts or counties. Industrial are atypical properties, which means that when looking for similar properties in order to analyse the market, the spatial scope of the research should be extended [Dolman 1979]. Early work in the US provided evidence that regional factors had an important impact on prices and yields, however that was limited to broad regions or sub-markets within given urban areas. In their research [Grissom, Hartzell and Liu 1987] they investigate if a segmented market exists for industrial real estate. The results support the existence of regional markets for industrial real estate. The authors note that geographic regions of the country vary in terms of their economies and cause differences in industrial real estate returns and prices. Moreover, there are some studies that examine the clustering effect of local industrial real estate markets [Benjamin, Zietz and Sirmans 2003]. The companies often locate within close proximity, frequently encouraged by government's incentives and availability of infrastructure to form "industrial districts". The companies can be more profitable in locations where there is an agglomeration of complementary activities.

Therefore, in this paper the analysis of industrial real estate prices and factors influencing them in the selected regional market was adopted as the research problem. The aim of the study was to verify the impact of the location of industrial real estate on their prices. The research hypothesis was: the industrial real estate market is supralocal and the location of the industrial property on regional market does affect its price. In order to prove the hypothesis, we collected data on the prices and characteristics of sold industrial properties in 2015-2019 in the southern part of Wielkopolskie Province in Poland. Then, the role of industrial real estate characteristics in determining prices was demonstrated. Data analysis allowed to determine whether the location of the properties on the regional market in the studied region influenced their prices. This is a contribution to the development of science, but also information that can be used by investors, property owners or property appraisers in the real estate valuation process.

The novelty of the paper is to indicate the factors affecting industrial real estate prices on the regional market. Most of the research concerns housing market, whilst industrial submarket is neglected. So far, the majority of authors have focused mainly on the analysis of factors influencing real estate prices in large cities, which were considered to represent the entire states. Few studies have examined the phenomenon on regional submarkets. However, the research we conducted showed that the industrial market in subregions is different from big cities, prices are lower, and properties are less modern. Hence, we decided to show what types of factors affect the industrial real estate prices in subregions.

In the article we subsequently review the literature on the methods of the industrial real estate market analysis, then characterise the research procedure and data sources, and finally discuss the obtained results in relation to the contemporary research achievements in this field.

2. Literature Review

2.1. Real Estate Market Analysis Methods

Real estate market analysis is a part of market research. From the marketing point of view, market research is a systematic planning, collection, analysis and presentation of data and conclusions related to a specific problem and purpose of the research. Market analysis is a part of this research, providing diagnostic data on the phenomena occurring on the market [Kotler and Keller 2012]. In strategic terms, market analysis is based on customer and competition analysis aimed at determining the attractiveness of the market (or its part) for current or future participants. This attractiveness is manifested in the possibility of making profits, measured by return on capital in the long run [Aaker and McLoughlin 2010].

The deepening of the meaning of "market research" and "market analysis" leads to the conclusion that the market analysis is placed in the market research process. Research is a planned, purposeful and systematic activity, and also leads to decision-making and activities as a result of obtaining information in the research process. Market analysis, preceded by the collection of relevant data, may be conducted *ad hoc*. It can also constitute the basis for issuing recommendations, but it does not have to lead to taking action.

Choosing a research strategy requires not only defining a research goal, but also identifying a possibility of obtaining data and available sources of information, which include [Rącka 2017]: censuses, public statistics, notarial deeds, the Registers of Real Estates Prices and Values, rent and lease agreements, real estate portals (sales and rentals), MLS, land and mortgage registers, records of the land-use network, geoportals, local spatial development plans, zoning, taxation of property (taxation tables and taxonomic maps), register of monuments and municipal register of monuments, reports, scientific and popular publications, sets of unit price indices in construction, valuation reports, technical and design documentation and other.

Market research analyses buyers and sellers (owners and tenants; lessors and lessees) for a particular type of property right or geographic area. It allows to determine what type of real estate, the structure of sellers and buyers, or the form of real estate ownership dominate in a given area. The elements of market analysis include the determination of [Carr, Lawson and Schultz 2003, Thrall 2002, Greer and Kolbe 2003, Fanning 2014]:
- the spatial range of the market,
- leading parts of the market (submarkets),
- current and future market size (supply and demand, market situation, vacancy rate, market absorption),
- the pace of development of the market and its parts (development factors: demographic data, fluctuations in sales, price policy; economic base: the level of income and professional activity of the population, etc.),
- profitability of the market and its parts (profitability level, average potential profit),
- industry cost structure (important in building a competitive advantage),
- distribution channels (existing, emerging and trends),
- market trends (changes in the demand and supply price elasticity, changes in buyer preferences, time on the market, regional trends),
- key success factors (elements necessary to achieve the company's marketing goals).

The market analysis procedure can be carried out starting from the observation: the behaviour of buyers and sellers, and the overall exchange relationship, which should be carried out continuously. It is important to subordinate observation to a previously formulated goal. The collected data should be described and explained, which makes it possible to identify the co-occurrence of phenomena and establish cause-effect relationships. This can be done using popular statistical programs. The next step is to build a model on the basis of which you can quantify the reality and predict the future (Fig. 1). The collected data can be analysed in terms of structure, intensity, variability, dynamics, development tendency, seasonality, as well as interdependence [Mruk 2003].

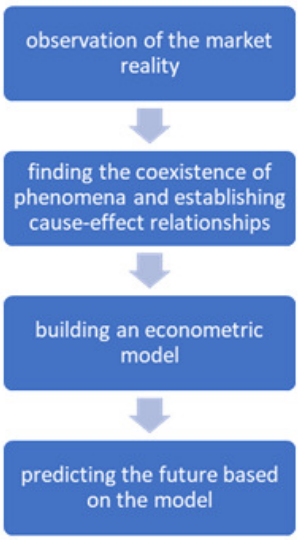

Fig. 1. Market Analysis Process

This article uses the above research procedure. We collected data on the prices and characteristics of sold industrial properties in 2015-2019 in the southern part of Wielkopolskie Province (counties: Kalisz, Ostrow Wielkopolski, Kepno, Krotoszyn, Ostrzeszow, Pleszew) in Poland (Fig. 2). Then, we showed the role of industrial real estate characteristics in determining prices. We analysed the data and determined whether the location of the properties on the regional market in the studied region influenced their prices.

2.2. Results of the analysis of the industrial real estate market

Literature rarely discusses industrial real estate market. This is due to the limited access to information as well as the large variety of this type of property [Bieda 2018; Wang, Kazak, Han and de Vries 2019]. The problem of low commercial real estate market transparency was raised in a study conducted to empirically investigate the extent to which appraisal-based information production complements or substitutes for transactions-based information production [Downs & Güner 2011]. The researchers tested the substitution hypothesis by constructing a market activity measure based on commercial real estate data for over 100,000 transactions from 2001 through 2009 across US 51 markets. The findings indicate that the market participants derive transactions-based information in case of relatively transparent markets. Appraisal-based information is potentially most critical in markets or conditions where the information environment is incomplete (i.e., transactions are scarce or the information regarding transactions is not public). Due to the low transparency of the industrial real estate market, it is difficult to rely on transaction data.

Some authors note the problem of heterogeneity of industrial real estate market, which is an aggregate market consisting of at least two submarkets: manufacturing and distribution [Black et al. 1997]. A sample of 331 industrial property sales from the south-eastern region of the United States in the period of 1987-1995. These studies show that there is no difference in prices of most industrial properties, some property-characteristic differ. The following factors were considered to differentiate industrial real estate: building volume, below-average building condition, site area, and dock-high doors.

Research on factors influencing the prices of industrial real estate is carried out much more often than analyses of prices in regional or national markets. Some authors [Jackson 2002] have studied the effect of environmental contamination on the sales prices of industrial properties. They examined to what extent sales prices may be impacted by contamination and whether sales price effects due to contamination persist subsequent to the remediation of previously contaminated industrial properties. To answer the research question, they estimated sales price models using data on industrial property sales in Southern California. The results show that there are statistically significant impacts on property values in the period before and during remediation, but that these effects dissipate subsequent to clean-up. Other authors focused on the possibility of reusing industrial real estate after removing contaminants from previous industrial activities [Tonin and Turvani 2014]. The research was conducted on the case of Porto Marghera in the Lagoon of Venice, a large and complex contaminated site listed on the Italian National Priority List. Using a hedonic price method, they explored the effect of contamination and alternative remediation schemes on the industrial real estate prices. As a result, industrial real estate with a complete and certified clean-up scheme are more expensive than properties remediated with the 'permanent safety containment measures'. The market for industrial real estate is influenced by a variety of factors, ranging from the specific characteristics of the properties (size, location, accessibility) to local demand factors and to macro variables.

Research on the impact of external factors on industrial real estate prices includes relationship between the selling price (per square foot) and property tax rate, property characteristics and location in one of the analysed counties [McDonald and Yurova 2006]. The authors analysed the industrial real estate market in O'Hare Airport area in metropolitan Chicago for 2001–2004. They found out that comparable properties located in two different suburban counties were sold for different prices. Previous studies found that industrial real estate prices are a function of distance from airports and freeways, property characteristics (size of building, size of land, parcel, age, ceiling height, office space in the building), and contamination prior to clean up.

3. Materials and Methods

In order to verify the research hypothesis, it was checked whether the location on the regional market had an impact on the industrial real estate prices. We used regression modelling (OLS). The analysis was based on the prices of sold production properties, derived from notarial deeds. We expanded the information from the notarial acts with data from geoportals kept by the County Geodetic and Cartographic Documentation Centres.

The impact of industrial real estate location on the regional market on their prices was verified by regression modelling. For this purpose, we have built a database containing all transactions on the real estate market in the

analysed submarket of the southern part of Wielkopolskie Province in 2015-2019, and selected transactions where the land was built-up with industrial plants. As there were no transactions on the primary market, we only analysed the secondary market. We built a database of nearly 100 records. Records containing incomplete information, e.g. where the property characteristics could not be determined, were removed from the original database. Finally, a set of 19 production properties from the secondary market was a subject of regression analysis. The transaction price was assumed as the dependent (endogenous) variable. On the other hand, the set of explanatory (exogenous) variables includes a wide range of real estate market characteristics (information about the date of sale, location (county), land area, building usable area, land development factor, type of space, type of buyer, type of seller, type of property rights). Initially, the largest possible number of potential explanatory variables was selected, gradually reducing it after verifying the significance of individual variables for the further procedure. The final acceptance or rejection of potential explanatory variables was determined by statistical and formal criteria.

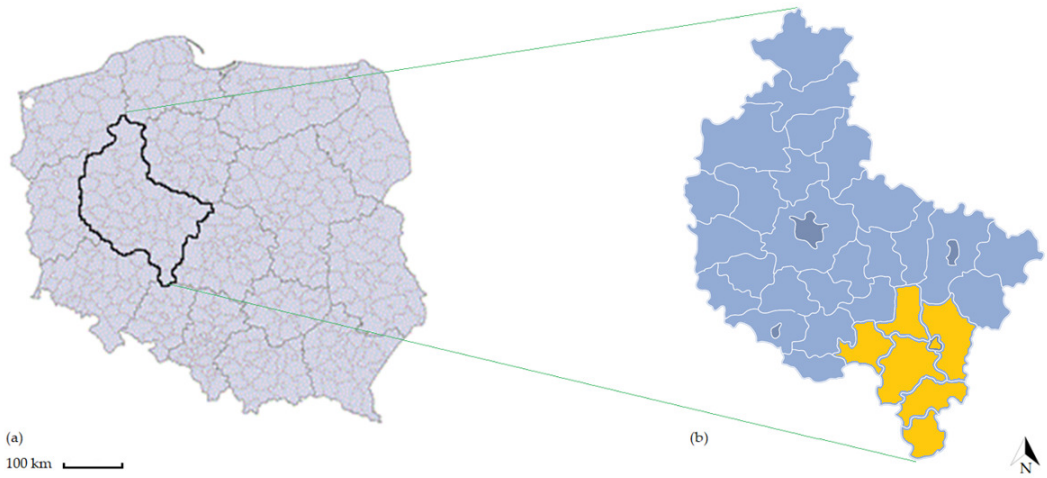

Fig. 2. Research Area. (a) Territory of Poland, (b) Wielkopolskie Province with analysed area marked

The analysed area covers mainly Kalisz-Ostrow Agglomeration, especially Kalisz, Kepno, Krotoszyn, Ostrow Wielkopolski, Ostrzeszow and Pleszew counties, located in southern part of Wielkopolskie Province. We analysed the market turnover on the area of 520 ha, which is almost 20% of the Province area. The following industries dominate there: electrotechnical, electronic, precision, machine, metal, food, chemical, textile and clothing, building materials. The subregion does not arouse such spectacular interest of investors as the capital city or regional cities, however, investments in the analysed area are both local and regional. Investment properties are largely purchased by external companies operating throughout the country and abroad.

A regression model was estimated by taking into account the regional market location and other property characteristics. The full list of potential explanatory variables is presented in Table 1.

Table 1: Potential variables explaining the price of industrial real estate

Explanatory variable	Type of variable	Description and variants of the variable
YEAR	quantitative	Year of transaction
AREA	quantitative	Area of county
LOKA	qualitative	Location in a county: (Kalisz = 1 and 0 otherwise)
LOKE	qualitative	Location in a county: (Kepno = 1 and 0 otherwise)
LOKR	qualitative	Location in a county: (Krotoszyn = 1 and 0 otherwise)
LOOS	qualitative	Location in a county: (Ostrow Wielkopolski = 1 and 0 otherwise)
LOOT	qualitative	Location in a county: (Ostrzeszow = 1 and 0 otherwise)
LOPL	qualitative	Location in a county: (Pleszew = 1 and 0 otherwise)
BLDA	quantitative	Building usable area [m2]
LNDA	quantitative	Land area [ha]
LDVF	quantitative	Land development factor [%]
USIN	qualitative	Use: industrial (industrial = 1 and 0 otherwise)
USWA	qualitative	Use: warehouse (warehouse = 1 and 0 otherwise)

USCO	qualitative	Use: commercial (commercial = 1 and 0 otherwise)
USOF	qualitative	Use: office (office = 1 and 0 otherwise)
TSEL	qualitative	Type of seller (enterprise = 1 and 0 otherwise)
TBUY	qualitative	Type of buyer (enterprise = 1 and 0 otherwise)
TPRR	qualitative	Type of property rights (ownership = 1 and 0 otherwise)

In regression modelling, we used a linear approach to estimate the model described by the equation:

$$y=\alpha_0 + \alpha_1 x_1+\alpha_2 x_2+...+\alpha_k x_k.$$

where y stands for the dependent variable (transaction price of industrial real estate), x_1, x_2, ..., x_k are the explanatory variables (the market characteristics of the property), while α_0, α_1, ..., α_k are the structural parameters of the model. Then we estimated OLS model and assessed its quality.

4. Results

The level of industrial real estate prices in recent years has been rather stable, although the condition of the industrial real estate market in southern part of Wielkopolskie Province (few transactions, properties differ significantly) makes it risky to assess the trend or forecast price changes. There were no significant changes in the industrial sector. There is an extension of the period of negotiating the terms of the transaction, the number of transactions is lower than in the period of the peak sales and price levels, while the relative balance of the positions of sellers and buyers is noticeable. The outlook for the regional industrial real estate market is optimistic. After the 2014-2016 period, which was very good for all market segments, we can still see increased activity on the part of investors, mainly in the logistics and warehouse sector, but also strictly in production. Demand in the broadly understood industry submarket remains at an optimal level, rental rates are stable, with a visible increase in the case of modern space, and the vacancy rate, despite new investments, does not increase. The investors' positive sentiment is mainly caused by the improvement in economic indicators, including the decline in unemployment, increase in employment and wages, and increase in private consumption.

The observation of the market participants' behaviour shows that for industrial real estate market, the following factors are of the greatest importance in determining value: real estate supply and real estate demand, real estate turnover, population size, unemployment rate, per capita income, property location, the amount of the rent, building exploitation costs, land use and zoning, type of property rights, technical infrastructure, distance from technical utility facilities, distance form main routes, accessibility, and anticipated changes. Most of the industrial properties are located in urban areas, with good access and infrastructure. In Kalisz county, the largest number (over 55%) of industrial properties are located in industrial districts, there are both older and modern facilities, built mainly in a special economic zone. Modern industrial plants are located mainly on the outskirts of the city, on the national road.

The supply of industrial properties on the regional market is small, there are currently over a dozen properties offered, most of them are located in Kalisz. The asking prices range from PLN 0.16 to PLN 3.5 million with the average PLN 1.5 million and the median PLN 1.3 million. Unit offer prices, on the other hand, oscillate around PLN 1,500 per m2. Most of the facilities are characterized by a dominant warehouse function, in a few the production function prevails.

Industrial real estate demand is limited. External investors (nationwide and international companies) with significant financial resources are interested primarily in the purchase of undeveloped real estate and the foundation of a facility that meets the requirements of the planned business activity. Local and regional investors pay attention to older and cheaper facilities. Industrial real estate is not of a universal nature and therefore it is difficult to sell – the level of turnover in this real estate submarket is small.

The estimated regression equation shows that the explained part of the variability of industrial real estate prices was shaped by a linear combination of variables characterizing properties in terms of their location, land area, type of space, date of sale, type of buyer, type of seller, type of property rights. Moreover, the upward trend in prices on the regional market in the analysed years was statistically significant (Table 2).

Table 2: Modelling prices on the industrial real estate market
R2=0.9963; corr.R2=0.9904; F(11,7)=169.52; p *value* (F)<0.0000

	Coefficient*	Std. error*	Coefficient	Std. error	t-ratio	p-value
Const			8239687	1327290	6,2079	0,000442
YEAR	-0,08296	0,034423	-596835	247640	-2,4101	0,046768
AREA	-0,17301	0,054002	-695676	217145	-3,2037	0,014988
LOPL	0,71324	0,035316	27789812	1376003	20,1960	0,000000
LOKE	-0,26965	0,056099	-7644566	1590367	-4,8068	0,001951
LOKR	-3,01220	0,267111	-117363426	10407335	-11,2770	0,000010
LNDA	2,82655	0,288825	3780592	386313	9,7864	0,000025
USIN	-0,12312	0,048527	-2145234	845561	-2,5371	0,038831
USWA	-0,06334	0,034641	-1103736	603601	-1,8286	0,110174
TSEL	0,26069	0,056198	5563291	1199314	4,6387	0,002373
TBUY	-0,49016	0,042446	-8540898	739603	-11,5479	0,000008
TPRR	-0,06853	0,037417	-1353927	739278	-1,8314	0,109717

The estimated model showed that the location of industrial real estate on the regional market had a statistically significant influence on their prices. The probability of making a mistake in the assessment of statistical significance was close to zero (p-Value<0.000). As expected, properties located close to the agglomeration centre were more expensive. The value of the model determination coefficient was 99%. The high statistical significance of the F test indicates that the estimated model is satisfactory, and its cognitive value is high.

5. Conclusions

Market analysis is carried out for specific purposes, specifying the segment and spatial scope of the market, as well as the time scope. The analysis should be based on transactional data, which is the most important set of data, but in the event of a problem with their availability, offer data can be used as more recent, constituting an "early detection of changes" system. However, the offer data are not the resultant of the forces of supply and demand, therefore they are not a fully reliable indicator of the market situation, but mainly a reflection of the expectations of the supply side of the market [Widłak 2013]. In this view, this paper analyses the industrial real estate market based on the provisions of real estate sale agreements (notarial deeds) in terms of real estate prices and characteristics, as did other authors [Krajewska and Pawłowski 2019].

The conducted study showed that the prices of industrial real estate are influenced by: location, land area, type of space, date (year) of sale, type of buyer, type of seller, type of property rights. Thus, the previously formulated hypothesis about the location impact on prices was confirmed.

Some studies show similar results. An example is the 1987-1991 study of productive property prices in the Dallas-Fort Worth, Texas metropolitan region [Lockwood and Rutherford 1996], in which authors employ a multivariate analysis of industrial property values designed specifically to address the measurement problems associated with current tests of the sources of industrial property value. They used a linear structural relations model to examine relationships between industrial property prices and hypothesized determinants of value. One of the features of industrial real estate is location in the local market. The authors proved that the property's value is positively related to its location (understood as the distance (in miles, calculated by the most direct route) to the Central Business District, distance to the Dallas/Fort Worth Airport, distance to a major road, access to rail, and in Dallas or in Fort Worth, as the location variables. It is worth noting, however, that these studies show there was a noticeable difference in the location between the two cities of the metropolitan area. Our research, however, concerns less urbanized areas, located outside metropolitan areas at a distance at least 100 km.

Investors often choose between purchasing an undeveloped or developed land. Making decisions about the location of industrial investments by enterprises is conditioned by their financial capabilities, but also various macroeconomic factors, and at least real estate prices and characteristics. Our research showed that industrial real estate prices are influenced by their location in the region, but also by other characteristics, such as the date of sale, land area, type of entities concluding the transaction or the type of property rights. As for the location, it is perceived on many levels – as the possibility of easy access, the availability of infrastructure, the proximity of sources of supply and sales markets, but also the condition of the real estate surroundings and the level of development of the local economy. The conducted research may be important for active participants of the industrial market, but also for brokers and valuers, providing better opportunities for modelling the price levels.

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Linguistic Cartography of Migration and Its Impact on The Social and Economic Spheres

Shibina K.M.
Research Scholar
Department of English and Languages
Amrita Vishwa Vidyapeetham
Kochi Campus, India
Email: ifaanwar@gmail.com
https://orcid.org/0000-0001-7469-0348

Dr. P.P. Vijayalakshmi
Professor
Department of English and Languages
Amrita Vishwa Vidyapeetham
Kochi Campus, India
Email: drppvijayalakshmi@gmail.com
https://orcid.org/0000-0002-8610-6839

Abstract

The terms diaspora and migration have obtained a broad semantic domain and encompass a diverse array of groups. A lot of people migrate to other geographical spheres in search of job and for better living. The paper probes into the linguistic effect of migration on the lives of people who move from India. An attempt is levied to analyze the relationship between linguistic factor and social, economic, and educational/ professional factors among 60 migrant respondents. Karl Pearson's Correlation Analysis is used for data analysis. As literature is the mirror of life, the paper also analyses diasporic drawings in literary works, both at national and international levels. To trace the essence of diasporic cartography in the works of Indian-English writers, literary work titled *A House for Mr. Biswas* by V.S. Naipaul is critically analyzed. Besides, it analyses the theme of migration in *Inside Out and Back Again* by Thanhha Lai and explores the impact of migration on international subjects. In short, the paper examines the power of language on the lives of migrant society.

Keywords: Diaspora, Economic, Educational, Linguistic, Migration, Social.

Introduction

In referring to modern diasporas, Sheffer (1986, p.3) has defined modern diasporas as cultural minority groups of migrant derivations inhabiting in host countries though upholding strong sentimental and material associations with their homelands. The diaspora endures a lot of difficulties in the struggle towards identity formation. The term refers to people who get displaced or dislocated, voluntarily or not, from their homeland as an aftereffect of colonialism, and is done through the process of migration, exile, immigration, and so on. The displaced retains a secret desire to come back to the homeland at times when such land exists in its true spirit. Diaspora implies a dislocation from the motherland or the place of origin and relocation in another country or region (Brah, 1996). It includes diverse groups of displaced who move across the globe. As a social construct, the term is in flux and attains new resonance over time. While the traditional pattern relate it with uprooting and resettlement, the post modern reading relate it to hybrid consciousness (Hall, 1990).It is a broad domain at present and includes a diverse range of cluster such as alien residents, guest workers, migrants, overseas communities, etc.

Writing is considered as a weapon by the diaspora community to bring out the inner thoughts and nostalgic feelings about the homeland. There is a remarkable difference between the first generation and second generation diasporic writers. While the former tries to withstand the heritage of their homeland through their food, clothing, and so on; the latter takes freedom of choice to remove the cultural indicators thereby making it easy to assimilate with the culture of the host country. A diasporic writer is always occupied twice within a luminous space as an outsider to the new culture and an outsider to the homeland mourning about the bygone past. In short, all such people go through the

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same types of nostalgic feelings, alienation, displacement, and so on. Hybridity and heterogeneity are the essential features of such subjects as the displaced takes in the elements of the dominant culture or language, and place it in flux through creolisation (Bhabha, 1994, p.120). A multi-dimensional approach including varied variables is quite essential in diasporic cartography. It creates nostalgia as it takes one through the process of "re-rooting" and intensifies the effect of displacement by accelerating the connection or memories with the homeland. The diasporic subject who undergoes various layers of identification attains a hybrid nature at times. In short, they have a physical life at the host country but maintain eternal bondage with their motherland, its cultural heritage, and so on. The endless love towards the homeland acts as an energizing factor to defy the process of isolation and assimilation in the new cultural setting.

Migration as a mode of diaspora has its significance as a social process from human civilization onwards. It is considered as the predominant course of action nowadays. Salman Rushdie (2010, pp. 278-280) suggests that similarly as the word metaphor suggests the movement of thoughts into pictures migrants are additionally "metaphorical beings' as they leave one culture and country to enter another. As the migrant undergoes social and linguistic dislocation in the very process of migration, he realizes that "reality is an artifact" and so resists all "absolute form of knowledge". It reinstates that a migrant who has been to various cultures is just sure of the relativity of things. Migration differs from immigration in such a sense that the former implies a permanent change of residence that need not be a shift from one state to another where the latter implies a shift from one state to another that too far from the homeland. It is a condition of human life rather than being an act and its effect on social relationships demands careful and systematic assessment. In the past, the tension between the native people and immigrants in ideologies reflected in their relations. However, immigration, communication means, and technological advancements accelerate the relationship between distinct linguistic groups. Good income and better living opportunities are the driving forces of migration in the post-modern era as it triggers the development of the multilingual community in the world. Technology also makes it possible for the immigrant to maintain regular contact with the native country.

Materials and Methods

The study is carried out using Primary and Secondary Data. For primary data collection, the researcher selected a sample of 60 including migrants from India to various countries and collected details using an open-ended questionnaire. Karl Pearson Correlation analysis is employed to analyze the relation between variables in the Primary Data. Secondary Data includes two novels and are analysed on linguistic and literary grounds using the theories of language and literature.

Research Discussion

The tables show the calculated correlation between four variables and focus on the interrelationship between Linguistic factor with Social, Economic, and Educational/Professional factors. Table 1 shows the correlation between two variables namely Linguistic and Economic factors.

On the basis of Correlation value (Table 1), it is inferred that there is a positive relationship exists between linguistic and economic factors with a correlation of .586. It shows a high positive correlation. It demonstrates that the rise of linguistic ability results in the rise of economic factors and vice-versa.

Correlations			
		Linguistic Factor	Economic Factor
Linguistic	Pearson Correlation	1	.586
	Sig. (2-tailed)		.001
	N	60	60
Economic	Pearson Correlation	.586	1
	Sig. (2-tailed)	.001	
	N	60	60

Table: 1

The key point of Marschak (1965) is that there is a warm relationship between the investigations of language improvement and financial matters, and as a fundamental device in human monetary exercises, language has financial qualities, for example, esteem, utility, expenses, and advantages. The way that a few qualities of a language have been saved or disposed of as time went on for the most part relies upon the capacity of that language to move the greatest measure of data with the base exertion. Knowing a language can be viewed as ability. To learn at least one

other dialects is an interest in human capital that brings monetary advantages. In the United States for instance, the loss of wages and the distinction in the joblessness rate brought about by the absence of English capability were assessed to be separately somewhere in the range of 3.8% and 38.6% and somewhere in the range of 1% and 6.5% (Gonzalez, 2005). Likewise, explicit language skills such as listening, speaking, reading, and writing definitely affect salary (Chiswick, 1991; Carnevale et al., 2001). Subsequently, from the point of view of human capital, the longing and inspiration of individuals' learning a language are performed under pure monetary motivating forces (Zhang, 2008a).

Table 2 demonstrates the correlation between two variables namely linguistic and educational factors and its result is as follows:

Correlations		Linguistic Factor	Educational Factor
Linguistic	Pearson Correlation	1	.666
	Sig. (2-tailed)		.000
	N	60	60
Education	Pearson Correlation	.666	1
	Sig. (2-tailed)	.000	
	N	60	60

Table 2

Correlations			
		Linguistic Factor	Social Factor
Linguistic	Pearson Correlation	1	.195
	Sig. (2-tailed)		.136
	N	60	60
Social	Pearson Correlation	.195	1
	Sig. (2-tailed)	.136	
	N	60	60

Based on the correlation value.666 (Table 2), it is asserted that there is a progressive relation between linguistic and educational factors. Language is used as a medium to impart education. As recommended by M. A. K. Halliday, the connection among language and education can be partitioned into three namely learning language, learning through language, and learning about language. Instructive projects for little youngsters regularly stress educational program and guidance to encourage language learning because the gradual learning of various realms of subjects can accomplish only through the medium of language. Early English learning in schools help students to get great direction over the language to get better educational outcome and thereby to contend in the worldwide situation (Enever& Moon, 2009).

Table 3 demonstrates the correlation between two variables namely linguistic and social factors as follows:

Table 3

It is shown in Table 3 that there is a correlation value of .195 between linguistic and social factors. The study shows that there is no significant relationship between these factors while compared to other factors. It is due to the cultural diversity of migrants and the language variations. It is inferred from the study that lack of proficiency in language hinders the social relationship between the migrants. English as a global language acts as a medium to strengthen the relationship between people and linguistic ability thereby results in better social interaction. In addition, it is through acculturation, the disparities are evaded to a certain level. Acculturation results in the cultural transmission of people when people of varied cultural settings have continuous contact between them and it is essential for adaptation in a foreign setting. As Agha (2006) asserts language is firmly connected to our social connections and is the medium through which we partake in an assortment of social exercises. Language is not only a type of social activity but also a compelling device with which we define models of public activity. In short, a connection exists between language, culture, and society.

A critical analysis of the secondary data helps us to trace the diasporic cartography in selected works. It helps us to understand about the factors that hinder the association between migrants and the host country. Being a Trinidad colonial, an English metropolitan, and a man of Indian ancestry, Naipaul has a unique personality and his fictions to

a great extent are a kind of self-exploration. *A House for Mr. Biswas* by V.S. Naipaul also deals with the theme of displacement. The protagonist Mohan Biswas is a man of Indian origin in rural Trinidad and so resembles Naipaul's father. His feeling of displacement and his firm desire to set up own identity by having a house of him move the novel forward. His dual perspective as a modern man without any orthodox Hindu practices and his attitude when he didn't get dowry throws light on the theme of displacement. Though none of the characters have paid any visit to India, they appear as close to being an India. They are offspring of Indian manual workers who left India in the 19th century.

Mohan's revelation of the world dictum that education is a prerequisite for survival in the world urges him to give the best of education to his son. The house where he lived is like a nation with many people (1961, I, ch.3). The novel throws light on the fact that educational aspect strengthens one's economic and social mobility. The protagonist understands that education is the only protector that assist one to survive in the new world (1961, p.393). It is this insight that urged him to provide the best education to his son Anand and thereby to light the life.

As a representation of human flexibility, *Inside Out and Back Again*(2011) by Thanhha Lai, a Vietnamese-American essayist, outlines the life of a little youngster named Kim Ha' and her family's relocation from Vietnam to Alabama because of Vietnam War. Different types of deterritorialization, removal, estrangement, and personality emergency that the focal character experiences inferable from the demonstration of being put out from the country. Here the uprooted experience a procedure of change and restoration that includes refashioning of character. At this point, undue accentuation is given to the battles that Kim Ha' suffered because of language obstructions and her counter endeavors for endurance. It is written in refrain structure to think about the hints of Vietnamese thus to give a sound to the way of life to which she has a place with. The language highlights tangible perplexity of social varieties and complex feelings of an evacuee. The readers get a cross breed experience where Vietnamese and American characters jump to life through the ten years of age hero.

The core problems that displace the central characters in the above mentioned literary pieces can be illustrated as follows:-

Title of the Work	Protagonist	Problem	Level of Displacement	Solution
A House for Mr. Biswas	Mohan Biswas	Identity Crisis	Emotional and Physical	Providing education to his son is considered as a key to enhance the economic and social mobility.
Inside Out and Back Again	Kim Ha'	Communication Barrier	Cultural	Language Acquisition

Stephen Krashen (1998, p.146) proposed the concept of "comprehensible input" to explain how the learners acquires a second language and it is defined as the "language input that can be understood by the listeners despite their not understanding all the words and structures in it". In both the works, the input is provided through education and self-motivated training respectively. The will and determination to overcome both emotional and physical obstructions are also conveyed in a deliberate manner.

It highlights the importance of mastering English language for global survival. It is through education and the medium of language, the central characters withstands the strong currents of social, economic, and institutional pressures. In Language and Culture, Kramsch (1998, p.10) affirms that the chronicled and abstract nature of culture are co-developed , thus individuals have a place with a specific network shares a typical social space and hold a typical arrangement of standard. Absence of education and learning about a language particularly in another land is depicted distinctively and it symbolizes the social antagonism. It underscores that by learning a language, one absorbs the social properties of the land too.

Conclusions

The study of the Primary Data establishes that there is a positive correlation between the selected variables. While correlations between linguistic and economic, educational show a significant increase, there is no significant correlation between linguistic and social factors. It throws light on the fact that the migrant gets displaced in a migrant world due to cultural variations. The migrants try to withstand in the host country through the processes of acculturation and assimilation. The diasporic community always tries to withstand their cultural heritage for the future generation and at the same time tries to amalgamate with the culture of the host country, and it eventually results in a dual culture. Any kind of discrimination leads to a categorization between the host and the guest communities and it adversely affects the guest community as a minority group and results in the conception of a broken identity.

Literature written by the migrated persona reflects their longing for cultural traits and the past glory of their homeland. As Rushdie (1991) asserts, the diasporic writers try to recreate their cultural memory through their works. In the process of negotiation, they confront with the process of acculturation. The dominant culture of the country takes its position forefront in the process. It is through the process, the migrant and the host develops a cultural adjustment and it results in overcoming the barriers. It is high time to evade the cultural confinements and to strengthen cultural integrity (Krishner, 2012).

Migration is a social process that eludes geographical boundaries, and social collaboration and technological advancements play a major role in it. People migrate from their homeland in search of a better opportunity and their income play a major role in the development of their country. Migration result in either positive or negative outcome to both origin and destination countries and balancing of the same lead to a pervasive effect. If the process gives positive outcome to both, the possible drawback of the process itself can be limited. Migration results in social, economic, political, and linguistic effects. By employing an equilibrium strategy, the adverse effects can be erased and a better social network can be formed. As Indians are accustomed with the practice of "unity in diversity", through cooperation and combination, we can implant unity and collaboration with people at any parts of the world.

Researchers have shown that migration results in the welfare and better conditioning of the families especially of migrants from poor countries to developed ones. It results in enhancing the economical, social, and educational standards of migrants and their families. In order to withstand in a new land, migrants make use of their linguistic skills. It is drawn from the analysis that linguistic factors assist in the gradual development of economic and professional factors. It is through the development of these three factors, social factors can be enhanced.

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Water Resources Management Digital Tools Development within Natural-Industrial Systems while climate change

Tatiana V. VEKSHINA
Russian State Hydrometeorological University, Saint Petersburg, Russia
tat.vekk@mail.ru

Valery M. ABRAMOV*
Russian State Hydrometeorological University, Saint Petersburg, Russia
val.abramov@mail.ru

Ekaterina M. KORINETS
Russian State Hydrometeorological University, Saint Petersburg, Russia
katt.korr@mail.ru

Mikhail B. SHILIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
mik.shilin@mail.ru

Sergey V. LUKYANOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
serg.luknv@mail.ru

Alexander S. AVERKIEV
Russian State Hydrometeorological University, Saint Petersburg, Russia
ale.aver@mail.ru

Vladimir A. BOLSHAKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vl.boll@mail.ru

Oleg I. SHEVCHUK
Russian State Hydrometeorological University, Saint Petersburg, Russia
ole.shevchuk@mail.ru

Natalia S. FROLOVA
Russian State Hydrometeorological University, Saint Petersburg, Russia
n.frolva@mail.ru

Yuri A. TATARENKO
Russian State Hydrometeorological University, Saint Petersburg, Russia
yury.tatarenko@mail.ru

Abstract

In paper, we considered results of digital tools development for water resources management within natural-industrial systems, adapted to climate change. In studies, we used methods of data bases constructing, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties and risk management approach. From the point of view of geo-information management, we structured geo-space to allocate the interconnected components of the solution space. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we proposed a structural model, that combines the investment objectives with cost of adequate geo-information support for water resources management within natural-industrial systems, adapted to climate change. We consider examples of

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developed tools usage for water resources management within different natural-industrial systems including Neva bay area. While research, we used platform https://www.researchgate.net/profile/Valery_Abramov2/ for data exchange and preliminary discussion.

Keywords: Digital Tools, Water Resources, Natural-Industrial Systems, Climate Change.

Introduction

Currently, the global environmental economy, including water resources management (WRM), is within Industry 4.0 period, when many businesses are planning and implementing a wide range of information technologies (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Lukyanov, 2019), (Sikarev, 2020), (Trunin, 2019). Industry 4.0 leads to serious technological changes in WRM, including natural risks management (NRM) (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new digital tools, including practical learning area (Averkiev, 2020), (Estrin, 2020), (Korinets, 2020), (Popov, 2019) (Prostakevich, 2020),

Below we describe the development results of digital tools for WRM while climate change within geo-information management area (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Mandryka, 2019), (Popov, 2014), (Popova, 2019), (Rumyantseva, 2017), (Zhigulsky, 2018) in environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). Significant attention is paid to geo-information support systems (GISS) within NRM in climate change context (Bournashov, 2014), (Gogoberidze, 2014), (Chestnov, 2020), (Chusov, 2012), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). Considered in this article developed geo-information support technologies for WRM while climate change take these factors into account.

Methods and data

In study, there are used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bolshakov, 2020), (Vekshina, 2020). While research, there are used data bases and tools of digital online platform (DOP) EOS (Sanina, 2020).

Results

Currently, WRM has important value for global environmental economy while climate change. We have made a statement that VRM should be implemented within environmental economics paradigm with the help of adequate decision support tools developed on geo- information management (GIM) basement.

From GIM point of view, WRM is to be carried out within related set of natural-industrial projects (NIPs) in common space area and time period while climate change. In Figure1, it is presented a block model of investment structure for such NIPs with water resources involving or polluting and distorting, which combines the investment objectives (blocks 1-5) with cost of adequate geo-information and geo-ecological support (blocks 6-8), including WRM within NIPs (block 7).

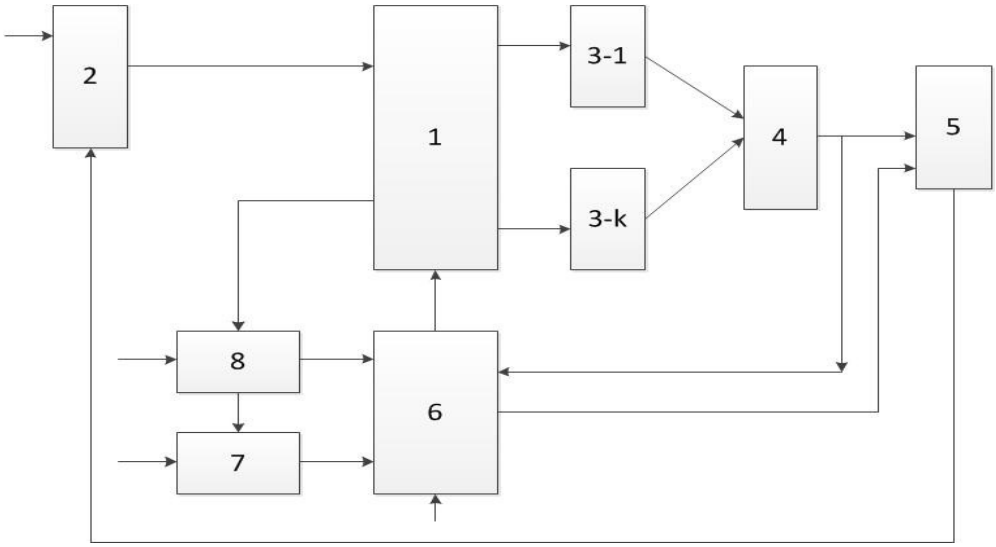

Figure 1 - - Block model for investment structure while territory development: 1 – block of distribution of resources; 2 – block of formation of resources; 3 - block of formation of private income; 4 - block of formation of total income; 5 – block of formation of the investment share of resources; 6 - block of comparison with the permissible level of risk; 7-block of formation changing in time set of natural risks within WRM, including climate change; 8 – block of environmental monitoring corresponding to block 7

Made in study analysis shows that largest part of the cost of managerial support is the environmental monitoring (block 8), the essence of which is determined by the content of block 7. Significant part of the cost in block 8 is hardware and software, the cost of which varies significantly.

On basement of above mentioned model (figure 1), we propose to develop the geo-information and geo-ecological support system (GIGESS) with combined structure for access, storage and analysis of information from open geo-spatial data sources, including archives and operative mode web tools.

As a result of the research, performed using foresight technologies, we suggest to use geo-information distributed online platforms (GIDOP) with cloud technologies (CT) as the main technological solutions for GIGESS. We gave preference to open platforms such as Google Earth https://earth.google.com/web/. In this article, we recommend to use GIDOP EOS eos.com, including its product LandViewer (LV) https://eos.com/lv/, which provides efficient open source tools for searching, processing, and analyzing large amounts of satellite data from the Landsat-8 and Sentinel-2 satellite systems. Usage of LV allows to find and use satellite images of chosen areas with WRM objects, to determine the location of these areas and to assess their main spatial characteristics (linear and area dimensions).

Let's go to examples. Neva Bay is prominent large water-terrestrial NIS, where WRM is very important strategical task. Here, WRM includes and operational monitoring for different coastal objects. On Neva bay coast there are Saint-Petersburg city with around five million people, some large ports, recreational zones, some particularly guarded natural zones. There is a need of a tool, which allows decision makers to see the Neva Bay as an integral object of WRM in the operational mode at strategic time intervals. As essential result of study, we propose to use LV, as such tool with conditionally open access to satellite data from the Landsat-8 and Sentinel-2 satellite systems for the Neva Bay area. In figure 2-4, there are presented satellite images of the Neva Bay area which era visualized with different LV's applications.

Figure 2 - Space image of Neva Bay on 27/06/2020 visualized with Natural Colors Application of LV

Figure 3 - General diagram of dependencies between data subsystem modules in VDP

Figure 4 - Space image of Neva Bay on 7/05/17 visualized with agriculture colour combination of LV

We propose to use GIDOP EOS for long-period monitoring within WRM. As example, there is space image for about 28 years' period ago for Neva Bay, which can be visible through GIDOP EOS (Figure 5).

Figure 5 - Space image of Neva Bay on 14/06/1992 (Landsat 5) visualized with Natural Colors Application of LV

Note, decoding of space images in figures 2-5 was not task of this paper.

Discussion

We propose to use GIDOP EOS in educational and training purposes for WRM at University level. The essential task of university practical learning (UPL) will be to teach students the practical aspects of work with GIDOP EOS tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies, that can reduce total cost of learning process.

Conclusion

We consider results of digital tools development for WRM within natural-industrial systems (NIS), adapted to climate change. In studies, we used methods of data bases constructing, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties, risk management approach. From the point of view of geo-information management, we structured geo-space to allocate the interconnected components of the solution space. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we proposed the block model of investment structure into NIPs with water resources involving or polluting and distorting, which combines the investment objectives with cost of adequate geo-information and geo-ecological support for WRM within NIPs while climate change. As essential result, we propose to use GIDOP EOS eos.com, including its product LV https://eos.com/lv/, as basement for low-cost GIGESS for WRM within NIPs while climate change. The presented in the article results of the research have a significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state environmental control bodies. They can be used in training and educational purposes, including preparation of master's programs in environmental economics.

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The Well-Being of Russian Regions under Threat: Economic and Social Impact Assessment of COVID-19

Ekaterina V. LISOVA
Autonomous non-profit organization of Higher Education "Institute of business career", Moscow, Russian Federation, https://orcid.org/0000-0001-9380-7310, lisovaekaterina78@gmail.com

Igor V. PETROV
Kuban State Technological University, Krasnodar, Russian Federation, p474@yandex.ru

Tatyana V. KORYAKINA
The Financial University under the Government of the RF (Lipetsk Branch), Lipetsk, Russian Federation, https://orcid.org/0000-0001-8922-8973, TVKoryakina@fa.ru

Victoria I. KALOMBO MULAMBA
Kuban State Technological University, Krasnodar, Russian Federation, https://orcid.org/0000-0002-4056-341X, v.i.kalombomulamba@yandex.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation, https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru (corresponding author)

Abstract

The purpose of the study is to reveal the nature and consequences of the economic and social impact of the coronavirus pandemic on the dynamics of Russian regions development. The authors described the economic consequences of the pandemic for the regions of the Russian Federation by analyzing key indicators of their socio-economic development. The top 10 regions that are most stable to the impact of the pandemic and the top 10 outsider regions for each analyzed indicator by economic sector are presented. The focus is on studying the structure of regional economies, identifying the most resistant to a decline in economic activity during the pandemic, and determining regions that have internal potential to deal with risks. The authors analyzed the most effective state support measures implemented by European countries and the United States in comparison with those proposed by the Russian Government.

Keywords: region, COVID-19 pandemic, Russia, economic damage, social consequences, economic barrier

Introduction

The problem of viral disease epidemics is not new. According to the world health organization, up to 5 million people get sick every year and up to 500 thousand die. Epidemics of "Spanish flu", "Asian flu", "Hong Kong flu", avian flu, SARS not only undermined the health and physical well-being of people, but also caused huge damage to the economy (for example, the economic damage from the SARS epidemic alone amounted to 59 billion dollars).

The impact of the 2019 coronavirus epidemic was a shock to the global economy, resulting in a halt to the usual socio-economic process and a devastating impact on entire regions and industries (for example, the almost complete shutdown of world tourism, world trade and the airline industry). Experts compare the current situation with an economic "barrier" to the development of the world economy, which will have a very negative impact on both the economies of countries and the entire global community. The economic impact of the coronavirus epidemic was superimposed on the prepared ground for the global crisis-the loosening of the established "globalization" model of the world economy, the tightening of global competition due to trade wars and the launch of reshoring processes, as well as the beginning of the destroying the European Union due to the initiation of "Brexit" in the UK.

Russia has not remained aloof from global problems. According to experts, the current situation certainly threatens the well-being of the country and its regions (Newsru, 2020). In the first four months of 2020, a third of Russia's regions experienced a reduction in budget revenues, and the drop in tax and non-tax revenues amounted to more than 200 billion rubles. The coronavirus pandemic is projected to reduce the country's gross domestic product (GDP) by

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10 to 20 percent (Tirskikh et al., 2020a). The situation is further aggravated by the strong impact on the Russian economy of the global energy market panic - the decline in energy prices on the world market at the height of the pandemic, and, consequently, a significant increase in inefficient reserves in the oil and gas sector (Profinance, 2020).

What are the economic and social consequences of the pandemic for Russian regions? How effective are state policy measures in maintaining the well-being of the country's regions? What is the potential of Russian regions to offset the negative impact of the pandemic? These questions are relevant for the study.

Methodology

The purpose of the study is to identify the nature and consequences of the economic and social impact of the coronavirus pandemic on the situation in Russian regions.

Research problem:

1) disclosure of the economic consequences of the pandemic for the regions of Russia;

2) identification of effective regions of the country and regions that have internal potential to deal with the risks of economic decline;

3) analysis of the structure of the regional economy in terms of their resistance to the negative impact of the coronavirus pandemic.

According to scientists, the coronavirus pandemic is not only a new “plague” of the 21st century (Bryndin et al., 2020; Rinaldi and Paradisi, 2020; Plushikov, 2020; Savinov et al., 2020; Maksimova and Morozov, 2020), but also a global destructive impact on the foundations of the world economy and the principles of functioning of modern society (Zhiltsov, 2020; Pazdnikova et al., 2020; Shaginyan, 2020; Howick and Ongaro, 2020; Soldatova and Soldatova, 2020; Yaikbaeva, 2020; Antropova, 2020; Khlopov, 2020; Maksimov, 2020; Koltsova et al., 2020; Dolgov and Savinov, 2020). The researchers emphasize that the erosion of state sovereignty of many countries will take place in the conditions of an even more active transfer of the influence of state policy towards the largest corporations, as well as the strengthening of modern methods of conducting hybrid wars.

The transition to a post-global world, triggered by the coronavirus pandemic, creates conditions for deepening uneven development both between different regions and between countries (Altayeva, 2020).

A number of relevant scientific studies are devoted to assessing the impact of the coronavirus pandemic on the Russian economy, forming forecasts of socio-economic development in the short and medium term, as well as analyzing the negative consequences of the pandemic in Russian regions and of the national economy sectors (Tirskikh et al., 2020a; Karpunina et al., 2020; Pazdnikova, 2020; Yaikbaeva, 2020; Buldakova, 2020). Special attention is paid to the analysis of implemented measures of state support for citizens and enterprises. Thus, the Russian Government is ready to allocate about 2-2. 5% of GDP to support citizens and entrepreneurs, while in the United States the government has allocated 20% of GDP for these purposes, in the European Union from 8 to 10%, and in Japan -10% (Soldatova and Soldatova, 2020).

However, the study of the mechanisms of state assistance to Russian regions in a difficult situation remains fragmentary (Tirskikh et al., 2020a), and the search for flexible models for getting out of it is open to research due to the lack of previous experience in overcoming such phenomena.

The information base of the research is represented by official statistical data of the Federal state statistics service of the Russian Federation (Rosstat), the Ministry of Finance of the Russian Federation, expert analytical agencies, including Expert, and materials of scientific publications.

Research methods: method of economic analysis, graphic method, method of systematization, analysis and synthesis, system approach.

Results

The introduction of quarantine, mass transfer of workers to a remote work system, mobilization of medical institutions, and institutional restrictions on international and domestic movements have led to some stabilization of the level of coronavirus infection among the population, which, however, is not provided in all regions of Russia. Regions with the highest incidence of coronavirus as of 11.09.2020 these are: Yamalo-Nenets Autonomous district, Republic of Tuva, Moscow, Murmansk region, Republic of Kalmykia, Magadan region (Fig. 1).

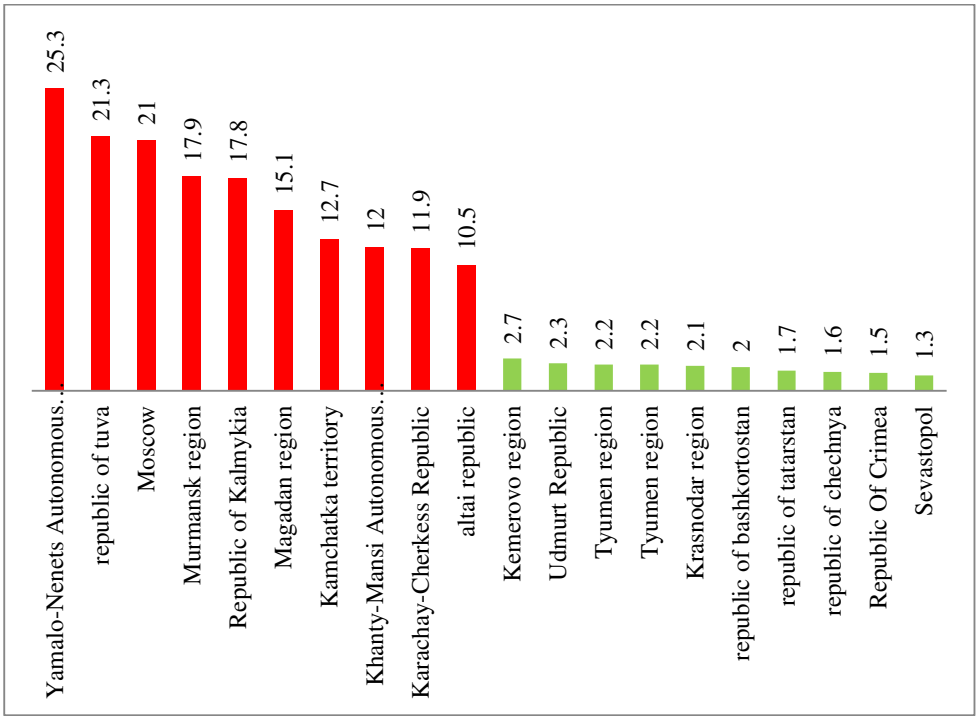

Fig. 1: Top-10 and Outsiders-10 among the Russian regions by the number of cases of the coronavirus in the 1000 population of the RF subject, a person (as 11.09.2020)
(compiled by the authors according Infotable, 2020)

We will analyze the impact of the coronavirus pandemic on the Russian economy to identify effective regions and regions that have internal potential to deal with the risks of economic decline. The overall negative impact of the coronavirus epidemic on the Russian economy was manifested in a decrease in the country's GDP by 11.82% (Fig. 2).

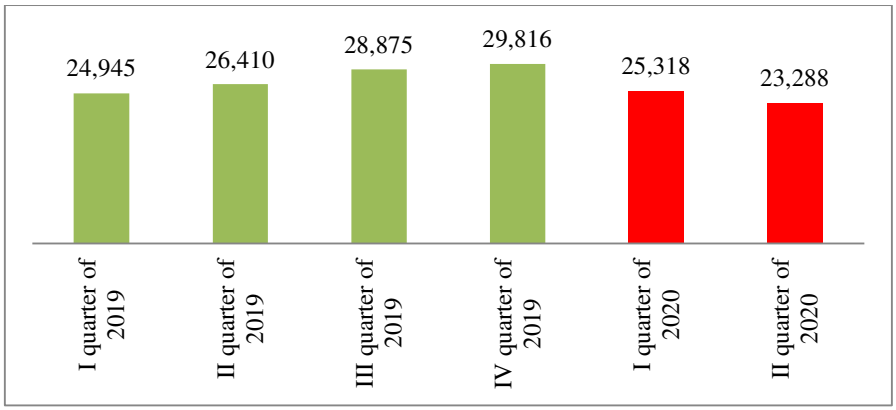

Fig. 2: GDP dynamics in current prices in 2019-2020, billion rubles
(compiled by the authors according to Rosstat, 2020)

According to the Ministry of Finance of the Russian Federation, as of August 1, 2020, tax and non-tax revenues decreased by 8% (-515 billion rubles), amounting to 6,041 billion rubles, while income tax receipts decreased by 18% (-387 billion rubles) compared to 2019 (Minfin, 2020). Repayable receipts from the federal budget amounted to 1,743 billion rubles, with an increase of 62% (+667 billion rubles). Expenses were financed in the amount of 7,867 billion rubles, with an increase of 19% (+1,240 billion rubles). The consolidated budget deficit was 4 billion rubles (in 2019, there was a surplus of 1,075 billion rubles). With a total deficit of 264 billion rubles, the budgets of 36 regions were executed (against 14 in 2019), and the budgets of 49 regions were executed with a surplus of 259 billion rubles (against 71 in 2019). Moreover, the

financing of budget deficits in the regions of the Russian Federation was carried out by attracting credit funds in the amount of 493 billion rubles.

Figure 3 shows the top-10 and outsiders-10 among the regions of the Russian Federation in terms of the dynamics of the budget surplus/deficit.

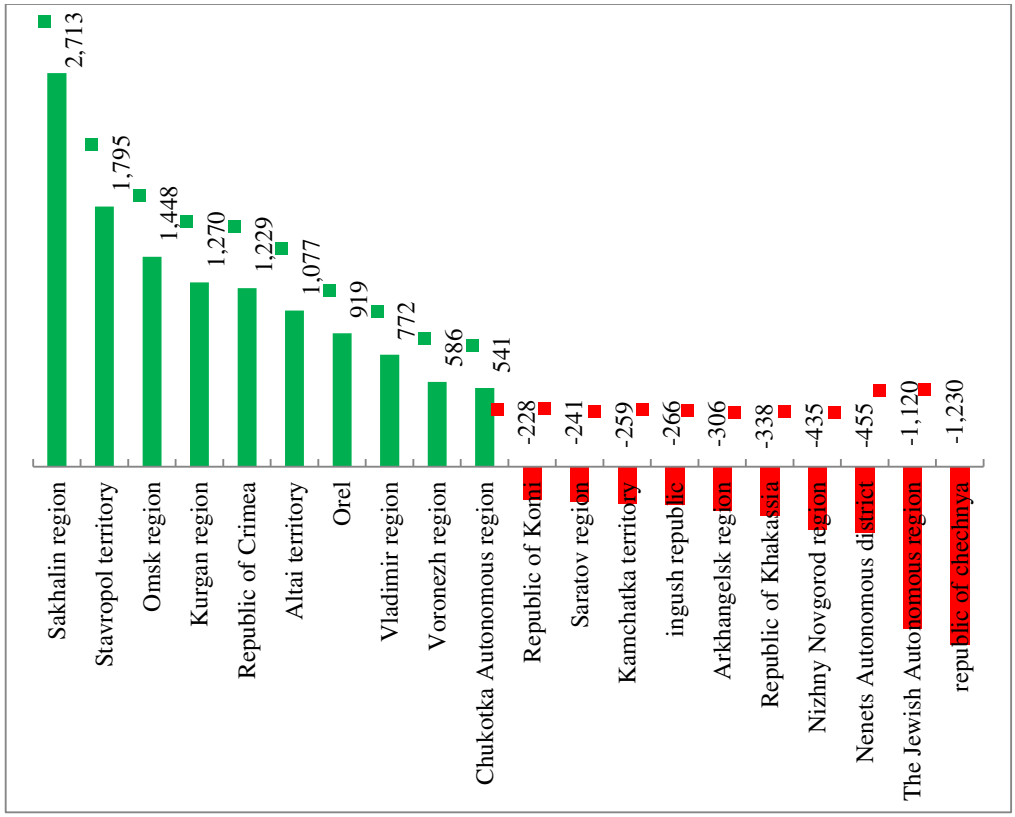

Fig. 3. Top-10 and outsiders-10 among the regions of the Russian Federation in terms of the dynamics of the budget surplus/deficit (comparison of August 2020 to December 2019, %)
(compiled by the authors according to the Minfin, 2020).

The state debt of the regions of the Russian Federation is 2,171 billion rubles, and it has grown by 2.7% (58 billion rubles) since the beginning of the year. Moreover, the growth of the debt of the Russian regions is actually offset by a sharp decrease in the efficiency of budget execution, caused by a reduction in regional economies and a "shock" scenario for the development of problem regions. So, figure 4 shows the top-10 and outsiders-10 among the regions of the Russian Federation in terms of the dynamics of state and municipal debt.

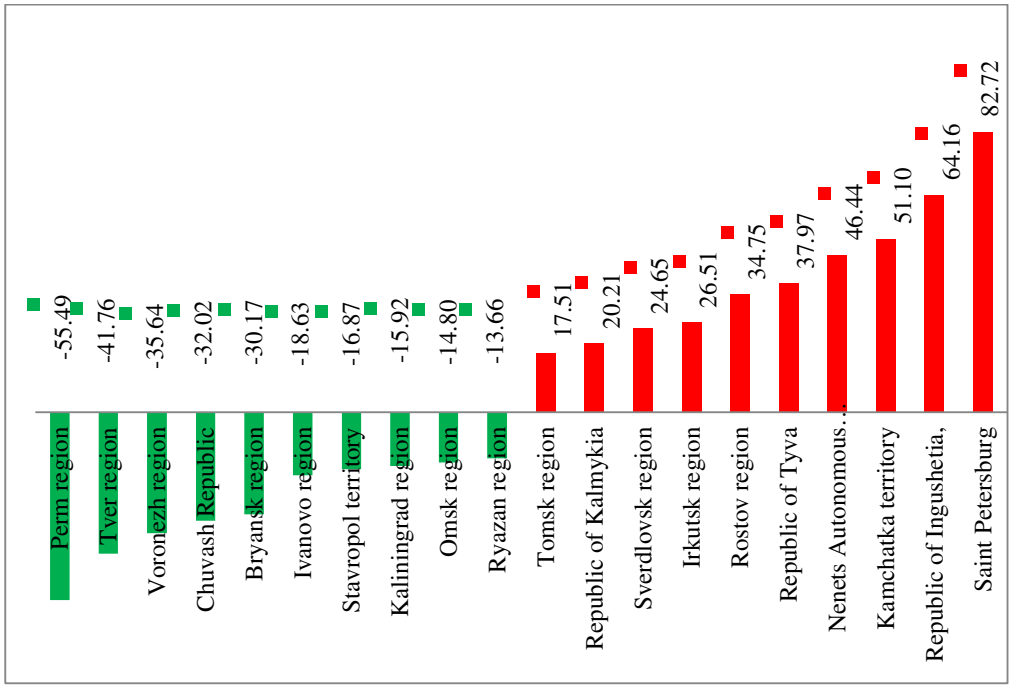

Fig. 4: Top-10 and outsiders-10 among the regions of the Russian Federation on the dynamics of state and municipal debt (comparison of data from August 2020 to December 2019, %)

(compiled by the authors according to Minfin, 2020).

The impact of the coronavirus epidemic on the industrial production index for January-July 2020 compared to the same period last year was manifested in a decrease in this indicator by 4.2% in the country as a whole, and the most negative situation in the industry was in the Republic of Tuva and Sevastopol (a decrease of about 40% from last year's level). The maximum growth was recorded in the Tyumen region, which can be explained by the presence in the structure of the regional economy of the Tyumen region of the main "locomotive" of regional growth - the mining sector, which occupies more than 60% in the structure of the regional economy. Significant growth is observed in the Republic of North Ossetia–Alania (+27.3%), the Republic of Karelia (+21.8%), the main sectors in the structure of the economy of which are the manufacturing sector (20%), the mining sector (17.1%), and the transport sector (11%). Industrial growth occurred in the Kabardino-Balkar Republic (+20%) and the Altai Republic (+18.9%), which have a rather weak industrial potential. In this case, the positive dynamics is explained by the presence of individual regional growth points in the industry. Industrial growth in the Tula region for 7 months of 2020 compared to the same period last year amounted to more than 20.3%, due to the presence of a strong manufacturing sector – enterprises of the regional military-industrial complex (Fig. 5).

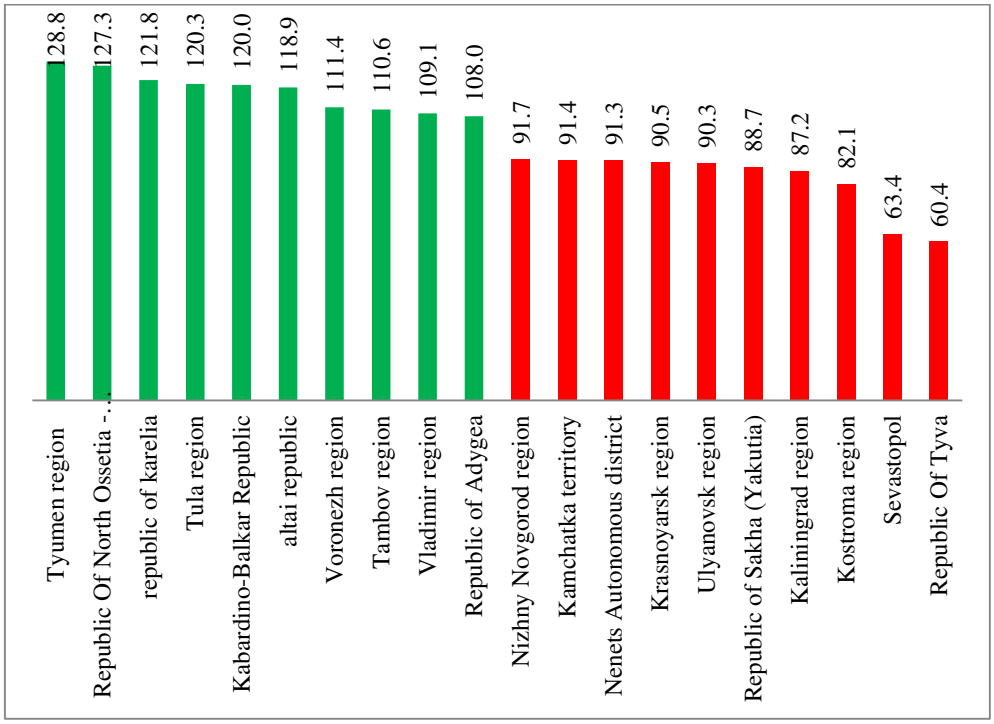

Fig. 5: Top-10 and outsiders-10 among the regions of the Russian Federation on the industrial production index for January-July 2020 to January-July 2019, %

(compiled by the authors according to Rosstat, 2020)

In the country as a whole, the regional manufacturing sector also did not withstand the negative impact of the coronavirus epidemic and in January-July 2020, by the same period of 2019, it decreased by 2.5%. By region, the situation is as follows (Fig. 6).

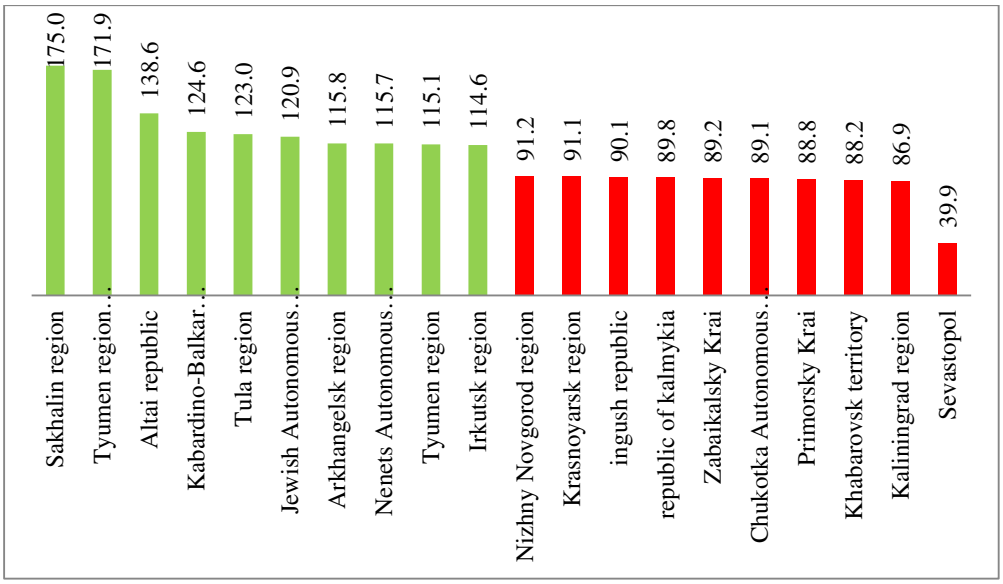

Fig. 6: Top-10 and outsiders-10 among the regions of the Russian Federation according to the index of production "Manufacturing sector" for January-July 2020 to January-July 2019,%

(compiled by the authors according to Rosstat, 2020)

Thus, among the outsiders in reducing this indicator, we can distinguish a group of regions with a low share of the manufacturing sector in the structure of the regional economy - Sevastopol (the share of manufacturing industry is 8.7%), Khabarovsk territory (9.9%), Primorsky Krai (9.5%), Chukotka Autonomous region (0.3%), Zabaykalsky Krai (2.8%), the Republic of Kalmykia (0.8%), the Republic of Ingushetia (5.5%). Here, the decline in the manufacturing industry is stronger than in the regions with a higher share of manufacturing in the structure of the regional product (Kaliningrad region (22.7%), Krasnoyarsk territory (31.8%), Nizhny Novgorod region (31.9%)). The exception is the Kaliningrad region, where the manufacturing index fell by 13%. The maximum index of the manufacturing industry in Sakhalin industry (the share of manufacturing in the structure of regional economy 2.4%), Tyumen region without Autonomous districts (18,2%), Altai Republic (4.6 per cent), Kabardino-Balkarian Republic (10,8%), Tula region (45,1), the Jewish Autonomous region (5,5%), Arkhangelsk region (17,4%), Nenets AO (0,2%), Tyumen region with districts (4.3 percent) and the Irkutsk region (10,9%). Thus, it can be noted that growth in the manufacturing sector, despite the negative impact of the coronavirus epidemic, does not depend on the share of manufacturing in the structure of the regional economy.

It should be noted that the construction sector of the Russian Federation as a whole withstood the negative impact of the coronavirus and decreased by only 0.4% in January-July 2020 compared to the same period in 2019. The strongest decline in the construction sector for 7 months of 2020 compared to the same period last year occurred in the following regions: the Republic of North Ossetia-Alania (the share of the construction sector in the economy of the subject is 8.6%), the Republic of Sakha (Yakutia) (9.6%), the Chukotka Autonomous region (7.3%). As the share of the construction sector in the regional economy decreases, the rate of decline in the sector reduces: Ivanovo region (6.2%), Ryazan region (4.9%), Pskov region (6.5%), Irkutsk region (6%), Vologda region (6.5%) and Kamchatka territory (4.1%). The regions with a lower share of the construction sector in the regional economy are the leaders in the growth of the construction sector for the first 7 months of 2020: Kostroma region (4.8%), Astrakhan region (4.9%), Tver region (6.3%), Yamalo-Nenets Autonomous district (12.4%), Kaliningrad region (8.1%), the Republic of Ingushetia (11.9%), Oryol region (7.1%), Zabaykalsky Krai (4.7%), Murmansk region (7%) and the Republic of Mari El (3.7%) (Fig. 7).

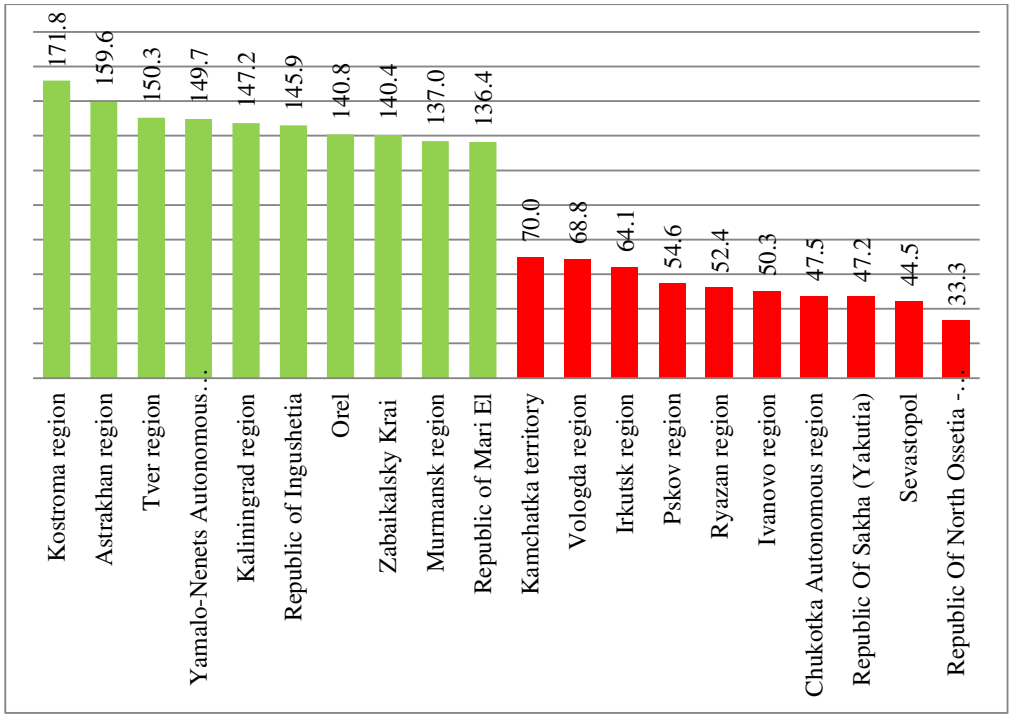

Fig. 7: Top-10 and outsiders-10 among the regions of the Russian Federation in terms of the volume of work performed by the type of activity "Construction", January-July 2020 to January-July 2019, %
(compiled by the authors according to Rosstat, 2020)

The agricultural sector showed growth of 3% in the country as a whole for the first half of 2020 compared to the same period last year. The largest growth was observed in the Tver region (the share of the agriculture sector in the regional economy of 6.8%), Kaliningrad oblast (6,3%), Jewish Autonomous region (7,4%), Kaluga region (5,7%), the Komi Republic (1,5%), Orel region (19,9%), the Republic of North Ossetia – Alania (12%), Tambov region (24,7%), Tula

region (6%), Penza region (12.2 per cent). As you can see, not all regions that have shown an increase in agricultural production have an agricultural specialization. The maximum reduction in agricultural production has occurred in the Magadan region (the share of agriculture in the structure of the regional economy is 6.3%), Novgorod region (7.8 per cent), the Republic of Kalmykia (25,9%), Stavropol region (14.7 per cent), the Republic of Crimea (6,7%), Kemerovo region (1.9 per cent), Rostov region (10,2%), Moscow (0,1%), Chukotka Autonomous district (2.5 percent), Volgograd region (10,5%) (Fig. 8).

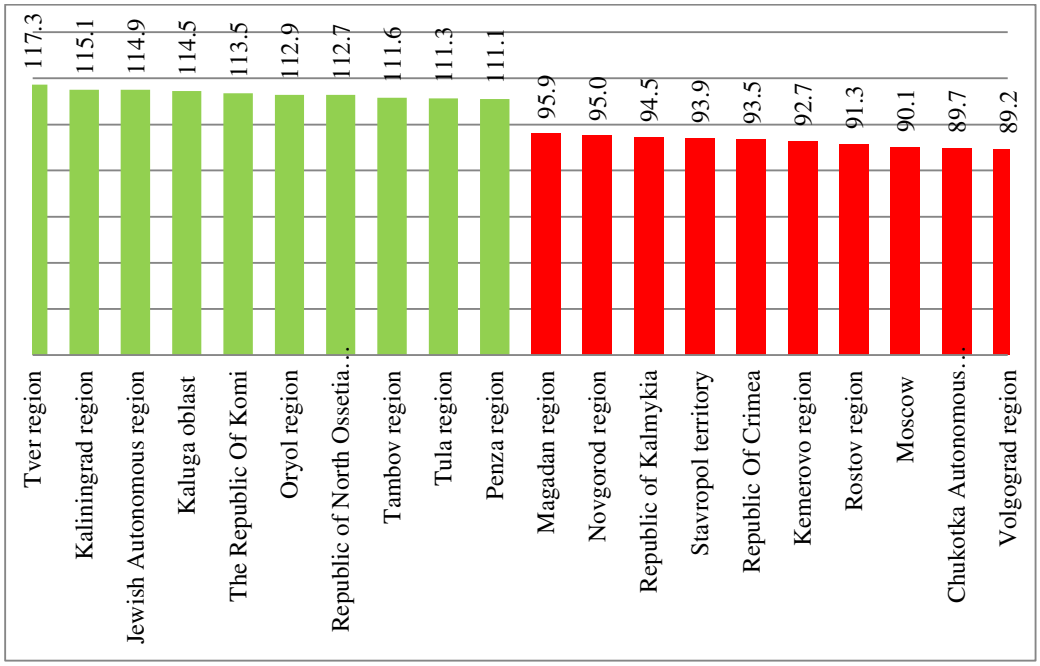

Fig. 8: Top-10 and outsiders-10 among the regions of the Russian Federation according to the index of agricultural production, I half of 2020 to I half of 2019, %

(compiled by the authors according to Rosstat, 2020)

For 7 months of 2020 to the same period of 2019, in terms of a general decline in business activity in the country caused by the coronavirus pandemic, the production index for the type of economic activity "providing electricity, gas and steam; air conditioning" decreased by 3%, and the production index for the mining sector - by 6.6%.

The pandemic also affected the state of retail trade - for 7 months of 2020, compared to the same period last year, its turnover in the whole country decreased by 5.8%, and the following situation was observed in the context of Russian regions (Fig. 9).

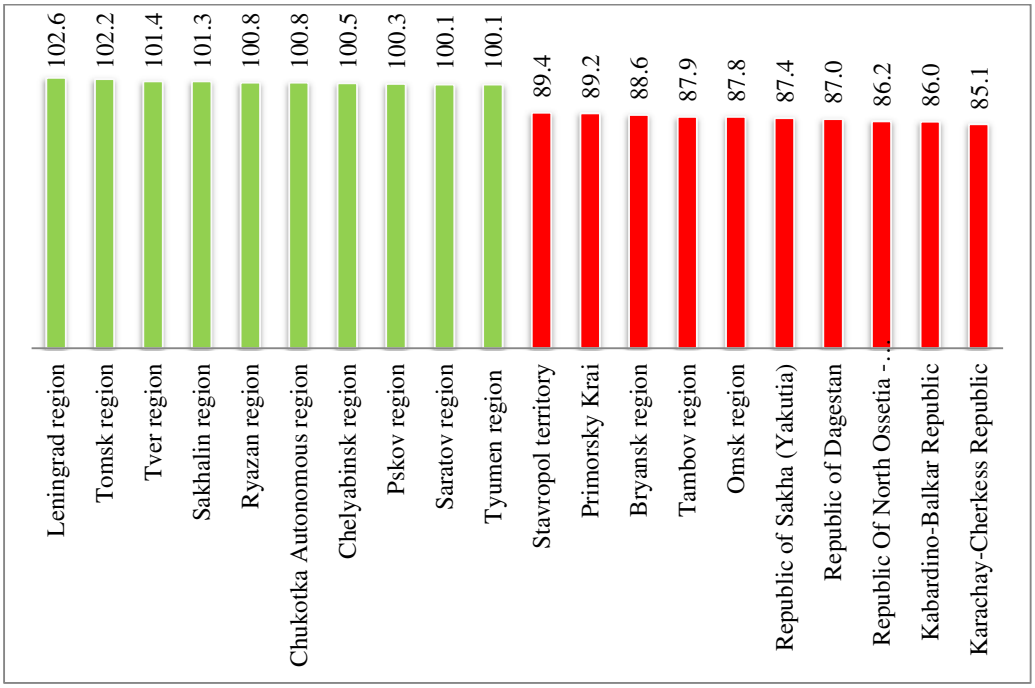

Fig. 9: Top-10 and outsiders-10 among Russian regions by retail trade turnover, January-July 2020 to January-July 2019, %

(compiled by the authors according to Rosstat, 2020)

The largest drop in retail trade turnover for 7 months of 2020 compared to the same period in 2019 occurred in regions with a high share of this sector in the structure of the regional economy (which can be explained by serious measures to prevent coronavirus diseases, including the introduction of quarantine in the regions): Stavropol territory (the share of retail trade in the regional economy is 15.9%), Primorye territory (19.3%), Bryansk region (17%), Tambov region (16%), Omsk region (11.5%), the Republic of Dagestan (23.2%), the Republic of North Ossetia – Alania (18.9%), Kabardino-Balkar Republic (16.3%), Karachay–Cherkess Republic (8.7%). The Republic of Sakha (Yakutia), which has a 5.7% share of retail trade in the structure of the regional economy, was an exception.

The introduction of quarantine also affected the sector of paid services to the population, the decrease in the volume of paid services to the population for 7 months of 2020 was 20.3% compared to the same period last year. The negative impact was maximum for Moscow, the Yamalo-Nenets Autonomous district, the Republic of North Ossetia-Alania, the Arkhangelsk region, and the Primorsky territory.

Rapid growth in the consumer price index in the country in the second quarter of 2020 compared with the same period last year declined by 4.8% per capita incomes, which also were not uniform in different regions of the country (Fig.10).

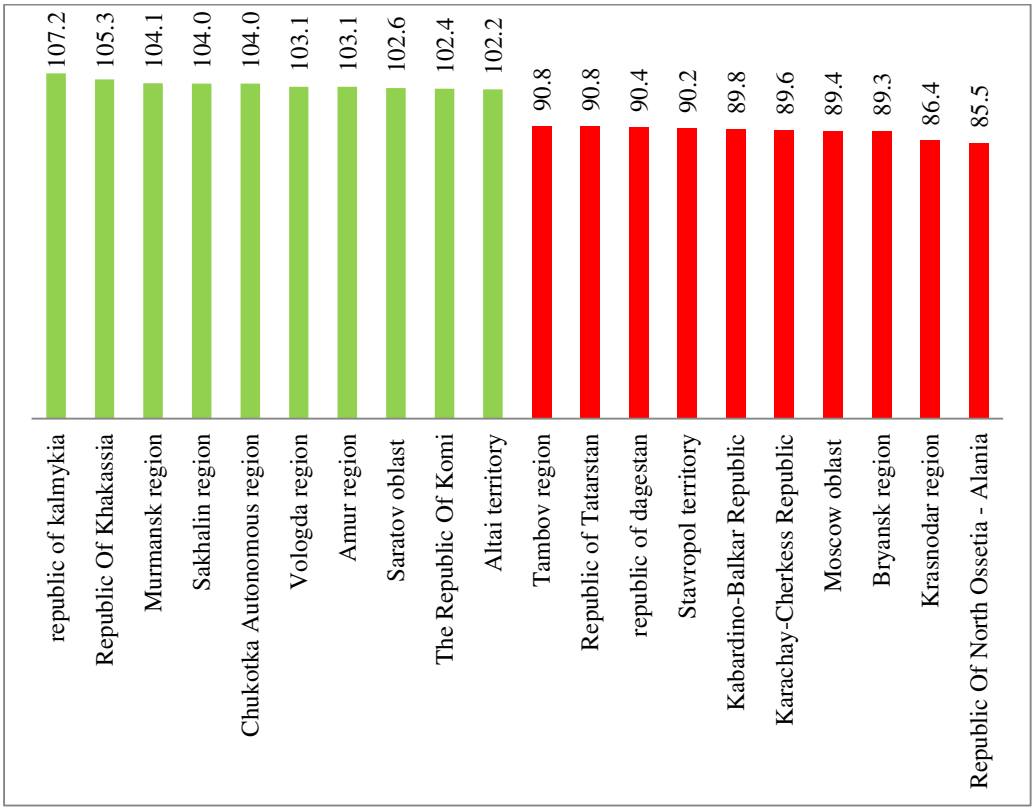

Fig. 10: Top-10 and outsiders-10 among the regions of the Russian Federation by average per capita monetary income of the population, II quarter of 2020 to II quarter of 2019, %

(compiled by the authors according to Rosstat, 2020)

And, of course, the negative consequences of the pandemic were manifested in the form of increased unemployment. According to the Ministry of labor and employment of the Russian Federation, in April the unemployment rate was 4.7%, in September 2020 - 6.4% (Rbc, 2020) . The highest growth in unemployment was observed in the Republic of Ingushetia (30.6% for May-July 2020), the Republic of Tuva (21%), the Chechen Republic (18.6%), and the Republic of North Ossetia-Alania (17.3%). The most stable regions in terms of maintaining employment were Moscow, Yamalo-Nenets Autonomous district, Khanty-Mansi Autonomous district, and Saint Petersburg (Fig. 11).

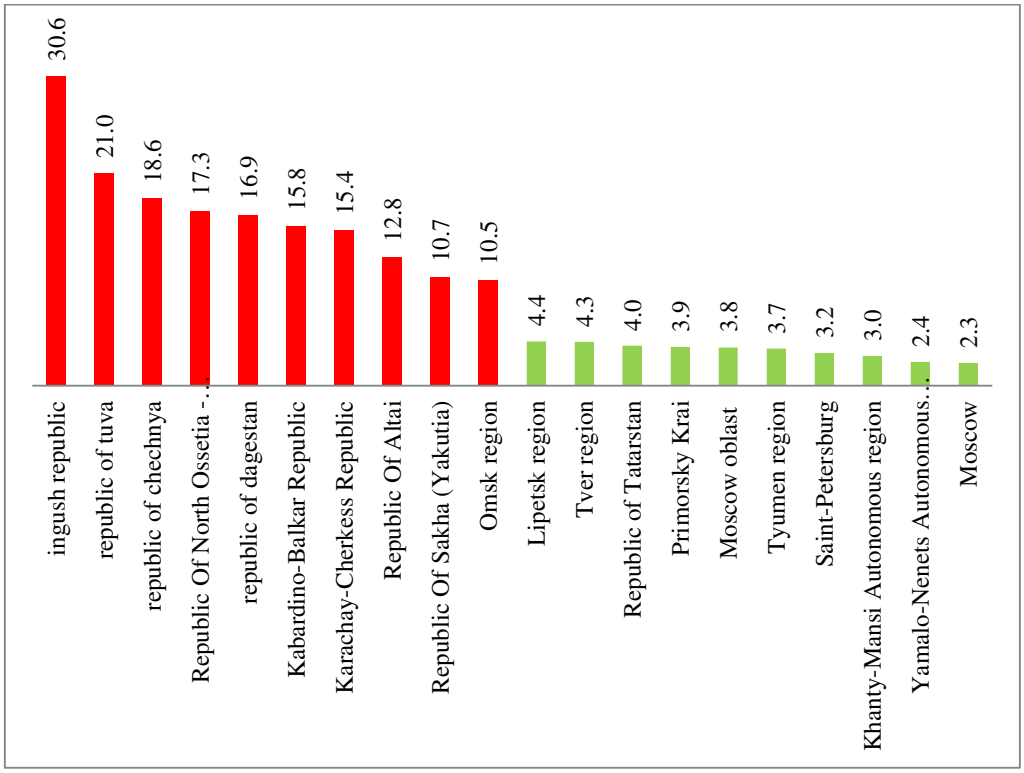

Fig. 11: Top-10 and outsiders-10 among the regions of the Russian Federation in terms of unemployment in the labor force aged 15-72 years, for May-July 2020 (average for the period), %

(compiled by the authors according to Rosstat, 2020)

A detailed analysis of the impact of the coronavirus epidemic on various aspects of the functioning of regional economies allows us to conclude that the most prosperous region of Russia during the pandemic is the Tyumen region, and the region that is in the most difficult socio-economic situation is the Republic of Sakha (Yakutia).

What ensures this level of stability in the Tyumen region? In the structure of economy of the Tyumen region a high proportion of sector mining of minerals (20,3%), manufacturing sector (18.2 per cent), the sector of wholesale and retail trade (11.3 per cent), transport sector (9.5%), the sector of scientific and professional activities (9,4%), construction sector (7,6%) (Fedstat, 2020). This structure of the Russian Federation's economy allows it to recover quickly after the Government's restrictive measures have been completed, not to disperse financial resources across many sectors, but to allocate narrowly targeted assistance to specific affected sectors of the region.

On the contrary, the Republic of Sakha (Yakutia) has a "weak" regional structure that has not actually coped with the crisis caused by the coronavirus epidemic. The Republic of Sakha (Yakutia) has a very well-developed mining sector (more than 50% in the structure of the economy of the subject), and, of course, in a region rich in natural resources, the development of other industries is weakened. The well-being of such a region depends to a greater extent on the development of one sector of the regional economy. This did not allow us to quickly reallocate resources to other "pain" points in the development of the coronavirus epidemic.

Thus, the more diversified structure of the region's economy was more resilient to the impact of the pandemic.

The Federal government plays an important role in overcoming the impact of the pandemic in the country's regions. For example, in most European countries and the United States, effective measures have been: the introduction of civil liability and penalties for violations of quarantine measures, the creation of centralized channels for informing citizens, state support for the medical care sector and pharmaceutical companies, direct financial support for citizens (for example, in the United States in the first weeks of the crisis, the President allocated $1,200 for each American; Every unemployed person received $400 a week, the tax burden of citizens was eased), support for large and small businesses (in the UK, 15% of GDP was allocated to support economic sectors; every entrepreneur registered in the United Kingdom could expect to receive 10,000 pounds from the state), salary increases for workers affected by the

coronavirus pandemic (a program implemented in Germany and extended for the period 2020-2021), and so on (Baranovsky, 2020).

The anti-crisis measures introduced in Russia slowed down the fall in revenues and stopped the growth of budget deficits, but only for a while. Tax breaks for business, which, however, led to an increase in the budget deficit of the Russian Federation's constituent entities. To make up for the increased costs of the state, the government proposed raising the tax rate on mining, reducing benefits in the oil and gas sector, increasing excise rates on tobacco products, updating agreements to avoid double taxation, and raising the tax rate on personal income to 15% for citizens earning more than 5 million rubles a year. In our opinion, the revision of these tax rates will not radically change the current situation, since most of them make up the revenue part of the Federal budget and can be redirected to national needs, for example, to increase the country's defense capability. At the same time, the increasing rate of income tax on "wealthy" individuals can provide growth of incomes of subjects of the Russian Federation to stabilize the financial situation in the country.

At the same time, the experience of the "full lockdown" experienced by the Russian economy and the possible adjustment of the structure of the economy of the affected regions in terms of their resistance to the pandemic will help to avoid serious imbalances in regional development, as well as take prompt measures to correct the situation.

Conclusion

The article analyzes the impact of the coronavirus pandemic on the socio-economic development of Russian regions. The authors studied the structure of the economy of Russian regions from the point of view of their resistance to a decrease in economic activity during the pandemic.

Using open statistical data, the authors showed which sectors of the economy and which regions were most and least affected by the pandemic. The authors formed the top 10 regions that are most successful in overcoming the crisis situation, as well as the top 10 outsider regions that have the weakest economic structure.

The article analyzes the measures of support to regions by the Russian government, as well as systematizes the most effective methods implemented by developed countries to normalize the economy during the pandemic.

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Development of the EAEU: Independence or Deepening Integration?

Galina Victorovna PODBIRALINA
Plekhanov RUSSIAN University of Economics, Moscow, Russian Federation
galvp@mail.ru

Tatiana Evgenievna MIGALEVA
Plekhanov Russian University of Economics, Moscow, Russian Federation
migaleva08@rambler.ru

Ludmila Lvovna RAZUMNOVA
Plekhanov Russian University of Economics, Moscow, Russian Federation
razumnova2003@yandex.ru

Natalia Anatolyevna NAVROTSKAIA,
Saint-Petersburg State University, Saint-Petersburg, Russian Federation
n.navrotskaya@spbu.ru

Abstract

The study assessed the development of integration in the Eurasian space, on the basis of which the hypothesis was substantiated that the processes taking place within the EAEU are aimed at maintaining sustainable economic growth and creating equal competitive conditions for its members. The study showed that the "four freedoms" within the EAEU contribute to the improvement of key indicators characterizing the integration processes. It was confirmed that the use of restrictive and the inconsistency of leaders have a serious impact on the implementation of agreements on the creation of common markets of production factors and is one of the obstacles in solving problems of using the economic and integration potential.

Keywords: EAEU, key indicators of integration, "four freedoms", economic and integration potential.

Introduction

In constantly changing world the integration provides the states participating in this process with additional opportunities to expand trade and economic interaction not only within the created association, but also with third countries, which, in turn, contributes to the achievement of competitive advantages for its participants, as well as an increase in the level of innovative economic activity as one of the main factors in increasing the competitiveness. The Eurasian Economic Union (EAEU) is considered a young integration association and its economic model is constantly being improved taking into account global trends in order to achieve deeper integration and maximize economic benefits for its members (Podbiralina, G., 2018).

As noted in the report of the Eurasian Economic Commission (EEC), "currently there is a growing tendency to reformat the existing architecture of the world economy. <…> International organizations regulating world trade, in particular the WTO, are not always able to respond to new risks and threats. The EAEU, in accordance with the norms and principles of the WTO, creates a network of regional integration groups. Such effective trade interaction with foreign partners and the development of integration within the Union itself make it an attractive, reliable partner" and contributes to the deepening of integration processes in the Eurasian space (Annual report. EEC, 2019).

In this regard, it seems appropriate to assess the results achieved within the EAEU integration project framework on the basis of the main indicators of foreign economic activity, which will identify problems in the development of integration in the Eurasian space and propose ways to solve them, as well as determine how economic integration contributes to the economic development of countries. This study also aims to confirm the conclusion that one of

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the key areas and the main factor of integration is the interaction of the participating countries in the field of trade and the implementation of large (including cross-border) infrastructure projects.

Review of relevant studies and problem statement

A significant number of theoretical and analytical studies are devoted to the development of economic integration, assessment of the strengths and weaknesses of this process in different regions of the world, as well as the relationship between economic integration and socio-economic development. For example, it was shown, that the conceptual foundations, the classification of five types (stages) of economic integration and the strategy of European economic integration (Balassa B., 1961), as well as the structures and instruments of foreign policy and European economic relations were laid down in the Schumann Declaration, at the same time their author in fact was a famous French economist and politician Jean Monnet (Schumann R., 2002; The European Union in Search of a Global Role: Politics, Economics, Security, 2015).

The development of common approaches to the internal and external problems faced by the European Community, as well as the formation of the institutional system of economic integration and its structure are reflected in the works (Lindberg, L., 1963; Pollack, M., 2009; Peterson J., Shackleton M., 2012; Parsons, C., Matthijs, M., 2015) and other authors.

The research of the Institute of Europe of the Russian Academy of Sciences are devoted to the most successful integration union and its interaction with the world (The European Union in Search of a Global Role: Politics, Economics, Security, 2015).

The experience of the EU in the formation and development of integration is in many ways valuable for other countries, including from the point of view of a comparative assessment of integration processes in the European and post-Soviet space.

The work (Apostolakis, S., Margaritou, K., 2018) assess not only the effectiveness of "Eurasian governance in its institutional dimension", but also emphasizes the role of entrepreneurship and innovation as a basis for economic integration and growth of member states. Based on use of Balassa's method, problems of achieving competitive advantages by individual countries participating in the Eurasian Economic Union are identified (Falkowski, K., 2017).

However, only a few of them present an analysis of the potential of the entire association. A number of works identify internal and external factors that impede the development of trade and economic relations (Podbiralina, G., 2018; Sopilko et al., 2019).

Nevertheless, most authors agree that the participants of regional integration associations “are linked not only by economic and political, but also by socio-cultural interests,” therefore their historical interdependence and existing interests contribute to the desire to intensify interaction between the post-Soviet countries in various fields, including science and education (Eurasian integration: origins, problems, prospects, 2017).

By becoming members of one or another integration association, countries strive to obtain certain economic benefits, so the main purpose of this article was to analyze the trade and economic interaction of the EAEU countries and, on its basis, to determine the directions of integration potential in the Eurasian space.

Research Methodology

The research methodology is based on assessing the trade and economic interaction of the member states of the Eurasian Economic Union and identifying areas for realizing the integration potential of the EAEU. The theoretical and methodological framework is characterized by a combination of theoretical and quantitative analysis, systematization, comparison, descriptive statistics, which makes it possible to identify modern trends in the development of Eurasian integration.

As a result of the analysis of the structure of the EAEU intra-zonal and foreign trade, other areas of foreign economic cooperation in the context of maintaining low growth rates of the world economy, caused by the recent impacts of the Covid-19 coronavirus infection and the strengthening existing trade and economic relations between countries, but also the development of new ones, especially with third countries (including through the conclusion of regional trade agreements (RTS). As a result, the participating countries of the integration association receive additional benefits: improving the well-being and quality of life of people; ensuring maximum efficiency of the common market for business and consumers, etc. And for the association itself (in this case, for the EAEU) it is

building new formats of interaction with external partners and, as a result, obtaining maximum efficiency from participation in the integration process.

The study (L.L. Razumnova, T.E. Migaleva, G.V. Podbiralina, N.P. Savina, 2020) considered the problems of integration cooperation between the EAEU countries during the COVID-19 pandemic.

The theoretical basis for studying this issue was the work of Russian and foreign scientists and experts in the field of regional integration, especially in the post-Soviet space, and analytical reports and reports of the Eurasian Economic Commission (EEC) and materials of the EAEU Department of Statistics.

The statistical basis for the study was the reports of the Eurasian Economic Commission (EEC) and data from the EAEU Department of Statistics.

Results

Let's highlight the key indicators in the strengthening of integration processes in the post-Soviet space, one of which can be considered changes in the volume of mutual (intra-union) and EAEU foreign trade.

Assessment of intra-union and foreign trade in goods of the EAEU countries

Based on the EAEU Department of Statistics data, it should be noted that from 2017 to the present, there has been an increase in the value of mutual trade in goods (Table 1).

Table 1: Mutual (intra-union) trade in goods of the EAEU 2015 - 2020, USD million

	2015	**2016**	**2017**	**2018**	**2019**	**January – July 2020**
Export						
to the countries of the Union (mutual trade)	45 615,7	42 960,3	54 711,6	60 261,5	61 634,0	29 326,3
including:						
Armenia	256,2	393,9	571,0	688,5	769,2	340,8
Belarus	11 007,8	11 384,8	13 651,0	13 932,2	14 569,7	7 632,5
Kazakhstan	5 120,3	3 930,2	5 262,5	6 046,8	6 406,2	2 842,1
Kyrgyzstan	410,2	447,1	541,5	640,6	641,7	279,4
Russia	28 821,2	26 804,3	34 685,6	38 953,4	39 247,2	18 231,5
Import						
from countries of the Union (mutual trade)	45 654,2	42 427,2	53 812,5	59 732,4	61 861,1	28 437,1
including:						
Armenia	988,8	1 062,6	1 314,2	1 440,7	1 707,0	929,4
Belarus	17 207,6	15 381,2	19 715,8	22 760,5	22 205,9	8 723,5
Kazakhstan	11 211,6	9 863,5	12 518,1	14 097,4	15 297,4	7 553,8
Kyrgyzstan	2 065,1	1 626,0	1 863,7	2 161,3	2 100,8	1 009,3
Russia	14 181,1	14 493,9	18 400,7	19 272,5	20 550,0	10 221,1

Source: Department of Statistics of the EAEU.

At the same time, from the moment of the formation of the EAEU (2015) and up to the present day, almost all EAEU member states (except Russia) had a negative balance in mutual trade in goods (Table 2). An increase in the trade deficit is observed annually for Armenia and Kazakhstan, while in the Republic of Belarus and Kyrgyzstan this indicator decreased in 2019. The only country that has a positive balance in mutual trade in goods with other member countries of the association is Russia (however, this indicator decreased in 2019). It should be noted that a negative trade balance has a negative impact on national economies, considering the low diversification of the trade structure (both domestic and foreign) (Kofner Y., 2020; Eurasian Economic Commission Analytical review, 2020).

Table 2: The balance of intra-union trade of the EAEU member states, 2015-2019, USD million

	2015	2016	2017	2018	2019	Average (2015-2019)	Change between 2015 and 2019,%
Armenia	-732,6	-668,7	-743,2	-752,2	-937,8	-579,34	-28,0
Belarus	-6199,8	-3996,4	-6064,8	-8828,3	-7636,2	-6545,1	-23,2
Kazakhstan	-6091,3	-5933,3	-7255,6	-8050,6	-8891,2	-7244,4	-46,0
Kyrgyzstan	-1654,9	-1178,9	-1322,2	-1520,7	-1459,9	-1427,32	11,8
Russia	14640,1	12310,4	16284,9	19680,9	18697,2	16322,7	27,7

Source: EAEU Statistics Department and authors' calculations.

The increase in the value of intra-union trade by 2019 can be assessed as good results compared to the decline in 2014 and 2015 against the backdrop of Western sanctions against Russia. In addition, there was a slight change in the status of the dollar as a payment unit: according to statistics, from 2013 to 2018 Russia reduced the share of settlements in dollars in foreign trade by 12.6%, increasing the share in euros and rubles by 26.6% and 14%, respectively. At the same time, the role of the Russian ruble as a settlement means within the EAEU in 2013 - 2017 increased from 61% to 74% (Eurasian Development Bank, 2019). Nevertheless, in 2019 in mutual settlements for the export and import of goods and services the share of national currencies payments decreased slightly, and settlements in Russian rubles amounted to 72.4% (72.7% in 2018), in other national currencies - 1.5% (against 1.2% in 2018). In the payments structure between the EAEU member states (taking into account mutual settlements) and all countries of the world, US dollars still prevailed. Their share in payments for exports was 60.6%, for imports - 36.5%. Other foreign currencies (except US dollar and euro) in settlements with third countries accounted for 1.9% in exports and 3.6% in imports (Eurasian Economic Commission. Express Information, 2020).

It should also be noted that in the first half of 2020, food became a driver of not only internal but also foreign EAEU trade. Its sales increased in the first half of 2020 by 17.2% in monetary terms. Non-food agricultural products showed an increase of 9.1%. Export sales of sugar (12 times), poultry meat and by-products (2.7 times), sunflower (doubled), sunflower oil (42.3%) and wheat (9.3%) increased the most. At the same time, as a whole, the volume of non-resource non-energy exports of the EAEU to third countries for the six months of this year decreased by 9% compared to the same period last year (Karabut T., 2020).

As for the EAEU foreign trade, the trend continues when the intrazonal (intra-union) trade turnover is noticeably inferior to the foreign trade turnover, which is mainly due to the orientation of Russia and Kazakhstan (large economies of the grouping) to export outside the union. Table 3 shows the indicators of the EAEU foreign trade, on the basis of which it can be determined that the total volume of foreign trade in goods of the Eurasian Union member states in January- July 2019 amounted to 735.8 billion US dollars, including the export of goods - 460.8 billion US dollars. Imports is just over $ 275 billion. However, compared to the previous year, the volume of foreign trade turnover decreased by 2.4% or by $ 18 billion, including exports - by 6.1% (by $ 29.9 billion), while imports, on the contrary, increased by 4,5% (by $ 11.9 billion) (Table 3). Nevertheless, the foreign trade surplus remains at USD 185.8 billion, which is USD 41.8 billion less than in 2018 (USD 227.6 billion).

Table 3: Foreign trade in goods of the EAEU 2015 - 2020, million US dollars

	2015	2016	2017	2018	2019	January – July 2020
Export						
to countries outside the Union	373 845,1	308 264,8	386 922,4	490 722,0	460 749,2	202 865,0
including:						
Armenia	1 227,7	1 397,8	1 666,7	1 724,0	1 879,4	992,9
Belarus	15 653,9	12 154,9	15 592,3	19 979,3	18 391,1	7 719,0
Kazakhstan	40 835,5	32 806,8	43 240,7	55 064,4	51 659,4	25 783,3
Kyrgyzstan	1 072,7	1 126,0	1 222,8	1 196,2	1 344,4	849,8
Russia	315 055,3	260 779,3	325 199,9	412 758,1	387 474,9	167 520,0
Import						

from countries outside the Union	205 537,4	201 107,9	247 271,3	263 114,4	275 026,7	139 091,8
including:						
Armenia	2 218,9	2 163,4	2 782,9	3 534,8	3 830,6	1 475,7
Belarus	13 088,6	12 234,7	14 525,9	15 689,1	17 280,5	8 834,4
Kazakhstan	19 356,2	15 513,2	17 081,5	19 561,1	24 411,9	12 562,7
Kyrgyzstan	2 088,8	2 374,5	2 631,1	3 130,7	2 888,3	945,2
Russia	168 784,9	168 822,1	210 249,9	221 198,7	226 615,4	115 273,8

Source: Department of Statistics of the EAEU.

The total volume of foreign trade in goods of the EAEU with third countries in January - July 2020 amounted to 342 billion US dollars, including exports of goods - 202.9 billion US dollars, imports - 139.1 billion US dollars. However, these indicators are significantly lower than the same period of 2019: compared to January - July 2019, the volume of foreign trade turnover decreased by 17.3% or by 71.6 billion dollars, exports - by 22.7% (by 59.5 billion dollars), imports - by 8% (by 12.1 billion dollars) (Eurasian Economic Commission. Analytical review, 2020).

This dynamics is primarily due to a sharp deterioration in the situation in world markets caused by the negative impact of Covid-19, as well as the ongoing trade confrontation between the two largest economies - the United States and China.

As a result, the decrease in the value of exports of the EAEU member states to third countries compared to 2018 (by 6.1%) is due to a decrease in average prices for exported goods (by 3.1%) and the physical volume of supplies (by 3.1%). The fall in prices and the decline in physical volume equally (by 50% respectively) determined the overall decline in the value indicator. The value volume of imports increased by 4.5%, their physical volume - by 5.9%. Average prices for imported goods decreased by 1.3%. The increase in the value of imports is entirely due to the growth of the commodity volume. The price conditions of trade with third countries are characterized by an unfavorable ratio of prices for exported and imported (price conditions index - 98.2%). The EAEU demand for goods from third countries exceeds the external one produced in the EAEU (gross conditions index - 91.5%). (Eurasian Economic Commission. Analytical review, 2020).

It should also be noted the unequal contributions of the EAEU member to the aggregate indicators of foreign trade (as a percentage of the EAEU total), which were distributed as follows (Figure. 1):

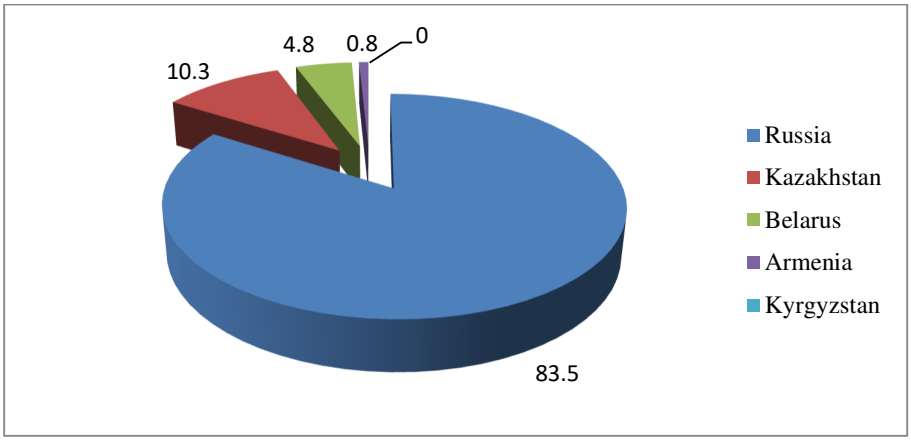

Figure 1: Contributions of the EAEU member states to the aggregate indicators of foreign trade, 2019, in % of the total for the EAEU.

Source: Eurasian Economic Commission, 2020.

Thus, at present it cannot be fully asserted that the indicators of intra-union and foreign trade characterize a high degree of integration in the EAEU, however, there is a huge potential that can be realized due to export diversification, as well as a decrease of the political factor influence. In the meantime, existing forecasts (including the EEC) indicate that in 2020, due to a sharp deterioration in the foreign trade situation, exports from the EAEU

will significantly decrease, and the volume of mutual trade of the association will decrease by 24.1% (The EAEU recorded a decrease in the volume of mutual and foreign trade, 2020).

Trade in services of the EAEU countries is a driver of integration development

It should be noted that trade in services is developing at a fairly rapid pace, which was largely facilitated by the conclusion of the Treaty on the EAEU and the creation of a single market for services, which began to function on January 1, 2015. Forty-three service sectors operate within the single market of services (including construction work, rural and forestry, wholesale and retail trade, logistics, etc.). In December 2016, the Presidents of the EAEU member states approved liberalization plans for 18 service sectors; by the decision of the Supreme Eurasian Economic Council on May 14, 2018, another 9 sectors were transferred to the format of a single service market. In May 2019, the single market for EAEU services was supplemented with mapping services (5 years of the Eurasian Economic Union. Eurasian Economic Commission, 2019; Export and import of services of the member states of the Eurasian Economic Union. Express information, 2020).

The single market for services in the EAEU allows to supply and receive services without restrictions, exemptions and additional requirements on the basis of a permit obtained by a service provider in its territory (which is part of the EAEU), with recognition of the professional qualifications of personnel. As a result, approximately 55% of the volume of services produced in the countries of the Eurasian Economic Union is already provided in the single market mode. In the future, this should help reduce prices, create new jobs, give an impetus to business development (especially small and medium-sized ones), and ultimately ensure the growth of national economies, increase the competitiveness of goods and services and the investment attractiveness of the EAEU economies. Nevertheless, from 2015 to 2018 in intrazonal trade in services, only the Republic of Belarus and the Russian Federation had a positive services trade balance (Table 4).

Table 4: Balance of intra-union trade in services, 2015-2018, USD million

	2015 г.	2016 г.	2017 г.	2018 г.	Average (2015-2018)	Change between 2015 and 2018,%	In relation to GDP (on average for 2015-2018),%
Armenia	-22,4	-71,9	-77,9	-88,0	-65,1	292,3	-0,6
Belarus	505,8	516,7	685,8	550,9	564,8	8,9	1,4
Kazakhstan	50,1	-271,7	-530,4	-151,2	-225,8	-401,8	-0,1
Kyrgyzstan	9,1	-6,2	-434,8	-113,7	-136,4	-1349,5	-1,9
Russia	961,8	546,6	630,0	735,3	718,4	-23,5	0,05

Source: Kofner Y., 2020.

In 2019, compared to 2018, the export of services increased in all EAEU countries, except for Russia; imports enlarged in Armenia, Belarus and Kyrgyzstan. A positive balance of trade in services was observed in Armenia, Belarus and Kyrgyzstan; in other EAEU member states, imports exceeded exports. Figure 2 shows the growth in trade in services.

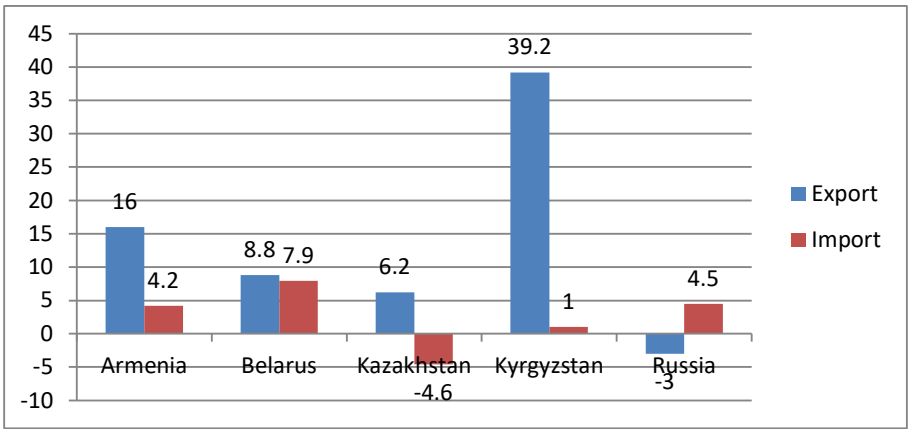

Figure 2: Growth in trade in services (2019, % of 2018).

Source: Eurasian Economic Commission, 2020

Thus, we see that intra-union trade in services is developing dynamically, which means that the existing economic and integration potential in this area can be realized. But for its implementation, it is necessary to remove existing barriers and obstacles in the internal market of the association, and the EEC is working to solve this problem.

So, at the meeting of the EEC Board in July 2020, the Minister for Internal Markets, Informatization, Information and Communication Technologies of the EEC G. Vardanyan presented a report on the results of monitoring the implementation of the roadmap for the elimination of exemptions and restrictions in the internal market of the EAEU for 2018-2019, where it was noted that currently 63% of the planned activities have been implemented. According to experts, “removing only certain obstacles included in the roadmap will reduce business transaction costs by about $ 100-120 million, and the cumulative positive effect of this removing will vary from 1.5 to 2% of the volume mutual trade "(EEC news, 2020).

Capital market as a necessary condition for the development of integration in the Eurasian space.

As noted in the EEC publications, the common financial market is currently at the stage of formation (the Agreement on its functioning should enter into force in 2025). It is assumed that the financial market will include not only the sphere of banking interaction, but also the insurance market, brokerage services, that is, the entire range of financial services (Annual report. EEC, 2019).

The concept of a EAEU common financial market formation was signed on October 1, 2019. This document defines: the main goals, principles, objectives, stages and expected results; legal basis and main directions of market functioning; the procedure for information interaction and administrative cooperation of financial market regulators; tasks and powers of the supranational body for regulating the EAEU common financial market. In addition, on December 23, 2014, an Agreement on the exchange of information (including confidential information) in order to create conditions in the financial markets to ensure the free movement of capital was signed. It entered into force on October 21, 2016 (The creation of a common labor market is one of the main priorities of the EAEU, 2016).

It is necessary to clarify that the capital market operates the main investment resources, which include not only loans and borrowings, but state and insurance funds, as well as the assets of enterprises. An important role is played by mutual investment and foreign direct investment (FDI), because their inflow allows to increase the fixed capital within the country, and an outflow increases the country's total ownership of assets in other member states. Thus, in the IV quarter of 2018, compared with the indicators of the previous period, the inflow of mutual direct investments to the EAEU member increased by 197 million US dollars. At the same time, direct investments in the EAEU from all over the world increased by USD 2,491 million (fig.3), and the predominant instruments of mutual direct investments were investments in the capital of companies, including reinvestment of income, investments in equity interest and shares of investment funds (Department of Statistics of the EAEU. Express information. Eurasian Economic Commission, 2019).

The EAEU Department of Statistics notes that during the period under review, in the structure of mutual direct investments, the largest inflow was observed in Belarus (703 million US dollars) and Kazakhstan (619 million US dollars). The main investor of mutual direct investments in the EAEU was Russia (USD 1,586 million) (Department of Statistics of the EAEU. Express information. Eurasian Economic Commission, 2019).

An important direction in the development of the integration and functioning of the capital market is the creation of the Eurasian Development Bank (EDB), which acts as a regional financial mechanism in the Eurasian space. As of September 1, 2019, the EDB's investment portfolio was approximately US $ 3.9 billion, and its balance sheet was US $ 2.6 billion (excluding provisions and discounts). Currently, the activities of this institute are aimed at financing priority projects in the field of energy, transport and infrastructure; carrying out informational, analytical and predictive research in the financial market of the EAEU, the CIS and other countries of Eurasia.

An important area contributing to the development of Eurasian integration can be considered the preparation of the annual Review of the largest investment projects of the EAEU countries, which brings together more than 600 investment projects in various sectors of the economy and is designed for a total amount of more than $ 700 billion. Its role and practical importance is to provide an opportunity to identify areas for the development of cooperation in industry, mutual attraction of investors, suppliers of equipment, raw materials, contractors to perform work and provide services for implementation of investment projects. The realization of the recommendations proposed in the Review will contribute to an increase in the volume of mutual FDI and mutual trade in investment goods and services within the EAEU (Department of Statistics of the EAEU. Express information, 2019).

Common Labor Market

The common labor market has been functioning in the EAEU since January 01, 2015. This means that, in accordance with the Treaty on the EAEU, citizens of the member states of the association have the same conditions of taxation, social insurance and medical care as citizens of the state of employment. Within the framework of the EAEU, all workers are given the opportunity to work not only under a labor contract, but also under a civil law contract. Mutual recognition of diplomas is ensured in all specialties with the exception of pharmacy, medicine, law and pedagogy. Children of labor migrants can attend preschool institutions and receive education in accordance with the legislation of the state of employment. The formation of legal conditions for workers should also contribute to the activation of migration processes within the EAEU, since "labor migration is a real resource in the development of the entire Eurasian region, and further integration will depend on how consistently the member states move in this direction" (Department of Statistics of the EAEU. Express information, 2016; Sopilko, N. et al., 2019).

Currently, a search system "Work without Borders" is being developed in the EAEU space. It will expand the opportunities for citizens of the member states of the association in the single labor market. The project is being implemented within the framework of the EAEU digital agenda. Since its launch, standard software has been created and integration work has been carried out in all five countries of the Union: Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia. The project "Unified search system" Work without borders ", if necessary," can become one of the services of the information system for recording labor migration", i.e. after the launch of the system, citizens of the EAEU countries will have additional opportunities for employment both in their own country and in the countries of the union, and for employers the list of sites for personnel search will expand (The search system "Work without Borders" is being created in the EAEU, 2020).

Nevertheless, for the existence of a single labor market to become economically feasible, it is necessary to develop and implement joint projects that are interesting (preferable) for the workers of the EAEU member states. In addition, it is important to invest in human capital and create attractive jobs for new workers, especially highly skilled workers. Only in this case the member states of the association will be able to realize the existing potential and create the necessary conditions for successful economic growth in the future.

Conclusions

Based on the study, the following results and conclusions were obtained.

During the existence of the EAEU, certain successes have been achieved. First of all, it is necessary to highlight the development and construction of an integration model of multilateral interaction, which is aimed at ensuring the strength and further development of the integration association. Since the functioning of the EAEU, one of the main conditions for its existence has been developed and adopted a huge array of supranational legislation, which is aimed at ensuring the free movement of goods, services, labor on 1/7 of the world land of the member states location. As a result, a common market for goods and services, labor and capital is functioning. In addition, as of 2019 a total of Memorandums were signed: eight - with regional integration associations, fourteen - with governments of third countries, eleven - with ministries and departments of third countries, thirty-eight - with international organizations and their subdivisions, and five - Trade agreements with other states.

Currently, a draft of the Strategic Directions for the Development of Eurasian Economic Integration until 2025 has been prepared (EAEU Closer to the people. Annual report. EEC, 2019), which indicates a new stage in the development of Eurasian integration. This document covers not only the completion of the areas provided by the Treaty on the EAEU to strengthen integration in the Eurasian space (the formation of single and common markets that ensure the implementation of the “four freedoms "; the development of basic regulatory legal acts, etc.), but also the achievement of harmonization and synchronization of the approaches of the Member States to the definition and regulation of new areas of cooperation; improvement of mechanisms of functioning and interaction of supranational and national institutions of the Union. Attention was paid to the development of new directions for the development of integration, in particular, in green technologies, renewable energy sources, in the field of health care, sports, tourism, education and science.

As noted in the Annual Report, "the new Strategy is fully consistent with national economic interests, the goals of sustainable and inclusive economic development of each EAEU member state" (Eurasian Economic Commission, 2019). In the future, in order to preserve the status of a “fast-growing integration association” for the EAEU, it is necessary to create conditions for the advanced development of the economy of all participants in this process, an increase in investment and innovation activity, in the competitiveness and scientific and production potential of the Eurasian Union as a whole. Based on the analysis of the EAEU's intra-union and foreign trade, it was determined

that since 2017, there has been an increase in the volume of mutual trade between the EAEU member states, however, this trend is largely due to an average prices rise for goods and services. In addition, the tendency of excess of foreign trade turnover over intrazonal remains. It is shown that integration within the EAEU has moved to a qualitatively new level, however, the effectiveness of the functioning of the association will largely depend on the creation of equal competitive conditions not only for its members, but also for third countries. In the meantime, we are witnessing the existing disagreements between the EAEU countries, for example, in making and agreeing decisions regarding the Draft Strategic Directions for the Development of Eurasian Economic Integration until 2025. Until now, the desire of the member states of the Union to preserve their sovereignty, as well as to independently build trade and economic cooperation with other countries, remains, which may subsequently lead to increased competition within the EAEU and negatively affects the development and strengthening of Eurasian integration.

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Purchase and Consumption Habits of Terrincho PDO Cheese: The Consumer Perspective in The Municipality of Bragança, Portugal

Larissa Caroline PERINOTO
Universidade Tecnológica Federal do Paraná, Campus Campo Mourão - Via Rosalina Maria dos Santos, 1233 CEP 87301-899 Campo Mourão, Paraná, Brasil, perinotolarissa@gmail.com

António José Gonçalves FERNANDES
Centro de Investigação de Montanha (CIMO) - Instituto Politécnico de Bragança, Campus Santa Apolónia, 5300-253 Bragança, Portugal, toze@ipb.pt

Roberta de Souza LEONE
Universidade Tecnológica Federal do Paraná, Campus Campo Mourão - Via Rosalina Maria dos Santos, 1233 CEP 87301-899 Campo Mourão, Paraná, Brasil, robertaleone@utfpr.edu.br

Maria Isabel Barreiro RIBEIRO
Centro de Investigação de Montanha (CIMO) - Instituto Politécnico de Bragança, Campus Santa Apolónia, 5300-253 Bragança, Portugal, xilote@ipb.pt

Abstract

Trás-os-Montes region presents a range of certified products with high cultural and commercial value such as Terrincho Protected Designation of Origin (PDO) cheese, which is manufactured with milk of the Churra sheep from Terra Quente. The aim of this research was to define the consumer profile of Terrincho PDO cheese, as well as its purchasing and consumption habits. To achieve these objectives, an analytical and cross-sectional research was developed. To collect the data, a structured questionnaire was applied through personal interviews. The respondents were approached, at random, in public spaces of Bragança city between March 1th and 27th, 2019. Of the 380 interviewees, 57 were consumers of Terrincho PDO cheese. These consumers were mainly female (56%), with an average age of 58.3 years (± 16.190), married (70%), active (50%), lived in the municipality of Bragança (90%) with 2 (40% %) or 3 (28%) people in their household. Consumers of Terrincho PDO cheese differ significantly (p-value < 0.05) from non-consumers because they had a higher education degree (53%), a monthly household income above 1200 euros and were retired (47%). The frequency of consumption of the product occurred once a month (33%) or two to four times a year (26%), while the purchase frequency occurred on a monthly basis (69%). At the time of the purchase, most of the interviewees opted for the certified product (67%) due to the safety (79%) that it represents. Terrincho PDO cheese is a product capable to generate high added-value contributing to the economic development of Trás-os-Montes region given its acceptance by consumers.

Keywords: Terrincho PDO cheese, Protected Designation of Origin, Market Research, Consumer profile, Bragança.

Introduction

Traditional Portuguese products and their particular modes of production characterize unique elements with origin in the region that gives its name. The strong connection with the place of production is able to prove that the quality of the product is influenced by the animal breeds, soil, vegetation, climate and manufacturing technology. These have been assuming increasingly important roles as they represent part of the social history of a given culture (Vales, 2014; Cabo, Ribeiro, Fernandes & Matos, 2015).

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The association of food products name with the place or region of origin is an ancestral practice, present in biblical passages, and was usually used among the Greeks and Romans, as they already did it as a way of differentiating products. This type of association has persisted over time and has become a form of appreciation. However, when a product reaches a reputation capable of crossing borders, there is the possibility of confrontation with products copied using the same name (Vales, 2014).

Given the potential of these products for the development of the rural environment to which they belong, policies for the valorization of traditional agro-food products were created, being the starting point for the protection of agricultural products by the European Union. Thus, there is a great interest in traditional products, where, with the reform of the Common Agricultural Policy (CAP) in 1992, the agricultural productivist model was put aside and the multifunctionality of agriculture went beyond the productive aspect, highlighting its role as facilitator of the construction of a territory in which people may live (Fiuza, Pinto & Amoedo, 2006; Tibério & Cristóvão, 2001).

A certification brand name ensures that a product from different manufactures will have particular characteristics, both in quality and in components, at a higher than normal level, this being a guarantee that it has been subjected to prior and continuous control by the producing association (Trentini & Sae. 2010). The use of a certificate of origin can, in theory, be applied to several product segments. As pointed out by Trentine and Sae (2010), any product class may be entitled to a certificate of origin. However, it is customary to have such a name for natural or elaborated products, where the geographical element has importance or even decisive influence on its quality and typicality.

The link between the product and the geographical region is due to natural and human factors. In the first case, it concerns the soil, climate, water, flora and fauna, as well as the nearby regions, namely, forests, sea, valleys or mountains. In the second case, it involves all the traditional techniques, work and practices related to production, and if these methods were transported to another region, it would not have the same effect in what concerns to the characteristics of the final product (Trentini & Sae, 2010).

According to the Comissão Europeia (2014), there is a preference on the part of consumers in relation to products of local or regional origin, as well as products of traditional specialties. The use of designations for specific products promotes the identification, the guarantee of quality and safety and the preservation of its tradition. The identification of Protected Names offers an incentive for the valorization of agricultural products and is available in the form of Protected Designation of Origin (PDO), Traditional Guaranteed Specialty (TGS) and Protected Geographical Indication (PGI) (Barros, 2014).

Among the products with Protected Names, the Terrincho PDO Cheese stands out in this research. This is a cheese obtained from the milk of the Churra da Terra Quente sheep, a breed whose manor is found, according to Ramos (2008), in the Terra Quente region of the Bragança district, including some municipalities of Vila Real and Guarda districts. The characteristics of the region favor the breeding of these animals, which makes it possible, thanks to their milk aptitude, to manufacture the only sheep cheese in the Trás-os-Montes region with a protected name.

Given the importance of the certified products for the development of the region in which it is produced, this study was carried out with the objective of knowing the buying and consuming habits of Terrincho PDO cheese consumers in the municipality of Bragança, as well as defining the consumer's profile.

Methodology

In order to achieve these objectives, an observational, quantitative, cross-sectional and analytical research was developed based on a sample constituted by 380 individuals. The anonymity of the respondent, the confidentiality of the collected data as well as the conditions relating to data protection were guaranteed to all participants.

Data was collected using a questionnaire that was applied to consumers who were circulating in the main squares and avenues of Bragança city between 11 and 27 March, 2019. The questionnaire had three sections. The first section consisted of questions regarding the consumption habits of Terrincho PDO cheese. The second section referred to the product's buying habits. Finally, the third section concerned the profile of the participant. All questions were structured, being multiple choice, single choice or dichotomous, with pre-defined alternatives, indicating whether the respondent could choose one or more alternatives, if necessary. Open questions were not used in this questionnaire, in order to facilitate the participants' cooperation. The order defined for the sections of the questionnaire aimed to create trust in the participants, leaving the personal questions to the end. In total, the questionnaire consisted of 30 questions.

A pre-test was carried out in order to highlight possible errors and allow the correction of the definitive questionnaire (Gil, 2002; Lakatos & Marconi, 2003). Only after the pre-test, the research instrument is validated. The pre-test must ensure that the questionnaire is well prepared, that is, regarding the clarity and precision of the words, the form and order of the questions and the introduction to the questionnaire (Gil, 2002; Gil, 2008). The pre-test carried out in this study took place in the municipality of Bragança on February 26, 2019, in a public square, with a sample of 15 respondents selected at random. The method of application was personal interviews. Each interview lasted, on average, 10 minutes. During the interview, the researcher could perceive the resistance of the interviewees to cooperate with the research, as well as the difficulty to answer some questions.

The sample characterization is shown in Table 1. Considering all the interviewed individuals, the distribution of the sample by gender was equitable (50%). However, most respondents had literary qualifications at the level of secondary education (12th grade) (32%) or higher education (33%), were married (53%), were employed (50%), lived in households with 2 (39%) or 3 (23%) people, had a monthly household income between 600 and 1200 euros (39 %) or 1201 and 3200 euros (33%) and lived in the municipality of Bragança (82%). The respondents' age ranged between 18 and 88 years, with an average age of 51.7 (± 18.625) years old.

Table 1: characterisation of the sample (n = 380)

Variable	Group	Frequencies	
		Absolute (n)	Relative (%)
Gender	Female	190	50
	Male	190	50
Education level	1st cycle incomplete	8	2
	1st cycle complete (4th grade)	65	17
	2nd cycle complete (6th grade)	22	6
	3rd cycle complete (9th grade)	37	10
	Secondary education (12th grade)	123	32
	Higher education	125	33
Marital status	Married	202	53
	Single	123	32
	Divorced	31	8
	Widow	24	6
Professional occupation	Employed	191	50
	Unemployed	31	8
	Student	29	8
	Retired	129	34
Monthly household income	Less than 600 euros	69	18
	Between 601 and 1200 euros	147	39
	Between 1201 and 3200 euros	123	32
	Between 3201 and 5200 euros	28	7
	More than 5200 euros	8	2
	Missing	5	1
Size of the household	1 person	74	20
	2 people	148	39
	3 people	86	23
	4 people	56	15
	> 4 people	16	4
Residence	Bragança's municipality	312	82
	Bragança's district (other municipalities)	36	10
	Other district	10	5
	Other country	13	3

The software used to edit and process the data was IBM SPSS version 26.0 (Statistical Package for Social Sciences). Descriptive statistics were calculated, namely, absolute and relative frequencies for nominal and ordinal variables and measures of central tendency and dispersion for variables of quantitative nature (Pestana & Gageiro, 2014; Maroco, 2018).

To compare the age of the interviewees was used the Man-Whitney test since the conditions to apply parametric tests were violated (data normality and variances homogeneity). In fact, the non-normality of the data was verified by using the Kolmogorov-Smirnov test with the Lilliefors correction ($n > 30$). The variances homogeneity was tested using the Levene test. The Man-Whitney test is used to teste the null hypothesis (H_0) that the medians (η) of consumers' and non-consumers age are equal (H_0: $\eta_{consumer} = \eta_{non\text{-}consumer}$) against the alternative hypothesis (H_1) that the medians of consumers' and non-consumers age are different (H_1: $\eta_{consumer} \neq \eta_{non\text{-}consumer}$).

Pearson's Chi-square test is characterized by being a non-parametric test, applied to nominal variables. It allows testing the null hypothesis of the proportions (θ) being equal (H_0: $\theta_{consumer} = \theta_{non\text{-}consumer}$), that is, the variables being independent, against the alternative hypothesis (H_1) of the proportions being different (H_1: $\theta_{consumer} \neq \theta_{non\text{-}consumer}$), that is, the variables being dependent (Sanders & Smidt, 2000). The practical rule of the Pearson Chi-square test indicates that $n > 20$ and 80% of the expected frequencies must be higher than 5 (Marroco, 2018). Pearson's Chi-square test was used to compare the profile of consumers and non-consumers of th Terrincho PDO cheese. Also, the channels of communication (media) and the types of promotion available to promote the product were compared considering the same groups. Fisher's Exact test is a non-parametric test used to compare two small independent samples, with dichotomous nominal variables grouped in 2x2 contingency tables when the practical rule of the Pearson's Chi-square test was violated (Marroco, 2018).

To carried out the analytical study, a significance level of 5% was used. According to Maroco (2018), the rule of statistical decision is to reject the null hypothesis when p-value (probability of significance) $\leq \alpha$.

Results and Discussion

Among 380 respondents, 57 were consumers of Terrincho PDO cheese (Table 2). The table shows the characteristics of the interviewees who consumed the product. It is noteworthy that the majority of consumers of the product were female (56%), had a higher education degree (53%), were married (70%), were employed (51%) or retired (47%), lived with 2 (39%) or 3 (28%) people in their household with a monthly household income between 600 and 1200 euros (23%) or between 1200 and 3200 euros (40%) and lived in the municipality of Bragança (90%).

For Wongleedee (2015), consumer behavior can be defined as actions to purchase goods and services for domestic and individual uses, in order to satisfy their basic needs, in which individuals are involved in the decision process and exchange of goods and services. According to Barroso and Madureira (2005), the cultural environment in which an individual grows determines, to a large extent, their patterns and consumption habits. Social status is a variable that influences and conditions consumer behavior, being a strong market segmentation variable. People belonging to the same social group tend to have the same opportunities, to live in the same type of houses, in the same areas, to buy similar products in the same type of stores. For this reason, to stratify populations, variables such as income, occupation, educational level or lifestyle are often used.

To analyze consumer behavior is to research consumers' patterns of purchase, consumption and use of products, or a specific product. Table 2 shows the comparison between respondents who were consumers of Terrincho PDO cheese and those who were not. There were significant differences (p-value < 0.05) in four of the characteristics evaluated, namely, educational level, marital status, professional occupation and monthly household income. There were no significant differences (p-value > 0.05) in three of the characteristics of the respondents, namely, between gender, size of the household and place of residence. It can be said with a 95% confidence level that those who consume Terrincho PDO cheese are married people, already, retired. The results in Table 2 also show that those who consume Terrincho PDO cheese are individuals with higher education qualifications and who earn a higher monthly income (between 1201 and 5200 euros per month) compared to non-consumers.

Among the non-consumers of the product, it can be concluded that the majority are people with academic qualifications concentrated between the 3rd cycle (9th grade) or secondary education. They are students or people who were unemployed, single, and with an average monthly household income between 600 and 1200 euros (Table 2).

In a study developed by by Fernandes, Ribeiro, Cabo and Matos (2017a) in the Bragança region, there were significant differences in educational level and in the household's monthly income, when comparing the profile of respondents who were consumers and non-consumers of gourmet products. The authors concluded that consumers of gourmet products in the Bragança region were people with higher education qualifications and higher income. Since gourmet products were

defined as high quality products, generally with specific origin certification and produced regionally, it was possible to confirm these characteristics obtained for consumers of Terrincho PDO cheese in the present study.

The average age of Terribcho PDO cheese consumers was 58.3 years old (± 16.190) and in non-consumers was 50.5 years old (± 18.805). When using the Mann-Whitney test to compare age between consumers and non-consumers, it was noticed that the median age of those who were consumers (62 years old) and those who were not consumers (52 years old) showed a significant difference (p-value = 0.005) at a 95% confidence level, indicating that consumers of Terrincho PDO cheese are older people. This significant difference in age was not detected in the study of consumers of gourmet products by Fernandes, Ribeiro, Cabo and Matos (2017a).

Table 2: profile of the consumer and non-consumer of Terrincho PDO cheese

Variable	Group	Consumer (%)		p-value [a]
		Yes (n = 57)	No (n = 323)	
Gender	Female	56	49	0,315
	Male	44	51	
Education level	1st cycle incomplete	2	2	0,027 *
	1st cycle complete (4th grade)	16	17	
	2nd cycle complete (6th grade)	4	6	
	3rd cycle complete (9th grade)	5	**11**	
	Secondary education (12th grade)	21	**34**	
	Higher education	**53**	29	
Marital status	Married	**70**	50	0,023 *
	Single	16	**35**	
	Divorced	7	8	
	Widow	7	6	
Professional occupation	Employed	51	50	0,007 *
	Unemployed	2	**9**	
	Student	0	**9**	
	Retired	**47**	32	
Monthly household income	Less than 600 euros	11	**20**	0,000 *
	Between 601 and 1200 euros	23	**42**	
	Between 1201 and 3200 euros	**40**	31	
	Between 3201 and 5200 euros	**16**	5	
	More than 5200 euros	**7**	1	
	Missing	4	1	
Size of the household	1 person	14	20	0,225
	2 people	39	39	
	3 people	28	22	
	4 people	19	14	
	> 4 people	0	5,0	
Residence	Bragança's municipality	90	81	0,242
	Bragança's district (other municipalities)	9	10	
	Other district	2	6	
	Other country	0	4	

[a] Results obtained with Pearson's Chi-square test.
* There are significant differences at the significance level of 5%.

One of the objectives of this research was to describe the consumption habits of the interviewees who assumed to consume Terrincho PDO cheese. According to Correia (2015), all individuals have needs, but these needs differ according to the different moments of their lives. For Zamberlan, Sparemberger, Wagner and Sartor (2006), consumption is a central resource in the formation of social and cultural identities. Regarding consumption, there are motivations, influences, habits, preferences and perceived risks, which are added and mixed making the moment of food consumption something with multiple meanings. The process of motivation for consumption begins with the recognition or activation of the need that occurs when there is disagreement between the desired state and the real state (Correia, 2015). The motivations that

lead the interviewed consumers of Terrincho PDO cheese (n = 57) to choose this product are shown in Figure 1. It is noticed that the majority of respondents choose this product because they value its sensory characteristics (68%) and few consumers associate the product with certain health benefits (2%). The sensory characteristics of a food are all the properties of the food that can be perceived by the human senses, namely, sight, touch, smell, hearing and taste, through which color, odor, taste, texture and sound of the product are detected (Teixeira, 2009).

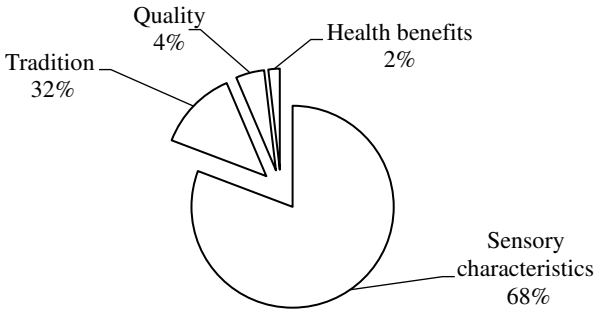

Fig. 1: Motivation to consume Terrincho PDO cheese (n = 57)

Among the 57 respondents who consumed the product, a frequency of consumption of 33% was presented for those who consumed the product once a month and 26% for those who consumed it 2 to 4 times a month. Those who consumed the product daily represented the smallest part of the interviewees, being only 11% (Figure 2).

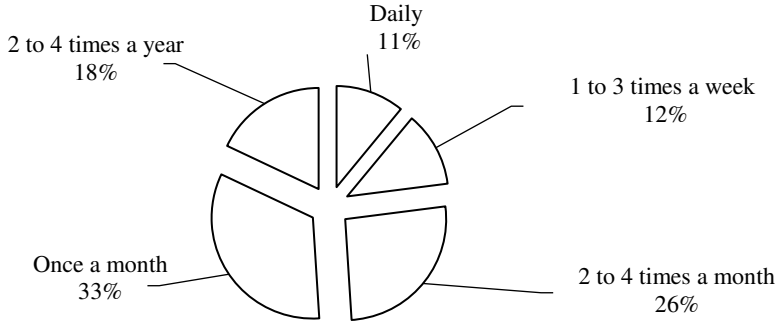

Fig. 2: Frequency of consumption of Terrincho PDO cheese (n = 57)

Still regarding consumption, it was found that, for most consumers, the product was eaten as an afternoon snack (75%) and as accompaniment (63%). Those who consumed it in main meals, represented 40% for dinner and 35% for lunch. About 21% consumed the product at breakfast and the smallest part of the interviewees consumed it at supper (16%). Among the ways of serving, in addition to the accompaniment, the consumers of Terrincho PDO cheese also indicated to serve the product as a dessert (35%), as a main dish (12%) or as an appetizer (5%), as can be seen in Figure 3.

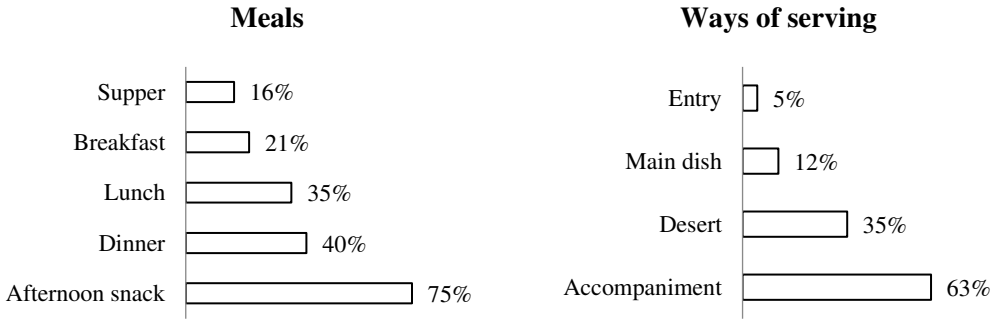

Fig. 3: Meals and ways of serving of the Terrincho PDO cheese (n = 57)

Regarding the forms of consumption, the interviewees preferred to consume Terrincho PDO cheese with bread (77%) and with marmalade or jam (53%). The smallest portion of the interviewed consumers (2%) answered that they used the product incorporated in meals (Figure 4). According to the study carried out by Fernandes, Ribeiro, Cabo and Matos (2017b), regarding the consumption of PDO cheese in the Bragança region, there was a preference for the consumption of cheeses accompanied by marmalade, and this combination occurred mainly as an afternoon snack.

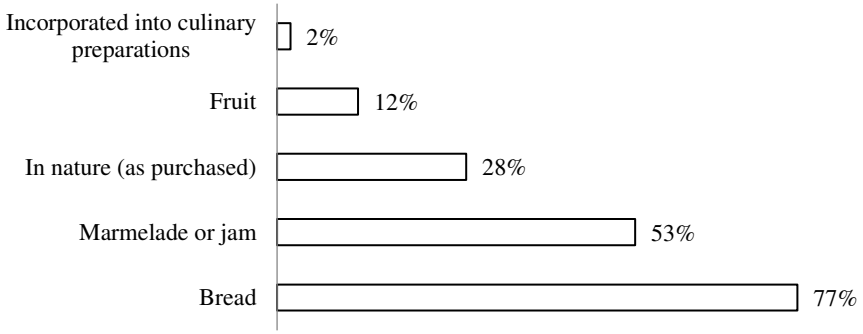

Fig. 4: Forms of consumption of the Terrincho PDO cheese (n = 57)

Terrincho PDO cheese is marketed in two forms, namely, the conventional Terrincho PDO cheese and Terrincho Velho PDO cheese. The Terrincho PDO cheese has a light straw yellow rind, with a slightly buttery texture and greasy aspect. The Terincho Velho PDO cheese presents reddish rind due to immersion in pepper paste mixed in olive oil, hard texture and less greasy aspect (QUEITEC, 2016). The two forms have different sensory, physical and chemical characteristics despite being produced from the same raw milk. As for the preference for Terrincho PDO cheese varieties (Figure 5), of the 57 consumers interviewed, 44% favor Terrincho PDO cheese in the conventional way, 31% give preference to Terrincho Velho PDO cheese with red and peppery rind and 25% consume both varieties.

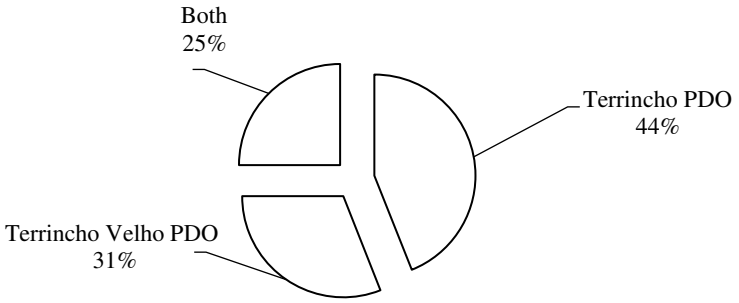

Fig. 5: Preferences for the varieties of Terrincho PDO cheese (n = 57)

Regarding the individual of the household responsible for the purchases (Figure 6), it was found that, of the 57 interviewed consumers of the product, 61% stated that women were responsible for supermarket purchases in their household, another 23% replied that the couple made the purchases and 16% stated that the man was responsible for purchases related to food in the household.

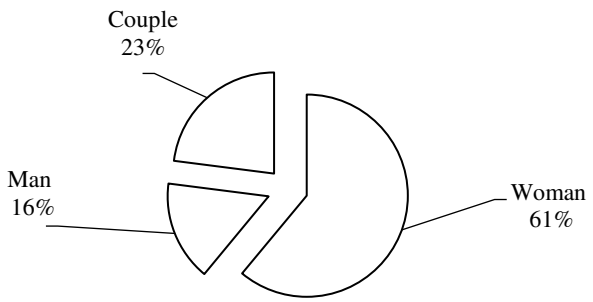

Fig. 6: Household member responsible for the purchase (n = 57)

As for the frequency of Terrincho PDO cheese purchase (Figure 7), 69% consumers bought it monthly, 19% responded to buy it annually and 12% bought it weekly.

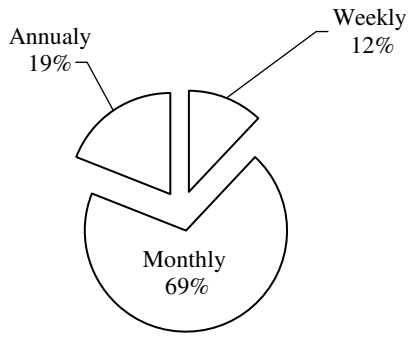

Fig. 7: Frequency of Terrincho PDO cheese purchase (n = 57)

Later, consumers of Terrincho PDO cheese were questioned about the seasonality of the consumption (Figure 8). Of the 57 respondents, 56% stated that they bought the product equally in every season. On the other hand, 44% (n = 25) stated there was a season of greater consumption.

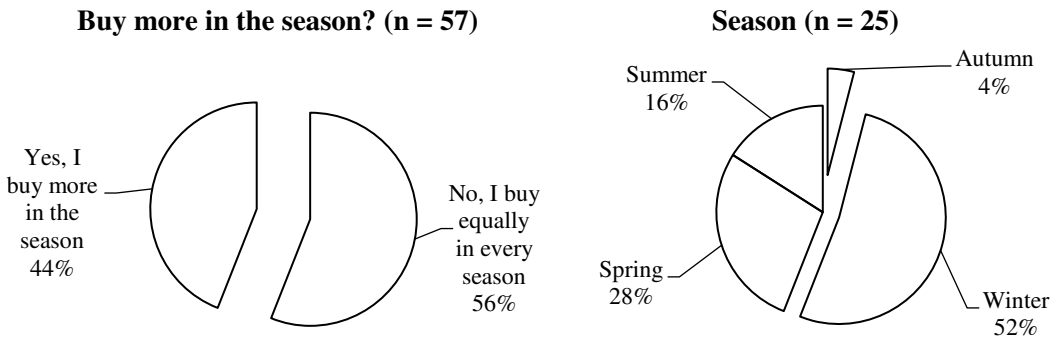

Fig. 8: Seasonal consumption of Terrincho PDO cheese

For 52% of the consumers who bought the product seasonally, the Winter was the season with highest consumption of the product followed by Spring (28%), as shown in Figure 8. In the traditional grazing of the Churra da Terra Quente sheep, that occurs according to the specifications of the Terrincho PDO cheese, in Spring there is a time of great food abundance, taking advantage of the rains of the cold season and, in Summer, the food shortage, with Autumn and Winter representing intermediate situations and variable production depending on the weather (QUEITEC, 2017). Therefore, there is a greater abundance of the product on the market at the end of Winter and in the Spring, due to the greater amount of food available to the Churra da Teera Quente sheep, with the availability of the product (8% of the 25 respondents) one of the motivations to the greater consumption of the product at a particular season.

Assessing the interviewees' motivations for consuming more Terrincho PDO cheese in specific seasons (Figure 9), it was found that, of the 25 respondents that respond to this question, 40% consumed the product more in a specific season due to quality and 32% did it due to traditional parties. Winter starts on December 21st and runs until March 20th, within this period traditional festivities take place, namely Christmas and New Year's Eve. These events may represent motivations for the consumption of traditional Portuguese products.

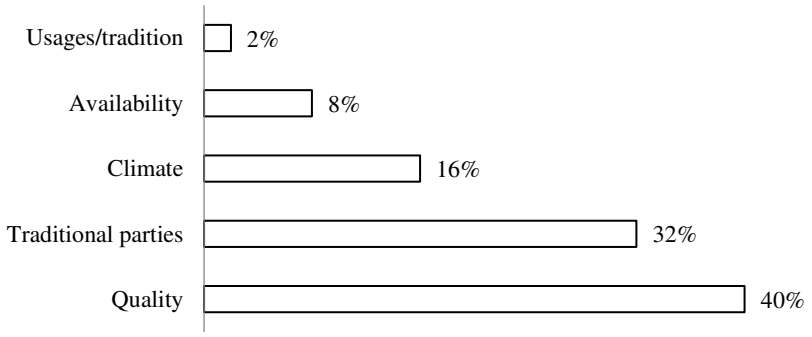

Fig. 9: Motivations for the seasonal consumption of Terrincho PDO cheese (n = 25)

Seeking to evaluate all the components of the marketing mix, the consumption habits were studied in relation to the product, the price, the distribution and the promotion of Terrincho PDO cheese. In fact, according to Barroso and Madureira (2005), it is always necessary to take into account all elements of the marketing mix, in order to develop marketing strategies that will subsequently support decisions about the elements that compose it.

In the section of buying habits, in relation to the product, consumers' preference was evaluated regarding products' physical characteristics, such as presentation, packaging and certification. As for the presentation preferences of Terrincho PDO cheese (Figure 10), of the 57 interviewed consumers, the majority assumed that they always chose to buy the whole unpackaged product (58%), secondly, they opted to buy it whole prepackaged (40%) and in third place in prepackaged portions (2%). There were no respondents who bought it emerged in olive oil. Still in Figure 10, it can be seen that most consumers interviewed had a preference for buying the product without packaging (56%). As for the types of packaging, consumers prefer the vacuum plastic packaging (28%), paper (14%), with a minority of consumers opting for decorative packaging (2%).

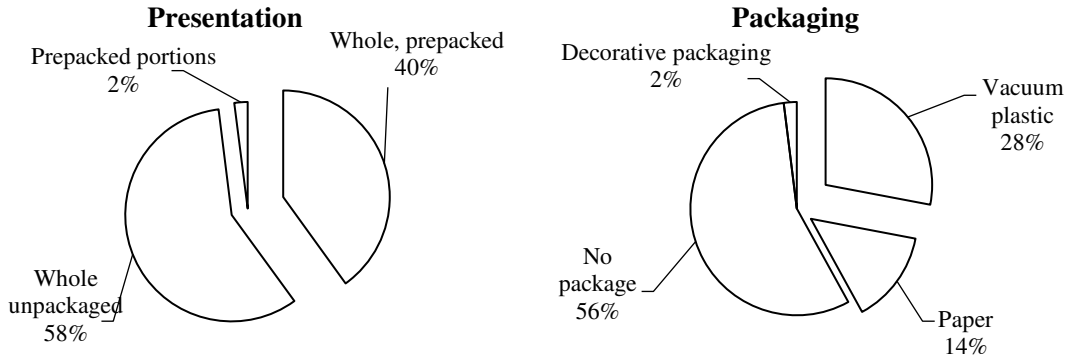

Fig. 10: Presentation and packaging of the Terrincho PDO cheese (n = 57)

As for certification (Figure 11), of the 57 respondents who consumed the product, 67% said they always buy the certified product. On the other hand, 30% indicated that they opted for the non-certified product and 3% were indifferent, indicating that they opted for the product that was available at the time of the purchase. Among the 67% who purchased only the certified product (n = 38), the reasons for this preference, were safety (79%) and quality (53%).

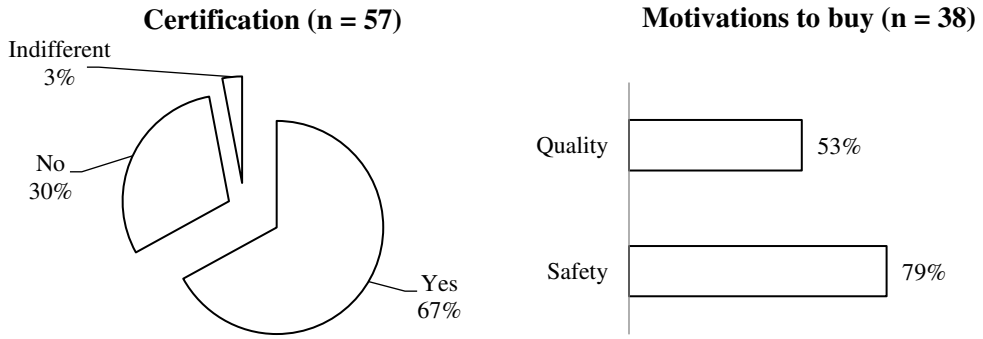

Fig. 11: Preference for product certification

The price represents a value that will allow to buy a finite amount, weight or other measure, of a good or service. The price depends on the average cost of the company and the value that the customer knows in relation to competing products (Wongleedee, 2015). Terrincho PDO cheese, as a traditional product, both certified and non-certified, has a high added value. Among traditional cheeses, at the national level, Terrincho PDO cheese had a commercial value only lower than Azeitão PDO cheese in 2016. The Terribcho PDO cheese costs 14.50 €/Kg for the certified product and 13.75 €/Kg for the non-certified product, and the Azeitão PDO cheese costs 20.00 €/Kg for the certified product and 12.00 €/Kg for non-certified product (DGADR, 2017). The significant differences in the income of consumers and non-consumers of the product are explained by the high added value that a traditional product, such as Terrincho PDO cheese, has become a food most consumed by the upper classes of the population.

For the interviewees who assumed to opt for the non-certified product (30%) or to be indifferent as to the type of product (certified/non-certified) they purchased (3%), they were asked if they would be willing to overpay for a certified product. Of the 19 respondents who answered this question, 74% said they would not overpay for a certified product and only 26% said they would be willing to overpay (Figure 12). To the 26% who stated that they would be willing to overpay to obtain a certified product (n = 5), they were asked how much they would be willing to overpay. Figure 12 shows that 40% of the respondents that answered to this question would pay more than 0.5 to 1 euros, another 40% would be willing to pay more than 2 euros for the certified product, and 20% would pay less than 0.5 euros.

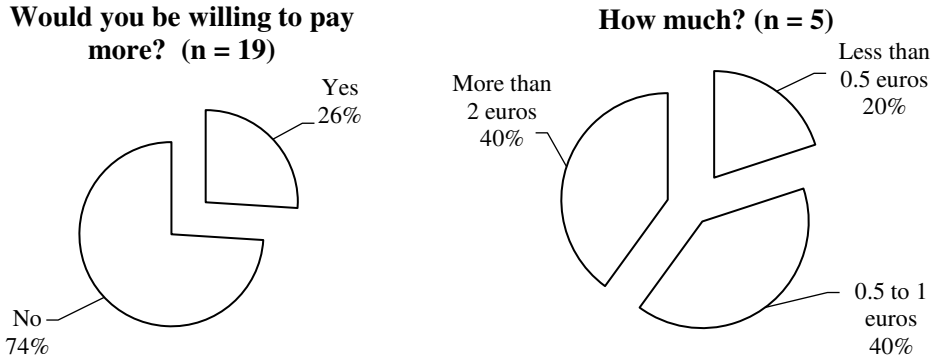

Fig. 12: Price of the Terrincho PDO cheese

Regarding distribution, that is, the means that the company has at its disposal to take the product from its origin to the final consumer (Barroso & Madureira, 2005), it can be seen in Figure 13 that 81% of the 57 interviewees, consumers of the product, prefer to buy Terrincho PDO cheese in supermarkets.

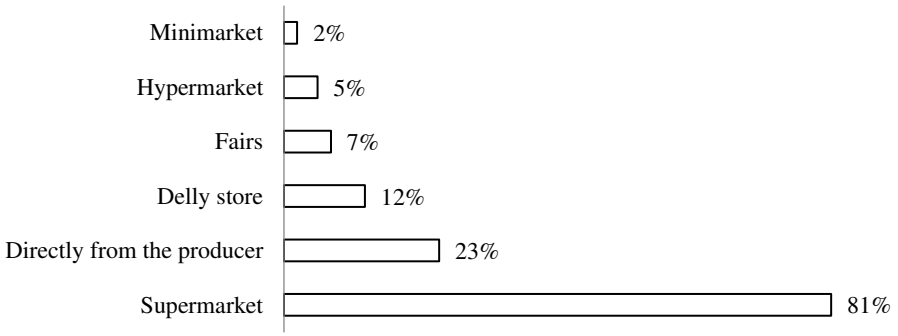

Fig. 13: Place of the purchase (n = 57)

There are still 23% of interviewed consumers who make the purchase directly from the producer. Considering that the 23% of the respondents, who prefer to purchase the product directly from the producer, prefer to obtain a certified producer, they will have to travel outside the municipality of Bragança to do so. It is known that the municipality of Bragança is not part of the region of production of Terrincho DOP cheese (QUEITEQ, 2017). The municipality of Macedo de Cavaleiros is the closest region to the municipality of Bragança where the product could be purchased directly to the producer.

Still in relation to product distribution, researching the motivation to select the place of purchase Terrincho PDO cheese, it can be observed in Figure 14, that the majority of respondents (68%) chose the place based on the proximity of the establishment to their residence. Other criteria pointed out were the quality they relate to the place and the trust in the establishment, with 11% of respondents each. The price and variety were not mentioned as very important criteria to select the place of purchase. In fact, only 5% of the interviewees considered these criteria.

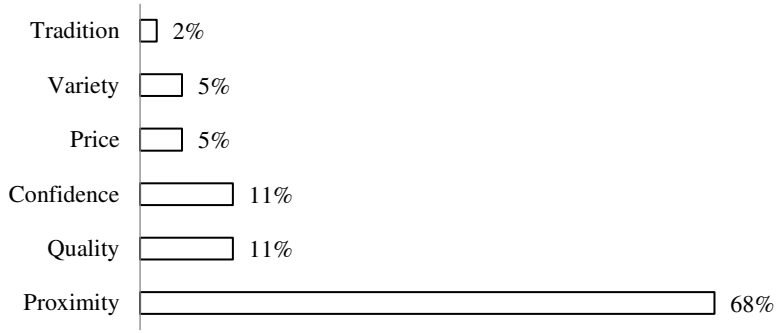

Fig. 14: Criteria to select the place of purchase (n = 57)

Promotion is the element of the marketing mix that establishes the bridge between the company and the outside (Barroso & Madureira, 2005). In this research, the promotion was evaluated through the channels of communication (media) to which the interviewees had access in their daily lives and the types of promotion that they thought were more appropriate to Terrincho PDO cheese. These questions were asked both consumers and non-consumers of the product allowing to identify the channels of communication and the types of promotion to which both groups of respondents have more access and value the most.

It can be seen that the media most used by both groups of respondents (Table 3) is television, with 89% for Terrincho PDO cheese consumers and 81% for non-consumers. In sequence, the Internet is the second most used media by both groups, with 63% of consumers and 64% of non-consumers. Still with a relevant share, national newspapers came in third place among the media, with 56% of the interviewees consumers of Terrincho PDO cheese and 46% of non-consumers.

When assessing the possible differences between the two groups of respondents, namely, consumers of Terrincho PDO cheese and non-consumers, using Pearson's Chi-square test and Fisher's Exact test, Table 3 was obtained. It is observed that there were no significant differences (p-value > 0.05) in any of the media (television, local newspaper, national newspaper, local radio, national radio, local magazine, national magazine, flyers and internet) considering the two groups

of respondents. Then, it can be concluded that all respondents make use of the media in the same way. The most used are television, the internet and national newspapers.

In order to carry out marketing campaigns, the Terrincho PDO cheese management company, considering the results of this research, can make use of the same channels of communication in order to reach the two different groups with an advertising campaign. It can be said that, regardless the channels of communication the company uses to promote the product, it can reach both groups, that is, those who already consume the Terrincho PDO cheese and those who are not yet consumers. Also, considering that the media that reach a larger population are the television, the internet and the national newspapers, the Terrincho PDO cheese management company, can use the internet as the main channel to communicate with potential clients since this is an affordable and accessible media capable to shorten the distribution chain since the company can sell directly to the final consumer. Internet can, also, be used to increase the visibility of the product through the use of social media. Television, despite being the most used media by both groups, has very high costs for the dissemination of products information, in general.

Table 3: channels of communication preferred by consumers and non-consumers of Terrincho PDO cheese

Variable	Group	Consumer		p-value
		Yes (n = 57)	No (n = 323)	
Television	Yes No	51 (89%) 6 (11%)	261 (81%) 62 (19%)	0,115 [a]
Local newspaper	Yes No	6 (11%) 51 (89%)	24 (7%) 299 (93%)	0,425 [b]
National newspaper	Yes No	32 (56%) 25 (44%)	148 (46%) 175 (54%)	0,150 [a]
Local radio	Yes No	5 (9%) 52 (91%)	40 (12%) 283 (88%)	0,436 [a]
National radio	Yes No	25 (44%) 32 (56%)	136 (42%) 187 (58%)	0,805 [a]
Local magazine	Yes No	1 (2%) 56 (98%)	12 (4%) 311 (96%)	0,701 [b]
National magazine	Yes No	7 (12%) 50 (88%)	25 (8%) 298 (92%)	0,297 [b]
Flyers	Yes No	1 (2%) 56 (98%)	18 (6%) 305 (94%)	0,330 [b]
Internet	Yes No	36 (63%) 21 (37%)	206 (64%) 117 (36%)	0,929 [a]

[a] *Obtained with Pearson's Chi-square test.*
[b] *Obtained with Fisher's exact test.*

According to Barroso and Madureira (2005), promotion is a very relevant variable in the agro-food sector, since it encompasses techniques for stimulating demand based on product experimentation or increasing its visibility. Also, experimentation is a powerful incentive when making a purchase decision. Promotions are characterized by being short-term activities with the objective to reach specific audiences. The types of promotion can be varied, and can involve tastings, free sample offers, free gifts, discount coupons, discounts to distributors and contests (Table 4).

Table 4: types of promotion preferred by consumers and non-consumers of Terrincho PDO cheese

Variable	Group	Consumer		p-value
		Yes (n = 57)	No (n = 323)	
Tastings	Yes No	28 (49%) 29 (51%)	160 (50%) 163 (50%)	0,954 [a]
Free sample offers	Yes No	15 (26%) 42 (74%)	84 (26%) 239 (74%)	0,961 [a]
Discount coupons	Yes No	10 (18%) 47 (82%)	36 (11%) 287 (88%)	0,172 [a]

Discounts to distributors	Yes No	3 (5%) 54 (95%)	25 (8%) 298 (92%)	0,783 [b]
Contests	Yes No	3 (5%) 54 (95%)	26 (8%) 297 (92%)	0,596 [b]
Free gifts	Yes No	1 (2%) 56 (98%)	14 (4%) 309 (96%)	0,709 [b]
Fairs	Yes No	35 (63%) 22 (37%)	165 (64%) 158 (36%)	0,150 [a]

[a] *Obtained with Pearson's Chi-square test.*
[b] *Obtained with Fisher's exact test.*

Among the ways to promote the Terrincho PDO cheese (Table 4), fairs were identified as the main type of promotion in the opinion of the interviewees, with 63% of the consumers and 64% of non-consumers. Tastings were the second most chosen type of promotion by respondents in both groups, with 49% of consumers and 50% of non-consumers.

Again, the comparison of the types of promotion considering the two groups of respondents, consumers and non-consumers of Terrincho PDO cheese revealed no differences at a 95% confidence level (p-value > 0.05) in the types of promotion (tastings, free sample offers, discount coupons, discounts to distributors, contests, free gifts, fairs). Again, indicating that the company can operate with the same types of promotions to reach its customers or to reach an audience that is not yet a customer of the product. So, in promotion campaigns, the Terrincho PDO cheese producer association could bet on marketing at fairs and tastings of the product at points of sale, which were the types of promotion most valued by both groups of respondents.

Conclusion

Most Terrincho PDO cheese consumers in the municipality of Bragança was female, with an average age of 58.3 years (± 16,190), who was employed or retired, lived with 2 or 3 people of their household, earn a monthly income above 1200 euros, had a higher education degree, was married and lived in the municipality of Bragança.

The main motivation for the consumption of Terrincho PDO cheese was linked to the sensory characteristics of the cheese. The consumption of the product occurs once a month, mainly as an afternoon snack and, generally, as an accompaniment to bread. It was also noticed that the consumers who preferred to consume the product in the main meals, namely, lunch or dinner, did it as a dessert, usually accompanied by jam, marmalade or bread. In addition to these consumption preferences, it was found that the consumers gave preference to Terrincho PDO cheese over Terrincho Velho PDO cheese.

In relation to purchasing habits, it was found that, in most cases, women are responsible for the purchases in the household, with the frequency of consumption and purchasing of Terrincho PDO cheese occurring monthly, in all seasons. However, those who chose to buy the product more seasonally, did it more in the Winter, motivated by the believe in a higher quality of the product. The preferred place to do the purchase was the supermarket, motivated by the proximity to the respondents' residence. At the time of the purchase, respondents prefer to purchase the whole product and without packaging. They, also, prefer to buy a certified product, mainly for the security it presents. Among those who opted for the non-certified product or were indifferent as to the type of product they purchased, it was realized that they would not be willing to overpay for a certified product.

With regard to promotion, it was found that the most used channels of communication, in the daily routine of the consumers, were the television and the internet. As for the types of promotion, the interviewees pointed out that they consider fairs and tastings as the best ways to promote the product. As there are no significant differences in the channels of communication and the types of promotion between groups of consumers and non-consumers of the product, there are indications that, regardless of the type of promotion that the company uses, it will reach both audiences.

The cross-sectional character of the research constitutes one of the limitations of this study. In fact. This type of study portrays the profile of the consumer in just one moment, being a static study. The non-probabilistic sample also ends up representing a limitation because the interviewees were chosen at random. For this reason, the results cannot be extrapolated to the general population. These limitations can be circumvented with future researches, which should be

longitudinal and based on probabilistic samples, ensuring that the sample of respondents is representative of the population of Bragança municipality and allowing to characterize the profile of Terrincho PDO cheese consumer over time.

Acknowledgments

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Influence of Building Information Modelling (BIM) on a Projects' Success

Sanda Mărioara NAȘ
TUCN, Romania, sanda.nas@mtc.utcluj.ro

Corina RĂDULESCU
TUCN, Romania, corinam.radulescu@gmail.com

Virgil Mihai Gh.M. RĂDULESCU
TUCN, Romania, mihai.radulescu@mtc.utcluj.ro

Gheorghe M.T. RĂDULESCU
TUCN, Romania, gheorghe.radulescu@@mtc.utcluj.ro

Mircea BONDREA
TUCN, Romania, mircea.bondrea@mtc.utcluj.ro

Adrian T.Gh.M
RĂDULESCU, TUCN, Romania, adrian.radulescu@@mtc.utcluj.ro

Abstract

The construction project, due to its complexity, often faces difficulties in the timely implementation of all activities, without interventions or modifications on them. Also, the realization of a construction involves the work of a large team of specialists and the collaboration of large categories of stakeholders. These are subject to new requirements and regulations, which have appeared periodically, related to safety conditions, quality, maintenance, etc. BIM is a concept that proactively responds to these challenges by improving the way buildings are designed, built and monitored. This paper suggests that BIM is a viable alternative to successfully implementing a complex project, due to the advantages created by the high-performance information system on which it is based. The research aimed to analyse the correlation between BIM performance factors and ensuring the success of construction projects. The analyse was performed by a survey applied on the managers in the construction sector from North-western Romania, who intend to implement, or have implemented BIM based construction projects. The study shows a positive correlation only with some of the BIM performance variables with the success of the project, suggesting the idea of a poor perception of managers in the studied area on the benefits of using BIM technology in construction projects.

Keywords: Building Information Modelling, Construction Projects, success factors

Introduction

The European construction sector is facing tough but promising economic, environmental and social challenges. This sector leads to economic growth and SMEs development. (https://ec.europa.eu/growth/sectors/construction_en). An innovative, competitive and growing construction sector is a key component of the response to the challenges of our century. Like other sectors, construction is currently going through its own "digital revolution", having previously received only modest improvements in productivity. Construction projects have a complex character which needs some additional elements from other projects to ensure their success. Companies must improve to stay ahead of their competition, but should cooperate with them. A construction project, due to its complexity, often faces difficulties in the timely implementation of all activities, without interventions or modifications. Also, a construction involves the work of a large team of specialists and the collaboration of large categories of stakeholders. (http://www3.weforum.org/). The new regulations and additional requirements make the design and the implementation of these projects more difficult. The solution is the use of BIM (Building Information Modeling); it provides an efficient flow of information throughout the design, construction and operation pahses of the construction, which in the end translates directly into a significant increase in performance.

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Building Information Modeling or BIM represents a new approach in designing buildings, unlike traditional technology CADD (Computer-Aided Design and Drafting) in addition to graphical objects, allows the manipulation of extensive and diversified data or information . They allow automatic generation of drawings, reports, order forms, collaboration with structural analysis applications, detailing, management and performance simulation, building monitoring during operation and more (Eastman et al., 2011; Kensek & Noble, 2014).

The success of BIM resides in the possibility that all specialties involved (architecture, structure, and installations) can use a single 3D model which will extract all the images and representations required: plans, sections, and elevations, details of execution, quantity and price estimates including as-built documentation. Any changes to the unique model are automatically reflected in all drawings and documents extracted from it, which allows effective management of changes in the project. This is extremely important because customers are usually willing to pay only the final draft, not the changes which occur during its development.

Several authors (Kensek & Noble,2014; Jalaei & Jrade, 2015; Wong & Zhou, 2015) argue the role of the Building information modeling. BIM, in the authors' opinion, represents a strategic tool to achieve cost savings, to increase operations' efficiency, to improve the quality of infrastructure and enhance the performances concerning environmental issues (Cerovsek, 2011; Miettinen & Paavola, 2014). The main problems that this concept solves refer to: reducing design time, eliminating the need to redesign, improving coordination between disciplines, the opportunity to explore and creating a simulation in the model to detect design problems with lower cost, higher quality and level of trusted deliverables (two-way connection with the 3D model, while the risk of inconsistencies is practically zero).The main advantage of BIM is increasing the level of coordination and collaboration between all team members involved in the project (architects, specialized engineers, manufacturers, executors, beneficiaries) from concept, technical project, execution details, to manufacturing, construction and maintenance. These new communication possibilities give designers the opportunity to improve their products. They allow, in theory, communication analysis and simulation software that provides real-time information throughout the design process.

Contribution of BIM to the success of Projects

BIM's performance factors

As a general principle, BIM uses full integration (Rahman et al., 2013; Irizarry et al.2013; Succar, 2009). Involves the correlation of all activities that execute drawings belonging to a project, in a single electronic format model. This prevents duplication of possible corrections to the drawings and their modification in real time, allowing all teams to have instant access to design changes made and to see the effects. Adoption of this model leads to the following performance factors:

1. Reducing time:

   A. Shortening redesign - By instantly modifying the project drawings and the possibility of their immediate visualization by the project team, the number of man-hours worked in the design activity is considerably reduced.
   B. Reducing changes in construction and resumption of work - identifying design problems and substantially reducing the implementation period of new design solutions. Execution of construction is carried out without changes and without restoration work, the so the cost associated with these changes is removed.
2. Estimating costs - The inclusion of design elements as attributes of BIM data processing, such as materials used, unit costs, pre-measurements, etc. will instantly generate the price for the whole assembly or other necessary calculations (quantities of works, carpentry centralizers, finishes, structural elements, lists of materials, etc.) obtained directly from the BIM model and the actual quantity and cost control.
3. Information flow rate - The BIM model allows the use of such information in several documents and places, storing all relevant information on the design of the building, and providing complete information about the project; in addition, BIM also stores all other information related to the project, including planning and costs. The effects of increasing the flow of information are reduced errors, which helps to minimize the costs of necessary changes.
4. Enhancing productivity - the full integration of BIM has the effect of increasing productivity within the construction project team. Work is streamlined by standardizing operations, similar to CAD technology (Computer Aid Design). However, besides having a complete resource database to work with, the BIM system allows designers to instantly see the effect of their design changes (Liu et al., 2017).

5. Increasing communication - As all design specialists work on the same model, make sure everyone knows what the other is doing.
6. Satisfaction and customer retention - capturing customer requirements and needs and establishing a common understanding with them on designing and developing a partnership approach is essential and their involvement throughout the process of informing and receiving feedback from them can be achieved by adopting BIM to meet and retain the customer.

Azhar et al.(2008), refers to a report by Stanford University's Center for Integrated Facilities Engineering, which highlights the benefits of BIM based on 32 projects:

- Savings for unplanned changes (up to 40%)
- Expected expenditure estimate (deviation of only 3%)
- Faster determination of expenditures (save up to 80% time)
- Cost savings (up to 10% of contract value)
- Time savings (up to 7%).

Success factors in Project Management

The success of a project depends on many factors.

Starting from the definition of project management, we can identify three constraints that influence the success of a project: purpose, cost and time (Müller & Jugdev, 2012). The time constraint refers to the time available for the project. Cost refers to the budget available. The purpose of the project represents the solving of the problem and achieving the objectives (goals).

These three constraints are interdependent. For example, if the scope of the project is expanded (new objectives are defined), this will involve higher costs and a longer execution time. If you want to reduce the time for a project then either costs need to be increased or goals need to be reduced. Achieving a balance between these three factors is the key to achieving a successful project.

According to Turner (2016), the criteria for the success of a project are:

- The product delivered by the project achieves its declared economic and social purpose; The project fulfills the predefined objectives: these are met under the conditions of functionality and quality required and under appropriate time and cost conditions;
- Satisfies the needs of different types of stakeholders and of the beneficiary;
- Makes a profit for the owner, financier or promoter;

In large part, there is a close link between these criteria and the benefits of implementing the BIM concept.
A positive correlation between BIM's performance factors can lead to increased success of BIM based projects.

Research Methodology

The research aimed to analyze the correlation between BIM performance factors and ensuring the success of a construction project.

The study is an exploratory one that describes and analyzes human behavior in the subject matter and is based on a questionnaire applied to managers in the construction industry. In this respect, 17 companies have been selected from the construction field in the NW of Romania. Criteria for the selection of these companies was related to the fact that these companies use the BIM tools, have complex projects in their portfolio and have carried out comparative analyzes related to the traditional design vs. BIM (http://allbim.net/home/ro/Utilizatori-BIM/Infrastructura-BIM.html)

Data and Methods

Business executives were asked to check information on time and money savings after implementing BIM. The managers of the 17 companies answered the questions. They were invited to appreciate the importance of the factors on a scale from 1 to 5, respectively 5 Very important, 1 Not at all important.

The companies to which the questionnaire was applied execute design, architecture, construction, structures, installations, automation and infrastructure. These companies have implemented a number of projects assisted by BIM technology, so they can answer the questionnaire.

Depending on their size, the companies are distributed according to Table 1.

Table 1: Distribution of companies on Firm's size and field(Source: The authors)

Company size	Micro	Small	Medium	Large	Total
Architecture	1	6	0	0	7
Structural engineering	0	3	2	2	7
Installations	1	0	0	0	1
Infractructure	0	0	1	1	2
TOTAL	2	9	3	3	17

Questions in the second part of the questionnaire refer to managers' perception of the qualitative features (performance factors) of the BIM on the success of the construction project regarding the correlation of these features.

Testing the research hypothesis

Hypothesis H 1: Managers' perception of BIM performance factors is correlated to the success of the construction project.

To check this research hypothesis we will use the following questions in the questionnaire: How do you assess the relevance and performance of BIM related to project success?

Hypothesis H 2: Correlation between project success and BIM performance factors is positive and significant.

Part II of the investigation served as the basis for data collection. In this part, the questions addressed the factors contributing to BIM performance, with varying scales of favorable or unfavorable perceptions of the BIM impact on the success of the project implementation. In this way, the possibility of erroneous answers from those who only put the maximum answer for each question was avoided. Respondents' choice varied on a scale from 1 to 5 (Likert scale), from the least important to the most important, with the following options:

How do you assess the importance of BIM performance factors on a scale from 1 to 5?

not at all important	small importance	medium importance	important	very important
1	2	3	4	5

The variables introduced in the research are:
V1 Increased success of the project
V2-V7 BIM performance factors:

- V2 - Time reduction
- V3 - Estimated costs
- V4 - Speed of information
- V5 - Productivity
- V6 - Communication
- V7 - Consumer satisfaction

Results

Responses received from managers were ranked in descending order, obtaining:

Time reduction (94 Estimate costs (88%), Speed of information (86%), Productivity (80%), Comnunication (70%) and – Consumers' satisfaction (54%).

Respondents were then asked to classify BIM performance factors according to their perception, respectively the degree of improvement of BIM on a scale from 1 to 5; 5 showing the most improvements and 1 indicating that BIM does not contribute at all to improving performance factors. In order to use this information to validate the research hypothesis, scores of importance were assigned to each individual response. Then, average scores were determined for each manager and these scores were assigned according to the importance of BIM factors, resulting in the correlation with Table 2.

Table 2: Distribution of average scores for the variables used to validate hypothesis H1(Source: The authors.)

Managers` perception on the importance of a project's success factors	Managers perception on the importance of BIM performance factors				Total
	Small importance	Medium importance	Important	Very important	
(2 - 2,5)	1	0	0	0	1
(2,5 – 3)	0	1	2	0	3
(3 - 3,5)	0	0	1	1	2
(3,5 – 4)	0	0	1	4	5
(4 - 4,5)	0	0	1	3	4
(4,5 – 5)	0	0	0	2	2
Total	**1**	**2**	**3**	**11**	**17**

To verify the assumptions in the study we used the $\chi 2$ test method (Opariuc, 2009).

$\chi 2$ is a coefficient of association between two nominal variables. It is rather a statistical test than an indicator of degree of association.

The null hypothesis of $\chi 2$is is that there is no association between two variables.

The contingency coefficient $\chi 2$ only allows for the identification of a contingency between the variables. We cannot be sure, however, about its intensity. The data processing and analysis was done using the IBM-SPSS 21 program. The test results are presented in Table 3 and the values for which the zero hypothesis is rejected are shown in Table 4.

For V1,V2,V3 V4, V5,V6,V7 the hypothesis is rejected, so there is a correlation between the variables.

Further, in order to verify the H2 hypothesis, we used Spearman correlation coefficient p (rho). It is a rank-based coefficient, it is not influenced by media representativeness and is generally used when the research group has small dimensions (under 30 cases), or when at least one of the variables does not meet the administration conditions of the parametric tests. The coefficient merely transforms the original scores into ranks and analyzes the relationship between them.

Table 3: Association test(Source: The authors. Computation with IBM-SPSS21)

Hypothesis Test Summary				
	Null Hypothesis	**Test**	**Sig.**	**Decision**
1	The categories of V1 occur with equal probabilities.	One-Sample Chi-Square Test	,009	Reject the null hypothesis.
2	The categories of V2 occur with equal probabilities.	One-Sample Chi-Square Test	,023	Reject the null hypothesis.
3	The categories of V3	One-Sample Chi-Square Test	,056	Reject the null hypothesis

	occur with equal probabilities.			
4	The categories of V4 occur with equal probabilities.	One-Sample Chi-Square Test	,047	Reject the null hypothesis.
5	The categories of V5 occur with equal probabilities.	One-Sample Chi-Square Test	,023	Reject the null hypothesis.
6	The categories of V6 occur with equal probabilities.	One-Sample Chi-Square Test	,056	Reject the null hypothesis.
7	The categories of V7 occur with equal probabilities.	One-Sample Chi-Square Test	,051	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is ,05.				

Table 4: Values of the Chi Square Test by variables(Source: The authors. Computation with IBM-SPSS21)

V1	**Chi-SquareTest=11,471**	**The min expected value=4,25**
V2	Chi-Square Test=7,529	The min expected value=5,667
V4	Chi-Square Test=6,118	The min expected value=5,667
V5	Chi-Square Test=7,529	The min expected value=5,667

The calculation formula (Opariuc, 2009) is not compressed and can be summarized as:

$$\rho = \frac{n(\sum r_x r_y) - \sum r_x \times \sum r_y}{\sqrt{n\sum r_x^2 - (\sum r_x)^2}\sqrt{n\sum r_y^2 - (\sum r_y)^2}} \qquad (1)$$

The Spearman correlation coefficient ρ is a directional correlation coefficient and can be between -1 and +1. Values close to +1 indicate a direct (positive) association between the two variables, while values close to -1 indicate the existence of a negative association. The closer the values are to 1 (regardless of the sign), the stronger the association, the variables being more "linked" to each other (Opariuc, 2009).

Discussions

The strongest correlations are noted between V1 and V2 = 1, i.e. the success of the project and time reduction, which means that reducing the re-design time and reducing construction changes and resuming works due to the BIM implementation will have a direct impact on the timely implementation of the project. Also, V6 and V3 have a correlation coefficient of 0.462 at a significant level of 0.05 (Table 5). The correct cost calculation will determine the correct price.

Table 5: Spearman's correlation of variables

			V2	V3	V4	V5	V6	V7	V1
Spearman's rho	V2	Correlation Coefficient	1,000	,200	-,274	-,0160	,084	,169	1,000**
		Sig. (1-tailed)	.	,220	,144	.	,374	,259	,270
		N	17	17	17	17	17	17	17
	V3	Correlation Coefficient	,200	1,000	,416*	,200	-,043	,462*	-,305

		Sig. (1-tailed)	,220	.	,049	,220	,031	,434	,033
		N	17	17	17	17	17	17	17
	V4	Correlation Coefficient	-,274	,416*	1,000	-,274	,421*	-,294	,119
		Sig. (1-tailed)	,144	,049	.	,144	,046	,126	,325
		N	17	17	17	17	17	17	17
	V5	Correlation Coefficient	-,160	,200	-,274	1,000	,084	,169	-,455*
		Sig. (1-tailed)	.	,220	,144	.	,374	,259	,270
		N	17	17	17	17	17	17	17
	V6	Correlation Coefficient	,084	-,043	,421*	,084	1,000	-,390	-,226
		Sig. (1-tailed)	,374	,031	,046	,374	.	,061	,192
		N	17	17	17	17	17	17	17
	V7	Correlation Coefficient	,169	,462*	-,294	,169	-,390	1,000	-,160
		Sig. (1-tailed)	,259	,434	,126	,259	,061	.	,117
		N	17	17	17	17	17	17	17
	V1	Correlation Coefficient	1,000**	-,305	,119	-,455*	-,226	-,160	1,000
		Sig. (1-tailed)	,270	,033	,325	,270	,192	,117	.
		N	17	17	17	17	17	17	17

**. Correlation is significant at the 0.01 level (1-tailed).
*. Correlation is significant at the 0.05 level (1-tailed).
(Source: The authors. Computation with IBM-SPSS21)

Customers are very sensitive to the contract price, which is one of the most powerful factors that determine purchasing decisions and satisfaction.

As for the V4, it has significant links with V3-Estimated Costs (0.416 at a significant level of 0.05) and V6-Communication (0.421416 at a significant level of 0.05), which suggests the perceived role and importance of information as the key resource for increasing performance in accounting information, and effective communication through the qualitative and quantitative flow of project-related information.

The only negative correlation occurs between V1 and V7 (-0.455 at a significant level of 0.05). This means the success of the project is not perceived as related to the productivity of BIM processes. Although this is a BIM performance factor, it is an effect of proper organization of BIM processes rather than the quality of project implementation.

Conclusions

In the context of increased competitiveness within the construction sector, numerous innovative strategies are being implemented worldwide, which will lead to increased performance. To this end, BIM represents, through its many advantages, a way to ensure an efficient information system considering that its effect is the successful implementation of the project.

The research aims to analyze the correlation between BIM performance factors, ensuring the success of a construction project. Following the analysis, the two hypotheses of the study were confirmed.

We believe that the research undertaken by us brings novelties and originality to the local research in the field of project BIM-based management in the construction industry, although it also has limitations: selecting the sample was done only at the level of a few companies that apply the BIM concept in Romania. At this level, not all managers have understood the role and importance of BIM, even if they do not currently use this technology for all construction projects.

Project implementation will continue to keep up the pace, shortening the construction cycle, and this will be the main concern over the next decade. This leads to an increase in pressure to achieve a performance management at

the construction site level and increase productivity. The overwhelming amount of information needed to create a project and the need for them to be available at the right time, leads to the need for better communication tools. Organizations that can use such solutions will get an important competitive advantage. At the same time, they also increase the ability of organizations to respond to technical training requirements.

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The Contribution of Geomatics Technologies in The Preservation of Cultural Heritage

Sanda Mărioara NAȘ
TUCN, Romania, sanda.nas@mtc.utcluj.ro

Virgil Mihai Gh.M. RĂDULESCU
TUCN, Romania, mihai.radulescu@mtc.utcluj.ro

Gheorghe M.T. RĂDULESCU
TUCN, Romania, gheorghe.radulescu@@mtc.utcluj.ro

Mircea BONDREA
TUCN, Romania, mircea.bondrea@mtc.utcluj.ro

Adrian T.Gh.M. RĂDULESCU
TUCN, Romania, adrian.radulescu@@mtc.utcluj.ro

Corina RĂDULESCU
TUCN, Romania, corinam.radulescu@gmail.com

Abstract

The last ten years have brought spectacular changes in the structure, nature and cost of geomatics systems and technologies. The decrease of the specific costs due to the increase of the service offer, makes these technologies more and more accessible, including in the conservation and enhancement activities of the cultural heritage built. The fact that in Transylvania there are more than 600 castles and mansions in different stages of degradation, because they have not yet been major themes for promotion, can be a prime example, because sooner or later, they will have to be analyzed and highlighted. The confirmation comes from the priorities of the Europe 2020 program of the European Commission and the European Council, through which the role of castles in Transylvania can be established in the context of the role of culture in local and regional development. The objective of this work is on the one hand to provide companies active in the field with information on the up-to-date status of the new geomatics technologies, thus contributing to the increase of their offer of specialized services, and on the other hand to signal to the beneficiary specialists (architects, historians, restorers, builders) the opportunities created by these systems as final results (Façade and Detail Plans, Models 2 and 3D, Sections, Relays, etc.) extremely useful in establishing strategies to restore the value of the cultural heritage built. The case study was carried out on a Bánffy Castle, from the village of Urmeniș, Bistrița Năsăud County.

Keywords: UAV, TLS, Conservation, Cultural Heritage.

Introduction and motivation

Current Geomatics Technologies (GT) offers new possibilities for visualizing and analyzing the status, geometry and appearance of cultural sites, for the purpose of analyzing and designing conservation, restoration, and finally enhancement actions. In fact, each construction belonging to or that can be assimilated to the cultural heritage, has its own characteristics, but the fact that the new technologies can be applied to each case makes them more and more available. Establishing the current state of an objective is essential in the elaboration of a conservation strategy. And the fact that the new technologies bring the objective, with all its details, on the analyst's screen, is the most important

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aspect of the present analysis. There is a new form of presentation of information regarding the state of an object analyzed. We have passed in a relatively short timeframe from the traditional presentation, consisting of topographic plans, graphic sections, elevations and static elevations for 2 and 3D models to the possibility that starting from the digital background offered by geomatics means, virtually infinite information on the studied construction can be extracted. The highest expectations in this area stem from aerial photogrammetry performed with an Unmanned Aerial Vehicle (UAV) and by laser scanning performed with a Terrestrial Laser Scanner (TLS), but the information can be supplemented by data taken from the ground, through terrestrial photogrammetry, made with a digital camera or data taken from enclosed spaces with portable lasers. All this information can be subsequently integrated, depending on the purpose and scope of the restoration action, in Geographic Information System (GIS) and/or Building Information Modeling (BIM), powerful information and analysis tools. However, the biggest problems created by the newly created general context come from the lack of knowledge of the real potential of these new tools.

Literature Review

It can be said that the development of the field of Geomatics, produced in the last ten years, had several engines but surely two of them can be identified that have a direct connection with the activity of monitoring and preserving the built cultural heritage: the first is the use of sensory technologies in monitoring the evolution of the health status of the construction, in the broad process of Structural Health Monitoring, an aspect that will be analyzed in a later paper, and the second one refers to the explosion occurring in the production of increasingly efficient technologies, but at the same time increasingly more accessible in the geometric-topographic surveying of the objectives being studied. In this context, an impressive number of papers have been published that address this latter aspect, which is extremely current. In the following we present those materials that had the greatest impact, related to the number of citations or the high degree of evaluation of the magazines or the conferences in which they were published.

The use of UAV in Cultural Heritage

According to the dictionary, an UAV (unmanned aircraft (or aerial) vehicle) is "an aircraft that can navigate without a human pilot on board" [D "ICAO's circular 328 AN/190], commonly defined as Drone. With military origins, as well as many other achievements in the field of Geomatics, due to the immense knowledge potential it offers, which can exceed the tolerable one, for authorities, all states have adopted strict rules for use, registration and monitoring [Stöcker, C., Bennett, R., Nex, F., Gerke, M. and Zevenbergen, J., 2017]. Arnadi Murtiyoso and Pierre Grussenmeyer state in their work on UAV intervention in the preservation of cultural heritage [Murtiyoso, A. and Grussenmeyer. P., 2017]. The problem is also addressed in other works [Azzola, P., Cardaci, Roberti, G.M. and Nannei, V.M., 2019, Barrile, V., Gelsomino, V. and Bilotta, G., 2017], and the opportunities of the results are highlighted in the works dealing with the subject of 2 and 3D models that can be created following the interpretation of digital images taken from the air with UAV systems [Manajitprasert, S., Tripathi N.K., and Arunplod, S., 2019].

The use of the Laser Scanner in Cultural Heritage

a. Stationary laser scanners

The spectacular growth of the laser scanner market made by the American market analysis platform Marketsand Markets in 2019, is expected to occur in all areas of the world from USA, Europe to Southeast Asia. The importance of laser scans in the activities dedicated to the conservation of the built cultural heritage [Daneshmand, M., Helmi, A., Avots, E., Noroozi, F., Alisinanoglu, F., Arslan, H.S., Gorbova, J., Haamer, R.E., Ozcinar, C. and Anbarjafari, G., 2018] is just one of the arguments that explain the constant and generalized growth of this particular market. Even though the advantages offered by laser scans are significant, the difficulties concerning them come from two directions: cost, which remains very high compared to conventional technologies, terrestrial or aerial photogrammetry performed with UAV systems and the second is the difficulty of use, learning the system and processing the data taken in the field, which requires specific and long-term training. Regarding the first aspect, Caprioli, Minchilli, Scognamiglio [Caprioli, M., Minchilli, M. and Scognamiglio, A., 2011] state that "the cost of laser scanner tools and software packages is still high... in every possible survey in the cultural heritage field", and regarding the second aspect: "the great demand for laser acquisition of historical buildings, monuments and objects for documentary purposes is not followed by training the purchaser in the requirements and goals for a correct survey. Despite the great potential of these tools, they are often only used to produce plans, elevations and sections (plotted to scale!)".

b. Mobile laser scanners

The advantages of using mobile laser scanners are undeniable: they can provide the most interior details of buildings evaluated in order to establish strategies to be followed in their preservation. Choosing a route to be scanned is essential to cover all information gaps. A model is presented in the work of Andrea di Filippo (and co-authors) [Filippo, A., Jiménez, J.A.M., Aparicio, L.J.S., Barba, S., Mora R. and Aguilera, D.G., 2018] in which the authors worked with ZEB-REVO, commercialized by GeoSLAM, which consisted of a 2D time-of-flight laser scanner (Hokuyo UTM-30LX-F from Hokuyo Automatic Co., Osaka, Japan), rigidly coupled to an IMU mounted on a rotary engine. It is essential that the planning of the scanning route, doubled by the continuous geo-referencing of the device at the time of data retrieval, cover the entire building in order to provide comprehensive and complete information.

Combined use of UAV and Laser Scanner technologies in Cultural Heritage

On the market of geomatics services offered for the activities of evaluation, protection and conservation of the built cultural heritage, there is a unanimous opinion that the combination of the aerial photogrammetry realized with UAV systems with the laser scanning performed with stationary laser scanners for the exterior of buildings and with mobile scanners for interiors is the optimal solution [Hoon Jo, Y. and Hong, S., 2019, Pimentel, C.J. and Rodrigo. G., 2019]. At times, there may be situations where outdoor laser scanning (the most expensive activity of the combination mentioned) can be replaced with terrestrial photogrammetry, which is much cheaper but which produces results that do not always meet the requirements of the architect [Seker, D.Z.
and Duran, Z., 2010].

Geomatics and Geoinformatics Technologies applied in Cultural Heritage

Once the technology that will be used has been established, knowing for each of the technologies what field work is required and which office shall carry it out, we can proceed to the design of the entire integrated system, subordinate to the intended goal. In Figure 1 we presented the Workflow of the integration of Geomatics-Geoinformatics Technologies in the activities of protection and conservation of the built cultural heritage, according to the author's view. In principle, the stages of carrying out a project regarding the restoration of a national heritage objective involves the following stages:

1. Identifying the planimetric landmarks of known Stereo 70 coordinates in the area, or near it; if they do not exist, a support base can be built using GNSS technology;
2. Identification of the level markings of known RMN1975 elevations in the area, or near it;
3. Thickening the planimetric and level networks in the operating area by creating Groud Control Points (GCP) that will allow accurate mapping of the target and bring it into the system;
4. Designing the flight plan for aerial photography made with a drone, carrying out the flight and taking the images considered necessary for the proposed goal;
5. Design of fixed stations for taking images from the ground with the means of terrestrial photogrammetry, a much cheaper alternative to laser scanning, but one that implies a significantly lower quality of the data as a whole, an activity corroborated with activity 4, in order to create a complementarity of the data so as to obtain the complete image of the target;
6. Design of fixed stations for taking images from the ground by laser scanning, activity corroborated with activity 4 with the specification made in the previous point, performing scans;
7. Designing the circuit to be followed with the mobile laser scanner station in order to capture all the interesting interior details for the project, the route and carrying out the scans;
8. The combined processing of data and the formation of the products necessary for the following activities:
   a. Use of 3D photogrammetry software for drones.
   b. Using a laser scanner data processing software.

The result of the laser scan will be a very dense point cloud (called DDSM - Dense Digital Surface Model). For each point of the model the coordinates X, Y and Z and the value of the reflectivity are known. The processing of the data taken with the laser scanner consists of a set of actions necessary to obtain the correct digital model of the object,

starting from a set of point clouds. This set of actions can be divided into 2 different stages [Leandro B. and Fulvio, R., 2004]: • Preliminary data processing;

• Solid point cloud modeling.

c. Quick Terrain Modeler (Manufacturer Applied Imagery) is one of the most important 3D terrain visualization software packages for the cloud.
d. ArcGIS Pro 4. (Manufacturer Esri) is a component of the Esri Geospatial Cloud, being a GIS desktop application.
e. JRC 3D Reconstructor Software (Manufacturer Gexcel) is a processing software that can import, process and manage the data of terrestrial, portable, mobile, aerial laser scanners and integrate UAV and Laser 3D data into a single platform.

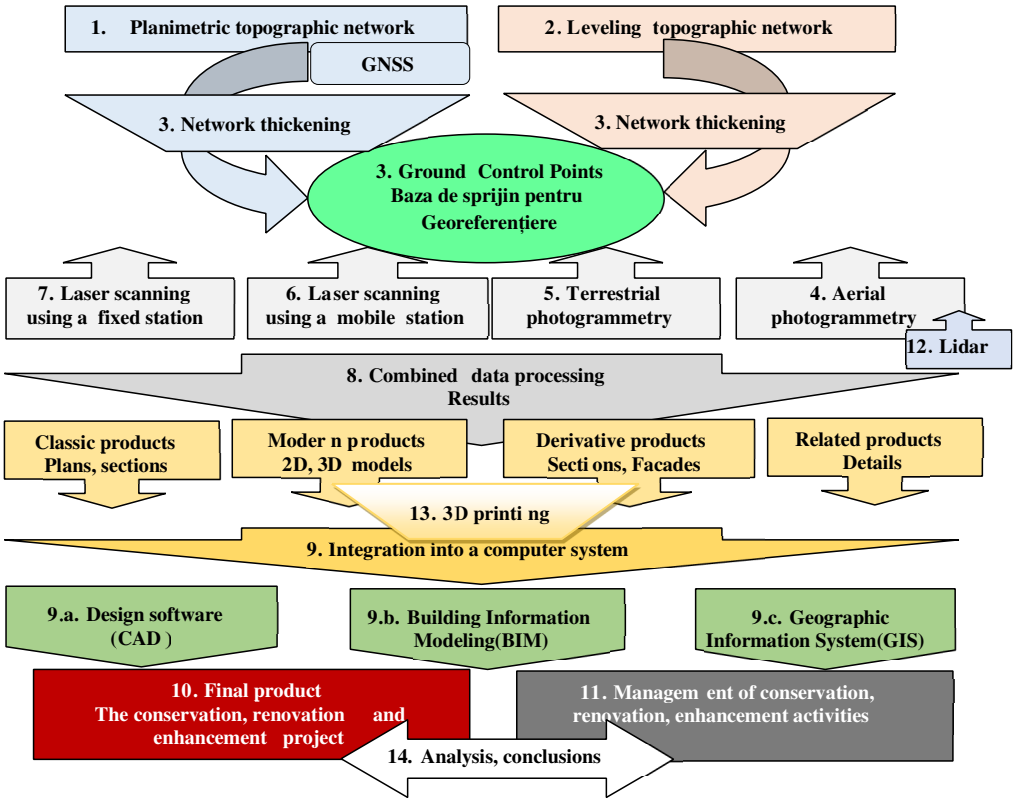

Fig. 1: The workflow of the integration of Geomatics-Geoinformatics Technologies in the activities of protection and conservation of the built cultural heritage (Source: Authors) The purpose of using laser scans in the activity of preserving the cultural heritage is generally to complete the graphic field documentation obtained through other Geospatial Technologies, to support the project with overall and detail plans, elevations and sections, as well as to study the geometrical characteristics of the vertical and horizontal structures.

9. Integration of the products obtained in the previous phase into a computer system:

a. The use of CAD design software is one of the solutions to continue the project, as these software serve as the data base for integrating different types of data obtained by a number of measurement techniques, including terrestrial, aerial, Lidar, or terrestrial photogrammetry, or aerial, fixed and mobile laser scanning. Thus, the registration and reconstruction process is replaced by a holistic approach to recording, processing and distributing information.

   b. Integration of the products obtained from UAV and Laser scanner data processing in Building Information Modeling (BIM) [Tkáč, M. and Mesároš, P., 2018].
   c. Integration of the products obtained from the processing of the UAV and Laser scanner data in the Geographic Information System (GIS). These will allow for an alternative, in the case of a project aimed at built cultural heritage, complementary to the other two mentioned in points a. and b. [Gustafsson, H. and Zuna, L., 2017].
10. The final product, the conservation, renovation, enhancement project was realized in step 9
   a. and implemented on a BIM and/or GIS platform, according to the requirements of the beneficiary of the whole process.
11. The management of the conservation, renovation and enhancement activities will be made available with the documentation and all the information provided and made available in the previous phase.
12. Alternatively, or complementary, Lidar technology can be used, either by using groundbased stations or by UAV technologies using Lidar cameras mounted on drones. The strength of this technology is that it is precise, fast and capable of obtaining a very intense cloud of points on the surface of the object in a short time, DEM (Digital Elevation Model) and DSM (Digital Surface Model) being generated automatically [Yoo, H-I., 2010].
13. 3D printing based on the three-dimensional model created following the previous steps becomes increasingly useful to make the connection between stages 9, 10 and 11[Marinos I. and Ewald, O., 2014].
14. The retrospective analysis of the entire process 1-13 will allow the issuing of extremely useful conclusions for similar future projects.

Case study

Bánffy Castle in the village of Urmeniș, overview

The paper [ONG Pont Group, Cluj Napoca, 2015] entitled The Castle Strategy in Transylvania 2016–2025, elaborated by the Pont NGO team from Cluj Napoca, makes an extremely detailed presentation of the situation and status of the castles in Transylvania. We chose as a Case Study the Bánffy Castle in the village of Urmeniș, which is in an advanced state of degradation (Figures 2, 3) but nevertheless recoverable.

The village of Urmeniş is located in Mureş County, town attested in documents from the XIV century entered in 1638 in the property of Prince György Rákóczi I, who, after having arranged here the center of the Urmeniş-Coroisânmartin domain, decided to build a new mansion. The new building was erected between 1639–1640, the architect of the building and the head of construction work being the master Mátyás Fundáló of Alba Iulia.

[https://www.castelintransilvania.ro/castelul-banffy-urmenis-.html, 2015]. During the reign of György Rákóczi II, the owner of the castle changed. It first came into the possession of the Barcsai family, and later, after a long process, it became the property of the Bánffy family, who in the years 1667–1668 modernized the castle.

Documentation works on the assessment of the state of the Bánffy Castle located in the village of Urmeniș, at the end of 2019

The works on data acquisition through UAV and Laser Scanner technologies took place in the first half of December 2019 and consisted of completing the most important stages mentioned in Figure 1. Thus, following the same phase of the documentation-acquisition stages of the field data, we performed the following operations:

1. Identifying the planimetric landmarks of known Stereo 70 coordinates in the area, or near it; if they do not exist, a support base can be built using GNSS technology; Given that the main purpose of the paper is to consider an objective, relativity being the main aspect and not accurately positioning it in the system, it was used the GNSS technology. Thus it was stationed in landmarks P1 and P2, with the antenna of the Leica GS08plus GNSS receiver, forming a support base P1P2, which was developed through the landmarks P3-P9, going through a planimetric circuit in the circuit using the total Leica TS02 7 station.

Fig. 2: Bánffy Castle in the village of Urmeniș, Mures County, exterior state in 2019

Fig. 3: Bánffy Castle, interior state in 2019

2. Identification of the level markings of known quotas RMN1975 located in the area, or near it; Starting from a known landmark in the RMN1975 system, the route P1-P9 was crossed, through a middle level geometric leveling with the Leica Sprinter 50 digital level, matching the quotas of the mentioned landmarks.
3. Thickening the planimetric and level networks in the operating area by creating Groud Control Points (GCP) that will allow accurate mapping of the target and bring it into the system. Thus, we created the support base for the georeferencing of the whole paper; for georeferencing we used 9 ground control points (GCPs) with coordinates determined by measurements taken with the total station, coordinates determined in the planimetric 1970 Stereo Projection System and the RMN 1975 Reference Plan, for elevations (Figure 4.); their coordinates are presented in Table 1.

Table 1: Ground Control point coordinates – GCP, Bánffy Castle, Urmeniș

Landmark	X(m)		Y(m)	Z(m)
		Stereo 70		RMN1975
P1	451543.288		585735.307	381.246
P2	451538.666		585753.723	382.025
P3	451539.308		585766.065	382.760
P4	451547.104		585782.078	383.937
P5	451571.142		585782.759	383.873
P6	451596.052		585773.126	382.365
P7	451595.125		585752.423	381.947
P8	451583.347		585738.462	381.865
P9	451565.593		585735.418	381.675

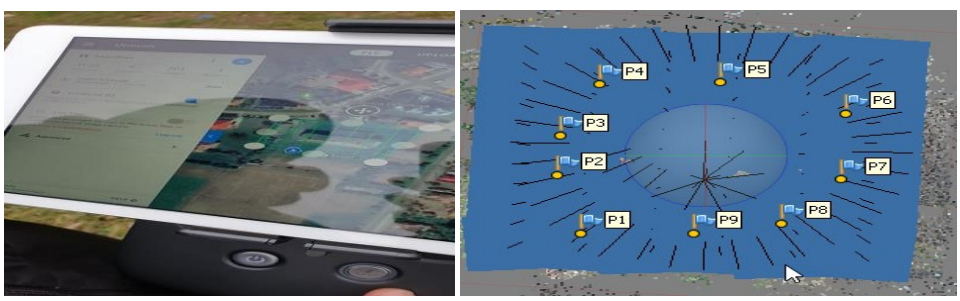

Fig. 4: Ground Control points –GCP, used for aerial photography of Bánffy Castle

Figure 5: The DJI Phantom 4 UAV drone used for aerial photography of Bánffy Castle, Urmeniș

4. Designing the flight plan for aerophotography performed with a drone, performing the flight and taking the images deemed necessary for the proposed goal. A DJI Phantom 4 UAV drone was used (Figure 5), with the

following features: Sensor Camera: 1" CMOS; Resolution: 20 Mpixels, Lens: FOV 84°; 8.8 mm/24 mm(35 mm equivalent format:24 mm);f/2.8 - f/11, auto focus at 1 m - ∞.

The drone was set to the automatic mode of taking pictures, on a route set by the device Drone Deploy software. (Figure 6). 120 photographs were taken during the first flight, some of them being shown in Figure 7.

Fig. 6: Airplane flight plan for Bánffy Castle, Urmeniș, on the instrument display

Fig. 7: Aerophotograms, Bánffy Castle, Urmeniș, 1st session

Following the analysis and processing of the photographs and the generation of the point cloud, unsatisfactory clarity and accuracy details were found, especially in the area below the eaves, which is due to the high altitude, thus chosen for the reasons mentioned.

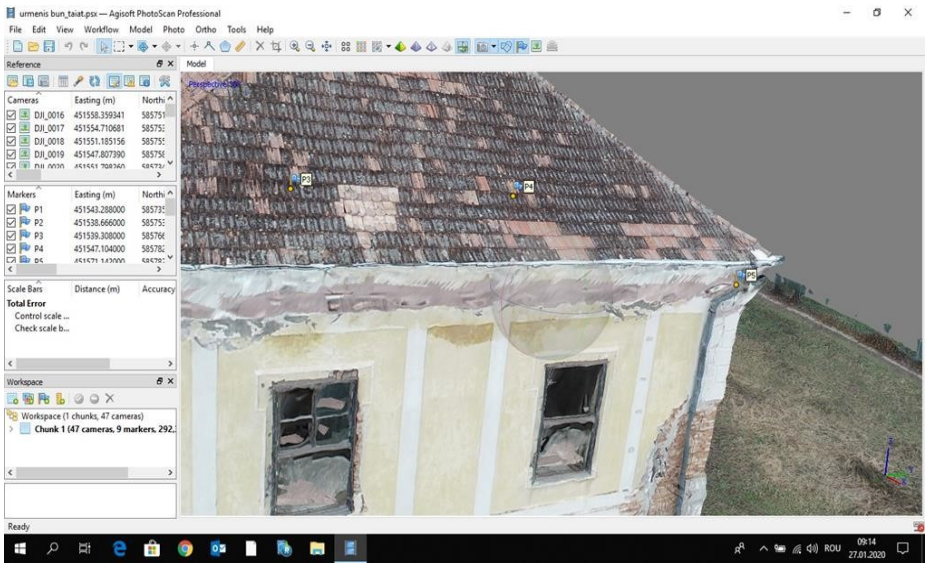

Fig. 8: Print screen of the photogramobtained in the 1st session, insufficiently clear details

On the same day and in the same conditions, with the same device, a second flight was performed in manual mode, in which the aim was to supplement the images for the subsequent generation of the 3D model and of a cloud of points with greater precision and clarity, in the areas that had not been appropriately covered by the first flight. Another 28 photos were taken, added and processed together with the original ones (Figure 9).

Fig. 9: Aerophotograms, Bánffy Castle, Urmeniș, 2nd session

5. In this case, we did not use the means of terrestrial photogrammetry, considering the UAV data and laser scans to be sufficient.

6. Designing fixed stations for taking images from the ground by laser scanning, performing scans. Laser scanning was performed with a scanner from Zoller + Frochlich (Z + F) (Figure 10). Data was collected from a number of 18 stations, arranged symmetrically with the construction, in order to be able to retrieve all the data necessary for the correct generation of the point cloud and the 3D model (Figure 11.a)

Fig. 10: Zoller + Frochlich (Z + F) Laser Scanner, Bánffy Castle, Urmeniș

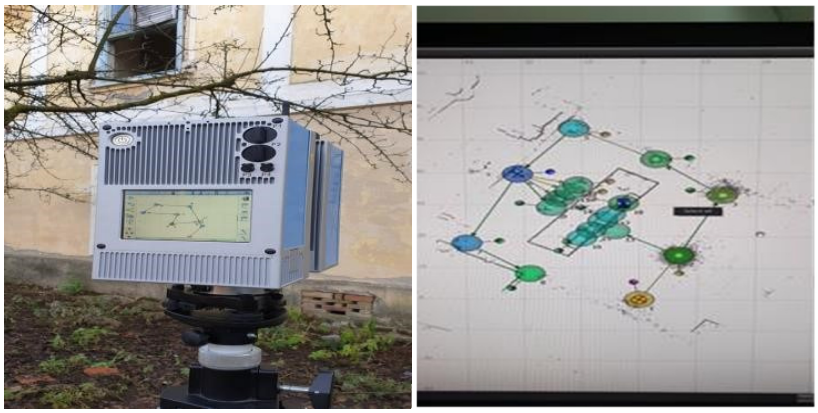

a. b.

Fig. 11. A: The 18 scan stations with Zoller + Frochlich (Z + F) Laser Scanner, Bánffy Castle, Urmeniș, b. Aligning the stations for georeferencing and data homogenization with UAVs

For aligning the 18 stations, the software of the Z+F Imager 5010 equipment was used (Figure 11.b), as well as targets glued to the façade with coordinates taken with the total station, to fit the points resulting in the same projection system with the points taken with UAV (Stereo 70, NMR 1975).

7. Designing the circuit to be followed with the mobile laser scanner station. The activity is scheduled for the future, depending on the opportunities for recovery that will be created following the transition to a next phase, by accessing steps 9-11.
8. The combined processing of the data and the formation of the products necessary for the following activities:
   a. Use of 3D photogrammetry software for drones. For the present case study, UAV data processing was performed with the Agisoft Photoscan software. A point cloud of 5,894,000 points was generated (Figure 12).
   b. Using laser scanner data processing software. After downloading the data taken from the field and cleaning the cloud of points from the noise points and those covering areas that were not of interest for the case study, a number of 289,000,000 points resulted.

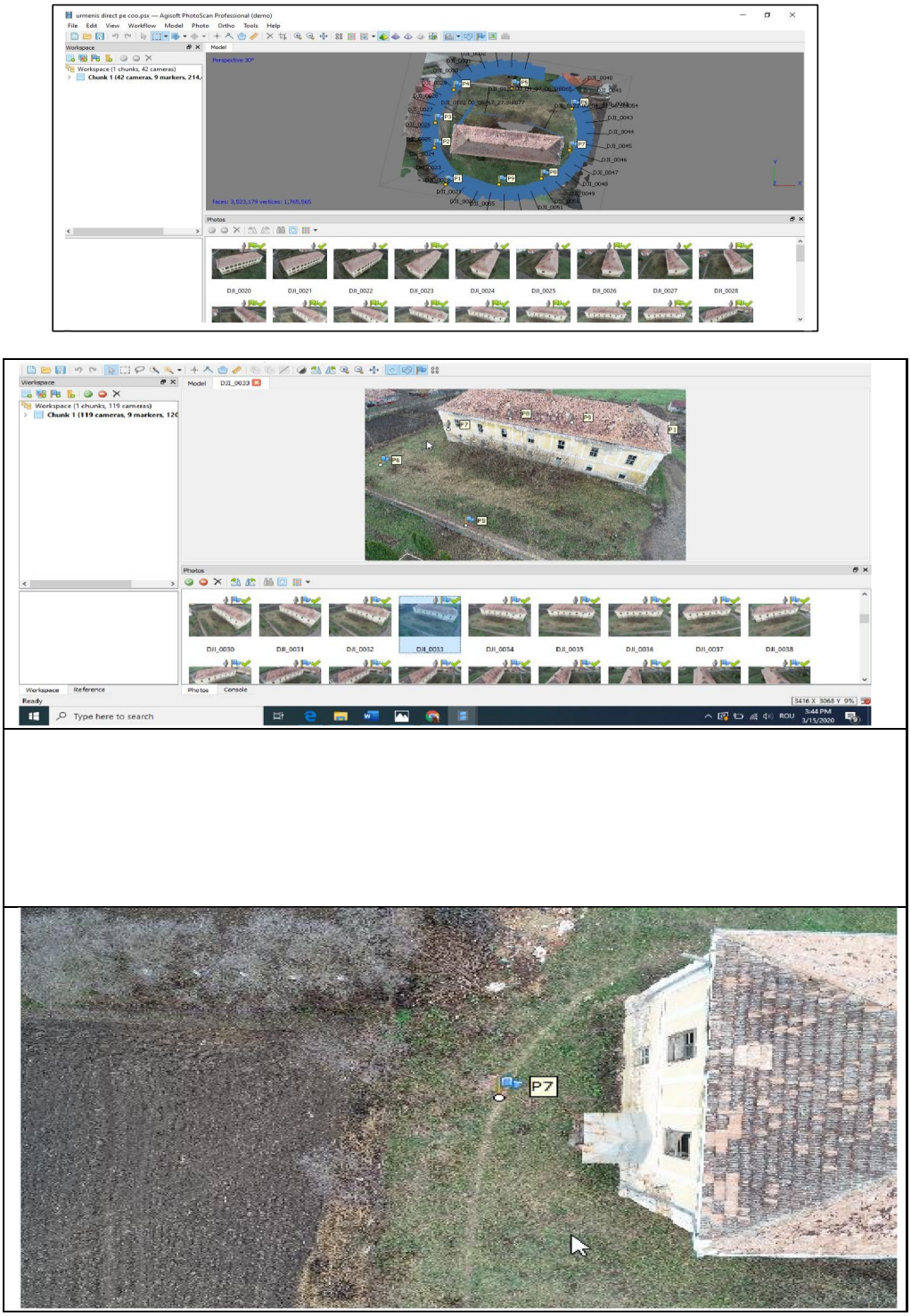

Fig. 12: Screenshots of Bánffy Castle, UAV aerophotograms processed in Agisoft Photoscan

Z + F LaserControl® Office and Scout is the optimal solution to work efficiently and fully with Zoller + Fröhlich laser scanners. A series of filters, measuring and recording tools allow high differentiated processing of scan data and are the key to filtering, recording and coloring 3D point clouds. The first step is to segment 3D terrestrial scanning using a Limit Box. The quality of the network can be adjusted depending on the size of the files and their use. The file is saved in OBJ format, then post processing is done in Autodesk Reminder. Finally, after various operations, a polygonal mesh with texture is obtained. The final grid will still have some white areas where the texture was not properly acquired and applied. These areas can be further processed using specific 3D textures such as Surface Painter or even 2D image processing software such as Adobe Photoshop.

c. Comparison and completion of the two point clouds resulting from the UAV and 3D Scanner was performed with the CloudCompare software (Figure 13). To align the point clouds and compare the errors, the point cloud resulting from the 3D Scanner (the bottom of Figure 13) was used as reference, over which, in the first phase, the point cloud resulting from the UAV was manually aligned.

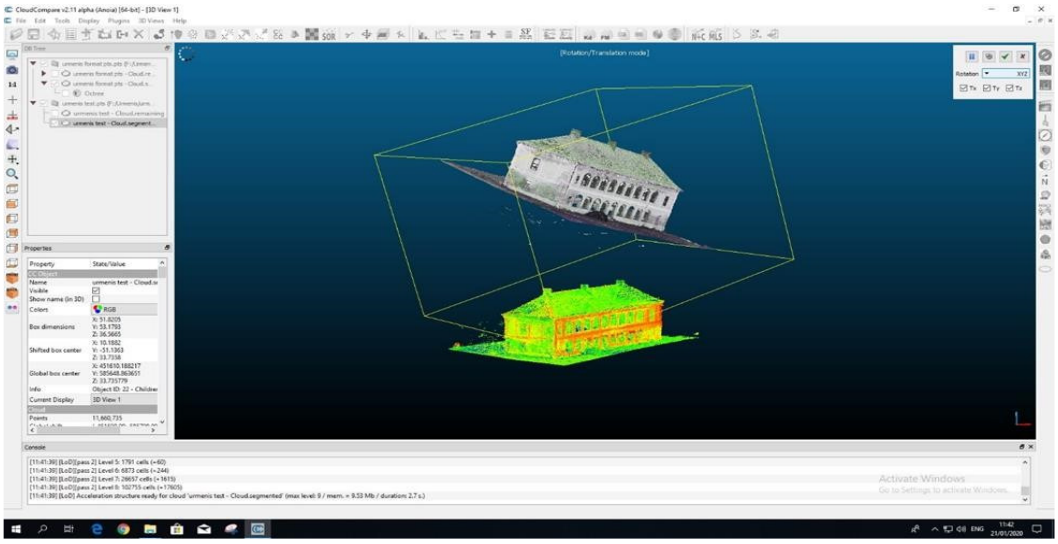

Fig. 13: Comparison of point clouds generated by processing UAV aerophotograms with laser scanner information using CloudCompare software

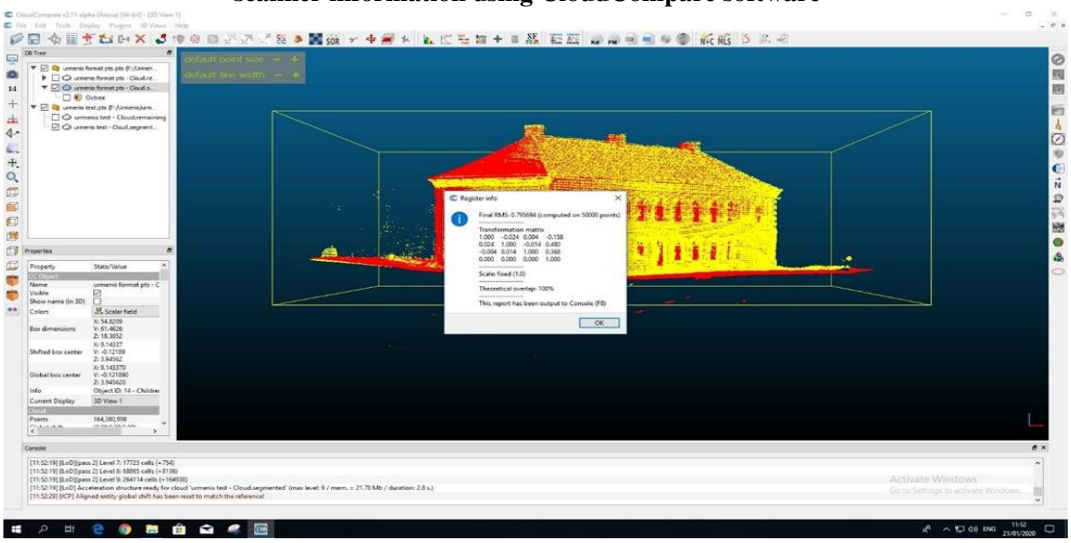

Fig. 14: The first matrix of errors (centimeters) generated in CloudCompare

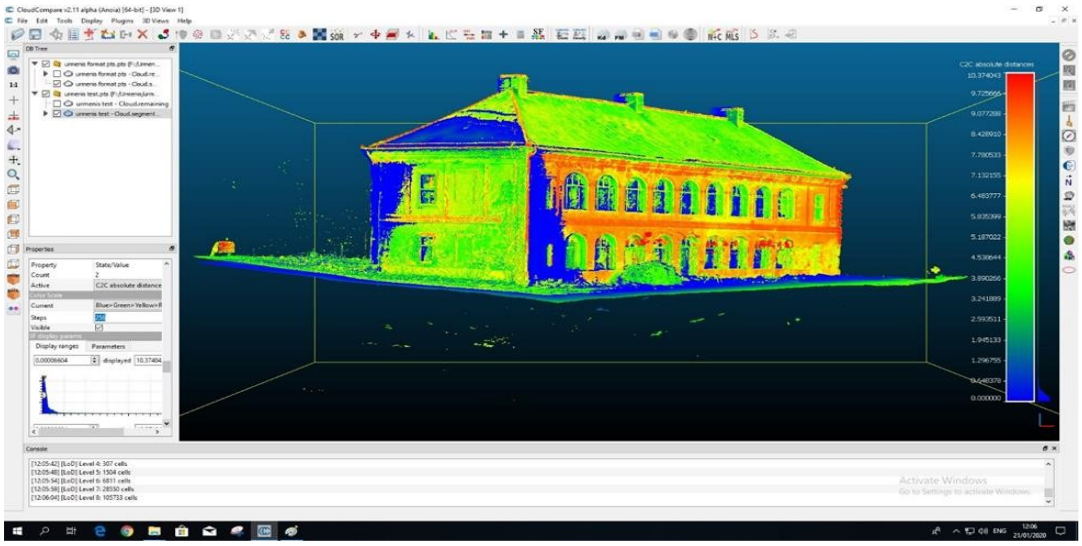

Fig. 15: The second error matrix generated in CloudCompare: it is observed that the errors star from the areas shown with blue (0-2 mm) to the maximum ones, shown with red (11-15 mm)

It can be observed that for the studied objective the error between the points belonging to the point cloud taken with UAV and the one taken with Laser Scanner was between 1 and 15 mm. After consulting with specialists in the reconstruction of heritage monuments, their opinion is that the presented margin of error is acceptable for monuments without complex architectural details, as is the case of the Bánffy Castle in Urmeniş, so that the point cloud resulting from the UAV can be used successfully in the activity of reconstruction and restoration of the studied objective. This may represent a first response in step 14 mentioned in Figure 1. All this information can be the basis of the transition to the design stage using CAD software and/or the construction of BIM and/or GIS as well as the management of activities for its restoration and maintenance, in stages 911.

Conclusions

The case study can be successfully replicated, in the context in which there are around 600 castles in Transylvania, with mostly identical construction and architectural features, belonging to nobility from the 14-18 centuries, which included a limited number of families. (Bánffy, Rákóczi, Bethlen, Teleki, etc.). The study refers exclusively to the outside area of the monuments, but the authors intend to make similar comparisons for the heritage monuments inside, in future works, using data taken with 360° cameras, Leica BLK3D and 3D scanning equipment and introducing into discussion other modeling software and comparative results (Technodigit 3DRESHAPER, Leica Cyclone, R ...), and in the next step to use Lidar technology and 3D printing of the generated 3D model (steps 12 and 13). All these technologies for collecting points (both those used in the present case study and those proposed) use totally non-invasive, sustainable methods, which require the perfect preservation of heritage buildings, the possibility of generating reports and images that can allow them to be visited through virtual reality, virtual tours, etc. It is important to replicate a large-scale case study in the studied area, leading to a drastic reduction of the costs of preserving the monuments, by generating data acquisition costs with technology UAV at the level of 10-15% of the costs required for LIDAR technology, 3D SCANNER (note: the price comparison is valid for the Romanian market but is close as a ratio in general). We consider that the present work is part of this trend, contributing to the arrangement of the technical support that extends at the basis of the strategy of enhancing at least part of the castles existing in Transylvania, in different states of degradation.

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Modeling the Impact of Socio-Economic Factors on European HSR Fare: The Perspective of Rail Baltica

Olga PITERINA

The Baltic International Academy, Riga, Latvia

olga@ekoair.lv

Abstract

The construction of the high-speed railway (HSR) corridor Rail Baltica with a gauge of 1435 mm is justified by the aim of achievement of greater economic cohesion of Latvia, Estonia and Lithuania with the rest of the European Union. The aim of this study is to prove the following hypothesis: HSR fares depend not only on the characteristics of individual HSR projects, but also on specific aspects of the economic environment in which the project is being implemented. The objects of study are the European States that are already operating HSR, as well as Rail Baltica Member States. To achieve the set aim of the study, the descriptive analysis, methods of multidimensional statistics and econometric methods were used. The result of the study is the grouping of research subjects by their level of development and determination of the degree of influence of significant factors on the value of the HSR fares. At the same time, it was noted that the forecast fare for passenger transportation along the Rail Baltica corridor is completely unrelated to salaries in the region, which may make it impossible for the bulk of the population of the project region to use these HSR services. It is concluded that objectively existing differences in the level of socio-economic development of European States have a significant impact on the formation of the HSR fare, which is confirmed by the results of correlation analysis, indicating different sets of influencing factors acting in the selected clusters.

Keywords: Cluster analysis; European High-Speed Railways; HSR fare; Rail Baltica.

Introduction

Developing a trans-European HSR network is a stated goal of the European Union. However, to date, the trans-European HSR network, according to the European Court of Auditors (2018) represents a few scattered national projects rather than a fully integrated pan-European network. Therefore, projects such as Rail Baltica, aimed at improving cross-border connections, were given priority status.

The main goal of the Rail Baltica project, which forms part of the Trans-European Transport Network (TEN-T) projects (European Commission (2007), declares the restoration of direct connection between the Baltic countries and the European railway network and development of regional integration based on the railway track gauge of 1435 mm. Currently, in the countries participating in the project, the railway track gauge is of 1520 mm. Estonia, Lithuania and Latvia have declared the project one of their priorities in the development of transport infrastructure. The European Commission (2015) expects that the creation of the TEN-T could create up to 10 million jobs by 2030 and increase the GDP of the European Union by 1.8%.

However, the data on an increase in EU GDP by 1.8% does not provide an understanding of the changes for each EU subject as a result of the implementation of the TEN-T. It is possible that for the countries producing rolling stock, infrastructure, services and rail control segments, GDP and jobs growth will reach even more significant values, while the peripheral regions of Europe, after the construction of HSR projects, will be forced to redirect taxpayers' funds from the implementation of social or educational programs to maintenance of the infrastructure of unprofitable HSR projects, as well as to close some of the existing enterprises due to the impossibility of competition of their products with similar products of large companies that received easier access to the peripheral markets of Europe due to the construction of the cross-border HSR.

In the case of Rail Baltica, this area of research remains controversial and requires consideration of a wide range of factors, especially those related to the territorial context. The issues of the impact of regional socio-economic processes on future fares for the carriage of goods and passengers have not yet been studied. In this regard, in this

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study, the author made an attempt to assess the degree of influence of the socio-economic characteristics of the Europeans States on HSR fares for international passengers travel, regardless of the state tariff policy of a particular country, and to determine the existing patterns in order to form a forecast of the price aspects of the Rail Baltica strategies for the future.

The formation of the initial hypothesis was influenced by the studies concerning the level of cross-country differentiation of socio-economic development indicators within the Europeans States.

The structure of the paper is as follows. The next section provides a review of the preceding literature with a focus on clustering of HSR subjects and HSR fares. The ensuing section 3 introduces the different data sets on which this analysis is based, and empirical strategies are detailed, while section 4 gives their results. The final section synthesizes and draws conclusions on the preceding analysis.

Background

When carrying out the study, the author relied on the methodological approaches to assessing regional disparities in the dynamics of socio-economic indicators described in Krugman (1991; 1999); Puga (2002). Precisely, New Economic Geography (NEG) of Krugman is a theoretical framework for understanding the economic processes that produce regional inequalities.

Puga (1999; 2002) analyzes the development of inequality within the EU countries, focusing on objective regional differences. At the same time, he notes that the improvement of transport links should be considered as two-way communication: on the one hand, less developed regions get the opportunity to quickly access highly developed transport hubs, on the other hand, companies from highly developed regions get new sales markets for their products, having a clear advantage over enterprises from these regions due to the scale of production.

As for HSR itself, in a number of paper by Thompson and Bawden (1992); Button (2012); Campos and De Rus (2009) reflect concerns about overall investment costs and real economic returns from HSR across regions. Moreover, Campos and De Rus (2009) argues that the emphasis on HSR connections is likely to favor central and end nodes of the network and is unlikely to promote the development of new activity centers in secondary nodes, thus, augmenting inequality in regions and reinforcing the core regions as transport hubs.

Clustering issues related to HSR regions have been investigated mainly to analyze passenger travel behavior and choice preference factors based on cluster membership (Jian and Zhang, 2012; Albalate, 2016; Gutierrez and Ortuño, 2017; Gutiérrez *et al*., 2018 ; Jing Yu Pan and Dothang Truong, 2018).

Li *et al*. (2016) and Jie *et al*. (2019) used analytical clustering techniques to assess the economic impact of HSR on cities along the route. Jianbo *et al*. (2020) conducted a cluster analysis of more than two hundred railway infrastructure standards in China. Moyano and Coronado (2018) used cluster scoring methods with the goal of deriving an HSR city-pair link typology.

The classification of railway stations for strategic transport and land use planning can be found in Zemp *et al*. (2011).

With regard to the spatial inequity of HSR fares, researchers note various aspects. For example, Bouf and Desmaris (2015) analyze the inequity of the French HSR pricing system (ticket prices per kilometer vary by the line and are not proportional to the distance traveled). Pagliara *et al*. (2016) show that in Italy consumers are very sensitive to the cost of high-speed train tickets, which has a strong impact on spatial equity.

Delaplace and Dobruszkes (2015) note that income levels affect the potential for leisure and long-distance mobility. When prices are high, they are more widely used by socio-professional categories that have the highest income and which are the most mobile (top managers, consultants, etc.) Thus, low-income populations may not be able to use HSR transport. Under these conditions, as Delaplace and Dobruszkes (2016) argue, considering government expenditure on HSR - taxpayers pay for the mobility of the wealthiest.

There are currently no published studies on the relationship between the pricing aspects of the Rail Baltica and the ability of the population of the project regions to pay for HSR services. The only source of information on this issue is the Cost-Benefit Analysis (CBA) of Ernst & Young Baltic (2017).

In scientific and academic databases, there were no papers available related to clustering the regions of the European HSR network, both active and under design or construction, in order to determine the impact of socio-economic factors on the price aspects of the network.

Revealing such differentiation and patterns of influence of socio-economic factors on HSR fare will increase the efficiency of planning and management decision-making process on the Rail Baltica project, which makes the choice of the author of this study relevant, both within the framework of the development of the trans-European HSR network and in the regional aspect.

Data and Methodology

Descriptive Analysis

As an initial step in investigating the relationship between socio-economic indicators and HSR fare, a table was compiled highlighting the various demographic, geographic and economic factors of the European States currently operating HSRs and the Rail Baltica Member States (RBMS) - the objects of the study clustering.

Table 1: Main socio-economic indicators

	Country	*GDP*	*POP*	D_{pop}	*URB*	*GFCF*	PRC_e	*SAL*	*TOU*	D_{rail}	*PRV*	*FARE*
	Unit	euro/person	million people	people/sq. km	%	euro/ person	euro/kWh	euro	million people	km/1000 km²	per 1000 inhabitants	euro/km
	1	2	3	4	5	6	7	8	9	10	11	12
EUROPA	Austria (AT)	44,978.2	8,840.5	105.4	58.7	1,326.78	0.082	2,053	30.8	66.0	655	0.12
	Belgium (BL)	41,460.3	11,427.0	374.3	98.1	1,064.93	0.100	2,091	9.1	5.5	571	0.15
	Finland (FN)	43,821.0	5,515.5	16.3	85.5	1,788.23	0.062	2,509	3.2	18.0	739	0.09
	France (FR)	36,218.3	66,966.0	104.1	81.0	1,200.21	0.077	2,157	89.4	50.0	478	0.14
	Germany (DE)	41,586.0	82,906.0	232.2	77.5	959.39	0.119	2,270	38.9	108.0	622	0.16
	Italy (IT)	30,121.4	60,422.0	200.5	71.0	625.43	0.151	1,762	61.6	56.0	801	0.19
	Luxembourg (LU)	60,053.1	602.0	232.8	91.2	3,958.77	0.067	3,009	1.0	105.0	733	0.13
	Netherlands (NL)	46,307.4	17,231.0	414.9	92.2	1,482.97	0.075	2,263	18.8	78.0	605	0.38
	Poland (PL)	13,469.0	37,975.0	121.5	60.0	610.08	0.080	736	19.6	62.0	684	0.04
	Spain (ES)	26,483.8	46,797.0	92.5	80.8	549.50	0.095	1,718	82.8	31.0	630	0.09
	Sweden (SW)	47,730.1	10,175.0	22.6.	88.0	2,267.14	0.065	3,062	7.4	24.0	517	0.12
	Switzerland (CH)	72,339.7	8,591.0	217.4	73.9	2,154.26	0.143	4,700	11.7	122.6	643	0.41
	United Kingdom (GB)	37,521.4	66,460.0	274.1	83.9	971.87	0.114	1,960	36.3	67.0	493	0.20
RB*	Estonia (EE)	20,303.1	1,322.0	29.2	69.2	1,035.78	0.080	958	3.2	33.7	607	0.10
	Latvia (LV)	15,593.9	1,927.2	29.9	68.3	835.93	0.099	648	1.9	33.1	396	0.10
	Lithuania (LT)	16,655.9	2,801.5	42.9	68.0	525,08	0.091	645	2.8	32.0	527	0.10

Note RB – Rail Baltica* *Source: designed by the author on the basis of European statistics*

In terms of the data gathering, a variety of sources have been used, but key sources included:

• Eurostat, UNECE, UNWTO – includes standard published data sets;
• National railway websites.

As study period 2018 was chosen, which is explained by the presence for this period of the last available complete database for all variables used in forming of the initial hypothesis.

It is necessary to take into account that the type of fare chosen for the study is for a single station to station pair, and as booking horizon (the period between booking and travel) - booking a month in advance.

The choice of variables is explained by the intention to study the impact on HSR fare of the main social and economic indicators, as well as the observance of the comparability and unity of the conditions of the objects under consideration.

The following indicators were used as indicators participating in the study:

Table 2: Defined variables

Code	*Dependent variable*	*Source*
FARE	HSR Fare determined by distance travelled irrespective of origin and destination	National railway websites; www.raileurope.com
Code	***Independent variable***	***Source***
GDP	Gross domestic product at current market prices per capita	Database of Eurostat
POP	Level of population	The United Nations Economic Commission for Europe (UNECE)
D_{pop}	Density of population	UNECE
URB	Degree of urbanization	Database of Eurostat
GFCF	Government gross fixed capital formation per capita	Database of Eurostat
PRC_e	Electricity prices (without VAT)	Database of Eurostat
SAL	Average salary (netto)	Database of Eurostat;
TOU	Amount of foreign visitors	The World Tourism Organization (UNWTO) is the United Nations
D_{rail}	Density of railway network	Database of Eurostat
PRV	Level of private vehicles ownership	Database of Eurostat

Source: designed by the author

Multidimensional Statistics

The clustering task boiled down to dividing all European States with HSR, including RBMS, into an unknown number of clusters.
Nominal GDP *per capita* and population density were selected as a set of variables that best reflects the concept of similarity between clustering objects in the framework of this study.

The most commonly used methods for processing socio-analytical data are the following methods: agglomerative hierarchical, divisive and iterative grouping methods (Kaufman and Rousseeuw, 2008). The following methods of hierarchical clustering are most common: between-group linkage, Ward minimum variance method, hereinafter - Ward method (Ward, 1963). Hierarchical agglomerative methods are more suitable for solving the problem of this study. From the methods mentioned above, the Ward and single-linkage methods are appropriate. Ward method aims to optimize the minimum variance within clusters. The initial formation of similarity between objects is determined using the Euclidean distance between the distance of their centers. For our problem, the Euclidean distance is calculated as follows:

$$E = \sqrt{(X_i - X_j)^2 + (Y_i - Y_j)^2} \quad (1)$$

The distance for the similarity matrix is calculated using the formula:

$$d_{i_j} = \frac{a_i(a_j)}{a_i + a_j}\left(\left|\left|\bar{X}_i - \bar{X}_j\right|\right|^2\right) \quad (2)$$

where a_i and a_j are the amplitudes of clusters I and J. $\bar{X}_i$ and $\bar{X}_j$ are the coordinates of the centers of mass of the clusters, ‖ ... ‖ - Euclidean distance. As a result, a symmetric matrix is formed. Then two clusters are determined, the distance d_{i_j} between them is minimal. These clusters are combined, and the new center of the resulting cluster is calculated:

$$\bar{X}^{(new)} = \frac{1}{a_i + a_j}(a_i\bar{X}_i + a_j\bar{X}_j) \quad (3)$$

The distance value for the formed cluster is recalculated according to the formula (2) taking into account the new coordinates of the center and amplitude.
However, in cases of elongated clusters, the Ward method tends to divide them into many small ones, 1-3 cells in each, and therefore, in this study, the use of only the Ward method for clustering objects leads to a significant number of clusters (7) with a small sample, which does not allow solving the research problem. In addition to Ward method, the single-linkage methods were used. This approach is appropriate to be used in the analysis of relatively small data sets (Everitt *et al.,* 2011). In this task, the degree of proximity between objects is determined by the principle of the location of the coordinates of the clustered objects on the plane - nearest are adjacent objects. This paper combines the above mentioned two methods to form the desired clusters.

Econometric Methods

At first inspection there appears to be no evidence relationship between the indicators presented in Table 1 and the change in the HSR fare. Nevertheless, the characteristics of national rail networks and the economic and demographic profile of states are part of the background against which tariff policy is determined, and might affect fare levels, whether administered, regulated or set only by reference to the market. Therefore, after the procedure of clustering the research objects, author examined the relationship between HSR fare in each of the clusters and a range of characteristics, set out in Table 1 with a comment on their potential influence in each of the clusters.

This study has made use of correlation analysis in order to determine the degree of influence of the variables selected by the author on the HSR fare within each of the clusters. For this, a matrix of paired correlation coefficients was used (Table 4).

Then, after defining the reference cluster and the most significant independent variable in it, the parameters of the resulting typological regression model, characterizing the influence of the selected factor on the HSR fare in all clusters, were estimated.

Results and Discussion

The final visualization of the structure of research objects ’clusters is presented below:

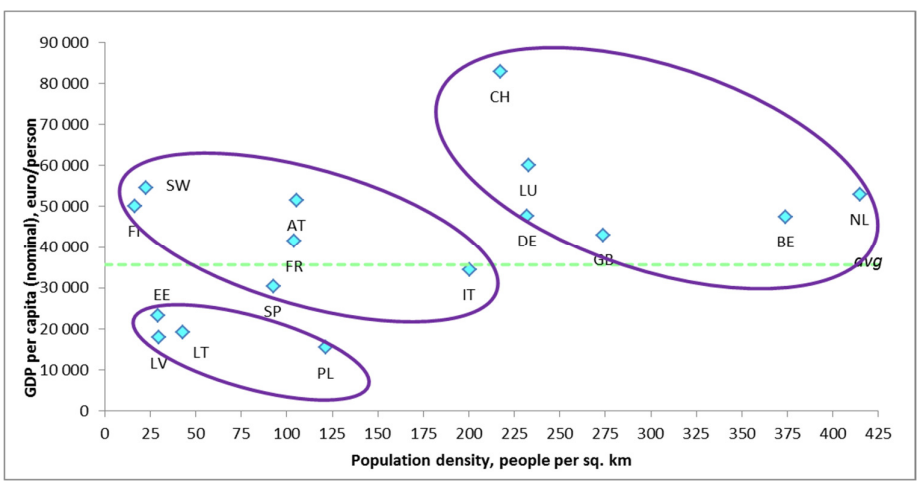

Figure 1: Summary fit of cluster analysis

Source: designed by the author

In this case, three clusters were identified. The first includes 6 subjects: Belgium, Germany, Luxembourg, Netherlands, Switzerland, United Kingdom. The second cluster also includes 6 subjects: Austria, Finland, France, Italy, Spain, Sweden; the third cluster includes Poland and RBMS.

For the general characteristics of the obtained clusters, the average values of the factors selected for the study (intragroup averages) were calculated, which are presented in Table 3.

Table 3: Average value of factors in clusters

Factor	*FARE*	*GDP*	*POP*	D_{pop}	*URB*	*GFCF*	PRC_e	*SAL*	*TOU*	D_{rail}	*PRV*
Cluster 1	0.24	49,878.0	31,202.8	290.9	86.1	1,765.4	0.103	2,715.5	19.3	81	611.2
Cluster 2	0.13	38,225.5	33,119.3	90.2	77.5	1,292.9	0.088	2,210.2	45.9	40.8	636.7
Cluster 3	0.09	16,505.5	11,006.4	55.9	66.4	751.7	0.087	746.8	6.9	40.2	553.5

Source: calculated by the author

Data in Table 3 allows to draw the following conclusions:

• The first cluster is characterized mainly by the highest average values among all three clusters, significantly inferior to the second cluster only by the number of foreign tourists. As for the average of the level of wages, GDP *per capita* and GFCF *per capita*, for the subjects of the first cluster they are practically 3.5; 3 and 2.5 times higher than for the subjects of the third cluster (RBMS) accordingly.
• The results obtained in respect of the averages for the first cluster are consistent with the view that high urbanization tends to result in relatively high rates of shortened rail travel, resulting in a higher average HSR fare.
• The second cluster is characterized by lower average values of indicators of economic development, with the exception of the indicator of foreign visitors, which is the maximum in this group of subjects. The highest rate of motor vehicle ownership is associated with the propensity of residents of southern Europe to own motorcycles.
• The third cluster includes subjects with the lowest socio-economic indicators, while having an equivalent average electricity prices with the second cluster.

As a result of using a matrix of paired correlation coefficients of independent variables with HSR fare, the factors that have the greatest influence on the studied variable within each of the clusters were established.

Table 4: Matrix of correlation coefficients between *FARE (Y)* and factors $X_1..X_n$ in the context of clusters

Factor	*GDP*	*POP*	D_{pop}	*URB*	*GFCF*	PRC_e	*SAL*	*TOU*	D_{rail}	*PRV*
Cluster 1	0.774	-0.586	0.0356	-0.284	0.901	0.056	0.699	-0.441	0.542	0.492
Cluster 2	-0.262	0.573	0.809	-0.357	-0.333	0.777	-0.282	0.307	0.621	0.236
Cluster 3	0.708	-0.999	-0.990	0.993	0.410	0.517	0.049	-0.998	-0.999	-0.707

Source: calculated by the author

It follows from Table 4 that the GFCF factor has the greatest influence on the dependent variable in the first cluster, and density population with electricity price factors in the second cluster. It is worth paying attention to the fact that in the third cluster, seven out of ten independent variables affect the HSR fare; five of them demonstrate a strong negative correlation, while the average salary in the region practically does not correlate with the projected fare for transportation along the new railway corridor. It is worth recalling that for RBMS, this study considers the rate specified in the investment justification of Ernst & Young Baltic (2017).

The relationship between population density and average HSR fare in the second and third clusters is very significant but has different signs.

Since the clustering results are represented by three groups of research subjects, to construct a typological regression of the entire set of subjects, it is needed to turn to the method of composition of regression models with the inclusion of dummy variables. Due to the fact the each cluster exhibits a different set of most influential factors, two models were evaluated. The statistical tools STATISTICA and HGROUP were utilized in this research.

Table 5: Matrix of correlation between the independent variables in the Cluster 1

	URB	D_{pop}	*POP*	*SAL*	*GDP*	*TOU*	D_{rail}	*GFCF*	*PRV*	PRC_e	*FARE*
URB	1	0,922	-0,386	-0,633	-0,546	-0,396	-0,907	-0,407	-0,365	-0,811	-0,284
D_{pop}	0,922	1	-0,468	-0,525	-0,402	-0,412	-0,677	-0,200	-0,179	-0,931	0,036
POP	-0,386	-0,468	1	-0,464	-0,560	0,977	0,260	-0,667	-0,331	0,149	-0,586
SAL	-0,633	-0,525	-0,464	1	0,989	-0,455	0,614	0,925	0,624	0,702	0,699
GDP	-0,546	-0,402	-0,560	0,989	1	-0,537	0,581	0,966	0,667	0,591	0,774
TOU	-0,396	-0,412	0,977	-0,455	-0,537	1	0,331	-0,599	-0,363	0,071	-0,441
D_{rail}	-0,907	-0,677	0,260	0,614	0,581	0,331	1	0,527	0,538	0,528	0,542
GFCF	-0,407	-0,200	-0,667	0,925	0,966	-0,599	0,527	1	0,617	0,388	0,901
PRV	-0,365	-0,179	-0,331	0,624	0,667	-0,363	0,538	0,617	1	0,227	0,492
PRC_e	-0,811	-0,931	0,149	0,702	0,591	0,071	0,528	0,388	0,227	1	0,056
FARE	-0,284	0,036	-0,586	0,699	0,774	-0,441	0,542	0,901	0,492	0,056	1

Source: calculated by the author

The first model is a regression reflecting the influence of the GFCF variable on the HSR fare in the first cluster, since in this case it is the reference one. After checking for multicollinearity between influencing factors in Cluster 1 (Tab. 5), the resulting regression equation can be expressed as follows:

$$\tilde{y} = 0.033 + 2.21 \cdot 10^{-4} GFCF_i \tag{4}$$

Table 6: Result of regression analysis of Cluster 1

Dependent Variable: FARE				
Variable	***Coefficient***	***Std. Error***	***T-Statistic***	***Prob.***
Determinate	0.033	0.086	-0.387	0.725
GFCF	$2.21 \cdot 10^{-4}$	$6.154 \cdot 10^{-5}$	3.594	0.007
R-squared	0.812		***F-statistic***	17.916
Adjusted R-squared	0.749		***Prob (F-statistic)***	0.007

Source: calculated by the author

Since the GFCF variable has a significant effect only in the first cluster, two dummy variables were used in the typological model for all three clusters (Chatterjee and Simonoff, 2012):

$$\tilde{y} = b_0 + b_1 GFCF_i + b_2 Z_{1_i} + b_3 Z_{2_i} \tag{5}$$

where b_1, b_2, b_3 are factor coefficients (model parameters), and b_2 and b_3 show how much the free member of the model differs with the values of dummy variables equal to one from the free member of the model with the base values; b_0 is a free term that determines the value of HSR fare provided that the values of the factors are zero (intersection with the y-axis); Z_1 and Z_2 are dummy-variables with the following values:

$$Z_1 = \begin{cases} 1, the\ Subject\ is\ in\ the\ \ Cluster\ 2; \\ 0, in\ other\ cases; \end{cases} \qquad Z_2 = \begin{cases} 1, the\ Subject\ is\ in\ the\ \ Cluster\ 3; \\ 0, in\ other\ cases; \end{cases}$$

The following model is obtained as a result of the correlation - regression analysis for all clusters based on the most influential factor in the reference cluster:

$$\tilde{y} = 0.187 + 5.489 \cdot 10^{-5} GFCF_i - 0.130 Z_{1_i} - 0.146 Z_{2_i}, \quad (6)$$

Summary statistics based on the above model is provided in Table 7.

Table 7: Model's Parameter Estimates

Dependent Variable: FARE				
Variable	***Coefficient***	***Std. Error***	***T-Statistic***	***Prob.***
Determinate	0.187	0.068	1.764	0.218
GFCF	$5.489 \cdot 10^{-5}$	$4.347 \cdot 10^{-5}$	2.293	0.038
Dummy Z_1	-0.130	0.049	-2.673	0.022
Dummy Z_2	-0.146	0.059	-2.422	0.034
R-squared	0.656		***F-statistic***	6.596
Adjusted R-squared	0.575		***Prob (F-statistic)***	0.009

Source: calculated by the author

In Tables 6, 7 parameter estimates are depicted. As seen in the tables, all independent variables are significant at 0.05 level. The F- test also shows that the regression models is globally significant at a level less than 0.01. The negative values of coefficients of the dummy variables imply that the fixed capital investments factor has lower values and lesser relationship with the HSR fare in the second and third clusters. This finding is consistent with the method and result of clustering of the objects in the study.

Conclusions

Based on the findings of the study, it is concluded that objective national and rail sector characteristics are the factors that have a significant impact on the HSR fare, regardless of the characteristics of individual projects or regulation of tariff policy.

Based on the final results of clustering of research subjects, the author concludes that examples of successful implementation of HSR projects in densely populated European States with an overwhelming share of urban population, high levels of GDP per capita and fixed capital investment should not be used as an advertising justification for the urgent need to implement such projects in less developed regions that do not have their own mechanical engineering enterprises; with a low population density, while having salary twice lower than the average in Europe.

With regard to the Rail Baltica project, another result is that the projected HSR fare does not correlate with salaries in the project region and has a weak correlation with the electricity price. The consequence of this may be the economic exclusion of most of the project region's population from the potential passenger traffic of Rail Baltica.

In connection with the above, the author considers it necessary to recommend the holders of the RB project to revise the forecast fares for passenger transportation, since it is expected that the total revenue will increase, despite the lower price, as a result of elastic demand. Otherwise, due to the lack of income, the potential passenger will prefer to drive their own car, if available, which will lead to a completely opposite result of the project, in contrast to the currently declared "green" effect of Rail Baltica.

Hence, for the States participating in the Rail Baltica project, it is necessary to develop a project pricing strategy with a clear understanding of the regional specifics, based on careful planning and coordination of actions between stakeholders. Achieving such cooperation requires innovation in institutional arrangements as the basis for all infrastructure development in the Rail Baltica project region.

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Mechanical Behavior Simulation of a Hip Joint Extracted from CT Scans of a Patient Diagnosed with Arthritis, By Using Finite Element Method

Patricia Isabela BRAILEANU
University POLITEHNICA of Bucharest, FIA, Bucharest, Romania, patricia.braileanu@upb.ro

Benyebka BOU-SAID
Universitè de Lyon, INSA-Lyon, LaMCoS, France, benyebka.bou-said@insa-lyon.fr

Ionel SIMION
University POLITEHNICA of Bucharest, FIA, Bucharest, Romania, ionel.simion@upb.ro

Ionut Cristian PEREDERIC
University POLITEHNICA of Bucharest, FIA, Bucharest, Romania, ionut.perederic@upb.ro

Abstract

The bone segmentation process is a method by which engineers can extract bone tissue using image processing algorithms such as threshold algorithm, region Growing algorithm or recursive Gaussian algorithm, on patients' MRI (Magnetic resonance imaging) or CT (Computer Tomographic) scans to obtain virtual models on which to perform virtual simulations using FEM (Finite Element Method). In biomechanics such studies represent an important step in determining the mechanical behavior of various human anatomical parts, especially for the bone joints, because the results obtained can be used to improve endoprosthesis and increase their lifespan.
This paper aims to virtually analyze the mechanical behavior of a female patient with hip joint arthritis by using CT scans in order to perform bone segmentation in dedicated software such as ScanIP Simpleware to extract the pelvis and the femur as an individual CAD (Computer Aided Design) part, and to perform virtual simulation at different loads corresponding to a certain body weight in order to observe how the patients' unhealthy hip joint is affected in the event that it would gain weight.

Keywords: Hip Joint; Arthritis; Mechanical Behavior; Virtual Simulation.

Introduction

The human hip joint, or sometimes referred as coxa in specialized medical terminology is the biggest joint of the human body. The hip joint plays an important role in the human body, without which locomotion would not have been possible. It is a synovial and spherical joint because the spherical head of the femur fits in the pelvic concave cavity, thus forming the hip joint capsule. The surface of the femoral head and the concave surface of the pelvis are covered by a layer of hyaline cartilage or articular cartilage, which has the role of reducing the friction between the two joint elements during movement, but also of absorbing shocks that may occur during more demanding activities or even in the event of an accident.

Arthritis is a pathological disease that involves articular inflammation which occurs as the acetabular labrum wears out with time. As the disease progresses the cartilage is diminished excessively until it disappears and, over time, leads to bone deformation that causes hip pain.

Nowadays exist around one hundred arthritis affections which, depending on the disease stage or progress, can lead over time to surgical interventions. The most common forms of arthritis are rheumatoid arthritis-RA (the most painful forms of arthritis, an autoimmune disease according to Harris, 1990) and osteoarthritis-OA (occurs at the appearance of acetabular labrum wear, especially with aging) according to Harris WH (1986). If arthritis affects more joints at the same time it is known as polyarthritis and it is usually associated with autoimmune diseases that can occur at any age.

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The causes of arthritis may vary, depending of the heredity, medical history and predisposition of the patient, the rheumatoid arthritis arises because the patient's immune system start to produce antibodies that attack their own tissues which, at the beginning results as an inflammation, but in time the inflammation spreads to the cartilage, muscles, tendons, ligaments and finally to the bones that start to deform and wear. This autoimmune disease affects around 1% of the world population being nine times more frequent in women. Osteoarthritis / osteoarthrosis instead, occurs with aging and it is a degenerative disease that appears with time. Because of hip cartilage wear, severe hip pain and disability among elderly patients is frequently caused.

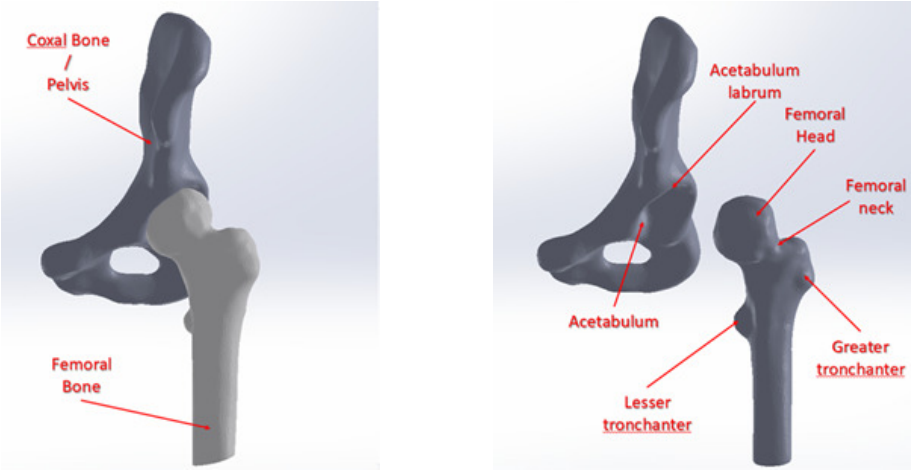

(a) (b)

Fig. 1: (a) Human hip joint assembly; (b) Human hip joint anatomical parts[Brăileanu, 2020].

Due to patients percentage who are predisposed to diseases such as arthritis the probability that they will undergo surgery to substitute the affected joints is constantly growing, thus, engineers and orthopedic surgeons are working together to optimize the current prosthetic implants in: geometry / design, material mechanical properties, the osseointegration capacity of the implant and its durability.

Methods

CT data acquisition

CT scans or Computed Tomography is one of the most revolutionary discoveries in medicine made by two researchers, Godfrey Hounsfield a British engineer and the physicist Allan Cormack with South African origin, invention who received the Nobel Prize in 1979 as noted by Brăileanu (2020) and Vladimir et al. (2006). The name of tomography comes from the Greek word "tomos" which means slice and from the word "graphia" which means writing.

The CT work on the principle of reconstructing the image of a body starting from its projection, thus realizing a two-dimensional reproduction of the patient's body. It measures the attenuation of an X-ray fascicle that crosses the patient's body and calculates its attenuation coefficient so that the radiological density of the tissues can be identified as noted by John et al. (1993). The patient exposure risk case of CT scan is minimal because of the small amount of radiation exposure during examination, presenting an optimal level of safety and a minimum exposure time.

For our particular study, we used the CT of a female patient aged 77 years old at the date of examination procedure. The patient was diagnosed with arthritis at the left hip subsequently undergoing a THR surgery to improve the patient's quality of life and eliminate the pain caused due to hip joint mechanical wear. In case of determining a problem at the hip joint level, radiologists use as ROI (Region of Interest) the patient pelvic area in order to lessen the exposed body zones, extracting only the necessary information for diagnosis and also for the procedures that help in organizing the surgery, such as THR preoperative planning.

Acquisition of DICOM (Digital Imaging and Communications in Medicine) images was made with the help of Siemens Somatom Definition AS in CT modality, the body part examined being set to the pelvic region with a nominal slice thickness called also slice thickness of 1 mm, the patient position was set to HFS (Head First Suspine), with a flat filter type, the peak kilo voltage or KVP of 140 mA·s, 34 kW generator power, data collection diameter of 500 mm and a reconstruction diameter of 474 mm, table height set up at 173.5 mm, distance source detector of 1085.6 mm and distance source to patient of 595 mm, exposure time of 1000 m·sec, rotation direction in CW (clockwise), the X-Ray tube current of 190 mA, a 0.6 mm single collimation width with a total of 12 mm collimation width, 0.55 spiral pitch factor value, with a total number of 356 DICOM image files. The table speed moves with 6.5(9) mm in one second in order to collect image data and the table feed per rotation is also about 6.5(9) mm during a complete rotation around the fixed orbit and in image collection was used an equal number of 512 rows and column in the image, being the multiples of the vertical or horizontal down sampling factor if any of them are encoded in the vertical or horizontal direction. Regarding pixel tag settings the spacing between each pixel center was set at ~0.93 mm with a 16 bits allocated for every pixel and a total of 12 bits used to store each pixel, with a number of 11 high bits which represents the most significant pixel data bit. The largest image pixel value of data acquisition is about 2251 and the smallest image pixel value is represented by 0, the rescale intercept set up to -1024, type 1 measured in HU (Hounsfield scale), the window center for display set to 40\400 and window width 350\2000, Brăileanu (2020).

2.2. Bone Segmentation Methodology

Today there are multiple dedicated software programs which realize bone segmentation in an automatic way by applying an image processing algorithm and directly extracting the bone tissue, or in a semi-manual way, requiring user's intervention, usually prepared or trained to use the specific software as noted by J. Fripp et al. (2010). In our case we had to extract the pelvis and the femur of a patient, which suffers of arthritis and because of this, an automatic bone segmentation software will extract the pelvis and femur in the same CAD file due to the hip joint wearing, the threshold algorithm couldn't identify the difference between the two bone parts. Because we are dealing with the CT scans of a patient with arthritis we chose to use the Simpleware ScanIP Version 7.0 +FE software, dedicated to the processing of medical images, having a complex basis of image processing algorithms which can be applied to obtain a better surface and a better CAD model in order to perform virtual analysis or even in preparing a 3D printing model, Brăileanu (2020).

The principle of bone tissue extraction from medical images is based on voxels (it is the equivalent of a pixel in a three-dimensional space) identification from region of interest by applying various image processing algorithms on each CT scan, slice by slice, so that the 3D anatomical model can be recreated as found by Brăileanu (2020) and Li Y et al. (2004).

The model accuracy obtained after image processing can also be influenced by the digital image quality, which are often affected by a specific phenomenon called noise. According to J.Lee (1980), noise in images occurs due to imperfections of medical capture devices, scanning systems or optical systems when transferring data and can be of several types: additive, Rician, multiplicative, Gaussian or white etc. As noted by Lei Huang et al. (2009), if the situation requires, these images can be processed with the purpose of imperfections and noise reduction, thus, the following algorithms can be applied: histogram equalization by adaptive filtering with contrast limitation or CLAHE, linear contrast adjustment, image filtering, Wavelet transform, Fourier transform, image binarization etc. All these medical image adjustments can help clinicians to better isolate and identify the patient's medical problem by increasing the visibility of the studied areas, Brăileanu (2020).

Mechanical properties of human bone tissue

As noted by Jae-Young et al. (1998) bones are not composed of a homogeneous and isotropic material, they have the characteristics of a non-uniform solid that consists of two types of bone tissue: cortical bone (hard bone or compact bone) tissue and spongy bone (trabecular bone or cancellous bone) tissue, each tissue having different mechanical properties.

The cortical bone tissue is represented by the outer part of the bone, is a hard tissue meant to support the structure of the human body, with a lamellar structure that is in a continuous transformation, developing in the areas where higher

mechanical loads appear, thus the cortical bone tissue represents most of the bone mass due to its high density. Studies performed on corpses, but also by simple CT scan analysis demonstrate that compact bone tissue has superior mechanical properties to spongy bone tissue according to Jae Young et al. (1993). However, studies have shown that cortical bone tissue mechanical properties may vary from patient to patient, so we can find an elastic modulus range between 17.9 and 3.9GPa with a Poisson coefficient between 0.62 and 0.26 determined by the patient's medical history, age and bone quality, Brăileanu (2020).

Table 1: Cortical bone tissue main mechanical properties, Morgan (2018).

Properties	Unit Measure	Value
Young Modulus	GPa	17.9
Poisson coefficient	N/A	0.3
Density	g/cm^3	0.9

Trabecular bone tissue is a porous tissue located inside the bone, having an irregular structure, with the role of giving flexibility to the bone and taking over the external loads and equally distributing them. Studies have shown that spongy bone tissue has lower mechanical characteristics than compact bone tissue, which makes it more fragile, representing a small percentage of total bone weight as noted by Jameson and Robert (2014). As in the case of cortical bone tissue, trabecular bone tissue can have a range of values depending on the patient's bone quality and age; studies showing that the young modulus of a trabecular bone can have a range between 0.76 and 10GPa.

Table 2: Trabecular bone tissue main mechanical properties, Ramin et al. (2015) and Birnbaum (2002)

Properties	Unit Measure	Value
Young Modulus	GPa	0.76
Poisson coefficient	N/A	0.3
Density	g/cm^3	0.3

As we grow older, the ability to restore bone cells slows down, our metabolism is transformed and the capacity to recover in case of complications and fractures is diminished, all these changes affects patient bone quality. Bone loss or bone demineralization occurs with aging or in case of diagnosing with disease causing this effect, which affects the population both men and women. Bruno et al. (2018) noted that although the loss of bone mass can affect regardless of gender, studies have shown that women are more exposed with aging to diseases such as osteoporosis or osteoarthritis (OA), a disease that affects bone quality, making patients more susceptible to fractures, slow healing or medical complications.

Assuming that both the femur and the pelvis contain a homogeneous and isotropic material, we have chosen to use the cortical tissue for this study, because of the better mechanical qualities. With age the cortical bone tissue loses its quality, becoming more porous and transforming into a tissue almost similar to the trabecular one. Following the cortical tissue analysis of the femur in case of females over 70 years old, studies have shown that Young's modulus can be 0.96 ± 0.19GPa, tensile strength can be 0.019 ± 0.0014GPa and compressive strength can be 0.096 ± 0.00083Gpa. The values show a significant deterioration of the bone quality compared to the average of the bone quality in case of a young and clinically healthy patient, thus in the case of our study, we used these values because the analyzed patient can be included in the age range and gender group statistic, Brăileanu (2020).

Finite Element Analysis of a female hip joint diagnosed with arthritis

Finite element analysis is a numerical method of reproducing in a simplified or complex manner a physical phenomenon helping us to describe and understand the virtual model behavior when submitted to external loads. Virtual models tend to reproduce the object, organ or cells as accurately as possible, but most of the times they are simplified, so the analysis can be reduced only to the area of interest because in the case of a complex model it takes more time and more resources to solve the equations and to give an analysis result. A biological model has a higher degree of difficulty due to its irregular shape and surface, so a mesh in this case can be more complex and the FEA study can take longer, Brăileanu (2020).

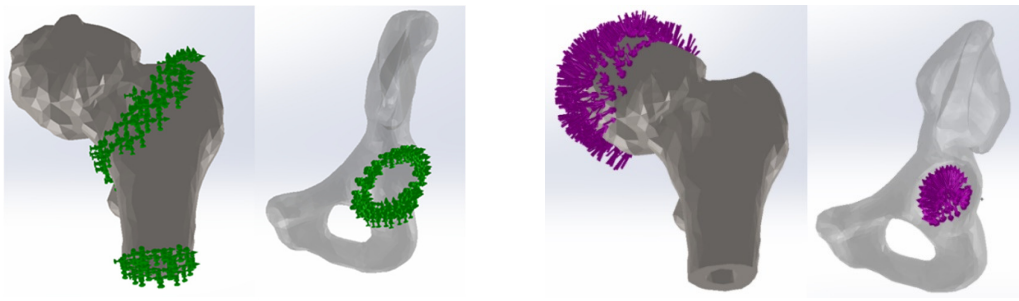

(**a**) (**b**)

Fig. 2: (a) Femur and pelvis fixture in Solidworks (green); (b) Femur and Pelvis load applied area in Solidworks (purple), Brăileanu (2020).

Even though this method has incredible potential in terms of the experimental side the results obtained from the analysis remain approximations of the CAD models mechanical behavior because they depend on the model parameters. Usually the errors that appear when solving are related to the simplification of the geometry model commonly named as discretization errors (they occur because of the element size or shape, which is in a relation of interdependence with the structure, anatomical morphology or model thickness), but also due to a displacement field called interpolation error. Although the human body is a complex "biological machine", this method allowed specialists to predict prosthesis or organs mechanical behavior and to evaluate them, in order to decide if the virtual model can pass at the ex vivo experimental test, Brăileanu (2020).

Fixing the geometry (constrains) helps maintain and support a CAD model, whether is a functional part or an assembly, and a mandatory step to perform FEM analysis. In order to fix the hip joint anatomical parts geometry, the constraints were simplified as follows: in case of the pelvis the acetabulum labrum area was fixed and in case of femur the inferior part of it was fixed, but also the margins of the femoral neck. This type of constraint helps us perform a static analysis of the anatomical parts to be able to understand how the hip joint models behaves when receiving external loads of different intensities, Brăileanu (2020).

Another mandatory condition for running a FEA study is to assign a type of material to the studied geometry. Because the study wants to recreate the mechanical behavior of a patient that has suffered bone loss due to arthritis, the material is not standardized, thus, a custom material can be created in a CAD software, for example Solidworks, Brăileanu (2020).

Table 3: Mechanical properties of the cortical bone tissue used in the FEA study, Jameson et al. (2014), Bruno et al. (2018)

Properties	Unit Measure	Value
Elastic Modulus	GPa	11.6
Poisson's Ratio	N/A	0.26
Mass Density	kg/m^{-3}	1440
Tensile Strength	MPa	21.13
Compressive Strength	MPa	97.19

In this study it was assumed that the material applied to both, pelvis and femur CAD models is homogeneous, linear, elastic and isotropic. Cortical bone tissue was used due to the superior properties and the mechanical properties data of the femoral cortical bone tissue of a female aged over 70 years were extracted from Raviraj Havaldar et al. study on effects of tensile and compressive loadings on human femur bone.

As noted by Nicola et al. (2010), the human hip joint is daily subjected to repetitive movements and external loads as a result of the activities that we perform, thus, during more demanding activities such as walking stairs or running, the human hip joint can be subject to stress up to ten times higher than during a normal gait cycle or a static position. This happens due to the high stress that can appear in the human hip joint, but also due to patient's weight, which can affect the coxofemoral articulation by increasing the load applied. In this study simulations were performed on both

pelvis and femur model by applying ten types of forces, some of them representing approximately the equivalent of the weight that a patient can have and some of them, respectively 2000 N, 2500 N and 3000 N, representing the equivalent of a shock received in the hip joint in case of accidents, Brăileanu (2020).

Table 4: Forces applied in the FEA study of a female arthritic hip joint, Brăileanu (2020)

Force	Value [N]	Equivalent in kgf
F_1	686.46	70
F_2	784.53	80
F_3	882.59	90
F_4	980.66	100
F_5	1078.73	110
F_6	1176.79	120
F_7	1274.86	130
F_8	2000	204
F_9	2500	255
F_{10}	3000	306

In this study, solid models of the pelvis and femur affected by arthritis were used, with a curvature based solid mesh type and 4 Jacobian points. The CAD pelvis model having a maximum element size of 7.62 mm and a minimum element size 7.61 mm, with a total number of 29 177 nodes and 18 608 elements, presenting a high quality mesh plot. The CAD femur model contains a 5.23 mm maximum element size and a 5.22 mm minimum element size, with a total number of 23 494 nodes and 15 298 elements, presenting a high quality mesh plot, Brăileanu (2020).

Results

Stress Analysis Results

Following the FEA study performed in each load case applied inside the acetabulum, the results have shown a minimum stress located in the node 6904 and a maximum stress located on node 8013, in the pelvis model in all FEA studies. In *Figure 4* we can identify the minimum and maximum stress values resulting from each analysis. From the analysis evolution of both minimum stress and maximum stress, the FEA study results of the patient's pelvic model who suffered bone loss due to arthritis disease show a linear increase of the load values from 686.46N to 1274.86N, however, with the application of loads greater than 2000N, stress increases considerably, Brăileanu (2020).

Figure 3 (b) contains the graphical representation of Von Mises and how it is distributed on the virtual pelvic model (N/mm^2 or MPa). Acetabulum margin is the most affected area, containing the maximum stress area that increases at the same time with the load, showing critical values especially in the case of 3000N force applied, Brăileanu (2020).

Following the FEA study performed in each load case applied to the femoral head, results have shown a minimum stress located in the node 5511 and a maximum stress located on node 4758, in the femur model, in all FEA studies. In *Figure 5* we can identify the minimum and maximum stress values resulting from each analysis. From the analysis evolution of both minimum stress and maximum stress, the FEA study results of the femur model of a patient who suffered bone loss due to arthritis disease, have shown a linear increase of the load values, Brăileanu (2020).

Figure 3 (a) contains the graphical representation of Von Mises stress on the femur virtual model. Femoral neck is the most affected area, containing the maximum stress area that increase at the same time with the load and showing higher values especially in the case of high loads applied, Brăileanu (2020).

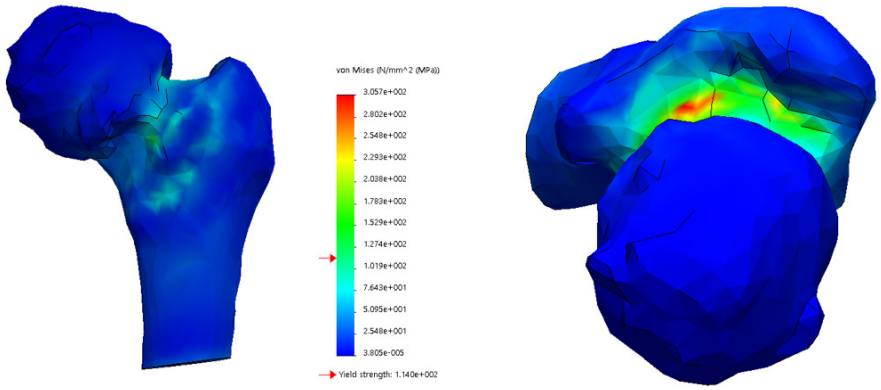

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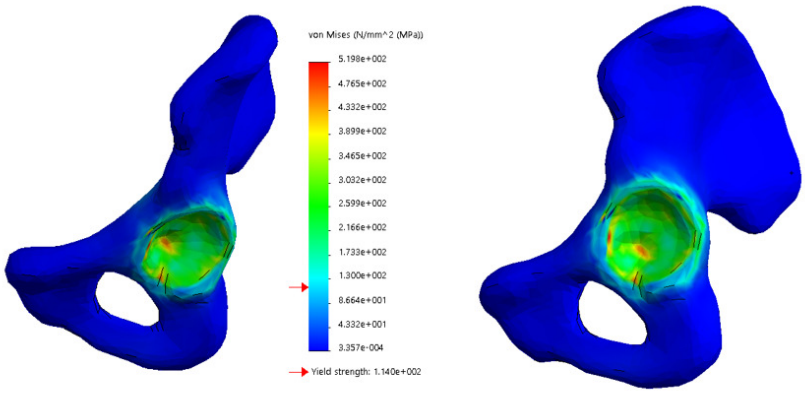

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Fig 3. (a): The femur model stress analysis results for F_{10} evolution in case of an older diagnosed with arthritis; (b) The coxofemoral model stress analysis results for F_{10} in case of an older patient diagnosed with arthritis, Brăileanu (2020).

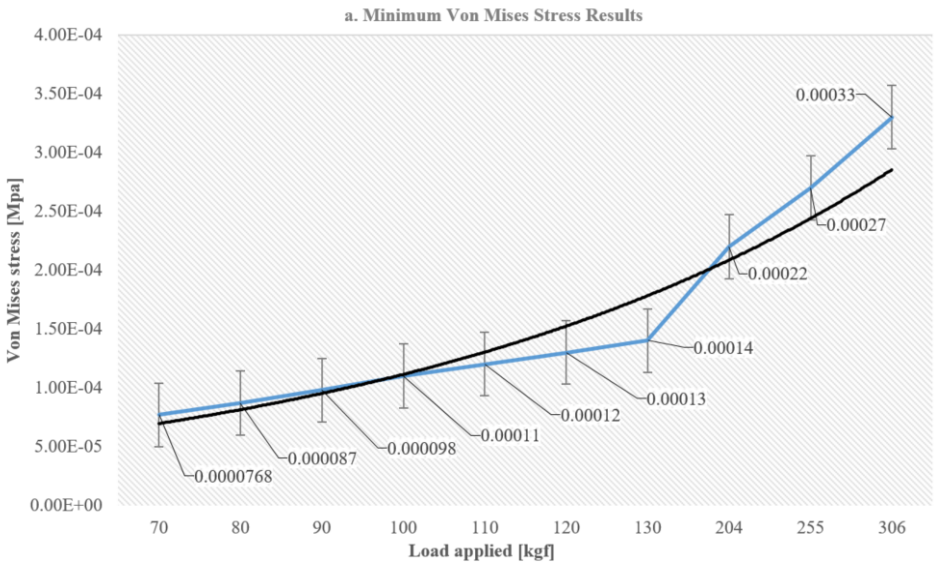

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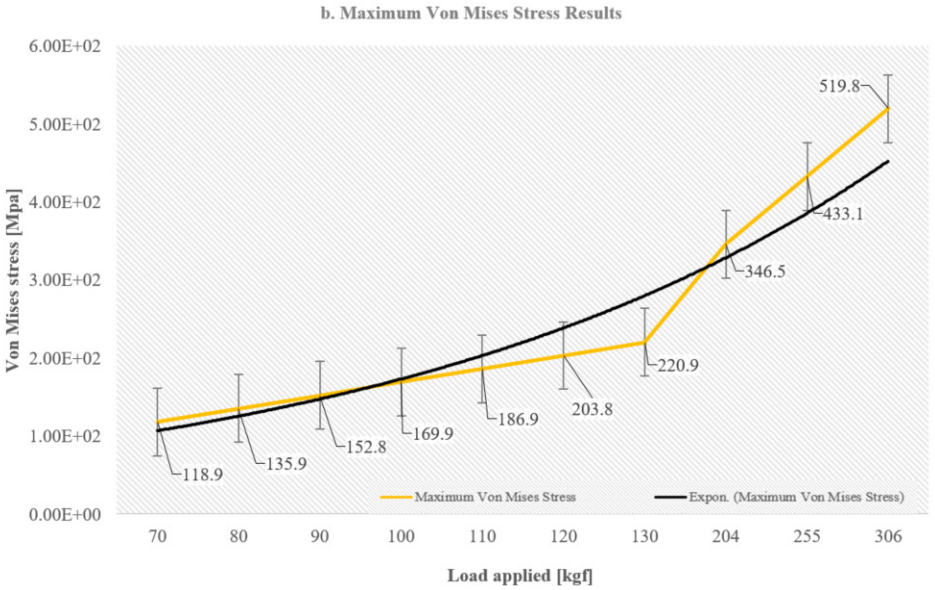

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Fig. 4: Minimum (a) and maximum (b) Von Mises Stress results [MPa] obtained in case of the pelvis CAD model, Brăileanu (2020).

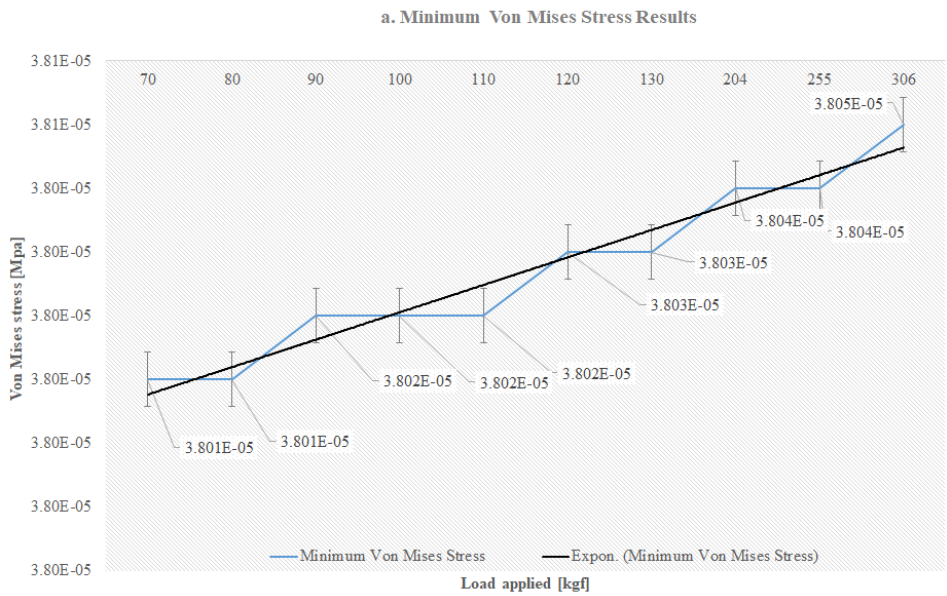

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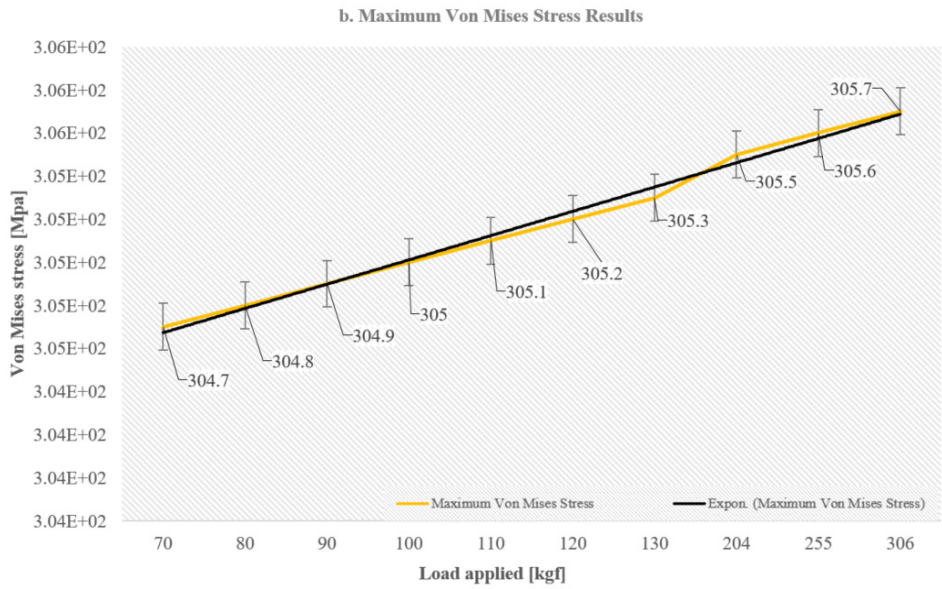

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Fig. 5: Minimum (a) and maximum (b) Von Mises Stress results [MPa] obtained in case of the femur CAD model, Brăileanu (2020).

Displacement Analysis Results

Following the FEA study performed in each load case applied inside the acetabulum, the results have shown a minimum displacement (0mm) located in the node 727 and a maximum displacement located in the node 8331, in the pelvis model in all FEA studies, Brăileanu (2020).

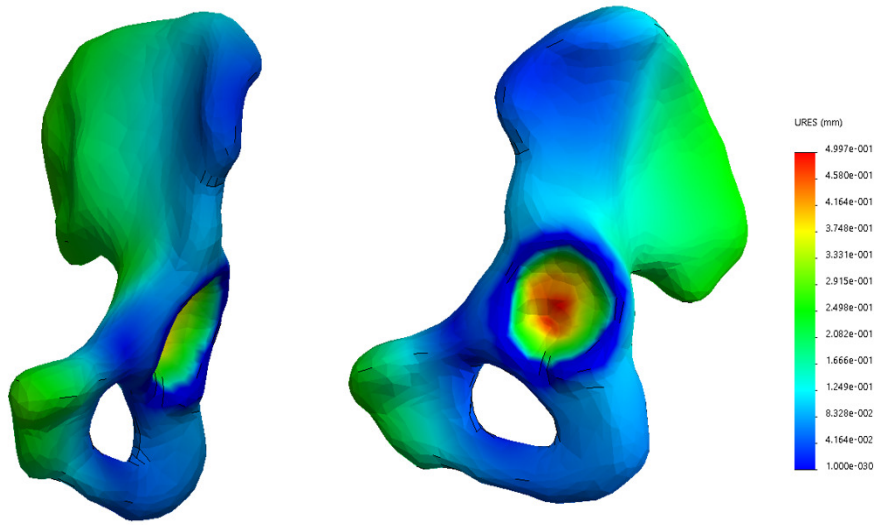

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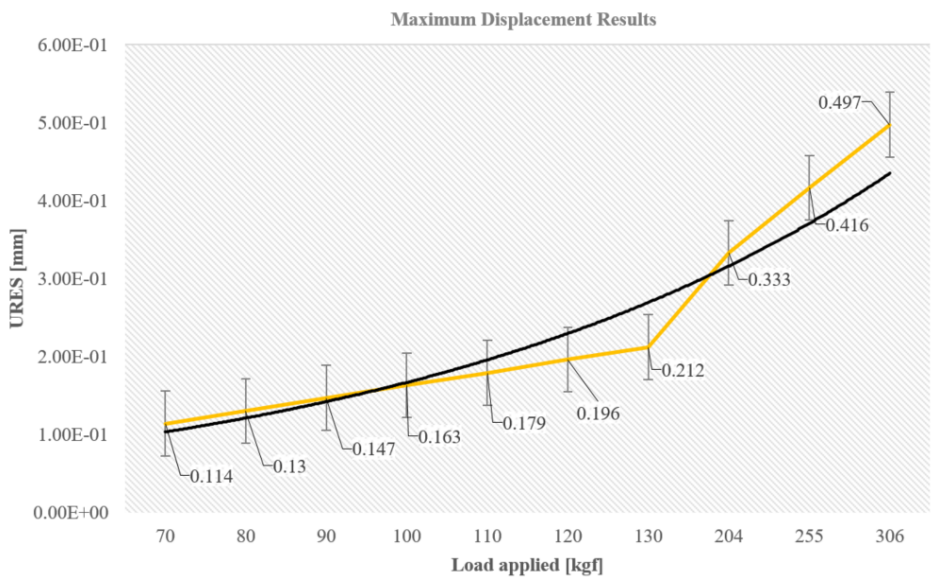

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Fig. 6: (a) The pelvis model displacement analysis results of F_{10} in case of an older patient diagnosed with arthritis; (b) Maximum displacement results [mm] obtained in the case of the femur CAD model, Brăileanu (2020).

In *Figure 6 (b)* we can identify the minimum and maximum displacement values resulting from each analysis. Following the analysis of the minimum displacement and maximum displacement evolution results from the FEA studies of the pelvis model of a patient who suffered bone loss due to arthritis disease, we can observe a linear deformation for the first eight cases, with an increase of the deformation in the case of applying a load which exceeds

a value of 2000N. *Figure 6 (a)* contains the graphical representation of displacement results and how deformations affect the pelvis virtual model. The acetabulum part is the most affected area, especially its center, displacement values increasing at the same time with the value of the load applied. Although the deformations may appear small, in case of an elderly patient suffering from arthritis and bone loss, a simple crack can rapidly degenerate into a fracture or other medical complications that can lead to surgery, Brăileanu (2020).

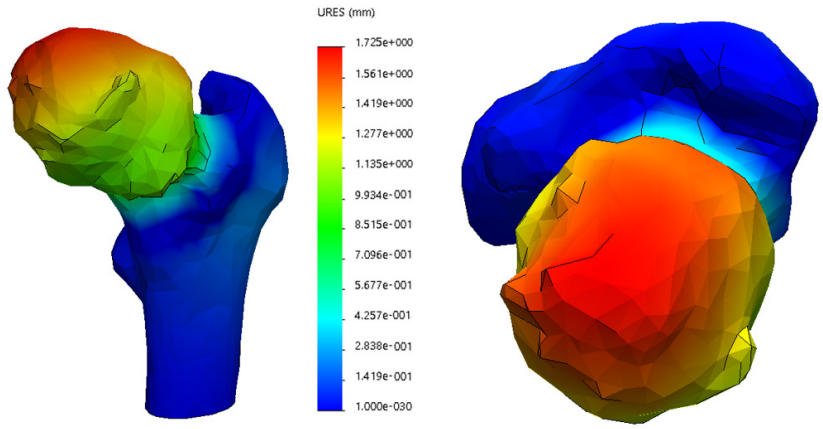

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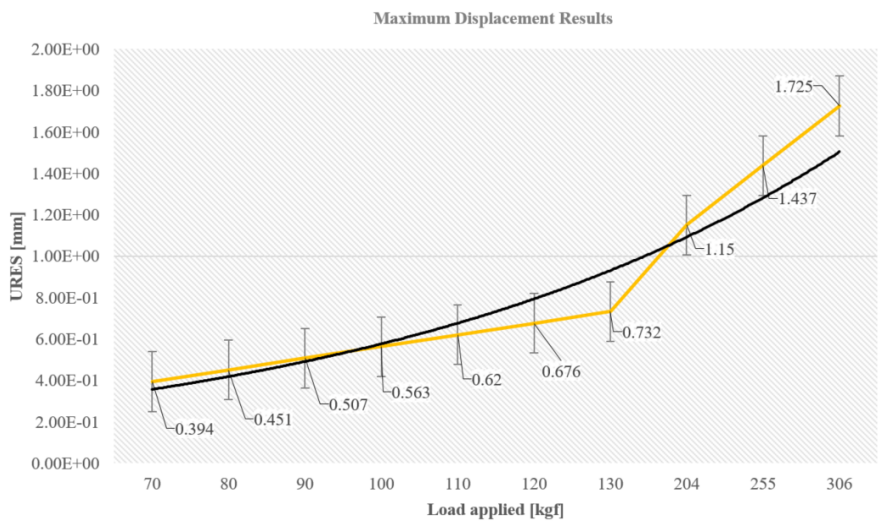

(**b**)

Fig. 7: (a) Femur model displacement analysis results of an elderly patient in case of F_{10} load; (b) Maximum displacement results [mm] obtained in the case of the femur CAD model, Brăileanu (2020).

The FEA study performed in each load case applied on the femoral head has shown a minimum displacement located in the node 175 and a maximum displacement located node 4, in all load cases. In *Figure 7 (b)* we can identify the minimum and maximum displacement values resulting from each analysis. *Figure 7 (a)* contains the graphical representation of displacement results and how deformations affect the femur virtual model. The femoral head part is the most affected area, displacement values increasing at the same time with the value of the applied load. Such displacement results in the case of an elderly patient suffering from arthritis and bone loss, can cause fractures of the femur which can conduct to a THR surgery, Brăileanu (2020).

Conclusions

Nowadays, FEA made with dedicated software is becoming more popular in research and in companies that want to verify the virtual prototype or who want to make design changes to a product and observe how they affect its mechanical behavior. Although in the case of human-designed shapes, the studies may seem simplified due to a so-called standard geometry and most of the times, due to the assigned material that is usually homogeneous, the virtual analysis of the mechanical behavior of human organs or anatomical parts must be radically simplified because of the complexity of the human body, geometric surfaces, tissue composition, patient's degrees of freedom, patient's mobility, patient's age, numerous variables which unfortunately cannot be fully taken into account, Brăileanu (2020).

Using CT scans of an elderly female patient diagnosed with arthritis at the left hip joint, bone segmentation was perform in order to obtain CAD models, which were used to performed static FEA studies at different loads in the pelvis acetabulum and on the femoral head, where normally stress may occur due to daily activities or as a result of injuries. The results of the study have shown that both, the pelvic model and the femoral model, present high stress values, which can occur due to the poor cortical bone tissue mechanical properties corresponding to female patients over 70 years old, used in the FEA studies. Comparing the analysis results obtained from the pelvis and femur model, we conclude that the femur is more prone to cracks and fractures than the pelvis, especially in the area of the femoral neck, due to its shape and load distribution capacity. Although virtual bone FEA studies are simplified due to the complexity and uniqueness of each patient, they can still provide valuable information regarding bone failure prediction, Brăileanu (2020).

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Selected Aspects of Occupational Safety (Case Study)

Kornelia POLEK-DURAJ

Opole University of Technology, Opole, Poland,
k.polek-duraj@po.edu.pl

Abstract

The article analyses selected aspects of work safety. Particular attention was paid to the accident rate, the number of employees working in hazardous conditions and harmful, nuisance and dangerous factors. The analysis was supplemented by a survey on the fields of work among employees of the wood industry.

Keyword: Work Conditions, Hazardous Condition, Wood Industry.

Introduction

Occupational safety is closely linked to the work environment organisation [In the book by Gembalska-Kwiecień (2015)], which impacts on human well-being, health, productivity and length of working age. Appropriate creation of work environment allows the organisation to develop, compete on the market and function in accordance with the applicable occupational health and safety standards. Therefore, it is a fundamental factor influencing the effective growth of every business activity. There are many factors of work environment that may have a negative impact on occupational safety (e.g. poor organisation of work, occurrence of onerous factors), which may have a destructive influence on the employee's well-being. They usually result in reduction of physical or mental performance and excessive fatigue leading to reduced productivity or accidents in the workplace. They also often have more serious health consequences, such as disabilities as a direct result of occupational accident or diseases. The work environment plays an important role in all sectors of the national economy. One of them is the furniture industry, which for many years has been one of the most dynamically developing branches of the Polish economy. Polish furniture is sold all over the world and its production is one of the most significant industries of both Polish and world economy. In 2019, the Polish furniture industry reached the value of sold production of 49 billion zloty, which accounted for over 4% of the total sold production of own products[1]. Approximately 90% of the produced furniture is exported[2], Analysing the statistical data, it can be noticed that companies that have mastered the furniture market in Poland are primarily micro and small enterprises (they account for over 98%[3] of the total number of entities on the furniture manufacturing market), a large proportion of which are family businesses. Unfortunately, the sector, in spite of significant sale successes, technological, technical and organisational progress, is characterised by numerous factors that negatively influence the quality of working conditions and non-compliance with contemporary OHS standards. It is reflected in the high level of threats and a large number of accidents at work, which weaken human capital to a large extent.

The Essence of Work Environment

The work environment is a crucial element of physical and psychosocial factors influencing the employee in the workplace. It is of relative importance as it refers to an individual, i.e. it is perceived variously by superior or subordinate. Thus, the work environment is central part of human environment. In order to properly illustrate the work environment with regard to safety, the concept of working conditions needs to be clarified. The term "working

[1] https://stat.gov.pl › gfx › produkcja_wyrobow_przemyslowych_w_2018_r [dostęp: 20.10.2019]
[2] http://www.biznesmeblowy.pl/rynek_mebli/111/produkcja_sprzedana_mebli_w_2018_roku_niespelnione_prognozy,16435.html [dostęp: 20.10.2019]
[3] Obliczenia własne na podstawie publikacji „Zmiany strukturalne grup podmiotów gospodarki narodowej w rejestrze REGON, 2018 r." GUS – Warszawa 2019

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conditions" used both in the scientific literature and the practice of economic life has not yet been precisely defined. It usually refers to " the totality of physical and psychosocial factors that originate in the work environment and affect individuals at work" [In the book by Pocztowski (2008)],. The term "working conditions" is often associated with the term "work environment" (In a research study by Gajdzik (2014)) . It is reflected in the detailed division of working conditions, which comprises organisational and technical elements (incorporating physical work environment and work organisation), economic elements (related to working conditions in terms of among others type of contract, remuneration, additional benefits for employees) and social elements (including interpersonal relations between superior - employee and employee - employee) [In the book by Dunlop and Williams (1997)]. The literature also distinguishes aesthetic factors(e.g. interior design, room equipment), sanitary and hygienic factors (e.g. social facilities), provisional factors (e.g. time spent at work,) content of work (e.g. scope of duties entrusted to employees) [In the book by Dunlop and Williams (1997)]. . Working conditions and workplace threats (e.g. caused by the specificity of production or technology used) constitute the integral part of professional functioning of an individual employee. The influence degree on the employee and its work depends on:

- type of factor, time and duration of action and severity,
- nuisance of work,
- individual resistance and sensitivity of a person to a given factor and state of health and current condition.

It is challenging to demonstrate the connection between these factors and their impact on workers. It cannot be assumed that the presence of harmful factors, burdensome or dangerous to health is equivalent in every case to potential risk of accident at work or occupational disease. Thus, they do not always determine whether or not work in given company is carried out in safe conditions. Properly implemented safety policy should be a key element in any company that aspires to be competitive on the market.

Characteristics of the wood and furniture industry in Poland

The wood and furniture industry in Poland has a long tradition. According to the Polish Classification of Activity (PKD), the sector comprises three divisions:

- Forestry and logging,
- Manufacture of articles of wood and cork, except furniture and manufacture of articles of straw and plaiting materials,
- Furniture production.

The furniture manufacturing division is the most thriving, as it dominates in terms of share of sold production, accounting for over 55% for the entire sector. It is an important indicator of sold production, which is one of the key parameters describing the state of the economy. It presents how quickly companies manage to sell their goods, i.e. what is the demand for the goods on the market. If the indicator is growing systematically, the economy is developing. If it is very high, one can speak of dynamic growth. A fall in the rate of sold production indicates a slowdown in the economic development. The statistics for 2020 will present this situation. It will be a consequence of the downfall that occurred in Poland due to COVID - 19 pandemic in the second quarter of 2020. So far, the furniture industry has been one of the fastest growing processing industry in Poland. For many years, the sales of furniture manufacturers have remained at 2% of GDP, and their share of total employment in the processing industry has been approximately 7%[4]. It is twice more than in the European Union. Poland is the sixth largest furniture producer in the world, with nearly 3% of world furniture production[5]. In terms of trade balance in international turnover, the Polish wood and furniture sector is inferior only to the Chinese and Italian sectors. At present, there are almost 31 thousand registered companies (as of 31.12.2019[6]) and according to the Central Statistical Office, more than 161 thousand people work[7].

Furniture production involves a number of various processes. Among the most important are: wood preservation, sawing, drying, wood panel production, mechanical processing, sanding, mortar, bleaching, dyeing, polishing, sandblasting, varnishing, assembling and finishing. Usually these processes occur in more than one plant. At each stage of production, workers are more or less exposed to hazardous, onerous or harmful factors. According to the

[4] Zatrudnienie i wynagrodzenia w gospodarce narodowej w 2019 r. GUS, Warszawa 2020
[5] http://www.pkobp.pl/media_files/87bf3f81-8f82-4934-9b05-3eb7f05a87a0.pdf [dostęp:15.05.2020]
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latest data of the Central Statistical Office (GUS) (dated on Dec. 2019), one in eight workers employed in the furniture industry works in dangerous conditions. Employees are most often exposed to noise, dust, chemicals, mechanical vibrations and incorrect lighting of the workplace. The degree of risk is largely determined by the technology used. At the same time, industry is characterised by a relatively high accident rate. It is most often caused by a lack of adequate protection of the workplace, defective machines (e.g. lack of a device protecting against the rejection of material) and simply inattention of employees. Interestingly, the accidents that occur are not always a consequence of poorly functioning obsolete machines, and more and more often they occur while using modern equipment. They are frequently a result of incompetence, recklessness of the employee and negligence of the employer (e.g. lack of a workplace instruction for safe work, inadequate training).

Selected aspects of occupational safety (case study)

In order to determine the level of occupational safety of persons employed in the furniture production in the Opole region, the analysis was performed to establish the number of workers exposed to hazardous conditions, the accident rate and reasons of accidents. The research was conducted in February 2020 in randomly selected plants, the representatives of small enterprises. Their selection results from the fact that small business account for over 90% of all economic entities in this sector, both in the Opole region and Poland. The study covered 80 plants with diverse market positions. The analysis used both the data provided by the Central Statistical Office and the plants. The data for analysis were adopted for the years 2010-2019. The research was complemented with the evaluation of interviews on safety awareness at workplace among randomly selected employees.

Table 1: Employment under threat of life between 2010-2019 (per 1000 employees)

Specification	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
industrial processing in total	142,9	138,2	100,6	138,1	133,1	126,1	124,1	119,9	118,7	118,6
wood and furniture industry in total	253,3	251,9	244,4	247,1	237,4	221,0	212,5	193,0	196,7	193,5
furniture industry	212,9	197,1	183,0	190,6	180,4	155,5	136,3	136,8	134,3	130,9
wood and furniture industry, opolskie voivodeship	261,3	194,6	189,0	213,1	170,2	155,2	184,6	153,2	183,6	180,1
furniture industry, opolskie voivodship	199,7	166,0	145,9	162,1	129,0	105,6	96,5	91,5	132,3	121,8
analysed plants	208,1	209,5	200,8	164,7	147,5	128,9	110,2	112,8	129,4	120,1

Source: Own study based on data obtained from the Industry Statistical Yearbooks 2009-2017 and the analysed plants.

Considering the employment rate in hazardous conditions, it can be seen that both the wood and furniture industry in general and the furniture industry itself in Poland are characterised by significantly higher values than the average for the entire industrial processing, despite a systematic decline since the beginning of the analysed period. It is particularly evident in the wood and furniture industry, which largely stems from occupational safety situation in the sawmill industry. During the investigated period, on average every sixth employee is exposed to hazardous work. The state is comparable in the Opole region, apart from the years 2013-2016, it was considerably lower then. Unfortunately, according to the latest data, it has increased again and the situation is at a comparable level to national data. However, it is worth noted that the rate of employment in hazardous conditions in furniture production in examined period has decreased, but not to a satisfactory level. It indicates that the level of occupational hazards is exceedingly high in the industry in question. Moreover, the level of risk did not change significantly during the period considered. Therefore, it can be concluded that both in the Opolskie Voivodship and in Poland, insufficient measures have been taken to eliminate or at least reduce occupational hazards.

Over a period of two five-year periods, the study was carried out in terms of the level of risk in examined establishments, detailing harmful, dangerous and burdensome factors at the workplace. On the basis of synthetic data presented in the table, it can be concluded that more than half of the employees work in hazardous conditions. Nevertheless, it can be seen that there has been a slight improvement over 5 years. The highest level of risk is caused by factors occurring in the work environment, which is largely due to the specific nature of the furniture industry. A high level of risk (more than ¼ of respondents) results from mechanical factors, using obsolete and exploited equipment in the production process. Practically all factory owners admitted that significant impact on the

situation is a consequence of extremely high costs of purchasing modern machines and tools. The relatively lowest percentage are workers who are exposed to hazards associated with the nuisance of work, which may indicate that mere operation of machines, tools or other equipment does not cause greater problems.

Table 2: Persons employed in hazardous conditions – dangerous, harmful and burdensome conditions in the factories investigated in years 2010-2014 and 2015-2019 (%)

specification	Total employment in hazardous conditions	Hazards related to working environment	Hazards related to nuisance of work	Hazards related to mechanical factors
2010-2014	62,3	58,9	14,5	26,6
2015-2019	55,8	54,2	18,7	27,1

Source: Own study based on data obtained in the analysed plants.

Considering that greatest risks to workers' health and life arise from the physical work environment, on the basis of a thorough analysis of the data, it has been established which are relevant and to what extent (table 2). Noise is the greatest threat, both in the wood and furniture industry, as well as in the furniture manufacturing sector and in the analysed plants. In all plants, it significantly excessed acceptable standards. Wood dust and chemicals contained in adhesives, varnishes, paints and preservatives correspondingly represent relatively high degree of risk. Every fifth employee is exposed to them. It is worth noting that it is only in the case of chemical substances that a higher level is recorded in relation to the wood and furniture industry in general. The lower percentage of employees in the other sections is not solely due to better working conditions in this aspect, but resumes from the fact that work with adhesives, various impregnates, etc. is an insignificant part of their duties. In addition, in some plants, workers are exposed to too high or too low temperatures, but it is more than twice as low as the industry in general. Since, unlike most other branches, furniture production is located indoors to a large extent it results in good conditions in this regard. The frequency of remaining risks is negligible and of low importance to the health of employees in the analysed factories.

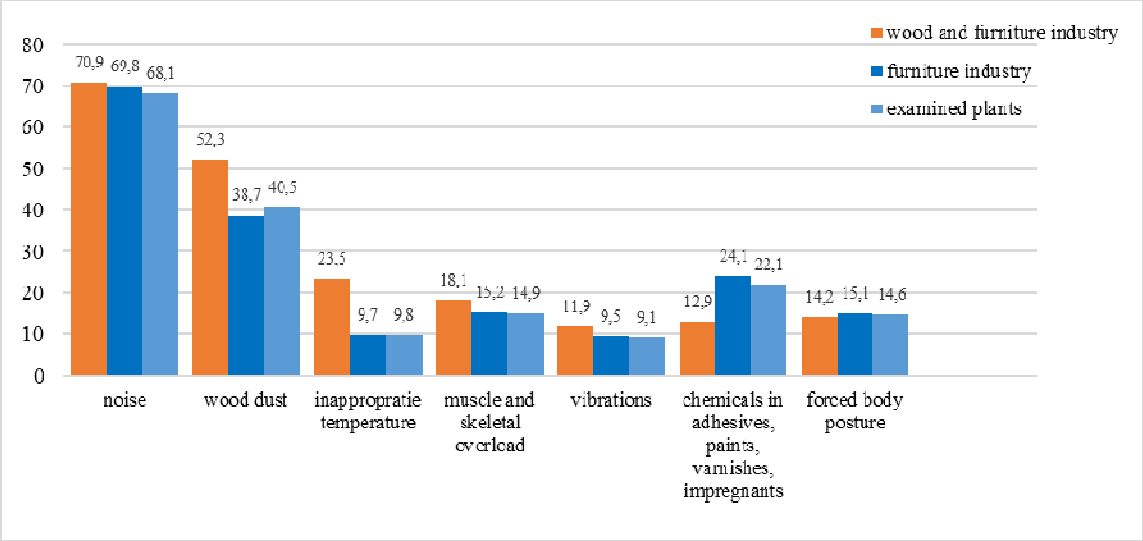

Fig. 1: Structure of workers exposed to hazards related to the work environment in the examined plants in comparison with the furniture industry in general and the wood and furniture industry in the Opole region in 2010-2019 (in %)

Source: Own study based on data obtained in the analysed plants and data from WUS in Opole.

On the basis of the data presented in table 4, it can be noticed that the level of accidents in the analysed sector both in general and in the analysed plants in Opolskie Voivodship is definitely higher than the national average in industrial processing. It also exceeds the average of the wood and furniture industry. It is worth noting, however, that in both cases data presents a downward trend, although recently it has been rather symbolic. On this basis, one

can be tempted to state that working conditions, and particularly the physical work environment in the manufacture of furniture, pose a fairly high risk to health.

Table 3: Accident rate per 1000 employees in industrial processing, in the wood and furniture industry in Poland and in the analysed plants in 2010-2019

Specification	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
industrial processing in total	12,20	13,10	13,60	12,50	11,64	11,59	11,12	10,99	10,64	10,23
wood and furniture industry in total	14,10	15,20	15,70	14,30	13,74	13,39	12,78	12,40	12,32	12,31
furniture industry	14,80	15,50	16,20	14,90	13,36	12,79	12,52	12,03	11,98	11,58
wood and furniture industry, Opolskie voivodeship	16,60	15,80	15,20	15,10	14,30	13,01	12,98	12,70	12,40	12,35
furniture industry, Opolskie voivodship	16,10	15,30	15,10	14,80	13,90	13,70	13,10	12,50	12,45	12,41

Source: Own study based on data obtained from the Industry Statistical Yearbooks for the years 2009-2018, information obtained from the Informatorium of the Central Statistical Office in Opole and data obtained in the analysed plants.

Analysing the data presented in table 4, it can be concluded that most accidents in the wood and furniture industry as well as in analysed plants are caused by mistakes made by the employees themselves. Among the most common reasons resulting from the human factor, the incorrect behaviour of employees (the cause of more than half of all accidents) is mentioned. To a much lesser extent, there are: employee arbitrary behaviour, deliberate non-use of protective equipment and improper physical condition of the employee.

Table 4: Reasons for accidents at the workplace in the wood and furniture industry in general and in selected plants of the furniture sector in the Opolskie Voivodeship in 2010-2019 (%)

Human factor			Organizational factor			Technical factor		
Wood and furniture industry	furniture industry	examined plants	wood and furniture industry	furniture industry	examined plants	wood and furniture industry	furniture industry	examined plants
78,7	75,9	77,7	10,1	7,7	7,1	12,2	16,4	15,2

Source: Own study based on data obtained in the analysed plants and data from Central Statistical Office in Opole.

It is worth noticing the discrepancies between the reasons in the sector in question and the entire industry. Furniture manufacturing plants are characterised by a lower number of accidents resulting from an inappropriate technical and organisational factors thus it may indicate relatively good work organisation and properly prepared equipment. Unfortunately, considering the human factor, it is more significant for furniture manufacturing plants than for other sectors of the wood and furniture industry. It is more alarming, as technical and organisational reasons of accidents can be reduced to a minimum, while reducing human causes is complicated, since often the behaviour of employees is unpredictable. Therefore, it can be concluded that it will not be feasible to improve working conditions and work quality unless on the one hand, workers themselves deliberately ignore health and safety recommendations and, on the other hand, employers knowingly or unknowingly put their health and even their lives at risk.

The information on occupational safety is complemented by the opinions of 150 production workers who were interviewed individually. In total, 100 interviews were conducted (85 men - 15 women). The low number of women in the survey results from the nature of work (heavy and arduous), mainly men work in production sectors. Most of the respondents have secondary and vocational education and work experience longer than 5 years. Each

employee answered 5 questions. The first one referred to the issue of providing personal protective equipment by the employer.

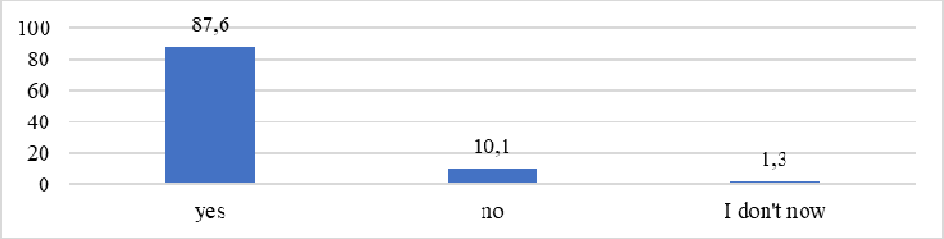

Fig. 2: Provision of personal protective equipment by the employer (in %)

Source: Own work based on conducted surveys.

Examining the data presented in figure 1, one can notice that every tenth person surveyed responded negatively. A low percentage of respondents have not possessed any knowledge in a given subject. Therefore, it can be determined that employers have not violated health and safety regulations in this respect. The first question was supplemented with verification whether the respondents use personal protective equipment. Here, the answers were quite surprising, since as many as ¼ of the respondents admitted that they violated the regulations in this respect (table 4). It may indicate that control in this regard is inappropriate.

Table 5: Structure of respondents' use of personal protective equipment

Do you use personal protective equipment?		
Yes, always	Yes, but not always	No
73,9%	24,3%	2,3%

Source: Own work based on conducted interviews.

The distribution of responses is even more alarming as it has been presented earlier that the industry is characterised by a relatively high level of risk in the workplace. It might lead to the conclusion that employers should enforce the use of personal protective equipment more effectively. Occasionally, it will be sufficient to organise training to raise awareness of the consequences of not using personal protective equipment, or systematic control at workstations combined with consequences if irregularities are found.

The next question was aimed at examining the level of employees' awareness of the numerous occupational hazards in their workplace (Figure 2).

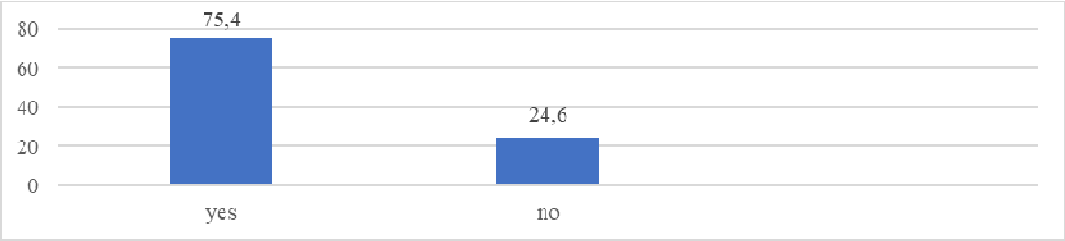

Fig. 3: Structure of workers' awareness of risks at work (in %)

Source: Own work based on conducted interviews.

Unfortunately, it can also be observed that a significant proportion of workers is unaware of the risks in the workplace. Interestingly, even those who responded positively, when asked to indicate the most common ones, were unable to give a clear answer. It is worth noting, however, that despite average awareness of employees of the fact that the employer provides personal protective equipment and occupational hazards, over 85% of respondents have a sense of security both at their workplace and in a company. Individuals expressing different opinion pointed out the lack of regular training in the area of occupational hazards and safety at work, which would be in line with the previous answers. Finally, the respondents were asked whether the feeling of safety at work translates into their satisfaction As it turned out, almost half of the surveyed employees (47.9%) answered negatively. The low remuneration and the lack of an indefinite work contract were primary reasons.

Summary

We are all adapting to live and work in an environment with specific characteristics. Deviations of environmental parameters from the conditions assumed to be safe may cause a number of negative disorders in human functioning and negatively influence on work and life quality. In the light of the studies carried out, it can be assumed that safety at workplace, during the analysed period, had not improved sufficiently to be considered satisfactory, particularly from the perspective of workers. There is still a high proportion of workers exposed to factors that threaten their health and relatively high accident rate. Moreover, the workers' approach to safety at work leaves much to be desired. Dismissive attitude of superiors is also alarming, as on the one hand, they are unable to motivate their subordinates adequately to use personal protective equipment and, on the other hand, they do not draw the appropriate consequences if health and safety rules are not obeyed in the workplace. Unfortunately, the analysis carried out indicates that the high position of the Polish furniture industry, both on the European and global markets, does not have a sufficient impact on work safety nor on a significant increase in the work environment quality in furniture manufacturing plants. Therefore, it can be concluded that the culture of work safety in the analysed industry requires significant changes, especially in the area of proper control of compliance with the requirements concerning procedures of behaviour at workstations and the use of personal protective clothing/equipment, as well as regular actions raising the awareness of superiors and their subordinates in the area of occupational health and safety. Measures should also be taken to increase external controls in companies, especially small ones, on compliance with health and safety rules. Only then would the employers quickly and more radical address the issue.

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Subjective Well-Being as A Determinant of Consumer Innovativeness in Seniors

Tomasz OLEJNICZAK
Poznań University Economics and Business, Poznań, Poland
tomasz.olejniczak@ue.poznan.pl

Magdalena OLEJNICZAK
WSB University in Poznań, Poznań, Poland
magdalena.olejniczak@wsb.poznan.pl

Abstract

The aging of the population is a long-term trend that began in Europe several decades ago. This trend is visible in the transformation of the age structure of the population and is reflected in the growing share of elderly people in the general population, combined with the corresponding decreasing share of the working-age population. As people age, they undergo general changes in their bodies in the physical, physiological, and mental spheres, which changes their market behavior. The importance of recognizing the attitudes of older people in the process of purchasing products results primarily from the fact that Poland is the fastest aging country in the European Union. Older people are perceived stereotypically as being closed to new things, with strongly shaped traditional attitudes. However, research results show that the senior segment is highly diverse. Increasingly, older consumers show interest in new products and services. The research aimed to determine the impact of subjective well-being on consumer innovativeness. This study was conducted in Poland in 2018 on a sample of 1,617 people. The respondents were selected using the quota selection method; the structure of the sample examined according to the criterion of gender and age was the same as the structure of the elderly population in the Wielkopolska region. The presented research results they indicate, that seniors are not a homogeneous group. At the analyses carried out indicate that the most important determinants of the process of acceptance of product innovations by seniors include, first of all, individual (subjective) variables. The inclusion of subjective well-being consisting of specific individual components in the analyses completed the picture of the shaping of attitudes of seniors towards new products. Older consumers may be an attractive segment for innovative companies.

Keywords: Consumer Behavior, Product Innovation, Older Consumers, Consumer Innovativeness, Subjective Well-Being, Seniors.

Introduction

Population aging is a global phenomenon deeply troubling to economists and policymakers due to its numerous economic and financial implications. In many European countries, and above all in Poland, this trend has been on the rise in recent years, and the effects are becoming increasingly noticeable.

At the end of 2018, the population of Poland was 38.4 million, including more than 9.5 million people aged 60 and over (approximately 25%). The share of people aged 60 and over in the general population increased from 14.7% in 1989 to 24.8% in 2018 (an increase of 3.9 million people). In the subpopulation of older people, the largest group (almost one-third) are 60-64-year-olds, the number of whom has increased by more than half over the last 25 years; the number of people aged over 80 has also increased (17.5% of the total population) (see Table 1). By 2050, the number of people aged 65 and over is expected to increase to 11.1 million (Population forecast for 2014-2050, 2014).

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Table 1: Number of older people and structure in Poland in 2018

	Population in thousands	%
In all	38411.2	
including people aged 60 and above	9508.4	24.75
60-64	2776.0	29.20
65-69	2413.0	25.38
70-74	1595.9	16.78
75-79	1057.7	11.12
80-84	876.5	9.22
85 and above	789.3	8.30

Source: Information on older people in Poland for 2018, 2019

The growing number of older people in Poland is conducive to research in many scientific disciplines aimed at describing and understanding consumer behavior due to aging. Many researchers make the effort to acquire knowledge about the specifics of decision-making in the purchasing processes of older people (Moschis 2003; Moschis 1996; Greco and Swayne, 1997; Ong, 2008; Sudbury and Simcock, 2009). Numerous studies have shown that human aging has a radical impact on consumption and purchasing behavior (Carpenter and Yoon, 2011; Mata, Schooler, and Rieskamp, 2007).

Population aging is a global phenomenon, which is particularly prevalent in developing countries. Therefore, for economists, the role of seniors as consumers has become the subject of numerous scientific considerations; a common thread therein is the statement that the market behavior of older people is highly diverse. At the same time, as is generally believed, the frequent lack of information on how seniors behave leads to the interpretation of their behavior based on specific stereotypes (Moschis 2012; Zniva and Weitzl, 2016).

However, it should be remembered that the actions of enterprises directing their products and services to seniors based only on a false image may be ineffective; hence the need to permanently deepen knowledge about the market behavior of older people. Aging is one of the key future challenges of global life. Of particular interest is the consumption-related decision-making of older people, as a better understanding of this phenomenon would facilitate the effective influence of behavior which would help to secure the economic well-being of, and ensure a better quality of life for, this demographic cohort (Olejniczak and Olejniczak, 2020). Presently, 12.3% of the world's population is aged 60 years or older - a proportion that is expected to rise to almost 22% by 2050. In line with this increase, the annual purchasing power of older people is expected to grow from $8 trillion in 2010 to more than $15 trillion by 2020 (Kearney, 2013). Given this change, companies have an increasing interest in understanding how older people make consumption-related decisions. This interest is driven by the hope of securing a better quality of life in old age through goods that suit this population's respective needs (Moschis, 2012).

The diversity of the course of the aging process considered in three dimensions (biomedical, mental, and social changes), as well as life events and circumstances that occur in the lives of older people, make their behaviors dynamic and highly diversified (Sthienrapapayut, Moschis, and Mathur, 2018). The research results presented so far also indicate that the attitudes of seniors towards innovation are moderately positive, but at the same time difficult to interpret and ambiguous. To deepen the considerations on their attitudes towards innovation, the identification of individual factors influencing the shaping of this process was made. The main goal of the research was to determine the determinants of purchasing and acceptance of product innovations by seniors on the FMCG (*fast-moving consumer goods)* market. As part of the implementation of this goal, it was assumed that the following qualitative factors are of significant importance in the acceptance process: health status, determined by the subjective opinion of consumers; cognitive age, determined by the measure of compliance with their chronological age; and the level of optimism of seniors, expressed by determining their feelings about their independence in terms of functioning in everyday life in the future. All these factors contribute to the subjective well-being of an elderly person.

The literature currently adopts a three-dimensional approach: well-being is created by emotional, personality (psychological), and social elements (Derbis, 2005; Petrescu and Kara, 2018; Cloninger, 2012). Emotional well-being is the subjective assessment of an individual regarding the severity of positive and negative effect, sense of happiness, general satisfaction with life, and satisfaction in its various areas (Román and Toffoletto, 2017). Psychological well-being means the state of human feelings that occur along with one's actions while striving to realize one's potential and living, and social well-being takes the nature of positive experiences of an individual resulting from his belonging

to a given society and community into account (Wojciechowska, 2008; Zammit et al., 2012; Ferring and Boll, 2010; Ulloa, Moller and Sousa-Poza, 2013).

Therefore, the article adopts a broad perspective, interpreting the subjective well-being of older people as: experiencing emotions (well-being related to age identity), level of mood (looking at the future in the context of the possibility of performing daily activities), as well as the level of life satisfaction (related to a subjective sense of health). As part of the analysis of seniors' consumer behavior, an attempt was made to verify the hypothesis that the subjective well-being of older people is an important element influencing their decisions related to the purchasing of product innovations

Method

Research among older people (it was assumed that a senior / older person is a consumer aged 60 years and over) was conducted with the help of a personal interview carried out in 2018 on a sample of 1617 people in Wielkopolska (Greater Poland). Wielkopolska is one of the largest regions in Poland (the second-largest region in terms of land area in square meters (m^2)), with the third-largest population - but with the lowest rate of aging in the country (taking into account the number of people over 60). Product innovations appearing on the *fast-moving consumer goods* (FMCG) market were analyzed: food, health products - parapharmaceuticals / medical, cosmetics, and household chemicals. The selection of respondents was carried out using the quota selection method, and the structure of the research sample according to the criterion of gender and age was the same as the structure of the elderly population in Greater Poland[1].

Sample

The respondents were selected using the quota selection method; the structure of the sample (see Table 2). examined according to the criterion of gender and age was the same as the structure of the elderly population in Wielkopolska.

Table 2: Structure of the sample in 2018 (%)

Age groups	Altogether	Women	Men
60-64	36.8	57.5	42.5
65-69	27.3	58.8	41.2
70-74	16.3	55.7	44.3
75-79	9.2	61.5	38.5
Over 80	10.4	72.6	27.4

Source: Own research

Measures

As part of the analysis, descriptive statistics were used to determine the structure of the surveyed population: structure and intensity indicators (proportions, percentages), location and variability measures (mean and standard deviations). The coefficients of variation of two independent variables referred to the correlation between variables measured on a quantitative (student t-test) and qualitative (Kendall) scale (Akoglu, 2018; Croux and Dehon, 2010).

Results

One of the determinants of shaping attitudes towards innovation is the specific attitude of seniors to changes in the environment. Researchers have noted the diversified approach of seniors to changes in the environment, which are reflected in attitudes of activity or withdrawal (Stuart-Hamilton, 2006). Research results indicate that the innovation of senior consumers, measured as interest in new products, should be assessed as moderate. Among respondents, one in three respondents (34.9%) is interested in new products, but only one in 10 (12.2%) looks for additional information and finally makes a purchase. Slightly more than one-fifth (22.3%) sometimes take note of product innovations, but rarely buy them (see Table 3).

[1] Based on the statistical chi-square (x2) test, the p-value was calculated, which was 0.74 (age) and 0.99 (sex), respectively. The values indicate that the structure studied is the same as the structure (age and gender) of older people in Wielkopolska (p–value > 0.005).

Table 3: Interest in product innovations by senior consumers

How interested are you in innovative, new products?	%
I am not interested and I do not buy such innovative products	16.0%
I am not interested, but sometimes I buy such products – as and when I need them	28.2%
I know there are such products, I can see them in stores, but I rarely or never buy them	21.3%
I'm interested, sometimes I take note, but I rarely or never buy (for various reasons)	22.3%
I am interested in looking for information on and buying innovative products	12.2%

Source: Own research

A similar-sized group of respondents (21.3%) notice market novelties in stores, but rarely or never buy them. 44.2% are not interested in new products, although at the same time 28.2% of those who are not interested declare that they buy new products in certain cases.

The results of the survey indicate the existence of two groups of seniors with different attitudes towards innovation: consciously innovative consumers (engaged in seeking information about new products and active shopping) and market conservative consumers (showing a lack of interest in new products). The largest group of respondents is a group which represented the full spectrum of behaviors that can be characterized from cautiously innovative (sometimes interested but rarely or never buyers) to innovatively unaware (declaring a total lack of interest in new products, but not ruling out purchasing in specific situations).

Three elements were adopted as components of the subjective well-being of seniors: an assessment of subjective health, an assessment of the prospects for independence in performing everyday activities in the future, and the subjective perceived age. The research results show that the seniors surveyed generally assessed their health quite positively. Almost half (47.9%) of respondents say that they feel well or very well, 28.4% of respondents sometimes feel more ailments, and only 23.8% declare that they are chronically ill and are under constant medical supervision (see Table 4).

Table 4: Subjective health of seniors

	%
Very good - I don't get sick	9.3%
Quite good - I have minor ailments	38.6%
Neither good nor bad - sometimes I suffer from greater ailments	28.4%
Quite bad - I have a chronic disease, I am under medical supervision	18.5%
Very bad - I have several types of diseases, I am constantly undergoing treatment	5.3%

Source: Own research

The subjective assessment of the health condition of seniors is varied, and the decisive factors in determining it are the chronological age, cognitive age, and the optimism of older people regarding independent functioning in the future (see Table 5).

Table 5: Correlation coefficients between the selected variables and the subjective assessment of health

Variables / Features	**Health of seniors**
Age	0.355**
Cognitive age	0.322**
Life optimism	0.333**

*** Correlation significant at the level of 0.001.*
Source: based on research results, 2018.

The results of the analyses conducted show that people who are younger, both in terms of age and mindset, and those thinking about the future in a positive way, more often assess their state of health as good and very good.

Chronological age, denoting the actual age of the consumer, has always been one of the main criteria of segmentation, as the prevailing opinion is that the use of this criterion is necessary because age determines consumption needs, habits, and lifestyle, and thus may be a significant predictor of changes in consumption behavior (Amatulli, Guido and Nataraajan, 2015). However, the development of knowledge about consumer behavior means that a view about the limitations of inference based on chronological age is increasingly prevalent.

It was noted that in terms of differentiation of consumer aging processes resulting from the passage of years as a result of biological and psychological changes, the variable chronological age is characterized by ambiguity in explaining consumption phenomena. It has increasingly been noticed that a given older person feels younger than he or she actually is, and this is reflected in the decisions he or she makes (Sherman, Schiffman, and Mathur, 2001; Van Auken, Barry and Bagozzi, 2006). As a result, the hypothesis that older consumers who feel younger than their birth certificate indicates may also behave like younger people was put forward and positively verified (Szmigin and Carrigan, 2000). Therefore, in consumer research, particular attention should be paid to the psychological concept of cognitive age, which is an image of the subjective perception of the perception of old age by consumers, as it can be considered a factor that explains consumer behavior well (Mathur and Moschis, 2005).

Moreover, the literature emphasizes that consumer purchases can be better explained through the prism of cognitive rather than chronological age (Yoon et al., 2005). Similar conclusions are drawn by other authors: for example, Gwinner and Stephens (2001) argue that cognitive age provides more information about consumer behavior in comparison with chronological age. This conclusion is also supported by Moschis, who clearly emphasizes that changes in recent years have strongly differentiated the aging process of individual consumers; hence, chronological age becomes a limited variable for predicting consumer behavior (Mathur, Mathur, and Moschis, 2011).

Cognitive age has thus proven to be a construct that can explain certain consumer behavior as well or even better than some of the more commonly used variables such as income, education, health, and social activity. Nevertheless, cognitive age may be an insufficient factor to interpret consumer behavior in many areas; hence the cognitive value of analyses of standard demographic data describing consumers is still recognized (Gwinner and Stephens, 2001).

Research results indicate that older people very often feel mentally younger than their chronological age would indicate (Choi, DiNitto, and Kim, 2014). I. Rippon and A. Steptoe (2015) analyzed data from research on aging from 2004-2005, in which almost 6,500 people participated. The perceived age was measured by asking participants the question: "How old are you?" and it turned out that the average age perceived by them was 56.8 years, which is 10 years lower than their actual average chronological age (65.8 years). The 2000 analysis of senior consumers in the United States shows that those aged over 50 feel 10 to 12 years younger than their chronological age (Szmigin and Carrigan, 2000).

Research conducted among elderly people in Wielkopolska confirms the above-mentioned results of other national studies: seniors assess their age as being lower than it really is. Over 42.5% of respondents believe that they feel younger than their birth certificate indicates. A third of those surveyed (36,8%) indicate that their cognitive age is equal to their real age, whereas one in every five seniors (20,7%) declares that subjectively they feel older than they really are (see Table 6).

Table 6: Cognitive age of seniors

	%
I feel older than I actually am	8.4%
I feel slightly older than I actually am	12.3%
I feel my age	36.8%
I feel slightly younger than I actually am	30.2%
I feel much younger than I actually am	12.3%

Source: Own research

Correlation analysis allows us to determine the relationship between the assessment of one's cognitive age and the variables describing the respondents. It turns out that the subjective sense of age fundamentally determines the optimism of seniors regarding the future, subjective health condition, chronological age, and the level of education (see Table 7). The more optimistic older people are about the future (in terms of coping with everyday activities), the better they assess their health condition, the higher the level of education they have, and the more often they consider themselves younger than their date of birth would indicate.

Table 7: Correlation coefficients between the selected variables and the perceived age of seniors

Variables	**Cognitive age**
Sex	$p < 0.05$
Life optimism	-0.392^{**}
Health	-0.322^{**}
Age	-0.280^{**}
Education	0.183^{**}

Social activity	-0.180**
Financial situation	0.159**

*** Correlation significant at the level of 0.001.*
Source: based on research results, 2018.

Social activity also influences cognitive age, as seniors who maintain intense interpersonal contacts are more likely to express the opinion that they feel younger. The literature also draws attention to the fact that women are more sensitive to negative stereotypes about old age (Barak and Schiffman, 1981).
The third component of the subjective well-being of older people is the individual assessment of independence in performing daily activities. The vast majority of seniors (68.5%) declare that in the future they will be able to cope alone or with a limited amount of help from their loved ones (see Table 8). Almost one in three respondents (31.5%) is now aware of their limitations and expects constant or temporary help from the environment in performing many daily activities.

Table 8: Life optimism of seniors

In the future:	%
I can handle it on my own - I will do most of my daily activities on my own	28.8%
I can cope with a little help from my relatives - sometimes, at certain times, my relatives will help me with my activities	39.7%
I will most likely require help - I think I will most likely require more help from my loved ones	19.5%
I expect others to help me - I know I can't do it alone	12.0%

Source: Own research

As may be assumed, the assessment of the future is largely based on the assessment of the present, and in the case of seniors, the assessment of the health situation and feelings about age is essential (see Table 9). To a very large extent, older people also associate their optimism regarding their future health and mental functioning with their financial situation and level of education. It may also be noted that seniors who lead an active lifestyle based on social relationships look to the future more positively and assess that they will perform most of their daily activities independently.

Table 9: Correlation coefficients between selected variables and the life optimism of seniors

Variables	**Life optimism**
Health	0.333**
Age	0.272**
Education	-0.155**
Financial situation	-0.206**
Social activity	0.148**
Cognitive age	-0.392**

*** Correlation significant at the level of 0.001.*
Source: based on research results, 2018.

The results of the study confirm that the innovativeness of senior consumers (measured by declarations of interest and the frequency of purchasing new products) depends in a statistically significant manner on the assessment of their subjective well-being. The better the health assessment, the lower the cognitive age and the greater life optimism, the more often interest in innovative products is declared, which also translates into subsequent purchases of new FMCG products (see Table 10).

Table 10: Correlation coefficients between subjective well-being and the level of interest in new products and the frequency of their purchase

Components of the subjective well-being of seniors	How interested are you in innovative, NEW products?	How often do you buy innovative products?
Health	-0.221**	0.401**
Cognitive age	0.245**	-0.608**
Life optimism	-0.222**	0.400**

*** Correlation significant at the level of 0.001.*
Source: based on research results, 2018.

The analysis of the research results based on the correlation of Kendall's coefficients shows that the subjective well-being of seniors significantly affects their interest in innovative products on the FMCG market, and is also of fundamental importance in the process of their purchasing behavior. This is highly interesting and requires further research into significant dependencies: real consumer behavior (in the form of research results on the frequency of buying new products) is more strongly correlated than the declarative interest in purchasing innovations by seniors.

Conclusion

Summarizing the presented research results, it should be clearly stated that seniors are not a homogeneous group. Various psychological and social factors significantly determine their attitudes toward product innovations. At the same time, the analyses carried out indicate that the most important determinants of the process of acceptance of product innovations by seniors include, first of all, individual (subjective) variables. The inclusion of subjective well-being consisting of specific individual components in the analyses completed the picture of the shaping of attitudes of seniors towards new products. At the same time, research results suggest that cognitive age may be a precise criterion explaining the diverse attitudes of older people towards product innovations in the FMCG market. It complements the view found in the literature that age may be treated as a set of many variables: life satisfaction, self-confidence, physical and social activity (Sherman, Schiffman, and Mathur, 2001; Barak, et al., 2001). A wider approach to perceived age than in the case of chronological age enables the analysis of the identity of seniors, especially their belonging to many groups with differing attitudes towards innovation: reluctant conservatives (seniors not interested in innovation, and look ahead with pessimism), knowledgeable traditionalists (older people with a sober view of their lives, who do not buy new products due to traditionalism, but notice new products in the commercial offer), aspiring withdrawn/passive (seniors with a diverse approach to innovation, interested, sometimes buyers, but still withdrawn, looking at the changing reality with a sense of worry), unaware practical (elderly people with a practical approach to shopping, who are not interested in new products, looking optimistically at the present and future), rational innovators (interested in new products, very positive about the future) (Olejniczak, 2019). Thus, the cognitive age category enriches knowledge about seniors, emphasizing diverse patterns of behavior, and ultimately has a fundamental application, especially in the market segmentation process.

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Analysis of The Y Generation's Advertising Perception

Jakub HORVÁTH
Faculty of Management, University of Prešov, Prešov, Slovakia
jakub.horvath@smail.unipo.sk

Abstract

The article focuses on the perception of advertising and its evaluation by the generation of the Millennials. The basic population for the purpose of the survey is the millennials of the East Slovakian region. 180 respondents were surveyed and it was possible to include 154 respondents' answers based on the criterion of completeness of completed questionnaires. Data collection was conducted through simple random sampling in January and February 2019. To verify the hypotheses, we used the StatSoft SPSS software. Due to the nature of the analysed variables we used Cronbach´s alpha and Mann Whitney U test. Based on the research findings, the respondents did not know or did not want to rate the internet advertising (banner, context, advertising on social networks, e-mail advertising). The generation of the Millennials evaluate internet advertising as more negative than the traditional advertising. This output suggests to some extent the so-called "advertising blindness". The result of the hypothesis verification is that there is a significant difference between the ranking of traditional and internet advertising in the generation of the Millennials. These results are very interesting if we confront them at the level of the global tendency of advertising perception by Y generation representatives.

Keywords: Advertising, Advertising Perception, Ad Ranking, The Millennials.

Introduction

People are hit by an enormous amount of ads trying to get their attention from various media - television, print media, radio, and now even the Internet. With this number of promotional messages, businesses that do not use marketing communication are in the shadows of those who use it (Hagyari, Bačík and Fedorko 2016). Every company that builds its promotional activities only on the recommendations of its customers does not very often achieve what we call magnetism (Turner and Shah 2014; Lizbetinová et. al. 2019). However, if the company wants to achieve it, it should focus on developing the right strategy for marketing communication (Bačík, Mihal and Fedorko 2015). Marketing is an activity, a set of institutions and processes that have been created to communicate, deliver and exchange offers that are valuable not only to customers but also to other stakeholders and the general public (Lamb, Hair and McDaniel 2012; Mura and Kljucnikov 2018). In traditional marketing theory, we should be familiar with McCarthy's 4P model, which deals with product, price, placement and promotion (Dann and Dann 2011). Marketing communication is, according to Ferencová and Butoracová Šindleryová (2009) "any form of controlled communication used by organizations to inform, persuade or influence consumers, intermediaries and even certain groups of the public". In the traditional marketing theory, marketing communication tools include advertising, public relations, personal sales, sales promotion, direct marketing and etc. (Armstrong et al. 2009). E-marketing is a form of marketing where the application of IT tools and the Internet allows marketing tools and activities to focus on the defined relationships (Molenaar 2012). Molenaar further claims that e-marketing consists of three sub-areas: marketing, information technology and Internet. E-marketing helps to create customer demand by using the power of the Internet (Mudrík and Fedorko 2010). It gives businesses the opportunity to exchange attention for value (attention economy) (Frankovský and Birknerová 2014). E-marketing tools help building a long-term customer relationship. Moreover, the e-marketing environment is very well measurable (Stokes 2013; Mura, Marchevská and Dúbravská 2018). Dorčák (2012) states that traditional forms of e-marketing communication include: website, contextual advertising, banner advertising, search engine advertising; PPC advertising, e-catalogues, e-mail marketing and public relation (Štarchoň et. al. 2018; Štefko, Bačík and Fedorko 2014). A website is a document containing hypertext, images, and other multimedia elements stored on a web server that is displayed to the user when entering a specific web address in the selected search engine (Fedorko and Kakalejčík 2015). For businesses, it is one of the proprietary media that allows it to communicate with its potential customer (Dorčák 2012). In an ideal world, any Internet user would immediately become a customer (Kovaľová, Frankovský, Birknerová and Zbihlejová

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2019). As the real world differs greatly from the ideal, businesses need to think about the steps that the customer takes before and after the purchase to offer the customer enough information transforming them to customers as soon as possible. The funnel is the best choice for defining a purchasing cycle.

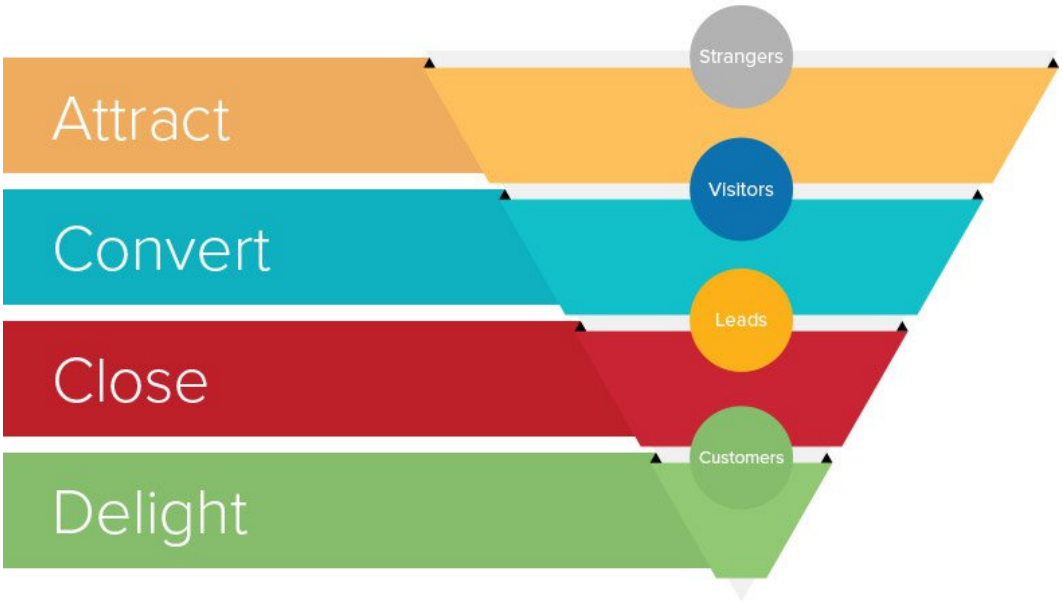

Fig. 1 : Purchasing funnel

The purchasing funnel is the purchasing process that the customer is conducting during the purchase cycle. It usually consists of several phases (Halligan Shah 2014). The definitions of the funnels vary with the author. However, for the purposes of this article, we will use Carter's (2013) purchasing funnel, which is shown in chart 1. The displayed funnel consists of 3 phases and 4 types of people involved in it. We can define these people as follows: stranger – represents an internet user who has not previously visited the business website (Halligan and Shah 2014); visitor – represents the internet user who previously visited the business website (Carter, 2013); lead - represents a visitor who has expressed a deeper interest in the website by providing their contact information in exchange for the content of the website (Scott, 2013; Štefko, Bačík and Fedorko 2014).

Methodology

The main objective of this article is to find out if there are differences in the ranking of traditional and online forms of advertising. Based on this objective, a research question is formulated as to whether: “Are there any differences in the evaluation of internet and traditional Y generation advertising?” Based on this research question, a research hypothesis is formulated:

H1: We assume that there are significant differences between the ranking of traditional and internet advertising in the generation of the Millennials.

The deeper relationships of the conducted research show a portion of inference statistics and part of the analytical processing. In this section, Cronbach's alpha and Mann Whitney U test were used.

For the purpose of this research, the research sample was defined as a new generation of customers represented by the Millennials. As for the definition of the age group of the Millennials, the article follows the methodology of Young (2017) from Ogilvy & Mather. The Millennials are referred to as “Y generation” from the age 18 to 34.

- C Centennials (1995-2012),
- Y Millennials (1977-1994),
- X Generation (1966-1976),
- S Generation (1955-1965).

The inputs to the analyses were obtained through the implementation of primary research, which was carried out using CAWI (Computer Assisted Web Interview). Data collection via an electronic questionnaire was conducted in January and February 2019. It was a quota selection based on the ROD variable, where were efforts to maintain the population ratio, i.e. 52% representing women and 48% representing men. It was an electronic inquiry, where the questionnaires were distributed on the Facebook pages to the groups of the University of Prešov and to other groups of people living in the Prešov and Košice regions. E-mails (from the private address database of the authors) were subsequently sent to identify the gender characteristics. The research was conducted in January and February 2019. Thus, based on the selection, the research has a limitation and therefore it can be generalised only to Eastern Slovakia. 180 answers were collected and in case of the question identifying their generation (how old are they) 26 respondents were eliminated, i.e. the number of selection proceeding to the investigation is 154.

Results

The examined issue points to the perception of advertising and its evaluation by the generation of the Millennials. The following chart shows the gender characteristics ratio.

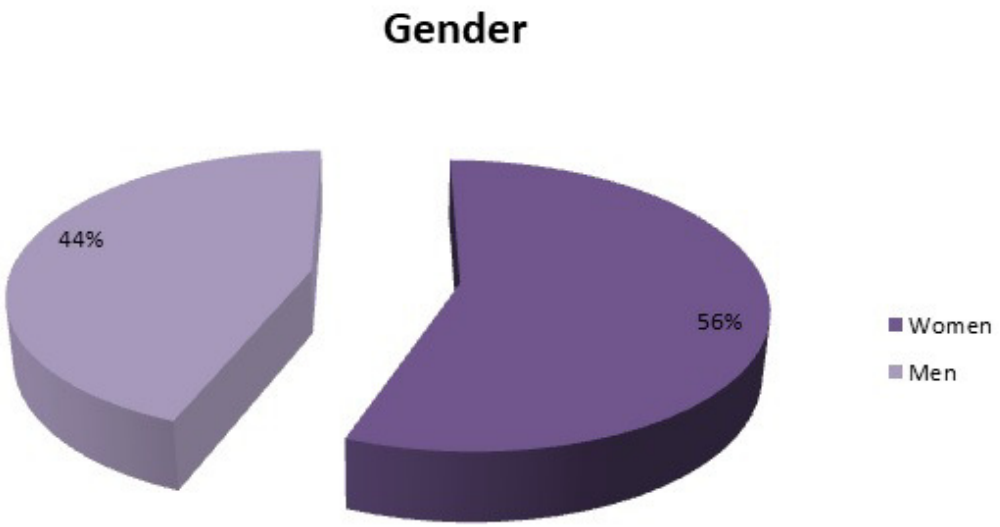

Fig. 2: Gender characteristics – Advertising Rank

The previous chart points to the fact that the selection consists of 55.84% women (86 respondents) and 44.16% men (68 respondents), thus we can talk about the selection approximating the actual population of Eastern Slovakia. The questionnaire for the survey variables (the ranking of individual types of ads) also offered the possibility of not filling out the items. The following table shows the actual frequencies found.

Table 1 Advertising Rank – Frequency

Advertising type	**TV Advertising**	**Banner advertising**	**Contextual Advertising**	**Advertising on Social Network**	**E-mail Advertising**
Valid	152	136	134	152	136
Not filled out	2	18	20	2	18
Advertising type	**Radio Advertising**	**Leaflet Advertising**	**Newspaper Advertising**	**Billboards**	**Posters**
Valid	152	150	154	154	154
Not filled out	2	4	0	0	0

It is noteworthy that the respondents did not know or did not want to rate the internet advertisement (banner, contextual, advertising on social networks, e-mail advertising).

Table 2: Descriptive Statistics - Advertising Rank

Advertising Type	TV Advertising	Banner Advertising	Contextual Advertising	Advertising on Social Network	E-mail Advertising
Negatively					
Rather negatively	62	36	36	34	58
Rather positively	44	42	46	44	58
Positively	32	46	36	54	8
	14	12	16	20	12
Median	2.00	2.00	2.00	2.00	2.00
Mean	1.99	2.25	2.24	2.39	1.81
Std. dev.	1.00	0.95	0.98	0.98	0.90
Advertising Type	**Radio Advertising**	**Leaflets**	**Newspaper Advertising**	**Billboards**	**Posters**
Negatively					
Rather negatively	26	12	8	16	10
Rather positively	52	32	16	30	26
Positively	56	70	88	66	74
	18	36	42	42	44
Median	2.00	3.00	3.00	3.00	3.00
Mean	2.43	2.87	3.06	2.87	2.99
Std. dev.	0.91	0.87	0.76	0.93	0.85

The previous table shows the outputs of descriptive statistics on the subject. Looking at the characteristics of the central tendency it is possible to note that the internet advertising of the generation of the Millennials is rated as more negative than the traditional one. This output suggests to some extent the so-called "advertising blindness". The following sections will be devoted to exact confirmation of the significance of the differences.

H1: We assume that there are significant differences between the ranking of traditional and internet advertising in the generation of the Millennials.

The assumption defined by the previous H1 hypothesis will be verified on average values of traditional and internet advertising. The possibility of average individual items is determined by an acceptable level of reliability. The following table illustrates this.

Table 3: Cronbach's α - Reliability

Traditional advertising		Internet advertising	
α	N	α	N
0.788	6	0.830	4

The threshold for applying the selected item adjustment procedure (arithmetic mean) in terms of reliability is 0.7 (70%), thus the condition can be considered fulfilled. Data were adjusted by arithmetic mean. The following table shows the Mann-Whitney Wilcoxon U test output, and thus the significance of the difference in ranking between traditional and internet advertising.

Table 4: Test - Difference in Ad Rank

Ad rank	
Mann Whitney U	2 949.000
Wilcoxon W	5 577.000
Z	- 5.683
Asymp. Sig. (2-tailed)	0.00

H0: there is no significant difference between the variables.
H1: there is significant difference between the variables.

Based on the p value, which is equal to zero to three decimal places, it is advisable not to reject the alternative H1 hypothesis and to adopt an opinion on the significant difference in the ranking of traditional and internet advertising. The presented output also recommends adopting the basic H1 hypothesis, that there is a significant difference between the evaluation of traditional and internet advertising in the generation of the Millennials. The following chart shows the difference.

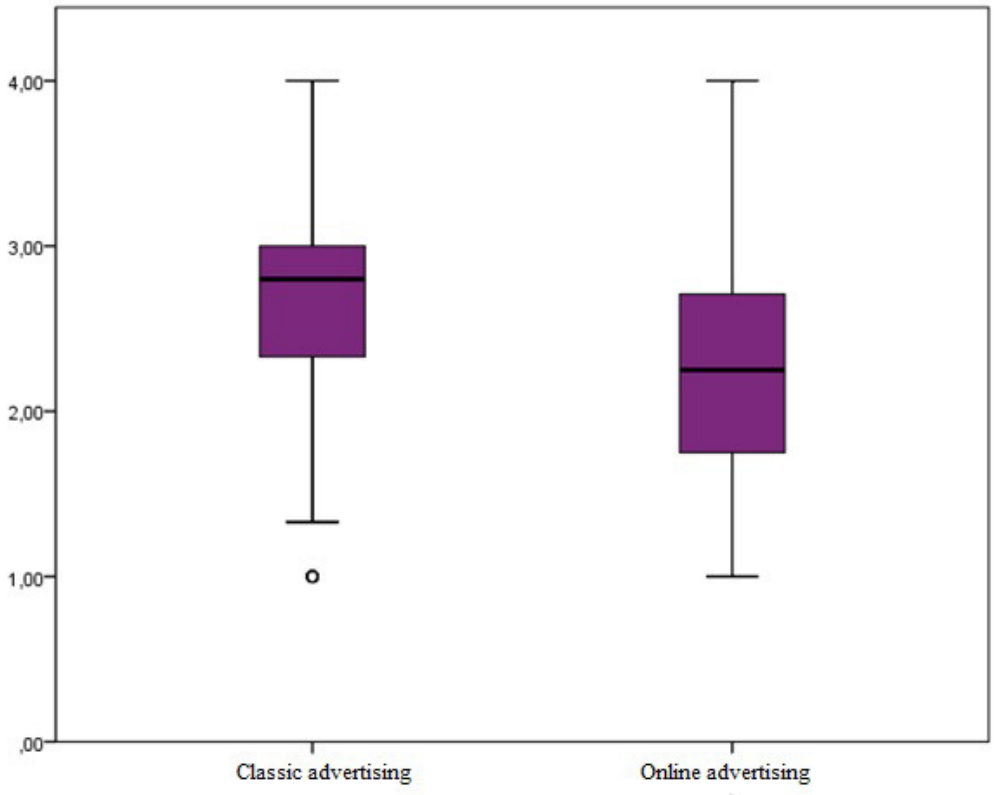

Fig. 3: Rating of traditional and internet advertising

From the above it is clear that the Y generation (the Millennials) evaluate better the classical/traditional advertising. This fact can be a cause of advertising blindness, i.e. the given generation is ignoring the ads on the screen of their smartphones and they are somehow immune to it.

Conclusion

Until recently, businesses have implemented their marketing activities based on traditional marketing communication tools. However, since these tools often required a considerable budget, they were not available for every business. In addition, they only provided one-way communication. However, the arrival of the Internet as a network of networks and

the emergence of social media has changed the situation. Using modern marketing communication tools, even small businesses with limited budgets have the ability to reach out to their target audience, often with minimal cost. In addition, they have the option of two-way communication.

A similar research was carried out by the authors Miklošík, Štarchoň, Vokounova. Korčoková (2020), Bačík, Fedorko, Rigelský, Sroka, Turáková (2018) and Wong and Malone (2016). The research results are very similar to ours, but mentioned researches are focusd especially on TV or SMS advertising. Research carried by Bačík et al. (2018) compares the perception of advertising not on the basis of gender, but on the basis of belonging to generation Y or Z.

Based on the above analysis, we can say that the Millennials do not know or do not want to evaluate the internet advertising. Representatives of the Y generation rated the internet advertising more negatively than the traditional one. This output suggests to some extent the so-called "advertising blindness". Based on the hypothesis we have established, we note that there is a significant difference between the evaluation of traditional and internet advertising in the generation of the Millennials. The y generation (the Millennials) rated traditional advertising as better. This fact can be a cause of advertising blindness, i.e. the given generation is ignoring the ads on the screen of their smartphones and they are somehow immune to it.

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Efecto Mediador De La Gestión Del Conocimiento Entre Las Tecnologías De Información Y El Desempeño Organizacional De Las Instituciones De Educación Superior

Felipe MACHORRO-RAMOS
Universidad de las Américas Puebla, San Andrés Cholula, México, felipe.machorro@udlap.mx

María Vanessa ROMERO-ORTIZ
Instituto Tecnológico Superior de Tierra Blanca, Tierra Blanca, México, vromero@itstb.edu.mx

Paul LEGER
Universidad Católica del Norte, Coquimbo, Chile, pleger@ucn.cl

Dayana JAQUE
Universidad Católica del Norte, Coquimbo, Chile, dayana.jaque@ucn.cl

Resumen

Las Tecnologías de Información y la Gestión del Conocimiento aportan de manera relevante al buen desempeño de las organizaciones. Esto es particularmente cierto en el caso de las instituciones de educación superior. Sin embargo, esta afirmación no ha sido demostrada previamente en la literatura ni tampoco se encuentran informes empíricos que la sustenten al menos parcialmente. Por ello, se realizó un estudio empírico en Instituciones de Educación Superior Tecnológica en México que considera la relación entre estas variables. Los resultados indican que las tecnologías de información influyen positivamente en la gestión del conocimiento, la cual tiene una relación positiva con las tres dimensiones medidas del desempeño organizacional: satisfacción de agentes, desempeño comparado y resultados de gestión. Con lo que mostramos por primera vez que las Tecnologías de Información y la Gestión del Conocimiento es útil para obtener un buen desempeño organizacional en las instituciones de educación superior mexicanas.

Keywords: Gestión Del Conocimiento, Desempeño Organizacional, Tecnologías De Información.

Introducción

El desempeño organizacional es uno de los constructos de mayor interés en los estudios económico administrativos. En un sentido simple, corresponde al indicador de lo bien que una organización está logrando sus objetivos dentro de un entorno cambiante donde la competencia es cada vez mayor (Arena, Arnaboldi, Azzone, & Carlucci, 2009; Li-An, 2011; Richard, Devinney, Yip, & Johnson, 2009).

En el caso de las instituciones de educación superior (IES), la importancia del desempeño organizacional se ve incrementada debido al papel vital que estas organizaciones juegan en el desarrollo del capital humano y crecimiento económico sostenible de una sociedad justa y equilibrada. Por ello es importante, en principio, encontrar métricas adecuadas para evaluar el desempeño de las IES, además de identificar los factores que contribuyen a mejorarlo.

Para contribuir a la solución de tales cuestiones, el presente documento propone utilizar la sección de resultados de excelencia administrativa del modelo EFQM como instrumento de autoevaluación del desempeño organizacional, así como estudiar la relación que tiene el uso de las tecnologías de información y comunicación (TICs) y la gestión del conocimiento con el desempeño en el contexto de las instituciones de educación superior tecnológica en México. Para ello, el escrito se compone de tres bloques. En el primero, se abordan el desempeño organizacional y la relación que las TICs y la gestión del conocimiento tienen con el mismo. En segundo lugar, se describe el método de trabajo. Finalmente, se presentan los resultados y las respectivas conclusiones.

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El desempeño organizacional en las IES

El concepto de desempeño organizacional se basa en la idea de que la organización es una asociación voluntaria de recursos productivos (humanos, físicos y de capital), con un propósito compartido (Richard et al., 2009). Estas fuentes de recursos estarán comprometidas con el logro de los objetivos en la medida que estén satisfechas con el valor que reciben a cambio. La esencia del desempeño es la creación de valor que la organización genera para sus integrantes en función de los recursos que éstos aportan a la misma. De esta forma, la discusión sobre el desempeño organizacional se centra en dos temas principales: para quién debe generar valor la organización y de qué forma debe hacerlo. Tradicionalmente, se identifican como stakeholders de las IES a los estudiantes y personal (académico y no académico), exalumnos, organizaciones profesionales, empleadores, ciudadanía en general, instituciones de educación media, otras instituciones de educación superior y gobierno (Sarrico, Rosa, Teixeira, & Cardoso, 2010; Yorke, 1991).

Un problema central en la medición del desempeño de las IES es identificar los factores que influyen en el logro de los resultados, es decir, los facilitadores o agentes. En el caso del modelo de excelencia de la EFQM, los resultados en clientes, en empleados, en la sociedad y en la gestión, son consecuencia de los agentes o facilitadores (liderazgo, personas, estrategia y alianzas y recursos), pues el modelo asume una relación causal entre facilitadores y resultados. En ese sentido, la utilización del modelo EFQM presenta la ventaja de poder separar a los facilitadores de los resultados y evaluar de forma completa el impacto de la organización en distintos stakeholders.

Así, la evaluación del desempeño en las IES puede ser realizada tomando en cuenta a diversos interesados, tendiendo a modelos que capten la naturaleza multidimensional de este complejo concepto. Es por ello que para tal efecto en el presente documento se propone al instrumento del modelo EFQM (específicamente el bloque de resultados) para la autoevaluación del desempeño organizacional, en la versión de Machorro y Mercado (2015), quienes reportan tres dimensiones del desempeño organizacional en IES mexicanas: Satisfacción de Agentes, Desempeño Comparado y Resultados de Gestión.

Las TICs y la gestión del conocimiento en el desempeño

El efecto que tiene la gestión del conocimiento en el desempeño organizacional ha sido estudiado ampliamente, encontrando en su mayoría resultados positivos y significativos. Tal es el caso de Gholami, Asli, Nazari-Shirkouhi, y Noruzy (2013), quien reporta una influencia de la gestión del conocimiento (adquisición, almacenamiento, creación, intercambio e implementación) en el desempeño organizacional medido con indicadores tanto financieros como no financieros i.e. productividad, innovación y satisfacción de clientes. Por su parte Daud y Yusoff (2011) estudia el efecto moderador que tienen los componentes del capital intelectual en la relación entre la gestión del conocimiento y el desempeño organizacional, Zack, McKeen, y Singh (2009) estudia el efecto de la gestión del conocimiento en el desempeño financiero con la mediación del desempeño organizacional.

Respeto a la relación entre las TICs y la gestión del conocimiento con el desempeño organizacional, se identifican dos estudios previos: Mills y Smith (2011) quienes encuentran una relación negativa y no significativa de la infraestructura tecnológica con el desempeño organizacional, mientras que la gestión del conocimiento tiene una influencia positiva y significativa. En el caso de Kuo y Ye (2010), reportan una relación positiva entre las tecnologías de información y la gestión del conocimiento, el cual, puede predecir un mejor desempeño en la organización. Por lo tanto, las hipótesis planteadas en el presente trabajo son las siguientes:

H1: Las tecnologías de información y comunicación tienen una influencia positiva y significativa en la gestión del conocimiento.

H2: La gestión del conocimiento influye positivamente al desempeño organizacional.

Método

Para el estudio de la relación entre las TICs, la gestión del conocimiento y el desempeño organizacional se consideró a ocho institutos tecnológicos descentralizados del estado de Veracruz (México), los cuales están certificados en la norma ISO 9000 y no aplican el modelo EFQM, ni ninguna otra opción para una autoevaluación integral del desempeño. Aunque en esta entidad federativa hay 21 instituciones tecnológicas, las participantes en el estudio son aquellas que ya cuentan con egresados colocados en el campo laboral, pues el instrumento de medición considera tanto su satisfacción como la de los empleadores en cuanto a la calidad de estos profesionistas. Dichas

características las cumplen 16 institutos tecnológicos, a los cuales se solicitó autorización para la aplicación del instrumento. Finalmente se obtuvo respuesta positiva de ocho de ellos.

Dado que las variables requieren la comprensión de datos de desempeño en un nivel organizacional se han tomado en cuenta únicamente a los mandos medios y directivos. En todos los casos, la aplicación del instrumento fue realizada de manera personal en las áreas de trabajo de los mandos medios y directivos (directores generales, directores de área, subdirectores, jefes de división y jefes de departamento); obteniéndose 147 cuestionarios debidamente requisitados.

La medición del desempeño organizacional se realizó con la escala reportada en Machorro y Mercado (2015), la cual toma como base el modelo EFQM de excelencia administrativa y cuenta con las siguientes dimensiones:

a) Satisfacción de Agentes, que mide el nivel de agrado que tienen los alumnos, padres de familia y personal con los resultados de la institución, así como la confianza en ella.

b) Desempeño Comparado, evaluación del logro de los objetivos de la institución, en función de los resultados obtenidos por otras similares. Este factor es particularmente importante para instituciones que forman parte de un sistema educativo, tales como los institutos tecnológicos en México.

c) Resultados de Gestión, los cuales presentan el grado de logro en los objetivos respecto a la planeación en la institución educativa: planificación, gestión del personal y gestión económica.

En el caso de las variables gestión del conocimiento y tecnologías de información, se crearon reactivos con opciones de respuesta en una escala de diferencial semántico, propuesta por Osgood, Suci, y Tannenbaum (1957), en la cual se presenta al sujeto un par de adjetivos bipolares con dirección o intensidad de su asociación en la escala. Para el caso del cuestionario construido, a partir de palabras clave identificadas, se realizan afirmaciones y se presentan dos adjetivos: adecuado o inadecuado. Cada adjetivo se acompaña de una descripción situacional que facilita la evaluación por parte del respondiente y se solicita determinar en una escala que va del uno al diez, su percepción sobre el instituto tecnológico en el que labora. Los aspectos incluidos en la medición de estas dos variables son:

a) Tecnologías de Información y Comunicación: calidad en la conectividad a internet, equipo de cómputo (hardware y software) e infraestructura para la educación a distancia.

b) Gestión del Conocimiento: investigación y producción científica, manuales y procedimientos y cultura orientada hacia la generación de conocimiento.

La tabla 1 presenta las dimensiones utilizadas, así como sus abreviaturas y número de reactivos.

Tabla 1: Dimensiones del instrumento aplicado

Dimensión	Abreviatura	Núm. Reactivos
Tecnologías de información	TICS	3
Gestión del conocimiento	KM	4
Satisfacción de Agentes	SAT_AGE	5
Desempeño Comparado	DES_COM	5
Resultados de gestión	RES_GES	5

Para el análisis de los datos obtenidos mediante la aplicación de cuestionarios se utilizó un modelo de ecuaciones estructurales basado en mínimos cuadrados parciales (Partial Least Squares, PLS), el cual presenta ciertas ventajas frente a las técnicas basadas en la covarianza (Covariance-based Structural Equation Modeling, CBSEM), en cuanto a las exigencias de la distribución de las variables de la muestra, el tipo de variables y el tamaño de la muestra (Gefen, Ringdon, & Straub, 2011). Por tanto, el análisis de los datos se realizó con la técnica de PLS utilizando el software WarpPLS en su versión 5.0.

Resultados Y Discusión

El análisis de datos muestra que el 57.1% de los encuestados son del sexo masculino y 42.9% del sexo femenino; 46.9% tiene estudios de licenciatura mientras que el 53.1% posgrado. Respecto al área en el que se desempeñan los encuestados el 51.7% laboran en el área académica, mientras el resto (48.3%) en áreas administrativas.

Bondad De Ajuste Del Modelo

Para la evaluación del ajuste del modelo mediante la técnica de PLS, los resultados incluyen tres índices: el coeficiente de trayectoria promedio (Average Path Coefficient, APC), la R cuadrada promedio (Average R-Squared, ARS) y el factor de inflación de la varianza promedio (Average Variance Inflation Factor, AVIF). Estas medidas se basan en el procedimiento Bootstrap que consiste en dividir la muestra original en N muestras para calcular la consistencia del parámetro que se desea evaluar con el objetivo de calcular su valor promedio y la significancia. El número de submuestras a utilizar recomendable es 500 de acuerdo con Chin (Wynne W. Chin, 1998; Wynne W Chin, 2010a)

Adicionalmente, Tenenhaus, Vinzi, Chatelin y Lauro (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005) plantean el uso del índice de bondad de ajuste (Goodness-of-Ft Index, GoF) como una manera de validar globalmente un modelo de mínimos cuadrados parciales. Esta medida se calcula mediante la raíz cuadrada del producto de la varianza media extraída (Average Variance Extracted, AVE) y la R2 promedio. Wetzels, Odekerken-Schröder y Van Oppen (Wetzels, Odekerken-Schröder, & Van Oppen, 2009) proponen el valor de 0.360 como umbral para asegurar un modelo con adecuado ajuste. Como puede verse en la tabla 2, las medidas de ajuste son adecuadas para proceder a la evaluación de los modelos de medida y estructural.

Tabla 2: Medidas de ajuste

Medida de ajuste	Valor obtenido	Valor recomendado
Tecnologías de información	TICS	3
Gestión del conocimiento	KM	4
Satisfacción de Agentes	SAT_AGE	5
Desempeño Comparado	DES_COM	5
Resultados de gestión	RES_GES	5

Modelo De Medida

Para la evaluación del modelo de medida mediante PLS, se calculó la confiabilidad individual por reactivo, la consistencia interna (o confiabilidad de la escala), la validez convergente y la validez divergente (Wynne W. Chin, 1998).

La confiabilidad individual del ítem es valorada examinando las cargas de las medidas con sus respectivos constructos. Para aceptar un indicador como integrante de un constructo, debe tener una carga igual o superior a 0.707 (Barclay, Higgins, & Thomson, 1995), lo que implica que más de 50% de la varianza de la variable observada es compartida por el constructo. Para el caso del modelo presentado, las cargas por variable son mayores que el valor sugerido. Como se muestra en la tabla 3, todos los reactivos tienen carga factorial mayor que 0.707, por lo que puede afirmarse que el modelo es confiable en cuanto a los reactivos de forma individual.

Tabla 3: Cargas factoriales por reactivo

	TICS	KM	SAT_AGE	DES_COM	RES_GES
TICS1	**0.885**	0.062	-0.154	0.185	-0.065
TICS2	**0.851**	-0.101	0.097	-0.036	0.027
TICS3	**0.772**	0.040	0.070	-0.173	0.044
KM1	0.132	**0.803**	0.121	-0.191	-0.091
KM2	0.030	**0.889**	0.050	0.100	-0.143
KM3	-0.174	**0.784**	-0.156	0.134	0.081
KM4	0.005	**0.883**	-0.023	-0.046	0.154

SAT_AGE1	-0.149	0.004	**0.784**	-0.195	0.161
SAT_AGE2	0.128	0.025	**0.811**	-0.398	0.064
SAT_AGE3	-0.040	0.064	**0.791**	0.184	-0.129
SAT_AGE4	0.107	-0.038	**0.845**	0.355	-0.313
SAT_AGE5	-0.059	-0.054	**0.772**	0.039	0.244
DES_COM1	0.172	-0.064	0.325	**0.796**	-0.162
DES_COM2	0.002	0.061	-0.132	**0.894**	-0.047
DES_COM3	-0.113	-0.026	-0.069	**0.901**	0.025
DES_COM4	0.000	0.002	-0.118	**0.890**	-0.015
DES_COM5	-0.044	0.021	0.030	**0.851**	0.191
RES_GES1	0.003	-0.034	0.022	0.033	**0.897**
RES_GES2	0.001	0.019	-0.151	-0.086	**0.912**
RES_GES3	0.121	0.012	0.023	-0.089	**0.895**
RES_GES4	-0.080	-0.040	0.253	0.029	**0.891**
RES_GES5	-0.044	0.041	-0.137	0.111	**0.929**

Para evaluar la consistencia interna de la escala, es decir, con qué rigurosidad las variables observadas miden a las variables latentes, se utilizan dos estadísticos: la confiabilidad compuesta y el alfa de Cronbach del constructo. La primera presupone a priori que cada indicador de un constructo contribuye de la misma forma, con la ventaja de no verse influenciada por el número de ítems en la escala (Hair, Sarstedt, Ringle, & Mena, 2012). La interpretación de ambos estadísticos es similar y según Nunnally (2009), quien sugiere 0.700 es un nivel de confiabilidad modesto en etapas tempranas de la investigación. Los valores observados en la tabla 3 son indicativos de que las dimensiones medidas tienen una alta confiabilidad.

Tabla 4: Confiablidad del instrumento

Constructo	No. de Reactivos	Confiabilidad compuesta	Alfa de Cronbach
TICS	3	0.875	0.785
KM	4	0.906	0.861
SAT_AGEN	5	0.899	0.860
DES_COM	5	0.938	0.917
RES_GES	5	0.958	0.945

La validez convergente evalúa si los diferentes ítems de un constructo miden realmente lo mismo, por lo que el ajuste será significativo y estarán altamente correlacionados. Para esto, se calculó la Varianza Media Extraída (AVE), pues proporciona la cantidad de varianza que un constructo obtiene de sus indicadores con relación a la cantidad de varianza debida al error de medida. Fornell y Larcker (1981), desarrolladores de esta técnica, sugieren que la AVE sea al menos de 50%. Para el caso del modelo evaluado, el valor más bajo es para el constructo satisfacción de agentes (64.20%), lo cual indica que existe validez convergente en todas los componentes (tabla 5).

Finalmente, para la validez divergente del modelo de PLS se comparó la raíz cuadrada de la AVE con la correlación entre los constructos. Para poder afirmar que el modelo tiene validez divergente es necesario que la AVE de cada constructo sea mayor que la varianza compartida con los demás (Kock, 2012). De acuerdo con los valores presentados en la tabla 5 todos los constructos del modelo cumplen con el criterio señalado de validez divergente.

Tabla 5: Validez convergente y divergente

Constructo	TICS	KM	SAT_AGEN	DES_COM
TICS	(0.837)	0.623	0.473	0.457
KM	0.623	(0.841)	0.577	0.577
SAT_AGEN	0.473	0.577	(0.801)	0.759
DES_COM	0.457	0.577	0.759	(0.867)
RES_GES	0.517	0.636	0.788	0.776

Modelo Estructural

El poder predictivo del modelo estructural en PLS es evaluado mediante la cantidad de varianza explicada (R^2) de las variables endógenas (Wynne W Chin, 2010b). Los coeficientes de trayectoria (β), indican en qué medida las variables predictoras contribuyen a la varianza explicada de las variables endógenas. En el caso de la R^2, se obtuvieron valores por encima de 0.400 en todos los casos (figura 1).

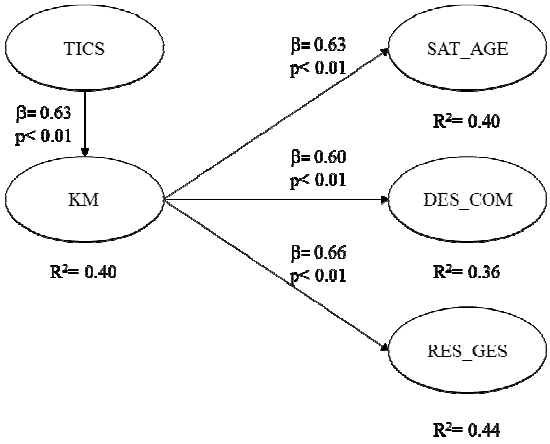

Fig. 1: Modelo estructrural

Adicionalmente, los coeficientes β en todos los casos resultan positivos y con valores elevados, siendo el menos fuerte el que evalúa la influencia de la gestión del conocimiento en el desempeño comparado de las IES. El análisis Bootstrap ejecutado con 500 submuestras de acuerdo con la recomendación de Chin (1998), evidencia que todos los coeficientes β son significativos a un nivel de 0.01.

De acuerdo con Falk y Miller (1992) un índice razonable para un modelo estructural es el efecto total de las variables exógenas sobre las endógenas evaluadas a través de la combinación de cada coeficiente de trayectoria (β) por la correlación entre los constructos (r). De este modo, una variable exógena debe influir en al menos 1.5% de la varianza del constructo endógeno para que dicha relación puede considerarse significativa.

Tabla 6: Influencia total

Relación entre constructos	β	r	Influencia
TICS - KM	0.63	0.623	0.392
KM - SAT_AGE	0.63	0.577	0.363
KM – DES_COM	0.60	0.577	0.346
KM – RES_GES	0.66	0.636	0.419

Conclusiones

El análisis de datos muestra que el 57.1% de los encuestados son del sexo masculino y 42.9% del De acuerdo con el análisis presentado, se valida la hipótesis de que las tecnologías de información tienen una relación positiva y significativa con la gestión del conocimiento. Además, la gestión del conocimiento tiene una influencia positiva en los tres constructos medidos del desempeño organizacional en instituciones de educación superior. Lo anterior plantea la necesidad de realizar una mejor gestión de las tecnologías de información en estas instituciones, las cuales puedan fomentar una mejor generación, almacenamiento, difusión e intercambio de conocimiento. Estos procesos de gestión del conocimiento tienen un impacto positivo en el desempeño ya que mejora los procesos tanto la satisfacción de estudiantes y empleados, así como el desempeño comparativo entre las instituciones. Además, ayuda a incrementar sus resultados de gestión, tales como el logro de objetivos planteados en los planes de desarrollo y factibilidad presupuestaria y financiera.

Como posible agenda de investigación futura se puede plantear: la aplicación del instrumento a una mayor muestra de IES, tanto en número como en tipo, con lo cual pudiera garantizarse la generalización de los resultados

obtenidos; además de complementar la evaluación del desempeño organizacional con información secundaria (datos estadísticos de las IES).

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Propuesta de diseño de un Cuadro de Mando Integral para una Institución de Educación Superior mexicana

Felipe MACHORRO-RAMOS

Universidad de las Américas Puebla, San Andrés Cholula, México
felipe.machorro@udlap.mx

María Vanessa ROMERO-ORTIZ

Instituto Tecnológico Superior de Tierra Blanca, Tierra Blanca, México
vromero@itstb.edu.mx

Cenith, MENDOZA

Instituto Tecnológico Superior de Tierra Blanca, Tierra Blanca, México
cenith.mendoza@itstb.edu.mx

Resumen

El Cuadro de Mando Integral (Balanced Scorecard) se considera una de las herramientas más eficientes en el control de gestión, además de tener la ventaja de poder adaptarse a distintos tipos de organizaciones. En esta investigación se presenta una propuesta de Cuadro de Mando Integral para una institución de educación superior tecnológica en México, para lo cual se creó un mapa estratégico de alineado con los documentos de planeación estratégica existente, así como también fueron diseñadas cédulas de indicadores útiles para la medición del desempeño. Se concluye que la herramienta es fácilmente adaptable a las características de una institución de educación superior pública y que puede resultar un instrumento adecuado de control organizacional.

Keywords: Cuadro de mando integral, mapa estratégico, educación superior, administración educativa, indicadores.

Introducción

Desde hace tres décadas los sistemas de educación a nivel internacional han estado en constantes cambios, la globalización provoca que las organizaciones tengan que competir en el mercado implementando herramientas de gestión administrativa más eficientes y eficaces orientadas hacia el logro de los objetivos para poder alcanzar el éxito. La administración estratégica en el sector educativo público en México no se queda atrás, ya que requiere de la implementación de estrategias para alcanzar los objetivos propuestos, enfocados en la misión de las instituciones, impulsados por un sistema de medición tangible (basado en indicadores) que les permitan evaluar su rendimiento. En los últimos años algunas instituciones públicas han comenzado a implementar herramientas de control de gestión provenientes del ámbito empresarial tales como el cuadro de mando integral (Balanced Scorecard).

El cuadro de mando integral es un instrumento de gestión administrativa que proporciona los elementos necesarios para poder obtener una dirección estratégica en una organización, así como controlar el cumplimento de los objetivos, fue creado para diferentes tipos de organizaciones empresariales por los autores estadounidenses Robert Kaplan y David Norton (1992). La gran flexibilidad de esta herramienta permite construir estrategias de tal manera que las organizaciones tengan acciones y resultados mediante la alineación de todos sus objetivos. Además, ha podido implantarse en organizaciones públicas y sin fines de lucro, específicamente en instituciones de educación superior.

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La institución educativa objeto del presente estudio brinda educación superior tecnológica en el estado de Veracruz, México. Cuenta con un instrumento de planificación estratégica, llamado Programa Institucional de Innovación y Desarrollo (PIID), en el que se definen los objetivos, las estrategias, líneas de acción y los indicadores que la organización se ha propuesto; sin embargo, no existe un instrumento formal de control para dar seguimiento al cumplimiento de los objetivos planteados.

La problemática originada por esta circunstancia es la incertidumbre de alcanzar los objetivos y metas establecidas por el PIID en tiempo y forma, y las consecuencias en el desempeño organizacional que esto tendría. Es por eso que el objetivo de este artículo es presentar una propuesta de gestión administrativa basada en el Cuadro de Mando Integral para esta institución. Se considera que esta herramienta es la adecuada para el cumplimiento de los objetivos estratégicos que permitan llevar con éxito la misión de la institución y de esta manera darle un valor agregado a la misma.

La estructura documento se conforma de la siguiente forma: posterior a la presente sección introductoria, el marco teórico aborda la temática de la adaptación del Cuadro de Mando Integral a instituciones públicas, específicamente en educación superior; la metodología expone las estrategias ejecutadas para el logro de los objetivos. En la sección de resultados se presenta el mapa estratégico diseñado y la propuesta de cédulas de indicadores; la última sección aborda las principales conclusiones y recomendaciones.

El Cuadro De Mando Integral

El Cuadro de Mando Integral (CMI), es utilizado como instrumento en control de gestión administrativa para las empresas, organizaciones e instituciones de todo el mundo, lucrativas y no lucrativas. El CMI puede interpretar los objetivos estratégicos y la misión de la organización en un sistema de medición de manera que los objetivos estén ligados a indicadores y relación entre ellos. Fue propuesto por los norteamericanos Robert Kaplan y David Norton (1992), quienes sugieren cuatro perspectivas o ejes en las cuales desarrollar los objetivos e indicadores:

a. La perspectiva financiera. Examina los resultados económicos buscando el desempeño financiero para maximizar los beneficios, esta perspectiva para las instituciones de sector público educativo se caracteriza por tratar de tener los recursos necesarios para prestar un servicio de calidad.

b. La perspectiva del cliente. Se centra en la imagen de la institución educativa, calidad del servicio, relaciones, precio o aquellos factores que son importantes para mantener la satisfacción de éste. En el sector educativo existen clientes internos (alumnos) y clientes externos (sector industrial).

c. La perspectiva de procesos internos. Se trata del control de los procesos, en el caso de las instituciones educativas son áreas claves o departamentos necesarios para poder alcanzar el objetivo organizacional de la institución de esta manera garantizar el éxito.

d. La perspectiva de aprendizaje y crecimiento. Se basa en la habilidad y competencia de los directivos, docentes y personal en general, así como la capacidad que tiene los empleados de alcanzar los objetivos de los de los procesos de la institución.

Mapas Estratégicos

Los mapas estratégicos tienen sus inicios en la milicia, cuando planean estratégicamente cómo atacar al enemigo, posteriormente esta actividad fue llevada a las organizaciones empresariales con modificaciones para su aplicación. A finales de los años cuarenta y principios de los cincuenta, aparecieron las primeras organizaciones en la administración con estas estrategias.

Dentro de la literatura del Cuadro de Mando Integral, los mapas estratégicos fueron propuestos por Kaplan y Norton (2000), como una herramienta para la alineación de los objetivos estratégicos a la misión y visión de las organizaciones. De esta forma, considerando que la administración estratégica está orientada a los objetivos de las organizaciones a largo plazo, un mapa estratégico es una representación gráfica de los objetivos estratégicos ordenados en las cuatro perspectivas, las relaciones causa-efecto entre objetivos, los indicadores, las metas, los responsables y los proyectos que van a medir el éxito que tiene la organización en su proceso de implantación de la

estrategia. Además, permite el análisis de su misión, el propósito los valores y el cumplimiento de los objetivos estratégicos para la obtención de resultados satisfactorios para sus principales usuarios o clientes.

Implementación Del Cuadro De Mando Integral En Universidades Públicas

El cuadro de mando integral tiene una amplia aceptación su aplicación en instituciones educativas. Por ejemplo, en Reino Unido, la Universidad de Edimburgo ha sido una de las primeras en medir su desempeño institucional con esta herramienta desde 2002 (Nelson, 2006). En esta universidad se adoptaron 32 indicadores distribuidos en cuatro perspectivas: desarrollo organizacional, que considera indicadores financiera, negocios internos y de stakeholders.

En Estados Unidos, Brown (2012), propone cuatro perspectivas para la escuela de enfermería del College de St. Scholastica en Duluth, Minnesota: financiera, estudiantes y comunidad, procesos internos y aprendizaje y crecimiento, cada una de ellas con cinco indicadores para medir el desempeño de la organización. Por su parte Xing (2009), propone el uso del CMI en la medición del desempeño organizacional de siete universidades en China. Para tal efecto en la perspectiva financiera considera como indicador la proporción entre el gasto y el ingreso; en la perspectiva clientes incluye la satisfacción social, de los empleadores, de padres y estudiantes; los procesos internos evaluados fueron el desempeño de la docencia y la investigación científica; finalmente, en la perspectiva de aprendizaje y crecimiento se evaluó la satisfacción de la planta docente.

Otro ejemplo del diseño y adaptación de las perspectivas del CMI en universidades se identifica en Inglaterra donde Philbin (2011) considera en la perspectiva financiera los fondos por programa; propone una nueva perspectiva de las partes interesadas (stakeholders); la tercer perspectiva hace referencia a las capacidades de la institución (personal adscrito y equipo); y finalmente la perspectiva de aprendizaje y crecimiento considera los productos de investigación (artículos científicos y conferencias).

De igual forma en Europa, Hladchenko (2015) realizó una comparación del diseño de los CMI en tres universidades de Alemania y una en Austria, tal análisis concluyó que la herramienta es capaz de brindar una visión sistemática de la estrategia de la institución, así como traducir dicha estrategia indicadores pertinentes para la medición del desempeño organizacional. En África, Mohamad (2016) midió el desempeño de ocho facultades de la Universidad Assiut (Egipto). Para tal efecto propuso cinco perspectivas distintas: perspectiva financiera, perspectiva de los clientes y beneficiarios, perspectiva de procesos internos, perspectiva de aprendizaje y crecimiento, y perspectiva de desempeño social.

Método

Este trabajo de investigación plantea la necesidad de diseñar una propuesta de modelo que represente de manera confiable aquellas variables reales relacionadas con la gestión estratégica de una institución educativa de nivel superior. Para ello se realizó por principio un diagnóstico organizacional con el objetivo de poder diseñar el mapa estratégico y los indicadores correspondientes.

Diagnóstico de la Institución Educativa

Como primera instancia, se recopilaron documentos relacionados con nivelación de jerarquías, acreditaciones y procesos existentes. Posteriormente se analizaron exhaustivamente la estructura y gestión de la institución educativa y su plan estratégico, donde se pudieron encontrar indicadores existentes con los objetivos del plan institucional. Así mismo se empleó un conjunto de entrevistas y encuestas para realizar un análisis FODA de la institución que sirviera como base para el establecimiento de perspectivas y prioridades estratégicas.

Establecimiento De Perspectivas

Para establecer las perspectivas correctas se realizó un análisis del estado del arte donde se identificaron varios artículos relacionados con características similares a la problemática de la institución, tal es el caso de la Universidad Nacional de Loja en Ecuador (Muñoz Vizhnay, 2011), es por ello que se decidió adaptar los cuestionamientos realizados en tal investigación para el establecimiento de las perspectivas del CMI:

- ¿Cómo nos ven los estudiantes?

- ¿Podemos continuar mejorando los procesos y creando valor?
- ¿En qué debemos ser los mejores?
- ¿Cómo podemos optimizar los recursos financieros?

Una de las principales características de un Cuadro de Mando Integral es que es una herramienta que es muy sencilla y clara. De tal manera que las perspectivas deben tener una secuencia lógica en el mapa estratégico, por lo que a partir del diagnóstico organizacional se estableció un orden de prioridad de las perspectivas establecidas.

Creación Del Mapa Estratégico

Un principal objetivo del Cuadro de Mando Integral el alineamiento de las actividades con el plan estratégico de la institución. Para poder realizarlo es fundamental traducir la visión en estrategias, que de manera lógica los objetivos. Esta relación causa efecto ilustra los supuestos en las diferentes perspectivas de la organización: estudiantes, procesos internos, aprendizaje y crecimiento y financiero.

Para el diseño del mapa estratégico se consideró también un objetivo central en cada perspectiva el cual fue seleccionado tomando en cuenta las prioridades de la institución.

Establecimiento De Indicadores Para Cada Objetivo

Para poder seleccionar los indicadores se tuvieron en cuenta varios criterios. Por principio, la cantidad de objetivos a establecer por cada perspectiva, los cuales se estableció no fueran mayor a seis ya que si se tienen demasiados indicadores pueden diluir el mensaje que comunica el CMI y, como consecuencia los resultados se pueden dispersar intentado perseguir demasiados objetivos al mismo tiempo.

Para cada indicador fue establecida la unidad de medida, así como la frecuencia de medición tomando en consideración la naturaleza de cada uno de ellos. Además, en función del análisis realizado, se determinó un valor meta para el año 2018, así como un rango de valores que indiquen precaución y peligro. De esta forma se pretende que la herramienta sea pertinente para monitorear de manera práctica el desempeño de la organización.

Resultados Y Discusión

Diagnóstico Organizacional

El primer paso para poder entender el propósito de la organización fue analizar su misión y visión, las cuales son presentadas en la Figura 1. Con base en ellas se pudieron realizar entrevistas a directivos para poder identificar los elementos del análisis FODA.

Visión
Ser una institución de alto desempeño que se esfuerce por ser parte de desarrollo sostenido, sustentable y equitativo encaminado a una excelencia profesional de sus egresados, con base docentes comprometida acorde a las épocas actuales y futura.
Misión
Formar Profesionales comprometidos con la sociedad y el medio ambiente de forma pertinente y equitativa a través de una educación integral que conlleve altos valores humanos en beneficio del desarrollo sustentable de la región, estado y el país

Fig. 1: Misión y visión de la institución

De acuerdo con las entrevistas realizadas a directivos de la institución se lograron establecer las fortalezas, oportunidades, debilidades y amenazas de la institución, con lo cual se estructuró la matriz FODA que se presenta en la Figura 2.

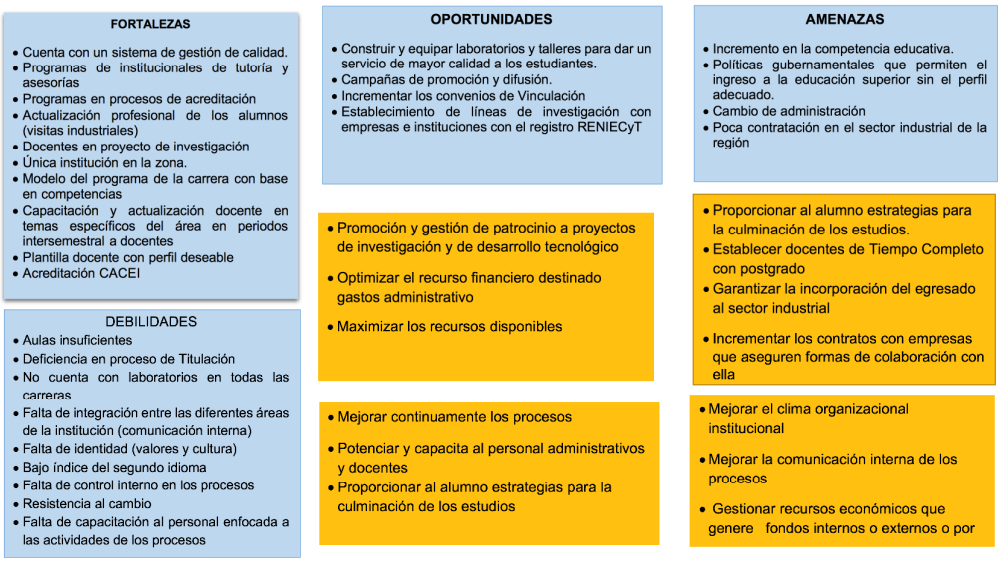

Fig. 2: Análisis FODA de la institución

Perspectivas del CMI

De acuerdo con el análisis organizacional realizado se establecieron las perspectivas pertinentes para el CMI de acuerdo con la metodología de Muñoz Vizhnay (2011). Las cuatro perspectivas finales, así como su prioridad se visualizan en la Figura 3.

Perspectiva del Cliente/Alumno. La principal función de la institución educativa es la satisfacción de las necesidades de los alumnos que son sus clientes. Esto destaca el compromiso de calificar profesionales altamente competentes, para que ellos sean bien aceptados en el mercado de trabajo como lo marca la misión de la institución.

Perspectiva del Aprendizaje y Crecimiento. Esta perspectiva se empodera de las instituciones educativas ya que es preponderante para las instituciones de enseñanza superior público, pues será fundamental la apuesta en la capacidad de los empleados, en el conocimiento, y así como los sistemas de información, para mantenerse en el mercado, continuando con la prestación de servicios con la calidad cada vez más exigido por la población, las instituciones de educativas tienen que la obligación constante de capacitar de su cuerpo docente, las formas de competencia que actualmente se trataba son muy demandantes porque ellos son los principales agentes en la formación de los alumnos, como habíamos referido anteriormente constituyen la preocupación principal de estas instituciones. También, el autor Niven (2008), refiere que en esta perspectiva está las capacidades de los empleados, la satisfacción de los mismos, la disponibilidad de la información y los sistemas de información.

Perspectiva de Los Procesos Internos. Define los outputs, de los procesos que permitan cumplir, los objetivos definidos para la perspectiva de los Clientes/Alumnos, los cuales son:

a. Calidad
b. Planeación
c. Vinculación
d. Servicios Administrativos
e. Finanzas

Estas actividades internas de la institución están suscritas en esta perspectiva y ellas cuando bien hechas llevan beneficios al exterior de la institución y cumplen con su cometido y crea valor a todos los implicados en este proceso.

Perspectiva Financiera. Al tratarse de una institución pública, el instituto depende de la financiación del estado y de la federación, por lo que debe de ser consciente del aspecto de la reducción de las subvenciones gubernamentales que existen y que se está presente en casi todos los países. Esta perspectiva es relevante ya que representa la única forma de llevar a cabo sus actividades y principalmente poder cumplir la misión institucional.

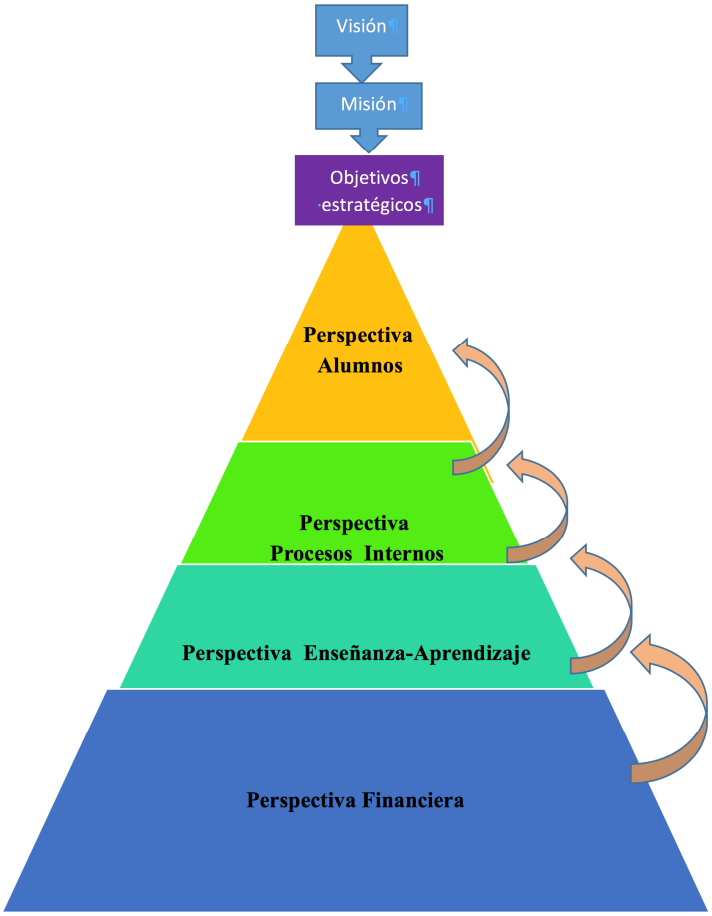

Fig. 3: Perspectivas del CMI

Mapa Estratégico

La Figura 4 muestra el mapa estratégico diseñado de acuerdo con el análisis del diagnóstico organizacional realizado. Puede apreciarse que se plantean cuatro objetivos estratégicos centrales, los cuales describen la ruta bajo la cual se propone que la institución logre cumplir con su misión. Cada uno de esos objetivos centrales están apoyados por objetivos estratégicos que se encuentran alineados a su ejecución. De esta manera se garantiza que todas las actividades que se realicen dentro de la organización apoyen a la misión institucional.

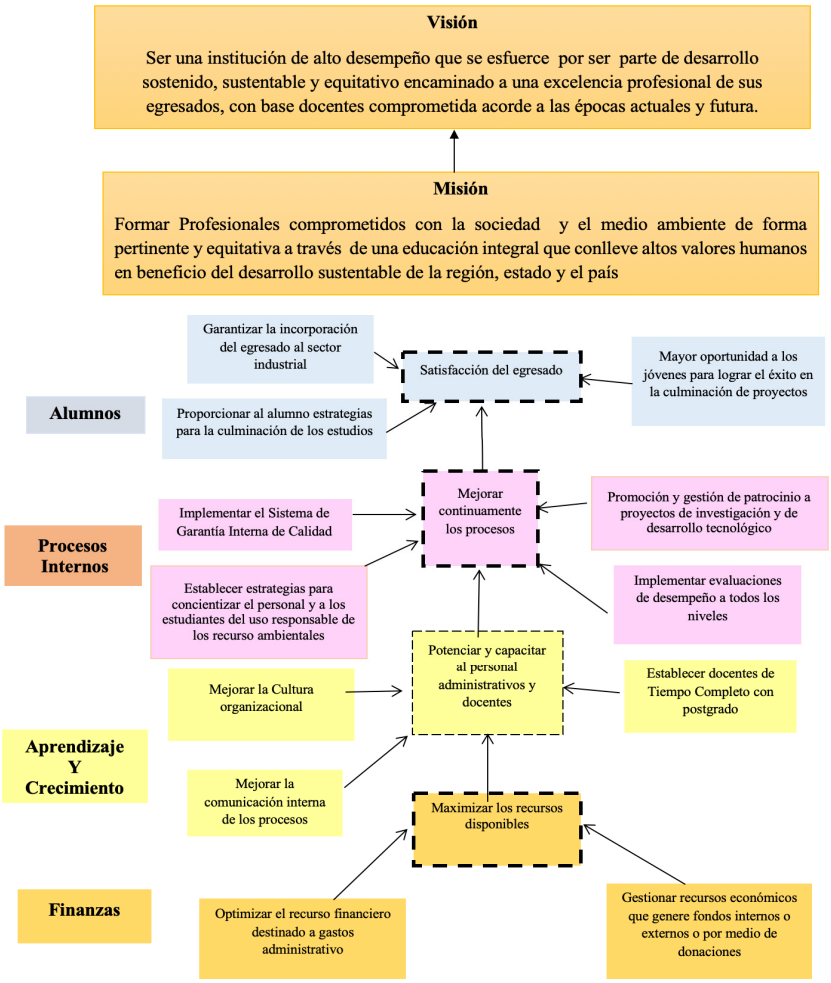

Fig. 4: Mapa estratégico

Objetivos E Indicadores

Se establecieron un total de 16 objetivos en el mapa estratégico. Se propone que cada uno de estos objetivos sea medido con al menos un indicador.

Tabla 1: Indicadores de la perspectiva Cliente/Alumnos

Tabla 2:

Objetivo	Indicadores
Satisfacción del egresado	Nivel de satisfacción de los usuarios
	Número de quejas por año en los servicios prestados.
Garantizar la incorporación del egresado al sector industrial	% de contratación de empresas en la región.
Proporcionar al alumno estrategias para la culminación de los estudios	% de alumnos atendidos por el personal de carrera
	% de alumnos inscritos en planes tutoriales
Mayor oportunidad a los jóvenes para lograr el éxito en la culminación de proyectos	Cursos de regularización impartidos por docente
	% de alumnos que participan en proyectos de investigación

Indicadores de la perspectiva Procesos Internos

Objetivos	Indicadores
Mejorar continuamente los procesos	Juntas de planeación al año.
Implementar el Sistema de Garantía Interna de Calidad	No conformidades en el sistema de calidad existente
Establecer estrategias para concientizar el personal y a los estudiantes del uso responsable de los recursos ambientales	% de uso de energía alternas
Implementar evaluaciones de desempeño a todos los niveles	% de Docentes evaluados al semestre
	% de Administrativos evaluados al semestre
Promoción y gestión de patrocinio a proyectos de investigación y de desarrollo tecnológico	Proyectos de investigación apoyados
	Proyectos de desarrollo tecnológico apoyados

Tabla 3: Indicadores de la perspectiva Aprendizaje y Crecimiento

Objetivos	Indicadores
Potenciar y capacitar a los administrativos y docentes	% de docentes en cursos de actualización
	% de participantes en actualización administrativa
	Número de eventos de formación y capacitación realizados
Mejorar la Cultura organizacional	% de personal capacitado en motivación laboral
Mejorar la comunicación interna de los procesos	% de personal capacitado en comunicación interna
Incrementar docentes de Tiempo Completo con postgrado	% de docentes de Tiempo Completo con posgrado

Tabla 4: Indicadores de la perspectiva Financiera

Objetivos	Indicadores
Maximizar los recursos disponibles	% de disminución del costo anual promedio por estudiante
Optimizar el recurso financiero destinado a gastos administrativo	% de disminución de gastos operativos
Gestionar recursos económicos que genere fondos internos o externos o por medio de donaciones	No. de donaciones anuales gestionadas

Cuadro de Mando Integral

Para poner diseñar el Cuadro de Mando Integral es necesario confeccionar cédulas que ayuden a estructurar el tablero de control. Se establecieron además intervalos de medición para los indicadores, para tal efecto se diseñaron semáforos de tal manera que ayuden a visualizar rápidamente en donde aplicar los correctivos o ajustes necesaria para lograr su efectividad en el tiempo propuesto y la consecución de todos los objetivos inicialmente. A

continuación, a manera de ejemplo se muestran las Fichas Técnicas del Cumplimento de los Indicadores para los objetivos centrales establecidos en el mapa estratégico.

Objetivo Estratégico	**Satisfacción del Egresado**						
Indicador	**Nivel de satisfacción de los usuarios**						
Responsable de cumplimiento	**Divisiones de Carrera**						
CLASE DE INDICADOR							
Alumno [x]	Procesos Internos [ ]		Crecimiento y Aprendizaje [ ]	Finanzas [ ]			
Responsable de documentación	**Jefe de División de Carrera**						
Unidad de Medida	**Tipo**			**Recolección**	**Revisión**		
Porcentaje	**Resultados**			**Semestral**	**Semestral**		
Meta a julio 2018	**Semáforo 2018**			**Meta a julio 2019**	**Semáforo 2019**		
85%	**85%**	**65%**	**55%**	**90%**	**90%**	**70%**	**60%**
Valor real 2018	**N/D**			**Valor real 2019**	**N/D**		
Cálculo de la Fórmula							
$\frac{Usuarios\ satisfechos}{Usuarios\ encuestados}(100\%)$							

Fig. 5: Ficha técnica. Perspectiva alumnos

Objetivo Estratégico	**Mejorar continuamente los procesos**						
Indicador	**Juntas de planeación al año.**						
Responsable de cumplimiento	**Subdirección de planeación**						
CLASE DE INDICADOR							
Alumno [ ]	Procesos Internos [X]		Crecimiento y Aprendizaje [ ]	Finanzas [ ]			
Responsable de documentación	**Subdirector de Planeación**						
Unidad de Medida	**Tipo**			**Recolección**	**Revisión**		
Cantidad	**Inductor**			**Semestral**	**Anual**		
Meta a julio 2018	**Semáforo 2018**			**Meta a julio 2019**	**Semáforo 2019**		
2	**2**	**1**	**0**	**15%**	**2**	**1**	**0**
Valor real 2018	**N/D**			**Valor real 2019**	**N/D**		
Cálculo de la Fórmula							
Número de juntas de planeación al año							

Fig. 6: Ficha técnica. Perspectiva procesos internos

Objetivo Estratégico	Potenciar y capacitar a los administrativos y docentes						
Indicador	% de docentes en cursos de actualización						
Responsable de cumplimiento	Subdirección académica						
CLASE DE INDICADOR							
Alumno ☐	Procesos Internos ☐		Crecimiento y Aprendizaje X		Finanzas ☐		
Responsable de documentación	Departamento de desarrollo académico						
Unidad de Medida	Tipo			Recolección	Revisión		
Cantidad	Inductor			Semestral	Anual		
Meta a julio 2018	Semáforo 2018			Meta a julio 2019	Semáforo 2019		
90%	90%	85%	80%	100%	100%	95%	90%
Valor real 2018	N/D			Valor real 2019	N/D		
Cálculo de la Fórmula							
$\frac{Docentes\ en\ cursos\ de\ capacitacion}{Total\ de\ docentes}(100)$							

Fig. 7: Ficha técnica. Perspectiva aprendizaje y crecimiento

Objetivo Estratégico	Maximizar los recursos disponibles						
Indicador	% de disminución del costo anual promedio por estudiante						
Responsable de cumplimiento	Subdirección administrativa						
CLASE DE INDICADOR							
Alumno ☐	Procesos Internos ☐		Crecimiento y Aprendizaje ☐		Finanzas X		
Responsable de documentación	Departamento de recursos financieros						
Unidad de Medida	Tipo			Recolección	Revisión		
Cantidad	Inductor			Semestral	Anual		
Meta a julio 2018	Semáforo 2018			Meta a julio 2019	Semáforo 2019		
5%	5%	3%	1%	5%	5%	3%	1%
Valor real 2018	N/D			Valor real 2019	N/D		
Cálculo de la Fórmula							
$1-\frac{Costo\ anual\ por\ alumno\ en\ el\ periodo\ t}{Costo\ anual\ por\ alumno\ en\ el\ periodo\ t-1}(100)$							

Fig. 8: Ficha técnica. Perspectiva finanzas

Conclusiones

El objetivo general de la investigación fue diseñar un modelo de Cuadro de Mando Integral para una institución pública de educación superior el cual fuera adaptado a las características particulares de dicha organización. A modo de conclusión general, se puede establecer que la herramienta utilizada (CMI) permite tener una visión y un control completo de la organización de forma alineada, y que posee una facilidad y flexibilidad en su uso, lo que permite incorporar y cambiar las perspectivas tradicionales. Debido a ello, para desarrollar el CMI, se realizó un

diagnóstico FODA con el fin de encontrar un enfoque que cumpliese con los requerimientos de la misión institucional.

De acuerdo con el diagnóstico realizado se adaptaron las cuatro perspectivas clásicas del CMI, reordenándolas para que se tuviera congruencia con misión y visión, además de transformar la perspectiva clientes a una perspectiva basada en la satifacción de los alumnos y egresados. El planteamiento de los objetivos estratégicos se formuló según las cuatro perspectivas propuestas (alumnos, procesos internos, aprendizaje y crecimiento y finanzas). Además se establecieron indicadores adecuados para cada uno de los objetivos planteados.

Podemos concluir que la presente investigación aporta evidencia de la factibilidad de la implementación de un Cuadro de Mando Integral en la institución, ya que la herramienta cuenta con la flexibilidad necesaria para adaptar las perspectivas en objetivos estratégicos e indicadores pertinentes para medir adecuadamente el desempeño organizacional de una institución pública de educación superior.

Finalmente se recomienda que la dirección general del instituto haga el seguimiento adecuado para que la herramienta propuesta pueda implementarse de tal forma que sirva como base para la mejor toma de decisiones y gestión administrativa a partir de la planeación estratégica con la que se cuenta.

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About the Community Leader - A Theoretical Approach

Carmen Sonia DUSE
Lucian Blaga University of Sibiu, Romania
carmen.duse@ulbsibiu.ro

Dan Maniu DUSE
Lucian Blaga University of Sibiu, Romania
dan-maniu.duse@ulbsibiu.ro

Abstract

In Romanian society there is only a pale image of the existence of community leaders, who should focus on people problems and solve them, without waiting for political involvement. Community membership is based on five attributes: boundaries, emotional security, group membership and group identification, and a common system of symbols. Community engagement can be defined in a context of partnership and reciprocity as a mutual exchange of knowledge and resources. Low community engagement leads to a lack of trust in the community. In this way, the level of unemployment, poverty and in direct connection with a poor quality education and with the increase of the crime rate are accentuated. Creating local networks of community members fosters a climate in which more people are willing to work to achieve a goal. This article is about who and what such a leader should look like, about the influence and positive changes it can bring to the community. While leaders 'theories place great emphasis on emotional intelligence, current research speaks to culturally intelligent leaders who know and understand how culture acts on the individual, how specific values and beliefs direct individuals' behavior. At the same time, because in times of crisis we need leaders, the article shows how such a leader can coagulate energies, to overcome critical moments. The article is a theoretical study conducted as a documentary document for building a training program for community leaders.

Keywords: Community, Leader, Ethic, Influence, Culture.

Introduction

Through this paper we aimed to demonstrate the importance of training community leaders to increase the well-being of the community and solve its main problems.

Therefore, the objectives of the paper are:

- presentation of the main features of an effective community leader
- demonstrating the leader's need to possess cultural intelligence
- designing some characteristics of the community leader during a pandemic.

We need these answers to build a training program for community leaders, in the category of those over 50, even those who have retired, and this in two ways:

- to use the experience and knowledge of a category that can bring value to the labor market;
- to respond to the utility needs of individuals, who with retirement from active life may develop anxiety and depression, exacerbations of diseases that until then manifested only latently.

The initiative is promoted and financed by a European project Erasmus + "Model Of The Mentoring Between The Local Community Leaders", no: 2019-1-PL01-KA204-065651.

Based on the bibliographic research undertaken on the profile of community leaders, a training program for these leaders will then be built, which will have branches throughout the country.

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Community is a fundamental building part of society which are realised through dynamic, diverse and interdependent interactions between and inside of groups, organizations and institutions and individuals, both internal and external to the community.

A community is a small or large social unit that has in common norms, religion, values or identity and often share a certain way of thinking and judging, specific to a certain area. The term "community" comes from the Latin "communitas" meaning community, "public spirit" (Latin-communis-shared). Communities can share intention, faith, resources, preferences, needs and risks, all of which influence the identity of members and their degree of cohesion.

Creating communities as places where people want to work and live has been a challenge for society, taking a step beyond their traditional role of providing services and ensuring the necessities of daily life. Communities can be seen as complex systems which are not only defined by boundaries such as geographical location but are open to different participants despite their location.

A definition of community was made by McMillan and Chavis (1986) throuth four dimensions: membership, influence, reinforcement and shared emotional connection. Wilkinson's theory (1991) shows that community development is a process in which local actors deliberately try to create or strengthen social networks to work together to solve community problems and express their common interest in the locality. In other words, community is defined by social interaction. In the same time, people can be parts of many communities and in this position they are able to "transfer, translate, and transform experiences from one community to another" as Dahlander and Frederiksen mentioned (2012).

Community membership is based on five attributes: boundaries, emotional security, group membership and group identification, and a common system of symbols. At the same time, influence shows, on the one hand, that a member who must be attracted to a group must have an influence on what the group does, and the cohesion of the group depends on how the group itself is able to influence the members. Community engagement can be defined in a context of partnership and reciprocity as a mutually beneficial exchange of knowledge and resources. Low community engagement leads to a lack of trust in the community. In this way there is an accentuation of the level of unemployment, poverty and in direct connection to a poor-quality education and to the increase of the crime rate. Creating local networks of community members fosters a climate where more people are willing to work to achieve a goal. Leaders who get involved in the community creates involved communities. People who accept the needs, values, and opinions of others are often the most influential members of the group, while those who force things by always wanting to influence, trying to dominate others, and ignoring the desires of others are often the least strong.

When it is decided to be organized a community, it is necessary to identify leaders and potential community leaders, because leadership is a vital element of that organizing action. In his work, Chaskin (2001) suggests that there are at least four common factors contributing to community strengthening, referring to the existence of resources (including individuals 'abilities, access to capital and resources), building a network of relationships, leadership and support for community members' participation in the action. collective and problem solving.

Leadership theory has evolved over the past decades, leaving from the idea of the leader as the main and decisive factor, to the influence of the others and more recently to the imagining of a multidimensional social process composed of complex relationships, which are based on social integration and individual skills.

In any organization, the effective leadership is based on promoting certain ideas, but to convince others, these ideas must be challenging, mobilizing. In other words, the leader is the inspiration and the engine of the action. The key elements of classical leadership are the follower, the influence, community objectives and peoples.

A follower is a person who is influenced by a leader. At the same time, a follower is not a "yes man" because he/she, in turn, influence the leader. At the same time, a follower is not a "yes man" because he/she, in turn, influence the leader. A good follower is a person who says what he thinks, gives a correct feedback, and influences the leader. An effective follower shares what he/she thinks with the leader.

The essence of leadership is influence. It involves the process by which the leader communicates the ideas and these ideas are accepted by the community, which supports the leader in their implementation.
The influence is highlighted by the leader-follower relationship. Leaders and followers often change roles in the influence process.

The community objectives can be achieved through the joint work of the leader and the other members / followers. The leader is the one who shows the direction, but together with the followers he sets the objectives.

A community cannot go forward only by preserving status quo. It`s about the vision of the leader to introduce the change and about his ability to present this change which is necessary and possible.

The greatest resource of any community is people. Being a good leader means loving people and knowing how to work with them. An effective leadership means appreciating people's capabilities and putting them at the service of achieving community goal.

Community leadership has other nuances than the classical notion of being "about" leaders "who solicit, convince and influence" followers ". According to Onyx and Leonard (2011), community leadership does not have hierarchies and is carried out through voluntary actions, which lead to the creation of social capital being a factor in promoting change.

Community leaders are, most often informal leaders, unelected but self-entitled.

The well-being of the community is built from the settings of development directions starting from the shared values of the members of the community, by building relationships based on ethics.

The community must be able to develop relations with the external environment, but at the same time it is necessary to ensure communication between its members, so that, to build relationships, connections inside the community. If there is trust in the relationships between the members of the community, they can reset the goals of the community, and in this way to set new roles and responsibilities for its members. Community development is one of the most useful way to improve the lives and livelihoods of individuals within a community as Syme and Ritterman mentioned (2009).

The Leader

Community leaders are those who cause change, those who make things progress. This implies that they are good connoisseurs of the community in which they live. Leaders have direct and indirect effects on community evolution and development.

These were widely share clearly understood and supported by all the community members. They must act to test all new developments, activities, or initiatives.

Many successful leaders start without self-confidence or skills. Leadership skills can be trained and built step by step. No matter what the skills are at the moment, anyone can become a leader if they want and accept it.

Effective leaders had a very strong and clear vision and set of values for their community which powerfully influenced their and others actions and established a clear sense of direction and purpose to it. To be a leader means to build a vision. As a community leader, you can have different visions. Vision is the starting point in any construction. It represents the way the leader understands to build for the community. Because nothing happens until it happens in someone's mind first.

To achieve the vision, the leader must follow a few steps:

1. First, develop his own vision
2. Communicate it to others
3. To share this vision with the group, and possibly improve it within the group.

To build the vision it must start from the things around you and think about how to make them better. It can find countless solutions and elements. The vision must be communicated continuously, every time you talk to people in the community, remind people where to go. The more the leader insist on the vision, the more people will be willing to commit.

The vision must be launched just before forming a group. As the leader increase the circle of those who know about it, it is created a community of people who know about his idea and who can support him. Community members must adhere to the common vision and develop a sense of ownership over it, to engage in the group. In this way they will engage in long-term community activities.

It is not necessary for people to agree with all the details of the leader's vision to follow him. But to work together, people need to share an overview and some basic goals. All of these give a detailed picture of what is happening in the community.

Based on these investigations, leaders could establish the direction, purpose, and goals of community development. In this phase, it is important for the leader to know how to communicate all these elements effectively and to start building his network. He must be able to motivate and mobilize all human resources of the community, establishing roles and building appropriate responsibilities for members. An important step here is to plan and design actions, for this purpose, the leader being able to express himself clearly and structured.

Once the planning of activities has been completed, the leader power of convincing will be decisive in creating relationships with others. The ability of a leader to establish a relationship is very important and he/she develops these relationships, using his/her reputation and resources. In this way, the leaders want to encourage community members to stay involved and continue to participate. To convince and be followed, community leaders must be characterized by a set of basic ideals and principles of community action. For this, leader must imagine innovations and solutions that have never existed before.

Leadership theories shows the leader must possess emotional intelligence. But some and more recent theories shows the leader must also possess cultural intelligence. Especially when working with and in favor of communities, leaders need to possess cultural intelligence, which means more than knowing cultures. There are multiple definitions of this cultural Intelligence, but I prefer to use this one which Butcher (2008) specified as a “key competencies, which allow us to effectively interact with people from diverse cultural backgrounds in all kinds of settings”.

Cultural intelligence requires that leaders possess more than cultural knowledge. They need to be aware of how culture works, how specific values and beliefs drive people's behavior.

Cultural intelligence has a certain dynamic, which assumes that, over time, one will continue to learn, and their cultural intelligence will expand. This is not a step-by-step process that culminates in an "end result." Due to cultural intelligence, the leader learns more about him / her, as well as about the ability to interact with different cultures. There is always enough place for improving and developing cultural intelligence.

Cultural intelligence does not speak of specific cultures. Cultural intelligence is a broad approach that considers the development of a set of skills, attitudes and knowledge that make it possible to adapt and interact with multiple cultures.

Finally, cultural intelligence is the ability to adapt successfully to unfamiliar cultural settings.

As a community leader there is a contact with a variety of characters, situations, problems. To address them, the leader must show flexibility in thinking, understand why community members behave in this way, discern where values, attitudes and behaviors relate to the culture of the group.

In this way, Marilee Adams (2004) proposes a new approach to change the judgment, starting from the way you ask your questions. She was speaking about the two types of questions: some involving judgments and some which involves learning. Usually, we ask ourselves both types of questions and choose which one to ask in any given situation. But asking questions in a different way leads to a different perspective (table 1). As a conclusion, culturally intelligent leaders create strategies that help them focus on goals and their interactions. They rely on feedback from the situation and use it to create a new image, thus creating new learning models for themselves.

Table 1: **Judger vs. learner questions**

Judger	Learner
What is wrong?	What works?
Who is to blame?	What am I responsible for?
How can I prove I am right?	Why can I prove I’m right?
How can I protect my territory?	What is the big picture?

How can I be in control?	What are my choices?
How could I lose?	What is useful about this?
How could I get hurt?	What can I learn?
Why is that person so clueless and frustrating?	What is the other person feeling, needing, and wanting?
Why bother?	What is possible?

As a conclusion, culturally intelligent leaders create strategies that help them focus on goals and their interactions. They rely on feedback from the situation and use it to create a new image, thus creating new learning models for themselves.

Community Culture

Culture is a complex, multidimensional concept. The community culture is highlighted by the way things are done in that community; it is reflected in the way people interact, make decisions, and influence others. Culture is reflected in the way people in a community live. This includes their language, religion, stereotypes, traditions, and history. It includes the fashion to which people relate and is socially accepted. Every community in the world has her own culture.

Culture is expressed through the social structure that brings people together. Social communities are created to address their formal needs (such as religious, school, and governmental), but also the informal ones (group and community activities that have various purposes: socialization, punctual problem solving, common objectives, etc.). Culture is highlighted by common and distinct values, beliefs, attitudes, assumptions that people have about themselves and others.

In the community can function formal roles (obtained through official elections) and informal ones through which people occupy a social structure: who are the leaders and followers, who has authority and who does not, who participates actively and who is less involved. Social norms are common behaviors that manifest and strengthen local culture. Thus, the norms are visible when the members of the community shake hands or not, when they meet, keep or not the cleanliness of the place where they live, respect or not, the formal and informal laws of the community, etc.

Community culture must be known and mastered by community leaders because the conscious and unconscious beliefs of community leaders materialize in decisions and behaviors, and repeated behaviors become leadership practices. These leadership practices are finally becoming patterns of leadership culture, so leaders must be aware of the responsibility in creating or changing culture.

Community culture allows people to practice how to understand other people's culture, accept involvement in relationships with others, and build strong and diverse communities. Community culture is a vivid expression of the culture of everyday life, which can be taught and practiced informally from an individual to another.

Community culture is characterized by fundamental assumptions about accepted behaviors, trends, and their daily manifestations. A fit between culture and leadership strategy is desirable because it creates added value for the community and society.

Culture is important for the vitality of the community. To create a common culture in the community the leader can start from promoting common values and accepting different ones. A balance between tolerance and sanction is desirable here. Violation of community values is sanctioned by social control. That is why the leader must make sure that community behavior is encouraged, and non-community behavior is more difficult. He must make culture visible as part of everyday life. Therefore, it is required to courageously address the fears and to the same extent to eliminate taboos.

It is the task of the leader to contribute decisively to the development of the community culture. In this regard, several questions can clarify the meaning of community culture. Thus, to clarify what are the objectives proposed for the community, the leader must start from the question of why you want to create a community, what is the purpose you propose? Here are some alternatives:

- to connect community members to share knowledge.

- to bring a series of improvements to community life (related to cleanliness, improved living conditions, leisure initiatives, etc.)

With the answers he finds, the leader understands how to streamline the strategy and promote the ideas in a way that is as meaningful as possible for the others.

Knowing the culture of the community by the leader facilitates collaboration with others and helps to form social networks. If people are already collaborating, the leader must be a good observer of how things happen in the community. Care is required, because although the leader may be enthusiastic and wants to involve everyone, it may be difficult at first. That is why it is sometimes better to start with fewer but more convinced people than a large crowd, but some of whom are supercritical and negative. As the first members begin to create a strong community culture, more people can be integrated into community issues and this will happen with fewer disruptions.

Influencing People

Influence is the leader's ability to persuade someone to think or act the way he desire. Influencing others is an essential part of leadership.

As McBrown (2018) presented, the working definition of influencing is "everything we say or don't do or don't , is or isn't, that modifies, affects, or changes someone else's behavior, thoughts, or actions, consciously or unconsciously, for better or worse." Or more simple, influencing is the act of affecting the behaviours and actions of others. Without the ability to influence people's thinking, feeling and desires, the leader cannot achieve what he set out to do for the community.

Therefore, the leader must know how he can influence, in order to make things happen in the community.
Being able to influence without formal authority is an essential desideratum, but one that cannot be achieved without people trusting the leader, without a clear picture of the goal pursued and without the leader having highly developed communication skills to convince and persuade.

Influencing does not always mean making others accept our point of view. It is neither necessary nor a problem for community members to always agree with the leader.

According to community toolbox, influence is a combination of three elements:

- the communicator - the person who wants to influence someone;
- the message - what the communicator wants the audience to do or believe;
- audience - the recipient of the message.

The question is how do these elements intertwine, in order for the influence to appear? What helps to accept the message? What are the factors that make the influence effective?

The combination of all three elements will ultimately determine the effectiveness of the influence of the others. The auditors are the ones who, in the end, let themselves be influenced or not.
But both the communicator and the message are very important. A leader with an important message can decisively influence the auditor.

A first step in building influence can be the consolidation of ready-made ones and the formation of new networks. Helping in this regard can be members of the old network, which can act as anchors for the creation of a new network. In this way some doors are open, which maybe in other conditions, you could not open.

Trying to build influence, the image and information that those in the community have about the leader is important. Therefore, they must be positive and credible. In this sense, the credibility of the leader is highlighted when the person is competent and knows what he is saying, when he/she has charisma and attracts the public by the way he expresses himself, when he/has has a high formal status in the community, when he speaks "in the language" of the audience.

Leaders or those who want to gain access to these positions need to be aware that their public image will be important in influencing others. Therefore, they must act in accordance with what they transmit, with the values they promote, with the things they support, so as not to create cognitive dissonance.

In the way, it is clear that the leader will influence them to a greater or lesser extent, depending on how they are perceived by the public, how flexible they are, how open they are to the ideas of others, listening to them and taking into account their opinions. Do not forget that the best ideas and with the greatest chances of being accepted by the community, are those resulting from the contribution of everybody, as a result of the creativity of the group.

Changing beliefs requires a sustained effort, sometimes over a long period of time. The process of influencing does not implicitly lead to rapid change. It is important that the leader does not disarm and learn to enjoy small victories without giving up the fight.

We all must influence people sometimes. But to be a community leader, influence means more than that. It is necessary to have a distinction between influence and manipulation. Influence allows the leader to complete things and achieve the desired results.

Some suggestions for influencing are specified in the bibliographic reference mentioned above in the Community toolbox. For example, one of the suggestions is to use comparison, metaphor, and the laws of persuasion. Another one is to manifest yourself reciprocally, returning positive behavior to the other. Finally, following one of the rules of negotiation, ask the audience to say "yes" three times before answering a crucial question.

In the article “Master the 3 Ways to Influence People”, the author shows about the tactics of influence fall into 3 categories: logical, emotional, or cooperative calls. Finally, the idea is that people influence with their head, heart, or hands.

When he/she uses logic, the leader influences others with his head, because he uses the rational part of their brain. To this end, the leader can influence by referring to the beliefs of his community, the advantages of the proposal or by presenting proven facts.
When a leader's calls connect with a person's emotions, it means that he is influencing the heart. Emotional appeals are directly related to the values of those they try to influence, as well as their sense of belonging. Influence with the heart is often effective when raising funds or recruiting a nonprofit board.

If the leader uses call for cooperation, the influence of others is based on collaboration and teamwork, and then we say that the leader influences with his own hands. Collaborating to achieve a goal that benefits the entire community is a powerful influencer, especially when the leader is working to make massive and lasting changes.

Influencing others means working effectively with people you have no formal authority over. The question is what is the best way to influence? There is no standard answer, because it all depends on the audience (community members), but also on the qualities of the leader, the way, and the ease with which he communicates and transmits, encourages and motivates. As Robinson (2019) mentioned, sometimes these ways of influencing can be combined, using 2-3, depending on the leader's power of persuasion and persuasion.

Leaders have a huge desire to do something; they must do, create, and share. This desire is the force that makes them invincible. Due to their motivation, they discover how to influence the people and the culture around them.

A leader always has the absolute belief that he/she can put his vision into practice, and the influence of others always begins with their conviction. To do this, the leader must convince others to trust him, because he/she knows that uncertainty, doubt, and fear are the biggest impediments in influencing others.

But to have an influence on others, it is necessary to know what is already influencing them. In this way, the leader can make real changes. The leader must show passion, energy, and knowledge of others, and so he will know how to speak to them, to sensitize them and get them involved.

Leaders change the community and the world around it by talking about building an effective story. They show that they care about those they influence and know how to adapt their approach to certain people or groups, inspiring others with their vision and putting their plans into action.

Conclusion: the leader in pandemic time

As Martin Luther King Jr. said: “The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy.”

In times of crisis, people try to find confidence, looking at those they trust, at their leaders. Communities also need role models to follow, so they follow closely what their leaders are doing. Especially in times of pandemic, community leaders must not forget that for those who follow them, they are those models who give the desired direction and show the future, without being touched (in an observable way) by what surrounds them.

Therefore, leaders need to demonstrate several qualities that can encourage the community to move forward. These qualities are:

1. Optimism and confidence that everything you do together will be completed successfully, so that even if it is bad now, tomorrow the sun "will smile on our street too!"

2. Calm, because a calm leader allows calm to be transferred to his followers, thus building confidence that everything will be fine. Any situation will find a better solution if things are treated calmly, patiently, and perseveringly.

3. Communication, without which there can be no relationship between the community and its leader (s). Communication helps to understand reality, to fight false news, as well as gossip, conspiracy stories, etc. But this communication must be done on several levels, on different channels and with as many communication agents as possible, reliable people from the leader's team. Community members need to know that they can always find their leader, or those on the team of community leaders, that the lieder is ready to listen them and help them with their problems. Under no circumstances should community members feel abandoned, as these things have an impact on the psyche, promote fear, despair and can even lead to an altered mental state.

People in the community need to know that they can rely on their leader, in all situations, especially when they feel weak, lonely, and helpless.

4. Empathy - to understand what they feel, what they do and why they do certain things, why they react like that to certain events. In a community with low social status, modest resources or almost no resources, the leader must ask himself how he can help them survive. Empathy means being close to them in those moments, sharing their worries with them, while giving them hope that they will be able to cope. Sometimes it is enough, as a leader, to listen to them. Emotional discharge is good for those who are suffering and are overwhelmed with worries. The leader must know and be able to show compassion in these difficult times, when one or more members of the family may be affected. A community can be made up of people of different ages, sometimes many seniors, who are vulnerable to disease issues.

Young people are not safe either, the reality proving serious health problems in young and very young people, even children. Deaths can occur in some families, with a devastating effect on those left behind. The leader must be able to express his compassion, to show those affected that they are not alone, that someone is suffering near them. Such things soften pain and suffering and empower people to move on.

5. Cooperation with others, because the leader cannot work alone. Without a team behind him, not even the best leader will be able to complete what he set out to do. In addition, for many people, to be useful to someone means to prove to oneself that he is capable, that he has an existential meaning. The way they build the leader, the team of supporters, but also the way they respond to the challenges of the pandemic are the defining factors for a successful leadership. In addition, by getting involved in solving problems, people will gain a correct and clear understanding of the problems caused by the pandemic. This will lead to the closure of rumors, which occur when people do not know very well what it is about.

6. Strengthening the feeling of community. Of course, the moment of the pandemic is not the one in which the feeling of belonging to the community begins to be built, but the one in which it strengthens. People need to feel supportive, to feel that they belong to the same group and that makes them not feel vulnerable. When there are more, when they are together, individual courage increases and at the same time the feeling of pride develops, because you are part of a community in which things are resolved.
In case of a pandemic, people's morale is very fragile, so we must help them maintain their optimism and hope, to have the strength to fight the disease.

7. Control of fear. The leader is also a human, with his problems, with his vulnerabilities, which means that he too can be overwhelmed by fears, uncertainties, doubts. But this is exactly the difference from an ordinary people to a leader: the fact that he can control himself, that he can judge in a balanced way and not be overwhelmed by the problems that surround him. At the same time, those around them must see the leader as a strong person who does

not lose control of his emotional balance. If the leader expresses doubt, fears, they can prove to be contagious for the rest of the team and then even for the whole community.

In times of pandemic, when the situation is uncertain, sometimes our actions can be blocked by the fear of not making a mistake, of not doing something irreversible. But this can lead to error, because things can get out of hand and some measures can be taken too late. Therefore, the leader must be surrounded by an equally competent, reliable team, who knows when to insist so as not to make the intervention unnecessary.

As a community leader, you must accept that you can be wrong, even if it means taking contradictory measures at times. After all, the crisis does not go on a predetermined route, so it is normal for changes to occur. It is a perfectly normal human reaction to return to something already said or done when things take another turn. But you must show people why you change your mind, to let them see the logic behind the leader's behavior. Here is the role of your team to support you, and to explain, to convince them.
It goes without saying there is no leader who knows them all, who has all the information at his disposal, so the leader's team must help gather perspectives to replace and support, where the leader can no longer cope, or it is overloaded.

Finally, both the leader and the team must be able to admit when they made a mistake and together formulate the desired direction because it avoids such things happening in the future.
As Douglas Mc Arthur said:" A true leader has the confidence to stand alone, the courage to make tough decision, and the compassion to listen to the needs of others. He does not set out to be a leader but become one by the equality of his actions and integrity of his intent".

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The Interactive Effects of Personality Traits and Collectivistic On Job Involvement

Muhammad RUSDI
UIN Raden Fatah Palembang, Indonesia
(Muhammadrusdi_Uin@Radenfatah.Ac.Id)

Heru Kurnianto TJAHJONO
Universitas Muhammadiyah Yogyakarta, Indonesia
(Herukurnianto@Umy.Ac.Id)

Arif HARTONO
Universitas Islam Indonesia Yogyakarta, Indonesia
(Arifhartono@Uii.Ac.Id)

Wisnu PRAJOGO
STIE YKPN Yogyakarta, Indonesia
(Wisnuprajogo@Gmail.Com)

Abstract

It is now well recognized that personality traits are strongly related to job-related attitudes and behaviors, there is still lack of studies that have explored the relationship between personality traits and job involvement. We proposed such a model based on the proposition that collectivistic as the moderator of the relationship between personality traits (extraversion and agreeableness) and job involvement. According to this proposed model, the higher collectivistic more likely positive effects extraversion and agreeableness on job involvement.

Keywords: Extraversion, Agreeableness, Collectivistic Orientation, Job Involvement.

Introduction

Job involvement can be defined as the degree to which the individual psychologically identifies with his work (Kanungo, 1982). Individuals who have high levels of job involvement will certainly think about, be attached to and pay attention to their work (Paullay et al., 1994), and consider performance to be the most important part of their identity and self-esteem (Lodahl and Kejner, 1965). Research on job involvement has continued to develop and has become one of the topics of interest to researchers. Some studies have devoted to predictor of job involvement such as turnover and absenteeism (Blau and Boal, 1987); performance (Keller, 1997; Rotenberry and Moberg, 2007; Biswas, 2011), job satisfaction and organizational commitment (Singh and Pestonjee, 1990; Brown, 1996; Khan et al., 2011; Ho et al., 2012; Zopiatis et al., 2014), Burnout (Chauhan, 2009), behavior of organizational citizenship (Chugtai, 2008; Diefendorff, 2002; Zhang, 2014; Ueda, 2012); organizational justice (Tjahjono, 2011; Tjahjono et al., 2019); religiousity and spirituality (Palupi & Tjahjono, 2016; Afandi et al., 2017; Tusa'diah et al., 2017) and work attachment (Scrima et al., 2014).

Whereas other have focused on job involvement as antecedent of other variables, such as perceptions of organizational support, (O'Driscoll and Randall, 1999; Cheng, 2011), quality of work life (Permarupan et al., 2013), psychological climate (Brown and Leigh 1996), transformational leadership (Sheikh et al., 2013), work values (Ho et al., 2012), locus of control (Pisheh, 2011), leadership style and organizational climate (Omolayo and Ajila , 2012), professional commitment (Singh and Gupta, 2015), personality traits (Bozionelos, 2004; Liao and Lee, 2009; Eswaran et al., 2011).

The present study, we put more emphasis on personality traits related to job involvement. We focus on extraversion and agreeableness for two reason. First, this traits were found to be the most important predictors of job involvement in non western studies (for example, Eswaran et al., 2011; Cheng, 2011; Liao and Lee, 2009). Second,

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in the previous studies still found the uncertainty of the relationship between the extraversion and agreeableness with job involvement so as not to show conclusive results. Some studies have reported that agreeableness has a negative effect on job involvement, while extraversion have no significant effect on job involvement (Bozionelos, 2004). In contrast, Eswaran et al. (2011) revealed that extraversion and agreeableness have a positive effect on job involvement.

Furthermore, Andreassen et al. (2010) in his empirical study found that extraversion have a positive effect on job involvement, and agreeableness has a negative relationship with job involvement. Similarly, the empirical study conducted by Liao and Lee (2009) mentions that the personality of extraversion and agreeableness have a positive effect on job involvement. Meanwhile, the results of empirical studies conducted by Burke (2006) found that extraversion has a positive effect on job involvement. Likewise, the study conducted by Cheng (2011) found that extraversion and agreeableness have a positif effect on job involvement.

In an attempt to add to the literature, especially in a non-Western culture, the purpose of this article is to demonstrate that collectivistic as the moderator of the relationship between extraversion, agreeableness and job involvement. The central tenet of the interactionist perspective is that job attitudes are shaped by both employees' personal attributes and the attributes of their work environment. Based on this premise, we predict that collectivistic an important factor will influence the frame of reference individuals use when evaluating their work environments (Williamson et al., 2009). Thus, people who have different cultural values will provide different attitudes and responses to the work environment (Chao and Moon, 2005).

In this case, collectivistic is orientation to values that emphasize the principles of togetherness and everyone will seek to maintain long-term social relationships (Wagner and Moch, 1986; Wagner, 1995). This is done because the group can provide emotional support and a sense of togetherness. Therefore, people who have high collectivism values perceive that the interests of the group are more important than personal interests. Moreover, the existence of these values asserts that the work done by everyone will have an impact on group performance. As a result people tend to identify themselves and engage in organizational work (Brown, 1996; Hackett and Hausdorf, 2001).

Several studies have also found that collectivistic orientation is an important predictor of personality (Huang et al., 1997; Triandis, 2001; Taras et al., 2010). In another example, research conducted by Williamson et al. (2009) revealed that a positive interaction between organizational rewards and collectivist orientation affects employees' commitment. Meanwhile, Fock et al. (2011) in his empirical study reported that collectivistic orientation moderates the relationship between employee psychological empowerment and job satisfaction. Similarly, the results of research Sheikh et al. (2013) finds that collectivistic orientation as moderator the influence of transformational leadership styles on job involvement.

From these result, it appears that colletivictic oritentation plays an important role in determining employee work attitude. Thus, the presence of collectivistic orientation in this study is thought to explain the influnece of extraversion and agreeableness on job involvement.

Theories

Activation Traits Theory

Activation traits theory (Tett and Gutterman, 2000) provides one possible expalanation to explain the relationship between extraversion, agreeableness, collectivistic orientation and job involvement. This theory suggest that employees will look for a work environment that allows for the easy expression of their unique personality traits. According to this theory, situation strength is related to trait relevance that can lead to the expression of one trait rather than another.

Literature Review

Relationship between extraversion and job involvement

According to Witt (2002) extraversion is a personality trait related to one's ability to interact with others. People with high extraversion levels are usually described as talking, passionate, active, and sociable (Barrick and Mount, 1991; Jhon and Srivastava, 1999). Rusting and Larsen (1997) further state that in general extravert individuals have a positive experience with work. Research shows that such a pleasant experience tends to shape positive attitudes toward work (Judge et al., 2002; Judge & Ilies, 2002; Furham et al., 1999). As a result the positive attitude

encourages a person to engage in work and earnestly in work (Watson and Clark, 1997; Ongore, 2014). Therefore, the following propositions are proposed:

P1: extraversion positive effect on job involvement

Relationship between agreeableness and job involvement

Agreeableness is described as being cooperative, trustworthy, optimistic, forgiving, friendly, avoiding conflict and easily compromising with existing issues (Graziano and Eisenberg, 1997). Organ and Lingl (1995) add that individuals who have a high degree of agreeableness tend to be affiliated and maintain good relationships with colleagues. Research shows that individuals with a high degree of agreeableness tend to exhibit higher levels of work performance and engagement (Barick and Mount 1991; Scrima *et al.,* 2014). Thus, individuals with high agreeableness have a strong level of motivation to participate in the work. On that basis, the following propositions are proposed:

P2: agreeableness positive effect on job involvement

Collectivistic As Moderator

Previous studies have suggested that differences in cultural values play an important role in shaping individual preferences (Cox et al., 1991; Coon and Kemmelmeir, 2001), since these cultural differences of values can cause a person to have a different work attitude- (Alper, 1975, Bloom and Bary, 1967, Slocum and Strawser, 1972). At the organizational level of observation, in the same cultural situation can be analyzed at the individual level because of the variation of those values at the individual level. It was found Tjahjono (2011) in the study of social capital. For example, individuals who have high collectivistic values tend to show concern for others, avoid conflicts and prioritize cooperation (Taras et al., 2010). This is because they are more oriented towards building good relationships with colleagues (Wagner, 1995; Eby and Dobbins, 1997). These attitudes and work behaviors differ from those with a low collectivist orientation that prioritizes individualistic aspects (Ramamoorthy and Flodd, , 2002, 2004). Therefore, individuals with high levels of collectivism tend to have a work attitude that prioritizes common interests rather than personal interests (Triandis, 1998, 2001).

Thus in a work environment emphasizing collectivistic values it is possible for employees with high extraversion and agreeableness leads to engaged and to more satisfaction (Hui et al., 1995; Choi et al., 2015; Templer, 2012). It is assumed that employee with high levels of extraversion tend to enjoy talking and interacting with colleagues, they are looking for jobs with high social interaction, tend to develop and maintain good interpersonal relationships is expected to lead to higher job involvement (Brown, 1996; Scrima et al., 2014). Thus, the more positive the interaction between collectivistic with extraversion and agreeablenss leads to higher the level of employee involvement. Based on this argument, the following propositions are proposed:

P3: There will be a significant interactive effect between collectivistic and extraversion on job involvement

P4: There will be a significant interactive effect between collectivistic and agreeableness on job involvement

The Model

Grounded in activation traits theory (Tett and Guterman, 2000), we develope a moderator model involving extraversion and agreeableness as antecedent, job involvement as an outcomes and collectivistic as the moderator. The model postulates that extraversion and agreeableness could help increase job involvement level and envinronment who more collectivistic orientation.

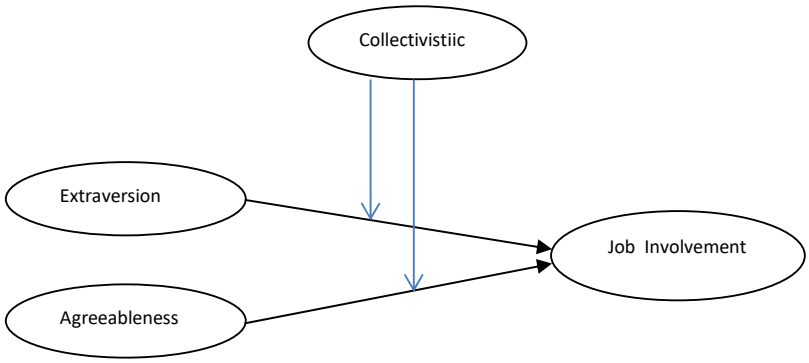

Figure 1: A moderator model on extraversion, agreeableness, collectivistic and job involvement

Conclusion

Based on some of the results of previous studies show that the relationship between the extraversion and agreeableness with the job involvement has not shown conclusive results. The uncertainty of the relationship is allegedly influenced by other factors such as collectivistic values. The presence of the collectivistic in this study has an important contribution in explaining the phenomenon of the influence of extraversion and agreeableness towards job involvement. Therefore, this study aims to proposed the following propositions: extraversion positive effect on job involvement, agreeableness positive effects on job involvement, the role of collectivistic orientation as the moderator of the relationship between extraversion, agreeableness and job involvement.

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Crafting Entrepreneurship Behaviour among Youth to Preserve the Culture of Malaysian Handicrafts

Melissa W. MIGIN
Faculty of Management (FOM), Multimedia University (MMU), Cyberjaya Selangor, Malaysia,
melissa.migin@mmu.edu.my

Kishamala THAMOTHARAN
Faculty of Management (FOM), Multimedia University (MMU), Cyberjaya Selangor, Malaysia,
kishamala@gmail.com

Hasliza HASSAN
Faculty of Management (FOM), Multimedia University (MMU), Cyberjaya Selangor, Malaysia,
hasliza.hassan@mmu.edu.my

Abstract

Although handicrafts portray the Malaysian culture and heritage legacy brought forward from previous generations, over the years, due to industrial revolution and technological advancements, the handicraft industry has been severely affected. However, entrepreneurship is one of the ways forward to sustainably preserve the handicraft industry. Hence, using Azjen's theory of planned behaviour (TPB), the aim of this research is to focus on the intention of the youth to venture into handicraft entrepreneurship as a path to rejuvenate the traditional handicrafts. The current study will extend the existing TPB framework by including the digital platform as an additional construct and will be based on cross-sectional quantitative findings. The target sample for this research comprises students from the National Craft Institute, Malaysia. This research aims to discover the entrepreneurial intention among the youth to pursue their careers in a traditional handicraft business. In line with the fourth industrial revolution, the impact of the digital platform will also be emphasized.

Keywords: Handicrafts, Malaysia, Entrepreneurial Intention, Digital Platform.

Introduction

The term 'cultural heritage' has evolved throughout the years, and although initially it referred to historical buildings and monuments, in this era, the knowledge and traditions inherited from our ancestors is also referred to as 'cultural heritage' (Yang, Shafi, Song, & Yang, 2018). Malaysia is a country with diverse cultures, traditions, religions, and ethnicities, and is a place where one can find differences in culture and religion within a small geographical area. According to the study by Petronela (2016), cultural heritage contributes to the GDP of the respective country. The reason being is that tourists or people in general like attaching their emotions to symbolic or meaningful architecture. Thus, protecting the heritage culture is very important. The tourism performance report indicates that handicrafts are among the items highly purchased by tourists (Malaysia Tourism Data, n.d.).

The advent of globalisation has led to challenges in the handicraft industry, such as mass production, lack of innovation, the unwillingness of youth to be involved in handicrafts, and the lack of financial resources. The lack of interest that is shown by the youth in small businesses, particularly in the handicraft industry, makes it challenging for craft products to thrive in the market (Yang et al., 2018; Fabeil, Mahmud, Nga, Hui, & Mail, 2017). One of the viable solutions that can be applied for this situation is to entice the younger generation in Malaysia to venture into the handicraft industry. Entrepreneurship is becoming a popular career choice and various efforts have been put forward by the Malaysian government to encourage entrepreneurial activities, especially among the youth (van Gelderen et al., 2008). Majlis Amanah Rakyat (MARA) and the SME Corporation Malaysia (SME Corp.) are among the institutions that have helped and supported the entrepreneurial activities.

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Although a wide range of studies has been conducted on the entrepreneurial intention among the youth in Malaysia (Ali et al., 2017; Chea, 2015), limited empirical research is available concerning the factors that impact the entrepreneurial intention of the youth in the handicraft industry. The theory of planned behaviour (TPB) is one of the frequently used models to test entrepreneurial intention and human behaviour overall. Most researchers integrated the TBP into their study of entrepreneurship to predict the intention to establish a business (Krueger et al., 2000; Van Gelderen et al., 2008; Kautonen et al., 2015). Hence, the TPB was adopted for this study to illustrate the relationship between the entrepreneurial intention and entrepreneurial attitude, subjective norms, and the digital platform. In line with the fourth industrial revolution, the digital platform is included as an additional construct to identify the determinants that affect entrepreneurial intention.

Thus, this study is conducted to address the above-mentioned gaps by focusing on the following objectives:

1. to discover the determinants that could craft the intention of youth to venture into handicraft entrepreneurship;
2. to examine the digital platform's influence on the intention of youth to venture into handicraft entrepreneurship; and,
3. to understand the relationship among attitude, subjective norms, perceived behavioural control, and the digital platform in venturing into handicraft entrepreneurship.

Literature Review

Handicrafts

Handicrafts refer to products that are handmade and that represent the culture of a community. At least 80% of the crafts are handmade using sustainable resources, such as clays, recyclable materials, and natural fibres to name a few. The handicrafts are made based upon functionality, innovation, religious affiliations, and social symbols (Garg, Mittal & Goyal, 2005; Bhawan & Marg, 2006; Rogerson, 2010). Handicrafts in Malaysia are divided into five key sectors, namely, textiles, forest-based, metal-based, earth-based, and various crafts (Amin, 2006; Fabeil, Mizal & Langgat, 2016).

Entrepreneurship

Entrepreneurship is a process of creating value by bringing together a unique package of resources to exploit an opportunity. It is a process of creating something new by putting in the requisite time and effort, taking into account the financial, psychological, and social risk. In general, entrepreneurship refers to those people who are inclined to take a risk by undertaking a new business in order to gain profit (Ferreira, 2013; Eisenmann, 2013). The contributions of entrepreneurs are significant as they create jobs, products, and process innovation. In this study, entrepreneurship is looked at from the handicraft perspective.

Theoretical Foundations, Framework, and Propositions

Numerous existing studies support the usage of the theory of planned behaviour (TPB) in predicting the intention to start a business (Krueger et al., 2000; van Gelderen et al., 2008; Kautonen et al., 2015). It is evident that TBP predicts entrepreneurial intention across different cultural backgrounds. Although most of the studies focused on the direct effect of attitude, perceived behavioural control, and subjective norms on intention, some suggested the inclusion of additional constructs. In order to increase the efficiency of TPB as a tool to predict entrepreneurial intention, another independent construct – digital platform – is included.

Attitude towards intention refers to a person's favourable or unfavourable opinion concerning the behaviour of interest. Attitude is regarded as one of the primary determinants of intention. Attitude towards entrepreneurship can be enhanced in various ways. Secondly, perceived behavioural control is one's belief that one can accomplish a task that has been undertaken, which is primarily influenced by one's involvement and insights gained through the difficulties and challenges that one has encountered (Ajzen,1991; Bandura,1997; Krueger et al., 2000). Besides that, perceived support from close relations, such as families, friends, and so on, has been shown to have a positive impact on the intention among potential entrepreneurs. One's supportive environment, especially from the people that matter, has a considerable effect on one's intention (Ajzen, 1991; Kolvereid & Isaksen, 2006). Lastly, the digital platform has a profound impact on entrepreneurial intention. The availability and ease of using the social networking sites to launch a business is preferred by young entrepreneurs (Alayis, Abdelwahed & Atteya, 2018). Social networking sites like Facebook, Twitter, Instagram, and so on play an exceptional role in inspiring people to become entrepreneurs (Fernández, Liñán, & Santos, 2009).

Based on the previous studies, the following propositions are proposed:

P1: There is a positive significant relationship between the attitude and the intention of the youth to venture into handicraft entrepreneurship.
P2: There is a positive significant relationship between the perceived behavioural control and the intention of the youth to venture into handicraft entrepreneurship.
P3: There is a positive significant relationship between the subjective norm and the intention of the youth to venture into the handicraft industry.
P4: There is a positive significant relationship between the digital platform and the intention of the youth to venture into handicraft entrepreneurship.

The conceptual framework is presented below:

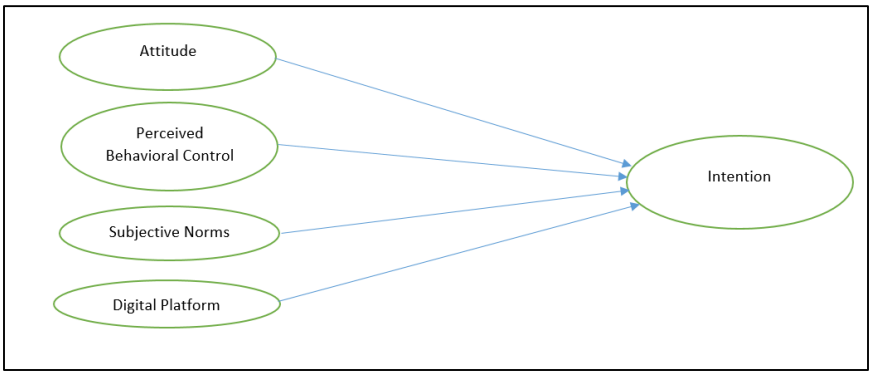

Figure 1: Conceptual Framework

Methodology

Sample

The target population of this study is students from the National Craft Institute Malaysia, which is located in Rawang. A few studies, such as Ismail et al. (2009), Shook and Bratianu (2010), van Gelderan et al. (2008), and Yusof et al. (2007), have prioritized students as the subject of their study. A total of 384 survey questionnaires will be distributed among the students.

Measurement

All the items in the questionnaire are developed based on past studies. This research uses five items to capture the attitude of youth towards intention. Five items are adapted from Azjen (1991) to reflect on how a student perceives the opinion of others concerning their entrepreneurial behaviour. Five questions are adapted from Alayis et al. (2018) to measure the impact of the usage of social networking sites on entrepreneurial intention among students of the handicraft courses.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) will be used for the first phase of the data analysis, to screen and obtain the descriptive statistical results. To test the hypothesized relationships and their respective indicators, SmartPLS software will be used.

Summary

A positive outlook among students towards entrepreneurship can be built by addressing the determinants that affect their intention towards establishing a handicraft business. Therefore, this paper suggests a conceptual framework to identify the factors that affect entrepreneurial intention to venture into the handicraft industry among the youth. This paper is expected to provide some insights into the determinants of entrepreneurial intention among the youth, especially towards the handicraft industry.

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What Could Happen with Cities and Mining Regions During A Lifecycle of Extractive Industry? Evidence from Polish Hard Coal Mining

Izabela JONEK-KOWALSKA

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland izabela.jonek-kowalska@polsl.pl

Ireneusz TOMECKI

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland ireneusz.tomecki@polsl.pl

Abstract

This article analyses the paths of transformation of mining cities and regions within the framework of a triad including (1) mining enterprise – micro perspective, (2) regional and (3) national governments – macro perspective, together with the socio-economic effects of choosing these paths. Considerations and research are conducted on the example of the Polish hard coal mining, which for many years remains one of the key industries in the Polish economy. The analysis covered a 15-year research period - 2003-2017.There are three main paths of transforming post-mining cities and regions: (1) continuation of mining in the region, (2) gradual substitution of mining by other service or industrial branches and (3) development of post-industrial tourism. The design and implementation of a transformation strategy should take place many years before the liquidation phase of mining in a given region. This is clearly confirmed by observation of the effects of mining liquidation in the studied Polish cities of Górny Śląsk. Failure to use the transformation paths indicated above exposes cities and regions to a very severe deterioration of the socio-economic status and image. It is not possible to improve them in the short term without significant investment outlays.

Keywords: Cities Transformation; Post-Industrial Regions; Regional Policy and Strategies; Regional Management; Coal Mining in Poland.

Introduction

Extraction of natural resources is a very socially and environmentally burdensome process at virtually every stage of the mining enterprise's life cycle (Toumbourou et al., 2020; Zhi et al., 2019). This is due to the nature of the production process, and apart from abandoning mining there are no ways to completely eliminate the burdensome effects of mining (Lehotský et al., 2019). Although they can be limited, it is connected with the need to incur additional financial outlays, which ultimately increases the costs of mining enterprises and reduces the profitability of mining production (Yu et al., 2020). Therefore, mining enterprises have and will tend to avoid these additional costs and downplay the socio-ecological aspects of mining, all the more so because their activity in a given region is time-limited by the sufficiency of given deposits of natural resources. Therefore, mining companies do not have to be interested in long-term implementation of the benefits of sustainable development, and the will to implement the principles of corporate social responsibility in their case can only remain marketing tool, if it is not accompanied by deeply rooted ethical values that characterise the managers of these organisations (Tang et al., 2020; Woźniak and Jurczyk, 2020; Kochmańska, 2019; Majer, 2013; Sapna et al., 2017).

Given the above circumstances, it should be noted that local, regional and national authorities play a decisive role in limiting the adverse effects of mining operations, which by definition are required to create, implement and control the compliance with mining regulations (Alvez et al., 2020; Atienza et al., 2020; Wang et al., 2019; Spiegel et al., 2018). In addition, they are also creators of business conditions in the short-term and strategic development perspective. Therefore, they have a direct impact on what is currently happening in the region and what will happen in the future. Thus, they are active stakeholders in the activities of mining enterprises, and it is within the framework of such a triad (mining enterprise - local, regional and national governments - local, regional and

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national community) that the consequences of mining activities are defined at each stage of its life cycle (Baran, 2019; Oppon et al., 2018; Cardoso, 2015; Huang et al., 2011).

In light of the above justification, this article analyses the paths of transformation of mining cities and regions in the context of the interaction of the above mentioned triad, together with the socio-economic effects of choosing these paths. Considerations and research are conducted on the example of the Polish hard coal mining, which for many years remains one of the key industries in the Polish economy (Bijańska and Wodarski, 2017; Michalak, 2016; Karbownik, 2005).

Literature Studies

In the life cycle of a mining enterprise, as in the case of other industries and enterprises, there are essentially three phases: establishment, development and liquidation. In the case of mining enterprises, the duration of this cycle is clearly limited by the size of the extracted deposits or the economic profitability of this process. Therefore, mining enterprises and industries are characterized by the temporary nature of existence in a given geographical location, which, combined with the high harmfulness of this type of activity becomes a source of many social, environmental and economic conflicts, which are primarily activated at the local and regional level (Crost and Felter, 2020; Gómez-Valenzuela et al., 2020; Rugadya, 2020; Orihuela et al., 2019; Yang and Ho, 2019; Hovards, 2019; Temper and Martinez-Alier, 2013; Avcı et al., 2010).

Nevertheless, the emergence and development of mining enterprises in a given region can be perceived as a source of economic benefits, especially in less civilised, industrialised or economically developed regions. New jobs are created and the chances of improving the economic situation of the residents and the local economy clearly increase. Local and regional authorities can also benefit from the economic benefits of starting mining enterprises by participation in fees and taxes paid by the mining industry. For this reason, they very often lobby and support mining entrepreneurs in contrast to local environmental or social organisations that fear the consequences of mining activities (Corrigan, 2019; Bainton and Jackson, 2019; Saletta and Orrman-Rossiter, 2018; Wakefield and Myers, 2018; Damigos et al., 2016; Zhang and Moffat, 2015; Söderholm and Svahn, 2015).

The establishment and development of mining enterprises is also justified by the state's resource policy. Extraction of natural resources can be a source of significant budget revenues (Siyam et al., 2020; Dai et al., 2019; Caputa, 2019; Ma et al., 2019; Rubbers, 2019; Hilson, 2000; Kumar and Amaratunga, 1994). It can become an important bargaining argument in international economic relations. It can also significantly affect the security of raw materials, including energy. The package of benefits associated with it is therefore attractive and alluring, and until there are economically and technologically viable substitutes or methods of producing natural resources, the problems associated with their extraction will be urgent and current.

If national, local government, social and ecological stakeholders come to an agreement, the emergence and development of the mining industry are inevitable. In this situation, the potential economic benefits outweigh the negative social and environmental effects. The problem of these effects appears again in the declining phase of mining enterprises in which resources are depleted or their extraction becomes economically or technically unjustified (Toumbourou et al., 2020; Molenda, 2019; Gorman and Dzombak, 2018; Krzemień et al. 2017; Bainton and Holcombe, 2018; Knierzinger and Ter-Ibinibe Sopelle, 2016). National, local and regional authorities should then consider ahead of time and by mutual agreement further regional transformation (Marais et al., 2019; Makhmudova and Matsui, 2019), which could theoretically follow the following patterns:

- starting new deposits in the region (subject to their existence and economically and technically justified possibility of extraction, and obtaining the consent of representatives of social and ecological environments),
- systematic replacement of the mining industry with other industrial and service industries,
- taking advantage of the opportunities for developing post-industrial tourism.

Defining and choosing one of the indicated options prevents social conflicts following the end of extraction due to: loss of jobs, increase in unemployment, decrease in income of residents and general pauperisation of the region (Otamonga and Poté, 2020; Kmieciak et al. 2018; George-Laurentiu et al., 2016; Rawashdeh et al., 2016). At the same time, this choice should at least take place several years in advance due to the long-term nature of liquidation of the mining enterprise and the long-term perceptibility of negative effects of this activity (Carneiro and Fourie, 2020; Everingham et al., 2018; Ober, 2020).

Misunderstanding or disregarding the consequences of mining enterprises entering the declining phase usually has disastrous consequences for local and regional communities. On the other hand, numerous cases of properly

planned, organised and implemented transformation strategies allow to state that mining regions can exist and develop in parallel with further development of the mining industry and also after the liquidation of mining plants (Veraart, 2019; Howieson et al., 2017; Harfst, 2015; Wolniak and Skotnicka-Zasadzień, 2012).

In light of the above circumstances, the main purpose of this article is to identify and characterise the socio-economic consequences and transformation pathss of cities and mining regions on the example of Polish hard coal mining. Detailed research objectives and problems related to this intention together with the research methods used are described in the next section. Then, the results of research on the transformation paths of mining regions in Poland and the socio-economic consequences of the post-mining transformation of the Śląskie Province (macro perspective) and the cities operating in it (micro perspective) are presented. At the end, conclusions regarding Poland and the studied regions were formulated. Theoretical possibilities of transformation of mining regions were also defined.

Methodology

Three research perspectives were used to identify patterns and consequences of the transformation of mining regions and cities. The first of these relates to the national level (Poland) and the three main mining basins: Lubelskie, Górnośląskie and Dolnośląskie. The second concerns the region, which is the Śląskie Province - the area of operation of the Górnośląskie Coal Basin, and the third is local and covers 19 Śląsk cities with poviat rights. This approach allows one to look at the process of changes and their consequences both synthetically and analytically.

The research is looking for answers to the following research problems:

1. At what stage is hard coal mining in three main mining regions in Poland?
2. What mining regions transformation paths have been implemented in each of the studied regions?
3. Were the cities located in the same mining region transformed in a similar or different way?
4. What influenced possible differences in urban transformation paths and their consequences?
5. What were the socio-economic consequences of selected transformation paths at regional and local level?

The analysis covered a 15-year research period - 2003-2017. In the course of the research, the following parameters were used to identify the socio-economic consequences of the transformation of regions and cities: population, budget revenues per capita, budget expenditure per capita, divided into current and investment expenditure, level of budget deficit/surplus, relation of total liabilities to total income.

For the data characterising the above parameters in the years 2003-2017, the average annual rate of change and arithmetic means were calculated, and based on them, a comparative analysis was carried out in the above mentioned research perspectives. At the end of the article, in order to group the 19 studied cities and formulate uniform management recommendations for them, Principal Components Analysis (PCA) was used to simplify the description of the studied cities from five parameters to two dimensions (Statistica Package), thus obtaining a description of the socio-economic consequences caused by choosing a specific transformation path.

Research Results

Transformation paths of post-mining regions in Poland

In Poland, hard coal mining was and is located in three basins located in different geographical regions of the country. In the southeast there is the Lubelskie Coal Basin (LZW). In the south of Poland, the Górnośląskie Coal Basin (GZW) operates, and in the south-west is the Dolnośląskie Coal Basin (DZW). Currently functioning mines only operate in GZW and LZW. In DZW, extraction was terminated in 2000 for economic reasons. Currently, the largest area of hard coal mining in Poland is GZW in which almost all Polish mines and mining companies operate: Polska Grupa Górnicza SA - 8 mines, Jastrzębska Spółka Węglowa SA - 5 mines, Tauron Wydobycie - 3 mines, Węglokoks SA - 1 mine, Przedsiębiorstwo Górnicze Silesia sp. z o.o. - 1 mine, Zakład Górniczy SILTECH sp. z o.o. – 1 mine, Zakład Górniczy Eko-Plus sp. z o.o. - 1 mine. There is one hard coal mine operating in LZG as part of the LW Bogdanka SA. enterprise. The geological characteristics of the Polish coal basins are presented in Table 1.

Table 1: General geological characteristics of Polish coal basins (as of 31/12/2018)

Basin name	Area [in km^2]	Number of deposits	Recoverable resources [in million t.]	The main types of coal
Dolnośląskie Coal Basin (DZW)	530	7	420	34-37
Górnośląskie Coal Basin (GZW)	5,600	144	49,350	31-33
Lubelskie Coal Basin (LZW)	1,200	10	11,661	31-33

Source: own study based on data of the Polish Geological Institute.

According to the data presented in Table 1, the largest and the most prospective Polish mining region is the Górnośląskie Coal Basin. However, it should be added that extraction in this area takes place in highly urbanised areas which significantly hinders operation and increases the costs of its operation. In addition, the deposits there are characterised by a high level of natural hazards, including primarily methane. In addition, most of the low-lying seams existing in the mines there have already been extracted. It is therefore necessary to deepen mining - up to 1,200 metres, which causes a significant deterioration in the working conditions of mining crews. These circumstances adversely affect health and safety at work and contribute to the deterioration of mining efficiency (Gembalska-Kwiecień, 2019).

The low and deteriorating efficiency of mining has been the reason for limiting mining activity in the Górnośląskie Coal Basin for years. In 1989 - the first year of economic transformation in Poland, 415,000 people were employed in mining with over 177 million tonnes extracted. The first period of intensive reforms began in 2001 and lasted until the end of 2003. Its effect was to reduce employment to 136,000 and decrease production to around 100 million tonnes. 29 mines were then closed. As part of this stage of the sector transformation, only the liquidation of mining plants and the system of severance pay and social protection were used for miners dismissed from mines. They rarely used the opportunity to retrain and often fell into ruin after exhausting the received funds. Due to the scale of redundancies, this phenomenon was of a collective nature and contributed to the increase in unemployment in the region and its ongoing pauperisation. Cities particularly affected by these circumstances were: Bytom, Świętochłowice and Zabrze.

After liquidation the existing mines were consolidated into several large mining enterprises, which was to ensure synergy and enable more effective management of the remaining mining plants (Wolniak, 2019). In the yearsma 2003-2012 mining plants were not liquidated on a mass scale and group redundancies were not made. In order to improve efficiency and effectiveness, individual mines were merged into existing mining enterprises to form so-called combined mines, most often with two-chain operation (Skotnicka-Zasadzień, 2013). Unfortunately, in the years 2012-2015 there was a severe economic downturn on the hard coal market, including a fall in prices and demand (Michalak and Bąk, 2018; Krawczyk-Sokołowska et al., 2019). In connection with the anti-carbon Policy of the European Union, this resulted in a deep crisis, as a result of which two large coal mining enterprises were closed, some of the permanently inefficient mines were closed and one joint mining enterprise was established - Polska Grupa Górnicza SA. Its structures also internal consolidation and the creation of three and four-chain combined mines took place. The liquidation of six mines in this phase of the sector transformation affected mostly the cities in which the closed plants operated. Among them again were: Bytom and Zabrze. They were joined by: Jastrzębie Zdrój, Żory and Ruda Śląska.

In the second of the described regions, the Lubelskie Coal Basin, mining conditions are significantly better. Mined hard coal seams are lower, characterised by a high thickness and low inclination (possibility of operating with a plough system) and serious natural hazards, including methane, are practically nonexistent. Favourable geological conditions have a positive impact on both the efficiency of extraction and the development opportunities of LW Bogdanka SA.

As already mentioned, in the last of the characterised region - the Dolnośląskie Coal Basin, operation was finally terminated in 2000 due to the very complicated tectonic conditions of the deposits located there, as well as frequent rock and gas outbursts, hindering economically profitable production. There have been several coal mines in this region since the eighteenth century, mainly near Wałbrzych and Nowa Ruda (including, among others *Bolesław Chrobry, Dawid, Herman, Julia, Mieszko, Piast, Słupiec, Segen Gottes, Teresa, Victoria, Wałbrzych)*. During the liquidation and post-liquidation phase, the closure of the mines contributed to the pauperisation of the region, the outflow of indigenous peoples and the progressive ageing of local society.

Preventive measures were only taken in the final phase of the liquidation of mining in DZW in the late 90s of the twentieth century, and they were focused on two priorities:

1. post-industrial tourism development,
2. complementing the industrial potential of the region.

Activities aimed at increasing the region's attractiveness perfectly matched the current business conducted in the region of south-western Poland, which was a certain facilitation for the development of post-mining tourism. The Dolnośląskie Coal Basin is located in the Sudetes region - an attractive mountain range with numerous rivers, lakes, caves and underground waters. And so, in 1994, the Mining Museum of Nowa Ruda was established, which was then expanded by the Tourist Coal Mine. In the facility you can learn about the mining history of the Dolnośląskie Coal Basin and visit the revitalised underground excavations of the Nowa Ruda mine (http://kopalnia-muzeum.pl/). The industrial potential of the region was supplemented in two ways. On the one hand, efforts were made to use and maintain existing industries, primarily including the ceramic industry (Wałbrzych porcelain factory) and hard coal processing (Victoria coking plant). On the other hand, new investment opportunities were sought by creating the Wałbrzych Special Economic Zone (WSEZ) offering entrepreneurs preferential tax and cost conditions for doing business. Thanks to the Zone, it was possible to strengthen and develop construction and automotive industry in the region. Nevertheless, despite the actions taken, the region of Wałbrzych and Nowa Ruda has not yet achieved full economic potential and regional significance it had prior to the liquidation of hard coal mines operating in this area.

Socio-Economic Consequences of The Transformation of Mining Regions on The Example of the Śląskie Province - A Macro Perspective

In the macro perspective, parameters are compared at the level of Poland and the Śląskie Province. The first of these is the population in the years 2003-2017, presented in Figure 1. In Poland, the population size was characterised by a slow growth trend. In the Śląskie Province, a well-adjusted trend function indicated a systematic reduction in the number of residents of this region. This is also confirmed by the average annual rate of change of this parameter indicated in Table 1. It amounted to 0.04% in the analysed period in Poland, and in the Śląskie Province -0.26% The identified regularity indicates the demographic decline of the post-mining area and the depopulation of Śląskie cities, which is largely associated with their decreasing industrial attractiveness and the increasing degree of environmental degradation.

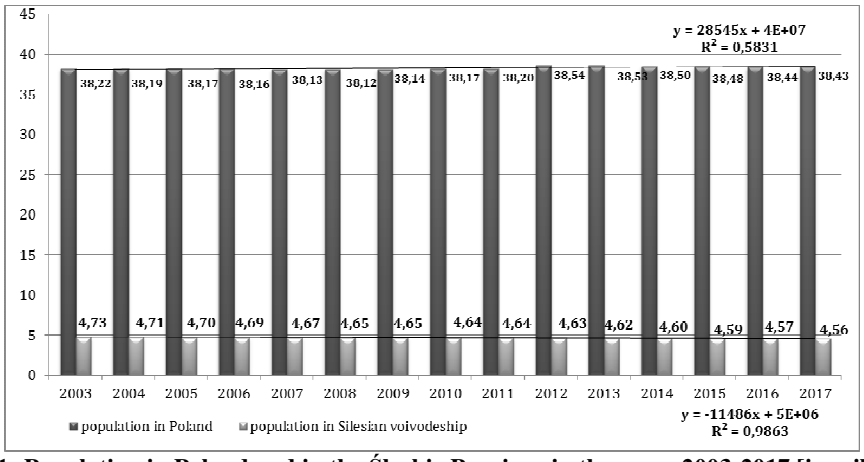

Fig. 1: Population in Poland and in the Śląskie Province in the years 2003-2017 [in million]

Table 1: The average annual rate of population change in budget parameters for local government units in Poland and in the Śląskie Province in the years 2003-2007 [in %]

Specification	Average annual rate of change
Population in Poland	0.04%
Population in the Śląskie Province	-0.26%
Revenue of local government units in Poland per capita	7.87%
Revenue of local government units in the Śląskie Province per capita	7.35%
Expenses of local government units in Poland per capita	7.71%
Expenses of local government units in the Śląskie Province per capita	7.18%
Investment expenses of local government units in Poland per capita	6.92%
Investment expenses of local government units in the Śląskie Province per capita	5.55%

Source: own work.

The slower pace of development of the Śląskie region in comparison to Poland is also evidenced by the lower average annual growth rate of income and expenses per capita. In the case of revenues, their growth dynamics was lower by 0.52% a year in the analysed period in the Śląskie Province, and by 0.53% a year in the case of expenses. The above differences become even more pronounced at the level of investment expenses, which increased by 6.92% a year in Poland and only by 5.55% in the Śląskie Province.

However, Śląskie Province as a whole region performed slightly better compared to the national average, in the context of the level of budget deficit and debt in relation to the level of total income. The average values of these parameters for all Polish provinces and the Śląskie Province are presented in Table 2. The data contained therein show that the average annual expenses of Polish provinces exceeded the income by 1.85%, while expenses of the Śląskie Province were higher than the income by 1.36%. The debt of municipalities in all Polish provinces constituted over 23% of total revenues, and Śląskie Province's debt in relation to total revenues was 22%. Here it is worth adding that the debts of Polish municipalities, including Śląskie municipalities, has been systematically growing over time due to the need to make own contribution to development projects financed by the European Union, and increasing the scope of tasks entrusted to local governments in Poland (Spałek, 2014).

The analysis carried out for the Śląskie Province shows that this region slowly depopulated during the period studied and developed economically slower compared to the national average. However, it was not excessively indebted and the average deficit of the municipalities operating in it was lower than the national average. Nevertheless, it should be added that the Śląskie Province, apart from the Górnośląskie Coal Basin, also includes the Beskid Śląski (Bielsko-Biała) in its region and part of the Kraków-Częstochowa Upland (Częstochowa). These are tourist and agricultural areas in which mining has never been carried out. Therefore, in the next section, the analysis was narrowed to a micro perspective referring to cities with poviat rights operating in the Śląskie Province (19 government units). This approach made it possible to assess the relationships between the demographic and financial situation of the government units studied, and their main economic specialisation.

Table 2: Average values of selected budget parameters in Poland and in the Śląskie Province in the years 2003-2007 [in %]

Specification	Arithmetic mean
Budget deficit / surplus of local government units in Poland	-1.85%
Budget deficit / surplus of local government units in the Śląskie Province	-1.36%
Liabilities of local government units versus total revenues in Poland	23.39%
Liabilities of local government units versus total revenues in the Śląskie Province	22.00%

Source: own work.

Socio-Economic Consequences of The Transformation of Mining Regions in Cities of the Śląskie Province - A Micro Perspective

Starting the analysis of social effects in the urban perspective, it is worth looking at the number of residents of the studied government units and their diversity in the studied group - Figure 2.

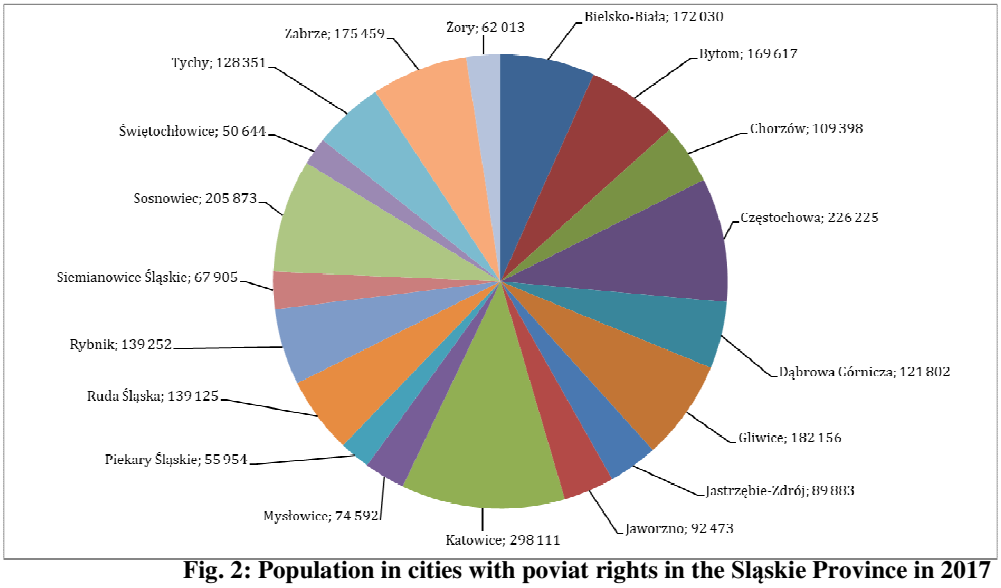

Fig. 2: Population in cities with poviat rights in the Sląskie Province in 2017

And so, the number of residents in all cities exceeds 50,000 in the studied group. The largest of them are: Katowice, Częstochowa and Sosnowiec (population over 200,000). Among the smallest are: Świętochłowice, Żory and Piekary Śląskie (population below 70,000).

In the case of detailed demographic parameters, presented in Figure 3, it can be concluded that In all the examined cities, a decrease in the population of 0.10% (Mysłowice) to 0.90% (Bytom) was recorded. Among the cities with the highest rate of depopulation, apart from the already indicated Bytom, there are: Częstochowa, Gliwice, Katowice, Siemianowice, Świętochłowice and Zabrze. In the given list only Częstochowa is not a post-mining city. It should also be added that Bytom, Świętochłowice and Zabrze are cities in which the liquidation of mines was carried out during both periods of mining restructuring in GZW, i.e. the cities most affected by the effects of regional transformation.

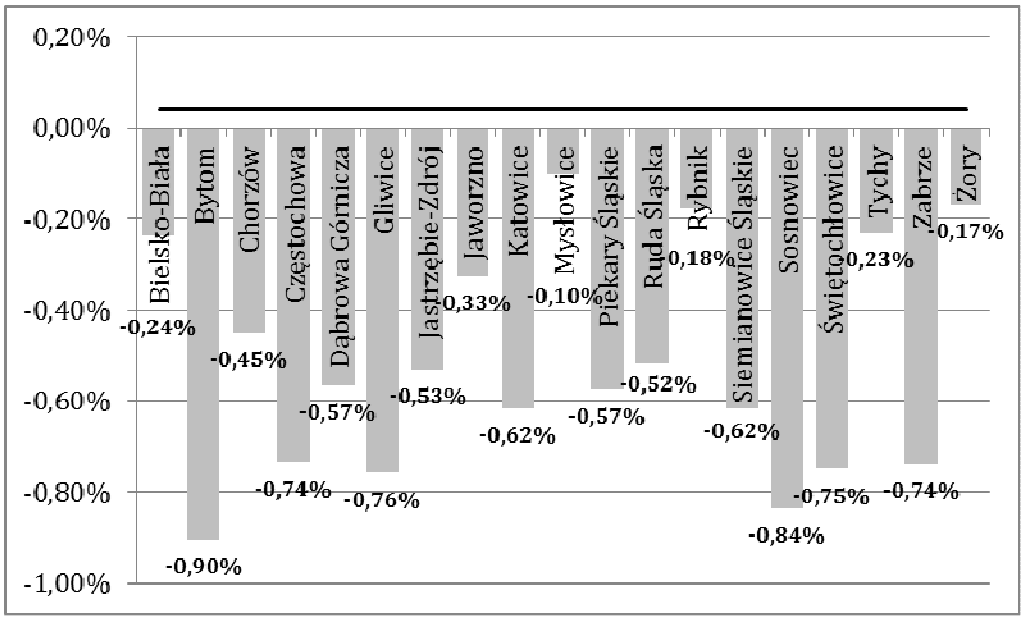

—— - average value for all local government units in Poland in the years 2003-2017

Fig. 3: Average rate of population change in the studied Śląskie cities and in Polish local government units in total in the years 2003-2017 [in %]

As part of further analysis, Figure 4 presents the average rate of change in budget revenues per capita in the studied Śląskie cities and in Polish local government units in total in the years 2003-2017. It shows that in only 9 out of 19 cities studied it was higher than the national average (Bielsko-Biała; Chorzów; Częstochowa; Jastrzębie-Zdrój; Piekary-Śląskie; Siemianowice Śląskie; Świętochłowice; Tychy; Żory). There was no mining in two of these cities (Bielsko-Biała and Częstochowa). Jastrzębie-Zdrój still has the largest European company mainly producing coking coal (Jastrzębska Spółka Węglowa SA). In Tychy, Chorzów and Siemianowice Śląskie - former mining regions, it was possible to carry out an industrial transformation (supported by the creation of special economic zones) and replace mining plants with enterprises from the automotive industry (Fiat; General Motors - Tychy; Adient - Siemianowice Śląskie), metallurgy (ArcelorMittal - Siemianowice Śląskie) and chemical (Zakłady Azotowe; Zakłady Chemiczne HAJDUKI - Chorzów). In Żory and Piekary Śląskie it was not possible to create or attract large industrial plants but many small and medium enterprises were created, and the cities changed their character from industrial to service and commercial.

In light of the above, it can therefore be stated that in almost all cities with above-average income growth the mining industry has been successfully replaced by other activities that do not expose the residents and the region to pauperisation. The exception in this respect is Świętochłowice, which, despite a significant rate of income growth, did not avoid the most serious effects of mine liquidation, which will be explained in detail later in this article.

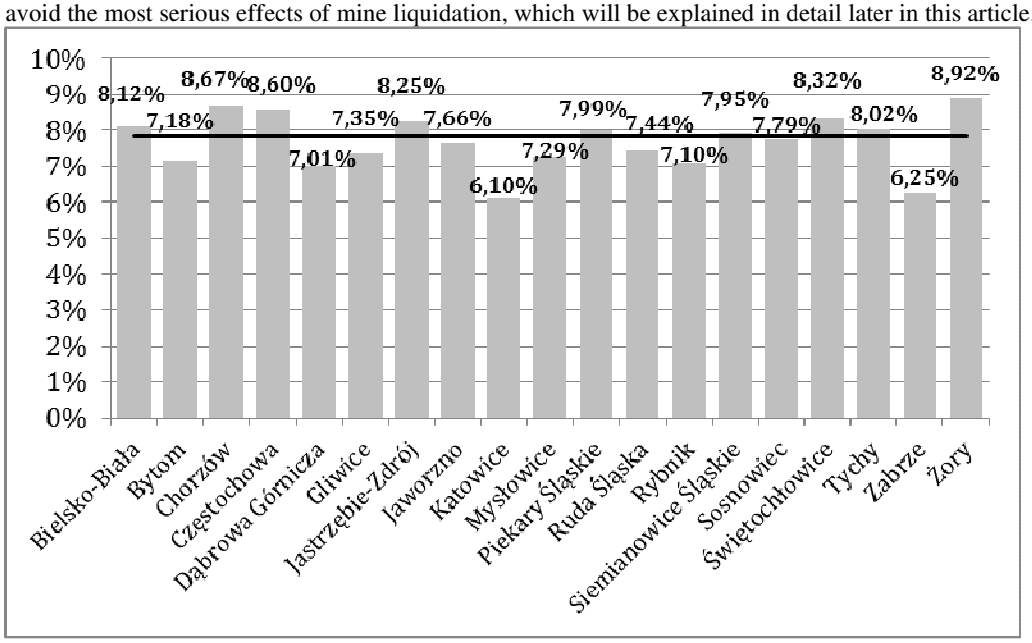

- average value for all local government units in Poland in the years 2003-2017

Fig. 4: The average rate of change in budget revenues per capita in the studied Śląskie cities and in Polish local government units in total in the years 2003-2017 [in %]

The lowest rate of income growth was recorded in: Bytom, Dąbrowa Górnicza, Katowice, Rybnik and Zabrze. Therefore, this group again included two cities most affected by the effects of restructuring (Bytom and Zabrze). In other cities, mines were also liquidated in at least one of the restructuring periods indicated earlier. However, it should be added that Katowice being the capital of the province, could certainly deal with the changes much better than smaller and less industrialised cities, such as Rybnik or Dąbrowa Górnicza.

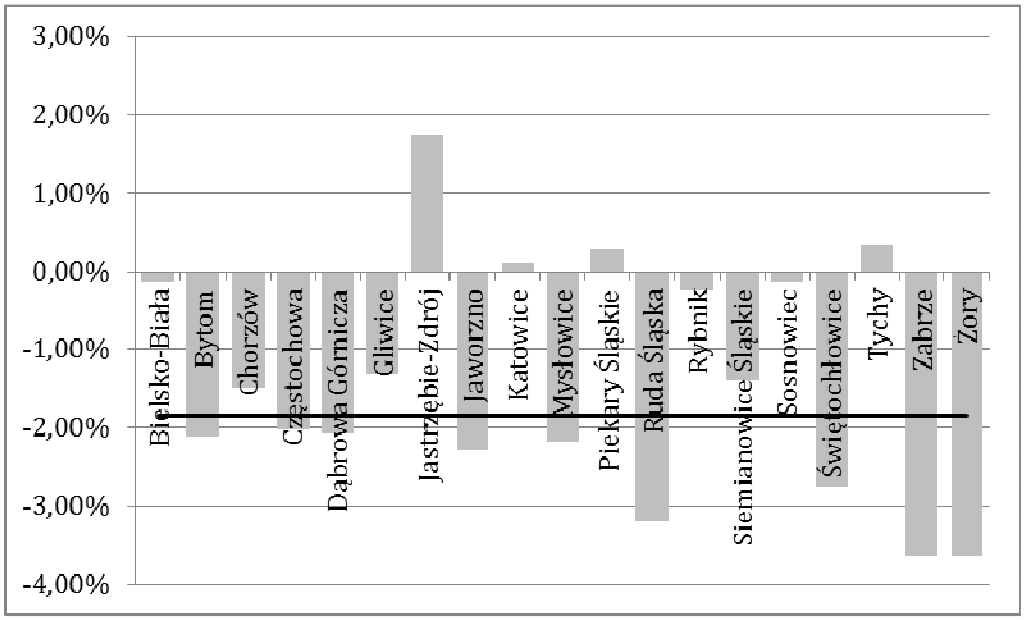

- average value for all local government units in Poland in the years 2003-2017

Fig. 5: Average deficit / budget surplus in the studied Śląskie cities and in Polish local government units in total in the years 2003-2017 [in %]

Figure 5 presents another of the economic parameters analysed, which is the size of the budget deficit / surplus. And so, surplus budgets occurred in: Jastrzębie Zdrój, Katowice, Piekary Śląskie and Tychy. Apart from Piekary Śląskie, all of these cities are large regional centres with a high degree of industrialisation, which either successfully continue mining traditions like Jastrzębie Zdrój or have established alternative development opportunities like Katowice and Tychy. It should also be added that these are the cities with the lowest depopulation rates and high per capita budget revenues. It can therefore be acknowledged that these cities coped well with the effects of mine liquidation.

In turn, among the cities with the highest average budget deficit were such government units as: Bytom, Dąbrowa Górnicza, Jaworzno, Ruda Śląska, Świętochłowice, Zabrze and Żory. In at least one of the identified restructuring periods mines were closed in all of these centres. In this context, the particularly difficult budgetary situation affected Ruda Śląska, Świętochłowice and Żory, where the deficit level was the highest.

The listed cities also had the highest level of debt in relation to total revenues (Figure 6) - over 30%. The record debt was in Żory, and the described group was joined by Zabrze, where the debt also exceeded 30%. These cities have therefore suffered the most severe economic consequences of the partial liquidation of hard coal mining in GZW.

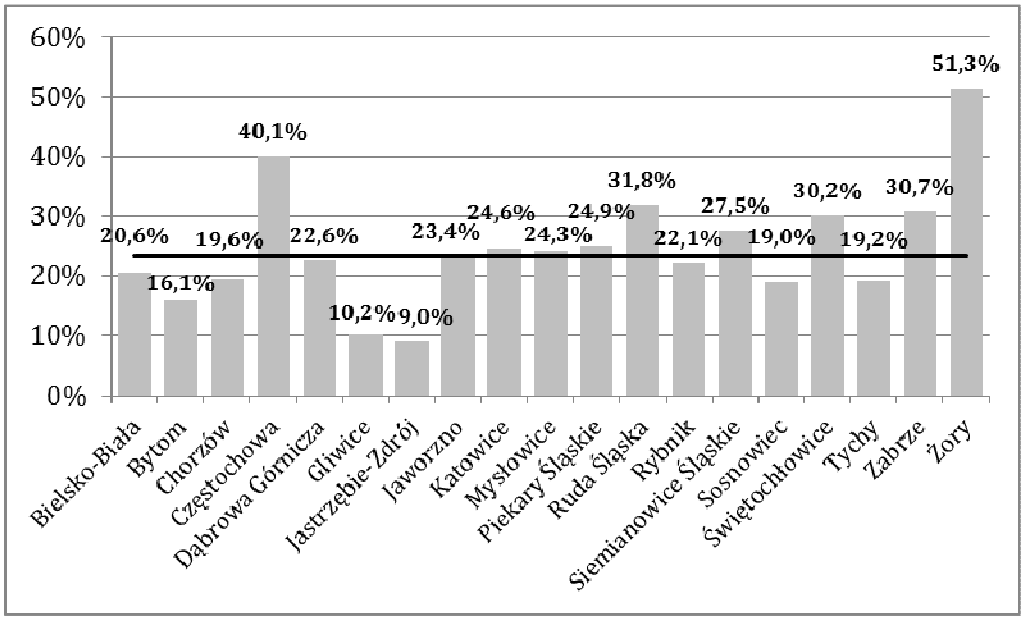

- average value for all local government units in Poland in the years 2003-2017

Fig. 6: Average relation of liabilities to total revenues in the studied Śląskie cities and in Polish local government units in the years 2003-2017 [in %]

Economic consequences of the transformation of mining regions in cities of the Śląskie Province - Principal Components Analysis (PCA)

In the last stage, in the assessment of the structure of the analysed cities (cases), Principal Components Analysis (PCA) was used to simplify the process of describing data from five variables to two dimensions (Statistica Package). The results of such segregation of cities in the Śląskie Province are presented in Figure 7.

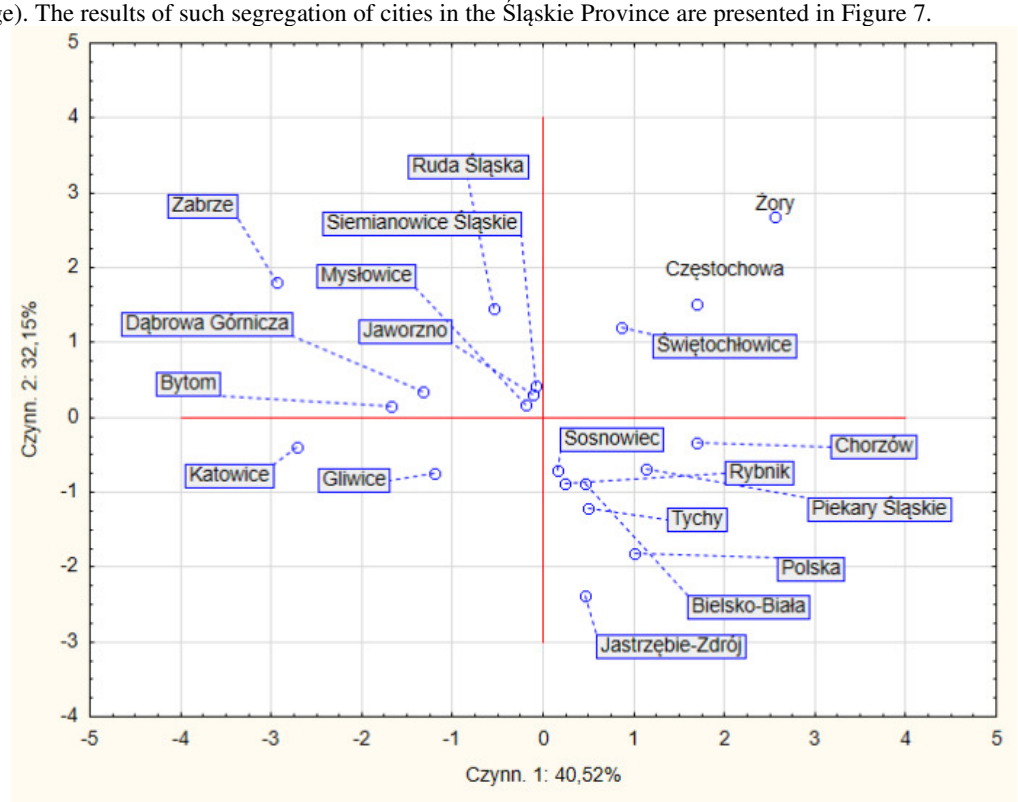

Fig. 7: Principal Components Analysis (PCA) results for the studied cities of the Śląskie Province (based on Statistica)

The first quarter of the coordinate system includes cities with high levels of budget deficits and indebtedness, in which the income growth rate rises above average over time. However, this is not a sufficient growth as these cities have unbalanced budgets and are very seriously indebted. They are therefore in a very difficult financial situation. The group of these cities includes: Częstochowa, Żory and Świętochłowice. The last two are post-mining cities in which effective transformation into other industries has not been carried out. Świętochłowice developed practically no other activity, and Żory became a commercial and service city, but in light of the data presented it did not bring the expected economic effects. In addition, it is worth emphasising that Żory, unlike Świętochłowice, was characterised by one of the lowest population decline rates which justifies the conclusion that in demographic terms, perhaps also including the attractiveness of the place of residence, they are in a much better position than Świętochłowice.

The second quarter of the coordinate system includes cities whose deficit and debt are also high, but in which the level of income (and expenses) is growing more slowly than the average in Poland. All cities located in this quarter are post-mining centres in a difficult economic situation and in most cases also characterised by high population loss (with the exception of Mysłowice and Jaworzno). Undoubtedly, in the most difficult situation are: Zabrze, Bytom and Ruda Śląska, which were most affected by the process of mine liquidation.

In the third quarter of the coordinate system there were only two cities, Gliwice and Katowice, which are the economic leaders of the region. In the context of the conducted analysis, these are government units with a relatively low deficit and debt, and a low growth rate of income and expenses (also due to their high initial level). Nevertheless, the number of residents is also falling above average in these cities. The cities in this quarter have developed the greatest potential for survival and development. They have a mining independent industry and offer their residents attractive housing conditions. They are also significant educational, cultural and sports centres. They also achieve good economic effects of transformation.

In the fourth quarter there were cities similar to Poland in terms of the parameters studied. They are characterised by lower than average indebtedness, surplus or low budget deficit, high income (and expenses) growth rate and quite a diverse population change rate. These are cities that were hardly affected by the mine liquidation, and partly also thanks to this they were able to become independent of the mining industry.

Conclusions

In formulating the main conclusions, reference was made to the research questions posed in the methodological part. And so, hard coal mining in each of the three studied coal basins is in a different development phase. Production in the Lubelskie Coal Basin is in a development phase and due to the significant extraction potential it will be continued in the near future. It is an attractive place of employment for local communities. Also, it does not cause significant ecological and social problems due to its favourable geographical location (apart from highly urbanised, valuable landscape or tourist areas) and very good geological and mining conditions (no natural hazards, low coal seams, high thickness of seams).

In the last decade of the twentieth century hard coal mining was liquidated in the Dolnośląskie Coal Basin for economic reasons. Post-mining cities have taken two transformation paths: (1) creating special economic zones to attract investors from outside the mining industry and / or (2) developing post-industrial tourism. Their implementation was not always successful. Cities which failed to follow any of the above mentioned paths are currently characterised by high unemployment rates, low income levels of residents and systematic depopulation.

In the Górnośląskie Coal Basin, hard coal mining still exists and is a key industry in the region. Nevertheless, due to the low and decreasing profitability of mining and deteriorating geological and mining conditions some of the mines were closed during two main stages of restructuring. Therefore, it can be acknowledged that mining in this region is in the pre-liquidation phase, in which specific transformation paths should be taken and implemented, all the more so as in many cities of the region the total liquidation of mines has resulted in severe pauperisation of these cities. Based on the analysis of 19 cities, they were classified into 4 groups, described in Table 4, together with management recommendations at their addresses.

Table 4: Groups of post-mining cities in the Śląskie Province - characteristics and development recommendations

No.	Characteristics of post-mining cities in the Śląskie Province	Recommendations
I.	High debt High deficit High income and expenses growth rate No economic transformation effects	Supporting local entrepreneurship Creating a favourable climate for new investments Cooperation with more developed cities in the region The use of public-private partnerships Improving attractiveness for current and potential residents Eliminating weaknesses and overcoming threats
II.	High debt High deficit Low income and expenses growth rate Insufficient economic transformation effects Depopulation	Supporting existing enterprises and strengthening of new business ventures Development of post-industrial tourism Revitalisation of post-mining areas and facilities Debt renegotiation Searching for opportunities to increase income Improving attractiveness for current and potential residents Eliminating weaknesses and seeking opportunities
III.	Low debt and deficit Low income growth rate Quite a high depopulation rate High economic transformation effects	Increasing attractiveness for current and potential residents Strengthening existing activities for the development of entrepreneurship and enterprises Development of post-industrial tourism Revitalisation of post-mining areas and facilities Strengthening advantages and seizing opportunities
IV.	Low debt Surplus or low budget deficit High income growth rate Diversified level of population change	Maintaining good financial standing Searching for new industrial and development opportunities (education, culture, sport) Increasing attractiveness for current and potential residents Strengthening advantages and overcoming threats

Source: own work.

By synthesising the conducted considerations and research it is possible to determine the theoretical paths of transformation of enterprises and the mining industry following the establishment and development phase, together with their consequences:

- continuation of mining in the region: establishment of new mines, starting of new deposits (consequences: maintenance of the development phase, preventing severe pauperisation of the region, prevention of social and environmental conflicts by minimising negative consequences of mining, and optimisation of economic and political benefits);
- gradual substitution of mining by other service or industrial branches: supporting local entrepreneurship, creating special economic zones (consequences: maintaining the region's development, preventing severe pauperisation of the region, becoming independent of the mining industry, making the region's image more attractive),
- development of post-industrial tourism: using liquidated mining infrastructure, joining the popular creation of post-industrial tourism routes and enriching post-industrial heritage (consequences: management of technical and human resources in the region, preventing severe pauperisation of the region, maintaining development of the region while preserving the centuries-old material and non-material traditions).

The pathss outlined above do not have to be, and are not carried out separately. Many analysed cities and regions implement them in parallel, gaining in addition their synergy effect. Nevertheless, it is worth adding that their design and implementation should take place many years before the liquidation phase of mining in a given region. This is clearly confirmed by observation of the effects of mining liquidation in the studied Polish cities of Górny Śląsk. Failure to use the transformation paths indicated above exposes cities and regions to a very severe deterioration of the socio-economic status and image. It is not possible to improve them in the short term without significant investment outlays.

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Modern Approaches to Assessing the Effectiveness of Social Budget Expenditures

Tatyana TKACHEVA, Southwest State University, Kursk, Russia, tat-tkacheva@yandex.ru

Lubov AFANASYEVA, Southwest State University, Kursk, Russia, lv_af@mail.ru

Alexander PIYALTSEV, Southwest State University, Kursk, Russia, pialcevaleksandr8@gmail.com

Abstract

In the contemporary fiscal practice with the methodological positions used quite a large variety of models and concepts of social policy, and social aspects of fiscal policy and taxation, which can be classified from the standpoint of social or subsidiary state and the appropriate fiscal policy: socio-loaded or liberal limited.
The article formulates two approaches to assessing the social orientation of budget policy at the regional level: process and effective. The proposed approaches are quite acceptable for the formation of the social dominant of budget policy and the allocation of budget allocations at the regional level.
As a result of the study, it is concluded that the priority direction of the budget policy at the regional level in the coming years will be to ensure social obligations. The degree of satisfaction of the population is a key indicator characterizing the effectiveness of the use of budgetary funds by state bodies, it serves as a final social indicator of the effectiveness of the use of budgetary funds.

Keywords Tax System, Budget System, Fiscal Mechanisms, Structural Parameters, Sustainable Development, Fiscal and Tax Regulation.

Introduction

Analyzing actual problems and tendencies of social orientation of fiscal policy at the regional level, it is necessary, first of all, to stop on consideration of essence of the social state. In this regard, studying the theoretical sources on this issue, it can be stated that in most of them the social state is understood as a special type of modern structure of society, which provides a high level of social protection of all citizens through an active state policy, including in the field of taxation. At the same time, the social state is characterized by the principle of social justice, the creation of ideally equal opportunities for all members of society through a system of financial, tax and social support measures, the transition from political and legal equality of citizens to their social equality, ensuring an acceptable standard of living for socially vulnerable segments of the population and individual citizens, the possibility of self-sufficiency, improving their welfare. To date, the social state as a constitutional principle is enshrined in the constitutions of countries such as Japan, Germany, Italy, Spain, Portugal, Sweden, as well as some other countries.

Applied studies of the processes of formation and development of social orientation of tax policy and evaluation of the effectiveness of tax and budget policy tools have been developed in the works Mayburov, I. A. (2012), Balatsky, E. V. (2003), Goncharenko, L. I., & Arhiptseva, L. M. (2011) Rykunova V. et al. (2017), Tsiklauri V. et al.(2019). Tciklauri V. et al. (2018), Tkacheva T, et al. (2016), Belousova L. et al. (2019). Kirilchuk, I., & Rykunova, V. (2019) Kirilchuk I. et al..(2019) Tkacheva T. et al. (2016).

In our opinion, the most important components of the assessment of the social orientation of the budget policy are, on the one hand, social standards that accumulate a level of decent and quality of life, and on the other – the effects of social action. But if the quantitative parameters of the functioning of social policy are defined and measured, the values, ideals, norms that simultaneously reflect and define the shape of social policy, themselves undergo economic and political metamorphoses.

A sign of the effectiveness of budget policy in the social aspect for the individual will be a sense of fullness of life, its qualitative manifestations, allowing to realize their needs and interests. A sign of the effectiveness of the budget policy in the social aspect for the society is the achievement of a high degree of satisfaction of the population with

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the quality and availability of budget services, which will contribute to the optimal level of development of society and regions (figure 1).

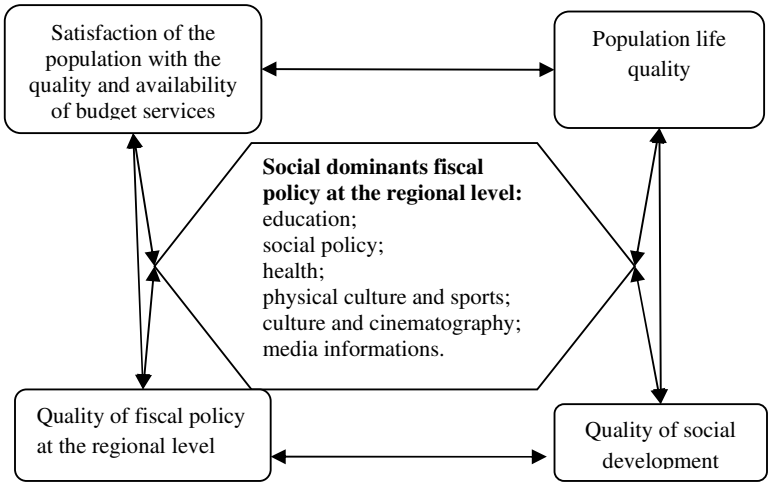

Fig. 1: Social dominants of fiscal policy at the regional level

The main social priorities of the budget policy of the modern state are:

– unconditional fulfillment of legally established obligations to pay social benefits and compensation in the field of social protection of the population (taking into account changes in legislation aimed at improving the targeting of social assistance, the application of the principle of assessing the need for social support measures);

– ensuring the balance of the pension Fund budget and further development of the pension system;

– provision of obligations in the field of education, health, culture, taking into account the determination of the volume of guaranteed state (municipal) services in these areas and the formation of a single standard cost for their provision

It seems appropriate to identify two General approaches when assessing the social orientation of budget policy at the regional level:

1) process, which is based on the measurement and accounting of intermediate indicators. When assessing social orientation of the budgetary policy takes into account the amount of budget allocations for the implementation of a social program, social events, the number of people reached by a given program, etc. It should be noted that within the framework of the process approach it is necessary to carry out a systematic monitoring of the level of satisfaction of the population with the quality and availability of basic municipal budget services, as well as monitoring the effectiveness of the local government of municipal districts, urban districts and settlements;

2) effective, which is based on the evaluation of the final result. Its essence is to identify not only the most important values, attitudes, consequences of assistance and support, but also to assess the effectiveness of the use of budgetary funds. It is the effectiveness that determines the measure of serving the budget policy to a person.

The essence of the proposed methodology for assessing the social orientation of the budget policy of the region is the analysis and evaluation of indicators such as the effectiveness of the use of budgetary funds, cost and efficiency of the use of budgetary funds.

The effectiveness of budget expenditures is understood as the degree of satisfaction of the population with the quality and availability of budget services. This is a key indicator that characterizes the effectiveness of the use of budgetary funds by local governments of the relevant territory, it serves as a final social indicator of the effectiveness of the use of budgetary funds.

The criterion for achieving a positive result is the degree of customer satisfaction at the level of at least 70%, which corresponds to the requirement established by the Concept of administrative reform in the Russian Federation. The assessment should be carried out for 10 basic budget services: management, pre-school education, General education, additional education, improvement, housing and communal services, primary health care, culture, library services, physical education and sports, as well as the assessment as a whole.

In the social aspect of the budget policy, it is advisable to compare the average per capita expenditures of the regional budget for social needs in the dynamics for several years.

It should be noted that the average per capita social spending is directly dependent on the ratio of cash income and the subsistence minimum in the region – the richer the population, the greater the budget spending on the social sphere. There are two reasons for this. First, the higher level of income of the population is typical for regions with higher levels of budget revenues, therefore, in such regions there is an opportunity to spend more money on social policy. Secondly, higher income levels are accompanied, as a rule, and higher stratification of the population by income, so the government is relatively prosperous regions forced to spend heavily on social protection.

In our opinion, in modern conditions, it is absolutely expedient to compare the volume of financial resources spent on the social sphere of the region with the initially established amounts of budget commitments when assessing the cost (table 1).

For comparison of the amount spent budget resources to the social sector of the region initially defined volumes you can set other intervals of values to enter a six-step rating system, and a three-stage, seven-speed, etc. Can not be ignored in the calculations any costs, or, conversely, something to consider further. It is advisable to consider the costs ineffective, regardless of the result, if the non-targeted expenditure of funds related to the reporting period is revealed.

Table 1: Estimation of the budget resources spent on the social sphere of the region with the initially set amounts of budget commitments

№	Financial resources spent on the social sphere of the region	Degree of achievement	Cost-effectiveness evaluation
1	Savings of more than 15% of planned volumes	The result is achieved	Very high efficiency
2	Cost savings from 5% to 15% of planned volumes	The result is achieved	High efficiency
3	Spent budget funds with a deviation of less than 5% of the planned volumes	The result is achieved	Efficiently
4	Additional expenditure of funds in the amount of 5% to 15% of the planned volumes	The result is achieved	Low efficiency
5	Additional expenditure of funds in the amount of more than 15% of the planned volumes	The result is achieved	Ineffectively
6	Misappropriation of budgetary funds	Result not achieved	Ineffectively

In any case, to determine effectiveness is to correlate the result with the costs (or resources) that the result caused. However, the content of the performance indicator, what question it will answer, depends on what the researcher takes as a result and what as a cost.

As part of the study of the efficiency of budget expenditures of the region, it is advisable to correlate the gross value added of the region (result) with the budget expenditures of the region, which caused this result. Table 2 shows the proposed matrix of indicators of budgetary efficiency of the region.

Table 2: Matrix of indicators of budgetary efficiency of the region

Indicators	The issue of the region,	Regional budget expenditures,	Population of the region,	VDS
The issue of the region,	V	RB	H	VDS /V
V	1	RB/IN	H/IN	VDS /RB
Regional budget expenditures,	IN/RB	1	B/RB	VDS / H
RB	IN/ H	RB/ H	1	1

Depending on the objectives of the budget analysis, any detail of the budget results and budget expenditures is possible. The matrix is symmetric with respect to the main diagonal, and the values of the indicators are inversely proportional. If the values above the main diagonal rise, the values below the main diagonal fall.

Results and Discussion

Above the main diagonal, the figures are the opposite and show the capacity of our result relative to any type of cost (for example, gross value added is divided by the output of the region). Above the main diagonal are indicators of budget capacity.

In the opinion of many expert analysts, which we fully share, the criterion of the reasonableness of the allocation of budget resources should be formed on the basis of the opinion of the population about the quality and availability of budget services.

The consumer, namely his condition, needs and their priority – this is the basis for the allocation of resources.

Conclusions

As a result of the study, the following conclusions can be drawn:

1. the priority direction of the budget policy at the regional level in the coming years will be the provision of social obligations;

2. the effectiveness of budget expenditures is understood as the degree of satisfaction of the population with the quality and availability of budget services. This is a key indicator that characterizes the effectiveness of the use of budgetary funds by local governments of the relevant territory, it serves as a final social indicator of the effectiveness of the use of budgetary funds;

3. when assessing the social orientation of budget policy at the regional level, it is advisable to use two process and effective approaches. The proposed approaches are quite acceptable for the formation of the social dominant of budget policy and the allocation of budget allocations at the regional level.

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Unobserved Income as A Limiting Factor for Sustainable Social and Economic Development in The Context of Digitalization

Tatyana TKACHEVA
Southwest State University, Kursk, Russia, tat-tkacheva@yandex.ru

Lubov AFANASYEVA
Southwest State University, Kursk, Russia, lv_af@mail.ru

Alexander PIYALTSEV
Southwest State University, Kursk, Russia, pialcevaleksandr8@gmail.com

Abstract

The paper is concerned with unobserved income as a limiting factor for sustainable social and economic development in the context of digitalization. The subject of the research are theoretical and methodological issues of unobserved income as a limiting factor for sustainable social and economic development in the context of digitalization. The purpose of the work is to substantiate a mathematical model reflecting regional differences in correlation between unobserved personal income and some characteristics of innovative digital development of the society on the basis of the analysis of the current state of unobserved income and factors affecting the level of digital and innovative development of the society. The paper reveals the substance of approaches to the implementation of the state policy of sustainable regional development in European countries. The study describes the key units of digital economy functioning which are closely interrelated and affect personal income and social and economic development of territories. Special attention is paid to modern research on the assessment of digitalization regarding Federal districts and economic and social effects of digitalization.

Keywords: Unobserved Economy, Unobserved Personal Income, Shadow Economy, Digital Economy, Sustainable Development.

Introduction

Research interest in unobsered personal income negatively affecting sustainable socio-economic development of regions, is growing all over the world. In the works of Russian and foreign authors, it is pointed out that a significant part of business activities is concentrated in the informal economy, and is more common to small businesses of various forms.

Unobserved personal income is in evidence in all countries including those with high socio-economic indices. It does not disappear with the development of digital economy and Internet technologies but transforms into new forms.

The constituent entities of the Russian Federation differ significantly in terms of natural and climatic conditions and the level of socio-economic development. Such regional features as significant differences in GRP per capita and average income per capita form a number of regional factors that determine the level of their informal economy, and at the same time are the result of their existence.

The subject of the research are theoretical and methodological issues of unobserved income as a limiting factor for sustainable socio-economic development in the context of digitalization. The purpose of the work is to substantiate a mathematical model reflecting regional differences of correlation between unobserved personal income and some characteristics of innovative digital development of the society on the basis of the analysis of the current state of unobserved income and specific factors affecting the level of digital and innovative development of the society.

The paper reveals the subject matter of approaches to the implementation of state policies of sustainable development of the regions in European countries. The study consideres the key units of digital economy functioning which are closely interrelated and affect the income of citizens and socio-economic regional

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development. Special attention is paid to modern research on the assessment of digitalization in respect to Federal districts as well as to the economic and social effects of digitalization.

The study of scientific research works on the measurement of the unobserved economy shows a variety of approaches to this issue. To measure the unobserved (underground) economy, the volume of foreign-exchange transactions was estimated, since according to Gutmann currency is the only form of cash suitable for transactions that are not registered and are not taxed (Gutmann, 1977). It has been found out that many of the developed economies experience similar symptoms manifested as the existence of an unobserved sector (an unmeasured, tax-free, informal sector) (Feige, 1981). The "macroelectric" approach is applied to the measurement of the informal economy in Central and Eastern Europe (for measuring overall economic activity in the economy, the most informative indicator is electricity consumption) (Kaufmann and Kaliberda, 1996). The significance of the issue under study is confirmed by the fact that the Organization for Economic Cooperation and Development (OECD) issued "Measuring of the Non-Observed Economy: A Handbook" in 2002. The unobserved economy in scientific works is closely associated with the shadow economy, which has been studied in detail in (Schneider, 2009), (Schneider and Medina, 2017), systematic studies of the shadow economy are conducted by the World Bank (Schneider, 2010), (Medina and Schneider, 2018). The shadow economy is often seen as an unreported economic activity hidden from state institutions (Miller, 2006; Orviska et al., 2006; Biswas et al. 2012; Elgin and Uras, 2013; Putnins and Sauk, 2015).

The active use of digital technologies in all economic activities, formation of the digital economy using innovative tools are very important in the modern paradigm of sustainable development of economic systems and counteraction to the shadow economy and corruption (Tsepelev and Kolesnikova, 2019).

Illegal digital activities create a digital shadow economy. “The physical marketplace is rapidly transforming itself into a global electronic arena, where the multicultural consumer and its market-driven society merge and execute limitless electronic transactions at the touch of a trader's dealing screen, electronic transfers, credit and debit cards, smart cards, and so on. These are just some of the mediums which are now exploited by the money launderer without leaving paper/audit trails for law enforcement agencies and compliance communities. Advances in communications, information systems and cyber electronic innovations increasingly dispel the myth that crime stops at the border” (Haines and Johnstone, 1999).

The results of the comparative analysis of the traditional and digital shadow economies have shown that the digital shadow economy is of the same illegal nature and involves the same participants as the traditional shadow economy. The digital shadow economy is a part of the shadow economy (Gaspareniene and Remeikiene, 2015).

Based on the expert assessment of approaches to the interpretation of the digital shadow economy category the following definition is given: “digital shadow economy refers to illegal activities, such as digital service provision and sales of goods/services online, when operating exceptionally in digital space, the entities violate the existent legal norms and regulations with a pursuit of illegal mutual interest and material benefits”. The distinctive features of the digital shadow economy are described in (Remeikiene et al., 2018). The digital shadow economy is estimated using a modified simulation model, which is presented in the study (Gasparėnienė et al., 2018).

Applied studies of the processes of formation and development of social orientation of tax policy and evaluation of the effectiveness of tax and budget policy tools have been developed in the works Rykunova V. et al. (2017), Tsiklauri V. et al.(2019). Tciklauri V. et al. (2018), Tkacheva T, et al. (2016), Belousova L. et al. (2019). Kirilchuk, I., & Rykunova, V. (2019) Kirilchuk I. et al..(2019) Tkacheva T. et al. (2016).

Appreciating the contribution of scientists to the development of this area, it should be noted that there are some features of detecting unobserved income as a factor limiting sustainable socio-economic development in the context of digitalization that are specified using national statistics.

Results and Discussion

The digital economy has significant advantages over the traditional one, including reducing the risks of the expansion of shadow income due to the increase of state financial control.

The estimation of unobserved economic activities including unobserved personal income, is of great importance for the Russian statistics (Masakova, 2000). The income that is not directly observed by statistical methods has a negative impact on the development of the economy; the efficiency of the state macroeconomic policy decreases, the competitive environment for business worsens, and the social security of the working population decreases. Many researchers conclude that the income that is not directly observed by statistical methods is one of the components of the shadow economy.

Let us calculate the unobserved personal income (UPI) using formula (1). The results of calculations are shown in Figure 1:

$$UPI = PCE+CP - AMI \qquad (1)$$

PCE – personal consumption expenditures, mln. rub. CP – compulsory payments, fees and other expenditures, mln. rub.AMI - available money income, mln. rub.

The contribution of the Federal districts to the shadow (unobserved) personal income is presented in Figure 1. Note that in 2014 the Republic of Crimea and Sevastopol were included in the Southern Federal district; in 2018 the Republic of Buryatia and Zabaykalsky Krai that used to be parts of the Siberian Federal district were included into the Far Eastern Federal district.

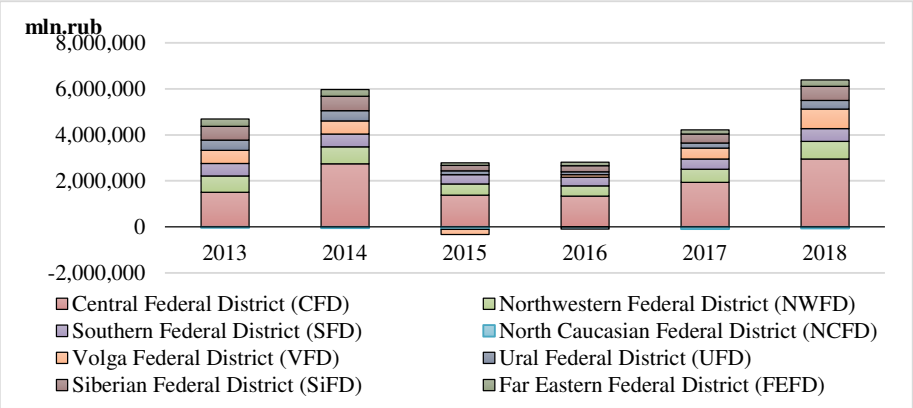

Fig.1: Contribution of Federal districts into the dynamics of unobserved personal income, mln.rub.

Source: Developed on the basis of: (Russian Federal State Statistics Service)

Having identified the volumes and trends of unobserved income, we put forward a hypothesis about the correlation between the unobserved income (UPI) and factors reflecting the level of digital and innovative development.

Index of small businesses turnover (M) reflects the results of implementing new technologies, production efficiency, and the level of competitiveness. The number of active subscribers to mobile broadband Internet (AMBS) reflects the opportunities for GDP growth, creation of new jobs, development and quick introduction of innovative goods and services to the market, and improvement of the quality and availability of public services.

The parameters of the multiple regression equation were estimated using Statistica 10.0 software package. The results of the multiple regression are given in Table 1.

Table 1: Estimating the quality of the multiple regression equation

	Summary Statistics; DV: UPI (Spreadsheet1 UPI-AMBS-M-2018)
Statistic	Value
Multiple R	0,995899307
Multiple R?	0,991815429
Adjusted R?	0,988541601
F(2,5)	302,952791
p	0,00000606023923
Std.Err. of Estimate	98,5787982

Source: authors' own calculations using Statistica 10.0. software package.

Let us analyze the obtained results. So, the multiple correlation coefficient is Multiple R = 0.9958; the coefficient of determination is R-square = 0.9918; the coefficient of multiple determination adjusted considering loss of degrees of freedom is Adjusted R 2 = 0.98854; the Fisher Criterion is F = 302.952, the level of significance of the model is p < 0.0000; the Standard error of estimate is Std. Error of estimate = 98. Let's analyze the data of the multiple regression. The table value of the Student's criterion corresponding to the confidence probability is g = 0.95 and the degrees of freedom are v = 8-3=5; $t_{cr.}$ = t0, 05; 5 = 73. Comparing the calculated t-statistics of the equation coefficients (in Figure 2 t (5) is given) with the table value, we conclude that all the obtained coefficients are not statistically significant.

In Table 2 the results of calculating the parameters of the multiple regression equation are presented. The results of multiple regression are reflected in the following model (2):

$$UPI = -446.753 + 0.12 \times M + 5.251 \times AMBS \quad (2)$$

Table 2: Results of calculating multiple regression equation parameters

N=8	Regression Summary for Dependent Variable: UPI (Spreadsheet1 UPI-AMBS-M-2018) R= ,99589931 R?= ,99181543 Adjusted R?= ,98854160 F(2,5)=302,95 p<,00001 Std.Error of estimate: 98,579					
	b*	Std.Err. of b*	b	Std.Err. of b	t(5)	p-value
Intercept			-446,753	444,7519	-1,00450	0,361245
M	0,959272	0,055926	0,120	0,0070	17,15254	0,000012
AMBS	0,052022	0,055926	5,251	5,6450	0,93020	0,394964

Equation (2) expresses the dependence of the unobserved personal income (UPI) on the turnover of small businesses (M) and the number of active subscribers to mobile broadband Internet (AMBS). The coefficients of the equation show the quantitative impact of each factor on the resulting indicator while the others remain unchanged. In our case, the unobserved personal income increases by 0.12 monetary units with the increase in the turnover of small businesses by 1 unit, while the indicator of the number of active subscribers to mobile broadband Internet remains unchanged; the unobserved personal income increases by 5.251 monetary units with the increase in the number of active subscribers to the mobile broadband Internet (AMBS) and with a constant indicator of the turnover of small businesses.

The multiple correlation coefficient of the constructed model (Multiple R) R = 0.9958 is very close to unity, which indicates a high degree of correlation between the factors under study. The coefficient of determination (R Square) is R 2 = 0.9918, which indicates that 99.18% of the variation of the UPI variable is due to the variation of the M and AMBS variables, and only 0.82% is accounted for by other unaccounted factors. The critical (table) value of the Fisher criterion for confidence figure is g = 0.95 and the degrees of freedom are v1 = 8-3 = 5 and v2 = 2: $F_{cr.}$ = F0, 05; 5;2 = 19.03. The calculated value of the Fisher criterion F = 302.9527 is much higher than the table value of criterion F_{tb} = 19.03, which indicates a good quality of the constructed model (the model is comparable to the experimental data). The significance level p = 0.00000 indicates that the constructed regression is highly significant. Let us investigate the degree of correlation between the variables. To do this, a correlation matrix is built. The correlation matrix is presented in Table 3.

Table 3: Correlation matrix

Variable	Correlations (Spreadsheet1 UPI-AMBS-M-2018) Marked correlations are significant at p < ,05000 N=8 (Casewise deletion of missing data)				
	Means	Std.Dev.	UPI	M	AMBS
UPI	791,052	920,919	1,000000	0,995188	0,714297
M	6664,288	7389,375	0,995188	1,000000	0,690393
AMBS	84,000	9,124	0,714297	0,690393	1,000000

From the correlation matrix it follows that all the factors under study have a significant and approximately equal influence on the unobserved personal income (the correlation coefficients between UPI and M, AMBS, are 0.9951; 0.7142, respectively). The correlation matrix also shows that there is a multicollinearity between the factors (the correlation coefficients between the regressors M and AMBS are also high). Let us analyze the residuals of the regression. The residuals are the differences between the observed values and the model values, i.e. the values calculated according to the model with the estimated parameters. The observed residual variables presented in

Let us construct a graph/ illustrating the observed values of unobserved personal income (UPI) and the predicted values obtained using the multiple regression equation UPI = -446.753 +0.12×M +5.251×AMBS.

Thus, the constructed regression equation (2) is comparable to the experimental data (it has a high coefficient of determination and significant F-statistics) and can be used for practical purposes.

The mathematical model developed on the basis of the multiple regression equation can serve as a basis for forecasting and estimating the value of unobserved personal income as a factor limiting the sustainable development of the regions of the Russian Federation. The unobserved personal income is a potential resource that should be involved and estimated by official statistics tools.

The dependence we have identified shows that an increase in the turnover of small businesses and an increase in the number of active subscribers to the mobile broadband Internet lead to the increase in the amount of the unobserved personal income. Unobserved personal income is not observed by direct statistical methods for both statistical and economic reasons.

The emergence of new opportunities and their active use by the general public under the conditions of digitalization, the introduction of innovative processes by small businesses contribute to the growth of wages and business income. Current trends in minimizing cash flow and simplifying transactions make informal cash flows transparent, but at the same time, the active use of cryptocurrencies allows financial transactions to be performed beyond the control of government institutions. These new opportunities for income growth cannot be estimated and taken into account by the existing tools of official statistics. It should be noted that the obtained model reflects the regional differences in the correlation between the unobserved personal income (UPI) and factors characterizing the level of digital and innovative development of the society.

Conclusions

The state policy of sustainable development has a great potential in regulating innovative development and contains a wide list of tools to support regions targeted at the development of digital technologies.

The transition to a digital economy model is accompanied by fundamentally new, qualitative changes in social and economic relations both at the state level and at the level of economic entities. This process brings new opportunities and threats. Modern digital tools allow markets and economic sectors to develop even in the event of an economic crisis due to a quick and flexible response to changes in market conditions, and to meet consumers' needs better. It is proved that income not observed by direct statistical methods is one of the components of the shadow economy.

It is concluded that the index of small businesses turnover (M) reflects the results of the introduction of new technologies, production efficiency, the level of competitiveness; the indicator of the number of active subscribers to the mobile broadband Internet (AMBS) reflects the opportunities for GDP growth, creation of new jobs, development and quick introduction to the market of innovative goods and services, improvement of the quality and availability of public services. Unobserved personal income is not observed by direct statistical methods for both statistical and economic reasons.

Based on the analysis above, it was found out that an increase in the turnover of small businesses and an increase in the number of active subscribers to the mobile broadband Internet lead to the increase in the amount of unobserved personal income.

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Tourists' Satisfaction in the Context of Traditional Textile-Based Tourism: What Factors Make Them Satisfied?

Usep SUHUD
Faculty of Economics, Universitas Negeri Jakarta, Indonesia
usuhud@unj.ac.id

Heryanti UTAMI
Faculty of Social Science, Universitas Negeri Jakarta, Indonesia
heryanti-utami@unj.ac.id

Elena Puspita CANDRA
Faculty of Economics, Universitas Negeri Jakarta, Indonesia
elenapuspitacandra_8215163683@mhs.unj.ac.id

Abstract

This study examines the factors that influence the satisfaction of tourists visiting Trusmi, a centre for batik artisans and traders who have become a tourist village. Three predictors were chosen, including destination image, perceived value, and memorable tourism experience. Participants in this study were selected using the convenient sampling method. In total, 332 participants filled out the questionnaire completely. The data were then processed using exploratory factor analysis, confirmatory factor analysis, and structural equation models. As a result, the destination image had a significant effect on perceived value. Additionally, the perceived value affected a memorable tourism experience and tourist satisfaction.

Keywords: Batik, Trusmi, Destination Image, Memorable Tourism Experience, Textile-Based Tourism.

Introduction

Traditional textiles are one of the products of indigenous peoples which become the identity of them, which sometimes even becomes a national identity (Hani & Das, 2018). In its development, this textile is not just a piece of cloth but has been made into clothing and crafts which later becomes another expression of the artisan's identity (Sunarya, 2016). However, the issue of traditional textiles is not always related to the identity, design, benefits, and manufacturing process, but also to conservation, market acceptance, and sustainability.

Research on traditional textiles, traditional textiles as part of tourism, or traditional textile production areas has long been the focus of research. Some studies are interesting because they contain controversy. Several other studies link the role of tourism for traditional textiles. In Spain, old textile factory sites have been conjured up as part of an industrial tourist attraction (Coit, 2001). Furthermore, a study by Cohen (2001) investigated the link between tourism, traditional textiles, and the opinions of traditional textile producers. Meanwhile, Onderwater, Richards, and Stam (2000) explore the factors that influence tourists to buy souvenirs from traditional textiles. In addition, there are several other studies related to textile-based tourism. Suhud, Maulida, and Kusumawardani (2018) explore motivations and obstacles for tourists to visit a textile-based tourism destination. Besides, Suhud, Tarma, and Maulida (2019) study on authenticity of an indigenous elements including its textile. Another research from Suhud (2019) is about the personification of a destination that has a thick element of traditional textiles.

Indonesia is a country with many tribes and indigenous peoples. Almost all of them have their work products related to textiles. Some of them have modified the basic materials, colours, and workmanship techniques. Some others still maintain their authenticity. Some indigenous peoples have succeeded in making their products superior to products from other indigenous peoples. Several attempts have been made by the Indonesian government and the craftsmen to make their businesses survive and continue to grow. One of the efforts is to make traditional textile manufacturing centres as a tourism destination and this has been done for a long time.

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In general, research on tourism destinations will measure the internal and external factors of tourists. Internal factors include demographic, psychographic, attitudes, perceptions, and motivation. Meanwhile, external factors include the quality of services and products, prices, and promotional tools. In this case, the textile-based tourism destination is Trusmi. Trusmi is a village in Cirebon, a district in the province of West Java. This village is famous as a centre for batik craftsmen and traders. Batik is a traditional textile that has become Indonesia's identity and has been recognized by UNESCO as the Representative List of the Intangible Cultural Heritage of Humanity. Trusmi has become a destination village for national tourists who love batik. Therefore, this study aims to examine the factors that influence the satisfaction of tourists who stay in traditional textile-based tourism destinations by including destination image, perceived value, and memorable tourism experience as three predictor variables. We find research on tourist behaviour in the context of traditional textile-based tourism to be scarce. In general, research on traditional textile-based tourism has not received much attention from tourism scholars.

Literature Review

Theoretical Background

Destination Image

Destination image is formed from a tourist's experience of a tourism destination, even if the tourist has never visited it (H. Kim & Chen, 2016). According to Baloglu and McClreary (1999), the destination image consists of the cognitive, affective, and global elements of a tourist and this is influenced by personal factors and stimulus factors. Personal factors include psychological (values, motivation, and personality) and social (age, education, marital status, and others). While the stimulus factors consist of information sources, previous experience, and distribution). The tourist experience is created from the information he or she obtains, whether through other people's stories, news from the mass media, or social media. Television viewers who regularly watch foreign drama series from a foreign country can have a perception of the image of the country as the tourism destination of origin of the drama series (Suhud & Willson, 2018).

Perceived Value

Here are two prominent definitions of perceived value. Woodruff (1997, p. 142) defines perceived value as “customer’s perceived preference for an evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer’s goals and purposes in use situations.” Zeithaml (1988, p. 14) defines perceived value as "the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given". These two definitions focus on customers and consumers who perceive the performance of the attributes and elements of a product. This perception works starting from the product before consumption, during consumption, or after consumption. Customers are different from consumers. Customers are those who buy and consume a product, while consumers are those who only consume the product. The product in these definitions refers to either goods or services. In the tourism industry, products also relate to goods and services.

Sánchez-Fernández dan Iniesta-Bonillo (2007) conduct a systematic review of studies on consumer value. According to them, those studies can be divided into two groups: unidimensional and multi-dimensional. Uni-dimensional consists of price-based studies, means-end theory, and additional research. An example of price-based studies is Monroe's research stream. Meanwhile, examples of the means-end theory are Zeithaml's approach, additional research, and the customer value hierarchy. Furthermore, multi-dimensional is divided into the customer value hierarchy and utilitarian and hedonic value. Utilitarian and hedonic value consist of axiology of value theory, Holbrook's typology of value, and consumption-value theory. The customer value hierarchy is an intersection of unidimensional and multi-dimensional. In the current study, we used a unidimensional approach of perceived value.

Prior studies have included perceived value as one of the variables that can affect visit and revisit intention, memorable tourism experience, trust, loyalty and tourist satisfaction (Jin et al., 2015; Moliner et al., 2007; Nugraha et al., 2019; Suhud et al., 2017; Thielemann et al., 2018). However, in this current study, perceived value is linked to memorable tourism experience and tourist satisfaction.

Memorable Tourism Experience

Traditional textiles are cultural products of an indigenous community. Tourists visiting a destination that has a traditional textile culture will, at one time or another, experience a certain tourism experience related to that textile, which is unforgettable. Several researchers have linked cultural elements into their memorable tourism experience. For example, Chen and Rahman (2018) state that memorable tourism experience is formed by tourist engagement and cultural contacts. Kim (2010, p. 2) defined memorable tourism experience (MTE) as “a tourism experience remembered and recalled after the event has occurred”. However, researchers are often confused by two terms that are similar but with different concepts and meanings, namely memorable tourism experiences and tourist experiences (H. Zhang et al., 2018).

Memorable tourism experience has been used to measure destination image, WOM intention, satisfaction, and revisit intention (J.-H. Kim, 2018; Song & Kim, 2017). In this current study, memorable tourism experience is linked to tourist satisfaction.

Tourist Satisfaction

When visiting a destination, a tourist has certain expectations for the attributes he will encounter in a tourism destination (Alegre & Garau, 2010). The attributes of a destination include, opportunity cost, hospitality, eating and drinking facilities, accommodation facilities, campground facilities, environment, and the extent of commercialization (Pizam et al., 1978). However, as times change and tourist behaviour changes, the attributes that tourists expect may differ. For example, tourists now hope that there will be easy internet access to how instagramable the places they visit.

There are only two possible feelings that we can find from tourists who visit a tourism destination: satisfied or dissatisfied (Alegre & Garau, 2010). The causes of contentment and dissatisfaction are the same. Many studies reveal the factors that influence this satisfaction and dissatisfaction, for example, destination image, tour quality, motivation, and perceived value (Lee et al., 2011; Som & Badarneh, 2011; M. Zhang et al., 2019).

Theoretical Framework

Destination Image and Perceived Value

Some studies examine the impact of perceived value on destination image. In contrast, in this current study, destination image examines perceived value. A study relating to island tourism is conducted by Cheng and Lu (2013). The scholars predict influencing factors of revisit intention. They link destination image of novelty, perceived value, and hedonic value. One of the results they document is that destination image significantly affects perceived value. Lin (2018) measures factors to influence environmentally responsible behaviour. In their study, destination image examines perceived value. As a result, destination image is claimed to have a significant effect on perceived value.

Some of the studies above lead us to this one hypothesis.

H_1 – Destination image will have a significant effect on perceived value.

Perceived Value and Memorable Tourism Experience

Previous studies demonstrate the impact of perceived value on memorable tourism experience. Nugraha et al. (2019) study intention of tourists to revisit a destination. They link perceived value to memorable tourism experience and revisit intention. Data were collected in seven major cities in Indonesia, including Jakarta, Bandung, Surabaya, Yogyakarta, Malang, Denpasar, and Makassar. They mention that perceived value significantly affects memorable tourism experience. Huang, Zhang, and Quan (2019) explore the impact of perceived value on memorable tourism experience and visit intention in the context of food event tourism. One of the findings they report that perceived value significantly affects memorable tourism experience.

We propose a hypothesis to be tested as follows.

H_2 – Perceived value will have a significant effect on memorable tourism experience.

Perceived Value and Tourist Satisfaction

Taking place in Mauritius, Ramseook-Munhurrun, Seebaluck, and Naidoo (2015) measure factors to influence tourist loyalty by involving international tourists. They claim that perceived value significantly affects satisfaction. Jin et al. (2015) employ perceived value to measure visit intention in the context water park destination. They compare first time visitors and repeater visitors. As a result, perceived value significantly affects satisfaction in both cases, first timers and repeaters. Furthermore, Rasoolimanesh, Dahalan, and Jaafar (2016) examine satisfaction of tourists who stay in a community-based homestay in the Lenggong Valley World Heritage Site by employing perceived value. This site is situated in Malaysia. They show a significant impact of perceived value on satisfaction.

The studies discussed above provide the basis for us to test this hypothesis.

H_3 – perceived value will have a significant effect on tourist satisfaction.

Memorable Tourism Experience and Tourist Satisfaction

Several studies examined the effect of memorable tourism experience on tourist satisfaction. In the study of Song and Kim (2017), memorable tourism experience is employed to assess memory of the trip and trip satisfaction. They say that memorable tourism experience is one of the important variables to shape tourists' satisfaction. Furthermore, Zhong, Busser, and Baloglu (2017) measure influencing factors of tourists' story telling. In this study, memorable tourism experience consists of seven dimensions including hedonism, novelty, culture, refreshment, meaningful, involvement, and knowledge. One of the findings they mention that memorable tourism experience significantly influences tourist's satisfaction.

Based on the above studies, we formulate a hypothesis as follows.

H4 – Memorable tourism experience will have a significant effect on tourist satisfaction.

Methods

Sample

This study required participants who had visited Trusmi at least once. For that, data collection was carried out in Trusmi. Participants were selected using a convenience sampling technique. They were asked one by one if they were willing to fill out the questionnaire. Once they agreed, a printed questionnaire was given to them to fill out.

Measures

There were four variables included in this current study. All variables were measured using indicators taken from previous studies. Destination image was examined by indicators adapted from Suhud and Willson (2018). Perceived value was measured using indicators adapted from Suhud and Wibowo (2016). Furthermore, memorable tourism experience was measured using indicators adapted from Kim (2018) and, Prougestaporn and Batra (2018). Lastly, revisit intention was measured using indicators from (Herstanti et al., 2014).

Data Analysis Methods

There were four phases of data processing that we conducted for this study. The data validity test is the first phase we do to analyse the data. This test uses exploratory factor analysis (EFA) with SPSS. The indicators that are considered valid are those that have factor loadings of at least 0.4 (Hair et al., 2019). EFA is also done to see the possibility of each variable having a dimension (component). The second phase is to evaluate construct reliability. Reliability of a construct is seen from its Cronbach's alpha value. If the calculated constructs have a minimum value of 0.7, then they will be deemed reliable and can be involved in testing at a later stage (Hair et al., 2019). The third phase is the calculation of confirmatory factor analysis (CFA) with AMOS software. The CFA helps us trim down indicators to truly valid ones that can survive use in hypothesis testing. The fourth phase is the final phase. In this phase, we calculate the structural equation model (SEM) with AMOS software. SEM is intended to test the research model or also known as hypothesis testing. There are four criteria selected to determine whether the model tested has achieved conformity, including probability, CMIN / DF, CFI, and RMSEA. A model is said to be fit if it has a probability value of 0.05 (Schermelleh-Engel et al., 2003) and CMIN/DF value of ≤ 2 (Tabachnick et al., 2007). Additionally, a fitted model also should have a CFI value of ≥ 0.97 (Li-tze Hu & Bentler, 1995) and RMSEA value of ≤ 0.05 (Li-tze Hu & Bentler, 1999).

Results

Participants

This study attracted 332 participants consisting of 209 females (63%) and 123 males (37%). Most participants (71.7%) were tourists domiciled in Jakarta. Talking about the level of education they had completed, 162 participants (48.8%) held undergraduate certificates. Regarding their marital status, 175 participants (52.7%) claimed to be single, and 147 participants (44.3%) claimed to be married. Furthermore, when asked about their employment status, 203 participants (61.1%) said they had a job, and 105 participants (31.6%) said they had not worked. Other information we obtain from respondents is about the frequency of tourists visiting Trusmi. Two hundred and twenty-two participants (66.9%) were first-time visitors. Furthermore, 80 participants (24.1%) had called twice, and 17 participants (5.1%) had visited three times. Meanwhile, the other 13 participants (3.9) have seen more than three times.

Table 1 : Profile of participants

Profile		Frequency	Percent
Sex	Male	123	37.0
	Female	209	63.0
	Total	332	100.0
Age	18-23	153	46.1
	24-29	28	8.4
	30-35	7	2.1
	36-41	12	3.6
	42-47	12	3.6
	48-53	78	23.5
	54-59	35	10.5
	60-65	7	2.1
Domicile	Jakarta	238	71.7
	Out of Jakarta	94	28.3
Level of education has been completed	Less than high school	5	1.5
	Highschool	83	25.0
	Diploma	26	7.8
	Undergraduate	162	48.8
	Graduate	56	16.9
Marital status	Unmarried	175	52.7
	Separated/divorced	4	1.2
	Married	147	44.3
	Widow/widower	6	1.8
Occupational status	Employed	203	61.1
	Unemployed	105	31.6
	Self-employed	19	5.7
	Retired	5	1.5

Data Validation and Reliability Tests

We conducted the data validity test on the four variables using exploratory factor analysis. With this analysis method, we proved whether a variable has dimensions or not. Besides, we also found valid indicators with a minimum loading factor of 0.4. From the calculation results, all variables have only one component, which means they have no dimensions. Furthermore, not a single variable had a factor loading of less than 0.4.

The next calculation we do is the reliability test. Destination image had an alpha value of 0.622, and perceived value had an alpha score of 0.696. Next, a memorable tourism experience had an alpha score of 0.688, and consumer satisfaction had a score of 0.787. That way, all variables could be considered reliable.

Table 2: Results of validity and reliability tests

	Variables and indicators	Factor loadings	Cronbach's alpha
	Destination image		0.622
D3	Trusmi has complete accommodation facilities	0.737	
D4	Trusmi has a good reputation as a tourist destination	0.733	
D1	Trusmi has a good quality of service for tourists	0.702	
D2	Trusmi is a great travel destination for families	0.572	
	Perceived value		**0.696**
V3	Trusmi offers good ticket prices	0.807	
V4	The overall value of batik in Trusmi is good	0.774	
V1	Doing tours in Trusmi makes me happy	0.664	
V2	The quality of batik in Trusmi extraordinary	0.641	

	Memorable tourism experience		**0.688**
M4	I could feel the local culture of Cirebon through Trusmi.	0.840	
M3	I gained a lot of new knowledge and experience after visiting Trusmi.	0.762	
M1	I have a pleasant experience from the facilities that available in Trusmi.	0.712	
M2	I rate facilities in Trusmi better than other destinations in Cirebon.	0.578	
	Tourist satisfaction		**0.787**
S2	I satisfied when visiting Trusmi.	0.818	
S1	I enjoyed to visiting Trusmi.	0.801	
S4	The experience of visiting Trusmi was exactly what I needed.	0.744	
S3	My choice to visit Trusmi was a good choice.	0.711	
S5	I have positive feelings about Trusmi.	0.617	

Hypotheses Tests

We tested the hypothesis using a structural equation model. The model tested (Fig. 1) had a probability score of 0.59, CMIN/DF score of 1.426, CFI score of 0.981, and RMSEA score of 0.36. These scores have met the criteria. Thus, this model could be said to be fit.

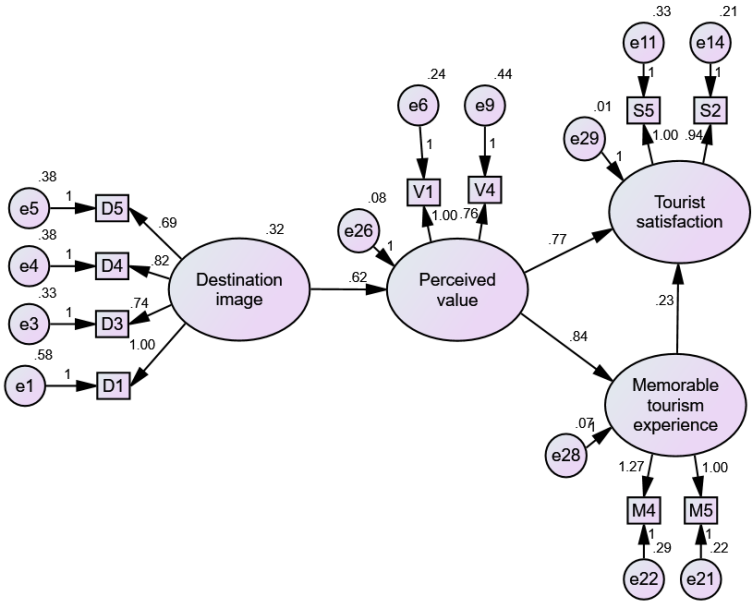

Fig. 1: Structural model of the hypotheses testing

Table 3 shows summary of the hypothesis testing. The first, second, and third hypotheses had critical ratio (C.R.) scores of 7.092, 7.781, and 3.321, respectively, indicating significances. However, the fourth hypothesis had a C.R. score of 1.126 showing an insignificance.

Table 3: Summary of the hypotheses testing

Hyp.	Path			C.R.	P	Results
H_1	Destination image	➔	Perceived value	7.092	***	Accepted
H_2	Perceived value	➔	Memorable tourism experience	7.781	***	Accepted
H_3	Perceived value	➔	Tourist satisfaction	3.321	***	Accepted
H_4	Memorable tourism experience	➔	Tourist satisfaction	1.126	0.260	Rejected

Discussion

Destination Image and Perceived Value

Destination image affected perceived value as reported by prior studies (Cheng & Lu, 2013; Lin, 2018). Before tourists visit a destination, they generally have expectations for that destination. When they arrive at that destination, the expectations may remain the same, or they may change. Same as the value they perceive. Value can be created before, during and after a visit to a destination. So, if the Trusmi they visit matches their expectations, and the value they feel is what they perceive, there is no reason for these tourists not to be satisfied with their visit to Trusmi.

Perceived Value and Tourist Satisfaction

Perceived value also measured tourist satisfaction (Huang et al., 2019; Nugraha et al., 2019). Destination managers, including shop owners and managers, always hope that tourists who visited their places where tourists who had values that are equivalent to their values. Mismatching values between those owned by the destination and those owned by tourists could result in gaps that lead to dissatisfaction. For this reason, destination managers need to formulate segmentation so that visiting tourists could understand if the value carried by the destination is not the same as that of tourists.

Perceived Value and Memorable Tourism Experience

Perceived value examined memorable tourism experience (Jin et al., 2015; Ramseook-Munhurrun et al., 2015; Rasoolimanesh et al., 2016). Tourists who visited Trusmi and thought that their visit had good value would tend to form an unforgettable experience. This experience formed from what they saw, felt, or heard. Indeed, this experience depended on the conditions of the destinations visited. In Trusmi, tourists saw rows of shops selling textiles and clothing made from batik, which it was a good experience for them, mainly because batik is made with a variety of motifs, colours, and materials.

Memorable Tourism Experience and Tourist Satisfaction

In general, tourists from outside the city visit the Trusmi Batik Complex in groups. There were groups of friends, family, spouses, and co-workers. In addition, not all visitors to this area shopped. Furthermore, in this area, there were not many activities that could be done by visitors, except to browse the merchandise offered and buy them. Thus, the experience experienced by tourists was very limited so that the memories created may be minimalist. Seeing this reality, textile-based tourism probably is niche tourism. It should be dedicated only for those who love traditional textile, traditional clothes, and shopping of traditional textile and traditional clothes. Those who had no interest in these things, they would feel bored. Previous research states that memorable tourism experience has a significant effect on revisit intention (Song & Kim, 2017; Zhong et al., 2017). However, this evidence was not valid in this study.

Conclusion

This study examined the effect of destination image, perceived value, and memorable tourism experience on tourist satisfaction. Participants are tourists who visit a tourism destination based on traditional textiles. As a result, the destination image had a significant effect on perceived value. Furthermore, the perceived value had a significant impact on tourist satisfaction and memorable tourism experience. Unfortunately, a memorable tourism experience did not have a substantial effect on tourist satisfaction.

This research teaches us how important it is to create a memorable tourism experience. Memorable tourism experience is considered important because it can have an impact on consumer satisfaction, also on the visit and revisit intention, as well as destination loyalty and word-of-mouth intention. Indeed, stimulating a memorable tourism experience is not an easy job for destination managers. But at least, they can pay attention to and improve the factors that can affect a memorable tourism experience.

We recognise some of the drawbacks of this study. Traditional textile tourism is part of cultural tourism. In general, this type of product is only attractive to tourists with a particular interest, especially in textiles and traditional clothing. For this reason, during participant selection, there should be screen questions about who should be involved. For example, those who visit this traditional textile-based destination because of their own will or because they want to see or buy. Thus, it is hoped that the research results will be better than the current one.

Traditional textile-based tourism destinations are found in countries with communities that are thick with textile cultures. Destinations like this can attract tourists who have a special interest in visiting. Research on the behaviour of tourists visiting such destinations is still limited. For this reason, future studies are expected to explore the same topic in different places.

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Modeling Entrepreneurship Development in Chuvashia

Valery V. SMIRNOV
Chuvash State University, Cheboksary, Russia
E-mail: walera712006@mail.ru

Vladislav L. SEMENOV
Chuvash State University, Cheboksary, Russia

Anna N. ZAKHAROVA
Chuvash State University, Cheboksary, Russia
E-mail: zaharova_an@mail.ru

Anzhelika G. ABRAMOVA
Chuvash State University, Cheboksary, Russia

Tamara V. TALANOVA
Chuvash State University, Cheboksary, Russia,
E-mail: tamaragoncharova@mail.ru

Galina S. DULINA
Chuvash State University, Cheboksary, Russia

Nadezhda V. SEMENOVA
Chuvash State University, Cheboksary, Russia

Abstract

The article considers the basis of entrepreneurial activity as self-movement, which is caused by contradictions. Such contradictions include export in opposition to import, the balance of which is determined by the mode of production, international division of labor, and type of the socio-economic formation. It is possible to adequately assess the essence of the matter and the conditions for the development of entrepreneurship in the sphere of distribution, at the level of international trade, when diversity of socio-economic formations of different nations leads to identity of differences. As a result of modeling the possibilities of entrepreneurship development in Chuvashia founded on the basic Cobb-Douglas function, taking into account the dynamics of international trade turnover, the dominance of the dynamics of average per capita money incomes of the population over the index of industrial production was revealed. On the one hand, this dominance makes it possible, due to the low values of per capita money incomes to maintain identically low levels of industrial production, and on the other hand, stimulation of the growth of industrial production, above the threshold level of profitability of entrepreneurship, will cause an increase in average per capita incomes of the population and international trade turnover. The increase in the level of profitability of entrepreneurship in Chuvashia is associated with the chemical industry. The main areas of implementing possibilities of entrepreneurship development in cooperation with the chemical industry are business services in the information and communication sector, financial intermediation and administrative services provided by females, as nascent entrepreneurs in particular. Business opportunities in Chuvashia are determined by the potential and conditions for overcoming the limits of its own economic structure, which are revealed in international trade.

Keywords: Import, Modeling, Entrepreneurship, Production, Development, Export.

Introduction

The relevance of modeling opportunities for the development of regional entrepreneurship in Chuvashia is associated with the all-Russian problem of low entrepreneurial activity. Chuvashia is among the lagging regions of the Russian Federation. Minister of Industry and Trade of the Russian Federation Dmitry Manturov is authorized to

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supervise the development of Chuvashia. On 12 March 2020, a working meeting was held between D. Manturov and the Head of the Chuvash Republic O.N. Nikolaev, during which the details of the program of socio-economic development of Chuvashia until 2024 were discussed.

The Ministry of Industry and Trade of the Russian Federation, together with the Industrial Development Fund, decided to reduce the lower limit for loans under joint financing programs from 20 to 10 million rubles, as well as to reduce the share of co-financing from regional industrial development funds under joint loan programs from 30% to 10%. These innovations will significantly increase availability of debt financing for the modernization of enterprises.

On 4 April 2020, Minister of Economic Development of the Russian Federation Mikhail Reshetnikov spoke about measures to support subsidized regions at the President's meeting with members of the Government: "there are regions that, due to objective circumstances, do not have a developed industry, there is not enough economic potential, so it was decided to develop individual development programs for these ten regions in addition to existing measures... the republics of Adygea, Altai, Karelia, Tyva, Chuvashia, Mari-El and Kalmykia, Pskov region and Kurgan region, Altai territory. Their implementation will increase the income of their citizens in five years by 6.5 thousand rubles, or about 30%. The total amount of funding for such programs from the federal budget for the period up to 2024 will amount to an additional billion for each region per year. Co-financing from regional budgets – 1%. The main goal of all these measures is to create about 70 thousand new jobs in these regions".

To identify opportunities for the development of entrepreneurship in Chuvashia, we will use the model for determining conditions for doing business. The basis of entrepreneurship is self-movement of entrepreneurial activity, which is caused by contradictions. So, it is necessary to identify the contradictions that are the basis of entrepreneurship and affect the dynamics of entrepreneurial activity. Such contradictions should formally include export in opposition to import, which characterizes foreign trade, that in the aggregate of different countries represents international trade.

The nature, level of development and significance of foreign trade are determined by the mode of production, international division of labor and type of the socio-economic formation. Foreign trade was widely developed in the capitalist formation, at the stage of large-scale machine industry. "Capitalist production does not exist at all without foreign trade" (Marx K., Engels F., 1961), "... for its full development, the existence of credit and competition in the world market, which in general is the basis and vital atmosphere of the capitalist mode of production" (Marx K., Engels F., 1961).

The world market, being a historical prerequisite for the development of the capitalist mode of production, was at the same time its result. Foreign markets are an inseparable part of the capitalist market. "The necessity of an external market for a capitalist country is not determined by the laws of sales of the social product (and super-value in particular), ... capitalism is only the result of a widely developed commodity circulation that goes beyond the borders of the state. Therefore, it is impossible to imagine a capitalist nation without foreign trade, and there is no such nation" (Lenin V.I., 1971).

The widely developed commodity circulation in capitalism is connected with socialization of labor as a commodity. This is the basis and foundation of business activity, which is normatively fixed in the law. Article 2, paragraph 1: "The civil legislation shall regulate relations between the persons, engaged in business activities or in those performed with their participation, proceeding from the fact that the business activity shall be an independent activity, performed at one's own risk, aimed at systematically deriving a profit from the use of the property, the sale of commodities, the performance of work or the rendering of services" (Civil Code…, 2020).

Property is identified with a product that is able to create value, to a greater extent, additional. In this respect, neither Marx nor Lenin considered entrepreneurial abilities as factors of production, but used them only as part of the description of the total labor involved in the production process. According to Marx's ideas, any entrepreneur contributes to the formation of the final product value together with ordinary employees and workers, and this is not a problem. The problem does not arise in the sphere of production, but in the sphere of distribution. The compensation of an entrepreneur that he receives as a reward for his business activities in the form of profit is not proportional – it is high relative to the share in the total labor aimed at forming the total value.

The active entry of the capitalist formation into the modern social consciousness places entrepreneurial ability at the level of factors of production. It is possible to assess adequately the essence of the matter and the conditions of entrepreneurship in the sphere of distribution at the level of international trade, when diversity of socio-economic formations of different nations leads to identity of differences. Thus, it is possible to identify the environment for the development of entrepreneurship and determine methods for assessing its development. So, the dynamics

(contradictions) of international trade is the object of modeling the opportunities for entrepreneurship development in Chuvashia.

Methodology

To model the opportunities for entrepreneurship development in Chuvashia, we apply descriptive statistics methods that include processing of empirical data, systematization, visual representation in the form of graphs and tables, their quantitative description by means of basic statistical indicators (King, Eckersley, 2019). With the help of tables, charts and summary measures the behavior of each variable is described. Tables, charts and graphs are constructed using "MS Excel", "IBM SPSS Statistics Software" (Fávero, Belfiore, 2019). Descriptive statistics assesses an array of data based on statistical indicators.

Statistical analysis will serve as a method of collecting, studying and presenting large amounts of data on characteristics[1] and relationships of data, correlation relationships of spatial and time series of indicators, while maintaining the research methodology.

The use of cluster analysis is due to the fact that statistical methodologies rely on probabilistic understanding of causality (Urlacher, 2020) and require justification of the connectivity of changes in the estimated indicators.

Literature Review

To understand the possibilities of regional entrepreneurship development, it is necessary to define the business process as an objective whole. At the same time, the whole model acts as a measure of the unity of quantity and quality of the description of business activity and the real basis of its concept.

The use of mathematics and logic, as a basis and condition, serving as a model allows us to efface the boundaries between modeling tools. Mathematical modeling of entrepreneurship is carried out within the framework of its idea as an independent activity, performed at one's own risk, aimed at systematically deriving a profit from the use of the property, the sale of commodities, the performance of work or the rendering of services.

Active implementation of the idea of entrepreneurship in all countries is associated with the UN Sustainable Development Goals (SDGs). For example, Sustainable Development Goal 8 is to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. To ensure sustainable economic growth, it is necessary to create conditions for high-quality work that stimulates economic development without harm to the environment.

Through the created conditions and the combination of the SDGs that determine these conditions, as well as practical consequences, trust is built between the UN and social entrepreneurial enterprises (Günzel-Jensen, Siebold, Kroeger, Korsgaard, 2020), the ideas of potential entrepreneurs about entrepreneurship are expanded, and they have a positive effect on entrepreneurial activity in society.

To achieve SDG 8, it is necessary to determine the true intentions to start a business and the ability to do so, i.e. the relationship between entrepreneurial intentions and behavior. Entrepreneurial intentions include a positive relationship with entrepreneurial passion (Syed, Butler, Smith and Cao, 2020), which suggests desirability as the main determinant of entrepreneurial goal setting, followed by self-efficacy, feasibility, opportunity, attitude, and collective effectiveness (Esfandiar, Sharifi-Tehrani, Pratt and Altinay, 2019) .

For an entrepreneur, it becomes apparent that there is a movement towards a cognitive-personal social career (self-efficacy, expectation of a result and intention), which coincides with his behavior in the ratio of goals and level of determination for an entrepreneurial career (Pérez-López, González-López and Rodríguez-Ariza, 2019). This leads to entrepreneurial identification, through social identity perspectives and role conflict (Zou, Li, Guo and Guo, 2019). For example, the modern entrepreneurial decision-making process is decomposed into seven levels of engagement, ranging from "never thought about starting a business" to "gave up", "thought about it", "took steps to start", "had a young business", "had an old business", and "will no longer be an entrepreneur" (Grilo and Thurik, 2008).

The multi-source dataset of 337 Standard & Poor (S&P) 500 companies for 2007-2015 showed that entrepreneurship-oriented managers tend to focus more on value creation (such as developing a new product) than on value assignment (such as advertising), but this influence depends on at least three factors: (1) the firm's relative performance, (2) compensation strategy, and (3) capital market patience (Wang, Dass, Arnett and Yu, 2020). Thus,

business activity in a broad sense is a positive factor for economic growth (Almodóvar-González, Fernández-Portillo and Díaz-Casero, 2020), including increasing the effectiveness of the relationship between business relations and activities.

Despite positive changes in Russia's positioning in various international ratings, the country's investment and business climate is not attractive enough for foreign investors (Smirnov, Talanova, Zakharova, Dulina, Getskina, Huraskina, 2018, Zakharova A.N., Dulina G.S., Talanova T.V., 2020). The observed systemic disregard for the problems of entrepreneurial trust and corruption, against the background of general instability of the economy and its perception, causes instability of the values of society and hampers the development of entrepreneurship (Smirnov, Semenov, Zakharova, Kadyshev. Dulina, 2019, Zakharova A.N., Dulina G.S., Talanova T.V., Semenov V.L., Gubanova N. G., Getskina I.B.,2018).

The current state of the small and medium-sized enterprises (SMEs) sector in Russia is of serious concern, which is caused by the unstable dynamics of changes in their number and employees, the formation of an unbalanced territorial structure of SMEs with their concentration in certain regions and their shadowization. Most of the SMEs conduct their economic activities within the so-called "shadow" sector of the economy, which indicates the inefficiency of the economic system as a whole.

Effective support for the development of SMEs can be based on the following principles: local governments should not substitute entrepreneurial initiatives; they should provide entrepreneurs with services that the private sector is unable to develop and should proceed from the priority of the development of public services that contribute to the achievement of the goals and objectives of socio-economic development of the territory that have the greatest multiplicative economic effect (Smirnov, Zakharova, Talanova, Dulina, Gubanova and Getskina, 2019).

The authorities need to preserve the existing credit of trust through comprehensive and consistent measures that involve the promotion of financial, informational, organizational and institutional support for entrepreneurship in priority sectors.

The analysis of Russian entrepreneurial priorities according to the Global Entrepreneurship Monitor (GEM) revealed the following positions in the hierarchy of rates of gain:

1) indicators of entrepreneurial behavior (table 1):
- active gain – "Percentage of those involved in (Total Early-Stage Entrepreneurial Activity) TEA in the 'Business Services' sector – Information and Communication, Financial Intermediation and Real Estate, Professional Services or Administrative Services, as defined by the ISIC 4.0 Business Type Codebook, Business Services Sector" and "Percentage of female 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, divided by the equivalent percentage for their male counterparts, Female/Male TEA Ratio";

Table 1: Hierarchy of rates of gain entrepreneurial behavior in Russia by median values (Me, %), 2007-2019

Indicator	Me, %
Percentage of those involved in TEA in the 'Business Services' sector – Information and Communication, Financial Intermediation and Real Estate, Professional Services or Administrative Services, as defined by the ISIC 4.0 Business Type Codebook, Business Services Sector	33.75
Percentage of female 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, divided by the equivalent percentage for their male counterparts, Female/Male TEA Ratio	22.86
Percentage of 18-64 population who are currently an owner-manager of an established business, i.e., owning and managing a running business that has paid salaries, wages, or any other payments to the owners for more than 42 months, Established Business Ownership	6.32
Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who see good opportunities to start a business but indicate that fear of failure would prevent them from setting up a business, Fear of Failure	3.62
Percentage of 18-64 population who agree with the statement that in their country most people consider starting a business as a desirable career choice, Entrepreneurship as a Good Career Choice	2.11
Percentage of those involved in TEA that are improvement-driven opportunity motivated, divided by the percentage of TEA that is necessity-motivated, Motivational Index	1.26
Percentage of 18-64 population who agree with the statement that in their country successful entrepreneurs receive high status, High Status to Successful Entrepreneurs	0.89
Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who see good opportunities to start a firm in the area where they live, Perceived Opportunities	0.32

Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who are latent entrepreneurs and who intend to start a business within three years, Entrepreneurial Intentions	-0.69
Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who believe they have the required skills and knowledge to start a business, Perceived Capabilities	-1.14
Percentage of those females involved in TEA who (i) claim to be driven by opportunity as opposed to finding no other option for work; and (ii) who indicate the main driver for being involved in this opportunity is being independent or increasing their income, rather than just maintaining their income, divided by the equivalent percentage for their male counterparts, Female/Male Opportunity-Driven TEA Ratio	-2.15
Rate of involvement of employees in entrepreneurial activities, such as developing or launching new goods or services, or setting up a new business unit, a new establishment or subsidiary, Entrepreneurial Employee Activity	-4.29
Percentage of those involved in TEA who indicate that their product or service is new to at least some customers and that few/no businesses offer the same product, Innovation	-8.08
Percentage of those involved in TEA who expect to create 6 or more jobs in 5 years, High Job Creation Expectation	-10.80
Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, Total Early-Stage Entrepreneurial Activity (TEA)	-20.37

Source: calculated in "SPSS Statistics" based to the Global Entrepreneurship Research Association, London Business School. Entrepreneurial Behaviour and Attitudes. https://www.gemconsortium.org/data/key-aps (10 March 2020).

- active decline – "Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, Total Early-Stage Entrepreneurial Activity (TEA)" and "Percentage of those involved in TEA who expect to create 6 or more jobs in 5 years, High Job Creation Expectation";

2) indicators of entrepreneurial framework conditions (table 2):
- active gain – "Degree to which training in creating or managing SMEs is embedded in the general system of education and training at primary and secondary levels, Basic School Entrepreneurial Education and Training" and "Availability of financial resources for small and medium-sized enterprises (including grants and subsidies), Financing for Entrepreneurs";

Table 2: Hierarchy of rates of gain entrepreneurial framework conditions in Russia by median values (Me, %), 2007-2019

Indicator	Me, %
Degree to which training in creating or managing SMEs is embedded in the general system of education and training at primary and secondary levels, Basic School Entrepreneurial Education and Training	18.57
Availability of financial resources for small and medium-sized enterprises (including grants and subsidies), Financing for Entrepreneurs	5.90
Degree of freedom for new firms to enter existing markets, Internal Market Openness	4.02
Extent to which government policies support entrepreneurship – entrepreneurship as a pressing economic issue, Government Support and Policies	2.29
Extent to which national research and development will lead to new commercial opportunities and be accessible to SMEs	1.47
Level of changes in the markets from year to year, Internal Market Dynamics	0.69
Degree to which training in creating and managing SMEs is embedded in the general system of education and training in higher education institutions, such as vocational schools, colleges, business schools, etc., Post School Entrepreneurial Education and Training	-1.05
Extent to which government policies support entrepreneurship – taxes or regulations are size neutral or encourage new and SMEs, Taxes and Bureaucracy	-2.03
Availability of property rights, commercial, accounting and other legal and valuation services and institutions supporting and assisting SMEs, Commercial and Professional Infrastructure	-3.36
Availability and quality of programs of direct support for SMEs at all levels of government (national, regional, municipal), Government Programs	-3.73
Ease of access to physical resources (communications, utilities, transport, land) or space at a price that is not discriminatory to SMEs, Physical and Service Infrastructure	-6.16
Extent to which social and cultural norms encourage or allow actions leading to new business practices or activities that have the potential to increase personal wealth and income, Cultural and Social Norms	-7.40

Source: calculated in "SPSS Statistics" based to the Global Entrepreneurship Research Association, London Business School. Entrepreneurial Framework Conditions. https://www.gemconsortium.org/data/key-nes

- active decline – "Extent to which social and cultural norms encourage or allow actions leading to new business practices or activities that have the potential to increase personal wealth and income, Cultural and Social Norms" and "Ease of access to physical resources (communications, utilities, transport, land) or space at a price that is not discriminatory to SMEs, Physical and Service Infrastructure".

So, Russian entrepreneurial priorities reflect the following possibilities of entrepreneurship development: basis – business services sector – information and communication, financial intermediation and real estate, professional services or administrative services; females who are either nascent entrepreneurs or owner-managers of a new business; conditions – training in creating or managing SMEs, availability of financial resources for small and medium-sized enterprises and entrepreneurs.
The limits for Russian entrepreneurship are percentage of nascent entrepreneurs (owner-managers of a new business) and percentage of those involved in TEA who expect to create 6 or more jobs in 5 years. In turn, the conditions for this limit are social and cultural norms that encourage or allow actions leading to new business practices or activities, as well as ease of access to physical resources and space at a price that is not discriminatory to SMEs (physical and service infrastructure).

Results

Analysis

To model the possibilities of entrepreneurship development in Chuvashia, we will assess the dynamics of international trade according to the Foreign Economic Activity Commodity Nomenclature (FEACN) of import and export based on the data of the Federal customs service of the Russian Federation.

As a result of determining the significant positions according to the FEACN of import and export of Chuvashia, the following priority areas related to the chemical industry were identified:

1) import by FEACN: 2921410000; 2924299900; 2924299909; 2926909800; 2931908002; 2933399900; 2933698000; 2933998008; 2934999000; 2935909000; 2935909001; 2935909009; 3808919000; 3808925000; 3808932700; 3920995900; 7007192000-M2;
2) export by FEACN: 2933998008; 3808925000; 3808932700.
So, according to the through flow of international trade, the priority is chemical products by FEACN 2933998008; 3808925000; 3808932700.

For the target orientation (organization) of international trade by the FEACN, a cluster analysis of significant (more than one million USD) commodity groups was carried out and “contradictory” (the reason for self-movement) clusters were identified:

- FEACN 2924299900 – “China – import” and FEACN 8419818000 – “Kazakhstan-export”;
- FEACN 2924299909 – “China – import” and FEACN 1905329900 – “China-export”;
- FEACN 2926909800 – “China – import” and FEACN 1905329900 – “China-export”;
- FEACN 2933998008 – “China – import” and FEACN 3808932700 – “Kazakhstan-export”;
- FEACN 2934999000 – “China – import” and FEACN 3808932700 – “Kazakhstan-export”;
- FEACN 2935909001 – “China – import” and FEACN 8537109900 – “Kazakhstan-export”;
- FEACN 8112997001 – “Korea – import” and FEACN 0901210001 – “Belarus-export”; FEACN 2853909000 – “Italy – export”; FEACN 3812310000 – “Poland – export”.

In the above commodity group contradictory clusters, closed to China, are the main basis of international trade turnover at a value in USD FEACN 2924299909; 2926909800 at FEACN 1905329900. Excluding the trade turnover closed to China, we will determine the potential of international trade turnover, which is the function of entrepreneurship possibilities in Chuvashia.

The potential of international trade turnover in Chuvashia reflects a pronounced negative character ($y = -4E+06 \cdot x^2 + 1E+07 \cdot x + 1E+07$, $R^2 = 0.9217$), with the absolute median value $Me_{absolute}$ = 14912066.3 USD (the asymmetry of the distribution is equal to -0.5) and rates of gain $Me_{rates\ of\ gain}$ = -56.7% (the asymmetry of the distribution is equal to -1.0) (figure 1).

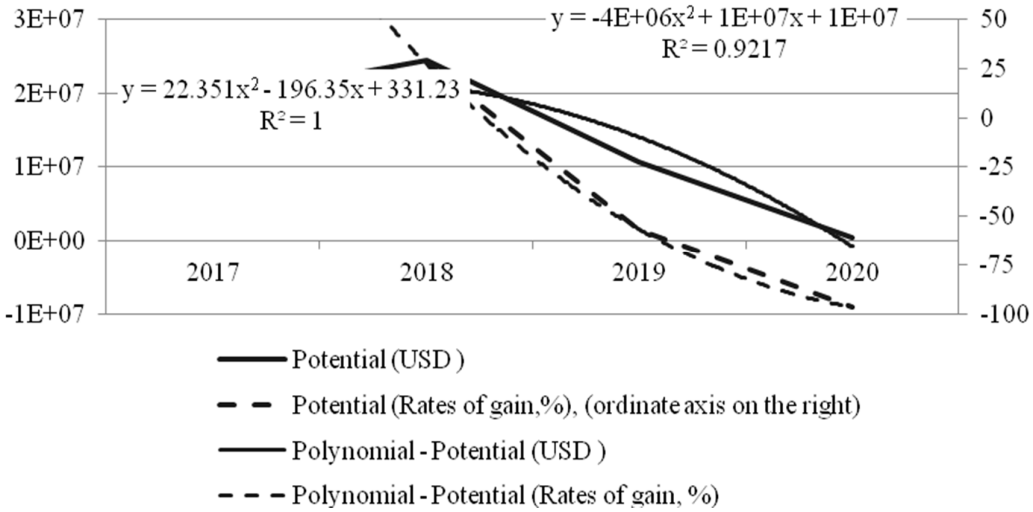

Fig. 1: Potential of trade turnover – function of opportunities of entrepreneurship existence in Chuvashia

(Source: calculated in "SPSS Statistics" based on the Federal customs service. Customs statistics of foreign trade of the Russian Federation. http://stat.customs.ru)

So, there is a significant acceleration of negative dynamics (rates of gain) of international trade turnover ($y = 22.351 \cdot x^2 - 196.35 \cdot x + 331.23$, $R^2 = 1$), which is a negative point (parameter) in the model of possibilities of entrepreneurship development in Chuvashia.

Modeling

To model possibilities of entrepreneurship development in Chuvashia we apply the Cobb-Douglas function as a basis, but changing it with respect to the dynamics of international trade turnover, which is presented in the formula as the base ($y = 22.351 \cdot x^2 - 196.35 \cdot x + 331.23$):

$O = (22.351 \cdot L^{\alpha} - 196.35 \cdot L^{\beta} + 331.23) \cdot (22.351 \cdot K^{\alpha} - 196.35 \cdot K^{\beta} + 331.23)$
where L – average per capita money incomes of the population (as a percentage to the previous year); K – industrial production index (as a percentage to the previous year).

As a result of applying the proposed formula, followed by a polynomial approximation, we get the function of possibilities of entrepreneurship development in Chuvashia: $y = 1.7439 \cdot x^3 - 14.873 \cdot x^2 + 38.498 \cdot x - 18.251$ (figure 2).

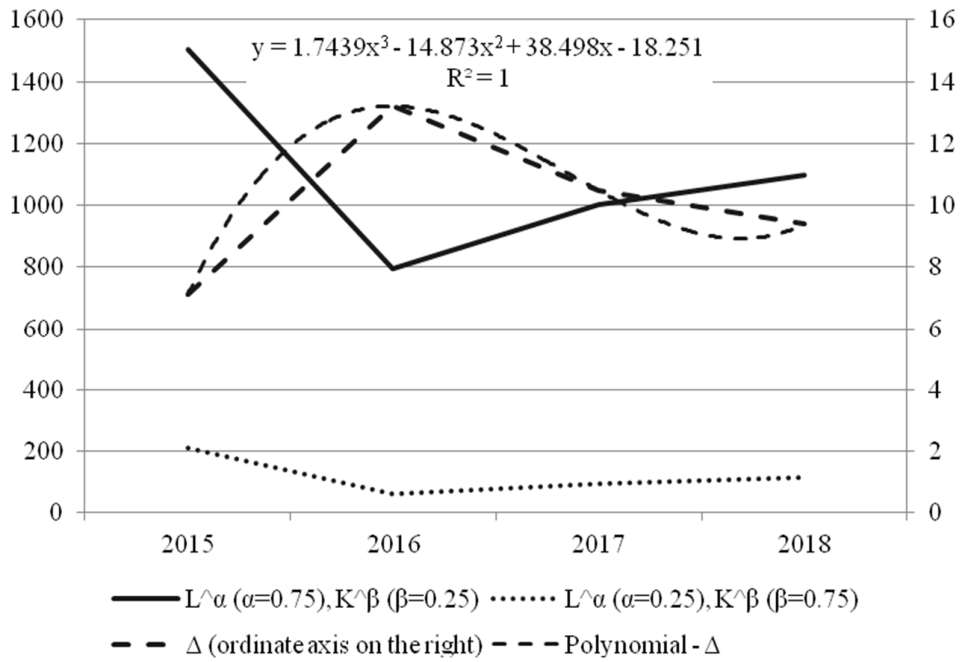

Fig. 2. Possibilities of existence of entrepreneurship in Chuvashia
(Source: calculated in "SPSS Statistics" based on the Federal customs service. Customs statistics of foreign trade of the Russian Federation. http://stat.customs.ru)

This function takes into account the influence of the dynamics of average per capita money incomes of the population and industrial production index on the activity of international trade turnover, as the main driver of entrepreneurial activity development in the region.

So, in Chuvashia, the determining factor of entrepreneurship is the dynamics of average per capita money incomes of the population, which makes it possible, due to its low values, to significantly reduce the need to increase the industrial production index. At the same time, stimulation of industrial production growth will cause an increase in average per capita incomes of the population and international trade turnover, thereby affecting the growth of entrepreneurship in Chuvashia.

The threshold value of profitability of entrepreneurship development possibilities in Chuvashia is x = L = K = 0.6 (figure 3).

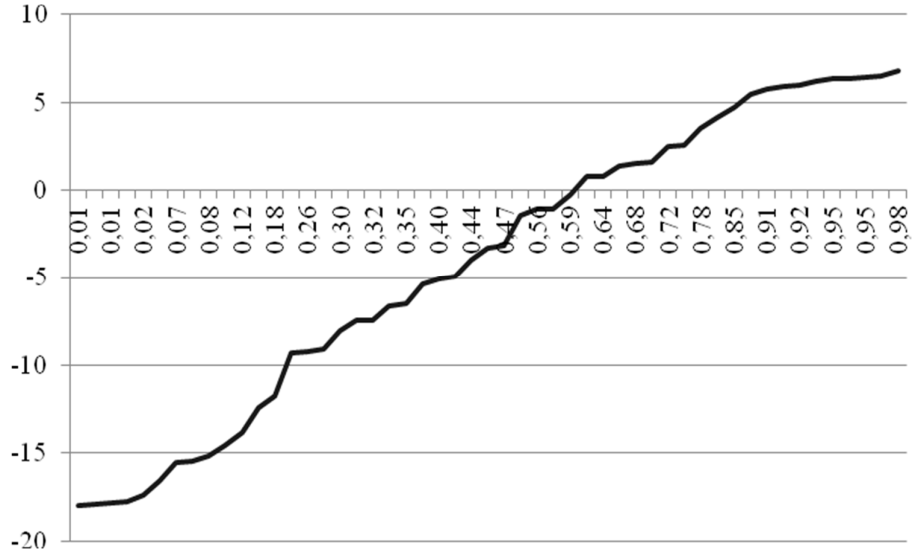

Fig. 3: Profitability of the possibility of entrepreneurship in Chuvashia
(Source: calculated in "SPSS Statistics" according to Fig. 2)

In other words, to ensure the profitability of possibilities of entrepreneurship development in Chuvashia, the average per capita money incomes of the population and the industrial production index must exceed 60% of the maximum level. This level is estimated relative to donor regions or developing countries with high entrepreneurial activity.

Discussion of Results

As a result of modeling the possibilities of entrepreneurship development in Chuvashia founded on the basic Cobb-Douglas function, taking into account the dynamics of international trade turnover, the dominance of the dynamics of average per capita money incomes of the population over the index of industrial production was revealed. On the one hand, this dominance makes it possible, due to the low values of per capita money incomes to maintain identically low levels of industrial production, and on the other hand, stimulation of the growth of industrial production, above the threshold level of profitability of entrepreneurship, will cause an increase in average per capita incomes of the population and international trade turnover, thereby affecting the growth of entrepreneurship in Chuvashia.

The increase in the level of profitability of entrepreneurship in Chuvashia is associated with the chemical industry according to FEACN 2933998008; 3808925000; 3808932700, which is more closed to China according to FEACN 1905329900; 2924299909; 2926909800.

Business services in the information and communication sector, financial intermediation and administrative services can be identified as opportunities for developing entrepreneurship in cooperation with the chemical industry. Females, nascent entrepreneurs (owner-managers of new businesses) can act as actors of interaction. This is facilitated by the established social and cultural conditions that encourage or allow appropriate actions, as well as ease of access to physical resources and service infrastructure.

Conclusions

Possibilities of increasing entrepreneurial activity in lagging regions, which, due to objective circumstances, do not have a developed industry, where there is no sufficient economic potential (low incomes and investment, high unemployment and poverty) lie in the plane of international trade. The regions are thus able to overcome the limits not only of their own economic structure, but of the Russian economy as a whole.

Active interaction with socio-economic formations of other countries allows us to discover new opportunities for the development of entrepreneurship in Chuvashia. At the same time, contradictions in international trade become the object of modeling opportunities for entrepreneurship development in Chuvashia.

As a result of modeling founded on the basic Cobb-Douglas function, taking into account the dynamics of international trade, the interdependence of the growth of industrial production and average per capita money incomes with the chemical industry was revealed. This interdependence makes it possible to use business services of the information and communication sector, financial intermediation and administrative services, in which females, nascent entrepreneurs who are not burdened with high wage requirements, but are more responsible and diligent can act as actors of interaction.

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Sectoral Structures and Regional Economic Development in European Union

Magdalena CYREK

University of Rzeszow, Poland, mcyrek@ur.edu.pl

Piotr CYREK

University of Rzeszow, Poland, piotrcyr@univ.rzeszow.pl

Abstract

The study deals with problems of sectoral structures of employment perceived as a determinant of economic results in terms of GDP per capita. The analysis is conducted for NUTS2 regions in European Union. The aim of the research is to identify clusters of regions basing on structural features of employment. To fulfill the task a Ward method is used. The paper verifies if the clusters with different sectoral labor distribution are simultaneously diversified concerning productive results of economic activity. Moreover, it is tested if the specified groups of regions are differentiated in terms of some selected indicators of human resources accessibility and labor market condition. Concerning the purpose, an analysis of variance is conducted. The results allow to conclude about positive relation between structural maturity and economic development for the EU regions. It suggests that some of regional economies may experience a middle-income trap, basing on traditional sectors and less intensive knowledge usage that limits possibilities for accelerated economic growth and improvement of quality of life. It is also found that more advanced economies in terms of sectoral structures are characterized by better human resources endowment, while sectoral labor distribution does not differentiate actual condition of a labor market. The research confirms a long-term character of the relations between sectoral structures and labor, that could be strengthen by economic policy supporting investments in human resources.

Keywords: sectoral structures, economic development, regions, European Union.

Introduction

Economic development is defined as quantitative and qualitative changes in production and consumption of goods and services. A final aim of the process of development is to improve quality of life, however, in economic terms it is usually limited to a growth of GDP per capita. Although GDP has a lot of limitation when describing welfare of society and human well-being, it is still important to specify factors influencing growth of production and finally contributing to a better life. Important part of economic development is constituted by structural transformation, and sectoral modernization is perceived as an indicator of economic maturity.

Relationships between productive results (GDP per capita) and sectoral distribution of economic activity may be analyzed at regional level. Numerous research stress that, even within converging groups of countries such as the European Union members, regional economies diverge (see e.g. Neculita and Sarpe, 2019; Longhi and Musolesi, 2007). Differences in sectoral structures and a kind of specialization may be one of the reasons. Structural features may lead some less developed regions to a middle income trap if they do not trigger their endogenic resources to innovate and modernize the economy.

It is worth noting that structural dimension of regional development is somehow neglected in economic debate (comparing to numerous research about economic development at an aggregate level), as determinants of interregional diversification of GDP per capita are found mainly in available endogenous resources, technology, infrastructure or institutions studied at an aggregate level. Meanwhile, sectoral distribution of resources and technology seems to play an important role in both a level of regional development and a process of reduction of regional disparities. Sectoral features of economy are decisive for quantity and quality of resources demanded, of which labor constitute an important part. Sectoral features determine regional productivity and its changes induced by technological progress (often sector bias technical change). Sectoral features of a region may influence its

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availability to take part in interregional networks as well as gain competitive advantage while competing for both resources and markets for their products. Sectoral features (especially kind of specialization) specify vulnerability of a region to shocks. Finally, sectoral features appoint general standard of living for citizens and possibility to satisfy their needs.

Concerning the relationships stated above, the aim of the study is to identify groups of regions in the European Union that are specified by economic structures with different level of advancement. It is tested if such groups are characterized by different level of economic results in terms of GDP per capita as well. It is expected that structural maturity goes along with a high production. The less advanced regional economies may thus experience a middle income trap. The paper also tests if structural differences are related to differences in human resources availability and condition of a labor market. Human resources are perceived in this context as one of important endogenic factors able to accelerate regional development in conditions of a knowledge-based economy.

The paper is structured as follows: the next section gives short review of discussion concerning problems of economic structures and regional development, the following section presents methods and data used in the research, then the main results are described and finally conclusions are drawn.

Literature Review

Economists try to explain regional differences using different models and theories, also those taking into account structural characteristics. Development economics identifies some patterns of structural modernization that seem to be universal and can allow to specify a level of advancement of an economy as well as to formulate some advice about structural policy. Theory of three sectors (early formulated by Fisher, 1935; Clark, 1940; Fourastié, 1949) points at tendencies to industrialization followed by a shift towards services. Modern studies indicate at knowledge-intensive and high-technology sectors development in the most advanced economies (see e.g. Ciriaci and Palma, 2016).

The neoclassical growth and regional development attitude explains interregional differences by resources endowment, comparative advantage and predicts existence of catching up processes (e.g. Solow, 1956; Barro and Sala-i-Martin, 1992). In contrary, model of inverted U curve proposed by Williamson (1965) suggests that regional disparities initially growth and convergence takes place at advanced stages of development, while endogenous growth theory and New Economic Geography points at divergence of regional GDP per capita connected with concentration of economic structures (e.g. Krugmann, 1991; Neculita and Sarpe, 2019). Generally a concept of structural convergence proposed by Wacziarg (2001) is empirically tested, still with ambiguous results.

Moreover, structuralists discuss problems of a middle income trap (e.g. Felipe, Abdon and Kumar, 2012; Eichengreen, Park, and Shin, 2013) that has its basis in sectoral structures of economies and pay attention to longstanding global divide connected with sectoral specialization. The division has its roots in specialization based on comparative advantage that pushes less developed economies into natural resources usage or labor-intensive branches and limit growth of wages and thus quality of life. As a solution, on the one hand, state interventionism is suggested that may help in development of domestic high-technology sectors by protection of the economy. On the other hand, liberalization and more openness for inflow of foreign investments (that allows for technology diffusion) is advised (within so called Washington Consensus). Modernly discussed New Structural Economics (see e.g. Lin and Chang, 2009; Rodrik, 2011; Lin, 2011, Lin, 2015) suggests an active role of state that should correct market externalities, provide information and coordinate investment and thus help in development of new sectors that can reveal comparative advantage. It is also pointed out (Kallioras and Petrakos, 2010) that a kind of specialization plays prevailing role for economic development and structural diversification is promoted (e.g. Longhi and Musolesi, 2007).

Summing up, both theory of regional development as well as structuralism do not provide a unique recipe for economic policy that could be able to reduce disparities and shape most favorable economic structure. The problem of regional divergence and a role of sectoral transformation in minimizing economic disparities is still a pending issue.

Research Methods

The paper adopts regional attitude to the analysis specified in the NUTS2016 classification for the European Union. It takes into account 281 regions of NUTS2 level, however, data unavailability limits the sample to 278 regions (regions FRM0, FRY5 and FI20 were excluded from the analysis).

Structural characteristics of the regional economies are specified in terms of functional groups of sections of economic activity defined in NACE Rev. 2. They cover 5 broadly specified sectors, e.g.:

- Agriculture (section A),
- Industry (sections B-F),
- Classical services – less knowledge-intensive services LKIS (sections G-I),
- Financial and business services – knowledge-intensive market services MKIS (sections J-N),
- Welfare services – knowledge-intensive non-market services OKIS (sections O-U).

The classification takes into account type of activities and their main features in terms of factors of production usage and organization of productive processes. Especially, it considers circumstances of knowledge-based economy model by including intensity of knowledge usage specified by engagement of highly educated employees.

Economic structures analyzed in the study are specified by distribution of employees across the 5 sectors of activity. A share of employment in each sector is calculated to avoid problems of comparisons of different scale regional economies. For each region the shares sum to 100%.

The EU regions are grouped with the usage of Ward method of agglomeration which is recognized as an effective hierarchical cluster analysis. In the process of agglomeration the Euclidean distance is adopted as a measure of distance between objects (regions). The agglomeration allows to specify clusters of the EU regions with similar features of sectoral distribution of employment.

An initial assumption of interrelations existing between sectoral structures of economies and other features of economic development requires to verify its validity. Thus, analysis of variance is conducted in the paper to test (assuming α=0,05) if some selected economic characteristics are essentially differentiated between the specified groups of regions. Firstly, we consider GDP per capita level as a main indicator of a general economic development and a measure of economic productive results. Then, we test some selected indicators of human resources accessibility (tertiary education, economic activity) that may be decisive for a sector existence and growth, strongly influencing a structural pattern of development. Finally, we check if actual labor market condition (specified by an unemployment rate) are diversified between regional clusters with different structural features. The existence of significant differences in any of the dimensions supports the thesis that structural features of the economy are important for an economic development in general or in its different aspects.

All data in the study are extracted from Eurostat database. They cover 2018 year as the most actual ones simultaneously for all of the indicators analyzed in the paper. Nevertheless, choice of the time seems to be reasonable considering relative stable economic condition in the EU (comparing to the preceding period of crisis and the succeeding disturbances in a time of coronavirus pandemic). Moreover, as structural changes are of a long-term character, the results presented in the study may have more long-standing implications as well.

Results

Clustering

Structural features of regional economies in the EU allows to specify two clusters. The clusters coverage is presented in Table 1.

Table 1: Results of classification of the EU regions by their sectoral structures of employment with the Ward method usage

Cluster	Regions (NUTS2)
1	BE10; BE21; BE23; BE24; BE31; BE32; BE33; BE34; BE35; BG41; CZ01; DK01; DK02; DK04; DK05; DE30; DE40; DE50; DE60; DE71; DE92; DEA1; DEA2; DED5; DEF0; IE06; EL30; ES30; ES63; ES64; FR10; FRB0; FRC1; FRE1; FRI1; FRI2; FRJ1; FRJ2; FRK1; FRK2; FRL0; FRY1; FRY2; FRY3; FRY4; ITC2; ITC3; ITI4; CY00; LT01; LU00; HU11; MT00; NL11; NL12; NL13; NL21; NL22; NL23; NL31; NL32; NL33; NL41; NL42; AT13; PL91; PT17; RO32; SK01; FI1B; SE11; SE12; SE21; SE22; SE23; SE31; SE32; SE33; UKC1; UKC2; UKD3; UKD4; UKD6; UKD7; UKE2; UKE3; UKE4; UKF2; UKG1; UKG3; UKH1; UKH2; UKH3; UKI3; UKI4; UKI5; UKI6; UKI7; UKJ1; UKJ2; UKJ3; UKJ4; UKK1; UKK2; UKK3; UKK4; UKL1; UKL2; UKM6; UKM7; UKM8; UKM9; UKN0
2	BE22; BE25; BG31; BG32; BG33; BG34; BG42; CZ02; CZ03; CZ04; CZ05; CZ06; CZ07; CZ08; DK03; DE11; DE12; DE13; DE14; DE21; DE22; DE23; DE24; DE25; DE26; DE27; DE72; DE73; DE80; DE91; DE93; DE94; DEA3; DEA4; DEA5; DEB1; DEB2; DEB3; DEC0; DED2; DED4;

	DEE0; DEG0; EE00; IE04; IE05; EL51; EL52; EL53; EL54; EL61; EL62; EL63; EL64; EL65; EL41; EL42; EL43; ES11; ES12; ES13; ES21; ES22; ES23; ES24; ES41; ES42; ES43; ES51; ES52; ES53; ES61; ES62; ES70; FRC2; FRD1; FRD2; FRE2; FRF1; FRF2; FRF3; FRG0; FRH0; FRI3; HR03; HR04; ITC1; ITC4; ITH1; ITH2; ITH3; ITH4; ITH5; ITI1; ITI2; ITI3; ITF1; ITF2; ITF3; ITF4; ITF5; ITF6; ITG1; ITG2; LV00; LT02; HU12; HU21; HU22; HU23; HU31; HU32; HU33; NL34; AT11; AT12; AT21; AT22; AT31; AT32; AT33; AT34; PL21; PL22; PL41; PL42; PL43; PL51; PL52; PL61; PL62; PL63; PL71; PL72; PL81; PL82; PL84; PL92; PT11; PT15; PT16; PT18; PT20; PT30; RO11; RO12; RO21; RO22; RO31; RO41; RO42; SI03; SI04; SK02; SK03; SK04; FI19; FI1C; FI1D; UKD1; UKE1; UKF1; UKF3; UKG2; UKM5

Source: own study based on Eurostat database (Employment…).

The first group consists of 113 regions. Most of the Belgian, Danish, French, Dutch, Swedish and English regions as well as Luxembourg, Cyprus and Malta classified as a whole country at NUTS2 level are included. Only a few regions from Central and Eastern European member states are covered in the cluster (1 from Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia), suggesting mature structural features of the economies typical for advanced stages of developmental processes.

The second cluster is much more numerous and is created by 165 regions. The group is dominated by regions from Germany (28), however, not typical for the whole German state as most of them belongs to the former GDR (East Germany) characterized by economic structures deformations inherited from the socialist system. Numerous regions in the second cluster are also those from Italy (18), Spain (16), Poland (16), Greece (12), and France (10), suggesting that the "South" Europe countries are more similar to the "East" than "West" part of the EU. It is worth noting that the cluster covers most of the regions from Bulgaria, the Czech Republic, Germany, Ireland, Greece, Spain, Italy, Hungary, Austria, Poland, Portugal, Romania, Slovenia, Slovakia and the whole Estonia, Croatia, Latvia, Slovenia and Finland. Most of them are regions from less advanced countries and later members of the EU.

Structural characteristics of the two clusters

An average structure of employment in each of the groups reveals typical sectoral features of the regional economies. The characteristics are presented in Table 2.

Table 2: Sectoral features of regional structures of employment in the two clusters

Group of sections	A	BCDEF	GHI	JKLMN	OPQRSTU
Cluster 1					
the average share (%)	1.6	18.2	23.5	20.3	36.4
coefficient of variation (%)	79.3	21.9	14.0	29.6	14.2
minimum share (%)	0.0	7.3	15.0	10.4	21.8
maximum share (%)	5.6	25.2	33.4	45.3	51.5
Cluster 2					
the average share (%)	6.4	28.2	25.0	12.1	28.4
coefficient of variation (%)	102.0	27.7	21.6	27.4	18.3
minimum share (%)	0.4	9.7	17.7	4.2	13.5
maximum share (%)	41.8	47.7	53.2	23.3	41.0

Source: own study based on Eurostat database (Employment…).

The first cluster is characterized by significantly smaller share of agriculture and industry in employment and a slightly smaller engagement in classical services. In contrary, both kinds of knowledge-intensive services (market and non-market) appears to be of greater importance in these regions than in the second cluster. These features prove advancement of developmental processes which are transforming economies into a knowledge-based model. Moreover, as a classical theory of three sectors states, labor force outflows from agriculture and then from industry and the process is much more advanced in the first cluster.

More detailed comparisons of the regions indicate diversification of sectoral features not only between the clusters but within each of them as well. Considering agriculture in the first cluster one can find regions (usually capital cities or big metropolises) where employment has totally non-agricultural character, while in the second cluster in some regions employment in agriculture exceeds 40%. Simultaneously, the second group is characterized by more variability (with coefficient of variation of 102%) than the first cluster (79%). Industrial sector seems to be less diversified, however, minimum share of employment in the sector is about 7% in the first cluster and nearly 48% in

the second one. Once again variation is higher within regions in the second cluster. Classical services are also more important for and diversified within the second cluster. While in the first group a share of classical services range from 15% to 33% with 14% variation, in the second cluster the lowest share is nearly 18% and the highest one exceeds 53% with variation of 22%. Knowledge-intensive market services, often treated as a modern sectoral growth pole, appear to be slightly more diversified within the first cluster where they range from about 10% to 45%. However, in the second cluster their share is essentially lower at average as well as at both tails – ranging from merely about 4% to 23%. Non-market knowledge-intensive services are connected with development of a welfare state functions and to some extend their reflect institutional solutions adopted in a region. That can be found as a reason for relatively low variation of their share in both clusters. The lowest share of the non-market knowledge-intensive services are found in the second cluster and is 13,5%, while in the first cluster the highest value of 51,5% is noted.

Summing up, the structural features of the two clusters indicate more advanced process of labor sectoral reallocation in the first group of regional economies, which seems to be also less internally diversified.

Productive results in the two clusters of regions

Importance of structural features for economic development may be signalized by differences in productive results connected with different structures. This is the reason for testing significance of differences in GDP per capita between the two clusters of regions. Results of comparisons concerning economic results in terms of GDP per capita are presented in Table 3.

Table 3: Differences in GDP per capita between the two clusters

Cluster	Characteristics	GDP per capita	Results of analysis of variance
1	the average value (euro)	37926.55	F=44.5535 p=1.35E-10
	coefficient of variation (%)	55.3	
	minimum (euro)	12900	
	maximum (euro)	213400	
2	the average value (euro)	24362.42	
	coefficient of variation (%)	52.2	
	minimum (euro)	5200	
	maximum (euro)	78700	

Source: own study based on Eurostat database (Gross…).

The results support the thesis about significance of sectoral distribution of labor for general level of economic development measured by production per capita. The analysis of variance proves that an essential difference appears between the two clusters. Detailed data indicate the highest average GDP per capita in the first group of regions which was specified as a more structurally mature. Moreover, both the minimum and maximum values are higher in the first cluster. However, the economic results within the first cluster are also more diversified than within the second one. Not only is the coefficient of variation slightly higher (55.3% vs. 52.2%), but also the range is higher (200500 euro vs. 73500 euro). This observation suggests that economic structure constitutes one from numerous factors affecting productive results of regional economy, and, moreover, that the other factors may increase their importance when the structures are already advanced.

Availability of human resources as a precondition for structural maturity

Important issue is connected also with preconditions of structural maturity of a regional economy. One from many essential factors influencing creation and growth of sectors that may constitute growth poles in modern advanced economies based on knowledge is availability of human resources. It is specified by demographic factors, as well as social and economic processes inducing pursuit to economic activity and investment in human capital. Although the processes are compound and interrelated, it seems that they can be reflected in such indicators as economic activity of population and educational attainment at tertiary level. The characteristics of human resources availability in the two clusters of regions are presented in Tables 4 and 5.

The first of the indicators of labor resources availability characterizes general inclination of society to participate in market activity in a sphere of employment. It is influenced by many factors, such as situation at a labor market and thus chances for employment and high remuneration, institutional solutions connected with labor services and social care as well as social relations in families or other social groups. Nevertheless, the higher the economic

activity at a labor market, the easier is to develop any sectoral kind of entrepreneurial activity, and a barrier for growth in a form of availability of labor resources is thus limited.

Table 4: Differences in economic activity rates between the two clusters

Cluster	Characteristics	Economic activity of population	Results of analysis of variance
1	the average value (%)	66.9	F=25.23283 p=9.14E-07
	coefficient of variation (%)	7.7	
	minimum (%)	52.3	
	maximum (%)	76.7	
2	the average value (%)	63.6	
	coefficient of variation (%)	8.5	
	minimum (%)	45.7	
	maximum (%)	73.6	

Source: own study based on Eurostat database (Economic…).

Considering economic activity of population in the two clusters of regions it is possible to claim that the differences between the clusters are significant. The first cluster is characterized by more favorable indicators, as the average, as well as the minimum and the maximum values of the activity rate are higher and it is less diversified within the group. Availability of human resources may positively influence sectoral development and, simultaneously, sectoral maturity in terms of welfare services accessibility to society or higher competitiveness of advanced knowledge-based economies may stimulate economic activity. Mutual feedbacks are compound, however, the general results are favorable for the first cluster.

The second indicator of availability of human resources – share of people with tertiary education takes into consideration quality of labor and readiness to participate in a knowledge-based economy. It is a factor of growth more specific to modern knowledge-intensive sectors.

Table 5: Differences in a share of population with tertiary education between the two clusters

Cluster	Characteristics	Population with tertiary education	Results of analysis of variance
1	the average value (%)	39.1	F=140.3354 p=1.89E-26
	coefficient of variation (%)	23.7	
	minimum (%)	18.8	
	maximum (%)	71.5	
2	the average value (%)	27.1	
	coefficient of variation (%)	27.7	
	minimum (%)	12.7	
	maximum (%)	49.6	

Source: own study based on Eurostat database (Population…).

Comparisons of tertiary education rates in the two clusters once again draw a picture in favor for the first group. The average rate reaches 39% which is 12 percentage points higher than for the second cluster. Maximum value is noted in the first cluster and it exceeds 71%, while the minimum value of merely 13% is found in the second group, pointing at high concentration of educated people in few EU regions. The results of analysis of variance prove that the between clusters differences are significant. The higher share of educated people, the more structurally mature an economy is. As above in a case of economic activity, the relationships: tertiary education – structural maturity are two-sided and compound, but has been revealed in a positive form in the first cluster.

Summing up, accessibility of human resources appeared to be diversified between the two clusters of regions. General relationship between availability of high quality labor and structural maturity may be specified as a positive one. Moreover, this relationship is revealed in a long-term, as both sectoral reallocation of labor as well as changes of social behaviors and investments in education are of a long-term nature.

Actual labor market condition and structural features of economy

Short-term relations between structural features and labor market condition are specified by ability to adapt to changes such as shocks in demand-side and general susceptibility to the shocks. The features are revealed at a labor market as a phenomenon of unemployment. Question which arises may be formulated as one about economic structure that minimize the negative phenomena at a labor market such as unemployment. Differences in a labor market condition expressed by unemployment rate between the two clusters are presented in Table 6.

Table 6: Differences in an unemployment rate between the two clusters

Cluster	Characteristics	Unemployment rate	Results of analysis of variance
1	the average value (%)	6.4	F=2.327416 p=0.128258
	coefficient of variation (%)	76.3	
	minimum (%)	1.3	
	maximum (%)	29.0	
2	the average value (%)	7.4	
	coefficient of variation (%)	76.3	
	minimum (%)	1.5	
	maximum (%)	27.0	

Source: own study based on Eurostat database (Unemployment…).

Although the first cluster is characterized by a lower average value of unemployment rate, the analysis of variance does not support a thesis that the differentiation between clusters is significant. It is connected with high variation within each group and a range of the unemployment rate that appeared higher in the first cluster. The observation allows to conclude that the short-term situation at a labor market is not determined by a shape of sectoral structures. It is not possible to claim that the more mature economies are less vulnerable to shocks in terms of employment. Moreover, the economic results of economies in terms of GDP per capita are not defined by problems at a labor market that are revealed as unemployment. They may be rather influenced by productivity of the employees engaged in economic activity, which may differ across sectors.

Conclusion

The research presented in the paper allows to distinguish two groups of regions within the European Union, which differ concerning their sectoral structures of employment as well as a general level of economic development. Generally, the more advanced is the economic structure, the higher are the productive results. Thus, it is possible to conclude that a middle income trap may relate to some of the regional economies gathered within the cluster with less advanced structures of employment in terms of sectoral distribution. Endangered by the trap seem to be especially regions from the South, Central and Eastern Europe. The cluster of the regions are specified by traditional labor-intensive and technologically not-advanced sectoral features, while the cluster covering regions of "the core" EU members reveals high engagement in knowledge-intensive sectors. Moreover, the clusters are significantly diversified concerning economic results measured by GDP per capita that are in favour for the more structurally advanced regions. One of possible reason for such diversification may be found in accessibility of human resources, as the clusters differ concerning economic activity of population as well as tertiary education. The identified relation is positive and goes in line: high quality labor – structural maturity. Simultaneously, it was not confirmed that structural features influence short-term condition of a labor market characterized by an unemployment rate. Thus, the research points at a long-term character of mutual relationships in a process of development and the fact creates an essential barrier in a catching-up process. Generally, structural characteristics appear to be an important factor influencing productive results of regional economies and they cannot be neglected when shaping developmental policy. Moreover, the policy should focus on a long-term character of processes of economic development and support human capital development as one of decisive productive factors in a knowledge-based economy.

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Digitalization of Russian Universities: Problems and Prospects

Maria E. KONOVALOVA
Samara State University of Economics, Samara, Russian Federation,
https://orcid.org/0000-0002-1876-8144, mkonoval@mail.ru

Zulay K. TAVBULATOVA
Chechen state University, Grozny, Russian Federation,
https://orcid.org/0000-0001-9598-9461, eva_didi@inbox.ru

Alla V. BOGOMOLOVA
Lipetsk State Pedagogical P. Semenov-Tyan-Shansky University, Lipetsk, Russian Federation,
https://orcid.org/0000-0001-9017-8651, bogomolova-av@ yandex.ru

Svetlana A. SHAKHVATOVA
Lipetsk Branch of the Russian Presidential Academy of National Economy and Public Administration (RANEPA),
Lipetsk, Russian Federation, https://orcid.org/0000-0002-8730-1951, shurupova2011@mail.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation,
https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru corresponding author

Abstract

The purpose of the research is to identify the advantages and threats of digitalization of universities, analyze the conditions and prospects for digitalization of Russian universities, as well as develop tools to overcome existing problems and limitations. The authors systematized the advantages of digitalization from development of online educational services segment, e-learning resources, use of digital technologies of electronic document circulation, involve of simulators, tools of augmented and virtual reality in the educational process, as well as digital support of students. The authors revealed the threats of digitalization of higher education institutions: the decline in the quality of education, the primitivization of competencies, the transfer of implicit knowledge, the loss of competitiveness, and threats of an informational nature. The authors analyzed the availability of Russian universities with computer equipment and specialized software, studied the growth dynamics of higher education programs implemented using electronic and distance technologies, as well as systematized the problems of implementing digital educational programs. The authors proposed a system of measures to level the existing problems and limitations of digitalization of the educational space in Russian practice.

Keywords: Digitalization, University, Internet, Digital Technologies, Threats, Staffing, Equipment of Educational Organizations

Introduction

The development of digital technologies is a process that allows to create fundamentally new conditions for generating knowledge and then sharing it. The widespread use of online platforms, online educational courses MOOCs, the introduction of modern learning technologies based on gamification, the use of virtual and augmented reality technologies and artificial intelligence to reproduce the specifics of a particular professional activity in the educational process, the introduction of electronic document management to optimize the university management process-are becoming an integral part of the development of a modern university.

However, in the process of digitalization, it is important to understand the existing potential of digital technologies for the long-term development of educational, research, and organizational and managerial activities of the university, as well as to identify and overcome the risks of digitalization.

In general, Russia is characterized by a significant digital lag behind the most developed countries. Thus, in terms of digital competitiveness, the country ranked only 38th out of 63 analyzed countries in 2019 and has certain problems

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with financing R&D (34th place), spending on education (48th place), and developing digital skills (42nd place) (IMD, 2019). This cannot but affect the level of digitalization of Russian universities and their positioning in the international space.

However, in recent years, the country has had positive dynamics in the processes of Internet penetration and availability, robotization, use of big data, and technology development. This suggests that the use of the country's potential for the development of digital technologies will allow Russian universities to take a worthy place in the international digital educational space.

Methodology

The process of transforming the traditional learning model into a digital one is reflected in research by Siemens et al. (2015), Neborsky (2017), Maslova et al. (2018). The new digital model of training is focused on productivity growth, new types of work, human needs and the formation of future-oriented competencies (Dneprovskaya, 2018; Nikulina and Starichenko, 2018).

Goodfellow and Lea (2013), Sidorov (2017), Brodovskaya et al. (2019), Hazemi et al. (1998) argue that the ultimate goal of the process of digitalization of the educational environment is the formation of “digital universities” that combine mixed forms of online education, online MOOC courses, as well as ensure the digitalization of scientific and educational content through the use of online platforms that integrate information services.

Uvarov and Frumin (2019) note that digital technologies in Russian education open up unlimited opportunities for students and teachers to control the information space and share it, generate interest in learning and meaningful academic work, but methodological developments for their use in education are progressing slowly.

Brodovskaya et al. (2019) emphasize that currently there is a direct request for students to move from traditional forms of building the educational process to digital and hybrid models, but in Russian practice, there is often a formal nature of digital environments of educational institutions, when digital educational environments are replaced by their set of platforms and tools.

The purpose of the research is to identify the advantages and risks of digitalization of universities, to analyze the conditions and prospects for digitalization of Russian universities, as well as to develop tools to overcome existing problems and limitations.

Research phases:

1) Analysis of the experience of digitalization of foreign universities, systematization of the advantages of using digital technologies in educational and research activities.
2) Identification of potential threats from the introduction of digital technologies in the activities of universities.
3) Research and evaluation of the digitalization dynamics of Russian universities, as well as identifying problems and limitations.
4) Development of recommendations for overcoming the existing digitalization problems of Russian universities.

Research methods: method of theoretical analysis, economic and statistical analysis method, analysis and synthesis, systematization method, graphic method.

Information base of the research: official data of the Ministry of education and science of the Russian Federation, the Federal state statistics service of the Russian Federation, the Federal portal Russian education.

Results

Digitalization of higher education institutions is dialectical.

On the one hand, modern digital technologies are new tools for the development of universities around the world and significantly expand the opportunities for sharing accumulated experience and knowledge (table 1).

Table 1: Digitalization advantages for universities

Component of the higher education digitalization	Advantage for the university	Example from international practice
The online educational services segment	The growth in the number of courses offered and the number of students ensures an increase in the university's extra-budgetary income (Efimov and Lapteva, 2018).	US universities provide $ 7 billion in annual budget replenishment (2.7% of GDP) through the implementation of online educational programs (Beketova and Demina, 2018).
Electronic educational resources	Increased opportunities for replication and dissemination of knowledge, increased mobility and individuality of learning, flexibility of the educational process and the formation of self-development skills of students (Kentnor, 2015; Rizzotto, 2017).	The popular educational platform Coursera in collaboration with the best universities in the world (University of Pennsylvania, Stanford University, University of Michigan, etc.) presents more than 2000 online courses from 180 branches of knowledge.
Digital technologies of electronic document management	Improving the efficiency of document management and decision-making, convenience and speed of providing services for documenting students, reducing errors, leveling the corruption component.	The BlackBoard system in US universities provides access to educational content, it is a platform for interaction between students and teachers, and also collects and analyzes big data about students and the educational process (Korotaev, 2009).
Learning gamification, simulators, augmented and virtual reality tools	The introduction of virtual simulators in the educational process reduces the cost of university materials, as well as accelerates the learning process of students and improves its quality (Uvarov and Frumin, 2019).	For example, the educational process uses professional virtual simulators with game elements: from virtual medical laboratories Medical Holodeck to the simulator for training fighter pilots Pilot Training Next (Volkov, 2018).
Digital support of applicants	Universities ' notification of their applicants on their websites about special events, the specifics of admission and training is focused on an individual approach and providing the most targeted information, which ensures the growth of the number of students.	The most comprehensive and detailed information for applicants is collected on the websites of new York University, University College London, and Seoul University (Brodovskaya et al., 2019).

Source: compiled by the authors

On the other hand, digitalization as an objective process that covers almost all areas of activity carries a lot of new and unknown things, including threatening the well-being of modern universities.

Among the threats to digitalization of educational organizations, the authors identify the following (Fig. 1).

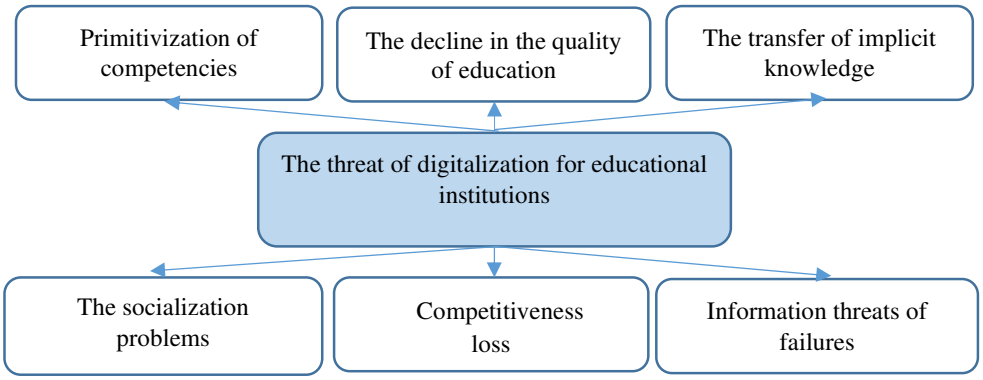

Fig. 1: The digitalization threats for educational institutions

(compiled by the authors)

The decline in the quality of educational services can be caused by such reasons as: low qualification of teachers; a high degree of information asymmetry that makes it difficult to assess the quality of students ' knowledge; unused opportunities for interactive interaction between teachers and students (Ustyuzhanina and Evsukov, 2018).

The primitivization of competencies may result from the intensive implementation of online education programs, resulting in the replacement of real human skills with digital technologies. On the one hand, it facilitates the solution of professional tasks, and, on the other hand, it turns a person into a mechanism for the formal execution of a sequence of actions (Ustyuzhanina and Evsukov, 2018).

The problem of transmitting implicit knowledge transmitted from person to person in the process of joint activities is revealed in the study of Polanyi (1966). Violation of the usual human relationships in the learning process, the termination of joint discussion of ongoing projects, the elimination of the possibility of learning from the personal experience of the teacher are the main drawbacks of the digital educational environment (Bromwich, 2015).

This is also related to the problem of socialization, which occurs when digital educational technologies are widely replaced by live human communication and interaction. The lack of psychological support for students and the termination of the educational function of the teacher lead to the undermining of a favorable social environment for the professional development of students.

As for the loss of competitiveness of an educational organization, according to Wissema (2016), digital technologies in education can be associated with “disruptive innovation, which will inevitably lead to the elimination of inefficient universities, and its benefits will be received by a relatively small number of winning universities”.

Information threats are an integral part of the digital environment in which universities operate. Exposure to information attacks, cyber espionage, software failures, and data leaks becomes a vulnerability factor for any organization (Karpunina et al., 2019; Karpunina et al., 2020).

What is the readiness of Russian universities to implement digital technologies? How well are the conditions for digitalization of the educational process in Russia formed?

In 2019, 1,279 organizations were licensed to conduct educational activities in the higher education system of the Russian Federation, which is 47% less than in 2013 (Minobrnauki, 2020).

According to a study of the state of informatization of Russian universities conducted by the Federal portal “Russian education”, almost every university (95.7 %) has computer classes. 27% of respondents rate the material and technical base of their university as “excellent”, and 40%-as “good”. 67.5% of teachers use software in the educational process, 59.9% – in distance learning, and 74.4% use it to assess the quality of education. Access to wireless Internet in higher education institutions is estimated at 62.8% (Russian education, 2018). It should be noted that the policy of universal digitalization of educational organizations set by the country's leadership is also reflected in the introduction of electronic document management systems at universities, as well as automated systems for the work of deans.

According to the Federal state statistics service of the Russian Federation, 1,279 higher education institutions in 2019 accounted for the following provision of personal computers and special software (except for general-purpose software) (table 2).

Table 2: Provision of Russian universities with personal computers and special software, 2019

Name of indicators	Availability in the organization		Also available for use by students	
	2015	**2019**	**2015**	**2019**
Personal computers – total	1075212	1052638	712437	683714
having access to the Internet	929647	931071	639340	634066
Program packages by specialty	1667	1168	1658	1641
Program computer-based testing	1637	1141	1622	1133
Virtual simulators	802	718	798	714
Electronic versions of reference books, encyclopedias, dictionaries	1713	1195	1697	1191

Electronic versions of textbooks for individual subjects or topics	1739	1213	1724	1212
Special software tools for scientific research	974	773	935	743
Electronic library systems	1760	1238	1750	1238
Electronic legal reference systems	1690	1214	1555	1147
Special software tools for solving organizational, managerial, and economic problems	1580	1149	0	0
EDM system	1362	1065	565	489
Content filtering tools for Internet access	1383	1105	1071	0
Other special software tools	1399	989	1189	846

Source: compiled by the authors according to the Federal state statistics service of the Russian Federation (2020)

Thus, the availability of personal computers in higher education institutions, including those with Internet access, as well as specialized software, remains at a low level, especially given the service life of computer equipment and the need for regular software updates.

The development of the online educational services segment in Russian universities has the following characteristics. The number of educational programs implemented using e-learning in the country's universities in 2019 was 12,133. Distance learning technologies were used to implement 6,485 bachelor's, specialist's, and master's degree programs. At the same time, the total number of educational programs implemented by Russian universities in 2019 was 46496. Thus, 26% of the total number of higher education programs were implemented in 2019 with the use of e - learning, 14% - with the use of distance technologies (Minobrnauki, 2020).

The dynamics of growth in the number of students enrolled in Russian universities in programs implemented using electronic and distance technologies is positive: in the period 2016-2019, while the total number of students enrolled in all programs decreased by 7.5%, there was an increase in the number of students enrolled in higher education programs using e-learning and distance technologies in general by 13.8%. This indicates a growing demand for this type of education. In 2019, the distribution of students in higher education programs implemented using e-learning and distance learning is as follows (Fig. 2).

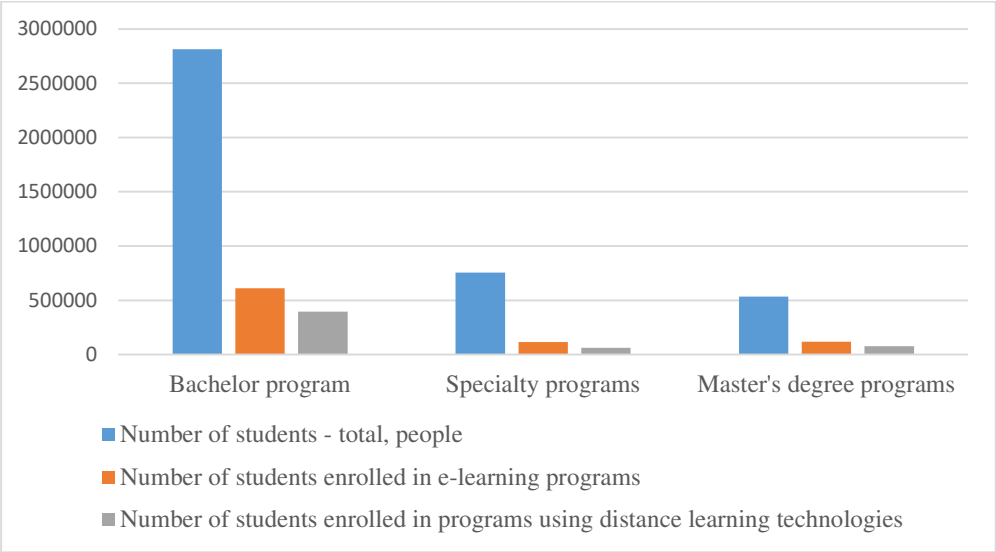

Fig. 2: Distribution of students in higher education programs implemented using e-learning and distance learning technologies, 2019

(compiled by the authors according to Minobrnauki, 2020)

The effectiveness of the process of implementing and using digital technologies in universities depends on the readiness of teaching staff and their level of digital literacy. In total, in 2018, the educational process in Russian universities was provided by 236.1 thousand teachers. According to the analysis of the level of digital literacy research-pedagogical staff of Russian universities concluded that teachers of higher educational institutions demonstrate high levels of knowledge, skills and attitudes in the field of digital technologies. Thus, the digital literacy index of higher education teachers is 88 percentage points out of 100 possible (Cherkesova and Mironova, 2019). In addition, the level of digital literacy of teachers is significantly higher than the national average and higher than the level of digital literacy of young people aged 18-24 (77 p. p. out of 100).

However, there are certain difficulties in organizing the educational process using digital technologies in Russian universities (Brodovskaya et al., 2019):
- low level of development of interactive forms of online support of the educational process and work with applicants;
- lack of digital traces of the educational process, primarily video sessions;
- depersonalization in the process of digital training support;
- low quality of educational content;
- lack of practice of constant updating of educational content;
- lack of placement of educational cases as a practice-oriented technology.

It is obvious that digital technologies that provide information dominate digital technologies aimed at communication and maintaining interactive formats of interaction between applicants, students, and teaching staff.

Many of these problems are the result of the lack of effective financial motivators for teachers to improve the quality of their work using digital technologies, incentives to increase the level of digital literacy, as well as limited funding for Russian universities and imperfect institutional framework. The latter applies, first of all, to the regulatory regulation of the implementation of distance and e-learning programs, which in Russian educational practice is only fragmentally fixed. It is a key factor in restraining the development of this segment of educational services.

In the presence of these unsolved problems in higher education institutions, conditions are created for the emergence of the digitalization threats described above (decrease in the quality of education, transfer of implicit knowledge, competitiveness loss, etc.).

The solution to these problems, according to the authors, lies in providing the following measures:

1) Further large-scale investment in the digital infrastructure of universities, the development of computer networks, increasing computing power, regular software updates and the formation of a full-fledged digital educational environment. This requires additional financial resources, the source of which can be, among other things, business structures interested in training and re-profiling professional personnel, as well as in creating innovation and technology clusters as promising resources for their own development.
2) Creating motivational mechanisms in higher education institutions to increase the interest and activity of teachers in mastering new digital educational technologies and improving the quality of the educational process. In this aspect, an effective tool can be the formation of communication platforms for teachers and students to communicate with IT-specialists, internal grants to pay for foreign internships for teachers to adapt advanced experience in the field of digital educational content, as well as stimulating the remuneration of university teachers by adjusting existing effective contracts.
3) Setting new strategic goals for the long–term development of universities - increasing competitiveness to enter the international educational space. This requires overcoming language barriers, ensuring the quality and diversity of educational products, the breadth of choice, the ability to design the content of the educational program in accordance with the needs of the consumer, ease of navigation and interface, and the prestige of the diploma received.

The basis for the implementation of the proposed measures is the institutional regulation of digital educational programs at the state level, which will ensure the comparability of educational standards and levels of higher education in Russia and abroad.

Conclusions

In the article, the authors analyze the process of digitalization of higher education institutions and systematize the advantages and threats of digitalization of the educational environment.

The authors define the benefits of digitalization from development of segment of online educational services, e-learning resources, use of digital technologies of electronic document circulation, use of simulators, simulators, tools, augmented and virtual reality in the educational process, as well as digital support of students.

Among the threats to the digitalization of higher education institutions, the authors highlight the decline in the quality of education, the primitivization of competencies, the transfer of implicit knowledge, the loss of competitiveness, and information threats.

The authors analyze the availability of Russian universities with computer equipment and specialized software and conclude that there are a number of problems that limit the formation of a full-fledged digital infrastructure of Russian universities. The authors study the growth dynamics of higher education programs. implemented using electronic and remote technologies. Based on this, it is concluded that there is a growing demand from consumers for digital education programs.

The authors systematize the problems of implementing digital educational programs, and also propose a system of measures to level them.

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Geo-Information and Geo-Ecological Support System for Floating Nuclear Power Plants in Arctic

Valery M. ABRAMOV *
Russian State Hydrometeorological University, Saint Petersburg, Russia

val.abramov@mail.ru

Evgeniy A. BAIKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia

e.baykov.00@mail.ru

Vladimir A. BOLSHAKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vl.boll@mail.ru

Vyacheslav G. BURLOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vyach.burl@mail.ru

Eugene P. ISTOMIN
Russian State Hydrometeorological University, Saint Petersburg, Russia

eug.istom@mail.ru

Ekaterina M. KORINETS
Russian State Hydrometeorological University, Saint Petersburg, Russia
katt.korr@mail.ru

Mikhail B. SHILIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
mik.shilin@mail.ru

Tatiana M. TATARNIKOVA
Russian State Hydrometeorological University, Saint Petersburg, Russia
t.tatarnikova.00@mail.ru

Tatiana V. VEKSHINA
Russian State Hydrometeorological University, Saint Petersburg, Russia
tat.vekk@mail.ru

Vladimir N. ZAVGORODNIY
Russian State Hydrometeorological University, Saint Petersburg, Russia
vla.zav@mail.ru

Abstract

In paper, we consider digital tools development results for geo-information and geo-ecological support to floating nuclear power plants in Arctic. In studies, we used methods of data bases constructing, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties and risk management. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware

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and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we demonstrate geo-information and geo-ecological system for first Russian floating nuclear power plant *Akademik Lomonosov* at Pevek. For data exchange and preliminary discussion we used platform https://www.researchgate.net/profile/Valery_Abramov2/ while research.

Keywords: geo-information support, floating nuclear power plants, Arctic

Introduction

Recently, the global environmental economy is within Industry 4.0 period, including floating nuclear power plants (FNPP) within energy sector. Now, many businesses are planning and implementing a wide range of information technologies (Lukyanov, 2019), (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Sikarev, 2020), (Trunin, 2019). Industry 4.0 leads to serious technological changes in geo-information and geo-ecological support for FNPP within energy sector, including natural risks management NRM (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new tools, including practical learning area (Averkiev, 2020), (Korinets, 2020), (Popov, 2019).

In paper, we describe the development results of digital tools for geo-information and geo-ecological support for FNPP within geo-information management (GIM) paradigm (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Mandryka, 2019), (Popov, 2014), (Popova, 2019), (Rumyantseva, 2017), (Zhigulsky, 2018) within environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). We paid significant attention to geo-information and geo-ecological support systems (GIGESS) in climate change context (Bournashov, 2014), (Gogoberidze, 2014), (Chestnov, 2020), (Chusov, 2012), (Estrin, 2020), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). Developed digital tools of GIGESS for FNPP in Arctic while climate change, considered in this article, take these factors into account.

Methods and data

In study, there are used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Tatarenko, 2020), (Vekshina, 2020). While research, there are used data bases and tools of digital online platform (DOP) EOS (Sanina, 2020) and EOS (Prostakevich, 2020).

Results

From open sources, it follows that at the end of August, the floating power plant (FTPP) *Akademik Lomonosov* was delivered to Chukotka with the help of tugs. This event was widely covered in the media https://www.reuters.com/article/us-russia-nuclear-floating-idUSKBN1VZ0CY. Soon, on December 19, 2019, it entered service in the vicinity of Pevek. This FTPP is the first of many similar ones planned for sale in the global energy market. The main technical characteristics of FTPP *Akademik Lomonosov*, as well as the history of its development and creation are given in various open sources, mainly in Russian. In figure 1, we present general view of FTPP *Akademik Lomonosov* at Pevek on computer made image while project stage, taken from open source https://bestlj.ru/151428-Vsja-pravda-pro-PATEHS-Akademik-Lomonosov.html. Commissioning of the station raised a serious question about geo-information and geo-ecological support for its operation in the Far North, as well as about similar support for next FTTPs.

Our analysis shows that there will be significant natural risks for the created natural-industrial system (FTTP itself, auxiliary structures, urbanized surrounding territories and port water areas) due to low air temperatures, strong winds, stationary and drifting ice fields, ice piles, hummocks, long waves, as well as a number of other phenomena in the atmosphere, lithosphere, hydrosphere and biosphere, including sediment movement, algae blooming, siltation, fouling of the floating hull and water intake channels. We propose to solve this problem with geo-information and geo-ecological support system (GIGESS), based on open source geo-information digital online platforms (GIDOPs) Earth (Sanina, 2020) and EOS, including its product LV (Prostakevich, 2020).

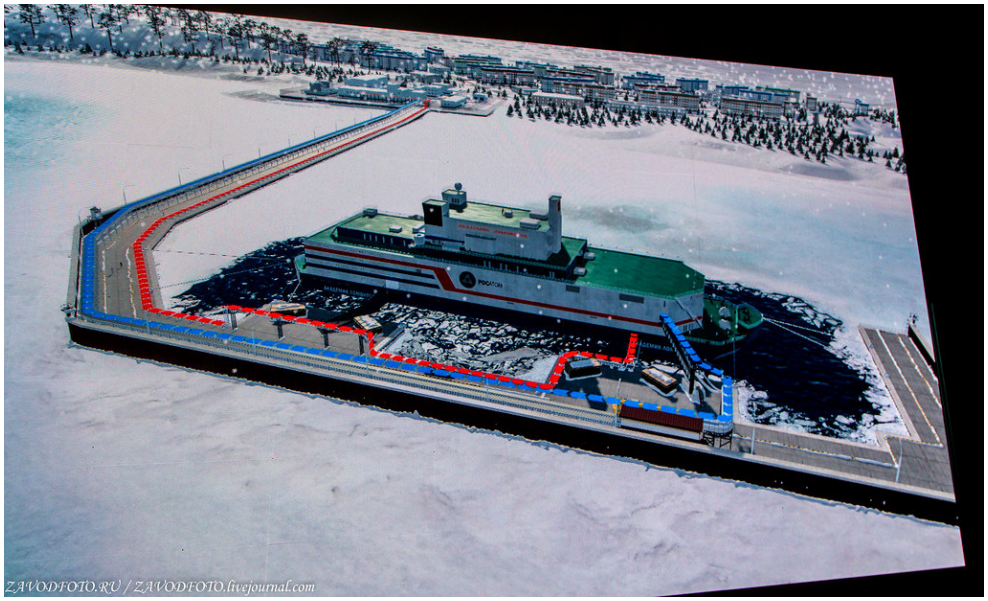

Figure 1: General view of FTPP Akademik Lomonosov at Pevek on computer made image while project stage (https://bestlj.ru/151428-Vsja-pravda-pro-PATEHS-Akademik-Lomonosov.html)

Let's move on to the example of using the proposed GIGESS for FNPP *Akademik Lomonosov* (here and after simply FNPP). A striking feature for its seasonal operation mode is formation and destruction of the ice cover around it. The greatest interest is in spring, when the solid ice field around the station begins to collapse and move, and drifting ice fields with a significant thickness of ice appear. Such fields can be piled on the protective hydraulic structure around the FNPP, and the force of the pile depends on the size of the ice field itself, as well as the strength and direction of the wind acting on it. In figure 2, we present port of Pevek space image on 12th May 2020 visualized with Atmospheric Removal Application of LV (green rectangular marks FNPP's area). You can see that the entire water area is occupied by a stationary ice field of a complex spatial structure with variable thickness and the presence of numerous cracks. It can be assumed that as this ice sheet melts, separate drift ice fields with different ice thickness will form.

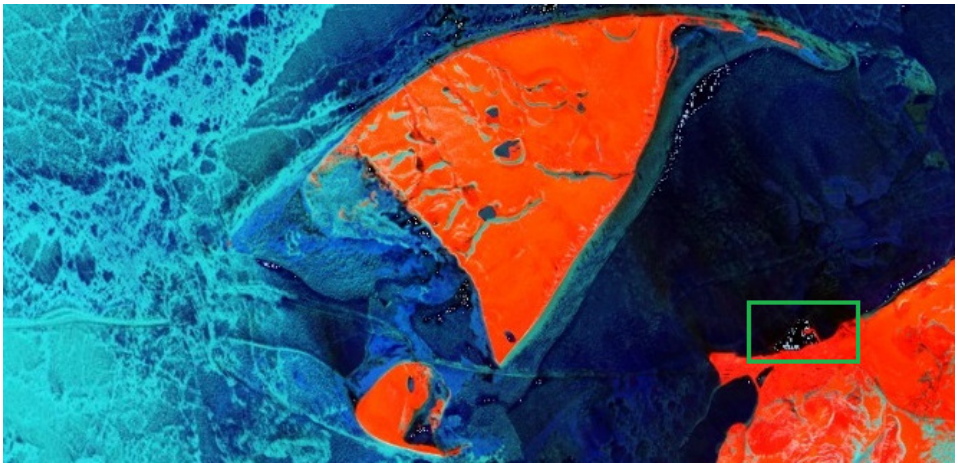

Figure 2 - Port of Pevek space image on 12th May 2020 visualized with Atmospheric Removal Application of LV (green rectangular marks FNPP's area)

In figure 3, we present port of Pevek space image on 5th June 2020 visualized with Atmospheric Removal Application of LV (red hexagon marks FNPP's area). As you can see, in a short period of time the stationary ice field broke up into a set of drifting ice fields with different ice thickness. The greatest danger to FNPP is

represented by set of large drifting ice fields located above and to the left of the red hexagon. With a northwesterly wind, they can approach and attack the FNPP's protective hydraulic structures.

Figure 3 - Port of Pevek space image on 5th June 2020 visualized with Atmospheric Removal Application of LV (red hexagon marks FNPP's area)

In figure 4, we present port of Pevek space image on 15th June 2020 visualized with Atmospheric Removal Application of LV (red hexagon marks FNPP's area). As you can see, inside red hexagon that marks FNPP's area there is large drifting ice field (greenish area) which attacks the FNPP's protective hydraulic works

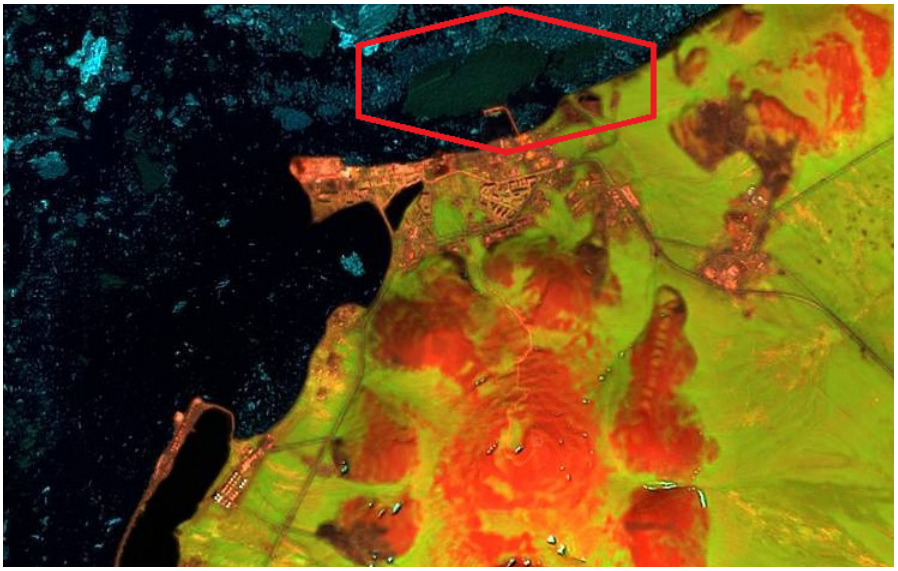

Figure 4: Port of Pevek space image on 15th June 2020 visualized with Atmospheric Removal Application of LV (red hexagon marks FNPP's area)

The maximum length and width of the attacking ice field measured with LV was 1.65 km and 0.658 km (figures 5 and 6) respectively.

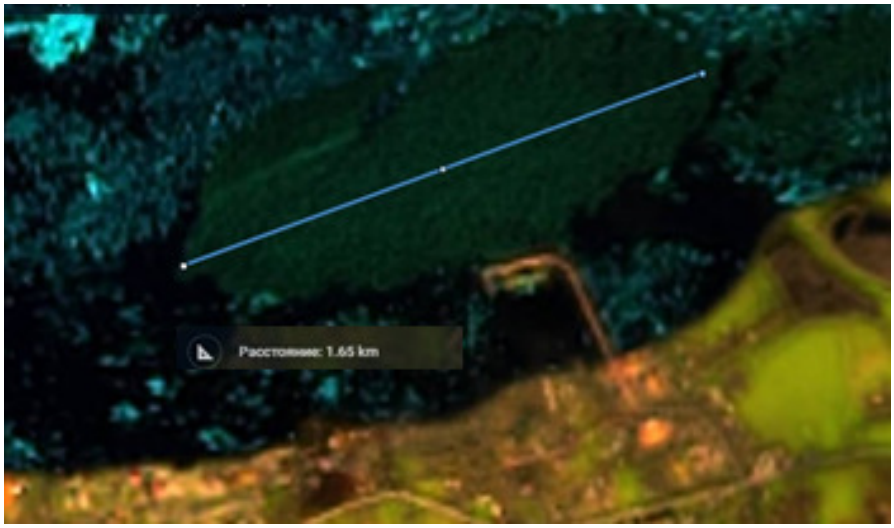

Figure 5: Maximum length of the attacking ice field measured with LV

Figure 6: Maximum width of the attacking ice field measured with LV

Analysis of the wind field on 15th June 2020 in the vicinity of FNPP's area (figure 7) showed that the attacking field was affected by a northwesterly wind at a speed of about 7 km/h.

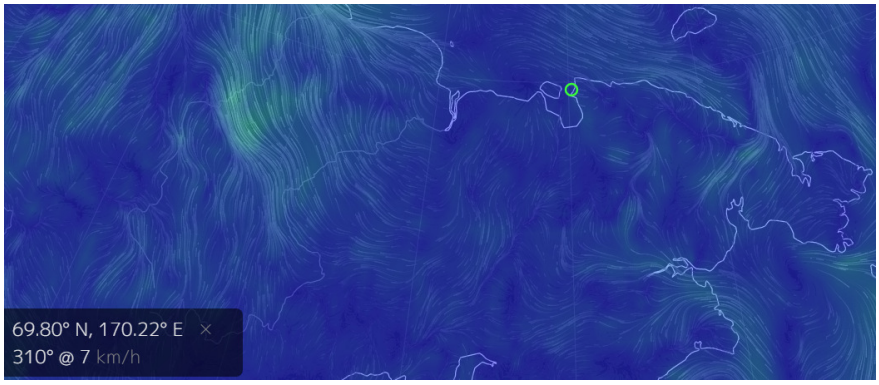

Figure 7: Wind field at FNPP on 15th June 2020 visualized with GIDOP Earth

Note, above mentioned data allow us to calculate the quantitative characteristics of the impact of the attacking ice field on the FNPP's protective hydraulic structures but this is not the purpose of this article.

As essential research result, we can recommend the developed GIGESS for FNPP *Akademik Lomonosov* as basement for subsequent FNPPs in the Arctic.

Discussion

Low-cost GIGESS for FNPP *Akademik Lomonosov* can be used in educational and training purposes. The essential task of university practical learning (UPL) in the field of integrated coastal zones management (Lukyanov, 2020) is to teach students the practical aspects of work with GIGESS for FNPP *Akademik Lomonosov* tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies (Popov, 2019), that can reduce total cost of learning process.

Conclusion

In article, we consider digital tools development results for geo-information and geo-ecological support system (GIGESS) to floating nuclear power plant (FNPP) in Arctic. In research, we used methods of data bases constructing, web-technologies and virtual reality tools. We suggest to use geo-information distributed online platforms (GIDOPs), as the main technological tools in the tasks of geo-information and geo-ecological support while FNPPs functioning. As study result, we demonstrate possibilities of GIGESS for first Russian FNPP *Akademik Lomonosov* at Pevek. As essential result, we propose to use developed GIGESS as basement for subsequent FNPPs in the Arctic, including educational and training purposes The presented in the article results of the research have a significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state environmental control bodies. They can be used in training and educational purposes, including preparation of master's programs in environmental economics.

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While study, associate professor Nikolay Popov, head of geo-information systems laboratory in Arctic and Subarctic Institute at the Russian State Hydrometeorological University (LGIS IAS RSHU), gave us very useful consulting. For preliminary discussion and data exchange while this research, we used platform https://www.researchgate.net/profile/Valery_Abramov2/.

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Big Data Analytics Capability and Firm Performance in The Tourism and Hospitality Industry: A Conceptual Paper

Norzalita Abd AZIZ
UKM-Graduate School of Business, Universiti Kebangsaan Malaysia, Bangi, Malaysia,
eita@ukm.edu.my
Fei LONG
UKM-Graduate School of Business, Universiti Kebangsaan Malaysia, Bangi, Malaysia,
longfei5202005@hotmail.com
Muhamad Luqman KHALIL
UKM-Graduate School of Business, Universiti Kebangsaan Malaysia, Bangi, Malaysia,
mluqman_k@yahoo.com

Abstract

The paper reviews the extant literature on big data analytics capability (BDAC) and firm performance. It is indicated that research on BDAC remains at an 'infancy' stage in the tourism and hospitality industry. Therefore, future research directions are discussed, including BDAC conceptualization issue and possible moderators towards the relationship between BDAC and firm performance.

Keywords: Big Data Analytics, BDAC, Firm Performance, Typology, Moderator.

Introduction

The tourism and hospitality industry has experienced a considerable growth in the past few decades. Tourism-related sectors provided 10% of jobs and generated 8.8 trillion USD (approximately 10.4% of global GDP) in 2018 (WTTC 2019). However, the whole industry has been severely disrupted by the Covid-19 pandemic on a global scale since its initial outbreak in Wuhan, China at the end of 2019.

To curb the spread of the pandemic, many countries have been implementing strict action plans, such as closure of businesses, shutting down transport facilities and even full lockdowns. Therefore, international tourist arrivals are estimated to decline 58% to 78% (UNWTO 2020). Due to limited human mobility and decreased social activities, hotels, restaurants, travel agencies and other businesses are facing seemingly insurmountable challenges (Nicola et al. 2020).

Hotel sector has been one of the hardest-hit by the Covid-19 pandemic across the world. Specifically, China's hotel occupancy rate dropped 89% in January of 2020, and Italy's hotel occupancy rate once dropped 94% (Nicola et al. 2020). Not only have small and medium sized hotels been seriously affected, but also international hotel giants. Amid the global uncertainties induced by the unprecedented pandemic, even Hilton Worldwide made an announcement for a revolving loan of 1.75 billion USD as a precautionary measure in March of 2020 (Nicola et al. 2020).

How to survive becomes a priority for many tourism-related businesses, and necessary measures are taken to cope with the consequences of Covid-19 (Duarte Alonso et al. 2020). As a result, digital transformation has been accelerated, which is mainly driven by the changes of customers' demands. For example, customers developed a

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preference in short-distance over long-haul travels and they have higher requirements on sanitation. Therefore, big data analytics is adopted to predict renewed customer preferences. By familiarizing the preferences, businesses are more likely to provide customized services for enhancing their market competitiveness and firm performance (Hao et al. 2020).

It is evident that the adoption of big data analytics is able to improve productivity, competitiveness and firm performance in a changeable market environment (Hao et al. 2020; Mikalef et al. 2019; Jeble et al. 2018). Nevertheless, it seems to be an unsolved puzzle as to what core resources are required to establish an appropriate big data analytics capability (BDAC) within an organization (Mikalef et al. 2019). In reality, many firms hold a skeptical stance towards big data analytics because their management either put more credits on personal experience over big data analytics or find the implementation of big data analytics extremely challenging (Egan & Haynes 2019; Henke et al. 2016). Besides, most of extant research focuses on big data analytics in the manufacturing sector (Gupta et al. 2018; Jeble et al. 2018). Therefore, there is very little knowledge on the key components of BDAC and its impacts on firm performance in the tourism and hospitality context.

In the present research, we discuss the conceptualization of BDAC and what core resources are needed to build an appropriate capability of big data analytics for tourism-related businesses. Besides, the conceptual paper discusses the effects of BDAC on firm performance. Based on the aforementioned discussion, future research directions are presented along with some insightful implications for the tourism and hospitality industry.

Theoretical Foundation of BDAC

With the development of information technology, the application of big data analytics has emerged as a popular topic among practitioners and researchers (George et al. 2016). As a new technological frontier, big data analytics is able to enhance a firm's competitiveness and business performance because it facilitates firms making correct strategic decisions through analysis of mass unsystematic data (Gupta et al. 2018). More precisely, appropriate application of big data analytics is an important index of a high-performing firm as it enables a firm to spot new opportunities regardless of external changes (Liu 2014).

For example, Amazon excels in transforming unsystematic mass data into competitive advantages via big data analytics. By collecting, processing and analyzing real-time data from users' browsing and searching history, Amazon develops advanced algorithms to find patterns and correlations in relation to customer and market preferences (Jeble et al. 2018). Given the benefits, more managers have gradually realized the importance of big data analytics for a firm's survival, growth and expansion, so some of them start to adopt big data analytics for strategic decision making (Grover et al. 2018). Nevertheless, the application of big data analytics is still at its 'infancy', and there are various challenges for further implementation.

Based on a joint report conducted by McKinsey and Company Global Institute in 2016, only 10%-60% of the previous forecast value of big data analytics is achieved in different industries in the US, and the achievement rate is just between 10%-20% in healthcare area (Henke et al. 2016). Besides, the same report points out that a few challenges, including talents, technology and leadership, lead to the failure of big data analytics implementation. More specifically, there is a lack of talents who are good at producing insightful analytics from mass unsystematic data; there is insufficient big data infrastructure for technical support; and there is a lack of qualified managers who are capable of transforming big data analytics into appropriate management decisions.

To gain competitive advantages in the market, a firm has to apply its internal resources in an effective and efficient way so as to improve its own capabilities (Barney 2001). Barney (1991) proposed a resource-based view (RBV) to explain the transformation mechanism from both tangible and intangible resources to capabilities within a firm. Besides, the deployed resources have to work synergistically towards firm competitiveness (Ghasemaghaei et al. 2017). Only a firm with sufficient organizational capabilities may achieve the synergistical effect in relation to

internal resources deployment (Barney, 1991). In extant literature, the RBV theory is often applied to approach the relationship between the deployment of in-house resources and the improvement of firm performance as it helps us understand a firm's competitiveness and market position (Erevelles et al. 2016).

As a static theory, RBV focuses on in-house resources within a firm, and neglects dynamic external environments. Therefore, Teece et al (1997) proposed dynamic capability view (DCV) as an extension of RBV, emphasizing environmental adaptation capability. Gupta et al (2018) argue that a firm should reconfigure both internal and external resources synergistically for maintaining and enhancing competitiveness advantages amid an increasing market complexity (Gupta et al. 2018). External environment shapes a firm's strategic goals, and the firm applies resources in accordance with its strategic goals, which transforms a firm's capabilities into corresponding competitive position (Gupta et al., 2018). Therefore, dynamic capability is referred to as an ability to strategically reconfigure both internal and external resources for fulfilling a firm's strategic goals in a dynamic market environment (Teece et al., 1997). Significantly, dynamic capability is a hierarchically layered concept with different dimensions, including management, technology and talent (Akter et al. 2016).

Both RBV and DCV are widely applied in strategic management to discuss how to maintain and enhance competitive advantages in a changeable business environment (Barney 1991; Gupta et al. 2018; Teece et al. 1997). Given the two theoretical foundations, BDAC is defined as an ability to effectively collect, process and analyze mass data to produce meaningful business insights guiding strategic decisions in the research context, and the formation of BDAC requires tangible resources, human skills and intangible resources. (Gupta et al. 2018; Jeble et al. 2018; Mikalef et al. 2019).

The Conceptualization of BDAC

BDAC is a multi-layered concept that is composed of various dimensions. Through an extensive literature review, it is found that there are different methods to conceptualize BDAC. As per Akter et al (2016), BDAC, as a hierarchical construct, consists of management capability, technology capability and talent capability. Similarly, Davenport et al (2012) argue that the conceptualization of BDAC should focus on three main aspects of big data analytics, including big data management capability, big data talents capability and tangible infrastructure capability. Meanwhile, Ransbotham et al (2015) state that BDAC contains building blocks of management culture, data infrastructure and data analytic skills. More importantly, Fosso Wamba and Akter (2019) conclude that BDAC is a third-order construct with three second-order dimensions (management capability, technology capability and talent capacity), and second-order primary dimension is composed by a few subdimensions.

Besides, Grant (1991) states that there are three core business resources within a firm, namely tangible (e.g. financial resource), human skills (e.g. staff's knowledge) and intangible (e.g. organizational culture). Furthermore, Mikalef et al (2019) refined Grant (1991)'s typology in a big data context, and they argue that tangible resources include data, technology and other basic resources; human skills contain technical and managerial skills; and intangible resources include both data-driven culture and organizational learning culture. The tangible, human and intangible resources are interrelated, and a coordination of these core resources is required to develop an appropriate BDAC (Mikalef et al. 2019).

Table 1: Typologies of BDAC

Related studies	Management capacity	Technology capacity	Talent capacity
Akter et al (2016)	Big data management capability	Big data technology capability	Big data staff capability
Mikalef et al (2019)	Data driven culture, organizational learning	Data, infrastructure and other basic resources	Technical skills, managerial skills

Jeble et al (2018)	Management skills, data driven culture, organizational learning	Tangible resources	Technical skills
Ransbotham et al (2015)	Analytics planning, sharing and coordination	Openness, compatibility and connectivity	Analytical talent, and related knowledge
Fosso Wamba et al (2017)	Planning, investment and control	Infrastructure for connectivity, compatibility, modularity	Talents with managerial, technical and business skills
Davenport et al (2012)	Analytics management capacity	Open source platforms	Data scientists

In terms of tangible resources, data-related infrastructure, equipment and technology should be deployed to develop big data solutions. Given the benefits of big data analytics, some firms make heavy financial investment in related "hardware", and match the big data initiatives with their strategic goals (Gupta & George 2016). Besides, big data itself is becoming more complex along with the development of information technology as it is generated at anytime and anywhere in various formats, which drives a firm to acquire advanced technologies and infrastructure to collect, store, process and analyze real-time big data for technological competence (Ferraris et al. 2019). In this research, we argue that basic resources, data, technology are essential tangible resources for BDAC. Although these tangible resources are the foundation to establish BDAC, they may not work unless there is a synergic mechanism with human and intangible resources (Jeble et al. 2018).

With regard to human resources, both technical and managerial skills are essential for big data talents to implement initiatives of big data analytics (Fosso Wamba et al. 2017). These skills are related to work experience, knowledge, interpersonal intelligence, problem solving ability (Barney 1991). Davenport (2014) further explains that analytical staff need to have professional technical abilities to handle big data, and managers need to obtain sufficient managerial skills to assemble, organize and manage a team in line with their firm's strategic goals. Compared to technical skills, managerial skills are relatively more difficult to acquire within a firm, and they largely determine the success rate of any big data project (Akter et al. 2016; Davenport 2014; Jeble et al. 2018).

Apart from tangible and human resources, there are some indispensable intangible resources that are important for big data analytics. Compared to tangible resources, intangible resources are not recorded in a firm's financial documents. Therefore, they may be easily ignored (Barney 2001). Nevertheless, intangible resources are crucial to firm performance (Teece 2015). Based on the extant literature, it is found that a positive organizational culture is one of the most important intangible resources within a firm because organizational culture, unlike tangible resources, is very difficult to be replicated by competitors (Barney 2001). In a changeable market environment, a firm has to regularly update its knowledge corresponding to external changes in relation to economic, social, environmental, political and legal aspects to maintain competitive advantages (Cabrera-Suárez et al. 2001). Thus, a firm needs a continuous learning culture to motivate analytical and managerial staff to keep pace with the latest knowledge.

In the big data context, a data-driven culture is a significant factor determining the implementation of big data analytics (Gupta & George 2016). An unsupportive organizational culture imposes a great challenge to implement big data analytics (Ransbotham et al. 2015). Big data analytics itself has a limited impact on strategic decision making without a data-driven workforce resulting from a data-driven culture (Grover et al. 2018). A firm with a strong data-driven culture is likely to modify its organizational process, mechanism and structure to make necessary

information accessible to all staff (Mikalef et al. 2019). Under such culture, a firm would like to invest in data-related technology and train its employees for data competency (Gupta & George 2016). Jeble et al (2018) specifically state that a data-driven culture is a key factor to realize full potential of big data. Therefore, this paper includes both organizational learning and data-driven culture as core components of intangible resources of BDAC.

Based on the aforementioned discussion, we propose that BDAC is a third-order construct with three second-order dimensions, including tangible, human and intangible resources. Tangible resources are composed of basic resources, data and technology; human resources include technical and managerial skills; intangible resources contain organizational learning and data-driven culture (Mikalef et al. 2019).

BDAC in the Tourism and Hospitality Context

There is no doubt that information technology has tremendous impacts on business operation. As an information-intensive sector, the tourism and hospitality industry consumes and produces a massive amount of data from customers, their digital devices and business operation processes (Wirtz et al. 2010). Precisely, tourists may search user generated content (UGC) before making any travel decision, and they may also share their travel experience on social media platforms; digital devices, such as smart phone, can be used to track tourists' movement patterns via GPS service; online searching, booking and other operation processes could facilitate businesses forming a better understanding of tourists' needs, wants and preferences (Buhalis & Foerste 2015; Li et al. 2018). Sheehan et al (2016) state that a firm's competitiveness and even business performance are heavily influenced by its ability in data management. Therefore, it is significant to understand BDAC and its impacts on firm performance in the context of tourism and hospitality.

However, the topic of big data is not widely discussed in the tourism and hospitality industry. According to the extant literature, a few tourism-related issues have been covered in relation to big data, including tourist behavior, Chinese tourists, event tourism, adventure tourism and tourism risk (Getz & Page 2016; Pomfret & Bramwell 2016; Yang et al. 2017; Yang et al. 2015). Most of these studies focus on data source, tourist characteristics or tourist preferences. The impact of big data analytics is under-researched in the tourism domain. Besides, practitioners do not attach enough importance on big data analytics because many managers remain relying on their personal experience over big data analytics for decision making (Egan & Haynes 2019). This is probably because of the complexity to implement big data analytics in the sector. As one of the most digitalized industries, tourism and hospitality, receives massive amounts of data that may be redundant, complex and even contradictory (Lloret-Climent et al. 2019). Thus, it is very difficult to achieve success in big data analytics within the industry. Nevertheless, it is believed that big data analytics is able to improve firm performance though its implementation is still at an "infancy" stage in tourism and hospitality (Lloret-Climent et al. 2019).

The Impacts of BDAC on Firm Performance

In the era of globalization and information technology, business competition exceeds the boundary of national borders. As a result, business competition becomes increasingly fierce among companies. Therefore, survival becomes a priority for businesses (Foster & Kaplan 2001). Apart from survival, a firm should enhance its competitiveness for more market share. Then, it may make more profits to ensure returns to stakeholders and future investment (Akter et al. 2016). Therefore, firm performance is crucial for business organizations. There is no exception for businesses in the tourism and hospitality industry.

In recent years, researchers and practitioners start to show a growing interest in BDAC and its effects on firm performance because BDAC, as a reflection of knowledge management, is one of the most critical determinants of competitiveness (Fosso Wamba et al. 2017). Specifically, BDAC allows a firm to gain a deeper and more holistic understanding of customers and the market (Ferraris 2019). Fosso Wamba et al (2017) argue that the adoption of big data analytics could facilitate a firm maintaining market competitiveness. More precisely, BDAC is likely to increase sales, revenue, profitability and productivity (Akter et al. 2016; Gupta & George 2016). Besides, BDAC is linked with higher market share as it may help a firm explore new market opportunities (Ji-Fan Ren et al. 2017). It is believed that the positive impacts of BDAC on firm performance applies to businesses in the tourism and hospitality sector as well. For example, Yadegaridehkordi et al (2020) suggest that big data adoption improves firm performance, such as profitability and revenue (Egan & Haynes 2019).

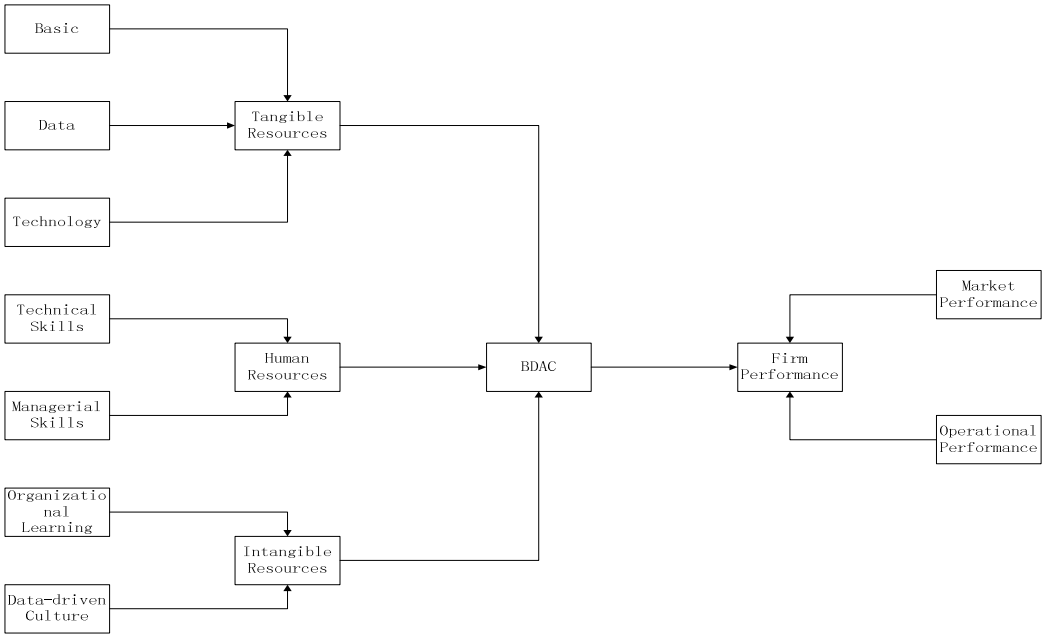

Figure 1: Conceptual framework of the research (BDAC's dimensional structure and its effect on firm performance)

With regard to the components of firm performance, we propose to include both market performance and operational performance in line with previous studies (Gupta & George 2016). According to Gupta et al (2018), market performance and operational performance are two core components of firm performance, and they are complementary to each other. Market performance measures whether a firm is able to explore new markets and launch new products/services to its existing market quickly (Gupta et al. 2018). In other words, a higher market share than competitors usually means good market performance (Ji-Fan Ren et al. 2017). Meanwhile, operational performance is reflected by productivity, profitability, return on investment and sales revenue (Akter et al. 2016). Therefore, both market performance and operational performance are considered key dimensions of firm performance in the paper.

Future BDAC Research in Tourism and Hospitality

In the ongoing industrial revolution 4.0, big data analytics becomes more important to determine a firm's overall competitiveness (Ardito et al. 2019). Majority of companies expressed their willingness to adopt big data analytics

in different industries so as to enhance their market position (Columbus 2014). Despite the willingness, only 16% of them applied big data analytics to optimize business process and strategy (Columbus 2014). What are the reasons that caused the disparity? Based on the extant literature and business reports, many companies have very limited knowledge of how to establish a sufficient capability to implement big data analytics and what core resources are needed for the capability (Henke et al. 2016; Mikalef et al. 2019).

Although the present paper proposes that BDAC is a third-order concept consisting of three second-order dimensions (i.e. tangible, human and intangible resources), and each dimension comprises sub-dimensions, there are other typologies as well (Mikalef et al. 2019). For example, Akter et al (2016) conceptualize BDAC as a third-order construct, but they propose very different first-order and second-order models of BDAC when compared to Mikalef et al (2019). Besides, BDAC may be approached as a second-order construct as well. Jeble et al (2018) argue that BDAC is composed of five dimensions, namely tangible resources, technical skills, management skills, organizational learning and data-driven culture. Therefore, future research may further examine the conceptualization issue of BDAC or the antecedents of BDAC (Rialti et al. 2019). With a clearer understanding of the core components of BDAC, businesses are more likely to form an appropriate capability to implement big data analytics.

Theoretically, BDAC is able to improve firm performance in terms of market share and other operational parameters (Barney 1991; Ferraris 2019; Gupta et al. 2018; Teece et al. 1997). The positive correlation is supported by some previous studies with empirical evidence, but these studies are mainly conducted in manufacturing sectors (Gupta et al. 2018; Jeble et al. 2018). According to Endrikat et al (2014), there are different challenges in different industries because of the variety of internal and external environment (e.g. competition intensity and market conditions). Thus, implications from manufacturing may not apply to tourism and hospitality. More importantly, big data analytics remains a marginal topic within tourism research despite its significance in the whole industry (Mariani 2019). Therefore, more studies of big data analytics and its impacts on firm performance should be conducted in a context of a given industry and country so as to fill up the research gap in literature.

Furthermore, there are important moderators influencing the relationship between BDAC and firm performance (Rialti et al. 2019). According to previous studies, organizational innovation, marketing innovation, firm size and leadership have been explored with preferable evidence (Baharuden et al. 2019; Nieves & Diaz-Meneses 2016; Raguseo et al. 2020; Ramirez et al. 2018). Nevertheless, it is suggested that future studies should explore other factors variables, such as innovativeness, growth, market share and cost leadership (Mikalef et al. 2019; Raguseo et al. 2020).

Conclusion

Based on previous research and relevant theories, the paper has suggested that BDAC has positive impacts on firm performance in terms of market share and operational parameters. Besides, possible antecedents of BDAC are discussed, which may facilitate tourism-related business, such as travel agencies and hotels, developing an appropriate BDAC by deploying the right core resources synergically so as to enhance their market competitiveness. In addition, possible research directions are provided to future studies. By addressing issues linking with future research directions, both researchers and practitioners could form a deep and holistic understanding of BDAC in the context of tourism and hospitality. Then, related businesses are more likely to improve their firm performance in the era of big data.

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Examining the Moderating Effect of Past Travel Satisfaction on Revisit Intention: A Case of Chinese Tourists Visiting Malaysia

Norzalita Abd AZIZ
UKM-Graduate School of Business, Universiti Kebangsaan Malaysia, Bangi, Malaysia,
eita@ukm.edu.my

Fei LONG
UKM-Graduate School of Business, Universiti Kebangsaan Malaysia, Bangi, Malaysia,
longfei5202005@hotmail.com

Abstract

China has become the largest source market for global outbound tourism. Many countries, including Malaysia, are aiming to attract more tourists from China to boost their tourism sector, and how to convince tourists to come back is a vital issue to achieve the goal. The paper intends to investigate Chinese tourists' intention to revisit Malaysia by applying the theory of reasoned action (TRA) and past travel satisfaction. PLS-SEM is used to analyze data from 276 respondents, and it is found that attitude, subjective norm and past travel satisfaction are significant factors influencing Chinese tourists' revisit intention to Malaysia. However, past travel satisfaction does not have any moderating effect. Based on the findings, national tourism organizations, marketers and operators are suggested to provide customized travel itineraries to Chinese tourists so as to make them loyal to their destination.

Keywords: Chinese tourists, Malaysia, Revisit intention, Past travel satisfaction, TRA.

Introduction

Malaysia is a well-known travel destination in Southeast Asia with its cultural diversity, beautiful natural scenery and convenient infrastructure. Since independence in 1957, Malaysia has been transforming its economy from resource-based to service-based. Its first attempt to develop tourism and hospitality dated back to the 1960s, but Malaysia didn't put too much effort into the sector until the last two decades of the 20th century (Phah et al. 2018). The promotional campaigns *Visit Malaysia* were implemented a few times, such as in 1990, 1994, 2000, 2007 and 2014, which marks Malaysia's increasing recognition of tourism's economic benefits (Mahadevan et al. 2016). Besides, the sector was identified as one key industry transforming Malaysia to a high-income nation by the Economic Transformation Programme (ETP) initiated by the Malaysian government in 2010.

In recent two decades, the tourism sector remains one of the most significant contributors to Malaysia's economy. According to WTTC (2017), the travel and tourism industry accounted for 13.7% to Malaysia's GDP in 2016, and provided 12.0% of total employment in the country. In terms of international arrivals, Malaysia received 25.83 million foreign tourists in 2018, and 70.1% of arrivals are made by tourists from other neighboring countries in Southeast Asia. Meanwhile, China was ranked the largest source market outside of Southeast Asia with 2.94 million arrivals in 2018, following Singapore's 10.62 million and Indonesia's 3.28 million (Jaafar 2019).

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Due to geographic location, historic ties and amicable relations with China, Malaysia has been a popular travel destination for Chinese citizens in the last few decades. To attract more tourists from China, Malaysia grants preferential policies towards Chinese tourists, such as loosening visa requirements and providing language assistance at main transport hubs. Besides, scholars have been conducting research to investigate determinant factors influencing Chinese tourists visiting Malaysia (Phah et al. 2018). However, there are insufficient studies discussing a crucial question whether Chinese tourists are willing to revisit Malaysia.

Both researchers and practitioners agree that repeat tourists are a stable source market for travel destinations, and tourist loyalty is a key factor deciding if a destination could survive and thrive (Opperman 2000; Tasci 2017). According to Opperman (2000), it would cost more resources to attract new tourists than to convince existing tourists to come back to the same destination. Besides, repeat tourists would spend more, and they are less likely to be influenced by perceived risks (Chew & Jahari 2014). In Malaysia, local researchers have noticed the issue of tourist loyalty, but they mainly focus on Western and Muslim tourists regardless of the importance of China's outbound tourism market (Battour et al. 2012).

This study aims to examine determinants of revisit intention to a destination by applying the theory of reasoned action (TRA) and past travel satisfaction in the context of Chinese tourists visiting Malaysia (Ajzen 1991; Loi et al. 2017). The article provides some valuable insights for policy makers, industry practitioners and researchers on why tourists from China revisit Malaysia, which may help them design a feasible and efficient marketing strategy.

Literature Review

Outbound Tourism Market of China

Although China has become the largest global source market, its outbound tourism didn't really exist until the 1980s. Before the implementation of China's opening-up policy in 1979, only a handful of social elites, diplomats and athletes could have had a chance to travel abroad. Travelling abroad was strictly controlled by the Chinese government because of the ideological confrontation between socialist and capitalist camps in the world. Even during the first few years after China's reform and opening, Chinese government remained a very conservative attitude towards outbound tourism.

The development of China's outbound tourism could be categorized into 3 main stages. In 1983, ordinary Chinese citizens were allowed to visit their relatives or friends in Hong Kong, Macao and regions around border areas, which marks the 1st development stage of China's outbound tourism. However, the policy was tentative as these trips had to be fully sponsored by the Chinese citizens' relatives or friends who live in Hong Kong or Macao (Dai et al. 2017). For the vast majority of common people, they did not have much chance to travel outside of mainland China even if they could afford the trip.

In 1980, China's National Tourism Administration started to introduce "Approved Destination Status" (ADS) scheme, and China's tourism administration enlisted countries to ADS when they signed bilateral tourism cooperation agreement with China. Singapore, Malaysia and Thailand are in the 1st batch of ADS countries. In 1997, China signed a bilateral agreement with Australia and New Zealand, and Chinese tourists were also allowed to visit ADS destinations at their own expenses, which marks the 2nd development stage of China's outbound tourism (Dai et al. 2017).

China successfully organized the Beijing Olympic Games in 2008, showing a prosperous and modern China to the whole world. Meanwhile, Chinese government decided to promote its outbound tourism for displaying China's soft power, marking the 3rd development stage of China's outbound tourism. After that, China has been actively encouraging Chinese citizens to travel abroad in contrast with its previous "restrictive attitude" towards outbound tourism (Dai et al. 2017). Especially after 2010, China's outbound tourism market entered "the second wave" of rapid growth (Arlt 2013). Dai et al (2017) postulate that each stage of outbound tourism is a reflection of social, economic and political situations in China during certain periods. To clearly understand China's outbound tourism market in the past, at present and in the future, related social, economic and political factors must be considered and comprehended.

TRA

The applicability of the TRA model is supported by many empirical research. According to Armitage and Conner (2001), TRA could explain 39% of variance of behavioral intention. Moreover, Hassan et al (2016) conducted a review research by analyzing 29 journal papers using the TRA model published from 2000 to 2013, and the findings indicate that 41% of variance of behavioral intention could be explained by the model.

In the domain of tourism studies, TRA is also adopted to understand various travel behaviors across different cultural backgrounds (Meng & Choi 2018; Park 2000). Furthermore, Park (2000) argues that the relative weights of attitude and subjective norm caused by cultural differences will not change both components' ability to predict behavioral intention. Nevertheless, Hassan et al (2016) postulate that the influence of attitude and subjective norm varies in different situational and cultural contexts, and the positive relationship between subjective norm and behavioral intention may be insignificant in some cultures and situations.

For example, Ryu and Han (2010) examined tourists' intention to try local food when they visit a travel destination, but it is found that subjective norm does not have a positive effect on behavioral intention. The study was conducted in the U.S. where individualism is prevailing, which may explain why respondents consider trying food a personal matter rather than an outcome of external social pressure (Hofstede 1980). Maheswaran and Shavitt (2000) postulate that it is very difficult to have a universally applicable theory regardless of cultures. Thus, the TRA model needs to be contextualized with regard to China's outbound tourists visiting Malaysia. Based on the discussion, the following hypotheses are proposed:

H1: Subjective norm positively influences Chinese tourists' intention to revisit Malaysia.

H2: Attitude positively influences Chinese tourists' intention to revisit Malaysia.

Past Travel Satisfaction

Tourists' past travel experience and past travel satisfaction are seen as antecedents in predicting tourists' travel behavior, including intention to revisit a destination (Alegre & Janme 2010; Tasci 2017). It is argued that previous travel experience has a direct effect on destination loyalty, and satisfied tourists are inclined to recommend the travel destination to other people (Loi et al. 2017; Oppermann 2000; Tasci 2017). Huang and Hsu (2009) conducted an empirical research to examine mainland Chinese tourists' revisit intention to Hong Kong. The findings suggest that they are more likely to revisit the city in the future if they are satisfied with their previous trip to Hong Kong. In addition, findings from Cheng et al (2005) suggest that past experience has an indirect impact on behavioral intention.

However, there is very little literature investigating past travel experience or satisfaction's moderating role in tourist behaviors. According to Tosun et al (2015), past experience has a moderating effect on revisiting intention. Hsieh et al (2016) also propose that past travel experience has a moderating role on travel intention (Ajzen 1991; Kidwell & Jewell 2008). Before visiting a destination, tourists would rely on their internal attitude and external source for decision making. If they are satisfied with their previous trips to a destination, they are more likely to revisit the destination (Hsieh et al. 2016). Based on what have been discussed above, the following hypotheses are postulated:

H3: Past travel satisfaction positively influences Chinese tourists' intention to revisit Malaysia.

H4: Past travel satisfaction positively moderate the relationship between subjective norm and revisit intention to Malaysia.

H5: Past travel satisfaction positively moderate the relationship between attitude and revisit intention to Malaysia.

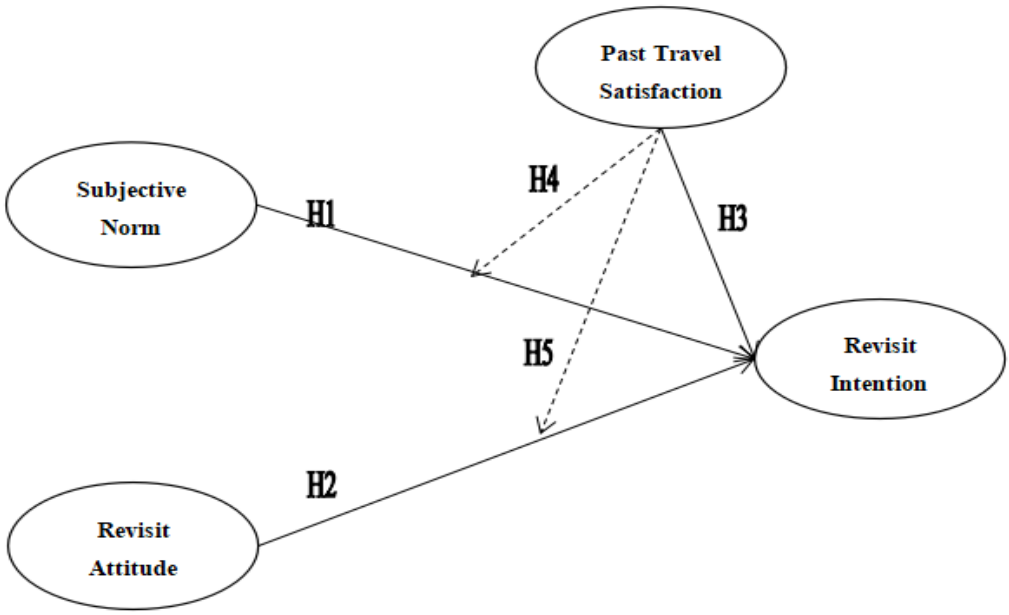

Figure 1: Conceptual framework of the research

Methodology

Online self-administered surveys were applied to collect data from Chinese tourists who had visited Malaysia at least once. Mafengwo.com is dubbed as the Chinese version of Lonely Planet (Wu & Pearce 2016), so invitation letters and online survey links were sent to mafengwo.com users who had posted their travel experience in Malaysia. Keyword "Malaysia" was used to search related posts, and a few thousand of posts were listed. Then a convenience sampling method was used. 1500 invitations were sent out from 28th September to 12th October, 2018, and eventually 276 usable respondents had been collected by 28th December, 2018.

The survey instrument was initially designed by referring to literature in English. Then, the questionnaire was back translated to Chinese for maximum consistency and accuracy (Brislin 1970). Besides, a small scale pretest was

conducted before the data collection stage (Sekaran 1983). Five Chinese students studying in a Malaysian public university were recruited, and all of them expressed that there were no ambiguity and complexity issues with regard to the Chinese version.

The survey has 2 parts. Part A includes items measuring independent moderating and dependent variables, and all the items were either adopted or adapted from previous literature (Huang & Hsu 2009; Loi et al. 2017; Ryu & Han 2010). In terms of measurement scales, survey items were measured by a 6-points Likert scale (Nadler et al. 2015). All Likert scales are ranged from 1 (strongly disagree) to 6 (strongly agree). Meanwhile, part B contains demographic information (i.e. gender, marital status, age, education, occupation and income).

Data Analysis and Findings

Socio-demographic Profile

Table 1: Profile of the Respondents

Characteristics		**Frequency**	**Percentage**
Gender	Male	110	39.8%
	Female	166	60.2%
Age	Below 20	4	1.4%
	Twenties	136	49.3%
	Thirties	97	35.2%
	Forties	22	7.9%
	Fifties	13	4.8%
	Sixties	4	1.4%
Education Level	Below High School	1	0.3%
	High- School Certificate	2	0.7%
	Diploma	31	11.3%
	Bachelor Degree	178	64.5%
	Master Degree	63	22.9%
	PhD (Doctorate)	1	0.3%
Profession	White Collar	131	47.5%
	Blue Collar	8	2.8%
	Manager	22	8.0%
	Businessman	12	4.4%
	Public Servant	28	10.2%
	Students	25	9.1%
	Others	46	16.6%
	Unemployed	4	1.4%
Marital Status	Single	101	36.6%
	Divorce/separated	5	1.8%
	Married/relationship	170	61.6%
Monthly Income	Below RMB 2000	23	8.3%

	RMB 2000-RMB 3999	46	16.6%
	RMB 4000-RMB 5999	69	25.1%
	RMB 6000-RMB 7999	46	16.6%
	RMB 8000-RMB 9999	29	10.5%
	Above RMB 10000	63	22.9%
Times Visited Malaysia	1-2 Times	229	82.9%
	3-4 Times	30	10.8%
	5 or Above Times	17	6.3%

PLS Data Analysis

The application of PLS-SEM is increasingly popular among researchers due to its advantages, such as flexibility in handling data (Hair et al. 2017). Besides, the purpose of the present research is to predict the relationships indicated by the conceptual framework. Therefore, PLS-SEM was adopted to analyze data rather than CB-SEM. Smart PLS version 3.2.8 was selected for data analysis.

There are a few standardized stages for applying SEM-PLS, including model specification, model evaluation and final result evaluation (Chin 2010). For measurement model or outer model testing, reliability and validity of latent variables were analyzed. For structural or inner model testing, the hypotheses of the present study were evaluated (Hair et al. 2017).

Table 2: Validation of the measurement scales

Construct	**Item**	**Loading**	**CR**	**AVE**
Subjective norm	SN1	0.911	0.860	0.675
	SN2	0.844		
	SN3	0.693		
Revisit Attitude	ATT1	0.919	0.966	0.876
	ATT2	0.907		
	ATT3	0.929		
	ATT4	0.929		
	ATT5	0.945		
Past Travel	PTS1	0.861	0.956	0.846
Satisfaction	PTS2	0.898		
	PTS3	0.946		
	PTS4	0.969		
Revisit Intention	IN1	0.940	0.966	0.876
	IN2	0.924		
	IN3	1.029		
	IN4	0.842		

Note: CR = Composite Reliability, AVE = Average Variance Explained

Measurement Model Assessment

Both internal consistency and validity were tested to confirm the measurement model. With regard to internal consistency, the present study measured composite reliability (CR) as an alternative of Cronbach's alpha (Hair et al

2017). As it is shown in table 2, all construct's CR values are greater than the threshold value of 0.7.

Convergent validity reflects how much a latent construct could explain the variance of its respective indicators (Hair et al. 2017). To confirm convergent validity, AVE value has to be greater than 0.5 (Hair et al. 2017). As it is shown in table 2, all AVE values range from 0.675 to 0.876. Meanwhile, discriminant validity reflects whether a latent construct is distinct from other constructs by examining correlations (Hair et al. 2017). For the present research, Heterotrait-Monotrait ratio of correlations (HTMT) was used in examining discriminant validity. According to Henseler et al (2016), discriminant validity is sufficient if HTMT value is less than 0.9. As it is indicated in table 3, all HTMT values ranged from 0.282 to 0.656, so discriminant validity was confirmed.

Table 3: Discriminant validity

	ATT	**IN**	**PTS**	**SN**
ATT				
IN	0.577			
PTS	0.656	0.282		
SN	0.469	0.547	0.308	

Note: Discriminant validity established at HTMT $_{0.90}$

Structural Model Assessment

Before moving to the structural model assessment stage, it has to be confirmed that there is no collinearity issue. According to Diamantapoulus and Sigauw (2006), VIF could be used for collinearity test, and the value should be lower than 3.3. As it is shown in table 4, no VIF value exceeds the threshold value, suggesting there is no collinearity problem for the study.

Table 4: Collinearity test

	ATT	PTS	SN
IN	2.280	2.076	1.381

Note: VIF is used to measure collinearity issue.

Then, the structural model of the research was assessed by a bootstrapping procedure. As it is shown in table 5, H1, H2 and H3 are supported. For SN -> IN, β=0.333, t=4.185, LL=0.205, UL=0.467. For ATT -> IN, β=0.502, t=5.917, LL=0.362, UL=0.642. For PTS -> IN, β=0.157, t=2.203, LL=0.037, UL=0.270. Based on these values, subjective norm, attitude and past travel satisfaction have a positive relationship with revisit intention. Path coefficient value of H2 is higher than that of H1, so attitude has a slightly more significant effect on behavioral intention when compared with subjective norm. Besides, the results of path coefficient assessment suggest that past travel satisfaction has a direct relationship with revisit intention, which meets the prerequisite of testing the moderating effect of past travel satisfaction (Hair et al. 2017).

Table 5: Results summary of hypotheses testing

Hypothesis	**Relationship**	**Path Coefficient**	**Std error**	**T Value**	**P Values**	**LL**	**UL**	**Decision**
H1	SN -> IN	0.333	0.080	4.185	0.000	0.205	0.467	Supported
H2	ATT -> IN	0.502	0.085	5.917	0.000	0.362	0.642	Supported
H3	PTS -> IN	0.157	0.071	2.203	0.028	0.037	0.270	Supported

Notes : LL (lower limit) and UL (upper limit) at 95 percent confidence interval.

Table 6: Results summary of hypotheses testing –moderating variables

Hypothesis	Relationship	Path Coefficient	Std error	T Value	P Values	LL	UL	Decision
H4	PTS moderating SN -> IN	0.056	0.112	0.738	0.461	-0.084	0.289	Not supported
H5	PTS moderating ATT -> IN	0.083	0.051	1.109	0.268	-0.141	0.024	Not supported

Notes : LL (lower limit) and UL (upper limit) at 95 percent confidence interval.

Bootstrapping analysis results of H4 and H5 are shown in table 6, For PTS moderating SN -> IN, β=0.056, t=0.738, LL=0.084, UL=0.289. For PTS moderating ATT -> IN, β=0.083, t=1.109, LL=0.141, UL=0.024. Therefore, both hypotheses are rejected as their T values are not significant.

Table 7: Assessment of coefficient

	R^2	f^2	Q^2	q^2
Construct				
ATT		0.199		0.186
SN		0.130		0.111
IN	0.417		0.349	

Table 7 above shows information on coefficients of determination (R^2), effect sizes (f^2), predictive relevance (Q^2) of exogenous variables on endogenous variables, and effect sizes for predictive validity (q^2) in this study. The value of R^2 for behavioral intention is 0.417, and this suggests that attitude, subjective norm and past travel satisfaction explain 41.7% variance of intention to revisit Malaysia among tourists from mainland China. According to Cohen (1989), the model is substantial to explain behavioral intention. With regard to f^2, attitude (0.199) has a medium effect size in producing R^2 for intention, and subjective norm (0.111) has a small effect size in producing R^2 for intention (Cohen 1988). Concerning the value of Q^2, it is greater than 0, which indicates that the model has sufficient predictive relevance, and the exogenous variables (subjective norm, attitude and past travel satisfaction) can predict the endogenous variable (intention). Besides, q^2 values are calculated by the method suggested by Hair et al (2017), and the results coincide with the f^2 values.

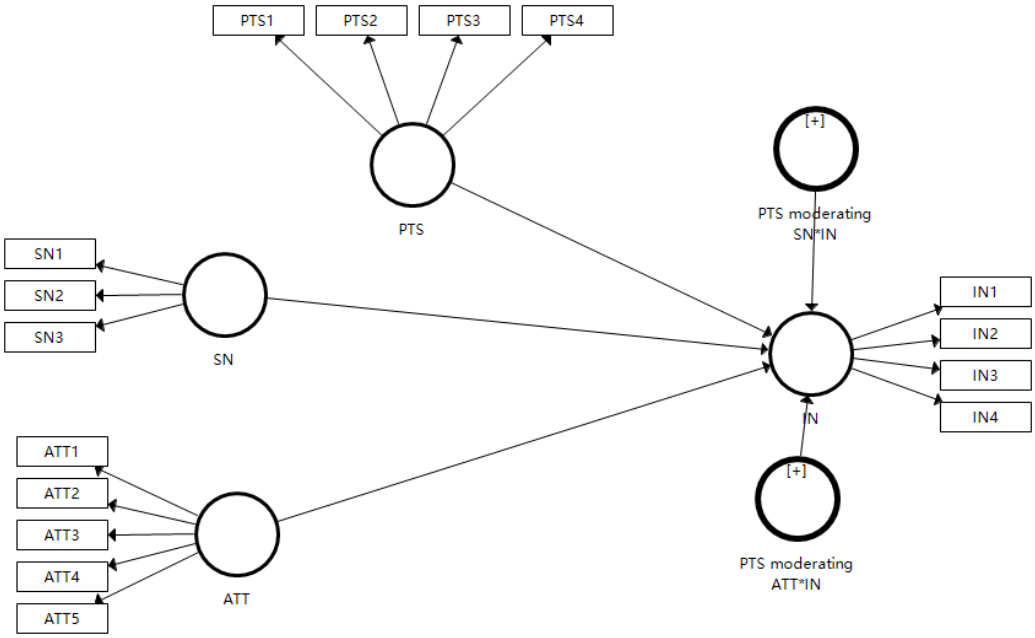

Figure 2: Structural Model

PTS-Past Travel Satisfaction, SN-Subjective norm, ATT-Revisit Attitude, IN- Revisit Intention

Discussion and Conclusion

The purpose of the present research is to investigate determining factors influencing revisit intention in the context of Chinese tourists visiting Malaysia. According to the findings, revisit intention is influenced by attitude, subjective norm and past travel satisfaction. There is no significant difference between subjective norm and attitude in influencing Chinese tourists' intention to revisit Malaysia, but attitude is slightly more important than subjective norm on revisit intention, which may imply that Chinese tourists are becoming more independent when it comes to choosing travel destinations (Hsieh et al 2016).

As a matter of fact, the influence of subjective norm varies in different cultural and situational settings (Hassan et al. 2016). Subjective norm may play a more important role in a collectivistic society than in an individualistic society. For example, Asian tourists would highly value opinions from their family and friends, and these opinions may outweigh their own attitude (Huang et al. 2008). It is possible that Chinese society is becoming more individualistic, and Chinese tourists start to focus on their own attitude rather than opinions from others for travel decisions (Li et al. 2011).

Besides, past travel satisfaction is positively related to revisit intention, suggesting that tourists who are satisfied with their previous trips to Malaysia are more likely to visit Malaysia again in the future (Tasci 2017). Nevertheless, past travel satisfaction is less significant than subjective norm in influencing revisit intention, which may be explained by the fact that Chinese tourists prefer to travel with family and friends, and they still value opinions from significant others (Lo & Qu 2014). Moreover, past travel satisfaction does not have any moderating effect in the research. Satisfaction may not necessarily induce loyalty to a destination, and a positive revisit attitude is not equivalent to loyalty (Yang & Lau 2015) . It is also possible that Chinese tourists, especially the younger ones, become mature as

they travel more. Thus, satisfaction may be a prerequisite of destination loyalty, but not enough to influence Chinese tourists' cognitive and affective response to a destination.

Furthermore, there are a few practical implications for destination marketing organizations and other stakeholders in Malaysia in relation to Chinese tourists. The demographic information shows that female tourists play a significant role in China's outbound tourism market. In the survey, 60.2% of respondents are female, coinciding with the fact that female tourists account for more than half of the world travel population (Li et al. 2011). Particularly in China, females are usually the ones who control the family finance (Wang 2009). Therefore, destination marketers should attach more attention on the segment of China's female tourists, and design suitable marketing strategies and travel products accordingly. The demographics also indicate that China's outbound tourists are generally young, well-educated and wealthy. However, the vast majority of them (82.9%) only visited Malaysia 1-2 times. Therefore, marketers and other stakeholders are suggested to diversify their products/services to keep repeat tourists.

As attitude, subjective norm and past travel satisfaction have significant effects on revisit intention, Malaysian tourism policy makers should take measures to improve Malaysia's destination image so as to facilitate Chinese tourists forming a positive attitude of Malaysia. However, attitude plays a more important role than subjective norm in influencing revisit intention (Hassan et al. 2016). The results of the study indicate that China remains a collectivistic society, but the influence of individualism becomes more prevailing, especially among young people. Thus, policy makers and operators need to provide more customized and individualized products to tourists from China. Moreover, they should make sure that tourists would be satisfied or even delighted with their trip in Malaysia for destination loyalty purposes.

Although the research provides insights of revisit intention in the context of Chinese tourists visiting Malaysia, there are some limitations as well. Convenience sampling method was applied for data collection via the internet. Internet users are generally young and well-educated in China, so the collected data is biased to some extent. Another limitation lies in the fact that data of all variables is from the same respondents. Future research should choose different resources for minimizing common method bias (Hulland et al. 2018).

Besides, tourists of different ages and genders may exhibit different purchase and travel behaviors (Božić & Jovanović 2017), so future studies may focus on different segments of Chinese tourists (e.g. young tourists, senior tourists and female tourists). Meanwhile, the study only applied the TRA model with past travel satisfaction to examine tourists intention to revisit Malaysia. However, some other factors are also associated with revisit intention, such as perceived constraints and travel motivation (Huang & Hsu 2009). Therefore, more factors should be considered for examining Chinese tourists' intention to revisit Malaysia.

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Diversidad De Género En El Consejo De Administración Y Sus Beneficios En La Eficiencia Empresarial: El Caso De España

Milagros Gutiérrez-Fernández
Department of Financial Economics and Accounting - Faculty of Business, Finance and Tourism-University of Extremadura, Avda. de la Universidad s/n, 10071 Cáceres, Spain, mgutierrezf@unex.es

Yakira Fernández-Torres
Department of Financial Economics and Accounting - Faculty of Business, Finance and Tourism-University of Extremadura, Avda. de la Universidad s/n, 10071 Cáceres, Spain, yakiraft@unex.es

Clara Gallego-Sosa
Department of Economy - Faculty of Economics and Business - University of Extremadura, Avda. de Elvas s/n, 06006 Badajoz, Spain, claragsg@unex.es

Abstract

La toma de decisiones llevada a cabo en el consejo de administración está influida por las características y los valores de sus miembros, entre los que ha recibido gran atención la diversidad de género. En esta línea, considerando la escasa representación femenina en la cúpula directiva de las organizaciones, la Comisión Europea ha propuesto una Directiva mediante la cual se pretende promover una presencia de mujeres de al menos un 40% en los consejos de administración de las empresas cotizadas. De esta forma, además de erradicar las barreras que dificultan el ascenso de las mujeres en la escala directiva, se pretende potenciar un mejor desempeño empresarial. Debido a la importancia de esta cuestión, y tomando como referencia las empresas españolas cotizadas durante 2004-2015, se pretende conocer el efecto que la diversidad de género en el ámbito directivo tiene en la eficiencia empresarial, poniéndose el foco en el posible efecto moderador del endeudamiento en tal relación. En este estudio se constata que la diversidad de género en el consejo de administración contribuye a la obtención de una mejor eficiencia empresarial, apoyándose así la necesidad de iniciativas que contribuyan a fomentar la igualdad de género, tanto por motivos de justicia social como causas de estrategia empresarial.

Keywords: Diversidad De Género, Consejos De Administración, Eficiencia Técnica, *Performance* Empresarial.

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Analytical View of The Issue of Shopping Behaviour of Millennials and Their Preferences in Terms of Electronic Commerce

Jakub HORVÁTH
Faculty of Management, University of Prešov, Prešov, Slovakia
jakub.horvath@unipo.sk,

Richard FEDORKO
Faculty of Management University of Prešov, Prešov, Slovakia
richard.fedorko@unipo.sk

Radovan BAČÍK
Faculty of Management, University of Prešov, Prešov, Slovakia
radovan.bacik@unipo.sk

Abstract

E-commerce plays an important role in today's world. Many customers shop online. The boom in e-commerce arrived mainly because today's consumers use the Internet on a daily basis, they like to try new things, discover new brands and products, but they are also modern, demanding and like convenience. The decisive criterion in this regard is access to the Internet, which is no longer a problem as people can now connect to the Internet anytime and anywhere. Life before the Internet is unimaginable for many Millennials. Generation Y uses the Internet in almost every aspect of their lives. Whether it's a search for trusted resources to write seminar papers, order food, watch online TV, or meet new people through cyberspace, the Internet has become an integral part of their lives. While widespread use of the Internet may not necessarily be a negative thing, it has lasting effects on the lives of Millennials. The aim of this paper is to identify the shopping behaviour of Millennials and their preferences when shopping online.

Keywords: electronic commerce, shopping behaviour, consumer preferences, e- commerce.

Introduction

E-commerce is a subset of e-business. Electronic commerce means the use of any information and communication technologies in order to carry out mutually beneficial transactions between the seller and the buyer (Bystrická 2013). The implementation of an information system into business processes, or the creation of an information infrastructure does not mean that it is electronic commerce (Štefko, Pollák, Gavurová 2018). The company can be included in this category only if it conducts communication with customers mainly through information and communication technologies or an implemented information system (Laudon and Traver 2016; Štefko and Šteffek 2017). According to Dorčák (2012), all business activities and services implemented through electronic data transfer tools, directly related to the implementation of business cases, can currently be included in electronic commerce (Bucko, Kakalejčík and Nastišin 2015). As for software or other information, these can also be transmitted to the end consumer electronically. At present, it is possible to carry out electronic commerce not only using personal computers, but also mobile communication platforms (Xanthidis a Nicholas 2004). Suchánek (2012) states that one of the first examples of e-commerce involving physical goods between a large number of sellers and buyers is the Boston Computer Exchange, which was set up in 1982. Manzoor (2010) states that the main elements of e-commerce are mainly online stores and related issues. However, most activities falling under online marketing are also well represented here, e.g. e-mail marketing, various affiliate programs, online advertising and all activities related to the promotion of Internet commerce (Leong and Ibrahim 2015). In a broader sense, we can also include here any websites that offer specific products or services which can be ordered via e-mail (Bhattacharyya and Bose 2020). The first e-shops in the world began to emerge around 1994 (Amazon, eBay, …). According to Tiaga and Tiaga (2012), online commerce is currently the fastest growing segment in terms of increasing business performance and productivity. E-commerce falls under direct sales, as customers can choose the goods without

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having to physically visit brick-and-mortar shops or shopping centres (Gerrikagoitia 2015). E-commerce is a fast-growing segment which is now considered an integral part of today's businesses (Shim et al. 2001). Its essence is based on the use of information and communication technologies. Today, online stores make it easier and faster to do business. As e-commerce is a form of direct sales, online shopping is easier and convenient as customers to not have to leave their homes (Čorba and Nastišin 2015). E-commerce covers a range of technologies which make business relationships more effective. Typical technologies involved in e-commerce include the following (Vanhoose 2011): electronic data exchange, electronic forms, electronic catalogues, electronic mail, electronic fund transfer, fax, voice messaging, technical data exchange, workflow (Fedorko 2018). The emergence and gradual use of e-commerce brings various benefits to different organizations, businesses and social groups. The benefits of e-commerce available to customers and businesses include the following (Tondr 2002):

Benefits for customers:

- e-commerce allows customers to compare prices and reviews through comparison websites (heureka.sk),
- e-shops are not limited by regional or national borders, the only things needed are a desktop computer, laptop, tablet or smartphone with the Internet connection,
- e-shops offer a wide range of options when it comes to choosing goods that are systematically categorized,
- opening hours on the Internet, unlike those in brick-and-mortar stores, are not limited (e-shops operate 24/7); online stores are not limited by any days off or holidays. Therefore, the customer can choose and buy products and services at any time convenient.

Kotler et al. (2007) lists these benefits for businesses:

- e-shops provide the opportunity to acquire new customers, as well as various opportunities to identify the needs and requirements of potential customers and consumers,
- e-shops are not as costly, companies connect directly with their distributors, suppliers and customers via the Internet, thus reducing not only their costs but also costs of their customers as customers already deal directly with sellers,
- e-shops provide companies with greater flexibility and allow them to make ongoing adjustments to offers and programs, online catalogues can be adapted and changed at any time - this is not possible with traditional catalogues that are already printed and sent to customers,
- e-shops ensure higher efficiency of distribution lines and logistics functions (sales support, order processing, etc.),
- customers provide feedback via the Internet - manufacturers can improve their products or services and increase the satisfaction of their customers.

Methodology

Based on the analysis of the current state of shopping behaviour, the aim of this paper is to identify the shopping behaviour of Millennials and their preferences in terms of e-commerce.

Scientific methods such as analysis, synthesis, comparison method and selected statistical methods will be used to fulfil the goal of the presented paper. A questionnaire method was used to obtain primary data. The link to the electronic questionnaire was placed on the relevant Facebook pages, it was also distributed, evenly within the regions of the Slovak Republic, by e-mail (the author's private database). A total of 962 respondents filled in the questionnaire, but the research focused only on the new generation of customers (Generation Y), ie respondents from 20 to 36 years inclusive (Young 2017). After removing inappropriate observations, a total sample of 824 respondents was used for the purposes of this paper. The obtained data were processed using Microsoft Excel. The results of individual analyses were obtained through Gretl and Statistica 13.

Inputs to the analysis were obtained by implementing the CAWI (Computer Assisted Web Interview) method. To obtain the necessary primary sources of information and data for the purposes of the paper, an exploratory method

is used, through questionnaires, the principle of which is based on obtaining data based on subjective answers of respondents, which in this case will represent representatives of the new generation of customers (Generation Y) who shop online. The questionnaire submitted by the respondents consisted of 30 questions, of which the first five questions are used to classify the analysed sample for subsequent statistical analysis. The questionnaire focused on demographic information and data related to the consumer behavior of millennials and their perception of uncertainty when shopping online.

The research focuses on a new generation of customers – the Millennials (Generation Y). Regarding the definition of the age group, we relied on the methodology of Young (2017) from the company Ogilvy & Mather. Millennials are referred to as "Generation Y" - people aged 20-36.

Table 1: Age distribution of consumers by generations

C	Centennials (2001-2009)
Y	Millennials (1984-2000)
X	Generation X (1964-1983)
S	Generation S (1963 and earlier)

The research sample consisted of 824 respondents, of which 180 (21.84%) were men and 644 (78.16%) were women. The average age for the whole sample was 24.73 years, for men it was 25.01 years and for women 24.64 years. The reason for this disparity is the fact that women take part in research more frequently than men. Given that the selection was based on availability and voluntariness, the disparity was not “corrected”.

Results

In Table 2 it can be seen that respondents aged 20 to 36 shop online rarely - based on the median value (several times every six months).

Table 2: Descriptive statistics for the item "How often do you shop online?“

Variable	Mean	Median	Modus	Standard deviation	Minimum	Maximum
Frequency of shopping	2,75	3	3	0,674	1	4

Respondents were also asked about the frequency of shopping for selected items. The following Table 3 shows the absolute and relative numbers of replies to the items concerning the purchase of these items.

Table 3: Frequency of shopping for selected items

Variable	Very often		Seldom		Rarely		Never	
Auto-moto	3	0.36%	31	3.76%	151	18.33%	**639**	**77.55%**
Travel tickets	162	19.66%	**239**	**29.00%**	231	28.03%	192	23.30%
Electronics	19	2.31%	249	30.22%	**394**	**47.82%**	162	19.66%
Music (CD / DVD)	25	3.03%	71	8.62%	171	20.75%	**557**	**67.60%**
Food/ groceries	64	7.77%	101	12.26%	144	17.48%	**515**	**62.50%**
Cosmetics / perfumes	78	9.47%	**309**	**37.50%**	252	30.58%	185	22.45%
Books	57	6.92%	**295**	**35.80%**	277	33.62%	195	23.67%
Medicine	23	2.79%	150	18.20%	165	20.02%	**486**	**58.98%**

Lottery / betting	17	2.06%	32	3.88%	90	10.92%	**685**	**83.13%**
Clothing / jewellery	155	18.81%	**372**	**45.15%**	200	24.27%	97	11.77%
PC (hardware / software	15	1.82%	76	9.22%	223	27.06%	**510**	**61.89%**
Insurance	7	0.85%	76	9.22%	257	31.19%	**484**	**58.74%**
Services (cinema, vacation, ...)	118	14.32%	**330**	**40.05%**	274	33.25%	102	12.38%
Sports equipment	39	4.73%	187	22.69%	282	34.22%	**316**	**38.35%**
Furnishings of an apartment / house	45	5.46%	223	27.06%	**345**	**41.87%**	211	25.61%

This item is further described in Table 4. It was found that none of the listed items is bought by respondents at least once every 2 days (very often). Based on the average value, the median, it can be stated that the least frequently purchased items are lottery, auto-moto, music, PC and insurance. On the other hand, the most frequently bought items are clothes and jewellery, services such as cinema tickets, holidays or cultural events tickets, travel tickets and cosmetics and perfumes. The lowest variability, i.e. the difference in responses, was found for the items auto-moto, lottery and betting. On the contrary, we recorded the highest variability in items like travel tickets, food and groceries, cosmetics and perfumes.

Table 4: Descriptive statistics on the frequency of shopping for selected items

Variable	Mean	Median	Modus	Standard deviation	Minimum	Maximum
Auto-moto	4,73	5	5	0,542	2	5
Travel tickets	3,55	4	3	1,050	2	5
Electronics	3,85	4	4	0,754	2	5
Music (CD / DVD)	4,53	5	5	0,777	2	5
Food/ groceries	4,35	5	5	0,969	2	5
Cosmetics / perfumes	3,66	4	3	0,929	2	5
Books	3,74	4	3	0,897	2	5
Medicine	4,35	5	5	0,872	2	5
Lottery / betting	4,75	5	5	0,624	2	5
Clothing / jewellery	3,29	3	3	0,905	2	5
PC (hardware / software	4,49	5	5	0,738	2	5
Insurance	4,48	5	5	0,697	2	5
Services (cinema, vacation, ...)	3,44	3	3	0,884	2	5
Sports equipment	4,06	4	5	0,893	2	5
Furnishings of an apartment / house	3,88	4	4	0,855	2	5

With regard to the selected items, the mutual relations of items were calculated using Spearman's coefficient. The values in Table 5 marked in red were statistically insignificant at the significance level $\alpha = 0.05$. On the other hand, the darker the colour of the cell, the higher the relationship. It can be seen that the items “Electronics” and “PC (hardware / software)” (rs = 0.42); “Sports equipment” and “apartment and house furnishings” (rs = 0.33); “Cosmetics / perfumes” and “clothing / jewellery” (rs = 0.31); “PC (hardware / software)” and “insurance” (rs = 0,31) matched the most.

Table 5: Matches with regard to the frequency of shopping for selected items

	Auto	CL	El	CD	Food	Cosm.	Books	Medicine	Lott.	Cloth	PC	Insur	Serv	Sport	Furn
Aut	1,00	-0,02	0,19	0,15	0,03	0,01	0,05	0,07	0,19	-0,04	0,28	0,19	0,01	0,16	0,15
CL		1,00	0,14	0,05	0,04	0,00	0,03	0,02	0,07	0,08	0,11	0,13	0,19	0,10	-0,01
El			1,00	0,28	0,05	0,10	0,19	0,16	0,04	0,04	0,42	0,20	0,22	0,25	0,26
CD				1,00	0,09	0,12	0,20	0,17	0,11	0,07	0,27	0,23	0,15	0,20	0,15
Aut					1,00	0,15	0,09	0,13	-0,01	0,09	0,04	0,11	0,08	0,11	0,13
Cosm						1,00	0,19	0,30	0,10	0,31	0,00	0,09	0,16	0,18	0,26
Book							1,00	0,23	0,02	0,10	0,14	0,11	0,19	0,20	0,27
Med								1,00	0,20	0,13	0,17	0,21	0,09	0,20	0,22
Lot									1,00	-0,01	0,18	0,20	0,03	0,10	0,01
Clot										1,00	-0,04	-0,01	0,17	0,21	0,19
PC											1,00	0,31	0,11	0,21	0,15
Poi												1,00	0,15	0,22	0,16
Serv													1,00	0,30	0,20
Spor														1,00	0,33
Furn															1,00

The remaining items of the questionnaire focused on respondents' agreement or disagreement (uncertainty) with the claims concerning online shopping. Descriptive statistics of responses of 824 respondents is given in Table 6.

Table 6: Descriptive statistics for items 8 – 30

Variable	Mean	Median	Modus	Modus frequency	Standard deviation
A8	5,40	6	7	271	1,52
A9	5,18	5	6	207	1,36
A10	3,66	4	2	182	1,66
A11	3,51	3	2	191	1,63
A12	4,42	4	4	220	1,59
A13	4,25	4	5	168	1,75
A14	3,14	3	1	175	1,72
A15	4,01	4	4	189	1,72
A16	4,59	5	5	192	1,58
A17	3,58	4	4	174	1,73
A18	4,00	4	4	201	1,61
A19	4,90	5	5	181	1,57
A20	4,16	4	4	215	1,69
A21	5,21	5	7	193	1,45
A22	4,34	4	4	188	1,64
A23	4,29	4	5	177	1,73
A24	3,86	4	4	172	1,73
A25	4,19	4	5	176	1,69
A26	4,29	4	4	184	1,63
A27	4,43	5	5	193	1,66
A28	3,50	3	3	169	1,68
A29	3,69	4	4	222	1,68
A30	3,63	4	4	264	1,44

Conclusion

E-commerce is a fast-growing segment that is a common part of today's businesses with information and communication technologies in its core. Today, online stores make it easier and faster to do business. As e-commerce allows for direct sales to customers, it is easier to buy goods from the comfort of home. E-commerce covers a range of technologies, the use of which leads to increased efficiency of business relationships.

Based on our research, it can be stated that the least frequently purchased items are lottery, auto-moto, music, PC and insurance. On the other hand, the most frequently bought are clothes and jewellery, services such as cinema tickets, holidays or cultural events tickets, travel tickets and cosmetics and perfumes. The lowest variability, i.e. the difference in the partial responses, was found for the items auto-moto, lottery and betting. On the contrary, we recorded the highest variability in items travel tickets, food and groceries, cosmetics and perfumes. The items "Electronics" and "PC (hardware / software)" (rs = 0.42); "Sports equipment" and "apartment and house furnishings" (rs = 0.33); "Cosmetics / perfumes" and "clothing / jewellery" (rs = 0.31); "PC (hardware / software)" and "insurance" (rs = 0,31) matched the most.

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Cyber Threat Intelligence for Zero-day Attacks from Dark and Surface Web using Machine Learning

Asaduz ZAMAN
Federation University Australia, a.zaman@federation.edu.au

Joarder KAMRUZZAMAN
Federation University Australia, joarder.kamruzzaman@federation.edu.au

Gour KARMAKAR
Federation University Australia, gour.karmakar@federation.edu.au

Abstract

In parallel to our growing online presence in recent years, zero-day cyberthreats have also become more commonplace and causing a considerable amount of financial damage each year. To protect the end-users from zero-day cyberthreats, it is imperative to provide them with the timely and actionable cyberthreat information. In this work, our approach is building a model to identify cyberthreats for zero-day attacks using heterogeneous information sources, including the dark web. For model building, we investigated three different feature extraction techniques to evaluate their effect on classifying zero-day cyberthreat information using different classifiers. Experimental results reveal that the use of relevant dark web data in model training significantly improves its performance to identify zero-day threats irrespective of the feature extraction technique used while TF-IDF based extraction yields better results than word or sentence based feature extraction in our case. We demonstrated that this approach is equally benefiting for extracting threat intelligence from multilingual surface web data. Our results are validated using two different performance metrics using four different classifiers.

Keywords: zero-day attack, cyberthreat identification, dark web, surface web.

Introduction

Over recent years, cyberthreats have become the most challenging aspect of our IT infrastructure surrounded life-style. Especially so when our online presence is growing due to various reasons including COVID-19 pandemic situation and businesses are becoming increasingly dependent on cloud computing. Recent technological advancements have enabled malicious hackers to commit cybercrimes on an immense scale. The sheer volume of cybercrimes in recent years has made it prohibitively difficult to prevent them with traditional measures. Zero-day attacks, in particular, are some of the most challenging cyberattacks to tackle due to their nature of the attack. Zero-day attacks are defined as the attacks that exploit publicly unknown vulnerabilities of a system, and no signature of the attack exists. Since the exploited vulnerabilities are unknown and the exposed systems have almost no way of knowing that the attack is underway, traditional measures including anti-virus programs and network security devices fall short of preventing such attacks. Therefore, there has been a shift in zero-day and related cyberthreat research in recent years toward proactive cyberthreat intelligence (CTI) gathering from various sources, including the dark web (Almukaynizi et al., 2017, Du et al., 2018, Nunes et al., 2018).

The dark web is defined as the hidden portion of the whole web only accessible through special means such as The Onion Router (TOR) network. Because it is challenging for law enforcement to track down dark web users, especially the darknet marketplaces (DNMs), it fosters a multitude of illegal activities such as buying and selling illegal products including hacking services, drugs, pornography, weapons. The darknet forums (DNFs) and internet relay chats (IRCs) on the other hand are the places where the malicious actors share information, which often includes sharing vulnerability information and elaborate hacking tutorials for hacker newbies.

It is imperative to understand and analyse the threat landscape from both the dark web and the surface web (i.e., regular web) to protect end-users from the growing risk of cyberthreats from zero-day attacks by providing timely and actionable cyberthreat intelligence. However, gathering practical and actionable cyberthreat intelligence from heterogeneous sources is a non-trivial task. Classifying whether the content is security-sensitive or not is imperative for further processing of the said content for extracting cyberthreat intelligence from them.

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Techniques in the literature for zero-day identification use either surface web, or dark web information hence has limited success. The efficacy of using both surface and dark web information for zero-day identification has been hardly explored. In this work, we propose a technique to identify such attacks by leveraging the information from the dark web in addition to the surface web. Figure 1 presents a schematic diagram of our proposed approach. We acquired several datasets from both dark web and surface web for cyberthreat identification related to zero-day attacks. Since feature extraction from textual data is the most dominant step for any text classification problem which ultimately impacts our threat identification method, we compare three different feature extraction techniques, namely, word embedding, sentence embedding, and term frequency-inverse frequency (TF-IDF) techniques to assess the most effective one. We used the extracted features to train four machine learning-based text classification models, including two deep learning models. Finally, we compared the trained models' ability to classify zero-day events temporally separated from the training datasets. Moreover, we analysed the performance of each model for their ability to classifying from multilingual contents.

Specifically, the contributions of this work include,

1. For identifying zero-day and non-English cyberthreats, enhancing model performance using both dark and surface web data during training,
2. Investigating the performance of word embedding and sentence embedding techniques for textual feature extraction, along with deep learning models, for zero-days related cyberthreat identification,
3. The efficacy of the proposed approach has been validated with extensive experiments.

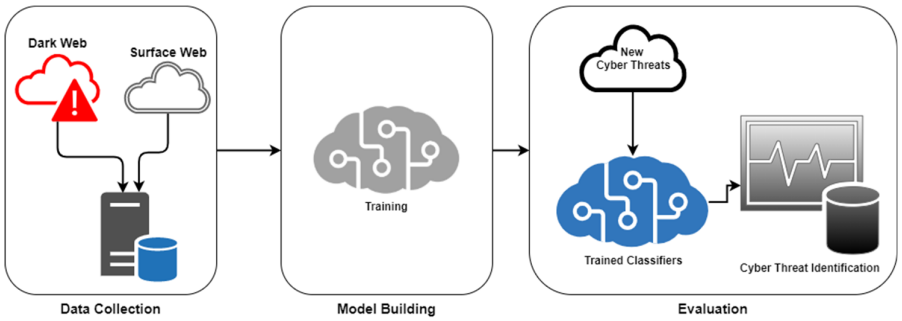

Figure 1: Combining both dark web and surface web for robust cyber threat identification model

Related Works

Since cyberthreats appear as text excerpt, cyberthreat identification from external sources is characteristically a text classification problem. In recent years, there have been considerable improvements in text classification, primarily because of the latest advancements of deep learning algorithms in natural language processing areas. Nowadays, text classification is extensively used in many different areas, including sentiment analysis, spam filtering, and topic detection. However, it is inherently more challenging than other classification domains because of the difficulties in semantic interpretation of text content. For this reason, different approaches for text feature extraction have been evolved, such as Bag of Words (BoW), Term Frequency-Inverse Document Frequency (TF-IDF), word embedding, and sentence embedding. BoW and TF-IDF (Jones, 1972, Salton and Buckley, 1988, Zhang et al., 2011) are two of the most prominent traditional approaches for feature extraction. However, these techniques do not fully consider the semantic information from the text. Moreover, they usually produce a huge vector representation from the text with very sparse information. Word embedding technique (Bengio et al., 2003, Mikolov et al., 2013), on the other hand, preserves semantic meanings of textual words and produces reasonably short and dense vector representation. However, word embedding can not represent the semantic meaning of the words in terms of the sentence structure, which has driven the invention of sentence embedding (Cer et al., 2018), another short and dense text feature extraction technique. There exist some techniques that have used BoW (Al Nabki et al., 2017, Almukaynizi et al., 2017), TF-IDF (Al Nabki et al., 2017, He et al., 2019, Nunes et al., 2018) for at-risk system identification and illegal activities classification from the dark web. However, to our knowledge, word and sentence embedding has not been exhaustively investigated for external cyberthreat.

Applying textual features, machine learning approaches such as Support Vector Machine (SVM), Naive Bayes (NB), Logistic Regression (Log-Reg), Random Forest (RF), and Decision Trees (DT) have been extensively used for text

classification (Joachims, 1998, Manevitz and Yousef, 2001, McCallum and Nigam, 1998). Despite their simplicity, they often demonstrate superior performance for many text classification problems. These classification models also have been used extensively in dark web content classification (Al Nabki et al., 2017, Almukaynizi et al., 2017, Ghosh et al., 2017, He et al., 2019, Nunes et al., 2018, Sabbah et al., 2016). Since text classification is a difficult problem, recently, deep neural networks based models such as long short term memory (LSTM) networks (Li et al., 2018, Liu and Guo, 2019) and convolution neural networks (CNNs) (Kim, 2014, LeCun et al., 1998, Zhang et al., 2015) have gained much attention in this area. Moreover, it requires further study to evaluate the performance of these deep learning algorithms in external threat identification.

Since the dark web is a good source of cyberthreat information, there have been several studies for cyberthreat identification using dark web dataset only (Al Nabki et al., 2017, Ghosh et al., 2017, He et al., 2019, Nunes et al., 2018, Sabbah et al., 2016). Since the dark web dataset is not sufficient to identify all types of cyberthreats, Almukaynizi et al. (Almukaynizi et al., 2017) used several datasets including data from National Vulnerability Database (NVD), Zero Day Initiative (ZDI), and ExploitDB in addition to the data from the dark web. Even though NVD, ZDI, and ExploitDB are collected from the surface web, the researchers did not consider all sources of surface web information.

To bridge the research gaps identified in this literature review, the effective zero-day and multilingual threat identification requires the consideration of all relevant footprints left in cyberspace, which demands to build learning models using both surface web and dark web datasets and evaluate the performance of these models for multilingual threats such as Chinese, Farsi, French, German, Hebrew, Russian, as well as zero-day events.

Feature Extraction and Model Building

To address the research issues identified in Sec. 2, we need to leverage the features extracted from different techniques and build learning models considering the state-of-the-art machine learning algorithms. The popular and emerging feature extraction techniques and machine learning models we investigated are described in Secs. 3.1 and 3.2, respectively.

Feature Extraction Techniques

Term Frequency-Inverse Document Frequency (TF-IDF): TF-IDF is the combination of counting frequency of each term in a single document, and inverse document frequency which is calculated by counting the appearance of that term in other documents of the whole corpus (Jones, 1972). TF-IDF provides higher scores to terms which are significant in a single document but not very common in the whole corpus. For example, the term "news" could be found many times in a single document which indicates that it is a significant term for that document. However, it is quite likely that the same term will appear in all of the documents, which makes it very common, thus not providing any value for classification. Therefore, the TD-IDF score will be very low for this term.

No semantic information is preserved in the TF-IDF process (Kowsari et al., 2019); however, it prioritizes unique and vital terms which makes TF-IDF very efficient in document classification problems (Zhang et al., 2015). One limitation of DF-IDF is that the resultant vector is very sparse, and hence the method is not a very good fit for the deep neural network which prefers dense information.

Word Embedding: Word embedding techniques provide a distributed representation of words in a document while maintaining the relationship with semantically neighbouring words (Bengio et al., 2003, Mikolov et al., 2013). The embedding model used in feature extraction, which is a neural network model with several hidden layers, is trained on an extensive corpus in an unsupervised setting to represent semantically similar words closer to each other. The pre-trained embedders can be used for transfer learning settings as well, a significant strength of this technique over TF-IDF feature extraction. For our study, we have used a pre-trained neural-net language model (NNLM) (Bengio et al., 2003) with three hidden layers originally trained on English Google News 200B corpus, which provides a 128-dimensional vector for each of the words. For the given sentence or paragraph, the resultant representation vector is the weighted sum divided by the square root of the sum of the squares of the weights.

Sentence Embedding: Although word embedding techniques preserve semantic information of the words, the representation of a sentence in word embedding is not straightforward. Sentence embedding techniques try to solve this issue by embedding the whole sentence. Although sentence embedding techniques are a very recent addition to feature extraction arsenals, it has proved to be effective in various text classification problems. In this study, we have used pre-trained universal sentence encoder based on deep averaging network (DAN) (Cer et al., 2018) for sentence embedding, which provides a 512-dimensional vector for each of the entries.

Model Building

In our literature review, we found that the most popular and effective classification models for text classification are SVM, RF, LSTM, and CNN, which we decided to investigate further for zero-day cyberthreat identification. These models are described in this section.

Support Vector Machine (SVM): SVM models try to maximize the margin, which is defined as the smallest perpendicular difference between the decision boundary and the data points, where the decision boundary is placed between the negative and positive samples. For this reason, SVM performs better for binary classification problems (Manevitz and Yousef, 2001). We have used radial basis function (RBF) as our kernel function. The regularization parameter C is set to 1.0 and gamma (of RBF function) is set to scale where it calculates the value based on the number of the features and variance of the training samples.

Random Forest (RF): Random forest classifiers use ensemble technique by training several decision-tree classifiers on different sub-sample of the whole training dataset. The final classification outcome is provided as the average of the outcomes of all decision trees (Ho, 1995). Since they use ensemble technique and decision trees, they usually provide better performance for a small and medium-size dataset. In this work, we have used 100 decision trees to build our random forest classifier.

Long Short Term Memory (LSTM): LSTM (Hochreiter and Schmidhuber, 1997) networks have proved to be very efficient in learning temporal dependencies in sequential data, which made them useful in text classification problems as well because the words in a sentence have a temporal relationship with each other. In contrast to recurrent neural networks (RNN) for time series analysis where the network suffers from vanishing gradients problem for longer sequences, the LSTM networks apply long term short memory technique by using forget gates along with input and output gates to solve the issue. In this work, we have used one bidirectional layer with 64 LSTM cells for text classification.

Convolution Neural Network (CNN): Although 2-D and 3-D CNN networks are the most efficient algorithm for image processing tasks, especially for object recognition (Krizhevsky et al., 2017), 1-D CNN architectures, on the other hand, appear to be effective for text classification problems (LeCun et al., 1998). In 1-D CNN architecture, the convolution layers can learn local features from the text. In this research project, we have used two convolution layers with filter-size of 256 and 128 respectively along with 1x3 kernel size for each filter.

Experimental Setup

Datasets

Dark Web (DW) Dataset: Finding a proper DW dataset for zero-day attack related CTI analysis is extremely difficult due to lack of publicly available dataset. Furthermore, the datasets that are available on request from other DW research groups often lack relevance because of misaligned research interest between groups. On the other hand, collecting DW data directly from the dark web provides better control over the relevance and quality of the data. However, it is often not feasible since it takes a considerable amount of resources both in terms of time and computation power. Moreover, the inherent risks associated with traversing dark web often outweighs the gains acquired.

For our purpose, we used the dataset collected by Po-Yi Du et al. (Du et al., 2018) which has been shared to the research community through AZSecure Hacker Access Portal (http://www.azsecure-hap.com). The dataset contains i) DNFs, ii) IRCs, iii) DNMs, and iv) Carding Shops data scraped from various sites on the dark web using automated HTML crawlers. In this work, we have used DNF and DNM datasets which includes 1,749,572 DNF entries from 8 forums spanning Jun 1, 2002, to Apr 12, 2020, and 253,353 DNM entries from 12 marketplaces spanning Apr 1, 2015, to Jan 1, 2018. In line with the observation of Po-Yi Du et al., we found that most of the entries are drugs-related. However, since this dataset does not include the ground truths, we had to define our ground truth for the dataset. For this work, we set labels based on the mention of common vulnerabilities and exposures (CVE) ids in an entry. MITRE Corporation (MITRE) assigns the CVE ids for the publicly known vulnerabilities as they emerge. Since the mention of CVE id in a specific format on the dark web is an excellent indicator that the entry is related to that particular vulnerability exploitation in some way most of the time, we decided to use this information as the positive/negative indicator. We dropped the CVE mentions from both training and testing dataset to discourage the models from making predictions based on the presence of this information. After data pre-processing and cleaning, we got 6,177 positive entries for cyberattacks from the total 2,002,925 entries, which is 0.31\% of the whole dataset.

The final balanced dataset for our experiment included all of the 6,177 positive entries and randomly selected 6,177 negative entries from the whole dataset.

Surface Web (SW) Dataset: In addition to DW dataset, we also trained our classification models on SW dataset. The resources to collect information from the surface web for cyberthreat identification information is very much non-exhaustive. However, we focused specifically on the dataset collected from Reddit, a community based online discussion forum for almost all of the topics found on the internet, for our SW dataset. There are several subreddit communities in which the discussion is limited on cybersecurity and zero-day attacks (e.g. r/cybersecurity). We searched Reddit submissions from 1st Jan 2015 to 10th Sep 2020 for specific keywords and subsequently labelled them based on CVE mentions. From the timeline, as mentioned earlier, we extracted 1,525 positive entries and randomly selected 1,525 negative entries found using different non-security-relevant keywords from the same timeline. *Table 1* describes both DW and SW datasets.

Table 1: Training and Test Dataset Description

	Training (80%)	Test (20%)	Total
Dark Web	9,171	2,293	11,464
Surface Web	2,440	610	3,050
Combined	11,611	2,903	14,514

Multilingual and Zero-day Events Test Data: Although several non-English entries can be found in our DW dataset from Russian and French languages, positive entries from the DW dataset did not include any non-English content, that is why we decided to discard non-English contents from the negative samples as well. However, to evaluate the robustness of trained models, we decided to collect and evaluate performance on zero-days events and multilingual information from Chinese, Farsi, French, German, Hebrew and Russian language. We used Google News API for searching non-English entries on the surface web, especially from the news article published around the world and translated them to English using Google Translate API. The translation is required since the classification models were trained exclusively on English language contents. In addition to multilingual test data, we collected several zero-day events form the same data source. We defined zero-day events based on the publication date of the data. In this work, we have used 9th September 2020 as the cut-off date, since our SW training dataset does not include anything after the date and the DW dataset cut-off date is further back in time. Our multilingual test data contains a total of 933 entries, and the zero-days test set has 377 entries.

Data Preprocessing

We have applied several standard and situation-specific text pre-processing routines which includes removing any non-ASCII characters, lowercase conversion, removing URLs, removing PGP key blocks from DW entries, expanding contraptions, removing stopwords based on English lexicon, and removing CVE-ids. For sentence embedding, we did not remove stopwords to retain sentence structures as much as possible.

We have used three different feature extraction techniques to compare their effectiveness for our use-case. For TF-IDF feature extraction, we have used TF-IDF vectorization with a max features of 10K, which returned 10,000-dimensional vectors for each of the entries. We utilized transfer learning approach for our word embedding and sentence embedding techniques for feature extraction. Tensorflow Hub is used for accessing trained and ready to use models. For word embedding, we have used the neural-net language model (NNLM) (Bengio et al., 2003) with three hidden layers originally trained on English Google News 200B corpus, which provides a 128-dimensional vector for each of the entries. The universal sentence encoder based on deep averaging network (DAN) (Cer et al., 2018) is used for sentence embedding, which provides a 512-dimensional vector for each of the entries.

Performance Matrices

The following metrics have been used to evaluate the efficacy of our proposed approach.

$$\text{F1} - \text{score} = 2 \times \frac{\text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

$$\text{Precision} = \frac{\text{TP}}{\text{TP} + \text{FP}} \times 100\%$$

$$\text{Recall} = \frac{\text{TP}}{\text{TP} + \text{FN}} \times 100\%$$

$$\text{G} - \text{mean} = \sqrt{\text{Specificity} \times \text{Sensitivity}}$$

$$\text{Specificity} = \frac{\text{TN}}{\text{TN} + \text{FP}}$$

$$\text{Sensitivity} = \frac{\text{TP}}{\text{TP} + \text{FN}}$$

where TP is the number of positive entries identified as positive, TN is the number of negative entries identified as negative, FP is the number of negative entries identified as positive, and FN is the number of positive entries identified as negative. We have used both F1-score and G-mean for reporting performance.

Result Analysis

The most intriguing insight we found from our F1-score and G-mean score analysis is that the addition of dark-web training dataset dramatically influences the performance of almost all of the classification models, which can be seen in *Table 2* and *Table 3* where models trained on DW dataset and Combined dataset always outperformed the models trained on SW dataset.

Table 2: Effect of using Dark Web dataset for classification models: Zero-days test set

	F1 Score			G-mean Score		
	SW Model	**DW Model**	**Combined Model**	**SW Model**	**DW Model**	**Combined Model**
Word	0.7145	0.6847	0.7588	0.7746	0.7320	0.8126
Sentence	0.9449	0.7617	0.9050	0.9517	0.7923	0.9367
TF-IDF	0.9686	0.8779	0.9878	0.9726	0.8953	0.9930

Table 3: Effect of using Dark Web dataset for classification models: Multilingual test set

	F1 Score			G-mean Score		
	SW Model	**DW Model**	**Combined Model**	**SW Model**	**DW Model**	**Combined Model**
Word	0.8145	0.7439	0.8315	0.8041	0.6787	0.8208
Sentence	0.9521	0.8085	0.8841	0.9569	0.7496	0.8854
TF-IDF	0.9491	0.8826	0.9561	0.9577	0.8734	0.9647

Table 4: Performance comparison of classification models over all feature extraction techniques

	F1 Score				G-mean Score			
Test Data	**LSTM**	**CNN**	**RF**	**SVM**	**LSTM**	**CNN**	**RF**	**SVM**
Zero-days	0.8374	0.8174	0.8782	0.8465	0.8547	0.8525	0.9109	0.8756
Multilingual	0.8488	0.8489	0.9064	0.8724	0.8182	0.8294	0.9106	0.8601

Note that, the DW model in *Table 2* and *Table 3* was trained on dark web dataset only, but tested on assessing identification of zero-day attacks on surface web data. The idea here is that, since more cyber criminal activities are noticed and planned in the dark web much ahead than their actual executions on the surface web targeting everyday and corporate users, a model built on the information extracted from the dark web will be equipped with the required knowledge to predict any impending zero-day attack on real users. This is demonstrated through the much better performance by the models trained with DW and combined datasets, irrespective of the text feature extraction methods used, namely, word, sentence and TF-IDF based methods. Although there is a particular bias regarding the size of our dark web and surface web training dataset, the fact that the performance was solely reported on data collected from the surface web should overcome the bias.

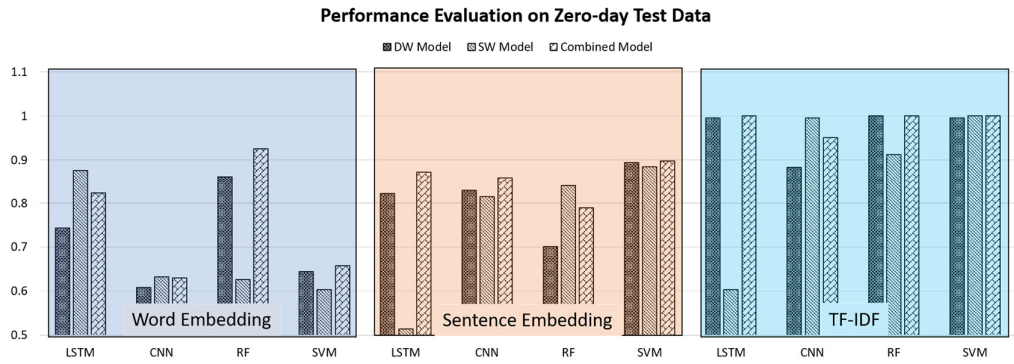

Figure 2: Performance evaluation on Zero-days test data (F1-score)

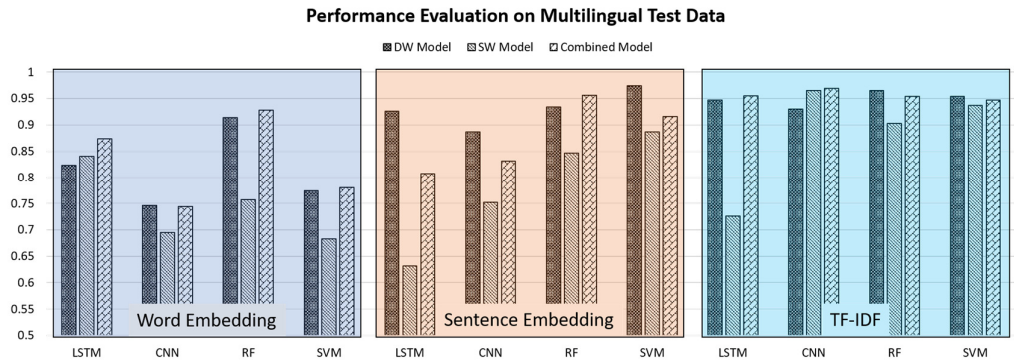

Figure 3: Performance evaluation on multilingual test data (F1-score)

Figure *2* and **Figure *3*** demonstrate the at-a-glance performance of the trained models on zero-day test data and multilingual test data, respectively, using three different extraction techniques mentioned in Section 3.1. The DW models, SW models and Combined models are trained on dark web dataset, surface web dataset, and their combined dataset respectively. From three different feature extraction techniques we employed, it is evident that the TF-IDF features helped the models best to learn the data distribution, which is also demonstrated in *Table 2* and *Table 3* where TF-IDF showed better performance in almost all of the cases for both zero-day test set and multilingual test set for both F1-score and G-mean score analysis. The TF-IDF feature extraction technique uses the current dataset to extract the most relevant features for the classifiers, enabling it to capture the context and characteristics of the dataset it deals. On the other hand, word embedding and sentence embedding techniques are pre-trained on a much larger global corpus which however fails to perform as expected on a smaller dataset of specialized nature which in this case is CTI.

Additionally, sentence embedding performed much better than word embedding for most of the cases both in G-mean score analysis and F1-score analysis. One of the major limitation in word and sentence embedding techniques are representing and retaining semantic information over the whole paragraph and for the whole document (Kowsari et al., 2019). The average number of words in each of the entries for the training dataset, multilingual test set, and zero-days test set are 171.86, 244.32, and 233.09 words respectively. The word embedding technique averages them as described in Sec. 3.1.2 to produce a 128-dimensional vector. On the other hand, the average number of sentences in each of the entries for the training dataset, multilingual test set, and zero-days test set are 27.41, 52.55, and 54.98 sentences respectively. Therefore, it appears that, in this specific case, word embedding techniques lose more information than sentence embedding techniques for representing and maintaining the semantic meaning of the words and sentences for each entry.

Our investigation on classification models' performance on cyberthreat identification problem reveals that the traditional statistical approaches such as RF and SVM, despite their simplicity, perform better than deep neural network models in most of the cases as shown in *Table 4*. Since both LSTM and CNN has proved to be very efficient in text classification problems over the traditional statistical approaches in various reports over time (Kim, 2014, LeCun et al., 1998, Li et al., 2018, Liu and Guo, 2019, Zhang et al., 2015), we think that they are not as effective in

our case mostly since the dataset used for training and testing these models are small compared to what is expected by them. Although it was possible to carefully tune the hyper-parameters for the neural network models for better performance, the statistical approaches could easily attain better performance with our datasets.

Conclusion

In this study, we investigated the influence of feature extraction techniques and text classification models for cyberthreat identification using the dark web and surface web data. We conclude that the TF-IDF feature extraction technique works better than the latest word embedding and sentence embedding techniques for our case, which features a small and situation-specific dataset. Additionally, despite their simplicity, statistical approaches such as SVM and RF works better than neural network models on problems where the size of the available dataset is much smaller such as cyberthreat identification problem.

Moreover, the dark web training dataset has the potential to add valuable insight for cyberthreat identification problems, especially for zero-day events. In some cases, the models trained on the dark web dataset alone outperformed the surface web trained models, especially for the case of multilingual test data. Particularly, we believe that the addition of dark web training dataset in cyberthreat identification problem could help build more robust models for zero-day attack identification since the zero-day attacks are discussed on the dark web long before the attacks become commonplace in the surface web.

There are some limitations in this study too. We did not collect the dark web dataset by ourself, which limited our ability to collect cyberthreat-specific contents from suitable dark web locations. The problem is evident in our dark web dataset, which has more than 2 million negative samples while only 6 thousand positive samples. In addition to that, our training dataset size for the surface web is smaller compared to our dark web training dataset. Gathering quality data from the dark web is extremely challenging because of the security concerns and resource limitation. Therefore, our current focus is on collecting a better and larger surface web dataset from various locations, including multilingual contents. We also would like to point out that increasing the dataset size could potentially alter the outcome of this study in favour of word and sentence embedding. We would like to experiment on a larger dataset to explore this point in near future.

Despite its limitations, this study provides some valuable insights, as discussed above. Considering the fact that the cyberthreat related research, especially zero-day threat identification using heterogeneous information sources, is a less explored area, we hope that this work would help the broader research community.

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A Flexible Load Flow Algorithm with Network Topology Reconfiguration for Radial and Meshed Distribution Systems Based on Power Summation Approach

Yassine MALIARI and Ahmed ABBOU

Equipe de recherche en énergie électrique et commande (EREE&C), Mohammadia School of Engineers, Mohammed V University, Rabat, Morocco
[1]maliari.elec@gmail.com abbou@emi.ac.ma

Abstract

This paper presents a load flow algorithm based on power summation principle, for meshed and radial low and medium voltage distribution networks, based on adaptation of the power summation approach for an on-line use, flexible with network topology reconfiguration. The proposed load flow analysis is based on the use of only linear formulation, based on power summation principle, the proposed load flow algorithm is easy to implement for passive and active distribution networks.

Keywords: Meshed distribution system; Radial distribution system; Load Flow; Power flow summation; Distributed generation; Voltage control; renewable energy.

Introduction

Distribution systems are usually designed as mesh networks, but operate as radial networks, it consists of two switches known as sectionalize switches and tie switches, due to system load balancing, service restoration, real power loss reduction, maintenance activities or voltage profile improvement, the network topology may be changed for several times in the same day.

Power flow is an important tool used in transmission network for power generating planning, the most important load flow methods existing in transmission system are: Gauss-Siedel method, Newton-Raphson method and Fast Decoupled method, for an optimum scheduling between generation plant and exchange of power.

Existing distribution networks load flow algorithms are based on the backward/forward sweep method obtained from the development of two matrices: Bus Injection to Bus Current (BIBC) and Bus Current to Bus Voltage (BCBV), from the topological structure of the network, and from the improvement of the Jacobien-based methods, such as Newton-Raphson, Gauss-Seidel and fast-decoupled methods, however, the computational time of the Jacobien-based methods is large [1][2].

Exiting load flow algorithms for distribution systems are developed from the conductors network characteristics, however, they does not take in consideration the changes in the network topology.

In this paper, we contribute a improvement of power summation based load flow methods, by ensuring an online use, and get flexible with networks topology changes. The proposed method is an iterative procedure based on power summation approach with the only use of Kirchhoff's formulation. From a dynamic data of system, a preliminary calculation is made to organize the radial distribution information. After the organization of the system data information into a suitable model. Voltages of all other nodes are set to the nominal voltage, and an iterative process start by calculating currents of branches using the Kirchhoff's current law, and the node voltages are updating using the voltage drop calculation, this backward and forward sweep are repeated until voltage magnitudes at each node in present iteration and previous iteration is lower than a tolerance limit. An IEEE 33-bus radial distribution system is taken as a study system for performing the test of the proposed method, the results shown are compared with three existing load flow methods presented in [3]: Primitive Impedance based Distribution Load Flow (PIDLF), Current Injections based Distribution Load Flow (CIM) and Fast Decoupled Single Matrix Model Distribution Load Flow (SMM).

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The main contributions of this paper is presenting a simple load flow method to implement, flexible with the network topology changes, the reducing flow calculation is obtained by ensuring an only use of simple algebraic expressions without any trigonometric functions or matrix calculation. The proposed load flow method is valid for meshed and radial distribution system with or without distributed generations, and it's flexible for the network reconfiguration.

In what follows, we present an overview of the existing load flow algorithms in section II. Next in Section III we provide existing control systems in the current medium distribution networks, for smart metering and supervisory control and data acquisition of the network, in section IV we discuss the results obtained from a 33-bus test system, and the comparison of the results with other existing load flow methods. Section V concludes this paper.

Overview of existing load flow algorithms

The most used power flow methods are: Gauss-Siedel method, Newton-Raphson method and Fast Decoupled method. The first step in performing those load flow analysis is the construction of the Y-bus admittance matrix using the transmission line and transformer input data.

The Gauss-Seidel load flow uses an iterative method based on Gauss equation, the Newton-Raphson is based on the expanding in Taylor's series about the initial estimate the active and reactive power formulation, the terms are limited to the first approximation of the equations. The Fast Decoupled Power Flow Method is one of the improved methods, which is based on a simplification of the Newton-Raphson method, the convergence is geometric.

A common procedure of the three methods, adopted for analysing power flow in a power system is discussed in the pseudo-code shown in Fig.1 [3].

```
# Start
# Construction of the Ybus Matrix
# Make an estimate of the voltage plan
# Substitute the old values into power equations for the next iteration
# Obtain the new value
# compare the new value with Old value
# If (New value – Old value) < specified tolerance; then end otherwise go to step 4.
```

Fig. 1: Pseudo-code procedure for analyzing load flow in a power system

But distribution system in North Africa are characterized by a high R/X rations and a strongly radial structure, which leads to ill-conditioned matrices and poor convergence characteristics of those load flow methods.

The problems have been revealed in a number of papers, where the classic transmission methods were not appropriate to solve practical problems presented when analysing distribution systems [4].

Several works had been presented in the scientific literature; the methods used can be divided into two principal categories: Methods based on the amelioration and adaptation of transmission methods such as fast-decoupled, and others are based on power summation method.

In what follow we constrate on the devellopement based on the power summation and the exploration of the radial structure of distribution network in North Africa.

The power summation method may be described in the following steps [5]:

Calculate the current injection at each busbar x using Eq 1:

$$I_x^{(k)} = \left(S_x / V_x^{(k)} \right)^* \quad x = 1,2,\ldots,n \tag{1}$$

Where Si is the power injection at node i, V(k)I is the voltage of node i calculated from iteration k.

- Start from an estimate of the voltage plan: 1 p.u.

- Go from the last busbar of each branch to the HV/MV substation busbar of each branch (backward path), use the estimated voltage values to estimate the branch current : Starting from the last ordered branch, with a direct application of Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) [6], current Jx,x+1 in branch from the node x to the node "x+1" is calculated using Eq 2:

$$J_{x,x+1}^{(k)} = -I_x + \sum J_x \tag{2}$$

Where Ix is the current injection of node i calculated from step1, $\sum J_x$are the currents in branches emanating from node "x".

- Go from the leaves to the HV/MV substation busbar to the last busbar of each branch (Forward path), use the branch current values to evaluate a new voltage magnitude using equ3:

$$V_x^{(k)} = V_{x-1}^{(k)} - Z_x J_x^{(k)} \ , x = 2,3 \ldots., n \tag{3}$$

Where Z_x is the series impedance of branch 'x-1,x"

- Go back to step3.

The algorithms converge when all voltage magnitudes calculated in present iteration and previous iteration remain between a pre-established tolerance.

$$\max\left(\left[V^{(k+1)}\right] - \left[V^{(k)}\right]\right) < \varepsilon \tag{4}$$

Advantages of the power summation method: based on the exploration of the network tree structure to calculate the desired variables, it is not necessary, as newton-raphson or Fact Decoupled algorithms, to store and factorize any matrix.

The power summation method needs two principal information:

- The active and reactive power of each network node, which can be provided by digital meter, and be collected by the smart metering infrastructure.
- Electrical characteristics between the sending and the receiving node of each branches, which can be provided by the technical characteristics of each cables and lines used, the topology modification can be detected by the medium voltage remote control or manually by the operator who applied the modification.

Existing Control Systems Used in the Current Distribution Networks

The needed information for power summation method can be provided by digital meter installed at consumers, utilities should equip the public busbar with digital meter to provide the active and reactive of all the network nodes

Those measurements could be collected by an advanced meter infrastructure, already exiting in several medium voltage networks and reassembled in a Load-Data table:

TABLE 1: LOAD-DATA TABLE

Node	KVA	KVAr
…	…	…
…	…	…
…	…	…

From a table with all electrical characteristics of each network, obtained from the electrical characteristics of each conductors used, and organized as shown in table 2.

TABLE 2: Line-Data table

Sending node	Receiving node	R (Ohm)	X (Ohm)
…	…	…	…
…	…	…	…
…	…	…	…

The network topology is not constant, the network topology may be changed for several several reasons, as discussed in the introduction section, however, any change in the topology structure can be detected manually or by the existing SCADA, installed at HV/MV substations, and used as medium voltage network remote control system.

A flexible load flow algorithm with network topology reconfigurations, can be obtained as shown in fig 2.

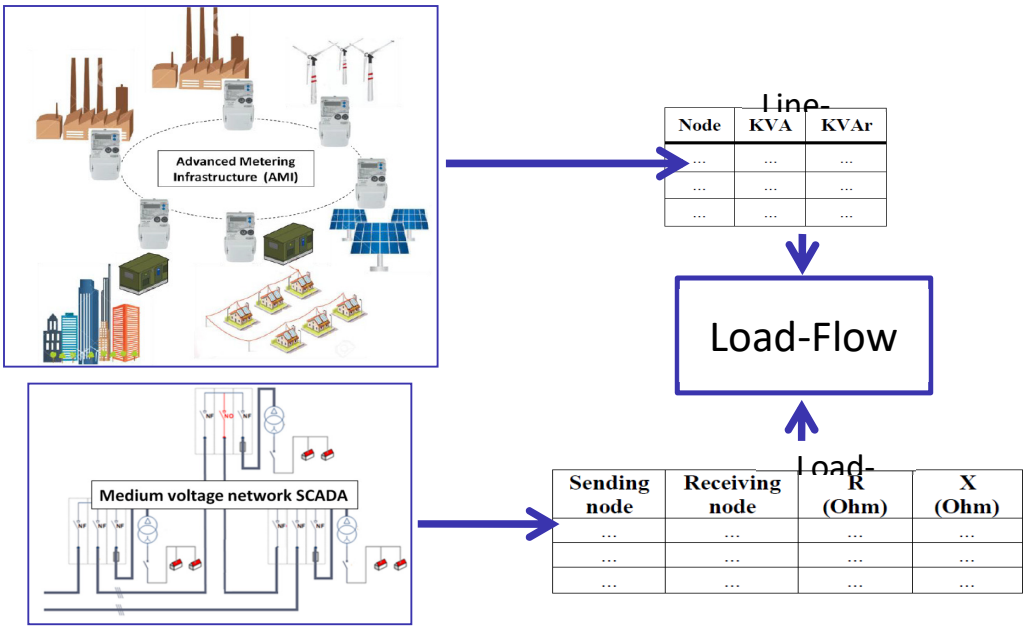

Fig. 2: Schematic of the flexible load flow principale

Algorithm Development

Let's take a simple network as shown in fig-3 to illustrate the methodology chosen to develop a network analysis method.

Current injections and relationship between the bus current injections and branch current can be obtained by applying Kirchhoff's current law (KCL) to the distribution network. The branch currents can then be formulated as functions of equivalent current injections.

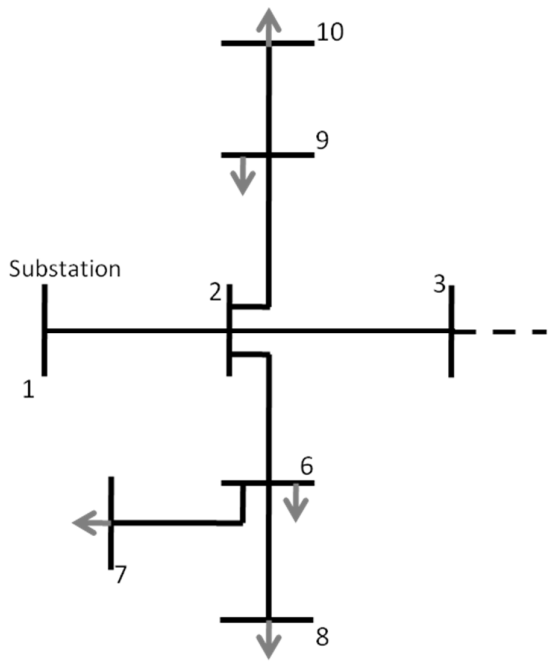

Fig. 3: Single line diagram of the proposed distribution network

For example the currents branch 1; 2; 3 and x can be expressed as:

$$J_{x,x+1}^{(k)} = I_x + \sum J_x \tag{5.1}$$

$$J_1 = I_2 + I_3 + I_4 + I_5 + I_6 + I_7 \tag{5.2}$$

$$J_3 = I_5 + I_6 \tag{5.3}$$

$$J_5 = I_6 \tag{5.4}$$

Therefore the relationship between the branch current and injections or consumptions currents can be expressed as:

$$\begin{bmatrix} J_1 \\ J_2 \\ J_3 \\ J_4 \\ J_5 \\ J_6 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} I_2 \\ I_3 \\ I_4 \\ I_5 \\ I_6 \\ I_7 \end{bmatrix} \tag{6.1}$$

$$[J] = [BIBC] \times [I] \tag{6.2}$$

The voltage magnitude of each node can be obtained as follows:

$$V_2 = V_1 - J_1 Z_{12} \tag{7.1}$$

$$V_3 = V_2 - J_2 Z_{23} \tag{7.2}$$

$$V_7 = V_2 - J_6 Z_{26} \tag{7.3}$$

Zxy are the line impedance between node x and node y. From the equations (6) and (7), we can obtain:

$$V_7 = V_1 - J_1Z_{12} - J_2Z_{23} - J_6Z_{26} \tag{8}$$

The equation (8) shows that the voltage magnitude of each node can be expressed as a function of injections or consumptions currents, line parameters and the root busbar voltage. therefore the relationship between branch currents and bus voltages can be expressed as:

$$\begin{bmatrix} V_1 \\ V_1 \\ V_1 \\ V_1 \\ V_1 \\ V_1 \end{bmatrix} - \begin{bmatrix} V_2 \\ V_3 \\ V_4 \\ V_5 \\ V_6 \\ V_7 \end{bmatrix} = \begin{bmatrix} Z_{12} & 0_{00} & 0_{00} & 0_{00} & 0_{00} & 0_{00} \\ Z_{12} & Z_{23} & 0_{00} & 0_{00} & 0_{00} & 0_{00} \\ Z_{12} & 0_{00} & Z_{34} & 0_{00} & 0_{00} & 0_{00} \\ Z_{12} & 0_{00} & Z_{34} & Z_{45} & 0_{00} & 0_{00} \\ Z_{12} & 0_{00} & Z_{34} & 0_{00} & Z_{56} & 0_{00} \\ Z_{12} & 0_{00} & 0_{00} & 0_{00} & 0_{00} & Z_{67} \end{bmatrix} \begin{bmatrix} J_1 \\ J_2 \\ J_3 \\ J_4 \\ J_5 \\ J_6 \end{bmatrix}$$

$$[\Delta V] = [BCBV] \times [J] \tag{9.2}$$

The two matrices BIBC and BCBV depend on the topological structure of the network. Combining equation (6.2) and (9.2), the relationship between injections or consumptions current injections and bus voltages magnitudes can be expressed as:

$$[\Delta V] = [BCBV][BIBC][I] = [DLF][I] \tag{10}$$

DLF is a multiplication matrix of BCBV and BIBC matrices

After preparing the BIBC and BCBV matrices, the voltages of all nodes are set to the nominal voltage "1p.u", as an initial value, an iterative procedure based start:

After the calculation of a [V(k)]
The new value of current injection is calculated by :

$$I_i^{(k)} = \left(S_i / V_i^{(k)} \right)^* \tag{11}$$

The $\Delta V^{(k+1)}$ is:

$$\left[\Delta V^{(k+1)}\right] = [DLF] \times \left[I^{(k)}\right] \tag{12}$$

And the new value of voltage is obtained by equ 13:

$$\left[V^{(k+1)}\right] = [V^0] + \left[\Delta V^{(k+1)}\right] \tag{13}$$

These two steps of computing the current injection, and updating voltage value are repeated until voltage magnitudes at each node in present iteration and previous iteration is lower than a tolerance limit ε.

$$\max\left(\left[V^{(k+1)}\right] - \left[V^{(k)}\right]\right) < \varepsilon \tag{14}$$

Case Study

The proposed mathematic method is tested in this section with a medium voltage network of 33 bus, as shown in fig 4, the topology characteristics of the network is presented in table 1 [4], the topology structure of the IEEE 33-bus is shown in fig 4

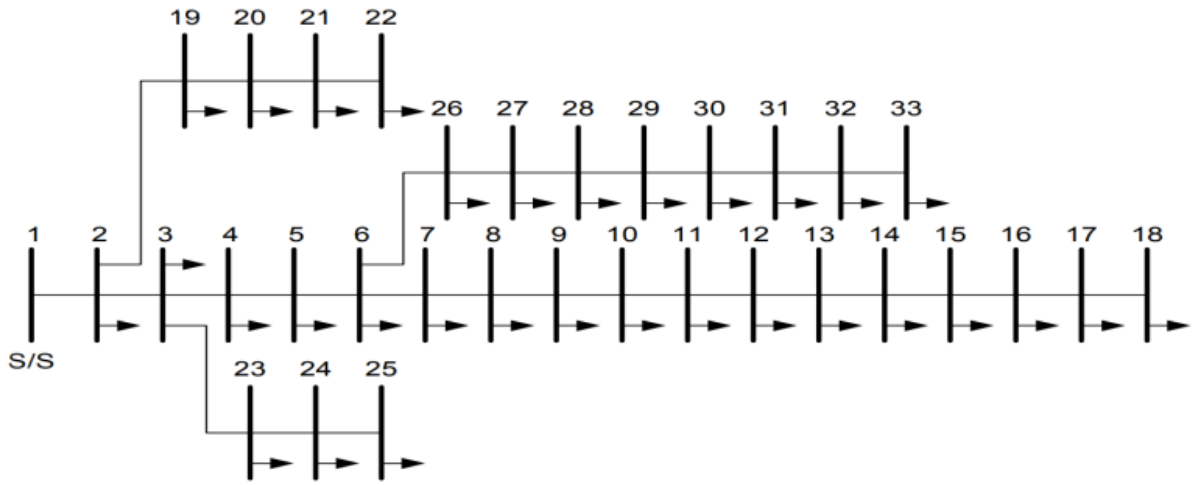

Fig. 4: Single phase diagram of IEEE 33-bus distribution system

From a Line Data, that indicates the resistance and reactance of each branches and the topology structure of the network, the iterative steps as shown in section 3.

TABLE 3: IEEE 33-bus network characteristics

Branch number	Sending bus	Receiving bus	R	X	P	Q
1	1	2	0.0922	0.047	100	60
2	2	3	0.493	0.2511	90	40
3	3	4	0.366	0.1844	120	80
4	4	5	0.3811	0.1941	60	30
5	5	6	0.819	0.707	60	20
6	6	7	0.1872	0.6188	200	100
7	7	8	0.7114	0.2351	200	100
8	8	9	1.03	0.74	60	20
9	9	10	1.044	0.74	60	20
10	10	11	0.1966	0.065	0	0
11	11	12	0.3744	0.1238	60	35
12	12	13	1.468	1.155	60	35
13	13	14	0.5416	0.7129	120	80
14	14	15	0.591	0.526	60	10
15	15	16	0.7463	0.545	60	20
16	16	17	1.289	1.721	60	20
17	17	18	0.732	0.574	90	40
18	2	19	0.164	0.1565	90	40
19	19	20	1.5402	1.3554	90	40
20	20	21	0.4095	0.4784	0	0
21	21	22	0.7089	0.9373	90	40
22	3	23	0.4512	0.3083	90	50
23	23	24	0.898	0.7091	420	200
24	24	25	0.896	0.7011	420	200
25	6	26	0.203	0.1034	60	25
26	26	27	0.2842	0.1447	60	25
27	27	28	1.059	0.9337	60	20
28	28	29	0.8042	0.7006	120	70
29	29	30	0.5075	0.2585	200	600
30	30	31	0.9744	0.963	150	70
31	31	32	0.3105	0.3619	210	100
32	32	33	0.341	0.5302	60	40

The results obtained are compared with the three existing load flow methods presented: Primitive Impedance based Distribution Load Flow (PIDLF), Current Injections based Distribution Load Flow (CIM) and Fast Decoupled Single Matrix Model Distribution Load Flow (SMM).

The results of the proposed load flow and Primitive Impedance based Distribution Load Flow (PIDLF), Current Injections based Distribution Load Flow (CIM) and Fast Decoupled Single Matrix Model Distribution Load Flow (SMM), are resumed in table 4.

TABLE 4: Comparison of the load flow results obtained by the power summation method and CIM, PIDLF and SMMM

Node	CIM	PIDLF	SMM	Proposed method		Node	CIM	PIDLF	SMM	Proposed method
1	1	1	1	1		18	0.9131	0.910813	0.91218	0.913062
2	0.99702	0.994529	0.99602	0.996982		19	0.99649	0.994002	0.9955	0.996455
3	0.98293	0.98047	0.98194	0.982889		20	0.99292	0.990434	0.99192	0.992879
4	0.97545	0.973007	0.97447	0.975410		21	0.99221	0.98973	0.99122	0.992173
5	0.96805	0.965628	0.96708	0.968012		22	0.99157	0.989095	0.99058	0.991534
6	0.94965	0.947273	0.9487	0.949613		23	0.97934	0.976893	0.97836	0.979303
7	0.94616	0.943797	0.94522	0.946127		24	0.97267	0.970238	0.9717	0.972634
8	0.94132	0.938964	0.94038	0.941284		25	0.96935	0.966922	0.96838	0.969311
9	0.93505	0.93271	0.93411	0.935012		26	0.94772	0.945349	0.94677	0.947683
10	0.92925	0.926927	0.92832	0.929214		27	0.94515	0.942791	0.94421	0.945117
11	0.92839	0.926069	0.92746	0.928354		28	0.93371	0.93138	0.93278	0.933677
12	0.92689	0.924574	0.92596	0.926854		29	0.9255	0.923182	0.92457	0.925462
13	0.92078	0.918475	0.91986	0.920744		30	0.92194	0.919634	0.92102	0.921905
14	0.91851	0.916215	0.91759	0.918475		31	0.91778	0.915483	0.91686	0.917744
15	0.9171	0.914805	0.91618	0.917063		32	0.91686	0.91457	0.91595	0.916828
16	0.91573	0.913442	0.91482	0.915698		33	0.91658	0.914287	0.91566	0.916544
17	0.9137	0.911419	0.91279	0.913668						

Comparison of the computational performance of the proposed approach with other methods is presented in Table5.

TABLE 5: Comparison of the performance of the proposed approach.

	CIM	PIDLF	SMM	Proposed method
IEEE 33-bus	5	7	4	4

In Fig 5, a graphical representation is given for the voltage magnitude of the IEEE-33 bus.

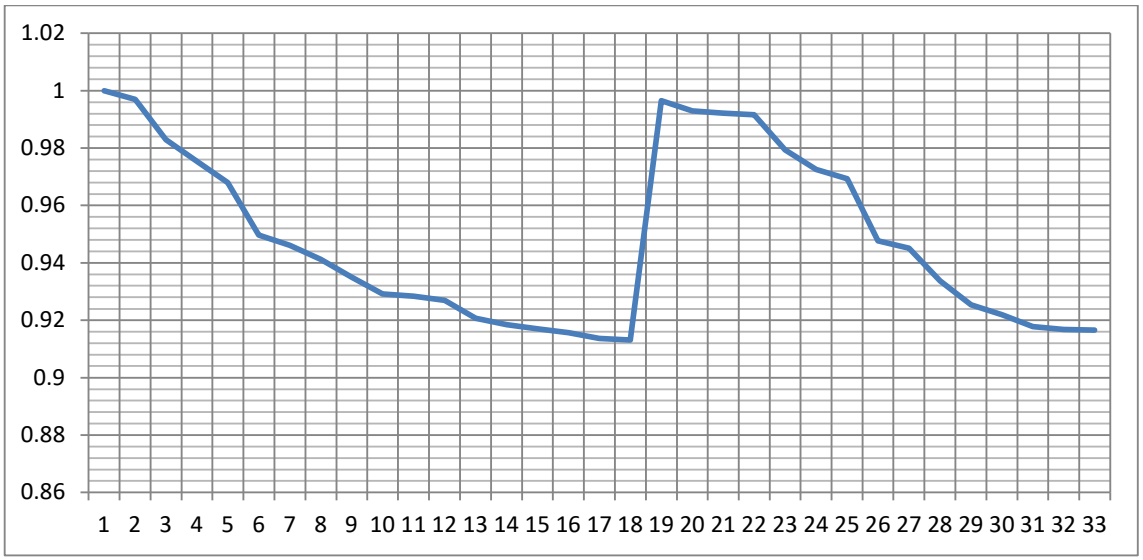

Fig. 5: Voltage magnitude of IEEE 33-bus system

Conclusions

In this paper, a load flow program based on power summation concept, is used to solve load flow problems in meshed and radial distribution systems, flexible with network topology reconfiguration.

The proposed Load flow method is easy to implement in passif and actif distribution networks, a Load-Data can be obtained and updated by the Advanced Metering Infrastructure (AMI), already existing and used for conusmers connected to the medium voltage distribution network, the needed Data of others loads can be obtained by eqquipping MV/LV substation by digital meters, and connect them to the Advanced Metering Infrastructure network. The Line-Data can be established by collecting the impedance of all the branches constituting the network, any change in the topology structure can be detected manually or by the existing SCADA, at HV/MV substations, and used as medium voltage network remote control system.

The proposed method can be exploited in several distribution network applications: Voltage control, demand side management, energy demand management.

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Tax Planning of The Enterprise and Analysis of Its Efficiency in The Context of Tax Management

Ruslana K. SHURPENKOVA
Banking University, Lviv, Ukraine
E-mail: ruslana.shurpenkova@gmail.com

Volodymyr V. STYBEL
Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, Lviv, Ukraine
E-mail: vstybel@ukr.net

Oksana M. SARAHMAN
Banking University, Lviv, Ukraine
E-mail: sarahman88@ukr.net

Tetyana V. KALAITAN
Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, Lviv, Ukraine
E-mail: kalaitantv@gmail.com

Liubov I. HALKIV
Lviv Polytechnic National University Lviv, Ukraine
E-mail: lubov.i.halkiv@lpnu.ua

Oleh Ya. HRYMAK
Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, Lviv, Ukraine
E-mail: grumo@i.ua

Myroslava V. VOVK
Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, Lviv, Ukraine
E-mail: mirkavovk21@gmail.com

Abstract

The purpose of this article is to develop new and improve existing theoretical foundations and practical measures to implement the tax planning system at the enterprise, taking into account the analysis of its efficiency. The problems of taxation and the direction of its influence on the efficiency of financial and economic activity of enterprises are one of the most actual issues of modern Ukrainian financial management. From the point of view of taxation, the whole process of activity of business entities is characterized by the emergence and change of tax relations. It is necessary to predict the appearance of such tax relations in order to influence them, even before carrying out the respective business operations. Tax planning reduces the uncertainty of the future tax expenditures of economic entities and the degree of their adaptation to an aggressive environment. That is why the peculiarities of the taxation process, its importance for the economy of the country as a whole and for each taxpayer in particular, make it necessary to distinguish the tax payment management system into an independent branch of financial management and a separate scientific and practical direction of economic thought in Ukraine.

Keywords: Tax Planning, Enterprise, Tax Management.

Introduction

Issues tax and taxation have a significant place in the research of economists, philosophers and politicians. From the first definitions of the place and role of the state in taxation, made by the founders of the classical school of political economy (William Petty (1623-1687) - "Treatise of Taxes and Contributions", Adam Smith (1723-1790) - section "The four basic rules of tax" from "An Inquiry into the Nature and Causes of the Wealth of Nations", David Ricardo

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(1772-1823) - "On the Principles of Political Economy and Taxation" and others), attempts were made to define the principles of effective and just taxation.

According to Atamanenko and Shurpenkova (2010), Nepesov (2011) the modern organization of tax planning at Ukrainian enterprises, in addition to its narrow-minded focus on reducing tax revenues, differs from the adopted standards by the excessively high role of enterprise accounting in the field of planning and some indifference of economic and financial services. The last one either do not participate in the planning of tax payments, or collect statistical information, moreover, after the fact.

Thus, the planning of tax payments by enterprises in the modern period of development can become one of the most important and useful functions of enterprise management, which, unfortunately, does not yet have the proper theoretical validity, and in practice is applied purely for the purpose of reducing tax payments to the budget, without taking into account the existing functional relationships in the internal organizational structure of the enterprise, it is haphazard in nature, designates Apressova (2008). All of the above again emphasizes the relevance of the topic of this work.

Encyclopedic Banking Dictionary Fedorov (1995) provides the following definition of tax planning: "minimizing the tax burden through financial planning, including deferred investments, the purchase of non-taxable securities, and the use of various tax warehouses". Dictionary of Business and Economics Terms by Friedman (2012) defines tax planning as a systematic analysis of different tax alternatives aimed at minimizing tax liabilities in the current and future periods. How (together or separately) to report when to sell assets and pay retirement benefits, when to receive income and pay expenses, when and to what extent to make gifts and buy real estate are all examples of tax planning.

Thus, both foreign and domestic researchers under tax planning understand, above all, activities aimed at reducing tax payments. The proposed definitions consider the meaning of tax planning from a purely limited perspective, perceiving it through the prism of confrontation of the taxpayer on the one hand, and the fiscal authorities on the other. At the same time, tax planning aims not only and not so much to reduce the tax deductions of the enterprise, although the optimization of the tax portfolio is its most important function, how much to become a regulator, together with the planning of marketing and production, the process of enterprise management.

The theoretical and practical aspects of tax planning at the enterprise are devoted to the work of many economists. Thus, the article on Armstrong et al (2019) is devoted to studying the strategic response of tax planning the authors of this work note that firms respond to changes in their industry-competitors' tax planning by changing their own tax planning in the same direction.

Chen et al (2019) research how does quasi-indexer ownership affect corporate tax planning. Authors conclude that higher quasi-indexer ownership leads to greater tax saving. So, Cooper and Nguyen, (2019) developed a new theoretical framework that analyses the interactions of motivations and opportunities in multinational enterprises' tax planning strategy. This study provides new insights detailing why and how companies plan their tax. Work of Niu et al (2019) is dedicated the study of the features of tax planning when selling to a competitor in a low-tax developing market.

Bradshaw et al (2019) investigates tax planning issues in enterprises where the state is the main shareholder. Scientists note that tax evasion at such enterprises is much lower. In the article by Ylönen and Laine (2015) discusses tax planning mechanisms for a multinational company that uses transfer pricing to achieve significant tax savings. Höglund, and Sundvik (2016) in their study conclude that outsourcing accounting tasks improves the corporate quality of tax reporting. According to scientists, firms with an internalized accounting function are more active tax planners.

The issues of global cooperation of the largest world states in the field of tax administration were studied by Lips (2018). The role of tax planning in market assessments of corporate social responsibility has been studied by Ling. and Wahab (2018). This study examines tax planning activities for their direct, mediating and moderating roles. The authors conclude that tax planning to moderate the companies' market valuations of social corporate responsibility positively.

Wahab and Holland (2012) notes that tax planning services are the largest source of fee and commission income for UK accounting firms. Authors suggest to use the Effective Tax Rate reconciliations to examine sub-categories of tax planning activities. The influence of the uncertain tax system on the application of the principle of "Aggressive tax planning" in an article by Alm (2014). Main conclusion is that there is much in theory to suggest that uncertainty leads to more use of "Aggressive tax planning", especially when both individual and group motivations are considered. Yaroshevych et al (2019) investigated the scheme of legal reduction of tax payments of companies through the use of a simplified system of taxation of small businesses.

Shevlin et al (2019) consider the impact of corporate tax policy on future macroeconomic growth. *Scientist*s propose an alternative tax rate measure that aggregates cash effective tax rates of researched firms, which reflect not only statutory tax rates, but also other features of the tax code, enforcement, and firms' tax planning. Blaufus, Möhlmann and Schwäbe (2019) explores the state-owned corporate tax strategy news stock exchange.

Laplante, et al (2019) investigate a tax avoidance strategy where firms use the ambiguity inherent in tax reporting to classify indirect costs as research and development (R&D) expenditures to take advantage of the R&D tax credit. Chaudhry et al (2017) examined the effect of the funding status of defined benefit pension plans on company tax avoidance behavior. The article by Kern (2012) examined the tax planning, research, policy and financial statement implications of tax credits via financial reporting income tax disclosures. The work of Marques et al (2011) is devoted to the study of the features of tax planning in Portugal in the context of enterprise profit management.

Thomas Neubig and Sacha (2018) investigate the strategy for tax evasion related to intellectual property and claim that it had resulted in biased measures of trade, GDP, and productivity. Gerasimova and Redin (2015) offer a system of indicators for analyzing the financial stability of the company. The system includes indicators of the quality of management, including tax management.

Summarizing the consideration of different classifications of tax planning, it should be noted that different authors, appealing to approximately the same concepts, interpret them differently. Moreover, the analysis of the economic literature has shown that the types, forms, methods and functions of management are generally defined in the same way, and in tax planning research, which is part of financial management, the same concept is given a different meaning. Obviously, this provision is due to the fact that in the study of general issues of tax planning, the authors abstracted from the basic conceptual concepts of management and planning theory.

Regulation

The main sphere of tax regulation is the economic sphere of society: the incentives and sanctions that attract the inflow of capital and labor to one or another type of economic activity, or, on the contrary, create obstacles to the development of unwanted economic trends. However, must be considered, that the impact of the size of the tax burden and tax rules are also being tested by the political and social spheres.

In all cases, the levying of a tax is considered by each individual as an "encroachment" on its welfare by the state. It is natural that taxpayers of all countries and at all times have been concerned and continue to be concerned about the reduction of fiscal obligations. People have long tried to reduce unnecessary, in their view, fiscal obligations). The psychological basis for law abiding citizens (taxpayers) is their justice - if a person thinks that the law is fair, then he or she respects it, if he / she believes that the law is unjust, then he / she looks for ways of circumventing norms avoid sanctions for its non-compliance.

The microeconomic aspect of calculating the "burden of taxation" involves the problem of the distribution of the tax burden between different social groups and between individual enterprises or groups of homogeneous enterprises, that is, industries (Shurpenkova, 2020). In turn, the distribution of the tax burden by social groups and industries are considered through the lens of the idea of fairness in taxation (Zakharov, 2010). Modern tax researchers believe that the tax system of the state is the most striking manifestation of the correlation of class and group interests, social forces, their struggles and compromises.

Tax Planning and Tax Optimization

Tax planning

Tax planning should be considered as one of the main functions of financial management. Tax expenditures are not intended to generate profit by definition.Taxes are withdrawn by irrevocably and are individually gratuitous, i.e. the organization, in a narrow sense, will not receive on these payments any counter benefits. In other words, it can be argued that the tax planning is one of the basic tools of generating performance indicators of functioning of the enterprise, since the calculation of the performance indicators of functioning of the enterprise without taking into account the tax consequences seems very reckless and irrational (Babanin, 2004). In addition, tax planning is able to become not only one of the most valuable and promising tools that are in the manager's arsenal, it already has a

profound impact on investment policy, on both macro and microeconomic level. Formation of tax planning is shown in figure (Fig. 1).

Tax Planning:

- Search of the most expedient variant of economic activity in terms of its tax consequences;

A pproving of optimized tax plan in the system of general economic planning and appointment of responsible persons for its observance;

- Permanent monitoring of external factors that may affect the results of the enterprise (change of tax legislation, new interpretation of certain norms of tax legislation by state authorities, court practice, economic and political situation in the country and in the world);

Calculation of current tax payments:

- To determine the amounts of tax liabilities based on the results of economic activity for the current tax period;

- Preparing a schedule of repayment of certain current tax payments;

- Monitoring the correctness of amounts of tax liabilities and the timeliness of their repayment.

Budgeting of tax payments:

- Determination of tax liabilities for future tax periods on the basis of interrelated budgets and business plans;

- Control over the implementation of the planned calculations. If the actual results of taxation are rejected from the planned, identifying the reasons for such deviations and adjustment of plans or economic transactions for the future;

Fig.1: Formation of tax planning

Notes: compiled on the basis (Ivanov et al, 2006)

It is worth noting that the budgeting of tax payments includes the calculation of current tax payments, and tax planning includes budgeting of tax payments. That is, there is accumulation of functions carried out by employees of the company from the basic and mandatory calculation of taxes to the special, in order to optimize taxation.

It should be noted that tax planning could be viewed as an element of the controlling system. Practical experience in business management in various areas confirms the effectiveness of the controlling system (Kalaitan, 2018; Kalaitan et al, 2019). According to Barulin and Barulina (2015), the implementation of tax controlling is due to the fact that the efficiency of tax management requires a coordinating system for managing the tax flows of firms. Unfortunately, the tax controlling methodology has not yet received the proper level of development both abroad and in Ukrainian practice.

Tax Optimization

Typically, the term «tax optimization» means the activities implemented by the taxpayer in order to reduce tax payments. There is a widespread belief, that the optimization is carried out only for the purpose of maximizing legal tax cuts. In this case, it is often called «tax minimization». At the same time, in practice, the minimum payments are not always optimal. For example, a company allocated from a general mass by too small tax payments is risking to draw the attention of the relevant authorities, and it is fraught with additional costs for this company (Gavrilenko et al, 2013).

The purpose of tax optimization is not to reduce any tax as such, but to increase all financial resources of the enterprise. Optimization of the tax policy of the enterprise allows to avoid tax overpayments at any given moment of time. In the conditions of high tax rates, improper or insufficient consideration of the tax factor may lead to very

unfavorable consequences or even cause the bankruptcy of the enterprise. The situation when the enterprise pays taxes formally following the letter of law, without binding to the peculiarities of its own business, is occurring less often in Ukraine (Zherebylo et al, 2019).

Reduction of tax payments only at first glance leads to an increase in the size of profit of the enterprise. It is possible that the reduction of one tax will lead to an increase in others, as well as to financial sanctions by regulatory authorities. Therefore, the most effective way to increase profitability is not the mechanical reduction of taxes, but the construction of an effective enterprise management system (Grachev, 2010).

There are three ways to reduce tax payments in international economic practice: 1) tax evasion, 2) tax avoidance and 3) tax planning (Bryzgalin et al, 2006; Ivashko, 2013). Tax evasion is an illegal way of reducing tax liabilities for tax payments. There is no legal option to evade taxes. Tax avoidance – it is minimizing tax liability by lawful use of conflicts and shortcomings in regulatory legislation; the taxpayer fully discloses his accounting and reporting information to the tax authorities. Both of these latter methods (2-d and 3-d), from a legal point of view, do not imply a violation of the legitimate interests of the budget. However, tax avoidance carries additional risks associated with the enormous difficulty of litigation with tax authorities. According to Dubrovsky and Cherkashin (2017) Ukrainian practice at the present stage is characterized by the following main features of the use of tax avoidance tools: 1) the structure of the economy, 2) the specifics of large "oligarchic" business, 3) attractive for small businesses simplified taxation system.

There is no clear line in the literature that separates tax planning from tax evasion. Therefore, it would be appropriate to apply the following criteria by which tax planning can be distinguished from tax avoidance (Kabanov, 2009):

- Tax planning operates in well-known categories, when the expected result can be determined with varying degrees of certainty.
- Tax planning is related to compliance with payment schedules, ensuring future tax payments with sufficient cash resources
- The concept of tax avoidance applies only to individual transactions or their related groups.

However, due to the ambiguity of the legal provisions, the line between planning and evasion can sometimes be blurred. Keeping of this limit while remaining within the law is a must-have task for effective tax planning.

Organization Analysis of Efficiency Tax Planning

The tax planning system envisages the development of a tax plan that covers a set of measures of operational, tactical and strategic levels of tax optimization. Assessing the effectiveness of the tax planning system is the final stage of tax planning. And it is an indicator of the effectiveness of all measures taken to optimize taxation. Elements of this stage are:

- comparison of actual data with planned indicators, determination of the magnitudes of deviations, identification and analysis of their causes, establishment of maximum permissible amounts of deviations (determination of the accuracy of tax planning);
- development of a system of indicators that allow to determine the effectiveness of the applied methods and ways of tax planning, as well as their degree of effect on the effective financial characteristics of the organization (determining the effectiveness of tax planning);
- adjusting the current tax planning system, making decisions on abandoning ineffective methods and developing new ones.

One of the common causes of deviation from the plan in practice is making an unplanned decision or abandoning an earlier one. The task of tax planning in this case is to minimize decisions that are not processed from the point of view of taxation, prompt analysis of changes and adjustments to the plan.

Analysis of the reasons for deviations of actual indicators from the planned ones makes it possible to:

- adjust medium- and long-term plans;
- take into account the identified internal shortcomings in the preparation of new plans;
- improve the planning and management system in the organization;

- to create a database of statistics characterizing the degree of influence of objective external factors on the magnitude of deviations.

Therefore, in order to check the effectiveness of the tax optimization measures, it is necessary to analyze the effectiveness of tax planning. Organizational forms of analysis of the effectiveness of tax planning at the enterprise are determined by its size and branch affiliation, Small businesses with a small number of employees and an industry-wide structure can involve a CFO, a chief accountant, or use the services of a specialist audit or consulting firm to perform the analysis. At large enterprises with an extensive structure, the analysis of the effectiveness of tax planning can be carried out by a special unit that is engaged in economic analysis.

The quality of the analysis of the effectiveness of tax planning depends on the systematic conduct of it. In this regard, all the economic analysis work should be planned at each enterprise. Comprehensive and thematic plans are drawn up for this. A comprehensive plan for analyzing the effectiveness of tax planning is compiled annually and includes a list of individual case studies and a calendar schedule for their implementation. When conducting an analysis of the effectiveness of tax planning, there are steps that are presented in table 1.

Table 1: Stages of tax planning effectiveness analysis*

Stage	Stage content
I stage	Identify the objects, goals and objectives of the analysis
II stage	Development of synthetic and analytical indicators
III stage	Collection and preparation of necessary information, verification of its accuracy, completeness and quality
IV stage	Metering and comparing results with current year target, past year data, and industry average
V stage	The calculation of the influence of factors on the overall indicators
VI stage	Identifying unused reserves to improve tax optimization efficiency.
VII stage	Summarizing the results of the analysis, assessing the effectiveness of tax planning, developing proposals and recommendations

**Notes: compiled on the basis (Pashenko, 2013; Kovalchuk. 2012)*

Particularly important in the analysis is a system of indicators that allows to comprehensively characterize the effectiveness of tax planning at the enterprise. The effectiveness of tax planning is determined by a series of coefficients, the general scheme of which calculates the ratio of the aggregate tax costs or their individual components to sales, cost or profit. Indicators can be calculated both in part of the unit and in percent.

The performance of tax planning can be divided into the following groups (Adamyk, O. V., 2005). Group I - indicators that allow you to get a general characterization of the effectiveness of methods and schemes selected by the company. Group II - indicators that characterize the part of tax payment groups, for example, in product prices and profits. Group III - indicators of the effectiveness of the use of tax benefits. The formulas for calculating the coefficients of each group are presented in Table 2.

Table 2: The coefficient of efficiency of tax planning at the enterprise*

Indicators	Formula for calculation
I group	
The coefficient of tax burden	$C_{tb}=\frac{The\ amount\ of\ taxes\ and\ contributions\ accrued}{Net\ profit\ calculated\ according\ to\ accounting}\times 100\%$
The coefficient of the tax effect	$C_{te}=\frac{Net\ profit}{Accrued\ taxes\ without\ PIT}\times 100\%$
The coefficient of efficiency of taxation	$C_{et}=\frac{Planned\ net\ profit}{The\ total\ amount\ of\ tax\ payments}\times 100\%$
The coefficient of the rationality of the tax policy	$C_{rtp}=\frac{The\ cost\ of\ forming\ and\ implementing\ tax\ policy}{The\ size\ of\ the\ economic\ effect}\times 100\%$
II group	
The coefficient of taxation sold products	

	$C_{tsp}=\frac{The\ amount\ of\ tax\ payments}{Volume\ of\ sold\ products}\times 100\%$
The coefficient of taxation of prices	$C_{tp}=\frac{The\ amount\ of\ taxes\ included\ in\ the\ price}{The\ price\ of\ products}\times 100\%$
The coefficient of taxation of profit	$C_{top}=\frac{The\ amount\ of\ taxes\ paid\ on\ gross\ income}{The\ amount\ of\ gross\ profit}\times 100\%$
The coefficient of taxation of income	$C_{ti}=\frac{Taxes\ included\ in\ the\ price\ of\ products}{Sales\ revenue\ (excluding\ indirect\ taxes)}\times 100\%$
The coefficient of taxation of expenses	$C_{te}=\frac{Taxes\ included\ in\ the\ cost\ of\ production}{Cost\ of\ products\ sold}\times 100\%$
III group	
The coefficient of preferential taxation	$C_{pt}=\frac{Tax\ savings\ resulting\ from\ the\ use\ of\ tax\ benefits}{The\ amount\ of\ tax\ liabilities\ excluding\ benefits}\times 100\%$
The coefficient of effectiveness application of privileges	$C_{eap}=\frac{Tax\ savings\ resulting\ from\ the\ use\ of\ tax\ benefits}{Total\ sales\ volume}\times 100\%$

* *Notes: compiled on the basis (Dolgikh, 2013; Samsonov, 2014)*

The amount of taxes accrued over the period should include not only self-calculated amounts, but also amounts accrued during that period by the tax inspection (including penalties and fines).

Indicators that directly characterize the efficiency of the tax policy of the organization include:

The coefficient of the tax effect indicates how net income is related to each other, which is the main indicator that characterizes the efficiency of financial and economic activity and the total amount of tax payments made by an organization (Dolgikh, 2013). An increase in the indicator, compared to the values of this indicator in the previous periods, will indicate the advantage of the profit received by the enterprise in comparison with the tax expenses, which will indicate the improvement of the effectiveness of the tax policy.

An indicator of the rationality of the tax policy of the organization. This indicator can be calculated both for all tax payments and separately for each tax. However, as economists-practitioners testify the costs associated with implementing the tax burden of the organization should not exceed 50% of the economic impact of the activity.

The tax rate of the products sold is one of the indicators that characterize the effectiveness of the tax policy of the organization. This indicator allows you to determine the amount of tax payments that are per unit volume sales, its decrease indicates a decrease in tax burden and increase the efficiency of tax policy.

Some of the tax burdens that characterize the effectiveness of the tax policy of the organization include:

Coefficient of taxation of income characterizes the share of tax payments levied on receipts (included in price of product) in sales revenue, it indicates raising the tax policy is not effective towards rationalization of tax payments paid from the proceeds (Samsonov, 2014).

Coefficient of taxation of expenses escribes the proportion of tax payments related to cost. It speaks the increase of insufficient effectiveness of tax policy in the direction of rationalization of tax payments related to cost. Coefficient of taxation of profit characterizes the proportion of taxes paid on profit in the balance sheet profit, its increase indicates the lack of efficiency of tax policy in the direction of rationalization of tax payments paid for profit and related to the financial result (Dolgikh, 2013; Samsonov, 2014).

Indicators of the effectiveness of direct and indirect tax benefits include:

The coefficient of preferential taxation allows the organization to determine the degree of influence of one or another privilege on the value of a given tax, as well as the sum of all privileges on the value of taxes paid as a whole. Describes the efficiency and performance of both individual benefits and all used in the organization of benefits. This coefficient must be greater than 0, and the higher its value, the higher the effectiveness of the benefits.

The coefficient of efficiency of application of the privilege allows the organization to determine the share of participation of this or that privilege in the increase of financial resources by the amount of total revenue (Dolgikh,

2013). Allows you to determine the proportion of additional revenue received. Describes the efficiency and performance of both individual benefits and all used in the organization of benefits. At $C_{eap} > 0$, the use of benefits (privileges) brings profit, at $C_{eap} < 0$ - a loss.

The results of the tax planning effectiveness analysis allow us to evaluate the positive effect achieved from tax optimization and to check whether the costs incurred in implementing the tax planning system are less than the benefits obtained by the enterprise through tax planning.

Conclusions and Directions for Further Research

Tax planning - is a special organization of the taxpayers' activity using a variety of methods, techniques and tools provided by the law and do not violate it in order to minimize tax liability of the taxpayer over time. The justified system of tax planning of the enterprise is able to sufficiently minimize the risks arising from the taxation of economic activity. In the systematization of tax planning, the rationale for its principles and methods, the creation of methods for planning the taxation of the enterprise should come to the fore.

Regarding the place of tax planning in the financial management system, the following should be noted. First, as part of the financial management system, tax planning occupies a specific place in it, due to the fact that the tax aspect is present in any segment of financial management of economic entities. Second, since tax relations, as an integral part of financial relations, arise at the redistributive stage of the reproduction process and are the final link in any entrepreneurial decision, tax planning as an integral part of financial management is characterized by limited autonomy. Thirdly, tax savings increase the enterprise's own financial resources, so the ultimate goal of tax planning is not only and not so much tax optimization, but of increasing its financial soundness and importance.

In today's Ukrainian conditions, we can distinguish the following main groups of businesses that are most in need of applying tax planning for their activities. First, these are complex corporate structures that have an extensive network of subsidiaries, where there are a number of additional optimization tasks that are traditionally involved in tax planning and have the most extensive developments in the field. Secondly, it is a newly created private company. The process of capital accumulation leads to the expansion and complication of the activities of many of these firms, as well as to the emergence of other factors that create the need for planning forms adequate to the modern market economy. Third, planning is objectively needed by state-owned and those that were state-owned and now privatized enterprises. For them, the scheduling function is traditional. However, their planning experience relates mainly to the period of a centralized managed economy. Hence the planning at these enterprises was secondary, reflected the planned activities at the central and sectoral levels, and therefore did not imply a serious ability to analyze and predict, determine their own development goals. This group of business entities can no longer live the old way, so forced to learn new methods of tax planning. Despite the fact that this group is the most inertial and conservative, the changed economic conditions make it actively seek out new methods of financial decision-making and engage not only in traditional financial planning but also in tax planning as a financial management subsystem. Fourth, small businesses also need tax planning that use both traditional and simplified taxation systems, or when choosing them, because of their limited resources and other complexities.

The increasing role of tax planning in today's market economy is determined by a number of factors. The need for tax planning is dictated primarily by two main factors: 1) a high level of tax burden for a particular business entity; 2) complexity and variability of tax legislation (Gribnau, 2020). Other factors include increasing the size of the firm and complicating its forms of activity.

Currently, the value of tax planning is growing as a factor of economic growth of economic entities, which is due primarily to the following circumstances:

- political and economic instability and the changes often made to tax law make some organizations more competitive. These are organizations that respond promptly to changes that are being made. As a rule, only business entities engaged in multivariate tax optimization calculations can do this;
- tax saving is a reserve for increasing the firm's net profit;
- maximizing net profit creates the conditions for dividend payments to increase and, accordingly, the value of the stock and the increase in the capitalization (price) of the enterprise.

Tax planning effectiveness analysis is conducted to determine the results of tax optimization measures. Organizational forms of analysis of the effectiveness of tax planning at the enterprise may be different and are determined by its size, organizational and legal form, industry specificity. Successful implementation of this analysis depends on carefully planned work on its implementation. In addition, the information base of the analysis plays an important role, so its completeness, quality and reliability must be checked before beginning the analysis. The results of the tax planning

effectiveness analysis allow us to compare the costs incurred in implementing the tax planning system and the financial savings resulting from tax optimization.

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Blended Learning Macroeconomic Course: A Methodology Proposal to Face COVID-19 Pandemic Situation in Mexico

Tamara ALCANTARA-CONCEPCION
Universidad Nacional Autónoma de México. Dirección General de Cómputo, y de Tecnologías de Información y Comunicación. Dirección de Innovación y Desarrollo Tecnológico. E-mail: talcantarac@unam.mx, ORCID: 0000-0002-3773-5006

Sonia BRICEÑO-VILORIA
Universidad Nacional Autónoma de México. Instituto de Ingeniería. Coordinación Ingeniería de Sistemas. E-mail: SBricenoV@iingen.unam.mx

Víctor LOMAS-BARRIE
Universidad Nacional Autónoma de México. Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas. Departamento de Ingeniería de Sistemas Computacionales y Automatización. E-mail: victor.lomas@iimas.unam.mx, ORCID: 0000-0003-2281-0891

Abstract

Even when Blended Learning is a model that has been developed and studied for at least fifteen years, it is still little used in classrooms and schools in Mexico. The COVID-19 pandemic has brought less up the need to implement teaching-learning processes that incorporate online choices. In Mexico's case, the education in all levels was interrupted in the middle of March 2020; professors had to face the challenge to conclude the courses on distance. At Universidad Nacional Autónoma de México, the Dean declared Blended Learning as the choice to follow the teaching-learning processes during this emergency. In that sense, Blended Learning offers, not only an alternative to online learning, but also to incorporate Information and Communication Technologies into Education daily practice. In this paper it is presented a brief state of the art of Blended learning, concept and main models; as some bibliometric indicators of scientific community interest on the topic. Then a review of university efforts to encourage Blended Learning among a community with thousands of professors and students; and the emergency of training programs from each school to follow courses even with the COVID-19 Pandemic. Finally, it is presented the methodology to develop a Blended Learning session, exemplifying with the Macroeconomy lesson developed for teaching during autumn-winter semester at Engineering Faculty of UNAM.

Palabras clave: Blended Learning, Mexico, University, Teaching-Learning Process.

Introducción

At the end of December 2019, in China, was reported for the first time the detection of coronavirus disease (WHO, 2020) which was later named COVID-19. With a very fast spread around the World, on March 11th of 2020, the World Health Organization (WHO) decided to declare the epidemic to pandemic (WHO2020a). Each country with COVID-19 menace decided measures as growing sanitary infrastructure capacities, teaching populations healthy practices and arriving into lock down, that stop face-to-face schools' attendance (OECD, 2020).

Blended Learning

Blended Learning has multiple denominations as mentioned Driscoll (in Graham, 2006); among them, it is possible to find Flexible Education or Flexible Learning (Salinas, 1999; Li & Wong, 2018); Mixed Formation or Education (Pascual, 2003; García, Cerda, Fernández, Riera, Amat & Higueras, 2020); Hybrid Learning (Bartolomé, 2004; Marsh, 2003; Raes, Detienne, Windey, & Depaepe, 2019; Goodyear, 2020); Learning semipresencial (Bartolomé, 2001; Leão y Bartolomé, 2003; Gamis, 2016); Technology-Mediated Instruction (Bullock et al, 2008; Henrie, Halverson & Graham, 2015); Mixed Mode (Llorente, 2008, Picciano, 2014); Combined Learning (Moran, 2012); Web-Enhanced Instruction (Alghazo, 2006; Wingard, 2004; Walker, G., & Johnson, N., 2008). Denominations vary with definitions; some of them focus on the technologies to deliver materials; others to the pedagogical perspective and, finally, the proportions of face-to-face teachers with the use of online choices. In other words, there are multiple

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denominations with similar concepts: the integration of Information and Communication Technologies (ICT) into the teaching-learning process without losing the professor's presence.

Graham, Allen, and Ure (2005) identified the Blended Learning as:

a. The combination of instructional media such as audio, streaming video, live virtual classroom, videotape, CD ROM and collaborative learning (Smith &McGregor, 1993; Bersin & Associates, 2003; Orey, 2002a, 2002b; Singh & Reed, 2001; Bishnoi, 2017).

b. The combination of different kinds of pedagogical approaches such as constructivism, behaviorism and cognitivism (Driscoll, 2002; House, 2002; Rossett, 2002).

c. The combination of offline traditional Face-to-Face (F2F) learning with online learning (delivery method) (Reay, 2001; Rooney, 2003; Sands, 2002; Ward & LaBranche, 2003; Young, 2002).

In sum, Blended Learning can be understanded from different perspectives: as a combination of technologies, pedagogical models and intervention modality of the teacher. And as a consequence, the knowledge scope necessary to design BL sessions has been increased and requires to acquiree more abilities and skills. For instance, technological competences required are identified by Vargas (2014) as:

1) Basic Information and Communication Technology (it includes terminology and operating system),

2) Basic ICT applications (Word processor, Spreadsheet and basic databases);

3) Multimedia applications;

4) Multimedia presentations;

5) Educational software as platforms and others;

6) Internet use (for instance: seeking information, Webpages use or edition among others).

Blended Learning Models

Blended Learning is associated with some instructional models that vary according to the type of interaction among teachers-students and students-students; if there is considered to use ICT media or face to face mode; classrooms, labs, computers room, on-line work at home, structured studies program or only specific concepts. Considering all of them, the teacher should choose an appropriate model and include didactic tools into the design to its specific teaching-learning process. As figure 1 shows, the BL Models are divided in two main categories:

- Rotation Models. Education activities take place at school, and are divided in on-line, F2F and collaborative work; usually there are some stations in the classroom or even at the whole school, where students are able to interact with teachers, using computers or making work teams with other students.
- Flexible Models. Education activities are adapted for each student attending its own learning target; it is possible to study at home or in school, on-line or F2F, specific topic or concept or a long studies program. The teaching-learning process is adapted into student requirements and learning objectives.

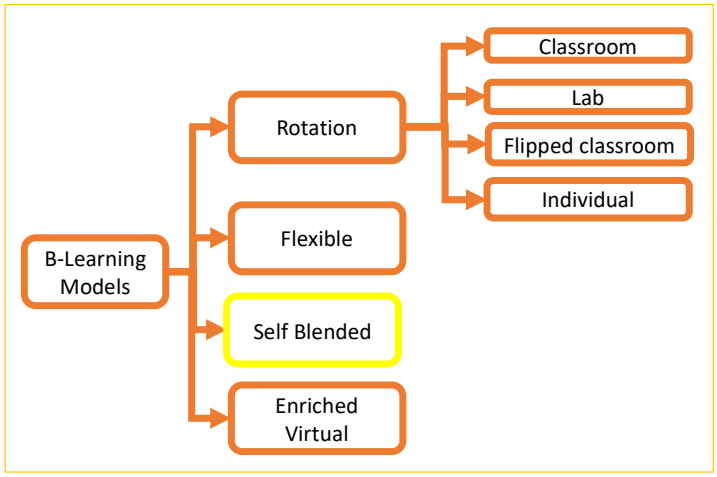

Figure 1: Blended Learning Models

Source: Adapted from Ayob, Abd Halim, Zulkifli, Zaid & Mokhtar (2019).

The most common are rotation models, however Pandemic situations and next future could represent the inclusion of other options. The models, in very simple way are:

a. Class Rotation Model. It is effectuated at school, where there is infrastructure disposal to facilitate station students' work. The activities are schedule to rotate among workstations, including traditional F2F sessions, on-line sessions, and teamwork; as a consequence, a group is divided in three subgroups, and each of them are assigned into a workstation activity.

b. Lab Rotation. It is very similar to the rotation class; but on-line activities are laboratory practices. It is a very common activity for learning languages or to practice chirurgic procedures.

c. Flipped Classroom. Main tasks are inverted; students learn basic concepts on-line and the session with teachers are for clarifying concepts and to solve problems with other students. In other words, the homework is solved in the classroom while theory is studied at home.

d. Individual Rotation. Rotation is programmed individually, considering each student requirement. The schedules are adapted differentiating students but, following times and general curricula.

e. Flexible. Teachers and students agree on places of study: at home or at school. Each student has its own rhythm and defines how deep their knowledge wants to reach. Teacher interventions depend on the student requirement.

f. Self-Blended Model. Students define the topic or assignment to study; usually activities are designed to reinforce knowledge or learn something additional of the curricula. A teacher can help if a student requires it.

g. Enriched Virtual Model. At home or at school; mainly designed to be on-line, but teacher intervention enriches the learning once or twice a week; it can include other students F2F.

All BL models incorporate on-line and F2F work, adapting activities according to curricula assignments, studies level and students' profiles; in consequence, the execution of each model usually differs from one school to another.

Blended Learning in scientific literature

Blended Learning is a topic that has been growing in published papers, reflecting increasing interest from scientist. To situate this phenomenon, a Scopus searching was made using as a keyword: "Blended learning". The keyword could appear in the title, the abstract or the keywords of the document, any other searching restriction was established. The search was made in the beginning October 2020, finding 8,242 documents, distributed as table 1 shows.

Table 1: Blended Learning documents by type

Document Type	Documents
Article	3,773
Conference Paper	3,219
Book Chapter	707
Review	220
Conference Review	194
Book	57
Other documents	22
Total	8,242

Source: Scopus searching (Scopus, 2020)

The table 1 shows that more than 80% of the documents are articles: published in journals representing 45.7%, while conference papers are 39%. On the other side, book chapters and books represent 9.26% and reviews of conferences and books are another 5% of the total. In other documents category there has been included editorials (22), notes (22), erratum (9) Letter (6), short survey (5), retracted (2) and undefined (6). Meanwhile, Figure 2 reports the growing interest of scientific community for almost 20 years, publishing each year more about Blended Learning problematic and solutions. In 2019 it is recorded a marked decline of publications in Scopus; however, it is probable that in 2020 the numbers growth as a consequence of Pandemic and the encourage for use this modality of education.

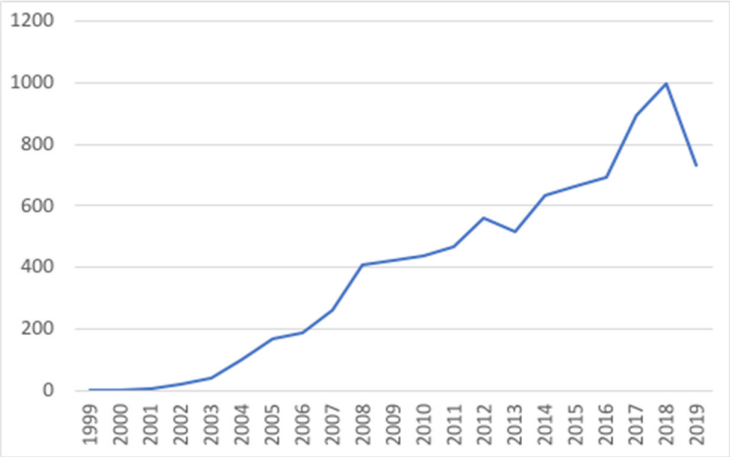

Figure 2: Scientific documents about Blended Learning published in Scopus

Source: Scopus searching (Scopus, 2020)

Blended Learning at UNAM

UNAM is the oldest and biggest University in Mexico; it is a Public institution with 360,883 students distributed by studies levels as table 2 shows; most of them in face to face programs with 41,332 professors (EstadisticaUNAM, 2020). The enormous university community represents a challenge to incorporate ICT in current activities, but specially, in the middle of the COVID-19 Pandemic that demands professors and students teaching, learning and interacting on-line without any pre-design of these kind of activities.

Table 2: Students at UNAM

Study level	***Students***
Postgraduate	30,634
Undergraduate	217,808
High School	111,569
Music propaedeutic	872

Source. (EstadisticaUNAM, 2020).

As in all the country and every educational level, the COVID-19 Pandemic interrupted the UNAM activities, suspending all traditional attendance into classrooms; as consequence Dr. Enrique Graue, the Dean of UNAM, the 1st of July of 2020 declared Blended Learning as the education target of the teaching-learning process at the institution (DGCS, 2020).

The Pandemic seems to be an important trigger to encourage the Blended Learning modality; however, for the size of the university and the tradition of F2F lessons, BL is not very well known and less used. A review of UNAM efforts in that sense was made, identifying BL courses on use for students; platforms and courses for teachers, and learning repositories for open educational resources. The table 3 shows reported BL experiences of teachers that developed and use Moodle as complement of their courses.

Table 3: UNAM Blended Learning background.

School, BL course and professor	Description
Language School.	One of the most advanced using BL courses for English teaching. It offers a course structured in 6 on-line hours and 4 F2F hours in two sessions by week. A 140 hours in total and seven learning units (Enallt, 2012)
Faculty of Medicine with the Informatic Biomedicine assignment.	Informatic Biomedicine is imparted as Blended Learning modality that incorporates clinic cases analysis and theoretical discussions (Gatica et al, 2011). Since 2010 the Official Curricula of Medicine studies at the Faculty of Medicine incorporated the Informatic Biomedicine as one of the first semester assignments.
DGTIC-H@bitat platform The Direction of Information and Communications Technology and Computing (DGTIC) at UNAM is in charge of computing and ICT institutional management; and throughout its H@bitat Program promotes the use of virtual spaces to build the B-Learning Courses of UNAM schools. The H@bitat Program reported next experiences (Zamora & Muñiz, 2011), (DGTIC-Educatic, 2020):	
Net@ History by Professor Jesus Nolasco from CCH Oriente	Virtual platform designed to study History of Mexico: Conquer and Colonial consolidation period. Use Moodle Platform to distribute tasks, lectures and to receive homework.
Educational Orientation Course in charge of professor Zaira Monroy Neri from Escuela Nacional Preparatoria 5.	Professor has added documents assigned to students' activities as practice spreadsheets, readings, guides and tutorials. Platform also has spaces to store students' assignments.
Colegio de Ciencias y Humanidades Sur, the Geogebra course was developed by professor Carlos José Navarro.	This course is a complement of F2F sessions; it is possible to download tutorials, exercises and other documents, and to participate in discussion forums from Moodle platform.
Patricia Flores Hernandez from ENP 9 designed the course: Food Orientation aimed at Nutriology Studies in technical level.	The objective is to complement F2F classes. The platform contains individual and group activities, documents and forums to interact on-line.
For the teaching of Geography, History and its Lexic; specially for Sonre, the Greek writing system	Has audio visual materials, also has surveys and tests for on-line assessment.
In the Medicine Faculty, professor Victor Hugo Olmedo has developed the course: Biostatistics.	The content is focused in practice examples, statistics methods and database management. It also contains a Case study activity, that includes a multiple-choice survey and the correspondent feedback.

Source: Enallt (2012); Gatica et al (2011); Zamora & Muñiz (2011); DGTIC-Educatic (2020)

In the case of platforms and courses for teachers, the use of Moodle as the main institutional platform. There are software courses and personalized help to obtain virtual classrooms associated professors teaching the official educational programs. Some workshops and certified programs to manage Moodle, most of them free or with low cost for teachers from UNAM, are available (DGTIC-Educatic, 2020). Other teachers' programs are part of the Open and Distance Education Coordination from UNAM, because all Online Educational courses are programmed in Moodle. In this Coordination, teachers find training in software for educational online activities and other educational topics (CUAEIEED, 2020).

Further, each School and Faculty has its own training program for their teachers; that is the case of Online Training Program, from Engineering Faculty. This Program began with Pandemic suspension of F2F courses, and it is offered

by Educational Computing Services Unity (UNICA) of the Faculty (Ingenieria, 2020). For instance, this Program has official accreditation by UNAM, and is structured to cover in one month a total of 35 hours; with next topics:

- Topic1. Institutional Protocol to continue distance educational tasks, using ICT
- Topic 2. Psycho-social effects of Pandemic. Emotions strategies, personal and professional abilities and online communication.
- Topic 3. Pedagogical and educational aspects in online education. General aspects, teacher online abilities, online learning-teaching processes, online evaluation instruments, and online didactic planning.
- Topic. 4 Information Technologies. G Suite, Microsoft, and Moodle virtual environments, and security and control of online environment.

The training program was transmitted by YouTube open canals and was successful becoming followed by more than five thousand people (Unica-Youtube, 2020).

UNAM also encourages BL efforts reinforcing the development of Open Educational Resources (OER). OER, are any type of educational materials that are in the public domain or introduced with an open license. The nature of these open materials means that anyone can legally and freely copy, use, adapt and re-share them (UNESCO, 2017).

UNAM has multiple educational resources among repositories of schools, faculties, institutes and libraries. To encourage the online resources UNAM built and public: *Toda la UNAM en Línea* (all the UNAM online) that contains thousands of educational, research and cultural resources. This Websites represents an effort to accomplishes the Open Access Policy (UNAMenlinea, 2019).

The other interesting learning repository is the University Learning Network (RUA). The RUA goal is to concentrate, link and be accessible all materials related to the UNAM curricula. Materials included in the RUA are generated by the UNAM or other university authors; and are linked with official study programs and specific topics approved by academic committees (Alcantara, 2018). It has been an enormous effort, considering UNAM has 235 programs of bachelor's degree; 92 postgraduate programs, 263 specialized programs, 3 high school programs and 37 technical options (EstadísticaUNAM). Nowadays, RUA has covered most of the courses of high school level, and some OER for bachelor courses (RUA-UNAM, 2017).

Structuring Blended Learning in Social Sciences teaching at Engineering Faculty of UNAM

At UNAM there is a Support Program for Innovating and Enhancement Educational Projects (PAPIME) with the objective of encourage a constant enhancement of learning-teaching process. The methodology presented in Figure 3, is one of the products of the project called: Blended Learning: …., that is supported by PAPIME.

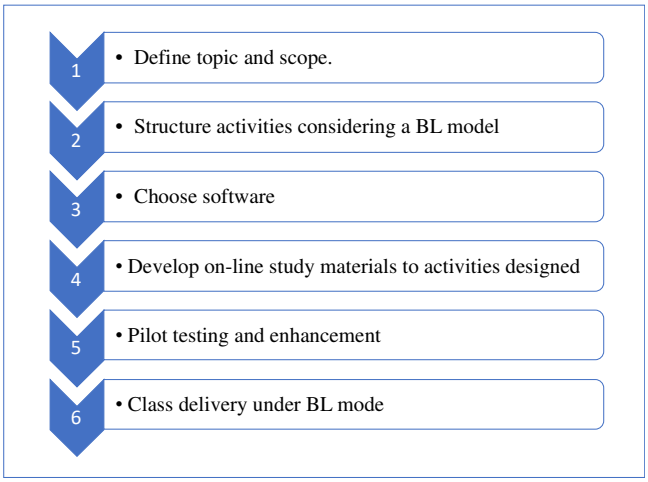

Figure 3: Designing BL class for teaching Macroeconomy

The methodology has been developed and applied in the design of Blended Learning session to the Macroeconomy topic, that belongs into the Economy Introduction Course of the Engineering Faculty at UNAM. In this case, the result is an OER as the main structure, involving F2F sessions

The methodology is composed by six steps:

7) Define topic and scope. This section consists of choosing and delimiting the topic(s), concepts or lessons to be developed in the structure activities considering a Blended Learning model.

8) To structure the activities that must be considered as part of the Blended Learning Model, it was developed in an Instructional Guide Format. The format contains main information to describe any instructional unit: course, assignment, concepts review, etc. each information field is auto explanatory, making it easier to develop. The filling of Instructional Guide has the intention to string a coherent structure, developing a disaggregated topic or subject (to granulate topics), in such a way that each learning goal corresponds to one or more activities aimed at achieving said goal.

Table 3 shows first part of Instructional Guide; this part refers to general information to identify the Educational Resource, the first column contains information required; second column describes the kind of data or information that describes the field; the third column is illustrating information for the Macroeconomic Topic development. In this way the topic belongs to Economy Introduction. The responsible of project, content design and development of Macroeconomy BL design are cited. In this case the course is part of Engineering program, the course is Economy Introduction, with key number: 1413, plan year: 2016 of the Engineering Faculty at UNAM

At the end of the table, it is recommended to specify the kind of license is given to the BL development material, concerning course description and OER. In this case, as the materials are encouraged to be Open Access, figure 4 presents information of Creative Commons Licenses, and the rights features established for each one. In this way, professor does not leave aside the decision of the type of permissions granted to the resource.

Table 3: Instructional Design Guide. General Information.

GENERAL INFORMATION.		
Information	***Content Description***	***Macroeconomy Topic to be developed***
Learning Unit: Course, topic, lesson, concept, other	Learning Unit Name	Assignature: Economy Introduction
Contents to be involved.	Indicate if it is a complete course, a topic, a segment of a topic or a concept.	Topic. Macroeconomía
Responsible for the Learning Unit	Main responsible for the Learning Unit.	SBC
Participants developing the Learning Unit	It can be the content responsible, the developing OER responsible, the graphic designer and other contributors to be recognized, as a sponsor.	TAC VLB etc.
Learning Unit Name	Name of the: program, course, unit, workshop, concept	Bachelor: Engineering
Program of study	Name, number, year of Curricula and School and University	Course: Economy Introduction, Key number: 1413, Plan year: 2016 Engineering Faculty at UNAM
Creative Commons Licence	Chose an Open License Attribution of the OER (See Figure 4): • Attribution CC BY. • Attribution-ShareAlike CC BY-SA. • Attribution-NoDerivs CC BY-ND. P • Attribution-NonCommercial CC BY-NC. • Attribution-NonCommercial-ShareAlike CC BY-NC-SA. • Attribution-NonCommercial-NoDerivs CC BY-NC-ND.	Attribution CC BY.

Note: Remember that Blended Learning requires on-line and alive activities with professor.

Licenses	Description
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Figure 4: Common Creative Licenses

Source: Information from Creative Commons (2019)

The second part of the Instructional Guide concerns with Learning Activities. In this sense, second part of Instructional Guide contains the main fields to describe each activity. In this way, teachers can develop structured their activity.

Table 3: Instructional Design Guide. Activity Design

Activity Number and name		Learning Activity 1: Macroeconomy utility.
Target of knowledge: Basic concepts		**Time for the activity:** 10 minutes
Resources to use: Macroeconomy OER	**Evidence/Product:** OER records	**Evaluation/Feedback:** OER feedback and F2F session
Desarrollo de la actividad		
General Procedure **Objective:** To explain Macroeconomy concept and the influence of culture of students, citing reliable sources. **F2F Instructions:** Professors ask students: 1. To study and to research Macroeconomy concept from recommended bibliography references or Open Access sources. 2. Teamwork: To elaborate a conceptual map involving macroeconomy concept The Map has to be uploaded in Moodle. Teams has to be formed by maximum five students; the team is going to be identified by a given number. Suggestion: To elaborate the conceptual map teams can use a brainstorm. **OER Instructions** Conceptual Map about Macroeconomy. Once the map is ready, one of the participants of each team should upload the map into the platform; following next rules:		

- Document Name: MCM_TeamX, where X is team number
- Conceptual map has to contain the complete names of all participants of the team.
- Consulted sources must be cited with APA format.
- To upload the file in Moodle, click the locate the correspondent activity and click on. Click Add submission to view the file uploading area, drag and drop your file, and click Save changes to save your map.

Importance of Macroeconomy.

- To explain how macroeconomy is useful, next task consists: in an individual brainstorm to identify the macroeconomy impact in their life.
- Finally, in F2F session, professor promotes a discussion based in each student ideas.

9) Choosing the software.

The selection of learning platform and software for programming multimedia activities and alive sessions depend on institutional policies. Each educational institution determines if they use a private or free platform; and establishes some user policies, that have to be considered. In the UNAM case, there are Virtual Classroom System and Educational Environments available, as: Web Conference (ZOOM, Blackboard Collaborate and WebEx Meeting) and Learning Management System (LMS) –Moodle.

The purposed methodology was applied, following institutional decisions, in Moodle and for the Multimedia activities development it was decided to use H5P; that is a tool designed to generate content with mainly educational purposes and that is compatible with several digital platforms in the distance education field, such as Moodle. It was decided to use H5P because most of the browsers support it natively, both those focused on mobile devices such as tablets or cell phones or for desktop computers. It is also compatible with the most used operating systems like Android, OSx, Microsoft Windows or GNU / Linux. H5P uses JavaScript as a programming language that runs directly in the browser once the web page has been loaded. And with the help of HTML5 and CSS elements it is possible to generate interactive material with attractive and responsive aspects. Its connection with Moodle, allows to record the evaluation or progress of the student. Another aspect to consider is that each content in H5P can be exported, to other websites, through a single file that compresses and packages the resources (images, texts, sounds and URLs) and logic. Also, the creative community of H5P is active and constantly generates changes and updates that improve the interaction, appearance and experience to the end user. Being a platform based on the drag and drop concept, it is straightforward to create and add new content without knowledge of JavaScript, HTML5 nor CSS

10) Develop on-line study materials responding to activities designed

The programming of the OER was made with the help of three students: one of them in charge of the H5P programming, other in charge of pedagogical aspects, and third student in charge of technical documentation of OER. The developing of didactic activities requires a very near communication of the design team; the use of Instructional Guide has been very useful in this sense, because is not only an initial point of pedagogical discussions, but also, has been use as a requirements description for programming. In this case the participation of an interdisciplinary team has enriched the course and enhanced the pedagogical aspects for all the participants.

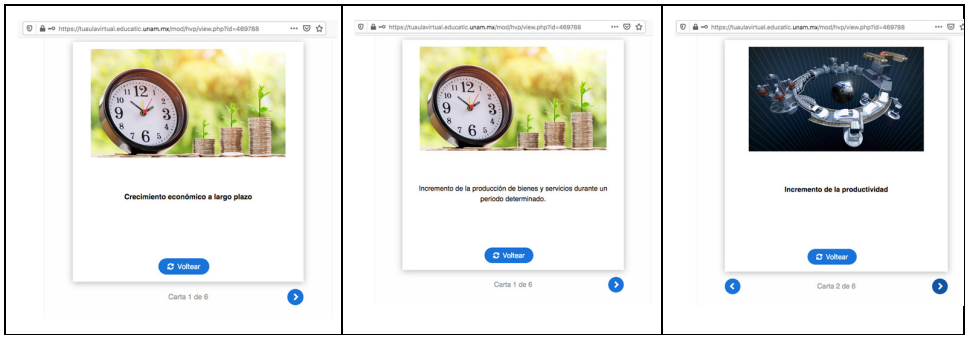

Figure 5: Screen sample of Macroeconomy OER (Flashcards)

11) Pilot testing and enhancement

    Th Beta version is going to be ready at the end of November 2020, and there are programmed two kind of testing: First the design team test, then the students of the group number 13 of Economy Introduction course are going to use it. The user survey is going to light the enhance opportunities from students with the right profile.

12) Class delivery under BL mode

    When all tests and modifications become approved, it is feasible and recommendable to make available OER for other teachers in the university, outside of the institutions and even for the general public. It is contemplated also, to upload this OER into de RUA repository.

Conclusions

This research project is contributing mainly with a methodology to develop an Open Educational Resource, but also with a designed BL Macroeconomy course described in an Instructional Guide and with multimedia OER developed. All these elements are going to be calibrated for the end of this year.

The BL of Macroeconomy is a course that combines the F2F activities guide for the professor, with online activities, completing in this way synchrony and asynchrony tasks. All the activities online have associated an adequate feedback, based in affirmative communication to encourage confidence interacting in a constructivist environment; where each student controls its own advances. Each activity is evaluated, and feedback is given at the end.

The research project and the related products were developed by a research team headed by a researcher with expertise in Blended Learning topics, and distance learning experience; a researcher with a wide experience in computing topics as technologies and architectures, supervising the programming of OER. The professor an economist with a wide experience in researching; she has been also professor in economy topics for more than 20 years; knowing the students characteristics and usual problems understanding some topics. The development of the BL course required also the participation of three students; all of them at the end of their bachelor's degree: informatic, pedagogical and industrial engineer. Because the COVID-19 problem was presented almost all the year 2020, each member of the research team developed the job at home, and virtual sessions for presenting advances and theoretical and operational discussions were made weekly.

In this case the participation of an interdisciplinary team has enriched the course and enhanced the pedagogical aspects for all the participants. The use of Instructional Guide has been very useful in this sense, because is not only an initial point of pedagogical discussions, but also, has been use as a requirements description for programming. Also the selection of learning platform and programming tool needs special attention to facilitate the course development.

The existence of financing programs for educational enhancement as PAPIME, guarantees the development of innovative OER, that once published in open repositories as the University Learning Network contributes with knowledge dissemination, one of the substantive functions of educational institutions. In this case, the project produced not only Macroeconomy BL course, but also the methodology that can be used to design Blended learning experiences for any course, topic, workshop or others.

The Macroeconomy BL course is going to be used as part of the current Introduction Economy course in the group 13 of the Engineering Faculty at UNAM. The user survey is going to light the enhance opportunities from students with the right profile. This information is going to be very useful to enhance not only Macroeconomy course, but also the complete methodology.

The conformation of project team has been a key piece to reach successful products. The knowledge and contribution of each members with different visions complemented with the whole vision of the leader of the project has facilitated the information fluxes, constant communication and product constructions

La conformación del equipo de trabajo del proyecto es una pieza clave de los productos generados. La visión de conjunto de la responsable del proyecto estableció no sólo la pauta de esa conformación, sino de la metodología de trabajo y del diseño idealizado de los productos, por su parte, la comunicación continua de todos los miembros del equipo facilitaron el flujo de información, despite the confinement.

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Management of Cash Flows in Crisis Situations

Adriana-Mihaela IONESCU
PhD, Economics Department, Faculty of Entrepreneurship, Business Engineering and Management, University POLITEHNICA of Bucharest, Bucharest, Romania, amihaela.ionescu@gmail.com

Ramona-Alexandra NEGHINA
PhD Student, Faculty of Entrepreneurship, Business Engineering and Management, University "Politehnica" of Bucharest, Bucharest, Romania, ramona.neghina@yahoo.com

Abstract

Any company, regardless of size or field of activity, can face several strategic and tactical challenges, especially when there are sudden economic changes, caused by emergencies and unexpected events. In order to adapt to ever-changing circumstances and opportunities, many companies are forced to make fundamental changes to their strategies and pay more attention to treasury management in order to achieve sustainable development. Treasury is considered a key element of the current and long-term management, ensuring the financing of the activity and the permanence of the enterprise. Its informative content is particularly important in the financial analysis, in the short term allowing the appreciation of liquidity and solvency, and in the long term measuring the need for financing. Using a case study, we show that understanding the enterprise in terms of cash flows is a way to achieve the performance of the enterprise, with simultaneous accounting, financial and investment influences and in relation to the multitude of users of financial information. We conclude that having an adequate system of budgetary control would allow companies to improve their managerial attitude and performance and provide useful information for solving financial challenges.

Keywords: Crisis, Covid 19, Cash Flows, Forecast, Budget, Decision.

Introduction

Any company, regardless of size or field of activity, can face several strategic and tactical challenges, especially when there are sudden economic changes, caused by emergencies and unexpected events. In the current context, influenced by Covid-19, most entrepreneurs focus on protecting employees, a clearer understanding of the risks that may arise in the company's business and crisis management; as a consequence, business plans, revenue and expenditure budgets and the cash flow of companies is constantly changing from day to day.

The occurrence of unpredictable events, such as Covid-19, can have an impact on expected results and profitability, but most importantly it can quickly generate cash flow tensions or even a financial liquidity crisis. Given the importance of cash flow at such times, entrepreneurs need to develop a management plan for available resources until the situation stabilizes. For this, it is essential to consider a perspective on the whole ecosystem that supports the business, as well as the implications of the decisions taken. Therefore, even in an uncertain horizon, good management is based on anticipation and planning.

Knowing that the business is essentially an integrated cash flow system driven by management decisions, the paper presents and analyzes a topic of great interest to businesses in crisis conditions and suggests the treasury budget as a cash flow planning tool, with relevance for business survival, growth and profitability.

The issue is approached in terms of the importance that the treasury budget has in making investment, operational and financing decisions in business, in order to maintain financial balance.

In this context, the first part of our paper describes the concepts that define the company's treasury and presents the general framework for managing the company's cash flows. In order to achieve this objective, the qualitative research methodology was used, as several scientific papers from the literature were analyzed. The research is based on an extensive documentation; it is scientifically based on a comprehensive and relevant bibliographic material,

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highlighted in the bibliographic references. The breferences include specialized books, articles, studies, laws and standards, having as source both Romanian and foreign literature. The sources have a great variety, a multidisciplinary content and support our approach.

In the second part of the paper we performed a quantitative research, using as a research tool the case study. Through this quantitative approach we aimed to present a practical model for preparing the treasury budget, using data from a company in the field of wood processing.

The results of this research can be included in an integrated model for assisting managerial decisions. Through this model we aim to place the treasury budget in the sphere of management tools par excellence, as treasury forecasts allow both the anticipation of the company's financial difficulties and the optimization of financing solutions.

Literature Review

The impact of the crisis generated by the Covid-19 pandemic was also felt strongly by the Romanian economy, which was affected by a substantial slowdown in growth, with negative and immediate effects on the population and enterprises, targeting mainly jobs and sales volume. Among the factors that determined the decline of companies we can list: major difficulties in providing the necessary financing and liquidity, blocking credit, declining demand for products and services, high taxation, rising prices for raw materials, energy and food, exchange rate increases and inflation, the financial blockage generated by late payments, the unstable legislative framework, the low degree of absorption of community funds, insufficient measures to support enterprises during the crisis.

These problems affected all types of companies, that were suddenly faced with late payments from customers (who also had cash flow problems), increased costs for repaying loans committed in foreign currency due to the depreciation of the national currency, the decrease in revenue caused by a decrease in demand for products and services offered, etc.

Numerous researches in the field show the importance of traditional budgeting, which was practically proven in periods of stability. According to Berland (2000), in a predictable environment, budgeting allows production optimization, prolongs internal predictability and simplifies resource allocation mechanisms. But in the context of a crisis, budgets have a reduced capacity to play the roles traditionally assigned: goal setting, resource allocation and motivation. This is mainly explained by the high degree of uncertainty, which forces budgets to deviate from their objectives.

In the conception of several authors, in a turbulent environment, the budget is used as a reflection tool to understand the environment (Gervais, 2009). This turbulent environment results from "the uncertainty of the actors' behavior (unpredictability of their actions) and from the dynamic complexity of the environment in which they operate" (Gervais, 2009). Despite the turbulent context, organizations pay continuous attention to the dynamic relationship between objectives and resources, not only during the budget preparation period, but throughout the budget year. Instability requires flexibility, and in the context of the crisis, budgets play a new economic role: to meet the demands of investors (Bescos, 2011).

One of the characteristics of contemporary organizations is their concern to develop efficient management systems and practices, which requires the concentration of efforts in the direction of treasury management. According to Ross et al. (2016), organizations with different sizes face problems that require distinct approaches and appropriate tools, depending on the nature and complexity of the projects undertaken. Therefore, a fast and efficient approach to cash flow prediction is highly desirable. On the other hand, Scott (2007) states that, in terms of the financial decision-making process, a careful analysis of cash flow assesses the decisions made by managers regarding the allocation of financial resources based on the impact on the company's ability to generate future cash flows.

Starting from the distinction between cash flow and cash, in the opinion of Sherman (2010) treasury management (cash flow) refers to the process of anticipation and planning of receipts and payments, while cash management refers to the processes of managing short-term liquidity of the enterprise in order to optimize its results. According to Ekanem (2010), managers need to consider several key elements for effective cash flow management. These elements include people and their mood (business executives, managers and employees), support network (business professionals), key performance indicators, along with appropriate management tools and techniques. For successful implementation, they must operate in an environment that encourages continuous learning and improvement, but always paying attention to the workload and working hours of their employees: bad time management and heavy workload can lead to burnout, that can affect employees' health and performance (Lie & Mihaita, 2015). On the other hand, inaccurate cash flow prediction and inadequate cash management lead to financial problems and negative cash flows (Kaka, Price, 1993).

Anthony (1988) considers that effectiveness and efficiency are the criteria for evaluating the actions of managers, and the role of the budget in achieving them is important, as it allows the translation of medium and long term strategic plans into short-term action programs, ensures budget control, coordinates the decision-making process and ensures the convergence of the strategic objectives of the enterprise.

Often, in small and medium enterprises there are no independent financial departments and because of this the manager is forced to manage both the practical aspects and the financial aspects of the sector he is leading. This situation involves making decisions whose consequences are difficult to quantify and which can shorten the life of the company in question. Consequently, it is necessary to have a clear separation of financial activity, regardless of the type of company, and if this is not possible, the manager must have a thorough knowledge of financial management (Nicolae, 2009).

Although it is recognized that uncertainty management is a necessary condition for effective project management, it can be assumed that it should become more sophisticated before practical results can be observed (Atkinson et al., 2006).

Methodology

Field research is the main part of the paper, this being directed towards current phenomena, analyzed in the real context of the company that is the object of the study. Regarding the method of data collection, for the case study we used data provided by the company under study. In order to complete the research, some data was collected by interview.

The building of the case study is explained by a step-by-step approach. The stages to be covered in the budget process are as follows: (1) gathering the necessary information; (2) preparation of partial treasury budgets; (3) elaboration and adjustment of the treasury budget.

Gathering information is the first step in the budgeting process and is the basis for the next steps. Here the resources available to the company are identified - they are reflected in the balance sheet; the costs related to certain activities carried out are also identified in this stage. Due to the impact of each activity on the cash flow of the enterprise, it is important to identify all the factors that may have an influence on it.

The following steps are developed for the preparation of the partial treasury budgets, the elaboration and adjustment of the final treasury budget. It is necessary from the beginning, as an important step, to establish the prediction horizon of the treasury budget, because in the case of short-term prediction, many parameters are known deterministically. Therefore, the budgets must describe the general lines of the financial evolution, to ensure a margin of maneuver within their own provisions and the possibility to be revised.

Crisis management measures, based on the treasury budget, strengthen our belief that non-specific cash flow forecasting instruments are valid in a highly regulated world, without major dangers or in the absence of essential trade-offs to overcome certain events. But in a more uncertain context, marked by the acceleration of competition or the emergence of a crisis such as Covid-19, it becomes essential for the company to adopt a dedicated cash forecasting tool, according to its business model. Without cash flow forecasts, the company risks running out of cash unexpectedly and therefore going into insolvency or even bankruptcy. We use our experience and also other research in this area to suggest some measures to guide a company to this end.

Use of the treasury budget for forecasting cash flows. Case study

The Treasury registers the cash flows of the various decisions taken by the enterprise; these decisions, depending on the settlement term considered, can be long-term decisions (concerning investments and their financing) and short-term decisions (related to the operation of the enterprise and of its operation). Each of these decisions, regardless of the branch in which it takes place, ultimately materializes in a flow of income and expenditure, which generates receipts and payments, which will be administered in the short term to maintain the balance of the treasury.

Through the budget, it will be possible to highlight the treasury surpluses or deficits from time to time and, implicitly, it will be possible to take decisions regarding the treasury management that aim at:

- ensuring the availability of financing (capital increase, long, medium- and short-term loans) at their lowest cost;

- increasing the efficiency of collecting the company's receivables without affecting the policy towards customers; balanced staggering of the maturity of the company's payment obligations;
- ensuring the treasury at zero level, in order to avoid financing or opportunity costs;
- investing the treasury surplus as profitable and as little risky as possible, etc.

In addition to the theoretical considerations presented above, we will further present, in a case study, a practical model for preparing the treasury budget for a company in the field of wood processing. Due to privacy reasons, the company's name used in the study will be anonymized and referred to as Company X.

Gathering Information

The treasury budget gathers the budgetary information of different financial years, hence the obligation to collect the necessary information. The information necessary for the elaboration of the treasury budget for the current year is collected from the balance sheet of the previous year and from the other approved budgets of the current year. Therefore, for the preparation of the budget three records and forecast documents are used: *the opening balance sheet* (balance sheet for the year ended - Table 1), *the forecast income statement* and *the forecast balance sheet*.

The treasury is based on the financial flows of a certain management period, determined by the income and expenses of the period (income statement) and by the change in receivables and payables at the beginning and end of the period (opening balance sheet and forecast balance sheet), according to relations:

Receipts of the period	**=**	**Initial receivables**	**+**	**Projected income for the period**	**-**	**Final receivables**
Payments for the period	**=**	**Initial debts**	**+**	**Estimated expenses for the period**	**-**	**Final debts**
Treasury budget		***Opening balance***		***Forecast income statement***		***Forecast balance***

Table 1: Annual financial situation Balance sheet at 31.12. 2019 (simplified)

A. Fixed assets		**535617**
Technical installations and machines	Gross value	584287
	- Depreciation	48670
	= Net value	535617
B. Current assets		**111447**
Inventories		2024
Raw materials		576
Final goods		1448
Miscellaneous receivables (1)		36861

Available at the bank	70538
C. Debts to be paid in a period < 1 year	**72172**
Trade debts - suppliers (2)	45120
Tax and social debts	26542
Amounts owed to credit institutions	510
D. Current assets or net current liabilities (working capital) (B-C)	**39.275**
E. Total assets less current liabilities (permanent capital)	221322
F. Debts to be paid in a period > 1 year	**20158**
Amounts owed to credit institutions	20158
G. Equity (E-F)	**191164**
Subscribed and paid-in share capital	120000
Legal reserves	71164

(1) The receivables of the clients are estimated to be collected: 60% in February and 40% in March 2020;

(2) The projected payments to the suppliers are made as follows: 55% of the debt value in the first month and 45% in the second month; of which: VAT payable 2,563 u.m.

Other information necessary for the elaboration of the treasury budget of year 2020: VAT to be paid until the 25th of the following month; VAT rate: 19%; Salaries are paid in the current month; Payment dividends are paid in June; Taxes and fees related to gross salaries due by the company to the state budget are considered 80% of the level of gross salaries; Debts to the budget regarding salaries are paid in the month following the payment of salaries; Income tax rate: 16%; Advance payment of income tax per quarter I and quarter II: in March - 4,000 u.m. and in June - 5,000 u.m.; The profit tax for the previous year is paid in April; The share of VAT generating expenses in the total expenses of the enterprise: fixed expenses 50%, variable expenses 60%, mixed expenses 40%, sales expenses 70%.

Preparation of partial treasury budgets

Cash flow is one of the key factors influencing the survival of small businesses, and the difference between the time of invoicing and the time of collection or payment influences the solvency of the business. Even if it has a profit margin, if a company does not practice good cash flow management, it operates at a significant risk. This becomes even more important for SME owners when operating in a climate of continued global economic volatility.

That is why, whaile elaborating the treasury budget, the distinction between *cash accounting* and *accrual accounting* must be taken into account, because there are situations in which an enterprise can end the financial year with profit, but at the same time it can register a negative treasury, due precisely to the gap between the moment of registering in the accounting the expenses and incomes and the moment of their maturity as receipys and payaments. The treasury budget thus becomes a management tool that translates in monetary terms (receipys and payaments) the expenses and revenues generated by the scheduled activities of the company, aiming to permanently ensure the payment capacity of the company, by synchronizing receipts with payments.

The treasury budget can be prepared for different periods of time, depending on the objectives of the company and the maturities of receipts and payments. Thus, the decision can be made to prepare annual budgets, when the maturities of receipts and payments are quarterly or greater than 90 days, budgets for several months (4-6 months), when the maturities of receipts and payments are monthly and greater than 30 days and day-to-month budgets. However, a realistic budgeting of the treasury is made for a management period of one year, with breakdown by month and breakdown by week for the first three months of the year.

In order to build the company's treasury budget, three distinct partial budgets are drawn up a priori: a revenue

budget, a payments budget, a VAT budget. The amounts related to expenditures and revenues registered in the budgets are without VAT. Receipts and payments must be expressed with VAT included, with the obligation to determine at the end of each month the amount representing "VAT payable" or "VAT recoverable", which will be settled with the state budget.

Revenue Budget

Receipts (cash inflows) refer to: settlements with customers (reflected in the sales budget), down payments received from customers, production of fixed assets (reflected in the investment budget), to which we add the financial receipts from: capital increases; obtaining a loan or selling a new issue of securities; rents, interest, dividends and other income collected.

The forecast of receipts is, in most cases, passed from the sales budget to the receipts from sales. Once the annual turnover and its monthly distribution are established, the forecast of receipts is based on a statistical record of the time staggering of the collection of monthly revenues. Furthermore, the forecast must consider the changes that may occur in the structure of sales and the degree of solvency of the company's customers, which will influence the gap between delivery and collection data, which is often 30-90 days.

The budget has two areas:

- The uppear area of the table allows the calculation of the turnover (including VAT) and the VAT collected for the current month (which is taken over in the VAT Budget)

- The lower area of the table highlights the receivables from customers and other receivables, which appear in the balance sheet of the previous year, taking into account the discrepancies on receipts, due to the agreed settlement terms.

The Revenue budget of Company X, for year 2020, is presented as follows (table 2):

Table 2: REVENUE BUDGET

Specification	Jan.	Feb.	Mar.	Apr.	May	June	Sem. I	Total year
1. Sales (excluding VAT) (according to Sales budget)	28000	30160	31200	32240	35040	35680	192320	423280
2. VAT collected	5600	6032	6240	6448	7008	7136	38464	84656
3. Turnover (including VAT) (1+2)	33600	36192	37440	38688	42048	42816	230784	507936
4. Accounts receivable from the initial balance sheet	0	22116	14744	0	0	0	36861	36861
5. Operating subsidies	0	0	0	210	0	100	310	530
6. Investment subsidies	10	0	5	0	10	6	31	50
7. Dividends receivable	0	0	0	0	0	875	875	875
8. Receipts from bank loans	0	400	0	0	0	0	0	400
9. The result of the disposal of the assets	0	0	130	0	0	140	270	460
10. Other receipts	40	35	29	31	27	25	92	279
Total receipts	**33650**	**58743**	**52348**	**38929**	**42075**	**43962**	**269223**	**547391**

Payment budget

Payments (cash outflows) refer to the payment of debts caused by purchases (reflected in the supply budget), payment of salaries and premiums, operating, administration and distribution expenses (included in the production expenditure budget, in the distribution expenditure budget, in the budget of administrative expenses, etc.), acquisitions of fixed assets (reflected in the investment budget), taxes and fees due to the state budget, to which payments of a financial nature are added: interest and dividends paid, loan repayments, purchases of financial securities, redemption of securities issued by the company.

Payments (cash outflows) refer to the payment of debts caused by purchases (reflected in the supply budget), payment of salaries and premiums, operating, administration and distribution expenses (included in the production expenditure budget, in the distribution expenditure budget, in the budget of administrative expenses, etc.), acquisitions of fixed assets (reflected in the investment budget), taxes and fees due to the state budget, to which payments of a financial nature are added: interest and dividends paid, loan repayments, purchases of financial securities, redemption of securities issued by the company.

The forecast of payments is made on the basis of projected expenditure and the planned staggering of payments and differs according to the nature of the expenditure, such as expenditure on material supplies, which is planned according to the manufacturing schedule or staff costs, which are provided taking into account the company's labor policy, etc.

The payments budget (Table 3) groups the expenditures appearing in the expenditure budgets, according to their way of regulation. The amount representing the "VAT payable" for the month, established in the VAT Budget, is also entered here.

Table 3: BUDGET OF PAYMENTS

Specification	Jan.	Feb.	Mar.	Apr.	May	June	Sem. I	Total year
1. Provider liabilities from the initial balance sheet:								
- payment in the first month 60%	27072	0	0	0	0	0	27072	27072
- payment in the second month 40%	0	18048	0	0	0	0	18048	18048
2. Purchases (VAT included) total	0	**30575**	0	**35658**	0	**38803**	105036	189068
- 30 day payment 45%	0	0	13759	0	16046	0	29805	53649
- 60 day payment 55%	0	0	0	16816	0	19611	36427	135419
3. Staff costs (net salaries)	5155	5155	5155	5155	5155	5155	30930	55677
4. Taxes and fees related to gross salaries	4124	4124	4124	4124	4124	4124	24744	44541
5. Indirect production costs (VAT included)	11505	11472	11509	11219	10986	11458	68153	122675
5.1 fixed production costs	1954	1954	1954	1954	1954	1954	11724	23454
5.2 variable production costs	699	703	682	690	739	728	4245	839
5.3 mixed production costs	1077	1097	1064	1107	1056	1076	6475	12928
5.4 sales expenses	7775	7718	7809	7468	7235	7700	45701	93279
6. Tax	0	0	4000	2564	0	5000	11564	20815
7. VAT payable	3415	0	4078	0	4921	3415	15829	1131
8. Acquisitions of fixed assets	10654	15607	0	0	0	0	1666	2998
9. Dividends paid	0	0	0	0	0	87	87	157
10. Loan repayments	100	128	28	28	28	28	342857	514286
11. Interest on loans	27	34	7	7	7	7	90571	115643
Total payments	**62052**	**54568**	**42660**	**37349**	**41267**	**48885**	**286781**	**566613**

VAT budget

This budget allows the calculation of "VAT payable" according to the rule:

VAT payable for month M	**=**	**VAT collected for month M**	**-**	**Deductible VAT for month M**

The VAT payable for a given month is paid during the following month.

The construction of the treasury budget requires the determination of the corresponding amount "deductible VAT" for the month and, therefore, the restoration of purchases of any kind.

The top of the table allows you to highlight purchases with VAT included, so that you can determine the amount representing "deductible VAT" for the month.

The bottom of the table enables the establishment of the “VAT payable” for the month, using the rule stated above; it represents the main area of the VAT budget.

Based on the information collected, the VAT Budget of Company X is presented as follows (Table 4):

Table 4: VAT BUDGET

Specification	Jan.	Feb.	Mar.	Apr.	May	June	Sem. I	Total year
I. Deductible VAT for the month, of which for:	**2185**	**7061**	**2186**	**7825**	**2087**	**8372**	**29716**	**69127**
1. Supplies of raw materials	0	4882	0	5693	0	6195	16770	42896
2. General production costs	2185	2179	2186	2132	2087	2177	12946	26231
2.1 fixed production costs	371	371	371	371	371	371	2226	4452
2.2 variable production costs	132	133	129	131	140	138	806	1595
2.3 mixed production costs	204	208	201	210	200	204	1230	2456
2.4 sales expenses	1478	1467	1485	1420	1376	1464	8684	177230
II. VAT collected for the month, of which for:	**5600**	**6032**	**6264**	**6448**	**7008**	**7162**	**38515**	**84743**
1. Sales of final products	5600	6032	6240	6448	7008	7136	38464	84656
2. Other sales	0	0	24	0	0	26	51	87
III. VAT payable for the month	**3415**		**4078**		**4921**			
IV. VAT recoverable for the month		**1029**		**1377**		**1210**		

Preparation of The Treasury Budget Itself

Once the partial treasury budgets have been established, **the treasury budget** is drawn up.

The treasury budget is generally presented in two succesive version and the budget work consists of:

a) establishing an initial version of the budget, which contains the gross monthly cash balances;
b) the development of an adjusted treasury budget, which takes into account the financial policy of the company.
a) **Initial version of the budget.** In this perspective, month by month, the revenues are compared with the payments, so that they are taken over in the previous partial budgets; at the same time, the availabilities that appear in the balance sheet of the previous year are taken into account.
This version is set column by column because the final cash balance of a given month becomes the initial balance of the following month.
b) **The adjusted (actual) treasury budget** resumes the total receipts, the total payments and, considering the initial treasury, will release the final treasury balance every month. These final cash balances may be deficits or surpluses. Only the financial manager can balance this treasury, so that the adjusted treasury budget must present zero or positive cash balances, as it will consider the financing policy adopted by the enterprise to balance its treasury. Preventive negotiation of short-term financing is generally less costly and safer than resorting to possible short-term loans in the event of a negative treasury.

The following rules are taken into account for the construction of the treasury budget:

- the initial balance in January corresponds to the treasury in the initial balance sheet;
- the final cash balance of one month is the initial balance of the following month;
- the final balance of December, after applying financing solutions, corresponds to the treasury from the forecast balance.

Final balance = Initial balance + Receipts – Payments

When the final balance is positive, the company has a cash surplus, which in the short term should be deposited in the bank to avoid the opportunity cost.
If this balance is negative, the company has a cash deficit, which must be absorbed by short-term financing, usually in the form of short-term bank loans, etc.
After adjusting the balances, the treasury budget (adjusted) or the cash flow plan (table 5) is drawn up.

Table 5: TREASURY BUDGET

	Jan.	Feb.	Mar.	Apr.	May	June	Sem. I	Dec.
Initial balance	72562	44160	48335	58023	59603	60411	72562	72562
Receipts	33650	58743	52348	38929	42075	43962	269707	547391
Payments	62052	54568	42660	37349	41267	48885	286781	566613
Final balance	**44160**	**48335**	**58023**	**59603**	**60411**	**55488**	**55488**	**53340**

The treasury budget is not flexible but needs to be reviewed frequently. Resulting from all the other budgets that make up the company's budget network, it bears all the effects of their changes: slowing or accelerating sales, rising wages, changes in commodity prices, changes in fiscal policy, etc. All these reasons show the need for frequent adjustments in order to have a budget as realistic as possible.

The company will need to test financial plans under stress in several scenarios, to understand the potential impact on financial performance and to assess its duration. When the business is significantly affected and previous budget assumptions and business plans are no longer relevant, the company must consider minimum operational requirements, including essential dependencies on manpower, suppliers, location and technology. Thus, a detailed analysis of the nature of receipts and payments is required, and the cash flow forecasting instrument should therefore be constructed according to the typology of receipts and payments, and not according to budgetary elements.

During the process of elaborating the treasury budgets, in a crisis situation, such as the crisis generated by COVID-19, the company must pay attention to the communication it has with different actors on the market:

- in relationship with customers, during the Covid-19 crisis, the company risks facing the absence of new orders or the collection of advance payments, with possible difficulty in fulfilling orders due to interruption of production process or suppliers, difficulties in recovery the value of goods and services in case of customers' inability to pay. In this situation, it is important to have direct communication between business partners in order to extend the deadlines or to invoke "force majeure" or "fortuitous event". These proactive actions will help mitigate damages or liability for non-performance of obligations towards customers.

- in its relationship with suppliers, the company must maintain regular contact with regard to their ability to deliver goods and provide services, as well as with regard to their plans to recover their value, thus enabling them to consider alternative options for receiving supply in a timely manner.
- in relation to creditors and investors, the company must analyze the terms and conditions of loan agreements, to identify debts and avoid breaches of contracts. These analyses will also have the benefit of giving the company the opportunity to proactively manage dialogue and communication with creditors on any necessary changes to existing conditions or refinancing agreements.
- in relation to government and regulatory authorities, the company should consult with their legal teams for advice on possible obligations, as well as with the business units, to see how to manage the communication of ongoing infringements and the collection of evidence, if any.

Pilotage measures in crisis situations based on the treasury budget

The companies' performances are the result of mobilizing all the resources they have, and in crisis situations the managers explore all the methods of flexibility and adaptation to the internal and external requirements of the organization. Having permanently as reference the treasury budget, the enterprises can resort to a series of measures that would allow them to pilot the enterprise in these unfavorable conditions:

- *Monitoring and updating the treasury budget as often as possible*. In times of crisis, the treasury budget becomes an extremely important tool, which provides a clear picture of receipts and payments. A correct planning and a permanent monitoring of them allows detailed analyses regarding the past financial results, the cash flow registered in a certain time interval, the activity of the cost and profit centers and taking the required corrective measures in order to remedy some unfavorable situations, which negatively affect the profitability of the business.
- *Avoid liquidity blockages*. During this period when many companies are likely to have fluctuations in sales or will face problems caused by very large increases in expenses, late collection of invoices from customers or discontinuity in the supply of stocks (because the supplier is blocked due to an outbreak of infection, because the supplier requires prepayment or reduces the payment term, due to stockouts, because in one period sales are very slow and in another orders are very high. All these negative shocks can be anticipated by simulating the impact on cash flow and working on the basis of several stress scenarios to avoid liquidity blockages, which inevitably increase the risk of going into insolvency.
- *Ensuring a cash reserve for crisis situations* can be achieved mainly by opening a short-term credit line, in order to cover the immediate need for cash caused by the gap between receipts and payments, the purchase of stocks, the payment of invoices or the payment of unexpected expenses. If necessary, the sale of assets that are not essential for the core business may also be used. Another possibility is to resort to factoring (financing of receivables), a method that does not require material guarantees and does not affect the degree of indebtedness or other financial indicators.
- *Choosing quality partners.* The company must always take into account the quality of the partners it collaborates with, whether they are a customer, a supplier, a bank or a strategic business partner. It is very important to know which partner can be trusted when it is necessary to request the postponement of payment terms or credit restructuring or renegotiation of contracts with customers and suppliers, to reduce the average duration of receivables collection and to extend suppliers' payment terms.
- *Adapting the business to the emergency situation (resilience strategy*). Given the rapidly changing context in which it operates, the company must be flexible, ready to take new measures in terms of business strategy, such as changing the product, accelerating sales and revenue, accelerating the liquidation of stocks, materialization of gains from the liquidation of stocks, changes of the client portfolio, ensuring the cash available for situations of crisis, etc.
- *Detailed analysis of expenses*. In order to maintain the activity going, it is important to reduce variable costs as much as possible and to keep fixed costs under control. The company must analyze operating costs and must consider reducing or discarding all non-essential expenses. Rational management of expenses, adapted to the level of monthly receipts, can be a very good resource (action) for maintaining a constant positive cash flow.
- *Reviewing investment plans*. The company must assess the possibilities for short-term capital raising, debt refinancing or additional support from banks or investors, as well as political support from the government. At the same time, taking into account the cash flow forecasts, you have to answer a series of questions such as: Which investments can be postponed until the situation improves? Which of them should be reconsidered? What investments are needed to return to positions and create a competitive advantage?
- *Staff motivation*. Another aspect that must be controlled in moments of uncertainty is the level of motivation of the team. Permanent communication regarding the existing situation, involvement in projects

that ensure the survival of the company, showing appreciation for the work done, offering empathic help for personal issues are elements that strengthen staff motivation. Encouraging work from home and mutual support are the best ways to deal with this time of crisis.

Conclusions

To conclude, we can say with conviction that the treasury budget is a very useful tool for the company's financial strategy and management decision-making, because detailed knowledge of cash flows helps the long-term development of the company. The policies of an enterprise can only be conceived from the cash flow, which is the key element of any business plan, and the movement of flows is the "great art" in the decision-making process.

Companies around the world are trying to accept the effects that current events have had on cash flows and their business. Although the risks are considerable, the crisis also reveals areas where companies can develop resilience and where they can reshape in the post-crisis period.

Acting in an uncertain horizon, with an unstable cash flow, it is essential for companies to follow the cash flow forecasts throughout the year, at least at monthly intervals and in case of atypical events. Good control of the projected cash flow, either in the “isolation” phase or a fortiori during takeover, can be a decisive competitive advantage for organizations' management and their ability to recover. Thus, financial managers can determine approximately the periods during which the treasury will have a surplus or a deficit, provisions that are found in the treasury budget.

Efficient management of the cash flow generated by the activities carried out can help the company in controlling and managing resources, reducing costs, maintaining financial stability, anticipating problems and maximizing the results obtained, while incorrect management of the treasury is often the main cause of bankruptcies.

In order to maintain the financial balance, it becomes necessary to use the treasury budget, which predicts the ratios between receipts and payments and identifies possible credit needs. Therefore, we can say that the treasury budget is a forecast dashboard of the company's liquidity supply and demand, which allows financial managers to optimize the company's financial results.

The cash flow statement has been integrated for more than fifteen years in the financial reporting system of Romanian enterprises, but it is not regularly taken into account by managers in the decision-making process. This statement is consistent with the findings of other researchers, including Mautz and Angell (2009), regarding the confusion and difficulties of understanding that the cash flow situation still raises for users of financial statements. We hope that our approach has succeeded in presenting, theoretically and applicatively, the importance of using the treasury budget in managing cash flows and that it will determine more and more managers to add it to the other performance management tools used in the management process.

The issues addressed in this paper create the premises for expanding research through an approach that allows budgetary control of the treasury and optimizing the company's cash flow, as well as identifying other methods and tools for managing the company's treasury. Having an adequate system of budgetary control would allow companies to improve their managerial attitude and performance and provide useful information for solving financial challenges.

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Increasing Operational Effectiveness of The Enterprise by Using the Methods of Lean Manufacturing and Six Sigma

Alexey Georgievich KORYAKOV
Financial University under the Government of the Russian Federation, Moscow, Russia
agkoryakov@fa.ru

Oleg Igorevich ZHEMERIKIN
MIREA — Russian Technological University, Moscow, Russia
ozhemer@yandex.ru

Martinas PRAZAUSKAS
Bournemouth University Poole House, United Kingdom
prazauskas@mail.ru

Abstract

As a rule, the problem of improving the operational effectiveness of the enterprise is in the responsibility of its key managers. The concepts of Lean manufacturing and Six Sigma (Lean Six Sigma) transpose these tasks on all the processes and areas of the creation of the product's value. The positive experience of Honeywell demonstrates how the operational effectiveness of the enterprise can be increased by incorporating the methods of Lean Six Sigma into the production system. This article discusses the main elements of the Honeywell operating system that may influence its operation efficiency. The specific examples of the use of Lean and Six Sigma methods at a Russian enterprise are given. The method of Tier meetings, which enables to increase the operational effectiveness by means of timely identification of production problems, is described. The conclusion highlights the possibility of spreading this experience to other Russian enterprises.

Keywords: lean manufacturing, six sigma, operational effectiveness, Tier meetings, Honeywell operating system (HOS).

Introduction

In the era of digitization, the task of increasing the operational efficiency of an enterprise, achieving the best ratio between attracted resources and the final results of its performance remains to be no less relevant [1, 2]. The practice shows that the best companies seek using all modern managerial methods to complete this task. Among these, Lean and Six Sigma are the most widely used methods [3,4]. In this regard, it would be particularly informative to consider the successful practice of applying the above methods by the example of Honeywell.

Honeywell is a diversified corporation that is concentrated on industrial technology & software and is among the world's 100 leading companied according to the Fortune magazine. The corporation's approximate annual turnover is 35 billion USD. The corporation serves customers all over the world, offering products and services in such industries aerospace engineering, special materials and the control systems for industrial enterprises and buildings [5].

On the territory of the Russian Federation, Honeywell owns three production plants on Lipetsk, Moscow and Arzamas (Nizhniy Novgorod region). They produce the components for automation systems, control, protection and security of safety of facilities as well as personnel, devices and systems for electricity and gas metering [5].

The Methods

This study of Honeywell's experience was completed by using the methods of systematical, logical and comparative analysis. The achieved findings will be implemented in the management of the company.

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The Results

The production system that is created by the company (HOS – Honeywell Operating Systems) allows to standardize and improve business processes of the company, as well as to create a specific work culture. It is based on the principles of Lean and Six Sigma and the employees' behavioral models. This system is implemented at all levels of the company, from business planning to manufacturing, and is focused on the level of personnel's involvement and continuous process improvement. It is needless to say, that the management support is needed for its successful performance. Much attention is paid to the production sectors where the product's value is created. The structure of HOS is demonstrated in Figure 1.

We believe, that for improving the company's operational efficiency, the following elements of HOS have significant potential: 5S, Visual Management, Tier Meetings, Rapid Problem Solving, The Suggestions on Improvements (Kaizen).

Figure 1: The structure of HOS

The developed by the company Tier Meetings system is characterized by short meetings of workers of production sites, managers and the employees of functional services. During these meetings, the results of the past day and the plans for the current day (or a week) are discussed, the main difficulties are identified, and priorities of the working day are set. The principle of conducting Tier Meetings is the same for all levels. In Honeywell, the meetings are hierarchically structured and arranged. It is worth mentioning, that duration of workshop meetings is strictly limited to a maximum of 15 minutes.

Tier 1 Meetings are held every morning at the beginning of a working day at the workplace. The meeting is dedicated to discussion of the elements of labor protection, quality indicators, and production efficiency. A shift foreman or an engineer of the quality control department tells about the implemented changes at the workplace. The worker, in turn, briefly describe the problems that occurred.

Then, Tier 2 Meetings of all company's departments (logistics, procurement, quality department, engineering department, warehouse, etc) take place. Tier 3 Meeting is arranged for the purpose of production planning and is attended by the heads of the departments. Thus, in the morning all the managers are aware of the results of the previous day and make changes, if needed, to the plans of the present day.

Let's have a look at the experience of Lean and Six Sigma for improving a company's operational efficiency given by three specific examples of the production activities of Honeywell enterprise in Lipetsk.

Example 1. 'Wrong thread number'.

White threads are used in the production process of the leash. A strictly defined number must be used for each seam. In case of using wrong thread, the entire product is rejected. As the threads do not differ from each other by their appearance, they can be identified only by the color of the coils and there are no any numerical designations.

During the final inspection, it turned out that several products had been made with the wrong thread numbers and these produces were rejected.

At the daily meeting of Tier 1, the engineer of quality control department (hereinafter – QC) explained the problem to the seamstresses and enquired for a possible solution. During the day, the shift foreman and the QC engineer discussed the possible options of eliminating this problem with seamstresses. They came to an agreement to mark the thread number on the holders above each sewing machine (which was done right away). In addition, the QC engineer prepared an information table for quick determining of the thread number by the color of the coil.

The next day, all the changes and innovations were told in detail to all employees at the meeting (thus, a training was conducted for the operator of two shifts). The conclusion of this example is obvious: by implementing 5S elements and visualization into HOS, the defect was eliminated, and it never appeared again.

Example 2. 'Bad cut'.

The harness tape arrives at the enterprise in reels of 100 meters each. Before sewing the product, the workers cut the pieces to required length. For this purpose, a special equipment is used – an automatic hot knife. After adjusting it to specific technological parameters (the knife temperature and cut time), the defect of the final product in the form of a bad cut appeared. The ends of the tape had not been sealed as they should be, and therefore could not meet the requirements on quality. Moreover, in a short period of time, the percentage of defective goods increased sharply (see figures 2 and 3).

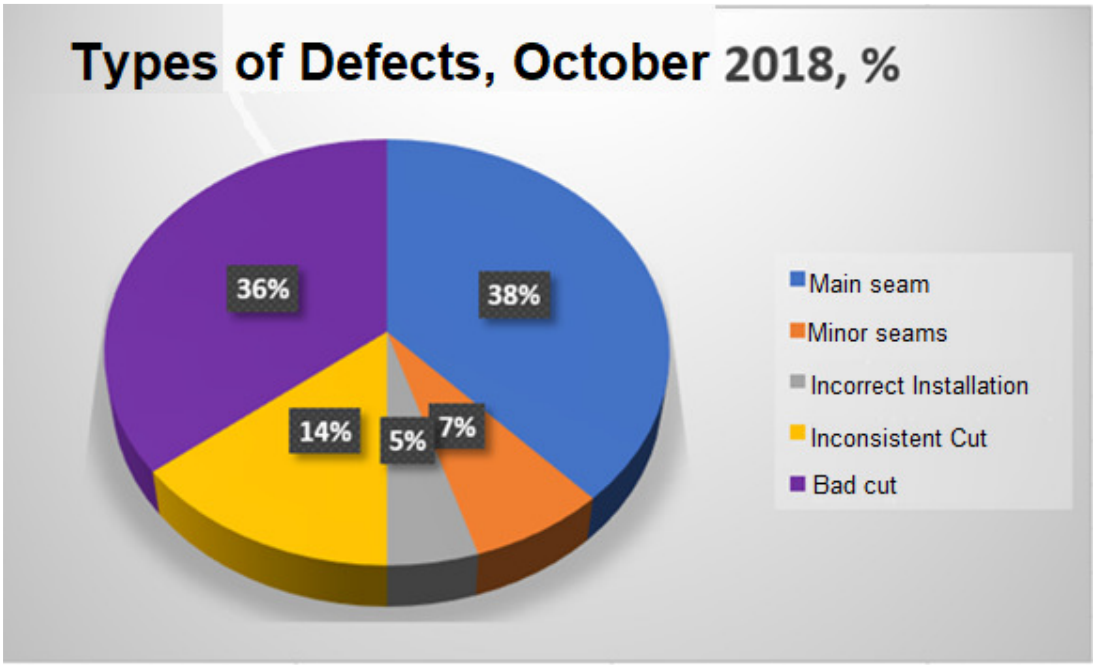

Figure 2: The structure of defected goods in October 2018.

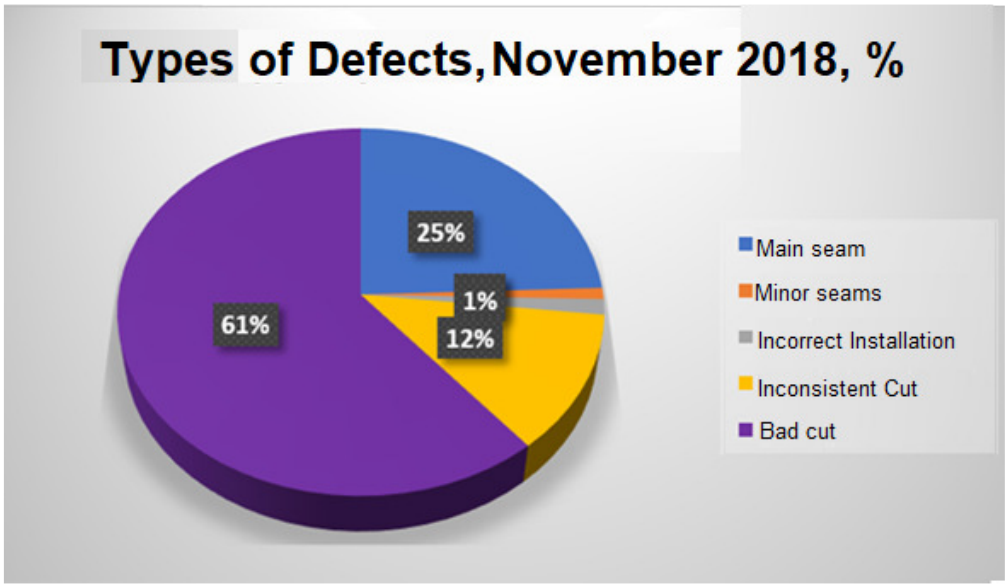

Figure 3: The structure of defected goods in November 2018.

As follows from Figure 2 and Figure 3, in October 2018 this type of defect accounted for 36% of all defected goods, but in November – 61% already.

After discovering this situation, the QC manager discussed the problem with the engineer responsible for the equipment and outlined possible solution to the problem. At the Tier Meeting, the production workers were shown this type of defect and were warned of the necessity of additional inspection at this production stage.

The engineers contacted the equipment manufacturer and had been adjusting the parameters of the hot knife, achieving the required quality of the cut. The seamstresses and the QC engineer had been monitoring the results of the changes and the amount of defects in order to identify the optimal parameters of the knife. As a result, in December 2018 the above defect had been eliminated entirely (see Figure 4).

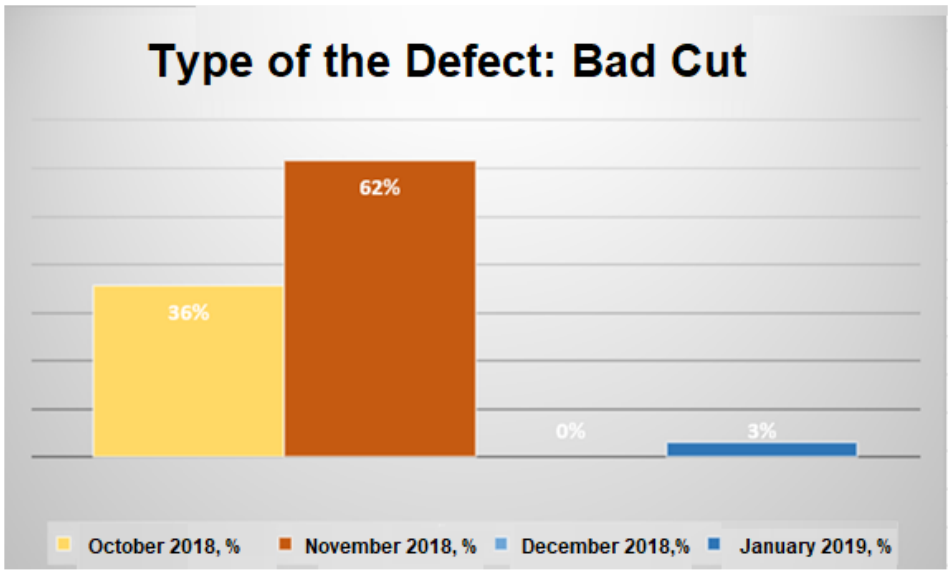

Figure 4: The dynamics of finished goods featuring 'bad cut' defect (October 2018 – January 2019).

Considering this example, we come to the conclusion that the company's engineers and managers have used such Lean manufacturing methods as 'Rapid Problem Solving' and 5S (in terms of forming the habit of accurate following the established rules, procedures and technological operations) as well as Six Sigma (reducing the percentage of defective goods).

Example 3. 'Falling out of the needle during sewing'.

During the production process, there were several identical cases when the needle was poorly secured in the needle bar and fell out during the sewing. As a result, the equipment was damaged, and the production entirely stopped for repair. Due to the frequent repetition of this situation, there was a potential threat of stopping production because of the amount of spare parts for sewing machines. Apart from that, the increased consumption of materials (needles) resulted in the increase of production costs.

According to the company's records, in February 2019 alone, equipment downtime at the production site due to needle falling out amounted for 20% of total downtime.

Since at the Tier 2 Meetings in the engineering department there is a daily analysis of production downtime due to the breakdowns of the equipment, the initial cause of the breakdown of the equipment was identified quickly. Then, at the Tier 2 Meeting, the engineers explained to the production workers (in this case – seamstresses) the causes of the equipment breakdowns. After that, an additional clause to the local regulatory act of the enterprise – the regulations for servicing sewing machines for operators, obliging them to check the needle attachment before working – has been added. These regulatory changes were introduced to the operators. In a week period, they were conducting appropriate training with the seamstresses. In the process of completion, the special screwdrivers were selected and placed at every workplace.

The technical audit of the failed spare parts identified exactly those parts that were necessary to have to be always available at the enterprise in order to avoid equipment downtime for organizational and technical reasons. It allowed to order the necessary parts to be delivered to the warehouse of the enterprise in advance (as the delivery may normally take several months). As a result of taken measures, the noted malfunction no longer appeared.

Conclusions

Honeywell's existing HOS manufacturing system combines all business processes for sustainable development, that is constantly developing the best products and is using the best experience, while increasing the productivity and efficiency of production processes, as well as reducing the costs [2, 3].

This system is based on the principles of Lean Manufacturing as well as the concepts of Six Sigma and 8 models of employees' behavior. The considered examples of practical implementation of the methodologies of Lean and Six Sigma inro the practice a Russian enterprise lead to the conclusion about its successful applicability for increasing operational efficiency. The experience of Honeywell can be extended to other Russian enterprises as well [6], [7].

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Household Preference Toward Financial Inclusion in the Coastal Area of Aceh Besar District, Aceh Province

ALIASUDDIN
Faculty of Economics and Business, Universitas Syiah Kuala
Banda Aceh, Indonesia
aliasuddin@unsyiah.ac.id

Taufiq C. DAWOOD
Faculty of Economics and Business, Universitas Syiah Kuala
Banda Aceh, Indonesia
taufiq.dawood@unsyiah.ac.id

Nanda RAHMI
Faculty of Economics and Business, Universitas Syiah Kuala
Banda Aceh, Indonesia
nanda_rahmi84@unsyiah.ac.id

Abstract

The aim of the study is to examine household preference toward financial inclusion in the coastal area of Aceh Besar District, Aceh Province, by using a logistic model. Primary data of households are collected from the coastal area with total respondents of 400 households. The results reveal that income has a positive and significant effect on household preference toward financial inclusion and the magnitude of the variable is the biggest compared to other variables. Furthermore, the educational level has a second bigger effect on household preference toward financial inclusion, whereas age has a negative and significant effect on household preference toward financial inclusion. To increase financial inclusion in this area, the local and provincial governments should promote household income.

JEL: D14, E10, E71, G41

Keywords: Poverty, Financial Inclusion, Aceh Besar, Aceh, Tsunami

Introduction

The development of banking services continues from conventional banking to digital banking. With digital banking, banking services are not only limited to the availability of bank offices. Still, they can reach a wider area as long as there is an internet network of sufficient quality to support digital banking. Although digital banking has developed very rapidly, many people do not have access to banking services. Bank Indonesia Banda Aceh finds that banking services in Aceh Besar District are still deficient at only 2.56 percent (BI Aceh, 2019). The position of Aceh Besar District, which borders the City of Banda Aceh, does not yet have good banking services, so that financial inclusion also faces obstacles. The imbalance in banking services is enormous because Banda Aceh has banking services of 11.19 percent and is the highest banking services in Aceh Province (BI Aceh, 2019). As an inland area of Banda Aceh, Aceh Besar District has an economy that does not follow the pattern of Banda Aceh as the center of economic growth in Aceh. For example, the poverty rate in Aceh Besar is still high, namely 13.92 percent, much higher than Banda Aceh, which reached 7.22 percent in 2019 (BPS Aceh, 2020). Meanwhile, the economic structure of Aceh Besar is still primarily dominated by the primary sector with a contribution of 28.12 percent, followed by the secondary sector at 17.32 percent and the tertiary sector at 54.56 percent (BPS Aceh Besar, 2019).

The workforce usually follows the pattern of economic structure in each sector. Figure 1 shows that the people's primary occupation in Aceh Besar District was in the tertiary sector from 2006 to 2017. This condition is the same as the distribution pattern of GRDP in Aceh Besar District. When viewed from the distribution of GRDP and the

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dominant occupation in the tertiary sector, the utilization of banking services should be more generous because activities in the tertiary sector are usually more modern and use a lot of banking services. However, banking services are available, which is still at 2.56 percent (BI Aceh, 2019). The result describes a situation that is not in line with the economy and workforce's distribution pattern—perhaps related to the tsunami disaster in 2004, which hampered the development of banking services in Aceh Besar District's coastal area.

The 2004 Aceh tsunami natural disaster caused financial inclusion to experience delays because several studies found that natural disasters harmed the regional economy, including financial inclusion (Keerthiratne & Tol, 2018). Aceh Besar District, which experienced the 2004 tsunami natural disaster, faced the problem of inequality. Aceh Besar District, which experienced the 2004 tsunami natural disaster, faced inequality of financial inclusion and delays in developing financial inclusion coupled with deficient availability of banking services.

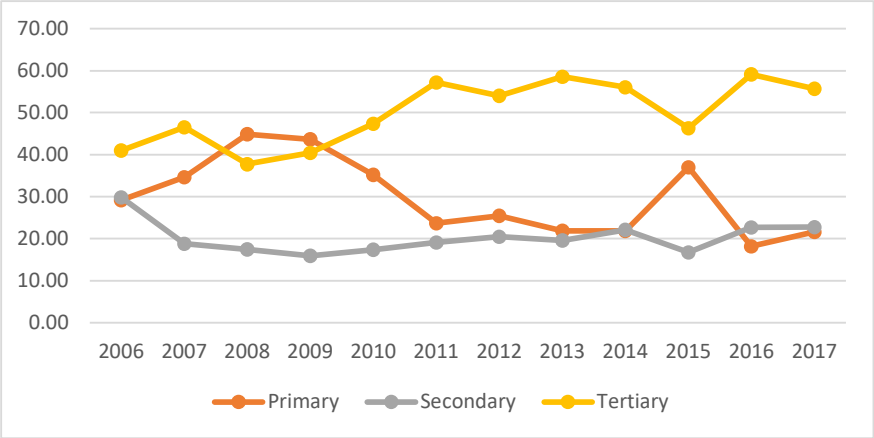

Figure 1: Employment by Main Sectors in Aceh Besar, 2006–2017 (percent)

Financial inclusion differences can also be caused by other factors such as income level, education, gender, region, and other factors (Ains & Weill, 2016). The same thing is documented by research conducted by Zins & Weill (2016) that several factors that determine financial inclusion are poverty level, education, and gender. Many studies have also analyzed the role of financial inclusion in poverty reduction. The study results prove that financial inclusion has a positive effect on economic growth in 55 OIC countries (Kim, Yu, & Hassan, 2018). The study shows that financial inclusion has an essential role in driving economic growth.

Furthermore, a study conducted by Li (2018) found that financial inclusion can reduce the amount of poverty in China. However, other studies find that financial inclusion cannot mitigate the poor (Neaime & Gaysset, 2018). This situation can occur due to various factors. For example, some people have not used banking services for productive activities, so financial inclusion has not been optimal.

Most of the studies conducted in many countries have focused more on financial inclusion on poverty and economic growth. Still, there is a minimal study of how households prefer financial inclusion. There are very few studies on this, and even for the 2004 Aceh tsunami, it has never been conducted. Based on these considerations, this study discusses household preferences for financial inclusion in the area after the 2004 Aceh tsunami, so this study is specifically for coastal areas in Aceh Besar District.

Literature Review

Aceh Besar District has many beaches used as tourist attractions, so that the coastal area became the center of economic growth before the 2004 Aceh tsunami. Thus, people are concentrated in this area to provide services for tourism activities in the coastal zone. Many victims of natural disasters in this area are caused by the concentration of residents in coastal areas. Many studies conducted in various countries prove that disasters cause damage and poverty in the area. Ramalanjaona (2011) found that the 2004 Aceh tsunami had a considerable impact. At least 250,000 people died in 18 countries, and 1.7 million people were left homeless.

Another study in Nigeria found that natural disasters significantly affect life, property, education, and people's lives (Ademola et al., 2016). Furthermore, research in India shows the impact of flooding on people's loss of life and property (Mahanta & Das, 2017). The same thing was found by Karim (2018) in Bangladesh, where floods harmed agricultural income. These various studies show that natural disasters affect people's lives, assets, and livelihoods, including financial and banking developments.

The rehabilitation and reconstruction of Aceh after the 2004 tsunami had a positive impact on people's lives in coastal areas, including in Aceh Besar District. However, the development of the financial and banking sectors was still relatively low, as evidenced by a study conducted by the Bank. Indonesia, whose banking services in Aceh Besar District, are still deficient (BI Aceh, 2019). The development of the financial and banking sectors is significant to encourage regional economic growth and improve people's welfare. Kim et al. (2018) found that financial inclusion substantially affects economic growth in OIC countries.

Furthermore, their research results show that there is a causality relationship between economic growth and financial inclusion. This result indicates that the development of financial inclusion is significant in improving people's welfare. A higher level of welfare will increase financial inclusion owned by the people.

Li (2018) proves that financial inclusion has a significant effect on reducing the poor in China. This research is the same as the results of previous research conducted by Boukhatem (2016). The study documents that financial inclusion impacts the reduction of the poor in low- and middle-income countries. However, different results were found by Neaime & Gaysset (2018) that financial inclusion does not have a significant effect on improving welfare in MALEA countries. That is, financial inclusion may not be notable under certain conditions in the country.

The study of financial inclusion plays a role in improving welfare, but there are also several studies on the development of financial inclusion and the factors that influence it. The result of financial inclusion cannot be separated from the internet's progress today because with the presence of the internet, digital banking is increasingly developing and able to serve customers in a broader range. Ozili (2018) states that digital banking's progress is an essential factor in the development of financial inclusion. Digital banking provides more comprehensive access to people, including those with low incomes.

Tchamyou et al. (2019) found that the development of ICT affects financial inclusion and will ultimately reduce inequality in people's income. In this case, digital banking's role is a significant factor in the development of financial inclusion (Iqbal & Sami, 2017).

Zins & Weill (2016) found that several factors determine the choice of financial inclusion by individuals. These factors are gender, wealth, education, and age. But especially for age, young people prefer digital banking compared to senior citizens because of using digital banking applications that make it easier for young people. Furthermore, confirmation of the study results was carried out by Ains & Weill (2016). Apart from these factors, there are still regional factors that determine financial inclusion by households. The result is closely related to the availability of useful internet to support digital banking.

Lyons et al. (2018) found that education, age, income, and gender are essential variables in society's financial inclusion preferences. This study's results are in line with previous research conducted by Zins & Weill (2016) and Ains & Weill (2016). Furthermore, previous research conducted by Swamy (2014) found that females are more receptive to financial inclusion than males.

This study of household preferences for financial inclusion is essential to fill empirical evidence gaps, especially in the post-2004 Aceh tsunami and particularly Aceh Besar District. This preference is expected to be one of the vital information in developing financial inclusion in Aceh Province, hoping that increasing financial inclusion can impact people's welfare.

Research Method

Population and Samples

This research was conducted in the coastal area of Aceh Besar District, selecting sample sub-districts carried out deliberately because of the aftermath of the tsunami in Aceh in 2004. There are six sub-districts sampled in this study. These districts are Lhoong, Leupong, Lhoknga, Peukan Bada, Baitussalam, and Masjid Raya. Tejada & Punzola (2012) state that a tolerable error of 5 percent determines the ideal number of samples represented by the Slovin formula. Determination of this ideal sample with the formula (Tejada & Punzola, 2012):

$$n = \frac{N}{1+Ne^2} \quad (1)$$

where *n* is the sample, *N* is the number of populations, and e is the error tolerance. Following equation (1) and the population in Table 1, the ideal sample size is:

$$n = \frac{24,771}{1+24,771(0.05)^2} = 393 \quad (2)$$

Fortunately, the number of samples in this study was 400, even though there was a Covid-19 pandemic. Still, the sampling method using simple random sampling carried out in households was only found due to the Covid-19 pandemic problem. The sample distribution for each sub-district is shown in Table 1.

Table 1: Subdistricts, Households, and Samples

No	Subdistrict	Households	Ideal Samples
1	Lhoong	3145	56
2	Leupung	879	16
3	Lhoknga	4176	74
4	Peukan Bada	4752	84
5	Baitussalam	5606	100
6	Masjid Raya	6213	110
Total		**24771**	**400**

Source: Author calculation from BPS Aceh Besar (2020).

Model

The analytical model commonly used in determining preferences is a logistic model. This logistic model's choice is due to the limited number of samples, and the dependent variable is dichotomous, so it is very suitable for this study. The estimation model in this study is stated as follows:

$$FI = \beta_1 + \beta_2 Y + \beta_3 EL + \beta_4 A + \varepsilon \quad (3)$$

Theoretical coefficients: $\beta_2, \beta_3 > 0$, and $\beta_4 < 0$

FI is financial inclusion. A dummy variable represents the variable, *1* for households with financial inclusion, and *0* otherwise. Income is measured in rupiah and transformed into a natural logarithm (in Indonesian rupiahs). Simultaneously, the education level is expressed in a dummy variable, *1* if the household has high education and *0* otherwise. Finally, *A* is the age in years. Increasing age will impact reducing the desire for financial inclusion because the advancement of digital banking affects the ability of senior citizens to use various digital financial applications.

The model used in this study is limited to only a few variables to get a parsimony model. The parsimony model usually gives more reliable results than an over parameterized model. The cross-tabulation was performed on the selected variables.

The logistic model in equation (3) is very suitable for use in this study because the sample size is 400 households. Following the large sample properties, the logistic model will be more reliable if the number of samples used. According to Tejada & Punzola (2012), the minimum sample size is 393, while this study used a sample of 400 households. Based on these considerations, this logistic model is very suitable for use in this study.

Findings and Discussion

Statistics of Variables

The findings and discussion section discusses several subsections that can complement this study. The first part is the statistics of variables that can be used to measure the distribution of data used in this study. The variables selected in this section are only age, family size, income, expenditure, and years of schooling.

The variables' statistics show that the lowest household sample age was 35 years, and the highest was 70 years, with an average of 45.52 years and a standard deviation of 9.14 years. When viewed from that age, most of the household samples are of productive age. Furthermore, the lowest number of dependent respondents is one person, and the maximum number of respondents is eight people with an average of three people. The average family size is almost the same as the average family size in Aceh Province, four.

Respondents in this study experienced enormous inequality because the smallest income was IDR 200,000, and the maximum was IDR 30,000,000. The lowest amount of income is far below the average income of Rp. 2,943,810. This condition indicates that some households are impoverished, and some are very rich. The same thing can be seen from the lowest total expenditure of IDR 30,000 and the highest IDR 8,000,000 with an average of IDR 1,910,048.

The last variable is the average years of schooling are 11 years, the lowest has never attended school, and the highest is 16 years. The average years of schooling are two years, where this achievement is higher than the national compulsory nine-year education program. Regarding income, there is a correlation that low-income households have a low level of education. More detailed data shows that only 30 households or 14.3 percent of respondents have high education, and 180 respondents or 85.7 percent have insufficient education. The variable statistics are presented in more detail in Table 2.

Table 2: Statistics of Variables

Variable	Minimum	Maximum	Mean	Std. Deviation
Age	35	70	45.52	9.14
Family Size	1	8	2.86	1.58
Income (IDR)	200,000	30,000,000	2,943,810	3,446,066
Expenditure (IDR)	30,000	8,000,000	1,910,048	1,147,548
Years of Schooling	0	16	11	3.48

Source: Estimated Results, 2020.

Estimated Logistic Model

Estimation of equation (3) is conducted to analyze household preferences for financial inclusion with independent variables, namely income, education, and age. The estimation results are presented in Table 3, where income is a variable that significantly influences household preferences for financial inclusion. This coefficient is positive, which indicates that an increase in income has a very significant effect on household desire for financial inclusion. This coefficient also has the most considerable magnitude compared to other variables. Increased income will have an impact on increasing the possibility of choosing financial inclusion. If income rises one time, the probability of selecting financial inclusion increases 13.42 times, assuming ceteris paribus.

The results of this study are in line with research conducted by Ains & Weill (2016), Zins & Weill (2016), and Lyons et al. (2018), who found that income is a significant variable in determining financial inclusion. This result implies that economic developments that result in increased income are very substantial in determining household preferences in choosing financial inclusion. Equality in economic development must be better and more equitable so that all society levels can access banking services, including digital banking.

Besides, education is also significant, indicating that education has a positive effect on financial inclusion choices. If one year of education increases, the probability of choosing financial inclusion will increase 1.12 times by the assumption that other variables are held constant. This is according to the statistical variables in Table 2, which provide information that there are still many respondents who have low education but are willing to use banking services to fulfill daily household transactions. This result is perfect for increasing the selection of financial inclusion so that more people use banking services. By increasing financial inclusion, it is hoped that it will reduce poverty and inequality in living standards and social welfare.

Research by Ains & Weill (2016), Zins & Weill (2016), and Lyons et al. (2018) stated that education is essential in financial inclusion. Thus, this study is in line with their research. Efforts to improve knowledge are a crucial factor so that people have a higher level of education. Better education will encourage households to use financial inclusion, which will increase the standard of living and welfare of the people.

The last variable is the respondent's age, which is negative and significant, which indicates that the older the respondent is, the lower the chances of choosing financial inclusion. This result is very rational because with the development of digital banking today, various banking service applications will not be easy for elderly households. An increase in age for one year resulted in a decrease in choosing financial inclusion by 0.96 times.

The effect of this age has a smaller magnitude than other independent variables. Table 3 shows the results of the logistic model estimation from equation (3) in this study. This study's results are in line with research by Swamy (2014), which found that the elderly have a lower tendency to have financial inclusion, especially digital banking.

Table 3: Estimated Logistic Model

Variable	Coefficient	SE	p-value	Odds Ratio
Income	2.597	0.304	0.000	13.42
Education	0.111	0.051	0.029	1.12
Age	-0.044	0.016	0.006	0.96
Constant	-37.126	4.307	0.000	0.00

Source: Estimated Results, 2020.

Cross-Tabulation

Several variables were tested individually to determine their effect on financial inclusion, with the control variable being gender—first, the impact of education on financial inclusion between males and females. The test results prove that education is very influential in financial inclusion in both males and females. This study demonstrates that education is critical in financial inclusion. Better education will influence people's desire to access banking services. This situation is very rational because, with better education, households' ability will be better and more open to various facilities provided by financial institutions, including digital banking. These results support the previous works that education is an essential variable in financial inclusion. These results can be seen in more detail in Table 4.

Table 4: Financial Inclusion, Educational Level, dan Gender

Gender	Pearson Chi-Square	df	p-value (2-sided)	p-value (1-sided)
Female	18.63	1	0.000	0.000
Male	16.41	1	0.000	0.000
Total	34.60	1	0.000	0.000

Source: Estimated Results, 2020.

Second, the effect of the level of welfare on financial inclusion between males and females. Low and non-poor households still have a desire for financial inclusion, both male and female. The result reveals that the advancement of banking services has been put to fair use by households. These results are also under the effects of previous estimates. For more details, the test results can be seen in Table 5.

Table 5: Financial Inclusion, Welfare, dan Gender

Gender	Pearson Chi-Square	df	p-value (2-sided)	p-value (1-sided)
Female	28.29	1	0.000	0.000
Male	26.17	1	0.000	0.000
Total	57.12	1	0.000	0.000

Source: Estimated Results, 2020.

Table 5 shows that the welfare variable is significant, as evidenced by the very significant Pearson Chi-Square coefficient on both 2 and 1 sides. This result is significant to emphasize that welfare is an essential factor for households in choosing financial inclusion. From all income levels, all walks of life can accept financial inclusion in the current transaction process. This development is an indicator of increasing public acceptance of financial inclusion. Financial institutions can utilize these developments to increase penetration of the financial market for all levels of society.

The last variable is the effect of job status on financial inclusion between males and females. The results of the latest variable statistical test are presented in Table 6. The table shows that female's employment status does not affect determining financial inclusion. Working and unemployed females still have a relatively low desire for financial inclusion. Meanwhile, for males, the work contract or long term is a significant variable so that every man in this study still wants access to financial inclusion. Financial inclusion is substantial for the male to support daily transactions in financing household needs. However, for females, the desire for financial inclusion from permanent and casual employment has not yet influenced financial inclusion choices.

Table 6: Financial Inclusion, Working Status, dan Gender

Gender	Pearson Chi-Square	Df	p-value (2-sided)	p-value (1-sided)
Female	0.46	1	0.570	0.310
Male	9.09	1	0.003	0.002
Total	8.96	1	0.004	0.002

Source: Estimated Results, 2020.

Conclusions

Based on variable statistics, logistic model estimation, and cross-tabulation, several things can be concluded. First, the respondents' average age in this study was at a productive age, even though some were 70 years old. Second, the number of household dependents is still below the Aceh Province average, so the dependency burden is relatively lower. Third, household income is unequal because some are very high, and some are very low, and the same condition is shown by expenditure. Fourth, the average years of schooling for sample households are higher than the national compulsory education program. Fifth, income is a significant variable in household preferences for financial inclusion, while the effects of education and age are also significant. Sixth, cross-tabulation shows that education is critical in financial inclusion for both males and females. The level of welfare indicates the same. Meanwhile, the types of work have different results between males and females, where females who have permanent jobs will have more influence on financial inclusion than males.

There are several recommendations according to the results of this study. First, banks must increase service coverage to villages to have complete access to banking services. Second, an increase in people's income, followed by better distribution, should be the government’s attention in any development policy to benefit from the regional development process. Third, it is necessary to encourage society's tendency towards education so that education plays a role in improving welfare and financial literacy. This situation will affect financial inclusion.

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Methods for Design Improvement of Feed System for Ultrasonically Aided Micro-Electrical Discharge Machining

Bogdan-Ionut CRISTEA

Polytechnic University, Bucharest, Romania, cristea.ibogdan@gmail.com

Liviu Daniel GHICULESCU

Polytechnic University, Bucharest, Romania, daniel.ghiculescu@upb.ro

Abstract

The paper deals with constructive solutions for a feed system used at a hybrid process for miniature material removal, ultrasonically aided micro-electrical discharge machining µEDM+US. Some aspects on the state of the art of feed system for EDM are presented, e.g. types of control loops and corresponding control systems, used to improve the EDM and micro-EDM technological performances. The general and main functions are formulated, based on conceptual design approach, which were substantiated by block diagrams for displacements execution and structure of feed system. These are associated with several methods for quality improvements applied for identification of design solutions, like QFD, FMEA, relation, affinity, and tree diagrams. Finally, some constructive solutions resulted that were implemented in the design of the feed system dedicated to µEDM+US machining.

Keywords: micro-EDM, ultrasonic vibration assisted micro-EDM, feed system.

Introduction

In the current trend of miniaturization, the demand for precise components, with small dimensions and micro-scale features, is growing. Many of these components are demanded by important industries, such as automotive, aerospace and biomedical. These industries, and many others, are using components made of alloys with increasingly high toughness and less heat sensitivity, essentially difficult to machine through conventional (cutting) methods. Nonconventional processes like Micro Electrical Discharge Machining (µEDM) can be an excellent popular technological solution to machine materials with enhanced mechanical properties as discussed by Prakash et al. (2017).

Micro Electrical Discharge Machining becomes an important fabrication process to be used in manufacturing components at micro scale. However, the process is limited by a narrow working gap (1 to 5 µm) which facilitates the accumulation of debris. The debris need to be removed as soon as possible from the gap to prevent accumulation, otherwise the process becomes unstable, due to abnormal discharges. This ineffective flushing of particles out of the working gap leads to extensive machining time. Because the tool diameter is less than 1 mm, often in the order of µm, flushing techniques like: pressure flushing, jet flushing and suction flushing are very difficult to implement and they usually lead to breaking or shattering the electrode. Therefore alternative flushing techniques need to be used, one of which is ultrasonic aiding.

Ultrasonically aided Micro Electrical Discharge Machining (µEDM+US) is a hybrid nonconventional process. The vibrations of the tool or workpiece, improves the stability and the productivity of the process by flushing out the debris from the working gap as concluded by Khatri et al.(2015). Ghiculescu (2015) found out that the surface quality is also improved by reducing the roughness and the thickness of molted and resolidified material with often has microcracks, the so-called white layer.

The working gap remains narrow in case of µEDM+US and moreover it varies with ultrasonic frequency, which requires a more precise feed system to be used than in case of classic microEDM. Quick response, high speed and high acceleration of the feed system, i.e. high dynamics, prevents short-circuit between electrode and workpiece and also idle working of EDM process.

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Aspects of state of the art of feed system for EDM

Feed systems are used to adjust the work gap throughout the machining process. If the work gap is too big, no discharges take place, and if the gap is too narrow, short-circuits could happen. Therefore, the work gap has to be maintained at an optimal distance throughout the machining process. Consequently, a feed system is required, the *servo* one is the most common used, providing a loop for feedback reaction. One of the simplest variant is based on controlling the work gap by measuring the voltage in it, as stated in the book written by Elman (2001), and shown in figure 1. Other variants are based on other analogic parameters like: delay time at discharge ignition, number of normal discharges within a sampling period etc.

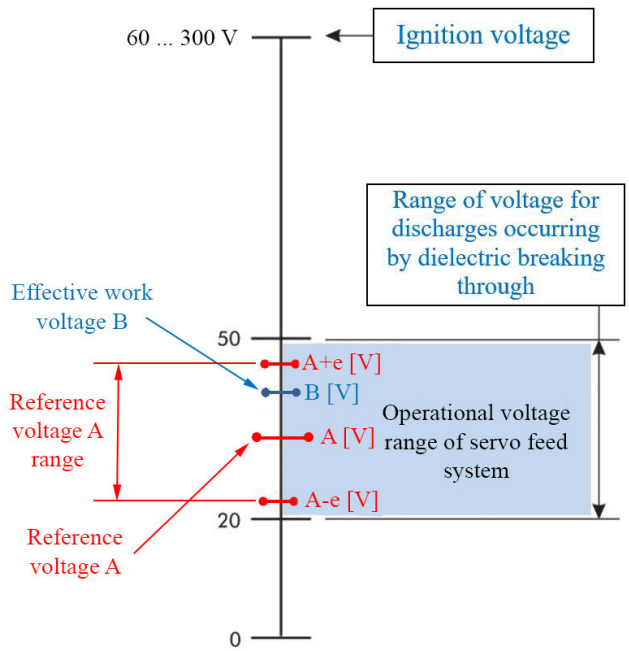

Fig. 1: The principle of EDM servo system based on voltage within the working gap

The system works as follows: a value in the machining voltage is selected as reference (A) with margins of ± e [V] for controlling the servo system. This reference voltage is compared to the real machining voltage (B), measured between the tool-electrode and workpiece. This difference between the reference voltage and the actual machining voltage between tool and workpiece is used to command the servo system to advance, retract or hold position.

Feed systems are built around a control loop, which is used to measure and adjust a certain variable to control a process. The most common ones are presented in figure 2 and 3, but there are also combinations of them (hybrid):

A. Open control loop – the output data has no influence on the input data. These type of systems do not measure the output data in order to check if the command has been properly executed (figure 2);

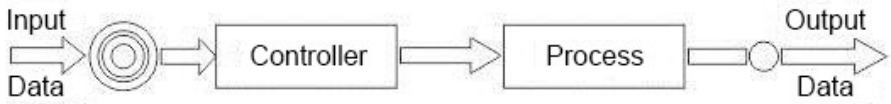

Fig. 2: Open control system

B. Closed control loop – the output data is fed back to the input data (feedback), in order to check that the command has been properly executed, and correct any errors (figure 3).

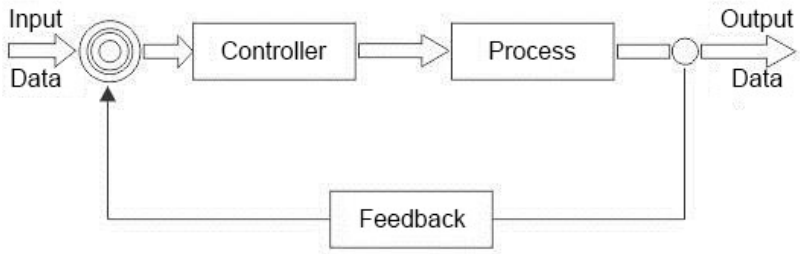

Fig. 3: Closed control system

On the basis of these control loops, a number of more sophisticated feed control systems emerged:

1. Adaptive Control System (ACS) – which is utilized to detect changes in process and automatically adjust the input parameters in order to optimize the result – the servo system works as an ACS;

2. Adaptive Control Optimization (ACO) – works just like ACS, but can adjust the input parameters before the process degrades, by tracking certain trends in the process;
3. Fuzzy logic – is a method that mimics the human mind in decision making. It analyzes all possibilities between 0 and 1, and takes the best decision possible.

These systems were adapted by various authors for EDM and µEDM machining, as shown in table 1.

Table 1: Published papers on feed systems

Control type	Title	Characteristics
ACO	An Adaptive Speed Control System for Micro Electro Discharge Machining	Yeo et al. (2009) developed an *adaptive* speed control for µEDM machining which demands a higher level of accuracy. The system enhanced the productivity by 50% in comparison with the classic servo system.
ACO	In-situ process monitoring and adaptive control for precision micro-EDM cavity milling	Jun et al. (2017) developed a new monitoring system in order to compensate for tool wear and achieve high machining accuracy. The system counts *normal discharges* and correlates it to the volumetric tool wear and compensates for it. The system reduced the work cycles by 18%, while maintaining accuracy.
FUZZY	Optimization of EDM Process with Fuzzy Logic Technique	*Taguchi method and fuzzy logic* are used by Biswas et al. (2012) to optimize EDM machining. The process parameters were optimized by performance parameters (productivity and surface roughness). Experiments identified a number of variable process parameters that achieved the best productivity and roughness.
FUZZY	Controlling of EDM Servo System using Fuzzy logic Controller	Shuruq et al. (2016) attached a *fuzzy logic* controller to a servo control system. The fuzzy controller can alter the motor's speed and acceleration, resulting in smoother curves of speed and acceleration. Therefore it reduces the excessive tool retraction, resulting in a less time consuming operation.

The papers published on feed systems focus on *speed control and process monitor*, showing that control over these can significantly improve the stability of EDM machining.

Some solutions for feed system

Several solutions for feed systems were developed by various authors:

1) Modification of the process dynamics in µEDM by means of an additional piezo-control system – Schulze et al. (2017) discussed that a chance to increase precision and productivity in EDM is to reduce the amount of inefficient process conditions. An approach is based on increasing the feed system dynamics and to achieve smaller increments;

2) A New Pulse Discriminating System for µEDM – Yeo et al. (2009) proposed a system that employs current pulse as the main detecting parameter, and classifies them into normal discharge, delayed discharge, arcing and short circuit. Experimental results show that machining time was reduced by more than 50% and the accuracy of resulting features is increased;
3) Digital Gap Monitor and Adaptive Integral Control for Auto-Jumping in EDM – Wang et al. (1995) uses an adaptive control strategy that regulates the periodical retraction of the tool electrode based on the working gap condition. The system ensures quick retraction (jumping) of the electrode.

Response time is crucial in µEDM. The faster the tool retraction happens the more short-circuits and arcing between tool and workpiece are avoided, resulting in improved working condition and stability. The faster the tool advances the more time is used machining, resulting in increased productivity.

Aspects of conceptual design

The general function of a feed system for microEDM is to position the tool electrode relative to machined surface under conditions of up to 5 µm, work gap. A series of main functions are deducted from the general function:
1. Ability to advance, hold and retract the electrode – the feed system must be capable of executing these types of movement throughout the operation length within a response time appropriate for microEDM;

2. Continually measure and indicate current position – system needs to constantly monitor its position with an accuracy of 10^{-1} µm order;
3. Execute movements with minimum delay – the feed system must execute technological movements – used while machining, and rapid movements – used in case of short-circuit and arcing. In both cases minimum delay is desired.

The PhD thesis of Ghiculescu (1999) revealed that there is a maximum response time of $\Delta T = 10$ ms, a threshold needed for small gaps, e.g. finishing or super finishing working modes (relation 1):

$$\Delta T = \Delta t_{MPP} + \Delta t_j + \Delta t_f + \Delta t_e \text{ [s]} \quad (1)$$

where: Δt_{MPP} – delay caused by a stepping motor [s]; Δt_j – delay caused by switching from advance command to retract command, clearance taking over [s]; Δt_f – delay caused by friction between moving elements [s]; Δt_e – delay caused by the elasticity of the system elements [s].

The study concluded that in 5 ms, there is a movement of 2 to 5 µm. Therefore it is recommended that the response time do not exceed 10 ms, otherwise the process becomes unstable for an usual 10 µm gap for the mentions above types of gaps. Since the study has been conducted in the case of EDM+US finishing, the value must be much lower for µEDM+US, where the gap varies with amplitude due to oscillation movement of tool or workpiece.

4. Execute movements after a profile of speed and acceleration – the feed system must be capable of adopting a speed and acceleration curve (*S shape* is one of the most appropriate) compatible with the precision imposed by µEDM+US machining.
5. Transform the rotation movement in translational movement – The component of the system that moves the electrode must execute only translational movement.

6. The system must be perpendicular on the work table – the feed system's precision depends on the perpendicularity on the machine's table;
7. Angle adjustment for use in angled holes – the system must be capable of executing a manner of sophisticated holes, inclined holes included;

8. Minimizing the transmission of ultrasonic vibrations within the technological system – Ultrasonically aiding µEDM consists of attaching an ultrasonic chain to the feed system. The horn, from the ultrasonic chain, has a node

where the vibration's amplitude is zero; the catching surface of US chain, the nodal flange is recommended to be as close as possible to the nodal plane.
Based on the functions detailed above, the block diagrams of the execution system of displacements (figure 4) and of the feed system structure were built (figure 5).

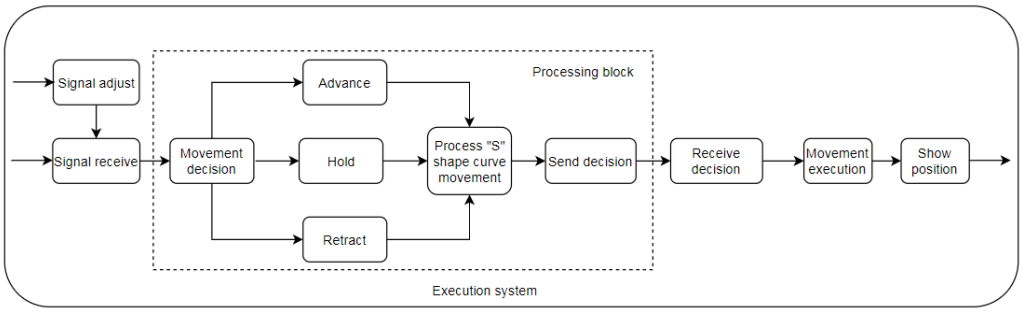

Fig. 4: Block diagram of displacements execution system

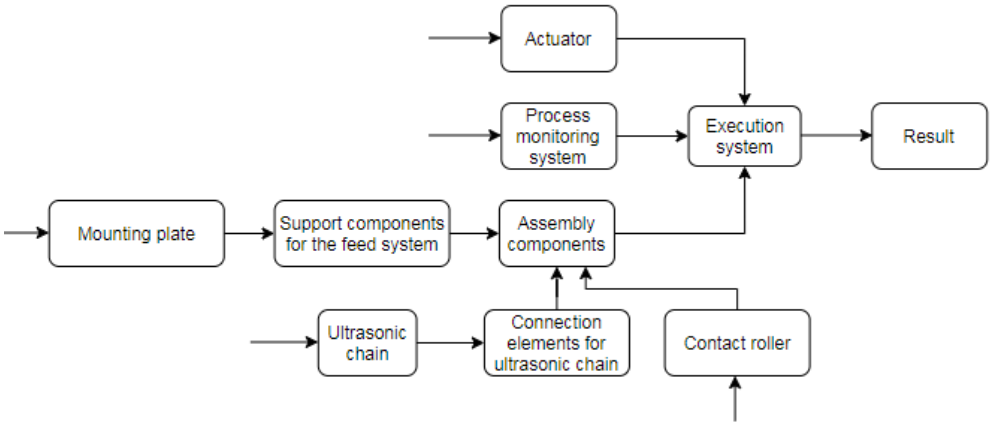

Fig. 5: Block diagram of feed system for ultrasonically aided microEDM

The main functions are used in the following chapter to improve the performance of the feed system of the ultrasonically aided µEDM through various performance improvement methods.

Methods for design improvement

In order to improve the performance of the feed system, a series of quality improvement methods are used from the book by Ghiculescu (2016): QFD (Quality Function Deployment) method, FMEA (Failure Mode and Effects Analysis) method, Affinity diagram, Relation diagram and Tree diagram:

Quality Function Deployment Method

Based on the main functions of the feed system and a requirements list from clients, several technical objectives resulted (figure 6), satisfying their needs in that order of priority: 1) Attach an encoder for position monitoring or output linear transducer; 2) Use "S" shape speed and acceleration curve – to make sure no shocks are induced in the system; 3) Motor native step split by a digital driver – the driver allows the motor to effectuate a so-called micro-step, the precision being increased; 4) In order to evaluate the minimum response times, certain tests are needed previously; 5) Use an adjustable contact roll to make the nut execute only translational movement; 6) Assemble the horn with minimal contact around the nodal plane; 7) Use a mounting plate with circular slots – to allow tilting; 8) Use blocks to align and orient components.

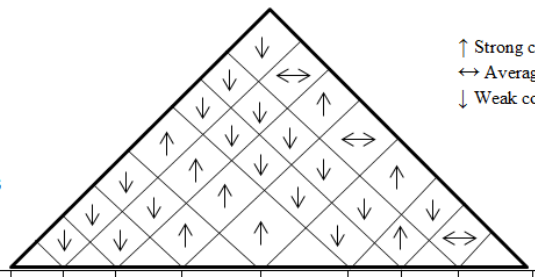

Clients requirements And priority \ Technical characteristics		Advance and retraction movements	Continuous monitoring position	Execution of movements with minimum response time	Execution of movements with correct profile of speed and acceleration	Transforming rotational movement in translational movement	Perpendicularity on work table	Adjustable tilt of the feed system	Minimize US vibration transmission in system	Competition assessment according to customer requirements*			
										1	2	3	4
Precision	66	●	●	●	●	●	●	●	○	A	A	A	A
High surface quality	52	●	●	●	●	○	○	□	●	A	B	B	B
High productivity	48	●	●	●	●	○	○	○	○	B	B	B	B
High reliability	42	○	●	○	●	○	○	○	●	B	B	X	X
High compactness	28	□	□	□	□	●	○	●	○	B	B	X	X
Global impact		31	37	31	37	27	21	25	27				
Organizational difficulty		8	7	6	6	9	6	8	6				
Technical assessment of competition*	1	A	A	B	B	A	A	A	B				
	2	A	A	B	B	A	A	A	B				
	3	A	B	B	B	A	A	X	X				
	4	A	B	X	B	A	A	X	X				
Technical objectives		Motor step split through digital driver	Attach an encoder /linear transducer for position monitoring	Validation of minimum response time	Use an "S" speed and acceleration curve	Use an adjustable contact roll to make the nut only execute translational movement	Use of blocks to align components	Mounting plate with circular slot	Reduced contact with the horn, and placement near the zero amplitude zone				

Fig. 6: Quality Function Deployment Diagram

*Each competitor (1, 2, 3, 4) is assessed with a mark, as follows: A – High mark; B – Average mark and X – Low mark based on clients requirements and technical characteristics. Afterwards the designed feed system uses the competitors as benchmarks to be exceeded one by one, starting with number 4.

Failure Mode and Effects Analysis method

The method identified a series of high RPN, Risk Priority Number, calculated as product of appearance, criticality, and detection error, as shown in table 2, and discussed below:

Table 2: Errors found with FMEA method

Component	Error	Cause	A	B	C	RPN*	Prevention methods
Motor	Bearing failure	Lifespan was exceeded	7	10	8	560	Motor change and run precision tests
Encoder	Faulty motion detection	Low resolution	3	10	8	240	Driver change, check resolution beforehand
Screw nut	Loose fits	Design error	5	10	10	500	Check calculations
Screw nut	Improper pitch	Design error	4	10	9	360	Check calculations
Screw nut	Bearing failure	Lifespan was exceeded	4	10	9	360	Bearing change
Shaft Coupling	High flexibility	Improper selection	4	10	10	400	Check documents and run tests
Shaft Coupling	Low flexibility	Improper selection	4	10	10	400	Check documents and run tests
Guide column	The contact pressure of the roller is excessive	Improper adjustment	4	10	10	400	Eliminate the improper adjustment by adding an eccentric spindle
Ultrasonic chain	Induces vibrations in system	Contact zone is too big	4	10	10	400	Check calculations for nodal positioning and reduce contact zone by using prisms

** The Risk Priority number is calculated as a product of occurrence (A), importance (B) and detection (C). They are rated on a scale of 1 – 10, where: 1 – very rare occurrence/very low importance/very easy detection and 10 – very frequent occurrence/ utmost importance/very hard detection.*

Motor bearing failures are very hard to detect (justifies the highest RPN) without proper laboratory testing, usually because there is no precision test on the ordered part. If the tested motor does not conform to the specified requirements, the motor will be replaced. The faulty motion detection of the encoder happens when the resolution of the encoder and the motor doesn't match. In order to prevent such errors, the motor's resolution needs to be checked (in all running modes) and an appropriate encoder needs to be ordered. The screw nut mechanism has loose fits between screw and nut, this happens due to design errors (improper dimensions), where the nut doesn't take full contact with the screw, leading to precision errors. Checking the mechanism's calculations is recommended, in order to avoid this error and the improper pitch error. The shaft coupling can be too flexible or too rigid, however in both cases testing needs to be done in order to know the impact it has on the feed system's precision. The contact pressure of the roller is excessive, this error can cause delays in motion execution. In order to prevent this error, an eccentric spindle is designed that lowers the roller on the guide column and ensures that subsequent adjustments retain the same contact pressure. The ultrasonic chain produces vibrations, however the horn has a zone where the amplitude of the vibration is zero. Contact has to be near this zone on a small zone, therefore prisms are used in order to assembly the horn with the feed systems. Finite element simulation needs to be used to bring the ultrasonic chain under resonance condition.

Affinity Diagram

The affinity diagram (figure 7) identified the most important ideas for enhancement of feed system precision:

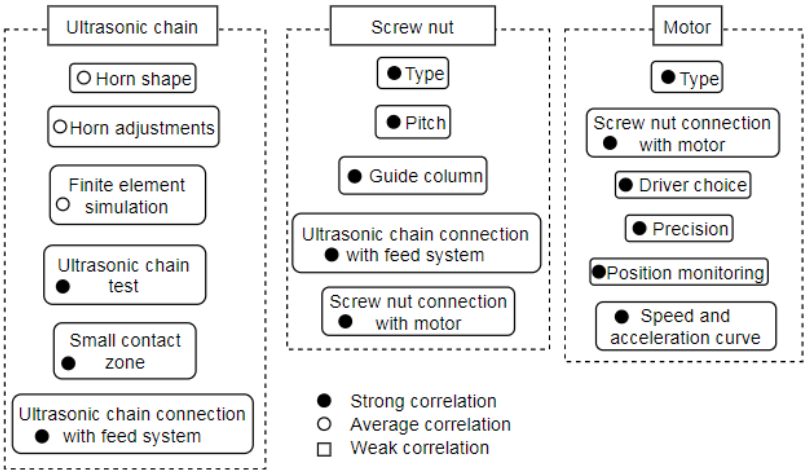

Fig. 7: Affinity diagram

1) Testing the ultrasonic chain – the ultrasonic chain is composed from the horn and transducer, assembled through a threaded pin. The horn and the transducer need to have the same natural frequency, otherwise the ultrasonic chain won't function optimally. Therefore it is necessary for the horn to be tested and adjusted in order to have the same natural frequency as the transducer; 2) Ensure that the contact surface with the horn is small, to avoid vibration propagation in the system; 3) Screw nut type – is one of the mechanisms that directly affects precision and needs to be designed accordingly; 4) Screw pitch – directly influences the screw nut mechanism, and needs to be taken in account when designing the nut screw system; 5) Guide column – makes possible for the nut to execute only translational movement; 6) Coupling flexibility – if it is too high it induces delays in execution, it it's too rigid it introduces deformations of coupled parts when they are not coaxially - in both ways it affects precision. However a flexible coupling is chosen, because the deformations of parts affects precision primarily; 7) Motor type – the most influential component that affects precision. The motor needs to be chosen on the account of precision and cost; 8) Motor driver – can allow the motor to function in different modes, one of which is of particular interest – microstepping – where the natural step of the motor can be split, enhancing the motor's precision; 9) Encoder for constant position monitoring.

Relationship Diagram

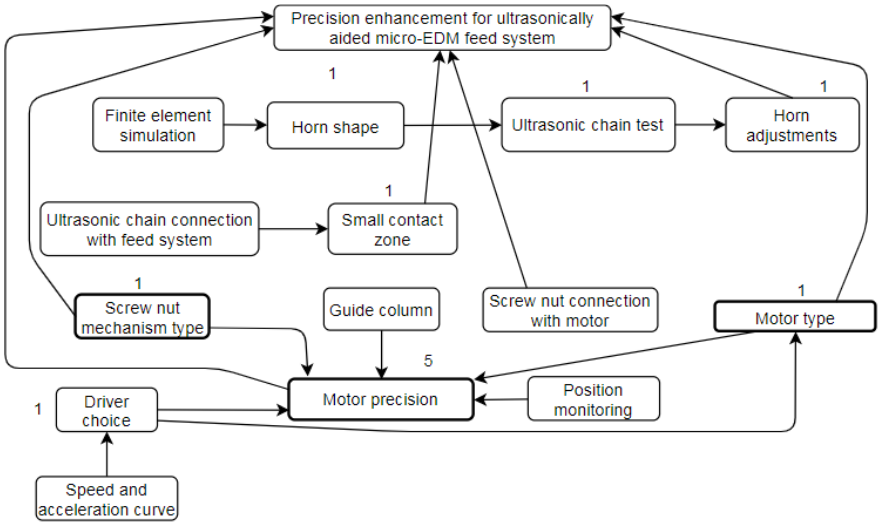

Fig. 8: Relationship diagram

Relation diagram identified the three main components responsible for precision enhancing (figure 8): The most important component is the motor, which directly influences precision. However the motor's precision is directly influenced by the screw-nut mechanism and motor type. Also, indirectly the speed and acceleration curve is important, because it can induce errors due to sudden acceleration and deceleration.

Tree diagram

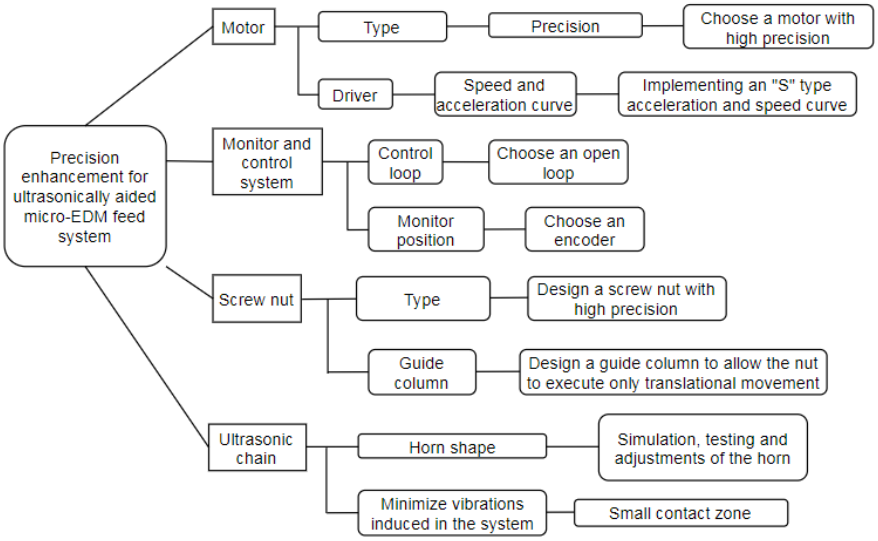

Fig. 9: Tree diagram

Tree diagram (figure 9) has identified the following ideas to enhance precision:

1) Choosing a high precision type motor; 2) Implementation of an "S" acceleration and speed curve; 3) Use an open loop control system for low cost benefits; 4) Use an encoder, for constant position monitoring; 5) Design a screw nut mechanism with high precision; 6) Design a column with a plane surface in contact with a roll, mounted on eccentric spindle, able to adjust the contact pressure by its rotation; that blocks the rotation of the nut and column, allowing only smooth translational movement, with reduced response time; 7) Simulate by finite element modeling and test the horn before use; 8) Have a small contact zone for the horn, when it is assembled with the feed system.

Feed system for µEDM+US

The designed feed system, appropriate to requirements of µEDM+US is presented in figure 10, incorporating the solutions and ideas found using the methods presented above.

The feed system is powered by an electric stepper motor which is used in microstep mode, and divided in 32 000 parts by a digital driver to ensure maximum precision. The motor's precision is continually monitored in terms of position, speed and acceleration by an encoder mounted above the motor, and assembled with a flexible coupling to prevent any coaxial deviations. The screw nut mechanism also uses a flexible coupling to connect with the motor. The screw nut mechanism is a roller type screw, recommended for high precision operations and low friction. The nut is locked from rotational movement by a roll, which has contact with a plane surface of a column guided by ball bushing with low friction. The contact pressure between the roller and column is adjusted by an eccentric spindle, which lowers or raises the roll. A pressure test is needed to see how much pressure is needed to completely stop the rotational movement of the nut without increasing the feed system's response time. The ultrasonic chain is mounted on the feed system using a set of prisms to ensure minimum contact, in the very proximity of nodal point, to minimize vibration transmission in the whole system. Finally the entire feed system is mounted on a plate that allows tilts up to 30º.

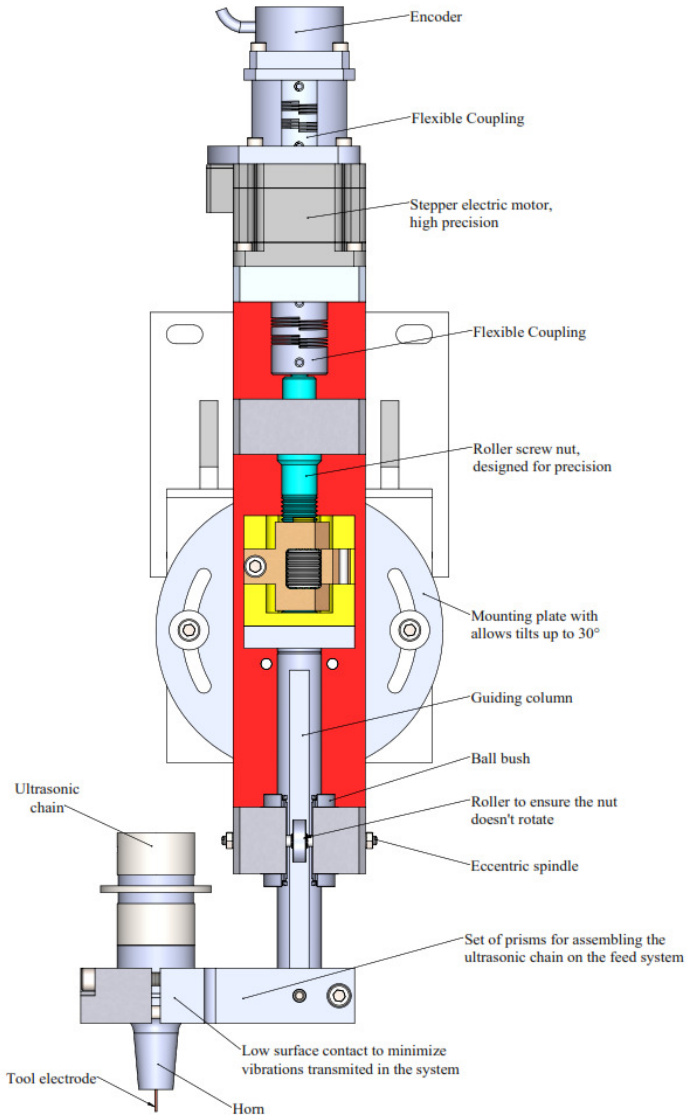

Fig. 10: Feed system for ultrasonically aided micro electrical discharge machining

Conclusions

The functions derived from systematical conceptual design associated with several methods for quality improvement led to some constructive solutions for the design of a feed system appropriate for a hybrid machining, ultrasonically aided micro-electrical discharge machining (µEDM+US). The **most relevant** solutions implemented were: micro-step division by digital driver in parts that ensures axial increment of 0.2 µm, even at 2 mm pitch of roll screw-nut mechanism; monitoring the position by an encoder; speed and acceleration on *S* shape curve to assure smooth rapid movements; decrease of response time by rolling friction at all movement organs of the feed system; translational displacements assured by a roller mounted on an eccentric spindle with possibility to attain an optimum contact pressure between roll and guided column by rotation around its axis; mounting of ultrasonic chain, which includes the electrode-tool, by using a set of prisms with contact in the very proximity of nodal plane, with null amplitude, to avoid transmission of ultrasonic vibration within the feed system.

Further researches will be focused on precise execution and testing in order to validate the constructive solutions of the designed µEDM+US feed system.

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Trends in Discrete Simulation in The Era of Industry 4.0

Miroslav MALAGA

University of West Bohemia, Pilsen, Czech Republic
malaga@kpv.zcu.cz

Zdeněk ULRYCH

University of West Bohemia, Pilsen, Czech Republic
ulrychz@kpv.zcu.cz

Abstract

The paper deals with a search of scientific articles focused on the optimization of production planning in relation to the use of energy and natural resources, production planning using simulation models in the context of Industry 4.0 and the methodologies for the creation and use of simulation models in the context of Industry 4.0. These topics are focused on the current development of the Industry 4.0 concept in connection with simulations, planning and optimization. These are mostly articles indexed in the Web of Science (WoS) and Scopus databases. These databases were selected because the articles contained in them are recognised by Czech technical universities.

Keywords: Industry 4.0, Simulation, Discrete simulation, Optimization, Green planning, Production planning.

Optimization of production planning (or planning) with regard to the use of energy and natural resources (green production planning)

Today, there is an increasing emphasis on the life of the individual with the least possible impact on our environment. There is a visible effort to reduce the use of plastics and other materials that can be harmful to the environment. An increasing part of the population is also thinking about minimizing the unnecessary relocation of people and services, materials or products across our planet. This is no longer just a question of individuals, but production companies and service industries are also starting to think this way. This thinking then has implications for product design (design, materials, etc.) and especially for the method of production and distribution. Price, respectively financial costs, is ceasing to be the most important factor in choosing the method of production, machines used, etc., but it is decided according to the required energy and its quantity and natural resources - regardless of financial advantage, or only with reasonable regard to the cost/energy ratio and natural resources. It is therefore beginning to be considered whether a product will be produced more cheaply, but with a greater "waste" of energy (or natural resources), or more expensively but with less "waste" of energy (or natural resources).

One approach to minimizing carbon emissions is to reduce energy consumption in a particular machining system. The authors propose an integration model based on nonlinear process planning and the implementation of such a method that will lead to a reduction in the energy consumption of the machining system. Zhang et al. (2016) use a model based on Therblig. Other approach mentioned by Wu et al. (2018) is to minimize carbon emissions by solving the problem of capacity multiple dose sizing for non-identical parallel machines, where the goal is to meet demand for various items in the planning horizon to minimize costs without reducing capacity and increasing carbon emissions using Lagrangian relaxation and generating columns to improve the lower and upper bounds above linear programming relaxation. A similar problem is solved by Zandi, Ramezanian and Monplaisir, (no date), who present a mathematical formulation that solves the problem of green production on parallel machines with respect to energy consumption and production time. Due to the high computational complexity of the proposed model, they developed a heuristic algorithm to obtain the exact Pareto boundary of these two targets with polynomial complexity. Another solution mentioned by Su, Yang and Liu (2017) is to use a hybrid swarm algorithm with discrete particles based on real data collected from a pharmaceutical company. The production planning model is based on an analysis of the energy consumption of different units and equipment, and experimental results have shown that carbon emissions in a company can be reduced by an average of 6.77%, and CO2 emissions can be reduced by 610.2 tonnes per year. Another possible approach is in a research study by Shin, Suh and Stroud (2015) improve green productivity (GP) where the basic mechanism of the algorithm is the

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implementation of a process improvement cycle, which measures GP performance by collecting machining data, quantifies this performance by categorical representation and predicts performance using prediction models.

Another way to minimize energy consumption, a model called ultra-flexible job shop (UFJS) is also studied by Liu, Zhang and Lu (2019). In UFJS, the order of operations between tasks can be changed within certain limits. To formulate this energy-efficient planning, a mixed-integer linearly programmed model was developed. To solve big problems, the authors then designed and implemented a genetic algorithm.

The authors Junker and Domann (2017) of the article "Towards Industry 4.0 in corporate energy management" state that more than 120 software systems are offered on the market, but according to their analysis this software can be used exclusively for monitoring and reporting. The reason is roughness of data and work of the software with them. Planning and management are not supported. Thus, they developed an energy management system which can collect data on energy consumption at the level of production facilities based on data sheets of equipment manufacturers and a modular and self-organized communication system (as a combination of hardware and software) that "reads" internal electricity data from production facilities in real time, or measures the flow of liquids or gases using sensors and provides real-time energy control.

An interesting way to minimize energy costs (in this case, it is really about costs, not about minimizing the carbon footprint or consumption) is to optimize product variants. Kruse, Uhlemann and Steinhilper (2016) see a link between the diversity of production and energy consumption. They have developed a simulation-based model that examines the effects of production diversity on energy consumption (electricity, compressed air, gas). The model was implemented in a simulation environment of discrete events and verified in a case study in the metal industry. The results show that efficient variant management makes it possible to improve energy efficiency.

Production planning using a simulation model in the context of Industry 4.0

A reasonably designed and created model and a simulation with suitable parameters running above it can be used as a tool for selecting a suitable product flow through the production process. In other words, the model and the simulation running above it can be used for production planning. As the approach to production evolves and new trends in production continue to emerge, planning methods need to be adapted accordingly. Currently, the paradigm is the concept of Industry 4.0, which builds on the transfer of constantly recurring activities, or simple activities from a human to a machine, and communication between people, people and machines, as well as the machines themselves. Therefore, the use of simulations for production planning in a company based on the Industry 4.0 concept and dedicated mainly to small series production could be suitable. In such production, it is necessary to solve the reconfiguration of production machines, suitable interchangeability for a new product and/or a new series, and to solve situations where the production of several types of products coincides, or one species in production is running out and at the same time a new one is to be produced as well. The vision is that the material can go through several paths during production, interchangeable machines report their status (settings, usage, etc.) and then the production can be planned both for a new product and theoretically for each piece when entering the system according to the state on the whole line. For this, however, it is necessary to modify one of the existing methods of production scheduling, or to create a completely new methodology. Predictive maintenance is also connected with production planning, which can include possible machine outages, etc. in the planning.

A constant trend in data collection (for simulations) or their visualization is the use of digital twins, which are supplemented by modern possibilities such as machine learning. These digital twins are used to develop intelligent algorithms for autonomous control and other cases involving optimization, mental models and decision support systems, mentioned by Atorf and Rossmann (2018). The digital twin enables the connection of the production system with its digital equivalent for the production process. According to the authors Uhlemann, Lehmann and Steinhilper (2017), in order to ensure the maximum conformity of the cybernetic process with its real model, multimodal data acquisition and evaluation must be performed. Jaensch et al. (2018) represent the possibility of extending digital twins with the possibility of machine learning of data-based models to the learning of control logic of complex systems. They show how to use machine learning in conjunction with these models to achieve shorter development time of production systems.

The topic of predictive maintenance also began to develop within the Industry 4.0 concept. This has a great impact on planning and allows production to be planned with regard to downtimes that are caused by maintenance, failures, etc. This approach pursues the goal of eliminating system failures before they occur. It prevents situations when the device enters unexpected downtime, and high costs are saved. One option is to use the generic predictive maintenance simulation in AnyLogic ™. The concept contains a description of the function and objectives of the simulation, the interface for data transfer to and from the simulation, the general structure of the simulation and the indicators used to evaluate the simulated production plans. The first case study shows how a simulation model can

be used to simulate sample data from a testbed to improve production plans how is mentioned in study by Zarte, Wunder and Pechmann (2017). According to Teufl et al. (2018) it is not uncommon today to have a predictive model of a factory, although these models are often simplified in nature. However, such models rarely reflect the current operational performance of the system, use simple and separate data streams, and do not have machine/workstation resolution. They can support production planning, but usually have limited use to optimize factory performance in response to changing external stimuli. That is why the OPTIMIZED research project is developing a holistic plant management platform that responds to unexpected factory failures. It uses the application of optimization based on simulation to support the production planning of the production process of one of the industrial demonstrators. The simulation model captures the relevant production limitations of the factory up to each machine and workstation. The simulation model reads data from enterprise information systems, live data from machines and data from retrofitted sensors in the production plant. As a result, service levels and production costs are optimized.

According to Fantini, Pinzone and Taisch (2020) with the growing cyber physical systems, there is a great consensus that work will change and different skills will be needed. However, the question remains whether the organization of work will evolve towards greater responsibility and decision-making of employees or towards higher technological control. The challenge is to manage this development and purposefully lead the process of integrating people into CPS. The authors propose a methodology to support the design and evaluation of various work configurations and consider the uniqueness of human labour and the characteristics of cyber production in a comprehensive framework. The method includes routine production as well as irregular scenarios, such as fault detection or maintenance intervention, with a particular interest in human labour. The applicability of this method is illustrated by two industrial cases, which lead to proposals for staff training and to the improvement of the whole cyber-physical-social system.

Simulation, or a digital twin, is now commonly used as a basis for decision making. Authors Denkena and Winter (2015) use a simulation of rotor blade production in the wind turbine sector as a basis for decision-making in order to reduce planning time and costs, and to estimate the mutual impact on production capacity by product, technology and factory in the planning phase. The authors Yang and Takakuwa (2017) go even further, focusing on production planning with regard to the possible ongoing communication between the manufacturer and the customer. Thanks to Industry 4.0, the manufacturer is able to respond more quickly to customer requirements, which means that manufacturers now have to control production planning more tightly. The customer order and the product processing table are imported into the simulation model. The experiments are implemented in case the system encounters unexpected conditions. The proposed approach represents a potential tool for manufacturers to make real-time decisions. Constantinescu, Francalanza and Matarazzo (2015) consider it one of the main challenges for Industry 4.0 to ensure that the right people have the right information at the right time to make the right decisions. That is why it comes with a multi-level just-in-time simulation tool to support digital race planning decisions. It uses appropriate means to capture and represent the knowledge of the production system in several types of industries and types of companies (large, small and medium-sized enterprises). To support modelling activity, the human-system interface of the simulation tool uses just-in-time information retrieval (JITIR) to proactively provide the required information at the right time based on context during modelling and simulation.

One way to use simulation and visualization to quickly verify production flow plans is by generating semi-automatic data-driven models, which is illustrated by an example of implementation using FexSim simulation software, how is mentioned by Krenczyk et al. (2018). Caggiano and Teti (2018) use digital modelling and simulation tools for short-term analysis and validation of production management strategies, or for medium-term production planning or design/redesign of a production system. They propose a Digital Factory methodology to support the expansion of an existing production cell for the production of aircraft engine turbine blades using robotic automation of its deburring station. 3D modelling and discrete simulation are used to verify the upgraded production cell in order to increase its efficiency in terms of resource utilization and transit time. The validation of the simulation model is performed by collecting real data from a physically reconfigured production cell and comparing them with the model forecast.

According to Avventuroso et al. (2017), there is currently a lack of knowledge and structured approaches regarding the transition of production systems from rapid prototyping to large-scale production. They therefore present a procedure for FMS simulation analysis supporting planning, design and performance evaluation. They developed and used a discrete simulation model for the operational evaluation of an industrial case, which includes 3D printing, automated transport and storage systems.

According to Goodall, Sharpe and West (2019), refurbishment operations in particular can benefit from the simulations to support the assessment of different strategies for real-time scenarios due to the uncertain nature of product returns. They propose a data-based simulation that consists of three elements:

- an adaptive remanufacturing simulation algorithm for modelling the complex material flow found in the remanufacturing process in a general and reusable way
- an information model for structuring and highlighting simulation data requirements
- a layer of information services for collecting and analysing sensor data for use in the simulation.

The simulation is implemented to demonstrate how to automatically reconfigure and adapt to changes in data inputs (process and factory models) using a case study of operations from an electrical and electronic waste producer.

Methodology of the approach to the creation of a simulation model in the context of Industry 4.0 and the use of simulation models

The standard approach in creating models and subsequent simulations is to create a model without a layer which would ensure communication between individual machines, or machines and workers in different positions and different hierarchical levels. At the moment, the standard "if" conditions on the given input/output are used for the transport system (conveyor, forklift, spreading, …) if is necessary to cover the decision-making. Thus, the question may be, for example, whether the flow of material/product could be evaluated not only according to the following workplace/operation, but according to a comprehensive view of the state of the production section, hall, or entire factories, including separate workplaces or plants. In the article "Industry 4.0 and the New Simulation Modelling Paradigm" by Rodic (2017), the authors present the influence of the Industry 4.0 concept on the development of a new simulation paradigm, embodied in the Digital Twin concept. The main lesson is that while the new paradigm of simulation modelling is being adopted by large companies and small and medium-sized enterprises, there are significant differences depending on the size of the company in the problems they face and the methodologies and technologies they use. While the cases examined suggest the adoption of a new model of simulation modelling in industrial and scientific communities, its adoption in academia requires close collaboration with industry partners and diversification of researchers' knowledge in order to build integrated, multilevel models of cyber systems. As the presented cases show, the lack of tools is not a problem, because the current generation of tools for modelling using discrete simulations for general use offers adequate integration possibilities.

A frequent requirement when creating simulation models is the possibility to use them as an educational platform, most often for education in simulations, communication, the concept of Industry 4.0, etc. According to Grube, Malik and Bilberg (2019) simulation and the digital twin are a way for SMEs to realize their potential. The authors emphasize the connection between virtual and physical artefacts. This in turn inspires companies to change. Uhlemann et al. (2017) also point out the lack of knowledge of the Industry 4.0 concept and the possibility of simulations with the possibility of automated data collection. They demonstrate the benefits of these solutions for SMEs on a digital twin using real-time data collection and consider it a suitable learning platform for this size of organization.

Mourtzis et al. (2019) also point out the ignorance of companies. They focus on trying to connect the academic sphere controlling the simulation with the private sector, for which it is a useful but relatively unknown tool. They consider the Teaching Factory to be a missing link aimed at bridging the gap between academia and industry. Therefore, they show the design and evaluation of a real production system using discrete simulation and, based on real data obtained from the metallurgical industry, it is presented in the context of the Teaching Factory paradigm. In contrast, Lang et al. (2018) present the concept and current state of development of modular, decentralized and digital learning factories for use by students and researchers. In addition to the presentation of industrial modules and their settings, they represent a control and communication strategy that enables the creation and operation of any preferred layout in the company. They also briefly describe the discrete simulation model and the emulation model for virtual commissioning.

Another interesting trend is the use of simulation and possibly digital twins for setting up cooperation between manufacturing companies. Kadar et al. (2018) propose using simulation to manage a network of producers who can dynamically reconfigure and share their resources within a pre-registered community, and to analyse how the cardinality of such a "community" affects both collaboration and global and local production KPIs. In contrast, Kaihara et al. (2017) present crowdsourced production, a new type of production in which companies share their production resources depending on their demand and capacity. Accordingly, companies share their resource information and can find an outsourcing company when they need specific resources. The authors developed a production simulation model which crowdsourced with a source model and an agent-based negotiation algorithm to evaluate production efficiency based on machine delivery and utilization. Depending on the combination and balance of the business style, the delivery rate varies with the saturation point, which depends on the identity of the sources. Turker et al. (2020) then use real-time data collection and simulations to decide whether or not there will

be a delay in production in the future, and the proposed system decides whether or not to outsource the production of the order.

Mentioned by Klos (2018) a frequent trend in the use of simulation is the possibility not only of predicting the necessary corrections, or downtime, but also the reorganization and implementation of a different production plan than the standard, e.g. in the event of a sudden failure. In such cases, the problem is to anticipate possible failures, and most importantly to have prepared scenarios for system behaviour. Therefore, the authors of the article propose a methodology for gaining knowledge about maintenance using computer simulation. They created their example using Tecnomatix Plant Simulation software. A similar topic is addressed by Shin, Cho and Oh (2018). who study active protection to enable the "self-repair" function. The authors proposed workshop modelling and a dynamic reconfigurable CPS scheme that can predict the occurrence of anomalies and self-protection in the model. To this end, machine learning technology has made it possible to reduce overload in the production process. The result is a proposed simulation model that autonomously detects abnormal situations and is dynamically reconfigurable using self-correction.

The articles dealing with simulations then show another direction which the simulations can take - interconnection. It is not only about interconnection with hardware, which for example enables real-time data collection, but also about connection of software for discrete simulations and software for dynamics simulation mentioned by Goncalves Laurindo, Peixoto and de Assis Rangel (2019), where the authors present an integration mechanism for online communication between these tools and also use it for verifying the logic of the programmed PLC. Another example is the connection between discrete simulation and virtual reality (VR DES) mentioned in the research paper by Turner et al. (2016). In this paper the authors identify VR DES as a new platform for scenario testing and decision making. The work addresses the necessary communication protocols, aspects of system design, model validation and VR and DES applications. According to the authors, further research is needed in the areas of lower latency image processing, DES delivery as a service, gesture recognition for VR Interactions DES, and the interconnection of DES with real-time data streams and large data files. T. Delbruegger et al. (2019) then focus on interconnecting simulation systems. According to the authors, simulation models cannot be easily combined, and therefore interdisciplinary global optimizations often cannot be achieved. In addition, the aspect of human interaction with such complex co-simulation systems is often overlooked. Therefore, they present a concept for combining different simulation models with interdisciplinary multilevel simulations of production systems. The concept includes three hierarchical levels of production systems (Process Simulation, Factory Simulation and Human Interaction) and allows human interaction with the simulation system, but the concept can be easily extended to support other levels. Within a multi-level structure, each simulation system performs multi-objective optimization. Pareto optimal solutions are passed on to simulations at higher hierarchical levels in order to combine them and meet the flexibly adaptable goals of the entire production system. The concept is tested using a simplified production system to be optimized in terms of power time and electricity consumption. The results show the potential to optimize the productivity and efficiency of production systems in this way.

Y. Lu et al. (2020) discuss the recent development of Digital Twin technologies in manufacturing systems and processes, analyse the connotations, application scenarios, and research issues of intelligent Digital Twin-controlled manufacturing in the context of Industry 4.0. In their work, they identify unresolved research problems in the development of digital twins for intelligent manufacturing:

- Standardize the architecture pattern for the digital twin by an ideal combination of the two currently used architectures
- Focus on reducing communication latency for digital twins
- Standardize the data collection mechanism (define best practices)
- Define standards for digital Twin
- Standardize/design default digital twin functions
- Focus on version management of the Twin-Twin model
- Focus on "simulating" people in Digital Twin applications

S. Kern and J. Scholz (2020) deal with a simulation approach based on modelling agents for indoor production facilities. Simulation methods are used to optimize the spatial dimension with respect to the simulation of production processes. The agent-based model developed in this paper is used to simulate a production environment using an artificial interior space and a set of test data. The results show that different levels of available spatial information affect the results of simulations of internal production environments and processes. The distances covered by labour agents can be significantly reduced as well as the unproductive movements of labour agents (excluding production assets).

Conclusion

The simulations and the idea of digital twins in the Industry 4.0 concept are shown to be a necessary tool not only for planning with regard to various requirements such as minimizing costs, increasing productivity, "green" production, but also for education. The importance of simulation and digital twins in current developments is becoming increasingly important. In addition, there is an observable trend to extend simulations and digital twins to new technologies and possibilities, such as machine learning, real-time data collection, virtual reality interconnection, discrete interconnection and dynamics simulation, or interconnection of simulations and digital twins across companies to simplify cooperation and outsourcing.

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Consideration of Corporate Environmental and Social Responsibility in Purchasing Decisions of Consumers in The U.S.: Product-Related Initiatives Are Most Likely to Be Noticed

Boris MIETHLICH
Department of Business Studies, IIC University of Technology, Phnom Penh, Cambodia,
boris.miethlich@gmail.com

Anett G. OLDENBURG
Department of Business Studies, IIC University of Technology, Phnom Penh, Cambodia
anett-gabriela-oldenburg@gmx.de

Alfred ZECH
Graduate School, IIC University of Technology, Phnom Penh, Cambodia
alfred.zech@t-online.de

Azim CAUSEVIC
Graduate School, IIC University of Technology, Phnom Penh, Cambodia
causevic.engineering@gmail.com

Kerim HRAPOVIĆ
Graduate School, IIC University of Technology, Phnom Penh, Cambodia
kerim.hrapovic@aon.at

Abstract

Not only companies but also consumers are increasingly trying to minimise the negative impacts of their consumption. Accordingly, factors such as sustainability and social responsibility play an increasingly important role in consumers' purchasing decisions. Therefore, the influence of environmental and social responsibility of companies on the purchasing decisions of consumers should be analysed. An online survey among consumers in the USA (n=148) was conducted and statistically analysed. The results of the study show that for the majority of consumers, the performance and price of a product or service is the most important factor in their purchasing decisions. However, more than half of the survey respondents are concerned about the sustainability, environmental and social responsibility of companies in their purchasing decisions. Consumers seem to be more aware of product-related CSR activities than of CSR activities related to services. Interestingly, the answers do not differ significantly by age, gender or household income level. The implication is that for consumers, aspects such as environmental and corporate social responsibility are essential factors in purchasing decisions, but in their absence, they are not an exclusion criterion. Besides, companies need to communicate CSR activities in the context of services to a greater extent, as consumers hardly notice them today. Further research on the influence of CSR activities on purchasing decisions and their communication needs to be further investigated.

Keywords: CSR, Purchasing Decisions, Marketing.

Introduction

The growing globalisation outside the marketplace creates external adverse effects of economic activity, which cause significant social and ecological damage nationally and internationally and across generations. The CSR movement is widely supported and conceptually promoted by politicians. The question is how CSR affects the short and long-term profit prospects of companies and which factors play a role here. A significant influencing factor here is the purchasing behaviour of consumers. The buying behaviour of CSR significantly influences the profit situation. The duty of responsible consumption limits our previous economic goal of unlimited freedom of consumption. Increasingly, all economic entities, both companies and consumers, are being called upon to act in a socially responsible manner (Schleer, 2014).

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It has already been found that emotions and feelings effectively shape the decision-making process of consumers. They impair logical thinking and make it difficult for people to find choices. Moral feelings about caring for other people play a central role in CSR-oriented purchasing decisions (Schleer, 2014).

CSR can provide three forms of value to consumers: emotional, social, and functional significance. Each of these enhances or diminishes the overall value proposition for consumers. Moreover, the added value created by one form of CSR can either reinforce or reduce other product attributes (Green & Peloza, 2011). The purchasing behaviour of some consumers is influenced by the perceived "CSR quality" of the companies placing the products on the market. Studies already carried outcomes to the result that it cannot be assumed that good CSR quality goes hand in hand with good product quality. The studies point to considerable potential for misleading CSR communication, which cannot be verified by consumers (Schoenheit, 2014). Other surveys show that more and more consumers want socially and environmentally responsible companies. Producers must, therefore, also meet ethical standards in their product manufacturing and take more responsibility for social concerns, such as fair working conditions. CSR demands a reorientation of the core business towards sustainability beyond the legal requirements, both at home and abroad. In its core business, CSR includes environmental protection, fair working conditions and consumer protection (Zimmermann, 2016).

From the vital relationship between CSR and consumer behaviour, this paper examines those factors that determine the influence of CSR activities on consumers' purchasing decisions. The dimensions of CSR and sustainability are increasingly in the spotlight and appear to play an increasingly important role in consumers' purchasing decisions. Today, it is not only companies that are striving to minimise their negative impact on the environment, but also consumers. There is little literature on the practical implementation of CSR activities in companies (Bhattacharya, Korschun & Sen, 2009; Castelnovo, 2020; Peloza & Shang, 2011). There is also little research on consumers' awareness for the product and non-product-related CSR activities and how consumers react to CSR activities in connection with products and services and how this influences their purchasing decisions (Chen et al., 2018; Peloza & Shang, 2011).

The main research question is, therefore: What influence does the environmental and social responsibility of companies have on the purchasing decisions of consumers? The following hypothesis can be derived from the literature review: The more visible corporate environmental and social responsibility initiatives are, the greater their influence on consumers' purchasing decisions.

The aim of the study is, therefore, to gain insights into the influence of CSR activities related to products and services on consumers' purchasing decisions. For the study, U.S. consumers were surveyed via structured online surveys. As the Western country with the highest GDP, the USA can be seen as a highly developed economy and therefore as a role model for many other nations, which allows for a specific generalisation of the results.

Literature Review

Corporate social responsibility is a model that is implemented in businesses which ensures the social accountability of companies, including the stakeholders, societies and communities. One of the essential components of CSR in business is to check the impact it is creating on the environment. Implementation of CSR aims to ensure that the effect is kept minimal and there is no degradation of the environment as a result of business functioning of the company. Furthermore, it is also essential that the business works for the betterment of the society and there is overall well being of communities. Thus, it is also the responsibility of companies to understand the needs of the customers instead of just focusing on profitability (Loureiro & Lopes, 2018).

CSR can be an element of competitive strategy. CSR activities are very valuable for product differentiation (Anselmsson & Johansson, 2007; Boehe & Cruz, 2010; Chen et al., 2018; Duarte, 2020). Especially in saturated markets, product differentiation is the most important instrument to achieve and maintain a competitive position. CSR activities that offer customer benefits can create a real competitive advantage (Oldenburg & Miethlich, 2020). In marketing, product differentiation is defined as the innovation of a product from other products so that it catches the attention of the customers. Product differentiation is an essential strategy in marketing that either focuses on the quality of the product or its price. Henceforth, marketers believe that to make the desired impact on the customers, a brand must create a new product different from the existing products in the market. Additionally, product differentiation also includes the relatively lower price of the products, which shall be another factor of creating an impact on the customers (Suki, Suki & Azman, 2016).

Customers must have adequate knowledge of the business and business-related aspects so that they can make their purchase decisions wisely. Corporate social responsibility is that essential element of marketing that helps to share

knowledge and creating awareness among the customers. The crux of CSR lies in the payment of heed to the environment, societies, communities and stakeholders. The customers shall identify themselves to be essential parts of the company with the help of corporate social responsibilities. However, the impact created on the customers must be positive, which shall be ensured with the similarity between the needs and objectives of the consumers as well as the company. The needs of the consumers must also be addressed so that the company could work towards the fulfilment of those (Alafi, 2018). One of the important factors associated with marketing is the knowledge sharing process for the customers. One central aspect that drives the decision-making process of customers is their knowledge, based on which they shall decide if they shall opt for the products and services of the concerned brand. Through CSR, they shall also develop a notion of the responsibilities and ethical sense of the company. Thus, consumers also create an idea that if the brand is paying heed to the environment, it shall also manufacture the products and design the services as per the needs of the consumers.

On the contrary, when firms do not implement CSR activities efficiently, there is a lack of information and knowledge, which also impacts the decision negatively making the process of the customers. This is because they are not sure of the activities and functions of the business (Mayorova & Lapitskaya, 2016). The significant impact that is triggered by corporate social responsibilities is the increase in sales, sponsorship, customer loyalty and profitability. Fishbein's theory of reasoned action shall be selected in this regard which focuses on the role of purchase intentions in driving the purchase behaviour of the consumers. One of the intentions of consumers' purchase intentions is satisfaction. However, the customers who are new to a company shall not have any previous experience cannot decide if they would gain satisfaction from the company. Thus, there would be no impact on their repeat purchase behaviour. Therefore, CSR plays a vital role in this regard because it creates an effect on the satisfaction level of the consumers and they shall opt for buying the products of the company (Park, Kim & Kwon, 2017). CSR activities also result incorporate evaluation which further impacts product evaluation. Whenever a consumer tries to evaluate a business for making his buying decision, he shall take into consideration the corporate social responsibility of the firm even if he has no buying experience in the past. In the process of making the business decision, the concerned individual shall use the information stored in his memory as a result of the implementation of corporate social responsibility of the firm. Thus, in this regard, it shall be understood that the CSR activities of a firm shall play a significant role in corporate evaluation by the customers by processing knowledge and information in their memory (Butt, 2016). The relationship between CSR and price has been evaluated. Therefore, it has been identified that lower price as a part of corporate social responsibility has a more significant impact on customers. The lower price shall impact the intent of the customers, and they shall be driven to buy the products of that brand. Apart from products, customers shall also be aware of the non-product related aspect of the brand by understanding that the needs of the customers are addressed well, particularly the customers who are price sensitive. Furthermore, taking into consideration the environmental aspect of CSR, it could be stated that this also impacts the buying intent of the customers. This is because they understand that the company has associated itself with activities that create well being on a broader aspect (Albus & Ro, 2017).

To gain real benefits from CSR activities, the awareness of consumers must be achieved (Du et al., 2007; Sen, Bhattacharya & Korschun, 2006). At the same time, CSR activities can only generate real competitive advantages if they manage to increase or create added value for customers (Chen et al., 2018; Peloza & Shang, 2011). Consumers are most likely to respond and prefer product-related CSR activities (Anselmsson & Johansson, 2007; Du, Bhattacharya & Sen, 2007; Chen et al., 2018; Peloza & Shang, 2011). For products, the attributes (labelling of content and origin, policy implementation, and product liability, etc.) the basis for the purchase decision. Other commitments of the manufacturer are hardly taken into account since this information is not present during the purchase decision, and the customer would have to deal with the manufacturing company in more detail. Social and work-related issues have a strong influence on a brand's CSR image but are more difficult to communicate (Anselmsson & Johansson, 2007). From the consumer's perspective, the treatment of employees plays a key role. The focus here is mainly on the people who have contact with consumers (Anselmsson et al., 2016; Rosenbaum et al., 2017). Communication for CSR activities in connection with services is difficult, and therefore the perception of consumers is comparatively low (Miethlich, 2019; Miethlich & Oldenburg, 2019). One example of CSR activities in services is the employment of disadvantaged groups, like people with disabilities (Castelnovo, 2020; Duarte, 2020; Miethlich, 2019; Miethlich & Oldenburg, 2019). Promoting the employment of disadvantaged groups creates added value through corporate social responsibility and secures the professional future of those concerned. Companies that get involved will produce a real "shared value" with increasing social prosperity, from which companies will benefit again (Miethlich & Slahor, 2018; Papula, Papulová & Papula, 2014).

Methods

To study what aspects are essential for the customers when making a purchase decision for a product or service an online survey (Table 1) has been carried out with a sample of 148 participants in Spring 2020. The survey used the SurveyMonkey (2020) panel, which includes over two million people worldwide. The invitations to participate in the

survey were dynamic and adjusted to achieve the most representative sample possible. The research question was operationalised, and the respondents have been asked questions about whether they consider environmental and social responsibilities of the companies when making decisions on the purchase of products or services, what they think about the corporate social responsibility, what issues should the companies address most urgently, etc. The Research method included an online survey among the U.S. citizens with a sample of 148 participants, among them 54 percent women, 46 percent men.

A 5-gradation Likert-scale has been used to assess the level of the respondents' agreement to the suggested statements in the following categories: not true, rather not true, neutral, rather true, true. To carry out statistical analysis, the gradations are transferred to a scale from 1 to 5, whereby 1 stands for "not true" and 5 for "true".

The quantitative analysis is then carried out using descriptive statistics and statistical tests using IBM SPSS statistical software. For the main variables, it was checked whether there are statistically significant correlations per different demographic characteristics including gender, age and household income level.

Table 1: Questionnaire of the online survey

Question	Answer options
I pay more attention to sustainability in	- Products - Services
I know a company that promotes the employment of people from disadvantaged groups	- Yes - Yes, that's why I'm a customer there. - No - No, but I'd be there to support the cause
What importance do the following aspects have for you when making a purchase decision for a product or service?	-Primarily performance and price count. -With my consumption, I want to contribute to a socially acceptable development and do not to harm the environment. -Only when I have products or services from different companies, but with identical characteristics to choose from, I consider the environmental responsibility of the company. -Only when I have products or services from different companies, but with identical characteristics to choose from, I consider the social responsibility of the company.
My opinion on corporate social responsibility	- Important and necessary - Not much - If I want to do something good, I get myself involved (voluntary work, donations, etc.) - It's not honest and just about marketing and the company's reputation
Which issues should be addressed most urgently by companies?	- environmental protection - fair and safe working conditions - promoting the employment of disadvantaged groups (social inclusion) - other
Demographics (Age, gender, household income, region)	Age, gender, household income, region

Results

The 54.1 percent of the survey respondents were female, and 45.9 percent were male. Respondents from 45 to 60 years old comprised the largest groups in the sample (35.1 percent in total), followed by the respondents from 30 to 44 years old (31.8 percent in total). Respondents from 18 to 29 years old comprised 18.9 percent of the total population, while 14.2 percent were those aged 61 and more. The income level of the respondents has been regrouped and presented through four levels. 24.1 percent of the respondents have a household income less than 24.999$. 27.8

percent have income levels between 25.000 and 49.999$, and 36.8 percent have income levels between 50.000 and 99.999$. 11.3 percent of the respondents had more than 100.000 $ household income (Table 2). 15 respondents refused to answer this question.

Table 2: Demographic Data of the Respondents

Demographic groups	Absolute numbers	%
Gender		
Female	80	54.1
Male	68	45.9
Age		
18-29	28	18.9
30-44	47	31.8
45-60	52	35.1
> 60	21	14.2
Household Income		
$0-$24,999	32	24.1
$25,000 -$49,999	37	27.8
$50,000 - $99,999	49	36.8
$100,000 +	15	11.3

As for the region of living, 18.2 percent of the respondents were from the Middle Atlantic, and 16.9 percent were from South Atlantic regions. Respondents living in East North Central and Pacific regions comprise 14.2 percent and 12.8 percent of the total population, respectively. 11.5 percent were from the West South-Central region. The rest of the respondents were from the West North Central, East South Central, New England and Mountain regions (Table 3).

Table 3: Region of Living of the Respondents

Region	Absolute numbers	%
Middle Atlantic	27	18.2
South Atlantic	25	16.9
East North Central	21	14.2
Pacific	19	12.8
West South Central	17	11.5
West North Central	14	9.5
East South Central	10	6.8
New England	8	5.4
Mountain	7	4.7

Respondents have been asked to mention whether they pay more attention to the sustainability of the product or services. 80.4% of the respondents mentioned that they pay more attention to sustainability in products, while 19.6% in services. Chi-square test did not reveal any differences for this indicator per gender, age and income groups (χ^2 (3, N = 148) = 0.74, p = .995).

In total 58.8 percent of the respondents mentioned that they know a company that promotes the employment of people from disadvantaged groups, among them 16.2 percent mentioned that that fact is the reason they are customers of these companies. This means that 27.6 percent of the respondents who are aware of the companies supporting the employment of people from disadvantaged groups are their customers intending to support their initiative. 41.3 percent of the respondents are not aware of the companies promoting work among disadvantaged groups, among them, 21.0 percent mentioned that in case they are aware of these types of companies they will support the cause. In total, 37.2 percent of the respondents are supporting or will support (if aware of) companies that promote the employment of people from disadvantaged groups.

The respondents have been asked to assess the importance of different aspects when making a purchase decision for a product or service. The following criteria have been suggested: "Primarily performance and price count", "Contribution to a socially acceptable development and not harming the environment", "Consideration of the environmental responsibility of the company", "Consideration of the social responsibility of the company". The results for each criterion are presented in the below sections.

Primarily performance and price count: 72.1 percent of the respondents mentioned that primarily performance and price count of products and services are important to them when making a purchase decision for a product or service, for 30.6 percent among them these aspects are crucial. 22.4 percent of the respondents mentioned that this aspect is neither important nor not important. 5.5 percent of the respondents mentioned that primary performance and price count is not important to them when making a purchase decision. Chi-square tests did not reveal any statistically significant differences for assessment of the importance of primarily performance and price count when making a purchase decision for a product or service per gender ($\chi2$ (4) = 0.947, p = .918), age ($\chi2$ (12) = 10.614, p = .562) and income groups ($\chi2$ (12) = 10.266, p = .593), p-value > .05.

Contribution to a socially acceptable development and not harming the environment: 61.0 percent of the respondents mentioned that they want to contribute to a socially acceptable development and do not to harm the environment when making consumption. For 32.2 percent of the respondents, this aspect is neither important nor not important. 6.9 percent do not think about contributing to a socially acceptable development and about the environment when making consumption decisions. No statistically significant differences have been found for this indicator per gender ($\chi2$ (4) = 1.744, p = .783), age ($\chi2$ (12) = 5.931, p = .920) and income groups ($\chi2$ (12) = 12.745, p = .388), p-value > .05.

Consideration of the environmental responsibility of the company when making a purchase decision: The respondents have been asked to mention to what extent they agree with the following statement: "Only when I have products or services from different companies, but with identical characteristics to choose from, I consider the environmental responsibility of the company". In total, 47.7 percent of the respondents agreed with this statement among them 18.4 percent completely agreed. 35.4 percent were neutral, and 17.0 percent did not agree with the statement. The statistical tests did not reveal any statistically significant correlation between the respondents incline to consider environmental responsibility of the company and their demographic characteristics including gender ($\chi2$ (4) = 0.695, p = .952), age ($\chi2$ (12) = 11.428, p = .493) and household income ($\chi2$ (12) = 16.417, p = .173), p-value > .05.

Consideration of the social responsibility of the company when making a purchase decision: Only 42.5 percent of the respondents consider social responsibility of the company when they have products or services from different companies, but with identical characteristics to choose from. 39.5 percent of the respondents are neutral, and 18.3 percent do not consider the social responsibility of the company when making purchase decisions. Consideration of the social responsibility of the companies when making purchase decision does not differ per gender ($\chi2$ (4) = 1.364, p = .850), age ($\chi2$ (12) = 15.642, p = .208) and income groups ($\chi2$ (12) = 11.219, p = .510).

Corporate social responsibility of the companies: Respondents have been asked to provide their opinion on corporate social responsibility (CSR). In total, 159 answers have been received. Almost half of the respondents think that corporate social responsibility is essential and necessary (53.4 percent of the respondents mentioned this option), which comprises 49.7 percent of the total answers received. 14.2 percent of the respondents (13.2 percent of total mentions) think that CSR is not much important and necessary. In comparison, 10.1 percent of the respondents believe that CRS is not honest and is just about marketing and the company's reputation (9.4 percent of the total mentions). 29.7 percent of the respondents argued that if they want to do something good, they will get themselves involved (voluntary work, donations, etc.) (27.7 percent of the total mentions).

To the question which issues the companies should address most urgently, 50.7 percent of the respondents mentioned fair and safe working conditions and 31.8 percent mentioned environmental protection. 12.2 percent of the respondents think that promotion of the employment of disadvantaged groups is the most urgent issue the companies should address. 5.4 percent of the respondents mentioned other issues, among them was the production of high-quality goods at a reasonable price (2 respondents), remaining profitable (2 respondents), both environmental and social issues (2 respondents) and provision of high wages and benefits to the employees (2 respondents).

The research question "What influence does the environmental and social responsibility of companies have on the purchasing decisions of consumers?" can be answered as follows: The environmental and social responsibility of companies plays a subordinate role in the purchasing decisions of customers and is only taken into account when the actual customer need is satisfied. Product-related initiatives seem to have the most significant influence on the purchasing decisions of consumers because of their visibility. Thus the hypothesis derived from the literature "The

more visible corporate environmental and social responsibility initiatives are, the greater their influence on consumers' purchasing decisions." can be confirmed by the results.

Conclusion

The study aimed to gain insight into which aspects are essential for the customers when making a purchase decision for a product or service. Research method included an online survey among the U.S. citizens with a sample of 148 participants, among them 54 percent women, 46 percent men. The results of the survey were statistically analysed.

Based on the discussions in the current review of literature, it could be stated that CSR activities have been indispensable in businesses. It is important that businesses pay attention to the well being of the stakeholders, customers and the environment. This is because of the increased rate of pollution in the current era, and therefore, it is crucial that firms check the pollution level and impact on the environment. Furthermore, taking into consideration the needs of the customers is equally important, and firms shall identify their needs first. Currently, consumers shall not opt for business firms which pay heed to only profitability. This is because the intent of the customers has changed. Henceforth, CSR activities impact knowledge and information of the customers, based on which they make their purchase decisions.

The findings of the online survey suggest the following:

- The vast majority of the respondents (80.4 percent) pay more attention to the sustainability of the product rather than the sustainability of the services.
- More than half of the respondents know a company that promotes the employment of people from disadvantaged groups, 27.6 percent of them are customers of these companies with an aim to support their initiative. 37.2 percent of the respondents are supporting or will support (if aware of) companies that promote the employment of people from disadvantaged groups.
- For about 70 percent of the respondents primarily performance and price count of the products and services are important when making a purchase decision for a product or service
- More than half of the respondents (about 60 percent) think about the contribution to a socially acceptable development and the environment when making consumption decisions. About 40 percent of the respondents are either neutral or do not consider socially acceptable development or the environment when making consumption decisions.
- Almost half of the respondents (47.7 percent) consider environmental responsibility and less than half of the respondents (42.5 percent) consider social responsibility of the companies when they have products or services from different companies, but with identical characteristics to choose from. The rest of the respondents are either neutral or do not consider environmental and social responsibility when making purchase decisions.
- No statistically significant differences have been found out for the different criteria of consumption preferences and per respondents' demographic characteristics including gender, age and household income level.
- More than half of the respondents think that corporate social responsibility is important and necessary. 10 percent of the respondents believe that CRS is not honest and is just about marketing and the company's reputation.
- Among the other issues, such as the provision of fair and safe working conditions and environmental protection, promotion of the employment of disadvantaged groups was mentioned less frequently as an issue that the companies should address most urgently (approximately by the 10 percent of the respondents).

For the majority of customers, the scope of services and the price of the product are important in their purchasing decisions. Customers seem more sensitive to product-related CSR activities than to CSR activities related to services. Interestingly, consumers do not seem to differ significantly in age, gender or income. The implication is that for consumers, factors such as environmental and corporate social responsibility are an important factor in purchasing decisions. Still, in their absence, they are not an exclusion criterion in the purchasing decision. Besides, companies need to communicate CSR activities in the context of services to a greater extent if consumers are to be aware of them at all.

The present study is based on a small sample only, but the results are in line with the findings of the existing literature. The study should also be conducted in other cultures and with larger samples. In particular, the communication of CSR activities in relation to services and in comparison to product-related CSR activities should be further researched.

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Project Management Innovations Driving Subsidiary Reputation: A Defence Industry Case Study

Dr Marco Antonio AMARAL FERIS
University of Wollongong, Wollongong, Australia, mferis@uow.edu.au

Klaus Peter STOLZMANN
Universidade do Vale do Rio dos Sinos, Porto Alegre, Brazil, klaus.slc@cpovo.net

Prof Rodney J. CLARKE
University of Wollongong, Wollongong, Australia, rclarke@uow.edu.au

Abstract

This qualitative study examines the development of an innovative military electronic board by a subsidiary of a high-tech multinational company (MNC). The module involved software, hardware and mechanical projects. A conflict with a traditional supplier of avionics systems in a project phase where scope changes are not permitted to vary, necessitated a change in the management approach. There were considerable technical, psychological and political challenges involved in the development of this module. This paper describes the unorthodox application of Agile methods that enabled this project to be delivered within much shorter timeframes than similar products developed by the headquarters. As a consequence of successfully completing this project, the role of the subsidiary in relation to the headquarters changed substantially. The level of confidence in the subsidiary's technical capacity increased and it now has almost a complete control of the NPD cycles for all national projects.

Keywords: Project Management, NPD, Springboard Theory, Stakeholder Analysis, Defence

Introduction

Although the relationship between headquarters and subsidiaries has been widely investigated by the international business literature over time (e.g. Gupta and Govindarajan 2000; Almeida and Phene 2004; Bouquet and Birkinshaw, 2008; Kostova et al. 2016; Stolzmann et al. 2019), there are few studies about subsidiary evolution, especially in the field of project management of NPD (e.g. Jha and Bose, 2019), whose importance has increased over time (Zwikael and Smyrk 2019). Based on springboard theory, which analyses the reasons and process of expansion of multinational companies (MNCs) in emerging countries (Luo and Tung, 2018), we aim to reduce this gap by investigating the value of project management innovation in increasing subsidiary performance and with increasing headquarters' attention (Ambos and Birkinshaw 2010).

In particular, we describe a case study about the development of a modular component for a military cargo plane by a subsidiary company that solved a major problem for the headquarters. Named X86, it is a double motherboard included in the mission computer (MC), an integrated information processing system, comprising software applications to support missions like cargo handling, in-flight refuelling, medical evacuation, search and rescue, forest fire fighting, amongst others. The headquarters had hired a traditional supplier of avionics systems to supply a mature X86 board. However, after the critical design review (CDR) of the aircraft (FAA 2000), where scope changes are not allowed, this supplier decided to increase the price and to extend the deadline beyond what had been previously agreed. From the point of view of the headquarters, extra costs could be absorbed, but delays in delivering this electronic board meant heavy fines and conflicts with the manufacturer of the aircraft (the intermediate customer) and potential commercial problems with the Air Force (the end-user customer). This situation proved to be an opportunity for the subsidiary to increase its autonomy without threatening the headquarters (Dönmez and Grote 2018) by showing its ability to develop complex projects from scratch. Our findings indicated that project management innovation can increase the performance of the subsidiary and thus, attract attention from the headquarters. For that reason, the project management approach should respect the characteristics of the project, the top manager should support this initiative and team members should have expertise and be motivated.

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The rest of this paper is organised as follows. Section 2 reviews the literature. Section 3 presents the case study focused on the approaches adopted that overcome the challenges described above. In Section 4, the authors outline the method, including the justification for choosing a case study and the procedures to collect data and the sample acquired, while Section 5 discusses the findings of this study. Sections 4 and 5 cover the criteria identified by Perks and Roberts (2013) for longitudinal studies in innovation. We conclude this paper by providing our methodological contribution of tailoring a range of project management approaches that was able to develop a complex NPD project in record time and deal with political issues.

Literature Review

In order to investigate the impact of project management innovation in increasing subsidiary performance and therefore increasing headquarters' attention, we start by reviewing six distinct project management approaches that can are applied to NPD projects, because 'one size does not fit all' (Shenhar and Dvir 2007). The role of the subsidiary in generating and disseminating knowledge across the multinational and the concept of success is undertaken the aim of which is to establish whether this can lead to an improve subsidiary's reputation.

Project Management Approaches

Created 1986, Stage-Gate is a sequential approach that aims to develop projects through five stages for managing project activities (scoping, build the business case, development, testing and validation, and launch). These five gates have acceptance criteria for moving a project from one stage to the next (Cooper et al. 2002). In Stage-Gate, costs follow a proportional inverse relation to the project uncertainty and stages. In the early stages, costs are usually low as the project uncertainty is high, but as uncertainty decreases during project development, the costs of subsequent phases increase (Summers and Scherpereel 2008). However, NPD projects have high uncertainty in the initial stages (Amaral Féris et al. 2020), conflicting with the cost constraint assumptions built into the initial stages of Stage-Gate (Van Oorschot et al. 2010).

In 1994, Microsoft created the MSF, consisting of two models: the (1) a Team Model that defines the people who will work in the project and their respective activities (Santos 2007); and a (2) Process Model that divides the project development in five project phases, including envision, planning, developing, stabilising and deploying. MSF's goal is to promote an iterative and adaptive process consisting of a set of principles (e.g. agility and learning from all the experiences), concepts (e.g. willingness to learn, motivated teams and customer-focused), as well as utilising proven practices (e.g. for multidisciplinary teams and working in teams) derived from its own experience in development products and services (Microsoft 2005).

Two years later, Rational Software created the RUP PM approach. With four project phases (inception, elaboration, construction and transition) and milestones between them. RUP aims at ensuring the development of a high-quality software that meets the customer's needs within a predictable schedule and budget through. To that end, RUP provides a comprehensive set of guidelines, templates and tools aimed at covering the development process in a more broad and deep way than other approaches (Karlsson and Wistrand 2006). It is however a 'heavy' process with more than 100 artefacts that represents an additional and often unnecessary burden for small projects (Smith 2001).

In this same year, the UK government created Projects IN Controlled Environments version 2 (PRINCE2). This approach focuses on the business case and process control that can be tailored to a specific project environment (McHugh and Hogan 2011). PRINCE2 has seven principles (e.g. learn from experience and manage by stages), seven processes (e.g. managing a stage boundary and closing a project) and seven themes (e.g. quality, risks and plans) (Kruger and Rudman 2013). However, as PRINCE2 is a legacy of the public sector, there are rigid practices that hinder its adoption in NPD projects, such as heavy documentation in almost every project step.

One year later, Eliyahu Goldratt created critical chain project management (CCPM) based on his theory of constraints (Goldratt 1997). CCPM is focused on resource management and assumes that task uncertainty is the major factor that will impact project performance. Instead of adding buffers on the duration of tasks to absorb any delays that may occur to the project, CCPM halves task estimations and distributes the remaining part into buffers that are monitored throughout the project. However, the applicability of CCPM in NPD projects is limited: it considers that the availability of resources is unlimited- this does not occur in practice; b) it views the software development process with the same logic as a manufacturing process- impossible to do in most cases; and c) it reduces estimates by imposition that can lead to a lack of commitment among team members (Raz et al. 2003).

In 2001, seventeen independent-minded software practitioners launched Agile, an approach that aimed at creating and responding to changes in order to succeed in developing software within an uncertain and turbulent environment (Howell et al. 2010). Instead of process, tools, comprehensive documentation and contract negotiation, Agile is focused on individuals, customer collaboration and incremental way of thinking, and covers project management, software development and testing through several practices. For example, Scrum to manage product

development (Sutherland, J. 2015) and Kanban to design, manage and visually improve flow systems (Dennehy and Conboy 2018). The success of Agile over recent years and its wide acceptance in the IS field, resulted in its popularity with diverse projects and industries, like construction, government, telecommunications and health care (Serrador and Pinto 2015).

The Role of the Subsidiary

Multinational companies (MNCs) play a crucial role in sharing knowledge, since mergers and acquisitions offer excellent opportunities for both the country and its subsidiaries to renew their knowledge base and to aggregate new knowledge. The main reason why MNCs exist is because of their ability to transfer and exploit knowledge more effectively and efficiently in the intra-corporate context than through external market mechanisms (Gupta and Govindarajan 2000). For MNCs, subsidiaries have two primary sources of external knowledge that can be taken advantage of: (1) other MNC units (e.g. headquarters and other subsidiaries) and (2) local organisations (e.g. customers and suppliers). The implication is that a subsidiary must be able to acquire, assimilate, and exploit the knowledge of the headquarters and their peers as a natural consequence of belonging to that global social community (Colakoglu et al. 2014).

Some subsidiaries seek to implement the headquarters approach in the local context. However, others have the incumbency to contribute to the MNC by generating and disseminating local knowledge. In this case, they need to leverage capabilities and resources across the enterprise by take initiatives that are monitored closely by the headquarters. The successful ones tend to increase their reputation and autonomy (Ambos and Birkinshaw 2010). However, there are several factors that impact these initiatives, such as skilled workforce, infrastructure (Cantwell and Mudambi 2005), competitors, suppliers, customers (Borini 2016) and the level of relation between the two units (Najafi-Tavani et al. 2015).

One of the most important actors in this process is the top manager of the subsidiary (Bouquet and Birkinshaw 2008), who has some degree of freedom to restrain formal requests from the headquarter or to submit their own proposals. For example, he or she can provide conditions to increase the absorptive capacity (i.e. the ability to recognise relevant knowledge, assimilate it and apply it commercially, see Song 2014) by promoting the transfer of knowledge to the headquarter and being the design authority of a NPD product in a reverse knowledge transfer process (Kogut and Mello 2017). Besides the potential profit from the delivery of a NPD, the subsidiary can increase its reputation within the headquarter (Blomkvist et al. 2010). Moreover, expatriates play a significant role. They are managers and specialists from the headquarters that are relocated into the subsidiary for integrating knowledge and processes between them and reducing cultural differences between team members (Kostova et al. 2016). Conversely to expatriates, inpatriates are relocated for a long-term stay abroad in the headquarter, aimed at sharing tacit knowledge that can be used to leverage knowledge generation (Chang et al. 2012). Finally, there are the local professionals that complement this rich organisational environment in the subsidiary.

Project Success Concepts

The traditional definition of project success is now five decades old. Avots (1969, p.78) suggested implicitly that project success is determined based on delivering on the scope with the quality required, on time as well as on budget. This is referred to as the Iron (or Golden) Triangle (Atkinson 1999; Zwikael and Smyrk 2011).

This concept has also been criticised by other researchers. Among others, Scott-Young and Samson (2008) claimed that satisfaction, longer-term business success and the preparation of the organisation for the future are ignored, while Bakker et al. (2010) stated that this definition is not suitable for software development, because requirements change during the project lifecycle, thereby influencing time and cost.

As a result, several researchers have proposed improvements to this definition. For example, Pinto and Slevin (1988) included the assessment of the usefulness of the project, as well as the level of satisfaction and effectiveness for its intend users. Atkinson (1999) added long-term properties, such as maintainability and evolvability factors. DeLone and McLean (2003) developed a model specific for information systems, dependent on the organisational context, aiming to synthesise different measures of effectiveness. Symons (2010) suggested measuring of the productivity of software development projects (ratio of software size to effort) and the speed of delivery (ratio of software size to duration). Zwikael and Smyrk (2011) proposed an additional dimension for assessing the unplanned effects that the project may produce, such as the degraded performance of a system after a new software release is launched (Savage et al. 2015). Lechler and Dvir (2010) published a more detailed view of project success with four distinct dimensions. These included efficiency for measuring the extent to which time and cost plans have been met, measuring the extent of benefits that the project brought to its client, customer satisfaction with the benefits provided by the project and how it was conducted as well as the business results for measuring the perceived value of the project.

The Case Study

In this section, the authors describe a set of unorthodox project management practices adopted in the development of the NPD that was able to overcome the challenges discussed previously in the Introduction. This section is organised according to what was reviewed in the literature and nine knowledge areas defined by Project Management Body of Knowledge (PMBOK) focusing on Agile practices (PMI 2017).

The role of the subsidiary. The subsidiary is located in an emerging country and part of a high-tech MNC that initially acquired it in order to provide product maintenance for local customers. In the early years, experienced managers and specialists (i.e. expatriates) were relocated to the subsidiary for implementing part of the organisational processes used by the headquarters and to start manufacturing products locally. Later, young engineers (i.e. inpatriates) were relocated to the headquarters to start the development of software projects. However, the level of subsidiary autonomy was very limited at that time, including the lack of autonomy to develop a complete NPD project. Over the years, its autonomy of the subsidiary has increased due to the quality of work it had provided to the headquarter. This led to a new context, where some projects were shared between the project managers of the headquarters and the subsidiary (Scott-Young et al. 2019). When the x86 crisis happened, the top manager of the subsidiary identified an opportunity to increase its reputation and autonomy (Blomkvist et al. 2010). He provided strong support for this challenging project (Shepherd et al. 2017), by funding it and acting politically (Kyriazis et al. 2017) to decrease the level of mistrust at the headquarters.

The concept of project success adopted. Usually, the subsidiary adopts the concept proposed by Lechler and Dvir (2010), because it includes aspects related to the outputs (like efficiency) and outcomes (including effectiveness, customer satisfaction and business results). In this project, on-time delivery was very important, because the intermediary customer expected a X86 board able to fly in the military cargo plane in five months. On the other hand, an over cost was acceptable, because the cost of developing this project could be absorbed later, during the future production of this board. This definition of success guided the approach adopted for cost and procurement management.

The project management approach adopted. The approach selected to manage this project was able to deal with the development of software, hardware and mechanical projects in order to build the X86 board. However, it should consider "whole forest" instead of a "single tree" (Lee et al. 2019), this led to developing a plan that included a strong stakeholder analysis able to deal with the two customers (see Section 6) and psychological aspects, such as motivation. Agile was combined with a sequential approach (Bianchi et al., 2020) aiming at responding to constant requirement changes while being able to develop a high quality plan (Amaral Féris et al. 2017). For software development, this combination is useful when there is a need to develop a certified (or certifiable) software that should follow the principles espoused in the standard DO-178- software certification of safety-critical avionic systems – Belz et al. 2019). This combination of two distinct approaches was also adopted in the hardware development, because of the time pressure that led to plan procurement in a different way (to be discussed next) and because of the existence of standard DO-254 for hardware (Belz et al. 2019).

Scope management. The specification for developing the X86 board from scratch included two high speed processor (Intel Core i7, 2.0GHz, dual-core) for running embedded Fedora-Linux, Gigabit Ethernet, DVI and VGA videos outputs, USB and RS-232 serial ports, 16 Gigabytes of SATA memory on-board flash, a PCI express connection, and high power dissipation (around 100W).

Schedule management. Usually, the R&D team from the headquarters takes one year to deliver similar projects. In this project, the R&D team from the subsidiary had only five months. The planning was based on the critical path- the activities that determines the shortest time possible to complete the project (PMI 2017). This led the creating several alternative plans (plan "B") especially for procuring the required parts (discussed further below).

Quality Management. The quality that needed to be achieved by the X86 in five months was technology readiness level (TRL) 6. TRL is a method developed at NASA that estimates the maturity of technology (Straub 2015). To achieve this, the project team followed rigorous development standards (e.g. DO-178 and DO.24). Although the boards were not audited because of the time, special equipment was used like the Highly Accelerated Life Testing (HALT) and Highly Accelerated Stress Screening (HASS) chamber applied sudden temperature changes and vibration to eliminate design and production problems. During planning, two technical leaders- from the headquarter and from the subsidiary- used a tool named QPLAN to improve the quality of the plan (Amaral Féris et al. 2017) for developing the MC and the X86embedded in the MC. For example, QPLAN provided suggestions for the MC including the need to have face-to-face communication instead of interactions by e-mail and for X86 the need to adopt a test methodology for quality improvement.

Resource Management. With the support of the top manager, it was possible to allocate and demonstrate the value of project teams with a mix of very experienced team members along with junior engineers when developing electronic products for critical applications.

Communications Management. In order to plan, monitor and control, the project manager organised frequent meetings (every Tuesdays and Thursdays) and invited all team members involved in this projects (i.e. people from, R&D, quality, production, supply chain and finance areas) to discuss the status of the project with total transparency. In addition, there were ad-hoc meetings with a small number of people to discuss issues in depth that were not discussed in the status meetings.

Risk Management. The development of the X86 was considered a high risk-project, because of the extreme time pressure (already discussed) and the fact that it was the first development of a military board by the subsidiary who was known for developing software, but not hardware.

Cost and procurement management. As previously discussed, delivering the X86 within the planned budget before the CDR was outside the concept of success adopted for this project. However, delivering the X86 on time and with the required quality was critical to the success of the project. This necessitated a new approach of performing well-established activities in a different way- with creativity (Khedhaouria et al. 2017)- an unorthodox practice of Agile while also developing hardware. Particularly unusual aspects include the following: (1) Usually the electronic engineers design an electronic board and only when it is complete, they generated the bill of materials (BOM). This is a list of parts required to be purchased. However, the length of this process was incompatible with the aggressive delivery timeframe. The hardware engineer delivered several preliminary BOMs during the process of board design. The project manager then delivered this list to the buyers and asked them to purchase what was on each list. At the end, there was a set of electronic components that were not used in the X86 because the design of the board changed during this process. This represented the purposeful generation of muda (i.e. waste – Suárez-Barraza et al., 2016) to trade off on the speed of development. On the other hand, this strategy allowed components to be available on-time. (2) For items on the critical path, such as a printed circuit board (PCB) that required 12 layers- few suppliers were qualified to produce it)- the project manager requested to purchase them from more than one supplier. This also represents additional costs. However, the first supplier to deliver the PCB solved the problem of deadline for this critical item. (3) Because it is a military board, electronic components have more robust specifications, but this also reduces the number of available suppliers. To complicate matters, it is possible that customs may provision these components from abroad, in turn inducing delivery delays. As a result, some critical components were purchased twice, and the buyers asked the supplier to send via regular post and via a private company. The first set of components solve the problem of deadline!

Methodology

In order to analyse the changes in the relationship between headquarters and the subsidiary, we performed an exploratory and descriptive qualitative approach. The object of analysis was the description of technological knowledge generation flows between the headquarters and the subsidiary through multiple sources of evidence for analysing a complex contemporary phenomenon within its real-life context (Yin 2003).

The researcher team had access to key actors in the headquarters and subsidiary that participated in this process, including expatriates, inpatriates and local practitioners that participated in the development of the X86 and its implications to the headquarter and subsidiary. See Table 1.

In order to get a rich set of data, the authors made observations, collected organisational reports and performed semi-structured interviews (Creswell 2014). To undertake this project, the research team visited the laboratories and R&D offices eight times and taking handwritten notes of the documents made available by the organisation (the defence industry MNC does not allow to take photographs or electronic reproduction of any documents). This procedure complemented the triangulation of data from the analysis of documents including code of ethics, organisation charts, reports and procedures. In addition, there were also follow-up meetings during the development of the research that helped in clarifying issues and confirming findings identified during the interviews (see Clarke 2019).

Table 1: Subjects of the Research

Role	Area	Workplace	Working time in this MNC
Hardware engineering manager	R&D	Subsidiary	6 years
Software engineering manager	R&D	Subsidiary	9 years
Engineering director	R&D	Subsidiary	11 years
Engineering director	R&D	Headquarter	30 years
Technical engineer	Operations	Subsidiary	11 years
Operations director	Operations	Subsidiary	34 years
Former project manager	Projects	Subsidiary	5 years
Manager	Projects	Subsidiary	11 years
Director	Projects	Subsidiary	12 years
Vice President	Sales	Subsidiary	4 years
Former CEO	Presidency	Subsidiary	10 years
Former CEO	Presidency	Subsidiary	4 years

We collected 12 semi-structured interviews from the participants. These served to elicit an understanding of the phenomenon under investigation. We developed three distinct scripts with interview protocols (guidance questions) for conducting the in-depth interviews. These scripts included dimensions of the headquarters-subsidiary relationship, their role and the actors that participated in the process of generating technological knowledge in the subsidiary. Then, a coding process was carried out to prepare the data analysis. In detail, the data were organised into nine short labelled and exemplified categories (Creswell 2014). These included: (1) Type of knowledge developed, (2) Information management process, (3) Forms of communication, (4) Role of subsidiary and headquarter, (5) Role of the subsidiary's general manager, (6) Role of expatriates, (7) Evolution of the subsidiary's role, (8) Formalization of projects and (9) Projects involving innovations.

Discussion

Initially, the headquarters was of the view that the subsidiary did not have the capability to develop a military electronic board with this level of complexity in such a short period of time. However, key project team members had significant experience in the development of other critical applications (e.g. electronic boards for industry automation) and were confident and motivated to break this assumption in order to acquire greater autonomy in future projects. Moreover, the literature has provided considerable evidence that technological knowledge created by the subsidiaries is often absorbed by the headquarters. This has been described as a ‘reverse transfer of knowledge’ (Kogut and Mello 2017).

Another strength of the subsidiary is the fact that there are some peculiarities in relation to similar developments made by headquarters. For example, the size of the subsidiary organisation is considerably smaller than the size of the headquarters. This allowed the use of creativity in a NPD project and provided more flexibility in tailoring existing organisational processes and access to the top manager. In turn, these factors provided strong support to the project team through funding and removing political issues and obstacles at headquarters.

In addition, a successful stakeholder analysis was created through a sharing of common interests with the Air Force (the final customer). The development of a local knowledge is important for the Air Force. However, when the proposed solution was presented to the manufacturer of the aircraft (the intermediate customer), their initial reaction was negative. From their point-of-view, this project was very risky because it meant development from scratch of a complex military board in a restrictive time frame (instead of the usual. 12 months) as well as representing a ‘first’ for the subsidiary. However, as the Air Force understood the value of this project and knew the quality of the team members, they ended up supporting this initiative.

Ultimately, a demonstration of the technical capacity especially given the importance of the end-costumer, led to an increase in the headquarters trust of the subsidiary. For example, an engineer from the headquarters stated that “the subsidiary is “able to produce in the simplest, easiest and fastest possible way". As a result, the subsidiary now leads all national projects and contributes to the generate knowledge to the entire organisation (Kogut and Mello 2017). Moreover, the careers of several members of the team benefited and the communication between areas enhanced significantly, while the issues found during the project execution led to enhancement of internal processes.

Based on these outcomes, we proposed a tentative conceptual model that shows the value of project management innovation increasing subsidiary performance and thus, attracting headquarter attention. This model is based on Ambos and Birkinshaw (2010)'s work that proposed a model to explain the relationship between headquarter's attention, strategic choice and subsidiary performance. We adopted this model by focusing in the role of the subsidiary and highlighting the value of project management along with four moderating factors, including team expertise, motivation, top manager support and time pressure to deliver the new product, as discussed in detail in this paper. See Figure 1.

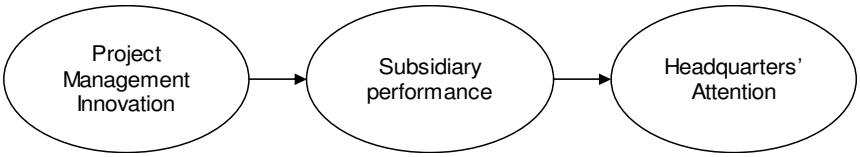

Figure 1: Tentative conceptual model (adapted from Ambos and Birkinshaw 2010)

Conclusions

This study examined the development of a military electronic board by a subsidiary, involving software, hardware and mechanical projects developed from scratch. This NPD was undertaken in much less time than development teams from the headquarter usually take. The project involved overcoming technical challenges and political issues that come from a scope change after the CDR, where requirements would usually be frozen. The project manager of the subsidiary, supported by the top manager and by the end-user customer, adopted an approach that moved beyond usual project management practices. The project management approach synthesised elements of Agile practices with the milestones, as well as the use of Agile for hardware development. It involved counter-intuitive parts acquisition, establishing alternative acquisition plans. The project was complex socially in that it necessitated a stakeholder analysis involved two customers often with conflicting interests. All parties required frequent communication and transparency and involved the attention of the project manager regarding the psychological aspects in order to motivate a skilled team to perform better than usual. Regardless of these difficulties, the NPD was delivered on-time, the headquarters level of confidence with its subsidiary increased significantly and the subsidiary was consequently granted more autonomy, including the leadership of all national projects.

This study contributes to research by showing that project management innovation, associated with team expertise, motivation and top management support can increase subsidiary performance even, under high time pressure. For practitioners, this study describes a set of unorthodox practices that can deliver NPD projects faster than usual and with the quality required.

The limitations of this research include a single case study of a specific project type in the defence sector. Future research may address this limitation by analysing the headquarter-subsidiary relationships in different project types and industries by using the model and methodology developed here.

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Empowering Organic Farmer Through Innovation in Indonesia: A Participatory Guarantee System Model

Vanda NINGRUM[1,2] and Triyanti ANUGRAHINI[3]

[1]Post Graduate Program in Social Welfare Science, Universitas Indonesia; [2]Indonesia Institute of Sciences, Jakarta, Indonesia;
[3]Departement of Social Welfare Science, Faculty of Political and Social Science, Universitas Indonesia
[1]vanda.ningrum@gmail.com (corresponding author's email)
[3]tran50@ui.ac.id

Abstract

Many studies define the Participatory Guarantee System (PGS) as a social innovation to help small-scale organic farmers gain access to organic guarantee and promote social inclusion. This study explores farmer empowerment in PGS Pacet in Claket Village, East Java Province, Indonesia. Data obtained by Interviews with 15 farmers and were analyzed with empowerment theory. This study found that the organic farming and PGS model able to empower collective and individual farmers. In collective, PGS facilitates groups to increase their capacity to maintained business sustainability, expand the market network, and improve their group's income. For individuals, the PGS could improve farmers' agriculture and social skills, increase their self-esteem, and boost household income. Thus, the PGS model also provides access for farmers to build better relationships with consumers and communities in the village. Based on these findings, the PGS model is essential for organic farming communities, especially for smallholders.

Keywords: Empowerment, Participatory Guarantee System (PGS), Organic Farmers.

Introduction

According to statistical data, there are still 24.8 million poor people or 9.22% of Indonesia's population (Badan Pusat Statistik Indonesia, 2019). Of these, 63% live in rural areas and work as a farmer. Amid farmer poverty, other social problems faced are reduced agricultural land, lack of farmer's bargaining power in the market, decreased soil fertility, and climate change. Of the many difficulties, empowering farmers is a crucial concern to do as an effort to transfer power to farmers to improve welfare. Conceptually, empowerment gives strength to clients (individuals, groups, or communities) to increase their capacity and confidence in making decisions and solving their problems (Adams, 1996; Payne, 2005).

Academics promote organic farming as a potential model to improve farmer welfare in the long term (Padmanabhan, 2020). From an environmental aspect, organic agriculture uses biological processes in plants and animals to build soil fertility and control pests towards ecologically-based agriculture (Padmanabhan, 2020). Thus organic agriculture can provide benefits for the current and next generation. In the social aspect, organic agriculture can strengthen local communities' structure because agriculture is carried out by considering local conditions and leading to food sovereignty (Altieri, 2009).

In Indonesia, organic agriculture has increased in recent years. Between 2014 and 2018, there was an increase in the land by 121%, from 113,638 to 251,631 hectares (Aliansi Organis Indonesia, 2020). The growth of the organic market provides an advantage in achieving the economic scale of production and increases the risk of dishonest traders exploiting organic products' added value. Thus, organic standards become a concern for consumers (Robert Home, Hervé Bouagnimbeck, Roberto Ugas, 2017; Zanasi, Venturi, Setti, & Rota, 2009). The Government encourages the organic guarantee to be passed through third-party certification. However, third-party certification is considered burdensome for small-scale farmers because they bear enormous entry costs while farmer productivity cannot cover (Cuéllar-Padilla & Ganuza-Fernandez, 2018; Sacchi, 2019). A study shows that 59% of household-scale organic farmers only manage land less than half a hectare with the status of renting or working on land owned by others (Ningrum, V & Subroto, 2020). The third-party certification also affects consumers' high price (Fatimah, 2017; Sacchi, Caputo, & Nayga, 2015).

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The organic farmer organizations in the world build an innovative guarantee to help small farmers get an organic certificate at a low cost. International Federation of Organic Agriculture Movements (IFOAM) has promoted the PGS based on direct participation between farmers, consumers, and others (NGOs, traders, universities, etc.). They work together to verify that the farmers' cultivation is following organic standards in IFOAM. Producers and consumers share the cost of guarantee through PGS not to burden the small farmer (Cuéllar-Padilla & Ganuza-Fernandez, 2018; Nelson, Tovar, Rindermann, & Cruz, 2010). PGS also provides an opportunity to increase consumer trust because consumers are directly involved in the organic verification process (Zanasi et al., 2009). From the aspect of empowerment, PGS is an alternative to solve organic guarantees (Cifuentes, Vogl, & Padilla, 2018). Various countries, such as Spain, Italy, Brazil, Mexico, and several other Asian countries, including Indonesia, have adopted this PGS guarantee system to help small scale organic farmers.

This study focuses on exploring farmer empowerment in PGS Pacet in Claket Village, East Java Province. Indonesia. PGS Pacet has a slight development inviting farmers to join. At the time of its inception in 2018, there were only five female farmers with less than 1/3 hectare of land under management. In 2020 the farmers who have joined have reached 21 farmers with five groups, most of which are dominated by women. Currently, farmer groups have cultivated 50 types of vegetables, fruit, and tubers. The increase in organic farming in this village has made Claket Village a natural tourist attraction that provides organic farming education.

We use a qualitative approach based on in-depth interviews with purposively selected informants. During September and October 2020, authors interviewed 15 informants of 12 farmers, two consumers, and a facilitator for Aliansi Organic Indonesia (AOI). We organized data into categories based on themes (coding) using NVivo 12 software to categorize the interview transcript data.

Farmer Empowerment's Literatures

The main focus of empowerment is resources, agency, and achievement. Resources refer to control over physical, financial, human, and intellectual resources. At the same time, the agency is the ability and freedom of a person or community to make life choices. Resources and agencies can jointly achieve their "functioning achievements," both essential functions that are universally and on parts based on individual or community preferences (Sell & Minot, 2018). In empowerment, there must be a transformation in which disadvantaged communities can expand their ability to make changes for the better. Rowland (1997) explains that empowerment increases participation in making decisions and includes a process that makes people feel capable and entitled to make decisions. Empowerment must involve dismantling negative social constructs and seeing themselves as having the capacity and right to act and influence decisions. There are three significant dimensions in the empowerment process: personal, relational, and collective dimensions (fig. 1). The personal dimension in empowerment is developing self-confidence and individual capacities and removing internalized effects of oppression.

In comparison, the relational dimension is developing the ability to negotiate and influence the relationships and decisions' nature. The collective is where individuals work together to achieve a broader impact than they can get themselves, includes involvement in political structures, but may also include collective action based on cooperation rather than competition. Collective action can be focused locally, such as groups at the village level or the country level (Rowlands, 1997).

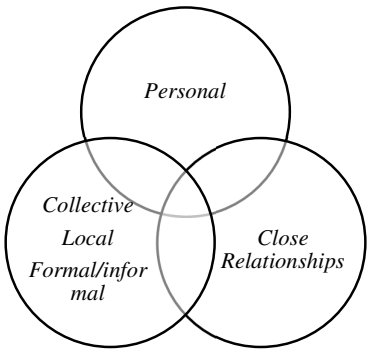

Fig. 1: Empowerment Dimensions

Source: Rowlands (1997) p.14

Agricultural empowerment studies have so far emphasized how farmers can innovate to carry out cultivation independently through organic agriculture (Altenbuchner, Vogel, & Larcher, 2017; Nath & Athinuwat, 2020). Besides, organic agriculture also allows strengthening the role of women in agriculture (Achandi, Kidane, Hepelwa,

& Mujawamariya, 2019; Altenbuchner et al., 2017; Lähdesmäki, Siltaoja, Luomala, Puska, & Kurki, 2019; Wright & Annes, 2016), strengthening the involvement of farmers in the production chain (Chisika & Yeom, 2020; Touri, 2016; Wright & Annes, 2016) and the ability to access technology (Beyene, Regassa, Legesse, Mamo, & Tadesse, 2018; Subashini & Fernando, 2018).

Although the aim is to provide organic guarantees to local consumers, the PGS model can encourage farmers in groups to work together and improve their abilities in agricultural practices through sharing knowledge and experiences. PGS also gives more attention to traditions, local ecology, social, and environment (Wangsa, 2017). In PGS, all parties have a collective commitment to implement organic principles in a joint action between farmers, consumers, Government, and other parties related to the organic food system (May 2019).

Results & Analysis

PGS Pacet

PGS Pacet was formed in 2018 and involved eight females and one male farmer divided into two groups: the Twelve and the Madani groups. In 2019, 8 other female farmers were joined and formed two groups, namely the Swadaya and the Miyatani Group. In early 2020, 7 female farmers were interested in joining and creating the Berdikari Group. Currently, the total number of farmers who are PGS members are 23 farmers divided into five groups. All land managed by the group has a lease status, with a land area controlled by the group between 500 to 3,600 meters. On this limited land, the farmer groups plant various commodities such as vegetables, fruits, and tubers. Each item is grown in turn, in limited but varied quantities. Currently, PGS Pacet has verified 54 types of commodities produced by farmer groups.

In the PGS Pacet activity, farmers learn how to treat organic land, plant cultivation and record all activities carried out by farmers on paper. For farmers, the process of taking notes on paper is an activity they consider problematic because most farmers' education is only at the primary level and they are not used to writing. However, the habits taught by PGS management familiarize farmers to keep these records. PGS documentation more a simple scheme than documents for third-party certificates; PGS allows farmers to fill forms themselves (Nelson et al., 2010; Sacchi et al., 2015). In PGS Pacet guarantees participation involves farmers and consumers.

Organic Farmer Empowerment

The authors can see the theme empowerment found in PGS Pacet as Fig. 2 below;

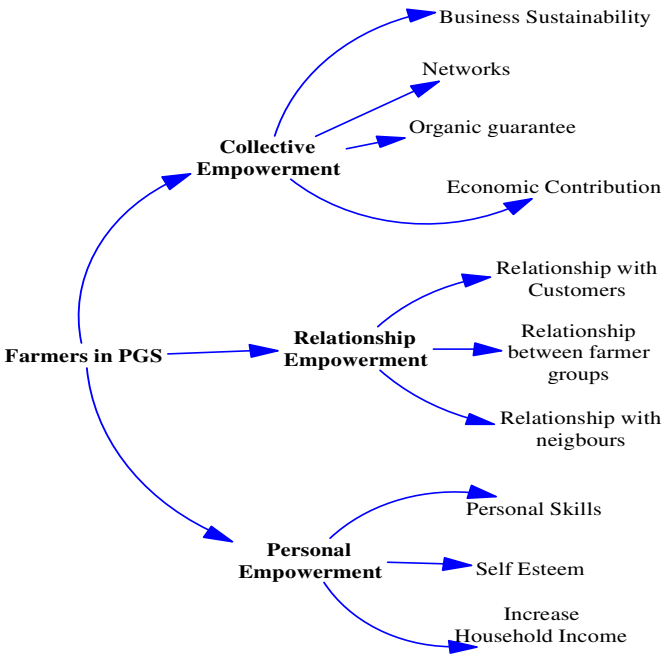

Fig. 2: The Theme Farmers Empowerment in PGS Pacet

Collective Empowerment

Collective empowerment develops when farmers work together to better impact than working individually or not being part of PGS. Group farming has a significant influence on empowering farmers in Indonesia (Maulini, Febrian, & Sutisna, 2019), especially for female farmers (Agarwal, 2020; Dohmwirth & Liu, 2020). The collective empowerment found in the PGS Pacet farmer groups from the results of this study included:

(1) Business Sustainability

Through groups within PGS, farmers can ensure their agricultural business's sustainability by resolving obstacles, such as cooperation in providing capital to lease land and planning crop management. The results showed that most of the farmers did not own land. Before joining the organic group, they were only seasonal farm laborers. The cultivation method in groups also allows farmers to carry out cultivation management to help farmers decide what they plant when they grow and how much they produce. By carrying out farming management, the market accepts all the group's commodities, and the crop rotation system can maintain nutrient fertility in the soil.

> *"On an area of 2000 square meters, it usually consists of 4-5 female farmers. So, from there, in each group, we make particular commodities, there are vegetables, fruit, and tubers. Here we have two groups that specialize in vegetables, then we make a planting schedule, and we record them on paper as documentation. In this planting schedule document, there is a division, in one group, in one area, for example, land, one of the five women we give a schedule of 4 to 5 types of vegetables. So there are about 25 types of vegetables in one land. Then we make a rotation in the ground; vegetables, fruit, and tubers have to keep rotating. This planting schedule is essential, so there is no overproduction (Miss. My, PGS Pacet Manager, September 2020).*

Most of the women farmers in the village generally do not only focus on farming. In their daily activities, they are responsible for domestic household activities such as cooking, cleaning, and caring for children. During limited time and energy, cooperation between farmers essential to maintain the farmer's garden, such as watering and cutting the grass.

(2) Networks

PGS Pacet builds networks with many parties such as farmers, consumers, agricultural servants, and village officials. However, the guarantee document only involves farmers and consumers, while agricultural servants and village officials are involved in the discussion process. The participation of many parties in PGS is needed to embrace a lot of support from the wider community.

> *So PGS is not just talking about guarantees. Still, on the role of farmers as producers, consumers, agricultural supporters, and village officials, PGS does not work alone but involves others' functions. Also, organic consumers are critical consumers, so when we invite them to attend, they can also be part of the guarantee, so their support is significant. Indeed, everything we do is for bridging with all parties "(Miss. My, PGS Pacet Manager, September 2020).*

PGS has two types of consumers: the end consumer (household) and distributors (traders). Consumers are the most critical network for farmers; apart from the fact that consumers are involved in the standard organic assessment, consumers also have a significant role in providing information on commodities that farmers must produce for the market. According to the Distributor, cooperation with PGS offers benefits for both farmers and consumers. PGS provides a forum for farmers and consumers to negotiate prices; the agreed price is fair for farmers and consumers.

> *"I like this collaboration with PGS Pacet, because we are open, so it's a Fairtrade. We discuss the price, if I give the seed, it means how much it will cost me, so there will be a discussion about the price, so the price we set is appropriate for the farmer and not too expensive for the customer, win solution for farmers and customers ". (Miss. Agn, Distributor, September 2020)*

The findings above show that PGS provides access for farmers to meet directly with consumers, where farmers can get information about market needs and open opportunities to expand the market. Farmer participation in the food chain helps farmers get a fair position in the market (Touri, 2016), even though the ability to negotiate in this market also affects women farmers to gain more excellent added value from their agricultural products (Wright & Annes, 2016*).*

(3) Organic Guarantee

After obtaining the organic guarantee, they feel that there is something to protect them, farmers are not alone but supported by many people, farmers are more convinced that the quality of their crops and more enthusiastic about farming.

> "*PGS protects us, the quality of our harvest can be guaranteed organic, we have more confidence in our cultivation." (Mrs. St, farmer, October 2020)*

Organic guarantees obtained by farmers can lead to higher farming motivation for the group. For farmers, PGS is not just organic legitimacy in the market, but also as an organization that becomes an identity for organic farmers. In other studies, agricultural quality standards through certification are considered significant in reducing the empowerment gap between men and women. Women have adequate access to training, assessment, and making decisions in the cultivation and marketing networks (Meemken & Qaim, 2018).

(4) Economic Contribution

The economic contribution felt by farmers is the increase in the group's amount of income because farmers get a more stable selling price compared to the previous conventional farming. Another economic contribution is the increase in consumers' number and area after obtaining a PGS certificate.

> *"Yes, it is the difference we feel. Previously our selling price was unstable; follow the price given to intermediaries. Now there is "PGS" which is very useful. " (Farmers St, October 2020).*

> *"Since we formed" PGS "and held meetings with consumers, so we have additional market share, the additions are in Malang, Gresik, Sidoharjo and Mojokerto. Previously we were only Surabaya "(Mbak My, PGS Pacet Manager, September 2020)*

Relationship Empowerment

(1) Relationship with Customer

The involvement of consumers in activities at PGS increases the interaction between farmers and consumers, thus creating a close and familiar relationship between farmers and consumers. Through this interaction, farmers can learn directly from consumers about updating market tastes and how to increase the added value of their agriculture.

> *"I have also been invited by PGS Pamor. There I met farmers and other consumers to talk about organic guarantees. It was January 2020. During the meeting, the farmers explained very transparently about fertilizers, pesticides, and how to cultivate them. Then the farmer asks what products are needed by consumers? So there is two-way communication from consumers to farmers. (Mrs. San, consumer, September 2020)*

> *"During the certification process, maybe every two weeks, I come to check the vegetables, check the harvester. Every time I meet with farmers, I also educate farmers about the wild plants around them that can be developed into more valuable products "(Mbak Agn, distributor, September 2020)*

The PGS model is part of social control because it contributes to creating social cohesion and building trust between farmers and consumers (Nelson et al., 2010; Robert Home, Hervé Bouagnimbeck, Roberto Ugas, 2017; Zanasi et al., 2009).

(2) Relationship between farmer groups

The success of the Madani Farmer Group then motivated women in the village to join organic groups. Although these farmers' success is not solely due to PGS, farmer groups, associations, and interactions facilitated by PGS become a place for women farmers to gather, not only to improve their skills but also to express their thoughts and feelings by farmers.

> *"Yes, we just said, we want to learn, if you want to join, please, from there my sister wanted to join, she said I could harvest together so that now the self-help group is triggered." (Mrs. Rn, Farmer, October 2020).*

> *"In group meetings, we usually tell stories about each other's family experiences, talk about family problems. If we were together, we spent a long time, from sunset to 9 PM we haven't returned home "(Mrs. Tik, farmer, October 2020)*

From the farmer's experience, PGS opens opportunities for farmers to share experiences (Hirata, Rocha, Assis, Souza-Esquerdo, & Bergamasco, 2019) and build closer relationships among farmers.

(3) Relationship with Neighbors

In PGS Pacet, farmers get pieces of training on organic cultivation techniques, crop management, making fertilizers, making natural pesticides, and other skills. According to interviews with farmers, the knowledge most often shared with other neighbors provides advice on dealing with pests if neighbors have problems with damage to their crops. This knowledge sharing is useful for the surrounding community because most people in Claket Village are farmers.

> *"There are a lot of tomato plants here, and pests often attack them, then I told them that organic fertilizers to solve pest problems" (Mrs. Pr, farmer, October 2020)*

Besides knowledge, organic agricultural products from farmer gardens are often given to neighbors if there is excess production. Farmers feel proud to provide healthy food for their neighbors, build better relationships and motivate them to do organic farming.

Personal Empowerment

The author found three personal empowerment themes in PGS Pacet: personal skills, self-esteem, and increasing household income.

(1) Personal Skills

Before joining organic farmer groups and PGS, all farmers practiced conventional farming and only knew cultivation in the garden since farmers form organic groups and PGS Pacet and communication skills with consumers, especially how to welcome consumers and present a product to consumers.

> *"Previously, I didn't know the various types of vegetables, I only knew about cabbage, mustard greens, and onions, but now I know the different kinds of vegetables. Since joining this group, I have been able to make a presentation in front of consumers, be able to learn better organic cultivation techniques, able to sell my crops to consumers ". (Mrs. Wti, Farmer, October 2020).*

According to PGS administrators, the PGS model can provide farmers with new knowledge about the organic farming management system as a whole. They were planning what to plant, how to produce it, how to maintain it, and how to market it. The organic standards in PGS also require farmers to make natural fertilizers and pesticides independently, thereby creating independence for farmers, farmers can independently produce production imports, and independent farmers market their products without depending on intermediaries.

> *"Farmers finally know that the agricultural system is not just planting and harvesting gardens, but now they know that agriculture is that they know the management system, the system, and record all on paper. Farmers know where the seeds come from, what pesticides are used for, you have to mention everything there. So far, the farmers in the group look smarter than other farmers". (Mbak We, Farmer, and PGS Pacet administrator, October 2020).*

(2) Self Esteem

Improvement of personal skills increases the sense of self-pride for farmers. Farmers feel they have productive activities that can be proud of their families and communities. Furthermore, female farmers consider farming to be entertainment for her during her busy household activities.

> *"A little bit confident. When asked by people, where are you from? Then I proudly answered from the garden. I feel like happy, there's something to be proud of ". (Mrs. Lk, Farmer, October 2020)*

> *"... I also want to have my entertainment in my heart, after doing household chores I want to have my entertainment" (Mrs. Tom, Farmer, October 2020)*

(3) Increase Household Income

An increase in income from group business has an impact on revenue for households. Farmers take advantage of this additional economy as family savings as protection if there are urgent family needs. Another advantage is that farmers can save farmers' expenses for consumption. The crops are not all sold but are used for their consumption, thereby reducing household costs. During the Covid-19 pandemic, Claket Village experienced a lockdown policy in three months (March - July). The Local Government severely restricted several markets, tourist attractions, restaurants, and human mobility; thus, agricultural products' demand decreased. Such jobs, like construction labor in the village, were also affected. The need for construction work fell so that most of the husbands of farmers lost their jobs. In contrast to the condition of organic farming, where the lockdown policy does not close their markets, farmers directly sell them to consumers without dependence on other parties. In such a situation, income from organic farming becomes the primary income in the family, as information from Mrs. Rn.

> *"My husband is a construction worker; now, my husband is having a hard time doing his job because of this Covid. Most of the activities are in the fields and helping to the garden. yes, this organic income is the foundation for the family. "(Rn Farmers, 2020)*

The personal skills obtained by farmers at PGS Pacet generate empowerment, especially for most women farmers, which ultimately improve household economic welfare. These results support other studies that found that organic agriculture can encourage women farmers' empowerment because of managing seeds, receiving various training, and increasing opinions (Altenbuchner et al., 2017). Besides, organic farming's main thing that must be strengthened is organic farmers' identity by managing organic agriculture's stigma. Lahdesmaki et al. (2019) analyzed the stigma of organic farming, which is considered difficult compared to conventional agriculture, which strengthens farmers to manage this stigma to encourage building the identity of organic farmers and the process of developing themselves to overcome their social difficulties in doing agriculture (Lähdesmäki et al., 2019).

Conclusion

Participatory Guarantee System is a social innovation that provides more benefits for participants than just the means of organic certification with lower costs. From the case studies found in PGS Pacet, we can conclude that organic farming with PGS can empower farmers because of the increased capacity for both farmer groups and individual farmers to improve welfare. For groups, PGS Pacet has changed the way farmers work, who previously only carried out production activities. Still, within this farmer group, PGS opens opportunities for farmers to be involved in post-production activities. For individual farmers, training and mentoring in PGS improves farmers' abilities, from technical skills in cultivation to communication skills between farmers and consumers and the rural community. From this study, we can define that capacity building for individual farmers can increase farmers' sense of self-esteem, especially for women farmers.

The PGS certificate challenge in Indonesia is that it has not received a guarantee from the Government; the Government only recognizes organic certification from third parties where it is still difficult for small scale farmers. Thus far, the PGS Model in Pacet is considered a grassroots movement to provide organic guarantees and empower small farmers both at the group and individual farmer levels.

Authors Contribution

Vanda Ningrum contributed to the design, conduct, analysis of the result, and writing of the manuscript.
Triyanti Anugrahini contributed to finalizing the design, the analysis, and writing of the manuscript.

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Advanced Technology and Changes in Labor Demand in Russia

Olga KOROPETS
Ural Federal University, Yekaterinburg, Russian Federation, okor78@mail.ru

Evgeniya TUKHTAROVA
Institute of Economics of the Ural Branch of Russian Academy of Science, Ural state University of Economics, Russian Federation, tyevgeniya@yandex.ru

Natalya NEKLYUDOVA
Institute of Economics of the Ural Branch of Russian Academy of Science; Liberal Arts University, Russian Federation, nnp81@mail.ru

Abstract

The article presents the impact analysis of the widespread use of advanced technologies on unemployment in the Russian regions. The authors believe that the transition to a new technological order, will restructure the labor demand in the regional labor markets of Russia. This restructuring will raise the demand for blue-collar workers, while those with university education will experience problems with employment. To confirm the proposed thesis, the authors used a correlation-regression analysis of space-time series. The study shows that most Russian regions have low potential for the new technological order transition. The use of this method allowed the authors to record a trend towards a decrease in the demand for people with university degrees, but also a significant difference between the regions towards the transition to the new technological order. Thus, the analysis results showed that high-tech regions with sufficient potential for the new technological order do not need a large number of people with higher education. At the same time, under the new conditions, high-tech regions are experiencing an acute shortage of workers with a secondary professional vocational education.

Keywords: Unemployment, Industry 4.0, Level of Education, Higher Education, Secondary Professional Education, Complete Secondary Education, High-Tech Regions

Introduction

Currently, a global restructuring of the world's economy to the new technological order is taking place. The so-called Industry 4:0, based on digital technologies and robotization is already beginning to influence the labor market, creating preconditions for structural shifts and its reformatting. As world experience has shown, the transition to a new technological structure is always accompanied by the labor release, due to the utility loss of some professional skills, which leads not only to the labor market restructuring, but also to an increase in the unemployment rate at the initial stage of the transition (Frey and Osborne, 2017; Harris et al., 2018; Larsson et al., 2014).

The global trends are also typical for the Russian regions. However, at present, not all Russian regions have the potential for the new technological order transition (Romanova, 2018). In the authors' opinion, most of the Russian regions, for various reasons, will remain in the fourth and fifth technological orders. Whereas the regions moving into the new technological order will be the first to experience an increase in the unemployment rate, amid a shortage of new specialists who will flow from other less successful territories. At the same time, the authors believe that the most sensitive and strong blow will fall on people with higher education.

In order to study the impact of new advanced (digital) technologies on unemployment in the Russian regions, the authors suggested a hypothesis: *the widespread introduction of the advanced technologies in the regions of the Russian Federation will have the greatest impact on people with higher education.*

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Theoretical Overview

Scientists from different countries note that the level of digitalization risk is not the same for representatives of different professions and depends, among other things, on the level of education (Ghobakhloo and Fathi, 2019). Scientists note the decline in employment as a result of replacing human resources with machines (Kim et al., 2017). It is believed that education and interdisciplinary will contribute to success in finding and re-finding jobs to reduce income inequality. Education is the best antidote to unemployment (Angeloni, 2020). One of the consequences of digitization is the multitude of new forms of work and collaboration that will require the development of new skills and competencies. New forms of employment have advantages over traditional forms. For example, distance work allows women to combine work and family responsibilities (Tonkikh et al., 2019). Teleworking has become especially popular during the coronavirus pandemic. However, not all workers will be able to master the necessary for Industry 4.0 skills and competencies.

A large-scale research conducted by analysts (PwC) analyzed over 200,000 existing jobs in 29 countries and identified three waves of automation:

1. The algorithm wave (before the 2020s);
2. The increase wave (till the end of the 2020s);
3. The autonomy wave (till the mid-2030s).

The first wave of automation, which is observed at present, is primarily associated with the automation of simple computational tasks and the structured data analysis. The second wave of automation will entail a more dynamic change in the execution of many work tasks, in particular those that are routine and repetitive. The third wave of automation is associated with the active introduction of autonomous artificial intelligence and robotics, which will automate routine tasks, as well as tasks related to manual labor or manual dexterity. Evidence obtained for the Russian Federation suggests that in the short term the automation risk is low for all levels of education. The risk for graduates of higher education institutions in the first wave is 3%, for those with secondary professional education and complete secondary education - 1%, respectively. However, less educated workers are much more vulnerable in the long run. By 2030, the potential for job automation for people with higher education is expected to be 11%, for people with secondary professional education - 31%, for people with complete secondary education - 39% (Hawksworth et al., 2019). A negative consequence of automation is a decrease in wages for low-skilled workers (Lankisch et al., 2019).

Thus, automation will, on the one hand, help to increase the prestige of higher education in mainly technical areas of training. On the other hand, it will lead to the fact that older workers and graduates of unpopular majors who do not have the opportunity to get a second degree for free, will be forced to agree to less qualified and low-paid jobs (Harris et al., 2018). All of the above creates serious threats to the social-psychological well-being and psychological safety of employees: "a situation in which labor relations can be terminated by the employer at any time exacerbates the insecurity of work and negatively affects the psychological safety of employees" (Zemtsov, 2017).

Metadata

To prove the hypothesis the tools of correlation-regression analysis based on space-time series for 2018-2019 were used. During the analysis, three one-factor models were obtained, which were included in the system of equations:

$$\begin{cases} un_ed = f\ (constanta,\ tech) \\ un_ed2 = f\ (constanta,\ tech) \\ un_ed3 = f\ (constanta,\ tech) \end{cases}$$

where un_ed is the number of unemployed with a higher education, un_ed2 is the number of unemployed with a secondary professional education, un_ed3 is the number of unemployed with a complete secondary education, constanta is a free member, tech is the number of advanced technologies used, further advanced technologies.

Analysis Results

The results of the econometric analysis recorded a trend towards an increase in unemployment of people with a higher education when using new technologies in enterprises. Thus, the analysis of the advanced technologies impact on various categories of people, depending on their level of education, showed that at present this category is at risk. Whereas for other groups, no statistically significant relationship was found, and the resulting coefficient recorded a reverse correlation (Table 1).

Table 1: The results of the econometric analysis of the impact of the advanced technologies use in unemployment

Exogenous variables	Endogenous variate		
	un	un_ed2	un_ ed3
const	632,3***	1287***	455,5***
TECH	0,25***	-0,013	-0,009
R2	0,33	0,01	0,01
Prob (F-stat)	0,00	0,29	0,21

*Note: *** the significance probability of the obtained coefficient if the indicator is 99%.*

The obtained elasticity coefficient for the use of advanced technologies indicator in relation to unemployment for people with higher education amounted to 0.25. So it can be assumed that, on average, the following pattern has developed in Russia: with the modern technologies introduction at enterprises for every 1000 units, this process will release 250 people with higher education. Note that the obtained elasticity is average for Russia. Presumably, this sensitivity will be even higher in high-tech regions, especially Moscow. Whereas for other regions, the elasticity may be lower, especially for low-tech areas.

Spatial analysis of the advanced technologies impact on people with higher education confirmed this thesis. As can be seen in high-tech Russian regions, the relation between advanced technologies and unemployment for people with a university degree is much stronger, and the sensitivity (elasticity) of this relation is vertical. This sensitivity indicates the inelasticity of the demand for advanced technologies in relation to people with a higher level of education (Fig. 1). In other words, the process of digitization and robotization is an objective process that, in any case, will facilitate the replacement of people with higher education with technology. Whereas for other regions, this sensitivity is less sensitive, and therefore has a flatter appearance.

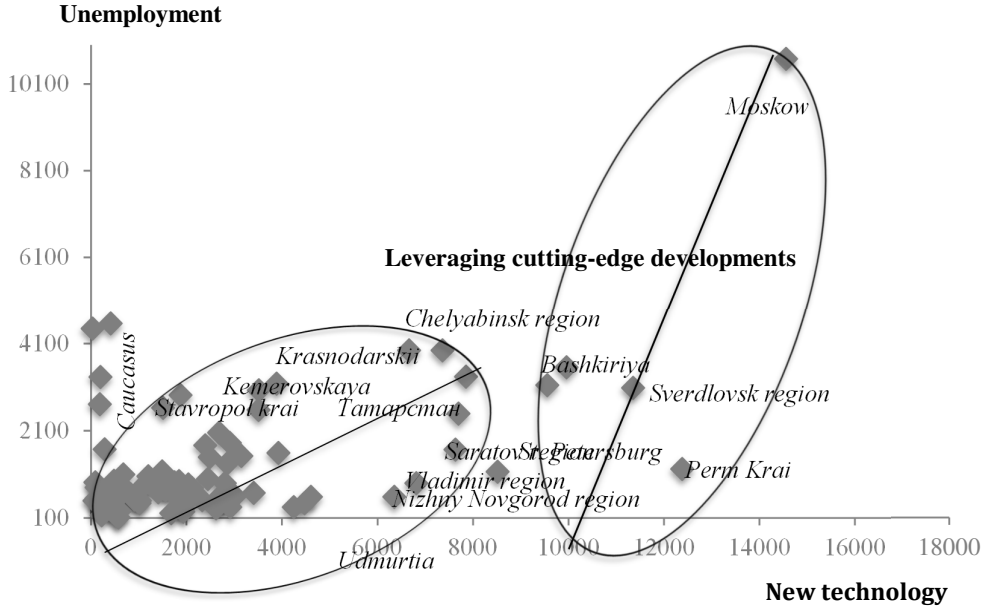

Sourse: Rosstat

Figure1: The relation between advanced technologies and unemployed people with higher education in the entities of the Russian Federation in 2018.

Another trend should be noted, there is an excess of people with higher education in Moscow, but there is a shortage of them in other high-tech regions. So, if Moscow is the only subject of the Russian Federation that fell into the first

quadrant, then such regions as Bashkiria, the Sverdlovsk Region and the Perm Territory entered the fourth quadrant in terms of the connection between technologies and the unemployed with higher education. From which we can conclude that these regions have a shortage of qualified personnel who do not have the digital skills necessary for the new technological order. This is proved by the report of the Department of Labor and Employment of the Sverdlovsk Region. Thus, according to the Department of Labor there is a persistent unmet demand from employers for specialists in the IT industry, which amounted to 237 vacancies in 2018[i].

If in relation between technologies and the unemployed with a higher education everything is unambiguous and the difference is only in the different regions sensitivity, then the relation between technologies and people with secondary professional education in Russia has a multi-vector situation (Fig. 6). Thus, Moscow, being a center of attraction for external and internal migrants, has absorbed a huge mass of people with higher education who have not found employment elsewhere. Whereas for people with secondary professional education in the region, there is an almost horizontal elasticity, which indicates both the shortage of industrial workers and the importance of the role of the people of this category for the new technological order. The same trend is typical for the Moscow Region (Fig. 2).

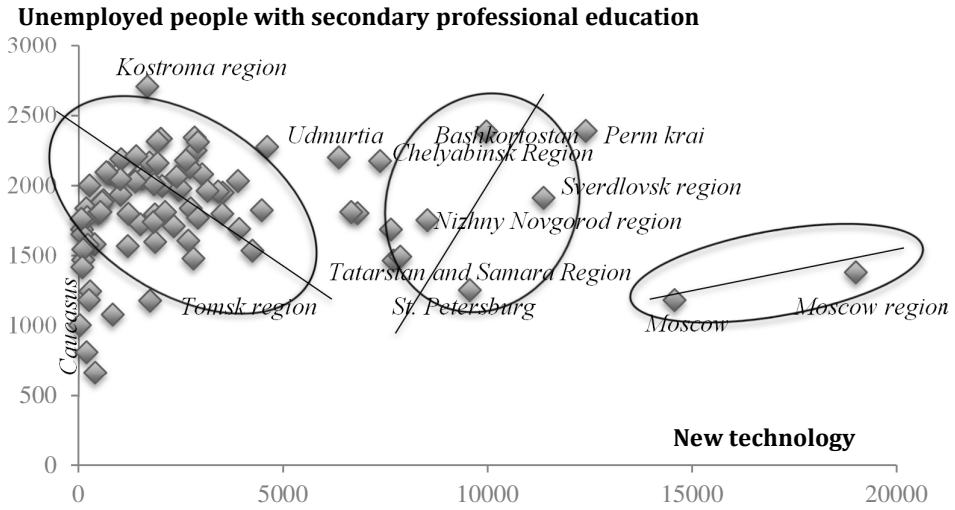

Sourse: Rosstat

Figure 2: The relation between advanced technologies and unemployed people with secondary professional education in the entities of the Russian Federation in 2018

Meanwhile, in the Sverdlovsk Region, Perm Territory, Bashkiria and a number of other regions, there is a steeper slope and a greater sensitivity for this category of people with respect to advanced technologies. Which can mean that there is no acute shortage of skilled workers in these regions.

It is interesting to note that in most Russian regions the unemployed people with secondary professional education are concentrated in the second quadrant, which indicates the lack of industrial production in sufficient quantities, so they cannot find employment in the labor market. Thus, in these regions, there is a backward correlation between technologies and the unemployed of this group. In other words, the introduction of advanced technologies reduces unemployment in low-tech regions of Russia for these people, which may mean an increase in demand for industrial workers, but with the development of digital skills.

Conclusion

The conducted research has confirmed the author's hypothesis that the advanced technologies have a multi-directional effect on different people depending on the level of education. In a new digital economy, there is no demand for a large number of people with liberal education, for this reason, the highest unemployment in this group is already observed in the regions that are moving to the new technological order.

Along with this trend, the use of advanced technologies involves the growth of blue-collar workers, but with the development of digital skills and competencies. Even today, in most Russian regions, there is a demand for such people. At the first stage of the transition to the new technological order, people with secondary professional education are the least vulnerable to the advanced technology's introduction in most regions of the Russian Federation.

For this reason, the authors believe that despite the spatial analysis results, which showed that most Russian regions today have low potential for the new technological structure transition, they are underestimated, because of the accumulated high level of human capital, which have historical experience in a short time to mobilize and master new work skills and competencies. And with a quick advanced technology introduction in these regions, there will be a process of reducing regional disparities between territories, as well as strengthening economic ties between them.

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Preliminary Analysis of Regeneration Possibilities of The Tourism Industry After the Coronavirus Pandemic

Magdalena SZOPA
Academy of Physical Education in Katowice, Poland

m.szopa@awf.katowice.pl

Piotr HALEMBA
Academy of Physical Education in Katowice, Poland

p.halemba@awf.katowice.pl

Abstract

The pandemic of the infectious disease COVID–19 caused by the SARS–Cov–2 coronavirus, officially announced by the WHO on March 11, 2020, has hit the global economy on multiple fronts. This paper analyzes the impact of the pandemic on the tourism sector and its ability to regenerate once the pandemic has ended. The subject of the research was the occupancy rate of bedrooms and bed-places in hotels and accommodation of a similar type according to the NACE 55.1 classification in five selected countries of the European Union in the period from January to July 2020 with the background of the occupancy rates in the years 2012–2019. The results have shown that even though the tourism sector has experienced a drastic decline in the face of the coronavirus pandemic, the occupancy rates in the analyzed countries quickly began to increase as soon as it was possible. With this observation the hypothesis about the high regeneration capacity of the tourism industry has been proven. This preliminary analysis allows for an optimistic view of the future of tourist services both for the ending of the pandemic and the sector surviving other possible crises in the future.

Keywords: COVID-19 Pandemic, Tourism, Industry, Regeneration.

Introduction

The pandemic of the infectious disease COVID–19 caused by the SARS–Cov–2 coronavirus, officially announced by the WHO on March 11, 2020, has hit the global economy on multiple fronts. The world has experienced major pandemics in the previous 40 years, however none of them had as damaging implications for the global economy (Gössling, Scott and Hall, 2020, p. 6). All sectors of the economy, except those whose production was intended to fight the virus, have been more or less affected by the pandemic. On the one hand, it was caused by a varying degree of restrictions introduced in most countries and the fact that a significant part of services could not be performed in compliance with the recommended sanitary regime. On the other hand, the conditions of such high economic risk meant that consumers could not be sure of their financial situation, which in turn translated into a reduction in demand for services.

One of the industries which have recorded significant losses is the tourism industry which is one of the most important global employers (UNWTO, 2020). For years, tourism has become an increasingly important sector of the world economy. According to data from the World Tourism Organization, in the period from January to September 2019, there was a 4% increase in the number of tourist check-ins in the world compared to the same months in 2018. An estimated 1.1 billion tourists travelled in the first nine months of 2019, which is 43 million more than in the same period in 2018 (UNWTO, 2019). With such a dynamic growth in the years preceding the declaration of the pandemic and the significant position of tourism in the global economy with previous concerns of overtourism (Higgins-Desbiolles, 2020, p. 611), the losses of the tourism sector caused by the economic crisis are becoming the object of scientific interest.

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Research Subject

The subject of the research was the occupancy rate of bedrooms and bed-places in hotels and accommodation of a similar type according to the NACE 55.1 classification in five selected countries of the European Union in the period from January to July 2020.

The purpose of analyzing the impact of the COVID-19 pandemic on global tourism was to examine the economic effects of restrictions introduced to protect and save lives and human health, and to collect data that, in the long run, could help create a plan to minimize losses in the tourism sector in the event of economic crises, especially world health crises.

The tourism industry is highly prone to all crises, in particular crises on a global scale. However, the tourism services sector is very diverse and involves many intermediate industries responsible for the production of a wide variety of goods and services. Therefore, the research hypothesis was the possibility of a quick return of the tourism sector to the best condition and efficient reconstruction of the tourism market after the coronavirus pandemic.

Materials

The research material was obtained from the Eurostat database. The occupancy rate of rooms and the number of beds were analyzed in five European Union countries, the selection of which was made on the basis of the size of their accommodation bases expressed in the number of bed-places. The criterion was the number of beds, as it best reflects the capacity of the accommodation base.

The number of bed-places is determined by the number of people who can stay overnight in the beds provided in the place of accommodation, excluding extra beds, which can be prepared at the special request of the guest. It is worth paying special attention to the fact that with this definition a double bed is counted as two single beds, as it can accommodate two people.

The subject of the study was the occupancy in hotels and similar accommodation establishments according to the NACE 55.1 classification. This class covers the provision of accommodation on a daily or weekly basis, mainly for short stays. This type of accommodation includes furnished rooms and apartments. Among the services that characterize this class are daily room cleaning and bed-making, as well as the availability of additional services such as catering services, parking, laundry services, exercise rooms, congress facilities, etc. This class includes accommodation provided by hotels, aparthotels and motels, but does not include houses, flats or apartments, and in particular does not include such facilities to be rented for permanent use.

The occupancy rate in hotels and similar types of accommodation has been compiled by Eurostat as data expressed in percentage figures. The occupancy rate of bedrooms and bed-places was calculated as the ratio of occupied rooms to the net number of rooms available, therefore it is the number of rooms and beds actually available for rent.

In order to give a broader context to the changes in the percentage data in the period from January to July 2020, they were also compared with the corresponding data for the same countries, type of accommodation and units whose occupancy rate was considered in 2012-2019.

Tables 1 and 2 below illustrate the occupancy rate of bedrooms and bed-places in the analyzed countries in the period 2012-2019, expressed as a percentage. Increasing tendencies in the occupancy of both coefficients concerning almost all the years covered by the study are easily noticeable.

Table 1: Occupancy rate of rooms in hotels and similar type of accommodation in the analyzed countries in the period 2012-2019, expressed as a percentage

	2012	2013	2014	2015	2016	2017	2018	2019
Germany	57.10	57.90	59.10	60.23	61.80	62.07	62.72	63.04
Spain	56.10	57.20	59.20	61.97	65.72	67.07	66.77	67.22
Italy	42.80	42.80	42.90	44.90	46.20	48.80	51.00	51.80
Netherlands	62.90	63.50	65.80	68.10	68.10	71.80	72.90	72.00
Poland	41.10	41.60	42.70	45.30	47.60	48.90	49.80	50.70

Table 2: Occupancy rate of bed-places in hotels and similar type of accommodation in the analyzed countries in the period 2012-2019, expressed as a percentage

	2012	2013	2014	2015	2016	2017	2018	2019
Germany	39.90	40.60	41.80	42.99	43.86	44.80	45.33	45.71
Spain	53.00	54.10	55.70	58.08	61.34	62.62	61.69	61.48
Italy	40.90	40.50	40.60	42.50	43.70	46.10	48.30	49.00
Netherlands	42.30	42.80	44.20	45.60	47.60	50.40	50.90	50.20
Poland	33.10	33.70	34.70	36.60	38.60	39.80	40.80	41.70

Tables 3 and 4 present the occupancy rate of rooms and bed-places in the analyzed type of accommodation in the selected European Union countries in the first half of 2020, along with their occupancy rate in the last month of 2019. Together with the data for 2020, the data from December of the previous year were presented in order to be referenced to the previous month already in January 2020.

Table 2: Occupancy rate of rooms in hotels and similar type of accommodation in the analyzed countries in December 2019 and in the first quarter of 2020, expressed as a percentage

	12.2019	1.2020	2.2020	3.2020	4.2020	5.2020	6.2020
Germany	55.64	49.85	55.28	29.36	12.15	17.92	32.75
Spain	53.92	54.44	59.74	34.67	0.00	19.24	24.15
Italy	38.90	42.60	46.90	11.30	4.10	6.50	17.90
Netherlands	61.30	52.30	58.50	28.60	4.20	10.70	25.40
Poland	41.00	41.50	46.50	21.80	8.50	10.80	23.40

Table 3: Occupancy rate of bed-places in hotels and similar type of accommodation in the analyzed countries in December 2019 and in the first quarter of 2020, expressed as a percentage

	12.2019	1.2020	2.2020	3.2020	4.2020	5.2020	6.2020
Germany	39.77	33.34	38.08	19.90	7.86	13.32	27.09
Spain	48.03	46.54	51.52	29.02	0	12.17	18.82
Italy	36.80	40.30	44.30	10.70	3.90	6.10	16.90
The Netherlands	42.10	37.50	44.10	18.80	2.70	9.90	24.20
Poland	33.90	34.60	38.70	17.30	6.80	8.40	19.90

Methods

Countries selected for the analysis were those with the largest accommodation bases in relation to the European Union member states in 2019. They were, in descending order, Italy (approx. 5.18 million beds), France (approx. 5.10 million beds), Spain (approx. 3.64 million beds), Germany (approx. 3.59 million beds) and the Netherlands (approx. 1.41 million beds). During the data collection, it was found that the database in question did not contain data for France that would allow it to be included in the compilation. Therefore, it was decided to consider Poland as the fifth country, which in 2019 ranked eighth on the list of European Union member states according to the size of the accommodation base (approx. 825 thousand beds).

The analysis was presented against the data from previous years regarding the worldwide growth of the tourism industry. As all the data on the occupancy rate of bedrooms and bed-places in 2012-2019 and in the first half of 2020 were presented as a percentage, only changes in percentage points over time were used to analyze the occupancy variability of the studied units.

A percentage point (p.p.) is defined as an arithmetic difference of two percentage values. It is calculated by substracting the initial percentage value from the final percentage value. The arithmetic mean was used to calculate the average percentage point changes.

Secondary research aprroach has been adopted as well.

Results (years 2012 – 2019)

Germany

Over the 8 studied years, the occupancy rate in Germany increased from 57.1% in 2012 to 63.04% in 2019. The occupancy rate of bed-places during the same period increased from 39.9% to 45.71%. Therefore, both of these values increased by less than 6 percentage points. Every year, the occupancy of rooms and beds increased by an average of about 0.85 percentage points. Both the largest and the smallest annual changes were recorded for the room occupancy - they amounted to 1.57 and 0.27 percentage points, respectively, and took place in successive years (an increase by 1.57 p.p. occurred at the turn of 2015 and 2016, and an increase by 0.27 p.p. at the turn of 2016 and 2017).

Spain

In the case of Spain, the occupancy rate of bedrooms in the period under consideration changed from 56.10% to 67.22%, thus increasing by around 11 percentage points over the eight years. The occupancy rate of bed-places, in turn, increased by around 8.5 percentage points, from 53% in 2012 to 61.48% in 2019. The room occupancy rate increased by around 1.6 percentage points each year, although in 2018 there was a slight annual decline (-0.3 percentage points). Bed occupancy increased by approximately 1.2 percentage points annually, but decreased in 2018 and 2019 (-0.93 p.p. and -0.21 p.p. respectively).

Italy

The room occupancy rate in Italy in 2019 increased by 9 percentage points compared to 2012: its amount changed from 42.8% to 51.8%. The occupancy of the beds increased from 40.9% to 49%, which is slightly more than 8 percentage points. The annual change in the occupancy of rooms and beds was around +1.3 and +1.15 percentage points, respectively. In 2013, there was a slight decrease in the bed occupancy (-0.4 p.p.).

The Netherlands

The structure of changes in the occupancy rate in the Netherlands was very similar to that in Italy, although the output percentages differed significantly, in particular for the occupancy of bedrooms. Over the years, it increased by slightly over 9 percentage points, from 62.9% in 2012 to as much as 72% in 2019. In the case of the bed occupancy rate, it was calculated that in 2019, compared to 2012, it changed by about 8 percentage points, as it increased from 42.3% to 50.2%. As in the case of Italy, the annual changes in room and bed occupancy rates averaged +1.3 and +1.15 percentage points, respectively. In 2019, both the room occupancy and the bed occupancy rate decreased slightly (-0.9 and -0.7 p.p., respectively).

Poland

Poland is characterized by similar percentage point changes in the occupancy rate of bedrooms and bed-places as Italy and the Netherlands - they were respectively 9.6 and 8.6 percentage points in 2019 compared to 2012. The occupancy rate of rooms increased from 41.1% to 50.7%, and the occupancy rate of beds - from 33.1% to 41.7%. Yearly average percentage point increases were around 1.4 and around 1.2 percentage points for room and bed occupancy rates, respectively.

Summary of the results from 2012 - 2019

As a result of the analysis of changes in the occupancy of bedrooms and bed-places in 2012-2019, increases in these percentages were found in all the analyzed countries.

The highest increase expressed in percentage points was observed over this period for the room occupancy in Spain (+11 p.p.). Compared to other countries, the lowest changes in the room occupancy rate were recorded in Germany (+6 p.p.). Italy, the Netherlands and Poland recorded very similar changes, oscillating at the level of 9 percentage points.

In the case of the occupancy rate of bed-places, the only country that stood out from the rest was Germany, with the smallest increase in 2019 compared to 2012, which was less than 6 percentage points. In the other studied countries, there was an increase by approx. 8 percentage points.

In all the countries, the average annual changes expressed in percentage points ranged between 0.8 - 1.6 percentage points.

Results (first half of 2020)

The occupancy rate of bedrooms

In terms of room data in the first half of 2020, the analysis of changes in the occupancy rate expressed in percentages showed declines. Figure 1 below shows the changes of occupancy rates, expressed as a percentage, for hotel rooms and similar types of accommodation in the five analyzed countries of the European Union.

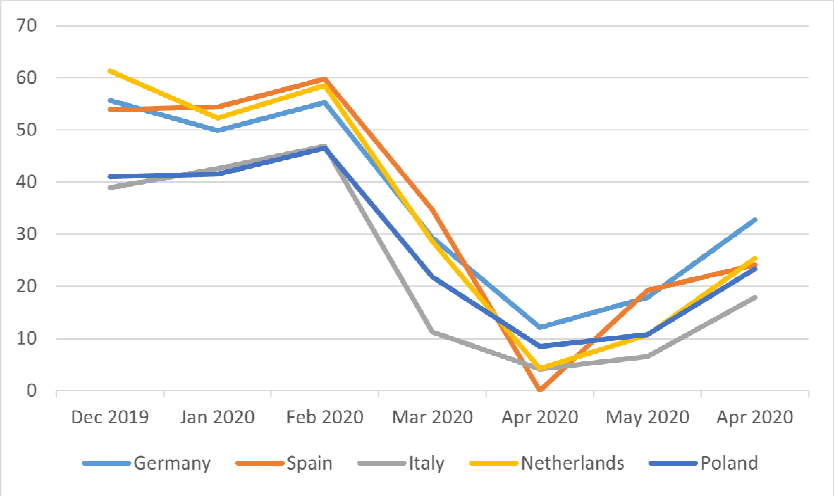

Fig.1: Changes in the occupancy of rooms (expressed as a percentage) in hotels and similar accommodation establishments in the analyzed countries in the first half of 2020

In January 2020, compared to December of the previous year, there was a slight decrease in the occupancy of bedrooms in Germany and the Netherlands (by approx. 6 and 9 percentage points, respectively), in other countries the change was minimal. In February, there were slight increases in the occupancy rate in all the countries - on average 5 percentage points.

March was the first month in which all the countries in question recorded significant reductions in the room occupancy at an average of 28 percentage points. In April, the occupancy rate hit a record low (an average decline compared to March of around 20 percentage points).

Since May, the upward trend in the occupancy rate has been returning: the average increase has been around 7 percentage points. The country which stood out from the rest of the others, with an exceptionally high growth in May, was Spain with an increase of approx. 19 percentage points. In June, an average increase of less than 12 percentage points was recorded in all the analyzed countries.

The occupancy rate of bed-places

The situation is similar for the occupancy rate of bed-places. Figure 2 below shows the percentage changes in terms of the bed occupancy for hotel rooms and similar types of accommodation establishments in the five EU countries considered.

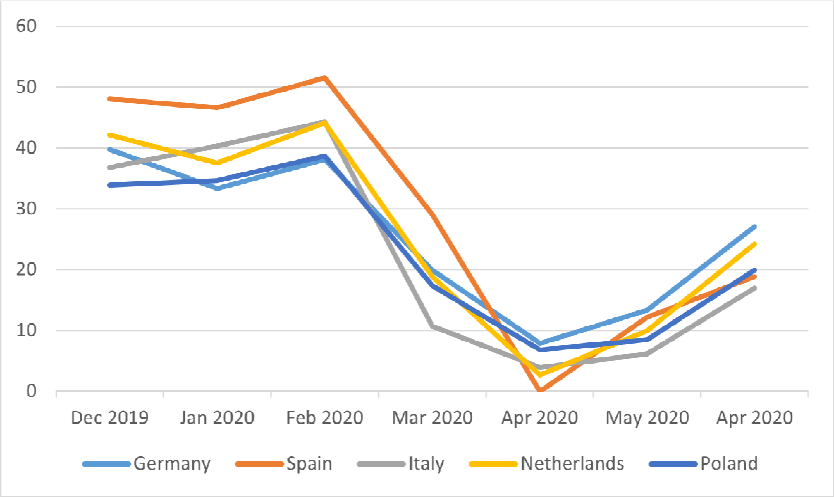

Fig. 2:Changes in the occupancy of beds (expressed as a percentage) in hotels and similar accommodation establishments in the five analyzed countries of the European Union

In January, the average change in the occupancy rate of bed places in the studied countries was -1.7 percentage points. In Italy, there was an increase of 3.5 percentage points compared to December of the previous year. In February, there was a slight, comparable growth in all the countries at an average of less than 5 percentage points.

As in the case of the room occupancy, the first month with a significant reduction in the occupancy rate of bed places in the analyzed countries was March - the average decrease among the countries in question was just over 24 percentage points. Again, April was a month with a record low bed occupancy (the average decrease compared to the previous month was around 15 percentage points).

As with the bedroom occupancy rate, bed occupancy in all the countries began to increase again in May, with the average change being less than 6 percentage points. Here, a country that stood out significantly from the rest was also Spain, where an increase of 12 percentage points was recorded. In June, the average increase in the bed occupancy in all the countries was less than 12 percentage points, although in this case in Spain the increase was much lower than in the other countries (+6.5 percentage points).

Discussion

COVID-19 resulted in numerous socio-cultural, economic and psychological impacts on the tourism industry (Sigala, 2020, p. 319). As the number of cases spread globally, the travel restrictions followed, beginning in the Wuhan region epicenter and reaching most countries by the end of March. Using country population data it has been estimated that 90% of the world's population were in countries with some level of international travel restrictions, with many of the countries having some degree of restritctions on internal movement as well (Gössling, Scott and Hall,, 2020, p. 7). The impact of the coronavirus pandemic on the occupancy rate of bedrooms and bed-places in the first half of 2020 can only be considered in terms of its size in previous years.

The analysis of the data for years preceding the pandemic outbreak (2012-2019) indicated that in all the studied countries, the occupancy rate of rooms and beds gradually increased year by year, with the average annual increase in occupancy in all the countries at an average of 1.2 percentage points. The highest increase expressed in percentage points that was observed during this period was for the room occupancy in Spain (+11 p.p.), which is not the only value at which Spain stands out from the other countries.

Figures 3 and 4 below illustrate how close to uniform was the increase in the occupancy of bedrooms and bed-places in the analyzed countries.

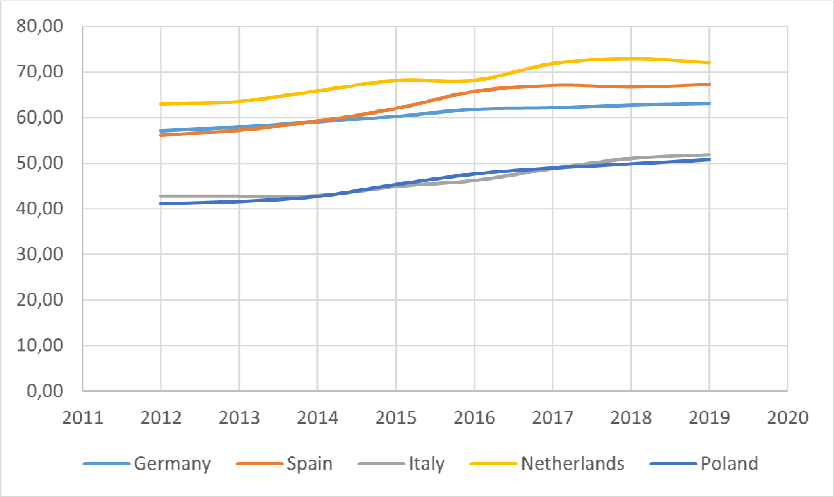

Fig. 3: The occupancy rate of bedrooms in the studied countries in 2012-2019 expressed as a percentage

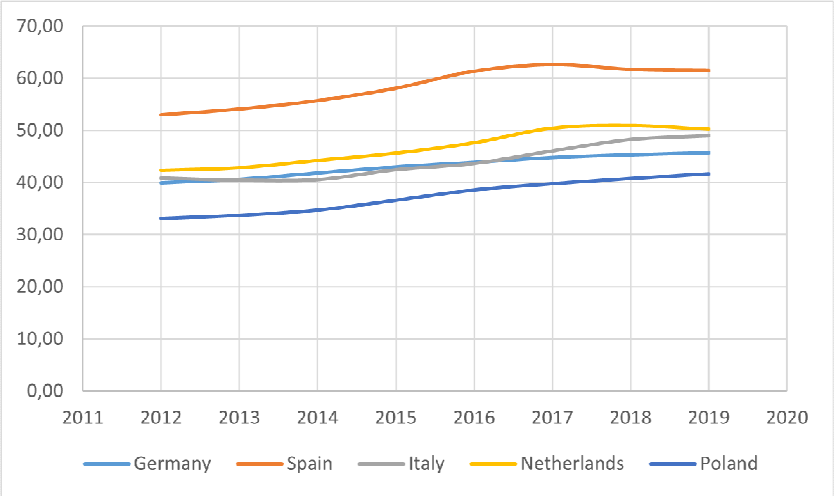

Fig. 4: The occupancy rate of bed-places in the studied countries in 2012-2019 expressed as a percentage

The chronological order of events related to the pandemic also plays a huge role in understanding the course of changes in the occupancy rate of rooms and beds in the studied countries in the first half of 2020. The first reports of the coronavirus appeared as early as December 2019, and on January 4, 2020, WHO reported on the Wuhan pneumonia syndrome.

On March 11, 2020, the outbreak of the coronavirus was characterized by the WHO as a pandemic, which had a direct impact on healthcare events in the countries concerned. It was at the beginning of March when the highest numbers of new infections and deaths associated with them were recorded. Back then, governments also made decisions about the application of various health protection measures.

This difficult situation is accurately reflected in the collected data, which is clearly visible in Figures 1 and 2. Both in the case of the room occupancy and bed occupancy rate, March was the first month with a significant decline in all the countries. There is undoubtedly a correlation here with the declaration of the pandemic by the WHO and with the increasing restrictions in all countries affected by the pandemic at the time.

All the countries recorded a similar course of changes in the occupancy rate during the six months of 2020 under consideration, but Spain was the only one in April to achieve 0% occupancy for both bedrooms and bed-places. At the end of March, the number of cases in Spain exceeded 170,000 and there were also nearly 8,500 deaths. For comparison, on the last day of March, almost 72,000 cases with 775 deaths were found in Germany, about 105,000 cases with as many as 12,500 deaths in Italy, in the Netherlands 12.5 thousand cases along with 1 thousand deaths, and in Poland the number of cases oscillated around 2.3 thousand with 33 deaths (Worldometers).

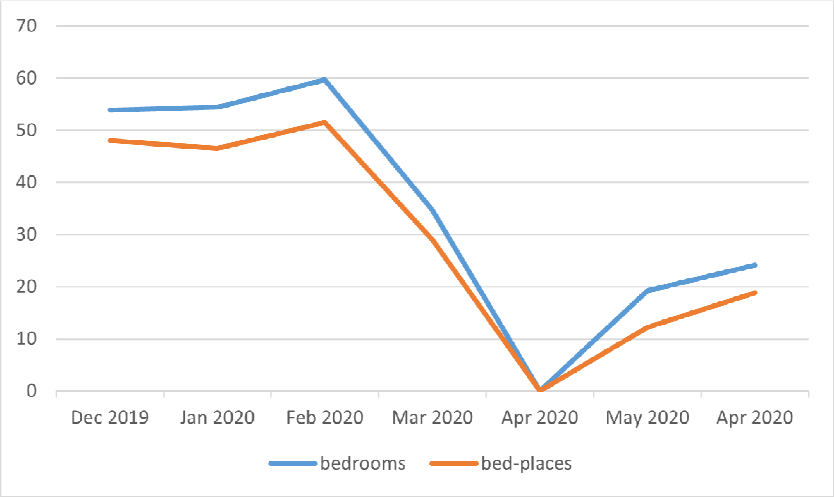

Fig. 5: Changes in the occupancy rate (expressed as a percentage) of bedrooms and bed-places in hotels and similar accommodation establishments in the analyzed countries in the first half of 2020

The analysis of the percentage of the occupancy rate of bedrooms and bed-places in the five selected European Union countries in the first half of 2020 against the background of the same data for the years 2012-2019 clearly shows that despite the drastic decline caused by the global health crisis, the occupancy rate in the analyzed countries quickly began to increase again. In June 2020, the occupancy of both rooms and beds was again close to the occupancy rate in March this year. This means that the tourism industry is characterized by high regeneration ability. Based on the data from just six months and without clear forecasts of the progress of the pandemic in the world, it is impossible to estimate how quickly the occupancy rate of bedrooms and bed-places in the studied countries will return to a level comparable to 2019. However, it can be expected that the trend towards rapid regeneration shown here will also take place on a larger scale.

Despite the preliminary analysis allowing an optimistic view on the regeneration possibilities of the tourism sector, it is important to recognize the pandemic crisis as a transformative opportunity (Sigala, 2020, p. 312). The recovery of the industry should be a goal as important as reforming the industry to a new economic order. Key lessons of the COVID-19 crisis are the importance of community, social connections and society (Higgins-Desbiolles, 2020, p. 618) as well as the importance of local tourism and travel.

Summary

The data presented herein show that in the face of the coronavirus pandemic, the tourism sector has experienced a drastic decline. With the increasing number of cases and increasing restrictions, this industry had to almost completely cease operations, which resulted in a significant reduction in the occupancy rate of rooms and beds, which before the crisis, from 2012, was characterized by constant and almost uniform growth. The obtained results allowed to confirm the hypothesis about the high regeneration capacity of the tourism industry, even in the face of such a serious crisis as the global health crisis. The conducted analysis is only an introduction to research on the regenerative capacity of the tourist market, however, it allows for an optimistic view of the future of tourist services under the obvious condition of gradual disappearance and gradual weakening of the applicable restrictions.

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A New Design of Education in The Context of The Covid-19 Crisis

Amalia Venera TODORUT
„Constantin Brancusi" University of Targu-Jiu, Romania
Email: amalia_venera@yahoo.com

Gabriela DOBROTA
„Constantin Brancusi" University of Targu-Jiu, Romania
Email: gabi.dobrota70@gmail.com

Abstract

The paper addresses a strictly topical issue regarding the need to reconfigure education in the context of the Coronavirus (COVID-19) crisis the fundamental objective of the paper is to highlight the role of universities in providing the necessary tools and ways of learning and development, in a completely different context to what is practiced until now. In the paper, we specify the importance of digital learning and characterize the standards for students and teachers for the implementation of online education. We also show future trends in the field of education and analyse a questionnaire applied to 114 European universities focusing on the impact of the coronavirus crisis on higher education. We also present aspects related to online learning practiced at "Constantin Brâncuși" University, through the analysis of a questionnaire applied to the main educational actors. The investigation methods materialized in the documentary and comparative analysis of the data and information provided by reports, statistics, specialized articles and in the application and interpretation of some questionnaires.

Keywords: digital education, innovation, universities, creativity;

Introduction

The world is living in an unprecedented period of crisis. A virus alters the way of life, the way of thinking and acting, alienates people causing them o retreat into a world that nobody really knows what it will look like.

Israeli historian and Professor Yuval Noah Harari stated, "Humankind is now facing a global crisis. Perhaps the biggest crisis of our generation. The decisions people and governments take in the next few weeks will probably shape the world for years to come. They will shape not just our healthcare systems but also our economy, politics and culture. We must act quickly and decisively. We should also take into account the long-term consequences of our actions. When choosing between alternatives, we should ask ourselves not only how to overcome the immediate threat, but also what kind of world we will inhabit once the storm passes. Yes, the storm will pass, humankind will survive, most of us will still be alive — but we will inhabit a different world."(Harari, N., Y., 2020)

A new world is being born on the ruins of globalization, for which we, by necessity, toned to reshape and reinvent ourselves. The COVID-19 pandemic has created a number of challenges, not only for public health, but also for many other areas of activity, including education. The crisis generated by COVID-19 is a crisis that began in the field of health, but has immediately affected other areas of life, such as economic, social, political, educational, cultural, religious, etc. Understanding this complexity cannot be achieved with deterministic and linear thinking patterns. A major paradigm shift is required, through the development of systemic, probabilistic and nonlinear thinking.

The Research Methodology

The implemented research is based on documents and reform strategies and is founded on an analysis of several studies in the education field seeking to determine what are the challenges and opportunities for online education in universities.

The method of investigation used is the documentary analysis approach, which includeddocuments concerning digital education in the new context; articles, studies, reports, dedicated to public policies in the country and the EU.

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We applied a series of questionnaires to students (200) and teachers (80) to determine the impact of the COVID-19 on the teaching process and also to determine the learning needs of students and the teacher training-development needs at ”Constantin Brancuși,, University of Targu-Jiu, Romania.
We also analyzed and interpreted a study involving a questionnaire applied to 114 universities in the European Union in the field of initiatives on the effects of coronavirus entitled Coronavirus - European Universities Initiative Impact Survey Results, of 2020

Through a comparative analysis on the areas that will be most affected by the COVID-19crisis and the elements that will be further developed, following this crisis, we have identified examples of good practices and measures that can be applied.

Challenges for the universities of today and tomorrow

In a context where volatility, uncertainty, complexity and ambiguity are key features, universities need to demonstrate organizational agility, resilience and rapid organizational change. At the same time, the transition from VUCA 1 (Volatility, Uncertainty, Complexity and Ambiguity) to the concept of VUCA 2 (Vision, Understanding, Courage and Adaptability) is required.

The coronavirus crisis is forcing universities to face long-term challenges in higher education, and some of the resulting changes could be permanent. "The pandemic is accelerating change in a tremendous way," says Bert van der Zwaan (Nature, 2020).

Universities already have online courses, but most teachers have had to rethink online media. More broadly, many institutions are learning the difficult way to deliver course materials through digital platforms, which is not the best way to teach them. on students. "Zooming the university is not a fair online learning" (Sarma, S., The Massachusetts Institute of Technology),

If universities resume their courses, the experience will be radically different. Teachers will be able to better respond to learning needs using both digital learning (such as video lectures) and face-to-face, allocating time in interacting with students to ensure that they understand the concepts taught. "We're talking about 'two-way learning.' (Witze, A., & Elizabeth Gibney)

The financial deficit facing universities around the world could mean new opportunities for cooperation, to develop innovative approaches, such as the European Universities Initiatives.

Even after the immediate financial crisis, the economic outlook could remain bleak. Some researchers say this could lead universities to focus on research and infrastructure projects that are most relevant to national interests in a post-pandemic world. For example, the British government is setting up a working group on research sustainability that aims to evaluate research projects in universities with a focus on planning the country's long-term future. (Witze, A., & Elizabeth Gibney)

Digital technology needs to make teaching more flexible and responsive. But this is not easy. It is not simply a tool that makes work completely predictable or unique. Even so, the education technology industry, backed by huge companies such as Microsoft and Amazon, continues to position itself as a solution to today's education problems. Some people even go so far as to suggest that technology can save higher education.

Some institutions have rapidly innovated and implemented e-learning, due in part to their familiarity with the tools specific to teaching approaches and considerations with e-learning. This allowed for greater student participation and involvement.

We have identified four valuable actions here: effective adaptation to rapidly changing circumstances, readiness, a willingness to collaborate and provide care and support, and a cautious attitude toward the educational technology being tested.

Online teaching can not stand alone. Teachers need training to involve students in online discussions and to facilitate a deeper understanding of the materials taught. Instructional designers can help teachers figure out how to learn best with technology and make the most of online learning. For institutions that are not prepared or planning measures, it is imperative to implement such methods as soon as possible, in order to avoid excessive demands and tensions arising from the rapid adoption of things. There is a clear need for post-secondary e-learning expertise and this crisis should

serve as a reminder that institutions need to cultivate these skills. Outsourcing online learning institutions in recent years could allow them to benefit from the expertise of other professionals.

As the pros and cons discussion progressess between supporters and skeptics, the impact of COVID-19 on educational institutions and students offers a chance to carefully examine educational technology in acute, crisis-driven contexts. Basic questions such as how to create involvement in online learning amid the COVID-19 pandemic, have led to studies that have shown that as students learn better when they are actively involved in the learning process than to passively listen to a lecture, during the coronavirus pandemic online courses have largely replaced traditional programs and student involvement has diminished. Other studies have highlighted the following steps in order to ensure involvement during in online learning.

- Strengthening the student-teacher interaction

When students and teachers are physically apart, it becomes more critical to create a social connection. While the students wait for the course to start, the teacher can use the chat function to ask them how they are doing and during the first session, guide them to the structure and requirements of the course.

This initial connection makes students feel more comfortable using the platform to provide questions and feedback during the course. It is a good idea to remind them to activate their videos. This makes them more responsible for paying attention to the class to avoid giving in to other distractions associated with learning at home.

- Planning assessments during the course with live student responses

Students' regular real-time answers provide valuable information about their opinions. These live responses allow the teacher to adapt subsequent courses to suit the level of understanding of the concepts and keep the students involved. For example, these unannounced assessments may take the form of short questions and surveys.

- Interaction between students

Stronger student interaction is needed and thus working in teams, with clear tasks, in virtual classrooms, has proven very successful. Group work allows students to deepen their understanding of the materials.

The International Society for Technology in Education (ISTE, 2017) has developed a series of standards for students and teachers, which provide a guide for implementing online education thus supporting students succeed in a society characterized by high technology.

The ISTE standards for students (2016) are :

1. Empowered student

This standard is beneficial because it was designed to encourage students to play an active role and to demonstrate their competence to use and choose technologies to achieve their learning objectives. Students gain feedback to improve their skills, customize their learning environments and build networks.

2. Digital citizen

The second standard focuses on raising awareness of responsibilities and rights to participate in a digital world. Students use technology safely and legally. They also demonstrate respect for intellectual property sharing rights.

3. Knowledge builder

Standards for students are also designed to build knowledge. Students improve their understanding of the world by effectively applying research methods to find information for their creative and intellectual concerns. This process encourages the development of theories and ideas.

4. Innovative designer

The fourth standard promotes creativity. Students design new solutions to real-world problems using different types of technologies. They use their critical thinking skills to solve open problems. Students are also involved in activities that address design constraints and calculated risks.

5. Creative communicator

The sixth standard allows students to create original works. One of the ways they can achieve this is by remixing digital resources in new contexts. Students think of new content by customizing it for their intended audience.

6. Global collaborator

This standard focuses on broadening students' perspectives. Students use digital tools to connect with students from different cultures and backgrounds. They use collaborative technologies to explore local and global issues and think of possible solutions from several points of view.

The ISTE standards for teachers describe their profile as follows:

1. Student

This standard emphasizes the importance of developing the technological skills that teachers need to meet current challenges. They achieve this goal by working with other professionals and exploring new practices that improve student outcomes. They work in professional networks and stay up to date on research that improves student learning.

2. Leader

Teachers are looking for leadership opportunities that shape and advance teaching and learning. They demand equal access to technology to meet the needs of all students. They also serve as role models for their peers, exploring and identifying new technological tools for learning.

3. Citizen

This standard involves creating opportunities for students, as they will help them make responsible social contributions. Teachers guide students on the safe and ethical use of technology. They teach them the importance of data protection, confidentiality and personal data management.

4. Collaborator

Teachers also need to spend time collaborating with students and colleagues. Work with colleagues to create learning experiences using digital tools. And with students, they use new digital tools to diagnose and fix technological problems.

5. Designer

This standard encourages teachers to design activities that are student-oriented and that reflect differentiated learning. They also use technology to personalize learning experiences that promote independent learning and adapt to students' needs.

6. Facilitator

Teachers create an environment in which students assume the right to learn. They establish learning opportunities by encouraging students to solve problems and innovate. They also shape creative expression and manage learning strategies in digital platforms and virtual environments.

7. Analyst

This standard focuses on using data to support and assist students in the learning process. Teachers use technology to design formative and summative assessments to provide feedback to students. This process guides progress as teachers communicate assessment data with students to promote student self-direction. “Less on-campus education and more distance learning” is emerging in the future, even if the COVID-19 crisis did not occur. Distance learning will develop as a result of unprecedented digitization and, with it, the need for education. custom. In addition, less importance will be given to the degree obtained and lifelong learning will become increasingly important. The university will have a completely different role and will move from the classic image of the ivory tower to the heart image of society, playing a decisive role in the life of society (Bert van der Zwaan., 2017)

Survey on the impact of COVID-19 on European Universities

The rapid spread of the COVID-19 virus across Europe has a substantial impact on higher education, with almost all institutions closing their doors to face-to-face activities and replacing them with online courses.

COVID-19 shows that there is an urgent need for much deeper cooperation between higher education institutions in the field of education, research and innovation. There is also a huge need to bring together and share online courses, data, digital infrastructure and research. COVID-19 has accelerated this need for a digital transformation of higher education institutions. (Coronavirus - European Universities Initiative impact survey results, 2020)

Following the application of a questionnaire to 114 universities in Europe, the following results emerged:

- 60% of higher education institutions consider that being part of a European university network has been helpful in resolving the current crisis difficulties due to COVID-19. Examples of what has been done in response to the pandemic include: brainstorming on common challenges, sharing best practices and solutions, pooling IT tools for distance learning and sharing online resources, maximizing online courses for all their students and maintaining international links, creating a common environment for sharing online teaching and good practice related to online teaching and virtual mobility, involvement of students from different universities in finding solutions to the challenges related to the pandemic, organizing virtual / combined mobility for the next year.
- Almost 80% shared good practices and measures to mitigate the impact of COVID-19 by providing e-learning tools and platforms, ad-hoc working groups on e-exams and e-testing, teacher training, common guidance for online students / learners, support through facilities (eg libraries, laboratories), activities / social assistance.
- 96% of institutions consider that they would have been better prepared to deal with this pandemic if their European University had already been fully operational. Examples of practices: A fully

functional EU digital interuniversity campus, with member universities combining online courses to provide high-quality continuing education through higher volumes of online courses for all their students, sharing the operational learning environment and common e-learning with common digital governance tools.Complete work infrastructure and tested methodology for joint joint courses in universities, with a strategy for managing mixed mobility (virtual and physical) and recognition mechanisms for students and staff. Development in collaboration with companies, regions and cities, short-term learning courses that provide employment at European level, "timely" skills, essential in the context of recovery, enabling them to have skills and qualify at any stage of their careers.

- 59% have started to communicate online courses or MOOCs that students from all their member universities can / will be able to access starting with the next academic semester Examples: creation of the first YUFE programs for the academic year 2020/2021 with common online courses ; blended and active learning (which can take the form of MOOCs) proposed through the development of connected learning communities; UNITE! and CIVICA is preparing an online course repository.
- 85% intend to move faster to a virtual European interuniversity campus
- 90% would consider it useful that Erasmus + accepts mixed mobility formats (ie short physical mobility, combined with virtual mobility) starting this autumn.

The YUFE- Young Universities for the future of Europe initiative is of great interest and importance for European countries and especially Romania, since it aims to become a single European university with various campuses throughout Europe. YUFE is proposed to offer a European university degree based on a combination of academic, professional and civic skills. The European degree of YUFE will be recognized and appreciated throughout the European Union and beyond. The intention is to start in 2021 (https://www.yufe.eu/).

RESULTS

The following figure is particularly suggestive to show which were and are still the areas affected by the COVID-19 pandemic, on a scale of 1 to 10, at the level of European universities, which participated in this questionnaire:

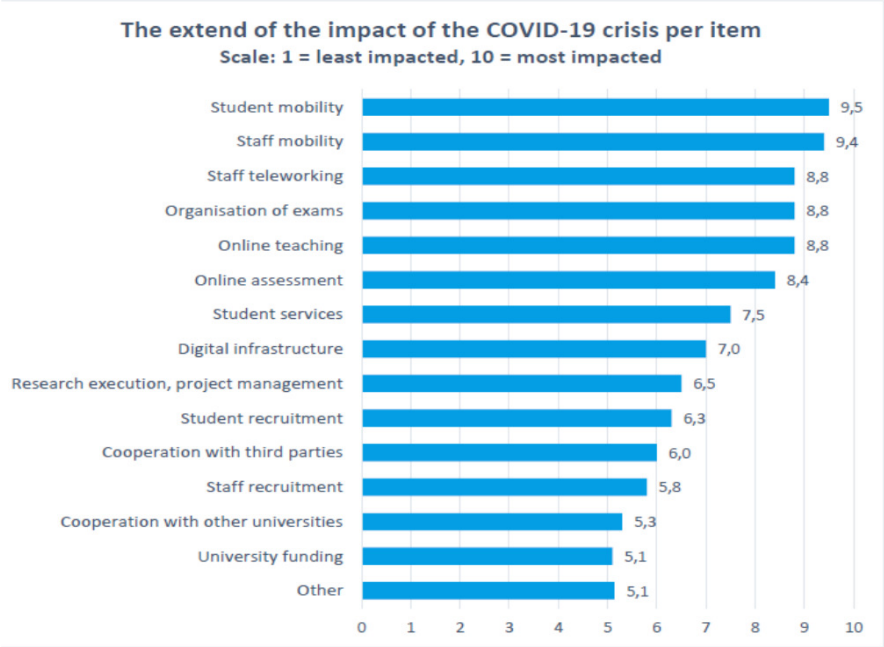

Figure 1: the areas affected by the covid pandemic 19

Source: Coronavirus - European Universities Initiative impact survey results, 2020

To the question "to what extent your higher education institution has implemented a series of measures specific to this period", it is evident that a very high share is online courses (95.1%), online evaluation (82.7%), support for mental health for students and staff (58%), adjustment of the academic calendar (46.7%) and others.

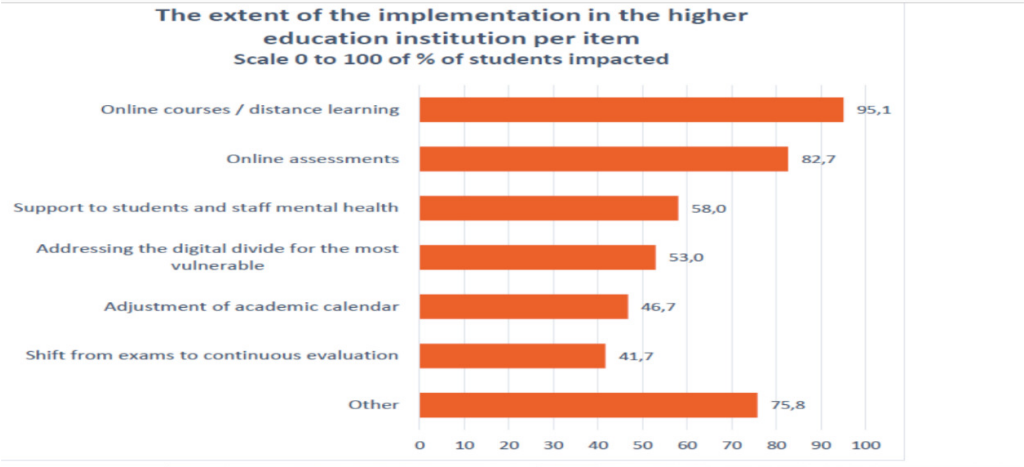

Figure 2: Extent of implementation of measures specific to the period
Source: Coronavirus - European Universities Initiative impact survey results, 2020

To the question "Planning for a quicker move towards a European virtual inter-university campus", the results show an overwhelming tendency (85%), to work in a virtual campus.

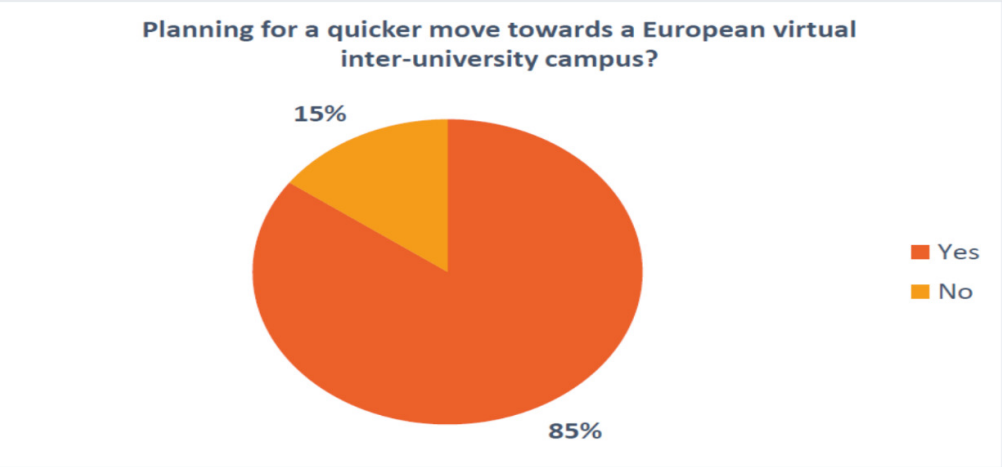

Figure 3: orientation towards a virtual campus
Source: Coronavirus - European Universities Initiative impact survey results, 2020

On the subject of the selection of the first four elements that will be most affected by the COVID-19 crisis in the middle of the period, it is noted that student and teacher mobility, student recruitment and internationalization will be substantially reduced:

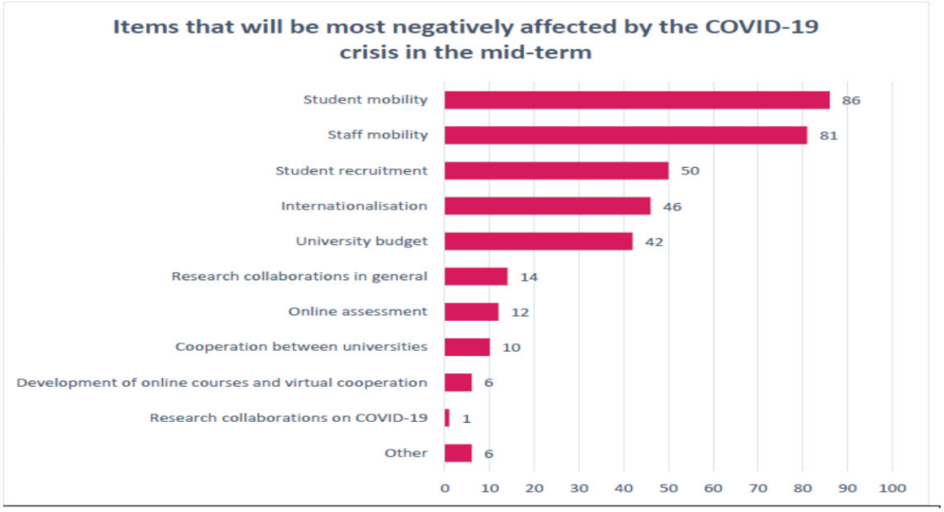

Figure 4: The areas that will be most affected by the COVID-19 crisis in the middle of the period
Source: Coronavirus - European Universities Initiative impact survey results, 2020

The elements that will be further supported, following the COVID-19 crisis, at the level of the analysed universities are also suggestive:

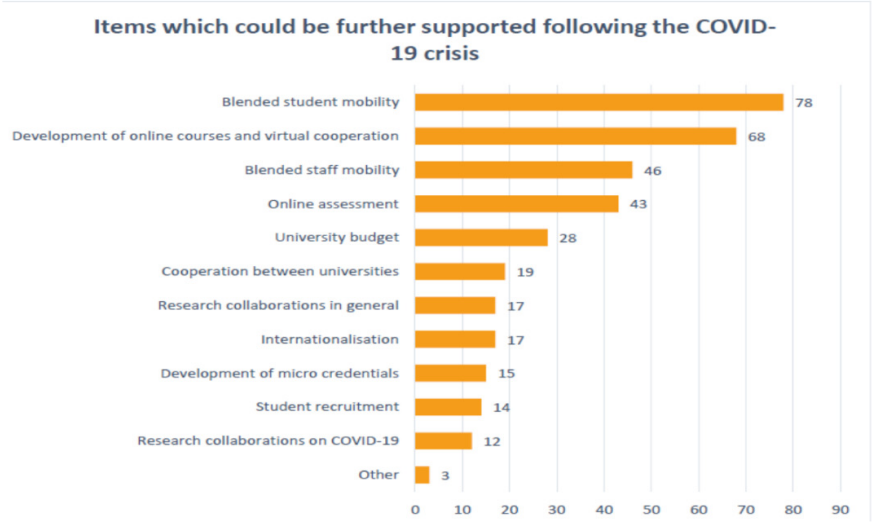

Figure 5: Elements that will be further developed following the COVID-19 crisis
Source: Coronavirus - European Universities Initiative impact survey results, 2020

The study also discusses examples of good practices and measures found in Europe. Some examples are presented in Table no 1, below.

Table 1: Examples of good practices and measures

Measures	Examples
Measures for online teaching and virtual mobility:	Exchange of examples and processes for online teaching and examination and comparison of IT tools; Switching to an electronic platform for teaching and learning; Development of common virtual mobility and options for future mobility; Development of ad hoc working groups (eg on digital education, virtual mobility and the impact of COVID-19); Teacher training, online guidance for students / trainees, support

Exchange of good practices	Collection and exchange of ideas for virtual activities, exchange and training, on digital learning, IT tools and platforms, etc. Updating and discussing situations and measures taken by universities regularly through virtual means; Sharing experiences on specific issues related to COVID.

Source: processing: Coronavirus - European Universities Initiative impact survey results, 2020

Also, students positively appreciate virtual activities, as follows:

- ✓ Digital learning tools and platforms work very well (71%);
- ✓ Moderators, teachers, trainers organize activities well (71%);
- ✓ The quality of activities is good (63%);
- ✓ These activities encourage participants to learn (55%);
- ✓ Activities are relevant to the mobility of participants (71).

In such an unbalanced landscape and with current time constraints, an obvious solution would be inter-university collaboration. By combining existing resources, both in terms of infrastructure and pedagogical support, universities can ensure students' access to quality online learning. This does not have to mean a unified curriculum, so the diversity of the academic offer is not jeopardized in any way. The main idea is to join forces on issues that consume too many resources and take time to address independently at this time, especially expertise and support for the design and delivery of online courses. It sounds like a distrust, but unfortunately this is not the way universities operate.

Collaboration is not really in their DNA, and the academic landscape has become increasingly competitive in recent decades. Each university wants to preserve its identity (and number of students) and would rather emphasize its individual character than see potential similarities and collaborations with other institutions. In Europe, this is combined with the variety of national education systems that often draw unnecessary barriers to collaborative efforts. When collaboration happens, it is mainly about research and is much less common when it comes to educational programs. This is partly due to the fact that teaching is still seen as an individual activity. While informal teaching exchanges take place, they are rarely formalized as inter-institutional programs.

Aspects of education within „Constantin Brâncuși" University (CBU) in the conditions of the covid crisis 19

At the CBU level, we applied a series of questionnaires to students and teachers to determine the impact of the covid crisis 19 on the teaching process and also to determine the learning needs of students and the training-development needs of teachers.

To the question "How difficult was it to get used to the online activity due to the conditions imposed by the pandemic", most of the students, respectively 79.3%, answered that they had no problems regarding accommodation with the system of online activities, the remaining 20.7% say they have encountered some accommodation difficulties.

To the question "What were the factors that created difficulties in your activity on the online platform during the pandemic period" 61.2% of the students specified that among the factors that created difficulties, the most suggestive are: "lack socializing with colleagues and teachers," and "the stress of the whole situation".

The factors related to "access to digital media and devices" or "access to the Internet" did not constitute barriers to the conduct of online activities.

Regarding the factors that motivated them to work on the online platform during the pandemic, 51.5% of students appreciated at a high and very high level the "development of digital skills", 49.8% of students appreciated at a high level and very high "exploring internet and online resources" and 44.3% of students appreciated at a high and very high level "fully experiencing online and distance activity". This highlights the interest and availability of students for this type of learning.

To the question "What types of activities do you consider that would contribute to the development of competencies specific to your profession and that should be further developed in the higher education institution, of course in compliance with the curricular provisions specific to the university level", regarding the types of activities that would contribute to the development of profession-specific skills, we note again a balanced distribution of the answers "very high level" and "high level" to all six variants of activities or actions proposed in the questionnaire, which reveals, on on the one hand, the interest of students for professional and personal development, and on the other hand the wide

range of activities and actions with which teachers can meet students, helping them to acquire the skills of the chosen profession.

A ranking of the most appreciated activities, according to the weight of the answers "very high level" and "high level", is the following Table no 2:

Table 2: Item-percentage correlation

Item	Procentage
Participation and promotion of student support programs through national educational policies to facilitate the acquisition of digital technology according to the economic and social possibilities of students	54,6 %
Increased involvement and participation of students in student research activities and sessions	52,9 %
Development of counseling and career guidance activities	52,6 %
Approaching active - participatory teaching strategies to course, seminar and laboratory activities	50,9 %
Development of the material and institutional research base in accordance with the current economic, scientific and social context	49,5 %
Capitalizing on Erasmus + mobility and internship periods	42,6 %

Source: own processing

Concerning the teachers, the impact of the COVID-19 crisis was captured with a series of questions and answers, the most relevant being the following:

Regarding the need for support and guidance teachers for online activity, almost half of the respondents, respectively 46.3%, answered that they do not need help. Of the others, 31.7% consider that they need support regarding the technical aspects, 22% regarding the pedagogical aspects and 2.4% regarding the content aspects of the discipline.

It can be concluded that most of the teachers did not have any problems in terms of accommodation with the system of online activities.

Regarding the face-to-face activities that could not be carried out online, out of the seven response variants, the highest percentage had the option h) Authentic communication (human relationship) with 85.4%, followed by the option f) Feedback for prompt correction or for confirmation of purchases by 46.3%.

A ranking of activities that are difficult to carry out online, with a negative impact on student education, is given in Table no 3 and Figure 6.

Table 3: Item-percentage correlation

Item	Percentage
Authentic communication (human relationship);	85,4 %
Feedback for prompt correction or confirmation of purchases;	46,3%
Applications and projects (seminar / laboratory);	36,6 %
Monitoring progress;	36,6 %
Explanations for understanding concepts, relationships, phenomena (course);	31,7 %
Personalized support /; Individual counseling	29,3
Explanations for understanding concepts, relationships, phenomena (seminar);	19,5%
Lectures (course);	9,8 %

Source: own processing

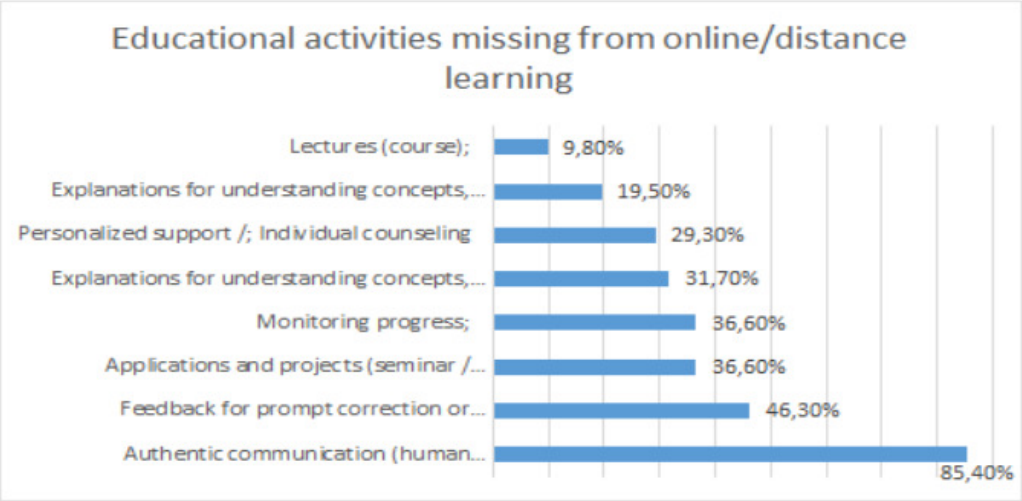

Figure 6: Educational activities that are important for learning and are not forthcoming in distance learning.

Source: own processing

Regarding how each relates to this type of distance / online education, the answers were as follows:

- 43.9% of teachers answered that the way they do distance / online education is clear and easy to explain / understand;
- 36.6% of teachers answered that distance / online education is easy to implement;
- 29.3% of teachers answered that distance / online education helps them to complete their teaching tasks faster;
- 24.4% of teachers answered that distance / online education makes them more productive in their teaching activity;
- 21.9% of teachers answered that distance / online education helps them to improve their teaching activity.

Regarding the innovations in teaching practice, adopted in the course and seminar, the teachers considered the following aspects as the most relevant:

- Teaching on a video platform, discussions on the classroom platform at the same time with the possibility of individualized tasks;
- Partial tests during the online teaching activity, which determine students to go through the subject taught during the semester and not just in session;
- Online feedback from students after almost every course, by solving a grid test on the platform;
- Sending to students as many documents in audio and video format;
- Creativity in terms of the content of the exercises and topics proposed for solving, they have more effectively translated the theory into practice;

When asked if they had ever attended an online education course or training, 65.9% had not attended an online education course or training.

Thus, the need for training in the field of online learning is outlined, with a pedagogical support adapted to the new changes.

Beyond these practical aspects, which are particularly important, a change of mentality is also needed - the recognition that education in the digital environment is not in itself inferior to the classical one, with which we have become accustomed. The methods and tools differ and the courses have to be designed differently, but research in the field confirms that the results are at least as good, and in some cases even superior, compared to face-to-face teaching.

Conclusions

Universities play an important role in meeting the challenges of the current crisis and they will undergo major changes, rapid and with considerable consequences for the development of society in general. In this context, it is important

for universities to focus on capacity building, first from a pedagogical point of view and then from the perspective of integrating technology into the educational process.

Education in general will go through profound transformations and nothing will be the same. No students, no teachers, no students, no school, no university. Flexibility, openness, self-regulation of the entire educational system, in relation to the unpredictable dynamics of the world we live in, must be basic landmarks in the near future. The speed and depth of change are the coordinates of the future in education.

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Types of Mobile and Virtual Consumer Interactions

Ahmed Y. MAHFOUZ
Prairie View A&M University, Prairie View, USA
aymahfouz@pvamu.edu

Abstract

Consumers find mobile and online shopping very convenient and cost effective. Online shopping would secure greater ubiquity and scale, given the current global pandemic. Different apps and web sites provide the appropriate platform for ecommerce transactions, medical needs through telemedicine, and entertainment through online movie streaming and gaming. This paper examined different types of these virtual interactions and created a scheme to allocate different kinds of consumers based on dimensions of their shopping habits and tendencies. Following the study's classification scheme, different types of shopping behavior emerged based on a sample of consumers surveyed. The results would be of benefit to business managers and app developers, resulting in richer online experiences for their target markets.

Keywords: Mobile Shopping, Consumer Behavior, Online Experiences, Consumer Engagement.

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Pedagogy and Learning Theories Through Learning Management Systems

Ahmed Y. MAHFOUZ

Prairie View A&M University, Prairie View, USA
aymahfouz@pvamu.edu

Abstract

Virtual or remote learning has been growing in popularity, in both student learning and corporate training. Given the recent global pandemic, a majority of learning and training moved to distance learning on learning management systems and platforms, such as Canvas, Moodle, and Blackboard. Videoconferencing tools and collaborative software would become the *new* normal for both learning, business, and training needs. Most learners have not heard of Zoom prior to last year or the year before. Zoom and Microsoft Teams, the videoconferencing and collaborative platforms, would gain popularity over the industry leaders, such as Cisco WebEx. With its recent boom and spike in usage, *Zoom* is now a new verb with a new meaning in the vernacular, on par with *Google*. The present study showcased learning theories and their corresponding tools and apps in learning management systems. Such communicative tools cultivate a richer learning experience for learners and business trainees through higher levels of engagement and participation.

Keywords: Pedagogy, IS Education, Learning Management Systems, Collaboration, Videoconferencing.

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Investment In R&D as A Trigger for Accelerated Development of The Digital Economy Ecosystem: A Comparative Analysis of OECD Countries

Malika A. SADUEVA
Grozny State Oil Technical University, Grozny, Chechen Republic, Russian Federation,
https://orcid.org/0000-0002-2246-7416, sadueva.m@mail.ru

Olga Y. KUZMINA
Samara State University of Economics, Samara, Russian Federation,
https://orcid.org/0000-0002-4460-0468, pisakina83@yandex.ru

Elena E. KUKINA
The Financial University under the Government of the RF (Lipetsk Branch), Lipetsk, Russian Federation,
https://orcid.org/0000-0002-9047-3359, EEKukina@fa.ru

Anna S. SHURUPOVA
Lipetsk Branch of the Russian Presidential Academy of National Economy and Public Administration (RANEPA),
Lipetsk, Russian Federation, https://orcid.org/0000-0001-6490-2079, shurupova2011@mail.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russia,
https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru (corresponding author)

Abstract

The purpose of the research is to reveal the infrastructure for generating innovations based on R&D as a structural element of the digital economy ecosystem, which provides a trigger effect of accelerated digital development of the national economy, as well as to develop a mechanism for making management decisions about investing in R&D using a trigger. The authors revealed the configuration of the digital economy ecosystem based on innovation generation subsystem. The authors analyzed the dynamics of investment in R&D in the OECD countries-leaders and outsiders in the IMD Global digital competitiveness rating 2019, compared their structure, and evaluated the effectiveness in the form of the number of registered patents, changes in labor productivity, as well as indicators of "technology", "knowledge", and "future readiness". The authors suggested using the trigger mechanism in the process of making management decisions about investing in R&D, and also justified the criterion for differentiating public policy.

Keywords: the digital economy, R&D investments, the trigger, the digital economy ecosystem, generating innovation

Introduction

One of the regularities of the current stage of society development is the intensification of the penetration of digital technologies into all spheres of human life, which results in the formation of a full-fledged digital economy ecosystem. We are talking about creating a space for communication between various actors (producers, consumers, scientific organizations, public authorities, institutions), as well as using their access to shared scalable resources to create new value through the use of digital technologies.

However, the ecosystem of the digital economy, which is complex in its structure and the nature of interaction between subjects, is a dynamic substance. It is in the process of continuous development, which can be carried out both in the direction of growth and in the direction of inhibition. To ensure its dynamic development, it is necessary to investigate the sources of its acceleration, the so-called triggers that set the digital economy ecosystem in motion.

Perhaps one of these triggers may be the intensification of investment in R&D. From 2000 to 2017, total global R&D spending almost tripled — from US $ 676 trillion to US $ 2.0 trillion) (OECD, 1960; OECD, 2018). Thus, the rapid

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growth of public and private investment in research and development during the period of industrial development (in 1960, it reached 69% of global R&D funding) helped the United States to become a global economic leader.

Can investing in R&D now be a trigger for launching the accelerated development of the digital economy ecosystem? What mechanisms should the state use to promote the development of R&D? The answers to these questions are relevant for this study.

Methodology

The purpose of the research is to reveal the infrastructure for generating innovations based on R &D as a structural element of the digital economy ecosystem that provides the trigger effect of accelerated digital development of the national economy, as well as to develop a mechanism for making management decisions about investing in R&D using a trigger.

Investigation phase:

1) Revealing the structural elements of the digital economy ecosystem, establishing the role and place of R&D in it.

2) Analysis of investment in R&D in some OECD countries for the period 1990-2018, research on the structure of investment in R&D.

3) Evaluating the results of investment in R&D as a reflection of the trigger effect.

4) Formation of a mechanism for implementing a differentiated policy in the field of investment in R&D for adaptation in leading and outsider countries of digital development.

The research is based on the works of scientists in the field of formation of the digital economy ecosystem, mechanisms for the development of R&D infrastructure, as well as institutional regulation of innovation.

Karpunina et al. (2020b) identifies the ecosystem of the digital economy with a space for interaction of subjects structured into subsystems depending on their functionality and having access to shared scalable resources, where the process of creating "value" is carried out on the basis of the use of digital technologies and communication channels. Prahalad and Ramasvami (2010) point to changing approaches to creating consumer value in the digital economy.

Moore (1996), Lepesh (2020) describe the features of the business subsystem functioning, as well as its changes in the digital environment. Sologubova (2017) emphasizes the importance of institutional regulation of the transition from an industrial to a digital economy.

Carter and Edvards (2001), Gibbons (1996), and Goldstein (2002) attempt to evaluate the impact of R&D using mathematical tools. Kohno et al. (2017) offer indicators and models for evaluating the effectiveness of public funding for research and development. The principle of operation of the trigger as an anti-crisis management tool is described by Chaya (2008).

The information base of the research is materials of IMD (2019), OECD statistics (2020a, b, c), Unesco Institute for Statistics (2020), World Bank (2020).

Research methods: method of theoretical analysis, method of induction and deduction, method of systematization, method of comparative analysis, system approach, graphical method, method of economic and statistical analysis.

Results

Karpunina et al. (2020b) identify four interacting ecosystems in the structure of the digital economy ecosystem (the business ecosystem, the consumer ecosystem, the ecosystem of talent and innovation, and the ecosystem of digital platforms and communications) that function within the appropriate institutional environment. However, according to the authors, the configuration of the digital economy ecosystem can have the following form (Fig. 1).

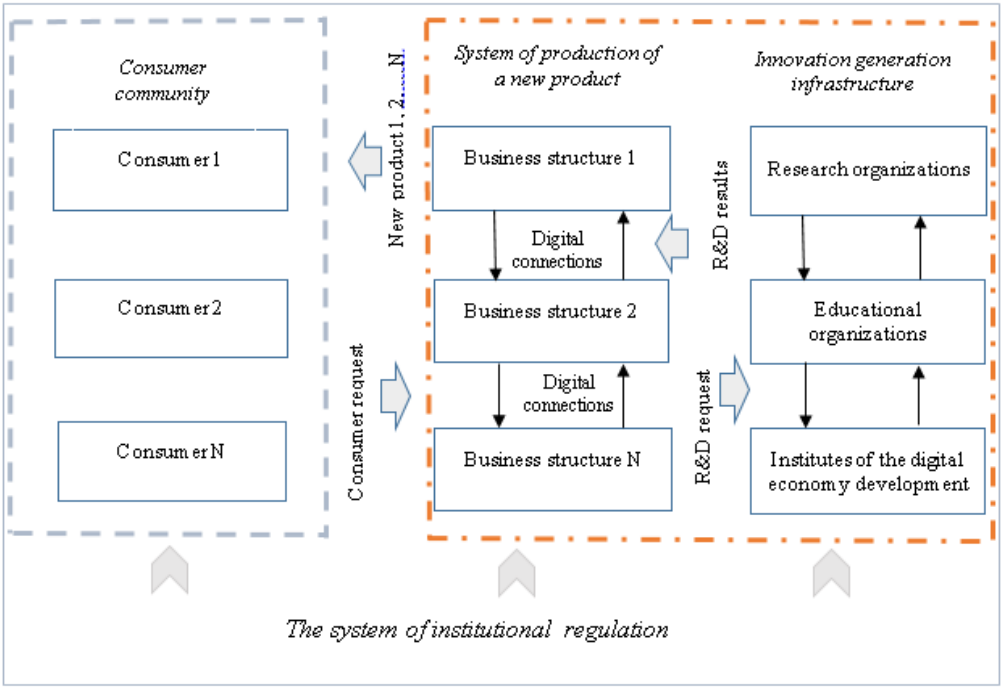

Fig. 1: Configuration of the digital economy ecosystem (compiled by the authors)

In the digital economy ecosystem, the process of creating a new product (its value) is determined by personalized consumer experience (Karpunina et al., 2020a). In this space, informed and active consumers form various online communities that have more market power, and form consumer requests, thereby becoming more involved in creating consumer value together with the company (Prahalad and Ramasvami, 2010).

According to Moore (1996), a business subsystem is an economic community of interacting enterprises that produce goods and services. In the digital economy, enterprises develop within the framework of network forms of management, using digital communication channels, and their activities are aimed at creating high-tech industries characterized by a high degree of technological processes automation based on the introduction of electronic and information and communication management tools, storage and transmission of information (Lepesh, 2020).

In the digital economy ecosystem, to meet the needs of consumers, enterprises must have access to the innovation generation infrastructure, which is a set of institutional entities: educational organizations, research structures, venture organizations, and institutions for the digital economy development. Educational organizations produce new personnel who carry the knowledge and skills necessary to create innovative products. The scientific basis is created by research organizations that carry out R&D in cooperation with higher educational institutions. Institutions for the digital economy development (technology parks, business incubators, innovation centers) allow to put into practice the achievements of science and technology.

All actors in the digital economy ecosystem implement their digital ambitions within the established "rules of the game", i.e. regulatory rules, technological standards, ethical standards, and other institutional regulatory measures (Sologubova, 2017).

According to the authors, the IMD global digital competitiveness rating can be used to assess the formation of the digital economy ecosystem, ranking countries by the degree of implementation and research of digital technologies leading to the transformation of state practices, business models and society as a whole (IMD, 2019). OECD countries occupy different positions in the IMD rating – the United States and European countries with mature economies are the leaders of the rating, while Colombia, Greece, Turkey, Mexico, and Slovakia complete the rating (table 1).

Table 1: OECD countries-leaders and outsiders in the IMD rating is, 2019

Country	Position in the rating	Number of points
OECD countries – the leaders of the ranking of IMD 2019		
USA	1	100
Sweden	3	96,07
Denmark	4	95,23
Switzerland	5	94,65
Netherlands	6	94,26
OECD countries-outsiders in the IMD 2019 rating		
Slovak Republic	47	62,62
Mexico	49	60,41
Turkey	52	59,79
Greece	53	59,63
Colombia	58	56,13

Source: compiled by the authors based on IMD (2019)

Let's analyze the dynamics of investment in R&D in the period 1990-2018 on the example of the OECD countries-leaders of the IMD global digital competitiveness rating (2019) and the OECD countries that complete the IMD rating (Fig. 2).

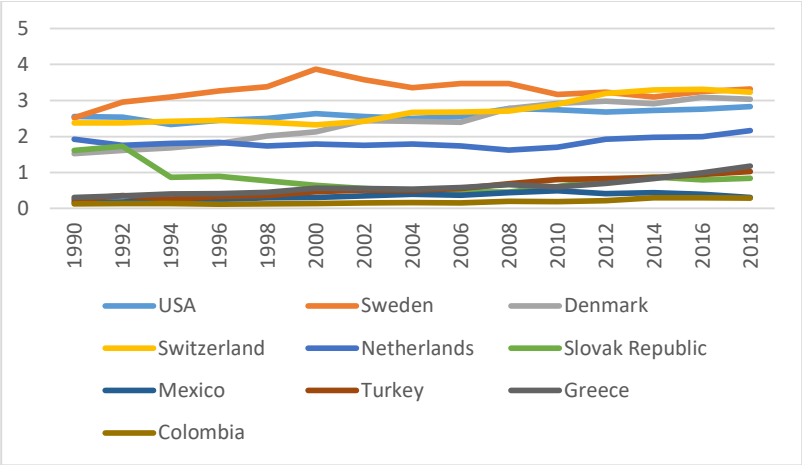

Fig. 2: Dynamics of investment in R&D (% of GDP) in OECD countries in the period 1990-2018
(compiled by the authors according to OECD, 2020b)

The dynamics of spending on research and development shows that most countries (Switzerland, Netherlands, United States, Turkey, and Colombia) are moving along a fairly smoothly developing trajectory. Sweden made a significant leap in R&D financing between 1990 and 2000, surpassing all the countries studied in terms of investment (as a percentage of GDP), and this trend continued until 2012, when Switzerland became the leader in R&D investment (as a percentage of GDP). Slovakia sharply reduced its investment in R&D in 1992, which continued until 2008.

Each country has its own structure of R&D financing. However, data analysis allows us to identify some patterns (table 2).

Table 2: R&D investment in selected OECD countries, 2019

Country	Position in the IMD 2019 rating	GDP (current prices) /billion US$)	GDP per capita (current US$)	Gross domestic spending on R&D, % of GDP	Gross domestic expenditure on R&D at current PPP $	R&D spending by Government, % of total R&D	R&D spending by Business, % от total R&D spending in PPP$	R&D spending by Universities and Private non-profit, % of total R&D	Number of researchers per million inhabitants
OECD countries – the leaders of the IMD 2019 ranking									
USA	1	21 427	65118	2,7	581 553,0	11,4	71,5	17,1	4 205
Sweden	3	530,8	51610	3,1	18 162,39	3,7	67,0	29,3	6 875
Denmark	4	348,1	59822	2,9	10 054,21	2,29	63,8	33,91	7 310
Switzerland	5	703,1	81994	3,2	18 688,49	0,89	71,5	27,6	4468
Netherlands	6	909,1	52448	2,0	21 463,06	11,9	56,0	32,1	4512
OECD countries-outsiders of the IMD 2019 ranking									
Slovak Republic	47	105,4	19329	0,9	1 486,94	28,3	36,8	34,9	2715
Mexico	49	1 258,3	9863	0,4	8 053,93	32,3	17,9	49,8	260
Turkey	52	754,4	9043	0,9	23 966,26	9,7	49,8	40,5	1160
Greece	53	209,9	19583	0,8	3 843,77	27,7	33,9	38,4	2791
Colombia	58	323,8	6432	0,3	2 208,88	8,95	42,6	48,45	58

Source: compiled by the authors according to the OECD (2020b), Unesco Institute for Statistic (2020), World Bank (2020)

The table clearly shows that in the OECD countries-leaders of the IMD 2019 rating, the share of R&D expenditures is high: from 2 to 3.2% of GDP. However, in outsider countries, it barely reaches 0.9% of GDP.

In the United States and most developed European countries, the business sector is actively involved in R&D financing, bearing most of the costs. The United States and Switzerland are the leaders in financing R&D expenditures by the business sector-71.5% of total R&D expenditures in these countries are covered by business structures. In Slovakia, Mexico, and Greece, the state co-finances R&D expenditures in approximately equal shares with business. In addition, in Colombia and Turkey, non-profit organizations and universities take on the majority of R&D investments.

When comparing the volume of R&D investment in current PPP, it becomes obvious that the world leadership belongs to the United States, where the volume of R&D investment in 2019 was US $ 581,553. 0 million, followed by Turkey (US $ 23,966.26 million), followed by the Netherlands (US $ 21,463. 06 million dollar), Switzerland (US $ 18,688. 49 million) and Sweden (US $ 18,162. 39).

Of course, when comparing the volume of investment in R&D, going beyond the OECD countries, China is the world leader in addition to the United States. According to Bloomberg, from 2009 to 2015, investment in R&D by American companies increased, but the main growth was in foreign investment, and primarily in China. In 2015, the United States invested about US $ 60 billion in Chinese research projects. At the same time, China itself began to experience an explosive growth in R&D investment: according to Capital IQ, from 2009 to 2015, it amounted to about 60% (Production Management, 2016).

The dynamics of R&D investment is significantly affected by economic instability. So, in the crisis years of 2008-2009, the largest western companies began to reduce their research and development budgets. According to McKinsey, in 2009, 40% of the world's top managers said they needed to reduce R&D spending, and 30% decided to reduce the number of R&D projects planned for the current year. However, some companies refused to reduce their investment in innovation, and some even planned to increase their budgets at the height of the crisis. As a result,

private sector investment in R&D in the West in gross terms only declined slightly in 2009, and in 2010 there was a steady growth again (Production Management, 2016).

Another global trend characteristic of the R&D sector during the crisis is the strengthening of connections between large companies and the educational environment and universities. For example, in 2009-2011, General Electric invested about $4 billion annually in research and development, including $800 million in new health products that were created at a research center in Bangalore with the involvement of students. The result was the release of the Mac 400 portable electrocardiograph at an adequate market price.

Why do major companies refuse to reduce their investment in R&D even in times of crisis and try to create a solid ballast of interaction with universities?

The fact is that the role of investment in R&D, described in the theory of corporate financial analysis, is extremely important for the development of enterprises.

Carter and Edvards (2001) and Gibbons (1996) mathematically assess the impact of R&D. An example of how this theory works in practice is the balanced portfolio of the R&D center of General electric Corporation, which includes the development of advanced technologies (15%), technical support for current business (15%), development of new generations of products/processes (35%), and advanced research (35%) (Goldstein, 2002).

The humanitarian and social results of investing in R&D at the macro level are: creating new jobs; improving working conditions; accelerating production processes and improving control over their execution phases; "transparency"of costs and results; increasing the flexibility of production processes and the speed of response in terms of adapting to changing external conditions.

An indicator of the economic performance of investments in R&D at the macro level can be: the number of patents received, which are the final result of innovative developments (fig. 3); labor productivity growth (fig.4).

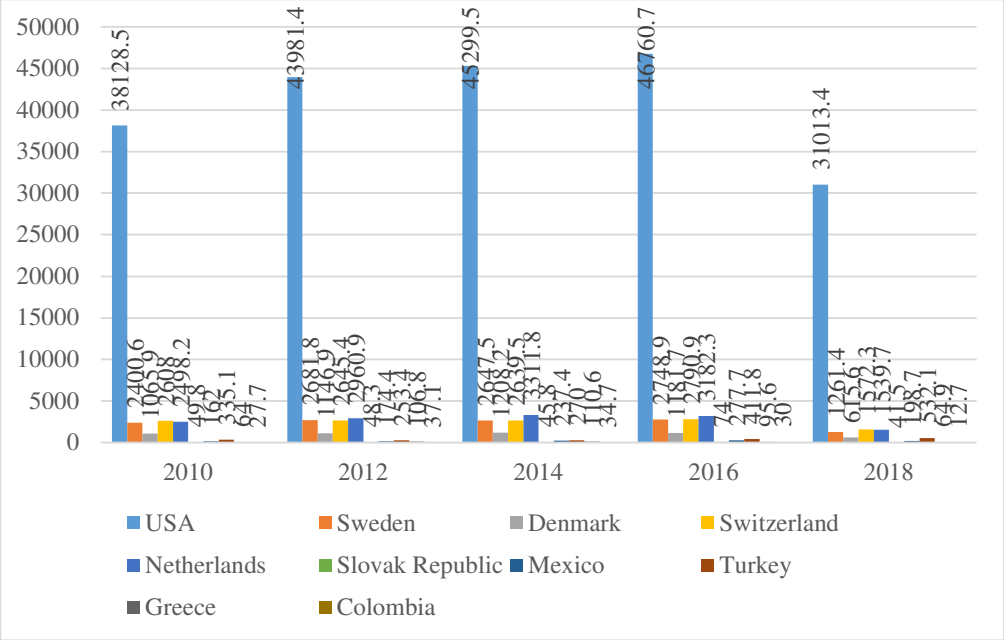

Fig. 3: Patents by technology: Patents - total and specific technology domains (OECD)
(Source: compiled by the authors according to OECD (2020c))

The data provided by the OECD shows that the US is the leader in the number of patents created, with the amount of investment in R&D in monetary terms in the US higher than in European countries, but as a percentage of GDP less than in Switzerland. Most European countries systematically increased the number of patents created until the global financial crisis of 2015-2016, then there was a sharp decline in indicators. Slovakia, Turkey, Greece and Colombia in the period 2010-2018 showed unstable dynamics of patent activity with periods of unjustified growth and decline.

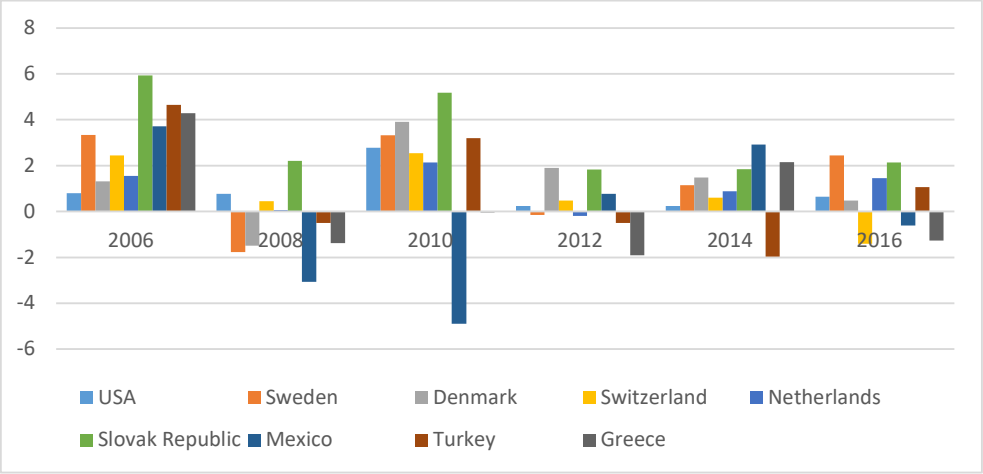

Fig. 4: Dynamics of labor productivity, annual growth in constant prices, %
(Source: compiled by the authors according to OECD (2020a))

The presented data allow us to conclude that in countries that invest in R&D at a high level, periods of decline in labor productivity as a result of global crises are less prolonged and less deep: for example, the US economy shows the smallest amplitude of fluctuations in labor productivity; Sweden and Denmark in 2008 showed a sharp drop in labor productivity, but in 2010 showed stable growth; in Switzerland, during the study period, there was only 1 decline in labor productivity in 2016. However, the Netherlands stands out from the general trend (with the average global volume of investment in R&D, the fall in labor productivity was observed 3 times in the period 2006-2016), as well as Slovakia, which shows a weak decline in productivity against the background of low R&D funding.

Thus, it is not possible to show a clearly established relationship between the volume of investment in R&D and their results on the example of the studied countries, due to the existence of factors that determine the effectiveness of the R&D investment process, except for the volume of investment: the distribution of spending over time; the strategy for implementing R&D; the duration of work from theoretical searches to the final result; the volume of the information base and its distribution over the entire investment period; the dynamics and results of implementing scientific developments at certain stages; established links between participants in research projects; investment culture and experience in organizing R&D. In other words, the efficiency of innovation generation depends on the quality of a single organizational and economic mechanism (Via Future, 2019; Kuznetsov et al., 2018; Kapustina et al., 2018).

In general, in 2019, the studied OECD countries were able to achieve the following values of the indicators "technology", "knowledge", and "future readiness", which reflect the implemented policy of investment in R&D (table 3).

Table 3: The values of the indicators "technology", "knowledge", and "future readiness" achieved by the OECD countries as a reflection of the implemented R&D investment policy, 2019

Country	Position in the rating by the indicator "technologies"	Number of points	Position in the rating according to the indicator "knowledge"	Number of points	Position in the rating according to the indicator "future readiness"	Number of points
OECD countries – the leaders of the IMD 2019 ranking						
USA	5	89,364	1	90,998	1	98,427
Sweden	7	88,238	4	89,727	6	89,034
Denmark	11	83,958	6	85,987	2	94,519

Switzerland	10	84,292	2	90,850	10	87,593
Netherlands	6	88,413	13	81,807	3	91,352
OECD countries-outsiders of the IMD 2019 ranking						
Slovak Republic	44	57,886	48	55,261	47	53,513
Mexico	52	53,589	52	53,505	49	52,930
Turkey	48	55,105	60	45,497	41	57,567
Greece	54	52,510	53	52,869	53	52,310
Colombia	60	47,521	57	48,331	55	51,316

Source: compiled by the authors based on IMD (2019)

From the previous analysis and the data presented in the table, it is clear that investment in R&D, indeed, provides the implementation of the trigger effect of accelerated digital development. The trigger is used in various spheres of human life to automatically affect certain parameters that can be both quantitative and qualitative estimates.

The trigger value is a restriction on the value of a particular indicator, factor, or criterion that causes a significant change in the defined (limit) indicator. Its fluctuations are most significant for the conditions of functioning of a particular national economy (Chaya, 2008).

The values of the "R&D investment rate" indicator will determine the value of the T – trigger coefficient. The authors suggest calculating this indicator using the formula:

$$I_{R\&D}=(Nr * GDP)/Np \quad (1)$$

where $I_{R\&D}$– R&D investment rate; N_r- number of researchers per million inhabitants of the country; *GDP* – Gross Domestic Product, billion US$ a deduction of expenses for the social sphere, defense of the country; N_p – number of population in the country, people. The results of calculating the "R&D investment rate" indicator for the studied countries, as well as determining the trigger value, are shown in table 4.

Table 4: Calculating the "R&D investment rate" indicator and determining the critical trigger value

Country	$I_{R\&D}$
OECD countries – the leaders of the IMD 2019 ranking	
USA	0,26
Sweden	0,29
Denmark	0.43
Switzerland	0,37
Netherlands	0,23
OECD countries-outsiders of the IMD 2019 ranking	
Slovak Republic	0,05
Mexico	0,003
Turkey	0,01
Greece	0,05
Colombia	0,0004
The range of critical values of the T-trigger	0,23-0,43

Source: compiled by the authors according to the OECD (2020b)

The use of a trigger can become a necessary and sufficient condition for making managerial decisions and, when using the appropriate software, automate the management of any economic processes in the state (fig. 4).

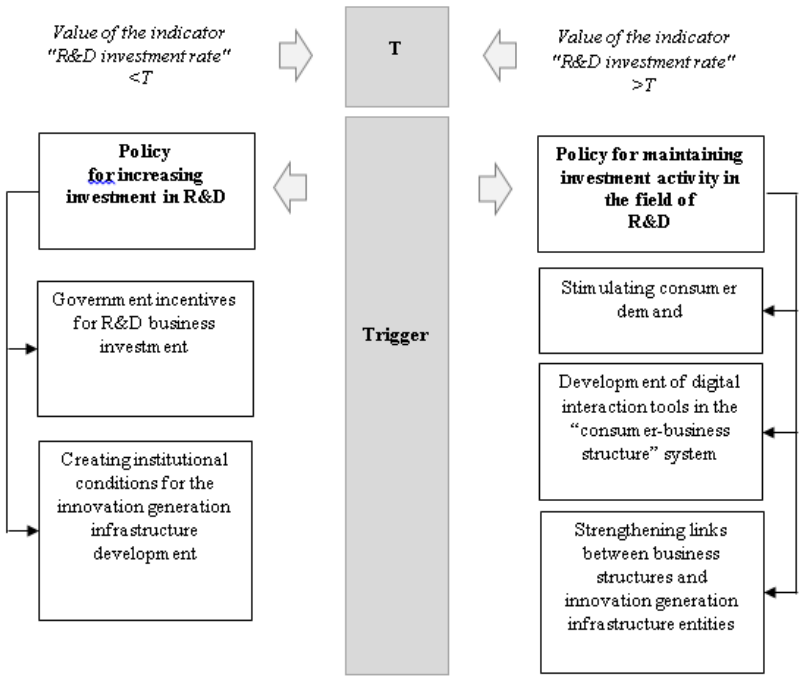

Fig. 4: The mechanism of trigger action in the process of making management decisions about investing in R&D

(compiled by the authors)

If the value of the "R&D investment rate" indicator becomes a critical value for a particular country below the T coefficient, setting the trigger to this critical value signals the need to suspend first-priority expenditures and redirect available funds to R&D financing. That is, as soon as the value of the indicator "R&D investment rate" becomes less than the critical value of the coefficient T for this particular country, the trigger configured for this value is overturned (snapped) and requires the suspension of first-priority expenditures through the software system from the public administration system. Conversely, the upper limit (threshold) of a trigger is adjusted in the same way when it is tipped (snapped) in the opposite direction and does not allow increasing investment in R&D above the value of the T coefficient.

In addition, it has achieved a critical value of the T coefficient is the switching policy of increasing investments in R&D (government expenditures business investment in R&D and institutional conditions for the development of infrastructure to generate innovation, including direct and tax support for innovation-oriented companies, the creation of business accelerators, new industrial policy based on smart specialization) policy of maintaining investment activity in R&D(to stimulate consumer demand, development of digital tools for interaction in the "consumer-business structure" system for tracking well-founded consumer requests by the manufacturer, as well as strengthening links between business structures and subjects of the innovation generation infrastructure). Among the countries studied, Slovenia, Turkey, Greece, Mexico and Colombia have not reached the critical value of the T coefficient and should implement policies to increase investment in R&D to accelerate economic and digital development. The United States, Sweden, Denmark, Switzerland, and the Netherlands should implement policies to maintain investment activity in R&D, since the values of the "R&D investment rate" indicator in these countries are higher than the critical value of the T coefficient.

Conclusions

The authors justified their own vision of the configuration of the digital economy ecosystem based on the subsystem of innovation generation, and also revealed the specifics of all its structural elements.

The authors used countries from the IMD global digital competitiveness rating (2019), which assesses the formation of the digital economy ecosystem. The analysis involved 5 OECD countries-leaders of the IMD rating, and 5 OECD countries-outsiders of the rating.

The authors analyzed and compared with the dynamics of investment in R&D in these countries, their structure, and effectiveness of investment in the form of number of registered patents, changes in labor productivity, as well as indicators of "technology", "knowledge", "future readiness" assessed in the IMD (2019).

It is concluded that ensuring stable investment in R&D provides greater stability of the national economy, larger adaptability to changing environmental conditions and faster overcoming of crises, as well as a high level of technology development and knowledge generation.

The mechanism of trigger action in the process of making management decisions about investing in R&D is revealed, and a criterion for differentiating public policy is proposed – the critical value of the indicator "R&D investment rate".

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Computer-Aided Grinding Process of Oil Seeds

Grzegorz SMIGIELSKI
Kazimierz Wielki University, Bydgoszcz, Poland, gs@ukw.edu.pl

Krzysztof TYSZCZUK
Kazimierz Wielki University, Bydgoszcz, Poland, krzytysz@ukw.edu.pl

Abstract

The grinding process of oil seeds requires careful selection of grinder input parameters to obtain a product with appropriate physical and chemical properties. The article presents a precise grinder design (with a measurement and control unit, and a genetic algorithm module), which facilitates selection of optimal settings of the mill during the industrial grinding process.

Keywords: Grinding, Dietary Supplements, Genetic Algorithm, Manufacturing System Technologies.

Introduction

Manufacturing high quality dietary supplements based on natural ingredients for human nutrition requires appropriate preparation of the biological material. In the dietary supplement manufacturing process, many factors are easily overlooked. Once the brand owner does not have the customer's best interests (healthy and efficiency), the rigorous manufacturing procedures are likely to be simplified. The result is the product might less efficiency or cause negative effects (Finley et al., 2019; Poniedziałek et al., 2018; JECFA, 2000; Golonka et al., 2019). The primary issue involves proper fragmentation thereof. Among the valuable seeds for preparation of dietary supplements are: flax (golden and brown), camelina, chia, fenugreek, black caraway, and mustard. Excessively high temperature during the grinding process of these seeds may be detrimental to the qualities of the product, e.g. the nutrient content or presence of harmful substances. The degree of fragmentation of the product is critical for its assimilability (Tyszczuk et al., 2018). In case of industrial-scale processing it is also vital to obtain the lowest energy expenditure by mass of the ground product. For each type of material the aforementioned parameters are a function of design features (e.g. shape of cutting elements) and process variables. For a given knife shape, a variable which affects the fragmentation degree the most is their linear velocity, which is a derivative of cutting disc (knife) diameter and their angular velocity.

Evolution in Grinder Design

Depending on the intended purpose and type of fragmented material there are several grinder designs. The authors and their associates are the originators of several grinders used for grinding biological and polymeric materials. Some of these solutions involve simple measurement units and manual control. Newer concepts employ microprocessor-based or computer-based measurement and control systems. Initially important for research purposes was obtaining the information on the temperature of the fragmented material and the possibility of changing the rotational speed. Determining the diameter of particles was done via vibrating screen after grinding. Subsequent stages of research made it possible to construct systems allowing the size of particles to be measured during the grinding process along with the ability to immediately change the parameters of the process (Śmigielski et al., 2019).

Precision Grinder

Precision grinder is a variant of a multi-disc grinder (Fig. 1), which comprises a stator with stationary discs (external) and a rotor with internal discs placed at determined distances (Fig. 2).

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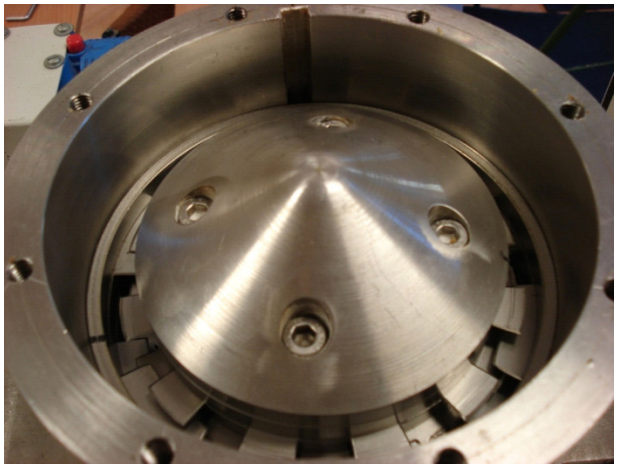

Fig. 1: Interior view of precision grinders without cover

Fig. 2: Sample design of the discs: stator and rotor

Controlling the grinder (Fig. 3) is handled via computer with an application designed in LabVIEW environment. U6 device by LabJack was used as a measurement and control unit. In order to control the rotational speed of the induction motor powering the grinder, a frequency converter was used, connected to the computer via RS485 bus, whereas the material dosage rate was controlled via an auger feeder with a dedicated controller. The measurement system allows recording the device operation parameters such as: electric current and power consumption by the motor, and temperature in the grinding chamber. The idea of using a virtual measurement device allows relatively quick adaptation of the measurement and control system for each grinder, which means the solution is highly versatile. The module used for measuring the particle size was designed for a different grinder. The fragmented material is transferred to the measurement chamber, where the particles are being photographed. Registration of the image was done via a 1.31 MP colour camera with a Pentax lens and a set of lens spacer rings. Within the software layer, Vision machine view module by LabVIEW was used, which allows cooperation with USB cameras (Relf , 2004; Rob, 2017). The resolution resulting from the vision field of the camera is 0.02 mm/pixel (Śmigielski et al., 2019). The fragmented seeds are assigned to appropriate diameter ranges (fractions) on the basis of recorded images.

Fig. 3: General view of a shredding stand

The precision grinder was supplemented with an additional optimisation software module based on a genetic algorithm (Rutkowski, 2012), which allows selection of grinding parameters (Fig. 4). Code sequence – the gene is created via control settings of the grinder (containing information on the rotational speed of the drive motor and feeder output). After the process is settled, measured are: grinder drive power, fraction share, expenditure – overall efficiency of the grinder.

Generation no. 1 contains 10 code sequences. Each code sequence was assigned a target function value. Target function value is increased when a fraction selected for assessment has a higher percentage in the fragmented product, and the amount of product in a given fraction passing through the measurement chamber is higher. Target function value changes when the power consumption of the system increases. To determine the influence of individual optimisation criteria, mass coefficients introduced before conducting the experiment are used:

$$C_{i,l} = \frac{k_Q Q_{i,l}(x) + k_m m_{i,l}}{k_n N_{i,l}},$$

where i – subsequent code sequence no., l – generation no., $Q(x)$ – fraction mass share x (%), m – grinder mass expenditure (conventional unit resulting from measurement chamber operation), k – mass coefficients, N – total power consumed by the measurement system (kW).

When the results for the entire generation are ready, the programme selects 4 best sequences based on the criterion of target function and transfers them to the genetic operation unit. Code sequence with the highest evaluation rating is transferred without changes to the next generation (cloning), whereas each two code sequences are subjected to hybridisation (reproduction). New code sequences constituting the next generation are subjected to mutation, namely the random change of bits at a low probability setting selected in the programme.

The new set of code sequences obtained through genetic operations constitutes a new generation, which is also subjected to testing, assessment and sorting by target function value. Values of optimised parameters are added to graphs. The number of generations is adjusted by the system operator. The result of the application is a file with grinder settings which make it possible to obtain a product of complex parameters at a reduced energy expenditure.

Fig. 4: Front application panel, including: smart control, results and genetic algorithm settings

Conclusions

Application of computer aid for controlling the grinding process significantly accelerated the experimentation and at the same time allowed obtaining input parameters characterised by obtained material possessing the highest possible product mass at 0.8 mm size, the lack of product temperature increase above 27-42 degrees Celsius and no precipitation of essential oils from the material during the grinding process. Such properties allow the use of biological materials in food industry for production of high-quality dietary supplements.

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Strengthening the Financial Components of State Regulation of Agricultural Production in Ukraine

Lesia BARABASH
Uman National University of Horticulture, Uman, Ukraine, E-mail: Lesly-z@ukr.net
Alla OSIPOVA
Uman National University of Horticulture, Uman, Ukraine, E-mail: 1207alla@ukr.net
Irina KORMAN
Uman National University of Horticulture, Uman, Ukraine, E-mail: irynakorman@gmail.com
Natalia OLYADNICHUK
Uman National University of Horticulture, Uman, Ukraine, E-mail: n.olyadnichuk@ukr.net
Oksana FROTER
Uman National University of Horticulture, Uman, Ukraine, E-mail: oksana-froter@ukr.net

Abstract

State regulation of agricultural production is an essential component of state financial and economic mechanisms, due to the importance of the agricultural sector as a basic source of food security. However, for the purposes of state regulation of this industry, Ukraine has followed the other way from developed countries, as direct government financial support was directed not to medium and small agricultural formations, but to large enterprises and agricultural holdings. As a result of such a regulatory policy, Ukraine is currently experiencing a deterioration in the quality of land, declining quality of agricultural products, misbalance in the development of agricultural production, rising unemployment and impoverishment in rural areas. As a result, Ukraine's agricultural sector is unattractive to investors, which hinders its harmonious and sustainable development.
The analysis of the functioning of the current system of state regulation of agricultural production testified to its inefficiency and the need to find areas for improvement. Therefore, attention was drawn to the need to activate the financial levers to stimulate the development of agricultural production, in particular its small forms: personal farms, farms and more. To increase interest and the level of efficiency of state regulation of agricultural production, a combined mechanism of state regulation of small agricultural producers, based on the use of products of financial components such as lending, insurance and taxation.

Keywords*:* State Regulation, Agricultural Production, Microinsurance, Microcredit.

Introduction

The economic development of countries with economies in transition largely depends on carefully selected instruments and mechanisms of regulation, especially in the financial sector. In this case, the selected mechanisms must meet the conditions of authenticity and efficiency, which must take into account the peculiarities of the national economy and a particular area of economic activity. And, of course, a prerequisite is their focus on a positive economic outcome. At the same time, the financial mechanisms of state regulation, covering the areas of lending, taxation, financing, insurance are designed to provide a favorable environment not only for the development of the selected industry, but also for the formation of its investment attractiveness.

One of the priority areas of the national economy of Ukraine is agricultural production. Its development in the post-socialist period acquired an irrational direction practiced in foreign countries by stimulating the activities of large enterprises and ignoring the promotion of small-scale agricultural production. As a result, the country is currently experiencing the decline of some agricultural sectors, which leads to deteriorating soil quality, increased exports of agricultural products, destruction of rural areas and impoverishment of the rural population.

It is possible to improve the situation by introducing effective mechanisms of state regulation of agricultural production. In particular, in the field of farming - farms and personal farms.

Analysis of recent research and publications

The sphere of state regulation of agricultural production in developing countries raises a number of questions for scientists. In particular, Raian Divanbeigi and Federica Saliola (2016) note that the decline in quality and increasing

heterogeneity in the development of agricultural production is observed in those countries that ignore state regulation [1].

The team of authors headed by Y. Nesterchuk (2019) emphasizes the need to focus the attention and state regulation on farms as active participants in the field of small agricultural production. According to scientists, such attention from the state will be an incentive to create fair competitive conditions in this field and will increase the economic efficiency of such enterprises [2].

O. Salamin and S. Poperechny (2018) emphasize the inadequate effectiveness of state regulation in the field of agricultural production in Ukraine, focusing on the predominance of large producers and violation of the architectonics of this area of activity, which, in fact, destroys the infrastructure of the market [3].

The problems of the theory of regulation and transformation under their influence in the field of agricultural production are covered in the works of Jean-Marc Toussaint and Pierre Labart (2016) [4].

The previous number of views and approaches shows that the chosen topic is quite relevant in the field of scientific research, which is due to the need to optimize agricultural production as a priority source of food security.

Research Methods

The study is based on the dialectical method of cognition. The method of analysis has become essential in the process of elaboration of existing and identification of promising theoretical foundations of the mechanisms of state regulation of agricultural production.

The assessment of modern features of functioning of the sphere of agricultural production of Ukraine was carried out by means of an empirical method.

Correlation-regression analysis revealed a key factor influencing the performance indicator, which contributed to the identification of promising objects of state regulation of agricultural production.

Using the method of induction, the results of the study were generalized, and conclusions were formulated.

Results

Theoretical bases of state regulation of agricultural production in Ukraine

The purpose of the reforms carried out in countries with economies in transition is to change its role in economic activity and create economic preconditions for the country's restructuring. That is why state regulation of the economy is the tool by which one can balance the spheres and branches of activity in order to achieve the desired efficiency of the national economy. Currently, among the many economic views and approaches, it is necessary to distinguish four main vectors of state regulation (Fig. 1).

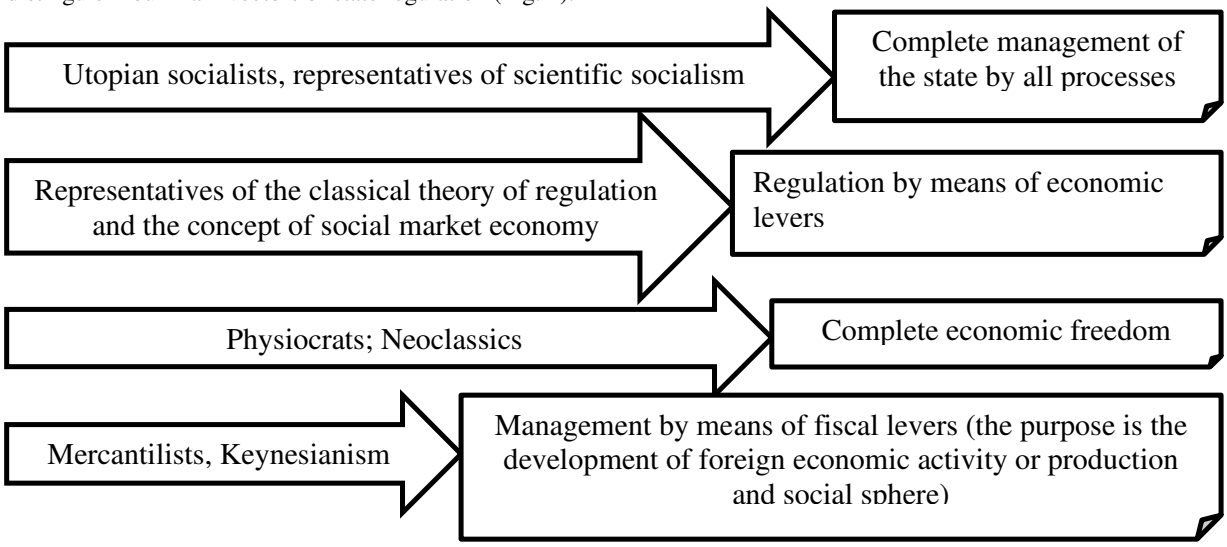

Fig. 1: Dialectics of views on the goals of state regulation among individual schools of economics [13, 14, 15, 17].

As we can see, the representatives of these classical schools are not marked by a unanimity of views on the objectives of state regulation. However, today we have fundamentally different business conditions, which also require a review of goals and approaches to the implementation of the last one. At the same time, special attention needs to be paid to outlining the mechanisms of state regulation in key areas of the national economy that are import-forming, in particular, the agricultural production sector.

Summarizing the realities of state regulation of agricultural production in Ukraine at the present stage, we believe that currently it can be implemented in five areas (Fig. 2).

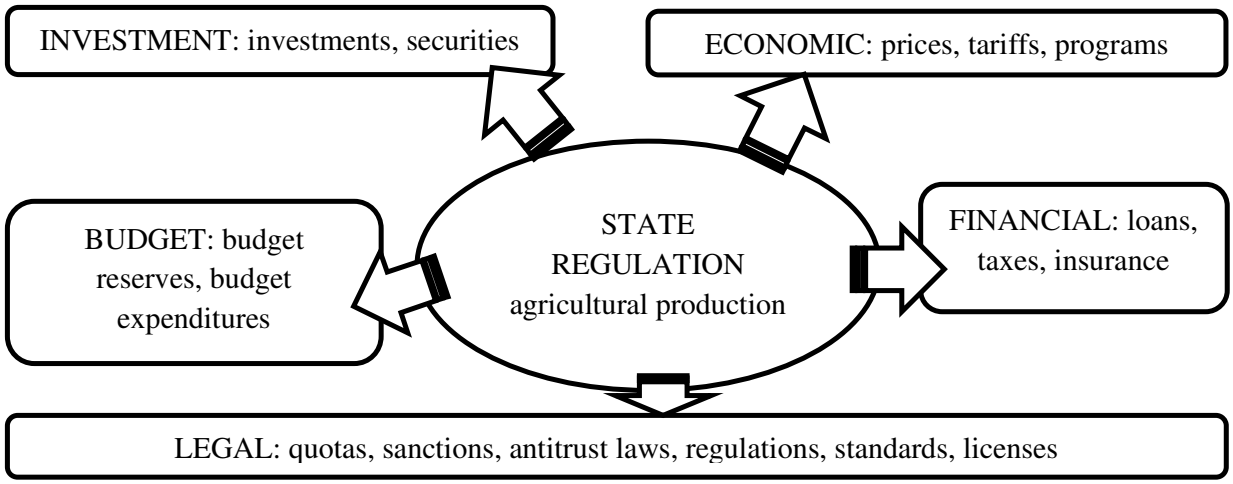

Fig. 2: Components of state regulation of agricultural production in Ukraine

Based on the highlighted positions in Fig. 2, it should be noted that state regulation of agricultural production in Ukraine is carried out through direct and indirect financing. The most active is the budget component, due to which certain categories of agricultural producers have the opportunity to receive financing and economic, especially its component such as special programs.

At the same time, the possibilities of such economic instruments as prices and tariffs are not used properly; needs to review and significantly improve the legal and financial components and active development – investment. It is due to the underestimation and significant limitations of these components that the current mechanisms of state regulation in Ukraine do not ensure the achievement of the expected positive effect.

The current state of state regulation of agricultural production in Ukraine

State regulation of agricultural production in Ukraine takes the form of mostly direct budget support. Contribute to the receipt of funds from the budget to producers a number of special programs (Fig. 3, 4, 5).

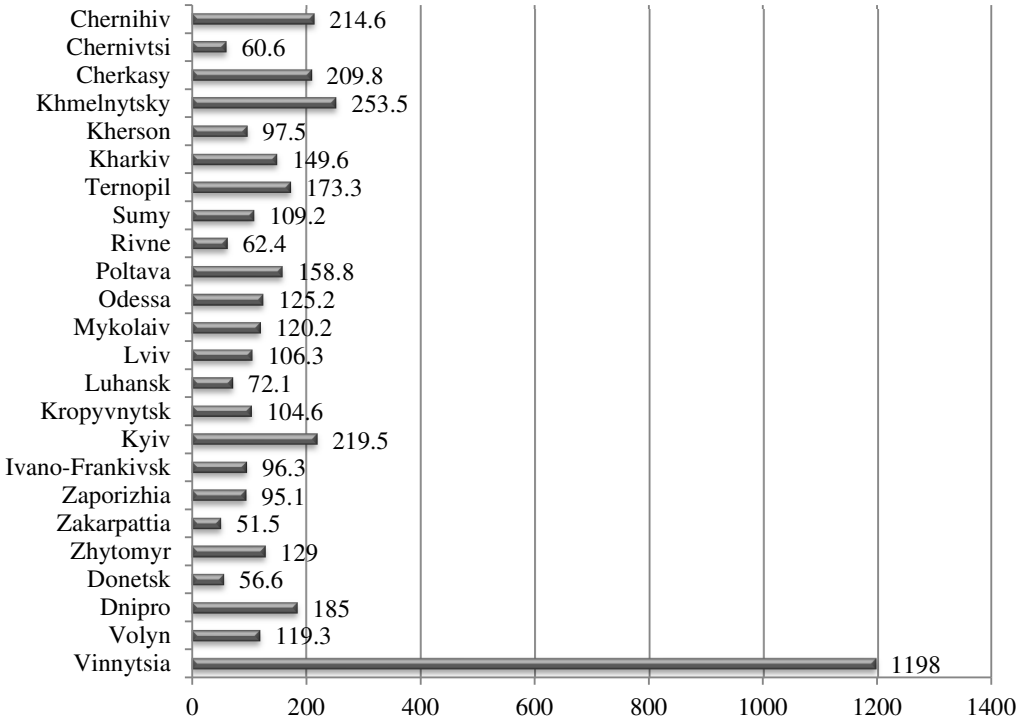

Fig. 3: Levels of direct state financial support provided to agricultural producers in 2018 by regions of Ukraine, UAH million [12]

The levels of direct state financial support in 2018 increased significantly compared to 2014. However, according to the data of Fig. 3, their distribution between the regions of Ukraine is uneven. Significant gaps in the receipt of funds are explained by the fact that the conditions imposed on the recipients of financial resources are quite difficult, and therefore can meet them mainly large, sometimes medium-sized agricultural enterprises.

The imbalances in the development of agricultural production should be mentioned separately. In particular, government programs are aimed at developing certain, popular and profitable areas of activity, while less interesting segments for producers remain out of the state's attention. Currently, in the field of crop production, the state pays the most attention to horticulture, for which in 2018 there was a budget support program 2801350 "Horticulture Development" (Fig. 4).

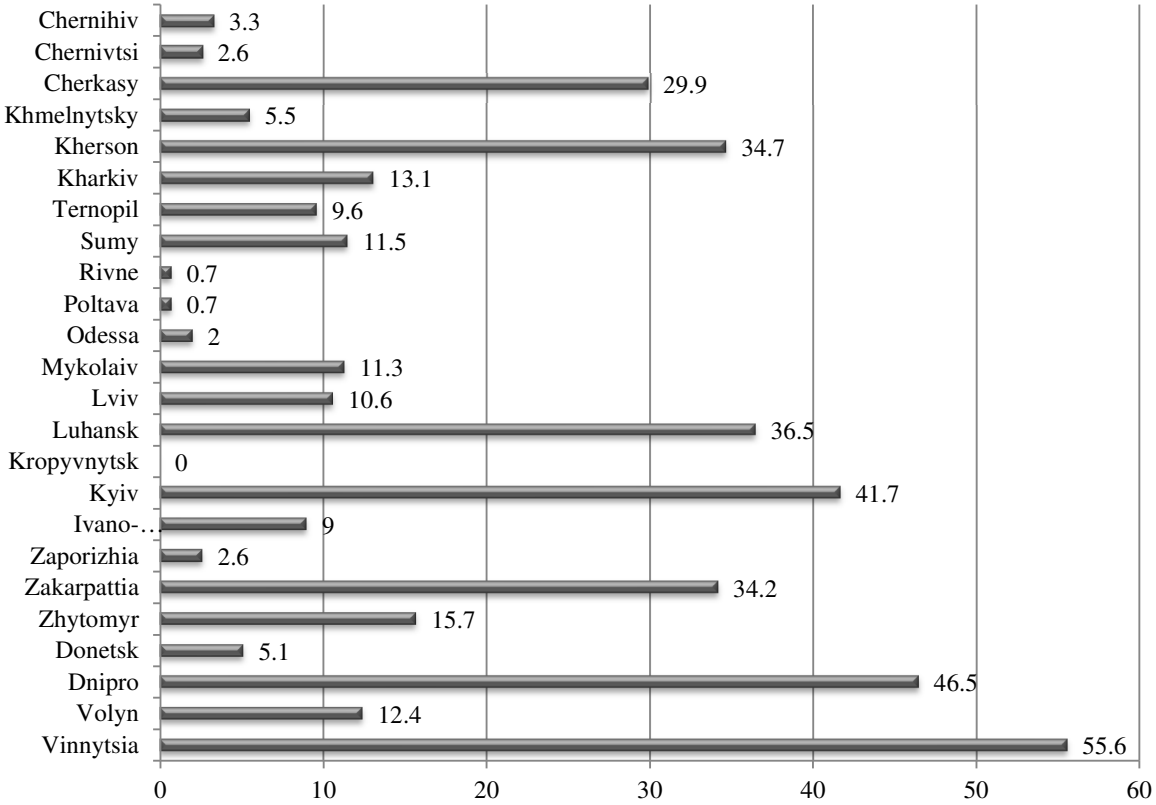

Fig. 4: Amounts of direct state funding for the development of horticulture in the regions of Ukraine in 2018, UAH million [12]

The distribution of funds under the program "Horticulture" (Fig. 4) is also characterized by uneven distribution of funds. However, in this segment, it is due to natural and climatic conditions that contribute to the more active development of this area of activity in some regions, as well as the popularity of this industry in some areas.

The livestock industry has experienced a special decline over the last 28 years. The evidence is a significant reduction in livestock and poultry, as shown in Fig. 5.

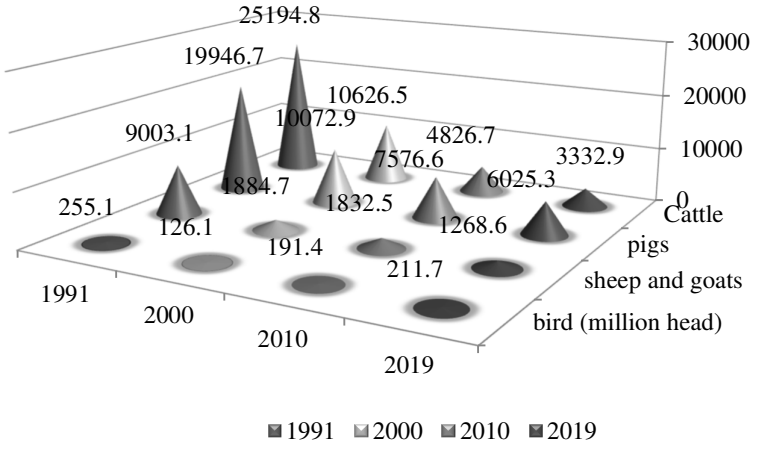

Fig. 5: Dynamics of the number of farm animals in Ukraine in 1991–2019, thousand heads [9]

As evidenced by the data of Fig. 5, in 2019, compared to 1991, there was a decrease in cattle by 7.5 times, pigs – by 3.3 times, sheep and goats – by more than 7 times. This phenomenon is explained by the fact that animal husbandry,

in contrast to crop production, has a prolonged payback period, and therefore this industry is not popular with large agricultural enterprises and agricultural holdings. The exception is poultry farming, where the payback period of projects is much shorter, and therefore the reduction in livestock is insignificant. Nowadays, these areas of activity have become interesting for farmers and private farms. However, the state program 2801540 "Development of dairy and meat cattle breeding", which operated in 2018, focused on large producers (Fig. 6).

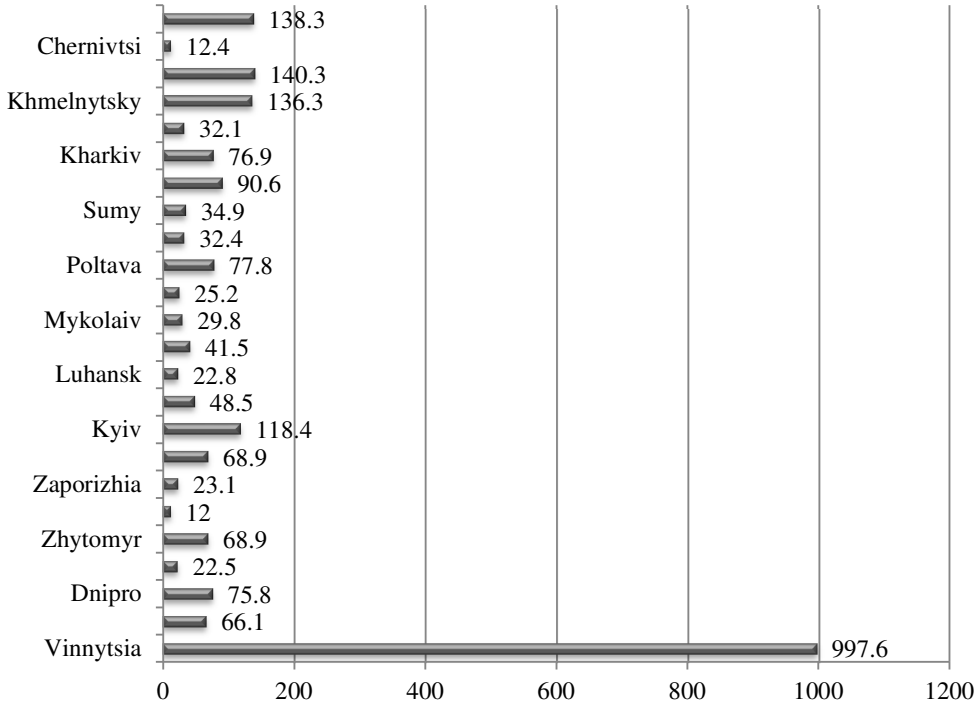

Fig. 6: Direct state financial support for the development of dairy and meat cattle breeding in the regions of Ukraine in 2018, UAH million [12]

According to the terms of the program, the amounts of budget funding were sent to legal entities that keep identified and registered dairy, dairy-meat and meat cows for each available cow on January 1 and stored on July 1 in the amount of UAH 1,500 per head cattle. The total amount of the program amounted to UAH 500 million [6].

In 2020, direct public funding in the field of animal husbandry is provided for a slightly expanded range of recipients in the following areas:

- subsidies for existing bee colonies – on a non-refundable basis will be provided to legal entities, natural persons-entrepreneurs and natural persons who are owners of bee colonies, for existing in the current year from 10 to 300 bee colonies in the amount of UAH 200 per bee colony;
- reimbursement of the cost of purchased breeding animals, bees, sperm and embryos – will be provided to legal entities and natural persons-entrepreneurs regardless of organizational and legal form and form of ownership for purchased by them domestic or imported breeding animals, bees, sperm and embryos up to 50% – costs, but not more than: for breeding heifers, cows – UAH 31,500 per head; for breeding pigs and boars – UAH 10,000 per head; for breeding ewes, rams – 11,000 UAH per head;
- for semen of bulls / boars – UAH 100 per dose (not more than 3 doses per head of cattle and 5 doses per head of pigs), sex – UAH 300 per dose not more than the 1st dose per head; bees – bee packages – UAH 500, queen bees – UAH 100; for cattle embryos - UAH 500 per piece;
- reimbursement of the cost of livestock facilities; compensation for the cost of facilities financed by bank loans – will be provided to legal entities regardless of organizational and legal form and form of ownership and natural persons –entrepreneurs, including family farms engaged in animal husbandry in the amount of up to 30% of the cost (excluding value added tax);
- compensation for the cost of facilities financed by bank loans – will be provided only to those entities that received such compensation in 2018 – 2019 in the amount of 25% of the amount of borrowed funds for a loan period of up to 5 years [10].

The selectivity of the segments of direct budget financing in agricultural production, giving preference to large agricultural producers has led to a deterioration of the environmental and quality component of economic conditions. In particular, large agricultural producers use intensive technologies that negatively affect the quality of land resources, destroying the fertile soil layer – chernozem. The quality of their products also does not meet European standards. However, if we change the economic conditions to ecological ones and provide balanced support, the potential of this sphere can increase many times over.

Given the shortcomings of the mechanisms of state regulation of agricultural production in Ukraine, we present some performance indicators that show generally negative economic trends.

The results of the functioning of state regulation of agricultural production in Ukraine at the present stage

One of the criteria for the effectiveness of state regulation of agricultural production in the country is the volume of agricultural production, as well as the volume of GDP produced by the relevant sector for a given year. These indicators guide the extent to which funds invested in the development of activities contribute to its development and increase the pace of production, which characterizes the economic efficiency of the process (Fig. 7).

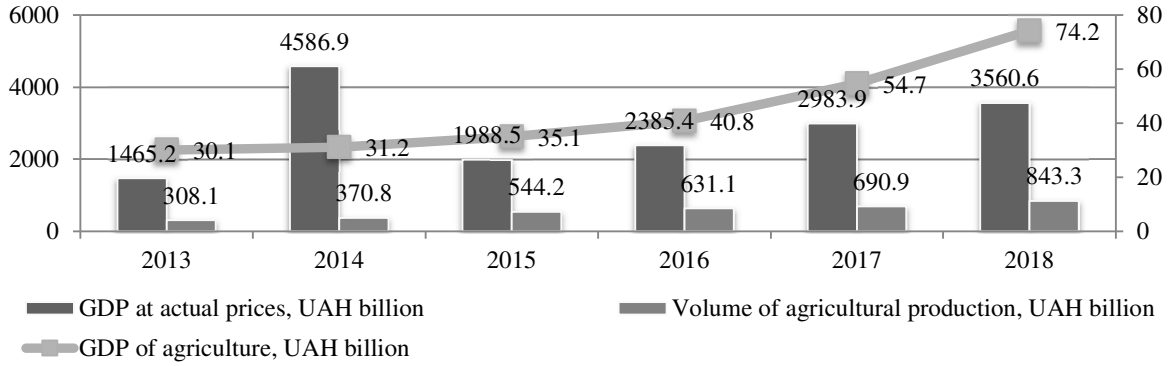

Fig. 7: Dynamics of performance indicators of agricultural production of Ukraine in 2013–2018 [8]

During the study period, there are growing trends both in terms of GDP (+20.95.4 billion UAH) and in terms of GDP of agriculture (+44.1 billion UAH), and relative to the volume of agricultural production (+532.5 billion UAH) (Fig. 7). However, the share of agricultural GDP in total GDP is quite low: if in 2013 it was 2.05%, in 2014 - 2.0% with a further decline to 1.8% in 2017. And only with the revision of direct budget funding programs for agricultural producers, when farms were added to the cohort of recipients, the figure rose to 2.08%. Proof of this fact is the volume of agricultural production, which in 2018 showed significant growth compared to previous periods.

Another indicator of economic efficiency of state regulation of agricultural production in the country is the level of inflation, recorded both in the country as a whole and in a particular industry in particular, which we can trace by changing the consumer price index (Fig. 8).

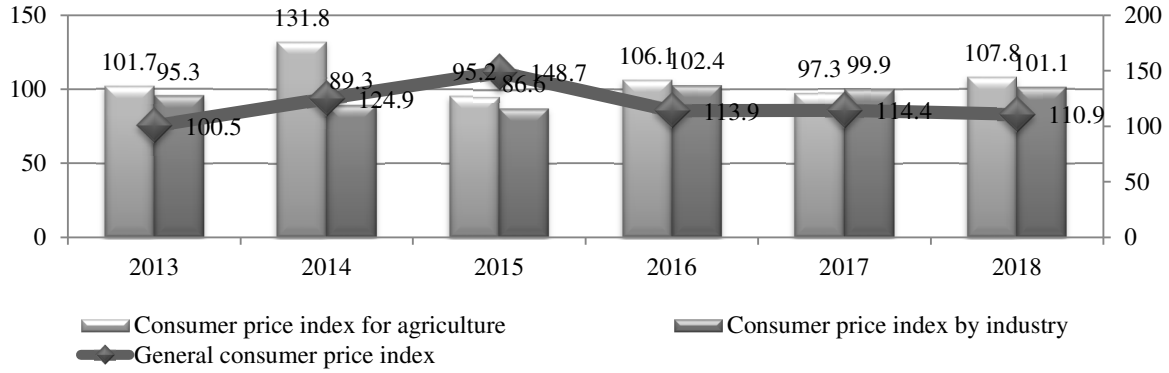

Fig. 8: Dynamics of the level of consumer price indices in 2013 – 2018, % [8]

During the study period, there were fluctuations in consumer price indices (Fig. 8) for all presented objects. However, it should be noted that the level of the consumer price index for industry is always lower than the same indicator for agriculture and the national. At the same time, the studied indicator for agriculture is always higher than industry, and in 2014 it even exceeded the national one. This indicates a steady rise in prices for agricultural products, and therefore there is a high level of costs incurred by agricultural producers, which contributes to higher prices. That is, we can talk about the lack of effectiveness of measures of state regulation carried out in agriculture at this stage.

Currently, the low level of prices for agricultural products does not allow to provide both small forms of agriculture and their employees with an adequate level of income (Fig. 9). In addition, in rural areas, the share of the population with incomes below the minimum is higher than in Ukraine as a whole.

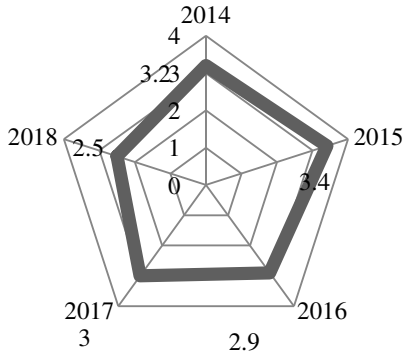

Fig. 9: Dynamics of the share of income from the sale of agricultural products in the structure of total household resources, % [16]

If in 2016 this figure in Ukraine was 3.8%, in rural areas – 3.9%; at the end of 2019, the situation worsened: the national rate was 1.1%, and rural – 1.3%. The lack of stimulation of agricultural production in small farms causes not only the impoverishment of the rural population, but also a decrease in the level of revenues of local government budgets, increasing their rotation and additional costs from higher budgets. Despite the improvement in the level of marketability of rural household products, its share in household incomes decreased in 2014 – 2018. However, small forms of agricultural management, in particular personal farms, should become the basis of a new state policy to stimulate entrepreneurial activity in agricultural production, improve the social situation in rural areas and the formation of food reserves.

Recalling the social component of assessing the effectiveness of state regulation of agricultural production, we focus on the unemployment rate of the rural population, which is not only evidence of poor state regulation, but also the cause of depression in rural areas (Fig. 10).

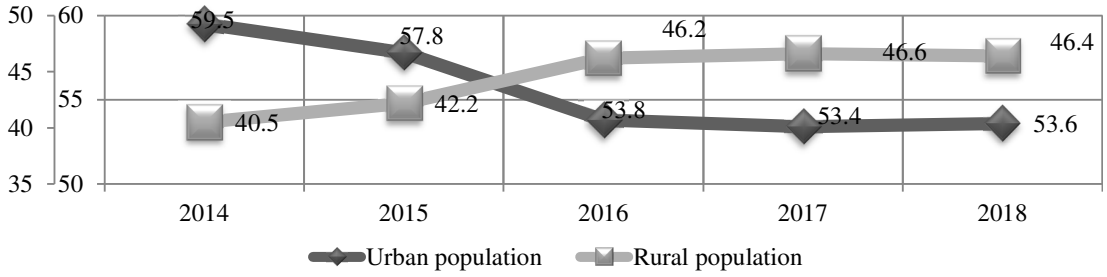

Fig. 10: The share of the unemployed population by place of residence in the total number of unemployed in 2014 – 2018, % [7]

During 2014–2018, the share of the unemployed rural population was over 40% (Fig. 10). At the same time, if the share of urban population decreased by 5.9 percentage points, then of rural population increased by the same percentage. If we take into account the share of unemployed in rural areas in the total unemployed population of Ukraine, it increased from 42.8 in 2013 to 48.0% in 2019. At the same time, according to statistics, it is in the countryside quite high level of informal employment: 39.6% in 2017 and 38.2% in 2018. That is, in fact, employment and hence income are in the shadows.

The unemployment rate is evidenced not only by the low level of social efficiency of ongoing state regulation measures. It demonstrates the lack of employment facilities. And employment in the agricultural sector is now recorded mainly in small and medium enterprises (Table 1).

Table 1: Dynamics of employment in agricultural production in 2013–2018, thousand people [5]

Indicator	2013	2014	2015	2016	2017	2018	Deviation (+ -) from 2018 to 2013
Number of people employed in agricultural production, total	3389,0	3091,4	2870,6	2866,5	2860,78	2937,6	-451,4
Including:							
- at large enterprises	38,8	46,6	48,3	38,1	27,5	32,8	-6,0
- at medium enterprises	410,8	390,0	374,7	359,3	336,5	324,8	-86,0
- at small enterprises	276,6	296,8	279,1	261,3	271,6	268,5	-8,1

The vast majority of the rural population, according to Table 1, employed in medium-sized enterprises. These include family farms. The second largest working rural population is small enterprises, which include personal farms. That is, it is a form of activity that can still be described as self-employment. The least numerous is employment in large agricultural enterprises, where there is a significant mechanization of production processes. That is, once again we are convinced that the sphere of state regulation of the development of agricultural production now bypasses the stimulation of a promising cohort of agricultural producers – medium and small enterprises. And the current regulatory measures have shown a negative effect, which has led to a decrease in the employment rate of the rural population and, consequently, its income, as noted above.

Considering the effectiveness of state regulation of agricultural production at the present stage of economic development of the industry, it is necessary to investigate the investment efficiency of measures (Table 2).

Table 2: Dynamics of investment efficiency indicators of state regulation of agricultural production in 2013 – 2018

Indicator	2013	2014	2015	2016	2017	2018	Deviation (+, -) from 2018 to 2013
GDP at actual prices, UAH billion	1465,2	1586,9	1988,5	2385,4	2983,9	3560,6	+2095,4
GDP of agriculture, UAH billion	30,1	31,2	35,1	40,8	54,7	74,2	+44,1
Total investment, UAH billion	249,9	219,4	273,1	359,2	448,5	578,7	+328,8
Investments in agriculture, UAH billion	18,6	18,8	30,2	50,5	64,2	66,1	+47,5
GDP ratio:							
- to the total investment	5,9	7,2	7,3	6,6	6,7	6,2	+0,3
- to the volume of investments in agriculture	78,8	84,4	65,8	47,2	46,5	53,9	-24,9
The ratio of GDP to agriculture:							
- to the total investment	0,12	0,14	0,13	0,11	0,12	0,13	+0,01

- to the volume of investments in agriculture	1,6	1,7	1,2	0,8	0,9	1,1	-0,5
Share of total investments:							
- in GDP	0,2	0,1	0,1	0,2	0,2	0,2	-
- in the GDP of agriculture	8,3	7,0	7,8	8,8	8,2	7,8	-0,5
Share of agricultural investments:							
- in GDP	0,01	0,01	0,02	0,02	0,02	0,02	+0,01
- in the GDP of agriculture	0,6	0,6	0,9	1,2	1,2	0,9	+0,3

The calculation of investment efficiency indicators of state regulation of agricultural production in the modern conditions of Ukraine's economy (Table 2) showed a low share of investments in agriculture both in the GDP of the state and in the industry itself. Moreover, it is in agriculture that there are declining trends in all indicators. From this we can conclude that the measures of state regulation do not increase the level of investment attractiveness of the studied industry.

The results of state regulation of agricultural production in Ukraine at the present stage indicate the need for its revision and search for new areas of implementation.

Directions for optimizing state regulation of agricultural production in Ukraine

Currently, the trends in the functioning of the agricultural sector indicate an active need to move from stimulating the development of large-scale production to support medium and small agricultural production, including small and specialized. Among the most important advantages of small and medium-sized forms of agricultural activity are the ecological approach to business, rational use of resources, production of organic products.

Therefore, the study of world experience presupposes the search for an effective model for Ukraine of the mechanism of state regulation of agricultural production, which on the basis of scientific innovations will be able to stimulate the development and functioning of small and medium agricultural producers: private farms, peasant farms and more.

The state's focus on a defined circle of producers will not only ensure the employment of the rural population and increase its welfare, but also actively implement research into real production activities, improve soil quality and reduce their plowing.

In any case, the sphere of state regulation of agricultural production should be aimed at small forms of management. And the proof of this was the correlation-regression analysis of the impact of selected factors on the GDP of the state (Table 3).

Table 3: Initial data for correlation and regression analysis of the impact of factors on the level of GDP, over the years [11]

Indicator	2012	2013	2014	2015	2016	2017	2018	2019
GDP at actual prices, UAH billion (in)	1404,7	1465,2	1586,9	1988,5	2385,4	2983,9	3560,6	3974,6
Volume of agricultural products, billion UAH (x_1)	258,3	308,1	370,8	544,2	631,1	690,9	843,3	840,6
State financial support, UAH	12,3	7,3	4,6	3,1	3,5	10,3	13,4	15,0

billion (x_2)								
Sales of agricultural products by large businesses, UAH billion (x_3)	19,4	23,4	31,6	61,2	53,0	38,9	54,8	70,0
Volume of sales of agricultural products by medium-sized businesses, UAH billion (x_4)	94,0	89,1	117,3	183,2	206,7	238,2	272,4	266,1
Volume of sales of agricultural products by small businesses, UAH billion (x_5)	53,8	53,7	71,2	117,9	155,0	190,6	213,3	202,7
- of which – micro-entrepreneurs, UAH billion. (x_6)	19,3	18,9	24,2	34,1	56,0	66,3	74,8	64,8
Income from the sale of agricultural products to and household, thousand UAH (x_7)	2,8	2,8	3,2	3,4	2,9	3,0	2,5	2,4

As a result of calculations, the multiple regression equation was obtained: $Y = 24.7914-103.0378X_1 - 390.6284X_2 + 232.8398X_3 + 200.9443X_4 + 508.2055X_5 - 1269.4732X_6 + 2510.2371X_7$.

Possible economic interpretation of the model parameters showed the following results:

- an increase in X_1 by UAH 1 billion leads to a decrease in Y by an average of UAH 103.038 billion;
- an increase in X_2 by UAH 1 billion leads to a decrease in Y by an average of UAH 390.628 billion;
- an increase in X_3 by UAH 1 billion leads to an increase in Y by an average of UAH 232.84 billion;
- an increase in X_4 by UAH 1 billion leads to an increase in Y by an average of UAH 200.944 billion;
- an increase in X_5 by UAH 1 billion leads to an increase in Y by an average of UAH 508.206 billion;
- an increase in X_6 by UAH 1 billion leads to a decrease in Y by an average of UAH 1269.473 billion;
- an increase in X_7 by UAH 1 billion leads to an increase in Y by an average of UAH 2510.237 billion

According to the maximum coefficient of elasticity $E_5 = 14.683$, from which we conclude that the greatest influence on the result Y has a factor X_5 – the volume of sales of agricultural products by small businesses, billion UAH.

We can test the hypothesis of general significance - the simultaneous equality of zero of all regression coefficients for explanatory variables:

H0: $R2 = 0$; $\beta 1 = \beta 2 = ... = \beta m = 0$.
H1: $R2 \neq 0$.

This hypothesis is tested using Fisher's F-distribution statistics. If $F < Fkp = F\alpha$; n-m-1, then there is no reason to reject the hypothesis H0. Tabular value for degrees of freedom k1 = 7 i k2 = n-m-1 = 8 - 7 - 1 = 0, Fkp (7; 0) = 0. Therefore, since the actual value is F> Fkp, the coefficient of determination is statistically significant and the regression equation is statistically reliable (the coefficients bi are jointly significant).

It was also found that in the studied situation 100% of the total variability Y is explained by the change of factors Xj, which proves the hypothesis about the statistical significance of the model parameters.

That is why, according to the study, state regulation of agricultural production in Ukraine should be directed to the sphere of small and medium agricultural production. Thus, it is necessary to activate the indirect influence which is embodied by means of financial components: crediting, insurance, the taxation.

Indirect state support in the tax sphere for small agricultural productions should stimulate them to active agricultural production and realization of state interests in this sphere. Therefore, such support should be a prerequisite: as one of the options, private farms will be able to become members of territorial production clusters.

And from this point of view it is necessary to reconsider the conditions of taxation of income of personal farms in the plane of collection of personal income tax. First of all, this is possible due to the change in the tax base, from the individual income of each taxpayer to the level of family income, as well as from the personal collection of tax to the payment of income of the entire personal farm. Thus, the mechanism of taxation of individual agricultural producers who have become members of territorial production clusters will be as follows (Fig. 11):

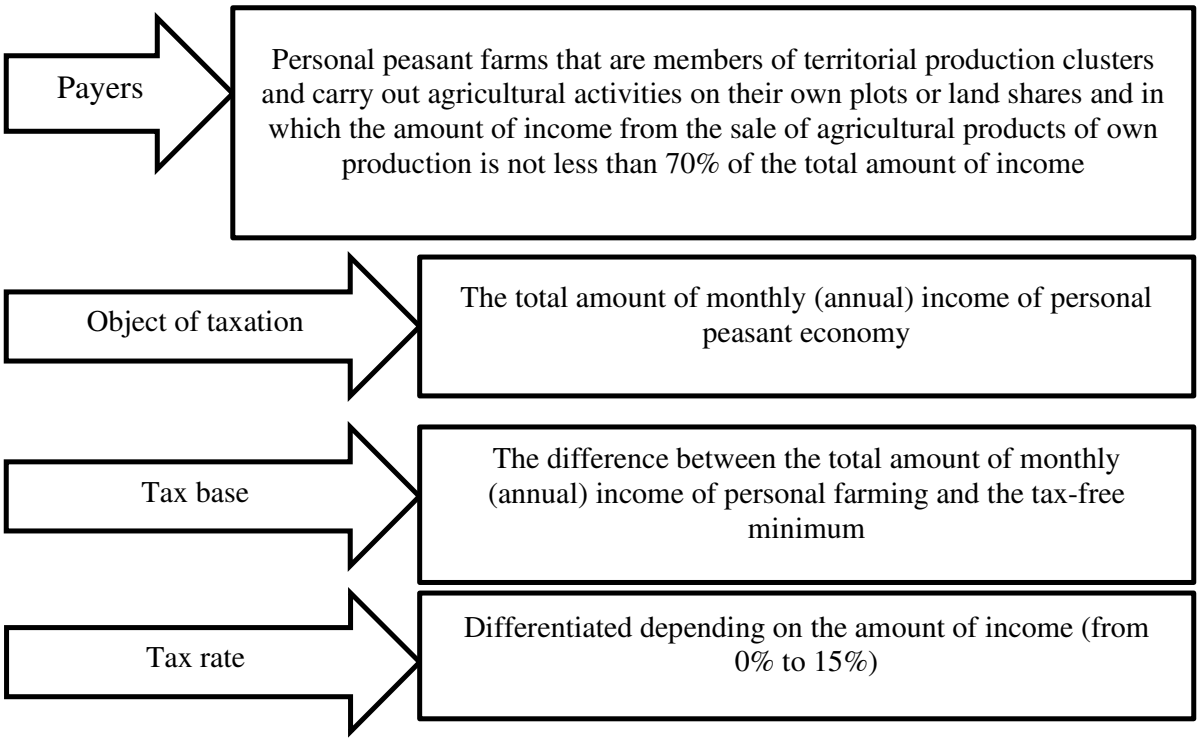

Fig. 11: The mechanism for collecting the tax on personal income under the state tax incentives for private farms that have become parties to regional industrial clusters

From the fig. 11 of the mechanism we see that the state can encourage personal farms to engage in agricultural production by replacing all currently paid by peasants taxes on personal income tax at differentiated rates, which will reduce the tax burden on such taxpayers.

In addition, a differentiated system of taxation of their incomes should be a significant stimulus for agricultural production by private farms (Table 4).

Table 4: Proposed scale of income taxation of small agricultural producers (private farms)

Tax base	Tax rate	Special conditions
Up to 2 tax-free minimums (TM)	0%	The non-taxable minimum is set at the level of the subsistence minimum determined by the law of Ukraine "On the State Budget of Ukraine" for the relevant year.
2 – 4 TM	5%	
4 – 6 TM	7,5%	
6 – 8 TM	10%	
8 – 10 TM	12,5%	
Over 10 TM	15%	

The proposed scale of personal income taxation takes into account the conditions and level of income of taxpayers, as well as allows to regulate the level of tax burden.

A separate condition should be the establishment of a non-taxable minimum at the level of the established subsistence level or, according to optimistic assumptions, at the level of the average wage in agriculture for the relevant period.

Also a prerequisite for the transition to the category of such payers is the registration of an individual agricultural activity, participation in the territorial production cluster and a high share (over 70%) of income from the sale of agricultural products produced on the farm or land share.

Such a mechanism of indirect state regulation stimulates the rural population to productive activities and at the same time will ensure the growth of employment in rural areas.

In addition to the above, the future effective model of state regulation of agricultural production in Ukraine should be based not only on the existing experience of foreign countries, but also take into account the peculiarities of the domestic economy in the studied area of production. After all, among the key factors in the functioning of the current model can be distinguished both positive and negative, which, in fact, go hand in hand, complementing each other (Fig. 12).

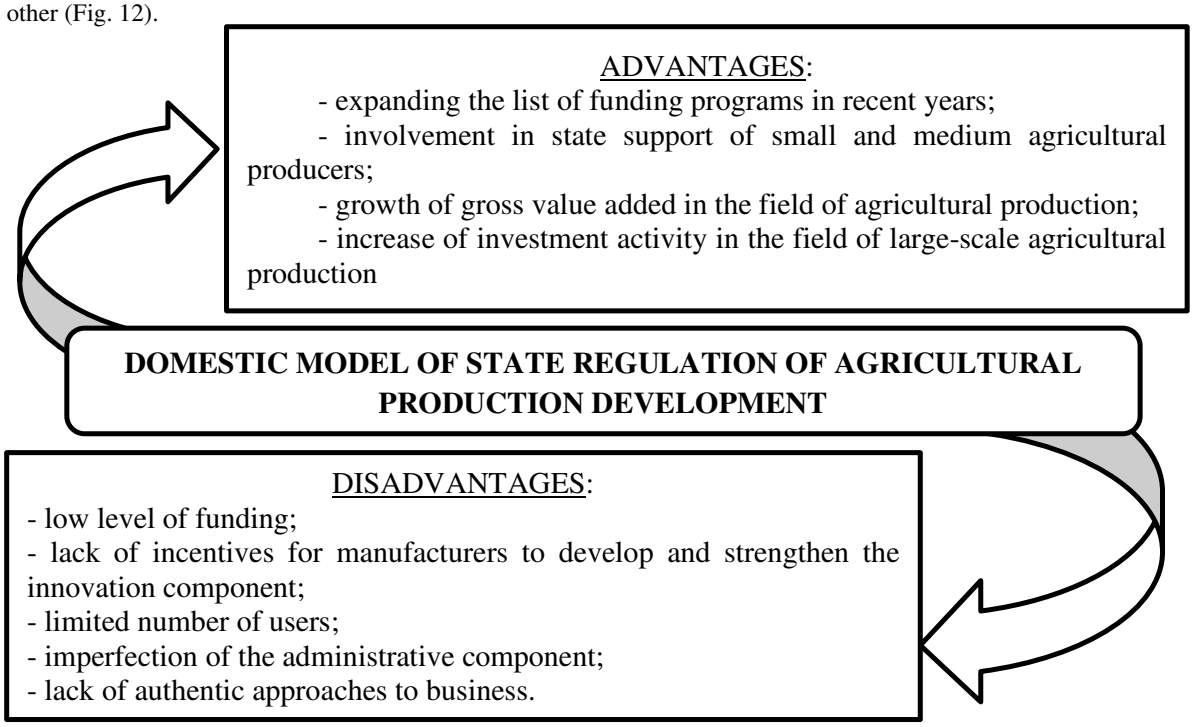

Fig. 12: Advantages and disadvantages of the domestic model of state support for agricultural production

Given the figures in Fig. 12 advantages and disadvantages of the current model of state regulation and based on the results of correlation analysis and own considerations on the need to change the priorities of agricultural production, we see the need to strengthen state regulation through financial instruments of indirect intervention.

Therefore, the developed and presented model of the combined mechanism of state regulation (Fig. 13) focuses on small agricultural producers (personal farms, farms, etc.), which operate both independently and within the envisaged territorial production clusters. The main levers of state influence on the activities of such agricultural producers are insurance companies that sell specialized insurance products, banks that provide concessional and microcredit, as well as local governments and the state – during taxation.

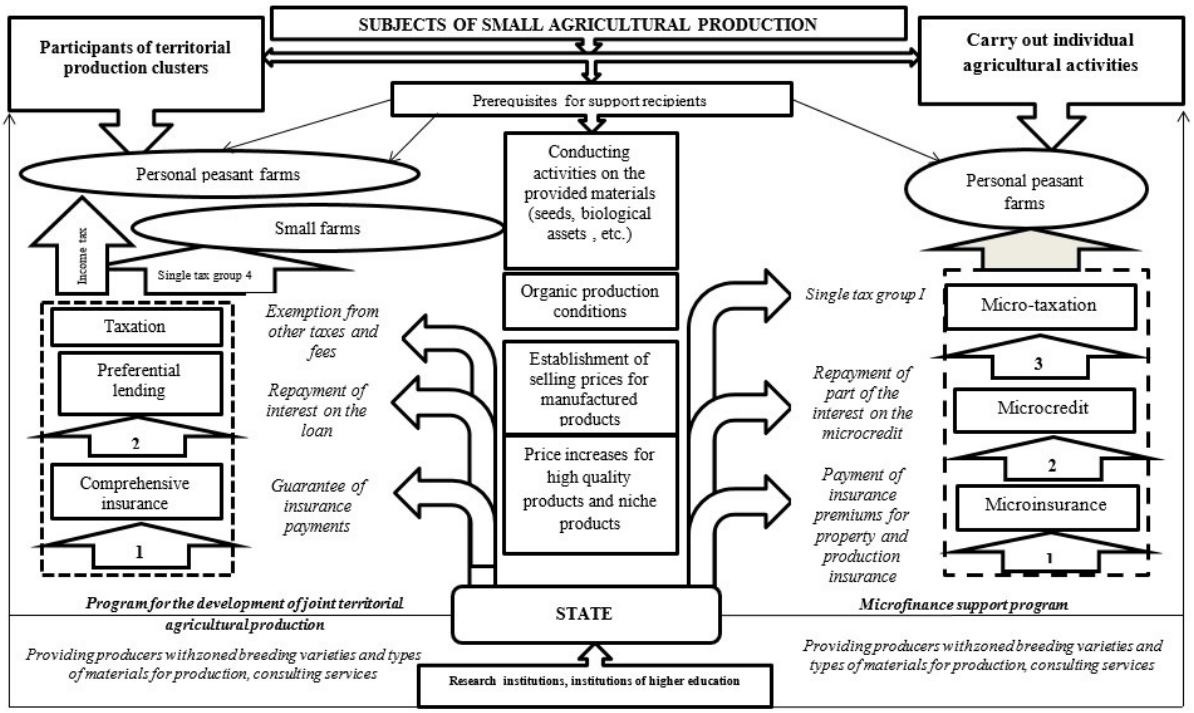

Fig. 13: Model of the combined mechanism of the state regulation of activity of small agricultural producers

Listed in fig. 13 model of the combined mechanism of state regulation of small agricultural producers is based on the fulfillment by recipients of funds of a number of conditions, including: agricultural activities on state-provided materials, planting material, biological assets and the use of exclusively organic technologies. At the same time, the state reserves the right to set prices for manufactured products and provide surcharges to the price for products of niche areas of production or high quality.

The categories of recipients of state support are divided into two groups: individual, which include personal farms that independently enter into agreements with the state and are registered by such business entities, and personal farms and small farms that are registered as business entities in within the established territorial production clusters.

For the former, there is a Microfinance Support Program, which unites donors of such support: banks that will provide microcredit services, insurance companies that will sell microinsurance products and the State Tax Service, which will control the taxation of such producers as payers of the single tax of group I. At the same time, it will be impossible to become a participant in the program without purchasing the necessary microinsurance products (1) from personal insurance, under which the insured is obliged to pay insurance premiums, and property and production insurance, where the state undertakes to pay insurance premiums. After the recipient has signed microinsurance agreements, he can apply for microloans on which the state repays part of the interest to the borrower.

Small-scale agricultural producers who have chosen the path of members of territorial associations of agricultural producers in order to become members of the Program of development of joint territorial agricultural production can also receive loans on favorable terms, when the state repays part of the interest to the bank. A mandatory condition for this is the conclusion of a comprehensive insurance contract with the insurance company.

Taxation in this case is carried out for personal farms in the form of personal income tax at progressive rates, and for small farms – in the form of a single tax (Group 4). In this case, such payers are exempt from all other types of taxes and fees.

In addition to the above, the peculiarity of the proposed model is that the above programs include research institutions that provide potential users of the program - small farmers with raw materials for activities: biological assets, zoned breeding varieties of crops and more. Higher education institutions also take part in the programs, which will provide consulting services to producers on participation in the programs, peculiarities of microfinance and microinsurance activities, etc.

Thus, the harmonious combination of the two proposed models of state support for small agricultural producers will not only fully ensure employment in rural areas, but also promote the development of all spheres of agricultural production and the economy as a whole.

Conclusions

The study revealed a number of problems caused by the current mechanism of state regulation of agricultural production. One of the main ones was ignoring the development of small and medium-sized farms, which led to the dominance of large-scale agricultural production, which focused on intensive production technologies, rather than indicators of organicity and product quality. As a result of these actions, the rural population is mostly uninterested in individual entrepreneurial agricultural activities, as it has no support from the state.

Among the negative consequences of the current mechanism of state regulation of agricultural production - a decrease in investment activity and, accordingly, the attractiveness of the industry, the impoverishment of the rural population and rising unemployment.

Improving the state of agricultural production in Ukraine is possible provided that the financial levers of state regulation are activated: lending, insurance, taxation. They became the basis for the development of a combined mechanism of state regulation of small agricultural producers.

Concentration of state regulation on small and medium-sized agricultural producers under the conditions determined by the combined mechanism will make it possible to reduce the negative phenomena in the financial and economic environment of the studied economic sphere and achieve its sustainable development.

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The Effects of Macroeconomic Shocks on Trends of Region's Foreign Economic Activity

Yuri I. TRESHCHEVSKY
Voronezh State University, Voronezh, Russia
utreshevski@yandex.ru

Anna Yu. KOSOBUTSKAYA
Voronezh State University, Voronezh, Russia
anna.rodnina@mail.ru

Elena A. OPOIKOVA
Voronezh State University, Voronezh, Russia
oea.voronezh@yandex.ru

Olga N. PAPINA
Voronezh State University, Voronezh, Russia
papinaolga2001@gmail.com

Abstract

The *goal* of the research is to identify long-term trends in the foreign economic activity in the Russian region with a medium level of development and to evaluate the effects of macroeconomic shocks on them. *Methods of research.* The research has been carried out using the following techniques. Cluster analysis is used to identify homogeneous groups of regions with similar parameters of different types of foreign economic activity. Comparative analysis to establish model regions reflecting characteristics of the respective clusters development. Correlation and regression analysis to investigate the dynamics of different types of foreign economic activity and logical analysis to establish the nature of impact of macroeconomic shocks on the parameters of foreign economic activity. *Results.* The study identified the features of development of different types of foreign economic activities in the "medium" region of Russia. It has been estimated that the impacts of macroeconomic shocks on exports to the CIS and non-CIS countries, on imports from both groups of countries, on technologies and technical services exchange and on foreign investments are of different nature.

Keywords: Region, Foreign Economic Relations, Macroeconomic Shocks.

Introduction

State of foreign economic relations has been of interest to researchers for several hundred years, starting with mercantilists, including Russian ones (Pososhkov I., 2001). Views on the causes and objectives of foreign economic relations have been changing. However, the main thesis remains unchanged - their state characterizes the competitiveness of a country's products. To the greatest extent, it concerns the export of goods, works, services and technologies. Trends in globalization and peculiarities of political processes have a significant impact on foreign economic relations (Freire M.R. (2019); Head K. and Mayer T. (2010); Dorin M., Olaru M., Andreea M. and Eidenmüller T. (2016); Ezroh J. (2014)). The whole complex of economic and political relations between specific countries and their groups is essential (Kuzmina V.M., Timchenko M.V. and Naumik V.A. (2020); Timokhin A.D. (2019)). For Russian regions, spatial transformation (Bitarova M.A., Getmantsev K.V., Ilyasova E.V., Krylova E.M. and Treshchevsky Y.I. (2020)) and differentiation of social and economic development, among others in innovation sphere (Endovitsky D.A., Treshchevsky Y.I. and Terzi I.V. (2020)) are essential.

In the second decade of the twentieth century, significant changes took place in the system of global economic and political relations, which influenced the state of foreign economic activity of the Russian regions. They are the global financial crisis of 2008-2009 and the imposition of sanctions and counter-sanctions in 2014-2015. At present, the spread of coronavirus pandemic poses a serious threat to the foreign economic activity of the regions. Therefore, we attempted to analyze the state of foreign economic activity of one of the "medium" regions of Russia, Voronezh Region.

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Methods of Research

Indicators reflecting various aspects of the region's external economic relations were selected for analysis – Gross Regional Product (GRP), GRP per capita, export to the CIS countries, export to non-CIS countries, import from CIS countries, import from non-CIS countries, export of technologies and technical services, import of technologies and technical services, foreign direct investments (inflow).

Due to the low concentration of information on foreign economic activity in the regions of the country, it had been necessary to review a significant number of resource books (Regions of Russia, 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019). Units of measurement for these indicators are defined in accordance with the abovementioned statistical compendiums.

The analysis was carried out in three stages.

The first stage was the construction of virtual clusters of the regions' foreign economic activity. The analysis was carried out by a conventional procedure (J.A. Hartigan and M.A. Wong (1979); I.D. Mandel (1988)). The total number of clusters adopted for calculation is five (this number of clusters in most cases reflects the nature and differentiation of Russian regions according to various combinations of socio-economic indicators).

Moscow is excluded from the research since its socio-economic characteristics differ greatly from other regions and differences between clusters are smoothed out compared with the capital's achievements. The regions of “the second order” included in the larger ones are also rejected in order to avoid re-counting. Regions with deficient data for the analyzed period left out from calculations.

The data for the following years are accepted for cluster analysis: 2000 (beginning of the new economy); 2005 (active market, but not economic overheating); 2009 (global crisis - macroeconomic shock); 2012 (calm year); 2015 (sanctions and counter-sanctions - macroeconomic shock); 2018 (the last year for which reliable statistics are available).

For general assessment of foreign economic activity level, the sum of normalized indicators above mentioned was adopted. The clustering has shown a significant differentiation of regions by the overall level of foreign economic activity development. The highest level as of 2018 was shown by the cluster, which comprises the following regions - Moscow Region, St. Petersburg and Tyumen Region. These are (excluding Moscow) the most developed regions in terms of almost all socio-economic indicators. The second (by the level of development) cluster includes industrially developed regions, among them - Leningrad Region, Krasnodar Territory, Rostov Region, Republic of Tatarstan, Nizhny Novgorod Region, Samara Region, Sverdlovsk Region, Chelyabinsk Region, Krasnoyarsk Territory, Kemerovo Region. The third position was taken by the cluster, which includes four large border regions - the Republic of Sakha (Yakutia), Magadan and Sakhalin Regions, the Chukotka Autonomous District.

The cluster that includes 21 regions (mostly with a differentiated economy of median level of development) is of great interest.

At the second stage, a selection of model regions reflecting the most the features of each cluster was carried out. The minimum distance from the virtual center of the corresponding cluster was accepted as a criterion for classifying a region as a model one.

The scope of the paper does not allow providing a broad overview of the each cluster’ study results. Therefore, the third stage is the correlation-regression analysis of the dynamics of each indicator of the model region of the cluster of medium level of development - Voronezh region. The analysis period is 19 years (from 2000 until 2018). The analysis was carried out using four functions most typical for socio-economic processes: linear, logarithmic (by natural logarithm), and power.

Results

The analysis showed that the general economic situation in the region is stable - GRP volume is growing. Moreover, its dynamics is well described by all three functions (Equations 1, 2, 3).

$y = 52333x - 123826$ (1);
$R^2 = 0.9513$
$y = 25860x^{1.1447}$ (2);

$R^2 = 0.9228$
$y = 316223\ln(x) – 255240$ (3);
$R^2 = 0.7152$
The type of the power function (Equation 2) at R-squared 0.92 even allows assuming an increase in GRP growth rates in the future. The actual values of GRP volume arranged by the years allow noting slight decrease in the growth rates in 2009 and 2015; however, decrease of GRP was observed in none of the years.

At stable region population, the same dynamics of GRP per capita is quite natural (Equations 4, 5, 6).

$y = 22.461x – 53.048$ (4);
$R^2 = 0.9538$
$y = 10.724x^{1.1597}$ (5);
$R^2 = 0.9281$
$y = 136.02\ln(x) - 110.07$ (6);
$R^2 = 0.7202$

Unlike the general economic indicators, the behavior of exports to the CIS countries is less stable (Figure 1, Equations 7, 8, 9).

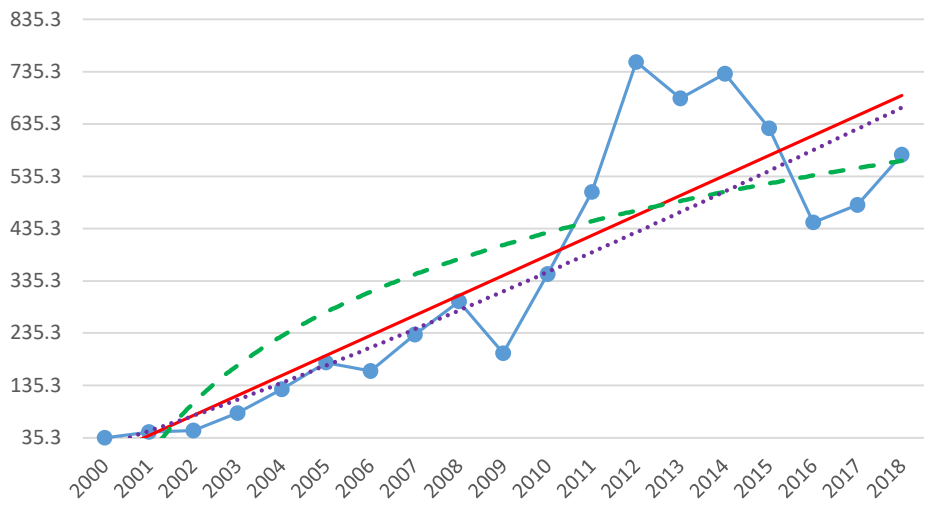

Fig. 1: Exports to CIS countries (million USD)

$y = 38.263x – 37.149$ (7);
$R^2 = 0.7548$
$y = 21.441x^{1.1674}$ (8);
$R^2 = 0.9054$
$y = 251.04\ln(x) - 174.29$ (9);
$R^2 = 0.6689$

In addition to estimation of the overall trend, a significant shrinkage of exports to CIS countries during periods of macroeconomic shocks (2009 and 2015) is worth noting. Exports did not reach in 2012-2014 the "pre-shock" levels, although in 2016 there was some recovery in this area of foreign economic activity of the region. In this regard, further logarithmic curve dynamics are quite possible, especially if we consider the macroeconomic shock of 2020 caused by the coronavirus pandemic.

The dynamics of exports to non-CIS countries (Figure 2, Equations 10, 11, 12) essentially corresponds to the dynamics of exports to CIS countries.

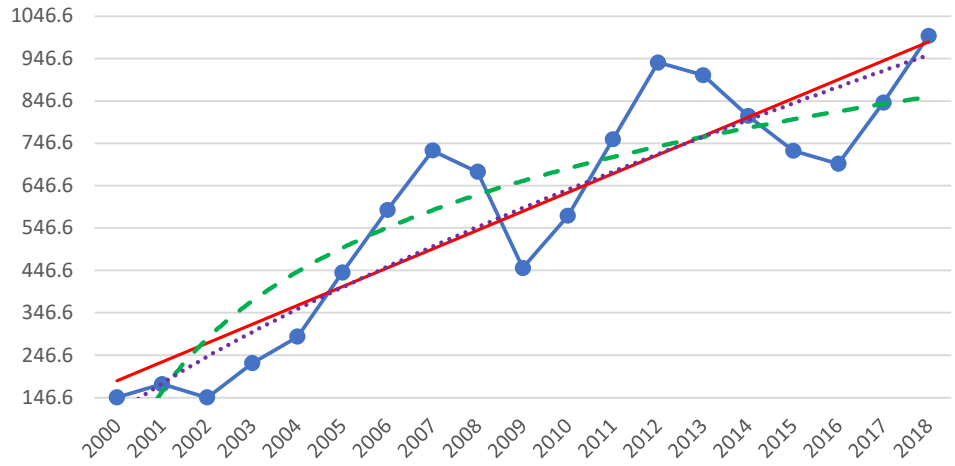

Fig. 2: Exports to non-CIS countries (million USD)

$y = 44.427x + 141.95$ (10);
$R^2 = 0.7964$
$y = 107.77x^{0.7411}$ (11);
$R^2 = 0.8649$
$y = 308.97\ln(x) - 53.514$ (12);
$R^2 = 0.7931$

Despite the coincidence of general trends in exports to CIS and non-CIS countries, there was a lack of functions corresponding to the potential increase in export to non-CIS countries. In addition, the decline in exports to this group of countries during the global financial crisis began in 2008 and lasted two years. The macroeconomic shock of 2014-2015 began in this sphere as early as in 2012 and lasted up until 2016. At the same time, there was a significant increase in export volumes in 2017 and 2018, which exceeded the "pre-shock" period of 2012.

Imports from both groups of countries are much less stable than exports. Dynamics of imports from CIS countries and the functions characterizing it are presented in Figure 3 and in Equations 13, 14, 15.

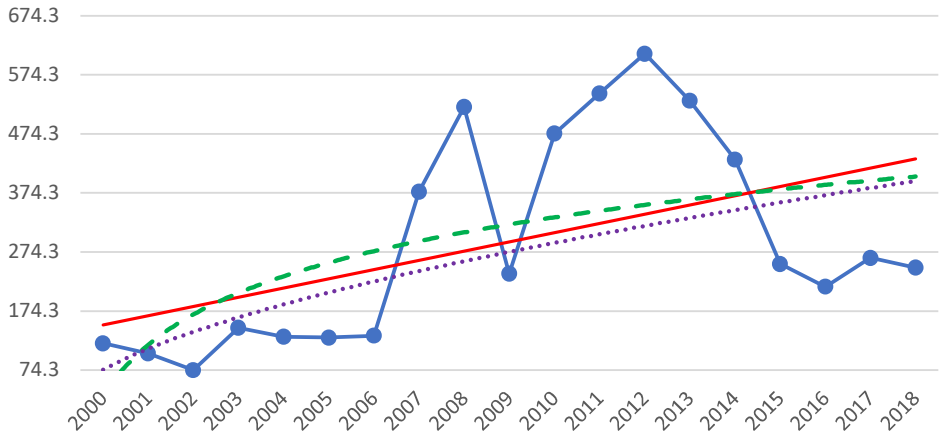

Fig. 3: Imports from CIS countries (million USD)

$y = 15.628x + 135.18$ (13);
$R^2 = 0.2497$
$y = 74.731x^{0.565}$ (14);
$R^2 = 0.4846$
$y = 126.48\ln(x) + 29.584$ (15);
$R^2 = 0.3368$

As one can see, there is no pronounced trend. We can only talk about slight increase in imports over the past 19 years since the beginning of the XXI century. Macroeconomic shocks have an extremely strong impact on imports from CIS countries. In this case, we can talk about another shock – the overheating of the Russian economy, which began in 2006 and led to more than fourfold increase in imports in two years (from 2006 to 2008). The financial crisis led to halving of imports in 2009, and 2012 was the beginning of a strong decline in the indicator value. Moreover, unlike exports, import volumes remained virtually unchanged from 2015 to 2018.

Imports from non-CIS countries have a more stable dynamics (Figure 4, Equations 16, 17, 18).

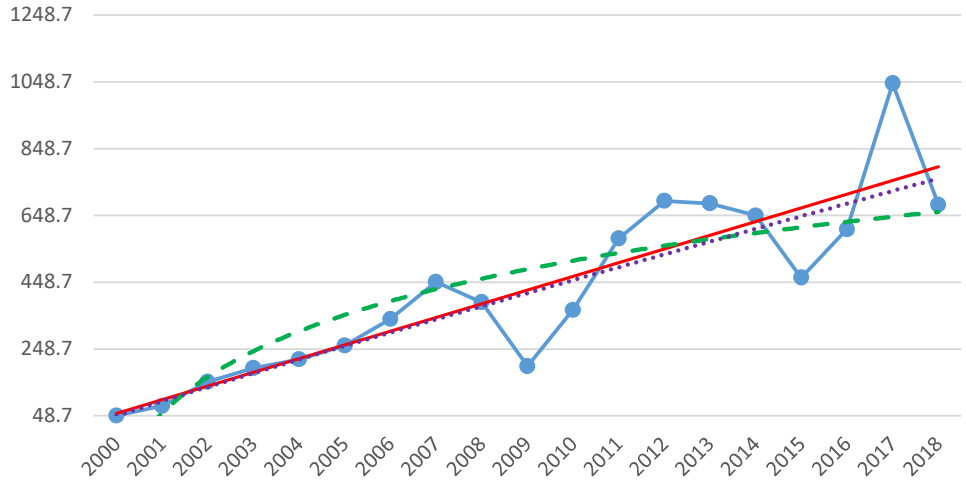

Fig. 4: Imports from non-CIS countries (million USD)

$y = 41.061x + 14.707$ (16);
$R^2 = 0.785$
$y = 47.97x^{0.938}$ (17);
$R^2 = 0.899$
$y = 267.8\ln(x) - 129.18$ (18);
$R^2 = 0.6876$

The fact that the power function (Equation 17) presents almost linear dynamics of indicator values is of concern. As expected, there was a decline in imports from non-CIS countries during the global financial crisis. However, the initial volume corresponding to the period of overheating of the Russian economy (2006-2007) was restored already in 2010. The decline in imports from non-CIS countries during the period of sanctions and counter-sanctions (2014 and beyond) is significantly less than from CIS countries. Since 2015, import volumes have increased significantly.

The logic behind the development of relations in the sphere of import of technologies and technical services is different. The financial crisis of 2008-2009 did not have a significant impact on the dynamics of imports of technologies and technical services. In general, there is a gradual increase in the value of the indicator. The exception was 2015, when there was a multiple growth, and 2016, when the volume of technology imports returned to the initial level of 2014. Despite the positive dynamics, it can be argued that this form of foreign economic activity is not of practical importance for the regional economy, as its volumes do not exceed USD 25 million even during the peak growth period.

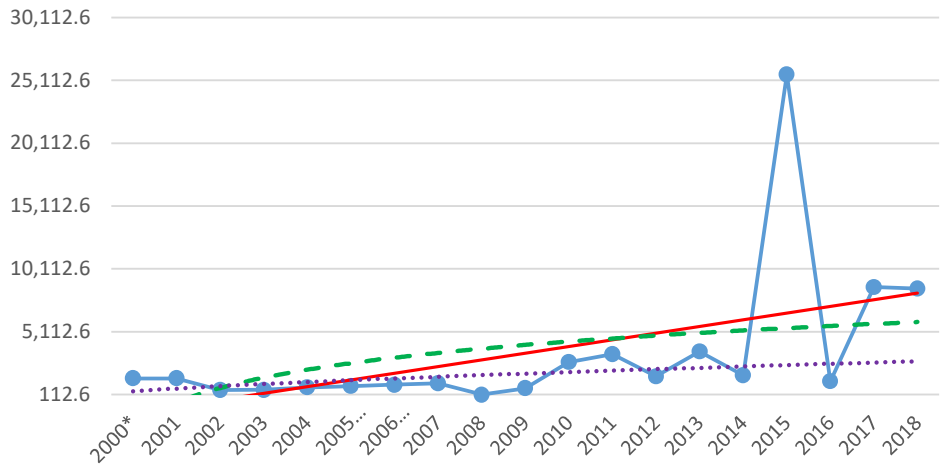

Fig. 5: Imports of technologies and technical services (annual payment, thousand USD)

There is practically no export of technologies and technical services from the region - it ranges from 1.5 million to 8.5 million US dollars. The dynamics is not described by any of the applied equations. Macro-economic shocks of 2008-2009 and 2014-2015 led to some growth in technology exports - the peak is in 2009. The dynamics of foreign investments in the Voronezh region (revenues) is shown in Figure 6.

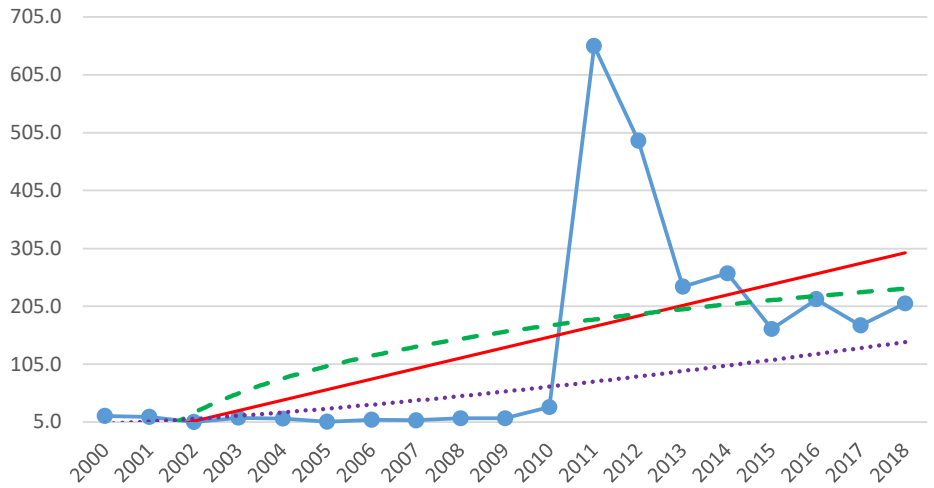

Fig. 6: Dynamics of foreign investments in Voronezh region (million USD)

As can be seen, a significant surge in investments in 2011 and their reduction in 2013-2018 does not allow considering the entire period as qualitatively unified. In fact, there are three different processes: low, practically the same level of investment in 2000 - 2010; “surge” in investment in 2011 - 2012 (in fact, these years are a separate period); maintaining the volume of investment at the level of 150-250 million USD per year. Macroeconomic shocks do not affect the dynamics of foreign investment.

Conclusions

The analysis of Voronezh Region, which represents a group of medium-developed Russian regions in terms of foreign economic activity, showed that the general economic indicators have a stable growth trend throughout the entire period of the "new economy" 2000 - 2018. Macroeconomic shocks of 2008-2009 and 2014-2015 did not have a significant impact on the economy. However, foreign economic activity is subject to significant changes.

Exports to CIS countries declined during the global economic crisis, but quickly returned to pre-crisis levels. The period of sanctions and counter-sanctions had a negative impact on exports to these countries. Form of correlation-regression equation suggest three case scenarios: growth by a linear function, higher growth by a power function, and decline in growth rates by logarithmic function.

Exports to non-CIS countries are subject to macroeconomic shocks (2008-2009 and 2014-2015). However, in both cases intense post-crisis growth is observed.

The dynamics of imports from CIS countries is extremely unstable. Macroeconomic shocks have a significant impact on it, along with other factors that are difficult to predict. Imports from non-CIS countries are more stable and may continue to increase at existing or declining rates. Macroeconomic shocks exert influence on imports from this group of countries, but the influence on imports from non-CIS countries is lower than on imports from CIS countries in terms of volume and time.

The volumes of exports and imports of technologies and technical services are insignificant and depend on hardly predictable factors. It is not yet clear how macroeconomic shocks affect this type of foreign economic activity.
The volume of foreign investments changes abruptly with the general upward trend. The changes are not related to macroeconomic shocks.

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Internal Marketing and Burnout:

An Exploratory Analysis in Romanian Health Care Organizations

Iuliana-Raluca GHEORGHE
Department of Health Care Marketing and Medical Technology, Faculty of Medicine, "Carol Davila" University of Medicine and Pharmacy, 050474 Bucharest, Romania; email: raluca.gheorghe@umfcd.ro

Victor-Lorin PURCĂREA
Department of Health Care Marketing and Medical Technology, Faculty of Medicine, "Carol Davila" University of Medicine and Pharmacy, 050474 Bucharest, Romania; email: victor.purcarea@gmail.com

Consuela-Mădălina GHEORGHE
Department of Marketing and Medical Technology, Faculty of Medicine, "Carol Davila" University of Medicine and Pharmacy, 050474 Bucharest, Romania; email: consuela.gheorghe@umfcd.ro

Adela-Magdalena CIOBANU
Department of Psychiatry, Faculty of Medicine, "Carol Davila" University of Medicine and Pharmacy, 050474 Bucharest, Romania; email: adela.ciobanu@gmail.com

Ovidiu POPA-VELEA
Department of Medical Psychology, Faculty of Medicine, "Carol Davila" University of Medicine and Pharmacy,050474 Bucharest, Romania; email: ovidiu.popa-velea@umfcd.ro

***Corresponding author:** *Consuela-Mădălina GHEORGHE consuela.gheorghe@umfcd.ro.*

Abstract

Burnout is an increasingly prevalent syndrome among physicians, with specific organizational factors contributing to its alleviation. This study aimed to assess the prevalence of burnout, its association with Internal Marketing (IM), and the use of IM practices within Romanian health care organizations. 332 Romanian physicians completed the Maslach Burnout Inventory–GS, the Internal Marketing Questionnaire, and a survey regarding socio-demographic and occupational characteristics. Statistical analyses included χ^2 for individual differences, Pearson correlations to measure the relationships between study variables, and hierarchical regressions, for the associations between IM, socio-demographic and occupational factors, and burnout. The prevalence of high-level burnout was 22.6%, with IM accounting for 67% of burnout variance. The IM usage was moderate (48.8%) and often not labeled as such. IM, multiple jobs and specialty were significant predictors of global burnout and cynicism ($p<.001$). IM only predicted exhaustion ($p<.001$), while IM and multiple jobs predicted personal inefficacy ($p<.001$). The contribution to burnout of occupational and socio-demographic factors was not significant. Our findings encourage acquisition and optimization of IM practices as an efficient public health strategy against burnout.

Keywords: Internal Marketing, health care organizations, organizational behavior, Public Health strategies

Introduction

Current health care systems are often described by many consumers as being "busy", "complex", or even "chaotic" (Bria et al, 2014). This perception stems, in part, from high general expectations regarding the quality of health services, as well as increasing demands for "personalized medicine" and "patient-centered care" (Gheorghe and Liao, 2012; Gheorghe et al, 2018). Consequently, health care systems are constantly subject to pressures from stakeholders, be they policy makers,

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health care analysts or health care consumers, aiming to implement the best possible quality of care in the most cost-efficient manner. In many low- and middle-income countries, this challenge is difficult to overcome, as their health care systems are fragile and lack the capacity to ensure delivery of services to those in need (Bria et al, 2013). In the particular case of Romania, these underlying factors were supplemented in the last three decades by a series of controversial health care reforms, which impacted the autonomy, prestige, and feelings of accomplishment of many health care professionals throughout their careers, as well as during their formative years in medical school. Thus, burnout syndrome became a prominent issue among Romanian physicians, regardless of their age or specialty (Bria et al, 2014; Bria et al, 2013; Popa-Velea et al, 2014; Popa-Velea, 2014; Popa-Velea et al, 2019).

Studies conducted so far and aiming to define burnout in medical contexts have provided a series of methods to address its causal factors, be they psychological, organizational and occupational (Bria et al, 2013). For example, frameworks such as the Job Demands Resources (JD-R) Model (Schaufeli, 2017) may represent a useful conceptual reference for monitoring the extent of burnout and prevent its onset, through the increase of personal engagement and internal motivation. However, in those cases where JD-R Model cannot provide a satisfactory answer, the Marketing field may offer other kind of strategic solutions to burnout, under the form of Internal Marketing (IM).

IM is a concept which describes employees as “internal consumers”, while the organization is considered a market that includes both suppliers and demanders of services, who together, form an “internal supply chain system” (Foreman and Money, 1995; Tsai and Tang, 2008; Berry and Parasuraman, 1991).

In terms of burnout prevention, IM could represent an efficient organizational tool, considering the literature reports pointing out its efficiency in changing employees’ attitudes and behaviors (Gronroos, 1990; Ahmed and Rafiq, 1995; Varey, 1995). Still, despite its undoubtable benefits, the implementation and coordination of IM practices may be a challenging task, as only a small number of organizations implement IM practices (Rafiq and Ahmed, 2000), due to a lack of consensus among scholars regarding what this implementation constitutes, as well as which measurement instruments to use and how they should be applied. In the health care field, even fewer studies are available, with specific interest in IM or its assessment (Iliopolos and Priporas, 2011; Azedo et al, 2012; Chang and Chang, 2007)..

Our study aims to address this gap in current knowledge about IM in health care settings and, especially, to gain insight into the possibilities of preventing burnout through the use of IM. The identification of potential associations between IM and burnout could help guide the development of new organizational strategies striving for the prevention of burnout in health care professionals. Specifically, the objectives of this research were:

(1) to examine the prevalence of burnout among Romanian physicians working in health care organizations;
(2) to identify the current IM practices in Romanian health care organizations;
(3) to measure the impact of IM on burnout.

Research Methodology

Participants

Participants comprised physicians from five Romanian private health care institutions, the selection being made on convenience sampling. The choice to study individuals working in private health care was based on the higher accessibility to physicians in this domain, also taking into consideration that previous national research has mostly been confined to public health organizations. The steady increase in the number of private health care organizations in Romania, over the last years, has resulted in a total of 187 distinct companies (National Institute of Statistics, 2017), making these kind of institutions an important segment in the medical job market.

Out of 1060 physicians initially approached for the study, that would guarantee a significant statistical threshold p of 0.05 and an accepted error of ± 3, 332 (31.32%) agreed to participate. This percentage of respondents could represent an argument in favor of interest regarding this theme among Romanian physicians, or at least among those working in private practice. All participants completed written informed consent forms. Out of 332 physicians, 245 (73.8%) were females and 87 (26.2%) were males. Mean age was 42.6 (±13.8). 183 (55.1%) were senior physicians and 149 (44.9%) were specialist physicians, 95 (58.7%) were smokers and 47 (14.2%) suffered from sleep disorders. The vast majority of physicians were

permanently employed (52.4%). 232 (69.9%) had multiple jobs as physicians, and worked between 47 and 51 hours/week (26.2%).

Procedure

The design of the study was cross-sectional. Data collection was conducted between October 2019 and January 2020. The study instruments were printed and enclosed in sealable envelopes, in order to ensure confidentiality.

IM was measured through the 15-item Internal Marketing questionnaire, adapted to the Romanian health care context (Foreman and Money, 1995). The items of the IM instrument were divided into three components: "Vision" (3 items), "Development" (4 items) and "Rewards" (8 items), measured on 5-point Likert scales (1 - Totally Disagree to 5 - Totally Agree). In health care settings, it has been described as displaying good validity, as well as reliability (Azedo et al, 2012). The global score of IM was computed by summing up the scores of Vision, Development and Rewards components.

For assessing burnout, we used the 16-item Maslach Burnout Inventory - General Survey, which consisted of 3 dimensions: "Exhaustion" (EX) (5 items), "Cynicism" (CY) (5 items) and "Personal Inefficacy" (PI) (6 items) (Bakker et al, 2002). We selected the MBI-GS instrument due to its universal applicability, as well as its confirmed cross-sectional validation among occupational domains, revealing a high level of robustness (Bakker et al, 2002; Mäkikangas et al, 2001) including in the health care field (Qiao and Schaufeli, 2011). All items were scored on 7-point Likert scales ranging from 0-Never to 6-Every day. The global score of burnout was computed by summing up the scores of EX, CY and PI.

Statistical Analysis

Data was collected and processed using the SPSS Statistics 20.0 software package. The first stage of the analysis included a description of the sample, using measures of statistical dispersion for quantitative variables, and frequency for qualitative variables. Threshold values for the classification of burnout into "high", "moderate" and "low" levels were calculated by splitting the scores into thirds (Maslach and Leiter, 2008). Likewise, IM scores were clustered into "high", "moderate" and "low" categories by splitting into thirds. A series of $\chi 2$ tests for independent samples were performed to detect significant differences among these groups, and Pearson correlation tests were conducted to determine the associations between variables and their subscales.

The second stage of the analysis comprised several hierarchical regressions designed to investigate the strength of the associations between the predictor variable IM and the predicted variable, burnout, as well as its components.
The threshold for statistical significance in all tests was $p < .05$.

Results

Prevalence of burnout and its components

75 (22.6%) of the participants had high levels of burnout. High EX was encountered in 102 physicians (30.7%), high CY in 142 (42.8%) and high PI in 108 (32.5%). Significant socio-demographic differences among individuals with high global burnout were related to specialty, and having multiple jobs. Regarding burnout components, socio-demographic differences in subjects with high EX were significantly related only to specialty; in those with high CY, they related to specialty and the number of multiple jobs, whereas in cases with high PI, they related to specialty, number of multiple jobs, and sleep disorders (Table 1).

Perceived use of IM practices

To assess the use of IM, its scores were split into thirds and, subsequently, classified into low, moderate and high. The vast majority of respondents perceived IM to be moderately used (48.8%) (Table 2). Although some respondents could not specifically identify vision as being an IM component of the health care organization at which they were employed

(41.3%), they did benefit from other IM components, such as the development of personnel (53.3%) and reward payments (51.8%).

Table 1: The differences in socio-demographic variables for individuals with high burnout levels

Variable		High global burnout (*n* = 75)			High EX (*n* =102)			High CY (*n* = 142)			High PI (*n* = 108)		
		n	χ^2	*p*	*n*	χ^2	*p*	*n*	χ^2	*p*	*n*	χ^2	*p*
Gender	Female	56	.03	.84	77	.21	.64	109	.12	.28	81	.12	.72
	Male	19			25			33			27		
Age (years)	31-40	30	1.05	.59	42	.81	.66	67	1.32	.51	49	.03	.98
	41-50	28			36			48			35		
	≥ 51	17			24			27			24		
Type of specialty	Medical	66	4.54	.03*	91	8.94	.003*	123	8.25	.004*	95	7.43	.006*
	Surgical	9			11			19			13		
Professional level	Senior	45	.93	.33	60	.81	.36	75	.53	.46	59	.01	.90
	Specialist	30			42			67			49		
Type of employment	Temporary	29	3.09	.07	45	.71	.39	68	.009	.92	50	.10	.74
	Permanent	46			57			74			58		
Working hours /week	38-41	21	.23	.97	26	2.58	.45	33	2.08	.55	29	1.37	.71
	42-46	19			25			38			30		
	47-51	19			23			35			24		
	>51	16			28			36			25		
Multiple jobs	yes	65	12.97	0.001¤	78	3.03	.08	111	8.10	.004*	85	5.92	.01*
	no	10			24			31			23		
Smoker	yes	43	.07	.77	54	2.03	.15	77	2.08	.14	60	.66	.41
	no	32			48			65			48		
Sleep disorders	yes	10	.05	.81	18	1.47	.22	22	.36	.54	9	4.46	.03*
	no	65			84			120			99		

*p<.05; ¤p<.001

Table 2: The perceived level of Internal Marketing usage in practice

Scale	Subscales	Perceived levels of usage		
		Low	Moderate	High
Internal marketing	Vision	137 (41.3%)	118 (35.5%)	77 (23.2%)
	Development	108 (32.5%)	177 (53.3%)	47 (14.2%)
	Rewards	111 (33.4%)	172 (51.8%)	49 (14.8%)
	Global	110 (33.1%)	162 (48.8%)	60 (18.1%)

Associations between burnout and IM

The means, standard deviations, and Pearson correlations of all the observed variables are depicted in Table 3. The average mean scores for IM and global burnout were 3.71 (SD = ± .58), and 2.36 (SD = ± .97), respectively. The two constructs were significantly correlated at $p < .001$ and $p < .05$ and all correlation coefficients were >.50. IM established an indirect and moderate relationship with burnout ($r = -.66$, $p < .05$).

Table 3: Descriptive statistics and Pearson correlations of study variables

Variables	M	SD	IM	Vision	Development	Rewards	BO	EX	CY
IM	3.71	0.58	-						
Vision	3.78	.85	.57¤	-					
Development	3.75	.65	.87¤	.50¤	-				
Rewards	3.67	.64	.94¤	.41¤	.69¤	-			
BO	2.36	.97	-.66*	-.32¤	-.57¤	-.64¤	-		
EX	2.37	1.06	-.60*	-.30¤	-.50¤	-.59¤	.92¤	-	
CY	2.36	1.06	-.57*	-.25¤	-.51¤	-.55¤	.89¤	.77¤	-
PI	2.36	1.06	-.63*	-.30¤	-.55	-.60¤	.93¤	.77¤	.73¤

**p<.05; ¤p<.001; M = mean; SD = standard deviation;*

IM = internal marketing; BO = burnout; EX = exhaustion; CY = cynicism; PI = personal inefficacy.

To measure the contribution of each category of the study variables (IM, socio-demographic, and occupational factors) to burnout variance, several hierarchical multiple regressions were conducted, using the stepwise method.

Three regression models emerged, which included the following predictors (Table 4):

- model 1: IM;
- model 2: IM and socio-demographic factors (gender, age, smoking and sleep disorders);
- model 3: IM, socio-demographic factors and occupational factors (specialty, professional level, type of employment, number of working hours / week and having multiple jobs).

Table 4: Hierarchical linear regression models for burnout and its components

Burnout	Model	*R*	R^2	Adj. R^2	Standard error of the estimate	R^2 change	*df1*	*df2*	*F* change	Sign. *F* change
EX	1	.60[a]	.365	.363	4.26	.365	1	330	189.50	.001
	2	.60[b]	.365	.363	4.26	.365	1	330	189.50	.001
	3	.60[c]	.365	.363	4.26	.365	1	330	189.50	.001
CY	1	.57[a]	.332	.330	3.48	.332	1	330	163.96	.001
	2	.57[b]	.332	.330	3.48	.332	1	330	163.96	.001
	3	.59[c]	.356	.350	3.43	.011	1	328	5.810	.016
PI	1	.63[a]	.397	.395	4.96	.397	1	330	216.85	.001
	2	.63[b]	.404	.400	4.94	.007	1	329	4.02	.046
	3	.64[c]	.410	.406	4.91	.013	1	329	7.325	.007
Global burnout[d]	1	.66[a]	.437	.435	11.03	.437	1	330	256.12	.001
	2	.66[b]	.437	.435	11.03	.437	1	330	256.12	.001
	3	.67[c]	.459	.454	10.85	.010	1	328	6.26	.013

IM = internal marketing; EX = exhaustion; CY = cynicism; PI = personal inefficacy; df= degrees of freedom; R^2= coefficient of determination; Adj. R^2= Adjusted R^2.

[a]Predictors: (constant), IM;

[b] Predictors: (constant), IM, gender, age, smoker status, sleep disorders;

[c]Predictors: (constant), IM, gender, age, smoker status, sleep disorders, specialty, professional level, type of employment, number of working hours/week, multiple jobs;

[d]The global score of burnout was computed by summing up the scores of EX, CY and PI.

Within all three regression models, EX was predicted by IM (standardized beta = -.60, t =-13.766, p<.001), explaining 60% of the variance.

CY was predicted by IM in model 1 and model 2 (standardized beta= -.57, t =-12.805, p<.001), by IM (standardized beta =-.54, t = -12.112, p<.001), type of specialty (standardized beta =-.12, t =-2.793, p<.001), and multiple jobs (standardized beta = -.10, t =-2.410, p<.05) in model 3. In model 1 and model 2, 57% of the variance in CY was explained by IM, and in model 3, IM, type of specialty and multiple jobs contributed to 59% of CY variance.

In model 1, PI was predicted by IM (standardized beta =-.63, t =-14.726, p<.001). In model 2, PI was predicted, additionally, by sleep disorders (standardized beta =.08, t = 2.0, p<.05). In model 3, PI was predicted by IM (standardized beta = -.61, t =-14.342, p<.001), as well as multiple jobs (standardized beta =-.11, t =-2.706, p<.001). The variables included in model 1 and model 2 explained 63% of the variance in PI, and the variables in model 3, explained 65% of the variance in PI.

The global burnout score was predicted in all three models by IM (standardized beta =-.63, t =-15.291, p<.001). In model 3, multiple jobs (standardized beta =-.11, t = =-2.845, p<.05), and type of specialty (standardized beta =-.10, t =-2.503, p<.05) contributed as well. The variables included in model 1 and model 2 accounted for 66% of the variance of global burnout, and model 3 explained 67% of variance in global burnout.

Discussion

Burnout is frequently linked to occupational stress and may have significant undesired effects on individuals, organizations and consumers (Maslach and Leiter, 2008). Gaining knowledge about its prevalence, the preventive impact of new organizational resources (such as IM) and their degree of implementation can be of paramount importance in designing the most appropriate strategies for reducing the risk and subsequent costs of burnout.

Our findings reveal that the prevalence of high-level burnout among Romanian physicians working in health care organizations was 22.6%. A possible explanation for this result may arise from the selection base itself, which is consistent with the description of private health care units as offering higher value-driven performance, quality-controlled work systems, and working conditions more tailored to both consumers' and physicians' expectations (Robontu, 2017). When analyzing the distinct components of burnout, we found their prevalence in our sample to be similar to that described in the literature, with the highest percentage pertaining to CY (42.8%) (Raggio and Malacarne, 2007). This may be a reflection of how physicians progressively distance themselves from their work, especially since, in our sample, 111 of 142 physicians high in CY had multiple jobs, entering a vicious cycle of routine. Managers must address this phenomenon by maintaining the internal motivation of employees, which is a good vehicle for keeping them consistent and productive (Todnem, 2005), and by cultivating abilities, such as adaptability, self-efficacy and achievement orientation (Hofstede, 2001).

The use of IM practices was perceived to be moderate (48.8%). This finding is, in part, satisfactory for Romania, considering that concepts such as IM are mostly acknowledged in developed countries and are not popular in societies (such as the Romanian one) facing a long-term transition of structures and mentalities from a communist health care system to a democratic one. In the context of a centrally-oriented and rigid hierarchical health care system, such as the Romanian one, the aforementioned values may be underestimated, as many processes specific to IM and local small-scale initiatives to implement them, may be underreported, for fear of negative consequences. It is also possible that, being only informally and / or non-systematically applied, this concept may trigger an incorrect usage (Gounaris, 2006), or not to be understood in the same way at different hierarchy organizational levels (Azędo et al, 2012).

Regarding the correlations of IM and burnout as well as its components, they were all statistically significant, negative, and moderate. These findings required a subsequent in-depth analysis, involving several hierarchical

regressions, which showed that global burnout was mainly influenced by IM, with insignificant contribution of the other considered variables (specialty, multiple jobs and sleep disorders).

Specifically, on burnout components:

- the relationship of EX with IM was significant (as IM explained 60% of EX variance), and was not influenced by other demographic or occupational factors. This finding suggests that, in order to decrease exhaustion in physicians, organizations should implement more IM-oriented programs, focusing on development objectives such as raising self-confidence, problem-solving abilities, mental strength and resilience (Rafiq and Ahmed, 2000);

- CY was influenced by IM, specialty and having multiple jobs. The last two factors contributed little to CY, this result being inconsistent with the literature (Qiao and Schaufeli, 2011). In contrast, IM explained 59% of CY variance, suggesting that health care organizations should implement employee training workshops, with the aim of raising their motivational level and encouraging them to explore new ideas and potential actions, so as to increase their interest in their work (Popa-Velea et al, 2019). Employee training may be conducted to ensure that employees know what tasks should be performed, and why (Rafiq and Ahmed, 2000);

- concerning PI, our results confirmed that this burnout component is correlated with IM, as well as with performing multiple jobs, this explaining 67% of the variance in PI scores. A high predisposition to PI may be overcome by implementing learning programs, in order to avoid stagnation, boredom and ineffectiveness, and to provide stimulating organizational tasks, skills and knowledge related to the job (Chang and Chang, 2007). PI may be also overcome by applying an adequate reward system: the incentives given to physicians should be tailored to their individual performance, with periodic adjustments (Foreman and Money, 1995; Berry and Parasuraman, 1991).

Since IM has been shown to contribute to global burnout, we analyzed which component of IM has the strongest correlation with burnout scores. This proved to be *the reward system.* Establishing an efficient reward system is described in the literature as being able to reinforce the organization's core values, such as excellence, innovation and respect, as well as increase employees' self-confidence, acting as a powerful trigger for them to invest more effort into gaining personal skills and knowledge (Gounaris, 2006).

Conclusions

Our study confirms the role of IM as strongly contributing to decreased levels of burnout and its components. In a landscape characterized by paucity of information about the impact of organizational factors on burnout risk, limited financial resources, and a poor knowledge of the balance between organizational risks and assets, our findings may represent a starting point for designing an array of solutions for preventing burnout, which could be suitable in Romania and other related contexts. Providing knowledge regarding burnout risk and elaborating efficient organizational strategies for the implementation of IM practices could not only lower the prevalence of burnout syndrome in physicians, but also help in building sensitivity towards the integration of "Relational Capital" (Gheorghe et al, 2018) in Public Health practice.

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Models and their IT Application for Search Planning

Andrzej NAJGEBAUER
Cybernetics Faculty, Institute of Information Systems, Military University of Technology, Warsaw, Poland,
E-mail: andrzej.najgebauer@wat.edu.pl

Jarosław RULKA
Cybernetics Faculty, Institute of Information Systems, Military University of Technology, Warsaw, Poland,
E-mail: jaroslaw.rulka@wat.edu.pl

Wojciech KULAS
Cybernetics Faculty, Institute of Information Systems, Military University of Technology, Warsaw, Poland,
E-mail: wojciech.kulas@wat.edu.pl

Abstract

The article is devoted to the modelling and planning method of searching the area in order to find the missing person. In the introduction we present scenarios and concepts in the field of search theory, referring to recognized sources of literature in this field. In addition, we present methods for evaluating the effectiveness of a site search, based on the theory and own studies introduced earlier. The most important part of the work is the search planning method taking into account field conditions, resources and qualifications of the searchers. Both the optimization model and the heuristic method of solving the formulated sentence are original. The application developed on this basis has been integrated with the system for collecting and processing information about missing persons in the framework of a geo-location server called CEZAR. The method has been tested for a number of cases. Selected cases are presented here.

Keywords: Searching missing person, optimization model of search planning, IT search planning application.

Introduction

Formal basis

The SEARCH AND SCREENING studies by Bernard Osgood Koopman in 1946 are used as a theoretical basis in modelling the process of searching for lost people. The study was created in the OPERATIONS EVALUATION GROUP OFFICE OF THE CHIEF OF NAVAL OPERATIONS NAVY DEPARTMENT. It concerned in particular the search and detection of marine targets. However, the model and methods contained in the study have also become the basis for the development of models and methods of searching for missing persons in land search and rescue operations (Search and Rescue (SAR)). In this section we will present basic models and methods for assessing the probability of detecting missing persons. The methods of estimating the effectiveness of a terrain search are based on many researches done by teams from many countries interested in effective finding lost people (Frost, J.R. and Stone, L.D.,2001), (Frost, J.R. , 2000), (Koopman, B.O., 1946), (Kratzke T, Stone L.D. and Frost J.R.,2010), (Stone, L.D.,2004). The optimization problem of search planning is quite unique and is formulated and solved by our team within the project financed by National Research and Development Centre (Nr DOB-BIO/12/01/2018).

Search scenarios

Let us assume that two search scenarios are being considered. Searches carried out on the basis of the site vetting through successive "observations" in a limited fragment of the searched area, separated by a certain period of time. It is assumed that the results of subsequent glances at the examined fragment may or may not result in detection of the searched object. The results of subsequent observations are independent of each other, and the chance of detection is identical in each subsequent glance.
Assuming that:

- g - the probability of detecting an object with one "observation",

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- p_n - the probability of detecting a u object in the n-course of "observation".

- T - the time (number of observations) necessary to detect the missing object and taking into account the assumptions made, we obtain the following dependence:

$$P\{T \le n\} = p_n = 1-(1-g)^n, n = 1,2,... \tag{1.1}$$

According to the adopted model, the probability of detecting the object sought exactly as a result of subsequent observations is equal:

$$P\{T+k\} = P_k = (1-g)^{k-1} \cdot g, \ k = 1,2,... \tag{1.2}$$

Using this relationship, you can determine the expected number of observations necessary to detect the desired object:

$$E\{T\} = \sum_{k=1}^{\infty} k \cdot (1-g)^k \cdot g = \frac{1}{g} \tag{1.3}$$

a) The search is carried out in such a way that the examined fragment of the area is subject to continuous observation. If we assume that the probability of detecting the object sought in a short period of time is γdt, it can be shown [4] that the following relationship exists:

b) $P\{T < t\} = \begin{cases} 1-e^{-\gamma t} & t > 0 \\ 0 & t \le 0 \end{cases}$,

We write this down as $P\{T < t\} = 1-e^{-\gamma t}, \quad t > 0$ (1.4)

$$E\{T\} = \overline{T} = \int_0^{\infty} t\gamma e^{-\gamma t} dt = \int_0^{\infty} e^{-\gamma t} dt = \frac{1}{\gamma} \tag{1.5}$$

The above dependencies are correct assuming that over time, the values of g and γ. However, with the passing of the search time, both the mutual position of the searched object and the searching team change. The conditions in which the search is carried out may also change. Thus, dependencies (1.1) and (1.4) obtain a character:

$$P\{T \le n\} = p_n = 1-(1-g_1)(1-g_2)\cdot..., n = 1,2,... \tag{1.6}$$

and for continuous observation:

$$p(t) = P\{T < t\} = 1-e^{-\int_0^t \gamma(u)du}, \quad t > 0 \tag{1.7}$$

Dependence of detection intensity on distance.

It has a major impact on values and has a distance between the observer and the object being sought. This distance varies with the duration of the search. Therefore, the proper procedure will be to determine the relationship between the values g and γ from the distance marked as r. The distance will result from the adopted search model and the location of the object sought. To determine the relationship $\gamma(r)$ the following case is considered:

- The observer is at a height h above the ground

- Intensity $\gamma(r)$ the detection of the searched object is directly proportional to the solid angle, corresponding to the size of the object located at a distance in the distance r from an observer.

The situation described by the assumptions is shown in Fig 1, based on considerations of (Koopman B.O., 1946) we have formal analysis:

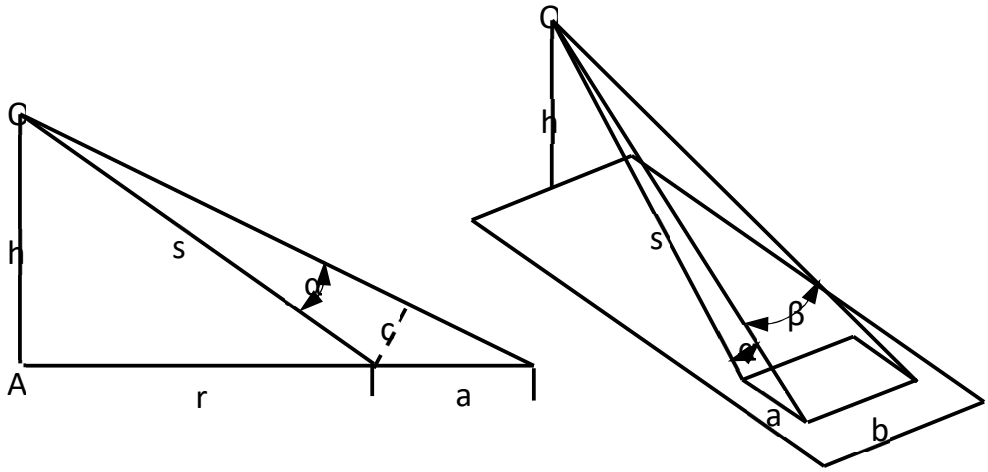

Fig. 1: The space angle

It can be shown that the solid angle SB, corresponding to an object with dimensions a,b remotely

r is:

$$SB = \frac{a \cdot b \cdot h}{s^3} = \frac{a \cdot b \cdot h}{\left(h^2 + r^2\right)^3} \tag{1.8}$$

Intensity of detection $\gamma(r)$ is therefore proportional to the value:

$$\gamma = \frac{k \cdot h}{s^3} = \frac{k \cdot h}{\left(h^2 + r^2\right)^3} \tag{1.9}$$

And for r ? h approximation can be made:

$$\gamma \approx \frac{k \cdot h}{r^3} \tag{1.10}$$

Dependencies (1.9) and (1.10) are called “inverse cube law of sighting”.

Proportionality factor k takes into account:

- area of the facility $R = a \cdot b$;
- weather conditions;
- field conditions;
- equipment and observer's ability to detect the object.

Terrain Model

The Search Planning function is based on the previously introduced terrain model.

The multi-resolution model of the terrain based on the division of a fragment of the terrain using a four-tree can be defined as follows:

$$Z_I^L(t) = \left\langle G_I^L(t), \Psi_I^L(t), \zeta_I^L(t), a \right\rangle \tag{1.11}$$

where:

L – resolution level (depth of the root-square division, number of digits in the description of the square number in a quadrant system).

G_I^L – Berge's graph without a loop, whose vertices are the squares of the terrain and the arcs connect the adjacent squares (if there is a possibility to pass between them). The number of vertices of this graph (2L*2L) is equal to the number of squares into which the square-root is divided and depends on the resolution level, i.e. the number *L*. It is suggested that the way the graph creates connections between the adjacent vertices (adjacent zones of the terrain) is as shown in Fig 2.

$\Psi_I^L(t)$ – a set of functions described on the tops of the graph.

$\zeta_I^L(t)$ – a set of functions described on the graph branches.

a – length of square root side

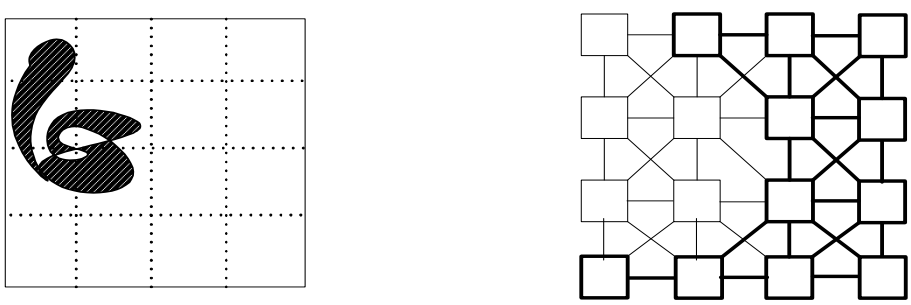

a) b)

Fig. 2: Example of a fragment of the terrain and its division into homogeneous squares according to the size (a) and graph (b) of the potential connections and connections selected for the fragment of the terrain with (a) (bold edges in the graph (b)).

Methods of estimating the effectiveness of a site search

Detection of an object moving on the curve

The particular analyses were realized by project team and described in (Najgebauer, A., et al. 2019), some results are presented here on the basis of the project.

Using the terms (introduction), it is possible to determine the probability of detecting an object moving in relation to the observer on the curve (only the case of continuous observation will be considered) (Koopman 1946):

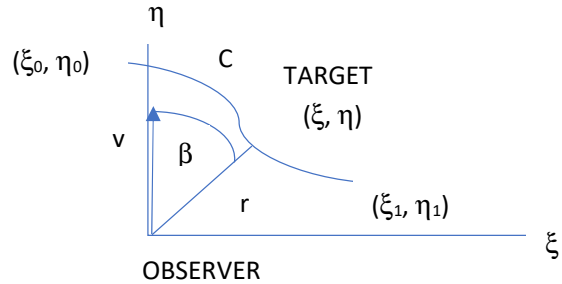

Fig. 3: Trajectory of movement of the object sought, relative to the observer.

We assume that the position of the object at moment t is defined by the coordinates $\xi(t),\eta(t)$. It follows from this that:

$$\gamma(r(t)) = \gamma(\sqrt{\xi^2(t)+\eta^2(t)}) \tag{2.1}$$

Thus, if an object moves from a point (ξ_0,η_0) up to (ξ_k,η_k) on time (t_0,t_k). The probability of its detection is determined by the dependencies (1.7) and (2.1):

$$p_C = 1 - exp[-\int_{t_0}^{t_k} \gamma(\sqrt{\xi^2(t)+\eta^2(t)})dt, \quad t > 0 \tag{2.2}$$

If marked by C The curve on which the detected object moves and by its speed in relation to the observer can be saved as a curve (2. 2):

$$\begin{aligned} p_C &= 1 - e^{-F[C]} \\ F[C] &= \int_C \frac{1}{w}\gamma(r)ds \end{aligned} \tag{2.3}$$

Objects moving in a straight line

A special case of the curve is a straight line, on which the object sought moves at a constant speed in relation to the observer. Assuming that the line of movement of the searched object is parallel to the axis of ordinates (0Y) of the coordinate system, such a situation can be presented using Fig 4.

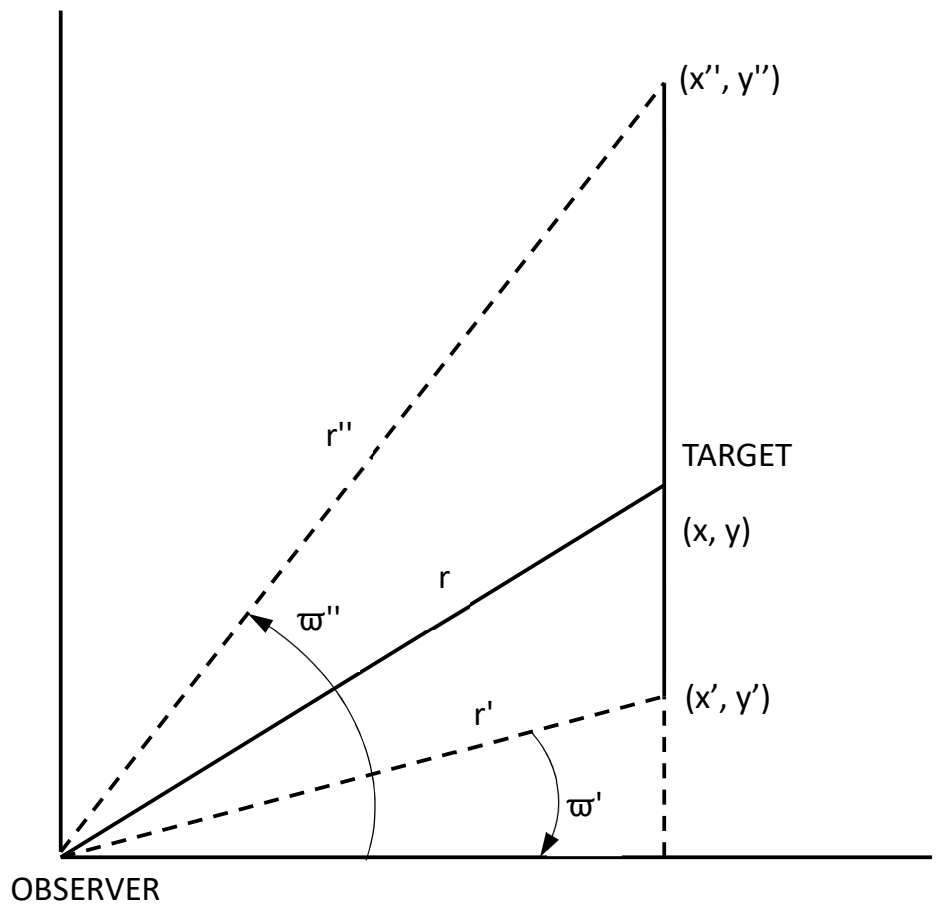

Fig. 4: The searched object moves along a line parallel to the ordinate axis (0Y) of the coordinate system.

In this case, the relation (2.3) takes the form:

$$
\begin{aligned}
& p_C = 1 - e^{-F[C]} \\
& F[C] = \int_{t_0}^{t_k} \gamma(\sqrt{x^2 + w^2 t^2})dt = \\
& \qquad = \frac{1}{w}\int_{y_0}^{y_k} \gamma(\sqrt{x^2 + y^2})dy \\
& y_0 = w \cdot t_0; \quad y_k = w \cdot t_k
\end{aligned}
\tag{2.4}
$$

Particularly interesting is the case described in the diagram in Fig 4. when the object being sought moves at a constant speed along its straight line for a long time before and after reaching the greatest approximation to the position of the observer (a point with coordinates $(0, x)$.

In this case, the probability of detection is only dependent on the coordinate value. From the formula (2.14) and taking into account "inverse cube law of sighting" ((1.9) or (1.10)) we obtain formulas:

$$a) \quad p(x) = 1 - e^{-\frac{2m}{(h^2+x^2)}}$$
$$or \tag{2.5}$$
$$b) \quad p(x) = 1 - e^{-\frac{2m}{x^2}}$$

where: $m = \frac{k \cdot h}{w}$.

Using the relation (2.5), a very interesting size is defined:

$$W = \int_{-\infty}^{+\infty} p(x)dx \tag{2.6}$$

Size is called "effective search (or sweep) width".

The interpretation W can be done based on the following model:

- the observer moves through the space in which the detected objects are evenly distributed (average of objects per unit area) with the speed
- all objects remain at rest or move with the same speed vector

Then, the expected number N_0 of objects detected by the observer in a unit of time is:

$$N_0 = W \cdot N \cdot w \tag{2.7}$$

The product $W \cdot w$ is called "effective search (or sweep) rate".

Uwzględniając zależności (2.15) oraz (2.16) otrzymujemy:

$$W = 2\sqrt{2\pi m} = 2\sqrt{\frac{2\pi kh}{w}} \tag{2.8}$$

Random Search

The random search is a case that meets the following assumptions (Koopman B.O., 1946]:

a) The location of the searched object is equally probable in each sub-area of area A.
b) The observer or observers move randomly in area A and independently of each other.
c) Each section of the road of a single observer is short in relation to the sum of lengths of all roads, but much longer than the potential detection range.
d) The observer always detects an object that is within the W/2 range on both sides of his or her path and never outside that range.

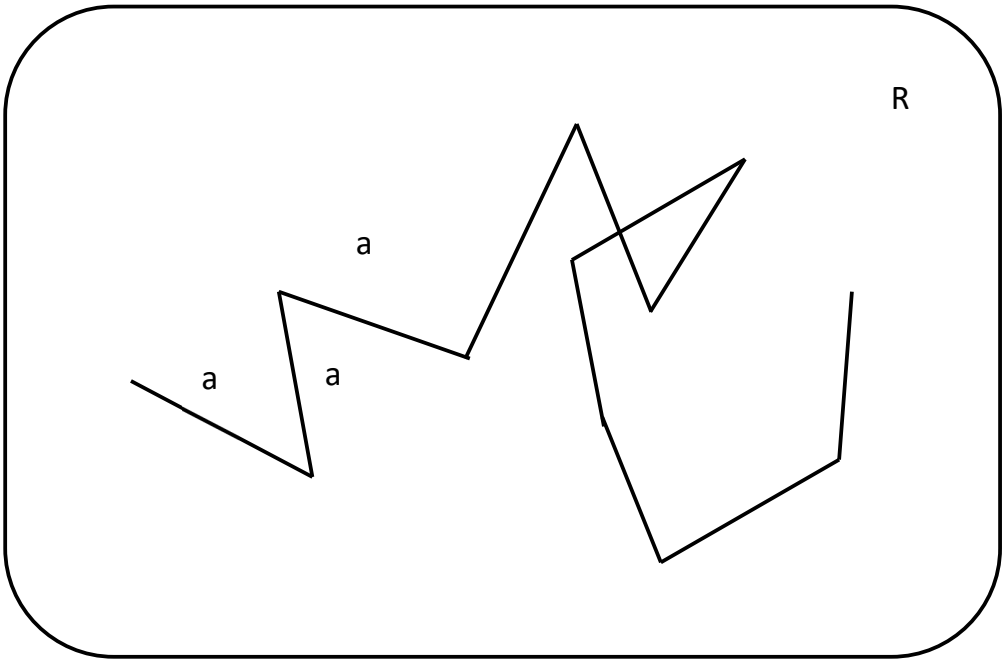

Fig. 5: Random scheme of searching in area R.

If the above assumptions are met, the probability of detecting an object, with the total length of the observers' route of a is in the form of:

$$p(a) = 1 - e^{-W \cdot a / R} \tag{2.9}$$

Assuming that each observer moves at a constant speed, the length of the road travelled is a product of the search time and speed to date. Thus, the relation (2.9) can be written in the form:

$$p(t) = 1 - e^{-W \cdot v \cdot t / R}, \quad t > 0 \tag{2.10}$$

In the article (Koester, R.J., et al.), the relationship is presented $p(C_t) = POD(C_t)$ where

$C_t = W \cdot v \cdot t / R$ was defined as the "coverage" of the exploration area by the existing explorations carried out at time t. Then:

$$POD(C_t) = p(t) = 1 - e^{-W \cdot v \cdot t / R}, \quad t > 0 \tag{2.11}$$

Parallel Search

Basing on considerations in (Koopman, B.O. 1946, p.29), parallel searches are carried out as shown in the figure 6.

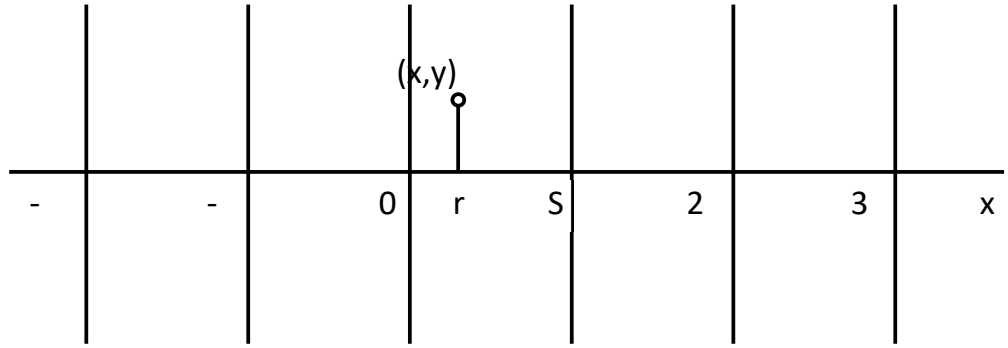

Fig. 6: Parallel search.

The following assumptions are considered:

a) The object sought is located randomly according to an even distribution.
b) The search line is infinitely many, located at a distance S.
c) The probability of detection is assumed to be (2.5 b)).

With the above assumptions, the probability of detecting an object is (Koopman, B.O., 1946, p.30):

$$POD(S) = erf\left(\frac{\pi\sqrt{2m}}{S}\right) = erf\left(\frac{\sqrt{\pi}}{2}\cdot\frac{W}{S}\right) \tag{2.12}$$

A special case of parallel searches, described among others in (Koopman, B.O., 1946) is presented in Figure 7 and the following considerations:

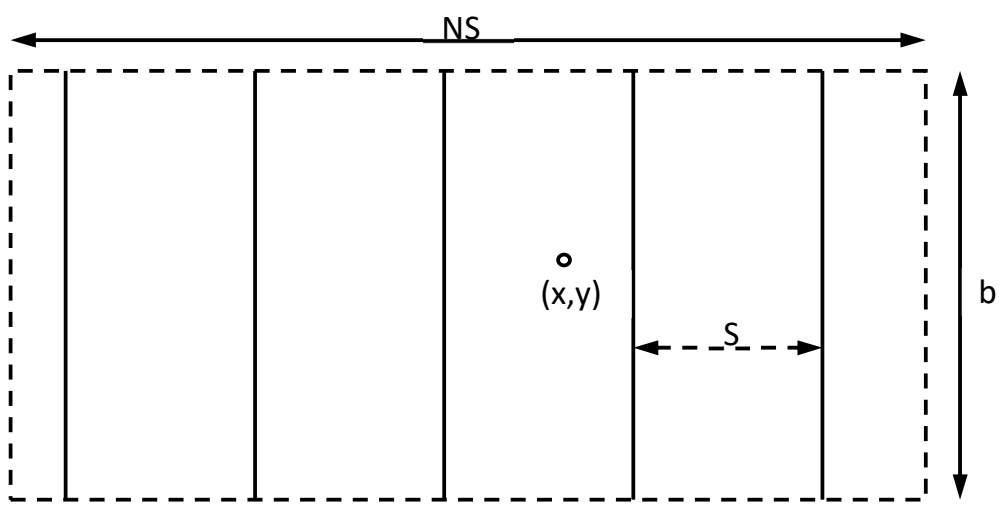

Fig. 7: Parallel search in a limited area.

Assumptions:

a) Searches shall be conducted in an area of size $N \cdot S \times b$
b) Prospect located on an evenly distributed basis over the prospect area
c) Searches are conducted on N randomly distributed lines of total length $N \cdot b$

With the above assumptions, the probability of detection is determined by a relationship:

$$POD(S) = 1 - e^{-W/S} \tag{2.13}$$

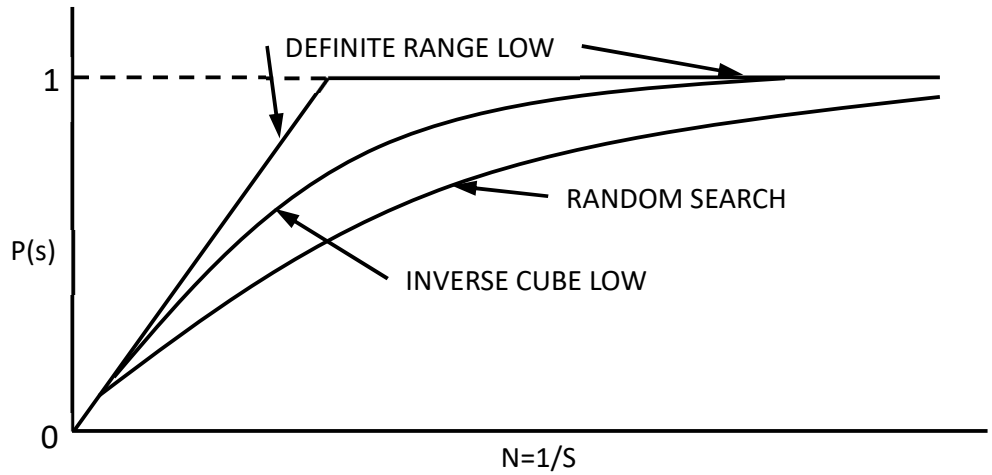

Fig. 8: The illustration of detection probability for parallel searches.

Formulas (2.2) and (2.3) have time dependent versions in the literature (Koester, R.J., et al., 2004, p.53):

$$\begin{aligned} &POD(t) = 1 - e^{-W \cdot t \cdot v / R} \\ &for \quad R = N \cdot S \cdot b \\ &POD(t) = 1 - e^{-\frac{W \cdot t \cdot v}{N \cdot S \cdot b}} \\ &if \quad t : t \cdot v = N \cdot b, \quad then \\ &POD(t) = 1 - e^{-\frac{W \cdot N \cdot b}{N \cdot S \cdot b}} = 1 - e^{-\frac{W}{S}} = P(S) \end{aligned} \tag{2.14}$$

Similarly, for (2.12) we find a relation:

$$POD(t) = erf\left(\frac{\sqrt{\pi}}{2} \cdot C_t\right) = ref\left(\frac{\sqrt{\pi}}{2} \cdot \frac{v \cdot W \cdot t}{R}\right) \tag{2.15}$$

Estimation of the effective search width W

From the relationships presented above it follows that for the purpose of determining the value of

POD it is necessary to know the probability function of detecting an object marked as $p(x)$ and defined by the relationship (2.5). The relationship (2.9) - (2.15) shows that the following are to be determined $POD(t)$ and $POD(S)$ it is sufficient to know the effective search width W (2.6). The value of this parameter is dependent on many factors:

- the speeds of movement of the observer.
- type of terrain.
- terrain.
- terrain cover.
- weather.
- seasons.
- time of day (lighting)

- the experience and fatigue of the seeker.

Estimating this parameter is very difficult. Performing the relevant experiments requires complex and expensive ones. Publication (Koester, R.J., et al. 2004) describes the rules of conducting and results of the experiments, concerning the collection of data for the estimation of the parameter W for a fixed set of conditions. These tests are not sufficient to determine the values of W for any conditions. However, the presented results may provide a reference point for evaluating the value of the parameter W under different conditions than those described in the report. For illustration purposes, we are quoting selected tables with data from this research. Summary of the determination of the Effective Search Width is presented in (Koester, R.J., et al., 2004)

The following data must be provided for the search planning function:

- area with division into sectors for which an initial classification is made as to coverage (12 types) and corrugation

Table 1: Classification of coverage type for terrain (sector). Own sources

Type of coverage	Type No.	% open	% forest	%swampy	% bushy	% grassy	% watery
open	0	80-100	0-20	0-20	0-20	0-20	0-20
forest	1	0-20	80-100	0-20	0-20	0-20	0-20
swampy	2	0-20	0-20	80-100	0-20	0-20	0-20
bushy	3	0-20	0-20	0-20	80-100	0-20	0-20
grassy	4	0-20	0-20	0-20	0-20	80-100	0-20
watery	5	0-20	0-20	0-20	0-20	0-20	80-100
Open-forest	6	30-50	30-50	0-20	0-20	0-20	0-20
forest-swampy	7	0-20	30-50	30-50	0-20	0-20	0-20
open-bushy	8	30-50	0-20	0-20	30-50	0-20	0-20
grassy-swampy	9	0-20	0-20	30-50	0-20	30-50	0-20
watery-forest	10	0-20	30-50	0-20	0-20	0-20	30-50
watery-bushy	11	0-20	0-20	0-20	30-50	0-20	30-50

- It is determined for certain types of formations (tiraliers, triples) depending on the type of sector coverage and corrugation: the rate of movement of the formation (sweepSpeed) and the effective observation width (sweepWdth). The calculation of the above parameters takes into account the composition of the formation (due to experience). Reference sweepWdth established for a single experienced prospector for particular types of coverings, the following was assumed

0	1	2	3	4	5	6	7	8	9	10	11
142	62	36	62	36	36	106	36	36	36	62	36

The values of sweepWdth and sweepSpeed are calculated using specific procedures.

- The presumed color of the searched for clothing is also taken into account, which has an impact on the reference width of observation by an experienced searcher in a particular type of search area coverage.

The formulation of the search plan optimization task and the method of its solution

The total search area is divided into sub-areas (segments) with homogeneous field characteristics and established probabilities of the object in a given segment. The figure below illustrates a hypothetical, exemplary division of the area into segments.

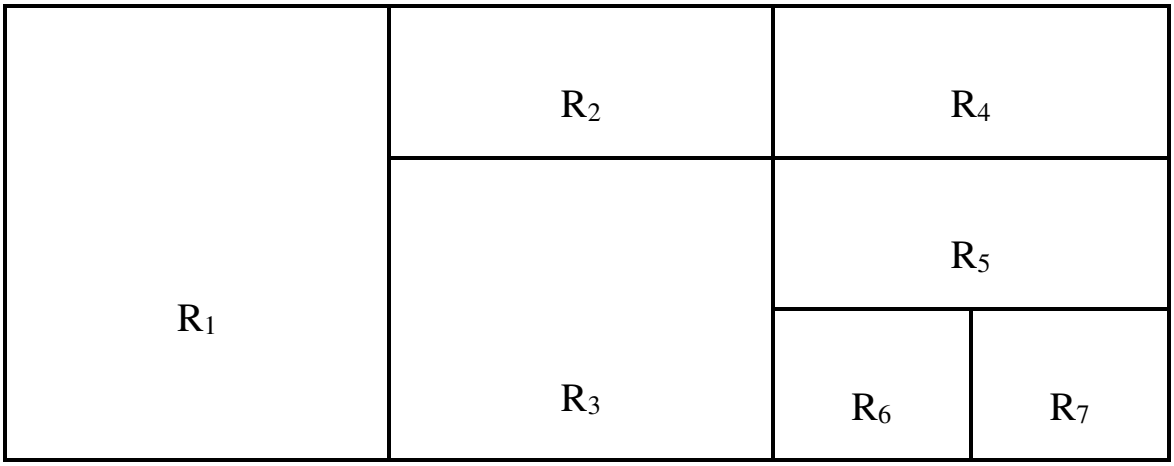

Fig. 9: Example division of the search area into segments (sectors).

R_i – area of the i-th sub-area (sector).

c_i – type of i-th sub-area (sector), $c_i \in C$. $i \in \{0,1,2,\dots,I\}$, I – number of sectors to be searched.

For the sake of completeness we assume that the sectors to be searched are numbered with positive numbers (i > 0), index i = 0 is assigned to an area not subject to search, which complements the search space (the so-called . rest of world).

We assume that the search is carried out by search units (formations) consisting of at least one man, which have specific equipment supporting the detection process. Among the types of search units, we can distinguish:

- a fast three,
- tyralier,
- Dog patrol,
- UAV.

The searches are carried out by the formations in a systematic way, which consists in passing through parallel lanes with a constant distance (the so-called walking) between people and subsequent lanes without the sub-areas already searched in previous positions.

We also assume that human resources are divided in a separable way according to their qualifications (set of qualification indexes $\{1,\dots,N\}$).

Every j-th type of prospecting unit ($j \in \{1,2,\dots,J\}$) we will be characterized by:

- d_j – minimum number of persons,
- u_j – maximum manning,
- s_j – intervals (spacing),
- g_{jn} – minimum number of members nth Qualifications for the entire staff (personnel qualification structure required),
- h_{jl} - required equipment (number of equipment) formation (lth kind of equipment $l \in \{1,\dots,L\}$).

The effectiveness of the search by a particular unit of a particular type can be characterized by a function: $esr(tt,j,a)$ - fan ounce describing the effective rate of search depending on

- t – terrain type,
- j – types of formation,

- $a = [a_n]_{n\in\{1,\dots,N\}}$ – staff structure in terms of qualifications (number of people with specific qualifications).

The decision-making process is described in a sequence of successive stages, in which the search plans are determined as updates to the previous plan. Events determining the moments of start/completion of subsequent stages are end of search in specific sectors or arrival of new forces. A plan update is an engagement of new and/or released forces within the current plan (after taking into account the completion of activities in specific sectors).

We assume that each time we make a decision, we maximize the exploration effort by engaging all available forces in an acceptable (reasonable) manner. Allocated effort in a sector means allocating individuals (with specific qualifications) to specific formations of a particular type (the range of the number of formations of each type operating in that sector is limited to M).

By the search plan $X(t_k)$ at k-th stage (at t_k) we will understand the matrix for allocating the number of people (by qualification) to units (formations) of a certain type for action in the specific sectors.

$$X\left(t_k\right)=\left[x_{ijmn}\left(t_k\right)\right] \tag{3.1}$$

where:

$x_{ijmn}(t_k)$ – the number of qualified individuals assigned to activities within the m-th type formation in the i-th sector as part of the new Phase 1 exploration plan at the time of the t_k.

Searches within the same sector carried out by different units (formations) are carried out in a systematic and coordinated manner, which means that there is no overlap of searched areas within and between stages. The activities at a given stage are carried out in parts of the sector not yet searched.

$SA_i(t)$ – total searched area (checked) in the i-th segment until t. The area of the checked lanes resulting from the way the search was carried out (parallel lanes while keeping the walk).

In view of the assumptions made, the effort $SA_i(t)$ in the sector is arithmetically accumulated (summed up) within a stage and between stages. We can therefore assume that:

$$SA_i\left(t_k\right)=SA_i\left(t_{k-1}\right)+SA_i\left(t_{k-1},t_k\right)=SA_i\left(t_0,t_k\right) \tag{3.2}$$

whereby:

$$SA_i\left(t_{k-1},t_k\right)=\sum_j SR_{ij}\left(t_{k-1}\right)\cdot\left(t_k-t_{k-1}\right), \tag{3.3}$$

$SR_{ij}(t_{k-1})$ – the total pace of checking the lanes of all formations of this type participating in the i-th sector within the plan of the moment t_{k-1}. The value of the total rate is determined from the formula

$$SR_{ij}\left(t_{k-1}\right)=\sum_m sr\left(tt_i,j,x_{ijm}\left(t_{k-1}\right)\right) \tag{3.5}$$

Due to the implementation of activities in parts of the sectors not yet searched, we assume that the effective EC coverage in a given stage is determined in relation to the area of the sector not searched at the beginning of the stage

The probability of detecting an object at the beginning of the k-th stage in the i-th sector over a period of time (t_k, t_{k+1}) based on (2.12) is:

$$POD_i\left(t_k,t_{k+1}\right)=\operatorname{erf}\left(\frac{\sqrt{\pi}}{2}\cdot EC_i(t_k,t_{k+1})\right) \tag{3.6}$$

where:

$EC_i(t_k,t_{k+1})$ – the total effective coverage of the i-th sector over time (t_k,t_{k+1}) is (concerns the part of the sector not yet searched for)

$$EC_i(t_k,t_{k+1})=\frac{ESA_i(t_k,t_{k+1})}{R_i-SA_i(t_k)} \tag{3.7}$$

Total effectively searched area in the i-th sector over time (t_{k-1},t_k) is:

$$ESA_i\left(t_k,t_{k+1}\right)=\sum_j ESR_{ij}(t_k)\cdot\left(t_{k+1}-t_k\right) \tag{3.8}$$

$ESR_{ij}(t_k)$ – the total rate of effective search for all formations of this type participating in the i-th sector within the plan of the moment t_k.

$$ESR_{ij}\left(t_k\right)=\sum_m esr\left(tt_i,j,x_{ijm}\left(t_k\right)\right) \tag{3.9}$$

$x_{ijm}(t_k)$ - vector of personnel (number of people with particular qualifications) of the *m*-th formation

The participants in the *i*-th sector are involved in activities in the i-th sector under the plan from the moment of t_k.

Due to the effects of exploration activities in accordance with the previous (old) exploration plan from the moment of t_{k-1} the probability distribution changes POC. Update of the probability distribution POC is done at the moment as follows:

$$\begin{aligned}POC_i\left(t_k\right)&=\frac{\left(1-\frac{SA_i(t_{k-1},t_k)}{R_i}\right)\cdot POC_i\left(t_{k-1}\right)+\frac{SA_i(t_{k-1},t_k)}{R_i}\cdot\left(1-POD_i\left(t_{k-1},t_k\right)\right)\cdot POC_i\left(t_{k-1}\right)}{\sum_l\left(1-\frac{SA_l(t_{k-1},t_k)}{R_l}\right)\cdot POC_l\left(t_{k-1}\right)+\frac{SA_l(t_{k-1},t_k)}{R_l}\cdot\left(1-POD_l\left(t_{k-1},t_k\right)\right)\cdot POC_l\left(t_{k-1}\right)}=\\&=\frac{POC_i\left(t_{k-1}\right)\cdot\left(1-\frac{SA_i(t_{k-1},t_k)}{R_i}+\frac{SA_i(t_{k-1},t_k)}{R_i}\cdot\left(1-POD_i\left(t_{k-1},t_k\right)\right)\right)}{\sum_l POC_l\left(t_{k-1}\right)\cdot\left(1-\frac{SA_l(t_{k-1},t_k)}{R_l}+\frac{SA_l(t_{k-1},t_k)}{R_l}\cdot\left(1-POD_l\left(t_{k-1},t_k\right)\right)\right)}=\\&=\frac{POC_i\left(t_{k-1}\right)\cdot\left(1-\frac{SA_i(t_{k-1},t_k)}{R_i}\cdot POD_i\left(t_{k-1},t_k\right)\right)}{\sum_l POC_l\left(t_{k-1}\right)\cdot\left(1-\frac{SA_l(t_{k-1},t_k)}{R_l}\cdot POD_l\left(t_{k-1},t_k\right)\right)}.\end{aligned} \tag{3.10}$$

Summary probability of success (for the entire exploration area) for the updated (new) exploration plan over a period of time (t_k,t_{k+1}).

$$POS\left(t_k, t_{k+1}\right) = \sum_i \left(1 - \frac{SA_i(t_k)}{R_i}\right) \cdot POC_i\left(t_k\right) \cdot POD_i\left(t_k, t_{k+1}\right) \tag{3.11}$$

Moment of the current end kth stage (start of stage *k+1*) is determined by the occurrence of an exploration termination event in any sector.

The predicted moment of completion of the current stage can be determined from the formula:

$$t_{k+1} = \min_i \left\{ t_{k+1}\left(i\right) : \sum_j SR_{ij}\left(t_k\right) > 0 \right\}, \tag{3.12}$$

where

$t_{k+1}(i)$ – the closest possible moment of completion of exploration in the i-th sector.

The condition in the above definition of a harvest excludes sectors that do not have a unit allocation under the current exploration plan.

Next minute $t_{k+1}(i)$, in which the entire area will be searched i-th sector We can determine from dependencies:

$$R_i - SA_i\left(t_k\right) - SA_i\left(t_k, t_{k+1}\left(i\right)\right) = 0 \tag{3.13}$$

After the transformations we get:

$$t_{k+1}\left(i\right) - t_k = \frac{R_i - SA_i\left(t_k\right)}{\sum_j SR_{ij}\left(t_k\right)} \tag{3.14}$$

Determining the current, initial (base) search plan $\bar{X}(t_k)$ and the human resources available $Z_n(t_k)$ resulting from the potential termination of activities in specific segments or the arrival of new forces.

$$\bar{x}_{ijmn}\left(t_k\right) = x_{ijmn}\left(t_{k-1}\right) \cdot b_i\left(t_k\right) \tag{3.15}$$

$$Z_n\left(t_k\right) = \sum_{i,j,m} x_{ijmn}\left(t_{k-1}\right) \cdot \left(1 - b_i\left(t_k\right)\right) + \Delta Z_n\left(t_k\right) \tag{3.16}$$

$$B(t_k) = \left[b_i\left(t_k\right)\right] \tag{3.17}$$

$B(t_k)$ – binary vector informing about the continuation or completion of the search in the i-th sector according to the old assignment. A value of 0 means the end of exploration in a given sector, which results in zeroing the effort allocation to that sector within the framework of updating the previous plan and returning the released resources to the available pool.

$\Delta Z_n(t_k)$ – new forces arrived at the moment t_k (vector by qualification).

The problem

The goal is to maximize the probability of success within a specific time horizon determined by the moment t(k+1) of the nearest event resulting from the planned (forecasted) completion of the search in any segment.

Input data:

- Current initial search plan $\bar{X}(t_k)$ (after the update related to the completion of activities in selected sectors).
- A set of search sectors together with the current probability of the object being located in this area $POC_i(t_k)$.
- $\Delta Z_n(t_k)$ – new forces arrived at the moment t with a breakdown of your qualifications.
- $B(t_k)$ – binary vector informing about the state of search in the sectors.
- Characteristics of search unit types
- Function describing the effective rate of search depending on the type of unit, personnel structure, type of terrain.
- $H_l(t_k)$ – current, available equipment of the l-type.

Decision variables:

- $Y(t_k)$ – additional allocation of people within the new units (formation) to sectors based on available resources.

Criterion function:

$$\max_{Y(t_k)} \rightarrow POS\left(t_k, t_{k+1}\right) \tag{3.18}$$

Restrictions:

1. The new search plan is a modification of the previous plan, taking into account the completion of work in specific sectors and adding new allocations of forces

$$x_{ijmn}\left(t_k\right) = \overline{x}_{ijmn}\left(t_k\right) + y_{ijmn}\left(t_k\right) \tag{3.19}$$

2. No modification of the allocation for operating units according to the previous plan

$$\forall\left(i, j, m\right)\left[\sum_n \overline{x}_{ijmn}\left(t_k\right) > 0 \Rightarrow y_{ijmn}\left(t_k\right) = 0\right] \tag{3.20}$$

3. The overall effort allocated must be met by available human resources with established qualifications n

$$\forall_n \sum_{i,j,m} y_{ijmn}\left(t_k\right) \le Z_n\left(t_k\right) \tag{3.21}$$

4. Each formation of a particular type assigned at a given stage to a particular sector must comply with the manning constraints

$$\forall\left(i, j, m\right)\left[\sum_n y_{ijmn}\left(t_k\right) \le u_j\right] \tag{3.22}$$

$$\forall\left(i, j, m\right)\left[\sum_n y_{ijmn}\left(t_k\right) \ge d_j\right] \tag{3.23}$$

5. Each formation of a particular type assigned at a given stage to a particular sector must meet the restrictions on the qualification structure of members

$$\forall(i,j,m,\tilde{n})\left[\frac{y_{ijm\tilde{n}}(t_k)}{\sum_n y_{ijmn}(t_k)} \geq g_{j\tilde{n}}\right] \tag{3.24}$$

6. For each formation of a particular type assigned at time t, the required equipment must be provided

$$\forall(l)\sum_{i,j,m} e_{ijm}(t_k)\cdot h_{jl} \leq H_l(t_k) \tag{3.25}$$

$$e_{ijm}(t_k) = \begin{cases} 1 & : \quad \sum_n y_{ijmn}(t_k) > 0 \\ 0 & : \quad \text{otherwise} \end{cases}$$

7. A single additional allocation must not be negative

$$y_{ijmn}(t_k) \geq 0 \tag{3.26}$$

The idea of an algorithm to find the best search plan

The idea of the algorithm is based on a two-level search of the solution space. The first level concerns the allocation of units of a specific type to specific sectors (the space of two-dimensional binary arrays). Searches within this space are performed through a full overview. Then, in a given step for a fixed allocation of units to sectors, a solution search is performed on the second level, which concerns the allocation of human resources with different qualifications to units within their overall allocation.

Within the second level of solution search, in the first step a preliminary, even distribution of human resources to units is made. It consists of iterative allocation of one person with the given qualifications (starting with the highest) to each unit with minimum and maximum staffing requirements. The solution is evaluated and becomes the starting point for a search of your nearest neighbourhood. The closest neighbourhood is determined by:

- a single exchange of an experienced person for an inexperienced one for a fixed pair of units or
- a single transfer of a person between a fixed pair of units.

If a given neighbourhood is better with an output (central) solution, it becomes an output (central) solution and searches move to a new neighbourhood. The searches end when the current, best output (central) solution does not have a better closest neighbour.

The best solution found locally is compared to the current best solution within the human resources allocation under test. When it is better, it replaces the current best solution.

Applications and Experimentation

After the development of the methods and integration with Geo-localization server we have the following procedure of runtime:

(1) On the tab "Actions", add a new action as a type by specifying "Open area search".

(2) Go to the system tab and start the geo-location module form.

(3) Loading the search segment by sector with sector coverage classification and POC (POA) filling - using a calculator or manually.

(4) Introduction of personal resources, divided into experienced and inexperienced ones.

(5) Designation of a search plan (allocation of a certain number of types of search formations (fast triples or tyraliers (extended lines)) with their composition in terms of the number of experienced and inexperienced individuals in each sector).

(6) Calculation for each sector: effective land cover and effective search rate and probability of detection in each sector.

(7) Reading the results. – allocation of formations to the sectors.

Expected result:

- Application launched.
- Launched form for entering people search issues with a new action of the type "Open area search" added.
- Launched geo-location and search planning module with a marked point indicating the last known location.
- Displaying the area according to the entered parameters.

After switching on the CESAR system, we have a number of possibilities to plan searches in the area outside the city or in urban parks and forests.

Display of map in CESAR (geo-localization server):

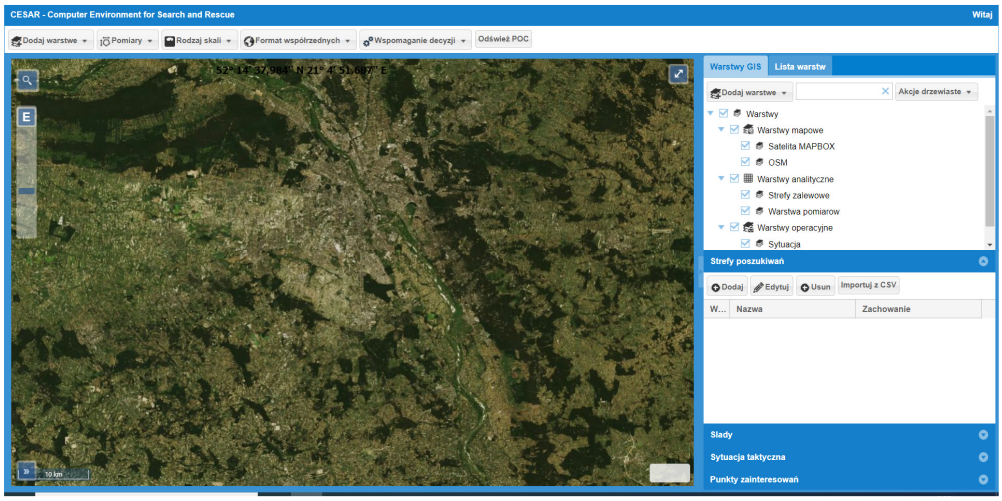

Fig. 10: CESAR screen.

Introducing a case from the main application:

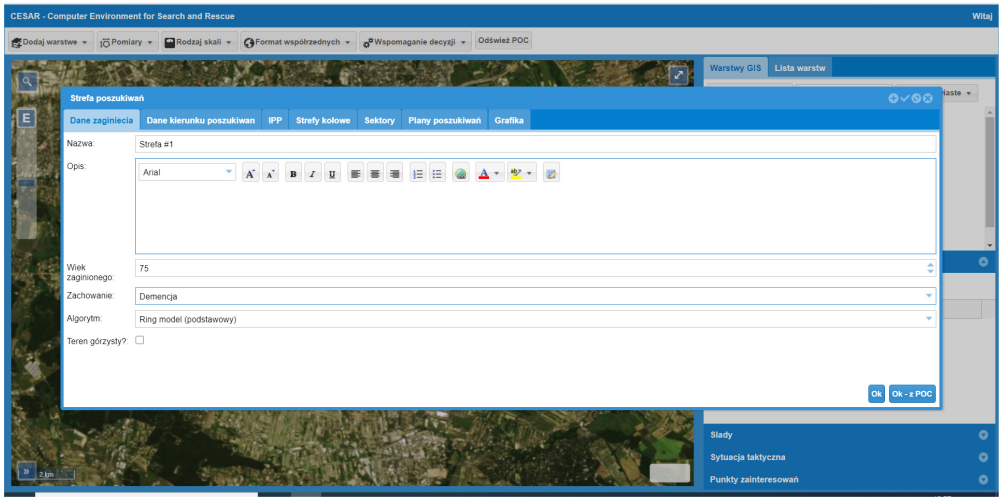

Fig. 11: Case of search.

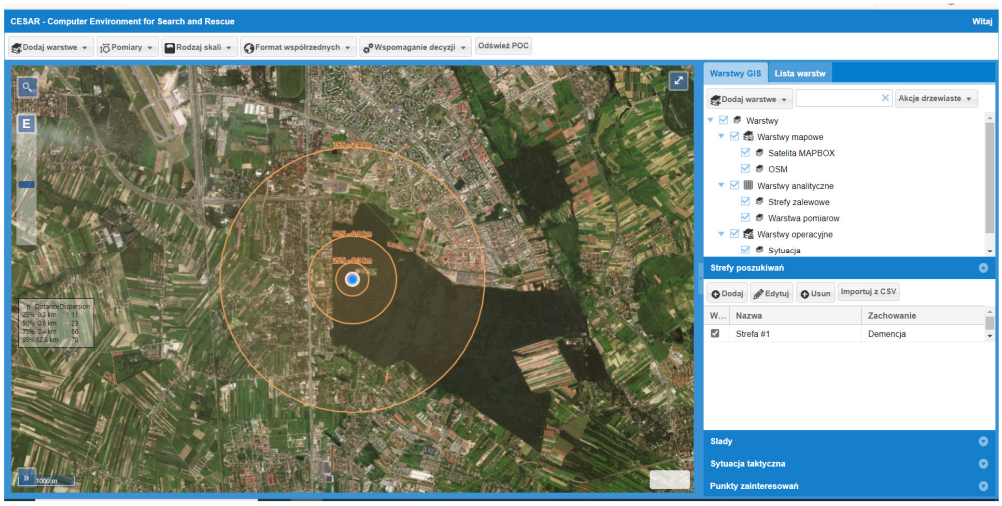

Fig. 12: Location of IPP

Introduction of search sectors in the selected area.

Sector 1:

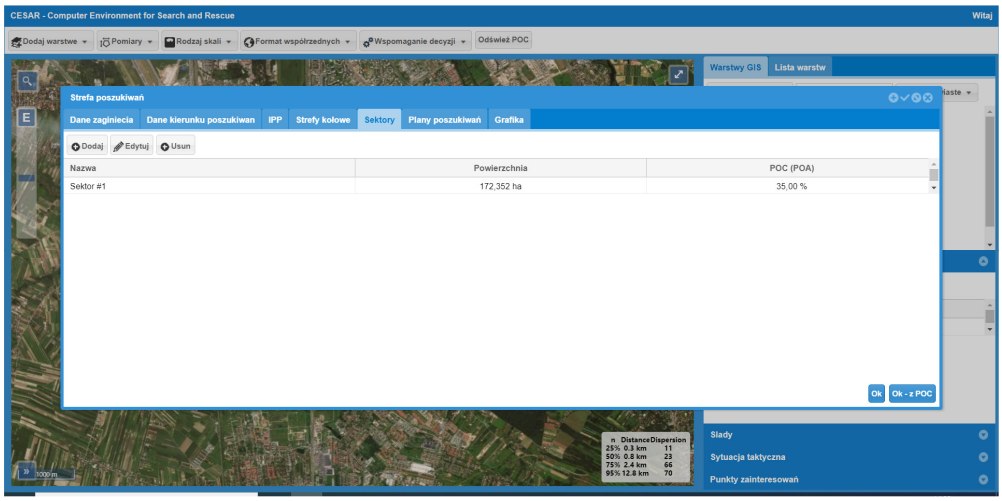

Fig. 13: Sector determination and description

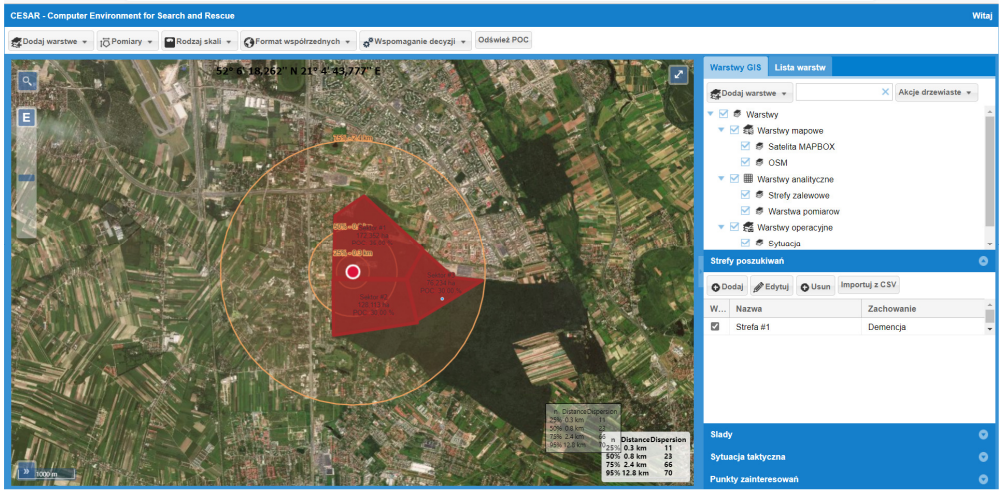

Fig. 14: Sector visualization

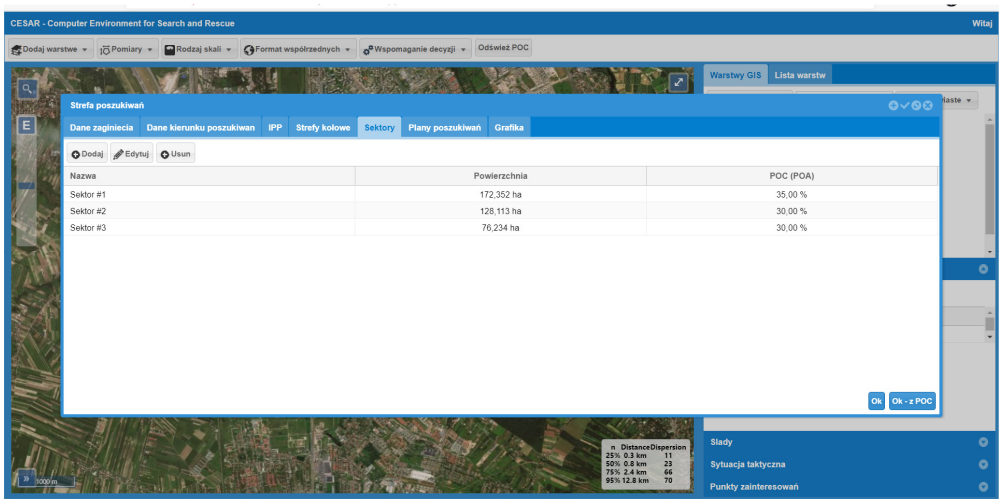

Fig. 15: Sectors of search with parameter probability of being missing in the area (POC (POA))

Moving to planning - 1 stage:

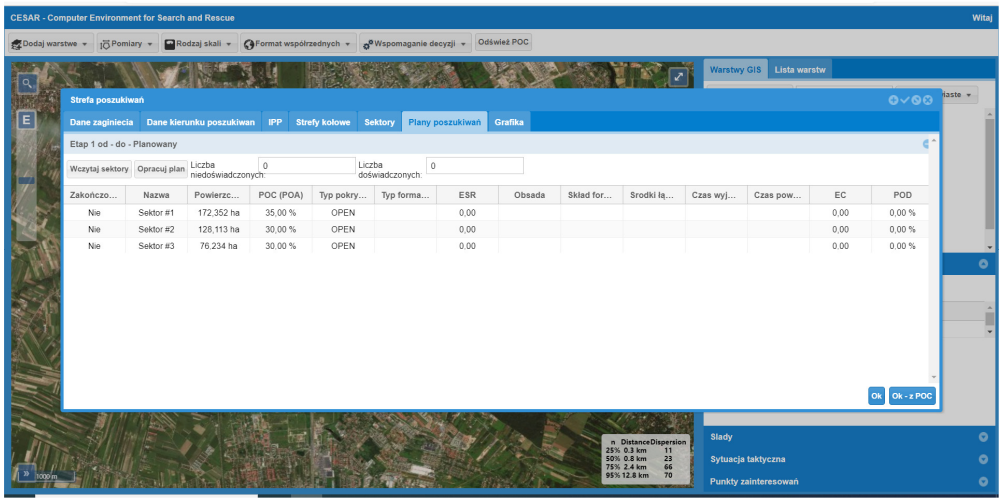

Fig. 16: Planning of search table.

Filling in personal resources:

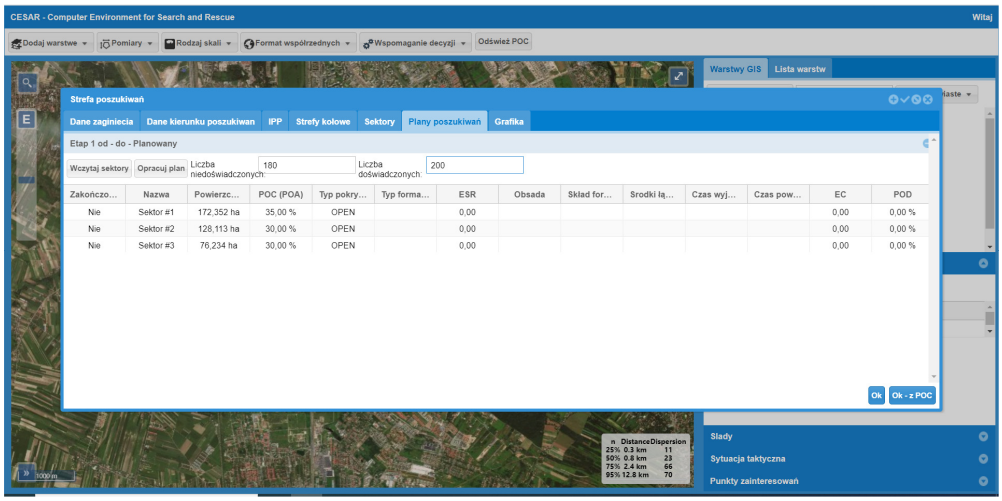

Fig. 17: Planning of search table - resources determining.

Start planning - develop a search plan:

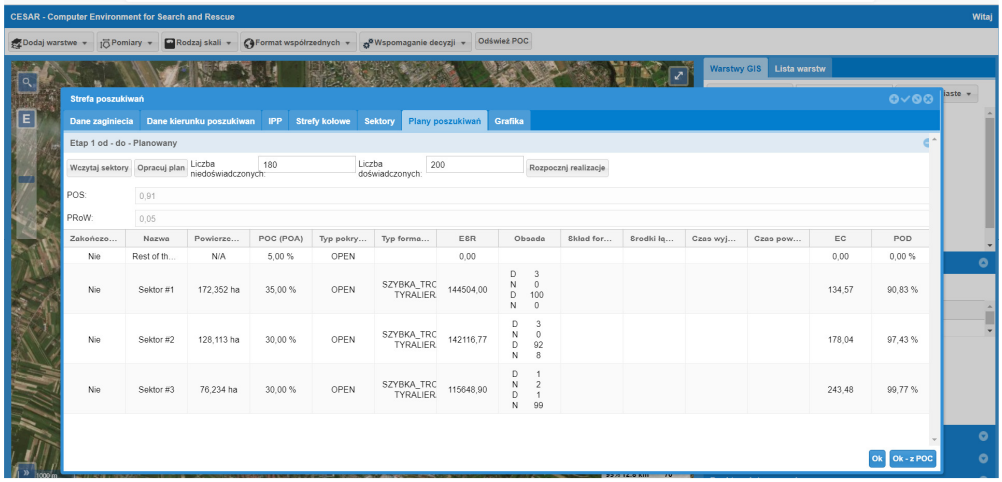

Fig. 18: Allocation plan.

Start of plan implementation in stage 1:

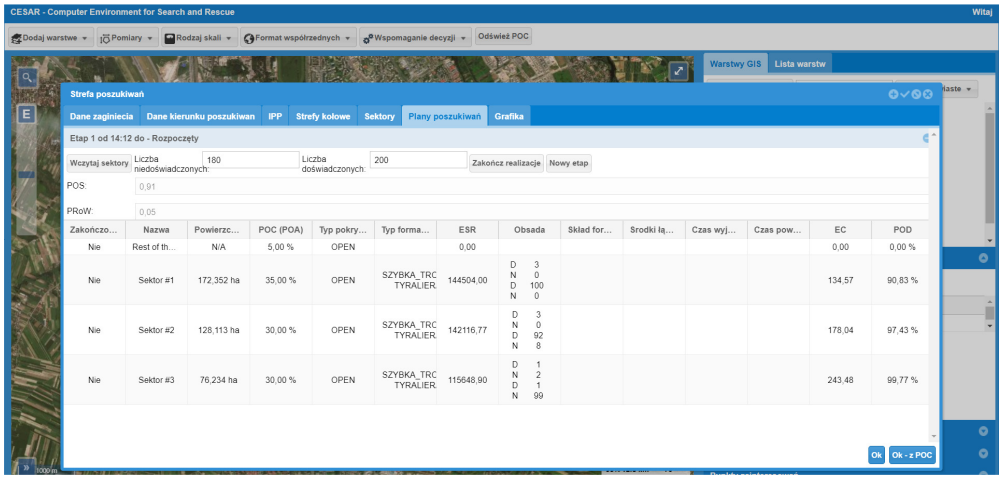

Fig. 19: Implementation of the exploration plan in stage 1.

Completion of stage 1:

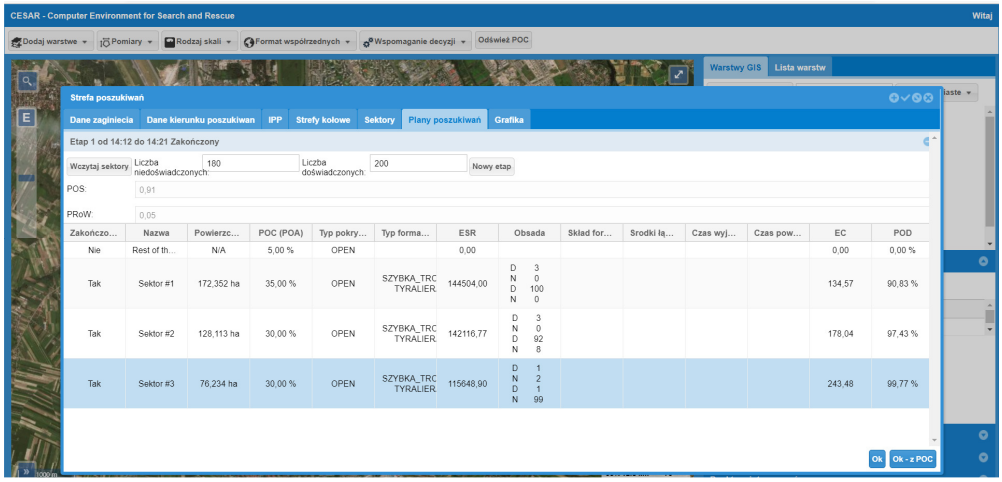

Fig. 20: Completion of the exploration plan in stage 1.

Start planning the second stage:

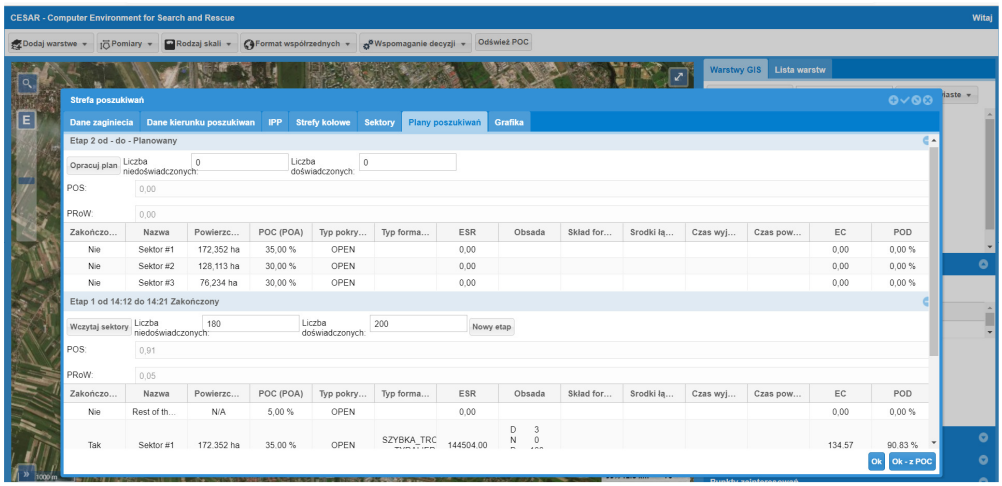

Fig. 21: Allocation plan. Stage 2- beginning .

Stage 2 planned:

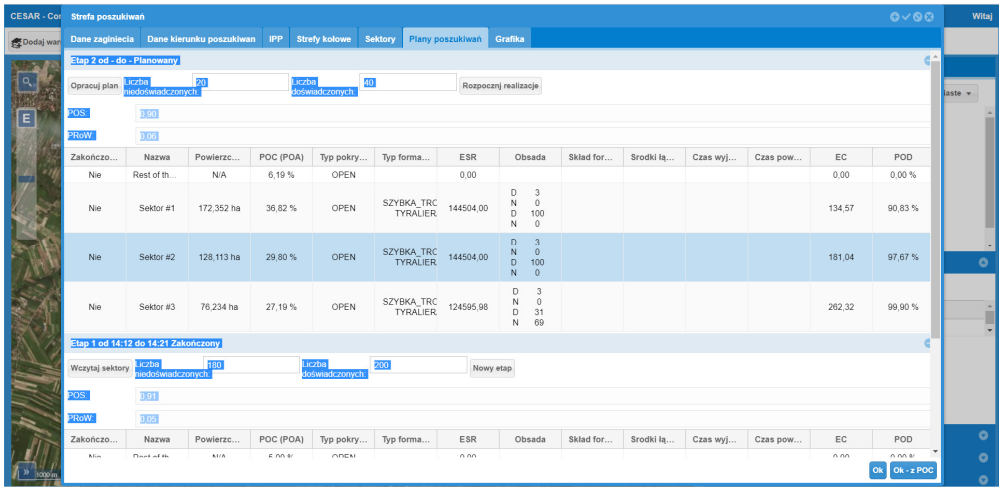

Fig. 22: Allocation plan. Stage 2- decision.

The implementation of the plan has begun:

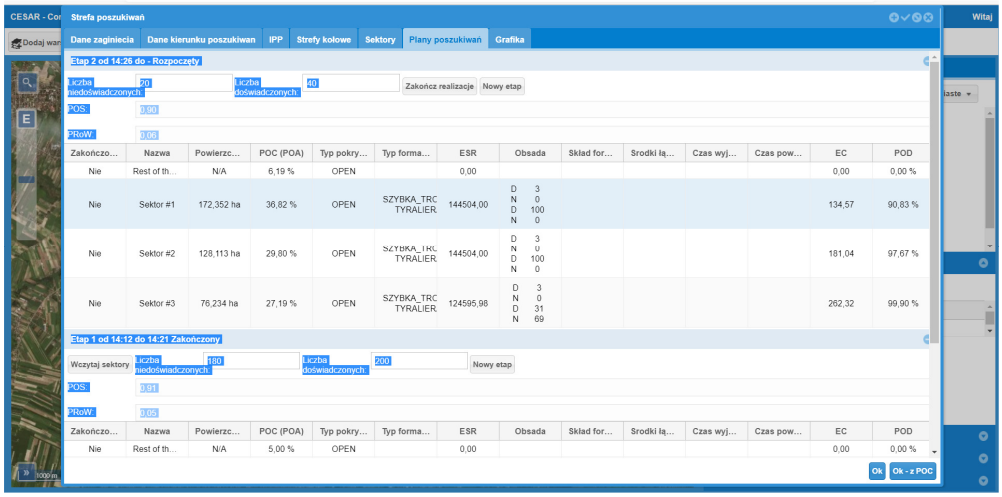

Fig 23: Implementation of plan - stage 2.

New forces arrived and the 3rd stage was planned:

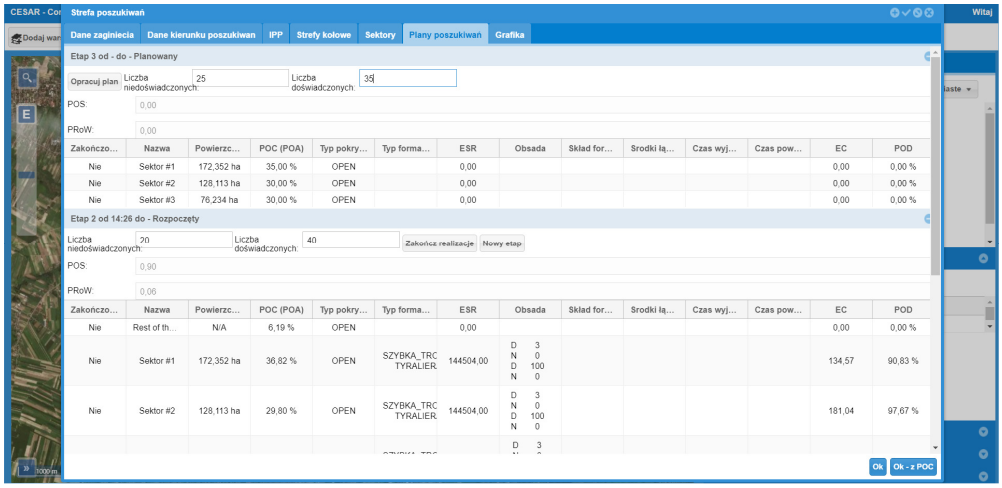

Fig. 24: Stage 3 - new forces arrived.

Stage 2 completed and stage 3 planned:

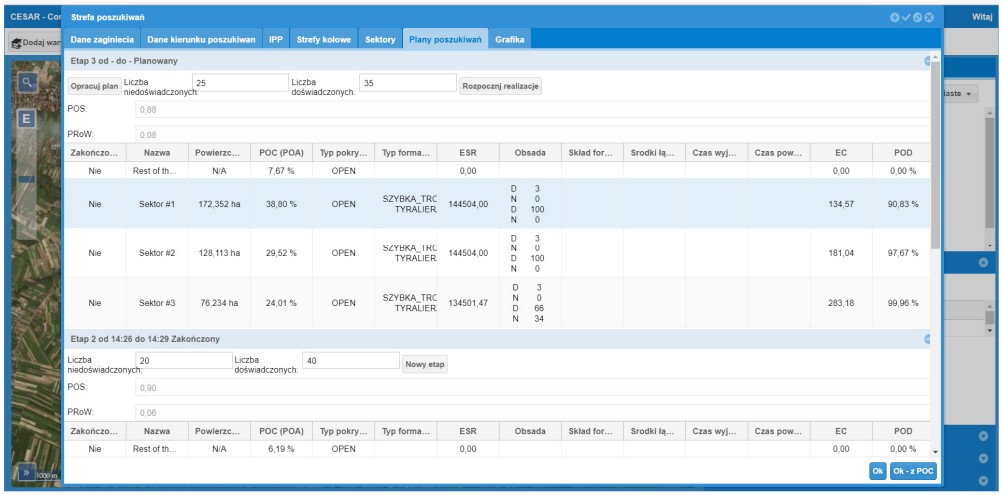

Fig. 25: Stage 2 completed, stage 3 planned.

The 3rd stage has been started:

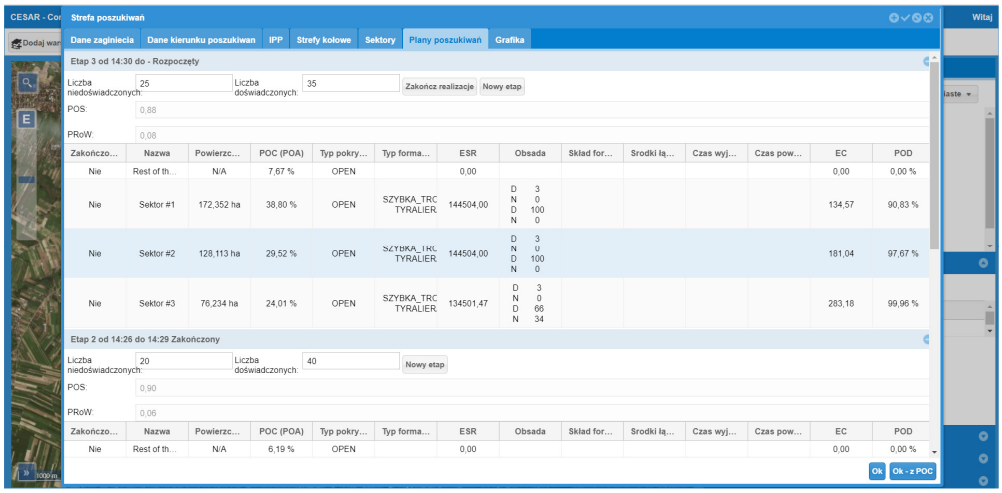

Fig. 26: Implementation of plan - stage 3.

End of the search:

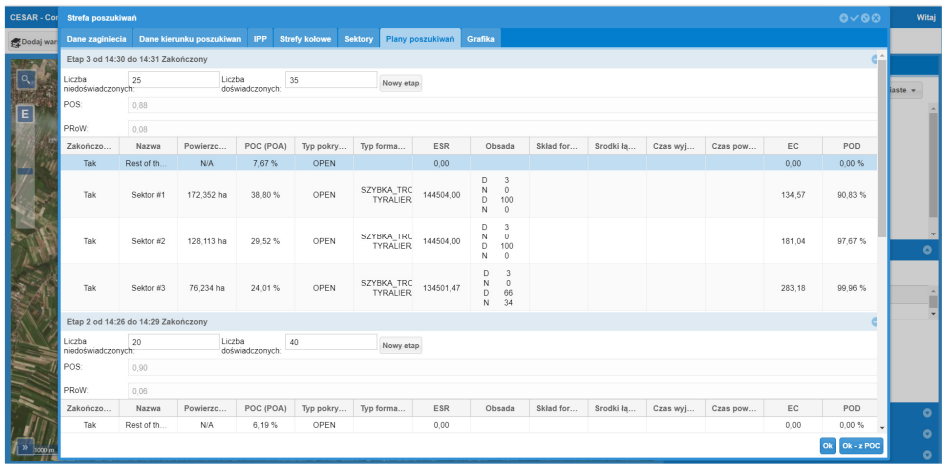

Fig. 27: Completion of stage 3. End of search.

The planning and implementation sequence is presented. Accelerated time demonstration.

Conclusions and Recommendations

The presented article about the search planning function gives the basis for the implementation of calculation methods, based on the terrain model with the assumed accuracy of square mapping and using the experimental data for determining the value of the effective search width W for given search sectors and appropriately selected search units. The algorithms should be tested on data close to real or real. Such data should be obtained as a result of analysis of real cases or as a result of an interview with police representatives participating in the missing people's search.

Acknowledgements

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Innovative and Investment Development of The Russian Federation: Regional Aspect

Anastasia Kurilova
0000-0003-1540-5388, Togliatti State University, Togliatti, Russian Federation
aakurilova@yandex.ru

Anna Kiryushkina
0000-0003-3690-9104, Togliatti State University, Togliatti, Russian Federation,
anka-kiryushkina@mail.ru

Sofia Savenkova
Educational Center «Shkola», Togliatti, Russian Federation,
aakurilova@yandex.ru

Abstract

Innovative and investment development of territories is an important element in the development of the country's economy. The article examines the factors that influence the investment and innovative development of the regions of the Russian Federation. The degree of influence of factors is determined through the construction of an econometric model. Modeling is carried out through the Gretl 1.9.11 software product using the least squares method.

Keywords: Innovative Development of Territories, Investment Development of Territories, Regional Economic Development.

Introduction

The issues of innovative and investment development of the economy at various levels are quite relevant at the present time. Many researchers consider this issue at the level of development of countries. And only a small proportion of foreign and Russian authors study innovative and investment development at the level of the constituent entities of the Russian Federation.

Domestic scientists and analysts in their predominantly theoretical designate the factors that influence or determine the innovative and investment development of the region. And only a few researchers prove the impact on investment activity using the mathematical apparatus. Note that, as a rule, the authors study the innovative or investment development of regions or regions that are part of one federal district. Institutional traps of innovative and investment activities are a serious obstacle on the path to well-balanced development of modern Russia's regions. Practice of economic players functioning shows that the regions lacking clear strategic orientation toward capital creation and increase are not capable to generate and maintain the key factors of success in competitive struggle.

Formulation of the problem

In recent scientific studies using economic and mathematical models as the most frequently used factors influencing the innovative and investment development of regions, such factors are identified as: - indices of the physical volume of the gross regional product; - dynamics of labor productivity; - the number of advanced technologies used; - the volume of innovative products, works and services in industrial production; - the cost of technological innovation in industrial production;- unemployment rate;- the proportion of industrial organizations that carry out technological innovations; - budgetary funds aimed at financing innovation.

It is interesting that the economic and mathematical models obtained by the researchers do not allow to fully determine the entire range of factors that influence the level of innovation and investment development of the subjects. The results of such scientific works reflect a high degree of dependence of innovative and investment development on

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budget financing and do not show the possibility of dependence on other sources and instruments of financing.

The purpose of this study is to identify the factors influencing the investment and innovative development of the constituent entities of the Russian Federation. The article uses the methods of a systems approach, analysis, synthesis and modeling. Modeling was carried out using the Gretl 1.9.11 software product using the least squares method.

Results

According to the analysis of publications and statistical data of all regions of the Russian Federation in the field of innovation and investment development and areas adjacent to it, it was proposed to use a number of other factors that, in the opinion of the authors, are influencing innovation and investment activities. The volume of innovative goods, works, services is proposed as an explained variable. This indicator is the most objective indicator of the innovative and investment development of territories. Let's take a closer look at each proposed factor.

In domestic publications, the indicator is considered - the cost of technological innovation in industrial production. However, innovations are applied not only in industrial production. Therefore, as the first explanatory variable, the model includes an indicator of a wider scope, namely, the cost of technological innovation of organizations. It allows you to consider the cost of technological innovation in all areas of production and activities.

The next factor is internal expenditures on research and development in the constituent entities of the Russian Federation. It reflects the actual cost of carrying out research and development in the country. Their assessment is based on statistical accounting of the costs of carrying out research and development by organizations' own forces during the reporting year, regardless of the source of funding.

Since innovative activity is a type of activity associated with the transformation of ideas (usually the results of research and development or other scientific and technical achievements) into technologically new or improved products or services introduced on the market, into new or improved technological processes or production methods (transmission) services used in practice, the internal volume of expenditures on research and development should have a significant impact on the level of innovative development as a whole.

Due to the presence of an obvious relationship between research, development and innovation, it is necessary to check the degree of influence on innovation activity and such an indicator as - the number of personnel engaged in research and development, by category for the constituent entities of the Russian Federation. We believe that this indicator is more appropriate than the indicator - the unemployment rate used by many domestic scientists.

According to the above, it is also necessary to check the degree of influence on the innovative activity of the indicator that determines the proportion of organizations that carried out technological, organizational, marketing innovations. The level of innovative activity is defined as the ratio of the number of organizations that carried out technological, organizational or marketing innovations to the total number of organizations surveyed for a certain period in the region.

The scientific works of domestic scientists do not reflect the fact that there is a possible dependence of the innovative and investment development of territories on the investment potential. As a rule, the work of scientists is reduced to the study of joint innovation and investment development of territories.

We consider it necessary to check the dependence of innovation on investment in the same territory. The indicator chosen as an index of investment development, was - the share of the investment potential of the region in the all-Russian potential. Information about this can be found on the website of the rating agency "Expert RA". Note that the methodology for calculating this indicator is public.

The agency publishes an annual report with ratings and stages of its determination for all Russian regions. An important aspect is that it is accredited by the Central Bank of the Russian Federation. Currently, the Central Bank of the Russian Federation has accredited only five agencies.

In the process of calculating the investment potential of the constituent entities of the Russian Federation, the rating agency "Expert RA" also determines the factors directly related to the innovative potential of the regions. Therefore, the model included the following indicator - the rank of the region's innovative potential.

Domestic scientists in their studies point to the existence of a direct relationship between innovation and investment activities and the amount of budgetary funding [15-20]. Therefore, the model included a factor that is directly related to budget financing: budget expenditures of a constituent entity of the Russian Federation for applied scientific research in the field of national economy.

Thus, the model includes factors that, for the most part, were not used in the study of innovation and investment development using mathematical modeling. Several factors have been replaced with more appropriate ones or taking into account more activities.

Note that the initial data for the construction of this model were the official statistics, the analytical portal of the Ministry of Finance of the Russian Federation, the website of the Federal Treasury and the website of the Expert RA rating agency.

The study used a sample of 415 observations of the above indicated indicators for the period from 2015 to 2019 of all constituent entities of the Russian Federation. The parameters of the model are estimated using the least squares method. Modeling was performed using the Gretl 1.9.11 software product. The simulation results are presented in the form of the formula (1):

$$Y = -4921{,}66 + 1{,}88 * X1 + 1{,}02 * X2 + 0{,}01 * X3 + 1176{,}3 * X4 + 790{,}01 * X5 - 58{,}27 * X6 - 68{,}83 * X7 + 24{,}28 * X8 , \quad (1)$$

where Y - the volume of innovative goods, works, services, million rubles.

X1 - the cost of technological innovation of organizations, million rubles;

X2 - internal expenditures on research and development in the constituent entities of the Russian Federation, million rubles;

X3 - the number of personnel engaged in research and development, by category for the constituent entities of the Russian Federation, people;

X4 - the proportion of organizations that have carried out technological, organizational, marketing innovations, %;

X5 - the share of the investment potential of the region in the all-Russian potential, %;

X6 - the rank of the region's innovative potential;

X7 - the rank of the investment potential;

X8 - budgetary expenditures on applied scientific research in the field of the national economy, million rubles.

In the resulting model, the coefficient of determination (R-squared) is approximately 0.75. This indicates the average quality of the model. Fisher's criterion (F-test): Fact = 193.99> Ftab. The obtained value of the Fisher criterion reflects the statistical significance of the regression equation, as well as the possibility of its application for the analysis and forecasting of economic processes.

Furthermore, the statistical significance of the regression parameters was checked by the Student's test. The results of the tests revealed that the regression coefficients for the factors X1, X2, X4 are statistically significant, and the rest are not. Similar findings were obtained by using the built-in function of the program "Sequential elimination of redundant variables", supporting the conclusion about the need to exclude variables X3, X5, X6, X7, X8.

Next, a model was built using the least squares method after excluding statistically insignificant factors. The simulation results are presented in the form of the formula (2):

$$Y = -4909{,}54 + 1{,}92 * X1 + 1{,}03 * X2 + 1194{,}13 * X4 \quad (2)$$

In the resulting model, the coefficient of determination (R-squared) is approximately 0.8, which indicates that this model approximates the data well enough and can be used in the analysis and forecasting process. Fisher's test (F-test) also confirms the statistical significance of the regression equation.

Next, we examined the statistical significance of the regression parameters and checked it for multicollinearity. The value of the Student's test indicates that the X4 factor is significant with a probability of 95%, and the X1 and X2 factors - with a probability of 99%. There is no multicollinearity.

As a result of the tests carried out, the model can be recognized as correct and is a theoretical proof of the existence of a relationship between the volume of innovative goods, works and services produced in the country and specific economic indicators.

It should be noted that when constructing the model, the principles of a limited number of factors were taken into account (since with too many factors, the practical value of the model in the form of its ability to reflect the patterns of development of the studied processes decreases) and simplicity of the model (too complex dependencies on a limited time interval can to the detriment of the main to a greater extent reflect the secondary relationships between variables).

Conclusions

Having analyzed the regressors of this model, the following conclusions can be drawn:

1) An increase in the cost of technological innovation of organizations by 1 million rubles. leads to an increase in the production of innovative goods, works, services by 1.99 million rubles, thus acting as a significant factor in increasing the innovativeness of the economy;

2) The internal costs of research and development have a similar effect - as a result of their increase by 1 million rubles. the growth of the volume of produced innovative goods, works, services by 0.93 million rubles;

3) In direct proportion to the volume of innovative goods, works, services, an increase in the proportion of organizations that have carried out technological, organizational and marketing innovations affects.

Currently, the country's innovation and investment system are fragmented, which limits its development even in the face of improved infrastructure. Thus, government initiatives and, accordingly, funding are aimed primarily at industries that can provide a limited impact on the economy (education, science, development of an innovative environment). The transformation of products developed within the framework of state-funded projects into competitive and commercialize ones is difficult due to the low interest of private business in using innovations as the main factor of production and a source of growth.

The share of private funding in R&D spending is low. At the same time, the lack of innovative activity on the part of private companies leads to their loss of positions in competitive markets and the separation of scientific developments from what is required by business.

Small and medium-sized businesses are poorly involved in the creation of innovative goods, works and services, which do not have enough own funds to modernize production and implement innovations and have limited access to financing markets.

In connection with the above, the key factors in the formation of an innovative model of the economy are government efforts to increase the innovation and investment activity of large business. This will create a synergistic effect together with ongoing initiatives to support education and science, as well as the development of financing instruments and simplify access to them, which will make the innovation and investment market more competitive, as well as increase the level of innovation and investment development of the territories.

In the study, a model was built, which is recognized as correct and is a theoretical proof of the existence of a relationship between the volume of innovative goods, works and services produced in the country and specific economic indicators. The list of factors influencing the investment and innovative development of territories remains incomplete and needs further research.

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Current State and New Directions of Activity of Islamic Financial Organizations in The World Economy

Aliskerov Murad
Kazan Federal University, Kazan, Russian Federation, spodvijnik051@mail.ru

Ajdar Ajupov
0000-0003-2139-1859, Kazan Federal University, Kazan, Russian Federation, a.a.ajupov@gmail.com

Anastasia Kurilova
0000-0002-1943-5675, Togliatti State University, Togliatti, Russian Federation, aakurilova@yandex.ru

Kirill Kurilov
0000-0003-1540-5388, Togliatti State University, Togliatti, Russian Federation, KY.Kurilov@gmail.com

Abstract

Islamic finance has been showing growth in turnover for several decades, and most experts predict positive dynamics in the future. This is due to a number of factors, in the first place, the rapid growth of the Muslim population, which is growing at a significant rate and by 2050 will amount to 2,494 million people. Also, in addition to the population, the economic power of the Muslim states is also growing, which is expressed in the growth in the volume of GDP that is created in the Muslim states. The data reflecting the GDP indicator shows that compared with 1913, the GDP of the Muslim world has grown from 1.5% of the world GDP in 1913 to 10.2% of the total GDP in 2011. In order to forecast and assess the development of Islamic finance, it is important to assess the dependence of the main indicator, reflecting the scale of development of the Islamic financial system - the total assets of Islamic banking on other indicators. The dependence of these indicators is supposed to be determined based on the formation of a correlation-regression model. Based on the model obtained, the following conclusions can be drawn about the influence of such indicators as the number of banks, the number of Muslim population, as well as the number of countries in which Muslim banking operates.

At the same time, in a number of Muslim countries there are problems associated with various political and social crises that periodically occur in Muslim countries. In a number of countries such as Syria, Afghanistan, Iraq there is a civil war. This hinders the development of Islamic finance and the economy in general. The COVID-19 pandemic has had a huge impact on economic development. In this regard, it is relevant to assess the current state and possible new areas of activity of Islamic financial organizations in the world economy.

Keywords: Islamic Finance, GDP, Financial Instruments, Sukuk, Banking, Regression, Correlation, Microfinance, Digital Technologies

Introduction

Islamic finance has been showing growth in turnover for several decades, and most experts predict positive dynamics in the future. This is due to a few factors, in the first place, the rapid growth of the Muslim population, which is growing at a significant rate and by 2050 will amount to 2,494 million people (Gorohov, 2014). Also, in addition to the population, the economic power of the Muslim states is also growing, which is expressed in the growth in the volume of GDP that is created in the Muslim states. The data reflecting the GDP indicator show that compared to 1913, the GDP of the Muslim world has grown from 1.5% of the world GDP in 1913 to 10.2% of the total GDP in 2011 (Gorohov, 2014).

One of the innovations that ensured the growth of Islamic finance was the issuance of bonds such as sukuk, the growth rate of which is constantly growing. This indicates the widespread use of this tool for attracting investment in projects of a state or even interstate scale (Islamic Development Bank, 2018).

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The concept of sukuk is based on the refusal to charge interest when issuing borrowed funds and is justified by a general lock (riba) on loan interest in force in Muslim countries. (Gafarof, Kurilov, Kurilova, 2016; Nomani, 2006). The largest share in Islamic finance is played by such a key player in the Islamic finance market as the Gulf Cooperation Council, which includes countries such as Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. This region accounts for 45.4% of the total share of Islamic finance (Islamic Financial Service Board, 2019). The second place is occupied by the Middle East region (excluding GCC) and South Asia with a share of 25.9%.

The third place in terms of total assets and financial transactions is held by the South-East Asia region, which has a 23.5% share of the total assets and transactions in the Islamic world.

Africa ranks last in total financial transactions in terms of assets and financial transactions, with a share of 1.6% (Islamic Financial Service Board, 2019).

As for the issue of sukuk as a type of financial instrument, Malaysia is the leader among Muslim countries with the volume of issuance of sukuk bonds in the amount of $ 6.22 billion, or 47.62%.

Next are the countries of the Gulf Cooperation Council: Saudi Arabia - $ 3.50 billion, or 26.74%, the United Arab Emirates - $ 2.12 billion, or 16.26%, Kuwait - $ 500 million or 3.83% and Qatar - $ 497 million, or 3.81%. In the same period, the top five major industries included oil and gas ($ 2.30 billion in transactions), utilities and electricity ($ 2.30 billion in transactions), real estate ($ 1.94 billion in transactions). dollars), transportation (amount of transactions - 1.84 billion dollars), telecommunications (amount of transactions - 1.54 billion dollars).

It should be noted that the volume of assets and banking operations in the Islamic financial system is growing rapidly. Thus, according to the state in 3Q19, Islamic banking assets increased by 12.7% and amounted to 72.4% of the total volume of Islamic banking assets and operations. Transactions in securities, including sukuk and funds, increased by 23.5%, while the share of Muslim insurance increased by 3.2%. At the same time, the share of insurance operations in Islamic finance is still insignificant, about 1.1% of the total volume of operations and assets (Islamic Financial Service Board, 2019).

Formulation of the problem

In order to forecast and assess the development of Islamic finance, it is advisable to assess the dependence of the main indicator reflecting the scale of development of the Islamic financial system - the total assets of Islamic banking on other indicators.

Table 1: Dynamics of indicators of development of Islamic banking, prepared by the authors based on data Islamic Financial Service Board, 2019; Gorohov, 2014; Vagitov & Igonina, 2014.

Year	Total assets of Islamic banking, billon USA doll.	Number of Islamic banks, units	Number of Islamic windows, units	Muslim population, million people	Number of countries where Islamic banking operates, units
2007	505	362	163	1235	39
2008	639	420	194	1359	44
2009	822	435	197	1547	49
…	…	…	…	…	…
2019	1768	644	238	1986	62

To assess the dependence of the total assets of Islamic banking, we will use indicators such as the number of Islamic banks, the number of Islamic windows (units serving visitors in accordance with Sharia norms), the number of Muslim population, etc., the number of countries in which Islamic banking operates. The data presented in Table 1 were obtained based on data published by the Islamic Financial Service Board, 2019; Gorohov, 2014; Vagitov & Igonina, 2014, as well as their own forecasts and calculations.

Results

The performed calculation of the correlation of the indicators indicated in table 1 to the total assets of Islamic banking made it possible to obtain a matrix of paired correlation coefficients in table 2.

Table 2: Pairwise correlation coefficient matrix

Index	Total assets of Islamic banking, billon USA doll. (Y)	Number of Islamic banks, units (X1)	Number of Islamic windows, units (X2)	Muslim population, million people (X3)	Number of countries where Islamic banking operates, units (X4)
Total assets of Islamic banking, billon USA doll. (Y)	1				
Number of Islamic banks, units (X1)	0,990	1			
Number of Islamic windows, units (X2)	-0,745	-0,781	1		
Muslim population, million people (X3)	0,983	0,974	-0,673	1	
Number of countries where Islamic banking operates, units (X4)	0,976	0,965	-0,623	0,992	1

Analyzing the data of the matrix of paired correlation coefficients, we can conclude that there is a strong positive relationship (more than 0.97) between the total assets of Islamic banking, the number of Muslim population and the number of countries in which Muslim banking operates. The number of Islamic windows in which Muslims are serviced according to Sharia law, according to Table 2, has a negative value (-0.745) on the total assets of Islamic banking. Such a negative relationship is associated with an insufficient number of observations, since an increase in the availability of services for the Muslim population would lead to the opposite result, i.e. growth of bank assets.

In a study of Islamic banking conducted by Vagitov & Igonina, 2014, similar data were obtained. However, the level of dependence on the main indicators was lower and did not exceed 0.75. Such differences are explained by an increase in the data series by six observations from 2013 to 2019, as well as a possible change in the strength of the relationship between the indicators.

Let's calculate the parameters of the regression equation (correlation) based on the data obtained. We will calculate the parameters of the regression equation using Microsoft Excel. The calculation results are shown in table 3.

The resulting regression equation, reflecting the dependence of the indicator of total assets of Islamic banking on the factors indicated in Table 1, will have the following form (1).

$$Y = -1064.41 + 1.856 * x_1 - 0.786 * x_2 + 0.403 * x_3 + 12.309 * x_4, \quad (1)$$

Table 3: Model of dependence of total assets of Islamic banking on influencing factors

Index	Coefficient	Standard error	t-statistics	P-value
Const	-1064,690	364,723	-2,919	0,043
Number of Islamic banks, units (X1)	1,856	1,786	1,039	0,357
Number of Islamic windows, units (X2)	-0,786	1,946	-0,404	0,707
Muslim population, million people (X3)	0,403	0,851	0,474	0,660
Number of countries where Islamic banking operates, units (X4)	12,309	33,537	0,367	0,732

Regression statistics are shown in Table 4.

Regression statistics show that the value of the multiple correlation coefficient (multiple R) is 0.993 and is close to one, which shows that the relationship between the factor and the resulting indicator is quite high.

By interpreting the results of the obtained model, the following conclusions can be drawn. An increase in the number of banks by one unit leads to an increase in the total assets of Islamic banks by USD 1.86 billion. An increase in the Muslim population of 1 million leads to an increase in assets of $ 0.44 billion, and an increase in the number of countries in which Islamic banking operates leads to an increase in assets of $ 12.3 billion.

Table 4: Regression Statistics Equation (1)

Index	Coefficient
Multiple R	0,993553282
R-square	0,987148124
Normalized R-square	0,974296248
Standard error	62,41811079
Observations	13

The resulting regression equation allows forecasting the future volume of assets in the Islamic financial system as the influencing factors change.

Conclusions

Analyzing the data obtained as a result of the formed regression equation, we can conclude that the growth of total assets in the Islamic financial system will directly depend on the availability of financial services to consumers - the population of Muslim countries.

Therefore, an important direction in the development of the Islamic banking system will be to increase points of access to financial services through an increase in the number of Islamic windows, as well as through the expansion of microfinance services.

The development of the provision of microfinance services is especially relevant in the context of the fact that today it is necessary to provide access to financial services for more than three million people, mainly the poor, of whom more than 85% live in Bangladesh, Indonesia, Pakistan and Sudan. According to experts, now the sector consists of 300 financial service providers, mainly represented by non-governmental organizations and cooperatives, while the level of involvement of the banking sector in the provision of microfinance services is still low.

In this regard, it is relevant to implement microfinance programs on a digital platform. Lending based on digital technologies is spreading rather quickly. From loan application to credit assessment, loan disbursement and repayment - all transactions and all interactions can be digitized. This transformation will significantly reduce the cost of operations and make these services possible and affordable for everyone (Khvan A.A., Konvisarova E.V., 2017).

A real example of the effective implementation of digital technologies in the financial sector is the Kenyan company M-Pesa, which supplies financial services to subscribers of the mobile operator Safaricom. The service is currently ported to the IBM platform for Vodafone. Within the framework of this system, it is possible to open and close deposits, make payments to other subscribers of the system, as well as use the services of microfinance services, which have become more accessible by reducing the cost of transactions due to the absence of the need to maintain bank offices, as well as cash transactions. The rapid success of this system in Kenya allowed the system to be scaled up to two more countries, Tanzania and Afghanistan. Also, this system is being implemented in South Africa, since in this country 13 million economically active residents do not have a bank account.

Thus, the participation of Islamic financial organizations in the organization of a digital platform would add to equation (1) another additional factor that affects the total volume of Islamic banking assets - the number of active users of mobile payment systems. The widespread introduction of this area would make it possible to quickly bring microfinance services to most of the population and obtain a positive economic and social effect.

It should be noted that most of the Muslim countries have become the arena for the development of regional and global social and political crises, which have caused the emergence of multimillion strata of the population from the category of refugees, have set new requirements to meet the needs of various categories of clients. Small entrepreneurs and businessmen found themselves on the verge of bankruptcy in the countries affected by these crises. More than 30 million refugees around the world, mostly related to Islamic countries, have either completely lost access to financial services, or have it in a very limited format. According to statistics, the largest number of refugees are natives of Muslim countries: Afghanistan, Somalia, Syria and are in neighboring Muslim countries. Accordingly, if not for this factor, the current growth rates of the world Islamic finance market would have had even higher rates (Koren A.V., Pustovarov A.A., 2018).

While highlighting the importance of this issue, it should be noted that the United Nations High Commissioner for Refugees (UNHCR) has introduced the possibility of a loan guarantee for microfinance service providers who work specifically with refugees. Another surprising innovation in response to humanitarian disasters has been the use of money (cash, electronic) instead of first aid supplies. Such cash transfer programs are obviously different from microfinance programs, where recipients are expected not to repay the disbursed funds. These financial services are designed for a short time, but they highlight the importance of gaining access to finance as one of the UN's sustainable development goals. The implementation of such programs would not only ensure the successful development of the Islamic financial system but would also provide financial services and support to the population of countries such as Syria, Palestine, Iraq in which there is an open war or martial law. In the future, as the situation stabilizes in countries and regions with a tense political and social situation, the payment system available to most of the population would become the basis for future economic growth.

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The Link Between Economic Growth and Tourism: Covid-19 Impact

Oleksii LYULYOV
Sumy State University, Sumy, Ukraine, alex_lyulev@econ.sumdu.edu.ua

Yana US
Sumy State University, Sumy, Ukraine, y.us@fem.sumdu.edu.ua

Tetyana PIMONENKO
Sumy State University, Ukraine, tetyana_pimonenko@econ.sumdu.edu.ua

Aleksy KWILINSKI
The London Academy of Science and Business, London, United Kingdom
a.kwilinski@london-asb.co.uk

Tetyana VASYLIEVA
Sumy State University, Sumy, Ukraine, tavasilyeva@fem.sumdu.edu.ua

Nataliya DALEVSKA
Institute for International Cooperation Development, Poznan, Poland, dalevskanm@gmail.com

Jan POLCYN
Stanisław Staszic University of Applied Sciences in Pila, Pila, Poland, Jan.Polcyn@puss.pila.pl

Viktoriia BOIKO
Kherson State Agrarian and Economic University, Kherson, Ukraine, boiko.vo17@gmail.com

Abstract

This paper deals with the investigation of the relationship between tourism and economic growth. The research theoretically proved modern tourism was a wide-spread dynamic industry with high impact on economic development, damaged by COVID-19 crisis. This paper aims to analyse changes in the tourism industry to forecast recovering of tourism activity in the view of quarantine restrictions. For achieving the goals, the authors used the extrapolation model ARIMA. The object is the routs plotting requests of Apple users in Poland, Estonia, Latvia, Lithuania, Hungary and Czechia from 13 January to 9 May 2020. The forecast has been conducted under several conditions as follows: 1) without the introduction of quarantine restrictions from 11.03.2020; 2) taking into account the quarantine restrictions on movements. The findings demonstrated that the adopted quarantine measures have a significant impact on overcoming the recession in the tourism industry in conditions of economic, social and political tension. Herewith, there is a slight positive tendency in recovering tourism. The results provide background for future researchers on developing a strategy to overcome the tourism recession.

Keywords: COVID-19, Domestic Tourism, Economic Growth, Pandemic, Tourism.

Introduction

The globalisation process with expanding the political, economic, scientific and culture communications is the main trigger for tourism industry development. In turn, the tourism activity allows getting to know better the historical-cultural heritage almost of any country, engage in the customs and traditions of different nations and expand their worldview. Consequently, tourism could be associated with rest, pleasure and new impressions for most of the people.

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However, tourism is one of the most profitable and dynamic economic industry. The tourism impact enlarges upon the key economic sectors as follows: the production of consumer goods, trade, building, transport and communication, agriculture, etc. Thus, it is a useful tool to improve the economic development of any country or territory due to the increasing the GDP; engaging additional currency; providing additional workplaces involved in the hotel and restaurant complex, transport industry and related industries; developing the related industries; the growth of revenue from taxes into the budgets of all levels; etc. (Pimonenko, et al., 2019; Lyulov, et al., 2018).

Notably, the border openness of countries has increased. In turn, the tourism freedom of Ukrainians estimated by the Henley Passport Index showed a positive tendency (Figure 1). It worth noting on 17 May 2017 the EU and Ukraine signed the agreement on visa-free regime. Herewith, Ukrainians may travel to EU countries with tourism or business goal to 90 days without a visa. Consequently, the number of countries not demanding the visa from Ukrainians increased in 1,56 times. Upon that, since the second quarter of 2020, the Ukrainians may travel to 129 countries without the visa. However, among the analysed countries which have a similar Soviet Union past, the leader is Lithuania while the Lithuanians are free to visit 181 countries as of 2020. Notably that in 2017 more than 14 million foreign tourists visited Ukraine, while the average income from which was 526,5 USD per entrance. Herewith, the tourism industry generated 1.4% of GDP, while provided 1.3% workplaces.

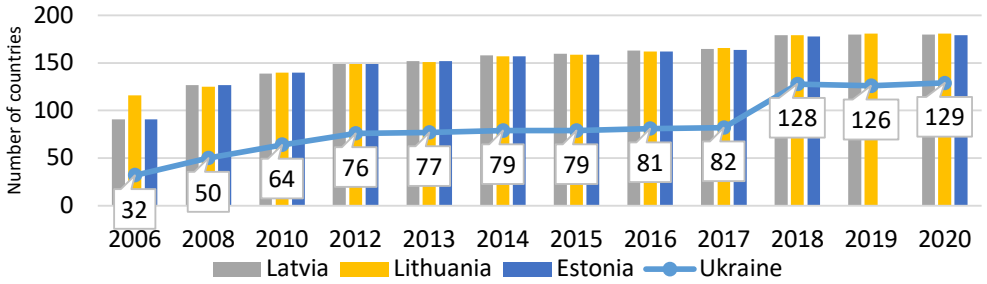

Fig. 1: The Dynamic of the Henley Passport Index of Latvia, Lithuania, Estonia and Ukraine (2006-2020) (created by the authors based on (Henley, 2020)

According to the Travel & Tourism Competitiveness Index, which reflects the competitiveness of a country's tourism industry by criteria such as business environment, protection and safety, health and hygiene, human resources and labour market, environmental status and others, Ukraine ranked 78th out of 140 in 2019 (Table 1). It should note that compared to 2017, Ukraine rose in the ranking by 10 positions.

At the same time, the competitiveness of Ukraine's tourism industry is lower by 3.2% compared to the global average, while in the EU the competitiveness is higher: in Estonia - by 9.1%, in Latvia - by 5%, in Lithuania - by 3.3%. In turn, the constant leader in this ranking is Spain, whose competitiveness in the tourism sector is higher by 41.4% compared to the global average.

The analysis of the experience of developed countries in tourism indicated that the geographical location of the region, the natural resources, climate conditions as well as the rich historical and cultural heritage are the main factors to attract the tourists. However, the demand generation on tourism services depends on some other factors that could increase or decrease the level of demand (Lyulov & Pimonenko, 2017; Letunovska, et al., 2017):

- economy-wide – the level of material welfare of consumers, developing the programs of improving the tourism industry, engaging the investments, correlation between the working and free time of employees, etc.;
- social and demographical – age, gender, education, profession, social status, condition of marriage, financial situation, residence, etc.;
- cultural and socio-psychological – the psychology of consumption, the priorities in the system of spiritual values, religion, etc.;
- personalised and behavioural – lifestyle, targets, personal characteristics, temperament, preferences, motives, etc.

Table 1: Travel & Tourism Competitiveness Index in 2019
(created by the authors based on (World, 2019))

Country	Rating position	Score	Absolute growth compared to 2017		Absolute growth compared to the global average rate, %
			rating position	score (%)	
Spain	1	5.4	0	0.3	41.4
USA	5	5.3	1	2.6	36.6
Italy	8	5.1	0	1.9	32.2
China	13	4.9	2	3.2	27.2
Thailand	31	4.5	3	2.6	16.9
Turkey	43	4.2	1	2	9.8
Estonia	46	4.2	-9	-7	9.1
Latvia	53	4	1	1.8	5
Lithuania	59	4	-3	1.5	3.3
Egypt	65	3.9	9	7	1.3
Marocco	66	3.9	-1	2.2	1.2
Ukraine	**78**	**3.7**	**10**	**6.5**	**-3.2**

According to the mentioned above, the tourism industry provides a particular region with cash inflows from tourists and increases the turnover of commodities and workplaces. In turn, for developing the tourism industry, it is necessary to implement the following: to provide cooperation between the tourism agencies and regional authority for popularising the region widely; to engage all participants of small business for developing common tourism concept coordinated by the regional authority; to focus on the inhabitants of close big cities and tourists in one day trip or vacation.

Literature Review

The investigation of the tourism impact on economic development is a goal of the significant number of scientific publications. Furthermore, tourism issues concern experts from the different professional field such as marketing, management, culture, medicine, ecology, etc. In turn, the systematisation of scientific publications on the link between economic growth and tourism demonstrates a positive tendency of publication activity. In the frame of this article, 1698 publications indexed by the Scopus database were analysed. The search was conducted by the keywords "economic growth" and "tourism" in the title, abstracts and keywords of publication. The limitation criterion was published articles in the period from 2000 to 2020.

According to Figure 2, the number of scientific publications in investigating the economic growth and tourism relationship presented in the Scopus database increased by more than 21 times in 2019 related to 2000. Moreover, the most massive part of documents was published by scientists from the USA (12%), China (11%), Great Britain (7%) and Malasia (7%). It worth noting than the link between tourism and economic growth is investigated in different subject areas as following in the field of social science (28%), Business, Management and Accounting (24.3%), Ecology (11%), Economics, Econometrics and Finance (9.7%), etc.

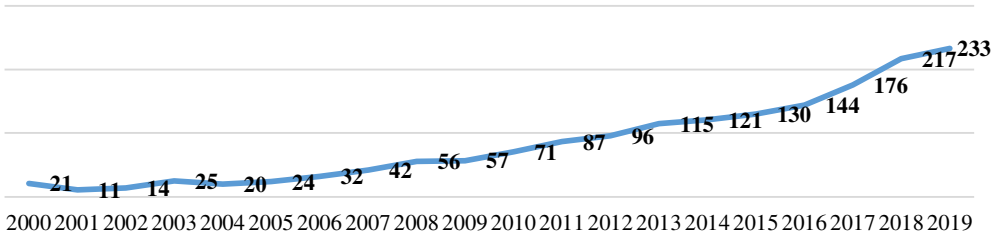

Fig. 2: The Dynamic of Publication Activity on the Link between Tourism and Economic Growth
(created by the authors using Scopus tools)

To deeper investigate the thematic directions of analysed publications, the bibliometric analysis was conducted using the VOSviewer tool. It worth noting that this tool allows building the network map on the base of the keywords co-

occurrences in the investigated publications. Moreover, it visualises the co-occurrence links with other keywords and calculates the total strength between them(Us, et al., 2020). Thus, set a limitation criterion minimum 5 of occurrences of keywords and excluding the irrelevant keywords, the network map was built with 249 items grouped in the clusters (Figure 3). In turn, the network map of keyword demonstrates different combination variants of the keywords as inside, so outside the cluster. It worth noting that different colours highlighted the specific cluster. Furthermore, the size of circles indicates the frequency of appearing the keyword in the scientific documents. Then, the bigger the diameter of the circle is, the more frequent the keyword is used. Herewith, the distance between circles indicates the link strength between two items.

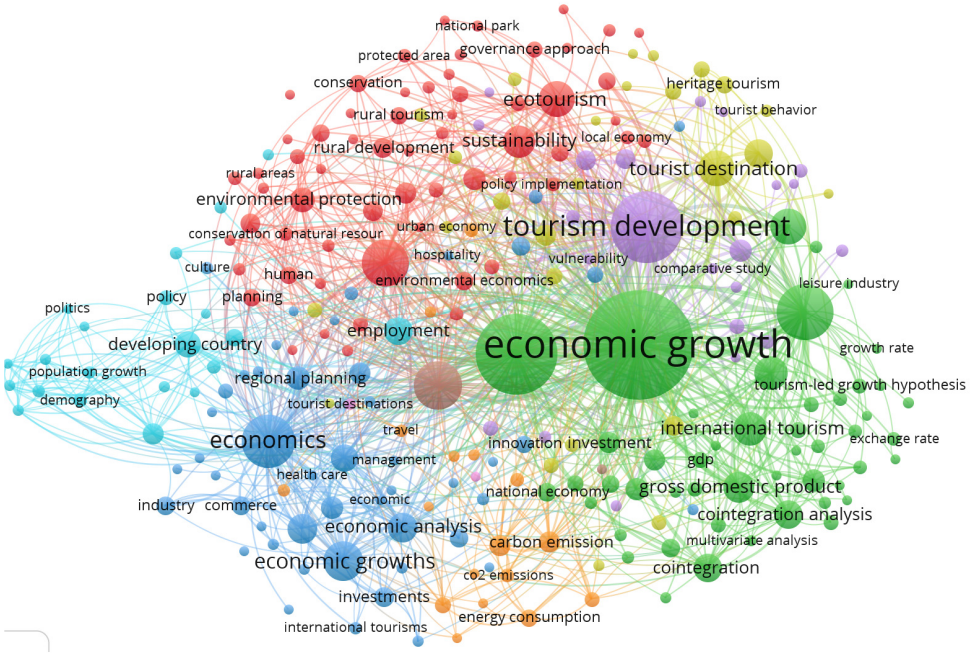

Fig. 3:The Network Map of the Theme Directions of Scientific Publications on Link between Tourism and Economic Growth (created by the authors using VOSviewer tool)

Following Figure 3, the network map consists of 9 clusters, which combine the investigate keywords on thematic closeness. Herewith, the most significant red cluster (61 items) is directed on research in the relationship between tourism and environmental issues. In turn, the green cluster (49 items) is intended to investigate the link between economic growth and tourism development. Then, the blue cluster (48 items) aimed at research on economic development, tourism and climate change.

In turn, the most articles on investigating the link between tourism and economic growth were published in scientific journal sa follows *Tourism Economics (Q1), Tourism Management (Q1), African Journal Of Hospitality Tourism And Leisure (Q3), Current Issues In Tourism (Q1), Journal Of Sustainable Tourism (Q1), Journal Of Travel Research (Q1), Tourism Analysis (Q2),* etc.

In turn, the summarisation of literature resources allowed selecting the significant number of scientific publications which are one of fundamental for tourism development. In turn, (Kmeco et al., 2019; Krajcik et al., 2019; Tyelyetov et al., 2012) dedicated to the investigations of the economic essence of tourism. While analysis of the tourism industry impact during the longterm period is researched in work (Tovmasyan, 2019). It worth noting, in the articles (Kljucnikov, et al., 2020; Lee, et al., 2013; Preechawong, et al., 2019; Lyulyov & Shvindina, 2017) the authors indicated in the linear relationship between economic growth and tourism development. Furthermore, in the frame of the articles (Chygryn et al., 2020; Bogachov et al., 2020; Dalevska et al., 2019; Dementyev & Kwilinski, 2020; Tkachenko et al., 2019a; 2019e; Boiko et al., 2019; Kuzior et al., 2019; Kwilinski et al., 2020a; 2020b; 2020c; Lakhno et al., 2018; Kharazishvili et al., 2020; Kondratenko et al., 2020; Dzwigol. 2019a; 2019b; 2020a; 2020b; Pająk et al., 2016; 2017; Dzwigol & Wolniak, 2018; Dzwigol & Dzwigol-Barosz, 2018; 2020; Ponomarenko 2018a; 2018b; 2018c; 2019; Dzwigol et al., 2019a; 2019b; 2019c; 2019d; 2020; Prokopenko et al., 2015; 2018; 2019a; 2019b; Kwilinski et al., 2020a; 2020b; Miśkiewicz, 2018; 2019; 2020a; 2020b; Miskiewicz & Wolniak, 2020; Bilan et al., 2019a, 2019b) the authors investigate the longterm relationship between tourism, digital economy, CO2, the foreign direct investments and economic growth. In particular, the researchers noted that the state of the tourism industry, the

foreign direct investments and CO2 level have a positive impact on the economic development, while the tourism and foreign direct investments negatively influence on the level of CO2. The authors in the papers (Czyżewski et al., 2019; Furmaniak et a., 2018; 2019a; 2019b; Kwilinski, 2018a; 2018b; 2019; Kwilinski et al., 2019a; 2019b; 2019c; 2019d; 2019e; 2019f; 2019g; Kwilinski & Kuzior 2020; Prokopenko, O., & Miskiewicz; Tkachenko et al., 2019b; 2019c; 2019d; Saługa et al., 2020; Savchenko, 2019) analysed the impact of industrial companies development on economic development and tourism in the region. The researchers Shubert S., Brida J., Ricco V. in the publication (Schubert, et al., 2011) noted that increasing the demand for tourism services lead to the improving of the economic situation and expanding the partnership between countries. The special attention is paid to investigating the state and opportunities of the Ukrainian tourism industry as well as its influence on the economic development in work (Teletov et al., 2012).

Table 2: The Systematisation of Studies on Modelling in Tourism

Studies	Region	Methods for modelling and forecasting	Topic of research
Song, et al., 2010	Hong Kong	ADLM (Autoregressive Distributed Lag Model)	Exploring the influence of the global financial crisis on tourism demand.
Tsui & Balli, 2017	Australia	The Box- Jenkins SARIMA, SARIMAX and SARIMAX/EGARCH volatility models	Forecasting the foreign passenger entries in the perspective of marketing expenditure.
Song, et al., 2011	Hong Kong	STSM (the structural time series model)	Modelling the development of tourism visitors depending on various factors.
Zortuk, 2009	Turkey	VECM (Vector Error Correction Model)	Examining the link between economic growth and sharp tourism development.
Srinivasan, et al., 2012	Sri Lanka	ARDL (the Autoregressive Distributed Lag)	Estimating the tourism influence on the development of the economy.
Malik, et al., 2010	Pakistan	Johansen cointegration technique and ECM (error correction model)	Testing the connection between tourism development and GDP increase.
Li, et al., 2005	Generally	TVP (the time-varying parameter model)and structural time-series model	Analysing the current developments in econometric models and approaches to discover the best one.
Li, et al., 2006	United Kingdom	TVP-ECM (error correction models and time-varying parameter)	Modelling tourism demand focusing on spending per tourist.
Kulendran & Dwyer, 2012	Australia	BSM (the Basin Structural Model)	Modelling the seasonal number of visitors in tourism depending on climate issues.
Kulendran & Shan, 2002	China	The naïve "No Change" model	Modelling the tourism demand in the view of Chinese "open door policy".

The systematisation of scientific publications in tourism modelling (Table 2) allowed noting many different econometric models, approaches and techniques used in tourism development forecast. Moreover, the theoretical results allowed to assume there was no single overperformed model to use for forecasting in tourism. In the frame of this article, the ARIMA(*p, d, q*) model was used to make the forecast of tourism recovering from COVID-19 in the view of two scenarios of development.

Methodology

In the frame of this article, the integrate autoregressive model ARIMA(p,d,q) was used to analyse the changes in the tourism industry and develop the short-term forecasts of tourism activity in consideration of the influence of quarantine restrictions. Notably, this model allows accurately reflecting the impact of COVID-19 on the tourism industry on the base of which it is possible to develop the strategy of tourism recovering. Thus, it worth noting, that ARIMA(p,d,q) model is a class of statistical models used to analyse and forecast time series data. Based on the paper (Krukov & Chernyagin, 2011), the ARIMA(p,d,q) model has the following form:

$$(\Delta^d X_t) = \sum_{i=1}^{p} \varphi_i \, (\Delta^d X_{t-1}) + \varepsilon_t + \sum_{j=1}^{q} \theta_j (\Delta^d \varepsilon_{t-j}) \, , \varepsilon_t \sim N(0, \sigma_t^2) \quad (1)$$

The short form of the ARIMA(*p,d,q*) model is:

$$\varphi(B)(1-B)^d X_t = \theta(B)\varepsilon_t \quad (2)$$

where $\varphi(\bullet)$, $\theta(\bullet)$ – polynomials of degree p and q,
B – lag operator ($B^j X_t = X_{t-j}, B^j \varepsilon_{t-j}, j = 0, \pm 1, \ldots$),
d – sequential difference order ($\Delta X_t = X_{t-1} - X_t = (1-B)X_t, \Delta^2 X_t = \Delta^2 X_{t+1} - \Delta X_t = (1-B)^2 X_t, \ldots$).

It worth noting that at the first time the systematic approach to developing ARIMA(p,d,q) model was presented by George Box and Gwilym Jenkins in 1976 (Ma, et al., 2018). Given that, the methodology of developing the ARIMA model consists of several main steps as follows:

1. Model identification that best suits the actual process under consideration.

On the base of calculated estimates for the autocorrelation and partial autocorrelation functions, the preliminary conclusion on the integration order d and the order values of the autoregression operators and the moving average p and q is done.

The primary model describing the stationary process is the autoregressive model with p-order. In turn, the autoregressive process means the dependence on the current level from the previous ones. The autoregression model (AR) p-order is expressed as

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t, \quad (3)$$

where Y_t – level of time series at the time point t (dependent variable);
$Y_{t-1}, Y_{t-2}, \ldots, Y_{t-p}$ – the levels of time series at the time points $t-1$, $t-2$, …, t – respectively (independent variables);
$\varphi_0, \varphi_1, \varphi_2, \ldots, \varphi_p$ – estimated coefficients;
ε_t – random walks describing the variable impacts unaccounted for the model (3).

The moving average (MA) model is a linear regression of the predicted time series value relative to the current and previous observed variables. Moreover, the random components are expected to be mutually independent and conform to a normal distribution with mean 0.
Thus, the model of moving average q-order is denoted as:

$$Y_t = \varepsilon_t - \omega_1 \varepsilon_{t-1} - \omega_2 \varepsilon_{t-2} - \ldots - \omega_q \varepsilon_{t-q}, \quad (4)$$

where Y_t – level of time series at the time point t (dependent variable);
ε_{t-1} – the values of remains i-time periods (independent variables);
$\omega_1, \omega_2, \ldots, \omega_q$ – estimated coefficients.

In accordance with the above-mentioned models, the combination of the autoregression model (AR) and moving average model (MA) present the model ARMA(p,q) :

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t - \omega_1 \varepsilon_{t-1} - \omega_2 \varepsilon_{t-2} - \ldots - \omega_q \varepsilon_{t-q}. \quad (6)$$

2. Parameter Assessment on the Base of Regression Methods.

Based on the calculated autocovariance for identified ARIMA(p,d,q) model, the initial estimates of moving averages parameters is done. The parameters are estimated based on the least square's method and the maximum likelihood principle.

3. The Diagnostic Testing the Adequacy of the Model.

The remains of the developed stochastic model (ε_t) are used to diagnose the adequacy of the model. Thus, the model quality and remains uncorrelatedness need testing.

4. Using the Model for Forecasting.

According to the abovementioned, in the framework of this paper, a stationary series were obtained using statistical tests for the presence of a unit root (Augmented Dickey-Fuller unit root test). Since, under the Dickey-Fuller statistics, the initial series was non-stationary. Thus, the operator of taking successive differences was used to go to the stationary series. After obtaining a stationary series, the model was identified by evaluating its parameters. Its series of residuals were analysed to check each trial model for adequacy.

Results

As the economy is closely related to tourism development, the significant contraction of tourists is one of the reasons for increasing poverty and economic crisis. It worth noting, several scenarios of economic influence on the tourism industry can be: 1) direct (generating the income from business in the hotel and restaurant business, transport sphere and tourism organisations); 2) indirect (investing in the tourism industry); 3) indicative means the spending the income by the beneficiaries of direct and indirect influences such as the owner of the organisation, employees, etc. (Vasylieva, et al., 2017).

According to the statistical data, 2019 year was one of the most prosperous for tourism and became the trigger for economic development and increasing employment rate. In general, tourism income was 10.3% of global GDP (8.9 USD trillion). Furthermore, the tourism industry provides over 330 mln workplaces (1 out of 10 employees works in the tourism industry). In turn, the total investments cost in the tourism industry was 948 USD billion (4.3% of total investments) (Report, 2019).

In turn, the analysis of statistical data shows that people in Ukraine travel much less compared to ones in EU countries. Thus, in 2018, citizens of Ukraine made 4.48 million trips within Ukraine. This number of trips indicates only about 11% of Ukrainians travelled both inside and outside Ukraine, while in 2015 the corresponding share was less than 5%.

Unfortunately, a significant decline in the number of tourist trips by Ukrainians was in 2014-2015 as a consequence of the political crisis in 2013 and the military conflict in the east part of the country. Following Figure 4, among the analysed EU countries, the most significant number of trips was made by Estonian citizens where one resident had about 6 visits in 2018, while by Lithuanian and Latvian – about 2 visits.

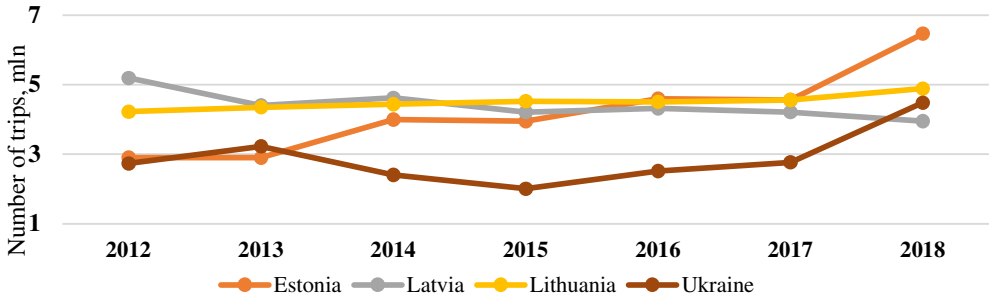

Fig. 4: The Internal and External Trips of Ukrainians, Estonians, Lithuanians and Latvians (2012-2018) (created by the authors based on data of Eurostat (2020), SSC of Ukraine (2020)

However, tourism development has fallen under the influence of the pandemic COVID-19 since the end of 2019. Thus, wide-spreading the virus and implementing the quarantine measures on the global level caused slowing the tourism activity (Figure 5). Following the data of the World Tourism Organization (WTTC), the entrances entirely or partly were forbidden on 96% directions of April 2020. It worth noting all counties of Africa, Asia and Pacific as well as the Middle East, 93% of EU countries and 92% countries of Americas imposed limitations on the movements of people because of COVID-19 spreading.

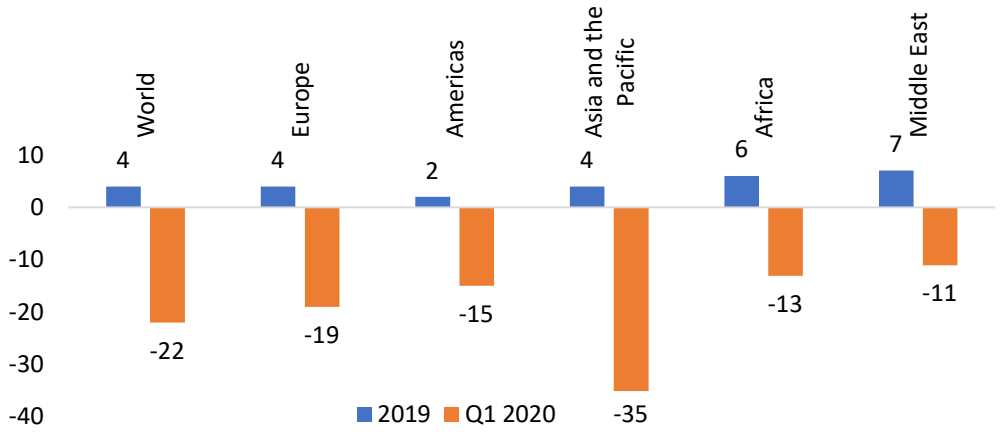

Fig. 5: Changes in Destination Dynamic of International Tourists by the World Regions (% of the previous year) (created by the authors based on (World, 2020)

In turn, there are four main types of limitations to prevent the wide COVID-19 spreading:

1) total or partial borders closures for international tourists;
2) possibility of access to particular places;
3) absolute or partial prohibition against making flights;
4) quarantine procedures, self-isolation, visa ban, etc.

The analysis of official resources allowed noticing the vast amount of publications on the forecast of COVID-19 influence on the tourism industry as on the national as international levels. In turn, according to the estimates of WTTC, the tourism industry would experience damage of 22 billion USD and cause decreasing world DGP by 30% and increasing the unemployment rate by 2.9%. In turn, the WTTC report on the tourism change impact on COVID-19 indicated that the power of the current crisis caused by COVID-19 is fivefold power than the world financial crisis in 2008. Furthermore, the Bloomberg and International Civil Aviation Organization predicted that aviation activity would be on the brink of bankruptcy (World, 2020).

Table 3: The dynamic pattern of site traffic (from December 2019 to April 2020) (SimilarWeb, 2020)

Sphere	Site	12.19	01.20	02.20	03.20	04.20	Growth rate
Air travel	skyscanner.com	13.8	16.2	13.3	9.05	3.5	-74.64
	turkishairlines.com	8.6	8.95	8.3	8.3	3.1	-63.95
	ryanair.com	37.8	45.2	38.4	35.1	14.1	-62.70
	wizzair.com	12.5	13.6	12	10.6	4.25	-66.00
	airasia.com	18.3	17.8	16.1	15	5.1	-72.13
Accommodations and Hotels	hilton.com	24.3	26.7	24.4	16.1	7.9	-67.49
	hotels.com	54.2	61.6	54.2	30	9.95	-81.64
	agoda.com	67.1	65	52.6	37.5	17.5	-73.92
	airbnb.com	73.8	90.6	81	54.8	26.3	-64.36
	booking.com	424	507.5	427.5	242.5	90.5	-78.66
Travel and Tourism	traveltrivia.com	10.4	12.2	10.3	10.7	9.35	-10.10
	tripadvisor.com	151.5	165	148	90	54.1	-64.29
	eastday.com	55.2	52.9	54.2	56.9	49.8	-9.78
	expedia.com	69.1	78.6	69.7	48	16.2	-76.56
	ctrip.com	37.2	30.9	12.9	13	13.8	-62.90
Ground transportation	uber.com	78.9	73	66.4	58.8	43.7	-44.61
	olacabs.com	5.15	4775	4.55	3.15	0.95	-81.55
	lyft.com	20.4	21.6	17.1	12.6	6.4	-68.63
	thetrainline.com	27.4	27.3	26.3	14.5	4.15	-84.85
	blablacar.com.ua	3.85	3.25	3.1	3.35	1.4	-63.54

Nowadays the tourism activity depends on the high level of transport and communication networks, restaurant and hotels complex, social sphere, etc. In turn, the limitation of movements caused by the quarantine regime led to significant losses in the mentioned above spheres. Table 3 demonstrates the traffic dynamic of the company sites providing tourism services by month from December 2019 to March 2020. Thus, the traffic of analysed sites in the category "Air travel" decreased by 68%, while in the category "Accommodation and Hotels" – by 73,2%, "Travel and Tourism" – by 44,7%, "Grounded transportation" – by 69%. According to the analysed sites, the level of demand decreased most of all in the category "Accommodation and Hotels."

Restrictions on international travel, as well as the introduction of quarantine to combat the spread of the COVID-19 pandemic, lead to large-scale losses in the tourism industry. It worth noting that the current crisis has biological nature, and an effective vaccine has not yet been invented to prevent the COVID-19 virus. Thus, the lack of drugs, mass quarantine and large-scale self-isolation has become the main methods of combating COVID-19. Consequently, the freedom of residents' movements in most countries is severely restricted.

Figure 6 displays the dynamics of people moving during the COVID-19 pandemic. The initial data are the requests of plotting the routs by the users of Apple products in Ukraine from 13 January 2020 to 09 May 2020. Thus, with the entry into force of quarantine restrictions, the walkings and drivings declined sharply. At the same time, the lowest number of people walking and driving denoted on 19 April 2020 (-64.66% compared to 13 January 2020), after which there is a positive tendency of movings. Moreover, the number of driving trips remained consistently higher during the investigated period, though much lower than the baseline level on 13 January 2020.

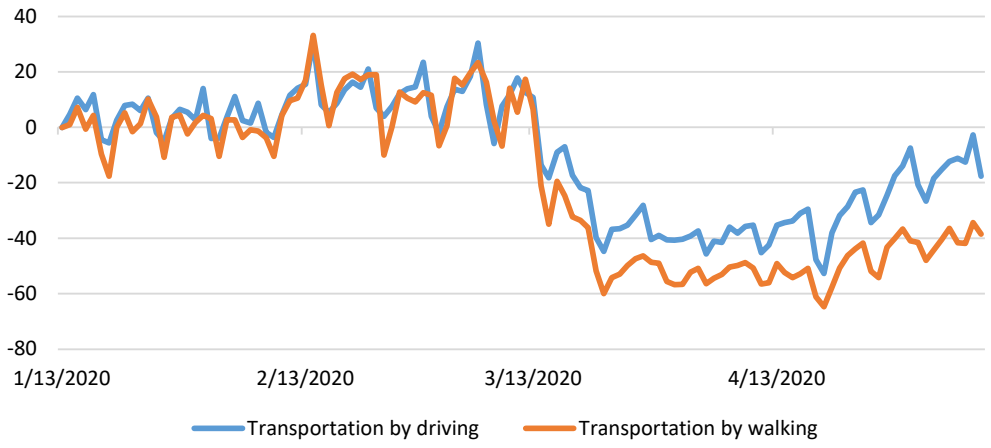

Fig. 6: The Dynamic Changes in the Number of the Request of Plotting the Routs by Apple Users in Ukraine (13.01-09.05.2020) (created by the authors (Apple, 2020).

Thus, based on the ARIMA model, which is one of the most popular extrapolation models, the forecast of several scenarios of the COVID-19 impact on the driving trips by Ukrainians was made upon the following conditions:

1) without the introduction of quarantine restrictions from 11.03.2020;
2) taking into account the quarantine restrictions on movements.

Thus, developing this model provides short-term forecasting of change of inquiries of inhabitants of Ukraine concerning laying of routes for movement by vehicles. In general, the built forecast can be used in making management decisions to develop a strategy for overcoming the tourism recession.

Thus, the empirical study was conducted using EViwes software based on daily requests from users of Apple products in the routing of routes within Ukraine from 13.01.2020 to 09.05.2020. The dynamics of the studied series is shown in Figure 7.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.502776	0.5286
Test critical values:	1% level	-3.490772	
	5% level	-2.887909	
	10% level	-2.580908	

Fig. 7: The stationary test of time series (Augmented Dickey-Fuller unit root test)
(calculated by the authors)

The Dickey-Fuller test was used to check the time series for stationarity. According to the value of the ADF test criterion (Fig. 8), the time series is non-stationary, as the value of t-statistics is higher than the critical values.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.86760	0.0000
Test critical values:	1% level	-3.490772	
	5% level	-2.887909	
	10% level	-2.580908	

Fig. 8: The First Differences of the Logarithmic Time Series (Augmented Dickey-Fuller Unit Root Test)
(calculated by the authors)

Thus, since the dynamics of requests was unstable, the forecast model development may be inaccurate. In this regard, the studied time series was reduced to a stationary one using the first differences of the time series logarithm (Figure 9). As a result, the time series is stationary and can be used to build the ARIMA model forecast.

For the first development scenario, we will analyse the dynamics of requests in the case when the people in Ukraine would not be limited to quarantine measures from 12 March 2020 and continue their usual way of life. The data for the study were selected from 13 January to 11 March 2020.

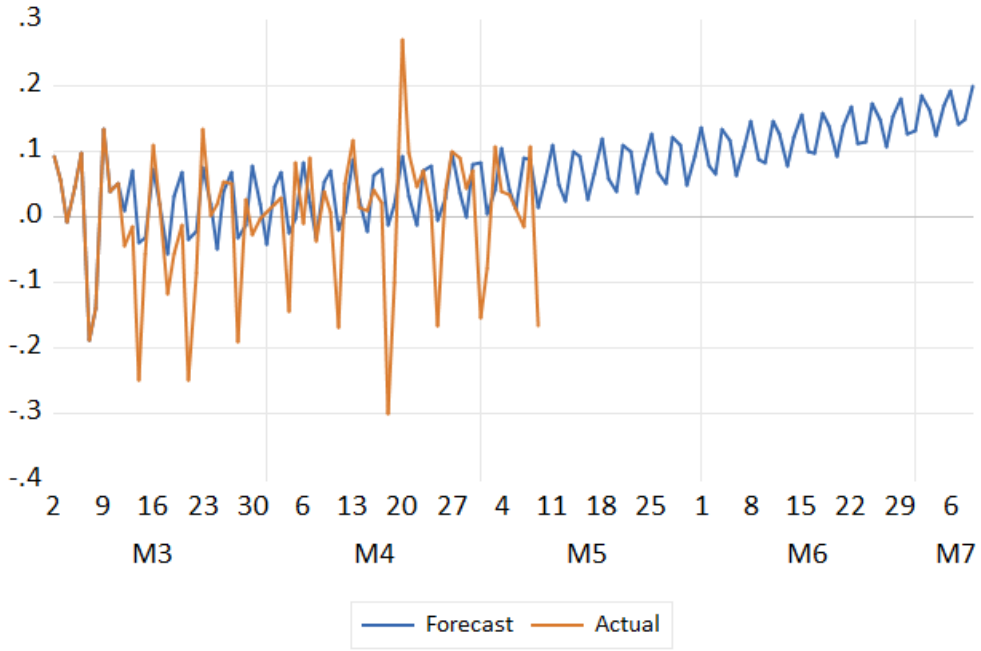

Fig. 10: The Forecast of the Number of the Requests of Plotting the Routs by Apple Users in Ukraine without Quarantine Restrictions (from 13.01.2020 to 11.03.2020)

In turn, Figure 10 demonstrates the short-term forecasting the requests dynamics of Ukrainian residents in laying travel routes by vehicles until 11 May 2020 according to data from 13 January 2020 to 11 March 2020, while in Figure 11 – until 11 July 2020 based on data from 13 January 2020 to 11 May 2020.

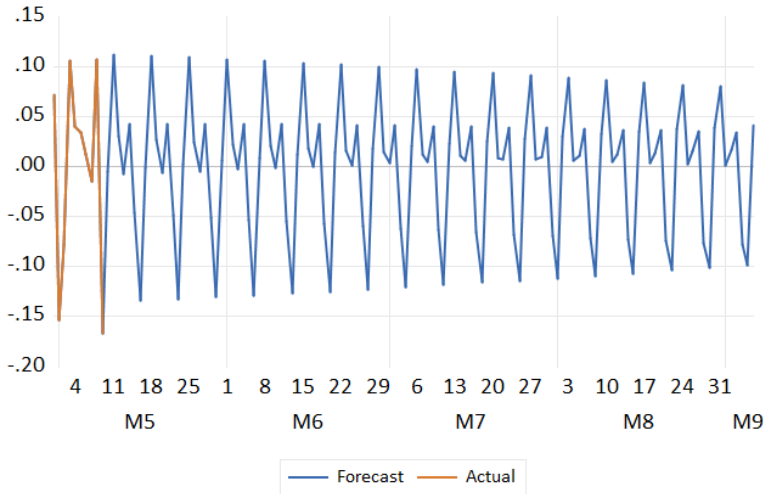

Fig. 11: The Forecast of Number of the Requests of Plotting the Routs by Apple Users in Ukraine with Quarantine Restrictions (from 11.03.2020 to 11.07.2020)

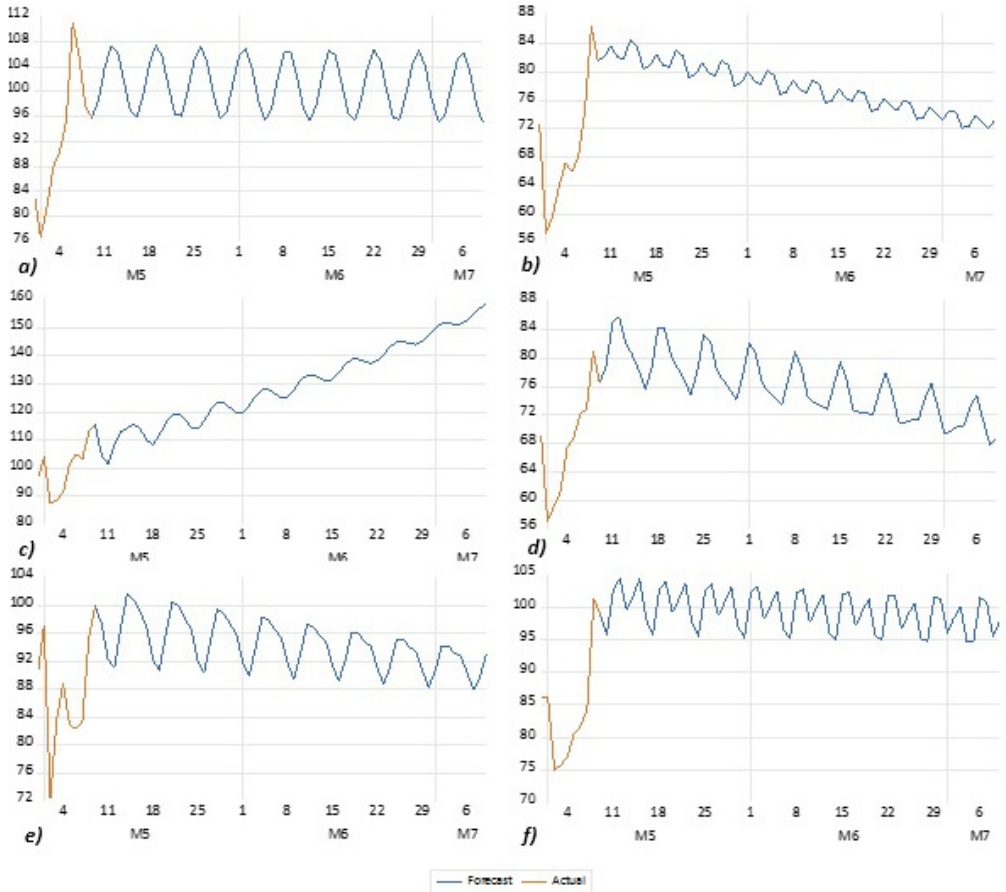

Fig. 12: The Forecast of the Number of the Requests of Plotting the Routs by Apple Users in *a)* Czechia; *b)* Poland; *c)*Estonia; *d)* Hungary; *e)* Latvia; *f)* Lithuania in Case of Quarantine Restrictions (from 09.05.2020 to 10.07.2020)

Thus, the obtained results of the forecast indicate that the adopted quarantine measures had a significant impact on the movement of residents within investigated countries. Particularly, if the quarantine measures were not introduced from 12.03.2020 and the population continued to live a normal life, the trend of movement would have rapid growth and did not have a significant impact on tourism in Ukraine. However, the second development scenario, subject to the introduction of quarantine restrictions from 09.05.2020, indicates that the dynamics of population movement will have a slightly positive trend that slowed down the tourism activity.

Figure 12 demonstrates the forecast models for EU countries which allowed assuming if the quarantine proceeds, the tourism activity would totally recess. Thus, it is strategically important to: form a reliable image of the investigated countries and increase the competitiveness of the tourism market; forme new proposals, ensuring a high level of hygiene and safety; attract innovative management methods and active use of modern information technology.

Conclusions

The systematisation of scientific resources indicated a growing publication activity on the link between tourism and economic growth. Notably, the bibliometric analysis based on the VOSviewer tool allowed to identify 9 clusters demonstrating the thematic areas of scientific publications in the investigated field. It worth noting that the most massive cluster (61 terms) aimed at studying the relationship between tourism and environmental issues. In turn, a slightly smaller cluster (49 terms) mainly indicated the study of economic growth and tourism development. The third big cluster (48 terms) is thematically focused on research in the field of economic development, tourism and climate change.

In the frame of this work, it was established that the tourism industry played a significant role in the economic growth of any country. However, nowadays the tourism sector is one of the worst-affected by the outbreak of the COVID-19 pandemic. Moreover, measures taken to combat the COVID-19 pandemic have harmed economic growth and have significantly restricted population movement, both inside and outside the country.

The development of domestic road tourism is one of the areas of recovery of the tourism sector. Given that, the paper predicts possible scenarios for the development of the tourism industry in Ukraine and EU countries of post-soviet past (Latvia, Lithuania, Estonia, Poland, Czechia and Hungary) during the pandemic COVID-19 based on the dynamic requests for routs plotting by Apple users in Ukraine (from 13 January to 9 May 2020). The development of domestic automobile tourism is one of the areas to begin recovering of the tourism sector. Based on the ARIMA model, the authors developed the possible scenarios for the development of the tourism industry of Ukraine during the pandemic COVID-19. The model was based on the number of the Apple users requests for plotting the routs in Ukraine from 13 January 2020 to 9 May 2020. In turn, the obtained results of the forecast indicated that the adopted quarantine measures have a significant impact on overcoming the recession in the tourism industry in conditions of economic, social and political tension.

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Government Policy on Macroeconomic Stability: Case for Low- and Middle- Income Economies

Oleksii LYULYOV
Sumy State University, Sumy, Ukraine, alex_lyulev@econ.sumdu.edu.ua

Tetyana PIMONENKO
Sumy State University, Sumy, Ukraine, tetyana_pimonenko@econ.sumdu.edu.ua

Aleksy KWILINSKI
The London Academy of Science and Business, London, United Kingdom,
a.kwilinski@london-asb.co.uk

Yana US
Sumy State University, Sumy, Ukraine, y.us@fem.sumdu.edu.ua

Olena AREFIEVA
National Aviation University, Kyiv, Ukraine, lena-2009-19@ukr.net

Oleksandr AKIMOV
Interregional Academy of Personnel Management, Kyiv, Ukraine, 1970aaa@ukr.net

Denys PUDRYK
Sumy State University, Sumy, Ukraine, pudrik.nusta@ukr.net

Abstract

This study summarizes the existing world experience on scientific and methodological approaches for assessing the macroeconomic stability of the national economy. The systematization of the scientific background allowed concluding the absence of unitized terminological apparatus to define the concept of macroeconomic stability. This study aims to develop the methodology of integrated assessment of the level of macroeconomic stability of the national economy under improving its conceptual bases. The object of this study is country Ukraine, its neighbour countries and countries that have recently joined the EU. For data processing, the authors used the program of statistical analysis Stata 14. The analysis of macro stability indicators was conducted at different stages of the economic cycle: 1) pre-crisis period (2000–2006); 2) crisis period (2007–2010); and 3) the post-crisis period (2011–2017). The authors proposed the methodology for the integrated assessment of the level of macroeconomic stability of the national economy based on the concept of the pentagon model of macroeconomic stability. Therefore, this model considered five main guidelines of state stabilization policy as follows: 1) GDP growth; 2) unemployment rate; 3) inflation rate; 4) external debt; 5) state budget balance. The obtained results of testing the proposed approach for assessing the level of macroeconomic stability allowed concluding that the largest level of decline in the static indicator of macroeconomic stability of the national economy in 2011-2017 was in Ukraine and Serbia. The authors noted that results of this study are considered to be the base for future investigations aimed at improving the conceptual bases of integrated assessment of the level of macroeconomic stability of the national economy.

Keywords: Macroeconomic Stability, Economic Growth, Index of Macroeconomic Stability, Pentagon Model

Introduction

In the conditions of uncertainty and extreme variability, the current trends in the national economy of Ukraine require the identification of qualitative and quantitative criteria of macroeconomic stability of the national economy to timely assess and neutralize the adverse effects of their convergent and divergent influences.

In turn, timely detection of negative trends of the qualitative and quantitative criteria changes of macroeconomic stability allows responding promptly to internal and external shocks and increase the level of competitiveness.

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Moreover, that goes to accelerate economic growth. However, it is essential to select a set of indicators that intimate the level of macroeconomic stability.

According to the image recognition theory, the main requirements for the selection criteria of the set of indicators are:

1. Regulatory and compliance with recognized and adopted regulations, which provide not only the fact of enshrining them in official statistics but also regulatory approval of the methodology of their collection (regardless of whether these indicators are statistics, sociological research or observation materials).
2. The possibility of empirical measurement. Thus, there should be the possibility to quantify the criteria.
3. Have high reactive informativeness, which provides fast and timely information about the activation of possible factors.
4. Have the property of holistic. Herewith, on the one hand, they are self-sufficient for the indicative reflection of a manifestation of a threat. However, on the other hand, in combination with other indicators, they can indicatively reflect another threat occurs that could not be displayed by no single indicator.

However, the systematization of the scientific background allowed concluding the absence of unitized terminological apparatus to define the concept of macroeconomic stability. In turn, it is one of the reasons for the lack of a single accepted by all researchers and experts way to solve the problem of choosing a set of indicators and method of measuring and assessing the level of macroeconomic stability of the national economy.

This study aims to develop the methodology of integrated assessment of the level of macroeconomic stability of the national economy under improving the conceptual bases of integrated assessment of the level of macroeconomic stability of the national economy.

Literature Review

The vast number of scientists devoted investigated the issues on the development, selection of requirements (criteria) for many indicators of estimating the macroeconomic stability of the national economy as the main subject. In turn, Ismihan M. (Ismihan et al., 2005) proposed to assess the level of macroeconomic stability using the unified indicators of inflation, public debt, external debt and exchange rate volatility. In the investigation (Suntsova, 2012) the author proposed to choose the parameters of assessing the macroeconomic stability of the national economy based on evaluating the macro-financial stability of the state and conduct it in the following stages:

1. Polycriteria assessment of the level of socio-economic development.
2. Grouping of key macro-financial indicators.
3. Evaluation of exogenous and endogenous effects.
4. Interpretation of the obtained results and development of recommendations.

The starting basis for the analysis of selected indices is International Financial Statistics (International Financial Statistics), official data of the Ministries of Statistics of a particular country and statistics of central banks of the respective countries (Suntsova, 2012).

In the paper (Radionova, & Malkovskaya, 2017) Radionova I. evaluated the results of macroeconomic policy by deviations from the equilibrium values of macroeconomic variables, which is based on the neoclassical idea of general equilibrium as a result of the interaction of aggregate markets. Moreover, the researcher noted that "the implementation of this approach involves certain stages of analysis as follows: the formation of time series of variables, construction of regression equations and evaluation of their quality, determining the equilibrium values of variables and estimating deviations from the actual values of macroeconomic variables.

Furthermore, the researchers Najarzadeh R. and Shahri V. propose to use the indicator of GDP volatility as an indicator of macroeconomic stability. In the papers (Lyulyov, 2018a; Iqbal, & Nawaz, 2010; Martínez-Vázquez, & McNab, 2006; Wanta, 2018; Lyulyov, 2018b), the scientists used the Misery index, which is the sum of the unemployment rate and the inflation rate, as the main parameters of macroeconomic stability.

Jaramillo L. and Sanchak C. (2007) and Kordos M. (2019), studied the index of macroeconomic instability, which combines inflation, budget deficit, exchange rate volatility, and loss of international reserves.

The scientists Kvasha T. and Stepashko V. proposed to follow the principle of complexity and systematics when choosing a set of indicators. That is, for selecting a system of indicators that comprehensively characterize the state of the system and helps to adjust it based on the formation of various tools and mechanisms (Lyulyov, 2017; Liulov

et al., 2020; Chygryn et al., 2020; Bogachov et al., 2020; Dalevska et al., 2019; Dementyev & Kwilinski, 2020; Dzwigol, 2019a; 2019b; 2020a; 2020b; Dzwigol & Dźwigoł-Barosz, 2018; 2020; Kondratenko et al., 2020; Kwilinski, 2018a; 2018b; 2019; Lakhno et al., 2018; Miskiewicz, 2018; 2019; 2020a; 2020b; Ponomarenko et al., 2018a; 2018b; 2018c; 2019; Prokopenko et al., 2015; 2018; 2019a; 2019b;; Prokopenko & Miskiewicz, 2020; Tkachenko et al., 2019a; 2019e). The authors in the investigations (Bilan et al., 2019a; 2019b; Bublyk et al., 2017; Kotenko et al., 2015; Pająk et al., 2016; 2017) proved that shadow economy and financial stability had negative impact on the macroeconomic stability and economic growth. The authors in the paper proved the linking between macroeconomic stability, innovation development and investment climate in the country (Lyulyov et al., 2017). Thus, the linking among green investment, innovation development (Lipkova et al., 2016) and economic growth as a main indicator of macroeconomic stability was confirmed in the papers (Dkhili, 2018; Lyulyov et al., 2017; Pimoenenko et al., 2018; Pimonenko, 2018; Pimonenko et al., 2017a; 2017b; Masharsky et al., 2018). The scientists in the papers (Harafonova et al., 2017; Boiko et al., 2019; Dzwigol et al., 2019a; 2019b; 2019c; 2020a; 2020b; 2019b; Furmaniak, et al., 2018; 2019a; Kharazishvili et al., 2020; Kwilinski et al., 2019a; 2019b; 2019c; 2019d; 2019e; 2019f; 2019g; Kwilinski & Kuzior, 2020; Kwilinski et al., 2020a; 2020b; 2020d; Miskiewicz & Wolniak, 2020; Saluga et al., 2020; Savchenko et al., 2019; Tkachenko et al., 2019b; 2019c; 2019d; Liubkina et al., 2019) proved that level of macroeconomic stability of the country influenced on the stable development of the industrial sector. In the papers (Kvitka et al., 2019; Dźwigoł et al., 2018) the scientists proved that education, research and development were the core indicators of macroeconomic stability.

In the report on the international experience in calculating macroeconomic indicators and their use, Sanjay Kalre identified the following criteria: 1) indicators should consider the specifics of the country; 2) have a clear economic significance; 3) wide statistical coverage; 4) consider cyclical behaviour (Kalra, 2012).

Methodology

A comparative analysis of the theoretical basis for assessing the level of macroeconomic stability of the national economy showed that using the concept of macroeconomic stability pentagon fully allows meeting the requirement to ensure the reliability of comparisons of different countries and achieve the main goals of stabilization policy.

The director of the Institute of Finance in Warsaw, Professor of Economics Grzegorz W. Kolodko (Kolodko, 1993) proposed a model of the pentagon of macroeconomic stability "Macroeconomic stabilization Pentagon" (MSP). This model is designed to assess the level of economic development, considering internal and external imbalances. The model of the pentagon of macroeconomic stability is based on the calculation of five key indicators that reflect the five signs of macroeconomic stability, viz:

- the growth rate of GDP (r);
- the unemployment rate (U);
- the inflation rate (CPI);
- balance of the state budget to GDP (G).
- balance of current turnover to GDP (CA) (Kolodko, 1993).

The MSP provides the country's achievement under five goals of macroeconomic stability: 1) stable economic growth, measured by the growth rate of GDP; 2) increasing in employment while decreasing in unemployment; 3) increasing the internal balance by reducing inflation rate, 4) providing a balanced state budget, which can support the financing of domestic debt without inflationary effects 5) maintaining the current account balance at a level that allows reducing external debt. The indicators mentioned above represents the apex of the pentagon (Figure 1).

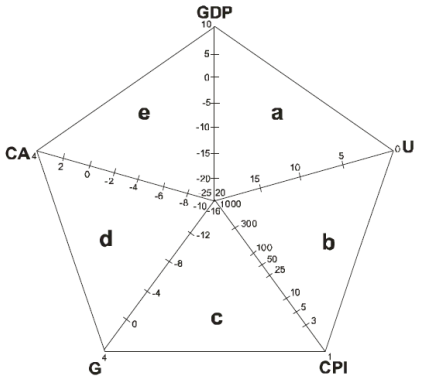

Fig. 1: The Pentagon of Macroeconomic Stability "Macroeconomic Stabilization Pentagon"
Source: developed based on (Kolodko, 1993).

However, the analysis of macroeconomic stability based on the MSP model has a static character. Thus, it does not consider the fluctuations of MSP indicators components and the risks of losing their stability. It should note that the obtained results of the analysis indicated the cyclical interaction and interdependence of indicators of macroeconomic stability of the national economy.

Based on the review of the basic concept of the pentagon model for assessment of macroeconomic stability developed by Gz. Kolodko and modified by K. Zaman and B. Derlik (Zaman, & Drcelic, 2009), G. Hurduzeu and M. Lazar (Hurduzeu, & Lazar, 2015), A. Malina and D. Miersva (Malina, & Mierzwa, 2014), J. Pedraza (Pedraza, 2012), R. Ionita (Ionita, 2015) and others, it follows that the above concepts consider the cyclical fluctuations of indicators for assessing the macroeconomic stability of the national economy.

In this regard, for eliminating the disadvantage, this study proposed a three-step approach to assessing the level of macroeconomic stability of the national economy: 1) Assessment of the static indicator of the level of macroeconomic stability of the national economy for the i-th country (MSi); 2) Evaluation of the cyclic component of the MSc; 3) Assessment of macroeconomic stability of the national economy.

The first stage is to determine the static component of the macroeconomic stability of the national economy based on the modified pentagon model (Zaman, & Drcelic, 2009):

$$MS_i = \sum_{j=1}^{n} A_j = \sum_{j=1}^{n} \left(\frac{X_j - X_{min}}{X_{max} - X_{min..}) \times 10}\right) \quad (1)$$

where A_j – normalized value j-component of the synthetic indicator MS; X_j – real value j-component of the synthetic indicator MS; X_{max} та X_{min} – maximum and minimum values of the synthetic indicator MS.

The maximum level of the static indicator of macroeconomic stability can reach 50. In turn, the value of each sub-index cannot exceed the level of 10. Table 1 presents the thresholds of the static indicator MS.

Table 1: The thresholds of the static indicator MS

THRESHOLDS	LEVELS
MS is (40;50]	the high level of economic stability
MS is (30; 40]	stable economy
MS is (20; 30]	semi-stable economy
MS is (10; 20]	the low level of economic stability
MS ≤10	volatile economy

Source: developed by the authors

The second stage is to calculate the deviations of the actual values variables from the equilibrium ones using the Godric-Prescott filter selecting the cyclic component of each of the elements of the synthetic indicator of macroeconomic stability of the national economy. In turn, the arithmetic means of the standard deviations allows considering the negative deviations of the equilibrium values of the parameters from the optimal value.

It should note that considering the standard deviations of the variables would take into account the negative trends that can be offset by the achieved stabilization of all other components. Moreover, it ensures that all MS components have equal sample volatility. Thus, the most stable components do not exclusively control changes in the index. The mathematical formalization of the calculation of these indicators involves the use of formulas (2; 3):

$$Skewness_j = 100 \times \frac{\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^3}{\left(\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^2\right)^{3/2}} \quad (2)$$

where Skewness – the asymmetry index of the j-component of the macroeconomic stability indicator (MS); x_i – the value of the respective component of the macroeconomic stability indicator (MS) in the i-period; $\bar{x}$ – the average value of the respective component of the macroeconomic stability indicator (MS) for the analysed period; n – the number of analysed periods.

$$Kurtosis_j = 100 \times \frac{\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^4}{\left(\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{\bar{x}}\right)^2\right)^2} \quad (3)$$

where $Kurtosis$ – the dimension of occurrence of extreme deviations of the j-component of the macroeconomic stabilization indicator (IMS).

Suppose the value of $Skewness$ indicator is close to 0. In that case, it indicates the symmetrical distribution of the j-component of the macroeconomic stability indicator (MS) while the impact of crises or booms would affect its reduction or increase, respectively. In turn, the non-zero value of the asymmetrical indicator (positive or negative) indicates instability. It means the predominance of positive (or negative) shocks.

The analysis of Skewness together with 3 $Kurtosis$ indicators allows completely demonstrate the impact of sharp unusual fluctuations in the country on the components of the macroeconomic stability indicator (MS). Herewith, in the case a symmetrical distribution of the individual components of the macroeconomic stabilization indicator (MS), the $Kurtosis$ indicator is equal to 3 or 300%. The value of more or less than the specified level indicates the tendency of the variable to extreme values. In the frame of the author' approach for assessing the macroeconomic stability of the national economy, it is proposed to calculate the cyclic component by the following formula (4):

$$MS_{cyc_i} = \left(\sum_{j=1}^{n} \sqrt{\frac{1}{T} \sum \left(c_{tj} - mean(c_{tj}) \right)^2} \right) / n \qquad (4)$$

where c_t – the cyclic component of the value of the j-element of the synthetic indicator *MS; mean* (c_t) – the cyclic component of the value of the j-element of the synthetic indicator *MS; T=1…t* – period for analysis.

$$c_t = X_t - \tau_t \qquad (5)$$

where X_t– the actual data of the value of the j-element of the synthetic indicator *MS*; τ_t – trend component.

The trend component is extracted from the actual data series y_t by solving the expression:

$$\min_{\tau_t} \sum_{t=1}^{T} ((y_t - \tau_t)^2 + \lambda((\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}))^2) \qquad (6)$$

The last stage is to calculate the ratio of static and cyclical indicators of macroeconomic stability of the national economy. It allows assessing the conversion of state regulatory policy. Furthermore, for providing a clear idea of the level of macroeconomic stability, it is necessary to conduct a graphical interpretation of the pentagon of macroeconomic stability as well as compare the MS indicator with the sum of standard deviations of MS subindexes considering the distribution asymmetry and extreme deviations.

Results

The first stage of the empirical investigation confirmed the need to consider the cyclical component. In turn, the authors assessed the level of macroeconomic stability of the country using the basic concept of the pentagon for assessing the macroeconomic stability of the country. In this case, the study object is Ukraine, its neighbour countries and countries that have recently joined the EU. For conducting the calculation, it was used the program of statistical analysis Stata 14. Tables 2-4 present the analysis of the MS indicator at different stages of the economic cycle: pre-crisis period (2000–2006), crisis period (2007–2010) and the post-crisis period (2011–2017).

Table 2: MS Index for Low- and Middle-Income Economies (2000-2006 – pre-crisis period)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania
2000	29.78	26.95	29.85	26.35	20.13	24.19
2001	38.19	28.41	31.89	23.15	22.55	28.93
2002	38.63	30.08	34.98	23.38	23.76	30.79
2003	41.36	30.71	38.84	22.69	24.00	32.14
2004	37.94	29.28	35.21	24.98	22.96	36.37
2005	33.05	32.62	36.52	26.13	23.25	32.18
2006	33.17	34.48	34.76	30.78	26.10	35.96
	Bulgaria	**George**	**Moldova**	**Hungary**	**Belarus**	**Serbia**
2000	22.21	24.53	22.03	25.78	32.36	22.40
2001	24.09	29.44	31.55	28.84	31.92	23.66
2002	27.00	26.40	35.11	26.54	34.16	30.04

2003	28.20	31.56	30.17	25.10	35.78	25.84
2004	32.25	28.86	30.06	29.87	41.43	28.53
2005	31.71	35.07	32.44	32.49	43.54	22.44
2006	32.35	36.49	27.42	32.03	45.39	23.08

Source: the authors' calculation

The obtained results (Table 2) indicated the different speed of changes of the macroeconomic stability of the national economy for investigated countries.

Table 3: MS Index for Low- and Middle-Income Economies (2007-2010 – crisis period)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania
2007	29,51	33,05	35,01	33,38	25,46	33,09
2008	19,28	19,62	26,57	29,51	25,30	32,85
2009	20,20	13,70	21,84	24,73	21,05	18,66
2010	25,56	12,75	20,91	23,99	18,57	18,59
	Bulgaria	**George**	**Moldova**	**Hungary**	**Belarus**	**Serbia**
2007	32,58	32,31	26,52	31,24	39,83	23,65
2008	32,44	22,13	32,90	33,50	42,76	24,77
2009	26,67	15,44	22,70	13,75	28,61	17,57
2010	21,03	21,19	28,92	16,09	33,57	14,48

Source: the authors' calculation

Table 4: MS Index for Low- and Middle-Income Economies (2011-2017 – post-crisis period)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania
2011	23,99	24,35	26,21	26,02	18,28	23,72
2012	20,53	26,63	26,88	24,55	17,07	23,54
2013	19,72	27,23	27,87	23,84	16,38	28,98
2014	19,83	25,93	28,78	26,91	17,87	29,74
2017	17,97	26,73	27,93	28,89	19,59	31,40
	Bulgaria	**George**	**Moldova**	**Hungary**	**Belarus**	**Serbia**
2011	25,55	29,50	29,71	22,33	26,78	14,18
2012	24,00	29,30	25,06	27,64	26,45	9,17
2013	23,73	25,69	34,26	22,61	25,55	17,48
2014	23,37	27,36	30,09	22,52	27,95	15,69
2017	27,46	24,79	22,15	20,66	25,76	19,43

Source: the authors' calculation

Therefore, in the pre-crisis period, most countries except Croatia and Serbia showed a stable level of macroeconomic stability. Table 2 indicates that the level of IMS achieved in Ukraine in 2003 was the highest in comparison with other analysed countries and amounted to 41.36. Profiles of macroeconomic stability of the analysed countries are presented in Figures 2-4.

a)

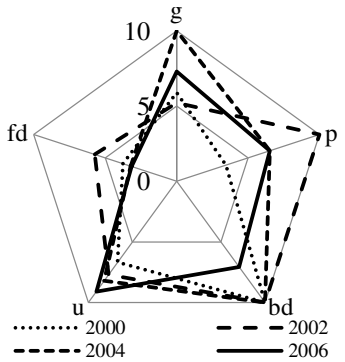

b)

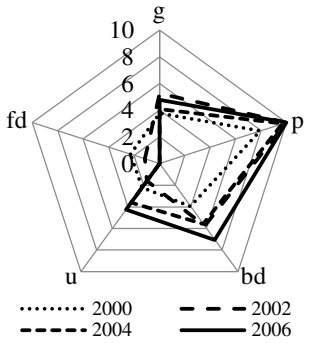

Fig. 2: The Pentagon of the Index of Macroeconomic Stability in *A)* Ukraine and *B)* Croatia (2000-2006)
Source: the authors' calculation

At the same time, for the entire pre-crisis period of 2000-2006, Belarus showed the best dynamics of macroeconomic stability (the level of the IMS indicator increased from 32.36 in 2000 to 45.39 in 2006). It should note that in terms of macroeconomic stability, the best IMS indicator for the entire analyzed period was achieved by Belarus in 2006.

Considering the crisis intensity from 2007 to 2010 through the prism of violating the acceptable range of macroeconomic stability, it is clear that the economies of the investigated countries could be divided into:

- crisis-resistant countries: Belarus;
- countries with moderate resilience to crises: Ukraine, Lithuania, Poland, Bulgaria, Georgia, Moldova;
- countries with low resilience to crises: Latvia, Croatia, Romania, Armenia and Serbia.

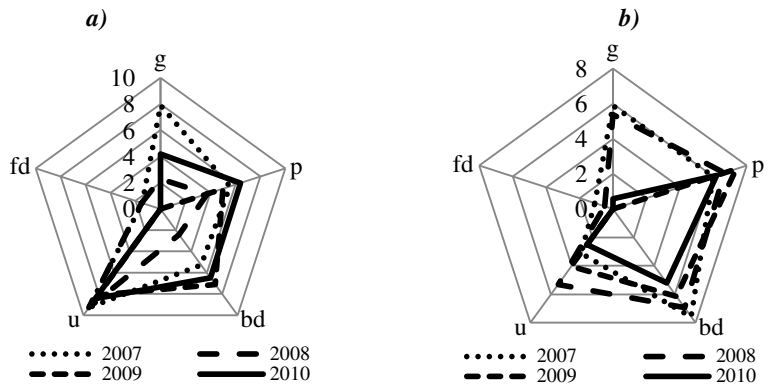

Fig. 3: The Pentagon of the Index of Macroeconomic Stability in *a)* Belarus and *b)* Serbia (2007-2010)
Source: the authors' calculation

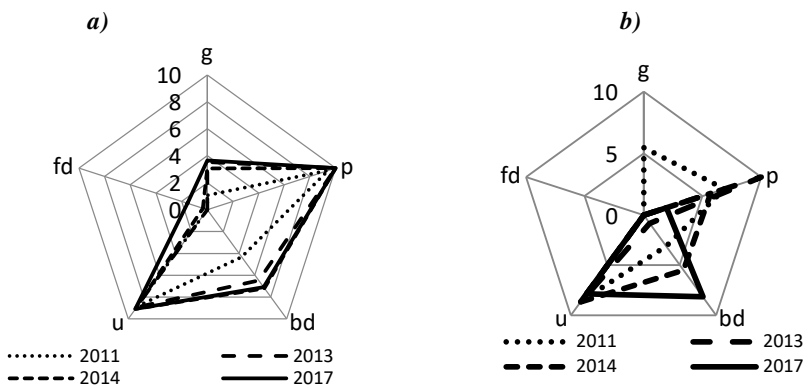

Fig. 4: The Pentagon of the Index of Macroeconomic Stability in *a)* Romania and *b)* Ukraine (2011-2017)
Source: the authors' calculation

Based on the IMS indicator, the comparison of the macroeconomic stability of the European Union was conducted. Therefore, the findings showed that the economies of Latvia, Lithuania and Poland had become more stable every year since joining the European Union in 2004. This situation had been observed until 2008. However, the financial crisis has negatively affected the stability of the economies of the investigated countries. It should note that from 2011 to 2017, Romania, Poland, and Lithuania significantly reduced the gap between IMS values achieved in the pre-crisis period (2000-2006). Besides, this process was the fastest in Romania. Its economy could be described as moderately stable – 31.40. Despite the low level of the IMS indicator in Croatia (in 2015 it was 19.59), the country's economy had been showing a tendency to improve macroeconomic stability significantly since joining the European Union in 2013.

Thus, the largest decrease in IMS from 2011 to 2017 was registered in Ukraine (17.97), Croatia (19.59), Serbia (19.43). Since 2006, the macroeconomic stability of Ukraine has deteriorated. The situation began to change in 2010-2012, but after 2012 macroeconomic stability began to decline significantly and reached its minimum in 2015. Thus, comparing the macroeconomic stability in 2000-2006 with 2011-2017, the area of the pentagon in 2017 reached minimum value (Fig. 4b).

Table 5 indicates the similarity of macroeconomic stability trends for the investigated countries. According to the obtained data, the highest effects of similarity of macroeconomic stability trends were recorded between Lithuania and Latvia (0.89), Georgia and Latvia (0.88), Bulgaria and Croatia (0.8), Belarus and Croatia (0.86). It indicates about almost ninety per cent coincidence economic growth rate. Armenia, Belarus, and Serbia are among the countries with the highest number of positive pairwise correlation coefficients exceeding 0.7. Negative values in the table indicate an inverse relationship. Thus, the upward trend of one country is accompanied by a downward trend of another. The obtained results of macroeconomic stability have shown an imbalance in the shapes of pentagonal surfaces. In turn, it indicates the growth of the main macroeconomic indicators of countries at different rates. Thus, in particular, the highest average GDP growth in 2000-2017 remained at the level of 6.92% of annual growth, which was demonstrated by the Armenian economy. However, despite the peak growth of this indicator in 2003 to 14.04, the total value of IMS was 25.10. It corresponds to a moderately stable economy. Among other EU countries, this result is impressive. However, it should note that it was achieved against the background of low unemployment, which for the period 2000-2005 reached more than 30%. The lowest average GDP growth in 2000-2015 was in Croatia (1.68%). Although, it should note the positive GDP growth in 2015 against the decline in 2009-2014 (approximately -7.4% in 2009 and - 0.4% in 2014). In turn, Croatia, Latvia and Lithuania have experienced the largest recessions. The Latvian economy decreased by 21% in 2008-2010, and the Lithuanian economy - by 12% in 2008-2009. The average GDP growth in Ukraine for 2000-2017 was 4.03% of annual growth. The period of the significant decline in GDP dynamics was 2009 and 2010, by 14.33% and 3.78%, respectively. It is reasonable to note years: 2005, 2006, 2007, when the economy showed growth of the specified indicator at a high level - to 10% a year.

Table 5: Matrix of Paired Correlation Coefficients MS for (2000-2017)

Country	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania	Bulgaria	Georgia	Moldova	Hungary	Belarus	Serbia
Ukraine	1.00											
Latvia	0.55	1.00										
Lithuania	**0.79**	**0.89**	1.00									
Poland	-0.26	0.26	0.11	1.00								
Croatia	0.60	0.40	0.63	0.42	1.00							
Romania	0.42	**0.77**	**0.79**	0.41	0.63	1.00						
Bulgaria	0.28	0.45	0.57	0.57	**0.80**	**0.75**	1.00					
Georgia	0.52	**0.88**	**0.78**	0.26	0.37	0.64	0.44	1.00				
Moldova	0.33	0.20	0.32	-0.31	0.17	0.37	0.15	0.25	1.00			
Hungary	0.42	**0.70**	0.69	0.41	0.63	**0.76**	0.66	**0.70**	0.35	1.00		
Belarus	0.53	0.36	0.57	0.41	**0.86**	0.61	**0.78**	0.46	0.27	**0.71**	1.00	
Serbia	**0.72**	0.45	**0.71**	0.09	**0.80**	0.68	0.59	0.23	0.35	0.51	0.65	1.00

Source: the authors' calculation

It is worth noting that as a result of the financial crisis, macroeconomic stability has deteriorated in each of the analysed aspects. Thus, the high level of unemployment (about 29%) contributed to the deterioration of the situation in Armenia, and the high level of the budget deficit in per cent to GDP (-12%) and external debt (168% of GDP) to the Latvian economy. The highest inflation rate in the period from 2007 to 2010 was in Ukraine. Analysis of the growth rate of inflation in Ukraine economy has indicated a big problem because in the analysed period its level reached double digits. Thus, in particular, in 2015, the inflation rate rose to 48.72. At the same time, as noted in the study (Vasilyeva, 2013), one of the critical factors in weakening the country's economic productivity is inflation. Besides, it is supported by expanding consumer lending to households, which does not correspond to the macroeconomic level of economic development. As can be seen from Table 6, two of the five indicators of macroeconomic stability in Ukraine are distributed with left-wing asymmetry: real GDP (-1.05); budget deficit (-0.26).

Table 6: The Data to Calculate Skewness and Kurtosis (2000-2017)

Country	GDP (%)		Inflation rate (%, a.a.)		Budget deficit (% to GDP)		Unemployment rate (%)		External debt (% to GDP)	
	S	*K*	*S*	*K*	*S*	*K*	*S*	*K*	*S*	*K*
Ukraine	-1.05	3.27	1.58	5.43	-0.26	2.05	0.69	2.71	0.98	3.73
Latvia	-1.38	4.66	0.97	3.22	1.70	4.75	0.20	2.41	-0.18	1.70
Lithuania	-2.21	8.48	0.80	3.02	1.16	3.08	-0.27	2.06	-0.17	1.49
Poland	0.25	2.41	0.71	3.72	0.25	2.14	0.36	1.45	0.12	1.39
Croatia	-0.98	3.40	0.21	2.57	-0.38	2.20	-0.26	2.43	-0.27	1.73
Romania	1.00	1.00	-1.47	2.56	-1.82	3.92	-1.07	1.20	-1.00	1.00
Bulgaria	-0.77	2.85	0.25	2.49	-0.11	1.96	0.31	2.25	-0.31	1.86
Georgia	-0.39	3.30	0.13	2.59	1.35	5.04	0.16	1.99	-0.24	3.13
Moldova	-1.25	3.82	0.20	2.11	0.68	3.62	-0.37	1.90	1.19	3.56
Hungary	-1.55	5.84	-0.16	1.94	1.21	3.71	0.31	1.52	-0.13	1.54
Belarus	-0.51	2.45	1.87	5.02	0.25	2.17	0.65	1.99	0.40	1.61
Serbia	-0.29	2.00	3.27	12.48	0.18	1.94	-0.21	1.96	-0.28	1.69

S – Skewness; K – Kurtosis
Source: the authors' calculation

However, the most significant negative impact on macroeconomic stability has the indicator of real GDP, because the value of the asymmetry coefficient, which is less than 0.5, can be ignored (Kolodizev & Maksimova, 2016).

Table 7: The Data to Calculate the Cyclical Component MS_c (2000-2017)

Year	Ukraine	Latvia	Lithuania	Poland	Croatia	Romania	Bulgaria	Georgia	Moldova	Hungary	Belarus	Serbia
2001	5.620	0.896	0.979	2.444	1.430	1.973	2.202	0.954	5.296	1.600	8.735	13.53
2005	6.163	2.198	2.559	2.306	2.115	3.353	4.183	4.100	6.112	4.692	8.818	11.57
2009	6.080	4.042	4.795	2.430	3.057	4.025	5.135	5.524	5.957	6.727	7.817	9.229
2014	5.683	3.435	3.557	2.268	2.926	4.051	4.416	4.856	5.084	5.758	8.859	7.760
2017	7.064	3.432	3.491	2.233	2.987	4.218	4.491	4.946	5.290	5.735	8.689	7.583

Source: the authors' calculation

In addition, it is appropriate to emphasize the presence of right-side asymmetry (Table 7) of each of the indicators of macroeconomic stability in Poland. In turn, it indicates a high probability of favourable deviations in the future.

At the next stage, for considering the negative deviations of equilibrium values of parameters from their optimal value deviations of actual values of variables from equilibrium are calculated.

It should note that low values of the ratio of static indicator MS with the sum of standard deviations of cyclic components of its subindexes indicate a high risk of losing macroeconomic stability and low synchronization of regulatory policies in its main areas (Table 5).

The most considerable level of decline in the static indicator of macroeconomic stability of the national economy from 2011 to 2017 was in Ukraine and Serbia.

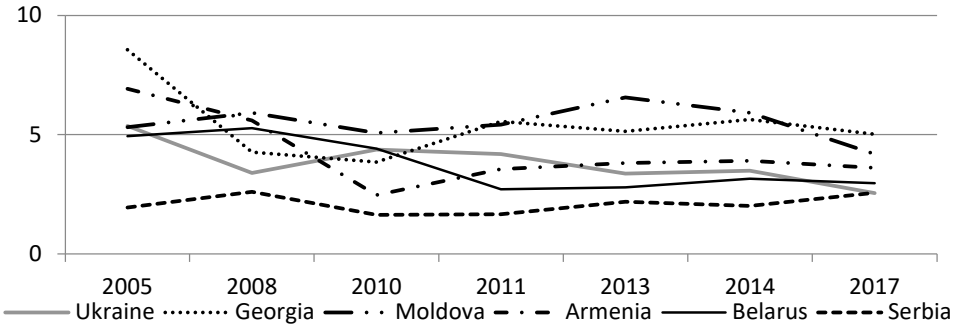

Fig. 5: The Calculation of the Level of Macroeconomic Stability for Ukraine, Georgia, Moldova, Armenia, Belarus and Serbia

Source: the authors' calculation

The level of macroeconomic stability of the national economy in Latvia, Lithuania, and Poland has been growing every year since they became the EU members until the crisis of 2008. Besides, Romania, Poland, and Lithuania significantly reduced the gap between macroeconomic stability of the pre-crisis levels in 2011–2015, where this process was the fastest in Romania.

Despite the low entry-level of macroeconomic stability of the Croatian national economy after joining to the EU, the dynamics of its macroeconomic stability has gained momentum.

Therefore, the low level of standard deviations of the cyclical components of macroeconomic stability of the national economy for the EU countries indicates the effectiveness of the conversion of the state policy of these countries on macro stabilization.

Conclusions

The empirical results of this study confirmed the need to consider not only static but also cyclical components for evaluating the level of macroeconomic stability of the national economy. In this regard, the conceptual framework for integrated assessment of the level of macroeconomic stability of the national economy has been improved.

The authors proposed the methodology of the integrated assessment of the level of macroeconomic stability of the national economy. Unlike the existing ones, this methodology based on the concept of the pentagon of macroeconomic stability and consider five main guidelines of state stabilization policy: GDP growth, unemployment, inflation, external debt, state budget balance. Besides, it systematically combines the static component of macroeconomic stability of the national economy and its cyclical component. Moreover, it allows assessing the conversion of state regulatory policy to achieve macroeconomic stability of the national economy. The results of testing the proposed approach to assessing the level of macroeconomic stability showed that the largest level of decline in the static indicator of macroeconomic stability of the national economy in 2011-2017 was in Ukraine and Serbia.

It is determined that the level of macroeconomic stability of national economies of Latvia, Lithuania, Poland has been growing annually since their joining to the EU before the crisis of 2008. Besides, Romania, Poland, and Lithuania significantly reduced the gap between macroeconomic stability of the pre-crisis levels in 2011–2015, where this process was the fastest in Romania. Despite the low entry-level of macroeconomic stability of the Croatian national economy after joining to the EU, the dynamics of its macroeconomic stability has gained momentum. It is established that the low level of standard deviations of cyclical components of macroeconomic stability of the national economies of the EU countries indicates the effectiveness of the conversion of public policy of these countries on macro stabilization.

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Economic Growth and Oil Industry Development: Assessment of the Interaction of National Economy Indicators

Saad MLAABDAL
Oleg Balatskyi Academic and Research Institute of Finance, Economics and Management, Sumy State University, Sumy, Ukraine, saad1764687@gmail.com

Olena CHYGRYN
Department of Marketing, Sumy State University, Sumy, Ukraine, echigrin0303@gmail.com

Aleksy KWILINSKI
The London Academy of Science and Business, London, United Kingdom
a.kwilinski@london-asb.co.uk

Oleksandr MUZYCHUK
Kharkiv National University of Internal Affairs, Ukraine, o.muzychuk23@gmail.com

Oleksandr AKIMOV
Department of Public Administration, Interregional Academy of Personnel Management, Ukraine
1970aaa@ukr.net

Abstract

The results of the national economy functioning determined by the huge complex of factors: structure of the national economic complex, the share of leading industries, the effectiveness of their development and the impact on socio-economic indicators of the country and regions of oil extraction complex. The purpose of the paper is to investigate the scientific approaches to the impact of oil price fluctuations on the economic growth of exporting countries and assessing the interaction of economic growth of the national economy and factors of the oil industry. To study the cointegration and causal relationships of the development of national economy the paper proposed a two-tier approach: on the basis of the heterogeneous modified OLS (FMOLS) model, a linear relationship is established between the indicators of economic development (GDP, capital and labor costs) and indicators of the functioning of the national economy (volumes of oil production and rent payments for oil); the causal links between the economic growth of national economy, the volume of oil production and rent payments are determined by the Granger method based on the developed time series model (VECM), which allows you to adjust the short-term dynamics of parameters depending on the identified long-term relationships between variables and their deviations. The results of the study of cointegration and causal links between the development of the oil industry and the national economy showed that the growth of oil production and the level of rent payments for oil increase GDP for OPEC countries, high and middle-income countries. For countries with low and below average income levels, a 10% increase in oil production leads to a 0.2% increase in GDP. Insignificant economic benefits for this configuration of countries are associated with the lack of systematic modernization of the industry and necessitate a change in the system of state regulation of exploration and use of oil fields, the transition from extensive to intensive development of oil production complex for high value added products.

Keywords: national economy, assessment, oil production, oil prices, oil rent

Introduction

The efficiency of the national economy of any state is determined by the structure of the economic complex, the share of leading industries, the effectiveness of their development and the impact on socio-economic indicators of the country and regions of oil production (Dzwigol, 2020). The relevant assessment becomes especially relevant for the countries - leaders in oil production, where the oil industry is the dominant industry, which largely determines the vectors of development of countries, socio-economic policies, the level of innovation and more. Estimation and econometric modelling of macroeconomic growth models includes a variety of approach methods, ranging from

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production functions and vector autoregressions to nonparametric modelling (Klymenko, 2016; Czyżewski, 2019; Hasan, 2019).

Literature Review

Considerable attention of domestic and foreign scientists is focused primarily on the study of the impact of oil price fluctuations on the economic growth of exporting countries (Bhowmik, 2019; Bilan, 2019c; Brychko, 2019; Mishchuk et al, 2020; Kostiukevych et al, 2020). The oil factors of the countries selected for the study have an impact on both political and economic processes, which in turn leads to price fluctuations, investment uncertainty, inflation, changes in the stock market and economic growth of the national economy (Dźwigoł, 2018; Naser, 2019; Vasilieva, 2017; Kalyayev et al., 2019; Akimov et al., 2020). In turn, the works (Bogachov et al., 2020; Boiko et al., 2019; Chygryn et al., 2020; Dalevska et al., 2019; Dementyev & Kwilinski, 2020; Dzwigol, 2019a; 2019b; 2020a; 2020b; Dzwigol & Dzwigol-Barosz, 2018; 2020; Dzwigol et al., 2019a; 2019b; 2019c; 2020a; 2020b; Furmaniak, et al., 2018; 2019a; 2019b; Kharazishvili et al., 2020; Kondratenko et al., 2020; Kwilinski, 2018a; 2018b; 2019; Kwilinski et al., 2019a; 2019b; 2019c; 2019d; 2019e; 2019f; 2019g; Kwilinski & Kuzior, 2020; Kwilinski et al., 2020a; 2020b; 2020d; Lakhno et al., 2018; Miskiewicz, 2018; 2019; 2020a; 2020b; Miskiewicz & Wolniak, 2020; Pająk et al., 2016; 2017; Ponomarenko et al., 2018a; 2018b; 2018c; 2019; Prokopenko et al., 2015; 2018; 2019a; 2019b; Prokopenko & Miskiewicz, 2020; Saluga et al., 2020; Savchenko et al., 2019; Tkachenko et al., 2019a; 2019b; 2019c; 2019d; 2019e) are devoted to sustainability in economic development at various levels of activity, allowing us to analyze the relationship in energy consumption more deeply.

Thus, the first study of the impact of oil prices on macroeconomic indicators of the country was conducted in 1983 by G. Hamilton in "Oil and the Macroeconomy since World War II". The researcher proved that the increase in oil prices has a more significant impact on changes in macroeconomic indicators than its fall (Hamilton, 2009; Abaas, 2018; Augbaka, 2019; Akimova et al., 2020).

R. Jimenez-Rodriguez and M. Sanchez (Jiménez-Rodríguez, 2005) in their work "Oil Price Shocks and Real GDP Growth - Empirical Evidence for Some OECD Countries" based on the use of multivariate VAR-analysis of panel data (formula1), for both linear and nonlinear models , found a significant relationship between oil prices and macroeconomic indicators of OECD countries. At the same time, the authors note different effects on changes in macroeconomic indicators due to lower and higher oil prices for different types of OECD countries: exporting and importing countries (Yevdokimov, 2018; Singh, 2019; Mlaabdal, 2017; Lyulyov, 2019a; Panasiuk et al., 2020). In particular, for importing countries, rising oil prices negatively affect their economic growth, and for exporting countries (UK and Norway) there is a diametrically different nature of the impact: rising oil prices have a significant negative impact on UK GDP growth, while Norway receives benefit from rising oil prices.

$$y_t = c + \sum_{i=1}^{p} \Phi_i \, y_{t-i} + \varepsilon_t \qquad (1)$$

where y_t – vector (n × 1) of endogenous variables (real GDP, effective exchange rate, oil price, wage level, inflation rate, short- and long-term interest rates).

A similar conclusion is reached by scientists (Haque, 2019; He, 2019) studying the relationship between oil prices and macroeconomic aggregates (gross domestic product, consumer prices and unemployment) for 26 OECD countries during 1980-2011 on the basis of econometric methods:

- cross-sectional dependence test:

$$CDLM1 = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \widehat{\rho_{ij}^2} \sim \chi_{\frac{N(N-1)}{2}}, \qquad (2)$$

- root tests:

$$\Delta y_{it} = a_i + \beta_i y_{i,t-1} + \gamma_i f_t + \varepsilon_{it}, \qquad (3)$$

H0: βi=0

H0: βi<0 i=1,2…N1, i= N1+1, N1+2,…N,

- panel integration tests.

The tests confirmed the existence of a long-term relationship between oil prices and macroeconomic aggregates. At the same time, the scientists (Kasztelnik, 2019; Kuzior, 2019) are indicating a statistically significant and negative impact of oil prices on gross domestic product, consumer prices and unemployment.

Omojolaibi J. (Omojolaibi, 2015) conducts his research on the impact of oil prices on the macroeconomic indicators of the oil-dependent country Nigeria for 1985-2010 years:

$$\begin{cases} CPI_t = \sum_{k=0}^{\infty} S_{11}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{12}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{13}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{14}(k)V_{4t-k}, \\ GDP_t = \sum_{k=0}^{\infty} S_{21}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{22}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{23}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{24}(k)V_{4t-k}, \\ M_{2t} = \sum_{k=0}^{\infty} S_{31}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{32}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{33}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{34}(k)V_{4t-k}, \\ OP_t = \sum_{k=0}^{\infty} S_{41}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{42}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{43}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{44}(k)V_{4t-k}, \end{cases} \quad (4)$$

where CRI -inflation, M_2 -money supply, GDP -gross domestic production, V_{it-k} – uncorrelated white noise values, $S_{ij}(L)$ – polynomials of the lag operator.

Structural equation (4) can be transformed into a vector equation:

$$X_t = [\ CPI_t\ GDP_t M_{2t} OP_t] \text{ та } V_t = [V_{1t}\ \ V_{2t}\ \ V_{3t}\ \ V_{4t}] \quad (5)$$

In a study (Cheng, 2017) on the impact of oil prices on Singapore's macroeconomic indicators, the authors found that changes in oil prices have little negative impact on gross domestic product, inflation and unemployment in the country. Another important conclusion is the establishment of a tendency to reduce the intensity of the impact of oil factors in Singapore since 1989 on economic growth (Bilan, 2019a; Kwilinski, 2018).

Ghalayini L. (Ghalayini, 2011) in order to investigate the impact of oil prices on economic growth uses tests on the causality of Granger:

$$GDP_t = C_0 + \sum a_i\, GDP_{t-i} + + \sum \beta_i\, P_{t-i} + \varepsilon \quad (6)$$

$$P_t = C_0 + \sum a_i\, P_{t-i} + + \sum \beta_i\, GDP_{t-i} + \varepsilon \quad (7)$$

where GDP_t – gross domestic product of the study country in the t-th period, P_t – the price of oil of the studied country in the t-th period.

The G-7 and OPEC countries were selected as the objects of Galaini's research (OPEC, (2018). Based on the analysis, the scientist concludes that for most countries there is no interaction between changes in oil prices and economic growth.

The significant influence of these oil factors on economic growth was reflected in the work of M. Mohammed (Mohammed, 2018) using a lag autoregressive model (3.8) based on Angola data for the period 1985-2015, the author concludes about the integrated processes of increasing oil production and economic growth. At the same time, the lack of inverse causality of economic growth to oil production, according to the author, indicates the dependence of Angola on external demand for its oil. Thus, the government needs to pursue a policy of economic diversification in order to minimize adverse global economic shocks associated with a sharp decline in global oil demand (Levchenko, 2018; Lyulyov, 2019b; Pimonenko, 2018; Teletov et al., 2020).

$$\begin{cases} \Delta Y_t = a_0 + \sum_{i=1}^{m} \beta \Delta Y_{t-i} + \sum_{i=1}^{n} \varphi \Delta OP_{t-i} + \theta_1 Y_{t-1} + \theta_2 P_{t-1} + \varepsilon_{1t} \\ \Delta OP_t = a_0 + \sum_{i=1}^{m} \beta \Delta OP_{t-i} + \sum_{i=1}^{n} \varphi \Delta Y_{t-i} + \theta_1 OP_{t-1} + \theta_2 Y_{t-1} + \varepsilon_{1t} \end{cases} \quad (8)$$

where Y – logarithm of the country's GDP, OP – the level of oil production in the country.

However, this result is the opposite of the conclusions of (Tamba, 2017). Based on the annual data for the period 1977–2010, J. Tamba investigated the causal relationship between oil production and economic growth. The results obtained using the vector autoregressive model (VAR) and the Wald test indicate that there is no causal relationship between the variables. In addition, an additional conclusion of the study is the need to introduce a transparent system of oil revenue management in the state, which, accordingly, will contribute to the economic growth of the state in the future (Vasilyeva, 2019; Miśkiewicz, 2020). Another group of scientists concluded that development of the oil complex produces significant environmental damage. To decrease the greenhouse gas emission could be realized through providing renewable energy and implementation the sustainable development principals in the oil industry (Cebula, 2018; Mentel, 2018). In this, case the authors (Chygryn, 2018; Chygryn, 2014; Bilan, 2019b) proved the positive impact of green investment on decreasing GHG emissions and increasing the share of renewable energy.

H. Choi and S. Yoo (Choi, 2016) concluded that the relationship between oil consumption and economic growth in Brazil has a two-way causality. Researchers note that Brazil's economic growth is driven by oil consumption, so reforms to overcome oil consumption restrictions should be implemented to minimize possible reductions in GDP. According to Pakistani scholars (Awan, 2018), such a reform should also be followed by the Government of Pakistan.

Because the results obtained from single-root tests, the joint integration and Granger causality based on error correction models (ECMs) have shown that there is a bilateral causality between oil consumption and economic growth in Pakistan. This means that increasing oil consumption directly affects economic growth (Marcel, 2019).

Alhatlan K. (Alkhathlan, K. A. (2013) conducted a thorough study of the relationship between oil production and economic growth in Saudi Arabia from 1971 to 2010. The paper emphasizes the presence, both in the short and long term, of a statistically significant impact of rent payments from oil production on the real gross domestic product of the country. This study is based on the solution of a system of equations:

$$\begin{cases} y_t = \beta_0 + \beta_1 or_t + \beta_2 inf_t + \beta_3 dco_t + \varepsilon_t \\ y_t = \beta_0 + \beta_1 or_t + \beta_2 inf_t + \beta_3 dco_t + \beta_4 tot_t + \varepsilon_t \\ y_t = \beta_0 + \beta_1 or_t + \beta_2 inf_t + \beta_3 dco_t + \beta_4 tot_t + \beta_5 wr_t + \varepsilon_t \\ y_t = \beta_0 + \beta_1 or_t + \beta_2 inf_t + \beta_3 dco_t + \beta_4 wr_t + \varepsilon_t \end{cases} \quad (9)$$

where y_t – real GDP per capita, or_t – the amount of rent payments from oil, inf_t – inflation, dco_t – the level of domestic oil consumption used in the industrial sector, tot_t – trade openness.

Methodology

To study the impact of the oil industry on the socio-ecological and economic development of the national economy, Ukraine is the object of study, and for comparison - 20 countries that have signed a cooperation agreement for economic, energy, financial and cultural cooperation under the initiative "One Belt and One way "and according to the World Bank are divided into three subgroups:

- high-income and above-average countries (Belgium, Italy, Kazakhstan, the Netherlands, Germany, Poland, Russia, Romania, Turkey, France),
- OPEC countries (Algeria, Indonesia, Iran, Qatar, Kuwait, United Arab Emirates, Saudi Arabia),
- countries with low and below average income (Ukraine, Uzbekistan).

To study the cointegration and causal relationships of the development of national economy in general, the paper proposes a two-tier approach:

1) on the basis of the heterogeneous modified OLS (FMOLS) model, a linear relationship is established between the indicators of economic development (GDP, capital and labor costs) and indicators of the functioning of the national economy (volumes of oil production and rent payments for oil);

2) the causal links between the economic growth of national economy, the volume of oil production and rent payments are determined by the Granger method based on the developed time series model (VECM), which allows you to adjust the short-term dynamics of parameters depending on the identified long-term relationships between variables and their deviations.

$$\text{FMOLS-model: GDP} = \text{F (K, L, OP)} \rightarrow \text{GDP}_{it} = \alpha + \beta_1 K_{it} + \beta_2 L_{it} + \beta_3 OP_{it} + \varepsilon_{it} \quad (10)$$

where GDP_{it} – GDP of the i-th country per capita in period t; K_{it} - capital costs of the i-th in the period t (gross fixed capital formation); L_{it} - labor costs of the i-th country in the period t (economically active population aged 15 years and older); OP_1 - volumes of oil production, OP_2 - volumes of rent payments for oil; β_1, β_2, β_3 - coefficients of elasticity, respectively, capital, labor, oil production; α - the level of technological development of national economy, which is determined by establishing the coefficients of elasticity of capital, labor, oil production, rent payments; ε - statistical error; t - research period; i - country of study.

$$\text{VECM-model: } \begin{cases} GDP_{it} = \alpha_0 + \sum_{i=1}^{m} \beta_{ik} \Delta GDP_{i,t-1} + \sum_{i=1}^{n} \eta_{ik} \Delta OP_{i,t-1} + e_{1t,} \\ OP_{it} = \alpha_0 + \sum_{i=1}^{m} \theta_{ik} \Delta OP_{i,t-1} + \sum_{i=1}^{n} \mu_{ik} \Delta OP_{i,t-1} + e_{1t}, \end{cases} \quad (11)$$

where α_0 – equation constant; $\beta_{ik}, \eta_{ik}, \theta_{ik}, \mu_{ik}$ – calculated system parameters; $\Delta GDP_{i,t-1}$ – change in GDP of the i-th country in the t-th period compared to the previous year; $OP_{i,t-1}$ – change parameters; e – statistical error.

Results

The traditional factors of change in demand and supply of oil on the world market, which forms the level of oil prices include: the scale of oil production; geopolitical position of the main oil-exporting regions; information on the depletion of oil reserves on the planet; oil and oil reserves in oil-importing countries and the level of reserves of oil-

exporting countries; statements by OPEC members on production quotas and price targets; oil infrastructure; environmental problems, etc.

The table 1 and 2 show the results of the regression analysis of the impact of the price per barrel of Texas oil on the economic growth of the European Union and the World during 1986-2019.

Table 1: Determining the Impact of the Price per Barrel of Texas Oil on the Economic Growth of The European Union during 1986-2019.

```
      Source |       SS           df       MS      Number of obs   =        30
-------------+----------------------------------   F(1, 28)        =     62.63
       Model |  3.8601e+26         1  3.8601e+26   Prob > F        =    0.0000
    Residual |  1.7257e+26        28  6.1632e+24   R-squared       =    0.6911
-------------+----------------------------------   Adj R-squared   =    0.6800
       Total |  5.5858e+26        29  1.9261e+25   Root MSE        =    2.5e+12

ВВП  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
Ціна |   1.33e+11   1.68e+10     7.91   0.000     9.83e+10    1.67e+11
cons |   7.13e+12   8.70e+11     8.19   0.000     5.35e+12    8.91e+12
------------------------------------------------------------------------------
```

Source: created by the author

The results of the regression analysis of the impact of the price per barrel of Texas oil on the economic growth of the European Union and the World during 1986-2019 showed its positive and statistically significant impact at the level of 1%.

Table 2: Determining the Impact of the Price per Barrel of Texas Oil on World Economic Growth during 1986-2019

```
      Source |       SS           df       MS      Number of obs   =        30
-------------+----------------------------------   F(1, 28)        =     40.49
       Model |  7.9973e+27         1  7.9973e+27   Prob > F        =    0.0000
    Residual |  5.5304e+27        28  1.9751e+26   R-squared       =    0.5912
-------------+----------------------------------   Adj R-squared   =    0.5766
       Total |  1.3528e+28        29  4.6647e+26   Root MSE        =    1.4e+13

ВВП  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
Ціна |   6.03e+11   9.48e+10     6.36   0.000     4.09e+11    7.98e+11
cons |   2.18e+13   4.93e+12     4.43   0.000     1.17e+13    3.19e+13
------------------------------------------------------------------------------
```

Source: created by the author

The results of cointegration and causation of oil production, rent payments for oil (key parameters of the oil industry) and economic growth of the national economy are presented in table 3, 4.

Table 3: The Results of Cointegration and Causation of Oil Production and Rent Payments for Oil and Economic Growth of the National Economy

The values of the constants β for the corresponding variables in the FMOLS model	FMOLS model configurations					
	Configuration A (high- and middle-income countries		Configuration C (OPEC countries)		Configuration E (low- and middle-income countries)	
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
β_1 (K)	0.1994	0.011**	0.223	0.000*	0.681	0,000**
β_2 (L)	–16.946	0.759	0.069	0.443	–7.665	0,867
β_3 (OP_1)	0.073	0.000*	0.099	0.000*	0.023	0,000*
β_3 (OP_2)	0.014	0.000*	0.117	0.000*	–0.037	0,018**
R^2 (OP_1/OP_2)	0.79/0.92		0.82/0.93		0.97/0.86	

Note: *, ** and *** – statistical significance at the level 1 %, 5 % and 10 %; R^2 – coefficient of model determination; Stat. – direction and strength of influence; Prob. – level of significance

Sources: created by the authors

The simulation results showed that the growth of oil production positively increases GDP for OPEC countries and countries with high and above-average incomes, which is primarily due to increased demand for oil, according to the foresee of International Energy Agency.

For low- and below-average-income countries, a 10% increase in oil production leads to a corresponding GDP growth of 0.2% on average.

Table 4: The Results of Cointegration and Causation of Oil Production and Rent Payments for Oil and Economic Growth of the National Economy

Hypotheses	VECM model configurations					
	Configuration A (high- and middle-income countries		Configuration C (OPEC countries)		Configuration E (low- and middle-income countries)	
	Prob.	Explanation	Prob.	Explanation	Prob.	Explanation
GDP → OP_1	0.045**	Lack of causality	0.046**	Bilateral causality	0.033**	Bilateral causality
OP_1 → GDP	0.036**	Unidirectional causality	0.053***		0.001*	
GDP → OP_2	0.042**	Lack of causality	0.063***	Bilateral causality	0.002*	Bilateral causality
OP_2 → GDP	0.033**	Unidirectional causality	0.068***		0.000*	
Note: *, ** and *** - statistical significance at the level 1 %, 5 % and 10 %						

Sources: created by the authors

Insignificant economic benefits for this type of country are associated with the lack of modernization of the industry and require a change in the paradigm of subsoil development, the transition from extensive to intensive development (strengthening technological development for high value-added products).

Positive values of parameters β_1 and β_3 for countries with high and above-average income and OPEC, their high statistical significance at the level of 1-5% suggest that countries with high and above-average income, OPEC use the amount of rent payments for oil for development technological progress contributing to increased economic development. With an increase in oil rents by 10% for low- and below-average-income countries, GDP will shrink by 0.3%, and the two-sided causality between these parameters indicates, on the one hand, the ineffectiveness of policies to support the development of those sectors of the economy. related to the extractive industry, and on the other hand about the inefficiency of market reforms carried out in the oil industry due to the instability of state institutions.

Conclusion

Conducted investigation gave the opportunity to concluded according the main features of the global energy market. 1. The world oil market is a recipient of the influence of global objective manifestations of the world economy, its social and political processes. Therefore, his study necessitates the study of relevant trends, institutions, market elements and features of their impact on pricing processes.

2. The level of consumption of oil and related products of its refining is determined by the level of development of each country.

3. Global trends in the development of innovative technologies, the development of alternative energy, the slowdown in the global economy cause certain changes in the growth of oil consumption.

4. Global objective and subjective development trends: uneven geographical location of fields, the creation of oil cartels that defend the interests of certain stakeholders and global institutions, in general, largely determine the monopoly position in the oil market.

5. The world oil market is constantly affected by the effects of various contradictions that arise between major stakeholders and market players and that have different economic, political, social and environmental interests.

6. The development of the world oil market is not stable; its development trends are determined from time to time in relation to the world leaders in oil production.

7. International policy in the field of environmental protection, the introduction of measures by countries to combat global climate change, the implementation of commitments by countries in the field of low-carbon development change the trends in the consumption of petroleum products.

The results of the study of cointegration and causal links between the development of the oil industry and the national economy showed that the growth of oil production and the level of rent payments for oil increase GDP for OPEC countries, high and middle-income countries. For countries with low and below average income levels, a 10% increase in oil production leads to a 0.2% increase in GDP. Insignificant economic benefits for this configuration of countries are associated with the lack of systematic modernization of the industry and necessitate a change in the system of

state regulation of exploration and use of oil fields, the transition from extensive to intensive development of oil production complex for high value added products.

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Mobile Applications – A Modern Method for Business

Olivia Doina NEGOIȚĂ
University POLITEHNICA of Bucharest, Romania, negoita.olivia@gmail.com

Mirona Ana Maria POPESCU
University POLITEHNICA of Bucharest, Romania, mirona.popescu15@gmail.com

Mihai Valeriu POPESCU
University POLITEHNICA of Bucharest, Romania, mihai.popescu0409@icloud.com

Abstract

The performance of the phones has evolved considerably, but the applications are the ones that really turn them into indispensable tools for everyday life, both professionally and personally. Developers are constantly rushing to keep up with the trends of the technological world. Every time something innovative appears, people's demand goes to it. Thus, in relation to trends and innovation, companies have begun to realize the importance of mobile application development services. Therefore, mobile application development companies are trying to come up with applications that have better interfaces, using new coding practices. The authors aim to conduct research to highlight the increasing use of mobile phone applications in carrying out activities within an organization. An organization of the categories of applications available in Google Play and AppStore is performed, their main features being underlined. At the same time, the criteria that must be taken into account when developing a mobile application are presented.

Keywords: Mobile Application, Business Environment, Customer Experience

Introduction

The technological advances that are gradually taking place in almost all fields of activity only bring benefits to large and small companies around the world which, through regular investments, have the possibility to streamline many of the activities that take place within them. If about a decade ago, all these companies focused exclusively on investments in technological equipment, today many companies choose to invest in various software applications that can be easily integrated into industrial processes and beyond. Software applications created especially for these environments have completely revolutionized many industrial sectors and not only, which is why they have become so popular in the world.

There are currently a variety of applications used in industrial environments, from a simple enterprise management application to a complex inventory application. Each of these applications have been developed in order to improve the quality of services offered but also in order to streamline the working time of employees.

Mobile applications have given power into the hands of customers. The world has already become mobile. By 2019, the number of mobile phone users will exceed 5 billion. There is no doubt that consumers use their phones to look for the things they want to buy or the activities they undertake. Mobile applications are beginning to be preferred to the detriment of websites.

Mobile applications allow the collection of information about customer preferences through the actions they perform. This information is used to show them personalized content so that they can make more prompt decisions. Companies that provide iPhone and Android application development services are already using artificial technology to learn user behavior and show them their products and services based on their preferences.

A good mobile application can offer an advantage over competitors who do not yet have one, bringing a great benefit by the fact that they can be accessed at any time and from any device. Thus, a mobile application becomes as important as online presence. Mobile applications are used by people of all ages, however young people have a special penchant

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for them. However, their use, according to Figure 1, is a high percentage for people who are actively participating in the labor market.

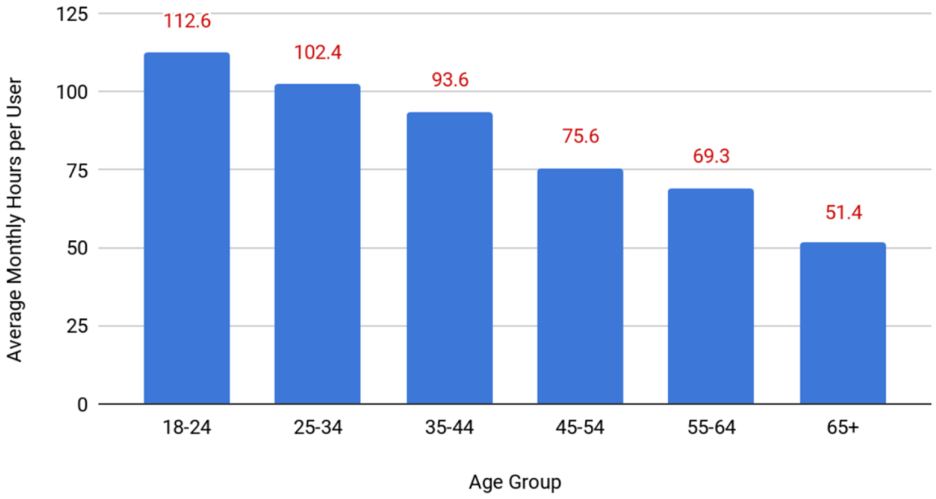

Fig. 1: Average monthly hours per mobile app user by age (https://www.simform.com/the-state-of-mobile-app-usage/)

Fig. 2 shows the main categories of applications for mobile phones, as well as user preferences for them. Although the first places in terms of spending time are represented by applications that help in recreational activities, which is correlated with the preference of young people for applications, are used in significant numbers and those intended for finance, productivity by the adult public.

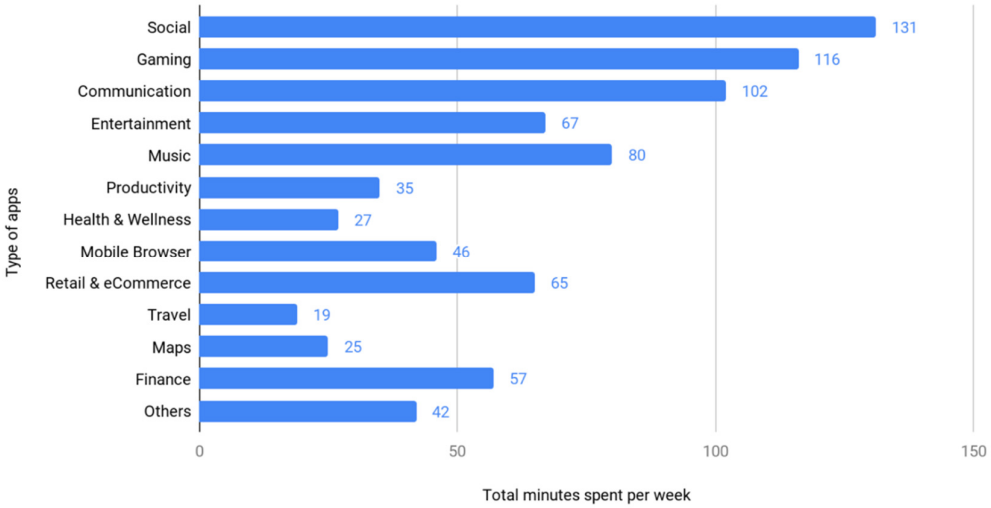

Fig. 1: Average weekly time spent in-app (https://www.simform.com/the-state-of-mobile-app-usage/)

State of the Art

Islam (2010) analyses the results of using a mobile application in a business environment. The mobile app development has increased in the last years. Therefore, the authors guided their research to be a global one in order to present statistical data about the impact and ethical perspective of mobile application from past and current years.

Chowdhury (2020) designed the concept for a BI mobile app and a prototype for it. They used a heuristic solution to conduct the tests which concluded with the observations that users are able to access the entire information in a single platform and it provides an up to date BI support for entrepreneurs and their businesses.

Cristofaro (2020) conducts a business model research that is a combination between qualitative and quantitative of 2250 mobile applications from Google Play Store using evolutionary lenses to interpret the results. E-business models are evaluated multiple times due to the modifications of the multi-level environment.

The research of Nastas (2019) focuses research on the biometric authentication through mobile device and its use regarding mobile applications that are developed to target different business areas. This comes from the necessity of security and the high degree of mobile applications usage in various business activities.
According to the study realized by Hajhmida (2020) mobile app developers have a huge challenge when it comes to publish their work on the official stores. Therefore, mobile applications need to remain in top ranking. This research presents an automated method to analyze data collected from Facebook that predicts mobile app breakout. The authors designed statistical features for user's sentiment regarding each post and machine learning techniques to develop a prediction model. One of their results consists in the fact that likes associated to a Facebook page are the key factor in increasing mobile application raking.

Ghosh (2020) uses a method to retrieve data from mobile devices in order to describe an unpleasant user experience of mobile applications.
The demand for qualitative mobile applications has increased as these are used more and more to complete the business circle. A Fuzzy Association Rule algorithm is used by Kabir (2017) to establish the experience of application users which can lead to a better usability. In their tests the authors consider a supply change management system to which are linked a considerable number of mobile application users. In their evaluation there are used twelve factors correlated with usability from ten usability evaluation models.

Due to the increasement of mobile applications, a considerable number of companies try to use them to develop stronger relations with consumers. This results in developing applications that take into account consumer preferences. Tarute (2017) gathered data from 246 respondents and used structural equations modeling to interpret the results. Consumer engagement influenced their intention to use continuously mobile applications.

Ecosystems of mobile business lay on innovations and facilitate the transactions of users in a multi-sided market. Winter (2018) proposes a model of success factors of mobile ecosystems to present an empirical framework for Android.

Evolution of Mobile Applications

Software can include the full range of programming products, usually consisting of the operating system (the most important in a computer's memory because it is the software that controls the computer), drivers and application programs. In some special cases, parts of the software are incorporated from the construction into the hardware components - by using preprogrammed integrated circuits.

In some areas, software means primarily the data that devices or computers work with, such as digitized images, sounds and music tracks, computer games, digitized movies, videos, and many other similar data. In extreme cases, even physical data carriers or "media" are considered to be "software", such as CD and DVD optical discs, VHS and MiniDV video tapes, audio tapes, etc. In other words, software is the application, the program that uses raw information resources (data, numbers).

A computer system cannot process data without being programmed. A program consists of a sequence of instructions that converge toward the solution of the problem to be solved. There are two categories of programs as it can be seen in Table 1:

Table 1: Categories of programs

Type of program	***Description***
System programs	*Application programs*
Coordinates the way the system components work and provides assistance in the operation of application programs. They are said to be basic software and consist of low-level programs that interact with the computer at its basic level. They are designed to facilitate the efficient use of computer system resources and to provide tools for the development and execution of application programs. These programs are developed for	Designed to solve problems specific to an application. They are said to make up application software. These programs perform data processing in accordance with the necessary information requirements; being made mainly by specialized software companies. Computer applications are those programs that are designed for users to use the computer in a specific problem and to perform a specific task (word

certain types of computer systems and cannot be used on other types. They are provided by the manufacturers of the computer systems or by specialized companies.	processing, billing, DTP, graphics applications), each with a specific function.

Mobile applications are constantly evolving. New applications are always appearing, and curiosity makes us try them. Now, in the context of the Covid-19 pandemic, we are using mobile applications more than in previous periods. On the one hand, professional and educational activity has moved to the online environment, and on the other hand, isolation at home has increased the time spent in front of screens. Below, in Table 2, there are presented the existent types of applications.

Table 2: Categories of applications

Games	Most applications are games. There is a long list of game categories available (logic, action, adventure, etc.). On the other hand, they are also among the most frequently used applications.
Education	In the category of educational applications there are also offering interactive means of learning. Many of them are methods of learning foreign languages or general culture. Also included in this category are applications for editing documents.
Business	Among the business applications there are series of applications that act as tools for entrepreneurs, such as finance management, inventory management or financial analysis. They are used to automate operations, which brings some benefits to companies.
Tools	The tool applications include a number of basic programs that help optimize the phone's performance or are useful for regular activities. Many of them are pre-installed and do not require downloading. These include the calendar, computer, reminder, notes, weather, flashlight, and phone cleaners.
Advertising	Entertainment applications help people to relax in their free time. These include watching movies and series, viral videos, etc.
Life style	Lifestyle applications are the ones that help people respect a certain lifestyle. For example, there are applications that remind people to drink water or that count the steps we take every day. Among them are the applications with physical exercises, but also those of dating and travel.
Music	Music and audio applications include those applications that allow people to listen to music of different genres or that help create music.
Books	Book and reference applications include those applications that contain e-books. These are usually paid applications.
Personalization	Personalization apps help people customize, create, or customize themes, widgets, wallpapers, new actions, voices, and navigation bars. These applications help people to transform their phone from all points of view.
Productivity	Productivity applications are frequently used due to their usefulness. These applications include documents and worksheets, budget management, planners, task management applications.

In conclusion, there are a lot of categories of mobile applications. These are useful tools in human lives or even ways to spend their free time.

Insights of Mobile Applications

Set of applications helps to better organize the activities within any enterprise. Moreover, these applications will help us reduce a number of expenses, but especially time considering that everything becomes much more intuitive thanks to the functions that these applications come with.

At first glance, these applications may seem a little complex or involve a fairly high investment, things that are far from reality in fact. The applications in question have been developed in such a way as to be as easy to use as possible by any employee and in addition, they do not involve high costs and can be easily implemented. They are developed specifically for a specific type of platform. The features are:

- They allow to take full advantage of the features that are built into mobile devices.
- They allow to take advantage of the distribution channel and showcase that represent the application stores of different manufacturers (App Store, Google Play)
- They must go through a pre-publication review process, both of the initial version of the application and of subsequent updates.
- Allow push notifications on devices
- Purchases from the App Store are associated with an account that the user must register, bank details are stored in that account. That way, they don't have to provide their account number every time they make a purchase.
- Work offline
- Native Look & Feel: both the appearance of the application and the user experience are better.

Each platform performs a different control of the content that is published. The best known are:

iOS: Its review and approval process takes between 4 days and 2 weeks. If they do not meet the requirements they set, they reject the publication of the application in their store.

Android: automatically published to personal store

Table 3: Type of programming applications

Web applications	
Description	Characteristics
These types of applications reach a larger number of users. A company can develop a web application or adapt the content of the web page to the mobile channel. The biggest disadvantage they have is that they do not appear in app stores, therefore the company has to put more effort both in marketing for users to know it and in physical resources for the application to work properly.	• Multiplatform: are compatible with any device. • Simpler technology than in native applications • Allows SEO and web analytics • Both its content and its functionality do not depend on the approval of third parties.
Hybrid solutions	
They are native applications, which in some sections show web content that can be uploaded from another server or from within the application. Apple does not allow this type of application because its content cannot be reviewed.	Once we have decided on the type of application, we need to choose the business model we will use. There are several: • Payment or Premium request • Free application • Freemium Model (Most used)

The process of programming mobile applications involves a variety of resources (from human to technological) which puts most companies - whether or not they have an IT profile - in difficulty.

From the type of application to its architecture, the definition of the core functionality and operating system for which it should be developed and optimized, these decisions often seem overwhelming for companies.

On the other hand, as an effect of online consumer behavior, the development of a mobile application has become a mandatory step for any company that wants to remain profitable and stable in the long run. Users of mobile applications promoted by a business have multiple expectations such as those shown in Figure 3.

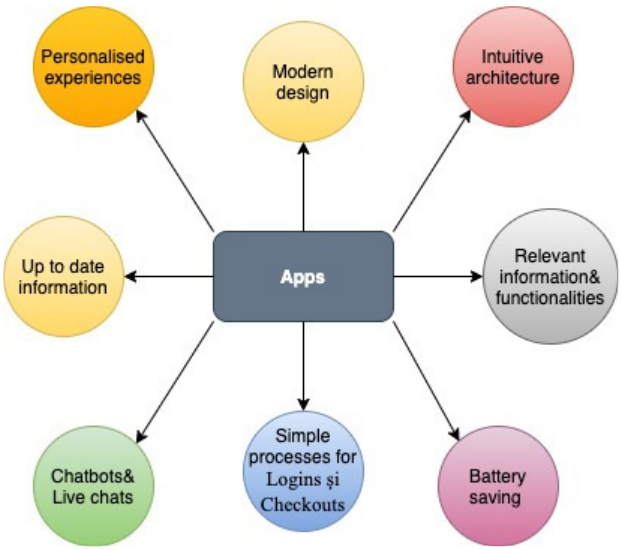

Figure 3: Applications characteristics expected by users

The choice of the mobile application you are going to develop must be made according to several criteria such as those presented in the Table 4.

Table 4: Criteria's for application development

Based on
Technologies / programming languages used
• Native applications - mobile applications created for a certain operating system (an application developed for Android cannot be used on iOS), being developed in relation to the particularities of a platform. (Programming languages: for Android - Java, Kotlin, for iOS - Swift or Objective-C). • Hybrid applications - mix between native and web applications: download from the application store and can interact with a number of features in devices (as well as native applications). (Programming languages: HTML5, CSS, and JavaScript and is based on HTML for display in the browser). • Web applications - web pages that behave like mobile applications and can be accessed without installation. (Programming languages: HTML, CSS, JavaScript, jQuery)
Key audience
User - generating benefits at the individual level • productivity; • communication; • inventory; • billings.
Business - helps to extract overview data to simplify business decisions • streamlining processes; • CRM applications; • analysis applications; • applications for process management; • personnel management applications.
Client - most of which materialize into independent mobile applications that help increase the profitability of a business in specific segments. • Real estate: web portals, CRM solutions; applications for calculating and comparative analysis of offers, property search functions based on smart filters, property presentations, etc. • Medical field: mobile applications that allow online appointments / consultations or an optimized management of internal processes (communication between different medical centers, offices, departments, access to the patient file to quickly see data on medical history, etc.), such as triage, health monitoring, etc. • Finance and insurance: CRM solutions, for offers from brokers, applications that allow financial analysis, etc.

• Transport and courier: car fleet management for the company providing transport services (points of interest, routes, driver behavior, consumption, etc.), mobile applications to connect customers with service providers and to facilitate communication and real-time tracking of deliveries, etc.
• E-commerce and retail: for online shopping, comparison of several offers, etc.
• HR: applications that enable dynamic communication between several types of users (recruitment companies, client companies, applicants) and the transfer of data and documents in a secure and dynamic way, mobile applications for recruitment and evaluation processes (synchronization of offers with applications, 360 evaluations, etc.)
• Tourism: mobile applications for reservations, for discovering new destinations according to certain expectations (by using smart filters), etc.

Conclusions

Lately, the fashion for mobile applications has come for all kinds of online services, including online stores. For many of them I consider a much greater utility of an application due to the fact that there can be send personalized notifications and somehow make the user a little more captive.

In recent years, the need for companies and entrepreneurs to associate a mobile application has become urgent. It is a tool that facilitates all the work of the user interested in buying certain products or using various services, as a result it generates respect and loyalty to brands.

This environment does not create discomfort to the customer considering that errors are much rarer in the case of an application or software than in the case of interpersonal relationships and the means of promotion that result from them. The keys to mobile application creators are functionality and, at the same time, user expectations. Thus, a mobile application is designed according to the purpose of the entity with which it is connected.

Through a mobile application, small businesses have the opportunity to improve the customer experience because the information will be easy to access. The feedback system allows companies to customize their application to improve the user experience and turn them into loyal customers. Also, the introduction of a short order module for the purchase of products contributes to the increase of sales. The applications offer a more convenient way to browse online and shop anywhere and anytime. Maximizing sales can also be achieved by sending alerts and notifications about a product, service, discounts and other offers.

Adding custom features to an application gives a company a competitive advantage over competitors in the field. Most of the time, small companies focus on the specific needs of customers to grow their business. A custom application perfectly adapted to the business contributes to the development of the company, keeping customers and stability in front of the competition. Rewards system, loyalty, push notifications or integration with social networks are just some of the features needed for a customized solution.

The intelligent planning of such a digital tool will also ensure a quick location of the company, important information and statistics about customer preferences, personalized payment system, project prioritization, mobile CRM.

Applications can solve a business's problems, allowing optimal use of resources, reducing losses and displaying a professional image to customers. Mobile applications are also used in the business environment of companies for a better organization of resources, a transparent communication, easier flow of information, improved security of access and solving tasks.

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Comparative Analysis of Excise Tax Policy and Its Impact on Alcohol Consumption in EU Countries and Russia

Elena V. IADRENNIKOVA

Ural Federal University named after the first President of Russia
B.N. Yeltsin, Yekaterinburg, Russia, elena.yadrennikova@mail.ru

Viktoriia A. KORETSKAIA-GARMASH

Ural Federal University named after the first President of Russia B.N. Yeltsin, Yekaterinburg, Russia
vkoretskaia-garmash@urfu.ru

Abstract

Government policy on excise taxes on alcohol consumption has remained a relevant research topic for scholars in Russia and abroad. Strong alcohol continues to dominate consumer preference in Russia, which leads to a number of negative consequences. This makes it ever more urgent a task to modify consumer preferences toward low alcohol beverages, wine and beer. The article analyzes government alcohol pricing policies aimed at reducing alcohol consumption in Russia and the European Union and their impact on alcohol consumption. The study compares the excise tax rates for alcohol, their patterns of change in Russia and the EU member states. Trends in the volume and structure of alcohol consumption under the influence of excise duties in Russia and the EU are examined. The author substantiates the need to improve the excise tax policy with regard to alcohol by incorporating the experience of other countries. This study seeks to analyze and assess the effectiveness of government measures to regulate the consumption of alcoholic drinks in Russia and the EU and to work out suggestions for improving the Russian system of excise taxation.

Keywords: Excise tax, alcoholic beverages, government excise tax policy on alcohol, tax rates, structure of alcohol consumption.

Introduction

Today, excise taxes are one of the key tools that governments have at their disposal for regulating the production and consumption of "harmful" products", including alcohol. Alcohol consumption generates a number of negative effects, resulting in a substantial burden for health care, the economy and society as a whole (Becker G., Murphy K., 1988; Babor T., et al., 2010). Reducing alcohol consumption and changing the structure of such consumption by shifting demand from strong drinks to low-alcohol beverages, wine and beer is, therefore, an extremely pressing task. An anti-alcohol policy that results in higher retail prices of alcohol has been proven effective globally. Any such policy primarily implies the introduction or excise taxes on alcohol or an increase in existing tax rates (Anderson P., Baumberg B., 2006; Cook P.J., Moore, M.J., 2002; Xu X., Chaloupka F.J., 2011; An R.P., Sturm R., 2011).

In order to fight off the negative effects of excessive alcohol use, most national governments make regular attempts to introduce regulation for the alcohol market. Over the past decade, the Russian Federation, too, has been making active efforts in this area. There are plenty of studies analyzing the effectiveness of anti-alcohol policies (Babor T., et al., 2010; Wagenaar A. et al., 2009). The majority of the authors consider other countries' situations, but there is a number of works looking at alcohol consumption in Russia and assessing the effectiveness of alcohol policies there (Radaev V.V., Kotelnikova, Z.V., 2016; Pridemore W. et al., 2014). The studies found that modern alcohol control policies being implemented by the Russian government are in general quite effective as regards their impact on consumption (Iadrennikova E.V., Busse R.A., 2020).

Alcohol consumption can be regulated and consumers' preferences can be modified towards beverages with a lower ABV by regularly indexing excise rates. This is the strategy that is followed by the Russian Federation. Regulation can also be enforced through levying excise tax at varying rates depending on the type of drink. Such an approach is common in the EU member states.

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This study seeks to analyze and assess the effectiveness of government measures to regulate the consumption of alcoholic drinks by means of excise taxes in Russia and the EU and to work out ways of improving the Russian system of excise taxation.

The study proceeds from a hypothesis that improving the system of excise taxes on alcoholic drinks in Russia by imposing higher taxes on spirits, lowering tax rates for wine and beer should help to further reduce per-capita alcohol consumption, encourage consumers to shift their preferences in favor of lower-alcohol products and lead the way to a healthier structure of alcohol consumption in the Russian Federation.

Methods

The research methods included a study of the present-day systems of excise taxes on alcohol and their peculiarities in Russia and the EU, as well as of state anti-alcohol policies employing the excise tax toolkit. A comparative analysis was performed of the size, dynamics and types of tax rates that are applied to the main types of alcohol-containing products in Russia and the EU for the period 2008-20.

The main types of alcohol both in Russia and the EU member states are spirits, beer, beer cocktails, wines and other alcoholic beverages. In the Russian Federation, spirits include alcoholic beverages with over 9% ABV (the most popular one being vodka; the category also includes cognac, strong liquors, brandy, and calvados, etc.) The beer group covers beers with an ABV over 0.5%. Between 2013 and 2016, the category also included fortified beer-containing drinks and beer cocktails. Other low-alcohol drinks with an ABV under 9% are cider, medovukha, perry, champagne, and sparkling wines.

A study was conducted of changes in the volume and structure of alcohol consumption in Russia and the European countries under the influence of excise taxation tools. The study of the trends in and structure of alcohol consumption by the adult population of Russia and the EU member states covered the period 2008-16. National alcohol consumption data was reported by the World Health Organization in litres of pure alcohol per year per person older than 15.

Data on tax rates was found on the website of the Federal State Statistics Service (gks.ru), the Federal Tax Service (nalog.ru), and the European Commission (ec.europa.eu). Alcohol consumption data was retrieved from the website of the World Health Organization (apps.who.int). Works by Russian and foreign scholars served as the methodological and theoretical framework of the study.

Results and Discussions

Analysis of alcohol tax policy and its impact on alcohol consumption in the EU

Indirect taxes in the EU member states are harmonized. National laws on excise taxes in the European countries are drafted with consideration for the union's legislation, and excise taxes must be in compliance with Council Directives of 19 October 1992: Directive 92/83/EEC establishes the structures of excise duties on alcohol and alcoholic beverages, categories of alcohol and alcoholic drinks subject to taxes, reduced rates for small breweries and small distilleries, certain products and geographical regions; Directive 92/84/EEC sets out the minimum rates applicable to each category of alcoholic drinks, and reduced rates for certain regions of Greece, Italy, and Portugal (European Commission. Taxation and customs union, 2020). Under the Directives, the list of excisable alcoholic drinks includes beer, wine (still and sparkling), intermediate products (port and sherry), and strong alcoholic drinks (ethyl alcohol). EU legislation only sets harmonized minimum rates. This means that EU countries are free to apply excise duty rates above these minima, according to their own national needs.

Excise tax rates have remained unchanged between 2008 and 2020 in the majority of EU countries. It is interesting to compare the rates of tax for spirits and drinks with less alcohol by volume in EU countries. Another interesting point is a zero rate for wines in 15 out of the European Union's 28 member states. A comparative analysis of excise rates that are imposed on the main types of alcoholic drinks in Russia and EU countries as of 2020 is presented in Table 1.

Table 1: Comparative analysis of the rates of excises on the main types of alcoholic beverages in Russia and EU countries in 2020

Countries	Excise rates						
	Spirits		Beer and mixed beer beverages**		Wines (except for champagne and sparkling wines)**		Champagne and sparkling wines***
	€/litre of absolute alcohol	EU country's ranking position	€/litre	EU country's ranking position	€/litre	EU country's ranking position	€/litre
Russia*	**6.853**	**-**	**0.277**	**-**	**0.391**	**-**	**0.504**
Minimum rates of excise duty in the EU	**5.500**	**-**	**0.090**	**-**	**0**	**-**	**0**
Austria	12.000	19	0.240	17	0	14-28	1.000
Belgium	29.928	5	0.241	16	0.749	8	2.563
Bulgaria	5.624	28	0.092	27	0	14-28	0
Germany	13.030	17	0.094	25	0	14-28	1.360/0.510
Cyprus	9.568	25	0.288	13	0	14-28	0
Czech Republic	12.529	18	0.147	23	0	14-28	0.909
Denmark	20.0927	7	0.362	9-10	1.508/0.694	4	1.957/1.143
Estonia	18.810	9	0.745	5	1.470/0.634	5	1.478/0.634
Greece	24.500	6	0.600	6	0	14-28	0
Spain	9.589	24	0.099	24	0	14-28	0
Finland	48.800	1	1.538	1	3.970/2.750	2	3.970/2.750
France	17.866	10	0.356	11	0.039	13	0.096
Croatia	7.151	27	0.259	14	0	14-28	0
Hungary	9.958	23	0.252	15	0	14-28	0.491
Ireland	42.570	3	1.082	2	4.248	1	8.497
Italy	10.350	22	0.362	9-10	0	14-28	0
Latvia	15.640	12	0.202	21	1.010	6	1.010
Lithuania	18.320	8	0.341	12	1.647/0.655	3	1.647/0.655
Luxembourg	10.411	21	0.095	26	0	14-28	0
Malta	13.600	15	0.232	18	0.205	12	0.205
Netherlands	16.860	11	0.380	8	0.883/0.442	7	0.883/0.442
Poland	14.355	13	0.220	19	0.397	10	0.397
Portugal	13.869	14	0.206	20	0	14-28	0
Romania	7.452	26	0.090	28	0	14-28	0.107
Sweden	47.813	2	1.002	4	0.507/0.242	9	0.507/0.242
Slovenia	13.200	16	0.581	7	0	14-28	0
Slovakia	10.800	20	0.172	22	0	14-28	0.795/0.542
UK	32.308	4	1.004	3	0.344/0.103	11	0.428/0.141

Source: European Commission. Taxation and customs union. (2020). Reading allowed: Tax information Communication database. Retrieved from http://ec.europa.eu/taxation_customs/tedb/splSearchForm.html,
author's calculations
**Excise duties in Russia were converted into euros by using the average exchange rates of the Central Bank of Russia as of January-September 2020 (1€=79.3766 rbs.).*
***In EU countries, beer excise rates vary in proportion to alcohol content while in Russia, the excise rates are set in roubles per litre. Since beer excise rates are expressed in a variety of ways, for the purpose of comparability, these rates were converted to euro per litre of beer of 12 degrees Plato or 4.8% ABV.*
****Excise rates for wines of different strength (champagne) are indicated after the slash, the highest rate is imposed on stronger alcoholic beverages.*

It is noteworthy that strong alcohol is subject to a high excise duty rate in EU countries. Bulgaria is the only country where the rate of excise duty is only slightly above the minimum rate. The actual rates are more than double the minimum rate in 19 EU countries (68%) and more than triple the minimum rate in 11 countries (39%). It is a different story when it comes to drinks with a lower ABV. First of all, EU countries can charge no excise on still and sparkling wines, and many of them do take advantage of that. For example, zero tax is applied to still wines in 15 EU countries (54%); nine countries apply a zero rate on sparkling wine (32%). Second, the minimum tax rate for beer and beer-containing drinks is 61 times less than the rate for strong alcohol. The actual rate for beer is only slightly higher than the minimum rate in seven countries (25% of all EU member states). Among them are, first and foremost, Germany and the Czech Republic, the world's leading beer making and beer drinking countries, followed by Bulgaria, Spain, Luxembourg, Romania, and Slovakia. Only 13 out of the 28 EU countries (46%) have tax rates for beer that are more than triple the minimum rate, matching or being higher than the tax imposed on beer in the Russian Federation. Therefore, EU countries have a great variety of excise tax rates applicable to various types of alcoholic drinks in order to regulate alcohol consumption and shift the preferences of consumers towards alcoholic drinks with less alcohol by volume.

We shall now look at how alcohol consumption by the adult population of EU countries changed between 2008 and 2016, as recorded by the World Health Organization (Tab. 2).

Table 2: Recorded annual per capita (15+) consumption of alcohol in EU countries in 2008-16 (litre per capita of pure alcohol)

Year / EU country	2008	2010	2012	2014	2015	2016	Percentage change 2016 (2015) on 2008	Country ranking (2015)
Austria	12.0	12.1	12.1	12.2	11.4	-	-0.6	22
Belgium	10.51	10.27	10.09	10.57	10.36	-	-0.15	12
Bulgaria	11.01	10.83	11.30	10.67	11.30	11.49	0.48	21
Germany	11.75	11.35	11.76	11.60	11.99	10.90	-0.85	25
Cyprus	12.03	11.32	10.56	9.59	9.55	-	-2.48	9
Czech Republic	13.35	12.65	12.97	12.06	12.82	12.99	-0.36	26
Denmark	10.71	10.24	9.10	9.53	9.38	9.55	-1.16	8
Estonia	16.38	14.97	16.96	17.29	16.64	15.35	-1.03	28
Greece	9.52	8.99	7.62	6.99	9.64	6.52	-3.0	1
Spain	10.24	9.78	8.83	8.70	8.26	8.58	-1.66	6
Finland	10.26	9.72	9.27	8.75	8.51	8.43	-1.83	7
France	12.3	12.33	12.24	11.97	11.87	11.74	-0.56	24
Croatia	12.3	12.11	11.92	10.64	9.89	10.32	-1.98	11
Hungary	11.64	10.75	11.14	10.88	10.90	-	-0.74	19
Ireland	12.42	11.63	11.53	11.0	10.93	11.46	-0.96	20
Italy	6.84	6.95	7.48	7.56	7.14	7.08	0.24	2
Latvia	11.84	9.83	10.29	10.6	10.82	11.19	-0.65	18
Lithuania	13.3	13.61	15.15	14.82	14.42	13.61	0.31	27
Luxembourg	11.72	11.72	11.89	11.69	11.83	11.22	-0.5	23
Malta	7.27	7.52	7.92	7.88	7.75	8.02	0.75	4
Netherlands	9.61	9.32	9.28	8.16	8.03	-	-1.58	5
Poland	11.4	10.04	10.19	10.45	10.48	10.43	-0.97	14
Portugal	12.35	12.23	10.86	10.35	10.54	10.66	-1.69	15
Romania	13.11	10.79	10.55	10.46	10.4	-	-2.71	13
Sweden	6.9	7.31	7.23	7.20	7.16	7.18	0.28	3
Slovenia	10.94	10.31	10.95	10.92	11.49	10.51	-0.43	15
Slovakia	11.43	10.55	10.66	10.89	10.78	10.14	-1.29	17
UK	10.78	10.22	9.76	9.69	9.82	9.81	-0.97	10

Source: World Health Organization. Official site (2020). Retrieved from: http://apps.who.int/gho/data/node.main-euro.A1039?lang=en&showonly=GISAH#, author's calculations

In general, alcohol consumption among adults is quite high in 23 out of the 28 EU countries, exceeding the WHO-recommended "safe limit" of 8 litres per annum. The majority of the countries reported a decrease in per-capita consumption over the period of observation, but five nations (Bulgaria, Malta, Lithuania, Sweden, and Italy) saw a slight increase in alcohol use. This is largely attributable to unchanging tax rates throughout the period of observation,

which resulted in excise duty rates actually decreasing by a more than a third due to inflation. The biggest decline in alcohol use was observed in Greece, Romania, Cyprus, Croatia, and Finland. In Finland and Greece, the decline is in correlation with high rates of excise duty.

Analysis of alcohol consumption by adults in EU countries shows that the majority of EU countries that are similar to Russia in terms of mindset and drinking culture saw per-capita alcohol consumption decrease between 2010 and 2016, but not drastically. Over the period of observation, recorded per-capita alcohol consumption in the examined EU countries decreased by an average of 2 to 15%. With annual per-capita alcohol consumption at 8.42 litres, Spain and Finland score at a comparable level with Russia. Austria, the Czech Republic, France, Ireland, Portugal and a number of other countries overtake Russia in alcohol use, while the Nordic countries – Norway and Sweden – and Italy and Greece boast a much lower level of alcohol consumption at around 6.5 litres per person. However, the structure of alcohol consumption in all those countries differs a lot from Russia's: in 12 countries (43% of all EU member states), including Germany, the Czech Republic, Belgium, Denmark, and Finland, beer is the dominant beverage, accounting for 40 to 56% of all alcohol consumed; while in France, Italy, Portugal, Sweden and some other countries (9 out of the 28 EU countries) wine is the most consumed alcoholic beverage (44 to 65%). Together, wine and beer account for 75 plus percent of alcohol consumed. Strong spirits dominate the alcohol consumption structure (≥40%) in four countries only (Bulgaria, Estonia, Cyprus, Slovenia). Three countries (Hungary, Malta, Great Britain) consume approximately equal volumes of wine, beer and strong spirits.

The overwhelming majority of EU countries prefer beverages with lower alcohol by volume (beer and wine), and the structural composition of alcohol consumption there is close to ideal with minimum negative effects (the share of beer in total alcohol consumption is 50%; wine 35%; spirits 15%) (Edwards G., et al, 1994). Consequently, the excise duty policy of European countries that applies considerably different tax rates to different types of beverages has proved highly effective. Nevertheless, it is advisable to regularly adjust the tax rates for inflation or allow for higher-than-inflation rate increases in order to push for further reduction in per-capita alcohol intake in EU countries. That would prevent the tax burden on alcoholic beverages from decreasing due to inflation.

Analysis of alcohol tax policy and its impact on alcohol consumption in the Russian Federation

Unlike EU countries, Russia has been increasing the rates of excise duty for alcoholic beverages almost annually. We shall examine how the rates of excise duty for alcohol in Russia changed and compared between 2008 and 2020 (Tab 3).

Table 3: Rates of excise duty for main types of taxable alcoholic beverages in the Russian Federation in 2008-20

Year / Indicator	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018-2019	2020	Change in 2020, in % to 2008
1. Excise tax, rouble/litre of ethyl alcohol													
1.1. Beverages with over 9 % ABV	173	191	210	231	300	400	500	500	500	523	523	544	314.5
1.2. Beverages with less than 9% ABV	110	121	158	190	270	320	400	400	400	418	418	435	395.5
2. Excise rates, rouble/litre													
2.1. Wines, fruit wines, winy beverages produced through natural fermentation without adding ethyl alcohol (except for champagne and sparkling wine)	2.35	2.6	3.5	5	6	7	8	8	9	18	18	31	1319.1

2.2. Champagne and sparkling wines	10.5	10.5	14	18	22	24	25	25	26	36	36	40	380.1
2.3. Beer, 0.5-8.6% ABV	2.74	3	9	10	12	15	18	18	20	21	21	22	802.9
2.4. Beer, over 8.6% ABV	8.94	9.8	14	17	21	26	31	31	37	39	39	41	458.6

Source: Federal Tax Service of the Russian Federation. Official site (2020). Retrieved from: https://www.nalog.ru/rn66/related_activities/statistics_and_analytics/forms/, author's calculations

Over the past decade, the excise tax policy in Russia has sought to constantly increase the tax rates. It is noteworthy that there is a negative trend of the rates for low-proof drinks growing disproportionately faster. Between 2008 and 2020, the tax rates increased 210% for spirits, 1,220% for wine, and eight-fold for beer.

Over the observed period, excise duty on spirits with over 9% ABV showed the smallest increase of a mere by 210%. This does not encourage consumers to reduce their intake of strong alcoholic beverages and is one of the reasons why spirits account for the biggest share in the structural composition of alcohol consumption in Russia (Tab.4). A comparison of taxes on strong alcohol across countries shows that Russia belongs to the countries with the minimum level of taxation, which is not typical of other nations in the northern latitudes. For example, in Finland, Sweden, and Ireland, the rates of excise duty for strong alcohol is 520 to 610% higher than in the Russian Federation (Tab 1). Consequently, there is the potential for further increases in excise duty rates for spirits.

The tax rate for beer in the 0.5 to 8.6% ABV range increased eight-fold, reaching 22 roubles per litre in 2020, which is much higher than in other countries of the Eurasian Economic Union (EEU) and even in such leading beer producing and consuming nations as Germany (the tax rate in Russia is 190% higher than Germany's) and the Czech Republic (the rate is 90% higher in Russia).

At the start of the observation period, excise tax rates for wine (with the exception of champagne and sparkling wines) in Russia were low. However, the tax rate for this type of alcoholic drinks increased significantly – by 1,220% - over the span of 13 years. The tax growth on wine has been the highest although wine accounts for the smallest share of total alcohol consumption in Russia (Tab 4). Our analysis shows that many European countries now employ a zero tax rate or an economically negligible rate of tax for wine. That is primarily the case in such top wine producing countries as Spain, Italy, Portugal and France, where zero taxation is meant to support their wine industries. Such an approach would be a promising option for Russia, too, because wine is a low-proof drink, and zero or near-zero tax would support winemaking and help change the preferences of consumers toward healthier drinking habits.

The rate of tax for spirits has, therefore, been insignificantly adjusted towards higher values, unlike the rate for low-proof drinks. This trend indicates that pricing tools of alcohol regulation policy primarily target beverages with lower ABV (wine and beer) rather than spirits. Consequently, the alcohol tax policy of Russia needs some modification. It is necessary to increase tax pressure on strong alcohol and reduce tax pressure on low-proof drinks in order to shift the preferences of consumers towards alcoholic drinks with less alcohol by volume.

Trends in the per-capita consumption of alcohol by adults in Russia and the structural composition of alcohol consumption are summarized in Table 4 for the period 2008-16 using the WHO data.

Table 4: Recorded annual per capita (15+) consumption of alcohol in Russia and consumption structure in 2008-2016

Year / Indicator	2008	2009	2010	2011	2012	2013	2014	2015	2016	Change in 2016, in % (percentage points) to 2008
1. Registered alcohol consumption in litres of pure alcohol										
All types of alcoholic beverages, including:	12.09	11.25	10.98	10.95	10.89	9.92	8.85	8.41	8.42	69.6
Beer	4.66	4.20	4.09	4.13	4.17	3.96	3.64	3.49	3.29	70.6

Wine	1.27	1.26	1.02	0.96	0.93	0.84	0.89	0.87	1.08	85.0
Spirits	6.16	5.79	5.06	5.04	4.95	4.36	3.60	3.36	3.25	52.8
Other alcoholic beverages	0	0	0.81	0.82	0.84	0.76	0.72	0.69	0.80	-
2. Structure of registered alcohol consumption, %										
All kinds of alcoholic drinks, including:	100	100	100	100	100	100	100	100	100	0
Beer	38.5	37.3	37.2	37.7	38.3	39.9	41.1	41.5	39.1	0.6
Wine	10.5	11.2	9.3	8.8	8.5	8.5	10.1	10.3	12.8	2.3
Spirits	51.0	51.5	46.1	46.0	45.5	43.9	40.7	40.0	38.6	-12.4
Other alcoholic beverages	0	0	7.4	7.5	7.7	7.7	8.1	8.2	9.5	-

Source: World Health Organization. Official site (2020). Retrieved from: http://apps.who.int/gho/data/node.main-euro.A1039?lang=en&showonly=GISAH#, author's calculations

Table 4 shows that per-capita alcohol consumption in Russia decreased significantly (by 30.4%) from 12.09 litres in 2010 to 8.42 litres in 2016. The structural composition of consumption changed, too. Among the beverages that account for the biggest tax revenues, the biggest drop in consumption was observed for spiri1ts, including vodka and cognac (minus 47.2%). The consumption of beer was down 29.4%, which is largely due to higher tax rates and, consequently, higher prices. The World Health Organization has a category of "other alcoholic beverages" that includes fortified wines, cider, fruit wines, etc. Consumption volumes of beverages included in the category can be equally distributed between spirits and wine.

Over the period of observation, per-capita consumption of strong alcohol has been decreasing in Russia as beverages with lower alcohol by volume, especially beer, have taken over a portion of the consumption share of hard spirits. This indicates that excise tax has been fulfilling its regulatory function rather successfully. Analysis of tax rate trends by type of alcoholic beverages in Russia shows that the existing tax policy with regard to alcoholic beverages primarily aims to reduce the consumption of low-proof drinks rather than hard spirits, hence the need for modification.

Options for improving alcohol taxation in the Russian Federation

The analysis has enabled the following suggestions as to how to improve alcohol tax policy. In Russia, the development of alcohol tax policy should pursue the goal of further increasing the rate of excise duty for strong alcohol and reducing the rate for beverages of lower alcohol by volume. To achieve that, greater rate differentiation needs to be employed in order to change the structural composition of consumption. The following modifications are suggested:

1. Increasing the excise tax rate for alcohol with ABV over 9%. The tax rate per unit of pure alcohol is almost the same for beer and spirits. This does not help the task of shifting consumer preferences toward low-proof alcohol beverages. The excise tax on spirits in Russia is low in comparison to other countries. There is, therefore, a feasible opportunity - and a need – to increase the tax on spirits as that would generate extra revenue for the government and help reduce the intake of strong alcohol.

2. Lowering the duty on beer and introducing a zero tax on natural wine without added alcohol in order to support the domestic winemaking industry and beer brewing and boost the share of low-proof alcohol (wine and beer) in the alcohol consumption structure in Russia.

The implementation of the above measures could help change the price structure of alcoholic beverages and provide an incentive for a shift in consumer preferences toward low-proof drinks such as wine and beer that are less harmful to health.

In EU countries, it is advisable to regularly adjust the tax rates for inflation to prevent the actual tax burden on alcoholic beverages from decreasing due to inflation and further reduce alcohol use in the EU.

Conclusion

Russia has been implementing its anti-alcohol policy in a more pronounced way (manifested in annual increases in alcohol tax rates, tougher regulation of alcohol production, distribution and consumption) than the EU member states. Nevertheless, the structural composition of alcohol consumption in the majority of EU countries appears healthier

(with low-alcohol drinks – wine and beer - dominating the consumption structure) than in Russia (where strong spirits account for the biggest share of total alcohol consumption). Alcohol consumption is regulated and consumer preferences are influenced towards low-alcohol drinks by means of alcohol tax rate differentiation. Analysis of tax rate trends by type of alcoholic beverages in Russia shows that the existing pricing methods primarily target low-alcohol beverages (wine and beer) rather than hard spirits, so Russia's alcohol tax policy needs some adjustment. Over the period of observation, alcohol consumption has declined both in Russia, and the majority of the EU countries. The structural composition of alcohol consumption has changed there, too, which is evidence of excise duty working pretty well as a state regulation tool for alcohol consumption. In Russia, the alcohol tax policy could be improved through higher tax rates for strong alcohol and lower rates for beverages with lower alcohol by volume. That would modify the preferences of consumers towards low-alcohol wines and beer that are less harmful to health. In EU countries, it is advisable to regularly adjust the alcohol tax rates for inflation to prevent the actual tax burden on alcoholic beverages from decreasing and to further reduce alcohol use.

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Fiscal Prevention of Counterfeit Cosmetics Imports: The Impact of Consumption Tax on Luxury Cosmetics (the Case of Russia and China)

Viktoriia A. KORETSKAIA-GARMASH
Ural Federal University named after the first President of Russia B.N. Yeltsin, Yekaterinburg, Russia,
e-mail:vkoretskaia-garmash@urfu.ru

Elena V. IADRENNIKOVA
Ural Federal University named after the first President of Russia B.N. Yeltsin, Yekaterinburg, Russia,
e-mail: elena.yadrennikova@mail.ru

Abstract

Cosmetics and makeup are the goods commonly associated with a healthy lifestyle and beauty as they are used to highlight one's best features and to hide imperfections. These goods are consumed by all population groups who anticipate to effect an agreeable visual impression. The demand for cosmetics is heavily influenced by users' comments and opinions on social media concerning the quality and effects of different products as well as advertising campaigns in mass media and the price levels. This study tests the hypothesis that the introduction of excise duties on luxury cosmetics in Russia will create a protective barrier against the imports of counterfeit goods. We use the case of China to show that consumption tax on cosmetics can be quite effective in this respect. The study provides an overview of the global trends in the cosmetics market and taxation of luxury cosmetics in China. The sales of cosmetics of mass market and luxury brands are considered. The volume and structure of the imports of cosmetics to Russia are analyzed. The conclusion is drawn concerning the potential of excise duties on luxury cosmetics in Russia in combatting the imports of counterfeit products.

Keywords: Consumption Tax, Excise Duties, Cosmetics, Luxury Cosmetics, Mass Market Cosmetics, China, Russia

Introduction

All modern taxation systems comprise excise duties. Excise duties are indirect taxes on the sale or use of specific products, which allow the government to regulate the volumes of consumption of such goods. The Tax Code of the Russian Federation (Tax Code of the Russian Federation Part 2, 2000) defines excise duties as federal indirect taxes on consumption of specific groups of goods included into the prices of these goods, with the tax burden being shifted from the taxpayer to consumer.

The fiscal function performed by excises is determined by Article 182 of the Tax Code of the Russian Federation, which stipulates that the objects of taxation in this case are the imports and sales of excisable goods while exports of excisable goods are generally exempt from excise duties.

Legislative stipulation of the categories of excisable goods is at the core of the regulating and fiscal functions performed by the consumption tax, which ensures the fulfillment of the social justice principle.
In modern tax policies, excises are levied on a relatively narrow tax base (Pepelyaev, Kudryashova and Nikonova, 2015). Excise duties are imposed on luxury products mostly consumed by high-income groups; the goods deemed to be harmful to consumers' health; and the goods that are damaging to the environment.

According to the above-described criteria, three key groups of excisable goods can be identified: alcohol and alcoholic drinks; tobacco products; and energy products and electricity (Mayburov and Ivanov, 2020).

Cosmetics and beauty products are a part of the global beauty market aiming to meet the needs of all social groups through its various segments with different price ranges. In world practice, high-quality cosmetics and beauty products are included into the lists of excisable goods, as is the case with the Chinese taxation system.

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Global beauty market is valued at €200 billion annually; 43% of this market is dominated by six manufacturing companies - L'Oreal, Unilever, Estee Launder, Procter&Gamble, Coty and Shiseido.

Depending on its applications, cosmetics can be divided into skincare, makeup, perfumes and personal hygiene products. Skin and haircare products account for 59.0% (Russian-Style Beauty) of the beauty market. They are meant to perform the following key functions - cleansing, moisturizing and nourishing. Makeup products rank second with 19.0%; perfumes and personal hygiene products, 12.0% and 10.0% respectively.

As people's financial well-being is growing, they become more interested in buying luxury makeup cosmetics and professional cosmetics (Russian-Style Beauty). While the beauty market generally grew by 4-5%, the growth of the luxury segment in 2017 reached 8.5-9.5%. The main consumers are Asian countries, as they make up 37% of the global sales.

The value of the Russian market of cosmetics and beauty products is estimated at €5 billion euro or 2.5% of the global market. It is, however, smaller that one fifth of the worldwide revenue of L'Oreal (Russian-Style Beauty).

The scale of imports of cosmetics and beauty products from different countries to Russia (see Table 1) (Imports of perfumes, cosmetics and toiletries by country, 2020).

Table 1: Imports of cosmetics and beauty products to Russia in the total volume of imports in 2013-2018, %

Country	2013	2014	2015	2016	2017	2018	Deviation, in percentage points	
							2018/ 2013	2018/ 2017
France	27.3	26.3	26.0	25.0	26.2	25.5	-1.8	-0.7
Germany	14.2	14.2	13.0	12.9	11.4	11.3	-2.9	-0.1
Italy	7.2	7.5	7.8	8.4	8.5	9.4	+2.2	+0.9
USA	6.6	5.7	6.0	5.4	6.1	6.8	+0.2	+0.7
Poland	6.0	5.8	6.5	6.1	6.2	6.0	0	-0.2
UK	5.1	5.5	5.4	5.6	5.1	4.5	-0.6	-0.6
Ireland	4.4	4.5	5.0	4.6	4.4	4.1	-0.3	-0.3
China	3.1	3.6	4.3	4.4	4.5	4.5	+1.4	0
Switzerland	2.9	2.8	3.3	3.4	3.0	3.0	+0.1	0
Belarus	2.7	1.7	1.6	1.8	2.0	2.2	-0.5	+0.2
Other countries	20.5	22.4	21.1	22.4	22.6	22.7	+2.2	+0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	-	-

As Table 1 shows, the largest long-standing exporter of cosmetics and beauty products to Russia is France, the world leader in cosmetics. France accounts for over a fourth of all the imports into Russia and is followed by Germany and Italy.

Between 2013 and 2018, there was a decline in the imports of cosmetics from France by 1.8 percentage points in comparison with 2013 and by 0.7 percentage points in comparison with 2017. Imports from Germany declined most significantly - 2.9 percentage points in comparison with 2013 and 0.1 percentage points in comparison with 2017.

There was an increase in the imports of cosmetics from Italy to Russia by 2.2 percentage points in comparison with 2013 and by 0.9 percentage points in comparison with 2017; from China, by 1.4 percentage points in comparison with 2013 while in comparison with 2017 the volume of imports remained virtually unchanged - at 4.5%. In 2018, in comparison with 2017, the imports from the USA grew by 0.9 percentage points and from Belarus, by 0.2.

The structure of imports to Russia by types of cosmetics and beauty products (see Fig.1).
As Fig.1 illustrates, in 201,8 the imports of cosmetics and beauty products decreased in comparison with 2013 and 2014. 2016 was a truly disastrous year for sales of perfumes and toilet waters, shaving products, antiperspirants and deodorants as well as oral care products.

Regardless of the specific period, between 2013 and 2019, the import structure was dominated by makeup products, skincare products, manicure and pedicure products, whose imports since 2016 were rising steadily from 907 million

dollars and reached 1,190 million in 2018. Imports of haircare products were also on the rise, reaching 461,0 million dollars in 2018, which exceeded the corresponding figures of 2015-2017. A similar upward trend was observed for shaving products, deodorants and antiperspirants. In 2018, however, the imports of perfumes and toilet waters and oral care products dropped from 189,0 million dollars in 2017 to 186 million.

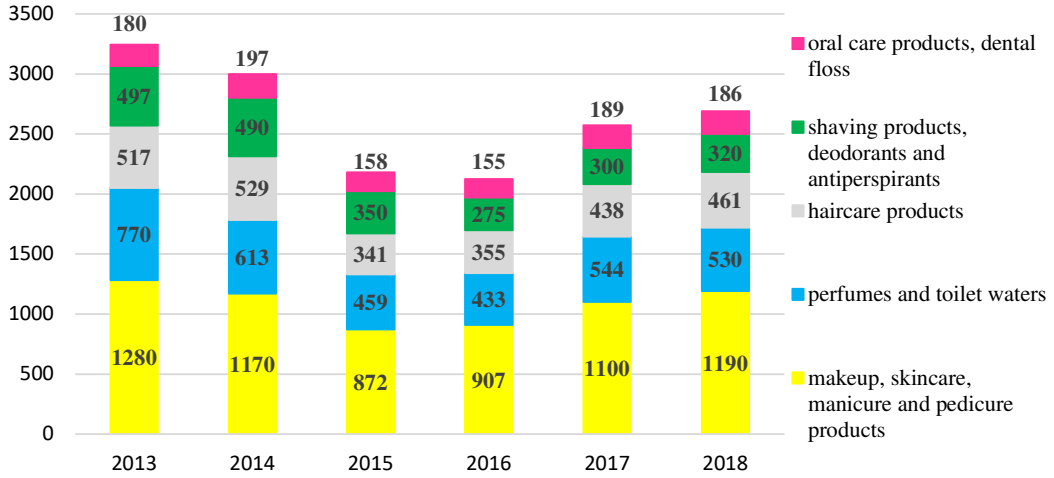

Fig 1. Structure of imports to Russia by types of cosmetics, mln dollars

In 2018, mass market products accounted for 81% of the imports while luxury cosmetics, for 19% (see Fig.2).

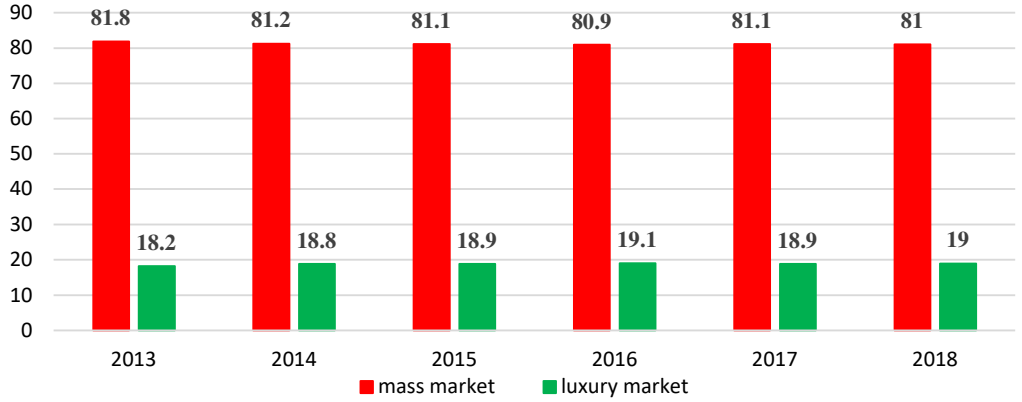

Fig 2. Sales of cosmetics and beauty products, by segment, %

Mass-market cosmetics are mostly sold through large networks of perfume stores and drogeries, which accounted for about 75% of the market in 2018. The network of drogerie stores Magnit Kosmetik is at the top of the ranking, followed by L'Etoile and Rive Gauche.

To gain a better idea of the size of the Russian luxury cosmetics market, we can look at the number of drogerie networks, which has grown almost threefold - from 100 to 276 companies. The share of drogerie stores on the Russian market exceeds 25% (it should be noted that this figure takes into account only the sales of cosmetics and cosmetic accessories) (see Table 2).

Table 2: Channels of distribution of perfumes and cosmetics from July 2018 to June 2019

Distribution channels	Share, %	Increase in monetary terms, %	Increase in volume terms, %
Hypermarkets	15.6	-3.0	-10.0
Supermarkets	6.0	+2.0	-3.0

Discount stores	14.3	+17.0	+11.0
Perfume networks and drogeries	37.5	-7.0	-1.0
Non-network perfume stores and household shops	6.0	-20.0	-16.0
On-line stores	7.9	+23.0	+23.0
Others	12.7	-6.0	-7.0
Total	100.0	-2.1	-1.6

As Table 2 shows, between July 2019 and June 2019, sales fell by 1.6% in volume terms and by 2.1%, in monetary terms in comparison with the same period of the previous year. On-line sales of perfumes and cosmetics are the fastest growing area. This segment grew by 23% both in monetary and in volume terms in the last year.

Cosmetics and beauty products are sold in retail stores, which are now rivaled by online platforms, including over 35,000 informal stores. There are currently over 6,000 domain names imitating the names of official websites of fragrance brands. Informal stores also use logos and color schemes similar to those of official brands, contextual advertising, targeted marketing via SMS and instant messengers.

Informal stores sell counterfeit products through unofficial online forums: in 2018, for example, over 3.6 posts were detected with offers of wholesale perfume deals. In some ads, the offers included several famous brands at once.

The Russian government tried to tackle the problem of counterfeit cosmetics and perfumes by introducing the procedure of mandatory labelling of perfumes and toilet waters. The purpose of the governmental decree 'The List of Individual Goods Subject to Mandatory Labelling by Means of Identification' was to prevent illegal imports, manufacturing and sales of goods, including fake ones, and, as a result, reduce the size of the 'black' and 'grey' markets and improve tax collection. The next step was to introduce labelling codes (QR codes or radio frequency identification tags (RFID), containing the information about the manufacturer and production date). Since 1 December 2019, this rule has been also applied to perfumes and toilet waters.

In 2018, clothing and textiles make up the largest share of fake goods - 36% of the total volume - in member countries of the Eurasian Economic Union. Toys account for 13%; footwear, 7.6%; bags and belts, 5.6%; labels and packaging, 2.3%. The share of counterfeit perfumes and beauty products seized by the police was 0.3% of the total amount of fake goods.

In this respect, Chinese experience of taxing consumption of cosmetics and beauty products is especially worthy of interest, especially in the light of China's tax reforms of 2016. In order to stimulate domestic consumption of cosmetics, the central government issued revised lists of excisable goods in September 2016. The consumption tax rate on higher-end products was lowered from 30 % to 15 % (see Table 3).

Table 3: Elements of the consumption tax on cosmetics and beauty products before China's fiscal reform of 2016

Taxable goods	Import duty rate, %		Consumption tax rate, %	VAT, %
	Reduced	Standard		
Perfumes	10	150	30	17
Lipstick	10	150	30	17
Eye makeup	10	150	30	17
Nail polish and nail lacquer	15	150	30	17
Powders	10	150	30	17
Skin care	6.5	150	0	17
Other skincare and beauty products	6.5	150	30	17
Shampoo	6.5	150	30	17

The notion of 'high-end (luxury) cosmetic products' was formulated to denote cosmetics with a final price above 10 yuan per ml or gram or 15 yuan per item produced in China or imported into the country (see Table 3). All other types of cosmetic products, except from high-quality goods, are exempt from taxation.

Lowering the consumption tax on cosmetics and beauty products has provided an incentive for the development of domestic production and created a barrier to the entry of foreign goods into the Chinese market as the import duties were set at the rate of 6.5-15% and VAT (17%). Thus, Chinese consumers are encouraged to change their preferences for domestic vs foreign products. It should be noted that a fourth of the Chinese market is occupied by the products of such companies as Procter&Gamble (USA),12,6%; L'Oreal (France), 9,1%; and Shiseido (Japan), 3,6%.

Unlike China, Russian legislation specifies the criteria for distinguishing mass-market cosmetics from their luxury counterparts, necessary for compiling a list of excisable goods.

Table 4 shows the main differences between the market segments of cosmetics and beauty products according to the international classification.

Thus, following the data in Table 4, a conclusion can be made that, despite the number of advantages of luxury cosmetics in comparison with mass- and middle-market goods, these goods remain inaccessible to mass consumer on a regular basis but instead are something that only few can afford.

Conclusion

In general, the Chinese taxation system is similar to many other systems in the world, despite some peculiarities rooted in the country's traditions and history. Its system of indirect taxation is not an exception and comprises a consumption tax levied on specific categories of commodities, considered harmful to society, luxurious or seen as capable of inducing respect for Chinese traditions.

Healthy lifestyle, which implies consumption of 'green' cosmetics and beauty products free of any toxic ingredients, promotes the demand for organic luxury cosmetics, including perfumes and toilet waters. As a result, there are now 40,000 specialized cosmetics stores and offices of direct sales companies.

If we look at the sales of luxury cosmetics and beauty products in Russia, we will see that they account for 19.0% of the total sales, which means that it would be reasonable to include them in the list of excisable goods.

Luxury cosmetics brands use exclusive, proprietary formulae, high-quality organic ingredients, 70-80% of natural and biologically active substances, natural preservatives such as colloidal silver, tea tree oil and so on, innovative technologies. Luxury makeup products are normally sold in specialized stores or beauty salons to ensure their authenticity since such brands run the largest risk of being counterfeited.

Luxury cosmetics are produced by such staples of beauty industry as Elizabeth Arden, Yves Saint Laurent, Nina Ricci, Chanel, Estee Lauder, Clinique, Helena Rubinstein, Givenchy, Christian Lacroix, Dior, Shiseido and other fashion houses.

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Table 4: Segments of the cosmetics market and their characteristics

Characteristics	**mass-market cosmetics**	**middle-market cosmetics**	**luxury cosmetics**	**exclusive cosmetics**	**professional cosmetics**	**cosmeceuticals**
Target group	young adults	middle-aged	middle-aged	middle-aged	middle age-older	Middle age-older
Ingredients	petrochemical-derived ingredients, lack of organic ingredients, preservatives	organic ingredients 30-60%, non-toxic preservatives	organic raw materials, bioactive ingredients, non-toxic preservatives	organic raw materials, bioactive ingredients	pharmaceutical synthetics	natural bioactive ingredients
Price	low	medium	high	very high	very high	very high
Suitable for daily use	yes	yes	yes	yes	no	yes
Impact on skin	negative, skin ageing	skin enhancement and protection	skin rejuvenation, skin quality improvement	skin rejuvenation, skin quality improvement	short-term positive effects, skin ageing	medicinal effect
Skin resistance to cosmetic products	no	yes, if used for longer than 6 months	no	no	yes	no
Package and visual design	bright plastic packaging	plastic	glass, biodegradable plastic, creative design	glass, biodegradable plastic, creative design	cardboard	glass, biodegradable plastic
Marketing	aggressive	moderate	moderate	moderate	no	no
Amount of goods on the market	sold in large quantities	sold in medium quantities	sold in small quantities	sold in limited numbers	sold in small quantities	sold in small quantities
Distribution channels	supermarkets, retail stores, drogeries	drogeries	specialized stores, duty free stores	specialized stores	beauty salons	pharmacy networks
Resistance to external exposure	no	low	moderate	moderate	high	moderate

The Influence of Judicial Delays on Enterprises' Activity

Beatrice LEUSTEAN
"Politehnica" University of Bucharest, Bucharest,Romania
leusteanbeatrice@yahoo.com

Ana DEMSOREAN
"Politehnica" University of Bucharest, Bucharest,Romania
ana.demsorean@upb.ro

Diana SCURTU
"Politehnica" University of Bucharest, Bucharest,Romania
diana.scurtu@stud.fils.upb.ro

Abstract

Judicial delays are a common fact that later years increased its influence on the market performance. This study focuses on the relationship between judicial delays and market leavers, on the relationship between the Judicial Effectiveness and the Corruption Perception Index. The global and regional data analysis revealed strong-holds among these events. Another study was applied on European Union countries, for being able to empirically test and reflect through a regional quantifiable frame Romanian's entrepreneur perception about judicial terms delays over the losses and bankruptcy spectrum their company experience.

Keywords: Corruption, Bankruptcies, Judicial Effectiveness, Correlation, Regression

Introduction

Time is a valuable resource for any enterprise, especially when related to cash-flow registers. Waiting for a resolution in a commercial law case implies valuable resources (pretended amounts and judicial fees) to be unlocked and used for business reasons. Delays in judicial Romanian system are a common fact, that in recent years has become a real threat not only for the market performance of a company but also for the existence of the legal entity. Delays in solving a commercial case are regarded as total days above the normative threshold (procedural stated maximum period in order to present a resolution) from this paper's perspective.

There is empirical data collected by the authors (http://portal.just.ro/SitePages/acasa.aspx) that prove later years' various delays in granting a judicial result. Summing the empirical data, there were many faults, of different causes that induced this situation. In commercial law, even if courts grand the winning part, alongside with the amounts required, the interest as well, it is very often cheaper for companies who owe money to use it for different other purposes and wait until a court decision is issued for paying the money. Other company owners even profit the favorable legislation and create a different company for each business they run, and should they need to pay greater amounts of money they simply let that company go bankrupt, because in practice more often there is no consequence for them.

The companies described above usually ask their lawyers to delay as much as possible the outcome of the trial, hence they use all legal possibilities to achieve such results.

For example, until some time ago, it was mandatory for courts of law to suspend the trial should one of the parties raise the non-constitutionality exception. At present this legislation was changed, due to multiple delays. However, there are other possibilities for a party to ask for more terms in order to postpone the outcome of the trial (saying they have a new lawyer, postponing for acknowledging various documents, or sometimes, even recuse the judge, and risking a fine, in desperate situations). There are as well objective reasons for delays, amongst which the most common are the delays due

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to legal experts not submitting their reports in time - it is actually usual for an expert to delay the trial at least 1-2 terms, and some -times such delays postpone the case for months. Another reason for delays is the necessity to obtain any documents from institutions, in which case the court drafts a request directly to the institution, which is obliged to answer, but very often they are slow. After the judge issues the first court decision, which can usually be appealed, in practice very often it takes a very long time until the decision is drafted, in order that the parties to be able to appeal it. Even if the procedural code provides a period of 30 days for drafting court decisions, in practice parties are often forced to wait for months and, because usually the appeal suspends the enforcement of the court decision, the entire process is delayed.

In consequence, this situation was perceived by the entrepreneurs as a threat to their place on the market, and in a significant manner, a trigger for bankruptcy or market exit. And very much related to administrative inadequacy that is mainly subjected to corruption issues in the state. This is not a novelty in Romania and has many nuances. In 2002, legal frame and taxation was perceived as having a downsize influence over entrepreneurial incentive (https://www.wall-street.ro/files/143876-401.pdf) for in 2018, the main obstacles for business incentive being pointed towards bureaucracy, legal volatility, the relationship to state authority and corruption (https://www.impacthub.ro/wp-content/uploads/2020/09/Studiu-ROWIN-12sept.pdf). According to SocialProgress.org, Romania registers low to medium scores on Social Progress Index 2020 international ranking, with modest values (but not alarming) in what concerns access to justice (0.77) and corruption (44.0) (https://www.socialprogress.org/index/global).

In scientific literature there are various studies for measuring the impact of bureaucracy (Ashyrov, Masso, 2020; Wang et al, 2020; Luo, Kaul, 2019; Kochnev et al, 2018), corruption (Tourish, Craig, 2020; Rose, 2020; Marchini et al, 2020; Gago-Rodriguez et al, 2020; Huang, Yuan, 2020) and legal volatility (Kucik, 2015; Duncan, 2014) over business incentive. There are international agencies such are Heritage Foundation and Transparency International that measure societal indicators that include judicial effectiveness, government integrity or perception on corruption issues. There is a substantiated fact that the Index of Economic Freedom includes Judicial Effectiveness and Government Integrity in its calculation (https://www.heritage.org/index/about). There was also found specific literature on the relationship between corruption and economic freedom (Zhang, 2012). But we have found scarce scientific literature on the procedural delays (quantified by the Judicial Effectiveness) over business incentive.

Our paper aims filling a gap in this area of research, by focusing on the relationship between judicial delays and the enterprise's activity on the market. The first part of the study focuses on the relationship between the Judicial Effectiveness (one of the descriptors for the Index of Economic Freedom) and the Corruption Perception Index. To find out if there might be quantified any influences (or correlations) (on global scale) between the judicial delays and the perception about discretionary will (i.e. corruption). Further, we'll investigate the influence of Judicial Effectiveness over market leavers (expressed in two ways: as number of enterprises that were registering bankruptcy and exits of enterprises), and the influence of Government Integrity over the same indicators for 22 OECD countries. And, for being able to empirically test and reflect through a regional quantifiable frame Romanian's entrepreneur perception about judicial terms delays over the losses and bankruptcy spectrum their company experience, we've studied Judicial Effectiveness influence over the number of enterprises in the European Union.

In the fourth part we present the results of our findings, and in the last section we conclude, and we offer our ideas for further investigation.

A World of Justice and Economic Freedom

As mentioned before, one thing researchers seem to agree with is judicial performance, operationalized as the ability of courts to avoid delays in the delivery of justice and trust in legal systems (Magalhaes, Garoupa 2020).

The performance of the courts, given the fact society and economy as a whole experience a digital era, when everything runs faster and the promises of constant improvements are high, has an important role for the well-functioning of the market (Frade et al, 2020) as courts are among the institutions that have the greatest impact on economic performance (Lorizio, Gurrieri, 2014). The World Bank acknowledges the importance of sound judicial systems to good governance and economic growth and scholars investigate various judicial reforms all over the world (Messick, 1999). There are studies for analyzing the impact of judicial efficiency over the entrepreneurial incentive on using court proceedings in the resolution of financial distress (bankruptcy procedures) (Mruk et.al, 2019), while others circumambulate on the centralization idea of legal authority in order to provide a clearer, more coherent, and more predictable legal infrastructure for patent law (Wagner, Petherbridge, 2004). Various analyses on determinants of the performance of commercial district courts, in terms of the number of resolved cases were conducted in Poland (Beldowski et al, 2020) and the most significant

finding was that an increase in the number of judges and auxiliary court staff can significantly enhance the number of resolved cases. On the contrary, the evidence from Nepal shows that multi-court judging exhibits a negative effect on judicial productivity at case resolution (Grajzl, Silwal, 2020). The relationship between size and judicial performance was tested using a Weber predictive model and there was found a positive relationship between size and formal rationality and a negative relationship between size and substantive rationality (Smith et al, 2020).

Other authors (Belermann, Christmann, 2020) substantiate the role of using prior judicial decisions for the efficiency of justice in civil law matters in a country. The experience of improving efficiency on public service by merging courts proved positive for some legal systems (Agrell et al, 2018) while for others judicial selection is a critical factor for judicial performance (Vakilifathi, Kousser, 2020). There are evidences that poor judicial administration also contributes to cases backlogs (Sen, 2020). In some regions of the world, the magistrate training, number of servers, quantity of assessments, IT tools, transparency and monthly payment are tested to be the main factors that induce judicial performance and also the political factor may exert influence over jurisdictional benefits (Ferreira, Borges 2020). In other regions, belonging to OECD countries, there are other reasons, such as intrinsic motivation (induced by extrinsic means) of the judges for inducing a more collaborative manner to assign cases and to promote judicial collegiality and mentoring (Murray et al., 2020).

There are evidences for the impact a performant judicial system has on the whole performance in the public sector and how discrepancies in development are related to this issue (Nissi et al, 2019). The relationship between institutional (judicial and political) and monetary dimensions of corruption were investigated for 16 developing and emerging economies and where the judicial corruption has higher stakes, the innovative activities of enterprises decrease (Riaz, Canter, 2020). Other authors estimate technical efficiency of judicial system for policy makers' purposes, in order to diminish bureaucracy induced delays (Ippoliti, Tria, 2020).

As such, authors were able to identify the main hypothesis for this investigation:

1. There is a quantifiable relationship between judicial effectiveness and the entrepreneurs' perspective on the corruption seen as related to the delays in courts.
2. There is a quantifiable relationship among judicial effectiveness and government integrity (best describing the macro-environment influenced by delays in courts) and market leavers.

Methodology

Taking into consideration the specificity of the study, the authors conducted a desktop research for finding the most important factors that impede or influence the judicial effectiveness, also the entrepreneurs' perspective about legal environment. Scientific literature was investigated in order to reflect the state of the art of the relationship among judicial system, perception of corruption and bankruptcy or market leaving.

In order to test the influences hypothesized about economic freedom and perceived corruption, applying the statistical investigation principles on 183 countries, authors found data matching and thus selected 178 countries on three years span. Even if there were 534 observation, thus proving statistical consistency, the fact that Index of Economic Freedom considers Judicial effectiveness since 2017, let authors no option to conduct a longer time-span investigation. The correlation was tested, and a regression model could be identified, also tested. Further, the same type of statistical investigation was applied for UE data (28 countries).

In order to describe if justice performance and government integrity have a quantifiable influence on business environment, authors selected data from OECD countries (also a few relevant non-OECD countries). Correlation and regression analysis were applied on investigating: a) Judicial Effectiveness on bankruptcies and on market exits (57 observations, 2017-2019); b) Government Integrity over bankruptcies and on market exits (57 observations, 2017-2019). Statistical significance was reported as satisfactory for a probability of .95.

The third numerical study, that was directed towards reflecting the direct and clustered influence of judicial effectiveness on the total number of enterprises was applied to EU-28 data. Correlation and regression were applied to 28 countries.

Results

The Judicial Effectiveness (one descriptor for Index of Economic Freedom) and the Corruption Perception Index statistical investigation proved to be highly correlated both on global scale (.83) and on European level (.86). Regression analysis fully validated the main hypothesis and described a quantified relationship between those indicators as presented below:

Table 1: Judicial Effectiveness on the Corruption Perception Index between 2017-2019, regression testing on global scale and for European Union-28

Regression Statistics Global scale		***Regression Statistics European Union - 28***				
Multiple R	0.8304535	0.8589353				
R Square	0.6896531	0.7377697				
Adjusted R Square	0.6890698	0.7345718				
Standard Error	10.548044	7.18272841				
Observations	534	84				
Global		***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***
Intercept	7.379470472	1.139965	6.473418	2.18E-10	5.140085	9.618856
Judicial Effectiveness	0.786768186	0.022882	34.3833	2.822E-137	0.741817	0.831719
European Union - 28		*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	10.00068231	3.675756	2.720713	0.007952	2.688431	17.31293
Judicial Effectiveness	0.84945174	0.055926	15.188888	1.49253E-25	0.7381973	0.960706

Source: Authors' own realization according to data collected and analyzed from https://www.transparency.org and https://www.heritage.org

Further investigating the assumption that developed economies prove their efficiency also through their judicial effectiveness and government integrity, authors collected, tested and found statistically significant results of the investigated indicators on data regarding market leavers available at: https://data.oecd.org/. Here are the results:

Table 2: Judicial Effectiveness and Government Integrity on Bankruptcy and Exits (OECD countries, 2017-2019)

Regression Statistics for Judicial Effectiveness on Bankruptcies		**Regression Statistics for Government Integrity on Bankruptcies**	**Regression Statistics for Judicial Effectiveness on Market Exits**	**Regression Statistics for Government Integrity on Bankruptcies**
Multiple R	0.243017	0.151713	0.507517	0.446357
R Square	0.059057	0.023017	0.257573	0.199235
Adjusted R Square	0.041949	0.005253	0.235737	0.175683
Standard Error	86.97163	88.6216	36.15441	37.54802
Observations	57	57	36	36

Source: Authors' own realization according to data collected analyzed from https://data.oecd.org/ and https://www.heritage.org

Feeble indirect correlations were found among Judicial Effectiveness, Government Integrity and Bankruptcy rate for developed countries. On the contrary, when looking at the correlation and regression testing data for the same indicators on the market leavers there is a significant causality, also influence (for 0.95 probability, P -value <0.005) for both Judicial Effectiveness and Government Integrity on business operativity on a market.

The third part of the numerical research was applied on a regional level, Romania being a member of European Union since 2007, in order to reflect the entrepreneur's perspective on judicial delays in a more homogenous manner. Because of the limitations related to data scarcity for later years (there were comparable data for only two years) and market leaving indicators (Euro-Stat database provides data on the number of enterprises), there was found a negligible correlation between Judicial Effectiveness and the total number of economical enterprises operating on the market in a specific timespan.

Conclusions

Delays in Court (seen as Judicial Effectiveness) influence in a highly amount all over the world citizens perception on corruption issues. There is a validation of the principle that law sustains democracy through free market perspective's and market efficiency from this point of view. Authors found that judicial delays are highly related to other issues that belong to democratic process and reflected in a clean or vicious manner on public opinion about democracy. In this manner was found the proof to validate various entrepreneur's perspective on market legal framework that impede their success.

Developed countries experience further support the validation of the subjective perspective with data on market leavers quantified as bankruptcy rate and market exits. The results of the study proved that Judicial Effectiveness and Government Integrity cause a feeble influence on bankruptcy but a significant one on market exits of the companies in developed countries.

Even if we were not able to support the presumption about direct judicial delays' influence on business incentive on European level, we have presented a method for investigating this phenomenon that may be further quantified and detailed when data reported by international agencies suffice.

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Digital Technologies for Sea Ports Geo-Information Support while climate change and Covid-19

Valery M. ABRAMOV*
Russian State Hydrometeorological University, Saint Petersburg, Russia
val.abramov@mail.ru

Igor A. SIKAREV
Russian State Hydrometeorological University, Saint Petersburg, Russia
ig.sikarev@mail.ru

Tatiana M. TATARNIKOVA
Russian State Hydrometeorological University, Saint Petersburg, Russia
t.tatarnikova.00@mail.ru

Vyacheslav G. BURLOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vyach.burl@mail.ru

Eugene P. ISTOMIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
eug.istom@mail.ru

Vladimir N. ZAVGORODNIY
Russian State Hydrometeorological University, Saint Petersburg, Russia
vla.zav@mail.ru

Evgeniy A. BAIKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
e.baykov.00@mail.ru

Ekaterina M. KORINETS
Russian State Hydrometeorological University, Saint Petersburg, Russia
katt.korr@mail.ru

Vladimir A. BOLSHAKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vl.boll@mail.ru

Tatiana V. VEKSHINA
Russian State Hydrometeorological University, Saint Petersburg, Russia
tat.vekk@mail.ru

Abstract

In paper, we consider digital technologies development results for geo-information support to sea ports activity. In studies, we used methods of data bases constructing, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties and risk management. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we demonstrate geo-information support system for Russian sea port Ust-Luga. For data exchange and preliminary discussion we used platform https://www.researchgate.net/profile/Valery_Abramov2/ while research.

Keywords: Digital Technologies, Geo-Information Support, Sea Ports, Climate Change, Covid-19

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Introduction

Currently, global environmental economy including sea ports activity (SPA) is within Industry 4.0 period, when while climate change and Covid-19 pandemic. Now, many businesses are planning and implementing a wide range of information technologies (Lukyanov, 2019), (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Trunin, 2019). Industry 4.0 leads to serious technological changes in geo-information support (GISS) for sea ports activity (SPA), including natural risks management (NRM) (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new tools, including practical learning area (Averkiev, 2020), (Korinets, 2020), (Popov, 2019).

In paper, we describe the development results of digital technologies for geo-information support to SPA within geo-information management (GIM) paradigm (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Mandryka, 2019), (Popov, 2014), (Popova, 2019), (Rumyantseva, 2017), (Zhigulsky, 2018) within environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). We paid significant attention to geo-information support systems (GISS) within climate change and covid-19 pandemic context (Bournashov, 2014), (Gogoberidze, 2014), (Chestnov, 2020), (Chusov, 2012), (Estrin, 2020), (Tatarenko, 2020), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). Developed digital technologies for GISS to SPA while climate change and covid-19 pandemic, considered in this article, take these factors into account.

Methods and data

In research, we used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. Also, we used big data technologies (Popova, 2019), (Yaily, 2019) From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bidenko, 2019). While study, we used data bases and tools of geo-information digital online platforms (GIDOPs) Earth (Bolshakov, 2020), (Sanina, 2020), and EOS, including its Land Viewer (LV) product (Prostakevich, 2020), (Vekshina, 2020).

Results

As a result of performed using foresight technology research, we put forward the claim that in present conditions of climate change and Covid-19 pandemic, it would be advisable to develop sea ports infrastructure with the aim of geopolitical risks management for global economics, which are summarized in (Prostakevich, 2020). Preference should be given to those sea ports, where climate change leads to an improvement in their overall operating conditions, for example, a reduction in the timing of ice risks in their waters. As GISS basement, we propose to use the tools of geo-information digital online platforms (GIDOPs) Earth (Bolshakov, 2020), (Sanina, 2020), and EOS, including its Land Viewer (LV) product (Prostakevich, 2020), (Vekshina, 2020). As an example, we consider the Russian port of Ust-Luga. In figure 1, we show a general view of this port location on the Gulf of Finland's map (red rectangle).

Figure 1 - General view of sea port Ust-Luga's location on the Gulf of Finland's map (red rectangle)

Relatively recently, the entire Gulf of Finland and the water area of the port of Ust-Luga were covered with ice for several months in winter. In figure 2, we show a satellite image of the Gulf of Finland on April 4, 1996, visualized with Natural Colors Application of LV product. It can be seen that the ice cover covers almost the entire water area of the Gulf of Finland, including the area of the future sea port of Ust-Luga (red rectangle), the construction of which began in 2000 and continues to this day.

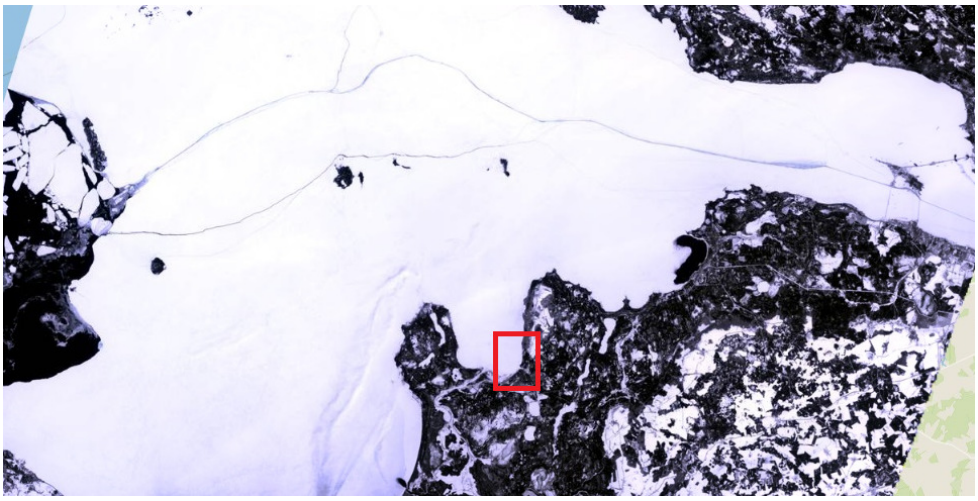

Figure 2 - Gulf of Finland's space image on 04/04/1996 visualized with Natural Color Application of LV (red rectangular is Ust-Luga sea port area)

In figure 3, we show a satellite image of the Gulf of Finland on February 4, 2020, visualized with Natural Colors Application of LV product. Comparative analysis of figures 2 and 3 shows that due to climate change in the Gulf of Finland, there is a significant terms reduction of ice cover presence in the area of sea port Ust-Luga, which allows to allocate it as a priority object for development of sea port infrastructure of Russia. This is exactly what is happening now, the Ust-Luga seaport is developing at an accelerated pace and by the year of 2025, the area of the port facilities will be expanded to 1,600 hectares.

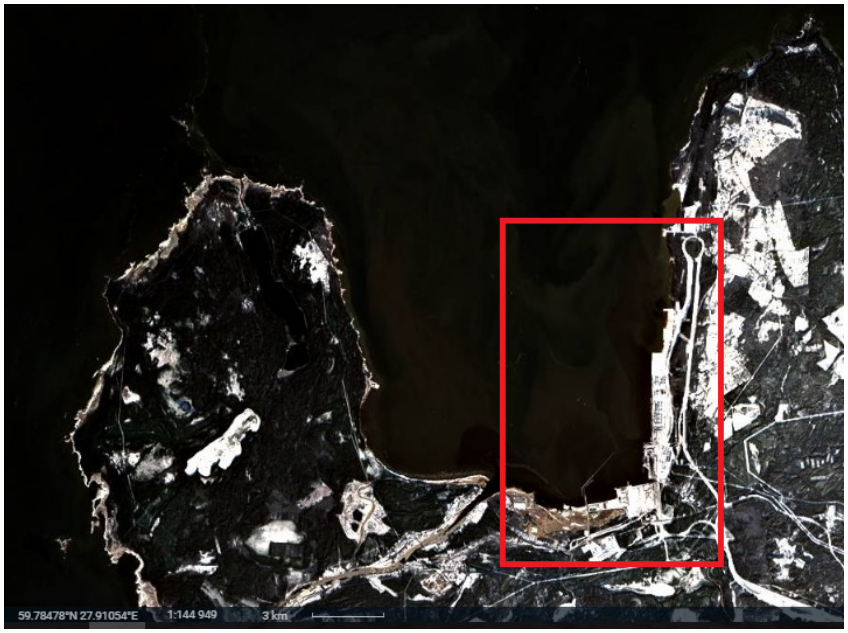

Figure 3 - Space image of the Luga Bay at Ust-Luga seaport on 06/02/2020 visualized with Natural Color Application of LV (red rectangular is Ust-Luga sea port area)

Note, significant terms reduction of ice cover presence at sea port Ust-Luga is an important incentive for private investors. And these investments are actively increasing. Currently, the port is carrying out intensive work on dredging the so-called approach channels and construction alluvial areas in the southern part of the port to the East of the Luga river mouth. The associated negative impact on the environment is the increased turbidity of the waters in the Bay and the violation of the natural habitat of bottom fauna. In figures 4 and 5, we present space images of the Luga Bay with Ust-Luga sea port on 23/09/2020 visualized with Natural Color Application of LV (red rectangular is Ust-Luga sea port area).

The use of special satellite image visualization applications as part of the proposed GISS (figures 6 and 7) made it possible to clearly identify the washed-up areas. The best results were achieved with the use of NDWI Application of LV (figure 7).

Figure 4 - Space image of the Luga Bay with Ust-Luga sea port on 23/09/2020 visualized with Natural Color Application of LV (red rectangular is Ust-Luga sea port area)

Figure 5 - Enlarged space image of the Luga Bay at Ust-Luga seaport on 23/09/2020 visualized with Natural Color Application of LV

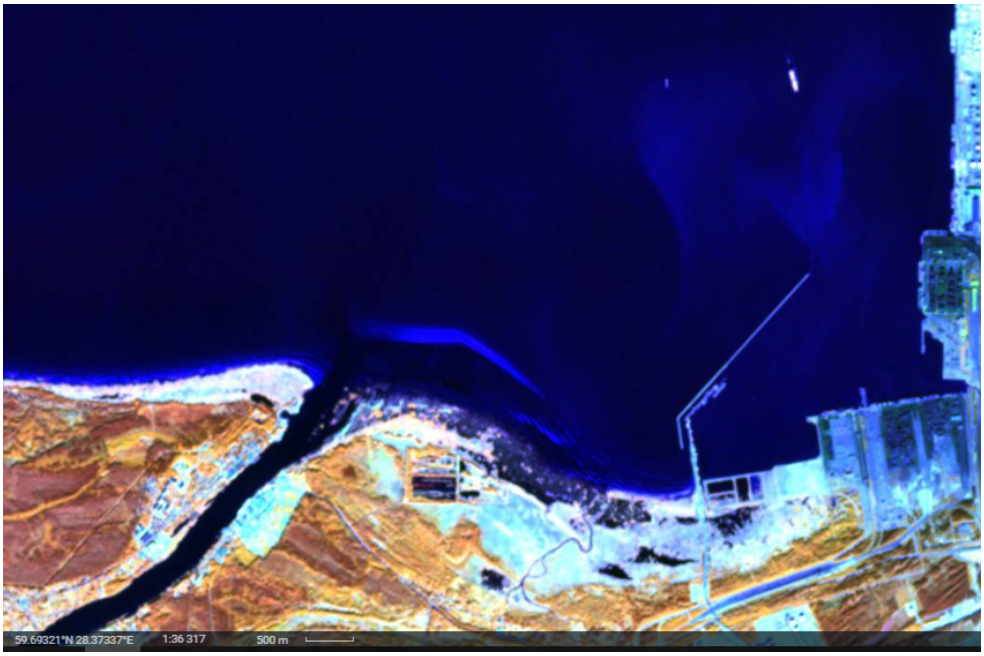

Figure 6 - Enlarged space image of the Luga Bay at Ust-Luga seaport on 23/09/2020 visualized with Land/Water Application of LV

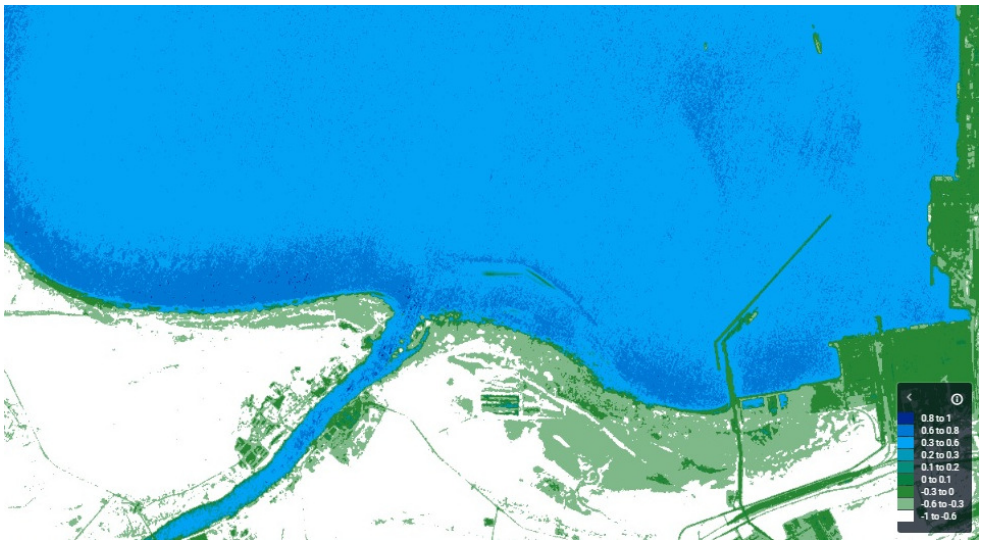

Figure 7 – Enlarged space of the Luga Bay at Ust-Luga seaport on 23/09/2020 visualized with NDWI Application of LV

As a result of the analysis of open mass media using the query system as part of the developed GISS, it was found that the above-mentioned dredging works are performed using the latest dredging vessel *Kronshlot* built in 2016 (figure 8).

Figure 8 – Dredging vessel *Kronshlot* built in 2016

We also established that dredging in the southern part of the port of Ust-Luga is expected to be carried out until the end of 2020, so increased turbidity in the Luga Bay will be observed further, until the end of these works.

Note, discussion of the environmental consequences of the above-mentioned dredging operations in sea port of Ust-Luga is not task of this article.

Discussion

Proposed above low-cost GISS for SPA can be used in educational and training purposes. The essential task of university practical learning (UPL) in the field of SPA is to teach students the practical aspects of work with GISS for SPA tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies (Korinets, 2020), (Popov, 2019), that can reduce total cost of learning process.

Conclusion

In article, we consider results of digital technologies development for geo-information support to SPA. In research, we used Foresight technologies, theory of decision making under uncertainties, risk management, methods of data bases constructing, web-technologies and virtual reality tools. As study result, we suggest to use GIDOPs Earth and EOS, including its LV product, as the main technological tools within GISS for SPA. We demonstrate possibilities of GISS for sea port Ust-Luga. As essential result, we propose to use developed GISS as basement for subsequent sea ports, including educational and training purposes. The research results presented in this article has significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state environmental control bodies.

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Development of Incentives for Research and Development Including Non-Budget Financing Under Russia's National Program Science and Technology Development

Viktoriya LAPOCHKINA
Russian Research Institute for Economics, Politics, and Law in Science and Technology (RIEPL) Moscow, Russia,
e-mail: lapochkina@riep.ru

Andrey KLYPIN
Russian Research Institute for Economics, Politics, and Law in Science and Technology (RIEPL) Moscow, Russia,
e-mail: klypin@riep.ru

Yuriy ANDREEV
Russian Research Institute for Economics, Politics, and Law in Science and Technology (RIEPL) Moscow, Russia,
e-mail: y.andreev@riep.ru

Roman TIKHONOV
Russian Research Institute for Economics, Politics, and Law in Science and Technology (RIEPL) Moscow, Russia,
e-mail: r.tikhonov@riep.ru

Elena PLEKHANOVA
Russian Research Institute for Economics, Politics, and Law in Science and Technology (RIEPL) Moscow, Russia,
e-mail: e.plehanova@riep.ru

Abstract

The Russian Federation currently faces the need to develop effective incentive mechanisms for research and development for the benefit of organizations in the real economy and create effective research and development (R&D) financing instruments, including non-budget financing. We propose methods for analytical consolidation of budget and non-budget expenditures on science for more effective assessment of R&D spending. Proposed methods will enable to increase the transparency of science funding, enhance the efficiency of public spending, identify new sources of non-budget funding for research and development.

Keywords: Science Funding, Budget and Non-Budget R&D Financing, Science And Technology Development.

Introduction

Current world trends show not only a transformation of social and economic systems, increased competition in world markets, changes in the structure of productive forces, redistribution of financial resources and concentration of geopolitical risks, but also reflect the irreversible process of development of the knowledge-based economy, accelerated formation of a new scientific and technological order of society, exponential growth in the knowledge-intensive industries, development of intellectual and educational potential of a person, emergence of new knowledge, scientific expertise, which until a quarter of a century ago was unthinkable and incomprehensible not only for the ordinary people but also for the scientific perception. The study shows a negative trend in the development of Russian science that funds from the federal budget that remain the main source of funding for basic and applied research within the framework of State programs. Russia continues to lag significantly behind many developed countries in its share of science expenditure, which is financed from extrabudgetary sources. It is vital that Russia do not remain on the sidelines of the world's scientific, technological and innovative processes and maintain and strengthen its position in the world's scientific, technological, innovative, information and intellectual cluster.

Research on the evolution of mechanisms and instruments to stimulate research and technological activity in the Russian Federation's State programs has been carried out in the past, in our view, does not reflect a complete and objective picture. The authors of this study have proposed effective mechanisms for stimulating research activities

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for the benefit of organizations in the real sector of the economy. In order to improve the efficiency of the Government's management of research and development and to create effective instruments for financing R&D from extrabudgetary sources.

Material and Methods

There were used such formal methods as classification, analysis, synthesis, deduction, induction, and comparative data analysis.

Results and Discussion

The practice of performing scientific and technological activities in the majority of technology companies which are successful in the market indicates that the process of an innovative product development is not divided into a research phase and, in fact, an innovation phase. At the same time, it should be noted that the need to separate the research phase into a particular phase can emerge in two cases: first, when a company does not have internal scientific expertise but, at the same time, has a strong independent research partner organization, which can carry out the company's orders for research and development; second, when companies have internal research centers (especially at large companies), which do relatively autonomous research and have their own plans for scientific research.

Both approaches are used in Russia, but as opposed to leading nations in scientific and technological innovation, companies in the real economy in Russia rarely have their own research facilities. For example, metallurgical company PAO Severstal has their own research institute in Cherepovets; JSC AvtoVAZ, the automaker in Togliatti, relies on a research center established jointly with German partners. The alternative when companies perform research activities using external scientific organizations is widespread in Russia and traces to the practices of the Russian defense industry. For example, St Petersburg Polytechnic University continuously works with defense plants under long-term agreements, and research activities around this cooperation became one of the university's priorities.

A study by the Boston Consulting Group provided a systematic comparison of research and innovation activities in 50 most innovative companies in the world. In the given report, all the leading companies have the following common features in a research study by Ringel, Grassl, Baeza, Kennedy, and Manly (2019):

– a significant turnover of financial resources, which enables to maintain scientific departments and purchase the latest equipment for their full-fledged work;
– obligatory leadership in the world market in a relatively narrow segment (there are exceptions, for example, German conglomerate Siemens AG, automobile corporation Toyota Motor Corporation);
– a closed cycle of work from developing a long-term strategy to organizing a dealership network around the world.

Abroad, in many cases, companies in the real economy and diverse external scientific organizations don't make public their collaboration, but they cooperate as part of their main activity at all stages of product creation. For example, in the United States, commonly, long-term research financing from the private sector belongs to the core activities of universities. Various research activities come with multiple approaches to defining research areas and subjects. There is a trend to evaluate the feasibility of basic research based on the expected impact for society. This is also reflected in the relationship between the phases of the full cycle "research - development - approbation – production". However, as a rule, the public sector is responsible for providing financing for basic research due to its long-term impacts on society, while the business sector is interested in applied research and development, which can potentially bring higher economic returns to the mid-term (less often - in the short term) perspective.

Socio-economic implications of productive interaction between the public and business sectors in the field of R&D are set out in figure 1.

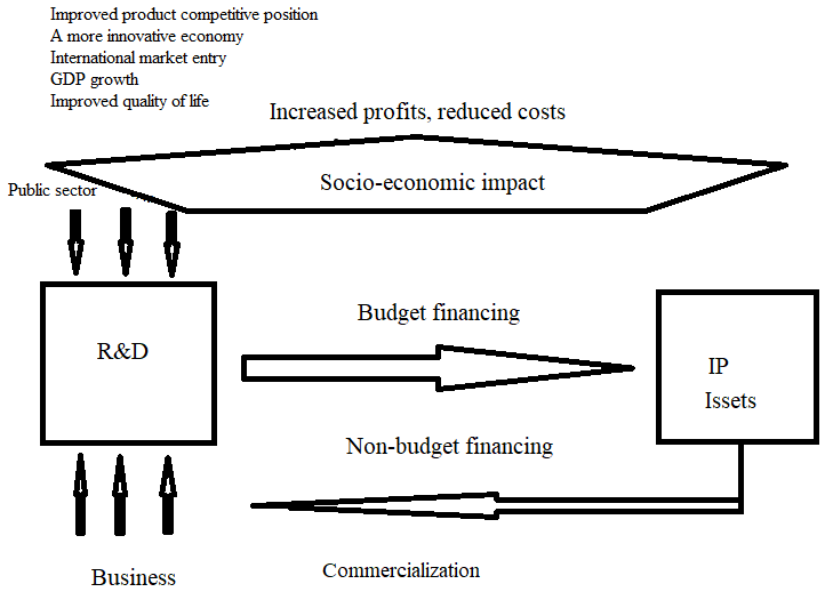

Fig. 1: The relationship between the public and business sectors in the field of R&D and socio-economic implications of this interaction

It can be pointed out that the process of creating intellectual property assets receives financing both from the public and business sectors. The public sector, through R&D, primarily seeks to achieve such outcomes as GDP growth and better quality of life for citizens; while the business sector wants to improve product competitive position, increase profits and reduce costs.

Russia ranks eighth in the world in terms of total R&D spending and is currently increasing budget allocations to basic and applied research. According to the Russian Federal Treasury, the cash execution of federal budget allocations to basic and applied research under Russia's 32 national programs in 2019 totaled 440,486.18 million rubles, including 191,085.45 million rubles spent on basic research, and 249,400.73 million rubles spent on applied research (Table 1).

Table 1: Cash execution of federal budget allocations to basic and applied research under Russia's national program in 2017-2019

Indicator	2017		2018		2019		Deviation (+,-) 2019 to 2017	Change rate, % 2019 to 2017
	The amount, thousand rubles	Proportion, %	The amount, thousand rubles	Proportion, %	The amount, thousand rubles	Proportion, %		
Cash execution of federal budget allocations, including	338572,4	100	368925,1	100	440486,1	100	101913,7	130,1
on basic research	116188,0	34,3	148120,0	40,1	191085,4	43,4	-74897,4	164,5
on applied research	222383,4	65,7	220805,1	59,9	249400,7	56,6	27017,3	112,1

The cash execution of federal budget allocations to basic and applied research under national programs has increased by 30.1%. The most significant growth of budget spending was on basic research - 164.5%; the increase of spending on applied research has reached 112.1%. Furthermore, in the period under review, we observe an increase in the share of spending on basic research: from 34.3% in 2017 to 43.4% in 2019 and a decrease in the share of spending on applied research: from 65.7% to 56.6%. It is worth noting that in 2019 the proportion of cash expenditure of the federal budget on basic and applied research under Russia's 4 out of 32 national programs amounted to 88.29% of the total spending on research and development for civilian purposes (figure 2).

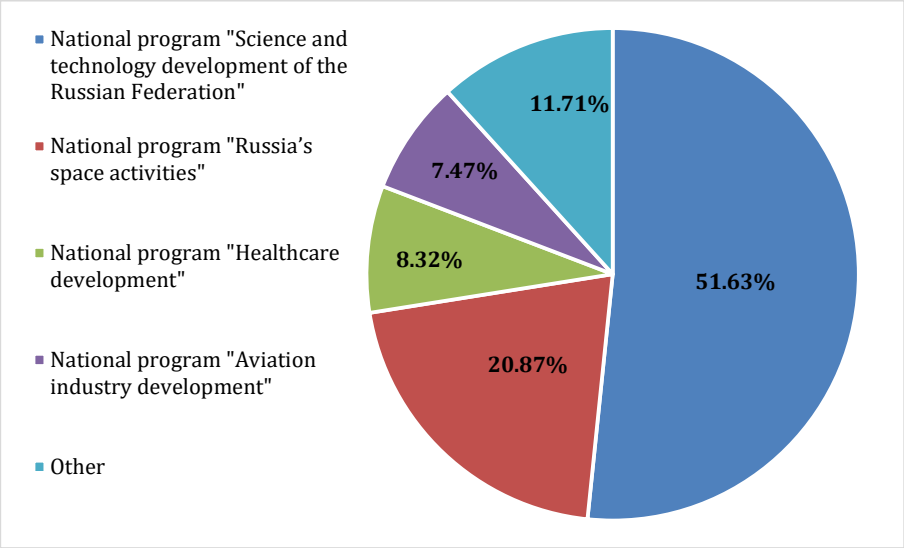

Fig.2: Cash expenditure of the federal budget on fundamental and applied research in 2019, %

Ilyina, Zharova, Burlankov (2018) mentioned that research into the development of methods for determining the efficiency of funds allocation on research and development has been actively evolving. It should be emphasized that at the current stage of the transformation of the research and development sphere and its integration into economic activities, the process of analyzing the efficiency of R&D spending should include measures aimed at improving the management of R&D activities and the development of effective incentive tools for the R&D sphere at the various phases of the innovation cycle.

The development of effective incentive mechanisms for research activities for the benefit of organizations in the real economy under Russia's national programs is inextricably linked to the task of improving the efficiency of public administration methods in the sphere of research and development and creating effective instruments of R&D financing. The primary goal, in this case, is to introduce a management mechanism in the field of science and technology development in Russia, aiming to improve the investment attractiveness and efficiency of investments in the sphere of research and development, improve the performance and relevance of research and development.

The appropriateness of the application of particular instruments aimed at developing the R&D sector can change depending on the various phases of the innovation cycle (basic research, applied research, experimental design). As a result, an effective method of systematizing management solutions under the national program Science and Technology Development is the distribution of these instruments by technology readiness levels (TRL).

TRL phase 1 implements the management instruments according to the basic research plan, including by doing the following - provide subsidies to world-class research centers; give access to scientific and technological information; award grant financing for the projects of the Russian Science Foundation (RSF) and the Russian Foundation for Basic Research; support the RSF projects, etc. TRL phases 2-3 and 4-7 implement government support measures for R&D with a focus on applied research and experimental design, including the implementation of Russian Government's orders No. 220 aiming to attract leading scientists to universities and science organizations and establish world-class laboratories led by top scientists; carry out science and technology projects and set up high-tech production facilities based in science cities, etc.

TRL phases 4-7 of the national program Science and Technology Development use the management tools aimed at delivering scientific and technological outputs in the form of new practical solutions for the use of technologies in manufacturing new products and providing services. These tools include the following measures - promote cooperation between Russian universities and organizations in the real economy to set up new high-tech production facilities; support the implementation of complex science and technology programs (CSTP), including by receiving non-budget financing; establish centers for the National Technology Initiative; support and develop resource sharing centers and unique scientific installations. The bulk of R&D financing under the national program Science and Technology Development is controlled by the management mechanisms which belong to TRL phase 1. At TRL phases 2-3, with the maturity of technology readiness levels, non-budget financing should increase with a simultaneous reduction of federal budget funding and its further increase at TRL phases 4-7 (according to the report of Ilyin (2019)).

However, in the opinion of the authors of this article, the instruments used to secure non-budget financing, first, are not sufficient to reverse the prevailing tendency of government budget financing of R&D, and second, the majority of measures for attracting the business sector to science are advisory in nature and are not attractive for the private sector. This circumstance is working against the achievement of scientific and technological breakthroughs set out in the Strategy for Science and Technology Development.

For Russian science, federal budget funding remains the main source of financing for basic and applied research. This type of financing has always suggested control over the activities of the investee, particularly if it is federal budget spending.

Table 2 sets out GDP growth rates and comparative growth rates of science funding from the federal budget. The growth rates of public financing of science do not exceed the projected GDP growth rates, which indicates that the amount of public financing is not sufficient.

Table 2: Comparative growth rates of GDP and public financing of science

Indicators	2013	2014	2015	2016	2017	2018	2019	2020*	2021*	2022*
Science financing from federal budget, billion Roubles	425,3	437,2	439,3	402,7	377,8	420,4	489,1	506,2	518,9	540,7
Growth rate, %	119,4	102,8	100,4	91,7	93,8	111,3	116,3	103,5	102,5	104,2
GDP, billion Roubles	72985,7	79030,0	83087,3	85616,0	91843,1	104629,6	110046,0	112 863,0	120 364,0	128 508,0
Growth rate, %	107,2	108,2	105,1	103,0	107,3	113,9	105,2	102,6	106,6	106,8
Proportion of budget financing in GDP, %	0,58	0,55	0,53	0,47	0,41	0,40	0,44	0,45	0,43	0,42

** as per the draft federal law 'On the federal budget for 2020 and for the planned period 2021 and 2022*
*** Authors' calculations based on Russian Statistics Agency (Rosstat) data*

The data indicate a decline in the growth rates of the federal budget's science spending before 2016 thereafter the public spending has only increased, and the largest increase occurred in 2018 and 2019. However, for this to have positive effects, a replacing and outpacing growth of non-budget spending is required but there is no statistical evidence for this (figure 3).

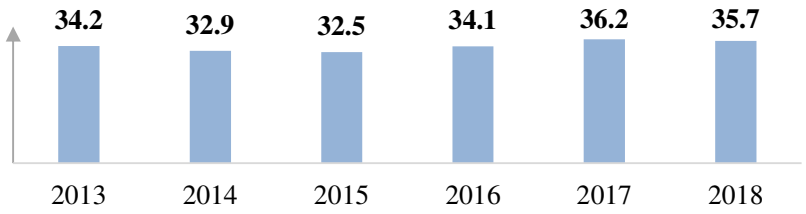

Fig. 3: The proportion of non-budget funds in total R&D financing, %

The main reasons for the low growth rates of non-budget funds in science include the following:

1) the absence of motivation for the business sector to invest in science, high risks of no return of investment, poor development of technologies for commercialization;

2) skeptical attitude towards science in the society as a result, among other things, of the reputation losses of the Russian Academy of Sciences (RAS) and a long-running campaign in the media to discredit the Academy;

3) underdeveloped mechanisms for attracting private investments in science. The concentration of the majority of scientific expertise in public research institutions, which are, to a significant extent, is secret and closed.

However, when making decisions on the selection of measures to stimulate non-budget R&D investment, it is necessary to consider that, despite the current more realistic goal setting, such decisions will undoubtedly increase the burden on economic agents. Furthermore, increased administrative regulation and/or pressure to attract non-budget funds may lead to other problems in the economic system (for example, widespread hiding of profits and, hence, a decrease of the profit tax base - in the event of introducing mandatory contributions to R&D from the profits of enterprises and business organizations).

To avoid an imbalance of the economic system, it is necessary to implement a set of measures that will provide a comprehensive solution to this problem, considering social, economic, legal, and institutional aspects. One of the main directions of the reforms underway should be an increase in the proportion of industries with high added value

in the Russian economy. Possible solutions to this problem could include both improving the statistical tools for R&D cost accounting and stimulating enterprises and business organizations of various forms of ownership to assign costs to research and development and include them in statistical records.

The current situation is caused, on the one hand, by the requirements of the strategic documents aiming to increase internal R&D spending to ensure accelerated science and technology development and the transition to a "smart" economy, and on the other hand, by the multichannel nature of R&D financing with no single system of budgetary and statistical records. This situation calls for the development of proposals to consolidate R&D spending in one instrument aimed at achieving the strategic goals in science.

National program 'Science and technology development of the Russian Federation' is to become such an instrument as the main tool for the implementation of Russia's Strategy for science and technology development and the single strategic planning document aiming to develop the nation's intellectual capability; provide scientific, technological and intellectual support for structural changes in the economy; ensure an efficient organization and technological update of science, technology, and innovation (high-tech) activities.

In a research study by Klimanov V., Safina A., (2017) under the current legal and regulatory framework for the development and implementation of the national programs, only public funds must be recorded in the national program (non-budget financing can be included for reference only). At the same time, the national program Science and Technology Development proposes to carry out the consolidation of science spending in two phases: Phase 1 consolidates all federal budget funds allocated to science, and Phase 2 consolidates non-budget funds. However, the consolidation of funds from non-budget sources should be based on the same principles and terms as the consolidation of budget funds, but it has to be included in the national program for reference purposes.

At the same time, it is worth noting that neither administrative measures only nor factual (non-analytical) inclusion in one document (national program Science and Technology Development) of all federal budget expenditure and non-budget funds will solve the problem of including all R&D spending from the other national programs into the national program Science and Technology Development.

Conclusions

In addition to funding consolidation measures, the following actions are to be taken:

- centralize the recording of R&D output in the Unified state information system for recording the R&D output for civil purposes (EGISU R&D). Public authorities should additionally work with subordinate R&D organizations to provide correct data showing the amount of budget and non-budget funding and real intellectual property output upon the completion of work;
- develop a culture of identifying and recording the intellectual property assets;
- develop communication tools between R&D organizations and organizations in the real economy;
- objectify data about the achieved R&D outcomes and their practical application, with the further use of information recorded in the EGISU R&D to inform management decisions;
- use the EGISU R&D data to improve competition, including focusing government support on the most productive and efficient IP owners;
- provide R&D information transparency for the society and at the same time ensure the lawful rights and interests of the authors of scientific ideas and achievements;
- introduce a particular section on science in the Budget classification code as a necessary alternative to the consolidation of all expenditures on science in a single national program;
- improve R&D accounting rules;
- interlink the forms of accounting, tax, and statistical reporting.

Another way to improve the commitment of business to R&D should be the active introduction of a "qualified customer" model into the economic practice and the development of complex science and technology programs and projects. Klypin et al (2019) mentioned that these projects are proposed in a particular sub-program of national program Science and Technology Development to achieve the priorities set out in Russia's Strategy for science and technology development approved by the Russian President's order of 01.12.2016 No. 642. This includes the creation of a coherent system of developing and implementing strategically significant science and technology projects with the participation of organizations in the real economy and a qualitatively new approach to the approval of scientific and technological output, and the evaluation of its impact.

The proposed measures and their integration into the R&D management and financing system are considered to lead to more efficient public financing of science, increased non-budget R&D funding and more transparent R&D spending.

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Conflict of Interest

We, as the authors of this article, declare with full responsibility that we have no existing or potential conflict of interest with any third party which may arise from the publication of this article. This declaration relates to the carrying out of scientific work, collection and processing of data, writing and preparation of this article, and making the decision to publish the manuscript.

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Assessing LIS Undergraduate Experiences in ODL during COVID-19 Outbreak in Malaysia

Faddliza MOHD ZAKI
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Negeri Sembilan, Malaysia
faddliza@uitm.edu.my

Noor Masliana RAZLAN
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Kelantan, Malaysia
masliana0315@uitm.edu.my

Nurulannisa ABDULLAH
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Kelantan, Malaysia
annisa@uitm.edu.my

Nurhidayah NASHARUDIN
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Negeri Sembilan, Malaysia
nurhidayah204@uitm.edu.my

Norhidayu MD YATIM
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Negeri Sembilan, Malaysia
norhidayu@uitm.edu.my

Noor Faraliza SAMSUDIN
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Negeri Sembilan, Malaysia
noorf053@uitm.edu.my

Jashira JAMIN
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Negeri Sembilan, Malaysia
jashira@uitm.edu.my

Intan Nurbaizura ZAINUDDIN
Faculty of Information Management
Universiti Teknologi MARA (UiTM)
Negeri Sembilan, Malaysia
intan422@uitm.edu.my

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Abstract

COVID-19 outbreak affected countries around the world including Malaysia in their tertiary education sector. In order to break the chain of COVID-19, Government of Malaysia enforced a Movement Control Order starting on March 18, 2020. Open and Distance Learning (ODL) was seen as a priority for teaching and learning method used during the outbreak. Thus, this study aims to identify the technological tools used by students in ODL and identify the preferred method and platforms by students in ODL. This study adopts quantitative method. A survey was used to determine the method and platforms preferred by Library and Information Science (LIS) students during ODL in Universiti Teknologi MARA (UiTM). The findings proved that students able to access the internet either by using mobile data, Wi-Fi or both. In addition, ODL method preferred by students is video recordings/ narrations. For students who preferred live lectures/ discussions, the platform that they opt for is Google Meet. Students preferred WhatsApp as the platform in receiving information from their lecturers and Google Classroom as an application platform to download teaching materials and assignments. Therefore, by identifying students' condition and preferences for ODL may assist lecturers and universities all around the world towards a successful teaching and learning process. Besides, other universities around the world can use the findings from this study to structure an effective policy and plan to ensure the success of ODL in their institutions that can improve the online teaching and learning process.

Keywords: 1. Open and Distance Learning 2. Online learning 3. Technological tools.

Introduction

Open and Distance Learning (ODL) was seen as a priority for teaching and learning method used during COVID-19 pandemic as precaution actions to ensure schools and academic institutions can continue its operation in the education system. Furthermore, this pandemic is being describes as a global crisis without precedent and this affects mostly the whole living system operations including the education system (Hall et al. 2020). The pandemic obviously give impact on the tertiary education sector in Malaysia when Government of Malaysia enforced a Movement Control Order starting on March 18, 2020 to break the chain of COVID-19 (Ain Umaira Md Shah et al. 2020). Universities themselves rapidly introduced new forms of teaching and learning, where shifts to online teaching, new forms of assessment and innovative digital communication tools are all evident (Raaper & Brown 2020). It is obvious that ODL is mediated by technology and the internet. Having access to both is vital for a successful teaching and learning process.

The digital technology such as desktops, laptops or smartphones can help students in ODL. However, from the research done by researchers, it was found that there are Library and Information Science (LIS) students from Universiti Teknologi MARA (UiTM) Negeri Sembilan Branch who do not participate in online studies due to technological constraints and access to the internet. In addition, there are lack of studies conducted on the implementation of ODL particularly on how students access to technology and what are the online learning method and platforms that they prefer to use during ODL involvement.

Therefore, the objectives of the study are:

1. To identify the technological tools used by students in ODL
2. To identify the preferred method and platforms by students in ODL

Literature Review

Open and Distance Learning (ODL) Deployment

Today's world challenge is a pandemic crisis. As we are all aware, because of the COVID-19 pandemic, things are shifting and changing rapidly and the effect, enforceability and interpretation of laws may be affected by future events. (Deliu 2020). This crisis has caused a sudden interruption of schools, colleges, universities, and other government institutions to use electronic learning system (e-learning) (Soni 2020). During these extreme times, students may have short-term and long-term disruptions in their education. The Higher Education Ministry of Malaysia has announced that all teaching and learning programmes in universities should be conducted through online platform. However, these are subject to the authorities from time to time by looking at the progress of COVID-19 cases and scenarios in Malaysia. Students are allowed to be involved in the resumption of physical face-to-face teaching and learning programmes but have to prioritise safety and physical distancing measures (Landau 2020). Thus, ODL have a great

contribution to educational processes today. Knowledge can be translated into a two-way online communication as a proactive partnership and at the same time ensuring one's safety and it is not necessarily be acquired in classrooms (Bernama 2020). The pivot from in-school classroom teaching and learning to entirely distance models of education is happening right now as necessitated by the COVID 19 crisis (Doucet et al. 2020). ODL are innovations to adapt to today's world. It is a combination of open learning and distance learning. Distance education has become a norm during the pandemic of COVID-19 to sustain the educational processes when students and teachers are constraint to have a face-to-face teaching and learning. This allows the students to self-pace through the online content. There are usually no set times for distance classes (Jenkins et al. 2017). ODL is different with the concept of blended learning. Blended learning is the combination of face-to-face and online delivery where 30-60% of the course content is electronically delivered. The electronic delivery can be either asynchronous or synchronous. Also sometimes termed as Hybrid Learning (Ministry of Education Malaysia 2014). In addition, blended learning is a method of teaching and learning by the combination of traditional class activities with computer-mediated and online instructions (Allen, Seaman & Garrett 2007). However, the similarities between ODL and blended learning are both methods required the students and teachers to access and use technology for teaching and learning.

Technological Requirement

Technology impose the changes in education. It give impact in the educational development. It moves the conventional methods to an e-learning environment that is a learning that facilitated and supported through the use of information and communications technology (ICT). It may involve the use of some, or all, of the following technologies; namely, desktop and laptop computers, software (including assistive software), interactive whiteboards, digital cameras, mobile and wireless tools (including mobile phones), electronic communication tools (including email, discussion boards, chat facilities & video conferencing), Virtual Learning Environments and learning activity management systems (Ministry of Education Malaysia 2014).

Students should be able to have access to technology and the internet as these are an important elements in ODL for their learning process. Thus, technology can support the ubiquitous learning and allow a combination of synchronous and asynchronous learning (Doucet et al. 2020). For effective learning, students should be allowed to choose one that suits their learning preferences or that can be personalised to their needs (Ministry of Education Malaysia 2014). Students may become bored and are quite likely to poorly perform on evaluations if learning preferences and teaching methods occasionally do not match (Litzinger et al. 2017).

Researchers have found out by an observation made on 23rd March 2020, Google Trends in Malaysia showed that the searches on 'Google Classroom', 'Zoom App' and 'Zoom Meeting' was recorded as the three highest search terms. These are online platforms that can support teaching and learning to be conducted online. They are many others available online platform such as Googel Meet, Microsoft Teams, Loom and Google Hangouts. In addition, data collected by Statistics Department of Malaysian Communications and Multimedia Commision (2018) highlighted that there are 28.7 million internet users in 2018. The average duration of daily use of Internet for age group of 20's are 8 hours per day and made them as the highest age group that access the Internet. This shows that supposedly university students should not have any issues regarding on ODL teaching and learning methods. Based on previous research conducted by Aminudin, Karthikeyan and Priyadarshana (2019) a study is needed on the practices of open, distance, and online learning along with the advances in new technology and the changing needs of students. It is compulsory for students to have access to technology and the Internet during ODL. Without a stable internet connection, the learning process will be disrupted. Furthermore, if students do not possess any learning facilities such as a laptop or a mobile phone, it is impossible to conduct the ODL for both lecturers and students and this will give impact to the students' performance. Furthermore, the implementation of ODL requires students' engagement, motivation and interaction. Students should be required to interact with one another, with the instruction, with the content, with the entire class, in small groups or teams, one-on-one with a peer, etc. (Ministry of Education Malaysia 2014).

Data Collection Methods

This study adopts quantitative method. A survey was used to determine the method and platforms preferred by Library and Information Science (LIS) students during ODL in UiTM for the course of 'Introduction to Cataloging'.

Research design and sample

Students of Semester 4 from UiTM Negeri Sembilan Branch, Rembau Campus were selected as the research sample in this study. The questionnaire was sent to students who had registered for a 'Introduction to Cataloging' course (course code - IMD 223) in semester March 2020-July 2020.

Population

The population consisted of 92 registered students for the course of IMD223. The students' population would be able to address the research questions as they are the participants who must undergo and completed the subject for the said semester.

Data Collection Instruments

To understand the preferred online learning method and platforms in ODL required by students, an analysis has been conducted based on the data extracted from the questionnaire. All the findings were analized using IBM SPSS 25.0 software.

Questionnaire

The questionnaire was circulated to Semester 4 students from UiTM Negeri Sembilan Branch, Rembau Campus. The questionnaire had ten MCQs to meet the objectives of this study.

Data Analysis

This study applied descriptive statistics to meet the research objectives because the respondents represent the population of Semester 4 students of IMD223 from UiTM Negeri Sembilan Branch, Rembau Campus. The descriptive statistics include frequency and percentage analysis, crosstabulation table and bar chart are used to identify students preferred online learning method and platforms in ODL.

Frequency Analysis

This study employed primary data from 92 respondents of Semester 4 students of IMD223 from UiTM Negeri Sembilan Branch, Rembau Campus. Table 1 shows the summary of data analysis for this study. There are 43 male students (46.7%) and 49 female students (53.3%) involves in this study.

Result found that more than half of the students live in city which are 62 students (67.4%) while only 30 students (32.6%) live in rural area during ODL was implemented. This analysis finds out that majority of the students have their own desktop or laptop (n = 89, 96.7%) and only 3 students (3.3%) do not have any desktop or laptop. The 3 students (3.3%) that do not have any desktop or laptop used their smartphone for ODL.

For the category of internet access, there are 55 students (59.8%) used their mobile data, 15 students (16.3%) used Wi-Fi and 22 students used both of mobile data and Wi-Fi as their internet access. Table 1 also reveals that 45 students (48.9%) prefer live lectures or discussions as the ODL method while another 47 students (51.1%) prefer video recordings or narrations. Most of the students prefer video recordings or narrations as ODL method compared to live lectures or discussions. The students that choose live lecturers or discussions as their ODL method reveals that their most preferred platform application is Google Meet (n = 36, 80%), Zoom (n = 7, 15.6%), Facebook (n = 1, 2.2%) and Discord (n = 1, 2.2%).

The most convenient application of platform that preferred by students when receiving information from lecturers is WhatsApp application which is 62 students (67.4%), followed by 20 students (21.7%) prefer Google Classroom, 7 students (7.6%) prefer Telegram, 2 students (2.2%) prefer E-mail and only 1 (1.1%) student prefer I-Learn/ uFuture (an online learning platform in UiTM). Meanwhile, the most convenient application of platform that preferred by students to download the teaching materials and assignments is Google Classroom which is 34 students (37.0%), followed by 28 students (30.4%) prefer WhatsApp application, 12 students (13.0%) prefer E-mail, 11 students (12.0%) prefer Telegram and only 7 student (7.6%) prefer I-Learn/ uFuture. For the category of students who received the "B40 - Internet Allowance", more than half students (n = 47, 51.1%) did not receive this allowance, while another 45 students (48.9%) received the "B40 - Internet Allowance".

Table 1: Summary of Data Analysis

Items	Frequency (N = 92)	Percentage (%)
Gender		
Male	43	46.7
Female	49	53.3
Where do you live during ODL implementation?		
City	62	67.4
Rural	30	32.6
Do you have any desktop or laptop?		
Yes	89	96.7
No	3	3.3
i. *How do you complete assignment that will be given by lecturer if you choose 'No' answer for question before?*		
Smartphone	3	3.3
What kind of internet access do you use?		
Mobile Data	55	59.8
Wifi	15	16.3
Both	22	23.9
What is you preferred method for ODL? If your answer is 'Live lectures/ discussions', please answer next question.		
Live Lectures / Discussions	45	48.9
Video Recordings / Narrations	47	51.1
i. *What is your most preferred application of platform?*		
Google Meet	36	80.0
Zoom	7	15.6
Discord	1	2.2
Facebook	1	2.2
What is the most convenient application or platform you prefer in receiving information by lecturers?		
WhatsApp	62	67.4
E-mail	2	2.2
Google Classroom	20	21.7
Telegram	7	7.6
I-Learn / uFuture	1	1.1
What is the most convenient application or platform you prefer to download the teaching materials and assignments?		
WhatsApp	28	30.4
E-mail	12	13.0
Google Classroom	34	37.0
Telegram	11	12.0
I-Learn / uFuture	7	7.6
Do you received the 'B40 – Internet Allowance'?		
Yes	45	48.9
No	47	51.1

Crosstabs Analysis

Table 2 shows the cross-tabulation table of students' location during ODL implementation with preferred method of ODL among Semester 4 students of IMD223 from UiTM Negeri Sembilan, Rembau Campus. The crosstabs table below reveals that 51.1% students (n = 47) prefer video recordings/ narrations and 48.9% students (n = 45) prefer live lectures/ discussions as the ODL method. Based on 51.1% students (n = 47) prefer video recordings/ narrations as the ODL method, there are 57.4% (n = 27) from city area and 42.6% (n = 20) from rural area. Meanwhile the other 48.9%

students (n = 45) prefer live lectures/ discussions as the ODL method, it is come from 77.8% (n = 35) city area students and 22.2% (n = 10) rural area students.

Table 2: Live Lectures vs Video Recordings

Location during ODL Implementation	Preferred Method of ODL		Total
	Live lectures/Discussions	Video Recodings/Narrations	
City	35 (77.8%)	27 (57.4%)	**62 (67.4%)**
Rural Area	10 (22.2%)	20 (42.6%)	**30 (32.6%)**
Total	**45 (48.9%)**	**47 (51.1%)**	

By referring to Table 3, the cross-tabulation table of internet access with preferred method of ODL among Semester 4 students of IMD223 from UiTM Negeri Sembilan Branch, Rembau Campus shows that 51.5% students (n = 47) who choose video recordings/ narrations as ODL method can access the internet through mobile data which are 72.3% of students (n = 34), 14.9% (n = 7) students can access through Wi-Fi and 12.8% students (n = 6) access through both of mobile data and Wi-Fi. While the other 48.9% students (n = 45) that chose live lectures/ discussions as ODL method, they access the internet through mobile data which are 46.7% of students (n = 21), 17.8% (n = 8) students can access through Wi-Fi and 35.6% students (n = 16) access through both of mobile data and Wi-Fi.

Table 3: Internet Access vs ODL Method

Internet Access	Preferred Method of ODL		Total
	Live lectures/Discussions	Video Recodings/Narrations	
Mobile Data	21 (46.7%)	34 (72.3%)	**55 (59.8%)**
Wi-Fi	8 (17.8%)	7 (14.9%)	**15 (16.3%)**
Both	16 (35.6%)	6 (12.8%)	**22 (23.9%)**
Total	**45 (48.9%)**	**47 (51.1%)**	

Discussions

Respondents Demographic Profile

According to Table 1, the total percentages of female students are higher than male students because overall population of female students in the campus are bigger than male students. This finding is supported by National Center for Education Statistics (2020) that stated the enrollment numbers of female students are higher than male students in American academic institutions since few years ago. Besides that, percentage of students live in city area is higher than students live in rural area probably because some students who live in rural area have moved to urban areas by staying at relatives' houses to get better internet facilities during ODL implementation. According to The Star (2020), some students, especially those living on islands and plantations, do not have efficient internet access, apart from not having facilities like computers, smartphones or other mobile devices that can facilitate the delivery process of online teaching and facilitation (PdPc) sessions.

Research Objective 1: To identify the technological tools used by students in ODL

Result demonstrates that 96.7% of students have their own desktop or laptop for ODL. Students preferred to have desktop or laptop because desktop computers are more powerful with many features, convenient keyboard, easy to use with mouse and have larger monitors. Besides that, laptop computers are highly portable and allow users to use the computer almost anywhere (England.edu 2020). However, there are 3.3% students only have smartphone during ODL implementation. Smartphone is not preferred by students for ODL because of the unstable internet connectivity, and the size of the screen and keypad which makes smartphone is not convenient for learning. Besides that,

smartphone did not support some file/ format, hang during important learning moments, intruding the learning sessions with incoming calls and the issue of a constant draining batteries.

In terms of internet resources, half of the respondents prefer to use mobile data than Wi-Fi because the former is more convenient. When using mobile data, students do not have to depends on a desktop or laptop with internet connection. All they need is just a smartphone with mobile data that supports the internet connection. Therefore, accessing internet is hassle free without wired, modems etc. Moreover, files and documents can be easily downloaded on their phone. Notes, assessments and other online learning contents can be downloaded online, Email can be read and sent anytime and anywhere. Apart from that, students do not have to install any software repeatedly. All they need is internet recharge cards. They just have to buy the cards and instantly can access the internet. Students can also subscribe for 3G or 4G internet data plan at a lower price in the market.

Research Objective 2: To identify the preferred method and platforms by students in ODL

From the analysis, it can be concluded that video recordings/ narrations are the most preferred ODL method among Semester 4 students of IMD223 from UiTM Negeri Sembilan Branch, Rembau Campus. Video recordings of lectures offer various benefits to the user (Nieder, Borges & Pearson 2011). Students can repeat the lecture subsequently at any time and place. They might gain time because the way to the lecture hall is no longer necessary (Spickard et al. 2002). For students who were convenient with live lectures/ discussions, the preferred platform they choose to use is Google Meet rather than Zoom, Facebook and Discord. Students were comfortable if the lecturers use Google Meet in delivering their subject contents since Google Meet gives personal connection that is missing from face-to-face class time. Furthermore, it helps students to communicate more clearly with facial expressions, body language and intonation, and pushing record and talking can be much faster than other forms of communication.

The most convenient application or platform choose by students when receive any information from lecturers is the WhatsApp application. There is a research done by Spickard et al. (2002), highlighted that WhatsApp is a free messenger application that works across multiple platforms like iPhone and android phones, and this application is being widely used among undergraduate students to send multimedia messages like photos, videos, audios along with simple text messages. Moreover, as mentioned by Fogg (2008), since internet facility is required for using WhatsApp, lots of information can also be accessed in real time and sharing that information through technology is both instantaneous and convenient. In addition, WhatsApp messenger has the following collaborative features such as multimedia, group chat, unlimited messaging, cross platform engagements, offline messaging, no charges involved, pins and users name (Bere, 2012)

Meanwhile the most convenient application of platform that preferred by students to download the teaching materials and assignments is Google Classroom. As stated by My e-Learning World (2020), the Google Classroom is a tool to facilitate instructor-learner communication and ensure easy feedback and smooth document sharing. The system guides both students and teachers through the process gently with the use of push notifications and emails. The learning tool is able to alerts students to receive assignments and turn them in on time.

Conclusion

The study has investigated and identified the LIS students' online learning method and platforms preferences during ODL specifically on students Semester 4 who had registered for 'Introduction to Cataloging' course (course code - IMD 223) for semester March – July 2020 in UiTM Negeri Sembilan Branch, Rembau Campus. The investigation led to identifying the technology tools used by the students and their preferred method and platforms used during ODL since not all students involved in online studies due to technological constraints and access to the internet.

The study has contributed to the understanding of the usage and effectiveness for teaching and learning method used during COVID-19 pandemic as precaution actions to ensure schools and academic institutions can continue its operation in the education system. The finding proved that students able to access the internet either by using mobile data, Wi-Fi or both. This shows that accessing internet is not an issue for students as they are able to be connected via online. Besides that, ODL method preferred by students is video recordings/ narrations due to this method allow students to have a flexible learning whereby they can learn ubiquitously and at any time. For students who preferred live lectures/ discussions, the platform that they opt for is Google Meet. Students also preferred WhatsApp as the platform in receiving information from their lecturers and Google Classroom as an application platform to download teaching materials and assignments.

The contribution of this study can be seen in term of providing relevant data and information to the various parties especially to the lecturers and the university. The university must have a comprehensive ODL policy to meet the

needs of students and lecturers. A lot of training programs should be conducted to enrich lecturers with enough knowledge and skills to ensure ODL can be delivered successfully. In international educational circles, there has long been a call for "Maslow before Bloom" (Doucet et al. 2020), which argues that students' basic needs must be met before academic learning can be fully embraced. Furthermore, according to Everett (2015), engaging students in learning is important to ensure persistence and improves academic achievement. Therefore, by identifying students' condition and preferences for ODL may assist lecturers and universities all around the world towards a successful teaching and learning process. Last but not least, it is obvious that other universities that are implementing ODL can use the findings from this study to structure an effective policy and plan to ensure the success of ODL in their institutions that can improve the online teaching and learning process.

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The Impact of Knowledge Management on The Evolution of The Business Process Management Lifecycle and Systems

Marek SZELAGOWSKI
Systems Research Institute, Polish Academy of Sciences, Poland, Warsaw
marek.szelagowski@dbpm.pl

Justyna BERNIAK WOZNY
University of Information Technology and Management, Rzeszow
jberniak@wsiz.edu.pl

Abstract

The Business Process Management Lifecycle shows schematically how to implement and manage processes in an organization. Its task is to present the main idea or cardinal principles of Business Process Management (BPM) in a way that allows their uniform and intuitive understanding by those participating or who are to participate in the implementation. The aim of this paper is to analyze the impact of the Knowledge Management (KM) on the Business Process Management Lifecycle evolution and consequently on the evolution of the Business Process Management Systems. The article is an important contribution to the theoretical reflection on the current state and further evolution of BPM and BPM Lifecycle and Systems from the KM perspective. In the practical sphere, the article indicates the need to change the approach to creating iBPMS systems, with particular emphasis on the necessary changes in the principles of knowledge creation and distribution mechanisms.

Keywords: Business Process Management (BPM), BPM Lifecycle, Business Process Management Systems (BPMS), Knowledge Management (KM).

Introduction

Business organizations in the Knowledge Economy (KE) operate in an environment which is being shaped by rapid changes driven by four mutually stimulating and strengthening factors exhibiting high dynamism: the growing volatility and pace of operations; globalization and changes in the principles of competition; changes in business culture and social conventions; development of information and communication technologies (Szelągowski, 2014). In such environment, one of the most practical business concepts is the concept of Business Process Management (BPM) (Plattfaut, 2014). As each product and service delivered to the market is the outcome of many activities, business processes are the key instruments for organizing these activities and for improving the understanding of their interrelationships. However, along with the change of requirements imposed by the KE, BPM itself is also constantly evolving. It cannot be limited as in traditional BPM to the structured, repeatable business processes. Due to the dynamic nature of business, it must also encompass processes which require real-time knowledge management and the performance of which is dependent on the knowledge of the knowledge worker and the individual requirements of the client. Thus, the aim of this paper is to analyze the impact of the Knowledge Management (KM) on the Business Process Management Lifecycle evolution and consequently on the evolution of the Business Process Management Systems.

Business Process Management and Knowledge Management

The research stems from two theoretical grounds: Business Process Management and Knowledge Management. The following subsections briefly introduce these conceptual backgrounds and the way they impact each other as the foundation for analyzing the evolution of the BPM Lifecycle and Systems.

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Business Process Management

Business Process Management enables the design, analysis, optimization, automation, and diagnosis of business processes by: separating process logic from the applications that run them; managing relationships among process participants; integrating internal and external process resources; and monitoring process performance (Burlton, 2001). As highlighted by Gabryelczyk and Roztocki (2018), BPM is a common and established management concept that helps to increase organization effectiveness, efficiency, and flexibility. The role of BPM is to provide techniques and software to design, enact, control, and analyze business processes involving humans, organizations, documents, and other sources of information (Marjanovic and Freeze, 2011; Di Ciccio, Marrella and Russo, 2015). Kemsley (2011) classified processes on the basis of their unpredictability ("*degree of structure*") and defined:

- fully structured processes which after having been modeled, can be repeatedly instantiated and executed in a predictable and controlled manner;
- semi-structured processes - structured processes with ad hoc exceptions and unstructured processes with predefined fragments;
- fully unstructured processes, where it is impossible to define a priori the exact steps to be taken in order to complete an assignment.

Most business functions involve semi-structured processes that do not have the same level of predictability as the routine structured work due to the requirements of an increasingly more hypercompetitive business environment. The fully structured processes mainly include production and administrative processes. As research by various organizations demonstrates, structured processes account for about 20-40% of all the processes within the organization and this percentage seems to be constantly decreasing (Olding and Rozwell, 2015). This means that 60% to 80% of the processes are impossible to simply repeat in the form of a once-defined standard process, as there are simply no standard processes in the KE. Structured and structured with ad hoc exceptions business processes should be more and more automated in order to minimize costs and execution time, and at the same time ensure stable, expected quality and relieve employees from their implementation. Unstructured with predefined fragments and unstructured BPs should be increasingly based on individual, team, and organizational knowledge and, consequently, become increasingly more flexible, as well as adjusted to the changing execution context (Richter-von Hagen et al., 2005). Effective management of business processes requires the use of different methodologies depending on the nature of BPs. A mistake in selecting a methodology (e.g. an attempt to strictly automate diagnostic and therapeutic processes or placing highly qualified employees at the production line and demanding creativity and flexibility from them) is one of the most serious risks for process implementation or management. Therefore, as one of the first steps in preparing the implementation or improvement of business processes, it is necessary to assess the nature of business processes in order to select the appropriate method and appropriate systems supporting BPM.

Knowledge Management

Knowledge should be understood as the fluid combination of information, experiences, and the context, which enable the ongoing evaluation and acquisition of new knowledge and enable the organization to achieve its goals. It is considered to be the foundation of competitive advantage (Nonaka and Takeuchi, 1995). From an organizational point of view, human knowledge can be classified as implicit or tacit knowledge, which is personal, context-specific and thus hard to formalize and communicate; and explicit or codified knowledge, which is transmissible in systematic and formal language among individuals or groups (Polanyi, 1967).

Knowledge Management (KM) is the organizational process for acquiring, organizing, and communicating both tacit and explicit knowledge. KM enables the creation, communication, and application of knowledge of all kinds to achieve business goals and is an integral part of an organization's strategy to improve business performance (Nonaka and Takeuchi, 1995). KM is also increasingly recognized as a strategic practice of knowledge-intensive companies, based on the knowledge-intensive business processes (kiBPs) defined as processes whose conduct and the delivered value depends on the creative and innovative use of knowledge by process executors in accordance with the context of execution (Gronau and Weber, 2004; Vaculin, 2011; Rodrigues et al., 2015; Little and Deokar, 2016).

The Knowledge and Process Continuum

The concepts of knowledge management and business process management are naturally gravitating towards one another, or perhaps even becoming unified (Jung, Choi and Song, 2007; Taylor, 2012). The integration of both these concepts on the foundation of acknowledging the empowered role of the employees and the new role of the management enables the creation of a concept which does not have the shortcomings of traditional business process management. This, in turn, allows for the restoration in process management of the constant, systemic possibility to respond to fast-paced, qualitative, unforeseen changes in the hypercompetitive environment (D'Aveni, 1994).

It is impossible to find organizations using only tacit knowledge or only explicit knowledge. As noticed by Inkpen and Dinur (1998) the distinction between explicit and tacit knowledge should not be viewed as a dichotomy but as a spectrum with the two knowledge types as the poles at either end. Similarly, it is impossible to find an organization using only fully structured or only fully unstructured processes. Consequently, the two knowledge types (explicit/tacit) and two process types (structured/unstructured) should be classified on a continuum representing the smooth, evolutionary transition of the organization between the use of only explicit knowledge in structured (repeatable) processes and readiness to use all knowledge (including tacit knowledge) in unstructured (unpredictable) processes (Figure 1). Delivering in the KE innovative, individualized products requires more and more unstructured processes that require more and more extensive use of tacit knowledge.

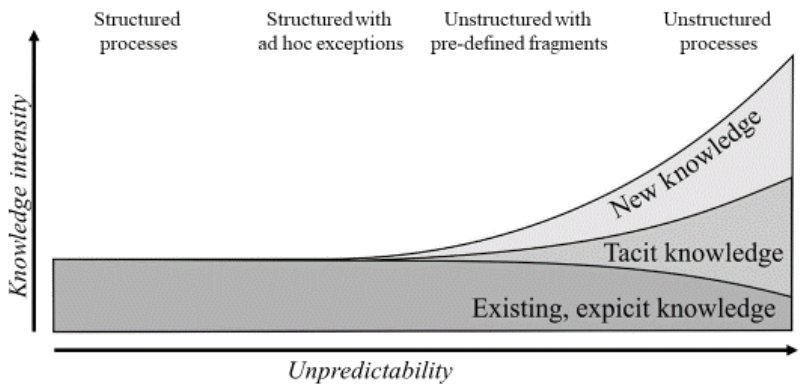

Fig. 1: The Knowledge and Process Continuum

Source: Szelągowski and Berniak-Woźny, 2019

The Evolution of the BPM Lifecycle

The Business Process Lifecycle has the role of a "roadmap" of the fundamental business-process-managing process in the organization. Its role is to present the cardinal principles of process management in a manner which enables their coherent and intuitive understanding by those participating in the implementation at present or in the future. As the next step in evolution, BPM Lifecycle is discussed based on the Knowledge and Process Continuum.

The process lifecycle

Process lifecycles in the organization are usually presented in illustrative form as a closed sequence of cyclical stages. Process lifecycle models prepared within the framework of traditional business process management are divided into stages presenting subsequent steps of the process lifecycle in the organization. There is a plethora of the BPM life cycle models proposed by academics (Table 1) and professionl bodies, for example as:

- Strategize, design, implement, compose, execute, monitor & control (Software AG, 2011);
- Define, model, simulate, implement, execute, monitor, analyze, optimize (Gartner, 2014);

- Model, implement, execute, monitor, optimize) (PNM SOFT, 2017);

Table 1: BPM life cycle models

Van de Aalst (2004)	(1) process design (2) system configuration (3) process enactment (4) diagnosis
Netjes et al. (2006)	(1) design (2) configuration (3) execution (4) control (5) diagnosis
Zur Muehlen and Ho (2006)	(1) specification of objectives and analysis of the environment (2) process design (3) process implementation (4) process enactment (5) process monitoring (6) process evaluation
Weske(2007)	(1) design and analysis (2) configuration (3) enactment (operationalization, monitoring and maintenance of processes) (4) evaluation
Hallerbach et al. (2008)	(1) modeling (2) instantiation/selection (the configuration or selection of variations according to the context) (3) execution (4) optimization
Verma (2009)	(1) define organization objectives (2) identify organizational processes (3) classify processes (4) choose the process that has the best contribution (5) determine the use of the most appropriate tool, whether it is for incremental or radical change (6) implementation of the improvement project (7) process monitoring
Pourshahid et al., 2009	(1) discovery & model/ remodel, (2) validation & simulation, (3) deployment & execution, (4) monitoring & performance management, (5) improvement
Houy et al. (2010)	(1) strategy development (2) definition and modelling (3) implementation (4) execution (5) monitoring and controlling (6) optimization and improvement
Gulledge et al. (2011)	(1) model (2) simulate (3) implement (4) deploy & execute (5) monitor (6) optimize
Di Ciccio et al. (2015)	(1) (re)design (2) configuration (3) enactment (4) diagnosis
Bernardo et al. (2017)	(1) analysis, (2) design and modeling,

	(3) implementation, (4) monitoring and controlling, (5) refining and planing
Dumas et al. (2018)	(1) identification (2) discovery (3) analysis (4) redesign (5) implementation (6) monitoring & controling

Due to the identified necessity of approaching the process lifecycle from the perspective of implementing and performing multiple processes in the organization "global" life cycle of processes in the organization will be call Business Process Management Lifecycle in organization (in short: BPM Lifecycle).

The traditional BPM Lifecycle and its limitations

If we take a diagram depicting the BPM Lifecycle and replace symbols corresponding to subsequent stages (usually circles or ellipses) with symbols for subprocesses known from the Business Process Model and Notation (BPMN), the BPM Lifecycle will depict a normal, sequential "relay" process with only one feedback loop, the goal of which is to ensure periodical analysis and improve the process model on the basis of data derived in the course of its execution. This is the case of most of the models presented in the Table 1.

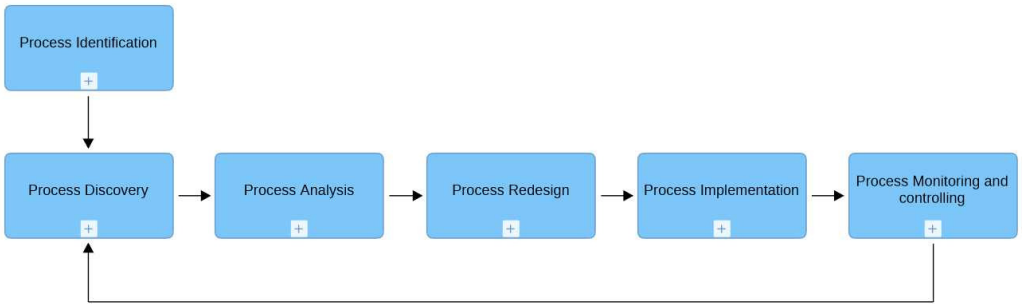

Fig. 2: The BPM Lifecycle as a process diagram in the BPMN notation.
Source: Author's own elaboration, on the basis of Dumas, La Rosa, Mendling & Reijers, 2018, 23.

In effect, processes cannot be improved upon or even changed at all during performance itself – this is possible upon completion and analysis alone. This is fully in accordance with the principles of the traditional concept of process management based on the fully structured processes, in which process performers are prevented from introducing changes in the course of performance itself. The course of the process is defined in the form of an "algorithm," prepared prior to initiating performance itself. In consequence, traditional process management lacks the possibility of quick usage of knowledge obtained by the performers in the course of the proces performance. In effect, this concept enables the use of robotic process automation (RPA) to automate traditional, repetitive processes, but does not provide the operational use of more advanced new technologies, such as process mining, machine learning (ML), or artificial intelligence (AI), in the course of performance.

The BPM Lifecycle Opened to Semi-structured Processes

Among the process lifecycle models within the framework of traditional process management, a truly significant qualitative change was proposed by the authors of the Process Mining Manifesto belonging to the IEEE Task Force on Process Mining (2012) (Fig. 3).

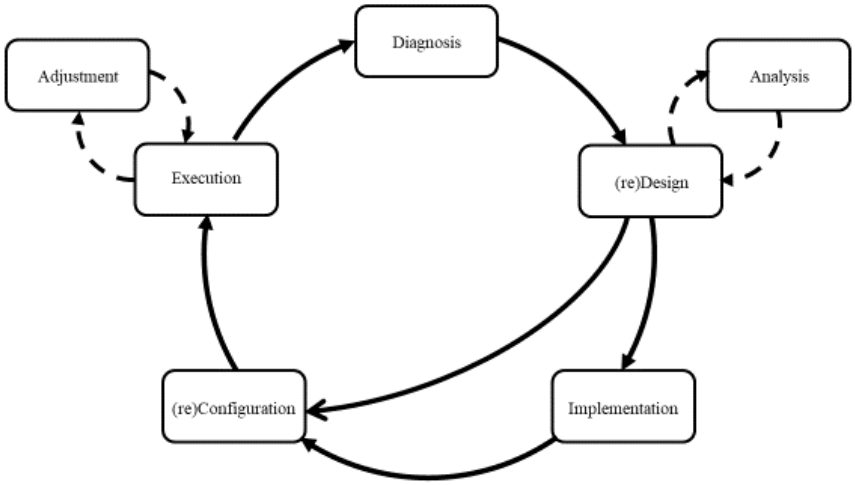

Fig. 3: The process lifecycle in the process mining methodology.
Source: Author's own elaboration, on the basis of IEEE Task Force on Process Mining, 2012, 4.

The process execution stage has been supplemented with an additional "Adjustment" loop, the aim of which is to adapt the process in the course of performance itself. The standard process lifecycle has also been supplemented with a (re)configuration stage, in which changes are made to process-based executive systems (e.g. workflow management, document management, RPA, or BPMS) without having to repeat the implementation stage performed e.g. as the result of creating separate process performance scenarios. When recommending the change of the process lifecycle, the authors of the Process Mining Manifesto have stressed that organizations should also include the possibility of adjusting processes in the stage of designing processes and their supporting IT tools ("Analysis" loop). This is a clear step toward changes to the process lifecycle, which allows for the management of semi-structured processes. Later on it was followed by rsearchers by adding the redesign stage to the BPM Lifecycle models (Di Ciccio et al. (2015) or Dumas et al. (2018)).

The BPM Lifecycle in Knowledge Economy

For business process management to be compatible with the requirements of the KE, it is essential to systematic, ongoing knowledge management through its use, verification and creation of new knowledge during the the design and execution of business processes is necessary. This, however, requires taking the concept of process lifecycles in a direction in which the performance of a process will not be equal with the perfect repetition of the standard, but rather, the repetition or dynamic adaption of the standard with the best possible results in mind, in a manner which is the most adequate in a given context and within the limits of the executive privileges of the performer. Such adaptations may be introduced by: process performers; process performers with the use of ICT solutions (e.g. online ML/AI); elements of autonomic AI. The postulated changes have been introduced in the process lifecycle model designed by Szelągowski (2019) in accordance with the concept of dynamic BPM (Fig. 4).

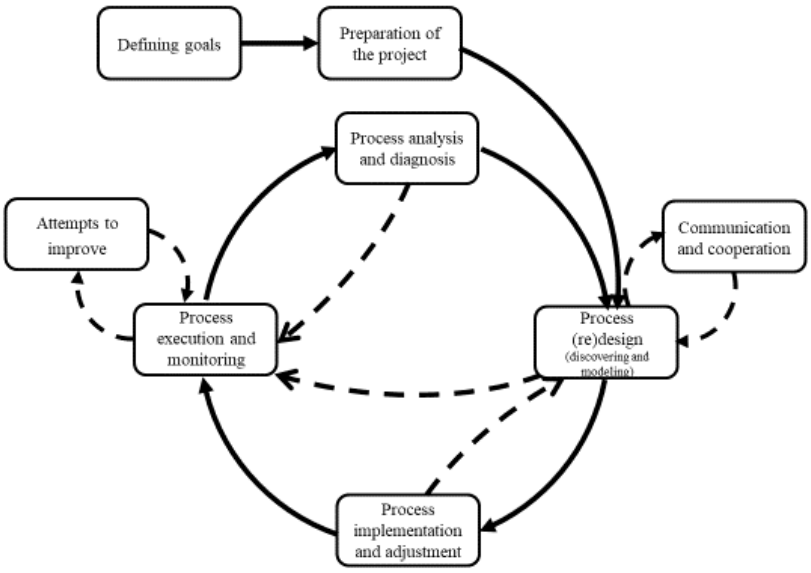

Fig. 4: The process lifecycle in dynamic BPM
Source: Author's own elaboration, on the basis of Szelągowski, 2019, 72.

The subsequent stages of the BPM Lifecycle of dynamically managed business processes are as follows:

Defining goals - of the project of implementing business process management, of the megaprocesses, and of knowledge management in the organization, as well as the principles of implementation themselves;

Preparation of the project and the organization for the implementation of process management, including assessment of the nature of business processes executed by the organization (e.g. unpredictability, knowledge-intensity);

The (re)Design stage - process descriptions and their corresponding data, created increasingly with the use of real data analysis with the use of process mining techniques or simulation research (digital twin).. Proposed process descriptions, to the extent tailored to the nature of the BPs, in the form e.g. of flow models or checklists. Prototypes of process-centric application (workflow, RPA or BPMS/iBPMS), which have been cleared for testing, should be consulted with in-house and external experts, and with practitioners who use them daily, through e.g. communities of practice or social media.

The Implementation and adjustment stage - process descriptions are implemented. Should it turn out that a designed process or configuration of a process-centric application does not meet the expectations of the users, it is possible to return to the (re)Design stage in order to prepare the process descriptions and process-centric applications once again.

The Execution and monitoring stage - business processes are performed and dynamically adapted according to context of the execution by process performers (or in the future – autonomic AI as well). Data on their performance is collected on an ongoing basis. They are also analyzed on an ongoing basis and, thanks to the use of ML / AI elements, used to support process executors. Empowered knowledge workers adapt described business processes to the requirements of a specific context of performance and the changing general conditions of process performance, using your tacit knowledge and, if required by the situation, creating new knowledge..

The Analysis and diagnosis stage. In addition to business processes being monitored in the Execution and monitoring stage, business processes are nevertheless evaluated *ex-post* by means of standard control actions and discovering the actual course of the executed processes (e.g. process mining or ML) and evaluating the results of the implemented improvements (e.g. ML or AI). Improvements resulting from practical attempts at innovation, which have been given a positive evaluation, may be introduced directly following in the Execution and monitoring stage or the (re)Design stage, without the necessity of going through the Implementation and adjustment stage.

The Evolution of the Business Process Management Systems

The evolution of the BPM Lifecycle in the organization led to the evolution of requirements for Busines Process Management Systems (Aalst, Bichler and Heinzl, 2018). Starting from two opposing positions:

- (Adaptive, Dynamic) Case Management Systems - support for processes with unpredictable course and not fully known, but potentially knowledge intensive,
- traditional BPMS - support for processes with a known and strictly repeated course thanks to having all the knowledge necessary to perform the processes before performing them;

vendors strive to support business processes, regardless of their nature - their unpredictability or knowledge intensity.

Recognizing the breakthrough of the changes taking place, in 2012 Gartner published the first Magic Quadrant for Intelligent Business Process Management Suites Report (Gartner, 2012), in which it unequivocally communicated the emergence of a new class of systems and explicitly recommended not to compare the presented results with previous reports on traditional BPMS systems. Three years later, Gartner published two reports the Magic Quadrant for BPM-Platform-Based Case Management Frameworks (Gartner, 2015a) and the Magic Quadrant for Intelligent Business Process Management Suites (Gartner, 2015b) at a weekly interval. These reports were basically based on the products of the same suppliers and presented the same functional criteria, as if Gartner could not decide how to assess the changes taking place in the market and, just in case, described management support systems from two different angles: extensions of traditional BPM and case management. In 2017 and 2019, Gartner published only reports on iBPMS, adding as a necessary functionality the support of iBPMS systems for designing and implementing semi-structured and unstructured processes in accordance with the Adaptive Case Management (ACM) methodology (Gartner, 2017; Gartner, 2019b). The evolution of iBPMS systems, as reflected in subsequent reports, clearly moves towards the possibility of supporting the use of dynamic BPM and enabling the implementation of the social BPM i.e. supporting the increasing use of knowledge in managing business processes by empowered knowledge workers (Pucher et al., 2014). At the same time, increasingly important for Gartner's evaluation of the products of individual vendors is the integration of technologies within the iBPMS framework that can support:

- acquiring knowledge about performed processes (process mining, real-time analytics, predictive analytics, ML / AI);
- process automation (IoT, RPA, ML / AI, IoT, Blockchain),

at all stages of the BPM Lifecycle. In its assessment of iBPMS systems, Gartner takes into account both, the support of structured processes, optimized on the basis of explicit knowledge possessed by the organization at the design stage, and unstructured processes, for which the achievement of the assumed goals requires from knowledge workers use of tacit knowledge in a manner fully adapted to the context of implementation.
The analysis of Gartner reports, as well as parallel reports of other organizations (e.g. Forrester or BPTrends), shows that in practice vendors and systems that do not support all types of BPs, combining features of traditional BPM, such as process flow modeling, with typical case management features, such as the ability to freely choose or create tasks to be performed (ISIS Papyrus, 2016, Pegasystems, 2020) do not count any more.

Conclusion

The development of BPM requires taking into account processes of different nature and the introduction of a qualitative change to the BPM Lifecycle, which would account for the possibility, and in the case of a large majority of semi-structured and unstructured processes – the necessity of using the knowledge of the process performers to tailor the processes to the context of a specific performance. Without this change it is impossible to make efficient use of new technologies, such as process mining, machine learning, or artificial intelligence. In the KE, implementations of process management in accordance with the traditional BPM Lifecycle were seen, and remain to be seen, as a success only because they pertain to structured (static, repeatable, routine, unchangeable) processes. However, the situation is changing as the share of structured processes in the organization is dynamically going down together with growing usage of new ICT technologies, among which one should primarily mention those which work in real time: process mining, machine learning, and artificial intelligence.

The BPM Lifecycle evolution presented in the paper requires the adjustment of methodologies and tools supporting process management with a view to the efficient use of both emerging ICT technologies and the knowledge of the organization. This primarily requires the analysis of the possibilities of using new IT tools and stimulating changes

during specific stages of the BPM Lifecycle with the use of developing IT tools, starting with structured process described with the use of easily accessible explicit knowledge, the automation of which is possible with the use of RPA tools, which are relatively quick to implement (Aalst, Bichler and Heinzl, 2018). Following the analysis, with the growing process maturity and knowledge management maturity of the organization, it is possible to naturally gravitate toward implementing increasingly more "intelligent" systems with a view to supporting processes requiring increasingly larger access to and use of tacit knowledge, revealed with the use of process mining, ML, AI, or simply iBPMS.

Summarizing the current evolution of functionalities of iBPMS systems, it can be concluded that the *de facto* unification of BPMS and ACMS systems has already taken place and that the further development of iBPMS is also heading towards more and more comprehensive support of knowledge management. This is the result of iBPMS support for all types of processes, regardless of the predictability requirements, but also the intensity of knowledge. This is the direction expected by researchers (Marjanovic and Freeze, 2011), and at the same time even imposed by the development of ML / AI technology and methodologies (Pucher et al., 2014). Further evolution in this direction will enable organizations to actually implement KM in their daily operations thanks to the possibility of verifying their knowledge and acquiring knowledge from the ongoing business processes, which will significantly impact the competitiveness and speed of development of the organization (Jung, Choi and Song, 2007). The distinctiveness of the concepts of traditional BPM and Case Management (as well as Knowledge Management) is already going down in history, replaced by a more natural dynamic BPM (integrated with KM), not by theorists' decisions, but under the pressure of practitioners, expecting better and better use of the dynamism of people and teams performing processes and learning from daily successes and failures. The subject of future works will be an in-depth analysis of the speed and scope of the signalled changes taking place, also taking into account the readiness of the business to implement them in everyday operations.

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Using Mobile Apps and a Digital Restaurant Menu to Promote Heritage in Rural Regions

Carlos R. CUNHA
UNIAG; Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal, crc@ipb.pt

Aida CARVALHO
Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança Portugal; CiTUR acarvalho@ipb.pt

Elisabete Paulo MORAIS
UNIAG; Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal, beta@ipb.pt

Bruno NAVARRO
CIUHCT; Fundação Côa Parque, Rua do Museu, 5150-620 Vila Nova de Foz Côa, Portugal
brunonavarro@arte-coa.pt

Abstract

Tourism is an area of vital interest to the Portuguese economy, having been, in 2019, the largest export economic activity in the country, accounting for 52.3% of services exports and 19.7% of total exports, having tourist revenues recorded an 8.7% contribution to Portuguese GDP (INE). Low density regions such as the territories of Vale do Côa, which, in their absence, would face great difficulties to develop are essential factors for development. The Tourism Strategy 2027 identified people as the main assets (single cross-cutting asset), differentiating assets (such as climate and light, history and culture; the sea; nature; water), qualifying assets (gastronomy and wines; events artistic, cultural, sports and business) and emerging assets (well-being, living). Tourism can take on a double dimension in these territories, on the one hand, constituting itself as a method of dynamizing and changing space, implementing new social and consumption patterns, generating new practices and multiple impacts, on the other, boosting local tourist resources (natural, heritage and cultural), beneficially contributing to the local economy. Promote Regions is a multidisciplinary challenge. This paper present a contribution-approach to promote regions heritage through a IT solutions based on mobile devices and making a restaurant digital menu a window to the promotion of reginal material and immaterial heritage, business promotion and cultural education, using the Côa Museum restaurant as a start point.

Keywords: Mobile Applications; Model; Tourism; Rural Regions.

Introduction

"When one thinks about food, there is an expectation of happiness – food brings people together; food allows people to "experience" other cultures" (Mannur, 2009). Gastronomy plays an increasingly significant role in tourism as an essential component of tourism consumption and production, in the context of regional development (Richards, G., 2012). However, food is rarely seen as part of cultural heritage in the public sense. Although they are generally considered a significant part of culture, eating habits are not seen as an aspect of heritage. Therefore, the role of food as a heritage and cultural driving force in the development and sustainability of cultural tourism requires further attention. This interpretation, growing in importance, was elevated to an intangible asset of the cultural heritage through the Resolution of the Council of Ministers nº. 96/2000, published in D.R. nº. 171/2000, Series I-B of 26 July 2000. This classification initiated a value chain process for gastronomy, products and their producers.

The Strategy Tourism (ST) 2027 aims to position Portugal as one of the most competitive, innovative and sustainable tourist destinations in the world and a reference in the production of goods and services for tourism worldwide, considers gastronomy and wine as one of the ten strategic assets of national tourism including people, climate and light, history and culture, the sea, nature, water, artistic-cultural, sports and business events, well-being and living - living in Portugal.

The same document identifies the product Gastronomy and Wines as a strategic asset to qualify the destination, which enriches the experience and adds value to the tourist offer of the territories. In the same vein, the argues that

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gastronomy is closely related to the social identity of destinations and is made up of cultural, economic and historical values, many symbolic elements and territorial icons. Being an important factor in strategies to diversify destinations, gastronomy enriches and promotes the tourist offer, attracting different audiences and valuing the quality of local production. The contribution to the local economy comes through its multiplier effect, capable of leveraging other areas of business, such as accommodation, entertainment activities, services in general, agriculture, creative industries. Indeed, if corrected articulated with other products, gastronomic tourism will contribute to the mitigation of seasonality and increase the will stay of tourists. Nowadays, knowing only the characteristics or the nutritional table of foods is not enough, it is fundamental to know and share the history, the spectrum of flavours, the confection techniques and the ingredients through authentic experiences and identities (Pine and Guilmore, 2011). In the new demands, the need to safeguard the food heritage in favour of cultural diversity and the richness of integral and sustainable development emerges. Thus, we start from a set of interrelated and complementary themes, forming the conceptual framework of the object of this project to be undertaken.

Given the current challenges imposed by Covid-19, there is evidence that consumer behaviour is changing, both among citizens (generally as a response to the need for healthier lifestyles) and with tourists who are increasingly curious to explore know-how, experience and the supply of tourism offers a way to do so in an ethical manner. With the creation and promotion of the interactive menu it is intended that the visitor gets more information about the products. This perspective of development and knowledge sharing allows the visitor to responsibly maximize the benefits in / for the local communities and minimize negative social or environmental impacts, thus helping the local population to conserve fragile cultures and habitats, promoting circular economies. Maintaining the true essence of food production and regional gastronomy supply. The interactive and inclusive menu project of the Côa Parque Foundation restaurant consists of the creation of interactive content, storytelling of the products, ways of life of the producers. The project aims at the development of tourism, enhancement of local agriculture, transmission of knowledge of practices through the enhancement of gastronomy and natural resources. This project aims to develop gastronomic tourism in the region, as well as to create opportunities for a greater tourist flow in other economic activities of the municipality/region.

Revision of the Literature

Heritage and tourism organizations have had to cope with three important incremental changes: the move to an experience and entertainment economy, the digital revolution with its resultant participatory culture, and, consequently, recognition of technology as one of the essential components of the cultural experience (Di Pietro et al., 2015).

Each society prints its own characteristics in gastronomy, through the preparation of typical dishes that are incorporated into local customs, which offers a differential for each region in typical cuisine. In this sense, through gastronomy it is possible to observe in communities the construction of identities, preferences, tastes, customs and the feeling of belonging to the place. Such factors allow to create a kitchen with characteristics currently being used in tourism to highlight the peculiarities of a particular culture (Pereira, Assis and Brito, 2020).

The rapid growth of the hospitality industry has attracted the interest of many researchers in recent decades (Li et al., 2017). Research dealing with restaurants, in particular, has grown significantly over the last 30 years (Di Pietro, 2017).

Restaurants have provided a research topic throughout the literature, from different points of view. First, from the management perspective, restaurants have attracted scholarly interest, regarding issues such as profitability (Thompson, 2009), the concept of capital structure (Upneja and Hua, 2006) and corporate social responsibility (Ham and Lee, 2011). Second, from the customer perspective, academic research has focused on restaurant, the measurement of customer satisfaction and loyalty (Gupta et al., 2007), food quality, restaurant atmosphere and service, and brand perceptions (Hyun, 2009). Finally, another important set of studies has focused on examining the restaurant sector from the tourism and hospitality industry perspective. This perspective addresses topics such as identification of the information sources and motivations that affect consumer preferences when selecting restaurants and tourist attitudes toward luxury restaurants (Cheng and Peng, 2018), among others. From this approach, the general implication is that tourism organizations and restaurants make a significant contribution to the creation of experiences (Matson-Barkat and Robert-Demontrond, 2018). The present work will focus on this latter perspective, creation of experiences, promoting and disseminating material and immaterial heritage.

A restaurant menu serves as the first point of communication with customers. It presents the customer with cues about the impending dining experience (Magnini and Kim, 2016).

A menu can determine the brand image and the personality of the restaurant (Magnini and Kim, 2016) and a correctly designed menu will direct customers' attention to a particular menu item. Given the importance of a menu within restaurant operations and management, a plethora of research studies have examined menu design and its impact on

customer responses and intentions (Yang, 2012; Wansink and Love, 2014; Ozdemir and Caliskan, 2015). These restaurant menu studies fall into two research streams, namely menu item placement and menu design properties.

Despite the extensive research in this field, research on restaurant menus is limited to static visual presentation on paper menus and, thus, provides few insights into dynamic and multimodal presentations on digital platforms. Among the various advantages of digital menus, multimodality would make digital platforms distinctive from conventional paper menus.

The distinctive benefits of digital menus come from digital displays, such as computer screens or touchscreens, that allow consumers to browse and choose food products and to have enhanced visuals and descriptions about foods. Digital menus also could present a great amount of information and they facilitate cross-selling opportunities by suggesting beverage pairings with dishes that customers want to order. As a result, digital menus foster consumers' interaction, resulting in more vivid mental images of food selection, more enjoyment, improved convenience and stronger encouragement for food selections.

Conceptual Model

The proposed conceptual model focuses on transforming a restaurant's menu into a window for the promotion of material heritage, intangible heritage, business and the promotion of cultural education. This view is supported by the use of information and communication technologies and in particular through the use of mobile devices, a mass object nowadays, as a means of accessing an information and services infrastructure.

The menu of a restaurant is, today, a persistently physical object capable of providing very little information about the products it contains. Some examples, described above, have carried out a process of digitizing the information on a menu, increasing the quantity and quality of the information provided to the consumer. However, there is still, in our opinion, a long way to go to maximize the potential that a menu can have as a vehicle to satisfy consumer needs when choosing a gastronomic menu and, not least, as a vehicle for promoting heritage. material and immaterial that revolves around gastronomy and, finally, as a vehicle for generating business.

Conceptual Model Vision

The proposed model, shown in figure 1, is centered on the ability to transform a restaurant menu into a purely digital object, accessible through mobile devices that can be made available by the restaurant and / or through the use of customers' mobile devices. The degree of sophistication of today's smartphones and their ability to connect to the Internet have made these devices an excellent support for accessing information and services. Cumulatively, the multimedia diversity of content that can be made available through digital applications is very vast today. In this sense, in the context of a menu, information about a gastronomic dish may contain text, image, video, and links to various content and / or external services. To this extent, content that allows a more objective and realistic perception of what will be the experience of tasting a gastronomic dish will be available. And yet, in this experience, the promotion of an entire heritage set that gravitates to this gastronomic dish may be made possible, such as: the origin of the ingredients; cooking methods (which can be ancestral and / or strongly regional); intangible heritage associated with the gastronomic dish (e.g. stories and / or legends associated with the origin of the dish); information about the cultural heritage exists in the places associated with the gastronomic dish; information on complementary products, such as a more appropriate choice of wines; etc. From a business perspective, and sustained by the fact that, often associated with gastronomic tourism, there is housing tourism, wine tourism, and the sale of products that make up the preparation of gastronomic dishes; the act of disgusting a meal can leverage e-commerce opportunities, individually supported by a given commercial agent and / or cooperation networks that offer complex and transversal tourism products.

As far as promotion and territorial cohesion is concerned, the proposed vision for a restaurant menu enhances the dissemination of institutional information about the territories, promoting them, something especially important in low density territories - which are typically very rich in heritage material and immaterial and, more specifically, gastronomic heritage. This vision can leverage the economic sustainability of these regions and their business fabric.

Finally, it is important to focus on that a gastronomic tasting experience is often a family experience. Where adults and children coexist. The latter, due to their specificities, tend to be consumers less interested in the perspectives described above. However, they are consumers and play an important role in the process. How can we answer them? In our opinion, a digital menu, accessible through mobile devices, presents a unique opportunity to catapult younger consumers to applications that promote heritage. As? Through the provision of small games (e.g. didactic, recreational and / or serious games) that, in the interest of the younger audience (often children) can generate empathy and even interest in material and immaterial heritage. We probably cannot wait for the attention of a creation to watch a video that presents the story of a region, or a legend associated with a gastronomic dish. However, we will captivate your attention with a small game that is a mix of entertainment and education. Thus, contributed to cultural education.

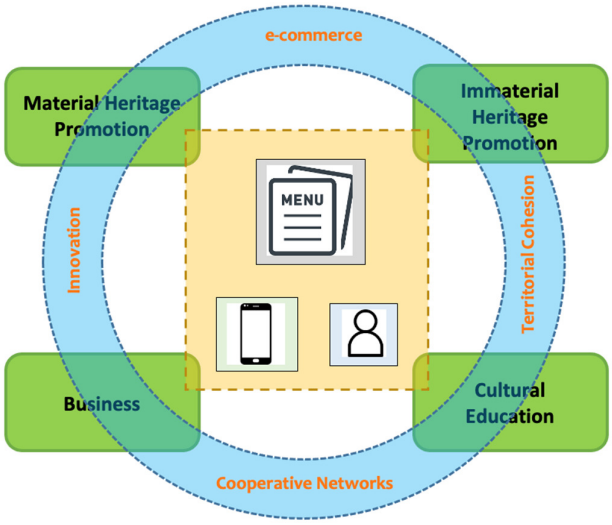

Figure 1: Conceptual Model

It is important not to forget that, in a tasting experience, the act of choosing and waiting for a meal, contains a waiting time which is typically sufficient to allows the enjoyment of the set of information and services that our model (and vision) proposes.

A New Restaurant Menu Concept

The figure 2 presents our restaurant menu perspective. We propose three lines of action in the development of a menu that allow you to explore and maximize the surroundings of a tasting experience and what it can leverage. The three perspectives can be characterized as follows:

- **Menu as information on what will be tasted:** We propose a digital menu capable of taking advantage of multimedia capabilities. In this sense, text, images, videos and links with information and external services should be used, so that the consumer can obtain the maximum information about the menu and the various gastronomic dishes offered by the restaurant; can understand the process of making the dishes, the genuineness of the ingredients and the complementary products, such as which wines should accompany the dish, etc. Likewise, it must support the rating of the dishes and the tasting opinions of consumers. This information is useful for both the consumer and the restaurant manager.
- **Menu as a promoter of material, immaterial heritage and cultural education:** The regions have in their cultural DNA a set of material and immaterial heritage. Often, the material and immaterial heritage merge. In the case of gastronomy, regional gastronomic products are steeped in cultural aspects - ancestral cooking practices, associated legends, places of origin with history. The act of scrolling through a menu, in the format in which we propose it, will allow obtaining information about the places of origin of the ingredients that are used in the preparation of meals and, in this way, catapult the places and their heritage to the consumer.
- **Menu as an enhancer of business opportunities:** The act of tasting, associated with the consumption of other associated products, such as wine, arouses numerous times a need to buy. On the other hand, obtaining information or services that gravitate around the menu (e.g. rural tourism products, wine tourism) may lead to the reservation of tourism products and services that will allow consumers to discover the regions of origin of the products. This model opens a window for the transformation of a digital menu into a driver for e-commerce and the generation of business opportunities.

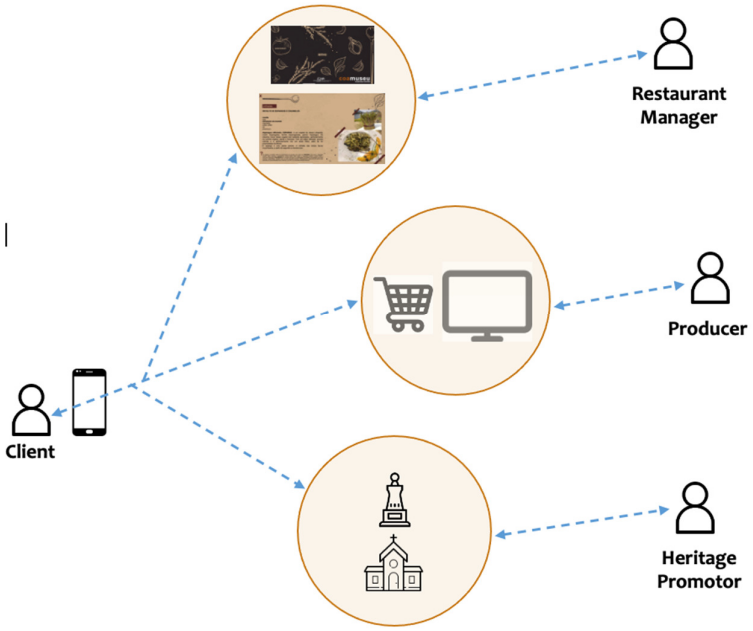

Figure 2: The restaurant menu concept

Conclusion and Final Remarks

The use of IT and Web enables users to interact and share their experiences. Consumers are encouraged to enter comments on the Internet regarding their stay and experience, thus sharing this information with other potential consumers creating a viral marketing effect. This sharing of views takes the form of word-of-mouth marketing (WOM) and can prove beneficial to institutions or, on the other hand, quite inconvenient if they introduce negative comments. The TripAdvisor helps almost 460 million travellers a month plan the best trip with the help of over 830 million assessments and opinions from 8.6 million accommodations, restaurants, experiences, airlines and cruises (Tripadvisor, 2020). One of the main changes is that users are no longer just consumers of content and information but also producers. Online comments and other content mean that most consumers find much more information about a particular location through access to information or comments left by other consumers who have already used the same location (Kotler, 2012). So the more streamlined and differentiated the content, the greater the possibility for positive reviews.

Tung & Ritchie (2011) highlight the influence of Storytelling as a prominent type of narrative designed to directly create consumers' memories about experiences, while. Morgan et al. (2010) refer that, in the tourism literature, the narrative has been used to analyze stories and themes about an interpretive environment that is intended to be explored, arguing that if leisure and tourism experiences are, to a certain extent, identity work, that will involve participants in narratives about themselves, people and places they encounter. The stories about the destination interact with the personal narratives of the visitors to create an experience incorporated in the place, which will be all the better when the tourist feels involved and an active part of the process in the recreation.

It is in the context set out above that this article proposes the use of mobile applications and a reengineering of a restaurant menu, making it a window for the promotion of territories, their heritage and, equally, contributed to the generation of business, which is fundamental to the competitiveness of regions, especially rural regions. This work, carried out with its focus on the museum of Côa, has in progress the creation of a prototype application that materializes the proposed model and can contribute to involve the consumer / tourist in the region and its cultural ecosystem.

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Digital Signature Corruption – Macos Preview Case Study

Michał GLET
Military University of Technology, Faculty of Cybernetics, Institute of Mathematics and Cryptology, Warsaw, Poland, michal.glet@wat.edu.pl

Kamil KACZYŃSKI
Military University of Technology, Faculty of Cybernetics, Institute of Mathematics and Cryptology, Warsaw, Poland, kamil.kaczynski@wat.edu.pl

Abstract

Digital signature schemes allow to exchange digital documents in a form that guarantees authenticity of the sender and full integrity of the data received. Any intentional or unintentional modification of the document is recognized, thus rendering the signature invalid. This paper describes a real-life case study in which the digital signature was corrupted merely by opening the file with the use of the macOS Preview app. Corruption may go unnoticed by the app user, leading to the submission of a digitally signed document with an invalid signature affixed thereto. In this paper, a method of reverting such changes is presented, along with recommendations for Apple software developers on how to prevent users from unintentional modification of signed documents.

Keywords: digital signature, macOS, document authenticity, pdf

Introduction

Digital signature schemes (Merkle 1989) usually employ asymmetric cryptography algorithms to ensure authenticity and integrity of the signed data, along with non-repudiation of its origin. Digital signature schemes are widely used in cryptographic protocols, software distribution, financial transactions, contract management and even for securing connections with websites. They may be used in any scenario in which detection of tampering with or forgery of electronic data is crucial.

Nowadays, when the volume of data sent in their digital version only increases steadily, the significance of digital signatures for modern economies is growing rapidly. Properly deployed digital signature schemes allow companies to send all documents to their customers using email, for instance, thus offering a cheaper alternative to sending paper documents and providing customers with a tool that guarantees authenticity of data. Digital signatures fostered the development of e-governments, enabling companies and citizens to submit digitally signed documents to governmental agencies without relying on the standard paper form. According to (Statista 2020), more than 77% of companies in Spain were using digital signatures in 2017. In countries such as Estonia (e-estonia 2020) and Poland (gov.pl 2020), citizens are also capable of digitally signing documents using their national ID card.

A digitally signed document is extremely sensitive to modification of its content. With even a single bit flipped, the entire digital signature will be rendered invalid. This definitely makes digital signatures more reliable than their traditional counterparts, but also requires software vendors to apply additional security measures when working with such files. In this paper, we present a case study concerning the macOS Preview app and a signed PDF file which was modified while being read. This case should be considered a warning for PDF file users and an indication of a bug that requires to be fixed by Apple Preview developers.

Pdf Signature

The ability to use digital signatures when working with PDF documents was first introduced in version 1.3 of the PDF specification (Adobe 2008). This feature allowed the data contained in the PDF document to be authenticated and the user who created the digital signature to be identified. The idea of digital signatures in PDF files is based on signature handlers. In the specification, Adobe described a few handlers that supported a limited number of digital signature types and gave an opportunity to other vendors to create new ones that would be specific to their business needs and requirements.

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In general terms, a digital signature is created in a PDF file by computing a digest (using hash function) of the specific PDF content data. This computed hash is stored in the PDF document. To verify that the specific PDF content has not been changed, the verifier must re-compute the digest and has to compare it with the one stored in the document. Differences in digest values indicate that the specific PDF content data has been modified after the document was first signed. Of course, the digest value in the PDF document is stored in the form of a digital signature format, such as, for instance, PKCS7 (RFC2315, 1998) or CAdES (RFC5126, 2008). This means that the value of the computed digest is secured and its authenticity is ensured e.g. by a digital certificate used by the user in the process of creating the digital signature.

According to Adobe DigSig (Adobe, 2020), the default digital signature format used by Adobe software is called *adbe.pkcs7.detached*. PDF specification 1.7 allowed for an additional use of *adbe.x509.rsa_sha1*, *adbe.pkcs7.sha1* and *ETSI.CAdES.detached*. *Adbe.pkcs7.sha1* stores the signature in the PKCS7 (RFC2315, 1998) format and allows only the SHA1 (NIST 2002) hash function to be used. *ETSI.CAdES.detached* stores signature in the CAdES (RFC5126, 2008) format and allows e.g. SHA1, SHA2 (SHA256, SHA384, SHA512) (NIST 2008) or RIPEMD160 [Dobbertin et al., 1996] to be used as the hash function. A similar list of hash functions could be used with *adbe.x509.rsa_sha1* and *adbe.pkcs7. detached* signature formats. In all formats, a signature based on RSA (Rivest et al., 1978), DSA (NIST, 2000) or ECDSA (NIST, 2013) could be used as well.

Case Study

The investigation was undertaken after an issue with verification of a qualified digital signature in a PDF file was reported. The reported issue was quite weird – Adobe Reader was not able to identify and verify the digital signature after working with the file in the macOS environment.

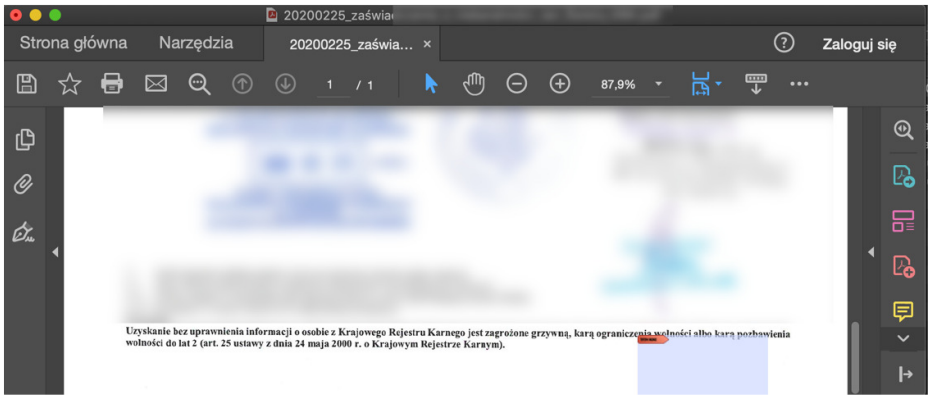

Figure 1. Blue rectangle – digital signature not recognized by Adobe Reader.

The review commenced by performing a binary analysis of the PDF file's content. The file was marked as compatible with version 1.7 of the PDF specification (Adobe 2008), – the file started with *%PDF-1.7*. According to binary content, the file was created on 2020-02-25 at 14:12:33 +0100 and was modified on two occasions. The first modification was performed at 2020-07-21 12:14:20 +0200. It added the digital signature to the PDF file. The digital signature was marked as *ETSI.CAdES.detached*. According to (Adobe, 2020), this type of digital signature is compatible with version 1.7 of the PDF specification and with Adobe Reader software starting from version 10.x. So, there should be no problems with using this file in Adobe Reader. The second modification was carried out on 2020-07-23, at 08:13:28 +0000 and was marked as performed by macOS 10.15.5 – binary file contained value << */Producer (macOS Wersja 10.15.5 \(kompilacja 19F101\)*. This was the next clue that linked the problem with verification of the digital signature with the macOS environment – the last modification of the file was performed by macOS and after file was thereafter improperly processed by Adobe Reader.

The next stage of the analysis focused on the latter modification. This modification was carried out in the incremental mode (according to paragraph 7.5.6 of [Adobe, (2008)). Because of this, all data generated by this modification were added at the end of the PDF file. Data from the original PDF file were not modified. The modification added, for instance, the *AAPL:AKExtra* element. This tag is not a part of version 1.7 of the PDF Specification (Adobe, 2008)], so it could not be processed correctly by Adobe Reader. Additionally, new elements contained direct references to the digital signature added in the first modification– references to element *Signature-ae67c2f2-17fa-40d9-88aa-b290ab203371*. There is quite high probability that this is the cause of all problems with identification and verification

of the digital signature by Adobe Reader. Adobe Reader did not understand those elements that contained references to the digital signature, so was not able to process the digital signature in a correct and convenient manner.

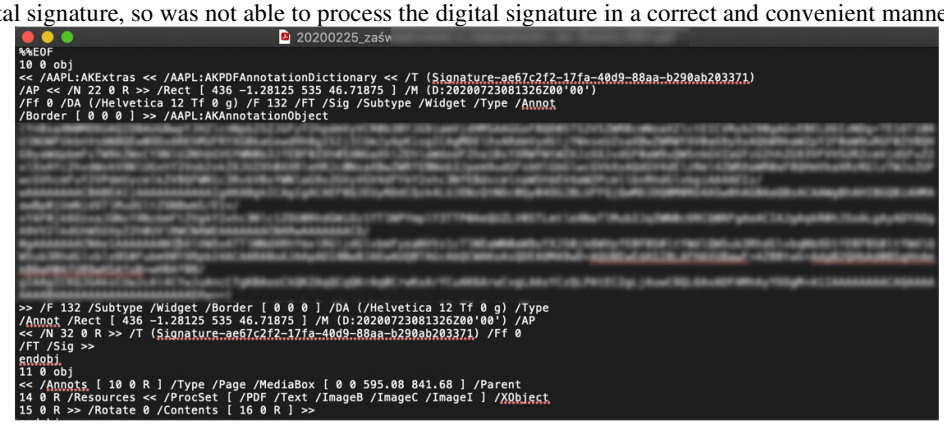

Figure 2. Some data added in the second modification.

The third part of the analysis focused on whether it was possible to show that the PDF file contained a valid and unaltered digital signature and that the signed data had not been modified. The approach adopted was very simple – the second modification was performed in the incremental mode (7.5.6 (Adobe, 2008)), so why not just delete the related data from the PDF file. Removal of data related to this modification should revert the PDF file to its previous state –identical to that after the first modification. Data introduced by the second modification were added to the PDF file after the first occurrence of the *%%EOF* element. Removal of everything that was present after the first occurrence of the *%%EOF* element solved problem – the digital signature was correctly identified and verified by Adobe Reader.

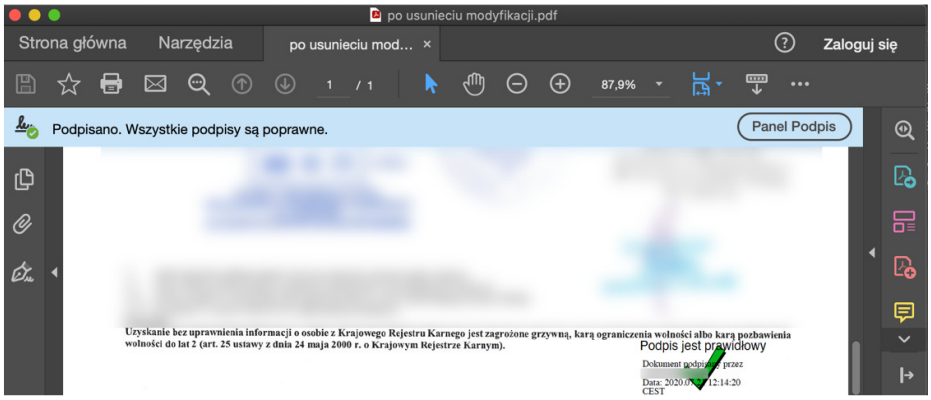

Figure 3. Digital signature identified and verified by Adobe Reader.

The final stage of the analysis focused on the reasons behind the modification introduced by macOS. A quick interview with the user who reported the problem failed to answer this question. He was sure that he had not done any conscious modifications affecting this PDF file and that macOS had not informed him about any modifications at all. It sounded quite weird, so the entire sequence of events needed to be verified. Firstly, the PDF file, without the second modification, was opened in macOS 15.5.5 using the Preview app that is the default software for viewing PDF files. The Preview application displayed the PDF file's data and an additional box with information about the digital signature embedded in the file. This additional box with the signature data was moveable – its position could be changed by using the drag-and-drop method. Quite shockingly, the movement of this box altered the PDF file immediately, without warning the user and without asking for permission, and added data similar to that added in the second modification of the analyzed file, as described above. The Preview application broke the PDF file and rendered its digital signature unreadable and unverifiable for Adobe Reader and for other similar software (e.g. software to verification of PAdES signatures, such as Certum proCertumSmartSign).

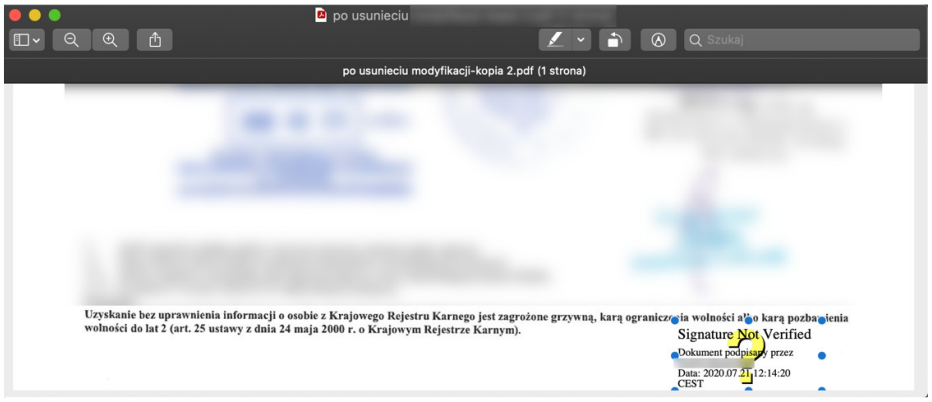

Figure 4. Movable box added in Preview application.

Conclusions

In this paper, we presented a case study concerning a PDF file's digital signature that was corrupted by macOS Preview software. The corruption resulted, in this case, in serious consequences for the company. The document was considered invalid, which resulted in rejection of the submitted bid. The company's representatives had no way of knowing that opening the file in macOS Preview could be devastating for their business.

The case study performed showed that Apple Preview had added some graphical elements to the PDF file, displaying some detail information about the digital signature used. Unfortunately, these new elements were not compatible with PDF Specification 1.7 and, thus, were not correctly interpreted by such software as Adobe Reader - undoubtably one of the most commonly used PDF viewers that allows to verify digital signatures.

It is quite clear that the modification performed by Preview should not have taken place. Apple Preview developers should implement a feature which clearly alerts users that a modification will be introduced to a signed PDF file. Preferably, such files should be opened in the read-only mode and potential changes should be saved in a copy of that file. Regardless of the above, users of PDF software should check if the file's signature is correctly recognized by Adobe PDF before submitting it.

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Olympic Games Legacy: Sports Facilities and Related Infrastructure as A Factor of Long-Term Regional Economic Dynamics

Dr. Nikolay V. GONTAR
Southern Federal University, Rostov-on-Don, Russian Federation
passat01@mail.ru

Dr. Valentina I. ODINTSOVA
Don State Technical University, Rostov-on-Don, Russian Federation
odintsova1749@mail.ru

Abstract

Olympic Games Legacy is often a significant problem for cities hosting the Olympics or FIFA Championships. At the same time, the formation of an extensive sports and non-sports infrastructure makes it possible to include the Olympic Games Legacy in the economic processes and social development of the cities where events are held. The article examines the example of Sochi, the host city of the XXII Winter Olympic Games in 2014, and analyzes the model that made the Olympic Games Legacy an element of urban sustainability. The article discusses the transformation of economic and non-economic factors in the use of Olympic Games Legacy. It also analyzed the change in the role of the Legacy in shaping the economic trajectory at three stages: before the start of the covid-19 pandemic, during the period of restrictions associated with the pandemic, and during the projected recovery from the crisis. The position of the city as an all-Russian resort is considered as the basis for the model of inclusion of the Olympic Games Legacy in Sochi in the processes of sustainable development of the city and the region. This made it possible to fully use the transport, engineering and other related infrastructure built for the Olympics, and also made it possible to maintain the functionality of sports facilities. These processes are analyzed in the article taking into account the multi-level dynamics of tourist visits in the world, Russia and Sochi in the period before the pandemic and in 2020. In addition, in relation to modern conditions, measures of state support for tourism as a key economic sector for Sochi are considered. Such measures are seen as an important tool for supporting the Olympic Games Legacy and preserving the role of its sporting elements as a factor in the economic development of Sochi.

Keywords: Olympic Games Legacy, Sport, Tourism, Sochi, Regional Politics.

Introduction

The global sports industry provides a significant infrastructure to support global sports. Such infrastructure (actually sports and accompanying), in turn, acts as a significant resource not only for holding sports events, but also for the formation of the development potential of cities and regions. As stated in Changing (2011)…, in the 2000s. sports projects attracted more and more funds, advertising budgets for sports events grew, businessmen invested in sports clubs, and sports facilities were built.

The long-term growth factors of the sports industry are: the growth of the world economy, the growing influence of TV advertising, the expansion of paid formats of sports broadcasts. In 2010, the revenues of the global sports industry amounted to $ 121.4 billion. Over the next 5 years, the annual growth rate was estimated at 3.7% (to $ 145.3 billion in 2015). North America is the key region for generating income from sports (41%). Excluding major events from the analysis, the global growth rate reached 4.7%. In the structure of the sports industry's income in the situation of the routine calendar (up to 2020), approximately 1/3 came from ticket sales and income from sponsors, and the rest came from the sale of broadcasting rights and merchandising.

Tourism is a significant resource for the development of the sports industry, it is a dynamic industry, accounting for about a third of the volume of trade in services in the world. According to Worldbank .. (2012), over the past 30 years, the contribution of the service sector to economic growth has exceeded the contribution of industrial production. In the structure of trade in services, about 1/4 of the world's trade in services is transport services, and about 1/3 is tourism, as reported by Balaeva (2009).

In the "Classification list of service sectors" of the GATT, within which approx. 160 service sectors in 12 directions, both tourism (4 groups) and sports (5 groups) appear. The profits of the sports industry are generated in large part by tourist visits to global sports events. However, the legacy of the Olympics and other world sports

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tournaments often gives rise to the problem of the further use of the sports and other material infrastructure created for the competition (the problem of "white elephants"). At the same time, one of the most successful examples of managing such a legacy is London 2012. The article examines the example of the Russian city of Sochi, the city of the 2014 Winter Olympics and football matches of the 2018 FIFA World Cup, and infrastructural heritage as a factor of sustainable development of Sochi.

Studies of the problems and effects of the creation and subsequent use of sports and related infrastructure at the regional and city levels indicate the widespread occurrence of the effects of large sports tournaments, which is emphasized, for example, by Kasimati et al (2008). Essex and Chalkley (2004) analyze the Winter Olympics as a trigger for the transformation of urban and regional politics. As emphasized by Smith (2009), the positive effects of sporting events can spread to peripheral territories. At the same time, in the temporal aspect, Leopkey and Parent (2012) emphasized the problems of linking the Olympic Games Legacy with its long-term effects.

Turning to the physical infrastructures created for the Olympics and other global sports forums, Kassens-Noor (2013) and Pereira (2018) substantiated the importance of the created transport heritage of the Olympics over a long time period (1992-2012) and the importance of such a heritage in transforming the accessibility of urban spaces. In general, the role of the post-Olympic legacy in the development of public spaces is studied, for example, by Preuss (2013), both in connection with the FIFA world championships and Olympics. Urban renewal and gentrification, increased safety are noted as significant effects, which is also noted by García (2004) in relation to sporting events in Glasgow 1990, Sydney 2000 and Barcelona 2004.

The successful experience of creating a safe and sustainable London space in preparation for the 2012 Olympics is described, in particular, by Fussey et al (2011). Describes East London's “De-Risking” in detail as part of Smith's (2014) revival plan ahead of the 2012 Olympics.

Finally, the social transformation of the space of cities hosting sports tournaments, the development of urban entrepreneurship, the growth of public interest in sports (which is associated with the development of sports and related infrastructure) were analyzed as significant, which is described using the example of the level of physical activity and sports among children and adolescents by Craig and Bauman (2014).

Today, the crisis in the sports and tourism industries is triggered by the covid-19 pandemic, which led to the suspension, in particular, of the football championships in European countries, the postponement of the Tokyo Olympics and the FIFA European Championship from 2020 to 2021, which generates significant crises in the sports industries and tourism and also requires an analysis of their prospects.

Methodological Framework

The preparation and conduct of sports competitions form the sports and related infrastructure of cities and regions where the Olympics and other global competitions are held. Research on the post-competitive use of such infrastructure is being conducted as part of the Olympic Games Legacy concept. This concept includes tangible and intangible heritage, economic, cultural, social, political and other aspects, according to McKay and Plumb (2001). Another way of structuring Olympic Games Legacy is 6 types: urban and environmental, sports, economic and tourism-related, political, cultural, social and communication-related, educational, as mentioned by MacAlloon (2003). At the same time, we are talking not only about the legacy of the Olympics, but also of major world tournaments, such as the World and European Football Championships. In this regard, based on the accepted classifications, an attempt was made to structure the legacy of the Olympics in Sochi as a resource for the development of the region.

Due to the fact that the use of sports and other facilities after world tournaments is not as significant as during their holding, sporting events of this kind give rise to problems of the subsequent management of the infrastructure. The article examines a model in which infrastructure of sports, transport, energy and urban economy has formed the potential for sustainable development of the vast territory of Sochi. The basis of this role of Olympic Games Legacy was the nature of Sochi's economy, its position as a resort of all-Russian importance.

However, the role of the legacy in Sochi is also seen as a resource that allowed Sochi to pass relatively smoothly through the period of restrictions caused by the SARS-CoV-2 (covid-19) pandemic and economic constraints in 2020, and can contribute to resilience during the recovery from the restrictions in the end of the pandemic.

In this regard, a step-by-step change in the impact of Olympic Games Legacy on the development trajectory of Greater Sochi was considered, and the accompanying factors that determined the use of this heritage in Sochi's core tourism sector were analyzed.

In connection with the study of the role of sports and related infrastructure in the formation of the sustainability of regional economic dynamics, the article uses methods of comparative statistical analysis, building a model for the use of Olympic Games Legacy in the specific conditions of Greater Sochi, and uses the analysis of factors of inclusion of heritage in economic dynamics.

Structure of the Olympic Games Legacy in Sochi

Sochi is a Russian resort on the Black Sea with the only subtropical zone in the Russian Federation, located in good transport accessibility from the centers of domestic Russian solvent demand for tourist services (Moscow, Central Russia), the center of Russian seaside tourism. Also Sochi and the Krasnodar region are an important direction of Russia's regional policy, as noted by Gontar (2006).

Sochi became the host city for the XXII Winter Olympic Games in 2014. Sochi also hosted the 2018 FIFA World Cup matches. The resort town of Sochi has a population of 530 thousand and is an area of 3.5 thousand square km. The Olympiad competitions were held in the south part of Sochi.

Preparations for the Olympics became the largest investment project in Russia in the 2010s. Significant funds were invested in the preparation of the events (over $ 50 billion in the preparation of the Olympics and over $ 10 billion in the preparation of the World Championship).

In addition to the corruption component, large expenses for the preparation of the Games were caused by a large influx of guests to the event. The guests of the Olympic Games in Sochi were approx. 4 million people. In addition, Sochi also hosted matches of the 2018 FIFA World Cup (in total, the championship in Russia was attended by 3 million guests).

For the 2014 Olympics, 11 sports facilities were built in Sochi. The coastal cluster included: Fisht Olympic Stadium (later transformed into a football stadium), Bolshoi Ice Palace, Puck Ice Arena, Ice Cube Curling Center, Iceberg Winter Sports Palace, Adler Arena. The Olympic Park was created. The mountain cluster included: the Laura ski and biathlon competition complex, the «Rosa Khutor» ski center, the «Russkiye Gorki» ski jumping complex, the «Sanki toboggan» sports center, and the «Rosa Khutor» extreme park.

In the structure of expenses for the Olympics, sports facilities accounted for only 17.6%. The rest of the funds were directed to the development of the Sochi territory and the infrastructure necessary for the Games and tourist visits. In Sochi, 42 hotels were built, which made it possible to increase the number of beds in them by 25 thousand, including in 4* and 5* hotels.

Reconstruction of the engineering infrastructure of Sochi affected 53 water supply and sewerage facilities, according to Artemova (2015). A new 50 km long Adler-Krasnaya Polyana railway-highway was built, which includes 28 bridges, 59 flyovers and 12 tunnels. About 200 new thermal power plants with a total capacity of over 500 MW have been built. These stations increased the potential of the Sochi power grid by 2.5 times, according to Shekhovtsov (2012). Also a new Dzhubginskaya thermal power plant was erected.

In general, the infrastructure legacy of the 2014 Olympics amounted to approx. 400 objects. By 2014, 360 kilometers of roads and 200 kilometers of railways had been laid and reconstructed in Sochi. The Sochi air terminal complex has been reconstructed and modernized on the eve of the Olympics. In 2012, the center of Sochi was connected by rail to the airport. A significant contribution to the development of the transport system was the construction of a backup to Kurortny Prospekt (before the Olympics, the avenue was the only through highway in Sochi along the coast).

In preparation for the Olympics, the F1 racing complex was built, and the seaport was reconstructed. To service the mountain cluster, 11 cable cars have been built. At the same time, the mountain cluster has a relatively stable potential for tourist demand, and includes 23 tracks 77 km long, of which 13 are sports, according to the Russian newspaper .. (2014).

The most significant objects of support for the Olympics, which were then included in the work of resort hotels, include the Tulip Inn Omega, RADISSON BLU RESORT & CONGRESS CENTER, and the Russian Seasons Hotel. The new hotel fund in Sochi, including 35 hotels with 20 thousand rooms, allowed to increase the number of rooms in Sochi to 57 thousand, which is more than in Moscow (41.3 thousand).

Model of Olympic Games Legacy inclusion in the formation of long-term sustainability of the economy of Sochi and the Krasnodar region

After the competition, Sochi's Olympic sports facilities were either reformatted or used for their original purpose. For example, the «Fisht» (Olympic opening stadium) was reconstructed in anticipation of the FIFA World Cup, the ice rink became the home of the Sochi Hockey Club, and most of the other facilities continue to perform their functions during regular competitions. The mountain cluster is also a place of active tourist visits to get acquainted with the facilities of the Olympics, as well as the Olympic village in the Imeretinskaya lowland (Coastal cluster).

In September 2014, the Sochi Tennis Academy and Figure Skating School became a training base for young athletes. The skating center «Adler-Arena» was transformed into an arena with tennis courts. The All-Russian Children's Sports and Recreation Center has opened in the Olympic Park. The Fisht stadium hosts regular matches of the Russian Premier League.

Speaking about the model of Olympic Games Legacy inclusion in the formation of sustainable economic growth in Sochi and the Krasnodar region, one should take into account the traditional structure of the influence of such a heritage on changes in the cities where the Games and FIFA Championships are held. Thus, the urban environment, the transport system, and public spaces are being improved. A number of districts are being gentrified. In addition, the impact on the social environment is manifested in the reduction of crime, the involvement of young people in sports.

In the situation of Sochi, Olympic Games Legacy, first of all, strengthened the specialization of the city as a resort by improving transport accessibility (airport, train station complex), developing a hotel system, increasing tourist attractions (Olympic Park, Olympic ski cluster). Thus, the key was the model of mutual support for the functioning of the Olympic Games Legacy due to the tourist profile of the city, and, conversely, the development of this profile due to the Olympic Games Legacy. This is due to the fact that Sochi remains a resort city, where HORECA employs approx. 172 thousand people, as noted by Olympic results .. (2014) Sochi also took 2nd place in the ranking of Russian cities popular for family vacations, according to Gureeva (2014).

The second significant aspect of the existing model was the inclusion of Olympic Games Legacy in the processes of regional development during the period of stable global processes (including 2019), during the covid-19 pandemic, and (predictably) during the recovery period after the pandemic. At the same time, if during the period of the Olympics the sports and related infrastructure were used as much as possible, in the post-Olympic period the predominant load was retained by non-sports facilities in Sochi, focused on ensuring the life of the city. The factors of inclusion of Olympic Games Legacy in the formation of the sustainability of economic processes, and the role of heritage in these processes, are different at different stages - tables 1 and 2.

Table 1: Dynamics of factors of use of Olympic Games Legacy in Sochi

Factors	**During the period 2014-2019**	**Covid-19 pandemic period (2020)**	**Post-pandemic recovery period (prognosis)**
Economic	An increase in the number of hotels of different categories, An increase in the transport accessibility of Sochi, a fall in the ruble exchange rate and a decrease in opportunities for foreign recreation for residents of the Russian Federation	Dominance of Sochi in the domestic tourism market, Preservation of deferred tourist demand due to quarantine until June 2020 and restrictions on population movements	Slow recovery of household income and limited potential for tourism abroad (focus on Sochi as a leading maritime destination), Recovery economic growth
Non-economic	Growth in the quality of the urban environment, Implementation of the state program for the development of the Olympic heritage, the interest of Russians in the facilities of the Olympics	The inability to fly abroad for tourism purposes due to the pandemic, Continuation of sports events in Sochi in autumn-winter 2020	The rate of recovery from the pandemic, Severity of state restrictive measures, The return of global tournaments in Sochi for certain types of competitions

Table 2: Impact of Olympic Games Legacy in Sochi on the economic dynamics of the city

Area of influence	**During the period 2014-2019**	**Covid-19 pandemic period (2020)**	**Post-pandemic recovery period (prognosis)**
Role for the city	New quality of the urban environment, transport infrastructure, transport accessibility for flights from cities of Russia and European countries, expanding the list of 4* and 5* hotels; increasing incomes of the population engaged in serving tourists; growth in the flow of tourists.	Preservation of economic activity due to the resumption of the summer tourist season from June 2020; support of other industries through tourism	Continued demand from Russians for rest in Sochi; Fast recovery due to lack of conservation of tourist sites and hotels
Role for Russia	The growth of the city's recognition in the world as a	Meeting the demand of Russians for recreation	Recovery of the economy of one of the

	Russian resort, the inclusion of Russia in the F1 racing calendar, the holding of stages of world competitions in winter sports, the training of athletes from Russia at the bases in Sochi, the development of children's sports tourism	by the sea in the absence of international flights, Ensuring the safety of recreation by meeting demand without flying abroad	largest regions of Russia as a "growth point" for the economy; preservation of the key tourist destination for Russians' recreation in a situation of slow restoration of communication with other countries

Characterizing (within the framework of the noted interaction of Olympic Games Legacy and the traditional tourist function of the city) tourist activity in Sochi during the period under review, we note that after the Olympics, Sochi hosted approx. 5 million tourists. However, the limited opportunities for Russians to visit resorts abroad due to the depreciation of the ruble since 2014 led to an increase in visits to Sochi. In 2018 and 2019, there was a recovery in the flow of Russians abroad due to the stabilization of the economic situation.

In Russia by 2019, more than 50 million tourist trips were made. The Krasnodar region was visited by about 16 million tourists. In 2019, the Krasnodar region became the leader in Russia in terms of the share of the cost of hotel services and other temporary accommodation for tourists. The share of the Krasnodar region was 24.0%, Moscow - 21.7%, St. Petersburg - 10%.

More than 76 million people were accommodated in hotels and similar places for collective accommodation of tourists in Russia in 2019. At the same time, Moscow accounted for 20.4%, the Krasnodar region - 10.9%, St. Petersburg - 8%.

The Sochi Olympics gave an impetus to the development of the hotel business in Sochi (in Russia, the FIFA World Cup 2018 served as such an impetus). So, if in 2013 the area of rooms in hotels and similar places for tourist accommodation in Russia reached 11.5 million square meters, then in 2019 it reached 22.2 million square meters. In the Krasnodar region, indicators increased from 1.8 to 4.3 million square meters.

However, the situation in the global and Russian tourism industry has become significantly complicated in 2020 due to the spread of the coronavirus and restrictions imposed by the governments of the countries of the world on international flights and travel within countries.

In 2019, which preceded the year of the pandemic, the number of international tourist trips made worldwide reached 1.5 billion, an increase from 2018 by 4%, according to the UNWTO. The growth of international tourism has continued for 10 consecutive years.

However, in 2020, due to the spread of the coronavirus, strict quarantine measures were taken in the spring of 2020, tourist trips were reduced, and mass sports competitions were canceled. From May-June 2020, some of the competitions and flights resumed. However, the Tokyo Olympics and the FIFA European Championship were postponed, which reduced both sports tourism and tourism in general. The industry recovery began only in the second half of 2020.

According to the UNWTO World Tourism Barometer and Statistical Annex (2020), in the first half of 2020, global tourism lost almost 2/3 of its volume. In June, the drop in tourist arrivals was 93% compared to the level of 2019. The drop in arrivals by about 440 million resulted in losses to the tourism industry in the amount of about 460 billion dollars. At the same time, in countries such as China and Russia, the flow of tourists inside the country has increased. By mid-autumn 2020, according to UNWTO, the following losses had occurred:

- Loss of 850 million to 1.1 billon international tourists,
- Loss of US$ 910 billion to US$ 1.2 trillion in export revenues from tourism,
- 100 to 120 million jobs at risk.

Tourism in Russia and Sochi was also hit by a pandemic in 2020. However, the rapid onset of the warm season and the slowdown in the spread of the epidemic in Russia made it possible to open resorts in June. In addition, the Government of the Russian Federation took measures to support demand in the industry, thus avoiding a catastrophic decline in the industry. In summer, the decrease in the number of tourists to mass destinations was only 30%. At the same time, the Krasnodar region has been visited by about 9 million tourists since the beginning of the year. In general, domestic tourism in Russia reached 70% of the level of 2019. This was facilitated by measures to return to Russians from the state budget part of the costs of tourist trips around the country. According to the cashback program, at the beginning of October 2020, vouchers were bought by about 70 thousand people. The second cashback program was launched on October 15th. More than 250 hotels and other accommodation facilities in the Krasnodar region, including Sochi, took part in the program of subsidizing recreation.

In 2019, the Krasnodar region (and, above all, Sochi) received 17.3 million tourists. From January 1 to September 15, 2020, 8.7 million tourists visited the Krasnodar region, which is 39% less than in 2019. During the velvet season, 4 * and 5 * hotels are still in demand. The occupancy of hotels with a developed infrastructure reaches 75%.

Among the measures that are designed to support the tourism industry in Russia and create conditions for the rapid recovery of the industry, one can name the measures of the federal government - Table 3

Table 3: Current and adopted support measures for enterprises of the tourism industry during a pandemic, according to the Federal Agency for Tourism.

For small and medium businesses	For large businesses
Subsidies for tour operators for reimbursement of losses related to air travel; Access to the tour operator's personal liability fund; Delay in the provision of accounting and industry reports; Refunds for canceled and rescheduled events; Renewal of licenses and permits; Interest-free loans for payment of salaries; Grants for wages, urgent needs, utility bills; Subsidizing access to borrowed funds at a preferential rate; Deferral of lease payments; Moratorium on bankruptcy, tax sanctions and audits; Tax holidays; Tax exemption on subsidies to SMEs; Extending tax payment deadlines for SMEs; Subsidies for the resumption of activities	Renewal of licenses and permits; Interest-free loans for payment of salaries; Moratorium on bankruptcy, tax sanctions, audits; Tax holidays; Resumption subsidies

In addition to government measures and programs to support tourism, the Krasnodar region also has regional support mechanisms. For example, in 2020 there is a regional program «South health resort», which aims to promote the resort potential of the region and increase the occupancy of sanatoriums in the low season. The program started on October 15, 2020 and will end on May 1, 2021. According to the program, residents and guests of the region can take advantage of health tours for 2-7 days or 2-3 weeks. Also in the region today, grants are provided, which are designed to stimulate the tourism enterprises of the region to develop tourist routes, upgrade infrastructure.

Conclusion. The holding of world-class sports tournaments forms an extensive sports and related infrastructure, contributes to the formation of a new quality of the urban environment, the involvement of the population in sports, and the development of entrepreneurship. Due to the lack of demand for many structures after the Olympics and world championships, the regions where they are held often face the problem of the legacy of the Olympics. The example of Sochi demonstrates a model that made it possible to avoid the formation of «white elephants» due to the fact that the facilities of the 2014 Olympics were built in the tourist center of Russia and turned out to be in demand as objects of tourist visits and as sports arenas. Also, engineering and transport structures have become the most important infrastructure element in demand. Both the sports and non-sports infrastructure of the Olympic Sochi became one of the factors of the stability and competitiveness of the economy of Sochi and the Krasnodar region in the period after the Olympics (2014-2019), during the period of coronavirus restrictions in international tourism in 2020. It will also contribute to the region's recovery from recession. Measures of state and regional support for tourism as an industry can be named as a key factor in the implementation of this scenario.

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Economic Security of Russian Regions: Risk Factors and Consequences of the Covid-19 Pandemic

Zoya P. MEJOKH
Russian University of Transport (RUT – MIIT), Moscow, Russian Federation,
https://orcid.org/0000-0001-8391-2870, mejokh.zoya@gmail.com

Elena V. KOROLYUK
Kuban State University, Krasnodar, Russian Federation,
https://orcid.org/0000-0002-2466-3728, lenkor@bk.ru

Dzhamiliya A. SOZAEVA
Moscow Financial and Industrial University «Synergy» («Synergy» University),
Public corporation «Unified Electronic Marketplace» (UEM), Moscow, Russian Federation,
https://orcid.org/0000-0003-3955-891X, dasozaeva@gmail.com

Nadezhda V. PILIPCHUK
Tver State University, Tver, Russian Federation,
https://orcid.org/0000-0001-8908-6899, nadezda.pilipchuk@gmail.com

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation,
https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru (corresponding author)

Abstract
The purpose of the study is to reveal the impact of the COVID-19 pandemic on the economic security of Russian regions, as well as to determine the appropriate directions for stabilizing the socio-economic situation. The authors identified specific features of the COVID - 19 pandemic that determine the nature of its impact on regional development. The authors structured the economic security of the region in terms of the emergence of risk factors and threats from the COVID-19 pandemic (economic security of the real sector of the economy of the region; economic security of the financial sector of the region; economic security of the social sphere of the region), and also defined a list of economic indicators that characterize each element of economic security. The authors analyzed the dynamics of indicators of economic security of Russian regions during the beginning of the pandemic based on operational data from the Federal state statistics service of the Russian Federation, as well as concluded that the impact of the COVID-19 pandemic on the state of economic security of Russian regions is heterogeneous, certain indicators of economic security at the regional level are decreasing. The authors suggested ways to stabilize the economic security of Russian regions.

Keywords: economic security, region, COVID-19, threats, recession, risk factors, economic security indicators

Introduction

In the modern world, there is a whole range of threats that undermine the economic security of states. And they are not always economic, technological, or man-made.

Viral epidemics regularly occur in the global space, which become a real disaster for humanity and its prosperous existence. Over the past century alone, the world has experienced a number of major viral epidemics: Spanish flu, SARS, avian flu, swine flu, Ebola, and others.

Viral epidemics bring an increase in deaths from viruses, direct harm to the health of the population, as well as significant damage to the economy. Thus, according to the world economic forum, the annual global cost of moderate to severe pandemics is about $ 570 billion, or 0.7% of global income (Weforum, 2018).

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The COVID-19 pandemic has become a real challenge to the global economy, which, according to analysts, will result in the loss of the world economy in the amount of $5.5 trillion in the next two years and the deepest peacetime recession since the 1930s (Bloomberg, 2020). The Russian regions did not remain aloof from what is happening.

The introduction of quarantine measures, the suspension of most of the country's enterprises, the blocking of international industrial and commercial communication channels, as well as the transition to remote work have led to a critical reduction in many socio-economic parameters of the national economy of Russian Federation.

What is the impact of the COVID-19 pandemic on the situation in the regional dimension, how has it affected the parameters of economic security of Russian regions, and is it possible to minimize the negative consequences for the economy of territories? Finding the answer to these questions requires a thorough analysis of the situation.

Methodology

The purpose of the study is to reveal the impact of the COVID-19 pandemic on the situation of Russian regions through the prism of assessing their economic security, as well as to determine the directions for stabilizing the socio-economic situation in regions of the country.

Investigation phase:

1) Identification of structural elements of the region's economic security and economic indicators that characterize them.

2) Analysis of the dynamics of indicators of economic security in Russian regions during the pandemic and systematization of risk factors.

3) Identification of ways to stabilize the economic security of Russian regions.

Research methods: comparative analysis method, systematization method, economic analysis method, system approach, induction and deduction.

Information base of the research: statistical data of the Federal state statistics service of the Russian Federation, the Ministry of Finance of the Russian Federation, the rating Agency RIA Rating, conference materials.

Theoretical Basis of The Research

In the scientific literature, the concept of economic security is identified with providing the economic system with decent living conditions and personal development, maintaining a certain level of socio-economic stability, as well as having a military-political potential to prevent internal and external threats to society and the state (Huber et al, 2010; Karpunina et al., 2019).

The economic security of a region is a multi-factor substance that is determined by the influence of financial, political, economic, and social factors of the internal and external environment on the balance of various components of the region's economic system (Edelev, 2007; Kremlev et al., 2007; Kalinina, 2010).

Shubina (2017) emphasizes that the economic security of a region depends on: the current state of the region's economy; the nature of the threats affecting it; the existing potential for economic development (the availability of natural resources, the degree of development of the industrial sector, favorable conditions for business development); the ability of the region's economy to innovate; the level of competitiveness of the region's economy.

Speaking about the threats from viral epidemics to humans, researchers point out that they cause a loss of income during the period of disability, an increase in expenses related to the purchase of medicines and medical care, and a growing probability of losing a job (Karpunina et al., 2020). In turn, the mass disability of employees negatively affects the activities of enterprises: the quality of labor decreases, as well as its productivity, which leads to a decline in production, and, accordingly, to a downturn in competitiveness and a reduction in profits, i.e., undermining the economic security of the enterprise.

Assessing the impact of viral epidemics in the regional context is very time-consuming, while at the country level, researchers note the damage in the form of a sharp increase in costs for the health system associated with the prevention and medical treatment of infected people, reduced labor productivity and disruption of the normal

functioning of the economy, which reduces the economic security of the state (Bloom et al., 2018; Fan et al., 2016; Brainerd and Siegler, 2003; Qiu et al., 2018).

Results

The COVID-19 pandemic, unlike previous viral epidemics, has specific features that determine the nature of its impact on regional development:

- intensity of virus spread and global reach: from December 2019 to March 2020, the virus has spread around the world, and the number of infected people continues to grow (Sochnenkova, 2020;Bugaenko , 2020);
- complete suspension of socio-economic activity in all regions and countries as a measure to counter the spread of infection (restrictions on movement; interruption of work of enterprises; transfer of employees of some enterprises to a remote work format; blocking of international communications and trade) (Kranov, 2020; Sheremet, 2020);
- complete uncertainty and inability to predict the rate of infection and the end of the pandemic (Ranepa, 2020).

The direct consequence of the pandemic, according to Rosstat, was a drop in Russia's GDP in the first half of 2020 of 3.4%. The decline occurred in the industrial sector, construction, and trade. The volume of investment in fixed assets has decreased, the real monetary income of the population has reduced, and unemployment has increased. Overall indicators for the country were made up of the results of individual regions with heterogeneous dynamics (RIA Rating, 2020b).

We structure the economic security of the region for the study of threats under the influence of the COVID-19 pandemic as follows (Orlova et al., 2016):

- economic security of the real sector of the region's economy;

- economic security of the region's financial sector;

- economic security of the social sphere.

Accordingly, the following threats to the economic security of the region in the context of the COVID-19 pandemic can be identified (Fig. 1).

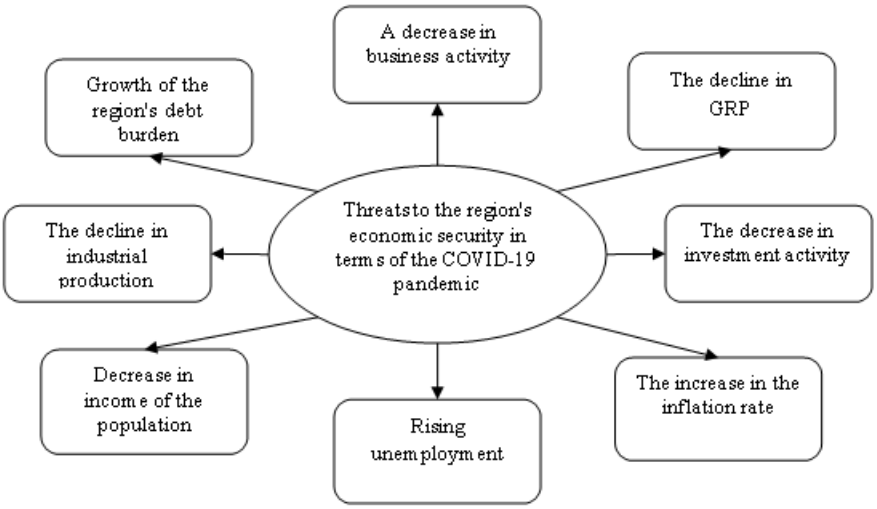

Fig. 1: Threats to the economic security of the region in the context of the COVID-19 pandemic (compiled by the authors)

Various approaches based on a set of indicators can be used to assess the economic security of the region (for example, in the methodology of Novikova and Krasnikov (2010) highlights 22 main indicators with their threshold values).

In accordance with the structure of economic security proposed by the authors, the following groups of socio-economic indicators can be identified to assess the impact of emerging threats (table 1).

Table 1: Indicators of economic security in the region (by structural elements)

Structural element of the region's economic security	Indicators
Economic security of the real sector of the region's economy	1) Volume of GRP per capita, % 2) Industrial production index, % 3) Investment in fixed assets per capita, % of GRP
Economic security of the region's financial sector	1) The level of the regional budget deficit, % of GRP 2) Loan volume, % of GRP 3) Share of unprofitable organizations, % 4) Consumer price index, % 5) State debt of the region, thousand rubles
Economic security of the social sphere of the region	1) Unemployment rate, % of the labor force 2) The share of the population with incomes below the subsistence minimum, % 3) The average per capita monetary income of the population, rubles. 4) Annual growth rate of real incomes of the population, %

Source: compiled by the authors

Interpretation of the analysis results is based on the threshold values of the main indicators of economic security of Russian regions presented in the works of Krivorotov and Kalina (2010), Tatarkin et al. (2007), Mityakov et al. (2013), Korableva and Karpov (2019), as well as the average Russian values.

Exceeding the threshold values for positive indicators and finding the values of negative indicators below the threshold indicates the appearance of signs of a decrease in the economic security of the region.

The collection of statistical data by regions of the Russian Federation is carried out in annual terms, as well as the determination of threshold values for economic security indicators. At present, there is a problem of collecting operational statistical data to assess changes in the level of economic security of regions during the pandemic. In this regard, the proposed list of indicators for assessing the economic security of regions will be incomplete. However, the operational data of the Federal state statistics service of the Russian Federation (2020) and the rating Agency RIA Rating (2020) for the first half of 2020 allow us to make a preliminary assessment of the state of economic security of Russian regions.

According to the results of the first half of 2020, industrial production in the Russian Federation decreased by 3.5%, while in the same period of 2019, growth in the industrial sector was 2.2%. Meanwhile, industrial production growth in the first half of 2020 was recorded in the Tyumen region (+28.6%) (due to the launch of a new manufacturing enterprise Zapsibneftekhim), the Tula region (+26.3%), and the Republic of North Ossetia-Alania (+25.9%).

The decline in industrial production in the first half of 2020 was recorded in 41 regions of the Russian Federation (RIA Rating, 2020b). The most significant decline was recorded in the Republic of Tyva (-39.1%) (due to a sharp fall in mining), Sevastopol, Kostroma region, Ulyanovsk region and Kaliningrad region. In other regions, the drop in industrial production did not exceed 10% (Federal state statistics service of the Russian Federation, 2020).

Production in the manufacturing sector increased in 45 regions in the first half of 2020 (57 in 2019). But there are regions that are characterized by growth-the Magadan region (+75.0%), the Tyumen region and the Altai Republic.

In the first half of 2020, the construction industry as a whole in Russia experienced a decrease of 0.5 % (in 2019 – an increase of 0.1%). Nevertheless, the growth of the construction industry in 2020 is typical for the Kostroma region, the Astrakhan region and the Ingush Republic. Positive dynamics of development of the construction industry was noted in 46 regions of the Russian Federation.

In the first half of 2020, the volume of investment in fixed assets in the Russian Federation decreased by 4.0% (compared to + 1.1% in the same period in 2019), but in 44 regions of the Russian Federation, the volume of investment in fixed assets increased (primarily in the Republic of Kalmykia) (RIA Rating, 2020a).

The negative impact of the pandemic was a 6.4% reduction in retail trade turnover in Russia as a whole: retail trade turnover remained at the same level in six regions, while the remaining 78 regions experienced a decrease in the indicator.

Reduction of real monetary incomes of the population in the first half of 2020 occurred in 64 regions of Russia, compared to the same period in 2019, they decreased by 3.1%. However, in 20 regions of the country, the real monetary income of the population has increased (for example, in the Chukotka Autonomous district).

In the first half of 2020, nominal wages in the country as a whole increased by 5.8% (in the same period of 2019, it raised by 7.1%), namely in 84 regions of the Russian Federation.

The COVID-19 pandemic created conditions for an increase in unemployment - up to 6.0% (in the same period of 2019 - 4.6%). At the same time, an increase in unemployment was recorded in 81 regions. In 3 regions (the Smolensk region, the Novosibirsk region, and the Kamchatka territory), it remained unchanged; in the Chukotka Autonomous district the unemployment rate decreased.

In the first half of 2020, there was a total deficit of consolidated budgets of all regions of Russia in the amount of 213.7 billion rubles, but consolidated budgets in 38 regions were executed with a surplus.

According to the Ministry of Finance of the Russian Federation, the total volume of state debt of the Russian regions amounted to 2,139 trillion rubles: in 33 regions showed the dynamics of growth of public debt, in 32 regions of the country there was a decrease of debt, and it remained unchanged in 20 regions (Minfin, 2020).

Thus, operational data indicate that the negative impact of the COVID-19 pandemic on the economic security of Russian regions is uneven. We systematize the available data on the socio-economic development of some regions of the country to confirm the conclusion (table 2). To do this, we select several typical recipient regions of Russia (Rosinfostat, 2020): The Dagestan Republic (1 place in the list of subsidized regions 2020 – government subsidies amounted to 72892 billion), Tambov region (27th place in the ranking of the most subsidized regions, government subsidies amounted to 9523 billion), Pskov region (43rd place – state grants totaled 4685 billion roubles), and also the largest donor regions: the Khanty-Mansi Autonomous district (Ugra), Moscow, Yamalo-Nenets Autonomous district.

Table 2: Indicators of economic security of Russian regions during the COVID-19 pandemic

The name of the indicator	Actual indicator		
	Region of the Russian Federation	January-September 2019	January-September 2020
Industrial production index, % compared to the same period of the previous year	Dagestan Republic	104,8	100,1
	Tambov region	100,8	107,0
	Pskov region	107,4	99,7
	Khanty-Mansi Autonomous district (Yugra)	101,1	92,6
	Moscow	107,4	103,2
	Yamalo-Nenets Autonomous district	112,7	97,3
Volume of investment in fixed assets, in comparable prices as a percentage of the same period of the previous year	Dagestan Republic	128,6	100,8
	Tambov region	49,9	100,5
	Pskov region	100,6	88,1
	Khanty-Mansi Autonomous district (Yugra)	89,9	115,7
	Moscow	102,0	108,2
	Yamalo-Nenets Autonomous district	129,8	120,4
Consumer price indices for goods and	Dagestan Republic	101,7	102,8
	Tambov region	103,2	103,2

services, as a percentage of the same period of the previous year	Pskov region	101,9	103,1
	Khanty-Mansi Autonomous district (Yugra)	101,7	102,2
	Moscow	102,7	102,5
	Yamalo-Nenets Autonomous district	100,9	101,5
Unemployment rate, % of the labor force	Dagestan Republic	13,0	15,7
	Tambov region	3,9	5,0
	Pskov region	5,1	6,9
	Khanty-Mansi Autonomous district (Yugra)	2,5	3,4
	Moscow	1,4	3,3
	Yamalo-Nenets Autonomous district	1,9	2,6
Dynamics of real monetary income of the population, in % to the same period of the previous year	Dagestan Republic	106,4	87,4
	Tambov region	98,6	86,6
	Pskov region	105,6	95,3
	Khanty-Mansi Autonomous district (Yugra)	102,7	97,5
	Moscow	102,4	96,3
	Yamalo-Nenets Autonomous district	105,4	100,7
State debt of the regions of the Russian Federation, thousand rubles	Dagestan Republic	9 796 336	9 327 936
	Tambov region	17 440 635	19 074 426
	Pskov region	15 618 216	17 026 985
	Khanty-Mansi Autonomous district(Yugra)	14 400 000	13 000 000
	Moscow	30 000 000	30 000 000
	Yamalo-Nenets Autonomous district	16 624 425	16 410 976

Source: compiled by the authors according to the Federal state statistics service of the Russian Federation (2020), the Ministry of Finance of the Russian Federation (2019, 2020)

In general, the data presented in the table allow us to conclude: a decrease in industrial production in most of the analyzed regions during the pandemic (in 5 out of 6 analyzed regions); an ambiguous dynamics of the behavior of fixed capital investment: 3 regions experienced an increase, 3 regions decreased; a slight increase in the rate of inflation in the first half of 2020; a significant growth in unemployment and a drop in real monetary income of the population in all the studied regions of the country; on the multidirectional dynamics of growth/reduction of the state debt of the regions (in 2 regions there was an increase, in 2 – a reduction, in 1 – remained unchanged).

The analysis of the dynamics of key macroeconomic indicators allows us to make a conclusion about the heterogeneity of the impact of the COVID-19 pandemic on the state of economic security of Russian regions. It is likely that the decline in key indicators of economic security in Russia's regions will continue in the future and will become noticeable at the regional level.

Reducing the identified threats to economic security from the COVID-19 pandemic requires the implementation of a set of public policy measures, including:

1) implementation of preventive medical measures to minimize the likelihood of new epidemic threats, development of a network of medical institutions, including through the use of advanced digital technologies (use of online services, phones and other digital transactions in case of emergencies), which allow to track the geography of the spread of viruses and save time when responding to an outbreak (ITU, 2015; Karpunina et al., 2020);

2) state support for businesses in the context of a pandemic to stimulate entrepreneurial activity, including through the use of tax tools and grant support;

3) social policy measures for the protection of socially vulnerable segments of the population, support for the population who lost their jobs due to the pandemic;

4) education policy – development and implementation of educational programs for retraining and advanced training of specialists;

5) the policy of accelerated digital development is to bridge digital gaps between regions, equalize access to the Internet and use digital platforms and services to form a solid basis for the national economic system, ensuring smooth operation and provision of goods and services in the event of an epidemic threat.

Conclusions

The authors identified the specifics of the COVID-19 pandemic, which had an impact on the dynamics of the development of Russian regions. The authors identified structural elements of the region's economic security to systematize risk factors and threats from the COVID-19 pandemic, and also identified a list of economic indicators that characterize them. The authors analyzed changes in indicators of economic security in Russian regions based on operational data from the Federal state statistics service of the Russian Federation in the first half of 2020, they concluded that the impact of the COVID-19 pandemic is heterogeneous in the context of economic security in various regions of Russia, as well as the likelihood of deterioration of economic security in the future. The authors proposed a set of public policy measures to level the identified threats to economic security from the COVID-19 pandemic.

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Scientific and Educational Potential as A Factor in Ensuring the Economic Security of The State in Terms of The Digital Development Intensification: Analysis and Assessment for The BRICS Countries

Elena A. YAKOVLEVA
Voronezh State Forestry Engineering University named after G.F. Morozov, Voronezh, Russian Federation, https://orcid.org/0000-0002-9697-8024, elena-12-27@mail.ru

Olga N. GORBUNOVA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation, https://orcid.org/0000-0002-8008-9134, oon26@mail.ru

Tigran L. OGANESYAN
Kuban State Technological University, Krasnodar, Russian Federation, oganesyant@mail.ru

Olga S. SHURUPOVA
Lipetsk State Pedagogical University named after P.P. Semenov-Tyan-Shanskiy, Lipetsk, Russian Federation, https://orcid.org/0000-0001-6987-9883, shurupovaolgas@mail.ru

Evgeniya K. KARPUNINA
Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation, https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru (corresponding author)

Abstract

The purpose of the research is to reveal the specifics and conduct a comprehensive analysis of the scientific and educational potential and the system of ensuring the economic security of the state as a basis for strengthening the positions of the BRICS countries in the global competitive space. The authors identified the structural features of the country's scientific and educational potential and identified its components (personnel, material and technical, economic, organizational and managerial), as well as assessed the development dynamics (within the BRICS group and in comparison, with some developed countries). The authors systematized economic security threats from the scientific and educational potential. It is concluded that China and Russia among the BRICS countries have a more stable position in terms of economic security, due to the state of their scientific and educational potential. The authors proposed tools to reduce economic security threats of the state from the scientific and educational potential development.

Keywords: economic security of the state, scientific and educational potential, BRICS, integration processes, digital economy

Introduction

The problem of ensuring economic security is becoming more and more relevant for modern states. This is due to the growing geo-economic instability, the negative impact of regularly recurring economic and financial crises on the stability of national economies, integration processes as a characteristic feature of the development of modern international economic relations, as well as the strengthening of the global world multipolarity in the new digital space. The latter is associated with the formation of new conditions for the digital environment, tougher competition for leadership, and increasing gaps between countries that are actively developing digital technologies and countries that remain aloof from technological development. So, experts of the World economic forum claim that the countries-leaders of digital development by 2025 can receive a cumulative increase in cash flow at the level of 122%, while the outsider countries - by 10% (Weforum, 2019).

The BRICS countries are considered by experts as the main contenders for leadership positions in the new global digital economy. Of course, their starting positions are completely different. The BRICS countries are characterized by an asymmetric level of development and accessibility of infrastructure components of the digital economy

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ecosystem (Inchakova and Mitrofanova, 2020). If in recent years China has been competing in the development and implementation of digital technologies with the world leader the United States, accounting for a fifth of global GDP by PPP (20.1%), the rest of the BRICS countries are still strengthening their positions in the development of digital technologies, demonstrating restrained positive dynamics and intentions to accelerate modernization in all areas of activity.

The basis for inclusion in the processes of digital competition at the global level is the developed scientific and educational potential of the country, which has resources for continuous reproduction, as well as a comprehensive system for ensuring the economic security of the state, which can protect the country from emerging risks and threats.

Literature Review

Kleiner (2018) considered the digital economy as organizations, business processes, innovative projects, and infrastructure systems interacting with each other in a localized space in order to create and circulate material and symbolic goods and values.

Karpunina et al. (2019), Molchan et al. (2019) systematized the advantages and challenges for individuals, businesses and national economies from digitalization, showed how the introduction of digital technologies affects the productivity of production factors and the economic growth dynamics. Brynjolfsson et al. (2018) in his research reflected the nature of the impact of digitalization on consumer welfare. Cooper and Kaplinsky (1989) argued that digital technologies and the Internet lead to an increase in the capabilities of countries ' economic systems and generally have a positive impact on the world economy.

At the same time, Hansen and Nissenbaum (2009) compared digitalization to a disaster, focusing on the emergence of numerous threats to the security of States and individuals. The lack of knowledge about the impact of the digital economy and related phenomena on human activity, the labor market, business, public administration, as well as global institutions that regulate this area is of concern to economists, managers, and politicians (Bukht and Heeks, 2018). For example, Zhang and Chen (2019) point to the possibility of increasing problems of income inequality among workers in developed and developing countries in terms of digitalization.

Researchers are also interested in the progress of digitalization in the BRICS countries. Thus, the current vectors of interaction between the BRICS countries on the formation of the digital economy ecosystem are reflected in works of Inshakova and Mitrofanova (2020). Studies by Bragina (2018), Spartak (2018), Tkachenko (2018), Davidson and Yang (2020), Ignatov (2020) attempt to compare and evaluate individual parameters of the digital economy of the BRICS countries.

Methodology

The purpose of the study is to reveal the specifics and assess the scientific and educational potential and the system of ensuring the economic security of the state as a basis for strengthening the positions of the BRICS countries in the global competitive space.

Research objectives:

- to determine the structural features of the country's scientific and educational potential;

- to analyze the dynamics of the scientific and educational potential development of the BRICS countries and systematize the corresponding economic security threats;

- to offer tools to reduce the economic security threats of the state from the scientific and educational potential.

Research methods: theoretical analysis method, graphical method, induction and deduction method, comparative analysis method, economic analysis method, system approach.

Information base of the research: open statistical data of the World Bank (2020), IMF (2018), OECD (2020), documents of strategic importance of the Governments of the Russian Federation, India, Brazil, China, materials of monographs and conferences.

Results

In General, in 2019, the BRICS countries provided 33.4% of global GDP, with nominal GDP reaching 20.8 trillion US dollars (Economicdata, 2020). In 2019, China overtook many of the world's leading countries in terms of GDP,

as well as in terms of the size of the digital economy sector, and came close to the world leader – the United States. India has achieved a GDP that is ahead of the United Kingdom in value terms, but when analyzed in terms of "GDP per capita", this equality disappears, but the digital sector in India is inferior to that in the UK. The other countries of the BRICS group (Russia, Brazil, and South Africa) lag behind the leading countries both in terms of GDP and the share of the digital sector in GDP (figure 1).

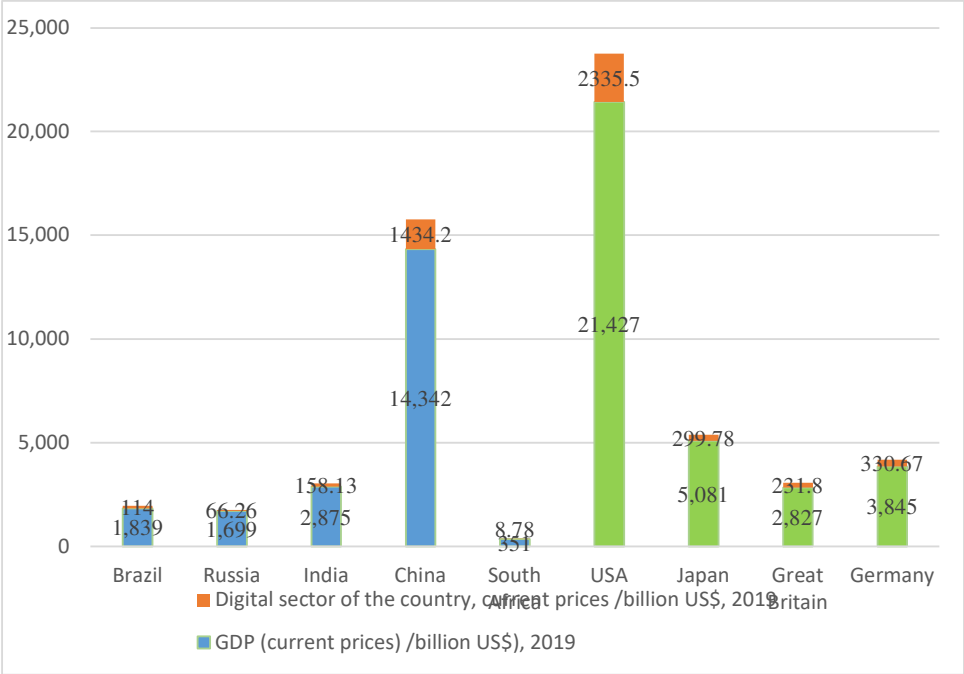

Fig. 1: Comparison of BRICS countries and developed countries in terms of GDP and the size of the digital economy sector (compiled by the authors according to World Bank (2020))

Another indicator of the country's digital development level is the export of ICT products. And in this case, the positions of the BRICS countries are very different. China is ahead of the world's leading countries in terms of this indicator 549954 million US dollars against 138,651 million US dollars in the United States. In contrast, Brazil, Russia, India, and South Africa lag behind developed European countries, the United States, and Japan by several times (figure 2).

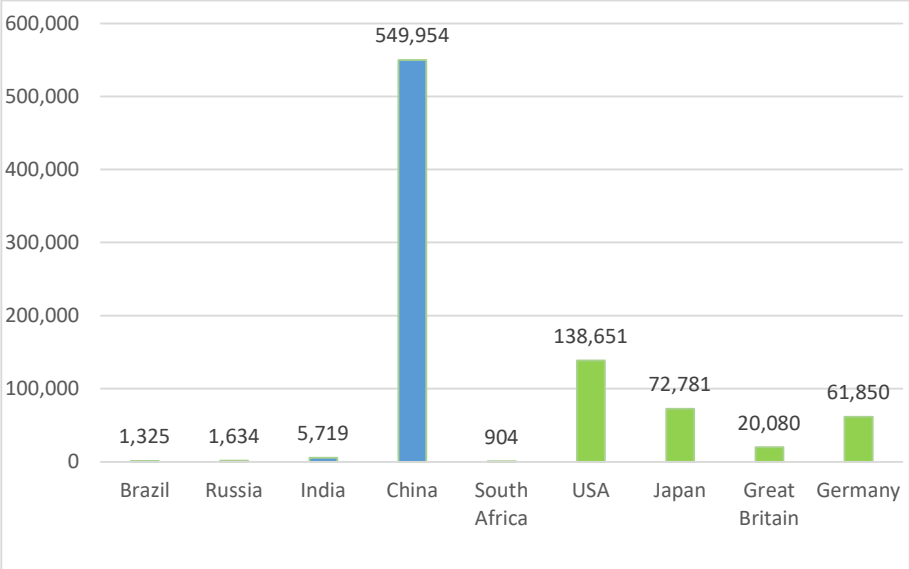

Fig. 2: Exports of ICT goods in BRICS and developed countries, million US dollars, 2019 (compiled by the authors according to OECD (2020d))

What determines success in building China's digital economy, and, conversely, what does Russia, India, Brazil, and South Africa lack to achieve digital leadership? Probably, in the transition to a new model of digital development, a special role is played by knowledge, produced innovations and new technologies, which are the result of the functioning of the scientific and educational potential of the country.

According to Shafikov (2006), scientific and educational potential is the potential of the education system contained in educational structures, which is aimed at the development of science, improvement of scientific products, as well as conducting research.

According to the authors, the following components can be distinguished in the structure of the scientific and educational potential of the state: personnel, material and technical, economic, organizational and managerial. Let's analyze them in the size of the BRICS countries.

1) The personnel component.

It is logical to divide the characteristics of the personnel component into two parts: the teaching staff of higher education institutions that provide training of highly qualified personnel and carry out scientific activities; the staff engaged in research and development in scientific organizations. Thanks to higher education institutions, the scale of training of highly qualified scientific personnel is expanded. The number of teaching staff in Russia in the period 2013-2018 decreased by 26.1% due to a reduction in the number of students and a decline in the number of educational organizations (Federal state statistics service of the Russian Federation, 2020). In addition, the conditions for postgraduate studies have changed due to the transition of the Russian Federation to the Bologna education system in 2010, which resulted in a sharp decrease in the number of postgraduates engaged in scientific activities and ensuring continuity in the scientific field – by 43% in the period from 1995 to 2015.

In contrast, in Brazil, the state's education policy was aimed at improving the literacy rate of the population, and the number of University teachers increased from 349,110 in 2014 to 362,307 in 2017 (i.e. by 3.4%) (OECD, 2020b). Meanwhile, in the UK, USA and Germany in 2014-2018, there was an increase in the number of University teachers from 6.8 % (in Germany) to 12.1% in the UK. The number of University teachers in the United States exceeds the number of University teachers in Russia by 2.2 times.

The number of research and development personnel per 1 million people in the BRICS group is significantly lower than in developed European countries, the United States and Japan. According to official data, only Russia is approaching the required level in terms of the number of researchers (Fig. 3).

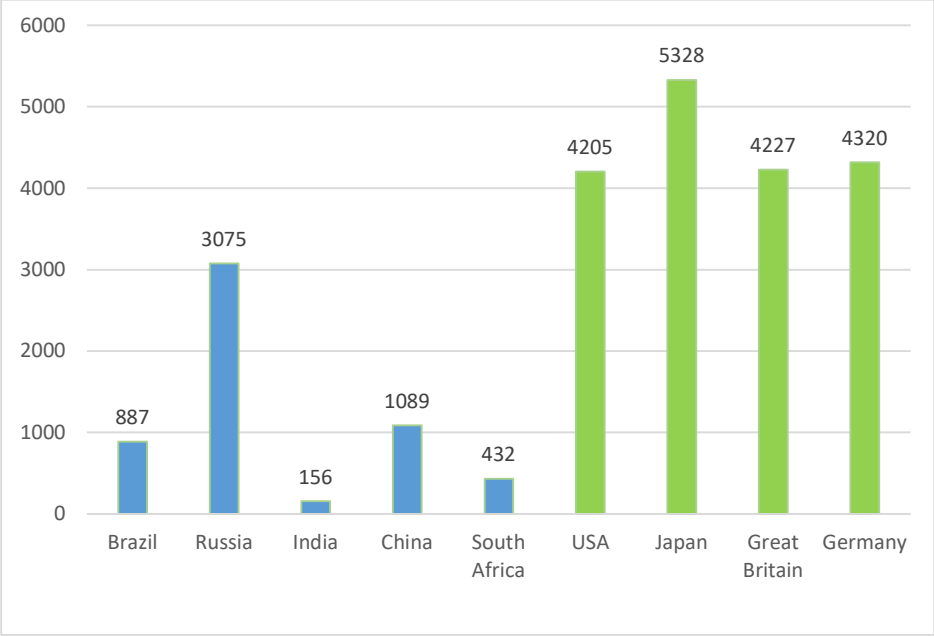

Fig. 3: Number of researchers per million inhabitants, 2019 (compiled by the authors according to Unesco Institute for Statistic (2020))

This situation with the staff engaged in research activities in the countries of the BRICS group is a serious concern.

2) Material and technical component.

An important component of the scientific potential of universities and research organizations is the material and technical base of R&D. Its development and constant updating in accordance with modern requirements is a prerequisite for the intensification of scientific and educational processes, improving the quality of scientific results, as well as the competitiveness of scientific, technical and innovative products. In addition, in a digital environment, the level of access to information and its completeness are important, they are provided with access to the Internet and opportunities to use ICT in professional activities. The BRICS countries are characterized by a lower level of physical infrastructure development: they have a lower speed of Internet access (among the BRICS countries, Russia has the highest speed (68.8), but it is far from the average European speed (250)), the number of active users and households with Internet access.

Nevertheless, they exceed the OECD average in terms of Internet connection costs (from $ 10.1 US PPP in Russia to $29.9 US PPP in Brazil) (Spartak, 2018; Shuisky, 2019; Ignatov, 2020).

In general, the BRICS countries are developing their universities and their material and technical base. This is especially true in China (Peking University, Tsinghua University and Fudan University are leaders in all rankings) and Russia (Degtereva and Chernysheva, 2018). In 2016, India developed a plan for the formation of ten public and ten private universities of international level, however, the problem of its implementation was significant underfunding, so the Indian institutes of technology are only world-class higher education institutions (RIA, 2017).

4) Economic component

The scientific and educational potential depends not only on the number of qualified personnel and the number of researchers, but also on the amount of funding for both University science and R&D in research organizations.

Research expenditures at all types of universities in 2019 were (in constant prices (2015) and constant PPP): 3,896 in Russia, 21,125 in Germany, 11,384 in the UK, and 53,958 in the US. That is, on average, in developed countries, these costs are 7.5 times higher than, for example, in Russia (OECD, 2020a).

R&D funding to an even greater extent determines the state of scientific and educational potential, as well as its implementation. In this aspect, the BRICS countries show different dynamics.

For example, according to available data from the OECD (2020), we can compare the dynamics of R&D financing in Russia, South Africa, and some developed countries (figure 4).

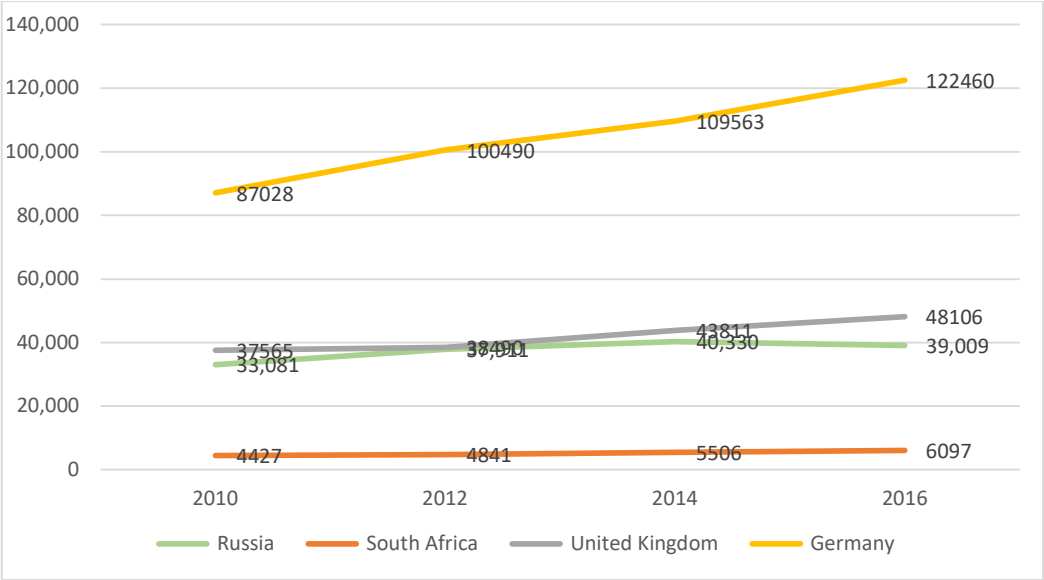

Fig. 4: Dynamics of R&D financing in 2010-2016 in BRICS countries and some OECD countries, millions US dollar, current prices, PPP (compiled by the authors according to OECD (2020c))

It becomes clear that in all the countries under review, the dynamics of R&D financing in the period 2010-2016 is positive (with the exception of Russia, where in 2016 there was a decrease of 3.3%). However, the amount of funding in Germany exceeds the same indicator in Russia by 3 times, in South Africa-by 30 times.

In 2019, Brazil and China invested 2.1-2.3% of GDP in R&D development at the level of developed European countries, which strengthened their positions in the global R&D market (figure 5).

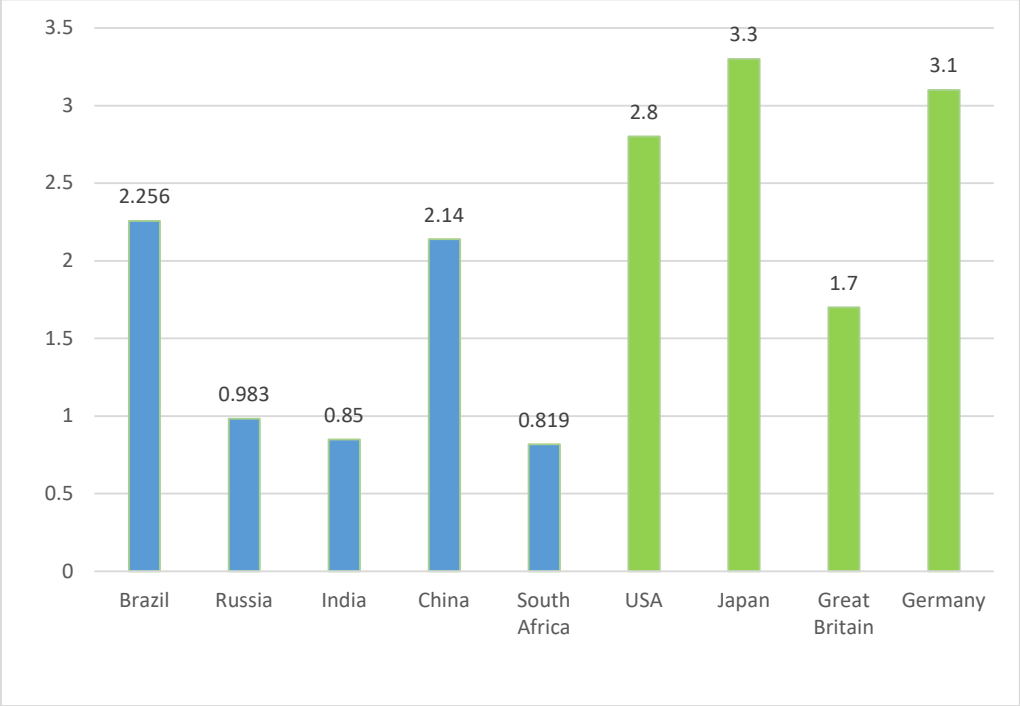

Fig. 5: R&D expenditures in BRICS and developed countries, % of GDP, 2019 (compiled by the authors according to OECD (2020e), Unesco Institute for Statistic (2020))

Note that the structure of R&D financing varies in the analyzed countries: in the United States, Japan, and most European countries, business structures are involved in R&D financing, which cover an average of 60 to 70% of all expenses; in developing countries, most of the R&D expenditures are financed by the state or non-profit organizations (Unesco Institute for Statistic, 2020).

6) The organizational and managerial component is largely determined by the state of the institutional environment, its ability to adapt to the changing conditions of the formation of a new technological order (Inshakov and Fesyun, 2014). For example, in China, the strategy for the development of science and technology is aimed at increasing the independence of industrial potential from the technologies of developed countries, while special attention is paid to fundamental research in those areas of science that guarantee China's entry into the world's technological leaders in the future (Slepak, 2012, 2014). Indeed, China competes in the development and implementation of digital technologies with the world leader the United States, it accounts for a fifth of the world's GDP by PPP (20.1%). India, as a regional leader, successfully incorporates national priorities into the agenda of international platforms for deepening it cooperation between countries and took the 3rd position in the world GDP in PPP in 2019 (8.18%) (Ignatov, 2020). Russia (3.02%) considers the development of ICT as the most influential tool for economic development and maintaining the competitiveness of the domestic economy, and demonstrates positive dynamics in ensuring access to ICT and the use of digital technologies (Government of the Russian Federation, 2018). Brazil (2.40%) is implementing a National strategy for the development of science, innovation and technology, gradually strengthening its position on the world stage in terms of digitalization and ICT (Government of Brazil, 2018). South Africa began to join the processes of forming the digital economy only in 2016-2017, increasing investment in the development of network infrastructure and developing demand for digital products in the domestic market, but at the international level it still has a significant lag (Ignatov, 2020).

The presence of a developed scientific and educational potential is a condition for the economically secure position of the state.

Slepak (2012, 2014) calculated indices of scientific and educational potential and proved the existence of a high correlation between the average per capita monetary income of the population and scientific and educational potential. The researcher noted that in regions with low values of scientific and educational potential, unemployment rates are significantly higher, which means that the level of economic security of the territory in this case decreases. This situation may be compounded by destructive and transformative digitalization (Fossen and Sorgner, 2019).

In addition, the growth of unemployment becomes a trigger for launching further threats to economic security - increasing social tension, migration outflow of the population. A separate problem in the digital economy is the increased information vulnerability of citizens, enterprises, and public authorities, which weakens the economic security of the state if appropriate protection measures are not taken (Karpunina et al. (2019), Karpunina et al. (2020)).

The existence of factors that limit the development of the country's scientific and educational potential (financial, economic, ideological, human, and institutional) leads to a decrease in the level of economic security of the country and its lag in the international space (Fig. 6).

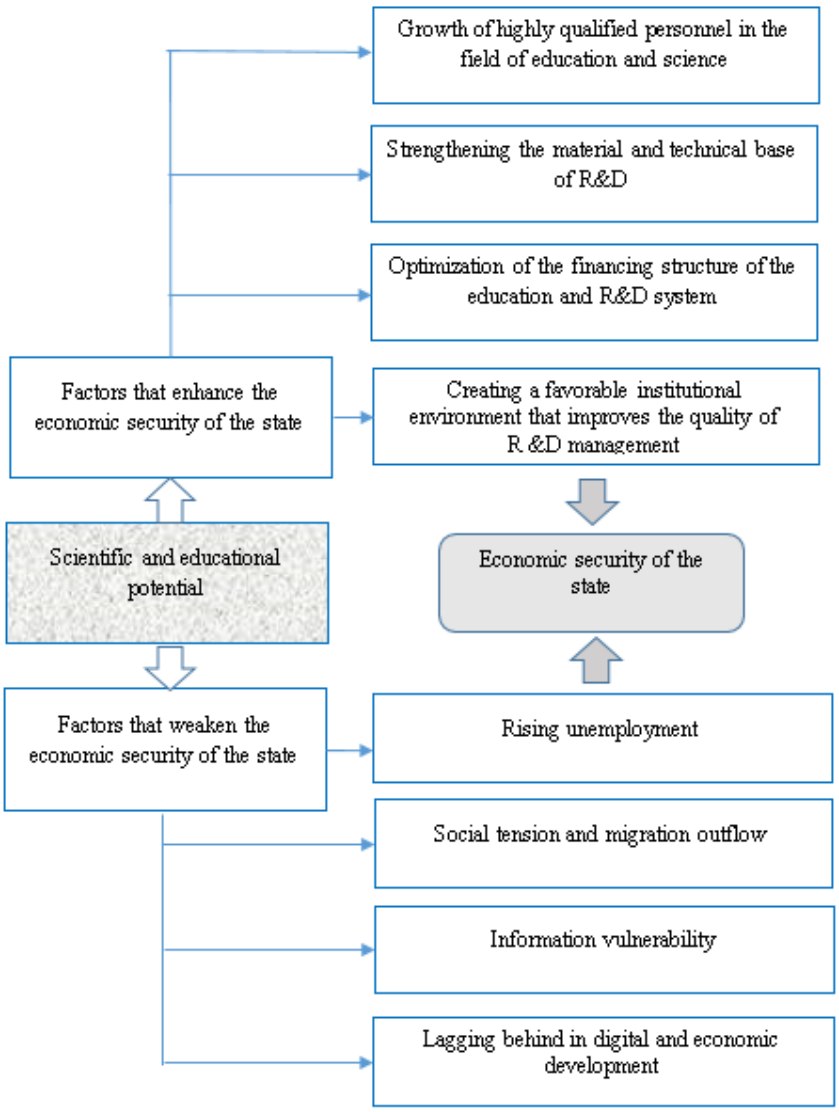

Fig. 6: Scientific and educational potential and factors of its influence on the economic security of the state (compiled by the authors)

The analysis of the BRICS countries revealed a clear advantage in the development of the scientific and educational potential of China and Russia, which are characterized by the most favorable trends in the development of the

education system, R&D, and innovation. Brazil and India have stable average positions in the analyzed indicators. South Africa currently has a slow development of the education and science system, lower R&D indicators among other BRICS member countries, and mixed trends in processes (Antipova and Rodionova, 2016). This means that China and Russia among the BRICS countries have a higher level of economic security, due to the level of development of their scientific and educational potential.

Strengthening the position of the BRICS countries in the global digital space requires the implementation of the following measures within national economies: modernization of the education system for training highly qualified specialists to ensure continuity in R&D; introduction of the principle of co-financing projects by business, as well as creating conditions for stimulating business activity in terms of R&D support; overcoming interregional digital gaps and territorial alignment in terms of access to the Internet, development of digital infrastructure; implementation of cybersecurity strategies at the national level; intra-integration educational and scientific cooperation of the BRICS countries as a basis for spreading the knowledge economy, innovation, high technologies and network readiness.

Conclusions

The authors revealed the content of the concept of "scientific and educational potential of the state" and identified its structural components (personnel, material and technical, economic, organizational and managerial). The authors analyzed the state and dynamics of development of each of the selected components in the BRICS countries, gave a comparative assessment with the leading countries of the world (USA, Japan, United Kingdom, Germany). The article offers a conceptual model of the relationship between scientific and educational potential and its impact on the economic security of the state. The authors proposed public policy measures to strengthen the position of the BRICS countries in the global digital space by developing their scientific and educational potential.

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Forecasting Critical Points of Financial Time Series

Anton V. GOLUB

System Architect, QIWI Plc, Moscow, Russia, e-mail: a.golub@qiwi.com

Natalia A. SHCHUKINA

Plekhanov Russian University of Economics, Moscow, Russia, e-mail: shchukinan@yandex.ru
Financial University under the Government of the Russian Federation, Moscow, Russia; e-mail: shchukinan@yandex.ru

Abstract

This study is devoted to development of an algorithm for identifying critical points of trend change or sharp jumps in economic systems. The time series of fractal dimension local values serves as an indicator of the economic system stability. The paper analyzes the stock quotes fractal characteristics of the five largest companies in different periods of time. The relationship between the dynamic stability violation and the fractal dimension deviation from the optimal value has been proven. These stability boundaries are built on the basis of a linearly weighted moving average and time series fractal dimension. Prediction of critical points and sharp jumps of trend is reduced to determining the intersection points of the fractal dimension local values curve with the curve of the normal system state boundaries. Threshold values of fractal dimension local values are analyzed to identify critical points. The results showed that the accuracy of determining the critical points using the fractal dimension local values increment is higher in comparison with the method of threshold values. However, the type of critical point can only be determined using the last one.

Keywords: Critical Point, Fractal Dimension, Financial Time Series, Investment Risk, Stock Quotes.

JEL Classification: C65; D58, E37.

Introduction

One of the most important institutions of the market system is the stock exchange, where the purchase and sale of shares and bonds of joint stock companies, as well as government bonds, takes place. Funds are mobilized through the stock exchange for investment in fixed assets of the industry.

Forecasting is by far the most important and urgent problem in the economic sphere. Financial markets, investment and lending activities need new tools for making correct forecasts and obtaining high-quality risk assessments. Today, one of the most popular methods of forecasting crisis phenomena is the "signal" method, which consists in developing threshold values for a selected indicator or a set of indicators, the intersection of which, with a certain probability, signals the threat of a financial crisis [Kaminsky & etc., 1998; Kaminsky, 1999].

Classical approaches to analyzing the risks of financial markets and economic units, such as fundamental and technical analysis, are often subject to cross-criticism and have several disadvantages compared to each other. It has been proved that time series of financial data, for example, stock quotes, have fractal statistics (Edgar E. Peters, 1994), the analysis and modeling of which can be performed using fractal methods. One of the promising directions of fractal analysis is the study of the dynamics in time of such a characteristic as fractal dimension. Modern research in the field of fractal methods develops tools for fractal analysis and adapts them to economic data (J.W. Kantelhardt, 2012; Kumar S. and Deo N., 2015; F. Schmitt, D. Schertzer and S. Lovejoy, 2001).

The research is aimed at predicting critical events (sharp surges, collapses or points of trend change) of stock prices in the financial market. The solution of these problems is of particular interest for the field of investment, and the application of methods of fractal and multifractal analysis gives a new understanding of the nature of economic processes from the point of view of physical phenomena and makes available many tools that have not been previously applied to the study of economic systems.

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Materials and Methods

Time series of stock quotes are convenient for testing fractal methods in that they contain a sufficiently large number of measurements. To analyze the dynamics of quotations, the time series of daily stock prices of five companies were selected: Amazon, Facebook, Apple, Tesla and Lukoil. Statistical data cover the period from 04.24.2015 to 04.08.2020 inclusive.

Let's find out how different the signals are: calculate the values and plot the graphs of the multifractal spectra of the signals under consideration. The multifractal spectrum effectively shows the distribution of the scaling factors for the signal, i.e. provides a measure of how much the local regularity of a signal changes over time. A signal that is monofractal exhibits nearly the same regularity throughout time and therefore has a narrowly supported multifractal spectrum. Conversely, a multifractal signal exhibits changes in signal regularity over time and has a multifractal spectrum with broader support.

Let's determine the singularity spectra D (h) and Hölder exponents h for the signals under consideration and plot their graphs. The graphs of the constructed multifractal spectra are shown in Figure 1. They suggest that the series of stocks under consideration are multifractal signals.

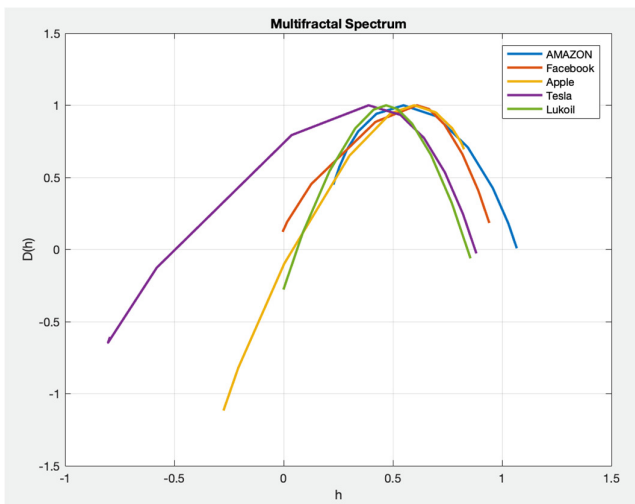

Figure 1: Graphs of multi-fractal spectra (singularity spectra) of time series

Source: Authors

The total scaling factor range (h) is:

1. 0,8343 for Amazon series (h ∈ [0,2277; 1,062]),
2. 0,9452 for Facebook series (h ∈ [-0,0038; 0,9414]),
3. 1,1005 for Apple series (h ∈ [-0,2750; 0,8255]),
4. 1,6856 for Tesla series (h ∈ [-0,8034; 0,8822]),
5. 0,8559 for Lukoil series (h ∈ [-0,0006; 0,8553]).

The values of the fractal indicators D, H and μ correlate with the complex non-periodic behavior of real time series, in which trends and flats chaotically replace the stochastic movement. At 1 <D <1.5, the time series have a long-term correlation, and a persistent market condition appears, which is completely characterized by the fractal dimension indicator. In this case, quantitative mathematical analysis is more reliable, which makes it possible to predict the current economic situation precisely with the help of classical methods of analysis. Moreover, the fractal dimension value close to one indicates the imminent end of the current trend. At D = 1.5 ± 0.05, the behavior of the system is stochastic and is well described by classical statistical methods, i.e. the distribution of stock prices in the market is Gaussian only if the fractal dimension is in a narrow range. At 1.5 < D <2, the time series becomes nonlinear, an antipersistent state of the stock price arises, the time curve becomes unstable and is ready to move to a new state. With such a range of fractal dimensions, it is necessary to use an analysis of the fundamental factors of the state of the economy.

The fractality index μ is also an indicator of the stability of the initial time series: the larger the value of μ, the more stable the behavior of the series, and the smaller μ, the stronger the trend is expressed in the original series, in other words, the case $\mu < 0.5$ can be interpreted as a trend, and the case $\mu > 0.5$ as a flat.

Let's calculate the main multifractal characteristics of the initial time series based on the obtained exponent values α of the power spectral density function, $D = 3 - \alpha$. The values of multifractal characteristics are presented in table 1.

Table 1: Values of the time series main fractal characteristics for the entire period under consideration

No.	Company name	Exponent of the power spectral density function, α	The Hurst Exponent, $H \in [0; 1]$	Fractal dimension, $D = 2 - H \in [1; 2]$	The spectral dimension, $\beta \in (-\infty; +\infty)$	Order of integration, $d = \beta/2 \in (-\infty; +\infty)$	Fractality index, $\mu = D - 1 \in [0; 1]$
1	Amazon	1.7894	0.7894	1.2106	2.5788	1.2894	0.2106
2	Facebook	1.8772	0.8772	1.1228	2.7544	1.3772	0.1228
3	Apple	1.9966	0.9966	1.0034	2.9932	1.4966	0.0034
4	Tesla	1.9558	0.9558	1.0442	2.9116	1.4558	0.0442
5	Lukoil	1.8569	0.8569	1.1431	2.7138	1.3569	0.1431

Source: Authors

The analysis of indicators indicates the persistence of the considered time series of stock quotes. As can be seen from Table 1, the values of the Hurst exponent are in the range characterizing the persistence of the considered time series. The fractal dimension values indicate a steady state, long-term correlation and the possibility of forecasting the current economic situation.

There are various methods for calculating the fractal dimension of signals, including Box-counting method, Multiresolution Box-counting Method (MRBC), Multiresolution Length Method (MRL), Katz Method, Sevcik Method, Higuchi Method, Detrended Fluctuation Analysis (DFA), Average Wavelet Coefficient (AWC). In the study of Raghavendra B. S. and Narayana Dutt D. (2010), a study of the influence of various parameters on the fractal dimension was carried out. The MRBC, MRL, Sevchik and Higuchi methods were found to be insensitive to waveform amplitudes (dispersion). Katz's method showed that as the amplitude increases, the fractal dimension increases. The Higuchi, MRBC, MRL methods showed the greatest efficiency in assessing the fractal dimension of oscillograms, and the results of the accuracy of the MRBC and MRL methods are comparable to the results of the Higuchi method. One of the most accurate methods is also the method of average wavelet coefficients and the method of deterministic fluctuation range. Let us determine the values of the Hurst exponent by the method of normalized range (R / S-analysis) and the fractal dimension of the series of indices by the most famous methods: the Higuchi method, DFA method and AWC method. The calculation results are presented in table 2.

Table 2: Fractal dimension and Hurst exponent values of time series

No.	Time series	DFA method	Higuchi	AWC method	Hurst exponent
1	Amazon	1.5280	1.4220	1.5790	0.9831
2	Facebook	1.4734	1.4972	1.5052	0.9786
3	Apple	1.5924	1.4633	1.6369	0.9837
4	Tesla	1.4401	1.6264	1.5412	0.9233
5	Lukoil	1.5323	1.4305	1.5721	0.9997

Source: Authors

Tsvetkov V. P., Tsvetkov I. V., Gulyaeva O. S. (2007) and Kudinov A. N., Tsvetkov V. P. and Tsvetkov I. V. (2009) found that the fractal dimension value can serve as an indicator of the number of factors affecting the system. If the fractal dimension is less than 1.4, the system is affected by one or more forces that move the system in one direction. If the dimension is about 1.5, then the forces acting on the system are multidirectional, but more or less compensate each other. The behavior of the system in this case is stochastic and is well described by classical statistical methods. If the fractal dimension takes on values greater than 1.6, then the system becomes unstable and is ready to move to a new state. The results of calculating the fractal dimension for the time series under study indicate the stability of economic systems, since the fractal dimensions have values close to 1.5.

Results

To substantiate the feasibility of using fractal analysis methods for studying crisis periods, we study the behavior of time series of stock quotes for Amazon, Facebook, Apple, Tesla and Lukoil in the period from 04.24.2015 to 04.08.2020. It is important to consider data of a different nature: indicators that are stable and indicators with a high degree of volatility. Figure 2 shows the different behavior of the time series of Amazon stock quotes.

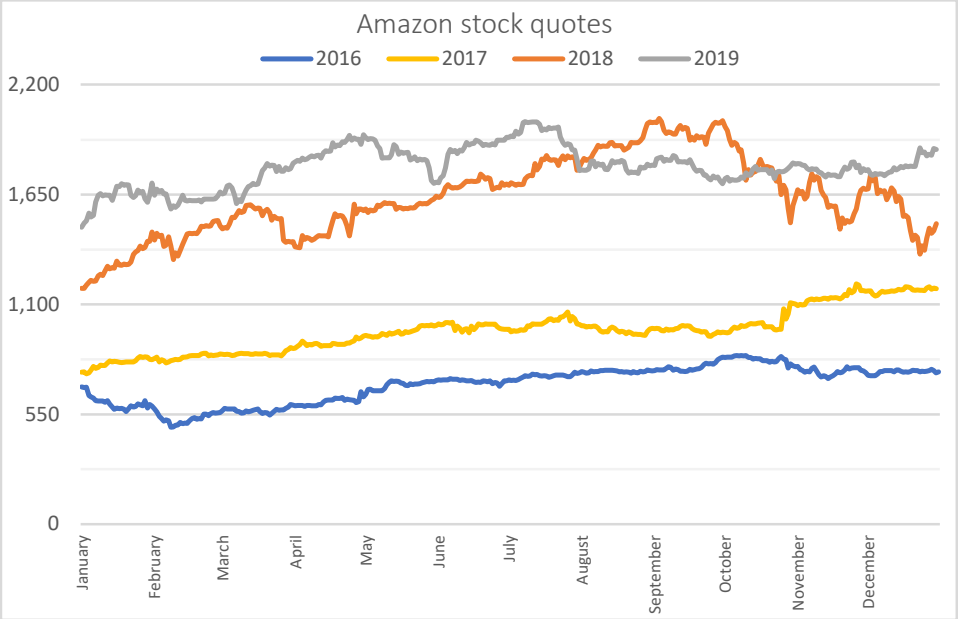

Figure 2: Amazon stock quotes in different time periods

Source: Authors

Let us determine the fractal dimension values by the Higuchi method of the studied time series in different years from 04.24.2015 to 04.08.2020. The calculation results are presented in table 3.

Table 3: The fractal dimension values of companies stock quotes time series in different periods

No.	Time series	The fractal dimension values					
		2015	2016	2017	2018	2019	2020
1	Amazon	1.2336	1.3704	1.3819	1.4299	1.5553	1.4118
2	Facebook	1.4879	1.5142	1.2586	1.4676	1.6450	1.2896
3	Apple	1.4975	1.5665	1.4300	1.4907	1.3710	1.3617
4	Tesla	1.5742	1.6651	1.4803	1.8026	1.4148	1.3961
5	Lukoil	1.7181	1.4733	1.4237	1.4124	1.4873	1.2807

Source: Authors

Let's analyze the dynamics of the time series fractal dimension of Facebook stock quotes. In 2016, one can observe rare jumps in the company's stock price. The maximum change in daily yield in 2016 occurred on January 28 and amounted to 12.01%. The next dramatic changes occurred on April 28, when the daily yield increased by 10.11%. The next shocks came in early June, when on June 2, the yield increased by 7.11% compared to June 1, and on June 3 again returned to the previous values, having decreased by 6.69%. On the remaining days of 2016, the daily return on Facebook shares varied within 1.5%. The fractal dimension of the time series is 1.5142. 2017 is characterized by

a more stable level of return on the company's shares. The maximum change in share prices occurred on July 27, 2017 and amounted to 3.90%. The fractal dimension value, calculated from the time series of quotes in 2017, is 1.2586, which is significantly lower than its value in 2016. The next year 2018 is unstable. The maximum change in share prices in 2018 was 18.25%. During this period, one can observe an increase in the fractal dimension up to 1.4676. In the spring and summer of 2019, for a number of stock quotes of the company, one can observe multiple daily jumps in the stock price from 10.22% to the maximum in 2019 of 22.99%. Thus, tracing the change in the dynamics of the fractal dimension of the time series of Facebook stock quotes, one can notice an increase in the fractal dimension both directly during periods of sharp changes in the stock price and in the previous period. At the same time, after a significant decrease in the fractal dimension, a period of trend change follows, which can be observed in 2018. This result is clearly visible for the time series of Facebook stock quotes. Figure 3 shows the dynamics of stock quotes and a diagram of changes in the fractal dimension of the time series of Facebook stock quotes.

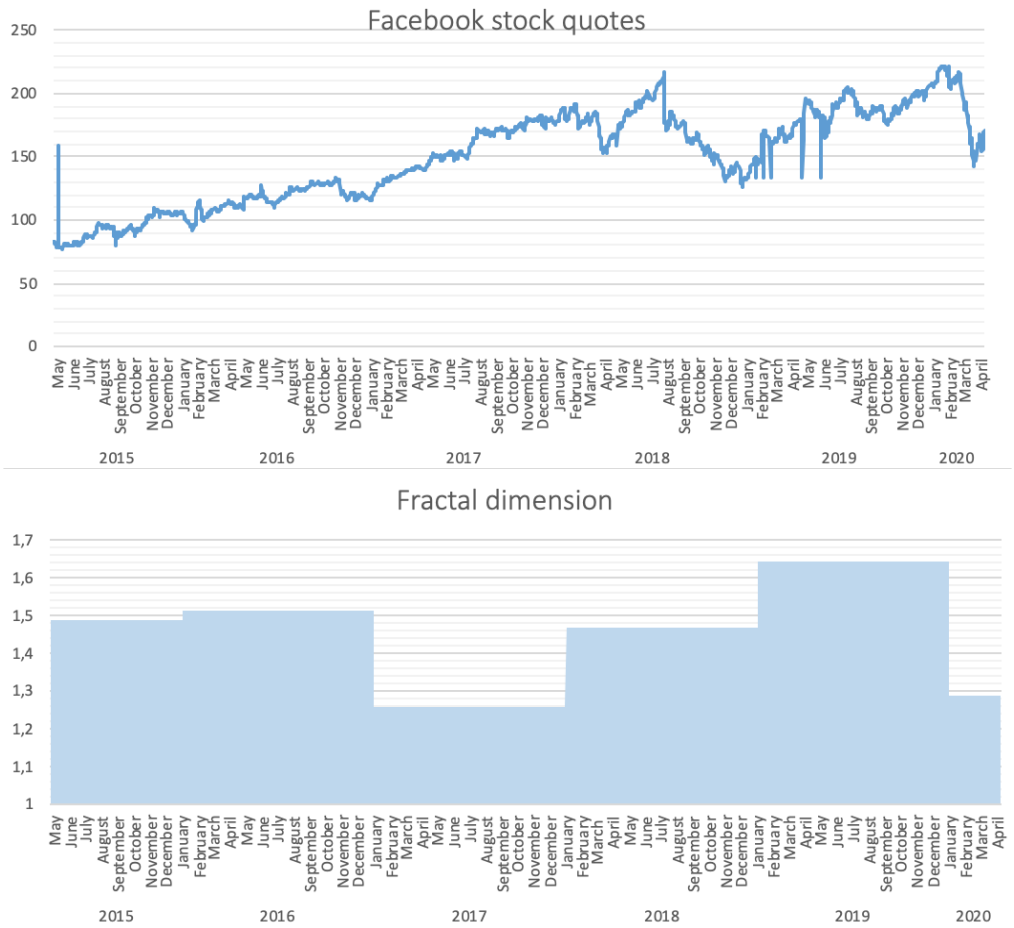

Figure 3: Dynamics of stock quotes and a diagram of changes in the fractal dimension of Facebook stock quotes time series

Source: Authors

For Tesla, the situation with the assessment of changes in the fractal dimension is somewhat different from all considered time series. In the period from 2015 to mid-2019. there is no clear trend in the dynamics of stock quotes. A slight upward trend can be observed in 2017 and negative dynamics until October 2019. Changes in the maximum values of daily yields during this period range from 8.59% in 2017 to 13.40% in 2018. The values of the fractal dimension are also not stable, and in 2015, 2016 and 2018 indicate instability and readiness to move to a new state. On October 7, 2019, a sharp jump can be observed, which changed the daily yield by 16.97% and an uptrend that followed. At the same time, the value of the fractal dimension decreased in 2019 to 1.4148, which indicates the stability of the company. Thus, for the time series of Tesla stock quotes, the high value of the fractal dimension in 2018 indicates future changes in the trend. Note that for the time series of Facebook stock quotes, the period of trend reversal followed a significant decrease in the value of the fractal dimension. Figure 4 shows the dynamics of stock quotes and a diagram of changes in the fractal dimension of the time series of Tesla stock quotes.

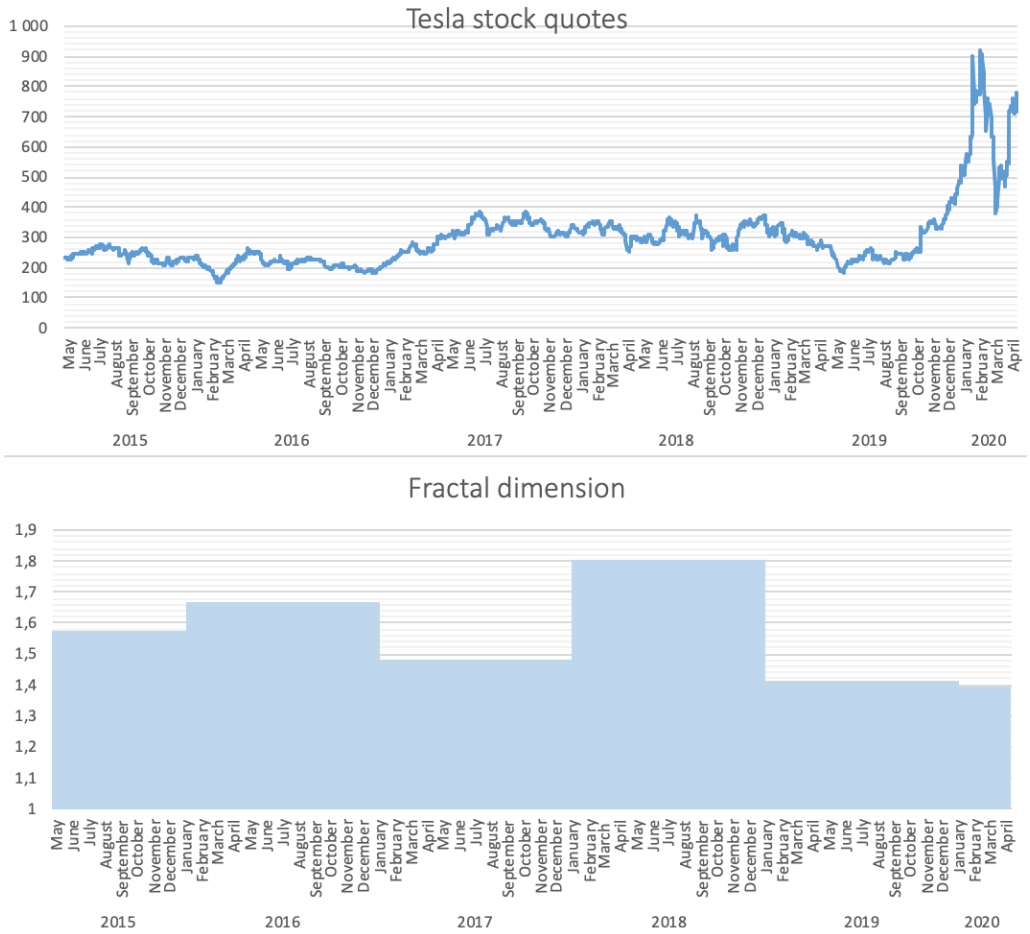

Figure 4: Dynamics of stock quotes and a diagram of changes in the fractal dimension of Tesla stock quotes time series

Source: Authors

Thus, the fractal dimension of a certain value can be used as an indicator of a crisis or a "flag" of a catastrophe. To predict the crisis development of the economic system, it is advisable to pay attention also to the periods preceding the crisis stages.

For further investigation of the nonstationary dynamics of fractal dimension, the “sliding window” method was applied, the essence of which is as follows. First, in the time series of stock quotes, a sequence of 60 values is selected and for these data the fractal dimension is calculated using the Higuchi method. After that, the interval moves to the right along the time series by one value, and the fractal dimension is calculated again. Repeating this procedure throughout the entire study period, we obtain the local values of the fractal dimension. The dynamics of the values of the time series of Lukoil stock quotes in comparison with the dynamics of the local values of the fractal dimension of the signal are shown in Figure 5.

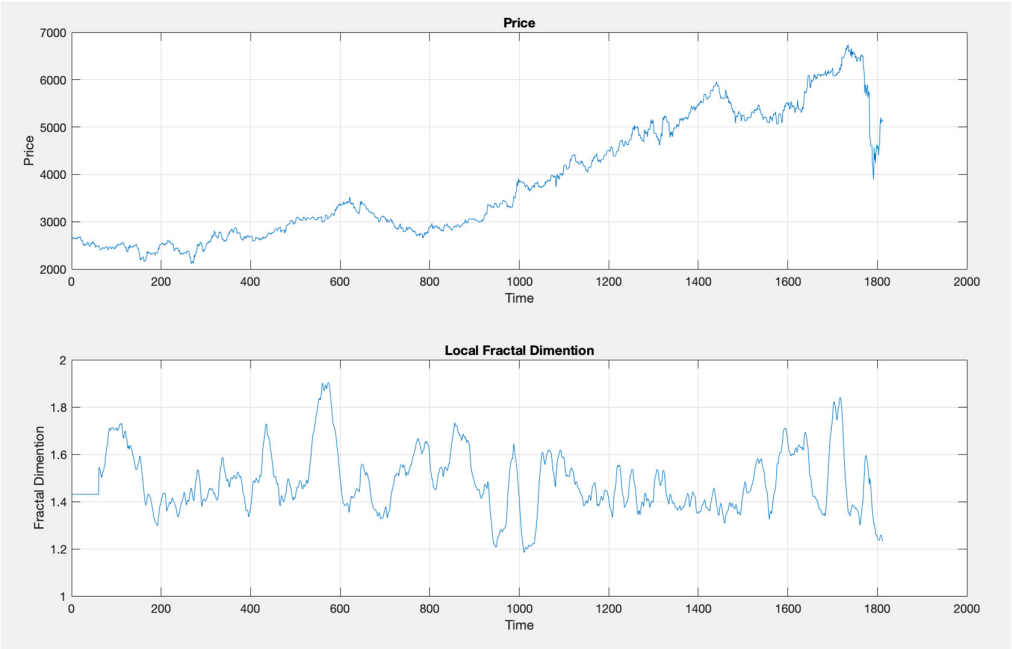

Figure 5: Dynamics of Lukoil stock quotes and local values of the fractal dimension
Source: Authors

For a fairly long period of time until January 2017, an upward trend can be observed in the time series of the company's stock quotes, accompanied by changes in the daily yield within 5%. Local values of fractal dimension during this period remain within the normal state from 1.3 to 1.7. In the period from 533 to 583 days, we see a sharp increase in the values of the fractal dimension to a maximum of 1.9039 on day 573. On day 604, the value of the fractal dimension again decreases to the value found across the entire time series, and we see the beginning of a change in the trend direction that began on day 628, i.e. 01/11/2017. This downtrend lasted until mid-June 2017, after which the trendline direction reversed and persisted until February 2020. Local values of the fractal dimension from 1681 to 1725 days, which corresponds to the period from 11/29/2019 to 01/12/2020, exceed the values of 1.6. Thus, abnormally high values of the fractal dimension warn of an impending trend change long before this moment.

Analysis of the dynamics of fractal dimensions of stock quotes time series of companies indicate the existence of a limiting fractal dimension, when approaching which instability and possible crisis manifestations arise.

In the paper of Gafarova, E.A. and Dobikova, D.V. (2012) when analyzing the dynamics of the fractal dimension of the exchange rates of developed and developing countries, it was shown that the lower and upper boundaries of the fractal dimension for a crisis-free state are 1.3 and 1.7, respectively. However, these boundaries of the normal state of the system do not always allow judging about the violation of stability and can determine a sufficiently large number of false signals. Thus, an overestimated value of the fractal dimension of the time series indicates a less stable state of the system, a number of stock prices will be characterized by sharp jumps in quotations, and the threshold of the normal state will be less sensitive to changes. A low value of the fractal dimension indicates a more stable state of the system. With a relatively low value of this indicator, the initial series of stock quotes will be characterized by a fairly smooth trend change and the absence of sharp drops and jumps, the threshold of the normal state will be more sensitive, which can be seen in Figure 6, which reflects the boundaries of the normal dynamics state of the fractal dimension time series of Tesla stock quotes.

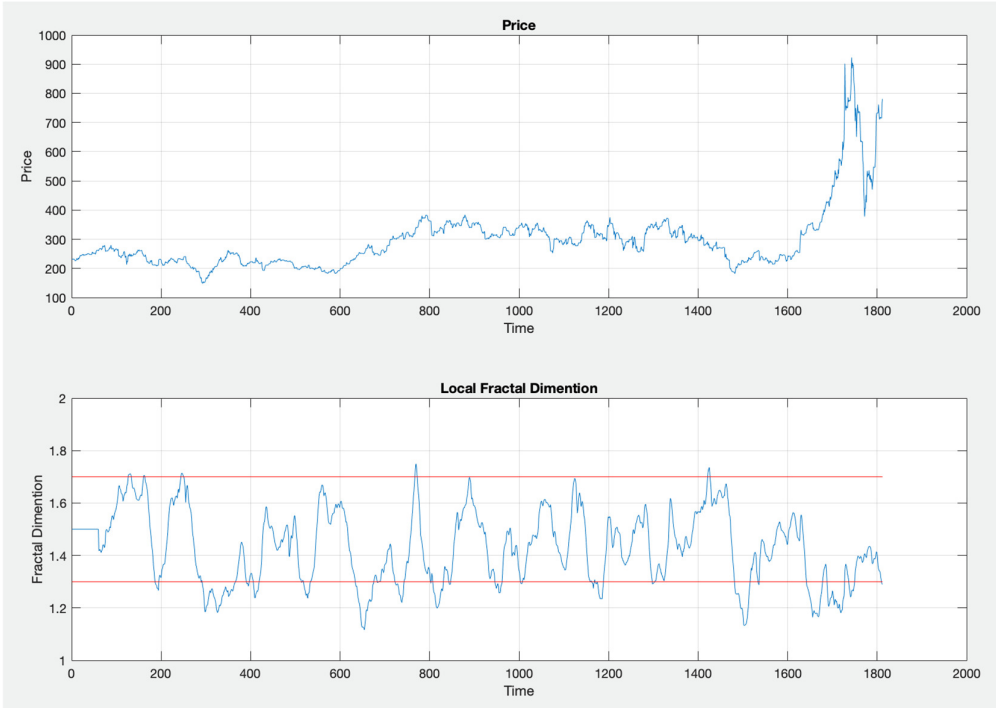

Figure 6: Dynamics of Tesla stock quotes, local values of the fractal dimension and the normal state boundary

Source: Authors

To predict the critical states of the system, it is important to find the boundaries of the threshold of the normal state, which depend on the current local values of the fractal dimension and the fractal dimension of the entire time series.

Forecasting is reduced to determining the intersection points of the curve of local values of the fractal dimension with the indicators of the upper and lower thresholds of the normal state. Such an event will be a signal for a future crisis in the time series (a sharp jump, trend change). The value of the lower and upper thresholds will affect the appearance of signals. Calculations show that for financial series the upper and lower boundaries of the normal state of the system can change. Therefore, it is necessary to determine the boundaries of the normal state in such a way that the critical states of the system can be identified for both an unstable and a stable period of the time series. A signal will be considered false if, after its appearance, there are no further trend change points or sharp jumps.

The threshold values of the normal state of the system for the initial time series will be determined on the basis of moving averages and the total fractal dimension of the series. As a result of the experiments, the boundaries of the normal state were resolved as follows:

$$FD_{up}(t) = \frac{1}{4n}\sum_{k=1}^{4n} FD(t-k) + 0.1FD;$$

$$FD_{dn}(t) = \frac{1}{4n}\sum_{k=1}^{4n} FD(t-k) - 0.1FD,$$

$FD_{up}(t)$, $FD_{dn}(t)$ – upper and lower limits of the normal system state,
$n = 60$ – width of the window for calculating of the fractal dimension local values,
FD – time series fractal dimension calculated by the Higuchi method.

The intersection of the fractal dimension local values with the upper or lower normal state boundary means the beginning of a signal – a critical point – a trend change or a sharp jump. As you can see, if both the signals of the lower and upper thresholds take place on a relatively short interval, this can serve as an indicator of a change in the trend of the time series of the company's stock quotes. If the signals are rare and appear separately – there is either an intersection of the upper or lower threshold of the normal state - one can judge the critical point of a sharp jump in the time series under study. Figure 7 shows a graph of Lukoil stock quotes and a number of local values of fractal dimension with found boundaries of the normal state.

Figure 7: Dynamics of Lukoil stock quotes, local values of the fractal dimension and the normal state boundary

Source: Authors

Let's analyze the critical points and critical areas of Lukoil stock quotes. The intersection of the fractal dimension local values with the upper normal state boundary from the 88th to the 124th day can be regarded as a quick fall in the share price, which occurred on the 154th day and amounted to 15%. The next single signal appears on the 183rd day and signals an upcoming small rise in quotes. The next single signal appears on the 220th day and indicates an upcoming sharp decline in quotations by 16.5%. Then the signal appears in the area of the 400th day, first at the lower and then at the upper threshold of the normal state. This is followed by a change in the trend direction, accompanied by two more critical points at the lower threshold of the normal state, which indicate the continuation of growth without changing the trend.

Then, in the area of the 600th day, a critical point appears, first at the upper and then at the lower border of the normal state. This was followed by a change in the direction of the trend. The next signal appears first at the lower and then at the upper border of the normal state, which indicates an impending trend change, which happened immediately after the 810th day.

The next critical area appears in the period from 953 to 1092 days. Following him in the quotations of the company's shares, one can observe an unstable situation with sharp jumps in quotations. On the 1208th day, a single critical point appears, crossing only the lower border of the normal state, after which a sharp jump in quotations by 18% followed. The next critical points appear at the border of the upper threshold, without crossing the normal line, from 1200 to 1300 days. This period corresponds to frequent and sharp jumps in the company's stock prices. The next signal appears in the area of 1580-1600th day, first at the lower and then at the upper border of the normal state of the system. About 15 days later, there was a significant increase in quotations, accompanied by the appearance of another signal at the upper threshold of the normal state. The next critical area took shape from 1772 to 1790 days and contains several critical points at once, arising alternately at different boundaries of the normal state. These signals can be regarded as a sharp drop and a trend reversal that followed.

Thus, only one critical point in the 800th day area remained unpredicted, which signaled a trend change. A number of local values of the fractal dimension do not cross the lower boundary of the normal state, although they approach it.

Let's consider Facebook stock quotes and the resulting series of local values of the fractal dimension for Facebook (Figure 8). For the Facebook stock quotes series, out of the most significant 23 critical points, only two points were not predicted.

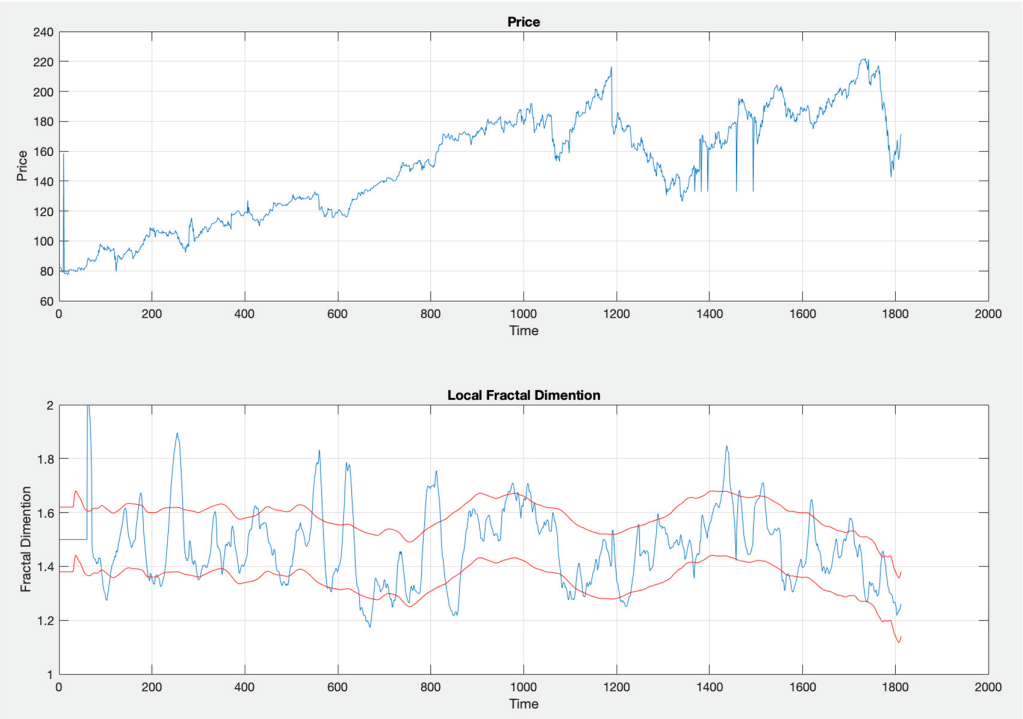

Figure 8: Dynamics of Facebook stock quotes, local values of the fractal dimension and the normal state boundary

Source: Authors

The analysis results show that crisis periods are characterized by sharp jumps in the fractal dimension local values. Therefore, it is necessary to consider the possibility of using increments of fractal dimensions to identify critical points.

The increments at the current time moment will be found as the difference between the current and the previous values of the fractal dimension. To identify the threshold of the normal state, it is necessary to determine the normative value, the excess of which will serve as an indicator of the critical state. Let us fix the normal state of the system with the value of increments of the fractal dimension not exceeding 0.025FD, where FD is the fractal dimension of the time series of the company's stock quotes.

For the time series of Facebook stock quotes, the number of predicted critical points turned out to be 4 more than what was revealed using the threshold values of the normal state of the fractal dimension (Figure 9). That is, the analysis of increments of local values of the fractal dimension is more sensitive to changes in the structure of the original time series.

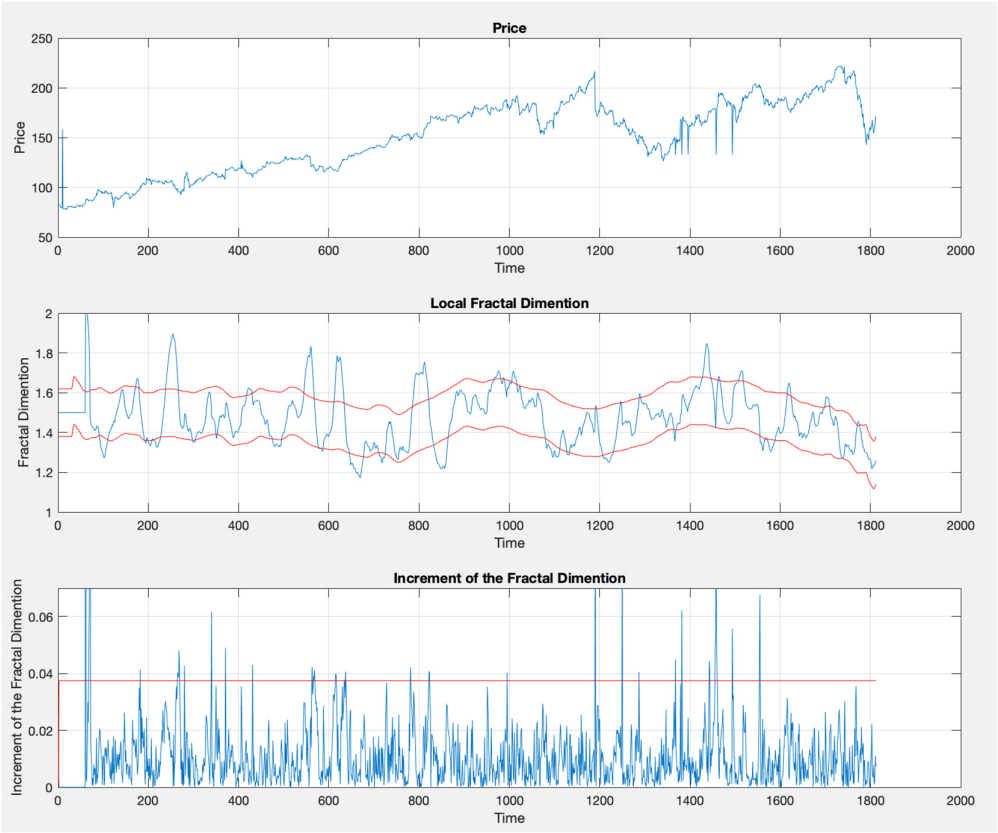

Figure 9: Dynamics of Facebook stock quotes, local values of fractal dimension and normal state boundaries, and a graph of increments of local fractal dimension values

Source: Authors

The results of a comparative analysis of methods for identifying critical points are presented in Table 4.

Table 4: Comparative characteristics of methods for the detection of critical points

Time series	Number of critical points	Normal state threshold method			Method of increments of local fractal dimension values		
		Number of predicted critical points	Number of false signals	Percentage of correctly predicted critical points	Number of predicted critical points	Number of false signals	Percentage of correctly predicted critical points
Amazon	27	24	2	0.83	22	0	0.81
Facebook	23	21	1	0.88	23	0	1.0
Apple	14	13	2	0.81	14	2	0.88
Tesla	25	22	0	0.88	22	0	0.88
Lukoil	16	15	0	0.94	16	0	1.0

Source: Authors

The study shows that the method of increments of local values of the fractal dimension is more sensitive to changes in the structure of the time series under study and makes it possible to identify a greater number of critical points of the system in comparison with the method of threshold values of the normal state. It should be noted that the method of increments of fractal dimension reveals critical points, but does not allow determining the type of critical point.

Conclusion

The paper analyzes the prerequisites for applying the methods of fractal and multifractal analysis to the data of financial systems. For efficient markets theory (EMH), an important measure of market efficiency is the volume of trades. However, the biggest market crashes occurred when liquidity was low along with high trading volume. Low liquidity can be characterized as unbalanced trading volume. Thus, explaining market crashes from an EMH perspective becomes difficult. The fractal market theory (FMH) has become an alternative to the efficient market theory. Unlike EMH, FMH claims that prices cannot reflect all available information, they only reflect information that is relevant only for a specific investment horizon.

The paper analyzes the stock quotes fractal characteristics of the five largest companies in different time periods. The relationship between the fractal dimension of the stock prices dynamic and their trend has been proven. The time series of the fractal dimension local values, obtained by the sliding window method, serves as an indicator of the economic stability of the economic system. The boundaries of the normal state of economic systems have been shown. An algorithm has been developed for determining the upper and lower thresholds of the normal state of fractal dimension for the purpose of predicting critical events. To implement it, the statistical method of linearly weighted moving average and the total fractal dimension of the series were used. The analysis of the threshold values of the increments of the local values of the fractal dimension to identify critical points. The results showed that the accuracy of determining the critical points using the increment of local values of the fractal dimension is higher in comparison with the method of threshold values. However, the type of critical point can only be determined using the method of threshold local values of the fractal dimension.

The proposed algorithm for identifying critical points of trend change or jumps in stock quotes helps to identify in advance the upcoming change in the time series trend direction, thereby helping investors to make a managerial decision on further actions in relation to this economic system. This approach draws attention to the systematic failure or progress of the system, which helps to level non-fundamental short-term unrest in the financial markets and reduce the likelihood of investment risk for an economic entity in an environment of turbulence, which may be caused by unreasonable influence from speculators. The developed algorithm can be used as an auxiliary tool for an investor to develop an optimal trading strategy and reduce investment risks.

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The Energy Efficiency Instruments for The Economy

Vladimir PLOTNIKOV
Saint-Petersburg State University of Economics,
Saint-Petersburg, Russia; Southwest State University, Kursk, Russia;
e-mail: plotnikov_2000@mail.ru

Ivan MAKAROV
Financial University under the Government of the Russian Federation
(Lipetsk branch), Lipetsk, Russia, e-mail: INMakarov@fa.ru

Ekaterina BARBASHINA
Southwest State University, Kursk, Russia;
Russian Presidential Academy of National Economy and Public Administration
(Lipetsk branch), Lipetsk, Russia; e-mail: k_barbashina@bk.ru

Oleg MAKAROV
Russian Presidential Academy of National Economy and Public
Administration (Lipetsk branch), Lipetsk, Russia, e-mail: oleg250483@mail.ru

Abstract

The problem of depletion of resources, the transition to sustainable development and the model of a green economy made it necessary to increase the efficiency of the use of economic resources. In particular, a lot of attention in various countries of the world is paid to improving energy efficiency and energy saving. In conditions of limited primary energy resources, the task of their careful use remains strategically important. The article discusses ways to solve this problem at the macroeconomic and microeconomic levels. The authors proposed to form an energy efficiency cluster. Such clusters can be implemented in structural and industrial policies. For these new integration formations, organizational schemes and management methods are proposed. The possibilities of state regulation of their creation and development are also considered.

Keywords: Energy Efficiency, Energy Consumption, Energy Saving, State Economic Policy, Energy Efficiency Cluster, Industrial Cluster.

Introduction

In modern conditions, the problems of ensuring the energy efficiency of the economy have become very relevant (Dunlop, 2019; EU, 2012; EU, 2019; European Commission, 2012; Kong et al., 2016; Makridou et al., 2015; Vertakova and Plotnikov, 2019; and other). As you know, the first impetus to improve energy efficiency was given by the global oil crisis of the 1970s (Johnson and Wilson, 1982). A significant increase in world prices for primary energy has led to an understanding of the irrationality of the previous model of business activities. Energy is no longer cheap. Ensuring competitiveness at all levels (national, regional, enterprise, products) required tight cost control. In this regard, efforts have been made to reduce energy consumption and improve energy efficiency.

Today (2020) the level of prices for primary energy in the world markets has significantly decreased. This is due to both the competition between the largest oil exporters (first, we are talking about the actions of Saudi Arabia) and the pandemic of the new coronavirus infection Covid-19. As a result of measures taken by national and regional governments, restrictions have been introduced for many types of economic activity. Borders have been closed for private travel, many businesses have been stopped, the work of shops and restaurants has been restricted, the population is advised not to leave their homes, etc. As a result, the demand for energy has dropped significantly. This led to a drop in prices.

The fall in prices was especially dramatic in the second quarter of 2020, when the "first wave" of the pandemic was observed (Figure 1). Later, prices stabilized at 35-40 USD / bbl. This is due to both the reduction in supply and the adaptation of the world economy to the pandemic shock. From the standpoint of the problem under consideration, a

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favorable situation has developed. The cost of primary energy has dropped. This allows less attention to be paid to energy saving issues.

Source: Trading Economics, 2020a.

Fig. 1: Crude oil prices at last year (West Texas Intermediate - WTI).

But strategically (Pirogova et al., 2020a), the situation has not changed. The observed crisis (Figure 2), according to available estimates, will be replaced by recovery growth in 2021-2022. After this "rebound", the global economy may return to growth rates approximately equal to those before the crisis (about 3% per year). China's economy, the largest economy among the countries of the world (in terms of purchasing power parity), has already overcome the crisis. After falling in the 2nd quarter of 2020, it is growing steadily again (Figure 3). Although economic growth in China is gradually declining, it remains above the world average. This means that energy consumption tends to increase (Pirogova et al., 2020b).

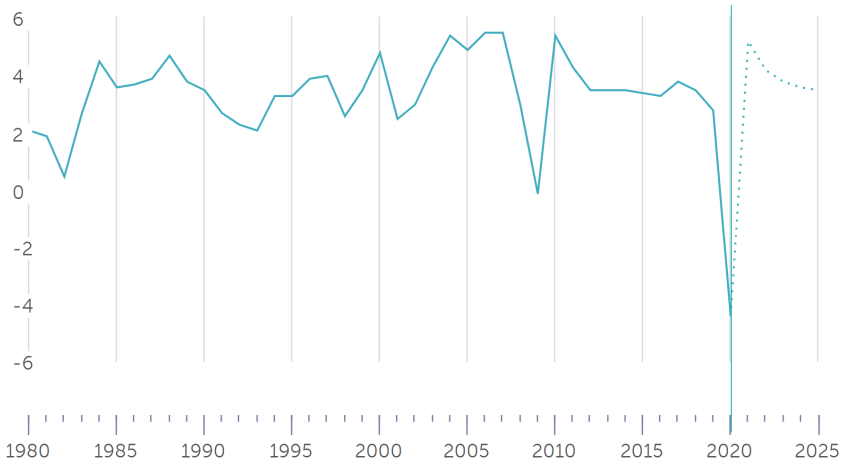

Source: IMF, 2020.

Fig. 2: Global GDP growth.

In conditions of limited primary energy resources, the task of their careful use remains strategically important. This task is relevant for many countries of the world. There is a steady trend towards energy efficiency in the economy (Figure 4). This is a global trend. If the economies of countries and regions, as well as individual enterprises do not consider this trend, they will quickly lose their competitiveness.

It should also be noted that improving energy efficiency is in good agreement with the internationally recognized Concept of Sustainable Development and the Green Economy Model (Kara et al., 2014; Vertakova and Plotnikov, 2019; Wang et al., 2014; and other).

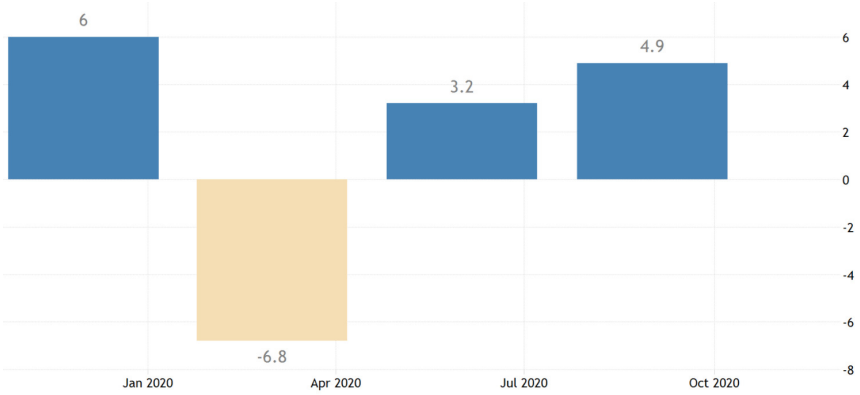

Source: Trading Economics, 2020b.

Fig. 3: China GDP annual growth rate at last year.

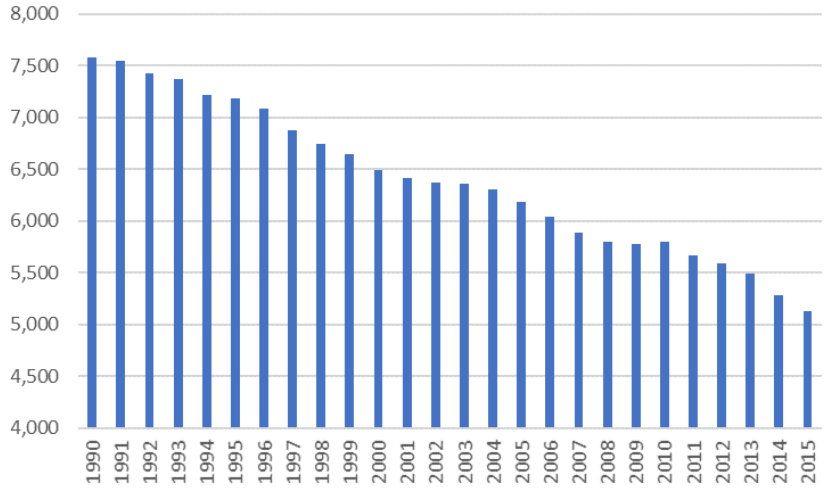

Source: Ritchie and Roser, 2015.

Fig. 4: Energy intensity level of primary energy (MJ/$2011 PPP GDP).

Materials and Methods

When solving the problem of effective design of regulation of national and regional markets, one should consider the trend of increasing energy efficiency. Taking it into account will help to increase the competitiveness of enterprises. At the same time, it is necessary to consider the presence of significant regional and sectoral heterogeneity of markets. The heterogeneity is manifested in the existence of industries that perform different functions in the national (regional) economy and different social functions. Also, heterogeneity is manifested in the unevenness of spatial development (Makarov et al., 2019; Plotnikov et al., 2018; Polozhentseva, 2016; Sanabria Gómez, 2017; Vertakova et al., 2015; and other). Moreover, the heterogeneity can be related to institutional factors. Therefore, it is necessary to consider the existing sectoral and institutional specifics.

Sector-institutional specificity, when analyzed at the micro level, is formed under the influence of the specifics of companies operating in certain industry markets. It is based on the combination of resources and the presence of goals, which are the embodiment of the strategic vision of the development of enterprises by their management. As important institutions of the external environment of enterprises, it is necessary to single out the state structural (including industrial) policy (Graham O.L.Jr., 1992). Moreover, this policy is specific in relation to the industry of enterprises functioning.

Improving energy efficiency is a strategic national challenge. Therefore (especially in developing countries), it is often viewed as a task solved primarily by the state, at the macro level of economic regulation. With this approach, the importance of enterprise management decisions is reduced. The potential for organizational and technological efficiency is declining. This is because enterprises receive the benefits from energy efficiency to a greater extent in

the form of indirect effects. The strength of their manifestation significantly depends on the information and analytical component of industrial policy.

With this approach, important factors are:

- Updating regulatory instruments in line with new technological advances and energy management standards.
- Formation of information bases (national, regional, sectoral) of effective and accessible technologies related to the rational use of energy resources.
- Formation of systems of competencies and qualifications in the field of energy efficiency. This task is solved through targeted training and retraining of personnel of enterprises.
- Monitoring the energy efficiency of industry and other sectors of the economy, forecasting the volume and structure of energy consumption.
- Formation and replication of cases of typical engineering activities and practices in the field of energy efficiency for mass implementation.

In addition to the macro approach to regulating energy conservation, a micro approach should also be used. It consists in the competitive actions of enterprise management. These actions are aimed at increasing the energy efficiency of production processes, sales, logistics, etc. At the same time, in addition to the modernization of existing enterprises, it is necessary to create a complex of modern industries that meet modern energy efficiency criteria. This task is being solved by attracting private investment. It is necessary to stimulate investors to create energy efficient, energy saving and “green” industries.

That is, the process of implementing the principles of an energy efficient economy should be bi-directional. It should go both "from above" and "from below". This will allow achieving a synergistic effect in this area. The nature of this effect is the growth of the energy efficient sector of the economy. This, firstly, stimulates all economic agents to introduce new energy efficient technologies. Secondly, even those sectors of the economy where these technologies are not used receive indirect effects associated with savings on various types of resources. Thirdly, the prerequisites are being formed for the creation of groups of associated energy-efficient industries. That is, new energy efficient clusters are being formed, which play the role of “energy efficiency poles” in the economy of the country and the region (similar to the “growth poles” in the theory of François Perroux, 1988).

Results and Discussion

In order to increase the efficiency of sectoral and regional markets, as indicated above, clusters can be formed. The cluster approach to optimizing economic processes has become widespread. It has proven its effectiveness in practice in many countries (Njøs and Jakobsen, 2016; Polozhentseva and Klevtsova, 2015; Sopoligová and Pavelková, 2017; Vertakova et al., 2016; and other). Due to the importance of the energy efficiency problem, its connection with the Sustainable Development Goals, the government can act as a coordinator in the creation of clusters. The functioning of clusters will help to reduce transaction costs and increase the efficiency of the economy as a whole.

The institutional embodiment of the coordination mechanism can be formalized by analogy with the Chambers of Commerce and Industry. The coordinating body that is being created can also work by analogy with the regulatory bodies of sectoral markets (for example, energy markets). Such regulators have been created and are successfully operating in the USA and Europe. Its financing scheme can be mixed. It can be partially financed from the state budget, as well as from contributions from professional market participants.

The main goal of the formation of such a financing scheme for the functioning of the regulator-coordinator is to focus on achieving the maximum efficiency of the functioning of this institution. Efficiency is ensured by considering the interests of enterprises and government (society). In addition, blended financing ensures the independence of management from both the authorities and major market players. To ensure the maximum efficiency of this body, it is possible to introduce the practice of targeted financing of the state component of the cash flow and procedures for performance auditing and public reporting.

In the energy efficiency cluster, interconnections between enterprises are built on principles that promote resource conservation, reduce the impact on the ecosystem, efficient and safe use of waste, etc. The result is a more favorable impact on the environment, the achievement of high economic and social performance indicators. The need to distinguish between economic growth and resource consumption to achieve environmental and social goals determines the importance of effective management of the clusters under consideration.

With the localization of energy efficiency cluster enterprises in a small area, eco-industrial parks can be formed (UNIDO, 2019). They are like conventional industrial parks, but with different functions. The direct economic effects from the development of eco-industrial parks include: the introduction of eco-innovations; increasing the competitiveness of companies and products; improving resource efficiency and energy efficiency; reducing waste; increased value added; reducing risks; growth in investment volumes.

If we consider the most successful schemes involving the use of cluster models focused on the integrated development of territories, including the development of social infrastructure, then it is necessary first of all to consider the Chinese zones of technical and economic development. These special zones combine the principles of strategic planning for regional and industrial development and the active initiative of private capital. Cluster development, due to its complex nature, is proposed to be regulated based on program-targeted management technologies.

Achieving sustainable and energy efficient development of enterprises is determined by considering several factors (Figure 5). The presented scheme reflects a combination of external and internal factors. One of the key external factors is the strengthening of global competition in an evolving economy that encompasses the markets for goods, services and capital, and other components of economic development. Competition is intensifying in the markets of industrial products, which are undergoing significant changes in connection with the outlined growth in the consumption of industrial products in the world. The processes of acquisition by foreign investors of factors of production (and enterprises) are growing in those countries where governments and local businesses do not support the development of their industrial production. A similar threat exists, for example, in Russia.

Of the internal factors, the insufficient level of human capital development should be noted. This problem is also typical, for example, for Russia. This is due to the unresolved problems of asymmetry of socio-economic development, with the mono-profile nature of the development of many cities. Modern technologies have significantly increased the requirements for labor qualifications in industrial business and reduced employment in it. This has reinforced the previously existing imbalances. There is also a reverse trend in spatial development. In world practice (especially during the Covid-19 pandemic), there have been trends in the outflow of the population from large cities to small ones, where high-tech industries are located, to rural areas that develop alternative businesses.

Conclusion

The combination of the cluster approach, the Chinese experience of the evolution of the Zone of Techno-Economic Development and the ideology of program-targeted management allows us to propose an approach to the formation of a strategy for the spatial and sectoral framework for ensuring energy efficiency in industry and the economy as a whole. According to the author's concept, the formation of a spatial and sectoral framework for energy efficiency should facilitate the process of restructuring the economy and structural balancing of the production basis of the economy.

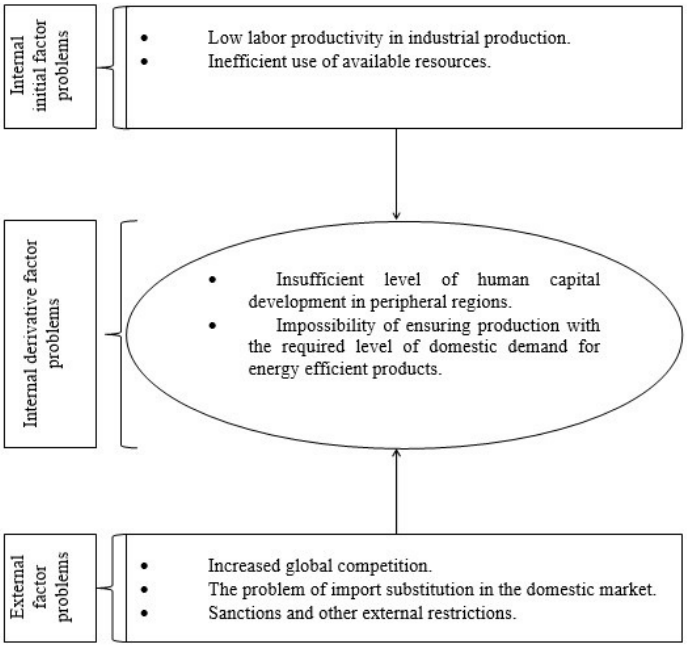

Source: compiled by authors.

Fig. 5: Factors of achieving energy efficiency in industry and economy.

Acknowledgments

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The Evolution of Speech Recognition Through Amazon Alexa

Aliyah M. GRAY
Prairie View A&M University, Prairie View, USA, aliyahgray0223@gmail.com

Ahmed Y. MAHFOUZ
Prairie View A&M University, Prairie View, USA, aymahfouz@pvamu.edu

Kishwar JOONAS
Prairie View A&M University, Prairie View, USA, kajoonas@pvamu.edu

Abstract

Over the years, society has put greater emphasis on simplifying everyday tasks and welcoming the idea of a digital world (Juan et. al., 2004). Speech recognition has advanced substantially over the last decade. Today, more people rely on digital assistants to accomplish everyday tasks. Amazon, the world's largest online retailer, took advantage of the new era of smart assistants and created Alexa, a digital assistant built into Amazon's services and devices, such as Echo, Dot, and Amazon TV (Wetzel, 2018). This paper analyzed the growing market of speech recognition software, and its positive and negative impacts on consumers, focusing on Amazon Alexa, which offered a larger range of options over its competitors.

Keywords: Speech Recognition, Ecommerce, Privacy, Personal Assistants.

Speech Recognition: History and Industry

For years society has been interested in speech recognition from gps systems, to language translators, and it has played a vital role in the technology industry. Bell Labs was able in 1952 to build the "Audrey" system, which recognized numbers but only could recognize one voice, and IBM in the 1960's released the Shoebox software, which processed sixteen spoken words in English (Pinola, 2011). In the 1970's, the U.S Department of Defense funded the Speech Understanding Research (SUR) program, one of the largest speech recognition programs in the world (Pinola, 2011). This research created the *Harpy* system, that was able to comprehend a little over 10,000 words, a major leap for the industry; engineers were beginning to get a better sense of the possibilities that would be advanced speech recognition. In the 1980's, the industry began shifting from less template-based ideas to pattern recognition (Juan et. al., 2004). Pattern recognition allowed for more finite options and created software that learned along the way.

Pattern recognition models were used as an indicator of a word from an unknown sound. At the end of the 1980's, a children's toy was released that could respond to speech, but only if a break was taken in between each word. In the meantime, speech recognition software microprocessors had become faster; so, in the 1990's, Dragon Dictate became the world's first company to release speech recognition software to the public, as it was mainly used for businesses and the government and was not yet released for personal use. In 1993, Apple entered the world of speech recognition which would later lead to Siri. Speak-able items were apart of Apple's plain talk software and enabled consumers to control their computers through speech without the hassle of programming the computer beforehand. Speech recognition had made major advancements over the last few years, and more companies are looking to create products that include this software (Pinola 2011).

Amazon in Business

Amazon is the mogul of the e-commerce industry. Amazon is the center for e-commerce, business transactions, entertainment, streaming, and cloud services (Murphy, 2017). This company has become a place where consumers can buy almost anything; and, with the introduction of Amazon Prime, consumers were given the opportunity to receive shorter shipping times and exclusive offers catered to Prime members. Amazon runs a complicated logistics operation as well; by 2017, Amazon had built in excess of one-hundred eighty huge warehouses, twenty-eight centers for sorting, fifty-nine delivery stations, and sixty-five central hubs for the two-hour same day delivery (Gershgorn, et. al., 2017).

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With the acquisition of Whole Foods, Amazon added over 300 more distribution centers in 2018 (Gershgorn, et. al., 2017). The company operates in over 10 countries with a revenue of 177 billion dollars in 2017 (Enright, 2018). With the introduction of Alexa, Amazon created a line of products that act as personal assistants, and differs from its competitors, such as Google Home and Microsoft Cortana. Amazon created Alexa Businesses, which allows companies to better streamline their processes. Alexa is able to order office supplies, work with IT, and Amazon partnered with popular companies such as Salesforce, WeWork, and Concur to make Alexa more versatile. Amazon has proven to be the leader of speech recognition and will only continue to add products to its line. The speech recognition industry includes the following: Amazon Echo and Echo Dot, Google Home, Google Home Mini, Amazon Echo Plus, Amazon Echo Spot, Amazon Echo Show, Amazon Echo Dot Kids Edition, Apple HomePod, Google Home Mini, Apple Siri, and Microsoft Cortana, etc.

Motivating Factors

Amazon focuses on the consumer and continues to be the largest hub for e-commerce and offers many other services, such personal assistants via speech recognition. When Amazon released Echo in 2014, it was an immediate success. With any adoption of technology, there is always the fear of privacy. With a product such as Echo, this fear is increased due to the fact that the product itself was built to learn as it goes. This case will address the following questions in regards to Amazon and Alexa:

- Is Alexa worth the privacy risk?
- What is Amazon doing to ensure their consumers' privacy is protected?
- How has Amazon's consistent business model contributed to its overall success?

According to techcrunch.com, 11% of Amazon users own an Amazon Alexa device, which is the equivalent of about 39 million people. With such a large consumer base, many users do not question the privacy aspect of these products, and unknowingly sign away the rights that could potentially be used by third parties in exchange for convenience (Martinez & Cameron, 2018). Amazon had a small number of cases in which privacy was violated with an Alexa product, but never due to hackers. Amazon continues to increase and monitor consumer privacy. Alexa has proven to be one of Amazon's best-selling products. This study will focus on how consumers can better protect themselves, as well as Amazon's role in protecting consumers. This study will also focus on the extensive engineering that goes into creating Alexa. and how Amazon's solid business model has led to their overall success.

Solutions

Strategy for Change

The business strategy and solution for Amazon to improve Alexa's privacy is for consumers to take advantage of the privacy options, as Amazon plans to add more features in the future. Amazon has taken what they believe to be the necessary measures to protect consumers by not allowing third-parties to download information and constantly initiating intensive security reviews (Montag, 2018). Amazon is only responsible for security of their servers, software, and the facilities that hold AWS (Kohgadai, 2018). With such advanced products. it is the responsibility of the consumer to ensure they are taking the correct precautions. Consumers are offered options to clear their voice recordings; many consumers are unaware that once Alexa is activated the system automatically saves the interaction. Consumers are able to manage permissions and choose what devices Alexa is connected to. Data transparency is a major factor for many buyers. and if Alexa is listening at all times, the option is given to review and delete recordings. As other defensive measures. it is suggested that consumers mute their Alexa products if not in use and avoid connecting sensitive accounts to Alexa.

Target Market

Amazon breaks segments its target market into 4 categories: demographics, situational, physiographic, and geographic. The demographic segmentation is composed of those people between the age of 25 to 50 years old; 45% of that group are regular online buyers. ranging from 35 to 49 years old ("Amazons Approach to Audience Segmentation", 2018). The lifecycle stage for this segmentation ranges from single to empty-nest. The situational segmentation involves consumers who view convenience as one of the major reasons for shopping online, the online discounts, and the attraction to lower online prices. The psychographic segmentation looks at the cognitive reasons why consumers purchase Amazon products: consumer loyalty, and those consumers who enjoy the aesthetics of the website. Lastly, the geographic segmentation involves Amazon having international appeal; the company focuses on developed areas, and Amazon has found that in rural areas smartphones are more of a necessity.

Consumer readiness plays a big role in market segmentation, as well their willingness to engage in this new age of technology (Zhu et al., 2003). Although demographics of all kinds use Amazon services, the company still uses advertisements that are centered around its market segments. The overall goal of any marketing team is to maintain loyal relationships with consumers. Research has shown that consumer loyalty is based upon financial, social, and structural bonds; most important of these are financial bonds, meaning the consumer has faith that they are getting the best price for the product (Hsieh et. al., 2011).

Role of Technology

One of Amazon's goals is to increase the interaction between consumers, and for this interaction to run smoothly, there has to be a level of motivation in the consumer to want to interact with the system (O'Brien, 2010). E-commerce main focus is to find ways to create revenue solely behind online traffic (Rayport, 1999). Jake Williams, founder of Rendition, a cybersecurity firm, analyzed the likelihood of Alexa devices being hacked and found that the likelihood was a lot smaller than many would think. Alexa is a virtual assistant that is only able to receive information from 2 sources: the consumer's voice and from the Amazon servers (Montag, 2018). There is a misconstrued conception that making purchases through the Alexa devices would reveal personal bank information if hacked; when in actuality credit card information is stored on the Amazon servers, and there would have to be a major security breach for this system to be hacked (Montag, 2018).

Since Alexa is not an app and does not provide visuals. developers must create a code that follows the sets of flow of both information and language (Hansen, 2017). Developers are also required to predict how people will phrase certain questions; this requires a higher level of language expertise (Hansen, 2017). When analyzing new technology, companies have to decide to adapt early or wait until more information has been acquired (Kumar, 2016). In October of 2017, Amazon opened its first research center in Germany whose focus was mainly on AI, and by partnering with Microsoft, Amazon provided its engineers with an easier way to use open-source AI (GreyB 2018). Engineers are able to collaborate with Microsoft products, such as Cortana, so both devices are able to communicate to one another (GreyB, 2018).

Outcomes of Success

Amazon released Alexa's first product, Echo, in early 2014, and within the first month sold 3 million products (PYMNTS, 2016). Consumer reviews has given Amazon the motivation and research to surpass its competitors such as Apple, who for years has held a prominent spot in the tech industry for smart devices. Scot Wingo, chairman of Channel Advisor. stated that he believes Echo, by itself, will become a 1 billion-dollar company. Consumers enjoy the Echo because the voice recognition that can be heard from a far distance (PYMNTS, 2016).

Amazon has created a product that is capable of holding small conversations and follow demands. A portion of Amazon's success is their dedication to teaching others how to develop the skills, just like those of their engineers, with the hope that they will expand their knowledge and create products of their own (Cheng. 2018). The overall goal of any company is to create products that can be substituted, and Amazon has done just that. Voice recognition is the new wave in computing, and consumers are eager to use devices that have human-like abilities (Cheng, 2018). When Amazon first began selling books in the late 90's, it was clear that the company had no regard to their low profitability, but the company was adamant it would create loyal customers, and later they would make up for losses (Rayport, 1999). Amazon prides itself on the fact that it is able to easily function at low margins, as the company did when it first began, ensuring its financial stability (Levy, 2011).

Challenges and Failures

Since the release of Alexa products, Amazon has had minimal privacy issues until a few years later. A family in Portland, Oregon was recorded by Echo, and the recording was sent to a friend. Many users are aware of the blue ring that appears when Alexa is initiated, and Amazon insisted that the alleged security breach woken Echo up due to a word sounding like Alexa (Zhou, 2018). After the conversation was recorded, Alexa then heard another similar phrase to "send message" initiating the text message, and according to Alexa engineers, Alexa then asked out loud to whom to send the recording to (Zhou, 2018).

Many people found this string of events very unlikely, and many consumers began to question whether they were unknowingly being recorded. Later in that same year, many people reported having a conversation about a specific product and then seeing an ad appear for that exact product on their cellphone or laptop. Amazon has released multiple ways for consumers to feel protected when using an Alexa product. Amazon has input all the necessary requirements to keep their consumers protected.

It is the job of consumers to protect themselves when buying these products. Amazon has posted and released many ways for consumers to feel protected. Too much blind faith is placed in these smart products, but unfortunately history has shown that mistakes are commonly made in the tech industry, so everyone needs to take precautions. Tamara Dinev and Paul Hart developed a study that collected data from 422 subjects and analyzed the relationship between social awareness and Internet literacy. The pair found that Internet literacy had a negative correlation to Internet privacy concerns, whereas social awareness has a positive correlation in relation to Internet privacy (Dinev and Hart, 2014). This study showed that those who are socially aware have more concern in regard to Internet privacy.

Reflections and Lessons

Through this study many lessons can be learned. One major lesson is that companies should focus on customer loyalty, not short-term and immediate revenue success, even if profit margins are low at the beginning to attract a bigger market share. Amazon has been able to create a business model to have long-term sustainable revenue. Over time, the company has learned the importance of consumer loyalty, and with the creation of Alexa, Amazon has continually updated its user features, so that the consumer can be in control of what information is shared, stored, and made public.

The creation of Alexa allowed Amazon to create their own code with a personal set of engineers, who can continue to add advancements. By creating their own systems, engineers are given more flexibility when it comes to logistics and are able to choose what companies they want to partner with while staying within their core values. Fast Company went to the Amazon headquarters and spoke to the director of the product division, Toni Reid and the head scientist for Alexa, Rohit Prasad. During the interview the two employees were able to give details behind their success.

One reasoning behind this success was that they adopted a process whereby teams work backwards based on possible press releases, meaning each team write a press release for a new project as if it has been released already, and then work backwards on how to make it a reality. By making the decision to not have a screen for Alexa products, Amazon learned that it would have to manually adjust the AI to work at a larger scale. Reid stated that creating products was simple due to the fact that Amazon listened to customer requests and found ways to fulfill them.

Amazon prides itself in educating current and future engineers on how to create and edit the code for Alexa. Amazon created the Alexa Champions Program, which recognizes those engineers who give back to the community and take time out to educate the future web engineers (Bixenspan, 2016). This program has made it quick and simple for developers to enhance their skills, because Amazon has made it so that developers are able to change the current code without having to rewrite the entire server code (Bixenspan, 2016).

April Hamilton, an Amazon employee, created a blog called *LoveMyEcho* where she provides tips for users and developers on how to enhance the Alexa experience (Bixenspan, 2016). Platforms, such as hers, solidifies Amazon's mission to share information with others, because ideally the company would love to see Alexa become the foundation for all smart assistants.

Conclusion

Speech recognition has become the new phenomenon in today's society. Speech recognition has allowed consumers the most natural way to interact with their home devices. Amazon created Alexa to assist with everyday tasks and created virtual assistants which were able to understand different voices and provide information on command. Speech recognition will continue to advance and will play a major role in the number of opportunities tech companies now have. Studies show that AI is a limitless space with a plethora of possibilities.

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Low-Rise Housing Construction: Incentives for Development, Internal Control

Natalia V. LAZAREVA
St. Petersburg State University of Economics, St. Petersburg, Russia
Lazarevan69@mail.ru

Elena N. SHTYKOVA
St. Petersburg State University of Economics, St. Petersburg, Russia
shtykovaen@bk.ru

Abstract

In the study, the authors examined the current trends in the development of low-rise housing construction (hereinafter referred to as MEHS) in Russia and in the countries of the European Union (hereinafter referred to as the EU) in the context of the global economic recession in 2020. On the example of foreign experience, the prospects for the development of MEZhS in Russia are proved. The factors hindering its development are identified, recommendations are given to eliminate the negative influence of these factors with continuous internal control of risks. A classification of low-rise buildings is carried out, an analysis of the dynamics of construction volumes, commissioning, the share of MEZhS in the total volume of housing construction is carried out, analogies are drawn between MEZhS in Russia and in the EU countries to identify incentives for further development.

Keywords: low-rise housing construction (MEZhS), individual housing construction (IZhS), development incentives, internal control

Introduction

In modern conditions of the global economic recession associated with the COVID 19 pandemic, low-rise housing construction remains a promising segment in the housing construction market. According to experts in research Pavlyushina, Muzychenko, Kheifets (2020), the current global recession is developing much faster than in previous crises. The sharp drop in GDP in all countries of the world in the second quarter of 2020 is associated with quarantine restrictions on economic activity in a number of industries. Thus, according to data published by the official website of the EU statistical office ec.europa.eu, in the second quarter of 2020, the GDP of European countries fell by an average of 11.6%, forming the highest deficit since 2002. According to the Ministry of Economic Development of Russia, in April 2020, Russia's GDP decreased by 12.0%. However, the experience of past crises has shown that MEZhS will withstand, and in Russia it can become a certain catalyst for the construction industry, creating a full-fledged alternative to panel and monolithic apartment buildings (MKD).

Research Methodology

The purpose of this study is to analyze the state and prove the prospects for the development of MEZhS. The objectives of the study are to consider current trends and incentives for the development of MEZHS in Russia and in the EU countries, to identify factors that impede the development of MEZHS in Russia, to give recommendations to stimulate the development of MEZHS in Russia, using continuous internal control. The study carried out the classification of MEZhS, analysis of the dynamics of the volume of construction, commissioning, the share of MEZhS in the total volume of housing construction, drawn analogies between MEZhS in Russia and in the EU.

Research Results

Low-rise buildings are defined as buildings no more than three stories high.

MEZHS classification groups:

Group 1: individual housing construction (hereinafter referred to as IZHS) - these are separate houses for one family, without the possibility of dividing them into independent objects;

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Group 2: block houses - houses of blocks with common walls, the number of blocks is limited to ten, each block is for one family and is located on its own land plot with access to the common territory;
Group 3: low-rise apartment buildings.

The classification of the type, type and methods of MEZhS is presented in Table 1.

Table 1: Classification of types of low-rise housing construction (MEZHS)

Building type	Construction method	Housing market view
– IZHS – locked houses – multi-apartment low-rise buildings	– individual (builds population) – organized (complex construction by the organization - developer)	– cottages and estates - individual buildings; – townhouses - block houses with a small plot of land for several owners; – multi-apartment low-rise buildings

Distinctive features of these buildings:

- lack of elevators and a centralized waste chute;
- lightweight engineering infrastructure;
- optional state examination of project documentation.

Analysis of the dynamics of the volume of commissioned housing as a stimulus for the development of MEZhS

Research Showcases of statistical data https://showdata.gks.ru/finder/descriptors/ on housing construction in Russia show that in 2020 compared to 2019, there is a dynamics of volume reduction. In the second and third quarters of 2020, the volume of housing construction decreased by 7.99 million square meters compared to the fourth quarter of 2019. m (-7.4%) and 538 thousand sq. m (-0.5%). Note that the negative dynamics of the first quarter of the year is explained by the seasonality factor: the mass commissioning of residential properties traditionally falls on the III – IV quarters of the year, therefore, at the beginning of next year, there is a decrease in the number of projects in the phase of active construction. In the second and third quarters of 2020, the worsening situation due to the spread of coronavirus infection strengthened the downward trend in housing construction. Commissioning of housing in 2020 showed a similar negative trend. In the first half of 2020, compared to the first half of 2019, the total volume of commissioned housing decreased by 2.2 million square meters. (-7.3%). The area of new housing in the individual housing construction sector has also decreased. Compared to the same period in 2019, in 2020, the figure fell by 1.3 million square meters. (-9.1%), according to Actual information and analytics on housing construction https: //our house.rf.

However, it should be noted that there is a positive trend towards an increase in the volume of housing commissioned in Russia in the third quarter of 2020. The indicator of the growth rate (decline) of residential buildings commissioning after a significant decrease in the second quarter of 2020 from 98.7 points to 88.6 points, in the third quarter rose to 97.7 points. In the individual housing construction sector, the volume of commissioning increased from 6.3 million sq.m. in the second quarter of 2020 to 10.8 million sq. m. in the third quarter. The dynamics of housing commissioning for the current period of 2020 is shown in Figure 1.

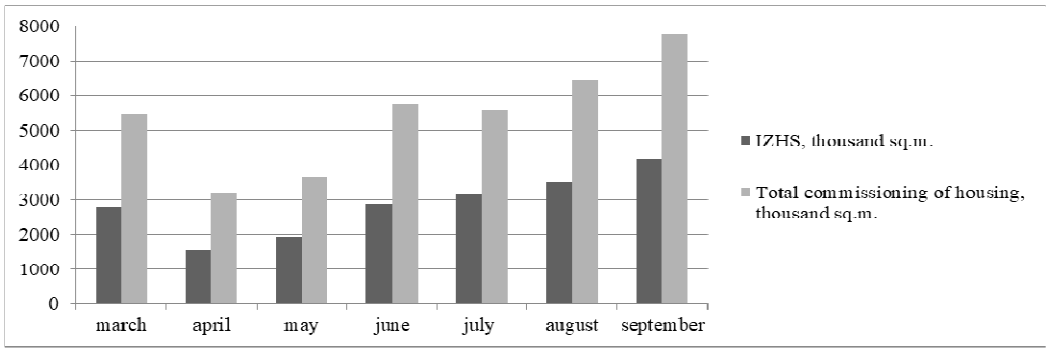

Compiled according to Rosstat data https://rosstat.gov.ru/folder/14458

Fig. 1: Housing commissioning in 2020 in Russia

Russian analytical reviews on housing construction, in research Tuzov, Sabelnikov, Arapova, Jafarov (2019), reveal the relationship between crisis moments in the economy and the behavior of the construction sector. The reaction of the latter is to increase the volume of housing commissioning and reduce the number of starts of new construction projects. Rosstat does not collect data on the start of new housing construction, therefore, the crisis phenomena in this area of the economy can only be tracked by indicators of commissioning. Note that these indicators were formed by the developers' decisions taken in earlier periods, and experts estimate such a "delay" about a year. The construction business is characterized by inertia and retains positive dynamics for a longer time during the crisis, but it also recovers more slowly afterwards. Let's take the Russian crisis that began in 2014 as an example: the volume of housing commissioning began to accelerate with a general slowdown in investment processes in the economy and reached its maximum in 2015, at the height of the crisis.

The EU countries reacted in a similar way to the global crisis. According to Eurostat ec.europa.eu, in European countries in the construction sector, the maximum decline in production was observed in May 2020, then in the third quarter of 2020 there was a positive trend, production in construction increased in August by an average of 2.5%.

Analyzing the statistical data, it can be concluded that in recent years there has been a steady trend towards an increase in the total volume of housing commissioned in Russia by the share of MEHS (Fig. 2).

Over the past four years, the share of MEHS increased from 45.92% in 2016 to 49.10% in 2019. This is largely due to a change in the structure of demand for housing (residents are switching their interest to housing in the suburbs - an alternative to a city apartment) and the emergence of state support for the development of MEHS ... In addition, the growth in the share of MEZhS is facilitated by: the speed of construction associated with the mobility of the production and technical base; the main focus on the use of the local resource base; more efficient construction logistics; the ability to build small-sized housing in remote and rural areas. A new product appeared on the housing market - “cottage village”.

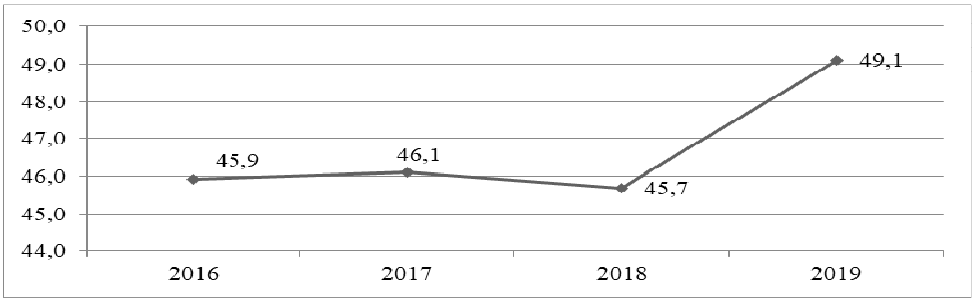

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Fig. 2: The share of low-rise residential construction in the total volume of housing commissioned Russia

Despite the positive dynamics, the Russian indicators of MEZhS commissioning lag significantly behind the MEZhS volumes in Europe. After analyzing the statistics of residential premises occupied by owners in the EU countries, the authors came to the conclusion that in some developed countries the share of individual houses reaches 88% (Netherlands). Individual houses occupy a high proportion of the total housing stock in France (81%) and Germany (82%). More than half of the residents of the Czech Republic (58%), Austria (60%), Hungary (62%) live in individual houses. It should be noted that in many European countries MEZHS is part of the urban development model. Studying the data of the EU Statistical Office on residential premises occupied by owners in 2015, it can be concluded that “35% of Europeans lived in apartments, 9% - in low-rise buildings with several owners (townhouses), 58% - in individual cottages” [five]. While the majority of Russian residents continue to live in apartment buildings.

In the research of the marketer Balaev (2009), “in European countries the price in prefabricated low-rise buildings popular for the population per 1 sq.m. living area is lower than in apartment blocks, the construction of such houses allows you to form a large living area per person ”. For example, in Germany there are 231 sq.m. per person. per person, in Finland 17, in Russia 9.

It should be noted that this tendency towards an increase in area is also outlined in Russia, since the actual cost per square meter of individual housing construction is cheaper than in apartment buildings. In 2018, it amounted to 23,000 rubles, while in MKD this figure was 34,000 rubles according to Rosstat. Over the past three years, the average size of commissioned individual residential buildings (hereinafter referred to as IR) has been growing, in contrast to apartment buildings, and in 2018 it reached 139.1 sq. m, a maximum since 2000 in Russia. The excess of

the area of IR over the area of an apartment in an apartment building by an average of 2.7 times undoubtedly contributes to the improvement of living conditions of the population of Russia

In fact, in research Shatilo (2015), "prices for residential real estate are significantly differentiated within cities and represent an important factor in spatial social stratification".

As mentioned above, MEZhS in Russia is subdivided into individual construction (houses built by the population) and organized construction (houses built by organizations). Rosstat does not provide a clear classification of statistical data on MEZhS in the context of these types of construction. After conducting a detailed analysis of statistical data for 2016-2019, the authors came to the conclusion that most of the MEZhS in Russia refers to individual construction, which ranges from 93.5% to 96.8% of the total. During the study period, the volume of organized construction is constantly decreasing (Fig. 3).

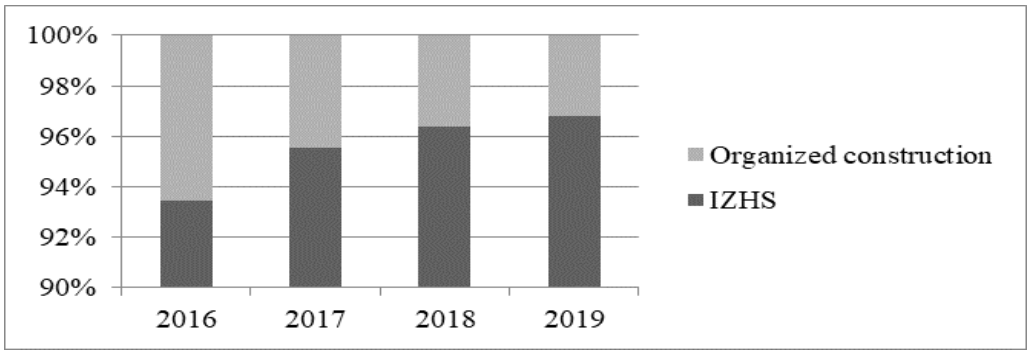

Compiled according to Rosstat data https://rosstat.gov.ru/folder/14458

Fig. 3: the ratio of the volume of input of MEZhS in the context of individual and organized construction

Thus, in the sphere of the Russian MEZhS, the problem of reducing complex organized buildings can be distinguished. In turn, in case of individual construction, there are often violations of building codes by private owners when they independently provide their sites with engineering infrastructure and high risks of non-compliance with construction technologies. In this regard, stimulating the construction of complex MEZhS projects, implemented in an industrial way around cities, would solve the problems of rational use of land, more economical spending of funds for construction, and regulation of population density. The foreign experience of MEZHS reflects the advantage of building organized residential communities, making housing more affordable and comfortable. In addition, the use of innovative methods in the production of materials for MEZhS will reduce construction costs, for example, housing built using 3D printing technology in the USA, China, smart houses with minimal energy consumption being built in Russia.

Factors hindering the development of MEZHS

At the present stage, the development of MEZhS in Russia is impeded not only by the risks characteristic of low-rise construction of residential buildings, but also by the following factors:

– The approved general plans of cities and settlements do not provide for the development of territories under the MEZhS;
– mortgage lending of the MEZhS market is underutilized due to the lack of standards (this makes it difficult to assess the subject of the pledge); that is why MEZhS houses are not liquid enough as collateral in comparison with apartments. In research Idrisov, Ponomarev (2019) "the implementation of infrastructure mortgages in Russia can increase the average annual rate of economic growth", in this regard, taking into account research Kosareva, Polidi (2019) "monitoring and assessment of the situation in the housing market and mortgage lending" is, along with the "welfare of the population", the main "mainstream » according to modern scientific research Naiden & Belousova (2018).
– there is no normative legal regulation in the field of MEZhS. For example, there is no clear definition in the typology of the less common form of MEZhS - a townhouse, which entails problems with the registration of land plots.

Risks specific to MEZHS

The types of risks typical of MEZhS are presented in table. 2. Identification of risks and their continuous internal control help to identify incentives for the development of MEZHS.

Table 2: Characteristics of the types of financial and management risks that reduce the development of low-rise housing construction

Risk groups	Types of MEZHS risks, their causes
Management risks	failure to fulfill plans and obligations in terms of the volume and quality of construction; unjustified overstatement of the estimated cost of objects; lack of responsibility for the violations committed; lack of reserves to cover force majeure circumstances and unprofitable contracts; attraction of counterparties without due diligence; lack of predictive assessment of the demand for objects and the solvency of potential buyers; bankruptcy of the developer; lack of readiness for digitalization; decrease in the effectiveness of strategic and operational management, others.
Financial risks	unreliable assessment of assets and liabilities; lack of analysis of the results of the internal control system; not conducting an inventory of assets and liabilities; improper accounting of income, expenses, assets, liabilities and disclosure of information in financial statements; understatement of taxes payable to the budget and unreasonable tax optimization, others.

Project financing, in research Karminsky, Burekhin (2019) "gives a full guarantee of the safety of citizens' funds and excludes their risks associated with possible unfair actions or bankruptcy of the developer". In research Dolganova, Deeva (2019) at the present stage of digitalization, the priority is "diagnostics of the company's readiness for the initial stage of digital transformation". It is obvious that, in research Litvintseva, Karelin (2020) “the positive impact of digitalization is observed in economically developed and wealthy regions”, in contrast to less developed ones, due to the best financial security. In research Zuev M.B., Zuev B.P., Bulgakova (2020) "Strategic management is intended to direct the influence of management to ensure future competitive excellence," as opposed to operational current enforcement of plans and commitments.

Internal control of incentives for the development of MEZHS is aimed at:

- assessment of the quality and volume of construction to achieve efficiency;
- calculation of predicted solvency and demand for objects by consumers;
- analysis of international practices of MEZhS value;
- ensuring information transparency, reliability of accounting and reporting of the developer.

Activities proposed to stimulate the development of MEZHS

The following proposed top-priority recommendations are aimed at increasing the volume and pace of low-rise housing construction in Russia, helping to stimulate the development of MEHS:

- increasing the volume of land plots for development under the MEZhS by approving new general plans with the provision of social, engineering and transport infrastructure; application of standard design documentation, standard layouts of MEZhS projects;
- development and approval of lending standards of the MEHS, allowing to reduce mortgage rates compared to rates in apartment blocks, since in research Kurichev, Kuricheva (2018) “there is an equilibrium relationship between the supply of new housing and net migration”, the suburban area develops, in research Kuricheva, Popov (2016), “mainly along transport corridors” contributing to the development of MEZHS.

Discussion of the Results

Despite the economic downturn in the 2nd quarter of 2020, the development trends of MEZHS in the EU countries and in Russia are assessed as positive. MEZhS is subdivided into three types: IZhS, block houses, low-rise apartment buildings. There are two types of MEZhS - individual (built by the population) and organized (built by the developer). Despite the increase in the share of MEZhS in Russia in recent years, these indicators are still far from those in the EU countries. The problem of reducing organized complex buildings in Russia is revealed, while the European experience proves their advantage over individual housing construction. The factors hindering the development of MEZhS in Russia are considered. Specific recommendations are given to stimulate the MEZhS.

Conclusion

The development of low-rise housing construction in the countries of the European Union has shown the advantages of this type of construction over apartment buildings. Modern trends in the development of low-rise construction of residential buildings in Russia have proved their prospects even in the context of the economic crisis, while ensuring continuous internal control of risks.

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Integrative Methods for Sustainable Competitive Advantage

Gheorghe TOLU
Polytechnic University, Bucharest, Romania, email: georgetolu@gmail.com

Daniel GHICULESCU
Polytechnic University, Bucharest, Romania, email: daniel.ghiculescu@upb.ro

Abstract

The paper deals with some integrative methods applied by a Romanian organization, manufacturer of electrical discharge machines, aiming at Sustainable Competitive Advantage (SCA). Some aspects of the strategic management process are presented, emphasizing the stage when the integrative methods must be applied. Some fundamental aspects of Customer Matrix, Producer Matrix and Risk Cube are presented. Finally, they are applied for the mentioned above organization, determining some solutions leading to SCA.

Keywords: Sustainable Competitive Advantage, Customer Matrix, Producer Matrix, Risk Cube.

Introduction

The strategy of an organization is the result of the strategic choice of its management regarding the paths it will follow and the means it will use to achieve the strategic objectives. The ways to achieve the strategic objectives are multiple, in this sense, the management of the organization must have clear options of how to achieve the strategic objectives. The main factors of an organization's strategy are resources, deadlines, sustainable competitive advantage. Resources are provided in strategies, usually globally or in the form of investment funds, and the origin of these funds could be own resources or borrowed resources. Strategic resources are material, human, informational and financial resources.

The terms incorporated in the strategy include: the initial term that represents the start date of the strategy, intermediate terms that represent the significant evolutions in the achievement of the strategic objectives, the final term that stipulates the date on which the implementation of the strategy ends. Competitive advantage is considered a fundamental priority for the management of the organization. The purpose of the strategy is to create and maintain a competitive advantage over competing organizations. Competitive advantage means that the organization achieves superior products from the Customer's point of view, compared to similar products offered by the competition. The advantage can be measured by cost advantages, differentiation, and market focus and is mentioned in the book *"Competitive Advantage"* written by Porter (2003).

Cost advantages that allow the organization to obtain higher profit margins than their competitors, even if they set their prices around or below market prices. Differentiation is the provision by the organization of a product or service, which is perceived by consumers as unique in the market, completely different from other products and services. Market focus is the ability of the organization to cover an individualized market.

Strategic Management

Strategic Management is the process by which strategies are formulated and implemented. The strategic dimension of management is ensured by the existence of a strategic thinking and an organizational culture favorable to change and performance in an external competitive environment. The competitive advantage achieved by an organization in relation to other organizations with which it is in competition, designed over time, gives the organization a strategic competitiveness. The fundamental principles of Strategic Management are setting the direction, concentrating efforts, and ensuring consistency and is mentioned in the book *"Strategic Management"* written by David et al (2016).

Strategic Management Process Model

Strategic Management is a complex process and is represented in the Figure 1.

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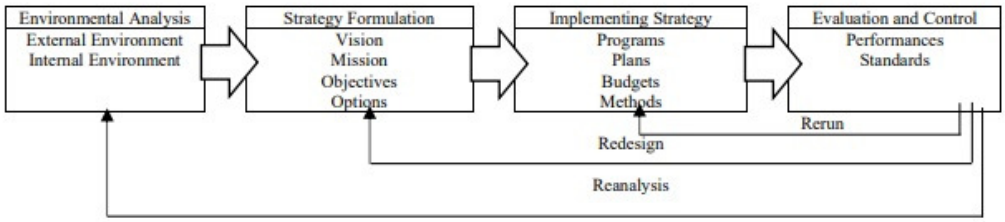

Fig. 1: Strategic Management Process Model is mentioned in the book *"Strategic Management"* written by Wheelen et al (2010).

The analysis of the external environment represents the starting point for the realization of the strategy. The external environment is general and competitive. The analysis of the internal environment includes: the structure, the culture, the resources, the capabilities, the essential competencies, and the possibilities of obtaining the sustainable competitive advantage. The formulation of the strategy consists in establishing the vision, mission, objectives, and strategic options. The implementation of the strategy is the realization of the strategic plan through specific programs, budgets, methods. Performance evaluation and control is done by reporting to objectives and making corrections and is mentioned in the book *"Strategy for Enterprise"* written by Butler (2005).

Quality Management

The design and implementation of a Quality Management system, which is essential to be associated to Strategic Management, are influenced by the objectives, the products it provides, the existing processes and the size and structure of the organization. The adoption of Quality Management in the organization must be an important strategic decision. Applying the principle of continuous improvement can lead to engaging a consistent approach across the organization for continuous performance improvement. Quality control (CC) and data quality assurance (CA) procedures are designed to avoid the introduction of errors in data sets - process called data contamination. There are two basic types of contamination: addition and omission. CC procedures are effective in reducing added errors. There are mechanisms applied before the data are obtained and which control the way in which they are acquired and registered and is mentioned in the book "Quality Management" written by Oprean et al (2008).

CA procedures are used to detect both omissions and additions after the data have been obtained and recorded, involving graphical and statistical methods. Data processing methods are used in all stages of Strategic Management Process: environmental analysis, formulation, implementation, and evaluation of the strategy and is mentioned in the book "Management in micro and nanotechnologies" written by Marinescu et al (2005).

Advanced Methods of Sustainable Competitive Advantage

The following integrative methods to obtain SCA are applied even in the first stage of the strategic management process (Figure 1), which begins with external and internal analysis.

The Customer Matrix

The Customer Matrix is an instrument used to achieve SCA. Different variants of this instruments are conceived. In this variant, the variables of Customer Matrix are Price and the Perceived Use Value (PUV) by the customer. The strategic options represent the displacements to the cardinal points (N, S, E, W) (Figure 2) and is mentioned in the book "Elements of Competitive Strategy" written by Faulkner et al (2000).

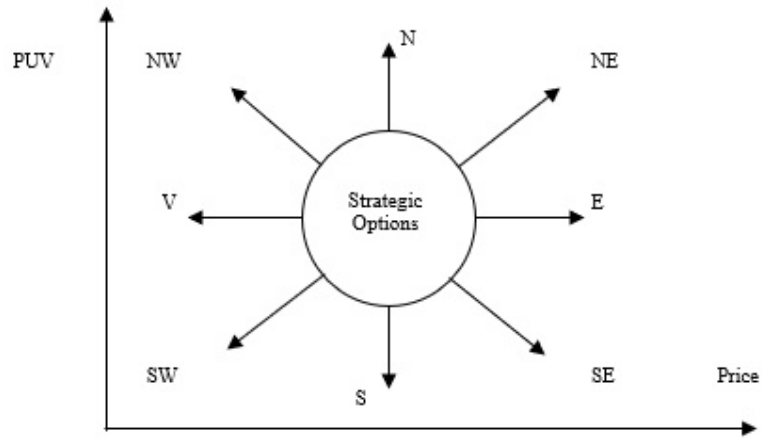

Fig. 2: Displacements in the Customer Matrix is mentioned in the book *"Elements of Competitive Strategy"* written by Faulkner et al (2000).

Moving to North (N) is the fundamental strategic option. The organization offers the customer a product at the same price, but with a higher value than that of competing organizations. Shifting the strategy to the North leads to an imitation reaction from the competition. The strategy adopted in this case is to focus on a single segment.

Moving to West (W) is the main strategic option. The organization offers the customer a product with the same value, but at a lower price than that of competing organizations. Shifting the strategy to the West leads to an imitation reaction from the competition. The organization must always reduce costs and the adoption of this long-term strategy is difficult to achieve.

Moving to North-West (NW) is the most useful path and involves increasing the value (PUV) while reducing the perceived price. This strategy is possible when the organization acts in the directions defined by Michael Porter: cost decrease, and product differentiation by increasing quality. These directions are based on continuous innovation and is mentioned in the book *"Innovation and Entrepreneurship"* written by Drucker (2015).

Moving to South (S) involves reducing the PUV and keeping the price constant.

Moving to East (E) involves increasing the price without the addition of PUV. The strategy can be profitable in crisis situations of various sectors of activity of innovative organization.

Moving to the South-East (SE) involves increasing the price at the same time as reducing the PUV and is useful in the short term when it was a quasi-monopoly in a certain sector of activity. The consequence is a strong damage to the image of innovative organization.

The Perceived Use Value (PUV) can be calculated using the relation:

$$\text{PUV} = \sum_{i=1}^{n} p_i \cdot x_{ir} \tag{1}$$

where:

x_{ir} is the relative value of quality characteristics i
and
p_i is the weight of quality characteristic i.

For a best control of given weights p_i, they must satisfy the condition:

$$\sum_{i=1}^{n} p_i = 100\% \tag{2}$$

if p_i is expressed as a percentage
or

$$\sum_{i=1}^{n} p_i = 1 \tag{3}$$

if $p_i < 1$.

Because the values of quality characteristics x_i are expressed in different units of measurement, they must be converted to relative values. For this, we consider a standard scale at which the value 0 corresponds to the weakest value of parameter x_{imin}, and the value 1, the best value of parameter x_{imax}.

To assign a normed value on the scale 0…1 to an effective value x_i, the interpolation relation is used:

$$x_{ir} = \frac{x_i - x_{imin}}{x_{imax} - x_{imin}} \tag{4}$$

The construction of Customer Matrix consists in going through the following steps:

Step 1: The elaboration of competitive strategy has as starting point, the identification of market segments. It is necessary to distinguish whether a particular customer is part of market segment found. Their assessment is based on the analysis of weights given to the quality characteristics (PUV dimensions).

Step 2: PUV dimensions are determined by asking customers what quality features they appreciate in a product. It is recommended to avoid questionnaires that lead to confirmation of Producer's options.

Step 3: Determining the weights for the PUV dimensions is done by asking customers what most important quality characteristics are appreciated and how the weights given to each quality characteristic should be distributed to a product.

Step 4: Determine the PUV, based on the PUV dimensions and weights for own product and competition. If the input data (x_i and p_i) are correct, then the performance evaluation should be between exaggerated levels of optimism and pessimism. In this way, a pro-competitive organizational culture is formed.

Step 5: Position the products in the Customer Matrix based on the variables: the perceived use value and the price perceived by the customer. A good way to check is to revalue the Matrix positions with changes in market share.

Step 6: Adopt specific strategies depending on the position of products in the Customer Matrix. The main competition takes place in a North-West (NW) direction.

The Producer Matrix

The Producer Matrix is an instrument for internal environment analyzing of organization in relation to other competitors from the same industry. Different variants are designed. In this case, the variables of Producer Matrix are Unit Costs and Efficiency (Figure 3).

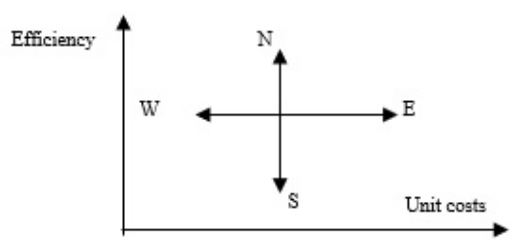

Fig. 3: The Producer Matrix variables is mentioned in the book *"Elements of Competitive Strategy"* written by Faulkner et al (2000).

The Producer Matrix establishes the relationship between the Unit cost and the competencies of organization creating the Perceived Use Value (PUV) by the customer.

There is an indirect link between the Customer Matrix and the Producer Matrix.

The competitive advantage can be obtained because of moving to North-West (NW) in the Customer Matrix. The organization can only act on the Producer Matrix in two directions reducing costs and increasing efficiency.

Moving to West (W) in the Producer Matrix by reducing costs can be followed by rising prices, which involves moving to East (E) in the Customer Matrix.

If the West (W) movement is insignificant, in the Producer Matrix, an insufficient decrease of costs, it is unlikely that it can be maintained in the Customer Matrix, by reducing the price in conditions of high competition.

The improvement of competence leads to a shift North (N) in the Producer Matrix, the effect being moving North (N), South (S) or not at all in the Customer Matrix, depending on the customer reaction to the quality characteristics of product.

The construction of Producer Matrix consists in going through the stages:

Step 1: For cost analysis is used the value chain of Michael Porter which includes all the processes that contribute to the construction of product (Figure 4).

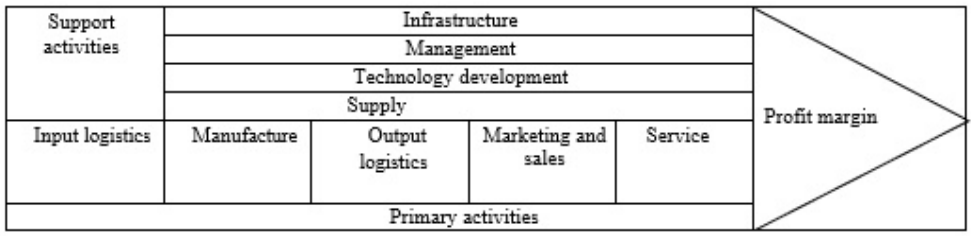

Fig. 4: The internal value chain is mentioned in the book *"Competitive Advantage"* written by Porter (2003).

Step 2: To define the market segment it is necessary to obtain the agreement of management team on the market segment to which the product is addressed. The Producer Matrix is elaborated to include the competencies of market segments on which the organization intends to launch.

Step 3: In order to identify the essential competencies, the question that the management team must answer is: what are the operating competencies, system, focused on costs that the organization must have in order to win the market segment, on which it acts.

Step 4: To assess the competencies of organization, the analysis must be extended to the main competitors in the market segment. The purpose of rating is to place competitors on the Producer Matrix.

The aggregate note of operating and system competencies is calculated using the relation:

$$N_{os} = \sum_{i=1}^{n} p_i \cdot C_{osi} \tag{5}$$

where:

C_{osi} represents the quota given to the operating or system competency i on a unitary scale,
and
p_i is the weight given to the competency i.

For a good control of weights pi granted, they must satisfy the condition:

$$\sum_{i=1}^{n} p_i = 100\% \tag{6}$$

The value of aggregate note *Nos* determines the position of vertical organization with the Efficiency in the Producer Matrix. To determine the position on the horizontal axis, information on the production costs of competitors is required. This refers to the profile of competence focused on reducing costs.

This assessment allows the classification of competitors based on external information.

The aggregate grade of cost focused competencies is calculated using the relation:

$$N_{fc} = \sum_{i=1}^{n} p_i \cdot Cfci \tag{7}$$

where:

C_{fci} is the share given to competency i focused on costs,
and
p_i is the share given to competency i.

For a good control of weights pi granted, they must satisfy the condition:

$$\sum_{i=1}^{n} p_i = 100\% \quad (8)$$

Step 5: Elaboration of competency Producer Matrix based on the aggregate grades determined in Stage 4 are used to determine the coordinates of competitors. Depending on the position of organization in the matrix, strategies for improving competence can be developed. The main competition takes place in the North-West (NW) direction.

The Risk Cube

The Risk Cube is a complex method that has the advantage of leading to an appropriate decision strategic of organization development, based on external and internal analyses. Based on the combinations between Customer and Producer Matrices, are designed different variants. The most important combination of these previous instruments is the following:

Combination 1: The Customer Matrix has a high PUV and a high price of product. The Producer Matrix has a high efficiency and a high production cost (Figure 5).

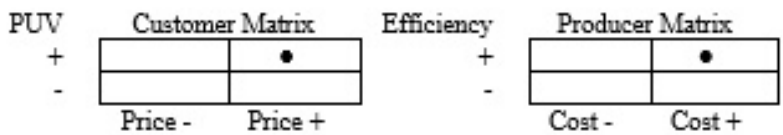

Fig. 5: Combination 1 of the two matrices is mentioned in the book *"Strategic Management"* written by Ghiculescu et al (2015).

Combination 2: The Customer Matrix has a low PUV and a high price of product. The Producer Matrix has low efficiency and low production cost (Figure 6).

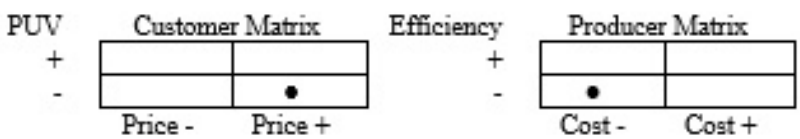

Fig. 6: Combination 2 of the two matrices is mentioned in the book *"Strategic Management"* written by Ghiculescu et al (2015).

Combination 3: The Customer Matrix has a high PUV and a high price of product. The Producer Matrix has low efficiency and high production cost (Figure 7).

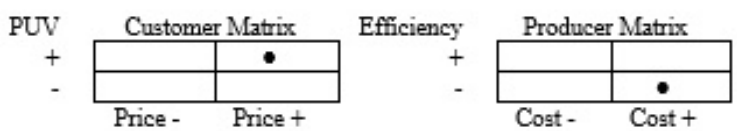

Fig. 7: Combination 3 of the two matrices is mentioned in the book *"Strategic Management"* written by Ghiculescu et al (2015).

Combination 4: The Customer Matrix has a low PUV and a low product price. The Producer Matrix has low efficiency and low production cost (Figure 8).

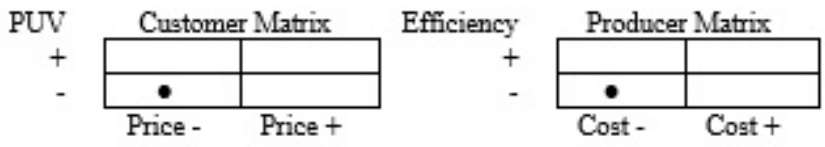

Fig. 8: Combination 4 of the two matrices is mentioned in the book *"Strategic Management"* written by Ghiculescu et al (2015).

Combination 5: The Customer Matrix has a high PUV and a low price of product. The Producer Matrix has a high efficiency and a low production cost (Figure 9).

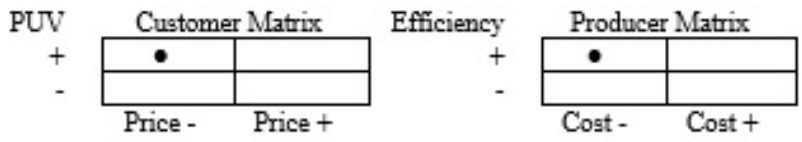

Fig. 9: Combination 5 of the two matrices is mentioned in the book *"Strategic Management"* written by Ghiculescu et al (2015).

Combination 6: The Customer Matrix has a low PUV and a high price of product. The Producer's Matrix has low efficiency and high production cost (Figure 10).

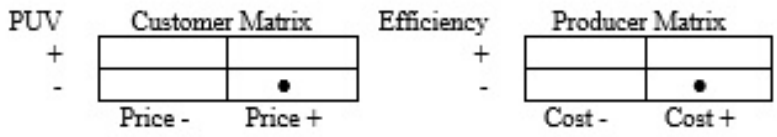

Fig. 10: Combination 6 of the two matrices is mentioned in the book *"Strategic Management"* written by Ghiculescu et al (2015).

The Risk Cube helps to establish the most appropriate strategy of organization and contains the following steps:

- the relationship between the product and the market is established,
- determine the requirements of customers in the market,
- the competencies of organization are analyzed.

If they are insufficient, it is established how the gap between the required and the current level can be covered. The problem can be solved by internal development alliance, or acquisition, each with different degree of risk. These strategic options are the main variables of cube, the first option being internal development because it is the least risky.

The second option the alliance involves operating with a partner, over whom the organization has limited control, so, a higher level of uncertainty.

The third option, the acquisition, is even more risky because it is necessary to harmonize the competencies of all the organizations involved, a difficult process that can ultimately lead to an overall imbalance. Risk analysis shows that it grows as the innovative organization moves away from the markets it operates and the products it makes.

The first least risky option is to make the same product for the same market, the organization being based on internal development. If the product is in decline or the market is already saturated, the other three options with increasing risk are considered:

- launching the same product in a new market,
- making a new product for the same market,
- launching a new product in a new market (Figure 11).

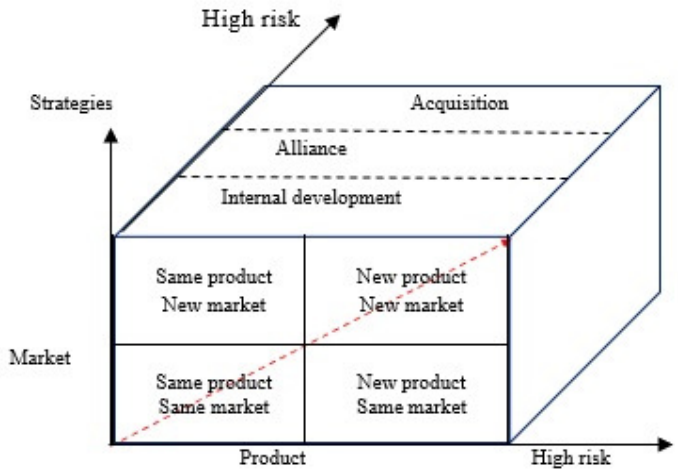

Fig. 11: The Risk Cube variables is mentioned in the book *"Elements of Competitive Strategy"* written by Faulkner et al (2000).

The second option is to launch the same product on another market, which involves rebuilding the Customer's Matrix and that of Producer to meet the new price and quality characteristics of market.

The third option is to make a new product on the same market and only involves the change of Producer Matrix because the competence for achieving the new value of use perceived by the Customer (PUV) and the costs of making the new product differ. Considering the restricted resources of the organization, a gradual strategy is recommended by approaching a risk minimization and is mentioned in the book *"Implanting Strategic Management"* written by Ansoff et al (2018).

The fourth option is to launch a new product in another market and will require updating both Customer and Producer Matrices. These options can be achieved through internal development alliance, or acquisition in ascending order of risk. In the Risk Cube, these strategic options can be characterized by a higher level of detail.

For the same product, the same market there is the following additional strategic options:

- keeping the current direction,
- withdrawing from the market,
- concentrating activities,
- increasing the market share.

Maintaining the current direction of innovative organization is a useful strategy if the market share is high and a Sustainable Competitive Advantage (SCA) has been obtained. The risk increases if the organization is not attentive to new trends that manifest themselves in the general external environment and to the evolution of competitive environment and is mentioned in the book *"Strategic Management"* written by Barney et al (2012).

Withdrawal from the market is a useful strategy of innovative organization if the market share is small, external threats is stronger and its competence are reduced. Timely withdrawal of organization is a useful strategy if losses can be minimized and resources can be leveraged in other markets or in other industries. The condition is that the barriers to exit from the market are not high, high expenses and advance payments are irrecoverable.

Concentrating the activities of innovative organization is the useful strategy in the phases of economic recession. It implies the consolidation of position in the sectors of activity in which it has a more favorable position.

The innovative organization withdraws from low-profit activities. The strategies associated with the concentration are cost decrease based on cost-focused competence and market leadership strategy.

Increasing market share is essential in the maturation phases of a sector of activity. If the industry is in the launch phase, competitors can evolve quickly and without increasing market share. The strategy is realized by methods that lead to movement to the North-West (NW) in the Customer Matrix.

The same product strategy, new market is characterized by a higher level of risk. It is necessary to develop a new Customer Matrix because changing the market involves new requirements related to PUV size and price. It is necessary to re-evaluate the position of innovative organization in the Producer Matrix.

New product strategy, the same market is riskier than any of strategic options presented. Even if the new product addresses the same market, it has different characteristics, requiring a change in the Customer Matrix. By default, the Producer Matrix must be developed to highlight the competence needed to make the new product.

The strategy can be applied using the following methods:

Making complementary products, taking over a new product based on a license or franchise, making a new product through own research and development. The construction of complementary products presents the lowest level of risk because the strategy is the closest to the current activity. There is a risk of financing above the allowed limit of new activities in the profitable activity. This risk increases with the degree of expansion.

The acquisition of a new product based on a license or franchise has the advantage that the product has been tested on the home market. The product thus no longer requires additional investment in research and development. The risk is that the new market is different from the original one, and Customers may have different preferences from those in the home market.

Making a new product through your own research and development is the riskiest strategy. The strategy is appropriate for organizations with financial, human, informational and material resources. Innovation competences need to be doubled by operational competence, especially in marketing and sales activities to capitalize on high Perceived Value Products (PUV).

New product strategy, new market presents the highest risk of strategies presented. If an organization has a large market share with another product, it can launch a new product in the same market, based on Customer loyalty to the brand.

Once the strategies have been analyzed and adopted using the Risk Cube, it is necessary to evaluate and control the strategies by the management team and the staff at the lower levels of innovative organization using nonconventional technologies.

A Case Study

The Customer Matrix

We have to evaluate the EDM machine made by suppliers from four countries: Japan (JP), Germany (DE), France (FR) and Romania (RO), using Customer Matrix, relative to the Romanian organization whose strategy is elaborated in the strategy management process described above.

The stages of creating the Customer Matrix are:

Step 1: Market segmentation. The product addresses a market segment formed by organizations in Romania, which use EDM processing for the active surfaces of molds. They are particularly interested in the precision and high quality of surfaces obtained.

Step 2: Identify the dimensions of PUV.

Users are interested in the following product features:

Overall dimensions:

(01) machine length (L),
(02) machine width (l),
(03) machine height (h),

(04) machine mass (M),

Worktable dimensions:

(05) table length (L_m),
(06) table width (l_m),

Working tank dimensions:

(07) tank length (L_c),
(08) tank width of (l_c),
(09) tank height (h_c),
(10) maximum mass of machined part (m_p),

Work races:

(11) X axis travel (X),
(12) Y axis travel (Y),
(13) Z axis travel (Z),

Positioning accuracy:

(14) positioning tolerance on X and Y axes ($T_{pX,Y}$),
(15) positioning tolerance on Z axis (T_{pZ}),
(16) average positioning dispersion on X and Y axes ($6\sigma_{X,Y}$),
(17) average positioning dispersion on Z axis ($6\sigma_Z$),
(18) reverse repositioning tolerance on X and Y axes ($T^{-1}_{pX,Y}$),
(19) reverses reposition tolerance on Z axis (T^{-1}),

Fast forward speeds:

(20) speed of fast advance on X and Y axes ($v_{sX,Y}$),
(21) speed of fast advance on Z axis (v_{sZ}),

Productivity:

(22) productivity in the materials of copper / steel materials ($V_{W,Cu/st}$),
(23) productivity in the pair of graphite / steel materials ($V_{W,gr/st}$),

Minimum Ra roughness of processed surface:

(24) minimum roughness at torque of copper / steel material materials ($R_{a,Cu/st}$),
(25) minimum roughness at torque of copper / metal carbide materials ($R_{a,Cu/MC}$),

Dielectric unit:

(26) filter fineness (f),
(27) injection pressure of dielectric fluid (p_{inj}),
(28) suction pressure of dielectric fluid (p_{asp}),
(29) coolant temperature (t_r),

EDM generator:

(30) maximum current stage (I_{max}),
(31) minimum current stage (I_{min}),
(32) maximum pulse time (t_{imax}),
(33) minimum pulse time (t_{imin}),
(34) maximum priming voltage (U_{0max}),
(35) minimum priming voltage (U_{0min}).

Step 3: Determining the weights of PUV dimensions.

Weights pi are awarded by a team of potentially qualified users. To reduce the subjectivity in the weighting, the average values p_{imed} given by the team members were determined. The sum of weights satisfied the relation (2).

As users are interested in the accuracy and quality of surfaces processed, they have given greater weight to the characteristics: (14), (15), (16), (17), (18), (19), (24), (25), (26), (31), (33) and lower weights of characteristics: (01), (02), (03), (04), (05), (06), (07), (08), (09), (10).

Step 4: PUV evaluation of products. The absolute values of x_i quality characteristics corresponding to the four products of companies from Japan (JP), Germany (DE), France (FR), Romania (RO) were centralized in Table 3. Depending on the weakest value of parameter x_{imin} and the best value of parameter xi_{max}, for each quality characteristic relative value was assigned on a normed scale from 0 to 1 based on relation (4).

Using the relation (1) PUV were determined for the products, the resulting values being found on the last line of Table 3.

Step 5: Determine the positions in the matrix.

The positioning of products in the Customer Matrix based on the two coordinates (Price and PUV) was represented in Figure 12.

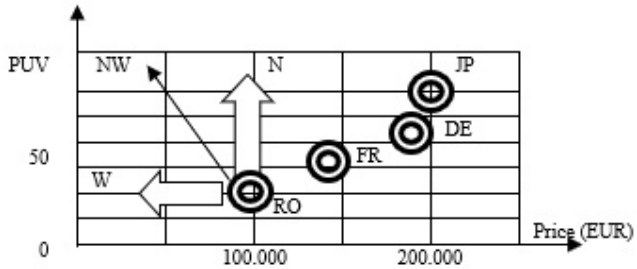

Fig. 12: Customer Matrix for the products

Stage 6: Development of strategy.

The strategy necessary to obtain SCA for the Romanian organization is formulated based on date provided by Customer Matrix. The market segment to which the product is addressed consists of organizations from Romania, which do not have high financial resources and are therefore sensitive to the price variable.

From this point of view, the Romanian product occupies a favorable position in the matrix in relation to the competitors. The prices of analyzed cars are influenced by the competence related to costs.

In the current conditions related to the global economic crisis, the Romanian organization must continue to pursue westward movement (continuous cost decrease). In Romania, the costs of production factors are relatively low compared to the rest competitors from Japan (JP), Germany (DE) and France (FR).

The calculation of variables related to Perceived Used Value (PUV) for the analyzed products are presented in Table 3.

Table 3: PUV evaluation for the products

Nr.	Technical Characteristic	JP		DE		FR		RO		p_{imed}
		x_i	x_{ir}	x_i	x_{ir}	x_i	x_{ir}	x_i	x_{ir}	[%]
01	L [mm]	3000	1	3500	0	3200	0.6	3400	0.2	1.5
02	l [mm]	2000	1	2500	0	2400	0.2	2300	0.4	1.5
03	h [mm]	2000	1	2100	0.5	2100	0.5	2200	0	1.5
04	M [kg]	2500	0	3100	1	2700	0.33	2900	0.67	1.5
05	L_m [mm]	600	0	800	1	700	0.5	750	0.75	1.5
06	l_m [mm]	350	0	650	1	550	0.67	450	0.33	1.5
07	L_c [mm]	700	0	850	1	750	0.33	810	0.73	1.5
08	l_c [mm]	400	0	700	1	600	0.67	480	0.27	1.5
09	h_c [mm]	400	0	600	1	400	0	500	0.5	1.5
10	m_p [kg]	300	0	450	1	380	0.53	420	0.8	3
11	X [mm]	300	0	450	1	400	0.67	420	0.8	1.5
12	Y [mm]	250	0	400	1	350	0.67	380	0.87	1.5
13	Z [mm]	250	0	400	1	380	0.87	380	0.87	1.5
14	$T_{pX,Y}$ [μm]	5	1	10	0	10	0	8	0.4	4
15	T_{pZ} [μm]	4	1	8	0	6	0.5	6	0.5	4
16	$6_{\sigma X,Y}$ [μm]	2	1	4	0	3	0.5	3	0.5	4
17	$6_{\sigma Z}$ [μm]	2	1	4	0	3	0.5	3	0.5	4
18	$T^{-1}_{pX,Y}$ [μm]	3	1	5	0	4	0.5	4	0.5	4
19	T^{-1}_{pZ} [μm] T-1	3	1	5	0	4	0.5	4	0.5	4
20	$v_{sX,Y}$ [mm/min]	1500	1	1800	1	1600	0.67	1200	0	1.5
21	v_{sZ} [mm/min]	700	0	900	1	800	0.5	800	0.5	1.5
22	$V_{W,Cu/st}$ [mm^3/min]	450	0.67	500	1	400	0.33	350	0	2
23	$V_{W,gr/st}$ [mm^3/min]	550	1	550	1	450	0.33	400	0	2
24	$R_{a,Cu/st}$ [μm]	0.05	1	0.1	0.86	0.1	0.86	0.4	0	8
25	$R_{a,Cu/MC}$ [μm]	0.1	1	0.2	0.86	0.2	0.86	0.8	0	8
26	f [μm]	5	1	10	0	6	0.8	6	0.8	4
27	p_{inj} [MPa]	0.1	1	0.1	1	0.05	0	0.06	0.01	3
28	p_{asp} [MPa]	0.05	1	0.03	0.33	0.02	0	0.02	0	3
29	t_r [°C]	4	1	6	0	6	0	4	1	1
30	I_{max} [A]	50	0.5	60	1	50	0.5	40	0	3
31	I_{min} [A]	0.5	0	0.5	0	0.4	0.25	0.1	1	5
32	t_{imax} μs]	1000	0.67	1200	1	800	0.33	600	0	2
33	t_{imin} [μs]	0.5	0.56	1	0	0.8	0.22	0.1	1	5
34	U_{0max} [V]	200	0.55	250	1	180	0.36	140	0	3
35	U_{0min} [V]	100	0.33	120	0	100	0.33	60	1	3
TOTAL		PUV_{JP} = 68.58		PUV_{DE} = 49.46		PUV_{FR} = 47.24		PUV_{RO} = 41.56		100%

But compared to other competitors in China, which enter the Romanian market in the current conditions of strong globalization, the organization in Romania is inferior. Therefore, the Romanian organization must develop other competence focused on reducing costs. In terms of PUV size, the Romanian product is the lowest rated compared to competitors, so moving north remains the main strategic option.

In order to ensure efficiency, it is based on the Romanian organization's focus on increasing the quality characteristics that have been quoted with high weights, which aims to ensure performance on the accuracy and quality of processing required by users.

As the competition takes place in the North-West (NW) direction, by composing the two movements mentioned above, the Romanian organization moves to the North-West (NW), aiming to obtain in perspective of Sustainable Competitive Advantage (SCA).

The Product Matrix could be used further to identify the needed competences for the organization to effectively improve the position of its product in the Customer Matrix. In this case, it is outward that Romanian organization

must find innovation competition to determine North (N) movement, to be vectorially combined to West (W) one. Furtherly, these innovation competencies, which are essential can be found, using Risk Cube instrument.

The strategic alliance between EDM machined manufacturer and a Research Institute and an University could be the solution gain these competencies, to achieve the technological transfer from an innovated product to a ready to market one, with improved position in the Customer Matrix.

The Producer Matrix

With the help of the Producer Matrix, it will be analyzed whether the Romanian organization has the essential competence necessary to enter the market segment of EDM machines, having the advantage of low cost at similar performance compared to EDM machines of competitors.

Stage 1: The market segment of EDM users consists of organizations, which operate in the field of injection mold manufacturing. Customers are interested in the accuracy and quality of surfaces generated by EDM. The financial resources they have are limited and therefore, price and cost are a success factor in this market segment.

Step 2: To obtain a percentage distribution of costs, the value chain analysis was used (Figure 13).

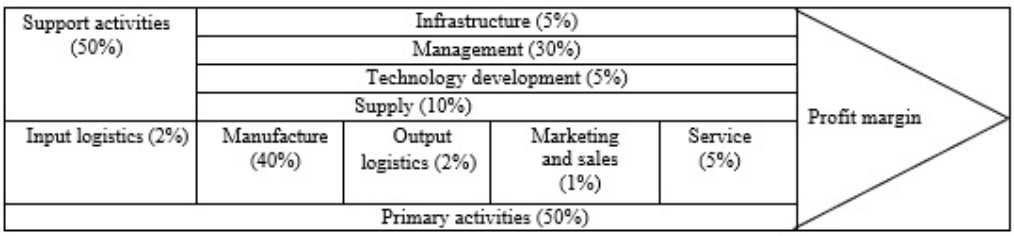

Fig. 13: Percentage distribution of costs on the internal value chain.

Step 3: The essential competencies required for the market segment to which the EDM machine is addressed are:

- Operating Competence: Technology (TC), Supplying (SC), Marketing (MK),
- System Competence: Innovation (IC), Quality Assurance (QA), Value Increase (VI),
- Cost Competencies: Coordination and Control (CC), Continuous Cost Decrease (CCD), Production Factors Cost (PFC), Economies of Scale (ES).

Step 4: Is the rating of core competencies relative to the main competitors in Japan, France, and Germany, which operate in the approached market segment. (Figure 14 and 15).

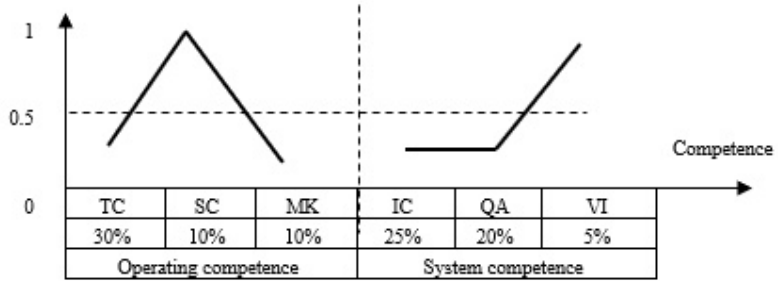

Fig. 14: Operating and system competence.

The aggregate note of operating and system competencies (*Nos)* was determined using the relation (5):

$Nos = 30\%TC + 10\%SC + 10\%MK + 25\%IC + 20\%QA + 5\%VI = 0.3 \times 0.2 + 0.1 \times 0.7 + 0.1 \times 0.1 + 0.25 \times 0.3 + 0.2 \times 0.3 + 0.05 \times 0.8 = 0.315$.

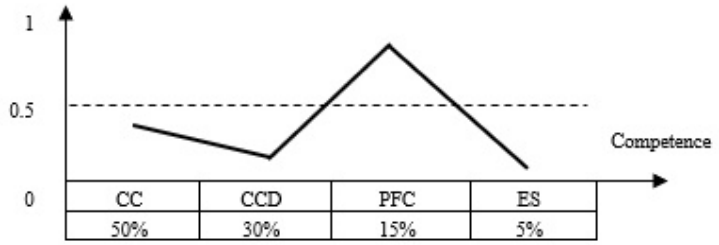

Fig. 15: Competence focused on costs.

The aggregate grade of cost-focused competencies (*Nfc)* was determined using the relation (7):

Nfc = 50%*CC* + 30%*CCD* + 15%*PFC* + 5%*ES* = 0.5 x 0.3 + 0.3 x 0.25 + 0.15 x 0.8 + 0.05 x 0.1 = 0.35.

Step 5: The aggregate scores determined above lead to the establishment of the competitors' positions in the Producer Matrix (Figure 16):

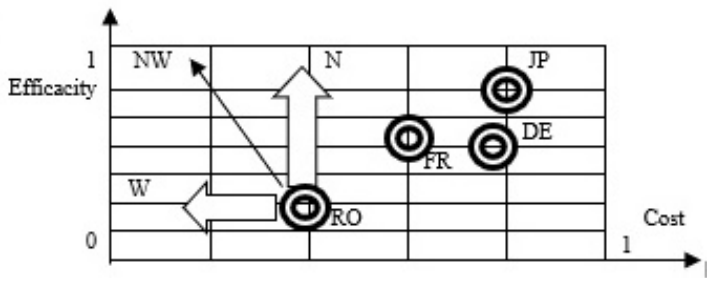

Fig. 16: Producer Matrix of competitors

Stage 6: In relation to the competing companies, the Romanian organization is better positioned on the unit costs axis, due to the lower Production Factors Costs (*PFC*). In the long run, however, that competence will lose value as labor costs increase.

If it must move West (W), the organization must develop its Coordination and Control (*CC*) and Continuous Cost Decrease (*CCD*). These two competencies focused on costs are addressed, according to SR EN ISO 9001: 2015 of Quality Management.

Because customers are interested in the precision and quality of surfaces processed by EDM, the organization is interested in increasing its efficiency competence and obtaining a perceived use value as high as possible.

If it is forced to move North (N), the organization must increase its Innovation Competence (*IC*) with action and Technology Competence (*TC*).

By the vectorial composition of the trips, the organization is directed to the North-West (NW), this representing the direction of the competition.

From the analysis of the value chain, it is observed that the values of administrative and management expenses are disproportionate compared to those regarding infrastructure and marketing activities. Resources can be taken from those allocated to management and administrative activities.

For the elaboration of the development strategy of the organization, it is necessary to increase the weights in the organizational structure, through investments in infrastructure, which affects the technological competence and through the development of the marketing department, which influences the economic performances.

The Risk Cube

The Risk Cube tool is applied for the Romanian organization, which aims to develop through the manufacture of EDM machines specialized in the field of micro-processing.

With the help of the Customer Matrix, the evaluation of the Romanian organization product compared to the competitors from Japan (JP), Germany (DE) and France (FR) is performed.

Adding the results from Producer Matrix, we obtained a low PUV and low Efficiency. (Figure 17).

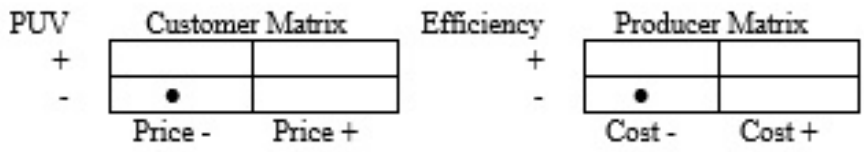

Fig. 17: Combination of Customer and Producer Matrices

If the distance between the Romanian organization and its competitors is large on the axis of effectiveness, it is necessary to create Alliances with other organizations specialized in the field, which could increase the Efficiency by adding chiefly innovation competencies. These organizations are Research Institutes and Universities that achieved results in the research project at laboratory level (Technology Readiness Level - TRL3).

In the first stage, the Romanian manufacturer will develop The Same product on The Same market, based on its high value-added competence, which involves modernizing the EDM machines in the product portfolio, in accordance with current requirements, at low costs and prices.

In the second stage, the Romanian organization will develop new EDM machines for high precision processing, i.e. The New product on the Same market, e.g. micro-EDM by implementing the results obtained in the research projects, by ultrasonic assistance of the material removal process, carried out within the alliances of which it is part (Figure 18).

Fig. 18:The Risk Cube Strategic Options

Conclusions

A series of integrated instruments, available for an organization like Customer Matrix, Producer Matrix and Risk Cube are used to attain and maintain Sustainable Competitive Advantage (SCA).

One can notice that the position of a product in the Customer Matrix, which determines a long-term profitable position on the market is strongly supported by the competencies provided by Producer Matrix, and furtherly, the source of these needed competencies could be indicated by using Risk Cube.

The only effective improvement of Customer Matrix position can be done by appropriate displacements, in the inner of the organization, i.e. within Producer Matrix.

For the presented case study, the Romanian Producer of electrical discharge machines, which has competencies of series fabrication, the effective solution to obtain the improved position in Customer Matrix could be a strategic

alliance with research institutes and universities with high qualified human resources and previous innovation results in this very specialized area.

Further research will be dedicated to better integrated the presented instrumented with forecast methods and applied them effectively for helping organizations to obtain Sustainable Competitive Advantage (SCA) during a longer time horizon.

Acknowledgement

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Research on the Natural Movement of Population in the South-Mountain Region

Camelia Maria PROCOP
Faculty of Management and Rural Development - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania, camelia.procop@yahoo.com

Eduard Alexandru DUMITRU
Faculty of Management and Rural Development - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania, dumitru.eduard.alexandru@gmail.com

Mihnea-Iulian VASILIU
Faculty of Management and Rural Development - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania,
mihneavasiliu@yahoo.com

Ana Ruxandra MICU
Faculty of Management and Rural Development - University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania, micuanaruxandra@yahoo.com

Abstract

This paper refers to the current situation of the population in the South-Muntenia Region, highlighting the social situation of this region, as well as the factors that influence the evolution of the population. At the national level, there is a demographic decline, due in particular to the low birth rate in comparison with the death rate, but also to the migration of the population, to areas with a higher standard of living. This is analyzed, it is obvious for the situation of its rural area in the South-Muntenia region in the direction of the marked demographic decline, in the situation of care in this regard regarding the need to take measures. Also regarding the works and encourages mentions or a series of measures designed to stop this demographic decline recorded in the analyzed region. Unfortunately, the low birth rate correlated with the high mortality recorded in this area, reveals gloomy prospects regarding the evolution of the countryside in the South-Muntenia region.

Keywords: Rural Development, Demography, Population.

Introduction

The South-Muntenia region is one of the 8 development regions of Romania, with an area of 34,453 kmp. It has 7 counties: Argeș, Prahova, Dâmbovița, Teleorman, Giurgiu, Ialomița and Călărași. In this paper, a series of data was analyzed, both quantitatively and qualitatively. Data from the National Institute of Statistics (INS) concerned the population registered at national level, birth, mortality, nuptiality and divorce, with particular reference to the South-Muntenia region.

The relief is a varied one (south the lowest altitudes, while in the north the highest altitudes are encountered, even over 2500 meters). Regarding the structure of the relief, it is divided as follows:

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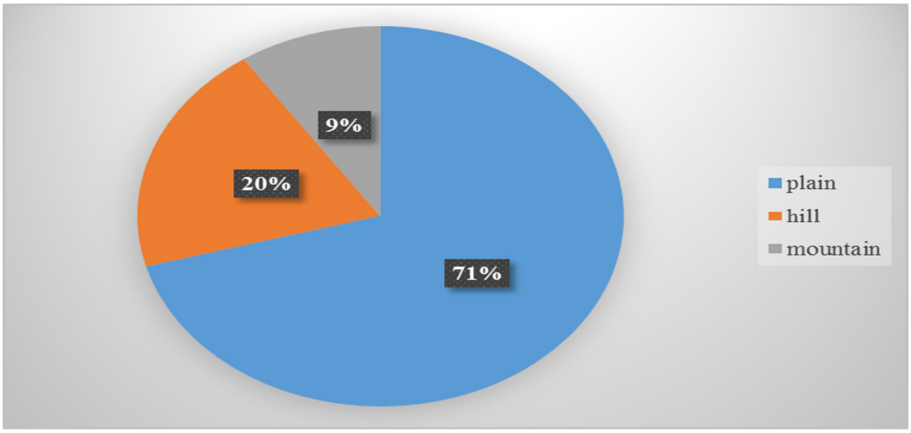

Fig. 1: Percentage representation of the relief encountered in the South Muntenia region
Source: ro.wikipedia.org;

As far as the hydrographic network is concerned, the Danube River is the main watercourse. There are also other water courses such as: Olt, Argeș, Dâmbovița and Ialomița.

The economy of the region is concentrated in the counties of Argeș and Prahova, being highly industrialized, specialized in the oil and chemical industry, but also in the construction of cars (Dacia). At the top, the main economic activity is represented by agriculture, here meeting some of the largest agricultural farms in Romania and beyond.

In the work of Bold I. et all (2003) it is mentioned that the word "rural" comes from Latin ruris (referring to culture, occupied or arranged territory). Also, in Dona I. et all (2005), the rural is defined as the place that includes all the activities that take place outside the urban area, consisting of 3 parts: administrative communities, pronounced dispersal of the population and the special role of forestry and agriculture.

Material and Method

The purpose of the paper is to highlight the demographic decline recorded in the South-Muntenia development region, located in Romania. By analyzing quantitatively and qualitatively the data on the evolution of the residing population in the urban environment, compared to the rural one, of the birth, mortality, nuptiality, but also of the labor force, it was possible to determine the main causes that led to the demographic decline recorded. The data used in the study, coming from the National Institute of Statistics (Romania), and the period taken into consideration was between 2012 and 2018.

Results and Discussions

During the analyzed period, the population residing on January 1 in Romania registered a decrease of approximately 2.8%, reaching in 2018, a population of 19.5 million inhabitants, compared to 2012, when it exceeded the threshold of 20 years. millions of inhabitants (Fig. 2).

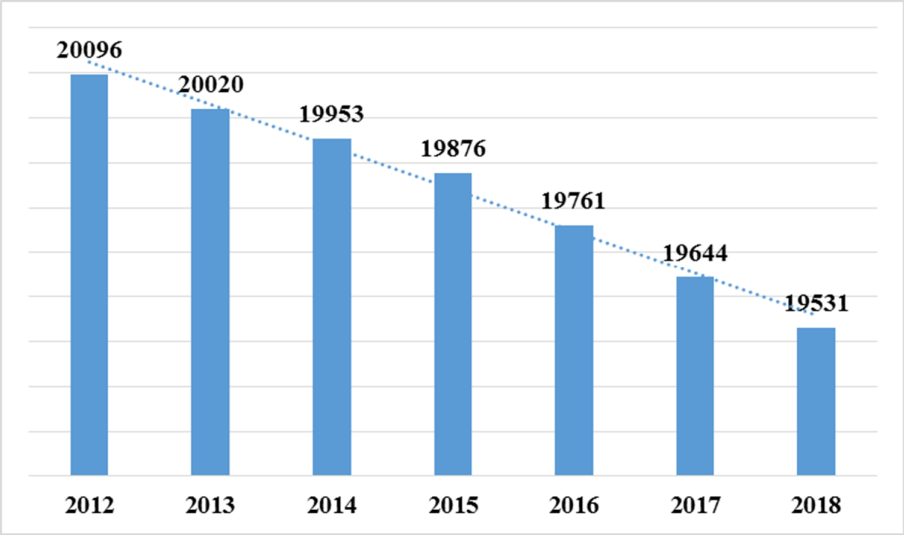

Fig. 2: The evolution of the resident population in Romania, between 2012-2018 (thousands inhabitants)

Source: INS database, accessed 27.08.2019.

In the South-Muntenia region it is observed that the demographic decline is more pronounced in the urban area, compared to the rural area, so that if in the rural area there was a decrease in 2018 compared to 2012 of about 5.6% (3.23 % at national level), in the rural area during the same period, the decrease was about 5% (2.23 at national level) (Fig. 3.).

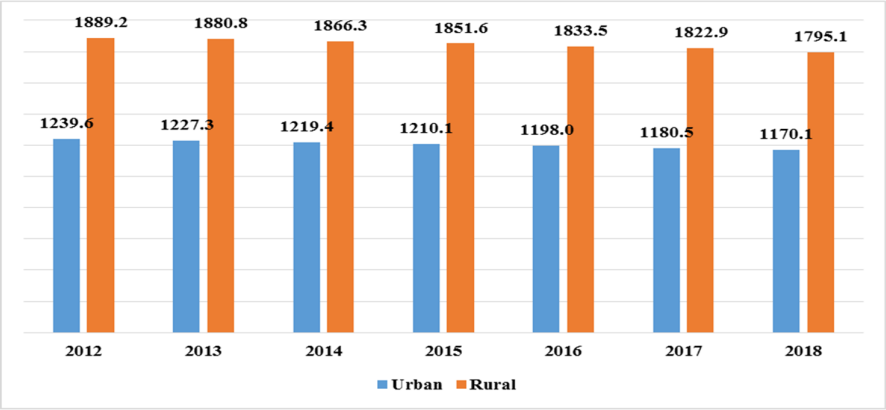

Fig. 3:The evolution of the resident population in the urban environment compared to the rural one in the period 2012-2018

Source: INS database, accessed 27.08.2019.

This can be determined by the fact that in the urban area predominantly young people are found, due to the jobs located in the urban area, while the rural area is characterized by an aging population and the lack of jobs. All these things cause the young people from the urban area to migrate to other countries, in search of a higher standard of living, while in the rural area, the number of deaths exceeds that of the births, thus causing the population decrease in the rural area (Fig. 3 .).

Table 1: Evolution of the resident population from the rural area in the South-Muntenia region, classified according to the counties in the composition

Specification	2012	2013	2014	2015	2016	2017	2018	2018/2012	Annual rhythm
	UM: Number of people							%	
TOTAL	9242268	9229533	9200472	9172491	9124167	9112130	9027161	-2.33	-0.39
The region SOUTH - MUNTENIA	1889209	1880842	1866287	1851626	1833547	1822853	1795093	-4.98	-0.85
Argeş	329927	327877	326516	324568	322187	320305	316509	-4.07	-0.69
Călăraşi	195110	194372	192683	190992	188772	187451	183917	-5.74	-0.98
Dâmboviţa	368035	367344	365781	364291	361501	359489	356210	-3.21	-0.54
Giurgiu	199263	200789	197421	196019	194715	195579	191034	-4.13	-0.70
Ialomiţa	153387	152047	150972	149577	147898	146760	144236	-5.97	-1.02
Prahova	387747	385628	384228	381480	378316	375983	372569	-3.91	-0.66

Source: INS database, accessed 27.08.2019.

According to the above table it can be noted that among the component counties of the South-Muntenia region, the most marked decrease of the population registered in 2018, compared to 2012, was found in Ialomiţa county by about 6% (Table no. 1).

Table 2: Birth evolution from the rural area in the South-Muntenia region classified according to the counties in the composition

Specification	2012	2013	2014	2015	2016	2017	2018	2018/2012	Annual rhythm
	UM: Number of people							%	
TOTAL	92679	96820	92059	92600	92194	92793	85887	-7.3	-1.26
The region SOUTH - MUNTENIA	16583	16404	16032	16225	16088	16084	15114	-8.9	-1.53
Argeş	2758	2755	2751	2848	2807	2818	2788	1.1	0.18
Călăraşi	1931	1857	1710	1785	1757	1749	1630	-15.6	-2.78
Dâmboviţa	3362	3344	3260	3261	3277	3256	3086	-8.2	-1.42
Giurgiu	1785	1735	1642	1770	1712	1763	1558	-12.7	-2.24
Ialomiţa	1582	1516	1537	1414	1425	1415	1291	-18.4	-3.33
Prahova	3316	3344	3293	3401	3350	3339	3210	-3.2	-0.54
Teleorman	1849	1853	1839	1746	1760	1744	1551	-16.1	-2.89

Source: INS database, accessed 27.08.2019.

Regarding the birth rate in the rural area, it is noted that at national level it registered a decrease of 2.3%, so that in 2012 the number of newborns was 92.6 thousand, while in the year 2018 was only 85.8 thousand people. Also the most drastic decrease was recorded in Calarasi county (-15.6%), while at the opposite pole was Prahova county (-3.2%) (Table no. 2.).

This can be attributed to the low number of young people, who contributed to this decline in birth rates registered in rural areas.

Table 3: The evolution of mortality in the rural area in the South-Muntenia region, classified according to the counties in its composition

Specification	2012	2013	2014	2015	2016	2017	2018	2018/2012	Annual rhythm
	UM: Number of people							%	
TOTAL	137878	134059	136199	139256	135329	137446	137725	-0.1	-0.02
The region SOUTH - MUNTENIA	29891	28721	29044	29397	29017	29348	28987	-3.0	-0.51
Argeş	4912	4778	4820	4884	4861	4932	4843	-1.4	-0.24
Călăraşi	3141	3040	3083	3150	3008	3177	3133	-0.3	-0.04
Dâmboviţa	4800	4839	4713	4811	4752	4813	4784	-0.3	-0.06
Giurgiu	3502	3307	3244	3223	3209	3348	3325	-5.1	-0.86
Ialomiţa	2621	2437	2645	2538	2565	2517	2544	-2.9	-0.50
Prahova	5478	5310	5299	5523	5561	5597	5569	1.7	0.27
Teleorman	5437	5010	5240	5268	5061	4964	4789	-11.9	-2.09

Source: INS database, accessed 27.08.2019.

The evolution of mortality registered in the rural area in the South-Muntenia region registered a slight decrease of 0.1% in 2018 (137.7 thousand deaths), compared to 2012 (137.8 thousand deaths) (Table 3.) .

We can see that in the area of rural area in the region of South-Muntenia in 2018, the number of births was only 15 thousand, while the number of deaths was over 137 thousand, so that the number of deaths was 9 times higher only in the case of births, which contributed to the demographic decline at both the regional and country level (Table no. 2, table no. 3.).

Table 4: The evolution of the nuptiality from the rural area in the South-Muntenia region classified by the counties in the composition

Specification	2012	2013	2014	2015	2016	2017	2018	2018/2012	Annual rhythm
	UM: Number of people							%	
TOTAL	38939	38522	41242	44479	48957	51401	51332	31.8	4.71
The region SOUTH - MUNTENIA	6953	6825	7365	8144	9127	9663	9474	36.3	5.29
Argeș	1307	1253	1408	1500	1562	1675	1660	27.0	4.07
Călărași	673	631	689	837	940	958	996	48.0	6.75
Dâmbovița	1475	1487	1547	1607	1793	2039	1923	30.4	4.52
Giurgiu	692	690	719	866	1011	1049	1094	58.1	7.93
Ialomița	493	501	557	657	692	720	749	51.9	7.22
Prahova	1564	1582	1691	1814	2103	2305	2117	35.4	5.18
Teleorman	749	681	754	863	1026	917	935	24.8	3.77

Source: INS database, accessed 27.08.2019.

The tradition maintained by the generations, regarding the marriage, is maintained in the rural area, so that it presents an upward trend in the South-Muntenia region, because if in 2012 the number of married persons was 6.9 thousand, in 2018 it reached a number of over 9.4 thousand married persons, an increase of 31.8% compared to 2012. However, the largest increase in the number of married persons in the rural area was registered in Giurgiu county, increasing by 58.1 % in 2018 compared to 2012 (Table no. 4).

Table 5: The evolution of the divorces from the rural area in the South-Muntenia region, classified according to the counties in the composition

Specification	2012	2013	2014	2015	2016	2017	2018	2018/2012	Annual rhythm
	UM: Number of people							%	
TOTAL	9534	8913	8496	10031	10012	10522	11024	15.63	2.45
The region SOUTH - MUNTENIA	1843	1813	1555	2014	2040	2226	2292	24.36	3.70
Argeș	330	340	278	329	292	447	386	16.97	2.65
Călărași	229	190	177	249	205	209	222	-3.06	-0.52
Dâmbovița	324	304	268	441	406	353	495	52.78	7.32
Giurgiu	138	116	53	116	175	216	113	-18.12	-3.28
Ialomița	181	142	109	143	161	139	173	-4.42	-0.75
Prahova	438	456	447	485	499	531	590	34.70	5.09
Teleorman	203	265	223	251	302	331	313	54.19	7.48

Source: INS database, accessed 27.08.2019.

Regarding the number of people who have divorced in the South-Muntenia region from the rural area, the trend is an ascending one, so that if in 2012, their number was 9.5 thousand, in 2018, their number was over 11 thousand people. It should be noted that although the tradition regarding marriages is maintained, at least in the rural area, it can be observed that if in the last years the divorce met mainly in urban areas, now this phenomenon is quite widespread in the rural area (Table no. 5.).

It should be noted that if at the level of 2018, in the South-Muntenia region of the rural area, the number of married people in the rural area was 9474 while the number of persons who divorced was 2292, with a share of about 24% of the total number of marriages (Table no. 4, Table no. 5).

Table 6: Evolution of the labor force from agriculture in the South-Muntenia region, between 2012-2017

Specification	2012	2013	2014	2015	2016	2017	2017/2012	Annual rhythm
	UM: Thousands						%	
TOTAL employed population at national level	8569.6	8530.6	8431.7	8340.6	8317.6	8366.8	-2.4	-0.48
TOTAL population employed in agriculture, forestry and fisheries, of which:	2510	2380.1	2304.1	2003.1	1726.8	1741.7	-30.6	-7.05
The region SOUTH - MUNTENIA	442.8	419.1	404.4	351.9	303.7	305.9	-30.9	-7.13
Arges	71.8	68	65.5	57	48.8	49.4	-31.2	-7.21
Calarasi	50.7	48.2	46.2	40.9	35.6	35.8	-29.4	-6.72
Dambovita	72.5	68.5	65.9	57.1	48.9	49.3	-32.0	-7.42
Giurgiu	47.8	45.1	43.3	37.8	32.6	32.8	-31.4	-7.26
Ialomita	45.6	43.5	42.6	37.4	32.8	32.9	-27.9	-6.32
Prahova	65.9	62	60	52.1	45.1	45.3	-31.3	-7.22
Teleorman	88.5	83.8	80.9	69.6	59.9	60.4	-31.8	-7.36

Source: INS database, accessed 27.08.2019.

At national level, the employed population registered a downward trend, so that if in 2012 the number of people working was 8.57 million people, while in 2017, their number was 8.36 million of people. Also, in 2018, of the total 8.36 million people, 1.74 million were active in the field of agriculture, forestry and fisheries, decreasing by more than 30% compared to 2012, when the population employed in this sector it was 2.5 million people.

Regarding the region of South-Muntenia, reporting the year 2018 to 2012, there is a decrease of 30.9% of the employed population in the field of agriculture, forestry and fisheries. This can be accounted for by the fact that people able to work, have chosen to migrate to other countries, with a higher standard of living, working either in the same field or in another field. Also, technology plays an extremely important role, as the new generations of agricultural machines in parallel with the built-in intelligence packages, counteract the decrease in the labor force requirement of farms.

Conclusions

At national level, there is a sharp decrease in the number of inhabitants, so that if in 2012 their number was about 20.1 million inhabitants, in 2018, it was only 19.5 million inhabitants.

The many problems facing the rural area, including the lack of jobs, contribute to the migration of the young population from the rural area, to the neighboring urban centers, or to other regions in other countries of Europe, especially in the context where the possibility of crossing borders it is no longer an impediment, with Romania's accession to the European Union in 2017.

For example, in the plain area of the South-Muntenia region, the main economic activity is agriculture, which is quite compact, with large and very large farms being highlighted, so that family farms do not find their place in this region. Also, family farms could represent a possible solution to increase the number of inhabitants from the rural area, in the context in which all family members are involved in this type of business.

The lack or poor development of the utilitarian infrastructure, lead to a low standard of living. This favors the migration of the population from the rural area to the urban centers. The development of the utilitarian infrastructure can be solved by accessing the European funds, but the localities whose budgets are anyway low, cannot ensure the co-financing of the projects meant to improve the utilitarian infrastructure.

According to table number 6 we can see that the labor force decreased considerably in 2017 compared to 2012, in the South-Muntenia region by about 31%. This is due in particular to the population that has reached the legal retirement age.

All these problems represent a vicious chain, for which solving these problems in turn will not diminish the exodus of the population from the rural environment. In this sense, concrete action must be taken in all the major challenges that rural areas face.

We must also be aware that the trend, both at European and local level, is leading to urbanization of the population, but even so, the rural area must be protected by making investments designed to slow the migration of the population from these areas.

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Intégrité Managériale : Un Etayage De La Pensée De Michael Jensen Grâce A La Phénoménologie De Paul Ricœur

Philippe JACQUINOT

Université Paris-Saclay, Univ Evry, IMT-BS, LITEM, 91025, Evry-Courcouronnes, France.
philippe.jacquinot@univ-evry.fr

Résumé

De longue date, la science économique a identifié la confiance comme étant un facteur essentiel de l'échange économique. Plus récemment, les sciences de gestion ont estimé que cette confiance repose elle-même sur l'intégrité, à savoir le respect de la promesse donnée même si l'intérêt économique ou le sentiment envers celui qui a fait confiance a changé. Michael Jensen a affirmé que le respect même de cette promesse fonde l'identité même de la personne, sans toutefois s'expliquer. Le présent travail se propose de mobiliser la pensée de Paul Ricoeur pour étayer celle de Michael Jensen.

Mots-clés : Intégrité, promesse, Ricœur, phénoménologie.

Introduction

L'intégrité fait l'objet d'une recherche assidue par les sciences de gestion depuis le milieu des années 1990. Elle est un facteur de production qui a été trop longtemps ignoré par la théorie (Jensen et al, 2010). Peu à peu, l'intégrité se dessine comme étant une question de promesse honorée, comme nous le verrons dans un premier temps. La phénoménologie de Paul Ricoeur permet de comprendre que le membre d'une organisation honore sa promesse pour des raisons identitaires, comme nous le verrons dans un second temps.

L'intégrité, une question de promesse honorée

Dans leur article séminal sur la confiance, Mayer, Davis et Schhoorman (1995) ont identifié l'intégrité comme étant l'une des trois caractéristiques d'une personne amenant à lui faire confiance, aux côtés de la compétence et de la bienveillance. On comprend qu'il faille de la compétence : à quoi bon, sinon, déposer son bien (l'usus de l'entreprise, son avenir personnel, etc.) dans les mains d'un autre ? On compte sur le fait qu'il saura déployer tout son savoir et son savoir-faire pour le préserver, voire le développer mieux qu'on ne le ferait soi-même. On comprend également qu'il faille de la bienveillance, une forme de savoir-être qui incite, selon son étymologie précise, à veiller sur le bien de l'autre. Mayer, Davis et Schoorman (1995) ont estimé que la bienveillance reposait sur un attachement, entendu comme un sentiment qui oriente positivement envers celui qui est bénéficiaire de la bienveillance. Ils ont ajouté que, hélas, comme tout sentiment, la bienveillance est sujette à changement, pour ne pas dire à versatilité. L'intégrité, autre savoir-être que la bienveillance, est alors cette sorte de force intérieure qui, malgré l'absence de sentiment favorable envers celui qui nous a fait confiance et s'est rendu vulnérable en remettant son bien à notre garde, nous amène à nous comporter conformément à notre parole.

Quelques années plus tard, en 1999, les mêmes auteurs ont proposé une échelle de mesure de l'intégrité :

1. La direction générale a un fort sens de la justice.
2. Je ne me suis jamais demandé si la direction générale allait scrupuleusement mettre en pratique ses paroles.
3. La direction générale s'évertue à être équitable dans ses échanges avec les autres.
4. Les actions et comportements de la direction générale ne sont pas très cohérents entre eux (résultats de l'évaluation à inverser).
5. J'apprécie les valeurs de la direction générale.
6. Des principes sains guident le comportement de la direction générale.

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On retrouve, quoique de manière plus détaillée, la question de la tenue de la promesse : il s'agit de mettre en pratique les principes qu'on a énoncés, à commencer par ceux de justice et d'équité.

Simons (2002), laissant de côté la question du contenu de la promesse – les principes de justice et d'équité – s'est concentré sur la question de la tenue elle-même de la promesse. Il a proposé un construit, celui d'intégrité comportementale (*behavioral integrity*), qu'il a défini comme étant : « le schéma perçu d'alignement entre les mots et les actes » (p. 19). Avec plusieurs de ses collègues, il en a donné, en 2007, une échelle de mesure :

1. Les paroles de mon responsable hiérarchique sont en adéquation avec ses actions.
2. Mon responsable hiérarchique tient ses promesses.
3. Mon responsable hiérarchique pratique ce qu'il prêche.
4. Mon responsable hiérarchique fait ce qu'il dit vouloir faire.
5. Mon responsable hiérarchique se conduit en conformité avec les valeurs dont il parle.
6. Mon responsable hiérarchique fait preuve des mêmes priorités que celles qu'il décrit.
7. Quand mon responsable hiérarchique promet quelque chose, je peux être certain que cela va arriver.
8. Quand mon responsable hiérarchique dit qu'il va faire quelque chose, il le fait.

Jensen et deux de ses co-auteurs, Werner Erhard et Steve Zaffron, ont complété, en 2018, le travail de Tony Simons. Ils ont préféré l'expression de promesse honorée à celle de parole tenue. Et ils ont défini la parole honorée comme étant le fait de tenir sa promesse ou, à défaut de pouvoir le faire, dès qu'on le sait, d'alerter les personnes concernées et de remédier au désordre qu'on a pu créer en ne tenant pas sa promesse. On peut être intègre au sens de Jensen et de ses co-auteurs sans l'être au sens de Simons puisqu'on peut ne pas réaliser la lettre de ce qu'on avait promis. En outre, pour Michael Jensen et ses co-auteurs, la promesse peut avoir été faite implicitement alors que pour Simons elle doit avoir été donnée explicitement. Pour Michael Jensen, fait ainsi preuve d'intégrité celui qui honore une promesse implicite alors que, pour Simons, il n'y a pas ici matière à démonstration d'intégrité.

Par ailleurs, Jensen (2014) a affirmé que, pour tenir sa parole, l'intègre fait preuve d'une grande « auto-discipline » (p.17). Autant le calcul coût sur bénéfice doit être fait par l'intègre avant de promettre, autant celui-ci s'interdit un tel calcul au moment de tenir (p. 21). Il s'agit d'un changement radical de paradigme pour Michael Jensen qui avait auparavant assuré que l'homme est un optimisateur permanent (Jensen et Meckling, 1976 ; Jensen et Meckling, 1994), comme l'ont souligné Jacquinot et Pellissier-Tanon (2018).

Dans ce même article de 2014, Michael Jensen a également affirmé que « La parole que l'on se donne à soi-même est une part critique de notre intégrité. Le fondement même de l'intégrité est de se déclarer à soi-même 'qui je suis est ma parole' et 'je donne ma parole à moi-même que je suis une personne intègre'. Sans ce fondement, vous ne serez jamais une personne intègre. » (p. 17). Mais Michael Jensen n'a pas justifié son affirmation. Le chercheur doit s'employer à trouver une telle justification. Il peut s'appuyer sur la phénoménologie de Paul Ricoeur.

La promesse honorée, une question d'identité

La personne intègre est sa parole, a affirmé Michael Jensen. Cette phrase parle à tout lecteur assidu de Paul Ricoeur, phénoménologue de référence en matière d'identité. Bien sûr, Paul Ricoeur a relevé, avec l'essentiel de la littérature, qu'une personne est reconnue grâce à une opération mentale consistant à faire un rapprochement entre celui qui se présente à nous maintenant et celui qui s'est manifesté à nous quelques secondes, jours ou années plus tôt. Et il a appelé cette identité *idemité* (ou mêmeté). Surtout, Paul Ricoeur l'a distinguée d'une autre identité dont il a eu l'intuition et qu'il a appelée *ipseité*. A la recherche de cette *ipséité*, Paul Ricoeur s'est intéressé à l'autre que soi, successivement en tant que celui qui agit, celui qui se narre et celui qui est sujet à imputation morale. Son ouvrage majeur, *Soi-même comme un autre*, publié en 1990, rend compte de cette progression et, spécifiquement plus intéressant pour notre propos, on peut y lire que « la tenue de la promesse […] paraît bien constituer un défi au temps, un déni du changement : quand même mon désir changerait, quand même je changerais d'opinion, d'inclinations, 'je maintiendrai' » (p.149). L'homme est, en effet, capable de placer « la constance à [lui]-même au-dessus des intermittences de [ses] désirs, dans le mépris des obstacles et des entraves extérieures » (p. 267). Cette constance, qui fait qu'on tient sa parole, est l'*ipséité*. Autrement dit, tenir sa parole résulte d'une constance qui est l'être même, ainsi manifesté à soi et aux autres.

Michael Jensen a non seulement affirmé qu'une personne est sa parole mais il a aussi déclaré que l'intégrité repose sur la parole donnée à soi-même d'être une personne intègre. La lecture de l'ouvrage *post-mortem* de Paul Ricœur, *Parcours de la reconnaissance* (2004), nous éclaire également. L'auteur s'est posé la question : « d'où l'énonciateur d'une promesse ponctuelle tire-t-il sa promesse ? » (p. 191). Il a répondu lui-même : « d'une promesse plus fondamentale, celle de tenir sa parole en toutes circonstances ; on peut parler ici de "la promesse avant la promesse".

C'est elle qui donne à chaque promesse son caractère d'engagement : engagement envers… et engagement à… Et c'est à cet engagement que s'attache le caractère d'ipséité de la promesse qui trouve dans certaines langues l'appui de la forme pronominale du verbe : je m'engage à. Cette ipséité, à la différence de la mêmeté [par référence à l'idem] typique de l'identité biologique et caractérielle d'un individu, consiste en une volonté de constance, de maintien de soi, qui met son sceau sur une histoire de vie affrontée à l'altération des circonstances et aux vicissitudes du cœur. C'est une identité maintenue malgré…, en dépit de…, de tout ce qui inclinerait à trahir sa parole » (p. 191-192). Pour Paul Ricœur, l'*ipseité* est donc fondée sur une engagement originel donné à soi-même de tenir ses promesses. Nous pouvons au surplus noter que, dans ce même ouvrage, Paul Ricoeur a élevé la promesse au rang de paradigme (selon son expression même) d'un aspect de la personne.

En définitive, pour Paul Ricœur, l'intégrité est bien, comme Michael Jensen l'a affirmé, une question d'identité et de promesse fondée sur une promesse originelle, faite à soi, de tenir ses promesses. Il s'agit d'ailleurs, pour ces deux auteurs, d'une question paradigmatique. Le présent travail permet, conformément à son objectif, d'étayer la pensée de Michel Jensen en mobilisant la phénoménologie de Paul Ricœur.

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Digital Technologies for Communication in Social Work

A. PEREIRA-GARCÍA
Corporación Universitaria Minuto de Dios – UNIMINUTO, Bogotá, Colombia,
alexander.pereira@uniminuto.edu.co

Abstract

The practice of social work has as one of its main characteristics the constant interaction with the users, object of their attention and intervention. In these interaction processes, communication constitutes a fundamental dynamic for the identification and solution of social problems, since social interaction is based on a communicative dimension. In the context of virtuality, accelerated in the context of the covid-19 pandemic, various interactions in social work have moved towards digital spaces. The communication processes, in this way, have now been placed in the virtual world. The document proposes an approach to some reflections on the aspects of electronic communication in social work and the relevance of the issue in the process of training future social workers.

Keywords: Social Work, Communication, Digital Technologies, Covid-19.

Communication and Social Work

The processes of communication constitute one of the most relevant dimensions in social work in accordance with the interactive nature of the discipline. The direct approach to users with the aim of improving their well-being and living conditions implies a process of constant communicative exchange. In practically all scenarios of social work, the ability to communicate effectively is a requirement for the achievement of the proposed objectives. In this sense, Barreto-Pico (2017) states that efficient communication is indispensable for the fulfillment of the social worker's mission.

The social worker acts as a facilitator of the relationships between subjects and social institutions and in this process fulfills various functions such as guiding the population to achieve its objectives and promoting participation in its own transformation processes (Barreto-Pico, 2017). In addition, from an investigative dimension, the professional makes an approach to the particular experiences of the subjects, to their contexts, perceptions and worldviews with the objective of understanding their reality and their problems. In all these areas, the communicational exchange is a transversal dimension in the professional practice of social work.

In fact, the service provided in the resolution of personal or family problems that people suffer has as a background the careful study of the client in their family and social environment, which "involve the transmission, reception and interpretation of non-verbal and verbal messages in order to communicate the nature of experience by sharing thought and feeling and in order to influence the behaviour of others" (Day, 2014, p. 15). From here, communication can be thought of as a process that cuts across social relations, and the way in which communicative processes are established has a decisive influence on relations between professionals and users and on improving the living conditions of the people who are the object of professional attention and intervention.

Methodological Approach

In the framework of the research project "Cyberintervention in Social Work", an approach was made to the experiences and perceptions of social work students in a university institution in Bogotá, Colombia, through the application of semi-structured interview instruments. In this phase of the work, the aim was to identify the relationships between disciplinary dynamics and aspects related to the digital society. Particular emphasis was placed on the relationships between social work and ICTs that deepened as a result of the pandemic. The current contingent reality has highlighted the relevance of digital technologies in the communication processes between social workers and users. This issue becomes important in the dynamics and experiences of virtual and distance care that are generated as a result of the social distancing policies regulated for the control of the covid-19 pandemic during this year.

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ICT and communication in social work

Day (2014) has shown that the dynamics of attention to users by social workers have a high communicative component, however, this process is not reduced to the simple provision of information. Attitudes, gestures, among other forms of expression or language, become significant elements to bring the professional and users closer together in the search for solutions to the social problems that afflict them. Given that many people assume their reality as a private matter, a high capacity for empathy and trust is required (Romero, 2017), such that people decide to provide confidential information to professionals seeking to understand their particular reality.

On the other hand, Day (2014) says that many users find it difficult to sufficiently understand the institutionalized and bureaucratic processes that are at the base of the relationship between the State and citizens. The completion of forms and other instruments for recording and collecting information often requires a complex technical process. This often involves the social worker in translating the information so that it is easily understood by users.

Language accuracy, efficiency in the exchange of information, and understanding the intentions and interests of the actors are key aspects of the communication process in social work. In a certain way, these elements are thought of as part of the dynamics of the traditional attention in social work, which are basically a disciplinary paradigm. However, the positioning of digitalization as an extension of social life and, particularly, the situation of the covid-19 pandemic that led to the acceleration of digitalization in many scenarios, have raised questions for the understanding of social work, its approaches, practices and methods.

It is clear that the digital society, thought as a dynamic centered on knowledge, has put in the exchange of information its main characteristic. The so-called information and communication technologies, ICT, have positioned themselves in the contemporary world as structuring factors of social life. Its most relevant characteristic is precisely its capacity of interconnection from the exchange of data. Byrne & Kirwam (2019) state that "social workers continue to recognize the centrality of relationship in social work practice but are trying to build and mediate relationships with service users in a fundamentally changed context since the theorization of relationship in social work was originally developed". Specifically, the different forms of electronic communication suggest a new framework of interaction.

Byrne & Kirwam (2019) state that "modes of electronic communication are not simply add-ons to society but are altering the social texture of society including the ways that people relate and interact with others". Of course, although it seems to be an alternative to face-to-face interaction, virtuality really implies a transformation in the dynamics of approaching the other. In the case of the research project, the students' perceptions about the digital tools were investigated, a majority of informants stated that the ICT mediation constitutes a contingency related to the demand of social distancing derived from the pandemic but that it does not replace the face-to-face approach to the users. The idea of direct contact as part of the practice of social work is ingrained.

However, some studies have shown that consumer demand for online clinical services is increasing, this in a case of inquiry into therapeutic communication practices via email (Mattison, 2012). In a similar vein, Bullock & Colvin (2015) technological communication in the United States has been gradually incorporated into the practice of social work in both administrative and therapeutic tasks. In addition to favoring communication with people who are located in isolated or distant places, digital tools have the advantage of establishing rapid and permanent contact, which generates an attraction for the communication processes, while favoring a greater follow-up of the users and the processes they experience in terms of professional attention. In the research project some informants agree with the perception of the advantages regarding frequent contact with their users, due to the possibilities of telephone and electronic communication supported in the use of social networks.

Molina et al (2015) recall that communication is an agent that models culture, so that the transits of the communicative process into the world of virtuality lead to a modification of interpersonal and institutional relations, the production of meaning, cultural identification and the predominant ethics, among other spheres. Communication cannot be understood simply as an exchange of information but as the staging of life experience mediated by electronic tools. Thus, electronic communication produces a certain type of social relations that can be favored by its mediation or, on the contrary, generate problems for the achievement of an efficient and adequate interaction between professionals and users.

Final Considerations

It has been reaffirmed that communication occupies a central place in practices related to social work given the need for approach and frequent contact with users. The mediation, the interview, the intervention and other processes related to the professional practice of social work are being modified by the relevance that electronic communication has assumed in today's world. These changes are substantial challenges for thinking about social work in the context

of the digital society. In many cases there is a perception of the instrumentalization of digital technologies by social workers, professionals and those in the process of training, given that technological mediation is affirmed as a contingent alternative to the traditional -and official- practices of social work, which are largely based on face-to-face work.

In the course of the research project some aspects have been identified that can be considered key in the intellectual debate on the relationship between ICT and social work. These issues, however, have not been sufficiently addressed in the training processes of social workers in the educational institution under study. This shows an urgent need to assume the reflections on the disciplinary horizon in the framework of the information society. The processes of electronic communication are far from facilitating the exchange of information; on the contrary, what they show is a particular way of understanding the social world, the problems experienced by human groups, and the forms of possible solutions in a reality that has crossed the borders of direct encounter and is built on new foundations, those of digitalization.

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Importance of Cyber Security in an Enterprise

Sayed Sayeed AHMAD
Al Ghurair University, Dubai Academic City, UAE 37374
Saeed.ks@gmail.com

Rabia Saeed MALIK
Middlesex University, Dubai Knowledge Village, UAE 37374
rabiasaeed284@gmail.com

Ihab WATTAR
Al Ghurair University, Dubai Academic City, UAE 37374
iwattar@hotmail.com

Abdul SAMAD
Jazan University, Jazan, KSA,
abdulsamad.in@gmail.com

Abstract

The impact of cyber security is growing at an exponential rate. This can be attributed to the increase in the number of devices and the increase in utilization of cyberspace, connected devices and networks to store, transfer, access and safeguard information. With the increase in the usage and popularity of cyber security, the researches and studies pertaining to the topic have also increased. This paper focuses on analyzing and scrutinizing existing studies and literature to ascertain the intricacies of cyber security and its importance for organizations.

Keywords: Cyber-attacks, threat, Stalking, Identity Theft, Phishing, Worms, Intellectual Property.

Introduction

The dawn of information has ushered in an era that has led to numerous innovations and inventions. The advancement in technology can be described as a boon to humanity considering the benefits it has availed (Purdy, 2016). But one of the greatest developments that has taken place in technology has to be „Internet". The Internet has not only revolutionized the way people communicate and interact but has given rise to a new dimension known as the Cyberspace.

The term cyberspace seeped into daily vernacular during the 1990s when fields such as networking, digital communication, and internet were on the rise and started gaining prominence. The definition of cyberspace has experienced many variations over the years as the scope of advancements in technology and the utility of the internet has increased. But it can be defined as an intangible domain within which the interaction and exchange of information by computers and an assortment of networks occur.

But along with benefits of a particular entity also comes numerous threats and drawbacks. The drawbacks in the case of cyberspace refers to the cyber-attacks. Cyber-attacks are best defined as a maneuvers designed to bypass the security of a device or network to access, alter or destroy information (Conteh & Schmick, 2016). To fend off such attacks and any other intrusions that might harm the device or network cyber security came into being. Cyber security is best defined as the concept that deters cyber-attacks and protects the validity of the data of a system or network. The evolution of the internet from a medium of exchanging and transferring information to a medium used for conducting business, financial

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transactions and advertisement has highlighted the need for cyber security in order to protect one‟s relevant and confidential information. Therefore, it has become one of the most important concepts and practices in recent times.

The cyberspace has expanded and is now full of a multitude of assorted users, content and information. This has allowed the possibility of the scope of attacks within the cyberspace to access, alter or destroy information. In fact, the number of connect devices in the world have already exceeded the human population and according to Statists, by the year 2020, the number of devices connected to the internet would surpass 50 billion (Statista, 2012). Therefore, adequate cyber security has become a paramount necessity for individuals, businesses, nations, and any entity that possesses or uses a connected device.

The paper primarily aims to „explore the importance of cyber security, the domain of operation of cyber security and its future scope. This paper employs interpretivist approach to qualitative research by interviewing a network security professional. Furthermore, additionally; primary and secondary both types of data are collected for study. The Study concludes that there is a unanimous consent regarding the importance of cyber security to organizations. There is a need for integration of cyber security in training and development to improve awareness and knowledge among employees regarding cyber security. Moreover, organizations also need to systematic review of every system and division to evaluate areas where cyber security is needed while organizations must also realize that there is a need for Cyber security measures and protocols irrespective of the nature of organization.

The interview revealed that while cyber security is an indispensable part of an organization and can effectively deal with cyber-attacks, cyber security protocols and would always be in a situation where they would respond to a threat rather than deal with it proactively.

Literature Review

In the year 2015, an article aimed at exploring the importance of Cyber Security explains the variety of cybercrimes and attacks as: Cyber Stalking, Identity Theft, Phishing, Worms, Theft of Intellectual Property, Trojan Horses, salami attack, DoS and DDoS, Viruses, and Spoofing [1]. The study also provides an overview of the propensity and frequency of cybercrimes and attacks have increased over a span of 4 years from 2010 to 2013. The study does not reach any conclusion and focuses more on the aspect of cyber security against cybercrimes and explains the various types of attacks. It does however highlight the need for cyber security considering the scenario of increasing cybercrimes and attacks.

An article published in the year 2015 in the National Cyber security Institute Journal aimed at focusing on the need of cyber security in journalism [2]. The research begins with highlighting the importance of journalism and the pertinent information prodded by it that helps in creating awareness and informing numerous people, then it pivots to the primary point of the study which is that there is increasing need for journalists to be educated on cyber security and to provide them with relevant tools. The need for journalists to be cognizant about the intricacies of cyber security has increased because of the approach and resources of organizations and government to ascertain the information of journalists and their sources. The study cites instances such as the Watergate Scandal of 1972 and the 2004 case of a CIA source for which a journalist was charged with „contempt of court‟ because of not revealing the source [2]. The industry of journalism and its associated organizations need to be adept at using tools of cyber security. Another instance was highlighted by the study which mentions how the documents leaked by Edward Snowden could not be released in time and were delayed because the journalist, Glenn Greenwald, revealed that Snowden had to guide him in every step on how to securely communicate.

Another article published in the year 2015 in the National Cyber security Institute Journal aimed at focusing on the possibility of cyber security in Healthcare [3]. The research begins with highlighting a crucial point that why is adequate cyber security absent from healthcare systems? The study emphasizes that patients should be provided with an assurance regarding confidentiality and privacy of their information. The study explores numerous avenues though which cyber security could be implemented and how it could complement healthcare. The study explores a multitude of avenues that include “Risk Assessment for Availability” while also exploring approaches such as exception handling and third party-risk management. But perhaps the most important and valid point of the study was the recommendation to develop “Unique Patient Identifier” at a national level [3]. The study argues that development and implementation of such a system would enable in resolving issues related to identity thefts and insurance scams. The study concludes by methionine that the need for cyber security in healthcare is paramount as it would not help with issue of confidentiality and privacy of the patients but it would also help in dealing with other issues such as insurance scam.

A 2016 article in the International Journal of Advanced Computer Research aims at describing the fundamentals of cyber security pertaining to attacks of social engineering [4]. The primary aim of the study is evaluation of the vulnerabilities in the infrastructure of IT aspects of an organization. The study had a broad scope and details the reason behind the growth in cyber-attacks while at the same time it also explores the impact of cyber-attacks on the organization and how cyber security can deal with such attacks and reduce the exposure of the organization. The study explores social engineering and explains how social engineering, the art of exploiting human weaknesses, is utilized by cyber-attacks to disrupt an organization. [4]. The study concludes that the best possible way to avoid and evade such attacks is to improve the level of education provided to employee regarding cyber security and vulnerabilities which can be targeted. Furthermore, it also states that one of the most common targets for such an attack are new employees.

An article in the International Journal of Cyber Criminology, 2014, aims at analyzing the nature of groups related to cybercrime [5]. The study explores the relationship between organization and cybercrime and various aspect of cybercrime including but not limited to definition, scope, challenges, etc. The study offer an insight into how organizations have been created for the sole purpose of committing cybercrimes. The study then cites and analyses cases pertaining to cybercrimes committed by organization and on organizations and their effects, such as Ryan Cleary: DDoS on SOCA; Aaron Swartz: Content Downloader; Andrew Auernheimer: Apple iPad Snoop. The study concludes by highlighting an important question: "whether organizations and individual offenders pursue similar goals. [5]" The study concludes that while there are similarities in the objectives of organizations and individuals both in relation to cybercrimes, there are also differences. It is further stated in the study that there is an apparent lack of information and research into this topic. But the study also highlights an important observation that organized cybercrime is relatively still in infancy and it is bound to evolve into a threat of substantial magnitude. Thus, there is an imperative need to improve the cyber security and adapt to future situations.

The Cyber Security Officer of Huawei Technologies, Andy Purdy, filed a report in the year 2016 that foci sued on addressing the issues of cyber security in context of supply chains [6]. The report claims that while organization invest huge amount of resources to improve their supply chain‟s effectiveness and efficiency, they do not consider other factors that may potentially harm the validity of the supply chain. The study focuses on the concept of supply chain risk management and explores mechanism that can be implemented in the supply chain to minimize risk from the point of cyber security. The report explores the NIST (National Institute of Standards and Technology) framework which intends to help organizations in not only understanding but managing their risks in a manner that propels them towards a stated of preparedness. The report highlights and explores a multitude of assorted factors that affect supply china of organizations while the report also explores various initiatives that are in progress or have been implemented to address the risks of supply chain. These initiatives are: Underwriters Laboratory, ENISA, SAFECode, the initiative by EastWest Institute, etc. [6]. Additionally, the report also analyses various initiatives that have been started and implemented by countries such as Japan, United States of America, China, and UK.

A report in the year 2017 aimed at exploring the intricacies of cyber security in non-governmental and non-profit organizations. The report highlights the fact that while organizations that have profit as their main objective and governments have one primary attribute in common with non-governmental and non-profit organizations that is their intention to secure their data. With the advent of the age of information and computers, every organization irrespective of their objectives have started employing the use of computing to attain effeteness and efficiently in their operations and activities. The report highlights and explores methods and approaches though which non-governmental and non-profit organizations can protect their data while at the same time report also recommends numerous ways which can be used by the organizations to safeguard their data. One of the key aspects which is pointed by the report is that organizations need to generate awareness among their employees and volunteers regarding cyber threats. This report further emphasizes that training and development of employees should include a session of cyber security to provide them information on the concept and to educate them about the fundamentals of the concepts.

Methodology

There are many steps that are included in this research process; literature review, data collection, data analysis, and conclusion.

Data Collection

50 randomly selected employed individuals were given a survey questionnaire of 10 questions. For the purpose of qualitative research, a network securities supervisor of a company in Dubai was interviewed. The interview with the

expert was a semi-structure interview; the primary purpose of the interview was to explore the concept in its practical application. The Interviewee was asked some personal questions and some questions specific to the environment of the company. Some of the answers and information provided by the interviewee has not been included due to their confidential nature.

The interview questions and answers

What are your thoughts about the evolution of cyber-attacks, cybercrime and cyber security?

I believe cyber-attacks and cybercrime have become more common in their frequency. One of the factors that has helped the evolution and spread of attacks and crimes is the fact that they have bifurcated into numerous methods of intrusion. This has helped in increasing their effectiveness and diminishing the capacity of cyber security since for every method a new counter measure has to be created, tested and implemented. Thus, in my view cyber security, even though it has evolved, the pace of evolution is slow in comparison to that of cyber-attacks and cybercrimes.

How often does your company have to deal with attacks?

I cannot provide you with exact details and numbers because of confidentiality and it being privileged information but I can tell you that the frequency of attacks in the case of our organization is not as high as some of the originations of other industries. The frequency and intensity of cyber-attacks and cybercrimes very commonly depends on the nature of the industry in which the organization operates. That being said, our company does have to face attacks but they are minor in comparison and are swiftly dealt with, such attacks include Trojan Horses, viruses, Worms, etc. These attacks usually disrupt daily operations and can infect the entire system if not dealt with in a timely manner.

What according to you is the future of cyber security?

In my personal view, not a lot will change for cyber security in the future. Do not misunderstand me, while I believe that cyber security will always evolve to deal with a cybercrime or cyber-attack, it will always be at a disadvantage because of the nature of attacks. While cyber security can pre-empt attacks and crimes, they can still be of numerous variations and can be altered a bit to attack in a different manner, thus, requiring cyber security protocols and approaches to evolve as well. But it will always be responding to a threat rather than proactively dealing with every threat.

How important is cyber security for an organization?

Cyber security is one of the most important aspects and practices for an organization. The reason for cyber security being of such importance is that it the last line of defense against cyber-attacks and cybercrimes that can potentially ruin an organization by accessing, sharing, deleting or stealing their confidential information.

The interview of the network security supervisor proved to extremely insightful as it provided a pragmatic view of an experience professional in the field of cyber security. The interviewee was helpful in explaining the utility of cyber security in deterring cyber-attacks to maintain the credibility, integrity and validity of the data of an organization. He further pointed out the dangerous repercussions that would have to be faced by organizations if the cyber security is inadequate. Another point was raised by the interviewee: that cyber security protocols would always be in a situation where they would respond to a threat rather than deal with it proactively.

A survey was conducted among 50 respondents to understand their views regarding the need for cyber-security in the particular organization they are working. The results of the survey are described below.

72% of the respondents think that their organization requires proper cyber security and only 28% of the individuals responded that their particular organization does not require cyber security as show in figure 1.

Figure 1

Almost ninety percent of the individuals that participated in the survey responded that their company has cyber security tools to detect viruses in their system. A total of 43 respondents said that their companies have adequate tools to detect the viruses. Only 6 responded with No for that question while one respondent skipped the particular question as show in figure 2.

Figure 2

From the survey conducted it is clear that most of the companies do not have an in-house IT technician to handle their network traffic. Only 40% of the individuals participated in the survey said they have an in-house IT technician to handle their network traffic. 60% of the respondents said 'No' as show in figure 3.

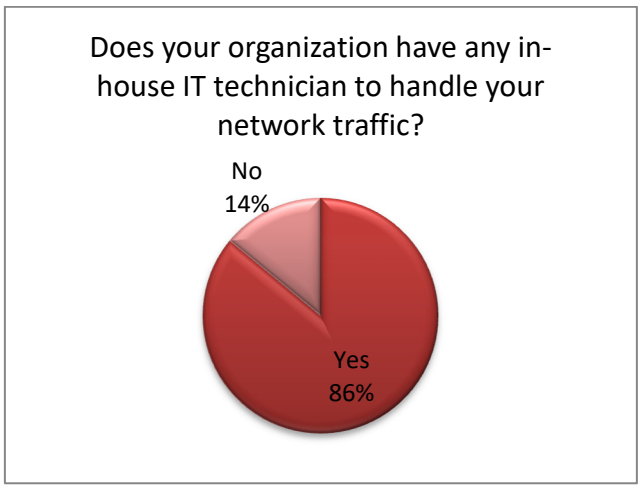

Figure 3

Most of the employees strongly believe that their company is capable of handling cyber-attacks. 86% of the respondents said that their company is capable of handling various cyber-attacks while only a small percentage of people said their company can't handle a cyber-attack. 14% of people responded 'No' for that particular question as show in figure 4.

Figure 4

A good number of people participated in the survey believes that data encryption is an effective way to avoid cyber-attacks and prevent attackers from stealing their data. A total of 44 respondents said that they trust data encryption method to protect their valuable organization information while 6 respondents said the data encryption won't be of much use as show in figure 5.

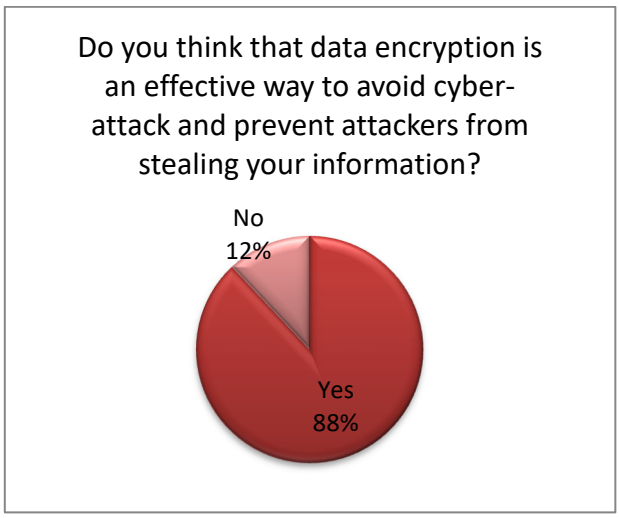

Figure 5

30% of the individuals that participated in the survey said that their organization network was hacked by hackers at least once. Most of the companies were not able to penetrate by the hackers and 70% of the respondents said that their company was exposed to any cyber-attack in the past as show in figure 6.

Figure 6

When the sampling population was asked about the information security policies in their companies, the results were almost 50-50. 42% of people said that their company had adequate network security policies while 58% of respondents said their companies don't have any information security policy as show in figure 7.

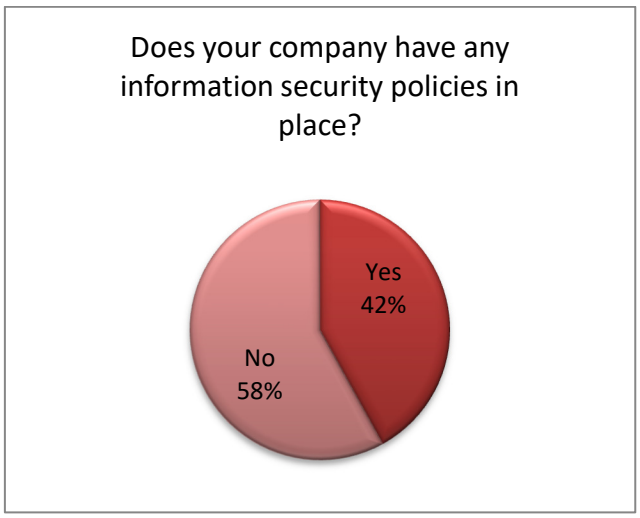

Figure 7

Most of the participants in the survey believe that their company network is not able to penetrate by small time hackers. 78% of the respondents said that their company network is secure and cannot be breached by small time hackers and organizations. A small percentage, 22% of respondents said that their network is even vulnerable against small time hackers and their company network is not all secure as show in figure 8.

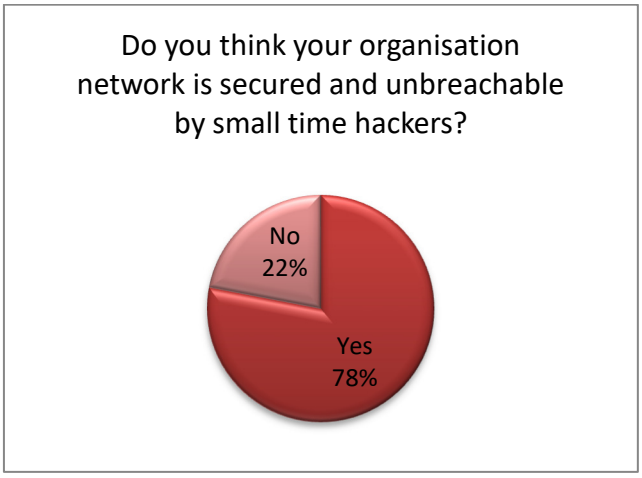

Figure 8

Most of the respondents strongly believe that the usage of anti-virus software and network security division in the organization is the best strategy to prevent cyber-attacks. 90% agreed to the use of anti-virus software and 84% agreed to the operation of a network security in the organization. Employee awareness and cyber security policies got 78% and 76% respectively.

Utilization of advanced security technologies got 64% while the departmental security analysis was considered a better strategy only by 30% of the survey respondents as show in figure 9.

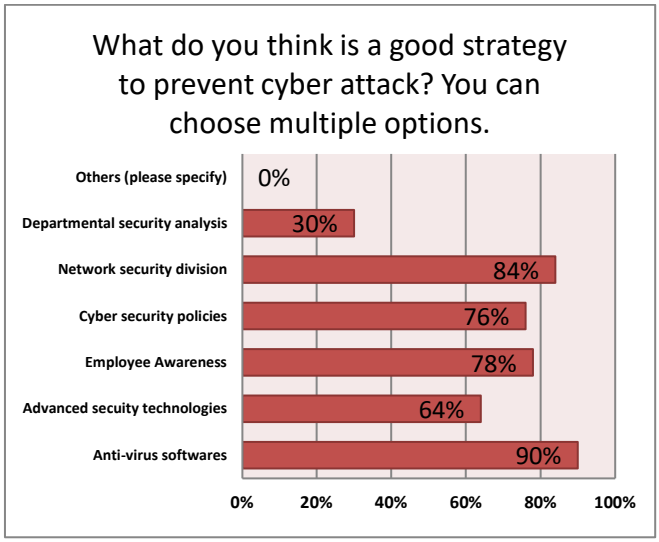

Figure 9

When the people participated in the survey were asked about the strategy that could be used by the hackers to get into their system as well into their company network, 94% of the respondents said that by means of portable devices the viruses can get into their system and then to their network. 92% believe that though internet download the hackers gets in to their system.88% and 72% of the respondents believe that online advertisements and e-mails are the strategies used by the hackers to penetrate their cyber security. Inside hacks and outside hacks received 30% each backing and the phishing website strategy and hardware hacks received 68% and 48% backing respectively by the respondents as show in figure 10.

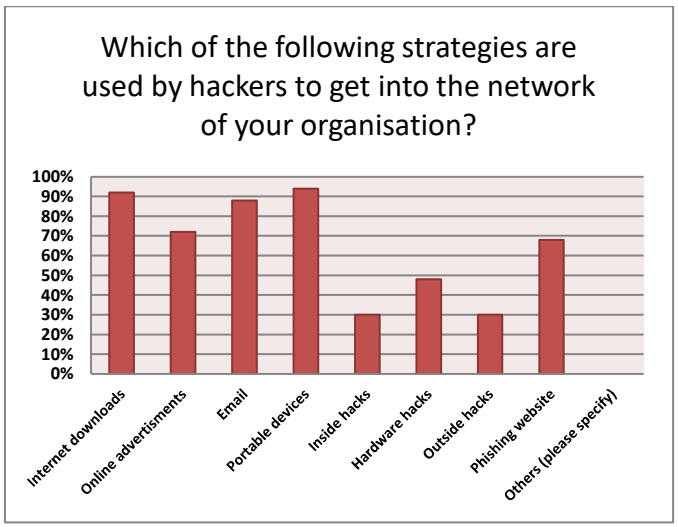

Figure 10

Findings & Discussion

The findings of the study can be divided into sections based on the nature of the information. This also helps in classifying findings on the basis of the type of data, i.e., secondary data and primary data respectively.

The literature review provided numerous important insights into cyber security and its relationship and importance in context of organizations. Few of the key aspects that became apparent during the course of literature review are that there is a lack of awareness and knowledge among employee of organizations regarding the importance and fundamentals of

cyber security. Three of the studies that were scrutinized in the literature review highlighted the importance and need for educating employee with regard to cyber security.

While three studies that were analyzed and reviewed in the Literature Review highlighted the need for improved cyber security in different types and divisions of organizations. Two of those studies pointed to an apparent lack of cyber security and its knowledge in organizations: Healthcare and Journalism. While the third study highlights the need for cyber security regarding supply chain risk management.

One of the studies also highlights the evolution experienced by cybercrimes and cyber-attacks by enumerating its various forms. The study highlighted a very significant fact, since the study was specifically on India; it highlighted the astounding increase in the number of cyber-attacks and cybercrimes, in addition to emphasizing the multitude of intrusions which have to be dealt with by cyber security.

While another study helped in highlighting the relationship of human factor is cybercrimes and attacks. The study provided an interesting outlook on the issues associated with cyber security as it pointed out that while the adequateness of cyber security is important, it is also imperative that the use of the network, system or device be aware about the outcomes and effects of cyber-attacks. The study further highlighted social engineering as a possible blind spot that cyber security cannot deal with even if it does undergo further evolution.

While analysis of the article in the International Journal of Cyber Criminology, 2014, provided interesting findings regarding the relationship between organizations and individual in context of cybercrimes and cyber-attacks. But the findings pertain to the cybercrimes and attacks by organizations rather than on organizations. The study pointed out that organized cyber-attacks and crimes are currently not as frequent as those of individuals but nevertheless they have proven to be harmful and dangerous. The study then provides examples of this point as proof of the problems that might arise for organizations that are targeted by such groups and highlighted the importance of cyber security.

Based on the findings of the literature review and the interview of the network security supervisor, a lot of relevant information has been amassed. The accumulated data has revealed numerous findings which are pertinent in dealing with issues of cybercrime and cyber-attacks.

The discussion will be classified on the basis of the type of data, i.e., secondary data and primary data (literature review and interview).

Some of the major points for deliberation revealed by the analysis of literature review are the lack of awareness among employees in organizations regarding cyber security and associated threats and implications. In the age of information, it should be imperative for organizations to trains and educate their employees in context of cyber security. One of the main reasons that this should be the main focus for organizations is because almost every field in all of the organizations now utilize IT and associated devices and software, this fact combined with the estimation that by the year 2020 there will be more than 50 billion devices connected to the internet should be a sign that should not be missed by organizations that cyber security in indispensable. One of the most obvious ways this situation can be rectified is through proper education and training. Every organization should initiate mandatory sessions on cyber security for each of their employee, regardless of their role in the organization.

Furthermore, industries and concepts that have not adopted cyber security should do so as quickly as they can in order to safeguard their data and information. As mentioned in the article, there can be problems if employees in general are not cognizant of cyber security. The example of Edward Snowden and Glen is just one of the examples in the field of journalism that highlight the need for education and awareness regarding cyber security. Journalists have to routinely interact with numerous informant and sources for information that is potentially damaging, additionally; they are also responsible for protecting the identity of their sources. Moreover, various fields also need to look into the possibility of integrating with or adopting cyber security. One such example is mentioned in a study above, supply chain risk management.

Organizations need to assess all their divisions and activities to ascertain areas that might be vulnerable to cyber-attacks and cybercrimes. Implementation of cyber security at such juncture would help organization in protecting their assets while growing and evolving at the same time. This would also help organizations deal with the fallout that can be experienced from corporate espionage.

Therefore, organizations need to:

- Integration of cyber security in training and development to improve awareness and knowledge among employees regarding cyber security.
- Systematic review of every system and division to evaluate areas where cyber security is needed.
- Need for Cyber security measures and protocols irrespective of the nature of organization.

Based on the findings of the interview it can be said that the importance of cyber security is paramount and undisputed. The network security supervisor emphasized the importance of cyber security at every question and further pointed out that nature of industry and organization matter in the intensity and frequency of attacks. But one of the key points of discussion from the interview is the point that cyber security protocols would always be in a situation where they would respond to a threat rather than deal with it proactively.

This should be a concern for organizations as cyber security indispensable in deterring cyber-attacks. There has to be a conscious collaborative effort between not just organizations but nations in order to create a solution which would enable cyber security to be a step ahead of cybercrimes and attacks.

From the survey, it is clear that cyber security is necessary for most of the companies. Another major finding of the study was that a large number of respondents said that their company was not exposed to any cyber-attacks and still almost every company has already implemented cyber security tools to detect viruses in their systems. Data encryptions in the companies were strongly backed by the respondents of the organization. They agreed that the data encryption method will prevent hackers from stealing their data and company information. Another major finding of the study was that most of the does not have any cyber security policies in their company and still most of them strongly believe that their company network can't be broken by any small time hackers and hacking groups. Utilization of anti-virus software's and network security division in the organization were strongly supported by the respondents as a better strategy to prevent various cyber-attacks and secure their confidential data's. Employee awareness programs, cyber security policies and utilization of advanced security technologies also received decent backing from the respondents. From the survey analysis, it is very clear that the hackers use portable device and infected internet files as a main strategy to get into the systems of the individuals. Online advertisements, phishing websites and e-mails hacks were also employed by the hackers to penetrate the network security of the organizations.

Conclusion

The Study concludes that there is a unanimous consent regarding the importance of cyber security to organizations. However, acknowledgement of cyber security as being indispensable is not important. There needs to be conscious effort on the part of organizations to improve their current measures and protocols of cyber security.

One of the chief concerns is regarding the lack of awareness among employees in organizations regarding cyber security and associated threats and implications. There is a need for integration of cyber security in training and development to improve awareness and knowledge among employees regarding cyber security. Additionally, organizations also need to systematic review of every system and division to evaluate areas where cyber security is needed while organizations must also realize that there is a need for Cyber security measures and protocols irrespective of the nature of organization. The interview revealed that while cyber security is an indispensable part of an organization and can effectively deal with cyber-attacks, cyber security protocols and would always be in a situation where they would respond to a threat rather than deal with it proactively.

The survey assisted the study to have a clear image regarding the cyber security awareness among the various companies. The study showed that portable devices and malicious internet files were commonly employed by the hackers to get into the system of the organizations. The study also revealed that a few numbers of companies were already exposed to the cyber-attacks. Even though most of the companies do not feel that they are not a potential target for the cyber-attacks, still they have implemented various cyber security tools to protect from attacks. Companies can make use of data encryption in their systems to prevent the disclosure of confidential data and information. Even though the hackers get into the network of the company, the data they collect would be useless until they can decrypt the files using the appropriate decrypting key. Organizations should have an in-house IT technician to handle the traffic in the network and

analyses them. The IT technician will be also able to provide adequate advice to the company management regarding the security challenges and adequate steps are to be implemented according to the changing conditions. Implementation of network security division and utilization of anti-virus software are the major strategies that can be used by the companies to prevent cyber-attacks. With the various cyber security strategies implemented by the companies, they strongly believe their network is not vulnerable to small time hackers and groups.

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Exploring Cultural Relevance in Entrepreneurship: The Case of Indigenous Igbo Business Mentoring (Igba-boyi)

Dare Ojo OMONIJO*
*Department of Student Industrial Work Experience Scheme, Covenant University, Ota/
Department of Sociology, Olabisi Onabanjo University, Ago Iwoye, Nigeria.
Phone No.: +23408233856587. E-mail: omonijoojo@yahoo.com.
ORCID: http://orcid.org/0000-0001-5479-3905

Chiamaka Ogechukwu JOE-AKUNNE
Department of Psychology, Nnamdi Azikiwe University, Awka Nigeria.
E-mail: co.joe-akunne@unizik.edu.ng.ORCID: http://orcid.org/0000-0002-1303-0992

Michael C. ANYAEGBUNAM
Department of Psychology, Nnamdi Azikiwe University, Awka, Nigeria.
E-mail: mykelivingstone777@yahoo.com. ORCID: https://orcid.org/0000-0003-4663-3025

Edith AWOGU-MADUAGWU
Department of Languages and General Studies, Covenant University, Nigeria.
E-mail: edith.awogu-maduagwu@covenantuniversity.edu.ng

Olusola B. OKUNLOLA
Department of Psychology, Covenant University, Ota, Nigeria.
E-mail: solami.okunlola@gmail.com

Abstract

Entrepreneurial activities could be perceived as an act of establishing businesses, indulging in risks that involve finance in profits anticipation. Of all tribes in Nigeria, it appears no one has done better than the Igbos in establishing small-scale businesses through a special scheme known as "Nwa-boyi" that evolved from their cultural background. In spite of the prevalence of the scheme in Igbo land, southeast Nigeria and its application for exploits in small scale businesses by the Igbos in villages, town and cities across Nigeria, the connectivity of "Nwa-boyi" with the culture of Igbo land is seemed not to have been fully illustrated in academic literature. The present article intends to address this gap in knowledge using data from secondary source and content analysis as the methodology. The article strives to discover how the value, beliefs and other cultural factors of Ndigbos have contributed positively to the success of indigenous Igbo business mentoring. The paper commends the scheme but suggests its inclusion in the customary law of Igbo land to safeguard against fraud or a breach of agreement between the 'Oga' and 'Nwa-boyi'

Keywords: Cultural Relevance, entrepreneurship, indigenous Igbo business mentoring,

Introduction

Human culture as illustrated in several studies plays eminent roles in the lives of mankind. Such roles involve dictating and shaping of behaviours or conducts; determining means of livelihood etc. In respect of the former, the moral values are impacted on children in every family and any child who lacks moral values is taught to adjust so that he or she can live a successful life. In the latter, some occupations are embedded in cultural heritage and they define how some persons earn a living. In Yoruba land, female genital mutilation is still actively practiced in some communities and persons engaging in the act (alabe) usually earn their living through the occupation.

Apart from culture, the environment could play a cogent role in determining people's occupation. Hence, while some people, by the reason of their culture and environment engage in agriculture and herding or cattle rearing,

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some specialise in fishing, trade and commerce etc. This analogy goes to illustrate the major occupations of the three major ethnic groups in Nigeria (**see Table i**)

Table i: The Major Ethnic Groups in Nigeria and Occupations

SN	Ethnic Groups	Occupations
1	Hausa/Fulani	Farming and herding or cattle rearing, art and artery
2	Yoruba	Farming, white-collar jobs, vocation in arts
3	Igbo	Trade and commerce, entrepreneurship
4	Ijaw	Farming and fishing

Source: Researchers compilation, (2020)

It is then expedient to show that all of the above-mentioned occupations contribute to personal and societal development. The place of agriculture/ herding in Northern Nigeria in the production of groundnuts, rice, yams, tomatoes, onions etc could be very difficult to ignore in the lives of prominent farmers in the region and the nation's economy (Adams and Mortimore, 1997). Also, the place of agriculture in areas of food and cash crops - rubber, coffee, timber and white-collar jobs in the lives of successful farmers among Yorubas. The contributions of the elite class in ministries and various agencies to national development are equally crucial to national economy. In Igbo land, studies have shown the contributions of entrepreneurship to personal and national development. For instance, Orugun & Nafiu, (2014) argues that Igbo business persons plays active roles the development of the Nigerian economy vial their entrepreneurial activities which have been considered the backbone of the Nigeria's economy. However, since the thrust of this paper is on Igbo entrepreneurship, its scope shall be restricted to the main strategy of raising entrepreneurs in the region.

Entrepreneurial activities could be perceived as an act of establishing businesses, indulging in risks that involve finance in profit anticipation. This goes to corroborate Schumpeter, (1939) on entrepreneurship being the motivating factor of modernity with specific features like the tendency of taking risks, innovation in areas of being proactive. Although, studies have shown sign of entrepreneurial actives across Nigeria, but it appears none of the two hundred and fifty ethnic groups in the country consider entrepreneurship as a major occupation than the Igbos, in the South East Geopolitical zone.

The seriousness of the Ndigbos in promoting entrepreneurship could be located in their indigenous strategy for raising entrepreneurs via small scale enterprises. This is popularly known as "igba-boyi" which is specially designed for youth to be attached to business mentors in the trade of his choice for a period of four to five years, as maybe agreed by the mentor and the youth parents or guardian. The period is to enable the youth learn the rudiments of business transactions and securing financial assistance to establish his personal business.

As illustrated in several studies, Igba Boyi" evolved from the cultural background of Ndigbos (Nnadozie, 2002; Obunike, 2016; Odili, & Ona, 2017). In spite of the prevalence of the scheme in Igbo land and its application for exploits in small scale businesses by the Igbos in villages, town and cities across Nigeria, the connectivity of "igba-boyi" with the culture of Igbo land is seemed not to have been fully illustrated in academic literature. The present article intends to address this gap in knowledge using data from secondary source and content analysis as the methodology. The article strives to discover how the value, beliefs and other cultural factors of Ndigbos have contributed positively to the success of indigenous Igbo business mentoring.

The paper is divided into three subsections. These include, the introduction, literature review and concluding remarks.

Literature Review

The Concept of Culture

The term culture is perceived differently by authors across the globe but with one focus which is hinged on the beliefs, norms etc being passed from one generation to another Omonijo**,** Anyaegbunam, Okoye, Nnatu, Okunlola, Adeleke, Olowookere, Adenuga & Olaoye (2019). However, the perception of (Bibeau & Corin, 1995; Nastasi & Hitchcock, 2016; Bonnie, Nastasi, Prerna, Arora & Kris Varjas 2017) on culture being: (i) the system of knowledge, meaning and action is considered in this work; and (ii) the beliefs, behavoiurs, substances and other features which a group of persons or groups of people within and outside a given locality shared as imperative to this discourse.

Reason being that the system of knowledge, beliefs and behaviours which are crucial elements of culture could have a strong connection with the indigenous Igbo business mentoring. In recent past, studies conducted on entrepreneurship have shown a link between cultures and people's beliefs, values and behaviours. Since people live by their cultures, the beliefs and values inherent in a given culture could go a long way in determining behaviours.

Thus, the roles of cultural differences between people have a decisive effect and influence a variety of individual behaviours. These include the decision to be self employed instead of becoming an employee (Mueller and Thomas, 2000). Hence, culture serves as the fundamental system of values common to a certain group of people and has the capacity to shapes the development of certain personality traits that motivate persons in the society to engage in behaviours which may not be evident in other societies (Mueller and Thomas, 2000).

Examination of Research on Igba Boyi

Igba Boyi is an indigenous Igbo name ascribed to apprenticeship or business mentoring in Southeast Nigeria. The name has its root in the language and culture of Ndigbos and it means serving masters to secure business skills and finance for establishing small scale business. Thus, it is a kind of informal and unstructured training scheduled for a definite time, which a person must undergo before acquiring entrepreneurial skills.

The practice affords the youth, most especially an opportunity to enroll in business mentoring or apprenticeship for training and financial resources to establish a small-scale business without sourcing for funds upon the completion of the training. The practice according to Orugun & Nafiu, (2014) is strongly connected to the Igbo Trade Apprenticeship System (ITAS) or the commencement of 'Ndigbo' commercial education philosophy (Dibia, 2013).

Since its inception, studies have shown that it serves as the arrowhead of Easterners entrepreneurship as it emphasizes seeking opportunities for investment through creativity, innovativeness and clients' fulfillment as well as the judicial allocating limited resources in a reliable traditional configuration (Orugun and Nafia, 2014).

The review of literature has shown that the practice is similar to modern strategies for establishing businesses in development nations. Such includes venture capital,

Exposition of Research on Entrepreneurship

According to Sarea & Hamdan, (2018), the term entrepreneurship has been in existence since 1732. Its commencement could be traced to the work of Richard Canillton who happened to be the first scholar to ascribe a definition to entrepreneurship as persons willing to carry out forms of arbitrage or getting involved in anything that has to do with financial risk, most especially with respect to a new business (Minniti and Levesque, 2008).

Right from the commencement of the 21st century, the expediency of entrepreneurial activities started gaining grounds among government officials, policy makers and investors as a factor that engenders economic growth and an element of encouraging job creation with the purpose of reducing poverty. Given this, studies for finding how entrepreneurship could contribute to economic growth, job creation and poverty reduction began to increase in most developing countries that are seriously facing the problem of unemployment and poverty.

Consequently, the perspectives of many authors on entrepreneurship are anchored on terms related to snatching the chance or opportunity irrespective of resources Stevenson and Jarillo, (1986); the means of taking decisions on entrepreneurship with a focus on inclusive tactic and style of leadership on the usefulness of identifying opportunities Timmons, (1999); the spirit of challenge and adventure that commercializes the opportunities seized at risk Drucker, (1998) cited in Park, (2017). Others include activities relating to perspicacity or judgment which entrepreneurs consider essential rather than describing it as a psychological state of human life Hisrich and Peters (1998); creating new businesses through management and innovation demonstrate by the entrepreneurs challenging spirit Song (2011) and the involvement of entrepreneurship as an important factor in improving business performance and how efforts should be expended to cultivate competency in business Park and Ahn (2016).

The foregoing is an indication that definitions of entrepreneurship varies and it depends on the situations, ethnic background, countries and individuals who indulge in it. However, the perspective of Miller (1983) which perceives entrepreneurship as a behaviour that re-distribute or re-combines resources with innovation and enterprising spirit as well as risk-taking mind to create value is seems to be more applicable to the practice of indigenous Igbo business mentoring for establishing small scale business.

The practice, right from the stage of identifying opportunity for mentorship to the stage of skill acquisition and financial resources for establishing small scale business involves recombination of resources with innovation and enterprising spirit coupled with risk-taking mind to create value in the sense of business transactions to ease unemployment and to facilitate personal development and to ensure societal development. This gives credence to the perspective of Schumpeter (1939) on entrepreneurship being the motivating factor of modernity with features like risk-taking tendencies, innovation-seeking spirit and pro-activeness.

As argue by Park (2017), central to entrepreneurial activities lies the existence of a positive energy that brings about changes via responding to a changing environment with the mind of innovation and creativity. The emergence of indigenous Igbo business mentoring could be traced to a positive energy developed by Ndigbos for their survival after the Nigerian civil war. As illustrated by Aremu and Buhari (2017), the scheme was designed as a reaction against the acute problem of starvation experienced in the course of the war and the aftermath state of hopelessness. These created in them the mind of innovation and creativity in business via an indigenous apprenticeship model for raising entrepreneurs.

With this practice actively in place, entrepreneurship could be greatly enhanced to address the problem of unemployment and poverty among the youth population. Also, it could assist in solving the problem of low and falling economic growth in a developing country such as Nigeria.

Elements of Entrepreneurship

Scholars have shown various elements of entrepreneurial activities in their studies. For instance, the work of Schumpeter (1939) focuses on how the spirit of entrepreneurs is usually after or looking for innovation, taking risk and engaging in pro-activeness while the study of Lassen *et al*. (2006) emphasized on entrepreneurship features like adventurousness, self-sufficiency, innovativeness and long term orientation. Due to recent times comprehensive and systematic studies, Miller, (1983) contends that taking risk, innovativeness and proactiveness could be considered the prominent elements. Given this, the study discusses the following three characteristics as core elements of entrepreneurship.

Innovativeness

For authors such as Schumpeter, (1939) and Van de Ven (1992), innovation is considered a vital element of entrepreneurship. This is not because it gives room for organizational and cultural management to realise the importance of new ideals and behaviours, but its expediency in stimulating new merchandises and services, unique experiences, research and development for new methods and creativity as well as technological development Lumpkin and Dess (1996). In the view of Lee (1999), which is quite different from the perspective of (Schumpeter, 1939; Van de Ven 1992), much emphasis was laid on innovation arising from market survey, advertising and experimental management procedure arising for organization. Kang (2011) views innovation as a potent strategy for promoting investments for constant development of new technologies. Kang (2011), also add an improvement in products with the view of gaining upper hands in areas of competition as aspect of elements of entrepreneurship.

The emergence of indigenous Igbo business mentoring could be regarded as a new innovation into entrepreneurships in Nigeria that has contributed to national development in areas of impacting skills and rendering financial assistance to prospective entrepreneurs who might have successfully completed mentoring to establish their businesses.

Risk Bearing

Bearing risk as an element of entrepreneurships is considered by Jung, (2015) as undertaking or deciding to take a decision which could be risky in an environment or situation that is not certain with the hope of adequately securing or capturing various opportunities involved. However, studies have shown that risk-taking varies among entrepreneurs (Bin and Park, 2002). Thus, while some entrepreneurs engage in low risk-taking inclination and make cautious decisions so as to avoid the danger of engaging in high risk-taking others strive to engage in high risk-taking tendency. Such entrepreneurs usually strive to make decisions faster in order to capture any opportunity.

The usefulness of risk-taking usually manifests in the degree of entrepreneurs to boldly challenge uncertainties or enjoy taking such decisions (Sexton and Bowman-Upton, 1986). However, Park (2017) believes that such an action in business is only meaningful if entrepreneurs are proactive in making use of opportunities at hand and not just accepting the risks.

Enrolling in indigenous Igbo business mentoring could be regarded as risk-taking. This is because it involves serving for many years, mostly under unpalatable working conditions in anticipation of financial settlement. Although, the probability of acquiring business skill could be very bright but the death of either Oga or boyi could lead to frustration along the way. Also, the oga may decide not to settle his mentee due to the poor state of the economy or market or other flimsy pretexts. In such a case the long-term objective of participating in the scheme could have been defeated.

Pro-activeness

Lumpkin and Dess (1996) view pro-activeness as the entrepreneurs or companies' ability to preoccupy market opportunity or maintaining a principal position in the market. Given this, companies or business can develop new products and also try to find means of obtaining new opportunities in an uncertain environment. Such businesses or organisations can vigorously strive to secure a leading or discriminative position in a newly established market (Kim, 2015). In addition to this, Kim, (1994) argues that proactiveness is the behaviour of entrepreneurs to actively involve in market changes, one step ahead of their counterparts. For Covin and Slevin (1991), it involves business owners competing aggressively more than others. Apart from this, it could be regarded as a future-oriented disposition which permits entrepreneurs to predict the future in order to make strategic decisions.

Considering the above analysis, it could be deduced that entrepreneurs engage in forecasting in order to secure opportunities that are related to market and demand. It could also be reasoned that entrepreneurs are not just simply counteracting their competitors, they consistently introduce some new products/services, development and management techniques into their companies.

Entrepreneurship usually manifests in form of small-scale to middle-scale and larger-scale enterprises. However, the present study focuses on the small-scale business which is to be discussed in the next section.

Study Area

Igbo is equally known as Southeast geopolitical zone of Nigeria (Slattery, 2016). Inhabitants are called "Ndigbo's". The total land area is about 15,800 square miles or about 41,000 square kilometres. It comprises of five states- Imo, Enugu, Anambra, Ebonyi and Abia. The region is enclosed on all sides by large rivers and other local tribes from southern and central Nigeria. Such include Bini, Ijaw, Ogoni, Igala, Urhobo, Yako etc. (Slattery, 2016). Although there are many industries in Igbo land, the major occupation of inhabitants is trade and commerce, which is been facilitated through the traditional apprenticeship known as indigenous Igbo business mentoring.

Theoretical Insight

Anthropological Entrepreneurship Theory

Several theories of entrepreneurship have emerged in academic literature in the recent past Omonijo**,** Adetola, Lawal, Odukoya, Olowookere, Okunlola & Rotimi, (2019). Prominent among them being the anthropological theory which is based or formed or developed on the crucial role which the concept of human cultural heritage plays in determining the success of entrepreneurial activities in a given society.

The theory is strictly associated with works of North and who argue that anthropology entails the commencement of human customs, its development and beliefs which people share per time in their respective localities. Human society is diverse. Similarly, the culture of human beings is diverse. In-spite of that its specificity in every ethnic background is obvious in different societies globally. Thus, as human society is diverse, the culture that determines how humanity lives their lives is varied. However, the specificity of culture in the diversity could be acknowledged in each cultural background across the world and it could influence the success of entrepreneurship. Thus, the connectivity between Igbo culture and Igba Boyi in line with this theory could be perceived in two ways:

Firstly, the belief of Ndigbos in seeing themselves as a communal group who work together on the basis of their common ancestry, language, history, etc. has not only helped the evolution and development of Igba Boyi Obunike, (2016) but its recycling of Igba Boyi in their respective villages, Towns and communities. Youth which could be loitering the street of their communities or engage in criminal activities are constantly recruiting into business mentoring and later be opportune to set up their personal businesses.

Secondly, it appears entrepreneur Ndigbos have realized the role of social interaction in every cultural setting and that must have informed their active involvement in social interactions with indigenes of other ethnic groups where they operate. Social interaction promotes entrepreneurial development and it must have been assisting in the promotion of Igbo businesses outside their geographical locations.

Thirdly, language is an aspect of anthropological entrepreneurial theory which Igbos must have considered and adhere to strictly in order to promote their businesses. The ability of Ndigbos to learn and speak the language of the host community must have been assisting them in their business transactions.

Although, anthropological theory of entrepreneurship undermines the role of opportunity and resources-based theory of entrepreneurship, but the theory is more suitable for an article of this nature because it is indigenously based.

Igbo Cultural Heritage in Connection with Business Mentoring and Development

According to Akeredolu-Ale, (1975) one of the problems besetting the growth of indigenous entrepreneurship in less developed countries is the tendency to underplay the implications of the peculiar history of developing countries. The culture is an aspect of history of any given society and it influences values and motivation for economic opportunities. Among other things, it involves collective means of allotting experience, beliefs, attitudes and values to members of the society from one generation to another. Also, it entails teaching of ideas, imitation and behaviours (Boyd and Richerson, 1985). Thus, the evolution of entrepreneurial activities in local environments is directed via communal /cultural ways of life and beliefs, and the source of business, the sayings of the people as well as their legacy Chachar, De Vita, Parveen and Chachar, (2013). Hence, the belief and communal ways of life, among other things, engender entrepreneurial activities.

Based on the belief of "Ndigbos" the world is called "Uwabuahia" which means a market place. In several studies' markets are described as the epicentres of human communities, social and business or economic interactions (Agozino and Anyanike, 2007). Its existence and the patronage of persons who are business-oriented have been associated with a successful life.

The social interpretation of market in Igbo culture could be viewed in naming the first four days of the week with market days- Nkwo, Afo, Oye and Eke. Each of these markets holds in 4 days, apart from daily markets such as Ekoawka in Awka, Anambra State. Additionally, the culture of Ndigbos states that any child born on any of the following market day is named after the market day (seeTable ii).

Table ii: Market Days, Children Names Among Ndigbos

SN	Market days	Week Days	Children names	
			Woman	**Man**
1	Nkwo	Thursday	Mgbankwo	Okwonkwo or Nwankwo
2	Afo	Wednesday	Ngbafor	Okafor or Nwafor
3	Oye	Tuesday	Mgboye	Okoye or Nwoye
4	Eke	Monday	Ngbeke	Nweke

Source: Researcher's compilation, (2020)

In every culture across the globe, name is very vital, as it goes to illustrate the identity of the people from one generation to another. Identifying market with names in some cultures gives the impression that market is the source of livelihood or success of the people in that culture. (Obunike, 2016).

With reference to business or economic transactions in market places, it could be reasoned that markets deals with economic value which could determine the success or failure of business persons in life. Since the major feature of every market is bargaining, people go to market to buy and sell, but bargaining precede purchasing and whosoever has the greatest power of bargaining with the resources at he or her disposal may likely become more successful in business transactions. This may likely account for why most parents in Igbo land usually employ this philosophy to bargain and negotiate with successful traders in their communities to engage their sons in mentoring for "Idu-Odibo" and skills needed to set up business in order to avoid being victims of unemployment and abject poverty in Nigeria.

Besides, Ndigbos perceive themselves a communal group who work together on the basis of their common ancestry, language, history, etc. Obunike, (2016). This could be used to explain the concept of "Igba Boyi" and its recycling within communities and states in Igbo land. The recycling must have given room for extended families orienting members into "Igba-Boyi" strategy which provides a good platform for entrepreneurship to run through families in many towns and communities in Igbo Land from one generation to another promoting the development of children propensity to follow the footsteps of their mentors or parents from one generation to another.

Therefore, it could be deduced that the culture of Igbo is now enriched with entrepreneurial strategy for economic, social, human and physical development, in as much as Obunike (2016), submits that various communities in Igbo land dominate certain lines of product or business as indicated in **Table iii:**

Table iii: Some "Ndigbo" Family Names, Line of Business and Sources

SN	Family Name	Line of Business	Sources
1	Akokwa local entrepreneurs	Kitchen utensils and household equipment	Obunike (2016)
2	Nando indigenous traders	Pharmaceutical drug business	Obunike (2016)
3	Nnewi indigenous entrepreneurs	Motor parts and transport business	Egwu, Ogbu, Ogunji, Oselebe & Udu (2011)
4	Alor indigenous entrepreneurs	"ogboabada" (wrappers),	Obunike (2016)
5	Abiriba indigenous traders	Okirika" (second-hand materials)	Obunike (2016)
6	Agulu indigenous traders	Bread making	Obunike (2016)
7	Ebonyi indigenous traders	Petty businesses and farming	Obunike (2016)
8	Awka-Etitipeople	Cosmeticsline of business	Obunike (2016)
9	Uke people	Tobaccostuff and articles	Obunike (2016)
10	Nsukka entrepreneurs	Palm wine	Obunike (2016)
11	Awka indigenous traders	Blacksmithing	Obunike (2016)
12	Others		

Source: Researcher's compilation, (2019)

Dwelling on the above, one could agree with Obunike (2016) that Igbo entrepreneurs engage entrepreneurial skills in increasing and forming new markets through opportunity utilization which could be a catalyst of economic growth and national development.

Besides, the fascinating aspect of Igbo culture lies in what is regarded as self-help and self-enterprise. Instead of relying of human connections Ndigbos rely on self-help. This seems to have become a song and an ideology in Igbo land.

Concluding Remarks

This work discussed the connectivity between the culture of Igbo land in southeast Nigeria with 'Igba Boyi', the indigenous apprenticeship for raising entrepreneurs among the youth population. From the inception of the scheme, its usefulness in raising business persons to create wealth and employment for 'Ndigbos' has been documented in the literature. Apart from that, other literatures have illustrated its contributions to economic development of Nigeria (Orogun and Nafiu, 2014). This goes to show that some people are still living by their culture, even in modern society where people are discarding some of their cultural practices, because they constitute impediment to national development.

This paper has brought to the fore the fact that while some cultural practices are harmful and constitutes impediment to the economic and human development, others such as the culture of Igbo land is on the side positive side. The positivity could be located in the raising successful business persons and contributing to wealth and job creation to foster human and economic development. The paper is of the view that if every aspect of human culture is positively employed in the same way the culture of Ndigbos has been deployed to entrepreneurship, some of the problems confronting development in Nigeria could be greatly resolved. The paper advocates for the support from government at all level to enrich the scheme for greater impacts in the lives of the youth population.

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Exploring the Differences Between the Selected forms of Apprenticeship and Indigenous Igbo Business Mentoring

Dare Ojo OMONIJO*
*Department of Student Industrial Work Experience Scheme, Covenant University,
Ota/ Department of Sociology, Olabisi Onabanjo University, Ago Iwoye, Nigeria.
E-mail: omonijoojo@yahoo.com.
ORCID: http://orcid.org/0000-0001-5479-3905

Michael C. ANYAEGBUNAM
Department of Psychology, Nnamdi Azikiwe University, Awka, Nigeria.
E-mail: mykelivingstone777@yahoo.com. ORCID: https://orcid.org/0000-0003-4663-3025

Chiamaka Ogechukwu JOE-AKUNNE
Department of Psychology, Nnamdi Azikiwe University, Awka, Nigeria. E-mail: co.joe-akunne@unizik.edu.ng.
ORCID: http://orcid.org/0000-0002-1303-0992

Edith AWOGU-MADUAGWU
Department of Languages and General Studies, Covenant University, Nigeria.
E-mail: edith.awogu-maduagwu@covenantuniversity.edu.ng

Jonathan Adedayo ODUKOYA
Department of Psychology, Covenant University, Ota, Nigeria
E-mail: Adadayo.odukoya@covenantuniversity.edu.ng

Abstract

Previous studies have shown several traditional apprenticeships in different vocations or occupations. These include dying, pottery, the weaving of cloth and hairdressing known as "onidiri" in Yoruba land, southwest Nigeria etc. Previous studies have shown that most of these occupations are in existence in other geopolitical zones of Nigeria except the indigenous Igbo business mentoring which is strictly restricted to Southeast Nigeria. Although, most of these apprenticeships are meant for skill impartation, spite of that it appears that indigenous Igbo business mentoring is unique in certain areas which are yet to be fully illustrated in academic and business literature in Nigeria. The present study intends to address this flaw in knowledge. It engages data from the secondary source which means, materials from the library and internet were used to collect information for the study while it considers content analysis as the most appropriate methodology due to its nature. The paper argues in the concluding section that the selected forms of apprenticeship share a common boundary with indigenous Igbo business mentoring but strictly different in areas of the financial assistance known as "idu-odibo" available for the youth who engaged in the scheme ("igba-odibo") but such an opportunity is not in existence in other apprenticeships. Where payment is concerned in other apprenticeships, it involves apprentices paying for the skills learnt and certificates to be issued for practice. The idea of masters or mentors offering financial assistance to the apprentices for a start-up makes the indigenous Igbo business mentoring a unique one.

Keywords: Differences, selected forms of Apprenticeship, indigenous Igbo Business Mentoring,

Introduction

Several decades ago, before the advent of British imperialism, Nigerians main sources of income were farming, herding, fishing, petty trading, occupations in art and craft etc., depending on people's cultural backgrounds in most cases. Then, Nigerians never experienced high level of unemployment, poverty and criminality that characterize daily life in towns, villages and cities across Nigeria today (Olawale, 2018). Apart from the social problem of slave

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trade Ibenegbu (2017), Nigerians never had it so rough in terms of what to eat, wear and where to live. The advent of colonialization brought about white-collar jobs in various organisations created by the colonialists. The quest for literacy in running colonial administration and other colonial establishments resulted in the introduction of formal education as a major means of skills acquisition (Robin, 2011). Thus, various schools were established by the colonialists and allied missionaries to impact knowledge on Nigerians (Metz, 1991).
At independence, Nigerians were still engaging in farming, but in collaboration with white- collar jobs, trading, herding fishing etc. until crude oil was discovered at Oloibiri in Delta State, precisely on Sunday 15th of January 1952, by Shell Darcy, currently called Shell Petroleum Development Company of Nigeria (SPDC). Due to the first time of unearthing crude oil which had the capacity of yielding or producing lucrative international trade to earn foreign exchange for national development, the discovery was regarded as historic (Internet Archive, 2011)

Besides, the breakthrough was recorded after fifty years of failed oil exploration and presented a great opportunity of flinging Nigeria into the publicity of the Petro-State globally (Internet Archive, 2011). However, instead of employing the proceeds from crude oil to upgrade and develop subsistence agriculture to extensive and intensive farming like that of Denmark in Europe, Ministry of Environment and Food of Denmark (2016); invest in quality education like South-east Asia to spur advancement in science and technology, the Nigeria elite, both in the military and politics squandered the resources and plunged the nation into a recession which eventually marked the commencement of high rate of unemployment and poverty (Morphy, 2007).

The adverse effects of unemployment and poverty among others resulted in the escalation of criminality, mostly among the youth population (Omonijo, Anyaegbunam, Obiorah, Nwagbo, Olowookere & Caleb, 2019). The reaction of the policy-makers to the high rate of poverty, unemployment and criminality, although not with an honest intention, led to the inclusion of entrepreneurial studies and apprenticeship education alignment schemes in the school curriculum Decker, (2019) with the aim of permitting or enabling graduates become self-employed after graduation.

Prior to the introduction of entrepreneurial studies in higher educational systems, apprenticeships were more or less left for drop-out students and students who had primary or secondary education but couldn't proceed to higher institutions due to poor academic performance or lack of sponsors or both Olulu & Udeorah, (2018) while education to higher institutions was meant for academically-inclined students.

However, the scenario began to change with the high rate of unemployment and poverty that negatively affected all classes of people, such as educated, uneducated, brilliant not brilliant, primary and secondary etc. Since educationally inclined students began to experience unemployment and poverty, most of them began to participate in entrepreneurship, vocational training and apprenticeship for self-employment as alternatives to white-collar jobs (Adesina, 2013; Olowookere, Emuchay, Babalola, Odukoya, Omonijo, Adekeye and Agoha, 2019).

The benefit accrued to such innovative may not be restricted to graduates themselves, but other skilled and unskilled persons who could be employed in such employments. Although both entrepreneurship, vocational studies, apprenticeship are very crucial to this discourse, the paper is more or less interested in an apprenticeship which could be viewed as a special arrangement for skill transfer between mentees and mentors in some traditional and modern occupations. The arrangement usually lasts for a couple of years to enable mentees to acquire skills required for effective practice.

Studies have shown that apprenticeship has been in existence in the world for several decades (Morgan, 2001). For Morgan, (2001) in particular, its origin is traceable to the medieval period in Europe, prior to Nigerians contact with West that brought about modernity and introduction of apprenticeship in modern occupations that were not well pronounced in the past. These include tailoring, repairs in electronics, machines, bicycles, motorcycles, cars etc. However, studies have shown that tradition apprenticeships are still in existence in occupations such as dyes and dyeing Akintonde and Areo, (2013), cotton spinning Sani (2013); pottery Gosselain, (1992); Smithing Ogundele (2005); blacksmithing David & Sterner (2012); iron smelting Sani (2013), manufacturing Oyeneye, (1980), Igbo traditional business school Agu & Nwachukwu, (2020) etc. in Nigeria

While the works of the above authors are commended for focusing on traditional occupations where apprenticeships are still practiced in Nigeria, it has been observed that these authors ignored the differences between other forms of apprenticeships and indigenous Igbo business mentoring which is regarded as a traditional method of engaging

apprenticeship for promoting small-scale enterprises and entrepreneurship in Igbo land, south east geopolitical zone of Nigeria.

Although, the work of Oyeneye (1980) focused on informal sector repairs services and manufacturing enterprise, while Agu & Nwachukwu, (2020) focused on Igbo traditional business school which is very relevant to the present study, the two studies are not without flaws. These include the restriction of Oyeneye, (1980) study to the informal sector repairs and manufacturing enterprise in Yoruba land and that of Agu & Nwachukwu, (2020) on Igbo traditional business school without any consideration for examining the differences between other forms of apprenticeships and indigenous Igbo business mentoring.

The importance of this piece is hinged on an apprenticeship which some authors have considered a viable strategy for personal empowerment and societal development but it could be observed that it has been underused in Nigeria in providing solutions to the problem of poverty and unemployment in Nigeria.

The paper is divided into three subsections. These include the introduction, literature review and concluding remarks.

The Study Area

Igbo is equally known as the Southeast Geopolitical Zone of Nigeria (Slattery, 2016). Inhabitants are called "Ndigbo's". The total land area is about 15,800 square miles or about 41,000 square kilometres. It comprises of five states- Imo, Enugu, Anambra, Ebonyi and Abia. The region is enclosed on all sides by large rivers and other local tribes from southern and central Nigeria. Such include Bini, Ijaw, Ogoni, Igala, Urhobo, Yako etc. (Slattery, 2016). Although there are many industries in Igbo land where some persons earn a living but the major occupation of inhabitants is trade and commerce. Some authors have strongly associated the growth in trade and commerce in Igbo land with the traditional apprenticeship system known as indigenous Igbo business mentoring (Obunike, 2016; Iwara, Amaechi & Netshandama, 2019).

The Conceptual Clarifications

Apprenticeship

In this piece, apprenticeship is considered as a learning process whereby persons who are a novice in a particular field of human endeavour try to practically engage in training. Such training aims at turning them to professionals at the end of the training and through years of experience or practice after the training. The training of such usually involves structured and unstructured programmes. The structured aspect could be considered on-the-job training and it requires acquiring knowledge, skills, attitude or discipline needed to function effectively in a given work. The unstructured apprenticeship is usually engaged in traditional occupations, where the rules of formal organisations may not suffice or be strictly applied.

Authors such as Craig and Bittel, (1967) posit that apprenticeship could be a combination of related technical instructions and on-the-job training to grant an opportunity for employees to learn the theoretical and practical aspects of the trade, craft and other jobs. Besides, Haliru, (2019), argues that it can be in form of the Business Apprenticeship Training Centre (BATCs), like the one in Kaduna, which was set up to train Nigerian youth nationwide could be regarded as one of such training since it focuses on vocational training for a trade, commerce and industry.

In another dimension, Anyanwu (1981) submits that apprenticeship is a system of helping new workers to acquire practical training to complement theories learnt in educational systems to fulfil the requirements of new works. In addition to the above, an apprenticeship could be viewed as a way of integrating guidance and counselling on mentees since most of them reside with their mentors.

Studies have shown that the length of apprenticeship varies across professions or sectors and culture and in most cases, such depend on the proficiency of the mentees. While those who are very brilliant could spend lesser years mentees who are not easily catching up with the training could spend longer years.

The main purpose of encouraging apprenticeship is to make provision for people to develop their potentials for immense contributions into their personal lives and societal advancement.

The drive for apprenticeship reached the climax in Nigeria when the rate of unemployment began to increase at an alarming rate (Omonijo, Adetola, Aborishade and Olowookere, 2020). The negative effect of the high rate of unemployment-poverty and high crime rate prompted the government to introduce National Directorate of Employment to train persons to be self-employed in some of the occupations in **Table i** and others not listed.

Table i: Traditional and Modern Jobs for Apprenticeship

SN	Traditional	Sources	Modern	Sources
1	Dyes and dyeing	Akintonde & Aeo (2013)	Furniture craft	Davy & frakenberg, (2019)
2	Cotton spinning	Sani (2013)	Brick work	
3	Pottery	Gosselain, (1992)	Painting/Decoration	
4	Smithing	Ogundele (2005	Joinery/Carpentry	
5	Blacksmithing	David & Sterner (2012)	Plumbing	
6	Iron smelting	Sani (2013)	Signwriting/Screen Poster	
7	Carving	Obadara & Abatan, (2014)	Fitter machinist	
8	Pot making		Mechanic (Bicycle, radio, motor, etc.)	
9	Adire Textile		Electrical installation	
10	And others		General welding	
11			Refrigerator/ air-conditioning	
12			And others	

Source: Researchers Compilation, (2020)

Davy & frakenberg, (2019) divides apprenticeship into two, independent and cooperative apprenticeships. The former is being organized by employers of labour without the involvement of a higher education system and their curriculums. In this case, theories learnt on campus are not relevant to the practical training designed for apprentices. In cooperative apprenticeship, employers of labour and educational systems usually organize and manage apprenticeship.

Also, Olulu & Udeorah, (2018) discussed two types of apprenticeship. The first being customary apprenticeship which can be categorized along with the ethnic groups. This includes the indigenous Igbo business mentoring. The second aspect is the apprenticeship under the Nigerian Labour Act of 2014. This Act stipulates that apprentices comprehend the terms and conditions of practices such as age requirement, freedom to decide either to enrol in apprenticeship or not.

The main purpose of apprenticeship is to stimulate self-employment among the youth population but the drive to ensure effective trained in skills, trade and learning is very weak in Nigeria due to several problems. Such include the outdated law governing apprenticeship which is dwindling the spirit of entrepreneurship among the youth population (Olulu & Udeorah, 2018).

Mentoring

Mentoring according to Bozeman and Feeney, (2007) cited in Idemudia, (2011) is a process involving the transformation of knowledge (formal or informal), social capital and psychosocial backing considered by the beneficiary as appropriate to work. This author also argues that it entails face-to-face informal communication during a sustained period of time, between persons who are considered to possess cognate knowledge and individuals who are novice (protégé) Idemudia, (2011).

Dwelling on the above definition, mentoring could be considered a process that involves time, an assistance process, the relationship of self-development between a mentor and protégé Idemudia, (2011). The mentor is generally expected to mediate an expert knowledge for the novice, help develop the novice's full potential in a diverse area of human endeavours (Ilieva-Kolev, 2015; Kunaka and Moos, 2019). For Kunaka and Moos (2019), it

has successfully been engaged as a valuable private development instrument in both business and academic environments as it bridges between business and academia. However, the thrust of this paper is on the indigenous Igbo business mentoring and its contributions to small scale enterprise and development.

The Concept of Indigenous Igbo Business Mentorship

The concept of indigenous Igbo business mentoring is a new form of apprenticeship in trade. Several authors have used different names to describe the concept but nearly all of them are related to Igbo names. These include "Imu Ahia", Agozino, & Anyanike, (2007); "Igba-odibo" Obunike, (2016); "Nwa Boy" Omonijo, Adetola, Lawal, Odukoya, Olowookere, Okunlola & Rotimi, (2019); "Igba-Boyi" Iwara, Amaechi & Netshandama, (2019) and others. Hence, any of the above terms is used to describe Igbo business mentoring in this piece.

The concept is relatively new in academic and business literature due to its neglect for several decades. However, a cursory examination at the practice across Nigeria among entrepreneurs shows that it could be regarded an indigenous form of business mentoring that permit youth to acquire business skill and financial assistance to set up their small-scale enterprises in order to better their lots, family members and society at large. It could also be regarded as another form of informal education that lunches youth into the business world. Apart from that, the concept could be regarded as another form of apprenticeship that ensures skill acquisition for youth in trade and commerce. In addition to the above, "Nwa Boy" is considered Igbo model of rising entrepreneurs since its applicability is peculiar to the South-East Geo-Political Zone of Nigeria (Udeze, 2014 cited in Omonijo, *et al*., 2019).

The Indigenous Igbo business mentoring could be akin to the Cognitive Apprenticeship Theory developed by Collins, Brown and Newman (1989) as the process where a principal of a skill teaches that skill to an intern in order to develop the potentials in him or her.

Its origin could be considered post-civil war phenomenon in South-East Geo-Political Zone of Nigeria and it could be associated with the quest for survival among youth after the war. As illustrated by Aremu and Buhari (2017), the acute problem of starvation experienced in the course of the war negatively affected them and it prompted them to device ways of settling themselves in business. The concept according to Orugun and Nafiu (2014), later became an indigenous apprenticeship model for raising entrepreneurs through the Igbo business learning culture otherwise known as Igbo Trade Apprenticeship System (ITAS). This apprenticeship scheme is considered unstructured training or scheme arranged for a definite period of time, which youth undergo so as to gain a desirable aspect of entrepreneurship skill through the development and automation of the ITAS in order to earn themselves a business of a lifetime (Dibia, 2013 cited in Omonijo, *et al.,2019*).

According to Ejo-Orusa (2019), there are two main forms of the 'Nwaboi' apprenticeship. These include 'Nwaboi' who learn a craft or skill, which is generally called 'Imu-Oru Aka' and those who learn a trade. 'Ndigbos' call this 'Imu-Ahia'. However, it should be noted that the scope is very wide, as it accommodates different types of business transactions, crafts and skills. Ejo-Orusa, (2019) also argues that the system is more traditional and never integrated with an organized private sector and the armpit of government support and oversight.

Just like other forms of skill acquisition, indigenous Igbo business mentoring is not without flaws. Such include the connectivity of the scheme with child labour. Studies have shown that most teenagers who supposed to be learning in educational systems are running the scheme in Igbo Land. The implication of males preferring apprenticeship to education in any society could be very grave because, with education, national development could be very difficult to attain.

Demarcation Between the Selected Forms Apprenticeship and Indigenous Igbo Business Mentorship

In this study, occupations, where apprenticeship is being carried out to train intern, is regarded as forms of apprenticeship. Some of such crafts are indicated in **Table ii**

Table ii: Various Forms of Apprenticeship

SN	Forms of Apprenticeship	Sources	
1	Blacksmithing		
2	Welding	Ejo-Orusa, (2019)	
3	Block moulding		
4	Trading (provisions)		
5	Repairs (motor, bicycles, motor cycles, generators, electronics		
6	Barbing		
7	Onidiri, (hair plaiting) and alabe (female genital mutilation)		
8 9 10 11 12	Bricklaying Painting Vulcanizing Dyes and dyeing And others	Olulu & Udeorah, (2018) Akintonde and Areo, (2013)	

Source: Researcher's Compilation, (2020)

According to Olulu & Udeorah, (2018), these forms of apprenticeship are widely engaged by persons of different ethnic backgrounds in the country, but they are prevalent among the Hausa/Fulani and Nupe in Northern, Igbo in the South East and Yorubas in the Southwest. While some of them could be related to the cultural background of people, others are not. Those that are related to the culture are being passed from one generation to another.

In respect of the present study, apart from trading, the forms of apprenticeship listed in **Table ii** may not relate to the indigenous Igbo business mentoring, because the scheme is purely on business transactions while some of the occupations listed are crafts and arty. However, the connectivity between apprenticeship and indigenous Igbo business mentoring could be located in skill impartation for self-employment and betterment of one's life as well as societal development.

In terms of the differences, the following line of distinctions can be drawn between the two:

In apprenticeship mentioned in **Table i and ii,** apprentices usually pay money for skill acquisition but the enrolment and training under indigenous Igbo business mentoring are free. Apart from that, the 'Oga', the mentor is responsible for feeding, accommodating and the health care of any 'Igba Boyi', mentee under him throughout mentorship. The case of apprenticeships in **Table i and ii** is quite different. Nevertheless, the probability of one's siblings coming to learn a trade under the tutelage one's brother or sister, may not be ruled out. In that wise, the mentor has dual roles to perform. These include the roles of a brother or sister, as the case may be, guidance, provider of accommodation, feeding and health care, and even the money to be used to establish the business or trade at the end of the apprenticeship. This means, the biological bond has a strong relationship with apprenticeship but the case of indigenous Igbo business mentoring is quite different. Without any biological affiliation, such responsibilities are being performed to persons of Igbo extraction.

Further to that, forms of apprenticeship listed in **Table i and ii** are not directly connected to one tribe in Nigeria Olulu & Udeorah, (2018), persons of different ethnic backgrounds usually engage them for skill acquisition and as a method of self-employment while indigenous Igbo business mentoring is strictly connected to the culture of 'Ndigbos'. Such a connection could be found in 'Ndigbos' perceiving themselves as a communal group who work together on the basis of common ancestry, language, history, etc. Obunike, (2016). This could be used to explain the concept of "Igba Boyi" and its recycling within communities and states in Igbo land. The recycling must have given room for extended families to orientate members into "Igba-Boyi" strategy. The strategy that has provided a good platform for entrepreneurship to run through families in many towns and communities in Igbo Land from one generation to another promoting the development of children propensity to follow the footsteps of their mentors or parents from one generation to another (Obunike, 2016).

Apart from the above, apprentices who engage in skill acquisition in apprenticeship listed above usually sought for funds to establish their small-scale businesses. Although, their parents, relations, guidance or well as wishers could be of help in providing the required funds for a start-up, it may not be compared with indigenous Igbo business mentoring that makes provision for such funds through the 'Oga' at the end of mentoring. At any rate, cases of some 'Ogas' defrauding their 'Nwa Boyi' may not be ruled out, but it appears such cases are not common.

While the above forms of apprenticeships are occupations on their own (**see Table i and ii**), indigenous Igbo business mentoring comprises of several businesses as illustrated in **Table iii.** Thus, its engagement is not restricted to only one trade or craft but several other business engagements.

Table iii: The Line of Businesses in Indigenous Igbo Business Mentoring

SN	Line of Business	Sources
1	Blacksmithing	Ogundele, (2005)
2	Palm wine business	
3	Drug business / Pharmaceutical outlets	
4	Bread making	Obunike, (2016)
5	Okrika Business	
6	Cosmetics	
7	Fashion designing	
8	Building materials	
9	Spare parts/ motor, bicycles etc.	
10	Kitchen utensils / household equipment	
11	Transportation	
12	Electronics	Ejo-Orusa, (2019)
13	Plumbing materials	
14	Foodstuff	
15	Haulage Business	
16	Computer and Handset repairs	
17	Film Making,	
18	Photography	
19	And others	

Source: Researcher's Compilation, (2020)

Concluding Remarks

This paper examined the differences in selected forms of apprenticeship and indigenous Igbo business mentoring. Although, some previous studies have shown that the two are strongly related in areas of skill acquisition indigenous Igbo business mentoring is quite different in areas of providing accommodation, feeding, health care and financial assistance for the apprentice. The provision of funds alone could be viewed as great assistance considering the problem of raising funds for a business start-up in contemporary Nigeria. The unique aspect of indigenous Igbo mentoring lies in accepting apprentices and according them shelter, food, health care to survive in the course of mentoring and making provision for funds to establish a business at the end of mentoring without any biological association.

This to some extent can be compared with the apprenticeship law in South Africa that makes provision for financial assistance and company attachment or start up pack for apprentices at the end of training. Although, company attachment or start-up pack is not applicable to Igbo business mentoring, because the government of Nigeria is responsible to the plight of common man but their selfish interests. Thus, the financial assistance rendering to apprentices at the end of their apprenticeship comes only from the faithful masters who are committed to transform the lives of the youth population. This paper lauds such a humanitarian service to humanity and hope that it would be kept alive and be upgraded and extended to other areas of life. Also, apprentices "igba boi" who serves their masters meritoriously are commended for their contributions to their masters' business development. This paper hopes that if the mutual relationship is kept alive and greatly improved on it could be of great assistance in building or encouraging self-employment drive in poverty and unemployment ridden society like Nigeria.

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Women's Education, Maternal Health, Entrepreneurship and Development in Nigeria

Dare Ojo OMONIJO*
*Department of Student Industrial Work Experience Scheme, Covenant University, Ota/
Department of Sociology, Olabisi Onabanjo University, Ago Iwoye, Nigeria.
Phone No.: +23408233856587. E-mail: omonijoojo@yahoo.com.
ORCID: http://orcid.org/0000-0001-5479-3905

Sola ALUKO-AROWOLO
Department of Sociology, Olabisi Onabanjo University, Ago-Iwoye, Nigeria.
Phone No.: +234 805 887 1606. E-mail: aluko@oouagoiwoye.edu.ng

Comfort Oyinlola OYAFUNKE-OMONIYI
Department of Sociology, Olabisi Onabanjo University, Ago-Iwoye, Nigeria. Phone No.: +23408038473806. E-mail: oyafunke-omoniyi.comfort@oouagoiwoye.edu.ng. ORCID: http://orcid.org/0000-0002-8923-3139

Saheed Akinmayowa LAWAL
Department of Sociology, Olabisi Onabanjo University, Ago-Iwoye, Nigeria
E-mail: akinmayowa.lawal@oouagoiwoye.edu.ng. Phone No.: +2348058536815.
ORCID ID: http://orcid.org/0000-0002-0344-311

Jonathan A. ODUKOYA
Department of Psychology, Covenant University, Ota, Nigeria.
Phone No.: 08034730219. E-mail: adedayo.odukoya@covenantuniversity.edu.ng.
ORCID No.: http://orcid.org/0000 0001 7300 0064

Elizabeth I. OLOWOOKERE
Department of Psychology, Covenant University, Ota, Nigeria.
Phone No.: 08036176393. E-mail: Elizabeth.olowookere@covenantuniversity.edu.ng

Abstract

In modern society, several studies have focused on women affairs in both developed and developing countries. Through some of such studies, some significant improvements have been recorded in the status of women in developed nations while the reverse has been the case in most developing countries such as Nigeria, mostly in the areas of education, maternal health, entrepreneurship and national development. This means women in developing countries are negatively affected in terms of education, maternal health, entrepreneurship and contributions national development in Nigeria. The present paper intends to discuss how women are negatively affected in these areas using data retrieved from a secondary source and content analysis as its methodology. The article used radical feminism theory to gain insight into the plight of women in Nigeria and advocated equal opportunity for men and women to develop their potentials in its concluding remarks. This could go a long way to ensure the transformation of women lives from poverty to affluence and enhance their immense contributions to societal development. Since contributions to national development depend on potentials which do not have any gender connotation, equal opportunity should be granted to male and female for capacity building. Such an effort could greatly enhance national development than when only one gender (male) is solely empowered.

Keywords: Patriarchy, women's education, maternal health, entrepreneurship and development

Introduction

The term development has occupied the mind of mankind for several decades but the yardsticks which are being used to determine the concept have remained unstable over the years. Such include variables like politics, economy,

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education, health care, nutrition, dwelling, etc. Although these are all relevant concepts in the field of development but the concern of this article in hinged on the human aspect which is generally known as human development.

Human development is the means of expanding the abundance of human life; instead of focusing on economic growth which may not reflect positively in the lives of ordinary citizens the focus of scholars in this area of sociology is hinged on how life is been made comfortable for mankind. Hence, UNDP (2019), argues that it is a strategy that human beings employ to create fair opportunities and choices for a better lifestyle.

In recent times, such strategies include a country's level of literacy, health care, unemployment and poverty level, entrepreneurship drive (Binder & Georgiadis, 2010). However, it could be noted that these variables could make meaning or be useful when human beings are allowed to develop their potentials irrespective of gender. On that ground, national development could be achieved faster and easier than when only one gender (male) is empowered.

Despite this, studies have shown that women's contributions to development, mostly in developing countries are hindered due to the norms of patriarchy. The norm for several decades has been empowering men to subjugate women, not minding their indispensable roles in society (George, Ozoya & Amoo, 2017; Afolabi, 2019).

The roles of women christened as indispensable in this piece might not be an intention to undermine the roles of men in development but an attempt to broadcast and commend the burden of women on crucial aspects of human life which are absolutely beyond the reach of men. These include:

a. The conception of babies for nine months;
b. Bringing forth of babies or giving birth to them in a painful situation;
c. Nurturing and educating children firstly by informal and later by formal method; and
d. Developing children morally, socially, religiously and psychologically.

These are cogent aspects of life that are exclusively meant for women. They are not only essential in maintaining society but crucial in transcending human society from one generation to another. Any carelessness on the part of women to adequately enforce the above-mentioned roles could lead to the escalation of indecency, abnormality, truancy, moral decadence, criminality in human society, all of which undermine national development.

Dwelling on biology and divine roles in human society, the encroachment of men into most of the above roles could be regarded as an exercise in futility. This is because it would be considered an abnormal or a taboo for men to develop breast, virginal, conceive and give birth to babies. Besides, the role of breadwinner ascribed to men in the society appears to have made it practically impossible for them to perform other roles of women which are not related to biology and divinity.

To 'win bread', a lot of energy is needed to be dispensed outside the home in work-related activities from morning till evening, and if possible, till night. Thus, the execution of such a vital role goes with physical, financial, social and psychological challenges. Thus, when men arrive home, they are expected to bath, eat, relax and sleep so as to be refreshed for the assignments lineup for attention or execution the next day. Although, in some homes, women are breadwinners, yet they are still subjected to subjugation despite the fact they carry out the role exclusively meant for men.

In spite of the above-mentioned indispensable contributions of women to life, the priority places on women affairs, most especially in areas of education, health, and entrepreneurship appears to be very weak in developing countries. Although, some literature state that women are well treated in developed countries, but the case of developing countries, where millions of women are seriously experiencing subjugation due to the norm of patriarchy (Okeke, Anyaehie, Ezenyeaku, 2012; Solomon, 2018) could be regarded as an issue of concern to scholars worldwide.

Patriarchy is a cultural practice that supports the subjugation of women and the superiority of men without any scientific evidence. Solomon, (2018) argues that patriarchy emerges from Greek word "Patriarkhēs" which literarily means the father of a given race or the chief of a race while authors such as Christine & Dudley Jr., (2020) traced the source of patriarchy to two Latin words "Pater (father) and arch (rule)", all translates to the rule of the father, strongly backup by the norm of patriarchy.

The irony is that the incapability, irresponsibility, insensitivity, lack of ingenuity and brilliance of a man does not confer the title of rulership or dominion on a woman who is more capable, sensible, brilliant, sensitive and responsible than the man in the family. His inability to perform social, cultural, and economic responsibilities in the family is immaterial. So long a man gets married to a woman, he has automatically become her superior in

developing countries and it appears the pathetic situation is aggravating due to the nature of developing countries which is characterized by illiteracy, poor exposure and underdevelopment.

At the root of patriarchy lie norms, beliefs and practices that determine how human beings live their lives. The addiction of men, to these norms, beliefs and practices is responsible for behaviours that manifest in the maltreatment of women. The irony of it all is that modernity and global campaign for its eradication are yet to yield a fruitful result largely because the practising communities are sticking to their tradition or culture. Thus, in spite of the general outcry for change, studies have shown that the position of women has not improved greatly in many developing countries, including Nigeria, most especially in their access to education, maternal care, entrepreneurship and contributions to national development (Firestone, 1970; Hanisch, 2009; Feminist Majority Organisation, 2020). It is on this premise the present article was conceived. The article is sub-divided to deliberate on the concept of education and its negative effect on women, health care, entrepreneurship and contributions to national development.

Literature Review

The Concept of Education

Education can be viewed as the wealth of knowledge and understanding which human being usually acquired at the end of studying or training in a particular field of human endeavour. Also, it could be regarded as a means of developing potentials in all spheres of life. It can equally be viewed as a process of obtaining literacy or skill needed to transform one's life, family members and the entire society in as much as it is a major requirement for securing work placement, affluence, influence and human development in general (Sivakumar & Sarvalingam, 2010). Thus, it is the bedrock of national development (Odia & Omofonmwan, 2007).

The foregoing is an indication that without education, the transformation ever recorded across the world could be practically impossible. The immense development in the field of education is responsible for the advancement in science and technology that has brought comfort to human beings in contemporary societies than in traditional societies when human energy was required to achieve feats and well-being.

Given the importance of education and the heavy resources required to ensure its actualization in qualitative terms, its responsibility becomes that of the government (Rahman and Uddin, 2009). The huge resources realized via tax, mineral resources etc. are under the control of the government and they are expected to be properly engaged in ensuring quality education. However, the management of such resources has been a serious problem among the elites in different parts of the world. While the elites in most developed nations are prudent in managing their resources, their counterparts in developing countries squander their nation's resources (Odukoya, Omonijo, Misra & Ahuja, 2021). Consequently, while education is well funded in the former, it is poorly sponsored in the later Husain & Syed, (2016) and this may likely be one of the reasons why education in the former is highly developed than the latter.

Women's Education in Nigeria

The usefulness of education must have prompted the world organisations, mostly the UNICEF, (2020) to consider it the right of every child, irrespective of where they live and their circumstances. However, the strict compliance of countries to its implementation is traceable only to developed nations while the leadership of developing countries such as Nigeria play lip-service to its implementation.

Consequently, 10.5 million children between the age of five and fourteen are out of school (UNICEF, 2020). Apart from children, another group that are badly affected in developing countries is women. Despite the adoption of the 1948 Universal Declaration on Human Rights, studies have shown that seventy-two million females are out of school (Gender statistics, 2010). Besides, out of the 774 million adult illiterates worldwide, 64% are women (Gender Statistics, 2010).

Women suffer this plight because they are regarded as properties that will eventually end up at the men's kitchen due to the distribution of social roles. In most villages in Nigeria, a girl-child is not given the right to education like the male-child because she is considered another man's property. The major implication is that the potential of such a child that is needed for the transformation of the society is being ruined. This corroborates Rölz, (2016) who argues that educating females is a strong instrument of combating global poverty, but women in developing countries may not attain their potentials due to improper or lack of formal education.

Studies have shown indicators that reveal the trends and pattern of education in developing countries, Nigeria inclusive, such measures include literacy, enrollment status and years spent in school (Rolz, 2016). The World Bank cited in Rolz, (2016) shows that each of these indicators leads to the same conclusions; the level of female education is low in the poorest countries, with just a handful of exceptions, and by any measure, the gender gap is the largest in such societies.

The foregoing prompted The United Nations Millennium Development Goal (MDG) to sponsor gender equalization (Aja-Okorie, 2013). Through this goal, it is mandatory for every country to empower women through education, but the position of women in Nigeria is yet to be greatly improved due to several limitations out of which patriarchy dominates (Olowookere, Omonijo, Odukoya and Anyaegbunam, 2020).

Maternal Health

Maternal health entails the medical services that are needed to women who are pregnant, aborted and nurturing babies. It also involves the care dimensions of family planning in most societies. In Nigeria, it is being organised as follows:

Table i: Tiers of Maternal Health Care, Locations and Activities in Nigeria

SN	Tiers	Locations	Activities	Sources
1	Primary	Nearest to women in each of the local governments	The tier handles antenatal cases, child delivery and postnatal.	Umana, (2018)
2	Secondary	Could be far to women's location but in existence in each of the 36 states	The tier handles complicated cases that cannot be handled in the primary	
3	Tertiary	Could be very far to women residence, but in existence in special locations within the country	The tier treats cases that secondary tier cannot handle.	

Source: Researchers' Compilation, (2020)

Although, studies have shown that maternal health problem is just one of the numerous challenges confronting the health sector in Nigeria but infectious and communicable diseases are other notable ones that often result in death. Other root causes of death according to Muhammad, Abdulkareem & Chowdbury, (2017) are HIV/AIDS, malaria, diarrhetic, malaria, protein/energy malnourishment, meningitis, cancer, infections related to lower respiratory, stroke and others.

The problem of health care has continued to generate problems in Nigeria due to the shortage of health personnel to attend to the large crowd seeking medical attention. Studies have shown that such medical experts are in large number but based in developed nations where they are well treated (Umana, 2018). Thus, there are twenty-seven medical doctors per one thousand Nigerians (Public Health Foundation of Nigeria, 2017). The gloomy state infrastructures, unfriendly attitudes of staff to patients, shortage of vital drugs and poor-quality service, water supply and electricity (Umana, 2018). Given this, the World Health Organisation (2019) ranked Nigeria's health care 187th among 191 United Nations member states.

The complicated health care in Nigeria is compounded with poor economic policies and factors related to politics, poverty and governance. Women are badly affected due to the inability to access medical care on their own because most of them are not educated and they are underemployed and underpaid.

Access of people to health care is another major criterion for determining human development index. While the problem could be regarded as a general problem, the case of maternal health is horrible and it has been a major concern to many developing countries. According to the World Health Organisation (2019), almost one hundred per cent of maternal death globally occur in developing countries with half and twenty per cent in West Africa and Nigeria respectively.

Specifically, the WHO (2019) states that from 2005 to 2015, over six hundred thousand cases of maternal death were recorded in Nigeria while less than nine hundred thousand cases of near-miss cases were reported. Thus, a woman in Nigeria has a one in twenty-two-lifetime risk of dying in the course of pregnancy, childbirth or

postpartum or post-abortion which may never be compared with developed nations that have the lifetime risk of one in forty-nine thousand.

Any woman lost to maternal death could be regarded as potential lost to national development. The more a country continues to experience such, the more she loses potential materials to national development.

Entrepreneurship

Just like other concepts in social sciences, entrepreneurship has been defined in several ways. These include the act of creating or extracting value Gaddefors & Anderson, (2017); a system premeditated to design, launch and run a new enterprise. Such a business is usually very small at the initial stage, but could later grow to a medium and large-scale business; the eagerness and ability to establish, organize and manage enterprises, not minding the risks it portends to make profits (Yetisen, *et al*., 2015).

The foregoing is an indication that entrepreneurship entails the act or a process of producing persons who are ready to take a risk in going into business transactions in order to earn profits, either to better their lots or ensure the transformation of families and human society at large. Over the years, experiences have shown that such an act or process do not entertain gender connotation, but the ability to possess features disposing to success in business transactions and it could be possessed by a man or a woman. Despite this, studies have shown that human factors predisposing entrepreneurship are more favourably disposed to men than women in developing countries Adenuga, Omonijo, Ogunyemi and Olowookere, (2020). Such could be traced to the norms of culture and patriarchy as well as biological factors.

Hinderance which human tradition places on women's entrepreneurship via culture lies in the denial of inheritance such as money, land, houses, cars etc. In most societies in Nigeria, women are not permitted to inherit their fathers' property. Such property is usually transferred to men in the family. This is because, when a woman gets married, she lives her father's house to leave permanently with her husband and his kindred. Her rights in that family are no longer tenable. The importance of inheritance in the life of a brilliant woman who has business initiative or prowess may not be quantified, judging from the problem of raising funds for a start-up in most developing countries. With a substantial wealth inherited, the foundation of a flourishing business could be laid and maintained by women who are prudent in managing resources. But when they are prevented from accessing such a vital opportunity, their business potentials could be destroying and that could be a major hindrance to women's contributions to national development.

The aspect of limitations which biology has placed on women's entrepreneurship could be located in areas of conception, childbirth, bread feeding and upbringings. These could be regarded as demanding tasks for women and those who are not physically strong may not be able to combine them with the stress of managing entrepreneurship, except if such an economic activity could be suspended till after childbearing.

Theoretical Point of View

Several theories have discussed the plights of women globally. Such include Marxist feminism, liberal feminism, radical feminism and others. While all of them have made some useful contributions to understanding the status of women in the society, mostly in developing countries, the focus of this paper is on radical feminism because of its strong connection with patriarchy and culture.

The origin of radical feminism has been traced to the work of Robin Morgan, Shulamith Firestone and Carol Hanisch in the year 1967 (Firestone, 1970; Hanisch, 2009; Feminist Majority Organisation, 2020). These authors were inspired by the rate at which women's position was neglected by the antiwar groups and civil rights crusaders led by men several decades ago. The neglect ignited their anger and prompted them to commence the movement as well as the protest in 1968 at Miss America Pageant, Atlantic City, New Jersey.

Radical feminism blames the disparity between men and women on patriarchy. In order to ensure women's freedom, radical feminist authors have refused to accept equality with men but suggested the total destruction of patriarchy, a complete end to domestic violence and rape. Ardent among such authors include Andrea Dworkin, Ellen Willis, Firestone, (1970) and Hanisch, (2009). They seriously contend with the act of dividing societal rights, power and privilege between men and women in the society using gender because of its connection with patriarchy and advocate for its abolition.

Dwelling on the above, radical feminism has a point that needs to be commended with all seriousness. Such is located in tracing the root of women's subjugation in the society to patriarchy, most especially in developing

countries such as Nigeria. To say that the norms of patriarchy backed up by the culture undermine women's position in the society is not an understatement; it reflects the social reality of women's subjugation. However, it becomes pertinent for radical feminists to note that every society operates by its culture and since patriarchy has a strong link with the culture of human society, the emergence of rules governing marital affairs could be very difficult to challenged and altered successfully.

Such rules include women leaving their father's house for their husbands' house after marriage, bearing their husband's name and raising children in the same name. Also, the dowry and bride price paid on women by their husbands in most societies are heavy (**See Table ii**); it gives the impression that women are being purchased by men. It appears such a heavy dowry has given men the right to consider women as their property.

Table ii: Communities, States and Dowries/bride price in Nigeria

SN	Communities	State	Dowries/Bride price	Source
1	Mbaise people	Imo State	From N300,000 to N500,000	Onuoha, (2020)
2	Annang people	Akwa Ibom	From N500,000 to N700,000	
3	Ikwerre inhabitants	Rivers state	One million naira	
4	Ngwo People	Enugu State	Not stated	
5	Bororos	Northern Nigeria	Ten to fifty live cows	
6	Ijebus	Ogun State	Not stated	
7	Nkpa	Abia State	Not stated	
8	Efik	Cross River	From N500,000 to 3 million	

Source: Researchers Compilation, (2020)

Besides, radical feminists have failed to realise that biology and spiritual engagements have already drawn a line of demarcation between men and women and any attempt to alter the demarcation could be regarded as an exercise in futility. Although, women have options of securing unlimited freedom for themselves in society such could be possible under the following conditions:

a. Forgetting about marriage and denying themselves the joy of sexual satisfaction under martial obligation. Although, they can have a sexual relationship with some men but such women are never considered responsible in most cultures;
b. Remaining childless, because it is not possible to conceive without having sexual intercourse with a man. Although, they can bear children outside marriage such children will be regarded as bastards in most cultures and it goes with ridicule;
c. Be ready to stay in their fathers' houses or their own houses as long as they live and
d. Be ready to cater for themselves.

Judging from human nature that needs comfort, companion, social interaction, emotional stability, the above conditions could be very difficult to apply to women, who are more often regard as weaker sex. Although, it may succeed to some extent in developed nations due the individualist nature of such countries but its application to women's situation in developing countries could be tantamount to subjecting women to a miserable lifestyle because:

i. Most women are poorly educated, unemployed, underemployed and underpaid and may not be able to cater to their needs;
ii. An unmarried woman is considered irresponsible and does not enjoy the respect from the African culture;
iii. Giving out daughters in marriage is a thing of joy in Africa culture. Hence, unmarried daughters are always a concern their parents; and
iv. Husbands are considered the crown of women in African culture "ade ori", thus any woman without a husband does not have a crown "ade ori" and is vulnerable to humiliation

Given the above, it could be a good idea if feminist theorists could reconsider their anger and bitterness against patriarchy and men domination and commence advocating for fair treatment of women in society.

Concluding Remarks

This paper discussed issues surrounding women's education, maternal health, entrepreneurship and development in Nigeria. The paper craved the indulgence of policymakers and strong advocate of patriarchy to the fact that education, health, entrepreneurship are cogent areas of human development that demands contributions from every

member of the society, irrespective of gender. The more a society gives equal participation to her inhabitants without any disparity the more advantageous it becomes for such a society. This goes to corroborate Giri, (2006:24) in a book titled "Deprived Devis: Women's Unequal Status in Society," that "The evidence is overwhelming that education improves health and productivity and that the poorest people gain most. When schools open their doors wider to girls and women, the benefits multiply."

Acknowledgments

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Analysis of Global Connections. Countries Closer and Further In Development in Globalization

Monika HADAS-DYDUCH

University of Economics in Katowice,
Department of Statistical and Mathematical Methods in Economics,
40-287 Katowice, ul. 1 Maja 50, Poland
Email: monika.dyduch@uekat.pl

Abstract

Globalization currently affects every person and every sphere of his life. For this reason, we have financial, social, cultural, political, ecological, economic and even globalization, as shown by recent global events related to COVID19, perhaps even globalization of illness. Globalization is not new but is changing fast. Global interaction is centuries old, reflecting a human instinct to find new opportunities, discover new people and places, and exchange ideas and goods. The article deals with the topic of general globalization, combining Economic Globalization, Social Globalization, and Political Globalization. The study was based on data provided by the Swiss Economic Institute. The aim of the article is to familiarize readers with this phenomenon, analysis of the development trend of general globalization and analysis of similarities in development with other countries. The aim of the article is to familiarize readers with the phenomenon of globalization, presentation of the genesis of globalization and detailed characteristics of individual types of globalization. Moreover, the aim of the study is to analyze the development tendency of general globalization and to analyze similarities in development with other countries. The article classifies countries into groups that are most similar to each other in terms of the development of globalization. Grouping was made according to different types of globalization. The aim of the article is to analyze globalization in the context of the intensity of this phenomenon in individual countries.

Keywords: Globalization, Integration, Political Globalization, Wavelets.

Introduction

Globalization is a multidimensional and multifaceted process defined in many ways, which has developed with varying intensity since the end of the 19th century and has gained particular importance in the last decades of the 20th century. Globalization creates both opportunities and threats for its participants. One of the increasing trends in the world for at least a quarter of a century is the progressing socio-economic diversification and cracking the world into two separate blocks - the world of poverty and the world of wealth (see: Cheba, 2015; Hadaś-Dyduch, 2016, 2016a, 2016b, 2016c, 2017, 2019, 2019a, 2019b, 2019c, 2020; Pietrzak & Ziemkiewicz, 2018b, 2019). The social structure is changing (see: Horáková, 2015; Jankiewicz, 2018a, 2018b, 2018c, Jankiewicz & Pietrzak, 2020). The distances between individual market segments and those remaining outside this market are growing. The benefits of economic growth are not evenly distributed. The richest are quickly escaping and at the same time the area of relative poverty of both the unemployed and some of the employed is growing, even in the conditions of favorable macroeconomic indicators and good economic condition of companies (see Dresher, 2006; Goryakin & Yevgeniy, 2015; Potrafke, 2015; Kuc, 2017a, 2017b; Pietrzak et al., 2017b; Hadaś-Dyduch, 2015, 2015a, 2015c, 2018a, 2018b; Kuc-Czarnecka et al., 2020).

Globalization currently affects every person and every sphere of his life. For this reason, we have financial, social, cultural, political, economic globalization, and even as recent world events related to the coronary virus may be disease globalization. The article focuses on general globalization. The study was based on an index constructed by the Swiss Economic Institute. "The Globalization Index is calculated on a yearly basis from 1970. However, not all data are available for all countries and all years. Missing values within a series are imputed using linear interpolation. Missing values at the beginning or the end of a series are substituted by the closest observation available. Specifically, this implies that we carry the last value backward in the case of missing data at the beginning of a series and forward in the case of missing data at the end of a series" (Swiss Economic Institute). The study in this article are based on data from the Swiss Economic Institute.

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Phases of Globalization Development

Global interaction is centuries old, reflecting a human instinct to find new opportunities, discover new people and places, and exchange ideas and goods. The core drivers of globalization used to be trade in goods and capital flows. Today, spurred on by rapid technological change, it is increasingly knowledge driven.

According to the European Commission and World Bank, the following events had a key impact on the development of globalization:

- 1914 – Openinig the Panam Canal;
- 1923 – First transcontinental non-sto flight;
- 1944 – Bretton Woods Conference;
- 1947 – General Agreement on Tariffs and Tarde;
- 1950 – First home TV set;
- 1951 – First contalner ship;
- 1961 – First industrial robot used in car manufacturing;
- 1961 – Organization for Economic Cooperation and Development (OECD);
- 1967 – Association of Southeast Asian Nations;
- 1973 – Organization of Arab Petroleum Exporting Countries oil embargo;
- 1974 – First personal computer;
- 1988 – Launch of first fair trade label;
- 1991 – World Wide Web;
- 1992 – First mobile text message sent;
- 1994 – North American Free Trade Association;
- 1995 – World Trade Organization (WTO);
- 1999 – Seattle WTO protests;
- 2000 – Millennial development goals;
- 2001 – China joins the WTO;
- 2006 – Wikileaks Twitter;
- 2007 – First smartphone;
- 2009 – Bitcoin;
- 2015 – First commercial delivery using a drone
- 2015 Sustainable development goals.

The above-mentioned events are often equated with phases of globalization. Globalization is still developing. Because „(…) a more connected world has brought with it new opportunities. People now travel, work, learn and live in different countries. They interact with each other on the web, sharing their ideas, cultures and experiences. Students have online access to courses run by leading universities across the world. Countries can produce more for less by specialising in what they do best and exploiting economies of scale in global markets. International competition, global climate action, scientific cooperation and exchange of ideas have stimulated creativity and accelerated innovation. Companies active in international markets remain competitive because they learn and adapt faster" ((European Commission).

Detailed Empirical Analysis

The empirical analysis is based on the globalization index, which may be composed of various components. The detailed components of the index used in the study are given below.

Components of the Globalization Index

The globalization index is a component of three globalizations: economic globalization, political globalization, social globalization.

The study was based on data provided by the Swiss Economic Institute, then economic globalisation is composed of trade globalisation and financial globalisation, of which each gets a weight of 50 percent. Social globalisation consists of personal contact, information flows and cultural proximity where each contributes one third. Economic, social and political globalisation are aggregated to the Globalisation Index using again equal weights (Gygli et al., 2019; Dresher, 2006).

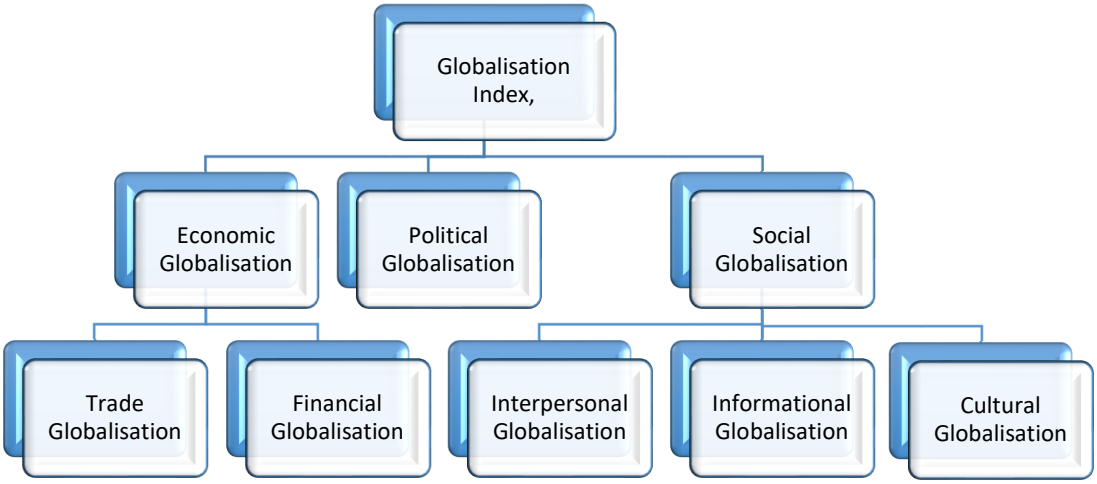

Economic globalization (see more in: Gygli, Haelg, Potrafke & Sturm, 2016; Potrafke, 2015; Sánchez-López, Aceytuno, & De Paz-Bañez, 2019) characterized as long distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges. Political globalization, characterized by a diffusion of government policies; and social globalization, expressed as the spread of ideas, information, images and people. See information about the European Union, the Visegrad Group, among others, in (Balcerzak, 2015, 2016, 2017, 2020; Balcerzak & Pietrzak, 2017; Cheba & Szopik-Depczyńska, 2017; Dmytrów & Bieszk-Stolorz, 2019; Simionescu et al., 2017; Gavurova et al., 2017; Hadaś-Dyduch et al., 2017). More about in trade in (Hadaś-Dyduch, 2018a, 2018b, 2019a, 2019b)

Classification of general globalization

The classification of globalization can be made in various ways. The globalization index, the components of which are given above, varies from country to country. Research shows that according to data from 2019 from the Swiss Economic Institute, the rate of general globalization is the highest in Switzerland and the lowest in Eritrea. However, due to the lack of data, the survey does not include countries such as: French Polynesia, Greenland, Guam, Korea, Dem. Rep., New Caledonia, Virgin Islands (U.S.).

The calculations show that the general globalization index, defined in the previous chapter for 209, has a maximum value of 91.91 and a minimum value of 31.15.The general globalization index, as defined in the previous chapter, currently assumes (we understand as 2019) a maximum value of 91.91 and a minimum value of 31.15. Depending on the value of this indicator, we can classify countries into eight groups due to the development of general globalization. The first group is the countries with the lowest level of globalization index, they are countries for which the index of general globalization takes the value ⟨30; 40). There were 7 countries in this group. The last group brings together countries with the highest rate of general globalization. The globalization index (GO) for this group is ⟨90; 100). This group includes 3 countries, i.e. Belgium, Netherlands, Switzerland.
Other groups:

- Group II - $GO \in \langle 40;\ 50)$. The group contains 38 countries.
- Group III - $GO \in \langle 50;\ 60)$. The group contains 51 countries.
- Group IV - $GO \in \langle 60;\ 70)$. The group contains 40 countries.
- Group V - $GO \in \langle 70;\ 80)$. The group contains 29 countries.
- Group VI - $GO \in \langle 80;\ 90)$. The group contains 29 countries.

ROUP 1

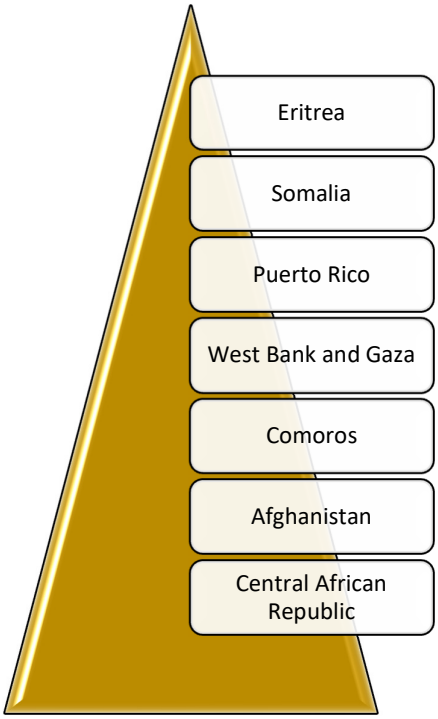

GROUP 2

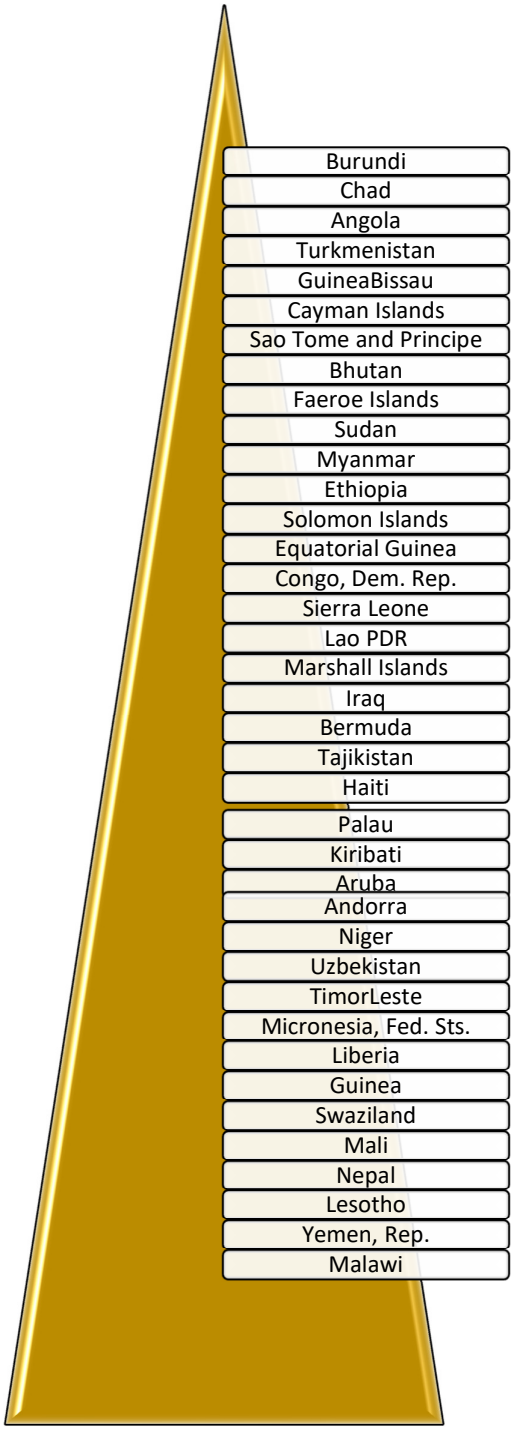

GROUP 3

GROUP 4

Madagascar
Maldives
Monaco
Tonga
Vanuatu
Zimbabwe
Tanzania
Syrian Arab Republic
Cameroon
Bangladesh
Benin
St. Kitts and Nevis
Papua New Guinea
Mauritania
St. Vincent and the Grenadines
Rwanda
Gambia, The
Togo
Samoa
Macao, China
Venezuela, RB
Iran, Islamic Rep.
Pakistan
Burkina Faso
Gabon
Uganda
Liechtenstein
Guyana
Suriname
Mozambique
Djibouti
Congo, Rep.
Libya
Cote d'Ivoire
Bahamas, The
Grenada
Botswana
Nigeria
Kenya
Algeria
Cape Verde
Dominica
San Marino
Zambia
St. Lucia
Fiji
Bolivia
Cambodia
Namibia
Belize
Sri Lanka

Brazil
Antigua and Barbuda
Ecuador
Senegal
Ghana
Nicaragua
India
Cuba
Barbados
Indonesia
Seychelles
Brunei Darussalam
Oman
Honduras
Paraguay
Guatemala
Kyrgyz Republic
Kazakhstan
Vietnam
Azerbaijan
Colombia
China
Trinidad and Tobago
Saudi Arabia
Jamaica
Mongolia
Albania
El Salvador
Dominican Republic
Philippines
Lebanon
Hong Kong, China
Egypt, Arab Rep.
Tunisia
Belarus
Armenia
Moldova
Bosnia and Herzegovina
Bahrain
Argentina

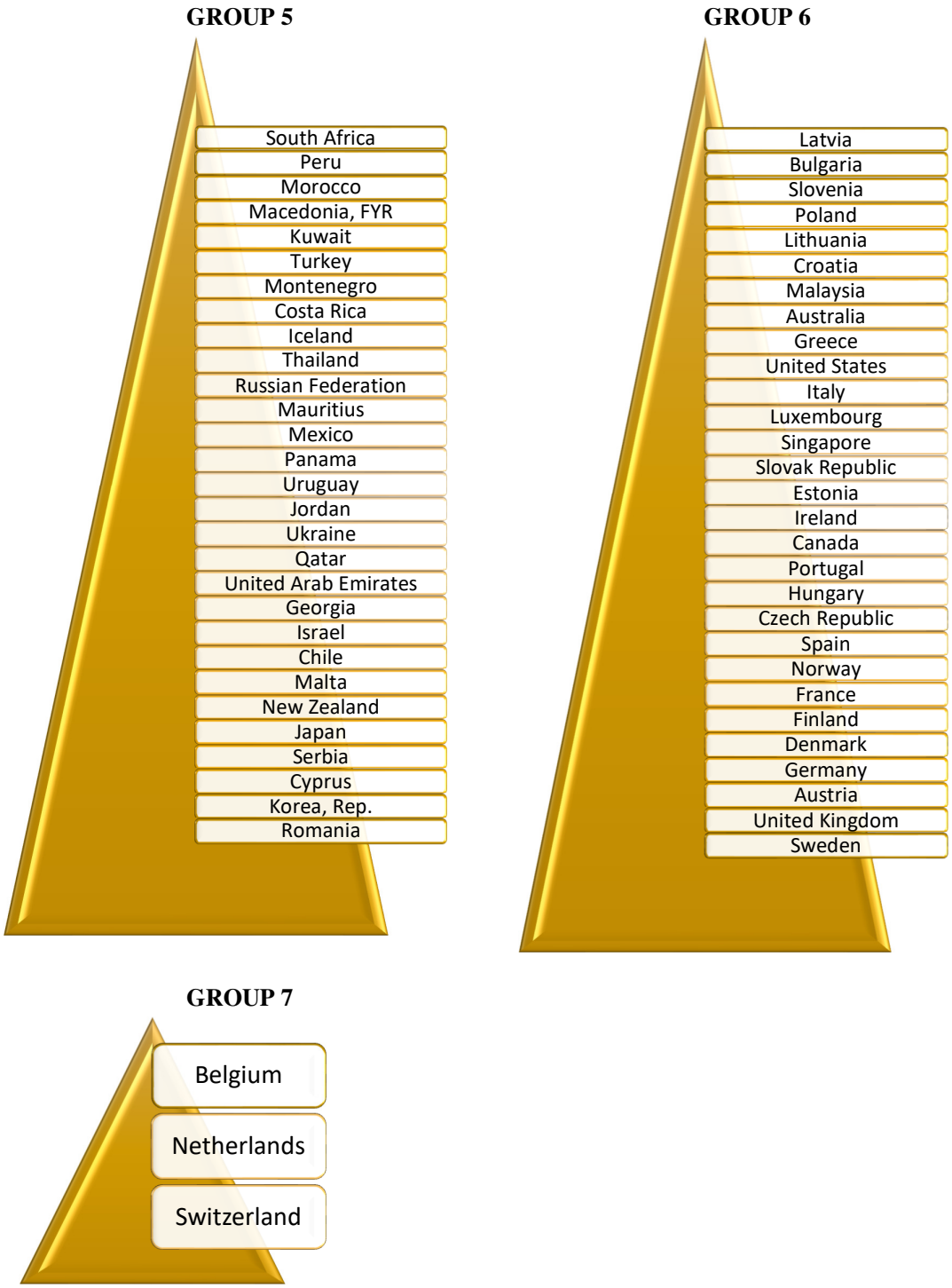

Fig. 1: Classification of countries, by general globalization index.

Classification of countries according to economic globalization

In this section, we will analyze countries according to their development in the context of economic globalization, i.e. we will group them according to the intensity of economic globalization in individual countries. Economic globalization - what is it ?? Eonomic globalization, characterized as long distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges. Economic globalisation is composed of trade globalisation (see more in: Łapinska, 2016; Miłek, 2018; Simionescu et al., 2018; Pietrzak & Jankiewicz 2019; Pietrzak & Łapińska, 2015; Pietrzak & Ziemkiewicz, 2018a;), financial globalisation and capital market development (see more in Meluzín et al., 2017, 2018a, 2018b, 2018c; Pietrzak et al., 2017a; Rollnik-Sadowska & Dąbrowska 2018;

Hadaś-Dyduch et al., 2019; Shkolnyk et al., 2019; Skalická et al., 2019a, 2019b), of which each gets a weight of 50 percent.

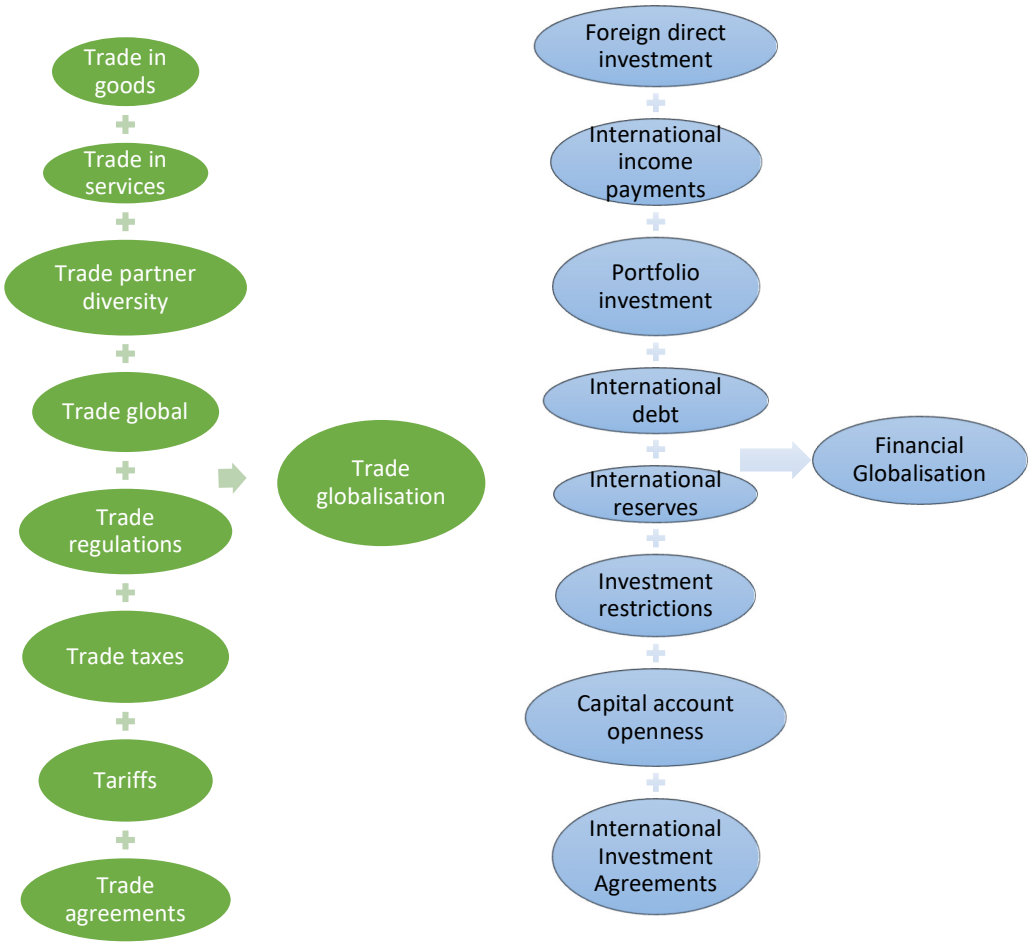

According to data from 2019 from the Swiss Economic Institute, the rate of economic globalization is the highest in Singapore and the lowest in Iran, Islamic Rep. Due to the lack of data, the study did not include such countries as: Andorra, Cayman Islands, Cuba, Faeroe Islands, French Polynesia, Greenland, Guam, Korea, Dem. Rep., Liechtenstein, Monaco, New Caledonia, Puerto Rico, San Marino, Virgin Islands (U.S.).

The economic globalization index, defined as above, currently assumes (we understand as 2019) a maximum value of 94 and a minimum value of 23.59. Depending on the value of this indicator, we can classify countries into eight groups due to the development of general globalization. The first group are countries with the lowest level of globalization index, they are countries for which the index of economic globalization (GE) takes the value ⟨20, 30). This group includes: Venezuela, RB; Chad; Bangladesh; Burundi; Comoros; Afghanistan; Ethiopia; Iran, Islamic Rep. The last group in the ranking brings together countries with the highest rate of economic globalization. The globalization index (GE) for this group is ⟨90; 100). This group includes 1 country - Singapore.

Others group:

- Group II - $GP \in \langle 30;\ 40)$. The group contains 21 countries.
- Group III - $GP \in \langle 40;\ 50)$. The group contains 33 countries.
- Group IV - $GP \in \langle 50;\ 60)$. The group contains 33 countries.
- Group V - $GP \in \langle 60;\ 70)$. The group contains 46 countries.

- Group VI - $GP \in \langle 70;\ 80)$. The group contains 24 countries.
- Group VII - $GP \in \langle 80;\ 90)$. The group contains 24 countries.

GROUP 1

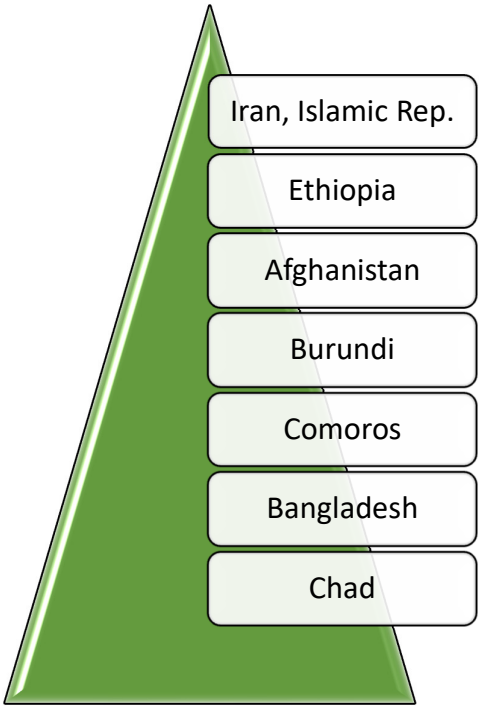

GROUP 2

GROUP 3

GROUP 4

GROUP 5

GROUP 6

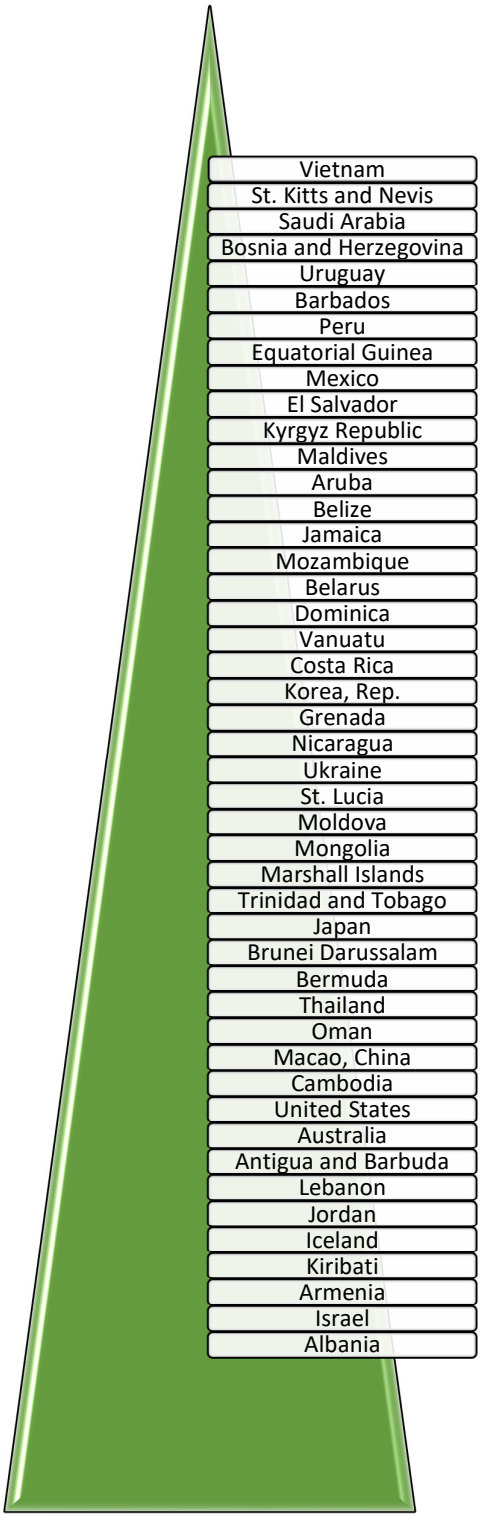

GROUP 7

GROUP 8

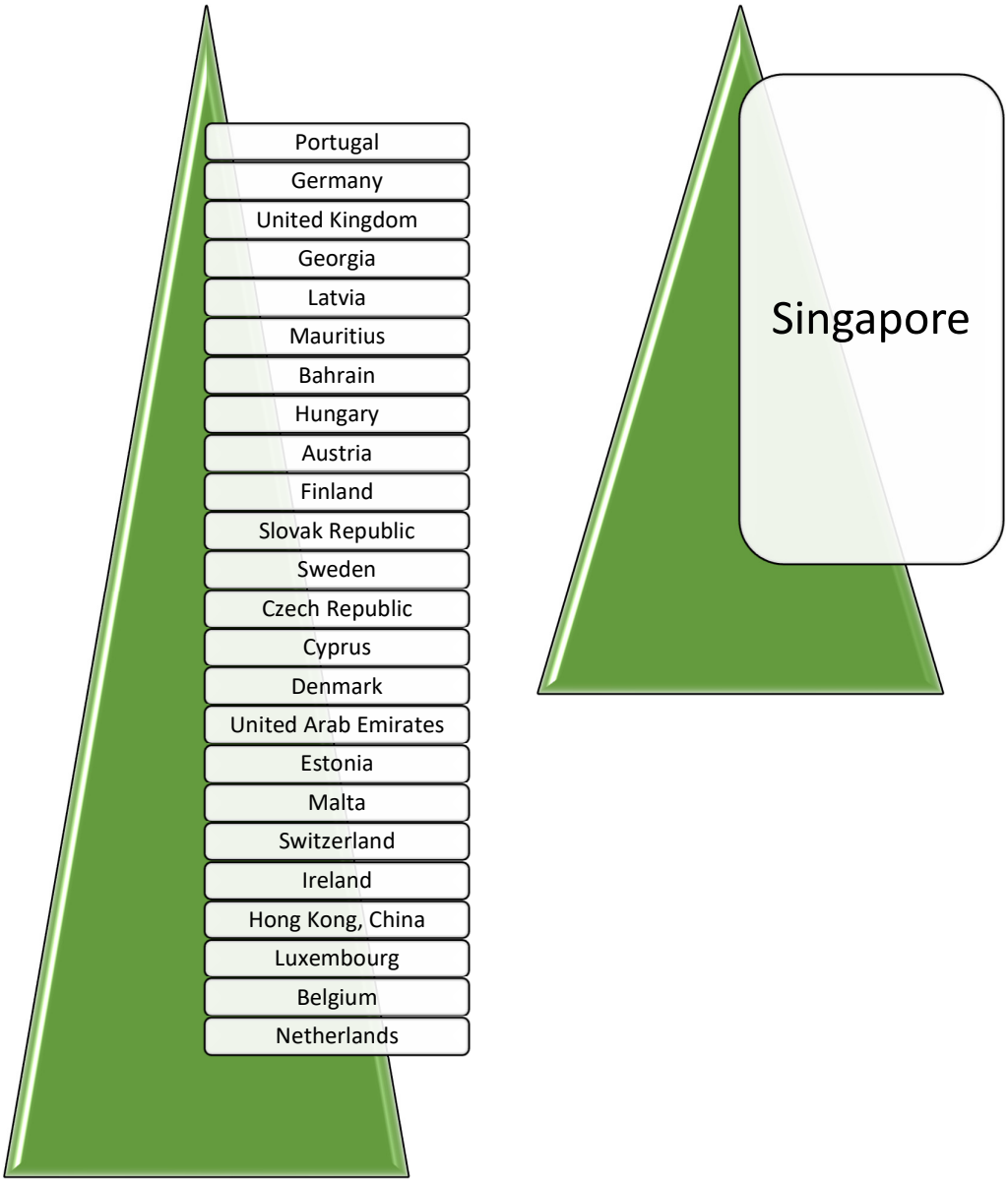

Fig. 2: Classification of countries, according to the index of economic globalization.

It should be noted that the group of countries with the highest rates of both general globalization and economic globalization included such countries as:

- Australia (G0=81,98999786, GE=82,86000061)
- Belgium (G0=90,58999634, GE=88,54000092)
- Czech Republic (G0=85,59999847, GE=84,04000092)
- Denmark (G0=88,26000214, GE=84,45999908)
- Estonia (G0=83,76999664, GE=86,26999664)
- Finland (G0=87,69999695, GE=82,97000122)
- Germany (G0=88,59999847, GE=80,48999786)
- Hungary (G0=84,98000336, GE=82,69000244)
- Ireland (G0=84,47000122, GE=87,97000122)
- Latvia (G0=80,56999969, GE=82,08000183)
- Luxembourg (G0=83,59999847, GE=88,30000305)
- Netherlands (G0=90,70999908, GE=88,66000366)
- Portugal (G0=84,72000122, GE=80,16999817)

- Singapore (G0=83,62000275, GE=94)
- Slovak Republic (G0=83,72000122, GE=83,06999969)
- Sweden (G0=89,93000031, GE=83,34999847)
- Switzerland (G0=91,19000244, GE=86,79000092)
- United Kingdom (G0=89,83999634, GE=81,47000122)

It can be said that the above-mentioned countries are conducting the most globalized economic strategy.

Classification of countries according to political globalization

Political globalization refers to the growth of the worldwide political system, both in size and complexity. That system includes national governments, their governmental and intergovernmental organizations as well as government-independent elements of global civil society such as international non-governmental organizations and social movement organizations. One of the key aspects of the political globalization is the declining importance of the nation-state and the rise of other actors on the political scene. The creation and existence of the United Nations is called one of the classic examples of political globalization (Ougaard, 2004).

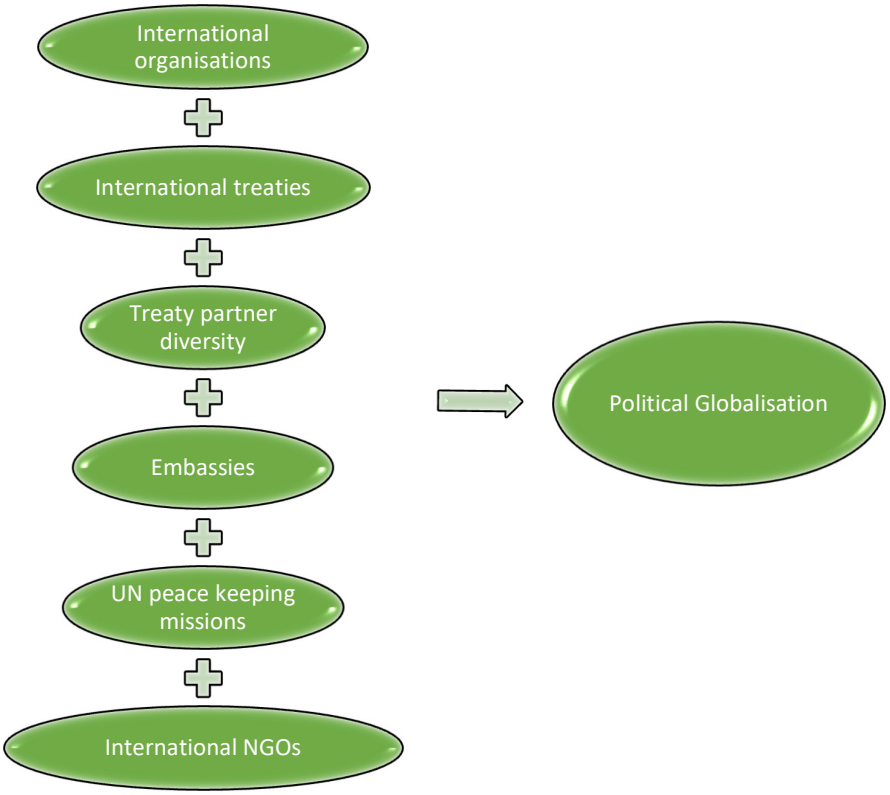

Fig. 3: Political Globalisation

According to data from 2019 from the Swiss Economic Institute, the rate of political globalization is the highest in Italy and the lowest in Greenland. The political globalization index, as defined above, currently adopts (we understand as 2019) a maximum value of 98.26 and a minimum value of 2.65. Depending on the value of this indicator, we can classify countries into ten groups due to the development of general globalization. The first group is the countries with the lowest level of political globalization index, the countries for which the index of political globalization takes the value ⟨0;10). This group included 9 countries: Greenland, New Caledonia, Virgin Islands (U.S.), Faeroe Islands, French Polynesia, Aruba, Cayman Islands, Bermuda, West Bank and Gaza.

The last group, i.e. the tenth group, brings together countries with the highest overall globalization rate. The globalization index (GP) for this group is ⟨90; 100). As many as 29 countries were classified in this group, i.e.Czech Republic, Australia, Norway, China, Romania, Korea, Rep., Poland, Argentina, Egypt, Arab Rep., Hungary, Greece, Canada, Turkey, India, Russian Federation, United States, Denmark, Finland, Portugal, Austria, Belgium, Switzerland, Sweden, Netherlands, Spain, United Kingdom, Germany, France, Italy.

Others group:

- **Group II** - $GP \in \langle 10;\ 20)$. The group contains 7 countries.:
  Palau, Puerto Rico, Marshall Islands, Micronesia, Fed. Sts., Macao, China, Kiribati, Andorra.

- **Group III** - $GP \in \langle 20;\ 30)$. The group contains 8 countries:
  St. Kitts and Nevis, Maldives, Sao Tome and Principe, Liechtenstein, Tonga, Monaco, Eritrea, Bhutan.
- **Group IV** - $GP \in \langle 30;\ 40)$. The group contains 20 countries:
  Hong Kong, China, Vanuatu, Solomon Islands, St. Vincent and the Grenadines, Bahamas, The Korea, Dem. Rep., Somalia, San Marino, Grenada, Equatorial, Guinea, Dominica, Samoa, Comoros, Antigua and Barbuda, Timor Leste, Suriname, St. Lucia, Seychelles, Swaziland, Turkmenistan.

- **Group V** - $GP \in \langle 40;\ 50)$. The group contains 11 countries:
  Lesotho, Lao PDR, Belize, Botswana, Barbados, Guyana, Afghanistan, Cape Verde, Haiti, Guinea Bissau, Tajikistan.

- **Group VI** - $GP \in \langle 50;\ 60)$. The group contains 21 countries:
  Brunei Darussalam, Oman, Central African Republic, Angola, Uzbekistan, Bahrain, Fiji, Iraq, Myanmar, Djibouti, Mauritius, Liberia, Papua New Guinea, Trinidad and Tobago, Sierra Leone, Burundi, Gambia, The Syrian Arab Republic, Chad, Sudan, Nicaragua.

- **Group VII** - $GP \in \langle 60;\ 70)$. The group contains 35 countries:
  Cambodia, Montenegro, Malawi, Iceland, Libya, Congo, Rep., Malta, Madagascar, Namibia, Kyrgyz Republic, Mauritania, United Arab Emirates, Albania, Niger, Gabon, Azerbaijan, Togo, Rwanda, Jamaica, Mozambique, Yemen, Rep., Kuwait, Panama, Cyprus, Nepal, Saudi Arabia, Lebanon, Congo, Dem. Rep., Guinea, Singapore, Zimbabwe, Mali, Honduras, Georgia, Qatar.

- **Group VIII** - $GP \in \langle 70;\ 80)$. The group contains 37 countries:
  Mongolia, Armenia, Benin, Luxembourg, Moldova, Zambia, Uganda, Kazakhstan, Macedonia, FYR Venezuela, RB Burkina Faso, Dominican Republic, Bolivia, Cameroon, Cote d'Ivoire, Vietnam, Israel, Costa Rica, Paraguay, Bangladesh, Belarus, El Salvador, Bosnia and Herzegovina, Ireland, Ecuador, Tanzania, New Zealand, Sri Lanka, Ethiopia, Latvia, Guatemala, Brazil, Lithuania, Cuba, Iran, Islamic Rep., Kenya, Colombia.

- **Group IX** - $GP \in \langle 80;\ 90)$. The group contains 25 countries.
  Estonia, Algeria, Ghana, Jordan, Thailand, Uruguay, Philippines, Senegal, Slovenia, Tunisia, Pakistan, Slovak Republic, Malaysia, Croatia, Nigeria, Peru, Bulgaria, Serbia, Morocco, Indonesia, South Africa, Chile, Mexico, Japan, Ukraine.

It should be noted that the group of countries with the highest rates of both political globalization and economic globalization included such countries as:

- Austria (GE = 82,86, GP = 95,96);
- Belgium (GE = 88,54000092, GP =96,27);
- Denmark (GE = 84,45999908, GP =93,77);
- Finland (GE = 82,97000122, GP =93,82);
- Hungary (GE = 82,69000244, GP =91,85);
- Netherlands (GE = 88,66000366, GP =97,33);
- Sweden (GE = 83,34999847, GP =97,26);
- Switzerland (GE = 86,79000092, GP =96,37).

Switzerland is a country in which the indicators of economic, political and general globalization are at a very high level. The index of general globalization and political globalization in Switzerland has been increasing by 0.51% on average annually since 1970, while the index of economic globalization by 0.66% (see more in Hadaś-Dyduch, 206, 2017).

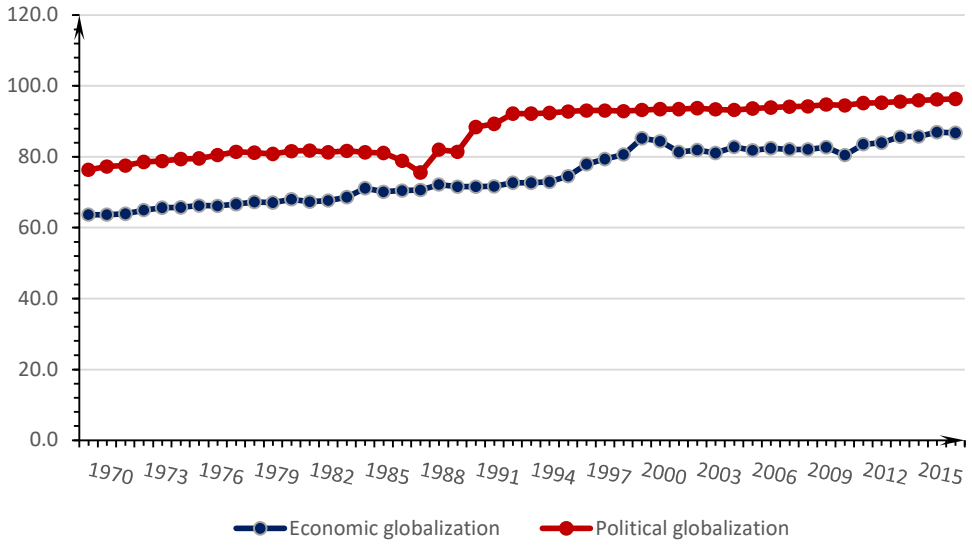

Fig. 4 : Political and economy globalisation in Switzerland.

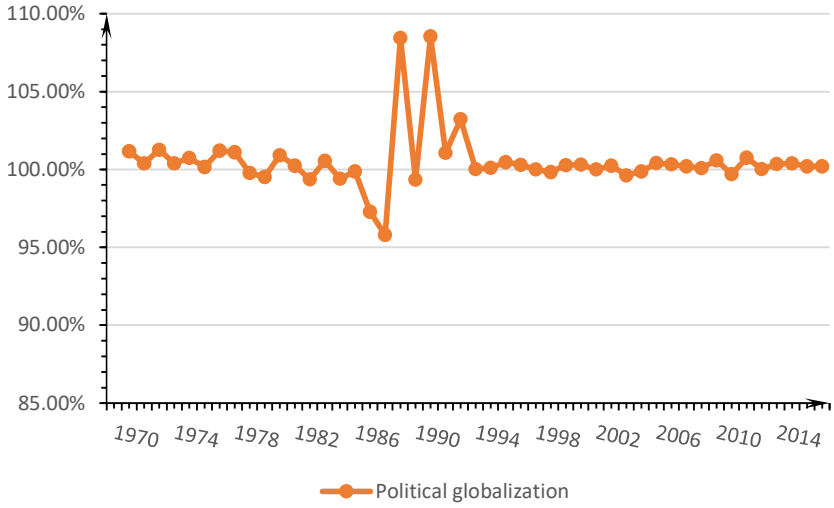

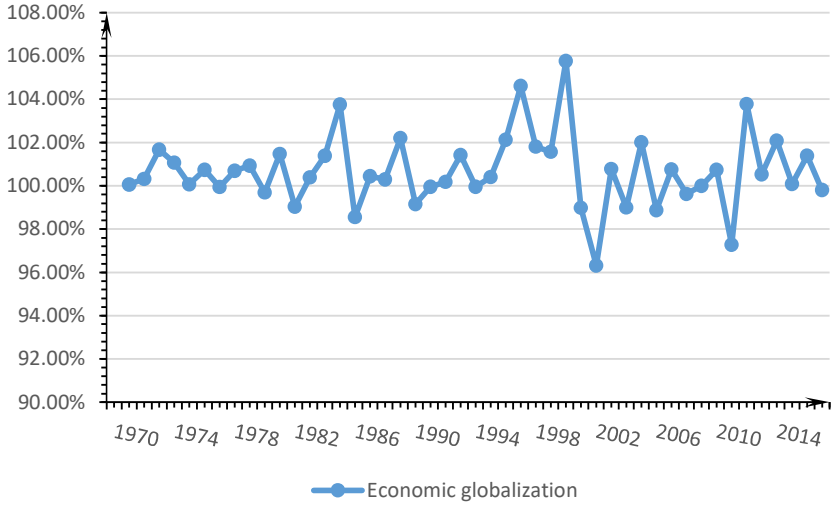

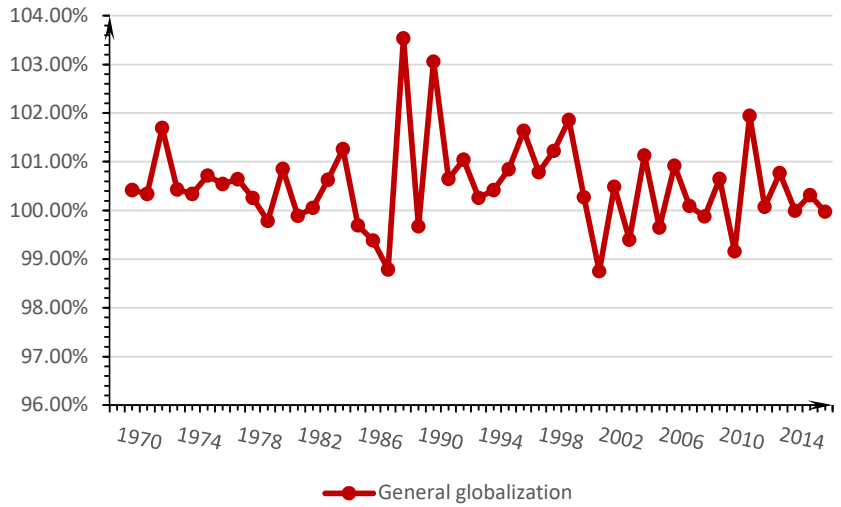

Fig. 5: The increments political and economy globalization in Switzerland compared to the previous year.

Conclusion

The globalization process is not guided by the so-called public charity, there is no place for selflessness. The tactics of action boils down to a certain exchange, transaction according to the principle of "something for something." Globalization tempts, attracts, makes alluring proposals, and in this way countries voluntarily submit to its tyranny and enslave. However, it is not without its risks and disadvantages. Threats include the creation of one local market, which is characterized by a tendency to harmonize, which may, as a consequence, threaten the national identity and cultural separateness of individual societies. Another threat to globalization is the decline in the role of national governments in favor of large corporations, lack of control over online content, etc. Globalization offers a new faith in achievement, success, progress and matter. However, it has a price.

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Five-Dimensional Approach to Complex Wellbeing Evaluation

Frantisek KONECNY

Faculty of Economics, VSB Technical University of Ostrava,
Czech Republic,
Email: KON0214@vsb.cz

Abstract

Current literature offers a large number of studies exploring the link between human resources practices and their influence on organizational outcome. Even though individual and organizational (financial) performance is commonly in the centre of managers attention, new approaches to HRM are on the rise. With a changing understanding of effective HRM, there is also a different perspective on the importance of stakeholders. Especially, implementing HRM practices that have a positive link with wellbeing of employees is a significant step in this multi-stakeholder approach. Although wellbeing is a popular keyword in literature in modern human resources management, evaluation of wellbeing usually differs. In this study, five-dimensional approach to wellbeing evaluation is identified and the results are used to find a difference between the managers and employees' perception of wellbeing in the workplace.

Keywords: Wellbeing, Social Wellbeing, Human Resources Management,

Introduction

With an increasing number of companies incorporating the stakeholder approach, we can see that releasing complex sustainability reports is the new norm for many organizations (Dhaliwal et al., 2012). As a result, specific stakeholder groups are getting more attention due to this approach. It is especially important to note the shift in the managers' approach to human resources. As many organizations nowadays claim their actions sustainable, the approach to the human resources management (HRM) is also often referred to as a sustainable HRM (Aust et al., 2020). Even though this multi-stakeholder approach may be in the centre of decision-making process of HR managers approach to the specific HRM practices may differ. Large number of HRM practices were researched extensively, such as training and development, employment security, selectivity in recruiting, high wages and incentive pay, participation and empowerment to name a few (Kalleberg a Moody, 1994; Guest, 2002; Pfeffer, 2005). Although, many studies are focused on the HRM practices and their organizational outcomes (Jiang, 2012), for example the effect of HRM practices on turnover and productivity (Husselid, 1995), service performance (Liao, 2010) or overall performance (MacDuffie, 1995, Gong et al., 2009), Currently, there is a need for research in the link between specific HRM practices and their effect on societal wellbeing, so that the practising managers could contribute to the upcoming business transformation (Beer et al., 2015).

Disclosing various, mostly qualitative metrics about employees' wellbeing, such as working conditions, work-life balance, overall health, personal and professional development and others important factors are a common part of sustainability reports, mainly due to the employer's recognition of the wellbeing policies benefits (Tehrani et al., 2007). Even though analysing the metrics, their trends and annual changes may be beneficial to the said stakeholder group, there is always a risk of presenting more flattering results of employee's satisfaction and wellbeing, especially due to the nature of sustainability reports (e.g. qualitative nature od data), thus common rhetoric may differ from reality (Keenoy, 1990). To understand difference in the perception of wellbeing from the managers and employee's perspective, five-dimensional approach to the well-being is identified and further used for a survey in the organizational environment.

Defining HRM and wellbeing

Human resources management (HRM) is often used as an "umbrella term" including a wide variety of practices common in the workplace. It is possible to define HRM as a central strategic management task, that is derived from personnel management (Keenoy, 1990). There is not a single set of practices, however, we can use a commonly accepted "two way" approach to the HRM (Boxall and Purcell, 2008; Guest, 2012). Using the common "two way"

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approach to human resource management, we can define a "soft" and a "hard" approach. (Milkman, 1997). A significant difference is in the strategic human resources management, which takes employees primarily as a unit from which it is possible to get the most out of or in the second case, when employees are seen as a key element of the organization, which needs to be developed through motivation, communication and personal development. (Pagán-Castaño, 2020). In the case of the "soft" approach, we can describe this option as "mutual benefit", this optimistic approach is based on the assumption that the application of specific human resource management practices that have a positive impact on employee wellbeing also ultimately have positive results for overall performance of the organization. On the other hand, the pessimistic variant of “hard” human resource management uses increased organizational performance by controlling employees over the achievement of individual and organizational goals (Van der Voorde et al., 2012, Dorenbosch, 2009).

Wellbeing is in literature also considered as a broad term, typically described with different models, as wellbeing could be approached from various perspectives. Theories could be divided into three categories; thus, wellbeing consists of hedonic, eudaimonic and social wellbeing (Gallagher a Lopez, 2009).

Firstly, hedonic category reflects subjective experience from person’s daily life. The effect of wellbeing is possible to describe as an experience of high level of pleasant emotions and low levels of negative emotions (Diener, 1984, Gould-Williams, 2003). Secondly, eudaimonic category of wellbeing is formed by the level of autonomy, personal growth, positive relationships, and self-acceptance. This approach makes wellbeing an outcome of person’s individual goals pursuits (Ryan et al., 2006). Lastly, social wellbeing is closely linked to an individual ability to overcome social challenges and live well in a social world (Robitschek and Keyes, 1998). According to Pagán-Castaño et al. (2020) it is also significant to distinguish several categories of wellbeing, as an HRM could have different effects (even contradictory) to selected category of wellbeing with specific practices. Furthermore, there are also recognized three main dimensions: subjective wellbeing and social wellbeing, both reflecting previous model, third dimension considers wellbeing as a physical and mental health issue, which is backed by other scholars (Ramsay et al., 2000).

In this work three basic categories of wellbeing are recognized according to the previously mentioned literature. To evaluate closely specific categories of wellbeing, there are also added two other categories, that in the result reflect five essential elements from Rath (2010). Five-dimensional model of wellbeing include career, social, financial, physical and community wellbeing. This model does not contradict commonly accepted three dimensions, some areas are expanded or divided into more practical categories. These categories reflect HR practices that are usually associated with wellbeing.

To understand how specific HR practices, influence wellbeing, we can look at various studies from HR management. Positive correlation between specific HR practices and overall wellbeing was found in a *competitive salary* (Staw a Bersade, 1993), which is reflected in the financial wellbeing section. Another example is *work-life balance*, that leads also to lower turnover and job satisfaction (McNall et al., 2010). This is also supported by Ramsay et al. (2002), with the relationship between longer work hours and more responsibilities as an important factor in workers satisfaction, and eventually wellbeing Work-life balance is included in the social wellbeing section. There is also a link between wellbeing and *performance appraisal practices*. According to scholars, performance appraisal eventually leads to wellbeing through employees’ better understanding of their needs and goals (Kooji et al., 2013). There is not explicitly a question about specific approach to performance appraisal, there are however included strength/goals/leadership perception in the career wellbeing section in this research. Aforementioned section also implicitly includes aspects of *sustainable careers*, which play an important part in the performance and wellbeing of workers (Tordera et al, 2020). Some HR practices are associated with negative link to wellbeing. Specifically, *job insecurity* could be detrimental to health and wellbeing (De Witte et al., 2015). Employees’ perception of their physical and mental health is included in the physical wellbeing part of the research. Even though community wellbeing lacks comprehensive framework or specific HR practices with proven link to wellbeing, there was some research about community wellbeing from theoretical perspective. Larson et al (2015) created a three-pillars framework, which divide community wellbeing in the social, individual and ecological parts. Although this specific framework was not used in this paper, questionnaire was constructed in a way, that the overall community wellbeing is represented by these parts.

Methodology

Data collection procedure and research sample

Research was conducted in cooperation with a specific company in Czech Republic. Data were collected through structured questionnaire from a 7-man management team and 24 employees. Questionnaire was divided into the five sections reflecting respective wellbeing categories. Questionnaire contained several identification questions,

followed by a set of questions regarding career, social, financial, physical and community wellbeing. To evaluate perception from a manager's and employees' point of view, both groups were scoring chosen statements in all categories on a classic 5-degree likert scale. Collected data were subjected to the analysis in IBM SPSS with application of Mann-Whitney U test. Mann-Whitney U test is a basic statistical nonparametric test, useful with ordinal data and two observations from groups, that are independent of each other. Both conditions were met in this research. Null hypothesis is set as H_0 = distributions of both groups is equal (in this case managers and employees) and alternative hypothesis H_1= distributions are not equal (again groups of managers and employees). Threshold for statistical significance is traditional p-value of 0,5. Several questions did not meet requirements of the test and are not included in the outcomes. This concerns questions with free text answer, which were not used for this part of the research.

Outcomes

To closely analyse a link between managers' and employees' perception of wellbeing in the workplace, this survey covered several aspects of wellbeing. Firstly, career wellbeing (in the Figure 1) consists of questions focusing on daily work life, sense of purpose in work, fulfilment, and work satisfaction. Secondly, social wellbeing (Figure 2) is considered with various equations regarding mostly employees' work/life balance and personal and professional relationships. Financial wellbeing (Figure 3) is reserved for questions regarding employees' financial standard of living. Physical wellbeing (Figure 4) figure answers mostly problems to health issues of responding employees. Lastly, community wellbeing (Figure 5) contains questions about belonging and involvement in the communities and areas, where questioned people live in.

Figures below offers a closer look at the specific questions asked, as well as a median of the answers. Statements were evaluated on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree). To statistically confirm significant difference, answers were subjected to statistical Mann-Whitney U test and the P-values of the collected answers are also in the table.

Figure 1 : Career wellbeing

Evaluated statement*	***Median***		***P-value***
	Manager	***Employee***	
Your employees/You are encouraged to use their strength every day.	4	4	,370
Your employees/You have available all the resources the need for their job.	4	3	,651
Your employees/You feel strong leadership presence.	3	3	,498
Your employees/You have an opportunity to learn something new every day.	2	3	,063
Your employees/You are comfortable in their/your everyday life, they/you rarely take things for granted.	4	3	,026**
Your employees/Your everyday work is purposeful.	4	3,5	,092
In the last 12 months, employees'/your work experience was satisfying	3	3	,240
In the last 12 months, employees/you were getting closer to their/your goals	3	3	,116
In the last 30 days, your employees/You have managed to do many things better than ever before.	3	3	,370

**Statements were evaluated on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree)*
*** P-value < 0,05*

The results in the Figure 1 indicate agreement on most of the aspects of career wellbeing. Medians for 4 questions in this area are the same value, which shows, that managers are very well informed about employees' strengths, their goals and overall work satisfactions. There was only one case of statistical difference of career wellbeing perception (p-value<0,026) and that was the question about employees' comfort in everyday life, where managers' median of answers resulted in 4 and employees' median with value 3.

Figure 2: Social wellbeing

*Evaluated statement**	*Median*		*P-value*
	Manager	*Employee*	
Your employees/You will always make time for regular trips or vacations with friends and families.	4	3	,041**
Your employees/You have groups (social, work), where they/you belong, where they/you are accepted.	4	4	,725
The relationships in the lives of Your employees/Yours are as strong as they can be.	4	4	,198
There is someone in the life of Your employees/Yours who supports their/your development.	3	4	,104
There is someone in the life of Your employees/Your who always motivates them to be healthy.	3	4	,031**
Every day, my employees are/I am treated with respect.	4	3	,263
Your employees'/Your relationships with their/your wives, partners or closest friends are stronger than ever.	4	3	,006**
Your employees'/Your personal relationships give them/you positive energy for every day.	3	3	,179

**Statements were evaluated on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree)*
*** P-value < 0,05*

Social wellbeing (in the Figure 2) is a complex area, as many factors influence wellbeing. These factors could be personal relationships, sense of belonging, respect, and other aspects, used in the survey. Managers and employees disagreed on several occasions. Statistically significant difference was found in a very first case, where managers mostly agreed, that employees' have sufficient time for regular family vacations with median value 4, whereas employees median was only at the value 3, resulted p-value was found to be less than 0,05. Managers also overvalued personal relationships of employees, which resulted in two answers with statistically significant difference in answers (p values 0,31 and 0,06).

Figure 3: Financial wellbeing

*Evaluated statement**	*Median*		*P-value*
	Manager	*Employee*	
Your employees/You have more than enough money to do what they/you want.	3	2	,001**
Compared to the people Your employees/You spend time with, they/you are happy with their standard of living.	4	4	,978
Your employees/You have created a financial reserve that could maintain their/your lifestyle if they leave today	4	3	,001**
I believe that in the future My employees/I will have enough money.	4	3	,000**
Your employees'/Your money are well managed.	3	1,5	,001**
In the last week, your employees/You have been worried about money.	3	3	,893

**Statements were evaluated on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree)*
*** P-value < 0,05*

In Figure 3 it is possible to see results of the financial wellbeing answers. Results in the financial wellbeing are the most varied, as the managers responses scored higher than employees, thus disagreement between two groups was found in several responses. Employees mostly did not agree with managers on their reward satisfaction for present and future, especially considering any financial reserves. 4 questions out of 6 in financial wellbeing were significantly different (p-value less than 0,05). This confirms that financial aspect of employee's job is perceived very differently from the managers point of view.

Figure 4: Physical wellbeing

*Evaluated statement**	*Median*		*P-value*
	Manager	*Employee*	
Your employees'/Your physical health is almost perfect.	4	3	,048**
Your employees/You are always satisfied with their/your physical appearance.	3	3	,116
Your employees/You often feel sad or depressed.	2	3	,009**
The doctor would say that Your employees/You do the best for their health.	3	3	,314
Your employees/You have too much stress in their lives.	3	4	,026**
Most days, your employees/You experience a lot of pain (mental or physical, or both).	3	2	,002**
Your employees/You exercise regularly to improve their/your health.	3	3	,685
Your employees/You eat a very healthy diet.	5	3	,022**
In the last week, your employees/You have had a lot of energy every day.	4	3	,263

*Statements were evaluated on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree)
** P-value < 0,05

Figure 4 contains results from the survey, specifically results from physical wellbeing section of the questionnaire. Answers median differs in most of the questions in this part. Employees evaluated their physical, mental health and their diet with lower numbers than their managers. Significant difference was found in five cases, which can show, that the perception of physical/mental wellbeing is very different in both groups.

Figure 5 Community wellbeing

Evaluated statement	*Median*		*P-value*
	Manager	*Employee*	
Your employees/You cannot imagine living in a better community or area than the one in which they/you live today.	3	3	,570
The communities or areas where Your employees/You live are the perfect places for them/you.	3	3	,607
The houses or apartments in which Your employees/You live are ideal for them/you and their/your families.	4	4	,431
Your employees/You consider the water and air in the area where your live to be safe.	4	3,5	,533
Your employees/You are proud of their/your community (or the areas where I live).	3	3	,607
In the community (or area where Your employees/You live), they/you always feel safe.	4	3,5	,081
In the last twelve months, your employees/You have received recognition for helping their/your community (the areas where they/you live).	3	3	,685

**Statements were evaluated on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree)*
*** P-value < 0,05*

Lastly, we can find community wellbeing results in the Figure 5. From the obtained results, it is possible to state, that no significant difference was found in the perception of community wellbeing from both groups. Employees consider their community and areas where they live as an ideal, safe, and optimal places, where they belong. Median from the answers of managers does not differ in most answers.

Conclusion

To conclude overall wellbeing level from different perspectives, several areas of wellbeing were explored. Career, social, physical, financial and community wellbeing served as a framework for finding answers in specific sections of workers wellbeing. However, the main goal was to find, whether there is a significant difference in the wellbeing perception from the managers' and employees' side. As important as a high level of wellbeing is, reported data about workers wellbeing are subjected to overvaluation by the organization (managers), considering subjective and qualitative information. For exact evaluation in all five categories, managers and employees evaluated given statements on a 5-point Likert scale (1 – Strongly disagree, 2 – disagree, 3- Neither agree nor disagree 4 – Agree, 5 – Strongly agree). Median of the managers and employees answers as well as p-value from the Mann-Whitney U test were used to find a statistical difference in the answers.

Firstly, career wellbeing was analysed, where only 2 of the 8 statements were significantly different in the chosen categories. Furthermore, more than half of the statements in this section resulted in the same median, thus career wellbeing is perceived very similarly (or insignificantly differently) by managers and employees. Social wellbeing proved three statements to be statistically different (p-value<0,05). It is important to note, that the differences were in the statements involving work-life balance (time for after work activities) and personal relationships. Medians for managers in these answers were one point higher than from the employees' answers. Biggest gap in the perception of wellbeing was found in the financial section of wellbeing. From 6 statements, only 2 were perceived in the same way, which is possible to see with the same median of the answers score. Another four answers were significantly different. Thus, financially related statements were very different, and managers overvalued their employee's perception. Physical wellbeing, consisting of mostly health related statements. Employees used lower scores on the scale than managers in statements about their diet, mental and physical discomfort, and overall physical health. Statistical difference was found in 4 of the 9 questions asked. Lastly, community wellbeing was evaluated. In this area, no significant difference in perception was found. This could be due to the fact, that managers are well informed about their employee's areas of living.

Given the structure of the research and the chosen method, it is also necessary to mention certain limitations arising from this article. For a deeper understanding of the relationship between the perception of wellbeing according to its dimensions, it would be appropriate to engage in research with a larger sample of respondents, beneficial would also be cross-industry comparison, or comparison with international focus (e.g. with other regions, other countries). Interesting overview of organizational health, concerning wellbeing offers Cotton and Hart (2003) with focus on organizational outcomes (performance). Furthermore, Hungerford and Cleary (2020) offer deeper understanding of trust in the workplace. This could be also a significant factor in management and employees' different perspective on their wellbeing, however, further research is needed in this area. Lastly, Böckerman et al. (2012) conclude that higher involvement of management is usually positively associated with several aspects of employee wellbeing. This is vital with connection to our research, as managers who are not involved with their employees might not only consider their employees' wellbeing different (higher) but could have direct negative influence on their employees' wellbeing.

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The Use of Phytobiotics In Aquaculture and In Fish Processing Industry: An Overview

Alina MOGODAN*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; alina.antache@ugal.ro

Stefan M. PETREA*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; stefan.petrea@ugal.ro; petreastefanmihai@yahoo.com

Ira A. SIMIONOV
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania and Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; ira.simionov@gmail.com

Aurelia NICA
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; aurelia.nica@ugal.ro

Dragos S. CRISTEA
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration 800008, Galaţi, Romania, dragoscristea@yahoo.com

Victor CRISTEA
"Dunărea de Jos" University of Galaţi, Transboarding Faculty and Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; victor.cristea@ugal.ro

Abstract

Fish can be called as an indispensable animal-source of food in human diet, due to the content of essential nutrients, in fish meat, with high bioavailability that are found in limited quantities in the diet. So, the present study aims to characterize the recent state of the art related to the use of phytobiotics in aquaculture and in fish processing industry. This aim targets to draw future research directions in the area of phytobiotics use for improving the profitability of fish-based sectors (fish production and processing). The effects of phytobiotic administration in fish diet during the period of preservation of fish meat freshness, from the moment of its slaughter, throughout the processing cycle, is a promising research direction. It can be also concluded that the idea of using phytobiotics in aquaculture, having the effect of preserving the freshness of fish meat for a longer period of time, is still an innovative scientific element, fully applicable to industrial fish production.

Keywords: Aquaculture, Phytobiotics, Fish Processing.

Background, Purpose and Value of Present Research

Fish and shellfish have been widely accepted as a good source of animal protein and other elements for the maintenance of body healthy. Fish can be called as an indispensable animal-source of food in human diet, due to the content of essential nutrients, in fish meat, with high bioavailability that are found in limited quantities in the diet. These nutrients consist in proteins, essential fats, vitamins and minerals.

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In recent years, in order to meet the growing demand for fish for human consumption, the activities have been undertaken to ensure the continuous development of aquaculture worldwide, thus improving the productive performance of aquaculture production systems, while diversifying fish species, bred in a controlled regime. A key part in the activities undertaken in the aquaculture industry is to maximize the production of fish within a relatively short time, which is designed mainly due to the feed administration for fish biomass, such as pelleted feeds, with an appropriate nutritional formula separately for each fish species.

As a result, it becomes necessary to incorporate in fish feed some natural substances with stimulating effect in order to improve the feed conversion efficiency of the food administered to the fish biomass, respectively for optimizing the growth performance indicators and also to improving the immunity. Phytobiotics are represented by a wide range of medicinal plants, aromatic plants from which some component parts can be used, namely seeds, flowers, leaves, stem or root in powder form, or extracts of them can be used, made with the help of solvents organic, containing bioactive compounds.

Therefore, the present study aims to characterize the recent state of the art related to the use of phytobiotics in aquaculture and in fish processing industry. This aim targets to draw future research directions in the area of phytobiotics use for improving the profitability of fish-based sectors (fish production and processing).

The novelty of this study is related to its wide-range analysis which includes both the advantages of using pytobiotics throughout the entire fish traceability chain, from the production sector, to processing sector, with possible future impact on selling and storing conditions, before reaching to the final consumer.

Study Retrieval and Selection Methodology

The information presented in this present research were collected from the scientific literature. Strategies for scientific study retrieval and selection were performed according to a specific methodology (Simionov et al., 2019), targeting therefore to obtain as many as possible information related to phytobiotics research and applications in fish-based industry, while considering especially the studies published in significant key journals, with high visibility and that were not commonly used in other overviews related to present research subject. As limiting factors in the process of scientific paper selection, it can be considered that the extent of searching is determined by the research question and resources available to the research team.

Findings of Present Research

The present paper findings section is structured based on three main advantages identified, after the scientific literature was studied, applicable both for aquaculture (improving fish immunity and contributing to better fish growth performance) and, future more, for fish processing industry.

Improving Immunity

In recirculating aquaculture systems, the requirement to monitor the health of biological material is determined by the intensity degree of the technological process, and the extent to which this may be achieved, in relation with the technical complexity of the system. These production systems usually involve the practice of high stocking densities and the reuse of a percentage, as high as possible, of technological water, aspects that can be considered as the main risk factors for the diseases occurrence.

Because the aquaculture closed systems involve high capital and operating expenses, much more rigorous disease control is needed, compared to open production systems. The most serious diseases that can affect the biomass culture in a closed system are caused by microorganisms (viruses, bacteria, fungi, unicellular organisms) (Cristea et al., 2002). Thus, in order to increase the immunity of the biological material, the administration of some natural substances, with immunostimulatory role, in fish feed, can be a solution.

Whereas the phytobiotics have a lot of immunostimulatory properties, they become extremely used in aquaculture, especially in recirculating aquaculture systems, as they play an important role in diseases prevention, but also in the treatment of certain diseases which can cause the loss of biological material, in a significant percentage. It is well known that once the disease has occurred at the level of a breeding unit, there is a danger that the entire production of fish will be compromised if appropriate measures are not taken to eradicate the pathogens. The

immunostimulatory properties of phytobiotics, which lead to increased resistance to disease by improving non-specific and specific defence mechanisms of the body, respectively the native and adaptive immune system, are mainly due to the bioactive compounds which they contain. On the other hand, bioactive compounds from plants are able to inhibit the generation of reactive oxygen species (ROS) and the formation of the free radicals, which leads to a reduction in oxidative stress in the fish organism. At the same time, it can be appreciated that phytobiotics are a potential source of replacement for allopathic pharmaceuticals, especially antibiotics, which can create dependence and even resistance to certain types of diseases encountered in aquaculture. In contrast to antibiotics, they are biodegradable and their impact on the aquatic environment is minimized (Antache et al., 2014a).

Research has shown that certain phytobiotics such as: *Allium sativum* (Shalaby et al., 2006), *Allium cepa* (Akrami et al., 2015), *Zingiber officinale* (Nya and Austin, 2009), *Camellia sinensis* (Ebrahimi et al., 2017), *Trigonella foenum-graecum* (Bahi et al., 2017), *Mentha piperita* (Adel et al., 2016), *Aloe vera* (Sharif Rohani et al., 2017), *Rosa canina* (Dadras et al., 2016), *Lycium barbarum* (Mo et al., 2016), *Ocimum basilicum* (Mohamad and Abasali, 2010), *Rosmarinus officinalis* (Antache et al., 2014a), *Thymus vulgaris* (Antache et al., 2014b), *Hippophae rhamnoides* (Csep et al., 2010b; Antache et al., 2014a), may improve the immune system of fish (*Oreochomis niloticus*, *Oncorhynchus mykiss*, *Labeo rohita*, *Sparus aurata*, *Paralichthys olivaceus*, *Huso huso*, *Acipenser baeri*, *Acipenser ruthenus*, *Cyprinus carpio*, etc.) by enhancing respiratory activity, phagocytic activity, bacterial activity which leads to increase the lysozyme, myeloperoxidase, immunoglobulins, cytokines. At the same time, after a specific period of phytobiotic administration, there was observed an increase in the resistance of fish to *Aeromonas hydrophyla* (Park and Choi, 2012), a widespread bacterium in aquaculture, as well as other bacteria (*Yersinia ruckeri*, *Vibrio vulnificus*, etc.).

Lee (2013) reported an improvement in the nonspecific immune response (increased respiratory activity, phagocytic activity, lysozyme and myeloperoxidase) in *P. olivaceus* in terms of dietary supplementation with a brown seaweed (*Eklonia cava*), most likely due to very high levels of antioxidants and polyphenols in this algae. At the same time, Park and Choi (2012) registered an increase in respiratory activity at Nile tilapia, phagocytic activity, lysozyme and alternative complement under the conditions of dietary administration of the phytobiotic Viscum album coloratum for 80 days. After this period, the fish were tested for *Aeromonas hydrophila* and in the case of fish in which the diet has been supplemented with phytobiotic was observed a higher survival rate with 42% than the control group.

Improving Growth Performance

Following the use of phytobiotics in aquaculture, there was observed an increase in appetite, stimulation of bile secretions and enzymatic activity. These properties are due to bioactive compounds, namely: polyphenols, flavonoids, alkaloids, polysaccharides and proteoglycans which play a major role in the prevention and control of microbial infections (Antache, 2014c). The table 1 presents main phytobiotics used in aquaculture as growth promoters.

Table 1: Phytobiotics used as growth promoters in aquaculture.

Order	Family	Species	Part used	Fish species used	References
Apiales	Araliaceae	*Panax quinquefolium*	Whole plant	*Oreochromis niloticus*	*Abdel-Tawwab, 2012*
Asparagales	Amaryllidaceae	*Allium sativum*	Whole plant	*Lates calcarifer*	*Militz et al., 2013;*
Asterales	Asteraceae	*Artemisia cina*	Whole plant	*Clarias gariepinus*	*Abdelhadi et al., 2010*
Ericales	Theaceae	*Camellia sinensis*	Not available	*Oncorhynchus mykiss*	*Sheikhzadeh et al., 2011*
Fabales	Fabaceae	*Trifolium pratense*	Seeds	*Oreochromis aureus*	*Syahidah et al., 2015*
Lamiales	Lamiaceae	*Ocimum basilicum*	Whole plant	*Oreochromis niloticus*	*Syahidah et al., 2015*
Lamiales	Lamiaceae	*Thymus vulgaris*	Leaves	*Acipenser stellatus*	*Dorojan et al., 2014*
Malpighial	Phyllanthac	*Sauropus*	Not	*Epinephelus*	*Putra et al.,*

es	eae	*androgynus*	available	*coioides*	*2013*
Poales	Poaceae	*Cynodon dactylon*	Not available	*Catla catla*	*Kaleeswaran et al., 2011*
Rosales	Rosaceae	*Crataegi fructus*	Not available	*Pagrus major*	*Takaoka et al., 2011*
Rosales	Elaeagnaceae	*Hippophae rhamnoides*	Fruits	*Acipenser stellatus*	*Dorojan et al., 2014*
Sapindales	Anacardiaceae	*Cotinus coggyria*	Not available	*Oncorhynchus mykiss*	*Bilen et al., 2011*
Solanales	Solanaceae	*Withania somnifera*	Not available	*Labeo rohita*	*Sharma et al., 2010*

Some researchers, following the administration of phytobiotics in fish feed, have noticed an improvement in technological growth indicators, which was determined by the stimulation of appetite, which led to higher food consumption, followed by an efficient use of it in the body and the stimulation of digestive secretions.

It was found that the replacement of corn meal with black-eyed bean powder (*Vigna unguiculata*), in a percentage of 50% to 100%, led to a higher growth performance in the species *Clarias gariepinus* (Falaye et al., 2012). Also, a significant increase in growth rate and in specific growth rate were obtained at *Huso huso* species in the case of garlic administration in fish feed (Gholipour et al., 2014).

Sweet potato peel extract (*Ipomoea batatas*) administered in a concentration of 15% in fish food led to improved growth performance and better food utilization efficiency in Nile tilapia. The desideratum of the research consists in the fact that the extract from the sweet potato peel can be incorporated in the feed of the Nile tilapia in order to reduce the cost associated with fish production (Omoregie et al., 2009).

A series of studies were made on some phytobiotics such as fenugreek, neem, thyme, sea buckthorn, rosemary, ginger, white onion, black pepper, hot red pepper, basil and Goji berries administrated in Nile tilapia (*Oreochromis niloticus*) diets, while in the case of different sturgeon species, the phytobiotics used included sea buckthorn, thyme and the mix between sea buckthorn and thyme, for testing the synergistic effect (Antache, 2014c). Researches were carried out over a longer period of time, in the order of months, and the results led to an improvement in the technological performance of biomass culture and the fish welfare, especially in the case of sea buckthorn, thyme, ginger, hot red pepper and the mix between sea buckthorn and thyme administration in fish feed (Antache, 2014c).

In terms of welfare status, the authors (Antache, 2014c) identified that almost all variants of phytobiotics lead to a better results of hematological and biochemical indices of the blood, leukocyte reaction, lysozyme - that plays a special role in the body's immune system, cortisol, as well as reducing oxidative stress. Administration of sea buckthorn, thyme, hot red pepper and onion led to a reduction in lipid peroxidation and an increase in total antioxidant capacity in muscle tissue and blood plasma, which resulted in an oxidative stress reduction (Antache, 2014c).

The effect of phytobiotics on fish products and their use as natural additives in fish diet

Phytobiotics generate a wide range of effects such as the antioxidant, antimicrobial, analgesic, antiparasitic, anticoccidial, hepatoprotective and growth stimulating effects.

The antioxidants found in plants, sometimes even in low concentrations, have the role of inhibiting the oxidation process of lipids, which is a real use in order to preserve the freshness of the meat. In medicinal, aromatics plants and fruits, antioxidants are mainly represented by polyphenols and flavonoids, which play a significant role in eradicating free radicals that lead to oxidative stress.

It has been found that the use of natural preservatives leads to increased shelf life of fish, due to the antioxidant and antimicrobial properties of phytobiotics. This is a promising step in improving fish processing technology.

At the same time, consumers of meat products prefer that they contain natural antioxidants in the detriment of synthetic antioxidants, both in order to maintain freshness by reducing lipid peroxidation, and also for more flavour. This view is supported by both researchers and processors.

By comparing the antioxidants extracted from various phytobiotics (especially herbs) used during the meat processing flow, it was mainly observed that the addition of rosemary, thyme, oregano, as well as other spices, led to the inhibition of lipid peroxidation with 60% (Tanabe et al., 2002).

For example, rosemary extract showed a superior antioxidant activity, because it has been shown to reduce the process of lipid oxidation in anchovies stored at 4°C for 28 days (Turhan et al., 2009). At the same time, rosemary extract in 0.4% concentration and 0.8%, respectively, has been shown to be more effective in reduction of bacterial growth and led to obtaining a satisfactory biochemical indicators in the case of Atlantic mackerel burgers, packaged in vacuum and refrigerated (Ucak et al., 2011). In 2014, Gao et al. showed the appearance of the synergistic effect of rosemary extract in combination with nisin (peptide produced by the probiotic *Lactococcus lactis*), in the case of pompano fillet (*Trachinotus ovatus*), during storage at 4°C, by inhibiting protein breakdown, lipid peroxidation, nucleotide destruction and microbial development. The extract of turmeric (*Curcuma longa*) and onion (*Allium cepa*), in 1.5% concentration for each phytobiotic, proved to have an excellent antibacterial property, for a period of 20 days, on rainbow trout (*Oncorhynchus mykiss*) vacuumed and refrigerated (Pezeshk et al., 2011). Selmi and Sadok (2008) observed that the application of thyme (*Thymus vulgaris*), in 0.1% concentration, on tuna meat (*Thunnus thynnus*), which was vacuumed and then stored at 0°C, minimized the lipid peroxidation, proven by a low concentration of malondialdehyde (MDA) and a high concentration of polyunsaturated fatty acids (PUFA), compared to the control variant (tuna meat that was not sprayed with thyme).

On the other hand, fruits, especially berries or those with a darker color, contain a higher concentration of antioxidants, anthocyanins and ascorbic acid, with a role in reducing lipid peroxidation. For example, polyphenols extracted from grapes prevent the oxidation of lipids in the muscles of fish meat. Other researchers have used an extract of orange peel and pomegranate peel in combination with nanoparticles of chitosan in order to prolong the shelf life of silver carp fillets (H. molitrix). However, the mix between pomegranate peel extract and chitosan nanoparticles has been shown to be more effective in delaying of the lipid peroxidation process (Zaeri et al., 2015). Also, it was observed that the silver carp fillets treated with a clove extract and a grape seed extract, inhibit the lipid peroxidation and protein destruction during the refrigeration (Shi et al., 2014). In 2015, Viji et al. presented the positive effect of mint and citrus extracts on slowing down the biochemical and microbiological changes in the case of the Indian mackerel which was been refrigerated.

In recent years, a specific technology was been applied to preserve the freshness of fish meat by introducing plant extracts into the ice layer, which has led to inhibition of microbial development and slowing of lipid peroxidation process of fresh fish meat (Viji and colab., 2017). Also, the addition to ice glaze of an aqueous extract of thyme (*Thymus serpyllum*) extended the storage time of some cyprinids (*Capoeta capoeta*), from 15 to 20 days (Oral et al., 2008).

The use of extract of rosemary (*Rosmarinus officinalis*) in 1% concentration in the ice glaze has contributed to the improvement of chemical and sensorial parameters and extends with 3 days the storage time of sardines, compared to the traditional ice storage methods (Ozyurt et al., 2012). This new strategy has proved to be quite useful for improving the quality of fish meat stored on board fishing vessels for long periods of time during fishing operations.

Another source of natural antioxidants is represented by medicinal plants, due to the catechins found in the leaves. For example, catechins extracted from green tea have as affect the reducing the lipids oxidation at the level of fish meat (Tang et al., 2001). At the same time, it has been shown that the use of green tea powder has slowed down the reduction of lipid oxidation in the case of frozen mackerel (Alghazeer et al., 2008).

The application of plant extracts or a mixture of plant extracts has been shown to extend the validity of foods, including fish and fish products. With their application, there was highlighted a delay in the appearance of lipid oxidation, an inhibition in microbial development and an improvement in textural properties. There are also a number of researches which showing the protective effect against the destruction of proteins and the inhibition of enzymes, where the use of plant extracts in the technology of fish preservation and fish meat.

The results presented above confirm the potential of plant extracts to replace synthetic additives in order to prevent oxidation and deterioration of food quality, especially fish and fish products. Therefore, plant extracts extend the scope of multifunctional natural food ingredients, which serve many useful activities in the fish processing sector.

However, recent research has also shown the importance of phytobiotics administering, in various forms, in the diet of fish cultured in recirculating aquaculture systems, due to immunostimulatory properties, as well as the ability to increase productivity, by improving technological indicators of growth performance, associated with biological material.

Research Limitations and Recommendations for Future Studies

Similar to most studies, the design of the current study is subject to limitations. Thus, this overview does not consider the economic impact of using phytobiotics both on aquaculture and fish processing industry. Therefore, it is recommended for future studies related to this research area to associate the technological performance of using phytobiotics with a cost-effectiveness analysis since both aquaculture and fish processing economic activities targets the profit maximization. Also, solutions for integrating fish with plant biomass production within multi-trophic systems can be considered in order to close the production loop and to improve the economic sustainability of aquaculture.

Conclusions

The effects of phytobiotic administration in fish diet during the period of preservation of fish meat freshness, from the moment of its slaughter, throughout the processing cycle, is a promising research direction. It can be also concluded that the idea of using phytobiotics in aquaculture, having the effect of preserving the freshness of fish meat for a longer period of time, is still an innovative scientific element, fully applicable to industrial fish production, that recommends future investigations.

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Overlaps Between the Family and The Business: Key Insights and Challenges of Family Entrepreneurship in Portugal

Ana Paula MARQUES
University of Minho: Institute of Social Sciences (UMinho), Communication and Society Research Centre [Centro de Estudos de Comunicação e Sociedade (CECS)], Braga, Portugal, amarques@ics.uminho.pt

Ana Isabel COUTO
School of Economics and Management of the University of Porto (FEP), Institute of Sociology of the University of Porto (IS-UP) [Instituto de Sociologia da Universidade do Porto], Centre for Organisational and Social Studies of P.Porto (CEOS.PP/ISCAP/P.PORTO) [Centro de Estudos Organizacionais e Sociais do P. Porto], Porto, Portugal, aicouto@fep.up.pt; anacouto@iscap.ipp.pt

Abstract

Family-oriented companies are a predominant type of company in the context of the Portuguese private business fabric. At the heart of this business typology, two structural aspects of the life of individuals coexist: work (company) and family, with multiple challenges experienced by those who create, manage and coordinate them: their entrepreneurs. Recent studies reveal that 50% of family businesses do not reach the second generation and only 20% reach the third generation (AEP, 2011). Business succession planning represents one of the main management challenges experienced in this segment of companies. This communication presents a reflection on family entrepreneurship in Portugal, offering a portrait of the family businesses in the North Region of Portugal and focusing on main management challenges, such as business succession and management professionalization. For this purpose, the main results from the research project "Roadmap for Portuguese family businesses" (2016-2018), financed by NORTE 2020 / FEDER will be presented. The aims of this project were to contribute to a better knowledge and institutional visibility of this segment of companies, as well as to assess the impact of companies Northern Region in the local, national and international economy. The data presented is the result of an eclectic methodological design that has combined a quantitative-extensive approach, based on the construction of a database with all family companies formally registered in the North of Portugal and posteriorly the application of an online survey (LimeSurvey platform) to the family entities collected in previous step, in order to better characterise the profiles of family companies, and also a qualitative-intensive approach based on the conduction of a set of 23 in-depth interviews to family managers/ owners, bearing in mind the diversity of this business typology, namely in terms of basic variables such as the sector of activity, size, year of foundation, founder's gender.

Keywords : Portugal, Family Entrepreneurship, Management Challenges, Entrepreneurs.

Introduction

Holding a long-term entrepreneurial vision, entrepreneurs /owners of family businesses make a significant contribution to the GDP and employment, to innovation and the development of local communities. In fact, family businesses (FB) constitute the prevailing corporate form[1], their success and long stability being fundamental both to the economy and to society. Actually, it is estimated that their weight in the national economy (between 70% and 80% of the Small and Medium Enterprises), also including the large quoted companies) positions them in a place of honour as agents in the creation of wealth, employment and territorial and social cohesion. Nevertheless, a significant unawareness of the business configurations of family businesses still persists, although it is consensual to recognise its internal heterogeneity (in terms of dimension, industry sector, seniority, degree of professionalisation, etc.). Similarly, family businesses maintain an emotional bond with the place where they were born, the place where their activity originated, and they tend to contribute to local development, not only directly by creating new job posts, but also through the creation of initiatives dedicated to regional promotion. Due to the influence of their founders' values, the importance of family reputation and concern in maintaining family leadership, family businesses, equally, tend to evince a greater predisposition to social responsibility which is translated in a sense of duty the family has to serve society.

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Furthering the knowledge on family businesses appears to be more relevant in the current framework of growing internationalisation of the Portuguese economy and impacts of Revolution 4.0 [Revolução 4.0], particularly digital economy and the dematerialisation of the productive processes. It is mainly specific challenges that are geared towards topics such as: the least attention regarding strategic planning matters; succession and transmission of the founder's legacy, maintaining the entrepreneurial "spirit"; the challenge of professionalisation of the business, maintaining the balance between family, property and business; the difficulties in engaging and maintaining qualified workforce (talent)/ professionalisation of careers. Simultaneously with these challenges, we should equally mention the relative *invisibility* of this corporate typology highlighted in recent literature (Marques, 2018a, Marques, 2018b), either in setting the definition of a family business and resulting operationalisation for the purpose of producing official statistics, (EU, 2009), or in the least attention of the political decision-makers given to the specificities of the family businesses and their social and economic contribution[2]. For all intents and purposes, it is assumed that a family business is that whose control is held by the family, in terms of appointing the management, and it is where some of its members participate and work[3].

In view of the extent and complexity of this topic, the current paper is based on the main results of the research project "Roadmap for Portuguese family businesses" (2016-2018), financed by NORTE 2020 / FEDER – and presents the following structure: firstly, a review of literature will be undertaken, focusing on the key challenges faced by this specific typology of enterprises, with particular emphasis on the challenge related to the importance of business succession planning; secondly, we will describe the methodological design of the research that supports the current paper; thirdly, the section dedicated to the presentation and discussion of outcomes, the adopted alignment will focus on three fundamental topics: 1) brief radiography of the family businesses; 2) key insights and challenges of family entrepreneurship in Portugal: professionalisation and preparation of succession of the family businesses; 3) overlaps between the family and the business - owners' view. The data presented is the result of an eclectic methodological design that has combined a quantitative-extensive approach, based on the construction of a database with all family companies formally registered in the North of Portugal and posteriorly the application of an online survey to the family entities collected in previous step, in order to better characterise the profiles of family companies, and also a qualitative-intensive approach based on the conduction of a set of 23 in-depth interviews to family managers/ owners, bearing in mind the diversity of this business typology, namely in terms of basic variables such as the sector of activity, size, year of foundation, founder's gender.

Literature Review

The entrepreneurial dimension, the risk and daring of the founder at the start and maintenance of the family business, as well as the importance of succession of the family business have been highlighted in the existing literature in the last decades. Several authors focused their analyses on the process of intergenerational succession management, treating it as one of the most challenging and simultaneously most critical stages in the life of a family business (Costa e Rio, 2011; AEP, 2011; Zahar, 2005; Chrisman et al., 2005; Miller, Steier e Le Breton-Miller, 2003). Also according to the European Family Business Barometer (KPMG, 2017), in the next five years we will witness one of the greatest intergenerational power and wealth transfers in this type of companies on a European scale, exposing the family businesses to the challenges of digital economy (KMG, 2017; UE, 2009).

Such transfer of businesses will take place in contexts of greater global competitiveness and in the framework of an accelerated transformation of the processes, products/services towards digital economy. The advances in automation and robotics, the internet of "things" and virtual reality, artificial intelligence and *big data*, among other manifestations, represent a huge challenge for the economy, due to its acceleration, complexity and unpredictability. For Schwab (2018), nothing and nobody will be completely immune to the changes of the increasingly shorter life cycles of constant innovation in the processes and products. The implications for the business organisation, work and the profile of qualifications and skills are countless, making the "digital" become a mobilising resource in the competitive dynamics.

Existing literature emphasises the urgency in the preparation and qualification of the successor (Costa, 2017; Costa e Rio, 2011; Lansberg, 1999; Gersick et al. 1997; Morris, Williams, Nel, 1996; Seymour, 1993) and in the professionalisation of the family businesses by hiring non-family managers and qualifying human resources. Nonetheless, the least preparation or lack of preparation of the successor remains a common feature to the majority of the family businesses, being residual the number of those that prepare for the transfer of leadership/ownership of the business. In turn, while it is the founders' strategic vision, resilience and the capacity to take risks that best characterise the entrepreneurial "spirit", the inability to disconnect from the family business constitutes one of the biggest obstacles to succession (Marques, 2018a; Jayantilal, 2016; Gallo, 1995; Sharma, Chrisman, Pablo, Chua, 2001). In effect, in many situations, succession is not explained as a strategic medium and long-term decision; it is

indefinitely postponed and devalued due to the strong connection between the founder and the business (Bachkaniwala, Wright, Ram, 2001), as well as the resistance to the arrival of non-family members to the company's management/structures of governance. Furthermore, many founders confuse the company's management and control, fearing the non-continuity of the business due to the fact that the executive power is in the hands of non-family professionals.

It is also crucial to understand that the importance assigned to the business by the founder goes beyond mere financial outcomes, comprising intangible aspects like *status*, its image and power. Often they associate it with strategies of transmission of the family *ethos*, its traditions and values, beside the upkeep of the "secret" of the family business and the privileged connection to the surrounding community, among other aspects. Thus, in the path of a family business, and in articulation with its generations, factors such as knowledge, reputation, enterprising "spirit", trust and communication between the family members, but also the process of socialisation, professionalisation and flexibilisation in the management of (new) members of business families, with the commitment and the transparency in the relationships that are established between business and family. These aspects enable the assessment of the "family culture" in the sense of *familiness* (Habbershon, Williams, 1999), through the resources that the family business has available in the interaction with the family as a whole.

Data and Methodology

As previously mentioned, the current paper is based on the main results of the research project "Roadmap for Portuguese family businesses" (2016-2018), financed by NORTE 2020 / FEDER" (NORTE-02-0853-FEDER-000018)[4].

This project pursued a dual strategic goal: (1) to map the family businesses of the North region, either small, medium or large; (2) to assess their impact on the local, national and international economy, taking into account the dynamics of job creation, internationalisation and innovation of investment, on the one hand, and on the other hand, the professionalisation of management and governance of the family businesses. This constitutes a pioneer and innovative study in Portugal since, up to now, we are unfamiliar with similar analyses that have combined the component of the mapping of family businesses in the North region with their characterisation and further development alongside a very robust sample which focuses on this business reality.

In order to improve its operationalisation, this project was developed from a research design crossing different techniques for data collection and data processing[5]. Delimited to the North region Portugal, an (online/ on-site) survey was applied to a database which was previously selected from a systematised collection of businesses that corresponded to the profile of a family business. From a universe of more than 41 thousand businesses included in the database (Roadmapef Database)[6], we proceeded to a sampling plan which was based on the representativeness of the distribution of the family businesses among the eight N.U.T. III that integrated the North region, and on the dimension of the business defined by the number of workers. In order to simplify the collection process, only three groups of businesses were considered according to the number of workers: businesses of smaller dimensions (up to 10 workers), medium-size businesses (from 10 to 49 workers) and larger businesses (50 or more workers). Bearing in mind our study goals, it was possible to ensure the constitution of a sample of 1148 family businesses, which is considered robust in terms of the representativeness of the target-universe, guaranteeing a level of trust of 95%, with a maximum permissible error of 3%.

To administer the survey, platform *LimeSurvey* was used (June and July 2017) and an on-site stage of application of the surveys to the family businesses (October 2017 to February 2018). In a complementary manner with this stage, 23 in-depth interviews were undertaken to entrepreneurs who owned family businesses, ensuring the diverse economic sectors by the North region N.U.T. III, and belonging to different generations. This activity enabled the reconstruction of the "history" and "culture" of the family business, and kinship networks, the trajectories of the founders, the main critical turning points/ readaptation/ transformation of the business, as well as, issues related with the current situation and the challenges for the future.

Findings and Discussion

Portrait of the Portuguese family businesses

The survey which was developed and applied within the scope of the project stemmed from the previous mapping of the family businesses of the North region (*Roadmapef Database)* and enabled the possibility of making a portrait of the North region family businesses as well as the profile of the entrepreneur(s) (cf. Table 1; Figure 1).

Table 1: Main features of participating Portuguese Family Businesses

NUTS III	No.	%
Alto Minho	67	5,8
Cávado	189	16,5
Ave	138	12,0
Área Metropolitana do Porto	543	47,3
Alto Tâmega	21	1,8
Tâmega and Sousa	110	9,6
Douro	53	4,6
Terras de Trás-os-Montes	27	2,4
Total	**1148**	
Enterprise seniority	**No.**	**%**
< 5 years	138	13,6
5 to 19 years	410	40,4
20 to 49 years	398	39,2
50 to 100 years	67	6,5
> 100 years	3	0,3
Total	**1022**	
Legal Form	**No.**	**%**
Limited Company	815	71,0
Sole proprietorship	121	10,5
Public Limited Company	120	10,5
Single-member Limited Company	87	7,6
Other	5	0,4
Total	**1148**	
Firm size (number of workers)	**No.**	**%**
≤ 3 workers	326	28,4%
4 - 9 workers	340	29,6%
10 - 49 workers	327	28,5%
50 - 99 workers	82	7,1%
≥ 100 workers	73	6,4%
Total	**1148**	

Source: Roadmap online survey to Family Businesses (N = 1.148)

Taking into account the findings obtained from the questionnaire by survey applied within the framework of the project, FB (Family Businesses) are overwhelmingly micro businesses (up to 9 workers), located in the N.T.U. III of the Metropolitan Area of Porto – a noticeable trend for the concentration of urbanisation along the coastline -, with a more substantial proportion of female labour in the larger businesses, whose presence is meaningful in the economic sectors of the services, in the manufacturing industry, consultancy activities, accommodation and construction. As far as seniority is concerned, these are FBs with less than 20 years, and it is predictable to see the coexistence, where applicable, of the first and second generations (Marques, 2018c).

The entrepreneur of the FB is mostly male (65%, which contrasts with only 35% of female entrepreneurs/owners of the FB) and only 38% of these hold a university degree. As for women entrepreneurs, even if under-represented, they can offer a higher level of education, and most than half of them (60%) hold a level of schooling which is equal or greater than higher education (degree).

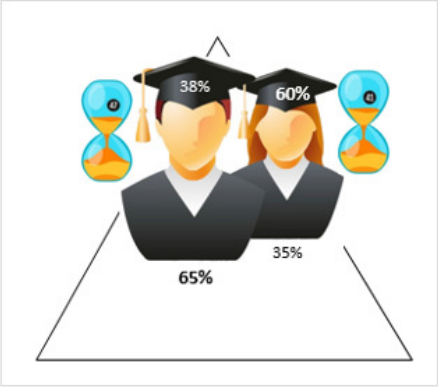

Fig. 1: Family business manager profile: gender and higher education level

Source: Roadmap online survey to Family Businesses (N = 1.148)

Key insights and challenges of family entrepreneurship in Portugal

The managerial challenges experienced in the context of family businesses are manifold. The traditional demands arising in any family business or entrepreneurial activity, such as – the need for constant innovation to remain in the lead, to deal with competition in the sector of economic activity where they operate, to ensure a good relationship with both with clients and suppliers, to manage their human resources in an efficient way, to invest in prospection and guarantee, on the whole, a healthy financial health of the business – are also followed by, in case of family businesses, specific internal challenges specifically related to its family nature. Among these challenges, the following may be highlighted: inheritance tax, donations, access to funding without loss of control of the business, but also the preparation of succession of the business, namely through the definition of family protocols, the preparation of the successor(s), of the management of potential conflicts, the professionalization of management, among others (Marques e Couto, 2019, 2017).

Business succession planning and key challenges in Family Management

The survey findings revealed that the businesses that declared to have claims to introduce changes in management, namely concerning the succession of leadership, in the short-term, that is, from 3 to 5 years, wished the youngest generation would be part of the management of the business (74%). This positioning contrasts significantly with a change that implied admission of managers that are external to the family, which gathered only 16% of the answers (Fig. 2).

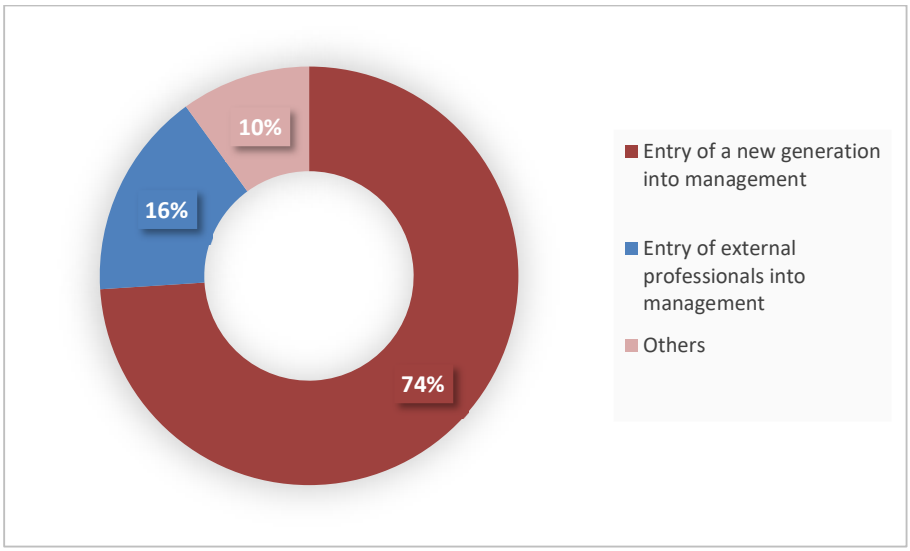

Fig. 2: Main short-term management changes (leadership succession)

Source: Roadmap online survey to Family Businesses (N = 1.148)

Identical findings concerning the maintenance of the family nature of the business, namely in structuring dimensions of its activity, such as the shareholder structure of the business, were equally identified in the *Roadmap* survey question related to projections of change in the shareholder structure (property succession). Regardless of key-variables like seniority or the dimension of the family business, the findings highlight that if changes are to be introduced in property succession, they will involve the transfer of property between family members (65,8%) and not changes that are indicative of an openness (*versus* preservation/ closing) of the family property, such as selling the business (which gathered 19,2% of the answers) or opening it to share capital of non- family members (which, in turn, gathered 13,3% of the answers).

Effectively, the findings of the survey by questionnaire applied to a broad range of family businesses of the North region of Portugal are very significant concerning the preservation of the family essence of this sector of businesses, especially when we address issues like the future of the business and succession prospects, either in terms of leadership, or in terms of property (Marques e Couto, 2019).

In line with these results, we can equally find the very significant positioning of all the businessmen surveyed with regard to the "niche" concerning the search for the successor of the business: 74,3% of the total of the FB business respondents indicated that the search for a successor should take place within the family context (Fig. 3). In other words, the choice of successor is clearly restricted to the family.

On the assumption that the leadership successor may be sought outside the family, opinions subdivide, with subtle differences, between outside the company's staff (10,2%) and inside the company's staff (8,9%).

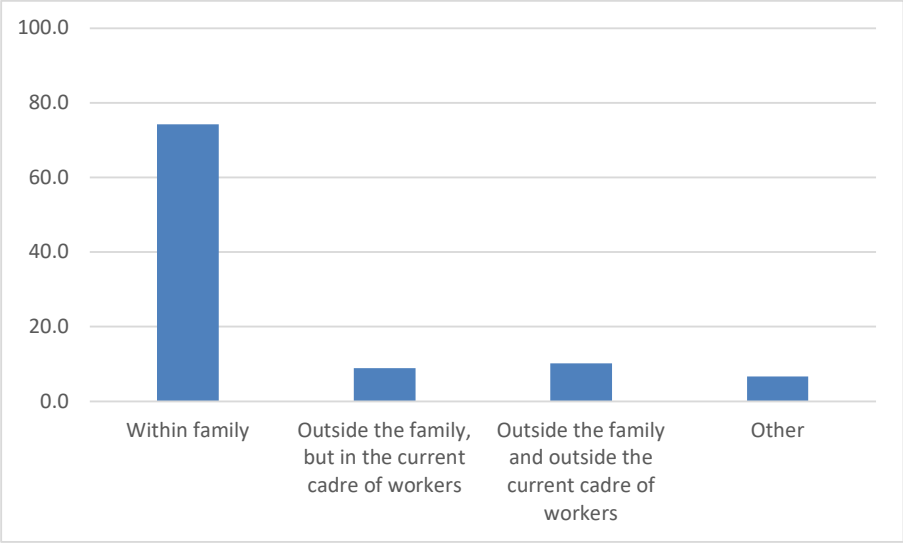

Fig. 3: Search for the successor of leadership

Source: Roadmap online survey to Family Businesses (N = 1.148)

The accomplished survey by questionnaire also ensured that entrepreneurs of FBs were given a voice, namely concerning the aspects they consider essential for the success of their businesses. (Figure 3). The findings obtained indicate that the factors which are perceived as being the most important are, therefore: (i) preparation and training of the successor prior to the actual start of her/his role (78.1%); (ii) the existence of a strategic programming (medium and long term) (76.1%); (iii) the separation between the family's interests and the business ones (75.1%); (iv) the prevalence of professional criteria in decision-making about property, governance and management of the business (73.1%).

This means that the FB entrepreneurs are worried about the continuity of their companies and trades, in particular from a medium and long-term perspective and that that concern may go through facing the challenges of professionalisation and succession, but always bearing in mind the avoidance of solutions and answers to these challenges, that may imply opening up the business to the exterior, that is, to *non-family solutions*.

This is evidenced when we analyse the least valued success factors by the entrepreneurs of family businesses surveyed, such as: (i) openness of the share capital to non-family members (8.8%); (ii) having external professional managers in the company direction (26.6%) (Fig. 4.).

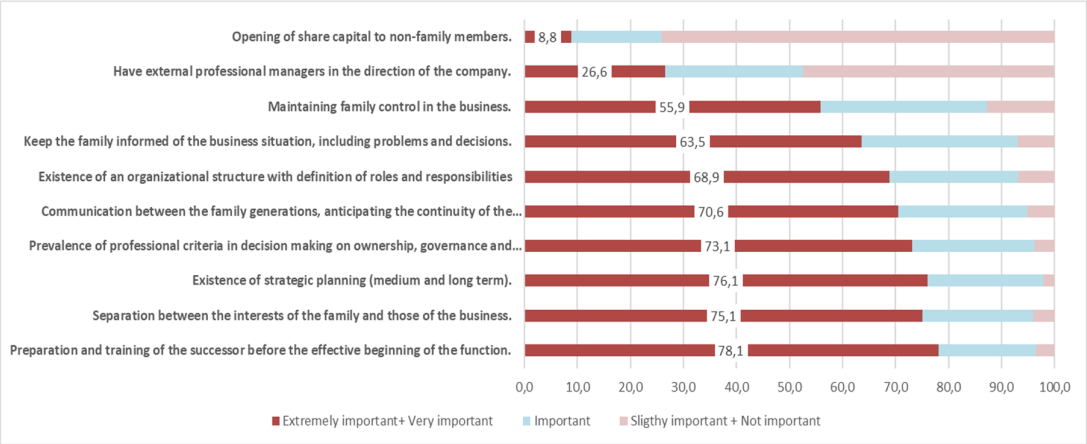

Fig. 4: Key factors for the success of the family businesses: the perspective of the FB leaders
Source: Roadmap online survey to Family Businesses (N = 1.148)

Overlaps between the family and the business: owners' view

As the number of family members increases and in spite of the fact that more options become available for choosing the successor, there may be a greater number of family members who do not wish to work in the family business, even though they expect to derive benefits from it. Hence, it is vital to establish rules of conduct that define how the family interacts in management through the definition of governance structures with the purpose of promoting its continuity.

Taking this into account, owners' testimonies have stressed the postponement of the succession (Marques e Silva, 2020) accompanied by the naturalisation of the "future" successor mainly in firms from the first generation.

> "No, I didn't [think about succession]! I have two children, and they also like this space very much. Succession will obviously be theirs, it will be theirs, but let's see how it goes in two years' time, let's wait and see!" (E4_1st Generation)

> "For now they [children] are still studying and they are still young, although the eldest already helps us at the weekend. He has been out with us to do some repair work on some machines to help us out. In fact, we wanted to give him a sense of responsibility and teach him how to earn his own money, his pocket money. Getting their own remuneration is also very enticing for them." (E20_1st Generation)

In turn, the fact that social roles are assigned to the different members of the family according to gender illustrates both the persistence of cultural patterns based on sexism, and the rupture of those patterns when we project the transference of the business succession onto the daughter, due to the fact that she has higher academic qualifications and level of professionalisation. Nevertheless, either because they are owners/shareholders, or because they hold managerial positions, family businesses undergo relevant transformations, in particular because they put emphasis on female entrepreneurs, for example in traditional sectors such as metalworking. To take up high-end positions effectively performing duties has been relevant at the level of the 2nd and 3rd generation family companies. The choice of this "female" leadership may be rooted in the fact that the descendants are only women, but it may also happen due to these women's profiles. In addition, it is important to bear in mind that many managers/owners tend to hold academic qualifications which are more suited for specific areas of the business in the Portuguese family businesses under analysis in the current paper.

> "We know for a fact that women have had fewer opportunities than men! That is obvious, but I personally prefer to look at people, in other words, I prefer to know if they are good professionals, whether male or female! If they perform their duty well, his/her opportunities will become available and he/she will have his/her place (…)" (E6_4th Generation)

> "My father said: '- My dear daughter, I was wondering if you would like to work at the factory?' I just stared at him, at the factory? 'The thing is, I don't see your sisters working there! If you don't do it, I can't see any of them adapting to that reality." (E9_5th Generation)

> "It is a very positive experience! Apart from the fact that it's a woman working in the company – and I have had proposals to work outside – I am a member of some associations precisely because I am a woman in the area of business management. Somehow that opens some doors and brings some recognition. It is good to see that people acknowledge you, and also, to see how the company has evolved in just a few years." (E1_2nd Generation)

Lastly, the strategy set up to prepare succession starts in the definition of the formal instruments of power transfer and constitution of the administrative boards, though to a lesser extent in the companies analysed in Portugal. When succession happens, not exempt from conflict, its preparation is decisive, as we can observe from the testimonies below:

> "In 2001, my father and my uncle realised that in order to ensure the continuity of their business they depended on us, we had to be involved, and also the capital and they also depended on the capital invested here. If they sold the business, they would never get the value they wanted, the fair price for them! Thus, they realised that if they donated it to us or gave us the opportunity to continue managing the business, they could have a fixed income, a steady income until the they died. And that's exactly what happened. There were deals, meetings and they realised that we [my sister and I] would be the followers, the next in line. That was the decision, but it was prepared by our father, taking into account our decision. We said that we needed some safeguards, we didn't want to work in the company for 10 or 20 years and at the time of our death we would be fighting each other. Let's define dates, set up when that happens. What safeguards will you give us? (…) There is a document … part of it was donated and another part was the right of usufruct and usufruct could be claimed at any time (…). There was some conflict, as expected, and different opinions. There were moments when it seemed that this would be in vain. We went back and forth, but in the end it worked! I believe that there is merit, in this case, thanks to my father and uncle who accepted, but thanks to us as well for giving them the safeguards they wanted, ensuring they would still be connected, safe!" (E23_3rd Geração)

Final Remarks

The family business is maintained thanks to the founder who holds a unique and privileged position in the creation of the cultural identity which is the basis of the organisation, enforcing his/her values and beliefs. These are formed by his/her own personality and cultural history, and hence they mirror the founder's education, his/her childhood, life experience, family and predecessors. Such education constitutes an illustration of the entrepreneurial dimension, of the founder's willingness to take risks and of his/her boldness at the start and maintenance of the family business, merging reasons such as business opportunity and the need to create self-employment.

Two interrelated critical dimensions arise from this study. The continuity of the companies and businesses, in particular in a medium/long-term perspective, means simultaneously facing the challenges of professionalisation and succession. Besides the investment in competitiveness and professionalised management, the continuity of the FBs tends to be envisaged stemming from solutions which are internal to the family. These have depended on strategies that are based on the postponement and "naturalisation" of succession, on the preparation of the second and third generations with more qualifications, regardless of gender, and only a very limited number of the businesses studied resort to the preparation and formalisation of mechanism of corporate succession in the medium and long-term. In fact, based on the findings of the quantitative and qualitative aspects of this study, family businesses, naturally embodied in their businessmen/leaders, reveal a not very favourable stance to welcoming external members (be it regarding the possibility of participating in the share capital, or in terms of the integration in the company's management), indicating, for that reason, a certain resistance to the *defamiliarisation* of their FBs.

However, we should highlight the importance of reputation and resilience in maintaining family leadership. By guaranteeing an intangible "brand", the family businesses aim to increase the means and tangible resources for the sustainability of its economic activity, becoming competitive in markets which are increasingly globalised. Simultaneously, due to the existing strong bond with the place where they were born, the commitment and territorial cohesion make these economic agents become relevant actors for local development.

End Not

[1] Family businesses are the most ubiquitous form of business organisation in Europe. However, only recently have studies on this topic been developed. So far, most of the existing literature was developed within the North-American context (Botero, De Massias, Nordqvist, 2015).

[2] Despite the urgency in building consensus around what is understood as family business, this issue overcomes the goals of the present article, wherefore we assume here the recommendations of the Group of Experts of the European Union about which characteristics enable the definition of a family business.

[3] Specialised literature on the topic catalogues more than 90 definitions and displays the difficulty of its operability and consequent comparability, not only in national terms but also internationally.

[4] This project, which is financed by Norte 2020 and by F.E.D.E.R. [European Fund of Regional Development), and led by the Centro Interdisciplinar em Ciências Sociais [nterdisciplinary Centre in Social Sciences – Polo Universidade do Minho], in partnership with the Associação Empresarial de Portugal (A.E.P.) [Enterpreneurial Association of Portugal]. This project, which had a two-year duration (2016-2018), involved a wide plan of in-situ activities, from the organisation of a cycle of workshops promoted by the N.U.T.III of the North region, to the dissemination of its main findings on the site www.roadpamef.uminho.pt.

[5] For further development of the methodological procedures adopted see Marques (2018a).

[6] The *Roadmapef* database mapped 41.496 family businesses in the North region. Its construction involved the mobilisation of: (i) the indicator "Family Business" of accredited body; (ii) Contacts from the Associação Empresarial de Portugal (AEP) [Portugal Business Association]; (iii) *Online* survey about family businesses. The *Roadmapef* database presents two kinds of information: fixed information related to the identification of the business; variable information, updated annually (turnover, weight of exports, number of workers, etc.).

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Classic Heirs and Premature Heirs. Desired Inheritances Versus Imposed Inheritances. A Motivation Analysis of Family Entrepreneurship in Portugal

Ana Isabel COUTO

School of Economics and Management of the University of Porto (FEP), Institute of Sociology of the University of Porto (IS-UP) [Instituto de Sociologia da Universidade do Porto], Centre for Organisational and Social Studies of P.Porto (CEOS.PP/ISCAP/P.PORTO) [Centro de Estudos Organizacionais e Sociais do P. Porto], Porto, Portugal, aicouto@fep.up.pt; anacouto@iscap.ipp.pt

Abstract

The current paper offers a reflection derived from the results of the qualitative research component in the author's PhD thesis on Small and Medium Enterprises (SME) and entrepreneurial dynamics in Portugal over the last thirty years (Couto, 2013). Relying on a limited, but diverse body of biographical interviews with SME business owners, a typified set of entrepreneurial pathways and contexts was identified. This paper will focus on *tendential entrepreneurship* pathways, also known as family entrepreneurship pathways. Contrary to initial expectations, the motivation analysis on entrepreneurial narratives allowed for the conclusion that the taking on of management roles is not a linear process. One could have assumed that these pathways, believed to follow a (family) trend, would be linear in their progression towards entrepreneur status. However, our interviews analysis allowed for the conclusion that even in trend-like pathways, linearity in transition, motivation and life choice are not necessarily unifying features in these specific entrepreneurship pathways.

Keywords: Small and Medium-Sized Enterprises (Smes), Family Entrepreneurship, Motivation Analysis.

Tendential (or continuity) *entrepreneurship* pathways (Couto, 2013, p.214) revealed a set of shared features: they comprise family business initiatives, among which can be found young business owners (with an average age of 33 years old) whose parents were the owners (and founding members) of the companies they are currently running. In this case, taking on the role of entrepreneur is not related to the initial establishment of the company; these are *heir entrepreneur*s who were given managerial roles at companies founded by their parents.

Contrary to initial expectations, the motivation analysis on entrepreneurial narratives allowed for the conclusion that the taking on of management roles for these subjects is not a linear process. One could have assumed that these pathways, believed to follow a trend, would be linear in their progression towards entrepreneur status. However, our interviews analysis allowed for the conclusion that even in trend-like pathways, linearity in transition, motivation and life choice are not necessarily a unifying feature. In her study on women entrepreneurs, and specifically in the modalities for access to entrepreneurship, Rodrigues emphasises: "obviously, one has to have married a business owner for the external fact of "widowhood" to have an impact on one's life, but we must mention that not every business owner's wife who becomes a widow takes on the management of the family business (1989: 104). The same rationale is applied when considering young entrepreneurs in family SMEs: certainly not all youths whose parents run and own businesses will themselves become entrepreneurs. Therefore, even if social conditions at start may influence certain life choices, there is always a framework of personal choices and concurrent socializing forces which could drive towards options and life choices that, in this light, appear to be divergent.

Some of these entrepreneurs felt the need to explicitly state that their option to become business owners was a deliberate life choice, keeping their distance from the (stereotypical) notion of linear business handover from parents to children. Ricardo Lopes, whose father's fatigue brought about the question of management continuity at Fabricil, is a clear example of this. According to his interview, accepting to manage the company was not a linear or immediate decision; it took careful pondering and discussion with a cousin, who is currently a partner and board member at the same company. This was a joint, well-matured business project in which they were not merely "entrepreneurs through inheritance", but also "entrepreneurs through action".

> *Usually, it's hard for people to believe. They tend to think it's an inheritance. If it involves family, they think it all boils down to inheritance, but it was clearly a life choice. Mostly because before I made some decisions, I had to come to an agreement with other people who were external to the company and couldn't join right*

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away. And, therefore, I only took on the role once I realized that they could join the company and I would have the chance to build a slightly different structure than what was in place… there was a need to align positions. I wouldn't have taken on the company if he [cousin] hadn't joined later… Therefore, if we hadn't come to an agreement, I wouldn't have accepted this role on my own. And therefore, many times it looks like an inheritance, but it really was a life choice. In our portfolio, we already have a few companies of our making, products of our management, so we're not simply «entrepreneurs through inheritance», but already «entrepreneurs through action».” (Ricardo Lopes, 42 years old, Fabricil enterprise)

Our motivation analysis also allowed us to confirm that when it comes to young *heir entrepreneurs*, there is no homogeneity with regards to motivation for entrepreneurship, and two distinct scenarios emerged within this category: on one hand, we could identify *classic heirs* and, on the other, premature *heirs.*

In the first subcategory – *classic heirs* (Couto, 2013, p.243) - we have identified young SME entrepreneurs whose transition to company management was timely secured and planned by their predecessors, i.e., their parents. Moreover, these cases confirm, as other studies on business owners have already shown, a trend for higher levels of formal education in *heirs* when compared to *founding members* (Shaw, 1993 *apud* Lisboa, 2002: 380).

The second subcategory – *premature heirs* (Couto, 2013, p.243) – is characterised by abrupt transitions to company management, motivated by circumstances external to the subject that push him/her towards a decision; the passing of a parent/ the company founder fits these cases. This means that these are not classic examples of a linear management handover from generation to generation, but cases in which the passing down stems from reasons outside the will of the individual. The cases included in this specific subcategory are related to *turning points* - i.e., significant moments of shift or inflection in the subjects' paths whose effects caused their trajectories to be redirected (Strauss and Corbin, 1990; Denzin and Lincoln, 2000; Nico, 2011) -, underlying their decision to take on a management role at the family company.

In André Rocha's case, 25 years old, the passing of his father when he was 11 led him to become company manager at 18. His father had founded a plumbing and piping business in 1985 and his mother managed the company til her son was fit to do so. André Rocha took on the management upon completion of a professional training program (equivalent to full mandatory education) at a vocational school for construction and public works in the North of Portugal. André defined himself as an average graded student who never enjoyed studying. In his interview, he states that he "never wanted to go to college", and that his mother gradually gave him managerial responsibilities. At 18, he became full-time company manager, after turning down a job offer at a major construction firm. Becoming an entrepreneur is suggestive of a sense of purpose, of a concern with preserving the family legacy ("I had that job offer, but I chose to stay. I thought I had to keep my father's company going.").

In João Cardoso's case, the sudden passing of his father when João was 21 forced him to interrupt his course of studies. He was a third year student at the Polytechnic of Porto, seeking a degree in Chemical Engineering, but dropped out to become manager at his father's furniture company. João is the oldest of four children (he has two sisters and a younger brother) and he believes that weighed upon his decision to lead the company. The other three children all finished college degrees and work in the field for which they studied. The company João is currently managing was built upon the company his father established 20 years ago, so as to purposefully avoid additional taxation. Since this is an area of business with strong local engagement, we should mention that João's family has a tradition in the production and trade of wood and derived products, and João's uncle and aunt own a furniture shop. In fact, these relatives were relevant in welcoming João to the business and to his new responsibilities after his father passed. Besides, João won't hesitate to say that even if his father's passing hastened his embracing of business ownership, he had always been attracted by this business activity and had always voiced his wish to work at the family business in the future, since he was influenced by his father and close to the activity and development of the company since early childhood. In this case, even if the inheritance was, to a certain extent, *imposed*, it was simultaneously *desired.* In fact, João could have sold the company after the passing of his father, but chose to carry on with the family business and preserve the family "legacy", as he says. In these cases, the affective and symbolic dimensions are clearly the prevailing motivation in the general framework of motivation to entrepreneurship.

Across all featured cases of family entrepreneurship pathways, we see that these entrepreneurs point to moments in their socialization process as reasons for them to later achieve entrepreneur status. In fact, early socialization with the company, or with the area of business the company belongs to, is clearly and particularly important for these young entrepreneurs in family SMEs. For instance, many of them mentioned going to company premises with their father on school holidays; others stated that family meal time was the moment when several company issues were discussed, etc. In other words, entrepreneurial predispositions and skills, which Guerreiro has written about (1996), were, in these cases, taught from an early age and, moreover, permanently activated and renewed within the family milieu.

Vasco Veloso's case is that which better illustrates the *classic heir* subcategory, since the family company is part of his personal and professional path as a *desired inheritance* (*versus* an *imposed inheritance*, as is the case with *premature heirs*). Becoming a business owner derived from Vasco's explicit wish to preserve his father's company. The handover was previously planned and he took on management responsibilities at 24. Nevertheless, Vasco, who majored in Economics at the School of Economics and Management of the University of Porto and also holds a degree in gemmology, does state that he would have liked his first work experience to have been outside the family business, but that wasn't feasible ("My sister is the youngest and my father could use a hand, he was already getting old… and I had to come along.")

The family tradition in the jewellery business was conducive to a favourable history and development of the company ("Boavista was established in 1984… My family history in the jewellery trade goes back to the mid 19th century. My father is the fourth generation to work in this trade. So, it's deeply rooted within the family."). According to Lisboa, Portuguese business structures have a fundamental difficulty at generating what he calls "industry dynasties", that is, according to the author, established companies cannot last for over three decades, a time frame which doesn't favour the emergence of dynasties (2002:540). In the overall set of researched companies, those currently run by Vasco Veloso, established in 1985, and Ricardo Lopes, established in 1965, are among the oldest and more firmly rooted. In light of what was previously said, they constitute an exception, not the rule.

In the case of Vasco Veloso, family tradition in the jewellery sector is not the single factor explaining the company's successful development: the growing involvement of family members also plays a part.

> *"Well, in recent years we grew a lot. Initially, if there was growth, it was solely due to my parents, then they came for me, meanwhile I went for my sister (laughs). Later, I managed to bring my wife along, but we can no longer handle this. If we want to keep growing, we have to delegate."* (Vasco Veloso, 34, Boavista)

The role of the family is, therefore, crucial (beyond the moment of foundation of the company) in terms of the actual, objective participation of several family members (parents, sister, uncle and wife) in the business activity. According to this entrepreneur, the fact that they have different academic backgrounds allows family members to run different departments within the company ("My father and my mother are the managers. I am director-general. My wife is in charge of marketing, my uncle is the administrative and financial supervisor, and my sister, who's a trained architect, is in charge of the company's visual identity, and she's the creative one, she's in charge of all things creative!"). Indeed, the analysis on Vasco' social and professional trajectory, as well as on the structure and organisational model of the company he's running, suggests a strong interlacing of entrepreneurship and family bonds.

If the cases included in this pathway are taken as reference, we may indeed conclude that family, in the various roles it plays, becomes the most relevant factor, in a pool of explanatory factors, for a positive experience of entrepreneurship.

The relevance of the family in building entrepreneurship pathways may be considered bearing in mind two distinct moments: (i) the initial foundation of the company and (ii) its later development. Previous researches has shown that the family may have an influence upon the conditions involved in the establishment of a company, but also upon its growth capacity and survival (Rodrigues, 1989, 1991; Guerreiro, 1996), giving emphasis on different *types of inheritance* and asset handover: " (…) one may not inherit a company, but instead inherit the capital required to start a company and seek initial funding, as well as "name" and "reputation" when facing a market of clients and suppliers" (Rodrigues, 1989: 74). These more subjective dimensions of inheritance were, in fact, mentioned by the SME entrepreneurs included in these pathways, when asked about the major beneficial factors not to the founding of a company – all of the cases are representative of 2nd generation entrepreneurs who were not involved in the original company foundation –, but to the lived experience of entrepreneurship.

In our research, *tendential entrepreneurship* pathways are, therefore, characterised by a set of cases which are revealing of *inheritances* at various levels, that is, not only objective *inheritances* with a material element (such as the economic asset itself, i.e., the company), but also other more subjective *inheritances* with an immaterial element (such as entrepreneur predispositions and skills taught at an early age, the "good name" and sound reputation of the company in the eyes of banking partners, clients or suppliers, etc.), which, as we have shown, have a definitive influence upon the former.

Endnotes

[1] To ensure anonymity, the names of entrepreneurs and companies referred are fictional.

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Digital Transformation in Saudi Universities: A Case Study

Musleh ALSULAMI
Umm Al-Qura University (UQU)
Makkah
Kingdom of Saudi Arabia
mhsulami@uqu.edu.sa

Abdullah ALJAMIE
Umm Al-Qura University (UQU)
Makkah
Kingdom of Saudi Arabia
akaljamie@gmail.com

Abstract

A country's digital transformation agenda should combine a robust strategy and bespoke adoption and implementation of information technology processes. The digital transformative process requires wholehearted embrace and a change mindset from both private and public entities across all sectors, such as the manufacturing, finance, transport and service industries, to healthcare, and even education. Several factors classified into technical and human factors may affect the success or failure of implementing a digital transformative agenda. The human elements, which are deemed most important include user experience, user awareness and trustworthiness, whereas the technological factors comprise the functionality and security of the systems, applications or devices. This research-in-progress explores Saudi Arabia's path to digital transformation as a key strategy towards achieving its Vision 2030 agenda. It will narrow down the digital transformation journey within the higher education sector and specifically the universities. It will seek to show the current status of this digital transformation in universities, highlight strengths and weaknesses of the implementation process and provide recommendations that can be adopted to successfully achieve digital transformation.

Keywords: Digital Transformation, University, Digitalization, Higher Education and Change and Adaptation.

Introduction

The core functions and key operations of educational institutions is to restore, maintain and advance education in a country [1]. To sustain this, such institutions need to continually deploy innovative changes, from modes of imparting learning, to examination processes, and even management style. Indeed, like the business world, the application of novel changes is an inevitable process, especially on educational systems, which are constantly experiencing dynamic teaching and learning demands, both internally and externally [1]. Incidentally, the demand for these changes has coincided with a period of rapid digital information explosion, technological discoveries, and disruptive innovations, which Big Data, Internet of Things (IoT), and Artificial Intelligence (AI) [1]. Thus, the education sector has no option but to smartly harness these disruptive technologies, coupled with the internet platform to innovate, reconstruct and successfully transform, digitally.

The process of digital transformation requires a complex strategy that not only incorporates information technology processes, but also the human aspect and their interactions with the systems [2]. It therefore requires an understanding of the bespoke organizational needs, entire processes involved, the steps to take and the full cooperation of all stakeholders [3]. Otherwise, the digital transformation process will face challenges and obstacles [4]. For instance, a myriad of organizations simply automates their existing services and label this a digital transformation – such as moving from handwritten purchase orders to computer-generated ones. In the education sector, some institutions simply shift their educational modules from the traditional classroom offerings to online and assume this is a digital transformation. However, digitization and digital transformation encompasses a wider focus and a multitude of strategies. This is what separates organizations that are merely "doing digital" and those deemed to be "digital innovators". The latter not only understand their specific holistic needs but are also able to exploit the vast technological innovations to create a competitive advantage in the marketplace [5].

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Effecting innovative change to the education system can be a daunting task. For example, at the higher education level, precisely the universities, the execution of innovative change to overhaul existing systems is a challenging endeavor due to the complex organizational structures, levels, functions and operations in place [1]. Furthermore, such institutions, whether public or private have already established their unique institutional culture that combines human and technical complexities. This makes resistance to change highly probable [3]. Consequently, researchers, such as Alharbi [4], have shown that innovative change is likely to incur financial loses in wasted resources and budget allocations if the proposed change is not fully embraced and implemented. Alharbi [4], further notes that one of the reasons for resistance to change is the lack of effective evaluation of the workforce needs in relation to the change strategy. In essence, there is a mismatch between these two critical elements. From the high education perspective, this would require a synergy between the management, the teaching staff and the students. Alharbi [4] also notes that the technical aspects in a system are the easiest to modify in contrast to human factors. In some cases, the developers and systems analysts tend to minimize or overlook human factors and instead prioritize the technical dimensions of the organization. This may lead to a misalignment of the change strategy and management resulting in implementation challenges and hurdles and eventually missing the objectives and goals of the organizational change [5].

From a country perspective, a government researches, designs, implements and maintains systems across all that are not only effective, sustainable, fulfills the needs of its people, but also justify the costs it incurs. However, in instances where these irreducible minimums are not achieved, there is need for revising and modifying the system. The system life cycle principle posits that when the national economy system undergoes a stagnating and strenuous period, it needs to be upgraded. Saudi Arabia is currently facing this critical phase, where a myriad of multi-sectorial pressures (both internally and externally) are being exerted to its national economic system. For instance, the ongoing geopolitical upheavals, coupled with volatility in global oil prices has had colossal socio-economic and financial strains and stresses to the country's economic system [6]. This has had a knock-on effect on its organizational mechanism across other sectors, including education. Hence, the need for restructuring these mechanisms and services, particularly in the education sector. One way of doing this is via digital transformation.

Digital transformation represents a path of strategic planning culminating in organizational change [1]. It commences with empowering the change team with new techniques and methods that assure a highly responsive and bold culture towards novel strategic innovation. This is augmented by having the right leadership driving this change transformation into a high-performing innovative organization. Principally, an appropriate team of technologists and marketers should assist the leadership in delivering this agenda [2]. The term "Digital" is synonymous with transformative change taking place in today's world and induced by rapid adoption of disruptive technology [2]. Organizations still utilizing traditional modes of operations and functioning are increasingly under pressure as the world transforms into a digital era. For those organizations that have seized this opportunity and adopted the digital transformation, they have created sustainable competitive advantages that have spurred their growth and buttressed them as leaders in their respective fields.

Currently, the government of Saudi Arabia is taking the huge responsibility, in terms of human and financial resources, of designing, building and implementing a national model for the digital transformation of its institutions across all sectors [7]. Within the higher education sector, this is being championed by both public and private universities with the latter being nominal in comparison to the former. All these efforts are under the government's umbrella initiative entitled Vision 2030 – a national transformative master plan. Its impetus is the expansion and easing of the nation's operations and peripheral functions to encompass the private sector, thus lessen public sector dependencies and related pressures in service provision [6]. Moreover, the amendments seek to eradicate the current hurdles, flaws and bottlenecks in the system [7]. Ultimately, the new structure envisions a more service-oriented and dynamic culture in the provision of quality services.

The goal of this research-in-progress is to show the major challenges and hurdles that the universities could face in their path to successfully actualizing the digital transformation plan and in relation to their readiness for change as per the Vision 2030's national education plan.

Literature Review

Change Definition

According to Wittenstein [8] change is defined as a transformative process of revamping from the present state to a more coveted one. Similarly, Lewin [3] states that, "Change and constancy are relative concepts; group life is never without change, merely differences in the amount and type of change exist" [p. 5]. Thus, the concept of change and

adaptability to it have been identified as the most critical factors in the realms of research and policy formulation across various sectors, including education systems.

But, notwithstanding the advances in the education sector, there are still significant impediments related to the adaptability and acceptance of change, particularly in this sector where digital transformation is still at its formative stages. Repetto [9], attributes these hurdles to a lack of understanding (by individuals affected by the change) and poor execution (by the drivers of change) of the desired modes of innovation and adaptation. From a research perspective, studies done by Biersbroek et al. [10], Preston et al. [11], Alshehri and Drew [12], Cartelli et al., [13], and Kreutzer et al. [14] have suggested there are various factors that may either lead to success or failure of administrative and governance system in their quest for executing change. These can be determined via scrutinizing the adaptive competence, appraising the ramifications, and pinpointing plausible options for both knowledge on the desired change and the acclimatization process to this change [10]-[14]. In addition, these studies [10]-[14], have also shown that there are limitations in the frameworks used to systematically examine the degree for change readiness and adaptability among educational organizations.

The Technological Change Worldwide and in Saudi Arabia

The widespread, multi-sectorial application and adoption of information and communication technologies (ICTs), has revolutionized and influenced all spheres of our lives [15]. The rapid development, deployment and uptake of ICT technologies and innovations is increasingly drawing the global community into a fully-digital era [2]. For example, the internet has completely transformed how people interact, work and communicate. Technological applications, such as web-based and mobile apps, and smart devices, including smart phones, tablets, smart gadgets, among others, are making the execution of daily tasks easier and allow people to stay connected irrespective of physical or geographical barriers [2]. Most of these smart devices are progressively being ingrained into daily routine to the point of people hardly functioning without them. Some these inevitable traditional routines include: the use of online maps for navigation, the use of instant message and e-mail delivery for communication, and the use of the internet for searching, watching content and browsing social media pages [15]. The newer applications include the use of IoT devices to remotely control energy consumption in smart homes, hail a taxi, engage in e-commerce from the comfort of one's home, and conveniently and securely perform cashless financial transactions. These illustrations are indeed the hallmarks of a digital society and the growing influence digitization is having on global populace [2].

Accordingly, countries round the world, including Saudi Arabia (KSA) are recognizing that embracing digitization creates an excellent opportunity for driving socio-economic progression leading to improved and quality living among its citizens [6]. Similarly, KSA is banking on the usage of ICT and digitization to stimulate the implementation plans and programs as per the Vision 2030 blueprint. The digitization process also aims at boosting national security, hasten the practice of good governance, and stimulate economic and social progression [5]. To attain and sustain full digitization in any given economy, change is inevitable [5].

Nonetheless, introducing change and maintaining innovation in an economy could face hurdles and implementation issues, especially in today's operational environments that comprise complex structures, functions and operations [16]. According to Alharbi [16], bringing about this change both in a public or private entity, small or large, can be quite a challenging prospect to the management authorities. This is attributed to the intertwined complexities of technical and human aspects [16]. In some instances, the innovation or change plans fail to achieve the desired objectives and consequently lead to wastage of invested resources. One of the major cause is inadequate examination and understanding of the intended changes in relation to the needs and effects on both human and non-human factors [17]. The human factors are more challenging compared to the technical elements in any given system [16]. This has seen implementers of change systems, such as system analysts and developers underrate or out rightly ignore human factors when planning for change. Instead, the mostly concentrate on the feasibility of the technical dimensions on the change system. Basically, this results in a misalignment of the desired change and the actual implementation processes, leading to controversies and execution issues and eventually failure in attaining the desired goals and objectives [17].

In relation to human factors, Alotaibi et al. [18] identifies user experience, user awareness and trustworthiness as the key components that can impede the successful adoption or implementation of digital technologies. According to Newman [19], trust is a vital component that influences users' enthusiasm in accepting new technology. Also, there exists a substantial correlation between trust and the adoption of a new technology [12]. Besides, there is also a compelling positive correlation between an individuals' acceptation to use new technologies and trust [12]. Hence, trust is a critical cog in the wheels of social and economic communications and interactions. Lack of trust hinders the introduction and embrace of new technologies is a substantial barrier and challenges for the introduction of new technologies [19]. For example, Alotaibi et al. [18], recommends that for any government to motivate and encourage

its citizenry to uptake online services, it needs to build mutual trust first. This can be realized by the government concentrating first on fulfilling positive short-term outcomes, which progressively builds users' trust towards fully implementation of the plan, upon accomplishing full trust [12].

User experience defines individual involvement or exposure to a specific device, application or system, which leads to the acquisition of cumulative skills and understanding of the system, device or application [13]. User experience plays a compelling role in an individuals' acceptance and continued use of the new technology, especially if it is beneficial [18]. The real successful achievement of a new technology is its continuous usage, rather than just its initial or temporary use. Temporary or low level application of these new technologies can delay the deployment and acceptance of these initiatives, including government-led ones [14]. In situations where a country has a high rate of user experience acceptance, the uptake of new technology is also high. Alshehri and Drew [12], note that in such cases, the users are very comfortable in quickly accepting and adopting new information systems, particularly if they acquire sufficient knowledge on how to utilize the new technology.

Finally, a lack of awareness is yet another element hindering the uptake of new technologies [13]. The government in conjunction with private and academic institutions should focus on creating awareness on the execution of new technology as means of motivating and encouraging public adoption [12]. User awareness is indeed significant when introducing new technologies, systems or devices to any user environment. Alotaibi et al. [18], note that user awareness is considered a key factor in introducing new information systems in developing nations, such as KSA. Thus, the promotion of awareness programs via training and targeting top management in organizations and government agencies should be promoted. Once these top-tier stakeholders have grasped the crux of the new technology, they can then positively influence the rest of the employees' attitudes towards technology adoption [14].

Cyber Attack

Technical factors, although ostensibly minimal in affecting the implementation of digital transformation, is still a big concern for any country [4]. Bell [20], points out that one of the notable technical factors responsible for slowing down or delaying KSA's rate of digital transformation is cyber insecurities or cyberattacks. In fact, Bell [20], opines that the occurrence of cybercrimes in KSA will probably double in the next two years and will result financial costs with 2020 projected at about $ billion. Saudi Arabia's attractive market and fast-growing economy makes it a key target for cyber criminals. This is coupled with the proliferation of financially wealthy individuals making cybercriminals' engagement in the vice quite lucrative [20]. Unfortunately, the country also lacks requisite technical capabilities and supportive legal legislation and laws to effectively combat cybercrime. Likewise, there is also poor awareness among it citizenry on matters related to IT security and safe internet use [21]. Lastly, the country is an emerging economy and still at its formative stages in digitization matters in comparison to more established global economies such as Japan or the United Kingdom [22]. Concisely, cyberattacks and cybercrime create dire consequences, which extensively negate the country's economic gains and operations across all sectors – both in private and government.

While the rates of cybercrime and cyberattacks are growing exponentially worldwide, Bell [20], indicates that KSA is one of the countries with the highest growing rates of these attacks. For instance, in 2017, Bell [20], reports that the country experienced a 35% surge in cyberattack cases from 2016. This has resulted in the country incurring higher costs (approximately 6-8%) compared to its neighbors in the Middle East [20]. Surprisingly, such cyber insecurity events are yet to trigger organizations (both public and private) in enhancing their investments in appropriate cybersecurity frameworks, both in terms of technology and personnel. Bell [20], indicates that in KSA average investment by organizations on cybersecurity capabilities, training and awareness is nearly 60% lower in comparison with the financial outlay undertaken by similar entities in developed nations. Such scenarios (high rate of cyber-attacks), compel the normal technology user in KSA to deem it unsafe to use, especially if it concerns new technology adoption. The notion and fear of sharing personal information via internet platforms and digital devices has seen seemingly innovative services, such as cashless financial systems, have a slow uptake the general user in KSA. This implies that security of devices, data and information forms an essential component that greatly persuades the adoption of new technology [18].

Digital Transformation and Vision 2030

Saudi Arabia's government has identified digital transformation the key driver for realizing their Vision 2030 agenda [23]. This has seen organizations and institutions, both public and private revolutionize their internal management processes, procedures and cultural practices to align themselves with the vision program [7]. Therefore, it is imperative that all businesses operating in the country embrace digital transformation or lose their competitive advantages and eventually risk exiting the Saudi market. Al-Helayyil et al. [24], notes that the rise of the digital

economy has triggered new business models and companies that are disrupting the traditional or conventional models and creating totally new niche markets. A vivid example is the transformation of digital photography that saw the fall of household names such as Kodak; e-commerce where online companies such as Amazon and E-bay have overtaken brick-and-mortal firms such as Walmart in consumer retail; taxi hailing, where companies such as Uber have deployed apps and grabbed a substantial market share from established taxi companies without owning a single taxi; YouTube, Netflix and iTunes have totally altered the film and music industry; and finally TripAdvisor and Airbnb have completely revolutionized the tourism, travel and hospitality industry globally [15]. The entry of such global disruptive companies, who have embraced digital transformation, into the Middle East market has threatened the existence of traditional companies in the region [4].

Nonetheless, all is not lost as long as these companies have a change in organizational readiness and ensure their personnel is willing to accept change and the digital transformation [16]. Vandeweerd et al. [17], caution that the continued operation of closed systems among companies that shun changes will not operate effectively in the current digital world, rather they should be flexible and adopt an open system. In addition, for companies to embrace this readiness for digital transformation, the stakeholders need to create awareness, motivate their personnel, and provide education through employee promotions, regular training, and offering financial incentives [17]. Nowadays employees perceive most organizations as learning and career growth institutions that play a crucial role in readiness for transformative change.

In 2016, Saudi Arabia launched its Vision 2030 agenda as a path for transformative and revolutionary change geared towards a post-oil economic era [7]. The aspirations of this initiative are to expand Saudi Arabia's sources of economic income and transform its economy. It is a comprehensive project that encompasses all sectors of the country's economic structure [24]. In June 2016, the cabinet ratified the NTP as the interim project geared towards achieving the outlined objective of Vision 2030 [7]. To ensure the eventual actualization of Vision 2030 and the fulfillment of all goals set, the Saudi has outlined the following objectives: a cutback in public spending via the exertion of more effective and efficient utilization of public resources; enhancement of the nation's World Economic Forum's yearly ranking on Global Competitive Index, (from the current position (25) to within top ten) by 2030; the reduction of the unemployment rate from 11.7% to 7 % by 2030 through the creation of more and better job opportunities for the citizenry; and expand the country's sources of economic revenue and income through digitization of the economy, creation of an attractive and competitive economic environment for foreign and local investors and privatization of most of its state-owned corporations, hence reduce the country's reliance on oil [24]. All these is founded on the successive implementation of the country's digital transformation and a core strategic approach to accomplishing the Vision 2030 goals [23].

Research Question

1. What is the status of digital transformation in Saudi Arabia's educational institutions in general and the Universities in specific?
2. What areas do they need to concentrate on to successfully achieve the digital transformation goals?

Aims and Objectives

General Objective

To identify the major challenges and hurdles that the universities could face in successfully implementing the digital transformation plan and in relation to their readiness for change as outlined in the Vision 2030's national education plan.

Specific Objectives

1. To show a concise picture of the current state of digitization in Saudi Arabia's universities.
2. To identify areas where both government and private universities need to focus on to adopt and successfully actualize the digital transformation
3. To identify the weaknesses and strengths of KSA educational institutions' preparedness for digital transformation.

Methodology

The proposed methodological approach for this research study is the qualitative case study. Creswell [25], explains this methodology as "the study if an issue explored through one or more cases within a bounded system (i.e. a setting,

a context)" [p. 73]. The researcher will employ the method to scrutinize various cases and adduce exhaustive descriptions. Furthermore, the researcher will employ interviews inform of questionnaires, as the preferred data collection mode, to accomplish the objectives of the study and answer the research question. This will entail the researcher distributing the research questionnaire to 50 employees derived from both government and private universities' IT departments located in Jeddah, Riyadh and Makkah. The questionnaire will comprise two major sections. The first section, the researcher will seek to capture the participants' level of understanding of the principles of digital transformation and its related concepts. In the second section, the researcher will pose relevant questions aimed at accomplishing the objectives of the study. The researcher will employ multiple choice questions that will include the following options: strongly agree, agree, disagree, and strongly disagree.

Moreover, the researcher will collect additional data by interviewing 10 IT experts from two Saudi Universities to validate information gathered via the questionnaires. The researcher will use semi-structured questions to gather this information from the IT experts. The researcher will select these experts based on their understanding and mandate for implementing the universities' vision in and in tandem with Saudi Arabia's vision 2030. In terms of data coding, the researcher will adopt a deductive approach. For data analysis, the researcher will utilize the qualitative technique, which will incorporate case narrations, identify thematic areas in the cases and even examine possible cross-case themes. This analytical approach ensures that the researcher will have practical, exhaustive experience with a rich array of data collection techniques that are not only flexible to use, but also provide for adaptation to the case problem and scenario.

Conclusion

Concisely, digital transformation is a comprehensive process that combines ICT processes, such as disruptive technology including Big Data, IoT and AI and a robust strategy. Any entity, be it an organization or country and within the public or private sectors needs to consider both technical and human factors in effecting its digital transformation. The technical factors include the functionality and security elements of the change system, while the human factors entail user experience, awareness and trustworthiness. Any mismatch between the transformative agenda and addressing of user needs may result in failure. Additionally, digital transformation represents a change in the organizational processes and operations, which may be resisted by the targeted adopters based on the human and technological factors outline earlier. This poses a significant challenge to organizations and must devise ways to overcome them. Ideally, an organization or government needs to match its needs for digital transformation and the appropriate human and technological factors to successfully achieve its digital transformation.

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Study on Essential Digital Leader's Skills in the Process of Digital Transformation

Bianca Ioana TRIFAN
The Bucharest University of Economic Studies, Bucharest, Romania

bianca.dumitr@gmail.com

Marieta OLARU
The Bucharest University of Economic Studies, Bucharest, Romania

olaru.marieta@gmail.com

Teodora FOGOROS
The Bucharest University of Economic Studies, Bucharest, Romania

teodora.elena@icloud.com

Abstract

This paper aims to analyze the importance of a digital leader in the context of digital transformations and to sketch the "portrait" of an efficient digital leader as close as possible to help companies easily going through the process of digitization. To obtain relevant information, we will examine the existing literature, as well as the latest published studies on the impact of a digital leader in the implementation process. Furthermore, we will investigate in depth what are the sets of skills and essential characteristics that the digital leader should have, to find out later in this research how important the digital leader is in an IT company, including how much professional experience and technical knowledge matters to support a successful transformational process. For this purpose, a targeted questionnaire has been used to ensure that all results presented in this paper are based on real data, tested for statistical significance. We conclude the research with a set of conclusions meant to outline the importance of having a digital leader when the company goes through a process of digital transformation and also to provide a structured "portrait" of the digital leader (skills and essential characteristics).

Keywords: digital leader, digital transformation process, digital leader skills.

Introduction

Digital transformation has become an extremely important factor for the business environment in recent years. Businesses have begun to increasingly embrace the idea of transforming the way they operate, and those that have not done it yet are beginning to take it into consideration (Akhtar et al., 2018). The results of the Eurobarometer survey show that most respondents believe that digital transformation has a positive impact on the economy (75%), quality of life (67%) and society (64%) (European Commission, 2017).

Meanwhile, the International Data Corporation estimates that, by 2022, worldwide, $2 billion will be invested in technologies and services that will allow the opening to a digital transformation, the transformation in this direction of business environment being inevitable (IDC, 2018).

But what does digital transformation really mean? The process refers to the strategical adoption of digital technologies with the final purpose of improving processes and productivity, delivering better customer and employee experience, managing business risk and controlling costs (IDC, 2018).

Digital transformation is the process of rethinking the business model or business process in the light of the availability and accessibility of digital technology. This can be done by using digitalization that refers to the analog information that has been digitized and that can be integrated and then used in various software applications with good premises for automation. On the other hand, digitization is the transition from analog to digital formats or simpler said, the process of collecting all available and then accessible information in a digital format.

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For many businesses today, the main motivation for digital transformation is the chance to gain competitive advantage by improving the customer's experience (Dumitrescu & Buzatu, 2020). Though, it is necessary to understand that digital transformations imply both risks (pressure for employees, lot of requirements) and opportunities (innovation, job enrichment), which requires a holistic approach focused on needs (Grab et al., 2020).

Since seeing the advance digital transformation has gained, as well as the challenge of proportions that it represents for organizations, it is inevitable to what are the critical factors that can help organizations turn the implementation of this process into a success.

First, we'd like to affirm that the biggest challenge is to innovate for the future and *not* digitize the past (Boros, Dumitrescu, & Burtica, 2018). That is why digital transformation is first and foremost a leadership challenge! A leader needs to inspire and empower teams and employees with a skill set and a digital mindset. Some authors in their paper (Scuotto et al., 2017) concluded that the digitization of businesses emergences the implementation of new business models and may also have repercussions on the relationship between the organization and its customers. This means as well that the communication between organizations and customers increased due to digitalization, meaning the exchange of data between them is easier (Papa et al., 2018). All these changes represent a challenge and have the ability to create tensions between old values and procedures, which in the end may represent an obstacle in implementing new technologies (Del Giudice, 2019). It's all about a strategic process of change that transforms an organization's business models, about how it creates value for its customers or citizens, and how it captures that value; that is, how it monetizes it. It seems that companies which are able to grasp the challenges brought by digital transformation are as well able to provide a new value proposition to their customers, for a better and reliable data management (Grab et al., 2019). For this transformation, a change in the skills, competencies and in the cultural DNA of the organization is needed. Learning and organizational culture are, in fact, critical factors of digital transformation. At the beginning of the digital revolution this was a technology topic, then it became a business topic, and today it is primarily a leadership topic (Cortellazzo, Bruni, & Zampieri, 2019).

For a deeper understanding, we would like to make a comparison between surviving in a jungle versus where we live today. The difference stands in the fact that the jungle is based on a process of *evolution*, in which you can anchor yourself to predictable landmarks. What we are experiencing today is a *revolution*, and the reason why we can call it a revolution is precisely that we lack the predictability of benchmarks, especially those that impact at a societal level as well organizational. No industry, no company, no individual is immune to the threat of being disrupted. Down to the personal level, being relevant in a digital world is the main challenge encountered.

Organizations which are facing digital transformations, and which had big expectations benefits related to business and customers have failed because they collided with the organization culture (Wokurka et al., 2017). Reorienting leadership in this world does not mean that traditional skills have been suppressed, but now they coexist within a mixture of new factors. Namely, to be a digital leader, one must become fluent in digital: developing new digital skills, experimenting and taking risks and understanding how technology transforms society and translates into impact on business (LearningPro, 2020)

What We Understand by A Digital Leader

In their article, Leonardus & Sasmoko discuss about the importance of leaders in developing innovative business models, especially in the context of digital transformation, considering them digital leaders (Leonardus & Sasmoko, 2019). Thus, the digital leader, involves a combination of the transformational leader's leadership style and the use of digital technology. Despite the fact that having a role of digital leader includes the usage of technology, the focus is still on strategy, structure and understanding the customer's needs (Briggs, J.,). Digital leadership is defined as the combination of a leader's culture and competence in optimizing the use of digital technology to create value for companies, while the key success factors for digital leaders are the visibility of the executive and supervisory committee, digital transformation being seen as the core and control (Sahin Danisman, 2015). In this context, the digital leader is assigned five essential characteristics to complete the transformational process - the leader must be *creative*, *thoughtful*, *visionary*, *inquisitive* and at the same time a *deep leader* (Zhu, 2015).

What are the steps that a digital leader should take to obtain a successful digital implementation?

In 2018, Deloitte developed a digital transformation scheme, designed to help global interpreters assess their current status in the digitization process, ask the right questions and define the steps they need to take.

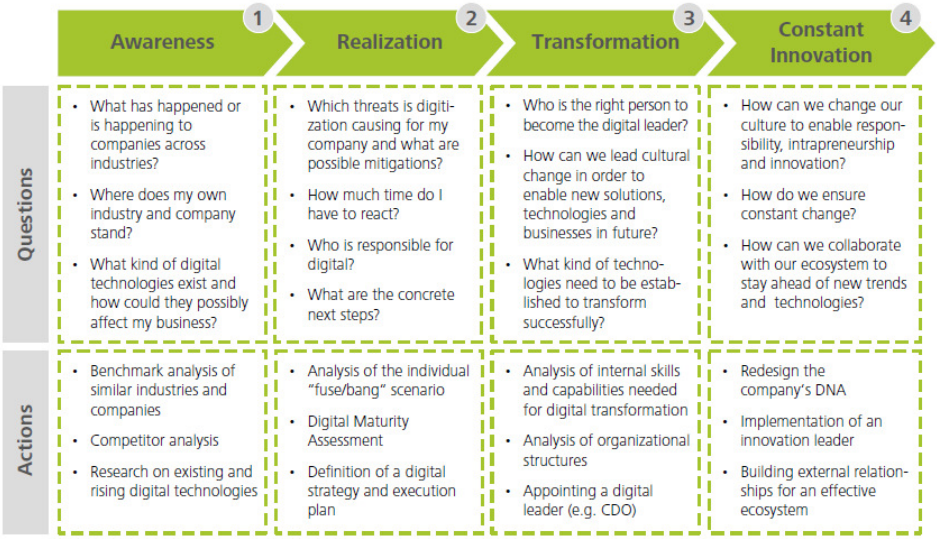

Figure 1: The stages of the digital transformation process

Source: Deloitte, 2018. Survival through Digital Leadership

First of all, the company digital leaders must be aware of the changes that digital transformation will cause, they must realize the specific impact on their business model, to define what are the steps to be taken for this transformation, to allow permanent change and innovation. While the first three stages shown in the figure 1 ensure survival, the fourth stage is necessary to create a sustainable future-value for the business.

In all four stages, the organization and its people are the critical success factors for the digital transformation. Cultural change within the organization is a necessary condition for creating opportunities and making room for innovation, and these can only be guided by a dedicated digital leader. The digital leader understands and respects traditional processes and structures and has the power, knowledge and charisma to adapt them for the company's digital future (Deloitte, 2018).

Therefore, the role of a digital leader is essential in leading the decision-making process as promptly as possible, but also in order to drive change of any kind (SCMedia, 2020). And to be able to drive this change, one of the main steps a digital leader must take is to build on the resources he has, starting with the human resource (VantageCircle, 2020).

Current state of adoption of a digital leader in companies during a digital transformation process

As digital transformation currently is at its infancy for many industries, it is very important for organizations to learn from the top digital performers in their field and then change and adapt in order to succeed (Martinez-Caro et al., 2020). One of the reasons that rather few companies have a well-defined digital strategy is that at the C-level / management team there are no leaders with digital skills: 72% of the board members do not have digital skills - cf. Russell Reynolds Assoc.; they support caution and not innovation, and the impact on organizations is harsh. This effect is called 'digitally illiterate leaders' (Russell Reynolds Associates, 2019).

According to a report made by McKinsey Digital (McKinsey & Company, 2018)., digital performance and digital leaders are key elements for companies to remain competitive on the market.

Hence, it was noticed during the time that we are in the very early days of digital transformation and, as a consequence, it is normal that digital leaders "outperform their digital followers and digital laggards in the sophistication and quality of their Digital Quotient" (McKinsey & Company, 2018).

Nevertheless, the adoption of the digital leader inside any company that faces a digital transformation process is part of the management strategy. Based on recent research, team leaders are challenged to pay more attention in understanding both how technology is able to increase the process quality and how can the human resource become part of the digital implementation process, by building a good knowledge base (Fogoros et al., 2020). Paul Willmott proposes three important steps that should constitute the base of any process from any company who intent on getting involved in a

digital transformation process. First, it is the alignment between overall corporate strategy and the digital initiatives the companies are perusing. Second, is the ability of driving a fast and agile culture through the help of digital leaders. Third is getting the right organization factors in place (talent, people, processes, structure, and systems that really make a difference when it comes to performing in this new world) (McKinsey & Company, 2018).

In theory these should be the key elements for success. But because studies regarding the adoption of digital leaders (second step proposed by Paul Willmott) in digital transformation processes are very limited and that there is no evidence or enough data, it's hard to conclude that the success of digital transformation process comes from the adoption of a digital leader (with all the skills and characteristics with which it must come bundled) (Hamill, 2019).

This is the reason why this paper proposes and analyzes a series of skills and characteristics attributed to the digital leader, and also the way in which he/she is seen and placed in the transformation process by the employees of the companies directly affected (either managers or individual contributors).

Research Objectives and Methodology

Research Objectives

The paper's research objectives:

1. See how the digital transformation process is being perceived inside surveyed companies in Romania and how important it is for both organizations and employees;
2. Essential characteristics for a digital leader - the surveyed companies' opinion in Romania;
3. Outline the "portrait" of a digital leader with all the knowledge he or she should have to sustain a successful digital transformation.

Research Methodology

We start with a survey of the current literature regarding the importance of a digital leader in a digital transformation process.

Given that there is not enough data on the effects that a digital leader has on a company that goes through a process of digital transformation, and neither on the skills and main characteristics that the digital leader should have to be able to lead a process of transformation, the approach used in this paper is that of the questionnaire. The aggregation of responses to targeted questions should either provide supporting evidence regarding the digital leader and its characteristics and role in the transformation process, or, contrarily, infirm the authors' hypothesis.

The questionnaire was created on an online platform to be accessible and easy to use and includes 13 research questions. The survey was filled-in by 183 professionals (both managers and non-managers), most of them coming from companies with an IT profile in Romania, during a four-week period in August 2020.

The number of responses is sufficient to draw statistically significant conclusions. All questions were subjected, depending on their type, to appropriate statistical tests. Whenever a test fails to meet the threshold, the implications of that question (or part of question) is ignored.

183 people from different companies familiar with the concept of digital transformation and who have a technical profile (both managers and non-managers) answered the questionnaire.

The first questions establish an understanding of the respondents' positions, from both managers (55.74%) and non-managers (44.26%), all participants having higher education and ~10% of them being MBA graduates (this was not a question; the questionnaire was directly given to an MBA graduate class). The other questions are related directly to the paper's research objectives.

Study results on perception of the digital transformation process in the surveyed companies in Romania

First, we choose to understand the importance of digital transformation and the importance of the role of the digital leader in such a process.

Thus, according to the responses received in our questionnaire, over 95% of respondents feel that digital transformation is an important process (32.79% agree and 62.3% strongly agree). Only 3 persons don't have a preference and 6 persons (3.28%) strongly disagree.

Regarding the question "For a company that is going through a digital transformation process, how important do you consider the digital leader to be?", almost 97% answered it is important (27.87% important and 68.85% very important), and only 3.28% say that the leader has an average importance. Nobody considers the digital leader as unimportant. Given the number of samples, the results are statistically significant.

Therefore, the conclusion we draw from these questions is that both the process of digital transformation and the presence of a digital leader to facilitate this transition are important for a business to be successful.

Study results on essential digital leader skills in the surveyed companies in Romania

Starting from Zhu's statement (Zhu, 2015) – referred here-on as 'current literature' – that the essential characteristics of a digital leader are to be creative, thoughtful, visionary, curious and at the same time a deep leader, following the research we can conclude:

The respondents were asked to rank a number of 13 skills/characteristics by reordering them: the first row represents the most important skill to have, down to the last row which is the least important. Each time a characteristic was placed first it got 13 points, while the last one got 1 point. Figure 2 shows the weighted scores for each of the 13 skills. Please note that every respondent got a randomized placement of the skills in his questionnaire to eliminate positional bias.

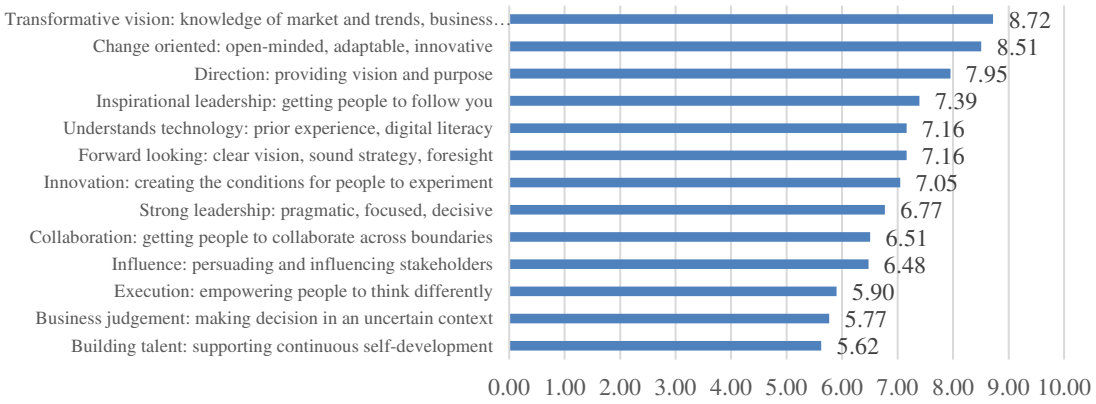

Figure 2: Weighted average of skill preference. Source: Authors' own research.

Out of 13 skills / characteristics presented in the survey to the participants, the first 6 were selected by them as the most important ones (we selected the top 5 as Zhu, but the 5th and the 6th skill obtained the same weighted score, so we included both in our current analysis):

1. Transformative vision: knowledge of market and trends, business acumen, problem solver
2. Change oriented: open-minded, adaptable, innovative, creative
3. Direction: providing vision and purpose
4. Inspirational leadership: getting people to follow you
5. Understands technology: prior experience, digital literacy
6. Forward looking: clear vision, sound strategy, foresight

Before drawing any conclusions, we analyze these skills regarding statistical significance. In table 1 we summarize our findings regarding significance, obtained by applying the single sample t-test.

Table 1:Two-tailed, single sample t-test, with the population mean μ = 7, significance at p<.05. Source: Authors' own research.

t-test	t-value	p-value	Significant at p<.05?
Transformative vision	6.403271	< .00001	**Yes**
Change oriented	5.722189	< .00001	**Yes**
Direction	3.608387	.000398	**Yes**
Inspirational leadership	1.419777	.157383	No
Understands technology	0.542344	.588245	No
Forward looking	0.57823	.563824	No

Looking at the results we see that only our top 3 skills are discussible, as we have enough samples to safely affirm (>95% confidence) that these skills are representative for the entire population.

Returning to current literature, the 5 attributes chosen by the survey participants confirm some of the skills mentioned by him but also come with others that are new.

Digital leadership is classified into five characteristics:

1. Thought leader, having the capability to be tough in facing market and competition change;
2. Creative leader, having the creativity and innovation mind set to formulate the idea into reality;
3. Global visionary leader, being able to provide direction and become an orchestra in transforming the digital business transformation;
4. Inquisitive leader, having learning capability to face complex and dynamic ecosystem due to volatility, uncertainty, complexity and ambiguity (VUCA) factors;
5. Profound leader, having in-depth knowledge and comprehension to make interpretation, assumption and synthesizing of information in making decision.

The top three characteristics that a digital leader should have, identified in the current literature (Zhu, 2015) and by this study are compared in Table 2.

Table 2: Skills of a digital leader. Source: Authors' own research

Skill	Current literature	This study	Comments
1.	Thought leader, having the capability to be tough in facing market and competition change	Transformative vision: knowledge of market and trends, business acumen, problem solver	In face of a changing market you need to be resilient, meaning thinking everything very well (Zhu); having knowledge about the market and having business acumen (our study). We argue that these 2 definitions are overlapping enough, while different from the other skills/characteristics to be considered similar.
2.	Creative leader, having the creativity and innovation mind set to formulate idea into reality	Change oriented: open-minded, adaptable, innovative, creative	A digital leader needs to be creative in face of a fast-changing market, has to be innovative and adaptable. These 2 definitions are similar.
3.	Global visionary leader, being able to provide direction and become an orchestra in transforming the digital business transformation	Direction: providing vision and purpose	For both, providing direction is essential for a digital leader.

Regarding the fourth and fifth different characteristics identified after our study and the literature, we cannot compare them because our results for these positions are not statistically significant.
Another interesting way to look at the findings is by selecting the first three choices of each person. Figure 3 shows that as a first choice, Transformative Vision is by far the most selected as the top choice, with 21.32% of respondents, which is a rather expected result. However, for the second choice, Inspirational Leadership, while getting mostly voted in the second place with 18.03% of respondents, in the overall weighted score it only ranks fourth. The third choice becomes even less evident, with Direction (11.48%) that makes it in top 5 and with Innovation (11.48% as well) that does not make it.
Testing whether the 1st choice result is statistically significant, the probability that the observed proportion of 21.32% comes from a population not equal to 7.69% (which is what random chance would yield choosing one of the 13 choices) is <.00001%. The 95% Adjusted Wald Confidence Interval is (15.97%, 27.83%). The second choice obtains a 95% CI interval of (13.1%, 24.28%), so it is statistically significant; the third choice however is not: it obtains an interval of (7.56%, 16.97%), meaning that the true mean of the population, with 95% confidence, lies in this interval, including our random chance choice of 7.69%.

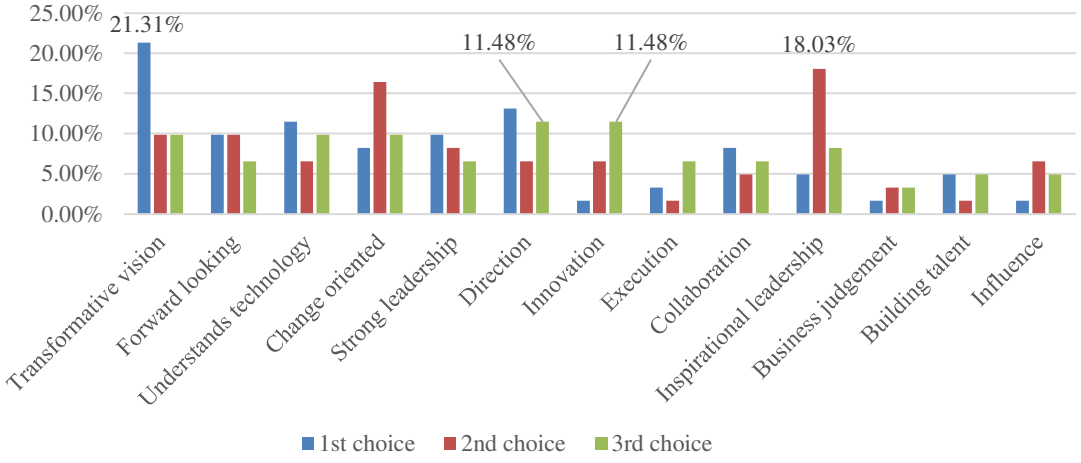

Figure 3: Preference proportion for each skill as being chosen 1st, 2nd or 3rd. Source: Authors' own research.

Study results on digital leader "portrait" in the surveyed companies in Romania

The final objective of this paper refers to the shaping of the "portrait" of the digital leader. Let's continue to sketch the portrait by looking at what people answer to the remaining questions in the survey. For the question of "Is technical knowledge important for a digital leader to succeed?", 73.77% answered affirmative (54.1% agree and 19.67% strongly agree); 14.75% are neutral with 11.48% saying that technical knowledge is not important (6.56% disagree and 4.92% strongly disagree).

Next, "The leader's previous experience is important in order for him to achieve a successful digital transformation," was confirmed as being important in proportion of 68.86% (9.8% strongly agree and 59.02% agree), 22.95% are neutral and 8.2% disagree.

In conclusion, both technical knowledge and previous experience (the second one a bit less important than the first one) are essential in shaping the portrait of an ideal digital leader.

This result came as a surprise for the authors of this paper because the responses were different from what we expected. Initially, from numerous discussions had with managers, people involved in digital transformation processes, reading of various specialty literature, we were most likely to believe that technical knowledge is not that important when it comes to be a digital leader. Nevertheless, according to our findings it seems that statistically this feature matters.

The same goes for the question that refers to the importance of the leader's previous experience. Our belief was that the previous experience is very important for a digital leader to have when it comes to such a big project that involves numerous changes, affects budgets, headcounts, organizational structures and so on. But results showed us that this characteristic is important to have (59.02%) and it is not very important (only 9.8%).

Going further to the next question relevant for our study, that has the purpose of determining the exact leadership style that goes hand in hand with the concept of a digital leader ("Which leadership style do you think best suits a digital leader?"), we found that 65.57% opted for a "transformational leadership" style, followed by "participatory or democratic" style with 24.59%. The results for the next four leadership styles were seen as not being important by the respondents therefore there will not be analyzed but only mentioned („Laissez-faire" leadership, transformational leadership, charismatic leadership and authoritarian or autocratic leadership).

This means that people associate the concept of digital leader with the person that can inspire employees to embrace and create change without micromanaging. It's a management style that is designed to give employees more room to be creative, look to the future and find new solutions to old problems (White, 2018).

The last step in outlining a more accurate profile of the digital leader is the question referring to the actions that a digital leader should take both in business and in relation to people in order to ensure a successful digital transformation. As such, to the question "A digital leader will more likely … (choose the option that you consider the most appropriate one)" the respondents had to choose between two options among 5 criteria. The results are as follows – a digital leader will:

- Use data driven analysis (93.44%)
- Set vision and not aspiration (83.61%)
- Develop customer or citizen-based strategy (73.77%)
- Outline coherent action (85.25%)
- Focus on outcomes (73.77)

Table 3: Choice between the first or second sentence completion. Source: Authors' own research

A digital leader will more likely …			
First option	Response percentage	Second option	Response percentage
Use data driven analysis	93.44%	Use subjective analysis	6.56%
Set vision	83.61%	Set aspiration	16.39%
Develop customer or citizen-based strategy	73.77%	Develop inside-out plans	26.23%
Outline coherent action	85.25%	Outline disjointed performance programs	14.75%
Focus on outcomes	73.77%	Focus on outputs	26.23%

Results & Discussion

By taking into account the results analyzed above, when a company would like to hire / assign a leader able to lead both a digital transformation process as well as his/her team, it is mandatory to look after the following characteristics and skills:

1. He/she must have a transformative vision. Meaning that he/she should have a great understanding of market and trends, business acumen and being a problem solver;
2. Also, this person must be change oriented. This means that skills like open-minded, adaptable, innovative, creative are desirable to have when we talk about a digital transformation leader;
3. Direction. He or she should provide vision and purpose;
4. Should have a decent amount of technical knowledge;
5. Should build upon previous experience in handling digital transformation processes.

What is important to be mentioned following this result is that if the first three characteristics are required for a digital leader to have, the last two are preferable but not mandatory.

The leadership style that is expected from him to apply is the transformational one while the actions recommended for a digital leader to embrace while going through a digital transformation process are to use data driven analysis, set vision and not aspiration, develop customer or citizen-based strategy, outline coherent action and focus on outcomes.

Conclusions

This paper aimed to analyze the importance of a digital leader in the context of digital transformation and to sketch its "portrait", meaning summarizing the key skills and characteristics needed to lead a successful digital transformation in Romania.

To compare to current literature and do so with confidence, we created a survey with targeted questions. Its results mostly confirmed our hypotheses, but some were surprising. We collected a significant number of responses (183), most of them coming from people that are working in the organizational environment both managers and non-managers. We draw the following conclusions:

C1. We have established that the digital transformation process is important not only for the company but also for its employees. We determined that the digital leader is a key piece in this process and that every company, team, business in general, that goes through a digital transformation should benefit from the support of a digital leader.

C2. According to (Zhu, 2015), a digital leader must be thought, creative, visionary, inquisitive and at the same time a profound leader.

Analyzing our survey, we were able to establish statistical significance for top 3 (of 13) skills/characteristics that a digital leader should have. These are: Transformative vision, Change oriented and Direction.

We argue that Zhu's top three characteristics have been chosen in the exact same order as by our respondents: while our definitions and Zhu's do not match word-for-word (Zhu outlines 5, we propose 13 more finer-grained ones), interestingly, the top three for each overlap well enough to be considered similar.

C3. We outlined the ideal "portrait" of the digital leader and determined the essential skills and characteristics that he/she should have.

C3.1. Digital leader's skills and characteristics:

Must-have skills

1. Transformative vision: knowledge of market and trends, business acumen, problem solver
2. Change oriented: open-minded, adaptable, innovative, creative
3. Direction: providing vision and purpose

Preferable to have skills

4. Technical knowledge, while important to have, surprisingly is not thought as critical
5. Previous experience in handling digital transformation processes

C3.2. Leadership style applied by digital leaders

Following our study, we identified that the leadership style that best suits a digital leader and that offers best results is the transformational one, followed relatively far by the participatory or democratic style.

C3.3. Going deeper, the study showed us that after establishing what are the characteristics and skills that we are looking for a digital leader to have and after making sure that the leadership style applied by him/her is transformational, it is important to also look at the actions that he/she is going to take after being in a leading position.

The data revealed that is essential for a digital leader to:

1. Use data driven analysis, rather than subjective analysis
2. Set vision and not aspiration
3. Develop customer or citizen-based strategy, rather than inside-out plans

4. Outline coherent action, rather than disjointed performance programs
5. Focus on outcomes, rather than on outputs

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Data Analysis for Gaining Insights on Customers' Awareness About Quality of The Fish and Fishery Products

Stefan M. PETREA*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, Domneasca Street, 800008, Galați, Romania; stefan.petrea@ugal.ro; petreastefanmihai@yahoo.com

Dragos Sebastian CRISTEA
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration, 800008, Galați, Romania; dragoscristea@yahoo.com; dragos.cristea@ugal.ro

Liliana MOGA
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration, 800008, Galați, Romania; liliana.moga@gmail.com

Alina MOGODAN
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; alina.antache@ugal.ro

Ira A. SIMIONOV
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania and "Dunărea de Jos" University of Galaţi, Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; ira.simionov@gmail.com

Aurelia NICA
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; aurelia.nica@ugal.ro

Sarina ROSENBERG
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration, 800008, Galați, Romania; sarina17.rosenberg@gmail.com

Victor CRISTEA
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania and "Dunărea de Jos" University of Galaţi, Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; victor.cristea@ugal.ro

Abstract

The research targets to get information regarding the fish and fishery products consumption, preference and the factors that influence the decision to buy, in association with the socio-economic characteristics of the consumers and to make an assessment of how the availability of information related to the traceability of fish-based products would influence the intention to buy these products in the future. A number of 12 parameters are considered for the analysis. Also, considering the data related to fish consumption, three time series algorithms were used. The exponential smoothing forecast method registered the highest accuracy. The subgroup analyses of socio-demographic characteristics reveal the emergence of new types of consumer preferences. When the geographical availability of fisheries is considered, the gradual increase in importance of the hypermarket becomes more obvious. In this context, the high dependence on the offer of hypermarkets raises the risk of an impoverished consumer choice in the near future. Education and product diversification are determinant factors for improving Romanian yearly fish consumption rate.

Keywords: Traceability, Fish Consumption, Fishery Sector, Time Series Algorithms.

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Introduction

Fish consumption is influenced by many factors such as socioeconomic background, education level (Olsen *et al.*, 2007), age (Myrland *et al.*, 2000) (Honkanen, Olsen and Verplanken, 2005), religion and cultural traditions (Devadawson, Jayasinghe and Sivakanesan, 2015), but lately, consumers are very preoccupied about the health involvement (Pieniak *et al.*, 2008), food safety and fish quality (Opara and Mazaud, 2001), being even willing to pay a higher price for quality products (Verbeke, Vermeir and Brunsø, 2007). Consumers want to have access to all the information needed (product name, provenience, etc.) in order to be informed of the buying decision about fish and fishery products, but, in most cases, this information do not exist or are too scarce. In order to reduce the perceived risk associated with food consumption, many countries have introduced the Food Traceability System, which provides all relevant information about the food process, "from the farm to the table" (Choe *et al.*, 2009) (Bailey *et al.*, 2016). Thus, any insights related to the factors that can influence the evolution of the market would be highly beneficial for the stakeholders in order to come with up with the best strategies, approaches or technological investments (Carlucci *et al.*, 2015).

The aim of this research is to get information regarding the fish and fishery products consumption, preference and the factors that influence the decision to buy, in association with the socio-economic characteristics of the consumers and to make an assessment of how the availability of information related to the traceability of fishery products would influence the intention to buy these products in the future, in Romania.

Material and Methods

Questionnaire design and data collection

The questionnaires were distributed to random respondents from Romania, after previous pretesting, with a various socio-economic and demographic backgrounds, gender and age dispersion.

The 1st part of questionnaire is related to the demographic characteristics. First question was "*Do you eat fish and fish products*?". If the answer was "*No*" the questionnaire was ended. A total of 730 valid questionnaires were used in the analysis. Preferred type of fishery product and the preferred place to purchase these products (multiple-choice) was also asked.

In the research 34 demographic parameters are included, structured according to following criteria:

- Place where the customer lives: urban, rural;
- Level of studies: college, high school, university, PhD;
- Occupational field: industry, constructions, agriculture, distribution, services, education, health, administration or some other sector;
- Age: less than 30, between 30 and 40, between 40 and 55, greater than 55;
- Preferences on the place where the customer can buy fish products: hypermarket, fishery, market, proximity store, directly from producer;
- Fish products type preferred by the customer: living fish, fresh fish, frozen fish, semi canned fish, canned fish, and seafood.

The 2nd part of questionnaire is related to the factors which can influence the decision to buy fish and fishery products and also, regarding the influence of the availability of traceability information on the intention to purchase these products. Respondents indicated their degree of agreement or disagreement using a five-point Likert scale: *1 – disagree, 2 – neither agree nor disagree, 3 – slightly agree, 4 – agree, 5 – strongly agree*. In this section, 12 parameters are considered for the analysis, structured as it follows:

- Supply chain: Transporting Conditions, Storing Conditions, Processing Conditions;
- Traceability: InfoQualityPc, InfoQualityStore, InfoQualityMobile (the quality of information provided through computers, directly in store or via mobile devices);
- Provenience: Provenience, Growing Conditions, Feeding Conditions;
- Processing conditions;
- Price;
- Freshness.

Forecast Analysis

The current research forecast analysis of the Romania's fish consumption was based on three types of time series algorithms, respectively: a) ARIMA, b) LSTM, c) Exponential Smoothing.

Statistical Methods

Analytics procedures are used in order to discover useful information or suggesting conclusions that could support decision-making processes for different fish market players. Usually, because of the ordinal nature of the Likert data, it is not advisable to use parametric techniques to analyse it (Joshi *et al.*, 2015). Therefore, in order to perform analysis of variance we will use procedures like Mann Whitney or Kruskal Wallis test. Still, a Likert scale, composed of four or more Likert-type items that represent similar questions, combined together into a single composite score, can be analysed as interval data. In this context, parametric analysis is justifiable by the Central Limit Theorem. Therefore, several techniques that we can include are t-test and ANOVA.

Results and Discussions

The present research targets to statistically identify if there are differences between the scoring tendencies of people, for all the questions and all demographic attributes. Thus, Kruskal Wallis test is applied. For this, demographic data is structured differently, see figure 1. The following R code performs the data structure change for the Employment attributes:

```
#adding Employment
fisheryData$Employment <- "Pending"
#aggregate Employment
for(i in 1:nrow(fisheryData)) {
  if ( fisheryData$Employeed[i] == "Yes") {fisheryData$Employment[i] <- "Working"}
  if ( fisheryData$Retired[i] == "Yes") {fisheryData$Employment[i] <- "Retired"}
  if ( fisheryData$Unemployed[i] == "Yes") {fisheryData$Employment[i] <- "Unemployed"}
  if ( fisheryData$Other[i] == "Yes") {fisheryData$Employment[i] <- "Other"}
}
#drop employment
#remove employment columns
drops <- c("Employeed","Retired","Unemployed", "Other")
fisheryData <- fisheryData[ , !(names(fisheryData) %in% drops)]
```

Figure 1: Aggregating employment attributes under one column/attribute

After running the above code extended for each category, a new structure, for the demographic part of the data frame that will better fit our procedures, is created – see figure 2.

ResidenceType	Studies	Employment	WorkDomain	Age	FishType	Distribution
Urban	Highschool	Working	Services	40_55	CannedFish	DirectProducer
Urban	University	Working	Services	30_40	CannedFish	Market
Urban	University	Working	OtherSector	30_40	CannedFish	DirectProducer
Urban	University	Working	Services	30_40	LivingFish	Fishery
Urban	University	Working	OtherSector	Under30	Seafood	Hipermarket

Figure 2: R data frame structure for demographic attributes

The new structure is constructed around seven components that include all the demographic parameters taken from the questionnaire data. From the analytics/programming perspective it is good to have available both type of structures. One that has a column for each demographic parameter with values of "yes"/"no" or 0-1 and one that combines the parameters into their categories (figure 2). This was due to data analytics procedures, like clustering techniques, which are working best with numerical values because of the distance concept, while for classification or regression techniques there are methods that can deal both type of data. Usually, most of the data analysis starts with the data visualization. Thus R library called "Likert" is used, which was specifically designed to display Likert

specific data (Bryer and Speerschneider, 2016). This library provides plenty of visualization profiles from which we choose one that allowed grouping the responses for each demographic category.

```
library(plyr)
if(!require(devtools)) install.packages("devtools")
devtools::install_github('jbryer/likert')
require(likert)
#splitting the dataframe for better visualization
items_first <- fisheryData[, c(38:43)]
items_second <- fisheryData[, c(44:49)]
AgeLikert_Set1 <- likert(items_first, grouping = fisheryData$Age)
AgeLikert_Set2 <- likert(items_second, grouping = fisheryData$Age)
FishTypeLikert_Set1 <- likert(items_first, grouping = fisheryData$FishType)
FishTypeLikert_Set2 <- likert(items_second, grouping = fisheryData$FishType)
plot(AgeLikert_Set1,type = "density", centered = FALSE)
plot(AgeLikert_Set2,type = "density", centered = FALSE)
plot(FishTypeLikert_Set1,type = "density", centered = FALSE)
plot(FishTypeLikert_Set2,type = "density", centered = FALSE)
```

Figure 3: R code that uses Likert package for data visualization

The visualization, presented in figure 4, proves one weakness of likert scale questionaires: based on the overall culture and context they lived in, the respondents tend to favour more the upper part of the scale. Still, for the presented case there are also several cases that displays more variation in data, which probably will favour the results of some classification algorithms presented later on. Still, from the first look over the data, we would assume that there will be not to much success when applying classification procedures. Probably, the classifiers will predict well on 4 and 5 classes and quite poor on 1, 2,3 classes. Even so, it will be possible to compare and observe which algorithms will predict most acurately. Until than, it is possible to extract useful information based on the context where rates like 3,4 and 5 are favored most.

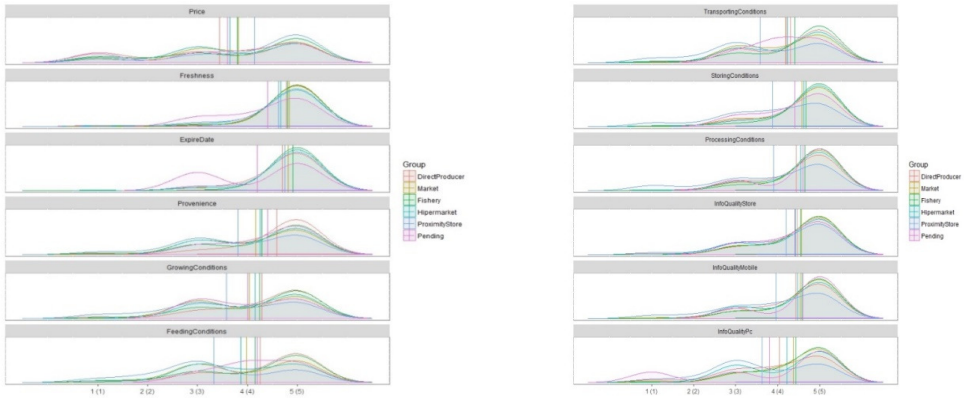

a. Data distribution based on distribution chanels

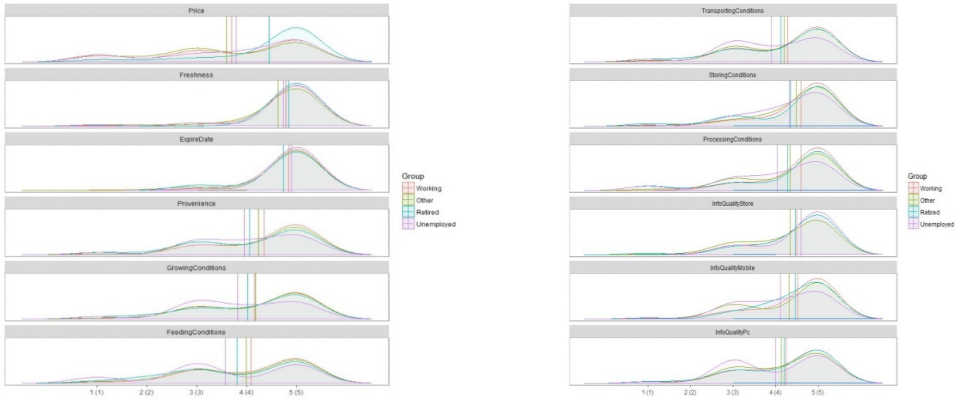

b. Data distribution based on employment

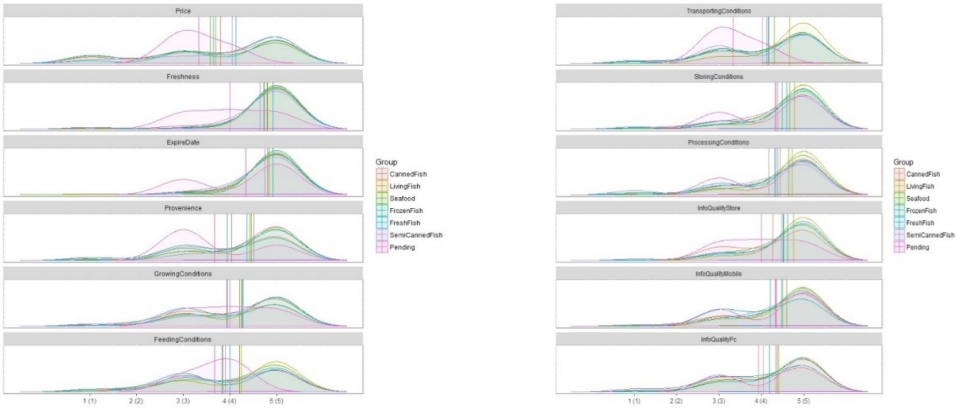

c. Data distribution based on fish type

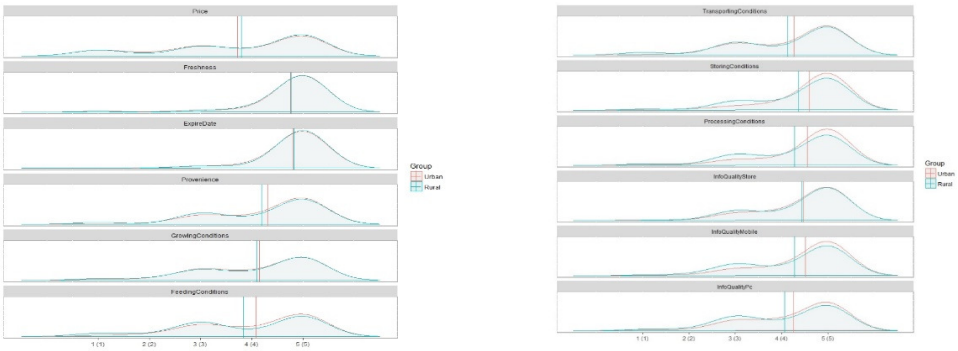

d. Data distribution based on residence type

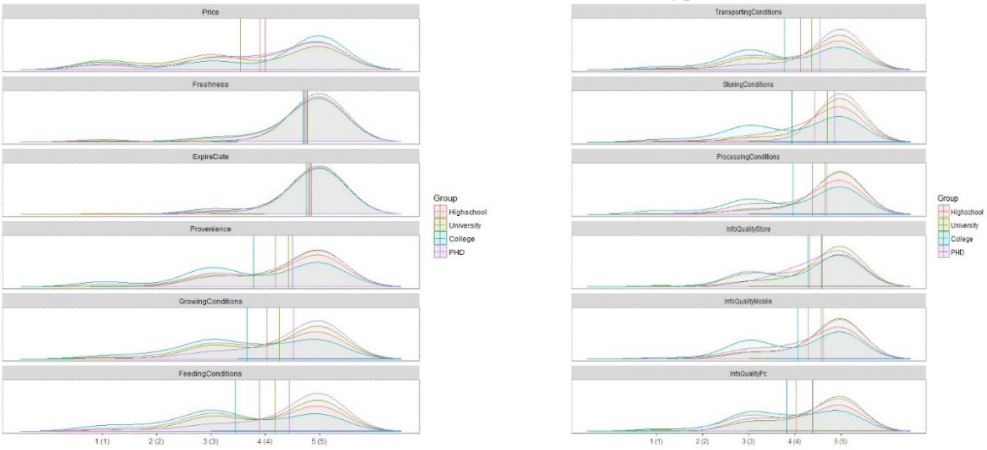

e. Data distribution based on studies

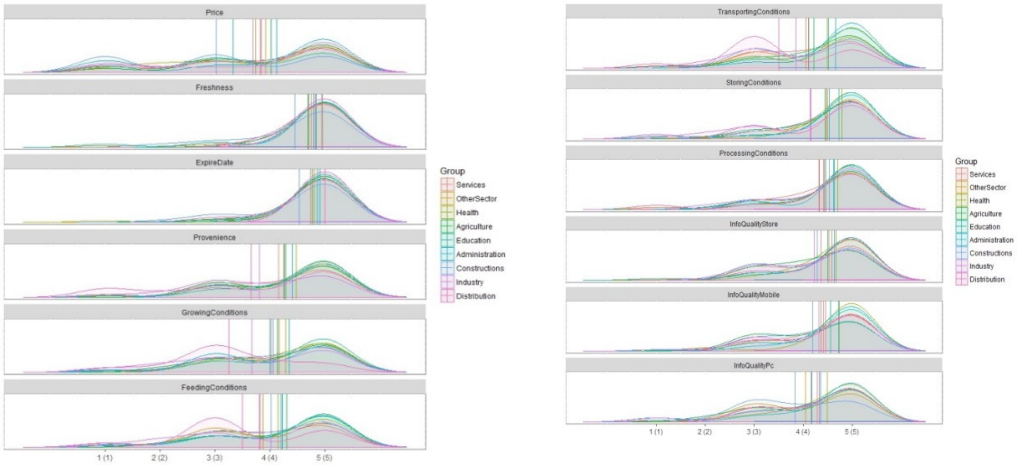

f. Data distribution based on work domain

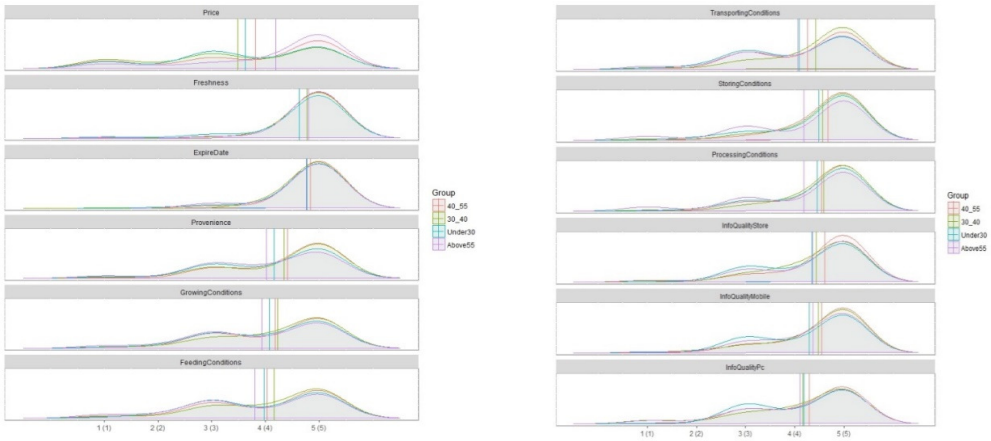

g. Data distribution based on age

Figure 4: Data visualization of the responses based on: a. distribution chanels (direct producer, market, fishery, hipermarket, proximity store, pending); b. employment (working, other, retired,unemployed); c. fish type (canned fish, living fish, seafood, frozen fish, fresh fish, semicanned fish, pending); d. residence type (urban, rural); e. studies (highschool, university, college, phd); f. work domain (services, othersector, health, agriculture, education,administration,constructions, industry, distributions); g. age (40-55, 30-40, under 30, above 55).

One way is to use non-parametric methods, like Kruskal Wallis test, used to compare two or more independent samples of equal or different sample sizes (Dalgaard, 2008). The null hypothesis of Kruskal test is that the medians of all groups are equal, and the alternative hypothesis is that at least one population median of one group is different from the population median of at least one other group. For this, we will programmatically define a loop that will take every demographic attribute within each group and perform a Kruskal Wallis test with every Likert item. Afterwards, we will select only those cases where the p-value of the test was below 0.05 (figure 5), which would mean statistically significant and draw also the bar plots for each case, as it is easier to observe scoring differences.

For respondents with PhD and University degree the price seems to be more important than for the ones that has college/high school degrees. Makes sense if we consider that respondents with higher education will have higher salaries and access to a larger diversity of fish products, with a larger scale of prices that must be considered (figure 5a).

For unemployed respondents, price is an important factor, not necessarily in the higher part of the scale but also in the lower part. For the lower – medium part, respondents probable use well known sources and clear products with known prices and high stability (figure 5b).

From the work domain perspective, price seems to be most important for respondents working in the industry and distribution sectors and least important for the people working in agriculture domain (figure 5c).

In terms of age, price factor is the most important for people between 30 and 40 years. This interval is when people discover the most in terms of recipes and gastronomy – especially fish gastronomy that involves more knowledge. However, it is also the interval where people tend to establish some kind of financial stability, so the price of the products is important (figure 5d).

Expire date factor is important mostly for the market buyer respondents. Hypermarkets offers a lot more trust on expire dates as everything is controlled, but in a normal market, many people are checking expire dates for most of the products that they buy (figure 5e). Also, for PhD and University respondents, provenience seems to be also an important factor (figure 5f).

Provenience factor is mostly important for respondents working in Industry and Education (figure 5g). The 30-40 age interval respondents seem also to value the provenience of the fish products, considering it a valuable factor (figure 5h).

Respondents that buys semi canned, canned fish and living fish products are the most interested in knowing the provenience of what they are buying (figure 5i). Probably, that is why many hypermarkets that are selling fresh fish presents also details about where the fish was brought. From the distribution perspective, respondents most interested in the provenience of the fish products are the ones that favours markets and direct producers (figure 5j). Related to growing conditions, respondents most interested are those with university and PhD degree (figure 5k), industry, education and distribution sectors (figure 5l), as well as market and direct producers (figure 5m). The information related to feeding conditions have high impact on industry, education and distribution sectors (figure 5n), as well as market and direct producers (figure 5o). Transporting conditions are considered one of the important factors related to fish and fish products for university and PhD degree respondents (figure 5p), industry and education sectors (figure 5g), respondents with age between 30 – 55 years (figure 5r) as well as market and direct producers (figure 5s).

Rural respondents are clearly the ones for which storing conditions represent an important factor (figure 5t). This is because most of the urban people trust that selling places must apply some agricultural rules, while in the rural environment the situation is completely different.

Storing conditions are important for university and PhD degree respondents (figure 5u), industry and education sectors (figure 5v). Storing conditions factor is important for respondents that buys semi-canned fish, canned fish and living fish (figure 5w). For canned fish this is a quite unusual situation, as that type of fish products is most protected against poor storing conditions so basically it should count less. Respondents buying from market, direct producers and fisheries are the most interested about the storing conditions of the fish products they are buying (figure 5x). This is normal and the providers should consider offering details on the storing conditions or directly displaying good storing technologies.

Process conditions are important for university and PhD degree respondents (figure 5y) as well as for respondents that buys canned and semi-canned fish (figure 5z) and for those from Market sector (figure 5a'). Related to traceability (InfoQualityPc, InfoQualityStore, InfoQualityMobile), respondents with university and PhD degree seem to be most important (figure 5b', figure 5g', figure 5j' figure 5m'). Traceability information are appreciated by the respondents which buy semi-canned and canned process fish and fish products (figure 5d', figure 5h', figure 5o'), from education, industry and distribution sectors (figure 5c', figure 5k', figure 5n') and for those with connections to Market sector (figure 5i', figure 5l', figure 5p').

"Price" - "Studies" Kruskal-Wallis chi-squared = 14.522, df = 3, p = 0.002274 < 0.05	"Price" - "Employment" Kruskal-Wallis chi-squared = 19.19, df = 3, p = 0.0002497 < 0.05

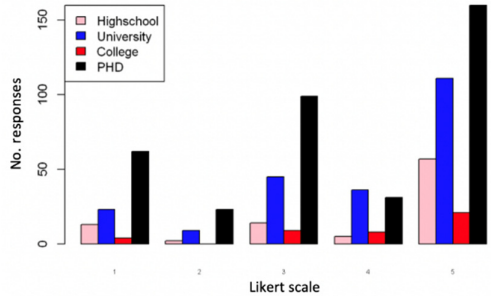

a. Price importance based on studies

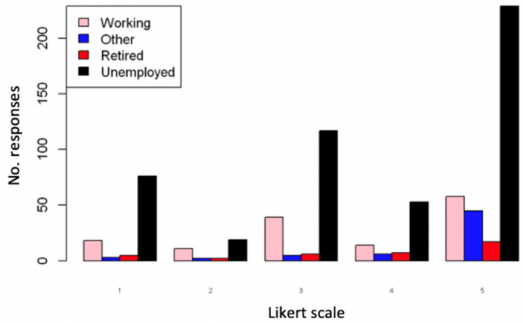

b. Price importance based on employment

"Price" - "WorkDomain"
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p = 0.0006087 < 0.05

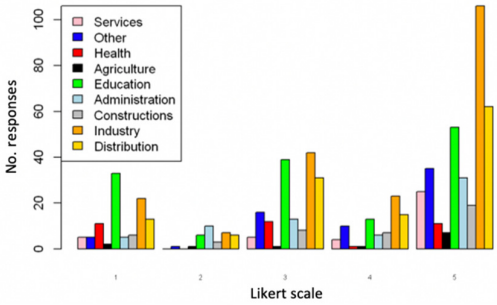

c. Price importance based on work domain

"Price" - "Age"
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p = 7.68e-05 < 0.05

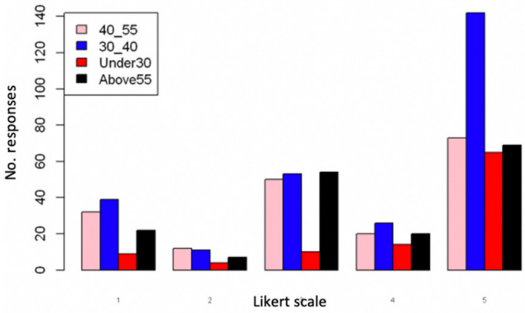

d. Price importance based on age

"ExpireDate"-"Distribution"
Kruskal-Wallis chi-squared = 25.6, df = 5,
p = 0.0001067 < 0.05

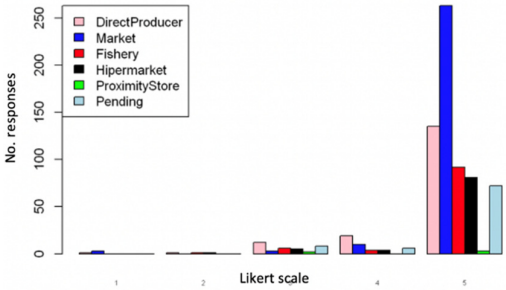

e. Expire date importance based on distribution

"Provenience" - "Studies"
Kruskal-Wallis chi-squared = 24.193, df = 3,
p = 2.277e-05 < 0.05

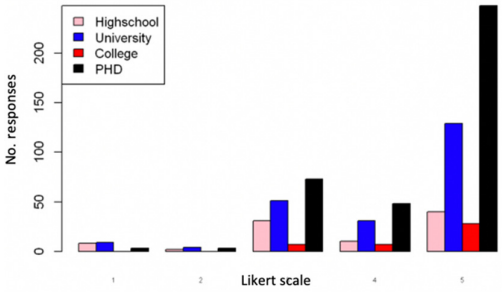

f. Provenience importance based on studies

"Provenience"- "WorkDomain"
Kruskal-Wallis chi-squared = 22.503, df = 8,
p = 0.004065 < 0.05

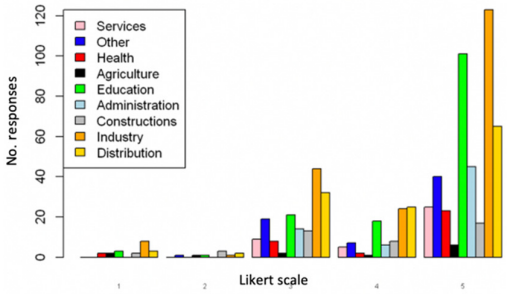

g. Provenience importance based on Work domain

"Provenience" - "Age"
Kruskal-Wallis chi-squared = 14.517, df = 3,
p = 0.002279 < 0.05

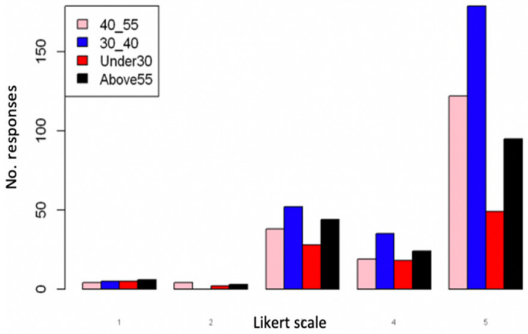

h. Provenience importance based on age

"Provenience" - "FishType"
Kruskal-Wallis chi-squared = 29.306, df = 6,
p = 5.324e-05 < 0.05

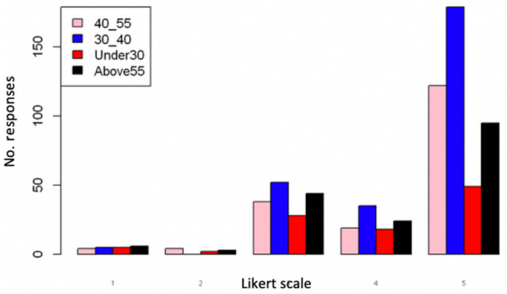

i. Provenience importance based on fish type

"Provenience"- "Distribution"
Kruskal-Wallis chi-squared = 38.357, df = 5,
p = 3.199e-07 < 0.05

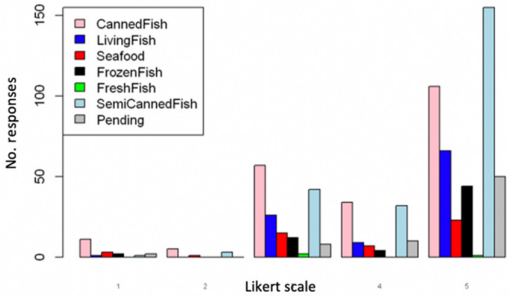

j. Provenience importance based on distribution

"GrowingConditions" - "Studies"
Kruskal-Wallis chi-squared = 29.51, df = 3,
p = 1.75e-06 < 0.05

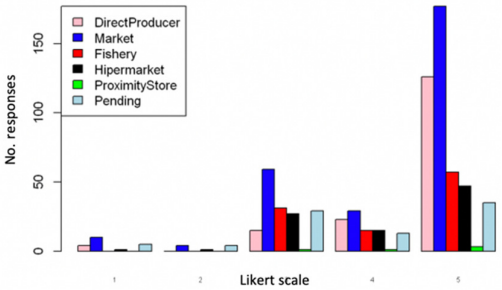

k. Growing condition importance based on studies

"GrowingConditions" - "WorkDomain"
Kruskal-Wallis chi-squared = 23.649, df = 8,
p = 0.002623 < 0.05

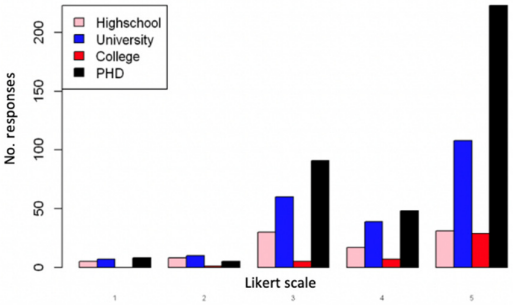

l. Growing condition importance based on work domain

"GrowingConditions" - "Distribution"
Kruskal-Wallis chi-squared = 28.192, df = 5,
p = 3.338e-05 < 0.05

"FeedingConditions" - "Studies"
Kruskal-Wallis chi-squared = 36.152, df = 3,
p = 6.954e-08 < 0.05

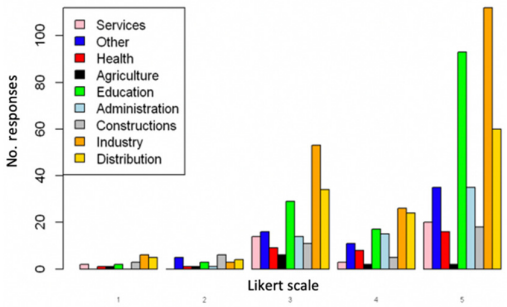

m. Growing condition importance based on distribution

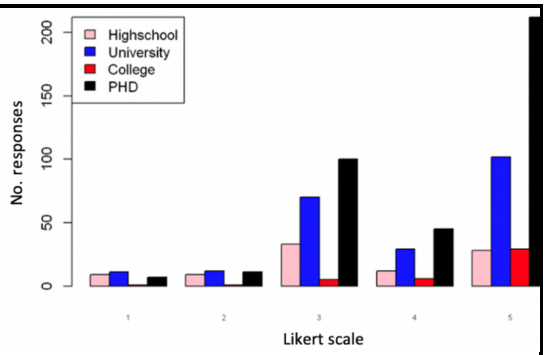

n. Feeding condition importance based on studies

"FeedingConditions" - "Distribution"
Kruskal-Wallis chi-squared = 47.058, df = 5,
p = 5.528e-09 < 0.05

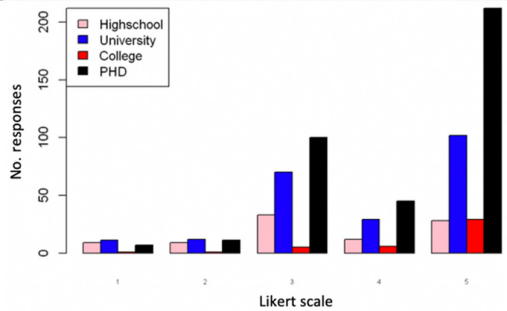

o. Feeding condition importance based on distribution

"TransportingConditions" - "Studies"
Kruskal-Wallis chi-squared = 29.102, df = 3,
p = 2.131e-06 < 0.05

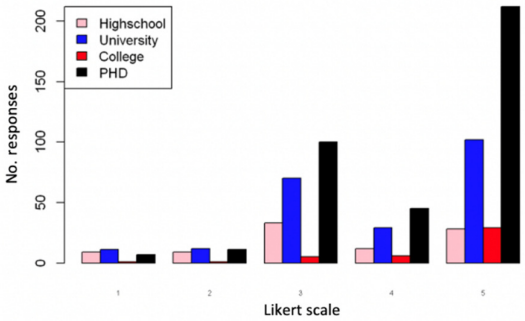

p. Transporting conditions importance based on studies

"TransportingConditions" - "WorkDomain"
Kruskal-Wallis chi-squared = 41.332, df = 8,
p = 1.807e-06 < 0.05

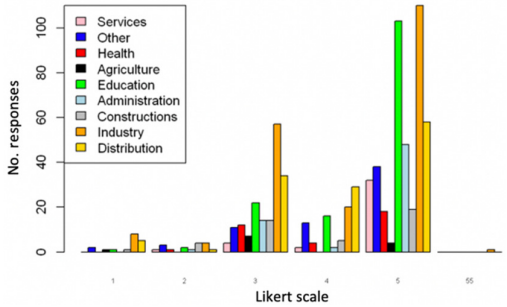

q. Transporting conditions importance based on work domain

"TransportingConditions" - "Age"
Kruskal-Wallis chi-squared = 13.602, df = 3,
p-value = 0.003501 < 0.05

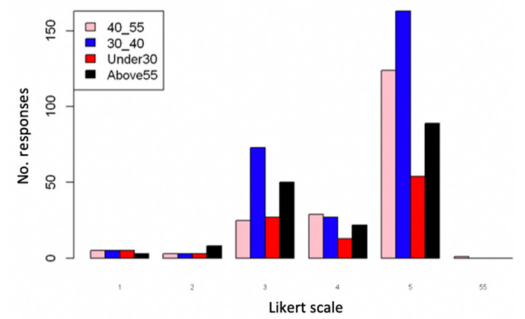

r. Transporting conditions importance based on age

"TransportingConditions" - "Distribution"
Kruskal-Wallis chi-squared = 40.021, df = 5,
p = 1.479e-07 < 0.05

"StoringConditions" - "ResidenceType"
Kruskal-Wallis chi-squared = 9.5092, df = 1,
p = 0.002044 < 0.05

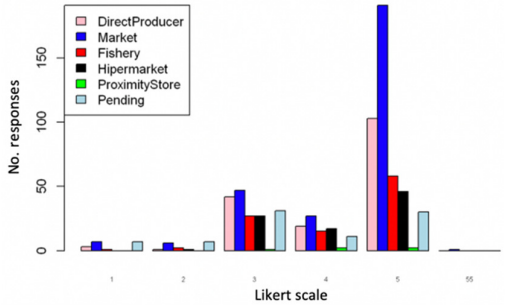

s. Transporting conditions importance based on distribution

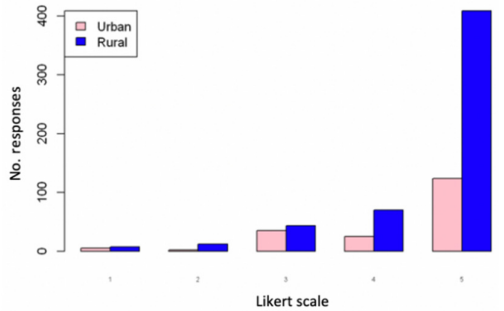

t. Storing conditions importance based on residence types

"StoringConditions" - "Studies"
Kruskal-Wallis chi-squared = 66.119, df = 3,
p = 2.89e-14 < 0.05

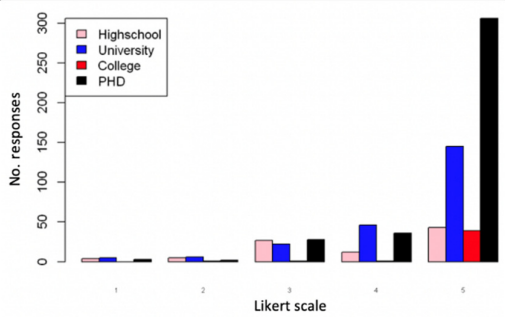

u. Storing conditions importance based on studies

"StoringConditions" - "WorkDomain"
Kruskal-Wallis chi-squared = 24.158, df = 8,
p = 0.002156 < 0.05

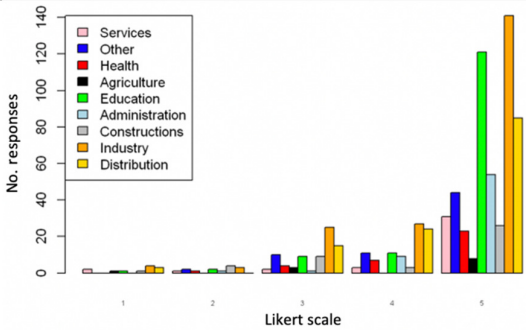

v. Storing conditions importance based on work domain

"StoringConditions" - "FishType"
Kruskal-Wallis chi-squared = 19.592, df = 6,
p = 0.00327 <0.05

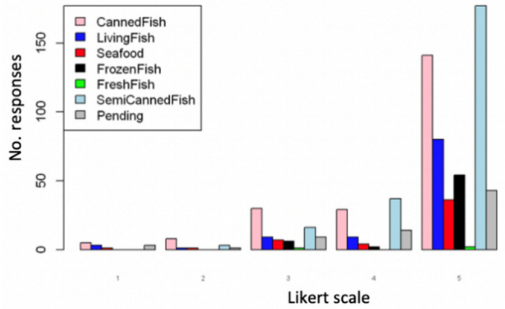

w. Storing conditions importance based on fish type

"StoringConditions" - "Distribution"
Kruskal-Wallis chi-squared = 58.441, df = 5,
p = 2.551e-11 < 0.05

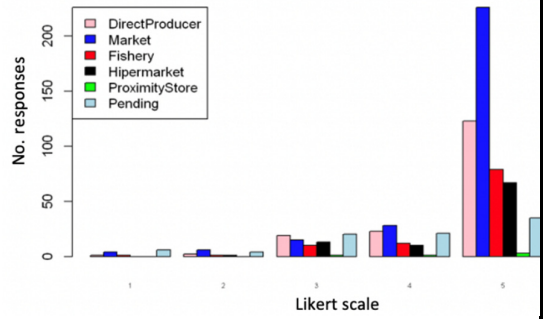

x. Storing conditions importance based on distribution

"ProcessingConditions" - "Studies"
Kruskal-Wallis chi-squared = 42.334, df = 3,
p = 3.408e-09 < 0.05

"ProcessingConditions" - "FishType"
Kruskal-Wallis chi-squared = 19.252, df = 6,
p = 0.003758 < 0.05

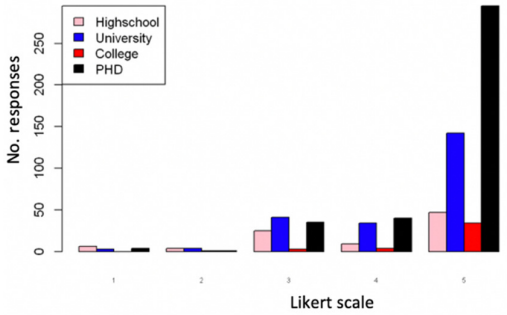

y. Processing conditions importance based on studies

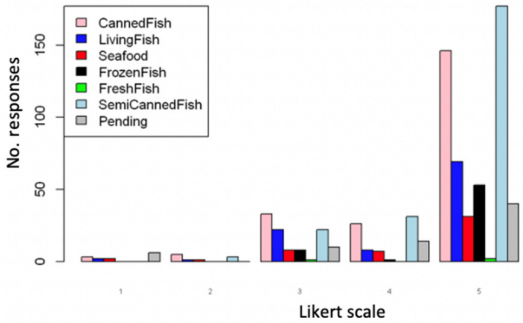

z. Processing conditions importance based on fish type

"ProcessingConditions" - "Distribution"
Kruskal-Wallis chi-squared = 37.479, df = 5,
p = 4.802e-07 < 0.05

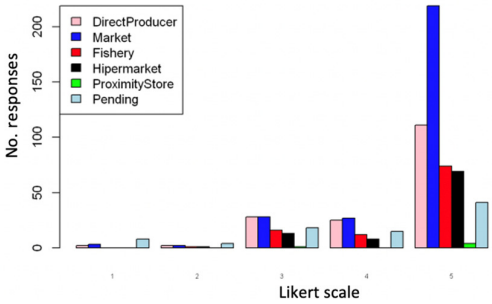

a'. Processing conditions importance based on distribution

"InfoQualityStore" - "Studies"
Kruskal-Wallis chi-squared = 25.547, df = 3,
p = 1.186e-05 < 0.05

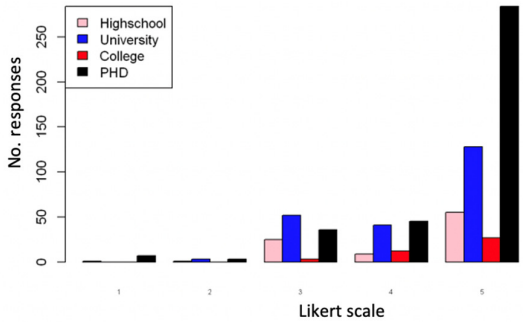

b'. Info Quality Store importance based on studies

"InfoQualityStore" - "WorkDomain"
Kruskal-Wallis chi-squared = 23.66, df = 8,
p = 0.002613 < 0.05

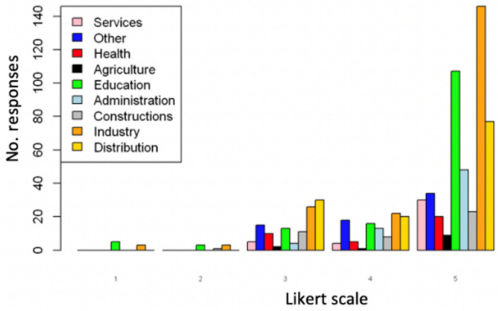

c'. Info Quality Store importance based on work domain

"InfoQualityStore" - "FishType"
Kruskal-Wallis chi-squared = 22.714, df = 6,
p = 0.0008981< 0.05

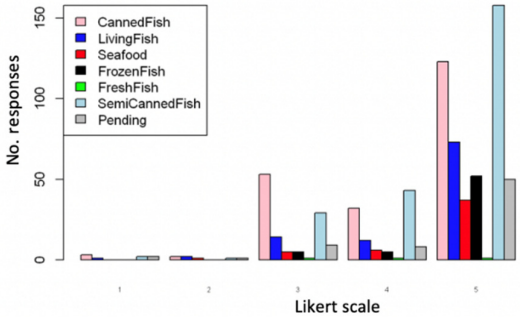

d'. Info Quality Store importance based on fish type

"InfoQualityMobile" - "Studies"
Kruskal-Wallis chi-squared = 37.322, df = 3,
p = 3.934e-08 < 0.05

"InfoQualityMobile" - "WorkDomain"
Kruskal-Wallis chi-squared = 29.149, df = 8,
p = 0.0002986 < 0.05

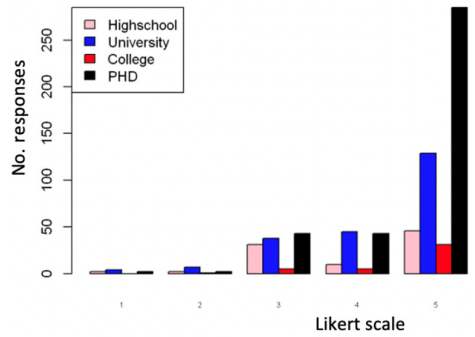

e'. Info Quality Mobile importance based on studies

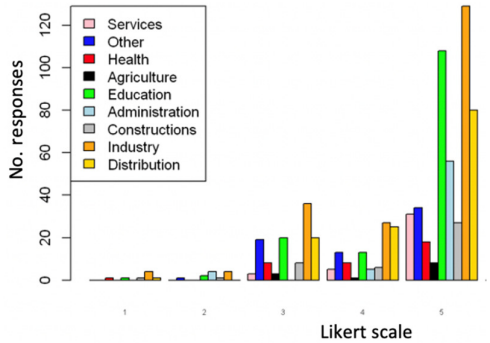

f'. Info Quality Mobile importance based on work domain

"InfoQualityPc" - "Studies"
Kruskal-Wallis chi-squared = 35.594, df = 3,
p = 9.123e-08 < 0.05

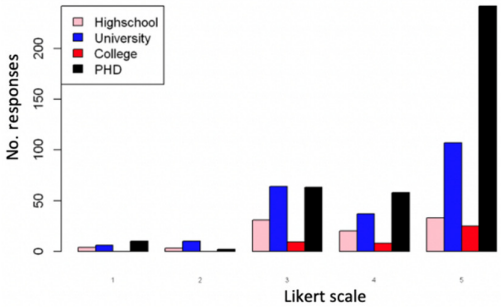

g'. Info Quality PC importance based on studies domain

"InfoQualityPc" - "FishType"
Kruskal-Wallis chi-squared = 26.492, df = 6,
p = 0.0001802 < 0.05

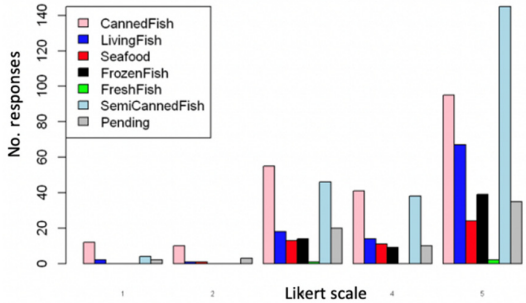

h'. Info Quality PC importance based on fish type

"InfoQualityPc" - "Distribution"
Kruskal-Wallis chi-squared = 42.999, df = 5,
p = 3.696e-08 < 0.05

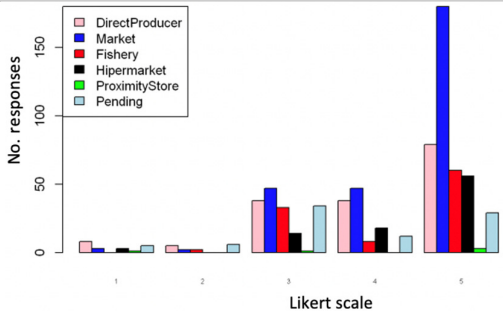

i'. Info Quality PC importance based on distribution

"QualityInfoMobile" - "Studies"
Kruskal-Wallis chi-squared = 18.404, df = 3,
p = 0.000363 < 0.05

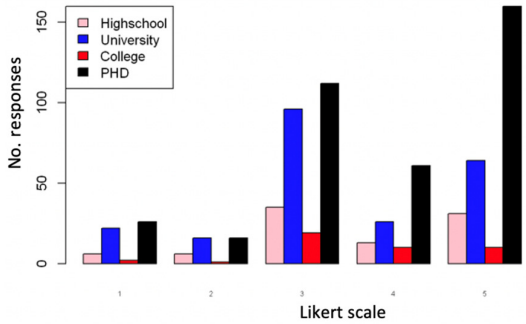

j'. Quality Info Mobile importance based on studies

"QualityInfoMobile" - "WorkDomain"
Kruskal-Wallis chi-squared = 25.091, df = 8,
p = 0.0015 < 0.05

"QualityInfoMobile" - "Distribution"
Kruskal-Wallis chi-squared = 25.781, df = 5,
p = 9.842e-05 < 0.05

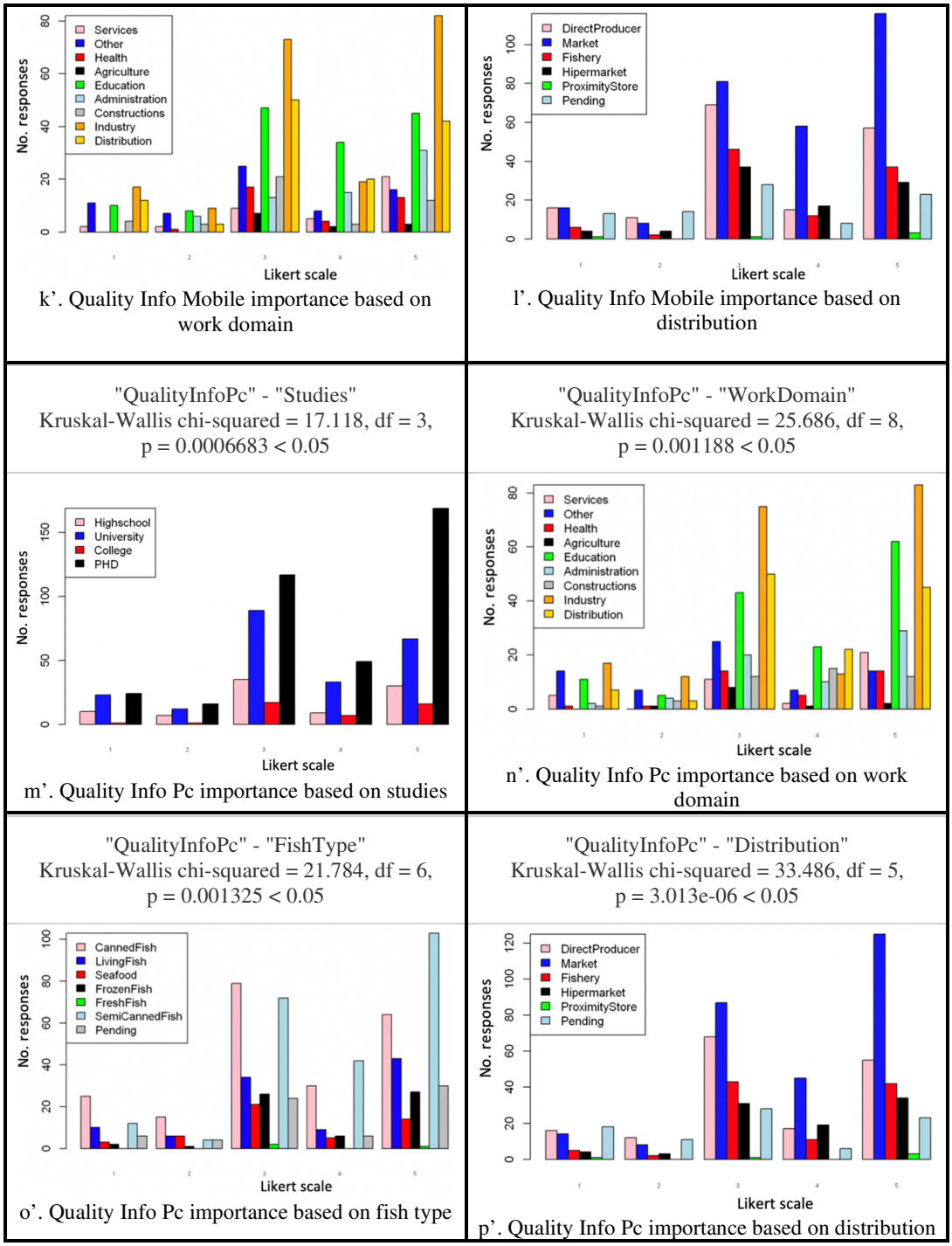

Figure 5: Kruskal-Wallis test results for p < 0.05

If we consider our study case situation, it is possible to aggregate several Likert items into three categories: *Supply chain* based on Transporting Conditions, Storing Conditions and Processing Conditions, *Traceability* based on InfoQualityPc, InfoQualityStore, and InfoQualityMobile, *Provenience* formed on Provenience, Growing Conditions and Feeding Conditions.

For each of these categories we will sum up respondent values for each attribute obtaining a single composite score. This way it will be possible to perform parametric analysis on our data that can be treated as interval data, where the mean is the best measure of central tendency. The following R code creates the aggregated columns (figure 6):

```
fisheryData$SupplyChainAgg <- as.numeric(fisheryData$TransportingConditions) +
as.numeric(fisheryData$StoringConditions) +
as.numeric(fisheryData$ProcessingConditions)
fisheryData$TraceabilityAgg <- as.numeric(fisheryData$InfoQualityPc) +
as.numeric(fisheryData$InfoQualityStore) +
as.numeric(fisheryData$InfoQualityMobile)
fisheryData$ProvenienceAgg <- as.numeric(fisheryData$Provenience) +
as.numeric(fisheryData$GrowingConditions) +
as.numeric(fisheryData$FeedingConditions)
```

```
anova (lm(SupplyChainAgg~Age+Studies+FishType+Distribution, data=fisheryData))
anova (lm(TraceabilityAgg~Age+Studies+FishType+Distribution, data=fisheryData))
anova (lm(ProvenienceAgg~Age+Studies+FishType+Distribution, data=fisheryData))
```

Figure 6: Columns aggregation and ANOVA analysis

As it can be notice in table 1, for all three cases, the two-way ANOVA output indicates significant difference of average scores. In addition, it seems that all demographic parameters involved are significant for these differences so further investigation is necessary. A good way to proceed is by using Tukey's range test (Bland and Altman, 1995), also Tukey's HSD (honest significant difference) test, or the Tukey–Kramer method.

Table 1: ANOVA analysis results

```
> anova (lm(SupplyChainAgg~Age+Studies+FishType+Distribution, data=fisheryData))
Analysis of Variance Table

Response: SupplyChainAgg
              Df Sum Sq Mean Sq F value    Pr(>F)
Age            3  111.3  37.105  7.4309 6.627e-05 ***
Studies        3  306.5 102.178 20.4627 9.939e-13 ***
FishType       6  128.0  21.337  4.2731 0.0003057 ***
Distribution   5  242.1  48.425  9.6979 5.650e-09 ***
Residuals    714 3565.3   4.993
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
> anova (lm(TraceabilityAgg~Age+Studies+FishType+Distribution, data=fisheryData))
Analysis of Variance Table

Response: TraceabilityAgg
              Df  Sum Sq Mean Sq F value    Pr(>F)
Age            3   50.05  16.682  4.0862 0.0068455 **
Studies        3  246.05  82.017 20.0891 1.652e-12 ***
FishType       6  101.54  16.924  4.1452 0.0004195 ***
Distribution   5  145.23  29.046  7.1143 1.660e-06 ***
Residuals    714 2915.03   4.083
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
> anova (lm(ProvenienceAgg~Age+Studies+FishType+Distribution, data=fisheryData))
Analysis of Variance Table

Response: ProvenienceAgg
              Df Sum Sq Mean Sq F value    Pr(>F)
Age            3   82.2  27.404  3.9327  0.008446 **
Studies        3  303.6 101.192 14.5219 3.435e-09 ***
FishType       6  120.4  20.067  2.8798  0.008849 **
Distribution   5  247.9  49.586  7.1160 1.653e-06 ***
Residuals    714 4975.3   6.968
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
a1 <- aov(fisheryData$SupplyChainAgg ~ fisheryData$Age)
posthoc <- TukeyHSD(x=a1, 'fisheryData$Age', conf.level=0.95)
a2 <- aov(fisheryData$SupplyChainAgg ~ fisheryData$Studies)
posthoc <- TukeyHSD(x=a2, 'fisheryData$Studies', conf.level=0.95)
```

Figure 7: ANOVA and Tukey test implementation in R code

Thus, Figure 7 and appendix 1 presents the R code that fits an analysis of variance model by a call to lm for each stratum, the call for Tukey algorithm and respectively the results of the Tukey tests.

By analysing Tukey results presented in appendix 1, it is possible to observe where the biggest mean differences are found between demographic parameters:

- For *SupplyChainAgg*: Above the age of 55 and 30-40 interval, Above 55 and 40-55 interval, High school – College, PhD-College, University-College, Phd-Highschool, University-High school, LivingFish – CannedFish, Semicanned fish – Living fish, Semicannedfish – Seafood, Proximity Store – Direct Producer, Proximity Store – Fishery, Proximity Store – Hypermarket, Proximity Store – Market;
- For *TraceabilityAgg*: Under the age of 30 and 40-55, PhD-College, University-College, University-High school, Fresh fish – CannedFish, Seafood-CannedFish, Fishery-Direct producer, Proximity Store – Direct producer, Proximity store – Fishery, Proximity Store – Hypermarket, Proximity Store – Market;

- For *ProvenienceAgg*: Above the age of 55 and 30-40, Above the age of 55 and 40-55, High school – College, PhD – College, University – College, PhD – High school, University – High school, Seafood – Canned fish, Proximity Store – Direct Producer, ProximityStore – Fishery, Proximity store – Market.

From the practical perspective, the pairs presented above defines the most significant differences related to Provenience, Traceability and Supply chain aggregated indicators found among demographic data. For example, if we consider Supply chain indicator, we can notice significant differences between respondents that buys living fish vs canned fish.

This makes sense, as the two kinds of products are very different from each other, therefore also the different importance rate for an indicator as traceability. Another good example is for Provenience indicator where respondents that go for proximity stores value differently than the ones that are buying from direct producers.

Thus, respondents that work in the services or industry are very interested in traceability, opposed to the ones working in construction or distribution. Respondents working in education scores highest when it comes to provenience opposed to the ones working in distribution.

Provenience indicator is very appreciated by the respondents which consumes frozen fish or semi-canned fish. Considering the data related to fish consumption, three time series algorithms were used, as follows: ARIMA, LSTM and exponential smoothing.

Therefore, figure 8 presents the fish consumption forecast till the year 2030, in Romania. It can be observed that, if solution for encouraging fish consumption will not be adopted, this indicator will register even a decreasing trend, fact which reveals the possible treats that fish-based sectors could be facing in near future.

Data presented in table 2 revealed that exponential smoothing forecast method registered the highest accuracy, fact that emphasizes that estimated forecast model is close to the real value.

Although LSTM based forecast indicates a decrease trend (figure 8) in fish consumption, its accuracy is the lowest – RMSE 1.23, compared to the other two forecast methods (ARIMA – RMSE 0.84 and exponential smoothing – RMSE 0.81).

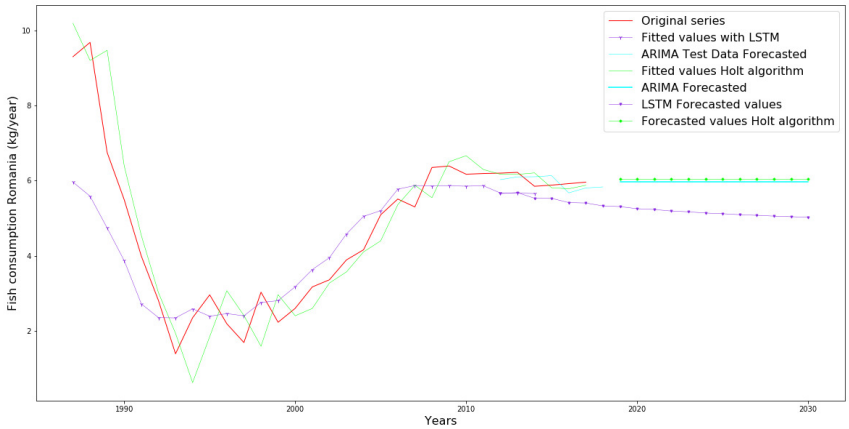

Figure 8: Fish consumption forecast (kg/year)

The present study is based on traceability chain analysis in order to better understand the consumers need and preferences and to react according to these variables, ensuring a better economic sustainability of the fish-based sectors.

Similar to most studies, the design of the current study is subject to limitations. Therefore, in order to have a more complex analysis of the fish-based sectors, cost-effectiveness analysis must be elaborated, for most of the technologies used in both fish rearing and processing. Therefore, in Romania, most of the aquaculture sector is based on pond aquaculture systems which ensure a low economic sustainability.

High production costs may be a cause which determines high prices for fish and fish products, in relation to the consumers income. Also, consumers preferences for fish species must be analysed, since in Romania, ciprinides species are among most popular fish species, being included also in a various of traditional dishes.

However, those species are not suitable to be reared in modern aquaculture recirculating systems since this production systems will generate high operational costs that cannot be cover by low economic value fish species, as ciprinides. Thus, future research on improving fish rearing and processing technologies in order to ensure better economic sustainability can be also a future research direction which will encourage fish consumption through ensuring fish and fish products affordable prices.

Conclusion

The subgroup analyses of socio-demographic characteristics reveal the emergence of new types of consumer preferences (e.g. sea food). Although the consumers increase the range of fish and fish products they consume, the market channels used for purchasing these products decreases in variability. When the geographical availability of fisheries is considered, the gradual increase in importance of the hypermarket becomes more obvious. In this context, the high dependence on the offer of hypermarkets raises the risk of an impoverished consumer choice in the near future. Also, information related to distribution chain of fish and fishery products be crucial for better production valorisation among various consumers types. Also, it is recommended to share information related to quality of the fish products (in stores, on internet or by using special mobile applications), since the present study reveals the interest of Romanian fish consumer for traceability. Thus, a fish products traceability system can improve fish consumption in Romania and, therefore, contribute to the development of fishery sector. Also, education and product diversification are determinant factors for improving Romanian yearly fish consumption rate.

Future studies must be conducted also in rural versus urban region and also, different regions from Romania must be compared in terms of consumers preferences and habits, in order to elaborate national strategies and policies which can be applied in order to rise fish consumption and develop fishery and aquaculture sector.

Acknowledgements

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Appendix 1: Tukey multiple comparisons of means

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$SupplyChainAgg ~ fisheryData$Age)

$`fisheryData$Age`
                    diff        lwr          upr     p adj
40_55-30_40    -0.1105630 -0.7014664  0.48034047 0.9631233
Above55-30_40  -1.1515152 -1.9166135 -0.38641680 0.0006693
Under30-30_40  -0.5596319 -1.2163083  0.09704455 0.1257041
Above55-40_55  -1.0409522 -1.7629883 -0.31891607 0.0012624
Under30-40_55  -0.4490689 -1.0550265  0.15688868 0.2253895
Under30-Above55 0.5918833 -0.1849006  1.36866715 0.2034590
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$SupplyChainAgg ~ fisheryData$Studies)

$`fisheryData$Studies`
                      diff       lwr      upr     p adj
Highschool-College  1.2537775  0.5048848 2.002670 0.0001087
PHD-College         2.4249084  1.3011072 3.548710 0.0000002
University-College  2.0630037  1.3590150 2.766992 0.0000000
PHD-Highschool      1.1711310  0.1581502 2.184112 0.0158802
University-Highschool 0.8092262  0.3005015 1.317951 0.0002726
University-PHD     -0.3619048 -1.3421546 0.618345 0.7774016
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$SupplyChainAgg ~ fisheryData$FishType)

$`fisheryData$FishType`
                          diff        lwr        upr     p adj
FreshFish-CannedFish   0.16072908 -0.6967353  1.0181934 0.9979526
FrozenFish-CannedFish -0.05815847 -1.1864296  1.0701127 0.9999989
LivingFish-CannedFish  1.18476450  0.1571473  2.2123817 0.0121801
Pending-CannedFish    -0.97652582 -5.1167811  3.1637295 0.9927417
Seafood-CannedFish     0.63720808 -0.0378643  1.3122805 0.0788424
SemiCannedFish-CannedFish -0.46224011 -1.4433216  0.5188414 0.8056315
FrozenFish-FreshFish  -0.21888756 -1.4566606  1.0188855 0.9985252
LivingFish-FreshFish   1.02403542 -0.1227355  2.1708063 0.1156231
Pending-FreshFish     -1.13725490 -5.3086816  3.0341718 0.9843637
Seafood-FreshFish      0.47647900 -0.3689848  1.3219428 0.6388761
SemiCannedFish-FreshFish  -0.62296919 -1.7282326  0.4822942 0.6387430
LivingFish-FrozenFish  1.24292298 -0.1182656  2.6041115 0.0997320
Pending-FrozenFish    -0.91836735 -5.1537600  3.3170253 0.9954062
Seafood-FrozenFish     0.69536656 -0.4238116  1.8145447 0.5233270
SemiCannedFish-FrozenFish -0.40408163 -1.7304895  0.9223263 0.9724406
Pending-LivingFish    -2.16129032 -6.3709878  2.0484071 0.7340283
Seafood-LivingFish    -0.54755642 -1.5651817  0.4700688 0.6882948
SemiCannedFish-LivingFish -1.64700461 -2.8889222 -0.4050870 0.0018592
Seafood-Pending        1.61373391 -2.5240527  5.7515205 0.9111292
SemiCannedFish-Pending 0.51428571 -3.6842946  4.7128660 0.9998216
SemiCannedFish-Seafood -1.09944819 -2.0700588 -0.1288376 0.0148792
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$SupplyChainAgg ~ fisheryData$Distribution)

$`fisheryData$Distribution`
                                  diff        lwr        upr     p adj
Fishery-DirectProducer        0.40373784 -0.2494882  1.0569639 0.4885177
Hipermarket-DirectProducer    0.08853444 -0.7485666  0.9256355 0.9996629
Market-DirectProducer         0.04212454 -0.8285203  0.9127694 0.9999930
Pending-DirectProducer       -0.10952381 -3.1451613  2.9261137 0.9999984
ProximityStore-DirectProducer -1.96068660 -2.8475965 -1.0737767 0.0000000
Hipermarket-Fishery          -0.31520340 -1.0864219  0.4560151 0.8520606
Market-Fishery               -0.36161330 -1.1691171  0.4458905 0.7962319
Pending-Fishery              -0.51326165 -3.5313960  2.5048727 0.9966551
ProximityStore-Fishery       -2.36442444 -3.1894390 -1.5394099 0.0000000
Market-Hipermarket           -0.04640990 -1.0087488  0.9159290 0.9999931
Pending-Hipermarket          -0.19805825 -3.2612541  2.8651376 0.9999703
ProximityStore-Hipermarket   -2.04922104 -3.0262998 -1.0721423 0.0000000
Pending-Market               -0.15164835 -3.2241803  2.9208836 0.9999922
ProximityStore-Market        -2.00281114 -3.0087769 -0.9968454 0.0000003
ProximityStore-Pending       -1.85116279 -4.9283432  1.2260177 0.5196228
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$TraceabilityAgg ~ fisheryData$Age)

$`fisheryData$Age`
                    diff        lwr          upr     p adj
40_55-30_40    0.360558044 -0.1690746  0.89019066 0.2971586
Above55-30_40 -0.241532977 -0.9272982  0.44423226 0.8011612
Under30-30_40 -0.243470961 -0.8320566  0.34511464 0.7108862
Above55-40_55 -0.602091021 -1.2492591  0.04507710 0.0787941
Under30-40_55 -0.604029005 -1.1471548 -0.06090321 0.0223261
Under30-Above55 -0.001937984 -0.6981771  0.69430111 0.9999999
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$TraceabilityAgg ~ fisheryData$Studies)

$`fisheryData$Studies`
                      diff          lwr        upr     p adj
Highschool-College  0.48008242 -0.19402836 1.1541932 0.2582574
PHD-College         1.36996337  0.35838118 2.3815456 0.0029031
University-College  1.44082051  0.80712983 2.0745112 0.0000000
PHD-Highschool      0.88988095 -0.02194691 1.8017088 0.0587464
University-Highschool 0.96073810  0.50281298 1.4186632 0.0000005
University-PHD      0.07085714 -0.81150821 0.9532225 0.9968718
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$TraceabilityAgg ~ fisheryData$FishType)

$`fisheryData$FishType`
                          diff        lwr       upr     p adj
FreshFish-CannedFish   0.84755592  0.08535028 1.6097616 0.0182025
FrozenFish-CannedFish  0.45539906 -0.54752852 1.4583266 0.8316115
LivingFish-CannedFish  1.11668938  0.20323372 2.0301450 0.0059259
Pending-CannedFish     0.12206573 -3.55823425 3.8023657 0.9999999
Seafood-CannedFish     0.94466945  0.34459319 1.5447457 0.0000788
SemiCannedFish-CannedFish  0.29825620 -0.57383352 1.1703459 0.9514707
FrozenFish-FreshFish  -0.39215686 -1.49242141 0.7081077 0.9410273
LivingFish-FreshFish   0.26913346 -0.75023870 1.2885056 0.9867754
Pending-FreshFish     -0.72549020 -4.43349860 2.9825182 0.9973980
Seafood-FreshFish      0.09711352 -0.65442480 0.8486518 0.9997565
SemiCannedFish-FreshFish  -0.54929972 -1.53177559 0.4331761 0.6476681
LivingFish-FrozenFish  0.66129032 -0.54867905 1.8712597 0.6720961
Pending-FrozenFish    -0.33333333 -4.09820154 3.4315349 0.9999735
Seafood-FrozenFish     0.48927039 -0.50557440 1.4841152 0.7718427
SemiCannedFish-FrozenFish -0.15714286 -1.33619549 1.0219098 0.9997085
Pending-LivingFish    -0.99462366 -4.73665119 2.7474039 0.9863019
Seafood-LivingFish    -0.17201994 -1.07659368 0.7325538 0.9977804
SemiCannedFish-LivingFish -0.81843318 -1.92238183 0.2855155 0.3010712
Seafood-Pending        0.82260372 -2.85550182 4.5007093 0.9945593
SemiCannedFish-Pending 0.17619048 -3.55595493 3.9083359 0.9999994
SemiCannedFish-Seafood -0.64641324 -1.50919530 0.2163688 0.2885164
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$TraceabilityAgg ~ fisheryData$Distribution)

$`fisheryData$Distribution`
                                  diff         lwr        upr     p adj
Fishery-DirectProducer        0.61623144  0.02709621  1.2053667 0.0342814
Hipermarket-DirectProducer    0.17822469 -0.57674474  0.9331941 0.9846993
Market-DirectProducer         0.52197802 -0.26324409  1.3072001 0.4032660
Pending-DirectProducer       -0.12857143 -2.86636930  2.6092264 0.9999939
ProximityStore-DirectProducer -1.14950166 -1.94939295 -0.3496104 0.0006364
Hipermarket-Fishery          -0.43800675 -1.13355769  0.2575442 0.4667705
Market-Fishery               -0.09425342 -0.82252948  0.6340226 0.9990980
Pending-Fishery              -0.74480287 -3.46681489  1.9772092 0.9705724
ProximityStore-Fishery       -1.76573310 -2.50980187 -1.0216643 0.0000000
Market-Hipermarket            0.34375333 -0.52416633  1.2116730 0.8681315
Pending-Hipermarket          -0.30679612 -3.06944846  2.4558562 0.9995719
ProximityStore-Hipermarket   -1.32772635 -2.20893964 -0.4465131 0.0002734
Pending-Market               -0.65054945 -3.42162197  2.1205231 0.9850769
ProximityStore-Market        -1.67147968 -2.57874579 -0.7642136 0.0000028
ProximityStore-Pending       -1.02093023 -3.79619512  1.7543347 0.9002600
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$ProvenienceAgg ~ fisheryData$Age)

$`fisheryData$Age`
                   diff        lwr          upr     p adj
40_55-30_40     -0.1126941 -0.7944870  0.56909873 0.9740932
Above55-30_40   -0.9777184 -1.8604998 -0.09493694 0.0231161
Under30-30_40   -0.5291319 -1.2868146  0.22855071 0.2749681
Above55-40_55   -0.8650242 -1.6981198 -0.03192865 0.0383449
Under30-40_55   -0.4164378 -1.1156004  0.28272471 0.4177966
Under30-Above55  0.4485864 -0.4476779  1.34485077 0.5703657
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$ProvenienceAgg ~ fisheryData$Studies)

$`fisheryData$Studies`
                        diff        lwr       upr     p adj
Highschool-College     1.1995192  0.3295143 2.0695242 0.0023110
PHD-College            2.5641026  1.2585582 3.8696469 0.0000032
University-College     1.9599121  1.1420732 2.7777510 0.0000000
PHD-Highschool         1.3645833  0.1877816 2.5413851 0.0154532
University-Highschool  0.7603929  0.1693963 1.3513894 0.0053427
University-PHD        -0.6041905 -1.7429680 0.5345871 0.5210584
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$ProvenienceAgg ~ fisheryData$FishType)

$`fisheryData$FishType`
                              diff        lwr       upr     p adj
FreshFish-CannedFish       0.83913284 -0.1454196 1.8236853 0.1536093
FrozenFish-CannedFish     -0.08383635 -1.3793329 1.2116602 0.9999959
LivingFish-CannedFish      1.07284568 -0.1070787 2.2527700 0.1026402
Pending-CannedFish        -0.46478873 -5.2186873 4.2891098 0.9999524
Seafood-CannedFish         1.09887364  0.3237462 1.8740011 0.0006164
SemiCannedFish-CannedFish  0.85902079 -0.2674706 1.9855121 0.2678886
FrozenFish-FreshFish      -0.92296919 -2.3441974 0.4982590 0.4675554
LivingFish-FreshFish       0.23371284 -1.0830254 1.5504511 0.9984941
Pending-FreshFish         -1.30392157 -6.0936115 3.4857684 0.9844809
Seafood-FreshFish          0.25974081 -0.7110325 1.2305141 0.9858202
SemiCannedFish-FreshFish   0.01988796 -1.2491908 1.2889667 1.0000000
LivingFish-FrozenFish      1.15668203 -0.4062535 2.7196176 0.3031772
Pending-FrozenFish        -0.38095238 -5.2440890 4.4821842 0.9999872
Seafood-FrozenFish         1.18270999 -0.1023459 2.4677659 0.0944617
SemiCannedFish-FrozenFish  0.94285714 -0.5801428 2.4658571 0.5278166
Pending-LivingFish        -1.53763441 -6.3712674 3.2959986 0.9658364
Seafood-LivingFish         0.02602797 -1.1424235 1.1944794 1.0000000
SemiCannedFish-LivingFish -0.21382488 -1.6398119 1.2121621 0.9994243
Seafood-Pending            1.56366237 -3.1874016 6.3147264 0.9596561
SemiCannedFish-Pending     1.32380952 -3.4970586 6.1446776 0.9837683
SemiCannedFish-Seafood    -0.23985285 -1.3543214 0.8746157 0.9955908
```

```
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = fisheryData$ProvenienceAgg ~ fisheryData$Distribution)

$`fisheryData$Distribution`
                                  diff       lwr          upr     p adj
Fishery-DirectProducer        -0.44994880 -1.208539  0.30864179 0.5356502
Hipermarket-DirectProducer    -0.86881646 -1.840941  0.10330789 0.1103260
Market-DirectProducer         -0.95512821 -1.966207  0.05595053 0.0765878
Pending-DirectProducer        -0.53095238 -4.056234  2.99432942 0.9981256
ProximityStore-DirectProducer -2.42165006 -3.451617 -1.39168279 0.0000000
Hipermarket-Fishery           -0.41886766 -1.314483  0.47674742 0.7646601
Market-Fishery                -0.50517941 -1.442932  0.43257366 0.6388779
Pending-Fishery               -0.08100358 -3.585959  3.42395182 0.9999998
ProximityStore-Fishery        -1.97170126 -2.929790 -1.01361296 0.0000001
Market-Hipermarket            -0.08631175 -1.203875  1.03125118 0.9999283
Pending-Hipermarket            0.33786408 -3.219421  3.89514934 0.9998012
ProximityStore-Hipermarket    -1.55283360 -2.687514 -0.41815335 0.0014075
Pending-Market                 0.42417582 -3.143952  3.99230319 0.9994031
ProximityStore-Market         -1.46652185 -2.634749 -0.29829511 0.0047906
ProximityStore-Pending        -1.89069767 -5.464223  1.68282793 0.6567936
```

Turkey and Russia in the Global Order. Implications for the Central and Eastern Europe

Karol Kujawa

WSB University, Dabrowa Gornicza, Poland
karol.kujawa@gmail.com

Abstract

In the past, Russia and Turkey considered each other as enemies. The breakthrough in Turkish-Russian relations took place after the Islamic Justice and Development Party (AKP) came to power in Turkey in 2002. In recent years we have witnessed a rapid revival in Turkish-Russian relations. Both countries are developing their economic and military cooperation and supporting each other internationally. However, this direction of Turkey's foreign policy concerns Western allies. They fear that the country will be completely dependent on Russia and thus become more unpredictable. Therefore, the main aim of this article is to examine the factors that have influenced the rapprochement of economic and military relations between these countries, especially between 2004 and 2019. The article will also debate the outlook for bilateral relations and the consequences of this new alliance for the security in Central and Eastern Europe.

Keywords: Turkey, Russia, security, Middle East, Central and Eastern Europe, Syria

Introduction

In recent years we have witnessed a rapid revival in Turkish-Russian relations. Both countries are developing their economic and military cooperation and supporting each other internationally. However, this direction of Turkey's foreign policy concerns Western allies. They fear that the country will be completely dependent on Russia and thus become more unpredictable. Therefore, the main aim of this article is to examine the factors that have influenced the rapprochement of economic and military relations between these countries, especially between 2002 and 2019. I wonder what consequences this new alliance has for international security. And most importantly, will Turkey remain a member of NATO? Will Turkey completely limit its cooperation with Western partners, become more unpredictable and dependent on Russia? The authors start with, in section one, a historical background of the Russian-Turkish relations as a point of historical reference for the subsequent sections of this chapter. The second section deals with the development of the Turkish-Russian relations under the AKP rule. Next chapter will concentrate on the Turkish-Russian relations after the coup attempt. Also, I will investigate how the Russian-Turkish cooperation affect the energy and military security of Central and Eastern European countries. Finally, I will describe perspectives of the bilateral relations.

From a methodological point of view author used analytical, descriptive, and comparative methods. Moreover, article include interviews conducted with several specialists from Turkey and Russia. The discussion on the future prospects for mutual relations between Russia and Turkey is largely hypothetical. This analysis contributes to the discussion on the prospects for cooperation between Russia and Turkey. Besides shedding new light on foreign policy, the author wonders whether leaders in Turkey and Russia might contribute to building long-term peaceful relations between the states and contribute to conflict resolution, or whether tension and violence between them will increase.

The results of these studies may prove very useful in the context of the ongoing academic debates surrounding the role of Turkey in the region and what is its dynamics and the interest toward the Central and Eastern Europe. Project may indicate what policies should be adopted by the Europearn countries in relation to Turkey. Besides, it is unlikely that future developments in the Middle East will lead to the end of the war in the region, and therefore this analytical work will remain important for many readers, including scholars, who want to broaden their knowledge and understand the role of Turkey in international relations. The results of this work may help fill the gap.

Historical Background

In the past, both the Ottoman Empire and Tsarist Russia saw each other as enemies. Both countries had imperial ambitions and wanted to play a key role in the Black Sea region. From the 17th to the 19th century, bilateral relations were dominated by armed conflicts. Even after the creation of the Turkish Republic, relations between the two

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countries did not develop properly. During Stalin's reign, the Soviets raised territorial claims against Turkey, which led to the country's rapprochement with the West. After World War II, Ankara began to see the USSR as a real threat to its own security. However, after Stalin's death and Turkey's accession to NATO, a change occurred. The Soviet Union adopted a more moderate stance towards the country: it stopped having territorial claims and officially recognized the new government in Turkey. After the end of the 1950s, the two states established economic cooperation. At the same time, Turkish President, Adnan Menderes, paid official visits to Moscow. However, all attempts to intensify cooperation between the two countries were interrupted by the Turkish army, which carried out a military coup and overthrew the democratically elected president.

After the collapse of the Soviet Union, a new era in Turkish-Russian relations began. Russia continued to treat the post-Soviet area as its sphere of influence, while Turkey became a close ally of the USA and a rival of Russia in the Caucasus and Central Asia. It supported Azerbaijan and Turkish-language nations living in former Soviet republics. During the war in Nagorno-Karabakh the Russians supported Armenians and the Turks Azerbaijan. Also, during the Chechen wars, both countries stood on opposite sides. Russia accused the Turkish government of tolerating the activities of Chechen organizations and not responding to the creation of a safe haven for Caucasian fighters on Turkish territory. On the other hand, the Russian side supported the Kurdistan Workers' Party, which the Turkish authorities have fought against for years (Kortunov 2005).

The warming in Turkish-Russian relations took place under the rule of the secular CHP party in the late 1990s. The Turkish authorities adopted a much more moderate stance towards Russia. As early as 1999, Turkey was the first NATO member to purchase weapons, helicopters and armored transporters from Russia. Also, Moscow fundamentally changed its perception of Turkey as a rival in the Caucasus and Central Asia. It began to treat Turkey as a partner. It stopped supporting the Kurdistan Workers' Party. Besides, in November 1999, Turkish Prime Minister Bülent Ecevit visited Moscow, and in October 2000, Russian Prime Minister Mikhail Kasyanov visited Turkey. As a result of these meetings, in 1999 Russia and Turkey signed a declaration on combating terrorism. In 2000 a joint committee for cooperation in the armaments industry was established, and in 2002 agreements on military cooperation and regular joint maneuvers in the Black Sea were concluded (Bieleń 2008).

AKP And Russia

The breakthrough in bilateral relations took place after the Islamic Justice and Development Party (AKP) came to power in Turkey in 2002. Since then, Turkey has changed its foreign policy vectors. It has sought to increase its role in the region and develop cooperation with all its neighbors. Russia has played a particular role in this process. The Turkish authorities were well aware that without cooperation with Russia, it would be very difficult for them to achieve their goals. A new stage in relations between these countries began with the visit to Ankara of Russian President Vladimir Putin on 5-6 December 2004. Since then, regular meetings have been held between representatives of these countries. The Blue Stream pipeline, which was put into operation in 2005, was to become the foundation of cooperation between the countries. At the same time, Turkey did not want to limit its cooperation with Russia. Ankara began developing economic cooperation with Georgia and Azerbaijan. As a result, the Baku-Tbilisi-Ceyhan pipeline was commissioned in 2005 to supply oil from Azerbaijan to Turkish ports. At the same time, the construction of the Nabucco gas pipeline, backed by several European Union member states and by the United States, began. This project was to transport 31 billion cubic meters of gas annually from deposits in the Caspian Sea in Azerbaijan and Turkmenistan to an energy center in Austria. Moreover, in 2007, the Baku-Tbilisi-Erzurum gas pipeline was built to transport natural gas from the Shah Deniz gas field in Azerbaijan (Yıldırım 2013).

To sum up, in the first years of the AKP rule, Russia became a strategic partner in trade. However, Turkey did not want to limit its cooperation only with this country. Ankara's goal was to diversify its energy resources. To this end, Turkey had cooperated with other countries in the region and the European Union (Kanbur & Bernat 2013). Thanks to these projects, Turkey tightened its economic cooperation with Georgia and Azerbaijan, which tried to pursue a policy independent of Moscow.

Second stage: 2010-2014

The intensification of cooperation between Russia and Turkey took place in 2010-2014. One of the main architects of this policy was the Turkish Foreign Minister, Ahmet Davutoğlu. Initially, he was the chief advisor to the Prime Minister of Turkey, Recep Tayyip Erdoğan, and in 2009 he became the Foreign Minister of Turkey. Since the beginning of his diplomatic career, he has supported the policy of "no problems with our neighbors". He presented the main principles of this concept in his book entitled "Strategic depth" (Stratejik Derinlik). The book argues that:

1. Turkey's relations with its neighbors should be based on peace and security;
2. any obstacles that hinder the economic and cultural integration of the region should be removed;
3. Turkey has the task of becoming a regional superpower. Turkey has deep historical contacts with the Arabs, the Kurds, the Persians and geographical proximity to Central Asia, the Balkans and the Caucasus.

In his doctrine, however, Davutoğlu did not put Russia at first place. He claimed that good neighborhood policy with Russia is not an alternative to relations with the EU. Nor is the model partnership with the United States a rival partnership against Russia (Davutoğlu 2010).

The policy of the new minister led in a short time to the development of economic cooperation between Russia and Turkey. On 12 May 2010, during the official visit of Russian President Dmitry Medvedev to Turkey, an agreement on the introduction of visa-free travel between the two countries was signed. Both countries waived the visa requirement to enter the other country for a period of less than 30 days. Since then, the Turkish coast has been very popular with Russians. Every year several million tourists go to Turkey from Russia. In 2014, 4.5 million Russians visited Turkey. A new record was set four years later when nearly 6 million Russian tourists went to Turkey. In addition, it is estimated that there are currently over 300,000 mixed Russian-Turkish marriages in Turkey. In the seaside resorts you can easily buy Russian newspapers and watch Russian TV (Pinar 2019; Nemtsova 2019).

At the same time, Russia was becoming one of Turkey's most important trading partners. It imported mainly textiles, machinery, food and household appliances from Turkey and exported energy resources (see figure 1). Moreover, Turkey became Gazprom's second largest customer after Germany (23.4 billion cubic metres; 34.5 billion cubic metres, respectively) (Axmith 2015, p. 121). In 2011, Russian gas exports to Turkey were record-breaking at 25.8 bcm (Natural Gas... 2019). In addition, Russia implemented a number of strategic projects in Turkey. The construction of the first nuclear power plant in Turkey, in which the Russian corporation "Rosatom" is involved, is planned to be completed in 2023. The Russian side will remain the owner of the power plant, but has announced its willingness to surrender 49% of shares to Turkish or foreign investors (Schneider 2019, p. 62).

Years	Turkish exports to Russia (milion $)	Turkish imports from Russia (million $)
2002	1168	3891
2003	1367	5451
2004	1859	9033
2005	2377	12905
2006	3237	17806
2007	4726	23508
2008	6481	31364
2009	3202	19718
2010	4631	21599
2011	5992	23952
2012	6682	26625
2013	6964	25064
2014	5945	25293
2015	3589	20399
2016	1733	15162
2017	2735	19514
2018	3401	22 300
2019	3400	21150

Figure 1: Level of trade and growth between Turkey and Russia in 2004-2016

Source: TUİK 2019;
https://www.statista.com/statistics/1001013/value-turkish-goods-exports-to-russia/, 2019;
https://wits.worldbank.org/CountryProfile/en/Country/TUR/Year/2018/TradeFlow/EXPIMP/Partner/by-country, 2019.

Besides, after lengthy negotiations in 2012, the Turkish authorities agreed to the South Stream pipeline being laid through Turkish territorial waters. The project would allow Russians to transport 63 bcm of gas from the Caspian Sea

to countries in Central and Eastern Europe, Austria, Italy and Greece, bypassing traditional routes through Ukraine, Poland and Belarus (Turowski 2019). The largest shareholders in this project are Russian energy giant Gazprom (50 per cent) and Italian Eni (20 per cent), while the French company EDF and German Wintershall each have a 15 per cent stake. The construction of the South Stream pipeline has been in conflict with the Nabucco pipeline project, supported by the European Union, which aims to reduce Europe's energy dependency on energy from Russia by transporting gas from the Caspian Sea to Europe via Turkey. The Nabucco project, supported by both the European Union and the United States, was to transport 31 billion cubic meters of gas annually from deposits in the Caspian Sea in Azerbaijan and Turkmenistan to an energy center in Austria. However, its construction never took place due to the financial crisis in the EU and the lack of political will of Western European countries.

Figure 2: South Stream and Nabucco gas pipelines

Source: https://www.researchgate.net/publication/280539019... 2019.

Despite the fact that the two countries were seeking to intensify their economic cooperation, their interests in the region continued to differ. Their main dispute has been their policy towards Syria. The Kremlin was not as loyal an ally of Damascus as Tehran, and the survival of the Syrian government was still his priority. Russia wants to keep Assad in power because he is his most important ally in the Arab world. However, after the outbreak of the so-called Arab Spring in 2010, Prime Minister Recep Tayyip Erdoğan initially adopted a rather moderate course towards the Syrian president. At the same time, he tried to persuade Assad to carry out democratic reforms. Before the parliamentary elections in Turkey on 12 June 2011, in which the AKP party won, the Turkish Prime Minister became more critical of the regime. He called on the Syrian President to end his brutal actions against anti-government demonstrators. However, the bloody repression of demonstrations by security forces in Hama in the first days of August 2011 led Erdoğan to increase pressure on Syria. He announced that Assad could lose the support of Turkey if he did not stop the bloodshed and carry out reforms. However, the Turkish prime minister's requests were not answered (Kujawa 2011).

Third stage – crisis and recovery. Turkish-Russian relations after the coup attempt

The growing crisis in the Middle East has put Turkish-Russian relations at a crossroads. In 2015, a Russian Su-24 plane was shot down by Turkish fighters over the Turkish-Syrian border. Moscow responded with sanctions. It banned the export of certain agricultural products, revoked visa-free travel for Turkish citizens, and imposed restrictions on Turkish businessmen. Sanctions did not cover the energy sector. In the face of the crisis, Turkey decided to apologize for the incident and restore economic relations as soon as possible. The blame for the shooting down was placed on the Gulen movement. In order to remedy the damage caused by the aviation incident, both countries signed a joint declaration to lift all trade restrictions between the two countries. As a result, the losses slowly recovered. In 2017, the level of bilateral trade increased from 16.9 billion USD in 2016 to 22.3 billion USD (We aim to… 2019).

Turkey has not only taken quick steps to restore good relations with Russia. It has also changed its policy towards Syria. Since then, Turkey has begun to relax its position towards the Assad regime: it has increasingly become more

rare to demanded the departure of Assad. The adoption of these foreign policy vectors by Turkey was welcomed by the Kremlin. Since then, Russia has begun to take an active part in the work for the stabilization of the Middle East. However, the crisis with Russia made the Turkish political elite aware of the threat posed by dependence on Russian energy resources. Since then, the Turkish authorities have made efforts to diversify their energy sources: in order to reduce Russia's monopoly on gas supplies, the construction of the Trans-Anatolian TANAP pipeline was launched in 2015, which will enable gas exports from the giant Shah Deniz fields in Azerbaijan to Europe. The project was inaugurated in 2018. The ceremony was attended by the President of Turkey, the President of Azerbaijan, Ilham Aliyev, the President of Ukraine, Petro Poroshenko, the President of Serbia, Aleksandar Vučić, and the Prime Minister of Bulgaria, Boyko Borisov. In the same year, the Trans-Atlantic Pipeline (TANAP) and the Trans-Adriatic Pipeline (TAP) along the banks of the Marica River on the Turkish-Greek border were joined. As a result of the connection of these two pipelines, natural gas from Azerbaijan can be transported to Italy (TANAP project… 2019).

Figure 3: TANAP project vital for Turkey, Azerbaijan

Source: https://www.worldbulletin.net... 2019.

Paradoxically, the internal situation in Turkey had the greatest impact on strengthening cooperation between these countries. In 2017, a military coup d'état failed. As a result, thousands of people connected with the Gülen movement were arrested. The vast majority of Western European countries expressed their protest against the brutality of the Turkish authorities. Russia, in contrast, expressed its solidity and support for the President of Turkey. For years, the Russian authorities have regarded the Gülen movement as a threat to their internal security. It treated its supporters as an American 5th column. As early as in 2000, the Russian Federal Security Service (FSB) launched an investigation into Gülen-related institutions and educational centers. Three years later, some of Gülen's schools were closed down due to a "threat to national security" and school teachers were deported. In 2007, the Russian prosecutor ruled that the group's ideology was dangerous, and the sale of Gülen's books was banned. Eventually, in 2011, the Russian authorities closed all of Gülen's institutions on the territory of their country (*Russia: The Fethullah…* 2015).

This attitude of Putin towards the Gülen movement led Erdoğan to see him as an ally. From then on, the Turkish president began to recognize Russia as a guarantor of his interests. Russia has become not only a strategic economic ally for Turkey, but above all a military ally. Despite opposition from the United States, Turkey decided to purchase the Russian S 400 system. In mid-2019, the Turkish authorities announced that they intended to accept deliveries of the S-400 system from Russia. The Turkish president stated that he would not withdraw from purchasing Russian weapons. As a result, Russia started to supply S-400 systems, and the training of Turkish soldiers in handling Russian weapons has already been completed.

Moreover, in order to avoid misunderstandings, Russia, Turkey and Iran very often started organizing meetings within the framework of the so-called “Astana Three”, during which they consulted each other on the most important decisions concerning the future of the Middle East. One of the most important of these was the issue of Syria. However, the interests of these countries were not always consistent. The Turkish authorities do not want at all costs to allow the emergence of a Kurdish quasi state in northern Syria through which a pipeline connecting the region with oil and gas-rich northern Iraq could be built in the future. They are striving to create a so-called 'safety zone' in the region, to which some 3 million Syrian refugees are to be resettled. To achieve this goal, the Turkish authorities

carried out a military operation, "Source of Peace", in October 2019. They wanted to create a 30 km-wide strip for a so-called "safety zone" in northern Syria, and to force the Kurds living there associated with the General Protection Units (YPG) to leave the area. The Russian authorities reacted critically to these actions, claiming that they violated the territorial integrity of the country.

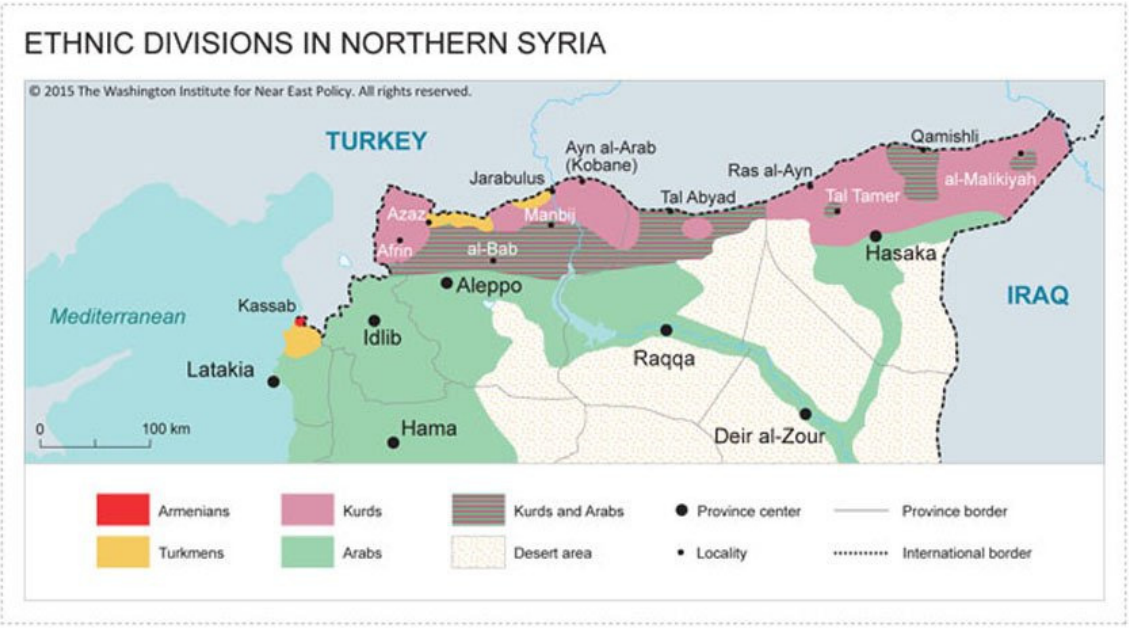

Figure 4: Ethnic divisions in Northern Syria

Source: http://static3.businessinsider.com.... 2019.

However, the dispute between the allies was quickly resolved. Russia agreed to Turkish conditions. This happened during a meeting between the Russian and Turkish presidents in Sochi. A 32-kilometre-wide buffer zone will be set up in Syria, joint patrols of Turkish and Russian soldiers have been launched in the area, and Kurdish fighters will be removed as a result. In this way, the northern part of Syria, hitherto controlled by the Kurds, will be under the rule of the Turks, Russians and the Syrian government army. In place of the Kurds, Turkey is to resettle the more than 3.5 million Syrian refugees it has hosted so far.

The Sochi agreement has proved extremely beneficial for Turkey. The main threat to Turkey—the prospect of a Kurdish state in the northern part of Syria—has been removed. Moreover, the problem of refugees from Syria, who are a growing problem for Turkey, is to be resolved. Their growing number is affecting the popularity of the Turkish president. The first sign of this was felt during the recent local elections, in which the ruling AKP party lost two million of supporters.

The cooperation between the two countries was not only limited to solving common problems in the region. They also took steps towards reducing dollar dominance in the global trade. The first attempt to trade with domestic currencies took President Erdoğan in late 2016. He had suggested to Russia and Iran to “trade using national money” and proposed that “the importer pays in the currency of the exporter”. According to this proposal; Turkey would pay for Russian imports in rubles. Also, Erdoğan emphasized that a financial market infrastructure in accordance with the agreement would be created, and currencies of both countries would become more attractive for commercial institutions.

Despite the fact that Turkey wants to intensify cooperation with Russia, it still does not want to limit its ambitions in the region. Its goal is energy independence. Certain hopes for achieving this goal appeared in the middle of 2020. At that time a Turkish drilling vessel discovered deposits in the western part of the Black Sea containing about 320 billion cubic metres of gas. According to President Erdoğan, further discoveries will allow Turkey to become completely independent energetically and even export gas outside the country. However, his announcements seem to be too optimistic. It is estimated that they will allow Turkey to satisfy the gas needs of the country for two decades. Other estimates say even for several years. Nevertheless, it means that the energy pressure on Turkey will decrease. It will also allow Turkey to negotiate favorable prices during the conversation with Gazprom, which expired in 2020 and has still not been established.

Implications for Central and Eastern Europe

Turkey's growing dependence on Russia makes it an increasingly unpredictable NATO member. This has a direct impact on the security of Central European countries. This shows the position of Turkey at the end of 2019. The country blocked NATO's plan to defend Poland and the Baltic States in case of an invasion from the East. It makes its consent dependent on the political help of its allies in the fight against the Kurds in Syria. Turkey demanded political support in the fight against the Kurdish militia in northern Syria (YPG). One of the conditions is formal recognition by member states that YPG members are terrorists. A disagreement by one of the countries would mean that the North Atlantic Treaty would have a problem with the smooth expansion of defensive forces in these countries. Ultimately, under pressure from the allies, Turkey changed its mind and agreed to sign the document.

Furthermore, Russia, thanks to its strong position in Syria and Turkey, has a real impact on the security of the region. It can trigger the migration of refugees not only to this country, but to Central and Eastern Europe. Turkey, which has already received almost 4 million Syrian refugees, is slowly losing patience and threatening Europe with opening its borders. This was shown, among others, by the Syrian-Russian offensive in Idlib, during which Turkey could cause an influx of 1.5 million refugees into Europe. In this way, Russia is trying to have a real influence on the migration process and wants to become a partner for the EU or a guarantor of stability in the Middle East and North Africa.

Close cooperation between Russia and Turkey weakens, above all, the energy security of Central and Eastern European countries. Apart from the Blue Stream pipeline, both countries have also started opening the new TurkStream gas pipeline which will bypass Ukraine. In this way Russia wants to give Gazprom a monopoly in South-Central Europe and thus may reduce political pressure on the countries of this region

Conclusions

The fact is that the European Union and the United States are slowly losing their close ally in the Middle East which plays a key role in Europe's energy and military security. Turkey has become increasingly economically and politically dependent on Russia. Thus, it has limited possibilities to influence the situation in the Middle East. However, this is not the end of President Putin's ambitions. Russia's goal is to exclude Turkey from the structures of the North Atlantic Alliance, close NATO bases and withdraw American soldiers from the country. But will it achieve this? On the one hand, it seems unlikely. The vast majority of Turks still express the need to remain in NATO. Besides, Turkey's exit from NATO would greatly reduce the country's defense capabilities. Without modern technology it will be very difficult for Turkey to conduct operations against the PKK and other terrorist organizations in Iraq and Syria. However, it seems that under Erdoğan's rule there will be no major changes in the country's foreign policy. He will strive at all costs to maintain close relations with Putin, who supports his position in the country and does not interfere in internal affairs. It is only after the departure from power of the Turkish president that a reset in relations with the West may occur. Moreover, he has been in power since 2002. The AKP is increasingly dissatisfied with Erdoğan's policy to date. There are still many Westernizers in the AKP who are increasingly boldly criticizing Turkish foreign policy vectors. The opposition, which aims to democratize Turkey and bring it closer to the European Union, is also growing in strength. Their chances of taking over power in the coming years are slim, but in the long run their position will systematically grow. The recent local elections have shown that Erdoğan is systematically losing supporters (around two million). The economic crisis has made more and more Turks express their disillusionment with the president's policy and want him to leave. However, it is possible that Turkey may be expelled from NATO by then. Such voices are increasingly frequent in the US Congress. In this situation, Turkey would become unpredictable and even more dependent on Russian influence. Therefore, despite these difficulties and problems, it is in the interests of both the European Union and the United States to keep Turkey within the Alliance.

An extremely important element of cooperation, which will undoubtedly affect the future of Russian-Turkish relations, is the energy sector. Turkey is highly dependent on gas imports from Russia. Recently, however, the Turkish authorities have become increasingly aware of the threat of dependence on gas supplies from Russia, and are making efforts to diversify their energy resources. One solution is the construction of the TANAP pipeline to transport gas from Azerbaijan to Turkey and further to Europe. This multi-sectorial policy may contribute to increasing Turkey's energy security. However, this does not mean that the country will be fully independent from Russian gas supplies. It will take many years before Turkey improves its energy independence. However, this will require greater cooperation with the European Union and the United States. Russia, on the other hand, will take all measures that distance Turkey from projects implemented with its western allies.

Perspectives

As a result, the main beneficiary of cooperation between these countries seems to be Russia, which has managed to make Turkey dependent on energy resources and limit the U.S.'s influence in the country. In the future, however, Turkey's dependence on Russia may increase. Several factors had an unmistakable impact on this process:

a) Firstly, the Russian president does not interfere in Turkey's internal affairs. He does not condemn the President of Turkey for the purges that were carried out in the power apparatus after the failed coup of 2017. On this matter, Russia has expressed solidarity and support for Erdoğan. Unlike many Western European countries and the US, Gülen's movement is to blamed for the failed coup.

c) Another factor that will undoubtedly determine Turkish-Russian cooperation is the Kurdish issue. Here too the Russian President gives Turkey his support. However, he does not want to increase Turkey's position in Syria and allow it access to the oil-producing areas in that country.

d) The building of mutual relations may also be supported by Putin's moderate stance towards Muslims living in Russia. For several years now he has been trying to support the activities of Russian Muslims. Among other things, the initiative to build the largest mosque in Russia was to serve this purpose. The opening ceremony of the Great Mosque in Moscow, which is able to accommodate 10 thousand people, was attended by, among others, the President of Palestine and the President of Turkey (Baczynska 2019).

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Understanding Airline Passenger Satisfaction Level Using Machine Learning

Serban ANGHEL
POLITEHNICA University of Bucharest, Bucharest, Romania
anghel.serban08@gmail.com

Adina Petruta PAVEL
POLITEHNICA University of Bucharest, Bucharest, Romania
adinappavel@gmail.com

Abstract

Air travel has come a long way from the crowded and noisy experience in the 1940s, through the glamorous experience in the 1970s and 1980s to the diversity of services provided today. The markets of the traditional airlines are more and more intertwined with the market of low-cost carriers (LCCs), the latter penetrating the upper class market by providing different paid services, such as cargo luggage, lunch, selection of seats and others. The future passengers' decision of which airline to choose becomes more difficult, as the airlines offer similar services, therefore the interest of the airlines to attract new passengers and to make them satisfied is more and more pronounced. This paper proposes a new approach to find out what exactly could be a crucial factor in improving the passengers' satisfaction by applying a machine learning algorithm on a large database with more than 100,000 passengers and more than 20 data points on each of them. The results could be used in the business decision making process, by focusing on providing the services which improve the most the passengers' satisfaction, therefore ensuring a sustainable development for an airline.

Keywords: Passenger satisfaction, Airline, Machine Learning, Decision Tree

Introduction

It is considered that the American brothers Wilbur and Orville Wright are the pioneers in aviation, one of the most powerful industries in the world today, when, in the cold morning of December 17th, 1903, they succeeded the first powered, sustained and controlled flight of a power-driven, heavier than air plane for 59 seconds, at 852 feet (History.com, 2019). As the air transport industry evolved, the world became more and more interconnected, allowing all kinds of businesses to flourish. From air travel to business meetings across the globe, it is estimated that around 82% of US citizens have flown at least one time during their life (Negroni, 2016). For comparison, 88% of US citizens reported that they own a car (Misra, 2015). With these numbers in mind, we can say that it is as approximately as common to fly with an airplane as it is to own a car.

However, this is the situation right now, in 2020. About one century ago, air travel was only for the wealthy and accomplished. In the 1930s, a round trip from the west coast to the east coast was priced around $260 – but the value of money was completely different. This represented about half the price of a new car and more than half of a yearly wage of a factory worker. (PBS LearningMedia, n.d.)

Passenger air travel changed dramatically over the years, with the development of new technologies, airplanes getting bigger, faster, more reliable and more capable of providing quality travelling.

In the beginning of passenger air travel era, in the 1920s, the airplanes were small, crowded (held fewer than 20 passengers), unpressurized (which meant that they had to fly at low altitudes, where significant meteorological phenomena was common) and very loud. The aircraft engineers estimated the engine noise of the airplanes during take-off to be around 120db. For comparison, the front rows at a rock concert sustain about 110db, while a military jet take-off caps at around 140db (ThinkWorth, 2016).

The next decade, between 1930 and 1940, showed a tremendous increase in the number of airline passengers, from 6,000 to 1.2 million by 1938 (ThinkWorth, 2016). In this period, stewards became in charge with more than just aiding to passengers' health and started to supply them with complementary beverages and food. By the end of 1930s, the airplanes became more comfortable, being soundproofed and heated. The first pressurized commercial aircraft was introduced in 1938.

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In the golden age of aviation, between 1940 and 1960, air travel became more luxurious and flamboyant. The flights got longer and the passengers got more comfortable during the flight. It is worth pointing out the fact that during this period, people dressed up for this event – flying was extremely glamorous.

In 1970s, with the introduction of the Boeing 747, flying became more affordable and common as the airlines had more tickets to sell per flight, making the price more reasonable. Nevertheless, first class remained exquisite.

In the 1990s, a new era of in-flight entertainment began with the introduction of big, cathode-ray tube TVs, placed above the isle – enabling the passengers to deal with the long, 10h flights. As a new addition, all passengers of age, including the ones from economy class, could benefit from complementary liquor on domestic and international flights.

Coming into the third millennium, the in-flight entertainment became even better, with each passenger having his own small LCD display embedded in the seat in front of him. The menus for food and beverages became less and less complex for the economy class, while the higher priced tickets still benefit from on-demand cuisine on long flights.

The major step that was made probably resides in the first class compartment, where several airlines refurbished the interiors. Right now, it is possible to book for over $20,000 per flight an entire suite on-board, complete with 8 minutes of running hot water for a quick shower before landing, a full size bed, huge 32-inch (80 cm in diagonal) TVs, a mini bar of soft and alcoholic drinks and many more.

From the passenger's point of view, one has an incredible amount of choices when deciding an airline for the next flight. One airline has better departure/arrival times, but no included luggage, another one comes with included check-in luggage, but with a higher price and so on.

The low-cost and ultra-low-cost tactics proved to be very successful; people are finding out that they do not need in-flight Wi-Fi for a two hour flight; it is more important that the tickets are cheaper. Two good examples of successful low-cost carriers (LCCs) are Ryanair and WizzAir, both of which hold a big percent of the market, above legacy airlines, such as Turkish Airlines or Lufthansa. (CAPA, 2015)

One another interesting aspect is that the market of low-costs and ultra-low-costs can intersect with the legacy, traditional airlines. By adding the costs of a low-cost ticket, a 23kg standard hold luggage, 2 course meal, one soft drink, one alcoholic drink and the ability to choose a seat, a person will find out that he will be paying more than the equivalent services at a traditional airline.

This intersection provides a serious extra revenue for the low-cost airlines – they reach the market of upper class travelers by being able to offer them only the services they need (maybe one does not need an extra 23 kg cargo hold luggage, for example – so he will be paying extra at the traditional airline for a service he will not use).

Nevertheless, it is important to mention that for WizzAir and Ryanair, the ancillary revenue (the revenue that comes from "extras", such as the ability to choose a seat, priority boarding and so on) represents a large part of the company's revenue. In the financial year 2015, 35% of WizzAir's revenue was from ancillary activities, while for Ryan Air the percentage was around 25% (CAPA, 2015).

Continuing this trend, in 2019, LCCs in Europe had 33.1% of the total seat capacity in the region. Ryanair transported 152.4 million passengers in that year, being considered the biggest airline group in Europe, followed by Wizz Air (Mazareanu, 2020). The latter has a progressive development strategy to capture larger market share across Europe, by entering new markets which were less explored by other European LCCs (e.g. Eastern Europe). Although LCCs market share in Europe increased by 10% in 2019 compared to 2009 (Mazareanu, 2020), the traditional airlines responded with new solutions to keep their market position.

However, it is of great importance for any airline to know exactly what makes the passengers satisfied – this way, the possibility of flying them again increases. Perhaps some services increase so much the level of satisfaction for passengers, that it would be more profitable to give that service for free to all passengers (this way, more passengers will come back to the same company and will use their services; more passengers translates into more revenue which obviously means more profit) as opposed to charging extra individually for that particular service/commodity.

Objective

This paper has the purpose to find, using machine learning algorithms, what exactly is changing the perception of passengers about the quality of the airline service as a whole. A supervised machine learning algorithm (decision tree) was applied on an open-source dataset which contains the satisfaction level of more than 100,000 passengers alongside more than 20 individual data points on each passenger, such as the type of traveler, distance travelled, seat class and many others. The programming language of choice was Python, while the used libraries were Sklearn, Pandas and Numpy.

The purpose was to gain new insights about what exactly is changing the perception of passengers about the quality of the airline service as a whole. The results could be used in order to provide a background for the sustainable development of an airline, with respect to its customers' wishes, in order to maximize their satisfaction while minimizing the costs associated.

As a research limitation, it is worth mentioning the fact that the dataset used has no clear origin (i.e. if the data comes from US travelers, EU travelers, world-wide travelers etc.) and it may have been subjected to social, economic and/or political conjunctures of regional, national or international scenarios.

Theoretical aspects of the decision tree classifier

The chosen algorithm for the analysis of the dataset is the decision tree classifier. This algorithm belongs to the supervised class of machine learning algorithms. This means that the machine sees the inputs and the desired outputs of the training data set when trying to discover some "rules" that the data entries follow, in order to predict the variable of interest (in this case is the level of satisfaction of the passenger).

This algorithm can be perceived as a supervised segmentation – basically it splits the training population into groups that differ from one another with respect to some value of interest.

The segmentation of the data takes the form of a tree, in such a way that the tree's root is at the top and it branches as it goes downward. This tree is made up of nodes – interior nodes and terminal nodes, which are also called leafs. The branches are emanating from the interior nodes.

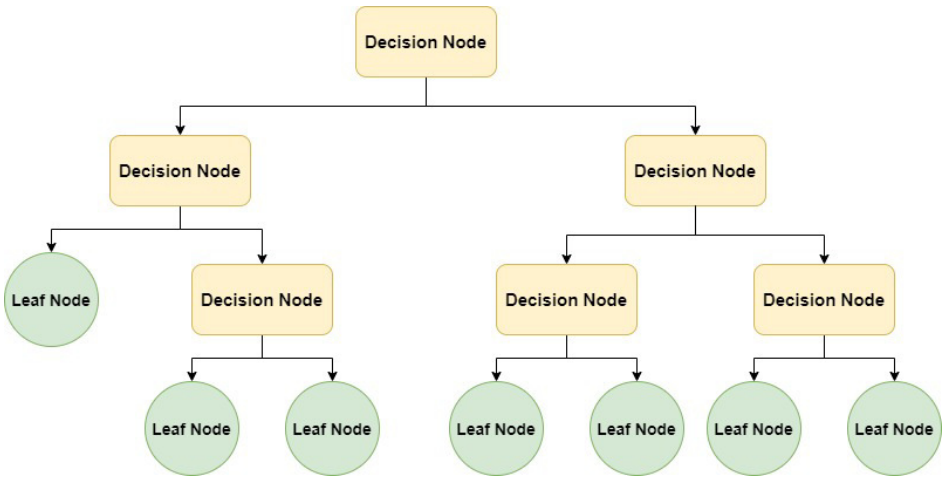

Figure 1: Basic structure of a decision tree

Each interior node in this tree represents a test of an attribute, a question related to that attribute. The dataset that will be processed has a large number of attributes: Gender, Customer Type, Age, Type of Travel, Class, Flight distance, Inflight Wi-Fi service, Departure/Arrival time convenient, Ease of Online booking, Gate location, Food and drink, Online boarding, Seat comfort, Inflight entertainment, On-board service, Leg room service, Baggage handling, Check-in service, Inflight service, Cleanliness, Departure Delay in Minutes, Arrival Delay in Minutes and the target variable, Satisfaction. From this interior node, each branch represents a different answer to that question – a certain value of the attribute, for example Age < 50.

Each data point from the data set will follow one and only one path through these branches, ending up in a terminal node (leaf). In other words, each leaf corresponds to a segment of the initial dataset and the path from the root node to the leaf gives the characteristics of that segment.

Since in this case we are interested in a supervised segmentation, each leaf contains a value for the target variable (as the algorithm sees the output values).

Decision trees or classification trees are used as predictive models. When trying to predict a target value for a new data point (predicting the satisfaction for a new customer, for example) we can predict its classification by finding the corresponding segment (going down the tree, answering the questions from each interior node – which can also be called decision nodes for that reason). In a tree, no nodes share the same descendants, as always the branches point downwards and there are no cycles.

The decision tree algorithm will split each node into more nodes, until all terminal nodes become pure (all of the instances in that node have the same value for the target variable). This will lead the decision tree to overfit. Overfitting means in simple terms that the algorithm memorizes the training dataset. It performs the splits until all of the leaf nodes are pure (have the same target variable, in our dataset that is "satisfied" or "unsatisfied"). If a classification tree is allowed to grow until all leaf nodes are pure, the prediction that the tree makes will be close to 100% accurate (because each leaf will most probably have only one member). This way, the algorithm will fail to properly generalize the information that is given through the training dataset.

In decision trees there are several ways that avoid overfitting: setting a limit on the amount of splits, setting a lower limit on the amount of members in a leaf and many others. However, if the phenomena of overfitting is avoided "too much", the decision tree will not be able to properly generalize on the data. There must be a certain level of complexity of the tree at which the model is performing the best on the testing (holdout) data – the data that the algorithm has not seen. This level of complexity can be found with something called fitting graph.

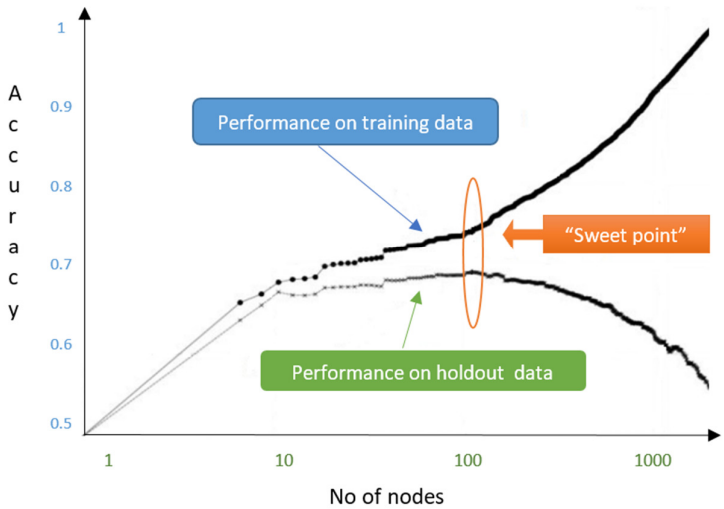

Figure 2 : Fitting graph; Reproduced from (Provost & Fawcett, 2013)

In ***Error! Reference source not found.*** a typical fitting graph is shown. It is important to notice that the tree complexity, in this case the tree size in nodes, is plotted on a logarithmical scale.

Beginning at the left, the tree is very small and has poor performance. As it is allowed more and more nodes it improves rapidly, and both training set accuracy and holdout (testing) set accuracy improve. The training set accuracy always is at least a little better than holdout set accuracy, since the algorithm did get a look at the training data when building the model. But at some point the tree starts to overfit: it acquires details of the training set that are not characteristic of the population in general, as represented by the holdout set. In this example overfitting starts to happen at around x = 100 nodes, denoted the "sweet spot" in the graph. As the trees are allowed to get larger, the training set accuracy continues to increase—in fact, it is capable of memorizing the entire training set if it is not controlled (via setting a maximum number of leafs etc.), leading to an accuracy of 1 (not shown). But the holdout accuracy declines as the tree grows past its "sweet spot"; the data subsets at the leaves get smaller and smaller, and the model generalizes from fewer and fewer data. This is an exact exemplification of the overfitting phenomena.

The fitting graph represents exactly the best trade-off between the extreme possibilities of not splitting the data as much as needed in order to generalize and building a complete tree until all the leaves are pure.

It is important to mention that the decision tree algorithm can only process numerical data, therefore the columns that have categorical values need to be pre-processed, as it will be shown further in this paper. An example of a categorical column is Gender, which has the values Male and Female.

Several decision trees were trained on the available data and, in order to easily compare their performances, for each of them a confusion matrix was generated. Generally, for a problem involving n classes, the confusion matrix is a $n \times n$ matrix, with the columns labelled with the predicted classes and the rows labelled with actual classes. Each instance in a test set has an actual class label (in this dataset, "satisfied" or "unsatisfied") as well as the predicted class by the classifier. In this case, because the dataset has only two classes, the confusion matrix will be a 2×2 matrix.

Table 1: Confusion Matrix

		Predicted condition	
		Predicted condition negative	Predicted condition positive
Actual condition / class label	Condition negative	**True negative**	**False Positive**
	Condition positive	**False Negative**	**True Positive**

This matrix gives birth to many important indicators that show the performance of the algorithm's predictions. This is important as it allows a more detailed analysis than just the simple accuracy of the model.

Accuracy, as a performance indicator, may show misleading results if the data set is unbalanced – for example, in the current dataset, if there were 99,000 satisfied customers and only 1,000 unsatisfied passengers. Continuing this example, if the tree classifier would predict that every customer is satisfied, it would have an overall accuracy of 99%, which it is exceptional.

In this context, accuracy is defined as the ratio between the correct predictions and the total number of cases analyzed: $\frac{\sum true\ positive + \sum true\ negative}{\sum total\ population}$.

At a closer look, the classifier would have a 100% recognition rate of the satisfied customers, known as sensitivity or true positive rate (TPR) which is equal to $\frac{\sum true\ positive}{\sum condition\ positive} = \frac{\sum true\ positive}{\sum true\ positive + \sum false\ negative}$, that is the proportion of the actual positives (in our case, actual satisfied customers) that are correctly identified as positives (predicted satisfied customers) – because all satisfied customers are predicted as satisfied. In this case, true positive represents the satisfied customers identified as satisfied, while false negative are the satisfied customers labelled as unsatisfied.

On the other hand, it would have a 0% recognition rate for the unsatisfied customers, which is called specificity or true negative rate (TNR) which is equal to $\frac{\sum true\ negative}{\sum condition\ negative} = \frac{\sum true\ negative}{\sum false\ positive + \sum true\ negative}$ - this represents the actual unsatisfied customers which are correctly labelled as unsatisfied.

It is obvious that is very important to choose the appropriate measure of performance for each application, as it heavily depends on what is desired. As an extreme example, if a classifier algorithm predicts whether a patient has cancer or not, obviously it would be of interest to correctly identify as many patients who actually have cancer. But then, one must ask himself: what is less desirable – to tell a healthy patient that he has cancer or to tell a patient that actually has cancer that he is healthy. It ultimately depends, as mentioned before, on the application of the algorithm.

Applying the Decision Tree Algorithm

After loading the dataset, it is necessary to process it before applying the decision tree algorithm. Firstly, we need to find if there are any missing values (which are labeled as NaN). This is easily done by using the built-in method isna().sum():

```
Gender                                0
Customer Type                         0
Age                                   0
Type of Travel                        0
Class                                 0
Flight Distance                       0
Inflight wifi service                 0
Departure/Arrival time convenient     0
Ease of Online booking                0
Gate location                         0
Food and drink                        0
Online boarding                       0
Seat comfort                          0
Inflight entertainment                0
On-board service                      0
Leg room service                      0
Baggage handling                      0
Checkin service                       0
Inflight service                      0
Cleanliness                           0
Departure Delay in Minutes            0
```

```
Arrival Delay in Minutes            310
satisfaction                          0
dtype: int64
```

The 310 missing values might not mean much of over 100,000 passengers, but nevertheless, if we replace them, we might improve the performance of our model. We considered three methods of replacing (called imputing) the missing values: with the mean value of the column, the median value of the column or the mode value of the column.

However, before replacing these values, the dataset was divided into training data and testing data by a ratio of 4/1. It was necessary to divide the dataset before imputing because otherwise, the training data would have had an "insight" of the testing data – making the input biased for the classifier. For example, these are the mean values:

```
Mean value for x_train is 15.250950203313344
Mean value for x_test is 14.889559299126322
Mean value for the dataset is 15.178678301832152
```

The comparison between the performances of the decision tree when trained using only the numerical columns (i.e. ignoring the columns with had categorical values as previously explained) with respect to the three imputing methods is presented below, in *Table 2*.

Table 2: Imputing with mean vs mode vs median (rounded values)

	Imputing method		
Performance index	Mean	Mode	Median
Accuracy	0.9233	0.9236	0.9236
Sensitivity	0.91558	0.9151	0.9151
Specificity	0.92936	0.93022	0.93022

The reason for which imputing with mode and imputing with median result in the same values is that, for this dataset, the mode is equal to the mean (both are zero).The next step in training the model is the use of the categorical columns. The sklearn library provides two approaches to this issue: label encoder and one-hot encoder.

First of all, the columns that have categorical values have been separated into a dataframe called xcat. The possible values of the attributes of these columns can be easily found out:

```
In[6]: for col in xcat.columns:
    print('column {} has {} values: {}'.format(col, len(xcat[col].value_counts()),
xcat[col].unique()))

Out[6]: column Gender has 2 values: ['Male' 'Female']
        column Customer Type has 2 values: ['Loyal Customer' 'disloyal Customer']
        column Type of Travel has 2 values: ['Personal Travel' 'Business travel']
        column Class has 3 values: ['Eco Plus' 'Business' 'Eco']
```

These columns may have important information, that could help the decision tree to classify better our passengers – as, for example, 'type of travel' and 'class' should have a significant impact on the passenger's satisfaction.

By applying label encoding, each column in xcat will be transformed. If we take the example of column 'Gender', the values 'Male' and 'Female' will be replaced with 0 and 1, in order for the decision tree to take advantage of the information from this column. This works quite well if the respective column has two possible values, like in the example above. However, if we take the example of the column class with the three values 'Eco Plus', 'Business' and 'Eco', after applying label encoding, the values of the class column will be 0, 1 and 2. This may influence the decision tree algorithm, as 2 is two times bigger than one.

This problem is solved using the one-hot encoder, which transforms each possible value of a categorical column into a column of its own, with binary values. Continuing on the example of the column class, this column will be replaced by three columns, 'Eco Plus', 'Business' and 'Eco', each of those having two possible values, 0 and 1. For example, a business class passenger will have the following values, with respect to these three columns:

```
'Eco plus' = 0
'Business' = 1
'Eco' = 0
```

The comparison between the performances of the decision tree when using label encoder versus using one-hot encoder is presented below, in *Table 3*.

Table 3: Label Encoder versus One-Hot Encoder

	Method	
Performance index	Label Encoder	One-Hot Encoder
Accuracy	0.9451	0.9460
Sensitivity	0.9415	0.9432
Specificity	0.9480	0.9482

As one-hot encoder provides better performance, the next step is to compare the performance of the decision tree applied on the dataset with one-hot encoder and imputing with mean versus one-hot encoder combined with imputing with mode. This can be seen below, in *Table 4*.

Table 4: Comparing One-Hot encoder with mean versus mode

	One-Hot Encoder	
Performance index	Imputing with mean	Imputing with mode
Accuracy	0.9460	0.9454
Sensitivity	0.9432	0.9428
Specificity	0.9482	0.9474

As we can see, imputing with mean yields better results, even if when the three replacing methods were compared, imputing with mode provided the best results.

The next step is to plot the fitting graph in order to find the maximum complexity of the model in order to avoid overfitting. The fitting graph was a plot of the accuracies on the training dataset and the testing dataset as a function of the complexity of the model. In this case, the measurement of the complexity will be the max depth that we allow the tree to grow up to.

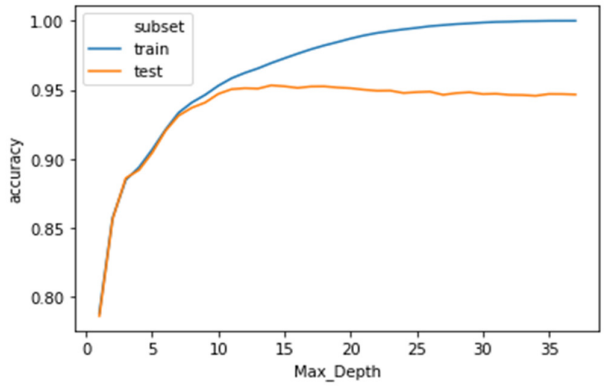

Figure 3: Decision Tree Fitting Graph

We can see that even if the downwards slope for the testing accuracy is not as prominent as the slope present in the theoretical fitting graph we can identify a sweet spot around the point Max_Depth= 15.

The exact value can be found using the block of code below:

```
results_test = results.loc[results['subset'] == 'test']
results_test.drop(['subset'], axis = 1, inplace = True)
max_acc_test = results_test['accuracy'].max()
depth_max_acc_test = results_test.loc[results_test['accuracy'] ==
                                max_acc_test, 'Max_Depth']
depth_max_acc_test = depth_max_acc_test.iloc[0]
Out[139]: 14
```

The final step is to pass the maximum depth obtained from above into the parameters of the decision tree model.

Conclusions

The performance of the final decision tree can be described looking at the confusion matrix associated and at the metrics that were previously used for comparison:

Table 5: Performance of the final decision tree

	Performance score
Accuracy	0.95318
Sensitivity	0.9250
Specificity	0.97534

Table 6: Confusion matrix for the final decision tree

		Predicted condition	
		Predicted condition negative	Predicted condition positive
Actual condition / class label	Condition negative	**11349**	**287**
	Condition positive	**686**	**8459**

In order to read and interpret the results obtained by applying the decision tree algorithm on the dataset, we plotted the feature importance. A feature is an attribute, one of more than twenty characteristics that are available for each of the passengers. The feature importance plot shows which of the features (attributes) separates the best the satisfied passengers from the unsatisfied ones.

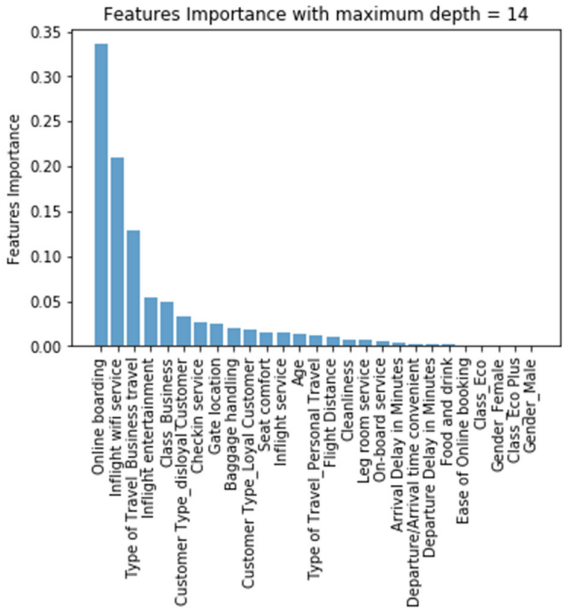

Figure 4: Feature Importance for maximum depth = 14

The decision tree obtained looks as follows:

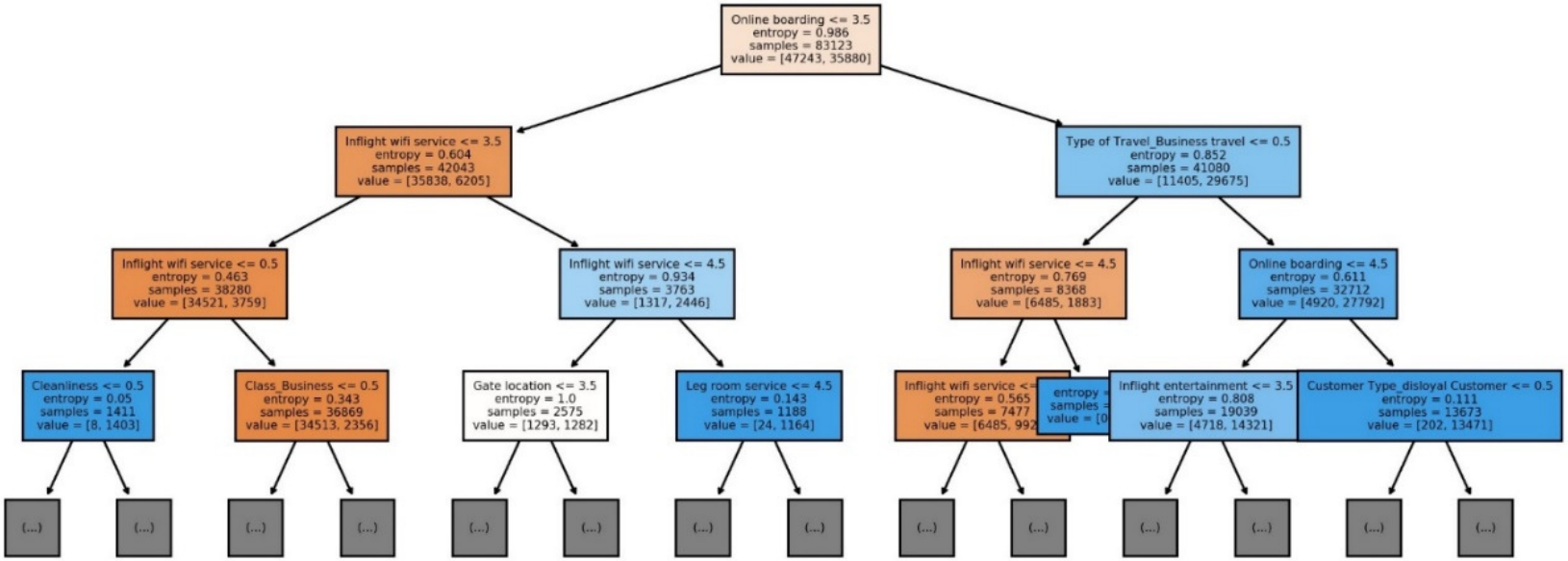

Figure 5: The decision tree with the best performance, plotted until the fourth split

The value that we need to take a look at in *Figure 5* is the entropy, which is a measurement of the impurity of the node. When entropy is equal to one, it means that the samples in that node are balanced, half are satisfied, half are dissatisfied. On the contrary, the closer the entropy is to zero, the purer that node is; i.e. the split performed above was good (at least on one of the children nodes) and it helped to separate the passengers with respect to the target variable.

The last row (value = [x,y]) shows the values of the samples' target variable that belong to a certain node. For example, if we take a look on the branching on the right hand side of the tree we can observe that from all the passengers that were business travelers (Type of travel_Business Travel = 1*)* and rated the online boarding experience with five out of five, from a total of 13,672 passengers, 13,471 declared themselves satisfied, while only 202 were not satisfied with the airline services as a whole.

This means from a business perspective that if the airline is able to provide an excellent online boarding experience for the business travelers, most likely they will be satisfied customers.

Some more interesting aspects that can be read from the decision tree in *Figure 5*:

- Looking on the left side of the decision tree, even if the online boarding was at most average (grades from zero to three) and the inflight Wi-Fi service was terrible or not existent (received a grade of zero out of five), 1403 passengers out of 1411 declared themselves satisfied. This means that some other service was very good (most probably) and in the end, we cannot correlate the non-existence of the inflight Wi-Fi service with a dissatisfied passenger;
- Following the first split on the left and then coming down on the right, we are at the opposite pole: if the inflight Wi-Fi service was excellent (received a grade of five out of five), again, most of the passengers (1164 out of 1188) declared themselves satisfied – we are able to correlate the excellent inflight Wi-Fi service with a satisfied customer, disregarding the values for the other attributes.

By looking at the features importance there are some interesting things that we can learn:

- The most informative attribute is *'Online Boarding'* – which probably refers to the quality of the online check-in service;
- The second most informative attribute was *'Inflight Wi-Fi service';*
- The third attribute was *'Type of Travel_Business Travel'* – this shows that if the passenger is a business traveler, it is a lot easier to predict his level of satisfaction;
- Certain aspects which usually are used by airlines in order to attract customers are not so important in determining the level of passenger satisfaction (in comparison with the ones above), such as:

    - 'Legroom service';
    - 'Food and drink';
    - 'Arrival delay in minutes';
    - 'Departure delay in minutes';
    - 'Departure/Arrival time convenient'.

However, this was only one of many machine learning algorithms that can be used on a dataset like this. Methods like similarity matching, clustering and profiling may help us to get valuable insights from the data. The field of machine learning algorithm is quite vast and there are a lot of algorithms to explore and to apply on the dataset.

The purpose of this research was to implement a machine learning algorithm on a new problem (airline passenger satisfaction level) in order to get valuable insight with respect to what makes a passenger satisfied. With that in mind, we consider that the current paper provides a good background for further business decisions that involve the areas of services that shall be improved, with the purpose of delivering quality services that actually matter to the passengers and successfully translate into an increase of their satisfaction level.

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Impact of Quality Healthcare Equipment and Physical Structure on NHIS-HMO Outpatient Enrollees' Perception in Lagos Hospitals

Abigail Affiong MKPEREDEM
Landmark University, Omu-Aran, Kwara State
abigaileyo23@gmail.com

Peter B. OGUNLADE
Landmark University, Omu-Aran, Kwara State
Ogunlade.peter@lmu.edu.ng

Chisaa O. IGBOLEKWU
Landmark University, Omu-Aran, Kwara State
Igbolekwu.chisaa@lmu.edu.ng

Festus ASAMU
Landmark University, Omu-Aran, Kwara State
asamu.festus@lmu.edu.ng

Bamidele RASAK
Landmark University, Omu-Aran, Kwara State
rasak.bamidele@lmu.edu.ng

Ogadimma ARISUKWU
Landmark University, Omu-Aran, Kwara State
arisukwu.ogadimma@lmu.edu.ng

Abstract

This study assess enrollees' perception of Health care facility's (HCFs) physical structure and equipment quality across 9 accredited National health insurance/ Health maintenance organisation (NHIS-HMO) providing healthcare facilities within the 3 local government areas in Lagos, Nigeria.
Anchored on the phenomenology of time consciousness and the filter theory of attention, the study methodology was triangulated using survey method and in-depth interview. A total of 252 questionnaires and 5 in-depth interviews (IDIs) were used to elicit data from selected respondents using simple random and convenient sampling technique. There were differences between the survey result and the in-depth interview (IDIs) responses in terms of structural awareness in contrast with access to treatment equipments. 61.1% of the respondents agreed that the physical environment of the HCF was conducive, 61.5% agreed to the presence of standard and functional medical equipments in the HCF. With regards to the quality rating, 55.1% perceived the quality of HCFs physical structure and equipment fairly positive while 30.6% of the respondents perceived it negatively. From the group comparisons, the Chi-Square results ($P<0.01$, $\chi2$ (16) = 66.750) revealed significant correlations between quality of HCFs physical environment and equipment and enrollees perception. The Spearman's correlation was also positive at .064. These findings indicate that the tangible aspects of healthcare service are significant in health outcomes as such, it is recommended that. Enrollees should have access to testing equipments considered relevant in illness treatment and the physical ambiance should be prioritised to ensure consistency in quality health promotion.

Keywords: Perception; National Health Insurance Scheme; Health Maintenance organization; Healthcare Quality.

Introduction

The problem of quality has slowly become a big part of our lives and of culture as a whole; it is difficult to describe quality because of its subjective existence and intangible characteristics that everyone wants it to be quality can be almost anything. Although, no single universally accepted definition exists, quality has been defined as "value" by Feigenbaum (1951), "excellence" by Peter and Waterman (1982). Zeithaml and Bitner (1996) research evidence

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indicates that the quality of service can be measured in five ways: service efficiency, service provider responsiveness, service provider assurance; consumer empathy and measurable proof of service quality. Donabedian (1980) amenities components of quality in healthcare included characteristics such as comfortable physical environment and excellent service delivery. The different views expressed in the definition of quality character are context determined and dependent on the perceived perspective of the individual authors'.

Several studies have been conducted to measure what areas of health care service are considered important and significant in building necessary cues in patient's experience. For instance, Donabedian (1980), viewed healthcare quality as applying technical and medical science in such a way as that health benefits are optimised without increasing risk. Similar to Mosadeghrad (2012b) five categories of quality healthcare which included environmental attribute, Donabedian amenities for quality check also included features such as comfort of physical surroundings and attributes of the organisation towards service provision.

While evaluating quality, literatures on NHIS-HMO have mostly focused on awareness and acceptability of the scheme, funding, and the quality of services rendered under the scheme. For example, Ibiwoye and Adeleke (2008); Awe and Sanusi (2009); Arodiogbu (2005); Okaro, Ohagwu and Njoku (2010) carried out studies in Nigeria on increasing consciousness, work and modus operandi of the National Health Insurance Scheme as well as the Health Maintenance Organisation. However, these studies did not consider the quality of healthcare facilities (HCFs) equipments and physical structure as factors influencing enrollees' perception. It, therefore, becomes necessary to assess enrollees' perception of HCFs equipment and physical structure quality across selected HCFs in Lagos, Nigeria.

Literature Review

Healthcare Facility tangible quality

Dijkstra, Pieterse, and Pruyn (2006) methodical research work regarding the effect of healthcare physical surroundings on consumers' welfare and health outcome revealed a positive correlating importance between the healthcare environment and the patients' health outcome. The Cochrane database of systematic reviews 2011 including a hundred and two works by Drautas where the investigated interventions were: 'positive distractors' which included 2 studies on aromas, 5 audiovisual studies, a study on decoration and 85 studies on music. While the multifaceted interventions had 2 studies, physical change to minimize environmental stress included interventions such as; a study each on the type of bedroom, lighting, and temperature, 3 studies on the quality of air, 2 flooring studies, and 1 study assessing furniture and furnishings..

Overall, patient-account revealed the ability of music to lessen health outcomes like apprehension; on the other hand, physiological effects, and drug use contribution had little proof. With the exception of quality of air, few researches accepted or denied the introduction of physical changes. It was discovered by the incorporated research that the physical changes in the hospital environment did not cause any damage or harm. Following the incorporated criterion incorporated to assess no studies was found on art, interventions to reduce HCFs noise, patient controls, and technologies; avenues to seek aid, accessibility to nature for example, through gardens, balcony, window space and ceilings.

Drahota (2005) clearly stated in a simple outline the significance and implications of the physical surroundings as it affects patient's wellbeing. In contemporary time, studies indicate that the potential consequences attached with healthcare facilities physical environmental cues on patients' recuperation and welfare has obtained considerable attention.

The Drahota's study laid bare the capability of environmental factors in the production of optimistic results in health consumers outcomes, an idea referred to as 'healing environments'. The surrounding physical state in healthcare facilities has the ability to affect and influence health consumer's perception. The 'healing environments' ideology makes reference to cognitive effects of the physical environment through neurophysiological processing (sensory perception). One significant study by Ulrich (1984) tracked the recovery of patients in hospitals while viewing vegetation as opposed to structures, and found that those with a view to nature recovered faster.

Theoretical Framework

Perception of HCFs physical structure and equipment quality through the lens of Edmund Husserl's Phenomenology of time consciousness

The study of "phenomena" (appearance of things, or how objects emerge in individual's experience, or in what forms individual's experience objects, thus the meanings objects have in our perception at a specific time is regarded as time conscious phenomenology.

The phenomenologist Husserl (2001) assumes that intentional consciousness is related with universal contents, this can be interpreted to mean that perception, recalling; imagining and willingness are intentional in its very existence as conscious actions of the moment, hence, time conscious phenomenology assumes that our physical awareness concerning things in our surrounding or the appearance of things in our minds eye (perception, experience, thoughts, and memory) is time-related Nijhoff (1966).

Although the intentional ideology possesses an undertone of wilful interest, it essentially showcases the connection consciousness has with surrounding objects. Our perception, according to classical Husserlian phenomenology, is geared (represents or intended) towards things through particular concepts, thoughts, ideas, and pictures temporarily. Husserl referred to the various structure of experience as "intentionality" because; the directedness of perception towards objects within the physical sphere possesses consciousness attributes.

One important implication of this theory is that it explores the composition of consciousness in the formation of perception concerning an object experienced within a particular time. The connection between this research work and the phenomenology of time-consciousness is that it seeks to account for intentionality in enrollees perception guided by experience over time.

Perception of HCFs physical structure and equipment quality through the len of Attention theory

We may better characterize our environment as an environment of stimuli. Stimuli influence all or every one of our senses. Although, not all of the sensory clues within an individual's physical environment are listened or taken in at the same time but the presence of multitude of stimuli has the ability to overpower the human sense of feeling, hearing, touching, tasting and smelling. Considering the inability of people to simultaneously uphold perceptible views to every stimulus exposed to in their physical setting, the clutter of cues observed are usually filtered after being taken in, with only a few accepted into the individual's mind.

A major proponent of the attention theory, Broadbent (1958) suggested that tangible features present in the environment at specific timing are stored in a limitless capacity sensory buffer for cues processing and selection. Such filters according to Gleitman (1996) are initially placed at the sensory filter for recording but gradually, they begin to move into the perception filter phase. Information that successfully passes through these filters is remembered, attached with meanings and kept in the memory for future use. An aspect of the attention theory (Naïve Realism) emphasizes the function of perceptual experience involving the direct consciousness of the mind to filter independent objects. This filtering ability is instantly apparent to the mind once we external objects.

Individual's perceptional experiences are made up of their mind-independent objects as well as its comprising features. At such, we are connected to those objects by our experiences and the unique quality of perception is attributed to objects that are independent of the mind's wit. In this way, when a patient enters the health care hospital, the patient sees every visible part of the health service provider (HCPs), which is an external entity. The experience is of the HCP—such a patient is conscious of the object (HCP) directly—and the sensory attributes which appears are elements of the mind-independent item.

Overall, the filter theory can be seen in the light of one of the major naïve realist defenders Martin, (2001, 2002, 2004, and 2006) who viewed experience as the relation linking persons with the object of awareness. To this end, the filter theory can be said to focus on the ability of the individual mind to take up, process and maintain certain signals from the HCF context, while others are rightly dismissed, thereby making perception a sequence involving the knowledge of mentally autonomous objects.

One implication of the filter theory is that healthcare consumers sensory cues can be distorted at first interaction making them equally distort information selectively. Martin (2002, p.378) believed experiences are products of

mind-independent objects, in which "one's experience relates one to the mind-independent world, and yet does so in a non-representational manner". Mind-independent things as well as its elements are consequently the components our experiences are made from, thus, determining the unique attribute of our perceptual experiences is traceable to the objects we are exposed to.

Often times, naïve realism is regarded as capturing individual's ability to have practical judgement concerning everyday matters, or the basic ability to perceive, understand, and judge as shared by nearly all people.

The connection between this research work and the filter theory of attention is to depict how enrollees subsequently attaches meanings to the cues and how such interpretations are attached to a stimulus exposed to during healthcare. These may involve good or bad experiences, but, such involvement depends on the force within the cue. Whatever personal understanding or meanings the enrollee makes regarding the accessed service will be kept in the memory to be recalled in the future when deciding about services to patronise in that particular HCF.

The Phenomenology of time consciousness as well as the attention theories was adopted to guide the study in investigating how perceptions are dependent on enrollees exposure to stimuli present in cues (whether good or bad) as an essential reality of the human consciousness. Enrollees perception of healthcare facility's physical structure and equipment can therefore be said to be linked to their given meanings to the objects encountered, both successional (eg, a mobile X-ray machine) or static (eg, a hospital building), this filtered cues are used in developing basic assumptions regarding the objects quality at the point of contact.

This theory builds on Archer's cultural morphology map theory, based on a model of transition found in the theory of social-ecological resilience. This overlay offers a partial response to the issue under discussion in resilience theory, community and organization. Also, it offers a context to explain what happens in the changing cultures at the cultural level. It illustrates how culture can support adaptive responses of changing communities. In two cultures, based ethnography advances the hypothesis that local cultural backgrounds play an important role in the community response to closure challenges. The theory review also provides an alternative to functionalistic approaches to research on resilience with a focus on institutional capabilities, functional engagement and social indicators. In comparison, Lyon and Parkins (2013) research provides insights into the human organization and social change, which lead to adaptation by placing culture as a dynamic structure, distinct from a social system which is static or changeable as part of social transition processes and which can remain static (resilient or adaptive). The scientists conclude that the economic upheaval alone is not a motive for concerted action. Collective action coincided with a strong pre-existing activist community and a collective immediate reaction. Instead of offering fast and simple perspectives, this interpretive approach to resilience evaluation seeks to cross various theoretical and empirically divisive theory and the empirical divisions between biophysical and social science approach for resilience studies in the society.

Methodology

The study triangulates between quantitative (questionnaires) and qualitative (In-depth interviews (IDIs) data collection method. The population comprises of NHIS and HMO enrollees' between 18 years and 65years visiting selected public and private hospitals in Eti-Osa, Ikeja and Ibeju-Lekki Local Government Areas (LGAs) within the three senatorial districts in Lagos, Nigeria. The accredited public and private HCFs included: (1) St. Mary Specialist Hospital, (2) Awoyaya hospital, (3) Blue cross hospital, (4) Unity hospital, (5) The Eko hospital, (6) General hospital Akodo, (7) Budo specialist hospital, (8) Etta Atlantic memorial hospital, and (9) St. Nicholas hospital. The selection of both public and private HCPs was to depict the two dominant healthcare facility systems in Nigeria.

Multistage sampling technique was used to select the study participants. Simple random sampling was employed at each stage to reduce selection bias. The first stage involved clustering the twenty (20) Local Governments into the three senatorial districts, selecting only one Local Government from each district through balloting. Stage two involved obtaining a list of all registered HCPs within the local governments and stratifying them into private and government administered. At this stage, convenience method was used to choose three HCFs accredited by NHIS to provide primary, secondary and or tertiary services to be sampled in the study.

Pett, Lackey, and Sullivan (2003) factor analyses of subjects-to-variables ratio, with a minimum of Garson (2008) ten (10) subjects per variable in the study instrument was utilised to choose a sample size of 240 enrollee respondents which was calculated (20 subjects per each of the 12 variables in the study instrument). The minimum

sample size of approximately 266 (240/0.9) patients was reached after adjusting for 10% non-response to the questionnaire.

A total of 252 copies of a structured questionnaire and 5 IDIs were used to elicit data from the respondents. The quantitative data collected was analysed using the nominal descriptive statistics of frequencies and simple percentages with the help of the Statistical Product and Service Solutions (SPSS) version 20. The qualitative data was analyzed using inductive content analysis. To find the relationship between the variables and test of hypotheses, the contingency Chi-Square and the Spearman's correlation analysis was performed.

The quality indicator variables were presented according to Ndiyo (2005) five (5) Likert scale position ranking. Where Strongly agree ranked highest (5), Agree ranked (4), Undecided ranked (3), Disagree ranked (2) and Strongly disagree ranked lowest (1). During hypotheses testing, these ordered categories were transformed, summated and the responses converted into five (5) categories termed as five (very good), four (good), three (undecided), two (bad) and one (very bad). The perception variables were measured using likert-type items of five ordered categories, rated from five (very high in quality) to one (very low in quality).

Ethical clearance was obtained from the Lagos State Government Health Service Commission before the study commenced with an ethical clearance code of: LSHSC/88/S.3/II/257. The management of all HCFs used in the study gave written approval for the implementation of the study. Study objectives, confidentiality of responses, benefits and the right to refuse were explained to participants of IDIs, of which written informed consent was obtained from willing participants and those without formal western education had the content translated to them in the locally spoken Yoruba language.

Results

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency Distribution (N=252)	Percentages (%)
Gender		
Male	82	32.5
Female	170	67.5
Age		
18-20	22	8.7
21-30	66	26.2
31-40	93	36.9
41-50	25	9.9
51-65	46	18.3
Marital Status		
Single	70	27.8
Married	134	53.2
Others	48	19.0
Educational Qualifications		
No Formal Education	22	8.7
First leaving school certificate	15	6.0
Secondary School	34	13.5
OND/NCE	32	12.7
HND/B.Sc	101	40.1
M.Sc/MBA/M.Ed	38	15.1
PhD	10	4.0
Public-Private Partnership		
Public/ NHIS	47	18.7
Private/ HMO	205	81.3
Public-Private HCFs		
Public HCFs	44	17.5
Private HCFs	208	82.5

Source: Field Survey (2019)

From Socio- Demographic characteristics of respondents in Table 1, majority (67.5%) of the respondents were females. This percentage of the female respondents corresponds with the last census report. Again, a larger proportion (53.2%) of the respondents was married. The majority (36.0%) of the respondents fall within the age bracket of 31 and 40 which represents the active working population with a mean interval of 3.0278. Although more expensive, larger proportion of the respondents (81.3%) subscribed to the private HMO plan and 82.5% accessed care in private HCFs.

Table 2: Distribution of respondents' on quality of HCF's physical structure and equipment

Questionnaire Item	Responses					Total
	Strongly Agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly Disagree (%)	
The physical environment of the HCF is conducive	60 (23.8%)	94 (37.3%)	32 (12.7%)	36 (14.3%)	30 (11.9%)	252 (100%)
The medical equipment is standard and functional	42 (16.7%)	113 (44.8%)	29 (11.5%)	40 (15.9%)	28 (11.1%)	252 (100%)

Source: Field Survey (2019)

In Table 2, Respondents assessment of the HCF tangible aspects of service reveals majority (61.1%) from a combined weight of Strongly Agree (SA) and Agree (A) accepted the conducive state of the HCFs physical environment. Similarly, 61.5% combined weight of Strongly Agree (SA) and Agree (A) shows HCF possession of standard and functional equipment compare to the combined weight (27%) of Disagree (D) and Strongly Disagree (SD) respondents' on the HCF equipment quality.

Table 2b: Distribution of respondents' perception on quality of HCF's physical structure and equipment

Questionnaire Item	Responses					Total
	Very High perception (%)	Fairly High perception (%)	Average perception (%)	Low perception (%)	Very Low perception (%)	
Respondents' rating of HCF physical structure and equipment quality	53 (21.0%)	86 (34.1%)	36 (14.3%)	36 (14.3%)	41 (16.3%)	252 (100%)

Source: Field Survey (2019)

Table 2b reveals that majority of the respondents (55.1%) from a combined weight of very high and fairly high rated positively while 30.6% combined weight of low and very low perception rated the HCFs physical structure and equipment negatively.

Test of hypothesis

H0: There is no significant relationship between enrollees' perception and HCFs physical structure and equipment quality.

H1: There is significant relationship between enrollees' perception and HCFs physical structure and equipment quality.

Decision criterion: Reject H0 if the calculated (observed value) of chi-square ($\chi 2c$) is found to be greater than the critical (table) value of chi-square $\chi 2t$ (0.01), if not, do not reject. Data from Table 2 and 2b were cross tabulated and used in testing this hypothesis. The result is shown in Table 3.

Table 3: Cross tabulation of relationship between enrollees' perception and quality of HCFs physical structure and equipment

Variables	Very high Perception (%)	Average Perception (%)	Very low Perception (%)	Total	χ^2
Very Good	29 (48.3)	8 (13.3)	23 (38.3)	60 (100.0)	$\chi^2 = 66.750$
Good	70 (73.7)	8 (8.4)	17 (17.9)	95 (100.0)	$r = .064$
Undecided	11 (35.5)	6 (19.4)	14 (45.2)	31 (100.0)	P = .000
Bad	17 (44.8)	8 (21.1)	13 (34.3)	38 (100.0)	df = 16
Very bad	12 (42.9)	6 (12.8)	10 (35.8)	28 (100.0)	
Total	**139 (55.1)**	**36 (14.3)**	**77 (30.6)**	**252 (100.0)**	

Source: Field Survey 2019
*** Correlation is significant at the 0.01 level*

Table 3 shows the relationship between enrollees' perception and the quality of physical structure and equipment. A total of ninety-nine (99) respondents' who are very high in perception who also saw the quality of physical structure and equipment as very good and good is higher than those (29) who are very high in perception but saw the quality of physical structure and equipment as bad and very bad. Also the 99 respondents' is higher than those (23) who are very low in perception and saw the quality of physical structure and equipment as very bad and bad. As we see from these group comparisons therefore, we can see empirically that there is a relationship between perception and quality of physical structure and equipment.

Inferential statistics supports this empirical observation as shown in the calculated $\chi 2(16)=66.750$ is higher than the chi-square table ($P<0.01$). Therefore the null hypothesis is rejected and the alternate hypothesis accepted. Also, the Spearman's correlation (r)=.064 shows a positive relation between perception and quality of equipment and physical structure.

Content Analyses

Regarding structure, respondents' were interviewed regarding the tangible physical aspects of the HCFs, as observed in one of the public HCF, the windows in the female ward were all broken, with little or no greenery. A participant asserted thus:

The atmosphere continually reeks of offensive odour ranging from vomit to corpse embalmment. There is always that frightful stench. You have to use a nose mask to curtail the smell (IDI 1. Female. 44)

As observed regarding examination, the assessment of the structural quality also includes the use of standard and functional equipment in treatment and some participants recounted their ordeal:

In my entire one year of assessing care here, I have never been sent for laboratory diagnosis. Once I complained, and the doctor picked an offense (IDI 4. Female. 52)

A respondent stated thus:

Technically, only sick people come to the hospital, and if proper diagnosis is carried out, one will get better, therefore cease visiting the hospital, and every medical facility wants to make profit, so, the longer the ailment, the more frequent the patient comes in for treatment. For instance, I have been visiting for on account of malaria for 6 months yet no blood test (IDI 2. Male. 26)

Another respondent' asserted further:

I noticed that out-of-pocket paying patients were coming out from various units of the hospital that conducts tests, scan, dialysis etc, so, I am sure the equipments are standard and functional, but as an enrollee, you don't have access to such luxury as the popular song in the mouth of every personnel is "it's not covered" making me wonder what the scheme actually covers (IDI 5. Male. 30)

These responses above suggest that healthcare facilities were in possession of standard and functional equipment, which was accessed by out-of-paying patients but enrollees were deprived of such evident based means of healthcare service. It is evident that despite the fact that hospitals are supposedly the place where patients despair is abated, the physical state can affect how patients perceive the quality of services. Thus validifying the 'cleanliness is next to godliness' slogan.

Furthermore, the responses show that an enrollees insurance plan determines the quality of service accessed at hospitals and the health plans also affects the quality of service rendered, such services that involves access to equipments testing kits. This therefore raises the concern for the quality of services accessed at the HCFs by the poor and low economy enrollees'.

Conclusively, IDI statements reflected that the patients' perceptive insight builds from the cues gathered during comprehensive healthcare services experience.

Discussion of findings

The major aim of this research was to "assess enrollees' perception of quality of HCFs physical structure and equipment". The null hypothesis "quality of HCFs physical structure and equipment does not affect enrollees' perception significantly" was postulated to direct the study. The research found that intangible aspect of healthcare services were taken into cognisance by the enrollees' as a contributing factor during healthcare access. This finding validates Mosadeghrad (2013) environmental attribute of quality healthcare and Dijkstra, (2006) demonstration on the relevance of the physical healthcare environment on the health and well-being of patients.

The survey result revealed that HCFs environment were conducive, and the equipment was of functional and of standard quality, yet, IDI responses indicated an appalling physical state in the area of general cleaning, and despite the presence of functional equipments, enrollees' treatment were being conducted without thorough evidence based investigations from medical diagnostic equipment due to either enrollees health plan, NHIS coverage, or HMO and HCF tariff agreement.

This is also consistent with the attention perspective that the individual mind is capable of picking, processing and maintaining environmental cues, making perception a sequence involving mental awareness of objects.

Information presented in Tables 2 and 2b was cross tabulated to test the null hypothesis generated. The contingency chi-square test result showed a significant relationship between the variables, likewise, a positive correlation result (.101) was ascertained from the Spearman analysis as shown in Table 3, thereby leading to the rejection of the null hypothesis.

Conclusion and Recommendations

The study shows enrollees perception is affected by the quality of HCFs tangible aspects (physical structure and equipment). This explains that HCF poor management of the physical structures as well as inadequacies in functional equipments has an effect on the healthcare services offered to enrollees'.

IDI research finding concludes that, though by policy statement, there is a social health insurance scheme in Nigeria, however in reality; there might be some problems in the dispensation of treatment due to bureaucratic nature of HCFs and the NHIS-HMO coverage policy. The study therefore recommends;

1. Though the respondent agreed that medical equipment were standard and functional at the HCFs, however, evidence suggested that some HCPs deprive enrollees from evidence-based diagnoses on the pretext of coverage. To ensure the desired healthcare result is achieved, it is recommended that constructive inspectorate division be instituted to ensure accredited HCPs deliver evidence-based services such as; enrollees' ability to access testing facilities like laboratory during health diagnosis process.

2. In the light of the fact that respondents' are aware of the tangible aspect of healthcare service, the physical ambiance such as flowering, waste management, constant flowing water and scent enhancers should be given priority to ensure consistency in quality health promotion.

3. Enrollees should be allowed to access laboratory as well as other testing facilities considered relevant in their illness treatment. This will ensure an all inclusive evidence based diagnosis for CIPA and CRPS (Congenital Insensitivity to Pain with Anhydrosis; Complex Regional Pain Syndrome) patients.

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Omnichannel Sales in Marketing Mix Context – Research Results

Roman DOMANSKI

Poznan University of Technology, Faculty of Engineering Management,
Institute of Logistics, Division of Production Engineering and Logistics, Poznan, Poland,
roman.domanski@put.poznan.pl

Michal ADAMCZAK

Poznan School of Logistics, Poznan, Poland,
michal.adamczk@wsl.com.pl

Abstract

Purpose: The theoretical purpose of this article is to identify customer behaviour in a multi-channel sales environment in terms of all marketing mix components: product - stock availability, price - differentiation level, promotion - additional terms and conditions, distribution - delivery and return options. The practical purpose of the article is to provide guidelines for the recommendations of the omni-channel structure built by trading companies. **Methodology:** As part of the theoretical part, a systematic literature review based on Scopus scientific articles was used. As part of the practical part, a questionnaire study was carried out based on an original algorithm, and as part of the analysis of the results, mathematical and statistical analyses were used, e.g. hypothesis testing by means of Mood's median test. **Findings:** In the scientific literature, omnichannel in general has definitely wider connections with marketing than strictly with the marketing mix (niche subject). Empirical research shows that Internet channels are the most popular sales channels among young customers (aged under 25). The vast majority of them make purchases by collecting information about the offer from more than one sales channel. **Implications**: The research results are first and foremost important for distributors shaping their logistics customer service systems in the spirit of omnichannel. They can also prove useful for consumers making purchases in the omnichannel distribution environment. **Originality**: On the theoretical side, the article identifies the theoretical gaps between omnichannel and marketing. On the practical side, the article contains an original methodological proposal of the omnichannel marketing research.

Keywords: omni-channel, marketing mix, purchase, sales channels, customer behaviour

Introduction

Nowadays, the customer can operate in the supplier's many sales channels. This phenomenon, depending on the degree of its advancement, is called: multichannel, crosschannel, omnichannel (increasing complexity gradient). Its most advanced form - omnichannel - allows the customer to function in the supplier's two or more sales channels at the same time. Although this axiom seems unreal in practice, it is actually implemented.

The authors of this article maintain that the omnichannel studies conducted so far are mainly static in character. This statics is related to: firstly - the lack of comprehensive and detailed knowledge about the sequence of transition (performance) of a specific transaction - what specific sales channel a specific customer used at what specific stage of the purchase-sales transaction; secondly - the lack of knowledge about what a particular customer was doing at a given stage of the purchase-sales transaction - whether they checked the offer in other sales channels at the same time or not.

Breaking the sales channels as part of the transaction (its non-linear transition - using different channels), combined with the parallel presence of the customer in the supplier's two sales channels at the same time, is at the heart of omnichannel. The condition that complements the essence of omnichannel, in line with the postulates of marketing, is the lack of differences in the level of customer service between channels - both at the level of the entire transaction and its individual stage (this aspect will be the subject of the authors' next article). The level of service in each sales channel (marketing mix composition) should be the same.

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Taking into account the cited disadvantages of the static approach, the authors of the present article decided to propose a dynamic approach in the omnichannel study. It consists in the full traceability of the course of the transaction - its transparency both globally and at each given stage. It consists in the fact that a fully identifiable customer purchases a given specific product recreating their historical purchasing experience. The research is carried out from the perspective of the logistic marketing mix - the following are checked in each channel: stock availability, price differentiation, additional terms and conditions, delivery and return options.

The purpose of this article is to identify the functioning of the customer in the distributor's sales channels from the perspective of the marketing mix elements. Achieving the purpose of the article requires:

- identification of the omnichannel scale based on the results of breaking/not breaking the sales channels,
- identification of the most and least preferred sales channels in a given marketing mix element,
- identification of the most and least frequently checked elements of the marketing mix in each sales channel, compared to the channel in which the purchase took place.

In relation to the theoretical assumptions of the omnichannel concept, it should be considered in practice whether consumers should actually have a full spectrum of choice in each sales channel. Intuition tells us that consumers undoubtedly do not use certain options of choice or use them marginally. From the business point of view, maintaining such sales channels costs money, unnecessarily straining distributors' sales budgets.

The structure of the article is as follows: section 1 - introduction (research background, purpose of the article), section 2 - literature review (assumptions, quantitative and qualitative analysis); section 3 - description of the research approach (research methodology and algorithm), section 4 - analysis of research results (assumptions, mathematical and statistical analyses, results interpretation), section 5 - summary (conclusions, research limitations, directions for future research).

Theoretical background

Assumptions of the Literature Analysis

A systematic literature review was carried out in September 2020 on the basis of the Scopus database of scientific articles (selection criterion: leading database of journals in the discipline of management and quality science which is represented by the authors of the article). The analysis of the literature consisted in searching for selected characteristic words and phrases in three places: title, abstract and keywords - independently (single search) and dependently (complex search for compounds). The conducted literature search is quantitative and qualitative in nature. The aim of the quantitative analysis was to identify the number of publications in particular thematic scopes. The aim of the qualitative analysis was to identify the type of thematic threads undertaken by individual researchers. The literature review is supplemented and completed by bibliometric reports, based on the statistics offered by the Scopus database.

Quantitative and qualitative analysis of publications

In the Scopus database, a total of 711 articles on omnichannel were selected, including 349 ("omnichannel") - the first set and 362 ("omni-channel") - the second set. Within the first set, only 3 ("marketing mix") or 2 ("marketing-mix") publications have connections with the elements of the marketing mix. Due to the fact that all articles from the "marketing-mix" category are included in the "marketing mix" category, the 3-element set will be analyzed further.

These publications are from 2018 (2) - 2019 (1). From the point of view of the number of publications, there are no clearly distinguished authors, research centres or countries - single affiliations. However, from the point of view of citations, publications by Wang (5), Park and Kim (3) can be singled out. The dominant area of allocation is Business, Management and Accounting (declared in each publication). Park and Kim explore how consumers' personality trait affects their omnichannel adoption behaviour. In-depth analysis of consumer profile may enable more specific methods for marketing and managing consumers in the omnichannel context (Park & Kim, 2019). Harvey and Sanchez explore the impact of the convergence of media, strategies and technologies on the four points of the traditional marketing mix (Harvey & Sanchez, 2018). Wang analyzes the best media for mobile phone purchase methods for different groups of buyers. The proposed solution can help in the clustering results of product mix in the contex of procurement and marketing solutions (Wang, 2018).

Within the second set, the situation is similar: 4 publications ("marketing mix") and 2 publications ("marketing-mix"). Similarly, all articles from the "marketing-mix" category are included in the "marketing mix" category, so the 4-element set will be analyzed further.

These publications come from 2015-2020: 2015 (1), 2016 (1), 2019 (1), 2020 (1). From the point of view of the number of publications, there are no clearly distinguished authors - individual affiliations. However, one can observe (in terms of research centres and countries) a slight dominance of the Rennes School of Business from France. From the point of view of citations, publications by the following authors can be singled out: especially Picot-Coupey et al. (59) and Kijpokin (5). The dominant area of allocation (similarly to the first set) is Business, Management and Accounting (declared in each publication). Agarwal and Dixit analyze the case of the Myntra - in spite of touching heights in the online world in a short time span, the company is not convinced about the customer satisfaction. Myntra is planning scaling up their offline presence by opening its physical stores to boost its brands (Agarwal & Dixit, 2020). Koetz analyzes the concept of customer experience (according to marketing approach) based on case of physical stores and Sephora Flash (a mix of a physical and digital store). To provide an enhanced omni-channel shopping experience is one of the most important things (Koetz, 2019). Picot-Coupey, Huré and Piveteau present channel design to enrich customers' shopping experiences. This article investigates empirically the challenges of an e-retailer when moving towards an omni-channel strategy (Picot-Coupey et al., 2016). Kijpokin explores the roles of corporate marketing strategies and brand management in the global retail industry. It is critical for modern organizations that seek to serve suppliers and customers (Kijpokin, 2015).

Due to the small number of publications, the authors of this article decided to extend the spectrum of analysis (omnichannel) to a broad approach to marketing (without being limited only to the marketing mix), but limited by the subject of this article - purchase issues. Therefore, the searched phrase was the following composition of words: omnichannel marketing purchase (first set). A total of 13 publications were selected, including 1 conference report (omitted in further analysis), 1 publication that had already appeared earlier (Wang, 2018). These publications come from 2014-2020: 2014 (2), 2016 (1), 2017 (1), 2018 (2), 2019 (3), 2020 (3). From the point of view of the number of publications, there are no clearly distinguished authors and research centres - individual affiliations, but in the case of countries there is quite a significant US dominance - 4 publications. From the point of view of citations, publications by the following authors stand out: especially Taylor and Levin (67), also Grewal et al. (13) and Berman and Thelen (10), to a lesser extent: Shankar (7), Taufique et al. (4), Kang (3), Zaware et al. (2), Kozlova et al. (2). The dominant area of allocation, next to Business, Management and Accounting (declared in 7 publications), is Computer Science (5 publications), which is a novelty in relation to the previous cases of the literature analysis. As part of 11 new publications, their authors undertake the following research threads: multimedia advertising effectiveness (Danaher et al., 2020); omnichannel consumer buying behaviour - the purchasing pattern (Zaware et al., 2020); purchase a professional retailing technology from the technology service provider (Hu & Zhou, 2020); effect of omnichannel marketing on the online search behaviour of retail consumers (Riantini, 2019); interrelationships among lifestyle of social-local-mobile (SoLoMo) consumers and omnichannel shopping intention (Kang, 2019); parameters, habits, pre-buying and post-buying behaviour, as well as preferences and expectations of the omnichannel consumer (Kozlova et al., 2019); differences between multichannel and omnichannel marketing and transition from multichannel marketing to omnichannel marketing (Berman & Thelen, 2018); customer equity (Taufique et al., 2017); influence of retailer tactics and customer-specific factors on shopping behaviour in shopper marketing (Grewal et al., 2017); evolution of shopper marketing from 1.0 to 2.0 (Shankar, 2014); predictors of mobile app usage for purchasing and information sharing (Taylor & Levin, 2014).

In the second set of articles, the searched phrase was the word composition: omni-channel marketing purchase (another form of the omnichannel notation). A total of 11 publications were selected, including 1 publication that had already appeared in the first set (Riantini, 2019). These publications come from 2017-2020: 2017 (3), 2018 (4), 2019 (1), 2020 (3). From the point of view of the number of publications, there are no clearly distinguished authors and research centres - single affiliations, but in the case of countries there is quite a significant US dominance - also 4 publications (similarly to the first set). From the point of view of citations, the following authors stand out: Zhang et al. (43), also Rippé et al. (18), to a lesser extent: Viejo-Fernández et al. (4), Miell et al. (3), Rajan et al. (2), Niimi and Hoshino (2), Ravula et al. (1). The dominant area of allocation, next to Business, Management and Accounting (declared in 9 publications), is Computer Science (4 publications), although here it does not dominate as much as before (first set). As part of 10 new publications, their authors undertake the following research topics: usage of omni-coupons - impact of cross-effects on consumer purchase outcomes (Ravula et al., 2020); comparisons showrooming with online buying behavior - effect on the price paid online by the customer (Viejo-Fernández et al., 2020); customer journey in digital media - the impact of cross-media exposure on customers' purchase decisions (Klein et al., 2020); measuring the effects of online-to-offline marketing - how consumers adopt this commerce models (Chiang et al., 2018); impact of channel integration in omni-channel retailing - effect of consumer empowerment (Zhang et al., 2018); best practice utilisation of fit and sizing technology in online fashion retailing (Miell et al., 2018); algorithm for measuring similarity of consumer movement paths in shopping mall (Kim et al.,

2018); salesperson's role in selling to a mobile-dependent consumer who uses mobile technology to search for information during the sales meeting (Rippé et al., 2017); key drivers of purchase intent by consumers in omni-channel shopping - merging online and offline shopping practices (Rajan et al., 2017); predicting purchases with using the variety of customer behaviors (user access patterns) - analysis of the purchase history and the browsing history (Niimi & Hoshino, 2017).

Summary of the Literature Review

The conducted literature searches allow for the formulation of the following conclusions. Strict connections of omnichannel with the marketing mix constitute a niche area of interest (a small number of publications resulting from it). In a broader sense (marketing considered globally without any limitations), individual elements of the marketing mix appear in other authors' publications related to omnichannel. However, there are no articles covering all of them at the same time. The review of the publications highlighted a wide variety of thematic threads undertaken by other authors. The following publications correspond the most (in some elements) to the subject of this article: (Klein et al., 2020), (Zaware et al., 2020), (Kang, 2019), (Koetz, 2019), (Kozlova et al., 2019), (Park & Kim, 2019), (Riantini, 2019), (Zhang et al., 2018), (Grewal et al., 2017), (Niimi & Hoshino, 2017), (Rajan et al., 2017), (Picot-Coupey et al., 2016).

Summing up, the research topic proposed by the authors of this article, from the point of view of its complexity (including all elements of the marketing mix at once), is an innovative approach in the omnichannel study. Also, the approach and research framework presented in sections 1 and 3 constitute an original methodological approach, not yet encountered in the publications of other scientists. The authors of this article, after previous work in the omnichannel area - private labels (Domański & Łabenda, 2020), CRM systems (Domański & Koliński, 2020), (Domański & Wojciechowski, 2020), (Domański & Filipiak, 2019), omnichannel costs (Adamczak et al., 2018), the concept of logistic customer service (Domański & Hadaś, 2017) - with this article open their new interest in the research topic concerning the analysis of omnichannel relationships and elements of the marketing mix.

Research Framework

Research Methodology

The theoretical goal of this article is to identify customer behaviour in the multi-channel sales environment in terms of all components of the marketing mix. The research consisted in recreating by the respondents their historical, recently made purchases (course of process performance). Three product categories were selected for the study: clothing/footwear, electronics, cosmetics. These are popular products, quite commonly purchased, with which the respondents should have extensive purchasing experience. The products differ from each other (research intention), which may allow the identification of differences and similarities in their purchase by customers.

In the study, the course of a purchase transaction is considered through the prism of marketing-mix elements in sales channels: stock availability, the level of price differentiation, additional terms and conditions and delivery options (delivery and return). The essence of the research is the question of breaking sales channels by the customer and their simultaneous presence in the supplier's more than one sales channel at the same time - e.g. if the respondent was buying something in a brick-and-mortar store, did they take into account any of the marketing-mix elements, e.g. checked the price in an online store?

The survey took the form of an electronic survey made available to respondents as part of Google documents. The survey was anonymous and voluntary. It was made available to young people aged 18-25 with at least secondary level education who are active in purchasing processes (they make purchases on their own). The choice of this age group and level of education was not accidental. The authors of the study are particularly interested in how people who in the near future will be a group of customers with the greatest purchasing potential behave in purchasing processes. Researching this group allows to draw conclusions that can be used to improve purchasing processes. Assuming the population size at the level of 3 099 300 - the number of people aged 18-25 in Poland in 2016 (Statistics Poland, 2016), the significance level at $\alpha = 0.05$ and the permissible error at the level of 7.5%, the research sample size is 171 people. The questionnaire was available for one month - June 2020. 188 full responses (complete fillings) were obtained, which were further analyzed in the research results section.

Research Algorithm

At the beginning, the respondent filled in a form, providing 3 simple characteristics of themselves: gender (female, male), age (18-20, 21-25) and the level of ICT skills (on a scale from 1 - very poor to 5 - very good). Then, the

respondent selected goods that they had recently bought (clothing/footwear, electronics, cosmetics) - only one of the three categories could be selected, then (question 1) they declared the sales channel under which the purchase was made (traditional store, online store, call centre, social media, trading platform) - also it was possible to choose only one of five categories.

The further course of the study took place in terms of the marketing-mix elements. As regards the stock element, the respondent was asked (question 2) whether, before making a purchase in the channel that they declared (question 1), they had checked the availability of goods also in another sales channel of the distributor (yes, no) - binary selection. In the case of a negative answer, the respondent was immediately redirected to the price part of the survey (question 4). In the case of a positive answer, the respondent was asked (question 3) to indicate the channel in which they did so (traditional store, online store, call centre, social media, commercial platform) - the same categories as in question 1. After that, as in the case of a negative answer, a transition to the price stage of the survey took place (question 4).

As far as the price element is concerned, the logic of the algorithm was exactly the same as in the case of the stock element: if the respondent did not check the price of the goods in the alternative sales channel, then after question 4, they were immediately transferred to question 6 (additional terms and conditions stage); if they did so, in question 5 they were asked to indicate the channel in which they were doing it. This was followed by moving on to question 6.

Therefore, if the respondent did not use alternative sales channels at a given stage of the purchase transaction, they were immediately redirected to the next marketing-mix element. If, at a given stage of the purchase transaction, the respondent used alternative sales channels, they were asked to indicate them. As regards the remaining elements of the marketing-mix, the respondent was asked to indicate alternative sales channels as part of: additional terms and conditions (question 7), delivery options (question 9), return options (question 11) - as long as they checked them.

Therefore, after answering question 1, the shortest path of the algorithm is the answer to only 5 questions (case of negation), the longest answer to all 10 questions (alternative checking of every element of the marketing-mix).

Research Results

Assumptions of the survey analysis

Before analyzing the results of the research, it was determined how the situation of not breaking and breaking the sales channel in the purchasing process would be identified. The situation of not breaking the sales channel takes place when the buyer did not check the conditions of the marketing mix elements in other sales channels or when they checked them but in the same sales channel, i.e. they analyzed the offer only within one sales channel. The remaining cases in which the respondents made purchases in the indicated sales channel, checking the elements of the marketing mix in other sales channels, were defined as breaking the sales channel.

Mathematical and statistical analysis of the survey results

The analysis of the distribution of the results of not breaking and breaking the sales channel in the purchasing process showed that there was no normal distribution of these variables. The distributions of results for individual layers cannot be assigned to any of the theoretical distributions.

The analysis of the results was focused on the implementation of three specific objectives of the study, which are:
- identification of the omnichannel scale based on the results of breaking/not breaking the sales channels,
- identification of the most and least preferred sales channels in a given marketing-mix element,
- identification of the most and least frequently checked elements of the marketing-mix in each sales channel, compared to the channel in which the purchase took place.

188 respondents took part in the survey. The basic characteristics of the tested sample are presented in Table 1.

Table 1: Characteristics of respondents and goods

		n	%
gender	female	102	54.3%
	male	86	45.7%
age	up to 20	45	23.9%
	21-25	143	76.1%
ICT skills	1	0	0.0%
	2	14	7.4%
	3	88	46.8%
	4	74	39.4%
	5	12	6.4%
type of goods	electronics	49	26.1%
	cosmetics	45	23.9%
	clothing/footwear	94	50.0%

Source: own research

The gender distribution of the respondents is close to 1:1. The age distribution of the study participants also reflects the characteristics of the population. The group up to 20 consists of people aged 18, 19 and 20. The second group is made up of people aged 21 to 25. It is assumed that the number of people in each year is similar. Therefore, if the second age range is wider (5 years) than the first (3 years), it should also be more numerous in the sample. In the studied sample, no one assessed their ICT skills at a very low level.

In the study, as specified in the methodology (section 3), questions were asked about the course of the purchasing process. Table 2 presents the distribution of the sales channels in which the analyzed goods were purchased.

Table 2: Sales channels in which the analyzed goods were purchased

sales channel	n	%
call center	0	0%
trading platform	23	12%
online store	105	56%
traditional store	60	32%
social media	0	0%

Source: own research

Despite including the possibility of making a purchase through a call centre and social media channels, none of the respondents indicated such an answer. The purchasing processes carried out in online stores and traditional stores had the largest share in the results. It should be noted here that the study was conducted in the period of defrosting the Polish economy after lockdown caused by the COVID-19 pandemic. Shopping in traditional stores at that time was not as easily accessible as usual.

In the first step of the analysis, the percentage of buyers breaking the sales channel in the purchasing process was checked (goal one). The conditions for breaking and not breaking the sales channel were described in the assumptions for the analysis of the survey results. The results of this analysis are presented in Table 3.

Table 3: Analysis of breaking and not breaking the sales channel in the purchasing process

	n	%
not breaking the sales channel	51	27%
breaking the sales channel	137	73%

Source: own research

It can be concluded from the obtained results that in the vast majority of purchasing processes, buyers checked the conditions of the marketing mix elements in more than one sales channel. Treating 27% of cases where a purchase

was carried out in not breaking the sales channel as a separate sub-sample, its 81% were cases where buyers made a purchase without checking the marketing mix elements in another channel, and 19% were cases where customers checked these conditions but in the same sales channel in which they made the purchase.

The phenomenon of breaking and not breaking the sales channel requires a deeper analysis. The authors of the study checked whether there were any differences in the occurrence of this phenomenon depending on the characteristics of the respondent and the goods purchased by them. The results of the detailed analysis of breaking and not breaking the sales channel in the purchasing process are presented in Table 4.

Table 4: Analysis of breaking and not breaking the sales channel in the purchasing process divided into layers of the research sample

		not breaking the sales channel		breaking the sales channel		P-Value
		n	%	n	%	
gender	female	29	28%	73	72%	0.661
	male	22	26%	64	74%	
age	up to 20	11	24%	34	76%	0.643
	21-25	40	28%	103	72%	
ICT skills	1	0	0%	0	0%	0.998
	2	4	29%	10	71%	
	3	24	27%	64	73%	
	4	20	27%	54	73%	
	5	3	25%	9	75%	
type of goods	electronics	8	16%	41	84%	0.104
	cosmetics	12	27%	33	73%	
	clothing/foot wear	31	33%	63	67%	

Source: own research

From the results presented in Table 4, it can be seen that there are no clear differences in breaking the sales channel between the groups selected in the survey report. The percentage of people who do not break the sales channel fluctuates around 27%, as in the results analyzed for the entire sample. Slight differences are visible only in the case of the goods that were bought (here the percentage of people who do not break the sales channel ranges from 16% to 33%).

In order to statistically verify the differences in individual layers of the research sample, the hypothesis was verified by means of Mood's median test. This approach is justified by the lack of the normal distribution of the results within the population layers. Additionally, in order to perform a quantitative analysis, the text values "not breaking the sales channel" were replaced with number 1, and the "breaking the sales channel" with number 2. The test sample was divided into layers according to the criteria included in the respondent's particulars. For example, one of the criteria is the respondent's gender, and the sample layers separated according to this criterion are two: female and male. For each criterion according to which the layers were separated, several statistical hypotheses were formulated:

H0: Medians of the individual layers of the sample are the same.
H1: Medians of the individual layers of the sample are different.

The study was conducted with the assumption of the significance level $\alpha = 0.05$. P-Value indicates that it is not possible to reject H0 hypotheses. Thus, the individual layers of the sample do not show any differences in breaking or not breaking the sales channel.

Continuing the analysis of breaking and not breaking the sales channels, the authors examined the direction in which the possible breaking of the channel occurs in the case of making a purchase in a specific channel. The results of this analysis are presented in Table 3.

Table 5: Analysis of breaking and not breaking the sales channel in the purchasing process divided into the channels in which the analyzed purchase was made

	not breaking the sales channel		call center		trading platform		online store		traditional store		social media	
sales channel in which the purchase was made	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
call center	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
trading platform	4	17%	0	0%	3	13%	18	78%	6	26%	2	9%
online store	29	28%	1	1%	52	50%	5	5%	32	30%	15	14%
traditional store	18	30%	0	0%	8	13%	41	68%	2	3%	4	7%
social media	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Source: own research

The results of the analysis for call center and social media channels are in grey due to insufficient number of responses. The most common dependency for the sales channel in which the purchase took place is marked in green. The headings of the lines (Table 5) show the sales channels in which the respondents made the original purchase. The columns show the channels in which the conditions within the selected elements of the marketing mix were checked. The percentage value in the individual fields of the table describes in what percentage of channel breaking in the purchasing process the buyer's attention was directed to the alternative channel, e.g. among people who made a purchase on the trading platform, 17% did not check offers in other channels, and 78% checked these conditions in an online store. In the study (explanation in section 3), the respondents could indicate several different sales channels in which they checked the conditions offered in particular elements of the marketing mix. Therefore, the percentage share of responses indicating sales channels does not add up to 100%. Totals greater than 100% show that customers checked offers in more than one sales channel.

The next stage of the analyses was the implementation of the second objective of this article - the answer to the question of what are the most and least preferred sales channels in a given marketing-mix element. The results of this analysis are presented in Table 6.

Table 6: Identification of the most and least preferred sales channels in a given marketing mix element

	call center		trading platform		online store		traditional store		social media	
marketing mix element	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
availability	0	0%	29	30%	48	50%	17	18%	2	2%
price	0	0%	48	42%	41	36%	21	19%	3	3%
additional terms and conditions	0	0%	18	19%	41	43%	19	20%	17	18%
delivery options	0	0%	24	38%	31	48%	7	11%	2	3%
return options	1	2%	14	27%	23	45%	13	25%	0	0%

Source: own research

As in Table 5, the results that were not included in the analysis are marked in grey this time (the number of responses for the call center channel was too small). The green colour marks the channels in which a given marketing mix element was checked the most often, and red - the one in which it was checked the least often.

The final stage of the analyses was the implementation of the third objective of the article, i.e. identification of the most and least tested elements of the marketing mix in each sales channel. The results of this analysis are presented in Table 6.

Table 7: Identification of the most and least checked elements of the marketing-mix in each sales channel

	availability		**price**		**additional terms and conditions**		**delivery options**		**return options**	
sales channel	**n**	**%**	**n**	**%**	**N**	**%**	**n**	**%**	**n**	**%**
call center	0	0%	0	0%	0	0%	0	0%	1	100%
trading platform	29	22%	48	36%	18	14%	24	18%	14	11%
online store	48	26%	41	22%	41	22%	31	17%	23	13%
tradition al store	17	22%	21	27%	19	25%	7	9%	13	17%
social media	2	8%	3	13%	17	71%	2	8%	0	0%

Source: own research

The results presented in Table 7 were supplemented with a colour illustration in accordance with the same assumptions as in Table 6. As before, also this time, data for the call center channel (too few responses) were excluded from the analysis.

Interpretation of Results

Summarizing the results of the conducted research, it should be stated that young people (aged 18-25), when purchasing clothing/footwear, cosmetics or electronics, very often check the conditions in several sales channels. As many as three quarters of respondents indicated that in the purchasing process which they analyzed they checked selected elements of the marketing mix in more than one sales channel. This transition between sales channels seems to be natural - it is a standard part of the purchasing process. There are no differences in terms of breaking the sales channel in the layers separated by gender, age, level of self-assessment of ICT skills or purchased goods. The differences in these layers are statistically insignificant. In the opinion of the authors of this study, it shows how natural and standard the element of the purchasing process of young people is to check sales conditions in various channels.

An important condition that should be indicated in the interpretation of the test results is the time in which it was conducted (June 2020). It was the time of economic defrosting after lockdown caused by the COVID-19 pandemic. This is especially important for interpreting the popularity of electronic sales channels. The sales channel most frequently indicated by respondents in which the analyzed purchase was made was the online store.

The analysis of the paths followed by buyers in the sales channels as part of the described purchasing processes allows to conclude that when making a purchase decision, the buyer most often compares the conditions of the marketing mix between online stores and purchasing platforms. In the event of making a decision to buy in a traditional store, its offer is compared with an online store. This regularity, although not statistically confirmed, is most visible in the case of the purchase of electronics, which may result from the greater value of these goods and the greater role of objectivity at the time of their purchase than in the case of more subjective decisions regarding the purchase of clothing/footwear or cosmetics. The remaining sales channels (call centre and social media) did not play a significant role (respondents mentioned them very rarely).

When analyzing the results from the perspective of selected elements of the marketing mix, it should be generalized that they are most often checked in the online store. The exception is the price, which is most often checked on purchasing platforms. The online store, due to the ease of reaching its offer (via a website or a dedicated

application), serves customers to check the offer in the broad sense of the word (comprehensive offer): price, additional terms and conditions, delivery conditions, return conditions, etc. Purchasing platforms, due to the easy possibility of comparing prices of different sellers, are an excellent tool for verifying this element of the marketing mix. The least frequently chosen sources of knowledge about the elements of the marketing mix are: call centre and social media.

When analyzing the results from the perspective of sales channels and the marketing mix elements tested in them, it should be noted that customers in electronic channels (online store, trading platform) most often check the price and additional terms and conditions. Interestingly, customers are not interested in the terms and conditions of return of goods purchased through this channel. The situation is different in the case of a traditional store, where the most frequently checked element of the marketing mix is the price. This is understandable when the purchase is made on-site. An interesting fact is that the most frequently indicated element of the marketing mix checked in the social media sales channel are additional terms and conditions. This shows the role that social media currently play in sales processes. They largely present the offer, especially those elements that can attract a potential customer. Therefore, customers expect from the offers presented in social media additional benefits related to the purchase (e.g. discount codes, bonuses, giveaways, etc.).

Conclusion, limitations and further research

Omnichannel is a young phenomenon that has been functioning for almost a decade. Classic sales and distribution channels have evolved naturally. The same is true for new forms of multichannel sales, which includes omnichannel (as their highest form of advancement). Hence, a large number of different research approaches can be observed in the omnichannel area. Which of these proposals will stand the test of time will most likely be decided by the customer's market - the handling of specific consumer requirements by the suppliers' logistics systems. Marketing creates various sales channels. The task of logistics is to conduct the flow of goods between the parties in an economical and effective way. Knowledge about the purchasing behaviour of consumers is crucial to the success of logistics goals.

As far as the theoretical part of this article is concerned, the limitation is the Scopus base of scientific articles - it is the only base considered as part of the literature review. Perhaps, in other scientific sources, the body of knowledge related to the subject of this article is broader. In terms of the practical part, the limitation is the fact that the study was performed only among people with at least secondary education residing in the territory of the Republic of Poland. It is necessary to note that also the current COVID-19 pandemic influenced the results of the study.

The directions for future research should consist in overcoming the existing limitations as well as extending the spectrum of omnichannel and marketing mix research to include new issues. A broader picture of theoretical knowledge in the subject can be obtained by conducting a literature search, e.g. in the Web of Science or Google Scholar resources. A broader picture of practical knowledge can be obtained as a result of further analyses focused on the level of customer satisfaction with the terms and conditions offered in individual sales channels and the implementation of these conditions as part of purchasing processes (assessment of the level of customer service). It would also be reasonable to extend the study to an international realm, which would allow to adapt the recommendations also to global distributors offering goods in more than one country. The survey must be necessarily repeated once the COVID-19 pandemic has ended (normal trading conditions).

According to the authors of the present article, the general conclusions of the conducted research direct the processes of building omnichannel sales channels for distributors of products of the clothing, cosmetics and electronics industries. From the point of view of young buyers, the most important sales channels are online stores, traditional stores and shopping platforms. The remaining channels are marginal solutions. The most important elements of the marketing mix which are checked in them are the price and additional terms and conditions offered by the sellers in a given channel.

Knowledge about the behaviour of young customers in sales channels is particularly important not only from the point of view of building the structure of future sales channels, but also from the point of view of directing consumers to their specific types, relationship management and shaping IT systems allowing for the collection and analysis of data on purchasing processes carried out by individual clients (CRM systems).

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Methodology of Risk Management Associated with Short Life Cycle Business Opportunities

Pawel KROLAS

[1] Poznan University of Technology, Faculty of Engineering Management

Corresponding author:
Pawel KROLAS
Faculty of Engineering Management
11 Strzelecka Str.
60-965 Poznań, Poland
email: pawel.krolas@put.poznan.pl

ABSTRACT

The environment may have a negative, neutral or positive influence on the organization. The unpredictability of the negative and neutral environment is often a source of potential threats whereas positive conditions creates opportunities to the organization. The turbulent environment of the enterprise forces on managers to take action dealing with the use of the business opportunities with limited possibility of risk verification. It is connected with short life cycle business opportunity and the dynamic nature of the risk. The paper presents meaning of the business opportunity and the risk connected with the use of the opportunity for the organizations. Based on different case studies the risk management process based on use of life cycle bossiness opportunity was created. The elaborated methodology allows evaluating of risk factors connected with the business opportunity from different sectors.

KEYWORDS: RISK, RISK MANAGEMENT, RISK MANAGEMENT PROCESS, OPPORTUNITY, LIFE CYCLE

The risk management process itself appears in the subject in literature various forms. In case of the Project Management Institute (Project Management Institute, 2009), distinguished six basic stages of risk management: risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, risk monitoring and control. Liderman K., (2008, p. 79); Hubbard, D., (2009, p. 30); Fraser J., Simkins B., (2010, pp. 203-4); and others present similar elements of the risk management process. According to the ISO 31000 standard, the risk management process includes six fundamental steps: communication and consultation (1), scope, context, criteria (2), risk management which include risk identification, risk analysis, risk evaluation (3), risk treatment (4), recording and reporting (5), monitoring and review (6).

The presented approach to risk management is mainly applicable in the case of large organizations, which may also have qualified organizational units. In the case of micro, small and medium-sized enterprises (SME), such an approach (narrowly specialized services dealing only with this issue) seems difficult to apply. Risk management in small and medium-sized enterprises has a less structured form, mainly based on the intuition of company managers.

In the literature on the subject, the issue of opportunities, especially risk identification and assessment, is mentioned in a few publications. The subject of risk identification and assessment concerning the life cycle opportunity is also insufficient. In addition to the lack of structuring of the theory related to opportunities and risks, one should also notice the needs of the business, especially SMEs, as regards the shaping of the risk management process dealing with the opportunities. Therefore, there is a research gap both in the area of theory and practice. This article is an attempt to fill the presented research gap. Therefore, there is a need to develop a solution that will allow reducing the risk in the event of opportunities with a short life cycle.

The research was carried out on a sample of ten small and medium-sized organizations from the SME group, which represented four basic industries: development, production, transport and services.

Literature Review

The phenomenon of opportunity is of interest to various scientific disciplines, ranging from microeconomics, strategic management cognitive science to resource theory (Hunter, 2013, pp. 58-59). Opportunities can be both subjec-

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tive and objective and it is up to the company to perceive them. Hang, Garnsey and Ruan (2013, p. 6) believe that opportunities are discovered as well as created by enterprises. Alvarez and Barney (2007, pp. 11-26) argue that opportunities exist regardless of the actions and perceptions of the company. Ardichvili et al. (2003, p. 106) suggest that opportunities can be recognized to some extent, but that they are essentially developed in the course of the organization's deliberate activities and not found. The occurrence of an opportunity may be the result of deliberate actions of the enterprise or may be related to the element of surprise (Shane, 2000, pp. 448-469). Kirzner (1997, pp. 60-85) believes that opportunities can be disclosed without deliberate searches because enterprises have the necessary readiness and resources to seize opportunities. Enterprises can create a situation by acting, combining various resources, making changes without much involvement in the process of looking for opportunities (Peiris I. et al., 2013). Krupski (2008, pp. 49-50) notes that opportunities appear, last for a while, and then disappear.

The sources of opportunities may occur in a competitive environment and the macro environment of the enterprise (Bessant and Tidd,2011, pp. 430-431).

Trzcielinski (2011, p. 49) understands by opportunity a situation that favours the subject of action in achieving the intended goal or desired effect, which exists in the surroundings of this subject or is a postulated state of the features of this environment. The author of the publication believes that an opportunity constitutes a set of favourable events in the environment that can be used by the company (in order to gain benefits) thanks to the ability to configure the necessary resources.

Opportunities can be categorized taking into account management levels in the organization, especially in the perspective of the organizational hierarchy level (Królas P., Włodarkiewicz-Klimek H., 2015):

- **strategic opportunities** - are associated with a qualitative leap (product, market, technology, finance) of the enterprise;
- **tactical opportunities** – are connected with introducing a solution for improving the organization or creating a new function;
- **operational opportunities** - they concern the implementation of projects that have an impact on the current operational activity of the organization.

Due to the duration, the opportunities are limited and create a certain life cycle. From this point of view, one should distinguish between opportunities with a long and short life cycle. In the case of long life cycle opportunities, they are noticeable by many market participants. Enterprises have time to pool and prepare resources to seize the opportunity. They can also better identify and reduce the risk (Królas, Włodakiewicz-Klimek, 2015). Opportunities which creates short life cycle of opportunities are noticed by few companies. Their use depends on the ability to configure the necessary resources in a short time.

Short life cycle opportunity includes five basic phases (Trzcieliński, 2011):

- **pre-embryonic** - in this phase future events appear, often with a very long time horizon, which may be beneficial for the enterprise,
- **embryonic** - this phase concerns the occurrence of events that are the basis for the emergence of other situations considered interesting for the company,
- **birth** - occurring events cause the occurrence of a favourable situation. The situation may be complete, understood as an opportunity or incomplete being a chance for the enterprise,
- **duration** - the duration of an opportunity may be related to many factors beyond the company's control.
- **decline** - this phase may occur in the case of a lack of available resources, a change in the factor determining the opportunity.

Risk management based on life cycle opportunity

Short life cycle risk relates to a company's goal of seizing the opportunity. The enterprise may seize an opportunity or choose not to pursue this goal. Such perception of risk is related to the necessity to make a decision about taking advantage of the opportunity in a short time, without the possibility of detailed analysis of the project, with limited resources and uncertainty as to the final result of the actions taken. The possibility of taking advantage of the opportunity depends on the relationship between the company's goals, the resources owned and the situational impact (Figure 1).

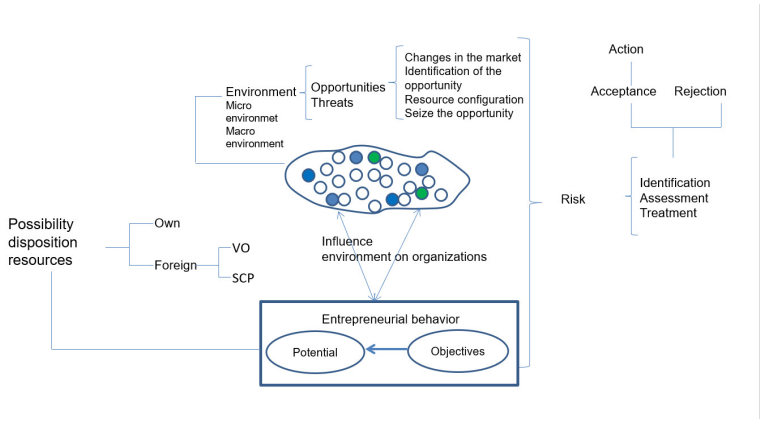

Figure 1: Risk related with the use of opportunity

Source: Own study

In such approach, the risk concerns the enterprise, the possibility of configuring the necessary resources (own and / or foreign), situational impact, consistency of goals that determine the possibility of using the opportunity. Due to the short life cycle, opportunities are seen by few companies. Taking advantage of short-life opportunities is related to the availability of resources. When the enterprise has own resources, the time needed to configure them is short, but the cost of having own resources is higher. Then the risk is mainly related to the implemented project. The situation is different when the enterprise does not have or partially owns own resources. The cost of using someone else's resources is then relatively low (resources are used when they are needed), but the risk occurs at the resource configuration stage and also when taking advantage of the opportunity. When it is necessary to establish cooperation, the level of risk is influenced by the history of cooperation between the entities. If the cooperation has not taken place before, the risk is high. Adversely, the use of previous links in cooperation allows to reduce the risk. Thus, the target is more likely to be exploited.

Risk identification also takes into account factors related not only to the use of opportunities, but also those related to the pre-embryonic, embryonic, birth, duration and decline phases of opportunity short life cycle.
The risk (R) is the a product of the probability (Table 1) P and the consequences C (Table 2),
where: R = P x C:

Table 1: The likelihood of the risk

Scale	Likelihood	Effect [%]	Description
1	Rare	1-20	May occur in rare circumstances
2	Unlikely	21-40	Could occur at some time
3	Possible	41-60	Might occur at most times
4	Likely	61-80	Will probably occur at most times
5	Almost certain	81-99	Is expected to occur at most times

Source: Own study, based on Gasiński T, Pijanowski S., (2011).

The scale of likelihood based on the value from 1 (rare) to 5 (almost certain). The same situation is dealing with the consequences (Table 2).

Table 2: The Consequences of the risk

Scale	Consequences	Effect [%]	Description
1	Insignificant	1-20	Very low impact on the organization's goals
2	Minor	21-40	Low impact on the organization's goals
3	Moderate	41-60	There may occur disruptions in goal realizations of the organization
4	Major	61-80	Temporary suspension of the possibility of achieving the organization's goal
5	Catastrophe	81-99	Inability to achieve the goal of organization's

Source: Own study, based on Gasiński T, Pijanowski S., (2011).

Risk matrix (Table 3) was created based on multiplying likelihood and consequences connected with a particular risk factor.

Table 3: Risk matrix

Likelihood	Almost certain	5	10	15	20	25
	Likely	4	8	12	16	20
	Possible	3	6	9	12	15
	Unlikely	2	4	6	8	10
	Rare	1	2	3	4	5
		Insignificant	Minor	Moderate	Major	Catastrophe
	Consequences					

Source: Own study, based on Gasiński T, Pijanowski S., (2011).

Based on risk matrix three levels of risk was created:

- low risk - point value 1-4.
- moderate risk - point value 5-12,
- high (critical) risk - point value 15-25.

The last step of the risk management process is dealing with the risk treatment (Hopkins, 2010, p. 245, Pritchard, 2001,p. 41) which include:
- risk acceptance - risk exposure is tolerated by the organization. In the case of high risk, the cost of implementing risk reduction measures is disproportionate to the possible benefits.
- risk reduction– is associated with the application of measures to prevent the occurrence of risk or to reduce the risk to an acceptable level.
- risk transfer - concerns the possibility of transferring the risk to an external entity (e.g. an insurance company or other entity). This form of risk manipulation is associated with incurring a certain cost by the decision-making entity.
- avoidance of risk - is associated with the cessation of activities that involve the risk. If this option is adopted, the company loses the possibility of a risk premium.

A consequence of the presented process should be a decision about acceptance or rejection of the opportunity.

Methodology

The research was conducted on a group of ten purposefully selected SME enterprises located in three voivodeships. All enterprises had an established position on the market of provided services. The study group included: real estates, service, transport and production organizations (Table 4).

Table 4: List of activities of the surveyed enterprises[1]

Lp.	Enterprise	Industry	Size	Voivodeship
1.	Alpha	Real estates	Micro	Greater Poland
2.	Beta	Real estates	Micro	Pomeranian
3.	Gamma	Service	Small	Greater Poland
4.	Delta	Transport	Small	Greater Poland
5.	Epsilon	Production	Small	Greater Poland
6.	Dzeta	Production	Medium	Greater Poland
7.	Eta	Production	Medium	Lesser Poland
8.	Theta	Production	Medium	Greater Poland
9.	Jota	Production	Medium	Greater Poland
10.	Kappa	Production	Large	Greater Poland

Source: Own study

[1] The author of the publication was not authorized to publish the names of the companies presented in the case study. For the purposes of this article, the companies are marked with the letters of the Greek alphabet.

The basic key in the selection of enterprises was the implementation of the process approach in which the author of this study was involved as a consultant and / or auditor. The case studies were conducted over a total of three years. Observation of the effects of used opportunities lasted up to two years.

Depending on the organization, the study lasted from three months to one and a half years. Research in enterprises were conducted in a parallel manner. The basic research methods used in the case study include:

- organization audit in terms of the possibility of implementing the process approach based on pro-quality systems,
- an interview and consultation with the company's management regarding the developed process approach, including ways of identifying and using opportunities,
- direct observation involving the author's participation in the implementation of the process approach,
- a workshop on the identification and assessment of risk associated with processes and the determination of risk factors related to the possibility of taking advantage of the opportunity,
- analysis of documentation related to the use of the opportunity.

Results and Discussion

The table 5 presents the projects constituting the case studies.

Table: 5 Identification of the opportunity – case study

Alpha	Beta	Gamma	Delta	Epsilon	Dzeta	Eta	Theta	Jota	Kappa
Obtaining a building permit	Sale of shares	Public tender - submission of an offer	Diversification of activities	Purchase of a used machine	Acquisition of the enterprise	Real estate purchase	Joining an EU project	Submission of an offer in the tender procedure	Obtaining access to EU operational programs

Source: Own study

The presented case studies cover various industries:

- **Alpha case** - represents company from real estate market on Greater Poland Voivodship. The opportunity was to obtain a building permit for the construction of a multi-family building.
- **Beta case** - represents company from real estate market on Pomeranian Voivodship, with particular emphasis on the Tri-City market and the Hel Peninsula. The opportunity for this company was the found strategic investor.
- **Gamma case** - company represents a consulting company that implements pro-quality systems throughout the country. The opportunity was the submission of an offer for a tender (public procurement).
- **Delta case** - company is a company that provides transport services for passenger cars, vans and trucks, as well as provides forwarding and logistics services. The opportunity was the diversification of activities by building a vehicle inspection station.
- **Epsilon case** - company specializes in pipe fastening systems and the production of such elements as pipe holders, gutter holders, hooks. The opportunity was the purchase of a used machine.
- **Dzeta case** – company deals with the production and delivery of shut-off and control valves as well as pumps for industrial and municipal installations. The opportunity was the acquisition of a construction company.
- **Eta case** - company deals in the production of cable harnesses and induction elements. The opportunity was the purchase of real estate plot enabling the transfer of the entire plant.
- **Theta case** - company deals with the production and sale of steel and aluminium structures. The opportunity concerned joining a project financed by the EU.
- **Jota case** - company deals in the production of medical devices. The opportunity was the submission of an offer for a tender.
- **Kappa case** – company deals with the processing of thermoplastics. The opportunity was gaining access to operational programs from the EU by changing the organization into a medium one.

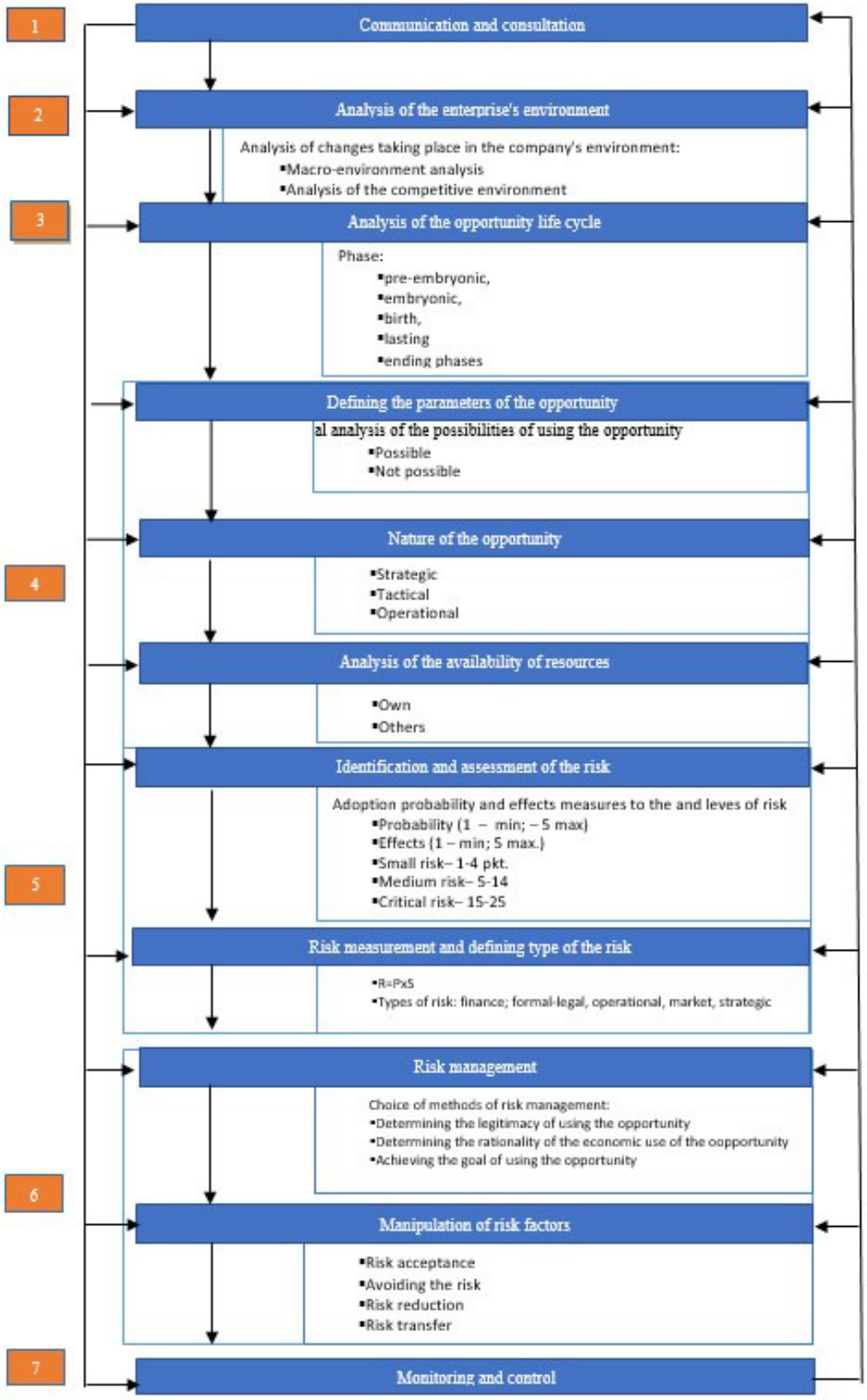

Figure 2: Risk management process based on short life cycle opportunity

Source: Own study

Communication and consultation (1)

- Communication and consultation is the first step in identifying opportunities with a short life cycle. Each case described in each case study involved communication at three basic levels:

- **Enterprises** - communication and consultation concerns those directly involved in identifying and seizing opportunities. In the case of micro and small entities, business managers were responsible for the opportunities. Medium-sized enterprises (over a hundred people) have dedicated departments that conduct communication and consultations with external entities, each in its scope.
- **Foreign resources** - in most cases, taking advantage of opportunities requires using someone foreign resources. Communication and consultation were dealing with the suppliers and other parties (administration) from the beginning up to the end of the project.

Analysis of the enterprise's environment (2)

The study conducted on the example of ten case studies showed that each opportunity taken is associated with other events occurring in the company's environment, which could have a positive or negative contribution to the use of the opportunity (Table 6).

Table 6: Environment of the company – case studies

Alpha	Beta	Gamma	Delta	Epsilon	Dzeta	Eta	Theta	Jota	Kappa
Changes in spatial development plans	Limited space for multi-apartment construction on the Hel Peninsula	Large competition	Limited competition (1 point providing similar services)	Strong competition on the market	Possibilities of extending the range of services	Difficulty in choosing proper a location	Requirements of Scandinavian clients to meet environmental standards	Strong competition in the market	Limited possibilities of obtaining funds from EU funds
Using the existing building conditions	No building conditions	Insufficient own resources	Possibility to diversify your business	High costs of purchasing a new machine	Taking over the liabilities of the acquired entity	High real estate prices	Enterprise expansion	Short time to proceed to the project	Limited development of R&D activities
Limited developer resources	Short investment cycle on the Hel Peninsula	Short time for acquiring subcontractors	Difficult to meet formal requirements	Low unemployment rate	Increasing the range of services offered by company	The need to secure the company's resources (people)	A large portfolio of orders for the company's products	Fulfilling formal requirements	Hierarchical structure with workers union

Source: Own study

Particular case studies presented in Table 6 could be noticed as similar to each other (Alpha - Beta and Gamma - Jota). The conditions related to the company's environment presented different problems. The decision to seize the opportunity depended on the decision-maker and the assessment performed.

Analysis of the opportunity life cycle (3)

The duration of the various phases of the short life cycle of opportunities shows Figure 3. The time could be calculated in weeks, months as well as years.

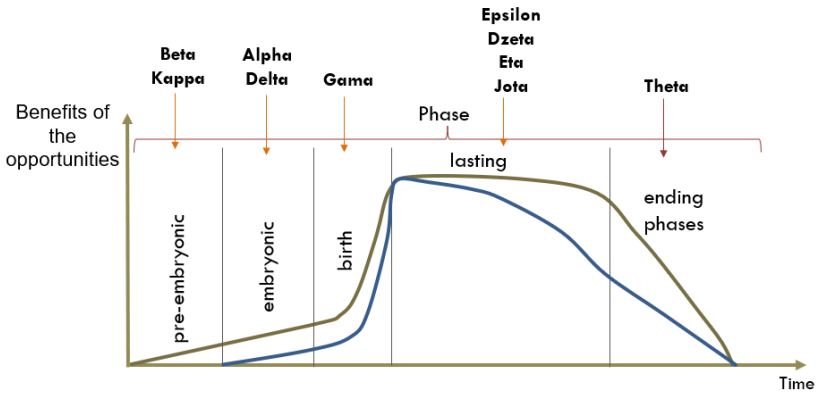

Figure: 2 : Shorty life cycle opportunity – case studies

Source: Own study, based on Trzcielinski, 2011

Based on Figure 3 it could be noticed that Beta and Kappa took steps to seize the opportunities in pre-embryonic phase. In both cases, preparations for the occurrence of a favourable situation for the entity took nearly two years. In the case of Alpha and Delta companies, the duration of the embryonic phase fluctuated within one year. Gamma made efforts to take advantage of the opportunities in the birth phase. This opportunity lasted for a couple of weeks. In the lasting phase were four companies Epsilon, Dzeta, Eta and Jota. The time for the fulfilment of the opportunity was counted in months. Theta company made efforts to use the opportunity in the decline phase. This time was counted in weeks.

Defining the parameters of the opportunity (4)

At this stage, the possibility of using the opportunity was determined:

- **Possible** - on the basis of the preliminary analysis, the decision-making entity made a decision on the legitimacy of further analysis of the situation aimed at using the opportunity. This state of affairs applied to all subjects presented in the case study.
- **Not possible** - on the basis of the preliminary analysis of the environment, there were no messages to take advantage of the opportunity. Such a situation was not presented in case studies.

Nature of the opportunity (4)

- **Strategic** - such features were associated with enterprises: Alpha, Beta, where there was a significant financial benefit. In the case of Eta, the assumption was to purchase real estate that would enable the transfer of operations to another city.
- **Tactical** - such features were associated with enterprises: Delta, Dzeta and Kappa companies were associated with this type of opportunity. In these cases, the aim was to broaden the scope (Delta, Dzeta) of services and to gain access to operational programs of EU (Kappa).
- **Operational** - this included cases: Gamma, Epsilon, Theta, Jota. In two cases: Gamma and Jota, the goal was to enter the tender. In the case of Epsilon, the goal was to buy a used machine. The objective of Theta's case was to get to the program of the EU and made an implementation of the environmental standard.

Analysis of the availability of resources (4)

The resources necessary to seize the opportunity have been divided into:

Own resources - in two cases the enterprise had sufficient resources to seize the opportunity (Theta and Kappa). The remaining companies had some of their own resources, but they were insufficient for the independent implementation of the project.

Foregin resourses - in other cases, the enterprise had to set up the necessary resources (financial, human) based on a supply chain partnership or an external credit line.

Identification and assessment of the risk (5)

Identification and assessment of the risk were done based on the presented approach:

- Probability (1 – min; – 5 max)

- Effects (1 – min; 5 - max.)
- Small risk – 1- 4 pkt.
- Medium risk – 5-14
- Critical risk – 15-25

Identification and assessment of risk in ten case studies included: the potential of the organizational, needed resources, the environment of the enterprise.

Risk measurement and defining type of risk (5)

The risk was calculated using the product of probability and effect.
The research identified two hundred and three risks associated with the use of opportunities with a short life cycle. Each of the risks has been assigned to the following categories: financial, formal and legal, operational, market and strategic.

Risk management (6)

Based on case studies, thirty of all identified risks were critical risks (Table 7).

Table: 7 Critical risk factors associated with seizing the opportunity – case studies

Alpha	Beta	Gamma	Delta	Epsilon	Dzeta	Eta	Theta	Jota	Kappa
Failure to obtain a building permit	Lack of parking space	Short period of time to prepare an offer	Reduction of financial liquidity	Long waiting period for the machine	Incorrect definition of the necessary financial resources	Losing some customers	Use of de minims found	Unfavorable criteria of selecting a bidder	Failure to meet the formal and legal requirements
Acquisition of a controlling stake in the company	Negative bank decision regarding the possibility of granting a loan	Difficult-to-meet project indicators	Difficulties in choosing technology	Long service response time to announced failures	Taking over the obligations of the acquired entity	Limitation of financial liquidity	Difficult to meet formal requirements related to the implementation	High degree of complexity of the offer	Long-term procedure of obtaining the status of a medium-sized enterprise
Unfavorable division of apartments	Low sales of apartments	Unfavorable form of payment for the invoice (at least after 3 months)	Difficulties related to failure to meet the construction completion deadline	Low machine occupancy	Payment gridlocks in relation to employees and subcontractors of the acquired entity	Losing key employees	Delegating employees for training when there is an increased demand for their work	Short execution time of the subject of the contract	Negative decision of the Supervisory Board regarding the transformation of the company

Source: Own study

Critical risks were partially eliminated by the application of risk management methods and techniques, thanks to which the obtained residual risks were acceptable. In the case when the application of risk management methods did not contribute to its reduction, the company was aware of the existence of such risk.

Monitoring and control (7)

At this stage, the risk factors identified during risk identification and assessment are monitored. The subject of monitoring and control also applies to all other stages. It should be possible to achieve the goals as well as monitor possible deviations from the adopted goal related to the use of the opportunity.

As a result of the implementation of the opportunity, an important element of monitoring and control is also updating the risks related to the current stage of advancement of the project implementation. Table 8 shows the achieved results.

Table 8: Final results – case studies

Alpha	Beta	Gamma	Delta	Epsilon	Dzeta	Eta	Theta	Jota	Kappa
Obtaining a building permit	Attracting an investor	Acquiring subcontractors	Choice of technology	Determining the conditions for the purchase of the machine	Conducting due diligence	Selected location	Fulfillment of the de minimis aid requirements	Make an offer	Positive decision of the Supervisory Board
Getting a loan and construction of flats	Obtaining formal procedure (building conditions and obtaining a building permit)	Make an offer and winning the tender	Realization of investments	Purchases and installing of machine	Established of boundary conditions	Purchase of real estate in the economic zone	Meeting formal requirements related to the implementation of the standard	Winning the order	The separation of two companies
Sales of apartments	Construction of apartments and sales of apartments	Implementation of the tender in accordance with the signed contract	Diversification of activities	Employee training and startup of the machine	Purchase of an enterprise	Transfer of the plant	Implementation of the environmental standard	Implementation of the contract in accordance with the signed contract	No obtaining the status of a medium-sized enterprise

Source: Own study

Based on the conducted research, it can be concluded that for micro-companies, the realization of the opportunity had strategic character decided about economic success (Alpha, Beta). In case of small and medium-sized enterprises taking advantage of the opportunity had a tactical and operational character which led to a competitive advantage by offering new products (Epsilon), extending the scope of services offered (Delta, Dzeta) or gaining benefits from locating the organization in the economic zone (Eta). Seizing the opportunity also made order backlog for the company's products (Gamma, Theta). In the case of Jota case, implement environmental standards made it possible to enter new markets.

The last presented case – Kappa, despite the steps taken, missed the opportunity because of the formal issues.

Conclusions

Opportunity is a situation conducive to the subject of action in achieving the intended goal. The development of both the opportunity and the way it is used in the organization depends on the sources of its creation, resources owned by the organization and the time of availability of the opportunity. The sources of possible opportunities appear both in the competitive and macro-environment. A business may seize an opportunity using its own or use foreign resources.

The company's ability to seize an opportunity is determined by the length of the opportunity life cycle. For opportunities with a long life cycle, they are open to many market competitors. Enterprises have time to pool and prepare resources to seize the opportunity. They can also better identify and reduce risk. Oppositely, short life cycle opportunities are perceived by few enterprises, and the risk related to the use must be analysed multidimensional and in relation to individual phases of the life cycle of the opportunity (Królas P., Włodarkiewicz-Klimek H., 2015).

The short life cycle risk management process covers seven basic elements: communication and consultation (1), analysis of the enterprise's environment (2), analysis of the opportunity life cycle (3), defining the parameters of the opportunity (4), identifications and assessment of the risk (5), Risk management (6), Monitoring and control (7).

On the basis of the research on the applied risk management process with a short life cycle, nine organizations took advantage of opportunities (Alpha, Beta, Gamma, Delta, Epsilon, Dzeta, Eta, Theta, Jota) and one, despite the actions taken, did not take advantage of the opportunity (Kappa).

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Effectiveness-Supporting Model of Organisational Climate According to Personnel of Different Levels

Anna WZIATEK-STASKO
Assoc. prof., Ph. D; Faculty of Management and Social Communication, Institute of Economics, Finance and Management; Department of Human Resources Management; Jagiellonian University in Kraków, Łojasiewicza 4 Street, 30-348 Kraków.
E-mail: anna.wziatek-stasko@uj.edu.pl

Olena KRAWCZYK-ANTONIUK - Ph. D
Businesswoman, Law-Administration-Taxes
E-mail: ok-a@wp.pl

Abstract

The issue of the organisational climate is attracting the attention of an increasingly broader group of contemporary researchers. In spite of an attempt to create a number of definitions to define the term of the "organisational climate", the term which is "an effectiveness-supporting organisational climate" remains a specific research gap. In the business practice, the latter is approached superficially, if not to say, intuitively. This article is theoretical and empirical in nature. Its main goal is to present the authors' own hypothesis of an effectiveness-supporting organisational climate model both in theory as well as from a practical point of view, considering opinions expressed by employees at different levels in the hierarchy. The key added value of the paper is identification of the organisational climate components of particular importance in the process of increasing the level of the selected parameters used to assess the organisational effectiveness of enterprises, in the opinion of blue collar workers, white collar workers without subordinate employees and managers. Using the research results, the authors succeeded in identifying the dissimilarity of respondents' preferences, taking a moderating variable they used, into account.

Keywords: Organisational Climate, Organisational Climate Model, Organisational Effectiveness, Effectiveness-Supporting Organisational Climate Model.

Introduction

While the concept of "the organisational climate" is very popular in the world of science as a research category, it seems that it is still not receiving sufficient attention from managers in enterprises and their staff. It appears that it is not sufficiently understood as a concept and, consequently, its exploration is based largely on intuition. It may be so because its operationalisation is more difficult that one may expect; however, it is important and implies certain consequences.

From the grammar point of view, the term "organisational climate" is a metaphorical adjective, whose first element is ambiguous in nature. The noun "climate" may be referred both to rooms, buildings, interpersonal relations as well as to meteorological properties. What these examples have in common is that, in each such example, a man feels the climate and the concept of the climate usually refers to people's adaptation to the existing conditions. In the literature, the term "the organisational climate" is sometimes replaced with the term "the atmosphere" which suggests that, to some extent, these terms are meteorology-related (Wudarzewski, 2013, p. 203-219). L. von Rosenstiel i F. Bögel (1992, p. 17) pointed out directly that "in the congitive sense, the organisational climate is similar to the meteorological climate since (...) we tend to describe interpersonal relations as warm, cold or that a storm is brewing". Accordingly, in spite of the meteorological roots of the term of the "organisational climate", at present, the term seems also firmly attached to the management sciences. It is of particular importance in the context of building a strong organisational culture, of which it is an element, raising the level of motivation and engagement of the staff, its creativity, openness to changes and risk propensity which, eventually, translates into increasing (or reducing) the level of effectiveness and economic and organisational efficiency of enterprises. "The rules of conduct, standards and values arising from the organisational

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culture determine both the effectiveness for formulating the company's strategy, effectiveness of change management processes as well as the effectiveness of motivational systems" (Altaf, 2011, p. 161-162; also see: Hulkko-Nyman, Sarti, Hakonen, Sweins, 2014, p.24–49; Jacobs, Renard, Snelgar, 2014, p.1–13; Harrington, Voehl, 2015, p.56; Aybas, Cevat Acar, 2017, p.363–372; Yongxing, Hongfei, Baoguo, Lei, 2017, p.708–713). In the light of above, it is of utmost importance to have complete understanding of the essence and the role of the organisational climate as wel as the mechanism of its impact on the effectiveness of the staff and, consequently, of the entire organisation.

This article presents the results of the research conducted in a search for a very important question: does a type of a position occupied by an employee (white collar, blue collar without subordinate employees, a managerial position) determines the structure of the effectiveness-supporting organisational climate model?

The essence and the role of the organisational climate

In many organisations, the problem is that managers ignore or even completely conceal the importance of the organisational climate in the process of effective people management. What is more, many of them do not see the relationship or misinterpret the relationship between the organisational climate and the organisational effectiveness of the company.

The organisational climate is an ambiguous concept and its interpretation may vary. Over the years, many attempts have been made to operationalise it. The organisational climate is the dominant way of perception in the organisation and the overall emotional responses of employees to their own work environment (Aarons, Sawitzky, 2006, p.61-72), it is the atmosphere prevailing in the organisation which affects the people (Dessler, Turner, 1992, p.23), these are the features distinguishing an organisation from other organisations in terms of the behaviour of other people in the organisation, which are relatively unchanged over time (Forehand, Gilmer, 1964, p.362), is a normative structure of attitudes and standards of behaviour, which serves as the basis for interpreting the situation and taking actions that constitute a source of pressure on the direction of activity (Gregopoulos, 1965, p.115-130), is a subjectively perceived set of features of an organisation, dependent on external and internal factors, which affect the behaviour of employees inside the organisation (Łochnicka, 2016, p. 102). The organisational climate means the relationships between the employee and colleagues and line managers, in particular the feeling of a friendly atmosphere in the work group and the ability to count on the help of both colleagues and line managers (Baruk, 2014, p. 11-21), it is also the main factor shaping organisational behaviour of employees, resulting from the content of social relations including the conditions of the institution's functioning - a formal power structure, type of technology, requirements for organisations, motives - aspirations and interests of employees and teams of employees (Wudarzewski, 2016, p. 55-71). The organisational climate is a manifestation of the organisational culture (Dabic, Laznjak, Smallbone, Svarc, 2018).

The wealth of views on the organisational climate does not make it easier to understand its essence. Taking a synthetic look at the organisational climate, one may conclude that some researchers perceive it as a way of perception and all emotional reactions, some see it as a factor shaping organisational behaviour of employees, and others as a normative structure of attitudes and behaviours. A different view allows us to see in the organisational climate a set of features characterising an organisation, including its standards, organisational policy, the internal work environment, patterns of behavior, attitudes, feelings, habits, interpersonal relationships, a set of measurable properties of the work environment.

Although a precise definition of the "orgnisational climate" concept is impossible to formulate, the importance of its role in an organisation should be emphasised as the organisational climate is responsible for the quality of the work environment, for the quality of interpersonal communication and for possible conflicts or their lack. The right organisational climate can increase employee satisfaction with work and, as a result, the level of their motivation, have a positive impact on their health (both mental and possible psychosomatic ailments) and well-being, which ultimately translates into the results of the entire organisation Badura, 2016, p. 15-18).

The consequence of failing to meet the expectations of employees as to providing them with the organisational climate they desire may be a decrease in their organisational commitment, an increase in morbidity, a less enthusiastic approach to work than expected, lack of job satisfaction, which may be reflected in their critical assessment of the entire organisation , externalizsed in a more or less official way. Permanent dissatisfaction of employees is a factor that signals to the top management that there are dysfunctions in the management process and that the manager lacks sufficient managerial competences.

Extensive literature studies indicate that the structure of the organisational climate can be built by an immeasurably

wide variety of components that interact with each other. The subject was taken up by many authors (e.g. Abendroth, den Dulk, 2011, p.234-256; Avgar, Kolins-Givan, Liu, 2011, p.717-741; McDonald, Townsend, Wharton, 2013, p. 205-222; Davidson, Manning, Timo, Ryder, 2001, p. 444-461; Kundu, 2007, p. 99-108, Wudarzewski, 2013, p. 59-78; Bratnicki, Wyciślak, 1980, p. 85-103; Wajszczak, 2000, p. 13-36, etc.). The following parameters are the most frequently mentioned in the world literature, repeated in the opinion of most authors over the last 70 years:

- friendly interpersonal relations (friendliness and affection),
- relations between a manager and an employee,
- Mutual trust,
- Transparency of information,
- Efficiency of communication,
- Support from one's line manager (supportive style of management),
- Challenges (including professional challenges),
- Motiviation for work,
- Structure (complexity)
- Transparency of information,

Appreciating the many years of scientific achievements of dozens of researchers around the world, as well as using their extensive experience related to the exploration of issues related to the organisational climate and its modelling, the authors of this study have developed a proprietary model, including components of particular importance in the process of optimizing the level of organisational effectiveness:

A1. Equal treatment of employees
A2A. The level of trust in the information coming from the line manager.
A2B. The level of trust in the information coming from colleagues.
A3A. The remuneration system used in the organisation.
A3B. The remuneration system used in the department/team.
A4A. Interpersonal relations in the organisation.
A4B. Interpersonal relations in the department/team.
A5A. Efficient communication in the organisation.
A5B. Efficient communication in the department/team.
A6. Commitment to the organisation

The essence of the organisational effectiveness

The category of "effectiveness" is an equally popular and ambiguous notion as is "the organisational climate". Despite many attempts, it has not been unequivocally defined in such a way that this definition would meet with universal acceptance. As Blaik observes (2015, p. 14), sometimes onemay think that subsequent, not always in-depth, attempts to define and identify the essence of efficiency in various areas of management (economy and management), contrary to the assumed intentions, rather contribute to deepening the aforementioned ambiguity and terminological confusion, especially in the context of the already existing multitude of definitions . Pyszka (2015, p. 13-25) believes that, within the scope of the issue of effectiveness, the authors follow the footsteps of effects, i.e. the results of action, usually identified with economic effects. However, it is increasingly suggested to analyse effectiveness in a wider context. While discussing effectiveness, the above-mentioned author raises the importance and the need to attempt at answering three important questions:

In what way definition of effectiveness may affect its measurement?

Does a broader non-economic approach to efficiency enable better identification of the positive effects of an organisation's operation?

How does the change in the dynamics of effectiveness affect the assessment of the purposefulness of an action?

Skrzypek (2007, p.313-325) claims that, in management sciences, efficiency is related to such concepts as efficiency, effectiveness, efficiency, productivity, profitability, rationality, but its nature overrides them. Ziębicki (2014) emphasises that, in the literature, it in two meanings: as economic efficiency and as organisational efficiency, with the proviso that economic efficiency is presented as one of the manifestations of organisational effectiveness. As a rule,

economic efficiency is defined as the ratio of results to inputs, while organisational efficiency is defined by means of multidimensional criteria. The criteria encompass different categories of results and attributes of an organisation. This domain was researched by many scientists (e.g. Cameron, 1986; Goodman, Pennings, 1977; Lawless, 1972; Lewin, Minton, 1986; Price, 2008; Steers, 1975, etc.). Bielski (2002) emphasises that "there is no single best criterion for assessing effectiveness, and their selection is subjective and is made under the influence of the values, preferences and interests of the entity making the assessment". Similarly, Kondalkar (2010, p.8) observes some difficulties in operationalising the concept, claiming that "organisational effectiveness is a complex phenomenon and is mostly based on the adopted strategy adapted to the needs of the development of individual individuals and teams (...) this perception of efficiency is related to the personal development of employees, who thus demonstrate a high level of motivation and emotional balance". The above view allows for a relatively free interpretation and opens the possibility of creating original solutions in the selection of measures for assessing the level of organisational effectiveness, which was done by the authors of this study.

Based on the analysis of the literature on the subject, six measures of organisational effectiveness have been identified, most often indicated as the key measures according to an international group of researchers, such as:

B1A. The degree of achieving organisation's goals.
B1B. The degree of achieving employee's goals.
B2A. Personnel development level shaped by the influence exerted by the line manager and colleagues.
B2B. The level of staff development shaped by colleagues.
B3. Fast adaptability to changes (by the organisation).
B4. The degree of the employees' ability to deliver tasks in compliance with the rules (standards) of the organisation.
B5A. Individual performance (effectiveness) of employees assessed by their line manager.
B5B. Individual performance (effectiveness) of employees according to their self-assessment.
B6. Convergence of employee's values and values promoted in the organisation.

Adopting the proprietary definition of "the efficiency-supporting model of the organisational climate" reading: "the efficiency-supporting model of the organisational climate means the construction of an ideal organisational reality, constituting a set of subjectively perceived its characteristics, enabling the study of the structure of this reality, the relationship between its elements and factors affecting it, which guarantees that the organisation's performance is optimal for the investment made in the organisation and performance", and taking into account the above-identified organisational climate components (A1-A6) and measures to assess organisational effectiveness (B1-B6), an attempt was made to create a model after the pattern presented in the Fig. 1.

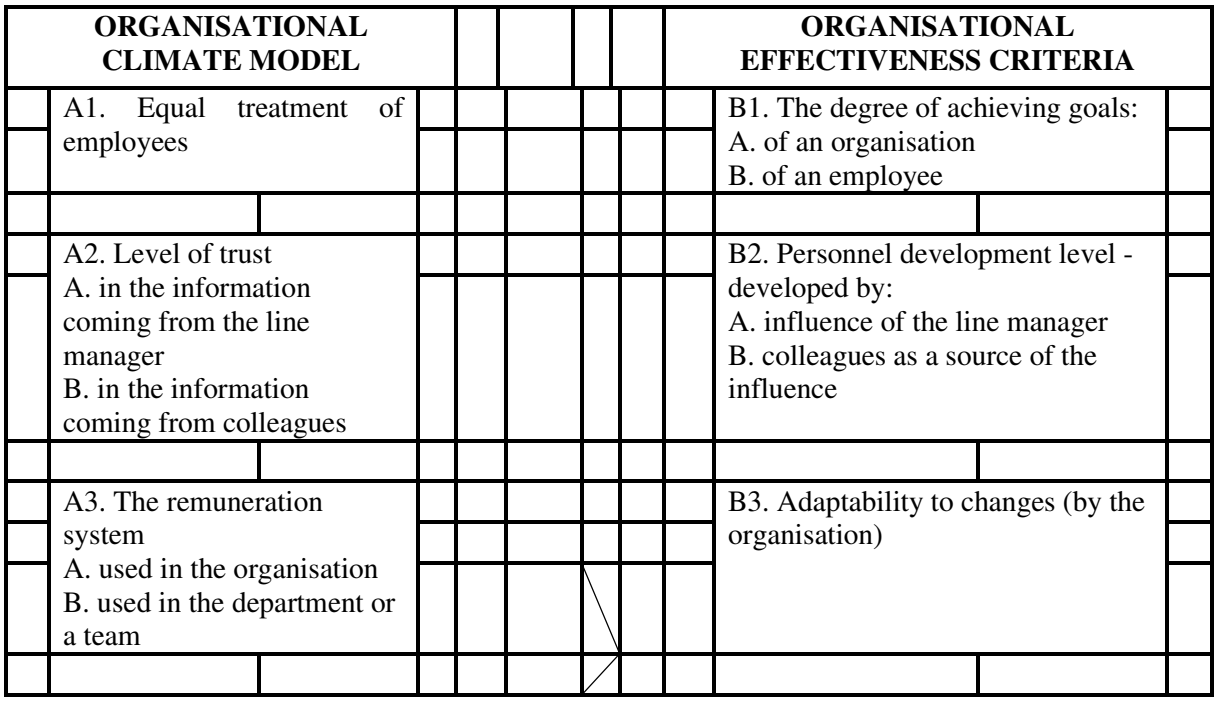

	A4. Interpersonal relations A. in the organisation B. in the department or a team							B4. The degree of the employees' ability to deliver tasks in compliance with the rules (standards) of the organisation		
	A5. Efficient communication A. in the organisation B. in the department or a team							B5. Effectiveness of a single employee: A. according to the line manager B. according to the employee concerned		
	A6. Commitment to the organisation							B6. Convergence of employee's values and values promoted in the organisation		

Figure 1: Effectiveness-supporting organisational climate model - theory

Source: Own analyses and studies

Research Methodology

In the research process, a proprietary questionnaire was used, its structure based on the identified variables: independent variables (A1-A6) and dependent variables (B1-B6). In the questionnaires, a 5-point Likert scale (1-5) was used, which is an estimative, dependency-displaying, one-dimensional scale while classified too a group of complex scales used to measure attitudes. The empirical research was run on a representative sample, where the type of job/position (blue collar, white collar, non-managerial without subordinate employees, managerial) was used as a moderating variable. The following assumptions were made when determining the optimal size of the sample:

- The analysis based on a regressive scheme to allow for analysing many organisational climate components (predictors) in a single statistical mode,
- The size of the sample should make it possible to run analyses for all ten organisational climate components (predictors),
- The value of the strength of the statistical reasoning was 0.80,
- A conventional threshold of 0.05 was used as the statistical significance threshold..
- a statistical model which allows for detecting even slight outcomes of 0.02 of f^2 Cohen's.

The research was conducted by using an Internet questionnaire and by direct questionnaire research among respondents. The research sample consisted of 1,348 respondents, out of which 1,266 properly filled out questionnaires were selected and eventually used in the process of the analysis. G*3.1.9.2. software was used for calculations. See Table 1 for respondents' structure by chosen criteria.

Table 1: Respondents' structure by different criteria

No.	Criterion		N	%
1	Sex	Woman	740	58%
		Men	526	42%
2	Age	Up to 25 years	486	38%
		Age 26-35	362	29%
		Age 36-45	219	17%
		Age 46-55	119	9%
		55 and more	80	6%
3	Education	Elementary	8	1%

No.	Criterion		N	%
		Lower secondary	10	1%
		Vocational	63	5%
		Secondary	610	48%
		Upper secondary (eng., B.A.)	282	22%
		M.A. or equivalent	258	20%
		Academic title	35	3%
4	**Industry**	Commerce	169	13%
		Industry	239	19%
		Construction	41	3%
		Agriculture	4	0%
		Services	452	36%
		Other sectors	361	29%
5	**No. of employees at respondents' employers**	2 -9	199	16%
		10 -49	314	25%
		50 -249	298	24%
		250 and more	455	36%
6	**Number of team members**	2 -5	606	48%
		6 -15	430	34%
		16 and more	230	18%
7	**Type of job/position**	Blue collar	456	36%
		White collar, non-managerial	531	42%
		managerial	279	22%
8	**Respondents' organisation ownership type**	Public sector	389	31%
		Private sector	837	66%
		Third sector organisations (NGOs)	40	3%
9	**Respondents' total years of work experience**	<12 months	131	10%
		From 1 to 5 years	446	35%
		From 5 to 15 years	356	28%
		>15 years	333	26%
10	**Respondents' years of work experience at their current employer**	<12 months	394	31%
		From 1 to 5 years	526	42%
		From 5 to 15 years	233	18%
		>15 years	113	9%
11	**Respondents' years of work at their present position**	<12 months	433	34%
		From 1 to 5 years	569	45%
		From 5 to 15 years	197	16%
		>15 years	67	5%

Source: Own analyses and studies

Dependencies between pairs of the analysed variables i.e. Each component of the organisational climate (A1-A6) and each organisational effectiveness ratio (B1-B6) were analysed with ρ Spearman rank correlation coefficient. The research results are presented in the tables 2 to 8, where p represents the statistical significance i.e. defines the probability of a random result. If the probability is lower than 0.05, the result is statistically significant. Fisher transformation values complimented the list and were used to verify the statistical significance of the differences between the values of the correlation coefficients in the compared groups. In the tables 2 - 8, the values confirming that dependences between variables, of statistical significance, are presented in red.

Research Results

The research process as a whole included:

- the respondents' assessment of selected components of the organisational climate (A1-A6), taking into account the type of job they occupy,
- the respondents' assessment of the level of selected parameters of organisational effectiveness, (B1-B6), taking into account the type of job they occupy,
- analysis of the correlation between all components of the organisational climate (A1-A6) and all criteria for the assessment of organisational effectiveness (B1-B6), taking into account the type of job position held by the respondents.

Due to the very extensive factual material that allowed the collection of the above-mentioned stages of the research process, this article presents only the results that concerned the analysis of the correlation between both groups of parameters, including the type of job position, according to the specification below.

- Table 2 - Spearman rank correlation ρ coefficients between the assessments of selected components of the organisational climate (A1-A6) and the assessments of the degree of achievement of the employee's goals (B1B),
- Table 3 - Spearman rank correlation coefficients between the assessments of selected components of the organisational climate (A1-A6) sssessing the level of human resources development shaped by the influence of colleagues (B2B),
- Table 4 - Spearman rank correlation coefficients between the assessments of selected components of the organisational climate (A1-A6) and the assessments of the organisation's capacity to adopt rapidly to changes (B3),
- Table 5 - Spearman rank correlation coefficients between the assessments of selected components of the organisational climate (A1-A6) and the assessments of the degree of achievement of the employee's goals (B4),
- Table 6 - Spearman rank correlation ρ coefficients between the assessments of selected components of the organisational climate (A1-A6) and the assessments of employee's performance by the line manager (B5A),
- Table 7 - Spearman rank correlation ρ coefficients between the assessments of selected components of the organisational climate (A1-A6) and self-assesment of employee's performance (B5B),
- Table 8 - Spearman rank correlation ρ coefficients between the assessments of selected components of the organisational climate (A1-A6) and assessments of the degree of convergence of the employee's value with the values promoted in the organisation (B6).

In the study of the correlation between the assessments of selected components of the organisational climate (A1-A6), and the assessments of the degree of achievement of the organisation's goals (B1A) and the assessments of the level of human resources development, shaped by the influence of the supervisor (B2A), no statistically significant differences between groups were found in the resultant correlation coefficients. Therefore, this article skips presentation of the results of these studies as irrelevant to the purpose of this article.

Table 2: Spearman ρ rank correlation coefficient between the assessment of some selected components of the organisational climate (A1-A6) and assessment of delivery on the employee's goals (B1B) in the group of blue collars, white collars without subordinate employees and managers

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
1.	A1. Equal treatment of employees	0.242*	0.315*	0.309*	-1.24	0.186	-0.95	0.254	0.09	0.397
2.	A2A. Trust in information coming from the line manager	0.377*	0.437*	0.387*	-1.12	0.212	-0.15	0.394	0.81	0.287
3.	A2B. Trust in information coming from colleagues	0.279*	0.303*	0.118*	-0.41	0.367	**2.20**	**0.035**	**2.62**	**0.013**
4.	A3A. Evaluation of the remuneration system used in the organisation	0.242*	0.254*	0.269*	-0.20	0.391	-0.38	0.371	-0.22	0.390
5.	A3B. Evaluation of the remuneration system used in	0.193*	0.259*	0.226*	-1.09	0.221	-0.45	0.360	0.47	0.357

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
	the department/team									
6.	A4A. Interpersonal relations in the organisation	0.303*	0.403*	0.462*	-1.79	0.081	**-2.45**	**0.020**	-0.98	0.247
7.	A4B. Interpersonal relations in the department/team	0.311*	0.362*	0.333*	-0.90	0.266	-0.32	0.379	0.44	0.361
8.	A5A. How effective the communication system in the organisation is	0.368*	0.409*	0.428*	-0.75	0.300	-0.93	0.258	-0.31	0.380
9.	A5B. How effective the communication in a department/team is	0.346*	0.412*	0.328*	-1.20	0.193	0.27	0.385	1.31	0.169
10.	A6. Current engagement in work in the organisation	0.389*	0.415*		-0.48	0.355	-0.90	0.265	-0.51	0.350

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

The data presented in the Table 2 indicate that a positive correlation between the assessment of the degree of achieving employee's goals (B1B (:

- and the level of trust in information coming from the line manager (A2B) was significantly statistically stronger in the group of blue collars and in the group of white collars in non-managerial positions than in the group of managers,
- and the assessment of interpersonal relations in the organisation (A4A) had a significantly statistically stronger in the group of managers than in the group of blue collar.

Table 3: Spearman ρ rank correlation coefficient between assessments of some chosen components of the organisational climate (A1-A6) and assessments of the personnel development level resultant from colleagues' influence (B2B) in the group of blue collars, white collars occupying non-managerial positions and managers

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
1.	A1. Equal treatment of employees	0.130*	0.099*	-0.010	0.49	0.354	1.84	0.073	1.47	0.135
2.	A2A. Trust in information coming from the line manager	0.211*	0.223*	0.121*	-0.20	0.391	1.21	0.191	1.42	0.146
3.	A2B. Trust in information coming from colleagues	0.361*	0.328*	0.174*	0.58	0.336	**2.65**	**0.012**	**2.22**	**0.034**
4.	A3A. Evaluation of the remuneration system used in the organisation	0.121*	0.176*	0.027	-0.88	0.271	1.24	0.185	2.03	0.051
5.	A3B. Evaluation of the remuneration system used in the department/team	0.093*	0.177*	-0.015,	-1.34	0.163	1.42	0.146	**2.61**	**0.013**
6.	A4A. Interpersonal relations in the organisation	0.322*	0.293*	0.288*	0.50	0.352	0.49	0.354	0.07	0.398

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
7.	A4B. Interpersonal relations in the department/team	0.329*	0.318*	0.258*	0.19	0.392	1.02	0.238	0.88	0.271
8.	A5A. How effective the communication system in the organisation is	0.272*	0.253*	0.350*	0.32	0.379	-1.13	0.210	-1.44	0.142
9.	A5B. How effective the communication in a department/team is	0.378*	0.315*	0.307*	1.12	0.213	1.05	0.229	0.12	0.396
10.	A6. Current engagement in work in the organisation	0.304*	0.264*	0.247*	0.68	0.317,	0.81	0.288	0.24	0.387

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

The data presented in the Table 3 show that a positive correlation between the assessment of the impact of the colleagues' opinion on personnel development level (B2B):

- and the level of trust in the information coming from the line manager (A2B) was significantly statistically stronger in the group of blue collars and in the group of white collars in non-managerial positions than in the group of managers,
- and the assessment of the remuneration system used in the department or a team (A3B) was statistically insignificant in the group of managers.

Table 4: Spearman ρ rank correlation coefficient between the scoring of some chosen components of the organisational climate (A1-A6) and assessment of the employees' capacity to adopt swiftly to changes (B3) in the group of blue collars, white collars occupying non-managerial positions and managers

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
1.	A1. Equal treatment of employees	0.159*	0.213*	0.212*	-0.87	0.272	-0.72	0.308	0.01	0.399
2.	A2A. Trust in information coming from the line manager	0.375*	0.378*	0.230*	-0.05	0.398	**2.10**	**0.044**	**2.20,**	**0.035**
3.	A2B. Trust in information coming from colleagues	0.286*	0.215*	0.116	1.18	0.198	**2.33**	**0.027**	1.37	0.156
4.	A3A. Evaluation of the remuneration system used in the organisation	0.183*	0.181*	0.134*	0.03	0.399,	0.66	0.321	0.65	0.323
5.	A3B. Evaluation of the remuneration system used in the department/team	0.179*	0.207*	0.084	-0.45	0.360	1.27	0.179	1.69	0.095
6.	A4A. Interpersonal relations in the organisation	0.339*	0.317*	0.350*	0.38	0.370	-0.16	0.394	-0.50	0.352
7.	A4B. Interpersonal relations in the department/team	0.254*	0.206*	0.221*	0.79	0.292	0.46	0.359	-0.21	0.390
8.	A5A. How effective the communication system in the	0.394*	0.420**	0.370*	-0.49	0.354	0.37	0.373	0.80	0.290

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
	organisation is									
9.	A5B. How effective the communication in a department/team is	0.296**	0.283**	0.281**	0.22	0.389	0.21	0.390	0.03	0.399
10.	A6. Current engagement in work in the organisation	0.275**	0.310**	0.233*	-0.60,	0.334	0.59	0.336	1.12	0.213

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

Table 4 shows that a positive correlation between the assessment of the capacity an organisation has to adopt rapidly to changes (B)

- and the level of trust in information coming from the line manager (A2A) was statistically stronger in the group of blue collars and in the group of white collars in non-managerial positions than in the group of managers,
- and the level of trust in information coming from colleagues (A2B) was statistically insignificant in the group of managers.

Table 5: Spearman ρ rank correlation coefficient between the scoring of some chosen components of the organisational climate (A1-A6) and the score of employees' capacity to deliver tasks according to the standards prevailing in the organisation (B4) in the group of blue collars and white collars occupying non-managerial positions

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
1.	A1. Equal treatment of employees	0.082	-0.057	0.064	**2.17**	**0.038**	0.24	0.388	-1.63	0.105
2.	A2A. Trust in information coming from the line manager	0.262**	0.224**	0.161**	0.63	0.327	1.39	0.153	0.88	0.271
3.	A2B. Trust in information coming from colleagues	0.151**	0.186**	0.063	-0.56	0.341	1.17	0.202	1.68	0.097
4.	A3A. Evaluation of the remuneration system used in the organisation	0.086	-0.012	0.096	1.53	0.123	-0.13	0.395	-1.46	0.138
5.	A3B. Evaluation of the remuneration system used in the department/team	0.084	-0.009	0.107	1.46	0.138	-0.30,	0.381	-1.57	0.117
6.	A4A. Interpersonal relations in the organisation	0.170**	0.185**	0.279**	-0.24	0.387	-1.51	0.129	-1.34	0.163
7.	A4B. Interpersonal relations in the department/team	0.166**	0.209**	0.260**	-0.70	0.313	-1.29,	0.173	-0.73	0.306
8.	A5A. How effective the communication system in the organisation is	0.256**	0.215**	0.222**	0.68	0.317	0.47	0.357	-0.10	0.397
9.	A5B. How effective the communication in a	0.293**	0.255**	0.253**	0.64	0.325	0.57	0.340	0.03	0.399

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
	department/team is									
10.	A6. Current engagement in work in the organisation	0.360**	0.315**	0.323**	0.79	0.291	0.55	0.343	-0.12	0.396

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

It was found that the correlations between the scoring given for the degree of the work compliance with the rules and the scoring for employees' treatment by their line managers were statistically different in terms of their value; however, there were not statistically different in any of these groups.

Table 6: Spearman ρ rank correlation coefficient between the scoring of some chosen components of the organisational climate (A1-A6) and the score of employees' capacity to deliver tasks according to the line manager (B5A) in the group of blue collars, white collars occupying non-managerial positions and managers

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
1.	A1. Equal treatment of employees	0.208**	0.265**	0.184**	-0.94	0.256	0.33	0.378	1.15	0.206
2.	A2A. Trust in information coming from the line manager	0.266**	0.345**	0.270**	-1.36	0.158	-0.06	0.398	1.12	0.214
3.	A2B. Trust in information coming from colleagues	0.144**	0.279*	0.107	**-2.21**	**0.035**	0.49	0.353	**2.41**	**0.022**
4.	A3A. Evaluation of the remuneration system used in the organisation	0.156**	0.173**	0.276**	-0.27	0.384	-1.65	0.102	-1.46	0.137
5.	A3B. Evaluation of the remuneration system used in the department/team	0.112*	0.216**	0.228**	-1.67	0.099	-1.57	0.117	-0.17	0.393
6.	A4A. Interpersonal relations in the organisation	0.232**	0.299**	0.294**	-1.13	0.212	-0.87	0.273	0.07	0.398
7.	A4B. Interpersonal relations in the department/team	0.222**	0.374**	0.277**	**-2.61**	**0.013**	-0.77	0.297	1.46	0.137
8.	A5A. How effective the communication system in the organisation is	0.164**	0.254**	0.192**	-1.47	0.135	-0.38	0.371	0.88	0.271
9.	A5B. How effective the communication in a department/team is	0.250**	0.344**	0.233**	-1.61	0.109	0.24	0.388	1.63	0.105
10.	A6. Current engagement in work in the organisation	0.292**	0.308**	0.396**	-0.27	0.384	-1.55	0.121	-1.35	0.160

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

According to Table 6, a positive correlation between the assessment of employee's individual capacity made by their line manager (B5A):

- and the level of trust in the information coming from colleagues (A2B) was the strongest in the group of white collar workers at non-managerial positions, weaker in the group of blue collar employees, statistically insignificant in the managers' group,
- as the assessment of interpersonal relations in the department or a team (A4B) was stronger in a group of white collar workers in non-managerial positions than in the group of blue collar workers.

Table 7: Spearman ρ rank correlation coefficient between the scoring of some chosen components of the organisational climate (A1-A6) and assessment of the employees' capacity (B5B) in the group of blue collars, white collars occupying non-managerial positions and managers

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8	9	10	11
1.	A1. Equal treatment of employees	0.116*	-0.016	0.066	**2.07**	**0.047**	0.66	0.321	-1.11	0.217
2.	A2A. Trust in information coming from the line manager	0.160**	0.071	0.142*	1.41	0.148	0.24	0.388	-0.97	0.250
3.	A2B. Trust in information coming from colleagues	0.120*	0.124**	0.115	-0.06	0.398	0.07	0.398	0.12	0.396
4.	A3A. Evaluation of the remuneration system used in the organisation	0.005	-0.023	0.074	0.44	0.363	-0.91	0.265	-1.31	0.170
5.	A3B. Evaluation of the remuneration system used in the department/team	-0.004	-0.007	0.004	0.05	0.399	-0.10	0.397	-0.15	0.395
6.	A4A. Interpersonal relations in the organisation	0.138*	0.064	0.171*	1.17	0.202	-0.44	0.362	-1.46	0.137,
7.	A4B. Interpersonal relations in the department/team	0.100*	0.101*	0.232*	-0.02	0.399	-1.78	0.082	-1.82	0.077
8.	A5A. How effective the communication system in the organisation is	0.142**	0.067	0.150*	1.18	0.198	-0.11	0.397	-1.13	0.210
9.	A5B. How effective the communication in a department/team is	0.140*	0.138*	0.227*	0.03	0.399	-1.18	0.199	-1.24	0.185
10.	A6. Current engagement in work in the organisation	0.293**	0.402*	0.418*	-1.94	0.061	-1.88	0.068	-0.26	0.386

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

Table 7 shows that the positive correlation between the self-assessment of individual performance made by the employee (B5B) and the assessment of equal treatment of employees by the line manager (A1) was statistically significant only in the group of people employed in blue-collar positions.

Table 8: Spearman ρ rank correlation coefficient between the assessment of selected components of the organisational climate (A1-A6) and assessment of the degree of convergence between the employee's values and the values promoted in the organisation (B6) in the group of blue collars, white collars occupying non-managerial positions and managers

No.	Organisational climate component	Position			Comparison by group					
		Blue collar	White collar	Managers	1 -2		1 -3		2 -3	
		1	2	3	*z*	*p*	*z*	*p*	*z*	*p*
1	2	3	4	5	6	7	8,	9	10	11
1.	A1. Equal treatment of employees	0.175**	0.262**	0.184**	-1.43	0.144	-0.12	0.396	1.11	0.216
2.	A2A. Trust in information coming from the line manager	0.283*	0.349*	0.373*	-1.15	0.207	-1.32	0.166	-0.37	0.372
3.	A2B. Trust in information coming from colleagues	0.299*	0.255*	0.165*	0.74,	0.302,	1.86,	0.071,	1.27,	0.178,
4.	A3A. Evaluation of the remuneration system used in the organisation	0.138*	0.265*	0.196*	**-2.07,**	**0.047,**	-0.78,	0.294,	0.98,	0.246,
5.	A3B. Evaluation of the remuneration system used in the department/team	0.125*	0.231*	0.178*	-1.71,	0.092,	-0.71,	0.310,	0.74,	0.302,
6.	A4A. Interpersonal relations in the organisation	0.379*	0.336*	0.326*	0.77,	0.297,	0.79,	0.291,	0.15,	0.394,
7.	A4B. Interpersonal relations in the department/team	0.260*	0.265*	0.177*	-0.08,	0.398,	1.14,	0.208,	1.25,	0.183,
8.	A5A. How effective the communication system in the organisation is	0.434*	0.376*	0.366*	1.08,	0.222,	1.06,	0.227,	0.16,	0.394,
9.	A5B. How effective the communication in a department/team is	0.332*	0.292*	0.208*	0.69,	0.314,	1.75,	0.086,	1.21,	0.192,
10.	A6. Current engagement in work in the organisation	0.278*	0.313*	0.303*	-0.60,	0.333,	-0.36,	0.374,	0.15,	0.395,

** p<0.05; (p=0.01)*

Source: own analysis based on research results.

Table 8 shows that the positive correlation between the assessments of the degree of convergence of the employee value with the bonus values in the organisation (B6) and the assessment of the remuneration system used in the organisation (A3A) was stronger in the group of people employed in non-manual positions without subordinate employees than in the group of employees worker positions.

Research conclusions and recommendations for practice

The aim of the research, the results of which are presented in this article, was to search for an answer to the question: does the type of job (blue collar, non-worker without subordinate employees, managerial position) determine the structure of the pro-efficiency model of the organisational climate. On the basis of the collected factual material, the following conclusions can be drawn:

1) All the components of the organisational climate specified in the model (A1-A6) influenced the criteria of organisational effectiveness (B1-B6), although not all the relationships turned out to be statistically significant (this article presents the results of the research concerning only statistically significant relationships).
2) The components of the organisational climate and the criteria of organisational effectiveness for all three groups of respondents partially overlapped. Note that:
   a) in case of the blue collar employees:
      - the level of trust in the information received from the supervisor (A2A) had a significant impact on the assessment of the degree of the organisation's ability to quickly adapt (adapt) to changes (B3),

- the level of trust in the information received from colleagues (A2B) had a significant impact on the degree of achievement of the employee's own goals (B1B) and the assessment of the degree of impact of colleagues on the level of human resources development (B2B) and the assessment of individual employee performance by the supervisor (B5A),

b) in case of employees occupying non-manual positions without subordinate employees:

- the level of trust in the information received from the supervisor (A2A) had a significant impact on the assessment of the degree of the organisation's ability to adapt quickly to changes (B3),
- the level of trust in the information received from colleagues (A2B) had a significant impact on the degree of achievement of the employee's own goals (B1B) and the assessment of the degree of impact of colleagues on the level of human resources development (B2B) and the assessment of individual employee's performance by the supervisor (B5A),
- the remuneration system used in the organisation (A3) significantly influenced the assessment of the level of convergence of the employee's values with the values awarded in the organisation (B6) and this distinguishes this group of employees from employees holding blue-collar positions

c) in case of employees holding managerial positions:

- assessment of equal treatment of employees (A1) influenced the self-assessment of individual employee performance (B5B),
- interpersonal relations in the organisation (A4) affected predominantly the degree of achievement of their own goals (B1B).

3) Employees from all three groups indicated the degree of achievement of the employee's own goals (B1B) as a significant criterion of organisational effectiveness, however, according to employees in the following positions:

a) workers and non-workers without subordinate employees - this assessment was influenced by the level of trust in the information received from co-workers (A2B),
b) employees in managerial positions - this assessment was influenced by the assessment of interpersonal relations in the organisation (A4A).

4) Employees occupying managerial positions indicated as the only group of employees the importance of such a component of the organisational climate as the assessment of equal treatment by the line manager (A1). This component influenced such a criterion of organisational effectiveness as the self-assessment of the employee's own performance (B5B), which was also important only for this group of respondents (it was not indicated in any of the other two groups).

5) For employees holding blue-collar and non-manual worker positions without subordinate employees, such organisational effectiveness criterion as:

a) self-assessment of their own performance (B5B) does not play a significant role,
b) the assessment of their performance made by their line managers (B5A) is statistically significant, and this parameter is influenced in both cases by such a component of the organisational climate as the level of trust in the information provided by colleagues (B2B), but this impact is stronger in the case of workers in non-manual positions without subordinate employees, rather than blue-collar workers.

6) Only employees occupying non-worker positions without subordinate employees indicated that the criterion of organisational effectiveness as statistically significant, such as the convergence of the employee's value with the premium values in the organisation (B6) - they are influenced by the assessment of the current level of reward used in the organisation (A3A), i.e. the climate component organisational, which was ignored by the other two groups of respondents.

The knowledge of the existence of a wide range of organisational climate components and the ability to identify those of particular importance to employees in a specific organisation is a key measure of the professionalism level of a modern manager and one of the leading challenges facing him. The aim of this article was to draw attention to the different preferences related to the modelling of the structure of the pro-effective organisational climate, taking into account the type of workstation.

For employees occupying blue-collar positions, the most important component turned out to be the level of trust in the information provided to them by:

- Their line managers - it affects the organisation's ability to quickly adapt (adapt) to changes;

- it shapes the assessment of the employee's individual performance made by his supervisor, as well as the degree of achievement of the employee's own goals and the scope of influence of colleagues on the level of development of this employee.

For employees occupying non-manual positions without subordinate employees, apart from trust, the essence of which has been discussed above, the evaluation of the reward system used in the organisation is equally important, as it affects the degree of convergence of the values professed by the employee with the values awarded in the organisation. For managers, however, the most important are completely different components of the organisational climate. The group increases the weight of such parameters as:

- equal treatment of employees by their line managers - which affects the self-assessment of their own performance,
- interpersonal relations in the organisation - which affects the degree of achievement of their own goals.

The role and responsibility of managers in emphasizing the importance of appropriate elements of the pro-efficiency model of the organisational climate is significant. They should bear in mind the fact that the psychological dimension of work may be just as important as its economic function, which identifies work as a source of income and emphasizes the achievement of a specific financial result.

Identifying the components of the organisational climate in a particular organisation and their implementation may indicate that the manager has acquired extremely valuable skills

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Academic E-Learning and Learning Management System for Teaching-Learning: Systematic Literature Review

Alexander RODRÍGUEZ ÁNGELES
Universidad Autónoma del Perú, Lima, Perú, alex2015.a@hotmail.com

Romario FLORES-TAIPE
Universidad Autónoma del Perú, Lima, Perú, romariojulerft@gmail.com

Javier GAMBOA-CRUZADO
Universidad Señor de Sipán S.A.C., Chiclayo, Perú, jgamboa65@hotmail.com

Guillermo PAUCAR-CARLOS
Universidad Nacional de San Antonio Abad del Cusco, Cusco, Perú, guillermo.paucar@unsaac.edu.pe

Luis SOTO-SOTO
Universidad Nacional Mayor de San Marcos, Lima, Perú, lssotos@hotmail.com

Augusto HIDALGO SÁNCHEZ
Universidad Nacional Mayor de San Marcos, Lima, Perú, ahidalgos@unmsm.edu.pe

Abstract

This study aims to conduct a systematic literature review (SLR) on the different aspects of E-Learning in education, specifically in the academic context, where E-Learning serves as a support for traditional teaching and learning methods. Important scientific contributions to this field are presented, which will serve as a guide to understand which tools and technologies are used for the creation of E-Learning modules (learning management systems, virtual campuses, virtual classrooms, etc.). In addition, the advantages of E-Learning over the traditional method of learning are presented. Data collected from 2015 to 2020 are provided to validate the observations. It is statistically demonstrated that the countries that publish more about E-Learning have the most active authors in the area. The study concludes with a comprehensive discussion on the advantages of E-Learning, as well as the tools required for its successful implementation and the factors that must be considered to ensure its maximum effectiveness.

Keywords: E-Learning at the academic level, Learning Management System, Teaching-Learning, Systematic Literature Review

Introduction

Achieving the best possible link between teaching and learning using information and communication technology (ICT) is a major challenge in the area of education, specifically at the academic level. Study centers seek to attain this link among the agents of the teaching-learning model, namely the teacher who teaches, the medium through which the course is delivered, and the student who learns [72]. A poor teaching method or medium of delivery leads to knowledge not being transmitted correctly, which in turn triggers student frustration and results in lower levels of learning. Sometimes, when too many relevant topics are handled in parallel, students may get confused and may not know what to do or where to start; the overload of information can interfere with their problem-understanding and decision-making abilities [72]. If the delivery or design of the course does not match the students' preferences, it may negatively affect their satisfaction, thus increasing the probability of students abandoning their education midway [72] [49].

The concept of online learning is growing and expanding across several sectors [28]. Online learning processes, such as E-Learning, B-learning, and M-learning, using learning management systems (LMSs), have already been implemented in most higher-level teaching-learning processes. Several universities have implemented these virtual

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and semi-virtual (B-learning) processes, and the use of LMS as a curricular support is vital in the smooth running of such virtual environments [72]. These generalized environments [55] provide a learning environment free of restrictions [2], hence providing greater flexibility in time, space, language, content, and administrative processes [16].

Online learning applications, such as social networks, virtual campuses, and LMS, allow students and teachers to meet, create, and share relevant information on the assigned courses. All platforms allow users to participate directly and share their opinions on the subject under discussion [82]. One of the main advantages of these applications is that they enable sharing of multimedia content (videos, images, documents, etc.) [12], which can be used as supporting material while conducting classes [82].

This study aims to analyze and highlight the many benefits of E-Learning, the most important of which is meaningful teaching-learning. For this purpose, different dimensions are contemplated, so that the application of E-Learning leads to efficient teaching, and consequently, optimal learning. Furthermore, different methodologies of software development necessary for these types of systems and the models that support these web platforms are discussed. This leads to a very important advancement in the field of education, as it offers new opportunities to students and teachers to improve the quality of autonomous learning and teamwork, and aids the development of new cognitive skills and knowledge.

This paper thus focuses on showing how E-Learning has been applied at the academic level to achieve a significant improvement in the teaching-learning process in the last five years. It is organized as follows: Section I presents the introduction to the research; Section II presents the corresponding background; Section III details the studies related to the research,; Section IV describes the methods and materials used in the research; Section V presents the results; Section VI discusses the study; and Section VII presents the conclusions and future possibilities.

Background

The substantial progress made in information technology over the last few years has had a major impact on every sector [5], including the field of education [51]. This has led to the proliferation of online universities and online courses [5]. Moreover, today's students are highly technologically literate and prefer to decide when, where, and at what pace to learn [19] [39]. This has forced educational institutions to adapt [39], and as a result, the traditional model has undergone a transformation into an online model that is free from the limitations of space and time, which has led to highly strategic changes in the educational and learning system [44].

E-Learning was first implemented in the UK, and has since undergone several changes. It started off as a tool to simply deliver information to students in the form of video files; however, after the emergence of the World Wide Web (www) and the increase in virtual learning environments, E-Learning has become quite complex, utilizing various systems that can be easily integrated with other technologies, such as social networks [74] [72]. These virtual environments are realized using learning management systems, which meet all requirements of developing a virtual platform in online learning, as they allow easy administration of courses (internal level) as well as the management of the learning process and performance tracking of the students taking these courses (external level). They are also considered the intermediary between the teacher and student, besides expanding the classroom spatially and temporally [6] [62]. Thus, educational institutions, teachers, and students must have practical knowledge about LMS [19].

E-Learning helps institutions project their brand image internationally and meet the growing demands of students worldwide. It also supports academic organizations in considerably saving their time and decreasing their dependency on paper-based processes, thus improving their overall efficiency [13]. To take full advantage of their potential, E-Learning implementations should focus on meeting the needs and concerns of their key stakeholders as much as possible, and LMS is at the top of the list of latest technological developments that cover all their stakeholders' requirements.

For this reason, it is necessary to undertake a comprehensive investigatation of the different dimensions of E-Learning, considering its various aspects, tools, and methodologies.

Related Work

As far as we have been able to investigate, there are no other systematic literature reviews (SLRs) on academic teaching-learning through E-Learning. However, some works have been collected that show the state of the art of this modern modality, giving us a clearer picture of the subject.

Benta et al. [13] compared a group of students taking classes in the traditional way with those using the LMS Moodle.

They focused on class attendance and homework submission, and the results showed that in traditional teaching, the percentage of students who did not submit their assignments was 56%, while the percentage that submitted was 44%. However, using Moodle, 82% of the students submitted their assignments, while only 18% did not.

The only SLR related to E-Learning was that proposed by Erhan and Jeffrey [29]. They studied the factors that considerably influence blended learning and E-Learning in relation to student satisfaction and engagement. The definitions of E-Learning, hybrid learning, and blended learning were reviewed, presented, and discussed in their study, comparing the different online teaching formats. They reviewed which factors are more prestigious than others, including the type of learning community and the identity of the student, course design, and prominent role of the teacher. In addition, the authors in [29] indicated that the digital learning environment offered by LMSs is one in which the geographical dispersion of students and eye contact are scarce. They reviewed several studies from two database sources, ERIC and ProQuest; 35 articles were read completely and 44 articles were selected for the final review. The authors concluded that the most prominent factors are the presence of the teacher in online and offline environments for on-campus activities and internships. Furthermore, they offered suggestions for an effective design of specific courses, promoting coherence between related activities among students and teachers.

Research Methods

This study applied the SLR process to efficiently compile and summarize the results obtained from the existing literature; this means that it is a reliable, controllable, and rigorous process to determine the current state of research in a particular topic, which in this case is E-Learning, at the academic level and LMS for teaching-learning.

Research Questions

The initial step toward identifying and examining relevant articles is the development and selection of appropriate research questions that will guide us through the review process. The objective is to map research on teaching-learning at the academic level through E-Learning and LMS, to find an answer to the four specific questions listed below (Table 1):

Table 1: Research Questions

Research Questions	Motivation
RQ1: What are the relevant advantages of the application of E-Learning for the improvement of teaching and learning at the academic level?	To understand the advantages of E-Learning for the improvement of teaching-learning at the academic level.
RQ2: What software development methodologies are being used for the development of E-Learning environments or platforms at the academic level to improve teaching-learning?	To identify the software development methodologies that are being used for E-Learning at the academic level to improve teaching-learning.
RQ3: What are the E-Learning modalities that are used in the process of teaching and learning at the academic level?	To discover the modalities of E-Learning in the teaching-learning process at the academic level.
RQ4: What are the technologies/tools that are being used for the deployment of E-Learning at the academic level to improve teaching-learning?	To review the technologies/tools that are being used in the deployment of E-Learning at the academic level in the improvement of teaching-learning.

A. Sources and Search Equations

A comprehensive search process was carried out, analyzing articles published between January 2015 and December 2020 using advanced search options. The search was performed on 10 search engines, listed in Table 2, and the search strings provided in the table were used for each search engine to achieve the best results.

Table 2: Search Sources

Search Sources
BASE: https://www.base-search.net/
Dialnet Plus: https://dialnet.unirioja.es/
DOAJ: https://doaj.org/
ERIC: http://biblioteca.uoc.edu/es/recursos/recurso/eric-educational-resource-information-center
Google Academic: https://scholar.google.es/schhp?hl=es
Redalyc: https://www.redalyc.org/
Science Direct: https://www.sciencedirect.com
Scopus: https://www.scopus.com
Springer Link: https://link.springer.com/
Taylor & Francis: https://www.tandfonline.com

Table 3: Search Strings

Source	Generic Search Equation
BASE	E-Learning OR "Virtual Campus" OR "Virtual classroom" OR "Learning Management System" AND SCRUM OR Agile AND methodology OR Method OR Model and Academic Teaching-Learning
Dialnet Plus	("Learning Management System" OR"E-Learning" OR "Virtual classroom") AND ("SCRUM" OR "Agile" AND ("methodology" OR "Method" OR "Model")) AND Academic Teaching-Learning
DOAJ	"Academic Teaching-Learning": "AND", ("E-Learning" OR "Virtual classroom" OR "Virtual campus") "AND" ("SCRUM" OR "Agile" AND ("Methodology" OR "Method" OR "Model"))
ERIC	Academic Teaching-Learning AND (Learning Management systemic OR E-Learning OR visual-campus OR visual-classroom) AND (SCRUM OR Agile AND(Methodology OR Method OR Model))
Google Academic	('Virtual Campus' OR 'E-Learning' OR 'Virtual classroom' OR 'Learning Management System') AND ('SCRUM' OR 'Agile' AND ('Methodology' OR 'Method' OR 'Model')) AND (Academic Teaching-Learning)
Redalyc	“Academic Teaching-Learning” AND (E-Learning OR Virtual campus OR Virtual classroom OR Learning Management System) AND (SCRUM OR Agile AND (Methodology OR Method OR Model))
Science Direct	("Virtual Campus" OR "E-Learning" OR "Virtual classroom") AND ("SCRUM" OR "Agile" AND ("methodology" OR "Method" OR "Model")) AND Academic Teaching-Learning

Scopus	(TITLE-ABS-KEY ("Learning Management System") OR TITLE-ABS-KEY ("Virtual Campus") OR TITLE-ABS-KEY E-Learning) OR TITLE-ABS-KEY ("Virtual classroom") AND TITLE-ABS-KEY (SCRUM) OR TITLE-ABS-KEY ("Agile") AND TITLE-ABS-KEY ("methodology") OR TITLE-ABS-KEY (method) OR TITLE-ABS-KEY (model) AND TITLE-ABS-KEY (Academic Teaching-Learning))
Springer Link	("Learning Management System" OR "E-Learning" OR "Virtual classroom") AND ("SCRUM" OR "Agile" AND ("Methodology" OR "Method" OR "Model") AND Academic Teaching-Learning
Taylor & Francis	[All: Academic Teaching-Learning] AND [[All: E-Learning] OR [All: Virtual-classroom] OR [All: Virtual-campus]] AND [[All: SCRUM] OR [All: Agile] AND [All: methodology] OR [All: Method] OR [All: Model]]]

B. Selection of Studies

The chart below (Fig 1) shows the number of results found through the aforementioned search strings for each source or search engine.

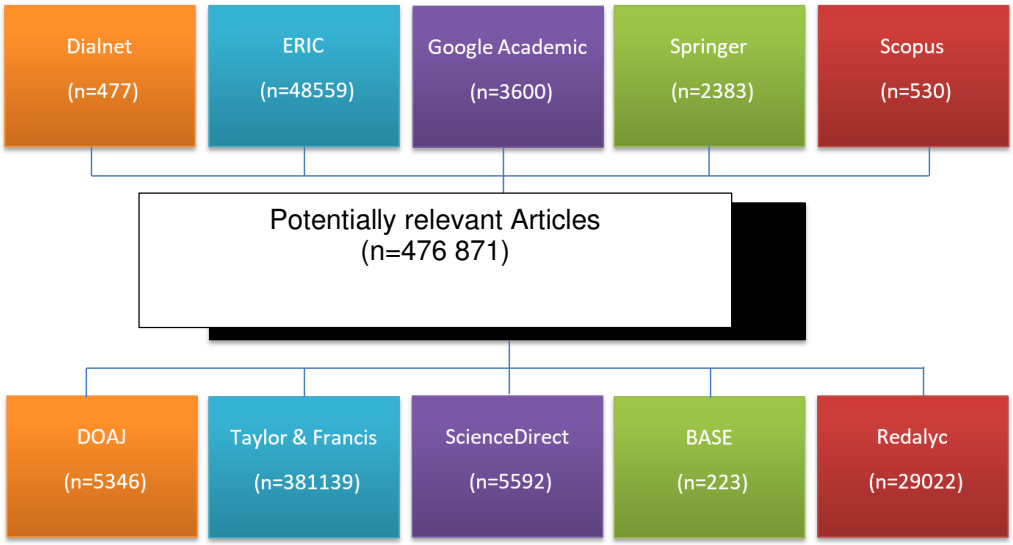

Fig. 1: Consolidated Results

The study applied seven criteria to filter the results, to obtain the best and most relevant results. Table 4 shows the exclusion criteria used to filter out the large volume of results obtained in the initial search.

Table 4: Exclusion Criteria

Exclusion Criteria	
CE1	The items are not less than 5 years old.
CE2	Search results are not scientific articles.
CE3	Articles are not written in English or Spanish.
CE4	The article is not fully accessible.
CE5	The articles are not related to the topic of education.

CE6	The study was not conducted on participants involved in academics in some way.
CE7	The articles do not propose an E-Learning, virtual campus, virtual classroom, or learning management system solution.

The process of study selection is illustrated in Fig 2. The initial advanced search gave N = 476 871 results. Then, the exclusion criteria were applied, starting with EC1 and EC2, which filtered the total number of results to N = 113 596. Finally, the criteria EC6 and EC7 were applied, which left us with 86 studies.

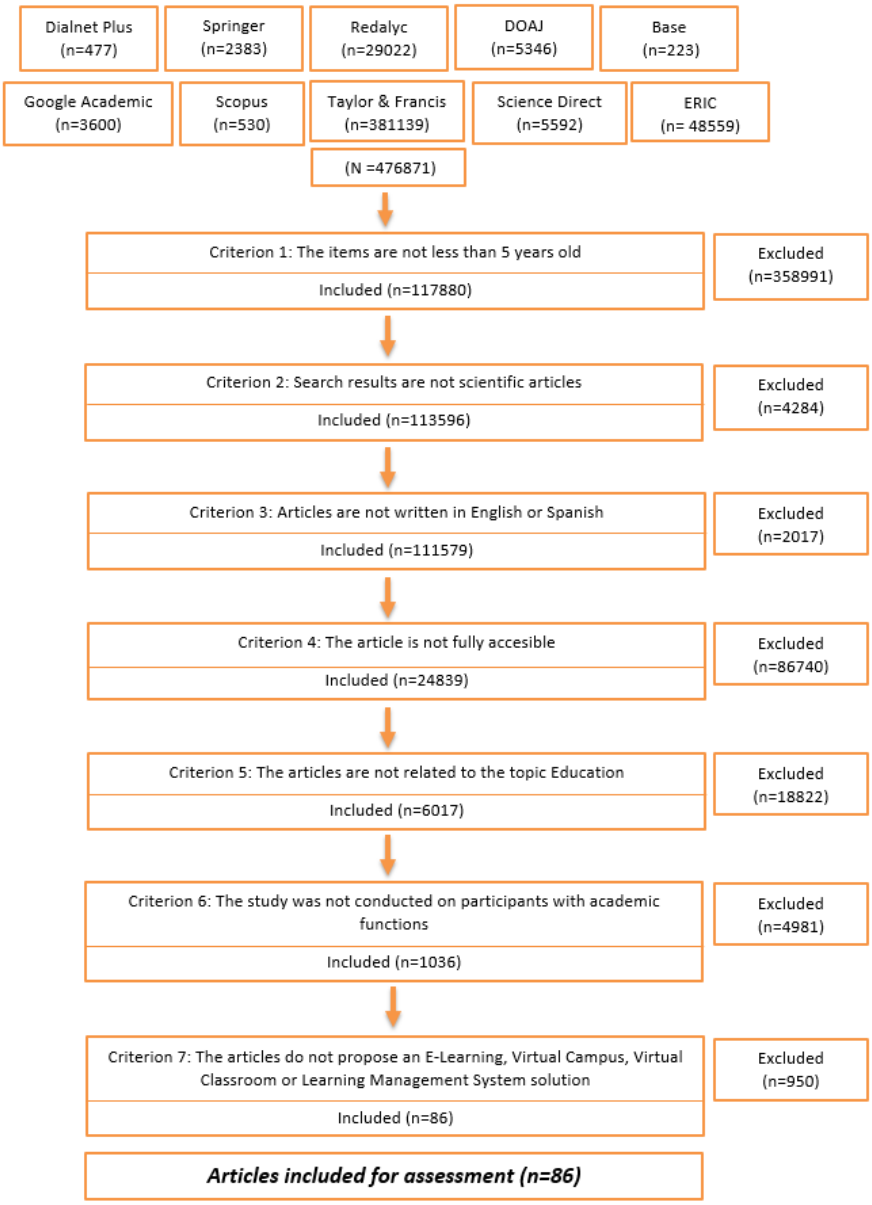

Fig. 2: Number of Results Consolidation Chart

C. Study Qualification

The application of quality criteria (QA) was the final step used to identify the final list of documents to be included in this literature review. QA was applied to assess the quality of the research papers according to the established research questions. Six QAs were formulated, as listed in Table 5.

Table 5: Quality Criteria

Criteria for evaluating quality	
QA1:	The research is done at/for an educational institution or house of studies.
QA2:	The authors have a high level of education
QA3:	The specific subject area is clearly defined
QA4:	The objective of the research is sufficiently explained and well motivated.
QA5:	Data collection measures are adequately described
QA6:	Methods or methodology are clearly described

All 86 articles were subjected to the study qualification phase through the application of the aforementioned QAs, and their quality was assessed. On completion of this process, 83 articles were selected for a systematic review. The final selected studies were saved in the Zotero tool (Fig 3) for the management of bibliographic references.

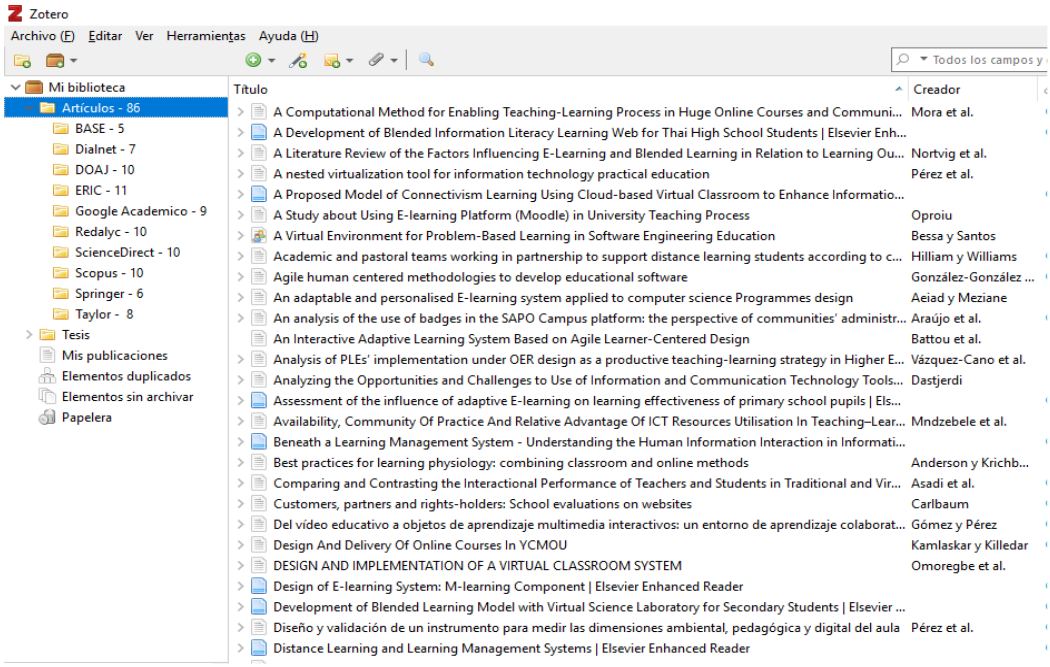

Fig. 3: Zotero's Reports with the Classified Studies

Review of Studies

At this stage, we begin reviewing the final selected studies by answering the aforementioned research questions.

Results

After performing the literature review process of the 83 selected studies, we proceed to answer the questions posed in this research.

A. *Advantages of the application of E-Learning in teaching and learning at the academic level*

According to the results obtained from the literature review, there are 10 relevant advantages of E-Learning related to the process of teaching-learning, as listed in Table 6.

Table 6: List of Advantages

Advantages	References	Qty. (%)
Lifelong learning	[2] [6] [13] [15] [18] [20] [28] [31] [50] [55] [64] [80]	12 (5.15)
Accessibility	[2] [3] [11] [15] [22] [28] [39] [43] [44] [45] [49] [54] [57] [59] [62] [64]	16 (6.87)
Flexibility	[2] [8] [11] [13] [16] [18] [20] [24] [27] [29] [31] [36] [37] [38] [40] [42] [47] [49] [56] [57] [59] [63] [64] [65] [67] [78] [82]	27 (11.59)
Active learning	[2] [4] [12] [14] [22] [31] [45] [47] [48] [49] [51] [52] [53] [54] [59] [77] [79]	17 (7.30)
Individual learning	[1] [4] [11] [27] [53] [57] [77]	7 (3)
Self-regulated learning	[29] [53] [72]	3 (1.27)
Interaction	[1] [2] [3] [7] [8] [9] [11] [13] [14] [16] [18] [19] [20] [22] [24] [25] [26] [27] [28] [29] [31] [32] [35] [37] [38] [40] [42] [43] [45] [46] [47] [48] [50] [51] [52] [53] [55] [57] [60] [62] [63] [64] [65] [67] [68] [69] [72] [73] [77] [78] [79] [80] [81] [82]	54 (23.18)
Motivation	[2] [6] [9] [11] [12] [13] [18] [22] [23] [24] [29] [31] [32] [35] [36] [37] [41] [44] [45] [46] [47] [49] [52] [53] [55] [57] [62] [63] [64] [65] [71] [72] [73] [74] [77] [78] [80] [83]	38 (16.31)
Student performance	[1] [2] [3] [4] [5] [7] [11] [13] [14] [16] [17] [19] [21] [22] [23] [24] [26] [29] [30] [31] [32] [37] [39] [41] [42] [43] [45] [47] [48] [51] [52] [53] [56] [63] [67] [69] [73] [74] [75] [79] [82] [83]	42 (18.03)
Thinking skills	[39] [44] [48] [63] [76]	5 (2.15)

Lifelong learning is a major advantage, as online learning makes it possible for the students to study whenever and wherever they want, as part of their daily life, and eliminates the requirement to travel to a specific place for learning or to adhere to strict schedules [13]. This is why this modality is flexible in terms of time, space, language, content, and administrative processes [16], making it accessible from anywhere in the world [57]. In addition, the active learning techniques used help involve students in the learning process, improve their attention span, increase their motivation to learn, and consequently, enhance their learning outcomes [12]. Likewise, the individual learning outcomes, according to [1], are used to validate and verify whether appropriate materials are selected during the development of educational resources. In addition, according to the authors in [29], both face-to-face and online learning are necessary to enhance student performance, as currently, there are no interactive functions sufficiently capable to enhance the students' self-regulated learning process and optimize their skills. In this process, technological tools are integrated that provide the greatest interaction between teachers and students, where knowledge is conveyed and different viewpoints are discussed [57]. This implementation promotes greater motivation in learning, and consequently, greater learning achievement, as students in this environment exhibit high levels of performance in

their tasks [39]. In addition, the students' thinking skills are best developed when ICTs are integrated into traditional processes [44]. Therefore, the advantage most reflected in E-Learning is student performance, which was found in 42 (18.03%) articles.

B. *Software development methodologies for LMS*

The results of the literature study show that three methodologies are used for software development, as listed in Table 7.

Table 7: Development Methodologies

SD methodologies	References	Qty. (%)
PBL	[14] [24] [46] [70]	4 (33.33)
xPBL	[14] [24]	2 (16.67)
Scrum	[9] [10] [37] [42] [46] [53]	6 (50)

Note that very few articles were found that discuss the methodology for the development of E-Learning software. As shown in the previous table, SCRUM is used in 6 articles; PBL in 4 articles; and finally, and the least used, xPBL is found in 2 articles.

C. *E-Learning modalities*

Besides E-Learning, some other modalities have also emerged recently, which are presented in Table 8. However, there are three trends that have obviated E-Learning, which are defined below.

Table 8: Online Learning Modalities

Modalities	References	Qty. (%)
E-Learning	[1] [2] [3] [4] [5] [9] [11] [12] [13] [15] [16] [19] [20] [22] [23] [25] [26] [27] [28] [30] [31] [32] [35] [37] [38] [41] [45] [46] [47] [51] [52] [53] [55] [58] [59] [60] [61] [63] [64] [65] [66] [67] [68] [69] [72] [74] [76] [78] [79]	49 (68.06)
B-Learning	[3] [8] [16] [20] [31] [34] [38] [46] [48] [51] [55] [66] [68] [69] [71] [72] [73] [78] [82]	19 (26.39)
M-Learning	[5] [46] [55]	3 (4.17%)
S-Learning	[35]	1 (1.38)

In E-Learning, information technology plays the central role in the process, while the traditional way of using classrooms, notebooks, and books is eliminated, to provide a flexible mode of education [74]. The modality here is clearly virtual; hence, a physical presence is impossible. In contrast, B-learning, also called blended learning, refers to semi-online learning, a mixed approach that allows for the combination of electronic and traditional (face-to-face) learning strategies [46]. In blended learning, technological devices are used to support access to various academic resources [20]. In recent years, another form of learning, known as M-learning (mobile learning), has emerged, in which mobile electronic devices such as tablets and smartphones are used as learning platforms; such learning encourages effective communication and group work. Finally, and after the increasing use of social networks in traditional classrooms, S-Learning (social media learning) appears, which is a learning environment based on social

media platforms such as Facebook, YouTube, and Twitter [35]. Therefore, the modality that has maximum strength in online learning is E-Learning, with 49 (68.06%) mentions, and that with the least strength is S-Learning, with only 1 (1.38%) mention.

D. Technologies/tools for the deployment of E-Learning in teaching-learning

The number of results obtained for this question were very large. Thirteen tools (Table IX) and three technologies (Table 9) were found to be relevant in recent years.

Table 9: E-Learning Tools

Tools		References	Qty. (%)
LMS	Moodle	[6] [8] [11] [12] [13] [16] [19] [26] [29] [33] [34] [35] [36] [41] [47] [51] [55] [58] [59] [61] [64] [65] [67] [68] [69] [72] [75] [78] [80]	29 (18.13)
	Blackboard	[3] [5] [11] [16] [19] [29] [53] [54] [59] [74]	10 (6.25)
	Scorm	[11] [19] [45] [59] [61] [62] [74]	7 (4.38)
	Canvas	[11] [80]	2 (1.25)
	WebCT	[19] [29] [31] [67] [74]	5 (3.13)
Social Networks		[6] [8] [18] [20] [27] [31] [35] [36] [55] [56] [61] [63] [67] [69] [77] [78] [80] [81]	18 (11.25)
Google Drive		[12] [14] [20] [22] [50] [55] [59] [61] [68] [70] [73]	11 (6.87)
Forum		[4] [5] [7] [8] [12] [13] [15] [16] [17] [18] [19] [20] [22] [27] [33] [39] [43] [47] [51] [52] [55] [56] [57] [58] [61] [62] [63] [64] [68] [69] [72] [74] [75] [78] [79] [80]	36 (22.5)
Mahara		[36] [46] [47] [58]	4 (2.5)
Flax		[3] [5] [54] [80]	4 (2.5)
Skype		[22] [55] [58] [61] [64]	5 (3.12)
Podcasts		[27] [30] [51] [54] [56] [64] [78] [80]	8 (5)
Wiki		[8] [12] [16] [19] [27] [30] [31] [34] [40] [45] [50] [55] [56] [61] [62] [64] [67] [68] [74] [78] [81]	21 (13.12)

Table IX shows that the most used tools for E-Learning are the online discussion forums, with a score of 22.5%, as they allow you to discuss a specific topic virtually. These are followed by Wikis, with a score of 13.12%.

Learning management systems have a large share in the whole area of E-Learning, with Moodle being the most used, with a score of 18.13% in online education, followed by Blackboard with 6.25%.

Regarding the technologies used in the researched articles, semantic web seems to be at the top (53.33%), followed by cloud computing (40%), and finally, adaptive E-Learning through machine learning (6.67%), as shown in Table 10.

Table 10: E-Learning Technologies

Technologies	References	Qty. (%)
Adaptive E-Learning	[45]	1 (6.67)
Cloud Computing	[2] [31] [50] [61] [70] [81]	6 (40)
Semantic Web	[1] [28] [31] [37] [63] [74] [80] [81]	8 (53.33)

Discussion

The literature presents different articles that contribute to the area of virtual learning (E-Learning) in the teaching-learning process, where aspects, platforms (LMS), tools, and a range of characteristics of this modern process are shown. However, the best of our knowlegde, no study has been conducted in a systematic manner and that covers different aspects of E-Learning. The study results demonstrate how E-Learning has been implemented in the teaching-learning process over the last 5 years; information has been provided regarding the tools that are used in E-Learning, followed by the advantages and various aspects of online learning. In contrast, there is lesser focus on the software development methodologies used for developing educational software or LMS. The implication for the research community is that this area is large and generates multiple modalities of employing these methods, which requires further exploration. Replications are required to clarify the concepts and understand the detailed modalities in the context of E-Learning.

The results show that E-Learning is a revolutionary method for teaching-learning, comprising multiple validated tools as well as emerging modalities, and hence, the most suitable option should be chosen according to the specific needs of the institution and stakeholders. As shown by Delen and Liew [66], teaching and learning are complex processes influenced by more than just the teaching format. For this reason, the different factors that influence teaching and learning in different formats and contexts should be analyzed, which enables an easy extension of E-Learning to other fields.

Conclusion and Future Research

In this study, the SLR methodology was used to address different aspects of E-Learning at the academic level and LMS for teaching-learning. Most of the articles were obtained from free databases; a total of 476,871 articles were obtained, from which 83 relevant articles were filtered out by applying the criteria of exclusion and quality, and the requisite information was extracted from them. The research questions were formulated and answered using the articles from the years 2015–2020. The following results were obtained: 10 advantages of E-Learning were obtained when compared to the traditional way of learning, of which the following stand out: motivation, lifelong learning, flexibility in both time and space, and a greater interaction between teachers and students. The development methodologies used were PBL, xPBL, and SCRUM, with SCRUM being the most used. However, for this question, there was relatively lesser information found in the literature; in contrast, there was a greater concentration of studies regarding the tools and technologies used for the deployment of E-Learning. These studies showed 16 major tools and technologies used, with the primary ones being social networks, online forums, LMSs such as Moodle and Blackboard, semantic web, and adaptive E-Learning based on machine learning. The different modalities of online learning were also identified, namely E-Learning, B-Learning, M-Learning, and S-Learning, with E-Learning being identified as the most popular process. Finally, and most importantly, 10 main factors were identified for the effectiveness of E-Learning. For the LMS systems, these were adaptability, usability, security, and availability; for teachers, these factors were the training they must undergo in these virtual environments and the integrated tools, as well as the feedback they must provide to the students and the transparency that they need to maintain in the teaching process; for the students, these factors comprised having commitment in the virtual process and ensuring an active participation inside the virtual classroom.

This study was not exempt from its limitations, and it is propitious to mention these to aid in future research. This study covers the literature from the years 2015 to 2020; however, this time period is less advantageous when you want to view and understand the latest developments. On the other hand, this study began in early April 2020, when the COVID-19 pandemic changed the daily and traditional processes, thus promoting further studies in E-Learning. Hence, it is recommended to perform more studies that cover more recent years, to better understand the latest developments and the exponential use of E-Learning as a result of the social distancing norms of the pandemic.

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The Relevance of Intercultural Communication in The Context of Sustainable Development Challenges

Svitlana ANDREYEVA
Lviv Regional Institute for Public Administration of the National Academy for Public Administration, Office of the President of Ukraine, Lviv, Ukraine saclviv@gmail.com

Mieczysław DUDEK
Juraj Pales Levoc Institute of Catholic University in Ruzomberok, Levoca, Slovak Republic m.dud@interia.pl, ORCID: 0000-0002-4108-7128

Agata WOZNIAK-KRAKOWIAN
Jan Dlugosz University in Czestochowa, Czestochowa, Poland
agata.krakowian@op.pl, ORCID 0000-0002-4937-7381

Abstract

The article has researched the theoretical foundations and variants of practical employment of intercultural communication in the context of sustainable development which is seen as a global trend based on observing the human rights. Using the public administration method, the article has analyzed the notions of sustainable development and intercultural sustainability based on communication in their interconnection and interaction as the potential notions for the future research field. The analysis has been grounded on the assumptions that sustainable intercultural awareness is bound to be a pre-condition for a general and global sustainable development of societies. It has been argued that intercultural research is becoming increasingly responsible for actively examining and reflecting on this capacity. Intercultural communication is seen as an organic component of sustainable development. It has been proved that this thematic area should be included in the official discourse on the dimensions of sustainability. Based on literature review three different approaches and their interrelation between culture and sustainability have been analyzed. A possibility of building stable intercultural relations from the point of view of different actors has been argued. It is argued that nowadays, the mission of education, language and intercultural communication, especially in globalized multicultural context, is to develop socially cohesive societies, promote multi-faceted public discourse aimed at preventing conflicts and, thus, ensuring more sustainable future. The need for further research into sustainability issues and urgent actions at all levels including international organizations, governments, and local communities is substantiated.

Keywords: Sustainable Development, Cultural Sustainability, Intercultural Communication, Intercultural Education, Intercultural Competencies, Social Cohesion.

Introduction

There is a demand in the growing ethnically and culturally diverse society for intercultural education as a strategic resource for sustainable development, equality, stability and social cohesion. Intercultural education programs in this context should be designed and implemented with the objective of sustainability, supported by the governments to ensure consistency of intervention programs aimed at promoting the social inclusion of all ethnic and cultural minorities living in the country. The COVID-19 pandemic has contributed to an increase in discrimination, inequality and vulnerability of certain society strata, placing pressure on the intercultural understanding capabilities of communities at a period when unity and joint efforts are needed more than ever before. The leading world organizations and the whole international community are sending and discussing various messages which stress the need to resolve systemic injustices in order to promote a more productive and coherent response to the crisis and to recover from it.

Sustainable development is a major concern of several UN organizations which recognize the intricate link between well-being, social justice, cultural diversity and intercultural discourse, technical progress and the health of our planet. Our world is changing impetuously at a pace never seen before, so the aspirations of governments and civil society are increasingly challenged by emerging environmental, economic and socio-cultural issues, such as the

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global economic crisis, climate change and human migration. Cultural diversity, intercultural communication and discussion are taking on new meanings as the international community seeks a new global order. Such concepts and the tendencies underpinning them, which give a valuable context for understanding sustainable development and building the alternative future it seeks to achieve, have been in the focus of scientific interdisciplinary discourse in the past few decades.

Recognizing and fostering cultural diversity based on respect for human rights would enhance intercultural interaction, protect the rights of marginalized groups and prevent conflicts on smaller and larger scales; promote social cohesion, thus creating favorable conditions for achieving development goals. Culture, seen in this way, is conducive to a more sustainable development. Intercultural communication has been seen as a subject for academic research that has been covered extensively in the interdisciplinary discourse over the past decades disclosing the impact of culture on interactions between individuals. However, the aspects of interconnection and interdependence of intercultural communication and sustainable development require further elaboration since they have significant theoretical and practical potential for the humanity, which substantiates the relevance of this research.

Well-known theorists and practitioners in public administration, human rights and sustainable development analyzed the most important aspects of the problematics, in particular, D. J. Fiorino (2010), D. Z. Leuenberger (2005), J. H. Spangenberg (2000), L. Winner (1986), V. Zahorskyi (2018), S. A. Zhukov (2016). Intercultural communication issues and their interconnections with sustainable development have been studied by B.K Alexander, D. Busch, W. Gudykunst, J. Oetzel, W. Messner, B. Spitzberg, L. Samovar, B. William, R.Wiseman.

The purpose of the article is to provide rational for the necessity to enhance the role and relevance of the use of a great potential of intercultural communication in achieving the sustainable development goals by developing and implementing relevant educational programs promoting intercultural competencies, fostering public multi-dimensional discourse at all levels shifting discussions from theoretical to practical plane by introducing legislative initiatives based on full respect for human rights.

Sustainable Development Based on Respecting Human Rights as A Global Trend

Sustainable development can be considered as a way to organize society so that it can thrive over the long term which means taking into account both the present and future imperatives, such as environmental and natural resource protection, or social and economic justice. Sustainability of culture is related to sustainable development as it is linked to the protection of cultural beliefs, cultural practices, conservation of heritage, and seeks to answer the question of whether or not any specific cultures will survive in the future context. Culture facilitates environmental sustainability at different levels: via the inherent ties between cultural diversity and biodiversity, as a result of its impact on patterns of consumption, and due to its contribution to sustainable practices of managing the environment. Global cultural competence is an ability which is multidimensional, since globally competent individuals will explore local, regional and intercultural problems, consider and appreciate various contexts and viewpoints, communicate with others in a positive and respectful manner and take responsible actions for sustainability and collective welfare.

Sustainable development is regarded as a global program for the protection and advancement of modern civilization that encompasses a complex of global meanings and goals that must be taken into consideration in operational and strategic management, since the concept of preserving biodiversity is relevant not only to nature but also the society and the individual. Sustainability is development that meets the needs of the present without undermining future generations' potential, maintaining a balance between economic growth, environmental protection and social welfare. As a term sustainable development first emerged in 1987 when the Brundtland Report was published, warning of the detrimental environmental aftermath of economic growth and globalization, which sought to find potential solutions to the problems created by industrialization and population growth.

As part of a new roadmap for sustainable development, the United Nations has adopted the 2030 Agenda, which includes the Sustainable Development Goals (SDG), a call for action to protect the planet and ensure people's economic well-being. Such universal goals necessitate an active involvement of the public, business companies, administrations and states all over the globe. The SDGs, also known as the Global Goals, are a plea from the UN to all countries around the world to tackle the immense challenges facing the humanity and to guarantee that all people have equal opportunities to live a better life without sacrificing our planet. One of the goals aims to ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development by 2030.

We agree with Duxbury and Kangas (2017) who confirm that sustainability is “a complex set of visions for the future of humanity”. And in a similar way, Rödel (2013) adds that the semantic invention of the word "sustainability" is of global historic significance and weight. So sustainability should be seen as humanity's first true cosmopolitan term. Novak-Kalyayeva et al. (2018) notes that sustainable development allows maintaining structural integrity, functional value, interoperability, regrouping, updating and efficiency. We share the position of the authors who emphasize the role of the human rights, which along with the imperatives of sustainable development, create a basis for humanistic potential, which in its turn, causes changes in the paradigm of modern state administration in favor of increasing the level of democracy of power and self-organization of society through the implementation of democratic reforms in key areas of the functioning of society and governance. We agree with Novak-Kalyayeva et al. (2018) who note that an organic connection exists between the status of implementation of human rights and the possibility of implementing strategies for sustainable development: without entrenching in human consciousness of human rights as fundamental principles for an efficient functioning of the society (including administration), sustainable development is running the risks of becoming a loud slogan for an indefinite time, especially in countries of democratic transition. Hence, changing the paradigm of public administration based on ecological government, social justice and non-discrimination is an indispensable prerequisite for the implementation of sustainable development strategies.

From the advent of the new environmental movement in the 1960s, contradictions between ecological and economic priorities have been a core feature of environmental policy. At one side of the debate is the concern that cutting emissions and protecting wildlife and other resources impairs economic growth, productivity and development unnecessarily. Through this point of view, while some environmental safeguards are required, the general rule of public policy should be to favor development. On the other hand, there is a statement that human health and ecological limits require a carefully planned path to growth, including little or no growth, and an ecological preference over economic objectives when they clash. Environmental policy has consisted of a struggle to determine where the balance should be struck between these priorities. Economically developed and stable democratic countries in the European Union as well as the United States, Japan, etc., have been implementing sustainable development approaches and strategies which has been facilitated by the fact that they have appropriate socio-economic and institutional conditions.

However, developing countries and countries of democratic transition, like Ukraine, are in the process of identifying this need to find an environmentally sound path to growth. Zahorskyi and Andreyeva (2018) note that they should be offered a middle ground in the growth versus economy debate: poverty reduction and economic progress are a priority, but within a context which respects ecological boundaries and human rights over the long term, alongside more holistic policies.

Sustainability is one of the very few principles or values gaining universal recognition alongside with democracy and human rights. The notion of sustainability was brought to the forefront by climate change, the loss of natural resources and collapsing states. The word “sustainability” derives from the Latin “sustinere” meaning to “hold up”. It requires a holistic and coordinated approach to environmental protection, economic prosperity and social equality. Sustainability in a developmental sense refers to the apparent inconsistency between development, on the one hand, which results in nature intervention, and which depletes natural resources; and, on the other hand, sustainability, which is a mechanism or state that can be managed for an indefinite time. In this respect, it’s a government's function to balance this paradox and try to reconcile ecological and economic priorities, so as to cope with the ecological crisis without affecting established economic growth.

Since the 1970s, the possible tension between economic and ecological priorities has formed the core fault line of environmental policy in the USA and most other countries. The common opinion is that environmental conservation efforts would diminish economic development, employment and global competitiveness. Alternatively, environmental activism focuses on the need to control growth in order to prevent its more harmful consequences like ecological deterioration. In most countries, halting or reversing development is impractical, economically costly, politically challenging and is likely to hurt the very groups that need to be protected. At the same time, an unguided "development above all" policy will result in an environmental catastrophe. Due to the financial crisis and climate change, the principle of green growth - the argument that the right balance of policies, investments and technology can result in beneficial growth within ecological boundaries - has become essential to global policy and national debates. As Fiorino (2018) emphasizes, ecological priorities must be integrated into the framework of the economic and political structures to achieve green growth.

Therefore, the analysis of the positive experience of implementing sustainable development strategies is important, has considerable theoretical, scientific and practical potential, particularly for countries in democratic transition. This is particularly important in the context of the latest strategies of production and distribution in the world which have led to globalization and multiple global processes resulting in the emergence of the new model of development

and governance in the society. Amid spreading of COVID-19 epidemic and pandemic, public officials at all levels of government around the world are dealing with a massive emergency crisis that is new to most communities today. COVID-19 has created immense challenges for public health, economic, political and social structures and will have immediate implications for achieving many of the Sustainable Development Goals (SDGs).

New approaches to building the relationship of society and governance on sustainable development principles and structural stability of administration systems, as well as limiting the phenomenon under investigation to philosophical reflections focused on profound arguments in interdisciplinary debate, have become characteristic of modern theoretical concept studies and their implementation in practice. Organic relation between the principles of sustainable development and public administration were identified and argued by Leunenberger (2007). Criteria for institutional resilience of administrative institutions, developed by Leunenberger and Wakin (2007), can be used to describe a set of indexes to be taken into consideration while elaborating structural and functional workload for public administration staff and bodies, including governing ones, as well as regional and local policy.

Examining economic, biological and social systems in the context of sustainable social development, Leunenberger and Bartle (2007) noted that the goals of the economic system include efficiency, equity in the expansion and improvement of the social safety net; and the goals of the social system are citizens' participation and social justice. The scholar emphasized that the systematic approach to sustainable development allowed defining the concept of "the ecology of public administration", because it covers the idea of interdependence of human life, balance, organic system and its stabilization.

The goals of human rights and humanistic ideals of sustainable development are at the core of the paradigm of democratic governance and reflect the general principles of European identity.

Intercultural sustainability as an integral component in the sustainable development framework

Only recently has the discourse on political security begun recognizing the need to continually ensure future intercultural understanding. Accordingly, the UNESCO Educational, Cultural and Scientific Organization in 2009 pointed out that intercultural dialogue is a critical pillar for the promotion of global sustainable development. Accordingly, one of their aims is “to persuade decision makers and the various stakeholders of the importance of investing in cultural diversity as an essential dimension of intercultural dialogue, since it can renew our approaches to sustainable development, ensure the effective exercise of universally recognized human rights and freedoms, and strengthen social cohesion and democratic governance”.

Busch (2017) defines intercultural sustainability as a term that comprises any effort to design intercultural relations in ways that ensure a peaceful and a constructive coexistence of people across cultures. He points out that this notion builds a bridge between research on intercultural communication and intercultural relations on the one side and the global political discourse on sustainability on the other side. Recently, the ecologically, politically, and socially inclusive political discourse on sustainability has included the notion of cultural sustainability, referring to the supposition that strong cultural identities will contribute to social cohesion. Alternatively, intercultural sustainability refers to the idea that any other aspects of sustainability will be put at risk as long as a balanced management of people's beliefs about culture and cultural affiliations are not guaranteed.

The UN has recognized the general effect the culture has on sustainability goals: Ban Ki-moon, its Secretary-General, summed up in June 2013 that, when the UN adopted its Millennium Development Goals (MDGs) for the period 2000-2015, it had underestimated the central role of culture in achieving sustainable development goals. Rectifying the flaw, the General Assembly issued two resolutions on culture and development in 2010 and 2011. In 2013, another UN conference took place in Hangzhou on “Culture: A Key to Sustainable Development” where again, culture was understood as an add-on that may support sustainability goals in other fields. If the role of culture for general sustainable development is that decisive, a culture of sustainability therefore may be the most precise solution, say Parodi et al. (2017).

With regard to culture, intercultural communication and intercultural relationships, authors hold differing views on how these phenomena can best be managed to contribute to global peace, peaceful coexistence and overall sustainable development of the society. Intercultural sustainability as a term comprises encouraging enduring, long-lasting and viable forms of intercultural relations and intercultural communication. Since the discourse on global sustainability comprises numerous dimensions from different fields of social activity, sustainability of intercultural communication and intercultural relations here are seen as an essential dimension.

Focusing on how sustainability goals are to be met, the literature review reveals a systematic distinction between egocentric approaches that emphasizes the significance of one side of participants in intercultural communication, vs. allocentric approaches that equally considers all sides in a dialogical fashion. As opposed to the above-mentioned approaches, utilitarian understanding of cultural and intercultural sustainability sees intercultural awareness as a mechanism to promote the sustainability of other social domains.

Egocentric approaches are aiming to promote the sustainability of a single culture or organization and this is usually the society or organization, to which the writers themselves belong. Utilitarian approaches advocate for a balanced care for the culture and cultural ties in the interests of a target outside the thematic area of intercultural communication or intercultural relations. In most instances, intercultural sustainability is seen here as an instrument to promote the sustainability of a political success and economic growth of a business, a corporation, an institution or even a nation. Lastly, allocentric strategies perceive the sustainability of intercultural relations, healthy and harmonious coexistence as the most significant value to be promoted. A dialogical approach that includes all parties concerned in an equal and egalitarian manner in the intercultural interaction process is a key to this concept.

Since all cultures are viewed by allocentric notions of the sustainability paradigm as equal and equally valuable, all of them should be maintained here in order to ensure both a healthy cultural diversity and a sustainable, nonviolent intercultural co-existence. There are a number of references in the scientific literature to the value of peaceful intercultural living together for the sake of global sustainability. On the other hand, Humphrey (2013) expresses his concern saying that intercultural conflict may put sustainable development at risk. Jakubowicz (2011) determines multiculturalism as a cultural policy which attempts to reconcile egocentric and allocentric understandings of sustainability. Sustainable multicultural societies thus rely on cultural organizations and institutions that reinforce these particular cultural identities while at the same time facilitating interaction with neighboring groups. Similarly, Kubal (2013) recommends that the local law of a country should be designed in such a way that it is consistent with local migrant groups' understandings of law and justice to ensure a secure livelihood. Constructive and peaceful intercultural interactions throughout the world can be considered as a vital precondition for the sustainable development of any other social sphere. When a conflict on a global scale interferes in the peaceful development, serious regression is bound to take place in cultural, political, and ecological domains. Allocentric approaches to the sustainability paradigm recognize the need to involve all stakeholders in a mutual dialogue on what intercultural sustainability is and how to achieve it.

Busch (2017) identified a few pitfalls that emerged from reflections on intercultural sustainability and he sees one of the major concerns in the inevitable danger of essentialising of the notions of the term. The study of intercultural communication and intercultural relations has the chance to become much more transparent and productive when debating and reflecting in an open forum on its normative goals as well as its future orientations towards intercultural sustainability. Moreover, research on intercultural communication can contribute significantly and necessarily to the discourse on sustainable development and global sustainability. Australia and Canada are the countries which are particularly known for their early efforts to create sustainable local communities by introducing concepts such as multiculturalism as understanding of cultures based on boundary-making and mutual evaluations will impede the implementation of sustainable societies. Instead, a widespread promotion of non-exclusive and non-judgmental notions of culture is required.

Communities will have to deliberately devote themselves to sustainability goals, since sustainable intercultural relations will not materialize by themselves. Ambrosini and Boccagni (2015) point out that the local community level may be the most immediate entry point for ensuring intercultural sustainability. Besides these general concepts, the field of application where the ideas of sustainability play the most prominent role could be education. Many authors agree that the more deeply people internalize this goal in their worldviews, the better sustainable intercultural relations are guaranteed. Specifying this aim, Woods et al. (2011) recommend that university students should be taught to become global citizens. Similarly, Crosbie (2014) believes that sustainable democracy and peaceful social coexistence on a global level can only be achieved through global citizenship based on cosmopolitan attitudes. Concerning education as a process, Tran (2009) reminds us that learning processes are primarily based on individual and subjective constructions and re-constructions, and that concepts for sustainable intercultural relationships should be built on this. Foreign language teaching should be seen as a special domain in education that seems even more suitable for the goals of enhancing intercultural dialogue and thus, understanding.

Intercultural training is usually seen as an educational method used in companies and professional organizations in its traditional form, but its results do not automatically have to be limited to institutional benefits. Cushner (2005) notices that trainees will also benefit personally from intercultural training and will thus be better able to contribute to facilitating sustainable intercultural relations in general. Intercultural training can therefore influence the core components of the orientations of individuals and thus contribute to behaviors that support sustainable intercultural relations. It cannot be taken for granted, however, that any intercultural experience will necessarily have a lasting

effect. Therefore, intercultural training research has one central issue: how to elaborate intercultural training in such a way that it has long-lasting, sustainable effects.

Discussion: Intercultural Education for Sustainable Future

Culture is who we are, where we belong and what molds our personality and no one doubts the basic premise that without culture no progress can be sustainable. People seek to preserve cherished past cultural traditions and meanings while engaging in the creation of new meanings in a hyper-communication environment. That exercise is not easy, though. This suggests developing "intercultural competencies" to maneuver through our globalized and diverse societies in a positive way. The ultimate goal is to guarantee each emancipated person full participation in the new environment allowing them the ability to express future aspirations for all life forms.

Our world is steadily moving to the point of "no return", a whirlpool, from which it will be almost impossible to get out and the number of challenges the humanity is facing is constantly growing. Some of the major concerns nowadays are uncontrolled globalization, sweeping digitalization of the society with its encroachment on our privacy and less direct connection between people, growing human mobility resulting in a migration crisis, which, in its turn has led to the rise of populist and extreme right-wing movements in some countries. For example, according to the Federal Office for the Protection of the Constitution (BfV, Internal Counterintelligence of the Federal Republic of Germany), in 2019, there were 53 right-wing radicals "representing special danger" throughout Germany. At the end of 2016, there were only 22 people. With the availability of weapons of mass destruction becoming increasingly less expensive and easier to access, the age of terrorism is on the rise. Addressing the reasons why people want to become terrorists and achieving cooperation between potentially hostile cultures is crucial.

Intercultural education should be built around such values as equity, diversity, inclusion, democracy and human rights. It is defined by the pursuance of equality, shaping of citizens and appreciation for and positive attitude towards cultural diversity, as well as the creation of shared values through a mutual dialogue. Sales and García (1997) propose that active people participation and criticism is central to the creation of a democratic society based on equality, inclusion and solidarity. Intercultural education advocates the work in coexistence understanding universal values in difference and creating larger and richer cultures. In this vein, as Dudek et.al (2018) argue it is vital to build a more interactive society in which its culturally diverse citizens learn to live together and thus contribute to social improvement and development, particularly through the education of the young citizens. Some researchers point out that intercultural education should be directed towards a global educational programme, intercultural citizenship education that needs critical thinking, a participatory model built on common issues. Salgado-Orellana (2019) argues that intercultural education requires an inclusive educational engagement from educational institutions to the community, an education model that reacts to the need to live together and develop in an intercultural society and goes beyond the school and goes to the community in order to achieve the following goals: 1) awareness and training of citizens; 2) acceptance, recognition, and a search for common values; 3) construction of broad and shared cultures; 4) integration and social, educational and labour insertion; 5) democratic and participatory management of the centres; 6) social and educational centres involved in the community and vice versa; and 7) dialogue, meeting, coexistence, cooperation and the overcoming of conflicts.

Kalyayev et al. (2019) highlight that intercultural education is therefore a well-founded model for contributing to social and human sustainability; it assists in preserving and enhancing social cohesion, and ensures the fulfillment of cultural rights of each individual. In other words, in order to achieve sustainable development intercultural education leads to maintaining cultural diversity and intercultural miscegenation as the legacy of all humanity and seeks to overcome all forms of bigotry and racial or social inequalities bringing the equality between genders and races among the people who live in our communities. This kind of education is the key to building the society which is culturally diverse and whose future generations of residents are the children who today are learning to live and go to our schools. Furthermore, Byram's (2013) proposals on intercultural citizenship, which uphold the notion that intercultural learning is the knowledge as well as the understanding of the people with whom it interacts, that learning should include attitudes and values connected to critical cultural awareness and social justice and ultimately that learning is achieved in interaction with others, thereby emphasizing the importance of learning both in and out-of-school and community settings, respectively.

The role of language teaching and learning in this context should not be underestimated. We can only infuse divergent interests through language and cross-cultural contact. Only through reaching mutual understanding can we bind together, live together and work together in a world of divergent concepts of existence. Only then will we be able to aspire to sustainable development. Today, more than ever, the task of language and intercultural communication, especially in multicultural context, should aim at understanding that language and culture affect each group in several important ways, and account for different understanding of global issues. Beyond this development task, language and cross-cultural communication should strive to get people and communities to

understand that where principle strategies intertwine with community sustainable development goals, they support inclusive development projects with a more human and democratic resonance. This is what language and intercultural communication should target to achieve in developing countries in particular, while being mindful of adjusting the aims to the briskly changing conditions of the modern reality.

Several important areas that undermine intercultural understanding during the COVID19 pandemic caused crisis include xenophobia and ethno cultural racism to gender-based abuse. The online platforms and social media could be used as the main means of developing successful solutions by which governments, professionals and societies have managed to continue intercultural learning and exchange throughout the crisis.

Conclusion

Egocentric approaches generally hinge on ethnocentric cultural and intercultural theories as well as ideas in favor of a single entity, company, group or individual. Utilitarian applications of the concept of sustainability see culture and proficient ways to manage cultural diversity as a tool to promote the achievement of sustainability aims in other social domains, for example, cultural resilience can be considered as a critical contribution to economic and business success. We believe that all three approaches have equal significance and should be applied based on the context, historical background and traditions. Moreover, they are intertwined and potentially, utilitarian approaches can be derived from both egocentric and allocentric understandings of sustainability.

Sustainable positive intercultural relations do not have a value of their own if they don't result in harnessing social cohesion and, thus, creating an environment conducive to reaching sustainable development goals. To achieve this, sustainable development goals should be institutionalized, laws should be adopted and concrete programs implemented globally. Otherwise we are running the risk of not going beyond the discussion framework and moving from words to deeds in the situation when delay is tantamount to death. Despite continuous technical progress the world stays very fragile amid growing terrorism threats, migration crisis, digitalization of the society and hence, growing cyberterrorism, overproduction on one end and poverty with lack of basic resources on the other, ongoing globalization and polarization of the society, globalization versus nationalism and post-pandemic deglobalilization, environmental collapse spiraling out of control. Combatting the virus requires social distancing and hence, builds walls between people - nations take future measures by closing borders to enhance national security. National interests are in the focus, countries such as the U.S. are moving manufactures back, and protectionism and xenophobia are on the rise. With ongoing contradictory processes of globalization and nationalism, it is unclear what the world will look like after the pandemic.

The governments and world organizations might fail the exam on dealing with the modern challenges if they don't start acting at the legislative level and put SDGs into prompt and effective coordinated actions.

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Consommateur Postmoderne Et Objets Connectés : Ancrage Théorique Et Proposition D'un Modèle Conceptuel

Meriem AZZOUZI
doctorante en sciences de gestion, Marrakech, Maroc, meriem2azzouzi@gmail.com

Salma MOUTHAR
doctorante en sciences de gestion, Marrakech, Maroc, salma.mouthar@gmail.com

Fouad NAOUI
Professeur d'enseignement supérieur, Marrakech, Maroc, n.fouad@yahoo.fr

Introduction

Au cours de la dernière décennie, les innovations technologiques et Internet ont de plus en plus envahi le marché de consommation à l'échelle mondiale. Les investissements dans le domaine des objets connectés s'élèvent à environ 3 milliard de dollars en 2020 selon le cabinet de conseil Américain Gartner (Novembre 2015), dont le nombre des objets connectés estimés est de 50 à 100 milliards OC en 2020 (N'Goala, 2016).

Les OC aident les utilisateurs pour atteindre les objectifs souhaités, tels que la surveillance du sommeil (les matelas ou oreillers intelligents peuvent mesurer le sommeil), l'activité sportive (les vêtements peuvent mesurer les performances sportives) ou d'autres mesures de santé, ce qui modifie les comportements et modes de vie (Yang et al., 2013). Toutefois l'acceptation de l'utilisation des OC est limitée par plusieurs variables, notamment l'utilité perçue, la facilité d'utilisation, la confidentialité et la gestion des données personnelles, ainsi que la difficulté de prise de contrôle due à la dimension matérielle et immatérielle de l'IdO. D'où l'intérêt du présent travail scientifique de mettre en contraste le besoin du consommateur connecté à renouveler ses habitudes de consommations habituelles d'une manière techniquement plus développée et les variables qui conditionnent son acceptation de ce développement en proposant un modèle conceptuel mettant en relation les caractéristiques du consommateur postmoderne et son acceptation de l'utilisation des objets connectés.

Revue de littérature

Consommation Postmoderne

De par sa nature le consommateur postmoderne est connu par ses fameux paradoxes (Alain Decrop 2008) parmi lesquels nous nous intéressons à celui de « l'ancien et le nouveau » qui explique le besoin de l'individu à retrouver son passé (l'ancien) technologiquement revisité (le nouveau). Autrement il est en recherche permanente à satisfaire ses anciens besoins d'une façon plus sophistiquée et performante.

Internet des objets (IdO)

L'IdO est une nouvelle façon d'interagir avec les objets, les environnements et les personnes. En effet, l'IdO peut connecter tout et tous, de manière dépendante ou indépendante des paramètres initiaux préétablis par les utilisateurs, selon l'intelligence artificielle incluse dans les capteurs, et peut fournir un retour d'information et des fonctionnalités personnalisées par le biais des objets intelligents (qui représentent l'aspect physique de l'IdO comme les smartphones, les tablettes, et les robots de connexion) et des applications mobiles (de base, connectées et intelligentes) (figure1). L'IdO comprend donc des objets physiques capables d'émettre des données par l'intermédiaire de capteurs, des objets virtuels connectés (c'est-à-dire des algorithmes d'intelligence artificielle et des réseaux sans fil) et des plateformes capables de collecter et de stocker, puis d'analyser et de transmettre des données.

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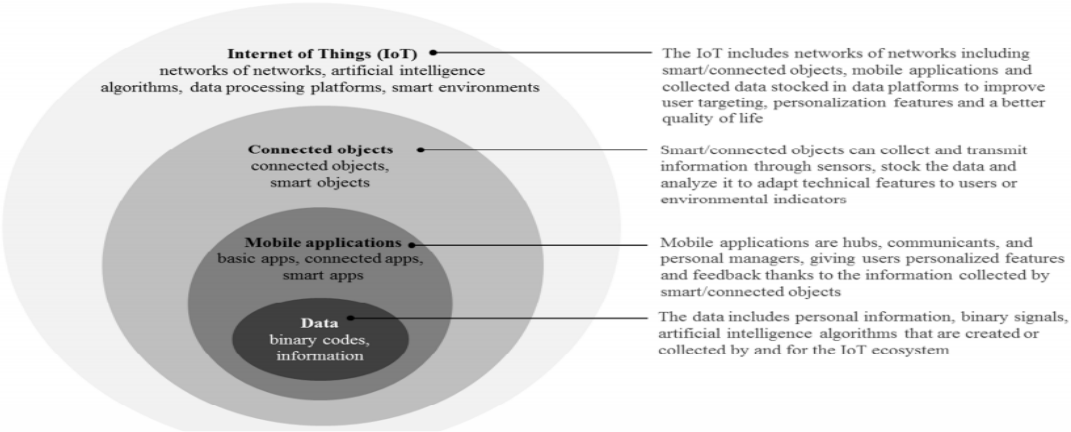

Figure 1 : Les composants de l'IdO

Source : (Attie, 2019)

Fondements Théoriques Et Proposition Du Modèle

Fondements Théoriques

L'IdO et les technologies intelligentes sont de plus en plus acceptées depuis quelques décennies, ce qui augmente les chances de profits pour les entreprises (Pister, 2011). Dans la littérature, on sait peu de choses sur l'acceptation et l'utilisation de l'IdO et des technologies intelligentes et sur leurs conséquences sur les perceptions et les comportements des consommateurs (Foroudi et al., 2018 ; Oh et al., 2007 ; Verhoef et al., 2017). Les technologies sont associées à la fois à des avantages et à des risques qui, à leur tour, deviennent des raisons d'adoption ou de rejet ; c'est pourquoi l'identification des meilleures conditions d'acceptation par les consommateurs est une question de recherche hautement prioritaire (Verhoef et al., 2017). La littérature contient différentes théories et modèles sur l'acceptation des technologies, tel que le modèle de l'acceptation de la technologie (TAM).

Les théories de l'action raisonnée (TRA) et du comportement planifié (TPB) ont conduit au développement de la TAM, qui prévoit que l'acceptation de la technologie par les utilisateurs est déterminée par trois facteurs : l'utilité, la facilité d'utilisation et les objectifs comportementaux (Teo, 2011). La TAM est l'une des théories les plus largement utilisées qui a été testée et critiquée dans le cadre de diverses recherches (Wu & Ke, 2016). Les études antérieures sur l'acquisition de la technologie et la diffusion de l'innovation se sont concentrées sur l'acceptation et l'utilité de l'Internet (Mortenson & Vidgen, 2016). Davis et al. (1992) ont introduit cette théorie pour prévoir l'acquisition et l'application des technologies de l'information. Cette théorie est aujourd'hui appliquée au développement d'applications sur différents systèmes d'exploitation. Le TAM est un modèle économique utilisé pour prédire l'acceptation des utilisateurs de ces technologies. Étant donné que l'environnement actuel du commerce électronique est géré par la technologie, les chercheurs utilisent ce modèle pour prédire l'acceptation et l'application des canaux en ligne (Ashraf, 2014 ; Pavlou, 2003).

Les variables de TAM, à savoir l'utilité perçue (PU) et la facilité d'utilisation perçue (PEU) semblent être des antécédents importants de l'adoption de l'IdO. Dans la littérature, ce sont les variables les plus utilisées pour expliquer l'adoption de la technologie (Hauser & Simmie, 1981) et de forts déterminants de l'utilisation de la technologie (Calantone et al., 2006 ; Davis, 1989 ; Taylor & Todd, 1995). Par conséquent, l'étude de la TAM (Davis, 1989) semble être l'approche de bon sens pour étudier l'adoption de l'IdO et des technologies intelligentes, car elle reste l'une des théories les plus influentes du comportement humain (King & He, 2006 ; Venkatesh et al., 2003). Les méta-analyses sur la TAM montrent un modèle robuste, significatif et puissant avec de fortes propriétés psychométriques qui peut être utilisé dans différents contextes technologiques (King & He, 2006 ; Lederer et al., 2000 ; Legris et al., 2003). Toutefois, le PU et le PEU sont critiqués pour leur faible pouvoir prédictif et leurs limites concernant les théories du comportement des consommateurs en matière de marketing (Bagozzi, 2007 ; Chuttur, 2009 ; Franz & Robey, 1986 ; Hu et al., 1999 ; Pikkarainen et al., 2004 ; Wu & Wang, 2005). Il semble également que le PU et le PEU soient plus importants pour les non-utilisateurs et les nouveaux utilisateurs. La littérature montre que l'influence du PU et du PEU diminue au fil du temps, mais que ces deux éléments sont des raisons d'accepter les technologies intelligentes (Venkatesh et al., 2003). Cependant, d'autres antécédents cognitifs et sociaux importants de l'adoption et de l'utilisation des nouvelles technologies devraient également être étudiés (Benbasat & Barki, 2007 ; Chuttur, 2009), tels que les avantages hédoniques (Chitturi et al., 2008 ; Sirgy, 2012) et l'influence sociale (Bagozzi, 2007 ; Venkatesh & Davis, 2000).

1. Hypothèses et Modèle conceptuel

H1 : La dualité (Ancien/Nouveau) impacte positivement l'intention de l'utilisation des objets connectés.

H2 : La relation entre la dualité (Ancien/Nouveau) et l'intention d'utilisation des IDO est médiatisée par l'utilité perçue.

H3 : la relation entre la dualité (Ancien/Nouveau) et l'intention d'utilisation des IDO est médiatisée par la facilité d'usage.

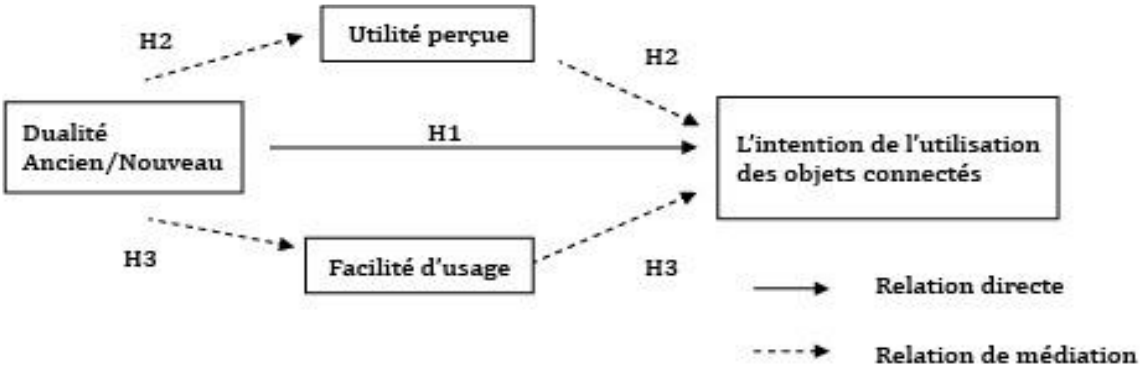

Figure 2 : Modèle conceptuel

Source : Les auteurs

Méthodologie De La Recherche

Pour juger la pertinence de notre modèle théorique empiriquement, il nous a semblé essentiel d'aborder notre recherche selon plusieurs méthodes complémentaires afin de la cerner au mieux. Il faut tout d'abord procéder à une étude qualitative exploratoire, qui nous permettra de choisir les variables à inclure, celles qu'il faut éliminer dans notre modèle. Après cette phase qualitative, une phase quantitative sera entamée pour tester les hypothèses formulées sur une large population. L'association des méthodes aussi bien quantitatives que qualitatives doit permettre d'acquérir une vision globale du phénomène étudié.

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Improving the Efficiency of Providing Public Transport Services in The EU and Ukraine

Milena KRAVCHENKO

National Academy for Public Administration under the President of Ukraine, Kyiv, Ukraine, Professor (Social and Humanitarian Policy Department)
https://orcid.org/0000-0003-4559-3033
Scopus Author ID: 57207849305
e-mail: milenaua@ukr.net

Tetiana TKACH

National Academy of Public Administration under the President of Ukraine, Kyiv, Ukraine
e-mail: milenaua2015@gmail.com

Aleksandra SIEDLACZEK-SZWED

Jan Dlugosz University in Czestochowa, Czestochowa, Poland, Professor (Department of Pedagogy, Faculty of Social Sciences) https://orcid.org/ 0000-0002-1934-3535
Scopus Author ID: 57211297660
e-mail: a.siedlaczek-szwed@ujd.edu.pl

Abstract

Analysis of the current state of socially significant services in the Ukrainian transportation area allows us to conclude that modern approaches to the formation and implementation of public policy in the social services area in the transport sector can not be called systematic, effective, and efficient given the lack of mechanisms for effective interaction of the system of providing socially significant services in the transport area, minimizing conflicts of interest of legal entities regarding the provision of such services, clear delineation of powers between public authorities and local governments, including in terms of territorial reform, stimulating the development of socially significant transport market services in the context of decentralization of power in Ukraine.

Ensuring the balance of social interests of every citizen and society as a whole, accompanied by the economic aspect of the realization of guaranteed rights and coordinated structural changes based on the achievements of the European community, will enable Ukraine to integrate its transport system into a single European space, to create foundations for the functioning of a real civil society, to ensure stable economic development of the country and to improve the provision of public transport services.

The generalization of the experience of providing socially significant transport services in the EU Member States made it possible to determine that the paradigmatic basis for reforming the system of such services in the EU countries in the growing trend of decentralization of public administration was the recognition of the importance of effective social and transport management. This development should be based on changing the vector of public policy formation, updating its institutional framework, changing the role and functions of institutions at the level of central and local authorities and local governments; development of mechanisms of market pricing for transport services and formation of new schemes of their financing and targeted payment; introduction of pilot projects of testing and evaluation of the most acceptable models for socially significant services in the transportation area; improving the regulatory framework; strengthening the responsibility of their providers; introduction of minimum quality standards for the provision of such services, the introduction of an independent system of control and guarantees of the quality of services provided.

Keywords: Conditions for Successful Deinstitutionalization.

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Introduction

Ukraine, declaring the emergence and development of a socially-oriented state, a free and competitive market, including a market of transport services, having significant social obligations and taking into account the social resonance on the use of reduced fare rights, faced both the need to break the legal vacuum to provide a guaranteed quantity of socially significant transport services and the need to ensure their proper quality.

The state of affairs in the transport sector regarding the provision of socially significant services in the transportation area (or public transport services) is widely publicized. According to the official website of the Ministry of Infrastructure of Ukraine quite a lot of questions from users of transport services, as well as from carriers, public authorities, and local governments, concern the legislative regulation of the provision of social transport services and compensation for the state's obligations to provide such services at reduced rates, and also international commitments; taking control measures regarding the refusal to provide public transport services at reduced rates; refusal to cross-subsidize unprofitable passenger transportation by rail at the expense of transportation of goods by rail, etc.

The development of an inefficient state policy on the provision of public transport services causes a shortage of rolling stock, contains corruption risks, creates additional barriers to starting and running a business, and as a result — the outflow of investment capital and rising prices (transport sector in 2018 created 7.5% of value added, but only due to import-export operations and growth in consumption of transport services by households, rather than through integration processes, job creation, and investment capital infusion).

Ukrainian legislation guarantees the provision of social services free of charge to those in difficult life circumstances, and on a paid basis — to all citizens who need them, which does not deny the importance of access to public services and reflects only the form of interaction between recipient and service provider. At the same time, the modern situation indicates the need for service orientation in the formation of such a policy, based on changing vectors from paternalism (consumer-administrative model) to solidarity.

Analysis of the current state of socially significant services in the Ukrainian transportation area allows us to conclude that modern approaches to the formation and implementation of public policy in the social services area in the transport sector can not be called systematic, effective, and efficient given the lack of mechanisms for effective interaction of the system of providing socially significant services in the transport area, minimizing conflicts of interest of legal entities regarding the provision of such services, clear delineation of powers between public authorities and local governments, including in terms of territorial reform, stimulating the development of socially significant transport market services in the context of decentralization of power in Ukraine.

Ensuring the balance of social interests of every citizen and society as a whole, accompanied by the economic aspect of the realization of guaranteed rights and coordinated structural changes based on the achievements of the European community, will enable Ukraine to integrate its transport system into a single European space, to create foundations for the functioning of a real civil society, to ensure stable economic development of the country and to improve the provision of public transport services.

Literature Review

The provision of social transport services in the EU Member States and increasing their efficiency in Ukraine is actively negotiated in academia. Ukrainian scientists are discussing the interpretation of the essence of the concept of social services, their connection with public (administrative) services, public services. Such authors include: J. Belevtsova (2009); K. Gafarova (2011); V. Honcharov (2012); Yu. Horemykin (2012); K. Dubich (2013); M. Kravchenko, T. Tkach (2019); A. Novikova, T. Yashchenko, O. Novikova (2012); L. Novak-Kalyayeva, A. Kuczabski, N. Yasnyska, S. Andreyeva, I. Shapovalova (2018); O. Savchuk, V. Kushnirenko (2015); A. Siedlaczek-Szwed (2018); O. Tishchenko (2015); N. Chudyk-Bilousova (2016). In the EU, the terms "public services" and "services of general interest" are used. Given the existing approaches, we believe that it is more correct to use the concept of socially significant services in the transport sector. Ineffective state policy on the provision of social transport services in Ukraine determines the study of new approaches.

The main goal of this article is to analyze the provision of social transport services in the EU and Ukraine in order to integrate the transport system of Ukraine into a single European Area, create a foundation for real civil society, ensure stable economic development and increase the efficiency of social transport services.

Presentation of the Core Material

EU 2011 White Paper on Transport identifies transport as one of the economic and social components of the development of the single European Transport Area, recognizing that it forms 5% of EU GDP and must ensure the mobility of the population, completely denying its absence and impossibility of implementation in any of its manifestations. Such development of population mobility must be accompanied by the development of electronic service technologies and help reduce the negative impact of transport activities on the environment. Meanwhile, the European Commission identified the development of urban, suburban, and intercity transportation, its safety and quality, as the main priorities for the future.

An important aspect of European transport policy in recent years has been the reorientation from the road to rail, as the latter can better meet the criterion of mobility. Road transport becomes subsidiary, which is used exclusively for transporting passengers to railway junctions. It should be noted that in EU countries, the metro is classified as public rail transport.

It should be noted that the system of differentiation of means of transport in Ukraine is somewhat different from the means of transport in the EU since the basis of the national system of differentiation is comprised of:

type of ownership: state, communal or private, in relation to ground transportation that does not go beyond the settlement;

type of technological transportation, if it is a question of transport outside the settlement (except for the city rail in the city of Kyiv).

In contrast, the EU transport is classified depending on the technological features of its operation: rail (railway, tram, and metro), road (buses, electric transport), water (sea, river), and aviation. This classification simplifies the system of public administration and is more understandable to public authorities, service providers, and consumers.

It should be noted that the reform of the transport services sector in the EU, as well as in Ukraine, was accompanied by a number of other reforms, including decentralization reform. In turn, the process of consolidation of territorial communities was also accompanied by processes of reforming methods and means of state support, as well as the reorientation of public policy in general.

The EU transport policy is based on the principles of the unity of the transport services market, freedom of business, fair competition, transparency, safety, and environmental protection. The EU Member States have gone through a rather difficult stage in reforming the transport sector of the economy, identifying four main reform packages and overcoming the path of more than 20 years.

Today, EU Member States have a proper and transparent policy on the organization of the provision of public passenger services (services of general economic interest), as well as the obligation to compensate for the loss of revenue from the provision of such services and/or granting exclusive rights to market operators in the event of tariff regulation and reduced transport services provided to certain categories of citizens. At the same time, transparent competitive principles (tenders for public procurement of such services), the conclusion of contracts (concession agreements) for the provision of transport services are provided, and the interests of all participants in the transport services market are taken into account.

European experience in organizing and providing public transport services requires both detailed study and implementation in the Ukrainian legislative area.

Policy in the socially important transport services area began with the development of the EU acquis - White and Green EU books, Council Regulations (EC) No 1191/69 and (EEC) No 1107/70 of 26 June 1969 on action concerning the obligations inherent in the concept of public service in transport by rail, road and inland waterway. This Regulation was subsequently amended and Regulation No 1370 / 2007of the European Parliament and of the Council of 23 October 2007 on public passenger transport services by rail and by road and repealing Council Regulations (EEC) Nos 1191/69 and 1107/70 (hereinafter - Regulation 1370).

Based on the need to implement the concept of building a “service” state, EU countries adhere to the principle of building-integrated transport systems to ensure proper quality of transport services to the population of a given area, as well as maintaining the competitiveness of public transport in relation to individual transport. The ultimate criteria for the appeal of an integrated system are time, price, comfort, reliability, and safety.

It is for this purpose that the EU has developed and implemented Regulation 1370, which entered into force on December 3, 2009, and aims to create an internal market for public transport services.

It should be noted that this aim is performed by supplementing the general rules of public procurement. This Regulation also lays down the conditions under which contracts provide for compensation payments and concessions for passenger transport are considered compatible with the internal market and exempt from the prior notification to the European Commission about the state aid if the cost of vehicles purchased for public transport services does not exceed 200 thousand euros.

Thus, the basic conditions of contracts for the provision of public transport services by Regulation 1370 include:

defining the geographical area of services provided;

the parameters of public transport services based on which the compensation should be calculated, and the nature and extent of all exclusive rights granted, in order to avoid any overpayment of compensation;

means of distribution of funds related to the provision of services (personnel costs, energy, infrastructure, maintenance, etc.);

means of distribution of income from the received financial result, from ticket sales, if such public transport service is not provided on a free basis, between the carrier and the customer of such service;

the duration of the contract for the provision of public transport services is limited and should not exceed ten years for bus services and fifteen years for passenger transport by rail or other means of rail transport.

Therefore, the conclusion of an agreement on the provision of public transport services is based on the need to provide competitive tendering mechanisms for the conclusion of such agreements, which should be open to all opeartors on a fair, transparent, and non-discriminatory basis.

Regulation 1370 also provides that municipalities may provide such services either independently or assign them to an operator under their management, just as they manage their own services (the so-called “direct agreement”).

If a national, regional, or local authority, and operators enjoying exclusive rights, do not have the ability or willingness to provide public transport services independently, they must enter into such an agreement in accordance with competitive procedures as defined by Regulation 1370 and related acts, in particular Directive 2014/25 / EU for tram and bus transport, if the amounts announced before the tender procedures exceed EUR 1,000 for service contracts in the case of public or other special services.

At the same time, the EU Member States may, if they wish, organize public procurement for contracts for the provision of public transport services at a lower cost than the above-mentioned maximums set by the European Commission every 2 years to determine the need to amend them in line with the international obligations of the EU.

Contracts for public services provided by rail are also concluded in accordance with the rules laid down in Regulation 1370. Concerning the metro and tram transport, such transport is excluded from the scope of the Regulation, but the EU Member States may apply it if they deem it appropriate.

Significant attention in Regulation 1370 is paid to the quality of public transport services, and therefore the EU subsequently standardized transport services as a whole DIN EN 15140 Public passenger transport — Basic requirements and recommendations for systems that measure delivered service quality and public transport services DIN EN 13816 Public passenger transport — Service quality definition, targeting and measurement in particular.

Thus, DIN EN 13816 stipulates that operators providing public transport services must meet all the criteria specified in the contract with the municipalities, in particular, the quality of such services. The standard visualizes the quality of this type of transport services by both the consumer and the service provider, and states that the main criterion for their interaction within certain limits is measurability both in terms of reimbursement of public transport services and the quality of such services.

The EU policy on the provision of public transport services as we can see is quite strict on the one hand and quite flexible on the other hand. It is built on the principle of compromise of common and national interests. By building a general framework for the formulation of public policy on the provision of public transport services (for example by establishing uniform criteria for the quality of social transport services), the EU institutions responsible for adopting a document or policy leave the EU Member States the choice of outcome based on the need to ensure a sufficient level of mobility and competition in the common market.

It is also important to emphasize that the period of implementation of Regulation 1370 was 10 years from the date of its entry into force, which, according to scholars, is commensurate with the period of reorientation of any policy.

The EU member states have come a long way in implementing these social policy instruments. It was the most difficult for the countries of the former socialist bloc, the management of which was based on the administrative-command method. Poland, Lithuania, Latvia, and Estonia have quite successfully overcome the "social specter of the era of advanced socialism."

It is worth noting that the above-mentioned EU member states have introduced the principles of exercising the rights to a transport concession. Thus, the provision of transport concession in Poland is based on such principles as:

reimbursement for the provision of socially significant transport services from the state and local budgets is through the Ministry of Infrastructure and Development of Poland;

introduction of accurate accounting when issuing a ticket upon presentation of a document certifying the right to concession;

determining the range of persons entitled to concession at the national and regional levels (persons with disabilities, pensioners, children, military, teachers, students);

determining the maximum level of income of one family per month, at which it is possible to receive public transport service at the level of income determined by the state;

dependence on the amount of allowance on central and local authorities. Territorial communities have the right to establish an additional amount to the state-guaranteed concession at the expense of their own budgets;

decentralization of powers at the city level (discounts on city buses depend on the mayor's office);

granting concession twice a year when traveling by rail.

In Estonia, since 2018, residents of counties have been exempted from paying a fare on county bus lines.

Lithuania reimburses the provided public transport services to the operator through the Ministry of Communications of the Republic of Lithuania in full for the intended purpose from the state budget. Accounting for the provision of transport services to the citizens who receive concession is carried out during the issuance of a ticket upon presenting a document certifying the right to receive public transport services. Accounting forms for groups of categories of the population entitled to receive public transport services and routes are drawn up monthly. In total, public transport services are provided to 15 categories: people with disabilities, war veterans and their families, pensioners, children, and others. Lithuania has completely abolished professional transport concession at the state level but has retained the right to establish such concession at the local level and exclusively at the expense of the local budget. Free transport for social categories is replaced by travel with a discount — 80% and 50% depending on the category of the recipient. Transport concession in urban transport is financed exclusively by local authorities based on accounting for public transport services provided. At the same time, the state budget finances exclusively the provision of public transport services on the intercity route.

The situation is similar in Germany, where the level of discount (concession) on public transport services is 50% of the difference between the income received by the operator from public transportation of socially vulnerable groups and its costs, calculated depending on the number of person-kilometers when providing such services. In this case, the average cost of public transport services is the rate of cost per person-kilometer, which is set by land governments or bodies authorized by statutory regulations, in accordance with the average of operators that work economically and efficiently; in addition, different cost rates for rail and non-rail transport, as well as for different regions of such services can be determined according to the operational and transport characteristics of the land. The compensation payment due to the application of the discount must be reduced by 12% each subsequent year following 2006. However, the German Federal Law on Public Services stipulates that public transport services, which are provided outside Germany are also reimbursable and such reimbursement should be made only for part of the services provided in the country of transport of German residents.

Therefore, summarizing the European experience of providing public transport services, it is worth emphasizing the following:

in the EU member states, there is no notion of travel concession or provision of transport services with reduced costs, it has been replaced by a broader and more capacious concept — socially important transport services (public services of general economic interest);

concessions in the EU do not mean a complete exemption from payment for transport services provided, but the provision of an economically justified level of discount on such services;

the state establishes general conditions for the provision of public transport services, local communities set additional discounts, additional categories of persons entitled to receive discounts, the right of local communities to set discounts for using public transport;

the state has delegated the obligation to account for public transport services to territorial communities, as well as granted the right to provide additional rights to travel concessions, subject to reimbursement of such concessions from the local budget;

territorial communities are not limited in the ways and methods of collecting information on the quantity and quality of public transport services provided within the framework of agreements on the provision of public transport services concluded with operators for a specified period;

territorial communities within the framework of agreements on interterritorial cooperation have the right to grant the right of travel concessions on routes outside the territorial community, regulating the issue of financial compensation to the operator of such services (usually in such cases the obligation to account for the categories of passengers entitled to travel concession is on the operator while territorial communities provide only control over such accounting).

Thus, implementing Regulation 1370 the EU member states achieve a balance of interests of transportation services consumers who are entitled to trevel concessions, territorial communities, and the state as a whole while avoiding social conflict.

In Ukraine, the mission of reforming public policy in the public transport services area can be defined as the process of forming an effective and efficient mechanism for the functioning of transport policy as a social component of public policy in the dynamic development of Ukrainian society.

Taking into account the experience of the EU member states in the formation and implementation of public policy in the public transport services area, we should note the goals of public policy reform in Ukraine in this area:

comprehensive, holistic, balanced, and high-quality development of the transport services sector to provide vulnerable social groups with public transport services of appropriate quality and quantity;

improving the standard of living of the population by creating appropriate transport conditions;

developing the self-support of regions in all its aspects (legal, economic, social) during the realization of public transport policy;

forming stable public-private relations during the provision of public transport services;

creating conditions for the dynamic, economic and competitive development of the transport sector of the economy;

ensuring an adequate level of protection of the rights of customers, providers and consumers of such services.

We agree with Ukrainian researchers that the strategic directions for improving the mechanism of providing public transport services are:

development and approval of socially and economically justified calculation norms of transport mobility by types of transportation (urban, suburban, etc.) per person;

optimization of the enumeration of categories of recipients of travel concessions and the enumeration of conditions for obtaining the latter (adequate increase in the level of income of working persons who obtain travel concessions and the use of indirect methods of assessing the property status of applicants for the travel concessions);

study of the conditions for determining the number of budget expenditures for the provision of concession in monetary terms;

development and introduction of a mechanism and procedure for granting travel concessions agreed for all types of public passenger transport (road transport, electric transport, metro, railway transport), including in monetary terms (if necessary).

The micro-goals of the strategic directions of reforming public policy in the public transport services area include:

formation of a methodology for determining the technical condition of vehicles involved in the provision of public transport services (maximum age, condition, serviceability, etc.);

introduction of a transition period and introduction of incentive measures for decommissioning of obsolete rolling stock;

formation of the methodology of passenger costs and calculation of the amount of concessions (discounts) (bus, railway, tram, metro) on the basis of advanced accounting techniques;

settling the type of scheme of the agreement between the competent authorities and the operators on the provision of public transport services (gross expenditure contract, net contract and, probably, concessions) and the assessment of the cost of compensation;

preparation of model agreements for the provision of public transport services for road and/or rail transport, including monitoring and control by the competent authorities during the term of the agreement;

development of methods for assessing and monitoring the achievement of public policy objectives in the public transport services area;

changes in the regulatory framework for the formation and implementation of public policy in the in the public transport services area.

The fundamental postulate of reforming the modern model of providing socially significant services in the transport area in the context of decentralization of public administration in Ukraine should be the transfer of part of budget funding to provide such services, based on community needs, including interterritorial interactions of such communities.

The formation and development of a modern system of socially significant services in the transportation area, taking into account the needs of the local community will expand the range of target social groups, based on the community's capacity, and simultaneously improve the targeting and quality of services; ensure maximum availability, efficient allocation and use of human, financial, material resources through better response to the needs of citizens; strengthen the relationship between budget funds and the level of quality of services provided in the community at the expense of these funds; strengthen the social responsibility of the community.

It should be noted that, in our opinion, short-term and medium-term prospects for changing (reforming) a certain policy are not the options that will give a lasting managerial and economic effect. At the same time, in order to fully update one or another direction of public policy, it is necessary to focus on a period of 10 to 15 years, taking into account the aspect of its coherence with other areas, which will require procedural adjustment in one way or another.

Harmonization of Ukrainian law with the EU acquis is not only a tool for deepening economic cooperation with the EU but also an important means of accelerating the further development of Ukraine as a whole. To this end, the state authorities of Ukraine have approved the relevant plans for the preparation of legal acts.

It is important to amend the laws of Ukraine “On Road Transport”, “On railway transport”, “On urban electric transport”, “On local state administrations”, “On local self-government in Ukraine”, “On the basics of social protection of persons with disabilities” and other regulations, in particular, to bring the legislation on public transport in line with Regulation 1370.

Certain steps have already been taken to amend the above-mentioned legal acts. Thus, several draft laws have been registered in the Verkhovna Rada of Ukraine, which, in our opinion, are extremely unsuccessful and not aimed at resolving the issue of changing institutional approaches to the provision of public transport services, but are purely populist, as they involve increasing the discount rate, expanding the categories of citizens entitled to such social services; expansion of modes of transport where such services can be provided. Also, we consider it necessary to develop laws of Ukraine “On the administrative-territorial structure of Ukraine” and “On socially significant transport services in Ukraine or transport services of general economic interest”, which would allow taking the provision of public transport services to a functionally new level in the decentralization of power.

An important step in improving the level of public transport services is the introduction of standards for the provision of public transport services as a specific mechanism for quality control of such services according to legally defined criteria in terms of providing state support. This can be achieved both through the relevant EU standards and through the introduction of ISO 9000 and 14000 certification systems in the transport sector, without waiting for the implementation of Regulation 1370. Concomitantly, it is also necessary to ensure amendments to the basic legislative acts: Civil and the Economic Codes of Ukraine to eliminate the dual approach to imposing sanctions for non-performance of contractual obligations under state/municipal contracts and private contracts.

The experience of post-socialist countries shows that moving away from the consumer-administrative model of providing public transport services requires reforming all its components. In particular, addressing the following issues:

determination of a single body of power responsible for the formation of a policy of proper transport services, taking into account the social component and the needs of territorial communities;

clear delineation at the legislative level of the competence of central and local authorities regarding the commissioning the public transport services, based on their needs, and for territorial communities and administrative units — taking into account the issues of spatial planning and their contractual interaction;

formation of a route network:

based on the objectives of interoperability and inclusiveness of transport services;

whereas rail transport is the most widely used in the provision of public transport services and road transport should be used exclusively as an alternative to transporting passengers to rail junctions or in the absence of any service at all;

based on the real needs of municipalities and administrative units;

taking into account the need to visit educational and medical institutions, workplaces, state and municipal authorities during their work;

introduction of a contractual provision of public transport services, based on the principles inherent in public (tender) procurement, based on the actual need for such services for the municipal or central government. Such contractual regulation should be applied not only in the system "customer – provider", but also at the level of "customer of higher-level services - customer of lower-level services" in cases where the length of the route exceeds the statutory percentage. It should also be provided that municipalities and administrative units that have public operators may grant them exclusive rights to provide public transport services, but such rights are "delegated" under a contract the essential terms of which are the same for all operators;

legislative consolidation of the essential terms of the contract for the provision of public transport services, including the term of the contract, which may not be less than 10 years, and the conditions for its extension; rules of organization and provision of services within the relevant route; conditions and rules of compensation (reimbursement) of operators' expenses for quality public transport services provided following the calculated quantity; rules for monitoring compliance with the terms of the contract; determination of commensurate civil liability for compliance with the terms of the contract;

legislative regulation of providing public transport services on the terms of a concession;

introduction of the procedure of standardization of transport services and its obligatory nature as an element of observance of the licensing legislation;

determination of mechanisms and amounts of state aid to operators, if the costs associated with the provision of public transport services, such as the renewal of rolling stock, exceed EUR 200,000;

addressing the issue of eliminating obstacles to the development of competition in the provision of public transport services, for example by introducing a percentage quota of the total length of routes in the respective territorial community;

elimination of strict tariff regulation and the transition to free pricing, which is formed under the influence of free economic processes based on a fair and transparent economic basis within the contractual regulation;

determining the method of calculating compensation for services provided;

conducting the budget decentralization depending on the accounted number of services, the territory of provided services, and the terms of the contract between customers of different levels;

reduction of the list of the categories of the population having travel concessions depending on the need to receive the service (indicator here is the level of material security);

waiver of 100% travel concession and economic justification of the amount of the discount guaranteed by the state;

introduction of differentiation of the weight of the discount depending on the category and material condition of the recipient of the service (increasing the targeting of the service);

introduction/filling of the electronic register of categories of the population having travel concessions of the corresponding territory and its "coordination" with the data contained in the tax register, the register of births and deaths, changes of the social status;

introduction of periodic revision of the basis for accrual of transportation benefits depending on the material support and the number of rides;

expanding the scope of implementation of electronic services accessible to people with disabilities, including on the local level;

carrying out the procedure for allocating the railway infrastructure operator and eliminating the monopoly position of the railway operator in operating the infrastructure;

development and financing of the railway infrastructure modernization program, including through the mechanism of public-private partnership;

attracting investments by admitting private operators to rail passenger transport to create competition in the railway transport sector;

creating conditions for the establishment of joint ventures in suburban passenger transport services with the participation of local authorities;

development of high-speed railways.

It is expedient to regulate the issues of political lobbying and advocacy through parallel processes by adopting appropriate normative acts; digital gaps (Internet coverage, detection of black, gray and white areas); provision of public transport services to temporarily displaced persons, and thus clarification of the fact who is a resident of the

territorial community; simplification of land allocation procedures for the development of the transport network; development and involvement in the provision of public transport services for electric vehicles and the development of appropriate infrastructure. The issues of attracting technical and material assistance for the implementation of structural reform of public transport services also remain important; conditions for attracting foreign operators to the transportation process as additional investments in the country's economy; development of mechanisms to reduce the cost of credit for both small and medium-sized businesses.

The natural monopoly of the railway must also go through the stages of reforming and introducing the principle of competition and free access to the market of foreign operators. Of course, this can only happen with changes in legislation and the willingness of management to improve the industry. This path is not easy and requires significant financial costs.

The corresponding corruption risks cannot be ignored either.

The implementation of any changes is not possible without a powerful information campaign, which requires effective communication on vertical and horizontal levels of public authorities and local governments, as well as communication with civil society organizations and residents of local communities.

As noted, the EU countries have gone through a fairly long phase, which covered almost 20 years and was conditionally divided into 4 packages of reforms, and most countries have received financial assistance from the EU for their implementation. However, all countries have one thing in common: sustainability and gradual development, as well as the planning of the periodicity of reforms with clear indicators of implementation.

Therefore, Ukraine should focus on defining strategic priorities for the formation and implementation of transportation policy in general and its social component in particular; define their indicators and ensure consistency and gradual implementation. Experience has shown that the EU countries have gone through a transition period, so it would be appropriate for Ukraine to take into account this experience of institutional change.

At the first stage of reform (approximately 3-5 years), it is necessary to focus, in particular, on the standardization of rules for the provision of public transport services with the gradual entry into force of certain rules depending on funding; promoting administrative reform; introduction of electronic accounting of the number of transported passengers enjoying travel concessions; synchronization of data from various registers, managed by public authorities and relevant local governments; identifying places where there is no transport connection, depending on demand, as well as areas where there is no Internet coverage; analysis of the validity of transport agreements; reforming the railway by dividing it into a carrier and a railway infrastructure operator; launching a technical audit of the rolling stock and infrastructure; professionalization of drivers.

At the second stage, (approximately 5 - 7 years) it is necessary to start the process of gradual formation of the transport network and reduction of categories of passengers entitled to travel concessions, the introduction of the material basis for distribution of transport discounts, differentiation of discount weight, further reorganization of the railway by division into freight operator and passenger carrier; to work out the issue of concession of a passenger carrier; develop regulations on compensation for public transport services provided; determine requirements for the quality of transport services; introduce voluntary standardization of services in the ISO system as an additional bonus to winning the tender; gradually introduce general tender procedures to determine the operator; to determine the method of calculating the price for reduced fare transportation and the method of compensation for public transport services provided; involve civic institutions.

At the third stage, (approximately 3-5 years) it is necessary to focus on the evaluation of the results obtained in the first two stages, as well as on the practical systematic updating of these registers, monitoring compliance with the terms of contracts, the development of the route network; creating conditions for improving the investment climate; credit system reform.

Conclusions

The generalization of the experience of providing socially significant transport services in the EU Member States made it possible to determine that the paradigmatic basis for reforming the system of such services in the EU countries in the growing trend of decentralization of public administration was the recognition of the importance of effective social and transport management. This development should be based on changing the vector of public policy formation, updating its institutional framework, changing the role and functions of institutions at the level of central and local authorities and local governments; development of mechanisms of market pricing for transport services and formation of new schemes of their financing and targeted payment; introduction of pilot projects of testing and

evaluation of the most acceptable models for socially significant services in the transportation area; improving the regulatory framework; strengthening the responsibility of their providers; introduction of minimum quality standards for the provision of such services, the introduction of an independent system of control and guarantees of the quality of services provided.

It is proposed to include in the main strategic directions of public policy reform in the public transport services area: development and approval of socially and economically justified calculation norms of transport mobility by types of transportation (urban, suburban, etc.) per person; optimization of the list of categories of people entitled to travel concessions and the list of conditions for obtaining those concessions (adequate increase in the level of income of working people paying the reduced fare and the use of indirect methods of assessing the property status of applicants); study of the conditions for determining the amount of budget expenditures for the provision of benefits in monetary terms; development and introduction of a mechanism and procedure for granting benefits or reduced fare agreed for all types of public passenger transport (road transport, electric transport, metro, railway transport), including in monetary terms (if necessary).

It is established that the proposed measures for the implementation of public policy of social and transportation spheres of public relations should be accompanied by a gradual change in the systemic characteristics of functioning and institutional relations under the influence of economic, social, and political factors.

In our opinion, the proposed ways to reform socially significant services in the transport area and in general the implementation of a balanced public transportation policy in the public transport services area based on European experience:

will ensure the functioning of transport in Ukraine at a higher level of organization as well as transparent "customer-operator-passenger" financial relations;

will provide an opportunity to meet the expectations of consumers of transport services to obtain services of high European level, proper quality, and safety;

will ensure the publicity of such services;

will allow removing the unsecured financial burden both from local authorities for social measures of the state and from business entities;

will establish regional norms (standards) for the consumption of concessional travel services;

will boost tax receipts from the activities of business entities by increasing the number of taxes and by increasing the number of businesses that will become market participants;

will promote the development of the national transportation system and its integration into the single European Transport Area.

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Study Regarding the Perception of The Restaurants from Craiova, Romania Regarding Food Delivery Applications

Dr. Laurențiu-Stelian MIHAI

University of Craiova, Craiova, Romania
mihai.laurentiu09@gmail.com

Abstract

In the last few years, the use of food delivery applications has increased in Romania in general and in Craiova, in particular. Food delivery applications such as Food Panda, Takeaway.com, Glovo and Uber Eats provide a simple and fast way for people to order their food online and have it delivered relatively fast. These applications quickly expanded due to aggressive marketing tactics, funded by large injections of capitol from a wide range of investors. This study aims to study how the restaurants perceive these food delivery applications. Can they be considered a business partner which offers fair terms for both parties or are they a necessary evil? In order to answer these questions, we conducted a survey on 37 restaurants, and we tried to find their opinion on several aspects, such as the biggest advantages and disadvantages of food delivery applications. Our findings have shown that restaurants tend to use food delivery application because they bring them more visibility and at the same time, there is a correlation between the age of the restaurants' and their perception of food delivery applications, meaning that younger restaurants tend to see the food delivery applications as more useful.

Keywords: Restaurants, Delivery, Food Delivery Applications, Glovo, Food Panda, Takeaway.Com,

Introduction

Nowadays, resources are becoming scarcer and more expensive, and at the same time the general public's awareness of reducing the waste of resources have grown, a new kind of economy has arisen, the sharing economy, aided by the advance in information technology. The first companies which introduced this new concept are Uber (founded in March 2009) and Airbnb (founded in August 2008). Both introduced a new business model which allowed the general public to share their resources (cars and homes, in this case) and make some money. Uber disrupted the traditional taxi industry, allowing regular people who owned cars to provide public transport, while Airbnb disrupted the hotel industry by allowing regular people to rent their homes for short periods of time. In both cases, neither company owns any of these assets: Uber doesn't own any of the cars that are working for them, while Airbnb doesn't own any of the houses or apartments which are being rented through their platform.

The sharing economy can be defined as "an economic system in which assets and services are shared between private individuals" (Lovick, 2020). It is a broad term that encompasses different applications, services or products. Atilla Marton, professor of digitalization at Copenhagen Business School divides the sharing economy into three distinct concepts (Lovick, 2020):

- The real sharing economy which is based on sharing in its simplest form (sharing food or other household objects between members of the same family or flat mates, without any monetary gain). A good example of the real sharing economy is Wikipedia, a platform where users voluntarily contribute and share knowledge (Lovick, 2020).
- Gift Giving – people share products or services (such as birthday gifts), while expecting the other to do the same in the future. A good example can be found in the early days of Information Age, where programmers would freely share bits of code (Lovick, 2020). Another good example is Napster, an early music streaming services which allowed people to share their music, while having access to other users' music.
- Pseudo-sharing economy which encapsulates today's sharing economy (Lovick, 2020). This concept implies that while people will happily share their assets, they will do it if they will get a compensation, either monetary or otherwise. The two most prominent sharing platforms—Airbnb and Uber—are very commercial and have very little to do with actual sharing in the sense of solidarity and community," insists Christoph Lutz, associate professor of communication and culture at BI Norwegian Business School (Lovick, 2020).

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Food Delivery Applications

Since Uber and Airbnb were founded in the last years of the 2000s, many other companies tried to adapt their business model in other industries. The main incentive for this was on one hand, an IT proficient market who prefer to do most of their chores using a smart phone, and on the other the massive funding that companies such as Uber ($24 bn) and Airbnb ($4.8 bn) have received. One of the first companies to apply the sharing economy concepts in food ordering was Uber itself, which launched its own food delivery service, Uber Eats in 2014 (Alba, 2016).

The food delivery application works in the following way: the clients download an application on their smartphone (or visit a website) in which they find all the restaurants which deliver food to their location. Each restaurant has its menu uploaded in the application and users select the products they want to buy by adding them to the cart, just like a regular online shopping experience. After finishing the order and choosing the payment method (cash or online), the restaurant receives the order, confirms it and tells the client (through the app) how long will it take until the order is ready, the customer receiving constant updates about the status of their order ("your order is confirmed"; "your order is being prepared", "the courier is on the way"; "the courier will arrive in few moments"). At the same time, after the client finishes placing the order, the order is assigned to a courier who receives the relevant information: which restaurant to pick the order from, where to deliver it, the client's phone number and other important details.

These companies are part of the sharing economy because even though they are food delivery applications, they don't make any food (they just have partnerships with different restaurants) and they don't own any car (the drivers, just like Uber drivers, are using their own cars to deliver the orders). The business model is very simple: for each order generated through one of these applications, the restaurant pays a fee, usually ranging from 10% to 15% of the orders' total value if the restaurants are interested only in order generation, and ranging from 22% to 33% if the restaurants want both order generation and delivery (Ram, 2018).

Research Methodology

The aim of this article is to study the perception of restaurant managers from Craiova regarding food delivery applications. In order to fulfil this aim, we tried to answer the following research questions:

Research Question 1: Which is the main advantage of food delivery applications, as it is perceived by restaurant managers from Craiova?

Research Question 2: Is there a significant correlation between the age of the restaurant and its perception of food delivery applications?

Research Question 3: Which is the main reason that restaurants are leaving food delivery applications?

Research Question 4: Which is the main reason that restaurants are refusing to join food delivery applications?

Sample Description

In order to fulfil the study's aim and to answer the research questions, we conducted a quantitative research, based on empirical data, gathered through a 10-question survey which was applied on a sample of 37 restaurants from Craiova, Romania.

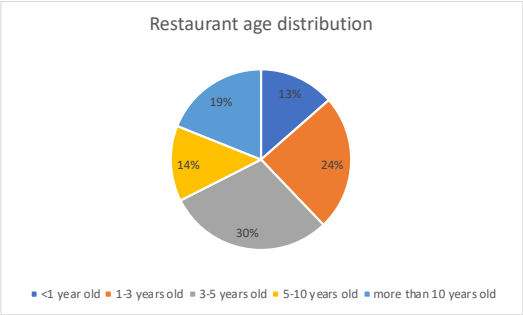

Fig. 1: Distribution of the restaurants' age

Source: authors' processing

As we can see from Figure 1, out of 37 restaurants, 13% (5) were opened less than 1 year ago, 24% (9) are between 1 and 3 years old, 30% (11) are between 3 and 5 years old, 14% (5) are between 5 and 10 years old and 19% (7) are more than 10 years old.

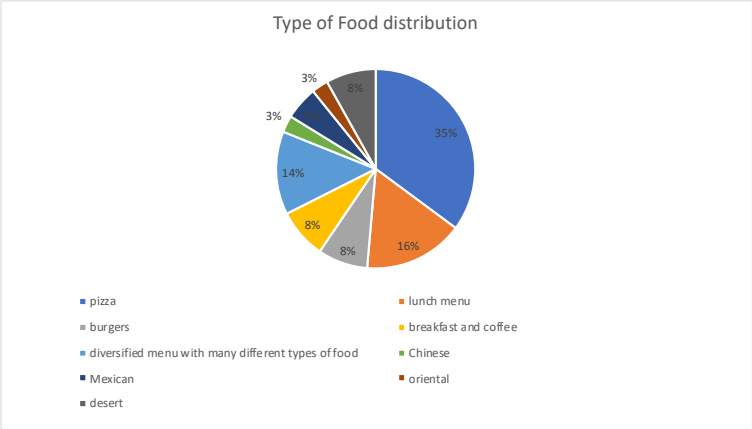

Fig. 2: Restaurants' distribution based on the type of served food

Source: authors' processing

Figure 2 is showing us that the most common food served by our respondents is pizza (35%, 13 restaurants), followed by lunch menu (16%, 6 restaurants), diversified menu with many different types of food (16%, 5 restaurants) and burgers, breakfast and desert (each category being 8% of the total number of respondents, 3 restaurants each). The least common type of food served by our respondents are Mexican (2 restaurants, 5%) and Chinese and Oriental Food (1 restaurant each, 2.5%).

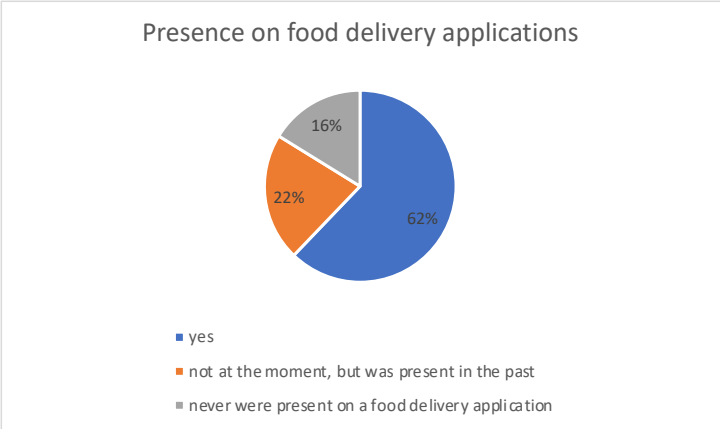

Fig. 3: Presence on food delivery applications

Source: authors' processing

Out of the 37 respondents, 62% (23 restaurants) are currently present on one of the main food delivery applications which operate in Craiova (Food Panda, Glovo, Takeaway.com, Eumananc.ro, Tazz, Gustos24 or Papago), 22% (8 restaurants) are not currently present on any food delivery application but were present in the past and 16% (6 restaurants) were never present on any food delivery application.

Results and Discussion

RQ1 - Which is the main advantage of food delivery applications, as it is perceived by restaurant managers from Craiova?

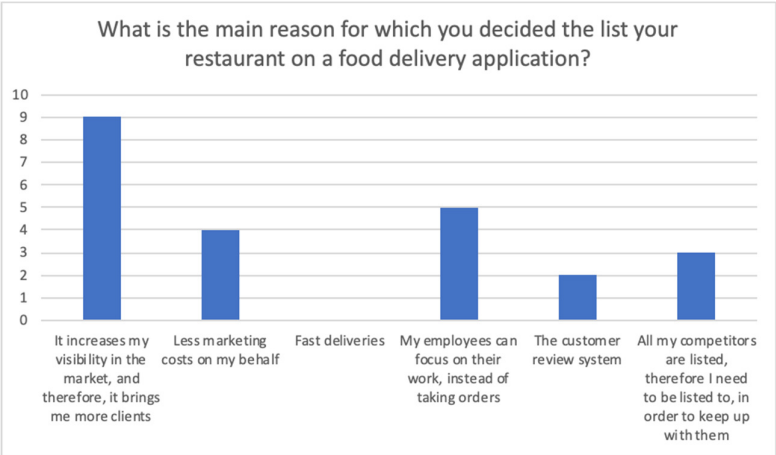

Fig. 4: The main cause for the restaurants' decision to join a food delivery application

Source: authors' processing

In Fig. 4, we can see the main reason that determined the restaurants to join a food delivery application. 9 out of the 23 restaurants that are currently on a food delivery application, stated that the main advantage of these application is that it increases their visibility in the market and therefore, brings them more clients. This is especially true for new restaurants, which don't have a strong brand and are not well known in the market (Ayidin, 2019). Instead of investing a significant sum in marketing and advertisements, they sign a partnership with a food delivery application and agree to pay them a percentage of all the incomes they generate through the food delivery application, the fee being owed only if an order comes through, unlike traditional marketing where is harder to measure the efficiency of advertising (Bortolato, 2018).

Moreover, 5 out 23 restaurants state that the main reason for which they joined the food delivery application is the fact that their employees can focus on their work, instead of taking orders by phone. Answering the phone and writing down the order takes time and a small restaurant can't afford to hire a person specifically for this job. Most of the time, this job is done by another employee who already has his own tasks and responsibilities and thus, the application really eases the employees' burden and streamlines the process.

RQ2 - Is there a significant correlation between the age of the restaurant and its perception of food delivery applications?

In order to answer this research question, we need to study the next three figures which show the correlation between the restaurant's age and three other variables.

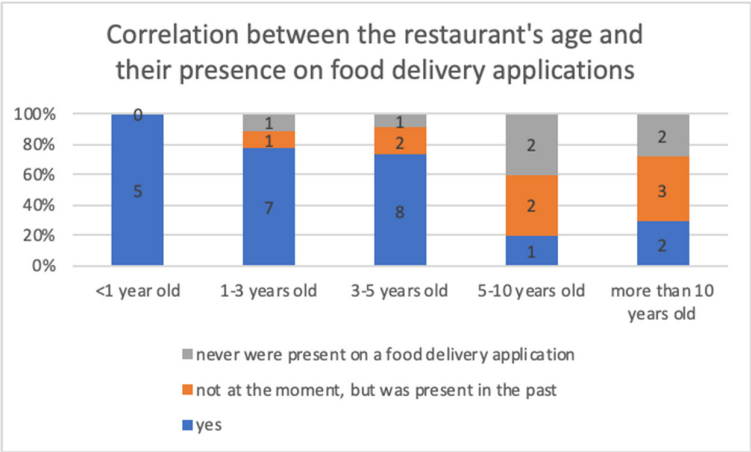

Fig. 5: The correlation between the restaurant's age and their presence on food delivery applications

Source: authors' processing

In Fig. 5, we can observe the correlation between the restaurant's age and their presence on food delivery applications. Thus, we can see that all (5) restaurants less than 1 year old are present on the food delivery applications, as well as 7 out of 9 (78%) restaurants between 1 and 3 years, 8 out of 11 (72%) of restaurants between 3 and 5 years old, 1 out of 5 (20%) restaurants between 5 and 10 years old and 2 out of 7 (28%) restaurants more than 10 years old. Thus, we can a descending trend of the restaurants' presence on food delivery applications as they age. This trend is not a surprise, taking into account the fact that younger restaurants have smaller market shares, lesser known brands and few recurring clients, thus their association with a larger brand (such as Food Panda, Takeaway.com and Glovo) is helping them increase their sales significantly. Older restaurants, especially the ones older than 5 years tend to have a large recurring client base and a strong brand (in some cases even stronger than the food delivery applications' which first started to appear in Craiova 2-3 years ago) and thus, the added value that the food delivery applications can bring them is limited.

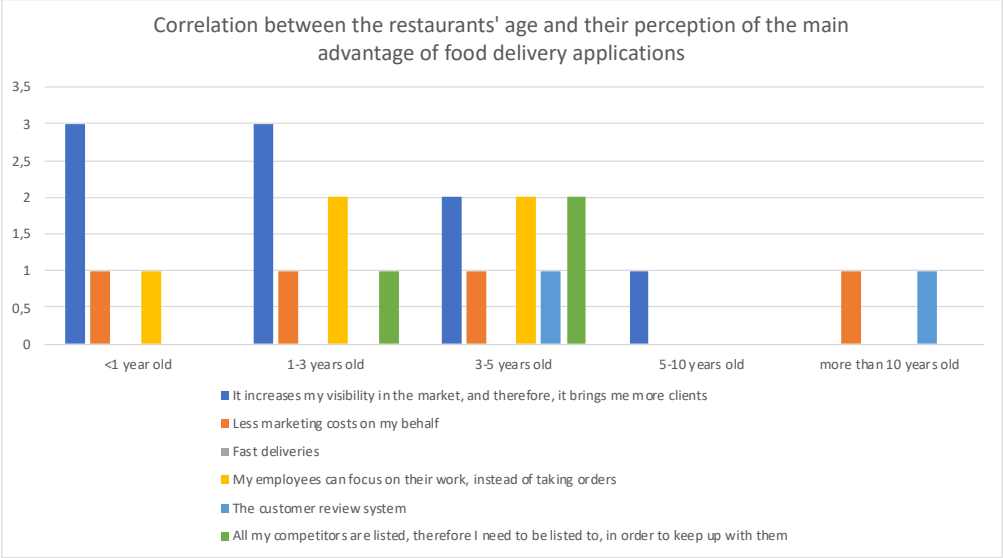

Fig. 6: Correlation between the restaurants' age and their perception of the main advantage of food delivery applications.

Source: authors' processing

In Fig. 6 we can observe how restaurants of different age perceive the main advantage of food delivery applications. For restaurants less than 3 years old (50%, 6 out of 12), the main perceived advantage is the increased visibility which generates an increase in their sales. Young restaurants don't have enough spare resources to invest heavily in

marketing and advertisements and thus, their association with a strong brand such as Food Panda, Takeaway.com or Glovo is beneficial.
The older restaurants start to see other advantages in being present on the food delivery applications: out of 8 restaurants aged between 3 and 5 years old, 2 perceive the increased visibility as the main advantage, 2 state that the fact that their employees can focus on their work instead of taking orders is the main advantage, while another 2 claim that they are present on food delivery applications because all of their competitors are there and they need to keep up with them.

Out of 3 restaurants aged 5 or more that are present on the food delivery applications, 1 considers the visibility as the main advantage, 1 considers that cutting the marketing costs the main advantage and 1 considers that they need to join the applications in order to keep up with their competitors.

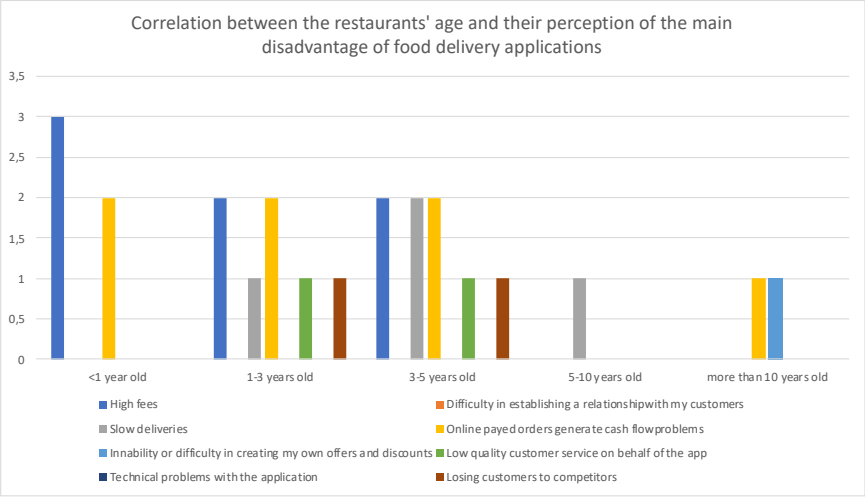

Fig. 7: Correlation between the restaurants' age and their perception of the main disadvantage of food delivery applications

Source: authors' processing

In Fig. 7, we can observe that out of 12 restaurants aged less than 3 years, 5 (42%) restaurants consider that the high fees are the biggest disadvantage of food delivery applications, while 4 (33%) consider that the online orders which generate cash flow problems are the main disadvantage they encountered while working with food delivery applications.

Out of 8 restaurants aged between 3 and 5 years old, high fees, cash flow problems generated by online paid orders and slow deliveries, each have been selected by 2 (25% each option) restaurants as the main disadvantage of food delivery applications.

Out of the 3 restaurants aged more than 5 years old which are present on food delivery applications, 1 (33%) considers that slow deliveries are the biggest disadvantage, 1 considers that the cash flow problems due to online paid orders is the biggest disadvantage, while another one (33%) considers that the inability to create its own offers and discounts is the biggest problems.

Regarding the correlation between the restaurants' age and their perception of food delivery applications we can conclude that there is a significant correlation between the two variables, which manifests as it follows:

Younger restaurants tend to be more present on food delivery applications, because they can benefit from the association with a bigger brand, while older restaurants, with stronger client bases and brands (some with brands even stronger than the food delivery applications themselves) are less likely to be found on a food delivery application;
Younger restaurants consider that the association with a larger brand brings them more visibility in the market while older restaurants tend to view the customer review system as the main advantage;
Younger restaurants who have smaller profit margins and turnover view the high fees as the biggest disadvantage of food delivery application, while older restaurants tend to consider the online paid orders which generate cash-flow problems to be the biggest disadvantage.

RQ3: Which is the main reason that restaurants are leaving food delivery applications?

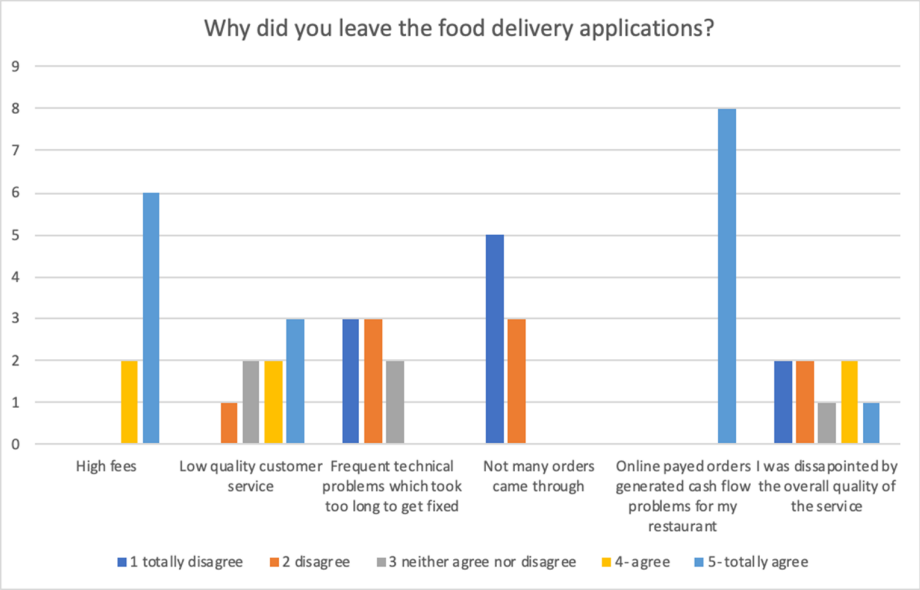

Fig. 8: The main cause of restaurants' decision to leave the food delivery applications.

Source: authors' processing

In order to answer this research question, we asked our respondents to rate six statements, using a 5-point Likert scale (ranging from 1 – totally disagree to 5 – totally agree). Thus, we can see out of 8 restaurants which are currently not present on any food delivery application, but were present in the past, all of them more or less agree (75% totally agree while 25% agree) that the fees were too high. Regarding the low-quality customer service as a reason to leave the food delivery applications, the answers were more evenly distributed: 3 out of 8 restaurants (38%) totally agreed with the statement, 2 out of 8 (25%) of the respondents agreed with this statement, 2 out of 8 (25%) of the respondents neither agreed or disagreed with the statement, while 1 out of 8 (12%) restaurants disagreed with the statement. Moreover, we can see that the applications are quite good from a technical point of view, because 6 out 8 (7.5%) of the restaurants more or less disagreed (37.5% totally disagreed and 37.5% disagreed) with the statement that the applications had too many technical problems which took too long to get fixed. Furthermore, all respondents more or less disagreed (63% totally disagreed, 37% disagreed) with the statement that not many orders came through. Regarding the statement "online paid orders generated cash flow problems for my restaurant", all 8 (100%) restaurants totally agreed, while the last statement "I was disappointed by the overall quality of the service" received mixed answers: 6 out of 8 respondents either totally disagreed, disagreed or agreed with the statement (25% each option) while 2 out of 8 either totally agreed or neither agreed nor disagreed (12.5% each option).

Based on the above arguments, we concluded that the main cause of the restaurants' decision to leave the food delivery applications is the fact that the online paid orders generated cash flow problems for the restaurants. If a client orders food through an application and chooses to pay online, the application receives the whole amount, holds the fees and transfers the remaining amount to the restaurant after 30 or more days. Basically, the restaurant doesn't have access to its own cash for 30 or more days, which affects its ability to pay in time its own suppliers, employees or taxes.

RQ4: Which is the main reason that restaurants are refusing to join food delivery applications?

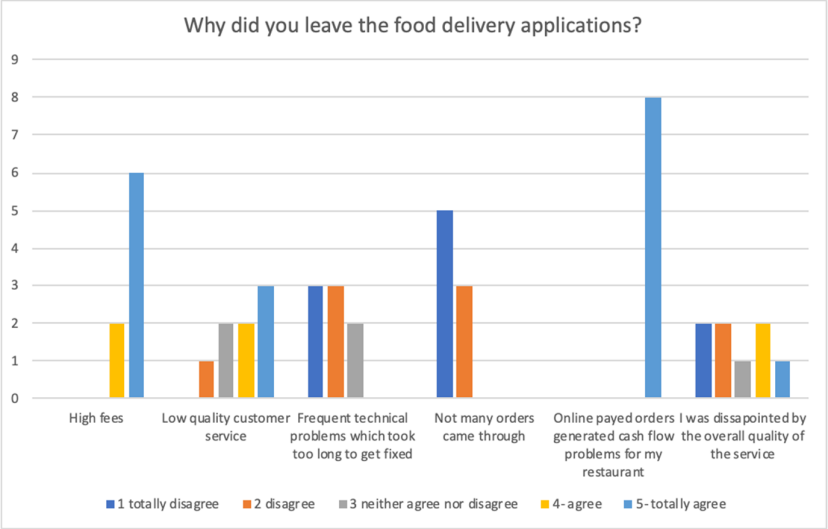

Fig.9: The main cause of restaurants' refusal to join food delivery applications

Source: authors' processing

In order to answer this research question, we asked the respondents to rate five statements on a Likert Scale, ranging from 1 – totally disagree to 5 – totally agree. Thus, we can see that all respondents more or less agree (83% totally agree and 17% agree) that the fees charged by the food delivery applications are too high. Moreover, all restaurants more or less agree (66% totally agree and 34% agree) that they have more than enough orders without using any food delivery application while 3 out of 6 (50%) agree (33% totally agree and 17% agree) that they don't want to share a part of their income with a third party. Furthermore, only 1 restaurant out of 6 (16%) totally agrees that the food delivery applications cannot bring an increase in their sales, while 2 out of 6 (33%) totally disagree with this statement. At the same time, 5 out of 6 restaurants more or less agree (50% totally agree and 33% agree) with the fact that the terms and conditions offered by the food delivery applications are not fair.

Thus, we can see that the main reason that restaurants refuse to join food delivery applications are the fees, which are too high. This is not surprising, considering that while the average profit margin in the restaurant industry is between 0 and 15% (Resendes, 2019), most food delivery application charge a fee between 12% and 18% for order generation and another fee between 10 and 15% for delivery services. Thus, for a restaurant to be able to make a profit in these conditions, it either has to raise its prices in order to cover the additional fees or to transfer a part of these fees to client, by adding additional fees (e.g. delivery fees, surcharge for not meeting the minimum order).

Conclusions

The results of our study have shown us that the main reason for which restaurants are joining food delivery applications is the fact that it brings them more visibility in the market, and therefore increases their sales. At the same time, we found that there is a significant correlation between the age of the restaurants and their perception of food delivery applications: younger restaurants tend to be more likely to join these kinds of applications, since they can benefit from the association with a stronger brand, despite the high fees and cash-flow problems related to online paid orders. Moreover, regarding the restaurants which were present on a food delivery application at one point in the past, the main reason for which they have left it is cash-flow problem generated by online paid orders and high fees. Furthermore, the restaurants which were never present on a food delivery application state that the high fees are not worth the small increase in sales. The problems addressed in study should be further explored with a larger sample from other cities in Romania.

Future research will have as objective the analysis of the impact that Corporate Social Responsibility has on the companies in the field of services based on the analysis made by Burlea-Schiopoiu and Mihai (Burlea-Schiopoiu & Mihai, 2019) on Romanian SMEs.

Acknowledgement

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Tax Regulation of Virtual Currencies in Developed Countries and Russia

Dr. Dmitry KOCHERGIN,
Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, e-mail: d.kochergin@spbu.ru, https://orcid.org/0000-0002-7046-1967

Natalia POKROVSKAIA,
PhD, Associate Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, e-mail: n.pokrovskaia@spbu.ru, https://orcid.org/ 0000-0002-8314-9470

Victor DOSTOV,
PhD, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia; Russian Electronic Money and Remittance Association, 5/2 Orlikov per., Moscow, 107078 Russia,
e-mail: dostov@npaed.ru, https://orcid.org/0000-0003-4518-2883

Pavel SHUST,
PhD, Saint-Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia; Russian Electronic Money and Remittance Association, 5/2 Orlikov per., Moscow, 107078 Russia,
e-mail: shoust@npaed.ru, https://orcid.org/0000-0002-2276-7523

Abstract

The paper explores tax regulation of virtual currencies (cryptocurrencies) as a new class of financial assets. The relevance of the topic is due to the wide development in the world of virtual currencies operations in the absence of a unified the interpretation of virtual currencies and in the absence generally accepted of the regulation of digital financial assets. The research is aiming to identify the economic and legal interpreting of virtual currency, determine taxation of virtual currencies in foreign countries and draft recommendations on taxation of cryptocurrencies transactions in Russia. Based on the study of tax regulation of virtual currencies in Singapore, UK, USA and Japan the paper defines interpretations of cryptocurrencies and outline their tax consequences. No correlation between taxation of virtual currencies and regulation of virtual currencies in the monetary and payment systems has been found. In most studied countries virtual currencies-related incomes are taxable by corporate taxes and the burden of taxation is defined by national approach to corporate taxation. The authors conclude that in Russia implementation of best global practices shall be complemented by considerations of domestic direct and indirect taxation specifics. The paper suggests that cryptocurrencies-related incomes should be subject to corporate income tax but exempted from personal income tax. Virtual currencies-related transactions should be exempted from VAT but without necessarily recognizing cryptocurrencies as official mean of payment.

Keywords: Virtual Currencies, Cryptocurrencies, Digital Financial Assets, Tax Regulation, Virtual Currency Taxation, Cryptocurrency Taxation.

Introduction

In recent years, active introduction of new digital information technologies has led to the emergence of a new class of assets in the payment sector and in the financial markets - crypto-assets, which are commonly called digital financial assets in Russia. Among these assets are virtual currencies, stablecoins, security tokens, utility tokens, etc. Most digital financial assets do not perform standard monetary functions and, from the point the banking regulators' point of view, they are not absolutely safe to be used as an exchange medium (Bank for International Settlements, 2019). Nevertheless, digital financial assets perform a wide range of financial functions and incorporate assets of different economic and legal nature, including monetary, equity, debt, etc. In most cases, such assets are created using the *distributed ledger technology*[1] or *blockchain*[2], allowing to store all information related to the issue, trading or transfer of assets in a decentralized manner.

Despite a wide range of digital financial assets, *virtual currencies (cryptocurrencies)* which can act as a payment instrument, as well as a means of savings and investment play one of the most significant roles. *From a functional point of view* virtual currency can be defined as a digital expression of value that can be bought and sold in a digital

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form and function as: 1) an exchange medium; and/or 2) a unit of account; and/or 3) a means of preserving value, but does not have legal status in any jurisdiction (that is, it is not a legal means of payment from a regulatory point of view in most developed and developing countries). *From an institutional point of view* virtual currency can be interpreted as a digital expression of value, which is issued not by traditional issuers of modern forms of money such as central banks, credit institutions or specialized issuers of electronic money, but it can be used to a limited extent as an alternative to generally accepted forms of money for payments being conducted in electronic networks (for more details, see Kochergin, 2016). Unlike central bank digital currencies, virtual currencies do not have a clearly identified issuer to whom monetary claims can be addressed (Kochergin et al, 2019).

Virtual currencies differ both from universally recognized national fiat money issued by state monetary authorities, and from electronic money issued by credit institutions or specialized issuers by a number of formal and essential criteria (Kochergin, 2017).

Essential features of virtual currencies are:

1) *A trust-based mechanism of value formation.* Virtual currencies are assets whose value is determined by demand and supply. The pricing of virtual currencies is similar to pricing of rare goods, such as gold. However, unlike gold, they do not have have intrinsic value. As a result, their value is based only on the belief that they can be exchanged for other goods or services, or a certain amount of national currency at some later time.

2) *Securing of a direct exchange of electronic value*. Until quite recently, only cash could be used to facilitate direct exchange of value between the parties without participation of intermediaries in payments. A key innovation in virtual currency schemes is the use of distributed ledger technology, which guarantees remote exchange of value in the absence of trust between parties and without participation of *intermediaries.*

3) An institutional mechanism in which information and financial transactions are managed without intermediaries. Most virtual currency schemes are not managed by any specific person or institution. This distinguishes them from electronic money systems that have one or more issuers of value that are responsible for the reimbursement of electronic money. A decentralized nature of most virtual currencies implies the absence of any identifiable scheme operators, which are usually credit institutions or specialized issuers in the case of electronic money (Kochergin, 2011).

A steady increase in appeal of the development of virtual currencies circulation has been observed since 2015. This appeal was dictated by payment and investment potential of virtual currencies as a new digital financial asset. As a result, during 2016-2017 exchange rates of virtual currencies has been steadily increasing. Thus, on January 7, 2018, a record cryptocurrency market capitalization was reached, amounting to $ 813.87 billion (CoinMarketCap). A subsequent deep correction of the virtual currency market, as a result of which the total cryptocurrency capitalization from January 2018 to December 2018 decreased by 80%, was associated with two factors - gaps in the regulation of virtual currencies and technological imperfection of most solutions existing on the market. The correction of leading virtual currencies in 2018 was also associated with the actions of financial regulators that weakened speculative activity in the market of operations with virtual currencies.

One of the most important problems hindering the widespread use of virtual currencies in the payment and investment spheres, not only by private payers and investors, but also by credit institutions and investment funds, is the lack of a comprehensive economic and legal framework for regulating digital financial assets. In this regard, timeliness of the introduction of regulatory mechanisms, including tax-related (which is the most important instrument of state regulation of digital financial assets) seem especially relevant because the interest in the virtual currencies on the part of financial market participants and regulatory bodies remains high.

The development of virtual currencies due to their decentralization, and the difficulty of determining the state affiliation of the operations mediated by them, on the other hand, represents significant challenge in various financial fields, including taxation. The features of virtual currencies create a potential opportunity to use them for global tax avoidance (Marian, 2013). At present, tax authorities of various countries are making attempts to tax the transactions related to virtual currencies, while the theoretical justification of such tax mechanisms usually follows practice and is likely to be widely implemented only in the near future.

Analysis of spontaneously emerging approaches to the taxation of transactions with virtual currencies in different countries, in the context of different interpretations and a lack of a unified approach to the taxation of digital financial assets both at national and international levels, is of undoubted research interest not only because of the introduction of such assets into the legal field in the framework of the modern digital economy, but also in connection with the development of a tax regulation regime for virtual currencies in the Russian Federation.

It is likely that the uncertainty associated with the taxation of virtual currencies will gradually decrease as far as their legislative regulation is introduced. International standards may be an incentive to develop such regulations. For example, in 2018, the Financial Action Task Force on Money Laundering (FATF) amended the Recommendations on combating money laundering and terrorism financing, recognizing the concept of "virtual asset" and "service providers related to virtual assets". In June 2019, clarifications were adopted to the Recommendation 15, which obliges all countries to introduce regulation regarding providers of services related to virtual assets, making them subject AML/CFT regulation (FATF, 2019).

The purpose of the article is to identify main economic and legal approaches to the interpretation and taxation of virtual currencies in foreign countries, to identify and characterize approaches to the interpretation of virtual currencies[3] in the tax sphere, as well as to formulate proposals for the taxation of operations with virtual currencies in Russia. The key objectives of the study are to determine the object of tax regulation in national laws and to analyse direct and indirect taxes imposed on transactions with this object. The study of approaches to taxation of virtual currencies is preceded by a review of previous scientific publications and a rationale for the choice of the analysed countries. Based on tax regulation of virtual currencies in Singapore, USA, Australia, the United Kingdom and Japan, possible interpretations of this financial asset and their tax consequences are summarized. Finally, the article draws conclusions about the possibility of using foreign experience in taxation of virtual currencies in relation to the tax regulation of virtual currencies in Russia.

Literature Review and Study Methodology

Despite high relevance of taxation issues related to transactions with virtual currencies, scientific research of these issues is fragmentary. As legal discussions about the economic nature of cryptocurrencies in the context of their taxation in Europe were the first chronologically and in breadth of distribution, these issues are most often presented in the studies of the European authors (Kowalski, 2015). Rather, reviews of regulatory initiatives and approaches to tax regulation of virtual currencies in different countries prevail (Likhuta et al., 2017; Global Legal Research Center, 2018). Attempts and generalizations are made of practical experience to develop theoretical directions of regulation in this sphere (Kochergin and Pokrovskaia, 2020a; Kochergin and Pokrovskaia, 2020b). In particular, A. Bal in his works of 2014-2015 (Bal, 2014; Bal, 2015) considers the issues of taxation of virtual currencies in three key aspects: a formation of a model approach to the taxation of virtual currencies, a description of tax legislation in this area in different countries, determination of areas for improving existing approaches to levying taxes in operations with virtual currencies. Of course, these aspects of taxation attract the attention of international regulators. In particular, although in the EU direct taxation of virtual currencies is carried out in accordance with the national laws of the Member States, the procedure for collecting VAT in the territory of these states since 2015 is in accordance with the decision of the European Court of Justice that purchase and sale of bitcoins[4] for fiat currencies is not subject to this tax (Vishnevsky and Chekina, 2018). Beyond that, in the report of the Organization for Economic Cooperation and Development, issued in March 2018, common approaches to determining the tax consequences of new technologies (cryptocurrencies and distributed ledger technologies) are expected by 2020 as part of the "Tax measures related to digitalization" project - BEPS events (Base Erosion and Profit Shifting) (OECD, 2018).

Although virtual currencies have an unlimited geographic scope, national approaches to regulating them vary widely both in the sphere of monetary relations and in the field of taxation. Against the background of the growing digitalization of tax administration processes (Victorova et al., 2019), tax authorities of an increasing number of states are issuing clarifications on the procedure for taxation of transactions with virtual currencies; however, the number of countries in which these clarifications have legal status remains low. To achieve this goal, we studied the tax aspects of virtual currencies functioning in countries where transactions with virtual currencies are legal, in countries pioneering in tax regulation in this area (see Table 1), as well as in countries whose financial markets are the most important from the point of view of innovative development: Singapore, UK, USA and Japan.

The study is based on comparative analysis and synthesis. For each country being analysed, approaches to determination of virtual currencies and their regulation in the monetary sphere were analysed; the structures and organizations that implement tax regulation are indicated, as well as links to relevant regulatory documents and regulatory requirements regarding the collection of taxes on virtual currencies are given. In addition, national systems of direct taxation of income of individuals and legal entities, as well as of indirect taxation, were analysed. The tax consequences of typical operations with virtual currencies for legal entities and individuals were examined, such as mining of virtual currencies; acquisition of virtual currencies; use of virtual currencies to pay for goods and services; receipt of virtual currencies as payment for goods or services; implementation of virtual currencies as part of the usual activities for the purchase/sale of virtual currencies; implementation of virtual currencies purchased for

investment purposes. Finally, approaches to the regulation of virtual currencies in Russia are described and proposals for taxing virtual currencies are formulated taking into account the experience of foreign countries.

Findings

Value of virtual currencies both in payment and financial spheres increases as far as their capitalization grows, scope and direction of their use widen, number of payment transactions increases, their costs decreases and the speed of payments increases. At the end of April 2019, more than 2140 virtual currencies were in circulation with a capitalization of more than 171.14 billion USD (CoinMarketCaP). Major and most famous virtual currencies were: Bitcoin Ethereum, XRP, Litecoin, EOS and Bitcoin Cash. At the same time, the value of transactions in the Bitcoin network in 2018 exceeded $ 3.3 trillion, which is six times more than the PayPal payment system and 16.5 times more than Western Union (Bitcoinexchangeguide, 2018). The daily trading volume of the world's largest cryptocurrency Bitcoin in March 2019 exceeded $ 11 billion, which was the most significant indicator for the 24-hour period since April 2017 (CoinMarketCap).

It should be noted that at present virtual currencies are legalized in more than 110 countries[5]. However, the degree of legalization, as well as the presence or absence of various restrictions on operations with virtual currencies, as before, varies significantly between countries. In general, countries with market economy and a high level of economic development have a more favorable regulatory regime for virtual currencies than countries with developing or emerging markets.

Table 1 presents different approaches to the interpretation of virtual currencies in order to implement monetary regulation in the G20 countries.

Table 1: Virtual currencies interpretation in G20 countries.

Countries	Legal status	Monetary Interpretation			
		Property	Currency	Barter good	Commodity
Australia	legal	+			
Argentina	legal	+			
Brazil	legal				+
Great Britain	legal	+			
Germany	legal		+		
India	limited	+			
Indonesia	limited				+
Italy	legal		+		
Canada	legal			+	
China	limited				+
Mexico	legal		+		
Russia	legal	+*			
Saudi Arabia	illegal				
Singapore[6]	legal		+		
USA	legal	+ **			
Turkey	legal				+
France	legal				+
South Korea	legal	not classified			
RSA	legal		+		
Japan	legal		+		

Source: Compiled by the authors on the basis of national regulations and / or official documents published by monetary regulators in the G20 countries.
*Note: * - According to the Act "On Digital Financial Assets and Digital Currency" effective from 01.01.2020 (State Duma of the Federation Council of the Russian Federation, 2020);*
*** - in October 2019 The chairman of the US Commodity Futures Trading Commission, Heath Tarbert, expressed the view that the largest virtual currencies such as Bitcoin and Ethereum, as well as other assets of a similar nature, should not be regarded as property, but as commodities (Yahoo Finance, 2017).*

As can be seen from Table 1, in the G20 countries, in order to implement monetary regulation, three main interpretations of virtual currencies prevail: 1) property 2) currency and 3) commodity. At the same time, as our subsequent analysis will show, the interpretation of virtual currencies for the purposes of monetary regulation and tax regulation may differ.

Direct and indirect taxation of operations with virtual currencies in Singapore

Singapore is one of the few countries in the world where favorable conditions have been created for the development of startups and attracting venture capital to innovative areas of the financial market in general and in the sphere of virtual currencies in particular.

Tax regulation of virtual currencies in Singapore is carried out by the Inland Revenue Authority of Singapore (IRAS) as part of taxation of business income (Inland Revenue Authority of Singapore, 2019b) and indirect taxation (Inland Revenue Authority of Singapore, 2019a). The basic income tax rate (excluding benefits and exemptions) is 17% in Singapore. At the same time, 75% of the first 10 thousand Singapore dollars (about 7.5 thousand US dollars) and 50% from the next 290 thousand Singapore dollars in 2019 and 190 thousand Singapore dollars from 2020 are supposed to be partially exempted from taxation (215 thousand and 140 thousand US dollars respectively). For startups, during the first three years after creation, the first 100 thousand Singapore dollars of income are excluded from taxation, and a 50% exemption of income is applied already from the next 200 thousand Singapore dollars in 2019 and 100 thousand Singapore dollars from 2020 (100 thousand and 75 thousand US dollars, respectively) (PWC, 2018, p. 2264). At this rate, all business income related to virtual currencies is taxed: from mining, from ordinary entrepreneurial activities in trading and exchange of virtual currencies. As with taxable income received from any other sources, it is assumed that they will be reduced by tax deductions (expenses from the corresponding activities provided for in tax legislation). Upon receipt of virtual currencies as payment for goods, works and services sold, their value is taken into account in Singapore dollars and then is subject to the income tax under the normal procedure. At the same time, income from growth in the value of foreign currency purchased by companies for investment purposes is not taxed. The income of individuals from mining, trading in virtual currencies or investing in them is also exempt from taxation.

A wider scope is inherent to taxation of virtual currencies circulation. Singapore's key indirect tax is the goods and services tax (GST), which is levied at a rate of 7% of the sale of goods and services within the country. Financial services, sale and rental of housing, import and sale of precious metals in the country are exempted from this tax. A 0% rate applies to the export of goods and services. Payers of the tax on goods and services are companies with a turnover of more than 1 million Singapore dollars per year (PWC, 2018, p. 2265-2266) (more than 720 thousand dollars in the United States). The levy of tax on goods and services implies the possibility of tax deduction in connection with the acquisition of materials and fixed assets by analogy with the value added tax.

For the purposes of collecting the tax on goods and services in Singapore, virtual currencies are not considered as “money”, “currency” or “commodities”. The supply of virtual currency is regarded as a service that is not subject to tax exemption. Thus, companies that are recognized as payers of tax on goods and services calculate the tax on the sale of virtual currencies from the agent’s commission in agent relations, from the fees for transactions with virtual currencies. The use of virtual currency by companies to pay for goods or services qualifies as a barter transaction. Two stages of the transaction are distinguished: the first is the supply of goods and services, and the second is the counter supply of virtual currency. Formally, the tax on goods and services is levied at each stage if each of the parties is a taxpayer. Import of goods paid in virtual currencies is subject to the same procedure for levying a tax on goods and services as imports paid in non-virtual currencies.

Crypto-assets Taxation in the United Kingdom

Modern taxation of virtual currencies in the UK, in comparison with other countries analyzed, is more comprehensive and is an element of a general approach to taxation of crypto-assets in the country being developed.

Her Majesty’s Revenue and Customs for the first time presented its position on the taxation of cryptocurrencies back in March 2014 in Analytical Report No. 9 “Bitcoin and Other Cryptocurrencies” (HM Revenue & Customs, 2014). The report indicated that cryptocurrencies have a unique identity and cannot be directly correlated with any other form of investment activity or payment mechanism.

In 2014 HMRC pointed out that the financial results of transactions with bitcoin companies are taxed on income and capital gains in accordance with the usual rules, which were not specified. HMRC assumed that every situation will be considered on the basis of its individual facts and circumstances, and appropriate legislation and case law

will be applied to determine a correct tax regime. The basic corporate income tax rate applicable to capital gains in the UK in 2019 is 19%; it is to be reduced to 17% from 2020 (PWC, 2018, p. 2669).

In December 2018, the HMRC published the "Crypto Assets for Individuals" report (HM Revenue & Customs, 2018), which is a specification of the final report on crypto-assets CATF in relation to taxation. The regulatory scope of this document is defined as crypto-assets, which means cryptographically protected digital representations of value or contractual rights that can be transferred, stored, traded electronically. According to HMRC, most often crypto-assets are acquired by citizens for personal investment with the expectation of an increase in their value or to save funds for the purchase of certain goods. For individuals, crypto-assets entail tax consequences on income tax, capital gains tax, inheritance tax.

Income tax in 2018-2019 levied in the United Kingdom at progressive rates from 20% to 43% with exemption for the first £ 11,850 of income (HM Revenue & Customs, 2019); when calculating taxable income, various deductions and exemptions apply. Capital gains tax is levied at a rate of 10% for the income up to GBP 46,350 and 20% for income exceeding the specified value. Therewith, UK income tax prevails over capital gains tax if crypto-assets trading is the main activity of the taxpayer. At the same time, income tax is levied according to the rules applicable to securities and other financial products - with the ability to summarize losses from trading some crypto-assets with income from trading other crypto-assets. In case of obtaining crypto-assets as a result of mining, the income from it, reduced by relevant expenses, as well as commissions or fees for mining, are subject to the income tax. When receiving crypto-assets as a result of airdrops[7], the income tax will not be levied on receiving cryptocurrencies without any counter actions, outside trade or business, including mining.

In the case of the sale of crypto-assets, a capital gains tax object may arise. According to HMRC, it is investment activity, which is a priority goal of purchase and sale of crypto-assets by individuals. The object of taxation on capital gains arises at the time of sale of crypto-assets, that is, at the time of sale of crypto-assets for fiat money, exchanging one type of crypto-asset for another, using crypto-assets to pay for goods or services, transferring crypto-assets to another person, and is taxed at basic capital gains tax rates. In this case, for inheritance tax purposes, crypto-assets are considered property.

One should mention the position of HMRC in approaches to the imposition of value added tax on cryptocurrencies. Even before the 2015 decision of the European Court of Justice on the exemption of bitcoin from VAT due to the economic nature of bitcoin, which corresponds not to the product but to the currency, the HMRC adhered to similar logic in the 2014 report. In relation to bitcoins and similar cryptocurrencies, it was assumed that income received from mining, as well as operations of exchanging bitcoin for fiat money, are not taxed, since they do not fall under the scope of VAT collection; other operations related to bitcoins are exempt from taxation in accordance with Article 135 (1) (d) of the EU VAT Directive (European Union, 2006). Moreover, when supplying any goods or services in exchange for bitcoin or other similar cryptocurrency, VAT will be charged in the usual manner.

The rules of taxation of crypto-assets in the UK are innovative both in indirect taxation and in terms of detailing the conditions for levying taxes, especially for transactions with crypto-assets made by individuals. Validity of taxation based on the initial differentiation of crypto-assets, in accordance with their nature and functions should be noted as well.

US Federal Taxation of Virtual Currencies

The American financial market is one of the most developed in the world, therefore, approaches to taxation of virtual currencies in the USA play a big role in choosing the tax regulation regime in those countries that have close economic and financial relations with the USA.

The United States Internal Revenue Service (IRS) issued in 2014 a guide on levying federal taxes on transactions using virtual currencies such as bitcoins or other similar currencies (IRS) Notice 2014-21) (Internal Revenue Service, 2014). The objects of IRS attention are virtual currencies that can be used to pay for goods or services, or for investment.

According to the approach of the US Internal Revenue Service, a virtual currency that has an equivalent value in real currency or replaces real currency is called a "convertible" virtual currency. For instance, bitcoin is an example of a convertible currency, as it can be digitally traded between users, can be acquired or exchanged for other fiat or virtual currencies. In general, selling or exchanging convertible virtual currency or using it to pay for goods or services in a transaction in the real economy has tax consequences that can lead to tax liabilities (FinCEN, 2013). As for the general procedure for taxing corporate incomes - following the results of the tax reform, from 2018 the federal tax rate on corporate income was reduced from 35% to 21%; however, large number of exceptions, benefits

and exemptions (PWC, 2018, p. 2699) are provided, which make possible a lower effective tax rate. For the purposes of this tax, virtual currency is treated as property.

Companies and individuals that receive virtual currency as payment for goods, work or services, the fair market value of the virtual currency in US dollars at the date of payment is included in gross income. In mining, fair market value of virtual currency at the acquisition date is included in gross income. If virtual currency mining is a trading or commercial activity, and the miner does not act as a hired worker, then his net income arising from such activity is self-employment income and is taxed accordingly. The fair market value of virtual currency when received for services performed as an independent contractor, measured in US dollars at the date of receipt, also represents income from self-employment and is tax deductible. Payment using virtual currency is regulated in the same way as any other payment.

Corporate income tax and capital gains tax on long-term virtual currency ownership of corporations are levied at a flat rate of 21%. For individuals, increase in the value of virtual currency after its sale after owning less than one year is taxed at the base income tax rate - from 10% to 37% depending on the level of personal income and the circumstances of tax payment. When selling virtual currency that has been owned for more than one year, the upper threshold for personal income tax is limited to 15% (for married individuals who file a tax return together with a maximum taxable income of 479,000 USD and 425,800 USD - for taxpayers who are not married) and 20% - for income exceeding the specified limit (EY, 2018, p. 1557).

Indirect taxation is represented in the United States by a sales tax collected on the states level. A sales tax collecting scheme is significantly different from the value added tax. A generalization of the various approaches of the US state authorities regarding levying sales taxes on transactions with virtual currencies (despite the fact that in most states these approaches are not represented by law) is a separate study objective.

Cryptocurrency Income Tax in Japan

Japan is the most developed country in terms of the use of virtual currencies in the payment and financial sectors, as well as in terms of legislation in this area. Thus, as early as in 2014, it was assumed that incomes associated with virtual currencies would be taxed in Japan by corporate income tax, personal income tax, and sales tax. However, concretization of the taxation procedure has occurred since 2017 after clarifications from the National Tax Agency of Japan.

Currently, the income arising from the use of bitcoin and other virtual currencies is subject to the income tax by analogy with income related to foreign currency and refers to different incomes (National Tax Agency of Japan, 2018a). Japan's national corporate income tax rate is 23.4%. For corporations with a capital of not more than 100 million yen (about 1 million USD) 15% is applied to the first 8 million yen of taxable profit. Companies and individuals also pay a local income and business tax at an average rate of about 10%. As a result, the effective income tax rate (including tax on capital gains) for companies taxed at a base rate of 23.4% is approximately 34%; for medium-sized companies, the effective rate is reduced to 30% (PWC, 2018, p. 1284).

It should be noted that in 2019 national tax on personal incomes is levied in Japan at a progressive rate: from 5% on income over 1,950,000 yen (about 1,800 USD). up to 45% of income over 40,000,000 yen (about 360,000 USD) Local taxes on personal income include the prefectural tax (flat rate of 4% plus 1,000 yen) and the municipal tax (flat rate of 6% plus 3,000 yen), as well as an additional payment of 1,000 yen when paying the local residents tax (Pokrovskaia and Belov, 2020). Thus, the total rate of taxation of personal income from ordinary sources ranges from 15% to 55%. The capital gains tax levied on income from the sale of securities, currencies and similar income is 20% (including 15% of the national tax and 5% of the local taxes) (EY, 2018, p. 747-748).

In accordance with the explanations of the National Tax Agency of Japan (National Tax Agency of Japan, 2018b), personal income related to bitcoin is classified as other income (which is not subject to capital gains tax) and therefore is subject to basic tax at a progressive rate of 15% to 55%. At the same time, the first 200,000 yen (about 1800 USD) of income are exempt from tax. Taxation of the increase in the value of Bitcoin as a regular income, and not by analogy with foreign currency income or securities income, actually means that for calculating the personal income tax Bitcoin is treated not as currency, but rather as property, which somewhat contradicts the money-and-credit approach to regulation and collection of other taxes.

Indirect taxation is represented in Japan by the sales tax, which is levied at a rate of 8% (with a planned increase in the rate up to 10%). The tax model does not imply value added taxation at each stage of product sales, but applies only to end-users of goods. In general, the sales tax in Japan has much in common with that of the United States, except that in Japan the tax is set at the central level and does not imply territorial differences. Since 2014, the sale

of virtual currency has been a subject of a sales tax at a rate of 8%. However, since 2017, the relevant transactions have been exempted from sales tax, which is primarily due to the recognition of virtual currencies as an official means of payment.

Due to the status of an official means of payment, on the one hand, and the peculiarities of indirect taxation (the absence of a value added tax), on the other, bitcoin operations themselves are not taxed in Japan. However, taxes on the results of these operations since 2017 are very high. In this regard, in 2020 in Japan it is planned to simplify the taxation of virtual currencies in order to stimulate their wider use within the framework of national jurisdiction (Bitcoin.com, 2018).

Prospects for taxing operations with digital financial assets in Russia

At present, in Russia there is no legalized taxation procedure for operations with digital financial assets in general and with virtual currencies in particular. Since 2017, legislative initiatives to regulate virtual currencies in Russia have been developed in the context of their interpretation in the framework of digital financial assets (see, Kochergin et al., 2020). In parallel with the consideration of the legal status issues and legitimacy of digital financial assets, attempts are being made to clarify the taxation procedure for transactions with these types of assets and their financial results. Federal Tax Service (FTS) of Russia in 2016 (Federal Tax Service of Russia, 2016) gave the following explanations: despite the fact that the legislation of the Russian Federation does not fix such concepts as “money surrogate”, “virtual currency”, “cryptocurrency”, the legislation of the Russian Federation does not prohibit Russian citizens and organizations conducting operations using cryptocurrency.

According to the Federal Tax Service of Russia, operations related to the acquisition or sale of cryptocurrencies using currency values (foreign currency and foreign securities) or the currency of the Russian Federation are foreign currency transactions. FTS of Russia, taking into account the international practice in the field of control over cryptocurrencies (virtual currencies), considers it necessary to provide a legal basis for obtaining information on transactions with cryptocurrencies from agents and currency control authorities by the tax authorities. Thus, in 2017 (Ministry of Finance of Russia, 2017), the Ministry of Finance issued an explanation about the need to pay personal income tax when making Bitcoin purchase and sale transactions between individuals in accordance with the general procedure for taxing economic benefits in cash or in kind, since chapter 23 of the Tax Code of the Russian Federation has not established a special procedure for taxing income in transactions with bitcoins. Moreover, the taxpayer must independently declare such income. A similar logic is applied to the issue of reflecting the income of a Russian organization from operations with cryptocurrency to calculate corporate income tax (Ministry of Finance of Russia, 2018b). In 2018 (Ministry of Finance of Russia, 2018a), the procedure for calculating personal income tax on transactions with cryptocurrencies was specified: the tax base on the income of individuals on cryptocurrency purchase and sale transactions is defined in Russian roubles as the excess of the total amount of income received by the taxpayer in the tax period from the sale of the corresponding cryptocurrency over the total amount of documented expenses for its acquisition.

In fact, the Ministry of Finance of the Russian Federation and the Federal Tax Service are trying to introduce a procedure for taxing business and state revenues, implemented in countries that started to regulate this sphere in 2014, namely, to impose a corporate income tax and personal income tax on the virtual currency income. In our opinion, the application of the best foreign practices should be carried out taking into account the specifics of the direct taxation in Russia. The taxation of organizations income as a whole is consistent with foreign experience and the introduction of the elements discussed above, such as: accounting for cryptocurrencies in roubles at the date of acquisition and taxation of the financial result of transactions with cryptocurrencies at the time of their implementation, can be an important step in building an integrated system for regulating digital financial assets in the Russian Federation. However, the feasibility and the possibility of taxation of the corresponding income of individuals is in doubt[8].

A feature of the Russian model of personal income taxation is the predominant tax withholding at source of income and the less developed system of revenue administration compared to countries with progressive taxation of income. Of course, certain types of income of individuals are successfully covered by the income tax in Russia and according to the results of their independent taxpayer declaration, however, this is due to the ability to control the receipt of the corresponding income on indirect grounds (for example, for income received from the results of the prize draw at advertising companies this is the organizers’ obligation to give information on the prizes paid; for income from apartment rental this is the possibility of physical control of these operations). In these conditions, the taxation of mining revenues and the increase in the value of cryptocurrencies at a base rate of 13% is faced with the obvious difficulty of controlling the payment of this tax. A feature of cryptocurrencies is, on the one hand, their virtual form, which does not allow to levy a source tax. On the other hand, the central characteristic of most cryptocurrencies is their anonymity, which makes it difficult to establish the recipient of the corresponding income.

Because, in our opinion, at least at the beginning of the creation of a comprehensive regulatory system for digital financial assets in general, and virtual currencies in particular, it is possible to exempt individuals from taxing income from operations with virtual currency or cryptocurrency by analogy with Singapore. At the same time, when creating cryptocurrency exchanges regulated by the legislation of the Russian Federation, the issue of the appropriateness of levying taxes at the source when trading cryptocurrencies requires separate consideration.

The most pressing issue is the taxation of value added tax on operations with digital financial assets. This issue can be resolved in two planes: either within the framework of the interpretation and legislative definition of the economic nature of digital financial assets in general, and virtual currencies in particular, in Russian legislation (in which the procedure for taxing these assets with VAT will be derivative), or in the field of direct tax regulation and clarification of the procedure for levying VAT or establishing exemption from transactions with digital financial assets and virtual currencies from the value added tax. Currently, only the first option is considered often, and in order to exempt the turnover of virtual currencies or cryptocurrencies from VAT, recognition of cryptocurrencies as a means of payment is being lobbied, which faces serious resistance in the monetary sphere, especially from the Central Bank of the Russian Federation. In this matter, we consider remarkable the experience of the United Kingdom, in which the exemption of virtual currencies from indirect taxation exists against a backdrop of non-recognition of virtual currencies as a means of payment and is carried out only within the framework of the tax sphere.

Conclusions

Findings allow us to draw conclusions about the prevailing common practice and national features of tax regimes in relation to virtual currencies, as well as to identify their taxation prospects for Russia.

Firstly, in most of the studied countries there is no unified definition of terms related to the turnover of digital financial assets, not only at the national level, but also at the level of different regulators. With the exception of Great Britain and Singapore, there is also no classification of new assets according to their economic nature or function. This leads to the fact that various regulatory bodies, including tax authorities, are trying to create independent approaches and interpretations of these economic assets that do not contradict the current national taxation practice.

Secondly, the taxation of virtual currencies is carried out regardless of the approaches to the legality of the respective financial assets in the monetary sphere, as well as the interpretation of virtual currencies and transactions with their use, which differ. Moreover, the tax sphere often relies on established views on virtual currencies (as is the case, for example, in the UK), but it is not necessarily derived from them (Japan).

Thirdly, in most countries, direct taxation of the results of transactions with virtual currencies is carried out according to general rules for various types of income, as is the case in the United States and Great Britain. Special conditions for levying taxes that apply exclusively to income from virtual currencies (as is the case, for example, for income from securities), are rare.

Fourthly, in all the countries studied, incomes associated with virtual currencies are subject to corporate income taxes, and the severity of the taxation is determined by the national taxation conditions of the companies - the highest rate (up to 34%) is established in Japan, the smallest - in Singapore, which, along with the absence of the capital gains tax, makes Singapore one of the most attractive countries in the field of digital financial assets. Interpretations of virtual currencies for the purpose of collecting income (profit) tax of the business are similar in the USA, Great Britain and Singapore - they are considered as an asset (property); in Japan, the taxation procedure coincides with the taxation of foreign exchange earnings.

Fifthly, among the analysed countries, the tax on personal income from operations with virtual currencies is not levied only in Singapore. In other countries, key differences relate to the following issues: 1) whether taxable income arises from the results of mining virtual currencies (as in the USA) or only after the sale of the “extracted” currency (as in Japan); 2) whether the tax consequences of using virtual currencies for personal consumption or with investment purposes differ; 3) whether the national income tax is levied, under what conditions and at what rates.

Sixthly, in regarding the taxation of realized income after long-term (more than one year) ownership of virtual currencies, the conditions in the USA and Great Britain are very similar. Tax rates average between 10% and 20%, although progressive income varies. Against this background, a significantly higher taxation of personal income from virtual currencies in Japan is noteworthy - at a progressive rate of 15% to 55%, which also allows us to

conclude that the interpretation of virtual currency in direct taxation of personal income is different from such in other areas of tax and monetary regulation.

Seventhly, the greatest coincidence is observed in the approaches to indirect taxation. Of all the countries considered (except for the United States), transactions with virtual currencies are taxed on goods and services only in Singapore. Moreover, exemption from value added tax or sales tax is not necessarily conditioned by the interpretation of the instrument in question as a currency.

Eighthly, when developing a taxation regime for operations with virtual currencies in Russia, it is necessary to take into account the best foreign practices, but also to supplement them with measures taking into account the specifics of Russian direct and indirect taxation. We believe that when taxing, it is advisable to consider virtual currencies in Russia as a kind of property. At the same time, despite the validity of taxing the income of operations with virtual currencies with corporate income tax, we believe that they should be exempt from personal income tax. Meanwhile, it is recommended to implement exemption from VAT on transactions with virtual currencies exclusively in tax sphere, without making it dependent on the recognition of virtual currencies as an official means of payment. In general, tax regulation of virtual currencies is not necessarily derived from money-credit regulation. Tax approaches to taxing transactions with virtual currencies can complement and balance other regulatory scope.

In general, tax regulation of virtual currency circulation can reduce speculative pressure in the digital financial assets market and lead to a decrease in the volatility of virtual currency rates. Reasonable tax regulation can create favourable conditions for stimulating non-speculative operations with virtual currencies both within national jurisdictions and at the international level, stimulating their use as a means of payment and means of savings.

Notes

[1] The term “distributed ledgers” means a decentralized or distributed unified accounting system for data on financial transactions, consisting of chains of formed transaction blocks (blockchain) built according to certain rules, which are used in decentralized virtual currency schemes. Key features of distributed ledger technology are: 1) decentralized distribution of equivalent copies of data between system participants; 2) sharing and synchronization of data in the system according to the consensus algorithm; 3) absence of an administrator responsible for the generation, management and transmission of data.

[2] Blockchain is underkind of distributed ledgers, representing a database consisting of a chain of blocks, each of which has information about the previous ones. Such a database is decentralized and distributed simultaneously on all computers of the system participants.

[3] Despite the fact that, from a formal point of view, the terms “virtual currency” and “cryptocurrency” are often used synonymously in economic studies, these terms are not identical. In fact, the term virtual currencies is broader and may include virtual currencies, which are based on the creation of other emission technologies than the blockchain. The term "cryptocurrency" is usually used to denote such a virtual currency, in the scheme of which emission and accounting are based on asymmetric encryption technology and use of various cryptographic methods to protect the information integrity. In the framework of our study, we allow the synonymous use of these terms because of the need to unify the object of taxation.

[4] Bitcoin is the first and largest cryptocurrency in the world in terms of capitalization. Created in 2008 by a programmer or a group of programmers known as Satoshi Nakamoto, at the end of April 2019, its capitalization amounted to about $ 172.17 billion. (more than 50% of the global virtual currency market volume) (CoinMarketCap).

[5] The term “legalized” does not mean that operations with virtual currencies in these countries are regulated by special legal norms and are complex. Regulation may be partial in nature, affecting only certain types of activities or operations of individual institutions. Such regulation may affect only the monetary sphere or the sphere of taxation.

[6] Singapore was added to the table instead of the EU as a single economic space, as in the EU countries there is currently no unified position regarding the interpretation of virtual currencies.

[7] Airdrop - is the process of free distribution of digital tokens or digital coins, aimed at popularizing a completely new cryptocurrency, which is not yet present on the exchanges, and the preliminary sale of which has just begun.

[8] In October 2019, the Russian cryptocurrency and Blockchain Association and the Commission for the Legal Support of the Digital Economy of the Moscow branch of the Association of Lawyers of Russia proposed a way to determine the official cryptocurrency rate for tax purposes. In particular, it is proposed to request a Bitcoin exchange rate from several authorized exchanges every day for 30 days and to record the average daily rate at 23:59:40 Moscow time. After that, it is proposed to calculate the cross rate of Bitcoin to the US dollar and the rouble.

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The Leadership Styles of Catalan SME Owner-Managers During The COVID-19 Pandemic

Laurențiu MIHAI, Ph.D

University of Craiova, Craiova, Romania
mihai.laurentiu09@gmail.com

Abstract

The present paper aims to identify the dominant leadership style (autocratic/transactional, democratic/transformational and laissez-faire/liberal) of SME owner-managers from Catalonia, Spain and to analyse how their distribution are influenced by several factors, such as Hofstede's cultural dimension, the company's maturity level and the respondent's gender. At the same time, the article studies the impact of the COVID-19 crisis upon the Catalan business environment. Our study is based on a quantitative, empirical research conducted on a sample of 164 small business owner-managers from Catalonia, Spain. Our findings show us that, among our sample, most of the respondents practice a democratic/transformational leadership style. At the same time, we arrived at the conclusion that the company's maturity level influences the leadership style of the owner manager in a direct and positive way, while there are no significant differences between the dominant leadership style of male and female SME owner-managers. Furthermore, our research is showing that the Catalan business environment has been greatly affected by the COVID-19 pandemic, most of our respondents reducing their operational capacity in some degree or the other.

Keywords: leadership, COVID-19 pandemic, SME, Catalonia, management.

Introduction

If leadership is a function, it must be considered an indispensable part of management, whose existence depends on a series of skills that form the leadership style of that person. Leadership is one of the concepts on which no consensus has been reached. As Stogdill (1974) states, the number of definitions of leadership is equal to the number of people who have tried to define it; however, many of these definitions take into account the "influence" factor.

Nowadays, the economic environment has become more dynamic and has led organizations to find new ways to cope with the changes they are undergoing. In such an environment, in order for organizations to be successful and survive, it is necessary for them to be concerned with flexibility, dynamism and evolution, constantly avoiding stagnation.

Van Wart (2012) mentions that researchers need to develop an integral leadership model that combines transactional and transformational elements and, at the same time, takes into account the public context and different situational variables.

Leadership experts say that this concept is one on which the success or failure of an organization depends (Bennis, 2007; Burlea-Schiopoiu and Remme, 2017). Both researchers and practitioners recognize leadership as a major element that affects organizational performance (Bass, 2008; Rowe et al., 2005). They concluded that effective leadership helps increase organizational performance and facilitates the achievement of goals (Gordon and Yukl, 2004). The negative effects of inefficient leadership on organizational performance and employee attitudes confirm the importance and significance of effective leadership.

A large number of leadership theories have been developed in the last decades of the last century, stating that many of the styles proposed by these theories are similar, with certain characteristics being encountered in several leadership styles, which can lead to confusion in among the leaders in the international business environment.

Hussain and Hassan (2016) consider that researchers need to develop an integral leadership model that combines transactional and transformational elements and, at the same time, takes into account the public context and different situational variables.

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Most recent studies regarding leadership styles analyse this concept in a large company context (Peris-Ortiz et al., 2012; Quinta et al., 2015; Alonso-Almeida et al., 2015; Tintore, 2019) or in public institutions (Ricard et al., 2017), the literature lacking consistent studies regarding the leadership styles of small and medium enterprises' owner-managers (Burlea-Schiopoiu and Idowu, 2016).

This article aims to identify the dominant leadership style of SME's owner-managers from Catalonia, Spain and to analyse how these styles are influenced by different variables, such as Hofstede's cultural dimensions, the company's level of maturity and the leaders' gender. At the same time, we could not ignore the current problems that the SME's are facing because of the COVID-19 pandemic and we tried to understand how this crisis has affected our respondents' businesses.

This research is an extension of the authors' previous doctoral research, which focused on leadership styles of SME owner-managers from Romania and the Netherlands. We have chosen Spain because, from a cultural point of view, it has both differences and similarities with Romania and the Netherlands, being somewhere between the two countries that were initially studied (Burlea-Schiopoiu and Mihai, 2019). Thus, Spain has a high distance from power, but significantly less than in Romania, with an average index of individuality, but with slight inclinations towards collectivism, a moderately feminine culture (aspect where it resembles Romania and in a more small measure with the Netherlands), with a low degree of uncertainty tolerance. Specifically, we have focused our research on Catalonia, since it is one of Spain's most economically developed regions, with a strong entrepreneurial culture and a healthy SME environment.

In order to fulfil our research objectives, we tried to answer to the following research questions:

Research question 1: Which is the dominant leadership style practiced by SME owners-managers from Catalonia, Spain?
Research question 2: Is there a significant correlation between the company's maturity and the owner-manager's leadership style
Research question 3: Is there a significant correlation between the owner-managers' gender and their leadership style?
Research question 4: How did the COVID-19 pandemic affect the respondent's business?

Literature Review

Research regarding leadership sometimes struggles with many different constructs.

The researchers are using concepts such as "leadership styles", "leadership models", "management styles" or "leadership theories" in order to study leadership from different perspectives (Quinta et al., 2015). Several researchers have studied the influence of different leadership styles on individual and organizational performance (Patiar and Mia, 2008; Burlea-Schiopoiu and Rainey, 2013; Quinta et al., 2015). The studies were based on the assumption that a manager's leadership style has a significant impact on the employees' satisfaction, behaviours and attitudes and, therefore, influences the organizational performance. Some authors stated that leadership styles influence employees' commitments to their job and may induce behavioural improvements that can positively impact the quality of their performance (Clark et al., 2009; Hartline et al., 2003)

In the following review of literature, we will focus on studies regarding three leadership styles: autocratic (transactional), democratic (transformational) and laissez-faire (liberal), which were first suggest by Bass (1990) and further developed by Judge and Piccolo (2004) and Erkutlu (2008).

Different styles of leadership can have different effects on the employees' overall job-satisfaction. Democratic (transformational) leaders motivate their followers beyond personal interests (Quinta et al., 2015) and can become strong role models for their employees (Bass, 2008). At the same time, autocratic (transactional) leadership styles focus on the exchange between leaders and followers (Ricard et al., 2017), while also offering clear direction and practicing strict control and evaluation of their employees (Van Wart, 2012). Laissez-faire (liberal) leaders tend to be more disconnected from the day to day operations of their companies, relieving themselves from operational duties and focusing on more important problems, such as strategic planning and management (Krieger, 2001; Mihai, 2015a). The autocratic (transactional) leadership theory proposes a strong top-down approach (Ricard et al., 2017). The basis of this theory is the fact that the only right way to lead is through strict direction and control, focusing at the same on a clear reward and punishment system for the employees. However, autocratic (transactional) leaders, while being presented as a supervisor, are still supposed to lead and provide guidance to their followers (Ricard et al., 2017). This leader relies mostly on rational incentives and processes in order to fulfil the organization's goals and clear hierarchy and high power distance characterize his/her relationship with subordinates. They are strongly task oriented, set and

monitor clear goals and objectives, exert control and strictly evaluate the performance of their employees (Van Wart, 2012).

Autocratic (transational) leaders tend to focus on the lower levels of Maslow's hierarchy of needs. They rely on a transaction model in which employees are rewarded for their achievements and punished for their failures (Bass, 1990). They are seen as very effective in "getting specific tasks completed by managing each portion individually" (Hargis et al., 2011, p.54)

Autocratic (transactional) leadership can be defined as a leader-subordinate relationship based on a series of exchanges and understandings between leaders and subordinates (Tintore, 2019). Those who participated in these transactional exchanges at work were formed in the quid pro quo, i.e. clearly defined roles, where the manager decides, and the subordinate executes. The exchange, or understanding, usually consists of a financial reward for the hours worked, without any personal recognition of subordinates' skills or achievements (Tintore, 2019).

Bass (2008) characterized autocratic (transactional) leaders as those who operate in existing systems or cultures. Moreover, he stated that transactional leaders are concerned with efficiency and time management, preferring to avoid risks and use processes and techniques that have proven their functionality in experiences. These leaders feel more comfortable in easy-to-predict situations where past performance could be used to indicate future success. To test his theories, since the 1980s, Bass has conducted a series of experiments that have resulted in the emergence of two transactional factors, situational reward and exception management.

The situational reward was represented by the employees 'desire to know what they need to do to receive rewards, while the exceptional management indicated the employees' desire to perform the tasks in the traditional way. Moreover, the researchers stated that the situational reward usually has a stronger correlation with the results than the management by exceptions, especially the passive one.

The democratic (transformational) leadership style is thought to be able to bring change in the organization (Ricard et al., 2017). This perspective builds on the transactional theory, which highlights the connection between leaders and followers and adds a supportive approach, which complements the directive approach of autocratic (transactional) leaders. Democratic (transformational) leaders are charismatic and they are able to change the organization from within, as well as the people in it, in order to fulfil their goals (Tintore, 2019). This means that democratic (transformational) leaders recognize the need for change and innovation and implement their vision by motivating their followers (Bass, 2008). This theory places the leader in the center of the organization (Quintana et al, 2015).

The theory of democratic (transformational) leadership is based on the research undertaken by Burns (1978) and involved both leaders and subordinates working together to increase the level of motivation related to achieving an idealistic goal. This idealistic goal was one in which the direction and aspirations of both leaders and subordinates were combined into a single vision (Askehave and Zethsen, 2014). Democratic (transformational leaders sought to energize subordinates, individually, without restricting their range of basic needs; thus, leaders sought to meet the higher needs of subordinates. Thus, they motivated their subordinates to aspire to organizational goals. In other words, if an organization views employees as individuals, they can become more loyal to the company.

Alonso-Almeida et al., (2015) stated that democratic (transformational) leaders possess strongly motivating behaviours, provide models for defining traits, values, beliefs and behaviours that should be imitated by subordinates, are visionaries in terms of articulating an ideological goal, and inspires confidence in subordinates, while providing intellectual stimulation and support.

Tintore (2019) stated that democratic (transformational) leaders connect with the needs and expectations of subordinates, motivate them, energize their mental and emotional resources, and enthusiastically involve them in the work to be done. Transformational leaders are often also called participatory or democratic leaders (Banks et al. 2016).

Democratic (transformational) leaders contribute to organizational change through their words, actions, speeches and behaviours, having a considerable influence on subordinates. This type of leadership occurs when leaders are able to develop subordinates' interest in the work they do, the organization's goals, mission, and vision, and to encourage them to think beyond individual goals (Mihai, 2018).

Democratic (transformational) leaders encourage their subordinates to look at old issues from new perspectives, work for organizational goals, and motivate them to act beyond self-interest. These leaders are able to share their vision

with their subordinates to the point where they adopt that vision as if it were their own. At the same time, transformational leaders have the ability to coordinate their subordinates, create coherence throughout the system, and direct the entire organization toward vision (Banks et al. 2016).

Contrary to the autocratic (transactional) leaders, which focus on the lower levels of Maslow Hierarchy of needs, democratic (transformational) leaders target the upper levels, such as the need for social relation, respect and self-realisation (Tintore, 2019).

The Laissez-faire (liberal) style derives from the democratic (participatory) leadership style, with the difference that the leader's involvement in the activities of his subordinates is minimal. This is one of the most controversial leadership styles, in the sense that some researchers even say that it implies the lack of any leadership behaviour (Mihai, 2015a). Employees have complete freedom to make decisions that govern their activities and have to solve problems on their own with very little guidance from leaders (Quintana et al, 2015).

Although this style of leadership may seem similar to passive management-by-exception (an element of autocratic/transactional leadership), Bass (2008) and Avolio (1999) argue that laissez-faire leadership represents a completely different leadership style, with clear differences from the autocratic (transactional) and democratic (transformational) styles.

The Laissez-Faire style is characterized by the fact that all the prerogatives of the leader are delegated to subordinates, who give them little (if any) support. If the leader is not involved in organizational activity, this lack of involvement can lead to a decrease in labour productivity, cohesion and satisfaction among subordinates (Arbaiza and Guillen, 2016).

This style, even though it may seem like a style used by lazy, irresponsible leaders, can be used, but successfully, in a company that has reached maturity. The leader can focus on administrative or strategic decisions, letting his employees organize and complete the company's operational activities, as they are sufficiently competent and experienced, and day-to-day activities have become routine and the chances as an unexpected situation to occur are quite small. This can be advantageous for them to adhere to, which can focus on the more important and complex aspects of the company.

Despite the advantages presented above, some employees cannot work efficiently without guidance, cannot manage their own time and, if given full freedom, their actions can have a negative impact on the company's performance. Moreover, given that in most cases (and especially in the case of small or medium-sized enterprises), subordinates tend to take over certain aspects of leaders 'behaviour, chances are that their non-involvement will lead to a decrease in team members' interest in the activity he has to carry out.

Mendez, Vera Munoz and Vera Munoz (2013) conducted a study that analysed the relationship between the three behavioural leadership styles presented above (autocratic/transactional, democrat/transformational and laissez-faire/liberal) and organizational efficiency among small and medium enterprises in the field construction, in Puebla, Mexico. Its results showed that 1) there is a positive and significant correlation between organizational efficiency and democratic and liberal styles (laissez-faire); 2) there is a negative correlation between organizational efficiency and autocrat style.

All of the aforementioned scholars have focused their research of leadership styles on large organisations, the literature lacking relevant studies regarding leadership styles in small and medium enterprises. Unlike larger organisations, which have multiple levels of management and where the leader exerts his influence only upon his direct subordinates, a small business has a leaner organizational structure, the leader is usually also the owner and his relationship with his employees is more direct and personal (Mihai, 2015a). Many researchers agree that a small business owner-manager’s leadership style can significantly affect the satisfaction of all his employees and therefore, the overall performance of his company (Bass, 2008; Gordon and Yukl, 2004; Peris-Ortiz et al., 2012; Mihai, 2018), the SME’s success or failure being direct effect of the leader’s attitudes and behaviours (Chaganti, Cook and Smeltz, 2002).

The present papers’ authors’ previous doctoral research focused on the study of leadership styles among Romanian (Mihai, 2015a) and Dutch (Mihai, 2015b; Mihai et al., 2017) small and medium enterprise owners, as well as on a comparison between the findings in each country (Mihai, 2016). The findings have shown that in both cases, the small and medium business owner-managers mostly tend to adopt the democratic/transactional style (Mihai, 2015a; Mihai, 2015b).

The SMEs are considered to be the backbone of every national economy (Rotaru et al., 2020) and even more so the engine of the European Union's economic development (Mihai, 2018), since they represent 99.8% of the European Union's 20 million enterprises (Moritz, 2011). Small and medium business contribute to an average of 50% of the Gross Domestic Product of developed countries (Mihai, 2015b), while employing roughly 75% of the total workforce in OECD countries (Mihai 2015b).

In Spain, according to Eurostat Data for 2018 (SBA Fact Sheet for Spain, 2019, p.2), there were around 2.79 million enterprises, out of which 2.78 (99.9%) are small and medium enterprises (less than 250 employees, an annual turnover of less than €50 million and total assets of less than €43 million). According to SBA Fact Sheet for Spain (2019, p.1) "small and medium-sized enterprises (SMEs) generate 61.3% of total value added and 71.9% of total employment in Spain. Between 2014 and 2018, SME value added rose by 19% and employment by 13.5%. The outlook for SMEs in Spain continues to be positive. SME value added is expected to grow again by 6.4% between 2018 and 2020. Over the same period, SME employment is forecast to increase by 2.8%, with an expected 249,600 new SME jobs created by 2020."

Regarding Catalonia, according to CEIC Data, in 2017 there were over 618.000 private enterprises (https://www.ceicdata.com/en/spain/number-of-companies-by-region/no-of-companies-catalonia), out of which more than 519.000 (83%) were SMEs, representing 59.6% of the total value of Catalan GDP (Catalan News, 2017.

We cannot discuss the small business environment without taking into account the impact of the COVID-19 pandemic, which has affected business from all across the world. In order to protect the population and slow the expanse of the pandemic, on the 13th of March 2020, the Catalan government adopted several measures which greatly affected the business environment, among which we should mention the closing of restaurants, bars and cafes (except those offering delivery and takeaway services), retail stores and shopping centers (except those exclusively dedicated to essential goods), theatres, cinemas, nightclubs, discotheques, pubs, dance halls, concert halls, and any other recreational establishment, as well as gambling establishments and amusement parks, theme parks and any another centre devoted to entertainment or leisure activities, including sporting facilities and sports clubs (El Nacional, 2020)These measures were in place until the end of May 2020. In October 2020, when new cases of COVID-19 infections reached new records, the Catalan government reinstated some of these measures, closing again restaurants, bars and cafes (except those who offer takeaway and delivery services), while limiting the customer capacity of physical retail units to 30% of the normal capacity (except for stores which offer essential goods and medicine, which were allowed to function with 50% of the normal customer capacity (Barcelona.cat, 2020)

As of 16th of April 2020, more than 90,000 companies (most of them SMEs) asked for temporary layoffs requests (ERTOs), affecting over 660.000 workers who remained temporarily unemployed, their work contract being suspended (Catalan News, 2020)

It is important to mention, that besides regulations which restricted the operation of business, the Catalan government also implemented a series of measures meant to aid those business affected by the pandemic. According to a Catalan government document called "Aid for productive activity and employment due to the effects of coronavirus" (Generalitat de Catalunya, 2020), these measures included but are not limited to following:

- An Emergency Employment Plan with a value of €59.29 million which benefits 1,500 companies and 4,300 workers (Generalitat de Catalunya, 2020);
- €70 million to finance the liquidity needs of Catalan SME (Generalitat de Catalunya, 2020);
- €1 billion credit line of loans for the self-employed and the business affected by the pandemic, 100% guaranteed by the Catalan government (Generalitat de Catalunya, 2020);
- An extension of tax deadlines until the end of the state of alarm decreed by the Spanish government (Generalitat de Catalunya, 2020);
- Creation of "Business Marketplace COVID-19", an online service dedicated to connecting the offer and the demand of goods and services dedicated to face the COVID-19 pandemic (Generalitat de Catalunya, 2020).

Research Methodology

This article aims to analyse the leadership styles of SME owner-managers from Catalonia, Spain and to understand how these leadership styles are influenced by different variables. The article analyse how the COVID-19 pandemic affect the Catalan small business environment and what are the respondents' perception regarding the Catalan government measures that were meant to support the business environment.

In order to fulfil our research objectives, we have conducted a quantitative research using an online questionnaire with 24 questions, which was applied to small and medium business owner-managers from Catalonia, Spain. In order to gather the relevant data, we have distributed our survey to over 450 Catalan entrepreneurs, from which we gathered almost 200 responses, 164 of them being validated as relevant for this research. We have invalidated more than 30 responses for being incomplete (the respondent did not answer all the questions) or for failing several statistical reliability tests. In 5 invalidated cases, the responses were complete as well as statistical reliable, but the respondents were not the owner-manager of the company or their company did not fit in the SME category.

The entrepreneurs, which had been given the survey, were selected in arbitrary way, mainly with the support of different professional organisations, which represent the SME environment from Catalonia, several NGOs, Facebook groups and discussion forums, as well as through the personal connections of the authors. It's important to mention that this study is based on an empirical research, since the authors could not travel to Catalonia due to the COVID-19 pandemic and at the same time, had limited time and resources which were not sufficient for conducting a more complex scientific research.

Our questionnaire was divided into three parts, the first part regarding general information about the respondent and his business, the second related to the identification of the respondents' leadership style and the last part regarding the impact of the COVID-19 pandemic. The first part included questions related to sex, age and education level of the respondents, as well as regarding his position in the company (only responses from the owner-managers of SME were included in this study), the SME category (micro, small or medium), the industry in which his business activates, as well as the age of the company.

The second part of the survey comprised 15 questions which measured (using a 5 point Likert scale, ranging from total disagreement to total agreement) respondents' attitude regarding their employees, how they make decisions and assign tasks, how they evaluate their subordinates and what degree of autonomy and responsibility are they giving them. These 15 questions were divided into 3 sets of 5 questions, each set being related to one of the three leadership styles (autocratic/transactional, democratic/transformational/ and laissez-faire/liberal). The 3 sets of questions were randomly spread across the survey, so the respondents wouldn't find the pattern and be as objective and honest as possible in their answers. The questions regarding the leadership style were adapted from two online surveys (Sagepub and NWlink). In order to identify the dominant leadership style of each respondent, we have added the score from each question in every set and considered the style with highest score as being dominant. The dominant style of each participant was used in the analysis and the discussion of the results.

The last part of the survey included two questions, one related to the operational capacity reduction of the respondents' business due to the COVID-19 pandemic and the other which included 8 Likert-scale statements, related to the impact of the COVID-19 pandemic and the respondents' perception regarding different aid measures implemented by the Catalan government.

It's important to note that this research is a continuation of the authors' previous doctoral research which studied the leadership styles of SME owner-managers from Romania and the Netherlands, as well as the correlation between these styles and several variables and thus, we have tried to keep the survey similar to the ones used in Romania and the Netherlands in order to be able to continue this research with a comparison between the three countries.

The results of this study were processed through MS Excel and IBM SPSS Statistics and the results are discussed below.

Results and Discussion

Sample Distribution

Our sample is represented by 164 owner-managers of small and medium enterprises from Catalonia, Spain where 51% (84 respondents) were female and 49% (80 respondents) were male. Considering that as of 2010, only 36.4% of Catalan businesses were owned by female entrepreneurs (Noguera, 2012), the large proportion of female respondents in our survey may imply a lower degree of the sample's representativeness (Badea, 2017).

From the 164 SMEs included in this research, 133 (81%) were micro-enterprises, 25 (15%) were small enterprises and 6 (4%) fit in the medium enterprise category.

Out of the 164 respondents, 45% (73 respondents) were managing businesses in the hospitality industry, 27% (45 respondents) were running a business in the service industry, 15% (25 respondents) were involved in retail activities,

while 13% (21 respondents) were involved in the manufacturing business. Thus, we have a distribution of 27% of the respondents running businesses in the secondary sector and 73% of the respondents running business in the tertiary sector. Considering that Catalonia's main contributor to the regional gross value added (GVA) is the tertiary sector (EU's Regional Innovation Monitor Plus, 2017), which accounted for 71.5% of the total in 2017, we can state that our sample is representative for the Catalan business environment, since the distribution of our sample is very similar to the regional distribution.

Moreover, another descriptive statistics variable that we found important for the aim of this study is the maturity of the respondents' businesses. Thus, 16% of the total sample population have been running their business for less than 3 years, 27% have a business for more than 3 years but less than 5 years, 33% have been running their business for more than 5 years but less than 10 years, while 24% have had a business for more than years.

Badea (2017) arrived at the conclusion that the female entrepreneurs of Catalonia are more receptive to participating in these kinds of studies, thus showing that they are able to understand the importance of scientific studies on the business environment are more concerned with ethics and development.

In order to answer the first research question, we have studied the distribution of the leadership styles of the sample population. The leadership styles have been identified according to the entrepreneurs' responses to the three sets of questions, as it was explained in the "Research methodology" part of this paper. Thus, as we can see from Fig. 1, 43% (71 respondents) of our respondents were identified as democratic/transformational leaders, 34% (55 respondents) of the entrepreneurs were identified as laissez-faire (liberal) leaders, while 23% (38 entrepreneurs) of the respondents were identified as autocratic/transactional leaders. Thus, most of our respondents were identified as democratic/transformational leaders, but the differences are not significant enough in order to safely say that the Catalan SME environment is dominated by one type of leadership or the other.

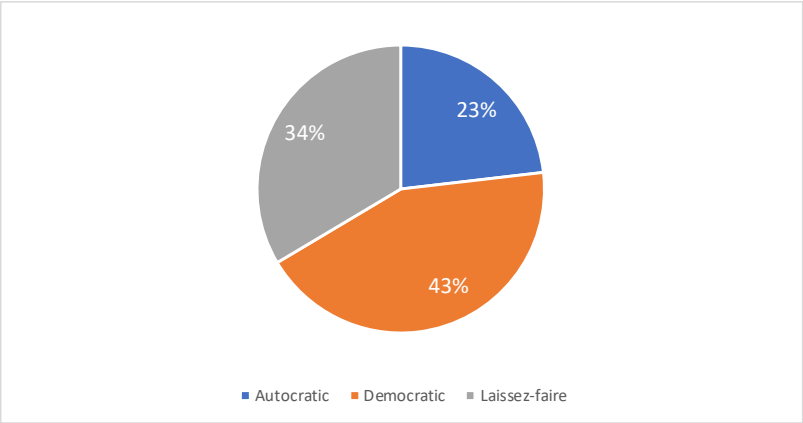

Fig. 1: The leadership styles of SME owner-managers from Catalonia, Spain

Source: authors' processing

In order to fully understand the causes of this result, we discuss several aspects, which may have influenced the distribution of leadership styles among our sample. First of all, we need to discuss Hofstede' cultural dimensions, which are an important determinant for the attitudes and behaviours of individuals which form a certain culture.

Nowadays, Hofstede's website (www.hofstede-insights.com/spain) measures 6 cultural dimensions (as opposed to the original 4). Thus, we have (a) Power Distance, (b) Individualism, (c) Masculinity, (d) Uncertainty Avoidance, (e) Long Term Orientation and (f) Indulgence. We will discuss each of them in particular, their values for the Spanish culture (as we did not find any relevant data regarding Catalonia in particular), as seen in Figure 2 and their implication on the distribution of leadership styles in our sample.

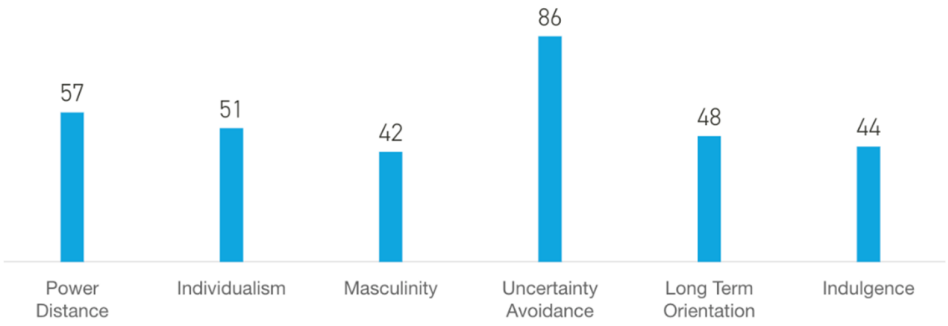

Fig. 1: Hofstede cultural dimensions values in Spain

Source: https://www.hofstede-insights.com/country-comparison/spain/

a) Power Distance

According to Hofstede's website, "this dimension deals with the fact that all individuals in societies are not equal – it expresses the attitude of the culture towards these inequalities amongst us. Power Distance is defined as the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally" (Hofstede Insights, 2020)The same website sets Spain's power distance index at 57, a high score that indicates Spain is a hierarchical society, in which "people accept a hierarchical order in which everybody has a place, and which needs no further justification. Hierarchy in an organisation is seen as reflecting inherent inequalities, centralisation is popular, subordinates expect to be told what to do and the ideal boss is a benevolent autocrat" (Hofstede Insights, 2020).

In our study, only 23% of the respondents have been identified as autocratic/transactional leaders, which, at a first glance, comes in contradiction with Spain's relatively high power distance index. In our opinion, Spain's power distance index of 57, while being relatively high, is significantly lower than many other European countries (especially, Eastern-European, former communists countries such as Romania, Serbia, Bulgaria or Ukraine), in which autocratic/transactional forms of leadership dominate, and thus some of the "benevolent autocrat" leaders of Spain may have been identified in our study as democratic/transformational. Moreover, we need to take into account the fact that we have identified the leadership styles of our respondents based on their own answers to a set of questions, and thus, subjectivism and the respondents' desire to be seen in a certain way might have influenced the final results.

b) Individualism

"The fundamental issue addressed by this dimension is the degree of interdependence a society maintains among its members. It has to do with whether people´s self-image is defined in terms of "I" or "We". In Individualist societies people are supposed to look after themselves and their direct family only. In Collectivist, society's people belong to 'in groups' that take care of them in exchange for loyalty (Hofstede Insights, 2020). Spain has a score of 51 on the Individualism index, which is considered collectivist when compared to most other European countries.

This inclination for collectivism might be an explanation for the predominance of non-autocratic (democratic/transformational and liberal) in our sample. This collectivist culture translates in tightly knitted teams forming at the workplace, people emphasizing teamwork and employees tending to put effort into their work without the need of strong motivational incentives from their management, thus inciting a more democratic/transformational or liberal style of management from their superiors (Burlea-Schiopoiu, 2009).

c) Masculinity

Hofstede's website states that "A high score (Masculine) on this dimension indicates that the society will be driven by competition, achievement and success, with success being defined by the winner/best in field – a value system that starts in school and continues throughout organizational life.

A low score (Feminine) on the dimension means that the dominant values in society are caring for others and quality of life. A Feminine society is one where quality of life is the sign of success and standing out from the crowd is not admirable. The fundamental issue here is what motivates people, wanting to be the best (Masculine) or liking what you do (Feminine)" (Hofstede Insights, 2020)

As we can see from Fig. 2, this dimension has a score of 42, which is a low score that indicates a feminine society, in which most things are settled by consensus. Polarization and excessive competition are not seen very well in the Spanish society, where "children are educated in search of harmony, refusing to take sides or standing out" (Hofstede Insights, 2020). Regarding the business environment, Spanish managers are likely to involve their employees in the decision-making process, to listen to their opinions and care for their needs and expectations, in other words, having a clear democratic/transformational approach to managing their teams.

d) Uncertainty avoidance

"The dimension Uncertainty Avoidance has to do with the way that a society deals with the fact that the future can never be known: should we try to control the future or just let it happen? This ambiguity brings with it anxiety and different cultures have learnt to deal with this anxiety in different ways. The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these is reflected in the score on Uncertainty Avoidance" (Hofstede Insights, 2020)A high score means a low tolerance for risk and unknown situations, while a low score implies that individuals are more likely to assume risks and have a higher tolerance for the unknown.

Of all six dimensions, uncertainty avoidance is the one that clearly defines Spain, having an extremely high score of 86, which means that Spanish people do not like taking risks, are afraid of the unknown and are resistant to change. "For example, in a very recent survey 75% of Spanish young people wanted to work in civil service (i.e. a job for life, no concerns about the future) whereas in the USA only 17% of young people would like it" (Hofstede Insights, 2020). Related to business, this high score implies that managers do not like taking risks and letting things to chance, which denotes a more autocratic/transactional approach to leadership and management, in which the manager sets a clear direction for his company, which is expected to be followed by the employees.

e) Long term orientation

According to Hofstede's website, "this dimension describes how every society has to maintain some links with its own past while dealing with the challenges of the present and future, and societies prioritise these two existential goals differently. Normative societies, which score low on this dimension, for example, prefer to maintain time-honoured traditions and norms while viewing societal change with suspicion. Those with a culture which scores high, on the other hand, take a more pragmatic approach: they encourage thrift and efforts in modern education as a way to prepare for the future" (Hofstede Insights, 2020)

In fig. 2we can see that Spain has an intermediate score of 48, which means it is a somewhat normative country. "Spanish people like to live in the moment, without a great concern about the future" (Hofstede Insights, 2020). In business, this means that the managers are rather short-term orientated, more focused on results than on people, both of which are characteristics of the autocratic/transactional leadership style

f) Indulgence

One challenge that confronts humanity, now and in the past, is the degree to which small children are socialized. Without socialization, we do not become "human". This dimension is defined as the extent to which people try to control their desires and impulses, based on the way they were raised. Relatively weak control is called "Indulgence" and relatively strong control is called "Restraint". Therefore, cultures can be described as Indulgent, if they have a high score or Restrained, if they score low on this dimension.

As we can see from Figure 2, Spain has a score of 44, which means it is a Restrained, rather than Indulgent society, with a tendency for pessimism and cynicism. Spanish people do not put much emphasis on their leisure time and tend to control their impulses and desires, because they have the perception that their actions should be restricted by social norms. A society with these characteristics is a breeding ground for autocratic/transactional leadership styles, where the manager is not concerned with the needs and desires of his employees, looking only to maximize their productivity at the workplace, in order to meet the organizational goals.

In conclusion, we can see that the higher percentage of democratic/transformational leaders in our sample (43%) can be explained by only two of the six cultural dimensions (Collectivism and Femininity). The other four imply, in a stronger or weaker measure, that the Spanish business environment should be characterized by autocratic/transactional leaders, which is contradicted by the low percentage of autocratic/transactional leaders in our sample (23%). One of the explanation for this contradiction of our results and the general cultural climate of Spain might be, the fact that Catalonia is the second most developed region of the country, with a GDP of 236.739 million euro € in 2019 (PIB de las Comunidades Autónomas, 2020), just 0,01% lower than that of Madrid, and thus, their business behaviour may be somewhat different than the Spanish average age. Moreover, Catalonia is a multicultural

society, with over 6400 foreign companies according to Invest in Spain and it has been recently awarded the Southern European region for foreign investment (2018-2019) by the Group Financial Times (European Cities and Regions of the Future 2018-2019) and thus, many different cultures are leaving their mark upon the Catalan business environment and the managers' practices might not only be in line with the average Spanish cultural identity.

Our results have shown that, while indeed having a larger proportion of democratic/transformational leaders (43%), the autocratic/transactional and laissez-faire leadership styles are also somewhat well represented in our sample (23% and 34%, respectively) and thus, while the first research question is answered, we cannot say for certain that the Catalan SMEs owner-managers are in a significant proportion democratic/transformational. A more accurate statement would be that while Catalan SME owner-managers have a slight tendency for a democratic/transformational leadership style, the Catalan business environment is well represented by all three leadership styles, a result strongly supported by the cultural evidence and arguments discussed above.

Regarding the second research question, in order to understand how the company's maturity is influencing the leadership style of the owner-manager, we used the Strategic Management Maturity Model (SMMM), developed by the Strategy Management Group (Averson et al, 2010). This model is tool aimed at managers who need to asses where their organization stands in terms of strategic management, to monitor progress in improving maturity of strategic management, and to allow benchmarking across organizations, or departments within one organization, in order to identify best practices. (Strategy Management Group, 2020). The model proposes eight dimensions of strategy (Leadership, Culture and Values, Strategic thinking and planning, Alignment, and Performance measurement, Performance Management, Process Improvement and Sustainability of Strategic Management) which are analysed across five levels of organizational maturity:

a) Level 1: Ad Hoc and Static

It is characteristic of organizations at this level that they currently do not do any strategic planning or management in a formal sense, tending to plan only on the tactical or operational level in an ad hoc and uncontrolled manner, normally by senior management behind closed doors. Leaders spend a majority of their time addressing operational issues and "putting out fires" and never address long-term strategy (Strategy Management Group, 2020).

b) Level 2: Reactive

It is characteristic of organizations at this level that some elements of effective planning and strategic performance management are being applied, only in an inconsistent fashion and often with poor results. Planning discipline is unlikely to be rigorous, and only happens in reaction to events or to temporarily please an individual leader. These organizations might measure performance or even use it to punish underperformers, but often these activities are done by individuals to meet a routine policy need and are not taken seriously. (Strategy Management Group, 2020).

c) Level 3: Structured & Proactive

It is characteristic of organizations at this level that there are formal structures and processes in place to comprehensively and proactively engage in strategic planning and management. These activities occur on a regular basis and are subject to some degree of improvement over time. Measurements are somewhat aligned with strategy and employee accountability is taken seriously. (Strategy Management Group, 2020).

d) Level 4: Management & Focused

It is characteristic of organizations at this level that strategy drives focus and decision making for the organization. Organization-wide standards and methods are broadly implemented for strategy management. Leaders formally engage employees in the process and a measurement & accountability work culture help drive strategic success for the organization (https://strategymanage.com/resources/strategic-planning-basics/strategic-management-maturity-model/).

e) Level 5: Continuous Improvement

The strategic planning and management excellence are embedded within the culture of the organization and are continuously improved in a formal sense, that it is a characteristic of organizations at this level. This means that as performance is evaluated, the organization first analyses how it is performing towards its strategic goals and then

second studies how effective the strategic planning and management processes are and adapts as necessary. Excellence in strategic management drives the organization's competitive edge or performance success. (Strategy Management Group, 2020).

The main drawback of this model is the fact that the five maturity levels are not directly linked to the age of the company, which represents the main variable with which we measure the maturity in our study. For the purpose of this study, we assumed that the first two Levels are applied to companies less than 3 years old, Level 3 is applied to companies between 3 and 5 years old, Level 4 is applied to companies between 5 and 10 years old and Level 5 is applied to companies older than 10 years.

Table 1: Leaders' behaviour across the five levels of organisational maturity

	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Leadership	Leaders dictate/command & control; otherwise disengaged	Leaders dictate but gather feedback sporadically	Leaders engage with direct reports only, but do model desired behaviours and values	Leaders empower many employees through ongoing engagement	Leaders & employees fully engage in a continuous dialog based on a team based culture

Source: Salamzadeh & Hajiseydjavadi, 2016, p.89

We have decided to look into the correlation between the company's maturity and the owner-managers leadership style in order to understand if the age of the company plays any role in the distribution of leadership styles among our sample. The findings shown in Fig. 3 are discussed below

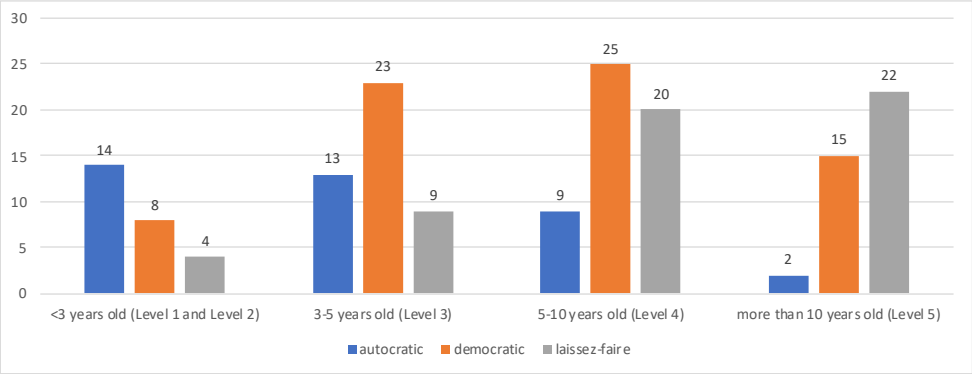

Fig. 3: The correlation between the company's maturity and the owner-manager's leadership style
Source: authors' processing

As we can observe from Figure 3, the distribution of leadership styles varies significantly among different maturity levels. Thus, in companies less than 3 years old (Level 1 and Level 2 from SMMM), most of the leaders from our sample were autocrats (53%). The percentage of autocratic/transactional leaders lowers constantly as we look at the other three maturity levels: 29% in 3-5 years old companies (Level 3), 17% in 5-10 years old companies (Level 4) and 7% in companies older than 10 years (Level 5). The percentage of democratic/transformational leaders is more or less the same in the last three maturity levels (even though the actual number of leaders increases in the first three levels and decreases in the last), while the first being significantly lower: 30% in the first maturity level, 51% in the second maturity level, 46% in the third maturity lever and 51% in the last. As for laissez-faire leaders, their presence is scarce in the first two levels (15% in the first and 17% in the second), but their proportion increases significantly if we look at older companies (37% for companies aged 5-10 years old and 75% in companies older than 10 years).

Thus, our findings show a tendency of the SME owner-managers to lower their authority as the company ages: they tend to be more autocratic/transactional in the young companies, democratic/transformational in companies, which are in the growth and development stage and liberal in mature companies. The reason for this might be the fact that in a young company (less than 3 years old), the employees are often inexperienced and need guidance and direction from their leader, who doesn't have yet full confidence in them and their abilities to fulfil their tasks and objectives and at the same time, a young company encounters many obstacles in its day to day operations (this being the stage in which many companies fail and end up closing their operations) and thus, the leader needs to be actively involved

in solving the problems which may arise at an operational level and to have an active role in steering the company on the right path in crisis situations.

As the company matures and reaches the growth and development stage (3-10 years old), employees become more experienced, more capable to solve on their own whatever problems might appear in the company's day to day operations and the leader's confidence in them and their abilities grows. It's important to note that this stage, some SME owner-managers might employ a middle-lever manager to run the company's day to day operations, and this his or hers involvement in the operational side of the company starts to diminish so he or she can focus on the more important issues, such as strategic planning and management.

A mature company, which has been on the market for more than 10 years, has very experienced employees and multiple levels of middle management and thus does not need the direct involvement of the owner-manager in its day-to-day operations, a fact that explains the prevalence of laissez-fair leaders in Level 5 companies. An important thing to mention is the fact that laissez faire leaders are also prevalent in some SME aged between 5 and 10 years old, the reason for this being that different companies mature at different speeds and it is entirely possible for some companies to have reached the last level of maturity earlier than 10 years.

In order to further study the correlation between the company's maturity and the owner's leadership style we have analysed the Pearson correlation between two variables: (1) the company's maturity and (2) the leaders' degree of involvement in the company's day to day operations (considering autocratic/transactional leaders have the highest degree of involvement, followed by democratic/transformational leaders and laissez-faire leaders, which have the lowest degree of involvement in the day to day operations). The results are shown in Table 2

Table 2: Pearson correlation between company's maturity and leader's involvement

		Leader's Involvement	Company's maturity
Leader's Involvement	Pearson correlation	1	-.229*
	Sig (2.dim)		.001
Company's maturity	Pearson correlation	-.229*	1
	Sig (2.dim)	.001	

Source: authors' processing

Our findings show a Pearson Correlation of -0,229 between the leader's involvement in the day to day operations and the company's maturity, with a sig. value of .001, which supports our previous findings that the company's maturity is influencing in a direct and negative way the leader's involvement in the day to day operations.

We continue our study of the Catalan SME's owner-managers' leadership styles with an analysis of the correlation between the respondents' gender and their leadership style. Our findings are show in Fig. 4

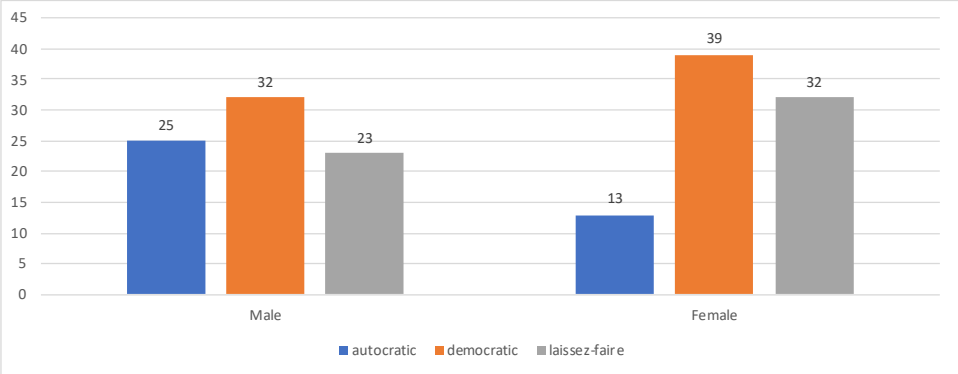

Fig. 4: The distribution of leadership styles across genders

Source: authors' processing

Looking at Fig. 4, we can see that in case of both genders, the dominant leadership style is democratic/transformational, which was to be expected, considering that this leadership style's prevalence in our sample (43%) of total respondents. However, it is important to note the distribution of the leadership styles across the

two genders. Thus, in the case of male respondents, the three styles are somewhat evenly distributed: 40% identified as democratic/transformational leaders, 31% identified as autocratic/transactional leaders while 29% identified as laissez-faire leaders. In the case of female respondents, the three styles are not so evenly distributed: 46% are democratic/transformational leaders, 39% are laissez-faire leaders and only 15% are autocratic/transactional leaders. Thus, even though both genders favour the democratic/transformational style, the main difference appears regarding the autocratic/transactional style: the proportion of male autocrat leaders is significantly higher than the proportion of female autocratic/transactional leaders.

Our results are in line with other authors' findings. Garcia-Solarte, Garcia-Perez-de-Lema and Madrid-Guijarro (2018, p.529) have studied this issue in a Colombian context and their results have shown that "companies with greater gender diversity (mostly women on the board of directors and in management) develop a transformational (democratic/transformational) organizational style orientated towards organizational change through the transformation of followers", rather than a transactional (autocratic/transactional) style focused on constant control and direction, as well as based on material rewards. Moreover, Eagly and Carli (2007), distinguished researchers on gender differences in leadership styles, found that the differences between male and female leadership styles are small, but they do exist. Levy (2010) found that these small differences are statistically significant regarding how males and females practice their leadership style, as well as how they are perceived in management positions and their efficiency in these positions. Other authors, such as Andersen and Hansson (2011, p.435) found that "women adopted participative styles of leadership and were more transformational leaders than men who adopted more directive and transactional styles of leadership".

Female leaders have a tendency to employ communal behaviours, such as affiliation, nurturing, communication and cooperation, while male leaders tend to display agentic behaviours and are more goal and task oriented, independent and focused in their decision-making process (Levy, 2010; Andersen & Hansson, 2011). Gordon and Yukl (2004) and Trinidad and Normure (2005) also studied this issue and came to the conclusion that female leaders are more likely to be inclusive, sensitive and nurturing and found that women scored higher than men on several skills such as teamwork, stability, motivation, recognizing trends and acting on new ideas. Forsyth (2010, p.113) stated that "women tend connect more with their group members by exhibiting behaviours such as smiling more, maintaining eye, and are more diplomatic with their comments". Another important study on this matter was conducted by the Management Research Group (2013, p.23) which found that "out of common leadership competency areas surveyed, women were rated higher by their superiors in areas like credibility with management, future potential, insight, sensitivity, and working with diverse people. Men were ranked higher in business aptitude, financial understanding, and strategic planning, which the researchers note are seen to be critical to corporate advancement. No gender differences were found in competencies such as team performance, effective thinking, and willingness to listen and no differences were found in overall effectiveness". It's important to note that several studies regarding the employees' perception of their superiors, have found that females leaders are perceived as less dominant than their male counterparts and that they "lose authority… if they employ feminine styles of leadership in male dominated roles" (Levy, 2010, p.372)

Most of these studies have the same limitation as ours, the fact that the results are based on the respondents' self-report data, which are considered somewhat unreliable by some researchers (Hamori-Ota, 2007). These differences in leadership behaviours may not be generalizable across all teams and situations and it is very difficult to predict a person's behaviour in a leadership position.

We must note that there are several studies, which did not find any significant differences in the leadership behaviour of male and female leaders. Andersen & Hansson (2011) conducted a study on public managers regarding their leadership and decision-making styles as well as motivation profiles and found some differences only regarding decision-making, but none was considered significant. Kent & Schuele (2010) analysed a large sample of German male and female leaders and found no difference regarding transformational (democratic/transformational) leadership behaviours. Cliff (2005) studied male and female SME owner-managers (as opposed to many of the aforementioned studies which analysed managers from different levels) and found no significant difference in their leadership behaviour. Another similar study was conducted by Dobbins and Platz (1986) which found that male and female leaders exhibit equal amounts of task oriented and people-oriented behaviours and their subordinates are equally satisfied.

This being said, we can conclude that while male leaders may be somewhat more inclined to exhibit autocratic/transactional leadership behaviours, there are not any significant differences between the leadership styles of male and female SME owner-managers.

In order to analyse how the COVID-19 pandemic has affected the small and medium enterprises from Catalonia, first we asked our respondents how the crisis affected their business from an operational point of view. Thus, 10 of the

respondents' companies (6%) are fully operational (100% of normal capacity), 31 respondents (19%) are running at a capacity between 75% and 100% of normal capacity, 43 respondents (26%) are operational between 50% and 75% of normal capacity, 52 respondents (31%) have reduced their operations to more than 50% and 28 respondents (18%) stated that their business was not operational when this study was conducted. Thus, we can see that 94% of our respondents were more or less affected from an operational point of view by the current crisis. In consensus with Burlea-Schiopoiu et al. (2017).

We continue our analyses with the correlation between operational capacity reduction and the company's industry in order to understand which were the industries most affected by the pandemic. The results are shown in fig. 5

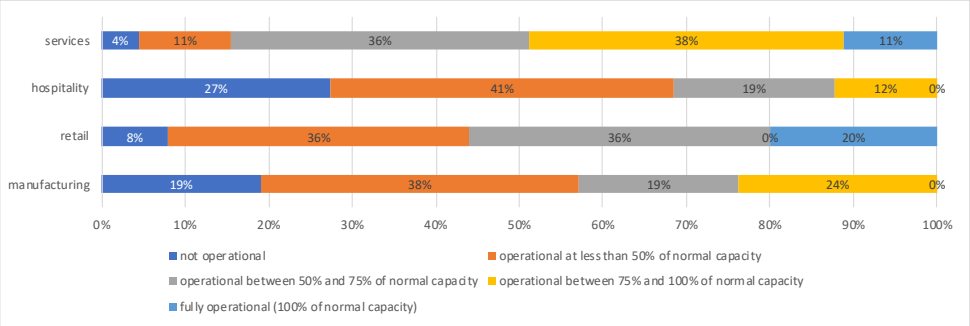

Fig. 5: The correlation between operational capacity reduction and industry

Source: authors processing

Our findings are showing us that 4% of the services companies including in our sample are not operational, 11% are operational at less than 50% of the normal capacity, 36% are operational between 50% and 75% of normal capacity, 38% are operational at more than 75% of normal capacity and 11% are fully operational. We can observe that the hospitality industry has been the most affected in our sample: 27% of the companies are not operational at the moment of the study, 41% are operational at less than 50% of normal capacity, 19% are operational between 50% and 75%, 12% are operational at more than 75% and not one company from this industry which was included in our sample is fully operational. Regarding the retail industry, 8% of the companies included in our sample are not operational, 36% are operational at less than 50% of normal capacity, 36% are operational between 50% and 75% of normal capacity, not a single company is operational at more than 75% of normal capacity and 20% are fully operational. In the manufacturing industry, we can observe that 19% of our respondents' companies are not operational, 38% are operational at less than 50% of normal capacity, 19% are operational between 50% and 75% of normal capacity and 24% are operational at more than 75% of normal capacity, but not a single manufacturing company included in our sample is fully operational.

As we can see, the hospitality companies from our sample have been the most affected by the COVID-19 pandemic. This was to be expected, considering that the Catalan government restrictions have mostly targeted restaurants, bars, cafes and to a lesser extend hotels and other accommodation units: during the initial phase of the new Coronavirus pandemic, bars and restaurants were closed (except those offering delivery and takeaway services), a measure that was reimposed on the 16th of October, when the daily number of people diagnosed with COVID-19 reached new records (Barcelona.cat, 2020) A significant part of the hospitality industry was forced to fully close: indoor bars and clubs, as well as restaurants which do not offer takeaway or delivery services, which might explain why 27% of the hospitality companies included in our study were closed at the moment the study was conducted. This finding is further supported by Barcelona's restauranteurs association claim that until the end of the year, 38% of the city's bars and restaurants will be out of the business (TheLocal.es, 2020) a main cause for this being the region's, and even more so Barcelona's dependency on tourism, which has sharply declined since the start of the pandemic.

These measures also affected (albeit in a lesser measure) the retail industry: stores and stops were forced to limit their customer capacity to 30% of the total capacity, with the exception of retail units selling basic necessities (food, groceries, medicine) which could function with their customer capacity limited to 50% of the normal capacity (Barcelona.cat, 2020)). These regulations support our finding that 44% of our respondents who own and manage a retail company either are closed or function at less than 50% of normal capacity. An interesting result is the fact that 20% of the retail companies included in our samples stated that they are functional, which means they only operate online shops and stores, with no physical location and thus, were not affected, in any measure, by the government regulation.

Our findings have shown us, that among our respondents, those who own and manage business in the services sector (transport, distribution, IT, marketing, home delivery, telecommunications, professional services, etc.) were the least affected by the COVID-19 pandemic, a result that can be explained by the fact that the government restrictions did not target them directly. Moreover, certain types of services such as home delivery flourished during the pandemic.

Furthermore, we continue our study with the analysis of the respondents' perception regarding the COVID-19 pandemic. We have asked our participants to rate 8 statements with a 5-point Likert-scale, ranging from 1 – Extremely Disagree to 5 – Extremely disagree. The questions as well as the mean value of the respondents' ratings are presented in the Table 3.

Table 3: Respondents perception of how the COVID-19 pandemic affected their business

	Question	Mean	Standard Deviation
1	In my opinion, the government restrictions are too harsh for the business environment	2.42	.512
2	The demand for my products/services has been significantly reduced during this crisis	4.12	.576
3	I had to increase the price of my products/services in order to compensate the lack of demand	3.11	.663
4	I had to temporary layoff a significant part of my workforce	3.49	.457
5	The extension of tax deadlines offered by the government is helping my business survive the pandemic	3.62	.715
6	The government and EU-backed liquidity lines and loans for SMEs are helping my business survive the pandemic	4.23	.216
7	The "Business Marketplace COVID-19" has proven to be very useful for the survival of my business	2.52	.498
8	In my opinion, the government aid measures are too restrictive (not enough companies can benefit from them)	2.95	.501

Source: authors' processing

The first question, related to the respondents' perception regarding the harshness of the government restriction registered a mean value of 2.42 (SD=.512), situating the average answer closer to the disagreement zone than the average zone, which means that our respondents don't consider the government's restrictions to be particularly harsh. This is a very interesting finding, considering that most of our respondents' business have been affected in some way by the government restrictions (as seen in Table 3). This result leads to believe that the Catalan government managed to successfully communicate the reasons behind the restrictions and how these restrictions are helping mitigate the public safety damage that the pandemic is causing, and the SME business owners understood the necessity of these measures, despite greatly hindering their operations.

The second question registered a mean answer of 4.12 (SD=.576), which places in the interval between agreement and strong agreement, which means, on an average, the Catalan SME owner-managers have encountered a severe decline in the demand for their products and services. This could be explained through the fact that Catalonia's (and in a greater extent, the region's largest city of Barcelona) dependency on tourism, which has been the most affected sector during this pandemic. Moreover, 45% of our respondents own and manage businesses in the hospitality industry and tourists represented a significant proportion of their customers.

The next question has a mean answer of 3.11 (SD=.663), placing it in the interval between the neutral and the agreement zone. This value indicates that our respondents had been forced, in some measure, to increase their prices in order to compensate for the lack of demand. A lack of demand means lower revenues, making it harder for the SME to reach a satisfactory level of profitability, or in some cases, even the break-even point.

The mean of 3.49 (SD=.457) is one of the highest in our study, placing it in the middle of the interval between neutral and agreement. This shows us that most of our respondents had to temporarily layoff some of their employees, as a solution to having their operating capacity reduced and the demand for their products and services in the lowest point of the last years. This finding is supported by Catalan News report that over 660.000 workers from over 90.000 enterprises (most of them SMEs) submitted temporarily layoff requests.
The fifth question has a mean answer of 3.62 (SD=.715), which situates in the interval between the neutral and agreement zone, which means, that our respondents have benefited from the extension on tax deadline provided by the Catalan government and this measure has been beneficial for them.

The sixth question registered the highest mean answer of all 8 questions, 4.23 (SD=.216), which means that the various liquidity lines and government or EU-backed loans have had a significant positive impact upon our respondents' business. This is normal, since most of our respondents' business have had their operational capacity reduced and/or have seen the demand for their products/services diminish and these government aid measures provided the much-needed liquidity that they needed in order to survive.

The second to last question, had a mean answer of 2.52 (SD=.498) which places it between the disagreement and the neutral zone. This question has the lowest mean score of the four questions regarding the government aid measures, which means the "Business Marketplace COVID-19" is not seen as a very helpful measure by our respondents. This is somewhat to be expected considering our hospitality and services dominated sample, since this measure is targeted more towards healthcare and technology companies which can bring their contribution to the fight against the COVID-19 pandemic.

The last question asked our respondents about their general perception regarding the inclusiveness of the Catalan government aid measures and it registered a mean answer of 2.95 (SD=.501), which places it extremely close to the neutral zone (3). This means that our respondents' perceptions were mixed, and we cannot safely say if the Catalan government aid measures were either inclusive or not inclusive enough.

Conclusions

This study's aim was to analyse the dominant leadership styles of SME owner-managers from Catalonia, Spain, as well as how these styles are influenced by different factors, such as Hofstede's cultural dimensions, the company's maturity level and the respondents' gender and the same time, to analyse the impact of the COVID-19 upon the Catalan SME environment and the respondents' perception regarding the aid measures implemented by the Catalan government in order to support the business environment during the pandemic.

Our findings have shown that in our sample, most of our respondents practiced a democratic/transformational leadership style. This result was further examined through Hofstede cultural dimensions and was supported by two of the six dimensions (Collectivism and Femininity).

Moreover, our research has found that the SME owner-managers' leadership style is influenced (among our sample) by the maturity level of his company. Thus, younger companies tend to entice a more autocratical/transactional approach from their leaders, while companies being in the growth and development staged are led by democratic/transformational leaders and older and more mature companies can be efficiently run by laissez-faire/liberal leaders.

Regarding the influence of the respondents' gender upon his dominant leadership style, our findings have shown that in case of both male and female leaders, the dominant style is democratic/transactional, but we can see a larger proportion of male leaders who employ an autocratic/transactional approach compared to female respondents.

In the last part of our research, we have analysed how the COVID-19 pandemic affected the operational capacity of our respondents. Our results have shown us that most of our respondents had to reduce the operations of their business to some degree, 18% of them not being operational at the moment of this study. Moreover, our findings suggest that our respondents don't consider the government restrictions as being too harsh, the demand for their products and services had been significantly reduced during the pandemic, some of them had to increase the price of their products or services in order to compensate for the lack of demand and many of them had to temporarily lay off a significant part of their staff. Regarding the aid measures implemented by the Catalan government in order to support the business environment, our respondents considered the extension of tax deadlines and the liquidity lines as very useful, unlike the "Business Marketplace COVID-19" which was not seen as extremely helpful, while the overall feeling of the degree of inclusion of the aid measures was mixed.

Regarding the limitations of this study, we should mention that it was conducted in an empirical and quantitative way, the authors having neither the time nor the resources to conduct a more complex scientific research. Moreover, the research was conducted online because the authors could not travel to Spain because of the COVID-19 travel restrictions and the sample was chosen arbitrarily. At the same time, the leadership styles were identified based on the respondents' answers to several questions and thus, might be affected by their subjectivity.

As we have mentioned before, this study is a continuation of the authors' previous doctoral research on leadership styles, which was conducted on a sample of Romanian and Dutch entrepreneurs. We want to further this research

by comparing the findings from Romania, the Netherlands and studying the similarities and the differences between the results, using Hofstede's cultural dimensions.

Acknowledgement

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Improving Quality in Value Stream Mapping

Vaclav MICHALEC
Czech Technical University in Prague, Prague, Czech Republic
michava1@cvut.cz

Michal KAVAN
Czech Technical University in Prague, Prague, Czech Republic
Michal.Kavan@fs.cvut.cz

Abstract

The current increase in the popularity of implementing a lean manufacturing concept that aims to satisfy customer requirements and ensure continuous improvement of the entire organization through the elimination of waste is now almost a necessity; not only for manufacturing companies but also for companies in other industries given the rapidly changing nature of today's world. One of the lean manufacturing tools being used to analyze, visualize, identify causes, bottlenecks and waste of a process is Value Stream Mapping (VSM): which can be applied to the entire company or its individual sections. The aim of this paper is to highlight some of the limitations of VSM in terms of quality measurement, and to present improvement possibilities for the tool by focusing on the quality of the process output as a whole, along with its individual activities.

Keywords: Quality, Lean Manufacturing, Value Steam Mapping, VSM.

Introduction

The aim of this paper is to highlight quality measurement by using value stream mapping as a tool of lean production suitable for the visualization and identification of process weak points. The first chapter defines quality from the point of view of manufacturing companies and deals with the total, and distribution of, costs associated with poor quality. A brief description of lean manufacturing will also be outlined. The second chapter focuses the current approach of value stream mapping and is followed by a third chapter describing the current possibilities of measuring quality in both individual and entire flow mapped activities, together with possible shortcomings and limitations. The final chapter describes alternative quality measurement options that can help improve problem identification. The conclusion of the article summarizes the findings and discusses the possibilities of developing a value stream mapping tool.

Quality and Lean Production

Quality by itself is defined in many ways, but focusing on its definition in terms of production, it is most commonly referred to as compliance of customer requirements or demand with the supply or technical output of the company, which meets the promised design or specific specifications described by Gravin (1984) in his article. As it follows from this determination that any deviation from the predefined output is a reduction of quality. It is therefore a matter of fulfilling specifications or design, which thus simplifies production in a certain way. Simplification is achieved through the timely elimination of deviations, both in the part of product development and production through component analysis and on the other hand, by identifying possible failure modes together with the design of increasing reliability through the quality control. The output of production methods is to emphasize quality through the reduction of deviations by preventing the occurrence of defective products through more thorough design and testing of prototypes, together with more frequent inspection of components and their subsequent removal to reduce costs associated with reprocessing, scrapping and complaints, which significantly exceeds costs. for the prevention of defects.

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Quality Costs

In most of the companies, the costs associated with poor quality range from 5 to 30% of the company's turnover, but we can also find costs reaching up to 36% for manufacturing companies and 40% for service companies mentioned by Russell (2013). In book by Westcott (2006) costs are generally divided into the following four categories:

- *Internal cost* - costs that arise before the final product is delivered to the customer. These costs are caused by activities such as reprocessing, repairs, poor material or communication quality, or insufficient inventory, all of which contribute to unplanned downtime.
- *External costs* - costs incurred after delivery of the product or provision of services to the customer. Examples may be the costs associated with the warranty period, complaints, product returns, but also the need to reduce the price due to non-compliance with customer requirements.
- *Appraisal costs* - costs associated with all activities related to inspections, tests, maintenance, calibration and testing.
- *Preventive costs* - costs incurred for prevention in order to minimize the costs associated with the failure of any processes throughout the company, but also the appraisal costs associated with quality. This category includes, for example, design reviews, evaluations of company processes, as well as surveys and evaluations of suppliers and, last but not least, education, training and coaching.

Tooley (2010) declared that if we determine the ratio of these costs, it is stated that 90% of the costs associated with poor quality are hidden in internal and external costs. From an accounting point of view, this is a direct loss of profit for the company. If we look at the causes of these internal and external costs associated with poor quality, they are due to low preventive costs, wherein a poor supplier control, insufficient staff training, lack of materials and/or tools, inefficient production planning, insufficient process control or poor communication are the main causes of the above 5 to 40% of the company's turnover.

Lean Manufacturing

The goal of delivering quality products mentioned by Norhazrina et al. (2020) to meet with customer requirements whole making maximum use of resources through the elimination of waste, is also set by the methodology of lean production. A methodology that originated as part of Toyota's manufacturing system in the middle of 20th century and has since spread to various industries around the world. The pressure to reduce all types of waste and meet customer requirements is growing with increasing competition, and thanks to empirically proven capabilities, lean manufacturing methodology is gaining more and more followers and thus becoming an integral part of corporate cultures. At the same time, as Rufe (2013) describes and approves, there is currently no argument against the need to engage in continuous improvement activities if the company is to remain viable and competitive in the global marketplace.

As described in previous paragraph and also by Jackson (2015), one of the causes of poor quality is inadequate processes within the company; together with insufficient control. To eliminate waste and variations in processes within the company, there are several tools that lean manufacturing applies. These are tools such as 5S, Kaizen, Kanban, SMED, Poka-Yoke, TPM, JIT or Gemba. However, after identifying the processes that add value or output from the so-called voice of the customer from the customer's point of view, the most suitable tool is to analyze the current state of compilation of the so-called value stream map.

Value Stream Mapping

In the book by Gulati (2013) the value stream mapping tool (VSM), is most used in continuous improvement activities; both in manufacturing and service companies. The advantage provided by VSM is an easy and realistic representation of the process from the customer and back to the customer together with the representation of the flow of information and material.

And as Russell (2013) adds the output of VSM is a comprehensive description of the entire process from communication with the customer, through order processing, production to delivery of the products or services back to the customer. The benefit of VSM is the easy identification of the places in the process where value is created and where, on the contrary, waste occurs. At the same time, VSM provides certain insights into the whole process; allowing process participants to see whole flow, not just the separate part pertaining to their role. This often contributes to improved communication and understanding between the activities of the whole process, as you can see in an example from King (2009) in Figure 1.

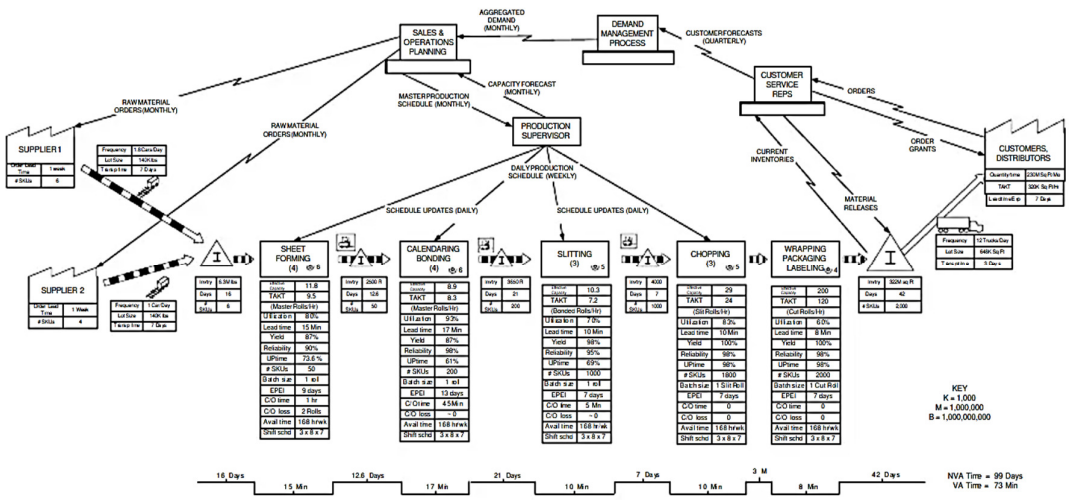

Figure 1: Example of value flow map processing.

At first look, VSM may appear similar to a process diagram, but the emphasis on the business impact of the whole process, based on lean thinking combined with the use of standardized symbols, makes VSM an advanced traffic management tool as relates Burke & Silvestrini (2017). Carried on by King & King (2015) the symbols are divided into three main groups capturing the flow of information, the material, and the timeline of the process. The information flow demonstrates the information flows from and to the customer in terms of managing the requirements of what and when is going to be produced and delivered with information flows between business entities. The timeline captures and compares the times of individual value-added-time process activities, along with non-value-added process activities times. The timeline is thus one of the key identifiers of the consequences of waste in terms of their types, not their causes. The flow of material from the point of view of manufacturing companies shows the transformation of material through the production process from its raw form to the finished product, and focuses only on the main activities of the whole flow or of the overall process. For a more detailed description and understanding of these main activities, so-called data boxes are compiled, which illustrate, for example, capacity, tact, utilization, OEE, but also quality.

Quality in Value Stream Mapping

The quality of the individual parts of the process described in the value stream can be referred to as "*Yield*", and defined using an equation (1):

$$Yield = \frac{Output}{Input} \cdot 100. \quad (1)$$

However as Kubiak & Benbow (2017) describes, this procedure and calculation strongly overestimates the quality of the activity because it does not reflect the internal costs associated with poor quality, such as repairs, rework, etc. The cause of overestimation is that repaired and reworked products are being returned to the process with subsequent of numerator increase. This simple difference can reduce the quality of the activity by a few percentage points and can greatly impact the visibility for the need for improvement in the activity.

If we move from measuring the quality of one activity of the mapped flow to measuring the quality of the overall flow, it is necessary to consider each partial step of the process. To obtain the overall quality, as the percentage of

units passing through the whole flow, referred to as the *Rolled Throughput Yield* (RTY), it is necessary to multiply the quality of each sub-process according to equation (2):

$$RTY = \prod_{i=1}^{n} TPY_i, \tag{2}$$

where:

n = Number of subprocesses,
TPY_i = Throughput yield of the ith subprocess.

Following on by Gigy & Williams (2012) from the above calculation it can also be expected that the multiplier effect achieved by the complexity of the process will have a negative effect on the overall quality of the mapped process; even under conditions where the quality of individual sub-activities will be high. For easier understanding and to visualize how complexity of the process reduces the overall quality of the output with the same level of quality of its individual parts, see figure 2 below.

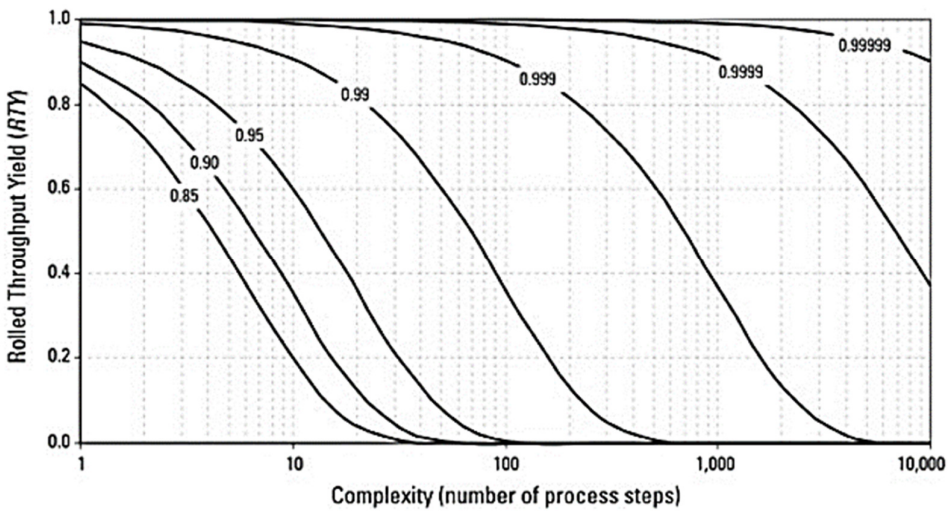

Figure 2: Decrease in the overall quality of the process at different levels of its complexity and the stable quality of individual activities.

Quality measurement options in value stream mapping

When mapping the value stream, the quality is recorded in one place, in the so-called data boxes, and as described more in detail in the previous chapter: it is not a completely unambiguous value. Therefore, this chapter is aiming introduce several options to improve the outputs associated with quality, and to possibly emphasize these outputs in the mapped activity of the whole value flow. One of these options is to focus on the percentage of defects occurring in each activity, referred to and called *Defects per Unit* (DPU), and can be determined according to equation (3):

$$DPU = \frac{Total\ defects}{Number\ of\ units\ observed}. \tag{3}$$

The benefit describe by Ruggeri et al. (2007) of DPU value is a focus on all possible defects that may appear during the activities taking place in the process or more activities. Consequently, it contributes to the visibility for the implementation of improvement activities.

A very interesting possibility for determining the quality of activities in a given process interpreted by Crossley (2008) can be the calculation of the process capability index, called the *Process Capability Index* (Cpk), which brings us to the introduction of this article and adds to the quality measurement requirements and specifications. Defined by the customer in terms of *upper specification limit* (USL), and *lower specification limit* (LSL), according to equation (4):

$$Cpk = min\left[\frac{USL-\overline{X}}{3\sigma}, \frac{\overline{X}-LSL}{3\sigma}\right], \tag{4}$$

where:

USL = upper specification limit,
LSL = lower specification limit,
σ = population standard deviation.

Once calculated, the result then gives a single value that acts as a measure of how a given activity or process produces products or services. The resulting value depends on the requirements of the customer, the industry, as well as the complexity of the process. The aim is to achieve a resulting value higher than 1.

Another option represented in the book by Stamatis (2003) is to focus on, and consider, the cause of defects. In both production processes and processes focused on services, the use of the tool *Failure Mode and Effects Analysis* (FMEA) is used quite commonly for this. FMEA provides a systematic method of examining all possible ways in which a failure can occur, while at the same time estimates for each defect its impact on the overall system, process or service, together with its severity and frequency of occurrence. A suitable and usable FMEA output is the so-called Risk priority number (RPN), see equation (5), which considers three basic components to help define the priority of a failure. They are *Occurrence* (O), which reflects the probability of failure, *Severity* (S), which determines the severity of a possible defect, and finally *Detection* (D), which describes the probability of detecting a possible defect.

$$RPN = O \cdot S \cdot D \quad ; \quad O, S, D \in [1,10] \tag{5}$$

where:

O = Occurrence,
S = Severity,
D = Detection.

There are many methods to define RPN components, but the most commonly recommended and used method is a numerical scale from 1 to 10. The disadvantage of FMEA is a lack of process chain visualization regarding defects, process control, or quality control loops. However, thanks to the use of RPN value and its subsequent implementation as another indicator in the data box of individual VSM activities, an interesting value stream indicator can be created. This allows for clear identify weaknesses and risk points in the process and then motivate the activities to implement appropriate measures with quality.

Another interesting possibility is to express the quality of either individual parts or the total flow of values using a monetary indicator. The main idea of this method for measuring quality is to use the attention of process owners to a clear and comprehensible indicator, which will almost certainly serve as a trigger for activities that will contribute to improving, if not eliminating, quality problems. The article by Haefner et al. (2014) deals with this issue which lists relevant costs related to quality preventive costs, costs associated with quality control, costs of repairing damaged products, costs associated with unsuccessful and discarded products, and finally the costs associated with product complaints by the customer using equation (6):

$$QC = PC_n + IC_i + RC_j + SC_k + CC_l \tag{6}$$

where:

PC_n = prevention costs,
IC_i = inspection costs,
RC_j = rework costs,
SC_k = scrapping costs,
CC_l = customer reclamation costs.

The next step is to insert the defined costs into the data box as another value describing the value stream or very interesting as mentioning article describes also presents a graphical visualization by adding a curve below the value flow map; which more clearly highlights both the cost of individual activities, as well as the total cost associated with the quality of the flow: as we can see in Figure (3) by Haefner et al. (2014).

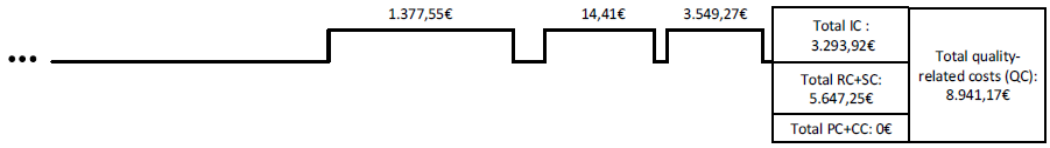

Figure 3: Example of application of a cost curve associated with quality together with the total costs of value streaming.

Acknowledgment

Competition between companies supplying customers with products and services is constantly increasing due to the development of industry, along with pressure to use their resources efficiently and reduce costs. For this reason, the costs associated with poor quality in the range of 5 to 40% of the company's turnover, as mentioned in the introduction to this article, can sometimes be liquidating. This fact contributes to the fact that more and more companies are implementing the concept of lean production, which aims to satisfy the customer's requirements to a maximum and ensure continuous improvement of the entire organization through the elimination of waste.

One of the tools that lean manufacturing methodology uses to visualize and identify weaknesses in a company's processes is value stream mapping. However, as the article describes, if quality is part of VSM, any given calculation is often not entirely clear and correct. This statement can be supported by Romero & Arce study (2017) that summarizes 120 studies published in the period 1990 - 2016 describing the implementation of the VSM tool; either alone or together with other lean manufacturing tools in various companies and enterprises. The outcome of this article is that of the 120 studies mentioned, more than half described improvements in lead time and Work in Process (WIP) metrics. Unfortunately, the quality of the process or value stream is not described and is not considered in this study; and probably in most of the 120 studies considered. Therefore, the reason may be intentional overestimation, misunderstandings, but also the low quality of training in the processing of VSM. For this reason, the article showcases other possibilities for quality measurement, which can be incorporated into the data boxes of the material flow, and thus help in the identification of weak points and their subsequent improvement.

One option is the DPU value, which focuses on the percentage of defects that occur in terms of all the possibilities of a given activity, and thus helps to better approach and identify the weak points of the process. Another option described in this article was the Cpk index, which describes the process's ability to meet customer requirements and specifications, which are defined as upper and lower output limits. These customer-defined limits, often referred to as service-level agreements (SLAs), can very easily be translated into a key performance indicator (KPI) of a given process, center, or line. By giving more consideration to the causes of defects a FMEA tool was showcased as a systematic method of examining all the ways in which a failure can occur. At the same time, it provides an estimate for each defect and its impact on the overall system, process, or service; together with its severity and frequency of occurrence by using its RPN value. A further interesting possibility or option is to express the quality of either individual parts or the total flow of values by using a monetary indicator with the idea being to measure quality to use it for the attention of process owners to have a clear and comprehensible indicator, which will almost certainly serve as a trigger for activities that will contribute to improving, if not eliminating, quality problems.

In conclusion value stream mapping is a more complex tool of lean manufacturing that has been popularized in the last ten years of the last century. However, in many publications, it is often described as a pen and paper tool, with its own limitations. The increasing complexity of company processes, which is associated with the need for today's customer to meet various customer requirements, also contributes to the inadequacy of the tool. Mapping the value stream thus becomes a tool that is not comprehensive enough for the complex processes of today's industry; making it is necessary to look for ways to further develop this tool and possibly combine it with new tools and methods; creating a hybrid approach.

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The Value of Waste Data In Informal Waste Management Systems

Paul STEMMET
Department of Information Systems, University of Cape Town, Cape Town, WP, South Africa,
stmpau001@myuct.ac.za

Walter F. UYS
Department of Information Systems, University of Cape Town, Cape Town, WP, South Africa, Walter.Uys@uct.ac.za

Ulrike RIVETT
Department of Information Systems, University of Cape Town, Cape Town, WP, South Africa,
Ulrike.Rivett@uct.ac.za

Abstract

In developing countries, informal waste management systems and informal waste pickers (IWP) are the most significant contributors to diverting waste from landfills. Waste management systems (WMS) are core to enabling the successful measurement, decision support, and allocation of resources to solve the challenges of waste globally, but in developing countries, the quality and volume of data to support these systems are lacking. This systematic literature review surfaces environmental concerns and poor waste data quality as one of the leading research topics on adopting WMS in the last five years. It also highlights that if our perspective on waste changes from a hazard to an artifact that provides data about post-consumer consumption, it becomes more valuable to the waste management industry. The informal waste management industry and IWP are well-positioned at the source of separation to provide and unlock the value of this data. The emergence of IoT and big data allows businesses to collect data about consumer waste at scale that was never feasible before. By seeing waste as a valuable data archive that can address the challenges of data quality and data availability in developing countries, waste data can prove valuable in driving WMS adoption and driving policy and budget decisions in the private and public sectors.

Keywords: Informal Waste Management, Data mining, Internet of Things, Big Data, Green-IS

Introduction

Green-IS is a subfield of the information systems discipline investigating how information systems can support sustainability. It is focused on systems and not siloed challenges like Green IT and can, therefore, tackle much more significant problems (Jan vom Brocke, Richard T Watson, Cathy Dwyer, Steve Elliot, & Nigel Melville, 2013; Watson, Richard, Boudreau, Chen, & Huber, 2008). Examples include systems to assist a business in transport planning for fleet management (reducing emissions), supply chain management (to make sure packaging is optimized), and consumer-driven application that allows a consumer to select the optimum product for the environment choices. Formal waste management is one of the costliest services to a city (Artuso, 2011) and consumes, on average, 4% of high-income and 19% of low-income city budgets (Kaza, Silpa, Lisa Yao 2018).

Incorporating informal waste pickers into a cities formal WMS can lead to the extension of landfills; and waste-related data information can be collected at source, improving financing, policy, and planning decisions for both business and the city. Much work has been done over the years to create well-defined and engineered WMS's in industrialized countries (Marshall and Farahbakhsh, 2013). However, these systems lack the robustness to address specific challenges that developing countries face, such as urbanization, inequality, and economic growth towards the current integrated solid waste management paradigm. Five factors historically drive the adoption of WMS in developed countries (Marshall and Farahbakhsh, 2013) (1) Resource Scarcity, (2) Public Health, (3) Public Awareness and Participation, (4) Climate Change, and (5) the environment. (Marshall and Farahbakhsh, 2013). Four additional factors (1) Urbanization,

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inequality, and economic growth, (2) Culture and socio-economic aspects, (3) political landscape, and (4) international influences the adoption of WMS in developing countries (Marshall and Farahbakhsh, 2013). This paper analyses and interprets the main concepts connected to solid waste management, informal waste pickers, waste management system adoption, waste data, and economic development, presenting a high-level overview of gaps in the literature suggesting additional research areas.

Research Objective

'WMS's implementation tends to fail in developing countries because of the lack of standardized waste data that can drive management financing, policy, and planning decisions (Worldbank, 2018). This research sets out to determine, through a systematic literature review, what value data collected from the informal waste management industry has for the formalized waste management industry based on the following research questions:

1. What are the essential factors for the successful adoption of waste-management systems?
2. How can the data from the informal waste-industry add value to the waste-management system and drive adoption?

Rather than framing Informal waste pickers as reliant on WMS, this paper focuses on how Informal Waste Pickers (and the informal waste management industry) can contribute to the adoption of these drivers WMS and how IS can support it.

Literature Review

This research topic has a cross-disciplinary topic that focuses on social, environmental, and information systems. The storyline around which the central neutral narrative (Sylvester *et al.*, 2013) is structured is the factors that influence 'WMS's development and adoption over the years (Marshall and Farahbakhsh, 2013). It quantifies and links the research papers to the five main drivers for WMS in developed countries and considers the four additional driving factors identified for developing countries (Marshall and Farahbakhsh, 2013).

Methodology

This review examines this complex ecosystem by integrating the literature on information systems & Waste Management Systems & Informal Waste management industry. The informal waste management industry is represented by informal waste pickers (IWP) for the literature search context. A preliminary scan of the literature on a broad subject topic conducted through Google Scholar:" information systems & Waste Management Systems & Informal Waste Pickers" revealed minimal combined quality results on this topic. The results indicated that the subject is a cross-disciplinary search and that waste management is the connecting factor between the domain of IS and Informal Waste Pickers (Figure 2)

Figure 1: WMS is the connection concept between IS and IWP

Therefore, the literature search methodology was broken into two components, "IS and WMS"and "Informal Waste Pickers and WMS." The research areas identified was a cross-disciplinary search between environmental science, waste management journals, and information system journals. The review considered the eight top information systems journals, computer science, waste management, and environmental science journals. The Special interest group for Green IS (SIGGreen) was also used as a departure point for references and sources. The investigation started broad with a Scopus, Web of Science, ACM Digital, and Google scholar search with a timespan of 2010 -2020 using the primary constructs of "Waste Pickers & Waste Management & Global South"and "Waste Pickers & Information Systems."

All the titles from the searches were reviewed and excluded if not directly connected to Waste Management, Waste Pickers, Information Systems, and the Global South. One hundred and three articles remained that focuses specifically

on these topics. Examination of the remaining papers' abstracts and main objectives highlighted how they would fit around the drivers for Waste Management as identified by (Marshall and Farahbakhsh, 2013).

Database	Papers
Scopus	36
Web of Science	84
ACM Digital	26
Google Scholar	1190

Figure 3: Papers by Sources

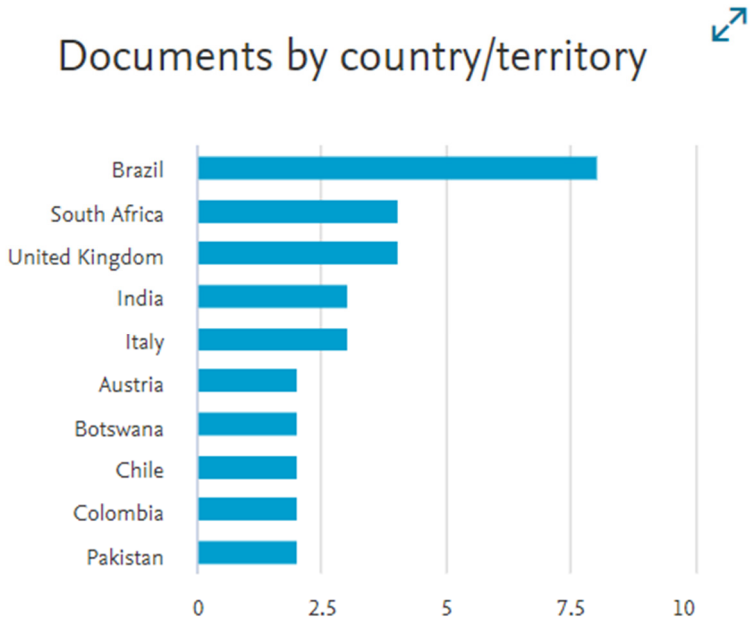

Figure 4: Documents by Territory and Country

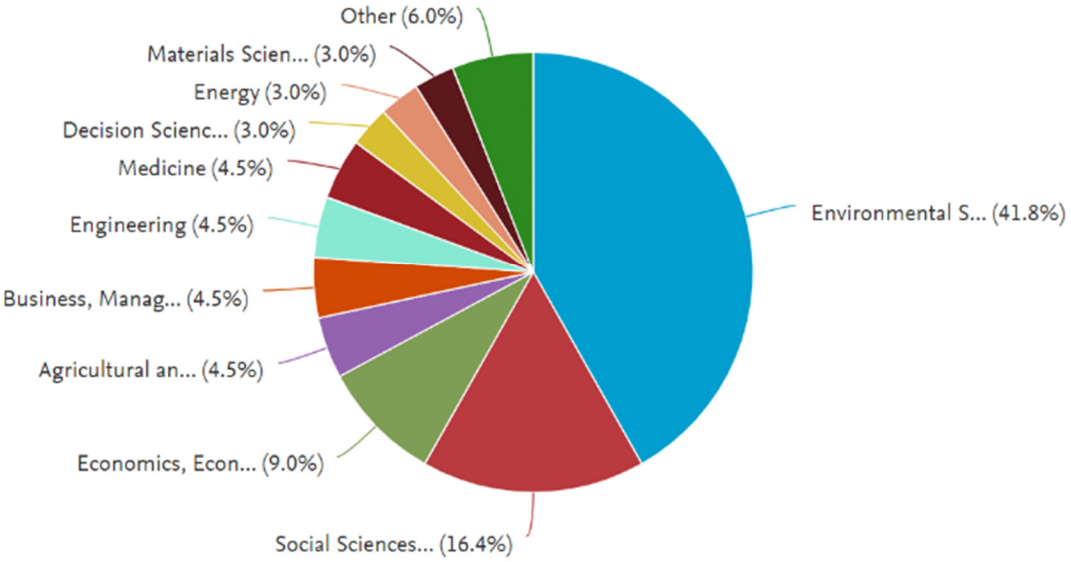

Figure 5: Documents by discipline

Structuring the papers around the central narrative of the five adoption factors for WMS reduced the combined article count to 28 (Figure 6). The initial searches revealed that research around waste management systems and Waste Pickers is more robust (higher h-index and g-index) then research found around the topic IS and Waste Pickers. A reference check was also done on the remaining papers to confirm if all subjects were covered, and two additional papers were found and added.

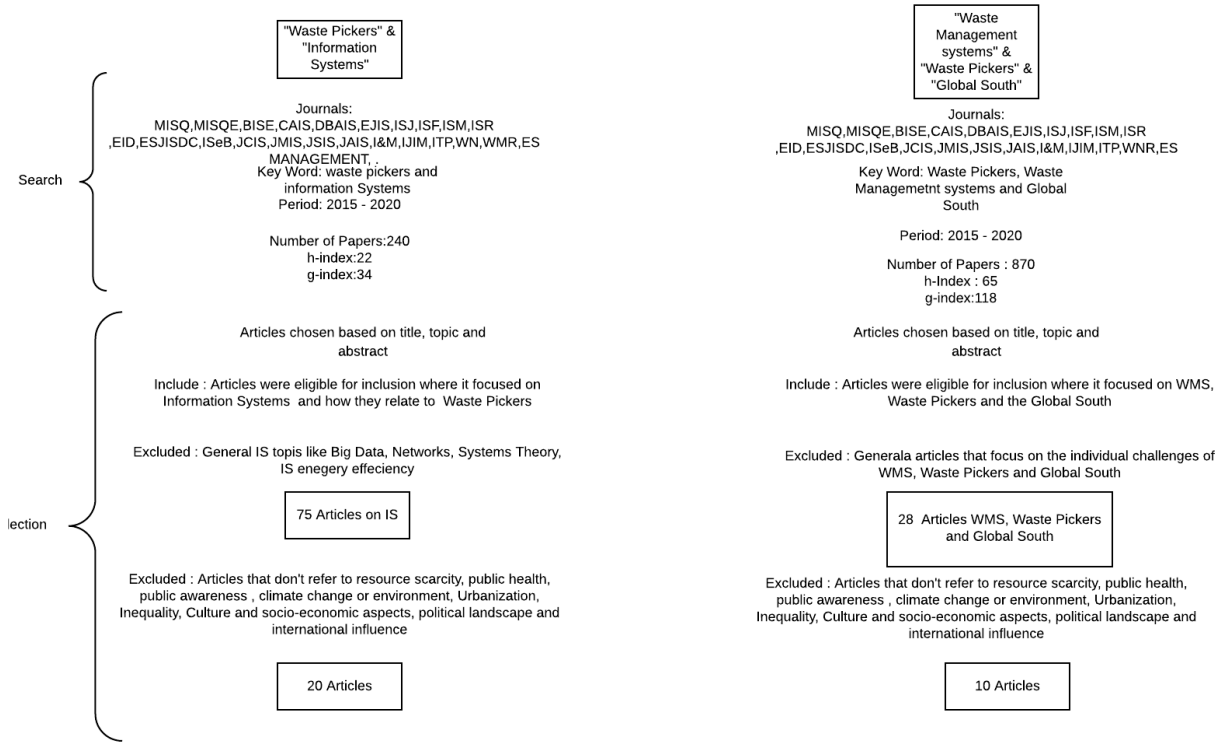

Figure 6: process followed in selecting Papers adapted from Gunter et al.,2017

Results

A descriptive review revealed waste management patterns and how they are potentially associated with Informal Waste Pickers (Sylvester *et al.*, 2013) in a quantifiable output. A meta-analysis (R.A Guzzo, S.E. Jackson, 1987) created a picture of the pooled data and how these answers relate to the research question. Individual articles were read in detail and based on word count, focused around the five primary drivers of WMS (Marshall and Farahbakhsh, 2013) words: “Waste Pickers,” “Health,” Environment,” “Awareness,” “climate,” “scarcity.” When reading the articles, the four drivers in developing countries were taken into consideration, namely: “urbanization inequality, economic, growth, culture, politics, international.”. This review quantifies and links the research papers to the five main drivers for WMS in developed countries and considers the four additional driving factors identified for developing countries (Marshall and Farahbakhsh, 2013).

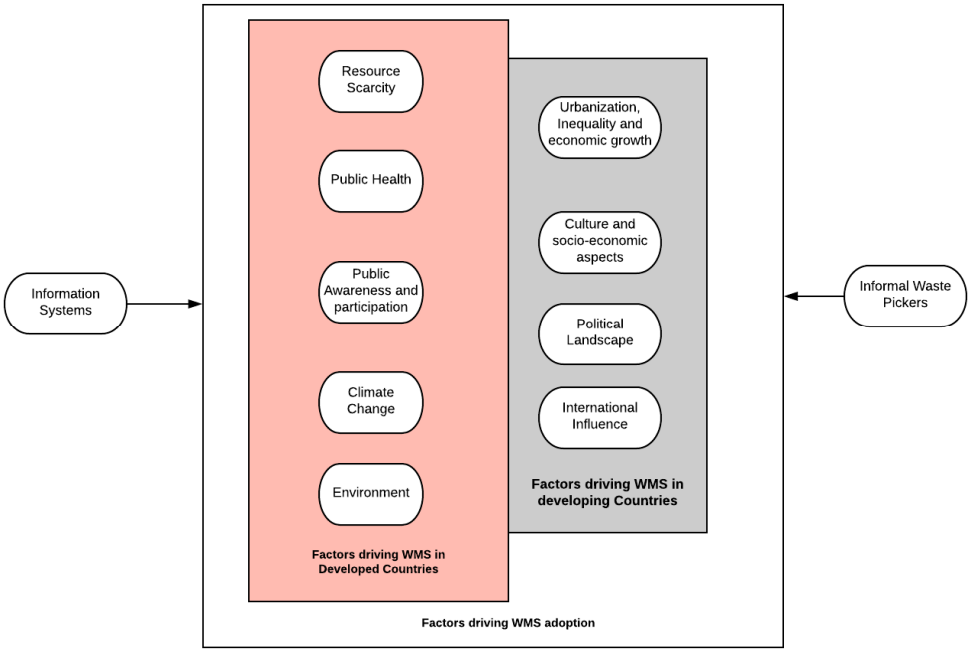

Figure 2: 5 Drivers for WMS influenced by Waste Pickers and IS

(Adapted from Marshall and Farahbakhsh 2013)

Concern for the environment emerged as the most important topic as a driver for WMS. Scarcity itself (of resources), health, and the climate were not featured that high. Considering that the main driver from the literature seems to be people's concern for the environment for adopting WMS, the paper continues by exploring how the informal waste management industry, WMS, and IS can support the environment itself.

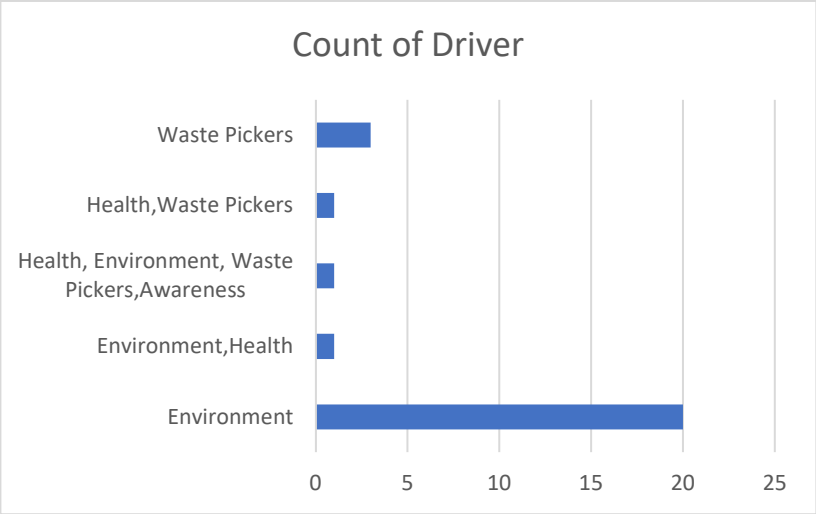

Figure 7: Papers mapped to 5 Drivers of WMS in developing countries

By overlaying papers with a high frequency of information system concept, Waste Pickers, WMS and where the environment is the primary concern (Table 2), we can isolate that papers 23,24,25,28,29 covers our main emerging driver, namely environmental factor and how it is connected to our three main concepts IS, Waste Pickers and WMS.

Table 2: Mapping WMS to Waste Pickers and IS

Concept	Paper
Information Systems	[23],[24],[25],[28],[29],[30]
Waste Pickers	[1],[2],[3],[5],[6],[7],[8],[9],[11],[12],[13],[14],[15],[18],[19],[20],[21],[22],[23],[24],[25],[26],[28],[29],[30]
WMS	[1-30]

Five clear concepts emerged from a word count performed on the papers (Figure 8), (1) Private Sector,(2) Data, (3) Value, (4) Separation at source, and (5) Integrated Waste Management.

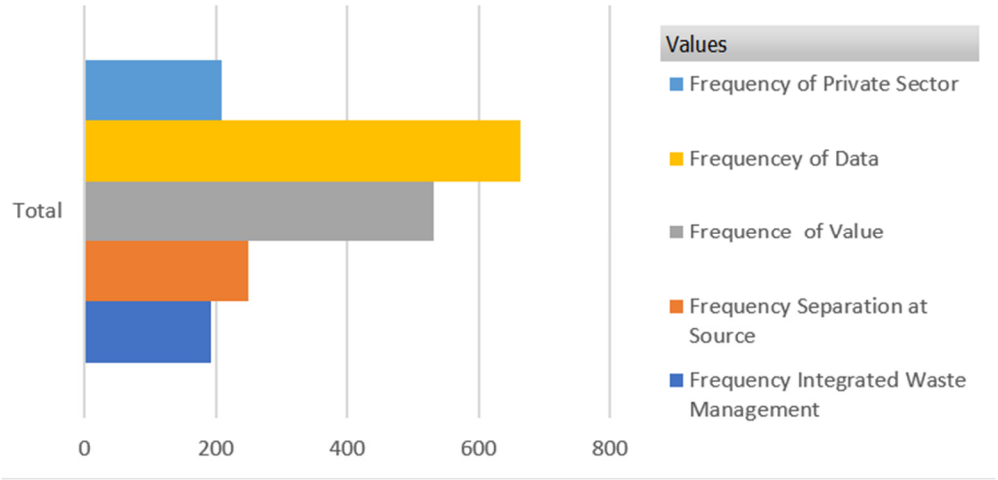

Figure 8: Emerging concepts within the WMS, Waste Pickers, IS, and the environment

The literature surfaced the Integrated Sustainable Waste Management Model (ISWMM) (Guerrero, Maas and Hogland, 2013) that highlighted five factors : (1) Policy & Legal, (2) Economic and financial instruments, (3) institutional arrangement, (4) social acceptance and welfare and (5) technical and operation influence the adoption of WMS in developing countries.

A conceptualized model is presented based on these concepts (Fig.9), with the resulting findings discussed.

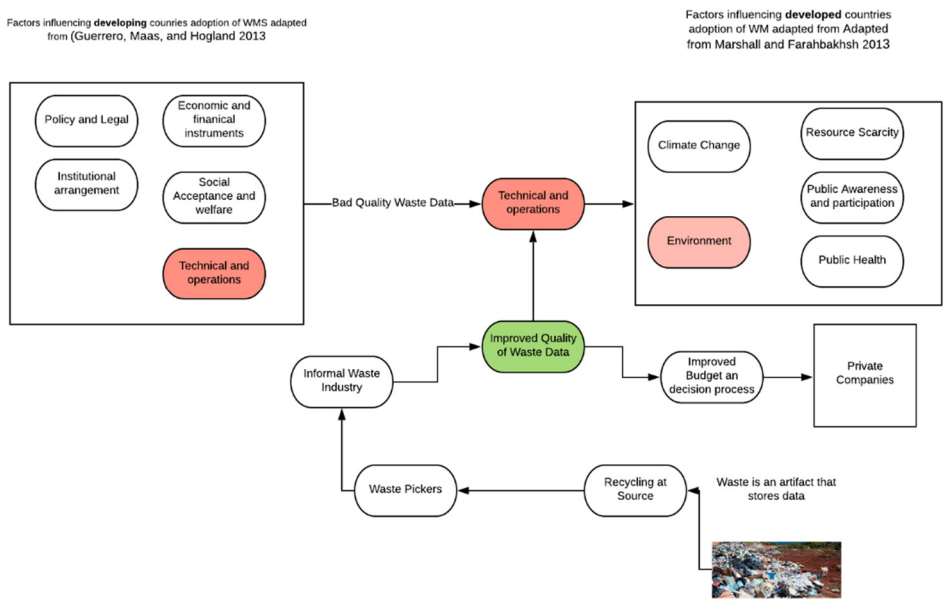

Figure 9: Conceptual Waste Data Model adapted from Guerrero, Maas, and Hogland (2013) and (Marshall and Farahbakhsh, 2013).

These five themes of this model are explored in further detail below.

Integrate Solid Waste Management

The current paradigm for formally managing solid waste management (SWM) called: "integrated solid waste management" (ISWM) originated in the 1990s with a policy shift away from landfill and a push to a broader understanding of the impact of waste on the environment (Marshall and Farahbakhsh, 2013). ISWM strives to balance environmental effectiveness, social acceptability, and economic affordability (Marshall and Farahbakhsh, 2013). Waste management systems that do not consider social components have a smaller chance of success (Joos *et al.*, 2000; Henry, Yongsheng and Jun, 2006). Over-complex technology and techniques that are too expensive to maintain, technical and operational issues influence WMS adoption in developing countries (Guerrero, Maas and Hogland, 2013; Marshall and Farahbakhsh, 2013). Another aspect contributing to the technical and operational issue is the lack of useful quality data in developing countries on waste generation and composition, leading to a lack of information to implement solid waste management systems (Guerrero, Maas and Hogland, 2013; Marshall and Farahbakhsh, 2013).

Reducing waste by separation at source

Separation of waste at source refers to the separation of post-consumer waste at the point of generation to prevent the waste from ever entering the formal waste management system(City of Cape Town, 2019). Separation at source potentially provides one of the most accessible and cost-effective measures to limit the amount of waste that enters a city's waste management system(Miezah *et al.*, 2015; Mian *et al.*, 2017; Nahman and Oelofse, 2018; Wehn and Almomani, 2019). Waste pickers provide an informal separation at source service, minimizing waste to landfills (Peres, 2016) as they value much of what might typically enter the waste system (Marshall and Farahbakhsh, 2013). There is a financial benefit to the formal plastic recycling industry when the source's recovery process is improved (Genc, Zeydan and Sarac, 2019). Also, there is a strong case for modifying waste management systems from developed countries for

the global South's unique requirements (Oteng-ababio, Owusu-sekyere and Amoah, 2017; Millington and Lawhon, 2019; Schröder, 2019). Recycling at the source provides crucial waste data from the generation of waste.

Informal Waste pickers

Informally dumped waste constitutes almost 90% of all waste in low-income countries (Artuso, 2011), with waste pickers playing a pivotal role in recycling this waste. In many cities across the Global South, thousands of individual waste pickers, sometimes organized as cooperatives, sustain themselves by extracting recyclable waste from street dumps and landfills, diverting these to recycling value chains (Wilson *et al.*, 2015). This way of life is, however, is under threat due to the gradual formalization of the industry globally and the exclusion of waste pickers (Schröder, 2019). Socially there are challenges and stigma between waste pickers, society, and the waste management industry (Wiego,2014), with waste pickers, sometimes forced to project a particular picture of themselves to be accepted (Peres, 2016).

The value of waste data

The literature highlights that depending on perspectives, waste is a resource, hazard, commodity, manageable object, help, and, more importantly, for our research question, an archive of knowledge (Moore, 2012). Landfills, garbage, and refuse to produce the "remainders of everyday life." By conceptualizing waste as an artifact that stores knowledge, it can provide information about contemporary consumer culture and become valuable. This analysis highlights that waste data itself, and its value within the environment and integrated WMS play an essential role in driving WMS adoption in developing countries (Genc et al. 2019; Guerrero et al. 2013; Kaza, Silpa, Lisa Yao 2018).

The Private Sector & Solid Waste Management

It is nearly impossible for countries and cities to battle the onslaught of population and pollution growth independently. It can only work with public-private partnerships, focusing on economic, social, and environmental pillars (Vitorino de Souza Melaré, Angelina, Montenegro González, Faceli, & Casadei, 2017). Business is still grappling to understand how to merge profits for its shareholders, environmental sustainability (Dao, Langella, & Carbo, 2011), and what the client wants. (Dao et al., 2011) refers to this as the new triple bottom line and argues that if companies develop an integrated sustainable framework (humans, supply chain, and IT resources), it will allow a company to achieve a sustained competitive advantage (Wu, Yang, Sun, & Zou, Dec 2018). Nobre and Tavares (Nobre & Tavares, 2017) extended this by arguing that the emergence of big data and the internet of things (IoT) would allow businesses to collect large numbers of data at a low cost to make a decision and extend their advantage instantly. The capability to share information with supply chain partners coupled with information systems that contain environmental information would allow businesses to increase their environmental performance by acting as a mediator in the supply chain (Meacham, Toms, Green, & Bhadauria, 2013) and enhance their economic development and organization transformation(Wu et al., Dec 2018).

Findings

One of the limiting factors in developing countries adopting formalized waste management systems is at a "technical and operations" level. The lack of quality data hampers decision making and planning ability for the adoption of waste management systems. Waste pickers and the informal waste industry in developing countries are well-positioned to improve the quality of the data needed to drive the WMS adoption in developing countries by generating data from recycling at source. Waste itself is an artifact with the ability to provide waste data about post-consumer behavior. It provides an affordable, high-quality waste data source that addresses one of the leading factors (technical and operational) in adopting WMS in developing countries. (Marshall and Farahbakhsh, 2013). Improving the quality, volume, and range of the collected waste data can be achieved by collecting the separation data at its source. The informal waste industry and IWP is well positioned within the waste industry to provide this data since they are responsible for recycling 90% of all waste in low-income countries. Data generated from waste can drive WMS adoption in developing countries by providing the necessary information at a sustainable cost to support "Technical and Operations" factors. For private business, the volume of data available at a low cost due to emerging technologies (IoT) could allow for rapid strategic decisions, providing an immediate strategic advantage.

Conclusion

This article set out to examine the factors influencing waste management in developing countries and how the informal waste industry can contribute to the adoption of waste management systems. The research used a descriptive review build around the five factors that drive waste management system adoption (Marshall and Farahbakhsh, 2013) in developing countries. It explored waste management systems in developing countries in the informal waste industry, focusing on waste pickers. Concern for the environment and the lack of quality data emerged as the leading factors that drive the adoption of waste management systems within developing countries. The paper has found that informal waste-pickers' data can help generate quality, affordable data to assist in adoption WMS in developing countries. The research paper proposed a conceptual model for the informal waste industry's inclusion within the formalized waste management industry to improve the quality and volume of data available to the formalized industry to drive policy and budget decisions. Future research could examine how this waste data information is leveraged in models that drive the informal industries' adoption within the formalized waste management industry.

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An Exploratory Survey on Perceived Privacy and Cybersecurity Challenges Faced by Professionals When Working from Home During COVID-19 Pandemic and Best Practices for Effective Risk Mitigation.

Glorin SEBASTIAN

School of Public Policy, Georgia institute of Technology, Atlanta, GA, USA
gsebastian6@gatech.edu

Abstract

According to PwC'S COVID-19 CFO Pulse survey, 41% of the finance leaders surveyed in North America said that they struggle to strike the right balance between flexibility and security for remote work. With major portion of the workforce in every country working from Home, employers might not have accounted for this scale of load on their IT infrastructure, not to mention their cybersecurity preparedness. Cybercriminals have been working to exploit this unpreparedness of the employers with regards to their IT Infrastructure. The purpose of this study is to discuss the increased Privacy and Cybersecurity risks of work from home due to Covid-19, and includes a framework that has concise and simple but extremely effective steps to mitigate and prevent these cyber-attacks.

Keywords: Privacy Risks, Cybersecurity, Covid-19, Work from Home.

Introduction

With the Covid-19 Pandemic affecting the entire Globe with over 40 Million cases, and 1 Million deaths as of October 2020 , per data obtained from Johns Hopkins Coronavirus Resource Center, and with a large percentage of workers and students working from Home or remote, could be the beginning of what William D. Eberle, Professor of Economics in Stanford's School of Humanities and Sciences in his June 2020 article on Stanford News calls the 'Work from Home' Economy. With the Covid-19 Pandemic which started in late 2019, stretching into 2021, the Pandemic is something that the world has not seen in the past 100 years, with almost everyone working from Home except the essential and front line workers.

According to PwC'S COVID-19 CFO Pulse survey, 41% of the finance leaders surveyed in North America said that they struggle to strike the right balance between flexibility and security for remote work. With major portion of the workforce in every country working from Home, employers might not have accounted for this scale of load on their IT infrastructure, not to mention their cybersecurity preparedness. With this record numbers of employees working from Home, companies are struggling not just to cope with the need for IT infrastructure to support the increased load on their IT servers but also to cope with the increase in cyber-attacks on their IT infrastructure. Cybercriminals have been working to exploit this unpreparedness of the employers with regards to their IT Infrastructure as is clear from the increased number of Cyber-attack complaints received by the FBI and Interpol.

The FBI reported in April 2020 that the number of complaints received by its Cyber Division was up to 800% increase from the numbers pre-coronavirus. Monster Cloud, a Managed Cybersecurity Services firm in its August 2020 Blog, noted that Interpol reported an "alarming rate of cyber-attacks aimed at major corporations, governments, and critical infrastructure". There has also been corporate ransomware attacks around August 2020, on multinational companies such as Honda, Garmin and Canon.

Given these circumstances, it is extremely timely and crucial for not just Multinational companies but also healthcare providers with significant amount of Health information, PII (Personally Identifiable Information) and PHI (Protected health information) to be aware and enforce proactive controls towards mitigating this very real risk. For example, the twitter handle hack in July 2020, in which twitter employees were targeted in a phone spear phishing attack, which led to bad actors assuming control of celebrity twitter handles including that of a former US President as reported in Twitter Blog. All these point to the proliferation of cyber-attacks against corporations and its employees.

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There are multiple types of cyber-attacks, however the common types that could affect work from Home systems include:

1) ***Social Engineering such as Phishing:***

Social Engineering refers to cyber-attacks that is accomplished through the weakest link i.e. humans. The bad actor who performs Phishing attacks uses social engineering techniques to deceive end-users, most times relying on human error, which indicates the importance of user-focused studies to help prevent future attacks as noted in the Systematic Literature Review by Das, Sanchari. (2019). Social engineering attacks are becoming very common even on corporate networks. An advanced version of Phishing is Spear phishing, which targets a specific person or group and often includes information known to be of interest to the target, such as current events or financial documents." Like other social engineering attacks, phishing attacks take advantage of the human tendency to respond to an emergency, hence most phishing emails would include a scenario that requires immediate action from the reader.

2) ***DoS and DDoS Attacks:***

A denial-of-service (DoS) attack occurs when legitimate users are unable to access resources such as information systems, devices, or network resources due to the actions of a malicious cyber attacker. A distributed denial-of-service (DDoS) attack is similar to DoS attacks, but usually includes multiple machines that are operating together to attack one target. DDoS attackers often leverage the use of a botnet—a group of hijacked internet-connected devices to carry out large scale attacks as per Security Tip (ST04-015) (2019). These attacks are specially of increased prominence with the emergence of 5G technology and IoT (Internet of Things) since increased internet speeds and interconnected IoT devices form the perfect scenario for these attacks.

3) ***Ransomware Attacks:***

Ransomware is a malware that when infects systems, usually encrypts all the data including, critical information and is perpetrated by bad actors or attackers who often demand money in return to the organization getting back access to their data. Ransomware attacks are particularly seen to target healthcare clients to gain access to the PII (Personally identifiable Information) and PHI (Personal health information).

Given this proliferation of Cyber-attacks specially on work from home setups, we also performed a study as part of this research. The main objectives for this study are as follows:

1. To measure the awareness among everyday company employees on the proliferation of the cyber-attacks, accelerated by the work from Home due to the Covid-19 Pandemic. This awareness is essentially also a measure of the effectiveness of employee cyber awareness training that they received from their respective corporate firms.

2. To suggest effective methods that companies could use to proactively detect and mitigate these Cyber risks, so that these attacks do not obstruct the work from home environment as well as to meet the most common security objectives for remote work as defined by NIST Special Publication (SP) 800-46 which is the CIA triad:
   - Confidentiality - ensuring that remote communications and data cannot be read by unauthorized parties.
   - Integrity - detect any changes to remote access communications that occur in transit; and
   - Availability—ensure that users can access resources through remote access.

Materials and Methods

The study included a survey conducted over 2 weeks in October 2020 and surveyed 109 participant responses. The survey was conducted over Google forms and shared individually to professionals on LinkedIn. To maintain uniformity the study was conducted only on professionals who could work from home completely.

The survey included questions on topics such as:

1. Ensure all the respondents had the required IT infrastructure to work from Home.
2. Enquire if the respondent company has enabled extra security measures/ controls such as VPN, Two Factor Authentication etc. to counter this increase in spam or phishing attempts.
3. If the extra security measures enabled by company has affected the employee productivity.
4. If since start of the Covid-19 Pandemic, while working from Home, the end user has experienced an increase in fraudulent emails, Phishing attempts, or spam to his/her corporate email.

Finally, the users are also asked to share suggestions on how to mitigate these Cyber security and Privacy related concerns that they might have with working from Home or remotely. The Data collected was analyzed and expressed as percentages and proportions. Please refer Table-1 for the survey responses from the study participants.

Results

All the 109 respondents have been working from Home 75% or more for the past 6 months, and most of them had enough IT infrastructure to work from Home and also had their company enable extra security measures or controls to counter increase in spam or phishing attempts.

Over 60% of the respondents agreed that there has been an increase in fraudulent emails, Phishing attempts, and spam to corporate email, since start of Covid-19 Pandemic, while 15% of the respondents thought that extra security measures had an adverse impact on their productivity. (Table 1)

Table-1: Survey responses of the study participants

What percentage of your work have you been doing remotely for the past 6 months?	***Response***
96-100%	89%
76-95%	11%
Do you have enough IT Infrastructure e.g.: Strong Internet connection, Laptop/ Desktop with the required specifications etc. to effectively work from Home?	**Response**
Yes, I had the required IT infrastructure to effectively WFH before the Pandemic	94%
did not have it prior to the Pandemic, company helped with setup during Pandemic	6%
Has your company enabled extra security measures/ controls such as VPN, Two Factor Authentication etc. to counter this increase in spam or phishing attempts?	**Response**
Yes	66%
No	28%
Did not notice	6%
If you answered Yes for above question, have these measures, affected your productivity?	**Response**
Yes	15%
No	85%
Since start of Covid-19 Pandemic, while working from Home, have you experienced an increase in fraudulent emails, Phishing attempts, and spam to your corporate email?	**Response**
Yes, there has been an increase	**62.4%**
No, there has not been an increase	37.6%

Measures for Mitigation of Cyber security Challenges

The Information Technology Laboratory (ITL), a component of the NIST Computer Resource Center, has issued a bulletin that reiterates NIST standards for teleworking. We compiled the mitigation measures suggested by the study participants and Special Publication (SP) 800-46 Revision 2, to come up with an 8 step WFH (Work from Home) Cyber-attack mitigation plan. (Figure 1). These should be included as part of internal controls by the Risk and Controls team as noted in the review article by Sebastian, G (2020) to ensure its implementation within the firm. While coming up with this framework we focused on effective and Policy friendly techniques which would be easy for the management to understand as well.

They include both detective and preventive controls, as described below and we recommend these Remote work security controls to be included in the firms security policy. However, each organization can decide on the level of enforcement of these controls based on a Risk based approach.

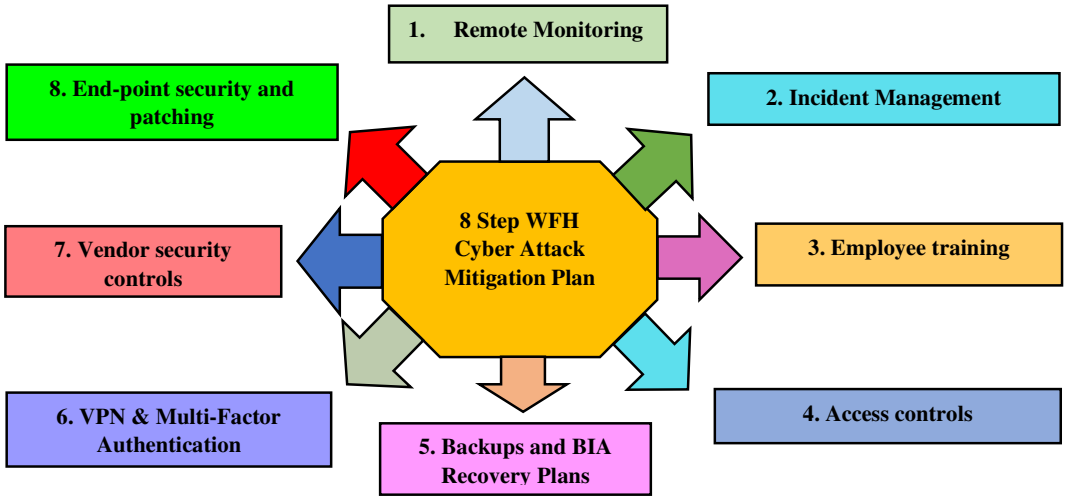

Fig. 1: Explains the Cyber mitigation steps that help combat cyber-attacks in workplace

Detective Control

1) *Remote Monitoring:*
Installing network scanning techniques including firewalls that restrict network traffic, DoS protection service that detects abnormal traffic flows and filters out such traffic. Active monitoring is one of the best detective controls to prevent Cyber-attacks.

2) *Incident Management:*
Incident management is a continuation of Monitoring and includes SIEM (Security information and event management) that provides a real-time analysis of security issues generated from the IT layers including application, network, and Databases. The technologies used for this incident management often have the ability for Data aggregation, correlation and sharing the information in form of Dashboards which can be used by management to assess risks and determine mitigation methods.

Preventive Control

3) *Employee training:* Humans are the weakest links in every cyber environment and hence it is to be made sure that, they are provided with appropriate training to ensure they are aware of the various attacks that they could face in a corporate environment. It is not just sufficient to have proper Employee security training, but there needs to be put in place a cyber-aware employee culture at workplace, and this awareness should be tested periodically with mock cyber-attack simulations.

4) *Access controls:* Ensuring the users have proper access controls and making sure to maintain proper segregation of duties between two conflicting business functions is important. Also there needs to be periodic review controls to ensure that the employees are not misusing their elevated access.

5) *Backups and BIA-Recovery Plans:*
Create a disaster recovery plan which includes backups and BIA (Business impact assessment) to set precedence for effective communication, mitigation, and recovery in case of critical cyberattacks. The backup plan specially helps in the case of Data loss. Also ensure the Data is encrypted on the device built-in storage including removable media used by the device.

6) *VPN, MFA:*
Both using VPN (Virtual private network) and MFA (Multi Factor authentication), ensures the user Data is protected. Employees that access company Data while connected to a VPN ensures that the Data in motion is protected between 2 devices on the Public network, same as they are connected over a Private network. Using the VPN provides security specially when connected to unsecured networks causing attacks such as man-in-the-middle attacks (MITM), eavesdropping etc. A Microsoft security blog dated August 2019, noted

that enabling MFA reduced cyber incidents by 99.9%. VPN and MFA together are the two most important preventive controls that can thwart majority of the Cyber attacks in a Work from home environment.

7) *Vendor security controls:*
Given a lot of critical Business processes and Data are outsourced to vendors, it is critical to ensure that the controls, especially Security controls on the Vendor side are effective. This usually is ensured via contract terms, and regular SOC (System and Organization Controls) audits. SOC-2 audit reports which audits the vendor Cyber and Data protection controls in place and its effectiveness is to be reviewed periodically.

8) *Endpoint security (including Wi-Fi and Access points) and Patching:*
Endpoint Security ensures each end point that is connected to the central corporate network is compliant to the organization standards and thus protects you from malware, ransom ware and other similar cyber-attacks. It manages the user access on an ongoing basis over the corporate network. It includes not just Anti-virus which is usually based on signature based protection, but end point security also includes, regular patching at Network, Application, Operating System and even at Database level, and this can be remotely monitored by Corporate IT Admin using technologies which recently has been using even Fuzzy logic, AI (Artificial Intelligence) etc. VPN discussed in #6 could be considered as part of end point security as well, but we included it as a separate point, since VPN is critical to Data protection for working from home, especially when connected to unprotected networks eg: in coffee shops. Endpoint security also includes central authentication techniques monitored by the Corporate IT Admin.

Discussion

This study tried to understand the perceived privacy and cyber security challenges faced by professionals when working from home during COVID-19 Pandemic and best practices on effective mitigation of risks. According to a similar study, by B. Gyunka and O. Christiana Abikoye (2017), one of the reasons for increase in cybersecurity risks is because we are lacking common practice and training on security. Another study by "Malicious Insider", Science Direct, 2020 found that the major challenge in cybersecurity is people risk management, authorization, and access control. In this paper based on survey study on work from home employees, we studied the perceived privacy and cyber security challenges faced by professionals when working from home during COVID-19 Pandemic. It is a fact that there has been a proliferation of Cyber-attacks since the start of the Covid-19 Pandemic, from the study we understand that most users are aware of this, but in Cyber security most is not good enough as it takes only one mistake from anyone of the employee to give a bad actor access to the enterprise resources.

Conclusion

In addition to the uncertainty caused by the Covid-19 Pandemic to health and the Economy, it is seen that cybercriminals are using this as an opportunity to launch cyber-attacks as most of the employees have been working from home for more than 6 months. We see that the employees are aware of this cyber-attack proliferation, but it needs to be made sure that all of them are fully aware of the cyber security and privacy risks posed by working from home. We also suggest an 8 step Work from home best practice framework for effective cyber risk mitigation while working from home. These steps in the framework are extremely effective to thwart cyber attacks and have been explained in a concise and simple manner, so that it can easily be used as a checklist for companies looking to incorporate remote work best practices into their security policy.

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Digitalization Wildfire Management while Climate Change and Covid-19

Valery M. ABRAMOV*
Russian State Hydrometeorological University, Saint Petersburg, Russia
val.abramov@mail.ru

Tatiana M. TATARNIKOVA
Russian State Hydrometeorological University, Saint Petersburg, Russia
t.tatarnikova.00@mail.ru

Igor A. SIKAREV
Russian State Hydrometeorological University, Saint Petersburg, Russia
ig.sikarev@mail.ru

Vyacheslav G. BURLOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vyach.burl@mail.ru

Vladimir N. ZAVGORODNIY
Russian State Hydrometeorological University, Saint Petersburg, Russia
vla.zav@mail.ru

Evgeniy A. BAIKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
e.baykov.00@mail.ru

Ekaterina M. KORINETS
Russian State Hydrometeorological University, Saint Petersburg, Russia
katt.korr@mail.ru

Vladimir A. BOLSHAKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vl.boll@mail.ru

Tatiana V. VEKSHINA
Russian State Hydrometeorological University, Saint Petersburg, Russia
tat.vekk@mail.ru

Ernest R. ESTRIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
ern.estrin@mail.ru

Abstract

In paper, we consider digitalization development results for managerial support to wildfire management within Industry 4.0 period while conditions of climate change and Covid-19. In studies, we used methods of data bases constructing, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties and risk management. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we demonstrate essential stages of managerial support system functioning for some examples of wildfire. For data exchange and preliminary discussion, we used platform https://www.researchgate.net/profile/Valery_Abramov2/ while research.

Keywords: Digitalization, Wildfire Management, Climate Change, Covid-19

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Introduction

Currently, global environmental economy wildfire management (WFM) area is within Industry 4.0 period, when while climate change and Covid-19 pandemic. Now, many businesses are planning and implementing a wide range of information technologies (Lukyanov, 2019), (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Trunin, 2019). Industry 4.0 leads to serious technological changes in geo-information support (GISS) for sea ports activity (SPA), including natural risks management (NRM) (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new tools, including practical learning area (Averkiev, 2020), (Korinets, 2020), (Popov, 2019).

In paper, we describe the development results for WFM digitalization within geo-information support to SPA within geo-information management (GIM) paradigm (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Mandryka, 2019), (Popov, 2014), (Popova, 2019), (Rumyantseva, 2017), (Zhigulsky, 2018) within environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). We paid significant attention to managerial support systems (MSS) within climate change and covid-19 pandemic context (Bournashov, 2014), (Gogoberidze, 2014), (Chestnov, 2020), (Chusov, 2012), (Sikarev, 2020), (Tatarenko, 2020), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). Developed digital technologies for MSS to WFM while climate change and covid-19 pandemic, considered in this article, take these factors into account.

Methods and Data

In study, we used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. Also, we used big data technologies (Popova, 2019), (Yaily, 2019) From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bidenko, 2019). While research, we used data bases and tools of geo-information digital online platforms (GIDOPs) Earth (Bolshakov, 2020), (Sanina, 2020), and EOS, including its Land Viewer (LV) product (Prostakevich, 2020), (Vekshina, 2020).

Results

Last years, WFM is a hot place in global environmental economy because of heavy lost, which estimates some billions US dollars globally. Due to climate change, annual losses due to wildfires are only growing. Due to the Covid-19 pandemic, revenues from the forest industry are falling, which significantly affects the resource availability **for** fire prevention. In these circumstances, it is necessary to combine the efforts and resources of commercial players, the civil sector and government authorities in solving the problems of WFM.We put forward a statement, that WFM in modern stage is to be carried out in the sustainable development paradigm as related set of large natural-industrial projects (NIPs) within common space area and time period.

In figure1, we present a block model of investment structure while WFM, that combines the investment objectives of such NIPs (blocks 1-5) with cost of adequate managerial support (blocks 6-8), including WFM's goals and tasks (block 7). Our analysis shows that the largest part of the cost of managerial support is the environmental monitoring (block 8), the essence of which is determined by the content of block 7. Significant part of the cost in block 8 is hardware and software, the cost of which varies significantly. Now, in Covid-19 pandemic conditions, cost of WFM can arise greatly because of general economic situation. On basement of above mentioned model, we proposed to develop the managerial support system (MSS) for WFM with combined structure for access, storage and analysis of information from open geo-spatial data sources, including archives and operative mode web tools. As a result of the research performed using foresight technologies, we suggest to use geo-information distributed online platforms (GIDOP) as the main technological solutions for MSS for WFM.

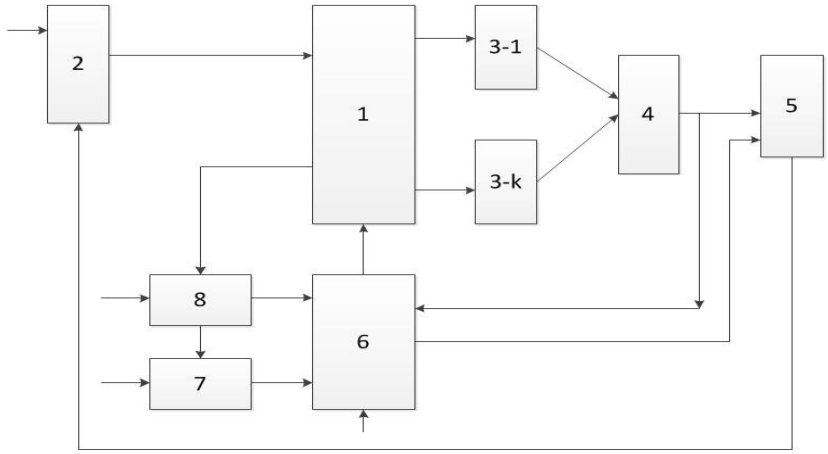

Figure 1 : Block model for investment structure while WFM: 1 – block of distribution of resources; 2 – block of formation of resources; 3 - block of formation of private income; 4 - block of formation of total income; 5 – block of formation of the investment share of resources; 6 - block of comparison with the permissible level of risk; 7-block of formation changing in time set of natural risks within WFM, including climate risks and Covid-19 pandemic risks; 8 – block of environmental monitoring for WFM while climate change, adapted to Covid-19 pandemic conditions

In our research, essential goal is block of environmental monitoring within MSS for WFM while climate change and Covid-19 pandemic. Reducing the cost of MSS is an important question for WFM while Covid-19 pandemic conditions. We propose to use GIDOP EOS eos.com, which provides efficient tools for searching, processing, and analyzing large amounts of satellite data from the Landsat-7, Landsat-8 and Sentinel-2 satellite systems. Usage of GIDOP EOS allows to find and use satellite images of forest areas with wildfires zones for training purposes, to determine the location of these fires and to assess their main spatial characteristics (linear and area dimensions), which are the main initial parameters for conducting wildfire struggle measures within WFM while climate change, adapted to Covid-19 pandemic conditions.

Let's go to example. In figures 2-6, we show the sequential operations performed for the largest wildfires in Australia in the fall of 2019 with using of GIDOP EOS and its tools. In the figures 2-6, we combine on one image the first and second mid-infrared (1566-1651 nm and 2107-2294 nm, respectively) and red (636-673 nm) channels, which allowed to identify the wildfires zones on combined space image as reddish colored areas on greening plane.

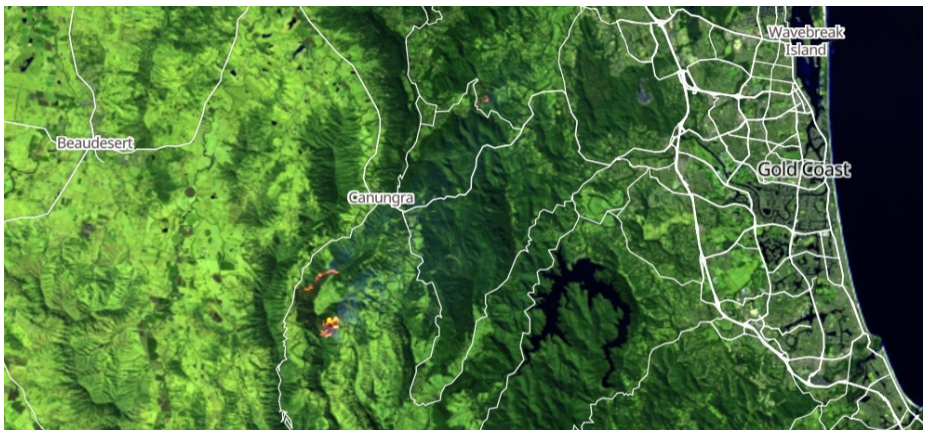

Figure 2: Space combine image with wildfire zones (reddish), 3rd September 2019, Australia

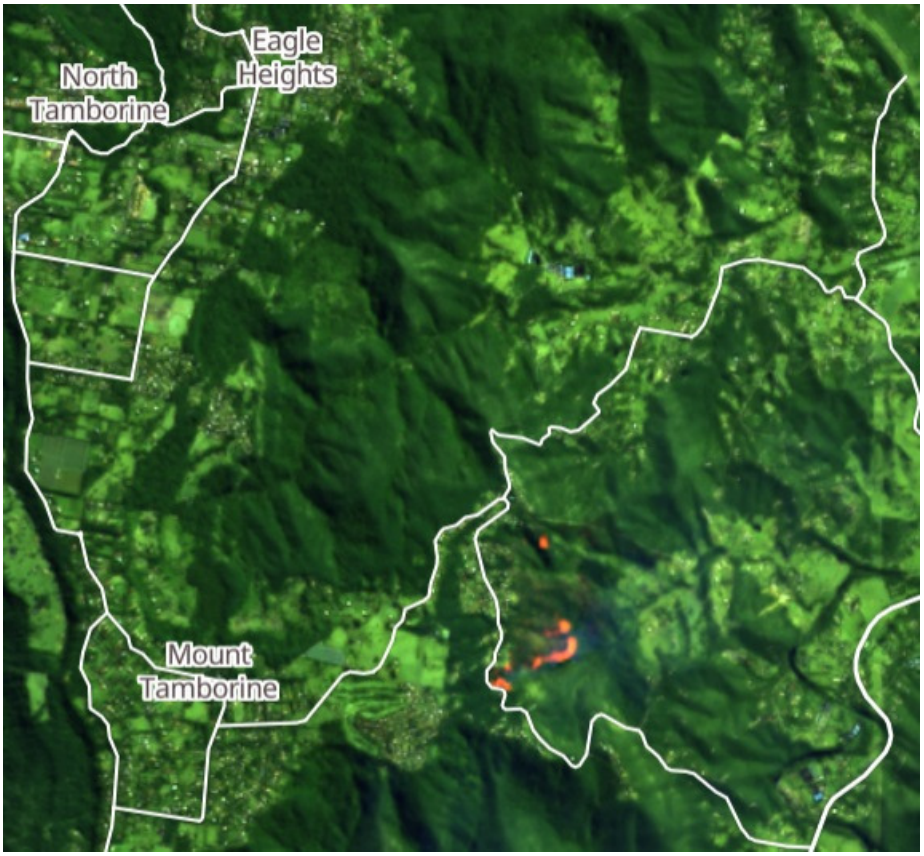

Figure 3 : Enlarge space combine image with wildfire zones, 3rd September 2019, Australia

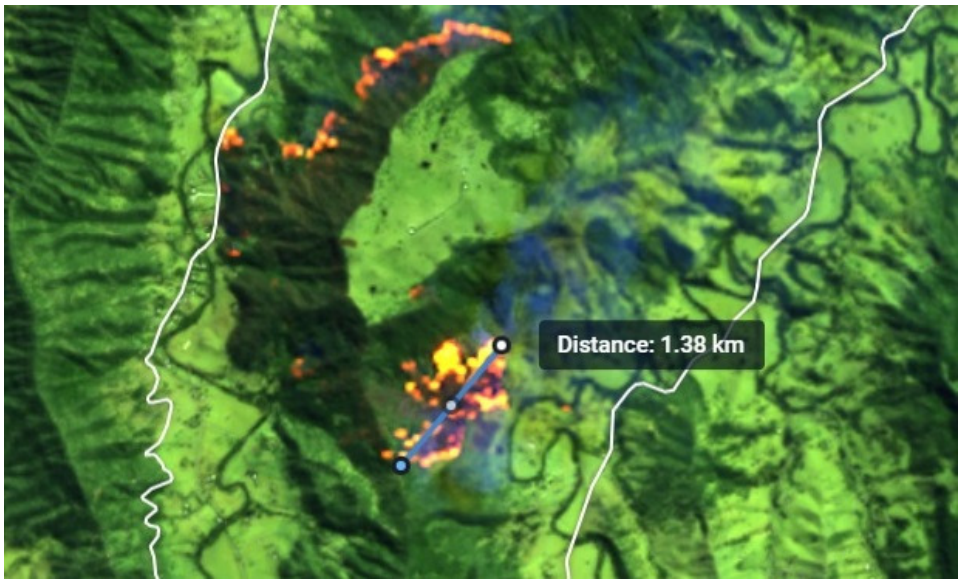

Figure 4 : Enlarge image of wildfire area and measuring its characteristics

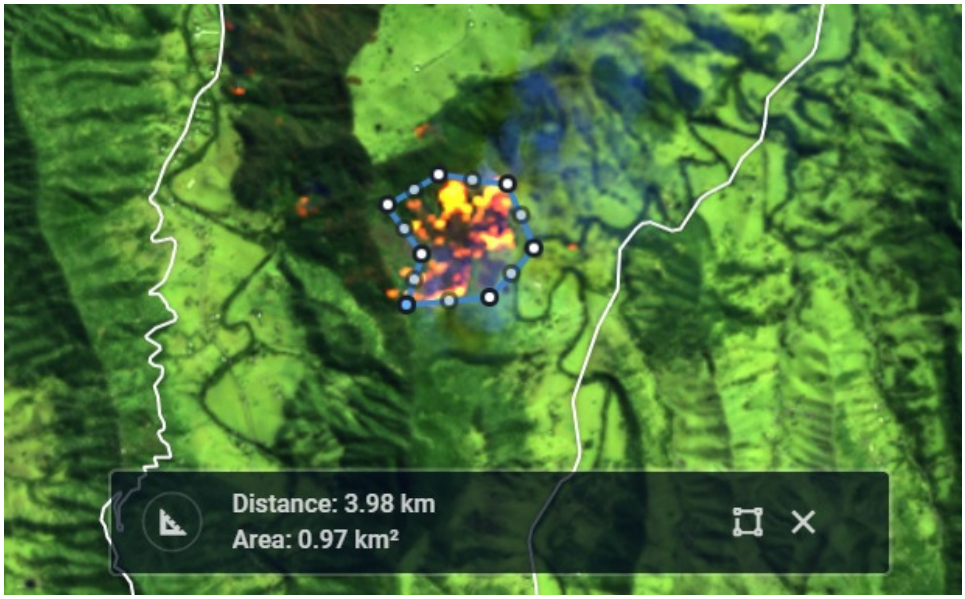

Figure 5 : Enlarge image of wildfire area and measuring its perimeter and area

Figure 6 : Enlarge image of another wildfire area and measuring its characteristics

Then, we obtained data for WFM from figures 2-6, using GIDOP EOS's data bases and tools, and combining on one image the first and second mid-infrared (1566-1651 nm and 2107-2294 nm, respectively) and red (636-673 nm) channels, to see wildfires zones on combined space image as reddish colored areas on greening plane. Note, discussion of those data using for WFM is not task of this article.

Discussion

Proposed above low-cost MSS for WFM can be used in educational and training purposes. The essential task of university practical learning in WFM area is to teach students the practical aspects of work with MSS for WFM tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies (Korinets, 2020), (Popov, 2019), that can reduce total cost of learning process.

Conclusion

In article, we describe digitalization results for WFM within Industry 4.0 period while conditions of climate change and Covid-19. In research, we used Foresight technologies, theory of decision making under uncertainties, risk management, methods of data bases constructing, web-technologies and virtual reality tools. As study result, we suggest to use GIDOP EOS, including its LV product, as the main technological tools within MSS for WFM. We demonstrate possibilities of MSS and show the sequential operations performed for wildfires in Australia in the fall of 2019 with using of MSS and its tools. As essential result, we propose to use developed MSS as basement for WFM, including educational and training purposes. The research results presented in this article has significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state environmental control bodies.

Acknowledgment

While study, Associate Professor Nikolay Popov, head of geo-information systems laboratory in Arctic and Subarctic Institute at RSHU (LGIS IAS RSHU), gave us very useful consulting. Platform https://www.researchgate.net/profile/Valery_Abramov2/ was used for preliminary discussion and data exchange while this research.

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Assessing UTAUT2 Model for Cyber Security Compliance: A Literature Review

Mohammed ALQAHTANI
University of Technology Sydney, Sydney, Australia
Mohammed.Alqahtani@student.uts.edu.au

Robin BRAUN
University of Technology Sydney, Sydney, Australia
Robin.Braun@uts.edu.au

Abstract

Cyber security breaches are caused due to misuse of information systems and non-compliance with cyber security measures and requirements. For effective compliance with cyber practices and human acceptance of cyber security technology, it is crucial to identify, research and analyze the factors contributing to its compliance and implementation. This study is an amalgamation and unification of the contemporary literature on the UTAUT2 model and the relationship between technology adoption and cyber security compliance. The rationale behind this study is to heal the literature gap regarding the relationship between technology adoption and cyber security compliance in the context of the Kingdom of Saudi Arabia. Based on our research and available literature, we can preliminarily conclude that factors influencing technology adoption also affect cyber security compliance, so there is a close relationship between technology adoption and cyber security compliance. This study proves a basic level idea to organizations to formulate a fully functional and useful security compliance framework for their organizations based on factors that influence the users' or employees' intentions and behavior. Consequently, the study is an exciting endeavor to prevent significant security weaknesses and reduce the security breaches in the information security systems by explaining different factors that strengthen the users' behavior and intentions to comply with the security. This is an ongoing study, and more information will emerge as it progresses.

Keywords: UTAUT2 model, technology adoption, cyber security compliance, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit.

Introduction

In the contemporary era, where technology is exclusively proliferating, organizations must adequately comply with cyber security measures to prevent cyber-attacks and data breaches. Cyber security compliance is exceptionally critical to be acted upon to better the companies to reap the benefits of cyber security measures and prevent cyber-attacks (Twizeyimana & Anderson, 2019; Koohang, Nowak, Paliszkiewicz & Nord, 2020). Consequently, ensuring compliance with cyber security requirements and measures are getting considerable attention in the current research industry for the establishment of adequate information security in the organizations and e-government offices (Herath & Rao 2009; Huang & Madnick 2020; Karokola et al. 2012; Vance, Siponen, & Pahnila 2012; Ronchi & Ronchi, 2019; Charlette & Osei-Bryson, 2020). The current study proposes a hypothesis to check out any potential relation between technology adoption and cyber security compliance. This study will be proving any potential relationship among the variables that influence technology adoption in light of previous research, studies, and literature.

Compliance with cyber security refers to changes in a person's behavior, conduct, and attitude due to a pre-established framework that may have been developed to view the requirement and risks to gain effective results of information security. According to the literature, compliance is not a reactive response. It needs to be viewed as ongoing organizational process. That is why cyber security investments are more critical than ever before (Haris & Martin, 2019; Shein, 2020). Cyber security and compliance go hand in hand; hence, aligning security programs with business objectives is necessary for a successful information security setup. The existing research on cyber security compliance has primarily focused on technological and behavioral factors, including developing and implementing the technical frameworks, factors like attitude, and the employees' behavior regarding compliance with cyber security (Alzahrani,

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2020). Most of the contemporary research does not primarily include factors that directly targets compliance and technological adoption in an organization.

Additionally, failure to cyber security measures has also enabled unauthorized people to misuse and abuse the information system that caused a rise in security breaches (Ronchi & Ronchi, 2019). Organizations need to establish and implement cyber security frameworks to secure the confidentiality and the privacy of their users and the data they possess. These strategies should focus on technological advancements such as Data Loss Prevention on emails of employees that help in preventing employees to send files and information outside organization that are restricted, authentication mechanism that force employees to use multiple factors, etc. On the other hand, they must also focus on the factors that directly influence employee's behavior, including technology acceptance, adoption, and cyber security compliance (AlKalbani et al., 2015; Karokola et al., 2012).

This study focuses on the UTAUT2 model of technology adoption (Venkatesh, Morris, Devis, 2003; Venkatesh, Thong, and Xu 2012). The primary focus of UTAUT is to explain the behavior and intentions of a user w.r.t adopting the technology. UTAUT2 is an extension of the UTAUT model (Venkatesh, Thong & Xu, 2012). However, the existing literature up to the knowledge, UTAUT2 model is not evidenced to be researched for cyber security compliance and to examine the relationship of the UTAUT2 model with security compliance.

Rationale & Objective

We hypothesize that cyber security compliance is related to technology adoption. The study is ongoing and at a very preliminary stage now. This hypothesis will be validated with surveys and questionnaires, especially in the context of Saudi Arabia in future work. We will mainly focus on the impact of technology use for compliance compared to behavioral change for cyber security compliance. With the advancement in technologies, now technology is also being able to enforce compliance with cyber security policies and measures.

This current study is a preliminary study for our future research, and its rationale is to study the UTAUT2 model concerning cyber security compliance in Saudi Arabia. The current paper is an addition to the existing literature in the market that can be used in future research to support and cite different findings and literature.

Literature Review

Cyber security Compliance

Compliance is the implementation of cyber security standards, and policies and these policies are then followed by the employees and organizations for adequate information security (Harris & Martin, 2019). Contemporary research indicates that many security issues arise due to the employees' non-compliance with the cyber security measures (Donalds & Osei-Bryson, 2020; Vance et al., 2012). Similarly, compliance with cyber security frameworks ensures the effectiveness of mechanism along with threat prevention and risk reduction (AlKalbani, Deng, & Kam, 2015; Chen, Chen, & Wu, 2018; Choi, Lee, & Hwang, 2018; D'Arcy & Greene, 2014; Donalds & Osei-Bryson, 2020; Karokola et al., 2012; Li et al., 2019).

For effective cyber security compliance, users are required to understand, take measures in the direction of compliance (Shappie, Dawson & Debb, 2019), and conform to the security measures (Charlette & Osei-Bryson, 2020). Choi et al. (2018) surveyed identifying the effect of the employee's behavior on cyber security compliance. The study concluded a positive relationship between user behavior and cyber security compliance, i.e. cyber security compliance influence employees' behavior.

UTAUT2 Model

Unified Theory of Acceptance and Technology 2 (UTAUT2) model is a relatively new Model that adopts conceptual and pragmatic likenesses in the previous eight models to explain and analyse the technology adoption process (Venkatesh, Thong & Xu, 2012). The primary aim of the UTAUT and UTUAT2 models is to explain user behavior and intentions for technology adoption. UTAUT has four constructs: performance expectancy, effort expectancy, social influence, and following facilitating conditions (Figure 1). The first three primarily determine the user's behavioral or usage intention, while the last one directly determines the user's behavior. Age, gender, voluntariness, and experience were posited as extraneous variables influencing the four fundamental factors corresponding to their usage intention and behavior (Benbasat & Barki, 2007; Venkatesh et al., 2003).

However, UTAUT2 is an extension of the UTAUT model. Venkatesh, Thong, and Xu (2012) anticipated UTAUT2 with new constructs; hedonic motivation, price value, and habit have been incorporated (Venkatesh, Thong & Xu,

2012). Although UTAUT2 is a relatively new Model, many research is in progress to test its validity, reliability, and suitability within diverse contexts (Venkatesh, Thong & Xu, 2012; Huang et al., 2020).

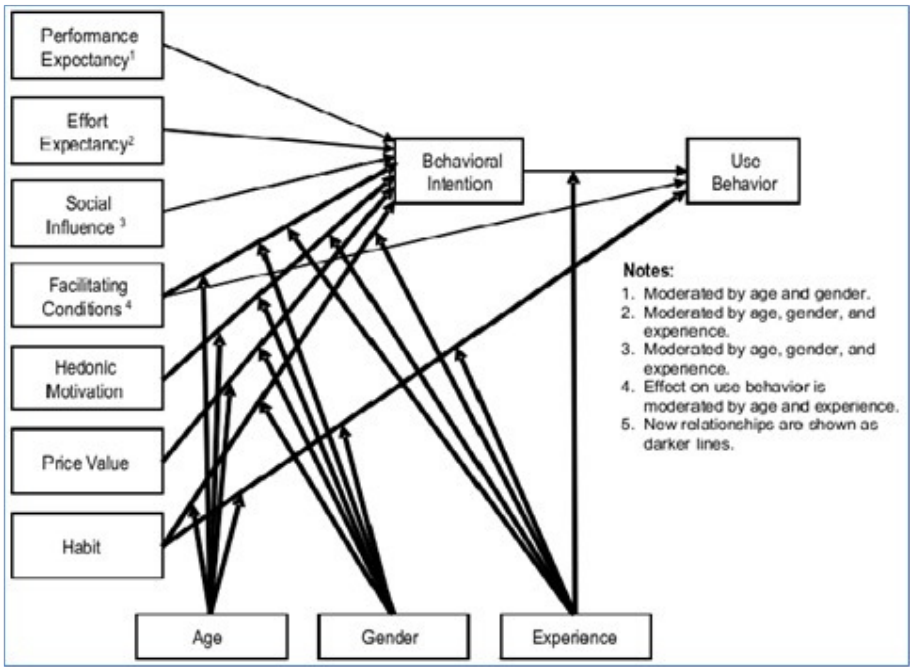

Figure 1 - UTAUT2 Model

Technology Adoption overview

Adopting technology refers to making vital decisions regarding accepting, deploying, and investing in them (Taherdoost, 2018). Technology adoption can be at the governmental level, organizational level, or individual level. The factors that affect the user's decision of technology utilization should be considered critical at every stage of technology development and deployment (Lai, 2017). On the other hand, awareness of emerging technology does not mean that the individual needs to adapt to every novel technology emerging. A company must be equipped with strong decision-making skills to choose a vital technology based on knowledge, experience, and acceptance ability.

A number of technology adoption and acceptance models have been developed to determine the relationship between the user's behavior and compliance with technology and its framework (Taherdoost, 2018). These technology adoption models highlight various factors that affect the adoption and behavior of the users. Some of these models may include Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DIT), Motivational Model (MM), Model of PC Utilization (MPU), Social Cognitive Theory (SCT), Unified Theory of Acceptance, Use of Technology (UTAUT) and other models (Taherdoost 2018).

Assessment of UTAUT2 for Cyber Security Compliance through literature

The unified theory of Acceptance and Use of Technology (UTAUT) has been a fundamental model in many studies in order to measure technology adoption and technology use (Maldonado et al., 2011; Fidani & Idrizi, 2012; Ain, Kaur & Waheed, 2015; Gharaibeh & Arshad, 2018). The literature shows that the UTAUT2 model has been used in various research in various contexts (Table 1).

In the following sections, a relationship of all constructs with cyber security compliance is stated in detail.

Table 1 - Industry-wide Application of UTAUT2

	Contexts	Reference
1	**Mobile Banking Services**	Gharaibeh & Arshad, 2018
2	**Smart Mobile Acceptance**	Ally & Gardiner, 2012
3	**E-Prescribing Technology Acceptance**	Cohen, et al, 2013
4	**Broad-Band Internet Adoption**	LaRose, et al, 2012
5	**E-Governance Technology**	Krishnaraju, et al, 2012; Vinodh & Mathew, 2012

Relationship between technology adoption & cyber security compliance

Cyber security compliance is a multidimensional discipline, and these disciplines are interconnected to ensure the implementation of cyber security policies and their compliance across the organization (Charlette & Osei-Bryson, 2020). The development and implementation of technical cyber security measures and the improvement of security strategies are insufficient to protect the critical data stored in an organization; the human factors that influence cyber security must be taken into account with technical controls. The absence of information security awareness; ignorance from the cyber best practices, harms, and benefits; carelessness; laziness in following cyber security practices; hatred towards security; and obstruction are the significant causes of user mistakes (Donalds and Osei-Bryson, 2020). Suppose the end-user and employees of the organization do not consider the importance of these policies and do not practice and follow these policies. In that case, the security of the organization cannot be ensured. Due to this, the individual or personal behaviour aspect of cyber security is essential. Several studies are carried out on the impact of cyber security behavior (Donalds and Osei-Bryson, 2020; Harris and Martin 2019). Many cyber security incidents have been occurred due to the negligence of cyber security policies (Herath and Rao 2009; Harris and Martin 2019; Li et al. 2019).

Cyber security compliance, in a broader sense, is the adoption and acceptance of new technologies. We are hypothesizing that cyber security compliance is influenced by technology adoption, which is our primary hypothesis. This is ongoing research and at a very preliminary stage. The hypothesis will be validated through surveys and questionnaires in later stages, especially in the context of Saudi Arabia. Our future study is focused on the impact of technology usage for compliance compared to behavioral change for cyber security compliance. Technology can be used to enforce compliance with cyber security policies and measures. However, is this worthy to implement in organizations or organizations should focus on changing their employees' behavior to comply with cyber security policies and measures? This study is a preliminary study for future research. Although this study aims to prove this hypothesis, some literature references are stated here for preliminary proof for our hypothesis's accuracy. No previous research was explicitly found on this topic, i.e., using technology for cyber security compliance; therefore, we are focusing on literature as a preliminary study. In the next stage, it will be validated through surveys and questionnaires.

Performance Expectancy

It is the concept of explaining that technology is expected to benefit the users in performing their activities in various ways (Escobar-Rodriguez & Carvajal-Trujjillo, 2014). This construct explains that using technology benefits an individual's performance at his job doing (Ain, Kaur & Waheed, 2015). Sumak et al. (2010) stated that performance expectancy directly affects behavioral intentions. Engotoit, Kituyi, and Moya (2016) investigated the performance expectancy's influence on commercial farmers' intention to use mobile banking communication systems in Uganda. The research interviewed 302 farmers. The findings state that performance expectancy is positively correlated with the commercial farmers' behavioural intentions related to mobile-based technologies of communication in Uganda. This study from Uganda is included because of its relevance with Authentication which is a trait of cyber security.

Similarly, a study conducted by Marshall et al. (2008) in order to identify the effect of end-user training on the performance expectancy. The results reported that end-users' training about how to comply with the developed security policies has a positive relationship with the performance expectancy. In another study (Muller & Lind, 2020), relationship of PE is also proposed and validated with cyber security compliance.

Effort Expectancy

This construct indicates an individual's belief about the effort or ease associated with technology use (Venkatesh et al., 2003; Escobar-Rodriguez & Carvajal-Trujjillo, 2014). Several studies have been conducted to validate and testify this construct for a relationship with behavior, user intention, and compliance with the security. A result of the study conducted in the context of e-government state that there is a significant positive relationship between the effort expectancy and behavioral intentions of the users regarding e-government technologies (Vinodh & Mathew, 2012). Moreover, (Raman and Don, 2013; Muller & Lind, 2020) also found out that effort expectancy has a significantly positive effect on pre-school teachers' acceptance of learning management systems and security compliance.

Alexandra (2020) conducted non-experimental correlational research in order to investigate the UTAUT construct's effect on behavioral intentions to comply with the financial services' National Institute of Standards and Technology Cyber security Framework (NIST CSF), while targeting the participants from professionals of cyber security's financial services. The study's findings analyzed using multiple regression analysis using SPSS states that effort expectancy is a significant predictor (with p=0.03 significance level) of behavioral intention for compliance with the National Institute of Standards and Technology Cyber security Framework (NIST CSF).

Social Influence

This factor is associated with the perceived value of the particular technology by the significant others, including friends, family, and other influencers (Venkatesh et al., 2003; Escobar-Rodriguez & Carvajal-Trujjillo, 2014, Ain, Kaur & Waheed, 2015). (Yazdanmehr et al. 2020; Alexandra, 2020) undertook a study to determine the moderating role of social influence on information security policy compliance. The study results propel that social influence plays a vital role in weakening and strengthening an individual's compliance towards security policies.

Moreover, Kim and Kim (2017) tried to identify information security usage as compliance management. The data was collected from 975 participants of various Korean energy companies that deployed a compliance system. The study's findings postulated that social pressure is the most significant moderating factor for the participants' compliance behavior, which strongly affected information security adoption and utilization levels. Also, Al-Shafi et al. (2009) also reported that peers' beliefs influence employees' views regarding e-government services. Also, social influence affects the employees' intention and behavior to use the services of e-government. The Saudi government is aware of e-government benefits. It can get substantial advantages from the e-government implementation for cross institutions services and delivery of services to citizens and besides (Santa, MacDonald & Ferrer, 2019). However, the efforts for e-government in Saudi Arabia are not yet completely implemented, and the advantage is not yet taken entirely and still in the implementation stage (Al-Zahrani 2020; Santa, MacDonald, & Ferrer 2019).

The organizational environment includes colleagues' behaviour, cues for action, and the employee's experience with several other factors (Li et al., 2019). According to (Herath and Rao 2009; Li et al. 2019), they note that their colleagues' behaviour influences employees' behaviour in cyber security as internal or external motivators. In the organizational cyber security context, people usually tend to behave as their co-workers and friends (Herath and Rao 2009; Venkatesh et al. 2003). In (Li et al. 2019), the author's proposed cues to action is an antecedent to cyber security behaviour. Cyber security behaviour directly leads to cyber security compliance, and 'use behaviour' is a significant construct of the UTAUT2 model.

Similarly, (Avina et al. 2017; Vance et al. 2012) also state a direct relationship of social norms with cyber security compliance behaviour.

Facilitating Condition

Facilitating conditions refer to as the perceived resources and facilities to an individual to perform a particular behavior (Escobar-Rodriguez & Carvajal-Trujjillo, 2014). This aspect also involves the support of an individual from various resources (Venkatesh et al., 2003). Studies show that unavailability or lack of proper resources can hinder students' performance on web-based technology and compliance with security protocols by an organization's employees (Nanayakkara, 2007). Catherine, Geofrey, Moya, and Aballo (2017) researched the moderating effect of the UTAUT model's constructs with ATM users' behavioral intentions with fingerprint authentication at banks in Uganda. This was a cross-sectional field study wherein the data was collected from 211 participants of Uganda's ATM users for this quantitative kind of study. The data were analysed using correlation and regression analysis. The results reported that facilitating conditions are strong predictors of behavioral intentions to comply with Uganda banks' fingerprint authentication policies.

Hedonic Motivation

Hedonic motivation is explained as an intrinsic pleasure drive while adapting to technology (Venkatesh et al., 2003; Escobar-Rodriguez & Carvajal-Trujjillo, 2014). A number of research have reported that hedonic motivation is also known as intrinsic motivation, directly impacts the technology adoption of the employees or individuals (Thong et al., 2006; Van der Heijden, 2004). Moreover, Brown and Venkatesh (2005) also find out that hedonic motivation is a significant predictor of technology use and behavioral intention for compliance with security policies. Additionally, Yoo, Sanders, and Cerveny (2018) proposed a study to determine the influence of flow (which is a synonym of hedonic motivation) and psychological ownership on security education, training, awareness, and compliance intention the participants. To conduct this study, a survey methodology was chosen for data collection and the theoretical framework. The study results identified that intrinsic motivation or flow positively influences the employees' security compliance intention.

In their study (Cialdini and Goldstein 2004; Griskevicius and Cialdini 2010) stated that social influence affects the behaviour through another person's actions, and the compliance to the cyber security policies is affected by behaviour. The strong influence depends on the ability to induce compliance. Six psychological principles influence the behaviour and compliance professional is based upon. These principles are Consistency, Reciprocity, Liking, Social validation, Authority, and Scarcity. The reciprocity principle states that people are most obliged to pay back the same behaviour, favour, or service they have first received from the others. The consistency rule for compliance is that people are consistent with things that they have said previously. One is more willing for compliance to request which he/she has committed to a position.

The person may first ask for a small favor, which can be easily complied with. A large favour is then asked, which is generally complied with by those who have previously served the small request. The social validation rule for compliance is that people comply more with a request for the behaviour if other people are doing similar things and consistent with it. The authority rule for compliance state that people tends to comply the suggestions of persons who have more legitimate authority. Authority may be regarding a specific situation or more it may exercise general authority. The liking principle for compliance is that people generally comply with the request of those individuals whom they most like. Before asking for any favour or request, the target is engaged to like them. The liking can be increased by physical attractiveness, similarity, compliments, and cooperation. The scarcity rule for compliance is that one tries to get and secure the scarce opportunities. There are varieties of techniques that can convert the power of scarcity to compliance.

As a whole, the above principles cover social, organizational, cultural factors that influence cyber security compliance. When a person requests explicitly or implicitly another person and the individual changes his conduct and behaviour due to this request, this norm is considered compliance. Compliance is a functioning form of social impact because it is ordinarily caused intentionally by an individual. The changes in internal beliefs and feelings of people sometimes become the reason for compliance. These purposes these changes are primarily not the compliance or necessary to comply, but the compliance may happen because of change in internal beliefs (Cialdini and Goldstein 2004; Leandre R. Fabrigar and Meghan E. Norris 2012).

Price Value

This factor is directed towards the users' perception of the benefits of the application versus the monetary cost of its usage (Escobar-Rodriguez & Carvajal-Trujjillo, 2014). In simple words, it means that the user's positive perception regarding the benefits of technology primarily impacts the user's intention to bear the cost of a particular technology. This is a cost-benefit analysis by the user, which subsequently affects the user's usage intention regarding a technology (Venkatesh, 2012). Ramamurthy and Wen (2014) identified that reward is a beneficial technique to promote employee compliance behavior. They argued that deterrence or penalties are sometimes ineffective in preventing the non-compliance behavior of the employees. However, rewards have a substantial effect in the direction of the employees' positive intentions regarding compliance with security policies.

Habit

This construct relates to technology's automatic usage because of the habit (Venkatesh et al., 2003). It can also be conceptualised as the performance of an act based on an individual's prior experience. This is because, after extended use of technology, it becomes a habit that may be referred to as a well-learned action sequence that is stimulated based on some environmental cues and may be repeated involuntarily (Bandyopadhyay & Fraccastoro, 2007). Several prior studies have cited habit as an influential predictor of behavioral intention towards technology usage (Lim et al., 2007; Kim & Kim, 2017; Venkatesh et al., 2012).

Karlzen and Hallberg (2017) studied the relationship between the theory of planned behavior and information security compliance. The hypothesis was tested using 645 white-collar workers; the data were recruited using random sampling and analysed using correlation and regression analysis. The research results suggested that habit was one of the strongest predictors of information security policy compliance with a correlation of 0.28.

According to (Avina et al. 2017; Herath and Rao 2009; Vance et al. 2012), social norms and habits directly influence security compliance behaviour.

Behavioral Intention

Niehoff et, al. in their study of the role of organizational behaviour in information system success, they found that organizational citizenship behaviour (OCB) ultimately leads to the effectiveness of ISS and OCB can improve individual and organizational compliance with information security policies which leads to success in information systems operations (Yen et al. 2008). Similarly, gender, age, education, and years of work are essential for compliance with security policy (D'Arcy and Herath 2011; Herath and Rao 2009).

Another primary reference to this relationship between cyber security compliance and technology adoption is a report published by Sandia National Laboratories (Avina et al., 2017). In this report, the authors stated that security behaviours are adopted based on the user's values and conduct standards. Intrinsic motivation and work rewards are critical for motivating behaviour change. Messaging, communication, and incentives should be tailored to the individual style, values, and attitudes towards cyber security. The individual-level requires most behaviour change and resources to implement cyber technology compliance. Avina et al. emphasized the frequency of communication of perceived risks and rewards for cyber technology adoption. Tangible and intangible incentives play an imperative role in an individual's behaviour change for cyber security compliance. They have proved a direct relationship between security behaviour adoptions and personal values and communicating perceived risks. Moreover, in this study, most of the constructs are related to personal behaviour, and perceived risks are a significant construct of our proposed model (Avina et al., 2017). Similarly, security behaviour is the same as behaviour intention of the UTAUT2 model.

A study (Choi et al. 2018) concluded that employees' behaviour directly relates to effective ISS compliance. The institutionalization of cyber security policies in practice encourages employees to adopt policies that make their behaviour more compliant. In a paper, Austin et al. concluded that relevance to perceived value and legitimacy is defined as internal incentives to comply with information system security (ISS) requirements, positively affecting them.

In (Sohrabi Safa et al. 2016), the authors state that sharing information security knowledge, collaboration, intervention, and expertise significantly affects employee attitudes towards compliance with organizational information security policies. Additionally, the results showed that personal commitment and norms influence employee attitudes. Also, attitude towards compliance with information security policies of an organization strongly influences the behavioural intentions associated with compliance of information security requirements.

The above statements are enough to establish a preliminary relationship between cyber security compliance and technology adoption and to start a detailed study to analyse each aspect and construct compliance and adoption. This study focuses on proving this relationship and then developing a compliance-based framework for cyber security compliance.

In response to the studies mentioned above and literature, it is found that behavioral intention, social influence, performance, and effort expectancy have a significant influence on the adoption and acceptance of technology and compliance with cyber security in various contexts (see table 2.).

Table 2 - UTAUT2 Relationship with Cyber Security Compliance

UTAUT2 Construct	Relationship with Cyber Security Compliance	Reference
Performance Expectancy	Yes	Ain, Kaur & Waheed, 2015; Sumak et al., 2010; Engotoit, Kituyi & Moya, 2016; Marshall, Mills & Olsen, 2008; El-Gayar & Moran, 2006; Muller & Lind, 2020
Effort Expectancy	Yes	Vinodh & Mathew, 2012; Raman and Don, 2013; Alexandra, 2020;
Social Influence	Yes	Yazdanmehr, Wang & Yang, 2020; Kim & Kim, 2017; Al-shafi, et al. 2009; Alexandra, 2020; Muller & Lind, 2020
Facilitating Conditions	Yes	Nanayakkara, 2007; Catherine, Geofrey, Moya & Aballo, 2017
Hedonic Motivation	Yes	Brown & Venkatesh, 2005; Yoo, Sanders & Cerveny, 2018; Cialdini and Goldstein 2004; Griskevicius and Cialdini 2010
Price Value	Yes	Ramamurthy & Wen, 2014; Muller & Lind, 2020
Habit	Yes	Kim, et al, 2005**;** Kim & Kim, 2017; Lim et al., 2007; Karlzen & Hallberg, 2017; Venkatesh et al., 2012.
Behavioral Intention	Yes	Sohrabi Safa et al. 2016; D'Arcy and Herath 2011; Herath and Rao 2009; Avina et al. 2017; Choi et al. 2018

Theoretical and Practical Contribution

The current study is a useful contribution to the literature as a theoretical and practical framework. Theoretically, this study demonstrates a very new kind of relationship between technology adoption and cyber security compliance, which will contribute to the development of compliance or security frameworks of an organization of public or private sectors or e-governments not only of Saudi Arabia but across the globe. The study's findings state that the factors that influence technology adoption have a similar effect on cyber security compliance. However, this paper is practically very beneficial for people in authority or administration to plan various factors of their organizations to make their employees more compliant with their deployed frameworks. Hence, this paper will help the organizations strategize the security compliance framework that will work effectively.

Limitations & Recommendations

The study's first and foremost limitation is that less data has been cited from Saudi Arabia because of a lack of research on this topic within the intended context. Special surveys for UTAUT2 constructs and some proposed new constructs that affect cyber security compliance are designed and the authors are working on them. Less data has been cited related to the habit and price value because researchers have ignored these constructs while conducting research. Another limitation can be the vast spectrum of this study; the study has not been done citing the literature from a specific culture or context. However, the study needs to be given attention to a specific culture or context, which will further give a detailed look to the factors affecting technology adoption and security compliance in a particular information security cultural setting which is another important factor to be considered for better understanding (Karlsson et al., 2016,).

In the literature review, different literature from other cultures like Uganda, Korea are cited. These are for literature review purposes. The future work in this domain by the researchers will be focused on Saudi Arabia but not on employees from specific organization. In addition to these limitations, further researches can adopt different adoption or cyber security models to compare and contrast the results.

Conclusion and Future Work

Cyber security has been one of the most critical factors affecting the efficacious deployment of a security framework. Simultaneously, technology adoption and factors affecting technology acceptance and security compliance are of even more significance. Researchers have reported that many security breaches have been observed because of their non-compliance and negligent behavior. Hence, the current study has described various factors that may be proved effective to lure the employees into complying with a particular organization's security policies. This study has explained the technology adoption utilising the UTAUT2 model and its influence on the employees' compliance intention and behavior. The study's findings identify all of the seven constructs that affect the employee or user's intention and behavior differently towards complying with cyber security. Therefore, the study has established a connection between technology adoption constructs and cyber security compliance.

This is ongoing research and at a very preliminary stage. The hypothesis will be validated with surveys and questionnaires, especially in the context of Saudi Arabia. Our future study will focus on the impact of technology use for compliance compared to behavioral change for cyber security compliance. Technology can be used to enforce compliance with cyber security policies and measures. However, is this worthy to implement in organizations or organizations should focus on changing their employees' behavior to comply with cyber security policies and measures? These answers will be coming in our upcoming publications.

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Contribution of The University Educational and Scientific Ecosystem in The Formation of a Regional Innovation System

Yuri PREOBRAZHENSKIY

Saratov State University, Saratov, Russian Federation,
topofag@yandex.ru

Abstract

Currently, universities largely determine the effectiveness of the formation of a regional innovation system and become a significant driver of innovative growth. The university is increasingly acting as an integrator, on the basis of which new knowledge is created and commercialized. Such integration can be carried out by understanding the principles of interaction between different actors and the principles of manifestation of a synergistic effect in the course of it. The application of the ecosystem model makes it possible to build an integral, consistent description of the processes of co-development and mutual enrichment of knowledge between the participants in the system. The nature of the dissemination of knowledge and its importance for the manifestation of externalities that allow the use of knowledge by all participants in the ecosystem are discussed. The balance of the educational and scientific ecosystems in the regions of Russia is estimated. Further research is associated with an empirical analysis of the interaction between the participants in the educational and innovation processes, the search for practices of optimal interaction between them on the example of specific regions.

Keywords: University Ecosystem, Knowledge Spillover, Regional Innovation Ecosystem

Introduction

Innovation is becoming more open, involving more diverse groups of participants and contributors than ever before. This trend has determined that in recent decades there have been significant changes in the nature of the relationship between universities and the subjects of the regional innovation system (RIS). Along with the traditional functions: educational (training), research (generation of new areas of knowledge and generations of technology) and educational and professional (formation of productive interaction of graduates with the environment), new functions of universities have emerged, among which we will single out the integration and transfer of knowledge, entrepreneurship, creation new types of activity, businesses, innovation infrastructure. The contribution of the university to the balanced development of the regional innovation system is growing (Firsova et al., 2020).

As a result, the task of describing the most productive model of organizing the interaction of the university with other subjects of the RIS is urgent. In recent years, the ecosystem approach has been increasingly used to describe such a model, which marks a transition from a rigid mechanistic system with indicative goals to a softer interaction of various agents with more degrees of freedom that form knowledge, innovation, business ecosystems.

Previous Research

The definition of a non-natural ecosystem allows for various interpretations. Actually, their basic discrepancy is whether the ecosystem approach is a full-fledged methodological tool or just a metaphor for strengthening (emphasizing) certain properties of a certain conglomerate of actors.

The attractiveness of this metaphor lies primarily in its ability to describe organic interaction, co-evolution of participants and the collective creation of results at the system level (Adner, 2016; Autio & Thomas, 2014). J. Moore's original work on economic ecosystems (Moore, 1993) is distinguished by the use of the term “ecosystem” to a greater extent as a metaphor for describing the interaction of enterprises in the aspects of competition and cooperation. It will be possible to substantiate the heuristic value of describing non-natural (i.e. related to society and economy) ecosystems by showing their differences from other forms of organization (value chains, networks) in the way of management, the nature of the interaction between participants, the specifics of information flows (including number and knowledge).

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In our opinion, an ecosystem differs from a simple system by the additional capabilities that parts of the system provide to other actors. These opportunities, as a rule, are free of charge and often do not have a specific addressee. The activity of innovation systems is not limited only to contractual obligations between its participants (Jacobides et al., 2018). First of all, this concerns knowledge. The ecosystem principle here manifests itself in the joint creation of knowledge, its greater availability for all ecosystem participants, and the possibility of further transformation and use in comparison with mechanistic systems. We are talking about an analog of natural ecosystem services when the value is created not during the removal of resources from natural ecosystems, but only due to being in a particular landscape (for example, during recreation).

Thus, we can expect that positive externalities, such as, for example, the knowledge spillover, in innovation and knowledge ecosystems are manifested more significantly. The transition from a rigid structure of a mechanistic system to a flexible ecosystem dramatically increases the importance of social interaction, and not only and not so much for profit. The soft presetting of the conditions of the system allows its elements to relatively freely "cross" ideas, skills, developments to obtain a new product, which was impossible in the system of rigidly preset parameters. Various paradigms of knowledge and various forms of generation and application of knowledge in an ecosystem coexist, co-evolve (Carayannis & Campbell, 2009, p. 203).

As can be seen from the diagram (see Fig. 1), the university is an organic part of both the knowledge ecosystem and the innovation ecosystem, which, in turn, acts as part of the entrepreneurial ecosystem.

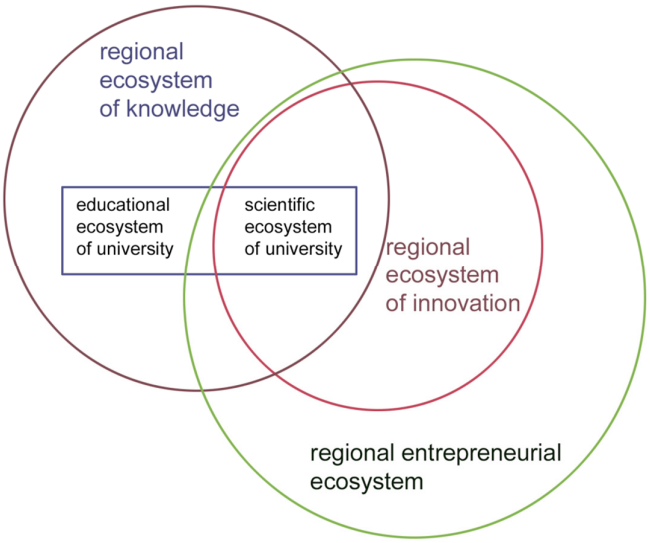

Fig. 1: The position of university ecosystems among regional ecosystems (compiled by the author)

Thus, the university forms, firstly, an educational, and secondly, a scientific and innovative ecosystem. The function of the first is to improve the quality of human capital, the function of the second is to stimulate the innovative development of the region. When both of these functions are performed in the region, a multiplier effect is observed, since an increase in the quality of human capital leads to an increased potential for the implementation of the innovative component of the region. At the same time, the more successful the innovative development is, the higher the quality of human capital. The more efficiently these functions are performed by universities, the more influence it has in the entrepreneurial ecosystem, attracting business projects and shaping the innovation agenda itself, i.e. offering businesses the opportunity to commercialize technologies created within the framework of RIS.

At the moment, in many Russian universities, the scientific and innovation ecosystem is in the stage of formation, while the educational ecosystem is formed to a greater extent. The study of the level of formation of the ecosystem of higher education should be carried out both at the local level (using the example of a specific university) and at the subnational level. In the latter case, the ratio of the educational and scientific, and innovative functions of the university will show its influence on the development of RIS.

Methods

The main research method in this work is a critical analysis of theories of non-natural ecosystems (including knowledge and education), as well as approaches to their identification and assessment of their functioning.

In the empirical part of the study, the main method is structural and analytical. The university's integration into RIS can be assessed based on the share of research revenues. We collected information on the amount of income of universities in Russian regions and calculated the share of income from research and development (R&D) in the total amount of income of universities in the constituent entities of the Russian Federation.

Results and Discussion

Analysis of the structure of funds received by type of income allowed us to distinguish four classes of regional systems of higher professional education, differing in the share of income from research and development (see table). In all regions, it is less than income from educational activities and can be considered secondary.

Table: Share of income from research and development in the total amount of income of universities by constituent entities of the Russian Federation

%	Russian regions
more than 20	Tomsk region, Perm region, Belgorod region
10-20	Republic of Tatarstan, Moscow, Nizhny Novgorod region, St. Petersburg, Samara region, Sakhalin region, Sverdlovsk region, Udmurt Republic, Tyumen region, Republic of Mordovia, Ryazan region, Novgorod region, Republic of Karelia, Rostov region, Ivanovo region, Yaroslavl region, Tambov region, Irkutsk region
5-10	Kursk Region, Jewish Autonomous Region, Novosibirsk Region, Voronezh Region, Republic of Dagestan, Volgograd Region, Tver Region, Krasnoyarsk Territory, Kostroma Region, Kabardino-Balkar Republic, Chelyabinsk Region, Republic of Bashkortostan, Vladimir Region, Primorsky Territory, Saratov Region, Moscow Region, Oryol region, Kemerovo region, Leningrad region, Arkhangelsk region, Stavropol region, Kaliningrad region, Tula region, Omsk region, Ulyanovsk region, Altai region, Penza region, Krasnodar region, Smolensk region, Chechen Republic, Pskov region, Khabarovsk region, Kurgan region, Trans-Baikal Territory, Republic of Buryatia
less than 5	Republic of Mari El, Astrakhan Region, Orenburg Region, Kaluga Region, Bryansk Region, Vologda Region, Republic of Ingushetia, Lipetsk Region, Komi Republic, Chuvash Republic, Republic of Kalmykia, Republic of Sakha (Yakutia), Magadan Region, Amur Region, Kamchatka Territory, g Sevastopol, Republic of Altai, Republic of North Ossetia - Alania, Kirov region, Republic of Adygea, Murmansk region, Republic of Khakassia, Republic of Karachay-Cherkessia, Republic of Tyva, Republic of Crimea, Chukotka Autonomous District

There are three regions with a relatively high share of such income (more than 20%) of the total income: Tomsk and Belgorod regions, Perm Territory. The largest number of regions in the group with a share of income from research and development from 5 to 10%. One can notice a certain relationship between the share of funds received from research and development and their value (see Fig.2).

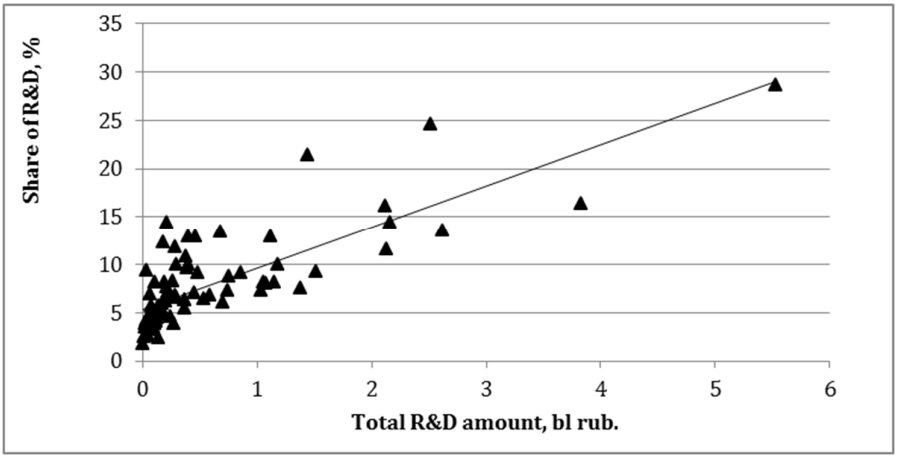

Fig. 2: Dependence of the share of research and development in the flow of funds to regional universities on its value (excluding Moscow and St. Petersburg)

The diagram shown earlier (Fig. 1) demonstrates, first of all, some desirable state and composition of ecosystems. In fact, in order to become the center of ecosystems, an integrator on the basis of which the entire assembly of the regional ecosystem is carried out, the university needs to form the foundations and tools for interaction with other actors of the potential innovation or knowledge ecosystem.

One of these tools is a platform for communication and interaction between various actors. Such sites have different names, are organized in different ways, but they are united by one goal - the creation and transfer of knowledge. Foreign experience shows the high productivity of creating the so-called spaces (for example, makerspace), these are specially equipped sites for joint (offline) activities, primarily in the field of "working by hand" or at the computer. However, this practice can be transferred not only to technical areas but also to natural science or humanitarian. The difference from seminars here is, firstly, a wider circle of people taking part in such coworking, and secondly, focus on the implementation of the innovative potential of interaction and, possibly, the subsequent commercialization of the result of such activities.

To understand the processes of knowledge spillover within such platforms, the idea of hidden, internal, non-formalized knowledge possessed by researchers or practitioners is of great importance. This knowledge, not being codified (that is, translated into a form understandable to everyone), can be transmitted only through personal communication, tete-a-tete (Nonaka, 1994). Interaction platforms, innovative spaces are designed to “extract” this knowledge from its carriers, spreading it. The exchange of ideas and experience remains productive, even if it is not in demand, the process of interactive communication, intellectual interaction, and enrichment is in many ways more important, which will sooner or later lead to the creation of innovations. Note that platforms should not be taken too literally - they are just a space for communication, more a process than a place.

A prerequisite for the functioning of such sites is the attraction of students, which will allow them, firstly, to communicate with professionals, perceiving practical experience in various fields of knowledge and production, and secondly, it will stimulate actors to a more thorough and accessible description of their theoretical developments experience.

Such processes will lead to the strengthening of the "third mission" of the university as an intellectual center of the local community, a place for discussion and expertise (Fadeikina et al., 2018, p.60) and, in general, will correspond to the transition to a new paradigm of world development, which is based on the formation of a new one, based on universal the values of ecological thinking, characterized by interdependence, interconnection, coherence of its components (Makhnovets & Popova, 2017, p. 144).

Regions differ in the intensity of knowledge codification. This can be estimated by the share of publications in collaboration with scientists from other organizations and by the share of publications with foreign scientists (Preobrazhenskiy, 2019). RIS are characterized by varying degrees of external (international, global) openness. The role of the university is also great in disclosing access to scientific information during conferences, discussions, presentations, exhibitions, etc.

An assessment of the university's involvement in RIS can also be based on an analysis of the number of creation of economic societies or economic partnerships by budgetary (autonomous) scientific institutions, educational institutions of higher education.

Conclusion

The innovation and knowledge ecosystem, as an indispensable part of it, is thus transformed from a metaphor into a working model with heuristic and practical value. The university acquires a special role in this model as a central link in the interaction of scientific and business actors. At the same time, it is important for him to simultaneously be both the most open and integral system. It is the positive externalities in the dissemination of knowledge within the ecosystem and between ecosystems that make it possible to speak about the heuristic value of the ecosystem concept.

In the context of embedding the university in the regional innovation system, the transformation of the educational process is inevitable, which will be carried out largely "from below", i.e. based on the needs and objectives of the ecosystem. This will reduce the problem of inconsistency between the structure of personnel training and the needs of the regional labor market. Functionally, the transformation of education will be carried out in the direction of greater interactive interaction on special platforms, allowing the creation and exchange of knowledge between actors of various institutions (scientific, business, etc.), and the commercialization of knowledge.

We have identified the relatively small importance of the scientific and innovation ecosystem in the universities of the regions of Russia. Its development will enhance the role of knowledge flow both in RIS and in between them (Preobrazhenskiy, 2020).

Further research will be associated with an analysis of the links between individual universities and identifying the level of formation of the scientific and innovative ecosystem.

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Examining the Potential Acceptance of Robots for Society 5.0; A Comparison Between Japan and the West

Kurtz LAW,
The Bucharest University of Economic Studies, Romania
kurtz.law@man.ase.ro

Cristian Iulian VLAD
The Bucharest University of Economic Studies, Romania
cristian@japancreativeenterprise.jp

Seiko ADACHI,
The Bucharest University of Economic Studies, Romania
paltier505@gmail.com

Keita SUGIYAMA,
The Bucharest University of Economic Studies, Romania
contact.keita@gmail.com

Abstract

Robots and Artificial Intelligence (AI) have been dramatized in many Hollywood movies, and people's perceptions of them have become stigmatized. Four categorizations of stigma have been suggested: robots and AI act by themselves against human interest, humans project 'evil' onto robots and AI, cultural identity is lost and robots and AI cause a loss of control for humans to shape their own future. With the Japanese government continuing to promote Society 5.0, this research examines whether Japan and Western countries are socially accepting of this concept, which seeks to integrate robot and AI technologies into everyday human life.

Keywords: Robots, Artificial Intelligence, Stigma, Society 5.0, Technology Management, Japan.

Introduction

The Japanese government introduced the concept of Society 5.0 in January 2016 as a means to address the growing likelihood of an overarching technological infrastructure that would support and surround all daily human life (Harayama, 2017). This technology would include activities centrally related to the Internet of Things (IoT), Artificial Intelligence (AI) and robotics (Fukuyama, 2018). While the typical understanding of robotics is usually that of hardware such as the Softbank robot Pepper (Softbank 2020), Robotic Process Automation (RPA) describes the automating of repetitive and predictable processes using digital robots also known as bots (Schatsky, et al., 2016).

Society 5.0 represents the culmination of continuous evolution of digital transformation which began with basic computer technology, through to the internet and now into the complex integration of both hardware and software systems. Today IoT, AI and robotics are gaining traction in areas such smart homes, healthcare, the automotive industry, gaming as well as retail customer service, restaurants and manufacturing (Vinay-Sagar and Kusuma, 2015; Nag and Mukhopadhyay, 2014).

Literature Review

While the potential for robot and AI technologies are not only wide but also scalable, 70% of digital transformation has failed to meet target projections (Tabrizi, et al. 2019). Tabrizi, et al. (2019) suggests that such failure is caused by a reliance on technological merits rather than on the foundation of sound strategy. James, et al. (2018) suggests that machines are incapable of empathy and as a result, jobs which need higher degrees of empathy are not replaceable. However, Coulton (2013) postulated that IoT and technology create an opportunity for heightened communication and delivery of empathy. Technologies such as Paro, the robotic seal while in itself does not have an AI capable of feeling empathy, is able to exhibit behavior which promotes empathy in patients suffering from dementia.

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This research examines several aspects of attitudes associated with the social acceptance of robots. Cave, et al. (2019) identify four positive robot associated stigma. Firstly, promoting a society with a freedom from repetitive and distasteful work. Secondly, the creation of a perfect friend, one which is empathic, caring, loyal and able to meet our personal needs. Additionally, the creation of robots and AI which can improve medical capabilities leading to longer and more comfortable living. And, the strengthening of security and military power ensuring local and national safety. However, Van Doorn, et al. (2017) suggest that people experience four categories of fear as shown in figure 1.

Category 1	Category 2
Confronting the unknown, humans project "evil" on to our digital doppelgangers	Utilization of robots and AI across all aspects of life leads to the loss of the human cultural identity
Category 3	**Category 4**
Robots act by themselves against human interest	As robots and AI become more self autonomous, human society has less control

Figure 1: Categories of Associated Robot Related Stigma

Source: Adapted from Van Doorn, et al. (2017).

Category 1 relates to the way in which people may experience a sense of paranoia when interacting with robots and AI. Robots today have no true sentience, mainly falling within the Artificial Narrow Intelligence (ANI) category which describes AI as reactive with responses primarily limited by the specifications of its programming (Pohl, 2015). Mori, et al. (2012) suggest that humanlike robots promote a shift in human expression from empathy to revulsion. As the human likeness increases, the human's affinity towards the robot decreases.

Category 2 refers to the ways in which environment influences our own sense of identity. Casakin, et al. (2014) states that beliefs, emotions, attitudes and previous experiences influence the construction of perceived reality. However, as AI optimizes human activities through Society 5.0, humans will begin to interact with robots and AI on a regular daily basis. Cultural norm will likely shift to incorporate robots and AI (Combi, 2016).

Category 3 relates to a fear of robots which have autonomy and intelligence. Kwon, et al. (2016) suggest that many people tend to overestimate robot capabilities as they are swayed by the continuous upselling of the expressions "Artificial Intelligence" and "Digital Transformation." Additionally, the popularization through science fiction movies has led to misconceptions of them (Meinecke and Voss, 2018; Bentley, et al. 2018). Famous films such as 2001 Space Odyssey, The Terminator, and The Matrix each have plots where AI gain autonomy and instigate scenarios which lead to the detriment of humanity.

Category 4 identifies the potential effect of long-term automation and integration of AI into increasing areas of human life. Wani, et al. (2018) indicates that automation through robotics and AI has led to increasing feelings of work insecurity. Arguments have been made that support the concept that jobs will not be eliminated, instead these technologies will support and augment human workers to be more productive and work more easily (Manyika, et al. 2017). Pham, et al. (2018) however, determined that humans who work alongside robots tend to suffer physically and mentally from having to keep up with the pace at which robots work. Additionally, due in part to the optimization of work-flow, their study showed that low-middle skilled workers saw a decrease in work hours which translated to a decrease in earnings.

Another aspect relating to the sense of loss of control relates to the increasing complexity of technologies. Rainie and Anderson (2017) states that within the vast amounts of code, algorithms are relatively invisible. As a result, systems are becoming less transparent as most people are increasingly in the dark as to how the technologies work.

Research Methodology

This research aims to recategorize the Negative Attitudes toward Robots Scale (NARS) questionnaire into the framework adapted from Van Doorn, et al. (2017). Through literature, we compiled NARS questionnaire responses from Syrdal, et al. (2013) which surveyed 1000 Japanese people and 146 Western participants.

By doing so, we examined whether negative associated stigma towards robots and AI are felt by people today, and therefore whether people are currently socially accepting of the fundamental premise of Society 5.0.

Additionally, 5 types of robots were examined based on functionality and appearance. Paro-Seal, Pepper and Roomba were chosen due to their physical presence. Humans physically interact with the machines as they perform their intended functions. Watson and RPA were chosen as digital representations of robots. Humans interact with them through graphical user interfaces. While Paro-seal and Roomba have no speech capability, Pepper and Watson can communicate directly with users. Pepper is programmed for verbal speech in multiple languages and has a digital display to assist with communication. Watson also has multi-language capability and has a chatbot function where communication occurs primarily through text. RPA is the least communicative, it is a programmed AI driven automation system with higher focus on practicality than on communication. Identification of the types of robots examined in this study according to function and appearance are shown in figure 2.

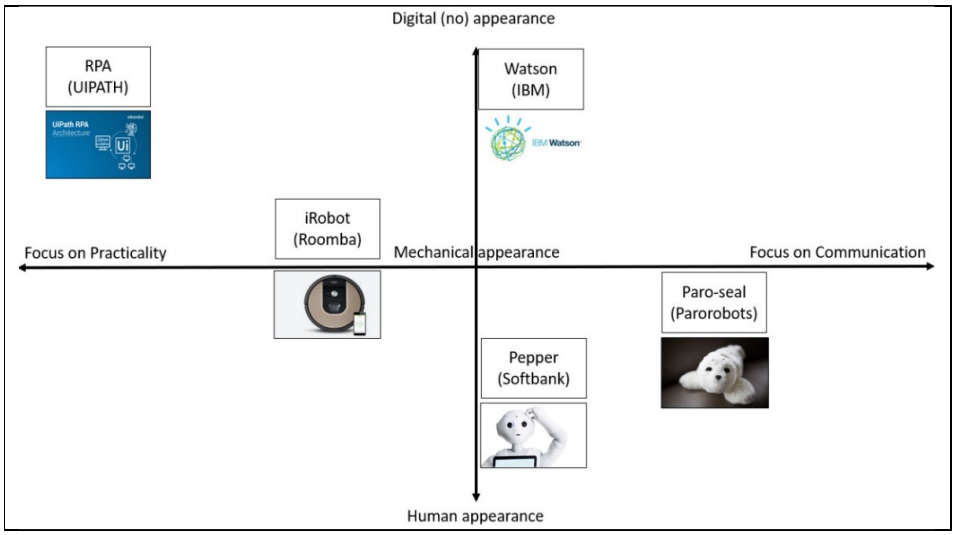

Figure 2: Types of Robots Classified According to Function and Appearance.
Source: Adapted from: Nitto, et al. (2017)

We examined a selection of variables associated with good to great customer experience (Hwang, 2010; Deloitte, 2016; Lotz, et al. 2018) and compared with the robots' core functions to identify whether there is compatibility. These variables were: the ability to be persuasive, to exhibit empathy, to be adaptable, to have effective communication, and to accept failure, or show ownership of responsibilities. Based on this qualitative assessment, we tried to determine whether these types of robots would exhibit qualities that are valued in customer service interactions.

Findings & Discussion

The findings of our comparative study between the five robots and the variables of good to great customer experiences can be seen in figure 3. The findings suggest that current level of technology is unable to meet human perception of great customer service. Additionally, because the technologies do not have self-awareness, or human equivalent cognition or intelligence, they are unable to take responsibility for their actions. Adaptability is primarily based on whether the robots have been given a sufficient bank of responses. In Watson's case, the robot assigns a probability factor to each response option, and makes a choice based on best probability. Pepper and Watson have programmed functions to apologize when unable to complete a user task, but these apologies are not heartfelt. Each of the robots have elements of empathy. For example, Paro-Seal's primary functionality is to enable dementia patients to form a bond with it. To do so, it has been programmed to make crying sounds, and to look into the patients' faces.

	Persuasion	Empathy	Adaptability	Communication	Responsibility
Paro Seal	Ability to impact dementia patients in a positive way.	Designed to encourage nurturing behavior in dementia patients.		Cries out for attention. Responds to being hit, stroked or being held. Able to emit seal-like sounds.	
Pepper	Pepper can engage with humans using	Able to pick up non-verbal cues.	Pepper's face is static. Gestures are not as flexible as a human's.	The robot communicates through spoken language.	Programmed function to apologize when answers cannot be found.
Robotic Process Automation		AI observes human interaction and learns from the experience.	Can be applied to any software system. RPA mimics human actions.		
Watson	Watson has the ability to impact user behavior towards technology through repetitive interactions.	In built Tone-Analyzer Understand emotions and communication style in text.	Ability to direct customers to humans when unable to find answers. Probability based algorithms for choosing answers	Conversation AI platform providing fast and straightforward answers.	Programmed function to apologize when answers cannot be found.

Figure 3: Representation of Robot Functions Compared to Good to Great Customer Service Variables.
Source: Author's own conception

In Figure 4, we can see that people have concerns about a number of categories, some of which overlap into different categories of the negative associated stigma towards robots and AI. Interestingly in category 1, some of the fear seems to be arbitrary, but other concerns are related to the potential unknown impact of robots being around children or the potential risk that robots might cause accidents. Additionally, concerns exist relating to potential conflict with religion such as the concept of "playing god" (Gent, 2015). In category 2, people are concerned about the potential robots and AIs have for affecting human cultural identity. While these technologies may enable humans to work more productively and perhaps more easily as boring and repetitive work is taken over by machines, some people may feel that the situation may have an adverse effect on how humans develop. Dagdeviren, et al. (2016) suggest that humans learn through overcoming challenges or living through hardship. If robots are used to shortcut human difficulty, this may lead to a decrease in learning opportunity.

Category 1 Confronting the unknown, humans project "evil" on to our digital doppelgangers
If robots had emotions or independent thoughts. If robots cause accidents or trouble. Robots can be bad influences for children. Robots are scary but for no apparent reason. Robots are a blasphemy against nature. The technologies needed to develop robots are fields that humans should not advance too far in. The development of robots is blasphemous from a religious perspective.
Category 2 Utilization of robots and AI across all aspects of life leads to the loss of human cultural identity
Robots can create new forms of interactions between humans and machines. Utilization of robots may make humans lazier. Use of social robots in society changes the way in which people work. Less people need to struggle, but human culture has been influenced by the challenges we have faced. Less interaction between people, as robots take on more jobs such as education and healthcare. Human robots may make us forget what it is like to be human. The development of robots is a blasphemy against nature. Interaction with robots could lead to problems in relationships between people. Organizations that produce robots, or regulate them might not think about the thoughts and feelings of the users. The public might not be aware of how human cultural identity is being lost until it's too late.

Figure 4: Determination of Negative Associated Stigma toward Robots and AI
Adapted from: Syrdal, et al. (2013); Billing, et al. (2019); Van Doorn (2017).

In figure 5, category 3, some concerns are raised regarding the ways in which robots and AI may make judgements which affect human lives. One example may be the autonomous vehicle and the trolly-dilemma which relates to the actively killing of one or more persons to save other persons. Wiseman and Grinberg (2017) suggest that car makers may want to convince potential customers that vehicles are safe, which would suggest that the AI should give priority to car occupants. In category 4, concerns are raised regarding the high costs for maintaining robots. In addition, the risks relating to dependency on technology are a source of worry. Ongoing questions of whether robots and AI will take away jobs are also represented.

Category 3 Robots act by themselves against human interest
If robots and artificial intelligences make judgements about things. If robots develop into human beings by becoming self aware, having emotions such as prejudice and bias, gaining rights. If information is not transparent, robot actions may go unchecked. Organizations may allow robot actions to go against human interest. Interaction with robots could lead to problems in relationships between people.
Category 4 As robots and AI become more self autonomous, human society has less control
Widespread use of robots lead to high maintenance costs for them. Robots may have bad influences on children. Robots have the ability to make judgements about things, automation will take away control from human society. Depending on robots too much could lead to disaster, if the technology is suddenly unusable. Widespread use of robots will take away jobs from people. Robots will take the boring, dirty and dangerous jobs, takes control away from people who rely on those types of jobs. Robots which may gain rights in the future, may take away control or rights from humans. Society will be dominated by robots. As robots become more complex, humans must advance further into potentially more dangerous fields of technology. Organizations that produce robots might not be trustworthy and transparent. Interacting with robots could lead to problems in relations between people. Humanoid robots will encourage less interaction between humans.

Figure 5: Determination of Negative Associated Stigma toward Robots and AI
Adapted from: Syrdal, et al. (2013); Billing, et al. (2019); Van Doorn (2017).

Conclusions

In this article, we examined whether societies are ready for the acceptance of robots and Artificial Intelligence as promoted by concepts such as Society 5.0. We identified types of robots already visible and affecting human lives and their functions compared to human perceptions of good customer service. The results of this research suggest that while robots and Artificial Intelligence are being promoted by governments such as in Japan, there is still a lot of concern and fear associated with robots and AI. Some of the fears seem arbitrary perhaps stemming from negative associated stigma from media as well as unanswered questions regarding job loss.

Limitations of this study include the limited scope of variables covered, for example our research does not elaborate on the frequency of issues raised by respondents to the original study. For example, according to the Syrdal, et al. (2013) NARS study, the frequency of respondents raising concern about robots having emotions and independent thoughts were higher than fears of robots causing accidents. Nonetheless, our research does not go into detail on this. Future research could be carried out to investigate how the frequency of respondents' concerns will affect people's perception of Society 5.0.

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Investments in Russian Art as a Protective Market Asset

Anton F. TIKHOMIROV
Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg, Russia, tihomirov_af@spbstu.ru

Alexandra O. ZAITSEVA
Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg, Russia,
westpoint2@mail.ru

Abstract

The paper considers the recent investment trend established on the art market. This trend is related to development of shared ownership for works of art. The emergence of the trend is determined by a significant rise of prices for works of art, on the one hand, and involvement of numerous small investors, who are ready to invest into a broad range of assets, on the other hand. However, it causes the problem of reducing investment risks related to a poorly chosen art object. This problem can be solved by implementing the shared ownership model in the form of an investment mutual fund. In Russia it is defined as a closed-end fund (CEF), whose assets replicate one of the art indices. On the example of the Russian market the authors show that tools of the investment funds established on the basis of Russian art indices can be used as a protective asset for the equity portfolio that models the Russian stock index MOEX10. The effect of deep diversification is achieved due to a strong negative correlation between the MOEX10 index and the Russian art index ARTIMX-Rus.

Keywords: Financial Market; Mutual Fund; Portfolio Optimization, Protective Asset.

Introduction

The uncertain macroeconomic situation causes considerable fluctuations of stock prices on the financial markets (*Baker,et al., 2016*). The price fluctuation of investment objects is the main risk factor for investors (*Kudryavtseva, et al.,2019),* whereas the main method to reduce this risk is diversification of an investment portfolio *(Sharpe, 2010)*. The essence of the effective diversification is to buy the portfolio of the assets, the reduced price of which can be compensated by the increase in the price of other assets.

The opportunities to use conventional market assets (stocks, bonds, exchange commodities, foreign currency) for diversification of investment portfolios are well studied by markets. However, resulting from the wide spread of securitization processes, new financial tools have recently emerged on the market. The value of these tools is related to the value of unique objects, e.g. real estate or cultural heritage. Are these tools challenging for investors?

The purpose of the present work is to unlock the investment potential of financial tools based on prices of works of Russian art exemplified by the Russian financial market.

Specifics of Art Investment

Today a lot of long-term investors are trying to diversify their investment portfolios by putting up for a variety of asset types. One of the most popular and fast-growing alternative types of investment are works of art, in particular – painting. According to the art market research by the Artnet platform, the price of art has risen more than 100% within the recent 30 years *(The Art Market 2020)*. As more and more people become aware of profitability of this investment sector, the art market has boosted.

The global experience is based on two main methods of investing into the art market: direct and indirect. The direct method of investment implies direct purchase of works of art via auction houses, art fairs, galleries and art dealers. The vast majority of high-value deals in this sector are made by major galleries and auction houses *(Woodham, 2017)*. Currently, this is a dominant technique of investment into artworks.

To possess world masterpieces is a pipe dream for numerous art-lovers, as the price of most works of art exceeds a million dollars. The price factor is an obstacle for most art investors. Therefore, the type of the direct method which has recently gained popularity is the one related to the model of shared ownership of art. This model has become widespread for the last two years, due to the rapid development of blockchain technology *(Greenhill, 2020;*

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Arutunyan, Kudryavtseva,et al.,2018) and readiness of investors to put up for a wide range of assets, from real estate to intellectual property and art.
However, although blockchain technology increases security of possessing a work of art, it does not relieve an investor of the risk connected with the volatile price of a specific object *(Arutunyan, M., Skhvediani, et al.,2018).* Volatility of stock prices, in particular, increases with the rising ratio of intangible assets on the company's balance sheet. This bears an additional risk of a considerable fall in the company's market capitalization caused by a change of the factors that form these intangible assets *(Tikhomirov, Komshilova, 2019).* For instance, such a factor for artistic treasures can be fashion for certain artistic trends.

About 85% of online art-platforms enable offering the shared ownership to their customers. According to Hiscox Art Online Report 2019 *(Hiscox, 2019),* there is a significant priority gap from generation to generation. For instance, approximately 48% of young buyers under 35 consider the shared ownership of art as an investment form, whereas the percentage of such buyers over 50 is only 29%.

Nevertheless, there are new methods of indirect investment via different types of deals, i.e. securities and investment funds. Primarily, we can note investments into art-stocks of companies, the revenue of which is generated by offering goods and services related to art market. For instance, they are sale of art objects, consulting services or providing information about valuation of artworks. It can be exemplified by Sotheby's *(The History of Sotheby's, 2010; Sothebys Stock Price, 2020),* Artnet AG *(Artnet AG, 2020)* stocks etc.

Unlike the first method, the second one is based on buying art-stocks, created as a result of securitization of assets, i.e. works of art. This method of indirect investment into art objects is ensured by several companies. These are such online platforms as Masterworks *(Masterworks, 2020; Masterworks Review, 2020)*, Maecenas *(The Art Investment Platform, 2020)*, Feral Horses (*Own shares of museum-worthy artworks, 2020)*, OMNIA Global company *(Is fine art the safest, 2020)*, which deals with securitization using bonds *(The Omnia bond, 2020).* Most of these platforms capitalize on blockchain technology in recording securities ownership.

The shared ownership model is also implemented in investments into mutual funds specialized in purchasing works of art. Frequently, world's most experienced art experts work for such companies. Investors, who are not professionals in art, can rely on advice from these funds.

However, in this situation investment requires securitization of art objects and turning them into art assets of the financial market. For an investor, securitized art assets represent a formalized financial tool, which can describe the situation on the market with common indicators, such as profitability, volatility, liquidity, time lags etc. Due to this, the most convenient investment tools are Mutual Funds, or their Russian equivalent - Closed-End Funds (CEF) *(Zhdanova, O. (2015).* Firstly, these funds have more significant financial resources than individual investors, which gives an opportunity to create more complete (or vice versa, more diversified) collections. In addition, the funds have the financial potential to invite qualified consultants for selecting more quality and promising assets. Unlike individual investments, the funds ensure economizing on custody and insurance of assets due to its large-scale effect.

Art Indices

For the successful operation of the market of financial art assets it is required to have a generalized market indicator, e.g. similar to S&P500 index for the stock market, and also preferably to have sectoral indicators. These indicators are essential for investors to collect information about the current state of their investments, and also to make strategic decisions when building portfolios. At present there are a lot of price and non-price indices that reflect dynamics of the art market as a whole, and its separate segments, in particular. The best-known art market indices are the following:

- Mei Moses repeat-sales index (WAAI – Mei Moses World All Art Index);
- BASI – Blouin Art Sales Index;
- C50 – Contemporary Art Index 50, developed by Artnet company;
- AMC – Art Market Confidence, developed by Artprice company;
- ST 5 000 index (Skate's Top 5 000) presents the database of the world's 5,000 most valuable artworks.

Calculation methods for each index is unique, though they are based on either statistical processing of repeat sales, or changes in capitalization of auction art market, or their combination. Obviously, the most famous art index is WAAI - World All Art Index *(Mei, Moses,. 2002).*

Financial market and artwork market: are they related?

The art market is evolving at a frenetic pace, and today its capitalization is comparable with a number of other economic areas. Is there any interrelation between the art market and the price movement of financial assets? Is it possible to use the works of art as an investment tool when building portfolios?

Studies on the interaction of the artwork market with the financial market provide controversial results. Some researchers point out that returns on investments into works of art, calculated with the use of an offered index, exceed returns on USA bonds and S&P 500 index *(Goetzman, 1993),* whereas the work *(Pesando,1993)* obtains the opposite results. The authors *(Renneboog, Houtte, (2002)* draw a conclusion that investment into art is worse than on the stock market. The study *(Mei, Moses, 2002)* presents the intermediate result: WAAI index yield is higher than the bond yield, but lower than the yield of S&P 500 and DJIA stock indices. However, most research papers highlight lower volatility of artwork market indices compared to the stock market. A specific feature of the artwork market is noted in *(Mei, Moses,(2002)* and *(Pesando,1993)*: profitability of most valuable artworks remains lower than the average in the market, which makes investments into masterpieces less profitable than investments into the middle or lower-end market segments.

Several research publications *(Goetzman, 1993), (Mikhlin, 2014), (Renneboog, Spaenjers, 2013).* reveal a positive correlation between the artwork market and the stock market. The art market and the non-ferrous metal market also show a positive correlation *(Mikhlin, 2014).* However, according to the well-known study *(Mei, Moses,2002)*, the obtained value for the coefficient of the correlation between the yield of S&P500 and DJIA and WAAI indices at the rate of 0.04 and 0.03 respectively proves the fact of no correlation between the above-stated indices. In addition, the authors *(Ginsburgh, Jeanfils,1995).* conclude that there is no correlation even between the markets.

From our standpoint, such a discrepancy in the market research results can be caused by the fact that the survey samples, the researchers used, refer to different time periods, countries, and rely on works of different schools, authors, lines of research.

Russian art as an Investment Object

The Russian art market reflects the situation, common for the national market, when, primarily, Russian works of art are traded. They are works of artists, who were born, lived and worked in the territory of the Russian Empire, USSR, and Russian Federation.

Table 1. Indicators of the auction market of Russian art (Visual art, IZO) from 2010 to 2019 (The market of Russian art,2020)

Indicator / year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Sales at internal auctions, mln USD	6.6	14.5	21.1	21.4	12.9	4.6	7.1	8.9	7.2	10.1
Ratio of sold items at internal auctions, %	49	37	31	35	41	35	44	38	47	54
Sales of Russian art at international auctions, mln USD	523	462	550	525	667	575	292	469	525	411

Ratio of sold Russian art items at international auctions, %	54	49	49	52	49	48	52	47	52	56

Since the middle of July 2014, the purchasing activity in the segment of Russian art has shown a significant growth *(Sothebys Stock Price,2020)* which is explained by the economic situation, i.e. a reduction in oil prices on the global market and ruble depreciation. In such a situation investors diversified their funds into works of art, in particular, in the segment of Russian art.

When it comes to cost features of the Russian art market, the portal ARTinvestment.ru *(The market of Russian art,2020)* provides data stating that the total sales only in the Russian internal auction market amounted to 10.1 mln USD in 2019 (table 1). Compared to the data 2018, it experienced an upturn. However, in comparison with the pre-recession indicator 2013 (21.4 mln USD), the market failed to recover after the decline in 2014, related to the economic slowdown in the country.

Nevertheless, in art market experts' opinion, today the world's art market has not lost interest in Russian art. On the global auction art market the sales of Russian artworks amount to 411 mln USD, which is close to the average for the previous decade (table 1).

Let us consider the ranking of the most expensive works of Russian artists, which were sold at Russian auctions in 2019 (Table 2). Generally, the canvasses of Russian artists occupy the medium-price niche, hereby they do not bear the risk of inefficiency, which happens when investing into masterpieces, which was described in *(Mei, Moses,2002)*. Apart from this, the price of Russian artworks has the great potential for growth, which is confirmed by the list of the most expensive items of Russian artists, sold at international auctions in 2019 (Table 3). Thus, the works of Russian art have become attractive for a wide range of investors.

Table 2: Top-5 most expensive paintings of Russian artists at Russian auctions
(The market of Russian art,2020)

Ranking	Artist, painting	Price, USD
1	Harlamoff A.A.,«Girl with a fan»	448,000
2	Serov V.A.,«After the Kulikov battle»	290,625
3	Aivazovsky I.K., «The Caucasian range from the sea»	186,000
4	Goncharova N.S., «A room in the Goncharovs' Manor Linen Factory»	168,300
5	Chagall M.Z., «Bell tower in Chambon-sur-Lac»	157,000

Table 3: Top-5 most expensive paintings of Russian artists at global auctions
(The market of Russian art,2020)

Ranking	Artist, painting	Price, USD
1	Rothko, Mark, Untitled	50,095 248
2	Staël, Nicolas de, «Parc des Princes»	22,248 000
3	Lempicka, Tamara, «The Pink Tunic»	13,362 500
4	Petrov-Vodkin, K.S., «Still life with lilac»	11,760 107
5	Soutine Ch.S., «Woman in red»	19,970 600

Currently, alternative investments into art are becoming one of the most popular ways of capital growth and preservation. Investment into works of art requires understanding of its features, as they are absolutely different from conventional investment tools.

On the Russian art market the role of indicators is played by art price indices of the ARTIMX-Rus family (*Kudryavtseva, et al.,2019).* Art index is a tool which is used to analyze the artwork market. This implies monitoring the dynamics of purchasing activity for different market segments, changes of average prices in the segment of painting and graphics. Primarily, investors focus on price indices that allow evaluating profitability, volatility, investment risk for an asset. In Russia this information is obtained by using the following indices:

ARTIMX-Rus (general), ARTIMX-Rus (painting) and ARTIMX-Rus graphic art *(ARTIMX Art Market Indices, 2020),* which are based on the data of auction sales in the segment of visual arts (Fig.1).

Russian experience of collective investment in works of art

Russia has limited and, unfortunately, not very successful experience in the functioning of mutual investment funds based on Russian works of art *(Zhdanova, 2015).* In total, since 2010, 9 mutual funds of art treasures have been registered. Of these, the investment units of two funds (CEF "Atlanta Art", CEF "Telefond") could circulate at organized auctions.

The most successful of these was CEF "Atlanta Art", which worked under the management of Management Company "Atlanta" *(News. Management Company Atlanta,2020).* The property of the fund was the "Italian Album" by Karl Bryullov - a collection of thirty-three studies and sketches, created in 1828 - 1832. The basis for evaluation - a complete collection of museum quality, which is ready to be exhibited by leading Russian museums. During the period of placement at the Moscow Exchange, "Atlanta Art" demonstrated the following dynamics of the unit cost (Figure 2, curve 1).

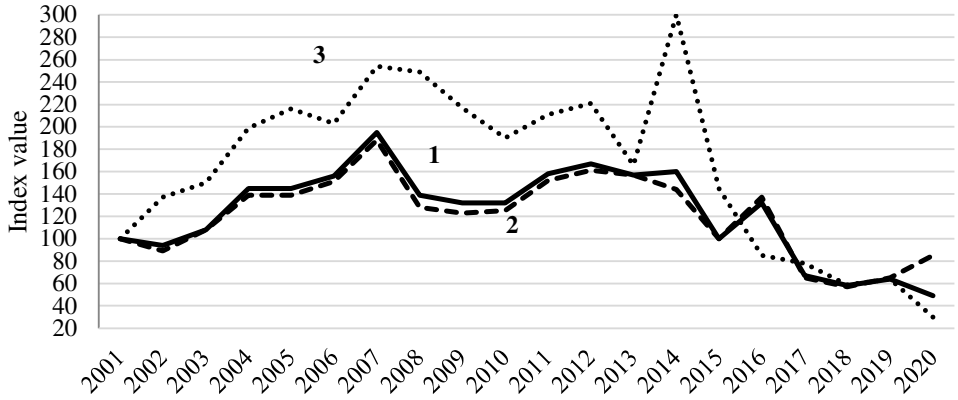

Fig.1: Price indices of Russian art ARTIMX art *(ARTIMX Art Market Indices, 2020):*
1 – ARTIMX-Rus; 2 – ARTIMX-Rus painting; 3 – ARTIMX-Rus graphic art

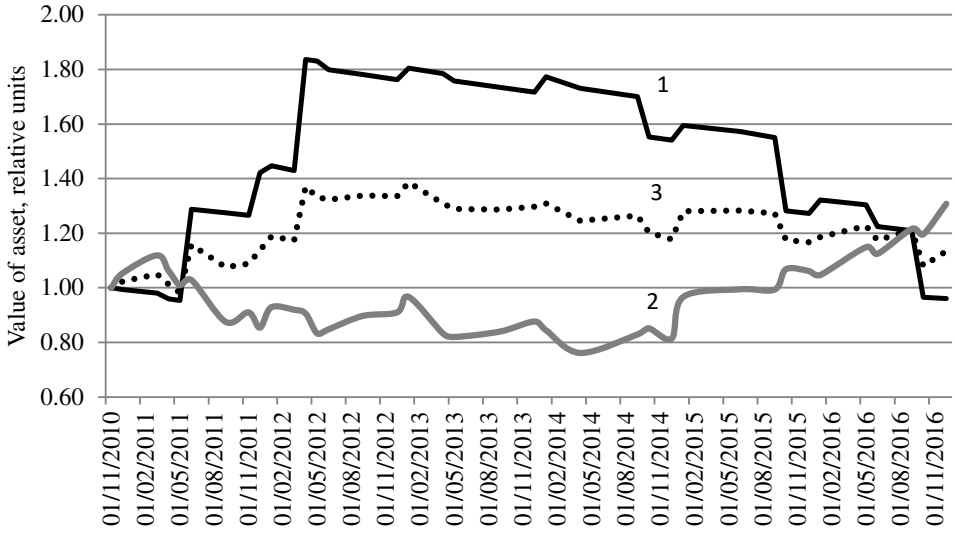

Figure 2: Asset value chart:
1 - Unit of CEF "Atlanta Art", par value 500 000 rubles *("Atlanta" Management company,2020);*
2 - Investments in stock index MOEX10;
3 – Portfolio: CEF "Atlanta Art" (50%) + stock index MICEX10 (50%).

The maximum value of a unit of par value of 500, 000 rubles was reached on April 28, 2012 and amounted to 917, 011.40 rubles. However, the chart also shows a decline in the value of the unit from May 31, 2016 with a mark of

the value on that day at 651, 180.35 rubles. The value of the unit of CEF "Atlanta Art" before the closing of the fund was equal to 479, 734.42 rubles. Such a drop in the unit value resulted in the MC's decision to liquidate the fund. Thus, MC "Atlanta" was the first to form the closed-end mutual fund of Russian art treasures "Atlanta Art", thus creating a new segment of the investment market in Russia *(Zhdanova, 2015).*

We believe that the decision to close the "Atlanta Art" fund due to only a drop in the value of the unit was a mistake, as was the very concept of investment in art, based on the expectation of only continuous growth in the value of assets. It will be shown below that works of art used as financial assets are also of interest to investors from a different perspective.

Analysis of financial indicators of the Russian art market

Despite the unsuccessful launch of the first Russian CEFs based on works of Russian art, in our opinion, these assets have great potential in the financial market. But this potential can be identified if we consider them not separately, but as one of the components of investment portfolios that are formed on a broad financial market. Let us consider some indicators characterizing works of Russian art as a market asset. As a price parameter, let us choose art indices of the ARTIMX-Rus family.

Dynamics of asset prices

Fig.1 shows a chart of dependencies of value of the ARTIMX-Rus family indices on the time horizon of 2001-2020 in relative terms (the initial value of the indices is accepted to be 100 in early 2001). We also calculated the average values of the indices' values, the values of the square deviation (usually denoted as SD), and the coefficients of variation CV for the time period considered. The data are presented in Table 4.

Table 4: Indicators of changes in the value of assets for the period of 2001-2020.
(ARTIMX Art Market Indices, 2020; Moscow Exchange indices,2020)

Asset	Average price value	SD_i	CV_i,%	R_{efi},% annual.
ARTIMX-Rus	122.90	40.95	33.32	-0.95
ARTIMX-Rus -painting	120.65	35.90	29.75	2.17
ARTIMX-Rus – graphic art	163.70	74.77	45.67	-1.01
RTSI	1096.20	564.00	51.50	21.52
MOEX10 INDEX	2848.20	1552.95	54.52	26.79
S&P500	1658.74	628.1	37.90	5.18
Gold (USD/ozt)	899.31	450.49	50.10	10.60
Brent Crude oil (USD/bbl)	60.50	29.19	48.24	7.97

For comparison, the same Table 3 presents similar indicators for the most popular financial assets among investors - Russian (MOEX10 and RTSI) and American (S&P500) stock indices, as well as gold and oil contracts. The table shows that the price dispersion of the art market assets, characterized by SD and CV indicators, is lower than that of stocks and commodity contracts. It is also known that SD and CV indicators are used by investors to assess the risk of their investments. Therefore, investments in works of art are less risky than those in traditional assets.

Table 4 also calculates the indicators of average effective yield of these assets R_{ef}, expressed in percent per annum. The table shows that the yield of art indices is significantly inferior to that of traditional assets.

However, investments in one single asset in the financial market are rare. The main operations of investors are portfolio investments made on the basis of diversification. Diversification of an investment portfolio implies inclusion of a large number of assets, each of which has its own unique set of profitability and risk indicators. The share of each asset is determined by investors themselves according to the required indicators of profitability and risk of the portfolio as a whole.

Diversification of an investment portfolio in order to reduce its risk is based on certain rules. One of them states that the most effective way of diversification is to include assets in the investment portfolio with as negative values of correlation coefficients of price changes over time as possible *(Sharpe,et al., 1998,Ch. 8).* In this case, risk indicator of the portfolio SD_p will be minimized.

Indeed, the square deviation of the value of asset portfolio σ_p is related to the values of the assets' SD by ratio:

$$\mathrm{SDp} = \sqrt{[\sum_{i=1}^{n}\sum_{j=1}^{n} SD_i\, \mathrm{SD}_j \rho_{ij}]} \quad (1)$$

where: - n is the total number of assets combined in the portfolio;
- $SD_{i,j}$ is the square deviation of cost for the i, j-th assets;
- ρ_{ij} is the pair correlation coefficient for the i-th and j-th assets; $-1 \leq \rho_{ij} \leq +1$.

In particular, for a portfolio containing two assets, 1 and 2,

$$\mathrm{SD_P} = \sqrt{\mathrm{SD}_1^2 + \mathrm{SD}_2^2 + 2\mathrm{SD}_1\mathrm{SD}_2\rho_{12}} \quad (2)$$

From the simplest example described by formula (2), it is clearly seen that the more negative the correlation coefficient $\rho_{1,2}$, is, the lower the value of square deviation SD_p **,** i.e. the risk of the portfolio as a whole.

Analysis of asset price correlation.

Let us determine how closely the changes in the prices of the assets presented in Table 3 are related. In order to do this, we have calculated the pair correlation coefficients for the period of 2001-2020, which are shown in Table 5.

Table 5: Values of coefficients of asset pair correlation

Asset	ARTIMX-Rus	ARTIMX-Rus -painting	ARTIMX-Rus – graphic art	RTSI Close	MICEX 10	S&P500	Gold	Brent
ARTIMX-Rus	1							
ARTIMX-Rus - painting	0.973	1						
ARTIMX-Rus – graphic art	0.871	0.784	1					
RTSI	0.399	0.437	0.208	1				
MOEX10 INDEX	**-0.212**	**-0.151**	**-0.345**	0.678	1			
S&P500	**-0.597**	**-0.532**	**-0.642**	0.197	0.762	1		
Gold	0.258	0.249	0.178	0.567	0.809	0.461	1	
Brent Crude oil	0.562	0.549	0.394	0.786	0.485	0.003	0.807	1

It follows from Table 5 that the coefficients of pair correlation between the art indices of Russian art and traditional market assets are in a wide range of values. The most interesting paired assets from the perspective of investment portfolio diversification, as will be shown below, are stocks from the US S&P500 index and the Russian stocks included in the MOEX10 index, as well as gold contracts.

Thus, characterizing the works of Russian art as assets of the financial market over a long (20 years) time horizon, the following conclusions should be drawn:

1. Their return is inferior to that of traditional assets.
2. The risk of price change is significantly lower than that of traditional financial assets.
3. The prices of financial assets - works of Russian art with such assets as Russian and US stocks have negative correlation coefficients.

Works of Russian art as a protective asset of a stock portfolio

The noticeable negative correlation of the value of Russian art objects with the indices of the stock market (Table 5) allows using them as the so-called "protective assets" when building stock portfolios.

Protective assets are assets with zero or reverse dependence on changes in the financial market. These are financial market tools that react minimally to fluctuations in, for example, stock prices. And some, the most valuable in terms of portfolio value protection, even become more expensive when market indices go down due to negative correlation with other assets of the portfolio. As a rule, their return is small, but their value to the investor consists in stabilization of the portfolio value (return). Their purpose is to hedge portfolio risks, creating a "safe haven" situation at a time when quotes of other components of the portfolio sharply fall.

The works of Russian art studied in this work, if positioned on the financial market, are ideal protective assets for stock portfolios. In this connection, it is possible to use such an asset as a component of a stock portfolio in which it will act as a protective asset. The weight of the component should be defined by investors themselves according to the planned level of profitability and risk.

Let us consider the possibilities of using the protective asset offered by us on a specific example. In section 4, the history of functioning of the Russian CEF "Atlanta Art", whose assets were formed from little-known works of the famous Russian master of the XIX century, Karl Bryullov, is considered. During the period of its existence, the CEF demonstrated both periods of strong growth of the unit's value and periods of its fall. The fund was liquidated when the value of a unit dropped below the nominal value of 500 000 rubles (fig.1, curve 1). The effective return on investment in the fund for the entire period was R_{ef} =-0.67% per annum at the time of its liquidation.
Fig.1 also shows the chart of the Moscow Exchange index MICEX 10 (curve 2). The effective return on investment in the index over the period of its existence was R_{ef} =4.60% per annum. The coefficient of correlation of a unit and stock index value ρ = -0.758. Thus, there is a strong negative correlation between the values of a unit of the CEF and investments in the index, which would allow forming a well-diversified portfolio with a minimum set of assets.

Curve 3 in Fig.1 represents the value of such a virtual portfolio, consisting 50% of investments in MICEX 10 and 50% - in CEF "Atlanta Art". The effective return of the portfolio for the period was 2.12% per annum. However, the volatility of the portfolio value, estimated by coefficient of variation CV, turned out to be significantly lower than that of its components (Table 5).

Table 5: Indicators of changes in the value and effective return on assets over the period of existence of the CEF

Asset	Average cost value	SD	CV, %	R_{ef},%
Unit of CEF “Atlanta Art”	1.443	0.303	21.0	-0.67
MOEX10 INDEX	0.966	0.130	0.135	4.60
Portfolio 50% CEF+50%MICEX10	1.204	0.111	0.092	2.12
Portfolio 10% CEF+90%MICEX10	1.013	0.096	0.095	4.12

Fig.1 and Table 5 show that combination of assets into a portfolio reduces both risk (SD and CV) and return on investment. By varying the share of assets in the portfolio, an investor is able to achieve the required return/risk ratio. For example, a portfolio consisting 90% of index assets and 10% of units of a CEF shows a higher effective return with a slight increase in risk (bottom row in Table 5).

In our opinion, a protective asset based on works of Russian art is advisable for long-term investment portfolios, the main requirement for which is to preserve their value. However, for effective use of an asset - works of Russian art - on the stock market, it is necessary to transform it into an acceptable market instrument - stocks, i.e. to securitize it.

Conclusions

In recent years, investment in art has been trending towards following the shared ownership model, where an investor without being an art enthusiast seeks to achieve the required return/risk ratio for their investment portfolio. However, there is a problem of reducing the risk of investment related to a poorly chosen art object. As shown in

the paper, this problem can be solved by implementing the model of shared ownership in the form of an investment fund, in Russia - a CEF, whose assets replicate one of the art indices.

The peculiarity of the dynamics of the Russian art price indices is their high negative correlation with the stock market indices and low volatility. This makes it possible to use stocks of a CEF primarily as a protective asset within investment portfolios.

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Risk Aversion Among Nations: Do Indulgence and Long-Term Orientation Matter?

Dr. Yousif ABDELRAHIM
Assistant Professor, Department of Management
College of Business Administration - Prince Mohammad Bin Fahd University
P.O. Box 1664, Al-Khobar 31952, Kingdom of Saudi Arabia
yabdelrahim@pmu.edu.sa

Dr. Assim ABDEL-RAZZAQ
Assistant Professor, Department of Accounting & Finance
College of Business Administration - Prince Mohammad Bin Fahd University
P.O. Box 1664, Al-Khobar 31952, Kingdom of Saudi Arabia
aabdelrazzaq@pmu.edu.sa

Abstract

This study examines the relationship between the Hofstede cultural values of long-term-short-term orientation, indulgence-restraint, and risk aversion in 53 developed and developing countries. To test our two hypotheses, we controlled for the country's per capita income, and religiosity. Using multiple linear regression analysis and secondary data from Hofstede's Cultural Study in 2010, Relative Risk Aversion Around the World, the Country-level Religiosity Index, and the World Bank Group; the results suggest that indulgence has a positive and significant impact on the country's risk aversion but the long-term orientation has a positive and non-significant impact on the country's risk aversion. This study confirms that cultural values matter when it comes to risk aversion across countries. The study also shows that not only do the cultural values of individualism and uncertainty avoidance influence risk aversion in countries but also indulgence-restraint.

Keywords: Risk Aversion, Risk Attitude, Risk Preference, Risk-Taking.

Introduction

Cultural values indeed cause considerable differences in risk-averse and risk-taking in societies (Rieger, Wang, and Hens, 2011). Risk aversion is critical in multinational business, behavioral economics, entrepreneurship, life insurance, financial institutions, banking, consumer behavior, and unemployment (Gandelman and Hernández-Murillo, 2015). Risk aversion has a significant impact on the country's economy and entrepreneurial investments (Guiso, 2012). Therefore, it is worthwhile for researchers to examine many factors that could influence risk preference at the individual, firm, and country level. Managers and other policymakers make decisions in several areas that affect businesses in organizations and economies in countries. These decisions might be influenced in one way or another by business and policy decision-makers level of risk preference. The micro-level decisions made by policymakers, business managers, and executives could influence a country's development outcome and economic growth (Gandelman, and Hernández-Murillo, 2015).

There are few studies on cultural values and their impact on risk-taking (i. e., willingly making risky decisions or taking some actions that may have unwanted results), risk aversion (i. e., avoid taking a few risks to minimize uncertainty and get around failure), and risk acceptance at the firm and individual levels. However, the majority of the studies on risk, aversion has focused on the cultural values of masculinity (MAS), individualism (IND), uncertainty avoidance (UA), power distance (PD), indulgence-restraint (ING), long-term/short-term orientation (LTO), and gender (i.e., male/female). Previous studies have used various proxies as a measure of risk aversion such as the Z-score, Hofstede uncertainty avoidance, self-assessed risk attitudes, the Pratt-Arrow measure of absolute risk aversion, and other proxies. For example, Kanagaretnam, Lim, and Lobo (2014) found that banks in high uncertainty and low individualism cultures are more risk-averse than banks in low uncertainty avoidance and high individualism. This study tries to cover the gap by empirically examines the relationship between the Hofstede cultural values of long-term-short-term orientation (LTO), indulgence-restraint (ING) and risk aversion at the country level in 53 developed and developing countries using the coefficient of relative risk aversion as a proxy for risk aversion.

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Litreature Review and Hypotheses Development

Risk Aversion

Risk aversion as a concept in business has been defined by many researchers. In this study risk aversion is defined as a person's preference of a riskless outcome by avoiding making risky decisions (Mandrik and Bao, 2005). Hence, individuals who are risk-averse have the tendency to seek guaranteed outcomes and avoid ambiguity.

Risk aversion is an essential factor in everyone's life decisions including investors, economists, and policymakers for financial and economic development decisions that might influence many people's lives. Risk aversion is viewed as a cultural trait at the country level because people with shared culture are more likely to cluster inside one country (Lehnert, Frijns, Gilbert, and Tourani-Rad, 2011). At the country level risk aversion plays an important part in economic development and the country's competitiveness (Zahra, 1999). For example, entrepreneurs' risk aversion has a critical influence on a country's employment rate and innovation because entrepreneurs create new job opportunities and innovate new services and goods to consumers (Burton, 2015).

Researchers have developed several measures as proxies to measure risk aversion. For instance, Szpiro (1986) developed the relative risk aversion constant by examining data from liability insurance in 15 countries between 1950 and 1980. Gandelman and Hernández-Murillo (2015) developed the coefficient of relative risk aversion using the Gallup World Poll self-reports data of self-reports on personal well-being in 117 developed and developing countries worldwide in 2006.

Power Distance

Power distance is the degree of expectations and acceptance of individuals to inequality and power differentials in their society. Karimi and Toikka (2014) found a negative and a significant relationship between power distance (i.e., the degree of expectation and acceptance of unequal power distribution by less powerful individuals in a society) and risk acceptance. In other words, societies in countries score high in power distance are less risk acceptance than societies in countries score low in power distance.

Individualism Versus Risk Aversion

Individualism is the extent to which individuals in society prioritize their personal needs and goals over their groups' goals and well-being. The extant literature shows that there is a relationship between Hofstede's cultural values and risk attitudes (i.e., risk aversion). Researchers have examined the influence of cultural values on risk aversion among individuals. Breuer, Riesener, and Salzmann (2014) found that investors' low individualistic countries are more risk-averse than their counterparts in high individualistic countries. In the study conducted by Karimi and Toikka (2014) on the influence of Hofstede's cross-cultural dimensions on risk acceptance, the two researchers concluded that the positive and a significant relationship between the cultural value of individualism and risk acceptance means societies in individualistic countries are more risk acceptance than societies in collectivistic countries. Therefore, in countries with high level of individualism, investors will be less reluctant to invest in assets that contain high elements of risk.

Masculinity Versus Risk Aversion

Masculinity is how much a society assigns different gender social rules for females and males. Iliyanova (2016) measured masculinity by using the industry sector where men and women work and found that masculinity has no significant impact on risk aversion. However, Iliyanova (2016) found that gender does have a relationship with risk aversion where men are less risk-averse than women. It is important to keep in mind that at this point did not use Hofstede's or the Globe Study indices as a proxy for masculinity. In addition, Karimi and Toikka (2014) found a negative and significant relationship between masculinity and risk acceptance. In other words, societies in countries score high in masculinity are less risk acceptance than societies in countries score low in masculinity.

Uncertainty Avoidance Versus Risk Aversion

Uncertainty Avoidance Index (UA) is the cultural value that measures the extent to which society members adapt to changes, handle anxiety, and deal with uncertainty. Hofstede (2001) suggests that cultures with high UA values usually feel less comfortable with ambiguous situations and prefer official rules. Whereas cultures with low UA values feel safe and enjoyable with the unknown. Countries with high UA values are more likely to be less socially stable, low economically, and politically stable than countries with low UA values (Khambata and Liu, 2005). There is a belief that UA and risk aversion are related because the two dimensions are caused by the same psychological actors (Kahn and Sarin, 1988).

Another study conducted by Munro-Smith (2002) found that individuals with high UA are inclined toward bureaucracy and risk-aversion. In addition, Karimi and Toikka (2014) found a negative and significant relationship between uncertainty avoidance and risk acceptance; long-term orientation and risk acceptance; and indulgence and risk acceptance. In other words, societies in countries score high in uncertainty avoidance are less risk acceptance than societies in countries score low in uncertainty avoidance.

Long-Term Orientation Versus Risk Aversion

Long-term orientation (LTO) - short-term orientation (STO) is the extent to individuals in society are future-oriented toward rewards, especially thrift (i.e., using money and other resources wisely and not wastefully) and determination in pursuing something regardless of difficulty (Hofstede, 2001). We expect that LTO societies are more likely to be cautious about making risky decisions, and therefore, more risk-averse. On the other hand, short-term orientation individuals are more oriented toward the present and the past, specifically, face-saving, credibility, reputation, respect for tradition, and satisfying social obligations" (Hofstede, 2011). Hence, we expect that STO societies are less to be cautious about making risky decisions, and therefore, less risk-averse. Following the above argument, we propose hypothesis 1(H1):

H1: Societies in countries score high in the cultural value of long-term orientation will be more risk-averse than societies in countries score low in the same cultural value.

Indulgence Versus Risk Aversion

Indulgence is defined by Hofstede and Minkov (2010). as "the extent to which people try to control their desires and impulses". According to Hofstede (2001) societies in low indulgence countries are inclined to distrustful, and skepticism. On the other hand, societies in high indulgent countries are inclined to be more confident, optimistic, and hopeful about the future (Hofstede, 2011). According to Yıldırım, Arslan, and Barutçu (2016) trust relates to optimism and trust depends on optimism when it comes to the future as trustful people believe that tomorrow is always going to be better than today. Studies have shown that there is a correlation between pessimism and risk tolerance as there is a belief among scholars that optimistic people are less risk-averse than pessimistic people (2008). In finance Guiso (2012) showed found that investors who are optimistic and have a high level of trust are more to accept risky investments such as stocks. In other words, optimism decreases risk aversion. Prior research done on developed nations has suggested that people who are trusting tend to take more financial risks when it comes to investing in stocks (2018). However, greater risk aversion could make trust between people to decline (2001).

The cultural value of indulgence mirrors an inclination towards gratification of human beings' natural desires of life, enjoying life and having fun (Minkov and Hofstede, 2012). Indulgence cultures attach more importance to pleasure and leisure which lead to more hedonic behaviors (i.e., behaviors that establish positive or pleasant experience) (Hofstede and Bond, 1988; Minkov and Hofstede, 2012). Hedonic behaviors could lead to riskier decisions and less risk-averse since pleasure is believed to be more important than the cost taking risk (Minkov, 2007). Finally, Karimi and Toikka (2014) found a negative and significant relationship between indulgence and risk acceptance. In other words, societies in countries score high in indulgence are less risk acceptance than societies in countries score low in indulgence. Following this line of discussion, we expect that indulgence negatively relates to risk-averse and posit the following hypothesis (H2):

H2: Societies in countries score high in the cultural value of indulgence will be less risk averse than societies in countries score low in the same cultural value.

Methodology

The Variables' Measurements

The Dependent Variable

Risk aversion (i.e., avoid making risky financial and/or non-financial decisions) is the dependent variable for this study measured by the coefficient of relative risk aversion at the country level. The coefficient of relative risk aversion was developed by Gandelman and Hernández-Murillo (2015) using the Gallup World Poll self-reports data of self-reports on personal well-being in 117 developed and developing countries worldwide in 2006. The coefficient of relative risk aversion ranges from zero to three, where zero means the population of the corresponding countries are not risk-averse society and three means the population of the corresponding country is an extremely risk-averse society. We choose the coefficient of risk aversion among many risk aversion proxies because this proxy incorporated

many developed and developing countries (117 countries) which might more comprehensive than other proxies that focused mainly in developed countries and covered fewer countries (15 and 31 countries respectively) around the world. The dataset on relative risk aversion is available at https://dspace.ort.edu.uy/bitstream/handle/20.50 0.11968/274 3/documen todeinvestigacion98.pdf.

The Independent Variables

Hofstede's cultural dimensions of long-term orientation (i.e., the degree to which society members are future reward oriented, especially perseverance and prudence) and indulgence (i.e., the degree to which individuals in society show a favorable or unfavorable reaction to their desires) are our independent variables measured at the country level. We borrowed the measures for these two cultural values from Manikov and Hofstede's (2012) study. Hofstede made his data on cultural values available to researchers at his website (https://www.hofstedeinsights.com/countrycomparison/). Hofstede measured the cultural values using a survey of IBM employees in many countries where the IBM subsidiaries are located. However, long-term orientation cultural value was added from Hofstede and Bond (1988) where they compared students from 23 different countries using Bond's Chinese Value Survey. Hofstede adopted indulgence versus restraint in his after he extracted this cultural value from the World Values Survey. Hofstede's cultural measures have shown reliability and validity.

The Control Variables

Both per capita income and religiosity are used as control variables measured at the country level. We controlled for religiosity because a prior study done by Noussair, Trautmann, Van de Kuilen, and Vellekoop (2013) have shown that religious people (i.e., people who attend church regularly) are more risk-averse than non-religious people. We borrowed the measures of religiosity in countries from the Extensive Country-Level Religiosity Index (ECLRI) developed by Joshanloo and Gebauer (2019) at https://psycnet.apa.org /record/ 2019-76861-001. The ECLRI was derived from the 2005 – 2017 Gallup World Poll (GWP) data where 1,862,900 randomly selected male and female respondents in 167 countries were asked about the importance of religion in their daily lives.

Per capita income (i.e., the average income of an individual in a given country). There are conflicting findings regarding the relationship between income and risk aversion. Shaw (1996) found a positive correlation between wage income and risk aversion at the individual level. Haushofer and Fehr (2014) concluded that poor countries are more risk-averse than rich countries. However, l'Haridon and Vieider (2019) showed that poorer countries are more risk tolerance than rich countries. In this study, we borrowed per capita income data from the World Development Reports in 2019 published by the World Bank at https://www.worldba nk.org/en/publication/wd r2019.

Data Analysis

The influence of the cultural values of long-term orientation and indulgence on risk aversion with per capita income and religiosity as control variables in 53 developed and developing countries was examined using multiple linear regression analysis because the dependent the variable dataset is not normally distributed which violates the least squares regression assumptions. To run the multiple linear regression analysis: First, we checked the Pearson correlation between the variables of interest (see Table1). Second, we checked the least-squares assumptions and found that the dependent variable data are not normally distributed. Hence, we decided to check for the multiple regression assumptions. We found that the assumptions are fulfilled (i.e., the mean of the residuals is zero; equal variance or Homoscedasticity of residuals, and multi-collinearity) (see Figure 1). Finally, we ran the multiple linear regression analysis of the two independent variables (i.e., long-term orientation and indulgence) after controlling for per capita income and religiosity.

Table 1: Descriptive statistics and inter-correlations

Variables	PD	UA	MAS	IND	LTO	ING	RA	PCI	Religion
PD	1								
UA	.373**	1							
MAS	-.068	-.191	1						
IND	-.697**	-.401**	.203	1					
LTO	.084	.164	-.014	.090	1				

ING	-.339**	-.234*	.254*	.139	-.646**	1			
RA	-.173	-.216	.107	.100	-.031	.281*	1		
PCI	-.713**	-.206	.177	.716**	.251*	.185	.165	1	
Religion	.416**	.027	.047	-.578**	-.539**	.185	.027	-.615**	1
Mean	64.66	72.04	49.02	39.75	49.53	47.09	.9425	25905.62	59.421
SD	20.910	19.613	19.109	23.816	25.247	23.234	.49973	20580.023	23.5258

Note: N = 53. PD = Power Distance. UA = Uncertainty Avoidance. MAS = Masculinity. IND = Individualism. LTO = Long-term Orientation. ING = Indulgence. RA = Risk Aversion. PCI = Per Capita Income. Religion = Country Level of Religiosity. SD = Standard Deviation. Comp. = Country Level of Competitiveness.

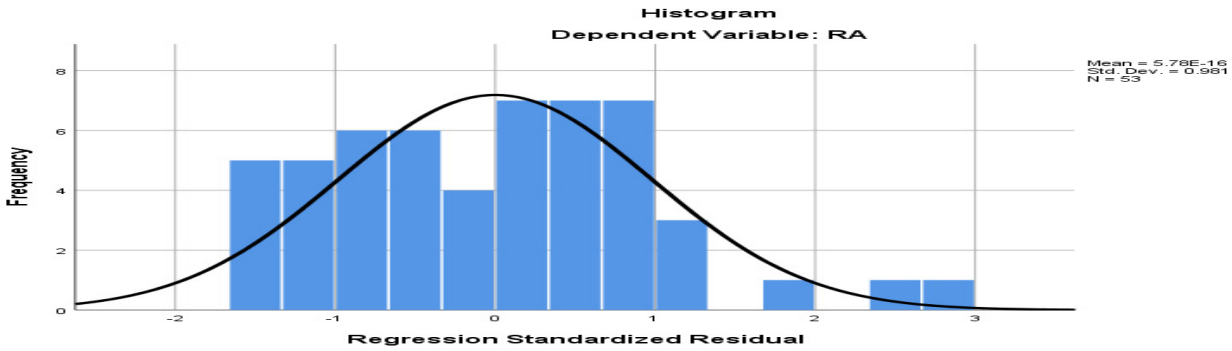

Figure 1: Standardized residual for the dependent variable (risk Aversion)

Empirical Results

Through the regression analysis results, we try to explain the differences across countries in the tendency to be risk-averse. Table 2 shows the summary of the multiple linear regression analysis results for variables (i.e., LTO and ING) predicting risk aversion (N = 53). ANOVA shows that the model is significant and fit (i.e., R2 = 0.118; R2 change = 3.49*; P < 0.05). The results of the multiple linear regression analysis also show indulgence appears to be a more important cultural variable than long-term orientation. Indulgence was significant when the two (i.e., religiosity and per capita income) control variables were included in the regression and also when we did not control for per capita income and religiosity. Long-term orientation shows no significant relationship with risk aversion. Surprisingly, the two control variables (religiosity and per capita income) were not significant at the country level.

Table 2: Summary of the multiple linear regression analysis for variables predicting risk aversion (N = 53).

Variable	B	SE	β	t	Sig.
ING	0.010	0.004	0.448	2.577	0.013*
LTO	0.005	0.003	0.259	1.487	0.143
R^2			0.118		
F for change in R^2			3.49*		

*Note. ING = Indulgence. LTO = Long-Term Orientation. B = Unstandardized Coefficient. **β** = Standardized Coefficient. T = T-Value. Sig. = Significance. *P < 0.05.*

Conclusion

The multiple linear regression results of examining 53 developed and developing countries suggest many conclusions about risk-aversion among countries. First, the national culture of all countries matters when it comes to the level of risk-aversion at the country level. Risk preference is a critical element component of economic behavior because it determines many of a country's economic decisions such as asset allocations, insurance purchases, and strategic decisions made by corporations (Rieger, Wang, and Hens, 2015). In general, we expect that highly developed countries with strong economies to be less risk-averse than developing countries. Second, not only individualism and uncertainty avoidance influence risk-aversion but also indulgence. Perhaps indulgence might have a significant influence on a society's level of risk-aversion because of confidence, trust, optimism, and hedonic behavior. Third, a country's level of religiosity and per capita income seem to be less important factors that influence risk-aversion among countries and societies. Even when we regressed religiosity and per capita income as independent variables on risk-aversion, we found no significant relationship between religiosity and risk-aversion and per capita income and risk-aversion. Finally, this study used the coefficient of relative risk aversion as a proxy for risk-aversion developed by Gandelman and Hernández-Murillo (2015) because it is a more comprehensive measure and also the data availability in many countries. However, future research could other proxies for risk-aversion to understand whether or not different risk-aversion measures can provide similar results.

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Logistic Support for The Omnichannel Strategy in The Fashion Retail – Areas and Directions of Improvement

Joanna DROBIAZGIEWICZ

University of Szczecin, Institute of Management, Faculty of Economics,
Finance and Management, Szczecin, Poland, joanna.drobiazgiewicz@usz.edu.pl
ORCID ID: 0000-0001-6726-8579

Abstract

The aim of the article is to present the areas of logistic support of omnichannel strategy in the fashion retail and to indicate the directions of its development. The article uses the method of critical analysis of source literature and case study. Based on a critical analysis of the literature, the first part of the article presents the essence of the omnichannel strategy and defines the role of logistics in its implementation. Logistic support for the omnichannel strategy involves many activities, both in the area of stationary sales and e-commerce. It requires the introduction of system solutions, which concern the management of the entire supply chain both in terms of goods flows as well as the accompanying information and funds. These solutions should ensure flexibility of operation, speed of reaction and customization, which is particularly characteristic of the fashion industry strategy.

In the next part of the article theoretical considerations have been referred to practical logistic solutions used in implementation of omnichannel strategy in the fashion sector. The areas of logistical support and solutions applied in these areas were defined. Next, possible directions of their improvement were indicated.

Finally, there have been presented the conclusions drawn from the performed research.

Keywords: e-commerce, omnichannel, logistic support,

Introduction

Increasing market competition and increasingly higher customer requirements have a significant impact on the activities of fashion companies. Companies producing clothing, footwear, accessories, etc. have to adapt their designs, production and store styling to the signals received from customers. At the same time they have to optimize the costs of production, transport and promotion. The key success factors in the fashion industry are (Macchion, Moretto, Caniato, Caridi, Danese, Vinelli, 2015): final product price, production costs, target country, quality, style and design, brand reputation, exclusivity, uniqueness, technological innovation, customer service, flexibility, reactivity and sustainability. To achieve success, it is necessary to introduce an appropriate management concept (Teece, 2010). Enterprises in the clothing industry are characterized by excellence of organizational solutions in terms of logistics and high flexibility of operations. This is particularly true for the fast fashion sector. Clothing industry, in the fast fashion sector is characterized by complexity and variability of the environment resulting from: short lead times, rapid changes in fashion trends, unpredictable demand and high competition in the industry.

The main goal of this article is to present the areas of logistic support for the fashion industry in the implementation of the omnichannel strategy as well as to show the changes taking place in individual areas of this support.

Research Methodology

The first part of the article is based on literature research and presents the essence of the omnichannel strategy and the importance of logistics processes in its implementation.

In the next studies, we can distinguish two essential parts. In the first one, on the basis of the analysis of processes taking place in the supply chains of the fashion sector as well as the scope of services offered by logistics operators, basic areas of logistics support were distinguished. Then, they were characterized and modern trends in this area were indicated. In the second part of the empirical research, in relation to specific areas of logistical support, practical solutions and services offered by logistics operators for Polish fashion sector were shown. This part of the article is based on information about the offer of industry services from selected leading logistics operators, such as: Fiege, Hellmann, Scheenker, UPS, Quehenberger and DHL, also delivered to the Polish market. The main areas analysed were order management, warehouse and stock management, transport and return management.

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Defining omnichannel as a concept

Meeting the expectations of customers and increasing the efficiency of retail stores forces companies to change their business models (Hosseini, Merz, Röglinger, and Wenninger, 2018; Massa, Tucci, and Afuah, 2017). The e-business models of that time are characterized by innovation, flexibility and openness (Teece, 2010). Significant trends in running an electronic business are the growing importance of value chain creation (Zot, Amit, 2000; Bhatt, Emdad, 2001; Wang, Lu, 2008). Important aspects are access to content, offering online services, new technologies and access services, good communication as well as appropriate software and hardware made available to users (Szpringer, 2012). Omnichannel can be defined as the operating strategy of e-business entities (McCornick, Cartwright, Perry, Barnes, Lynch & Ball, 2014). Ominichannel allows for new shopping experiences by combining different channels in which the interaction between the vendor and the customer occurs. The channels can be defined as contact points such as traditional or stationary and modern ones such as mobile or online. The customer can use whatever he thinks is best at any stage of the purchasing process in which he is (Mosquera, Pascual, Ayensa, 2017). The benefits for the customer resulting from the full integration of multi-channel sales are: the use of similar prices and promotional campaigns in all channels (possibility of redeeming coupons), the possibility of returning goods at all points of sale, regardless of where it was purchased, consistency of goods and services in all channels.

The implementation of the omnichannel strategy requires a thoughtful introduction of a structure of activities related to marketing, ordering system, inventory management, returns and support for their extensive and automated IT. In the omnichannel strategy customers use different channels at the same time, which requires their integration. Unlike the multi- or cross-channel strategy, omnichannel allows for the integration of objectives of all channels, joint channel management and the possibility of their full integration as well as common data management (Verhoefa, Kannanb, Inman, 2015; Mosquera, Pascual, Ayensa, 2017; Beck and Rygl, 2015). An important role in this respect is played by logistical support in the implementation of the flow of goods, information and financial resources both between sales channels, vendor and customer as well as between other participants in the supply chain (Metters, Walton, 2007).

Introducing a well-functioning omnichannel strategy requires designing and implementing changes in the organizational structure of the company and the use of modern technologies as well as process automation infrastructure (Xie, Jiang, Zhao & Hong, 2014). The implementation of the omnichannel strategy requires, above all, cooperation in the areas of logistics, sales and marketing. The basis for coordination activities between teams which participate in all stages of the customer value creation process is to design and implement an effective system of information flow and communication (Christopher, 2016). It seems necessary to use modern IT systems, which should be a basic element of the infrastructure both internal and external information flows. This is essential to handle sales in the omnichannel strategy (Piotrowicz, Cuthbertson, 2014). It must, among other things, provide information whether the selected goods are available, where they are and when they will be ready for release or shipment. On this basis, it is possible to provide the consumer with reliable information on the forms of delivery or collection and the lead time.

A prerequisite for omnichannel retailing is the creation of central and integrated information systems that include elements such as CRM, WMS, order management, financial management, payment services and ERP system (Hübner, Wollenburg, Holzapfel, 2016; Nettsträter, Geißen, Witthaut, Ebel & Schoneboom, 2015).

In the implementation of multi-channel sales, it is necessary to provide logistic support in all phases of the distribution process, both in the pre-transactional, transactional and posttransactional phase.

Logistical support for omnichannel strategy - areas and directions for improvement

The implementation of the omnichannel strategy requires a number of logistical processes that can be applied to different areas (Fig. 1).

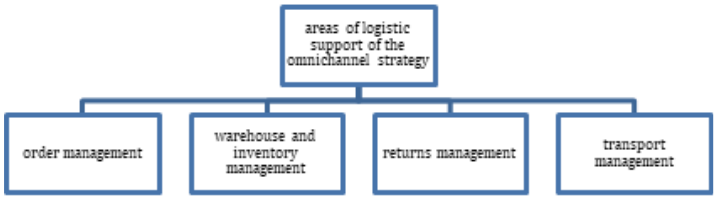

Fig. 1: The areas of logistic support of the omnichannel strategy

Source: own study.

In the considerations, a division into the following areas of logistical support was adopted:

- order management (processes from the moment of the customer's order to the moment of delivery to the customer),
- transport management,
- warehouse and inventory management,
- return management.

Order management

Order management is a complex process which consists of many elements. Order management involves the need to ensure proper communication both with the customer and with other participants in the supply chain. This communication is the basis for accessing up-to-date stock information and ensuring an efficient flow of goods. Each stage of the sales process is important and one of the most crucial is the customer's ordering itself. Access to relevant information and product description will determine whether the customer will purchase the right product for himself, which he will not return later. What is also important is that the customer who buys the product online should receive current information about the availability of the product. In case they are out of date, it may turn out that the purchased product is no longer in stock. In this case the customer will not receive the product and must wait for a refund. Poorly organized order fulfillment may not meet customer expectations, lead to delays in shipment, cause out-of-date information or discourage purchase. As a result, it can lead to a definite loss of the customer.

Orders in the sale of omnichannel can be realized in various forms, such as:

- online order sent to a traditional store, collection takes place in the store (click & collect) (Gao and Su, 2017);
- purchase and collection in a traditional store (immediately or after a certain time);
- online order placed with a sales agent (eRetail channel, e.g. Zalando, Answer) realized directly to the buyer's house through the sales agent distribution infrastructure or the seller (Pawłowski, Pastuszak, 2019);
- orders sent to the consumer from the manufacturer of the product via the online retailer,
- orders sent directly from the manufacturer.

In recent years, customer requirements for increased speed, flexibility and last mile delivery convenience have been increasing. Expectations of changing the place and time of delivery are also growing (Hübner, Kuhn, Wollenburg, 2016) . Forms of order completion are related to the so-called last mile, which is an important and challenging element of the supply chain. The moment when the customer receives the parcel in hand and how it is done will influence the evaluation of the quality of the whole purchase process. The efficiency of last mile deliveries is of particular interest in various aspects, such as: lowering delivery costs by optimizing transport routes (Geetha, Poonthalir, & Vanathi, 2013), changes in the distribution network (Verlinde, Macharis, Milan and Kin, 2014), new forms of delivery to the customer, or organization of loading goods on the means of transport (Lin, Yu, 2006).

Companies that use omnichannel sales offer their customers the following forms of delivery:

- delivery of the product to the customer's house,

- delivery of goods to a parcel locker,

- collection at a point (e.g. post office, local store, gas station),

- collection at the stationary store.

Apart from deliveries to the customer, the issue of deliveries (supplies) of individual stationary stores is very important. An significant problem that may arise here is the problem of time windows, i.e. limited possibility of delivering goods to stores. They can only be delivered in specific, narrow time frames.

Returns Management

The requirements of customers purchasing goods in different channels also apply to problem-free returns. In omnichannel's strategy, customers should be able to return a product at different points of sale, regardless of where they made their purchase. As part of this strategy it is necessary to implement an appropriate reverse logistics infrastructure (Rao, Rabinovich & Raju, 2014; Dekker, Fleischmann, Inderfurth, and Wassenhove, 2004). It should ensure good customer service also in the post-sales phase and support the optimization of return costs for products related to transport and re-storage (Fleischmann, Bloemhof-Ruwaard and others 1997).

The clothing industry is one of those where return management plays an important role. It is particularly important when a large number of products are ordered online, without the possibility of seeing and trying them on (Bell, Gallino & Moreno, 2014). One way to reduce the number of returns of products purchased online may be to provide more accurate information about the product, better quality photos and the possibility of a virtual try-on.

In addition to transport and storage, the logistics operator's tasks in the area of return handling often include added-value services such as minor repairs of returned products, ironing or repackaging.

Transport Management

The basic area of logistic support for the sale of products is transport related to the movement of goods between the participants of the supply chain. Multi-channel sales cause that many stocks are in transport, which requires a solution for real time visibility of goods. Advanced logistic solutions ensure control of shipments, orders and the means of transport themselves. These solutions also include opportunities for cooperation between partners in the supply chain. Through appropriate communication and data exchange between trading partners, it is possible, among other things, to determine a more accurate estimated time of delivery.

Warehouse and inventory management

Growing e-commerce market related to, among others, introduction of omnichannel strategy results in increased demand for warehouse space and modern tools supporting warehouse management. Entities offering the handling of warehouse processes are faced with ever higher requirements, especially with regard to such aspects as (Richards, 2017; Żuchowski, 2016):

- speed and faultless acceptance of deliveries,

- efficiency and effectiveness of the picking process,

- the speed of shipping the goods,

- efficient operation regardless of large seasonal sales fluctuations,

- creating additional space related to the provision of value-added services, such as creating promotional sets, labelling, repackaging.

In order to meet the requirements it is necessary to properly design the warehouse space and apply appropriate techniques, technologies and systems supporting effective and efficient warehouse processes. The increased complexity resulting from multi-channeling requires the use of Warehouse Management Systems (WMS). Knowledge about the inventory of goods and their location is essential. This information is necessary to effectively manage orders. Knowledge of inventory levels is essential for planning activities throughout the supply chain. Managers should continuously conduct extensive analysis in the area of inventory management. The problem is also knowing the state of inventory that is in transit.

The more sales channels a vendor offers, the more complex inventory management becomes (Kumar, Eidem & Noriega Perdomo, 2012). Optimizing the level of inventories is possible primarily due to the involvement of qualified IT personnel who appropriately redesign business processes (Frazer, Stiehler, 2014).

A new trend that can be noticed is the new role of the physical store, which can be an additional place of distribution and storage. The store can be a place where the customer can receive orders online. Besides, the seller can send orders that are placed online directly from the store to the customer (Napolitano, 2013; Giannopoulos, 2014). This increases the amount of products in stationary stores, which are treated as micro-magazines.

This solution has many advantages:

- possibility of quick delivery to the customer from a store located close to the customer (Napolitano, 2013);

- using pickup in the store and shipping the goods to the customer allows the seller to make better use of existing inventory and thus reduce excess inventory that could otherwise be sold at a discounted price (Giannopoulos, 2014);

- offering the customer the possibility of collecting the goods in the store allows to reduce the costs of the "last mile". Delivery of the product to the customer is a relatively expensive part of distribution for the seller (Agatz, Fleischmann & van Nunen, 2008);

- besides, personal collection of the goods in the store can also be an incentive to purchase other goods that the customer will see in the stationary store (Zhang, Farris, Irvin, Kushwaha, Steenburgh & Weitz, 2010).

New trends in warehouse management also include giving the warehouse new functions such as acting as showrooms or sales points. There is now also a trend to segment supply chains by channel, resulting in duplication of inventory and infrastructure. Some companies such as DHL (DHL, 2015) are beginning to offer multi-channel distribution center projects. Separate channel spaces in the same warehouse and different automation solutions are used to meet the different requirements of the B2B and B2C channel supply chain, but stocks are common to both channels.

Modern solutions supporting omnichannel strategy

The fashion market is growing, online shopping is becoming more and more popular, the number of orders is increasing and customer requirements are growing. Sellers need to adapt to this new situation and they find it really challenging. In addition, the fashion industry is specific and is characterized by, among other things, dynamic changes in the offer, the need to move goods quickly and the need to ensure the safe transport of delicate products. The involvement of specialized logistics service providers is essential for the implementation of logistics processes (Rabinovich, Knemeyer & Mayer, 2007). The growing needs of the fashion sector in terms of logistic support mean that there are more and more entities of this type on the market. Thanks to their experience and knowledge they offer solutions tailored to the needs of their customers.

Currently, the most dynamically operating on the Polish market are international and global logistics operators, such as: Fiege, Hellmann, Scheenker, UPS, Quehenberger, DHL. They provide a wide range of industry services, including those supporting the fashion industry. Services dedicated to the fashion industry are both typical logistic services as well as additional services that go beyond their typical scope.

Table 1 presents practical logistics support services for the fashion industry based on information from Fiege, Hellmann, Scheenker, UPS, Quehenberger and DHL.

Table 1: Selected logistic support services for fashion industry provided by logistic operators

Support areas	Services
Procurement management	order processing in the online store carriers' management the operator's partner's ability to track the entire order process, from receipt of the order, through picking and packing, even up to the cash refund for the completed return packaging logistics for internet sales collecting personalized orders data management debt management document management content management
Return management	handling of returns, including quick receipt of the return, its classification, cash back, or sending another size complaint handling recycling of clothing recycling of hangers recycling of packaging
Transport	GOH transport (clothes on hangers) store deliveries Track & Trace real-time tracking optimal route planning with state-of-the-art IT solutions special transport equipment (dedicated containers) customs services traffic management in the area adjacent to the production plant

Warehouse and inventory management	GOH storage (clothes on hangers) hanging transport high-bay warehouse cross-docking services management of storage of store equipment and commercial materials separation of zones for high value goods services of a picking robot, which picks cartons of shoes or clothes and moves (transfers) the completed packages to the packing and shipping area automatic conveyor systems with sorters Separation of storage space for different types of packing into different channels logistics centers transshipment hub
Value added services	unpacking and commissioning putting on clothes on hangers country-specific labelling attaching safety tags washing, drying and ironing of clothing quality control of finished products dimension and color control, cataloguing of articles sending patterns to photographic studios conducting own photographic studies preparation of promotional kits collecting goods from the sewing room and performing preliminary quality control

Source: own study based on based on information from logistics operators Fiege, Hellmann, Scheenker, UPS, Quehenberger, DHL.

As can be seen, the scope of services provided by logistics operators is very wide in each of the analyzed areas of logistics support. Return services play an important role, and there are more and more of them due to the increase in online sales. Another important service accompanying material flows is information flow management. The needs of the fashion sector also contributed to the creation of a number of value-added services that differ from the typical nature of logistics services. Examples of such services are washing or ironing clothes. Another example is conducting photographic studies to prepare an appropriate product presentation.

Conclusion

The different distribution channels in the omnichannel strategy require different approaches and logistics solutions. Online stores need above all up-to-date information about stock levels, an efficient order picking system and fast and flexible deliveries to the customer. On the other hand, deliveries to stationary stores must be demand-driven and planned so that the goods can be received in narrow time windows outside work. Additionally, companies operating in accordance with fast-fashion ideas strive for frequent but smaller deliveries and have greater demand for picking and transport services. Specialized logistics operators provide services to fashion companies. They offer their customers solutions tailored to their needs. As the requirements of the industry grow, so does the range of these services. Particularly important are added-value services that go beyond the typical scope of logistics services such as transport and storage and the accompanying information flows. The takeover of this type of services by logistics operators allows to relieve companies from the fashion industry and allows them to focus on the preparation of new collections.

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Directions of Shaping the Open Data Performance Expectancy in Europe In the Light of Text Mining Analysis

Iwona ZDONEK
Gliwice, Poland, iwona.zdonek@polsl.pl

Anna SOLTYSIK-PIORUNKIEWICZ
Katowice, Poland, anna.soltysik-piorunkiewicz@ue.katowice.pl

Abstract

The main purpose of the paper is to describe the directions of shaping open data performance expectancy in Europe. There are three objectives of the paper: (1) finding the currently dominant terms in open data performance expectancy creation; (2) finding the geographical areas of Europe that have a dominant contribution in creating open data performance expectancy; (3) exploring the links between the geographical areas of Europe in open data performance expectancy creation. The research methods are based on: text mining, visualization techniques, and correlation analysis. The analyzed data come from texts promoting digital products and services that use open data. The research covers 287 digital products and services based on open data. The time frame covers the period 2018-2019 and the research focuses mainly on European issues. The research results show that the most popular digital products and services based on open data are applications, websites and platforms. The main direction in presenting the benefits of their use is related to promoting them as tools to provide real time information on public issues, primarily in areas such as transport, education, culture and sport, economics and finance and health. The most uniform geographical area in terms of creation of open data performance expectancy is Western Europe; in Northern and Southern Europe dominating countries can be found, while Eastern Europe shows the smallest activity.

Keywords: Open Data Performance Expectancy, Open Data, Text Mining.

Introduction

This paper is a part of the research area dedicated to describe the directions of shaping open data performance expectancy in Europe. The open data performance expectancy is formulated as a predictor in the UTAUT model. It is defined as „the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447). Moreover, Venkatesh and Speier (1999) admit that obtaining valuable results, such as earnings increase or work efficiency increase, are significant motivators to use a particular technology. In the context of open data technology this means that "availability of open data technologies, such as data platforms, software, tools and interfaces increases individual's or organization's expectancy to perform better" (Zuiderwijk et al., 2015, p. 431) and that the availability of these technologies will allow for tangible financial benefits. Zuiderwijk and his co-workers postulate that measures should be taken to raise awareness of the benefits of open data in order to increase social performance expectancy. When analysing materials promoting open data in the Internet one can see that this postulate is strongly realised. Different countries are building open data portals and promoting the benefits of open data technologies there. In this context, it seems interesting to examine the direction of these activities promoting the expected benefits of using open data (performance expectancy). Thus, three objectives of this paper were formulated: (1) finding the currently dominant terms in open data performance expectancy creation; (2) finding the geographical areas of Europe that have a dominant contribution in creating open data performance expectancy; (3) exploring the links between the geographical areas of Europe in open data performance expectancy creation.

The achievement of these goals will bring to literature a new perspective of the study of the "performance expectancy" construct for open data. This perspective is based on the analysis of materials promoting the use of open data using text mining and visualization techniques with supporting methods. It is also worth adding that the continuation of the proposed research in the long term may give an interesting insight into the development of values promoted in society.

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Literature Review

Since the main idea of using open data is to generate their economic value by using open data in different ways and by different users, it is worth noting that this idea is firmly anchored in the realization of the idea of creating a "society of imagination", which leads us directly to the idea of Society 5.0 (Keidaneren 2016, Keindanren 2018). In such society the technological transformation and imagination and creativity of different people lead to problem solution and value creation (Keidaneren 2016, Keindanren 2018). As open data stem from the Society 5.0 concept, numerous researchers explore both the influence of open data on society functioning and factors that improve the use of open data. Among papers dealing with open data one can find works focusing on a selected field, e.g. Medicine (Burton et al. 2020, Conrado et al. 2020a, Conrado et al 2020b) or environmental issues (Salas et al. 2020, Rantala et al. 2020, Pafi et al. 2020). However, there are also papers dealing with open data in a more general perspective. Such papers are those that describe the issue of economic value of open data (Verhulst & Young 2016, Zeleti et al. 2016, Carrara et al. 2015, Jetzek et al. 2014, Worthy 2015, Janssen et al. 2012). There are also papers on the influence of open data on democratic processes through expanding transparency, citizens' active participation in decision-making processes, policy making and solving social issues (Ruijer et al. 2020, Ruijer et al. 2017a, Ruijer et al. 2017c Verhulst & Young 2016, Sivarajah et al. 2016, Dawes & Helbing 2010). In literature on open data one can also find papers focused on exploring the conditions favourable for open data utilisation (Zuiderwijk et al. 2014, Susha et al. 2015a, Susha et al. 2015b, Susha et al. 2015c Dawes et al. 2016, Kampars et al. 2020). Many of them bring the issue of open data quality to the fore (Vetro et al. 2016, Zuiderwijk & Janssen 2015). Among papers concerning research on conditions favourable for open data utilisation are also those that consider the issue of design of platforms dedicated to open data. Such papers focus on very sophisticated issues, such as context-specific approach (Ruijer et. al. 2017b).

It is not difficult to notice that although the papers devoted to open data focus on various economic, social or technical issues, two main research trends can be indicated. The first explores the question of open data usability and value. The second focuses on analysing factors that foster or hinder the increasing use of open data by the society. Both trends lead straight to the subject concerning the acceptance of new technology. Though there are several models describing the acceptance of technology (theory of reasoned action (Fishbein and Ajzen, 1975), theory of planned behaviour (Ajzen, 1991), technology acceptance model (Davis, 1989)), in this paper one of the most important models describing the acceptance and use of new technology – the UTAUT model (Unified theory of acceptance and use of technology) – was chosen as a background. This model is very often used to test the acceptance and use of Information Technology (Venkatesh et. al 2003). Open data acceptance has already been analysed with this model (Zuiderwijk et al., 2015) as well as with the use of the model resulting from social cognitive theory (Wang 2020, Wang & Lo 2016). However, the observations made by the author of this paper refer more to the constructs proposed in the UTAUT model. The key idea of the UTAUT is that a number of factors lead to the behavioural intention to accept and use technology, while this behavioural intention in combination with facilitating conditions leads to the actual use of this technology (Sykes, Venkatesh, Gosain, 2009). Thus, in the UTAUT model Behavioural Intention to use Information Technology is an important construct. It is determined as an individual's intention, prediction or plan to use a technology in the future. Four constructs have a direct influence on Behavioural Intention to use Information Technology. These are Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. In addition, there are four more important moderators for this construct, i.e. Gender, Age, Experience and Voluntariness of Use.

The relation between the trends surrounding open data research and the UTAUT model stems from the fact that in order to use open data it is necessary to use the related dedicated technology. (Zuiderwijk et al., 2015). The first mentioned trend, which analyses the usability and value of open data, is related to the UTAUT model construct described as "performance expectancy". The second trend, which explores stimulants and destimulants of the growing use of open data, is connected with the UTAUT model constructs called "Effort expectancy" and "Social influence". The research on the acceptance and use of open data technology with the use of UTAUT model was conducted by Zuiderwijk and his co-workers (Zuiderwijk et al., 2015). They proved that "performance expectancy" and "social influence" are positively correlated with behavioural intention to use and accept open data technologies. On the other hand, "Effort expectancy" and "Voluntariness of use" are negatively correlated with the use intention and acceptance of open data technology (Zuiderwijk et al., 2015). Zuiderwijk and his co-workers have indicated a number of recommendations on how to develop individual constructs in order to increase behavioural intention to use and accept open data technologies. Each of these constructs is a broad research area with several subareas, which can be seen in the available literature on open data.

Materials and Methods

Research questions and hypotheses

Based on the theoretical research and to fulfill the objective of the paper no. 1, research question (RQ1) and hypothesis (H1) were formulated:

RQ 1: How are products and services created on the basis of open data presented? What terms are dominating in the descriptions of presented case studies?
H1: Applications and websites use open data. The dominant terms in the descriptions of open data-based products and services indicate the relationship with Society 5.0

To fulfill the objectives of the paper no. 2 and no. 3, research question (RQ2) and hypothesis (H2) were formulated:

RQ2: How are products/services created on the basis of open data promoted in particular parts of Europe? Were there similarities between those geographical areas?
H2: There is a similarity in promoting open data-based products and services in particular parts of Europe.

Conceptual scheme of research elaboration

In order to meet the main objective of the paper, the conceptual scheme of research elaboration was used:

Step 1: *Collecting data*

The research data were retrieved from European Data Portal. This portal implements the policy of promoting benefits resulting from using open data and collects descriptions of applications, websites, portals and services using open data (the so-called use cases). The collected use cases come from different countries. Thus, files with descriptions of created products/services from the last two years, i.e. 2019 and 2018, were retrieved. This period covered descriptions of 287 applications, websites, portals and services using open data. The files were processed into a text format, organised into a data frame and further analysed using text mining, visualisation techniques, and correlation analysis.

Step 2*: Processing of text variables*

The analysis was made with the use of R packages dedicated for text mining. Thus, text data were tokenised into words and bigrams, and cleared from the so-called stop words (words that do not carry an important meaning). The resulting set of tokens (words or bigrams) were subjected to counting and visualisation, usually on bar chart diagrams. The obtained results were compared with the terminology used in the literature relating to Society 5.0. Thus, the hypothesis 1 was verified.

Step 3*: Creating subsets and searching for similarities between them*

Text variables were analysed in the context of the remaining variables, i.e. Country, region of Europe (north, south, east, west). Thus, the above-mentioned operations of text mining were also performed on data subsets. Due to this, an analysis was performed for countries and regions of Europe. As a result of text mining, sets of tokens characteristic for a given subset were achieved. In order to answer the question concerning the similarity of subsets, data base techniques were used, which enabled us to link the created sets. The link was a field containing tokens selected at an earlier stage. Thanks to this it was possible to use calculate the correlation coefficient for the subsets. Thus, the hypothesis 2 was verified.

Description of Research Sample

In order to present the research sample, meaning the collation of countries promoting products/services based on open data in 2018-2019, a bar chart and map visualisation were developed, as presented in figure 1.

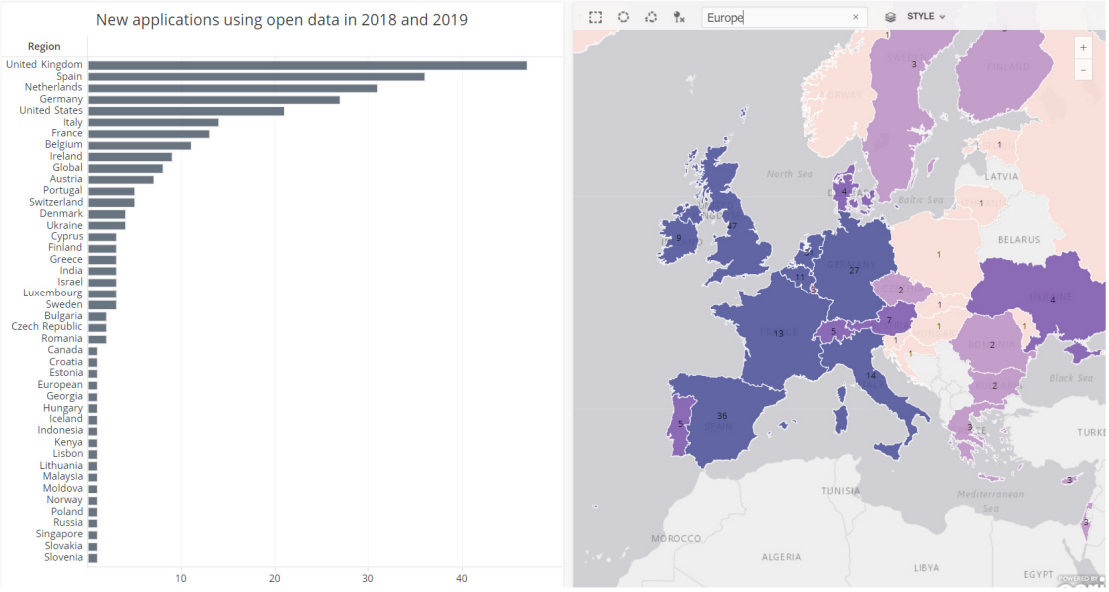

Figure 1: Number of new products and services using open data in 2018-2019 in particular countries (visualisation on a European scale on the right)

As shown in the figure, United Kingdom had a dominant role in the period under analysis. Among top three countries there was also Spain and Netherlands. The visualisation on the map shows that Germany, Italy, France, Belgium and Ireland should be included in the group of countries that dominate in terms of promoting products and services based on open data. The identification of these countries is quite important because in the following part of the study the considerations are divided into Northern, Southern, Eastern and Western Europe. Thus, it is worth noting that Northern Europe, which in the analysed period showed the highest activity in performance expectancy creation, was dominated by UK and Ireland with a small share of other countries from this part of Europe. It was similar in Southern Europe where Spain and Italy dominated with a small share of other countries. This means that these parts of Europe features large variation in the degree of activity of individual countries. The situation was different in Western Europe, where one can see a significant activity of several countries, i.e. Netherlands, Germany, France and Belgium, which means that with respect to activity in promoting products and services based on open data this part of Europe was less diverse in the analysed period. Eastern Europe is characterised by similar low diversity. However, countries from this part of Europe showed low activity in the analysed period.

Results

The most popular products and services and terms that dominate in descriptions of products and services using open data

When answering the research question about the presentation of open data based products and services, the bar chart was created (fig. 1). it points that websites and application are the most popular.

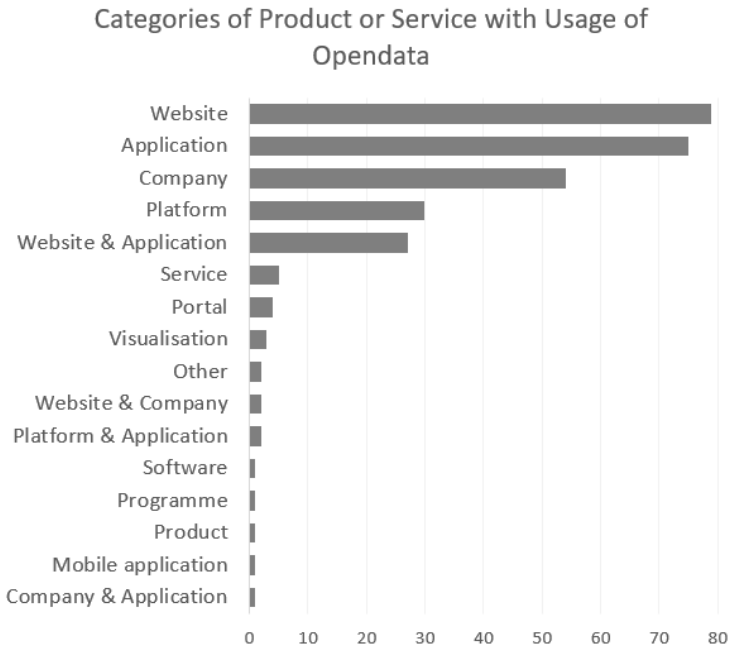

Figure 2: Categories of products/services with usage of open data (with amount of cases)

When answering the research question about terms that dominate in products/services descriptions a set of words (fig. 3) and bigrams (fig. 5) was created. The analysis of words showed a large number of the term "data", which dominated all other terms. This huge domination shows the leading role of data in the analysed products and services, which of course is not surprising. Therefore, in further analysis, this term was treated as an outlier, which could have a significant impact on the subsequent stages of the analysis of the obtained data. Then, the terms "information", "users" and "public" scored big numbers. This is an evidence of promotion of the benefits of providing user-oriented information linked to public objectives, which is of course closely linked to the nature and idea of open data. The focus on users is also highlighted by the presence of the following nouns in the further part of the ranking: "people", "citizens" and "user", as well as verbs: "provide", "collects", "access", "enables", "helps", "offers", "create". The role of these terms will be more broadly discussed in bigrams analysis. The large number of such terms as "application", "website" and "platforms" is also worth noting. This ranking presents options of available products/services created based on open data. The most popular are then applications and websites, while platforms take the third position. As it was possible to compare the results of analysis obtained through the text mining technique with the visualisation techniques on "Products/services" variable, such comparison was made. This way it was found that the most popular products/services in the analysed period were applications and websites with a smaller share of platforms, companies and services.

Apart from the terms related to user benefits and those describing options of created products/services, the ranking also presents a group of terms connected with a particular business sector. The dominant role in this respect is played by terms related to transport, i.e. "transport", "location", "traffic", "parking". The domination of these terms does not surprise if we analyse the ranging of business sectors in the analysed period, where transport is at the forefront (see fig. 4).

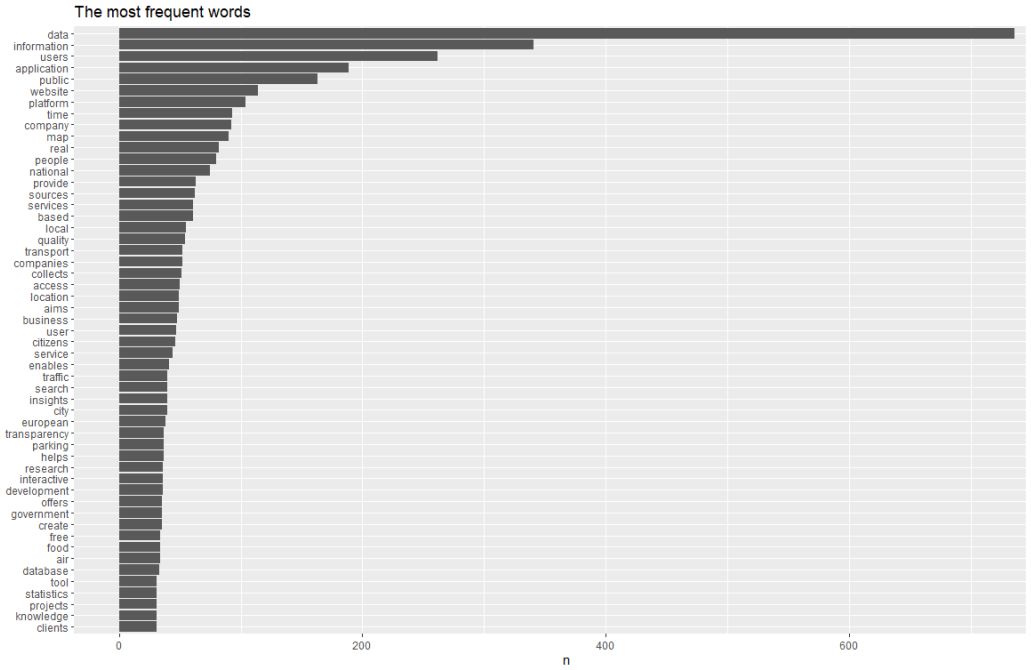

Figure 3: The most common words occurring in the descriptions of products/services using open data

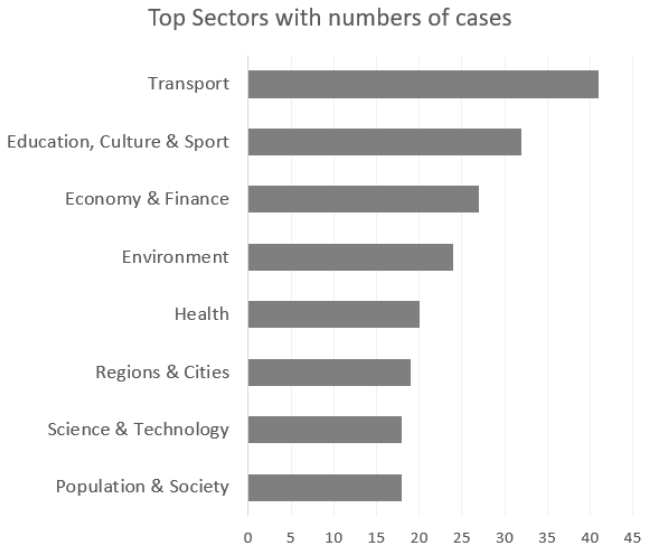

Figure 4: Ranging of the biggest business sectors using open data in 2018-2019

Analysis of bigrams (fig. 5), similarly as the analysis of words, selected the term that has the role of an outlier. In the case of bigrams it was the term "real time", which illustrates the main benefit of using open data. In the bigrams one can see the presence of an outlier determined at the stage of words analysis, meaning the term "data", which now appears with other terms, i.e. "collect (-s, -ed) / gathers data", "public data", "data sources", "data portal", "data visualization", "data driven", "weather data", "transport data", "traffic data", "data quality" and "geospatial data". The analysis of bigrams selected also further phrases connected with presenting benefits of products/services based on open data. These are phrases containing verbs like: "collects data", "enable people", "provide users", "helps users/people", "provide real", promotes transparency", as well as phrases containing adjectives like "user friendly", "easily accessible", "additional information". The use of these phrases in communication is to encourage users to use the new product/service. It also suggests a high focus of the promotional message on the end user, which is characteristic of marketing communication. The second group of phrases consists of those related to the specificity of a sector for which the created product/service is dedicated. Thus, these are such phrases as: "parking facilities", "public transport", "traffic information" "bike citizens", "arrival times", alternative fuelling", "air

quality", "public toilet", "real estate", "land insight", "house price". Thus, with reference to Figure 3 presenting the dominant sectors during the period under examination, it can be seen that in the bigrams terms characteristic for the transport sector are the leading group. The third group of phrases present in the bigrams are those related to methods of open data processing and visualisation, i.e.: "machine learning", "artificial intelligence", "search engine", "predictive models", "data visualization", "interactive maps", "graphic information".

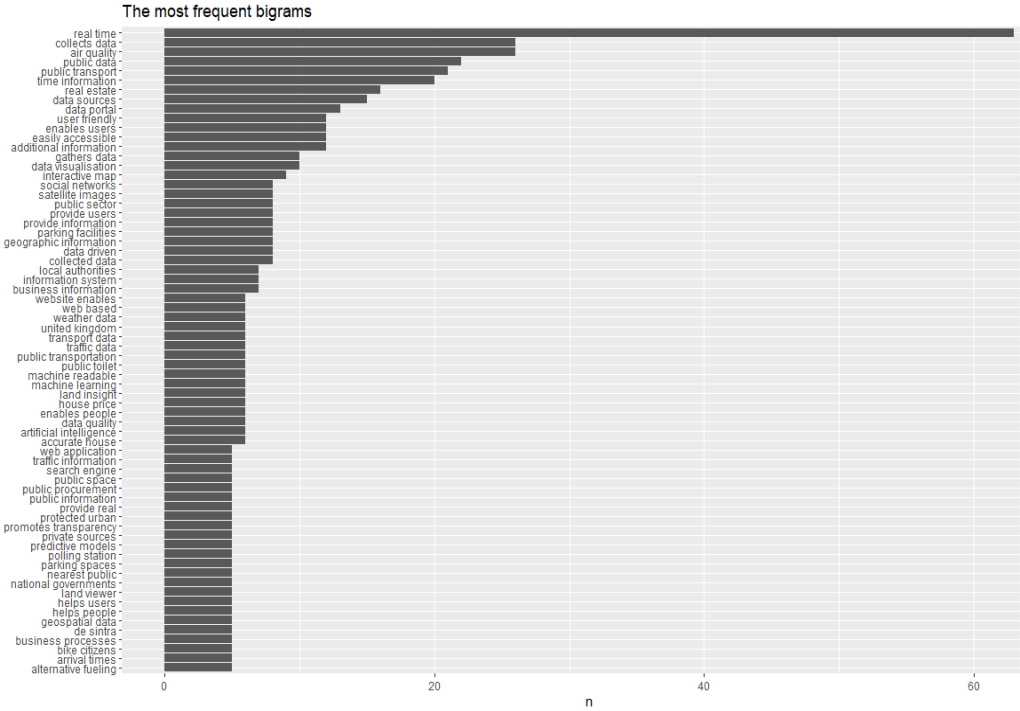

Figure 5: The most common bigrams occurring in the descriptions of products/ services using open data

The analysis of the number of words present in the descriptions of products and services based on open data showed a large presence of terms related to the words "data" and "information". These terms are characteristic of the terminology present in the texts describing Society 4.0 and Society 5.0. (see Webster 2014). The analysis of bigrams depicted terminology typical for Society 5.0 ("machine learning", "artificial intelligence", "search engine", "predictive models", "data visualisation", "interactive maps", "graphic information", "data driven"). Thus, while the terms "data" and "information" have grown out of the concept of Society 4.0, the promotion of data processing by artificial intelligence and its provision to physical space for human use shows that in materials that promote the usefulness of open data there are ideas stemming from the concept of Society 5.0. This postulate is reinforced by the fact that both the analysis of words and bigrams show significant user focus, which is also directly connected with the postulates of the Society 5.0 (Fukuyama 2018, Keidanren 2018).

Analysis of terms in a geographical context – finding similarities between sets

The answer to the question about similarities between geographical areas was sought by means of scatter plot diagrams and a correlation coefficient. First of all, sets of words characteristic for four geographical areas of Europe were created, i.e. Northern Europe, Southern Europe, Western Europe and Eastern Europe. Then they were paired and relevant calculations were made (table 1). Correlation test was also performed, which showed that the correlation coefficients are significantly different than zero. As the term "data" was identified as an outlier before, it was not considered in the diagrams and calculations.

Table 1: Coefficients of correlation between sets of words describing products/services

Description	**Northern Europe**	**Western Europe**	**Eastern Europe**	**Southern Europe**
Northern Europe	1			
Western Europe	0.532	1		

Eastern Europe	0.312	0.337	1	
Southern Europe	0.465	0.443	0.303	1

The presented research results show that the most correlated sets of words are those for Northern Europe and Western Europe (0.532), Southern and Northern Europe (0.465), and Southern and Western Europe (0.443). Relatively lower correlation coefficients could be observed everywhere where Eastern Europe was present. Undoubtedly, this was influenced by the small number of use cases from Eastern Europe.

Table 2: Hypotheses verifying results

No	Study assumption	Verified result
H1	Applications and websites use open data. The dominant terms in the descriptions of open data-based products and services indicate the relationship with Society 4.0 and have implication into development of Society 5.0	Accepted, based on visualization of amount of cases (fig. 2) and based on text mining analysis shown by the words and bigrams analyses (fig. 3 and fig. 5)
H2	There is a similarity in promoting open data-based products and services in particular parts of Europe.	Partly accepted, based on the correlation analysis (tab. 1). There are some similarities in relationship between Northern, Western and Southern Europe. The relationship between Eastern Europe and other parts of Europe is weaker.

Conclusion and Discussion

The research results show that the most popular digital products and services based on open data are applications, websites and platforms. The analysis of the documents promoting the use of open data has also shown that the main direction in presenting the benefits of open data products and services is to promote them as tools to provide information on public issues in real time, primarily in areas such as transport, education, culture and sport, economics and finance and health. The issues of data collection and provision to the user, enabling them to access information, and ensuring transparency related to public issues are highlighted. It is worth noting that the transport sector is one of the sectors that use open data most frequently in the analysed period. This may be explained by a noticeable intensification of innovative activities in logistics and seeking new and better performance of logistics tasks through digitalisation of its processes (Witkowski 2017). This brings us to a subject related to the idea of Industry 4.0, where digitalisation of logistic processes allows sustainable development in areas indicated by Kayikci and described by him as three dimensions of sustainability, i.e. economic, environmental and social dimension (Kayikci 2018). Therefore, it can be assumed that a large number of products and services that use open data in the transport sector fit into these dimensions and allow for more reasonable fuel consumption (fuel savings), implying financial (and therefore economic) savings and reduction of environmental pollution and use of non-renewable resources (environmental dimension) and social benefits (social dimension) in terms of improved health through cleaner air and noise reduction.

As the research has shown, the development of “performance expectancy” has not been evenly implemented in Europe over the years under study. The most uniform geographical area in terms of creation of open data performance expectancy is Western Europe; in Northern and Southern Europe dominating countries can be found, while Eastern Europe shows the smallest activity. The most active countries in this respect are United Kingdom, Netherlands, Spain and Germany, Italy, France, Belgium and Ireland. When comparing these results with analysis of open data maturity in Europe (Blank 2019, Cecconi & Radu 2018, Open data in Europe 2019, 2018, 2017, and 2016) one can see that these are the countries referred to as “trend setters” or “fast trackers”. It is therefore not surprising that they are very active in promoting products and services based on open data, and therefore very active in performance expectancy. It is also worth mentioning that research by Zhong (Zhong 2017) indicated the scientific centres from United Kingdom, Germany, France and Italy as those publishing numerous papers devoted to the idea of “intelligent manufacturing”, which is another important idea related to Industry 4.0. This gives rise to the assumption that the high positions of these countries in both rankings related to open data use and rankings of scientific publications on intelligent manufacturing can be linked. The similarity of sets of words for Northern, Western and Southern Europe also shows the economic relations of these parts of Europe.

Limitation

The main limitation of the conducted research is the short research period (2018 - 2019). A period of 10 years would be a better research period. However, so far data from such a long period are not available. The research sample also included big disproportions between the number of promoted solutions based on open data. For example, Eastern European products/services were few in number, while the United Kingdom dominated all other countries in its geographical area. In subsequent studies, however, with more use cases available for analysis, these limitations will no longer be present.

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Socio-Economic Growth and Development Through Innovation on The Example of Tourism Companies in Poland

Małgorzata BROJAK-TRZASKOWSKA

Institute of Spatial Management and Socio-Economic Geography
University of Szczecin
Szczecin, Poland
malgorzata.brojak-trzaskowska@usz.edu.pl

Abstract

The main objective of the research is to identify exogenous conditions for growth and development through innovation in the economy on the example of Polish tourism companies and to define a general course of action for improvement in the scope covered by the research. The rationale for research is regarding growth and economic development as an up-to-date and important issue. The research process involved the method of critical analysis of the source literature, especially in the theoretical part. The empirical part was based on the analysis of the research material obtained by means of a survey and the observation method, while the application part uses mainly logical reasoning and the synthesis method. The article presents results of the surveys conducted in tourism companies regarding the external determinants of innovative growth and development, in terms of macroeconomic, formal, legal, institutional and socio-cultural aspects. The study was conducted twice at an interval of five years. The results of the surveys indicate that in the case of the first survey, the formal and legal factors prevailed in the structure of external determinants of growth and development of tourism companies, while in the second survey – macroeconomic factors.

Keywords: Macro- and Microeconomic Growth and Development, Tourism, Innovations, Tourism Company.

Introduction

Modern reality, both social and economic, creates the need to skilfully combine science with practice. This is primarily about increasing the pragmatism of scientific research which should not be solely confined to the ideological sphere. This means that the representatives of the world of science should not create new, strictly theoretical concepts, without the possibility of their practical application. Such an approach to science is justified by the omnipresent changes. Due to the progress of civilisation and its implications, including the transposition of business models, new applications of scientific and technical solutions, cultural changes, as well as transformations taking place in the daily life of individuals and groups, innovation is and will be integral part of social and economic life.

In view of the above, it is necessary to emphasise the importance of undertaking new and continuing research on creative and innovative behaviours and attitudes, both in the theoretical and cognitive as well as empirical and application dimension, adequately to the main spheres of human activity (tourism in this article). The cognitive view on the subject matter of this article, the research objective, the organisation of work and its content refers in general to the field of social sciences and, more specifically, to the economic issues of spatial management on the example of tourism. The main stages of the conducted research are schematically presented in Figure 1.

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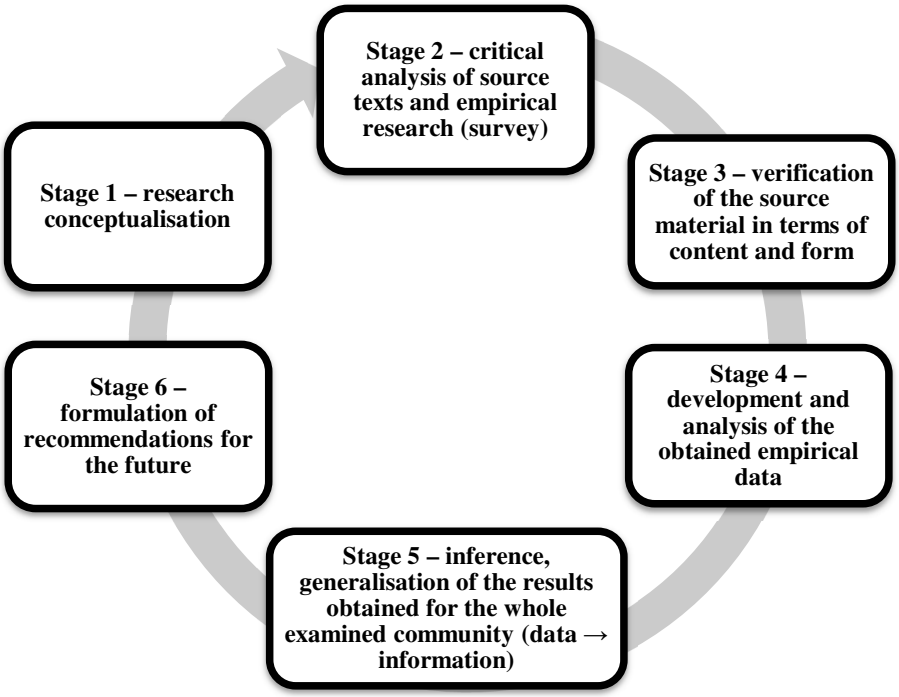

Fig. 1: Model of the research approach applied in the article

Source: own work.

The main aim of the undertaken research is to identify (systematise and analyse) external determinants of innovative growth and economic development on the example of tourism companies in Poland and to recommend specific actions to improve the current situation within the scope covered by the research.

The research process involved the method of critical analysis of the source literature, especially in the theoretical part devoted to the issue of innovation in the context of economic growth and development. The empirical part was based on the analysis of the research material obtained by means of a survey and the observation method, while the application part uses mainly logical reasoning and the synthesis method.

Two surveys by means of questionnaires were conducted. The first survey was carried out in 2011 (Brojak-Trzaskowska 2012) and the second in 2016 (Brojak-Trzaskowska 2018). The questionnaires were sent out through the traditional means (by registered letter), and only a small group of business entities operating in the tourism sector were reached via the Internet. A total of 57 complete questionnaires were returned in the first survey and 254 correctly completed questionnaires in the second survey. The research sample, both during the first and second survey, covered a set of tourism business entities, diversified in terms of the organisational and legal form of tourism business, size of the enterprise (measured by the number of employees), type of business activity in tourism (accommodation, catering, tourist transport, sport and recreation and other related services, e.g. activity of tourist guides, entertainment and culture), sector and ownership form, as well as location by provinces [*voivodeships*] according to the administrative division in Poland, and the scope of activity.

Due to the complexity and multifacetedness of the research carried out, this article presents a comparative analysis only in relation to the main external determinants of innovative growth and development of tourism companies in Poland. This means that the analysis of the structure of internal determinants has been omitted as it requires a separate specific study and thus a more detailed analytical approach.

It should be stressed that both the first and the second study were carried out under relatively stable economic, political and social conditions. Therefore, the impact of specific conditions such as epidemics, threat of terrorism, armed conflicts and others has not been taken into account. These are extraordinary phenomena, difficult to predict, and a reliable and comprehensive assessment of their actual socio-economic impact, including their scale would be challenging. They should therefore be treated as crisis or crisis-generating situations, even if they do not ultimately trigger an economic crisis. This is best illustrated by the current epidemic situation and, especially, its global scope, i.e. the virus is not limited to a specific region but has a supra-state, supra-regional dimension – the effects of its spread may affect every sphere of human life and every individual, to a greater or lesser extent.

It is worth noting that tourism and transport are the sections of societies and economies which are most vulnerable to the adverse effects of the pandemic. This is in reference to the spread of COVID-19 (coronavirus SARS-CoV-2) throughout the world, and in particular to the consequences of the formal, legal and institutional solutions introduced in individual countries, which are more or less restrictive, and which directly or indirectly affect the movement of the population and thus tourism. This, as a result, may lead to a partial and in some cases even complete suspension of tourist traffic in certain areas, e.g. regions of Italy, but also in other parts of the world, including Poland.

In addition, the discussed phenomenon may have other implications, such as a general decline in demand for tourism and related products and services, taking into account spatial and temporal differentiation. In addition to health aspects (deaths, illness, absenteeism), formal and legal restrictions should be mentioned, especially those related to:

- partial or complete closure of national borders at a given time;
- restriction of liberty of movement in international traffic;
- partial reduction of transport mobility in domestic traffic;
- restrictions on trade, especially in large areas, in catering, entertainment, education, etc.

Strictly economic aspects are undoubtedly crucial, e.g. the increase in prices and, consequently, the rise in inflation, the decline in the population's purchasing power, stock market crash and others. In addition, the importance of psychological factors should be emphasised. It should be noted that these factors are not only significant now (during the pandemic), but may also exert an effect in the future, once the situation has stabilised. This effect includes aspects relating to fear, uncertainty and unwillingness to travel to places which have been affected by the pandemic or other phenomenon associated with a state of danger to human health and life.
This may result in a significant reduction in tourist traffic and tourism-related benefits.

Growth and economic development through innovation – cognitive and perceptive perspective

The subject matter of the research undertaken creates the need to systematise the discussed conceptual categories i.e. growth and economic development.

In the source literature, economic growth is usually defined through the prism of increasing production capacity in the economy, which in turn is determined primarily by the volume of tangible and intangible production, capital resources (not only financial but also human), investment and savings rates, as well as technical progress and the efficiency of institutions. They say so: Leszczyński (2018), Woźniak (2008), Fiedor(2007), Gordon (2016), Ostry, Berg (2017) and Pritchett (2000). It is important to underline that the main determinants of economic growth are also valid for economic development. However, this influence is particularly evident in technical and technological progress, changes in scientific, technical and innovation policy, efficiency of governance (both at the central and local government level), quality of human capital and investment processes.

An appropriate analysis of the term “economic development” on the basis of the economic sciences literature shows that this term refers to complex changes with a broader cognitive scope than economic growth, including institutional and structural transformations in the economy, e.g. with regard to the departmental and sectoral structure, as well as changes in the structure of demand and supply of specific goods and services at a given time and structural changes taking place in the labour market (Leszczyński 2018, Jaffee 1998, Ghosh 2013).

Modern economic systems and subsystems should be characterised by the interpenetration of activities aimed at economic growth and development. In comprehensive terms, this should not only be economic growth and development, but overall growth and development in the social and economic sphere, additionally including environmental requirements, and above all based on the initiation and promotion of creative and innovative attitudes. Such an approach, i.e. development and growth based on the social, economic and environmental triad, underlining the importance of knowledge and innovation, corresponds in fact to sustainable development principles.

In contrast to traditional economies, usually based on outdated industrial production and often oriented only towards economic growth, without simultaneous social and economic development – in modern economies and societies there should be a correlation between growth and economic development. It is desirable that these phenomena occur concurrently or alternatively with a slight time lag. The importance of information, knowledge and innovation should be emphasised as a major driver of economic growth and development in place of traditional resources, which, when used unskilfully, become useless.

It is worth noting that nowadays economic growth is usually identified with one of the main economic categories based on a quantitative approach, while economic development is based on qualitative changes. Implicitly, it may be indicated that, on the one hand, these concepts may be considered in terms of similarities, and, on the other hand, in terms of differences between them. By analogy, it may be stated that both growth and development are economic categories, essentially of an ameliorative nature (in terms of social and economic effects and consequences), conditioned by different external and internal factors. The second cognitive perspective of these phenomena, relating to the differences between them, implies that – as has already been indicated – economic growth is of a quantitative nature, while economic development of a qualitative nature. As a consequence, different indicators must be applied to measure them. For example, for economic growth on a macroeconomic scale, GDP is used (despite certain imperfections, this measure is widely used and generally accepted by practitioners and representatives of the scientific community, including economists), while on a microeconomic scale, e.g. for a specific business entity (company), such a synthetic measure is the financial result. The NEW (Net Economic Welfare), MEW (Measure of Economic Welfare), ISEW (The Index of Sustainable Economic Welfare) may be adopted to measure socio-economic development. Other options in this respect include the HDI (Human Development Index), which inter alia measures average life expectancy, levels of illiteracy (reading and writing comprehension), gross enrolment rates and GDP per capita. As regards the development of business entities, this may include an improvement in terms of customer service, product quality, etc. Furthermore, it should be stressed that the diversity of these conceptual categories is additionally reflected in the detailed structure of the factors determining them. This means that despite the identification of exo- and endogenous conditions, there are clear differences in their detailed specification.

When considering the examined issues in the context of enterprises (including tourism companies) as one of the key elements of economic systems (including the tourism economy), it should be noted that the growth and development through innovation of these specific business entities is determined by a set of factors which may be considered from two perspectives:

1. In general terms, when the examined factors are considered as a whole according to logical divisions based on transparent classification categories. If the source of these determinants is recognised as the main criterion for their division, external (exogenous) and internal (endogenous) factors may be distinguished. The source of the former is the widely understood environment of tourism companies, while the latter – the internal environment of these specific entities of the tourist economy, their human potential together with knowledge, skills, as well as technical, organisational and financial resources.
2. In more specific terms, based on a more thorough identification and analysis of the factors determining the innovative growth and development of tourism companies. Therefore, the following specific factors may be further identified in the established groups of external and internal determinants:
   a) in the group of external factors – macroeconomic, formal and legal or administrative and institutional or socio-cultural determinants;
   b) in the group of internal factors – economic and financial, organisational and management, intellectual and other determinants.

The presented systematisation is one of the possibilities in this respect. Another option may be based on a two-tier classification in which the in first level two basic groups are identified, i.e. demand and supply factors, while the second level involves their more detailed specification, i.e. further subdivision of the groups into specific subgroups, and even additional types and classes (within a given subgroup).

Among other classifications in the research area under consideration, the division into economic and non-economic determinants (Dziedzic, Skalska 2012, Dwyer, Forsyth, Dwyer 2010, Sinclair, Stabler 1997), as well as general and specific determinants may be indicated. General factors include the processes characteristic for the economy as a whole, such as: increasing leisure time resources, departure from the phenomenon of so-called synchronisation (combination of work, mobility and leisure), individualisation of consumer behaviour and, at the same time, customisation of products, as well as the increased importance of knowledge, customer requirements and the level of their education, and the increased importance of experiences of tourists. In the group of specific determinants, however, the following should be considered the most important: predominance of tourist services, complexity of the tourist product, susceptibility of the tourist market to changes, customisation of services and forms of recreation, digitisation of the tourist market, especially channels in the distribution system, which allows tourists to independently and freely compose travel packages, eliminating completely or to certain extent the involvement of travel agent. Other specific factors include: global standardisation as a consequence of globalisation processes taking place in the economy, the phenomenon of co-creation, which replaces the typical process of exchange on the tourism services market, the emergence of new, diverse needs and requirements of tourists, the growing importance of pro-ecological attitudes, the growing importance of regular customers, and the renewability (restitution) of demand for tourism services (Kachniewska, Niezgoda, Nawrocka, Pawlicz 2012, Niezgoda 2011, 2014).

Nowadays, innovations are present in almost every sphere of social and economic life (thus also in tourism). However, they are perceived and, consequently, defined differently. Literature review, as well as review of the opinions formulated by business practitioners, politicians and even the media on the understanding of innovation and its role in economic life and in society, allow us to conclude that despite many specific differences, numerous common (universal) aspects may be observed. There is a general consensus on the very core of innovation, which is identified with the novelty and pragmatism of creative ideas. Naturally, the range and level of novelty may vary. On the one hand, innovations may be absolute, radical, e.g. concerning new tourism products or the creation of new tourism markets. On the other hand, there may also be relative innovations which are related to the design and application of new elements in existing products or the improvement of existing solutions, such as marketing activities and instruments.

Economic and development through innovation – empirical and pragmatic perspective

In spite of the great diversity in the determinants of growth and development through innovation from the point of view of business entities in the tourism industry presented in the theoretical and cognitive section, the classification of these factors into external and internal groups was adopted as a reference for further research.

Table 1: external determinants of growth and development through innovation – exemplification of Polish tourism companies

Determinants	**Survey I – answers of respondents** (n = 57)			**Survey II – answers of respondents** (n = 254)		
	In absolute numbers	Share (in %)	Average number of indications per 1 respondent	In absolute numbers	Share (in %)	Average number of indications per 1 respondent
Macroeconomic	128	32.2	2.25	486	37.1	1.91
Formal and legal	156	39.2	2.74	418	31.9	1.65
Socio-cultural	114	28.5	2.00	406	31.0	1.60
Total	**398**	**100**	**6.98**	**1310**	**100**	**5.16**

Source: own work based on survey results.

The results of the surveys presented in Table 1 indicate that in the case of the first survey, the formal and legal factors prevailed in the structure of external determinants of growth and development of tourism companies, while in the second survey macroeconomic factors prevailed. Taking into account the percentage share of particular external determinants, the importance of macroeconomic factors increased by almost 5% in survey II compared to survey I. In the case of socio-cultural factors, this was an increase of 2.5%, while in respect of formal and legal aspects it was a decrease of 7.3%.

Too broad generalisation of the empirical data presented in Table 1 requires additional explanations, especially as regards the structure of individual determinants.

As regards the first survey, it should be noted that in the case of the dominant group of determinants of innovative growth and development of the tourism companies, i.e. formal and legal factors, particular indications of the respondents were as follows (in descending order): bureaucracy (22.2%), insufficient support for innovators by authorities and institutions at the local government level and heavy tax burdens in tourism (18.5% each), variability and low transparency of legal regulations concerning running a tourism business (almost 15%). Moreover, a relatively low percentage of issues related to difficulties in obtaining patents, as well as those related to the protection of intellectual property was observed (7.4% and 3.7% respectively). As regards macroeconomic determinants, one in four respondents had difficulty in obtaining external sources of financing for innovative activities, and one in five respondents experienced unfavourable economic downturn. Market factors, including those related to a limited sales market and lack of demand for innovative solutions, were of lesser importance for the surveyed entrepreneurs. Furthermore, it was determined that the tourism sector has generally not experienced problems related to a lack of information on innovation (including new technologies) or the establishment of innovation cooperation, e.g. with business environment institutions, other companies or representatives of the scientific community. In the group of socio-cultural conditions for growth and development of tourism companies through the initiation of innovative activities, the highest ranked aspect was failure to adjust the educational system

to the needs of business practice (25% of the total number of respondents' answers), distrust of the society towards implementation of changes, including innovations, lack of relations between science and business, and at the same time – lack of orientation of scientific activity towards the needs reported by entrepreneurs representing the tourism sector. As all of the factors indicated above inhibit innovative development of enterprises, it is worth noting a positive phenomenon, i.e. creative and innovative behaviours and attitudes, which – in the opinion of the respondents – characterise Polish society.

As regards the second survey, it should be noted that in the case of the dominant group of determinants of innovative growth and development of the tourism companies, i.e. macroeconomic factors, the indications of the respondents were as follows: low purchasing power of tourists (24.3% of all answers), limited demand for tourism services (19.7%), as well as unfavourable economic situation (16.5%). Slightly less important for entrepreneurs representing the tourism sector in Poland were difficulties in obtaining external sources of financing for activities aimed at development, including innovations (15.2%). The second most important group of determinants of innovative growth and development for the surveyed enterprises, i.e. formal and legal factors, included: heavy financial burdens relating to tourist business activity (almost 34% of the total number of answers provided by the respondents), excessive bureaucracy (slightly over 20%), lack of transparency of legal regulations (17%), as well as too frequent changes in legal regulations (13.9%). In the third group of factors, i.e. among socio-cultural determinants, the unfavourable structure and demographic changes in the Polish society obtained the highest percentage of answers, whereas the distrust of tourists towards changes initiated by tourist companies and lack of entrepreneurial attitudes in the nation were indicated relatively less frequently.

It should be emphasised that the examined categories of determinants of innovative growth and development of tourist companies in Poland are of a limiting (inhibitory) nature. Therefore, they are in fact barriers to this growth and development.

Conclusions

On the basis of literature review and empirical research, it may be concluded that in the case of innovative activities in the tourism sector, innovative cooperation, effective technology transfer (Pansiri 2008, Zhang, Song, Huang 2009, Shaw, Williams 2009) and creation of innovation networks are recommended and are considered by many researchers as the most effective path to implement and promote innovation (Burbiel 2009, Schepers, van den Berg 2007) and even stimulate and entrepreneurship in the tourism economy (Pikkemaat, Weiermair2007, Najda-Janoszka 2014, Faems, Van Looy, Debackere 2005). This applies in particular to the areas of the tourist destination (regional perspective), as well as to individual locations striving to perform and develop the tourist function (local perspective). Furthermore, numerous authors often underline the importance of, and at the same time the need for, further in-depth studies and research, not only theoretical and cognitive, but also theoretical and empirical on innovation and innovativeness in tourism(Hall 2009, Hall, Williams 2008, Sundbo, Orfila-Sintes, Sørensen 2007). In addition, crisis management in tourism should play an important role today(Sharpley 2005). Changes, such as globalization, emphasis on the sustainable development(Baghdadi 2019, Chew 2009, Wang 2010), the increase of clients' awareness, the importance of innovation and the pressure of competition, are the determinants affecting changes in the whole economy, thus entailing the service sector (e.g. the tourism sector).

In addition to these aspects, others may be pointed out, such as the fact that innovation in tourism should generate specific value for certain stakeholders, thus contributing to socio-economic development. It should be emphasised, however, that the value (economic, social, environmental, cultural, psychological or other), the interest group (tourists and so-called visitors, tourism companies, other competitive and cooperative business entities, local communities, business environment institutions, tourism organisations and associations, central and/or local government authorities or other stakeholders) and the degree of impact depend on various factors. These factors primarily include the reasons for a given undertaking or, in other words, the potential benefits from developing a given innovation in relation to its specific type, scope and applicability of an innovative solution, as well as the level of participation of a given interest group in innovation processes.

In the context of external conditions for the growth and development of tourist companies, it is crucial to render modern, alternative sources of financing of innovative activities more accessible to entrepreneurs, to minimise the adverse consequences of economic downturn. Furthermore, it is necessary to diversify the products and services offered by tourist companies and to customise them to the needs and expectations of customers, yet taking into account the competitive potential of specific tourism business entities, as well as coordinated promotion of branded tourist products and/or services with high potential together with the development of the tourist information system at a macroeconomic and mesoeconomic level. It is also recommended to diversify the distribution channels of tourist services, with a simultaneous differentiation in terms of instruments for sale stimulation, and to make the state's innovation policy more dynamic through system, institutional and administrative solutions, including a

comprehensive system of economic incentives (fiscal and non-tax ones, e.g. tax relief, technology credits and loans, subsidies) and non-economic instruments (simplification of administrative procedures, popularisation of innovative behaviour – development of innovation culture) encouraging entities of direct and indirect tourism economy to conduct innovative activity.

From the point of view of entrepreneurs providing services to tourists, it is important to increase transparency and reduce the frequency of changes in the applicable legal regulations concerning establishing and running a tourist business, as well as provide tourist companies with better access to external highly specialised advisory, information, promotion and training services, i.e. services supporting the functioning and development of tourism business.

Moreover, a major role may and should be assigned to the development of tourist infrastructure (primary and auxiliary), as well as accompanying facilities, attracting tourists by enhancing the image of Poland, individual regions and specific host locations with a high development potential in terms of tourism by means of the outstanding tourist values, building an integrated system of tourist information and supporting and coordinating activities of the business environment for the benefit of tourist development at various levels of the economy by supporting the creation and diffusion of innovative undertakings in tourism.

It is important that the recommended solutions are not solely declared, but actually implemented.

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Benchmarking in The Armed Forces – A New Field of International Cooperation

Janusz MATERAC and Zdzislaw KNECHT

General Tadeusz Kosciuszko
Military University of Land Forces,
Wroclaw, Poland

corresponding author e-mail: jmwielun@gmail,com
author e-mail: zknecht@wp.pl

Abstract

The article aims to diagnose the application of the benchmarking concept in the Polish Armed Forces. The article describes the research methodology and presents the benchmarking partners of the Polish Armed Forces. Next, the "Lessons Learned System" functioning in the Armed Forces is presented as a benchmarking tool. In the following part of the study, there are given selected examples of its application. Conclusions from the conducted research are described in the context of applying and extending benchmarking use in the Armed Forces. A parallel goal is to bring the scientific staff and readers of the scientific periodical closer to the military benchmarking field of international cooperation.

Keywords: Benchmarking, Polish Armed Forces, Management Concepts

Introduction

If benchmarking is to be understood as a management concept in which an organization "*compares itself with the best ones, sets the course for the best products and services provided, and acquires knowledge from partners and competitor*" (Zimniewicz, 2009, p. 43).

As far as the Armed Forces are concerned, this is even more important, because armed conflicts are practically confrontations of military capabilities. Contemporary conflicts, especially the so-called hybrid warfare, in which the very clash of troops is already the end of the conflict, prove the concept. Political and strategic multilateral preparations precede them.

Thus, since the dawn of time, the armed forces have been organizations watching solutions of both their enemies and allies. The armed forces must continuously expand their knowledge and acquire the most effective technical means. Such data is necessary to catch up with or surpass the leaders.

The article is a stage of a research project aiming to answer the question: Are modern management concepts applied in the Polish Armed Forces?

Research Methodology

The research problem was the question: Is the management concept of benchmarking used in the Polish Armed Forces? The objective of the research was to diagnose the application of benchmarking in the Polish Armed Forces. For the study, a hypothesis was adopted for verification: the concept of benchmarking is used in the Polish Armed Forces. The following methods were employed for the research:

- standardized interview;
- participatory observation;
- analysis of legal acts and source materials.

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A questionnaire was prepared to conduct a standardized interview in order to solve the research problem. The following questions were formulated:

1. Is benchmarking used in the Armed Forces of the Republic of Poland?
2. What are the fundamental objectives of benchmarking applications in the Polish Armed Forces?
3. Which types of benchmarking are used in the Polish Armed Forces?
4. What are the practical examples of the application of this concept?
5. What is the main driving force for using the concept?
6. What conditions must be met to apply the concept?
7. How does the benchmarking process proceed in the Armed Forces?
8. What institutions exist in the Polish Armed Forces that apply or support the use of this concept?
9. What are the critical barriers to applying the concept in the Armed Forces?
10. When did benchmarking begin to be applied in the Armed Forces?
11. Has the specificity of military service changed significantly after the implementation of benchmarking in the Polish Armed Forces?
12. What are the essential documents that standardize or support the application of benchmarking in the Polish Armed Forces?

The research was carried out in 2019 and covered officers who performed duties of personnel supervising the implementation of the "Lessons Learned System" (Polish abbrev. SWD), (Manual, 2014). These were specialists of the tactical level, appointed to the SWD structures by their respective command. In total, 17 structured interviews were conducted.

Benchmarking partners of the Polish Armed Forces

Finding the right partner is believed to be one of the essential elements of the benchmarking concept. The partner can be internal, external, or functional (general). As a NATO member, Poland has gained many benchmarking partners and has opened up to extensive cooperation between allied Armed Forces.

Over the years, the Polish Armed Forces have participated in many overseas missions; these include Organization for Security and Cooperation in Europe (OSCE), United Nations (UN), North Atlantic Treaty Organization (NATO), or cooperation with the United States troops. The largest Polish overseas missions were Iraqi Freedom in 2003-2008 in Iraq and International Security Assistance Force in Afghanistan in 2004-2014. The participation of Polish troops in those operations allowed the Armed Forces to open up to the world. It gave the opportunity to cooperate side by side with their allies. It allowed for the observation of the best and latest solutions in the military field (Rudaś, Kramski, 2012).

Another opportunity to benefit from the knowledge and experience of world leaders of military craftsmanship is provided by the presence of allied troops in Poland (Materac, 2019). On 8-9 July 2016, the first North Atlantic Alliance Summit was held in Poland. Summit meetings are held at the level of states and heads of governments (Soloch, Pietrzak, 2016). During this important event, key decisions were taken for the security of Poland and the entire region. Thanks to these decisions, allied troops are stationed on Poland's territory, and command structures of NATO and United States troops have been deployed on the eastern flank. The allied troops currently staying on the Polish territory are implementing two initiatives (MON, 2020):

- NATO (eFP);
- US (Atlantic Resolve).

As mentioned above, all the opportunities are a basis for cooperation with external partners within the framework of benchmarking. The presence of the allied forces, the possibility of permanent observation of their actions and solutions applied in practice are an excellent chance for the development of the Polish Armed Forces. Polish soldiers can learn from the best and later implement the acquired knowledge.

The Lessons Learned System as a benchmarking tool

As already noted in the introduction, since the beginning of history, the Armed Forces have tried to use lessons learned from won or lost wars. One of the war objectives has always been the improvement of applied strategies, operational art principles, and updating doctrine, organization, and armament (Jabłoński, Lis, 2012). To benefit

from the experience gained effectively, appropriate regulations, procedures, and tools, such as the benchmarking method, are required.

Most of the borrowed solutions and lessons learned transferred between the allied armies come from the allied armies within the North Atlantic Alliance (Manual, 2014). They fit precisely into the benchmarking concept, which assumes the comparison to the best and catching up with them (Zimniewicz, 2009). Polish soldiers have drawn their solutions mainly from the United States Armed Forces. Given the above, an appropriate system of collecting, gathering, and disseminating experience from operations conducted outside the country was created in 2007. Changing external conditions and essential operational needs forced the system to evolve in 2012. The old system was replaced by a new - national and universal Lessons Learned System (SWD) (Jabłoński, Lis, 2012).

The holistic and comprehensive incorporation of lessons learned in military activities is closely related to management theory and practice (Manual, 2014). The ideal field of the application here is the Armed Forces, operating under conditions of constant change.

Methods and procedures for gathering, analyzing, and finally utilizing experiences function in most countries of the North Atlantic Alliance and the European Union. The development and continuous improvement of these systems is a priority. They bring measurable benefits, transforming into (Manual, 2014):

- improvement of training results;
- implementation of the best organizational solutions;
- use of higher quality equipment and armaments;
- increasing the effectiveness of the use of troops in operations;
- enhancement of soldiers' safety.

The document which practically norms the principles of functioning and organization of the system of experience use is *Instrukcja Systemu Wykorzystania Doświadczeń (the Manual of the Lessons Learned System)* developed by the Center for Doctrine and Training of the Armed Forces. It takes all standards binding in the North Atlantic Alliance into consideration. With this, the Polish national system is consistent with Lessons Learned standards used in NATO, the European Union, and other allied armies (Manual, 2014).

The Lessons Learned System is a way of gaining knowledge, integrating knowledge, and managing change (Manual, 2014). The elements of these two management concepts are presented in Table 1.

Table 1: Knowledge management and change management elements

Knowledge management	**Change management**
Identification of observations	Planning the implementation of corrective actions and setting up tasks
Analysis	Implementation of corrective actions
Dissemination	Verification of corrective actions

As a process of applying experiences, the Lessons Learned System (SWD) consists of the following stages (Manual, 2014):

1. identification of observations,
2. analysis of observations,
3. planning the implementation of corrective actions and setting tasks,
4. implementation of corrective actions,
5. verification of implemented corrective actions.
6. dissemination.

Although the SWD Manual does not define the process of using lessons learned as benchmarking, it can undoubtedly be stated that anatomically it is identical with the essence of benchmarking and closely related to it, because observation is present in the benchmarking process and the SWD. In benchmarking, it is directly defined as understanding and documenting the processes implemented in the partner (Andersen, 1995). However, using the SWD Manual, an observation should be treated as a description of events and factors that affect the organization's functioning.

The objects of observation in the SWD are not limited since it is impossible to predict the situation, undertakings, and events requiring correction in the future (Coursebook, 2014). The main difference between these two

approaches is the place of observation in processes. In the SWD, it constitutes the first step, but the third one in the approach proposed by B. Andersen. The stages of the proceedings in other items of literature are described as presented in Figure 1.

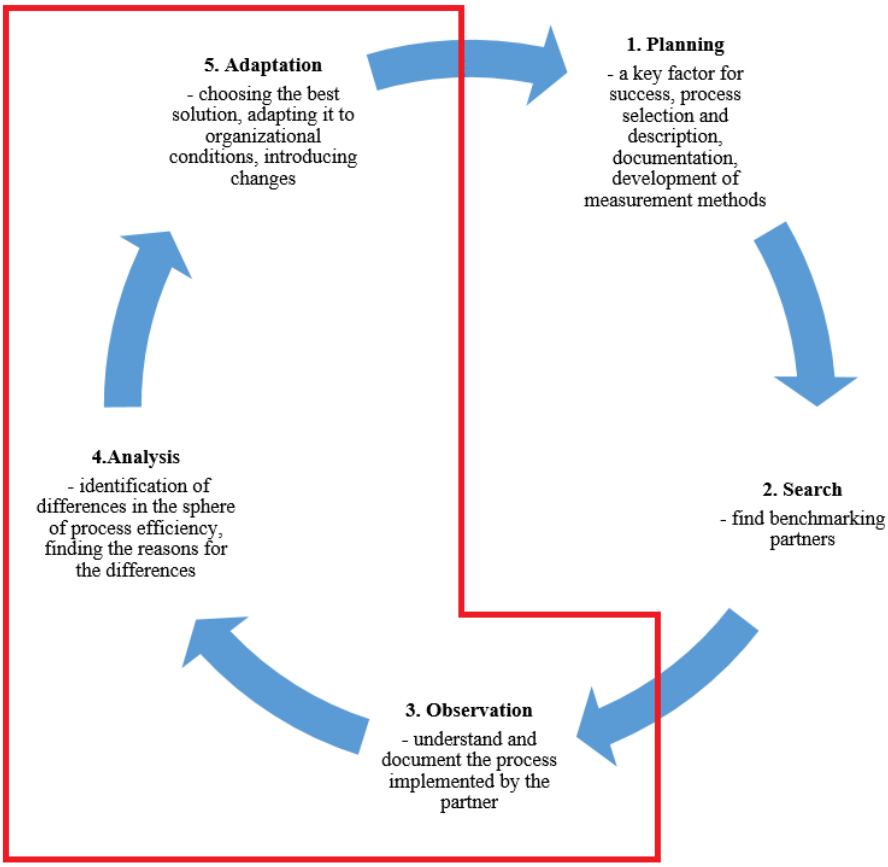

Fig. 1: Repeated stages of the SWD in the benchmarking process

A working document, used by soldiers to inform about their observations, is the "Observation report sheet," as presented in Figure 2. It provides the observer's necessary data and observation data. The author of the sheet then places the causes of the event, conclusions, and recommendations accordingly (Manual, 2014).

The course of action described in it gives the possibility to conduct observations at foreign partners - allies Due to apparent reasons resulting from the arms race, the activity of the Armed Forces is widely secret and, therefore, the use of benchmarking activities in the allied structures has a value and importance challenging to assess.

Observation Report Sheet

First name		**Surname**	
Rank		**Organizational cell/unit**	
Post		**Military Branch (equivalent)**	
Telephone			
Fax.		Open email	
Mobile phone		Mil-Wan email	

Date of observation:
Title:
Specifying the main observed event, problem, negative phenomenon, good practice.

1. **Type of activity:**

Specifying the area of activity where the observation took place, e.g.: international operation, exercise with troops, staff training, training activities, functional component of capabilities, etc.

2. **Description of the observation:**

Brief description of the event. Providing a concise description of the problem, negative phenomenon, or good practice.

3. **Reasons for the event:**

Identifying the causes of the event with the reasons and circumstances that influenced its occurrence. Detailing the observation with answers to questions according to the scheme: who, what, where, when, why, and how. Precise presentation of actions that were taken to eliminate the problem or negative phenomenon and indication of reasons why it was not solved (no data from previous points of the form repeated).

4. **Conclusions:**

A concise and logical summary of the observed causes and effects of the negative event or good practice.

5. **Recommendations:**

The proposal should include, if possible, recommended corrective actions and their contractors. Indicating actions to be taken (e.g., making positive changes, improvements) to avoid a repetition of the observed problem, and proposing corrective actions to the contractor. These could be, for example, actions to change instruction records, publications, procedures, reorganize command structures, improve training processes, equipment, etc.

Proposal after qualification of observations			
SWD STAFF	**POSITIVE**	**NEGTIVE**	**DATE**
rank, first name and surname	*Example: Recognize as used experience (identified observation)*	*Example: Observation rejected (to be disseminated)*	

Commander's decision			
COMMANDER	**ACCEPTED**	**REJECTED**	**DATE**
rank, first name and surname			

Fig. 2: Observation report sheet

Examples of the use of benchmarking in the Polish Armed Forces

An example of the application of benchmarking in the Polish Armed Forces is the "Leadership Training System" and its essence: *a purposeful integration of the development of individual personality traits and substantive, performance, and social competences acquired by cadets in the course of their studies. The system is based on the American experience, currently implemented by the US Army within the West Point Leader Development System, as well as on university experience gained through extensive international cooperation in the scope of implemented projects and courses* (Military University, 2020). The way of transferring knowledge changed within the framework of the system. It is not only transferred by lecturers (instructors), but also between cadets themselves. The method is modeled on solutions implemented for years at West Point. Through these activities, the University aims to *create the so-called "character leaders," who will show significant effectiveness in the realization of tasks set for an officer of the 21st century"* (Military University, 2020).

Another example of "borrowing" from the American Armed Forces is the "*Concept of Development of the Professional NCO Corps* (The Minister of Defense, 2018)." According to that concept, the new organization of the Armed Forces is to draw on the proven experiences of the allied countries. A team was formed which took advantage of the comments of experts and non-commissioned officers in formulating the new concept (PAP, 2020). The concept defines the role of a non-commissioned officer as a leader, who must build a team, motivate soldiers, and effectively command them. It is connected to gaining the necessary knowledge from the Americans and borrowing it in the training processes.

An example of using benchmarking in the native Armed Forces is the field uniform WZ 2010. The previously used uniform WZ 93 has been criticized. It was accused of poor functionality on the current battlefield, confirmed during missions in Iraq and Afghanistan. Many times, there were situations that a Polish soldier went on patrols in an American uniform (Bączyk, 2008, p. 46–47).

The consequence of these events was the decision to design and introduce a new, safe uniform. It was preceded by analyses, evaluation, and tests conducted by soldiers during overseas missions (PKW Afghanistan, PKW Chad, PKW Iraq). It was a novelty in the implementation of innovations with the participation of methodology known in

benchmarking and common in the civil economy (Szulejko, 2008). Many changes have been introduced to the Polish model, and "borrowings" prove the value of benchmarking practice.

It should be added that such tendencies are becoming increasingly common between science, economy, and the Armed Forces. They are patronized by the Armed Forces Command suggesting organizing joint exercises with representatives of business executives in the future: "...it would be beneficial to both sides, would overcome some mental resistance resulting from the historical burden, and develop new habits and competencies, allowing for even more effective command...(Andrzejczak, 2018)."

The software-based on SAP Business One, using ERP (Milewski, 2014) solutions, and the Integrated Multi-Level National Defense Ministry Information System (Polish abbrev. ZWSI RON) (Decision, 2008) exemplify the implementation of solutions used in the civil environment in the Armed Forces. These systems are designed to increase efficiency and profitability. Their task is to support the decision-making process. Easily accessible and transparent data enable that. Global corporate giants apply this type of software. The system operates based on a secured, departmental ICT network - MILNET-Z (Cyberdefence, 2020). SAP Business One is a solution designed to meet the specialized needs of organizations and enterprises. The software performs a wide range of functions such as management of finance, production, warehouse, or customer relationship, as well as reporting and procurement. The system allows for its adaptation and implementation in a short time.

The adapted sets of SAP for Defense & Security solutions that allow for the improvement of transparency of possessed resources and assistance in making decisions are dedicated to the Armed Forces worldwide. Another advantage of this system is the reduction of costs and reaction time (Milewski, 2016, p. 216). Minimizing the use of resources is one of the primary objectives of military operations. Appropriate use of resources often determines the success of operations or missions. Software such as SAP allows for a meaningful review of resources with the use of existing knowledge. Thanks to such measures, the user saves time and money. The importance of this activity can also be attributed to building the Armed Forces prestige as an organization implementing innovations and improvements, and which is efficient and prone to progress (Wełyczko, Kałużny, 2010).

The illustrations presented in the study are examples of "borrowings" introduced to the Polish Armed Forces, both from allied Armed Forces and the civilian environment. The issues discussed concern implementations in the whole structure of the Armed Forces, starting from a military education. The military uses benchmarking borrowing from the lessons learned of civil organizations, implementing proven tools. The illustrations given have been selected from a wide range of benchmarking practices in the Armed Forces. Attempts were made to select more recent examples of its application. The presentation of the examples, however, is significantly limited due to the confidentiality of processes taking place in the military. The above examples are open and have been confirmed by media reports or publications.

Conclusions from research on the application of the benchmarking concept in the Polish Armed Forces

The first interview question asked whether benchmarking is used in the Polish Armed Forces. The answer was positive, although this fact is not described by clearly defined normative documents. The armies are constantly watching the solutions implemented by someone, both in allies and enemies. The data collected is essential to catch up with or outdo leaders. In the next question, an attempt was made to examine the validity of the benchmarking objectives. It was pointed out that the primary purpose of applying this concept is to increase operational capacity continuously. When using benchmarking methods, the military gains essential data necessary for more effective training of soldiers. By comparing procedures used in different armies, the Armed Forces are able to choose the best solutions in a faster, more straightforward, and cheaper manner. Soldiers are stimulated to create new concepts of classes; the innovativeness of the Armed Forces as the whole is increased.

In the further part of the interview, an attempt was made to determine which types of benchmarking defined in the subject literature and employed in the Polish Armed Forces. While considering the subjective approach, it was found that internal, competitive, and functional benchmarking is used in the Armed Forces of the Republic of Poland (Adamik, 2015). The use of internal benchmarking is manifested by the fact that military units taking part in joint exercises observe and compare the ways of task execution or procedures.

The basis for the use of competitive benchmarking is contacting with the Armed Forces of other countries, mainly within the North Atlantic Alliance.

In the simplest terms, the use of functional benchmarking can be explained by "borrowings" from civil organizations or management sciences and introducing them to the Armed Forces.

It was then recognized that the driving force behind the application of the benchmarking concept is Poland's presence in the NATO structures. Lagging in modernization and incomplete unification of the training of Polish soldiers in relation to their foreign colleagues, determine the benchmarking as an apt tool for development and continuous improvement. Using solutions that have been proven from conflicts and stabilization missions around the world is an excellent opportunity for the Armed Forces. It saves time and money and, last but not least, soldiers' physical and mental health.

The vivisection to indicate conditions conducive to applying this concept in the Armed Forces indicated that it is primarily having a benchmarking partner. This task is currently facilitated by the presence of the Polish Armed Forces in NATO. Thanks to this, the Polish Armed Forces can take advantage of the best solutions. Currently, there are many allied troops on Polish territory, which facilitates observations.

As for the matter of how the process works in the Armed Forces, it was considered that it is similar to most of the processes of this type known in practice. Moreover, when comparing the course of the classic benchmarking process with the processes of knowledge management and change management described in the Manual of the Lessons Learned System, it was indicated that there are insignificant differences. They relate to the fact that it starts with the identification of observations, and the benchmarking process starts with the specificity of planning, depending on needs.

As regards the identification of an institution applying or supporting the application of this concept, everyone stressed the role of the Center for Doctrine and Training of the Polish Armed Forces as an entity liable for the use of experience at the political-military level and the Inspectorate for the Implementation of Innovative Defense Technologies.

The Centre is an independent organizational unit operating within the Ministry of Defense. Its tasks include standardization in the operational area (allied and national) and collection and use of lessons learned gained. It is also responsible for experimenting and searching for new abilities or concepts of the Armed Forces' training. Implementing these tasks is essential for the modernization of the Polish Armed Forces and ensuring their compatibility with the allies within NATO.

Besides, the interviewees were well familiarized with the objectives and tasks of the Inspectorate for the Implementation of Innovative Defense Technologies as an institution responsible for the identification, analysis, and monitoring of innovative technology development. The activities aim at the introduction of new weapon systems and military equipment. In addition, the process of using the lessons learned is implemented at each command level and is executed by the designated structures depending on the command level.

In the further part of the interview, an attempt was made to identify barriers in the application of benchmarking in the Armed Forces. The organizational culture, related to the application of this concept, was indicated as essential, as the Armed Forces are a hierarchical organization based on numerous normative documents. Therefore, the introduction of new procedures or solutions requires opinions at many levels and thus extends over time.

In the next question, an attempt was made to indicate the period in which benchmarking began to be implemented in the Armed Forces. The use of this concept was closely related to Poland's efforts to become a NATO member. The Armed Forces had to adapt to its western allies. Overseas missions, during which Polish soldiers have had contact with NATO partners, are another significant stimulus for the development of benchmarking in the Armed Forces.

It was then probed how the specifics of the service changed after the implementation of benchmarking. It was concluded that benchmarking has a positive impact on functioning. The introduction of the latest solutions, procedures, or technologies increases the Armed Forces' operational capabilities. The application of benchmarking appears essential for the Armed Forces' permanent modernization as an essential guarantee of security. This concept improves the operation of the entire Armed Forces, from increasing the comfort of an ordinary soldier who has received a new uniform pattern to reforms in the modernized system or training in the officers' corps.

In the last question, an attempt was made to identify the essential documents that standardize or support benchmarking. The interviewed persons stated that there are no unequivocal documents concerning benchmarking. However, when taking the documents containing its essence into account, the Manual for Lessons Learned System can be listed. Another document was once the Decision No. 161/MON of 9 April 2008 on rationalization activities in the Ministry of National Defense. Currently, that document is no longer valid. However, there is an approval for

this kind of innovation, hence the postulate to popularize the essence, principles and appropriate regulations in the formal implementation of benchmarking is increasingly urgent.

Conclusion

The Armed Forces of the Republic of Poland is an organization with a structure of over one hundred thousand people (soon one hundred and fifty) and a budget of 2% of GDP. The responsibility facing the Ministry's decision-makers, commanders of Military Units, or administrators of state budget funds should force them to know, adapt, and apply proven management concepts and other global solutions. That includes the concept of benchmarking.

The accession to the structures of the North Atlantic Alliance can be compared to the opening of the once closed economy to the global market. As in globalization processes, the military is forced to standardize their actions, unify processes, and adapt to new partners. Undertaking these actions is a challenge, characterized by a considerable number of problems and spread over a long period. On the other hand, this need should be understood as an opportunity to leave the periphery of the "military world" and join the most modern armies.

The concept of management that undoubtedly makes it possible to implement the actions mentioned earlier is benchmarking. The specificity of the Armed Forces and their somewhat specific adaptation of benchmarking - in the authors' opinion - has considerable cognitive values for its application in other activity segments: companies, social organizations, administration, or, as is currently the case, the occurrence of global threats. Here, a good case is the current coronavirus protection action, entrusted to a large part of military medical and military structures recognized as efficient and competent. Generalizing the problem of using this method of improving the Armed Forces, there is still a need and possibility to make full use of benchmarking, its potential, and capabilities. There are plenty of civil organizations' experiences in the use of benchmarking in management, so the authors believe that it can be used more fully in command, which is sister to management.

The benchmarking discussed in the paper is a somewhat anonymous field of international cooperation. Its specific feature is - as opposed to know-how - the lack of need for funding. However, its scope depends on the military responsible for those activities: on their cooperation with the industry, the armaments industry, and the research and implementation activities of military universities. It depends on the scientific activity of military inventors and implementers and scientific activity and careers. When it comes to the development of cooperation between the economy and the military, the authors recommend benchmarking. It can play an essential role as a specific economic activity, having more benefits, because not only economical, but also social, defensive, and with excellent development prospects (Gutt et al. 2013, p. 257). It is worth remembering that in the sphere of military technology, the highest-ranking raw materials, goods, or products tested even in space are made. Like everything that concerns social support, the descriptive activity can also be adequately supported by its promotion (Knecht et all. 2013, p. 2013).

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Shaping the Armed Forces' Image During the Covid-19 Epidemic Based on Territorial Defense Forces' Activities

Janusz MATERAC and Zdzislaw KNECHT

General Tadeusz Kosciuszko
Military University of Land Forces,
Wroclaw, Poland

corresponding author e-mail: jmwielun@gmail,com
author e-mail: zknecht@wp.pl

Abstract

The article presents information activities in the Polish Armed Forces, conducted by Territorial Defense Forces (TDF) units in the coronavirus epidemic outbreak era. They are presented in the context of image-building activities of an individual unit; then, there are made analyses and generalizations, which are original recommendations for further activities. To some extent, the article reflects the usefulness of military actions in the event of a crisis and other manifestations of danger. Based on the image-related activities, the anti-crisis operation code-named "Resilient Spring" was presented, along with an analysis of the 14th West Pomeranian Territorial Defense Brigade's participation. The recommendations for building a positive image of the Territorial Defense Forces in the future were also suggested. The experience gained in the special, challenging conditions of the epidemic, or cooperation with other uniformed services, allowed proposing new activities of shaping the Armed Forces' image as a formation serving the society in times of peace.

Keywords: Crisis, Epidemic, Territorial Defense, Brigade

Introduction

In the event of a crisis, it is possible to verify the usefulness of the entities responsible for counteracting, reacting, and overcoming the crisis. There are many such organizations and the nationwide crisis management structure is the coordinator (Pieterek, 2018, p. 87).

In many countries, such as the USA, Italy, or Sweden, in the event of crisis situations, it is the territorial defense units that coordinate the control of most symptoms of the crisis (Polcikiewicz, 2016). In Poland, the Territorial Defense Forces are tasked to be ready to defend local communities, including counteracting the effects of natural disasters and fighting them, and carrying out rescue operations in crisis situations (Pytel, 2020).

In Poland, Territorial Defense Forces were established in 2017, and the process is still being continued (Stachowicz, 2017). The process of forming subsequent brigades by voivodship allowed individual units to take over Permanent Regions of Responsibility throughout the Republic of Poland territory. Not all regions have established battalions for territorial service following the law, tasks, and powers set for this structure. Therefore, the undertaken topic is a vivisection of this new military organization's practical testing in Poland and its prospects. Based on the actual events and the anatomy of the taken actions of an image-related nature, it was possible to analyze public relations programs in this formation that have not yet been verified (Dojwa, 2013). Taking up this topic has specific cognitive values, as it enables the adoption of appropriate recommendations for further activity.

Characteristics of the operation code-named "Resilient Spring"

In Poland, the first case of the coronavirus Covid-19 appeared on March 4, 2020. The threat of this disease caused that on March 6, 2020, the Armed Forces, for the first time after 1989, engaged in anti-crisis operations on such a large scale. On March 12, 2020, the Territorial Defense Forces changed the model of functioning from training to anti-crisis [Internet 1], and from March 18, 2020, they began an anti-crisis operation under the code name "Resilient Spring" [Internet 2].

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The purpose of this operation is (...) *to mitigate the effects of the crisis and strengthen the resilience to the crisis of local communities, support all local government and sanitary institutions providing aid (...) support the Border Guard and the Police* (...). To rationalize the activities of TDF troops as part of this operation, those in need were classified and groups of people covered by support. They were [Internet 3]:

- *families of health professionals involved in preventing the spread of the virus,*
- *combatants,*
- *veterans of operations outside the country,*
- *elderly people over 60 years of age,*
- *disabled people,*
- *single parents,*
- *quarantined persons.*

The operation in terms of media coverage was marked (tagged) with hashtags classifying individual activities into groups for information purposes and rationalization of cooperation with the society [Internet 3]:

courage - helping families of medical staff, the disabled, people in quarantine;
tradition - they also support combatants and the elderly;
#brotherhood - support for the charges of social welfare centers and Caritas (foundation, nongovernmental organization) of individual dioceses;
responsibility - specially selected soldiers, who are less than 45 years old, delegated to the operation do not suffer from chronic diseases and do not report any health problems;
psychological assistance - 24-hour, free, nationwide psychological help line;
blood donation - blood donation in brigades, military education institutions and individual blood donation by soldiers
#always ready - activities related to the formation creed - "I am a helping arm and shield to my community."

At the peak of the operation, even 5.5 thousand Territorial Defense Forces soldiers and cadets from military education institutions participated in it every day. From the beginning of the operation, 16.5 thousand Territorial Defense Forces soldiers were involved, which constituted nearly 70% of the formation, 80% of them were soldiers – volunteers [Internet 4].

The areas of activity of the Territorial Defense Forces during the operation "Resilient Spring" are presented in Table 1.

Table 1: Support provided by the Territorial Defense Forces during the fight against the Covid-19 virus

TDF support	
Hospitals and sanitary services	Construction of field emergency rooms, Staff assigned to work in medical care, Support for staff families, Triages, interviews, temperature measurement, Taking swabs, Blood donation.
Local Government and Non-governmental Organization (NGO)	Food distribution, Distribution of anti-crisis measures, Medical and logistic support for nursing homes (DPS), DPS evacuation - Crisis Intervention Teams.
Border Guard	Surveillance of the state border, Border crossing control, Help for travelers.
Police	Preventive patrols, Quarantine monitoring.
Material Reserves Agency	Securing three logistic warehouses, Transport of materials to end users.
Civil Aviation Office	Sanitary and epidemiological control of controllers and crews, Sanitary and epidemiological control of passengers, Collecting location cards.
Individual and social resilience	Demonstrating presence, Education / Building awareness, Helping people in quarantine Help for people in need and combatants, Line of psychological and pedagogical support.

The activities of "territorials" as part of the operation were widely reported in the media. The TDF commands' activity corresponding with public relations and contributing to the deepening of cooperation, and thus the effectiveness / efficiency of work of this still little known in Poland military organization established to directly serve the society (Black, 2018), deserves attention. Information on the formation's activities is available on the TDF website - in the Crisis Management / Resilient Spring tabs. The Territorial Defense Forces also widely covered their activities in social media - mainly on Facebook and Twitter.

Building a positive image among the local community during the implementation of anti-crisis measures by the 14 BOT (during the promotional activity of 14 BOTs subject to analysis, evaluation, and recommendation)

The subject of the analysis was the work done to shape a positive image of the organization during anti-crisis activities (Knecht, 2018). The authors analyzed reports and media reports on the 14 BOT (the 14th Territorial Defense Brigade). In addition to the analysis of media messages, the study also used the participant observation method. The works covered the period from March 12, 2020 to May 11, 2020, which is the hottest intensity of work to counteract the restrictions of the pandemic. A summary of media reports from the discussed period is presented in Table 2.

Table 2: List of media reports

Period	Type of media	Number of publications	Topic
March 12, 2020 - March 19, 2020	Local TV	1	- Information on sending West Pomeranian territorials to the borders and deploying them to help with medical services.
	Newspapers / Internet local portals	9	- Zachodniopomorskie territorials conduct patrols, support border guards, and help veterans - West Pomeranian territorials support border guards and help veterans
	Press service	1	- Territorials to fight coronavirus
	Radio	1	- Territorials bring help
	Nationwide newspapers / portals	1	Soldiers on the border. They support border guards.
	National portal on security and defense	1	- Characteristics of the brigade's operations during a pandemic
	Paper-based press	2	- Territorials at the borders
March 20, 2020 - March 31, 2020	Newspapers / Internet local portals	7	- Territorials help Caritas fight the epidemic - Food transport for the commune (Karlino - people were in quarantine there). - Blood donation campaign
	Paper-based press	6	- Support for border guards - Territories help Caritas. - Food transport for the commune of Karlino - Information on the activities of TDF soldiers.
	Radio	3	- Support for Caritas in food transport - Help for the commune and the food bank. - Territorials' actions.
	National portal on security and defense	1	- Adoption of "dark and silent" as a patron (Heroes of the Polish Underground during World War II)
	Office website	1	- Food transport
	Local television - material and reportage on the website	2	

April 1, 2020 – April 4, 2020	Newspapers / Internet local portals	8	- Blood donation - Unloading gifts for the Polish Red Cross (PCK) - Support for the commune and NGOs - Organization of food shipments - Helping foundations - Cooperation with the Police
	Paper-based press	3	- Blood donation - Helping foundations - Cooperation with the Police
	National portal on security and defense	1	- Aid for NGOs, MOPS and veterans
	Social media	1	- Joint TDF and Police patrols
	Radio	4	- Helping foundations - Food transports - Cooperation with the Police - Support for the health care
	Local TV	1	- Aid to the food bank
	Nationwide television	1	-Aid to the food bank
	Other web portals	1	- Helping foundations
April 11, 2020 – April 20, 2020	Newspapers / Internet local portals	12	-Support for medical services -Easter in the barracks -Support for DPS
	Paper-based press	2	-Aid for medical services
	Social media	2	- Transports for the health service -Support for DPS
	Radio	4	-Easter in the barracks -Support for medical services -Support for DPS
	Local TV	1	- Support for DPS - Aid for DPS
	Nationwide television	2	
	Other websites	1	
	Nationwide portals	2	
	Office website	1	
	National portal on security and defense	1	
April 21, 2020 – April 30, 2020	Newspapers / Internet local portals	10	- Organization of Crisis Intervention Teams - Summary of the month of activities - Help for animal shelters
	Paper-based press	1	- Help for animal shelters
	National portal on security and defense	2	
	Social media	5	
	Radio	4	- Summary of the month of activities - Help for animal shelters
	Local TV	2	- Summary of the month of activities - Help for animal shelters
	Nationwide portals	4	- Help for animal shelters
May 1, 2020 – May 11, 2020	Newspapers / Internet local portals	9	- Distributing food to the poorest - Helping animal shelters

			- Mobile coronavirus testing - Organization of drive-thru +3 points - Food transport - Organization of drive-thru points - Food transport
	Paper-based press	4	-Helping animal shelters - Support for Nursing Homes - Food transportation - Organization of drive-thru points
	National portal on security and defense	1	- Giving food to the poorest - Appealing to join TDF
	Social media	2	- Food transport
	Radio	50	- Organization of drive-thru points - Food transport
	Local TV	2	- Organization of drive-thru points - Food transportation
	Nationwide portals	3	- Appealing to join TDF
	Nationwide television	4	- Giving food to the poorest - Appealing to join TDF
	Office website	1	- Organization of drive-thru points

The period: March 12, 2020 - March 19, 2020

In the first week of anti-crisis activities, 16 publications on activities carried out by the 14 BOT appeared in the media. The main task performed by West Pomeranian territorials in the first week of anti-crisis activities was to close the borders of the Republic of Poland. Information on cooperation with the Border Service appeared in all 16 publications concerning 14 BOT.

The strong publicity of the brigade's activities in the first week of the operation was a proper marketing procedure. Since the unit operated in Szczecin for several weeks, frequent information about the 14 BOT allowed to instill in the local community the knowledge about the existence of the Brigade and its tasks in crisis situations. Public relations activities, in addition to building awareness of the newly created Brigade, made it possible to reach potential recruits with information. The positive image of the TDF soldiers helping in a crisis presented by the media encourages young people to join the Armed Forces and take up military service.

The greatest number of publications about the Brigade appeared in newspapers, websites, and local websites. Considering that the target group in the recruitment processes for the unit are young people from the West Pomeranian Voivodship, which is the Permanent Responsibility Region (SRO), the Brigade is obliged to look for people willing to serve in the military.

The media coverage also raised the subject of territorial cooperation with other services, primarily medics and fire brigades. That allows the residents to become aware of the nature of TDF activities - it is not only training, but also providing help in times of crisis. For shaping a positive image, such activities are an effective tool for consolidating a positive image (Knecht, 2006).

It should be emphasized that information about BOT activities appeared in all media (except social media). Most of the information was in the local media, but there was also an interview with the commander of the 14 BOT on the nationwide Defence 24 industry website. Thanks to this, the knowledge about the Brigade's creation and scope of activities could be transferred across the country.

The period: March 20, 2020 - March 31, 2020

In the next ten days of operation under the code name "Resilient Spring" 20 media publications on the 14 BOT appeared in the media. In the next ten days of the operation, the tasks reported in the media changed. The main media "burden" concerned the coverage of food transport for Caritas (a foundation - non-governmental organization) and people in quarantine. Support of NGOs (non-governmental organizations) such as foundations built a positive reception of the Brigade and shaped the image of a soldier (a territorial) characterized by

brotherhood. Support for people in quarantine was the main media topic in the discussed period. The number of publications on the activities of the 14 BOT on local websites, portals, and newspapers was similar to the number published in paper form.

Information about the choice of a patron by the 14 BOT has appeared on industry websites. That is the only information not related to the operation code-named "Resilient Spring".

At the end of the period in question, the topic of blood donation by soldiers appeared; it as important from an image point of view. The military has been one of the most active in this area for years (Strąk, 2020, p. 98).
Media coverage in this period created the image of a soldier who fulfilled not only orders or official tasks but was also a member of the local community, providing help to those in need (Klein, 2019). It warms up the image of the Armed Forces and brings it closer to people. The Armed Forces ceased to be a hermetic organization. Soldiers are no longer perceived as an organization prepared for the time of war, but they are always useful, efficient and well-organized, as was proved in life during the current pandemic. It is the Armed Forces that respond to those called even in an emergency.

The period: April 1, 2020 – April 4, 2020

During the discussed period of the operation code named "Resilient Spring", there were 20 publications on the activities of the 14 BOT. In the period from April 1 to April 10 publications about the activities of the 14 BOT increasingly appeared in the media. They concerned the activities of the Brigade in many fields of the fight against the coronavirus. The event, which was strongly publicized and promoted in the media, was a blood donation campaign in which territorial groups participated. During this difficult period for the medical services (with large blood shortages in banks), the soldiers presented an attitude of readiness to perform any task assigned to them. Under the slogan "blood ties", together with commanders, they supported the action, donating priceless blood. The event was very positively received by the media.

It is worth paying attention to the fact that the reports on aid to food banks were shown on nationwide television (TVP INFO – the news program). This topic was also discussed on the radio and internet portals.

The campaign to help the Centaurus Foundation (an organization helping animals in need) was widely publicized. This allowed for the creation of the silhouette of a soldier acting selflessly, providing support to the weakest, including animals.

There were reports in the media about TDF's cooperation with the Police during patrols. This shaped the image of TDF as an organization capable of cooperating with various services.

The appearance of the uniform on the streets undoubtedly increased the importance of anti-virus activities and the sense of danger, which favored mobilization for cooperation (Piekarski,2019). The presence of TDF soldiers on the streets served the purpose of demonstrating the presence and building awareness of the Armed Forces' constant struggle with the "invisible enemy".

From media reports, it was possible to learn about the support of veterans by TDF soldiers. It is from them that they take over the traditions of wearing a uniform. They show that what matters to them is history and educated attitudes of loving Homeland.

The period: April 11, 2020 - April 20, 2020

In the discussed period of the operation under the code name "Resilient Spring" there were 28 publications on the activities of the 14 BOT. At this stage of the operation, the number of publications on the 14 BOT increased. There were almost thirty of them. It was related to the Brigade's performance of key tasks. These tasks were followed by the media and websites. The Brigade Command and the press spokesperson were of great importance for the promotion of the image, they reported, for example, on Easter in the barracks.

The task that was most strongly emphasized in the mass media was the support for the West Pomeranian DPSs. These events were reported in all kinds of media. The reports showed that the military is where the threat is the greatest and the support is most needed.

The media also reported support for doctors and medics, including in hospitals when soldiers took temperature measurements. These relationships built the image of a soldier (territorial) that performs tasks "on the front line". It

was pointed out that the Armed Forces soldiers spend Easter in the barracks, carrying out tasks related to the operation under the code name Resilient Spring. This information was accompanied by interviews with the command and the press spokesperson of the 14 BOT. Spending holidays on the implementation of tasks built an image of the Armed Forces that one can count on. The Armed Forces should be perceived as a guarantor of security. The reports emphasized the motto of the Territorial Defense Forces - "always ready, always close" [Internet 6].

The period: April 21, 2020 - April 30, 2020

In the discussed period of the operation under the code name "Resilient Spring" there were 28 publications on the activities of the 14 BOT. Then, the most widely reported in the media was helping animal shelters, this time with the participation of the cadets from the Military University of Land Forces, who strongly supported the Szczecin territorial. These events were reported in all media. Two reports were published on industry websites related to security and defense.

Soldiers were presented as people to whom the harm of others, including animals, is not indifferent. The soldiers, at their own expense, collected food, and then delivered it to the most needy animals. The reason for starting the action was the difficulties of shelters in collecting funds and animal food caused by the outbreak of the pandemic. The action was also widely reflected in social media on portals related to animal lovers, which could expand the number of recipients of information on the activities of the 14 BOT. There were also numerous reports in the media regarding the summary of the first weeks of the operation, where the activity of the West Pomeranian territorials was positively described.

The period: May 1, 2020 - May 11, 2020

This decade saw 26 publications and numerous radio reports on the 14 BOT's activities. In the first ten days of May, topics published in the media about the activities of the 14 BOT concerned the distribution of food to the poorest, food transport, the organization of drive-thru points (test and go) and the appeal to join the ranks of the Brigade.

The organization of drive-thru points in Koszalin by the 14 BOT was the most frequently discussed event in the media in the analyzed period. The event was particularly aired on the radio. The military relieved the medical services and the State Sanitary and Epidemiological Station by organizing swab collection points from people in quarantine. The Armed Forces showed their multitasking and organizational skills, and the capabilities of supporting medical services.

It is worth noting that while the government was planning to lift the first restrictions, the Command of the 14 BOT started sending out through the media an appeal to join the territorial service. The use of increased, positive media coverage is the right thing to do in terms of developing the human potential of the Brigade. Numerous publications on military activities in the last two months increased the number of people who heard about the existence of this formation in the West Pomeranian voivodship. A wide range of activities, helping those in need, cooperation with other services can be convincing arguments for joining the TDF ranks.

Conclusions and Recommendations

The analysis of the media activities proves that the 14th Territorial Defense Brigade is an example of an organization shaping a positive image during a crisis. It allows the conclusion that for the Armed Forces the time of danger is a period of increased public relations activity. Their participation in controlling the epidemic is the right time to promote them and provide the society with information about their tasks, responsibilities, and role in society. The Armed Forces resemble and even strengthen the image of the military among citizens as a guarantor of security and defense. The military is presented as a security pillar that cooperates with other services (Klein, 2019). Recent public opinion polls (2019) show that 3/4 of Poles positively assess the Polish Armed Forces [CBOS]. This result will probably be corrected after the epidemic ends.

The intensive military activity during the epidemic created an opportunity to deepen ties with the society. The cooperation was established between TDF and local authorities, all types of uniformed services, medical entities, and non-governmental organizations. Its result is the agreement signed in August 2020 between the Territorial Defense Forces and the Caritas Foundation. The cooperation means, among others, helping the victims of natural disasters and catastrophes in the country and aiding the elderly, the needy and the sick, including combatants, repressed people and war veterans [Internet 5].

The cooperation of territorial defense services and others, as part of COVID-19, has become a testing ground for fighting an unknown crisis, based on which the military has created new capabilities (Materac, 2019).

Reports on the soldiers' life in the era of epidemics, generalizations and conclusions from the "front" of the fight of a specific entity (14 BOT) with the threat - coronavirus, make the values of this military formation visible to the public. Territorial Defense Forces as a new - fifth type of troops, have become in the public perception an important element of the country's security, subject to ennoblement.

Vivisection of new needs in communication with the media is a kind of test of the media's ability to respond to communication needs with the military. All media channels are used. It should be concluded that the promotion of the Territorial Defense Forces must be carried out both by the Brigades in the Permanent Responsibility Region - voivodship, and centrally by the Territorial Defense Forces Command in nationwide media. It is essential to use all available media. The need exists to formulate for TDF units the framework of a specific program of image-related - public relations - activities in the event of an unpredictable crisis, which would additionally increase the building of a positive image of the organization. However, it should be stated that the work of the commands and press spokespersons in the Territorial Defense Forces in the analyzed period remained at a high level. All events related to the fight against COVID-19 were reported locally, and the most important events were additionally made available and promoted at the central level by the TDF Command.

During the pandemic, the Territorial Defense Forces, as a new formation, gained the opportunity to establish permanent channels and communication contacts with local media.

TDF are still looking for its place in society and in military formations. Foreign designs cannot be transferred in their entirety. It is the time to construct own concepts, influence the shaping of, for example, social, educational, and civic life, or service to society in times of peace. The Territorial Defense Forces must obtain full public support. Initiatives in the form of the action code named "Resilient Spring" positively test the military capabilities in practice, they are an opportunity to gain social trust and support in everyday activities, including recruitment and development of this military formation. It should be emphasized that in Poland, the Territorial Defense Forces are still in the period of formation. The staffing needs are still significant, and the positive image of the military undoubtedly helps. Additionally, the positive "media hype" around TDF is helpful since it is important in reaching many potential recruits.

An interesting conclusion is the fact that the effectiveness in shaping a positive image of the Armed Forces, including TDF, is greater if it is illustrated on specific examples of providing aid to the society. Reports in the media at that time created the image of a soldier who fulfilled not only orders or official tasks but was also a member of the local community, providing help to the needy, acting selflessly, providing support to the weakest, and who is not indifferent to the harm of others (Knecht, Materac, 2020). It warms up the image of the Armed Forces and brings it closer to people. The Armed Forces cease to be a hermetic organization. Soldiers are no longer perceived as an organization prepared for the time of war but as useful at all times, and at the same time efficient and well-organized. It should also be noted that in recent years there has been a renaissance of pro-defense and paramilitary organizations in Poland. They are close allies to cooperate in the implementation of tasks performed within territorial defense and their potential can be used (Knecht, 2018).

In the discussed period, in relation to the 14 BOT, it is easy to notice the principle of "herd journalism". It should be understood as journalists' interest in the same topic. The same information is often reproduced in different media (Jabłoński, 2006).

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A Systematic Literature Review on Management of Public Transport in Real Time using a Geolocation System

Fernando POLANCO-SOLGORRE
Universidad Autónoma del Perú, Lima, Perú
fpolanco@autonoma.edu.pe

Joel CUENCA-VILLOGAS
Universidad Autónoma del Perú, Lima, Perú
jcuencav@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Señor de Sipán S.A.C., Chiclayo, Perú
jgamboa65@hotmail.com

Liset RODRIGUEZ BACA
Universidad Autónoma del Perú, Lima, Perú
liset.rodriguez@autonoma.pe

Carlos CHAVEZ HERRERA
Universidad Nacional Mayor de San Marcos, Lima, Perú
cchavezh@unmsm.edu.pe

Anibal SIFUENTES DAMIÁN
Universidad Nacional José Faustino Sánchez Carrión, Huacho, Perú
asifuentes@unjfsc.edu.pe

Abstract

Today, real-time monitoring of public transport is crucial as it significantly influences traffic, and if the transit of vehicles is not managed efficiently, it could result in a congestion of vehicles in transit routes (traffic). Most companies find implementing technologies such as a global positioning system (GPS), cameras, sensors, and Internet expensive. This paper focuses on an exhaustive review of 69 articles, extracted from various recognized academic sources and published in 2016–2020, that have explored different ways to improve transport management using technology. This study presents the different ways of using geolocation, utilization of improved tools, and transport management. Therefore, the results can help in attaining an enhanced understanding of public transport management.

Keywords: Geolocation, GPS, Monitoring, Server, API, Public Transport, Web Servers

Introduction

Public transport is vital in today's world because it helps people reach their destinations [5]. As the users of public transport cannot perceive or visualize the trajectory of the vehicles they are travelling in, the companies that provide this service must monitor not only the location of their vehicles but also their quality of service. In most places across the world, there is inadequate monitoring of public transport because of the considerable number of vehicles, especially buses, on routes. Not much technology is used for process management and monitoring as most public transport companies, at present, do not have the budget required to implement monitoring tools in each bus. A manual control system is tedious to use and easy to tamper because of its dependence on the human factor [59]; such systems have been in place since the 1960s and contribute to information disorder while failing to provide adequate service.

There is extensive competition in public transport in terms of providing services, because of the large variety of buses; this results in more disorder, traffic, and informality. Traffic is an important factor in every city in the world as the high congestion of cars and buses and lack of public transport monitoring can result in delays on the route.

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Sometimes, two or more buses ply on the same route, which can lead to the buses competing with each other to get more passengers and arrive at their destinations first, thus putting the lives of passengers at risk by speeding and not following the traffic rules. Users may not know when their bus will arrive at the bus stop [59], and thus, may have to wait for several minutes; this may make them prey to robbery and other crimes [5].

In most companies, buses are monitored by controllers that are placed on the route [63]. These controllers keep track of the transport when it is in the domain of the controller and determine whether the vehicle is late or on time. If the controllers are placed far apart on the stretch of a route or are missing, then the transport is not adequately monitored, thus causing irregularities. These irregularities include transports going slower than normal to get more passengers, making unnecessary stops, reaching a certain point and returning without going to the final destination, and creating small routes, which are considered as ghost routes, to make more profits. In addition, during the day, there is a greater influx of passengers and a greater demand for public transport. If the number of transports on the route is not increased at the time of arrival [20] at the bus stop, there will not be enough space or seats for passengers. To address this issue, various solutions have been proposed globally. For example, in the city of Cúcuta [5], a web system was implemented using the bus's GPS, which showed its real-time location.

This paper focuses on researching different approaches of improving public transport management.

The rest of this paper is organized as follows. Section II presents the background and important concepts related to the topic. Section III explains the methods and materials used (formulation of questions, sources, search equations, exclusion criteria, classification, and review of studies). Section IV examines the methods and materials used for the research. Section V outlines the results. Finally, Section VI presents the conclusions and recommendations for future work.

Background and Related Work

Different solutions have been proposed for varied public transport needs as research has evolved over time regarding how technology can be used to benefit the transport business and provide a better user experience.

Poonawala et al. [2] conducted a study on the use of mobile phones and smart cards utilized by the user for payment to determine the time at which they took the bus and got off it, the amount of time for which they traveled, and where they went. These collected data served as behavioral patterns that were used to improve the processes of the services provided. Using two technologies, such as smart cards and mobile GPS, their study provided a detailed report on the user's behavior pattern.

Derevitskiy et al. [29] implemented GPS in their transport vehicles to evaluate passenger behavior and the load generated on the roads, especially during traffic, to calculate the travel time and provide solutions while reducing the congestion of transport, depending on the direction in which it is going.

James and Nair [62] proposed a model that used Long Range (LoRa) wireless transmission as an alternative to GPS. LoRa is located in the central and radio frequency (RF) is located at each bus stop. Information is sent to the central to track a bus each time it arrives at the bus stop and estimate its time of arrival. The implementation of LoRa costs significantly less than that of GPS, cameras, or other technologies on the buses; it also consumes less energy.
Castro-Correa et al. aimed [5] to improve the public transport system by implementing GPS on buses, with all information stored on a server and displayed on the website using Google Maps to determine the route of the bus and its time of arrival.

Velázquez et al. [59] developed a system based on free technologies that could monitor the route of transport units to facilitate decision-making for releasing new transport units. They intended to offer an accessible system that could present a viable alternative from an economic viewpoint and met the administrative staff's needs.

Saad et al. developed [20] a bus tracking system to show the real-time location and estimate the time of arrival of the buses at the next stop. This tracking device, which was integrated into the bus, had a GPS receiver and ESPresso Lite V2.0. The GPS receiver retrieved the latitude, longitude, and speed of the bus, and these data were sent to the database server via Wi-Fi. The web application helped the user to control the bus's location in real time, and thus, help plan the trip based on the information provided, such as bus routes, number of stops, and time of arrival.

In [4], a GPS-enabled mobile phone was used instead of a GPS device to track the real-time location of the bus and helped with monitoring and planning transportation routes; it was enhanced with Google Street View. The device was also used [6] in the GSM network to locate the bus in real time and identify its coordinates. Another way of

sending coordinates efficiently [14] is the general packet radio service (GPRS) technology, which is a stable signal similar to GSM. Thus, various solutions are available for improving the management of public transport.

Methodology

Here, research in the software engineering field was conducted using the systematic literature review (SLR) process. In this research method, an exhaustive review of documents is conducted on a certain study theme, which in this case is the public transport management by geolocation. These documents are then evaluated and synthesized to reach a rational conclusion regarding what is known about the management of transport by geolocation.

Research Questions

To construct the review protocol, first, the research questions were carefully formulated; this would guide the review process. In this review, the objective was to map the research on geolocation transport management and to answer the questions specified in Table 1.

Table 1: Research Questions

Research Questions	Motivation
RQ1: Why is it important to implement a geolocation system to improve the public transport management?	To know the greatest need in the world to implement a geolocation system in the area of public transport.
Q2: Which tools are being used to develop geolocation systems?	To know what tools have been used to develop a geolocation system.
RQ3: Which geolocation application programming interface (APIs) are used most frequently?	To determine the most used API in geolocation.
RQ4: In which countries has research been conducted on geolocation systems?	To know the most active countries in geolocation systems research.
Q5: What programming languages are most used to develop geolocation systems?	To know the most used languages to develop a geolocation system.

A. *Search Sources*

The search engine selection process for the articles focused on several sources to select the best and most prestigious ones, including Google Academic, ScienceDirect, Microsoft Academic, IEEE Xplore, Springer Link, DOAJ, Dialnet, Taylor & Francis, Wiley Online Library, ResearchGate, EBSCOhost, Scopus, and ACM Digital Library.

B. *Search Equations*

An extensive search process was conducted for primary studies published between January 2016 and June 2020, which combined automatic and manual searches. In addition, a manual search was performed on relevant journals and conference proceedings (Table II). The researchers searched for the titles of all published articles in each source used in the manual search.

Automatic search was performed on 13 search engines and indexing systems, including ACM Digital Library, Google Scholar, ScienceDirect, IEEE Xplore, EBSCOhost, Scopus, ResearchGate, Wiley Online Library, Taylor, Dialnet, DOAJ, Springer, and Microsoft Academic. All searches throughout the document were performed automatically. To achieve high coverage, an automatic search string was used (Table 2).

Table 2: Manual Search Sources

Source	Generic Search Chain
Google Academic	Geolocation system methodology OR model OR method "SCRUM"
	Geolocation system AND transportation management
ScienceDirect	Geolocation system and transportation management
Microsoft Academic	Geolocation system AND transportation management
Scopus	ALL ("Geolocation" AND "Transportation")
IEEE Xplore	("All Metadata": Geolocation) AND "All Metadata": transportation)
Springer	Transportation AND management AND "geolocation"
DOAJ	Geolocation and transportation
Dialnet	"Geolocation system" and "transportation management"
Taylor & Francis	[All: geolocation system] AND [All: transportation management]
Wiley Online Library	"Geolocation" anywhere and "transportation management" anywhere
ACM Digital Library	[All: geolocation system] AND [All: transportation management]
ResearchGate	(Geolocation system) and (transportation management)
EBSCOhost	TX geolocation system AND AB transportation

C. *Consolidated Number of Results by Source*

The process of article selection is illustrated in Fig 1. Thirteen researchers evaluated the results of the automated search (N = 310 369) by considering the titles and excluding articles that were clearly not relevant.

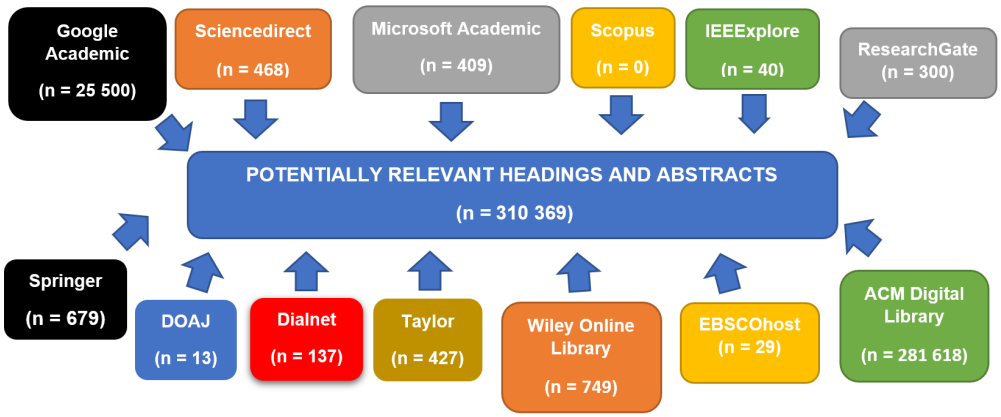

Fig. 1: Stages of the Study Selection Process

D. *Exclusion Criteria*

Studies were eligible to be included in the review if they presented research on transport management by geolocation. Given the abundance of theoretical research concerning the study of personality, it was determined that only those studies that addressed traits or type theories were to be included. Studies addressing other individual characteristics (e.g., behavior, cognition, competence, skills, and roles) were excluded.

No restriction was placed on the type of studies; therefore, articles reporting empirical studies (based on direct observation or experiments), theoretical studies (based on an understanding of the topic by experience or reference to other work), industrial experience reports, and literature reviews were eligible. Only articles written in English and Spanish were included.

Furthermore, studies that included opinion articles, views, or purely anecdotal evidence, as well as those presenting ongoing research or incomplete results, were excluded. Table 3 lists the exclusion criteria used in our study.

Table 3: Exclusion Criteria

Exclusion Criteria
SG1: Exclude proposals that do not apply geolocation.
CE2: Exclude items that are more than five years old.
CE3: Exclude thesis or book; it should be an article or paper.
CE4: Exclude articles that are not written in English or Spanish.
CE5: Exclude items that did not use the software to obtain the solution.
CE6: Exclude items that are not openly accessible.

E. *Consolidated Number of Results when Applying Criteria*

Exclusion criteria were applied to the set of potentially relevant studies (n = 310 369), resulting in 69 articles being selected for review (Fig 2).

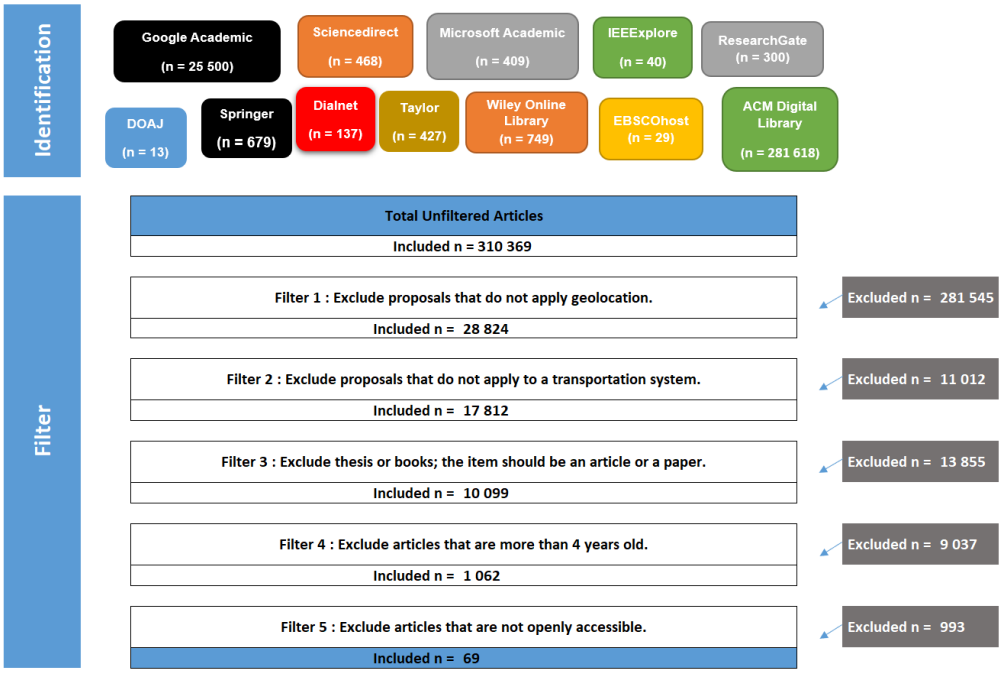

Fig. 2: Stages of the Study Excluding Process

F. *Criteria for Evaluating the Quality of Studies*

The following quality criteria for were developed for reviewing articles.

QA1. Does the topic belong to the fields of computer science, information systems, or management?
QA2. Is the article relevant to the topic?
QA3. Are the bibliographic sources of good quality?
QA4. Are the authors relevant and reputable?
QA5. Is the use of geolocation adequately described?
QA6. Is it clear in which area a geolocation system is applied?

It was validated that all items met the quality criteria and thus, no more articles were eliminated.

G. *Classification of Studies to be Reviewed*

The reports were drawn up with Mendeley:

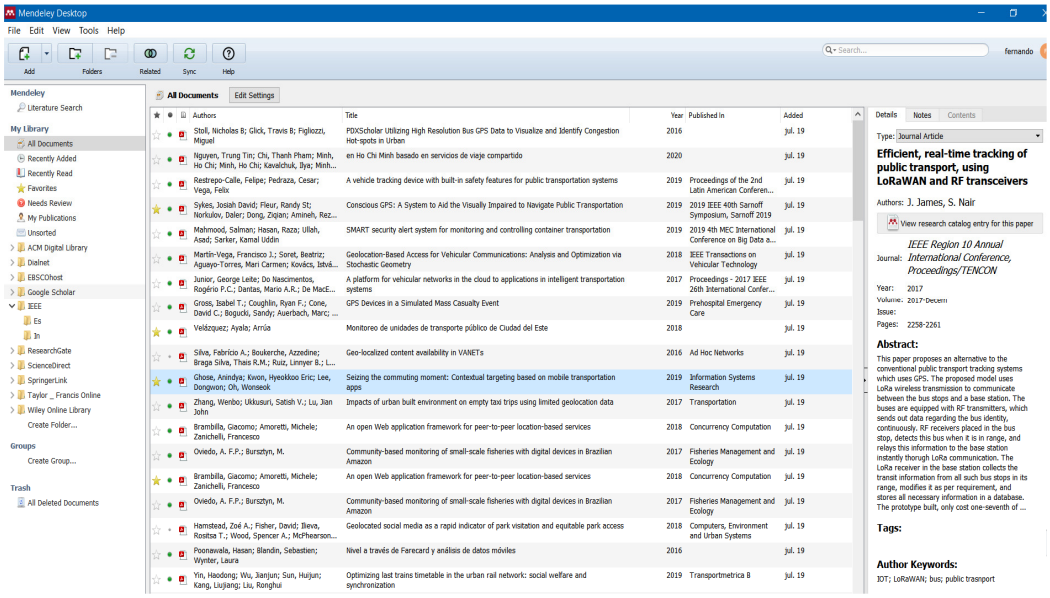

Fig. 3: Mendeley's Report

H. Miscellaneous Reports

This section presents various graphics that despite being good did not help in answering the RQs captured at the beginning.

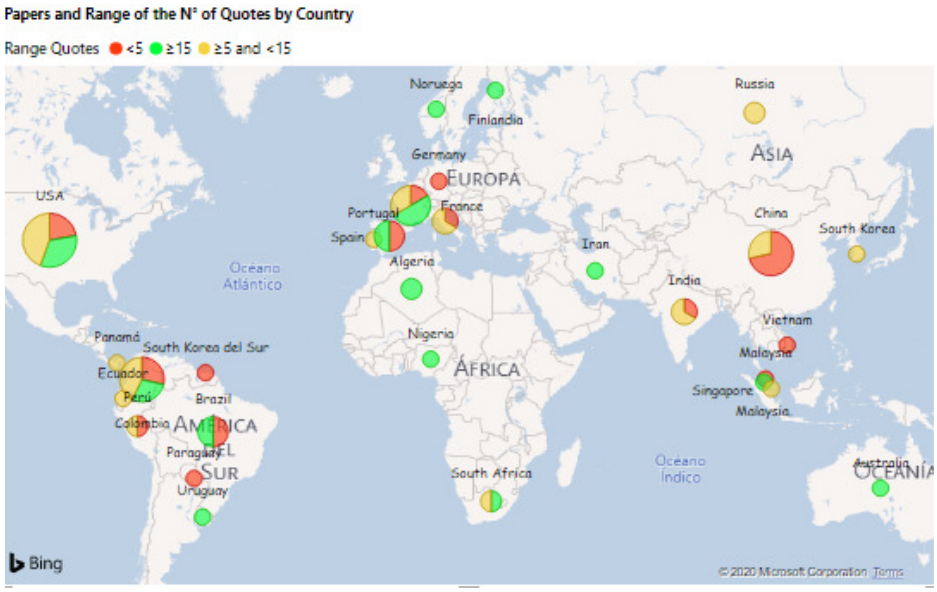

Fig. 4: Articles and Range of Quotations by Country

Fig 4 shows all countries that were cited, and Fig 5 shows the range of citations.

Country	<5	≥15	≥5 and <15	Total
USA	2	3	4	9
China	5		2	7
Colombia	2	2	3	7
France	1	3	2	6
Brazil	2	2		4
Spain	2	2		4
India	1		2	3
Italy	1		2	3
Algeria		2		2
Perú	1		1	2
Russia			2	2
South Africa		1	1	2
Total	22	22	25	69

Fig. 5: Items by Country and Range of Citations

An analysis of the Fig 5 shows that the United States has 9 items, of which 2 have less than 5 citations, 3 are greater than or equal to 15 citations, and the remaining 4 range between greater or equal to 5 and less than 15.

N° of Papers per Source

Source	2016	2017	2018	2019	2020	Total
ACM Digital Library	1		1			2
Dialnet		1	2	1		4
EBSCOhost	1	1	1			3
Google Scholar	2	3	2	4	1	12
IEEE Xplore	1	3	3	6	1	14
ResearchGate	2	1		3	1	7
Science Direct	1		2		2	5
SpringerLink		2		3	2	7
Taylor & Francis Online	3	2	3	5		13
Wiley Online Library		2				2
Total	11	15	14	22	7	69

Fig. 6: Number of Items per Source

Results

After conducting the SRL process on the 69 selected articles, the questions that were raised in this paper were addressed.

RQ1: *Why is it important to implement a geolocation system to improve public transport management?*

The SLR shows that it is necessary to implement a geolocation system to improve public transport management as it can help with traffic, routes, security, and time of arrival.

Table 4: Answer for the Need of Implementation

No	Necessity	References	Qty. (%)
1	Traffic	[2], [7], [8], [9], [10], [12], [14], [15], [16], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [40], [42], [43], [44], [46], [47], [48], [49], [50], [51], [52], [53], [59], [60], [62], [63], [64], [66], [67], [69]	48 (70)
2	Route	[2], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [20],	4

		[22], [24], [25], [26], [27], [28], [29], [31], [32], [33], [36], [37], [38], [39], [40], [42], [43], [44], [46], [47], [49], [51], [52], [53], [54], [60], [61], [62], [63], [64], [65], [67], [69]	(65)
3	Time of arrival	[9], [12], [14], [19], [20], [32], [35], [37], [38], [39], [43], [45], [47], [52], [53], [54], [55], [59], [60], [61], [62], [63], [68], [69]	24 (35)
4	Security	[16], [20], [23], [25], [27], [33], [35], [36], [40], [42], [56], [57], [60], [63], [64], [65], [66], [67]	18 (26)

Table 4 shows that one of the reasons for implementing a geolocation system is the constant traffic caused by the increasing population and modernization, which creates a need for people to move from one point to another [5] more quickly and increases the number of cars on the streets across the world. Another reason is to monitor transport and observe its route [63], so that it can benefit the user waiting at the bus stop and control the driver's location.

RQ2: Which *tools are being used to develop geolocation systems?*

Based on the SLR, the following table presents the tools used most frequently to develop geolocation systems.

Table 5: Type of Development Tools

No	Kit	References	Qty. (%)
1	GPS	[2], [3], [4], [5], [6], [8], [10], [11], [13], [14], [16], [17], [18], [19], [20], [21], [22], [23], [24], [26], [27], [28], [29], [30], [31], [32], [33], [37], [38], [40], [42], [43], [46], [48], [50], [51], [52], [53], [56], [57], [58], [59], [60], [61], [62], [63], [64], [65], [67], [68], [69]	51 (74)
2	Mobile	[1], [2], [8], [10], [12], [13], [14], [15], [19], [20], [22], [23], [24], [26], [27], [28], [29], [30], [35], [36], [37], [38], [40], [41], [43], [44], [45], [46], [48], [49], [50], [51], [53], [55], [57], [60], [61], [62], [64], [65], [67], [68]	42 (61)
3	GSM	[3], [6], [7], [10], [14], [16], [23], [28], [56]	9 (13)
4	Satellite	[3], [4], [6], [17]	4 (6)

Table 5 shows that the tools used most frequently to develop geolocation systems include implementing a GPS module [6] [20] and using a mobile to track a vehicle through its integrated GPS [1] [13].

RQ3: *Which geolocation application programming interface (APIs) are used most frequently?*

As per the SLR, Table 6 shows that the most used geolocation APIs for the development or case study of the articles.

Table 6: Answer for API Software

No	APIs	References	Qty. (%)
1	Google Maps	[1], [5], [10], [13], [14], [20], [29], [39], [48], [59], [60], [62], [68], [69]	14 (20)
2	Google Street	[4], [13], [19], [29], [35], [56], [60], [68], [69]	9 (13)
3	Google Earth	[3], [14], [20], [51], [65]	5 (7)
4	OpenStreetMap	[15], [25], [33], [35], [56]	5 (7)

The most used and common geolocation API is Google Maps because it offers updated locations and satellite observation, and helps with directions toward a designated point on the map and routes between different locations.

The rest are services similar to Google maps but are part of the large group of Google programs. Finally, open-source systems, such as OpenStreetMap [35], which is similar to Google maps but free, are also used.

RQ4: *In which countries has research been conducted on geolocation systems?*

To determine the countries in which the geolocation system was used, the exclusion criteria were applied. This resulted in only 69 items, which are shown in Fig 7.

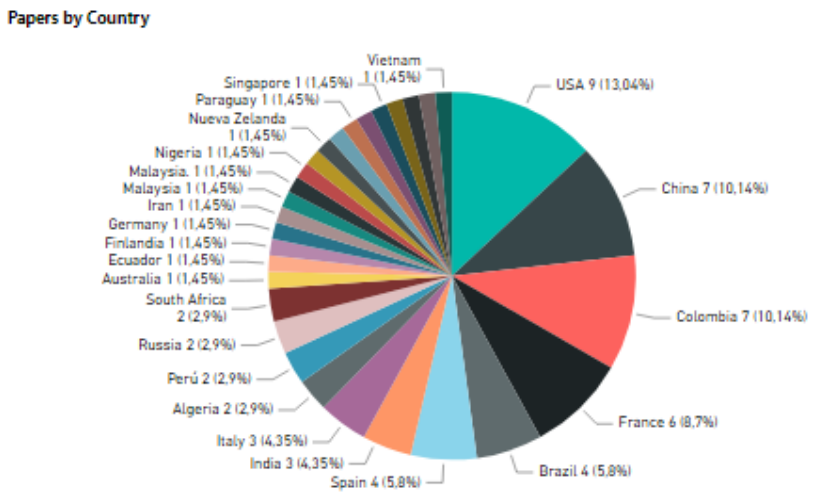

Fig. 7: Items by Country

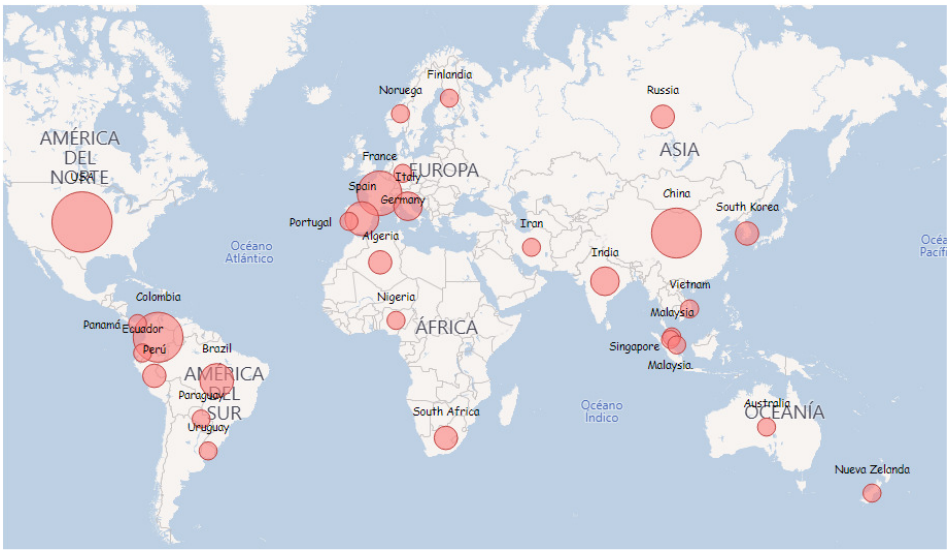

Fig. 8: Items by Country

Figs 7 and 8 show that the United States makes the most use of the geolocation system with nine items, followed by China and Colombia, both with seven items each.

RQ5: *What programming languages are most used to develop geolocation systems?*

Based on the SLR, the most used programming languages for developing a geolocation system and that are mentioned in the articles are presented in Table 8.

Table 8: Answer of Languages for Software Development

No	Language	References	Qty. (%)
1	Android	[1], [5], [6], [13], [14], [17], [18], [19], [20], [36], [38], [41], [56], [57], [59], [60], [65], [68]	18 (26)
2	Java	[1], [5], [6], [14], [15], [17], [20], [23], [33], [39], [41], [56]	12 (17)
3	JavaScript	[1], [5], [6], [14], [17], [20], [23], [41], [56]	9 (13)
4	Php	[5], [6], [14], [20], [23]	5 (7)

Table VII shows that the programming language most used and mentioned by various authors to develop geolocation systems is Android as it is used by the incorporated GPS and Google maps. The second most used language is Java as Android study is based on Java, followed by JavaScript as it is a language that all web pages use currently.

Discussion

The present transport management system is very important and extensive. Of the 69 articles regarding development, most did not specify [14] a methodology for implementing the geolocation system and most of them used Google Maps as a complement to the development of the transport system. However, the API is expensive, because it does not allow much manipulation; thus, more emphasis needs to be given on open-source systems.

The simplest method of tracking nowadays is using the GPS present in the mobile phone, as it does not require extra costs to implement it on the transport vehicle because almost everyone uses a smartphone. For companies, making an investment or implementing new technologies is not as feasible as using already available technologies such as mobile phones.

Conclusions and Future Work

This paper used the SLR to analyze the studies that were published less than five years ago. It was initiated with a base of 12 academic searchers, of which only 10 obtained results that provided 309–947 articles. After applying the exclusion criteria, only 69 articles were left. Implementing the SLR made it possible to answer the questions raised in this investigation successfully, and the findings helped identify the benefits of implementing the geolocation systems for public transport management. The areas in which these systems were applied include public transport, the public transit, and taxis. Moreover, the tools used to develop geolocation systems were GPS, satellite, and GSM; the most used APIs were Google services and OpenStreetMap and the most used programming languages were JavaScript, Android, Java, and Php. Finally, the articles that support these study results correspond to the most active authors in the subject.

This study has certain limitations. First, it fails to explain, in detail, the steps that should be taken for the construction and development of the geolocation devices. However, it does explain where the bus can be installed, so that in the future, it will not be affected by the constant breaking of springs and the blows that the device may receive due to the poor condition of the roads.

It is recommended that future work use studies published less than three years ago that explore the construction of the geolocation devices and the development of the systems that will monitor these devices in detail.

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Analysis of Preferences of Rail Passengers In the Context of Sustainable Development

Grazyna ROSA
University of Szczecin, Szczecin, Poland, grazyna.rosa@usz.edu.pl

Abstract

The aim of the article is to analyse the preferences of rail passengers in the context of using the results of research to enhance sustainable development. In order to achieve this aim, a method of critical analysis of available secondary research results and a questionnaire method used in primary research were adopted. The author's own research was conducted on a representative sample of 331 young travellers. On the basis of the available secondary research results, the price, time and modern technology categories and the detailed elements thereof were selected for analysis. The results of the research may be used to formulate a strategy for the sustainable development of transport, contributing to the reduction of road passenger transport in favour of rail transport.

Keywords: user preferences, passenger transport, rail transport, sustainable development

Article category: research

Literature review

The notion of "sustainable development" is regulated in the Polish Environmental Law in Article 3, which provides the following definition: it is social and economic development in which the process of integration of political, economic and social activities occurs with the maintenance of the natural balance and sustainability of the basic natural processes, in order to guarantee that the basic needs of the community or citizens of both the contemporary generation and future generations are satisfied (Dz.U. – Journal of Laws – 2001, No. 62, item 627 of 20 June 2001). Many international researchers deal with the issues of sustainable development: Parris and Kates (2003), Egelston (2012), Kahle and Gurel-Atay (2014), Sachs (2015), Mensah and Casadevall (2019), Dehghanmongabadi and Hoşkara (2020).

According to this definition, sustainable development priorities should additionally apply to transport (Makarova, et al. 2017), both of passengers and cargo (Nijkamp, 1994; Gudmundsson and Höjer 1996; Raitasuo, Bask, Rajahonka, 2019; Dembińska, 2020). The issue of reducing the adverse impact of transport on the environment has been reflected in key European transport documents. The objectives set out in subsequent Green and White Papers on transport, including the European Commission's White Paper on Transport by 2050, are aimed at alleviating the adverse environmental impact of transport (European Commission, 2010). This approach is justified by the rapid development of transport and traffic and the resulting problems: traffic congestion, air and noise pollution, problems with road safety, which are caused to a much greater extent by road transport than by rail transport (Deakin, 2001; Wang et al, 2018 ; Akinyemi and Zuidgeest, 2000). As a result of the implementation of these objectives, strategies and action plans at all levels of decision making indicate the need to increase the use of railways in passenger traffic in Poland over the next few years and to reduce private transport in particular.

According to Eurostat data, between 2000 and 2017 the number of cars per 1,000 inhabitants increased in Poland from 261 to 593. This is the largest increase in the motorisation coefficient among 27 European Union countries (Eurostat, CSO, 2019). This means that in Poland, a potential rail transport customer may actually choose between a passenger car and a train. The modern transport services market is therefore a customer's market. The studies and analyses carried out indicate that competition in passenger transport primarily involves instruments such as product (time, comfort and safety, physical accessibility and number of connections) and price (Rosa, 2020, p. 108; Kos et al, 2020, p. 114). The rolling stock is being successively renovated, both by car and rail operators (with the participation of the state and local governments), customer service is improving as well. Drivers have more and more expressways and motorways at their disposal, which has improved the safety of car travel and significantly shortened the travel time between major cities in Poland.

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Experience and solutions introduced in other countries may be useful in achieving the defined objectives. Switzerland has the highest rate of rail use in Europe, with nearly 70 journeys per capita per year. Travelling by rail in this country is characterised by (*Wykorzystanie i potencjał...* 2017, p. 11):

- high availability of railway services (large number of trains per day and cyclical train timetable);
- reliability;
- travel comfort (comfortable and well-muted cars available even in regional transportation);
- well-organised connections with other modes of transport, as well as a wide range of services offered under a single ticket for all modes of transport.

Another factor encouraging the use of rail operators is the relatively high costs associated with the use of a car in a city.

The potential of railways in Poland and other European countries may be compared on the basis of the average number of passenger trains passing daily on a statistical kilometre of railway line. In Poland, an average of 20 passenger trains pass each day on one kilometre of railway line, i.e. about 7 times less than in the Netherlands. The European average in this category is 45 trains per 1 km of railway line (*Wykorzystanie i potencjał...* 2017, p.11). The behaviour of travellers, which is based on their preferences, is changing as well.

Consumer behaviour on the market is limited by a number of factors, the most important of which include: consumer tastes and preferences; the amount of money available, i.e. an available budget, and the prices of alternative goods (*Teoria wyboru konsumenta*). Preferences of consumers depend on their knowledge, opinions, emotions or beliefs; they are a reflection of their perception of a given product and brand. This perception is subjective (Rosa (eds.), 2015). Consumers' preferences result from the fact that they strive to satisfy their needs by selecting goods which are available on the market in great numbers and which meet their expectations. These choices reflect their tastes, preferences and personalities; they are a determinant of demand, specifying the products consumers want to purchase (Szymańska, 2012).

The analysis of the approaches to passenger transport presented in the literature reveals that for many years, common carriers and transport providers have assumed that if their services are relatively reliable and the condition of their vehicles (often outdated) does not pose an immediate threat to travellers, then the customers will be satisfied with the service provided (Bąkowski, Szewczuk (ed.) 2000), (Engelhardt, 2007, 2018), (Paprocki, 1996), (Wyszomirski, (ed.), 1994, 1998), (Tomanek, 2002). They considered price as the main instrument of competition. The analysis of the results available in the literature indicates that the capability to provide reliable services is insufficient to achieve and maintain a strong competitive position in a changing environment. The importance of standard services is diminishing. The role of knowledge, cooperation skills, entrepreneurship and innovation is growing. The importance of innovation in the field of transport service, technology as well as customer relations is recognised (Rosa, 2013, 2018), (Kos et al, 2018), (*Koleje pasażerskie…* (b) April 2017), (Drewnowski, 2019). The customers are increasingly demanding in respect of, for example, the quality of services offered, safety, provision of current information, the carrier's partnership approach, customer service, often even comprehensive logistics service on a national and international scale (Bocheński, Wojtkiewicz 2019), (Krawiec, Ćwiek, 2019), (Massel, 2019), (Mężyk, 2019), (Szałucki 2019, (Kos et al, 2020). Where these elements come to the fore, companies competing in the passenger transport market must carry out a professional analysis of the market and the preferences of customers in order to provide the values most appreciated by customers.

On the other hand, customer preferences are a new subject which is insufficiently investigated in the literature (cf: Rosa, 2018), (Kos et al, 2020). The preferences of passenger rail transport customers stem from the necessity to satisfy transport needs, which reflect their expectations and personality.

Research method

The research was carried out from October 2017 to March 2018 on a random sample of 350 people from all over Poland, meeting the age requirement and thus constituting a homogeneous sample of “young adults” aged 18-29 years. Survey methodology involving a questionnaire was applied. The analysis of the completed questionnaires revealed that 19 of them were incomplete, and thus a sample of 331 persons was eligible for further study.

Table 1 presents the characteristics of the respondents based on the information contained in the particulars.

Table 1: Respondents' socio-demographic characteristics (N=331)

	Total (%)
Gender	
Female	50.61%
Male	49.39%
Education	
Higher education	18.54%
Secondary education	78.72%
Vocational education	2.74%
Household composition	
Single	9.37%
Two people	14.5%
Three people	23.26%
Four people	36.25%
Five and more	16.62%
Household net income/month/per capita	
Very low income (<232 EURO)	9.24%
Low income (232-464 EURO)	39.81%
Medium income (465-696 EURO)	35.03%
High income (696 EURO<)	15.92%
Job status	
Employed	83.42%
Unemployed	16.58%
*Student	76.74%
Place of residence	
Countryside	22.80%
City up to 99,000 inhabitants	32.22%
City with 100,000 to 199,000 inhabitants	14.29%
City with over 200,000 inhabitants	30.70%

Source: own work

The aim of the research was to select the key features of passenger transport services relevant to customers, and have these features assessed by the providers of rail passenger transport services in Poland. In order to achieve the intended aim of the article, an attempt was made to answer the following research questions:

1. What is the importance of the characteristics of passenger rail transport services in the context of the activities included in the price category?
2. What is the importance of the characteristics of services provided by passenger rail transport operators in the context of the activities included the time category?
3. What is the importance of the characteristics of services provided by passenger rail transport operators in the context of the activities included in the modern technologies category?
4. What is the opinion of the characteristics of passenger rail transport services in the context of the activities included in the price category?
5. What is the opinion of the characteristics of services provided by passenger rail transport operators in the context of the activities included the time category?
6. What is the opinion of the characteristics of services provided by passenger rail transport operators in the context of the activities included in the modern technologies category?
7. What statistically significant socio-demographic variables correlate with the preferences of rail passengers?

The hypothesis formulated in the research states that the greater the importance of particular categories (price, time and modern technologies) for the passengers, the higher the overall opinion of rail transport. The answers available to the respondents included “very important”, “important”, “less important”, “unimportant” and their opinion was measured on a scale of “very good”, “good”, “bad”, “very bad”.

In order to answer the research questions and test the hypothesis, statistical analyses were carried out using the IBM SPSS Statistics version 25. The software was used to analyse the main descriptive statistics, characterise the respondents with the use of frequency analysis, as well as to carry out several Pearson's Chi^2 correlation tests, Student's t-tests for independent samples, one-way analysis of variance, Pearson's r and regression analysis. The classical threshold of $\alpha = 0.05$ was designated as the significance level. The probability results of the test statistics at the level of $0.05 < p < 0.1$ were interpreted as significant at the level of statistical tendency.

Research results

The analysis of the answers provided by the respondents allowed the following conclusions to be drawn:

Basic descriptive statistics of the measured quantitative variables with a normality test

In the first step, basic descriptive statistics were calculated (Table 2) with the Shapiro-Wilk test analysing the normal distribution of all measured variables on the quantitative scale. The result indicated that the distributions were significantly different from the Gaussian curve. However, the skewness of all variables did not exceed -2 < Sk. > 2, therefore the variables could be considered to have distributions close to normal.

Table 2: Descriptive statistics of the measured quantitative variables with a normality test

	M	*Me*	*SD*	*Min.*	*Max.*	*Kurt.*	*Sk.*	*S-W*	*p*
Significance of modern technology	1.8	1.71	0.57	1	4	1.34	0.97	0.92	<0.001
Significance of the ticket price	1.57	1.33	0.57	1	4	2.71	1.38	0.83	<0.001
Significance of travel time	1.34	1.3	0.55	1	4	3.21	1.66	0.76	<0.001
Opinion of modern technology	1.97	2	0.53	1	4	1.24	0.47	0.96	<0.001
Opinion of the ticket price	2.27	2.33	0.63	1	4	0	0.12	0.97	<0.001
Opinion of travel time	2.26	2.2	0.64	1	4	0.13	0.06	0.97	<0.001
General opinion of rail transport services	2.1	2.09	0.49	1	4	1.74	0.2	0.96	<0.001

Source: own study based on primary research (N=331)

M – mean, Me – median, SD – standard deviation, Min. – minimum score, Max. – maximum score, Kurt. – kurtosis, Sk. – skewness S-W – Shapiro-Wilk test result, p – significance of Shapiro-Wilk tests

Correlation between socio-demographic variables and preferences of rail passengers

In order to identify statistically significant socio-demographic variables which correlate with the preferences of rail passengers, Student's t-tests for independent samples and one-way variance analyses were performed. It was verified whether the reported significance level of modern technologies in trains and the time and ticket price correlate with socio-demographic variables such as gender, education, household size, income, professional status, student status and place of residence. The t-test for independent samples was used for socio-demographic variables having only two groups (Table 3).

Table 3: The correlation between rail transport preferences and socio-demographic variables

		t	*p*	*d*	95% *CL*	
					LL	*UL*
Significance of modern technology	Gender	-2.11	0.036	-0.01	-0.27	-0.1
	Professional status	0.16	0.874	0	-0.15	0.18
	Student status	-1.24	0.215	-0.01	-0.25	0.06

Significance of the ticket price	Gender	-2.84	0.005	-0.02	-0.33	-0.06
	Professional status	-1.51	0.132	0	-0.3	0.04
	Student status	-0.94	0.350	-0.01	-0.27	0.1
Significance of travel time	Gender	-4.69	<0.001	-0.03	-0.39	-0.15
	Professional status	0.39	0.669	0	-0.17	0.25
	Student status	-2.7	0.009	-0.03	-0.45	-0.07

Source: own study based on primary research (N=331)

t – result of t-tests, p – significance of t-test, d – Cohen's d, 95% CL – 95% confidence level, LL – lower limit of confidence level, UL – upper limit of confidence level

In the next step, a one-way analysis of variance was performed several times, in which the variables tested included the opinions on the significance of modern technologies, ticket price and travel time in rail transport. The statistics were carried out for grouping variables located on a qualitative scale and had more than two groups. These socio-demographic variables included education, household size, household income and place of residence of the respondents. The correlation strength was calculated using omega^2 (Table 4).

Table 4: The correlation between rail transport preferences and socio-demographic variables

		F	*p*	ω^2
Significance of modern technology	Education	2.18	0.090	0.01
	Household size	0.98	0.421	0
	Income	0.73	0.535	0
	Place of residence	2.46	0.063	0.01
Significance of the ticket price	Education	0.78	0.504	0
	Household size	0.57	0.684	-0.01
	Income	0.54	0.652	-0.01
	Place of residence	2.09	0.101	0.01
Significance of travel time	Education	2.78	0.042	0.02
	Household size	1.07	0.375	-0.01
	Income	0.04	0.991	0
	Place of residence	0.59	0.623	0.01

Source: own study based on primary research (N=331)

F – result of variance analysis, p – significance of variance analysis, ω2 – omega-squared

Correlations between preferences regarding modern technologies and travel time as well as ticket price and gender proved to be significant. In other analyses, a weak correlation was observed between the significance of travel time and student status and the relationship of education with this preference. In addition, a correlation

was established at the level of statistical trend for the preference of modern technology with education and place of residence and for the preference of rail travel time with place of residence. All the correlations, both significant and at the level of statistical trend, were weak.

In order to determine the respondents' preferences concerning modern technologies, a factor analysis was carried out for all questions included in a given category. In addition, Pearson's Chi^2 analysis was performed to verify the relationship between gender and the specific responses regarding the opinion on the significance of modern technology.

It was decided that general preferences in relation to modern technologies should be described first. The respondents' mean was M = 1.8 with standard deviation SD = 0.57, which meant that for most of the respondents modern technology was important or very important, as the lower the score, the more important the aspect was for the respondents. Modern technologies were less important for women (M = 1.73; SD = 0.5) than for men (M = 1.48; SD = 0.63). The category defined as "modern technologies in passenger rail transport" included*(end note):

- being able to check information in social media during the journey;
- provision of additional services, such as Wi-Fi;
- being able to check rail connections online;
- availability of an electronic ticket during the journey;
- being able to purchase a train ticket online;
- being able to purchase a ticket using mobile devices;
- being able to track the route and location of the train during the journey through the mobile application.

It was established on the basis of a detailed analysis of travellers' preferences regarding modern technologies that only the significance of ability to check rail connections online varied significantly in statistical terms with respect to gender. The answers to the remaining questions given by women and men were similar enough to conclude that there is no statistically significant correlation.

In addition, it was established that, overall, the most important element of modern technology was the ability to check rail connections online. It was reported very important by the greatest number of people. After conversion of the answers into the numbers so that the lowest number would represent the greatest significance of a given aspect, the mean for the significance of the ability to check rail connections online was M = 1.43, i.e. between "very important" and "important", with a slight leaning towards the "very important" answer.

Another significant element of modern technology was the ability of buying a train ticket online. In this case as well most people considered it very important. After converting the response variants into numbers, the mean score was between "very important" and "important", slightly closer to the "important" answer (M = 1.54).

Being able to buy a train ticket via a mobile device was the third significant element of modern technology. Again, more than half of the respondents considered this to be a very important aspect of rail travel. Moreover, the lowest number of respondents reported this aspect as completely unimportant. Once again, after the conversion of the answers, a mean was obtained between "very important" and "important", with a leaning towards "important" answer (M = 1.6).

The last element generally considered as important by the respondents was the availability of an electronic train ticket. After converting the verbal answers into numbers, the mean M = 1.66 was obtained. This was the last aspect of modern technology whose mean did not exceed 2, which meant a "less important" answer. Less than half of the respondents reported the availability of an e-ticket as very important.

The provision of additional services, such as Wi-Fi, and the ability of the mobile application to track the route and location of the train during the journey were much less important than the above issues. Both issues were assessed similarly in terms of their significance, and after the conversion obtained a mean of M = 2.01, indicating low importance of the two elements. When assessing the significance of providing additional services, most respondents considered this to be a moderately important aspect of the rail transport service. However, the most common answer to the question about the importance of the ability to track a train's route during the journey was "very important". A considerably smaller number of "important" answers and larger number of respondents who considered it less important than the provision of additional services contributed to a similar mean of both issues.

The least important issue, according to the respondents, was being able to check information in social media. This element of modern technology gathered the greatest number of "completely unimportant" answers.

Moreover, far fewer respondents reported it was very important than in the other questions. After conversion of the answers, it was observed that the mean obtained is between the "less important" and "completely unimportant" answers (*M* = 2.47).

The analysis of the second element – time should begin with the presentation of the overall result for the significance of travel time. The mean for the significance of travel time was *M* = 1.38; *SD* = 0.55, which meant that the importance of this category was assessed between "important" and "very important", with a greater inclination towards the "very important" answer. Women were more concerned about travel time (*M* = 1.21; *SD* = 0.33) than men (*M* = 1.48; *SD* = 0.53).

In order to examine in more detail the preferences regarding travel time in rail transport, frequency analyses were carried out for each question separately. Since, as in the other categories of rail transport services, a strong correlation with gender was observed, correlation analyses were performed for individual questions and the answers of the respondents were presented. The category "travel time in passenger rail transport" included: duration of the journey, number of transfers, convenient connection times, number of connections, punctuality of trains.
After converting the answers into numbers, it was established that all aspects relating to travel time have a mean of less than 1.5, which means that their importance was usually reported to be very high.

Convenient connection times had the lowest mean, i.e. proved to be the most important for the respondents (*M* = 1.34). It was also the question which collected the highest number of "very important" answers. Moreover, in the case of convenient times of rail transport connections, the fewest respondents reported that this aspect was completely unimportant.

The respondents attached less importance to the punctuality of rail transport than to convenient connection times (*M* = 1.37).

The number of connections (*M* = 1.4) was ranked third in terms of importance in the category of rail transport travel time. It is this aspect from the travel time category that the respondents most often considered important.

The least important of the railway travel time category was the duration of the journey and the number of transfers. In both cases the mean was M = 1.41. More respondents considered the duration of the journey as very important than the number of transfers. The mean was levelled by the lower number of respondents considering the travel duration as unimportant.

The last and third category in which the respondents' preferences were investigated was the ticket price. According to the mean obtained, this was the most significant aspect in rail transport (*M* = 1.57; *SD* = 0.57). In addition, a statistically significant difference was observed in the assessment of the significance of the ticket price between women (*M* = 1.48; *SD* = 0.47) and men (*M* = 1.67; *SD* = 0.66). Women attached more importance to the price of rail travel than men.

Due to a strong correlation between gender and the reported importance of the ticket price, it was decided to carefully examine the preferences of the respondents, while at the same time analysing their correlation with gender. For this purpose, Pearson's Chi^2 correlation analysis was applied and, depending on the result of the significance of the correlation, a frequency analysis was performed for all respondents or by gender. This allowed the determination of importance of refunds guaranteed due to delays, special offers and railway ticket prices for respondents. The following elements were included in the category of price in passenger rail transport: refunds due to delays, special offers, ticket price.

The ticket price was the most important price element for the respondents (*M* = 1.4). However, the assessment of the price significance varied according to gender. Women were more concerned about ticket price (*M* = 1,29) than men (M = 1.52).

Special offers ranked second (*M* = 1.54). While women were more inclined to believe that special offers were very important (*M* = 1.38), men usually considered special offers to be important, yet not a priority (*M* = 1.73).

The least important element of the price category was the refund for delays in rail transport (*M* = 1,78). Nevertheless, it was still recognised as an important aspect of rail transport. It is with this question that the opinions of men (*M* = 1.8) and women (*M* = 1.76) were most similar.

Overall assessment of passenger rail transport services

Having examined the priorities of the respondents concerning railway transport, it was decided to analyse how the respondents evaluate the services provided currently. The respondents assessed individual elements of services from 1 to 4, where 1 meant a very good grade and 4 a very bad grade. After calculating the average of the grades, it was established that the respondents have a good opinion of rail transport services (M = 2.1; SD = 0.49).

In addition, it was decided to examine whether the preferences of the respondents were related to their opinion. For this purpose, a correlation was analysed between the overall assessment of the respondents and their opinion on the importance of modern technology and the time and ticket price (Table 5). Pearson's r test was used for calculations due to the quantitative scale of variables and distributions similar to the Gaussian curve.

Table 5: Correlations between the assessment of rail transport services and the preferences of the respondents.

	Assessment of rail transport services	
Significance	r	p
Significance of modern technology	0.25	<0.001
Significance of the ticket price	0.18	0.008
Significance of travel time	0.06	0.363

Source: own study based on primary research (N=331)

It was observed that opinions on the significance of modern technologies and the ticket price correlate strongly with the overall assessment of rail transport services. In addition, all correlations had a positive value, which meant that the greater the importance of the individual categories, the better the rail transport was assessed in general by respondents. Only the opinion on travel dime did not statistically correlate with the assessment of the rail transport service.

As regards the ticket price, the correlation was poor whereas the relationship with the importance of modern technology was weak.

Since both correlations proved to be significant, a regression analysis was carried out. It allowed the determination of how the model, with these categories, explains the assessment variances.

The regression analysis showed that, knowing the given preferences of the respondents, it is possible to predict approximately 7% of the general assessment variance concerning railway transport [$F(2.212) = 6.54$; $p = 0.002$; $R^2 = 0.07$]. However, the significance of modern technology proved to be an irrelevant predictor ($t = 0.06$; $p = 0.952$; $\beta = 0$; $B = 0.06$). The only relevant predictor was the opinion on the ticket price ($t = 2.49$; $p = 0.013$; $\beta = 0.07$; $B = 0.17$). Since the value of the intercept B = 1,71, the model equation is as follows:
Assessment of rail transport = 1.71 + 0.17**opinion on the significance of the ticket price*

Research summary and conclusions

Considering the low share of rail transport in passenger transport in general, in the EU and Poland, the reasons and objectives for using passenger cars as an alternative means of travel should be analysed very carefully. They are used primarily for commuting to work as well as for shopping and leisure activities. The main reasons indicated by the respondents (presented in the results of secondary research) for choosing a passenger car for commuting to work or school instead of public transport include: too long distance to the nearest public transport stop/station, the lack of appropriate connections in the public transport timetable and unacceptable time of public transport travel (Pilot study on the behaviour of travellers in Poland, stage III – final report 2015), (Kos, Krawczyk, Tomanek, 2020, p. 114-117).

This was confirmed by the results of the presented primary research which indicated that for young customers (service users) convenient connection times are the most important (the most important characteristic). The following elements were almost equally important for respondents: ticket price, safety in the means of transport,

duration of the journey, number of transfers, number of connections, punctuality, quality of services provided and ability to check connections online.

The research shows that the best feature of rail passenger transport services (the execution of which was assessed as “very well” and “well” by the respondents) according to young customers (service users) include: safety in the means of transport, the availability of an electronic ticket, employees' competences, the ability to check connections online, purchasing a ticket using mobile devices, displaying/informing about the next station/stop.

On the other hand, the worst features of rail passenger transport services (answers: “bad” and “very bad”) according to young customers (service users) include: punctuality, tracking the route and location of the train during the journey through applications, refunds due to delays, provision of additional services, such as Wi-Fi, duration of the journey, convenient connection times (the most important feature), number of connections.

While with the increase in importance of the modern technology and price categories, the overall assessment of the respondents concerning passenger rail transport improved, which allowed the confirmation of the hypothesis set out in the introduction concerning these two categories, the opinion on travel time and the factors included in this category (duration of the journey, number of transfers, convenient connection times (the most important feature), number of connections, punctuality) did not correlate statistically with the assessment of these services, which allowed the rejection of the hypothesis set out for the third category. This is a particularly important conclusion which indicates the trends in the provision of passenger rail transport services.
The results of research carried out on rail passengers in Poland suggest that the carriers and passenger transport operators should take into account their preferences. This may result in a gradual redirection (shift) of demand for rail transport in line with the preferred goals and objectives of sustainable transport.

*__Endnote:__ It should be additionally emphasised that the implications and the rate of development of modern technologies in passenger rail transport in Poland differ from the global level, and, as a result, the solutions examined are not the latest or up to date from a global perspective, yet they fully reflect the level of advancement of these services in Poland.

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The State and The Market in The Process of Formation and Development of The Information Economy in Russia

Anna KAMYSHOVA
Saint Petersburg State University of Economics (UNECON), St. Petersburg, Russia
kamyshova76@mail.ru

Valery LEVENTSOV
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
va@leventsov.ru

Abstract

The article studies the stages of formation and development of the information society abroad and in Russia. Special attention is paid to the analysis of the development and implementation of ICT as the main factor of successful formation and development of the information society. Relevant from the standpoint of economic theory is the study of the relationship between state and market regulators in the process of formation and development of the information society, both in Russia and abroad. The author reveals that the process of formation of the information society in Russia took place under active state regulation aimed at the introduction of ICT in various levels of government. Moreover, the further development of the information society in Russia requires a well-founded program of state support for information industries, which is the key to ensuring the country's competitiveness.

Keywords: Global Information Society, information society, information and communication technology (ICT), state, market, digital economy.

Introduction

The first mention of the term "information society" by Professor Yu. Hayashi in reports submitted to the Japanese government in the second half of the 1960s [1]. Reports prepared by reputable organizations (the economic planning Agency, The Institute for the development of computer use, the Council on industrial structure) defined an "information society" as a society in which the development of computerization will provide subjects with access to reliable sources of information and ensure a high level of automation of production. Products produced in such a society contain more "information".

The basic research on the problems of formation and development of the information society was based on the work of D. Bell «The Coming of Post-Industrial. A venture in Social Forecasting» [2]. According to the concept of D. Bell, the history of human development can be divided into three stages: agricultural, industrial and post-industrial. In his study of the post-industrial stage of development of society, D. Bell relies on the characteristics of the industrial stage. Based on the approaches of T. Veblen and other theorists, it considers industrial society as "a society in which the main goal is to produce the maximum number of machines and things" [3]. A characteristic feature of post-industrial society is the transition from the production of material goods to the production of services related to education, health, research and management. Knowledge and information become a strategic resource of post-industrial society. Further development of the concept of the information society is reflected in the work of I. Masuda [4], which presents the main principles and features of the information society. From the point of view of I. Masuda, the Foundation of the information society is computer technologies designed to replace or strengthen intellectual labor. The information technology revolution is creating a new production force that allows mass production of new technologies and knowledge. In such a society, the leading sector of the economy is intellectual production, whose products are accumulated and distributed through ICT.

T. Stonier's conceptual ideas are reflected in his work "Information wealth: the profile of the post-industrial economy" [5] and were reduced to understanding "information" as a form of capital that can be stored and accumulated for future use. According to T. Stonier's concept, in a post-industrial society, national information resources become a

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potential source of national wealth. In this regard, it is the information industry, which is based on ICT, that is becoming the leading sector of the economy, the development of which determines the potential of any national economy. It is this industry, which is the basis of the service sector, that is becoming the dominant industry in terms of its share in the total output of the country and employment in the economy.

The innovative views of scientists such as Marshall McLuhan [6] and Alvin Toffler [7] have been criticized by traditional science and the General public. A distinctive feature of M. McLuhan's scientific position was his statement that communication technologies are becoming the main factor determining the formation and development of the socio-economic basis of society. McLuhan assigned a special role in this process to the telecommunications and computer networks, which act as the nervous system in the formation of the "global embrace". In his arguments, McLuhan presented mass communication on the one hand as a part of society, on the other hand, as a force, unlimited power over society. A. Toffler in his work "The Third wave" offers his own vision of the history of the development of society, highlighting three waves in the history of the development of civilization: agricultural (before the 18th century), industrial (before the 50s of the 20th century) and post-industrial (since the 50s of the 20th century). A. Toffler also believes that the beginning of the third wave is associated with the information revolution. Interesting from the point of view of transformation of the usual forms of interaction is the contrast of traditionally bulky corporations of small firms, among which a special place was given to "individual activity in an electronic cottage" - a workplace in the house remotely from work (a modern form of remote employment). [8-11]

At the turn of the 1980s and 1990s, a new stage in the development of the concept of the global information society was marked by the publication of scientific works by Peter Ferdinand Drucker and Manuel Castells. Peter Drucker in his research "Post-Capitalist society" [12] tried to formulate a new vision of the concept of post-industrial society. One of the Central elements of this concept, distinguishing it from the works of the predecessors, is justification of transformation of national States under globalization of economy and society.

M. Castells in his research "the Information age: economy, society and culture" [13] referred to the main features of the new emerging world order as the global economy and international financial markets. The main focus of Castells 'work is on the research of trends underlying the formation of a"network society". At the same time, network structures are both a cause and a consequence of globalization. Information, its collection, processing and transmission, becomes an element of the productive forces of society and a source of power.

All these concepts of formation and development of information (post-industrial) society are united by the fact that they consider the rapid development and spread of ICT as a distinctive feature of the global information revolution, which affects all spheres of social and economic life, both in the world and in individual national economies. The importance of these trends was reflected in the Okinawa Charter of the global information society, which States: "Information and communication technologies are one of the most important factors influencing the formation of society in the XXI century" [14]. Taking into account the current changes, it is important for economic science to understand the role of the state and the market in these processes.

The purpose of this research is to identify the role of the state and the market in the formation and development of the information economy in Russia and abroad. The research is aimed at substantiating the mechanism of interaction between the state and the market in the development of ICT in Russia as the main factor in the formation and development of the national information economy. [15-18]

The article will consider the research methodology, carry out a comparative analysis of the stages of the formation of the information economy abroad and in Russia, identify the role of the state and the market in this process and the main conclusions of the work, which make it possible to substantiate the role of the state and the market in the development of ICT in Russia.

Method of Research

The methodology of this research is based on the application of philosophical methods of scientific knowledge, such as:

- a combination of the historical and the logical, which makes it possible to reveal the logic of the formation of the information-network society abroad and in Russia, based on the analysis of the historical stages of the formation of modern society;
- a combination of synthesis and analysis, which implies the simultaneous study of global processes within the system of world economic relations and the analysis of particular processes inherent in various economic systems.

The theoretical basis of the research is the works of famous foreign and domestic scientists, which present the main provisions of modern science in the era of the formation and development of the global information-network society. [19-20]

An important role in this research is assigned to the analysis of problems associated with the peculiarities of the formation and development of the information network society in different countries, as well as to identify the role of the state and the market in various models of the information society.

Research on the role of the state and the market in the formation and development of the information society abroad

The research of the role of the state and the market in the process of formation and development of the information society abroad is based on the analysis of models of development of the information society (models of informatization), which allows us to identify the differences between national economies. As a rule, these differences are based on the features of macroeconomic policy and conceptual provisions of the state in the process of formation and development of the information society. In economic theory, two models are conditionally distinguished: Western and Eastern. At the same time, when analyzing the Western model, one should distinguish between the American and European models, and within the Eastern model, the path of China and other Asian countries.

The process of formation and development of the information society in the EU has the main feature - the search for a certain balance between the state and the market, the basis of which is a combination of state and market regulators, depending on the changing environment. This approach, which determines the role of the state in the formation and development of the information society, was enshrined in the 1993 EU resolution and assumed the need to achieve a balance between social and market orientation. Also in the report of the Danish government "Information Society 2000" it was emphasized that "the market cannot be allowed to take control of the strategy of developing information highways, but this strategy must take into account the possibilities of market forces" [21]. Nevertheless, the macroeconomic policy of the EU countries assigns a serious role to the market, paying great attention to solving the problems of privatization and liberalization of the ICT market. Moreover, the problem of privatization has long been resolved, and the discussions concern only the ICT liberalization policy.

Countries such as Great Britain, Finland, Sweden and the Netherlands completed the discussion on ICT liberalization in the late 90s of the last century, an impulse for which was the "agreement on the liberalization of the telecommunications services market" signed in February 1997 by 69 countries.

The American model of information society development is based on the dominant role of the market while minimizing the functions of the state in the process of formation and development of the information society. This model assumes complete liberalization of the ICT market. Moreover, like the United Kingdom, the United States, when allocating priorities, considers the building of information highways to be paramount, on the basis of which the service sector subsequently develops. [22]

Within the framework of the eastern model, Japan, the group of countries "Asian tigers", China and India are distinguished. The common thing for the countries of the eastern model of the formation and development of the information society is the cooperation of the state and the market, the establishment of a connection between cultural values and social changes. The basis of cooperation between the state and the market is the assistance of the state in achieving the above principles at the level of a single firm.

Japan's successes, dubbed the "Japanese economic miracle," were made possible by a competent macroeconomic policy aimed at stimulating R&D spending and prioritizing ICT in the country's socio-economic development. The strategic goals of the country in the field of ICT are: development of a system of compatible and interconnected telecommunication networks; development and implementation of ICT; creation and distribution of information devices and technologies; development and implementation of software and information services; preparation of qualified workforce for the information sphere. [23] The subsequent implementation of the strategic goals has become an incentive for the development of ICT and information-oriented activities. Moreover, in the 2000s. ICT has become a powerful driver of economic growth in Japan. For Japan, whose demographic processes are characterized by a rapid aging of the population against the background of a decrease in the birth rate, ICT is a factor that makes it possible to compensate for the negative impact of these phenomena.

The basis of the model of the formation and development of the information society in the countries of "Asian tigers" is the model of economic cooperation between the state and the market. The success of this model is based on

government intervention in making investment decisions that require large capital investments, government participation in the creation and development of the national information infrastructure. The problems arising in the process of creation and development of the information society, requiring active government participation, include: increased competition in the creation and implementation of ICT; uneven realization of potential in the ICT product market and the labor market; the need to ensure equal access to information resources for all market participants. [24]

The Chinese model is based on a competent macroeconomic policy of the state, the purpose of which is to ensure a significant inflow of foreign investment in the economy, including in the information sphere. An important feature of investment activity is the large share of TNC investments in the total volume of investments in the country, and in the information sphere in particular. This process is being enhanced by the growing number of qualified Chinese ICT professionals.

The model of the formation and development of ICT in India has been called “intermediate”, since this country has abandoned both full privatization (state enterprises are not transferred to the private sector) and soft liberalization (competition is allowed in the domestic market for services with a limited presence of foreign firms). Human capital is considered the main factor that ensures the successful process of creating and developing the information society in India, which is expressed in a high level of scientific and technical potential according to world estimates.

Summing up the analysis of the relationship between the state and the market in different models of the development of the information society, it is important to note that the relationship between the state and the market in economic systems of different types is determined by the structural characteristics of the real sector [25-26]. At the same time, one of the main roles in the development of a model for the development of the information society is played by national cultural characteristics that dominate the formation of demand for types of ICT [27].

Research on the role of the state and the market in the formation and development of the information society in Russia

The study of the role of the state and the market in the process of formation and development of the information society in Russia is based on the analysis of the stages due to the alternate solution of emerging problems. At the same time, the formation of an information society in Russia is a prerequisite for ensuring sustainable development of the country and its full integration into the world economic system.

The initial stage of state regulation of the formation and development of the information society in Russia was the development of the basic principles of state information policy. The concept of state information policy was developed and approved by the Committee on Information Policy and Communications of the State Duma of the Federal Assembly of the Russian Federation on October 15, 1998 [28]. The basic principles of the concept of state information policy were: the principle of openness; the principle of equality of interests; the principle of consistency; the principle of priority of the national producer; the principle of social orientation; the principle of state support; the principle of priority of law. Analysis of the content of the basic principles of the concept of state information policy allows us to assert that it is the state that is assigned the main role in the formation and development of the information society in Russia.

In 1999, the Concept of Formation of the Information Society in Russia was developed [29], and on May 28, 199, it was considered and approved by the State Commission for Informatization under the State Committee of the Russian Federation for Communications and Informatization. The purpose of the concept is to find a Russian way of developing the information society, the main directions, provisions and priorities of the state information policy that ensure this process. The concept emphasizes that the leading role in the process of formation and development of the information society should belong to the state. The main task of the state at the initial stage is to develop a legislative framework.

In order to preserve Russia's national interests in the information sphere and ensure information national security, the Doctrine of Information Security of the Russian Federation was developed in 2000 [30-31], which was approved by the Security Council of the Russian Federation at a meeting on June 23 and approved by the President of Russia on September 9, 2000. The role of the state in ensuring national information security is the leading one and is reduced to the implementation of the following measures: development of mechanisms and implementation of the regulatory framework in the information sphere; development of mechanisms for increasing the effectiveness of public administration in the information sphere and economic policy in general; creation and development of a professional training system for employees to ensure the country's information security; development of domestic ICT for defence purposes to ensure the country's technological independence; development and implementation of federal programs

aimed at creating publicly accessible archives of information resources of federal and regional authorities; prevention of computer crimes.

In January 2002, by a decree of the Government of the Russian Federation, the Federal Target Program "Electronic Russia" was approved [32]. The main role in its implementation is assigned to the Ministry of Economic Development and Trade of the Russian Federation and the Ministry of the Russian Federation for Communications and Informatization. The main objectives of the program are: increasing the efficiency of the economy and public administration through the introduction and mass dissemination of ICT; ensuring freedom of access to information; an increase in the number of qualified ICT specialists. The main sources of financing for this program are budgetary funds, private investment of Russian business and foreign investment.

Analysis of the development of the information sphere in Russia: the dynamics of the introduction of ICT in the activities of enterprises and the life of households

Analysis of the dynamics of costs for ICT on the part of business and households allows us to assert that in Russia there is a steady increase in private sector spending on information and telecommunications technologies. So, in the period from 2005 to 2018, organizations' expenditures on ICT increased from 215 billion rubles. up to 1,676 billion rubles, demonstrating growth over the entire study interval. Moreover, 26.6% were the costs of paying for the services of third-party organizations and specialists in information communication technologies (except for communication and training services) in 2018 compared to 16.2% in 2005. Organizations' expenses for the purchase of computers and office equipment decreased from 36.5% in 2005 to 19.9% in 2018 amid an increase in the cost of purchasing software from 10.2% in 2005 to 18.1% in 2018 [33].

The data presented by the Federal State Statistics Service indicate that enterprises and organizations are increasing their spending on ICT, thereby demonstrating the deepening of Russian business into the information economy: information resources are becoming a full-fledged factor of production. Thus, the share of ICT costs in the total volume of investments in fixed assets in 2005 was 5.95%, and by 2018 it increased to 9.43%.

The number of enterprises using ICT in Russia has also increased. According to official statistics, the number of enterprises using personal computers increased from 91.1% in 2005 to 94.0% in 2018.The number of organizations using servers increased from 9.3% in 2005 to 53.4 % in 2018 The number of enterprises using e-mail in their work also increased from 56.0% in 2005 to 90.9% in 2018.The number of organizations with a Web site on the Internet increased from 14.8% in 2005 to 50.9% in 2018 [34].

Analysis of the inclusion of ICT in the life of households showed that the number of active subscribers of fixed access to the Internet increased by 22.1% from 26,944 thousand people in 2015 up to 32,910 thousand people in 2019. At the same time, the number of active subscribers of mobile access to the Internet increased by 32.5% from 109,926 thousand people in 2015 up to 145663 thousand people in 2019 The data provided by the Federal State Statistics Service indicate that the growth rate of the number of mobile Internet users significantly exceeds the growth in the number of fixed Internet users. Analysis of access to the Internet in households (based on data from sample surveys of the population on the use of ICT; as a percentage of the total number of households) allows us to state that the percentage of households with access to the Internet in the period from 2017 to 2019 changed insignificantly and amounted to 76.9% in 2019 compared to 76.3% in 2017. At the same time, the largest share among Internet users was made by households using other mobile devices (mobile phones or smartphones, devices for reading e-books, etc.) to access the Internet: 56.0% in 2017 and 66% in 2019 [35].

The presented data of the Federal State Statistics Service indicate that the increase in the expenditures of the population (households in particular) on the Internet, access to which from mobile devices is increasing, making up the largest proportion, is a consequence of the increase in the standard of living of the population. At the same time, providing mobile access to information via the Internet becomes a necessary condition for the normal functioning of the average household. This fact confirms the inclusion of Russia in the global processes associated with the formation and development of the global information society. Thus, the process of formation and development of the information society is inextricably linked with the transition of the economy to a new technological order, which causes qualitative transformations in all spheres of the reproduction processes of socio-economic systems. Despite the presence of a steady trend towards the inclusion of ICT in the activities of enterprises and organizations, the predominant use of ICT is observed in the sphere of consumption and exchange. At the same time, the use of ICT directly in the production process remains at a low level. In 2018, only 86% of organizations in the business sector have access to the Internet, while in Finland 100% of organizations. Providing employees with mobile devices for Internet access in business organizations in the Russian Federation is only 5% of the total number of employees, and

in Finland - 49% of employees. The use of the Internet in organizations for purchasing and selling (as a percentage of the total number of organizations in the business sector) in the Russian Federation is 20% and 15%, respectively, and in Sweden - 78% and 32%. The use of ERP and CRM systems in organizations (as a percentage of the total number of organizations in the business sector) in the Russian Federation is 22% and 18%, respectively, and in Finland - 39% and 39% [36].

Conclusion

In the course of the research, devoted to the analysis of the ratio of state and market regulators in the process of formation and development of the information society in Russia, the main patterns inherent in this phenomenon were identified, both in the world and in Russia.

1. All national economies in terms of the ratio of the state and the market in the process of formation and development of the information society can be conditionally divided into two groups: countries that have assigned the leading role in this process to the state; countries that have preferred market mechanisms for the formation and development of the information society.
2. The model of the formation and development of the information society in Russia presupposes the domination of the state as a regulator of this process, and the main areas requiring state participation in this process are: formation of the legal framework; financing the process of creation and implementation of ICT in all spheres of the country's socio-economic life; formation of human capital that meets the requirements of the information society.
3. The main trends inherent in the process of formation and development of the information society, both in the world and in Russia, are the following:
   First, it is obvious that information is becoming one of the factors of production of any national economy, along with labour, capital and natural resources. Today, the scale of the involvement of information in the process of socio-economic development of the national economy is comparable to the traditional factors of production in terms of total costs.
   Secondly, there are changes in the structure of the real sector of the economy in favor of increasing the share of the information sector in the gross national product. The increase in the share of the information sphere in the structure of the Russian economy is confirmed by data from the Federal State Statistics Service, according to which employment in the field of information and communications in the period from 2010 to 2019 increased from 1.9% to 2.1% of the total employed population. This trend is accompanied by an increase in labor productivity in this sector, where in the period from 2015 to 2018 productivity increased from 100.4% to 103.0%. The expansion of production activities in the field of ICT is confirmed by an increase in investment in fixed assets. So, in the period from 2015 to 2019 investments in fixed assets in telecommunications increased by 61.98%, and in information technology - by 4.6 times. [22]. The growth of investment activity in the information sphere is reflected in the results of economic activity, measured by the volume of gross value added by sectors of the economy. The share of computer software development, consulting services in this area, other related services and activities in the field of information technology increased from 0.7% to 1.1% in the period from 2014 to 2018. At the same time, the share of activities in the field of telecommunications decreased from 1.5% to 1.0% during the study period [23].
   Fourth, the change in the role of the state in the process of formation and development of the information society, which is a global trend. As shown in this study, a number of countries at the stage of formation of the information society assigned the state the main role as a regulator of this process. The Russian model of the formation and development of the information society has followed this path of development. However, the further process of development of the information society within the framework of national systems is increasingly becoming a part of the global process, involving more and more countries of the world community. In this regard, a number of functions that belonged to states within their national borders are gradually being transferred to supranational institutions (regulators), which exacerbates the problem of ensuring national information security [24].

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Research of Social Media Channels as A Digital Analytical and Planning Technology of Advertising Campaigns

Elena ISAENKO
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia
pror-nr@bukep.ru

Elena MAKRINOVA
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

Irina ROZDOLSKAYA
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

Elena MATUZENKO
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

Svetlana BOZHUK
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University
Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
bojuk.svetlana@yandex.ru

Abstract

In Russia social media, in particular instant messengers, have advanced rapidly in recent years. The most popular ones are WhatsApp, Viber, Skype, Telegram. The purpose of this article is to systematize factors of market positioning of social media channels as a digital analytical and planning technology of advertising campaigns. A systematic approach and comparative analysis were used to study this problem.
The authors attempted to develop a methodological approach towards analyzing and planning of advertising campaigns in social media based on the analysis of the factors characterizing quantitative parameters of the Internet platform development and its target audience distribution.
The proposed approach was tested by the authors for determining the development features of Telegram messenger, analyzing its target audience (users with higher education engaged in science, technique, information technology, etc.) and its promotional product (posts in the form of a native format, etc.).
The analysis concluded that Telegram platform is suitable for analyzing and planning of promotion campaigns in any business field.

Keywords: social media, advertising campaign, messengers, target audience, digital advertising technologies

Introduction

Telegram, as an advertising campaign planning tool, is a relatively young online platform. In July 2017, it started as a channel catalog with the ability to track reposts; currently it is positioned as a tool for analyzing and planning of advertising campaigns with a monthly attendance of more than 600 thousand people. It should be noted that in 2018 the number of active service users increased sixfold (compared with 2017), and in December 2018 alone, they viewed more than 2.5 million pages.

A high popularity of the application, in our opinion, is due to the applied encryption technology, which guarantees users' anonymity and restricts access to personal data. According to the results of the Project Group study, focused on the analysis of using Telegram by the central government, the messenger is convenient for information dissemination: access to any Telegram channel can be purchased for a certain amount of money and the customer remains anonymous.

A potential Telegram's advantage is its user-friendly interface and the targeted nature of advertising, while a high conversion percentage is ensured by placing information on relevant channels and focusing on a potentially interested consumer. Therefore, manufacturers are actively using the application for business purposes, and channel

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owners make a profit of advertising placement, which contributes to the steady growth of the messenger's popularity.

Finally, popular channels owners profit successfully by selling them. A promoted channel with a large number of subscribers can cost several hundred thousand rubles.
Currently, the number of Telegram users is growing, and along with the growth of the target audience, political and business structures are starting to view it as an effective PR mechanism, an advertising and propaganda tool.

Research Methodology

Cabinet research methods were used in the analysis: analysis of scientific and methodological literature on the topic under study, generalization and classification of the investigation, overview of the existing foreign and Russian experience in the field of marketing [1, 2] and Internet advertising. A systematic approach and comparative analysis were used for examining this problem.

This study is a continuation of the authors' previous researches [3-8] on the development issues and features of social media in the digital marketing technology system. The purpose of this article is to investigate the results of using social media for both analyzing and planning of advertising campaigns [9-10].

In contrast to previously published works (Arshad, 2018 [9]; Cavaliere, 2018 [10]; Jain, Subhash, 1999 [11]; Moskaleva et al, 2018 [12]; Neumann, 2018 [13]), devoted to digital technologies development, the authors attempted to work out a methodological approach to analyzing and planning of advertising campaigns in social media based on the analysis of factors, characterizing quantitative parameters of the Internet platform development and its target audience distribution.

The proposed approach was tested by the authors when determining developmental characteristics of Telegram messenger, analyzing its target audience (users with higher education engaged in science, technique, information technology, etc.) and an advertising product (posts in the form of a native format, etc.) [13-14].

Results obtained

A study of various sources on the use of Telegram messenger for planning advertising campaigns allowed the authors to conclude that currently there are no methodological approaches satisfactory for such studies. The available statistics, as well as the polls conducted on Telegram messenger development, do not provide a holistic picture for making managerial decisions regarding planning an advertising campaign by using this online platform [15-16].

In that context, the authors attempted to systematize the factors of Telegram messenger market positioning in order to use it as an advertising platform for business promotion. Moreover, the authors systematized market-positioning factors in two groups (Fig. 1).

The first group gives an idea of Telegram's development trends. It includes the following criteria: distribution geography, distribution of channels on subject matters, number of channel subscribers, channel citation index, number of channel links to media sites and social networks. The indicators of the second factor group of Telegram messenger market positioning give an idea about its target audience according to gender, age, occupation, interests, objectives of using, number of contacts, number of channels read by users, share of other Internet services usage, frequency of commercials on various platform channels. [17]

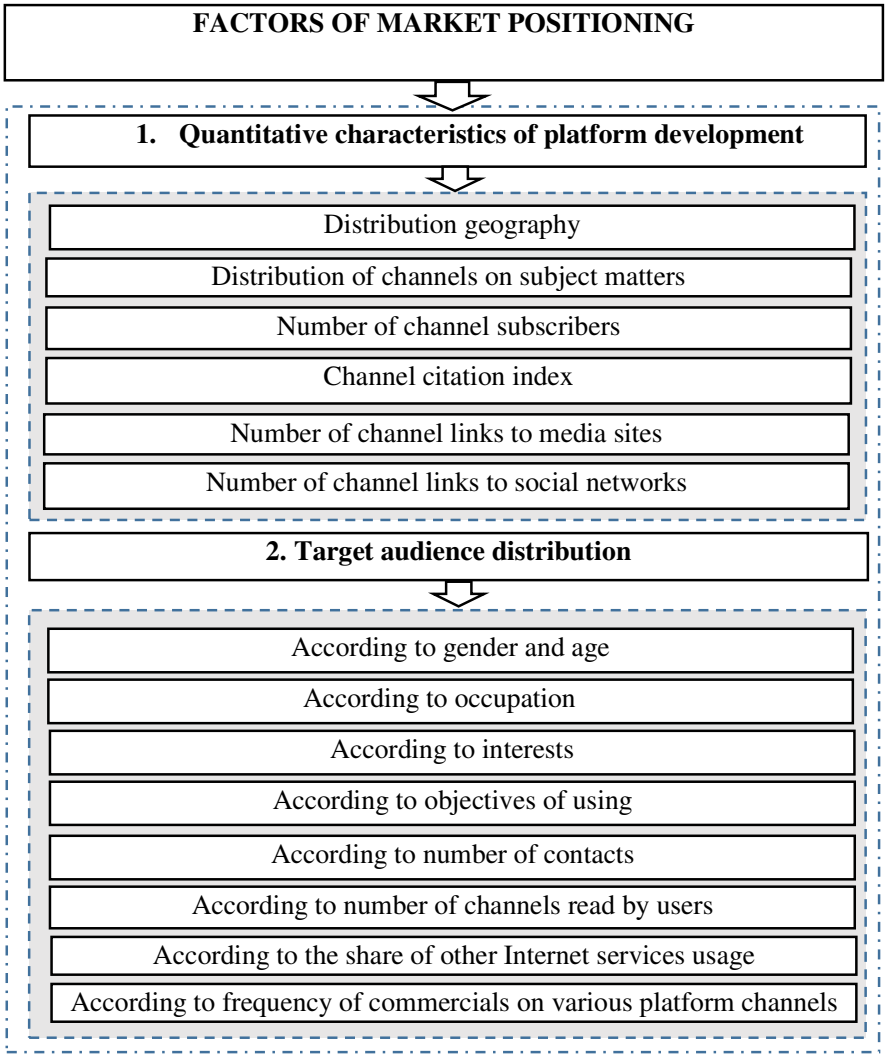

Fig.1: Systematization of social media factors of market positioning

Let us consider these factors in more detail.

Initially, Telegram focused on the Russian market (63 thousand channels at the end of 2018), and now the Russian-language segment remains the main priority, but geography of the channel penetration in other countries is expanding (Fig. 2). [18-20]

Monthly Attendance 600,000 people
Channel Base
100 312

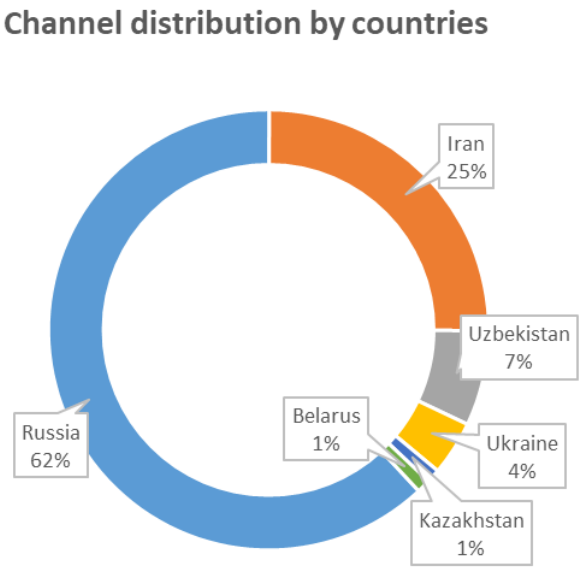

Fig.2: Distribution geography of Telegram in 2018, %

Currently, users from 6 countries communicate in Telegram messenger, whereof 62% are Russians, 25% are citizens of Iran, 7% are from Uzbekistan, 4% are Ukrainians, and citizens of Kazakhstan and Belarus –1% each. On average, 600 thousand people visited the channel per month, using 100312 channels; in Russia 856 channels link to Telegram.

Analyzing Russian Telegram users by region, we can conclude that a large share is constituted by residents of Moscow (36%) and St. Petersburg (15%); large cities range from 1.5% to 2.7%. The share of Telegram users in the central part of Russia accounts for almost 50% of the total.

During 2018, the number of Telegram channels increased and by the end of the year, almost 40 thousand new Russian-language channels were indexed.

In 2018, interests of Telegram users changed (Fig. 3). Despite the fact that almost every major entertainment public in the social network Vkontakte has a Telegram channel, according to criteria *number of channels* the author's blogs regained the first place (at the end of 2017 humorous channels were on top for a short time), and the second place belongs to business issues; music channels have risen in ranking by several times. Cryptocurrencies are currently not as popular as they were at the end of 2017, so this subject matter is in the sixth place on Telegram. Moreover, Technology category channels, which took the leading position a year and a half ago, are now not included in the top 10, giving way to Health and Sports channels as well as to Art and Photo channels.

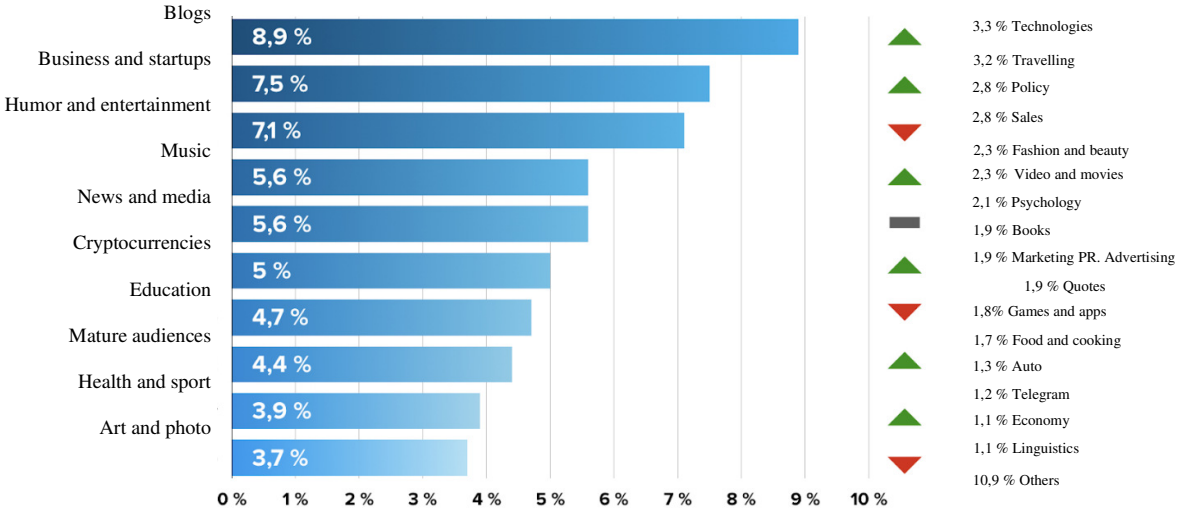

Fig.3: Telegram channels share by subject matters, %

Let us consider the most popular channels of Telegram platform by the number of subscribers (Fig. 4). Mash channel is at the top with 470.1 thousand subscribers, in second place is KB with 376.5 thousand users, and third place is taken by MDK.

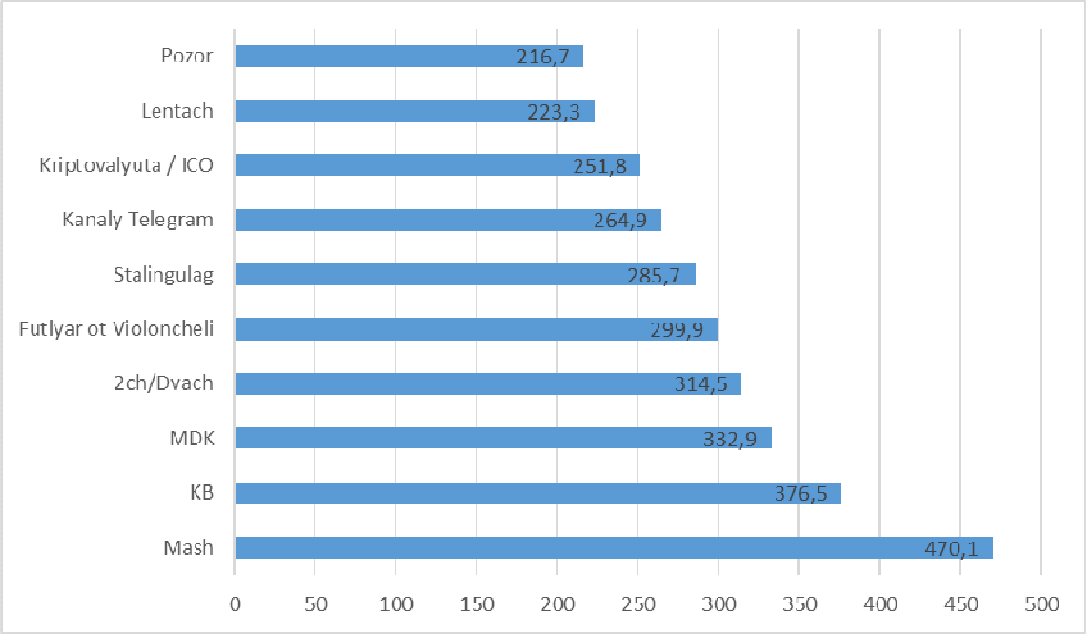

Fig. 4: The number of Telegram subscribers in 2018 by channels, thousand people

Compared to 2017, the number of subscribers in 2018 increased in the following way: Mash channel – more than 3.5 times, Futlyar ot Violoncheli channel increased the number of subscribers fivefold, Dvach and MDK channels doubled the number.

In 2018, specialists of Telegram platform changed the formula for citation index calculating because this figure did not reflect reality due to a large-scale purchase of commercials at low-quality channels. At present, it is possible to realistically assess the most influential and popular Telegram channels inside the messenger at year's end (Fig. 5).

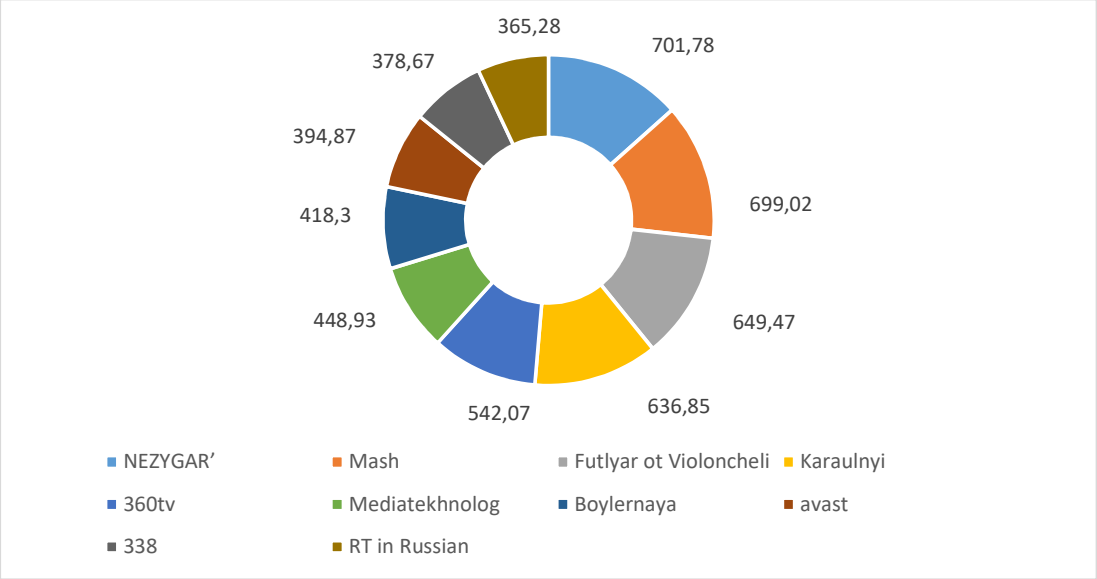

Fig.5: Telegram channels by citation index

The figure illustrates that the citation number of Nezygar channel ranks first, Mash channel is in 2nd place, and Futlyar ot Violoncheli is in 3rd place. The last two channels have significantly increased the number of subscribers by the end of 2018.

Let us estimate the rating on *number of channel links to media sites* in Telegram in 2018 (Table 1). Medusa is at the top with its own six popular channels (they account for 80% of the entire link mass).

The five most mentioned media also includ TJournal, vc.ru, Kommersant and RBC. If to sort the top channels descending, it is as follows: 1st place is taken by Medusa, RBC is in 2nd place and Vc.ru is the 3rd one.

Table 1: Number of channel links to media sites in Telegram in 2018

№	Mass media	Site	Number of views of publications with a link to a media site	Number of publications with a link to a media site	Number of channels with at least one link to a media site
1	Medusa	medusa.io	286677786	29175	3506
2	TJournal	tjournal.ru	103433963	16333	2101
3	VC	vc.ru	82231848	22676	2719
4	Kommersant	kommersant.ru	71412407	29437	2663
5	RBC	rbc.ru	68948175	36355	2915
6	Dozhd	tvrain.ru	67983505	10253	963
7	RIA News	ria.ru	55539747	18240	2276
8	TASS	tass.ru	35555541	14982	2082
9	Znak	znak.com	34561384	46591	1168
10	Life	life.ru	33587035	12170	858
11	Lenta.ru	lenta.ru	33151456	44711	2121
12	Fontanka	fontanka.ru	32880892	73898	718
13	Nozh	knife.media	30463505	5892	960
14	Snob	snob.ru	29208256	4245	845
15	Mediazona	zona.media	28620544	9234	929
16	Vedomosti	vedomosti.ru	28558058	9773	1605
17	BBC	bbc.com	26920512	9453	1763
18	RTVI	rtvi.com	22438291	5711	482
19	Interfax	interfax.ru	22281463	10652	1315
20	Rossiyskaya gazeta	rg.ru	21475200	7911	1090

Figure 6 shows the services most often mentioned by Telegram. YouTube is at the top with more than half a million posts in almost 17 thousand channels (30% of the entire Russian-language Telegram). Social network VKontakte ranks second; 3rd place is taken by social network Twitter; Instagram is in 4th place and Facebook is the fifth one.

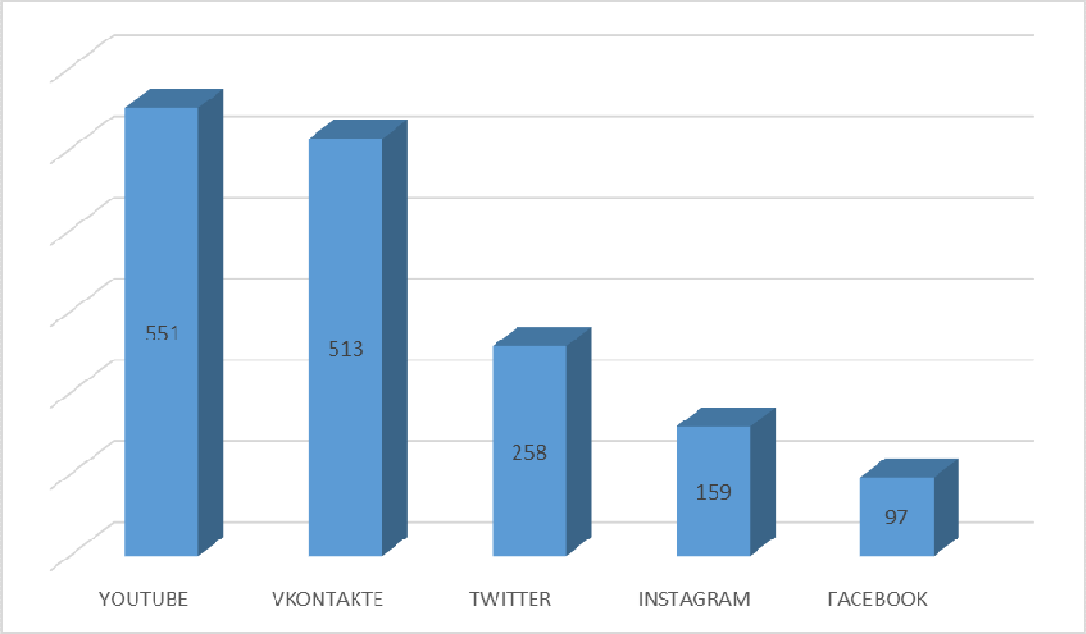

Fig. 6: Services mentioned in Telegram in 2018, thousand units

In order to correctly promote business in Telegram, it is necessary to study the target audience and their needs. Entrepreneurs, executives, freelancers, and Internet marketing specialist are popular users of Telegram. [21]

Let us consider the Telegram's audience based on a survey conducted by @aboutSMM channel. Currently, men constitute the majority of the messenger users (57%).

Telegram's target audience, depending on gender and age, is shown in Fig. 7. The figure depicts that 48% of women aged from 18 to 24 are users of the platform, and 40% constitute men aged from 25 to 34. Men and women aged from 45 to 64 and schoolchildren aged from 12 to 17 use Telegram the least. Therefore, we can conclude that the active audience of Telegram messenger is in the age range from 18 to 34 years.

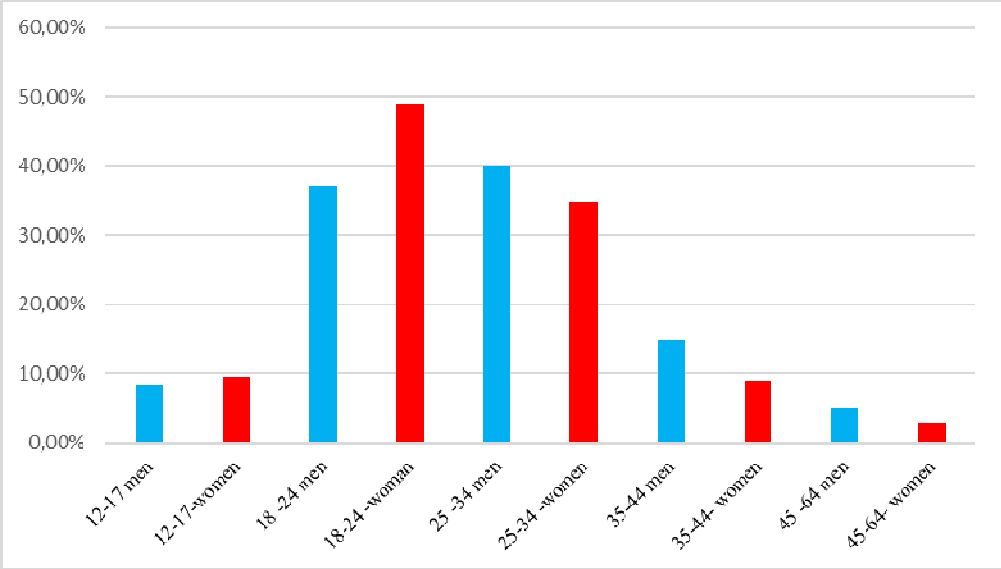

Fig.7: Distribution of Telegram target audience according to gender and age, %

The most active users of Telegram are “experienced specialists” (35%), “students” (25%) and “young specialists” (17%), a small proportion of Telegram users constitute schoolchildren and unemployed population (5% each). [22-34] The rest of the audience is made up of mid- and top-level executives; 57% of users have higher education, which proves a high quality of the target audience.

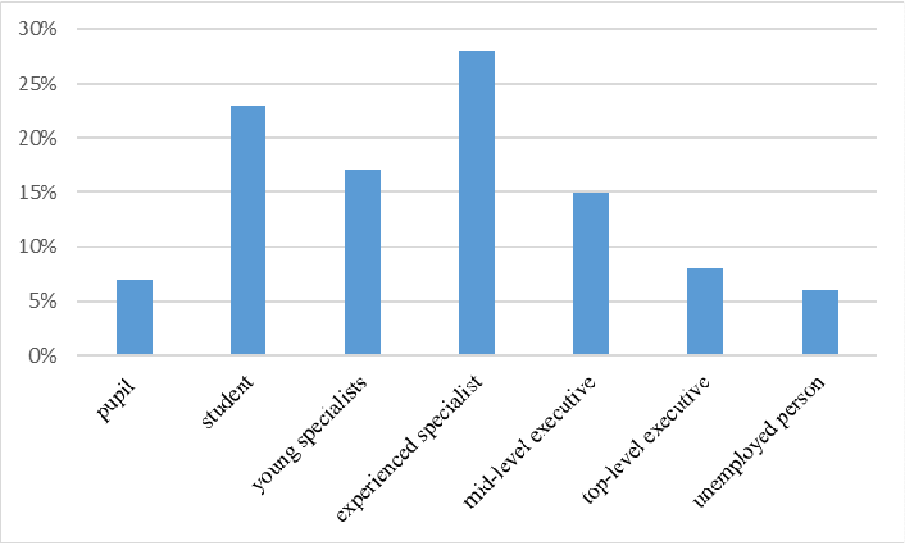

Fig. 8: Distribution of Telegram target audience according to occupation, %

Figure 9 shows interests of Telegram users. Almost half of the messenger users (47%) are interested in information technology, 42% are interested in science and technology, 41% – watch movies and TV shows (Fig. 9). 39% of Telegram users enjoy reading news on large media channels and 35% are interested in reading books. The proportion of Telegram users subscribed to entertainment channels amounts to 29%.

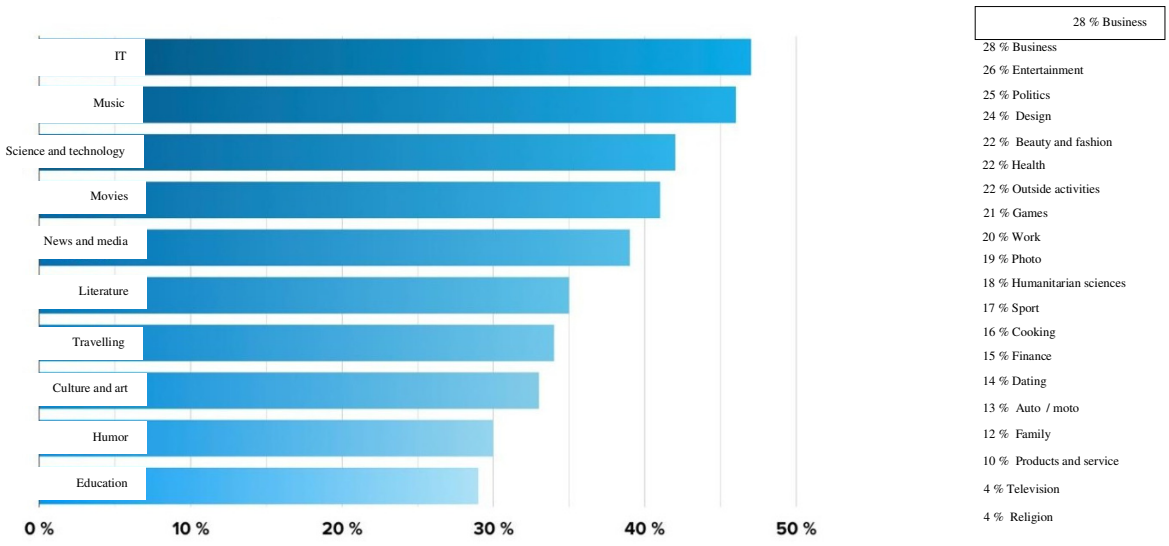

Fig. 9: Distribution of Telegram target audience according to interests, %

The largest share of Telegram target audience use the messenger via Androids (60%), about 40% of users get access to the platform via iPhones, and 2% of the audience use Windows platform.

In the course of the survey, it turned out that more than 90% of Telegram users enjoy the messenger to see something they need, 88% – use the platform for correspondence purposes, 45% of users prefer chat rooms (Fig. 10). The number of Telegram messenger’s authors in 2018 reached 16%, and the number of subscribers using bots was 45%.

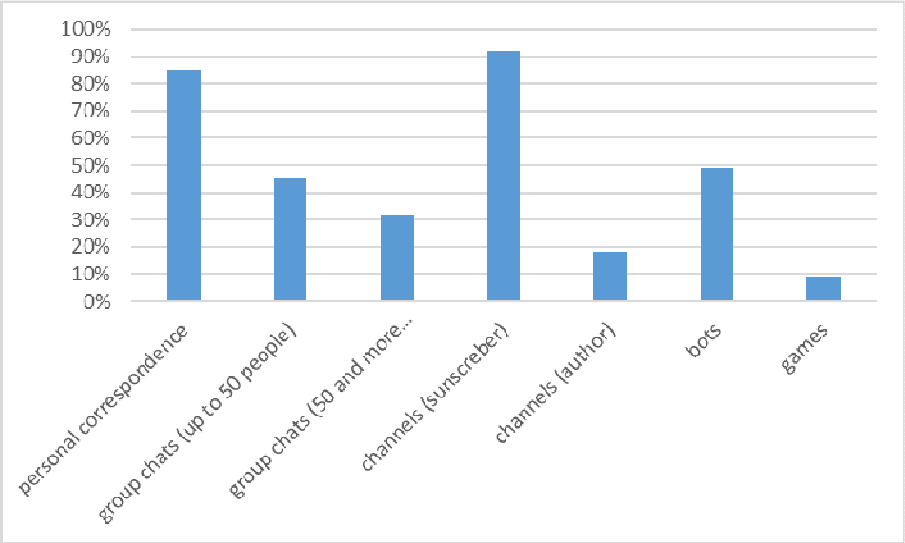

Fig. 10: Distribution of Telegram target audience according to the objectives of using, %

Any social network or messenger user has a list of contacts (friends). Unlike social networks, Telegram messenger opens chat on adding a contact. Therefore, most users have only 5-10 contacts of their closest friends and partners with whom they often communicate (Fig. 11).

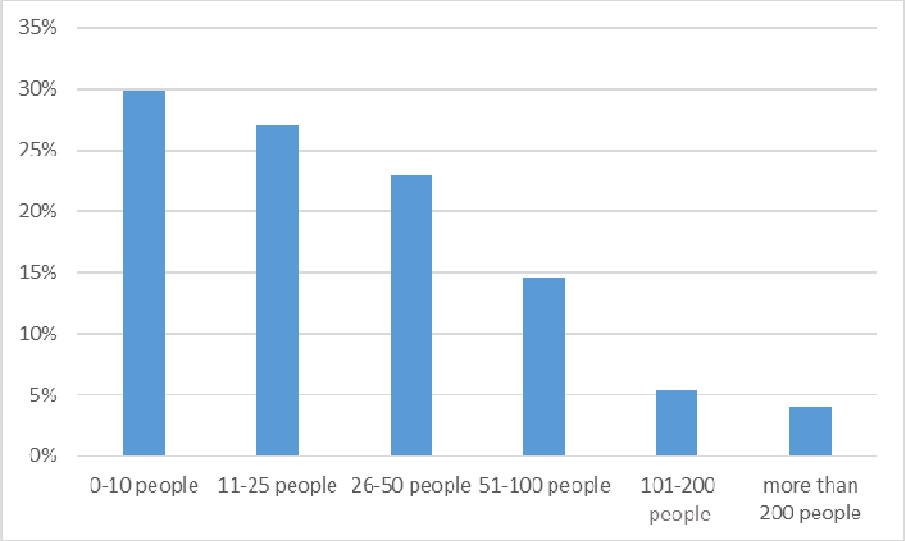

Fig. 11: Telegram target audience distribution according to the number of contacts,%

Approximately one third of Telegram messenger users (30%) are subscribed to 10-25 channels, 27% of users – to 5-10 channels, and 24% – to 1-5 channels. Those who are not subscribed to any channel and those who are subscribed to more than 50 channels amount to less than 5% (Fig. 12).

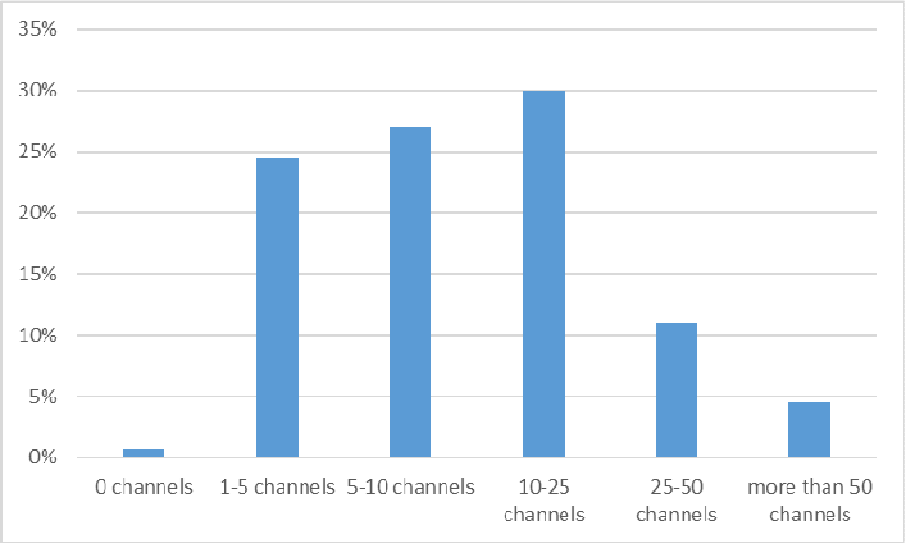

Fig. 12: Telegram target audience distribution according to number of channels read by users, %

Almost 70% of Telegram audience are either registered in the social network VKontakte or often use it, 56% of them chat in WhatsApp, 30% use Viber, 30% use the social network Facebook, 19% use iMessage via iPhone (Fig. 13).

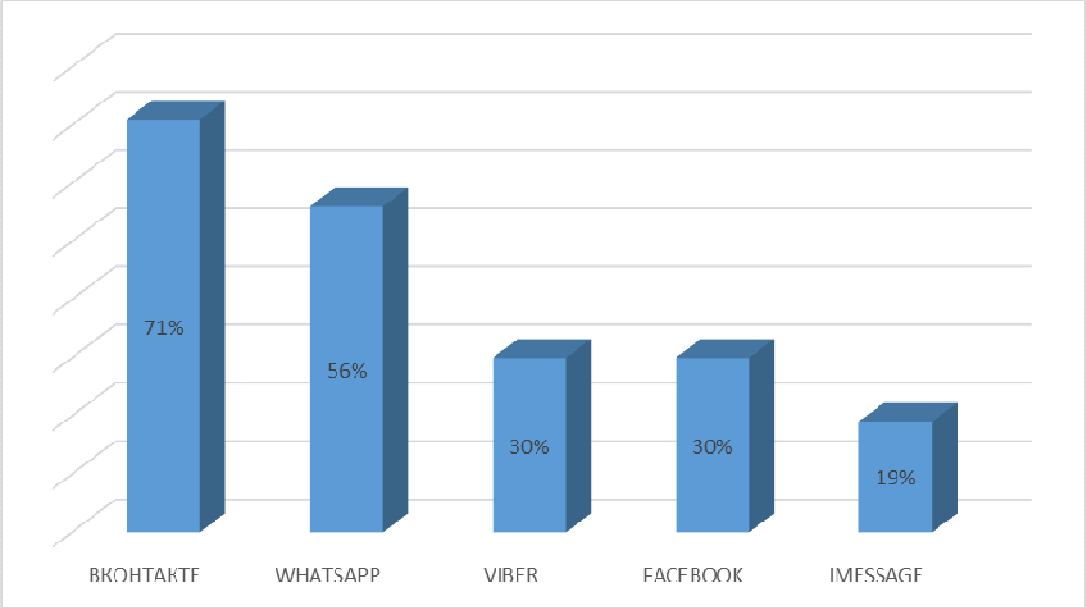

Fig. 13: Distribution of Telegram target audience according to the share of other Internet services usage,%

In Telegram messenger an advertisement is placed as a post or a native format. Therefore, 25% of Telegram users do not see advertising on the messenger channels, 30% see it very rarely and 25% see it only occasionally.

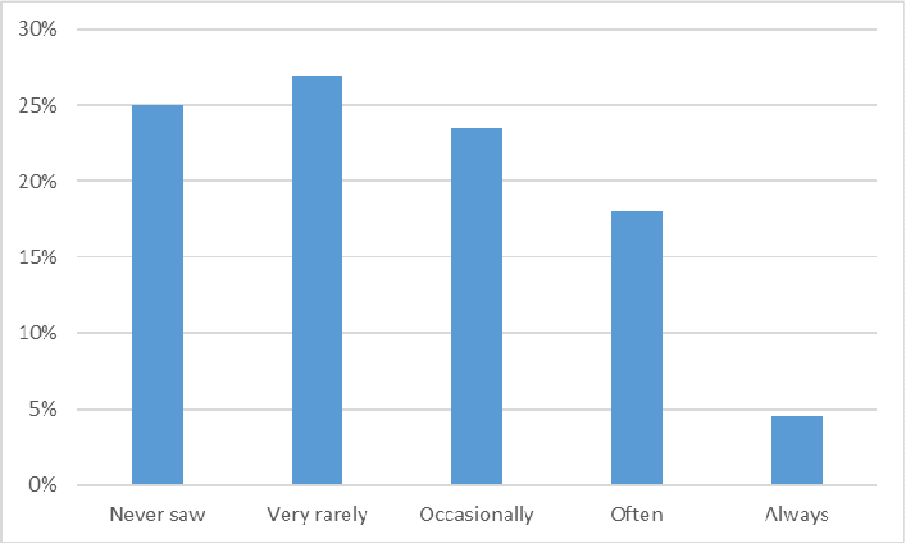

Fig. 14: Distribution of Telegram target audience according to frequency of commercials on various platform channels, %

Approximately 17% of users see advertisements very often and 5% see them constantly. Apparently, they are subscribed only to entertainment channels.

Telegram has become a popular messenger and its audience is very diverse. Now the messenger is used not only by entrepreneurs and IT specialists, but also by different categories of users.

Currently, there is no fierce competition on this platform; there are no clear leaders in every economic realm. Therefore, nearly any author with minimal skills can develop their channel and get first profit in 2-3 months.

To evaluate Telegram target followers' feedback we use the ER indicator (engagement rate of followers'), which is calculated as follows:

ER = the sum of all engagements (likes, reposts, comments) / number of subscribers * 100%.

However, in the judgment of the authors, the drawback of this indicator is that it does not take into account coverage, involvement on specific days and interaction with individual posts.

Therefore, in our opinion, to evaluate Telegram target followers' feedback, it is necessary to use several subtypes of ER.

1. Reach engagement rate (ERR) = number of engagements / coverage * 100%.
This indicator shows the approximate share of those who have seen community publications and reacted to them in one way or other.
2. Engagement rate per day (ER Day) = number of engagement per day / number of subscribers * 100%.
Daily engagement shows how many times a day the average subscriber showed his/her activity.
3. Engagement rate per post (ER Post) = the amount of involvement per 1 publication / number of subscribers at the date of publication * 100%.

The indicator allows evaluating interest in specific publications, comparing them in terms of effectiveness.

4. View engagement rate (ER View) = number of engagements per 1 publication / number of views * 100%.
This indicator shows the specific share of the target audience who made comments on a specific advertisement viewing.

Social media analytics tool "Popsters" is used for running community analysis in social networks and messengers. It automatically calculates all of the listed above indicators.

Thus, in order to enable effective advertising communications in messengers, many advertising specialists calculate rates of both return on investment and target followers' feedback, while advertising on several platforms to achieve appropriate goals and decide on the format for each target audience.

Conclusion

The study on Telegram's market positioning factors for analyzing and planning of advertising campaigns for business operations leads the authors to the following conclusions.

The active Telegram messenger audience is in the age range from 18 to 34 years. 57% of users have higher education, which proves the high quality of the audience. 47% of the messenger users are interested in information technology, 42% are interested in science and technology, 41% watch movies and TV shows, 39% read news channels of major media companies, and 35% read books. Almost 70% of the Telegram audience are either registered in the social network VKontakte or often use it, 56% of them chat in WhatsApp, 30% use Viber, 30% use the social network Facebook, 19% use iMessage via iPhone. In Telegram messenger an advertisement is placed as a post or a native format. Therefore, 25% of Telegram users do not see advertising on the messenger channels, 30% see it very rarely and 25% see it only occasionally.

Based on the above stated, we can conclude that Telegram messenger is currently an effective platform for analyzing and planning advertising campaigns in any business field.

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Marketing Strategy of Organizations of Consumer Cooperation Based on the Formation of the Marketing Information System as the Foundation for Ensuring Their Competitiveness

Elena ISAENKO
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

E.E. TARASOVA
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia
pror-nr@bukep.ru

N.A. PLETNEVA
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University
Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
gvozdok@yandex.ru

L.A. LIBRAM
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

K.V. TARASOVA
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

Abstract

The purpose of this article is to develop recommendations for implementing the marketing strategy of organizations of consumer cooperation following the formation of the marketing information system for ensuring their competitiveness.

The article discusses the essence of the organization's marketing strategy and the main stages of its formation; the components of the organization's marketing strategy were selected; the role of the marketing information system for developing and implementing of the marketing strategy is shown; the competitive advantages of organizations of consumer cooperation from the standpoint of their marketing strategies are identified; and strategic directions for retail trade development within consumer cooperation are shown. In the process of research, an algorithm for the organization's marketing strategy development by means of using a marketing information system is proposed; the conceptual diagram of the organization's marketing information system formation is given; factors of macro- and microenvironment are studied; SWOT analysis aimed at the expansion of information base for making managerial decisions is carried out; grouping of the consumer cooperation benefits is carried out in accordance with the identified strategies with a view to their use for marketing strategies developing. The article presents a model for marketing strategies formation that allows to track the sequence of operations from setting goals to adjusting the strategy and contribute to the achievement of sustainable competitive positions and rise in the consumer's loyalty. The article contains a system of assessment indicators and presents the results of a comprehensive assessment of the retail strategies implementation within consumer cooperation under the selected components. The information base for research comprised official statistics, publications on retail trade and consumer cooperation development, marketing researches, as well as source materials collected during the authors' interviews with customers and heads of organizations of consumer cooperation.

Keywords: Marketing strategy, marketing information system, organizations of consumer cooperation, competitiveness, retail trade, algorithm for marketing strategy development, comprehensive assessment of marketing strategies implementation.

Introduction

Activation of market-driven processes results in the need to consider various organizational and economic aspects of entities operating in the consumer market, in particular organizations of consumer cooperation. Studies have shown that the need to improve competitiveness of organizations of consumer cooperation is becoming particularly relevant, as there is a significant

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decrease in the number of these enterprises and exclusion of organizations of consumer cooperation from the rural market which is their traditional segment. Competitive environment is enhancing in the Russian consumer market both due to the increasing number of individual private retail trade enterprises, and the rapid development of Russian and international retail chains, which are gaining market share not only in large cities, but also in cities of regional significance [1-3].

In this regard, there is a growing need for monitoring of development trends of the enterprise's external environment and taking into account the characteristics of consumer behavior. From the standpoint of ensuring competitiveness, it is also important to apply digital technologies in marketing activity of organizations of consumer cooperation, and to develop a marketing information system for making sound management decisions in the face of increased competition on the consumer market.

Innovations and information technologies are being introduced in the retail organizations of Russia and foreign countries, making competitive activity more complex. There are constant qualitative changes in customer preferences, significantly differentiating in different consumer segments [2-5].

Under the current conditions, promotion of competitiveness of organizations of consumer cooperation is possible through the development and application of an effective marketing strategy based on the widespread use of digital technologies at all stages of its development and implementation. It should also consider the influence of both external factors and internal resources and features driven by organizational and economic activity of organizations of consumer cooperation.

Research Methods

The theoretical background of the study were the works of Russian and foreign scientists examining issues concerning marketing strategies formulating, economics, management and marketing, and consumer cooperation. Methods of economic-statistical analysis and sociological analysis constituted a methodological basis of the study, namely: analytical (to study the essence of marketing strategy); dialectic (to study marketing strategy development in conjunction with external and internal factors); statistical (to study trends and characteristics of the consumer market formation and development).

The achievement of the envisaged targets was carried out on the basis of the general scientific method, including: induction and deduction, analysis, synthesis, observation method, economic-statistical method, method of dynamic series construction, method of comparative analysis, index method, graphical method, structural and marketing analysis. Systemic and integrated approaches have been used in the research process.

The information base was provided by the data of Russian organizations of consumer cooperation, in particular, the Belgorod Regional Consumer Union, as well as research findings accumulated by domestic and foreign scientists.

Findings

The development and implementation of marketing strategies in a rapidly changing external environment is a necessary and indispensable condition for increasing the entity's competitiveness. Marketing strategy allows to determine the main goals and substantiate principal ways to achieve them in a certain period of time. [6] The marketing strategy of the retail trade of organizations of consumer cooperation is understood as the general course of the organization's development in the long term, aimed at achieving its marketing goals and allowing to justify directions for implementing marketing activity in the field of product and pricing policies, allocation and promotion policies, customer relations shaping while considering activity orientation of organizations of consumer cooperation.

Of particular relevance is the problem of determining priorities in the formation of the marketing information system as a mechanism for providing managerial decisions based on the interaction of its core and interconnected elements – the marketing information system (MIS) and the system for marketing information collection. [7]

Implementation of the marketing information system would enable the development of the enterprise's effective marketing strategy and help in assessing information needs. The marketing strategy development is based on the analysis of the enterprise's external and internal environment and on the availability of strategic information.

The theoretical and practical significance of the organization's marketing strategy development and its implementation through the effective marketing information system formation, as well as its under-development for management decisions justification, determined the relevance of this study.

Various aspects of the marketing strategy and the marketing information system formation, development of marketing activities of organizations of consumer cooperation were considered in the works of Russian and foreign scientists: Ansoff I. [3], Blank I.A. [4], Gilbert D. [5], Isaenko E.V. [6, 7, 8], Kotler F. [9], Tarasova E.E. [10, 11, 12, 13, 14], Teplov V.I. [15, 15, 17], Evans J. [18] and others.

Marketing strategy determines the vector of the organization's development and promotion of goods for maximizing incomes and profits in the long term. The result of the marketing strategy is a marketing plan aimed at strengthening the product position in the industry, reducing potential risks and threats from competitors and profit maximization. [19]

Marketing strategy development involves a number of stages: formulation of the organization's mission and goals; macro-environment assessment; microenvironment assessment; SWOT analysis implementation; marketing goals formation; demand segmentation and target audience selection; research of marketing potential; analysis of the marketing mix; competitive analysis; development of strategic alternatives; definition of the marketing strategy; implementation of the marketing strategy; control over the strategy implementation; assessment of the strategy implementation; strategy adjustment.

For organizations of consumer cooperation, it is advisable to carry out each stage of the marketing strategy development and implementation with the use of the marketing information system and digital technologies for making managerial decisions and dealing with clients.

Marketing strategy involves management decision-making and action development connected with marketing mix tools: product, price, place, promotion. Each of these components also requires a strategic approach, i.e. development of marketing strategies at the operational level concerning formulation of product and pricing strategies, distribution and promotion strategies [20-22].

The algorithm of the organization's marketing strategy development with the use of the marketing information system is shown in Figure 1.

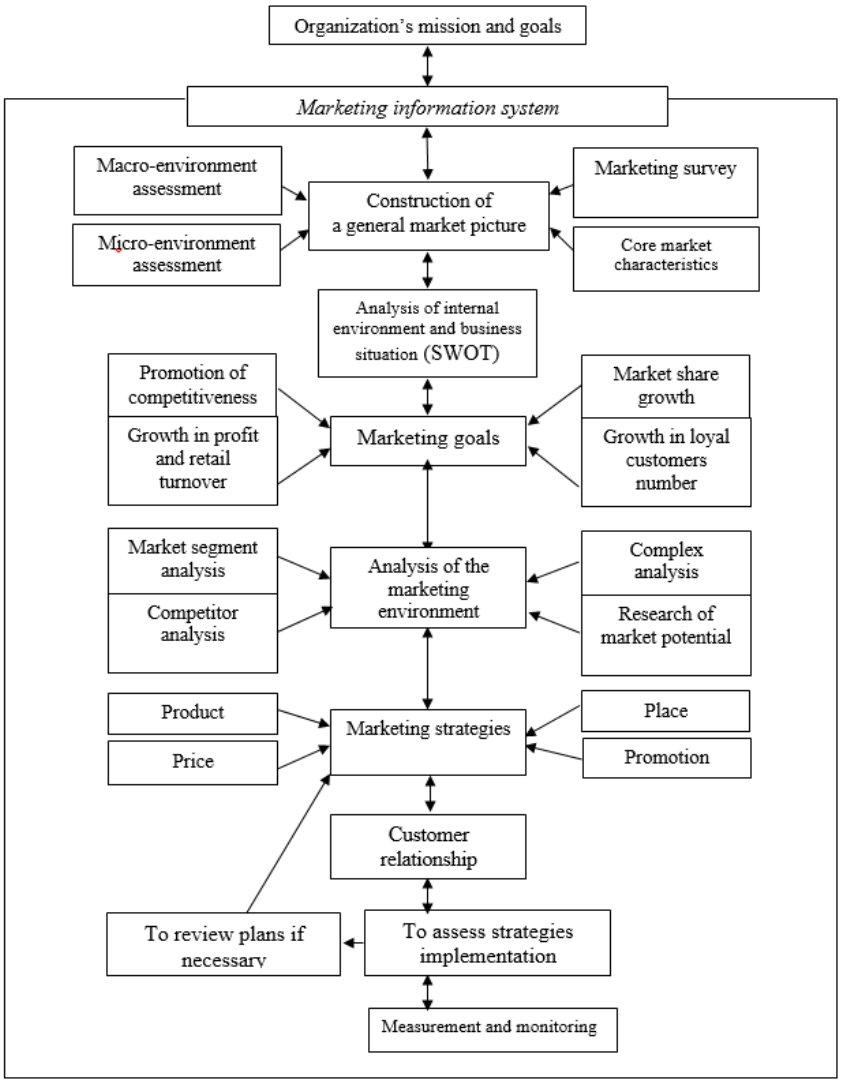

Figure 1: Algorithm of the organization's marketing strategy development with the use of the marketing information system

Application of the proposed algorithm of the marketing strategy development and implementation within organizations of consumer cooperation will attract potential buyers and shareholders, as well as help increase the market share.

Retail marketing is primarily focused on the consumers, their needs, expectations, preferences and tastes, and is aimed at profit maximization due to the fully satisfied customers' needs. In this regard, the developed marketing strategies in the context of marketing tools should promote improvement of relationships with the customers.

Under the modern conditions, the system of consumer cooperation is undergoing the stage of market adaptation. Organizations of consumer cooperation have significant marketing potential. However, as practice shows, they cannot fully balance their own marketing opportunities with the existing market requirements, which is a limiting factor for the organizations' development in a competitive environment [23-26].

To increase competitiveness, attract customers, boost demand, it is necessary to review existing marketing strategies, conduct an in-depth analysis of the used marketing mix, and develop a customer relationship strategy.

In this regard, in the course of the study, the authors analyzed the elements of consumer cooperation's retail marketing complex: product, price, place, promotion.

To increase competitiveness of organizations of consumer cooperation, it is necessary to manage the marketing mix tools in order to most effectively influence the market, consumer's behavior and achieve the desired objectives under the existing conditions and the chosen marketing strategy.

In the process of developing and implementing a marketing strategy, senior management should adequately assess the existing competitiveness factors of organizations of consumer cooperation.

From the combination of factors, it is necessary to single out the main ones, identify market environment trends, analyze organization's competitiveness factors and benefit from them, evaluate influence and interconnection of external and internal factors[27-28].

To ensure competitiveness of organizations of consumer cooperation, it is important to collect and analyze information on demographic, economic, political, legal, scientific and technical changes in the external environment of organizations. The marketing information system plays a significant role in meeting these tasks.

A marketing information system (MIS) is the totality (single complex) of personnel, equipment, procedures, and methods designed to collect, process, analyze, and distribute, at a set time, reliable information for making marketing decisions. The marketing information system is designed to solve both marketing problems and strategic planning tasks. The main advantages connected to the use of the marketing information system are: formatted and systematic collection of information; wide range of marketing information; high speed of marketing information analysis[29-30].

MIS transforms the data obtained from internal and external sources into information necessary for the heads of marketing departments and includes subsystems of internal reporting, external environment monitoring, marketing research and decision support.

Functioning of the marketing information system serves to solving the following problems:

– the amount of incoming information may be too large to be processed by marketing service employees;
– generalization and dissemination of a large amount of operational information, for example, on realization of products, can take up too much time and distract employees from performing their basic marketing functions;
– the cost of the marketing information system creating may exceed its effectiveness.

Therefore, the organization must independently establish its accounting system on the grounds of the organization's specificities and marketing objectives.

In the process of developing and implementing the marketing strategy for organizations of consumer cooperation, it is proposed to use a conceptual scheme for formation of the marketing information system aimed at reducing uncertainty in the process of managerial decision making (Fig. 2).

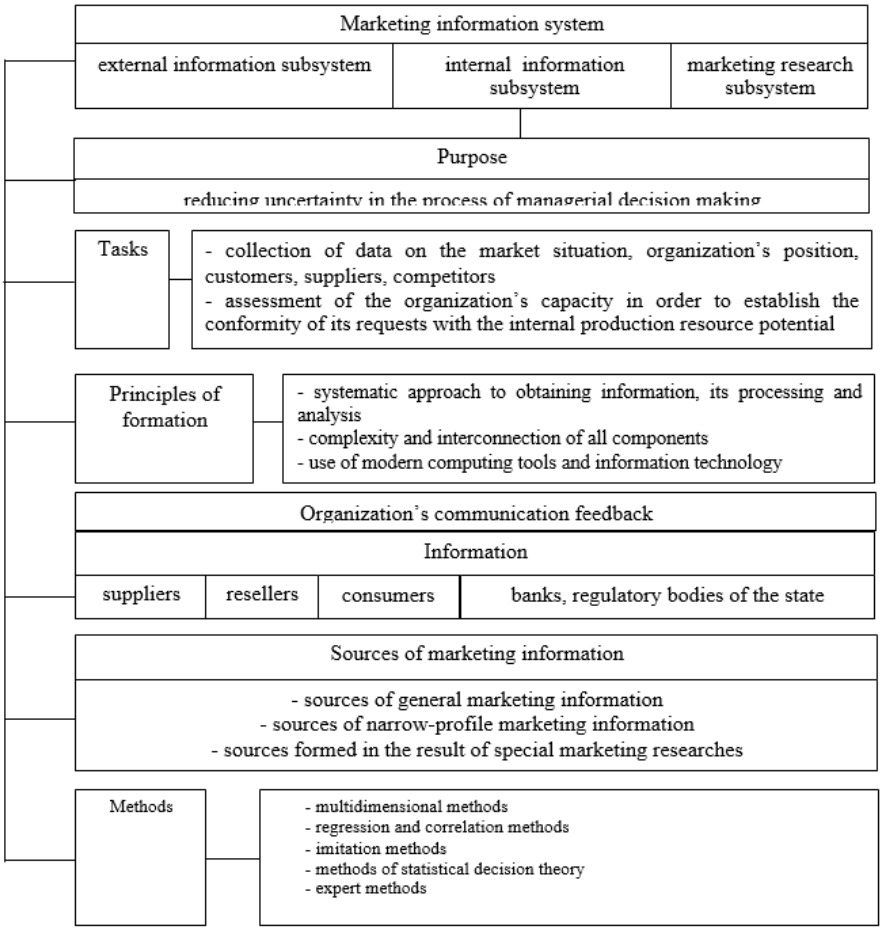

Figure 2: Conceptual scheme for formation of the marketing information system

The internal environment analysis of any enterprise and assessment of its competitive strength should result in the identification of competitive advantages and evaluation of the entity's competitiveness. Competitive advantages are crucial characteristics of the organization's market activity that create a certain superiority over competitors. Creation of competitive advantages is associated with the development of a set of measures concerning goods, distribution, prices, incentives, which provide superiority over similar actions of competitors. The main marketing activity directions of organizations of consumer cooperation are associated with the use and enhancement of competitive advantages due to the specifics of their functioning in the consumer market [31-33].

In the course of the study, the competitive advantages of organizations of consumer cooperation were grouped in accordance with the identified strategies: product, price, distribution strategy, promotion strategy and customer relationship strategy. Using competitive advantages in the process of developing and implementing marketing strategies by organizations of consumer cooperation will increase their marketing activity efficiency and competitiveness in the consumer market.

Strengths and weaknesses of the activity of organizations of consumer cooperation can be esteemed through SWOT analysis.

The SWOT analysis matrix presents strengths and weaknesses, opportunities and threats of the activities of organizations of consumer cooperation in the Belgorod region.

Table 1: The SWOT analysis matrix of organizations of consumer cooperation in the Belgorod region.

Strengths	Weaknesses
The established image of a socially oriented system	Low share of non-food product sales
Very own social base – shareholders – allowing to have a guaranteed sales segment	Slow response to changing market conditions
Cohesion of organizational system	Lack of mobile and retail distribution network
Diversified nature of the activity, allowing to create integrated economy	Insufficient level of physical infrastructure development of enterprises of consumer cooperation, especially in rural areas
Availability of own commodity resources	Insufficient level of employees' interest in their labor results
Availability of a stationary trading network	Lack of working capital
Availability of very own educational institutions that provide training, retraining and advanced training of personnel to meet the market needs	Underutilization of the COOP brand capacity
Public confidence	Poor operation on attracting shareholders and providing them with benefits and discounts for goods and services
The opportunity to study and implement best practices of cooperative organizations	Lack of in-depth analysis of each organization's results
Interaction of organizations of consumer cooperation with public authorities	
Opportunities	**Threats**
Entry into new markets through retail development in urban areas and district centers	High competition from private entities, retail chains
Diversification of activity	Low solvency of the rural population
The possibility of attracting public funds	Unpredictability of the socio-political situation
Reaching new consumer groups through expanded services	Growth in inflation, prices and tariffs for rates of utility services, transport and other services
Possibilities for using digital technology	High interest rates on bank loans
	Unfavourable demographic changes
	Menace of unemployment
	Poor rural infrastructure
	Coronavirus pandemic (COVID-19)

In order to increase competitiveness and efficiency of organizations of consumer cooperation, to attract shareholders and customers, it is necessary to develop a retail strategy.

Implementation of the retail development strategy of consumer cooperation is possible with an effective marketing strategy. In this regard, we propose the retail marketing strategy for consumer cooperation, which includes five strategy blocks in line with the marketing mix tools (product, price, place and promotion), as well as a strategy for interaction with consumers [34].

Important factors influencing development and implementation of the marketing strategy are the policy coherence with the external environment, internal balance, orientation to available resources and effectiveness.

The retail marketing strategy of consumer cooperation is aimed at achieving market and intra-organizational goals and involves competitor analysis, analysis of marketing potential, analysis of the marketing mix, selection of the target segment, development of measures to attract the target segment through marketing components, development of measures to improve relationships with consumers (Fig. 3).

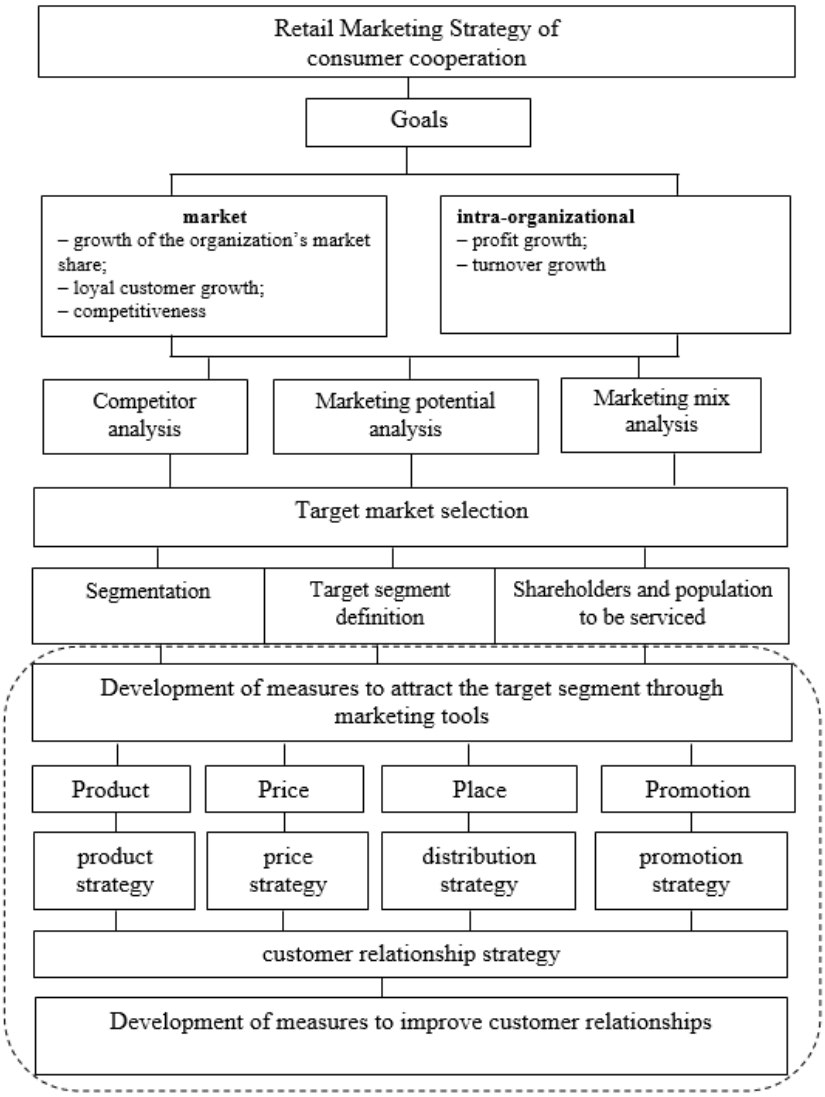

Figure 3: The retail marketing strategy

Use of innovative marketing technologies is important for the retail marketing strategy implementation within consumer cooperation.

For a more detailed analysis and evaluation of each strategy, the authors developed an indicator framework that allows to evaluate each of the applied marketing strategies concerning product, price, distribution and promotion [25].

The following indicators are recommended for the product strategy evaluation: retail turnover; retail turnover growth rate; share of food products in total retail turnover; share of non-food products in total retail turnover; share of certain product groups in retail turnover; coefficient of income elasticity; coefficient of price elasticity; stock amount; turnover of goods; turnover profitability; amount of essential commodities in the paycheck; number of items with one purchase; range of goods coefficient; coefficient of assortment renewal; coefficient of goods assortment updating; coefficient of goods assortment stability; range of goods provided by the assortment list; volume of sales of own-produced goods; volume of paid services.

The following indicators are recommended for evaluation of the pricing strategy implementation: average purchase price (average check); average mark-up; check growth rate; share of expensive goods in the paycheck; share of low price category goods in the paycheck; coefficient of price elasticity; retail floor space; the share of retail floor space in the total store area; average store size.

The following indicators are recommended for distribution strategy evaluation: retail sales per square metre of the retail floor space; coefficient of retail floor space elasticity; the amount of inventory placed on one square metre of the retail floor space; installation area coefficient; exposure area coefficient; retail sales per square metre of the retail floor space; number of self-service stores; number of self-service stores equipped with modern cash registers; number of working places for cashiers; coefficient of introduction of modern forms of customer service; share of self-service stores in their total number; share of retail self-service stores in total retail trade turnover; retail delivery trade turnover; coefficient of the store usability; coefficient of attractiveness of the retail floor space interior; coefficient of the goods display attractiveness; increase in the number of stores using ACS; amount of self-service checkouts; number of smart carts with integrated devices; amount of funds aimed at modernizing stores.

The main indicator of promotion strategy assessment is market share. However, indicators are proposed to detail block assessment:

Incentives (volume of the shareholders' mutual fund; average size of the shareholders' mutual fund; amount of cooperative payments; amount of benefits provided to shareholders; number of discount programs available in the store; amount of funds allocated for holding an incentive event; amount of shareholders' bonuses; shareholders' dividend value);

advertising (advertising costs; share of advertising costs within circulation expenses; level of circulation expenses directed to advertising; number of advertisements, placed in the media; number of television and radio commercials; coefficient of in-store advertising media usage; breadth of advertising coverage of potential consumers; frequency of advertising occurrence; impact of the advertising message; brand recognition, brand name);

personal sales (average monthly salary of trade workers; average monthly salary of salesclerks; number of staff with upgraded qualifications; amount of funds allocated for personnel's training and retraining);

public relations (the number of fairs with actual participation; turnover received from participating in fairs; number of the held holidays; number participation in donor events; the number of seminars held for advertising purposes).

The effectiveness of the customer relationship strategy implementation should be assessed by the following indicators: number of people served; number of shareholders; share of shareholders among the served population; retail turnover per a shareholder; retail sales per a person; number of shareholders per a shop; retail floor space per 1000 people; number of consumer complaints; quality of customer service; customer loyalty; customer satisfaction (costs, conveniences, communications); conversion rate – a number of people who made purchases of the total number of store visitors; average number of customers per day; number of one buyer's visits to the store per month; average time spent by one customer in a store; the proportion of regular customers in their total number; share of new customers in their total number; share of the newly cooperated population in the total number of shareholders; proportion of dissatisfied customers in their total number.

We propose a methodological approach to assessing strategies implementation based on the proposed indicators and corresponding to the following:

1. The purpose of the assessment – for an operational audit of the marketing strategy implementation; monitoring of strategies implementation by regional organizations of consumer cooperation; comparative analysis of the strategies implementation by organizations of consumer cooperation; assessing enterprises' competitiveness (an integrated assessment of the implementation of a set of strategies).
2. Application of the results. The results of the assessment can be used by employees of organizations of consumer cooperation to improve marketing activity in their organizations, adjust implemented strategies, and make decisions on skills improvement of marketing services specialists.
3. For whom it is intended. This technique is intended for independent employees of organizations involved in developing strategies, auditing, monitoring of strategies implementation and making decisions on their adjustment.

To carry out an integrated assessment, we used tempo indicators instead of quantitative ones. Index indicators were selected for the calculation, that allowed us to show the dynamics of each strategy applied in all consumer societies of the Belgorod region.

To evaluate each strategy, we have chosen from one to 3 indicators. For a more complete assessment, the calculation should include the maximum possible number of indicators, but the principle of their further integration

can remain the same [26]. Therefore, to bring all the indicators within each strategy to one summarizing indicator (Isum = Ip, Ip, Ip, Ip, Ic) we used the following formula

$$I_{\text{sum}} = \sqrt[n]{B_1 \cdot B_2 \cdot ....Bn},$$

where $Isum$ – is equal to the summarized indicator for each strategy Isum = I_p, Ip, Ip, Ip, Ic;

B1, B2, ... Bn - growth indices of indicators taken for evaluation within each block of strategies;
n - number of indicators

Summarizing indicator is sufficient to assess which strategy is being implemented better or worse, and in order to assess how all the strategies are implemented and identify leading or lagging consumer societies, it is necessary to calculate the integral indicator.

For an integrated assessment of the implementation of all strategies, we propose to calculate the integral indicator of the growth index

$$Ip = \sqrt[5]{Ip \cdot Ip \cdot Ip \cdot Ip \cdot Ic},$$

where Ip – integral indicator of the growth index of strategies totality;

Ip, Ip, Ip, Ip, Ic – summarizing indicators for each strategy.

Table 2: Integrated indicator on consumer cooperation retail strategies

№	Business entities	Product strategy Index	Price strategy index	Distribution strategy Index	Promotion Strategy Index	Consumption index	Integral indicator
1	Alekseevka district consumer society	0,97	1,03	1,02	1,00	1,04	1,01
2	Belgorod district consumer society	1,01	1,01	0,01	1,05	1,14	0,41
3	Oktyabrskiy Khlebokombinat consumer society	0,96	1,00	0,01	0,90	1,04	0,39
4	Ivnya consumer society Alliance	0,95	1,00	0,70	0,99	0,66	0,85
5	Krasnaya Gvardiya district consumer society	1,00	0,95	0,01	1,21	1,06	0,41
6	Prochorovka district consumer society	0,95	0,99	0,96	1,05	1,01	0,99
7	Rakitnoye district consumer society	0,56	1,08	0,01	0,87	0,67	0,32
8	Staryi Oscol district consumer society	0,93	0,94	0,01	0,94	0,59	0,34
9	Tomarovka village consumer society	0,97	0,96	0,90	0,84	1,00	0,93
10	Urazovo consumer society	1,01	1,00	0,72	1,15	0,88	0,94
11	Shebekino district consumer society	0,99	1,03	1,10	1,13	0,87	1,02
12	Jakovlevo consumer society	0,56	0,78	0,50	1,41	0,83	0,76
	sum-total	0,95	0,97	0,83	1,05	0,87	0,93

From the above data it can be seen that the leaders are organizations of consumer cooperation functioning in Alekseevka and Shebekino. Marketing strategies are worst implemented in Rakitnoye and Staryi Oscol district consumer societies and Oktyabrskiy Khlebokombinat consumer society. They did not reach the leaders of Prokhorovka, Tomarovka, Urazovo district consumer societies.

This assessment methodology is universal and makes it possible to compare districts both for each individual strategy and for their totality. In the calculation, it is possible to take any number of indicators demanding evaluation. Comparison should be carried out by using another set of indicators.

If to assess all regional organizations of consumer cooperation, it is clear that product, price, distribution, and customer relationship strategies are not being implemented effectively and only the promotion strategy has a

positive implementation dynamic. Therefore, either adjustment of the developed strategies is required or the development of a new marketing strategy.

Conclusion

Thus, the assessment of the achieved level of the core marketing strategies (product, price, distribution, promotion, relationships with consumers) determines development directions of the organization's marketing activity. In the process of developing and implementing of the organization's marketing strategy, it is advisable to take advantage of the formation of an effective marketing information system.

The implementation of the proposed directions for the marketing strategy implementation will allow organizations of consumer cooperation to increase their market share, satisfy customers' needs, and ensure the competitiveness of organizations.

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Systematic Literature Review on Web Applications for Medical Attention and Medical Appointments

Alexander AGUILAR-CHÁVEZ
Universidad Autónoma del Perú, Lima, Perú,
aaguilar23@autonoma.edu.pe

Jeshuá BANDA-BARRIENTOS
Universidad Autónoma del Perú, Lima, Perú, jbanda@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Autónoma del Perú, Lima, Perú, jgamboa65@hotmail.com

Norma GÁLVEZ-DÍAZ
Universidad Señor de Sipán S.A.C., Chiclayo, Perú, ncarmengd@hotmail.com

Liset RODRIGUEZ BACA
Universidad Autónoma del Perú, Lima, Perú, liset.rodriguez@autonoma.pe

Guillermo PAUCAR-CARLOS
Universidad Nacional de San Antonio Abad del Cusco, Cusco, Perú, guillermo.paucar@unsaac.edu.pe

Carlos ARROYO-PÉREZ
Universidad Nacional Mayor de San Marcos, Perú, carroyop@unmsm.edu.pe

Summary

Today, healthcare systems have a great wealth of information about patients. This has a direct impact on the way people seek information and care. The objective of this research is to provide a systematic literature review (SLR) of different studies that have been carried out since 2015 regarding the development of web applications in different areas of healthcare. Further, we provide a comprehensive statistical analysis, and specifically, we extracted 70 journal articles published between the years 2015 and 2020. The results provided in this document have enabled us to answer the questions posed and led us to conclude that web applications are necessary in medical systems. This is because such applications facilitate rapid access to essential patient data to any healthcare professional, thereby avoiding loss of data, delays in treatment while requesting information, and duplication of information.

Keywords: Medical Care, Medical Appointment, Web Application, Methodology, Scrum

Introduction

Development of web applications for information management is one of the current trends within companies or private institutions in the healthcare sector. The lack of organization of information is unhelpful for institutions. Inadequate information management has consequences such as delays in the delivery of or access to information, loss of data, duplication of information, all of which can result in a loss of consistency and reliability. The lack of organization of information in health care companies is affected while requiring access to medical care and medical appointments.

Studies have reported that there is currently a waiting time of 1 to 4 hours for medical care. Although the benefits of Information and Communications Technology (ICT) are clear and sufficient, studies show that the adoption of new information systems at the clinical level is not an easy task, and utilization rates are not as high as expected for the current technological situation; they are very low [1]. This is due to the fact that computerization of the clinical sector has crucial barriers that can cause any project to fail if certain situations are not taken into account; for example, having the political and economic support that guarantees governance of the project, adequate strategic planning with clear objectives in the short, medium and long term, a set of external regulations (mainly laws and resolutions) and internal regulations (defined and documented business processes) that provide a legal framework and regulate these

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aspects, the definition and adoption of a set of standards that allow the integration and interoperability of data from different systems and, finally, an adequate organizational change management process at all levels [10]. In other words, the implementation of information systems in the clinical environment has technological limitations on the system itself and the infrastructure that supports it, but the greatest challenge lies in the limitations of the environment and context (strategic plan that frames it, governance, planning of professional training and change management, recycling of processes and workflows, local standards and laws, budgets, communication, etc.).

This research is structured as follows: The topic has been introduced in Section I; Section II presents the background and related works; Section III describes the methodology applied; Section IV presents the results of the study; Section V contains a discussion of the results, and finally, Section VI presents the conclusions and future research.

Background and Related Works

With each day, the technological advancements applied to the business world are becoming beneficial in developing a competitiveness that forces the application of this technology for the benefit of healthcare companies and their customers.

The term *business competitiveness* refers to the different strategies and methods that the various entities carry out in order to not only obtain the best results, but also to ensure that these results are the means by which the company becomes a leader in the services it provides [13].

Technology plays a critical role in a company's competitiveness and is one of the intangible factors that makes management more difficult. However, applying technology appropriately will result in better service from the company and greater customer satisfaction, while also providing time and resource optimization. This would project a better future for the company, broaden its criteria, and develop an image that may even lead it to cross borders [43].

Today, the management of patients by clinics, hospitals and health centers is of great importance to improve the treatment of these patients, as well as substantially favoring doctors in the performance of their work. This allows for better care, and better control of patients, diseases, and statistics.
There is a significant amount of software that is dedicated to conducting such tasks in an efficient way, thus enabling the generation of a centralized database, a control for the doctors, and the design of strategies to obtain solutions to a patient's problems.

As in all cases, there are different degrees of quality among software and options for adapting them to the needs of health centers, hospitals, or clinics [32].

Methodology

The systematic literature review (SLR) method allows to identify, evaluate, interpret, and synthesize all the existing and relevant research on a topic of particular interest; it requires considerably more effort and formal procedure to prepare the review than conventional literature reviews. The SLR method allows the validation of the results reported in the systematic review, and these results are supported and endorsed by the Review Protocol (see Fig 1) .

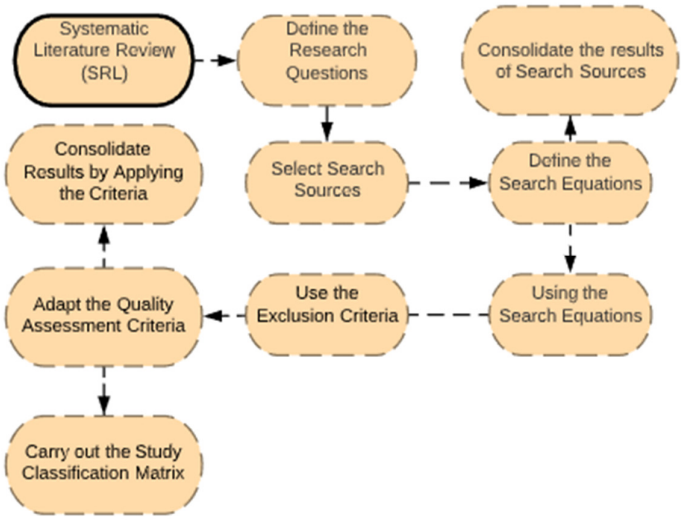

Fig. 1: Systematic Literature Review

Definition of Research Questions

The study aims to answer some questions (see Table 1) by reviewing a few scientific articles.

Table 1: Research questions

Research Questions	Rationale
RQ1: What are the criteria for measuring the effectiveness of web applications in WordPress?	Determine the effectiveness of web applications in WordPress.
RQ2: How much satisfaction arises from using web applications developed with different frameworks including WordPress?	Determine the effectiveness of web applications developed with Scrum.
RQ3: Are the results of the web applications in WordPress related to the improvement of medical care and appointments in clinics?	Determine the results of WordPress web applications related to the care- and appointment-enhancement feature.
RQ4: How many studies have been published since 2015?	Calculate how many studies were published since 2015.
RQ5: In which areas have web systems been applied in WordPress?	Define who are the most active authors in the area.
RQ6: Which methodologies are used for web application development?	Know which methodology is used for the development of web applications.

Search and Selection

A total of ten sources were considered for the search: Dialnet, EBSCO host,
Google Scholar, IEEE Xplore, ProQuest, Science Direct, Scopus, Springer Link, Taylor & Francis Online, Wiley Online Library.

To define a scope for these sources, search queries were developed as listed in Table 2.

Table 2: Search queries by source

Sources	Search Query
Google Scholar	Medical attention Medical appointments SCRUM OR Methodology OR Method OR Model "Web Application"
Scopus	(TITLE-ABS-KEY (“Web Application”) AND ALL (method OR methodology OR model) AND ALL (medical AND appointments))
Taylor & Francis	[All: "web application"] AND [[All: method] OR [All: methodology] OR [All: model]] AND [All: medical attention]
IEEE Xplore	((("Full Text & Metadata”: Web Application) AND "Full Text & Metadata”: Method OR Methodology OR Model) AND "Full Text & Metadata”: Medical Appointments)
Springer Link	Web Application AND (Method OR Methodology OR Model) AND Medical Attention OR Medical Appointments
Science Direct	("Methodology" OR "Method" OR "Model") AND "Web Application" AND ("Medical Attention" OR "Medical Appointments")
Dialnet	(“Web Application”) AND ("Methodology") AND (“Medical Attention”) OR (“Medical Appointments”)
Wiley	""Web Application"" anywhere and "Method OR Methodology OR Model" anywhere and "Medical Attention OR Appointments" anywhere
EBSCO host	TX Web Application AND TX ("Methodology" OR "Method" OR "Model") AND TX Medical Attention
ProQuest	(Web Application) AND (Methodology OR Method OR Model) AND (Medical Appointments) AND (Medical Attention)

A. Identified Studies

After searching in each of the 10 sources that were considered according to the queries, the results of the journal articles required for the review were obtained, as shown in Fig 2.

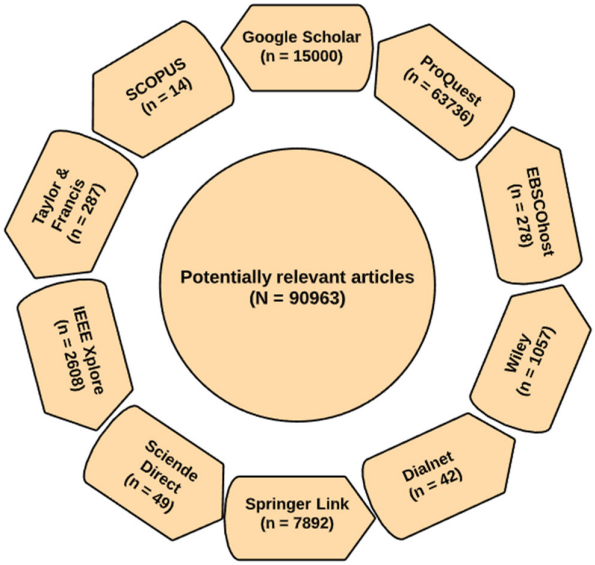

Fig. 2: Identified studies through search results

B. Exclusion Criteria

According to the results shown in Fig 2. 90 963 articles were obtained, and six exclusion criteria were applied to the search results; this was to decrease the burden of reading many articles, as can be seen in Table 3**.**

Table 3: Exclusion criteria

Id.	Criterion
EC1	They are not articles OR
EC2	Articles older than 5 years OR
EC3	Articles not in the Technology or Computing area OR
EC4	Articles not containing sufficient information OR
EC5	Articles not written in English OR
EC6	Articles are not open access

C. Summary of the number of results when applying Exclusion Criteria

According to Table 3, six exclusion criteria were applied to reduce the number of articles obtained to carry out the review; this resulted in 90 articles.

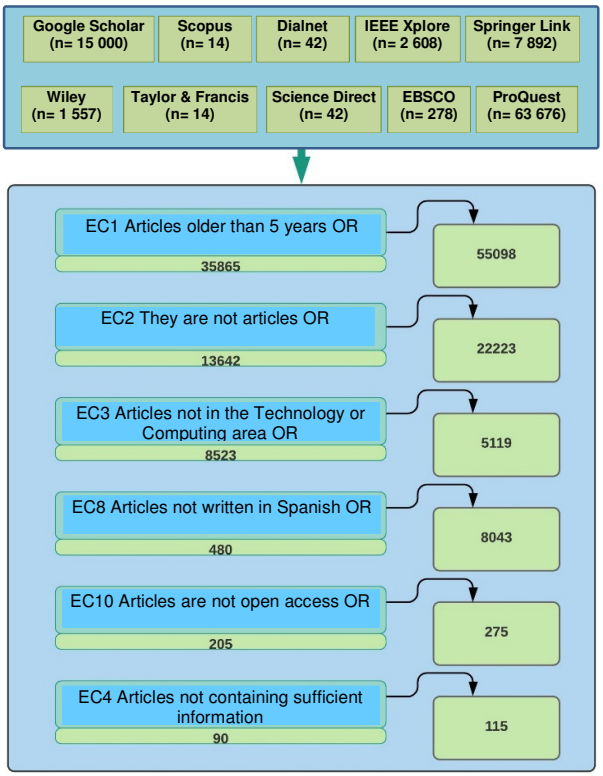

Fig. 3: Summary of criteria applied

Source	Initial articles	Filter 1: EC1 EC2	Filter 2: EC3 EC4	Filter 3: EC5 EC6	Filter 4: EC7 EC8	Filter 5: EC9 EC10	Final articles	% TotFinal
Dialnet	42	25	10	13			13	14%
EBSCOhost	278	112	19	4			4	4%
Google Scholar	15000	8090	46	14			14	16%
IEEE Explore	2608	210	24	13			13	14%
ProQuest	63736	2717	224	15			15	17%
Science Direct	49	29	10	7			7	8%
Scopus	14	11	11	3			3	3%
Springer	7892	1993	52	18			18	20%
Taylor & Francis Online	287	158	36	2			2	2%
Wiley Online Library	1057	294	25	1			1	1%
Total	**90963**						**90**	**100%**

Fig. 4: Application of exclusion criteria

D. Criteria for assessing the quality of studies

Table 4 shows the six quality criteria formulated to assess the selected scientific articles.

Table 4: Quality assessment criteria

Go.	Description
QA1.	Do the articles have quality bibliographic sources?
QA2.	Do the articles have a good explanation of their purpose?
QA3.	Are the articles relevant to the research?
QA4.	Does the article have a well-organized structure?
QA5.	Is the finding of the article clearly explained?
QA6.	Are the data on the articles properly collected?

All articles were assessed against all quality criteria. Some of them did not meet the criteria, and hence, they were eliminated, leaving 70 articles selected, as shown in Fig 5.

N° of Papers per Source

Source	2015	2016	2017	2018	2019	2020	Total
Springer	1	5	3	3	2	2	16
ProQuest		2	3	1	6	2	14
IEEE Xplore	1			2	8	2	13
Dialnet		1	3	4	2		10
Science Direct	2	1	3	1			7
Ebsco Host	2		2				4
Scopus				1	1	1	3
Taylor & Francis Online						2	2
Wiley Online Library			1				1
Total	6	9	15	12	19	9	70

Fig. 5: Items by year and source

E. Mendeley reports of the classified studies

Fig 6 shows a Mendeley report detailing the management of the 70 selected studies.

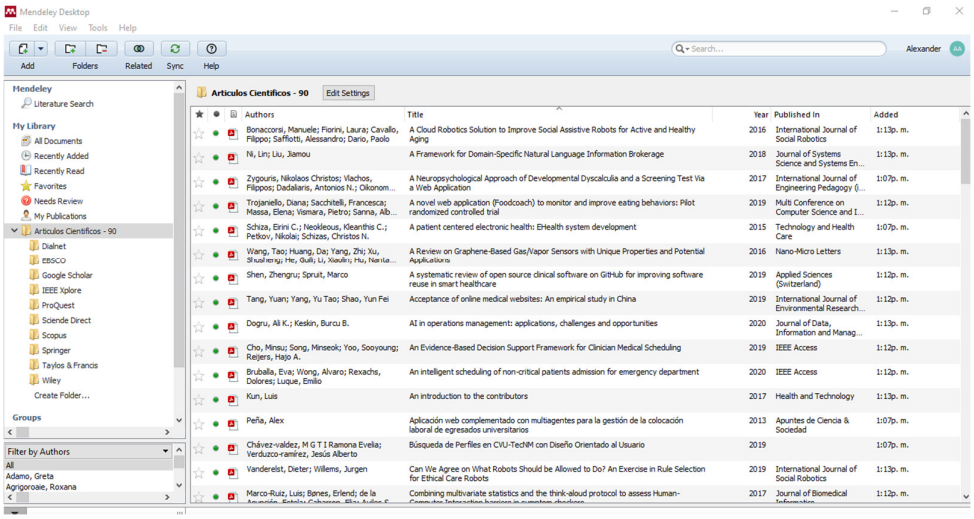

Fig. 6: Mendeley's Report

F. Miscellaneous Reports

As can be seen in Fig 7, these are the number of articles published in different sources per year, with 2015 being the year with the lowest number of articles published on healthcare and medical web applications and 2019 being the year with the highest number of articles. The journal publisher named Science Direct had the greatest number of research articles.

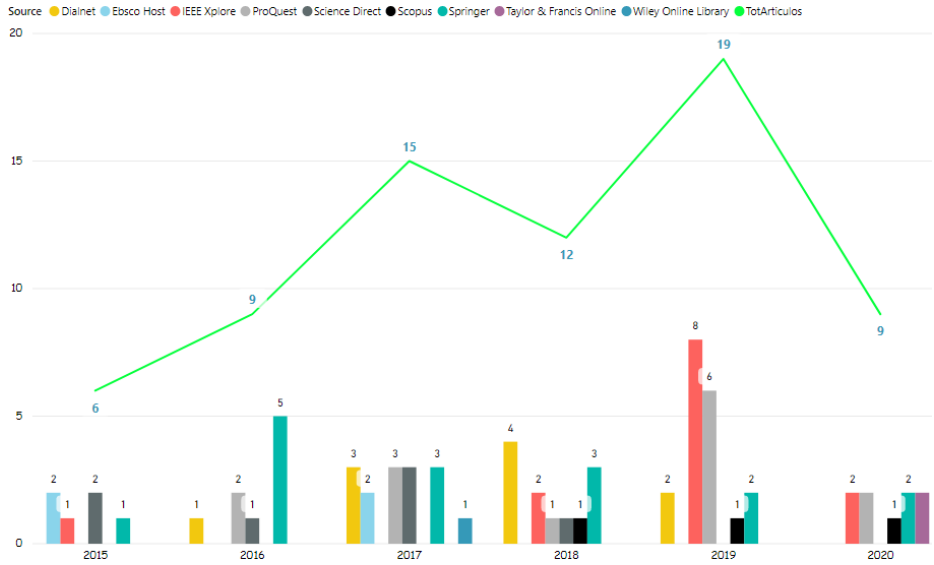

Fig. 7: Items by year and source

Fig. 8: Number of item citations by source and citations range by country.

In Fig 8, it can be seen that China, the USA, and a part of Europe have the highest number of citations per article.

Number of articles by Publication Type and Source

Publication Type	Dialnet	Ebsco Host	IEEE Xplore	ProQuest	Science Direct	Scopus	Springer	Taylor & Francis Online	Wiley Online Library	Total
Conference proceeding					3	3	1		1	8
Journal	10	4	13	14	4		15	2		62
Total	10	4	13	14	7	3	16	2	1	70

Fig. 9: Articles by publication type and source

From the data presented in Fig 9, it was determined that the number of journals is greater than the number of conferences in which information about web applications applied to medical care and appointments can be obtained, in addition to the fact that the greatest number of journals are published by Springer.

Results

The results of each of the research questions (RQ) posed in this paper are presented below:

Q1: What are the criteria for measuring the effectiveness of web applications in WordPress?

To answer this question, the SLR methodology was applied, in which the effectiveness of web applications in WordPress was determined through the implementations in the different scientific articles analyzed for the elaboration of this work. Many authors concluded that web applications in WordPress are effective based on the following indicators: Promptness, Well-being, Productivity, Security.

Eirini & Kleanthis [12] developed a Web System to improve the follow-up procedure of patients examined at the hospital. This had positive results as it allowed quick access to information for visualization and to determine if patient recovery was positive.

Gu, D. & Guo, J [64] in their research work, determined that the development of web applications is beneficial in the area of medical care, wherein it increases the number of patients served in the shortest time possible.

In Tables 5 and 6, all selected articles that demonstrate an indicator that supports the effectiveness of web applications in WordPress are detailed:

Table 5: Productivity indicator obtained in the studies analyzed

Effectiveness of websites	Articles	No. (%)
Fast	[5], [11], [13], [16],[17], [20], [21], [27], [29], [30], [31], [33], [48], [49], [53], [54], [56], [65], [66], [67], [68], [69]	22 (43)
Good	[12], [19], [22], [32], [34], [35], [36], [38], [41], [42], [43], [45], [55], [58], [60], [62], [63], [70], [72], [73]	20 (39)
Productive	[37], [56]	2 (4)
Safe	[14], [37], [44], [51], [59], [61], [71]	7 (14)

Table 5 shows that in 22 items, equivalent to 43% of the total number of items, the promptness when performing activities using web applications is convincing. In addition, in 20 articles referring to 39% of the total, it is beneficial to perform different processes through the use of web applications.

RQ2: How much satisfaction results from using web applications developed with different frameworks including WordPress?

When applying the SLR, we can see the satisfaction and confidence in using a web application. According to the articles published, we can conclude that people feel satisfied with the use of a web system on a large scale.

Chávez & Verduzco [12] developed a web application to search for patients in an administrative module of the platform, which allowed them to refer to their registered information. As a result, they were satisfied with the usability of the web application and the benefits it provided.

Libert & Timothy [14] implemented a web application for health-care monitoring. The results of their usage were moderate, as the number of patients they served was higher than the number that the web system could handle, making it slow at times.

Table 6: Table of satisfaction with the use of web pages

Satisfaction with the use of web pages	Articles	No. (%)
Moderate	[2] [9] [14] [18] [20] [27] [30] [32] [40] [45] [48] [54] [56] [64] [68] [69] [73]	17 (77)
Satisfied	[12] [15] [21] [44] [67]	5 (23)

As can be seen in Table 6, there are 17 articles that have moderate satisfaction in the usage, implementation, or development of web applications, and only 5 articles show satisfaction with their usage as the evaluation results were positive.

RQ3: Are the results of the web applications in WordPress related with improvement of medical care and appointments in clinics?

A SLR was applied and data analysis was performed in Power BI, which shows information of hospitals and clinics focused on medical care. The expected results are that the improvement of medical care is associated with improvement, while showing negative results due to low-quality care.

Table 7: List of websites in medicine

Relatedness of websites with medical care	Articles	No. (%)
Medical Attention	[11] [12] [13] [14] [16] [17] [19] [20] [21] [27] [28] [29] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40]	22 (42)
Clinical Attention	[41] [42] [43] [44] [45] [46] [49] [50] [51] [54] [55] [58] [60] [61] [60] [64] [65] [66] [67] [68] [69] [72]	22 (42)
Hospital	[1] [15] [23] [30] [48] [56] [59] [73]	8 (16)

Table 7 shows that there are 22 items in relation to the medical care process and 22 items in clinical care, both having a 42% equivalence. Both belong to the field of medicine, and hence, it can be deduced that there is a close relationship in the use of web applications for the field of medicine

RQ4: How many studies have been published since 2015?

After reviewing the articles, it can be seen that in the last 5 years, from 2015 to 2020, 90,963 articles were obtained. Nonetheless, when applying the exclusion criteria (EC1, EC2, EC3, EC4, EC5, EC6 and EC7), a total of 70 articles were obtained that were of the journal and conference types.

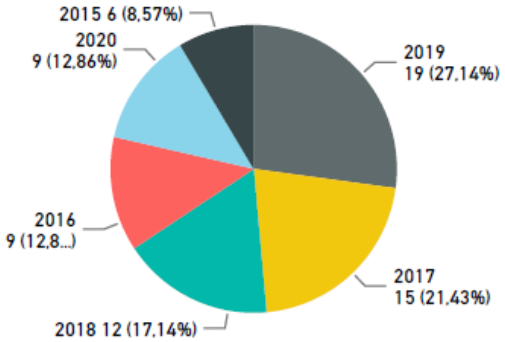

Fig. 10: Studies published in the last 5 years

Figure 10 shows that in the last 5 years, approximately 70 articles were published on medical care and appointments, with the year of greatest research being 2019, with 19 articles.

RQ5: In which areas have web systems been applied in WordPress?

To answer this question, the SLR methodology was performed. It is mentioned that the areas where web systems are applied in WordPress are within the 70 articles reviewed during the SLR methodology. Further, this question was analyzed with the Power BI tool, and the results obtained are listed in Table 8.

Table 8: Areas of application of web systems

Areas where web development is applied	Articles	No. (%)
Business	[15] [35] [48] [51] [54] [61] [62]	7 (13)
Education	[11] [14] [28] [30] [31] [37] [43] [44] [45] [52] [53] [56] [58] [61] [63] [64] [73]	17 (31)
Medicine	[12] [13] [17] [18] [19] [20] [21] [22] [23] [27] [32] [33] [34] [36] [38] [40] [42] [50] [55] [59] [60] [65] [66] [67] [68] [69] [70] [71] [72]	29 (54)
Politics	[63]	1 (2)

As can be seen in Table 8, the areas most represented are medicine and education, which are the ones with the largest number of articles found and in which much interest has been expressed.

RQ6: Which methodologies are used for web application development?

In Table 9, the most applied methodologies for the development of web applications are listed. As mentioned in the graph plotted using the Power BI tool, it can be seen that four methodologies were obtained.

Table 9: Methodologies used to develop web applications

Most used development methodologies	Articles	No. (%)
Cascade	[2] [5] [14]	3 (4)
RUP	[1] [3] [4] [6] [7] [8] [9] [10] [17] [20] [40] [58] [61] [71]	14 (20)
SCRUM	[54]	1 (1)
METH XP	[11] [12] [13] [15] [16] [18] [19] [21] [22] [23] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [38] [39] [41] [42] [43] [44] [45] [46] [47] [48] [50] [51] [52] [53] [55] [56] [57] [58] [59] [60] [62] [63] [64] [65] [66] [67] [68] [69] [70] [72] [73]	51 (75)

As shown in Table 9, the most commonly used methodologies were XP and RUP.

Discussion

As the results of the questions raised earlier in this study have been presented, we will proceed to discuss the results in this section. The effectiveness of web systems in WordPress was determined based on indicators obtained by the authors during their research, which is reported as analysis of implementations. Furthermore, the effectiveness of web systems in WordPress promotes that certain authors implement them in multiple areas and fields, and not only in medicine.

In addition to the importance of working with a development methodology to structure, plan, and control the entire development process, from start to finish, it is necessary to emphasize that these development methodologies are used depending on the type of work or project to be developed.

This work is a match for Wang's study [19], wherein it was found that the proportion of hospitals that offer appointments on their websites is much higher among medical health centers than among clinics. This finding may be related to different volumes and outpatient admissions at different hospital levels.

Conclusion and Future Research

In this research, a SLR method was used to analyze studies published during the years 2015 to 2020. The study initially began with 10 academic databases applying search queries, which provided an initial number of 90,963 articles; subsequently, six exclusion and quality criteria were applied to the results, thus reducing the number of articles to 70.

With the SLR, all the questions raised in this research work have been successfully answered. The findings allowed to identify that the web systems with WordPress are efficient in different areas or fields where its implementation is required. There are several aspects that have been identified and have been beneficial, such as promptness in processes, productivity of work or tasks, ease of usage, and security of web systems; these are the indicators that demonstrate the effectiveness of web application development in WordPress.

More than half of the hospitals or clinics have public online appointment systems. However, most systems simply serve the function of registration and rarely take advantage of the opportunity to meet.
Therefore, there should be efforts to strengthen the functions of these online appointment systems to improve the efficiency of consultations. Some methodologies for information extraction and retrieval of unstructured medical

records should be considered to improve the efficiency of the appointment process.

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Systematic Review of the Literature on Information Security Management Implementing Good Practices based on ISO 27001

Jorge ACHULLA PALACIOS
Universidad Autónoma del Perú, Lima, Perú
jachullapalacios12@gmail.com

Carlos GRANADOS SORIA
Universidad Autónoma del Perú, Lima, Perú
cgranados@gmail.com

Javier GAMBOA-CRUZADO
Universidad Autónoma del Perú, Lima, Perú
jgamboa65@hotmail.com

Huber RODRIGUEZ-NOMURA
Universidad Señor de Sipán S.A.C., Lima, Chiclayo
hub_rono@hotmail.com

Leonidas ASTO HUAMAN
Universidad Nacional Autónoma de Tayacaja Daniel Hernández Morillo, Huancavelica, Perú
astoleonidas@gmail.com

Amanda DURÁN-CARHUAMACA
Universidad Nacional de Cañete, Cañete, Perú, Perú
aduran@undc.edu.pe

Abstract

Business, government, and public institutions continuously experience challenges in the use of modern information technology, requiring integrated measures for the protection of information and ensuring three fundamental aspects: confidentiality, availability, and integrity. To carry out these actions, strategies must be established where action policies are adopted for each of these cases. Therefore, the following research work was carried out to determine the benefits and effectiveness of the implementation of good practices developed under the ISO/IEC 27001 standard. An in-depth research was conducted with articles published from 2015 to 2020, which were extracted from various academic sources. This study explores the dynamics that occur in the use and application of standards up to the present time, considering the present situation of COVID-19, where the securities in the institutions are being violated.

Keywords: Good Practices, ISO 27001, Information Security, Systematic Review.

Introduction

Recently, information has become an important asset for organizations. However, it requires special protection. Information must be adequately protected regardless of its format and mode of transmission. Therefore, the objective of information security is to adequately protect high-profile information from piracy, intrusion, identity theft, unauthorized disclosure, interruption, modification and destruction. Owing to its demand, information security is considered as an administrative issue.

A recent survey has shown that the total losses incurred in a single security incident, including direct financial losses owing to operational losses or negative stock market reactions [1, 2], loss of reputation, and business disruption, have become more severe.

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To facilitate the development of information security management in organizations, the ISO 27001 standard has been developed and adopted by organizations globally. This standard first emerged in 1995 as BS-7799, and then was revised in 2005.

ISO 27001 is a standard that defines a set of principles on the implementation of an information security management system (ISMS), with appropriate security controls among all the controls provided by ISO/IEC 27001. During recent years, several initiatives related to quality and best practices of security have emerged. Therefore, it is a priority for companies to ensure their continuity, in order to minimize potential injuries, and maximize the return on investment and business opportunities.

The objective of this research is to use the systematic review of the literature to determine the main advances of the use of good practices, based on ISO 27001 standards in information security management. The efficiency and effectiveness of the ISMS by implementing good practices based on ISO/IEC 27001 can benefit an organization in terms of operational performance or stock market reactions. Furthermore, the positive impact on operational and financial performance of companies is demonstrated.

The remaining part of this document is organized as follows: Section II presents the background, and Section III presents the methodology followed for the review of the study documents. Section IV presents the results, Section V reports the discussion, and finally Section VI presents the conclusions and future work.

Background

Business organizations support their business activities using information and communication technologies. Therefore, they should equip their networked computer systems and infrastructure with the policies and protection measures that guarantee the development and sustainability of these business activities. Maintaining the confidentiality, integrity, availability, and authorized usability of the information is significantly important, and thus, it requires professionals capable of ensuring, managing, and maintaining the security of information in their systems for present and future use.

Best Practices

Good practices can be beneficial for organizations that want to improve their IT services. An organization should aim to close capability gaps by adopting best practices for IT service management at all levels. Network management tools and processes are necessary to control potential failures or degradations in network services that support IT services. Therefore, it is important to have a general foundation on network management and its current importance. The network management must include a global vision of the different network elements involved in the service provision and the scope of its management (Hernández Valverde, 2014, p. 3).

Adopting good practices can help an organization develop or improve the skills required to deliver services. A "good practice" is the integration and application of frameworks, methods, and standards. To adopt a good practice, it is necessary to consider the sources, enablers, scenarios, and drivers involved. (Hernández Valverde, 2014, p. 3)

ISO 27001

The ISO 27001 standard for ISMS enables organizations to assess risk, and implement the controls necessary to mitigate or eliminate the risk. (ISO Tools, 2019)

Information Security

Information security is a critical issue compared to a computer data security issue; it should be oriented to protect intellectual property and important information of organizations and individuals.

The risks of information are present when two elements flow:

Threats and vulnerabilities are intimately linked, and there can be no consequences without their joint presence. Threats utilize vulnerabilities, and can originate from any part, internal or external, related to the organizations' environment (Tarazona T, 2007, p. 137).

Vulnerabilities are weaknesses in technology or information-related processes, and thus, are considered as characteristics of the information systems or infrastructure that contains it. A threat is any situation or event that affect the possibility of organizations or people to develop their activities; thus, directly affecting the information or the systems that process it. (Tarazona T, 2007, p. 137)

This implementation has increased the security of the information assets of the company Card Perú S.A., which guarantees that the information security risks are known, assumed, managed, and minimized in a documented, systematic, structured, repeatable, efficient, and adaptable manner during changes in the risks, environment, and technologies. (Barrantes Porras & Hugo Herrera, 2012, p. 5).

Therefore, the current ISMSs are becoming increasingly important. Through the guidelines provided by the ISO 27001 standard, any company can obtain an advanced protection of its data and information, owing to the assistance it provides in the evaluation and execution of information security controls.

Methodology

Systematic Literature Review

For the development of this research work, the systematic literature review (SRL) process shown in Fig 1 was used, with the objective of summarizing the existing information regarding a particular topic; in this case on information security management. These documents are evaluated, analyzed, and synthesized to reach a coherent conclusion on what is known and what is not known about information security management.

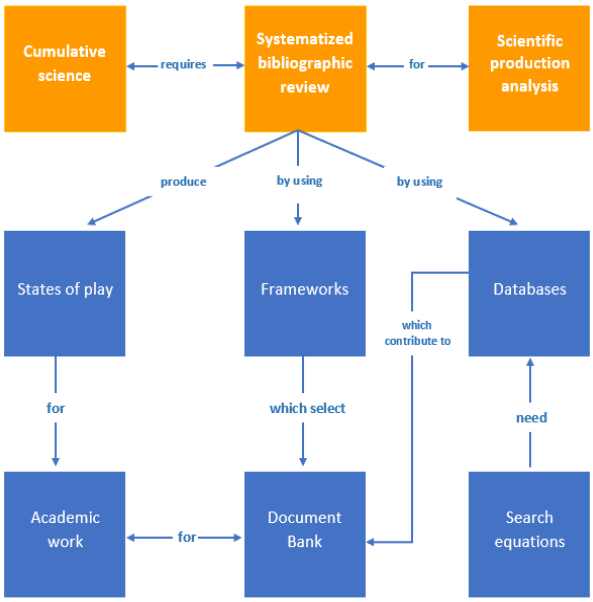

Fig. 1: RSL process

A. Research Questions

Table 1 presents the research questions to be answered through the identification and analysis of the selected articles related to information security management.

Table 1: Research questions

Research Question	Motivation
RQ1: What are the effectiveness criteria of the good practices based on the ISO 27001 STANDARD to improve information security management?	Determine the effectiveness of good practices based on the ISO 27001 STANDARD to improve information security management.
RQ2: What are the most widely used means of publication?	Determine the means of publication found for the research.

RQ3: What types of technological support have information security oriented techniques provided?	Delimit the technologies that have provided information security oriented techniques.
RQ4: In what areas have good practices based on the ISO 27001 standard been applied?	Specify the areas in which good practices based on ISO 27001 have been applied.
RQ5: What are the security controls for the development of good practices based on the ISO 27001 standard?	Define security controls for the development of good practices based on the ISO 27001 STANDARD.

B. Search Sources

For the classification of scientific articles, 10 academic meta-search engines were used: IEEE Xplore, Springer Link, Google Scholar, Taylor & Fancis, DOAJ, Science Direct, Microsoft Academic, EBSCOhost, and Scopus.

C. Search Equations

Various search engines for academic sources have a defined search structure, which allows articles on a particular topic to be obtained in a more precise way. Table 2 shows the search equations for these engines.

Table 2: Equations by source

Source	Search Equation
IEEE Xplore	((("All Metadata":Good Practice) And "All Metadata": ISO 27001 Standard) And "All Metadata": Information Security) Or "All Metadata": Methodology)
Springer Link	"Good-Practices "And "Information-Security" And “Methodology Or Method Or Model”
Google Academic	ISO 27001 Standard And "Information Security Management" Or Methodology
Taylor	[All: Good Practices] And [All: ISO 27001 Standard] And [All: Information Security Management]
Dialnet	("Good Practices"-" ISO 27001") And ("Information Security Management" Or "Methodology")
DOAJ	"Information Security": "And", " ISO 27001": "Or", "Methodology"
Science Direct	" ISO 27001 Standard" And "Information Security Management" Or "Methodology"
Microsoft Academic	" ISO -27001" And "Good-Practices" And "Security-Information-Management"
EBSCOhost	((Good Practices) And (ISO 27001 Standard) And (Information Security Management)
Scopus	All ("ISO 27001") And All (“Information Security Management”) And All ("Good Practices") Or ("Methodology") Or Methodology Or Method Or Model

D. Number of Results by Source

After the search equations have been applied, a certain number of scientific papers are obtained for each search source, as shown in Fig 2.

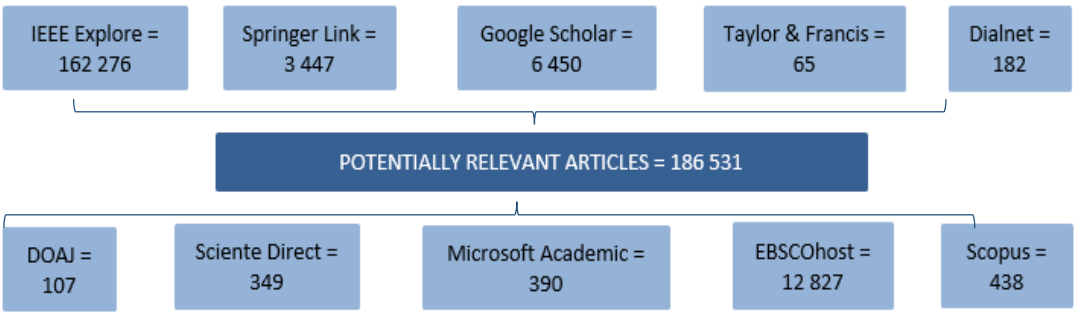

Fig. 2: Total Results by Source

E. Exclusion Criteria

Some exclusion criteria have been formulated to filter the articles found, and thereby obtaining the documents indicated for the development of this research work (Table 3).

Table 3: Exclusion criteria

Id.	Exclusion Criteria
CE1	Search results are not articles OR
CE2	The items are not less than 5 years old OR
CE3	Articles are not written in English OR
CE4	The articles do not propose a solution with the development of the ISO 27001 OR
CE5	Items do not show the sample unit OR
CE6	The articles do not contain keywords related to the research

F. Results when Applying Exclusionary Criteria

Fig 3 details the number of items excluded when applying each of the six exclusion criteria. Finally, the items left are 100.

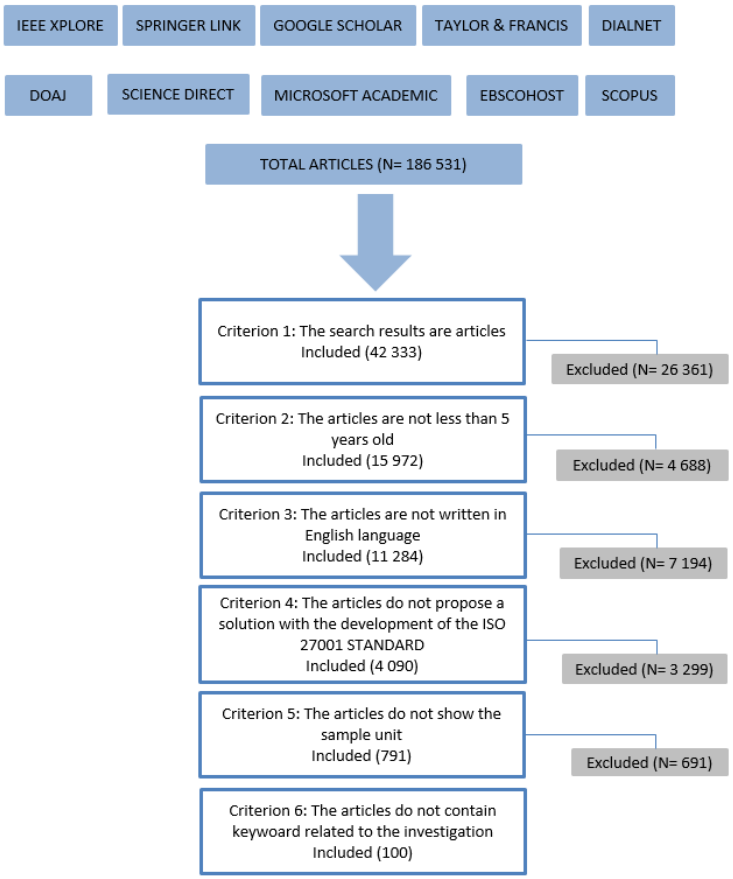

Fig 3. Results by Source

G. Evaluation of the Quality of Studies

For the evaluation of quality scientific articles, six quality criteria were formulated in addition to the exclusion criteria (Table 4).

Table 4: Criteria for Evaluating Quality

Id.	Quality Assessment Criteria
QA1	Does the article have a well-organized and described structure?
QA2	Is the article relevant to the investigation?
QA3	Are the bibliographic sources of quality?
QA4	In the article, is the purpose of the research clearly explained?
QA5	In the article, are the research findings clearly explained?

After applying the five quality evaluation criteria to each of the 100 scientific articles, it was found that they all met these quality criteria.

H. Reports with Mendeley of the Classified Studies

The Mendeley application was used to record and store the 100 scientific articles, as shown in Fig 4.

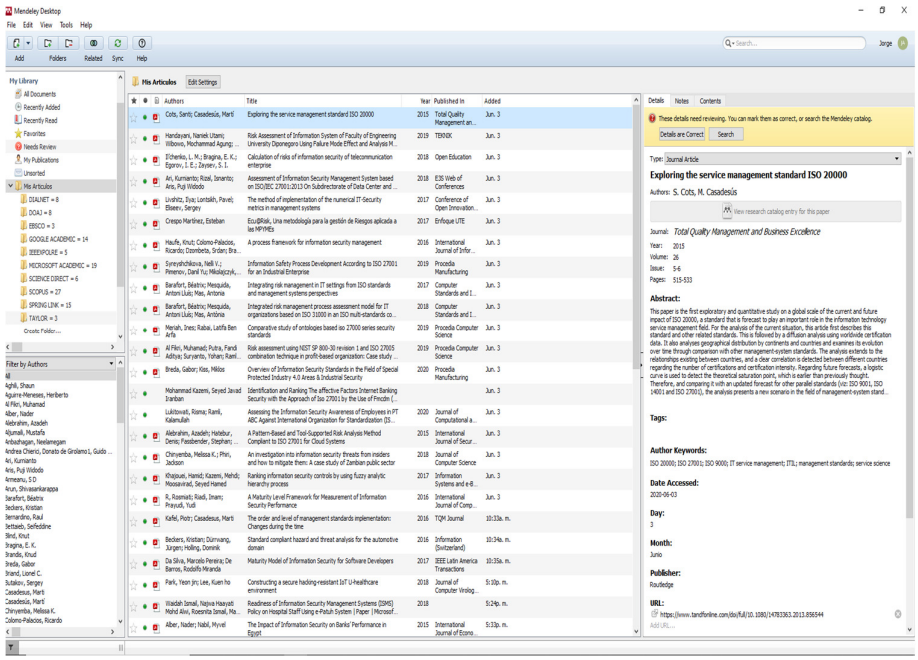

Fig. 4: Reporting with Mendeley

Results

After performing the RSL of the 80 selected studies, the initially planned questions in the research are answered.

RQ1: What are the effectiveness criteria of the good practices based on the ISO 27001 STANDARD to improve information security management?

Based on the systematic review of the literature, it is possible to determine the effectiveness of the ISMS and the benefits that were obtained in its implementation in the different scientific articles analyzed in this work. Many of the authors determined that the ISMS under the ISO 27001 standard as the solution to solve the problems of vulnerabilities and information leakage related to quality processes, security assessment, and security management, as shown in Table 5.

Table 5: Effectiveness criteria in studies

Benefits	Articles	Cant. (%)
Quality Processes	[1] [3] [4] [5] [6] [7] [10] [13] [14] [15] [16] [17] [18] [21] [23] [25] [29] [30] [31] [32] [33] [35] [36] [39] [46] [47] [51] [52] [53] [54] [55] [56] [61] [62]	34 (32.08)
Security Assessment	[1] [2] [3] [4] [5] [6] [7] [8] [9] [11] [12] [13] [14] [15] [16] [18] [21] [22] [23] [24] [26] [27] [28] [29] [30] [31] [32] [33] [34] [36] [37] [38] [39] [40] [41] [43]	36 (33.96)
Security Management	[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [18] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [39]	36 (33.96)

In the study conducted by Khajouei, H., Kazemi, M. & Moosavirad, and S. H [33], a fuzzy analytical hierarchy process was used to prioritize and select effective management domains, as well as to control objectives in information security controls. According to the results, access control, information systems acquisition, development, and maintenance have the highest priorities among the information security controls in the management domains.

Santos Olmo Parra, A. and Sanchez Crespo [65] carried out studies presenting a proposal for an innovative methodology for risk analysis and management called MARISMA-ARG. This allows for a completely dynamic risk analysis system that can output information at all times of the real situation of the company, which is of significant value to it.

RQ2: What are the most widely used means of publication?

Nine search sources were used for this research: IEEE Xplore, Springer Link, Google Scholar, Taylor & Francis, DOAJ, Science Direct, Microsoft Academic, EBSCOhost, and Scopus. Each source contributed a considerable number of scientific articles; the most important being Google Scholar with 33 articles and Springer Link with 15 scientific articles. The graph of the total number of scientific articles per search source is shown in Fig 5.

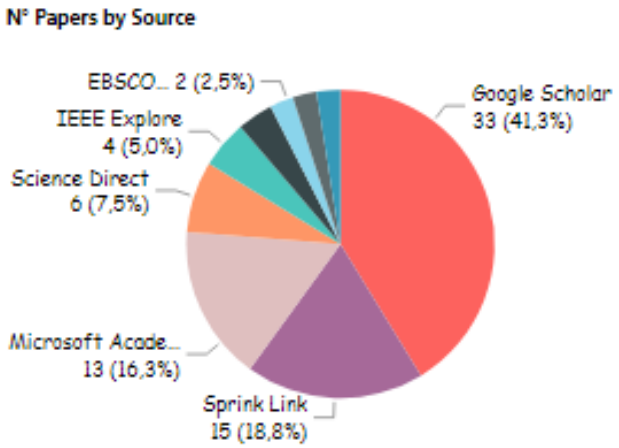

Fig. 5: Total number of articles by source

Fig 6 shows that Google Scholar accumulates the highest number of publications and obtained the highest number (i.e., 12) in the year 2016.

N° Papers by Source

Fuente	2015	2016	2017	2018	2019	2020	Total
DOAJ			1	1		1	3
EBSCOhost		1			1		2
Google Scholar	7	12	3	7	4		33
IEEE Explore				1	1	2	4
Microsoft Academic	1	3	1	5	3		13
Science Direct			1	1	3	1	6
Scopus		1	1				2
Sprink Link	1	2	4		2	6	15
Taylor & Francis Online	1		1				2
Total	10	19	12	15	14	10	80

Fig. 6: Items by source and year

RQ3: What types of technological support have information security oriented techniques provided?

To understand the support at technological level provided by the techniques oriented to the security depends on how the solution of the information security is developed in the organization.

Nelli V. Syreyshchikova & Liviu Moldovan [5] in their research work reported that company JSC "K" experiences difficulties that require timely protection of the company's information processes. Thus, it has implemented the design, development, and mastery of rules of information security in accordance with the requirements of ISO 27001 standard for 9 conditions of the company to minimize any vulnerability and ensuring integrity and confidentiality of the company information.

Marko Niemimaa [37] studied the cost factors of information systems security breaches. He determined that 76% had experienced or expected to experience result in the loss of customers or business partners. Therefore, to prevent such violations, organizations should implement the best practices in the management standard, such as ISO 27001;

This will ensure that they obtain security policies that will prevent violation; for instance, in the case of a computer attack (Table 6).

Table 6: Technological supports implemented with information security

Technology Support	Articles	Cant. (%)
Safety Rules	[3] [5] [8] [10] [32 [35] [47] [52] [66] [80]	10 (11.76)
Security Policy	[1] [2] [5] [6] [7] [8] [9] [10] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [42] [45] [47] [48] [50] [51] [55] [56] [59] [61] [68] [70] [72] [74] [75] [77] [79] [80]	51 (60)
Strategic Planning	[4] [6] [14] [17] [30] [31] [32] [33] [39] [44] [46] [51] [57] [58] [61] [64] [65] [66] [67] [68] [71] [72] [74] [80]	24 (28.24)

RQ4: In which areas have good practices based on the ISO 27001 standard been applied?

When analyzing in detail the 80 scientific articles to carry out the research, it has been verified that the information security management has been applied in different areas and fields because they have important information. Furthermore, many of these companies fear being vulnerable.

Nader Alber & Myvel Nabil [21] in their research work reported the impact of information security on the performance of Egyptian banks using a sample of 32 banks. They established that the ISO 27001, COBIT, and PCI-DSS standards are necessary to prevent information security threats, as well as the types of security threats in the banking sector ranging from accidental threats (employee acts, program problems, and fires) to intentional threats (hacker, virus, spyware, and employee acts). Finally, they concluded that if a bank does not have information security management, it can be vulnerable to the loss of its customers' information, which would cause a lawsuit against the bank, and may result into a loss of billions of dollars.

Gabor Breda & Miklos Kiss [10] conducted research on how the industries previously and currently perform information security management by applying the ISO 27001 STANDARD and are eligible for audit by the ISACA association of auditors, as well as the realization of a framework in COBIT that assists in IT security procedures.

Finally, Table 7 shows the areas in which information security management has been implemented with ISO 27001.

Table 7: Areas of implementation of ISO 27001

Areas	Articles	Cant. (%)
Bank	[13] [20] [21] [23] [32] [35] [38] [40] [44] [47] [49] [51] [54] [59] [69] [78]	16 (20.25)
Industry	[1] [3] [4] [6] [7] [10] [12] [13] [14] [17] [18] [20] [21] [23] [25] [26] [27] [28] [29] [30] [41] [44] [45] [50] [55] [59] [60] [66] [69] [71] [72] [74] [75] [78] [80]	35 (44.30)
Telecommunication	[10] [13] [14] [18] [23] [27] [30] [33] [47] [51] [52] [55] [61]	13 (16.46)
University	[12][13] [14] [16] [22] [25] [30] [45] [47] [52] [63] [64] [65] [66] [70]	15 (18.99)

Q5: What are the Security Controls for the development of good practices based on the ISO 27001 standard?

The development of good practices based on the ISO 27001 STANDARD depends on how it is implemented in the organization; Therefore, the following authors are considered as reference:

Joffre Velasco & Rodrigo Ullauri [44]. They studied the benefits of implementing an ISMS according to the ISO 27001 STANDARD, in which the main controls implemented are the information security policy, such as asset management as well as encryption and key management. The mentioned managements are some controls that in this study have been implemented for the corresponding certification.

Darko Paspalj [80]. The security of the information systems counts on the controls of security of the human resources and management of assets operational security, in which the controls are obligatory considering the applicability within the institution. Furthermore, people who are in charge of the information security are those who are assigned, i.e., those in charge of the implementation of the NORM ISO 27001 within the organization.

Table 8 shows the list of articles in which security controls have been considered for the development of good practices.

Table 8: Security controls for the development of good practices

Controls	Articles	Cant. (%)
ISO Standard Controls	[1] [2] [3] [4] [8] [9] [10] [12] [13] [14] [15] [16] [18] [20] [21] [22] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [40] [42] [43] [44] [45] [46] [48] [49] [50] [51] [53] [54] [55] [56] [57] [58] [59] [61] [62] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [78] [79] [80]	62 (66.67)
Quality Management	[1] [3] [4] [5] [6] [7] [10] [13] [14] [15] [16] [17] [18] [20] [21] [23] [25] [29] [30] [31] [32] [33] [35] [36] [39] [46] [47] [48] [56] [60] [61]	31 (33.33)

Discussion

The effectiveness of ISMS based on good practices under ISO 27001 was determined according to the benefits obtained by the authors in their research, i.e., the achievements in their ISMS projects. Furthermore, the effectiveness of ISMS allows many authors to apply it in various areas or fields where the use of information is not desired by its users. The results of their research also determine the importance of following a development methodology that ensures the quality and security standards of the project; thus, it is important to know the types of tools or techniques of ISMS. Moreover, it has been demonstrated that data require special treatment to ensure the availability, confidentiality, and integrity of information, because a deficient ISMS project would bring losses of valuable information for industries, both operational and economic.

The evidence of this study suggests that ISMS is a good option when there is leakage or loss of information. Therefore, it is the task of the professionals to determine the ideal way to implement ISMS in a company considering the development methodologies that exist, tools, and techniques that support it, as well as quality standards and security. All this requires a good analysis and knowledge of the company, in which the ISMS solution will be developed.

Conclusions and Future Works

In this research, we used SLR to examine the research carried out worldwide in the last five years on information security management that implements good practices based on ISO 27001. Studies that were analyzed were from the year 2015 to 2020. We started from a base of 10 academic searchers applying search equations, and then applied a series of exclusion and quality criteria to finally obtain 80 articles. The SRL has successfully answered the questions posed in the research work; the findings have identified how to implement the ISMS under ISO 27001 in organizations. There are several benefits that have been determined as the strategic advantages; thus, improving data quality, reducing time, and reducing operating costs. These results demonstrate the effectiveness of ISMS. The ISMS is increasingly being implemented in various areas, including education, medical and banking sector, agencies, and areas of preference owing to the amount of data it handle, and the need to be safeguarded and protected. In addition, it has been demonstrated that ISMS relies on various techniques and tools that help improve its effectiveness in confidentiality, integrity, availability, and accessibility of information. Finally, the articles supporting the results of this study are from the active authors in the field and important search sources.

The limitation of this study includes being conducted with articles found in a period of 5 years, which restricts it to a time limit. Furthermore, new methodologies, tools, and techniques are constantly being developed; thus, leading the ISMS to new paradigms that will require new studies. For future research, it is recommended that the studies to be utilized to be within a period of less than 3 years, in order to obtain the recent trends related to ISMS, which can provide the authors with new concepts to contribute to their research and cover the knowledge gaps found.

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Búsqueda De Una Estrategia De Desarrollo Del Peru En Una Economía Global Volátil

Oleg N. Zhilkin (a), Wilmer P. Chavarry G. (b)*

*Autor correspondiente
(a) Universidad de la Amistad de los Pueblos de Rusia
Calle Miklukho-Maklaya, 6, Moscú, 117198, Rusia, correo: zhilkin_on@pfur.ru
(b) Universidad de la Amistad de los Pueblos de Rusia
Calle Miklukho-Maklay, 6, Moscú, 117198, Rusia, correo: wilmerchg14@gmail.com

Resumen

Este artículo mediante el análisis de la teoría del comercio internacional y las actuales tendencias económicas en el mundo, evalua la posibilidad de mejorar el desarrollo del sector económico exterior en América Latina en su conjunto y en particular en Perú.
Mediante el uso de estadísticas del sector de comercio exterior y considerando las tendencias globales del comercio internacional durante la última década, haciendo un especial enfasis en el periodo 2019-2020, se evalua la capacidad de Perú para satisfacer la creciente demanda diferenciada y así especializarse en sectores ventajosos, permitiéndoles integrarse en cadenas de suministro globales, proporcionando recursos (tales como insumos o ya sean productos finales), bienes y servicios en los distintos niveles de mercado. Peru esta dentro de los 20 principales provedores de alimentos en el mundo, segun la agencia especializada en inteligencia comercial, "Fresh Fruit", teniendo en cuenta este potencial y su diversificada oferta, se ha determinado que existe una posibilidad real de crear cadenas de valor alrededor de los nichos de mercado que existen en el comercio global.
El presente estudio utiliza la teoría de la ventaja comparativa como base para cuantificar la competitividad de los productos a partir de la comparación global, lo que nos permite indicar cómo avanzar hacia mayores niveles de especialización en la estructura productiva y exportadora (Lauterbach, 2015). Como resultado, se obtuvo veinte productos con una tendencia positiva en sus exportaciones y doce productos que a pesar de contar con cifras inferiores en sus exportaciones, tienen un mayor potencial de crecimiento.

Palabras clave: Comercio internacional, ventajas comparativas, exportaciones, América Latina, Perú.

Introducción

Este articulo pretende reflexionar sobre la importancia que tiene el comercio internacional en los países de Latinoamérica para identificar los tipos de producción (productos, bienes o servicios) e intercambios que se deben realizar para lograr beneficios económicos sostenibles; para ello se estudia la teoría de comercio internacional y su modelo de ventajas comparativas.

En el marco macroeconómico, según datos del FMI, Perú en el 2018 logró elevar las exportaciones totales hasta $ 48.09 mil millones de dólares (+ 7.5% de 2017), logrando así un récord histórico para las exportaciones peruanas. Este crecimiento se explica por el notable crecimiento del sector no tradicional, que alcanzó los $ 13,2 mil millones (+ 12,6% respecto a 2017). En diciembre de 2019, las exportaciones peruanas sumaron un total de US$ 45.985 millones, lo que supuso lo que evidencia una caída del 4.2% con respecto a lo registrado en diciembre del año anterior. La proyección de crecimiento para 2020 ha ido sustancialmente a la baja, -14% del PIB y con una caída en las importaciones de US$9,058 millones y una caída de las exportaciones de US$ 8,304 millones, todo esto debido a la poca demanda externa generada por el período de cuarentena en el mundo y conjunto con el largo confinamiento de 3 meses y 14 días que en Perú han eclipsado el importante plan de apoyo económico implementado por el gobierno, y ha provocado importantes pérdidas de empleo.

A pesar de los importantes avances macroeconómicos registrados en la última década, la economía todavía no ha salido de su trampa de ingresos medios ni ha elevado significativamente su rango de ingresos medios. Este resultado se debe a que los peruanos poseen sólo una pequeña parte del crecimiento económico interno, y a la continua

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dependencia de la industria del estado del mercado de recursos naturales. Esto se debe al hecho de que la economía peruana está abierta, lo que significa que es altamente susceptible. a las fluctuaciones en el entorno externo, como en la crisis del 2014.

Sobre la base de lo anterior, la aplicación de reformas estructurales relacionadas con una mayor diversificación de la economía en sectores más prometedores dará lugar a un aumento de nuevos puestos de trabajo altamente cualificados y a un aumento de las exportaciones de valor añadido, lo que reducirá la dependencia de la demanda externa de materias primas (Lauterbach, 2015).).

En este contexto, y dada la composición actual de la canasta de exportación peruana, este estudio busca identificar productos de exportación con potencial para el comercio internacional. Para ello, el estudio considera dos elementos importantes. En primer lugar, analiza aquellos tipos de productos en los que el país ha obtenido ventajas comparativas en los últimos años y que se beneficiarían satisfacer la creciente demanda mundial. En segundo lugar, se evalúan los productos que tienen la menor participación en la cesta de exportación, pero que pueden seguir creciendo y ganar dominio del mercado con el tiempo.

En el desarrollo de esta investigación, se aplicó la metodología del IBCR e IB, que se basa en diversas teorías de ventaja comparativa que han surgido a lo largo de los años. Como resultado, se realizó un estudio sobre la base de treinta y dos productos, como se mencionó anteriormente.

Como resultado del estudio, se ha identificado que Perú ya cuenta con productos líderes en la exportación de mercancías a nivel nacional, como minerales de cobre y oro; productos agrícolas como espárragos frescos, frijoles secos, quinua, maca, arándanos frescos, cortezas de agrios (limón), mangos frescos, uvas frescas, mandarinas frescas; productos marinos congelados como jibias, globitos, calamares y pota; productos textiles como la vicuña fina y la lana de alpaca, entre otros. Sin embargo, la oferta de exportación es mucho más grande y deja espacio para el comercio internacional de otros productos con ventajas comparativas, como joyas, piedras preciosas o semipreciosas, semillas agrícolas, residuos de polímeros de estireno y otros productos que ofrecen ventajas comparativas ocultas.

Perú y su impacto en el mercado internacional

Para un mejor estudio las exportaciones peruanas, es importante entender definición de los términos productos tradicionales y productos no tradicionales. Las ***exportaciones tradicionales*** *incluyen básicamente productos mineros, agrícolas, hidrocarburos y harina de pescado determinados por el Decreto Supremo 076-92-EF[1]. Son considerados como* ***exportaciones no tradicionales*** *las demás partidas arancelarias no señaladas en esa norma y son productos que tienden a tener un mayor valor agregado, se agrupan en agropecuarios, textiles, pesqueros, maderas y papeles, químicos, metal-mecánicos, sidero-metalúrgicos y joyería, minería no metálica y otros.*

En los últimos años, Perú constantemente ha ido elevando sus volúmenes de exportación, llegando a tener desempeños históricos (véase la figura 1) en 2019 logró exportaciones equivalentes a 45,9 mil millones dólares. Pero no solo ha mejorados sus volúmenes, a su vez se ha diversificado la oferta exportadora. El crecimiento fue impresionante; en el 2000, se registraron exportaciones de tan solo 12 productos no tradicionales por un valor de más de 30 millones de dólares (producción de metal y ropa, principalmente); mientras que en 2019 este indicador aumentó a 72 productos, siendo los más exportados los productos agrícolas.

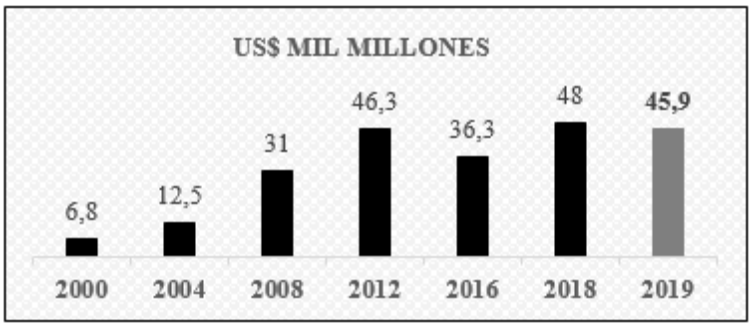

Figura 1: Año 2019, tercer mejor desempeño histórico de las Exportaciones Peruanas (mil millones de dólares).

Fuente: Construido por autor basado en datos del Banco Central de Reserva del Perú.
https://www.bcrp.gob.pe/estadisticas/cuadros-de-la-nota-semanal.html (Consultado el 10 de agosto del 2020).

En 2000, el valor de las exportaciones agrícolas alcanzó los 644 millones de dólares; en 2019, esta cifra aumentó a 6341 millones de dólares estadounidenses, según BCRP (2020) (véase la figura 2). En el 2019 se ha obtenido una cifra récord de exportaciones no tradicionales, se registraron envíos al exterior de 732 productos, 13 791 millones de dólares, 4,1% mas que en el año anterior.

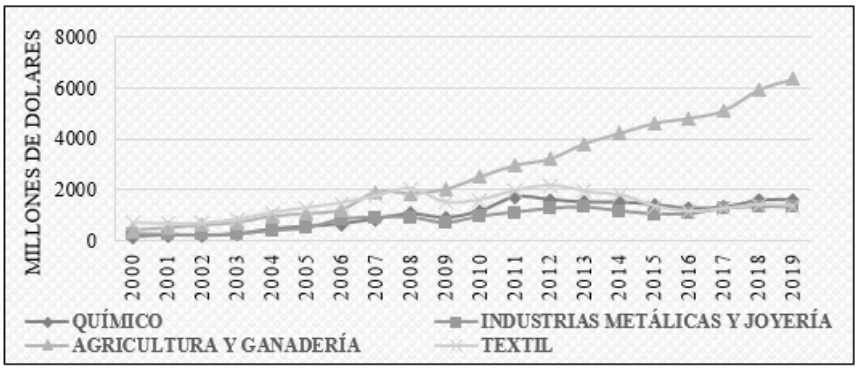

Figura 2. Perú: Evolución de las exportaciones no tradicionales 2000-2019 (millones de dólares).

Fuente: Construido por el autor basado en datos del Banco Central de Reserva del Perú. https://www.bcrp.gob.pe/estadisticas/cuadros-de-la-nota-semanal.html (Consultado el 10 de diciembre de 2019).

Los progresos realizados por el país en materia de nuevos bienes exportados y mercados objetivo se basan a los 20 acuerdos comerciales vigentes (véase la Figura 3), como los acuerdos de libre comercio con China(en el 2019 China importó productos peruanos por una cifra equivalente a 13 503 millones de dólares), la Unión Europea, Estados Unidos, México y Chile, permitiendo el acceso de los productos peruanos a 54 mercados internacionales, en su mayoría transportados por vía marítima (89.1%, fuente PROMPERU). El país líder Según datos de PROMPERU, actualmente el 49.1% de la población mundial tiene acceso a los productos peruanos.

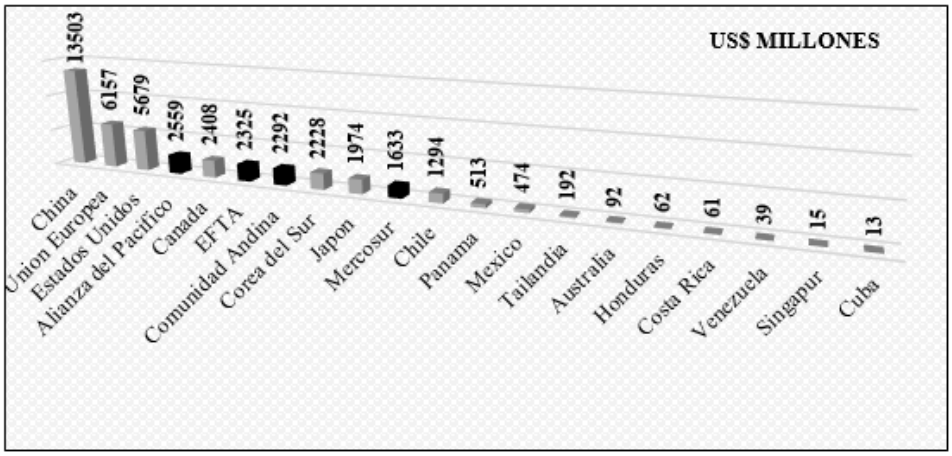

Figura 3: Volumen de exportaciones Peruanas a través de la Red de Acuerdos Comerciales Vigentes (millones de dólares).

Fuente: Construido por el autor basado en datos del Banco Central de Reserva del Perú. https://www.bcrp.gob.pe/estadisticas/cuadros-de-la-nota-semanal.html (Consultado el 15 de septiembre del 2020).

En cuanto a los mercados objetivo, sobre la base de 2019 informaciones, cuatro países concentraron alrededor del 57% de las exportaciones peruanas: el 30% se centró en el mercado Chino, mientras que los Estados Unidos representaron el 16,6 por ciento, Suiza el 5,3 por ciento y la República de Corea el 4,8 por ciento suministren productos peruanos. Otros mercados importantes son la India (4,4%), Japón (4,2%) y España (4,2%), entre otros (véase la Figura 4).

China es el principal mercado de destino para las exportaciones tradicionales, principalmente la minería (38%) y la pesca (47%); Si bien los Estados Unidos son el principal destino de las exportaciones no tradicionales, incluidos los textiles y el vestido (50 por ciento) y la agroindustria (32%) (Mincetur, 2017).

Además, del 88,7 por ciento de las exportaciones peruanas, que estaban cubiertas por las preferencias en el marco de las zonas francas existentes, destacan los mercados de China, los Estados Unidos, la Unión Europea, Corea del Sur, la Comunidad Andina, la AELC y el Mercosur, entre otros.
Sin embargo, existe una concentración de entregas en el extranjero tanto en los productos como en los mercados; por lo tanto, es necesario identificar y estimular nuevas actividades de producción, que son un factor adicional en el crecimiento económico, lo que permite diversificar la cesta de exportación e integrarla en las cadenas de valor mundiales (Producción, 2014).

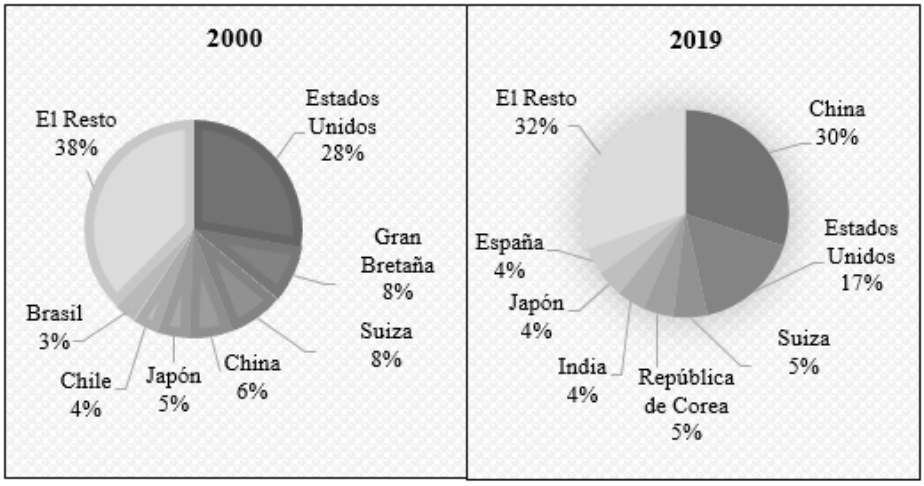

Figure 4. Peru: Major export destinations, 2000 and 2019 (in percents).

Fuente: Construido por el autor basado en datos de SUNAT http://www.sunat.gob.pe/operatividadaduanera/index.html (Consultado el 15 de diciembre de 2019).

Cabe señalar que Perú en los últimos años se ha convertido en líder mundial y regional en la exportación de productos no tradicionales, el Perú es ahora el primer exportador mundial de arándanos, espárragos, lacas colorantes, quinua, cemento Clinker y Maquinas perforadoras, y esto debido a la política de diversificación de los mercados de destino.

Perú se encuentra en el segundo lugar de exportaciones en el mundo de mandarinas, pota precocida, conchas de abanico, zinc sin alear, suturas quirúrgicas, vidrios de seguridad, placas y baldosas. Tercer lugar en la exportación de paprika, palta, Fosfato de calcio, conservas de anchoas, aceitunas conservadas. Cuarto lugar en Palmitos de conserva, oxido de Zinc, oxido de Boro. Quinto lugar en la exportación de uvas, oxido de hidrogeno de cobre y oxicloruros de cobre.

Perú registra récords en la producción de los sectores agroindustria y pesca no tradicional, actualmente se exportaron 732 productos nacionales.

Los principales productos no tradicionales que alcanzaron récord de exportación en el 2019 destacan la uva (8%), los arándanos (51%), el abocado (4%), la pota cruda congelada (65%), los mangos frescos (1.5%), la pota precocida congelada (5.5%), la plata aleada (200%), la mandarina (128%), el alcohol etílico (80%) y los langostinos (54%).
Estos 12 productos representan el 30% del total exportado en productos con valor agregado.

Se ha visto una inclusión más amplia de los productos en la oferta exportada, haciendo hincapié en una mayor proporción de productos agropecuarios (43,5%), productos químicos (11,8%), textiles (10,8%), acero (9,8%) y otros. Sin embargo, se observa que los mayores volúmenes de exportaciones siguen enfocados en los recursos naturales y productos de bajo valor agregado.

Con respecto a lo anterior, el FMI (2019) señala que las exportaciones de los países andinos se concentran en el sector extractivo, principalmente en las industrias petrolera y minera, lo que afecta al resto de las exportaciones, contribuyendo al fortalecimiento de las exportaciones no reembolsables con baja productividad ("enfermedad holandesa") y baja competitividad a nivel internacional. (véase la figura 6).

En los últimos años, Perú, como parte de una estrategia para consolidar los ingresos de sus productos en diversos mercados, ha iniciado negociaciones sobre acuerdos de libre comercio con países con los que ha tenido un intercambio comercial más amplio con el fin de buscar mayores beneficios permanentes para los productos peruanos y aprovechar las oportunidades de Mercado Ampliado (Mincetur, 2018).).

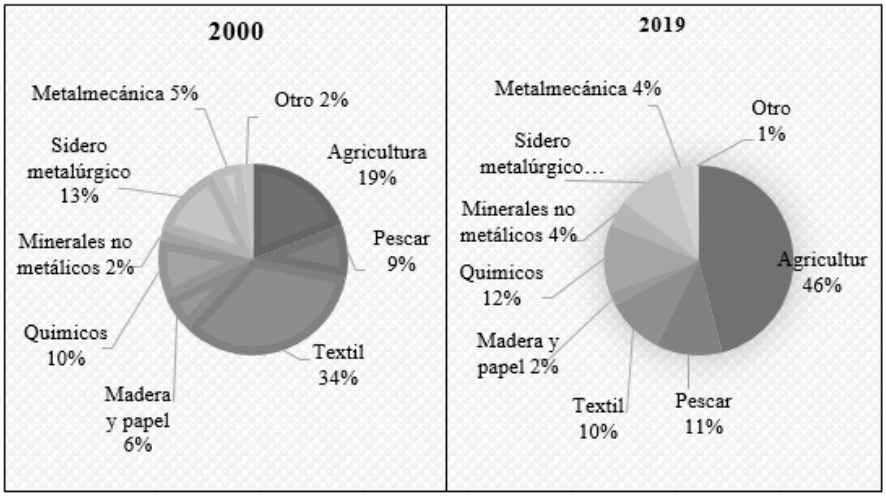

Figure 6. Peru: Exportaciones de los principales grupos de productos no tradicionales, 2000 y 2019 (en porcentaje).

Fuente: Elaborado por el autor con base en datos del Banco Central de Reserva del Perú. https://www.bcrp.gob.pe/estadisticas/cuadros-de-la-nota-semanal.html (Accessed 05 December 2019).

En cuanto a la exportación de productos no tradicionales, en 2000 Perú registró ventas por un total de $ 2.044 millones de dólares (BCRP, 2018), estableciendo diversos productos entre las principales entregas, tales como camisas de algodón, espárragos, alambre de cobre, pelo de cardán delgado, camisas de algodón, aleaciones de zinc y madera y otros. La apertura comercial y la búsqueda de nuevos mercados permitieron que las exportaciones no tradicionales alcanzaran los 13,783 millones en 2019 (BCRP, 2020), lo que representa un aumento del 674% en comparación con 2000, debido principalmente a las mayores ventas de productos agrícolas líderes en calificación (véase figura 7)

Figura 7. Perú: exportaciones totales 2000-2019 (millones de dólares).

Fuente: Construido por el autor basado en datos del Banco Central de Reserva del Perú. https://www.bcrp.gob.pe/estadisticas/cuadros-de-la-nota-semanal.html (Consultado el 10 de diciembre del 2019).

Se requiere una especialización relativa en el campo de los recursos naturales, así como una política sectorial de diversificación de la producción, destinada no sólo a agregar valor a los sectores potenciales, sino también a asegurar que el país se desarrolle productivamente e integre productos pequeños (Ghezzi, 2018).

En este contexto, sobre la base de la información sobre las operaciones comerciales internacionales, los siguientes son aquellos productos (tradicionales y no tradicionales) en los que el Perú obtuvo ventajas comparativas en el período 2010-2016 y que deberían seguir contribuyendo a la diversificación de la economía y al logro del crecimiento económico a más largo plazo. Aunque el país tiene un gran potencial que aún no se ha utilizado plenamente, existe el

riesgo de perder progresos significativos si se estancó o comete un error al continuar exportando productos predominantemente tradicionales.

Variación de las exportaciones peruanas en el primer trimestre del 2020.

Tabla 1: Exportaciones de productos Tradicionales y no tradicionales 2020

Sector	Ene-mar 2019	Ene-mar 2020	Variacion %	Participacion %
Tradicional	*$7.673.676.216*	*$6.242.434.278*	*-18,65%*	***67,85%***
Mineria	*$6.033.818.906*	*$5.353.430.381*	*-11,28%*	*58,18%*
Petroleo y Gas Natural	*$880.927.371*	*$531.519.179*	*-39,66%*	*5,78%*
Pesca Tradicional	*$666.603.850*	*$295.964.139*	*-55,60%*	*3,22%*
Agro Tradicional	*$92.326.089*	*$61.520.579*	*-33,37%*	*0,67%*
No tradicional	$3.267.560.089	$2.958.689.278	-9,45%	**32,17%**
Agro No Tradicional	*$1.444.840.914*	*$1.582.934.918*	*9,56%*	*17,20%*
Quimico	*$375.183.934*	*$340.713.565*	*-9,19%*	*3,70%*
Textil y Confecciones	*$349.678.271*	*$272.824.880*	*-21,98%*	*2,97%*
Sidero Metalurgico	*$265.167.549*	*$218.954.910*	*-17,43%*	*2,38%*
Pesca No Tradicional	*$396.231.890*	*$247.157.009*	*-37,62%*	*2,69%*
Mineria No Metalica	*$137.382.354*	*$86.379.784*	*-37,12%*	*0,94%*
Metal Mecanico	*$141.424.684*	*$115.484.036*	*-18,34%*	*1,26%*
Maderas	*$30.727.197*	*$24.391.358*	*-20,62%*	*0,27%*
Industria de Papel y Carton	*$53.599.800*	*$39.159.722*	*-26,94%*	*0,43%*
Joyeria	*$39.802.902*	*$6.369.266*	*-84,00%*	*0,07%*
Pieles y Cueros	*$4.935.035*	*$3.218.323*	*-34,79%*	*0,03%*
Calzado	*$5.099.028*	*$4.317.894*	*-15,32%*	*0,05%*
Atesanias/Decoracion	*$290.359*	*$294.761*	*1,52%*	*0,00%*
Varios	*$23.196.172*	*$16.488.852*	*-28,92%*	*0,18%*
Total	***$10.941.236.305***	***$9.201.123.556***	*-15,90%*	***100%***

Fuente: Construido por el autor basado en los datos de Comtrade.
https://comtrade.un.org/
(Consultado el 10 de octubre del 2020).

Por otro lado, China se posicionó como principal destino durante el periodo mencionado en el 2020, a pesar de que los envíos a dicho mercado disminuyeron en 21.64%, en relación al año anterior. Como segundo mercado de destino se encuentra la Unión Europea, con un 9.16% de disminución; seguido de Estados Unidos, 10%. En la tabla 2, se puede observar que, dentro de los 15 principales destinos, las exportaciones a Corea del Sur, Chile, Emiratos Árabes y México fueron las únicas que registraron incremento. Asimismo, se muestra que, en el 2019, Suiza se posicionó como cuarto principal destino; sin embargo, en el 2020, bajó de posición al puesto 8. Similar desempeño tuvo Japón, que bajó un puesto.

Métodos De Investigación

El proceso metodológico desarrollado se basó en información comercial internacional de diferentes plataformas como Contrade, el Centro de Investigación Estratégica del Perú, INEI (Instituto Peruano de Estadística e Informática), Banco Mundial, RBC Daily Business Newspaper y otros. Así como estudios realizados por diferentes autores peruanos, rusos, entre otros, que han proporcionado un acceso detallado a los principales datos sobre el comercio exterior mundial, así como el análisis de los datos del comercio internacional.

Con esto se ha tenido acceso a las exportaciones e importaciones que Perú y los paises Latinoamericanos han hecho a los diferentes mercados y a su vez se ha identificado las exportaciones de cada producto peruano al mundo durante el período 2010-2020.

Luego de la recaudación de datos y trabajando en funsion del metodo de ventajas comparativas, se procedió a la identificación de los productos potenciales, que cuentan con un crecimiento progresivo para el periodo de estudio. Seguido, se han comparado los productos peruanos con los de otros países, a través del cálculo de los índices de Balanza Comercial Relativa (IBCR), paso en el que se pudo cuantificar e identificar los países con los cuales Perú muestra una ventaja comparativa; luego se calculó el Índice de Balassa (IB) e indice de Balassa Normalizado (IB), con lo cual identificamos los productos que aún no han llegado a considerarse potenciales, pero tienen gran perspectivas de mejorar en el mercado internacional.

Y para finalizar el estudio se midio la variacion y como se han visto afectadas las exportaiones peruanas y latinoamericanas de los productos identificados como potenciales de los años 2019 y 2020 en sus primeros trimestres.

Resultados

Productos tradicionales y no tradicionales en los que se encontro una ventaja comparativa con el resto del mundo.

Tabla 2: Exportaciones peruanas, principales productos, enero a marzo de 2019 y 2020. Valor FOB expresado en US$.

Descripcion	Ene-mar 2019	Ene-mar 2020	Variacion %	Participacion %
Minerales de cobre y sus concentrados	$2.811.588.900	$2.423.208.564	-13,81%	26,34%
Oro en demás formas, en bruto	$1.632.653.294	$123.756.761	-92,42%	13,40%
Uvas frescas	$354.233.032	$469.518.861	32,55%	5,10%
Los demás minerales de zinc y sus concentrados	$411.356.761	$349.056.588	-15,15%	3,78%
Cátodos de cobre refinado	$237.813.479	$316.216.618	32,97%	3,44%
Minerales de hierro y sus concentrados	$196.975.771	$271.598.721	37,88%	2,95%
Minerales de plomo y sus concentrados	$224.605.443	$242.669.867	8,04%	2,64%
Descripcion	Ene-mar 2019	Ene-mar 2020	Variacion %	Participacion %
Harina, polvo y "pellets", de pescado	$540.852.833	$226.965.036	-58,04%	2,47%
Mangos y mangostanes, frescos o secos	$173.362.167	$179.826.609	3,73%	1,95%
Paltas, frescas o secas	$41.857.996	$136.292.578	225,61%	1,48%
Las demás gasolinas sin tetraetilo de plomo	$187.687.968	$133.533.175	-28,85%	1,45%
Demás minerales de molibdeno	$149.716.130	$114.542.431	-23,49%	1,24%
Gas natural, licuado	$214.679.675	$112.792.344	-47,46%	1,23%

Zinc en bruto, sin alear	$112.770.406	$111.815.475	-0,85%	1,22%
Residual 6	$92.253.304	$111.069.067	20,40%	1,21%
Minerales de plata y sus concentrados	$115.940.765	$105.704.801	-8,83%	1,15%
Estaño sin alear	$97.237.854	$100.484.934	3,34%	1,09%
Carburorreactores tipo queroseno para reactores	$119.212.177	$90.062.105	-24,45%	0,98%
Mango, sin cocer o cocidos	$48.650.488	$63.430.634	30,38%	0,69%
Espárragos, frescos o refrigerados	$55.381.890	$56.381.468	1,80%	0,61%
Jibas incl. globitos, calamares y potas, congelados	$119.287.005	$51.640.436	-56,71%	0,56%
Zinc en bruto, sin alear	$65.072.829	$51.340.937	-21,10%	0,56%
Café sin tostar, sin descafeinar	$68.444.101	$46.161.002	-32,56%	0,50%
Alambre de cobre refinado	$47.417.969	$45.207.828	-4,66%	0,49%
Arándanos, frescos	$82.217.533	$39.550.884	-51,89%	0,43%
Grasas y aceites de pescado y sus fracciones	$92.178.054	$39.339.900	-57,32%	0,43%
Tshirt de algodón para hombres o mujeres	$43.628.576	$37.915.172	-13,10%	0,41%
Minerales de oro y sus concentrados	$4.767.257	$36.946.253	675,00%	0,40%
Aceites crudos de petróleo	$1.589	$36.419.933	2291903,34%	0,40%
Demás preparaciones para la alimentación anima	$50.540.429	$34.776.396	-31,19%	0,38%
Otros productos	$2.548.850.632	$1.933.898.180	-24,13%	21,02%
Total	$10.941.236.307	$8.092.123.558	-26,04%	100%

Fuente: Construido por el autor basado en los datos de Comtrade.
https://comtrade.un.org/
(Consultado el 10 de octubre del 2020).

Conclusión

En los ultimos años se ha demostrado la inestabilidad del mercado internacional, las ultimas crisis mundiales que afectaron significativamente a la region, como la crisis financiera de 2007-2008 genero una contraccion mundial del 2.9%, la guerra comercial entre China y Estados Unidos iniciada en el 2018 y ahora en el 2020, debido a la crisis ocasiona por la pandemia COVID19, generó una contraccion mundial estimada del 6.2%. Pero ubieron otros eventos importantes que abrieron nuevos mercados a Latinoamerica, como las sanciones a Rusia por Estados Unidos y la Union Europea, a partir de la guerra con Ucrania en el 2014, que abrieon un nuevo mercado con grandes oportunidades, demostrando la volativilidad de la economia global. Otro factor importante en los paises de la region es la poca demanda diferenciada con la que cada pais Latinoamericano cuenta.
Y es por esto que se propone la creacion de una estrategia de comercio Internacional para la region, teniendo en cuenta las ventajas comparativas de cada país.

Tomando en cuenta a Perú como ejemplo de estudio, usando la teoria de ventaja comparativa y los datos del comercio internacional se hizo posible determinar una lista de treinta y dos productos que cuentan con ventajas comparativas con respecto a los paise de la region y el mundo, de los cuales se identificó, veinte productos (tradicionales y no tradicionales), que aumentaron las ventas en el extranjero de manera constante para el periodo de estudio 2010, hasta el primer trimestre del 2019, y los otros doce, con volúmenes de exportación bajos, pero con un gran potencial de crecimiento.

a. Productos tradicionales basados en recursos naturales que Perú exportó entre 2010-2020. con una mayor participación en el comercio de estos productos. Esto le permite obtener un IBCR positivo, que expresa una ventaja en los intercambios de comercio.

Entre los productos se encuentran cobre, oro, zinc, plata, plomo, molibdeno, harina y aceite de pescado, gas natural y café; Es necesario tener en cuenta la estrategia regional, que permitirá exportar productos más complejos, especializados y diversos, para aumentar no sólo su competitividad, sino también para hacer que la economía sea menos vulnerable a las fluctuaciones de los precios de los bienes exportados.

b. Productos no tradicionales con mayor valor añadido y exportados al Perú con ventajas comparativas en el período 2010-2018. Este grupo está formado principalmente por productos agroindustriales, como uvas, aguacates, espárragos, arándanos, mangos, plátanos, cacao, pero también zinc sin endulzar o leche evaporada, que representan una dinámica de comercio exterior que los pone con un IBCR positivo y un valor significativo de exportación en este grupo. Esto requiere un aumento de los altos costos logísticos, altos estándares laborales, una infraestructura de transporte débil, entre otras cosas, con el fin de distribuir los factores de producción necesarios para crear una industria con un alto componente tecnológico.

c. productos no tradicionales para restaurar la cesta de exportación y dirigirla a grandes cadenas de valor mundiales. Aquí se identificaron los siguientes productos: guisantes verdes, granada, pulpo, manteca de cacao, mantas de lana o pelo fino, abrigos y suéteres de lana, Pisco, cebollas, zinc y productos de fresa. Estos productos ofrecen la oportunidad de estimular el desarrollo local mediante el fortalecimiento de las actividades de producción con potencial de exportación. De hecho, el plan nacional para diversificar la producción requiere la creación de nuevos mecanismos de crecimiento, identificando potencialidades de las cadenas de valor mundiales y coordinando los esfuerzos en el lev els intersectoriaal y territorialpara aumentar la competitividad.

A su vez se evaluo el comportamiento de los productos potenciales para los primeros trimestres de los años 2019-2020. Econtrandose que los productos exportados, de la lista de los principales productos, los envíos de harina de pescado fueron los más afectados, con una caída de 58.04%; seguido de las grasas y aceites de pescado, -57.32%; jibias, -56,71%; y arándanos, -51.89%. Por otro lado, las exportaciones de aceites crudos de petróleo mostraron un incremento considerable, tal como lo muestra la tabla 2. Además, los envíos de minerales de oro y sus concentrados crecieron 675%.

En el primer trimestre del 2020, y según los datos de la Cámara de Comercio de Lima, las exportaciones peruanas sumaron US$ 9,201 millones, monto 15.9% menor al mismo periodo del año anterior. Dentro del macro sector tradicional (que tuvo una baja de 18.65%), el sector más afectado fue la tradicional, cuyas exportaciones disminuyeron en 55.60%; seguido del petróleo y gas natural, con una caída de 39.66%. Por su parte, el macro sector no tradicional tuvo una variación negativa de 9.45%, dentro del cual el más afectado fue el sector joyería, que tuvo una disminución de 84%; seguido de la pesca no tradicional, 37.62%.

Para el cierre del año, según datos del FMI, se prevé que la actividad económica se recupere gradualmente, y que en 2021 se registre una expansión en el PIB del 6.5%, cifra que se encuentra por encima de los países vecinos Latinoamericanos (Encontrándose Chile en segundo lugar con un crecimiento proyectado según el FMI de un 5%, seguido de Colombia con 4%, Argentina 3.9%, Brasil 3.6% y México con un 3.3%), de igual manera para el 2021según datos del BCR se espera un incremento en las exportaciones de 7,336 millones y en las importaciones de US$ 5,016 millones.

Las ventajas comparativas que el país tiene a nivel de diversos tipos de productos permiten seguir promoviendo inversiones en estos sectores y, en particular, asegurar el desarrollo regional a través de tasas productivas que fortalezcan la estructura empresarial, el desarrollo de una infraestructura logística competitiva y una red de proveedores, que pueden incluirse en la cadena de valor global, que aumenta el empleo y el bienestar de la población. Por último, cabe señalar que el modelo teórico por el que está justificado este análisis nos permite identificar las mercancías líderes en la exportación de mercancías a nivel nacional; sin embargo, la cesta de exportación es más ancha y deja espacio para el comercio internacional de otros productos con ventajas comparativas, tales como joyas, piedras preciosas o semipreciosas, semillas de semillas, pinturas y dibujos hechos a mano, desechos de polímeros de estireno y otros productos identificados, mostrando el índice positivo de equilibrio comercial y el índice balassa bilateral.

[1] Decreto Supremo 076-92-EF, ley que define la lista de exportaciones tradicionales, tales como: Minería, petróleo y gas natural, pesca tradicional y agro tradicional (algodón, azúcar, café, etc.). Los productos que no se encuentren dentro de los sectores mencionados, son considerados productos no tradicionales (Agro no tradicional, Químico, Textil y confecciones, Sìdero metalúrgico, Pesca no tradicional, minería no metálica, madera, joyería, etc.).

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Mobile Applications for Location and Access to Places of Interest: A Systematic Review

Maria ARDAYA-SERVIGÓN
Universidad Autónoma del Perú, Lima, Perú, ardayamaria@gmail.com

Gianpaul NINALAYA-VALVERDE
Universidad Autónoma del Perú , Lima, Perú, gninalaya@gmail.com

Javier GAMBOA-CRUZADO
Universidad Autónoma del Perú, Lima, Perú, jgamboa65@hotmail.com

Roger CHANDUVÍ CALDERÓN
Universidad Señor de Sipán S.A.C. , Chiclayo, Perú, rchanduvi@crece.uss.edu.pe

Anibal SIFUENTES DAMIÁN
Universidad Nacional José Faustino Sánchez Carrión, Huacho, Perú, asifuentes@unjfsc.edu.pe

Carlos CHAVEZ HERRERA
Universidad Nacional Mayor de San Marcos, Lima, Perú, cchavezh@unmsm.edu.pe

Jorge INCHE MITMA
Universidad Nacional Mayor de San Marcos, Lima, Perú, jinchem@unmsm.edu.pe

Summary

With the passing of years, the market has undergone a technological transformation, making the business environment more competitive. Thus, companies such as those in the automotive mechanics sector, which is mostly composed of micro and small businesses, cannot continue to work in traditional ways. To be competitive and meet the demands of the environment, it is necessary to seek advantages, such as the implementation of technologies. Currently, people are tied to smartphones, PCs, and laptops for communication, work, information searches, etc. This paper is an exhaustive review of documents published between 2016 and 2020, which have been extracted from 10 academic sources; 100 of these articles were selected by means of search queries. By applying a quality-criteria assessment, 81 definitive documents were obtained. From this study, the research questions were answered, showing that the development and use of mobile applications is relevant in broader areas and generate great competitive advantages.

Keywords: Mobile Application, Scrum, Geolocation, Location, Access, Information, Systematic Review.

Introduction

In today's business world, there is competition in the marketplace, so businesses promote offers to attract customers; however, this is not enough to be competitive and increase revenue. In modern times, with people's busy and hectic lifestyles, it would be advantageous if they could be provided with up-to-date information on the establishments they wish to find [81], such as the location of a store, entertainment venue, restaurants, bars, hotels, roads, or specific addresses [63][14].

Currently, in Latin America, the auto mechanic industry has a big problem. When one needs to find one of these centers must be acquainted this service through a friend, family member, or social network that recommends it, or the first one available nearby. In the case of an accident, one must search for telephone numbers to call and confirm whether the business is open. Then, if the establishment is closed, one must keep looking, even if the car repair shop is not nearby. A tow truck is needed to help transport the car, and even if one finally finds a service provider, there would be no information regarding the quality of their service or a guarantee on the spare parts they use. Because of this, the traditional environment in which these establishments work must change, and they need to implement new alternatives.

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The growth of mobile devices and wireless networks is reaching users of various ages across societies, increasing the interest in accessing online information services anywhere, anytime. Mobile platform technologies (Android and iPhone) that are circulating in the community are among today's information technologies, which are the basis for bringing about changes in various aspects for basic needs of human life. Most smartphones today have built-in and available technology features, such as sensors, location-based services, and internet access [5][33].

Therefore, it is clear that today, the Internet has become an important tool for communication, and applications have appeared as indispensable instruments for the propagation of information, as well as the provision of services to network users [52].

The paper is organized as follows. Section I is the introduction, Section II presents the background and related research, Section III explains the methodology of the research, and Section IV presents the results of this study. Finally, Section V presents the discussions and Section VI describes the conclusion and future research.

Background and Related Research

In the last several years, several investigations have been carried out on the development and use of geolocation applications to locate and access places in different sectors, or areas, such as services, transit, medicine, education, tourism, emergency alerts, and public safety. These fields may be subjects of study where technology and tools [6] would help improve and facilitate people's lives and companies' marketing, as using geolocation technology to deliver information to a large number of people about locations is a current real-world application [21].

There are a variety of mobile system research works, such as G. Suddul, K. Nundran, J. L. K. Cheung, and M. Richomme [11], in which a local geolocation API is presented for rapid application development on the France Telecom Orange Lab Emerginov platform [6]. This is an open platform that provides a rich set of APIs to support the development of microservices and aims to empower local communities to design and deliver multimedia content (voice, SMS, USSD), and to generate an application called MapPie for all-in-one geolocation. It has a development environment to test all the functionalities available for the client application.

A. Delgado and J. Sosa [12], show a mobile application with geolocation capabilities to find solid-waste-processing facilities in areas where they are not readily available. For this need, a solution has been proposed in the Olivos District, as users do not know which company is responsible for collecting solid waste, or the time, place, or day of collection, nor the specific location for pickup. Therefore, to contribute to the reduction of pollution in the Olivos District, a mobile application with specific activities and a simple operation has been developed. This application has been developed for the Android operating system to implement a geolocation system for solid waste-collection units that works in real time as a preventive measure to reduce the high levels of environmental pollution in the district of Los Olivos, as well as to reduce social conflicts.

The "Peluquerías" application by L. Enciso-Quispe, P. A. Quezada-Sarmiento, E. Chavez, C. Sanmartín, and E. Zelaya-Policarpo [13] has a more specific concept. It was developed for the web and then adapted to mobile devices; it is also a multiplatform application. It locates beauty salons within the city of Loja, shows information such as name of the business, slogan, description, days of operation, and, very importantly, emphasizes the times when it is open to the public; it also has a system that helps the user arrive at the beauty parlor by suggesting a route, which is obtained using Google Maps API services. These characteristics are differentiating factors, as its use is intuitive and very easy. The application is developed using Scrum, which is a process in which a set of good practices are applied regularly to work collaboratively in teams and obtain the best possible result from a project.

Research Methodology

This study is a systematic literature review (SLR), which, according to B. Kitchenham [82], is an iterative process that combines all existing literature on a specific topic or research question. It consists of the following stages: asking questions, developing search queries, identifying search sources, searching for and selecting articles, applying exclusion criteria, assessing the quality of primary studies, reviewing documents, and identifying findings. Therefore, it is appropriate to identify the current state of such studies in software engineering and to identify the evidence for conducting a systematic review of the literature.

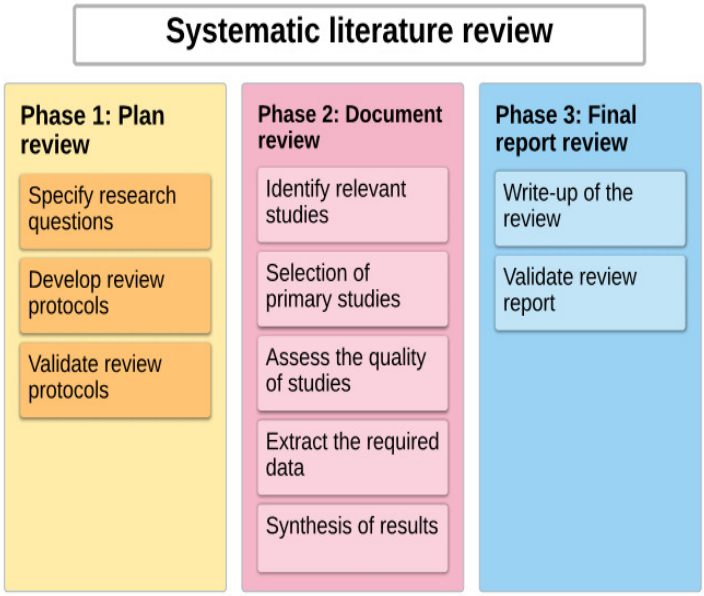

Fig. 1Systematic literature review process

A. Research Questions

The following research questions have been defined and will be answered through the analysis of the scientific articles to be identified in the study (Table 1).

Table 1: Research questions and reasons

Questions	Motivation
RQ1. What are the criteria for measuring the overall effectiveness of mobile applications using geolocation**?**	Know the overall effectiveness of mobile applications with geolocation.
RQ2. What are the criteria for measuring the overall effectiveness of mobile applications developed using the scrum methodology**?**	Determine the overall efficiency of mobile applications developed using Scrum.
RQ3. What are the criteria for measuring the overall efficiency of mobile applications using geolocation that were developed through the scrum methodology**?**	Identify the overall efficiency of Mobile Applications with geolocation, developed using Scrum.
RQ4. What sources and means of publication are the main objectives of research development in the topic**?**	Determine which sources and means of publication are the main objectives of research production in the area.
RQ5. In what areas have mobile applications developed with geolocation been used**?**	Identify in which areas mobile applications developed with the Scrum methodology have been used.

B. Exclusion Criteria

In this section, the main objective is to ensure that all articles selected in this study are relevant and related. The information found was chosen from various documents, such as journals and conference papers, all written in English or Spanish and published in digital databases between 2016 and 2020. The authors of the research did not include articles that were irrelevant or unrelated to the topic and context of study. Table 2 shows the exclusion criteria applied.

Table 2: Exclusion Criteria

Id.	Criteria
EC1	Articles that are not less than 4 years old OR
EC2	Articles that are not written in English and Spanish OR
EC3	Articles that have not been published in journals or conferences OR
EC4	Articles that do not use a methodology in their research OR
EC5	Articles not in the technology and communications area

C. Search Strategy

The search strategy describes the organizational structure of the key terms used to search a digital database. This technique is used to manually and automatically scan sources to retrieve and review data for use in the study. The scoping was carried out in ten digital databases: IEEE Xplore, Science Direct, ProQuest, ACM Digital Library, Springer Link, EBSCOhost, Wiley Online Library, Scopus, Taylor & Francis Online, and Google Scholar.

These databases were selected because they were considered to be the most notable, up-to-date, accessible, and easy to work with, showing that they are outstanding in the publication of journals and conference papers in their respective fields of research.

The research questions and titles were scoped for key words or terms of agreement and relevant interest to define the search limits to be considered. The queries that ended up being used are listed in Table 3.

Table 3: Table of Search Equations

Data Sources	Queries
IEEE Xplore	((("Full Text & Metadata":mobile application) AND "Full Text & Metadata":location) AND "Full Tex0t & Metadata":Scrum)
Science Direct	mobile application AND location AND Scrum
ProQuest	(mobile application) AND (location to place) AND Scrum
ACM Digital Library	And All: location And All: Scrum
Springer Link	mobile AND application AND Scrum AND "location
EBSCOhost	TX mobile applications AND TX location AND TX Scrum
Willey Online Library	"mobile applicative" anywhere and "location" anywhere and "Scrum" anywhere
Scopus	ALL (mobile AND application) AND ALL (location) AND ALL (Scrum)
Taylor & Francis Online	And All: location And All: Scrum
Google Scholar	application mobile AND "Scrum" AND "location

D. Study Selection Process

The number of research studies first rendered by the search queries was 3,754, taken from the ten different databases. These are shown in Fig 2.

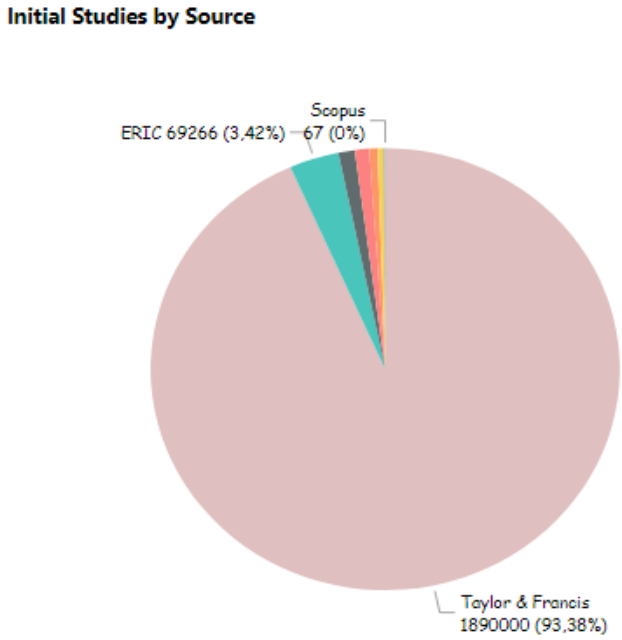

Fig. 2: Summary of number of results by source

The five selected criteria were used, resulting in 100 research pieces related to the present study, as shown in Fig 3.

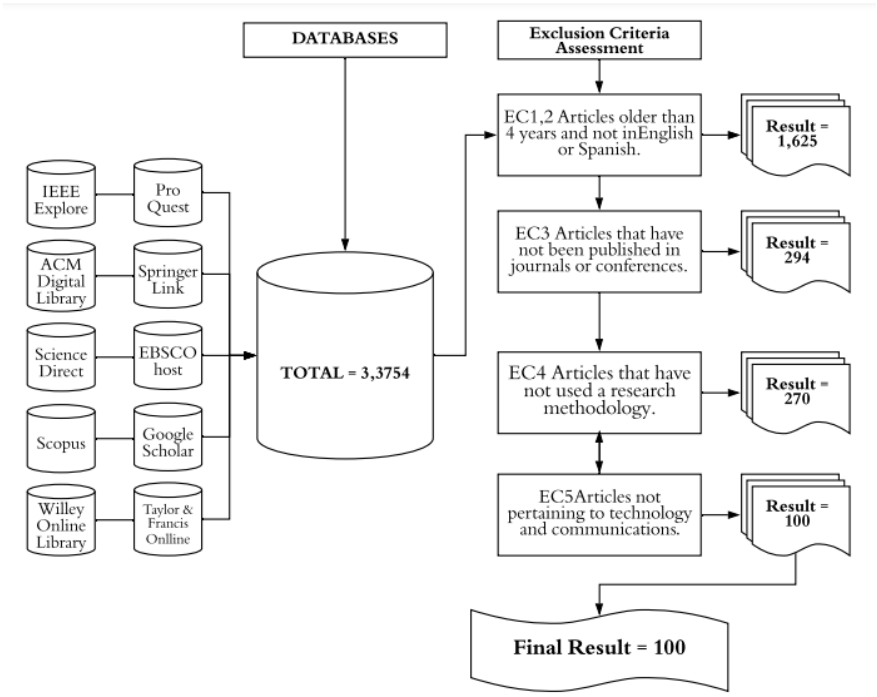

Fig. 4: Summary of the number of results after applying exclusion criteria

E. Quality Criteria Assessment for Studies

Five criteria were used to evaluate the quality of the 100 articles obtained, of which, only 81 investigations were left that met all the criteria (Table 4).

Table 4: Quality criteria used

Id.	Quality Criteria
QC1	Does the article have a well-organized and described structure?
QC2	Are the bibliographic databases of sufficient quality?
QC3	Does it clearly show the purpose of the research?
QC4	Does the article discuss the validity and/or limitations of the research?
QC5	Is the article relevant to the research being conducted?

Results

This phase of the review will answer the questions that were raised.

A. RQ1. What are the criteria for measuring the overall effectiveness of mobile applications using geolocation?

To answer this first question, criteria were identified to measure the effectiveness of the application using geolocation:

Table 5 shows that the criterion that has the most support is real-time location with 33%, representing 29 articles out of the 81 analyzed, whereas the criterion that has the least support is the creation of routes with 11 articles, representing 12%.

Table 5: Effectiveness criteria for mobile applications using geolocation

Criteria	Articles	No. (%)
Accuracy	[20], [23], [37], [38], [39], [42], [44], [45], [49], [65], [67], [69], [73], [75], [76], [81]	16 (18)
Saving time	[3], [6], [9], [16], [22], [24], [29], [33], [43], [45], [46], [53], [57], [58], [62], [63], [77], [78], [81]	19 (21)
Proximity	[3], [20], [26], [37], [41], [47], [49], [50], [60], [69], [70], [71], [75], [78]	14 (16)
Real-time location	[2], [3], [7], [13], [29], [34], [36], [38], [42], [44], [45], [46], [47], [48], [49], [53], [58], [60], [61], [62], [63], [68], [69], [70], [71], [75], [76], [78], [80].	29 (33)
Routes	[8], [14], [27], [30], [45], [46], [48], [63], [65], [67], [75]	11 (12)

Using geolocation significantly shortens the duration and extent of searches by improving location accuracy, which is easy to comprehend and is precise within meters in space and minutes in time.

Positioning technology makes high-precision real-time continuity monitoring feasible for positioning and navigation, including geographic information and satellite maps [20][23][44][69].

Location-estimation techniques can be divided into three general categories: proximity, triangulation, and scene analysis.

Proximity-based methods can only provide an approximate position of a device based on link or connection information.

When more than one antenna detects the same moving target, the location is defined by the antenna that receives the strongest signal. This method is simple to implement [75][69][70][78][63].

One of the most important problems for users is that they may take a long time to reach routes, places that are not familiar to them, and shorter roads to get home faster or detours to avoid city traffic. Using geolocation through mobile applications provides assistance in performing these routes, as well as a history of routes taken that shows details, such as other routes taken or places stopped [14][45][48].

B. RQ2. What are the criteria for measuring the overall effectiveness of mobile applications developed using the Scrum methodology?

To answer this question, criteria were identified to measure the effectiveness of the application using geolocation.

Table 6 shows that the criterion with the most support is quality, with 36 articles, interpreted as 45%. In contrast, the incremental criterion shows the least support with 11.25%, representing 9 articles out of the 81 analyzed.

Table 6: Effectiveness criteria for mobile applications developed with Scrum

Criteria	Articles	No. (%)
Agile	[5], [9], [12], [28], [35], 36], [55], [56], [66], [67], [77]	11 (13.75)
Iterative	[9], [12], [17], [19], [28], 32], [35], [39], [61], [67], [70], [74], [75]	13 (16.25)
Flexible	[9], [12], [17], [28], [31], [32], [35], [56], [63], [77], [78]	11 (13.75)
Incremental	[5], [25], [28], [32], [36], [47], [51], [68], [72]	9 (11.25)
Quality	[1], [3], [6], [7], [9], [12], [14], [19], [20], [21], [24], [28], [32], [33], [34], [36], [37], [39], [40], [44], [45], [46], [48], [50], [56], [57], [61], [72], [73], [74], [75], [76], [77], [80]	36 (45)

Agile methodologies are widely implemented and used worldwide, with more than 20 different agile methodologies and types. The agile approach is considered one of the best approaches for mobile application development and identifying changes in the processes. The selection of the agile process will often depend on the experience and knowledge of the development team, and the time of delivery of the application.

Mobile applications require a higher degree of flexibility than desktop systems, and achieve this by integrating various mobile development processes with agile techniques and versatile and flexible process mapping.

Agile techniques focus on development activities and tasks around analysis and design. In these techniques, continuous Sprint application development is performed. The main contribution of the proposed framework is the guidance provided for the consideration of key aspects of agile development, as well as software attributes in the mobile domain [9][5][12][56].

Scrum shows criteria such as flexibility to change, small iterations, and short time releases; iterative customer response; high quality; and teamwork to achieve objectives [35].

From the very first moment of software development, the ISO/Quality IEC 25010 should be considered, which demonstrates the quality characteristics to be used [6] [19].

C. RQ3. What are the criteria for measuring the overall efficiency of mobile applications using geolocation, and that were developed through the Scrum methodology?

To answer this question, several criteria were identified to measure the effectiveness of geolocation applications developed through Scrum methodology.

Table 7 shows that the criterion with the most support is low cost with 37%, representing 41 articles out of the 81 analyzed, whereas that with the least support is adaptiveness with 11 articles, that are interpreted as 10%.

Table 7: Efficiency criteria of mobile apps with geolocation developed with Scrum

Criteria	Articles	No. (%)
Functional	[1], [2], [3], [20], [23], [9], [12], [14], [16], [17], [19], [20], [26], [28], [29], [36], [38], [40], [48], [49], [50], [61], [62], [63], [67], [70], [71], [75], [76], [77]	28 (25)
Low Cost	[1], [2], [6], [9], [13], [21], [22], [24], [25], [26], [28], [31], [32], [33], [36], [37], [39], [40], [43], [46], [47], [48], [50], [56], [57], [60], [63], [67], [68], [69], [70], [71], [72], [73], [74], [76], [77], [78], [80], [81]	40 (36)
Adaptive	[8], [9], [12], [26], [28], [39], [46], [47], [61], [70], [75]	11 (10)
Interactive	[6], [7], [8], [14], [17], [28], [30], [31], [37], [60], [61], [63], [67], [73], [77]	15 (14)
Exact location	[20], [23], [37], [38], [39], [42], [44], [45], [49], [65], [67], [69], [73], [75], [76], [81]	16 (15)

The developed design of an application must be functional to facilitate navigation and provide accuracy, maintainability, portability, and adaptability [2][17][12].

Geolocation is one of the technologies used frequently in mobile phones today, and has proven to be useful. Mobile phones have a function that is integrated into a tool that can send and receive satellite signals to collect the exact location of the person, device, or place. This can determine the consumer's information, needs, and choices of products and services. This is important because without finding the right location information, the user does not know where to find what they need [34][24][36][64].

An interactive method is presented using Scrum, which in each iteration obtains feedback from stakeholders for constant improvements and to obtain a good final product [8].

D. RQ4. What sources and means of publication are the main objectives of research development in the topic?

This question can be answered with Fig 4, which shows that of the total of 81 articles examined, there are two publication objectives, with the highest percentage (64.2%) being journal articles with 52 articles, and the lowest (35.8%) being proceedings with 29 articles.

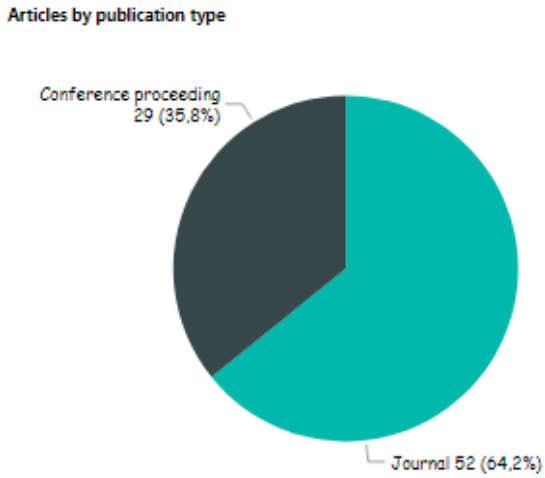

Fig. 4: Articles by publication type

By analyzing the 81 articles, the results shown in Fig 5 were obtained. The source with the most public proceedings is IEEE Explore, with 14 articles, whereas in the case of journals, it is Springer Link with 11 articles.

Number of articles by Publication Type and Source

Publication Type	ACM Digital Library	EBSCO host	Google Scholar	IEEE Explore	ProQuest	Science Direct	Scopus	Springer Link	Taylor & Francis Online	Wiley Online Library	Total
Conference proceeding	5	3	3	14		3		1			29
Journal	1	4	3	1	10	3	10	11	5	4	52
Total	6	7	6	15	10	6	10	12	5	4	81

Fig. 5: Articles by publication type and source

E. RQ5. In what areas have the mobile applications developed with geolocation been used?

In the articles reviewed, different areas were found to be used for the implementation of applications using geolocation.

Table 8 lists the areas of implementation, where transport shows the most degree of support with 22 items, which is 27.1%. In contrast, medicine shows the least support with 7 items, which is 8.6%.

Table 8: Areas of implementation

Areas	Articles	No. (%)
Medicine	[2], [6], [19], [34], [49], [60], [62]	7 (8.6)
Transport	[2], [7], [10], [17], [22], [26], [30], [32], [34], [42], [48], [53], [54], [61], [63], [65], [74], [75], [76], [78]	22 (27.1)
Tourism	[4], [6], [14], [30], [31], [33], [48], [59], [60], [63], [50], [61], [62], [63], [75],	12 (14.8)
Daily life	[2], [7], [14], [36], [37], [41], [47], [48], [67], [71], [73], [75]	12 (14.8)
Emergency	[2], [8], [13], [16], [17], [19], [20], [24], [29], [36], [43], [53], [62], [63], [69], [74], [75], [80]	20 (24.6)
Marketing	[1], [6], [9], [14], [30], [33], [34], [36], [49], [53], [63], [69], [71], [72], [73], [76], [81]	18 (22.2)
City	[15], [16], [27], [40], [63], [65], [74], [75], [76], [77]	10 (12.3)

Discussion

Once the results of the questions posed in this study are defined, the results can be discussed. The effectiveness of the mobile applications with geolocation was determined based on the criteria obtained by the authors as achievements in their research. Further, the effectiveness of the mobile applications with geolocation prompts many authors to use them in various fields where the use of personal information is not desired by its users. The results of this work also determined how important it is to follow a development methodology that ensures the quality standards and security of the project. In turn, it is important to know the types of tools used to create mobile applications with geolocation to be used. Depending on the needs of the users, not all tools are necessary for the same scenarios. It has also been shown that the data require special treatment to ensure that true and reliable information is provided.

The evidence in this article suggests that mobile applications with geolocation are a good option because they cover an impressive number of important areas. It is up to the professionals to determine the best way to implement them, taking into consideration the development methodologies, the tools and techniques that exist to support them, as well as the quality and security standards.
This work is consistent with the research by F. Kamoun, M. El Barachi, A. Hachani, F. Belqasmi, A. Ben Said, and I. Amri [32] on the use of mobile applications with geolocation for the emergency supply of oxygen cylinders to patients suffering from sudden respiratory distress.

Conclusion and Future Research

In this research, a systematic literature review (SLR) was used to analyze studies between 2016 and 2020. This work was based on 10 academic databases by applying search queries, which provided a total of 3,754 articles initially. The SLR successfully answered the questions raised in this research work. The findings enabled the identification of very important data when creating a mobile application with geolocation, such as tools for their creation, areas in which they are used, and which methodologies could work. Compared to traditional methods, the use of Scrum methodology has several advantages, such as the development of incremental projects; specifically, one can create applications based on customer needs. It can be concluded that today, the use of applications with geolocation is very important because it can provide solutions to the most common problems in everyday life, such as finding places for free or reaching a location in case of emergency. In addition, this function can be combined with many others, such as a panic button, which has been implemented in various areas.

For future research, it is recommended to use studies with a period of less than 3 years to obtain the latest trends in mobile applications with geolocation that can contribute new concepts for new authors to apply to their research.

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Assessment of Causes and Effects of Corporate Restructuring

Kinga BAUER

Cracow University of Economics, Department of Accounting, Krakow, Poland

kinga.bauer@uek.krakow.pl

Abstract

Constant changes that take place in the economic environment of enterprises force them to constantly adapt to current conditions. Ignoring changes can cause serious crises and even bankruptcy of companies. A method of counteracting crisis situations, as well as a method of overcoming them, is the restructuring process. In the event of a crisis situation, the starting point is restructuring aimed at remedial actions, and only then taking development measures. Carrying out restructuring requires a series of analyses to determine the grounds and effects of the changes which have been implemented. The goal of the article was to determine the measures used in the diagnosis of the needs and effects of restructuring, as well as the importance of plans and forecasts in the assessment of the implemented changes. In order to achieve this goal, literature studies and surveys in the form of questionnaires were conducted on a group of restructuring specialists. As a result of the conducted research, it was found that there is no uniform set of indicators used in the restructuring process to assess the need to restructure and the achieved results. Popular indicators for diagnosing the needs and effects of restructuring are liquidity, solvency and profitability ratios. Restructuring specialists also identified as important, information on the company's plans, forecasts, goals and strategy which could affect its future cash flow.

Keywords: corporate restructuring, financial measures, financial statement, financial ratios

Introduction

Restructuring is equated with activities that lead to an increase in the value and effectiveness of business operations. Its purpose is to develop and improve competitiveness. However, the impulse to carry out the restructuring process may be not only the improvement of good but unsatisfactory results, but also the recovery from a crisis situation of a given enterprise. When a company experiences a serious crisis, the first step to take must be restructuring with the purpose of remedial actions, and only then development. In extreme cases, that are the risk of insolvency or insolvency, this process may be conducted with the consent of the law court and under the supervision of court-appointed restructuring advisors or other court representatives. The designation of persons responsible for carrying out judicial restructuring proceedings depends on the law of a given country. The commencement of the restructuring process, as well as the assurance of gaining positive effects after its completion, requires the use of a number of measures, created both on the basis of financial statements and other assessments resulting from the achievements in the theory and practice of management. The results should be compared to the plans and forecasts prepared for the purpose of restructuring. Due to the wide spectrum of the subject of assessment of causes and effects of corporate restructuring, this article focuses on issues related to the financial measures used and sources of information prepared *ex ante*, such as plans and forecasts.

The purpose of this article is to determine the measures used in the diagnosis of the needs and effects of restructuring, as well as the importance of plans and forecasts in the assessment of the implemented changes. The research method consists of a critical literature review, questionnaires and methods of mathematical statistics. As part of the objective, the essence of restructuring and indications for conducting financial analyses preceding the initiation and completion of the restructuring process will be determined. A literature review pertaining to the diagnosis of the needs and effects of restructuring will be conducted. Financial indicators used in the restructuring process will be specified as well. A survey, which was conducted among a group of restructuring specialists, on the information selected for the evaluation of the restructuring process will be used. The research sample contains the opinion of 103 specialists in the field of restructuring, most of them with many years of experience in restructuring proceedings. The empirical research was conducted in Poland.

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The purpose of this study is to obtain an answer to the following questions:

- which financial indicators are specified as important in the diagnosis of the causes and the assessment of the effects of restructuring?
- is the information on plans, forecasted targets and operating strategies of the restructured entity important for restructuring specialists?

The above questions were formulated on the basis of literature studies and previous experiences of the author regarding the restructuring processes.

Restructuring as a process of changes in an enterprise

Enterprise restructuring can be considered from a theoretical point of view or legal regulations and economic practices, and its essence is the subject of research of many scientists around the world. In economics, "restructuring" is a concept that does not have a single, universally accepted definition. The definitions of restructuring used in the literature, share common features. The definitions indicate that, restructuring is a rapid and radical change that touches upon important areas in a given enterprise. The definitions make explicit reference to the strategy, from various perspectives. Restructuring is called a growth strategy, a strategic process leading to maximization of monetary worth, as well as a major change of strategy (Borowiecki and Nalepka, 2003, p. 75).

Emphasis put on the role of change is included in one of the best-known definitions of restructuring, which was created by H. Singh (1993, p. 147). While defining restructuring, he stated that it is a multifaceted term used among practitioners and is still a relatively new term. Restructuring involves significant and rapid changes in the organizational structure as well as in the structure of assets and capital of a given enterprise. He also draws attention to the controversy around the effects of restructuring. He notes that, restructuring proponents argue that more efficient organizations have emerged as a result of a thorough assessment of the ability to generate monetary resources. Critics argue that, organizational disruptions resulting from restructuring exceed the expected benefits of restructuring.

G. L. Clark (1994, p. 9) called restructuring a deliberate process of rebuilding the overtaken system towards a possible and more desirable method of acquirement. When planning and implementing restructuring, a choice is made between different options. On the other hand, D. Vance (2009, p. 3) notes that, restructuring is not a magical change, on the contrary: it is difficult and may be frustrating. Multiple techniques should be used, even more than once. Sometimes a business will take two steps forward and one step back. Restructuring involves the repeated application of various techniques. However, most companies can be saved if they start restructuring quickly enough and the management is ready to take aggressive action. Restructuring is not limited to companies in difficulty. It can also be the process of transforming a company into an increasingly stronger organization. N. Alias, M. H. Yaacob and N. Jaffar (2017, p. 13) point out that, carrying out the restructuring process brings a number of benefits, such as increasing knowledge, experience and skills within an enterprise. The positive role of restructuring processes is also recognized and discussed, among others, in the works of: N. Malačič and I. Malačič (2016), T. Hoshi,, S. Koibuchi and U. Schaede (2018), A. Chandel, and A. Tiwari (2018), S. Kumaraswamy, Ebrahim and Nasser (2019), Y. Arsenyev et al. (2020).

Managers of a particular enterprise can play an important, both positive and negative role in the restructuring. Managers can be the party responsible for the emergence of a crisis situation, and at the same time, create a new structure thanks to their involvement in the change process. Referring to the reasons why the implementation of restructuring was needed, H. Singh and C. Markides (1997, pp. 213-219) pointed to the predominance of management errors in the choice of the organizational structure, rather than managerial abuses. On the other hand, G. L. Clark (1994, p. 9) notes that, the restructuring process requires the involvement of managers as the ones responsible for restructuring, optimization of resources and searching for new income.

The definitions of restructuring also include references to its impact on the financial condition of an enterprise, which will be reflected in financial measures such as profitability and items on financial statements. For example, I. Altman and E. Hotchkiss (2006), when defining restructuring, referred to such effects as changes in assets and structure of capital, increased value for owners or improved operational efficiency, and changes in the level of debt and ability to be in debt.

Although restructuring means activities aimed at improving the company's performance, M. Zorn, P. M. Norman, F. C. Butler and M. S. Bhussar (2017) point out that, scientific research on the impact of restructuring on the company's performance does not give clear results. Organizational restructuring may lead to negative consequences, ultimately ending in bankruptcy.

Due to the need to plan changes and the uncertainty of achieving the intended effects, a rational approach to the restructuring process is an analysis of the needs to carry out particular activities and afterwards, measure their results. This can be achieved by both, measures that use data derived from financial statements, and other methods of diagnosis resulting from science and the practice of management.

Measures Used in The Diagnosis of The Needs and Effects of Restructuring: Literature Review

Constant adaptation to the changing economic environment in order to cope with competition, forces enterprises to use various methods and tools, and contributes to the dynamic development of the theory and practice of strategic management as a method of reducing the negative impact of sudden turbulence an enterprise may experience (Masztalerz, 2007). Restructuring processes are a response to the volatility of the economic environment. They also cause changes in the science and practice of management, as well as new, improved approaches to the analysis of implemented changes. The need to monitor changes is indicated in scientific research. The publications indicate the need for continuous supervision over the course of the change process, and after the repair period, the comparison of goals with the achieved results, both in the short and long term (Nowak, 2012, pp. 18-19; Borowiecki and Wysłocka, 2012, pp. 104- 156).

The complexity of the restructuring processes and the need to adapt them to individual cases, affects the variety of information used. One of the main sources of information in the restructuring process is the financial statement. P. Bartkowiak and R. Borowiecki (2001, pp. 9-22), while analysing the complexity and effectiveness of the restructuring processes, noted that the nature and type of information affect the reliability of analyses and an objective assessment of enterprises undergoing changes. In their opinion, an indisputable fact is that the periodic financial statements of enterprises provide the most valuable information on the financial condition of enterprises and are a basic source to conduct correct analyses of these specific activities in the enterprise. R. Borowiecki and E. Wysłocka (2012, pp. 104-156), in their analysis of the list of possible financial indicators, conclude that indicators based on financial statements are the most important and most frequently used in practice.

On the basis of a financial statement, a financial analysis is carried out, which can be prepared both *ex post* before starting the restructuring process in order to determine the need to carry out particular activities and *ex ante* to define planned changes. It can also be carried out after the completion of the process in order to determine the obtained effects (cf., among others, Nogalski and Marcinkiewicz, 2004, p. 28; Waściński, 2010, pp. 109-113, 300-303; Borowiecki and Wysłocka, 2012, pp. . 104-156). There is no clear indication as to which of the financial indicators should be used in the assessment. For example, A. Nalepka (1999, pp. 67-71), D. Czerwińska-Kayzer (2018, p. 243) and A. Duliniec (2007, pp. 115-120) emphasize the importance of liquidity and profitability in the restructuring process. It is worth noting that although maintaining liquidity is a prerequisite for maintaining economic activity, excess liquidity leads to a reduction in profitability, which may limit the company's development. Low level of liquidity may also have negative effects on profitability, and thus in the long term lead to loss of solvency or even bankruptcy (Czerwińska-Kayzer, 2018, p. 243). When referring to actions to avoid bankruptcy, S. T. Surdykowska (2012, pp. 44-45) mentions profitability and solvency as the necessary conditions. The role of profitability in the survival of a company is also emphasized by Z. Dresler (2014, p. 12). He points out that a long-term lack of profit causes not only a problem with the development of the enterprise, but also may lead to bankruptcy. Bankruptcy is preceded by a lack of liquidity, the loss of which is, however, the result of processes resulting from the lack of profit. In turn, H. Sokół (2014, p. 146) mentions the loss of solvency as the most important symptom of a crisis situation. The loss of solvency follows the stages of stalling development, a decline in market share and a systematic deterioration of the economic and financial condition. On the other hand, the research by N. H. Wellalage and S. Locke (2012, pp. 1-17) shows that profitability, liquidity and the size of the enterprise have an impact on the risk of bankruptcy. The importance of financial indicators in the assessment of the needs and effects of restructuring also results from the fact that they constitute the basis for building early warning models against bankruptcy. Their role is also related to the ease of measurement (Zorn, Norman, Butler and Bhussar, 2017; Wójcik-Jurkiewicz and Karczewska, 2019). The aforementioned indicators refer to the risk of bankruptcy; they are also important in the diagnosis of the need to restructure enterprises which are in a crisis.

Financial indicators are not the only measures used in the restructuring process. Recent research into bankruptcy risk assessment has combined financial and market data with other “soft information” such as legal actions, timely reporting, employee loyalty and quality of management (Altman, Sabato & Wilson, 2008). B. Nogalski and H. Macinkiewicz (2004, pp. 61-62) point out that the assessment of the competitiveness of a company undergoing a crisis is an important element of the management process. Research should be conducted in the areas and scope adjusted to the needs of the recipients of such information. The study of an entity should take into account not only its economic performance, but also other factors (e.g. organizational or cultural). According to N. Crutzen and D. Van Caillie (2008, p. 292), the possibility of diagnosing the risk of bankruptcy depends on the stage of the crisis situation

in which the company is at the time. In the early stages, crisis manifests itself in organizational problems or in the structure of an entity. Only a serious crisis situation is reflected in financial indicators.

Due to the complexity of the restructuring process, the overall assessment of the current situation of a company should be quite broad and include both an analysis of the environment as well as an analysis of the mission, goals, strategy and resources. The assessment of the current condition of an enterprise is one of the main elements of the restructuring program, which should be prepared in several versions, e.g. optimistic, pessimistic and realistic. An integral, though more detailed, element of the restructuring program is the restructuring plan (Garstka, 2006, pp. 36-40). The restructuring plan should include an assessment of the crisis situation, an economic and financial analysis of the indebted enterprise, as well as an action plan specifying the tools to be used for its implementation (Niebieszczańska, 2014, p. 162). One of the important elements of the restructuring program are financial projections, which in monetary units express basic financial documents, i.e. financial statements prepared *ex ante* and financial indicators calculated on its basis (Zakrzewska-Bielawska, 2005, pp. 74-75).

A model approach to the restructuring process proposed by M. Porada-Rochoń (2009, p. 75-77) indicates that activities should begin with a diagnosis of threats of a crisis in an enterprise, afterwards with the phase of creating a concept, then implementing changes and assessing the effects. Therefore, *ex-post* measurement of the company's financial condition should take place at the beginning and at the end of activities and operations, and *ex-ante* assessment of planned changes should also be made.

Assessment of usefulness of plans and forecasts in the restructuring process: the stand of specialists in the field of restructuring in Poland

Based on the conducted literature studies, it can be concluded that the assessment of the causes and effects of restructuring is inherently related to the measurement of economic quantities. Information obtained from an entity's financial statements is of particular importance. Financial indicators from the liquidity, solvency and profitability groups are indicated as significant in the assessment of a company's financial condition, which should be carried out both before initiating the restructuring process and after its completion.

At the same time, other sources of information that can and should be used in restructuring processes and their evaluation are also indicated. In Poland, such sources include restructuring plans and various types of forecasts that indicate the adopted strategy and planned activities of a given entity, which may in turn affect its future financial flow. These issues are regulated in Poland by the Restructuring Law, requiring the preparation of a restructuring plan at the initial stage of the proceedings, the implementation of which is subject to assessment during and after the end of court proceedings (Restructuring Law, 2015, Art. 9, 31, 33).

In order to determine the significance of this type of information, prepared *ex ante*, on the basis of plans and estimates prepared by those involved in the restructuring process in an enterprise, a question was asked to specialists in the field of restructuring in Poland regarding the significance of this particular information. Transparency of the restructuring process is required to carry out a correct assessment, and so this study was made under this assumption.

The study sample consists of responses from 103 specialists in the field of restructuring. The respondents also have knowledge and experience in the field of bankruptcy. The respondents include practitioners, i.e. judges specializing in restructuring and bankruptcy proceedings, restructuring advisors, scientists specializing in restructuring processes, as well as people who were part of a team responsible for creating the current Restructuring Law in Poland. The choice of Poland for research is purposeful. Poland is a country which has undergone a thorough reform of its restructuring law in recent years.

The research sample included:

- 29 judges conducting insolvency proceedings,
- 12 members of the Minister of Justice Council for the Amendment of Bankruptcy and Reorganisation Law,
- 96 people who have declared that they have practical experience in insolvency proceedings conducted in 2013-2015; 62 of them have declared to also have practical experience in proceedings under the Law that went into effect in 2016.

The research sample collected allows to assume that the completed questionnaires contain the opinions of those who, in their professional work, influence the scope and even the quality of documentation collected in court for the purpose of restructuring proceedings.

The empirical research carried out is part of a much broader research project regarding the informational role of accounting in restructuring and insolvency proceedings. The questionnaire contains 149 detailed questions.

Below is the research question the respondents were asked:
Please assess the importance of information on the plans, forecasts, goals and strategy of the entity in restructuring, with particular emphasis on the circumstances of its activities that may affect future cash flow, using a scale of 1 to 5 (where 1 means completely irrelevant information and 5 means crucial information).

"I don't know" or "not applicable" was a possible answer to each question. The distribution of answers to the question asked is presented in Table 1 and in Figure 1.

Table 1: Distribution of assessments of specialists in the field of restructuring on the validity of information

Information on:	number of individual assessments on a scale of 1 to 5					number of "I don't know" "not applicable" answers	no answer
	1	2	3	4	5		
the plans, forecasts, goals and strategy of the entity in restructuring, with particular emphasis on the circumstances of its activities that may affect future cash flow	0	4	13	41	41	2	2

Source: own elaboration

The share of high ratings (4 or 5) is 0.828, which proves that information on the plans, forecasts, goals and strategy of the entity in restructuring, with particular emphasis on the circumstances of its activities that may affect its future cash flow, is important. The error of this assessment is 7.4%, which means that the expected share of high ratings in the entire population with a 95% probability is in the range of 0.75 to 0.90.

As the respondents rated on a scale from 1 to 5, it was also possible to determine the mean score, which was 4.2 (the error of the mean estimate is only 0.16). The high average confirms that the indicated information is of great importance to the respondents.

The respondents' assessment of the significance of information on the plans, forecasts, goals and strategy of the entity being restructured indicates that this type of information prepared *ex ante* is important for the restructuring process.

Conclusions

Restructuring of enterprises is a complex process that requires both a diagnosis of the condition prior to its initiation and an assessment of the effects achieved. Assessments should be carried out in many aspects, using financial measures and assessments derived from management theory and practice. An important aspect of diagnosing the needs and effects of restructuring is the construction of plans and forecasts, and then the assessment of their implementation at each stage of changes and after the entire process is completed.

As it results from research, despite a growing role of information not related to the accounting of enterprises, financial indicators are still important in assessing the need to conduct restructuring and measuring its effects. There is no one specific set of financial indicators for this assessment, but the most common are liquidity, solvency and profitability ratios, which are also the basis for building bankruptcy prediction models.

Plans and forecasts of an entity's future are of great importance for the restructuring process. This is clearly indicated by the results of empirical research carried out among a group of specialists in the field of restructuring. The research was carried out in Poland, but the type of information that may be of importance for the restructuring process, diagnosis of the grounds for its initiation and assessment of the effects of implementing it, is of universal importance. As a result of the conducted research, it was found that restructuring specialists pay great attention to information on forecasts, plans, goals and strategies of the restructured enterprise, which may positively affect its future cash flow. The average score obtained was 4.2 (using a scale of 1 to 5 (where 1 means completely irrelevant information and 5 means crucial information).

The relatively small research sample is a limitation of the research. However, considering the low errors of the obtained evaluations, the results can be considered reliable. Further research is planned on assessing the restructuring process in conjunction with the data used for its implementation.

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Stock and Market Trading Volume As Factors of Return Volatility

Leslaw Markowski

University of Warmia and Mazury in Olsztyn, Poland
The Faculty of Economics, Department of Finance
E-mail: leszekm@uwm.edu.pl

Abstract

This study examined the relationships between conditional volatility of individual stock returns and stocks and market trading volume and mixed variable in terms of trading volume with price movement indicator. Using GARCH(1,1) model specification in the sample of 20 stocks listed on the Warsaw Stock Exchange the results reveal a decreasing of volatility persistence in nineteen stocks when contemporaneous trading volume was added to the variance equation. The model with indicator variables demonstrates a reduction of the persistence in all stocks compared to the model without any exogenous variables. Moreover, the model with stock volume outperforms the model with market volume for all stocks as far as persistence reduction. Models with both market trading volume and market price movement find a much greater impact of market volume on stocks volatility in downward market price movement than in upward market price movement.

Keywords: Conditional Volatility, GARCH, Mixture of Distribution, Trading Volume, Volatility Persistence.

JEL: C32, G12

Introduction

Investors throughout the trading day receive a lot of information at different times. This information is reflected in intermediate equilibrium prices and when investors glean the new information the final informational equilibrium in prices is reached. The flow and adoption of information is defined as sequential information arrival hypothesis (SIAH) (Copeland 1976). It can be assumed that with the simultaneous arrival of information, the trading volume of any asset will increase. Therefore, the volume can be a variable predicting variability in price changes. There should be a positive correlation between trading volume and absolute returns of price changes (Copeland, Friedman, 1987). This statement, in turn, is the subject of the mixture of distribution hypothesis (MDH) and proposed by Clark (1973). Price changes and trading volume as an information arrival rate are independently distributed but they can also be considered as a joint distribution. This implies positive contemporaneous relation between price volatility and volume. Conditional variance of price change and trading volume are positive function of information arrival. The potential impact of trading volume on price volatility can be tested using GARCH model in which the variance of returns is heteroskedasticity due to the information that arrive to the market. Using the contemporaneous trading volume should decrease the volatility persistence in conditional variance equation compared to the equation without that volume. This statement has found support in many studies. Lamoureux and Lastrapes (1990) discovered that phenomenon of variance clustering diminishes when the contemporaneous trading volume is included to the variance equation. Gallo and Pacini (2000) also observed reduction of the estimated persistence in the GARCH(1, 1) and EGARCH(1, 1) for US stocks. Bohl and Henke (2003) in Polish stock market showed a reduction of persistence in conditional volatility after including trading volume in the model. Wang et al. (2005) used trading volume as a proxy of information arrival rate and found that the volume effect is positive and substantially reduces the persistence of conditional variance. Ezzat and Kirkulag-Uludag (2014) in the Saudi Exchange provided strong evidence for the validity of the mixture of distribution hypothesis. They demonstrated that volatility persistence decreases when the trading volume is included in the conditional variance equation. The same effect Tan et al. (2015) revealed using the sample in Australian stock market. The relationships between trading volume and return volatility for the sample of bank stocks was examined in study of Rotila et al (2015). They found the above relations but under certain conditions such as stock's size and for the financial crisis period in 2009. MDH and SIAH are verified by Tseng et al. (2015) and Shen et al. (2018). They supported the sequential information arrival using lagged volume to predict volatility. Wang et al. (2019) in the Bitcoin market documented significant relationship between trading volume and return volatility and supported the SIAH incorporated different kinds of measurements of volume and sample periods.

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In this paper, in addition to the impact of trading volume on volatility, a problem of the relationship was raised in connection with the sign of arrival rate. The question arises whether good or bad information strengthened the volume and whether there is an asymmetry in the impact of a given type of information. A broad study on this topic was carried out by Tan et al. (2015). They proposed price movement indicators and revealed that model with these variables reduce persistence in returns' volatility more than models with volume alone. Furthermore, they observed that upward price movement influence conditional volatility more than a downward price movement.

The last aspect raised in the work is the study of the impact of market volume and market volume with price movement (good and bad) on the volatility of the stock. The noteworthy question is whether the overall activity of all investors in the market and this activity in periods of positive and negative market returns have an impact on the volatility of individual stocks. Moreover, it is interesting whether market trading volume contributes to a reduction of persistence in volatility of returns. Past research does not investigate the relationship between stock volatility and market condition rate.

The study is to clarify whether there is a contemporaneous relationship between stock trading volume or market trading volume and conditional volatility of any stock. Research also introduces the volume with a price movement.

Methodology

Conditional volatility-volume relation

The explanation that stock returns are generated according with a mixture distribution hypothesis can be verify in using of proper ARCH model. That model can describe of the rate of information arrivals as a generating process of mixing variables (Ahmed et al., 2005). One of that variables is trading volume and it is incorporating to explain of conditional volatility stock returns. The volume plays an important role from investors' point of view because it reflects their expectations. It seems important to study the joint distribution of returns and volume to confirm the mixture of distribution hypothesis. The GARCH(1,1) model is the tool that use contemporaneous trading volume and allow to measure the level of persistence' reduction. Including trading volume generalised variance specification with the mean equation considering autocorrelation in returns is given by:

$$R_t = \varphi_0 + \varphi_1 R_{t-1} + \varepsilon_t \tag{1}$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta Vol_t, \tag{2}$$

$$\varepsilon_t = \sigma_t \vartheta_t \; ; \; \varepsilon_t \sim IID(0, \sigma_t^2); \; \vartheta_t \sim IID(0,1) \tag{3}$$

where R_t, Vol_t is return and trading volume of any asset in trading period *t*, respectively. The volume reflects an appropriate proxy of information arrival rate, where news tends to increase the trading volume. Therefore, the estimation of δ is expected to be positive, which means increasing conditional volatility of stock returns. The sum of parameters $\alpha_1$and β_1 measures the level of volatility persistence. Including the mixing variable in the form of volume should reduce the persistence in conditional variance that is eliminate the ARCH effect in time periods of returns (Lamoureux and Lastrapes, 1990).

Trading volume and price movement direction in conditional volatility

In this paragraph, the study is expanded to include the impact of the type of information (good and bad news) on volatility-volume relation. Investors may react in distinct way to different types of information. Considering growing and descending price movement the conditional volatility equation with a trading volume is as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta_1 Vol_t^+ + \delta_2 Vol_t^- \tag{4}$$

where

$$Vol_t^+ = \begin{cases} Vol_t & if \quad P_{t-1}^{close} < P_t^{close} \quad or \quad R_t > 0 \\ 0 & if \quad otherwise \end{cases} \tag{5}$$

$$Vol_t^- = \begin{cases} Vol_t & if \quad P_{t-1}^{close} \geq P_t^{close} \quad or \quad R_t \leq 0 \\ 0 & if \quad otherwise \end{cases} \tag{6}$$

and P_{t-1}^{close}, P_t^{close} denote close trading prices of any asset in *t-1* and *t* periods, respectively. Obviously, the indicator volume variables (5) and (6) aggregate to the trading volume. The equation (4) leads to the following two research questions. Firstly, whether volume in upward and downward price movement periods more reduce a persistence in conditional volatility than contemporaneous trading volume in equation (2). Secondly, assuming that investors react much more strongly and immediately to good news than to bad information, good arrival rate persuade conditional volatility more than bad arrival rate.

Market trading volume in conditional volatility

Another research problem raised in this work is the influence of market volume on volatility-volume relationship of any asset. Including market trading volume, the generalised variance specification is given as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta Vol_{M,t}, \tag{7}$$

where $Vol_{M,t}$ is market volume in trading period *t*.

Taking into account growing and descending price movement the conditional volatility equation with a market trading volume Vol_M is as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta_1 Vol_{M,t}^+ + \delta_2 Vol_{M,t}^- \tag{8}$$

where

$$Vol_{M,t}^+ = \begin{cases} Vol_{M,t} & if \quad P_{M,t-1}^{close} < P_{M,t}^{close} \quad or \quad R_{M,t} > 0 \\ 0 & if \quad otherwise \end{cases} \tag{9}$$

$$Vol_{M,t}^- = \begin{cases} Vol_{M,t} & if \quad P_{M,t-1}^{close} \geq P_{M,t}^{close} \quad or \quad R_{M,t} \leq 0 \\ 0 & if \quad otherwise \end{cases} \tag{10}$$

and $P_{M,t-1}^{close}$, $P_{M,t}^{close}$ denote close market trading prices in *t-1* and *t* periods, respectively.

In the context of relations (7) and (8), two questions can be specified. Firstly, whether market volume influences the conditional volatility in the same degree as an asset volume and secondly, whether market price movement matter in the impact of market volume on asset volatility.

Data

A dataset includes a series of daily log returns of stocks quoted on the Warsaw Stock Exchange and belonging to the index WIG20, of which 14 stocks are characterized by full time series. The returns in the research period for trading day are calculated as follows:

$$R_t = \ln(P_t^{close}) - \ln(P_{t-1}^{close}) \tag{11}$$

The sample period is from January 4, 2010 to December 30, 2019 what spans 2497 observations. The volume of WIG20 index is used as the market trading volume approximation. Before the test (which has not been presented), the autocorrelation and stationarity of the tested time series were examined. The results of the Ljung-Box test indicate that the rates of return exhibit autocorrelation in volatility, which justifies the use of ARCH class models. The statistics of the same test reject the null hypothesis that the volume time series is not autocorrelated. The statistics of Augmented Dickey-Fuller test confirm the stationarity both return and volume time series. For modelling conditional volatility of returns is used GARCH(1,1) model which provides a good fit.

Results and Discussion

The study of the impact of volume on conditional volatility compares the estimates of GARCH(1,1) model and the model with trading volume. Results in Table 1 indicate the high level of persistence in 19 of 20 stocks which varies from 0.6996 to 0.9999. The estimates of variance equation with contemporaneous trading volume in Table 2 reveal a substantial decreasing of volatility persistence in 16 stocks and for the remaining four stocks there was a slight decline of the persistence. Except for Bank Pekao stock trading volume has positive and statistically significant influence on conditional volatility of other stocks. These results are consistent with those obtained by Lamoureux and Lastrapes (1990). Furthermore, in five stocks contemporaneous trading volume procures lagged one period volatility insignificant in any significancy level.

Table 1: Estimates of GARCH(1,1) model

Model	$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2$		
Stock	$\hat{\alpha}_1$	$\hat{\beta}_1$	$\hat{\alpha}_1 + \hat{\beta}_1$
Alior Bank	0.4241***	0.2770***	0.7011
Bank Pekao	0.0343***	0.9334***	0.9677
CCC	0.0255***	0.9617***	0.9872
CD Projekt	0.1138***	0.8444***	0.9582
Cyfrowy Polsat	0.0797***	0.6469***	0.7266
Dino Polska	0.1634***	0.5362***	0.6996
Grupa Lotos	0.0448***	0.8987***	0.9435
JSW	0.0730***	0.9083***	0.9813
KGHM	0.0585***	0.9191***	0.9776
LPP	0.2247***	0.0000	0.2247
mBank	0.0614***	0.8961***	0.9575
Orange Polska	0.0282***	0.9473***	0.9755
PGE	0.0669***	0.9238***	0.9907
PGNiG	0.0604***	0.9058***	0.9662
PKN Orlen	0.0556***	0.8457***	0.9013
PKO BP	0.0582***	0.9059***	0.9641
Play Communications	0.0664***	0.9174***	0.9838
PZU	0.0739***	0.8439***	0.9178
Santander Bank Polska	0.0589**	0.9410***	0.9999
Tauron Polska Energia	0.0832***	0.8855***	0.9687

*Notes: ***, **, * indicates significance at the 1%, 5% and 10% respectively.*
Source: own study.

Table 2: Estimates of GARCH(1,1) model with trading volume

Model	$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta Vol_t$			
Stock	$\hat{\alpha}_1$	$\hat{\beta}_1$	$\hat{\alpha}_1 + \hat{\beta}_1$	$\hat{\delta}$
Alior Bank	0.1467***	-0.0675**	0.0792	7.58x10^{-6} ***
Bank Pekao	0.0463***	0.9068***	0.9531	8.09x10^{-9}
CCC	0.1696***	-0.0575***	0.1121	3.86x10^{-6} ***
CD Projekt	0.0142	-0.0469***	-0.0327	1.79x10^{-6} ***
Cyfrowy Polsat	0.0763***	-0.0794***	-0.0031	4.53x10^{-7} ***
Dino Polska	0.0021	-0.0283	-0.0262	2.81x10^{-6} ***
Grupa Lotos	0.0261	-0.0700***	-0.0439	1.29x10^{-6} ***
JSW	0.0623***	-0.0576***	0.0047	2.59x10^{-6} ***
KGHM	0.0541***	-0.0971***	-0.0430	6.28x10^{-7} ***
LPP	0.1426***	0.0077	0.1503	9.73x10^{-5} ***
mBank	0.0933***	0.0140	0.1073	9.20x10^{-6} ***
Orange Polska	0.0829***	-0.0559**	0.0270	6.77x10^{-8} ***
PGE	0.0674***	0.9198***	0.9872	1.32x10^{-9} **
PGNiG	0.0003	0.0062	0.0065	7.35x10^{-8} ***
PKN Orlen	0.0579***	-0.0609**	-0.0030	3.09x10^{-7} ***
PKO BP	0.0482**	-0.0373*	0.0109	8.01x10^{-8} ***
Play Communications	0.1121***	0.7898***	0.9019	5.89x10^{-8} ***
PZU	0.0948***	-0.1309	-0.0361	6.71x10^{-8} ***
Santander Bank Polska	0.0584***	0.9246***	0.9830	8.35x10^{-8} ***
Tauron Polska Energia	0.0535**	-0.0529**	0.0006	9.40x10^{-8} ***

*Notes: ***, **, * indicates significance at the 1%, 5% and 10% respectively.*
Source: own study.

The next stage of the study of volatility-volume relationships is the estimation of GARCH (1,1) model covering the impact of both volume and price movement. The results are presented in Table 3. The model provides similar results to the model with trading volume in the variance equation as far as persistence reduction. For 19 stocks, the sum of $\hat{\alpha}_1 + \hat{\beta}_1$ is lower than the sum of these parameters for variance equation without any exogenous variables. Moreover, when the trading volume and the volume with price indicator were added the ARCH effects considerably decline and in the case of 5 stocks become even insignificant. Variables considering price changes make an additional contribution to the explanation of conditional volatility. As expected, the impact is mostly positive and statistically significant in the case of 17 stocks with the price movement both in a positive and negative direction. However, the above effect is asymmetric. Using the Wald test in fourteen stocks the combined variable (upward price movement and volume) has a greater impact on conditional volatility than the variable connecting downward price movement with trading volume. This shows a stronger and less immediate response of investors to good news than bad news. These results are consistent with the results obtained by Tan et al. (2015).

Table 3: Estimates of GARCH(1,1) model with trading period indicators

Model	$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta_1 Vol_t^+ + \delta_2 Vol_t^-$					
Stock	$\hat{\alpha}_1$	$\hat{\beta}_1$	$\hat{\alpha}_1 + \hat{\beta}_1$	$\hat{\delta}_1$	$\hat{\delta}_2$	$\delta_1 > \delta_2$
Alior Bank	0.1467**	-0.0305***	0.1162	2.95×10^{-6} ***	8.97×10^{-7} ***	Y
Bank Pekao	0.0306**	0.9478***	0.9784	3.29×10^{-10}	-6.28×10^{-9}	N
CCC	0.1179***	-0.0748***	0.0431	3.11×10^{-6} ***	2.98×10^{-6} ***	Y
CD Projekt	0.0023	-0.0213**	-0.0190	2.46×10^{-6} ***	1.31×10^{-6} ***	Y
Cyfrowy Polsat	0.0548***	-0.0596***	-0.0048	7.35×10^{-7} ***	2.71×10^{-7} ***	Y
Dino Polska	-0.0151	-0.0472***	-0.0623	3.77×10^{-6} ***	2.19×10^{-6} ***	Y
Grupa Lotos	0.0023	-0.0633***	-0.0610	1.76×10^{-6} ***	1.01×10^{-6} ***	Y
JSW	0.0479***	-0.0872***	-0.0393	3.29×10^{-6} ***	2.06×10^{-6} ***	Y
KGHM	0.0468*	-0.1021***	-0.0553	6.23×10^{-7} ***	6.23×10^{-7} ***	N
LPP	0.1443***	0.0084	0.1527	1.01×10^{-4} ***	9.36×10^{-5} ***	Y
mBank	0.0604***	-0.0052	0.0552	2.41×10^{-5} ***	4.56×10^{-6} ***	Y
Orange Polska	0.0064***	-0.0164	-0.0100	1.41×10^{-7} ***	2.91×10^{-8} ***	Y
PGE	0.0653***	0.9201***	0.9854	1.42×10^{-10}	3.64×10^{-9} ***	N
PGNiG	0.0119	-0.0284***	-0.0165	3.31×10^{-8} ***	1.22×10^{-7} ***	N
PKN Orlen	0.0402***	-0.0444***	-0.0042	6.80×10^{-7} ***	1.92×10^{-7} ***	Y
PKO BP	0.0639***	-0.0628***	0.0011	1.75×10^{-7} ***	3.72×10^{-8} ***	Y
Play Comm.	0.0954**	0.8423***	0.9377	2.69×10^{-8} **	5.36×10^{-8} ***	N
PZU	0.0933***	-0.1370**	-0.0437	9.56×10^{-8} ***	4.64×10^{-8} ***	Y
Santander B.P.	0.0567***	0.9268***	0.9835	-1.69×10^{-8}	1.71×10^{-7} ***	N
Tauron Pol. Ener.	-0.0091	-0.0217**	-0.0308	2.08×10^{-7} ***	5.31×10^{-8} ***	Y

*Notes: ***, **, * indicates significance at the 1%, 5% and 10% respectively.*
Source: own study.

In the last part of the research the volatility-volume relationships are estimated in GARCH(1,1) models where conditional volatility of any stocks is dependent on market trading volume and market price movement. The results are presented in Table 4. Market volume increases conditional volatility in 13 stocks (for 8 stocks statistically significant) and for seven stocks market volume impact was negative for conditional volatility but only four of them are statistically significant. The models with contemporaneous market trading volume indicate a decreasing of volatility persistence in 12 stocks in relation to the models contained in Table 1. However, these results are much weaker than in the case of models using stock trading volume.

Table 4: Estimates of GARCH(1,1) model with trading volume of market index

Model	$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta Vol_{M,t}$			
Stock	$\hat{\alpha}_1$	$\hat{\beta}_1$	$\hat{\alpha}_1 + \hat{\beta}_1$	δ
Alior Bank	0.4538***	0.0684**	0.5222	1.06x10^{-5} ***
Bank Pekao	0.0511***	0.9251***	0.9762	4.63x10^{-8}
CCC	0.0219*	0.9667***	0.9886	-9.75x10^{-8} ***
CD Projekt	0.1224***	0.8298***	0.9522	1.23x10^{-6} ***
Cyfrowy Polsat	0.0973**	0.1371	0.2344	4.28x10^{-6} ***
Dino Polska	0.1540***	0.5372***	0.6912	7.05x10^{-6} ***
Grupa Lotos	0.0470***	0.8877***	0.9347	1.59x10^{-7}
JSW	0.0702***	0.9113***	0.9815	-2.43x10^{-7} *
KGHM	0.0584***	0.9192***	0.9776	4.20x10^{-9}
LPP	0.0275***	0.9366***	0.9641	-1.03x10^{-7} **
mBank	0.0614***	0.8962***	0.9576	-1.36x10^{-8}
Orange Polska	0.0279***	0.9487***	0.9766	-8.39x10^{-8} ***
PGE	0.0668***	0.9231***	0.9899	-7.03x10^{-8}
PGNiG	0.0599***	0.9067***	0.9666	-7.74x10^{-8}
PKN Orlen	0.1262***	0.0364	0.1626	5.54x10^{-6} ***
PKO BP	0.0583***	0.9051***	0.9634	3.57x10^{-8}
Play Communications	0.0347**	0.9398***	0.9745	2.01x10^{-6} ***
PZU	0.0823***	-0.0091	0.0732	5.33x10^{-6} ***
Santander Bank Polska	0.0743***	0.9255***	0.9998	1.16x10^{-8}
Tauron Polska Energia	0.0844***	0.8834***	0.9678	1.19x10^{-7} *

*Notes: ***, **, * indicates significance at the 1%, 5% and 10% respectively.*
Source: own study.

Table 5 provides the estimation results of variance equations with the impact of both market volume and market price movement. Models with indicator variables decrease the persistence in volatility to a much lesser extent (14 stocks out of 20) than models with stock trading volume (19 stocks). The model with stock volume outperforms the model with market volume for all stocks as far as persistence reduction.

Table 5: Estimates of GARCH(1,1) model with trading period indicators of market index

Model	$\sigma_t^2 = \alpha_0 + \alpha_1 \xi_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \delta_1 Vol_{M,t}^{+} + \delta_2 Vol_{M,t}^{-}$					
Stock	$\hat{\alpha}_1$	$\hat{\beta}_1$	$\hat{\alpha}_1 + \hat{\beta}_1$	$\hat{\delta}_1$	$\hat{\delta}_2$	$\delta_1 > \delta_2$
Alior Bank	0.4531***	0.0685**	0.5216	1.08x10^{-5} ***	1.05x10^{-5} ***	N
Bank Pekao	0.0486***	0.9259***	0.9745	-2.83x10^{-8}	1.26x10^{-7} *	N

CCC	0.0250^{***}	0.9591^{***}	0.9841	$-2.51\text{x}10^{-7\,***}$	$5.88\text{x}10^{-8}$	N
CD Projekt	0.1168^{***}	0.8348^{***}	0.9516	$6.03\text{x}10^{-7\,**}$	$1.94\text{x}10^{-6\,***}$	N
Cyfrowy Polsat	0.0934^{***}	0.1029	0.1963	$4.85\text{x}10^{-6\,***}$	$4.17\text{x}10^{-6\,***}$	Y
Dino Polska	0.1510^{***}	0.5638^{***}	0.7148	$6.01\text{x}10^{-6\,**}$	$7.73\text{x}10^{-6\,***}$	N
Grupa Lotos	0.0444^{***}	0.8941^{***}	0.9385	$5.41\text{x}10^{-8}$	$2.18\text{x}10^{-7\,**}$	N
JSW	0.0699^{***}	0.9097^{***}	0.9796	$-5.58\text{x}10^{-7\,***}$	$6.06\text{x}10^{-7}$	N
KGHM	0.0582^{***}	0.9172^{***}	0.9754	$-3.29\text{x}10^{-7\,**}$	$4.71\text{x}10^{-7\,***}$	N
LPP	0.2291^{***}	-0.0630	0.1661	$1.46\text{x}10^{-6\,**}$	$8.66\text{x}10^{-7}$	Y
mBank	0.0562^{***}	0.9039^{***}	0.9601	$-4.38\text{x}10^{-7\,***}$	$4.52\text{x}10^{-7\,***}$	N
Orange Polska	0.0352^{***}	0.9195^{***}	0.9547	$-3.28\text{x}10^{-7\,***}$	$1.70\text{x}10^{-7\,***}$	N
PGE	0.0657^{***}	0.9240^{***}	0.9897	$-1.73\text{x}10^{-7\,**}$	$4.49\text{x}10^{-8}$	N
PGNiG	0.0566^{***}	0.9104^{***}	0.9670	$-3.16\text{x}10^{-7\,***}$	$2.63\text{x}10^{-7\,**}$	N
PKN Orlen	0.1259^{***}	0.0357	0.1616	$6.29\text{x}10^{-6\,***}$	$4.86\text{x}10^{-6\,**}$	Y
PKO BP	0.9102^{***}	0.0558^{***}	0.9660	$-7.71\text{x}10^{-8}$	$1.69\text{x}10^{-7\,**}$	N
Play Comm.	0.0365^{***}	0.9385^{***}	0.9750	$1.74\text{x}10^{-6\,***}$	$2.06\text{x}10^{-6\,***}$	N
PZU	0.0846^{***}	0.7824^{***}	0.8670	$2.90\text{x}10^{-7\,*}$	$5.00\text{x}10^{-7\,***}$	N
Santander B.P.	0.0704^{***}	0.9286^{***}	0.9990	$4.78\text{x}10^{-8\,*}$	$-6.27\text{x}10^{-8\,*}$	Y
Tauron Pol. Ener.	0.0674^{***}	0.9089^{***}	0.9763	$-2.27\text{x}10^{-7\,***}$	$7.72\text{x}10^{-7\,***}$	N

*Notes: ***, **, * indicates significance at the 1%, 5% and 10% respectively.*
Source: own study.

An interesting information is provided by estimates of parameters δ_1 and δ_2. In periods with downward market price movement the market volume increases conditional volatility in 19 stocks (15 statistically significant), but in periods with upward market price movement the market volume decreases conditional volatility in the half of stocks. In the case of the second half of stocks the market volume increases volatility, but generally not more than during in periods with downward market price movement. Market trading volume has a higher influence on stocks volatility during upward periods than downward periods only in the case of four stocks. Therefore, the results suggest a much greater impact of market volume on stocks volatility in downward market price movement than in upward market price movement. Comparing the estimates in Tables 3 and 5, investors perceive information on stock trading volume differently (opposite) than market trading volume.

Conclusion

The paper presents research the relationship between return volatility and trading volume using GARCH(1,1) model on the example of 20 companies listed on the Warsaw Stock Exchange and belonging to the WIG20 index. Changes of persistence in volatility are investigate considering trading volume in upward and downward price movement.

The study provides some important findings. The results of variance equation reveal that contemporaneous trading volume causes a substantial decreasing of volatility persistence in 19 out of stocks and it has a statistically positive influence on conditional volatility of these stocks. The model with indicator variables considering both the volume and price movement demonstrate a reduction of the persistence in all stocks compared to the model of variance equation without any exogenous variables. Moreover, as expected, for more stocks the upward price movement has a greater impact on conditional volatility than the downward price movement. The combined variables, volume and indicator of price movement direction have positive and statistically significant influence on returns' variation.

Moreover, the research also concerned models where conditional volatility of any stock is dependent on market trading volume. The models with market trading volume decrease the volatility persistence for less stocks than models using stock trading volume. The model with stock volume outperforms the model with market volume for all stocks as far as persistence reduction.

Models with both market trading volume and market price movement find a much greater impact of market volume on stocks volatility in downward market price movement than in upward market price movement. In periods with downward market price movement the market volume mostly increases conditional volatility, but in periods with upward market price movement the market volume decreases conditional volatility in a half of stocks. The results suggest that investors perceive information on stock trading volume differently (opposite) than market trading volume.

The research verifies investors' behaviour in the trading period due to the type of information related to movement in price. Furthermore, it expands the capabilities of modelling and forecasting variation of traded stocks returns.

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Human Relations Management Maturity Model in The Teal Organization - Selected Issues

Joanna IWKO
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Wroclaw, Poland, joanna.iwko@pwr.edu.pl, https://orcid.org/0000-0003-3993-9528

Aneta PISARSKA
Faculty of Social Sciences, Calisia University, Kalisz, Poland, a.pisarska@akademiakaliska.edu.pl, https://orcid.org/0000-0002-7032-7944

Abstract

Nowadays, in the era of a great challenge in managing organizations, the model of teal organizations described by F. Laloux is becoming more and more popular. Many organizations are considering entering this way, and those that are already following it ask themselves at what stage are they "on the way to teal". The research problem is the attempt to answer the question: what are the maturity levels of the organization "on the way to teal" in the area of human relations? What characterizes a mature teal organization in the field of human relations? The aim of the article is to develop the initial concept of Human Relations Management Maturity Model in a teal organization. The research methods used in the study include critical analysis of the subject literature and logical reasoning.

Keywords: Maturity Model, Teal Organization, Human Relations, Recruiting and Selection

Introduction

Currently, due to the fact that traditional management methods seem to be less and less effective, the teal organization model described by F. Laloux (Laloux 2014, Laloux 2015) is gaining more and more interest among contemporary organizations. Although this concept seems fairly new, many organizations have used elements in their activities that refer directly to the teal organization model. Teal organization is the way that allows contemporary companies to cope with changing conditions and to better adopt to the current reality. As it is a complex approach especially connected with the human resources area, it requires maturity to fully benefit from expected results. “The way to teal" is a long and complex process that requires, above all, a change of consciousness. This change cannot be made ad hoc overnight. Moreover, teal organizations are human-centered, which means that they put people in the center, and based on their knowledge, skills, intuition, spirituality, i.e. full of humanity, they organize the work of employee teams and cooperation with all stakeholders. These organizations, wanting to start the transformation from the traditional to the teal model, are asking themselves where they are “on the way to teal”.

Every organization seeks to improve its way of managing especially in the field of human resources. The basis for achieving excellence in management are described e.g. by maturity models (MM). In the literature on the subject, there is a number of areas in which researchers have developed maturity models in many sectors**,** e.g. in the areas of project management (Souzaa and Gomes, 2015), process management (Tarhan et al, 2016), quality management (ISO 9004:2018), supply chain management (Yahiaoui et al, 2019), lifecycle management (Myrodia et al, 2019). Maturity models are frameworks for assessing an organization’s management competences and for the planning of actions that shall result in an improvement of organizational management competence. The majority of the models depict the maturity of an organization in a step-like structure with so-called maturity levels (generally, 5 levels are identified) (Klaus-Rosińska, 2016). The main elements of maturity models are: (1) a number of maturity levels, (2) a descriptor for each level, (3) the characteristics of organizations in each maturity level, (4) a number of important dimensions of the discipline being assessed, (5) important activities under each dimension, and (6) the description of the way in which each activity might be performed in each maturity level (Niknam et al, 2013).

Having considered the above, the authors have attempted to develop a conceptual management maturity model to help organizations determine the level of maturity of their organization on the way to teal in the teal organization in the area of human resources management. Human resources management in traditional organizations involves the following elements: human resource planning, gaining people for the company (recruiting, selection, onboarding), the development of human resources (motivation, payment, training and development, employee appraisal) and discharge (dismissal) (Listwan, 2010).

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The knowledge gained by the authors after interviews with representatives of several organizations that are "on the way to teal" has shown that these organizations are moving away from traditional naming of the area concerning employees "human resources" in favour of, among others, "human relations". This is due to the completely different range of employee practices that are undertaken in teal organizations. The traditional understanding of the "human resources" area does not correspond to what is concerned with employee issues in teal organizations. Due to the fact that in these organizations the term "human relations" is more often used, the authors of the article proposed to name the developed model "Human relations management maturity model".

The research problem is to answer the question: What are the maturity levels of the organization "on the way to teal" in the area of human relations? What characterizes a mature teal organization in the field of human relations? The aim of the article is to develop the initial concept of Human Relations Management Maturity Model in a teal organization. The research methods used in the study include critical analysis of the subject literature and logical reasoning.

Proposal of maturity model in human relations management in a teal organization

Human Relations Management Maturity Model in teal organizations presented in this article constitutes a framework that divides teal organizations into four maturity levels based upon maturity of all elements of human relations management. It can be used for evaluating the maturity of teal organization in the area of human relations. Figure 1 shows the four levels of maturity of the teal organization in this model in human relations management.

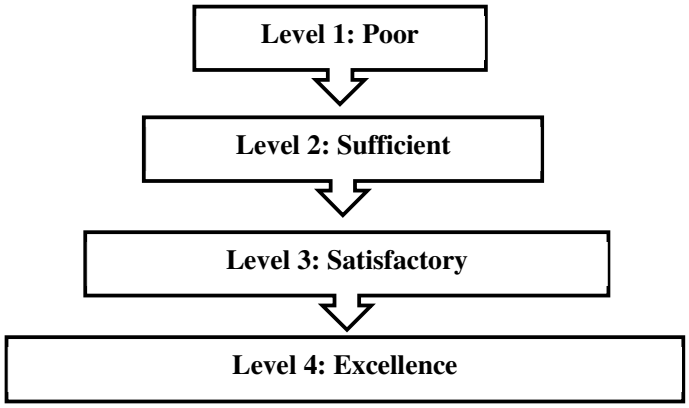

Fig. 1: Maturity levels of teal organizations in Human Relations Maturity Model

Source: Own work

Taking this into account, a teal organization can be considered fully mature, i.e. one that has achieved level 4: Excellence in human relations management, if it is characterized by the following features:

- The culture of the organization and its values permeate all personal subfunctions. The values of the organization are the basis of all personnel decisions in the organization. All employees are fully themselves in the workplace and identify themselves with the evolutionary purpose of the organization, which is the result of the convergence of the employee and organizational values.
- The personnel function in the organization is transparent, which means that all decisions concerning employees are open, beginning with the recruitment and selection stage.
- The organization shares its knowledge on the implementation of the personnel function with other teal organizations, as well as with traditionally managed organizations. It helps other organizations to implement teal practices in the area of personnel function.
- Employees are promoters of their organizations in the local environment.
- Self-managed teams independently implement all personnel subfunctions according to their needs, i.e .:
    - they recruit and select job candidates. They look for candidates primarily suited to the culture of the organization, but with high knowledge, skills and experience (at the level of management in traditional organizations). Furthermore, the candidates should have a high level of awareness, be mature, responsible, competent, committed (physically, mentally, emotionally), internally motivated;
    - they actively support new employees in the process of social and professional adaptation;
    - they determine the rules and amount of remuneration, also taking into account the non-professional situation of an employee. Team remuneration is fair, low-spread and transparent;
    - they create conditions for the development of motivation (internal and external);

- they perform many roles in the organization, working for the team with full commitment, applying to their talents, knowledge, skills, professional experience (flexible roles);
- they provide continuous feedback on an ongoing basis in an atmosphere of mutual respect and trust using non-violent communication. Failures and mistakes are natural elements of everyday life in the organization and are treated as the opportunity to learn;
- they create conditions for continuous training and development of knowledge, skills and experience within the organization. Employee development is based primarily on the strengths of team members. On the other hand, however, employees are aware of the areas that need further development;
- they build trust in the team constantly: relations between employees based on respect, dignity and trust; deep relationships, built not only on a professional basis;
- they talk openly about problems in the team and use so-called open communication in the conflict resolution process;
- they offer various support for employees leaving the organization when the decision to part with a particular team member is made. After the termination of the cooperation, they maintain good relations with the departing employees (long-term cooperation);
- team leaders fill the concept of servant leadership.

In the further part of the study, the authors have presented the details of the Human Relations Management Maturity Model in teal organizations in the area of recruiting and selection, which is one of the most developed and most important elements of the personal function in teal organizations (Pisarska and Iwko, 2018).

Maturity assessment sheets in the area of recruiting and selection in the Human Relations Management Maturity Model in a teal organization

Human Relations Management Maturity Model in teal organizations in the area of recruiting and selection was developed taking into consideration the following dimensions:

1. The values of the organization and the values of the candidate for the job.
2. Participation of members of the team to which the recruitment is conducted.
3. Status of the recruitment and selection process in the organization and its duration and complexity.
4. Transparency in the recruitment and selection process.

The maturity assessment sheet in the area of recruiting and selection in this model in teal organizations is presented in Tables from 1 to 4.

Table 1: The maturity assessment sheet in the area of recruiting and selection - The values of the organization and the values of the candidate for the job - in Human Relations Management Maturity Model

Dimension	Maturity levels	
	Level	**Features**
The values of the organization and the values of the candidate for the job	1	The organization's values are not defined or written down, but the organization knows they exist and addresses them informally or ad hoc in the area of recruitment and selection. The inclusion of the candidate's values in the recruitment and selection process and their diagnosis takes place in an informal or ad hoc manner. Including values in the recruitment and selection process and their diagnosis takes place in an informal or ad hoc manner. The relationship between the organization and the job applicant is mostly formal.
	2	Identifying and writing down the values of the organization. Including the values of the organization in the recruitment and selection process of job candidates, informing candidates about the values of the organization. The inclusion and diagnosis of the candidate's value in the recruitment and selection process takes place in a formal manner. The relationship between the organization and the job applicant goes beyond formal issues.
	3	Organizational values are the basis of most elements of the recruitment and selection processes.

		The candidate's values are the basis for making decisions about hiring him/her, as well as knowledge, skills (hard and soft) and experience. The similarity of the values of the job candidate and the organization is high and determined based on a reliable diagnosis.
	4	Full sharing of the values of the organization by the candidate is the basis for making a decision on his/her employment. The candidate's values are more important than his/her knowledge, skills and experience. Taking into account the spiritual values of the organization (organization as a living organism with its "soul") and the candidate. Building deep relationships with the job candidate based on shared values. The basis of the recruitment process constitutes mutual trust, respect and honesty between the organization and the job applicant. Both the job applicant and the organization are equal partners.

Source: Own work

Table 2: The maturity assessment sheet in the area of recruiting and selection - Participation of members of the team to which the recruitment process is conducted - in Human Relations Management Maturity Model

Dimension	Maturity levels	
	Level	**Features**
Participation of members of the team to which the recruitment process is conducted	1	The selection process is initiated only by the owner of the organization. The recruitment and selection processes are carried out by employees of the personnel unit with the participation of members of the team to which the recruitment process is conducted. Employees of the personnel unit select the candidate most suited to the organization and recommend him/her to the owner of the organization. The owner negotiates the working and payment conditions and signs the employment contract.
	2	The recruitment process is initiated by the owner of the organization or members of the team being recruited. The recruitment and selection processes are conducted by the members of the team to which the recruitment is conducted with little participation of the personnel unit employees. Team members, with little participation of the personnel of the HR unit, select the candidate who is best-suited for the team and organization, recommending him/her to the owner of the organization. The owner negotiates the working and payment conditions and signs the employment contract with the candidate.
	3	The recruitment process is initiated by the members of the team to which the recruitment is conducted. Team members independently conduct the selection process and are fully responsible for its implementation. Team members select the candidate best-suited for the organization and team and recommend him/her to the owner of the organization. Together with the team members, the owner negotiates the working and payment conditions and signs the employment contract with the candidate.
	4	The recruitment process is initiated by the members of the team to which the recruitment is conducted. Team members independently conduct the selection process and are fully responsible for its implementation. Team members select the candidate best-suited for the team and the entire organization. Team members together with the candidate determine the terms of work and pay and sign the employment contract.

Source: Own work

Table 3. The maturity assessment sheet in the area of recruiting and selection - Status of the recruitment and selection process in the organization and its duration and complexity - in Human Relations Management Maturity Model

Dimension	Maturity levels	
	Level	**Features**
Status of the recruitment and selection process in the organization and its duration and complexity	1	Recruitment is treated on a par with other elements of the personnel function. The organization does not educate the labour market about its specificity, values, organizational culture, and what candidates it is looking for. The recruitment process is short, not very extensive and intuitive. There are no written procedures for the selection process. The organization uses the support of external companies in the recruitment process.
	2	Recruitment is an important element of the personnel function. The organization occasionally educates the labour market about its specificity, values, organizational culture, and what candidates it is looking for. The recruitment process is longer, more complex. Some processes and procedures in this area are written down and followed reliably. Recruitment procedures are developed by employees of the personnel unit. The organization occasionally uses the support of external companies in the recruitment process. The organization occasionally educates the labour market.
	3	The recruitment process is a very important element of the personnel function. Most processes and procedures in this area are written down and followed reliably. Sometimes the candidate who does not fit the organizational culture is not employed, despite having the necessary knowledge and skills. Long and extensive process. The procedures for the recruitment process are developed by team members with the participation of personnel unit employees. The organization frequently educates the labour market.
	4	Recruitment is the most important element of the personnel function and other functions performed in the organization. All processes and procedures in this area are written down and followed reliably. Permanent education of the labour market. Resignation from employing the candidate who does not fit the organizational culture despite having the necessary knowledge and skills. A very long and complex process, it continues until the organization becomes sure that the given person fits its specific organizational culture. The procedures for the recruitment process are developed by team members and tailored to the specificity of the team.

Source: Own work

Table 4: The maturity assessment sheet in the area of recruiting and selection - Transparency in the recruitment and selection process - in Human Relations Management Maturity Model

Dimension	Maturity levels	
	Level	**Features**
Transparency in the recruitment and selection process	1	Transparency of recruitment and selection processes for job applicants is either informal or ad hoc. The organization creates a positive image in the eyes of the candidate and provides them with information only about its strengths. First of all, the candidate presents his/her advantages and achievements. The organization does not inform the candidate about the applicable salary ranges.
	2	The organization informs the candidate about its strengths as well as some of the challenges it faces. The candidate reveals not only his/her advantages, but also selected areas that need further development. The organization informs about the salary scales in the job advertisement and discusses them during the selection process.
	3	The organization provides the candidate with information about its strengths, as well as the challenges or difficulties they face. The candidate is aware and speaks openly about his/her advantages, successes and failures or weaknesses. The organization includes the information about the organisation's salary ranges in the job advertisement and discusses it during the selection process.
	4	Both the organization and the candidate stand fully towards each other, i.e. they are authentic, openly talk about their advantages and disadvantages, finances, challenges and difficulties. The decision to hire the candidate is based on the real image of the candidate. The decision to choose the organization by the candidate is based on its authentic image. Access of employees of the organization, the candidate him/herself and the organizations cooperating with the given teal organization to the documentation regarding the entire recruitment process. Conducting the recruitment and selection processes of job candidates in a transparent manner, using open recruitment and remuneration criteria. Salary information, financial data, including company profits available to everyone. The organization shares knowledge on good recruitment practices with other organizations.

Source: Own work

With the help of the above sheets, an organization "on the way to teal" can determine its own level of maturity in the area of recruitment and selection. These sheets can also be used to identify areas and steps the organization could undertake to reach a higher level of maturity in the future. However, it should be remembered that each teal organization and the employed individuals are different. Hence, the "way to teal" of any organisation may differ. The model proposed by the authors, like every model, is a kind of simplification of the reality under study and it should be used with this awareness.

A mature teal organization in the area of recruitment and selection is an organization that:

- gives priority to the recruitment and selection of employees,
- respects employees who are the greatest value of the organization, including candidates for employment,
- the recruitment process is based on mutual trust and openness between the organization and the candidate to work,
- does not employ candidates if their values are not consistent with those of the company, even though they have the appropriate knowledge, skills and experience,

- employs only those candidates who are suited for the organization and its purpose,
- employs only those candidates who accept integrity as an internal benchmark,
- employs candidates who have the ability to identify and resolve conflicts and compromise,
- recruits people who are primarily guided by professional ethics and high social sensitivity,
- employs mature and conscious people with whom deep relations can be built on a partnership basis,
- the processes of recruitment and selection of candidates for work are carried out in a transparent manner, using open recruitment criteria,
- creates the conditions for both parties to make a better-informed decision about future cooperation through openness and being authentic both in the areas of strengths and areas for development,
- self-managed teams initiate and implement the recruitment and selection process, including the selection of the most suitable candidate for the team and the entire organization and the determination of the employment conditions of the candidate to work,
- continuously informs the labour market about its organizational culture,
- the recruitment and selection process is complex,
- the recruitment and selection process is transparent,
- shares good practice knowledge with other organizations.

Conclusions

The paper presents Maturity Model that can be used to diagnose level of maturity in human relations management in teal organization. This model divides teal organizations into four maturity levels based upon maturity of all elements of human relations management. This model can suggest further steps to be taken to improve maturity level in human relations management in teal organization especially in the area of recruiting and selection. Based on this model, each organization will be able to arrive at the answer to the question of on which stage it is "on the way to teal" in the area of recruitment and selection. Finally, it is worth emphasizing that the foundation of recruitment and selection constitutes the organizational culture, which is confirmed by the practices of many organizations that have entered "the way to teal". According to the authors, teal organizations are characterized by a high quality culture, which A. Blikle called the "teal culture of quality" (Blikle, 2016). These organizations put people at the centre, and therefore they give a great importance to the recruitment and selection of suitable candidates for work. The research conducted by K. Cameron and W. Sine (Cameron and Sine, 1999) shows that in organizations with a more advanced culture of quality one can observe, i. al., high level of orientation on the optimal use of human resources, which can be seen in teal organizations. The authors of the article, based on a qualitative approach, will plan to conduct a comparative study of several teal companies in the future in order to determine their level of maturity in the field of human relations management.

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Modern Approaches to the Judicial Settlement of Disputes over the Customs Value of Goods in the Russian Federation

Tatyana Maximova
0000-0002-8532-7963, ITMO University, St. Petersburg, Russia
maximovatg@gmail.com

Elena Y. Gordeeva
State University of Aerospace Instrumentation, St. Petersburg, Russia
sssg2007@yandex.ru

Alina A. Meleshkina
ITMO University, St. Petersburg, Russia
alinalinainana@yandex.ru

Andrei S. Nikolaev
0000-0003-2913-7898, ITMO University, St. Petersburg, Russia
nikand@itmo.ru

Anton A. Antipov
ITMO University, St. Petersburg, Russia, aantipov80@mail.ru

Svetlana V. Murashova
ITMO University, Russia, fpp5@list.ru

Abstract

The authors have developed proposals for specific directions for improving the activities of customs authorities in the field of resolving disputes over the customs value of goods. During the process of the developing the customs risk profiles of the customs value of the goods is required to consider not only the price characteristics of the product, but also the materials contained in the public domain. It is advisable to improve the software of the customs authorities by creating a full-fledged information base for making decisions in the field of customs value control.

Keywords: International Business, International Trade, Customs Value, Judicial Disputes, Customs Value Adjustment, Foreign Trade Operators, Customs Authorities.

Introduction and the research Question

The role of the customs value is very significant in the transboundary movement of goods since it is not only the basis for calculating the amount of customs payments due but is also used to take government measures for regulating the foreign trade. The reliability of the customs value of goods declared by the participants of foreign economic activities has an impact on the efficiency of the customs and tariff regulation of foreign trade activity [3].

The methodology for treatment and control of the customs value is complex and depends on many factors. Its value for the same goods may often vary, at times depending on the customs authority to which the goods are declared. Problems and discrepancies arise even in the customs value treatment to determine commodity structure at the state level in many countries [1.2].

Nowadays, customs authorities and participants of foreign economic activities often act as competing parties, opponents, rather than effectively interacting partners [8]. The customs value is always a kind of "stumbling stone" in relations between them, because foreign trade operators, acting on commercial basis, prefer a lower size of the customs value, which allows keeping down the costs associated with the payment of customs duties.

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On the other hand, customs payments remain the main source of federal budget revenues. Therefore, disputes related to the amount of customs value and the procedures for determining it are often the subject of litigation.

Methodology of the study

The study provides a comprehensive analysis of the regulatory framework for calculating the customs value of goods in the Eurasian Economic Union (EAEU) and the Russian Federation, as well its control process. Several resolutions of the Plenum of the Supreme Court of the Russian Federation, which are important in the area of declaration and control of the customs value, have been analyzed. Their influence on the judicial dispute settlement in this area has been revealed.

Firstly, the analysis was made on the cases in which the court decisions were taken in favor of participants of foreign economic activities, then on the cases where they were made in favor of customs authorities. Based on the results of the analysis, the factors contributing to the adoption of this or that decision were identified. Thus, the possibilities of being successful in an action against the customs authorities on the customs value increase and against the foreign trade operators on its decrease were summarized. At the same time, several issues related to the settlement of disputes over the customs value of goods were highlighted. In conclusion, the foreign trade operators and customs authorities were given recommendations in the settlement of disputes over the customs value of goods.

Results of the study for discussion

The purpose of this study is to develop proposals for improving the process of settling the disputes over the customs value of goods in the Russian Federation.

The role of resolutions of the Plenum of the Supreme Court in the regulation of the judicial disputes related to the customs value

In the process of determining and controlling the customs value of goods, there is a clash of interests of two opposing parties, namely the foreign trade participants and the customs authorities. It often leads to disputes and conflicts that in some cases can be resolved through the courts. Even though the majority of decisions of the customs authorities on declaration or control of the customs value are appealed through the pre-trial process (about 71% of all decisions in 2015-2018), the number of cases requiring litigation remains significant (about 33% of all cases in which the customs authorities were involved in 2015-2018; according to the statistics of arbitration courts, the participants of foreign economic activities were able to appeal successfully the customs value adjustment in court in 55% - 60% of cases in 2018-2019).

It is worth noting that every year the number of judicial disputes related to determination and control of the customs value of goods is growing. This may indicate the ineffectiveness of the procedure for pre-trial settlement of such disputes, as well as the complexity of the unambiguous application of customs legislation in this area. Thus, six methods of determining the customs value are currently applied. Each method has its specifics and features of the application, which are not always clearly indicated [5,6]. At the same time, in the Customs Service Development Strategy of the Russian Federation until 2030 the important goals are considered as following: the reduction in the number of lawsuits brought against the customs authorities and the shift in emphasis from judicial to pre-trial customs dispute resolution [4].

The current situation is aggravated by the fact that a uniform practice for interpretation and application of customs legislation by courts has not been formed yet in the Russian Federation.

In this regard, the Plenum of the Supreme Court of the Russian Federation adopted two resolutions, which clarify and concretize the law enforcement in the cases related to the customs value of goods.

As a result of the relevant resolutions adopted by the Plenum of the Supreme Court, a number of factors formed in the judicial practice can be identified.

Some of them strengthen the position of the customs authorities in court:

The court's acceptance of the customs authorities' arguments about the low price level of imported goods compared to the value of similar goods;

The court's admission of the customs authorities' arguments that, if there is a relationship between the seller and the buyer of goods, it is the declarant who is responsible for proving that such a relationship does not affect the deal price.

However, there are some factors that weaken the position of the customs authorities:

1. In litigation practice, there is a position that the documents initially submitted by a participant of foreign economic activities when declaring goods are sufficient for the customs authority to accept the declared customs value, and the submission of additional documents requested by the customs authority is a right, not an obligation of the declarant;
2. The obligation to provide documents at the request of the customs authorities to confirm the declared customs value of goods may be imposed on the declarant only in respect of those documents that are available to the declarant;
3. The identification of certain flaws in the documents submitted by the declarant to confirm the customs value of goods in accordance with the requirements of the civil legislation, which does not refute the fact of the transaction on certain terms, cannot constitute grounds for making changes or amendments to the declaration of goods.

Despite the above mentioned factors, negative for the customs authorities , the percentage of decisions on the customs value that were not subsequently reversed through judicial procedures in 2016-2018 not only remained steadily high (at least 95%) but also increased , reaching 98.5% in 2018. This testifies to the high competence of customs officials in controlling the customs value of goods, which allows them to prove the validity of their decisions in court.

Analysis of litigation practice in cases concerning the customs value of goods

The study of specific rulings of the arbitration courts of the Russian Federation has revealed in which cases the decisions are made in favor of the customs authorities more often, and in which in favor of the foreign trade operators.

In general, the outcome of court proceedings relating to the customs value of goods depends entirely on the court's documentary base presented by the parties to the process:

1. A set of documents from the declarant and additional documents and information sent by him at the request of the customs authorities;
2. The availability of the necessary information and evidence of an inaccurate declaration of the customs value;
3. The presence or absence of contradictions in the documents submitted by the declarant;
4. The specific reasonable doubts of the customs authorities on the reliability of the declared customs value;
5. The rate of the revealed deviations of the declared customs value from the prices for identical or similar goods.

The court makes decisions in favor of the foreign trade operators more often in cases where the decision to make changes (amendments) to the goods declaration does not provide justification for taking such a decision, when there are no specific signs of an inaccurate declaration of the customs value identified by the customs authorities or specific information misdeclared by the declarant.

Also, decisions are not made in favor of customs authorities in the absence of justification for the impossibility of applying the method of determining the customs value declared by the declarant if there are documents submitted to the customs authorities.

In practice, one of the main problems of the customs authorities in customs value control is the fact that decisions on making changes (amendments) to the goods declaration are often made only on the basis of the fact that the customs value declared by the declarants differs downwards from the one contained in the databases of the customs authorities. However, this fact in itself is not a cause for making such a decision.

At the same time, in court proceedings, the customs authorities often cannot justify the validity of refusing to use the first method for the customs value determination.

As an example, the ruling of the Moscow District Court of Arbitration of 02.08.2019 NoF05-11448/2019 in the case No A40-238116/18-94-2609 overturns the decision taken by the customs authorities to make changes (amendments) in the goods declaration. The decision was made by the customs authorities on the basis of the fact that the customs value declared by the declarant differed from the price information available to the customs authorities. The customs authorities also concluded that the additional documents and information provided by the declarant were contradictory and unconfirmed, which made it unacceptable to use the first method of determining customs value, and thus the need for applying the sixth method was pointed out.

In this particular situation the court took the side of the declarant, since the documents submitted by the declarant to the customs authorities confirmed that:

1. The customs value of goods is specified without any conditions and fixed;
2. The price of the commodity lot is formed in a free commercial sale environment on the basis of a commercial offer from a foreign society;
3. The slight deviation of the value of the goods from the values determined by the customs authorities is explained by the discount granted, based on the legal relationship between the parties.

At the same time, the customs authorities did not provide any evidence of the inaccuracy of the documents and information submitted by the declarant. No reasons for rejection to use the first method for determining the customs value were found. When applying the reserve method based on the price information on the goods, the customs authorities used price information for goods that did not correspond to the comparable imported goods.

Nevertheless, the absolute majority of decisions of the customs authorities on making changes (amendments) to the goods declaration related to the customs value of goods are not overturned by the courts.

In this regard, the courts take the side of the customs authorities in cases where the customs authorities provide additional evidence of the under-declaration of customs value received during customs control, addressing the specific inconsistencies and contradictions in the documents and information submitted by the declarant, the unjustified significant deviations of the declared customs value from the price level for identical or homogeneous goods.

Another example is the decision of the Arbitration Court of the East Siberian District No. F02-1772/2019 dated June 18, 2019, in case No. A10-3699/2018. It confirms the legality of the decision made by the customs authorities on making changes (amendments) to the goods declaration. In this case, the declarant did not comply with the structure of the customs value of goods, which led to the understatement of the amounts of customs payments made.

When the goods were released by the customs authorities, customs audit was carried out. It revealed that the declarant had concluded a unified freight forwarding agreement, which included the transportation of goods both before the import into the customs territory of the EAEU and directly across its territory. The costs of transportation through the customs territory of the EAEU were not separately identified. Therefore, their deduction from the customs value could not be made. Based on the results of the inspection, the customs authorities decided to make changes (amendments) to the goods declaration.

The court confirmed the validity of the decision, as the costs for transportation of goods on the customs territory of the EAEU were not allocated by the declarant from the contract price of the goods and documented.

Thus, in the course of legal proceedings on the issues related to the customs value of goods, the customs authorities find it most difficult to prove the necessity of the following actions:

1. The legality of the decision to make changes (amendments) to the goods declaration;
2. The legitimacy of refusal to apply the first method of determining the customs value of goods if there is a set of documents submitted by the declarant.

The current issues in customs control over the customs value of goods make it complicated to prove the above mentioned facts:

1. The imperfection of the risk management system in control of the customs value of goods, which is expressed in the use of only the price characteristics of imported goods in the risk profiles for controlling the customs value. Unscrupulous declarants find out benchmarks and declare the lowest possible customs value;
2. The lack of reliable sources of price information available to customs authorities on the value of transactions with goods;
3. The lack of a specific and exhaustive list of documents that foreign trade operators must submit to the customs authorities during the customs control of the customs value of goods, which leads to the need to form a list of requested documents and information for each specific transaction, increasing the time spent on the process of controlling the customs value of goods;
4. The lack of developed interaction between the customs authorities of the Russian Federation and foreign customs authorities and organizations.

Conclusions / Recommendations

Several proposals for improving the process under consideration have been developed to solve the identified issues. They are mainly as follows:

1. When developing risk profiles on the customs value of goods, it is necessary to take into account not only the price characteristics of goods but also the trademark, terms of delivery, as well as the empowerment of customs officials in the application of measures to minimize risks;
2. The refinement of customs authorities' software that contains the price information about goods by adding the real-time data on stock-exchange quotations, the product features (trademark, quality characteristics, country of origin, etc.), the world prices for the evaluated goods, some extra information from the manufactures' price lists;
3. The approval of the minimum list of documents, which the declarant is required to submit to confirm the declared customs value for each of the methods of its determination;
4. The creation of a single standard for requesting information from foreign customs authorities, since such a standard does not exist, as well as providing the possibility of making the requests directly at customs checkpoints, without the mediation of regional customs offices.

Based on the analyzed judicial practice in declaration and control of the customs value of goods, several recommendations for foreign trade operators can be developed.

When importing goods into the customs territory of the EAEU, the customs value of which is less than the price level for identical or similar goods, it is reasonable for foreign trade operators to prepare in advance a set of documents confirming the actual conclusion of a foreign trade transaction and zero influence of factors on the contract price, the effect of which cannot be quantified (the seller's price list in the form of a public offer, export customs declaration, payment orders to pay for consignments of goods, bank control records).

If it is impossible to submit the documents and information requested by the customs authorities, the declarant should send the written explanations to the customs authorities to clarify the objective reasons for the impossibility of their submission.

Provided the reliable information and documents are submitted, the actions mentioned above will minimize the possibility of making a decision by the customs authorities to make changes (amendments) to the declaration of goods. If the appropriate decision is made by the customs authorities and the declarant disagrees with it, these actions will strengthen the position of a foreign trade operator in court.

On the other hand, in the process of controlling the customs value of goods, it is advisable for customs authorities to pay attention to the following:

1. The need for a more thorough customs audit of the documents and information submitted by the declarant, in particular those parts of the corresponding documents that deal with the terms of delivery of goods, cost of their transportation, payment terms;
2. The basis for recognizing documents or information used in the process of calculating the customs value of goods as unreliable can only be clear evidence that is documented: the document examinations acts, invoices, as well as other documents on the basis of which the customs authority can prove the identified inconsistencies;
3. It is necessary to make it obligatory for the customs authority to request from the declarant the documentary evidence of the facts that affect the size of the customs value, which will require its adjustment and serve as a basis for making changes to the customs declaration;
4. Specification of particular grounds for making amendments to the goods declaration in case the customs authorities decide to bring about changes.

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Information Management Using Mobile Apps: A Systematic Review

Prieto ZARATE RODRIGO
Universidad Autónoma del Perú, Lima, Perú
lprieto@autonoma.edu.pe

Javier GAMBOA-CRUZADO
Universidad Autónoma del Perú, Lima, Perú
jgamboa65@hotmail.com

Alberto JIMENEZ GARCÍA
Universidad Señor de Sipán S.A.C., Chiclayo, Perú
ajimenez79@hotmail.com

Oscar MUJICA RUIZ
Universidad Nacional Federico Villarreal, Lima, Perú
omujica@unfv.edu.pe

María RODRÍGUEZ KONG
Universidad Señor de Sipán S.A.C., Chiclayo, Perú
pattykong21@gmail.com

Augusto HIDALGO-SÁNCHEZ
Universidad Nacional Mayor de San Marcos, Lima, Perú
ahidalgos@hotmail.com

Abstract

The use of Android applications for information management in organizations is highly beneficial for their economic development, as it can aid in effective decision making and thus avert a significant amount of risk. This study aimed to develop a systematic literature review on information management based on Android mobile applications, in which search and selection techniques regarding documents are applied, the used methods are identified, and potential future research directions are reported. The results obtained based on the systematic review provide a broader perspective to evaluate decision-making based on information management in organizations.

Keywords: Management Information, Mobile Apps, Android, Technology Information, Systematic Literature Review

Introduction

The growth and development of information technology have significantly influenced the global market over the past 15 years. With the emergence of powerful hardware tools, versatile software applications, and high-speed networking, the Industrial Age has been transformed into the Information Age. This rapid evolution creates uncertainty regarding the suitability of technologies for mobile programming. One of the most commonly implemented architectures has been provided by the Android system. The accelerated change in the technology and information market has generated a new horizontal approach to business processes in information technology (IT) companies. Therefore, information services management has gained prominence as it seeks to ensure the correct operation of processes involved in the information management, change management, and requirements of a company. Consequently, information management is regarded as fundamentally relevant in companies. Therefore, this study tries to study technology to guarantee efficiency in information management.

The rest of the paper has been organized as follows: Section II provides the background and related studies; Section III presents the methodology; Section IV describes the evaluation results of the Systematic Literature Review (SRL); Section V presents a discussion of the results; and Section VI concludes the paper.

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Background and Related Work

The importance of the use of mobile applications, programming languages, and mobile operating systems has been widely researched over the past few years, based on which mobile applications are adopted for process optimization. The use of mobile applications has been prevalent in various fields, such as administration, tourism, and medicine, and has yielded desirable results (e.g., efficiency).

Mobile applications speed up management, consultation, and purchase processes, allowing companies to be "within reach" of their customers at any time. At present, the immediacy factor is the main requirement of the business world (López Gallegos, 2015).

Recent studies have confirmed that the market for mobile applications has increased considerably as 80% of the internet users have smartphones. The growing use of mobile devices has generated the need for companies to develop their applications, especially in business management (i.e., process, services, and information management). This is aimed at having a presence in the mobile world, in addition to other significant advantages (DIGETBI, 2016).

During the analysis and design phases of management application development, 52% of the companies were found to have followed testing programs that consider the opinions of the users; only 48% use analytical reports to understand the concerns of the users of these applications. As management is key to company operations, the management applications that are used throughout project life cycles can help reduce the incidence of failures, which frustrate the users or affect security, and realize good decision making (Funds & Markets, 2015).

Recommendations have been presented herein so as to guide future studies in the selection of methodology and interpretation of results.

Review Method

In this study, we performed a systematic review of the literature that included search, collection, classification, and information analysis methods, with which we reduced the time and effort required to approach a research problem. The following steps were adopted: questions were posed according to the research; search equations were prepared; search operations were conducted using different article search engines; exclusion criteria were applied; questions were posed to check the quality of studies obtained; the obtained studies were selected and classified; and review analysis and data extraction were performed.

A. Research Questions

The following research questions (RQs), which will guide the review process of studies, were developed to analyze a mobile application based on Android for information management:

RQ1: Which methodologies have been used to develop Android mobile applications?
RQ2: Which databases have been used the most to develop mobile applications?
RQ3: How many studies have been published over the years?
RQ4: Based on the SCRUM methodology, in which areas have the Android mobile applications been used?
RQ5: What operating systems are being used to develop Android mobile applications for information management?

B. Search Equations

Search equations are derived according to the search terms grouped based on the variables (Table 1).

Table 1: Search Terms

Descriptor		Description
English	English	
Mobile application	Mobile application	Independent variable
SCRUM	SCRUM	Intervening variable
Methodology	Methodology	
Method	Method	
Model	Model	
Information management	Information management	Dependent variable

The words provided in Table 1 were fundamental to form search equations as they perfectly describe the research topics: management information, mobile applications, and Android operating system (OS). The topics entail a series of techniques and tools. As a variable involved was used, by the SCRUM methodology since to perform this research work requires a methodology that allows you to follow an order of procedures that lead to good results. The dependent variable was considered for information management; owing to the inclusion of these variables, search equations were obtained in different article search pages, as shown in Table 2.

Table 2: Search Equations

Source	Generic Search Equation
Science Direct	(“mobile application” and “android” and “information management” and (“method” or “methodology” or “model”))
IEEE Xplore	((("Full Text & Metadata": mobile application) AND "Full Text & Metadata": android) AND "Full Text & Metadata": information management) OR "Full Text & Metadata": method or methodology or model).
ACM Digital Library	[All: mobile application] AND [All: android] AND [All: information management] AND [All: scrum methodology]
Google Scholar	Mobile application with SCRUM and methodology or method or model and information management.
Springer Link	Mobile application with SCRUM and methodology or method or model and information management.
Microsoft Academic	Mobile application and Android and SCRUM methodology and information management.
Redalyc	Mobile application with SCRUM and methodology or method or model and information management.
Taylor & Francis	[All: mobile application] AND [All: Android] AND [All: information management] AND [All: method or methodology or model]
Cern Document Server	Mobile application with SCRUM and methodology or method or model and information management.
SciELO	(Mobile application) AND (Android) AND (methodology or model or method).
WorldWideScience	Title: Mobile application with Android and SCRUM or methodology and information management.
WILEY	Mobile application anywhere and Android anywhere and information management anywhere and method or methodology or model anywhere.
ETHzurich	All fields contain mobile applications and all fields contain Android or all fields contain information management and all fields contain (method or all fields contain methodology or all fields contain model).

C. Search

When the search operations were performed using the above equations, several documents were obtained, the most relevant being the ACM Digital Library. Fig 1 depicts the number of output documents corresponding to each source.

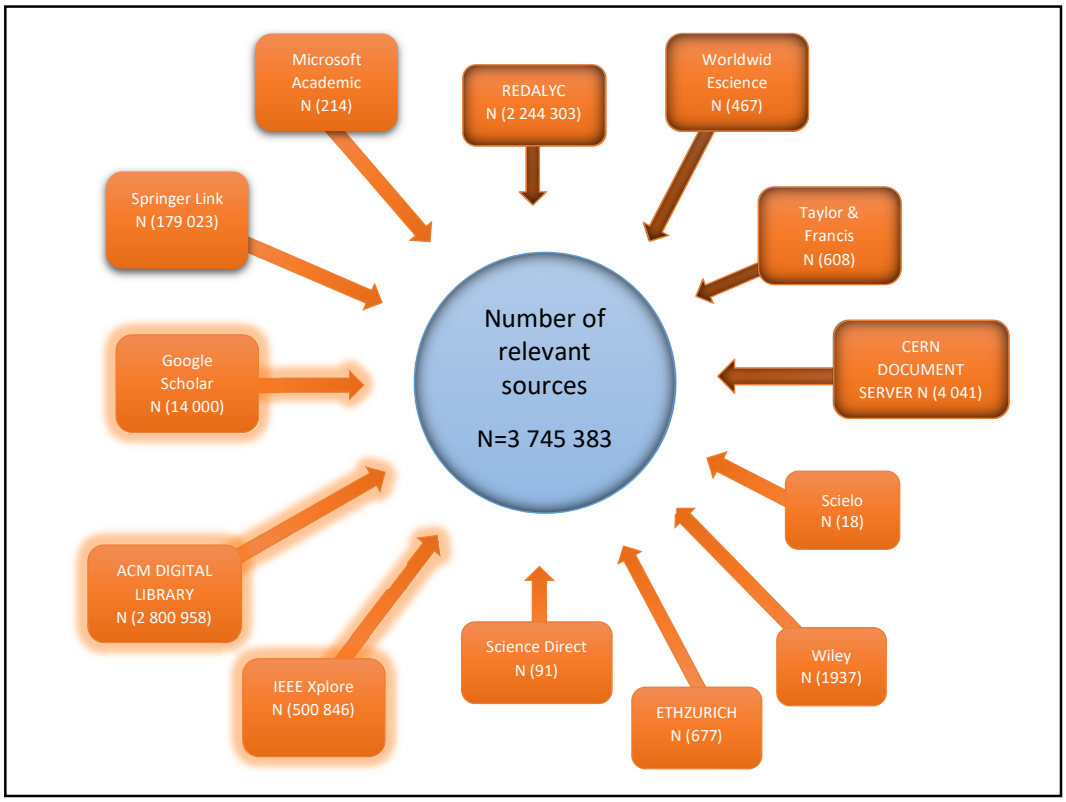

Fig. 1: Consolidated Numbers Based on Source

D. Exclusion Criteria

Numerous studies were compiled for this research; however, as the knowledge is regularly updated in the technological field, several criteria were introduced to select good articles. The first criterion was that the articles should not be more than 5 years old and should have quantitative data that are relevant to the research.

As some search engines provide a large amount of information pertaining to different areas, the exclusion criteria were selected for articles that did not use Android mobile applications, that is, articles that are not written in English, Spanish, and Portuguese languages.

As the search for articles related to mobile applications uses various methodologies for development, it was decided to exclude developmental methodologies other than SCRUM; moreover, the articles that did not provide answers for the RQs and were not experimental were excluded.

Finally, the researches that help more to carry out this work, are the articles that describe the collection of data in a suitable way, many of the results found are from diverse areas, then the criterion of exclusion will be applied that the articles that are not from the area of technology, and do not speak of management will not be included, also the articles will be excluded that do not specify the methods of collection of data, these applied criteria will help to select researches that are more oriented to the topic, and thus, to be able to have better results that allow to evidence the use of these techniques in the bibliographical analysis.

E. Study Selection

The selection of the articles was classified in an orderly manner based on search sources using the Zotero tool, in which 85 articles were read and stored for research (Fig 2).

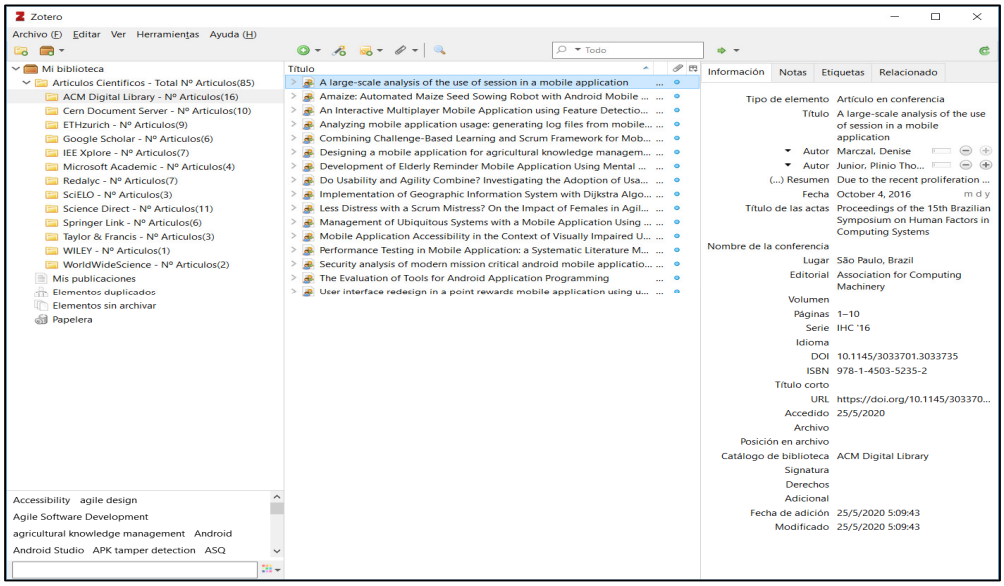

Fig. 2: Reports in Zotero.

By applying the search equations, 3,745,383 articles were selected. Subsequently, the exclusion criteria were applied, in which 10 criteria were grouped into pairs to rapidly reduce the number of articles, resulting in 85 articles, as shown in Fig 3.

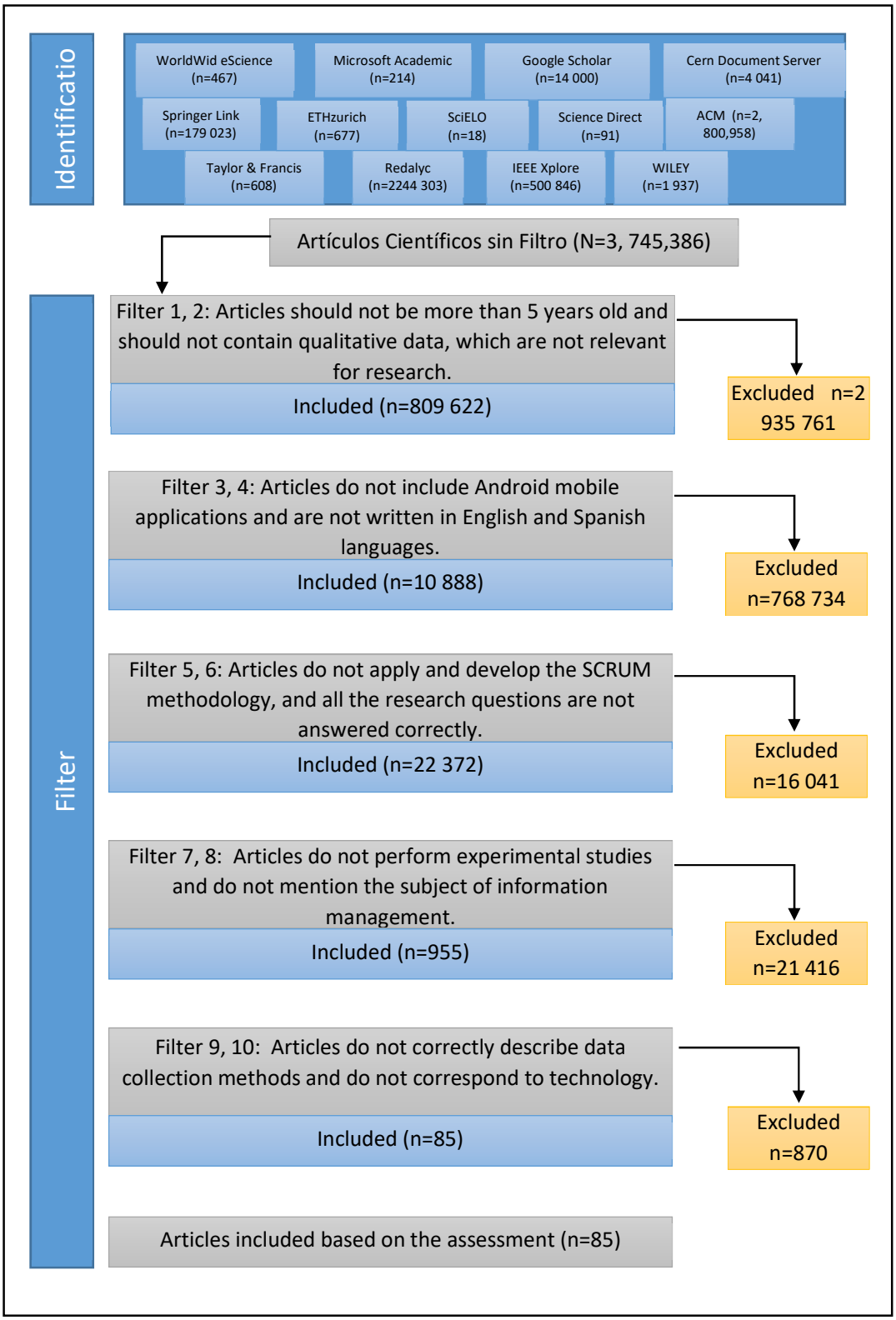

Fig. 3: Consolidated Results Chart with Excluded Criteria

In the study selection process (Fig 3), the results of the automatic search (N = 3 745 383) were evaluated based on the exclusion criteria by examining the titles, and the studies that were not relevant (N = 3 745 298) were excluded. Finally, 85 articles were selected for review.

F. Quality Assessment

The quality assessment (QA) criteria to evaluate the articles were formulated. It selected the corresponding articles to answer the afore described RQs. These reviews were performed after the application of the exclusion criteria. All the articles satisfied the following seven quality criteria selected in this study:

QA1: Are the results of the study established and supported by the findings?
QA2: Is the purpose of the research explained in detail?
QA3: Does the topic belong to the fields of computer science, information system, or management?
QA4: Is the analysis of the data used in the study adequately described?
QA5: Is the research methodology explained in detail?
QA6: Are the research objectives identified in the document?

Following the QA, all 85 articles were found to comply with the QA criteria; thus, no article was removed.

G. Data Extraction

Data extraction was performed on the 85 articles, wherein each study was assigned a unique reference number ([1]). The following data were extracted from each article: title of the article; the source or search engine; year of publication, country, number of pages, and the language in which the article is located; type of publication (maybe a scientific article or an RSL); name of the publication; research methodology; authors or author; author affiliations (university); number of citations; summary of the article; keywords; and sample size.

H. Synthesis of Findings

An exhaustive analysis of the selected studies was performed manually. The data were used to obtain various plots for further elucidation.

Fig 4 depicts the articles based on country quotations.

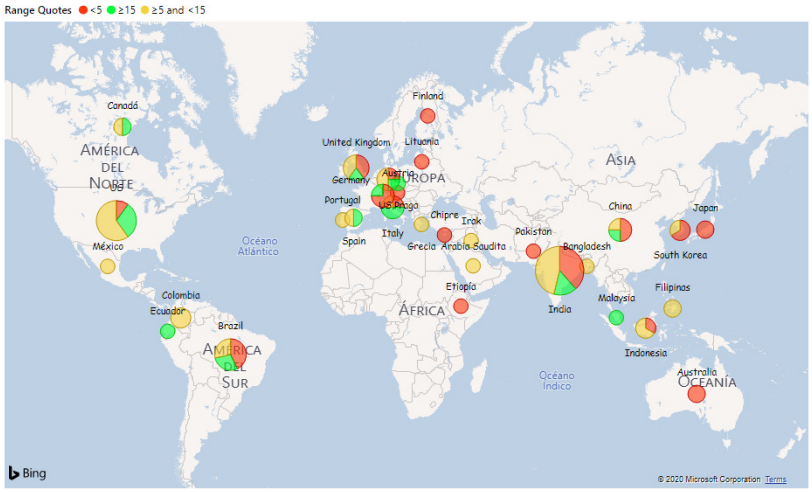

Fig. 4: Items according to country quotations.

Fig 5 shows the number of items per country.

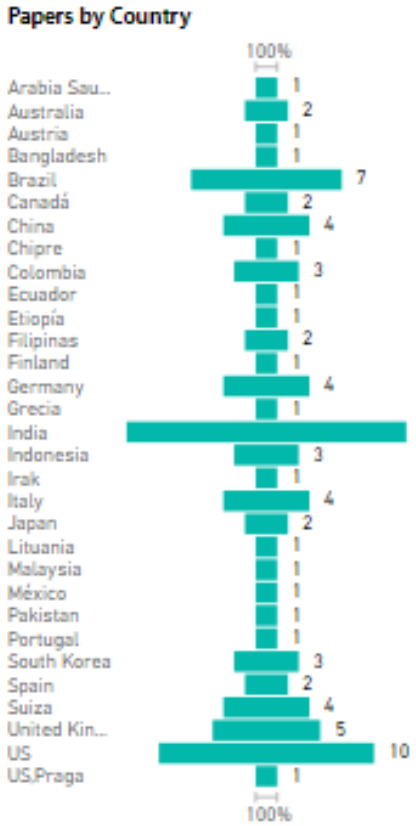

Fig. 5: Items per country.

Fig 6 shows the number of items per country and the percentage represented by the number of items.

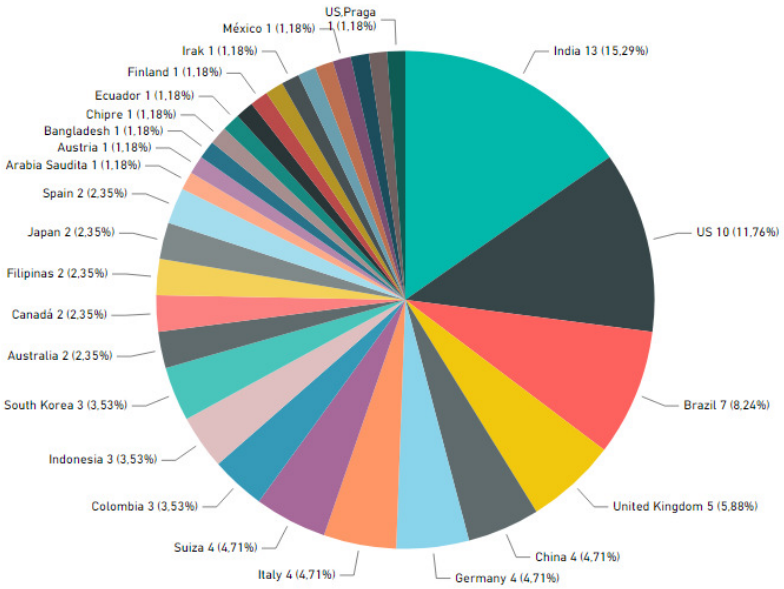

Fig. 6: Items per country and their percentage

Results

A. Answers to the Research Questions

This section presents the results of the RSL responding to each of the established RQs:

RQ1: What are the methods used to develop Android mobile applications?

Among the 85 articles, we found several methodologies to develop mobile applications, which are the most required by companies for management (Table 3). Moreover, this also answers RQ1.

Table 3: Methodologies used

Development Methodologies	Articles	Qty. (%)
SCRUM	[5] [8] [10] [36] [37] [41] [59] [60] [65] [68] [84]	11 (17.2)
RUP	[1] [4] [8] [12] [25] [55] [68] [73] [81] [82]	10 (15.6)
Mobile D	[3] [7] [13] [16] [18] [19] [20] [21] [23] [24] [26] [28] [30] [32] [34] [35] [37] [38] [39] [42] [43] [46] [47] [49] [50] [53] [57] [58] [60] [62] [63] [65] [66] [69] [70] [72] [74] [75] [76] [77] [81] [83] [85]	43 (67.2)

RQ2: Which are the most used databases in the development of mobile applications?

In the reviewed articles, it was found that the databases for mobile applications are fundamental for service, process, and information management. Among these, three types of databases were found, namely, MySQL, SQLite, and PHP. Most articles did not reflect what type of database would be more effective for a mobile application and Android but implied that a mobile application could not function without any database; then, an evaluation was performed to determine which database more effective according to the articles that mentioned databases. According to the investigated articles, any database that is applied to mobile applications would be 100% effective; but the suitability of each database would depend on the functions of the mobile application (Table 4).

Table 4: Mobile Application Database

Database of Mobile Apps	Articles	Qty. (%)
MySQL	[3] [11] [22] [40] [50]	5 (41.7)
Sqlite	[1] [33] [35] [72]	4 (33.3)
PHP	[23] [25] [76]	3 (25)

RQ3: How many studies have been published over the years?

To address RQ3, 3 745 383 articles were selected in the beginning, and finally, 85 articles published during the last 5 years were considered (Fig 7).

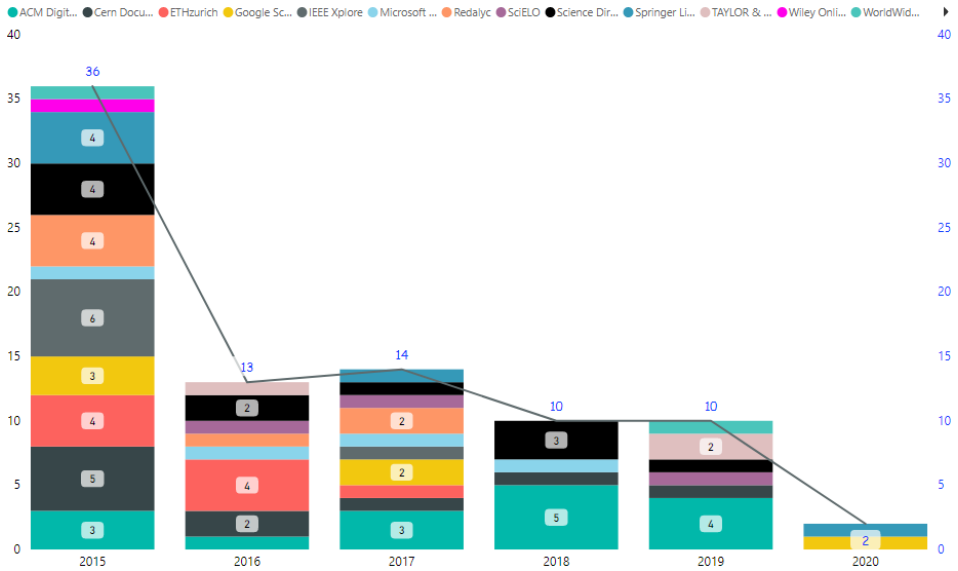

Fig. 7: Articles Published Based on Year and Source.

Fig 8 shows the search source, the year, and the total number of articles published during the last 5 years.

N° of Papers per Source

Source	2015	2016	2017	2018	2019	2020	Total
ACM Digital Library	3	1	3	5	4		16
Science Direct	4	2	1	3	1		11
Cern Document Server	5	2	1	1	1		10
ETHzurich	4	4	1				9
IEEE Xplore	6		1				7
Redalyc	4	1	2				7
Google Scholar	3		2			1	6
Springer Link	4		1			1	6
Microsoft Academic	1	1	1	1			4
SciELO		1	1		1		3
TAYLOR & FRANCIS		1			2		3
WorldWideScience	1				1		2
Wiley Online Library	1						1
Total	36	13	14	10	10	2	85

Fig. 8: Articles by search source and year.

RQ4: In which areas Android mobile applications have been used based on the SCRUM methodology?

Several study areas concern the development of mobile applications with varied functions. The articles considered indicated the following: education, medicine, business, and tourism, which use Android mobile applications based on the SCRUM methodology; the area that used this method the most was the business area (Table 5).

Table 5: Areas of Study

Study Areas	Articles	Qty. (%)
Education	[5] [15] [17] [18] [20] [22] [27] [41] [45] [46] [50] [54] [56] [58] [59] [61] [78] [79] [81] [83] [84]	21 (41.2)
Medicine	[28] [36] [61] [76]	4 (7.8)

Business	[3] [16] [17] [26] [28] [36] [37] [41] [56] [58] [59] [61] [65] [67] [69] [70] [73] [77] [80] [81] [83] [85]	22 (43.1)
Tourism	[3] [22] [54] [81]	4 (7.8)

RQ5: What operating systems are being used to develop mobile applications for information management?

The OSs used in the development of mobile applications are Android OS, Linux, Windows, and BlackBerry; however, the selected 85 articles indicated that the OS for efficient management is Android, which is one of the greatest advantages offered in the current competitive market (Table 6).

Table 6: Operating Systems

OSs used in Mobile Applications	Articles	Qty. (%)
Android OS	[4] [5] [6] [7] [10] [11] [12] [15] [16] [17] [19] [21] [22] [24] [25] [26] [27] [28] [29] [30] [31] [33] [37] [43] [46] [48] [49] [51] [52] [53] [55] [57] [59] [60] [61] [62] [63] [64] [65] [67] [70] [72] [73] [74] [75] [76] [77] [82] [83] [84] [85]	51 (68)
Linux	[34] [35] [38] [44] [47] [50] [56] [73] [78]	9 (12)
Windows	[3] [39] [49] [73] [75] [81]	6 (8)
BlackBerry	[14] [23] [24] [27] [38] [39] [40] [45] [73]	9 (12)

Discussion

A. Implications for Research and Practice

Thus far, several reviews have been conducted to rule out the greatest possibility of errors while writing articles. Our findings indicate a large concentration of empirical research on the study of mobile applications and management, followed by studies on methodologies used in mobile applications.

The other research topics that were not related to this study were discarded to focus on the articles that are relevant. In addition, we found no external replication of studies that are unrelated to the research.

One of the implications of these findings is that this study has opened up several opportunities to be explored in the research community. In particular, replication is necessary if a consistent body of knowledge is to be consolidated, which can guide future research and influence the practice of mobile management applications. For practitioners, the direct application of the study results must be carefully performed. Conflicting evidence suggests that the field of research is not mature, and the direct application of the methods and tools used in the studies may not produce the desired effects. The interpretations of the results obtained must be carefully analyzed so as to have some good practices pertaining to article writing. Moreover, a careful analysis of the context, in which the research was conducted, is necessary to assess the possibility of generalizing the results to other settings.

B. Limitations of the investigation

The limitations found in this RSL research are the data collected throughout the research and the language of the article. These make the study selection process difficult. Selection errors can be prevented by adopting research protocols developed based on well-established guidelines. The selection of articles in various search engines, either paid or free, affects the timing of the research, as it depends on the ability of an individual to be able to access all articles relevant to the research. A multistage selection process was used, and the reasons for excluding articles were recorded at each stage. Although the search and selection processes were carried out by the researcher, conflicts in the selection process were resolved with the help of experts in the field.

Conclusions

In this study, 3,745,383 articles were obtained from the search operations, and after the application of the exclusion criteria, 85 articles remained, which were manually reviewed. These articles would provide answers to the formulated research questions. In these studies, which are related to the current research topic of information management through a mobile device, most articles considered mobile applications, the Android OS, and spanned various fields, such as medicine, tourism and administration. The empirical studies found that the selected 85 articles indicate the directions of relevant research over the years and the importance of mobile applications in various fields.

Considering the importance of the effect of human factors on several aspects of software engineering, the amount of research in this regard by engineers is limited. It can be concluded that the analysis of the Android mobile applications has been elaborated based on an evaluation of the developers (using the questions based on scales), resulting in several articles that complement the research.

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Use of Digital Technologies in Marketing Activity of Higher Education Institutions

V.I. TEPLOV
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

E.E. TARASOVA
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia

Abraham ALTHONAYAN
International Business Development Program, Senior Lecturer in Strategic and Operational Management and MBA, Brunel University, London, United Kingdom

E.A. SHEIN
Belgorod University of Cooperation, Economics and Law, Sadovaya st. 116-A, Belgorod, 308023, Russia
pror-nr@bukep.ru

K.V. EVDOKIMOV
Saint-Petersburg State Agrarian University, Russia
ekvmanager@mail.ru

Aliya AYTASOVA
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University
Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
aytasovaaliya5@gmail.com

Abstract

The article substantiates the need to use digital technologies in university marketing activity to implement informative, communicative, representational, image-building functions. The purpose of the work is to consider and estimate implementation of digital marketing technologies into directions of university marketing activity based on the systematization of digital marketing tools. In research process the authors used systemic and integrated approaches, economic and statistical methods, desk study, and methods of expert estimations. The article shows the role of digital marketing in higher institutions' activity; provides systematization of research tools used to promote the university in its online environment; their interaction is established and the influence on university website performance is determined. The study systematizes directions of university marketing activity with the use of digital technologies; the analysis is carried out from the perspective of various target groups; university sites content is analyzed and its assessment is given. The article proposes a methodological approach to university website performance evaluation on the basis of online analytical services; presents results of its testing and identifies the main directions for university marketing activity improvement by using digital technologies.

Keywords: Digital Technologies, Digital Marketing, University Marketing Activities, Target User Groups.

Introduction

The university brand and its promotion ensure competitive advantages, customers' loyalty, and employers' interests. Currently, educational institutions are widely using digital technologies, that is digital marketing, in their marketing activity for promoting a university brand, improving the present image and attracting customers.

The university marketing activity based on the digital technologies usage is aimed at implementation of informative, communicative, representational, image-building functions and, to a large extent, ensure their competitiveness and attractiveness for various target groups.

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Important areas of university marketing activity are markets of educational services, consumer research, communication activity, promotion. Implementation of these areas is associated with the use of digital technologies. In this regard, a study on the use of digital technologies in university marketing activity is relevant.

Research Methodology

In the course of the analysis, we used cabinet research methods: analysis of domestic and foreign scientific literature relevant to subject matter; generalization and systematization of scientific information in the field of digital marketing [1, 2, 3, 4]. Economic and statistical methods and the method of expert estimations were used when computing.

This study is a continuation of the authors' previous research [5, 6, 7, 8, 9, 10] on university marketing activity based on the Internet technologies implementation.

The goal, set in the framework of this article, concerned consideration and evaluation of the directions of university marketing activity by using digital technologies with the help of digital marketing tools. In contrast to previously published works, the authors attempted to develop a methodological approach to university website performance evaluation by the marketing component (optimization and attendance). The approach was tested and the indicators of university website performance evaluation obtained through online analytical services.

The proposed approach was tested by means of university website performance evaluation based on the digital technologies usage on the example of BUCEL and Brunel University, London.

Results obtained

Digital marketing is a general term used to refer to the targeted and interactive marketing of goods and services using digital technologies to attract and keep potential customers. The main objectives of digital marketing are brand promotion and sales growth through various means. Digital marketing includes a wide selection of marketing tactics to promote products, services and brands [11] .

The main goal of digital marketing is promotion of resources, increased recognition and relevance of organizations, goods and services; wide coverage of the target audience and feedback from potential consumers [12].

In relation to universities, the goal of digital marketing is to promote educational services and provide the necessary information to target groups of users (students, applicants, employees, authorities, employers, graduates) for further feedback.

University marketing should be considered against the position of university promotion in the online environment through special tools and technologies.

In promoting a university brand while interacting with various target groups, it is advisable to use digital marketing tools such as display advertising, contextual advertising, search engine marketing, direct marketing, mobile marketing, social marketing, time marketing and permission-based marketing.

In order to effectively promote universities it seems feasible to use search engine marketing in general and SEO (search engine optimization) in particular; SMO (social media optimization) and SMM (social media marketing).

Systematization of digital marketing tools used in marketing activity is given in Figure 1.

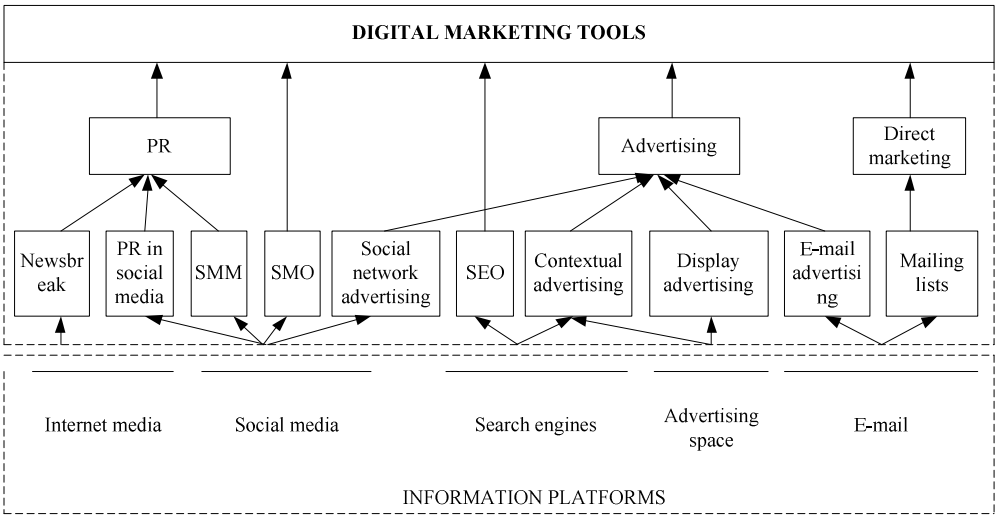

Fig. 1: Digital marketing tools used in university marketing activity

Different target audiences use various tools to gain access to information concerning university activity. The main tool of the university marketing activity on the Internet is its official website, which should be considered as an important tool for promoting universities and fostering digital opportunities. The study revealed the interaction of the university marketing activity tools in the course of implementing digital technologies [13]. It also disclosed their influence on improving the university website functioning by attracting new viewers for product and brand promotion with the aim to improve the university image and get loyalty from target user groups.

Universities have gained significant experience in using digital technologies to work with various target groups. The analysis of fostering digital opportunities in university marketing activity of was carried out on the example of BUCEL (Russia) and Brunel University (London, UK).

In previous studies [6] we made an attempt to systematize university marketing activity aimed at dealing with various target groups (students, applicants and their parents, employers) based on the digital technologies usage; analyze the content of websites of BUCEL and Brunel University devoted to universities' interaction with the target audience of students, parents, applicants, employers, etc. (table 1).

Table 1: Directions of the two universities' marketing activity through digital technologies

Directions	BUCEL site pages	University of Brunel site pages
– conducting marketing research of potential and real consumers, international and regional educational services market	UNESCO Chair Education for Sustainable Development of Cooperatives; International activity; News	Knowledge Transfer Partnerships (KTP) Brunel Research A-Z
– attracting potential consumers of educational services; formation of a database of potential applicants	Student admission Post-graduate student admission; Additional Education Center; Photo Gallery Video Library; Newspaper of the Belgorod University of Cooperation, Economics and Law University News	Study (Undergraduate, Postgraduate, International) Subjects Campus life Research Business Services News and Events Alumni About
– identification of interested applicants and personal work with the most promising ones	News archive; BUCEL pages in social networks: vk, facebook, twitter, instagram	Information for practitioners and schools Higher education fairs Professional Development Centre
– identification of interested students and personal work with the most promising ones	Cultural Work Center Additional Education Center; Students Research work; Internship and Work Placement Department.	Other funding Higher education fairs Professional Development Centre

– increasing of applicants' loyalty by involving them into the university life: receiving information about university events, campus life, contests, olympiads	News; Student achievements	News and Events
– informing applicants in advance about the fulfillment of formal requirements necessary for enrolment	Student admission	Study
– development of advertising policy - print advertisements, TV commercials, online advertising, etc.	Multimedia; Mass Media about us	Transparency Information
– arrangement of meetings with applicants' parents	News archive; BUCEL pages in social networks: vk, facebook, twitter, Instagram	Open Days Information for parents and carers Support for your students Clearing information for parents, guardians and carers Guide for parents, family, carers and friends
– development of social network contacts with potential consumers (online surveys, promotion of social network groups, information content availability), etc.	Links to social networks: vk, facebook, twitter, instagram	Links to social networks: facebook, twitter, youtube, flickr)
– development of practical activities in the framework of the university curriculum; contacts with enterprises and other regions	Internship and Work Placement Department Partners and employers; International activity	Alumni benefits New graduates Job Shop Employers
– student placement activity	Internship and Work Placement Department Automated Employment Information System	Business advice and support
– branding; university brand promotion activity	Announcements of events; University Achievements	Announcements of events; University Achievements
– study of the regional labor market to determine the most popular professions and their prospects for further development	Internship and Work Placement Department Analysis of the situation in the labor market in the Belgorod region	Advertising vacancies
— interaction of structural divisions aimed at the maximum satisfaction of the consumers' needs in educational services	University rules and regulations	Rules and Regulations

The analysis of both marketing activity implementation and corresponding BUCEL and Brunel University site pages content showed that the two universities actively use their sites for interaction and communication with various target groups – students, applicants and their parents, employers. However, attention should be paid to filling and regular updating of sites as well as to relevance of the information provided for various target groups.

In a competitive environment surrounding the educational services market and the labor market, universities find various ways and mechanisms to attract applicants and employers [14].

Particular attention should be paid to conducting marketing research of potential and real consumers, international and regional educational services market. Of specific interest is Brunel University activity announced at the site page *Knowledge Transfer Partnerships* focused on conveying knowledge and expertise from the university to small businesses for their expanding and venturing into new markets.

Any business should have a specific business task or a new innovative idea for further development. Participation in knowledge transfer partnerships can help significantly increase profit, improve personnel qualification, create new jobs, develop new products, processes or services, etc.

The direction of BUCEL's site *Conducting marketing research of potential and real consumers, international and regional educational services market* contains information on the UNESCO Chair, functioning at BUCEL, and materials about the section Cooperation in the Global World of the UNESCO Chair of the Faculty of Global Processes, Moscow State University, as well as data on the university's international activity.

In an increasingly competitive educational services market environment and in the face of demographic crisis, universities should pay more attention to such areas as identification of interested applicants and personal work with the most promising ones, arrangement of meetings with applicants' parents.

On the Brunel University website this information is presented on the following pages: Open Days, Information for parents and carers, Support for your students, Clearing information for parents, guardians and carers, Guide for parents, family, carers and friends.

According to a survey (Student Hut, 2019), the Professional Development Center (PDC) Employment Service was voted by the university students as the fifth best career service in the UK (Student Hut, 2019) as they support graduates' career development and enhance their employability. One-minute video is posted on the website. It contains the following appeals: unleash your potential; reveal strengths; develop skills; connect with employers; translate ideas into business; we can help you find a job; how to successfully pass an interview.

This site page includes the following headings: Supporting professional development; Moving on as a graduate; Skills programmes and awards as well as the tasks of the Professional Development Center team:

– The Career team will help you explore your career options and provide you with a wide range of support and opportunities. This site page offers a mechanism for interacting with employers who want to work with PDC. They are responsible for organizing campus events such as fall and summer recruitment fairs, presentations, employer information events;

– The Innovation Hub team is ready to provide support for students and graduates who want to develop their ideas into a winning business;

– The Job Shop team is ready to help students find part-time opportunities on and off campus. The team also acts as an HR function for all students working on campus;

– The Modern Languages team offers the opportunity to learn a new language, develop competence in four basic skills: listening, speaking, reading and writing;

– The Administration and Career Information team offers students the chance to secure a placement through their well-established connections in wide range of industries in public and private sectors. The career information staff manages PDC career information resources using electronic and traditional library materials.

Currently, such an important direction as development of social network contacts with potential consumers is gaining particular relevance, which allows to quickly disseminate information about the university activity, implement communication.

Digital technologies play an important role not only for promoting the university's brand, attracting applicants, but also for informing various target groups about university activity.

As it was noted above, the university website provides the necessary information for various groups of the target audience: students, teaching staff, employees, parents, employers, authorities, graduates, etc.

In the course of the study, we systematized the data posted on the BUCEL and Brunel University websites which is intended for different target groups of users.

The analysis of the cases disclosed that for applicants and their parents as well as for graduates universities should place virtual excursions and museums, information on professional development and employment, successful professional profiles, etc.

For foreign partners it could be interesting to get information in the English language on international projects, visa and invitation support service, useful contacts, various university activities, etc.

Analysis of the information presented on the universities' websites for different target groups, its comparative analysis with data of other domestic and foreign universities will help determine the directions for further development and application of digital technologies in the universities' marketing activity.

In our studies, we proposed a methodological approach to assess the university website functioning, substantiated university marketing activity directions based on the Internet technologies usage.

The methodological approach is based on the active use of digital technologies to evaluate university marketing activity aimed at various groups of users [15]. The proposed methodological approach was tested on the example of BUCEL and Brunel University, London. For evaluation, we used university website performance indicators obtained through analytical online services.

Table 2 shows website performance indicators of Belgorod University of Cooperation, Economics and Law, Belgorod and Brunel University, London, obtained through analytical online services.

Table 2: Website performance indicators of Belgorod University of Cooperation, Economics and Law, Belgorod and Brunel University, London, obtained through analytical online services

Review criteria			BUCEL	Brunel University London
Common	**Web address**		bukep.ru	brunel.ac.uk
	Page load time, sec.		4,26	3,67
	CMS		MODx	Contens
Search engine systems	Indexing	Yandex	13159	18670
		Google	18800	81300
Traffic	Page views	Day	2380	142000
		Week	16660	991000
		Month	71400	4390000
	Visits	Day	600	20400
		Week	4200	143000
		Month	17900	631000
Links to the site	Referred Pages		49404	1168928
	Referred Domains		502	12265
	Trust to the site	Trust Rank	21	39
		Domain Rank	24	40
Statistics systems	Yandex.Metrika		+	-
	Google Tag Manager		-	+

The interest of target user groups in various sections of the university website and the posted information is reflected in traffic indicators (views and visitors). The number of page views on the Brunel University website exceeds the number of page views on the BUCEL website daily, weekly and monthly by almost 60 times; the number of the Brunel University website visitors exceeds the number of the BUCEL website visitors by almost 35 times (Fig. 2). These indicators are inextricably linked with the number of users – target contact audiences.

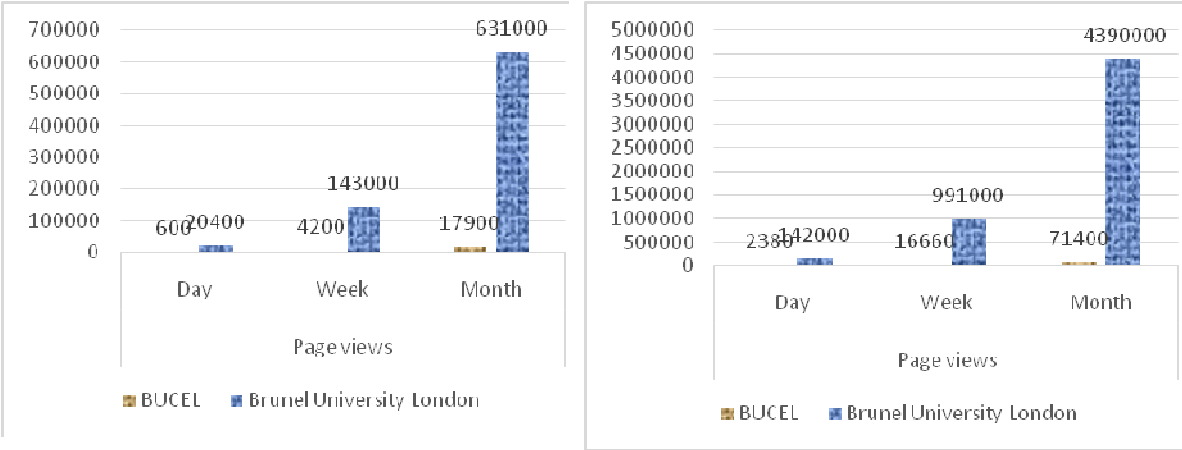

Fig. 2: Website performance indicators of BUCEL and Brunel University by traffic review criteria

Important indicators of the university Website performance obtained through analytical online services are the following: site address; CMS (content management system); page load time; number of site indexed pages; views and visits; number of referred web resources; statistics systems.

The testing results allow us to conclude that, in general, the indicators of the Brunel University website are better than the indicators of the official BUCEL website. The loading time is less, which allows users to maintain their interest while working. Both sites are built using CMS, which makes placement of new content easier and cheaper, therefore, it increases the speed of providing new information for the target contact audience. In our opinion, the web address *bukep.ru* is more attractive due to a shorter spelling.

Indicators of such criteria as indexing by search engine systems, traffic and links to the site reflect the overall popularity and attractiveness of the site.

Both sites have connected web-analytics systems that allow to analyze site traffic by its target contact audience and, based on the information received, make decisions about the future development strategy of the resource.

Table 3 gives a comparative description of BUCEL and Brunel University websites on the availability of elements and information blocks demanded by users.

Table 3: Comparison of the official websites of Belgorod University of Cooperation, Economics and Law, Belgorod and Brunel University, London on the availability of elements and information blocks demanded by users

	Resource Objects	Information Objects	BUCEL	Brunel University London
1	Site navigation	menu	+	+
		information retrieval system	+	+
		quick (hot) links	+	+
2	Information about …	University history, structure, partners	+	+
		educational programs	+	+
		scientific work	+	+
		directions of training, rules of admission	+	+
		alumni	+	+
3	Information for …	applicants	+	+
		students, international students	+	+
		employees	+	
		alumni	+	+
4	News	news	+	+
		event announcements, calendar of events	+	+
5	Communication Objects	feedback	-	
		blog	-	
		forum	-	
		social networks	-	+
6	Interactive elements	media library	+	+
		class schedule	+	
		premises navigation	-	
7	Mobile Items	website as a mobile application	-	+
8	Contact Information	addresses and phone numbers of structural units	+	+

The user elements and information blocks given in table 3 are that very minimum that any educational organization's site should have. As can be seen from table 3, the sites of BUCEL and Brunel University are similar in both functional and informational content.

It should be noted that universities actively use the full-text search system, convenient site navigation, and introduce other control elements. The once-popular approaches of Web 2.0 are being replaced by Web 3.0, where high-quality content and services prevail against technology. The ever more numerous educational resources and services provide their services online. When determining the main university marketing activity directions based on digital technologies usage, it is worthwhile to take into consideration new approaches and prospects.

Important constituents of the university website performance evaluation are both the interactivity resource analysis and the marketing component analysis.

Interactivity resource analysis requires interaction with the site and other communication process participants (feedback, registration, polls and votes, news feed, forum, guest book, etc.).

Marketing component analysis:

– SEO analysis (Search Engaged Optimization – a set of internal and external actions aimed at site optimization in order to increase its position in providing search results) – search engine optimization (TCI[1], PR[2], links to the resource, inclusion in catalogue databases, key words, layout, content uniqueness);

[1] TIC (thematic citation index) - Yandex search engine technology, which consists in determining resources credibility by taking into account the quality characteristics - links from other sites.

– SMO analysis (Social Media Optimization – a set of measures aimed at attracting visitors by optimizing a brand's presence on social media networks) – website optimization for social media;

– clickstream analysis (geographic distribution of users, route, frequency of return, etc.);

– analysis of advertising materials.

To assess university website functioning we used economic and statistical methods and the method of expert estimations.

The technique output parameters are presented by individual, summarizing and integrated criteria.

We selected the most significant indicators, which, in our opinion, reflect the site's performance most accurately, and which can be quickly obtained through the site's databases and analytical systems.

During the assessment, it is recommended to convert site's performance measurement indicators with the marketing component into normalized estimates by measuring deviations from the average value of all as one standard deviation. Summarizing indicators are defined as arithmetic average of individual values distributed based on the sigmoid function [16]. The integrated indicator for the website performance evaluation is calculated as the arithmetic average of summarizing indicators.

Conversion of indicators for the website performance evaluation into normalized estimates is carried out by calculating deviations from the average value of all as one standard deviation. As a result of this operation, basic reference data are converted into a new set with the average value equal to zero and the standard deviation equal to one.

Normalized value of the *i* indicator is determined by formula 1:

$$N_i = \frac{x_i - \bar{x}_i}{\sigma_i}, \quad (1)$$

where N_i – normalized value of the *i* indicator;

x_i – initial value of the *i* indicator;

$\bar{x}_i$ – average value of the *i* indicator;

σ_i – standard deviation according to the general totality defined by the indicators.

Standard deviation according to the general totality defined by the indicators, is calculated by formula 2:

$$\sigma_i - \sqrt{\sum \frac{(x_i - \bar{x}_i)^2}{n}}, \quad (2)$$

where σ_i – standard deviation according to the general totality defined by the indicators,

x_i – initial value of the *i* indicator;

$\bar{x}_i$ – average value of the *i* indicator.

To determine the individual indicators for the university website performance evaluation, we place the obtained values of the indicators in the interval 0-1 based on the sigmoid function (formula 3):

$$p_{1i} = \frac{1}{1 + e^{N_i}}, \quad (3)$$

where p_{1i} – individual indicators for the website performance evaluation;

N_i – normalized value of the *i* indicator.

General indicators for the website performance evaluation are calculated by formula 4

$$G_{1j} = \frac{\sum_{i=1}^{m} p_{1ij}}{m}, \quad (4)$$

where

p_{1ij} – individual indicators for the website performance evaluation;

m – number of indicators in the *j*-component of the indicator system

Integral indicator for the University website performance evaluation is calculated by formula 5:

[2] PR (Page Rang) – calculation algorithm of page authority used by google search engine

$$I_1 - \frac{\sum_{j=1}^{k} G_{1j}}{k}, \quad (5)$$

where I_1 – integral indicator for the website performance evaluation;
k – number of analyzed components of the indicator framework

Table 4 shows the indicators for the University website performance evaluation according to the marketing component (optimization and site traffic), their average values and standard deviation for 2011-2019.

Table 4: The average value and standard deviation of indicators for performance evaluation of Belgorod University of Cooperation, Economics and Law website

Website versions by years / Indicators	2011	2012	2013	2015	2017	2019	Average value	Standard deviation
Marketing component (optimization)								
Number of internal links (average per year)	98	155	163	170	175	178	156,50	29,8446
Number of links from the site (average per year)	18	21	27	30	38	42	29,33	9,3737
Number of links to the site (average per year)	3326,7	1236,9	4240,8	4496,5	4785,9	4940,1	3837,82	1395,4324
Number of referring sites (average per year)	98,6	79,3	120,4	250,9	430,9	502,3	247,07	181,7613
Number of referring sites from education from the education field	8	6	15	18	30	32	18,17	10,8888
Marketing component (site traffic)								
Number of visits (average per day)	1684,1	1485,4	2145,1	2496,7	2987,3	3256,2	2342,47	704,4814
Number of unique visitors (average per day)	1236,7	1115,9	1653,6	1798,7	1895,6	1957,6	1609,68	353,0974
Number of viewed pages (average per day)	2554,1	2363,1	4918,3	5548,2	6108,6	6,985,5	4298,46	1732,8494

Calculations show that within the researched period there was a significant increase for all the selected indicators. As marketing indicators characterizing site optimization were selected the following ones: number of internal links, number of links from the site, number of links to the site, number of referring sites, number of referring sites from the education field. To assess site traffic we applied the following indicators: number of visits, number of unique visitors, number of viewed pages.

Applying this methodological approach, it is possible to conduct a comparative assessment of the university sites functioning according to selected criteria and indicators, depending on the aim of the study.

The results of university website performance evaluation make it possible to substantiate marketing activity directions on the basis of digital technologies usage

(Fig. 3).

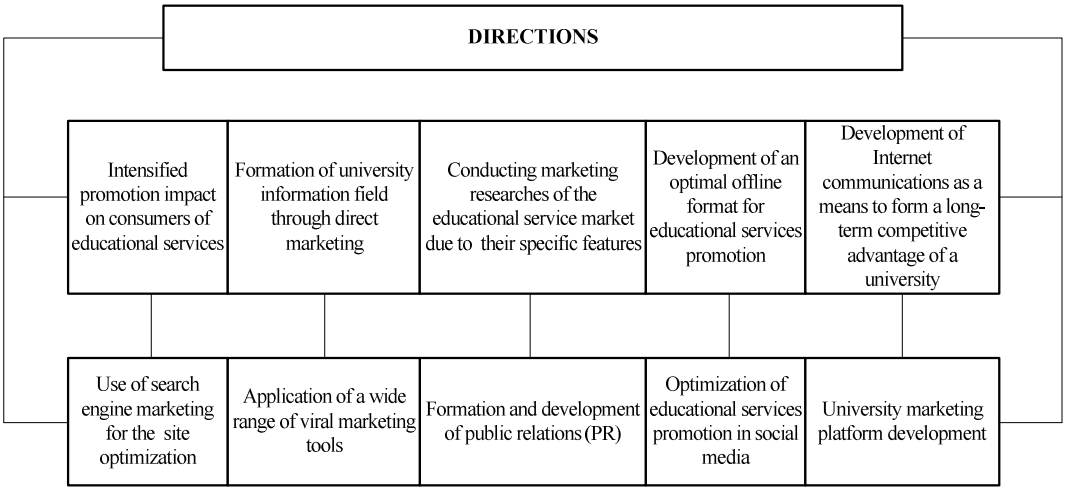

Fig. 3: University marketing activity directions on the basis of the digital technologies usage

A set of specific marketing actions could be developed for each area on the basis of other universities' best practices concerning their usage of digital technologies in marketing activity for interacting with various target groups. Our own possibilities should also be taken into account.

The following marketing activity recommendations can be useful: apply innovative approaches to reflect students and post-graduate students' activity; encourage students' social network activity, answer their questions and provide necessary resources; encourage the staff's social network activity, their grouping in networks; display technical capabilities, discuss the latest achievements in this field; get a feel for online culture in order to promote the university's brand and improve its image; supervise the content created in the educational institution, and encourage further content creation taking into account modern approaches [17].

The article discusses the use of digital technologies in the university marketing activity from the perspective of university brand promotion and target groups of users (students, teaching staff, employees, parents, employers, authorities, graduates, etc.) attraction

Another important area of digital technologies usage is their implementation in the educational process.

Currently, Russian and foreign universities are actively using the Internet space as an electronic university. In this regard, the problem of improving specialists' professionalism in the field of information technology, as well as their engagement in university marketing activity is of great importance.

Conclusion

The study allows the authors to draw the following conclusions. The use of digital technologies can improve effectiveness of university marketing activity and contribute to the implementation of informative, communicative, representational, image-building functions. Various tools should be used to interact with different groups of users (students, teachers, employees, parents, employers, graduates, etc.) while implementing these functions.

To realize the directions of university marketing activity it is worthwhile to dynamically use university sites as an important tool for interacting with target groups. In order to improve functioning of the university website, it is advisable to estimate other universities' experience of using digital technologies for attracting customers and to analyze filling of the sites and content of individual pages.

It is advisable to conduct a comparative assessment of university sites functioning due to indicators obtained through analytical online services.

Important evaluation components of university website performance are the analysis of resource interactivity and the analysis of the marketing component (optimization and attendance). Using the proposed methodological approach, it is possible to conduct a comparative evaluation of university website performance according to selected criteria and indicators depending on the purpose of the study.
The evaluation results of university website performance make it possible to substantiate the directions for improving university marketing activity based on digital technologies usage.

The use of digital technologies in the university marketing activity will help attract target groups, promote educational programs, and increase attractiveness and competitiveness of universities.

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A Tool to Support Anti-Crisis Training as an Example of Dual-Use of IT Technology

Wojciech KULAS
Military University of Technology, Faculty of Cybernetics, Warsaw, Poland, wojciech.kulas@wat.edu.pl

Zbigniew TARAPATA
Military University of Technology, Faculty of Cybernetics, Warsaw, Poland, zbigniew.tarapata@wat.edu.pl

Abstract

In the paper, the authors presented the concept and elements of implementation of the subsystem to support the training process of operators of the anti-crisis system. It was made in the form of emulators of hazard monitoring systems for the needs of an IT system supporting the analysis of threats in the form of CBRN (Chemical, Biological, Radiation, Nuclear) contamination, forecasting their effects and alerting the population.

The genesis of building the emulator subsystem is the need to provide a tool to support the training process of people involved in the activities of the National System of Detection of Contamination and Alarming (KSWSiA) in Poland. However, the emulators designed in this way can also be used as a tool to support the development of emergency procedures and to support the software development process.

Emulators were proposed as pure IT tools, run in the same hardware environment as the constructed system. A constructive simulation was chosen as the emulation method, but reduced to a simple, determined data delivery in accordance with the previously prepared scenario.

Keywords: Emulators, Support of Anti-Crisis Training, Software Development, Dual-Use of IT Technology.

Introduction

The work is based on our experiences resulting from developing IT system supporting analyses of threats related to contamination and alarming (WAZkA) (see Tarapata et al (2017)) for the purpose of the National System for Detection of Contamination and Alarming (pol. *Krajowy System Wykrywania Skażeń i Alarmowania, KSWSiA*) in Poland (Binek and Czepiel (2014)). The implementation of the WAZkA system made it necessary to implement the subsystem to support the training process of operators. It was one of the main the WAZkA software requirements.

The purpose of the constructed the WAZkA system was to support the anti-crisis management system, mainly in terms of passing the information, coordinating actions, and forecasting the development of threats. The WAZkA system is aimed at collecting information obtained from various sources: starting from sensors (see Grabowski et al (2001), Lipiński et al (2001)) and single observers, through particular levels of the anti-crisis management system, and ending with national centers. The information is collected and supplemented with the results of the analyses conducted in the system environment. The so prepared data are made available to all interested parties: population, elements of the anti-crisis management system, other information media. The data are made available in different forms: tabular, descriptive, graphic on a background map, text, and voice notifications. Alerts and notifications, which confirm the development of threats and which constitute direct instruction to undertake preventive actions, are of special significance.

To allow the designed system work in the training mode, it must be possible to replace the actual environment with the training environment. The replaceable elements of the environment shall be as follows: databases, information sources and recipients of alerts and notifications. The sources and data recipients may be replaced with specialized operators and automatic machines. The logic of the information recipients is usually very simple. It is much more complex in case of the information sources. They need to deliver notifications in accordance with the principles effective while observing the phenomena and in accordance with the physics of the development of threats. Therefore, the information sources were chosen as the most suitable for automating the IT system.

Replacement of the actual information sources with automatic machines makes it necessary to build emulators. The behavior of the information sources suggests that the construction of the simulation software shall be a good way to

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provide IT support. That is how the information tool to support the training process was created. During its development, it became necessary to quickly deliver the environment for launching and testing the emerging the WAZkA system. The assumptions and implementation were modified in such a manner so as to enable the same subsystem of emulators to support the system developers. Therefore, the functions supporting the manufacturing process were added to the tool to support the training process.

Although, the presented solution was designed for the anti-crisis system, however, the outlined problems occur in most of the constructed IT systems, in particular class C2 (Command and Control) systems (Tarapata (2011)).

The paper is organized as follows. First, we present placement of the emulator in the WAZkA system and its expected role. Next, we describe architecture of the emulator and its ultimate role in the WAZKA. Finally, we describe the possibilities of dual-use of emulators, particularly in software development process.

Placement of the emulator in the WAZkA system and its expected role

Requirements on the WAZkA system

The expectations of shareholders with respect to the presented anti-crisis system (WAZkA) may be summarized in the following points:

1. The basic result shall be in the form of the IT tool.
2. It should reduce the time between detection of a threat and passing of the information to the public.
3. The tool shall be intended for the bodies responsible for undertaking particular actions.
4. It should optimize the decision-making processes of the public administration bodies and coordinate activities of the rescue entities.
5. It should also be the system ready to react to new threats.
6. The tool must be a platform for organizing training sessions.

Based on such expectations, the requirements for the software were formulated. The requirements may be summarized in the following points (Tarapata et al (2017), WAZkA (2018)):

1. Exchange of information. The purpose of the requirement is to support the process of information exchange between the elements of the contamination detection and alarming system.
2. Assessment and analysis of threats. The requirement is a generalized functionality, aimed at developing and implementing the tool for the needs of the entities forming part of the contamination detection and alarming system of the tool supporting the process of preparation of expert assessments and analyses of contingency situations, resulting in biological, chemical or radioactive contamination, for the decision-making bodies.
3. Coordination of activities. The purpose of the requirement is to deliver the functionality for coordinating activities of the elements of the contamination detection and alarming system and analyses.
4. Access to the threat knowledge base. The purpose of the requirement is to provide access to the developed electronic catalog of threats of chemical, biological and radioactive contamination. The catalog needs to be in the form of a knowledge base, accessible and possible to expand by authorized users.
5. Training session. The purpose of the requirement is to allow training of the public administration entities, using the created products.
6. Emulation of the monitoring systems. The purpose of the requirement is to feed the system with the generated test, user-controlled data on threats. It facilitates the training process and allows to verify cooperation between the system and services in case of unusual threats. Furthermore, the requirement is aimed at supporting the training system by generating the data on threats to implement the predefined scenario of development and consequences of such threats.

The two last requirements are related to the training function of the system. The training sessions are usually conducted in a non-automatic manner, using operators. The preparation of exercises requires development of a plan for sending notifications, including the following information:

- operating and astronomical time of sending notifications,
- content of notifications,
- source or sender,
- recipient,
- manner of sending notifications.

The plan had to be developed by analysts having in-depth knowledge of the procedures and physics of the phenomena related to the spread of contamination. It is a long and labor-intensive process. The exercises are

performed in the form of sending the notifications by the properly instructed operators in accordance with the developed plan, without any significant deviations.
The concept of using the constructed the WAZkA system for the training purposes is based on applying the same system as in case of typical work. Therefore, it is necessary to change the entire environment, in which such system is supposed to be operating during the training session. The environment elements are as follows:

- sources of data on contamination,
- recipients of notifications and alerts,
- databases.

The exchange of sources and recipients usually comes down to replacing the actual elements with training services. It is often troublesome and costly to organize the training, as it requires many operators. Therefore, it becomes necessary to substitute a part of the personnel (or even all of them) for the specialized IT subsystem. It is easiest to do it in automatic or automated data sources.

Placement of emulator in WAZkA and its role

The emulator, in general, is the system which behaves like another computer system, but which was designed in a different technology and environment. The emulator behaves like the actual system only from a certain point of view, depending on the purpose of application of such emulator. Since the emulator is "seen" only by the constructed IT system, it must be compatible with the system replaced at the interface level.

Emulators are used in different applications and contexts. For example, the paper by Greenberg et al (1995) presents test results using EM (real-time hazard monitor, historically termed an error monitor (EM)) in conjunction with a Flight Management System (FMS) emulator. In the paper by Bowman and Woods (2016) authors develop methodology for the two thin-plate spline, with application to atmospheric dispersion, to capture the spatial structure and fit a Gaussian process emulator to the coefficients of the resultant basis functions and demonstrate that these emulators significantly outperform the principal component emulator. Authors Yin and Song (2013 write about emulators approach to automatic malware analysis. Manatakis et al (2014) demonstrate the potential of the proposed simulation-driven WSN emulation approach by using it to estimate how communication and energy costs scale with the network's size when implementing a collaborative algorithm for tracking the spatiotemporal evolution of a progressing environmental hazard.

The behavior model of emulators depends on the required degree of adequacy. In case of the described application, the emulators do not have to behave in the exact same manner as the actual phenomena and the systems that track them. They do not have to and even should not deliver the most probable data. It is enough when such emulators provide the probable data. For didactic purposes, the training is much more valuable in the decision-making process when executed in new, not typical, conditions. Therefore, it may be concluded that the behavior models of emulators may be quite simplified, which significantly facilitates and accelerates their implementation and hence reduces the costs.

The most obvious application of such emulators is to "emulate" automatic sources of data on contamination. However, their limited use in case of non-automated sources, e.g. to send informal information via e-mail, is also possible.

A natural way to implement the emulators is to use the same techniques and environments as in case of the whole system. The easiest way of emulation is the computer simulation method. Physical phenomena are of continuous nature, but actual systems for collecting and delivering data are triggered by events. Therefore, the appropriate type of simulation is discrete-event ones.

It is possible to adopt various behavior models of emulators. According to the general principles of software design, it is essential to start the work from creating the riskiest behavior models, which are usually also the most complex ones. If the emulator subsystem is only a tool to support the training process, the order of creation needs to be established. Having a tool for easy delivery of the working environment of the whole constructed system allows to create a better system in a much easier and quicker manner. In such case, the priority is to deliver the environment as quickly as possible. Therefore, from the point of view of mitigating threats to the entire undertaking, it is essential to start building emulators in accordance with the models that may be delivered as fast as possible. These are usually the simplest models.

The above deliberations may be summarized with the following conclusions:

- since the WAZkA system is a purely IT system – the subsystem of emulators shall also be purely IT,
- with the above in mind, it is clear that the application of the computer simulation techniques shall be a good choice,
- actual behavior of the emulated systems (not phenomena) is based on events, therefore, such type of the computer simulation is preferred,
- the degree of adequacy does not have to be high, thus, simplified model of the emulated systems and phenomena may be adopted,
- it should be assumed that the emulators shall be built from the simplest to the most complex one (the purpose is to reduce the risk of creating the whole system, not the subsystem of emulators),
- the subsystem of emulators should be completely transparent for the system – it should be created as independent software integrated with the system through the same interfaces as the actual environment,
- the emulators are not only data producers, but also consumers; future system extension with emulators of data consumers may be taken into consideration,
- the simulation should be based on the predefined scenario (in a manner close to the implementation of the plan for sending notifications); scenario modification during the emulation process is an option worth considering.

Description of the architecture of the emulator and its ultimate role in the WAZKA

Layered software concept of the emulator subsystem

The analysis of the expected behavior of the emulator subsystem conducted based on the specification of requirements led to the development of the layer software concept. It was shown in Fig. 1.

Fig. 2 shows activation screen for the emulation subsystem prototype in the WAZkA.

The key component of the developed concept is the component of emulators. It appears in such a few copies that corresponds to the developed types of emulators. For the constructed system, three types of emulators were developed:

- simple generation of data as defined in the scenario,
- simple determination of the environment status as defined in the scenario and automatic data generation,
- data generation using the behavior model of the phenomenon with the parameters as defined in the scenario and automatic data generation.

They differ in the level of technological advancement, hence, complexity of performance. In the subsequent part of the article, the adopted solutions for types of emulators were described. The description was in accordance with the level of technological advancement, starting from the simplest emulator.

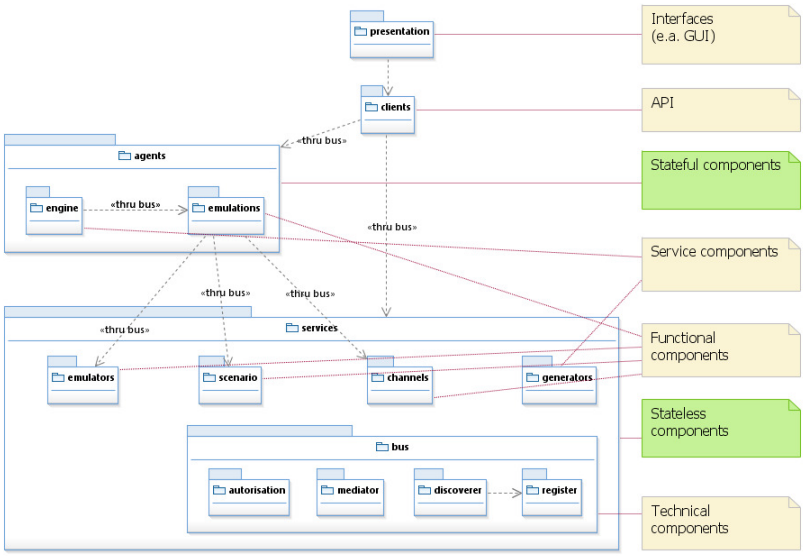

Fig. 1: Layered software concept of the emulator subsystem

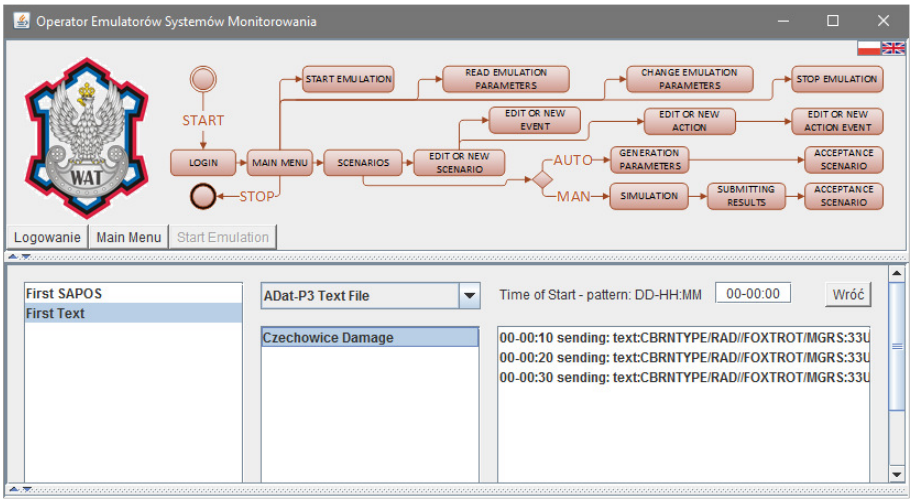

Fig. 2: Activation screen for the emulation subsystem prototype in the WAZkA

Simple generation of data as defined in the scenario

This concept of emulation is the simplest, but also the most flexible. It means that the information to be passed in the notifications for the system was expressly defined in the scenario. Therefore, the emulation scenario must include:

- expected time of sending the notification,
- contents of the notification.

The difficulty in using such emulator is that the model of spreading the phenomenon and operations of the monitoring system must exist "in the mind" of a person creating the scenario (scenarist, analyst, or training manager). The emulator does not provide any support in that respect. A person with a specialist knowledge may develop the scenario, which is also labor-intensive.

Simple determination of the environment status as defined in the scenario and automatic data generation

This type of scenario has an in-built model of operations of the monitoring system. Such system is usually fully automatic and the algorithm of its operations relatively simple. The model of such system is simple thus, the emulator is easy to implement. The model of spreading the phenomenon must still exist "in the mind" of a scenarist. However, creation of the scenario comes down to the definition of the instructions, which shall appear in sensors. Therefore, the scenario needs to include:

- expected time of changing the value read by the sensor,
- identifier (location) of the sensor,
- value which needs to be read,
- parameters of reading the value from the sensors by the monitoring system:
  - frequency of reading the value,
  - frequency of sending data to the system.

This type of emulator does not support the scenarist in modeling the phenomenon but relieves them from the obligation to organize the procedure for sending data from sensors to the system.

Data generation using the behavior model of the phenomenon with the parameters as defined in the scenario and automatic data generation

In case of such emulator, it is necessary to include in the scenario only those parameters that initialize events and refer to the operations of the monitoring system. It is enough for the scenarist to know which events shall occur, not how they shall proceed. The scenarist is not required to have extensive knowledge in that respect. Additionally, the time necessary to develop the scenario (hence, the time of preparation of exercises) is significantly shorter. On the other hand, the process of constructing the emulator is much more complex. Nonetheless, while considering the

previously justified assumptions, the model of spreading the phenomenon may be significantly simplified.
Fig. 3 shows a schematic sample model, which illustrates its level of simplification. The model complies with NATO ATP-45(d) standard (ATP-45, (2010)).

The widening lines define the sector, in which the whole phenomenon shall appear with the probability of 0.7. The sector is set based on pragmatic methodology. In accordance with the so defined sector, the locations of the phenomenon are determined at subsequent times (shown in the form of circles). The passing of an event leaves a trace, which depends on the size of the phenomenon and passing time. Once the event passes, the effects of the phenomenon are spontaneously degraded. Furthermore, the pragmatic rule of degradation was also adopted here.

Weather information, limited to the wind direction and efficient speed, is used to determine the direction of spreading the phenomenon. Other parameters were omitted, which is acceptable in case of the model used for emulation. Certainly, the models used to assess the situation and to make the decisions must be much more advanced and hence more adequate for the actual phenomenon.

It follows from the above that the following should be included in the scenario:

- expected time of event,
- place of event,
- size of event,
- weather parameters:
  - change time of weather conditions,
  - wind direction,
  - efficient wind speed,
- parameters of reading the sensors by the monitoring system:
  - frequency of reading the value,
  - frequency of sending data to the system.

Other parameters are derived from the data included in the scenario. The parameters are as follows:

- trajectory of the phenomenon spreading (calculated based on the wind direction),
- speed of spreading (calculated based on the wind speed),
- duration of spreading (calculated based on the event size),
- speed of cloud broadening (calculated based on the event size),
- initial dose level (calculated based on the event size),
- half-life (a typical value was adopted).

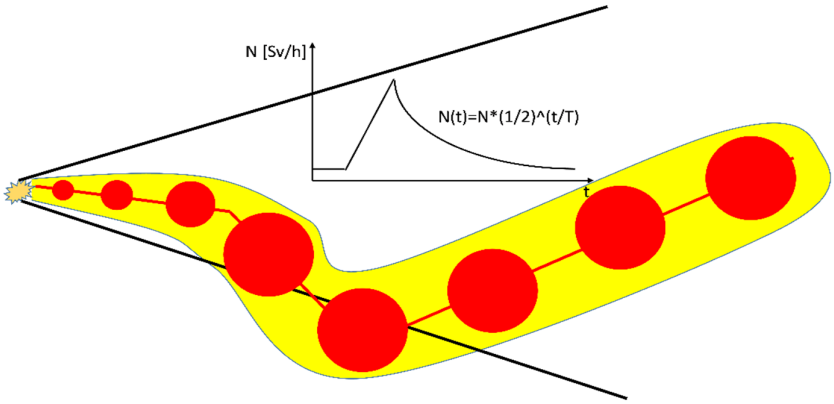

Fig. 3: Sketch of the phenomenon spreading model (N – radiation level in sievert per hour (Sv/h) units, t – time that has passed from start of radiation, T – half-life of radioactive substance which is source of radiation)

Using WAZkA for training anti-crisis teams

In the paper by Kulas and Tarapata (2018), the authors presented the concept and elements of implementation of the subsystem to support the training process of operators of the anti-crisis system. It was made in the form of emulators of hazard monitoring systems for the needs of an IT system WAZkA. However, the emulators designed in this way can also be used as a tool to support the development of emergency procedures. Emulators were

proposed as IT tools. A constructive simulation was chosen as the emulation method, but reduced to a simple, determined data delivery in accordance with the previously prepared scenario.

Replacement of the actual information sources with automatic machines makes it necessary to build emulators. The easiest way of emulation is the computer simulation method. The behavior of the information sources suggests that the construction of the simulation software shall be a good way to provide IT support. That is how the IT tool to support the training process was created.

Fig. 4 shows an example of using emulators in WAZkA system and steps being conducted. Although, the presented solution was designed for the anti-crisis system, however, the outlined problems occur in most of the constructed IT systems, class C2 (Tarapata (2011)). It is important to emphasize that the presented solution is dedicated for replacing personnel on different levels during anti-crisis CBRN threats training, not during anti-crisis management or anti-crisis decision support.

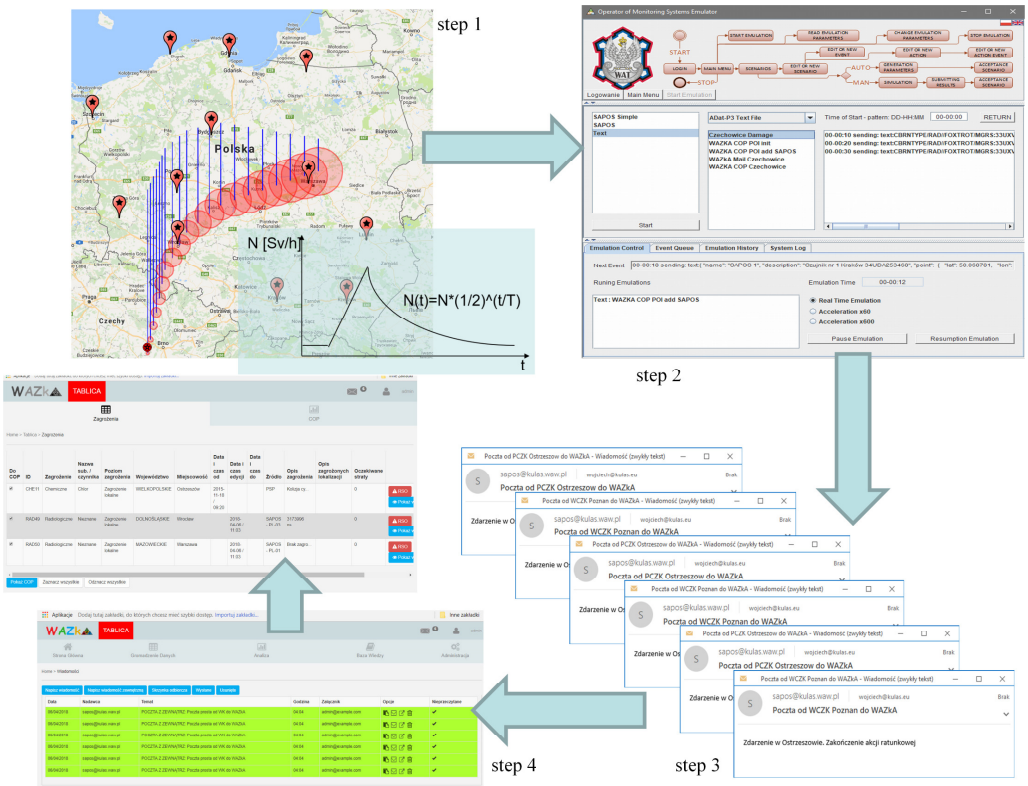

Fig. 4: Example of using emulators in WAZkA system: (step 1) model of phenomenon, (step 2) emulation process control, (step 3) sending messages, (step 4) receiving messages in WAZkA, source: own elaboration

Description of the possibilities of dual-use

Typical application of the emulator subsystem was outlined in the requirements for the constructed IT system. During specific implementation of the subsystem, a possibility of additional use of the so defined software appeared. It means that the subsystem of emulators may be used as the testing environment for the currently created software. In this way, the tool intended for handling training activities of the system also became the tool supporting the software development process.

The new application did not require any changes in the functionality. What changes was only the time necessary to deliver the tool. The tool had to be delivered before the deadline set for acceptance tests. It was also preferred to deliver the useful product earlier, even without complete functionality. At the earlier stages of production, such tool is suitable to perform the integration testing of the subsequent software incremental changes.

The application of the subsystem of emulators as the tool supporting the software development process consists in the supporting of the construction of the testing environment. Such environment automatically delivers the input

data. It allows to construct automatic tests, hence, indirectly, allowing efficient implementation of agile methodology.

Simple emulators require clear definition of the data that are to be generated. It requires a lot of work on the part of both analysts and testers. Such emulators turn out to be efficient at the initial production stage, when the tests are not usually complex. On the other hand, the aforesaid emulators are very simple and may be quickly delivered.

The implemented phenomena development models and operations of the monitoring and data provision systems are included in the advanced emulators. Such a solution significantly simplifies the construction of tests. In extreme cases, it allows to eliminate the analysts while constructing the tests (their knowledge was included in the models and implemented in emulators). The data generated by such emulators may be complex, whereas the effort used for their preparation insignificant. A disadvantage of the aforementioned solutions is a high degree of complexity, which makes it difficult to quickly deliver such solutions. However, complex test data are usually necessary at the later stages of the software implementation.

The application of the computer simulation techniques also allows to easily introduce randomness of the data generation process. It offers new possibilities of testing.

An advantage of all emulators is the possibility of multiple use of the ready environment, without the necessity of repeated involvement of testers. Additionally, the speed of automatic data delivery exceeds the capabilities of a tester several times.

The advantages from the dual-use of the subsystem of emulators may be summarized in the following points:

- faster testing,
- reduced time of work of analysts and testers,
- easy repeatability of testing,
- automatic testing,
- added randomness of tests,
- low cost of adaptation of available solutions,
- supported implementation of agile methodology.

Summary

The presented emulation environment allows to construct and deliver emulators in a flexible manner. In the described case, it was used for the purposes of a specific system, but potentially it may be also applied in any other system. In the article, three implemented emulators were described, but it is possible to extend the environment with other emulators as well - designed both for a specific system and for general application.

The simplest of the designed emulators has great potential of versatility. Since there is no in-built model, the emulator may be used in any way. It may be the starting point for using the emulators while building any system. More complex emulators may be designed and gradually implemented while executing the undertaking.

The main objective of providing the emulators was a possibility of easy use of the system for the training purposes. However, the emulators also proved useful in the process of designing the software. They allowed quick provision of the environment for testing the designed product.

The principle of delivering emulators from the simplest to the most complex one was adopted. It seems at variance with the rules of software engineering, according to which it is required to start the procedure from the riskiest tasks. However, it should be remembered that the emulators are only the subsystem of the whole, thus, the risk of implementation must be considered with respect to the entire system. In such case, quick delivery of the testing environment is the priority and contributes to the risk reduction of the whole undertaking by allowing better testing more quickly.

In case of large systems, it is usually required to deliver the emulators together with the training environment. Extensive training sessions require substantial funds and time. It is indispensable to develop the exercise scenario and train personnel. The main personnel consist of people imitating the sources or recipients of notifications. In both cases, the emulators contribute to the reduction of costs and time necessary to prepare the exercises by:

- providing tools for building scenarios,
- simplifying the construction of scenarios by delivering the implemented models,

- providing tools for automatic generation of events, without the help of personnel.

The concept of emulators may be extended. One of the possibilities is to deliver the consumer emulators apart from the source emulator. Once initiated, the outlined emulators operate in accordance with the scenario, without a possibility of interference. In some cases, it may prove useful to influence the emulation process during its course. It is the second possible direction of development of the presented emulators.

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Job Pursuit Intentions of Undergraduates towards Green Human Resource Management

Diane Christine FERNANDEZ[1]
Faculty of Business, Multimedia University (MMU), Melaka, Malaysia, dianechristine2602@gmail.com

Dr. Jaya GANESAN[2*]
Corresponding Author
Faculty of Business, Multimedia University (MMU), Melaka, Malaysia, jaya.ganesan@mmu.edu.my

Dr. YEOW Jian Ai[3]
Faculty of Business, Multimedia University (MMU), Melaka, Malaysia, jayeow@mmu.edu.my

Abstract

The paper aims to propose the influence of Green Human Resource Management dimensions on the Job Pursuit Intentions. Two mediators; Employers' Attractiveness and Employers' Prestige intervenes the aforementioned relationship. It reviews precedent conceptual and empirical papers in accordance to this subject. The past empirical papers were retrieved on the topic of Green Human Resource Management whereby a condensed table on these with relation to Job Pursuit Intentions is illustrated. Moreover, extracting information from both conceptual and empirical papers enabled an organisation based on each variable. Few studies in a quantitative approach has been conducted on the outlook of Green Human Resource Management dimensions on Job Pursuit Intentions as separate themes. From the past empirical studies, the Green Human Resource Management dimensions are commonly treated as either a whole or a selective fragment of the various components of Green Human Resource Management. This review paper will be beneficial for researchers with interest in exploring the concept of Green Human Resource Management factors influencing the Job Pursuit Intentions. In addition, this information and knowledge can serve as an awareness to practitioners to include green initiatives as a strategic talent acquisition and management tool. The review paper enables enrichment to the limited knowledge base on the outlook of potential employees towards Green Human Resource Management. Besides, this paper provides a combination of three underlying theories which are Ability-Motivation-Opportunity Theory, Signalling Theory and Social Identity Theory. Also, the proposed research framework is an extension whereby Green Employee Relations is presented in the hypothesized relationship.

Keywords: Green Human Resource Management, Job Pursuit Intentions, Employers' Attractiveness, Employers' Prestige

Introduction

Research Background

Transitioning into a green economy enables reduction in environmental degradation and promotes efficiency in resources, sustainability and low carbon emission. The Global Green Economy Index (GGEI) in Malaysia is still at its infancy. Malaysia ranked 65 out of 80 countries in this index (Tamanini, 2016). The major concern of economic losses derives from weather and climate-related calamities which also includes industrial activities contributing to this effect (Shafaei et al., 2020). Malaysia has pledged under the Paris Agreement to diminish Greenhouse Gas (GHG) emissions by 45% by 2030 (Ministry of International Trade and Industry, 2017).

There is a total of 633,344 enrolments in the private Higher Educations Institutions (HEIs) of Malaysia whereby undergraduates comprise 313,214 enrolments (Department of Higher Education, 2019). The unemployment rate rocketed in May 2020 at 5.3% (Department of Statistics Malaysia, 2020a) while the graduates unemployment rate in 2019 is at 3.9% (Department of Statistics, Malaysia 2020b). There is a dire need to create more jobs to address this issue. Chief Economist and Head of Research of AmBank stressed a need in focusing new area for green jobs to perpetuate sustainability in the economy (Dass, 2018). The concept of Green HRM is depicted in two; "conserve and develop knowledge capital, and the implementation of eco-friendly HRM practices" (Deshwal, 2015; Prasad, 2013; Mehta & Mehta, 2017; Rana & Jain, 2014; Sheopuri & Sheopuri, 2015).

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Problem Statement

The GGEI is at an advent stage in Malaysia. This is conspicuous in a study by the Asian Institute of Finance (AIF) revealing only 26% of Human Resource professionals voiced out in readiness to implement the Green HRM practices (Asian Institute of Finance, 2017). Thus, denoting an initiation phase for Green HRM. With effect of the rising unemployment rate, the former Human Resource Minister of Malaysia, M. Kulasegaran implied that the green economy is projected to produce a surge of job opportunities (Carvalho et al., 2019). According to the executive director of Malaysia Employers Federation (MEF), youths are gravitated to pursue jobs in organizations with green and socially responsible philosophies (Chin & Menon, 2020). However, it is unidentified, if any, the extent of the influence on each dimension of Green HRM towards the perception of undergraduates in the present milieu.

The Fourth Industrial Revolution on the basis of cyber physical-systems to augment digitization (Michalski et al., 2018) presents outlook to address ecological and sustainable matters (Bonilla et al., 2018; Estevez & Wu, 2017). Several researches have expounded on environmental achievements and green branding as a strategic tool to sell goods or deliver services (customer perspectives) (Alamsyah & Muhammed, 2019; Danciu, 2015; González-Rodríguez et al., 2019; Jamar, 2020). Nevertheless, in spite of the surge in precedent literatures related to Green HRM , the awareness and knowledge on the perspectives of potential employees are not entirely discerned (Chaudhary, 2018, 2019b). Thus, this research aspires to discourse the gap and uncover the current perception of undergraduates on this concept.

Research Objective

The purpose of the study is to investigate the perception of undergraduates on the relationship between Green HRM and Job Pursuit Intentions and also through the role of mediators; Employers' Attractiveness and Employers' Prestige.

Literature Review

Concept of Green HRM

The advent of green philosophy emerged in the early 1960s where in the United States central social movements issues comprised "civil rights, women's rights, consumers' rights and the environmental movement" (Babic & Tunc, 2020; Clark & Rempel, 2018; Kalva, 2016). It was surmised that the social and environmental factions greatly propelled companies to abide with policies designed to preserve the environment and the stakeholders (Shen et al., 2019). Green HRM is the amalgamation of HRM and environmental management (Jabbour & de Sousa Jabbour, 2016; Jyoti, 2019; Renwick et al., 2008; Sharma & Gupta, 2015).

Ability-Motivation-Opportunity (AMO) Theory

This model was expanded on the concept of high- performance work systems (HPWS) and its abbreviation stand for the three principles which boost human capital performance (Appelbaum et al., 2000).

The dimensions of Green HRM were coined under this theory (Arulrajah & Opatha, 2016; Jerónimo et al., 2019; Pham et al., 2019; Renwick et al., 2012). It is clarified that green behaviours may be fostered through incorporation of these three HPWS.

Green Job Positions and Descriptions (GJPD)

Green Job Positions and Descriptions stipulates tasks, duties and responsibilities reflected in environmental bearing (Ahmad, 2015; Arulrajah et al., 2015; Leszczynska, 2016; Renwick et al., 2008). Green jobs exhibited more cognitive skills, non-routine tasks and training juxtaposed with non-green jobs (Bowen et al., 2018; Consoli et al., 2016). Moreover, technical skills are required for green jobs (Bhiwajee & Docile, 2019; Colijn, 2014; Falxa-Raymond et al., 2013). In this viewpoint, it shows that green jobs require considerable insight and deepened re-training. An empirical study on the viewpoint of undergraduates towards GJPD displayed a positive bearing on Employers' Prestige (Nejati & Ahmad, 2015).

Green Recruitment and Selection (GRS)

This refers to the process of recruiting and selecting individuals equipped with EM behaviour, knowledge and skills (Castellini, 2019; Obaid & Alias, 2015; Peerzadah et al., 2018). Digitization can be used to diminish environmental deterioration (Bangwal & Tiwari, 2015; Kane, 2011; Mwita, 2019). It can be construed in the outlook of Industry 4.0 as it allows an automated recruitment climate. Also, a selection criterion like candidates' environmental stance permits an apt selection for the organization (Arulrajah et al., 2015; Hosain & Rahman, 2016; Mandip, 2012; Pham & Paillé, 2019). Bauer & Aiman-Smith (1996), a pioneer research on green recruiting efforts displayed affirmative

views. A similar discovery in Ali et al. (2017) empirical study was also noted. On the contrary, environmental information in recruitment websites did not entice individuals' attraction (Guerci et al., 2015).

Green Training and Development (GTD)

This represents a system of practices that govern the development of EM skills, knowledge and abilities through education and awareness (Das & Kumar Singh, 2016; Saeed et al., 2018; Tang et al., 2017). GTD can intervene in waste management and energy efficiency (Ahmad, 2015; Mandip, 2012; Sharma, 2016; Owino & Kwasira, 2016). Hence, it is pivotal for the success of other Green HRM components as it enables heighten green awareness. Past empirical studies revealed positive associations (Ali et al., 2017; Nejati & Ahmad, 2015).

Green Performance Management (GPM)

This comprises a system of appraisal concerning organizations' environmental interest, policies and responsibilities throughout one's profession (Ahmad, 2015; Jabbour et al., 2008). Renwick et al. (2008) expressed that there are challenges in measuring GPM standards across various business functions. Thus, creation of general GPM indicators for all levels allow a more systematic approach. Themes like green incidents, green responsibilities, green energy efficiency, etc. (Arulrajah et al., 2016; Peerzadah et al., 2018; Saeed et al., 2018; Tang et al., 2017). Feedback by superiors should be provided continuously (Ahmad, 2015; Arulrajah et al., 2015). With perspectives from future employees, the Green HRM which also comprise GPM scale showed significance on Job Pursuit Intentions (Chaudhary, 2018).

Green Pay and Rewards (GPR)

This refers to a system of monetary and non-monetary rewards which act as reinforcements for pro-environmental behaviours (Jabbour et al., 2008; Luu, 2018; Zaki & Norazman, 2019). Both remuneration styles should co-exist to intensify green behaviour. A prior research by Nejati & Ahmad (2015) exposed confirmatory findings between GPR and Employers' Attractiveness.

a) Green Pay and Benefits

Green base pay can be connected in the reward systems for accomplished green goals (Jackson et al., 2011; Langat, 2017; Mandip, 2012). Other financial rewards such as incentives, bonuses, (Labella-Fernández & Martínez-del-Río, 2019; Slavić & Berber, 2015) green travel benefits and green tax (Tang et al., 2017).

b) Green Relational Returns

Non-financial rewards for green achievements are public recognition, praise, special leave, gifts, etc. (Labella-Fernández & Martínez-del-Río, 2019; Mandago, 2018; Tang et al., 2017). Such green relational returns can increase one's worth to engage in green habits.

Green Employee Relations (GER)

Green Employee Relations refer to employers' facilitation for employee engagement, participation and empowerment (Ahmad, 2015; Ramus, 2001 as cited in Oyedokun, 2019). It has been addressed in past Green HRM conceptual papers as green employee involvement, participation and empowerment (Mandip, 2012; Pinzone et al., 2016; Renwick et al., 2008, 2012; Saeed et al., 2018; Tang et al., 2017). Organizations who authorize green innovative ideas to flow freely at any levels can be signified as transparent and ideal. The empirical study by Chaudhary (2019b) revealed Green HRM (included green employee involvement) relates affirmatively on Job Pursuit Intentions.

Job Pursuit Intentions (JPI)

This is defined as behavioural intentions of individuals towards the organization (Highhouse et al., 2003) which implies an active nature (Aiman-Smith et al., 2001; Boğan et al., 2020; Wayne & Casper, 2012). Therefore, it is signified as a dependent variable. Prior empirical studies presented affirmative discoveries between firm attributes such as Corporate Social Responsibilities (Kumari & Saini, 2018; Prihatiningsih et al., 2017; Truong, 2019), and Corporate Social Performance (Greening & Turban, 2000; Tsai et al., 2015; Wang, 2013) towards JPI. In addition, firm attributes like Green HRM also displayed positive findings on JPI (Chaudhary, 2018, 2019a, 2019b; Nejati & Ahmad, 2015; Ali et al., 2017).

Mediators

Both mediators; Employers' Attractiveness and Employers' Prestige have shown to mediate the relationship of Green HRM and JPI in precedent empirical studies (Chaudhary, 2018, 2019a, 2019b; Nejati and Ahmad, 2015). Moreover, these mediations offer relation with Social Identity Theory. As the theory states one would involve with favourable social groups (e.g. organizations that integrate Green HRM practices) to increase self-concept, both these mediators depict on the attractiveness and prestige level of the organization. Thus, it is proposed that individuals who deem

Green HRM as pertinent when seeking for jobs will strive to engage in such organizations as in their light, such social groups are attractive and prestigious. This justifies the introduction of the two mediators in the research framework.

a) Employers' Attractiveness (EA)

This is expressed as preliminary attitudes about the organization as a future workplace which denotes a passive nature (Highhouse et al., 2003). Precedent researches showed significant findings on Employers' Attractiveness intervening the relationship between firm attributes and JPI (Gomes & Neves, 2011; Phillips et al., 2014; Priyadarshini et al., 2019; Shaughnessy et al., 2016). It also mediates the relationship between Green HRM and JPI (Chaudhary, 2019a; Nejati & Ahmad, 2015).

b) Employers' Prestige (EP)

This represents the features of organizations which is defined by social consensus (Highhouse et al., 2003). Past empirical studies revealed positive findings on EP mediating the relationship between firm attributes and JPI (Devina et al., 2016; Shaughnessy et al., 2016; Wayne & Casper, 2012). In view of Green HRM as firms' features, EP intervenes the relationship (Chaudhary, 2018, 2019b; Nejati & Ahmad, 2015).

Signalling Theory

This theory was conceptualized by Spence (1973). It offers rationales where job applicants utilize limited information (signals) to draw assumption and comprehension of the organizations' environment (Ganesan et al., 2018; Renwick et al., 2012; Rynes et al., 1991; Pham & Paillé, 2019; Spence, 1973).

Social Identity Theory

This theory was theorised by Tajfel (1974) and defined as part of one's identity is ingrained to one's group affiliation. Moreover, it presents understanding that self-concept shapes a person to associate with illustrious social group (Yong et al., 2019; Shen et al., 2016) like green organizational image (Al-Ghazali & Afsar, 2020; Luu, 2018).

Table 1: Summary of Prior Empirical Studies between Green HRM and JPI

No.	Author(s)	Title	Journal	Key discoveries
1.	Bauer and Aiman-Smith (1996)	Green career choices: The influence of ecological stance on recruiting	Journal of Business and Psychology	• Potential United States recruits expressed positively when discovered proactive company's environmental stance
2	Nejati and Ahmad (2015)	Job Seekers' Perception of Green Human Resource Management	Conference on Green Human Resource Management	• GPR positively influence EA, GJPD positively impact EP • The most prominent; GTD positively relate EA and EP • The outcome variables from Green HRM significantly influence JPI of job seekers in Malaysia
3.	Guerci et al. (2015)	Green and non-green recruitment practices for attracting job applicants: exploring independent and interactive effects	The International Journal of Human Resource Management	• In Green Recruitment; green reputation attracts Italian applicants, but no impact on environmental information in recruitment websites
4.	Ali et al. (2017)	Impact of Green Human Resource Management Practices on Job Seekers' Attraction	Journal of Resources Development and Management	• Green recruitment and green training have assenting influence on Pakistani job applicants

				• Moderator: Employer reputation increases the above association
5.	Chaudhary (2018)	Can green human resource management attract young talent? An empirical analysis	Evidence-based HRM	• Green HRM relates significantly with JPI of future applicants in India. EP mediated the association. • Environmental Orientation revealed significant moderation between Green HRM and JPI • Moderator: Gender no impact
6.	Chaudhary (2019a)	Effects of green human resource management: testing a moderated mediation model	International Journal of Productivity and Performance Management	• EA partially mediated perceived Green HRM and JPI. • Moderator: Environmental Orientation strengthen the relationship
7.	Chaudhary (2019b)	Green human resource management and job pursuit intention: Examining the underlying processes	Corporate Social Responsibility and Environmental Management	• The effect of Green HRM on JPI through EP was significant, however EA showed insignificance • EP and EA sequentially mediated the relationship

The differences of this conceptual study as compared with Chaudhary (2018, 2019a, 2019b) is this paper integrates another theory which is AMO Theory to clarify on the Green HRM components. Green HRM practices like GJPD, GRS and GTD can effectively boost green behaviour as it highlights on one's ability. Next, GPM and GPR can motivate one to engage in environmental activities. Lastly, the third HPWS; Opportunity is linked to GER through an open and encouraging employer-employee relationship towards green practices. Moreover, this study treats the dimensions of Green HRM as an individual component rather than a unified or whole term in its framework. Thus, these components can be highlighted as the novelty of the study.

Green HRM studies in Malaysia, specifically on the intentions of job pursuit can be seen in an empirical study by Nejati and Ahmad (2015). The differences of this conceptual paper with Nejati and Ahmad (2015) is the extension of related theories where two more theories which are AMO Theory and Social Identity Theory are introduced. Next, this study integrates the 'Recruitment' and 'Selection' as one practice. Lastly, this study extends by introducing an additional Green HRM practice which is Green Employee Relations in the research model.

Proposed Research Framework

The paper proposed the following research framework which was supported by research objective, related theories and precedent literatures. The AMO Theory propounds understanding on the dimension of Green HRM (Fawehinmi et al., 2020; Renwick et al., 2012). Meanwhile, Signalling Theory and Social Identity Theory offer explanation for job applicants' JPI in attractive and prestigious organizations (Catano & Morrow Hines, 2016).

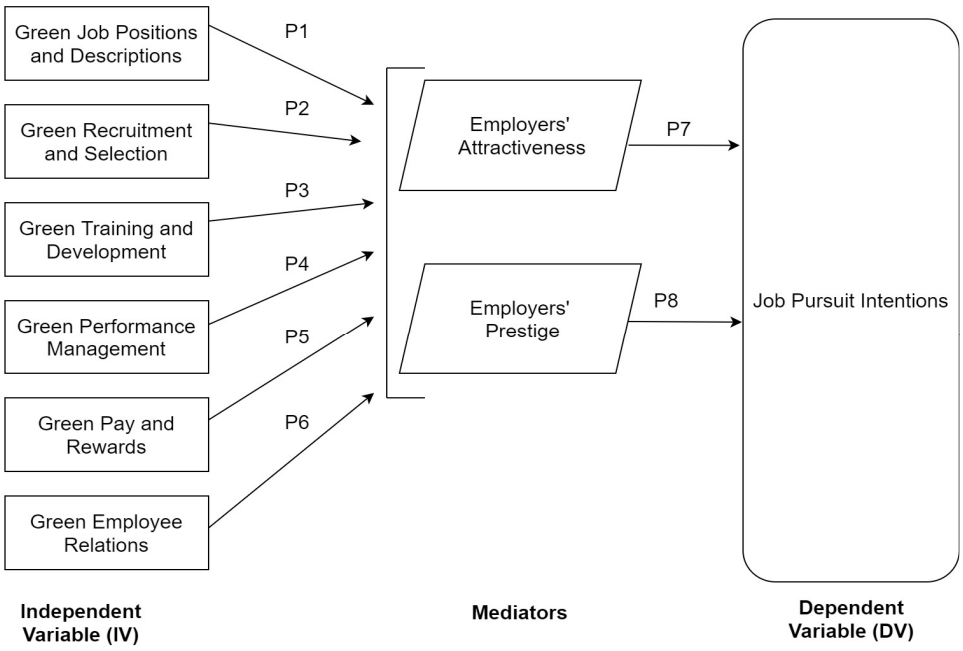

Fig. 1: Proposed Research Framework

Direct Effect

Green HRM practices were linked to AMO Theory; develop green abilities, elevate motivation in green behaviour and provide green opportunities (Renwick et al., 2012). This can be classified as GJPD, GRS, GTD (A); GPM, GPR (M) and GER (O). The Signalling Theory states each organizational practice are construed as signals sent by the organization (App et al., 2012). It is assumed that one who perceive Green HRM as favourable signals, will vigorously pursue such establishments. This can be viewed from precedent empirical studies (Ali et al., 2017; Chaudhary, 2018, 2019b) which relate significantly on JPI.

Thus, it is proposed that:

P1: There will be a positive relationship between GJPD and JPI.

P2: There will be a positive relationship between GRS and JPI.

P3: There will be a positive relationship between GTD and JPI.

P4: There will be a positive relationship between GPM and JPI.

P5: There will be a positive relationship between GPR and JPI.

P6: There will be a positive relationship between GER and JPI.

Mediating Effect: Employers' Attractiveness

Grounded by the assumption from Social Identity Theory where one engages in a social group as long as it fulfils self-concept (Tajfel, 1974). Thus, it can be attributed in EA as affiliating in Green HRM organizations may fortify one's self-worth. This sentiment is also shared by Chaudhary (2019c). Similarly, AMO Theory and Signalling Theory offer clarification of the dimensions of Green HRM. For instance, enrichment of (A) by acquiring and developing green talents, intensify (M) through green remuneration and performance evaluation, and enable (O) via knowledge-sharing at all units (Gholami et al., 2016). Meanwhile, it is put forward that HR practices signal to individuals what is proffered by the organization (Latorre et al., 2016). Job seekers who remark Green HRM determinants as upmost merit may be lured in pro-green firms. Related research discovered EA to mediate the relationship between Green HRM and JPI (Chaudhary, 2019a; Nejati & Ahmad, 2015).

Therefore, it is conjectured that:

P1a: EA mediates the relationship between GJPD and JPI.

P2a: EA mediates the relationship between GRS and JPI.

P3a: EA mediates the relationship between GTD and JPI.

P4a: EA mediates the relationship between GPM and JPI.

P5a: EA mediates the relationship between GPR and JPI.

P6a: EA mediates the relationship between GER and JPI.

Mediating Effect: Employers' Prestige

Affiliating with renowned social groups are yearned by some. As mentioned in the Social Identity Theory, part of one's self identity is influenced by the social group (Tajfel, 1974). It can be implied in the mediating variable; EP. Besides, AMO Theory and Signalling Theory posit explanation on Green HRM. Similar precedent literatures exhibited EP to intervene the relationship between Green HRM and JPI (Chaudhary, 2018, 2019b; Nejati & Ahmad, 2015).

Hence, it is hypothesized that:

P1b: EP mediates the relationship between GJPD and JPI.

P2b: EP mediates the relationship between GRS and JPI.

P3b: EP mediates the relationship between GTD and JPI.

P4b: EP mediates the relationship between GPM and JPI.

P5b: EP mediates the relationship between GPR and JPI.

P6b: EP mediates the relationship between GER and JPI.

Conclusion

This is a review paper. A detailed analysis will be done in the near future. The paper underlies theories from AMO Theory, Signalling Theory and Social Identity Theory. These theories are used to explain individual-level behaviour in relation to Green HRM (Kim et al., 2019; Nejati & Ahmad, 2015; Tahir et al., 2020). Empirical studies which researched on the perception of Green HRM on the Job Pursuit Intentions as separate/individual components are limited. As from these several studies, this contemporary variable is generally treated as either an amalgamation or a fragment of the various components of Green HRM. Thus, the research seeks to comprehend the significance of each Green HRM dimension.

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Support Students to Learn – Use of TetraMap® to Shift our Mindset in Emergency Remote Teaching

Ivy CHAN
College of Professional and Continuing Education, The Hong Kong Polytechnic University, Hong Kong, PRC.
ivy.chan@cpce-polyu.edu.hk

Carmen SUM
College of Professional and Continuing Education, The Hong Kong Polytechnic University, Hong Kong, PRC.
carmen.sum@cpce-polyu.edu.hk

Joyce CHENG
College of Professional and Continuing Education, The Hong Kong Polytechnic University, Hong Kong, PRC.
joyce.cheng@cpce-polyu.edu.hk

Abstract

The outbreak of COVID-19 has swept its abrupt impacts in education around the globe. The higher education institutions in Hong Kong are in no exception. Instructors of a business subject were given limited time to plan, design, and implement emergent remote teaching, which is a transformation from conventional face-to-face teaching. To meet the ends, the instructors adopted the TetraMap® model, and deployed the four nature elements to shift the mindset on pedagogical design of various learning and teaching materials for 344 students. Without enormous adoption towards high-end technologies, the instructors made the mindset shift to explore new solutions that support students in their learning amid the coronavirus pandemic. The results were encouraging that positive feedback on emergent remote teaching was well received from students. Educators may further explore the application of TetraMap® model in their online and face-to-face teaching.

Keywords: mindset, emergent remote teaching, learning

Introduction

The unprecedented COVID-19 pandemic has disrupted the learning and teaching ecology with the sudden shutdown of schools and pressing need to transform face-to-face (F2F) teaching into emergency remote teaching (ERT) (Chen and Hu, February 26, 2020). Like other faculties around the globe, two instructors of a business subject were inundated with expectations: become nimble learners with digital technology, re-design semester-based curriculum and prepare teaching materials ready for remote teaching within a tight schedule (Lederman, March 18, 2020). The instructors were primarily familiar with conventional classroom teaching through which they interacted with students directly. Knowing most students were not completely prepared for the abrupt transition to remote instruction, the instructors believed the mere digitalisation of PowerPoint slides could hardly connect and engage students throughout the remote learning journey. Therefore, they adopted novel perspectives to transform face-to-face teaching into emergent remote teaching.

This paper reported the transformation of teaching pedagogies in a business subject with 344 students enrolled in spring 2020. Instead of replicating the face-to-face pedagogy over online platform, the instructors adopted the TetraMap® model, including the four elements (TetraMap®, n.d.), instigated "mindset shift" to rethink and experiment different teaching practices that could support students' learning in this exceptional era. Student evaluation of learning on ERT is comparable with student feedback in F2F mode.

The four elements of TetraMap® model

TetraMap® is a well-proven learning model that helps to unlock everyone's potential, understand diversity, and improve team performance. It uses four basic elements of nature: Earth, Air, Water and Fire to assist in defining aspects of people's nature. Individuals are unique with various orientations on the four basic elements that guide their thinking and influence their behaviours. The key ideas of the four elements are discussed below.

Earth element – like a mountain is firm (TetraMap®, n.d.)

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- Individuals are confident and bold with their decisions. They are firm and conscientious to accomplish predefined goals.
- Typical question raised: "Where should we head to?"

Air element – like the wind is clear (TetraMap®, n.d.)

- Individuals are focused and methodical. They turn idea into detailed and orderly procedures.
- Typical question raised: "What are the next steps?"

Water element – like a lake is calm (TetraMap®, n.d.)

- Individuals are considerate and people-oriented. They show patience and are able to hold the team cohesion.
- Typical question raised: "How does this work affect others?"

Fire element – like the sun is bright (TetraMap®, n.d.)

- Individuals are inspirational and action-oriented. They stay open and explore different possible directions.
- Typical question raised: "Why not give a try?"

TetraMap® Adopted in a Business Subject

Prior to the outbreak of COVID-19, F2F learning mode was unanimously adopted across schools where students and instructors learned and interacted directly. The unexpected halt of schools induced immense stress to different stakeholders. Students and parents were not fully prepared for the novel learning experiences, such as hardware requirement and attention span. Instructors had to make swift move to ERT and curriculum transformation with limited time while they were uncertain their students could continue the learning pace as expected.

In a business subject, two instructors were pressed to restructure the 13-week face-to-face teaching as remote learning, ranging from pre-recorded teaching slides, assessments, online exercise, and interactive discussion. The adoption of TetraMap® model inspired the instructors to understand self-inclinations on four elements, value the difference from each other, embrace the new perspectives to develop sensible and feasible teaching strategies within the tight schedule (Table 1).

Four major learning and teaching constituents for ERT were considered while the four TetraMap® elements were deployed to derive a synergetic mindset shift to support students' learning. The Earth element helped the instructors to stay firm with the learning outcomes. The instructors connected and taught students with a consistent schedule for the learning outcomes via TEAMS as a well-suited tool. Synchronous and live lectures were essential to the students, in which the instructors can externalise new ideas to the students and support them to combine and foster with their resided knowledge that they learned before.

By adopting the Air element, the instructors organised weekly learning topics systematically, which corresponded to the learning goals on learning management system. This practice ensured the fit between know-who and know-how. Considering the disparity in IT devices and remote learning infrastructures, the instructors provided both learning and teaching materials that can be used at synchronous and asynchronous modes.

The Water element ignited more empathy to the students, particularly those who were less privileged or unable to engage in live lectures. Students were encouraged to embrace change together, and more student-driven learning activities were introduced, e.g., theme-based discussion, instead of mere lecturing by instructors. More encouragement on effort, embrace of mistakes and guided inquiry of knowledge can build students' confidence to progress.

Hesitation to show face or speak up in online platform presented more challenges to the instructors to ensure the students can progress accordingly. The Fire element transcended the instructors' idea about what they can do other than live virtual classroom learning. The pre-recorded videos prepared by the instructors, links to access relevant

videos (e.g., snap judgment in interview), and short articles posted on the Learning Management Systems enabled students to master the pertinent knowledge and learn at their own autonomy and pace. Therefore, the instructors designed content in small doses that enabled the students to comprehend easily.

Table 1: Four Elements of TetraMap®

	Earth	**Air**	**Water**	**Fire**
Mindset	Be sturdy	Be systematic	Be empathetic	Be innovative
Subject learning objectives	Follow the stipulated subject intended learning outcomes	Develop weekly learning topics and develop a visible learning progress	Embrace change, be flexible and have fun of the new attempts	Empower students to take the lead for better strategies; cutting back on traditional lecturing time
Teaching & learning materials (Asynchronous)	Mastery of knowledge	Neat and visible learning flow in learning management system	Be empathetic and care well-being	Encourage students to set their own pace
Teaching & learning materials (Synchronous)	Externalise and combine knowledge and good practices	Ensure fit between know-who and know-how	Appreciate efforts, trials and errors	Learn with bite-sized doses

Students' Feedback on Emergent Remote Teaching

Regarding teaching and learning design, the two instructors had been working as a team and teaching for a business subject in 2018/2019 and 2019/2020. In order to understand the learning impacts of ERT on students, a comparison of two student evaluation surveys' results was made (Table 2). At the end of the spring semester, students who enrolled in the business subject were invited to complete subject evaluation surveys. They were invited to rate their learning experiences along with a five-point scale from strongly disagree to strongly agree. There were 344 and 351 students enrolled in 2019/2020 and 2018/2019 respectively. The response rates were comparable: 184 (53.5%) and 203 (57.8%) completed and valid surveys were returned in 2019/2020 and 2018/2019 respectively.

The shift of mindset helped the instructors to face hectic situation, plan and reorganise the teaching pedagogies to support the students' learning (Shah 2016). In essence, the students had clear understanding about the learning objectives, and were able to progress accordingly. The distinctive learning modes did not undermine their participation or engagement in class.

Table 2: Students Feedback on Teaching

Students' Feedback on Learning	**2019/2020 Emergent Remote Teaching (n =184)**	**2018/2019 Face-to-Face Teaching (n = 203)**
1. I have a clear understanding of what I am expected to learn from this subject.	3.97	3.89
2. The learning materials, e.g. prescribed textbook, handouts and/or reference materials, have helped me achieve the subject learning outcomes.	3.99	4.03
3. The tests/assignments have helped me achieve the subject learning outcomes.	4.01	3.96
4. I understand the assessment criteria.	3.83	4.00

5. Relative to the subject learning outcomes, the amount of work required for this subject is reasonable.	3.96	3.92
6. I am encouraged to think about the material in a critical manner.	3.94	3.95
7. I am encouraged to find information on my own and learn independently.	3.87	3.97
8. I found the lectures stimulating.	3.84	3.89
9. There have been sufficient opportunities for me to ask questions/raise issues.	4.09	3.91
10. Students were encouraged to participate actively in class.	4.01	3.98

Conclusion and way forward

The emergent remote learning experience reported in this paper showed that the shift of instructors' mindset has yielded the positive outcomes on students' learning in spite of the absence of cutting-edge technologies. The unprecedented disruption amid the COVID-19 outbreak serves as a wake-up call to educators to revisit their habitual stickiness on conventional F2F learning (Bishop 2020; Oblinger 10 August 2020; Shah 2016).

In the long run, educators can utilise the four elements of TetraMap® model to design new instructional strategies to support students' learning, no matter in online or F2F mode. The Earth element addresses what to be achieved – outcomes. Educators have to plan the learning outcomes of a course or subject and then each learning topic. These learning outcomes have to be "SMART", that is simple, measurable, achievable, relevant, and time-based. Educators should then communicate these SMART goals to students via the learning platform or teaching plan. An outcome-based approach would guide the teaching process for instructors and facilitate the learning strategy for students.

The Air element addresses how the learning goals are to be achieved – processes. Educators could adopt different activities and feedback that help students understand the visible path to harness their learning capacity (Horspool and Lang 2012). Lesson plans could be used to specify the teaching contents, resources, references, and learning outcomes for each topic. The learning platforms or formats, for example, face-to-face, asynchronous, or synchronous settings, should also be announced in advance, which enables students to prepare well for the lessons. For example, students have to know "what are the key learning points in this topic?"; "what are the assessment criteria of my report?" and "how could I improve my presentation style next time?"

The Water element may encourage educators to balance students' psychological state, anxiety level, peer relationship when they have to improve the pedagogical competence (Biddix et al. 2015; Martin 2020). Educators should first understand students' ability and learning behaviours under different learning modes, and then adjust or balance the teaching materials for different students and teaching settings. Greater patience and empathy would instil greater harmony between instructors and students, and that would enhance students' commitment and involvement in their study.

In addition, educators may exert their Fire element to stimulate students to acquire the essential digital skills that enable them to learn in a new era, as well as the resilience to embrace change as lifelong learners (Tull et al. 2017). Educators might introduce different possible directions and suggestions to students in different learning situations. Various types of teaching and learning activities could be explored to motivate and engage students in the learning process. They should also adapt to any unprecedented changes or challenges with an open mind and respond in a fast and positive way. Educators with this kind of mindset and action would become the role models for students.

Acknowledgement

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A Sentiment Analysis Case Study: Socializing about Social Distancing

Alexandra - Cristina SPÂNU
Department of Engineering in Foreign Language, University POLITEHNICA of Bucharest, Bucharest, Romania, anda.spanu@gmail.com

Maria-Iuliana DASCALU (corresponding author)
Department of Engineering in Foreign Language, University POLITEHNICA of Bucharest, Bucharest, Romania, maria.dascalu@upb.ro

Paulina SPÂNU
Faculty of Industrial Engineering and Robotics, University POLITEHNICA of Bucharest, Bucharest, Romania, pauspa16@yahoo.com

Iulia Cristina STANICA
Department of Engineering in Foreign Language, Doctoral School of Automatic Control and Computers, University POLITEHNICA of Bucharest, Bucharest, Romania, iulia.stanica@gmail.com

Abstract

Sentiment analysis is a process that uses natural language processing and machine learning to extract and identify the emotion associated with a text or an image. In the literature, we find different approaches to sentiment analysis that predominantly fall into two categories: machine-learning-based and lexical-based. When using machine learning for sentiment analysis, usually a classifier is required. When applying lexical-based methods, a list of known words, with each word having an associated sentiment, is used. The aim of the paper is to analyze the opinion of Instagram users towards the lockdown and social distancing caused by the COVID-19 pandemic, which spread rapidly worldwide at the beginning of 2020, with the use of various sentiment analysis tools. All the data collected for this study is public data gathered with the help of a tool called Phantombuster and is composed of over 15,000 posts. The posts were selected using several relevant hashtags and for the actual sentiment analysis process, Google Cloud was used. The collection and interpretation of the data are described in depth in this paper, providing suitable examples and possible explanations for the obtained result. The study might have importance for decision makers, but also for researchers, who have to choose or combine several sentiment analysis instruments in order to obtain meaningful results in their field of study.

Keywords: sentiment analysis tools; opinion about social distancing; opinions about COVID-10 pandemic; Instagram social network.

Introduction

Humans have always had the desire to express themselves, whether it is through their attires, their preferred activities, or their opinions regarding varying topics. With the rise of the Internet and different social media platforms, such as Instagram or Facebook, this desire became easier and easier to be fulfilled. Having this possibility of being heard is not only beneficial on an individual level but is also influential to the business landscape, especially but not exclusively when it comes to marketing. Companies are now able of gathering feedback in real-time from customers and can adapt their products to better fulfill their customers' needs and improve their strategy. Also, policy and decision makers can "hear" people voice before undertaking a certain action. This process of analyzing people opinions in online environments is called sentiment analysis and it is sustained by modern technologies, such as machine learning (ML) or natural language processing (NLP) tools. As it is said it generates a lot of economic value and improves our day-to-day lives, the current paper focuses on presenting a case study for sentiment analysis in the context of revealing various technologies, techniques, and tools for this. The case study is very actual, as we debate upon social distancing opinions in COVID-19 period on a well-

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known social network – Instagram. The case study underlines how a performant sentiment analysis can be done combining various tools in a newly developed web-application.

Supporting Technologies and Techniques for Sentiment Analysis

There are to main techniques for sentiment analysis: machine-learning-based and lexical-based [1]. When using machine learning for sentiment analysis, usually a classifier is required. Classifiers make use of data labels and generate tags, such as positive, negative, or neutral. However, as mentioned in [1], labeling could be time-consuming or not even allowed in some cases. The other approach is lexical-based, using a list of known words, with each word having an associated sentiment. Creating this dictionary is not easy nor complete as slang, for example, is rarely included [1].

There have been some comparative studies [1], [2], [3] between lexical-based and machine-learning-based sentiment analysis, each using different data sets and evaluation metrics. In [1] the authors compare eight sentiment analysis methods, which are considered among the most popular in scientific literature, and use two different datasets, a near-complete log of Twitter messages, collected throughout three and a half years and six sets of messages rated as positive and negative by humans. The methods compared are emoticons, Linguistic Inquiry, and Word Count (LIWC), SentiWordNet, SenticNet, SailAil Sentiment Analyzer (SASA), Happiness Index, and PANAS-t. All these methods were evaluated and compared in terms of coverage, degree of agreement, prediction performance, and polarity. The authors also implemented a web service based on a combined method that relies on the methods previously analyzed. They concluded that combining all the methods does not lead to the best performance but combining some of the methods, in terms of the data is the best approach.

Another comparison study is conducted in [2], where two machine-learning-based approaches, Naive Bayes (NB) and Support Vector Machine (SVM), and one lexical-based approach, SentiWordNet, are analyzed. The dataset used consisted of two online Indian news archives, from which the political news about two parties was extracted. Their focus was on the polarity and the implementation steps included tokenization, stop word removal, lemmatization, and pos tagging, performed using NLTK and Stanford POS tagger. Among the sentiment analysis methods, the best F-measure was SVM.

Furthermore, in [3] a supervised structured machine learning and a lexicon-based technique are compared. The lexicon-based sentiment classification was performed using Apache Hadoop and for the machine-learning method, Stanford Sentiment Treebank and Recursive Neural Tensor Network (RNTN) are introduced. The Treebank contains fully labeled parse trees constructed from movie reviews. The tests were based on a sample Zooniverse dataset and the experimental evaluation shows the RNTN method has a better performance score that the lexicon-based in terms of accuracy. However, the lexicon-based shows better performance on positive comments.

When it comes to lexical resources, a tool that is heavily mentioned in literature studies [1], [2], [4] is SentiWordNet. It is based on an English lexical dictionary called WordNet, which groups words into synonym sets, called synsets [4]. SentiWordNet assigns three different scores to a synset to indicate the sentiment of the text (positive, negative, and neutral); scores that have values of [0, 1] and add up to one [4]. In [1] the average score of a given text was determined by computing the synsets of all the words and comparing the positive and the negative scores. However, there are other approaches, such as [5], where an improved SentiWordNet, which modifies the objective words, is proposed. Given the advances made in machine learning and data mining, a considerable number of sentiment analysis research papers focus mostly on this approach. As previously mentioned, machine-learning tools use classifiers for determining the polarity of a word [6].

The approaches described so far focus only on textual sentiment analysis, however, some studies that explore sentiment analysis on visual content [7], [8], [9]. Some only propose solutions for visual sentiment analysis [7], while others try to combine textual and visual sentiment analysis methods [8], [9]. In [7], the authors used images from which they automatically extracted the so- called objective text description. They concluded that the objective text extracted from the pictures provides better results than the subjective text provided by the user and suggest that their methods could be used for other image-text association tasks. Compared to [7], the methods presented in [8] and [9] combine visual and textual sentiment analysis by using deep learning techniques. The authors of [8] propose a model in which visual and textual sentiment representations are obtained through multi-layer Convolutional Neural Networks (CNN). The visual sub-network consists of five convolutional layers and takes 244×244 pixels RGB images as input, while the textual sub-network uses pre-trained distributed representations of words. The two network representations are combined in a pooling layer. The method proposed was tested on two data sets the Visual Sentiment Ontology (VSO) dataset and the Multilingual Visual Sentiment Ontology (MVSO) dataset, and proved to effective on VSO, having 1.3% accuracy gain [8]. Another approach to textual and visual integration for

sentiment analysis is explained in [9], where a bag of affective words (BoAW) that provides "visual cues" for sentiment analysis is introduced.

Sentiment Analysis Tools

Currently, there are several applications for sentiment analysis, each having features meant to address a specific purpose. Some are further described. MonkeyLearn [10] is a user-friendly machine learning platform for analyzing text. It uses a pre-trained sentiment analysis model and offers integrations with different applications, such as Excel or Google Sheets. Moreover, the platform allows the user to build a custom model for sentiment analysis; model that you can also test on the same platform. It has a free plan and multiple premium plans. Lexalytics [11] is another text-analysis tool, which focuses on the customer's response to the business. It uses NLP to analyze the text and compiles the information in a visualization dashboard. The data is collected from social media platforms and has applicability in multiple domains, such as the airline industry. It does not have a free plan, as MonkeyLearn has. Brandwatch [12] is another platform that provides consumer insights. Compared with the previous two tools, Brandwatch also has an image insights tool that can identify images associated with a certain brand. This information extracted based on images includes metrics like mention volume, aggregate followers, and latest activity. Brandwatch is a tool for brand management that allows companies to monitor changes in sentiment, understand customer opinions, and track fluctuations in brand health. The platform is not free. Repustate [13] is another tool for assessing the sentiment behind a customer's feedback. It has support for multiple languages, such as Chinese, French, and German, and can determine the sentiment behind slang, such as LOL, FYI and TBH, and also Emojis. Moreover, it allows the user to alternate meanings of words allowing full control over how the software analyzes customers' feedback. It is not a free platform, too. Comprehend [14] is a service provided by Amazon that uses machine-learning algorithms to identify the sentiment of the customer. It has several features for discovering insights and relationships from data, such as identifying the language of the text or organizing a collection of text documents by topic. Unlike the other tools mentioned above, this tool does not offer a visual dashboard or platform, but rather a functional API, with a pay-per-use policy. Google Cloud [15] works similarly to Amazon, offering a large variety of services, among which a service for NLP, called Cloud Natural Language. The sentiment analysis tool identifies the author's emotional opinion as positive, negative, or neutral. It supports a variety of languages, but unlike Amazon Comprehend one can, but is not required to specify the language of the text to be analyzed. If the language is not specified, it will be automatically determined when running the sentiment analysis method.

As it can be observed, each of the applications that are mentioned above has useful features, necessary to provide accurate sentiment analysis. Some of them are more versatile, letting business users customize their input more, while others are more restrictive in that sense. Furthermore, their price range varies a lot, with some being more affordable than others. A detailed analysis of these applications' features is presented comparatively in the table below.

Table 1: Features Matrix for Sentiment Analysis Tools

	MonkeyLearn	Lexalytics	Brandwatch	Repustate	Amazon Comprehend	Google Cloud
Customizable sentiment models	✓	✓	✓	✓	✓	✓
Visual Sentiment Analysis			✓			
Visual Dashboard		✓	✓			
Multiple Languages Support	✓	✓	✓	✓	✓	✓
Free Option	✓				*Pay-per-use*	*Pay-per-use*
Categorize Data Based On Region			✓			
Slang Assessment				✓		
Emojis Assessment				✓		

A Case Study for Sentiment Analysis

As previously mentioned, sentiment analysis can be used to extract insights from public posts regarding different topics. In this paper, we have chosen to analyze the opinions of Instagram users towards the lockdown and social distancing from COVID-19 pandemic, which spread rapidly worldwide at the beginning of 2020. As tools, we used several ones, like Phantombuster, Google Cloud or Amazon Comprehend, but also created our own Node.js application, which calls other APIs.

Data collection

To automatically extract the data from Instagram, a specialized tool called Phantombuster [16] was used. Phantombuster has many automations (called "Phantoms") that can extract data on behalf of a user from all major social networks and websites (e.g. Facebook, Twitter, Instagram or LinkedIn) and offers the possibility to create automations for custom websites as well. In this case, an Instagram predefined Phantom (Instagram Hashtag Collector) has been used to scrape public data, with the setup from Figure 1 - a. To scrape Instagram posts by hashtag, one must authenticate so the automation will act on his behalf, that is why a session cookie is provided for this setup. The number of posts it scrapes per hashtag is 5000 (Max Posts), keeping track of data and removing duplicates. The program runs every day and collects the data in CSV and JSON format. The targeted hashtags are specified in a public Google Spreadsheet, per row, in the first column: see Figure 1-b.

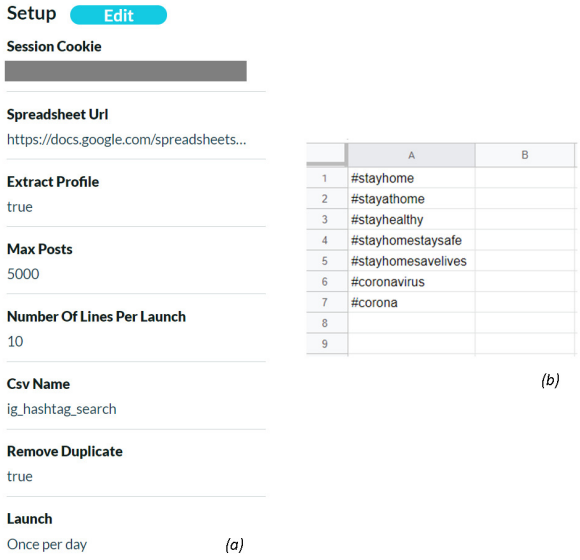

Figure 1: (a) Instagram Hashtag Collector Setup. (b) Hashtags Spreadsheet for Sentiment Analysis

Analysis with Google Cloud

After gathering the data, it was analyzed with Google Cloud, since this tool is easy to integrate and work with. Initially, the data was organized as a JSON file, containing an array of over 25,000 posts. From this initial file, we extracted first the descriptions with more than three characters, obtaining an array with 24,940 posts. The sentiment detection API from Google needs the language of the input, and, for this, we used another API from Amazon Comprehend to detect the language of the posts. Since the file size was quite large, an asynchronous dominant language detection job for language detection was used. Amazon Comprehend examines the text to determine the dominant language, using identifiers from RFC 5646. The response contains a score that represents the confidence level that a particular language is a dominant language in the document. Using the language response, only posts having English as a dominant language were kept for further processing, the others being discarded. This is since all the posts that will be used for sentiment detection must have the same language. The remaining descriptions from the Instagram posts (over 15,000 posts) were written in a plain text file, line by line, and then analyzed with Google Cloud, like in Figure 2.

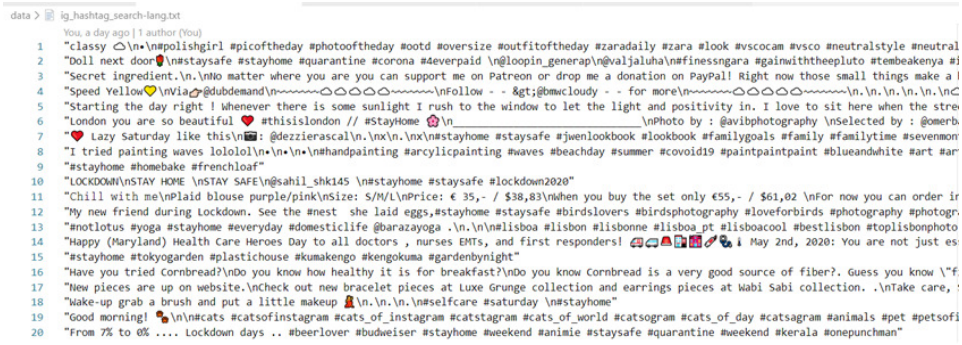

Figure 2: Part of file with Instagram Posts Descriptions

All the scripts for document processing, as well as API calls (Amazon Comprehend and Google Cloud), were implemented using Node.js; the function used for obtaining the sentiment scores is depicted in Figure 3. The analysis for the posts was performed by firstly reading the description txt file, line by line, since each description was written on a separate line, then collecting the lines in an array. After the file was read, the array contained all the descriptions and the *getSentiment* function was applied to each of its elements.

```
async function getSentiment(text) {
  // Imports the Google Cloud client library
  const language = require("@google-cloud/language");

  // Instantiates a client
  const client = new language.LanguageServiceClient();

  const document = {
    content: text,
    language: "EN",
    type: "PLAIN_TEXT",
  };

  // Detects the sentiment of the text
  const [result] = await client.analyzeSentiment({ document: document });
  const sentiment = result.documentSentiment;

  return sentiment;
}
```

Figure 3: Function to Determine Sentiment Scores

Interpretation of Results

The response sentiment has a score and a magnitude, the score indicating the overall emotion of the text, and the magnitude showing the presence of the emotional content, this value being proportional to the length of the text. If the text has a score of 0.0 could mean either that the text is neutral or that has both high positive and negative values. These cases can be interpreted using the magnitude score, a low magnitude value meaning the text is neutral, while a higher value being specific to mixed texts. Google offers in the official documentation an interpretation of the sentiment using the score and the magnitude as a guideline (see Figure 4); however, it can be adjusted for specific scenarios.

Sentiment	Sample Values
Clearly Positive*	"score": 0.8, "magnitude": 3.0
Clearly Negative*	"score": -0.6, "magnitude": 4.0
Neutral	"score": 0.1, "magnitude": 0.0
Mixed	"score": 0.0, "magnitude": 4.0

Figure 4: Interpretation of Sentiments from Google

For the interpretation of the result, the maximum, the minimum, and the average of the scores and magnitudes were computed. The values of these computations are highlighted in Figure 5.

Scores

(index)	max	min	avg
0	0.8999999761581421	-0.8999999761581421	0.22452158181807275

Magnitude

(index)	max	min	avg
0	17.200000762939453	0	0.8117658727026378

Figure 5: Maximum, Minimum and Average of Scores and Magnitudes

Given these values, the posts with a score higher or equal than 0.2 are considered positive, the posts with a score between -0.2 and 0.2 are either mixed or neutral, and the posts with a score lower or equal than -0.2 are negative. The value of the magnitude is a key element for differentiating between mixed and neutral posts, a value higher or equal than 0.8 indicating a mixed emotion, while a value lower than 0.8 represents a neutral emotion. The threshold of 0.8 was chosen since it is close to the mean of magnitudes.

```
//interpretation
const positive = sentArray.filter((el) => el.score >= 0.2);
const negative = sentArray.filter((el) => el.score <= -0.2);
const neutral = sentArray.filter(
  (el) => el.score > -0.2 && el.score < 0.2 && el.magnitude < 0.8
);
const mixed = sentArray.filter(
  (el) => el.score > -0.2 && el.score < 0.2 && el.magnitude >= 0.8
);
```

Figure 6: Filtering of Sentiments

After categorizing the posts according to the sentiment that they possess, the result are presented in Figure 7.

```
{
  "positive":0.6128414939949848,
  "negative":0.04883199155338524 6,
  "neutral":0.2815758215652633,
  "mixed":0.05675069288636664
}
```

Figure 7: Sentiment Scores

The interpretation of the emotion extracted from the given text can be better visualized in the graph below, where the feeling expressed on Instagram during quarantine was mostly positive.

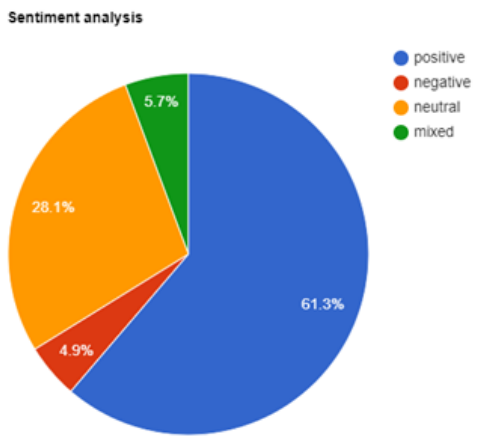

Figure 8: Pie Chart of Sentiment Scores

The fact that the sentiment score for the positive feeling was the highest could be regarded as unexpected, given that it was a difficult and stressful time for everyone. However, it is possible that due to the problems caused by the pandemic and the lockdown and also due to the abundance of worrying news that was broadcasted in a short period, people felt the need to share positive thoughts and be supportive and encouraging with each other.

Another important factor is the extra free time that a lot of people had while staying at home, which made some of them try new things or discover new passions like these individuals (sample from the collected data):

"5 Crazy Exercises using the socks 🧦 at Home 🏠 give it a try 🏃 #stayhome #fitterplanet #summervibes #fitnessvideo #armenia #yerevan #foryourpage #foryourlife #lesmills #onefamily"

"Quiche 💛 What I love about this dish is that you can be so creative 😊 my version had spinach, mushrooms and feta cheese. By the way - it is spinach season right now 🌱 #quiche #stayhome #veggie #selfmade #baking #bakinglove #spinach #seasonalfood #seasonability #foodconcious"

Furthermore, a lot of businesses, such as gyms or restaurants, moved online during the lockdown and used platforms, such as Instagram to promote their services and attract customers. Online marketing has become quite essential for a lot of companies that managed to maintain a stable client base through the lockdown. Businesses who understood how to leverage this situation to their benefit continued to produce revenue or even had larger profits than before as people had more free time to invest in other activities, as previously mentioned.

*"Sunday's Online Classes 8:30 Am Deep stretch w/ Rasha Salhoub […] **Payment methodsVia Bank transfer Or Vodafone cash: Or Payme store (will send you a link to pay via fawry) Please make sure to take a picture of your payment receipt and send it to us and will send you the link to the class. [...]"*

Additionally, there was a big movement for celebrating doctors and nurses who were on the frontline and who put a lot of effort to treat many incoming patients. Among the collected data several posts resembled this:

"Happy (Maryland) Health Care Heroes Day to all doctors, nurses EMTs, and first responders! 🚑🚐🚨🏥🏥💉🧬🌡 May 2nd, 2020: You are not just essential workers, you are front line heroes. The challenges you face on a daily basis, risking your own life and well-being of your families, is truly an inspiration. We thank you for all you have done and continue to do. ❤️❤️❤️❤️ [..]"

Finally, the second largest category of sentiments is represented by the neutral one and the reason for that is that not all Instagram users post images or videos with long descriptive captions, but rather, short, and concise ones.

Some users type descriptions formed by a couple of words or hashtags, while others add only emojis or choose solely to tag their friends in their photos. Examples of these types of descriptions can be observed below.

"#drawing #eyes #sketching #stayhome"

" 🍉🍋🥝 #selfportrait #stayhome"

"Veg pizza #stayhome #staysafe"

Moreover, a lot of users described their activities objectively, without any "emotion" that can be extracted from their input.

"Playing with my best dog park friend Uma (black dachshund) and new friend Chubby (pug mix)"

"This Corona virus has a very big ego, He will not come to your house unless you go out and invite him. Stay Home! #stayhome #staysafe #stayhealthy #keepsafedistance #stopspreadcovid #gitanjaliindia #teamgitanjali #love"

To sum up, based on this dataset, it can be concluded that people expressed mostly positive opinions during the lockdown from the beginning of 2020. While the individual intention of their posts is difficult to pinpoint, a hypothesis is that they wanted to find positive activities to focus on, as a distraction from the difficult reality of the time.

Conclusions

This paper presents a proof of concept for sentiment analysis used as a tool in determining the general feeling regarding a current problem. The data consists of over 15,000 public Instagram descriptions, written in English, and collected at the beginning of 2020. Amazon Comprehend was applied for the language selection, and Google Cloud for the sentiment analysis process. The score and magnitude of the posts were classified using the maximum, minimum, and average of these values. The overall feeling obtained based on the given assumptions was a positive one, which could be regarded as a peculiar result. There are some possible explanations for this result which were detailed before, such as discovering new passions or encouraging others in the pandemic context. While the individual intention of the posts is difficult to pinpoint, a hypothesis is that people wanted to find positive activities to focus on, as a distraction from the difficult reality of the time. We claim that the analysis can be useful for authorities to make decisions related to school starting or for business to make decisions related to their future expansion plans and the work is important for social network analysis research [17].

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E-Learning Experiences of Higher Education Institutions in The Republic of Serbia During Covid-19, Content Analysis and Case Study ITS Belgrade

Goran RADIĆ
Information Technology School – Belgrade, Serbia.
email: goran.radic@its.edu.rs

Bojan S. RISTIĆ
Information Technology School – Belgrade, Serbia.
email: bojan.ristic@its.edu.rs

Svetlana ANĐELIĆ
Information Technology School – Belgrade, Serbia.
email: svetlana.andjelic@its.edu.rs

Valentin KULETO
Faculty of Contemporary Arts, Belgrade, Serbia
e-mail: valentin.kuleto@fsu.edu.rs

Milena ILIĆ
Faculty of Contemporary Arts, Belgrade, Serbia
email: milena.ilic@fsu.edu.rs

Abstract

The hasty entering into the online learning system caused by the Covid-19 pandemic has brought certain benefits to students, governments and educational institutions, while on the other hand it has demonstrated certain shortcomings. Neither all students have fast internet, functional hardware, or the required level of information and communication technology skills nor all educators have digital competence. Apart from students, educators were even more expected to know information and communication technologies, and those who do not have required knowledge did not have enough time to get to know and learn. The transition to online learning has been a big challenge for governments, education systems and schools, so it is important to share knowledge and experience to learn important lessons because due to the Covid-19 pandemic the online learning expectations are high. The online learning system is considered to be the basis for creating a hybrid form of learning and a catalyst for a change of formal education.

The paper is based on the available information using the content analysis method and observation with participation describes the experiences of higher education institutions in the Republic of Serbia with e-learning concepts which those institutions used for teaching students as a response to Covid-19 epidemiological measures, the prohibition of assembly and a state of emergency that has been declared throughout the country.

Paper presents a case study as an example of good practice E-learning Experience of Information Technology School – ITS which uses a proactive approach and nurtures the quality culture. ITS is the first accredited private higher education institution in the sphere of information technology in Serbia. In addition to offering quality in the sense of excellent conditions for studying, state-of-the-art equipment, and highly trained personnel, ITS prepares students for a practical professional in IT while they are still in school. In the ITS curriculum, the school has included global computer science education standards, implemented top-quality programs and it`s incorporated founders' experience after years of working in IT education.

Keywords: E-learning, online learning, Covid-19, Information and Communications Technology, Smart University, digital competency

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Introduction

Important areas for understanding the subject of the research are e-learning, information and communications technology along with Covid-19. A brief overview of important knowledge using reference literature from these areas, library and other sources, as well as an overview of other formal sources and content whose understanding is important for setting the research problem are given below.

This paper consists of three parts: research problem setting, content analysis and case study. Content analysis, participatory observation, case study and survey research will be used to collect the data necessary for the research. For the analysis of the results of the survey research, a mean score will be used to measure the level of student satisfaction with various elements of pedagogical work of teachers during classes in the summer semester 2019/20 and to compare with the basic results.

Research problem setting and reviewing sources

The group of scientists has formed an online data source about Covid-19 (Our World in Data, 2020). They have prepared Coronavirus Country Profiles including 207 country profiles which allow scientists to explore the statistics on the coronavirus pandemic for every country in the world (updated on the daily basis). Covid-19 is fast evolving pandemic and there is no easy way to identify success in progress against it. The major indicator is mortality and the rate of the confirmed deaths. Country Profiles have a purpose in tracking the impact of the pandemic and studying statistics on the coronavirus pandemic. Figure 1 shows daily new confirmed Covid-19 cases in Serbia during the period 07.03.2020. – 30.08.2020. (Our World in Data, 2020).

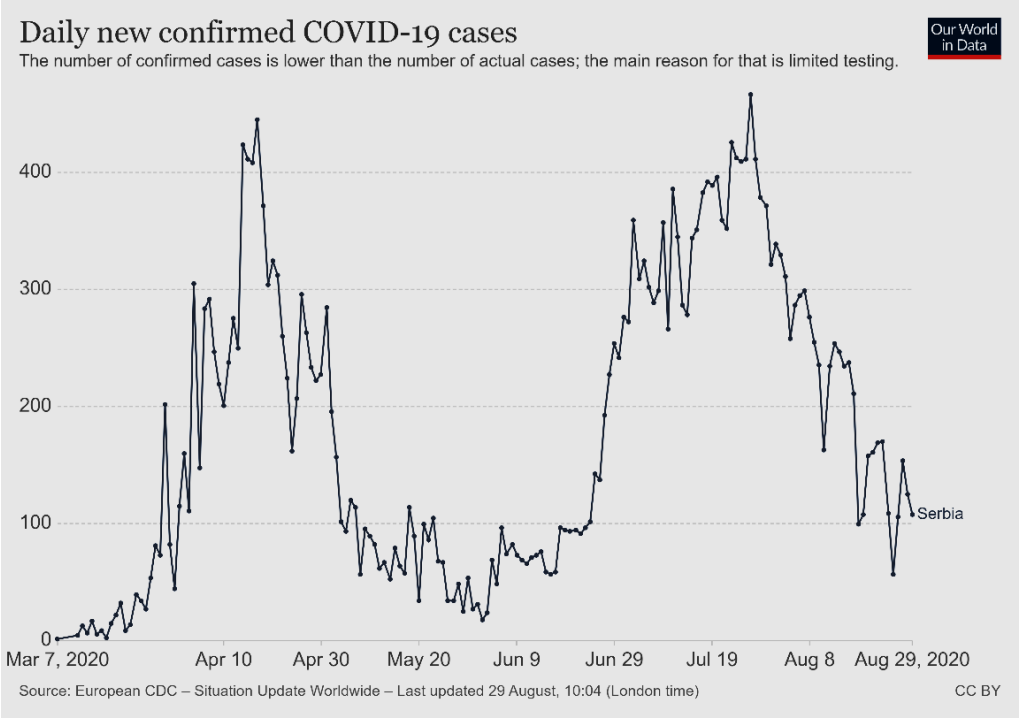

Figure 1: Confirmed Covid-19 cases in Serbia 07.03.2020. – 30.08.2020. (Our World in Data, 2020)

Important source of coronavirus information is an Agency of European Union European Centre for Disease Prevention and Control (ECDC, 2020) with daily and weekly surveillance reports and country profiles. The main indicators are The 14-day notification rate of new COVID-19 cases, and the 14-day death rate.

To understand how governments have responded to the pandemic, Our World in Data platform uses data from the Coronavirus Government Response Tracker (OxCGRT), which is published and managed by researchers at the Blavatnik School of Government at the University of Oxford.
According to Our World in Data the" tracker collects publicly available information on 17 indicators of government responses, spanning containment and closure policies (such as school closures and restrictions in movement); economic policies; and health system policies (such as testing regimes)." (Our World in Data, 2020)

Figure 2 shows how governmental response has changed over time. It shows the Government Stringency Index – a composite measure of the strictness of policy responses. The index on any given day is calculated as the mean score of nine policy measures, each taking a value between 0 and 100. See the authors' full description of how this index is calculated. A higher score indicates a stricter government response (i.e. 100 = strictest response). The OxCGRT project calculates this index using nine specific measures, including school and workplace closures; restrictions on public gatherings; transport restrictions; and stay-at-home requirements.

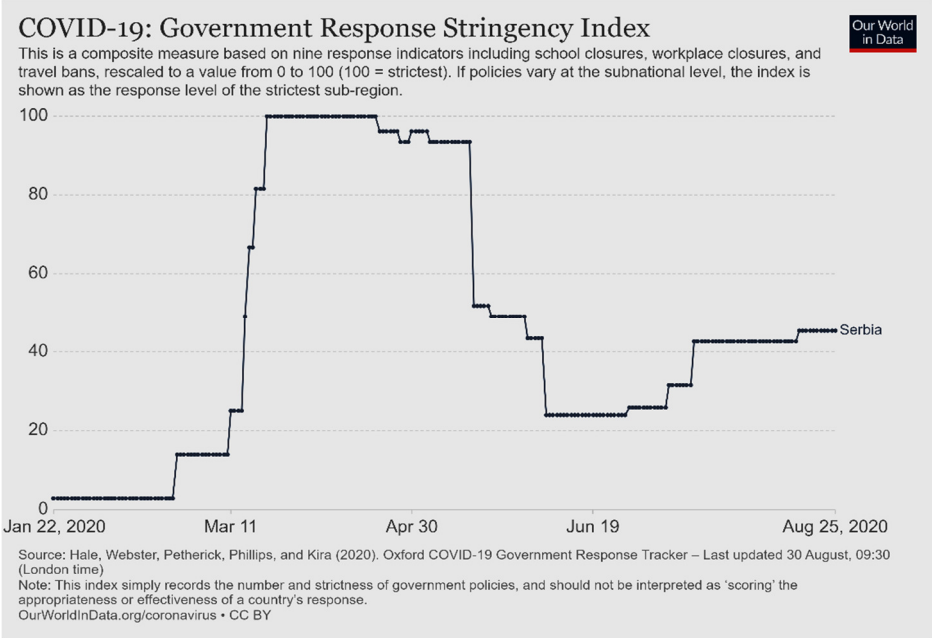

Figure 2. Covid-19: Government Stringency Index cases in Serbia 07.03.2020. – 30.08.2020. (Our World in Data, 2020)

Figure 3 shows Government Stringency Index of Serbia - the score is 45,37 on 25th August in context of world-wide data.

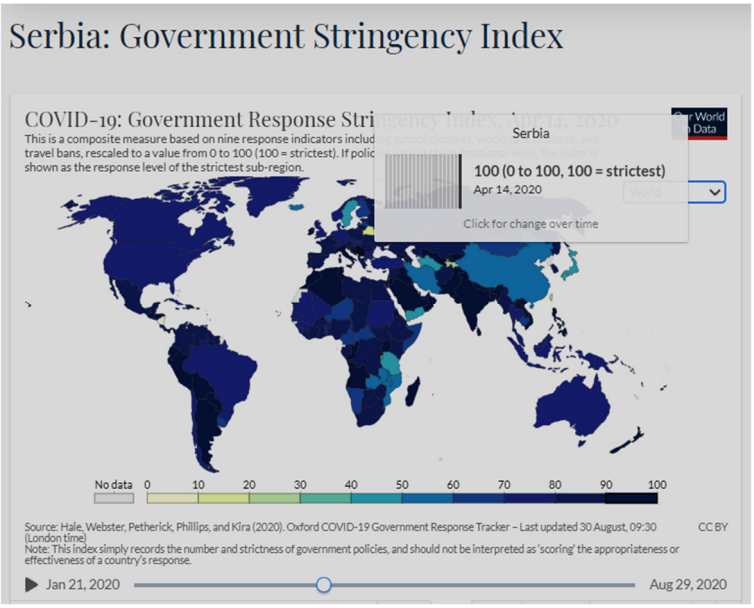

Figure 3: Covid-19: Government Stringency Index cases in Serbia 07/03/2020 – 30/08/2020 (Our World in Data, 2020)

The Government Stringency Index of Serbia ranged from 2.78 (22/01/2020) to 100% (for the period 21/03/ - 21/04/2020). The highest score of 100% lasted for 31 days, and for the next 26 days it was between 93.52% and $ 96.3. In the period when the Government of the Republic of Serbia had the strictest response, because of its specific measures like school and workplace closures; restrictions on public gatherings; transport restrictions; and stay-at-home requirements. The President of the Republic of Serbia declared a state of emergency on 15 of March at a time when, according to official data, there were 48 infected with Covid-19 and no deaths. (RS Ministry of Health, 2020) As of Monday, March 16, due to the state of emergency, schools, faculties and kindergartens were closed, and all sports events were suspended and all public gatherings were banned. Due to the declaration of a state of emergency, higher education institutions in the Republic of Serbia were declared at a different pace. Rare among them that have platforms for distance learning, software for communication with students, and the archive of lectures were able to react faster and offer their students quality content and an adequate replacement for lectures in amphitheaters and auditoriums.

Most faculties organized some kind of "teaching" such as sending presentations and other materials to students, and the organization itself was left to teachers. In the majority of cases, as evidenced by student testimonies on various forums and portals and survey results, even this way of teaching did not exist. Some faculties promptly informed students about the changes through their official websites. All forms of direct teaching (lectures and exercises) and consultations with students were realized via electronic communication.

The realization of colloquia and exams at all levels of studies was postponed at all higher education institutions in the Republic of Serbia until the conditions were created. After 52 days, the state of emergency was lifted, but certain measures that were introduced in order to reduce the possibility of spreading the virus remained in force (RS Government, 2020).

The Ministry of Education, Science and Technological Development informed higher education institutions that they can continue working on May 15, 2020. year, (Notice, 2020), followed by the General Instructions for the application of mandatory preventive measures during the pandemic at universities, colleges, academies of vocational studies and colleges. After the lifting of the state of emergency, most higher education institutions enabled the return of teachers and organized exam deadlines with strict observance of security measures. The general instruction included a recommendation that in the period after the abolition of the state of emergency, the higher education institution continue to organize online forms of teaching, consider the justification and possibility of a certain reduction of exam material and other recommendations regarding extending the deadline for final papers, validity of pre-examination obligations, consider tuition reduction measures, debt rescheduling, and more. (Proposed measures, 2020)

Major edtech investments were made before COVID-19, in 2019, US$18.66 billion and the market for online education projected to reach $350 Billion by 2025 globally primarily for “the introduction of flexible learning technologies in the corporate and education sectors”, according to global study – Online Education Market Study 2019. (Research and Market, 2019)

Mc Kinsey, in his 2016 study, emphasizes that adults learn best in an environment that provides them with a rich, interactive experience and freedom to experiment and the ability to make a variety of mistakes without risk. Dedicated learning facilities provide an ideal combination of exposure to real production problems and opportunities for employees to try new approaches without fear that something may go wrong. Experience shows that people not only learn faster in such environments, but also acquire knowledge faster and retain a larger amount of learning. (MC Kinsey, 2016)

Some studies show that we keep only 10% of the knowledge acquired through books or formal classes, that we keep 32% of the acquired knowledge through simulations and games, and that if we learn based on experience, we adopt and keep 65% of what we learn. It is best to learn through work (learning and transformation of knowledge) because in that case 80-100% of what is learned is retained. (Ilić, et al 2019)

Many worldwide universities try to develop the Smart University concept and its related concepts like smart education, smart e-learning, smart campus, smart classroom ie. they are looking for the best ways to transform a traditional university into a smart university. (Tikhomirov, Dneprovskaya, 2015). Major components required for that are: smart software systems, smart hardware systems and equipment, smart technologies, smart pedagogy, and stakeholders (like students, professional staff, alumni, etc. (Uskov, et al 2016).

Regarding online learning in Covid-19 conditions, the OECD concluded that online learning is faced with several challenges, especially for children (the study was done for the primary school level) who did not have a good internet network and insufficient knowledge of information technology. and the difference between those who were privileged

and had good functional computers and those who did not. Some countries provided computers (OECD, 2020)

UNESCO assisted through various platforms by facilitating the maintenance of distance education, especially for vulnerable categories as school closures have affected 60% of the pupil and student population. (UNESCO, 2020).

All indicators before and after Covid-19 speak in favor of the importance of online learning so that future trends in education can be clearly predicted. In that context, the use of information-communication technologies and a wide platform of education for editors and students in this field is of great importance.

The use of ICT in educational processes is still at the low level in some countries, therefore it is necessary to train many teachers at all levels in ICT to equip themselves for the reengineering of society through skills; ICT is the most efficient means of rapid dissemination of information and knowledge transfer, decentralization of work, expansion of the workforce, but it is also expensive. With the help of ICT, the teacher becomes a facilitator, supervisor and leader in classroom teaching. However, the mandatory acquisition of ICT skills by teachers should be given priority attention even though a large number of teachers do not have a basic level of knowledge of hardware and software or IT technology (Chinyere, 2014) and their digital competence related to the ability to use information and communication technology for work and communication with the existence of skills demonstrated "through the use of computers to find, evaluate, create, archive, present and share information, as well as social interaction using the Internet and social networks "(Marković-Blagojević, et al 2019).

E-learning experiences Serbian higher education institutions - Content analysis

In Serbia, the activity of higher education according to the Law on Higher Education is provided by universities, faculties, academies of vocational studies, high schools and colleges of vocational studies which have been accredited in accordance with the Law on Higher Education. Based on the accreditation, the Commission determines, among other things, whether the higher education institution or study program meets the standards set by the National Council. Also, it should be ascertained whether the conditions for the introduction of the program are met.

According to available data, there are 18 universities in Serbia today, of which 9 were founded and funded by the state, while 9 universities are privately owned. (Nat, 2020) The question is whether these universities, as well as other higher education institutions, follow trends in education, economic tendencies, technology development, ie different needs for educational profiles, and whether in accordance with these continuous evaluations of existing programs, they innovate or even if they find that they are completely obsolete. Therefore, is higher education in the Republic of Serbia developmental and progressive, and is the adequate knowledge offered to students thanks to educational programs? (Ristić, et al 2019)

There is still an insufficient knowledge base in Serbia when it comes to the effects of Covid-19 on higher education. Two significant surveys were conducted in April and August 2020 by the NajStudent portal whose publicly available data were used for further analysis. In the survey conducted by the site NajStudent.com (Najstudent, 2020) in the period from April 21 to April 27, 1,447 academics gave answers about the impact of the pandemic on their studies.

According to the data of the Republic Bureau of Statistics in the school year 2019/20. year, 241,968 students were enrolled at all higher education institutions at all study levels in the Republic of Serbia. (Republic Statistical Office, 2020)

It can be stated that the population size is 241,960, and that the sample is 1447, the level of reliability is 95%, the confidence interval is 2.57%, and the sample is adequate. In terms of representativeness of the sample, the entire sample consisted of students in the Republic of Serbia, so that the sample represents the entire population of Serbian students in the right way. Thus, it can be stated that the sample is representative, i.e. that it realistically reflects the actual structure of the population. It can be stated that the sample is adequate because it is large enough.

When asked what measures the faculties have taken to adapt to the state of emergency, almost half of the students stated that the professors sent PDF and PPT presentations with or without an audio recording. The results of the research indicated that every third professor holds online lectures, and 16% hold consultations on a fixed term. The majority of students, as many as 70%, believe that these changes have had a bad effect on their acquisition of knowledge, almost a quarter do not feel that there are big differences compared to regular lectures, while only 8% stated that they acquire knowledge more easily in this way.

Students rated their satisfaction with the implemented measures at higher education institutions due to the introduction of the state of emergency with an average grade of 3.19 on a scale from 1 to 5. Opinions among the student population on whether the faculty has taken all necessary measures to transfer knowledge are literally divided in the ratio of 50% to

50%.

Asked what faculties and colleges should do in these conditions, almost two-fifths of students considered that they should make professors more accessible, and the same percentage believes that information on the website of these institutions should be more accessible. About 20% of respondents had different suggestions, most often: standardization of online lectures, the introduction of an online colloquium, audio recordings followed by materials, etc.

When asked which of regular activities should be better organized at the faculty, the majority of respondents, almost 40%, think that these are colloquia, then 35% want them to be lectures, followed by consultations with 13%. Only every ninth student thinks that everything is well organized. (Student, 2020).

The new research was conducted on a sample of 1955 respondents during August 2020.

According to the population size of 241,968, a sample of 1955, a confidence level of 95%, a confidence interval of 2.21%, it can be concluded that the sample is adequate. In terms of representativeness of the sample, the entire sample consisted of students in the Republic of Serbia, so that the sample represents the entire population of Serbian students in the right way. Thus, it can be stated that the sample is representative, i.e. that it realistically reflects the actual structure of the population. It can be stated that the sample is adequate because it is large enough.

This research concluded that in addition to the organization of online study itself, the pandemic greatly affected the students themselves. This is supported by the fact that more than half of them lost their sense of studying, and furthermore the pandemic affected students, in a way that they needed more time to learn the material due to the lack of lectures and exercises. Two-fifths of respondents stated that they lacked contact with colleagues, while only 21% of them had more time to learn due to this situation. Respondents rated the work of the faculty in unforeseen circumstances, as well as the organization of online lectures and colloquia on an average of 3 on a scale from 1 to 5, where 1 is the lowest and 5 the highest.

Suggesting what could be better organized, the respondents named almost all segments of study, primarily the organization of exam deadlines, then timely information regarding classes and exams, lectures and consultations, organization of exercises and practical classes, but also colloquia, while only every 11th respondent said that everything was well organized. The research clearly shows the negative impact of the effects of the Covid 19 pandemic on students and the overall study process. (Student, 2020)

E-learning ITS Experience Case study: Get quality right the first time

About company

Information Technology School Belgrade (ITS) as College of Vocational Studies is an independent higher education institution that has four accredited study programs of Information Technology, Computer Multimedia, Electronic Business and Information Systems. Information Technology School was founded by two leading regional companies in the IT area – LINK group and Comtrade. Since 2018 ITS has organized master vocational studies as well, within one accredited program of Information Technology. The business results so far, from the beginning of its work, show that ITS manages to operate with a positive result (ensure the provided services to students with quality study, supported by modern IT and other equipment, regularly paying salaries to employees).

Professional competence and immense experience of the founding companies serve as a guarantee of a quality education and a successful career. (Information Technology School, ITS – Belgrade, 2020) LINK group is a multinational company working in professional education and certification in IT and modern business, as well as software development. (Link Group, 2020) Comtrade is a dynamic and well-established group of technology companies, with a 25-year track record of innovation and steady development of some of the world's most advanced software. (Comtrade, 2020)

ITS, as a private higher education institution, is financed from tuition fees, which is currently the only source of income. The organizational structure has all the elements provided by the Law on Higher Education of the Republic of Serbia and others necessary for efficient management and achievement of the goals it has set for itself.

Although ITS is a vocational school, it still pays attention to research and scientific work, primarily through the participation of its teachers in scientific conferences, the publication of papers in journals, and the implementation of projects begins. The complete organization and all activities are aimed at achieving the mission, vision, goals, and tasks

of ITS as a vocational school that strives to continuously develop and improve its work. ITS regularly and qualitatively performs its basic activity - the implementation of accredited study programs but does not neglect the training of teachers throughout the research. ITS continuously improves its organization and supplements or changes the basic acts (Statute, regulations, instructions, quality documents) in order to improve the overall work.

ITS has functional form of organization. Functional organizational structure is statistically the most common method of organizational structure and represents the oldest type of project organization. It represents the total opposite in relation to the project organizational structure. It is based on grouping people by expertise and specialization of performing certain jobs in the sector in which they are assigned.
The characteristic of this structure is that in a hierarchical relationship, employees in the sectors are accountable only to the managers of those and exclusively those sectors, while the managers of these sectors are accountable to the top managers, often directly to the director of the company.

In the functional structure, it is common to create departments such as accounting, marketing or research and development. The division of labor in a functional structure is not based on the type of product or project supported, but on the type of work performed. In an organization that has a functional structure, members routinely work on multiple projects or support multiple production lines simultaneously.
Major stakeholders are: Investors, employees of ITS, ITS management, students, parents, community, Ministry of Education, Science and Technology, alumni.

Human resources management in a (business) organization represents a precondition for its success. (Ilić, Ranković, Dedić, 2020). This truth is recognized as a business philosophy of ITS. ITS has developed the Smart University concept with the concept of smart education, smart e-learning, smart campus, smart classroom, conducting the transformation from a traditional university into a smart university using smart software systems, smart hardware systems and equipment, smart technologies, smart pedagogy, stakeholders etc. All of its teachers and associates have all the necessary digital competences improving themselves on a regular basis in order to be able to follow world educational trends and develop their ICT skills.

Problem

At ITS, staff nurture two-way communication with students. Communication takes place in lectures and exercises, during the semesters. Direct communication also takes place at the consultations that take place on the school premises. Other communication takes place through ICT media. All forms of direct teaching (lectures and exercises) and consultations with students have been conducted on school premises, supported by modern information and communication technologies.

State of emergency in the Republic of Serbia was declared on March 15th, 2020. The summer semester of the 2019/20 academic year is underway. During the state of emergency, initiated by the Covid-19 pandemic, it was not possible to organize lectures nor face-to-face consultations with students in the high school premises due to the declared state of emergency, as well as after that due to epidemiological measures and prohibition of assembly. When the state of emergency is lifted it was necessary to organize consultations and exams, while ensuring compliance with epidemiological measures to protect employees and students.

Solution

Students open a corporate mail account on the mail server immediately after enrolling in the first year of study. Through this mail account, students receive automatic messages that are integrated with all software solutions used at its level. Also, students receive regular and up-to-date information from the student service on their email account, but they can also communicate with ITS teaching and non-teaching staff and with their fellow students. Experience shows that this form of communication and exchange of information is very popular and accepted among ITS students. Also, the following software solutions were used for communication at ITS:

- Information system (IS ITS)
- Distance Learning System (DLS)
- Content Management Server (CMS)

- Student Web Portal
- Library software.

Using all the above services, students were able to continue to study regularly and attend lectures. Classes were held via live stream, teaching materials were published on the portal after each class, videos of all lectures were archived and professors were available for video consultations. During the conditions where we all stayed longer in our homes, ITS students had the opportunity to take advantage of that time and master the covered material. We believe that this will be confirmed in the exam period when the conditions for the first exams are met.

ITS did not interrupt its work at any time during the state of emergency. Classes were regularly held via live stream, using Distance Learning System of the LINK group company, as the school founder.

The state of emergency was lifted but the epidemiological measures banning gatherings were still in place. Schools and colleges were particularly affected by the current situation due to the nature of their activities and will probably be the last where the situation will completely normalize.

ITS professors were extremely dedicated to the students and regularly performed their duties even in the state of emergency, beside their professional competencies and obvious digital competences. In compliance with all the recommended measures, they used to come to work and teach, using live stream from ITS classrooms. They were also available to students via video conferences and responded to their mails within 24 hours.

In addition to live stream, all broadcast lectures and exercises were recorded and saved in a special video archive on the Distance Learning platform. This option is especially useful for ITS students when preparing for exams because each lecture can be reviewed multiple times.

ITS managed to adjust quickly and conduct all the classes even in the state of emergency because it has used the Distance Learning System in the schoolwork since 2006, when the school was founded. It applies a huge number of software services to support the teaching process. Live stream has been part of regular ITS service since 2015 and has now only gained in importance.

In addition to live stream, this platform also includes online courses that help students master the teaching material as efficiently as possible and prepare for the exams. Students can also have access to online tests to check their knowledge in each subject that give them an insight to how much material they have mastered and what they still need to work on.

Teaching material was regularly published on the student portal after each given lecture in all subjects, both basic and master studies. Mimeographed course notes and textbooks are available to students for all subjects of the studies with subject teachers as their authors. There is also a collection of multimedia materials for learning and testing knowledge, as an additional learning resource. It is also enabled to register exams online via student portal and have access to all electronic test results.

ITS students have also followed the classes over their phones in the last period. IOS and Android applications have been available to them. They can use these applications to access the Distance Learning System, scheduled Live Class sessions and video archives. This free app provides easy access to all lectures and online lessons. It is enough to install the application on their phones- then they can easily go through the anticipated material or watch online classes.

In addition to live stream, regular video consultations were also conducted, with professors of all subjects of basic and master studies, using Google Meet service once a week for 60 minutes, for each subject in the semester. The professors discussed the covered material live with the students. They were also available for all student questions.

Employees in professional services were available all the time during the state of emergency and continued to provide technical and software support to ITS students. Student service was available for all questions by email and telephone while technical support provided students undisturbed conducting of teaching, announcement of the schedule and all teaching materials on a daily basis.

In accordance with the recommendations of the Ministry of Education, Science and Technological Development the exams were conducted in April, June and July. Epidemiological measures were followed as well as other

recommendations regarding the continuation of online lectures, exercises and consultations, volume of examination material and financial relief.

Reflection upon the training results, analysis and lessons learned

The selected model of learning and the combination of lectures and exercises, the choice of teaching forms, the way of checking what has been learned shows good results. Student`s grades are in the expected ITS average, and students through the survey show satisfaction with different elements.

Assessment of student satisfaction (Results of student surveys on the quality of teachers' work) within the survey at the end of each semester is important for obtaining student`s satisfaction, but not the only element that is important. Different surveys have been formed in forms for student surveys. Management conducts analyses of realized surveys that are periodically conducted with the aim of determining the degree of satisfaction of ITS students with the quality of the teaching process and the conditions of studying at ITS. The surveys also determine possible remarks and suggestions of students, which serve as a basis for improving the overall functioning of ITS.

The engagement of associates and professors in the permanent and temporary bodies of the school is also assessed after every semester. The quality of teaching literature, textbooks, books, scripts, collections of assignments, practicums, electronic materials that are posted on the student portal, is regularly controlled by students through surveys and management.

Survey on the quality of pedagogical work of teachers and associates has been conducted with the students of basic and master vocational ITS studies in the 2019/20 study year. (Student Survey Analysis 2020) The survey was conducted in mid-August 2020. It was started due to the epidemiological situation and emergency caused by the coronavirus pandemic (Covid-19), immediately after the end of the exam period in June. The survey was finished after four weeks in order to give students enough time to express their impressions after all the activities during the summer semester and conducted distance learning, so that they could also evaluate the conduct of exams and not just pre-exam obligations. The survey was conducted electronically and is anonymous.
The following elements, related to teachers, were evaluated:

1. clarity and comprehensibility of lectures,
2. the previous grades with the teacher correspond to the demonstrated knowledge of a student
3. communication and email response speed
4. transparency and the emphasis of the most important
5. encouraging student involvement and participation in teaching
6. good preparation for a class
7. the manner of conducting the exam with this teacher
8. contemporaneity of the programme
9. objectivity and proper relations with students

There are nine elements on the quality of pedagogical work of teachers and six elements of associates (associates are not evaluated for the following elements: contemporaneity of the programmer, the previous grades with the teacher correspond to my demonstrated knowledge and the manner of conducting the exam with this teacher) that were evaluated.

There were 1515 students of basic vocational studies who participated in the research, most of them second year students 37,56 (n=589), then third year students 29,99% (n=470) and first year students 29,10% (n=29,10) while the least of them were students of master studies, if we take into account the total number of respondents which is 1567.

Table 1: Information of study participants

Year of study	n	%
First year of study	456	29,10
Second year of study	589	37,59

Third year of study	470	29,99
Master studies	52	3,32
Total	**1567**	**100,00**

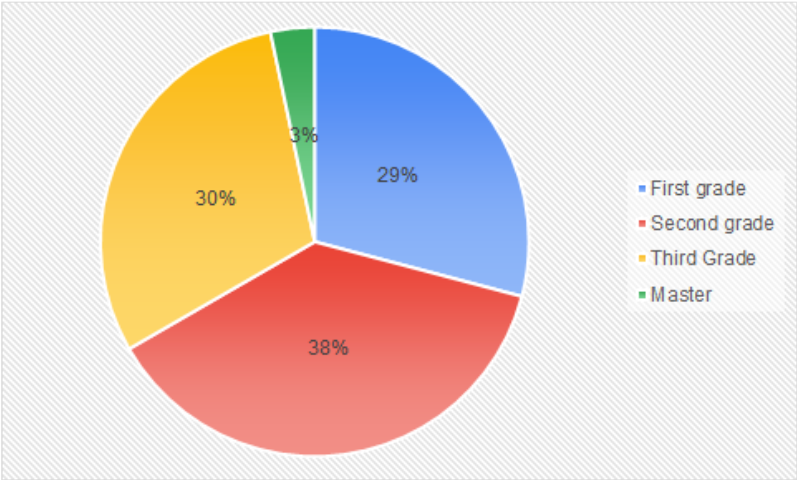

Figure 4: Information of study participants

Table 2: Teacher survey results in the summer semester of the 2019/2020 school year by years of study and study programs - mean score

Year of study	**IT**	**EB**	**IS**	**CM**
First year of study (mean score)	4.26	4.41	4.72	4.65
Second year of study (mean score)	4.33	4.51	4.55	4.54
Third year of study (mean score)	4.68	4.70	4.88	4.43
Master studies (mean score)	4.72	/	/	/

Mean score starts from 4,26 to 4,88, in total (from 4,42 to 4,84 last year). When it comes to study programmes, there are differences in mean scores in all years of study, although the lowest score was on Electronic Business department (EB)- second year of studies (IT last year). There is also the biggest difference on Electronic Business department – first year (Computer Multimedia - CM the previous year). In the first year, the mean score ranges from 4,26 to 4,72 (from 4,56 to 4,79 last year), in the second year from 4,33 to 4,55 (from 4,50 to 4,84 the previous year), and in the third year from 4,43 to 4,88 (from 4,42 to 4,69 last year). The difference between the highest and the lowest mean score in the first and in the third year of studies is the same while the smallest difference is in the second year of studies that indicates steady quality of teachers. The difference in all study years was about the same in the previous academic year.

Mean score, on master vocational studies, ranges from 4,33 to 4,93 (from 3,44 to 5,00 last year). Mean score is 4,72 (4,67 the previous year). On the whole, it could be concluded that ITS has an excellent teaching staff (mean score 4,72) according to the student's grades.

By analyzing the grades given by the respondents to the associates, it could be concluded that ITS also has quality associates whose lower average grade was slightly lower compared to the teacher's grade (mean score 4,08 compared to 4,26).

Conclusion

There are numerous influences and achievements of different forms of e-learning during the Covid-19 pandemic in different countries. Some experts believe that the unplanned and rapid transition to online learning without preparation and insufficient coverage of the Internet has caused many bad experiences for users (pupils and student as well as educators), while the others believe that the whole experience will degenerate a hybrid model that will bring numerous benefits to all participants.

State of emergency due to the Covid-19 pandemic, epidemiological measures in terms of social distance and the ban on gatherings have affected various spheres of society in the Republic of Serbia, especially higher education institutions which have developed, in different ways at different times, some adequate responses regarding some ways of distance learning or only sending teaching materials to students. Unfortunately, in some cases, there was no communication with students. Deficiencies in the reaction of higher education institutions and teaching staff as well as the impact of the epidemic on students and on the study process itself have been proved by two independent researches.

During the state of emergency in the Republic of Serbia, for 52 days as well as after that with adherence to epidemiological measures and other recommendations of the competent ministry, ITS-Belgrade showed capability to rapidly accept the changes, thanks to a proactive approach, strategic management and perennial application of the online learning model as a general application of information communication technologies in daily functioning of the school, conducting lectures and exercises and communication with students. If we look at the mean score of the student satisfaction with the elements of the survey for the previous and the current year, it was clear that there are no discrepancies in the quality of service provided. ITS student satisfaction, expressed with high average individual grades of the elements of the quality of the pedagogical work of teachers and associates, proves that ITS successfully coped with the conditions of providing educational services during the Covid-19, as well as in regular business.

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Conceptual Models for Development of Universities in Russia

Tatyana Maximova
[0000-0002-8532-7963], ITMO University, St. Petersburg, Russia
maximovatg@gmail.com

Irina Sokolova
St.Petersburg State University, Russia
i_sokolova@bk.ru

Dmitry Verzilin
[0000-0003-2305-4610], Federal State Budgetary Institution of Science "St. Petersburg Federal Research Center of the Russian Academy of Sciences", Lesgaft National State University of Physical Education, Sport and Health, St. Petersburg, Russia, modusponens@mail.ru

Tatyana Kruglova
PhD, assistant professor, Lesgaft National State University of Physical Education,
Sport and Health, St. Petersburg, Russia
krug.t@list.ru

Abstract

In the last decade, scientific activities of large universities in Russia have been actively funded by the state. Universities are making attempts to implement one or several development models at once: a research university, a world-class university, an entrepreneurial university, a flagship university of the region, etc. The lack of a clear understanding of the strategy and model of the development of the university can lead to the formal fulfillment of the efficiency indicators set by the state and low real efficiency of spending budget funds.
A statistical study for open data of annual monitoring of the Russian universities let determine and analyze the models of the activities of Russian universities in the field of scientific research and innovative developments have been determined. The universities were identified that implement promising, from the point of view of world experience, models of scientific management. Differences in the development of the field of research and development in national research universities were revealed. It was shown that an increase in the share of extra-budgetary funds and in the share of funds of universities for research and development is not accompanied by an increase in the effectiveness of innovative activities in the regions. The performed classification of regions and the calculated values of the factors of the innovative activity efficiency and the financial conditions for the operation of regional flagship universities can be used to plan further support for flagship universities at the expense of the federal budget.

Keywords: Flagship University, Innovative Regional Development, National Research Universities.

Introduction and the Research Question

Till now Russian Federation mostly use direct government funding for supporting science. There is still a lack of interest in business to invest into research and development. The scientific activities of large universities in the country in the last decade have been actively funded by the state. The leading universities were supposed to overcome limits of routine educational activity. It is assumed that university staff should actively participate in scientific research with results brought to the market of innovative technologies and products. The activities of universities should be aimed at promoting innovations. This concept corresponds to the world practice of university-driven research and development. However, according to Eurostat [5], the present share of higher education employees in overall stuff conducting research and development is about 32% in European Union, 24% in Japan, and only 15% in Russia. In internal costs of research and development the share of higher education sector is less with 23% in EU, 12% in Japan and about 10% in Russia.

The Strategy for Innovative Development of the Russian Federation and other government documents of strategic planning [2, 3, 17] specify tasks of developing innovative activity, effective commercialization and implementation of scientific developments. Leading universities should become centers of regional innovation ecosystems. Since

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2017, Russia has been implementing the priority project "Universities as centers of space for innovation creation" [12] aimed at making universities active participants in regional socio-economic and innovative development. Currently [11, 16] dozens of leading universities acquired special statuses providing for more autonomous educational policy and additional funding. Specifically, 29 universities got the status of national research universities (NRU) and 33 universities worked out approved programs granting the status of regional flagship universities.

Our express monitoring of universities' strategies in Russia allows us to conclude that universities are making attempts to implement one or several development models at once: a research university, a world-class university, an entrepreneurial university, a flagship university of the region, etc. The lack of a clear understanding of the strategy and development model of the university can lead to a formal implementation of indicators set by the state and to a low real efficiency of spending governmental funds.

The aim of the study was to determine through open statistical data the use of typical models specifying scientific research and innovative development in Russian universities.

Related Work

From the survey [7] we can sort out typical models specifying how universities do influence upon regional innovation strategies. The author identified four typical models that are most frequently encountered in publications on this topic. Namely, the model of an entrepreneurial university, aimed at the commercialization of research and development results; a regional innovation system (RIS) model, in which the university becomes a link between business and public administration; a model of an involved university, in which the university interacts with society and industry, sharing knowledge as a mutually beneficial resource, and a model of the university as a carrier of a social mission. The latter model is more dependent on leaders advancing the social mission. That survey analyzes the shortcomings in the implementation of the four models, specific to the United States. For example, universities are interested in being patent holders, rather than in selling licenses.

From [10] we can get conceptual models describing an influence of universities on innovative regional development in the UK, Sweden and Austria. Descriptions of the models are rather detailed and include conditions and results of their implementation in those three countries, such as the amount of funding, results of specific programs and projects, and the regulatory framework. In addition to the first three of four models mentioned above, there is a model of universities operating in the so-called "second mode" as carriers of new forms of knowledge production. Such universities combine interdisciplinary research, new scientific directions, new approaches to research and development management, and new applications of scientific results.

An analysis [14] of the model of an entrepreneurial university in Scotland provides for a conclusion that insufficient contribution of the private sector to research and development reduces the efficiency of entrepreneurial universities. Universities are unable to compensate for the insufficient contribution of the private sector, since their main priorities should lay in the reproduction of human capital and the conduct of fundamental research.

In some publications [1, 6, 7, 8, 10, 14, 19] on the influence of universities on regional innovative development there are conclusions that this influence is often exaggerated, and the actual results do not correspond to expectations. For example, there is a disconnection between the knowledge acquired at the university and its actual application in practice. The works [7, 10, 14] are quite typical in this area.

Analysis of publications shows how it is important when planning regional strategies for innovative development to determine the priorities of universities and maintain a balance between educational, scientific and entrepreneurial activities.

Materials and Methods

Our statistical study was carried out for open data from the annual monitoring of Russian universities [4]. We analyzed indicators of innovation and research activities, and the innovation infrastructure of universities in 2017 and 2018. Specifically, we observed activities of regional flagship universities and universities with the dominant development model of national research university (NRU).

The flagship university model assumes a significant impact of a university on the development of innovations in the region. So, to assess the state of innovative development of the regions in which the flagship universities operate, the data of Rosstat were used [18]. To level the random fluctuations in the values of the indicators, the data for 2017 and

2018 were averaged. We compared results obtained with the sub-indices of innovative development of regions and regional indices of innovative development for 2017 [13].

The methodology for determining the level of innovative development of regions described in [13, p.57-76] assumes the standardization of the initial statistical indicators and the calculation of summary subindices, which are sums of normalized indicators with equal weights. When normalizing, the transformation of indicators is used to compensate for the asymmetry of their distributions, then its average value is subtracted from each transformed indicator, then the resulting value is divided by the difference between the maximum and minimum values of the transformed indicator. The disadvantage of this technique is that it ignores possible correlations between the initial indicators. Therefore, it is not known in advance how certain aspects of innovative development will affect the final values of the indices. The indices themselves can have statistically significant correlations with each other. The integral index is the sum of five partial indices with weights proportional to the number of primary indicators included in each index. The use of a single integral index leads to the loss of a significant part of the information contained in the values of the initial indicators.

To overcome abovementioned shortcomings, when analyzing the multidimensional space of indicators characterizing the innovative development of regions, a factor analysis of the initial statistical indicators was used. In the factor analysis model (see, eg, [15]), the variance of each initial indicator is decomposed into the variance due to generality, that is, the existence of common, sometimes called latent, factors and into the variance due to specificity, that is, the variation of each initial statistical indicator. The technique of factor analysis is aimed at assessing factor loads (representing the values of the correlation coefficients of latent factors with the initial indicators), specific variances, determining the values of common latent factors for each object, and interpreting the selected factors according to the specifics of the initial indicators. Rotation methods are used to obtain an interpreted load matrix, so that each latent factor has high loads (correlation coefficients) for some initial indicators and low for others. In the present study, rotation was used according to the Quartimax method (see, eg, [15]). The obtained values of latent factors were used to classify regions using cluster analysis methods; analysis of variance was used to compare clusters (see, eg, [15]). A similar approach has been tested in the formation of strategic guidelines for state policy [20].

We used methods of descriptive statistics for the primary analysis of statistical indicators.

Results

Research universities as innovation centers

This study is a continuation of our research on the performance of scientific and innovative activities of national research universities.

In [8] we analyzed financial indicators of the scientific activity of universities in 2017. The article [9] presents the results of the data analysis for 2018. The patterns identified according to the data for 2017 were still valid in 2018.

In particular, we observed a constant elasticity of the share of income from R&D by the total volume of R&D in monetary terms (for the considered intervals of indicators). The change in the volume of R&D (x) by 1% led to a change in the share of income from R&D in the total volume of university revenues (y) by 0.45% -0.46%:

$y = 0.047x0.45$, $R^2 = 0.621$ (2017) и $y = 0.039x0.46$, $R^2 = 0.637$ (2018).

The indicators of financial support for scientific research in national research universities are subject to the following statistically significant patterns.

R&D revenues (y) per one scientific and pedagogical employee increase with an increase in the share of extra-budgetary funds in R&D revenues (x). The pattern was observed for 2017 and 2018, and there was an increase in average employee income for a given share of extra-budgetary funds:

$y = 31.849x - 187.93$, $R^2 = 0.552$ (2017);
$y = 34.149x - 162.41$, $R^2 = 0.592$ (2018).

The patterns obtained testify to positive trends in the implementation of scientific activities in national research universities.

An analysis of the structure of funding of universities in the context of budgetary and extra-budgetary sources showed [8] that in 2017 universities with lower total R&D funds had a higher share of extrabudgetary funds in R&D revenues.

The interval of the values of the indicator "the share of extra-budgetary funds in the total revenues of the university from R&D" was 22-100% for the analyzed universities. In 2018, the value of this indicator was in the range of 49-76%.
At the same time, the values of the indicator "total R&D in monetary terms" increased in 2018. This fact indicates an increase in the involvement of the elements of the innovation ecosystem in the financing of research and development.

At the same time, the values of the indicator "total R&D in monetary terms" increased in 2018. This fact indicates an increase in the involvement of non-government investors in the financing of research and development.

As a result of the analysis, we have identified universities that implement promising, from the point of view of world experience, models of scientific management. These are, first of all, those universities for which there is a positive relative increase in the target indicators, such as the total volume of R&D, the share of extra-budgetary funds in the revenues from R&D, and the share of R&D revenues in total revenues.

In [8] we presented an approach to identifying differences between national research universities in the field of research and development. According to the statistical data of 2017 and 2018, we identified nine leading universities with high practice-oriented scientific activity, but with an average levels of entrepreneurial innovation activity and of budget-oriented scientific activity.

Flagship universities as centers of innovative regional development

The main goal of creating the NRUs was to develop and commercialize innovative technologies [1]. The achievement of this goal also contributed to the training and employment of personnel with competencies in the field of research and development at the forefront of the world.

At the same time, the creation of the NRUs did not ensure innovative development of Russian regions of, since out of 29 NRUs, 19 are located in Moscow and St. Petersburg, another 4 are in cities with a population over one million and only 6 are in other regional centers. The need to educate and retain personnel in the regions of Russia, the creation of centers for regional innovative development, required additional support for regional universities at the expense of the federal budget [11, 12, 16]. To date, programs of regional innovative development have been supported with the aid of 33 flagship universities located in 31 regions (constituent entities) of the Russian Federation. During the period from 2016 to 2020, inclusive, each flagship university received subsidies from the federal budget in the amount of up to 150 million rubles annually. To determine the prospects for further support, it is necessary to assess the state of innovative development of the regions in which flagship universities operate. For these purposes, the factor analysis of the initial statistical indicators was used (Table 1). Factor loadings made it possible to interpret the first factor as a factor of the effectiveness of regional innovation activities, and the second as the financial conditions for the operation of flagship universities. The factors obtained explain more than 57% of the variance of the initial indicators. The values of the factors calculated for the regions in which the flagship universities are located were used to classify the regions using the k-means clustering method. Two groups (clusters) of regions have been identified. The values of the factors for the clusters are shown in Fig. 6. In the regions of the first cluster, there are higher values of the efficiency factor (the average values of the efficiency factor are, respectively: 0.75 units for cluster 1, -0.76 units for cluster 2). In the second cluster, on average, there are higher values of the financial conditions factor (the average values of the financial conditions factor are, respectively: -0.26 units for cluster 1, 0.13 units for cluster 2). The result obtained can be interpreted as the fact that an increase in the share of extra-budgetary funds and the share of university funds for carrying out research and development is not accompanied by an increase in the effectiveness of innovative activities in the regions.

Table 1 : Factor loadings (calculated by the authors according to UIISS data [18] for 2017 and 2018)

Initial indicators	Factor 1 (efficiency)	Factor 1 (financial conditions)
Internal current expenditures on research and development per one employee who performed research and development (excluding part-time workers and persons who worked under civil law contracts), thousand rubles	**0.64**	0.17
Share of extra-budgetary funds in internal expenditures on research and development, %	0.14	**0.80**
Share of the higher education sector in internal expenditures on research and development, %	-0.29	0.71

Share of costs for technological innovation in the total volume of shipped goods, work performed, and services in industrial organizations, %	**0.72**	-0.35
Share of innovative goods, work performed, services in the total volume of goods shipped, work performed, and services, %	**0.58**	0.06
Share of organizations implementing technological innovations in the total number of surveyed organizations, %	**0.81**	-0.24
Share of variance explained	0.34	0.23

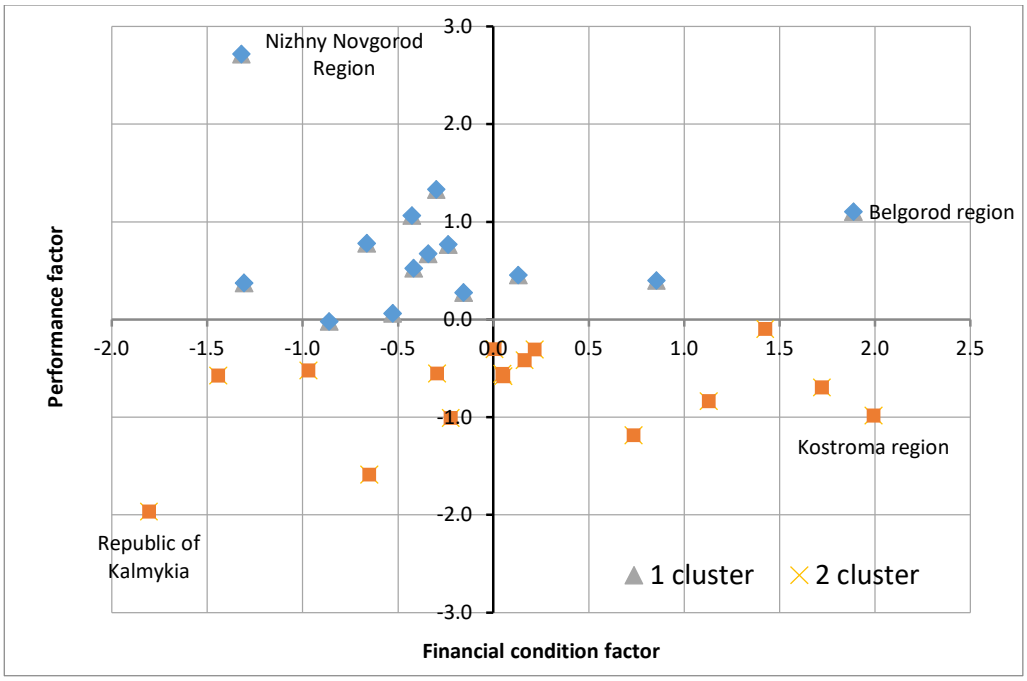

Figure 1: Values of the factors for the regions where flagship universities are located (constructed by the authors based on the results of factor analysis).

In Table 2, for reference, we presented the regions included in each cluster, the values of the factors for the regions, the distances to the centers of the clusters, allowing us to conclude how a particular region is typical for the cluster.

Table 2 : The elements and characteristics of the clusters

1 cluster	Factor 1	Factor 2	Distance	1 cluster	Factor 1	Factor 2	Distance
Belgorod region	1.1	1.9	1.5	Kostroma region	-1.0	2.0	1.3
Vladimir region	0.3	-0.2	0.3	Oryol Region	-1.0	-0.2	0.3
Voronezh region	0.1	-0.5	0.5	Republic of Karelia	-1.6	-0.7	0.8
Tula region	1.3	-0.3	0.4	Komi Republic	-0.6	0.0	0.2
Yaroslavskaya oblast	0.7	-0.3	0.1	Vologda Region	-1.2	0.7	0.5
Novgorod region	0.5	0.1	0.3	Murmansk region	-0.6	-1.4	1.1
Republic of Bashkortostan	0.4	0.9	0.8	Pskov region	-0.1	1.4	1.0
Kirov region	0.0	-0.9	0.7	Republic of Kalmykia	-2.0	-1.8	1.6
Nizhny Novgorod Region	2.7	-1.3	1.6	Krasnodar region	-0.4	0.2	0.2
Samara Region	0.5	-0.4	0.2	Volgograd region	-0.3	0.2	0.3
Chelyabinsk region	0.4	-1.3	0.8	Rostov region	-0.3	0.0	0.3
Krasnoyarsk region	0.8	-0.7	0.3	Mari El Republic	-0.7	1.7	1.1
Omsk region	0.8	-0.2	0.0	Saratov region	-0.6	-0.3	0.3
Tomsk region	1.1	-0.4	0.2	Altai region	-0.6	0.1	0.1
Average	***0.75***	***-0.26***		Kemerovo Region - Kuzbass	-0.8	1.1	0.7
				Novosibirsk region	-0.5	-1.0	0.8
				Average	***-0.76***	***0.13***	

The resulting classification of regions can be used when planning innovative activities in regions based on flagship universities. When planning, it is necessary to take into account the identified differences between regions.

The results were compared with estimates obtained for the indices of innovative development of regions for 2017 [13]. It was found out that the values of the regional innovation index and four of the five sub-indices of innovative development of regions are statistically significantly different for the two identified clusters. The values of the total regional index of innovative development and sub-indices characterizing the socio-economic conditions of innovation, export activity and the quality of regional policy are higher for the first cluster. For the sub-index characterizing the regional scientific and technological potential, statistically significant differences were not observed. At the same time, this sub-index has a correlation coefficient with the highlighted performance factor of 0.45 ($p < 0.05$). Thus, the correspondence of the results of the factorial and cluster analysis to the results presented in [13] was established, which indicates the consistency of both approaches.

Conclusion

In the last decade, scientific activities of large universities in Russia have been actively funded by the state. Universities are making attempts to implement one or several development models at once: a research university, a world-class university, an entrepreneurial university, a flagship university of the region, etc. The lack of a clear understanding of the strategy and development model of the university can lead to the formal implementation of the efficiency indicators set by the state and a low actual efficiency of spending budget funds.

As a result of a statistical study for open data of annual monitoring of Russian universities, the models of the activities of Russian universities in the field of scientific research and innovative developments have been determined.

For national research universities, indicators of financial support for research and development are subject to the following statistically significant patterns. The elasticity of the share of R&D revenues in terms of the total volume of R&D in monetary terms (for the considered intervals of indicators) is constant. R&D revenues per one scientific and pedagogical worker increase with an increase in the share of extra-budgetary funds in R&D revenues. The established patterns testify to positive trends in the implementation of scientific activities in national research universities.

Universities with lower total R&D funds had a higher share of extra-budgetary funds in R&D revenues. The values of the indicator "total R&D in monetary terms" increased in 2018 compared to 2017. This fact indicates an increase in the involvement of the non-governmental elements of the innovation ecosystem in the financing of research and development.

We identified universities implementing promising, from the point of view of world experience, models of scientific management. These are, first of all, those universities for which there is a positive relative increase in the indicators of the total volume of R&D, the share of extra-budgetary funds in the revenues from R&D, and the share of R&D revenues in total revenues.

There are differences in the development of the field of research and development in national research universities. For nine leading universities, we note average levels of entrepreneurial innovation activity and budget-oriented scientific activity, as well as high practice-oriented scientific activity.

The flagship university model assumes a significant impact of such a university on the development of innovations in the region. To date, programs of regional innovative development have been supported on the basis of 33 flagship universities located in 31 constituent entities of the Russian Federation. To determine the prospects for further support, it is necessary to assess the state of innovative development of the regions in which flagship universities operate. For that we used data of Rosstat. The results obtained were compared with the sub-indices and indices of innovative development of regions for 2017.

The results of the factor analysis made it possible to single out two latent factors: the factor of the efficiency of regional innovation and the factor of the financial conditions of the flagship universities. For these factors, the regions in which the flagship universities are located were divided into two clusters. In the regions of the first cluster, higher values of the innovation efficiency factor were observed. In the second cluster there were, on average, higher values of the factor of financial conditions. The obtained result can be interpreted as the fact that an increase in the share of extra-budgetary funds and in the share of university funds for carrying out research and development is not accompanied by an increase in the effectiveness of innovative activities in the regions. The correspondence of the results of factor and cluster analysis with the results of determining the sub-indices of regional innovative

development has been established. To plan further support for flagship universities at the expense of the federal budget, it is advisable to use the performed classification of regions and the calculated values of the factors of the efficiency of innovative activities and the financial conditions of the flagship universities.

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Tourism During Pandemic of Covid-19: Analysis of The Situation and Ways Out of The Crisis

Iryna KYRYLIUK
Ph. D. in Economics, Associate Professor of the Department of Technologies and Organization of Tourism and Hotel and Restaurant Business Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: irina_kurul@ukr.net

Valentyna SHAPOVAL
Doctor of Economics, Professor of the Department of Tourism and Economics of the enterprise Dnipro University of Technology «Dnipro Polytechnic», Dnipro, Ukraine, e-mail: vmshapoval2017@gmail.com

Inna POVOROZNIUK
Ph. D. in Economics, Associate Professor of the Department of Technologies and Organization of Tourism and Hotel and Restaurant Business Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: inna-173@ukr.net

Tetyana HERASYMENKO
Ph. D. in Geological, Associate Professor of the Department of Tourism and Economics of the enterprise Dnipro University of Technology «Dnipro Polytechnic», Dnipro, Ukraine,
e-mail: tatyana400@gmail.com

Oksana LYTVYN
Teacher of the Department of Technologies and Organization of Tourism and Hotel and Restaurant Business Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: okslit79@ukr.net

Abstract

The article analyses the situation on the market of the tourism industry in the context of the COVID-19 pandemic. The global crisis caused by the COVID-19 pandemic has radically changed the activities of the tourism industry around the world. Restrictions that have been implemented almost all over the world, especially the closure of interstate borders, caused significant damage to the tourism industry. The tendencies of losses of the tourist branch are determined and the attention is focused on the problems of significant decrease of tourist activity and level of employment in the tourism and related fields. The approaches of the governments of some tourist-attractive countries of the world are systematized for minimizing the consequences of the COVID-19 pandemic and stimulating the recovery of the tourism sector.

Practical proposals for overcoming the crisis are presented, its implementation will reduce the level of negative impact of the pandemic on the economy of the tourism industry. It is substantiated that there is a need of search of innovative models, introduction of new approaches, application of information technologies, improvement of the general model of communications in the conditions of tourists restriction on movement; all of that will promote access to tourist objects and will attract new audience, develop new skills and support transition to new conditions. Smart tourism is a catalyst for change that has significant potential, and it is a source of information for customers about the territory, in addition this is a quality communication channel with tourism service providers. Gamification is part of the modern information and communication infrastructure and is gaining popularity in the marketing activities of companies, using the best ideas borrowed from loyalty programs, game mechanics and behavioural economics and creating mechanisms for the participation of tourists in business processes.

Keywords: Tourism, Pandemic, Global Tourism Industry, Marketing Innovations.

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Introduction

Tourism is one of the priority areas of economic and cultural development of many countries and an important factor in socio-economic development. Due to the functioning of tourism, the employment rate is growing (in 2019, the global tourism industry provided every tenth job - 330 million, which is equivalent to 10.3% of total employment) and creates 10.3% of world GDP, investment flows , state and local budgets are being filled (Travel and Tourism Economic Report 2019 – World, 2019). The development of tourism should become one of the strategic objectives of further stabilization and socio-economic growth of countries, individual territorial and administrative units, destinations.

The global crisis caused by the COVID-19 pandemic has radically changed the activities of the tourism industry around the world. According to the World Tourism Organization (UWNTO), as a result of the COVID-19 pandemic, the world tourism industry (compared to the same period in 2019) has been having negative consequences since the beginning of 2020: reduction of international tourist arrivals from 850 million to 1.1 billion people; the amount of unreceived export earnings from tourism - from 910 billion to 1.2 trillion US dollars; from 100 to 120 million jobs lost in the tourism sector (International tourism and COVID-19, 2020). During the COVID-19 pandemic, due to restrictive measures imposed by states on the movement of citizens, quarantine, air travel bans, etc., tourism became one of the sectors of the world economy that suffered the most, so it needs immediate effective action and ways out of the crisis. This means that the study is relevant and requires exploratory, analytical and practical developments.

Materials and Methods

The analysis of the latest researches and publications testifies to considerable interest of scientists of various branches concerning the sphere of the world tourist industry. In particular, such scientists as: Huliaieva V., Kabushkina M., Kvartalnoho V., Kyfiaka V., Liubtsevoi O., Malskoi I., Midltona V., Shapovala H. and others dedicated their works to the issues of world trends in tourism development. At the same time, the issues of assessing the current processes taking place in the world market of tourist services in the context of modern challenges and threats, in particular caused by the COVID-19 pandemic, remain insufficiently researched.

The following research methods and techniques were applied during the study: evaluation and data processing, statistical method, study of economic processes, determination of patterns and trends in their development, identification of areas of further improvement of these processes.

The analysis of the materials presented in the scientific literature allowed to comprehensively assess the problems of tourism business development and to conclude that it is insufficient to study the applied nature of the development of effective measures to overcome the crisis caused by the COVID-19 pandemic.

The aim of the study is to analyze the situation in the tourism industry and study the crises that have arisen as a result of the COVID-19 pandemic.

Given the purpose of the study, its task is to develop practical proposals to reduce the negative impact of the pandemic on the economy of the tourism industry.

Literature Review

Due to the spread of the COVID-19 pandemic, the tourism industry has found itself in a crisis situation, the negative consequences of which have a devastating impact on the world economy and employment. For each job vacancy directly created in the field of tourism, directly or indirectly produces about one and a half additional jobs. In 2020, before the COVID-19 pandemic, the labor-intensive hotel and restaurant industries alone employed 144 million people worldwide (COVID-19 and Labor (Issue 2), 2020). They include about 44 million self-employed workers and 7 million employers (COVID-19 and Labor (Issue 3), 2020). Most tourism enterprises are micro, small, and medium-sized enterprises with less than 50 employees. Approximately 30% of the total workforce is employed in companies with 2-9 employees.(ILO Bulletin, 2020).

According to the UNWTO World Tourism Barometer complete isolation, which was introduced in connection with the spread of the COVID-19 pandemic, led to a decrease in the number of international tourists in May 2020 by 98% compared to 2019 (pic.1-2). In the period from January to May 2020 compared to the same period in 2019, the number of tourists decreased by 56% or 300 million people, which led to a loss of revenues from world tourism in

the amount of 320 billion US dollars, which is more than three times the loss during the global economic crisis of 2009 (Impact of COVID-19 on global tourism made clear as unwto counts the cost of standstill, 2020).

In the Asia-Pacific region, first affected by the COVID-19 pandemic, the number of international tourist arrivals fell by 60% in January-May, by 58% in Europe, the Middle East by 51%, and in the USA and Africa by 47%.

However, it should be noted that during the summer months there is a slight trend towards a gradual change in tourism in the Northern Hemisphere, reflected in the gradual lifting of travel restrictions in some countries, the resumption of international flights, and the relaunch of some domestic and intra-regional markets (Market intelligence UNWTO World Tourism Barometer, 2020).

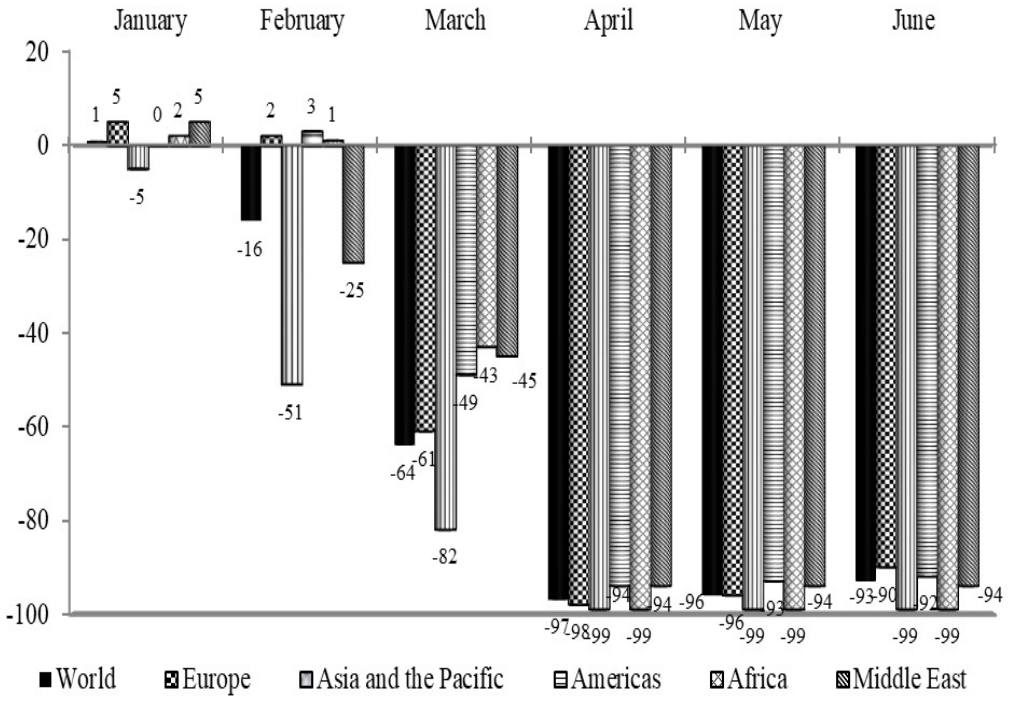

Fig.1: International tourist arrivals (YTD change,%)

Source: built by the authors based on materials International tourism and COVID - 19, 2020.

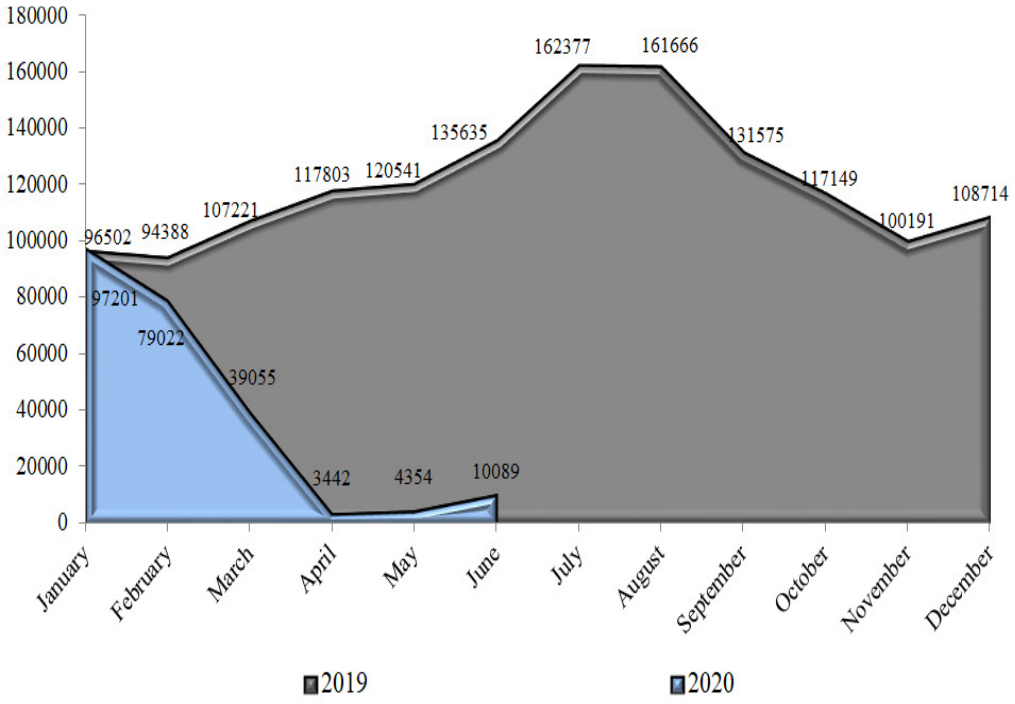

Fig.2: International tourist arrivals (thousand)

Source: built by the authors based on materials International tourism and COVID - 19, 2020.

The significant negative impact is felt by all industries in which tourism has a significant multiplier effect, including aviation, manufacturing, agriculture, food and beverage supply. For example, the cancellation of flights and the closure of airports have led to the temporary loss of more than 10 million jobs in civil aviation. According to the latest estimates of the International Air Transport Association (IATA), the industry's losses could reach $ 113 billion. Overall, IATA estimates that international aviation business can be reduced by 19% (COVID-19: Resources for Airlines & Air Transport Professionals, 2020).

Results

The main factors that negatively affect the confidence and decisions of consumers of travel services are: travel restrictions and border closures that apply to most destinations, travel security issues, virus outbreaks and risks of new bans, the danger associated with lack of reliable information and deteriorating economic situation. The tourism industry needs a reboot. In the near future, the world is still facing serious challenges, from the indefinite duration of the pandemic period to restrictions on movement, all in the context of the global economic recession. Countries around the world are implementing a wide range of measures to minimize the effects of the COVID-19 pandemic and encourage the recovery of the tourism sector.

Table 1: Government measures taken by countries in a pandemic COVID-19

Budget stimulation as% of GDP	New loans and liquidity support	Deferral of payments on existing loans and bonds	Deferment of tax liabilities, their reduction or cancellation	Wage support
Germany				
23 %	€ 100 billion for direct recapitalization to ensure the solvency of companies; € 400 billion in	mostly through the European Central Bank and focused on stabilizing long-term interest rates that are lower or	Deferment of tax payments and reduction of advance tax payments, corporate taxes and trade taxes Cancellation of law	Extended access to short-term loss assistance Extended child support payments program for low-income parents

	guarantees that will help businesses confront liquidity problems; € 100 billion for refinancing	slightly lower than the market rate, depending on the rate and business	enforcement measures / fines in cases of late payment Advance tax payments, corporate income tax and trade tax have been abolished	Facilitate access to basic income support for non-employed people Expansion and simplification of social assistance compensation programs
Poland				
12%	PLN 25 billion (€ 5.65 billion) to support micro-enterprises in the form of interest-free loans PLN 50 billion (€ 11.3 billion) to support SMEs in the form of interest-free loans PLN 25 billion (€ 5.65 billion) to support large enterprises in the form of loans or bonds, purchase of shares or securities	Payment of principal and interest on the loan Extension of the grace period for an additional period of up to 6 or up to 12 months Reduction of the interest rate on loans to 0% for a period not exceeding 12 months Opportunity to discuss the terms of the loan for all entrepreneurs, regardless of the size of the business	Deferment of most taxes; Simplified forms and procedures for filing tax returns; The procedure of tax deductions has been accelerated	Payment of wage subsidies for employees of institutions affected by the pandemic and non-employees: 50% of the minimum salary - a drop in volume by 30% 70% of the minimum salary - a drop in volume by 50% 90% of the minimum salary - a drop in volume by 80%
Hungary				
9%	Providing soft loans and guaranteed loans; new export support through the state bank Eximbank; a grant of € 800,000 for investments in export companies; working capital loans on concessional terms; a new mechanism for providing guarantees and insurance.	Suspension of loan payments until the end of 2020 for all those who received a loan by March 18; extension of the term for obtaining short-term loans of business enterprises until July 30; annual interest rate (APR) for new loans increased to AP rate plus 5%	Mitigation of social protection for the sectors of the economy that are most at risk (travel, tourism, entertainment, etc.); new additional tax for credit institutions during 2020; a new additional tax for retail outlets (crisis tax) in favor of other important sectors; simplified taxation procedure and tax return procedures	Compensation of 70% of salary for three months for companies experiencing decline; significant reduction of various deductions from salary; 40% salary increase for people working in the engineering sector or in the field of research and development
Ukraine				
No data availab le	UAH 4 billion allocated to compensate the interest on existing loans for micro and small	Introduction of a zero declaration and tax on withdrawn capital; Abolition of total	The deadline for payment of taxes on land, land lease and real estate tax, which was due in April 2020, has been extended to	Temporary unemployment benefits for those who have lost their jobs as a result of the COVID-19 pandemic

	enterprises, as well as an expanded program of available loans (5-7-9%); UAH 24 billion to provide loans with state investment guarantees; UAH 1.6 billion in support of creative industries	fiscalization with full implementation of PPO software	June 30, 2020, and similar taxes for March 2020 have been abolished.	are paid in the amount of two thirds of the amount of salary for each reduced working hour, but not more than the fixed amount, namely the established minimum monthly salary (currently 4723 UAH or 150 €); increasing pensions and unemployment benefits

Source: International monetary fund policy, 2020; KPMG. Ukraine. Government and institution measures in response to COVID-19, 2020; International tourism and COVID-19, 2020; HDC Hotel&Destination Consulting, 2020.

Success in the resumption of tourism at the present stage and in the future depends on both interstate and public-private cooperation, on the efforts of all stakeholders in different regions and industries. The development and implementation of timely, large-scale efforts and agreed mechanisms will allow to level the consequences of the COVID-19 pandemic. Short-term, medium-term, and long-term measures should be developed on the basis of the International Labor Organization's response to the COVID-19 pandemic, which addresses four interrelated challenges (COVID-19 and Tourism, 2020).

Stimulating the economy and employment. It is necessary to develop and implement budgetary stimulus measures by providing new credit mechanisms, including sectoral ones. Micro, small and medium-sized enterprises of the tourism business are especially in need of credit resources, which at this stage are in an extremely difficult situation due to limited resources and problems with access to capital. It is advisable to use the approach of adjusting the terms of the loan on existing credit lines so that they become more accessible to these companies through guarantees and a reduction or fixed level of interest rates.

Support for tourism enterprises, jobs and income. Policies to support tourism enterprises, jobs and income can be provided by suspending or subsidizing taxes, fees and social security contributions. In many countries, tourism is seasonal, so there is a problem of informal employment in the industry, which is complicated by weak legal regulation and low level of organization of workers. Migrant workers, women and young people are most vulnerable to informal and temporary employment. Income support measures may include temporary wage subsidies and easing of tax and debt obligations.

Protection of employees of tourist enterprises. Effective measures include subsidies for paid leave for employees of enterprises that must be closed and assistance in cleaning and disinfecting workplaces before they are created. In many countries, workers who are experiencing deteriorating health or are in quarantine are granted paid leave.

Social dialogue as a source of decisions. Policies aimed at reducing the negative effects of the crisis should be formed on the basis of tripartite social dialogue.

It is obvious that measures aimed at supporting the tourism business and preserving jobs and sources of income are extremely important for the industry and its further development.

Restrictions on the movement of tourists require the search for innovative models, the introduction of new approaches, the use of information technology, improving the overall model of communication that will promote access to tourist facilities and attract new audiences, develop new skills and support the transition of tourists to new conditions. Continuous communication between the subjects of tourism and related activities at all stages of travel with existing and potential tourists is provided through various forms of marketing communications.

Intensive use and implementation of smart technologies in everyday life allow us to predict the transition from the traditional form of economic relations to the smart economy. Smart-tourism has features that have the characteristics of manifestation in the functioning of smart-cities and smart-destinations - the spatial aspect, as well as in the management of territorial-administrative units and destinations – a functional approach.

Research shows that smart tourism (sustainable, meaningful, actions that lead to responsible trips) is considered not as an industry, but as a catalyst for change that occurs when participants make constant, tangible actions that make travel responsible and modern.

Mobile information services demonstrate the presence of significant potential, both as a source of information for customers about the territory, and a quality channel of communication with tourism service providers. Creating information portals based on Internet services and software of modern gadgets today is one of the promising areas of development of the tourism industry. The development of the modern concept of using integrated information systems (IIS), combining Internet services and software applications of modern gadgets due to the need to synthesize information technology with Smart-method in urban cultural tourism by creating new information systems to control access to information flows. Development of smart tourism, constant and systematic use of smart elements leads to additional value of travels, rendering of additional services in the field of city cultural tourism (Kyryliuk, Lytvyn, 2019).

A new communication trend with consumers of travel services is gamification, which is part of modern information and communication infrastructure and is gaining popularity in the marketing activities of companies, using the best ideas from loyalty programs, game mechanics and behavioral economics and creating mechanisms for tourist participation in business processes.

Gamification is a kind of game technique, which provides a game form of any activity that increases the interest of participants to spend their time and energy on it, attracts and retains the consumer who is focused on the accumulation of unique bonuses and points. The gamification strategy is based on the reward for completed tasks in the form of points, honors or levels, indicators of progress and issuance of virtual currency to the performer. Gamification has effectively proven itself as a lever of influence on modern consumers, regardless of their age, social status and other characteristics.

The popularity of the concept of gamification is largely determined by the shift of generations in the age structure towards the young generation of millennials (born digital, digital natives, Net-Geners, Y-generation, MeMeMe-generation, millennials), who were born and socialized in a new information environment. Internet technologies, smartphones and games are an integral part of their lives, that stimulates the development of interactive tools to involve this category in the implementation of projects with the introduction of game elements. In 2017, there were approximately 1.7 billion millennials on the planet, this is almost 24% of the total population of the Earth. According to estimates of the experts, 75% of jobs in the world will be filled by this generation until 2025 (GBCSA, 2010).

The active penetration of game methods in marketing is explained by the following factors:

- significant coverage of adults with various game activities and monetization of these activities;
- constant availability of mobile devices and the Internet;
- falling efficiency of traditional types of advertising.

Gamification in marketing allows us to solve the following tasks: attracting users, retaining the attention of consumers, monetization of visits.

Gamification in tourism can take various forms, such as the use of auxiliary and virtual reality with the resources application, gamification of tours, games in theme parks, games between cultural heritage sites, websites, gaming experience in restaurants or accommodation, as an increase while on the plane, gaming in museums, the whole virtual tour in the game format of others (Tunic, 2017).

The implementation of gamification in the museum space contributes to its attractiveness and motivates guests to visit museums. The development of attractive museum programs, games, quests, interactivity of museum expositions allows you to dive in a certain atmosphere, to enliven the museum space. The trend of the game merging digital space with the real through the use of mobile applications allows you to combine electronic games with the space of reality, game-wise connecting digital space with the museum.

Modern multimedia capabilities combine a real environment and VR technologies. Open quests and mobile quest applications with augmented reality mechanisms create a new world for travelers and transform the journey into an exciting game. Mobile applications encourage more people to travel to explore new cities.

Elements of the game are introduced into the work of hotels and restaurants to effectively sell services and increase the number of consumers. Adaptation of these institutions to the use of game technologies, application of loyalty

systems, accumulation of points, which measure the achievements of users in the game, rewards for completed tasks or achieving a certain status (level, number of points) is economically viable for the company. The real benefits (free breakfast/lunch/dinner, additional meal, increase in the number of guests, decrease in the amount of the receipt of others) are effective with the help of virtual ones. Real rewards bring users closer to real institutions, allow him to appreciate all its benefits and as a result of its transformation from virtual to real loyal consumption of services.

The results of the implementation of innovative models to support the tourism industry are shown in table 2.

Table 2: Innovative models to support the tourism industry

Types of innovative models	Means of implementation	Result
Smart-technologies	Creation of new information systems to control access to information flows of the tourist services network. The constant and systematic use of smart elements.	1.Additional value of travel; 2. provision of additional services in the field of urban cultural tourism
Gamification in tourism	Development of interactive tools for attracting tourists to the implementation of projects with the introduction of game elements.	1. Attracting users; 2. retaining the attention of consumers; 3. monetization of visits
Gamification in the activities of museums	Attractive museum programs, games, quests, interactive museum expositions, mobile quest applications with augmented reality mechanisms	1. Motivation of visitors to visit museums; 2. the number of visitors increases
Gamification in the activities of hotels and restaurants	Use of game technologies; application of loyalty systems; accumulation of points, which measure the achievements of users during the game; rewards for completed tasks or achievement of a certain status (level, number of points).	1. The efficiency of sales of services increases; 2. the number of visitors increases

Accordingly, gamification is a marketing innovation in the field of tourism and is a competitive advantage of businesses and destinations. The use of the game format in travel services allows you to attract new, retain and motivate regular customers and becomes an integral part of most travel.

Conclusions

At the current stage, the crisis related to the COVID-19 pandemic has forced the tourism business to step out of its comfort zone and look for innovative ways to develop and operate. An important factor in the recovery of the tourism industry should be a strategic approach aimed at business continuity through interstate cooperation, public-private cooperation, public support for tourism and business initiatives, simplification of travel conditions, removal of barriers, mitigation of fiscal policy, incentives and application marketing innovations to restore trust among consumers of travel services. The use of modern marketing communications in the context of the COVID-19 pandemic will allow us to develop and promote tourist and cultural sites, to increase the potential for future travel. In order to successfully promote tourism products, it is necessary to create alliances of tourism and cultural facilities with technology companies and the private sector in order to build capacity after the resumption of tourism.

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Comparative Study Between Romania And Visegrad Countries, Related to Agricultural Sector Performance

Ira A. SIMIONOV
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania and Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; ira.simionov@gmail.com

Alina MOGODAN*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; alina.antache@ugal.ro

Stefan M. PETREA*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; stefan.petrea@ugal.ro; petreastefanmihai@yahoo.com

Aurelia NICA
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; aurelia.nica@ugal.ro

Dragos S. CRISTEA
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration 800008, Galaţi, Romania, dragoscristea@yahoo.com

Sarina ROSENBERG
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration, 800008, Galați, Romania; sarina17.rosenberg@gmail.com

Victor CRISTEA
"Dunărea de Jos" University of Galaţi, Transboarding Faculty and Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; victor.cristea@ugal.ro

Abstract

The purpose of the present study is to compare the dynamics of 6 agricultural parameters (crop yield, employment rate, total GVA, the GVA of the agriculture sector, DP and LPA) in Romania and the countries within the Visegrad Group, between the years 2007-2013.Poland registered the highest GVA, GVA from agriculture and DP between the years 2007 and 2013. Romania scored the highest percentage of the employment rate between the studied timeline. Czech Republic registered the highest crop yield and LPA. Continuous monitoring of the European agriculture performance is needed in order to identify a long-term trend and develop prediction models, for future development of support strategies and legislation framework of the sector.

Keywords: agricultural sector performance, crop yield, employment rate, Visegrad Group.

Introduction

Agriculture refers to the extraction or harvesting of products from the earth and is part of the primary sector of the economy. Agriculture is the broadest word that can be used to indicate the methods in which crop plants and domestic animals support the human population by supplying food and other products(Harris and Fuller, 2014).In the European Union, agriculture is the main land user, accounting for more than 47% of the total territory

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(Giannakis et al., 2015).Since the expansion of the European Union (EU), significant funding under the Common Agricultural Policy (CAP) and structural funds umbrella has been allocated to ensure the renewalof agricultural machinery in the new EU Member States (Volkov et al., 2020).

The dynamic character of this sector has manifested during the past decade and can be attributable to a large variety of factors, such as disruption of production, distribution networks enhancement, climate change (there is no other economic sector as exposed to natural hazards), economical strategies and globalization or investments dynamics (Petrea et al., 2020).

From the total output value of the EU's agricultural industry,approximately 55.0 %was generatedby the next countries: France (77.2 billion €), Italy (56.9 billion €), Germany (52.7 billion €) and Spain (52.2 billion €). Other countries combined output such as the United Kingdom (29.8 billion €), the Netherlands(28.2 billion €), Poland (25.0 billion €) and Romania (18.6 billion €)accounted for approximately 23.4 % (Eurostat, 2018). In the last years, a small rise value of the EU's agricultural industry was observed, which is dueto the developments in the values recorded in Romania (+8.0 %), France (+5.6 %), Italy (+3.0 %) and Spain (+3.0 %) (Eurostat, 2018). At the opposite pole, a decline in the values of the agricultural industries was observed in countriessuch as: Denmark (-8.9 %), Sweden (-8.8 %), Germany (-6.3 %) and Poland (-2.4 %) (Eurostat, 2018).From the employment point of view, higher levels of salaried labor input were observed in Ireland (+5.0 % per year on average), Luxembourg (+3.9 % per year on average), Austria (+2.6 % per year on average) and Poland (+2.2 % per year on average). At the opposite pole, declines of the salaried labor input were observed were noted in Slovakia (-5.2 % per year on average), Greece (-3.6 % per year on average), Czech Republic (-3.3 % per year on average) and Romania (-3.2 % per year on average) (Eurostat, 2018). Low productivity of the agricultural sector is determined by the lack of investments, capital and available loan schemes (Shik et al., 2016; Petrea et al., 2020).

Quantifiable parameters can be used in order to assess the agriculture performance and productivity such as crop yield, employment rate, the gross value added (GVA), direct payments (DP) and labor productivity in agriculture (LPA). According to Giannakis et al., (2015), Eastern European countries exhibit the highest rates of decline in the number of farm holdings due to the restructuring process of privatization and redistribution of agricultural land. According to Petrea et al. (2020), GVA is strongly related to productivity as it measures the contribution tothe economy of an individual producer, industry or sector.

According to Baer-Nawrocka (2016), there was observed a transformation of the agriculture sector in the countries of Central and Eastern Europe, manifested through improved productivity over a long period of time. Therefore, the aim of this study is to compare the dynamics of 6 agricultural parameters (crop yield, employment rate, total GVA, the GVA of the agriculture sector, DP and LPA) in Romania and the countries within the Visegrad Group, between the years 2007-2013.

Materials and Methods

The agriculture activities in Czech Republic, Hungary, Poland, Slovakia and Romania are supported by the Common Agricultural Policy (CAP).

The following parameters were recorded and analyzed: crop yield (kg), employment rate (%), the total GVA (billion $), the GVA of the agricultural sector (billion $), DP and LPA (€/annual work unit), for each of the aforementioned country, and for each year within 2007-2013 timeline.

Results and Discussions

The crop yield is directly influenced by factors such as climate, irrigation, fertilizer use etc. As it can be observed in Figure 1, the lowest crop yield was registered in the year 2007 in all countries, except for Poland, which registered the lowest crop yield in the year 2008. In case of the highest crop yield, the production varied with the highest values in the year 2011 for Romania and Czech Republic, and in the year 2008 for Hungary and Slovakia. In all the studied years, the Czech Republic recorded the highest yield production, compared to the rest of the analyzed countries, except for the years 2008 and 2009, when Hungary recorded the highest crop yield.

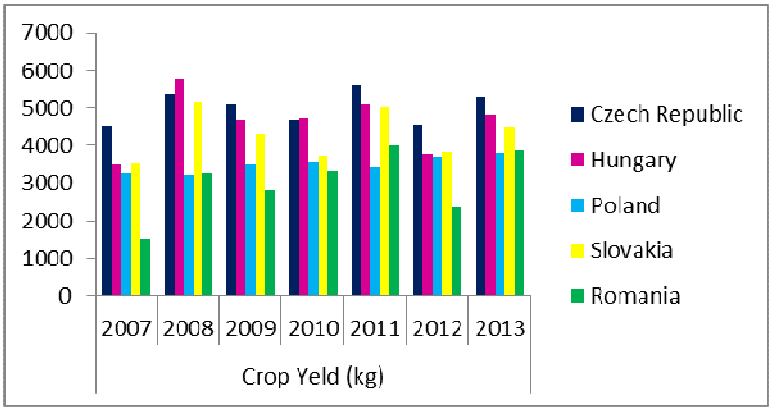

Fig. 1: The crop yield in the analyzed countries

The employment rate in the analyzed countries was relatively constant within the studied timeline, for each country. As it can be observed in Figure 2, the highest employment rate was recorded in Romania (between 28.7–31.01%), followed by Poland (between 12-14.74%). The lowest employment rate was observed in the Czech Republic (between 2.99-3.03%) and Slovakia (3.08-4.21%).

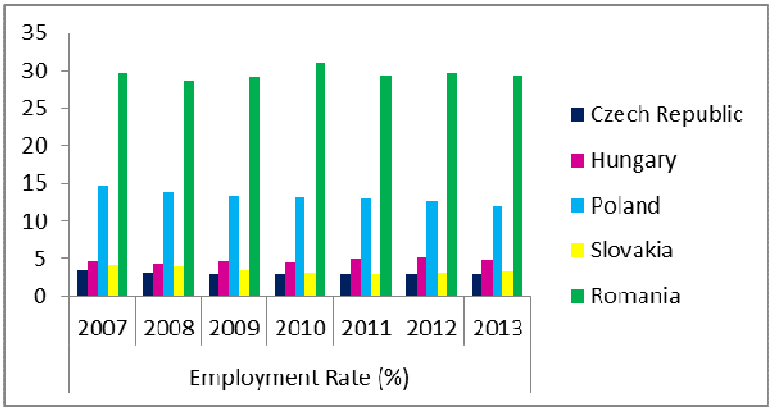

Fig. 2: The employment rate in the analyzed countries

The total GVA in the analyzed countries (Figure 3) was constant between the years 2007-2013. The highest GVA was recorded in Poland, for all the studied years and the lowest GVA wasrecorded in Slovakia, for all studied years.

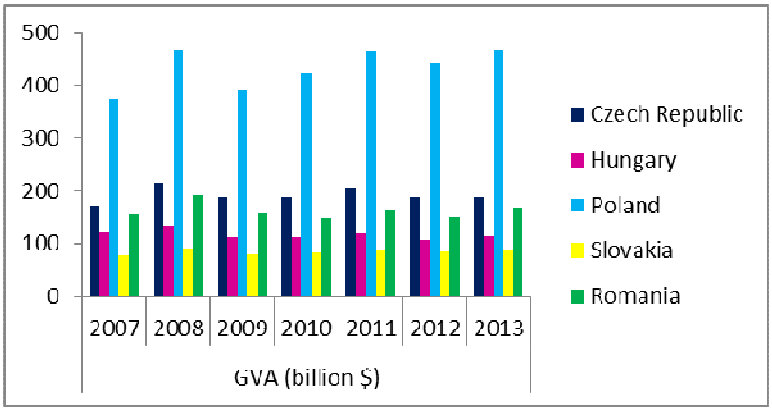

Fig. 3: The gross value added in the analyzed countries

The GVA generated from the agricultural activities (Figure 4) registered the highest values in Poland (between 10.93 and 15.07 billion $), followed by Romania (between 8 and 13.51 billion $). The lowest agricultural GVA was recorded in Slovakia (between 1.5 and 2.7 billion $).

The percentage of GVA agriculture from the total GVA, registered highest average value in Romania (6.29%), followed by Hungary (4.19%). This result emphasizes the significant importance of agriculture sector in these countries economy. However, in case of Czech Republic and Slovakia, the agriculture sector registers a low GVA percentage from the total GVA, fact that points out the potential of further development of the sector in the aforementioned countries.

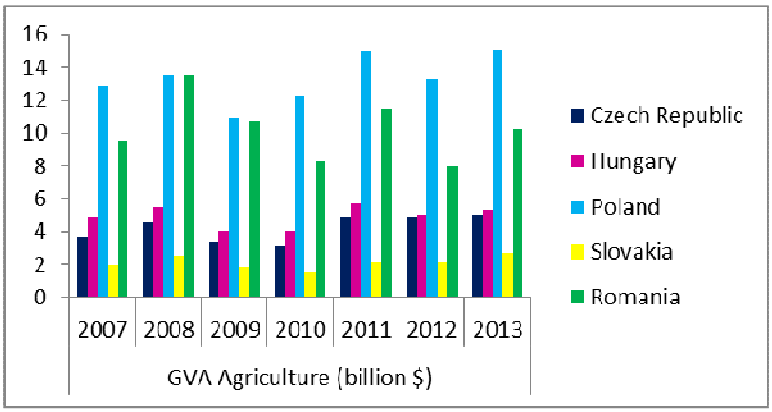

Fig. 4: The gross added value from the agricultural activities in the analyzed countries

The direct payments granted by the European Union to the analyzed countries manifestedan upward trend between the years 2007-2013 (Figure 5). Poland registered the highest values of direct payments (between 1076.45 and 2769.5 €/ha), followed by Hungary (between 471.52 and 1203.4€/ha). The lowest values of direct payments were recorded in Slovakia.

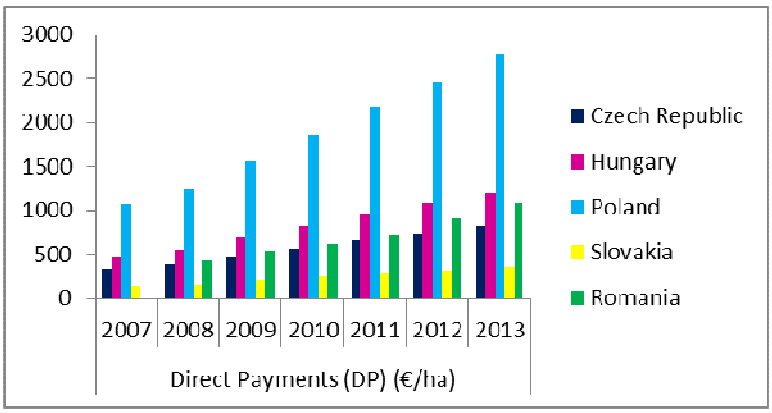

Fig. 5: Direct payments in all analyzed countries

The LPA registered the highest values in the Czech Republic, followed by Slovakia (Figure 6), in all the studied years. The lowest LPA was registered in Romania and Poland (Figure 6), for all analyzed years.

Czech Republic and Slovakia assured the highest crop yield from the studied countries (Figure 1), with low employment rate (Figure 2), fact which reveals a superior degree of technical and technological abilities that are used in agriculture, although this sector is not majorly contributing to total economic performance of the country, compared to Romania, where the situation is opposite.

Considering that Hungary scored the second highest crop yield, a low percentage of employment rate and high value of direct payments, it is highlighted the intentions of this country to develop its agriculture sector, making it a key sector in the national economy.

The high investments in the agricultural sector in Poland, manifested through a high value of direct payments, indicate the intentions of this country to raise the productive performance of this sector. This was expected since Poland registered the lowest LPA compared to the rest of the Visegrad countries. Thus, the polish agriculture needs a consistent financial input (DP) for retechnologization, the development of new, economic sustainable growing technologies respectively.

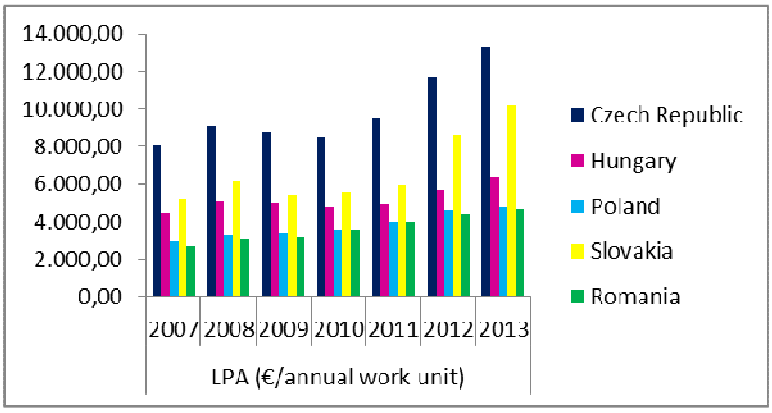

Fig. 6: The labor productivity in agriculture in all analyzed countries

The status of Romania is similar to Poland, with the mention that the Romanian agricultural sector occupies a more important place in the national economy, considering the high employment rate percentage. Nevertheless, the Romanian investments in this sector are below the Polish investments, fact that determines the recommendation of a raise of these investments, through different instruments in European finances, and thus, raising the potential of national agriculture sector.

Conclusions

Poland registered the highest GVA, GVA from agriculture and DP between the years 2007 and 2013, compared to the rest of the Visegrad countries and Romania. Thus, it can be highlighted the high potential of this country to future development of the agriculture sector and its significant importance in the national economy.

Romania scored the highest percentage of the employment rate between the studied timeline, compared to the countries within the Visegrad group. This fact associated to the low crop yield of the country, indicates the need of an upgrade of the agricultural infrastructure.

Czech Republic registered the highest crop yield and LPA, compared to the rest of the Visegrad countries and Romania, fact that emphasizes the efficient development of the agriculture sector in this country.

Continuous monitoring of the European agriculture performance is needed in order to identify a long-term trend and develop prediction models, for future development of support strategies and legislation framework of the sector.

Acknowledgment

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Development of National Production Base in The Context of The Implementation of New Economic Policy

Vladimir KOVARDA

Southwest State University, Kursk, Russia, e-mail: kovarda@yandex.ru

Roman LAPTEV

Southwest State University, Kursk, Russia, e-mail: laptevr@yandex.ru

Abstract

The social, political and economic development of Russia in the 1920s was largely determined by the legacy of the Civil War and War Communism. Historians discuss the importance of the NEP (New Economic Policy) phenomenon, which is an extremely unyielding subject of research for a number of reasons.

Keywords: New Economic Policy, government investment, War Communism, Civil War, cooperative economy management.

The New Economic Policy ("New" in relation to the War Communism) is usually considered as a policy of transition from capitalism to socialism, implemented since March 1921 (10th Communist Party Congress) to the second half of 1920s. NEP was proclaimed in the context of a severe political crisis that arose during the country's transition to peaceful life (the Civil War in most of Russia and other Soviet republics ended by 1921).

The root cause of the political crisis of 1921 was the inability of the Russian communist party of the Bolsheviks to lead the country on the one hand, and the unwillingness of the population (especially the peasantry) to submit to the economic policy of War Communism in peacetime on the other hand.

The main reason of discontent of the peasantry was food surplus requisitioning (complete alienation of surplus agricultural production in profit of the state). This discontent was expressed in the rise of anti-Bolshevik riots in a number of regions of the country, including the "antonovschina" in the Tambov province, where the government had to use regular army units led by N. M. Tukhachevsky to pacify the peasants.
In early 1921, mass strikes began in Petrograd, and on March 1, Kronstadt sailors rose up in solidarity. Rebels demanded "power to the Soviets, not to the parties." The mutiny was suppressed on the night of August 16-17, 1921, by troops under the command of Tukhachevsky and Trotsky.

By the beginning of 1920, a crisis started within the ruling Bolshevik party due to so-called "discussion of trade unions".

In the midst of the crisis, 10th Communist Party Congress began to work in March 1921. The Congress put an end to factional activity in the Communist Party (resolution "On unity in the Party") and officially established the Central Control Commission (CCC), which was supposed to prevent the formation of factions, sort out personal conflicts, etc. During the Congress, Lenin first proposed replacing food surplus requisitioning with tax in kind, and peasants received the right to sell all surplus products on the market. The measures proposed by Lenin were fixed by the decisions of 10th Communist Party Congress (May 1921). Since that time, the transition to the NEP was finally proclaimed.

The NEP was finally established in 1923 (RSFSR) and in 1924 (other republics of the USSR).

1. Replacement of food surplus requisitioning with tax in kind (spring 1921)
2. Permission for private trade (May 1921)
3. Beginning of denationalization (autumn 1921)

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4. Creation of a legal framework that meets the new economic conditions (1922)
5. Monetary reform (introduction of the gold ten-rouble coin) (1922-1924)

In October 1921, the State Bank was restored, which controlled the network of newly formed cooperative banks, credit and insurance partnerships. At the end of 1922, monetary reform began. Until March 1924, a stable (gold ten-rouble coin) and collapsing (Soviet bank note) currencies were simultaneously in circulation. The exchange ratio was 1 gold ten-rouble coin for 60 thousand Soviet bank notes. By February 1924, the State Bank bought the remaining Soviet bank from the people. The gold ten-rouble coin was a hard convertible currency and was worth about 6 USD until 1927.

Elements of long-term planning were also introduced into the NEP. The first such plan was prepared by the State Commission for Electrification of Russia and approved at the VIII Congress of Soviets in December 1920. In February 1921, the State Planning Committee of the USSR was established.

As a result of these events, the national economy has revived, and market relations have begun to improve. However, political regime hardened (censorship, one-party system, intraparty purges).

With the introduction of the NEP, a slow but steady economic recovery begins. 1925 was the year of maximum development of concessions: major contracts were signed with the Americans (manganese mining in Georgia) and with the British (gold mining in Siberia). As of 1926, 113 agreements with foreign companies were registered, but only 31 contracts were related to industry. Since 1923, rapid demographic growth began:

- 1923 – 134 million people
- 1926 - 147 million people (average annual growth of 2%).

The analysis of economic condition of the transition to the new economic policy suggests that commercial and industrial cooperation activities were carried out in extremely adverse conditions due to the economic devastation and outcome of famine (1921-1922), aggressive fiscal policy, lack of funds, and the low purchasing power of the population.

NEP improved the national economy, but it was not possible to avoid crises. The most sensitive crises were Scissors Crisis of 1923 (widening gap between industrial and agricultural prices) and the procurement crisis of 1927-1928. Unemployment has steadily increased due to competitive business environment. These facts became the political justification for the rejection of the NEP in the late 1920s.

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Research of Dynamics of the State Policy of Regional Development of Russia in the Context of Stimulating Spatial Development

Vladimir KOVARDA
Southwest State University, Kursk, Russia
e-mail: kovarda@yandex.ru

Elena BOLYCHEVA
Southwest State University, Kursk, Russia, e-mail: boly4eva2012@yandex.ru

Roman LAPTEV
Southwest State University, Kursk, Russia, e-mail: laptevr@yandex.ru

Abstract

Each country, regardless of its territory, contains a certain number of administrative and territorial entities, therefore the state regional policy is implemented in all countries and is essential within the framework of the overall economic development strategy. In the Russian Federation, issues of regional development are constantly relevant. Currently, in accordance with the Order of the Government of the Russian Federation N 207-r "On approval of the strategy of spatial development of the Russian Federation until 2025" d/d February 13, 2019, the goals, objectives, mechanisms and methods of spatial development of the country are approved. In general, regional policy in Russia is fast-paced due to significant impacts of both external and internal factors.

Keywords: State Policy, Special Economic Zone, Priority Social and Economic Development Area, Regional Development.

Regional policy in Russia has undergone many changes in the process of evolution from decentralization and significant independence (1990s) to significant centralization and redistribution of a significant part of the accumulated funds in favor of the Federal budget of Russia and other centralized funds (since the mid-2000s). As a result, some researchers note that certain regions of the Russian Federation are subsidized due to the redistribution of a significant part of the accumulated funds in a benefit for the Federal budget of Russia and other centralized funds. In the end, many heads of government bodies of constituent entities of the Russian Federation point to a significant dependence on Federal authorities and the increasing importance of interpersonal relationships.

Recently, the state policy of regional development began to evolve in the field of granting greater independence to the governing bodies of the Russian regions. One of the main principles is the implementation of state support for regional and local authorities, provided that they independently exercise their powers established by the Constitution of the Russian Federation and Federal laws.

In accordance with the Decree of the President of Russia, constituent entities of the Russian Federation are funded with grants (inter-budget transfers) proportionally to their development ratings.

These days, EU shifts from equalization via compensations into stimulation of underused region capacity in order to provide competitiveness. China and USA apparently try to achieve balanced spatial development through the development of development of aggregated regions (macro regions). However, long-term balanced spatial development can't be achieved using direct economic incentives (fiscal balancing etc.) due to limited government resources. Due to this fact, federal authorities in the Russian Federation use indirect incentives in order to stimulate region competitiveness through the development of endogenous factors. It should be noted that these incentives cause certain government expenditures (tax and customs losses). According to the report of the Accounts Chamber of the Russian Federation, residents of special economic zones (SEZ) receive 28 billion RUB of benefits over 11 years (2005-2015). However, the development of SEZs and expansion of production volume will cause improvement in employment and increase in tax payments, increasing government revenues.

Creation of the territories with special legal status holds an important position among indirect incentives in Russia. First off, these are special economic zones (SEZs), most of which were created under the Federal Law No. 116-FZ

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"On Special Economic Zones in the Russian Federation" d/d July 22, 2005. Residents of such territories have a number of benefits and preferences.

It should be noted that in 2016 the Accounts Chamber of the Russian Federation reported that many SEZs appeared to be ineffective. Due to this fact, there were a number of government decrees on termination of SEZs. Concurrently, in 2014, the federal law on creation of priority social and economic development areas (PSEDA) came into force. There are also benefits for residents of these territories (Figure 1).

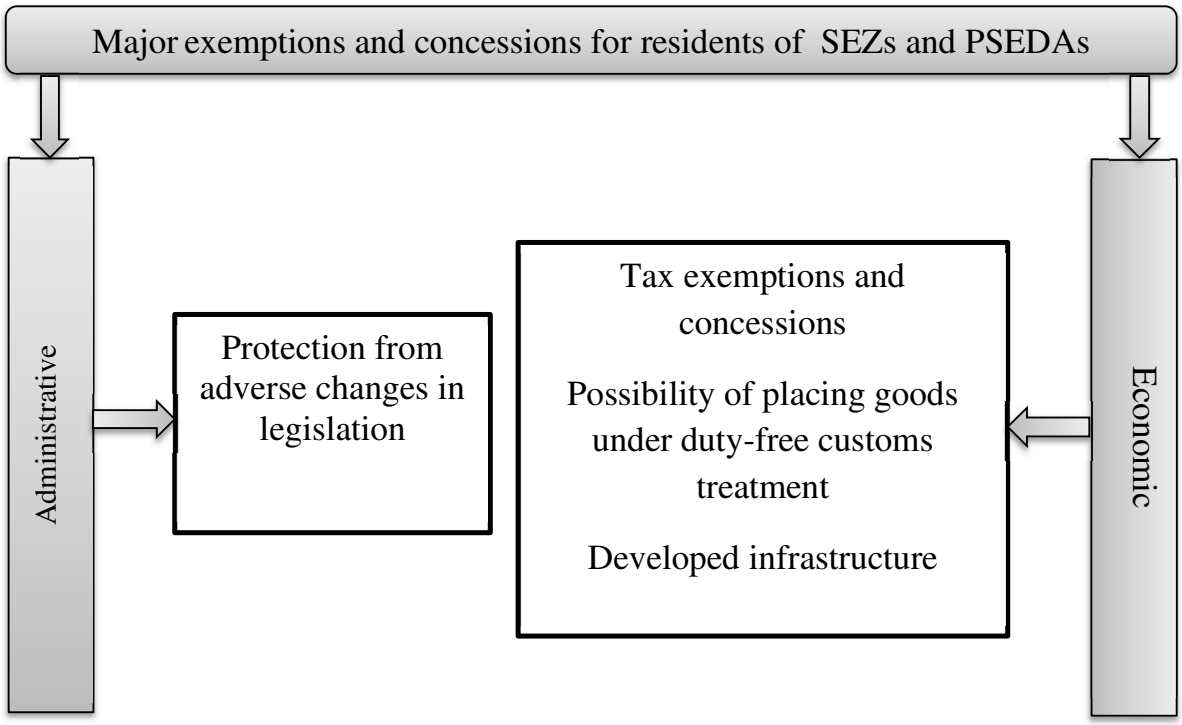

Figure 1: Major exemptions and concessions for residents of SEZs and PSEDAs

At the same time, these indirect instruments of economic stimulation of regional development have significant differences and function in parallel and complement each other. These territories are characterized by different scheduled durations (49 years without extension for SEZ and 70 years with possibility extension for PSEDA), different goals and objectives, as well as different localizations. Thus, SEZs are created for the development of manufacturing industries, high-tech industries, tourism, health resorts, port and transport infrastructure, technology development, and the production of novel products. PSEDAs are created in order to create favorable conditions for attracting investment, ensuring accelerated social and economic development, and creating comfortable conditions for ensuring the human and societal life.

PSEDA can be created only within the constituent entity of the Russian Federation, while SEZ can occupy several constituent entities.

Thus, PSEDA is is more flexible and focused on regional development.

On July 1, 2019, Chapter 25 of the Federal Law No. 289-FZ d/d March 3, 2018 came into force allowing creation of free warehouse customs regimes with the possibility of placing goods under free warehouse customs treatment (i. e. reducing customs charges).

However, despite increasing use of indirect incentives, direct governmental funding for social and economic equalization of regions continues to grow. In 2017, developmental differences between 10 wealthiest and 10 poorest regions reduced from 5.7 to 2.6 times due to equalization transfers from federal budget. Total amount of inter-budget transfers is 1690.1 billion RUB.

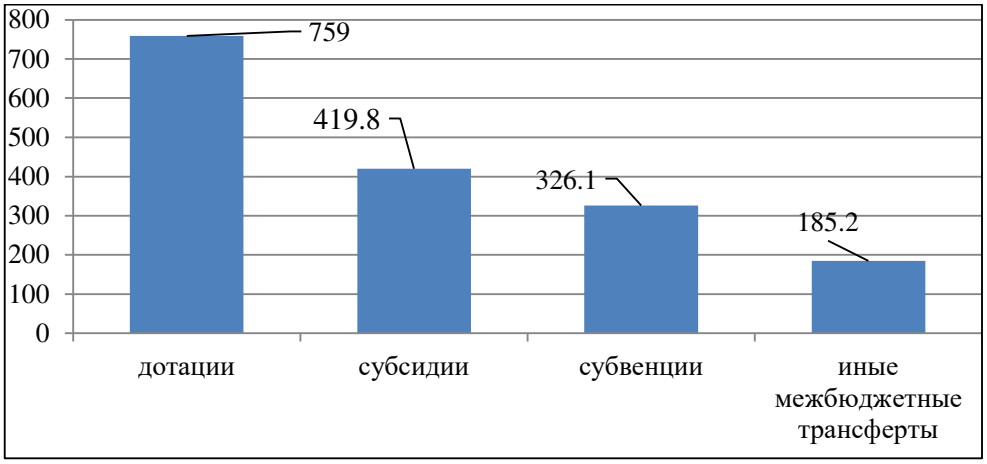

Figure 2: Structure of inter-budget transfers in 2017, billion RUB

Figure 2 shows that grants amounted to 44.91% of all inter-budget transfers in 2017. Figure 3 shows that grants tended to grow in 2016-2018: granted amounts increased more than 1.5 times over two years.

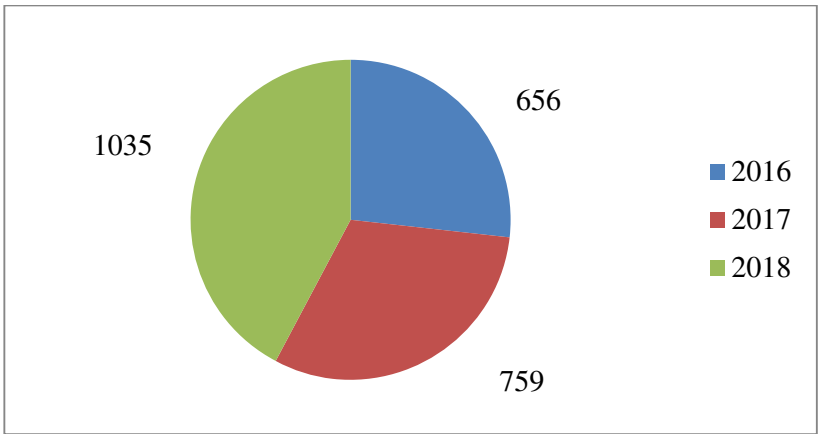

Figure 3: Time course of grants as inter-budget transfers, billion RUB

Thus, constituent entities of the Russian Federation are still supported directly due to existing redistribution system. However, the use of indirect incentives gradually increases.

Nowadays, regional equalization still prevails in EU, however mechanisms of stimulation of endogenous factors of regional economic development are increasingly frequently used.

Conclusion

Nowadays, the state policy of regional development in Russia transforms from federal centralization into the stimulation in region competitiveness through the development of endogenous factors and increasing use of indirect incentives.

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Factors of Bank Profitability: Empirical Evidence from Poland and Czechia

Wiktoria SLOMIANY

Heineken Global Shared Services, Poland wiktoriaslomiany0@gmail.com,

Marcin KĘDZIOR

Cracow University of Economics, Cracow, Poland, kedziorm@uek.krakow.pl

Abstract

The paper aims to identify the major factors which affect the profitability of banks in selected East European countries. The empirical analysis verifies the profitability factors in 40 listed banks in Poland and Czechia. The analysed factors comprise bank size, capital adequacy, loan loss provisions, liquidity, management efficiency, lending, revenue diversification, market concentration, economic growth and inflation. The factors regarded as the most significant ones include loan loss provisions, capital adequacy and management efficiency. The multivariate analysis is based on linear mixed models.

Keywords: banking, bank profitability, determinants of profitability, Poland, Czechia

Introduction

Banks are stated to be one of the most relevant financial institutions in the economy. Although objectives of every bank differ, there are some that are the same for each banking institution - profitability, liquidity and maximizing the value of the bank (Rose, 1996). Looking at a big picture, banks supporting the economy in financial terms determine the existence, functioning and development of economic entities, but also in a larger scope, is a key for development of different sectors of economy and economy as a whole (Kopiński, 2016).

The notion of profitability shows how banks manage their resources and how efficient is their performance. High or increasing profitability is the only way for banks to encourage investors for investment in shares or debt issues or to boost their operations in extended periods of time. Managers use profitability ratios to receive information about the bank, it is used for internal purposes, but also for attracting potential investors and keeping the current ones (Compton, 1989). Good level of profitability strengthens the position of banks, which encourages potential customers to use bank services (Kopiński, 2016).

The paper aims to verify profitability factors on the basis of banks from selected East European countries. The choice of this subject is determined by the actual scientific needs. The profitability of banks from Eastern Europe countries, as yet, has not been subjected to in-depth empirical verification. The only significant works in this field are as follows: Djalilov, Piesse (2016); Havrylchyk, Jurzyk (2011); Kopiński, (2016); Titko et al (2015). As yet, the factors impacting the profitability of Polish and Czech banks, verified in this work, have not been subjected to empirical verification. The work analyses the following factors which have an impact on bank profitability: bank size, capital adequacy, loan loss provisions, liquidity, management efficiency, lending, revenue diversification, market concentration, economic growth and inflation. The authors believe that relatively innovative factors include loan loss provisions and revenue concentration, in particular in the population of banks from Eastern and Central Europe.

The analysis, conducted in 2013-2017, comprises 40 banks from Poland and Czechia. The choice of banks from these two countries results from similarities between them in such areas as economic development, the development of banking sectors, as well as the institutional and legal environment. In the first part of the paper, several determinants of bank profitability are described and their relationship with profitability is analysed comparing various researches. In the second part of the article, an analysis of the statistical significance of the influence of various factors on the profitability of banks in Poland and the Czech Republic was carried out. Correlations between quantitative variables are evaluated using Spearman's correlation coefficient. Because the collected data is not independent, multivariate analysis is based on linear mixed models.

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Determinants of bank profitability

In the literature, the determinants of bank profitability are divided into internal (microeconomic) and external (macroeconomic) ones. In the article the following internal factors will be analyzed: bank size, capital adequacy, loan loss provisions, management efficiency, liquidity, lending, revenue diversification, market concentration, GDP growth, and inflation rate.

Bank size

Many research studies indicate bank size as a factor which influences bank profitability. However, one cannot clearly state whether bank profitability is positively or negatively influenced by this variable (Rose, 1996). A positive correlation was discovered in the USA before the crisis of 2008 - customers felt safe keeping money in big banks due to a simple reason - in case of economic turbulences, they believed that government would bail out the bank as it was "too big to fail" (Ding et al, 2017). According to I. Adelopo et al (2018) bank profitability before, during and after the financial crisis of 2008 was similar, but larger banks can easier overcome current financial problems with their resources and scale advantages.

It was noticed that large banks could benefit more from product and loan diversification possibilities (Smirlock, 1985). A positive relationship between bank size and profitability is also associated with economies of scale (Bourke. 1989).

However, as it was noticed in the evidence from Switzerland, the impact of bank size is not always clear cut (Dietrich, Wanzenried, 2011). The authors found out that during the crisis, large banks were less profitable than small or medium-sized banks. It was due to much higher loan loss provisions during the crisis.

Shehzad et al (2013) pointed out that expanding operations in different markets increases costs, which are far greater than profits. Such costs include product development, diversification and branch expansion. However, it was also noticed that during unsteady times, such as crisis, large banks have an advantage and they borrow on lower rates and lend at higher ones, enjoying monopolistic position (Allen et al, 2011).

Capital Adequacy

Capital adequacy is strongly associated with Basel Capital Accord. It is stated there that supervisors need to set minimum adequacy levels which are appropriate and prudent. Capital adequacy ratios are key ones in assessing the financial situation of a bank, its solvency or possibility of expansion (Lessambo, 2013). According to Tran et al (2016), if adequately capitalized banks raised more capital, there would be a negative relationship between capital and profitability, whereas for undercapitalized banks, the correlation would be positive.

In the previous research, the results concerning relationships between capital adequacy and profitability were mixed. Bourke (1989) found out that banks which are highly capitalized, also have better sources of financing on low cost and low risk level and they can enter markets with better quality assets, therefore they are more profitable. However, other researchers- like Altunbas et al (2007) claim that across Europe inefficient banks tend to be the ones that are highly-capitalized. It was also noticed by Kashyap et al (2010) that an increase in capital ratios also raises the cost of funding.

Dietrich and Wanzenried (2011) verified empirically that capital ratio does not have impact on Swiss banks' profitability before the crisis, however it is a significant and negative determinant during the crisis. The reason for that can be that safer banks in Switzerland received lots of deposits, but since the lending demand was decreased, income was not increased. The authors mentioned above also accomplished work concerning profitability in low, middle- and high-income countries (Dietrich, Wanzenried 2014). According to their research, capital ratio has a positive and significant impact on banks in high-income countries. Highly-capitalized banks are perceived as safer; thus their funding costs are lower. Similar results were achieved by Demirguc-Kunt and Huizinga (1999) and (Borroni et al, 2016).

Loan Loss Provisions

Credit risk is the likelihood of the deterioration in the credit standing of the borrower. In general, diversified portfolio of loans and credits is advised, as different likelihood of default is assigned to different types of assets and off-balance sheet activities. The highest risk is associated with loans, as they are mostly given for longer periods of time and the financial situation of individuals and companies can change (Casu et al, 2006)

If banks carry out their operations in unstable and risky environment, having troubles controlling their lending, they will probably have a higher loan loss provision ratio, which implies reduced credit quality, resulting in increased provisioning costs and decreased interest revenue. According to Menicucci and Paolucci (2016) European banks showed a negative relationship between the ratio and profitability. The same results were also validated in Swiss

research (Dietrich, Wanzenried, 2011). The authors also noticed that loan loss provisions have been increased noticeably during the crisis and it affected the profitability results.

In the study concerning profitability in transition countries, it was interesting to find out that in late transition countries (such as Armenia, Belarus, Moldova, Ukraine) the impact of credit risk was negative on profitability, whereas when it comes to early transition countries (including, among others, Poland, Czech Republic, Hungary, Lithuania), it was just the opposite - the relationship was positive (Djalilov, Piesse, 2016). Managers from early transition countries took longer time to work on the proper risk strategy and they were engaging in risky transactions whereas late transition countries chose risk-averse strategy. The negative relationship between the ratio of loan loss provisions and bank profitability was also validated by Croatian data (Pepur, Tripovic, 2017).

Management Efficiency

Efficiency of banks is necessary due to a competitive market and high expectations of the owners of banks. In the literature there can be found two approaches to efficiency – structural and non-structural one. Structural approach focuses on either cost minimization or profit maximization. Non-structural approach pays attention to achieved financial performance. Often performance is based on the market value of the firm (Berger et al, 2012).

A study carried out by Molyneux et al (1996) in European banks showed that small banks have higher chances of minimizing costs by using economies of scale than large banks. This changed in the first decade of the twenty-first century, though. It was also noticed by Altunbas et al (2007) that probability of attaining average cost saving is higher when operational inefficiencies are decreased or removed than when economies of scale are used. Empirical research carried out by (Borroni et al, 2016) proved that the higher cost-to-income ratio, the lower profitability. The same was noticed in the research assessing profitability in selected countries of Central and Easter European Countries (Petria et al, 2015). The correlation was much stronger for ROAE than for ROAA.

However, in the investigation of Spanish banks the outcome was opposite - the higher the efficiency, the higher the profitability (Trujillo-Ponce, 2013). The author noticed that since the early 1990s improvements in technology, information and communication have made banks perform in a more efficient manner, lowering their expenses while revenues were generated at a higher level.

Liquidity

As liquidity is one of the main objectives of a banking institution, it can greatly impact profitability. Liquidity is seen as an ability to repay obligations when they become due (Duttweiler, 2009). Vodova (2016) analyzed links between profitability and liquidity in the Polish banking sector. A positive correlation between liquidity and profitability was found among medium banks. The ones with a good level of liquid asset ratio show high profitability. Bordeleau and Graham (2010) discovered that keeping liquid assets makes profitability higher, however up to a certain point after which the relationship is reversed. It was also found that this relationship is dependent on the business model of the bank and risk of issues with the funding market.

However, other authors have noticed a negative relationship between liquidity and profitability (Adelopo et al, 2018; Petria et al, 2014).

Loans to Total Assets

Lending is the main activity of a bank, together with deposit taking. Lending provides funds for some period of time by a bank, the borrower is obliged to give back a borrowed amount together with interest in a specified period of time. Bikker and Vervliet (2018) noticed that a relationship between loans ratio and profitability might be difficult to be predicted because of the fact that on the one hand, big loan portfolio generates high interest income, but on the other hand, the credit risk exposure is greater as well. Greater loan portfolio increases profitability, but the credit risk can decrease profitability. (Trujillo-Ponce, 2013) also confirmed a positive relationship between lending and profitability for Spanish banks. The same results were obtained by Borroni et al (2016), but only when dependent variable was Net Interest Margin. Both Menicucci and Paolucci (2016) and Demirguc-Kunt and Huizinga (2000) confirmed an insignificant relationship between the loan ratio and profitability.

Revenue Diversification

Banks rely on both interest and non-interest income, however the proportion of non-interest income in net operating income varies, depending on the character of the bank. It is claimed that gradually non-interest income will have more impact on the bank's profitability (Koch, MacDonald 2010). Diversification was assessed inter alia by Demirguc-Kunt and Huizinga (1999). A negative correlation was noticed between non-interest income ratio and net interest margin. The authors found out that this relationship is stronger in rich countries than in poor ones.

In the research concerning bank profitability in the Euro Zone results depend on the dependent variable used Borroni et al (2016). Those results show that during the period of stabilized economy, banks increase profitability by engaging mainly in lending. In the times of crisis, other sources of income are necessary. Also, according to Dietrich and Wanzenried (2011), banks engaged mainly in traditional banking activities will have lower profitability.

GDP Growth Rate

According to Zampara et al (2017) – macroeconomic factors have big influence on the profitability as they can cause great opportunities or great threats. Higher GDP causes greater demand for bank services and also drop in the rate of bad credits. During economic growth, banks set the rates and fees to be higher and this is beneficial for profitability. In times of economic slowdown, there are more loan defaults, the quality of credit portfolio deteriorates and overall the profitability of the bank is hurt. It was also noticed that prosperous economy has positive impact on solvency of borrowers, encourages businesses and individuals to make investments and take more loans (Trujillo-Ponce, 2013). Adelopo et al (2018) and Pepur, Tripovic (2017) also observed positive impact of GDP Growth Rate on bank profitability.

Inflation

Another way of assessing the relationship between macroeconomic conditions and profitability is via inflation- usually described as annual inflation rate. Typically, increase in inflation is associated with higher loan rates and then raise in bank income. However, some authors notice that the fact if the inflation was foreseen or not, has some influence as well. If it was predicted, then the profitability can be increased. On the other hand, when inflation is sudden, borrowers are not prepared for it, and this can cause problems with loan repayments. There is also an issue that banks would not adjust their rates in accordance to inflation promptly. Then there is a threat that the costs would be higher than gains which would reduce profitability as well.

The research examining Chinese banking sector found out that the relationship between inflation and bank profitability is positive and significant (Tan, Floros, 2012). Authors concluded that the reason behind it is that during studied time period (2003-2009) the inflation was anticipated. Banks had time and could plan the adjustment of the interest rates to make the revenues higher than the costs

In another research Adelopo et al (2018) noticed that. during times with healthy economy, banks are predicted to be more profitable. Results show that the higher the inflation, the higher the profitability and this relationship is statistically significant. In case of more costs appearing, banks can effectively pass them on customers.

Positive results were also confirmed for Spanish banks (Trujillo-Ponce 2013). Author also underlined the point that if the inflation was expected, this information gave banks more time to prepare and to adjust their interest rates accordingly.

HHI Index

Hirschman-Herfindahl index is used for assessing concentration ratio in the particular industry. Negative relationship between the Hirschman-Herfindahl index and profitability was discovered by Borroni et al (2016). According to the authors this relation can be associated with strong competition that is a result of lowering interest margin and as an effect- profitability. The same results were confirmed by Petria et al (2015). Positive correlation was noticed in the research concerning Tunisian banks during the financial crisis which most likely was associated with the high quality of management of Tunisian banks (Rachdi 2013). Similar results are observed for Spanish banks (Trujillo-Ponce 2013).

The Results of Empirical Research

This study comprises listed banks from Poland and Czechia. The choice of banks from these two countries result from a number of similarities between the two nations with regard to the following areas: economic development, banking sectors, legal systems, and cultural and historical factors. In the first phase of the study the authors analyse the impact of selected factors on profitability using linear correlation coefficients, followed by regression analysis. Correlations between quantitative variables are analysed using Spearman's correlation coefficient. Because the collected data is not independent, multiple factor analysis is based on linear mixed models. The analysis comprises 40 banks from Poland and Czechia in 2013-2017. The analysis assumes a significance level of 0.05. Therefore, all p values below 0.05 are interpreted as confirming significant correlations. The analysis is conducted in R-3.6.2. The models were built on non-independent observations (40 banks, each evaluated in 5 consecutive years), a linear mixed model was used. Observations could be temporarily and spatially correlated. By temporal correlation, we mean correlation between data from the same bank but two distinct years. By spatial correlation, we mean correlation between data from two distinct banks in the same year. This led us to include two crossed random effects in our model: one for year and one for bank.

The definitions of dependent and independent variables are presented below.

Table 1: Dependent and independent variables

Symbol	Variables	Proxy	Expected relation
Dependent variables			
ROAA	Return on Average Assets	Net Income/Average total assets	
ROAE	Return on Average Equity	Net Income/Average total equity	
Independent variables			
Bank-specific determinants			
BS	bank size	natural logarithm of total assets	+
CA	capital adequacy	equity/total assets	+
LLP	loan loss provisions	loan loss provisions/total loans	-
ME	management efficiency	cost to income ratio	-
L	lending	total loans/total assets	+
RD	revenue diversification	non-interest income/operating revenues	+
LR	liquidity risk	loans/customer deposits	-
Industry-specific determinants			
MC	market concentration	hirschman-herfindahl index	+
Macroeconomic determinants			
EG	economic growth	gdp growth	+
I	inflation	inflation	+/-

Source: Author's own work.

Table 2 presents linear correlation analysis for variables ROAA and ROAE. ROAA is significantly correlated with bank size, capital adequacy, loan loss provisions and management efficiency. ROAA is most affected by capital adequacy, management efficiency and bank size. Therefore, banks with a large share of equity are expected to have a higher level of profitability. Also, the efficient management of the global conglomerates of costs and revenue has a negative impact on banks' profitability. Bank size, which usually indicates an impact on various market players including competitors and clients, is also strongly correlated with corporate profitability. As expected, loan loss provisions have a negative impact on profitability and, obviously, on banks' financial result. ROAE, in turn, is correlated with a larger number of variables, but the level of correlation is generally lower. The following variables are regarded to be significantly correlated with ROAE: bank size, capital adequacy, loan loss provisions, management efficiency, liquidity risk and HHI index. Management efficiency is a variable most negatively correlated with ROAE. The character of correlations (positive or negative) of particular variables with ROAA and ROAE is identical. Among new statistically significant variables, attention should be given to the mutual impact of liquidity risk and ROAE. It is in line with the theoretical assumptions which assume that all risk measures are significant for investors. Moreover, industry concentration increases profitability measured by ROAE. The following variables are most strongly correlated with ROAE: management efficiency, bank size, liquidity risk and HHI index.

Table 2: Linear correlation analysis between ROAA and ROAE profitability factors for Polish and Czech banks

	Bank size	Capital Adequacy	Loan loss provisions	Management efficiency	Liquidity risk	Loans to total assets	Revenue diversification	HHI Index	GDP growth rate	Inflation
ROAA	r=0.463, p<0.001*	r=0.604, p<0.001*	r=-0.2, p=0.004*	r=-0.452, p<0.001*	r=-0.066, p=0.35	r=0.035, p=0.626	r=0.028, p=0.693	r=-0.009, p=0.905	r=-0.022, p=0.759	r=0.001, p=0.992
ROAE	r=0.28, p<0.001*	r=0.156, p=0.028*	r=-0.188, p=0.008*	r=-0.561, p<0.001*	r=-0.277, p<0.001*	r=-0.107, p=0.132	r=-0.077, p=0.279	r=0.206, p=0.003*	r=-0.069, p=0.33	r=0.113, p=0.111

r - Spearman's correlation coefficient
** statistically significant (p<0.05)*
Source: Author's own work

Tables 3 and 4 present a linear mixed model for variables ROAA and ROAE. The significant factors affecting ROAA are as follows: capital adequacy, loan loss provisions, management efficiency, liquidity risk, loans to total assets and revenue diversification. The impact of the above factors on ROAA is as expected and negative (loans loss provisions, management efficiency, liquidity risk), and positive (capital adequacy, loans to total assets and revenues diversification). The greatest range of impact is found for loan loss provisions, capital adequacy and management efficiency. A significant impact of economic growth and inflation rates on the higher profitability of Polish and Czech banks is not recorded. The profitability of banks in the analysed countries is significantly affected by an appropriate level of equity, which mitigates risk and, consequently, reduces the cost of acquired capital. Proper capitalization also increases bank's trustworthiness, attracting potential customers. Same results have been confirmed by Bourke (1989). Financial liquidity also mitigates bank risk, but excessive liquidity can have a negative effect on maintaining high. This supports the findings of Vodova (2016), however it is worth to mention that the results of analysis of the relationship between liquidity and profitability are not uniform and vary from research to research. A significant role is played by appropriate lending policies and the analysis of clients' creditworthiness (Tan, 2016; Menicucci, Paolucci, 2016), as well as generating higher revenue dynamics in relation to cost dynamics (management efficiency). The study confirms the results obtained by Trujillo-Ponce (2013) and Borroni et al (2016) and shows that efficiency is connected with the profitability. It should be also noted that a large volume of loans has a positive impact on profitability, but of equal importance in this context is revenue diversification. Positive correlation of profitability with lending proves that the interest income coming from the loans is more important, than the credit risk coming from lending (also confirmed by Trujillo-Ponce, 2013). However, banks also noticed that having other sources of income can be advantageous and influence profitability in a positive way, which wasn't true for Eastern countries two decades ago (Demirguc-Kunt, Huizinga, 1999).

Table 3: Linear mixed model for ROAA for Polish and Czech banks

Variable	Parameter	95%CI		p
Bank size	-0.03691	-0.11974	0.04591	0.38
Capital Adequacy [%]	0.0838	0.06434	0.10326	<0.001 *
Loan loss provisions [%]	-0.11161	-0.18321	-0.04001	0.002 *
Management efficiency [%]	-0.02758	-0.0348	-0.02035	<0.001 *
Liquidity risk [%]	-0.00028	-0.00039	-0.00016	<0.001 *
Loans to total assets [%]	0.00611	0.001	0.01122	0.019 *

Variable	Parameter	95%CI		p
Revenue diversification [%]	0.0106	0.00412	0.01708	0.001 *
HHI Index	0.00002	-0.00045	0.00049	0.946
GDP growth rate [%]	0.00392	-0.04307	0.0509	0.87
Inflation [%]	-0.01127	-0.10045	0.07791	0.803

p – multivariable linear mixed model
** statistically significant (p<0.05)*
Source: Author's own work

Table 4 presents a linear mixed model for ROAE in Polish and Czech listed banks. The impact of particular factors on ROAA and ROAE can be regarded as similar, which indicates the reliability of the obtained results. The impact of loan loss provisions, management efficiency, liquidity risk and revenue diversification on profitability is very similar for ROAA and ROAE. The impact of capital adequacy and loans to total assets on ROAE is less significant than on ROAA. Even though insignificance of capital adequacy with ROAE might seem unexpected, in the research concerning Euro Area the same results have been obtained (Borroni et al, 2016).

There is no impact of economic growth and inflation on the profitability of Polish and Czech banks. However, the most unexpected finding is a slight impact of bank size on profitability in light of the fact that bank size has frequently performed the function of a control variable in a number of empirical research studies of banks' financial management. Even though it is surprising result, it was confirmed also by Adelopo et al (2018). ROAE is most affected by loan loss provisions, it is also in line with results of Dietrich and Wanzenried (2011).

Table 4: Linear mixed model for ROAE for Polish and Czech banks

Variable	Parameter	95%CI		p
Bank size	-0.58904	-1.37556	0.19747	0.141
Capital Adequacy	-0.03616	-0.22098	0.14865	0.7
Loan loss provisions	-1.6907	-2.3706	-1.01081	<0.001 *
Management efficiency	-0.32468	-0.39326	-0.25609	<0.001 *
Liquidity risk	-0.00357	-0.00463	-0.0025	<0.001 *
Loans to total assets	0.04842	-0.00011	0.09696	0.051
Revenue diversification	0.11321	0.05167	0.17475	<0.001 *
HHI Index	0.00125	-0.00322	0.00571	0.583
GDP growth rate	0.15735	-0.28884	0.60355	0.487
Inflation	0.04631	-0.80049	0.89311	0.914

p – multivariable linear mixed model
** statistically significant (p<0.05)*
Source: Author's own work

Concluding Remarks

Banks constitute a lifeblood of the economy, and they are commonly regarded as factors which have a great impact on a broadly understood socioeconomic environment. In the time of the economic slowdown caused by the Covid-19 pandemic, an analysis of banks' financial standing is of crucial importance to a number of market players and the

results can influence many decisions. Easter European countries were also severely hit by the pandemic and banks with stable financial foundations and with constant financial results have an important role to play in the period of the pandemic and post-pandemic, essential for the recovery of national economies. It seems that without financing of enterprises by the banking sector, the macroeconomic situation will not improve significantly. This work analyses listed banks in Eastern Europe countries and presents the empirical verification of such factors as bank size, capital adequacy, loan loss provisions, management efficiency, liquidity, loans to total assets, revenue diversification, industry concentration, GDP growth rate, and inflation rate. The authors verify a negative impact of loan loss provisions, management efficiency, liquidity risk, and a positive impact of bank size, capital adequacy, loans to total assets, revenues diversification and industry concentration. The major factors influencing the profitability of Polish and Czech banks include loan loss provisions, capital adequacy and management efficiency. It can be concluded that banks' most fundamental activities in the area of the quality of granted loans, capital adequacy and management efficiency have a major impact on the profitability of Polish and Czech banks. The obtained results are consistent with both return on assets and return on equity. A significant role from the perspective of banks' financial success is played by the supervision of EU and government institutions over bank security (capital adequacy), and supervision over management efficiency, exercised by supervisory boards, and the quality of loans. The results of the conducted research are significant for the banking sector of Eastern European countries, as well as governments, banking supervisory authorities and standard setters.

The limitations of this work result from a relatively small number of analysed countries and banks as well as a small number of variables. Further analyses should focus on broader verification of profitability factors for banks in West and East European countries, as well as the characteristics of banks' corporate governance systems.

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Identification of Commands Encoded Optically

Artur ARCIUCH
Cybernetics Faculty, Military University of Technology, Warsaw, Poland, artur.arciuch@wat.edu.pl

Tomasz PALYS
Cybernetics Faculty, Military University of Technology, Warsaw, Poland, tomasz.palys@wat.edu.pl

Abstract

The paper presents the method of simultaneous identification of multiple commands encoded optically. The command encoding algorithm and the multiple command identification algorithm based on Extended Finite State Machine (EFSM) were developed. The method has been examined in a real and virtual environment. The method can be used in systems that implement the control of objects optically by using multiple commands issued by multiple operators.

Keywords: Laser Beam Coding, Augmented Reality, Extended Finite State Machine.

Introduction

The control of the system's objects by pointing them out at the (virtual) stage with a marker displayed by a laser pointer is the subject of the research and is used in many applications. The elements of such a system are: the stage, laser pointer - a manipulator that generates a command (e.g. by pointing out a specific element of the stage) and the camera - the sensor that registers specific elements of the stage in order to detect and identify the command generated by the manipulator. The command (the encoded optical signal generated by the pointer) has various forms and interpretation, e.g. the type of the command depends on: the object of the stage, which was pointed out (as reported by Pramit et al (2012) and Olsen and Nielsen (2001)), the color of the laser (Gu et al (2014)), the way the optical signal is encoded (Vogt et al (2003) and Palys et al (2017)). Pramit et al (2012) and Olsen and Nielsen (2001) described the results of the research consisting in inputting, into the operating system, commands, by pointing out certain elements of the user's graphic interface with the laser pointer's marker, were presented. The marker generated by the laser pointer is also used to mark SLAM (Simultaneous Localization And Mapping) system elements as described by Gu et al (2014), or in systems such as optical shooting ranges – it was shown by Soetedjo et al (2013) and Soetedjo and Nurcahyo (2011). Very interesting results were obtained in systems for controlling robotic manipulators, by using this system to point out objects subject to manipulations – it was described by Xie et al (2009), or to point out a point, to which the robot should move – as was mentioned by Fukuda et al (2009). Another direction of the research is the attempt to encode the commands in the optical signal emitted by the laser, which such signal manifests itself as a marker flashing in a specific way – as was described by Vogt et al (2003) and Palys et al (2017). Encoding commands can also consist of changing a laser color - as was shown in research conducted by Gu et al (2014). The differentiation of markers generated on the stage by several operators (by several laser pointers) may pose the another problem, which analyzed in research conducted by Gu et al (2014), Vogt et al (2003) and Palys et al (2017).

The paper presents the method and the results of the research on the implementation of this method consisting in the detection and identification of signals encoded optically, which are displayed in the form of markers flashing on the screen (on the stage). The markers are applied to the stage in the form of spots emitted by the laser pointer.

Motivation

Controlling the system by means of the signal encoded optically requires a method of generating single commands. If the number of commands is small, you can assign various colors to the commands. Another solution is the approach of encoding the laser signal in the form of a blinking, in a specific way, marker, whose source is a laser pointer. Such an attempt was made by Vogt et al (2003), where the laser signal was encoded according to the RS-232 standard. However, the results showed that the simultaneous detection and identification of multiple laser signals is complex and the method proposed by Vogt et al (2003) needs to be modified. The research conducted by

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the authors, among others, shows that the very method of encoding the optical signal generated by the laser pointer should be modified. In research conducted by Palys et al (2017) the method of laser signal encoding was proposed and examined in such a way that the interruptions, consisting in dimming out the marker during the exposure of the command, are short and their number does not exceed 2. The results of the command identification were obtained at the level of 98.86% (3600 attempts were made), which prompted the authors to carry out the research (a generalization of the research results is presented in this paper) evaluating the usefulness of the developed method for parallel detection and identification of multiple signals generated by the pointer (the laser pointers) emitting a signal of equal wavelength. Initial research results was described by Palys and Arciuch (2019).

Next chapters describe the encoding and command identification method and present the research results obtained in the proposed real and also simulation environment, and the conclusions. The simulation environment was presented in a research by Arciuch and Palys (2019).

The method to encode a command

The encoding of the signal generated by the laser pointer, into the form of commands, is based on activating and deactivating the marker on the stage in a strictly defined time. The command c_i, where $i = 1, ..., N$ and N is the number of commands, is saved as a binary vector, and the time of emission of one bit of the command is equal to T_W. It is assumed that the deactivation time of the marker, when exposing the command, is short, always equal to the exposure time of one bit, and their number does not exceed 2. Let Ω stand for a code table: $\Omega = [\omega_{rk}]_{L \times L} : \omega_{rk} = k+(r-1)(2L+2-r)/2$ for $r+k+1 \leq L \vee \omega_{rk} = \phi : r+k+1 > L$, where $r = 1, \ldots, L$; $k = 1, \ldots, L$; L – is the number of rows and columns and the symbol ϕ stands for an undefined (unimportant) element. In turn, by $B = [b_j]_{((L+1)*L/2)}$ the column vector was denoted, whose elements are binary vectors. Each element of the code table ω_{rk} is uniquely assigned the binary vector $b_j = [\alpha, 1, 1]$, where $j = k+(r-1)(2L+2-r)/2$. The last two numbers one of the b_j vector are the stop bit and the end frame bit respectively. If $r = 1$, then $\alpha = \rho$, where $\rho = \zeta(L+1-r)$, which corresponds to the notation of the index of the row r in the $L+2$ bit cold-one code (ζ) having an inverted bit order.

	k_1	k_2	k_3	k_4	k_5	k_6	k_7	k_8
r_1	**1**	2	3	4	5	6	7	**8**
r_2	9	10	11	12	13	14	**15**	ϕ
r_3	16	17	18	19	20	21	ϕ	ϕ
r_4	22	23	24	25	26	ϕ	ϕ	ϕ
r_5	27	28	29	30	ϕ	ϕ	ϕ	ϕ
r_6	31	32	33	ϕ	ϕ	ϕ	ϕ	ϕ
r_7	34	35	ϕ	ϕ	ϕ	ϕ	ϕ	ϕ
r_8	**36**	ϕ	ϕ	ϕ	ϕ	ϕ	ϕ	ϕ

Fig 1. Example of the code array for 36 commands

b_1 = **[1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]**
b_8 = **[1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1]**
b_{15} = **[1, 1, 1, 1, 1, 1, 1, 0, 1, 0, 1, 1]**
b_{36} = **[1, 0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1]**

Fig 2. Example of encoding the commands

Otherwise, $\alpha = \rho + \kappa$; where $\kappa = \zeta(L+1-r-k)$. The parameter κ is equal to the sum of the index of the row r and the column k written in the cold-one code having an inverted bit order. An example of the code array for $L = 8$ is shown in Fig 1 and the examples of binary vectors in Fig 2.

After assuming that the emission time of a single bit is constant and equal to T_W, the way to encode commands with the following properties was obtained. Binary vectors are transmitted in series. The exposure time of the code is constant and equal to $(L+4)T_W$. The marker (the laser pointer) is being enabled i.e. activated only at the moment when the bit changes from "0" to "1" and the marker is being disabled i.e. deactivated at the moment when the bit changes from "1" to "0". One or two interruptions with the T_W length may occur during the code exposure. To encode N commands, a code array with $L = round(sqrt(2N))$ rows and columns should be built.

Identification of commands

Description of the method

The sequence of stage images obtained with the camera makes the input data for the method. Decoding the command is based on observations of markers detected in subsequent images. At the moment t (in a single image) you can observe no more than K markers, where K is the number of commands sent simultaneously or with an

offset less than the exposure time of the marker. The marker is represented by the Extended Finite State Machine (EFSM).

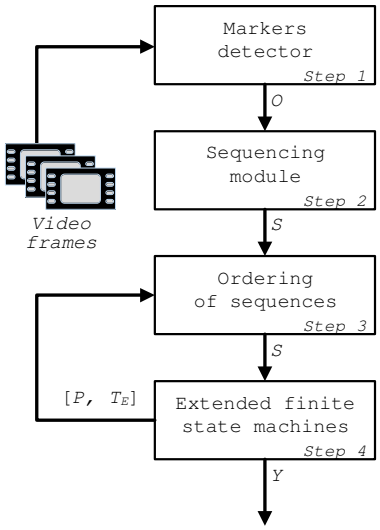


```
function [S', S] = Sequencing (t, O, S')
Input:
        t - detection time
        O = {oj, where j = 1, …, J}
        S' = {si, where i = 1, …, I}
Output:
        S' - active sequences
        S - inactive sequences
Algorithm:
IF J > 0 THEN                                   //STEP 1
        IF I > 0 THEN
                D = Distance (S', O);           //STEP 2
                Y = Inconsistent (D, S');
                D = Allowed Value (D, Y);
                WHILE IsAllowed(D) == true DO //STEP 3
                        [i, j] = MinAllowed(D);
                        S' = Append (S', i, oj, t);
                        O = Remove(O, j);
                        D = Remove(D, j);
                        D = SetNotAllowed (D, i);
                ENDWHILE
        ENDIF
        IF Count(O) > 0 THEN                    //STEP 4
                S' = AddNew (S', O, t);
        ENDIF
ENDIF
[S', S] = Verification(S');                     //STEP 5
```

Fig 3. Method of decoding messages

Fig 4. Algorithm for creating a marker observation sequence

The process of decoding the command takes place in the four phases, as presented in Fig 3. The first phase consists in detecting the marker, observing its position and writing the detection time in memory. In the second phase, based on the detection times, the observations of each marker are arranged in sequences. From the values of the parameters describing the sequence: the moment of activation and deactivation and the estimator of the average marker position are determined. This phase ends with dividing the sequence into active and inactive ones. Inactive sequences represent disabled markers and active sequences represent enabled markers. In the third phase, each inactive sequence is given to the input of the relevant EFSM machine, and the fourth phase of decoding takes place. In this phase, a recognition of commands is being performed. The marker disable time and the estimator of its average position, lastly assigned to the machine, are transmitted in the feedback path to the phase three. This provides the basis for organizing and linking the inactive observation sequences with the EFSM machine representing the marker observed.

Detection and sequencing of observations

The first phase (see Fig 2) is connected with determining the marker's observation on the basis of a sequence of images obtained with the camera. The method of marker detection is described in □. In the case of images in RGB format, the $R = [r_{ij}]_{W \times H} : r_{ij} \in \{0,...,255\}$ component is analyzed, where W x H is the resolution of the image (the authors conducted experiments for the R component of the image in RGB format and the V component of the image in HSV format). The R image is subjected to the contrast normalization operation: $r_{ij} = (r_{ij} - r_{avg}) / r_{max}$, where r_{avg} and r_{max} represent, respectively, the average and maximum value of the R matrix elements. Then the image is subjected to the binarization - the threshold value h is being selected experimentally, although e.g. in the paper □ this value was determined from the relation: $h = r_{max} / 1.1$. Markers detected in the image acquired at the moment t form the set $O = \{o_j\} : o_j = [x_j, y_j]$, where $j = 1, \ldots, J$, J represents the number of observations acquired at the moment t, and x_j, y_j represent the center of the marker. The set O and the moment of detection t make the input data for the second phase of the decoding algorithm. In this phase, a sequence is created from the acquired observations - the order in the sequence is being determined by the detection times (see Fig 3). The sequencing of observations is then being carried out. Let $S' = \{s_i\}$, where $i = 1, ..., I$ and I represent the number of sequences that represent the enabled markers, represent a set of active sequences. The first step of the algorithm consists in checking if the number of the observations J obtained is bigger than zero. If it's bigger than zero, go to step two, and if it's not bigger, go to step five. Additionally, in the first step, you should check if there are active sequences. If no active

sequences exist then the fourth step of the algorithm should be performed. If there are active sequences, the distance matrix (according to the Euclidean metric) $D = [d_{ij}]_{I \times J}$, between the obtained observations o_j, and the average values of markers' positions that represent sequences s_i should be determined and the coefficients' matrix for inconsistency of attaching observations to the sequence $Y_{ij} = (d_{ij} - avg(\{s_i\})) / std(\{s_i\})$ should be determined, where $avg(\{s_i\})$ means the average value between the adjacent elements of the sequence and $std(\{s_i\})$ means their standard deviation. The second step is ended with the designation, in the matrix D, of the prohibited values, for which the non-compliance factor $Y_{ij} \geq 4$. The third step of the algorithm is being repeated until all allowed values are exhausted. First, the smallest available d_{ij} distance is searched for. Based on the index of the row i and the index of the column j do the following steps. Attach the observation o_j to the S_i sequence and update its average position $p^{(i)}$ and initially assume that the moment of disabling $t^{(i)}_E$ is equal to t. Then remove the observation o_j from the set O, and the column j from the set D. After setting the elements of the row i as not allowed ones in the distances' matrix, repeat the third step of the algorithm. The fourth step consists in checking if there are any observations in the O set that were not attached to the sequence. If there are such observations, new sequences are created from them. The marker activation time should be assumed as $t^{(i)}_B = t$. The last, fifth step consist in dividing the sequences into active ones and inactive ones. Sequences, to which observations at the moment t were attached, are treated as the active sequences S' and others as the inactive sequences S.

Recognition of Commands

The third phase of the method (see Fig 2) consists in passing inactive sequences to the input of a proper EFSM machine. For each active machine, the average marker position and the time to disable the marker, is read. The procedure is analogous to that of attaching observations to the sequence. The difference is that in the third step, instead of the attachment operation, the selected sequences are passed to the input of a proper machine, and in the fourth step, instead of creating a new sequence, the sequence is given to the input of the machine that is in its initial state.

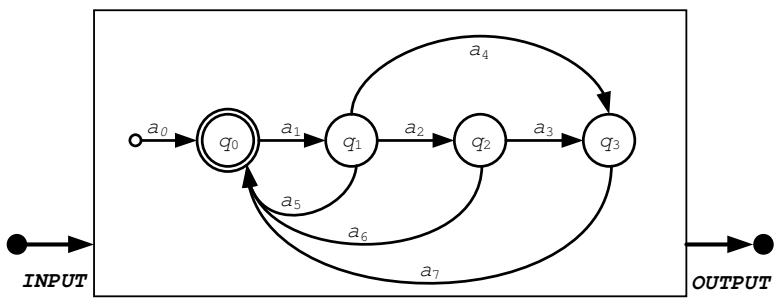

Fig 5: State diagram of EFSM

Transitions	Current state	Input symbol	Guard functions	Update functions	Output symbol	Next state
a_0	–	–	–	$k=0,\ r=0,$ $T_E=0,\ P=(0,0)$	ϕ	q_0
a_1	q_0	$s^{(i)}$	$f(t^{(i)}_E - t^{(i)}_B) \leq L$	$k=f(t^{(i)}_E - t^{(i)}_B),$ $T_E=t^{(i)}_E,\ P=p^{(i)}$	ϕ	q_1
a_2	q_1	$s^{(i)}$	$h(t^{(i)}_E - t^{(i)}_B) \leq L$ $\wedge\ f(t^{(i)}_B - T_E) == 1$	$r=f(t^{(i)}_E - t^{(i)}_B)+1,$ $T_E=t^{(i)}_E$	ϕ	q_2
a_3	q_2	$s^{(i)}$	$h(t^{(i)}_E - t^{(i)}_B) == L+1$ $\wedge\ f(t^{(i)}_B - T_E) == 1$	$T_E=t^{(i)}_E$	$g()$	q_3
a_4	q_1	$s^{(i)}$	$h(t^{(i)}_E - t^{(i)}_B) == L+2$ $\wedge\ f(t^{(i)}_B - T_E) == 1$	$T_E=t^{(i)}_E$	$g()$	q_3

a_5	q_1	$s^{(i)}$	$h(t-T_E)>L+2$	$k=0,\ r=0,$ $T_E=0,\ P=(0,0)$	ϕ	q_0
a_6	q_2	$s^{(i)}$	$h(t-T_E)>L+2$	$k=0,\ r=0,$ $T_E=0,\ P=(0,0)$	ϕ	q_0
a_7	q_3	-	-	$k=0,\ r=0,$ $T_E=0,\ P=(0,0)$	ϕ	q_0

where:

$f(t)=\ \mathrm{round}(t/T_W)$

$h(t)=\ f(t)+k+r$

$g()\ =\ k+(r-1)(2L+2-r)/2$

Fig. 6: Transitions set of EFSM

The last phase is related to the recognition of commands. The process is executed by an extended states' machine, which is defined as the 6-tuple EFSM = (Q, q_0, V, M, W, A). The interpretation of the operation of the states' machine and the meaning of the individual symbols is as follows. The set of the states of the machine is denoted by $Q = \{q_0, q_1, q_2, q_3\}$. The initial state of the machine is denoted by q_0. The state associated with the first activity of the marker, which such activity is associated with the column index of the code array, is represented by q_1. In turn, q_2 denotes the second activity of the marker, which such activity represents the messages below the first row of the code array. The state q_3 is equated with the last activity of the marker. The states can only be changed at the moment of the marker deactivation if a symbol being the member of the set of input symbols M appears at the input. Each input symbol is identified with a sequence of observations of the marker s_i. The change of a state is affected by the time of enabling the marker $t^{(i)}_B$ and the time of disabling the marker $t^{(i)}_E$. Additionally, the estimator of the average position of the marker $p^{(i)}$ is being written in memory. The finite machine of the states was extended by a set of variables $V = \{r, k, t, T_E, P\}$, where r stands for a row index and k for a column index of the code array and t for the current moment. After each change of a state, the disable time T_E and the estimator of the average position of the marker P is being written in memory. Transitions between states of the machine are defined as elements of the set $A = \{a_k: (q, s, guard, update(V), w, q')\}$, which means that if the machine is in the state q and the element $s \in M$, appears at the input, then the transition to the state q' will take place if and only if the logical expression *guard* is true. Only in this case the variables of the machine shall be updated and an element $w \in W$ shall be generated at the output, where W means a set of commands extended by the blank element ϕ (see Fig 1). The states' diagram of the EFSM machine is shown in Fig 5 and the elements of the set A (see Fig 6). Moving the machine from the initial state to the state q_1 means making an assumption about the start of the command transmission. The assumption is considered true if and only if the model reaches state q_3. Only in this case, the element w is generated at the machine output (based on the variables r, k). In other cases, the element ϕ is given to the output. Each rejection of the assumption (assumed in the state q_1) results in the model going to the initial state q_0.

Results of Research

The effectiveness of the command recognition algorithm was examined in two phases. The first phase in a real environment and the second one in a simulated one. In both phases, the commands c_i, where $i \in \{1,...,36\}$, were encoded by using the technique presented in chapter 3. In the real environment, the effectiveness of single command recognition was examined depending on the bit T_W emission time and resolutions of images, on the basis of which the marker detection was performed.

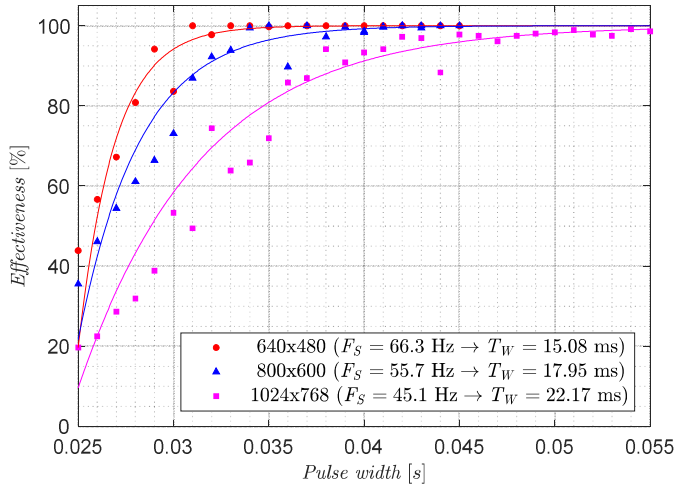

Fig. 7: Influence of a camera resolution and a time emission of the T_W bit on the effectiveness of commands' identification

In turn, the markers representing five commands were generated in the simulated environment and the influence of the distance between the markers on the efficiency of the system was examined. Additionally, the influence of marker vibrations and activation time delays on the recognition result was examined. The real workstation consisted of: the Manta G - 201 Allied Vision camera with a lens with a focal length of F = 8 mm, equipped with a mid-pass (λ_0 = 650 nm ± 10 nm) optical filter; the laptop computer; the laser pointer, that was shown by Palys et al (2017); the screen.

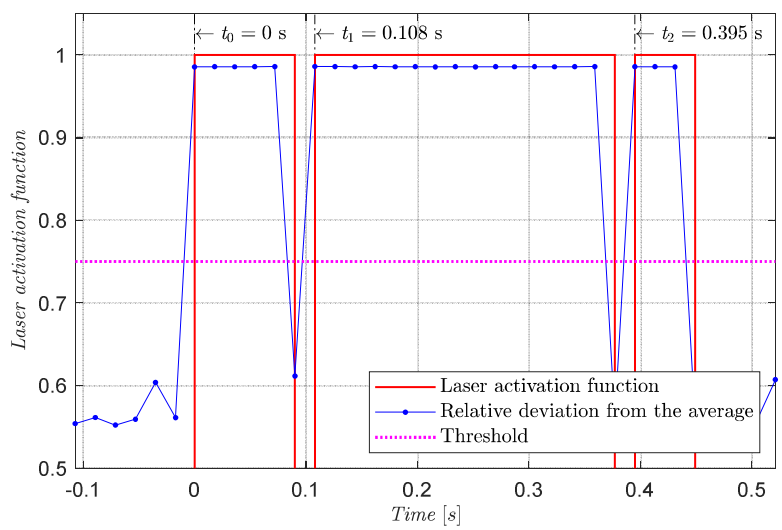

Fig. 8: Identification of the commend c_{35}

The examination was performed for the camera resolutions of: 640x480 *px*, 800x600 *px* and 1024x768 *px*. The frequency of acquiring successive frames of the image was respectively: 66.3 *Hz* (640x480 *px*), 55.7 *Hz* (800x600 *px*) and 45.1 *Hz* (1024x768 *px*), and the T_W time varied from 0.025s to 0.055s in 0.001s steps. During the experiment, if for the camera resolution of 640x480 *px* the images changed on average every 0.0151s, then the correctness of the command recognition was 90% (T_W = 0.0302 *s*). The results of the experiment are presented in Fig. 7. Additionally, in Fig. 8, the marker activation function and the obtained time relationships for the c_{35} command are presented.

To carry out the second phase of the experiment, the command generation and recognition system, in Simulink environment (Matlab by MathWorks) was built. The system made possible to recognize five commands simultaneously. Experiments were conducted for five scenarios. Each scenario consisted in generating the marker for the command c_3 at the point P_3 =[200, 200]*px* and the markers for the commands: c_1, c_2, c_4, c_5, at points with the

coordinates: P_1 = [135, 135]px, P_2 = [265, 135]px, P_4 = [135, 265]px, P_5 = [265, 265]px. Then the points P_1, P_2, P_4 and P_5 were moved towards the point P_3. Each scenario was repeated 100 times. In the first scenario it was examined how the distances between P_i: $i \in \{1, \ldots, 5\}$ affect the effectiveness of command recognition. For this scenario the recognition efficiency began to decrease after reaching the 11px distance from P_3. On the other hand it was examined in the second scenario how the marker vibrations affect the effectiveness of the system. Each coordinate, of each point, was changed by a random value (according to normal distribution) from the (-3px, 3px) range. For this scenario the effectiveness began to decrease after reaching the 35px distance from P_3. In the next three scenarios the activation time of the command marker was changed and the points' vibrations were simulated. The activation delay was T_W, $2T_W$ and $3T_W$. respectively. For the T_W delay, the efficiency of identification began to decrease after reaching a distance of 28px from P_3. For $2T_W$ and $3T_W$ delays, the identification efficiency began to decrease after reaching 26px from P_3. The results of the experiments are shown respectively in Fig. 9 and Fig. 10. The proposed method makes it possible to identify multiple commands emitted simultaneously and to identify commands having different start times. Moreover, the method takes into account the vibrations of the markers, which are the commands' carriers. The method can be used in systems that implement the control of objects optically by using multiple commands issued by multiple operators. The conducted experiments confirm the effectiveness of the method presented in the paper.

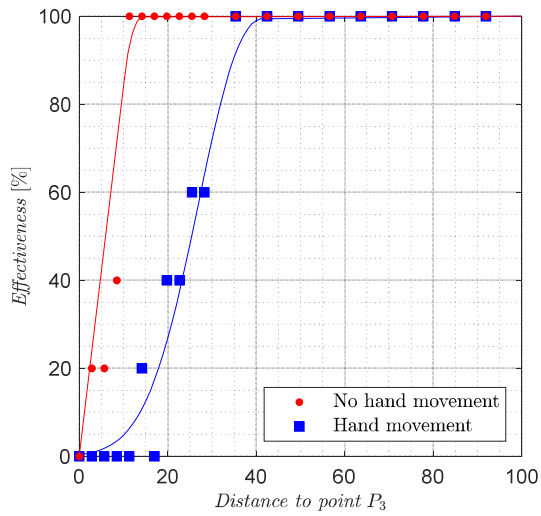

Fig. 9: Influence of distance between markers on the system efficiency

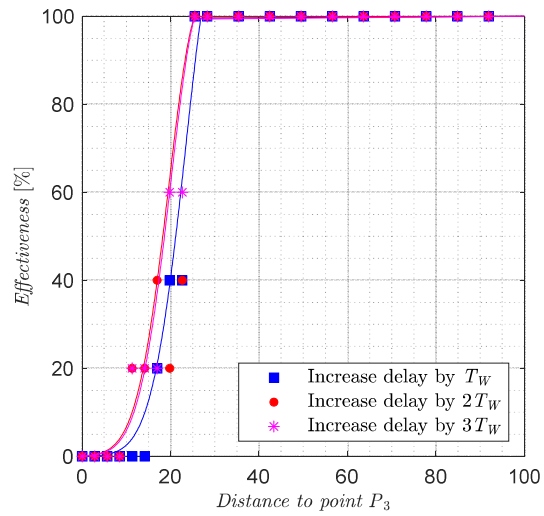

Fig. 10: The influence of the delay of the marker activation on the system efficiency

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The Risk of Using Internet and Mobile Banking Services from the Perspective of Polish Representatives of the Baby Boomer, X, Y, Z Generations

Jacek ADAMEK
Wroclaw University of Economics and Business, Poland, jacek.adamek@ue.wroc.pl

Malgorzata SOLARZ
Wroclaw University of Economics and Business, Poland, malgorzata.solarz@ue.wroc.pl

Abstract

The purpose of the article is to present the approach to the risk of using internet and mobile banking services and also the tools and activities aimed at reducing it by Polish representatives of the Baby Boomer, X, Y, Z generations. Based on the analysis and interpretation of the research findings conducted on a nationwide sample and covering the members of the distinguished populations, the following first research hypothesis was refuted: *the representatives of the analysed generations show both a diversified level of openness towards technological innovations and the acceptance of the related risk* (H I), whereas the following two hypotheses were verified: *the representatives of the analysed generations show a diversified use of internet and mobile banking services* (H II), and *the representatives of the analysed generations show a diversified approach to the activities reducing the risk of using internet and mobile banking services* (H III). The accuracy assessment of the formulated hypotheses was based on the identification of the respondents' attitudes to new technologies and the related risks, the declared use of internet and mobile banking services, as well as the tools and activities used by the people under study aimed at reducing the risks related to the discussed form of banking.

Keywords: internet and mobile banking, perceived risks, generational cohorts

Introduction

Technological innovations affect every dimension of human life, including the organization and transfer of financial services which cover the needs related to the broadly understood acquisition, collection and distribution of natural persons' funds, carried out through and with the use of online and mobile banking. Knowledgeable and rational use of internet and mobile banking services requires, on the one hand, the need to recognize the related risks and, on the other, to adopt an active attitude towards their causes and effects. These activities apply to both financial intermediaries and the consumers of their services. Scientific and practical importance should be assigned to the recognition of attitudes adopted by consumers of mobile banking services towards these risks and the actions taken to limit their potential. This knowledge creates, e.g., the premise of educational, cognitive or promotional activity focused on developing diverse, in the generational cross-section, attitudes and behaviours towards the emerging threats.

The purpose of the presented study is to show the approach to the risk of using internet and mobile banking services as well as the tools and activities aimed at reducing it by Polish representatives of the Baby boomer, X, Y, Z generations. The premise for preparing the article was the research gap noticed by the authors and concerning both the cross-generational perception of the risk associated with the use of internet and mobile banking services, and also the assessment of attitudes and actions related to its reduction undertaken by Polish members of population cohorts. The structure of the article is focused on the implementation of the adopted research goal and, apart from the introduction, it includes sections devoted to: a/risk and its perception in taking consumer decisions, b/characteristics of generational cohorts, c/methodology and findings of the conducted research, as well as d/conclusions resulting from the analysis and assessment of the research findings.

Risk and its Perception in Consumer Decisions

The risk of online transactions can be approached as one of the key elements explaining and influencing the appropriate purchase behaviour (Zhang et al 2012), (Chen et al 2015) of people who perform these transactions

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(consumers). The perceived risk as a subjective vision of the threats associated with purchase decisions was conceptualized in 1960 by R. Bauer (1960). This optics is based on the assumption that any decision to purchase goods or services is associated with risk, whereas the perceived risk can be defined, e.g., as (…) *the nature and amount of uncertainty or consequences experienced by the consumer in contemplating a particular purchase decision* (Cox and Rich 1964) see (Guru et al. 2020, p. 138). The uncertainty associated with the achievement of the goals underlying the act of purchase remains the source of this risk. The perceived risk is a factor influencing the appropriate consumer behaviour, as they want to avoid making mistakes, and its level turns into a function (Mitchell 1999), (Cox and Rich, 1964):

- the importance of the goals pursued through the purchased good and
- the subjective significance of the consequences resulting from these failures.

The feeling of uncertainty and the perceived risk are also present during the purchasing decisions made via the Internet, including those associated with the purchase and use of the offer provided by internet and mobile banking services.

The perceived risk of purchase decisions can be analysed in many dimensions (Biswas and Biswas 2004), (Boksberger et al 2007), (Hong 2015), (Papas 2016), however, the risk dimensions most frequently associated with e-banking are as follows: Perceived performance risk, Perceived security risk, Perceived privacy risk, Perceived time loss risk, Perceived social risk (see Table 1).

Table 1: Dimensions of the perceived risk in purchase decisions combined with the use of internet and mobile banking

Dimension of perceived risk	***Content of perceived risk***
Perceived performance risk	It refers to working/functioning of the obtained product in a way that ensures meeting the expected needs/functions. It may result from a wrong choice being a consequence of the subjective inability to assess its quality. Information asymmetry and the absence of possibility to test internet banking services limit the consumer's ability to make a choice that meets his/her expectations, thus reducing confidence in the offered products/services.
Perceived security risk	It is associated with the risk of losing financial resources. The security of accumulated funds is treated as one of the most important factors determining the acceptance and use of online banking, while the gap between the expected and actual security of new technologies becomes a factor which determines the behaviour of potential and current clients of these institutions. Another dimension of this risk is, e.g., the probability that the price of the service/product is not in line with its subjective value perceived by the consumer.
Perceived privacy risk	It is connected with the subjective feeling of the risk related to losing confidential information regarding personal data, wealth, family, etc.
Perceived time loss risk	The use of online tools as well as acquiring skills to take advantage of these facilities results in the need of proficiency in appropriate techniques, learning which often requires devoting an extensive amount of time, primarily in the case of senior citizens. According to the consumers of internet and mobile banking services, this time may also be taken up by the need of repeating certain operations that were previously performed incorrectly.
Perceived social risk	It refers to the social environment and its approach to, e.g., new technologies, including the use of online banking as a form of access to financial services. For example, in the era featuring the dynamic development of social networks, the expressed opinions and the promoted attitudes if considered authoritative and desirable, on the one hand, may stimulate/influence purchasing decisions, whereas, on the other, constitute a platform for their evaluation and acceptance by the community members in which the consumer is functioning.

Source: authors' compilation based on: (Cunningham et al 2005) (Gerrard et al. 2006), (Littler and Melanthiou 2006), (Mihalcescu et al 2008), (Aldás-Manzano et al. 2009), (Kesharwani and Singh Bisht. 2012), (Li 2012).

It is natural that the actions performed by the potential and current consumers of financial services offered by internet and mobile banking, rationalizing purchasing acts (and their consequences), have to focus on identifying and recognizing these risks along with their potential, and also on adopting an active attitude towards the emerging risks. Such an attitude provides the basis for making knowledgeable purchasing choices, ultimately determining consumer satisfaction with the choices made.

Baby boomer, X, Y, Z generations and their characteristics

Observing the behaviour of individual consumer groups can be based on the generational cohort theory. In the opinion of X. Li et al (2013), this theory is a tool for learning and understanding the similarities and differences in the adopted attitudes, behaviours and preferences expressed by the members of individual generations. W. Strauss and N. Howe (1991) argue that a generation should be understood as a population of people born in the same period of time, characterised by similar geographic and historical locations, and therefore sharing a common identity. According to these authors, belonging to a given generation is compulsory and permanent. In addition, the individual generational cohorts experience (…) *the same national events, moods and trends at similar ages* (Strauss and Howe 1991, p. 48), which ultimately results in a state providing each generation with a collective personality. J. W. Smith, J. W and A. Clurman (1998) explain the term generation as a group of people sharing common life experiences, shaped by the worldwide events, natural disasters, politics, economic conditions and pop culture. In accordance with this optics, the similarity of experiences is a unique category, and therefore owing to them it is possible to distinguish one generation cohort from another. In turn, M. MacCrindle and E. Wolfinger (2014) approach the term generation as a group of people born in the same era, shaped by the same timeframe and under the influence of the same social factors. Ultimately it is *(…) a cohort united by age and life stage, conditions and technology, events and experiences* (MacCrindle and Wolfinger 2014. p. 3). These authors emphasize that the common characteristics of individual generations break through geographic, cultural or socio-economic boundaries, and thus become the determinants of these global communities.

Remaining beyond the dispute on the definition itself, it can be adopted that a generation is a group of people connected by a similar timeframe of birth and significant events at critical stages in the development of the social, economic and cultural environment in which they have to fulfil their functions and goals. This viewpoint allows concluding that currently four generations are identified and described from different perspectives in the source literature (Howe and Strauss 2000) (Jorgensen 2003), (Bejtkovský 2016), (Littrell et al 2005) (Schade et al, 2016) (Koksal 2019) (Yu and Miller 2005) (Reisenwitz and Iyer 2009), (Fishman 2016) (Sima 2016). They are as follows (the discussion on the differentiation of time intervals assigned to each of these generations is disregarded here): a/Baby boomer (Bb) (1946 – 1964), b/Generation X (X) (1965 – 1979), c/Generation Y (Y) (1980 – 1994) and d/Generation Z (Z) 1995 – present). Table 2 presents the basic characteristics of the aforementioned groups.

Table 2: The characteristics assigned to the representatives of the Bb, X, Y, Z generation

	Baby boomer	***X***	***Y***	***Z***
Knowledge sharing	Willingly, voluntarily	It is based on mutuality and cooperation	Only in cases of self-interest or if forced	On virtual level, easily and rapidly, no stake, publically
Teamwork	Unknown	Natural environment (multinational companies)	Belief in the success of common effort	On a virtual level (only if forced)
Aim	Solid existence	Multi-environment, Secure position	Rivalry for leader position	Live for the present
View	Communal, unified thinking	Self-centred and medium-term	Egotistical, short-term	No sense of commitment, be happy with what you have and live for the present
Relationship	First and foremost Personal	Personal and virtual Networks	Principally virtual, network	Virtual and superficial
Values	Patience, soft skills, respect for traditions, EQ, hard work	Hard work, openness, respect for diversity, curiosity, practicality	Flexibility, mobility, broad but superficial knowledge, success orientation, creativity, freedom of information takes priority	Live for the present, rapid reaction to everything, initiator, brave, rapid information access and content search
IT	It is based on self-instruction and incomplete	Uses with confidence	Part of its everyday life	Intuitive
Others	Respect for	Rule abiding,	Desire for	Differing viewpoints,

	hierarchy, exaggerated modesty or arrogant inflexibility, passivity, cynicism, disappointment	materialistic, fair play, less respect for hierarchy, has a sense of relativity, need to prove themselves	independence, no respect for tradition, quest for new forms of knowledge, inverse socialization, arrogant, home office and part-time work, interim management, undervalue soft skills and EQ	lack of thinking, happiness, pleasure, divided attention, lack of consequential thinking, no desire to make sense of things, the boundaries of work and entertainment overlap, feel at home anywhere

Source: (Bencsik et al. 2016)

One of the dimensions and areas of the research addressing the characteristics, preferences and attitudes presented by the representatives of particular generations is analysing their financial behaviour. They cover various issues, also the ones concerning the use of technological innovations, including internet and mobile banking (Bruce et al. 2019), (Boonsiritomachai and Pitchayadejanant 2017), (Tan and Lau 2016), (Cuong et al. 2015), (Rutecka and Bednarz 2017), (Shankar and Jebarajakirthy 2019), (Shams et al. 2020), (Munoz-Leiva et al 2017) (Koenig-Lewis et al. 2010). This research is primarily focused on the analysis and assessment of the importance regarding the intentions underlying the use of appropriate financial services, including those offered by the aforementioned banking services. At this point, it is worth adding that the authors of this study have also noticed a certain gap in the existing research concerning both the cross-generational perception of the risk related to using internet and mobile banking services as well as the assessment of attitudes and actions connected with its reduction.

Methodology and Research Results

In the context of the above considerations, the purpose of the article was: *to show the approach towards the risk of using internet and mobile banking services as well as the tools and activities aimed at reducing it by Polish representatives of the Baby boomer (Bb), X, Y, Z generations.* The adopted goal became the basis for the formulation of three following research hypotheses:

1. The representatives of the analysed generations show both a diversified level of openness towards technological innovations and the acceptance of the related risk (H I),
2. The representatives of the analysed generations show a diversified use of internet and mobile banking services (H II),
3. The representatives of the analysed generations show a diversified approach to the activities reducing the risk of using internet and mobile banking services (H III).

In order to carry out the purpose of the study and to verify the adopted hypotheses the authors provided their own, original answers to the following research questions:

1) What is the attitude of the representatives of particular generations to new technologies and the related risks?
2) What is the declarative level of using internet and mobile banking services among the representatives of the studied cohorts?
3) What is the approach of the representatives of the analysed generations to the activities reducing the risk related to using internet and mobile banking services?

The verification process of the adopted hypotheses was based on the results of surveys conducted by the authors in March 2020 using the CAWI method (*Computer-Assisted Web Interview*), on a nationwide sample covering 1040 respondents. These studies are a part of the research project entitled: *Self-exclusion from digital banking services in the light of the characteristics of X, Y, Z generations*. The research sample was selected in a random and quota manner. The structure of the sample was corrected using the analytical weight, so that it corresponded to the structure of Poles in terms of the key characteristics related to the subject of the study. When constructing the weight, socio-demographic variables were taken into account, such as: gender, age, education, income level and size of the place of residence (see Table 3).

Table 3: Research sample – characteristics

Generation *(n=1040)*																							
Z				**Y**				**X**				**Bb**											
147 (14%)				284 (27%)				307 (30%)				302 (29.0%)											
Gender *(n=100%)*																							
Women (53%)								**Men (47%)**															
Z		**Y**		**X**		**Bb**		**Z**		**Y**		**X**		**Bb**									
54%		51%		47%		61%		46%		49%		53%		49%									
Education *(n=100%)*																							
Primary/lower secondary (2%)				***Vocational (8%)***				***Secondary (42%)***				***Higher (48%)***											
Z	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**								
5	1	1	1	3	5	11	10	61	34	40	50	31	60	48	39								
Net income (PLN) *(n=100%)*																							
<1000 (6%)				***1001-2000 (19%)***				***2001-3000 (22%)***				***3001-5000 (23%)***				***>5000 (10%)***				***Answer declined (20%)***			
Z	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**
14	2	5	6	16	18	16	26	15	24	21	24	20	26	25	20	5	13	12	8	30	17	21	16
Place of residence *(n=100%)*																							
Village (39%)				***City <20 thous. (10%)***				***City 20-99 thous. (20%)***				***City 100-199 thous. (9%)***				***City 200-499 thous. (9%)***				***City >500 thous. (13%)***			
Z	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**	**Z**	**Y**	**X**	**Bb**
47	36	45	31	10	11	9	11	17	17	20	23	8	8	9	12	7	11	7	10	11	17	10	13

Source: authors' compilation based on the survey research.

The population represented by four generations included 53% of women and 47% of men. Gender analysis of the representatives within the surveyed generations indicates that the highest share of women is attributed to generation Bb (61%), whereas generation X has the highest share of men in the number of the studied cohort.

In the surveyed population, higher level of education was the dominant one, whereas secondary education was represented by 48% and 42% of its members, respectively. The university graduates accounted for as many as 60% of Y generation representatives. In turn, primary and vocational education was characteristic for 10% of the respondents. Among them the leading positions were taken by X and Bb generations. On average, every eighth person representing X generation and every ninth person from Bb generation was assigned the lowest level of education.

The vast majority of the analysed population (43%) earned net monthly income ranging from PLN 2001 to PLN 5000, while the net income of every tenth respondent was higher than PLN 5000. The highest percentage of the best earners was among X and Y generations (such income was earned by 13% and 12% representatives of these generations, respectively). The representatives of these generations also dominated in the group of people earning net income ranging from PLN 2001 to PLN 5000. The percentage of Y generation representatives reaching this level of income was 50% (X - 46%). One in five surveyed people declined to answer the question about their monthly net income.

39.00% of the respondents lived in a village, whereas the other lived in cities of various sizes. A village was the place of residence for as many as 47% representatives of the youngest of the analysed generations (Z), while the most numerous urban population was characteristic for the representatives of Bb generation, 70% of whom were city dwellers. A statistical picture of a typical representative of the analysed cohorts is shown in Table 4.

Table 4: Statistical characteristics of a typical representative of Z, Y, X, Bb generation

Z	**Y**	**X**	**Bb**
Gender			
Woman	Woman	Men	Woman
Education			
Secondary	Higher	Higher	Secondary
Net income (PLN)			
3001-5000	3001-5000	3001-5000	1001-2000
Place of residence village/city			
City	City	City	City

Source: authors' compilation based on the survey research.

The first part of the survey covered the respondents' attitudes to technological innovations and the related risk (see Table 5).

Table 5: Attitudes of the representatives of the surveyed generations to new technologies and the related risk

I am open to new technologies (n = 100%)				
	Z	Y	X	B
Yes	65%	54%	61%	52%
No	35%	46%	39%	48%
I treat technological innovations as highly risky				
Yes	10%	14%	9%	9%
No	90%	86%	91%	91%

Source: authors' compilation based on the survey research.

The analysis of the above presented information confirms that Z generation remains most open to new technologies (65% of its members show such openness), while the representatives of Bb generation are the least inclined to accept and use technological innovations (almost half of them present a sceptical attitude towards such innovations). This situation does not come as a surprise, taking into account the technical and technological environment and the pace of its changes, in which the representatives of these generations were and are fulfilling their social and professional functions. Interestingly, the low level of new technologies acceptance is shown by the representatives of Y generation (54%) which, in turn, can be explained, e.g., by the highest percentage of their ratings indicating high level of risk related to using such innovations. It is somewhat surprising that the level of risk assessment regarding technological innovations, presented by the representatives of other generations, i.e. Z, X and Bb, is evenly matched. On average, only one in ten members of these cohorts expressed an opinion about high level of risk related to technological innovations.

The assessment and ranking of the generational distribution covering people declaring openness to new technologies and those treating new technologies as highly risky, adjusted by the number of the studied cohorts, confirms the above conclusions allowing to indicate that the first group is formed by the representatives of Z generation (28%), X (26 %), Y (24%), Bb (22%), whereas the second one includes members of Y (33%), Z (24%), X (22%), Bb (21%) generations.

The second area of the conducted analyses was the declared level of using internet and mobile banking services by the members of the surveyed populations (see Table 6).

Table 6: Declared use of internet and mobile banking services in the analysed cohorts

I have an online bank account (n = 100%)				
Answer	**Z**	**Y**	**X**	**B**
Yes	63%	61%	62%	68%
No	37%	39%	38%	32%
I use mobile banking applications				
Yes	60%	48%	53%	37%
No	40%	52%	47%	63%
I use modern mobile payment systems (PayPal, PayU, BLIK, Google Pay, HCE)				
Yes	60%	45%	52%	45%
No	40%	55%	48%	55%

Source: authors' compilation based on the survey research.

The content of the above Table shows that an online bank account is the most popular service of the discussed forms of banking, used by the representatives of the analysed populations. Bb generation is the leading one in this area (68% of them use this financial service). The relative popularity of an online bank account does not match the use of mobile banking applications. In this case, the difference between the percentage of the representatives of the borderline generations assessed in terms of using mobile banking applications is as high as 23 percentage points (Z – 60%, Bb – 37%). In the case of Bb generation, this situation can be explained by, e.g., not having a smartphone or not showing the need to use it for such purposes. Another factor explaining the above situation may be the reluctance to use this distribution channel for banking services, influenced by the following factors:

- technical (e.g. having a mobile phone not adapted for this purpose),
- personal factor (e.g. subjective difficulty in operating a mobile banking application, concern about making mistakes resulting in financial consequences).

The level assessment of using modern mobile payment systems by the members of the surveyed populations remains consistent with their using mobile banking applications. Z population is the leading one in this respect, as 60% of its representatives take advantage of this type of payment systems. Y and Bb generations are placed at the other extreme. In the case of these cohorts, the systems are used by 45% of their members.

When assessing the distribution and generation ranking of people declaring the use of internet and mobile banking services discussed above, adjusted by the size of the surveyed populations, it is concluded that these groups are formed by the following percentage of the analysed cohorts:

- having an online bank account – Bb (26%), Z (25%), Y (25%), X (24%),
- using mobile banking applications – Z (31%), X (26%), Y (24%), Bb (19%),
- using modern mobile payment systems – Z (30%), X (25%), Y (23%), Bb (22%).

The final area of research presented in this study was the approach taken by the representatives of the analysed generations to the actions reducing the risk related to using internet and mobile banking (see Table 7).

Table 7: Declared approach of the representatives of the analysed cohorts to the activities reducing the risk related to using internet and mobile banking

I have an up-to-date antivirus software installed (n = 100%)				
	Z	Y	X	Bb
Yes	61%	47%	57%	66%
No	39%	53%	43%	34%
When logging into online banking I always pay attention to the correct address of the bank whose services I use				
	Z	Y	X	Bb
Yes	58%	51%	62%	69%
No	42%	49%	38%	31%
I read the content of all attachments to the incoming e-mails and/or text messages				
	Z	Y	X	Bb
Yes	39%	31%	38%	38%
No	61%	69%	62%	62%
I use mobile banking at school/work through the Wi-Fi network operating there				
	Z	Y	X	Bb
Yes	30%	27%	33%	19%
No	70%	73%	67%	81%
I believe that my daily limits for online transactions in mobile/internet banking set by the bank should be increased				
	Z	Y	X	Bb
Yes	23%	20%	19%	13%
No	77%	80%	81%	87%

Source: authors' compilation based on the survey research.

The assessment of this approach is based on the analysis of using appropriate services/activities indicating, on the one hand, the awareness of the emerging risks associated with the use of internet and mobile banking and, on the other, an active approach to their reduction. For example, Bb generation is the group whose members have the highest percentage of installed and up-to-date antivirus software (66% of the respondents from Bb generation have and use such protection), with the indication that more than half of Y population does not have such software). The analysis addressing behaviour of the representatives of the studied cohorts favouring the reduction of risk related to using internet and mobile banking also shows that:

- approx. between 51% (Y) and 69% (Bb) members of the analysed generations pay special attention to correct internet address of the bank whose services they use, with the highest percentage of these people referring to the oldest generations (Bb and X),

- representatives of the assessed generations are aware of the risks associated with the content of attachments to the received e-mail or text messages, including those addressed by their banks. The content of such messages is consciously unrecognized by 69% of Y generation, 62% X and Bb each, and 61% Z,
- members of the surveyed generations also show great awareness of the risks related to using public Wi-Fi networks, in the authors' opinion. In this case, using such access points is declared by 19 to 33% of the representatives of particular populations (19% Bb), (27% Y), (30% Z), (33% Y),
- a similar conclusion refers to the assessment of bank internet/mobile transaction limits. From the perspective of the vast majority representatives of all surveyed generations, their usually low level, set by the bank, is considered safe and not requiring any additional adjustment. This opinion is expressed by 87% of Bb generation, 81% X, 80% Y and 77% Z.

Research Conclusions

The conducted research presents a diversified picture of the approach to the risk related to using internet and mobile banking services as well as the tools and activities of its reduction by Polish representatives of the Baby boomer, X, Y, Z generations. The conclusions resulting from the interpretation of the collected answers can be approached as the picture of specific states and attitudes represented by the respondents towards technological innovations and the associated risks, and also their activities, which are assumed to be the response to the risks related to using the dynamically developing online banking based on the internet and mobile access channel and the distribution of its services.

In the opinion of the research authors the first hypothesis stating: *The representatives of the analysed generations show both a diversified level of openness towards technological innovations and the acceptance of the related risk* (H I) should be refuted. Such an interpretation of the obtained research results is supported by the situation of a clear difference in both acceptance and openness towards new technologies between the studied cohorts. The analysis of the percentage of people open to new technologies clearly shows its growing tendency related to the assessment of the representatives of the increasingly younger generations. This state seems to be natural, having adopted that the professional and social activity as well as everyday life of these populations' members was accompanied, to a varying degree, by the dynamic and profound changes created by technical and technological innovations. However, the differentiation in openness to new technologies does not go along with the differences in the perception of the related risks. In the authors' opinion, the low and relatively constant level of perceiving these innovations as risky can be explained in two ways. On the one hand, it may be a consequence of the assumption that the representatives of the analysed cohorts perceive these innovations as friendly, meeting the expectations and needs of their users, and therefore free from the risks of their application and, on the other, this result may be the consequence of insufficient knowledge and awareness related to the negative consequences of implementing technical and technological innovations.

The second hypothesis can be considered as verified, which says: *The representatives of the analysed generations show a diversified use of internet and mobile banking services* (H II) as well as the third hypothesis stating: *The representatives of the analysed generations show a diversified approach to the activities reducing the risk of using internet and mobile banking services* (H III).

Hypothesis II has been confirmed in the visible differentiation of using the services in question by the individual cohorts. In this case it is clearly visible that the younger generations, comparing to their predecessors, find it easier to use modern tools and techniques for accessing financial services. The only exemption from this conclusion is the leading role of the representatives of Bb generation in having online bank accounts comparing to other populations. At this point, it is worth adding that from the perspective of assessing this use, there is still an extensive space for the activities to be carried out by banking institutions and other financial market organizers focused on education and promotion of internet and mobile banking, predominantly among the representatives of older generations. Such activities are absolutely desirable in the current epidemic situation, as they favour the protection of people who make financial transfers and payments by accelerating them, refraining from cash payments or abandoning the need for their physical realisation in bank branches.

The conclusion regarding the verification of hypothesis III is a consequence of the situation, according to which the analysed populations show actual differences in using the discussed services and taking actions reducing the risks related to the analysed forms of banking. This difference, referring to, e.g., having and using the up-to-date antivirus software, verification of the correct bank internet address or using public hotspots can be explained by the different perception of the risk implied by accessing the web-based network and internet and mobile banking services, as well as the subjective assessment of the effectiveness of specific protective measures.

Regardless, however, of the reasons underlying the situation discussed in this article, it is important to emphasize the need for intensifying educational and cognitive activities characterizing: a/ the risks implied by using mobile and internet banking, b/ tools and desirable attitudes of their consumers reducing the related risks.

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Polish Code of Professional Ethics in Accounting – A Survey Among Accountants and Other Professionals

Marek CIESLAK, PhD

Poznan University of Economics and Business, Poznan, Poland
marek.cieslak@ue.poznan.pl

Abstract

The need for a code of ethics to ensure equality for stakeholder groups is taken for granted. The Code of Professional Ethics in Accounting regulates the ethical behavior of people professionally involved in accounting. The conducted survey allowed for the formulation of a number of conclusions regarding the Code. Although the respondents considered the principles to be correct, they were less willing to support solutions binding the practice of the accounting profession with compliance with the principles contained in the Code. The largest number of respondents decided that the requirement for practicing the profession in accounting should be observance of the principle of professional secrecy, and the least that it should be compliance with the rules of conduct in the event of a conflict of interest.

Keywords: accounting ethics, accountants, code of ethics, Poland.

Introduction

Professional ethics develops with many users, as then they must make choices in the interpersonal sphere. It is the task of judging and compromising that requires ethical judgment and that develops the dynamics of service institutions. Hence, the profession must also develop its own value system in order to assess and influence the goals of the stakeholders' activities (Cieślak and Skoczek-Spychała 2006, 2007). Individual value systems of any group cannot provide an acceptable standard, and a relatively independent set of standard values is needed to drive the necessary choices. Service profession codes of ethics must mean costs for some users and benefits for others. Their establishment requires a relatively independent standard.

The aim of the paper is to present the results of the survey concerning the Code of Professional Ethics in Accounting, prepared and adopted by the Accountants Association in Poland, which is meant to be phase one of bigger research taking also other stakeholders into consideration. The presentation will be preceded by short considerations on accounting ethics and the characteristics of the Code. Due to the limited volume of this article, the research results will be presented in a shortened, synthetic form (without graphs showing the distribution of responses).

Ethics and its Codification as an Element of Accounting

The need for codes of ethics to maintain equality between different but valuable groups is usually taken for granted. However, an important question remains: how do leaders view and try to achieve equality? Is the term equality in the sense of the concept of justice too idealized and vague to serve as a practical standard? It is, of course, possible to adopt one of the competing groups' code of ethics as theirs, but it is an accepted practice to create collective value based on the needs articulated by all stakeholders and use it to evaluate individual sacrifices and benefits.

T.G. Higgins and W.E. Olson (1972, p. 33) stated that the code of ethics is the basic document creating professions, ethical concepts fill the body with spirit, and a consent to ethical concepts and adherence to them by the majority of practitioners changes the profession into a profession.

The code of ethics must be authoritative to be an effective tool of social control - it must also be credible to obtain effective power. While obviously the usual doubts about the notion of compliance and of possible consequences are

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important, the process of convincing parties affected by the code that this proposed code of ethics should be supported despite some undesirable consequences is equally important. (Preston et al. 1995, p. 530).

Codes of ethics are needed in accounting also because accounting standards (legal regulations, rules - which, of course, depend on the legal system in which the entity operates) instruct the accountant on how to proceed in a typical decisions in rarer but often far-reaching consequences, unusual situations.

Characteristics of the Code of Professional Ethics in Accounting

The Code of Professional Ethics in Accounting (hereinafter also referred to as the Code or Code of Professional Ethics) was adopted on June 23, 2007 by the 19th National Congress of Delegates of the Accountants Association in Poland (*Stowarzyszenie Ksiegowych w Polsce,* hereinafter also SKwP). The Code contains regulations of ethical conduct in the most important spheres of professional activity of people dealing with accountancy. The preamble states that the Code contains "patterns of ethical behavior that should be followed by accountants in their profession" and is intended to be the basis for resolving ethical disputes. Although it obliges "every person dealing with accounting to observe the principles of ethics and to act in accordance with the spirit of the development of the profession in the field of accounting and the global environment in which it is currently performed" (SKwP 2007, preamble), it is an honorary obligation, which actually apply only to the signatories of the Code, regardless of whether they are members of the SKwP, which in turn is not mandatory.

According to the Code, a person dealing with accounting is a natural person who performs accounting activities (nb. The accounting activities described in the Code are an adaptation of Art. 4 sec. 3 of the Accounting Act (Act 1994), however, a provision was added to perform financial analysis and popularize knowledge in the field of accounting), management support activities, tax settlements and other public-law settlements in the entity, as well as other persons related to accounting through teaching or other forms of accounting popularization.

The SKwP Code contains nine ethical principles applicable to people dealing with accounting, namely the principle of professional competence, the principle of high-quality work, the principle of professional independence, the principles of responsibility for the prepared and presented information, principles of conduct in relations with persons, entities and institutions professionally related to it, rules of conduct in cases of disputes and conflicts of interest, rules of conduct in special situations, rules of professional secrecy and the rule of properly offering services in the field of accounting. The authors of the Code also included a provision that the profession in the field of accounting is a profession of special importance, which should be seen in the macro- and microeconomic scale.

Results of the Conducted Research

As the Code has been implemented for a longer time, I have decided to survey the knowledge of its provisions on a sample of 316 respondents, employed mainly in accounting departments of the units. Among the respondents there were also people employed in the financial departments of enterprises, describing themselves as "members of the management of the entity", including chief accountants and financial directors, as well as people related to finances, working, for example, in tax offices or credit departments of banks, collectively included in the 'other' category.

Although only 5% of respondents declared membership in the SKwP, the awareness of the Code was declared by an average of 22% of respondents. The largest percentage of people (33%) who have read the Code in relation to those declaring that they know its existence are members of the management of economic units. A similar declaration was made by 14% of people who identify themselves as accountants. None of the other respondents read the document before completing the survey.

The respondents stated that the Code of Professional Ethics in Accounting is necessary. The opposite opinion was expressed by 18% of the respondents: the largest number among employees of financial departments, and the least among employees of accounting departments. Among the respondents who declared knowledge about the existence of the Code, the most opposed to it was among the members of unit management (17% of respondents declared that they had read this document and it is not needed), and the least among employees of financial and other departments (all considered its existence needed); 6% of employees in the accounting department admitted that they knew about its existence, but did not read it and considered it unnecessary. On the other hand, respondents declaring a lack of knowledge about the existence of the Code, this document has the most opponents among employees of financial departments (31%).

The respondents (85% in total) stated that the Code should apply to all people involved in accounting. Only 15% were of the opposite opinion. The first option gained the greatest support among the respondents declaring them-

selves as members of the unit's management, and the lowest among persons describing themselves as employed in the financial department.

When asked whether the enforcement of the provisions of the Code of Professional Ethics in Accounting should be left in the hands of the professional self-government or SKwP, or should it be handed over to the judiciary, the overwhelming majority of the respondents opted for the first option.

The next nine questions of the survey concerned the following rules contained in the Code of Professional Ethics in Accounting. The respondents were asked for their opinion on the validity of a particular rule, as well as for their opinion on whether compliance with the rule should be a requirement for the accounting (accountant) profession. Below I present the most interesting answers gathered in the survey.

The first question concerned the validity of the principle of professional competence, which 91% of respondents considered correct. The greatest number of supporters of making the performance of an accounting profession dependent on compliance with the principle of professional competence was among representatives of other professions, and the least among employees of the financial department. It is also worth noting that 58% of the accounting department employees answered "yes", which is a value lower than the weighted average for all respondents, which was 65%.

The second of the principles included in the Code of Professional Ethics in Accounting, the principle of high-quality work, was recognized as right by 88% of respondents. It was least accepted by employees of the accounting department, and only in the group of other employees this principle was assessed as highly as the principle of professional competence. Compliance with the principle of high-quality work as a requirement for the accounting profession was supported by only half of the respondents.

The principle of professional independence was recognized as correct by even fewer respondents than the first two principles (74%), but it is interesting that 86% of people who define themselves as members of the management of the unit had such an opinion. The responses of employees from other departments resulted in a low acceptance level compared to the first two principles.

The fourth question concerning the principles included in the Code of Professional Ethics in Accounting was intended by the respondents to indicate that the principle of responsibility for the prepared and presented information in the field of accounting is right or wrong. The answers show that this principle was appreciated by the respondents, and the fact that the practice of an accounting profession was dependent on compliance with this principle was much less accepted. Relatively the least convinced here were representatives of the management staff (56%), and the most convinced people of other professions (77%). Against the background of answers to a similar question regarding the remaining rules, the total score of 64% of the answer to "yes" should be considered quite high.

Another principle of the Code regulates the conduct in relations with persons and entities professionally associated with a person practicing accounting. Almost all employees of other departments in the units considered it correct (96%), and she found the most opponents among employees of financial departments (20%) and members of management units (74%).

The rules of conduct of a person dealing with accounting in the event of a dispute and conflict of interest were considered correct by 73% of the respondents; the employees of financial departments did so the most (84%). This rule found the greatest opponents among the management of units and employees of accounting departments (18% and 17%, respectively), and the most "I don't know" answers were given by employees of other departments of enterprises (21%). These principles were the only ones that received more "no" than "yes" answers to the question of whether compliance with them should be a requirement for accounting professionals (41% and 35% respectively). Responses to "yes" prevailed among the members of management of units and employees of other departments in enterprises, while answers to "no" prevailed among employees of financial and accounting departments

The principle of professional secrecy, which is not particularly surprising, turned out to be the principle most appreciated by people describing themselves as members of the management of the unit - everyone considered it correct, just like the respondents working in the accounting department (99% "yes"). In total, 98% of respondents agreed with its wording. Also, the largest number of respondents (77% in total) considered that compliance with this principle should be a requirement for the accounting profession. Again, it is not surprising that the most supporters of this approach were among the management staff (86% in favor, only 4% against).

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The last rule from the Code of Professional Ethics, i.e. the rule regulating the principles of properly offering accounting services, may be perceived as controversial, if only because it is unethical to offer accounting services by making any comparisons with other accountants, especially - in terms of competences and prices of services (SKwP 2007, point 8.1.5) The rule was assessed as correct by the respondents (78%), it gained the least supporters among employees of financial departments (67%), and the most among representatives of other professions (88%). However, the highest number of opposing votes was recorded among the management staff.

Conclusions

The survey conducted on a sample of over 300 people working in accounting departments, financial departments, unit management and other positions related, however, directly or indirectly to accounting, allowed for the formulation of a number of conclusions.

The awareness of the existence of the Code of Professional Ethics in Accounting is quite low among respondents, however, the vast majority of respondents recognize the need for a document regulating the ethical behavior of people working in the field of accounting. The respondents believe that the provisions of the Code should be binding on all persons dealing with accounting, and not only on the members of SKwP, which prepared the Code. According to the respondents to the questionnaire, the supervision over compliance with the provisions of the Code should be carried out by the professional self-government, and not by the state authorities through the administration of justice.

All the rules of conduct formulated in the Code of Professional Ethics in Accounting were considered correct by a significant majority of votes; the principles of professional secrecy (98%), professional competence (95%) and responsibility for the prepared and presented information in the field of accounting (93%) gained the greatest support. The smallest number of respondents (74%) considered the principle of professional independence and the rules of conduct of a person dealing with accounting as correct in cases of disputes and conflicts of interest.

The respondents supported the solution that requirements the performance of the accounting profession to a lesser extent than compliance with the Code. The highest number of respondents (77%) considered that the requirement of practicing the profession in the field of accounting should be observance of the principle of professional secrecy, and the least - the rules of conduct of a person dealing with accounting in cases of dispute and conflict of interest (35%) and proceedings a person dealing with accountancy in relations with persons associated with her professionally (38%). Such responses may or may not be caused by a lack of faith in one's own abilities and security ("what will happen, if it happens to me to break the rule"?).

The average assessment of the principles contained in the Code was similar in all professional groups (from 83% to 89% of the respondents considered them correct), the highest rated principles were assessed by representatives of the management staff, and the lowest - interestingly - by employees of accounting departments.

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Criterion for Assessing the Causes of Road Accidents

Agnieszka PODGÓRSKA
Siedlce University of Natural Sciences and Humanities, Siedlce, Poland

Jan RAJCHEL
Siedlce University of Natural Sciences and Humanities, Siedlce Poland

Jarosław KOZUBA
Silesian University of Technology, Faculty of Transport and Aviation Engineering
Katowice, Poland, e-mial: jaroslaw.kozuba@polsl.pl

Piotr NIEDZIELSKI,
University of Szczecin, Poland

Patrycja CZERNIEJEWSKA
Pomeranian Academy in Słupsk, Poland, e-mail: patrycja.czerniejewska@apsl.edu.pl

Abstract

This article presents a statistical analysis of road accidents, which happened in 2018 on Polish roads, with particular regard to the age group in which the highest number of injuries/fatalities from road accidents occurs. The research is based on the causal analysis of increased accident rates amongst the identified demographic group of drivers, as well as on external factors such as the national driver training system or legal and organizational solutions in the remit of road safety. This research article for the first time presents results and recommendations on the causes and effects of road accidents based on a detailed analysis of; the aggregate age of drivers, the current training regime and level of confidence in the rules governing specific road behaviour. This is an innovative approach, both from a theoretical and a practical safety sciences perspective, with a future impact on road safety.

Keywords: Road Safety, Road Traffic Accidents, Young Drivers, Driving Behaviour.

Introduction

The occurrence of road accidents is accompanied by many different factors, such as the type and condition of the road infrastructure, traffic congestion and its organization, the type and technical condition of vehicles, the development of scientific and technical facilities in the field of motoring, the involvement of administration in the implementation of tasks in the field road safety and many other elements more or less noticeable or palpable [11]. However, the most important reason influencing the occurrence of road accidents in the human-vehicle-road relationship is definitely the human factor [8]. Due to the fault of human, both as a vehicle driver and being an unprotected participant in traffic, a total of over 90% of all road incidents in a given calendar year occur. When analysing this factor, attention should be paid to the age of vehicle drivers, which for years indicates a certain age group in which the highest number of accidents and consequently victims. The study presents a statistical analysis of road accidents taking into account the age criterion of perpetrators. In terms of selecting the age group that is most often the culprit of road accidents, an attempt was made to identify and analyse the causes of the increased accident rate of a statistically selected group and to answer the following questions whether: is the fault caused by an inadequate training system and on drivers obtaining a driving license for the first time? What can be considered one of the main research problems? Or maybe not fully functional legal and disorganized solutions or even threatening road safety are the main cause of road accidents due to human factor? This question should also be treated as one of the equivalent research problems. There were also postulates de lege lata and de lege ferenda in the scope of improving the state of safety in road traffic, which should be treated as the main goal of research carried out using statistical and comparative methods as well as by means of analysis. This research study analyses the causes of road accidents and involves a comprehensive survey on a national scale. Indeed, there are similar studies conducted across other nations which have analysed the causes and impacts of road traffic accidents. This research

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has been based on three main factors which have included previous world-wide analysis, respectively; 1) impact of driver speed as a cause of road accidents – based on research conducted by the Ci2N University of Strasbourg for the VINCI Autoroutes Foundation – 2017, 2) age of drivers – by the Ministry of Transport of Great Britain [10] and 3) training system – by "British School Motoring" (one of the most famous driving schools in Great Britain) [23].

The article uses statistical data from 2018. At the time of submitting the print material, the data for 2019 was not available, however, a comparative analysis of the last few years indicates that in percentage terms they change within the statistical error.

Age of Managers

Analysing the statistics of road accidents, their effects, circumstances and causes of occurrence, it can be seen that the source of the largest number of road accidents is human error (as a participant in road traffic) (Fig. 1). In 2018, this was responsible for 30 171 road accidents (95,3% of the total), in which 2 569 people were killed (89,8% of all fatalities) and 35 690 were injured, i.e. 95,5% of all victims.

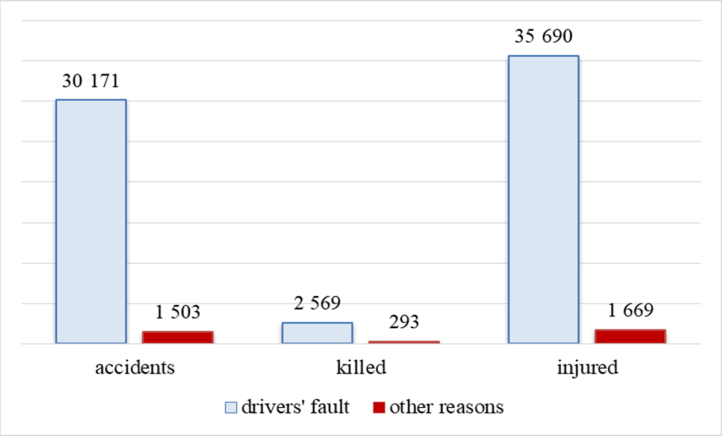

Fig. 1: Report on the occurrence of road accidents in 2018. Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, *Wypadki drogowe w Polsce w 2018 roku,* Warszawa 2019.

For years, most road accidents have been caused by the fault of drivers, putting them in the first place of all statistics, reaching numbers exceeding ten times higher than the perpetrators of other accidents due to the fault of pedestrians and passengers (Fig. 2). As at 30 June 2018, the population of this age group was 2 922 156 people, a group between 25 and 39 year old – 8 903 584, people between 40 and 59 years old recorded 10 266 316, while there were 9 392 660 people in the age group over 60 [24].

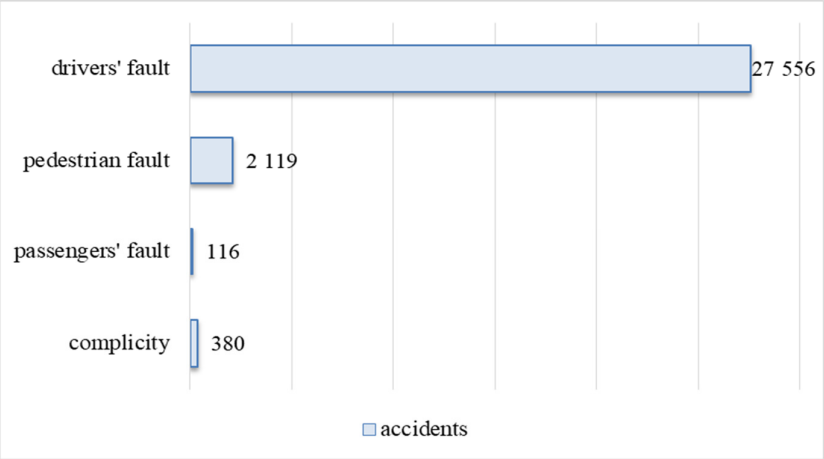

Fig. 2: Road accidents in 2018 by agency. Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, *Wypadki drogowe w Polsce w 2018 roku,* Warszawa 2019.

In 2018, drivers of vehicles were the perpetrators of 27 556 road accidents, in which 33 261 people were injured and 2 177 were killed. Most accidents happened this year: in May (2,697), June (2,673), July (2 689) and October (2 699), and least in February (1 542). Most submissions about the events the police received on Friday (5 230), and the least on Sunday (3 681), while the most common hours of events were the so-called rush hour, i.e. between 4 p.m. and 6 p.m. (4 383), and least between 2 p.m. and 4 p.m., when 302 road accidents occurred.

Particular attention should be paid to the group of so-called "young drivers" between 18 and 24 years old, which has the highest rate of road accidents per 10 000 population (Fig. 3).

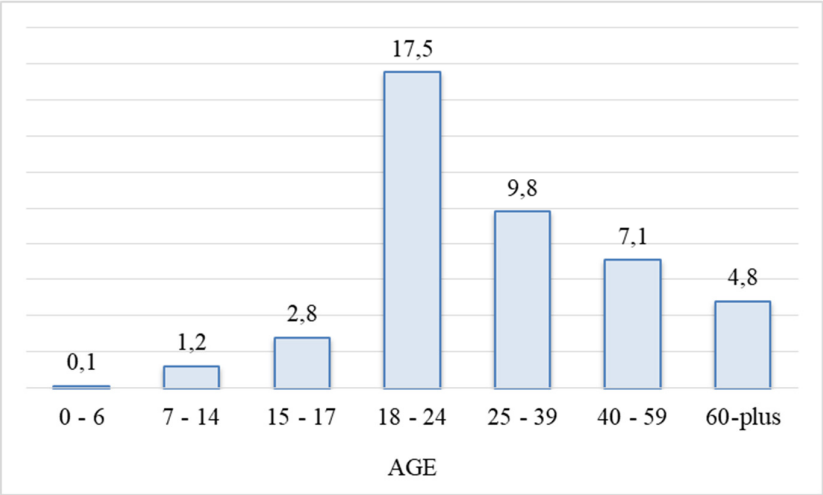

Fig. 3: Accident rate per 10 000 population by age group. Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, *Wypadki drogowe w Polsce w 2018 roku,* Warszawa 2019.

In 2018, 5 113 road accidents were caused by "young drivers" aged between 18 and 24 years old, which accounted for 18,6% of all accidents that were generally caused by the drivers. As a result of these events, 428 people were killed and 6 734 were injured. In addition, it should be noted that within the age group directing from 18 to 24 years of age there is also the largest number of fatal and injured victims (Fig. 4).

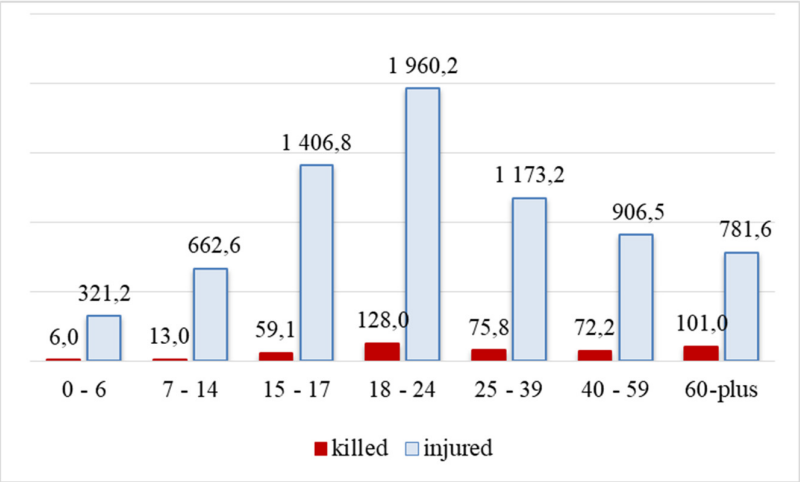

Fig. 4: Rate of deaths and injuries per 1 million population in 2018. Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, *Wypadki drogowe w Polsce w 2018 roku,* Warszawa 2019.

The highest number of fatal accidents, 379, in relation to the population, was also caused by this group of "young drivers", which accounted for 19,1% of all accidents caused by drivers. It was mainly a collision with a tree, a side impact, frontal collision and hovering on a pedestrian (Fig. 5).

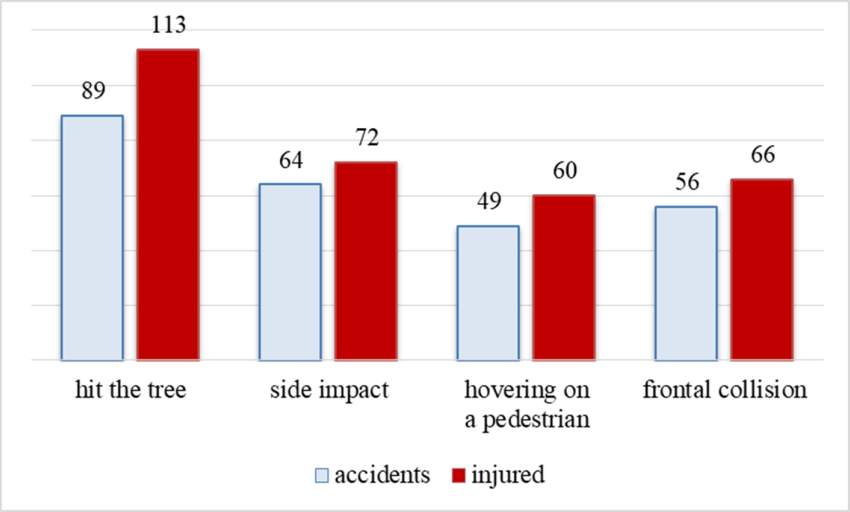

Fig. 5: Type of road accidents with a fatal outcome caused by drivers of vehicles in the age range 18-24.

Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, Wypadki drogowe w Polsce w 2018 roku, Warszawa 2019.

The most common causes of accidents caused by drivers in this age group were: inadequate speed to traffic conditions, failure to give priority to crossings, and failure to give priority to pedestrians at a pedestrian crossing (Fig. 6).

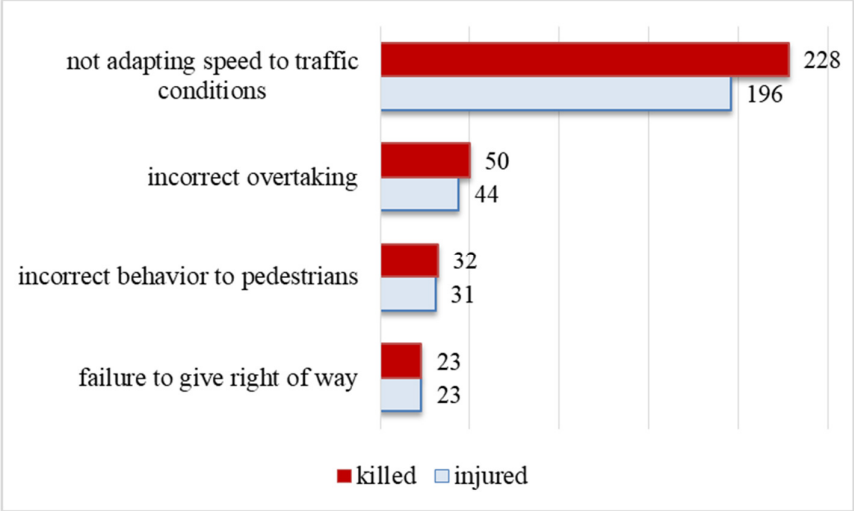

Fig. 6: The main causes of fatal accidents caused by drivers in the 18-24 age group

Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, Wypadki drogowe w Polsce w 2018 roku, Warszawa 2019.

The main cause of road accidents for which drivers are responsible at 18 to 24 years old, is a mismatch of speed to traffic conditions, which in 2018, constituted, 35,6% of accidents, resulting in 53,3% of all fatalities in accidents caused by them.

Speed, as a source of road accidents depends on the class, function of the road, nature of traffic and development of the surroundings [16]. It can therefore be concluded that a factor threatening road safety is the lack of ability for young drivers to adapt their speed to the type of road, technical solutions and traffic solutions [4]. It should be noted that one of the reasons for drivers exceeding the speed limit is the vehicle manufacturers themselves, who are constantly working on increasing the speed of designed cars.

Research conducted on a group of young drivers shows that they achieve driving pleasure only after developing a significant speed and in conditions that allow for fast driving [5]. Studies conducted on a group of young drivers indicate that they achieve driving pleasure from excessive speeding and in conditions that allow for fast driving. Ergonomic studies show, however, that at speeds above 130 km/h. the driver of the vehicle decreases its level of perception and response time to external stimuli, i.e. road signals and other road users [17]. This is due to reaching the biological limit of mental fitness at this speed, and especially if excessive speed is accompanied by heavy traffic. The driver of the car is obliged to constantly make choices and actions regardless of the perception and assessment of the situation. At high speeds, the probability of making a mistake increases significantly, while the possibility of corrective actions decreases [6].

There are probably several sources contributing to "young drivers" exceed speed limits. Undoubtedly, one of them is the lack of appropriate practical knowledge and experience, which often results in faulty assessment of road conditions and inadequate speed adjustment to these conditions. For example, during heavy rainfall, in the fog or after dark, it is much more difficult to maintain control over a vehicle moving additionally at excessive speed. Lack of the right skills and the mentioned practical knowledge mean that young drivers in bad weather are not able to accurately assess the distance between vehicles, braking distance, or vehicle driver behaviour during a sudden cornering [15]. Acquiring such important manners of driving a vehicle as recognizing hazards on the road, maintaining a safe (not always allowable) speed, the ability to combat distraction or dealing with difficult or urgent road situations is the result of many years of practice. Preparation courses for driving tests are focused only on passing on basic knowledge about driving without the possibility (due to the limited number of hours) of meticulous and sufficiently to learn to react in very different and numerous situations on the road.

Another reason affecting speeding by young drivers is ignorance of their psyche and automotive skills. Negative factors of everyday life, or the desire to impress peers can cause the driver to be aggressive or bravado on the road. The driver's personality function manifests itself either in cautious driving or in excessive self-confidence. And it is this negative attitude of the driver towards the environment in connection with the lack of knowledge of his personality that is the hidden cause of road accidents, the source of which is excessive speed [7].

Failure to adapt speed to traffic conditions by young people is a problem present not only in Poland. For example, in 2015 Goodyear's tyre company commissioned a survey in Europe, the Middle East and Africa regarding speed limits and compliance with traffic rules [18]. The survey was addressed via the Internet to drivers under 25 years of age. Research results have shown that the speed in a given section is usually exceeded by young drivers in Poland, which 81% of respondents admitted. Slightly less in Africa – 79% and in Russia – 60%. The most responsible young drivers turned out to be residents of Great Britain (54%) and Spain (40% respondents admitted to speeding). Spaniards also much less often try to achieve the maximum speed of their vehicles. This state of affairs is probably explained by the effective enforcement of the law and the quite numerous number of speed cameras. However, young drivers from Russia (46%) and Germany (53%) admitted to testing their vehicle. The behaviour of the latter group is not surprising, however, as most German motorways, as few, do not have speed limits.

Statistics also indicate that the cause of road accidents caused by "young drivers" of vehicles was not only the failure to adapt speed to traffic conditions, but also incorrect overtaking, incorrect driver behaviour towards pedestrians, or failure to give priority to another traffic user [13]. Drivers in this age group, adopt these bad practices most often in urban traffic or in places with heavy traffic. Here the so-called thrill present at excessive speed gives way to bravado and a desire to impress, which is manifested in extreme overcoming the difficulties of city traffic, or the satisfaction of poor (sometimes imaginary) competition with other drivers. Research indicates that incorrect overtaking is the effect of rush or is dictated by the desire to show off the "young driver" of their skills, while slow and compliant with traffic rules for many of them means weakness and cowardice [14].

It is this improper and irresponsible approach to the basic principles of road safety that are the cause of a large number of road accidents with tragic consequences. The decisions made by drivers are, after all, an objective assessment of the situation and their own capabilities, which often – in the case of drivers up to 24 years old – are different than the reality indicates. In the absence of experience, there are various reasons for accidents causes in young drivers. These include: deciding to perform any manoeuver, in addition at excessive speed, lack of concentration (sometimes under the influence of alcohol or other stimulants) and cooperation with other road users (necessary e.g. when overtaking, passing, avoiding) very often inexperienced drivers mistakenly they assess the distance of another car, the possibility of their own vehicle or the prevailing road conditions, and are probably not aware of the fact that in such a situation they pose a threat not only to themselves but also to other participants using the roads properly [3].

Analysing the above behaviours and characteristics, it is possible to present a general profile portrait of the "young driver", which has the following features:

- treats his vehicle in a utilitarian way, which he only uses to travel quickly;
- extremely approaches the appearance of the vehicle, i.e. either does not show a clear interest in the car, or - in order to stand out and want to impress – unduly focuses his attention on various accessories and modifications (e.g. modernization, tuning, modernization, installation of equipment for loud listening of music, etc.);
- drives his vehicle carelessly, automatically and without proper concentration or attention to his driving style;
- while driving, often uses the telephone (sometimes also without the required hands-free kits), which focuses on conversation, instead of safety, smokes cigarettes, which in turn limits manual operations;
- shows constant rush resulting from permanent lateness;
- does not respect traffic regulations, which is due to lack of concentration, lack of involvement in driving and educational gaps;
- park the vehicle in a prohibited area with no parking (most likely out of convenience, laziness or as a result of thoughtlessness);
- behaves selfishly, e.g. by forcing priority, so-called driving on the road, or preventing drivers on subordinate roads from joining traffic, of which this manoeuver is sometimes only possible with the appropriate behaviour of another driver;
- derives satisfaction from dangerous driving, often above the speed limit, and in relation to properly moving drivers can be aggressive and rude;
- as a tendency to decide on performing risky ones and dangerous activities and behaviours, such as overtaking at excessive speeds in places with no overtaking.

The characteristics of "young drivers" indicated above are confirmed both by statistics on the road accidents caused by them and the results of numerous observations of their use of roads. Both should be a premise for reflection that will force all drivers to verify their driving style and complement this style with quality. This applies in particular to young drivers (not seniority) of drivers, because any vehicle they use is like a dangerous tool in the hands of the wrong person, because they lack the imagination and responsibility for themselves and for other road users (passengers, pedestrians, other drivers etc.) [12]. This is indicated by offenses with the participation of "young drivers", which in most cases have a tragic ending (Fig. 7).

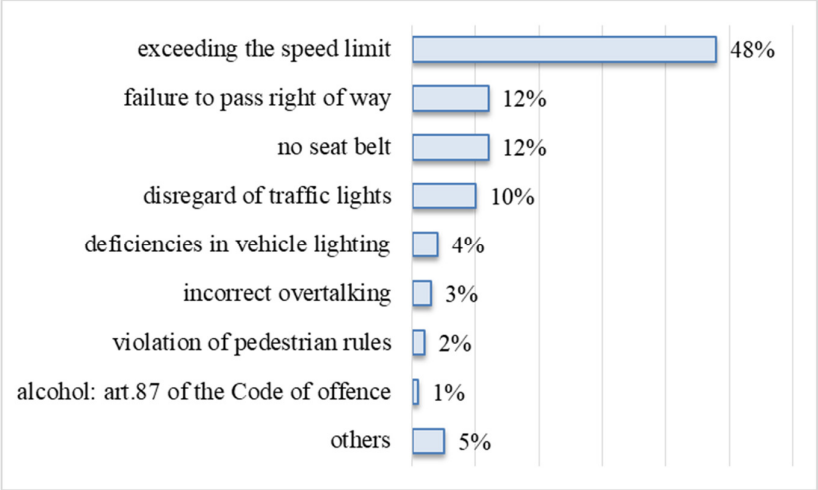

Fig. 7: Structure of offenses committed by "young drivers" revealed by the Police in 2018.

Source: Authors own work based on Komenda Główna Policji Biuro Ruchu Drogowego, Wypadki drogowe w Polsce w 2018 roku, Warszawa 2019.

The offenses indicated proof that the existing preventive systems (fines, penalty points) used by the Police proved to be ineffective. In the present world, with deeply rooted democracy, in which there are no authorities, even police officers no longer give due respect. Society requires more rights, more privileges and more benefits from the state, without any obligations. This applies especially to young people, who are a group of people who respect the law the least (although you cannot generalize here, because it could be far from being harmful to honest and righteous younger people). Although this inexperience or behaviour is often explained by youthful enthusiasm, joy of life and independence, which is the receipt of a second (after ID card) important document - driving license, this law does

not justify neither vices nor offenses. However, information about road incidents, or tragic statistics in this area do not have causative power and are not able to influence the reason of some "young drivers". It is hardly surprising, because the source of all methods is psychological background. By submitting to smaller or greater temptations, we all feel free and we have the right to make various choices. However, this does not absolve anyone from responsibility, and motivation, reflection and analysis of their own conduct should be elements of teaching at a very early stage of life, and when referring to education of participation in road traffic - at the level of the first theoretical classes in the training centre. This approach to the issue of "young drivers" as road participants will probably make it more friendly and attractive, and thus – safer [9].

Training system for drivers obtaining a driving license for the first time

Research issues related to road safety are many areas of human activity related to such thematic groups as e.g. legal and organizational solutions, rescue systems, educational and preventive activity, psychological and medical problems, the impact of transport and road technology and technology, traffic supervision, gathering and grouping information, examining threats and their causes, analysing explanatory, preventive and repressive measures. However, referring to the criterion for assessing the causes of road accidents caused by drivers of vehicles, including groups of so-called "Young managers" can be identified in several areas in which to look for the reasons for such a high accident rate from the indicated groups. And these are, among others: a system of training candidates for drivers, a system of road marking using signs and signals, and control systems and the use of preventive and repressive measures against the so-called "young managers".

Based on Article. 26 of the Act of 5 January 2011 on drivers of vehicles [19] to conduct training for persons applying for permission to drive a motor vehicle (driving license) are entitled: driver training centres, as organizational units of the entrepreneur entered in the register of entrepreneurs operating training centres; military units in the scope of training soldiers for the needs of the Polish Armed Forces and organizational units of services subordinated to or supervised by the minister competent for internal affairs - in the scope of training people for the needs of these services. As you can see, the Act indicates the multitude of entities authorized to conduct courses, however, they differ in training methods and the level of assessment of effects, which in turn depends on the people running the courses, i.e. instructors. Remembering about the group of "young managers", about their agency, lack of experience and bravado while driving, the question arises whether one of the reasons for this is the proper preparation of teachers for conducting this type of education. Driving instructors play the most important role at the stage of training young drivers, because their knowledge, practice and training skills affect the driving safety of young drivers.

The cited act on vehicle drivers regulates the rules of admitting people to conduct training as a driving instructor. Article 33 indicates that it may be a person who has at least secondary education; has the same driving license category as the scope covered by the training for not less than two years; has a valid medical and psychological certificate about the absence of health contraindications to perform the duties of an instructor; has successfully completed a course for candidates for instructors and will provide a certificate of its completion, and has not been the subject of a court judgment for offenses against road safety. The paradox of this regulation is that it requires the instructor to only confirm the possession of a driving license, and not to document the driving practice.

In addition, conducting driving courses is usually an additional gainful occupation for instructors, and the duration of his work, according to the Act, may not exceed a total of 12 hours, so taking into account the fatigue of such a person with "regular" employment, the effectiveness of the work as an instructor should be questioned, which is responsible for the safety of not only driving, but also the student himself. In such a system and for such a limited time, he is unable to teach the student basic reflexes, develop desired responses, or put him under control of behaviour when moving a vehicle. The centres where the courses are conducted also leave a number of doubts. Often, their infrastructure is not adapted to the needs and training requirements.

In order to improve road safety and minimize (eliminate) accidents involving "young drivers", measures should be taken to improve the system of training candidates for drivers obtaining a driving license for the first time, in particular:

- increasing the competence level of instructors and lecturers, with particular emphasis on their training process, level of knowledge and experience,
- improving the quality of services provided by driver training centres by introducing operating restrictions and restrictions,
- imposing strict requirements on driver training centres and reliable standardization.

The introduction of suggested changes discussed below may significantly enhance the level of training for drivers, and consequently eliminate many threats to road safety arising from improper practices, particularly amongst young drivers.

Lack of trust in road signs as a cause of traffic incidents

An important factor influencing the occurrence of road incidents (collisions, accidents and disasters) is undoubtedly non-compliance of road traffic rules and law by vehicle drivers. The statistics cited above indicate that the largest number of road incidents occurs in the group of "young drivers" blamed for many negative behaviours, such as bravado, recklessness, lack of experience, or permanent non-compliance with traffic rules, including road signs and signals. All drivers navigating on known sections of roads are aware of traffic hazards existing in these places and set up various types of road signs. However, for even an experienced driver moves sometimes in an uncertain manner, while performing many activities, such as tracking the map, controlling traffic on the road and reading important information from road signs. However, if these signs are obscure or do not comply with accepted rules or their appearance goes beyond the norm, it is difficult not only to notice, but also to follow. Therefore, the driver is not always liable for causing cause a traffic accident.

In Poland, the issue of road signs and signals in road traffic, their significance and scope of validity was set out in the Regulation of the Ministers of Infrastructure and Interior and Administration of July 31, 2002 on road signs and signals [20]. In accordance with art. 3. on roads apply: 1) vertical signs in the form of shields, boards with inscriptions or symbols, which also appear in the form of illuminated signs; 2) horizontal signs in the form of lines, inscriptions and symbols placed on the road surface; 3) light signals transmitted by signalling devices; 4) signals given by authorized persons; 5) sound or vibration signals sent by devices placed on the road.

It is recognized that compliance to road signs: order, prohibition and warning are placed on roads to ensure orderly traffic organization and to maintain safe driving. Everything would be straightforward if road signs were set up for each threat or required information. However, on Polish roads you can meet many absurdities disorganizing this movement, or even affecting the emergence of threats. This is explained in the following six considerations:

- speed limit signs. As you can easily see, the antidote for every threat (although not always a threat) is speed limit (i.e. sign B-33 limiting speed to 40 km / h). However, the road situation does not always require road users to make such a decision. In Great Britain, for example, where drivers and other road users have to use their experience and judgement, there are many sections of winding roads with no speed limit, and yet statistics show that in this country there are fewer accidents and fewer number of victims
- marking errors can cause confusion. This problem particularly applies to drivers who, without knowing the map or making the area, are forced to perform dangerous manoeuvers, e.g. sudden stopping, turning back or reversing on busy roads, because road signs have been placed wrongly or are illegible. From road signs (especially those on express roads), information must be read by drivers quickly to be able to choose the appropriate response (e.g. change of lane).
- setting the B-20 signs, i.e. "stop" at closed or rarely used level crossings. Of course, maintaining special safety in such places is indisputable, but drivers ignore such restrictions, because in combination with a straight section of the road without special hazards, they consider the presence of such signs to be meaningless. Even patrolling policemen enforce compliance with regulations without thinking about the legitimacy of introducing restrictions. As a consequence, such situations result in a lack of respect for road signs on busy unguarded crossings where accidents are common.
- irremovable signs after completion of road works. The problem here is that despite the completion of construction works, road signs still restrict movement along this section of the road. In addition, having erected signs related to the repaired road section (e.g. speed limits), no reference signs are placed. Drivers become confused, resulting in slow driving, until the next intersection cancelling the restriction. Rarely do drivers follow orders and simply ignore this restriction.
- defective system solutions and lack of consistency due to municipalities or county pursuing their own road marking policy. The same threats are marked in different ways in different communes or counties. Ridiculous speed limits are simply ignored by drivers. In addition, positioning of traffic signs are often set too close to the danger or well in advance, which causes chaos and loss of orientation by the driver.
- clutter and excessive information compounded by additional banners placed and hung. Their appearance or setting rules have not been regulated in any legal act. Traffic signs are no longer visible or readable with bright, shining or even moving advertisements. An uninformed driver is not able to see a road sign important for road safety. Road signs informing about e.g. petrol stations (D-23), restaurants (D-28) or vulcanization (D-26a) are the biggest problem, which are replaced by the advertisement of a

given service provider (Irregularities regarding the setting of road signs where included In the post-audit statement of the Supreme Audit Office regarding the control of public road, in addition to roads manager by the General Directorate for National Roads and Motorways. In 77% of cases, the control revealed irregularities in vertical and horizontal markings, in particular they concerned the positioning of the marks in a way that did not meet the requirements set out in the regulations and not in accordance with the adopted traffic organization [25]).

These are examples of inadequate road marking causing misinformation and ignoring of important warnings by drivers, thus not complying with the law. This problem affects drivers of all ages, not just "young" ones. In addition, the excessive amount of information on the road for any driver makes it not possible to "register" even when travelling at the applicable speed. Traffic has the characteristic that it can change radically at any time and to prevent hazards drivers must constantly monitor the traffic situation (e.g. other moving vehicles or road users).

The method of setting road signs and signals is regulated by the Regulation of the Minister of Infrastructure of 3 July 2003 on detailed technical conditions for road signs and signals and road safety devices and conditions for their placement on roads [21].

Currently, the regulations indicate a large number of road signs and signals, both in type, size, colour and purpose, therefore their setting should be thought out, i.e. they should appear only where they are really necessary and in a manner appropriate to the prevailing conditions and situations

Conclusions

This research article for the first time presents results and recommendations on the causes and effects of road accidents based on a detailed analysis of; the aggregate age of drivers, the current training regime and level of confidence in the rules governing specific road behaviour. The author has analysed the general profile and common characteristics of the "young driver", attributed by typical behaviour of young people and reflected on the inefficient and inadequate training system for such challenges. The authors believe that a significant factor that has a negative impact on shaping the silhouette of a "young driver" are irregularities that occur in road signage and markings.

To improve the level of trust in road signs, focus on systemic solutions for:

- amendments to the rules on setting road signs and their regular updating in order to harmonize these rules across the country,
- designation and appropriate training of persons responsible for setting road signs and for designing traffic organization, since at present no qualifications or permits are required of these persons.

Currently, traffic signs can be erected by any employee in this position. Sometimes, they are arranged in a mutually exclusive way, or in excess. Road signs are set by road owners, i.e. the General Directorate for National Roads and Motorways, it can also be done by heads of provinces and communes, county executives, or presidents of cities with county rights. Railway workers and employees of road repair companies also have the right to set signs. According to the law, road signs can be set by any official who has been employed in such a position and there is no requirement for these individuals to have a driving license.

In addition, in order to improve the level of road safety and reduce risks in this traffic, you should focus on control systems and the use of preventive and repressive measures against a group of so-called "young managers" [1]. The effectiveness of these projects should be achieved by:

- selective approach to the application of penalties for the group of "young managers",
- introduction by the services responsible for maintaining road safety and order of the obligation to create detailed risk maps in the subordinate area,
- focusing on identifying groups of "young drivers" who frequently violate traffic law (e.g. organizing races on the road in built-up areas),
- creating a palette of educational measures.

It cannot be prejudiced that all drivers when driving a vehicle do so in a manner that is unreasonable or bypassing applicable law. Many of them do it wisely and properly, not only by taking into account traffic law, but through proper observation of the environment and the ability to predict the behaviour of other road users. An experienced driver is able to predict the behaviour of another driver and react early enough to the threat to prevent a traffic incident with various effects.

Among the "responsible" group of drivers, there are also road accidents due to, for example, improperly functioning road infrastructure limiting the possibility of proper driving on the road, as well as due to the lack of driving culture of other drivers, i.e. by non-compliance with regulations, lack of experience or recklessness. The aforementioned driving culture together with the broadly understood communication culture and with the entire legal and institutional system normalizing road traffic is part of the safe space surrounding the human being and the road [2].

In addition, driving culture (along with driving safety) should be part of the training process for candidates for drivers who for any reason have lost their driving license. Training tailored primarily among the "young drivers" will contribute to improving road safety and the entire management system, which will contribute significantly to reducing the risk of road hazards, i.e. collisions, road accidents or disasters that result in tragic events.

The research undertaken in this article will be further developed, both in terms of the proposed aspects and also through benchmarking with other countries, taking into account the analysis of the application of practical solutions which provide much better road safety statistics.

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Covid-19 Impact on Banking Sector: Case of Latvia

Aija PILVERE-JAVORSKA and Baiba RIVZA

Latvia University of Life Sciences and Technologies, Jelgava, Latvia
apilvere@gmail.com

Abstract

Covid-19 pandemic first wave took place in second quarter 2020 in Latvia. Rapid reaction from the government imposing restrictions, resulted in medical "success" with few causalities. Impact on the economy is still to be evaluated, while the main indicators and predictions are in, Latvia is expected to face the largest GDP contraction among Baltic States. Banking is one of the main sectors securing funding lifeline to the companies, in order to produce goods and services, provide employment, thus to create value added for economy. The aim of the research is to assess the Covid-19 pandemic first wave impact on how banks operate and what is funding availability to enhance economic recovery possibilities in Latvia. Authors discovered that already after 2008 recession bank lending had an overall trend to decrease in Latvia, thus reducing available funding to the companies and households for recovery. Bank business model has changed already before Covid-19 pandemic, especially in the light of restructuring of banking sector by supervisory institutions. Covid-19 impact in banking sector has been to whom banks lend money, there are significant increase in lending to government, holding and lending money to Central Bank and other monetary financial institutions, while we saw even further reduction of lending to companies. Overall major banks' profits have seen a drop in Q22020, but they remained profitable, with exception one of the major banks experienced significant losses.

Keywords: Covid-19, banking sector, impact analysis, Latvia.

Introduction

Covid-19 pandemic, which at its beginning was not believable to reach Europe and let alone Latvia – a far Nordic European Union (EU) country, however in second quarter of 2020 (Q2 2020) the first wave of Covid-19 was unrolling across Europe and Latvia. This pandemic is different from the recession in 2008. Researchers Wojcik D. and Ioannou S. (2020), confirms it by stating that "whereas the global financial crisis on 2008 is sometimes referred to as the North Atlantic crisis, the COVID-19 pandemic is truly global, directly affecting almost every country in the world." It was a wave of unknown and seeing Italy battle with severe causalities, Government of Latvia took drastic measures and on 12.03.2020, declared emergency situation in Latvia. This move allowed Latvia to be called a "success" case with relatively few causalities in the medical terms in Q2 2020, and even allowed to end the emergency situation on June 09, 2020. There is a necessity to evaluate the impact of Covid-19 first wave, how the "success" and fighting with Covid-19 has affected economy in Latvia. As noted by Sheridan A., Andersen A.L., Hansen E.T., Johannesen N. (2020), that "in many countries, the introduction of social distancing laws in response to COVID-19 has occurred at the same time as a sharp contraction in economic activity, including consumer spending." On the other hand, economic impact has been seen also on financial and banking system in the world, this has been already recognized by Rizwan M.S., Ahmad G., Ashraf D. (2020) that "COVID-19 has slowed down the global economy. Consequently, financial institutions are facing elevated levels of liquidity risk, loan defaults, and loss of intermediation revenues. Interconnectedness among financial institutions can spread individual issues to the network of institutions resulting in an overall heating-up of the financial system." Similarly, the impact in the research has discovered also on other part of financial system – stock market by O. Erdem (2020), and Harjoto M.A., Rossi F., K. Paglia J.K. (2020). The global pandemic of Covid-19 has generated negative shocks on the equity markets across the globe.

Authors agree with Barnoussi A., Howieson B., van Beest F. (2020), who recognized "the COVID-19 pandemic is rapidly changing the economic environment, so banks will need to reassess whether it is still reasonable to consider credit risk to be low. Normally they can rely on their credit ratings, so they need to update the ratings to meet the new economic environment." They recognized that need to reassess, but have to recognize that the change cannot be stopped, are banking system and their supervisory institutions prepared for that - is one of the questions to answer yet in Latvia. Similarly, in the context of historical events Korzeb Z., Niedziółka P. (2020), emphasized that "as with

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previous global crises, it is essential to learn lessons from the current situation, as pandemics are unlikely to be repeated in the future. The power of supervisory institution over banking system and its help to revive or defer economic recovery is important and is acknowledged by Podtserkovnyi O., Vozniakovska K. (2020), where they indicated that "the real powers of the national (central) bank in the economic system and the actual ability of governments to subordinate the decisions and actions of such banks to their current interests depend on this assessment, which may negatively affect confidence in the national currency and prospects for overcoming the economic consequences of the Covid-19 epidemic." The global impact and challenges of institutions were defined by Bryce C., Ring P., Ashby S., Wardman J. K. (2020) that "transboundary crises present a significant challenge for organizations, including businesses and public institutions. Established crisis management responses can be ineffective and business continuity can be severely disrupted as problems occur over multiple domains and manifest in unfamiliar ways. Often escalating and migrating risk quickly across political and social boundaries to affect society, businesses, and global financial markets". Similarly were elaborated by Flögel F., Gärtner S. (2020), that "still, the pandemic differs from the financial crisis as the real economy at large is in turmoil, which is likely to cause defaults on business loans and potentially also affect the much larger housing loan market." The issue is two folded – the health of existing issued loans and new loans to be issued are equality important, to drive economic growth and development. Without funding companies can only stagnate, especially if the country has weak stock market, thus companies have limited sources of funding available, as is the case in Latvia. Additionally banks can be grouped in the clusters in the Covid-19 based on actions, as discovered by Talbot T., Ordonez-Ponce E. (2020), that "in the COVID-19 pandemic… three clusters of banks are identified: sweeping actions, cautious actions, and wait & see, highlighting that while most banks are doing little to help their stakeholders, three of them have a proactive and strong commitment to their clients and communities in these times of need.". This is an interesting perfective of analysis, unfortunately the lack of available data of individual bank data on loan issuance in Latvia, prevents authors to assess banking system from this perspective. On other hand, there is one more dimension to evaluate the impact, which is discovered by Li X., Xie Y., Lin J.H.(2020) , their "…results show that (i) the COVID-19 explosion makes the bank more prong to loan risk-taking, thereby adversely affecting banking stability. (ii) Government capital injections make the bank more prudent to loan risk-taking, thus contributing to banking stability."

There are several ways to evaluate economic impact, authors are doing it through evaluating banking system and what impact Covid-19 has had on the availability of the funding to the economy, via loans available to companies and households and put forward recommendations to improve situation in Latvia. Topically on the issue has also been emphasized by J.W. Goodell (2020) "banks of course by their nature are vulnerable in times of economic downturns, because of the likelihood of nonperforming loans and the possibility in extreme cases of bank runs. It remains to be seen how COVID-19 will change the practices of financial institutions." Similarly, Korzeb Z., Niedziółka P. (2020), emphasized that "as with previous global crises, it is essential to learn lessons from the current situation, as pandemics are unlikely to be repeated in the future. Therefore, the biggest challenge facing the banking sector today is to reorient existing strategies to prepare for similar scenarios in the future. The scale of lending, which appears to be crucial for economy's recovery, depends on the extent to which capital will be consumed as a result of the crisis and to what extent capital requirements will be liberalized." Overall, when other researchers evaluate Covid-19 impact on economy and banking, they research how well are banks capitalized and their profit levels, but lack the research on how banks in pandemic help or hold back economic recovery. Thus, the ***research aim*** is: to assess the Covid-19 impact on the changes of how banks operate and what is funding availability to enhance economic recovery possibilities in Latvia.

Materials and Methods

Authors used scientific literature review, combined with analysis of Covid-19 legislative acts and available statistics from the Financial and Capital Market Commission (FCMC) Latvia. This research is structured in three main parts: pre-Covid-19 banking sector landscape in Northern EU: Finland (FI), Sweden (SE) and Denmark (DK) compared to three Baltic States (Estonia (EE), Latvia (LV) and Lithuania (LT), second part analyzes main indicators of overall banking system in Latvia on quarterly bases from 2018 until Q2 2020. This is done to be able to compare two non-Covid-19 second quarters of 2018 and 2019, in order to remove seasonal biases if any. Third part evaluates all 13 in Latvia operating and reporting banks on the individual bases to research their business model and to evaluate Covid-19 impact on individual bank level. In order to perform this research authors compiled annual data from 5 central banks of Denmark, Sweden, Finland, Estonia and Lithuania, as well as from FCMC in Latvia, for time period form 2003 until 2019, on the total lending (TL), and total deposits (TD). Authors used polynomial relationship trendline, to forecast and extrapolate potential development of various indicators.

Results and Discussion

Pre-Covid-19 Banking Sector in Northern Europe and Latvia

Authors assessed pre-Covid-19 pandemic landscape of the banking sector in Latvia in the context of the closest neighbors – Estonia and Lithuania and against well-developed Nordic EU countries: Finland, Sweden and Denmark, already since 2003. The intension was to compare the banking system development to and post 2008 recession and its development upon arrival of Covid-19. This resonates well also with researcher Piotrowski, D. (2020) that "criticism of the banks' actions has intensified especially since the global financial crisis initiated in 2007." This along with introduced overhaul or reorganization of the banking system by the supervisory institutions in Latvia, has set the impact on the banking system and loan availability already preceding Covid-19. As can be observed in Figure 1, it is almost obvious that in Sweden and Finland banking main indicators: namely lending and deposits growth had not experienced significant impact of 2008-2009 recession, while in Denmark those indicators' growth did have an impact and had experience modest drop and stagnated since then. On other hand deposits in Finland banks did not have any drop and had been slowly and steadily growing. In Sweden there had been a drop in bank deposits during the recession period, however it has recovered significantly and experienced steady increase since 2011. In Denmark similarly as with lending, deposits observed a mild drop and had not seen significant growth as in Sweden.

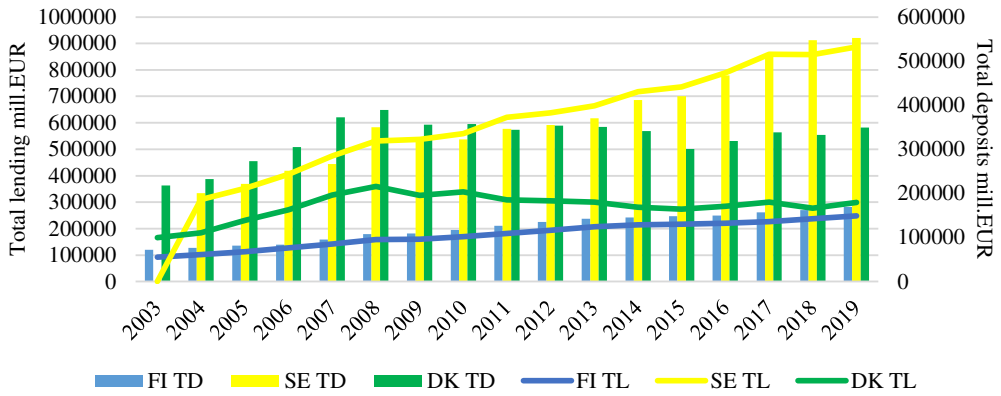

Fig. 1: Nordic EU Countries Total Lending (TL) and Total Deposits (TD) during 2003-2019.
Source: Authors' compiled based on the central banks of Finland, Sweden and Denmark data

The lending and borrowing situation in Baltic States banks presented similar trends, while deposits did not drop significantly, there had been an insignificant drop of deposits in banks of Lithuania and Latvia, while total lending in banks of Lithuania and Latvia encountered significant drop. In the meantime, in Lithuania banking sector lending by 2019 even exceeded pre-recession amount, while in Latvia as the total lending dropped in 2009, it had been declining until 2018, when only in 2019 saw a slight increase, reaching only 2006-year level. In Estonia banks saw a mild drop and steady recovery in total lending, as can be observed in Fig.2.

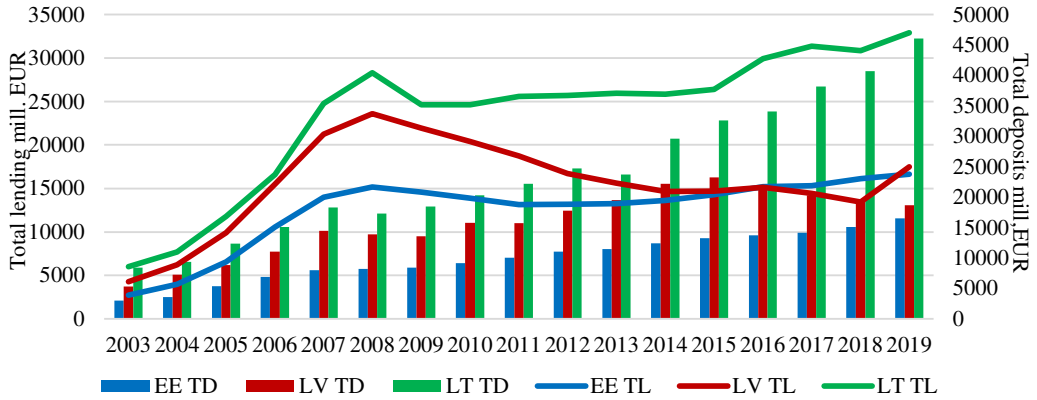

Fig. 2: Baltic States Bank Total Lending (TL) and Deposits (TD).

Source: Authors' compiled based on the central banks of Estonia and Lithuania, and on FCMC data of Latvia

As discovered by Pilvere-Javorska A. et al. (2020) the correlation results of GDP per capita with total bank lending, lending to the companies and households, there are strong correlations in Finland and Sweden in all 3 components, in Lithuania and Estonia in 2 out of 3 bank lending components, while in Latvia, there is no strong correlation, suggesting that there is need for further analysis. This has suggested that in Latvia there are other factors, besides main macroeconomic indicators, influencing bank lending. Authors discovered that indeed there are historical differences since 2008, while bank lending drops in 2008-2009 in all reviewed countries, it recovers along with GDP per capita growth, with exception in Latvia, where bank lending had started declining in 2008, and continues declining until 2018, while GDP per capita and deposits recovered post decline in 2008. This can be observed when looking closer to the bank sector lending development when compared to GDP per capita historical development in 2003-2019. As is displayed in Figure 3. authors decomposed total lending between lending to households, non-financial corporations (further term used companies) and other lending as residual, in order to determine to which lending segment the drop is attributed in Latvia. It is observed that GDP per capita despite the drop in 2009 and 2010, has recovered and in 2013 reached pre-recession year 2008. Other issue for analysis is what was observed above, that total bank lending decreases, as Figure 3 displays, the lending dropped to households and companies, while other lending (which includes lending to other Monetary Financial Institutions (MFIs) and government) has remain unchanged and even saw significant increase in 2019, which is before Covid-19 started in Europe. Thus, the lending increase mentioned earlier in Latvia is attributable to the other lending.

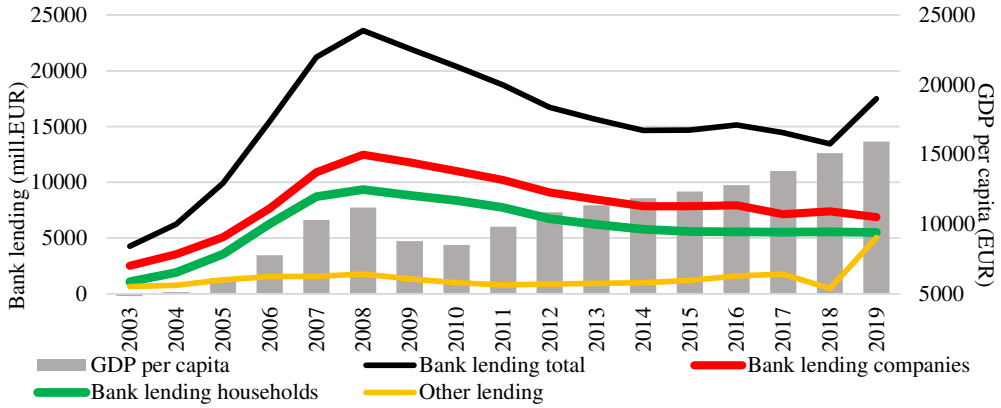

Fig.3: Bank lending and GDP per capita

Source: Authors' compiled based on FCMC Latvia and EC data.

Similar analysis in Latvia was done on the other part of the banking assets: deposits, Figure 4 reveals, that deposits from households has seen steady and stabile increase from 2003 to 2019, while deposits from companies dropped in recession 2008-2009, but recovered. However, deposits from companies, experienced again decline since 2015. In annual report on financial system the Bank of Latvia (2016) report notifies that weak lending has been for years and its further weakening would negatively impact economy. This together with this Bank of Latvia mentioned that parent companies of Banks operating in Latvia due to their situation weakening in Nordics, could use their subsidiary bank resources in the case of turbulence and relocate them to help their operation in their group headquarter countries, i.e. Sweden, Norway, Denmark. This combined with the capital restructuring initiated afterwards from Latvian government on the financial sector, as can be seen in the Figure 3 and 4, even more impacted lending and funding availability for the companies and from the companies.

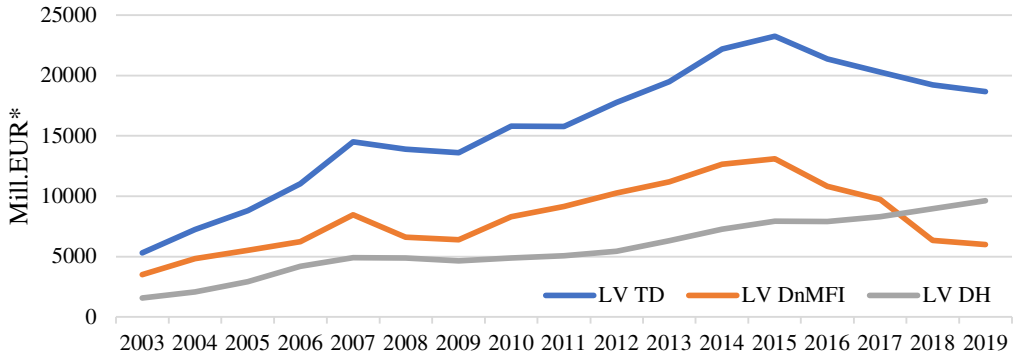

** TD- total deposits, DnMFI – deposits to non-Monetary Financial Institutions, DH- deposits from households*

Fig.4: Bank Deposits breakdown by origin, years 2004-2019, in Latvia

Source: Authors' compiled based on FCMC data.

In addition, in Latvia as has been stated by the FCMC, there has been taking place complete transformation of banking sector, initiated by the supervisory institutions. The transformation has even more slowed down lending to companies, as has been seen in Fig.3. and combined with already declining lending since 2008, combined with the way the transformation has been executed, has been having significant negative impact on the available funding and lending to the companies. This is especially complicated, since in Latvia bank lending is in many cases the only access to the companies and households for external funding for development. If that was not enough, early 2020 Covid-19 pandemic arrived. The impact of it is analyzed further in the research. Next issue to address, what impact has had Covid-19 first wave on banking sector and funding available to non-monetary financial corporations in Latvia?

Banking Sector in Latvia during Covid-19

In Latvia as of the Q2 2020 are operating 13 banks and 3 EU banking subsidiaries (Luminor Bank, previously was registered in Latvia, now a branch of Estonia registered bank) Bigbank Latvia branch (Estonia) and OP Corporate Bank Plc Latvia branch (Finland). As stated by the Latvia FCMC Chairwoman Santa Purgaile in April 2020, that "the overall banking performance in 2019 demonstrates stability", however, the important aspect which is not really discussed is what happens to funding availability to the companies and households, she hints that "over the past year, the total amount of assets in the Latvian banking sector did not change significantly" (Santa Purgaile: ……2020). While total amount of assets did not change significantly, as data shows in Fig.5., significantly changed where the assets are deployed. As can be observed in Fig.5. since Q2 2018 there has been observed decline of the proportion of loans to non-monetary financial corporations to total banking assets, as well as stagnation with decrease in Q2 2020 of loans to households to total assets. Since Q2 2019 until Q1 2020 is observed increase in banking assets held in Central Bank and lent to other credit institutions. If for the Covid-19 impact could be the jump of banks using their assets to purchase /invest in debt securities, it would be useful to analyses the information in which debt securities investments the jump is attributed, however no public information was found by the authors. This needs to be evaluated in which securities the holding had been increased, especially when looking at debt securities yield pattern, as euro area debt securities itself for AAA bonds are with negative yields for all maturities (European Central Bank…..), also in April 08, 2020 State state-owned Development Finance Institution "Altum" (further Altum) has issued 20 mill.EUR worth of bonds with 1.3% yield to maturity, what is notable, that the bond issue was organized by negotiating country Lithuania SEB Bankas.

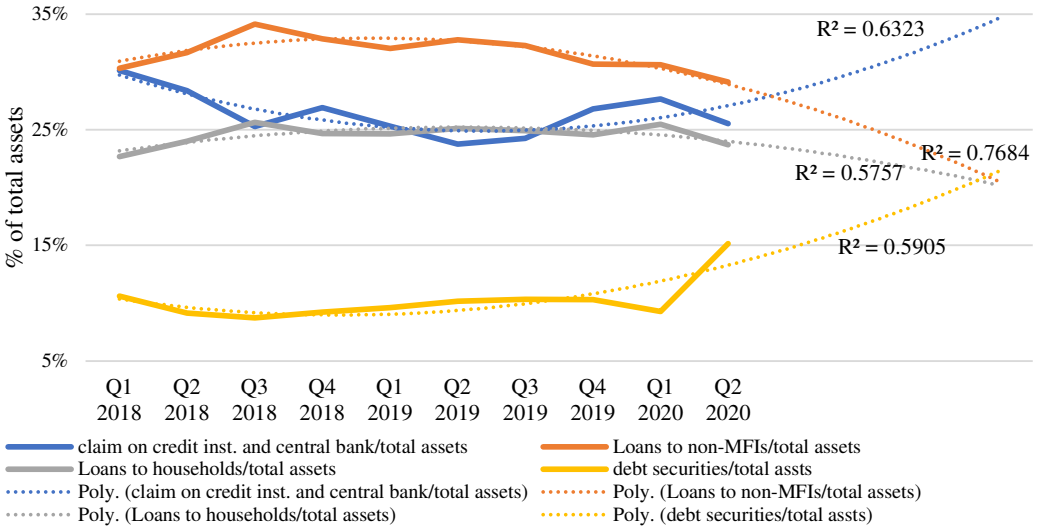

Fig.5: Where bank money is invested, as % of total assets and trends in in Latvia from 2018 to Q2 2020

Source: Author's calculations based on Latvia FCMC data.

Authors to assess the future development, extrapolated data by adding 4 additional quarters to see if there are no changes, what development scenario can be expected. Using polynomial relationship trendline, which results in the highest with fit of the forecasted data to the trendline, Thus, if there are no changes in the existing status quo, the upcoming year will be tough for companies and economy as such, as banks most likely will continue "safe" policy holding its assets in central bank and lending to other credit institutions, as forecasted trend indicates with R square being 63% of upward trend, and invested in debt securities, while declining trend especially to loans to companies or R square being 77% and households. Now the companies who qualify for lending as indicated in "Financial sector future…" 2020 report, are following: cash flow is crucial, no lending for collateral, total equity above 25%, total

labilities against EBITDA less than 4-5 times, companies should have a reserve for at least 10-20% in cash flow, ability to service their liabilities, ability to repay loan principle. It should be noted that based on the aforementioned information, implied average loan term is less than 5 years. This length of loan maturities cannot provide financing of production expansion, investments into plants and factories, but it is typical maturities for leasing and equipment finance. There is needed an analysis how many of overall number of companies in Latvia qualifies for those criteria, and second issue for the companies which qualifies to this lending criteria, do they require lending at all.

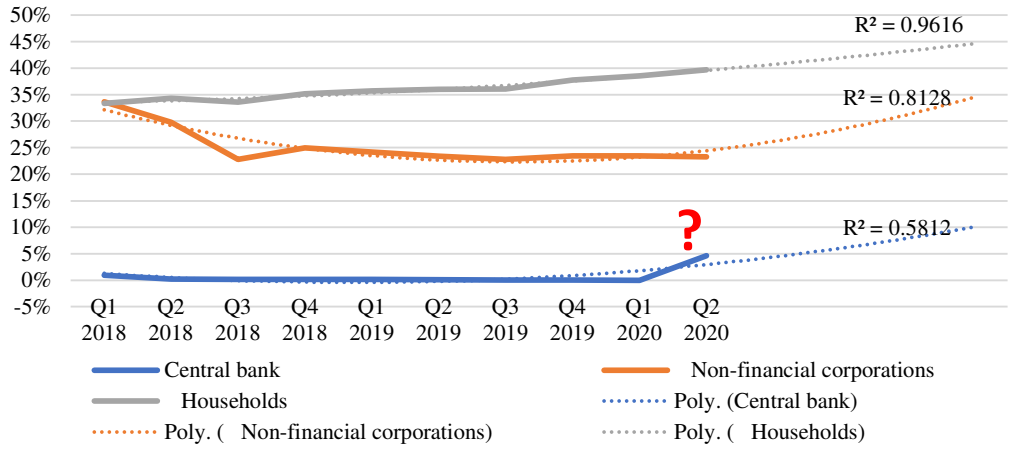

Fig. 6: Where bank gets the money? Fraction of deposits as percentage of total assets, % in Latvia
Source: Author's calculations based on Latvia FCMC data.

Other side of banking system assets is where the money comes from, from available Latvia FCMC data, there has been decline as already noted since 2015 for the deposits by companies until 2019 beginning and stagnates further until Q2 2020, when measured as a fraction of total assets. When evaluating closer the source where banks obtain money, authors continued evaluating deposits as a fraction of total assets, there is one surprise in Covid-19 times or Q2 2020, that there is significant jump from 0 to almost 5% of total assets as a deposit from Central Bank of Latvia. This generates question, especially as further we will see in analysis of individual banks operating in Latvia have 30% of their assets held in Central bank or lent to other MFIs. This poses a question and need for more detailed evaluation why and in which bank(s) Central bank of Latvia has invested or deposited significant amount of the money?

Already Central Bank of Latvia in their Financial Stability Report, issued 21.07.2020, recognize that lending has contracted significantly, that is in 2014 ratio of loans to domestic non-MFIs to GDP was 27%, and in 2019 only 17.7%, which corresponds to the authors' research results already from 2008. Also, Central Bank of Latvia recognizes in 2020 that banks are well position to the upcoming Covid-19 crisis, which is also what Latvia FCMC has stated, however banks themselves yes, how about companies and availability of so needed funding?

Table 1: Assets of Banks in Latvia as of 27.09.2020 by Latvia FCMC reporting from 2018 until Q2 2020

Banking Assets		**Q22020/Q22019 (%)**	**Q22020/Q22018 (%)**	**Change, thsd. EUR Q2 2020 compared to Q2 2018**
Items				
Cash and cash balances at central banks		121%	92%	-449481
Claims on credit institutions		85%	62%	-496275
Loans to non-bank clients		96%	93%	-1023979
Incl.	General government	182%	220%	96998
	Other financial corporations	75%	126%	107612
	Non-financial corporations	94%	88%	-915509
	Households	100%	95%	-313080

Source: Authors' calculations based on Latvia FCMC data.

Thus, to evaluate Covid-19 impact on banks in Latvia, authors analyzed Q2 2020 against Q2 2019 and Q2 2018. The results are compiled in Table 1, analysis of where the banking assets are deployed and their change. When comparing Q2 2020 to both Q2 2019 and Q2 2018 – data showed the change in to whom banks lent amid Covid-19 pandemic

impact – that is lending to general government. Banks had issued in Q2 2020 compared to Q2 2019 to the central government significantly more loans an increase is by more than 82% over the Q2 2019 and even more by 120% more when compared to Q2 2018. It would be necessary to determine for what these loans are issued for, is it for the Covid-19 pandemic first wave impact lessening projects or other projects? As general government is 100% safe source of lending to banks, they are apparently more preferred compared to the financing of non-MFIs. Loans to companies, when calculating loans outstanding at Q2 2020 less Q2 2018, indicates that loans to companies outstanding amount has reduced by 915 mill.EUR. One of the reasons could be the government policy and fines by supervisory authorities to the banks within the scope of financial system restructuring, which has created situation when banks in fear do not finance regular companies and prefer lending to government. In the meantime, at no point authors consider to support or promote lending to the companies which are in poor shape or with bad business model, however the analysis reveals that there are several issues in the sector from the 2008 up to the Q2 2020, that worsens the availability of the loans to the companies. Also, AS SKDS survey of households and companies (2020) on the transformation of the banking system reported, that 20.4% of companies reported that their cooperation with banks has worsened or significantly worsened, while 15.1% of households report the same. Also 28.5% of companies who have taken loan or leasing within 2019 (only 15.2% of all companies), reported that they have observed increased reporting required by banks or rejection of their applications. Thus, it supports authors' earlier findings.

In line with the declining loan residual to companies, and to evaluated further concept in Latvia of theory that loan quality during pandemic deteriorates, authors calculated the impact of delinquent loans, non-performing loans as a percentage of total loans issued, where excluded were loans to the government, since loans to government usually are not delinquent or non-performing). Results are presented in Figure 7 and it is observed that since Q1 2018 non-performing loans have a decreasing trend with an increase in Q3 2019, and similar increase in observed for non-MFI corporation loans in Q2 2020, thus Covid-19 pandemic impact is slightly seen, especially for the companies' abilities and discipline to repay the loans.

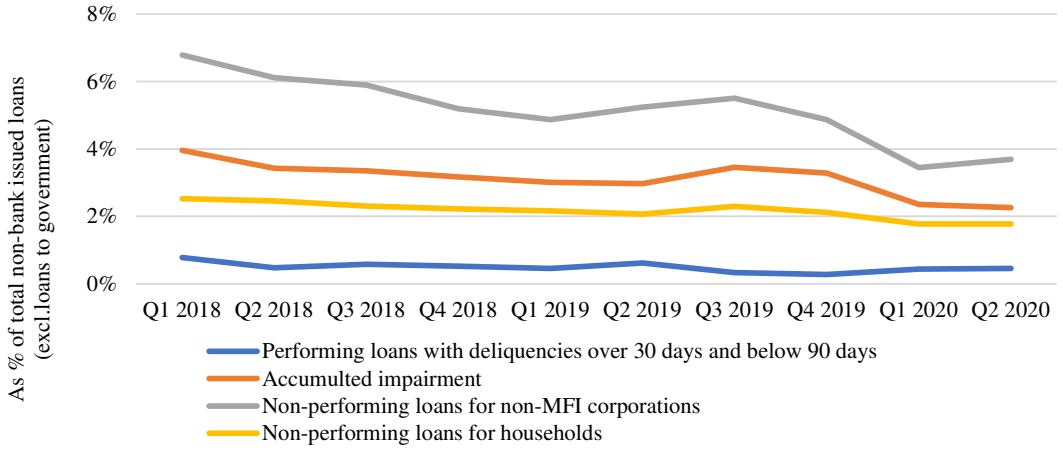

Fig. 7: Delinquent and non-performing loans as % of total non-bank issued loans (excl. loans to government) in Latvia from Q1 2018 to Q2 2020

Source: Authors' calculations based on Latvia FCMC data.

Similar trend is seen in the Figure 8, where there is small increase in Q2 2020 in restructured loans as % of total non-bank issued loans (excluding loans to government). This increase in similar as observed also in Q1 2019 for loans to companies, which impacted also all restructured loans increase as % of total non-bank issued loans. Thus, the factors impacting restructuring of loans in Q1 2019 and Q2 2020 need be evaluated closer by the Latvia FCMC and Central Bank of Latvia, since they have detailed access to each bank's data on loans and restructured loans, to establish what fraction of the increase was attributed to the Covid-19 pandemic and what to the similar factors, which occurred in Q1 2019. Bank loan quality has not change significantly and thus, there has not been the Covid-19 pandemic effect observed, or the effect is coming with delay and will be seen more in coming quarters, thus analysis should continue once data becomes available.

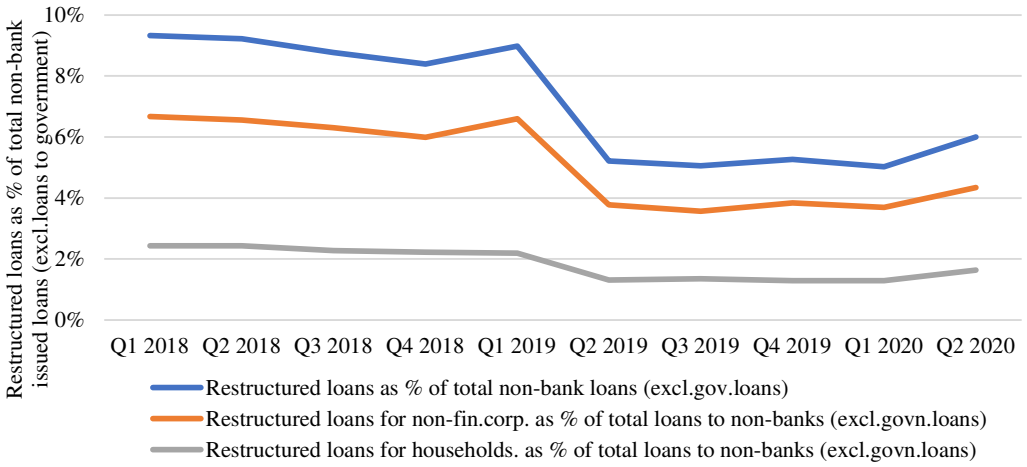

Fig. 8: Restructured loans as % of total non-bank issued loans (excl. loans to government) in Latvia from Q1 2018 to Q2 2020

Source: Authors' calculations based on Latvia FCMC data.

Presented information, along with that in Latvia, the forecast of the expected GDP drop to be the largest among all three Baltic States in Latvia. IMF in October forecasted that Latvia is expected to have 2020 GDP to contract of 6.0%, while Lithuania 1.8%, and Estonia 5.2% (Regional Economic… 2020), presents the future struggles to the companies if status quo in banking sector resides, thus need to evaluate on the individual bank level the impact of Covid-19 pandemic.

Individual Banking Sector in Latvia during Covid-19 pandemic

As lending data is not available per each individual bank, it is impossible to determine, which banks have reduced or halted lending to companies, and who are main lenders to the general government and on what terms. Thus, authors attempted to evaluate the banking sector from available data on individual bank level, who report in Latvia. First need to rank banks based on their size; thus, banks were ranked based on their total assets, 93% of total assets or size of banking market in Latvia is comprises by five banks out of 13 reporting in Latvia: largest being Swedbank 37% of total assets, Citadele bank – 24%, SEB bank -21%, Rietumu Bank -8% and BlueOrange Bank – 3%, rest of the banks are only 1% if measured their size by their total assets.

First dimension that authors evaluated was what proportion of total assets are held in Central Bank of Latvia or have lent to other MFIs, overall average is 28% as presented in Fig.9. If at the first glance 28% seems significant, then compared to Q1 2018 average was 36%, thus there has been a decline. When evaluated two largest banks Swedbank and Citadele bank, they held 33% and 32% of their total assets in central bank or has lent to other MFIs, which is the same level for Swedbank and SEB bank when compared in Q2 2020 and Q2 2019, while a substantial increase for Citadele Bank in Q2 2020 when compared to Q2 2019 – it was 13%, and 18% in Q2 2018. Thus, Citadele Bank is the main bank which has switched large proportion of its assets to the hold in central bank or lend to MFIs. Large proportion of these funds could be rerouted to the companies and household in the form of lending.

Other dimension of analysis on the individual bank level, which indicate their business model, as defined by Berger A.N. et al (2016) that "commercial banks are typically defined as institutions that make commercial loans and issue transactions deposits." Thus, they pay interest for deposits and charge interest on issued loans, as well as charge fees for new loan issuance, for instance, account opening and servicing. As is compiled and presented in the Fig.10. average fee income as % of total fee and interest income was 47% in Q2 2018, 43% in Q2 2019, and 40% in Q2 2020.

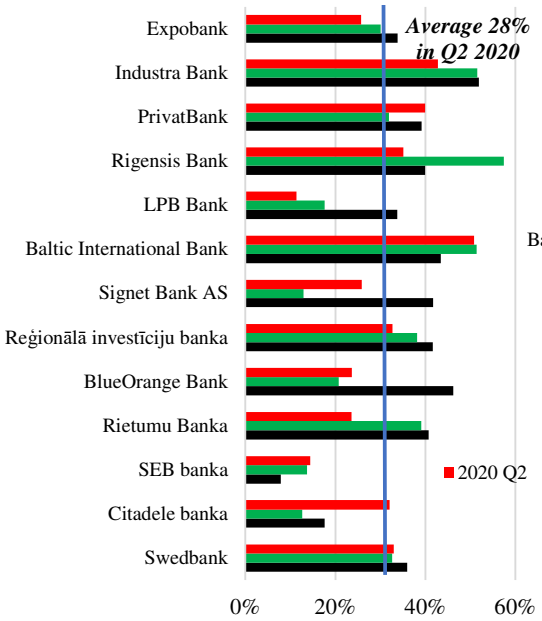

Fig.9. Total assets held by each individual bank in central bank and other MFIs % of total assets in Latvia in Q2 2018, 2019, 2020

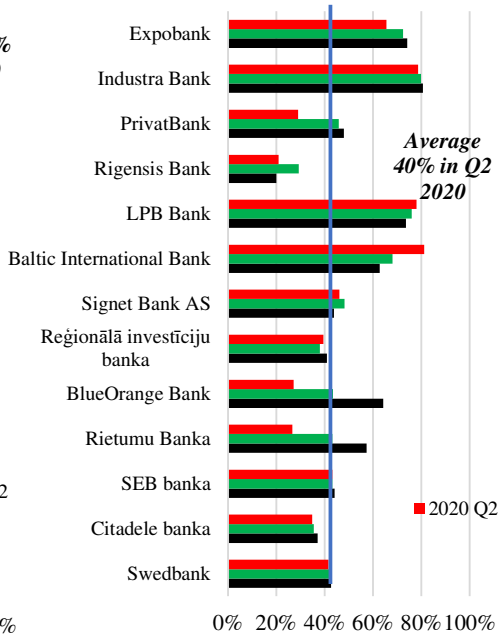

Fig.10. Bank fee income as % of fee and interest income in Latvia, at the end of Q2 2018, 2019, 2020

Source: Authors' calculations based on FCMC data.

On other hand, when issuing loans, the main and largest commission fee is loan issuance in Latvia banks, mainly ranging from 0.5%-2% of loan amount, and thus since we do not have data on the issued loans by each of the banks, then for the banks, where there is major drop and drop in general on commission fee income as a fraction of commission fee and income fee, could signal and confirm that loan issuance has diminished. For major banks in Latvia – Citadele, Swedbank, Rietumu Bank and BlueOrange Bank, especially in for later two, this confirms, while for SEB bank there is a small drop already in 2019 Q2 which is sustained in Q2 2020, these banks comprise 93% of total banking assets reporting in Latvia. Contrary is observed for Baltic International Bank and LPB bank, which are one of the smallest banks by total assets, each representing 1% in Latvia.

Third dimension, is weather Covid-19 pandemic in Q2 2020 has impacted individual bank profits, and to what level and which banks. Individual bank profits were compared and presented in Fig.11.

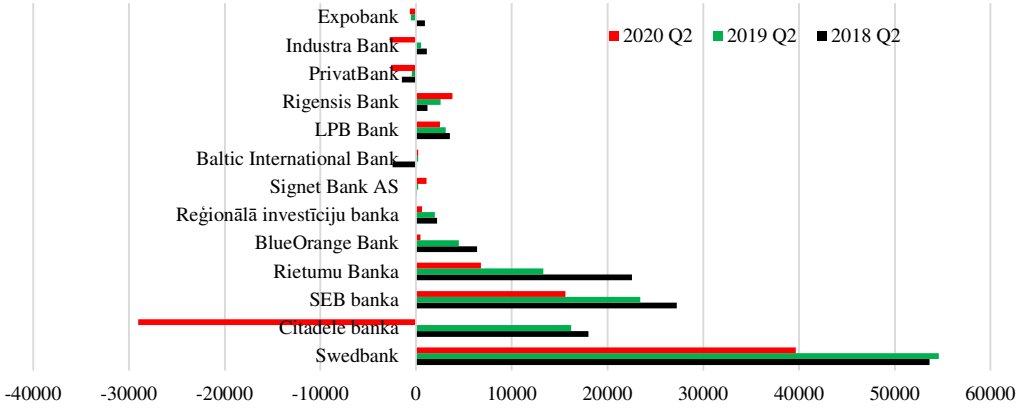

Fig.11: Bank Profits for Q2 2018, 2019, 2020 in Latvia, Thsd.EUR

Source: Authors' calculations based on Latvia FCMC data.

Citadele Bank, the second in size bank in Latvia has experience almost 30 mill. EUR loss in Q2 2020, which in large part is attributed to the write-off of 24.6 mill. EUR, or as explained in Latvia FCMC table as "Net profit or loss on financial assets and financial liabilities designated at fair value through profit or loss" It is unclear to what that loss

has been attributed to. It is very clear, that Covid-19 pandemic had significant impact on top 5 banks' profits, they have dropped when comparing to the second quarters in 2018 and 2019.

Conclusions and Recommendations

Overall banking sector in Latvia had experienced decline in lending already pre-Covid-19 pandemic, that is from 2009 until 2018, while for Estonia and Lithuania, as well as Sweden and Finland lending grew from 2009 until 2019. In Latvia lending showed an increase in 2019, but it was attributable to lending to government. On the other hand, deposits grew in all countries, also Latvia, as did GDP per capita. There declining trend in loan residuals persist also when comparing Q2 2018, 2019 with Covid-19 pandemic first wave Q2 2020, when banks increased lending to general government and even more by 915 mill.EUR decreased loans outstanding to companies in Q2 2020 compared to Q2 2018. Major change which can be attributed partially to Covid-19 pandemic is shift in lending to general government, which has increased significantly in Q2 2020.

Together with financial sector restructuring done by the supervisory authorities, banks are reluctant to lend to companies, as noted to criteria issued by Financial sector future…report in 2020, where main lending parameters are listed to whom banks are open to lend, thus the maturities are short and criteria is one to which unclear how many companies can comply with and if they do, then do these companies are in need for the funding. Thus, currently bank lending is hindering growth and recovery of the economy.

Individual bank data indicates that major part of main reporting banks in Latvia holds the assets in Central Bank of Latvia or has lent to other MFIs, while the proportion has decreased – still comprising almost one third of their assets, but it has decreased based on the lending to general government. Covid-19 pandemic first wave had significant negative impact on the banks' profitability, however major banks, except Citadele Bank who experienced major loss, have operated with profit in Q2 2020.

The reasons of the bank lending are also the financial sector restructuring, and thus authors suggest that in banking supervisory sector, there is need to issue more detailed information to the banks on the parameters of what is seen as acceptable clients and what is considered as risky clients. Commercial banks need to have motivation and confidence that when issuing loans or serving customers, they will not risk facing penalty or risk to be blacklisted or under strict supervision of supervisory institution.

Authors suggest also to FCMC to interview and work closely with local bank managers, what are hindering factors for loan growth and how together supervisory authorities with commercial banks can make lending landscape stronger, especially in the turn of Covid-19 pandemic second wave.

Acknowledgement

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Multi-criteria Assessment of the Quality of Local Government Websites: An Example from Małopolskie Voivodeship, Poland

Karol KROL* (PhD)
University of Agriculture in Kraków, Faculty of Environmental Engineering and Land Surveying
al. Mickiewicza 24/28, 30-059 Kraków, Poland, e-mail: k.krol@onet.com.pl, e-mail2: k.krol@urk.edu.pl
website: http://homeproject.pl , ORCID: https://orcid.org/0000-0003-0534-8471
*corresponding author

Dariusz ZDONEK (PhD)
Silesian University of Technology in Gliwice, Faculty of Organization and Management
ul. Roosevelta 26, 41-800 Zabrze, Poland, e-mail: dariusz.zdonek@polsl.pl, ORCID: https://orcid.org/0000-0002-6190-9643

Abstract

Purpose: E-services provided by public administration are most often available through a web browser or mobile application. The development technique can directly affect use comfort and conformity with service and operating quality policy of the entire office. The quality of the application matters and should be monitored. It is valid for all tiers of public administration, also local governments. The purpose of the work is to perform a multi-criteria assessment of websites of local government units in Małopolskie Voivodeship. **Design/methodology/approach:** The study covered 182 websites of local government units. The results were normalised with zero unitarisation. This way, each website could be assigned a synthetic aggregate quality indicator, SQI. **Findings**: The attribute with the lowest score for the tested websites was the performance on mobile devices. It suggests that local governments should optimise their websites for mobile devices. **Research limitations/implications:** The study involved a limited number of website quality attributes and a limited number of test applications. **Originality/value:** The study pinpoints critical attributes of local government websites in need of optimisation.

Keywords: E-Administration, Quality, Usability, User Experience, Optimisations, Design Standards.

Introduction

E-administration develops thanks to IT systems. They are handled by administration personnel who need restricted-access privileges, usually through authorised access, identity check, or encrypted VPN to work with the system. The results of the use of such systems might, however, be available to the general public. Their primary user should be a citizen. Therefore e-services are most often provided through web browsers or mobile applications for two-way communication. The user is not required to install additional software.

End-user applications are built in various ways. Their development technique can directly affect use comfort and conformity with service and operating quality policy of the entire office [Qutaishat 2013, Sá et al. 2016, Ismailova and Inal 2017]. Therefore, the quality of the application matters and should be monitored. It is valid for all tiers of public administration, also local governments [Król and Zdonek 2020a]. Local governments often implement central-government regulations. They also solve problems of local communities and can use websites and mobile applications to this end. So these should be of high quality. The purpose of the work is to perform a multi-criteria assessment of websites of local government units in Małopolskie Voivodeship.

This paper is organised as follows. The second section presents issues relevant to the quality of websites, particularly multi-criteria quality assessment. Section three describes the methodological framework for the research. Key results and conclusions are presented next. Discussion analyses results of selected public administration website quality tests. The findings are provided in the summary, and research limitations are discussed in the final part.

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Website Quality

In principle, a website can be built according to precise and easily available standards, such as the World Wide Web Consortium W3C standards regarding code correctness (HTML and CSS) and website accessibility. They contain guidelines for each part of a website. One can also choose from among myriads of content management systems (CMS) that conform to the standards. Note, however, that W3C standards are not normative. They are, nevertheless, respected and followed by creators of websites and web applications all over the world.

Design standards can be 'official' (recorded in the documentation) or come in the form of 'good practice'. Many universal attributes of IT system quality have been recorded in standards by the International Organization for Standardization (ISO). ISO/IEC 25010:2011* , for example, describes six main software quality characteristics: (1) functionality, (2) reliability, (3) usability, (4) efficiency, (5) maintainability, and (6) portability. According to ISO 9241-100** , usability is derived from (1) effectiveness; (2) efficiency, and (3) use satisfaction. Such standards as ISO 13406*** , ISO 14915**** , or ISO TR 16982***** apply to the usability of interactive systems and user interface ergonomics. They set required quality attributes to ensure sufficient use and human-machine interaction quality. It is not always the case that a list of guidelines and quality criteria is available. It is particularly true for website attributes that affect its place on the search engine ranking list. In such a case, it is the intuition, knowledge, and experience of the administrator/editor of a website that matter the most. High search result rankings are often achieved with trial and error. Moreover, the usability quality of websites is often measured with metrics formulated as good practices, such as Nielsen's heuristics [Huang and Benyoucef 2014].

Website Quality Assessment

Website quality is a complex issue [Lee-Geiller and Lee 2019]; hence it can be evaluated in different ways: with or without users, automatically (an algorithmic indicator score) or manually after a cognitive walkthrough. The approaches listed above can be successfully combined as well. What is more, website quality assessment is often subjective, based on original checklists, and hinging on the author's skills and knowledge to a large extent.

An indicator-based assessment usually comes in two forms. (1) A global aggregate multi-criteria assessment takes into consideration as large a number of numeric indicators describing website quality as possible. (2) A detailed assessment focused on a specific domain cross-validates a selected quality attribute, such as performance.

Website quality attributes include mobile readiness, content quality (content is king), etc. Mobile readiness can be verified in various ways, using test applications, CSS (Cascading Style Sheet) code exploration, or with specific mobile devices [Galvez and Youngblood 2016]. It is relatively easy to check whether a website changes its appearance to fit a mobile device, but to verify the usability (the comfort of use) of a website is more complicated and requires extensive testing [Garcia-Lopez et al. 2017]. The same applies to content quality assessment. It can be quantitative or qualitative. A qualitative assessment measures the ratio of code (HTML, CSS, JS) to the text content (the text to HTML ratio, THR). A qualitative assessment can measure the so-called semantic value or its ease of perception [Ojha et al. 2018]. Performance [Dickinger and Stangl 2013] and SEO [Giannakoulopoulos et al. 2019] are just as important. Website performance can be expressed with various scores, such as Yslow, PageSpeed Score, or measures of load time (in seconds): First Byte, First Contentful Paint, or Fully Loaded. Assessment of search engine optimisation can aggregate measurements of all of the attributes mentioned above.

Another design attribute determining the quality of a website is its accessibility. Relevant guidelines (Web Content Accessibility Guidelines, WCAG) are provided by the World Wide Web Consortium W3C [Ismail et al. 2018, Król and Zdonek 2020a]. Other factors of website quality are the number of backlinks and the quality of internal links [Król and Zdonek 2019] as well as global quality indicators such as Alexa Rank, Serpstat Visibility, or Open PageRank [Ziakis et al. 2019].

Materials and Methods

The study covered websites of all 182 local government units in Małopolskie Voivodeship, Poland (Fig. 1). The quality of the websites was measured with eight web applications run in a web browser (Table 1). The quality indicators and test tools were selected based on a literature analysis [Galvez and Youngblood 2016, King and Youngblood 2016, Garcia-Lopez et al. 2017, Giannakoulopoulos et al. 2019, Król and Zdonek 2020b].

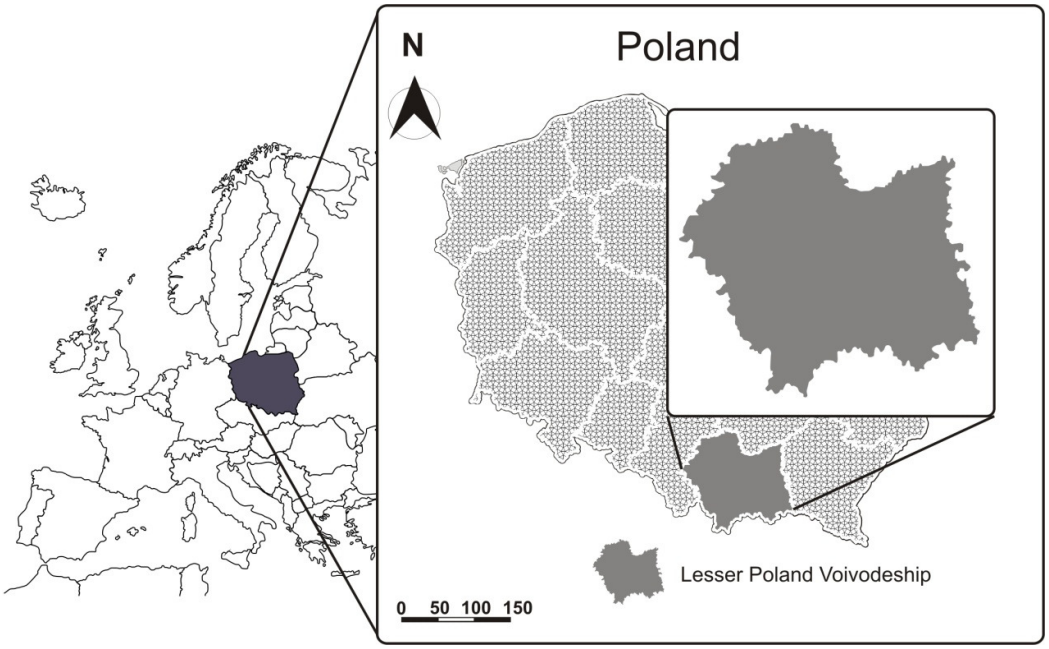

Fig. 2: Małopolskie Voivodeship, Poland. Source: own work

The research was informal, quantitative, and carried out under normal use conditions. Each test gave a final score. The final scores were positioned in various ranges and resulted from the aggregation of various tests (Table 1).

Table 1: Test applications and scope of tests

Test scope	Test tool (URL)	Indicator (score scale)
Search Engine Optimisation (SEO)	ZadroWeb (zadroweb.com/seo-auditor)	SEO Score (0–100)
Mobile optimisation test	Mobile-Friendly Test: Bulk Testing Tool (technicalseo.com/tools/mobile-friendly/)	Mobile readiness (0–1)
Performance (desktop) PSI desktop	PageSpeed Insights (developers.google.com/speed/pagespeed/insights/)	Google PageSpeed Score (0–100)
Performance (mobile) PSI mobile	PageSpeed Insights (developers.google.com/speed/pagespeed/insights/)	Google PageSpeed Score (0–100)
Text to HTML ratio THR	Text to HTML ratio checker (prepostseo.com/code-to-text-ratio)	Text ratio (0–100%)
No. of backlinks	Backlink Checker (iwebtool.com/backlink_checker)	Backlinks (>0)
General website quality	Blink Audit Tool (audyt.blink.pl)	Quality indicator (0–100%)
Text semantics, marketing value evaluation	Blink Audit Tool (audyt.blink.pl)	Score (0–100%)
Accessibility (WCAG guidelines)	WebAIM WAVE Web Accessibility Evaluation Tool (wave.webaim.org)	Errors (>0)
Open PageRank	Open PageRank Online Tool (domcop.com/openpagerank)	Page Rank Value (0–10)

Research Process

The author first assessed the search engine optimisation of the websites using automatic algorithms. ZadroWeb generated the final summary score for SEO tests. The application evaluates such parameters as conformity with

W3C standards, complete metadata, performance, and values of Page Authority and Domain Authority. Mobile readiness was tested with the Bulk Testing Tool.

Website performance was tested in the desktop and mobile modes with PageSpeed Insights (Google Developers). The value of the Text to HTML ratio (THR) and the number of backlinks were verified. The semantic value of the text was assessed with Blink Audit Tool. Conformity with WCAG was verified using WAVE Web Accessibility, and global 'website ranking position' was evaluated with Open PageRank. The measurements were then standardised with Equation (1) for LTB characteristics and Equation (2) for STB values. An LTB diagnostic variable, larger-the better, should be as high as possible (SEO score, for example). An STB variable, smaller-the-better, should have the lowest possible value (such as syntax errors in HTML code). Standardised variables lie in the [0,1] interval.

$$zij = [xij - mini\{xij\}] / rj \quad (1)$$
$$zij = [maxi\{xij\} - xij] / rj \quad (2)$$

where $zij \in [0,1]$.
and:
zij – a standardised variable;
$zij = 0 \Leftrightarrow xij = mini\{xij\}$;
$zij = 1 \Leftrightarrow xij = maxi\{xij\}$;
xij – the value of the variable before standardisation;
mini{xij} – the minimum value of the variable before standardisation;
maxi{xij} – the maximum value of the variable before standardisation;
rj – the range for the j-th variable.

The standardisation found the common denominator for the diagnostic variables so they could be added up. This way, each website could be described with a synthetic aggregate quality indicator (SQI). The SQI value was used to group the websites into categories.

Results and Conclusions

Each of the websites could score 0 to 10 multi-criteria quality assessment points [0,10]. The website with the lowest score had 2.86 points (SQI value), while the website with the highest result had 6.68 points. All the investigated websites scored 865.9 points in total out of 1820, which is 47.6% of the available points (Fig. 1). It is a mediocre result at best, suggesting that most of the websites needed to be optimised. Characteristics most in need of optimisation included mobile performance (PSI mobile) and the number of backlinks. Still, desktop performance (PSI desktop) had plenty of room for improvement as well.

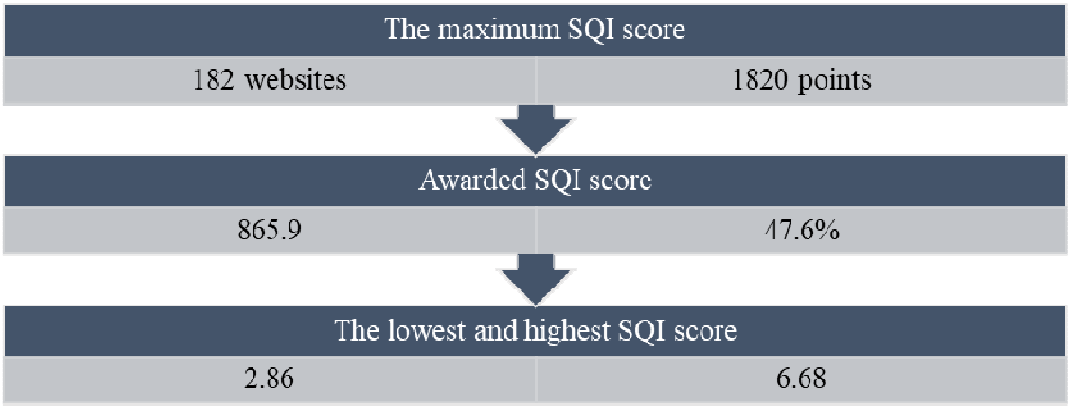

Figure 2: The general quality results for local government websites in Małopolskie Voivodeship. Source: own work

As many as 88 websites (a little over 48%) reached mobile performance up to 38 points (out of 100 maximum PSI mobile points). The poorest performing website scored only 2 PSI mobile points out of 100 (Table 2). Mobile performance of 33 websites was critical, with scores below 20. Such a low performance can significantly hinder browsing comfort or even prevent mobile use completely. Moreover, at least 41 websites (22.5%) required urgent desktop performance optimisation (PSI desktop).

Table 2: Descriptive statistics – SEO, performance, and THR tests

Attribute	SEO	PSI desktop	PSI mobile	THR
Mean	71.66	63.26	39.21	14.99
Median	72.9	63	38	16
Min.	52.34	10	2	2
Max.	85.05	99	93	33

Source: own research

The largest range was noted for the number of backlinks (Table 3). Note, however, that the quality of the pages the links came from was not verified, and this quality is important for search engine results page ranking. Values of a general quality indicator (according to the Blink Audit Tool) ranged from 36 to 82 percentage points (Table 3). Note further that there were relatively many websites with average or low Open PageRank values (below 2 points). In addition, many of the investigated websites required accessibility optimisation, in particular as regards the visibility of some content on the screen/display (Table 3).

Low values of Open PageRank are characteristic of unpopular websites, which are those with low visitor counts and few quality backlinks. It is somewhat puzzling as public administration websites are open to the public and need not attract visitors. Their audience comes 'ex officio'. Such websites are, therefore, predisposed to large visitor volumes and many backlinks.

Table 3: Descriptive statistics – link, content, accessibility, and other quality indicators

Attribute	Backlink	General quality score	Semantics	Accessibility	Open PageRank
Mean	215,184.16	61.38	63.54	20.47	2.97
Median	8,530.5	61	65	15	3.18
Min.	223	36	35	0	0.22
Max.	18,066,954	82	95	185	4.85

Source: own research

Most objects in the set of websites scored 'average' SQI values. This group constituted almost 77% of all the websites (type II and II websites combined). The mean quality score under the research design was from 4 to 6 SQI points (Table 4). Websites that demonstrated 'average quality' required optimisation, but no gross design errors were identified. Nevertheless, the multitude of minor flaws in many areas, including development technique and the way content was published, cumulated, which reduced their general score. Websites not optimised for mobile devices, with poor performance, few backlinks, and low values of other quality indicators had the poorest results.

Table 4: Typology of websites divided by the SQI value

Score range	0–2.99	3.0–3.99	4.0–4.99	5.0–5.99	6.00–7.00
Number of websites	1	30	81	59	11
Percentage (%)	0.55	16.48	44.51	32.42	6.04
Website type	V	IV	III	II	I

Source: own research

The investigated websites scored almost 72% of the maximum number of points for SEO, about 63% of points for PSI desktop performance, and a little over 39% of PSI mobile performance points (Table 5). Moreover, almost 80% of them 'reacted to display size'. They adapted their appearance (layout, content position, menu, etc.) to mobile devices (in various ways and to various extents).

Table 5: Quantitative statistics – SEO, performance, THR, and mobile readiness tests

Attribute	SEO	PSI desktop	PSI mobile	THR	Mobile readiness
The maximum score	18,200	18,200	18,200	18,200	182
Total scores	13,042.14	11,513	7,137	2,729	144
Percentage (%)	71.66	63.26	39.21	14.99	79.12

Source: own research

The websites scored high as regards search engine optimisation. It is a good result, but the measurement involved only one tool and does not provide a sound footing for an unambiguous SEO assessment. Algorithmic SEO measurements should employ complementary tests with several test tools.

Discussion

The quality of public administration websites is assessed comprehensively or in one dimension. One of the most frequently investigated attributes of such websites is accessibility [Kamoun and Basel Almourad 2014, Galvez and Youngblood 2016, King and Youngblood 2016, Paul and Das 2019, Król and Zdonek 2020a]. It is mostly because the accessibility of websites of institutions financed by the public budget is regulated in many countries, also in Poland [KRI 2012].

Kopackova et al. [2010] focused on the accessibility of local e-government websites in the Czech Republic (n=39). They looked into website accessibility from a wider perspective, taking into consideration the search engine results page visibility. The researchers employed selected computerised tools and techniques. The criteria defined for accessibility and findability testing were as follows: findability through Czech search engines, page rank, URL comprehensibility, observance of WCAG rules, comprehensibility of screen reader output, (X)HTML validation, display in a low-resolution browser, separation of content from the graphic part, and metadata usage. Kopackova et al. [2010] demonstrated that the websites they tested most often had to be corrected to conform to W3C recommendations, mostly as regards (X)HTML syntax and WCAG compliance. Furthermore, they noted a need to improve the content as regards SEO, including keywords and headers.

Galvez and Youngblood [2016] comprehensively assessed local e-government websites in Rhode Island. They evaluated development technique quality in terms of accessibility, usability, and mobile readiness. They used WebAIM's WAVE to investigate accessibility. Galvez and Youngblood [2016] demonstrated that local government websites in Rhode Island should be optimised, in particular, in terms of accessibility and mobile readiness.

Al-Soud and Nakata [2010] tested accessibility, usability, transparency, and responsiveness of thirty Jordanian government websites and their readiness to deliver government services online. They employed tools for automatic evaluation of selected website attributes, including SortSite (PowerMapper Software) in their research. They assessed such attributes as usability, conformity to W3C standards, link rot, and SEO. Their website evaluation revealed that the websites suffered from a lack of consistency in standards and features. Furthermore, they identified a lack of consideration of citizens' expectations and needs through the absence of various features which facilitate the user interaction process.

Most studies on public administration websites conclude that the websites require optimisation, especially regarding accessibility and mobile readiness. Generally, every website can be optimised, amended, or improved to a certain extent both as regards technical issues and content.

Summary

From the technical perspective, public administration websites, including those of local government units, should conform to the same design (quality) standards as other websites. Websites can differ in terms of content, for example, its arrangement and text or layout, but also function and functionalities.

The attribute with the lowest score for the tested websites was the performance on mobile devices (PSI mobile). The results indicate a real need to optimise websites of local government units for mobile devices. The importance of the matter rises with the rising number of users who browse websites on mobile devices. Moreover, desktop and mobile performance affect website rank in search engine results pages.

Research limitations

There is a risk that studies on large sets of websites can turn out to be superficial or relatively generalising because of a large number of tested objects and the complexity of the issue of 'website quality'. On the other hand, only a study on a representative (sufficiently large) sample can justify conclusions for the entire population. Such an approach inherently limits the number of assessed quality criteria and tools. It provides no room for in-depth quality assessment, which is the foundation of dedicated quality audits.

Quality assessment of a specific set of websites provides certain general insight mostly into global problems. Nevertheless, when upgrading their websites, local government units should focus primarily on the results of a detailed audit, which can pinpoint problem areas in need of intervention. One must not forget that the online ecosystem is a complex one, and each website is an individual specimen.

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Footnotes

* ISO/IEC 25010:2011: Systems and Software Engineering – Systems and Software Quality Requirements and Evaluation (SQuaRE) – System and Software Quality Models.
** ISO 9241-100: Ergonomics of Human-System Interaction. Part 110: Dialogue Principles.
***ISO 13406: Ergonomic Requirements for Work with Visual Displays Based on Flat Panels.
****ISO 14915: Software Ergonomics for Multimedia User Interfaces.
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Why Does Tribalism Cause Corruption in Some Countries?

Dr. Yousif ABDELRAHIM
Assistant Professor, Department of Management
College of Business Administration - Prince Mohammad Bin Fahd University
P.O. Box 1664, Al-Khobar 31952, Kingdom of Saudi Arabia
yabdelrahim@pmu.edu.sa

Abstract

This research paper explores the relationship between tribal factors of gender inequality, ethnic fractionalization, indigenous population, group grievance, and the country's level of corruption and explains why tribalism causes corruption in 132 countries worldwide. I used the least-squares multiple regression analysis and secondary data from the Corruption Perception Index, the Global Economy, the Human Resource Development, Economic Commission for Latin America and the Caribbean and the World Bank Group, the Historical Index of Ethnic Fractionalization Dataset, and the Economist Study as evidence of corruption, group grievance, gender inequality, indigenous population, ethnic fractionalization, and political instability to test the four hypotheses. The results suggest that Group grievance, gender inequality, and ethnic fractionalization have a strong and significant relationship with the country's level of corruption. However, indigenous population appears to have no significant relationship with the country's level of corruption. The research theoretical and practical implications and future research have also been discussed.

Keywords: Tribalism Index, Corruption, gender inequality, ethnic fractionalization, indigenous population, group grievance.

Introduction

According to Transparency International (TI) (https://www.transparency.org/en/ pre ss/one-in-four-people-in-africa-pay-bribes-survey-says), approximately130 million Africans paid a Bribe in 2019 alone; either to get access to essential services or to escape penalty by the court and /or the police. The costs of corruption (i.e., the exploitation of power for personal gain) are evident and acknowledged. Recently, Global Financial Integrity (www.gfintegrity.org/) reported that $1.1 trillion lost to corruption in the world's developing countries in 2013. For example, $ 25.50 billion Lost to corruption in Iraq between January 2011 and December, 2014. What makes Many countries in the Middle East and North Africa (MENA) along with other African countries to be the most corrupt countries in the World is still in a dilemma. Since corruption impacts a country's economy, growth and the quality of life people live, scholars need to study corruption from different angles. Tribalism Index (TI), developed by the USF Global Initiative on Civil Society and Conflicts (http://usfglobalinitiative.org/tribalism-index/) has long recognized that tribalism (i.e., tribalism is the perceptions of gender inequality, perceptions of grievance, linguistic and ethnic fractionalization) is one of these angles that plays an important role in corruption. Previous studies such as Abdelrahim (2019, 2020) empirically found a positive relationship between tribalism and corruption which confirms the TI findings.

However, social science in general and the management field, in particular, have been Slow-moving to conduct meaningful research in the area of tribalism and corruption that explains why tribalism causes corruption. Tribalism and corruption issues have hardly been addressed in most of the management's top journals. Hence, it is critical for the management field to become involved in scholarship that may help academics and practitioners to better comprehend the many aspects of tribalism and a country-level of corruption. That leads to one research question; why does tribalism cause corruption? This study fills the gap in the literature by answering the above-mentioned question through examining the relationship between the critical factors (i.e., indicators/components) of tribalism (i.e., the perceptions of gender inequality, perceptions of grievance, linguistic and ethnic fractionalization) and corruption empirically (Figure1). The findings of this study could also benefit educators and policymakers to understand the dynamics of tribalism and focus on tailoring specific educational programs and policies that help reduce corruption.

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Literature Review and Hypotheses Development

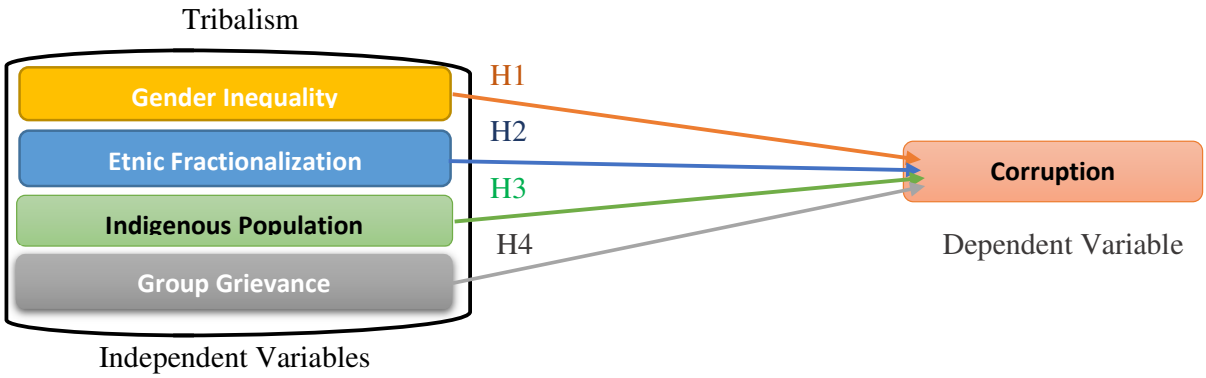

Figure1: The conceptual framework for the relationship between tribalism and corruption

Corruption

According to Transparency International (2020), corruption is the exploitation of power by government and nongovernment administrators, officers, and key employees for personal gain. The act of corruption includes illicit enrichment, misusing government property, bribery, hiring relatives and friends, embezzlement, etc. Researchers such as Seldadyo and De Haan (2005) have identified many reasons cultural, economic, and non-economic factors that cause corruption in countries. Corruption hinders economic growth, discourages foreign investors, employment, government spending on social programs, and harbors poverty (Šumah, 2018).

Tribalism

Consistent with the tribalism index, I define tribalism at a country-level as the perceptions of corruption (i.e., the extent to which government agencies are corrupt due to favoritism, nepotism, and bureaucracy); population demographics (i.e., how big indigenous population in a society is); gender inequality (i.e., to what extent women are actually equal to men in education, political empowerment, and health); perceptions of grievance (i.e., the extent to which groups in a society experience grieve); linguistic and ethnic fractionalization (i.e., the extent to which a society keeps its ethnic and linguistic patterns). I adopted tribalism definition from the tribalism index is the only quantitative measure at the country level that exists in the literature, and I need to be consistent with the TI scale. In addition, the tribalism index is a very valid scale with multiple indicators that capture all or most aspects of tribalism.

Tribalism Versus Corruption

The relationship between tribalism and corruption has long been identified by Jacobson and Deckard (2012) and the positive relationship between tribalism and corruption at the country-level has been empirically confirmed by Abdelrahim (2019, 2020). Many researchers have linked tribalism to corruption. Gullette (2007) has conceptualized tribalism as one kind of corruption due to kinship ties. Jacobson and Deckard (2012) relate tribalism to corruption because of kin networks that pressurize government personnel to practice nepotism and nepotism to help their tribe members get richer. Individuals' values, norms could significantly dictate corruption (Theron, 2013). For instance, African tribal officials usually accept gifts as gifts are considered a part of their cultural norms (Theron, 2013). In a tribal collectivistic culture, individuals are responsible to take care of their relatives and close family members. Social pressure created cultural norms and collective tribal life might cause tribe members to fulfill their cultural obligations through corrupt actions such as favoritism and nepotism.

Gender Inequailty Versus Corruption

Previous Research has claimed a positive relationship between gender inequality and corruption. For example, gender inequality is associated with a higher perceived level of corruption and differences in critical development outcomes in tribal countries (Branisa and Ziegler, 2013). Prior studies have examined the relationship between gender inequality, which measured on the basis of women representation at the workplace in a country) and corruption. The greater the representation of women in a country, the lower level of corruption in economic and political life (Swamy et al., 2001; Dollar, Fisman, and Gatti, 2001). In addition, gender differentiation in masculine cultures contributes to gender inequality and gender inequality contributes to corruption (Islam, 2004). Moreover, Swamy et al. (2001) found that men and women tolerate corruption differently as men are more tolerant to corruption than women do. Finally,

Rivas (2013) experimentally showed that men go for corrupt choices habitually more than women. Hence, I argue that gender inequality in countries is more likely to increase the level of corruption in a country and posit hypothesis 1 (H1) and hypothesis 1 (H1):

H1: Corruption in countries with a high level of gender inequality will be higher than corruption in countries with a low level of gender inequality.

Ethnic Fractionalization

Ethnic fractionalization is another factor of tribalism that relates to corruption. The relationship between ethnic fractionalization and corruption was articulated by Cerqueti et al. (2012). Cerquet noted the existing nonlinear relationship between corruption and ethnic fractionalization. Many researchers believe that Corruption is high in homogeneous countries and low in countries with intermediate ethnic fractionalization (Svensson, 200). Ethnolinguistic fractionalization seems to be accountable for different kinds of corruption-related phenomena (Shleifer and Vishny 1993). According to the study conducted by Mauro (1995), corruption is high in higher ethnic diverse societies due to the ethnic power structure that facilitate more bribery taking. Since bribery is a form of corruption and ethnic fractionalization causes more bribery, I expect that countries with high ethnic fractionalization to be highly corrupt and posit hypothesis 2 (H2):

H2: Corruption in countries with a high level of ethnic fractionalization will be higher than corruption in countries with a low level of ethnic fractionalization.

Indigenous Population (Population Demographic)

How big indigenous population in a society plays a critical role in corruption. Social identity theory has predicted traditional in-group bias (Tajfel & Turner, 1979). The theory also proposed that group members tend to favor the in-group to whom they belong over the out-group members for motives to be in line with group promotion and self-esteem. In addition, research on social cognition suggests that instinctive tendencies could significantly influence behavior without responsive recognition (Bargh, 1997; Perugini, 2005). The disadvantaged (low-status minorities) out-group minority people frequently show out-group favoritism because of the negative stereotypes among low-status minorities and their struggle for equal rights (Hinkle & Brown, 1990; Mullen et al., 1992). Since indigenous people live collectively is one group I suggest that the indigenous population practice in-group favoritism. Favoritism has been known for its relationship with corruption by prior research. Favoritism is a kind of corruption that based on mutual trust and long-term social relations and reciprocity (Lowe et al., 2008). According to Redlawsk, D. P. (2005), corruption is perceived as lawbreaking and corruption also understood as favoritism among Americans. Following the above discussion, I would argue that indigenous population is associated with corruption and propose hypothesis 3 (H3):

H3: Corruption in countries with a high level of the indigenous population will be higher than corruption in countries with a low level of the indigenous population.

Group Grievance (Perceptions of Grievance)

Perceptions of grievance (the extent to which groups in a society experience grieve). Grievances caused by indigenous marginalization in some countries such as Nigeria is often a fuel that fans violent conflict (Smith, D. J., 2014). That implies grievances could be one of the factors that motivate the outbreak of violent rebellion, civil war, and political instability in a country. For example, the main motivation for the Libyan violent rebellion is the collection of group grievances caused by economic grievances, the lifestyle of the former president family members, absence of political rights, and tribal grievances (Are, W. W, 2013). Rebellion can be explained by severe grievances (Collier, P., & Hoeffler, A., 2004). Violent rebellion causes civil war and civil war is an extreme form of political instability (Ghobarah, H. et al., 2003). Political instability has been known for its contribution to the high rate of corruption in the Economic Community of West African States (ECOWAS) (Lederman et al., 2005; Leite and Weidmann, 1999; Park, 2003). Based on the above I would argue that group grievance is associated with corruption and propose hypothesis 4 (H4):

H4*: Corruption in countries with a high level of group*

Methodology

Data Collection

I used the following general research model to collect secondary data from different resources and tested the four research hypotheses:

$$LOC=\beta_0+\beta_1*GI+\beta_2*EF+\beta_3*IP+\beta_4*GG \quad (1)$$

Where LOC, GI, IP, EF, GG, and PI refer to corruption, gender inequality, indigenous population, ethnic fractionalization, group grievance, and political instability, respectively. After testing the research hypotheses, the study of the specific model is shown below:

$$LOC=\beta_0+\beta_1*GI+\beta_2*EF+\beta_4*GG \quad (2)$$

PI*GR refers to the interaction between political instability and group grievance. EF2, IP2 and PI2 refer to the impact of ethnic fractionalization, the indigenous population, and political instability at higher levels of EF, IP and PI on corruption.

Dependent Variable

Corruption is the dependent variable measured at the country level. I used the corruption perceptions index as a proxy to measure corruption in 132 countries. The Corruption Perceptions Index (CPI) was developed by Transparency International (TI) researchers and experts rank 180 regions and countries based on perceptions of corruption captured by survey questions in the last two years in twelve different institutions. The CPI combines data from thirteen different sources that surveyed a country's business people and experts with their perceptions of the corruption level in the public sector. The CPI put together several dimensions of corruption to constitute an index that is available online at https://www.transparency. org/en/cpi/2019/ resu lts/table. Respondents who are experts and business executives answered the CPI survey questions that capture all forms of corruption in the public sector including nepotism, favoritism, bribery, etc. The CPI uses a scale of zero (highly corrupt) to 100 (very clean). For instance, Denmark ranks first with a score of 87 while Somalia with a score of nine ranks 180.

Independent Variable

Indigenous population, group grievance, ethnic fractionalization, and gender inequality are the study independent variables at the country level. Group grievance is measured by the group grievance index and the dataset for group grievance was borrowed from the Global Economy website at https://www.theglobaleconomy. Com /rankings/group_grievance_index/. Gender inequality is measured by gender equality index and the dataset was borrowed from the Human Resource Development at http://hdr.undp.org/en/data. Indigenous population is measured by indigenous population index and the dataset for indigenous population was borrowed from the Economic Commission for Latin America and Caribbean at https://www.cepal. org/ en/infografias /los-pueblos-indigenasen-america-latina and the World Bank Group / International World Group for Indigenous Affairs (IWGIA) at http://iwgia. org/ima ges/yearbook/2020/IWGIA_The_Indigenous_World_2020.pdf. Ethnic fractionalizat-ion is a variable that was measured by ethnic fractionalization index and the dataset for ethnic fractionalization was borrowed from the Historical Index of Ethnic Fractionalization Dataset at (HIEF)https://dataverse. harvard.edu/dataset. xhtml?Persi sten tId=doi:10.7910/DVN/4JQRCL

Control Variable

The literature review shows that a country's political instability could influence the country's level of corruption. Political instability increases the level of corruption in the long-term (Nurudeen, Abd Karim, and Aziz, 2015). Political instability is measured by the political instability index borrowed from the Economist Study at http://viewswire.eiu.com/site_info.asp?info_ name=social_unrest_tab le&page= noa ds&rf=0The Economist Study ranks countries at a scale ranges from zero to ten, where zero means a country is highly not corrupt and ten means a country is highly corrupt.

Hypothesis Test

In this research study I examined the influence of four factors of tribalism (i.e., group grievance, indigenous population, gender inequality, and ethnic fractionalization) on the national levels of corruption in 132 countries using the ordinary least-squares multiple regression analysis and controlling for controlling for political instability. The least squares regression analysis is used because the corruption variable dataset is normally distributed with appropriate variance. To test examine the influence of tribalism factors on levels of corruption, I controlled for the countries' political instability and entered all the tribalism factors simultaneously. I also thought carefully about indigenous population factor when entered the tribalism variables individually in the regression equations because of the data limitation on indigenous population. The number of tribalism variables in the regressions always kept one, two, or three variables at a time, keeping enough degrees of freedom. For other tribalism factors there was no need for limiting the number of tribalism factors entered in the regression equation since I have a dataset for 132 countries, and therefore, no concerns about the degree of freedom.

Results

Through the results of the least-squares multiple regression analysis, the study seeks to explain the dissimilarities across nations in the propensity to be corrupt. Table 1 shows the correlations between all the six variables included in the least square regression analysis. Table 2 shows the inclination of a nation to be corrupt versus tribalism factors and political instability. The cross-sectional data for corruption of all regions and countries under examination were measured as perceptions in all 132 nations.

The results from the ordinary least squares suggest group grievance to be the most powerful tribal factor that influences the level of corruption in many nations because it is significant in all of the three regression equations in which it was included. Group grievance appears to have a remarkable relationship with the country's level of corruption. Ethnic fractionalization is the second most important tribal factor because it has a significant relationship with the level of corruption in two out of four regression models. Gender inequality also has a significant relationship with the level of corruption in one of the three regression models. The tribal factor of the indigenous population appears to have no significant explanatory power in all of the four regression equations. Finally, political instability appears to be a significant control variable in one of the four regression

Table 1: Correlations between all the six variables

	EF	GG	GI	IP	LOC	PI
EF	1					
GG	0.199**	1				
GI	0.227**	0.278**	1			
IP	0.273*	0.406**	0.171	1		
LOC	-0.293**	-0.589**	-.298**	-0.202	1	
PI	0.015	-0.028	0.057	-0.101	-0.061	1

Note: **Correlation is significant at the 0.05 level (1-tailed). **Correlation is significant at the 0.01 level (1-tailed). EF= Ethnic Fractionalization; GG= Group Grievance; GI= Gender Inequality; IP= Indigenous Population; LOC= Level of Corruption; and PI= Political Instability.*

Table 2: Summary of the Least Square Regression Analysis for Variables Predicting Perceptions of Corruption (N=132)

	Model 1	Model 2	Model 3	Model 4
Variable	***β / sig.***	***β / sig.***	***β / sig.***	***β / sig.***
Constant	44.80 / 0.00***	76.34 / 0.000***	80.8 / 0.000***	80.11 / 0.000***
PI	13.09 / 0.00***	-0.45 / 0.37	-0.44 / 0.318	-0.38 / 0.377
GG		-5.01 / 0.000***	-4.75 / 0.000***	-4.53 / 0.000***
EF			-13.88 / 0.013*	-11.73 / 0.035*
IP				0.07 / 0.693
R^2	0.424	0.527	0.589	0.640
F for change in R^2	30.95***	22.78***	19.010***	17.33***

Note: p* < 0.05; p** < 0.01; p*** < 0.001
β = *Beta;* sig. = Significance; PI = Political Instability; GG = Group Grievance; EF = Ethnic Fractionalization; Indigenous Population; R^2 = R Square.

Conclusions

The least-squares regression analysis supported three of the four hypotheses. H1, H2, and H4 were supported. Gender inequality, ethnic fractionalization, and group grievance all have a significant effect on the country's level of corruption. The results showed no significant relationship found between the level of corruption and the indigenous population. Support for H1 and is consistent with Branisa and Ziegler (2013) who associated high levels of gender inequality with higher levels of corruption in countries. The relationship between indigenous population and the country's level of corruption was not support. Perhaps, could have no significant impact on the country's level of corruption since indigenous people are highly unemployed and even when they are in the workforce they are more likely to hold non key positions that will allow them to make important decisions and be corruption. For example, in Australia indigenous employment disparity is still an issue since the unemployment rate among indigenous people is 28% (Taylor, & Hunter, 1998).

Theoretically, research study findings may help scholars to explain why tribalism causes corruption in some countries. Researchers also could have a clear idea about which tribal factor contributes the most to levels of corruption in highly tribal communities and countries worldwide. Practically, the study findings could help educators to tailor specific training programs that focus on gender equality and gender differences, and therefore, incorruptness. The research findings might also layout guidance for policymakers to extra special attention to ethnic fractionalization with regard to socioeconomic distribution. Finally, the findings may help leaders to embrace new strategies that help overcome social instability and group grievance. Future research should investigate why political instability does not significantly impact the country's levels of corruption in all of the regression four models.

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The Influence of the Presence of Art on Social Cohesion during COVID-19

Iuliana COMAN

Bucharest University of Economic Studies, Bucharest, Romania

iuliana.coman@csie.ase.ro

Abstract

The crisis generated by the Covid-19 pandemic brought major changes in the behavior of the society, on the freedom of movement, on the organization of events, on the program of schools and universities. The aim of this paper is the evaluation of the changes manifested in the behavior of art consumers with an accent on the influences manifested by art upon the social cohesion during the Covid-19 pandemic. The research considers macroeconomic indicators provided by the National Institute of Statistics, Eurostat, and a survey conducted in the first week of May 2020, during the Covid-19 crisis. The purpose of the survey was to analyses art consumer behavior during this pandemic, the presence of art in the lives of respondents, and the influence that art has on the life of society. The sample of the survey included 200 persons with high education in the South of Romania, being defined using demographic sampling rates. The results showed that art continued to be present in the life of society and participate in supporting the passage of this period, continuing to participate in the consolidation of the community.

Keywords: Art, Society, Community, Influences, Covid-19.

Introduction

Cultural Barometers carried out in Romania, France, or Canada during the last years, demonstrate that art has an important role in society, developing the independence of individuals, expanding the capacity of knowledge, developing the understanding and the ability to act. Art also participates in the construction of social cohesion and develops society by encouraging civic participation. (Croitoru and Becuț Marinescu, 2017).

Gombrich (2012) underline also that art was an important component of mankind since ancient times, participating in the construction of society.

Art participated in the creation of a detailed image of the different period in mankind history, with a special contribution during the period of crisis, creating an exhaustive picture of these periods (Demos, 2013) (McDonnell and Tepper 2014), but also participating in the development of solutions to overcome these periods difficulty (Linesch, 1994) or their prevention (Klingman et al., 1987).

The role of art in the construction of society starting with the beginning of human history, the different influences manifested by art during the crisis period were analyzed in different researches. This paper aims to present the specificity of the evolution of art consumers' behavior during the Covid-19 crisis, in Romania, considering also the macro economical context generated by the Covid-19 crisis. More than this the paper analyses the influences manifested by art on the life of society and the participation of art in the consolidation of society.

Literature Review

The utility of art was presented in a series of researches published during the last years. Gombrich (2012) underline the utility of art, art consisting in the construction of temples and houses, in the making of paintings and sculptures

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or the weaving of an ornamental motif, there are no peoples who have not developed an art form. Gabeaud (1930) reminds the role of art to express feelings or the spiritual dimension of art like contemplation and prayer.

The capacity of art to participate in social cohesion was also reflected by Muhammad et al. (2016) and by Otte (2019). De Arriba et al. (2019) present the capacity of art to present and to find solutions to contemporaneous problems.

Pantano (2011) shows that culture influences consumers' behavior, the cultural components influencing the process of product perception. Nissley (2010) presents the implications of the art presence in contemporary society: decoration, entertainment; as a tool for management/leadership development and strategic transformation when the business integrates arts in areas such as vision and values, creativity and innovation, branding and marketing.

The covid-19 pandemic brought massive changes in the behavior of art consumers and art producers, art being one of the most affected sectors (Danieli and Olmstead-Rumsey, 2020), but the segment of luxury products in the art market registered an increasing trend during this period (Puaschunder, 2020).

The Internet penetration registered high increases during last year (Internet World Stats). The evolution of the Internet transformed internet platforms into the most common solution for access to the different forms of art during the Covid-19 crisis. Li et al. (2019), Korstanje and Babu (2016), and Chung and Yun (2013) analyses important issues associated with the processes of disseminating information using Internet like the responsibility of the mass-media in the impartiality of the message broadcasted and the role of the media in not amplifying risk and in not politicizing the risk issue.

The influences between art and society are analyzed also by Biraglia and Gerrath (2020). In their research is analyzed the impact of museum sponsorship on the perception of consumers. Another influence analyzed during the Covid-19 crises is the influence of music upon patients and staff working in clinics (Giordano et al., 2020). At the same time, attention is paid to the impact that concerts during the COvid-19 pandemic can have on listeners but also on singers. (Helding et al., 2020).

Objectives and Methodology of Research

The objectives of the research included the presentation of the socio-economic context generated by the Coronavirus Crisis in the Romanian society, a short presentation of the art consumers behavior during the Covid-19 crisis, and analysis regarding the influence of the art presence upon the society and upon the conviction regarding the capacity of art to participate to the consolidation of community.

The presentation of the socio-economic context considers different macroeconomic indicators. For analyzing the influence of the presence of art upon society a survey was organized, during the first week of May 2020 on a sample of 200 people in the south of Romania. The data collection was organized using TalkOnlinePanel - a company specialized in online surveys.

The structure of the sample was defined using the next sampling rates: education - persons with university studies; gender - 50% men and 50% women; age - 35% of respondents with ages between 31 and 40 years old, 47% with ages between 41 and 50 years old and 18% others.

The sample included persons with higher education for assuring thus a consistent exposure of the respondents to art and therefore a more profound analysis of the impact of art in the life of individuals and the life of society. The influence of education on the behavior of art consumers was also confirmed by the Cultural Barometer 2018 where it is mentioned that people with higher education have the greatest participation in cultural consumption (Croitoru and Becuț Mariescu, 2019). In defining the questionnaire, different studies and statistical analyses carried out in recent years in the field of art were taken into consideration, allowing the identification of the main factors which are manifesting in this field. Among the factors analyzed are the next ones: consumption of art, the presence of art in the lives of the respondents, the convictions regarding the participation of the art in the life of individuals, and the consolidation the society.

The method used to identify the relationships between factors was the Chi-Square method and Cramer's V test. The test introduced by Karl Pearson allows the verification of the hypothesis of an association between the variables generated by answers obtained from two different questions.

For calculating the Chi-Square indicator, computed using EXCEL, contingency tables were organized by intersecting the answers to two questions: X - with the alternatives Xi, placed as rows of the table, and Y - with the alternatives Yj, placed in columns. (Mihaita, Stanciu-Capota, 2005).
The next steps were:

- The formulation of the null hypothesis H0, which states that between the two variables-segmentation questions there is no causal link or association
- Choosing the significance level or threshold α and calculating the number of degrees of freedom of the table according to the formula (r-1) (c-1); based on these data, one assumes from the table of distribution $\chi 2$ its value, theoretically (index t);
- Calculating the expected theoretical frequencies (expected, in case of a homogeneity test), according to the following formula:
  θij=(Total Line I x Total Line J) / Total = Ti. x T.j
- Calculation of $\chi 2$ index using the formula: $\chi 2=\sum ri=1\sum cj=1$ [(xij- θij)2/ θij]
- $\chi 2$ is compared with the one obtained from the distribution table $\chi 2$ as follows:
  • if $\chi 2$calculated > $\chi 2$teroretical, the null hypothesis is rejected and therefore there is an association or potential relationship between the studied segmentation variables;
  • if $\chi 2$calculated < $\chi 2$teroretical, the null hypothesis is accepted and therefore there is no association or potential relationship between the studied segmentation variables.
- After identifying the existence of the association between the segmentation variables, we used the Cramer's V test to verify how strong the connection between the two variables is.

$V=\sqrt{(\chi 2/[(N)Min (r-1, c-1))}$

The scale of values that Cramer's V can have is the following:

- ≤0.10 there is no association
- >0.10 and ≤0.30 weak association
- >0.3 and ≤0.50 moderate association
- >0.5 and ≤0.70 strong association
- >0.70 very strong association

Results

Art consumption in the Romanian society

The image of art consumption in Romania during the Covid-19 crisis is reflected by data obtained in the survey organized regarding the behavior of art consumers in southern Romania in the first week of May 2020.

The analysis of consumption frequencies was done considering the context generated by the Covid-19 crisis and the available platforms that offer access to different art forms and cultures.

The data obtained show that 75% of respondents consumed movies using internet platforms with a frequency of at least weekly and among men even 79% consumed movies at least weekly using Internet platforms.

In the case of theater consumption using Internet platforms, 44% of respondents consumed at least once a month. And in the case of theater, there is a higher consumption for men, 47% of men have consumed at least monthly theater using the various existing platforms. Music continues to be the art form consumed with the highest daily frequency, 57% of respondents consumed music daily using various forms of online broadcasting. In the case of Literature, 59% of the respondents read with a frequency at least weekly Literature in classical format or electronic format. The visual arts were also available online during this period, many museums exhibited their galleries in

virtual tours. Thus, the survey shows that 59% of respondents accessed various Internet platforms used to display works of art. It can also be mentioned that 16% of the respondents consumed other art forms besides the ones mentioned above. These other art forms include dance, culinary art, and photography.

In the survey the influence of art on society and the participation of art in community consolidation were analyzed, both topics were the subject of questions in the questionnaire.
Data obtained show that 55% of respondents expressed their total agreement regarding the influence of art upon the life of society and 12% of respondents expressed their partial agreement regarding the influence of art upon the life of society. It can also be seen that women are more convinced that art influences the life of society, 88% of women have expressed their agreement, and in the case of men 82% of them have expressed their agreement on the influence of art on society. If we consider education as a segmentation variable, it can be seen that people with postgraduate studies are more convinced of the ability of art to influence society, 86% of people with postgraduate studies have expressed their agreement concerning the influence of art on society, and in in the case of people with university degrees, 84% of them expressed their agreement on the ability of art to influence society.

Analyzing the capacity of art to participate in the consolidation of the community, the answers also showed the conviction of the respondents regarding the capacity of art to participate in the strengthening of the community. 90% of the respondents expressed their agreement regarding the participation of art in the consolidation of the society, 54% expressed their total agreement, and 36% the partial agreement. The differences between men's and women's beliefs are very small, 90% of women and 89% of men agreed. If we use education as a segmentation variable there are also small differences: 90% of respondents with university studies and 88% of respondents with postgraduate studies have expressed their agreement on the participation of art in the consolidation of community.

To analyze the influence of art on society, the influences generated by the following variables were also considered: the presence of art in the respondents' lives, the age, gender, and studies of the respondents.

Table 1: Influences upon the convictions regarding the capacity of art to influence the life of society

Variable 1	Variable 2	$\chi 2$	CRAMER V
Art influences the life of society	Arta was present in life	31.30	0.39 (Moderate association)
Art influences the life of society	Age	2.61	0.11 (weak association)
Art influences the life of society	Gender	1.43	0.08 (no association)
Art influences the life of society	Education	1.47	0.09 (no association)

Source: Author's own research

It has been observed that there is an association between the presence of art and the influence of art on society, as was expected. The presence of art influences the convictions about the ability of art to influence society but should be mentioned that also the convictions regarding the capacity of art to influence the society manifest influence upon the presence of art, generally in the social context, the existence of an association means to influence that manifests itself in both directions between the two variables.

Age also shows a weak influence on the convictions about the ability of art to influence society. (Craver's V is 0.11). The variables Gender and Education do not show influence, between them and the convictions regarding the capacity of the art to influence society there is no association.

Analyzing the influences that manifest on the capacity of art to contribute to the consolidation of the community, the following possible variables of influence were analyzed: the presence of art in the respondents' lives, age, gender, and education.

The association between the presence of art and the contribution of art to the consolidation of the community is strong. It is the strongest association identified in this analysis. Also, the ability of art to contribute to community building is weakly associated with age and education. Gender does not show any influence on the agreement on the ability of the art to contribute to the consolidation of the community.

Table 2: Influences upon the convictions regarding the capacity of art to consolidate community

Variable 1	Variable 2	$\chi 2$	CRAMER V
Arta participate in the consolidation of community	Arta was present in life	49.53	0.5 (Strong association)
Arta participate in the consolidation of community	Age	2.74	0.12 (Weak association)
Arta participate in the consolidation of community	Gender	0.32	0.04 (No association)
Arta participate in the consolidation of community	Education	3.78	0.14 (Weak association)

Source: Author's own research

Limitations of the research

This communication is an academic lecture, an example of robustness a simple approach starting from the statistical instrumentation of the percentages of contingency tables of the dichotomous variables found in planes and hyperplanes of interaction or indifference.

The survey organized for surprising the image of the Romanian art consumption during the Covid-19 crisis has not statistical guarantees, the approach offered an image regarding the 200 respondents included in the sample.

One of the goals of this paper is to promote this subject, of the importance that the presence of art represents in the consolidation of the society, aiming to participate in the launch of the subject regarding the analyzes and discussions on this topic.

Comments

The influence of the presence of art on social cohesion

Art was one of the most affected sectors during the Covid-19 pandemic. Danieli and Olmstead-Rumsey (2020) mention that the related shutdowns are concentrated in just a few sectors like arts, entertainment, recreation.

Changes were necessary for the behavior of art consumers and art producers due to the movement restrictions, non-essential stores closed, and events stops. In the Romanian market starting with 17 March schools, universities, non-essential shops, and events were closed, and national and international movements and flights were restricted. The restrictions were removed starting with the 1st of June, and flights were partially restricted.

Looking to the evolution of the Romanian art market reflected by macroeconomic indicators calculated by the National Institute of Statistics, during the last 10 years we have an increasing trend for the number of spectators and auditors at artistic performances, concerts, cinema spectators, and visitors to museums and public collections. A fluctuating evolution was registered for the number of active readers in libraries, the number of printed books and brochures entered in the Legal Deposit of the National Library, and for the number of newspapers, magazines, and other periodicals.

ARTMARK, the biggest company in the sector of artwork auctions, released in 2020 a report regarding the perspectives of the Romanian art market in 2020 and 2021 in the context of the Covid-19 pandemic. The report presents the evolution of the Romanian art market in recent years and an estimation of the evolution for 2020. In Romania, the art market has experienced annual growth of 22% in the last five years, until the end of 2019. The year 2020 begins under the auspices of a positive end of 2019, signaling trends of moderate, organic growth in all directions.

Also, the data obtained in the survey conducted for this study show that art consumption continued during the period of the crisis caused by a coronavirus. Respondents to the study conducted in Romania continued to consume art in various forms using mainly internet platforms that helped consumers to have access to various art forms, from movies, theater, art exhibitions, music to museum tours. Although the study is without statistical guarantees, it aims

to launch a topic that may be of interest in contemporary society, namely the impact of art consumption on the lives of individuals and society.

The capability of art to participate in building society and consolidating the community was one of the conclusions of the latest Cultural Barometers conducted in Romania, as well as in other European countries or worldwide. (Croitoru and Becuț Marinecu, 2017).

This influence is also manifested in times of crisis, such as the one we are going through. Gupta (2020), shows how art, the act of viewing, making, and sharing music, street art, paintings, graphic art, cinema, and digital videos can serve as a therapeutic vehicle for empowerment, solidarity, and collective action as most human beings strive to adopt practices of extreme social distancing as the recommended community mitigation strategy to help save lives before a vaccine is developed.
The data obtained in the survey organized for this research show that the respondents are convinced that art influences the life of society and participates in the consolidation of society. We find this conviction among respondents regardless of age, gender, or education. There is, however, a set of variables that influence respondents' beliefs about the influence of art on society, namely the presence of art in the life of society. This influence was identified both in the period preceding the Coronavirus crisis (Coman and Mihaita, 2019) and is identified in the crisis period.

Recent studies also show the influence of variables such as convictions regarding art on the assessments of the usefulness of art or of the ability of art to influence society (Coman, 2020).

Published studies also show that art has an influence on society, and on consumer behavior in the periods before the coronavirus crisis (Croitoru and Becuț Marinecu, 2017) also influencing consumer perceptions (Pantano, 2011).

Music, in particular, influences the lives of listeners in general, but it is also used to go through difficult periods during the crisis, such as the one we are going through, being used in clinics. (Giordano et al., 2020).

The influences of art on society are also manifested by the role that art plays in building the urban landscape, in improving the quality of life (Muhammad et al., 2016), reaching the support that art can have in the educational process, such as in the development of creative pedagogy methods for teaching political economy (De Arriba et al., 2019).

Conclusions

The beginning of 2020 found Romania in a period of economic growth with an optimistic society, in which the Index of Consumer Confidence managed in December 2019 to exceed for the first time the European average of the consumer confidence index (European Commission). Art consumption was registering also an increasing trend for most indicators.

The Covid-19 pandemic brought a series of restrictions that the Romanian society and economy had not faced in the last decades: travel restrictions, flight restrictions, closing schools and universities, banning events, and closing non-essential stores. During this period generated by the Covid-19 crisis, art consumption continued, in different forms, adapted to the period, continuing to be present in the lives of people and society.

This paper offers a brief profile of art consumer behavior in Romanian society during the Covid-19 crisis, considering the influences that art manifests on society and the participation of art in building social cohesion. Through the Survey carried out, survey without statistical guarantees, the research participates in the presentation of this topic and aims to open it for further research.

According to the survey conducted in May 2020, 75% of respondents consumed movies using internet platforms with a frequency of at least weekly, 44% of respondents consumed theater at least once a month. Music continues to be the art form consumed with the highest daily frequency, 57% of respondents consumed music daily using various forms of online broadcasting. In the case of Literature, 59% of the respondents read with a frequency at least weekly literature in classical format or electronic format.

This research also shows that art continues to participate in the strengthening of the community, 90% of the respondents of the survey agreed on the ability of art to participate in community building, and 85% agreed on the ability of art to influence society.

The role of art in society during this period covers many other areas, exceeding the answer to people's esthetic needs. Art participate in the consolidation of communities, art offers the support of staff and patients in clinics, in the case of music, or provides an investment solution in these turbulent times, or art plays the role of support for solidarity and collective action in the sustenance of the community strategies such as social distancing during the Covid-19 crisis.

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Factors Influencing Investment Decision of Mutual Funds and The Role of Personality Traits in Their Perception Among Retail Investors in Kerala

Abhijith
Research Scholar, Department of Commerce and Management, School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Kochi, Kerala, India
Email ID: abhijith3011@gmail.com

P. Balasubramanian
Head and Assistant Professor (Sr. Grade), Department of Commerce and Management, School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Kochi, Kerala, India
Email ID: baladiwansapudur@gmail.com

Abstract

Behavioural Finance as a field has been making an effort to elucidate a litany of heuristics, prejudices, inefficiencies to make sense of price moments of financial instruments. This paper is an attempt to study the factors influencing investment decisions among retail investors in Kerala. Data was collected from respondents through questionnaire. Personality traits indirectly impacts how we use we existing set of information this study shed light on the impact of personality traits on investment decision. It would help in better understanding even with near-universal access to information and necessary allied infrastructure the investment per capita remains low compared to the rest of India. It also attempts to observe the influence of extroversion and openness as personality traits on the perception of factors influencing investment decisions among investors. The significant factors that influence investment decisions are observed to make it easier for improving and getting more retail investors to invest in mutual funds.

Keywords: Mutual Funds, Kerala, Personality Traits, Investment Decision, Individual Investor

Introduction

The integration of the world economies has bought nations closer; this has made the economic future of any country interlinked that of other countries. The integration of the Indian economy with that of the world in 1991 which led to an increase in India's Gross Domestic Product from $303.056 Billion in 1991 to $451.573 Billion in 2001(World Bank) which represents a significant spike in growth between 1981-1991 when the GDP grew from $270.471 Billion to $303.056 billion (World Bank). The high growth had made more than 50% of the Indian Population (around 600 million) on account of better salaries and growth prospects be classified as middle class. (Krishnan, S., & Hatekar, N 2017). The vast part of the Indian populace who now made disposable income and a growing desire to improve their standard of living want to find avenues to park part of their savings in financial instruments, to earn better returns. This led to the populace of India investing in but not limited equity market, mutual funds, public provident fund, Fixed deposits in banks, Life insurance policies, post office saving schemes, debentures, treasury bills, options, derivatives, and savings bank account.

Significance of The Study

The mutual fund industry is the fastest-growing segment of the Indian financial sector even while being highly competitive and offering attractive returns on the corpus invested by the investors and providing operational flexibility (Reserve Bank of India,2017). There has been a 25% Compounded Annual Growth Rate increase in the Assets Under Manage during 2013-2018. "The growing formalization and financialization of the Indian economy, household savings have been shifting from physical assets to financial Assets, and within financial assets from bank deposits to securities" (Reserve Bank of India,2018). Retail Investors investment decision on investing in financial decisions are based upon variables including but not limited to Risk aversion, Prospecting, Anchoring, herding (Wamae, J. N., 2013), Neutral Information, accounting information, self-image/firm-image coincidence, advocate recommendation, personal financial needs (Mutswenje, V. S. 2009). The study of such factors is of great significance because conventional financial and economic theories such as Capital Asset Pricing Model, Efficient Market Hypothesis, Monetary Theory, etc which are based on a certain set of assumptions have at times been put to test due to financial market anomalies. Daniel Kahneman a psychologist who won the Nobel Memorial Prize in Economic Science in

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2002 along with Amos Tversky can be credited to inventing the topic of behavioral finance, which changed the way we expect financial instruments to behave in the financial market. Behavioural Finance as a field has been making an effort to elucidate a litany of heuristics, prejudices, inefficiencies to make sense of price moments of financial instruments (Hammond, R. C. 2015). The existing literature covers the factors influencing investment decision, but there exists a lack of papers on how the personality of an individual influences his perception of the factors. This paper is an attempt to fill this void.

Literature Review

Theoretical Review

Ajzen (1986,1991,2000,2002) introduced the theory of planned behavior, which is considered to be one of the preeminent social psychology theory that can be made use of to anticipate the behavior of humans. It was refined for a pre-existing theory known as the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980).

TRA considers the intention of the behavior as the direct motivator for individuals to perform the behavior. TRA even though widely accepted did not precisely predict the behavior of individuals who were constrained by a lack of opportunities or time etc, even when the individual would otherwise be socially urged and is favorable to perform it (Ajzen, 1991).

Global Context

Grinblatt, M., & Keloharju, M. (2000) observed that in the Finnish financial market foreign investors tend to trade with the market, whereas Finnish investors tended to trade against the market. Kaniel et al. (2012), and Kelley and Tetlock (2013) found that there exists an order imbalance of the ability to predict future returns or price movements by individual investors, signifying that some of the individual investors possessing price-sensitive information.

Dickason and Ferreira (2018) studied to identify the association of investment biases with that with the category the investor belongs to, and how they make their investment decisions. It was found that investors with low to average risk tolerances, in general, displayed to loss aversion bias and mental accounting bias. An impulsive decision making and self -control bias was observed among investors with a high tolerance to risk. Investors with moderate risk aversion were susceptible to anchoring, overconfidence, regret aversion, and availability biases. It was concluded that such studies would help create investment products that are attractive to investors.

Hossain, M. F., & Nasrin, S. (2012) studied to identify the factors that influenced the investment decision of retail investors in equity shares which were listed in the Dhaka Stock Exchange. The study arrived at the conclusion that investors had placed significant emphasis on share price, accounting information, specific attributes, and reputation of the business entity. It was found that demographic factors influenced how accounting information was considered significant in the investment decision.

Chen et al. (2015) attempted to identify herding among investors in Taiwan. It was found that large individual investors usually formed a herd, whose activities directly correlated to movements in the equity share price. The trading operations of small retail investors were indirectly related to present and future movements in equity share price and returns, which was attributed to the behavior of selling share before any positive price-sensitive information becomes public and buying shares before any negative price-sensitive information becoming public.

Phan, K. C., & Zhou, J. (2014) attempted to identify the factors that were influencing the investment behavior of investors in the Vietnamese Stock Market. The authors found a significant impact of subjective norm, psychological factors, investment attitude of the investor, and subjective norm on the individual's investment behavior. Gender has a statistically relevant moderation effect on the relation between investment attitude and psychological factors, between behavioral intention and subject norms and attitude of the investor and behavioral intention. East (1993) studied equity share investment decision in Britain, the study found that the theory of planned behavior was able to accurately predict investment decisions.

Gunathilaka, C. (2014) concluded that accounting information, self-image/firm image, and advocates recommendation has a significant influence on the selection of equity stocks in Colombo. Clark M. & Soutar, G. N. (2004) Concluded that recent share price moments and company management played a bigger role than price to earnings ratio and dividends (present and past) in the Australian Financial market.

Indian Context

There exists a significant relationship between the demographic factors and the capacity of an individual to bear risk, Respondents who regarded themselves as a conscientious, extravert, and agreeable were in general found to take more risk (Athira, and Kakkakunnan, 2020). This supports the interlinkage of investment decisions with the demographic and personality traits of the investor (Thomas and Rajendran 2012).

Joshi et al. (2011) attributed the investing behavior investors in Gujarat was significantly impacted by market expectations, market sentiments, and past performance. Bennet et al. (2011) observed a significant difference in investment decisions between gender.

Objectives

- To know a demographic profile of retail investors in Kerala.
- To analyse the factors that significantly affect the investment decision.
- To explore the role of personality traits in influencing investment decisions.

Hypotheses

- H_{0a}: All factors significantly associated with the influence investment decision
- $H_{0b:}$ Personality traits significantly associated influence how factors are perceived.

Research Methodology

The study focuses on the state of Kerala, the population of the study is the retail investors in mutual funds in Kerala. The sample size of 384 was selected as per Morgan's table, confidence interval was 95% and margin of error was at 5%. The data was collected with the use of a questionnaire. Out of the 384 filled questionnaire, 125 (33%) were considered for the study, the rest were rejected due to being incomplete or multiple selections being selected for questions. This research design uses a descriptive and analytical research design. The questionnaire was divided into two segments one enquiring about the demographic information of the respondent and the second segment enquiring about the respondent's perception of the economic factors in influencing their investment decision. The response was analyzed using the Statistical Program for Social Science by IBM.

Data Analysis, Interpretation and Conclusion

Demographic Profile

The demographic profile of the respondents is presented in Table 1. The table shows the demographic profile of the respondents based on the age of the respondents, gender of the respondents, education level, monthly income, and marital status of the respondent.

Table 1: Demographic profile of the respondent

		Count	Percentage
Age	Under 18	0	0.0%
	19-22	40	32.0%
	23-26	49	39.2%
	27-30	18	14.4%
	Above 30	18	14.4%
	Total	125	100.0%
Gender	Female	84	67.2%
	Male	41	32.8%
	Total	125	100.0%
Marital Status	Single	91	72.8%
	Married	30	24.0%
	Divorcee	4	3.2%
	Total	125	100.0%
Highest Education Qualification	Higher Secondary	0	0.0%
	Senior Secondary	0	0.0%
	Graduate	52	41.6%
	Post- Graduate	65	52.0%

	Others	8	6.4%
	Total	125	100.0%
Annual Household income	Under Rs.3,00,000	43	34.4%
	Rs.3,00,001- Rs.5,00,000	34	27.2%
	Rs.5,00,001- Rs.7,00,000	20	16.0%
	Rs.7,00,001- Rs.9,00,000	6	4.8%
	Above Rs.9,00,000	22	17.6%
	Total	125	100.0%

Source: Primary Data

It is observed that 39.2% of the respondents were between 23-26 years old, 32% where between the age of 19-22, and those aged between 27-30 and above 30 each accounted for 14% of the respondents. 62.7% were female and the rest where men. Singles accounted for 72.8% of the respondents, married 24%, and divorcees 3.2%. Postgraduates accounted for 52% of the respondents, graduates 41.6%, others at 6.4%. 34.4% of the respondents had an annual household income of under Rs.3,00,000., 27.2% household earned between Rs.3,00,001- Rs.5,00,000., 17.6% of the respondents had a household income in excess of Rs.9,00,000., Rs.5,00,001- Rs.7,00,000 by % and 4.8% Rs.7,00,001- Rs.9,00,000.

Cronbach Alpha

Cronbach Alpha is used to measure the internal consistency of a questionnaire. The value usually lies between 0-1. A high value denotes a set of items that are closely related to as a group.

Table 2: Cronbach's Alpha of questions on factors affecting investment decision.

	Cronbach's Alpha	N of Items
Overall (Investment Decision)	.912	30
Self-image and Firm Image	.652	9
Accounting Information	.905	7
Neutral Information	.616	6
Advocate Recommendation	.594	4
Personal Financial Needs	.712	4

A high Cronbach's Alpha denotes a set of items that are closely related to as a group. In this case, the questions on factors affecting investment decision are closely related to each other

Table 3: Cronbach's Alpha of questions on personality.

	Cronbach's Alpha	N of Items
Overall (Personality)	.770	10
Extroversion	.731	5
Openness	.551	5

A high Cronbach's Alpha denotes a set of items that are closely related to as a group. In this case, the questions on personality are closely related to each other.

Rescaled Communalities

Table 4: Rescaled Commonalities based on the personality trait

	Initial	Extraction (Extroversion)	Extraction (Openness)
Religion	1.000	.846	.845
Political party affiliation	1.000	.911	.909
The environmental record of the business entity	1.000	.785	.810
Perceived ethics of the firm	1.000	.768	.791
Family member opinions	1.000	.815	.792
Firms involvement in solving community problems	1.000	.592	.636
Feeling about the firm's products and services	1.000	.835	.807
Ease of obtaining borrowed funds	1.000	.723	.806
Attractive of alternative investment avenue	1.000	.738	.675
Diversification Needs	1.000	.789	.801
Coverage in press	1.000	.689	.737
Opinions of the firm's majority shareholders	1.000	.704	.834
Friend or Co-worker recommendation	1.000	.759	.792
Statements from government officials	1.000	.683	.710
The reputation of the firm	1.000	.826	.805
Gut feeling about the economy	1.000	.825	.810
Information obtained from the internet	1.000	.746	.792
Getting rich quickly	1.000	.654	.689
minimizing risk	1.000	.676	.628
Fluctuation's in the stock market	1.000	.657	.654
Affordability	1.000	.776	.742
Broker Recommendation	1.000	.704	.653
Past performance	1.000	.795	.768
Current Economic Indicators	1.000	.778	.766
Firms Status in the Industry	1.000	.729	.726
Dividends paid in the past	1.000	.751	.644
Marketability of the instrument	1.000	.777	.712
Condition of Financial statements	1.000	.832	.805
Expected Corporate earnings	1.000	.718	.761
Expected Dividends	1.000	.769	.719

Communality measures the percentage of variance in a given variable under study which could be explained by all other factors conjointly and this value can be construed as the reliability of the indicator. Political affiliation has the highest variability in both cases whereas "Firms involvement in solving Community problems" has the lowest variability in the case of extroverts and "Minimizing risk" in the case of open-minded respondents.

Table 5: Total Variance explained based on extroversion.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.765	32.550	32.550	9.765	32.550	32.550
2	3.051	10.172	42.722	3.051	10.172	42.722
3	2.617	8.722	51.444	2.617	8.722	51.444
4	1.893	6.310	57.754	1.893	6.310	57.754
5	1.660	5.533	63.287	1.660	5.533	63.287
6	1.331	4.435	67.722	1.331	4.435	67.722
7	1.206	4.020	71.742	1.206	4.020	71.742
8	1.128	3.759	75.501	1.128	3.759	75.501
9	.959	3.196	78.697			
10	.819	2.730	81.427			
11	.745	2.482	83.909			
12	.625	2.083	85.991			
13	.579	1.930	87.921			
14	.542	1.807	89.728			
15	.491	1.637	91.365			
16	.407	1.358	92.723			
17	.342	1.142	93.864			
18	.309	1.029	94.894			
19	.293	.976	95.870			
20	.279	.930	96.800			
21	.207	.689	97.489			
22	.152	.507	97.996			
23	.138	.460	98.456			
24	.131	.437	98.893			
25	.100	.334	99.226			
26	.087	.291	99.518			
27	.057	.190	99.708			
28	.043	.144	99.852			
29	.025	.082	99.934			
30	.020	.066	100.000			

Table 5 indicates the total degree of variance that can be explained by each component. Eight factors that together explained 75.501% of the total variability was extracted. These are orthogonal to each other. The cut-off was based on the condition that the eigenvalue should be at least 1. The first component explained 32.55% of observed variance, the second component 10.1722%, the third component 8.722%, the fourth component 6.310%, the fifth component 5.533%, the sixth component 4.435%, the seventh component 4.020%, and the eighth component 3.759%.

Table 6: Total Variance explained based on Openness.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.362	31.207	31.207	9.362	31.207	31.207
2	3.549	11.829	43.036	3.549	11.829	43.036
3	2.840	9.467	52.504	2.840	9.467	52.504
4	1.729	5.763	58.267	1.729	5.763	58.267
5	1.524	5.079	63.345	1.524	5.079	63.345
6	1.383	4.611	67.956	1.383	4.611	67.956
7	1.181	3.938	71.894	1.181	3.938	71.894
8	1.053	3.509	75.403	1.053	3.509	75.403
9	.901	3.002	78.405			
10	.779	2.596	81.001			

11	.720	2.399	83.399			
12	.688	2.292	85.691			
13	.589	1.964	87.655			
14	.566	1.888	89.542			
15	.475	1.584	91.127			
16	.414	1.380	92.507			
17	.352	1.172	93.679			
18	.327	1.089	94.769			
19	.288	.960	95.729			
20	.247	.824	96.553			
21	.211	.704	97.256			
22	.165	.551	97.808			
23	.149	.496	98.303			
24	.120	.399	98.703			
25	.107	.355	99.058			
26	.104	.348	99.406			
27	.078	.259	99.665			
28	.047	.157	99.822			
29	.029	.096	99.918			
30	.025	.082	100.000			

Table 6 indicates the total degree of variance that can be explained by each component. Eight factors that together explained 75.403% of the total variability was extracted. These are orthogonal to each other. The cut-off was based on the condition that eigenvalue should be at least 1. The first component explained 31.207% of observed variance, the second component 11.829%, the third component 9.467%, the fourth component 5.763%, the fifth component 5.079%, the sixth component 4.611%, the seventh component 3.938%, and the eighth component 3.509%.

Table 7 shows variables that make each variable influence on each component. Value is in the range of -1 to 1. A value of greater than 0.5 shows a significant influence on the corresponding component. It is observed in table 8 and table 6 that respondents show a significant difference in how they perceive factors that influence an investment decision.

Table 7: Rotated component matric based on the Personality traits.

	Component (Extroversion)								**Component (Openness)**							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Religion	-.040	-.302	.413	.522	.376	.351	-.113	.180	-.206	.166	.599	.334	.462	.111	.039	-.279
Political party affiliation	.261	.060	.385	.487	.592	.000	-.089	.310	.125	.367	.503	.191	.312	.552	.151	-.210
Environmental record of the business entity	.168	.787	-.129	.037	.239	-.149	.196	.042	.177	.731	-.297	-.077	-.083	.272	.186	.187
Perceived ethics of the firm	.189	.822	-.114	.099	.109	-.079	.097	.080	.228	.765	-.348	-.031	-.109	.135	.034	.016
Family member opinions	.177	.055	.148	.519	-.377	.537	.142	-.195	.182	.348	.134	.543	.208	-.512	.122	-.065
Firms involvement in solving Community problems	.404	.349	-.063	.436	-.135	-.145	.264	.062	.356	.629	-.049	.213	-.046	-.133	.087	.195
Feeling about the firm's products and services	.733	.392	-.020	-.112	.006	.137	-.248	-.225	.730	.421	-.167	-.045	.040	-.058	-.236	-.077
Ease of obtaining borrowed funds	.466	.078	.455	-.165	-.451	.208	.113	-.080	.448	.361	.278	-.146	-.046	-.562	-.243	.004
Attractive of alternative investment avenue	.673	.249	.108	.095	-.181	-.012	-.397	-.109	.743	.175	.043	.079	-.130	.026	-.185	-.182
Diversification Needs	.585	.361	.264	.204	-.002	.050	-.329	-.308	.581	.520	.047	.145	.136	-.082	-.381	-.006

Coverage in press	.508	.085	.529	-.249	.196	-.190	-.040	-.075	.472	.328	.469	-.259	.057	.086	-.098	.315
Opinions of the firm's majority shareholders	.619	.092	.328	-.039	-.041	-.053	.443	-.044	.592	.034	.344	-.072	-.084	.006	.526	.275
Friend or Co-worker recommendation	.700	.001	.482	.027	-.086	-.126	.087	.074	.670	.028	.525	-.151	-.176	.017	.090	-.069
Statements from government officials	.574	.075	.472	-.090	-.102	-.281	.121	.111	.536	.085	.462	-.171	-.375	.134	.117	-.006
Reputation of the firm	.753	.262	.044	-.241	-.075	.039	-.320	.141	.742	.189	-.093	-.261	-.178	.013	-.129	-.305
Gut feeling about the economy	.403	-.282	-.138	.505	-.197	-.515	.001	.075	.377	-.143	.127	.538	-.552	.158	-.110	-.018
Information obtained from the internet	.450	-.430	-.011	.118	-.058	-.433	-.041	-.390	.395	-.396	.159	.408	-.337	.152	-.236	.310
Getting rich quickly	.380	-.425	.361	-.010	-.405	-.018	.018	.183	.353	-.325	.529	-.030	-.203	-.323	.180	.002
minimizing risk	.499	-.540	-.244	.012	.199	.025	.052	-.181	.488	-.447	-.100	.176	.256	-.048	-.203	.199
Fluctuation's in the stock market	.690	-.212	-.066	.092	.276	-.181	-.009	-.119	.595	-.281	.091	.099	.057	.350	-.275	.021
Affordability	.610	-.093	-.325	.075	.294	.034	.115	-.427	.604	-.076	-.314	.259	.265	.122	-.083	.338
Broker Recommendation	.423	-.437	.365	-.255	.299	.207	.031	-.051	.353	-.317	.469	-.225	.350	-.028	-.176	.055
Past performance	.668	-.119	.097	-.390	.285	.110	.282	.027	.651	-.184	.063	-.427	.284	.053	-.071	.190
Current Economic Indicators	.651	-.065	-.229	-.237	.035	-.073	-.329	.356	.666	-.212	-.228	-.161	-.096	.136	-.048	-.412
Firms Status in the Industry	.735	.100	-.268	-.252	.080	.164	.099	-.015	.746	-.097	-.334	-.192	.098	-.005	.041	.012
Dividends paid in the past	.651	-.113	-.322	-.027	-.104	.053	.318	.308	.653	-.271	-.284	-.118	.047	-.084	.200	.012
Marketability of the instrument	.755	-.029	-.382	.064	.021	.235	.017	.012	.739	-.181	-.195	.073	.208	.035	.198	-.081
Condition of Financial statements	.829	-.015	-.268	.032	-.083	.178	.055	.172	.828	-.054	-.170	.070	.120	-.090	.232	-.076
Expected Corporate earnings	.732	-.072	-.328	.246	-.018	.071	.056	-.022	.722	-.149	-.230	.282	.116	.000	.266	.026
Expected Dividends	.668	-.261	-.305	.067	-.182	.006	-.247	.253	.685	-.319	-.166	.163	-.049	-.105	.110	-.261

Freidman's Factor Ranking

Table 8: Ranking of variables based on Mean.

	N	Mean	Std. Deviation	Rank
Reputation of the firm	125	4.384	0.8499	1
Firms Status in the Industry	125	4.32	0.7362	2
Current Economic Indicators	125	4.304	0.7954	3
Condition of Financial statements	125	4.208	0.7859	4
Past performance	125	4.2	0.8424	5
Marketability of the instrument	125	4.2	0.8424	6
Affordability	125	4.168	0.8494	7
Feeling about the firm's products and services	125	4.16	0.8651	8

Expected Dividends	125	4.152	0.8525	9
Expected Corporate earnings	125	4.104	0.8213	10
minimizing risk	125	4.032	0.8224	11
Dividends paid in the past	125	4.016	0.9068	12
Attractive of alternative investment avenue	125	3.984	0.8889	13
Diversification Needs	125	3.96	0.9193	14
Information obtained from the internet	125	3.936	0.9136	15
Friend or Co-worker recommendation	125	3.904	0.9107	16
Statements from government officials	125	3.824	0.8713	17
Family member opinions	125	3.824	1.1003	18
Perceived ethics of the firm	125	3.784	1.2546	19
Opinions of the firm's majority shareholders	125	3.744	1.0152	20
Fluctuation's in the stock market	125	3.72	0.8576	21
Ease of obtaining borrowed funds	125	3.672	1.0455	22
Gut feeling about the economy	125	3.656	0.9681	23
Firms involvement in solving community problems	125	3.624	1.1120	24
Coverage in press	125	3.576	1.1091	25
The environmental record of the business entity	125	3.432	1.2465	26
Broker Recommendation	125	3.248	0.9643	27
Getting rich quickly	125	3.224	1.1837	28
Religion	125	1.848	1.2052	29
Political party affiliation	125	1.776	1.1561	30

Friedman rank test assigns weights bases on the degrees of importance of factors in influencing the activity. Table 8 depicts the influence of factors and their degree of influence if investment decisions It can be seen that the first 12 factors greatly influence investment decision, 13-28 factors, and averagely important, and the last two are least influential.

Findings and Suggestions

The demographic profile of the respondents signifies that respondents irrespective of age, gender, marital status, education, and income invest money in equity mutual fund schemes. It was also seen that respondents perceive the variables differently based on personality traits. All the factors except for religion and political affiliation of the respondents play a significant part in influencing the investment decision of the respondents.

Conclusion

It is concluded that factors except for religion and political affiliation of the respondents play a significant part in influencing the investment decision of the respondents. The respondent's perception of factors is influenced by their personality and that people irrespective of age, gender, marital status, income, and education invest in equity mutual funds. This study could help asset management companies develop customized advertisements to prospective customers based on the personality thereby helping them convert leads into sales. It also sheds light on an indirectly influencing factor on which further study across geographical boundaries could be done and studied to find if similar impact is observed in other places.

Limitations and Scope for Future Study

The study is limited to thirty factors and the state of Kerala. There exist immense potential and value to study if the factors are similarly influenced in other places. Studies can also be done on how personality impacts their perception

among investors. The influence of personality is an invisible factor that brings forward other biases of the investor and is therefore of significance to study.

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Solutions for Improving the Economic Efficiency of Koi Carp Intensive Aquaculture Considering Different Technological Scenarios

Aurelia NICA*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; aurelia.nica@ugal.ro

Alina MOGODAN
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; alina.antache@ugal.ro

Ira A. SIMIONOV
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania and Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; ira.simionov@gmail.com

Stefan M. PETREA*
"Dunărea de Jos" University of Galaţi, Food Science and Engineering Faculty, Food Science, Food Engineering, Biotechnologies and Aquaculture, 800008, Galați, Romania; stefan.petrea@ugal.ro; petreastefanmihai@yahoo.com

Dragos S. CRISTEA
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration 800008, Galaţi, Romania, dragoscristea@yahoo.com

Mihaela NECULITA
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration 800008, Galaţi, Romania, neculitam@yahoo.fr

Sarina ROSENBERG
"Dunărea de Jos" University of Galaţi, Faculty of Economics and Business Administration, 800008, Galați, Romania; sarina17.rosenberg@gmail.com

Victor CRISTEA
"Dunărea de Jos" University of Galaţi, Transboarding Faculty and Multidisciplinary Research Platform (ReForm) – MoRAS, 800008, Galați, Romania; victor.cristea@ugal.ro\

Abstract

The aim of present study is to evaluate the effect of 4 significant different feeding rates (V1 – 0.22%, V2 – 0.12%, V3 – 1.22%, respectively V4 – 1%) on koi carp rearing and economic sustainability performances in order to determine proper feeding technologies that addresses to certain technological scenario. The experimental trials were carried out during a 41 days experimental period. The experimental design was made in duplicate. The water quality parameters (water temperature, pH, and dissolve oxygen) were evaluated daily during the entire experimental trials. The average individual biomass was 28±1.2 grams and the average individual length was 11±0.5 cm. Considering the registered values of SGR, FCR and RGR, it can be stated that V1 and V2 feeding rates are recommended for koi carp stocking, during a longer period of time, while V3 and V4 feeding rates can be also applied for rearing purposes. From an economic point of view it is recommended not to use, on a long-term, the V1 and V2 technological scenario, since they do not offer economic sustainability. These scenarios are recommended to be used only during limited period of time, if certain dysfunctionalities develops during the fish rearing technological process. If koi carp rearing is targeted, the V4 scenario is identified as most suitable in order to be used for assuring the best results in terms of production (FCR value) and economical sustainability. However, the results of this present study are influenced by the PRAS performance to sustain a certain degree of production intensity, limited by the configuration and design of water conditioning units.

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Keywords: Economic Sustainability, Feeding Rates, Intensive Aquaculture, Koi Carp.

Introduction

In recent years, the growth of fish in recirculating systems and partial recirculating systems has experienced a significant increase, more and more investors being attracted by the benefits of such a business. Recirculating and partial recirculating systems are controlled systems in which fish or other aquatic creatures can be intensively farmed, the technological water being recirculated through a series of filters and devices, thus removing unwanted substances from the water.

Considering the modern aquaculture sector, different types of aquaculture systems such as recirculating aquaculture systems (RAS), partial recirculating aquaculture systems (PRAS) or integrated aquaculture systems were established to conserve and minimize the water usage and to optimize the production. In a RAS and PRAS, a part of wastewater is reused after appropriate treatment and conditioning. It is one of the most intriguing strategies for intensifying aquaculture production while simultaneously reducing wastes. It provides a dual benefit of reducing water demand and minimizing effluent problem. The RAS and PRAS is designed to collect and remove waste products, uneaten feed and harmful bacteria from the fish tank and treated water can be recycled back into the system. (Nuwansi et al., 2019).

Ornamental fish culture is fast emerging as a major branch of global aquaculture. The koi carp is an economically important species of ornamental freshwater fish (Kumara et al., 2015). The Japanese ornamental carp (*Cyprinus carpio* var. Koi) is famous for multi various colors and patterns, making it commonly culture and trade across the world (Tian et al., 2018).

However, for the industrial ornamental fish sector five biological traits are considered as most important: growth rate, feed intake, feed conversion ratio, mortality rate and uniformity. These traits influence farm income and expense. Thus, fish that grow fast will attain market weight early which saves costs. When ensuring uniform products, famers can increase profit by selling more fish in the preferred price range (Omasakia et al., 2017). Also, low mortality rates will be achieved if achieving a proper balance between the production system design and the applied feeding technology.

In order to evaluate the economic sustainability of a fish farms, fixed and variable cost must be considered. Thus, feeding is a major factor that determines the production costs in aquaculture (Li et al., 2020). Feed cost depends largely on the crude protein content in the diet (Kabir et al., 2019). Also, the feeding intensity and fish diet crude protein content are influencing the design of aquaculture production system technical aspects and water conditioning capacity.

Feed represents the major cost of production, therefore, reducing feed intake by assuring low values of FCR will led to an increase farm profit. Feed conversion ratio (FCR), the ratio between feed intake and body weight gain, is of major interest for improving aquaculture sustainability through reduced feed costs and environmental impacts (Rodde et al., 2020).

However, in aquaculture, the feeding rate varies, according to the fish development stage, fish stocking density and production system water conditioning performance. As it is considered an economic activity, industrial aquaculture implies permanent financial inputs and outputs. Since financial inputs are required permanently, in order to sustain the proper application of fish rearing technology, the income is conditioned by ornamental fish sale. It is known that, during a production cycle, a series of scenarios can appear, as follows: fish feed shortages, shipping restrictions, working restrictions, financial shortages, water conditioning equipment failure. Thus, the fish rearing technology must be flexible in order to adapt, on short of long term, to each of these scenarios, without losing fish biomass. This can be possible by applying proper feeding rates that will be able to sustain fish biomass and prevent it for losing weight or, if possible, ensuring the best rearing performances with limited fish feed resources, ensuring also a proper economic sustainability.

The aim of present study is to evaluate the effect of 4 significant different feeding rates (V1 – 0.22%, V2 – 0.12%, V3 – 1.22%, respectively V4 – 1%) on koi carp rearing and economic sustainability performances in order to determine proper feeding technologies that addresses to certain technological scenario.

Materials and Methods

Experimental Design

The experimental trials were carried out at the Aquaculture Research Center of Food Science and Engineering Faculty – ''Dunarea de Jos'' University of Galati, Romania, during a 41 days experimental period. The koi carp exemplars were reared in 4 experimental variants, by applying different feeding rates, as presented in figure 1.

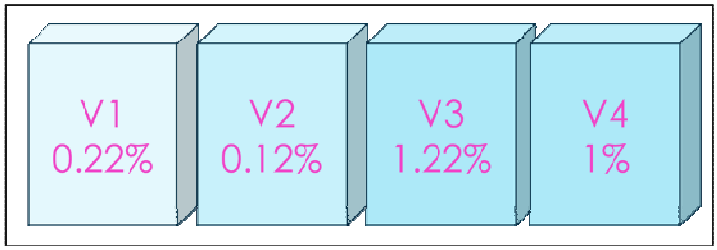

Fig. 1: Experimental variants

The experimental design was made in duplicate. The experimental partial recirculating production system (PRAS) consists in PVCL rearing units and water treatment modules composed of mechanical sponge filter and biological activated carbon (BAC) filter. For V1 and V2 a single filtration module was used, while 2 filtration modules were used for each of V3 and V4 experimental variants.

The following formula was applied for determining the hydraulic retention time (*HRT*) and hydraulic loading rate (*HLR*) in each of the four experimental variants: $HRT = (S \times h \times n) / Q$, (*hours*), where S – rearing units surface (m^2), h – water level within the rearing units (m), n – porosity of rearing units material, Q – inlet water flow (m^3/day) and $HLR = Q/S$ *(m/day)*. Thus, the HRT was evaluated at 5.27x10-4hours at V1 and V2 and 2.63x10-4 hours at V3 and V4, respectively. In terms of *HLR*, a 40 m/day value is attributed to V1 and V2, while 80 m/day is assured at V3 and V4 experimental variants.

A 40% daily water exchange rate was applied in order to assure optimum growth conditions for the biological material. The experimental fish groups were homogeneous at the start of the experiment. No significant differences ($p>0.05$) were registered between the variants in terms of both fish individual biomass and individual length. The average individual biomass was 28±1.2 grams and the average individual length was 11±0.5 cm.

The biological material from all four experimental variants was fed with pellets with a biochemical composition as presented in table 1.

Table 1: Biochemical composition of pellets

Parameter	Value
Crude protein	38%
Lipids	15%
Fiber	1.7 %
Ash	8.8 %
Phosphorus	1.2%

Methods for Water Quality Analysis

The technological water temperature, pH and dissolved oxygen (DO) were determined daily, using a WTW – 340pH meter, respectively a WTW Oxi 315 I temperature and DO meter.

Technological Indicators

Growth performance and feed utilization were calculated according to Petrea et al., 2019a:

1. Total biomass gain: IBG = Bf-Bi[g/fish], with Bf – final fish biomass; Bi – initial fish biomass;
2. Specific growth rate: SGR = 100 x (ln Bf - ln Bi)/t [% fish biomass/day], with Bf – final fish biomass, Bi – initial fish biomass, t- duration of the experiment;
3. Feed conversion ratio: FCR = F/IBG [kg feed intake/kg fish biomass gain], with F –feed intake, FBG – individual biomass gain;
4. Protein efficiency ratio: PER =IBG/(F*CP/100) [kg/kg], with FBG –individual biomass gain, F – feed intake, CP -crude protein.

Results and Discussions

Technological Scenario

Water Quality Parameter

The water quality parameters (water temperature, pH, and dissolve oxygen) were evaluated daily during the entire experimental trials. Thus, water temperature ranged from 18.5oC to 25oC at all experimental variants, with no statistically significant difference (p>0.05). The pH ranged between 6.1 – 6.8 (figure2), while dissolved oxygen (DO) ranged between 4.2 – 6.8 mg/L (figure 3). The results reveal low pH values for the variants where higher feeding rates were applied (V3 and V4), compared to V1 and V2. However, no statistically significant differences were observed between the experimental variants (p>0.05) in term of pH, although the average value registered in V3 is lower compared to the pH average values registered at the rest of the experimental variants. Most probably, the feeding rate applied in V3 is closed to the maximum water conditioning limit of the PRAS system, fact revealed also by the low DO concentrations registered during the experimental period at this experimental variant. Also, in terms of water DO, the V3 registered significant (p<0.05) lower concentrations, compared to the rest of experimental variants (V1, V2, V4). The dynamics of both pH and DO are closely related to water exchange rate. Thus, the ups and downs are mostly influenced by high water exchange rate (40% per day), since the production systems is a PRAS.

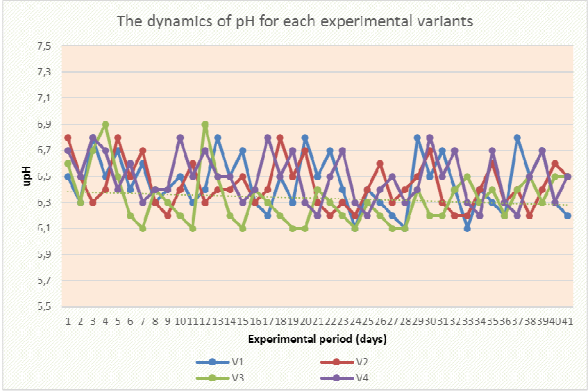

Fig. 2: The pH dynamics, for each variant, during the entire experimental trial

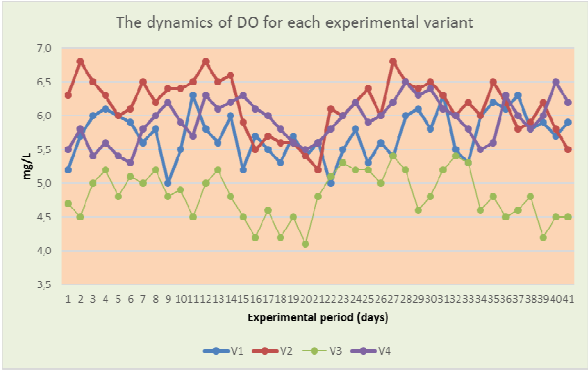

Fig. 3: The DO dynamics, for each variant, during the entire experimental trial

Growth Parameters

The growth performance indicators (table 2) revealed no mortalities during the trial, therefore confirming the good results registered in terms of water quality.

Table 2: Growth performance indicators for each of the experimental variants

Technological parameter	V1	V2	V3	V4
Experimental period (days)	41	41	41	41
Survival (%)	100	100	100	100
Individual biomass gain (g)	0.72	0.17	7.66	7.68
Feed protein (%)	38	38	38	38
Daily feeding ratio (% BW)	0.22	0.12	1.22	1
Initial fish stocking density (kg/m3)	3.78	3.78	3.79	3.85
Final fish stocking density (kg/m3)	3.89	3.81	4.89	4.95
Relative growth rate (g/g/day)	0.66×10^{-3}	0.15×10^{-3}	7.04×10^{-3}	6.94×10^{-3}
Specific growth rate - SGR (%BW/day)	0.07	0.02	0.62	0.61
Feed conversion ratio – FCR (g feed / g biomass gain)	3.30	5.62	1.73	1.44
Protein efficiency ratio - PER (g/g)	0.80	0.61	1.52	2.19

In aquaculture, several models applicable to the concave portion of the growth curve have been used. The formula most used is the ″instantaneous growth rate″ or ″specific growth rate″ (SGR) and is based on the natural logarithm of body weight (Bureau et al., 2000). The average specific growth rate indicates a superior fish production at V3 (0.62 %BW/day) and V4 (0.61 %BW/day), compared to the rest of the experimental variants (V1 - 0.07 %BW/day and V2 - 0.02 %BW/day, respectively).

The FCR indicates the technological efficiency of feeding strategy (Petrea et al., 2020) in each of the tested experimental variants. Thus, the FCR indicator reveals better values, as expected, mostly dependent on the applied feeding ratio. The V4 registered the best technological efficiency emphasized by a FCR value of 1.44, followed by V3 (1.73). However, it is important to mention that all FCR values are positive, situation which emphasizes that fish gain in biomass during the 41 days experimental period, although a low feeding rate were applied both in V1 and V2. Related to other similar studies, it must be emphasized that Safari and Sarkheil (2018) analyzed the growth performance of koi carp with an initial individual weight of 7.42 g, reared during a 63 days experimental trial by administrating feed with 34% crude protein and applying a feeding rate of 0.56%BW and recorded an average FCR value of 2.88 g/g. Also, Nuwansi et al. (2019) registered FCR values between 4.13 – 5.59 g/g for koi carp with an individual weight of 4.04 - 4.05 g, by applying a feeding rate of 2% BW.

Regarding the individual and total RGR recorded values, no significant differences ($p>0.05$) were recorded between V3 and V4 experimental variants, while statistically significant differences ($p<0.05$) were recorded between V2 and the rest of experimental variants. The highest RGR value is registered at V3 while the lowest is associated to V2 (table 2).

Considering the registered values of SGR, FCR and RGR (table 2), it can be stated that V1 and V2 feeding rates are recommended for koi carp stocking, during a longer period of time, while V3 and V4 feeding rates can be also applied for rearing purposes, especially in production systems with limited possibility to maintain the water quality parameters within an optimal range throughout the entire experimental period.

A highest protein efficiency ratio (PER) is recorded at V4 experimental variants, followed by V3. Also, V2 registered the lowest PER value, in accordance with the daily feeding rate applied at this experimental variant throughout the trial (0.12% BW).

The FCR and PER results emphasize that 1% feeding ratio is most suitable to be applied if koi carp rearing technological sustainability is targeted, considering the present PRAS.

However, if PRAS water treatment capacity will be improved or water exchange rate will be increased over 40%, the optimal feeding rate will also exceed 1% BW.

Economic Scenario

The economic sustainability for each of the four scenarios, described by the experimental variants (V1, V2, V3, V4) tested in present trial, is important to be considered since aquaculture is an economic industrial activity and all the technological decisions must be justified, also, by their economic impact. Thus, since koi carp price varies, depending not only on size, but on a series of factors as genetic lineage, coloration pattern, provenance or methods of selling (bulk of individually), it is difficult to estimate an income.

However, considering the differences related to water treatment design and the various technological performances obtained for each of the four scenarios, it can be concluded that the economic sustainability can be estimated by evaluating the operational costs related to electricity and fish feed.

Also, according to other studies (Petrea et al., 2016; Petrea et al., 2019b), costs related to electricity and fish feed have the highest percentage from total variable costs.

For the evaluation of electricity costs, the electricity consumption was determined, considering the design of the PRAS, described in the material and methods section, as follows: V1 – 797.22 KWh per kg fish produced, V2 – 3416.67 KWh per kg fish produced, V3 – 155.20 KWh per kg fish produced and V4 – 154.90KWh per kg fish produced.

Table 3: Feeding and operational costs per one kg of koi carp, in different scenarios

Operational costs (€)	**Economic scenario**			
	V1	**V2**	**V3**	**V4**
Electricity cost per one kg of koi carp produced	117,86	505,13	22,95	22,90
Feeding costs per one kg of koi carp produced	19,82	33,74	10,37	8,65
TOTAL	137,68	538,87	33,32	31,55

It can be observed that both V1 and V2 presents a very high electricity consumption per kg koi carp produced, mostly due to low values of biomass gain, registered during the experimental trial as a direct consequence of low feeding rates applied. This situation is also encountered in both feeding and electricity costs, presented in table 3.

Thus, it is recommended not to use, on a long-term, the V1 and V2 technological scenario, since they do not offer economic sustainability. These scenarios are recommended to be used only during limited period of time, if certain dysfunctionalities develops during the fish rearing technological process.

Conclusions

Appropriate feeding strategy for each technological scenario is fundamental for assuring the economical sustainability of the aquaculture activity. The V2 scenario is considered to be most suitable for stocking koi carp during limited period of time if resource limitations (fish feed shortages) occur. However, if the fish stocking periods are longer and the resources availability is less limited, the V1 scenario can be applied, improving therefore the economic sustainability.

If koi carp rearing is targeted, the V4 scenario is identified as most suitable in order to be used for assuring the best results in terms of production (FCR value) and economical sustainability. However, the results of this present study are influenced by the PRAS performance to sustain a certain degree of production intensity, limited by the configuration and design of water conditioning units.

Acknowledgment

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Circular Business Model For Granulated Carbonated Volatile Fly Ash From Fluidized Beds In Underground Mining Techniques

Jadwiga PROKSA

Central Mining Institute, Plac Gwarków 1, 40-166 Katowice, Poland

jproksa@gig.eu

Abstract

Circular business models are one of potential ways for industry to profitably achieve radical gains in resource efficiency. This article presents the concept of a closed-loop business model on the example of the management of fly fluidized ash in synergy with power plant and mine. The developed model consists of recycling by-products from the power industry by using them in underground mining technologies. Designing a business based on usage of granulate material produced according to the new method of processing fluidized fly ash was presented on the Lean Canvas model.

Keywords: Circular Business Models, Lean Canvas, industrial synergy, Cradle-to-Cradle, carbonatizated granulate.

Introduction

Zero waste, circular economy, industrial synergy are popular concepts nowadays. In order for these slogans to be followed by actions, a comprehensive knowledge of designing circular business models is needed. The essence of the circular economy is to remain in the economy of products, raw materials and materials as long as possible, along with minimizing waste generation, at all stages of the product life cycle. To do this, new business models based on industrial cooperation should be developed (Bocken N., Snihurc Y., 2020; Lewandowski M., 2016). Circular concept means pursuing and creating the opportunities for a shift from an "end-of-life" concept to "Cradle-to-Cradle". The circular economy becomes a new vision of resource processing, value creation and entrepreneurship. Companies need to consider how to close material loops, reduce resources, and keep materials and products in the loop for as long as possible. This may result in the necessity to reconsider the values offered and the necessity of industrial cooperation.

A review of business models supporting the circular economy (CE) is described in a research study by Lewandowski (2016), examining various cases of the model's transition to a closed loop. Classic models are not enough - they have gaps, they are not consistent with the CE concept, and their success often depends on the specifics of the business. The application of CE guidelines in business models is complicated, the economy may have great difficulties in not generating waste, probably 100% circular business models do not exist (yet) (Van Renswoude K., Wolde A.T., Joustra D.J., 2015).

This article presents the concept of a closed-loop business model on the example of the management of fly fluidized ash in synergy with power plant and mine. The proposal fits in the business model of recovery and recycling, linked to the production and consumption system, where everything that was considered waste is reused.

The developed model consists of recycling by-products from the power industry by using them in the mining structures. The solutions included in the patents developed at the Central Mining Institute prove that combustion by-products subjected to the carbonation process can be returned to the mine in the mine-power plant system, in accordance with the concept of a circular economy. The proposed model of mine and power plant synergy is based on the interaction of these two sectors (Proksa J., 2017). The research on carbonation of these ashes, carried out with use of technical carbon dioxide, lead to the reduction of free calcium content below 1%. Such product meets the requirements of the application in underground mining technologies. The fly ash from the Łagisza Power Plant was carbonated as described in the work (Łączny M.J., et al., 2015) and in the patent PL 410867 ("Method for

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processing volatile ashes from the use of the energy producing fuels for the product with controlled content of free calcium oxide"). The resulting carbonated fluidized ash then was used in a simultaneous three-phase granulation process in the system: solid - liquid - gas carried out in the granulator - intensive counter-rotating mixer (Proksa J., Bzowski Z., 2020). The result of the research is a patent application in Poland No. P.431864 ("Method of obtaining carbonatizated granulate on the basis of fly ash"). The possible applications of the granules in selected underground mining technologies were initially determined, e.g.: sealing of goafs, filling voids and unused workings, liquidation of shafts, construction of explosion-proof dams. The article presents the Lean Canvas approach for the above case - a business model was developed for the management of processed fluidized fly ash for use in underground mining technologies.

Concept of the Buisness Model

Business Model Canvas (BMC) is a tool that allows to effectively control the approach to business. It allows to gather extensive knowledge and necessary information and enter them into one model, which can be flexibly corrected if necessary. BMC, created by Alexandr Osterwalder, is mainly used in companies that are already on the market and looking for improvement. Based on this model, a variation was created - Lean Canvas (LC), developed by Ash Maurya. This model is targeted at new businesses, products and technologies. LC, as opposed to BMC, focuses on: problem understanding, solution, key metrics, and unfair advantage. It is characterized by a view on uncertain and risky activities in business (Sire P., Prevost E., Guillou Y., Riwan A., Saulais P., 2019).

The business model consists of nine elements that allow to define value and profit. LC proposes an iterative approach to process management. The Ash Maurya template fields should be filled in the following order (Maurya A., 2012; York J.M., 2020):

1. Problems - the most important problems to be solved should be indicated,

2. Customer segmentation - the target customers for whom the product or service will be delivered should be determined. It is closely related to the problems,

3. Value Proposition - the benefits that customers will have from the product or service provided should be established. This is the value promised to be delivered,

4. Solution - the solutions (and their most important features) to the previously established problems should be provided,

5. Unfair advantage - the advantage over the competition that is unique and cannot be copied should be considered. An unfair advantage can help in finding of partners and investors,

6. Structure of revenues - all elements related to the company's revenues should be determined,

7. Cost structure - all operating costs related to the introduction of the company/product to the market, maintaining customer relations and generating revenues should be determined,

8. Channels - all possible methods of reaching customers should be established,

9. Key indicators - indicators to monitor performance should be determined. This constitutes a feedback from the market about the product or service.

Table 1: Maurya's lean canvas.

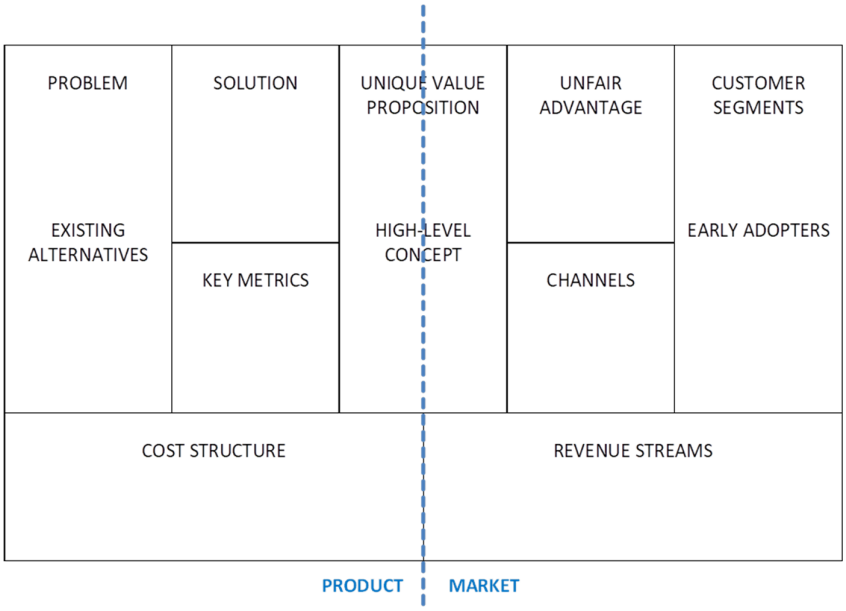

Due to the innovative approach to the fluidized fly ash processing and the development of a new product, the Lean Canvas model has been used in the research.

Designing circular business models

The concept of a circular economy is based on the main principles of the new approach to economics: design out waste/design for reuse, build resilience through diversity, rely on energy from renewable sources, think in systems, waste is food/Think in cascades/Share values - symbiosis (Ellen MacArthur Foundation). Circular business models are one of potential ways for industry to profitably achieve radical gains in resource efficiency. An interesting direction may also be the adaptation of risk management to innovation in CBM (Linder, M .; Williander, M., 2015).

Designing a business based on usage of granulate material produced according to the new method of processing fluidized fly ash was presented on the Lean Canvas model. The analyzed case is characterized by the Circular Economy approach and industrial synergy. To make the transition from a linear business model to a circular business model possible, value proposition should be treated as a key element (Osterwalder, A., Pigneur, Y., Bernarda, G., Smith, A., 2014). Table 2 presents the results of the research.

Table 2: Lean Canvas for power plant and mine synergy.

1.Problem ▪ Development of fluidized fly ash ▪ Carbon dioxide disposal ▪ Waste prevention at source ▪ Dusting in transport of fluidized fly ash ▪ Closing the loop in the synergy of the mine-power plant system ▪ Trends towards industrial symbiosis ▪ Power plant - mine cooperation ▪ Effective waste management in a power plant	**4.Solution** ▪ Loop closure ▪ A new way of managing fly fluidized ash ▪ A new way of carbon dioxide management **8.Key metrics** ▪ Efficient technology ▪ Waste management ▪ Placing the processed waste in the mine	**3.Unique value proposition** ▪ Innovative zero waste technology in the process of energetic coal combustion ▪ Economical technology, energy-saving, highly effective, environmentally friendly ▪ Easy transport of the product due to the absence of dusty substances ▪ Industrial symbiosis ▪ Extending the product life cycle ▪ Circular products enable product-life extension	**5.Unfair advantage** Simultaneous carbonation and granulation of the fly ash with addition of CO_2 **9.Channels** ▪ Business-to-Business ▪ Networking ▪ Seminars ▪ Fairs ▪ E-mais	**2.Customer segment** ▪ Polish coal industry ▪ Raw materials and mineral wastes companies. ▪ Polish waste operators
7.Cost structure ▪ Logistics ▪ Production line ▪ Transport line ▪ Product testing			**6.Revenue streams** ▪ Efficient waste management ▪ Circular Economy ▪ Waste-free power engineering ▪ Power Plant – Mine cooperation ▪ Industrial synergy	

Conclusions

The aim of CE is designing products in non-waste technologies and extending the product life cycle. Waste-free energy in cooperation with the mining industry has a chance to create industrial synergy in order to close the cycle. Carbonation of fluidized fly ashes with the use of carbon dioxide appears to be a promising way of processing them for the recovery and use of this waste. It is an innovative technology developed at the Central Mining Institute. This opens up new perspectives in the use of carbonated fluidized fly ash in various types of mining technologies. This approach is an opportunity to close the loop in this industrial synergy. The developed concept was modeled in Lean Canvas.

The solutions to the problems defined in the model are presented in the solution position. The solution for the formation of fly ash is the process of simultaneous carbonation and granulation, which gives the possibility of using these products in the mine and closing the loop. Additionally, this process eliminates the problem of dust release during transport. The presented unique value proposition is in line with the Circular Economy concept.

Acknowledgments

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The Relationship Between Externalities and Economic Efficiency

Marius BULEARCĂ
Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania,
mariusbulearca@yahoo.com

Cornelia NEAGU
Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania,
neagu_cornelia@yahoo.com

Cristian SIMA
Centre for Industry and Services' Economics, Romanian Academy, Bucharest, Romania,
sima60cristian@yahoo.com

Abstract

As announced in our previous works, this paper is part of a larger research that deals with sustainable development and environmental protection in extractive industry. In this respect, this paper is aiming to identify the relationship that may exist between externalities and economic efficiency in terms of market failure. We begin our analysis of externalities by discussing the forms that externalities can take in terms of consumption and production. Then we shall move on by explaining the links between externalities (as source of market failure) and economic efficiency. In the end, by looking at three sorts of pollution problem – a consumer-to-consumer case, a producer-to-producer case, and a case where the unintended effect is from a producer to consumers – we shall bring out all of the essential features of pollution as a market failure problem.

Keywords: Consumer, Efficiency, Externality, Market Failure, Pollution, Production Function, Producer, Property Right, Utility.

Introduction

An external effect, or an externality, is said to occur when the production or consumption decisions of one agent have an impact on the utility or profit of another agent in an unintended way, and when no compensation/payment is made by the generator of the impact to the affected party. Some authors leave out from the definition of an externality the condition that the effect is not paid or compensated for, on the grounds that if there were payment or compensation then there would be no lack of intention involved, so that the lack of compensation/payment part of the definition as given in the text here is redundant [Barber and Markandya, 1990; Mäler, 2011; Howarth, 2012; Brown *et al.*, 2015].

As we shall see, there is something in this. However, we prefer the definition given here as it calls attention to the fact that lack of compensation/payment is a key feature of externality as a policy problem. Policy solutions to externality problems always involve introducing some kind of compensation/payment so as to remove the unintentionality, though it has to be said that the compensation/payment does not necessarily go to/come from the affected agent [Perman *et al.*, 2003; Common, 2004; Petri, 2004].

In our analysis thus far [Neagu *et al.*, 2019], we have excluded the existence of externalities by the assumptions that were made about the utility and production functions. But in practice consumption and production behaviour by some agents does affect, in uncompensated/unpaid for ways, the utility gained by other consumers and the output produced, and profit realised, by other producers [Redclift, 1992; Pezzey and Toman, 2002; de Man, 2016].

Economic behaviour does, in fact, involve external effects. The stated definition of an external effect is not perhaps very illuminating as to what exactly is involved. Things will become clearer as we work through the analysis. The two key things to keep in mind are that we are interested in effects from one agent to another which are unintended,

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and where there is no compensation, in respect of a harmful effect, or payment, in respect of a beneficial effect.

Classification of Externalities

In our two-person, two-(private)-commodity, two input economy we have worked with:

$$U^A = U^A(X^A, Y^A)$$

$$U^B = U^B(X^B, Y^B)$$

as utility functions, and:

$$X = X(K^X, L^X)$$

$$Y = Y(K^Y, L^Y)$$

as production functions.

Note that here the only things that affect an individual's utility are her own consumption levels, and that the only things that affect a firm's output are the levels of inputs that it uses. There are, that is, no external effects. External effects can, first, be classified according to what sort of economic activity they originate in and what sort of economic activity they impact on. Given two sorts of economic activity, consumption and production, this gives rise to the six-fold classification shown in Table 1. The first column shows whether the originating agent is a consumer or producer, the second whether the affected agent is a consumer or producer, and the third provides an illustrative utility or production function for the affected agent. In Table 1, we are concerned only to set out the forms that unintended interdependence between agents could take. Some examples will be provided shortly.

Table 1: Externality classification

Arising in	Affecting	Utility/production function
Consumption	Consumption	$U^A(X^A, Y^A, X^B)$
Consumption	Production	$X(K^X, L^X, Y^A)$
Consumption	Consumption and production	$U^A(X^A, Y^A, X^B)$ and $Y(K^Y, L^Y, X^B)$
Production	Consumption	$U^A(X^A, Y^A, X)$
Production	Production	$X(K^X, L^X, Y)$
Production	Consumption and production	$U^A(X^A, Y^A, Y)$ and $X(K^X, L^X, Y)$

Source: Authors own assumptions.

In the first row in Table 1, an example of a consumption externality is where agent B's consumption of commodity *X* is an argument in A's utility function – B's consumption of *X* affects the utility that A derives from given levels of consumption of *X* and *Y*. In the second row, A's consumption of *Y* is shown as affecting the production of *X*, for given levels of capital and labour input. The third row has B's consumption of *X* affecting both A's utility and the production of *Y*. In the fourth row the amount of *X* produced, as well as A's consumption of *X*, affects A's utility. The fifth row has the production of *Y* determining, for given capital and labour inputs, the amount of *X* produced. Finally, in the sixth row we have a situation where the level of *Y* affects both A's utility and the production of *X*.

The unintended impact that an external effect involves may be harmful or beneficial. As such, table 2 provides examples of both kinds. If an individual has a vaccination that protects them, which is their intention, it also has the unintended effect of reducing the probability that others will contract the disease.

Table 2: Beneficial and harmful externalities

Effect on others	Originating in consumption	Originating in production
Beneficial	Vaccination against an infectious disease	Pollination of blossom arising from proximity to apiary
Adverse	Noise pollution from radio playing in park	Chemical factory discharge of contaminated water into water systems

Source: Authors own assumptions.

An individual playing their radio loudly in the park inflicts suffering on others, though that is not their intention. In these two cases, the external effect originates in consumption and affects individuals. A beneficial externality originating in production, and impacting on production, is the case where a honey producer's bees pollinate a nearby fruit orchard. Pollution, in the bottom right cell, is a harmful externality which most usually originates in production activities. It can affect consumers, or producers, or both.

Another dimension according to which external effects can be classified is in terms of whether they have, or do not have, the public goods characteristics of non-rivalry and non-excludability. While external effects can have the characteristics of private goods, those that are most relevant for policy analysis exhibit non-rivalry and non-excludability. This is especially the case with external effects that involve the natural environment, which mainly involve pollution problems. Why this is the case will become clear in the analysis that follows here. All of the examples in Table 2 involve non-rivalry and non-excludability.

Externalities and Economic Efficiency

Externalities are a source of market failure. Given that all of the other institutional conditions for a pure market system to realise an efficient allocation hold [Guesnerie, 1989], if there is a beneficial externality the market will produce too little of it in relation to the requirements of allocative efficiency [Howarth, 2012; Bulearca and Popescu, 2019], while in the case of a harmful externality the market will produce more of it than efficiency requires. Since we are concerned with the application of welfare economics to environmental problems [O'Connell, 1982; Bernham, 2008; Feldman, 2008; Deardoff, 2014], and the main relevance of externalities there is in regard to environmental pollution, we shall look in any detail only at harmful externalities here.

We shall now produce an important example that concerns a harmful externality pollution problem. We will demonstrate that the market, in the absence of corrective policy, will 'over-supply' pollution by looking at three sorts of pollution problem – a consumer-to-consumer case, a producer-to-producer case, and a case where the unintended effect is from a producer to consumers. These three cases bring out all of the essential features of pollution as a market failure problem. In our demonstration we shall use diagrams and partial equilibrium analysis [Grandmont, 1977; Geankoplos, 1987; Black, 1995; Eaton *et al.*, 2009] to make the essential points (this analysis method may be reviewed in a previous paper [Bulearca and Popescu, 2019].

Evidence now suggests that the accumulation of tropospheric ozone in urban areas poses serious threats to human health, and also leads to agricultural crop damage in surrounding areas. Note that this accumulation of ozone in lower layers of the atmosphere is completely distinct from the destruction of the ozone layer in the earth's upper atmosphere (the stratosphere). The latter phenomenon – often known as 'holes in the ozone layer' – causes different problems (this issue will be largely addressed in a future work).

A major source of tropospheric ozone is road vehicle exhaust emissions. Because vehicle emissions have real effects on well-being through our utility and production functions, these emissions can be termed 'goods' (although it may be preferable to label them as 'bads' as the effects on utility are adverse). However, with no individual private property rights in clean air, in the absence of government intervention, no charge is made for such emissions. With no charges being made for damaging emissions, resources will not be allocated efficiently. An efficient allocation would involve lower exhaust emissions, implying one or more of: lower traffic volumes, change in fuel type used, increased engine efficiency, enhanced exhaust control.

How such objectives might be achieved is considered in this paper, and in more detail in a future paper, but it should be clear at this stage that one method would be through the use of a tax on the emissions that cause ozone accumulation [MacGillivray, 1994]. As such, an efficient emissions tax would impose a tax rate equal to the value of the marginal damage that would occur at the efficient level of emissions. In arriving at this conclusion, we do not explicitly consider the time dimension of pollution. But note that if ozone accumulates over time, and damage is dependent on the stock of ozone rather than the flow of emissions in any particular period, then we need to consider the accumulation of the

pollutant over time. As we shall demonstrate in a future work, where emission flows lead to accumulating stocks of pollutants, it may be efficient to impose a tax rate that rises over time.

Hence, before getting into these cases in a little detail, at this stage we can make a general intuitive point that covers both beneficial and harmful externalities. The basic problem with external effects follows directly from the definition in regard to un-intendedness and lack of payment/compensation. These two features of the externality problem are directly related. The lack of intentionality follows from the fact that the impact involved does not carry with it any recompense, in the case of a beneficial effect, or penalty, in the case of a harmful effect. External effects arise where an agent's actions affecting other agents do not involve any feedback – benefit is conferred which is not rewarded, or harm is done which is not punished.

Given the lack of reward/punishment, which in a market system would be signalled by monetary payment, an agent will not take any account of the effect concerned. It will be unintended and 'external' to their decision making. Where it is a beneficial effect, it will not be encouraged sufficiently, and there will not be enough of it. Where it is a harmful effect, it will not be discouraged sufficiently, and there will be too much of it. The key to dealing with the market failure that external effects give rise to, is to put in place the missing feedbacks, to create a system which does reward/punish the generation of beneficial/harmful effects, so that they are no longer unintentional.

Consumption–Consumption Externality

Suppose that A and B live in adjacent flats (apartments). A is a saxophone player, who enjoys practising a lot. B does not like music, and can hear A practising. The utility functions are:

$$U^A = U^A(M^A, S^A)$$

$$U^B = U^B(M^B, S^A)$$

where M represents wealth and S^A is the hours that A plays the saxophone each week, with $\partial U^A/\partial M^A > 0$, $\partial U^B/\partial M^B > 0$, $\partial U^A/\partial S^A > 0$ and $\partial U^B/\partial S^A < 0$.

In Figure 1 we show, as MB, the marginal benefit of playing to A, and, as MEC for marginal external cost, the marginal cost of playing to B. Marginal benefit is the amount that A would pay, if it were necessary, to play a little more. Conversely, MB is the amount of compensation that would be required to leave A as well off given a small reduction in playing. Marginal external cost is the amount that B would be willing to pay for a little less playing. Conversely, MEC is the amount of compensation that would be required to leave B as well off given a small increase in M (hours of A's saxophone playing).

Given that A does not in fact have to pay anything to play her saxophone in her flat, she will increase her hours of playing up to the level M_0, where MB is equal to zero. At that level, A's total benefit from playing is given by the sum of the areas of the triangles a, b and d, and B's total suffering is measured in money terms by the sum of the areas b, d and c.

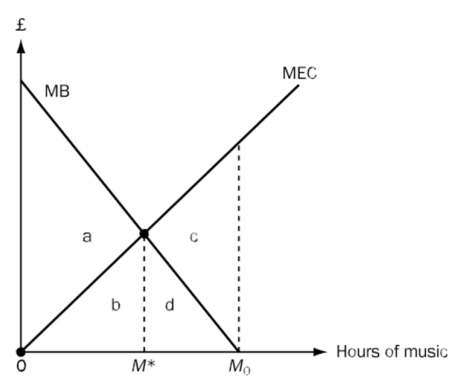

Figure 1: The bargaining solution to an externality problem

This is not an efficient outcome, because at M_0, MEC > MB. The efficient outcome is at M^* where MEC = MB. At any M to the left of M^*, MB > MEC, so that for a small increase in M, A would be willing to pay more than would compensate B for that increase. At any M to the right of M^*, MEC > MB so that for a small decrease in M, B would

be willing to pay more for a small decrease in M than would be required to compensate A for that decrease. The inefficient level of saxophone playing at M_0 comes about because there are no payments in respect of variations in M, no market in M, so that the effect on B is unintentional on the part of A.

At the level of principle, the solution to this problem of inefficiency is fairly obvious. The problem is that A does not compensate B because B does not have any legal right to such compensation, does not have a property right [Bulearca and Popescu, 2019] in a domestic environment unpolluted by saxophone music. So, the solution is to establish such a property right, to give B the legal right to a domestic environment that is not noise polluted.

Such legal arrangements would support bargaining which would lead to M^* as the level of M. The argument that establishes that M^* would be the outcome under a legal regime where B can claim compensation from A exactly parallels the argument that establishes that M^* is the efficient outcome. To the left of M^*, with MB > MEC, A will be willing to pay more in compensation for a small increase in M than B requires, so will pay and play more. A will not increase M beyond M^* because the compensation that it would be necessary to pay B would be greater than the worth to A of the small increase thereby attained.

The Coase Theorem

The idea that, given a suitable assignment of property rights, private bargaining between individuals can correct externality problems and lead to efficient outcomes is generally attributed to the Nobel prize winning economist Ronald Coase, and the result discussed above is often referred to as the *'Coase theorem'* [Coase, 1960]. In fact, the result discussed above is only half of the Coase theorem. The other half says that an efficient outcome can also be attained by vesting the property right in the generator of the external effect. In that case, the generator would have the legal right to play, for this example, as much saxophone as she liked. The point is that given that right, it could be in the interests of the victim to offer money to the generator not to exercise their right to the full. Just as the absence of a clear property right vested in the victim inhibits one kind of bargaining, so does the absence of a clear property right vested in the generator inhibit another kind of bargaining.

Suppose then, that in our saxophone-playing example a law is passed saying that all saxophone players have an absolute right to practise up to the limits of their physical endurance. Legally A can play as much as she wants. But, a legal right can be traded. So, the opportunity now exists for A and B to bargain to a contract specifying the amount that A will actually play. That amount will be M^* in Figure 1. To the right of M^*, MEC > MB, so B's willingness to pay for a small reduction is greater than the compensation that A requires for that small reduction. Starting at M_0 and considering successive small reductions, B will be offering more than A requires until M^* is reached where B's offer will exactly match the least that A would accept. As such, A and B would not be able to agree on a level of M to the left of M^*, since there B's willingness to pay is less than A requires by way of compensation.

So, what the Coase theorem actually says is that given this kind of externality situation, due to incomplete private property rights, one solution involves creating property rights for either the victim or the generator, and that either assignment will lead to an efficient outcome. It needs to be explicitly and carefully noted here that there are two things that are not being claimed. First, that it is not being said that the outcome will be the same in both cases. Second, that it is not being said that either way of assigning property rights necessarily promotes equity.

In regard to the first point here, note that considering the move from M_0 to M^* in our saxophone music example consequent upon the establishment of the property right and the ensuing bargaining we have:

- For the case where B gets the property right – there is an M reduction of $(M_0 - M^*)$ and A pays B an amount equal to the area of triangle b, the money value of B's suffering at the efficient outcome M^*.
- For the case where A gets the property right – there is an M reduction of $(M_0 - M^*)$ and B pays A an amount equal to the area of triangle d, the money value of A's loss as compared with the no-property-rights situation.

Clearly, which way the property right is assigned affects the wealth of A or B. To be granted a new property right is to have one's potential monetary wealth increased. In case (a), B experiences less saxophone hours and an increase in wealth by virtue of a payment from A, so that A's wealth goes down with her pleasure from playing. In case (b), B experiences less saxophone hours and a decrease in wealth by virtue of a payment to A, who gets less pleasure from playing. As we have drawn Figure 1, in neither (a) nor (b) does the increase in wealth affect the receiving individual's tastes. In case (a), that is, B's willingness to pay for less music hours is not affected by becoming wealthier – the slope of the MEC line does not change. In case (b), A's willingness to pay for more music hours is not affected by becoming wealthier – the slope and position of the MB line do not change.

While these assumptions may be plausible in this example, they clearly are not generally appropriate. They were

imposed here to produce a simple and clear graphical representation. If the assumption that tastes are unaffected by wealth increases is dropped, then with the case (a) assignment MEC would shift and with the case (b) assignment MB would shift. In neither case then would M^* as shown in Figure 1 be the bargaining outcome, and the outcomes would be different in the two cases. Both outcomes would be efficient, because in both cases we would have MB = MEC, but they would involve different levels of M.

So, the first point is that the Coase theorem properly understood says that there will be an efficient outcome under either assignment of property rights, not that there will be the same efficient outcome under either assignment. The second point, concerning equity, is simply that there is no implication that either assignment will have any desirable implications in terms of equity. This follows directly from our earlier discussions of the relationship between optimality and efficiency [Bulearca and Popescu, 2019]. In the case of our saxophone example, we have said nothing about the initial wealth/income situations of the two individuals.

Clearly, our views on which way the property right should be assigned will, unless we are totally uninterested in equity, be affected by the wealth/income of the two individuals. Given that efficiency criteria do not discriminate between the two possible assignments of property rights, it might seem natural to take the view that the assignment should be on the basis of equity considerations. Unfortunately, this does not lead to any generally applicable rules. It is not always the case that externality sufferers are relatively poor and generators relatively rich, or vice versa.

Even if we confine attention to a particular class of nuisance, such as saxophone playing in flats, it cannot be presumed that sufferers deserve, on equity grounds, to get the property right – some may be poor in relation to their neighbour and some rich. Given the simple and compelling logic of the arguments of the Coase theorem, the question arises as to why uncorrected externalities are a problem. If they exist by virtue of poorly defined property rights and can be solved by the assignment of clearly defined property rights, why have legislatures not acted to deal with externality problems by assigning property rights? A full answer to this question would be well beyond the scope of this paper, but the following points are worthy of note.

First, as we have seen, the case for property rights solutions is entirely an efficiency case. Legislators do not give efficiency criteria the weight that economists do – they are interested in all sorts of other criteria.

Second, even given clearly defined property rights, bargaining is costly. The costs increase with the number of participants. While expositions of the Coase theorem deal with small numbers of generators and sufferers, typically one of each, externality problems that are matters for serious policy concern generally involve many generators and/or many sufferers, and are often such that it is difficult and expensive to relate one particular agent's suffering to another particular agent's action. This makes bargaining expensive, even if the necessary property rights exist in law. The costs of bargaining, or more generally 'transactions costs', may be so great as to make bargaining infeasible.

Third, even leaving aside the large numbers problem, in many cases of interest the externality has 'public bad' characteristics which preclude bargaining as a solution. 'Public bad' is a term often used for a public good that confers negative, rather than positive, utility on those who consume it. As such, in the remaining part of this paper we shall discuss this last point in the context of producer-to-consumer externalities.

Production–Production Externality

For situations where numbers are small, this case can be dealt with rather quickly. Consider two firms with production functions:

$$X = X(K^X, L^X, S)$$

$$Y = Y(K^Y, L^Y, S)$$

where S stands for pollutant emissions arising in the production of Y, which emissions affect the output of X for given levels of K and L input there. As an example, Y is paper produced in a mill which discharges effluent S into a river upstream from a laundry which extracts water from the river to produce clean linen, X. Then, the assumption is that $\partial Y/\partial S > 0$, so that for given levels of K^Y and L^Y lower S emissions means lower Y output, and that $\partial X/\partial S < 0$, so that for given levels of K^X and L^X higher S means lower X.

Note that we are guilty here of something that we cautioned against in a previous paper [Neagu *et al.*, 2019] in our discussion of the materials balance principle – writing a production function in which there is a material output, S, for which no material input basis is given. We do this in the interests of simplicity. A more appropriate production function specification may be given to show that the essential point for present purposes is not affected by our shortcut

in the interests of simplicity. As such, a more satisfactory production function for the polluting firm would be:

$$Y = Y(K^Y, L^Y, R^Y, S\{R^Y\})$$

where R^Y is the input of some material, say tonnes of coal, and $S\{R^Y\}$ maps coal burned into emissions, of say smoke, and $\partial Y/\partial R^Y = Y_R > 0$, $\partial Y/\partial S = Y_S > 0$ and $\partial S/\partial R^Y = SR^Y > 0$. We shall now show that while this more plausible model specification complicates the story a little, it does not alter the essential message.

This externality situation is amenable to exactly the same kind of treatment as the consumer-to-consumer case just considered. Property rights could be assigned to the downstream sufferer or to the upstream generator. Bargaining could then, in either case, produce an efficient outcome. To see this simply requires the reinterpretation and relabelling of the horizontal axis in Figure 1-5.13 so that it refers to S, with S_0 replacing M_0 and S^* replacing M^*.

For profits in the production of X we have:

$$\pi^X = P_X X(K^X, L^X, S) - P_K K^X - P_L L^X$$

where $\partial \pi^X/\partial S < 0$.

The impact of a small increase in S on profits in the production of X is, in the terminology of Figure 1, marginal external cost, MEC.

For profits in the production of Y we have:

$$\pi^Y = P_X Y(K^Y, L^Y, S) - P_K K^Y - P_L L^Y$$

where $\partial \pi^Y/\partial S > 0$.

The impact of a small increase in S on profits in the production of Y is, in the terminology of Figure 1, marginal benefit, MB.

With these reinterpretations, the previous analysis using Figure 1 applies to the producer-to-producer case – in the absence of a well-defined property right S will be too large for efficiency, while an efficient outcome can result from bargaining based on a property right assigned to either the producer of X or the producer of Y.

An alternative way of internalising the externality would be to have the firms collude so as to maximise their joint profits, thus this would produce an efficient outcome. The matter is, however, quite intuitive. The externality arises because the Y producer does not take account of the effects of its actions on the output for given inputs of the X producer. If the Y producer chooses its levels of K^Y, L^Y and S in the light of the consequences for the output of X for given K^X and L^X, and hence on the profits arising in the production of X, then those consequences will not be unintended.

On the contrary, the two firms will be operated as if they were a single firm producing two commodities. We know that a single firm producing a single commodity will behave as required for efficiency, given all of the ideal conditions. All that is being said now is that this result carries over to a firm producing two commodities. For the firm that is producing both X and Y the ideal conditions do apply, as there is no impact on its activities the level of which is unintentionally set by others.

While joint profit maximisation can internalise an externality as required for efficiency, there appear to be few, if any, recorded instances of firms colluding, or merging, so as to internalise a pollution externality. Collusion to maximise joint profits will only occur if both firms believe that their share of maximised joint profits will be larger than the profits earned separately. There is, in general, no reason to suppose that cases where there is the prospect of both firms making higher profits with collusion will coincide with circumstances where there is a recognised inter-firm pollution externality.

Production–Consumption Externality

The key feature of the case to be considered now is that the external effect impact on two agents, and with respect to them is non-rival and non-excludable in consumption. As is the case generally in this paper, 'two' is a convenient way of looking at 'many' – the two case brings out all the essential features of the many case while simplifying the notation and the analysis. Putting this key feature in the context of the production-to-consumption case aligns with

the perceived nature of the pollution problems seen as most relevant to policy determination. These are typically seen as being situations where emissions arising in production adversely affect individuals in ways that are non-rival and non-excludable.

So, in terms of our two-person, two-commodity economy we assume that:

$$U^A = U^A(X^A, Y^A, S) \text{ with } \partial U^A/\partial S < 0$$

$$U^B = U^B(X^B, Y^B, S) \text{ with } \partial U^B/\partial S < 0$$

$$X = X(K^X, L^X)$$

$$Y = Y(K^Y, L^Y, S) \text{ with } \partial Y/\partial S > 0$$

Emissions arise in the production of Y and adversely affect the utilities of A and B. The pollution experienced by A and B is non-rival and non-excludable. A concrete example, bearing in mind that 'two' stands for 'many', would be a fossil-fuel-burning electricity plant located in an urban area. Its emissions pollute the urban airshed, and, to a first approximation, all who live within the affected area experience the same level of atmospheric pollution.

Given our earlier discussion of the supply of public goods, we can immediately conclude here that private bargaining based on some assignment of property rights will not deal with the externality problem. And, the joint profit maximisation solution is not relevant. In this kind of situation, correcting the market failure requires some kind of ongoing intervention in the workings of the market by some government agency. As we shall consider at some length and in some detail in a future paper, there is a range of means of intervention that the government agency, call it an environmental protection agency (noted as Agency), could use. Here, we shall just look at the use of taxation by the Agency, so as to bring out the essential features of the situation where the externality has the characteristics of a public bad. Here we shall use partial equilibrium analysis based on Figure 2.

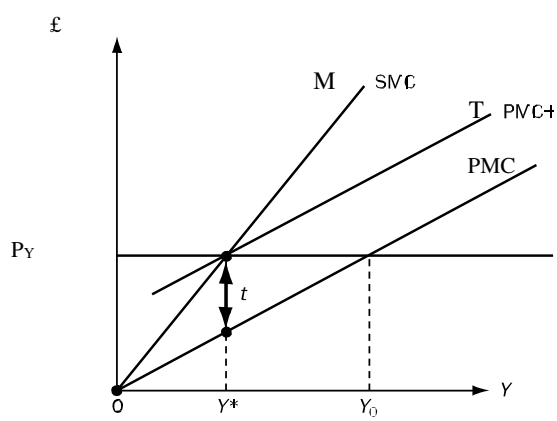

Figure 2: Taxation for externality correction

It introduces some new terminology. PMC stands for private marginal cost. Private costs are the input costs that the Y producer actually takes account of in determining its profit-maximising output level, that is:

$$C = P_K K^Y + P_L L^Y = C(Y)$$

so that PMC = $\partial C/\partial Y$.

We introduced the idea of MEC (marginal external cost) in considering the consumer-to-consumer case, as the amount that the sufferer would be willing to pay to reduce suffering by a small amount. In the present case there are two sufferers and MEC is the sum of the willingness to pay of each of them, as consumption of suffering is non-rival and non-excludable. We define social marginal cost as:

$$SMC = PMC + MEC$$

Figure 2 shows PMC increasing with *Y* in the usual way. The SMC line has a steeper slope than the PMC line, so that MEC is increasing with *Y* – as *Y* production increases, *S* output increases. To maximise profit, the *Y* firm will produce at Y_0, where PMC is equal to the output price P_Y. This is not the *Y* output that goes with efficiency, as in balancing costs and benefits at the margin it is ignoring the costs borne by A and B. Efficiency requires the balancing at the margin of benefits and costs which include the external costs borne by A and B. The efficient output level for *Y* is, that is, *Y** where SMC equals P_Y. In the absence of any correction of the market failure that is the external costs imposed on A and B, the market-determined level of *Y* output will be too high for efficiency, as will the corresponding level of *S*.

To correct this market failure the Agency can tax *S* at a suitable rate. In Figure 2, we show a line labelled PMCT, which stands for private marginal cost with the tax in place. This line shows how the *Y* firm's marginal costs behave given that the Agency is taxing *S* at the appropriate rate. As shown in Figure 2-5.14, the appropriate tax rate is:

$$t = SMC^* - PMC^* = MEC^* \tag{1}$$

that is, the tax needs to be equal to marginal external cost at the efficient levels of *Y* and *S*. As such, we may show that another way of stating this is:

$$t = P_X \left[MRUS_{XS}^{A} + MRUS_{XS}^{B} \right] \tag{2}$$

Comparing equations (1) and (2), we are saying that:

$$MEC^* = P_X \left[MRUS_{XS}^{A} + MRUS_{XS}^{B} \right] \tag{3}$$

This makes a lot of sense. Recall that MRUS stands for marginal rate of utility substitution [Bulearca and Popescu, 2019]. The *XS* subscripts indicate that it is the MRUS for commodity *X* and pollution *S* that is involved here. Recall also that the MRUS gives the amount of the increase in, in this case, *X* that would keep utility constant in the face of a small increase in *S*. Equation (3) says that MEC* is the monetary value of the extra consumption of commodity *X* by A and B that would be required to compensate them both for a small increase in *S*, from the efficient level of *S*. In saying this we are choosing to use the commodity *X* as the compensation vehicle. We could equally well have chosen the commodity *Y* for this purpose and derived:

$$t = P_Y \left[MRUS_{YS}^{A} + MRUS_{YS}^{B} \right] \tag{4}$$

and

$$MEC^* = P_Y \left[MRUS_{YS}^{A} + MRUS_{YS}^{B} \right] \tag{5}$$

Taxation at the rate MEC* is required to bring about efficiency. Note that the tax rate required is not MEC at Y_0, is not MEC in the uncorrected situation. In order to be able to impose taxation of emissions at the required rate, the Agency would need to be able to identify *Y**. Given that prior to the Agency intervention what is actually happening is Y_0, identification of Y* and calculation of the corresponding MEC* would require that the Agency knew how MEC varied with S, i.e. knew the utility functions of A and B. It is in the nature of the case that this information is not revealed in markets. The problems of preference revelation in regard to public goods were discussed above.

Clearly, those problems carry over to public bads such as pollution. The implications of this for feasible policy in respect of pollution control by taxation shall be discussed in a future paper.

Finally here we should note that the basic nature of the result derived here for the case where just one production activity gives rise to the emissions of concern carries over to the case where the emissions arise in more than one

production activity. Consider a two-person, two-commodity economy where:

$$U^A = U^A(X^A, Y^A, S) \text{ with } \partial U^A/\partial S < 0$$

$$U^B = U^B(X^B, Y^B, S) \text{ with } \partial U^B/\partial S < 0$$

$$X = X(K^X, L^X, S^X) \text{ with } \partial S/\partial S^X > 0$$

$$Y = Y(K^Y, L^Y, S^Y) \text{ with } \partial Y/\partial S^Y > 0$$

$$S = S^X + S^Y$$

Both production activities involve emissions of *S*, and both individuals are adversely affected by the total amount of *S* emissions. In this case, efficiency requires that emissions from both sources be taxed at the same rate, t = MEC*.

Conclusions

As this paper is part of a larger research that deals with sustainable development and environmental protection in extractive industry, in this article we identified the relationship existing between externalities and economic efficiency in terms of market failure. An external effect, or an externality, is said to occur when the production or consumption decisions of one agent have an impact on the utility or profit of another agent in an unintended way, and when no compensation/payment is made by the generator of the impact to the affected party.

As demonstrated, there is something in this because we preferred the definition given here as it calls attention to the fact that lack of compensation/payment is a key feature of externality as a policy problem. Hence, policy solutions to externality problems always involve introducing some kind of compensation/payment so as to remove the unintentionality, though it has to be said that the compensation/payment does not necessarily go to/come from the affected agent.

While in our previous analysis we have excluded the existence of externalities by the assumptions that were made about the utility and production functions, in practice consumption and production behaviour by some agents does affect, in uncompensated/unpaid for ways, the utility gained by other consumers and the output produced, and profit realised, by other producers. Economic behaviour does, in fact, involve external effects. The stated definition of an external effect is not perhaps very illuminating as to what exactly is involved. The two key things to keep in mind are that we are interested in effects from one agent to another which are unintended, and where there is no compensation, in respect of a harmful effect, or payment, in respect of a beneficial effect.

We began our analysis of externalities by discussing the forms that externalities can take in terms of consumption and production. As such, external effects can, first, be classified according to what sort of economic activity they originate in and what sort of economic activity they impact on. Given two sorts of economic activity, consumption and production, in this paper we were concerned only to set out the forms that unintended interdependence between agents could take.

Another dimension according to which external effects can be classified is in terms of whether they have, or do not have, the public goods characteristics of non-rivalry and non-excludability. While external effects can have the characteristics of private goods, those that are most relevant for policy analysis exhibit non-rivalry and non-excludability. This is especially the case with external effects that involve the natural environment, which mainly involve pollution problems.

Externalities are a source of market failure. Given that all of the other institutional conditions for a pure market system to realise an efficient allocation hold, if there is a beneficial externality the market will produce too little of it in relation to the requirements of allocative efficiency, while in the case of a harmful externality the market will produce more of it than efficiency requires. Since we are concerned with the application of welfare economics to environmental problems, and the main relevance of externalities there is in regard to environmental pollution, in our analysis we focussed only at harmful externalities.

As such, where it is a harmful effect, it will not be discouraged sufficiently, and there will be too much of it. Therefore, the key to dealing with the market failure that external effects give rise to, is to put in place the missing feedbacks, to create a system which does reward/punish the generation of beneficial/harmful effects, so that they are no longer unintentional. The idea that, given a suitable assignment of property rights, private bargaining between individuals

can correct externality problems and lead to efficient outcomes is often referred to as the 'Coase theorem'.

So, what the Coase theorem actually says is that given this kind of externality situation, due to incomplete private property rights, one solution involves creating property rights for either the victim or the generator, and that either assignment will lead to an efficient outcome. As we demonstrated in this paper, there are two things that are not being claimed: first, that the outcome will be the same in both cases; and second, that either way of assigning property rights necessarily promotes equity.

Given the simple and compelling logic of the arguments of the Coase theorem, the question arises as to why uncorrected externalities are a problem. If they exist by virtue of poorly defined property rights and can be solved by the assignment of clearly defined property rights, why have legislatures not acted to deal with externality problems by assigning property rights? A full answer to this question would be well beyond the scope of this paper, but the following points are worthy of note.

First, as we have seen, the case for property rights solutions is entirely an efficiency case. Second, even given clearly defined property rights, bargaining is costly; the costs increase with the number of participants, as the costs of bargaining, or more generally 'transactions costs', may be so great as to make bargaining infeasible. And third, even leaving aside the large numbers problem, in many cases of interest the externality has 'public bad' characteristics which preclude bargaining as a solution. 'Public bad' is a term often used for a public good that confers negative, rather than positive, utility on those who consume it.

Hence, in the remaining part this paper discussed this last point in the context of producer-to-consumer externalities analysis through consumption-consumption externality, production-production externality and production-consumption externality, all considered to be essential features of pollution as a market failure problem.

In our discussion of market failure thus far we have assumed that just one of the ideal conditions required for markets to achieve efficiency is not satisfied. Based on the main findings of this paper, our future works will address issues regarding the second-best theorem that welfare economics implies in discussing harmful externalities generated by firms, meaning a package of government interventions that do the best that can be done given that not all sources of market failure can be corrected.

Finally, as many of the services that the environment provides involve some kind of market failure, the levels of provision in a market system will not be those corresponding to allocative efficiency. Much of resource and environmental economics is about devising ways to intervene in the market system so as to promote efficiency in the use of environmental services. In our next papers we shall look at the problem of pollution, building on our previous researches of that problem under the externality issue.

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Restructuring of Energy Sector Enterprises as An Emitter of Environmental Pollutants in The Face of New Ecological Standards

Renata ŻABA-NIERODA

Department of Finance for Sustainable Development
Cracow University of Economics, Cracow, Poland
E-mail address: zabar@uek.krakow.pl

Abstract

An attempt was made to present the plant as a company producing significant amounts of particulates, CO2, SO2 and NO2. The guidelines for the size of these pollutants for the power industry have been stricter and will be even more stringent. The need to adapt to standards that will be reflected in standards will increase the amount and cost of implementing environmental standards. Power plants have been struggling to adapt to environmental requirements in the past, with further constraints requiring substantial investment to meet growing environmental requirements. Ecological standards reduced to pollutant emission standards were very difficult to achieve. In the future, severe emission standards will be even more severe for the power industry. The ways to adapt to the standards can be different forms of power plant activity. This will require increased investment.

Keywords: Pollution, Ecological Standard, Power Plant, Power Industry.

Introduction

The civilizational development of the world is connected with an increase in energy consumption for the developing industry, construction, transport, communications, agriculture, trade and service networks, and the growing social needs of the population. The needs of the economy and the inhabitants for energy are met mainly by the energy sector. The European Union's policy on environmental protection is assessed as restrictive. The defined ecological goals are socially desirable quality standards in terms of the condition of the basic components of the natural environment that should be provided by power plants. Numerous and rigorous ecological standards for the power sector in the form of European Union directives must be implemented. Polish power companies are taking adjustments in this area. The adaptation of the Polish power industry to the more stringent ecological requirements has a large impact on the formation of electricity prices. There will also be differences in the prices of energy offered by individual producers. The costs of implementing EU directives vary for different manufacturers, depending on the scope of modernization and carried out by them in previous years.

The aim of the article is to present new ecological standards applicable to Polish power plants and ways of adapting power plants to more and more stringent environmental requirements. A crisis situation occurs both in an enterprise struggling with maintaining financial liquidity and in an entity that has so far functioned as healthy, but the environment has fallen ill. Thus, crisis factors occur inside the enterprise - they are endogenous factors, but also outside - exogenous factors (independent of the individual). Management is making decisions, what to change to make it better? - and therefore - change or what and how to restructure? Restructuring is most often associated with a bad situation that threatens to go bankrupt. This is a corrective restructuring. But it should be remembered that there is also development restructuring. It involves introducing changes at every stage of the company's life - not only when the entity loses liquidity and begins to fall into crisis. Each change should be a change for the better, it should have the features of development restructuring, the types of which are very different.

The common feature of the definitions of restructuring contained in the literature is that all authors agree that it is a change, and the change is thorough (radical), covering important areas of economic activity. In the literature, restructuring is defined in many different ways due to the variety of areas of changes that may concern: the economic system of the state, its individual sectors, regions or specific enterprises or their groupings. However, all these definitions have a certain point of contact - that is the purpose of change. This goal is to improve the rationality and

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efficiency of resource and production factor management, giving the economic structure the features of modernity, flexibility, innovation and adaptability.

The essence and systematization of environmental protection standards

In the economic theory and practice of environmental protection policy, there are two basic groups of methods for regulating environmental protection activities [Fiedor et al. 2002, p. 280]:

- direct (direct coercion), administrative and legal methods, based mainly on technological standards (norms) of permissible levels of pollutant emission, these are orders or prohibitions regulating the manner (intensity) of using environmental resources,
- indirect (indirect coercion), economic and market methods, based mainly on the theoretical premise, leading, through appropriate legal, institutional and economic solutions, to internalization of the negative effects of production (consumption) activities, which may reduce the social costs of achieving the desired level of pollution.

Business entities are regulated by direct methods - standards. A standard is a commonly agreed criterion that determines the common, usually most desirable characteristics of something, such as a manufactured object or human behavior. The standard is also called the basic, simplest version of the product. In a technique, a standard is a set of parameters, usually with a name, that provides the appropriate level of quality, safety, comfort or compatibility with other products. Standards can be defined as a typical value of any variable that characterizes the behavior of an economic system [Kornai 1983], they constitute the average value of a variable of the analyzed system. The standards are useful in situations where there is a risk of irreversible changes in the environment, they can be regarded as effective preventive measures. There are four categories of standards [Folmer, Gabel, Opschoor 1996, p. 222]: immission, emission, technical, product.

Immission standards characterize the desired state of the environment and constitute ecological goals. It is an acceptable level of concentration of pollutants in the environment (immission) or an acceptable dose of these pollutants for humans, fauna and flora, or for environmentally noxious interactions. They are to ensure health, ecological safety and an adequate standard of living. Defining the limits of interference in the environment limits economic losses and ecological externalities [Famielec 1999, p. 32]. Environmental quality standards are requirements that must be met in a given time by the environment as a whole or its individual natural elements [Act of 27 April 2001]. In the Polish legal system, the immission standards have been regulated for: atmospheric air, surface water, soil, noise.

Emission standards may be introduced in the form of a legal act, binding throughout the country, or in the form of an administrative act that applies to a specific economic entity (the sum of standards for individual entities may not exceed the standards applicable in a given area). They take the form of emission limit values. Emission was defined by the Environmental Protection Act [Act of 27 April 2001] as introduced directly or indirectly, as a result of human activity, into the air, water, soil or soil: substances, energy, such as heat, noise, vibration or electromagnetic fields . The amount of emission is understood as the type and amount of substances or energy released into the environment at a given time, as well as the concentration or levels of substances or energy, in particular in waste gases, introduced sewage and generated waste. [Act of April 27, 2001].

The emission standards are the emission limit values specified in the Regulation of the Minister of the Environment [Regulation of the Minister of the Environment of 4 November 2014] and are binding standards. On their basis, the emission limit values for installations are determined. The emission limit values are such additional emission standards that may not be exceeded by installations requiring an integrated permit.

Substances are chemical elements and their compounds, mixtures or solutions occurring in the environment or resulting from human activity. Pollution is an emission that may be harmful to human health or the state of the environment, may cause damage to material goods, deteriorate the aesthetic value of the environment or interfere with other, justified ways of using the environment. Emission is a broader concept than pollution. This definition differs from the common understanding of the term issue. It means a substance or energy introduced into any component of the environment, and not the phenomenon of introducing them into the environment. Emission is often identified primarily with air pollution, while, according to the definition of environmental law, emissions are also waste or sewage discharged into the environment. This interpretation and definition is of fundamental importance for environmental legislation, as it always defines emission limit values and not pollutants in the permit.

Technical standards define the type of production process or abatement equipment that the polluter plant has to install (e.g. a specific type of scrubber, stack or water purification). The condition for their determination concerns the technological possibilities of complying with the standard (otherwise, they cannot be enforced). The expression of feasibility is the concept of the best BAT technology achieved (Best Available Technlogy) or a best possible technique

that is not excessively expensive BATNEEC (Best Available Techniques Not Entailing Excessive Costs). Technological conditions can be used in the process of defining norms (standards) in several ways based on technologies:

- existing, used and generally available,
- the best achievable (BAT or BATNEEC), available only to some entities - their dissemination requires additional investment or organizational effort,
- at the experimental stage.

The standard is set as the desired level, but achieving it requires undertaking technological research. It is used when the available technology does not guarantee the appropriate quality of the environment. Government agendas impose standards on companies and leave time for them to achieve them through technological adjustments. For many enterprises, regulations of this type will pose a specific threat to their development and as such will become a motivation to take appropriate actions [Kobyłko (ed.) 2000, p. 17]. Technological considerations mean adapting the standards to the best available technique. In this regard, a solution can be selected from among five possible standards. These standards are [Górka ((ed.) 1999, p. 45]:

- average,
- model,
- experimental,
- not having the appropriate technology,
- economically sensible.

Technology-based standards are not free from flaws and ambiguities resulting from the failure to adapt technological progress to development, the imbalance between the stability of industry operating conditions and technological innovations, and the emergence of different technological and financial incentives. It is necessary to adjust standards and other regulations to the evolution of the technology of increasing the requirements of the social environment (as to the quality of the natural environment). They should favor the development of technology and respond to innovation.

Product standards define the features of potentially polluting products that have a negative impact on the natural environment or its individual components. They define the permissible content of ecologically hazardous substances in a given product, as well as the permissible levels of impurities that may arise when using a given product. Product standards include technological standards used in the power industry and relating to the requirement to use specific materials and raw materials. They define the minimum level of energy efficiency of various primary energy carriers (sometimes they have a rather specific form of an indicator, such as: maximum emission of a given gaseous or dust pollutant per one gigajoule of energy generated with the use of a specific energy fuel).

The standards system is associated with legal and administrative permits (licenses) for the use of specific environmental resources or the pollution of its individual components. These are: administrative decisions (planning and regulatory), concessions, licenses, permits, consents [Fiedor et al. 2002, p. 285].

Planning decisions concern building conditions and land development, and regulatory decisions concern the scope of permitted but harmful use of the natural environment (e.g. water-legal permits for special use of water or the permissible amount and type of pollutant emission). Administrative acts also include decisions on imposing fines for violating environmental protection requirements and decisions on temporary suspension of operations.

The standards are combined with do's and don'ts (including the choice of technology) and environmental recommendations. The orders force subjects to certain behaviors, most often they concern the choice of the type of technology, cleaning or production device. The bans define which solutions cannot be applied or which activities cannot be undertaken. Theoretically, these instruments are characterized by a very low degree of environmental risk, but the costs of controlling their compliance are high (transaction costs). Ecological recommendations are of a different nature, as well as tips about the possibilities of a given entity if it wants to improve the sphere of ecological and economic activity or contribute to the implementation of a specific ecological goal. They are used in the ecological policy of the European Union countries in connection with the increase in environmental awareness, favoring the implementation of recommendations in practice, and acceptance of proposals by economic entities caring for their ecological image. The application of ecological recommendations may be connected with the use of a specific non-monetary and non-fiscal instrument of moral pressure, the existence of which, with the ecological awareness of the society, makes recommendations an effective instrument of environmental protection policy. Effective management

of a company is impossible without taking into account the aspects of environmental protection [Mikołajczyk (ed.) 2006, p. 26]. Nowadays, enterprises not only eliminate the damage caused to the environment, but most of all they implement pro-ecological activities [Burzyńska, Fila 2007, p. 39].

Ecological standards in selected power plants may be achieved by such groups of investment and organisational enterprises as liquidation of the existing sources, abandoning or reducing energy production, modernisation of the existing sources with various applicable technologies, building new sources of energy production with various technologies limiting emission of pollution into air (eco-innovative solutions in this respect), application of new types of raw materials for energy production, emission trading [Żaba-Nieroda 2011, s. 180]. The identified methods and enterprises of implementation of ecological standards in the electrical power engineering sector have been grouped into 6 blocks and all of them result in financial consequences typical of operational, financial and investment activities. The consequences of protection activities are not directly isolated and apparent in the accounting and financial reporting of companies. Work is still in progress on creating the so-called ecological accounting, initiated, among others, by the Ministry of Environment and the Ministry of Economy [Famielec J., Stępień M, 2005, p. 52]. They allow naming and measuring financial consequences of protection activities, including implementation of ecological standards. Typical financial categories related to ecological enterprises include: investment expenditures (expenses) and the resulting assets, current costs (expenses), proceeds from sales, equity, obligations (as a source of financing).

The natural environment as an element of power plant operations

The natural environment is an indispensable element of every human activity. The resources and forces of the environment are used as production factors, it creates the conditions for production activity and consumption. The use of the environment should be carried out in a way that allows to maximize the net benefits of economic development while protecting and ensuring the recovery of the usefulness and quality of natural resources in the long term.

Depletion of natural resources and reduction of resilience and the ability to regenerate the environment must affect the results and conditions of running a business, and in the long term it leads to a serious limitation of the development opportunities of future generations [Kryk 2003, p.15].

The state's ecological policy and actions for sustainable consumption and production take into account two principles:

1. The polluter pays principle - meaning placing full responsibility, including material responsibility, for the effects of pollution and other threats to the environment on individuals using environmental resources. This rule also applies to the nuisance caused by the consumption process, especially when the consumer has the option to choose consumer goods that are less harmful to the environment.
2. The principle of prevention - assuming that counteracting the negative effects on the environment should be undertaken at the stage of planning and implementation of projects based on the possessed knowledge, implementation of the procedure of environmental impact assessment and monitoring of ongoing projects. This means that when choosing preventive measures and methods of eliminating the effects of specific processes or events, as well as the distribution of available resources for environmental protection, preferences will be given to activities that will prevent pollution, develop recycling, and enable an integrated approach to reducing and eliminating pollution and threats. and will favor the introduction of pro-environmental systems for managing production processes and services.

In the production of electricity, the emission of air pollutants is particularly burdensome for the environment, mainly concerning combustion of fuels in conventional fuel power plants (hard coal and lignite, heating oil, natural gas). Due to the amount of emissions and their nuisance, the most important emissions are: SOx, NOx, CO2 and dust [CIE ZE 1997].

Data on these emissions from individual production technologies are presented in Table 1. Dust from fuel and waste landfills is an additional source of pollution. Ashes intensively dusty during unloading and handling (when they are not yet compacted) and ashes stored in dry, above-level landfills. The emission of ashes from the surface of furnace waste dumps may exceed 10 Mg per year from 1 ha of the landfill [Kucowski, Laudyn, Przekwas 1993, p. 285].

Table 1: Average emissions of pollutants from conventional fuel power plants in the world

Type of fuel	Air emissions			
	SO_x	NO_x	Dusts	CO_2
	[1000 Mg/Gwe] rocznie			
Carbon (3% content) sulfur				
Conventional boilers				
- no emission reduction	205	32	252	8013
- with emission reduction	23	23	1	-
Fluidized bed boilers with dust extraction	38	10	3	-
Lignite (0.6% sulfur content)				
- no emission reduction	54	44	284	8393
- - with emission reduction	16	23	1	-
Heating oil				
- no emission reduction	84	28	6	6577
- - with emission reduction	9	14	0,4	-
Natural gas - no emission reduction	0,02	25	0,3	4461

Source: Own study based on: [Graczyk 2005, s.102].

The amount of pollutant emission depends on a number of factors, mainly [Kamiński 2006, p. 98]:

- type and quality of fuel: content of chemically pure coal, sulfur, nitrogen and mineral substances, calorific value,
- type of technology: type of installation (conventional boilers, fluidized bed boilers, industrial furnaces, turbines, gas etc.),
- type and location of the burner, size and age of the device as well as its technical condition, etc.,
- operating conditions: excess temperature load, excess air, admixtures, emission abatement method used.

This paper focuses on the standards for air pollution caused by the power industry. Compliance with the standards requires the reduction of gas and dust emissions, in particular SO2, NOx and CO2 gases, the development of energy generation in renewable sources and the development of combined heat and power generation, which allows for obtaining electricity with significant energy savings in primary fuel. Actions in this area force the creation of restructuring solutions in power plants, but also in the entire sector.

Ecological Standards and The Need to Restructure Power Plants

Poland has relatively large reserves of solid fuels (hard coal and lignite), small reserves of natural gas, scarce oil reserves. Renewable energy sources are dominated by biomass and geothermal water energy. Poland has no uranium ores with a significant concentration of this element, whereas significant amounts of uranium are in diffused form [Soliński 2012, p. 62]. Electricity is mainly produced by professional thermal coal- and lignite-fired power plants. Some of the electricity comes from industrial power plants and gas-fired power plants. Hydroelectric power plants, wind turbines, biomass-fuelled power plants and biogas combustion plants play an inconsiderable part in the generation of electricity. An analysis of the data presented in Figure 1 shows that primary energy consumption decreased during the period under examination. Energy consumption decreased in the first analysis period until 1995, only to increase in the following year and decrease again.[Famielec, Kijanka Żaba-Nieroda 2019, 13] The increase in energy consumption is visible in 2010 and 2011 followed by a further decrease in energy consumption.

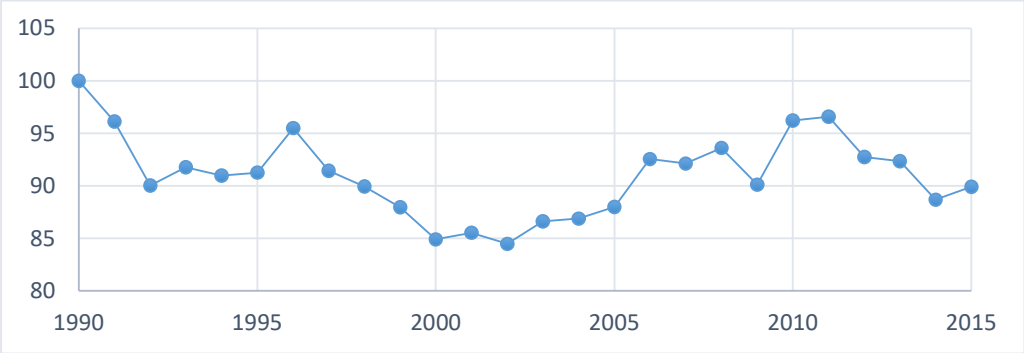

Fig. 1: The dynamics of primary energy consumption in Poland in 1990-2015 (1990 = 100)

Source: Compilation and own calculations based on the IEA statistical base.

The structure of primary energy consumption also changed during the period under examination. The main source of final energy in the period analyzed was coal and crude oil. Since the beginning of the 1990s, the share of coal had systematically decreased and the share of consumption of oil, natural gas and renewable energy had increased. Figure 2 shows the structure of primary energy consumption in 1990 and 2015.

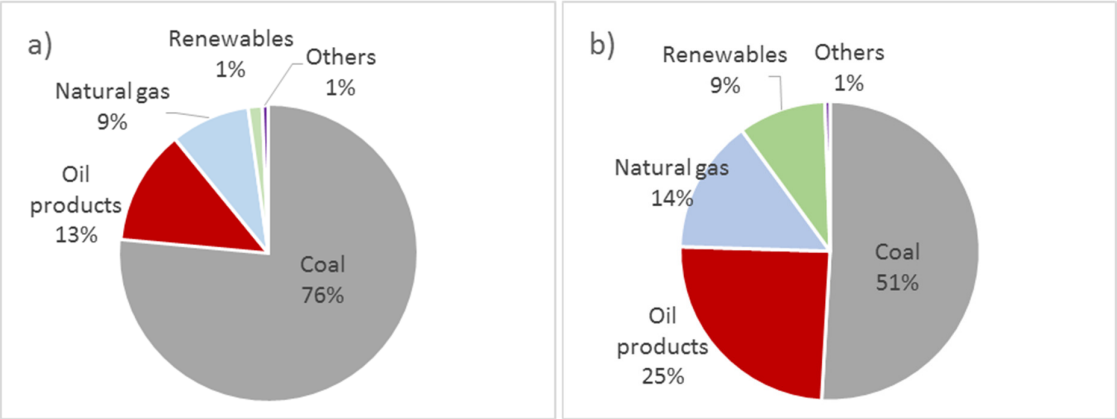

Fig. 2: The structure of primary energy carrier consumption in the year a) 1990 and b) 2015

Source: Own compilation based on the IEA statistical base.

The key ecological environmental policy objectives have been curtailed to a reduction of CO_2 emissions by 2020 as compared to 1990. Table 2 presents the EU Member States' greenhouse gas emission reduction targets by 2030.

Table 2: The EU Member States' greenhouse gas emission reduction targets by 2030

Grounds for setting the target	Target year of reduction	EU Member States' greenhouse gas emission reduction targets	Achieved CO_2 emission reduction targets in the period under examination a. actual b. on the basis of an annual average target
Kyoto Protocol to the United Nations Framework Convention on Climate Change	up to 2012	by 6% compared* to the 1990 level	for 2012 a. - 15.55 % b. - 6.00%
European Union climate and energy packet – 3x20	up to 2020	by 20% compared** to the 1990 level	for 2015 a. - 16. 83% b. - 16.6 %

Climate and energy policies up to 2030	up to 2030	by 40% compared to the 1990 level	for 2015 a. - 16.83% b.- 25.0 %

**for 15 EU Member States*
*** for 28 EU Member States*
Source: Own compilation on the basis of https://ec.europa.eu/clima/policies/strategies/2020_en

As shown in Table 2, Poland has met the guidelines contained in the Kyoto Protocol and the measures taken to reduce greenhouse gas emissions in the field of CO_2 have been implemented above the assumed limits. The action programme for all EU countries, called the climate and energy package, or 3x20% by 2020, endorsed by the European Council in March 2007 and implemented in April 2009, set out three key objectives, which were, at the same time, the objectives of the Europe 2020 strategy for smart, sustainable and inclusive growth [Famielec, Kijanka Żaba-Nieroda 2019, p. 16]:

1. Reducing greenhouse gas emissions in the European Union by 20% by 2020 compared to the 1990 levels.
2. Increasing the share of renewable energy to 20% of final gross energy consumption in the European Union in 2020.
3. Increasing energy efficiency in the Union by 20% as compared to forecasts for 2020, as well as increasing the share of biofuels in total transport fuel consumption to 10% by 2020.

As part of the climate and energy policy up to 2030, adopted by national leaders in October 2014, the EU is in pursuit of three main objectives, which include:

1. Reduction by at least 40% of greenhouse gas emissions as compared to the 1990 levels.
2. Ensuring that at least a 27% share of renewable energy sources in total energy consumption is achieved.
3. At least a 27% increase in energy efficiency.

By achieving the first of these objectives, the European Union will be able to undertake cost-effective measures to attain the long-term goal of reducing emissions by 80-95% by 2050 in the context of the necessary reductions that should be achieved collectively by the developed countries, and to provide a fair and ambitious contribution to reaching the Paris Agreement.

However, in order for it to be implemented, the sectors covered by the EU Emissions Trading Scheme would have to reduce emissions by 43% compared to the 2005 levels, which necessitates the reform and strengthening of the ETS; sectors not covered by this scheme would have to reduce emissions by 30% as compared to the 2005 level, which requires the setting of individual binding targets for individual Member States.

The European Commission is seeking cost-effective ways to make the European economy more climate-friendly and more energy-efficient. The improvement of energy efficiency is perceived as the most cost-effective way of reducing greenhouse gas emissions and the largest source of energy available to the world [Cullen and Allwood 2010, pp. 2059-2069]. The EU's road map for moving to a low-carbon economy indicates that by 2050 the European Union should have reduced its greenhouse gas emissions by 80% as compared to the 1990 levels only through national emission reductions. The key steps in achieving this objective would be to achieve a 40% emission reduction by 2030 and a 60% emission reduction by 2040. It is assumed that all sectors must be involved, to the extent appropriate to their technological and economic capacity, but it should be borne in mind that there are differences in the size of the reductions to be achieved between sectors [Famielec, Kijanka, Żaba-Nieroda 2019, p. 18].

According to the European Investment Bank, the investment needs of the electricity sector by 2020 will amount to almost EUR 70 billion (approximately PLN 300 billion). Of this, the renewable part will amount to EUR 12 billion, the nuclear part - EUR 6 billion, and the CO_2 capture and storage systems (CCS) - as much as EUR 25 billion. The main problem is that CO_2 emissions can be reduced mainly by building gas power plants or renewable energy. Until 2020, the CCS technology to be installed in coal-fired power plants will not be applicable. The cost of building a coal-fired power plant with CCS will be one-third higher than a traditional one, and the cost of producing electricity by up to two-thirds. The reduction of CO_2 in Poland will have a much greater impact on slowing GDP growth than in other EU countries. It is estimated that by 2030 we will lose 1 percentage point on average annually. GDP. In the EU, growth is expected to amount to 0.6 percentage points. Rising costs of energy investments will translate into higher electricity bills. Construction of nuclear and wind installations is associated with high investment outlays for this purpose.

The construction of a nuclear power plant per 1 MW of capacity costs about - PLN 15 million. The outlays for wind farms are much lower, but due to the limited time of their use, they actually amount to several times more than for nuclear installations. In the case of a gas-fired power plant, the cost of building 1 MW of capacity is approx. PLN 2-3 million, depending on the technology, and in the case of coal, it is PLN 5.5-6 million. Fuel for the latter is relatively cheaper. However, it is the combustion of gas that produces less CO_2 emissions. This is important from the point of view of Poland in the context of the EU climate package and the tightening of regulations on CO_2 emissions.

Polska Grupa Energetyczna announced that the planned new unit at the Dolna Odra power plant will be fired with coal, alternatively the use of gas technology in the construction of this unit was also considered. A few months later, information was released that the opposite would be the case - a gas unit would be built instead of the previously planned hard coal-fired unit. Experts believe that in the case of Dolna Odra, located near Szczecin, a gas unit will be more economically viable, which would not be profitable in Silesia, where coal is transported over short distances (and state energy companies are prohibited from importing this fuel). Gas from Norway is to flow to the vicinity of Szczecin via the planned Baltic Pipe pipeline via Denmark [Baca-Pogorzelska 2017].

It is possible to introduce emission limits for conventional technologies in the EU in conjunction with the reform of the CO_2 emission allowance trading system (the so-called EU ETS). The current stage of the project for the construction of a new unit in Dolna Odra, planned by the end of Q2 2018, will include the development of a feasibility study for the investment, as well as launching other administrative proceedings aimed at obtaining a decision on environmental conditions for this task. The company is considering selecting one of the three technologies: a simple cycle gas unit, a simple cycle gas unit prepared for a possible extension to a gas and steam unit (CCGT ready) or a gas and steam unit. Due to the specific location conditions of the Dolna Odra Power Plant, located in an area characterized by high demand for power balancing the power system, the new unit should be highly flexible. Consultations with Polskie Sieci Elektroenergetyczne have shown that the gas block is able to meet these requirements.

Costs of adapting electricity producers to new standards

Adapting to EU regulations will cost electricity producers PLN 140 billion by 2030, which means that the price of electricity may increase by about 20%. The energy sector will have to spend about PLN 100 billion on investments in gas and coal (or nuclear) blocks, and these are not all the huge expenses of the Polish energy sector planned in the coming years. The next planned expenses of PLN 130 billion are fees for CO_2 emissions in 2021-2030, additional costs are at least PLN 6 billion for adapting the power plant to the so-called BAT conclusions - lower emissions of sulfur and nitrogen compounds, chlorine and mercury by 2021. The presented investment outlays may cause that in the perspective of 2030 the average electricity bill may increase from the current approx. PLN 100 per month to PLN 120.

Poland relies on the production of energy from coal, its share in the energy generation structure is approx. 86%, in 2030 it is to be 60%. The Polish energy system is based on well-worn installations. On July 31, 2017, the European Commission made a formal decision to initiate the entry into force of the so-called BAT conclusions for power plants, which will apply from 2021. It is estimated that the adjustment costs in this respect will amount to approximately PLN 15 billion necessary for the modernization of energy installations so that they emit less SO_2 and NOx as well as Hg and Cl compounds. The five largest Polish energy companies controlled by the State Treasury estimate their expenses at approx. PLN 6-9 billion [http://serwisy.gazetaprawna.pl (10/09/2017)]. For the Energa concern, this means the need to modernize the Ostrołęka B Power Plant and the Elbląg and Kalisz CHP plants. In the case of Tauron, assessments are ongoing regarding the need to adapt the installation to changing requirements. PGNiG Termika believes that its Siekierki CHP plant is adapted to the new regulations (similarly to the Wola heat plant), the company is considering turning off two steam boilers and turbine sets. In Żerań, most of the old devices will be dismantled, they will be replaced by a new steam and gas unit, the cost of which will amount to PLN 1.5 billion. Boilers in the Kawęczyn Heat and Power Plant and the Pruszków Heat and Power Plant require adjustments. In the case of Kozienice Power Plant, adjusting the generating units to the BAT conclusions costs about PLN 150 million. In the case of Połaniec Power Plant, approximately PLN 300 million. The estimated expenditures of the Enea concern will amount to approximately PLN 500 million.

Although the principle promoted by the European Commission is technological neutrality, it is not respected in this case. The limit of 550 g CO_2 / kWh covers all available technologies with the exception of coal. Even the most modern coal units currently emit 700 g of CO_2 per kWh of energy produced. The most modern coal-fired power plants in the world achieve an efficiency of 43%. To fit within the 550 g limit, they would have to work with 65-70% efficiency - it is technologically unattainable. The draft winter package proposes a maximum emission of new power plants at the level of 550 g CO_2 / 1 kWh, the EU ETS project goes further, assuming the threshold of 450 g CO_2 / 1 kWh. The most modern coal-fired power plants do not go below 700 g CO_2 / kWh. Poland requests that these numbers be

averaged not for a given gym, but for the entire country. Such a solution would allow the construction of coal units, e.g. assuming the construction of a nuclear power plant that does not emit CO_2.

On July 31, 2017, the European Commission adopted an implementing act on new standards tightening emission standards for industry, including coal-fired power plants. This is another step limiting air pollution, but also a considerable challenge for the Polish energy sector. The new regulations concern the so-called large combustion plants, i.e. power plants and combined heat and power plants, which are responsible for almost one third of industrial air pollutants in the EU. All installations that are subject to these regulations, and there are about 3.5 thousand of them in the EU, will have four years to reduce emissions of harmful substances into the atmosphere. By mid-2021, power plants and large heating plants have to adjust their emissions to BAT requirements. These standards are to be the basis on which the relevant environmental protection authorities will issue permits for enterprises. This is not about CO_2 emissions, but about gases such as SO_2, NO_x (and dust). Additional substances such as Hg, HCl, HF and NH_3 were also covered by the emission limit values. The limits apply to all large combustion plants with a capacity of 50 MW or more, except for those that benefit from previous derogations from some of the regulations. The Directive on industrial emissions [Directive of November 24, 2010], according to which BAT requirements are the benchmark for pollutant emissions, provides for the possibility of granting derogations from the limits. A company that wants to use such a solution will have to indicate that the costs of compliance with the standards are disproportionate to the environmental benefits they bring

Conclusion

The presented study is a methodological approach in which an attempt was made to present the power plant as enterprises generating significant amounts of dust pollution, CO2, SO2 and NO2. The guidelines for the size of these pollutants for the power sector have become more stringent and will be even more stringent. The necessity to adapt to the norms which are the expression of the standards will increase the outlays and costs of implementing ecological standards. Power plants made an effort to adapt to environmental requirements in the previous years, and subsequent restrictions require significant investment outlays to adapt to the growing environmental requirements. The state of the environment is largely determined by what we introduce into it. Ecological standards reduced to pollutant emission standards were very difficult to achieve. In the future, strict emission standards will be even more severe for the power sector. The level of standards has risen sharply since 2020. Various forms of power plant activity may be ways to comply with the standards. This will require increased capital expenditure and an increase in costs related to compliance with the standards. Electricity prices will also rise as a result of rising costs.

Acknowledgment

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Knowledge Management in The Context of Service Companies

Rober Balcerzyk

Dr., Assistant Professor at the Faculty of Management of the General Tadeusz Kościuszko Military University of Land Forces in Wrocław, email: robert.rb@interia.pl
ORCID: 0000-0002-5462-6901

Abstract

The main objective of the research presented in the article was to diagnose the Knowledge management in organization. The conducted research was of a pilot nature. This article attempts to define the term *„knowledge management"* based both on the literature on management sciences and on the respondents' opinion. There is also described a model concept of *„knowledge management"*. In the described studies, the factors determining the *„knowledge management"*. Factors affecting knowledge sharing in the respondents' opinion were presented. Barriers in the development of companies were presented. Problems related to data acquisition and processing were described. Based on the analysis of research results, conclusions have been formulated that can be used in the design of *„knowledge management"* programs.

Keywords: Knowledge Management, Knowledge, Information.

Introduction

The development of a knowledge-based economy and globalisation have led to a revolution in management concepts. In modern organisations, the importance of intellectual capital as a significant part (component, determinant) of the total value of the organisation is appreciated. A special role in organisations is assigned to employees. It is the employees who, to a large extent, constitute the „*added value*" of the company. It is easy to purchase new technology, however the preparation and motivation of employees is a capital that is built up for a relatively long time and cannot be copied.

Full implementation of development programmes within the framework of *knowledge management* requires the involvement of the company's top management, the entire management staff and the employees themselves.

Knowledge currently becomes a commodity, has a measurable form and creates *„added value for the company"*. Knowledge workers determine the strength of the enterprise and create the *intellectual capital* of the organisation. Nowadays, knowledge management is recognised as a concept of organisation management, which emphasizes the role of the intellectual capital of employees in building competitive advantage. It makes it possible to improve processes and react to changes in such turbulent environment.

In today's computerised world, in the era of innovation, an overwhelming amount of data and information is encountered. As a result, they do not always constitute useful and sought-after knowledge which can be applied anywhere in the organisation management. In short, we should know what we are looking for, for what purpose, and what this knowledge is supposed be used for as well as how to use it in order to achieve expected results in our organisation.

The concept of knowledge management in the literature on management sciences.

In the literature of the problem, the concept of knowledge management is defined in various ways. There were attempts to define knowledge as early as in ancient times (Galata 2004). Greek philosophers, such as Plato and Aristotle, were the first ones to try to define what knowledge was. Socrates, Plato and Aristotle stressed that the measure of wisdom was the ability to show surprise (I know that I know nothing). Attempts to explain this concept

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were also made by the supporters of idealism (Descartes, Kant), empiricism (Locke, Hume) and the 20th century philosophers (Ryle, Macmurray).
M.J. Stankiewicz (2006) states that „knowledge is a changing mixture of experience, contextual information values and expert insight, providing a framework for assessing and connecting new experiences and information. It is created and used in the consciousness of its owner".

P. Drucker (2002) believes that „knowledge is always connected to a person, is carried, created, justified and perfected by that person and applied, taught and passed on to others and used by a person for good or bad purposes". P. Drucker defines knowledge as an effective use of information in action and is the first to appreciate the importance of knowledge in the economy.

L. Kowalczyk (Drucker 1999) believes that „knowledge remains to be closely correlated with skills (often considered more important than knowledge itself) and competences (the essence of which is the ability to solve professional problems in a specific work environment). Competences, like knowledge, become relevant when they are used to achieve specific goals, but this requires a combination of competence, motivation and the working environment".

A. Sopińska, P. Wachowiak (2006) devised the following model of knowledge management in a company (Figure 1).

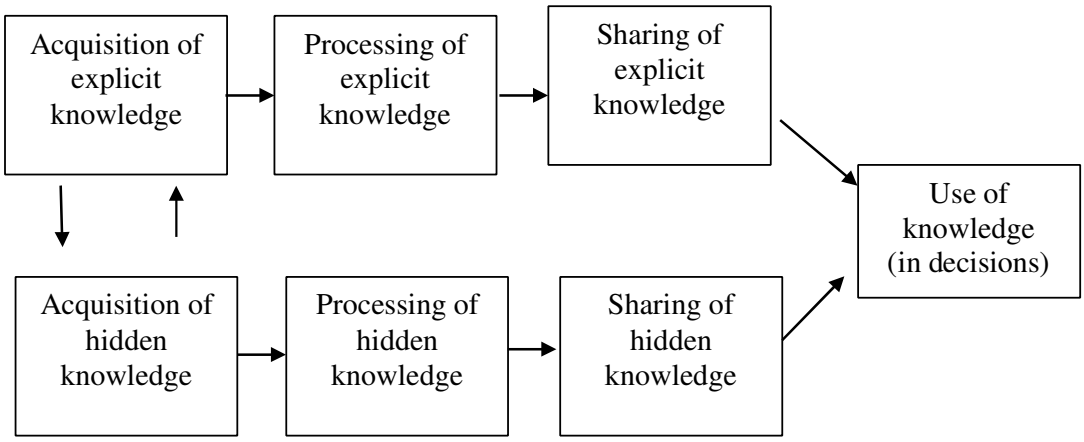

Figure 1: Model of knowledge management in an enterprise

Source: A. Sopińska, P. Wachowiak, 2006

The first stage of knowledge management is the acquisition of explicit knowledge. It consists in obtaining all information from various sources. At this stage an important role is played by the analysis of the company's information needs and data collection. In the next stage - the processing of explicit knowledge - the information collected is subject to preliminary arrangement and storage and then analysis and interpretation. These activities are followed by the sharing of explicit knowledge. In consists in disseminating the collected and processed information, reaching out to parties interested in the results of the analyses conducted. They provide new insights into the interpretation of events, phenomena or objects. They can influence the behaviour and judgment of the recipient.

Another kind of knowledge in hidden knowledge. Its acquisition mainly consists in improving the competences of employees. Its processing (second stage) consists in the assessment of the degree of assimilation of knowledge acquired by the employee, verifying the usefulness of knowledge from the point of view of the objectives to be achieved by the employee and the organisation itself. The next stage is the sharing of hidden knowledge consisting in passing the knowledge on to other employees.

The last stage of knowledge management is the joint use of explicit and tacit knowledge used to make managerial decisions. It is important to link explicit and tacit knowledge since they intersect with each other. It leads to the rational use of knowledge resources in the organisation.

Authors of the described concept of knowledge management attribute a special role to the organisational culture in this process. It should be oriented towards innovation, openness to the environment and pragmatism.

Knowledge is divided into explicit and tacit knowledge. Explicit and tacit knowledge are not completely separate. During the creative activities of individuals and groups, there is interaction and interpenetration between the two types of knowledge. Explicit knowledge turns into tacit knowledge and vice versa. In literature, it is indicated that the basis of knowledge is data and information, which become knowledge only after being processed (Figure 2).

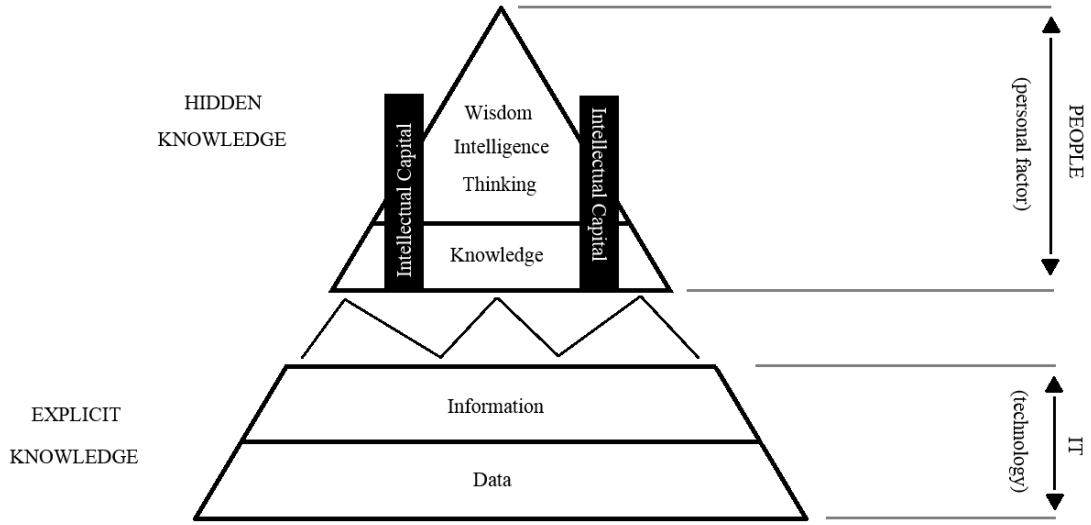

Figure 2: Hierarchy of knowledge

Source: M. Kłak, 2010

Data are a component of the information (Brdulak 2005). They include raw and unanalysed facts, figures and events. Nowadays, they are most usually saved and stored in the form of data sets. These should be understood as sets of single facts about a certain event. Processed data constitute messages and shape information. In an organisational context, data constitute a formalised record of the transactions made.

Collected, organised and properly interpreted data constitute information essential in the decision-making process. In the context of information, both the sender and the recipient are concerned. Thanks to the message, it is possible to obtain answers to the questions: who?, what?, where?, when?

S. Galata treats information as all events (real or conceptual), recorded, collated, grouped, interpreted and generalised from the point of view of the adopted goal (Galata 2004).

The characteristic feature of knowledge is that it is usually of qualitative nature.[1] Data and information are perceived differently. Rather, they are of quantitative and formal character. Other characteristics of knowledge are:

- dominance - knowledge takes precedence over all other resources;
- inexhaustibility - the value of knowledge increases with the frequency of its use;
- simultaneity- the use of knowledge resources by many people in different places at the same time is possible;
- multidimensionality - considers knowledge management in functional, process, instrumental and institutional terms.

Methods and characteristics of the research sample

[1] M. Klimczok, A. Tomczyk, *Zarządzanie wiedzą – współczesna koncepcja zarządzania przedsiębiorstwem*, Zeszyty Naukowe Wyższej Szkoły Humanitas. Zarządzanie, Sosnowiec 2012, nr 2, s. 166.

The research presented in the article uses the triangulation of research methods such as:

- analysis and criticism of literature (literature on knowledge management, innovation management, employee development);
- secondary source analysis (reports, research reports on knowledge management in enterprises);
- a diagnostic survey with company employees in the area of „knowledge management".

A **diagnostic survey was adopted as the leading method in the conducted research.** This allowed for an acquisition of an objective context of the examined phenomenon and ensured high quality of the research. The diversity of methods was aimed at achieving a consistency of the empirical basis for the inference.

The **questionnaire** was developed on the basis of a literature analysis in the field of knowledge management. The questionnaire was intended for students (part-time students) of three Universities of the Lower Silesian Voivodeship. In the research, the following variables were set as independent variables: gender of the respondents, age of the respondents, size of the company (workplace), place of residence.

The respondents are part-time students at three Universities in Wroclaw and nearby municipalities. A total of 356 students were examined. The studied group was evenly divided on the basis of gender. Women constituted 51% of the surveyed group and men constituted 49% of it. The gender of the respondents is presented in Figure 3.

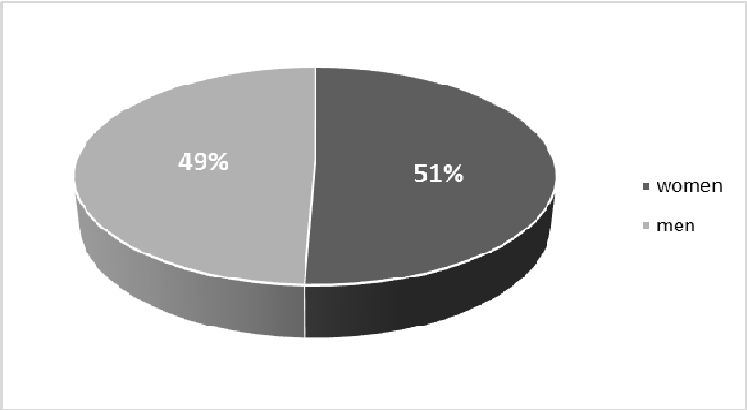

Figure 3: The group studied according to gender.

*Source***:***own research*

About 69% of the respondents were young people aged 19-29. 19.7% of the respondents were aged 30 to 40. The least numerous group were students over 40 years of age (11.2% of respondents). During the analysis of the structure of the group examined in terms of age, it should be noted that the respondents are young people at the stage of preparation for a career or early professional career, during which a crystallisation, the narrowing of the field of exploration and finalisation of the choice of profession take place. They recognise the need for continuous improvement and learning. They want to build their own intellectual capital to ensure their competitiveness on the labour market. It consists primarily of acquired knowledge, skills and experience, which are used in the work performed. They invest in themselves while simultaneously having higher requirements regarding career and professional development. The age of respondents is shown in Figure 4.

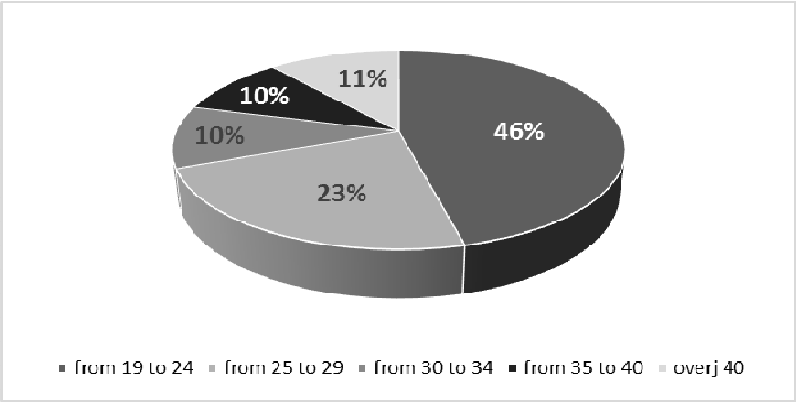

Figure 4: Group examined in terms of gender.

Source: own research

About 35% of the respondents are employees of companies employing more than 100 people. Over 21% of the students were employed in medium companies (21 to 50 employees) and the same percentage of students were employed in organisations employing 6 to 10 employees. Only 10.1% of respondents were employed in companies employing 51 to 100 employees. Respondents are mainly employees of small and medium companies due to the fact that they live in the surrounding villages. The employment of respondents in terms of the size of the company is shown in Figure 5.

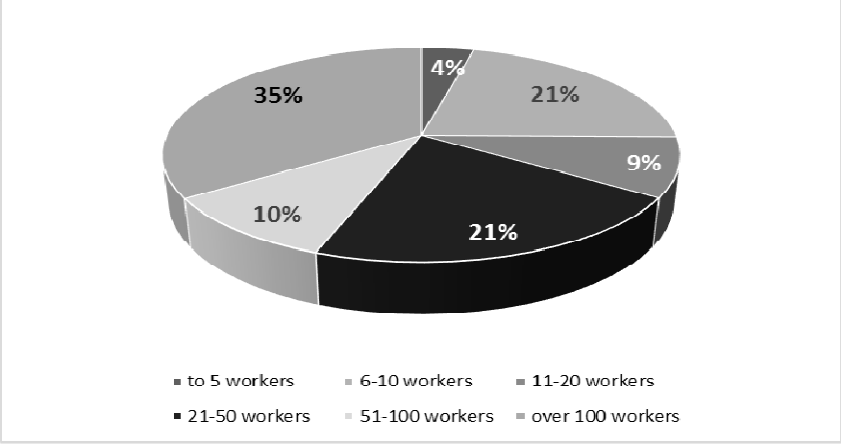

Figure 5: Employment of respondents due to the size of the company

Source: Own research

Two of the examined Universities were located in poviat towns in the Lower Silesian Voivodship. Therefore, 43% of the respondents are inhabitants of small municipalities with up to 50,000 inhabitants (Figure 6). Almost one third of the respondents are rural residents (over 28%). A relatively small group of respondents are inhabitants of municipalities with up to 10,000 inhabitants (7.3%). Only 1.1% are residents of larger cities. Therefore, the respondents are employees at small and medium companies.

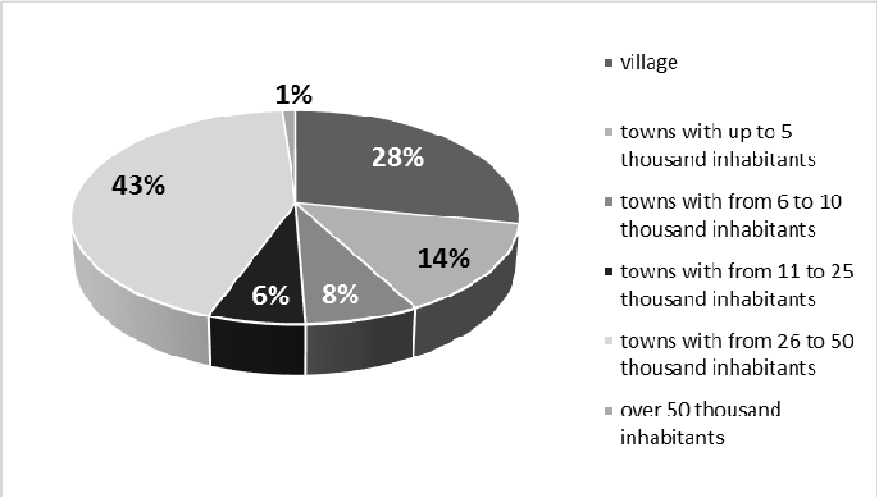

Figure 6: Respondents' place of residence.

Source: Own research

Acquiring information and developing knowledge management

In one of the first questions the respondents were asked for their opinion on the understanding of the term "knowledge" (Figure 7).

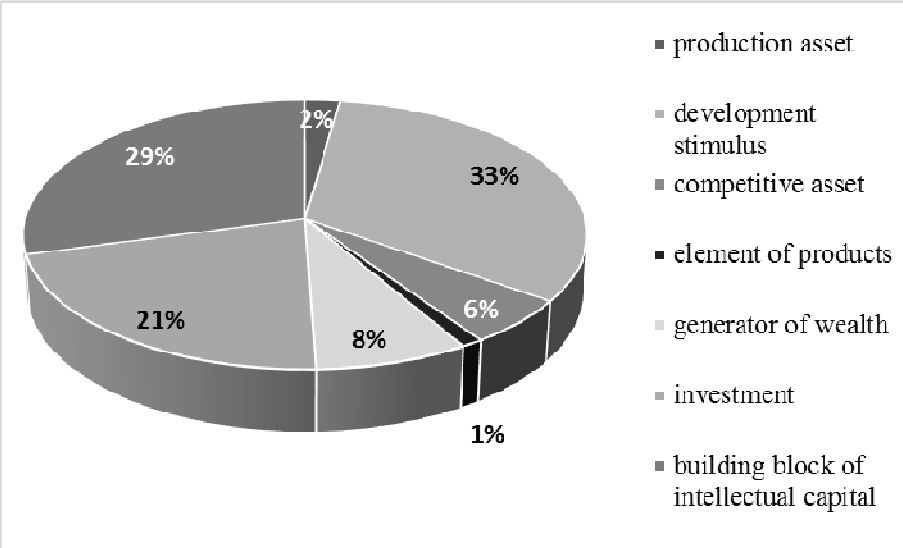

Figure 7: Understanding of the term "knowledge" by respondents

Source: Own research

More than half of the respondents (50%) are aware of the importance of knowledge in today's economy. Approximately 21% believe that knowledge is an investment and another 29% of respondents say that knowledge is a building block of intellectual capital. They understand the importance of knowledge in broadening competences, improving effectiveness and efficiency in an organisation. It can therefore be assumed that they treat knowledge (or rather acquiring it through participation in courses, trainings, workshops or studies) as an important component of the intellectual capital of an organisation. It can be argued that they treat the financial resources used by the organisation to obtain knowledge as an investment rather than a cost. Nearly 33% of respondents believe that knowledge is a development stimulus and 8% define knowledge as a generator of wealth. More than 6% treat knowledge as a competitive asset and only 2% treat it as a production asset. It is worth noting that no one interprets knowledge as an element of products, and yet it is knowledge that determines their creation.

Respondents' opinions allow for concluding that knowledge is the basic resource of an organisation determining its intelligence. Knowledge is a property of the employees and not the organization. It determines the market value of the company at the same time. Knowledge is the art of creating the value of intangible assets of an organization. The success of a company is determined by the ability to acquire, accumulate and share the knowledge with co-workers. Knowledge is the foundation for the functioning of a modern organization. It should also be stressed that knowledge is of a qualitative nature.

The next question asked to the respondents was meant to determine whether the examined students actively participate in the process of knowledge sharing (they share with other co-workers). Their opinions are shown in Figure 8.

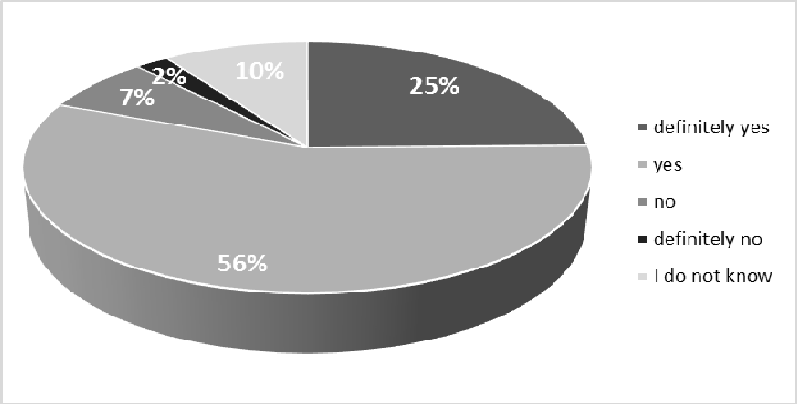

Figure 8: Respondents' views regarding active participation in knowledge sharing

Source: Own research

Almost all respondents (81%) confirmed their active willingness to share knowledge by ticking "yes" or "definitely yes". Only 9% of the respondents gave a negative answer. This proves that the respondents are very aware of the impact of the knowledge sharing process on the functioning of an organisation. It can be assumed that the companies employing the examined group have an appropriate "climate" in the organisational culture conducive to knowledge sharing. It is likely that these companies also have an appropriate incentive system in place to encourage their employees to share knowledge. It also shows that the employees identify with the organisation and are emotionally attached to it. They are loyal employees and they identify the trajectory of their career path with the development of the company. It can also be presumed that they have the proper competences to establish desired interpersonal relations, communication or teamwork. Knowledge sharing is not only about passing it on, but also about assimilating it.

These organisations probably have the proper technical infrastructure to support knowledge management in a company. It should be remember that having appropriate information technology tools facilitates and accelerates the process of obtaining information that makes problem solving and managerial decision-making easier.

Respondents were asked for opinions regarding the functioning of organisational units in the company directly responsible for knowledge management in the organisation. This is shown in Figure 9.

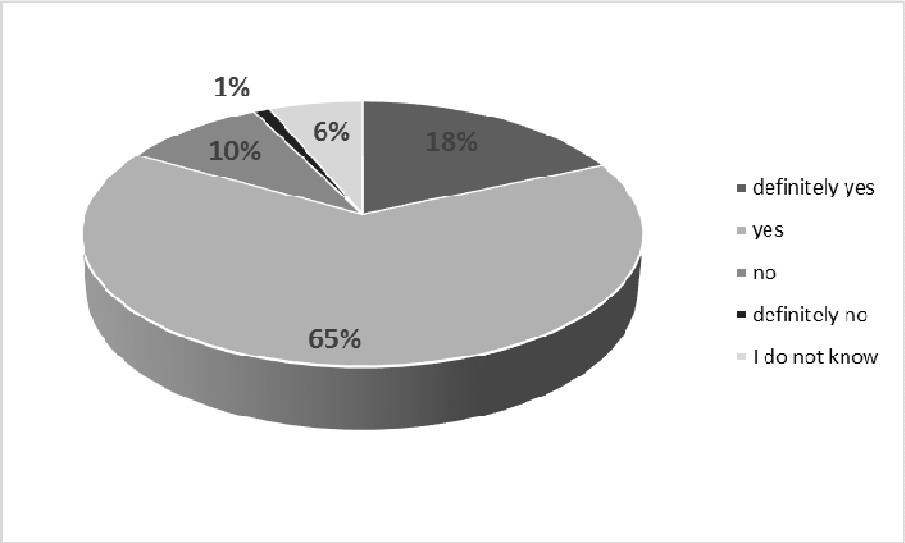

Figure 9: Respondents' opinions regarding the functioning of organisational units directly responsible for knowledge management in the company

Source: Own research

More than 82% of respondents are of the opinion that the company should have special organisational units responsible for knowledge management. About 6% of the respondents have no opinion on this subject and only 10% are against it. It means that employees want to have access to the company's information resources that make their work easier. This may also indicate that they want to share knowledge "in a safe manner". On the one hand, they want to receive confirmed (verified) information and on the other hand, they want the information provided to co-workers to not be used in any undesirable way. Research confirms that employees demand people responsible for knowledge sharing in their structures. It can be assumed that these tasks are currently performed by middle and line management. They recognise the importance of knowledge in such a competitive economy. Despite the fact that the majority of respondents are employed in companies employing up to 100 employees, they see a need to establish "knowledge management" units. This, in turn, shows that the respondents are also aware of the problems in creating efficiently functioning "knowledge networks". It should be expected that these companies probably have a relatively simple organisational structure that is conducive to communication between employees anyway.

Research also shows that information technologies are a determining factor in the knowledge management process. Respondents' opinions on this subject were shown in Figure 10.

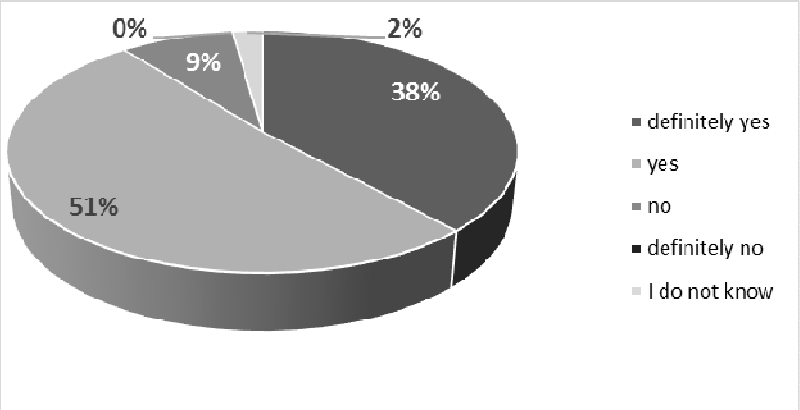

Figure 10: Opinions regarding the perception of information technology.

Source: Own research

The vast majority of employees (89%) claim that the knowledge management process is determined by information technologies. Only 9% of respondents are of the opposite opinion. It should be remembered, however, that the tools

used in the process of knowledge management are intended only to support it. They are intended to ensure that relevant staff receive information in good time. They also provide access to information (knowledge) and lead to material prosperity. The results show that economic, social, scientific and technical progress and globalisation caused the Polish society to be increasingly more informative. Complex processes require the use of a growing number of new techniques and tools for data collection, processing and delivery to users. Respondents recognise that information is a cornerstone of knowledge development and innovation. Information is the basic and most significant "resource" in the organisation.

The research has attempted to determine what constitutes the greatest barrier to knowledge sharing. The results are shown in Figure 11.

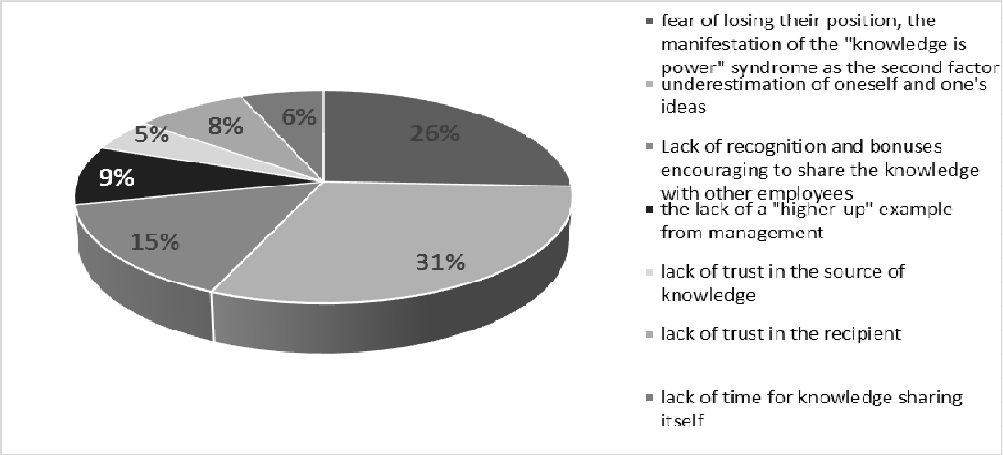

Figure 11: Opinions regarding barriers to knowledge sharing

Source: Own research

The main factor constituting a barrier to knowledge sharing in the opinion of respondents is the lack of self-confidence, underestimation of oneself and one's ideas (31%). It should be remembered that low self-esteem is the result of excessive self-criticism, lack of self-confidence and low self-value. One may think that the respondents are characterised by low self-esteem (avoiding ambitious goals, new tasks, and strong reaction to criticism from co-workers). The reason may be insufficient knowledge of oneself and receiving unfavourable (somewhat biased) messages in the past from superiors, teachers, parents. Therefore, it is necessary to create an organisational climate in which comparison of employees with others and making an assessment based on the assessment of others are avoided.

Respondents mention the fear of losing their position, the manifestation of the "knowledge is power" syndrome as the second factor (barrier) (26%). In the opinion of respondents, possessing unique knowledge grants power to the employee. It should be remembered that power is a social relationship between individuals in which one party imposes their will on the other. It exists wherever there are superiors and subordinates. Therefore, in the opinion of the respondents, sharing knowledge makes the employee (in terms of their professional competences) unattractive for the organisation.

Lack of recognition and bonuses encouraging to share the knowledge with other employees is considered to be a barrier by approximately 15% of respondents. This proves that there is a lack of incentive systems supporting the development of employee competences, increase of involvement and employee satisfaction. Lack of incentive systems complicates the building of competences within organisations that are difficult to obtain on the external labour market. Thanks to the implementation of such solutions, the company becomes a more attractive workplace for new employees.

One in ten respondents believes that the barrier is the lack of a "higher-up" example from management (9%). The same number of respondents is characterised by a lack of trust in the recipient (fear of improper use of the knowledge shared) (8%). Respondents also mention the lack of time for knowledge sharing itself (6%) and lack of trust in the source of knowledge (3.3%).

The results show the problem in knowledge sharing is not the lack of adequate IT infrastructure, but people (employees). Psychological traits, behaviour and motives for action constitute the main problem.

Conclusions

Summing up the problem of "knowledge management", it should be stated that this process is determined by many different factors. These include mainly the organisational culture (favourable conditions for cooperation), employee competences (establishing interpersonal contacts, communicating, teamwork skills) and information technology infrastructure (appropriate preparation and equipment of workstations, possession of appropriate information technology tools, access to information technology networks).

The main determinant of an organisation's intellectual capital is the knowledge and skills of its employees. They are the ones who create the added value of the company. They are the ones who provide the competitive advantage. The financial resources allocated to their development and vocational training should be treated as investments rather than costs.

Employees recognise the importance of knowledge in the functioning of the company. They postulate the appointment of persons in organisational structures responsible for "knowledge management" in the company. Such a solution may be to appoint managers or coordinators of "knowledge management" in the company. These persons would also play an important role in initiating changes in the organisation.

Thanks to the use of information technologies, it is possible to obtain information which in turn becomes a key strategic resource of the organisation. Information is essential to coordinate production, sales and intercontinental marketing in the age of globalisation. Modern computers and communication technologies create an information technology infrastructure that enables acquisition, processing and storage of information. Information in the modern world is intensively used in economic, social and political life. All this in turn leads to the creation of an information society.

The use of new information technologies in the organisation streamlines and increases the effectiveness of the company thanks to the acceleration of management and decision-making procedures.

In a learning organisation it is important to create an organisational culture based on openness, cooperation and knowledge sharing in a way that enables the implementation of new ideas and concepts. Research shows that encouraging people to share knowledge is not an easy task. Promotions are not only a privilege for people who have this knowledge, but also for those who are able to share it with their co-workers.

At the stage of selection of employees for the organisation (when preparing the employee's competence profile) particular attention should be paid to the psychological traits, behaviour and attitudes of candidates in the intellectual, emotional and behavioural spheres.

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The State of Corporate Social Entrepreneurship (CSE) in Higher Education Institutions (HEIs): the Portuguese Case

Ana Isabel COUTO
School of Economics and Management of the University of Porto (FEP), Institute of Sociology of the University of Porto (IS-UP) [Instituto de Sociologia da Universidade do Porto], Centre for Organisational and Social Studies of P.Porto (CEOS.PP/ISCAP/P.PORTO) [Centro de Estudos Organizacionais e Sociais do P. Porto], Porto, Portugal, aicouto@fep.up.pt; anacouto@iscap.ipp.pt

Cristina PARENTE
Faculty of Arts and Humanities of the University of Porto (FLUP), Institute of Sociology of the University of Porto (IS-UP) [Instituto de Sociologia da Universidade do Porto], Porto, Portugal, cparente@letras.up.pt

Sofia Alexandra CRUZ
School of Economics and Management of the University of Porto (FEP) [Faculdade de Economia da Universidade do Porto] Institute of Sociology of the University of Porto (IS-UP) [Instituto de Sociologia da Universidade do Porto], Porto, Portugal, sacruz@fep.up.pt

Filipe Fonseca CASTRO
U.Porto Innovation [U.Porto Inovação], Rectory of the University of Porto [Reitoria da Universidade do Porto], Porto, Portugal, fcastro@reit.up.pt, filipecastro.correio@gmail.com

Teresa C. ALEGRE
Faculty of Arts and Humanities of University of Porto (FLUP), Porto, Portugal, mtasilva@reit.up.pt, teresacunhaalegre@gmail.com

Abstract

Corporate Social Entrepreneurship (CSE) emerged as an approach derived from the evolution and discussion around corporate social responsibility. It is not intended to be another form of corporate social responsibility (CSR), but rather a process for invigorating and advancing the development of CSR. It implies a global and disruptive change within organizations (Austin & Reficco 2009). This paper is part of a broader research that is being developed within the scope of *EMBRACE - European Corporate Social Entrepreneurship curriculum*, a project funded by the European Union. It aims to present the main results from the first Phase of the project focused on the review of CSE programmes in Higher Education Institutions (HEIs) in Europe, giving particular emphasis to the Portuguese context. In order to develop the state of art of Corporate Social Entrepreneurship (CSE) programmes in HEIs a qualitative methodological approach was defined, using three complementary tools for data collection: desk research, interviews and focus group with key-informants. This preliminary study shows a weak awareness presented by Portuguese experts, regarding the CSE approach. It also stresses the lack of CSE programmes and trainings taking place at Portuguese HEIs, even though there are several courses related to corporate and social businesses and management. It became evident the strong rooting of the concept and practices of corporate social responsibility, as well as social entrepreneurship, and at the same time the need to work towards raising awareness for the CSE approach, aimed at the simultaneous creation of economic and social value.

Keywords: Corporate Social Entrepreneurship; Higher Education Institutions (HEIs); Portuguese CSE educational programmes

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The EMBRACE Project: Main Aims and Outputs

EMBRACE aims to promote CSE in HEI educational programmes and improve students' competences, employability and attitudes contributing to the creation of new business opportunities dealing with social change inside companies as well as promoting collaboration among companies.

By fostering the engagement of central actors as Academia (namely, students, researchers, *alumni* (graduates), teachers, managers of CSE programmes in HEIs, experts on education/training on CSE) and Enterprises (namely, entrepreneurs, managers, experts on promotion of social intrapreneurship, experts on CSR processes), the central aim of EMBRACE project is to co-design, co-create, co-develop and co-implement an innovative, multidisciplinary European Corporate Social Entrepreneurship Curriculum (ECSEC) to be incorporated into HEI educational programmes across all disciplines.

The project's design includes different phases (Work Packages) each one with specific outputs (Deliverables) and associated operational objectives (Figure 1).

The current paper is based on the main results of the first research Phase - "Review of Corporate Social Entrepreneurship (CSE) Programmes in HEIs". Firstly, it is made a brief review of literature, focused on a key concept - Corporate Social Entrepreneurship. Secondly, it is presented a description of the methodological design defined for this specific phase, followed, thirdly, by the presentation and discussion of the main findings considering the Portuguese context.

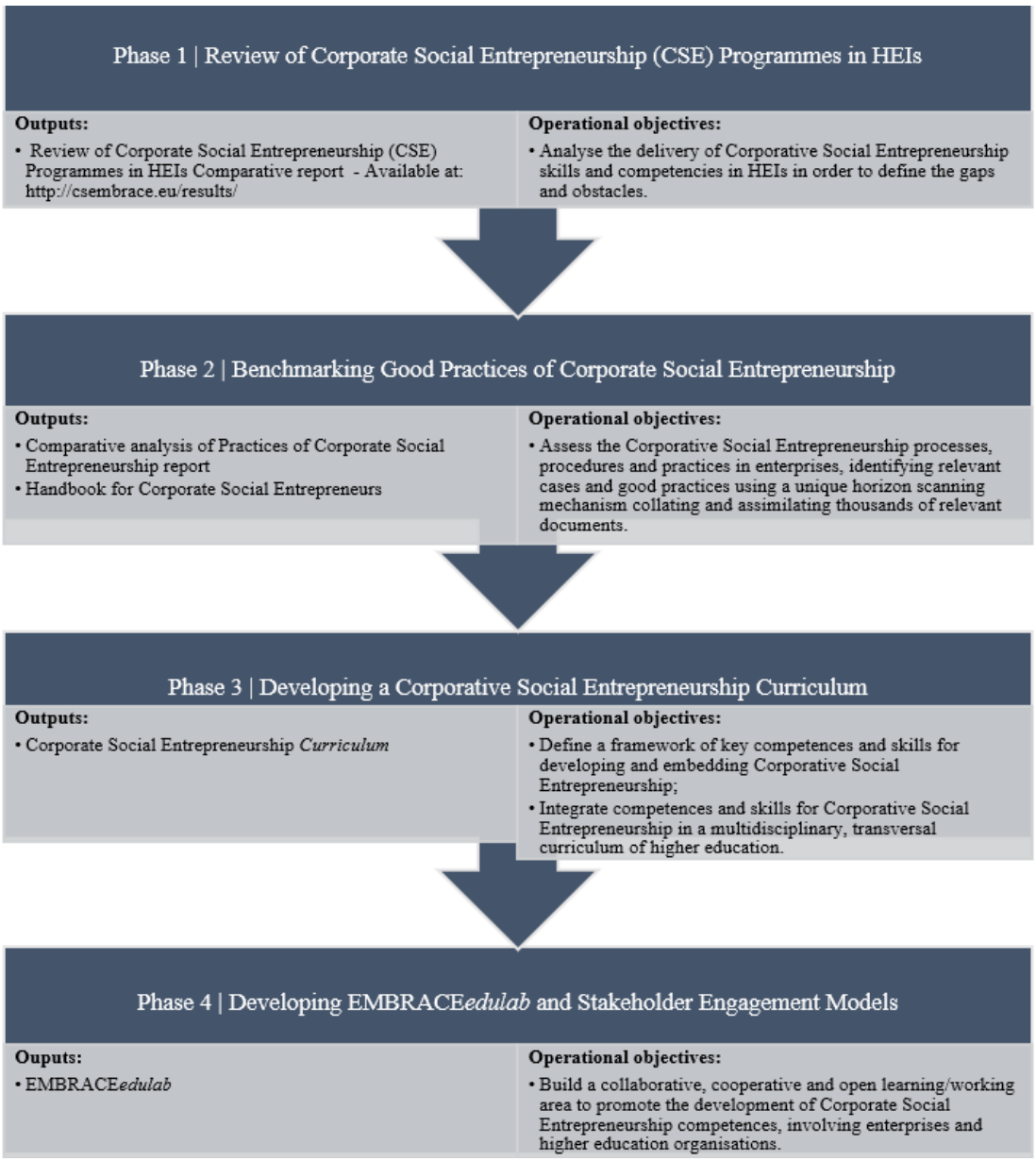

Fig. 1: Project´s design: main phases, main outputs, operational objectives

Corporate Social Entrepreneurship: An Emergent Concept

Corporate social entrepreneurship is a specific concept and concerns new practices, which justifies why there are still ambiguities and discussion around the term and its meaning.

Corporate Social Entrepreneurship emerged as an approach resulting from the evolution and discussion around corporate social responsibility (Bowen, 1953; Azevedo & Carlos, 2015: 63). According to Austin and Reficco (2009) CSE embodies elements and criteria of *corporate entrepreneurship*, in a classic assumption as defined by Say, Schumpeter, Drucker and Stevenson, and of *social entrepreneurship*, most recently affirmed with the proposals of Dees (2001).

CSE is comprised as "the process of extending the firm's domain of competence and corresponding opportunity set through innovative leveraging of resources, both within and outside its direct control, aimed at the simultaneous creation of economic and social value" (Austin, Reficco, Wei-Skillern, 2006). Considering Austin and Reficco perspective, CSE it is not another form of CSR, but rather a process for invigorating and advancing the development of CSR. CSE aims to provide an approach that will accelerate the CSR journey. The fundamental purpose is therefore to

accelerate companies' organizational transformation into more powerful generators of societal betterment (Austin & Reficco 2009: 2-3).

The authors identify 5 key-elements of CSE, as presented in Table 1.

Table 1: Key-elements of CSE (Austin & Reficco, 2009)

Dimensions	Definition
1. Enabling environment	Entrepreneurial mindset and entrepreneurial culture enabling fundamental organizational transformation, in order to achieved of economic and social value generated both in vision and strategy, and in the organization structure and processes. This entrepreneurial environment promote economic and social values.
2. The Corporate Social Intrapreneur	Individuals within the enterprise who are focused on fostering and bringing about the internal organizational transformation and innovation that moves the organization to a more advanced state of CSR. This means, coexistence of social entrepreneur and corporate entrepreneur advocating integration of social and business values using of new resources, configurations, actions and relationships, stakeholders. This integration is communicated externally and internally in order to show how changes and social action are fundamental for enterprise needs and interests.
3. Corporate purpose: values-based organizations	Creation of social, economic and environmental value are structural of the organization identity, as well as ethical actions and innovative and disruptive solutions. Compliance and sharing values within the organization to promote work across departmental lines.
4. Value creation and double return	Optimization of returns to stakeholders and other external actors affected by social and economic values. Transparent accountability focus on complementary and synergistic rather than competitive.
5. Co-generating value	Collaboration with external organizations in order to establishment of strategic alliances to create innovative solutions and leverage the resources outside their direct control to solve economic and social problems and to promote the success of innovative business

Aligned with the Harvard approach by Austin and Reficco (2009), the consortium of EMBRACE project defined CSE as «'a way of doing business' so that all staff in any given organisation (public, private or third sector) are fully aware of their role, responsibility and contribution to the sustainable socioeconomic enhancement of their organisations and the communities in which they live and work. The CSE process includes: creating an enabling entrepreneurial environment, fostering corporate social intrapreneurship, amplifying corporate purpose and values as well as building strategic

alliances in order to solve economic and social problems and to promote the success of emerging innovative business strategies».

Data and Methodology

As mentioned before, the Phase 1 operational objective was to analyse the delivery of Corporative Social Entrepreneurship programmes in HEIs in the nine European countries involved in the project (Germany, Greece, Hungary, Ireland, Lithuania, Portugal, Romania, Spain and The Netherlands) in order to define the gaps and obstacles of the implementation and use of CSE, especially in the academic context. The current paper is focused on the main results regarding the Portuguese context.

In order to develop the state of art of Corporate Social Entrepreneurship (CSE) Programmes in Portuguese HEIs a qualitative methodological approach was defined. We have used three complementary tools for data collection: (i) desk research, (ii) interviews, (iii) focus group.

Concerning the desk research, we have analyzed the institutional websites from 51 HEIs (out of a total of 119 HEIs in Portugal), in order to encounter 20 to 25 courses of CSE or related terms (such as, Corporate Social Responsibility (CSR), Social Entrepreneurship, Corporate entrepreneurship, Intrapreneurship, Social innovation).

In terms of interviews, we have conducted a set of 7 interviews to relevant actors from Academia in this field, from different Regions of Portugal (North - Porto, Center - Coimbra and Lisboa and South – Algarve), identified through the desk research, namely managers of programmes for CSE in HEIs (3), experts on education/training on CSE (2), experts on promotion of social intrapreneurship and CSR processes (2).

Regarding the focus groups, 2 were carried out in order to have a broader knowledge of the representations of CSE, needs in terms of demand of CSE courses/modules/programmes, ways of involving different actors (industry, government organisations, businesses in general, Civic Society Organisations) in the co-development and co-design of such modules/ courses/ programmes. The focus groups participants' profiles were equal to the ones defined for the interviews.

Findings and Discussion

The state of Corporate Social Entrepreneurship (CSE) programmes delivery in Portuguese Higher Education Institutions (HEIs)

Considering the desk research carried out it was possible to identify 41 CSE (or related terms) courses and programmes in the Portuguese HEIs. In terms of scientific area, most of these courses and programmes are delivered at faculties and schools of Management, Economics and Business (25 courses). These programmes are mainly connected with the classic corporate entrepreneurship approach (containing disciplines as "business plan", "leadership", "innovation management" and "business management").

Nevertheless, it was also possible to identify courses and programmes delivered at faculties and schools of Sociology, Political Sciences, Human Sciences, Arts and Humanities, Psychology and Educational Sciences (11 courses). These programmes are closer to the social entrepreneurship approach (incorporating disciplines with topics as "collaborative work", "impact on business and society", "social economy", "social responsibility", "social intervention" and "social innovation").

It is important to highlight that more than a half of these CSE programmes (28) are delivered at post-graduation level, namely at Master Level (17) or Executive & MBA level (11). This means, that there is a lack of CSE approach in prior levels of higher education (Bachelor).

The interviews and focus group carried out provided important inputs concerning the state of awareness and knowledge regarding the concept of CSE in the Portuguese Academia.

Prior Awareness and Knowledge of The CSE Concept in The Portuguese Academia

The key informants were unfamiliar with the concept. It is indeed an emergent concept in the field. The reflections shared by experts during the interviews and focus groups show that there are different CSE understandings: i) for most of them, there are no relevant differences between CSR and CSE; ii) others consider that CSE is a new designation for

the phenomenon of social entrepreneurship; iii) and only a minority of experts positioned the CSE concept at the heart of the business model and refers that CSE opens a new model and establishes a new contract with society.

Main actors identified as key elements for the co-design and co-implementation of European Corporate Social Entrepreneurship Curriculum (ECSEC)

According to experts' perspectives about entities that should participate in the co-design and development of CSE training programmes, courses or modules, a heterogeneous and wide set of stakeholders should be involved on this, namely private companies, not-for profit and public organizations, cultural entities, governmental institutions from different levels (European, national, regional and local).

Considering the experts shared perspectives, moving towards initiatives and practices that explore the model proposed by the concept of CSE implies the shift to an integrated approach with different stakeholders and not particularly focused on just one entity. This means creating articulated and heterogeneous alliances.

General Pedagogical Strategy

In order to have a comprehensive and integrated CSE approach, experts advocated the need of having a mixed approach: that would include the contribution of a theoretical framework plus "field work" in businesses and organizations. In other words, this mixed approach should combine a theoretical dimension with a practical part, namely trough an internship (of short duration e.g.) in different types of organizations (public, private and nonprofit).

Final Remarks

More than taking place outside the logic of the activities of the companies, CSE presents itself as a proposal to conciliate both economic and social mindsets and aims to transcend corporate social responsibility practices (Austin & Reficco, 2009). This approach has direct consequences in the way that organizations are managed and organize their internal and external practices and how the different stakeholders are involved.

This preliminary study shows the lack of CSE programmes and trainings taking place at Portuguese HEIs – even though there are several courses related to corporate and social businesses and management.

It also stresses the lack of knowledge/awareness presented by Portuguese experts reflecting the inexistence of practices that seek to reconcile (intra) entrepreneurial action throughout a double approach: economic and social. Indeed, no organizations and companies with CSE practices were referred or identified while conducting the interviews and focus groups (even though there is a strong use and implementation of corporate social responsibility concept and practices).

The hegemony of a classical economic thinking can create obstacles for new entrepreneurs to become early-adopters of CSE practices. The involvement and comprehension, since early, by teachers, researchers, students, alumni, (future and current) entrepreneurs can be important in order to develop and implement CSE approach and its specific business models. In order to achieve this goal, it seems important to design CSE courses, programmes and trainings in HEIs.

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Workplace Motivation: Engaging Employees During A Pandemic

PhD.student Ec. Andreea Daniela Tudor,
Bucharest University of Economic Studies, Management, Romania,

PhD.student Ec. Agata Laura Țoc
Bucharest University of Economic Studies, Management, Romania,

PhD.studentEc. Alina Georgiana Petre
Bucharest University of Economic Studies, Management, Romania

PhD.student Ec. Aurora Cosma
Bucharest University of Economic Studies, Management, Romania,

PhD.student Ec. Andreea Stoica
Bucharest University of Economic Studies, Management, Romania,

Abstract

Professionals in all fields are indispensable to make the economy work when societies go through public health crises, natural disasters or catastrophes. Analyzing the studies conducted by various specialists, we notice that a large part of these workers are not willing to work in such conditions. In this paper we wanted to find out what can motivate a person to work in conditions of stress, fatigue and risk of illness, which motivational tools may be applicable in an economy in crisis. The COVID 19 pandemic is one of the biggest challenges humankind has met so far. The population is going through a period of continuous stress that creates many problems and mental health. The category most affected by this problem is the medical staff, who are reluctant to continue their activity.

Our desire is to find out how we can best motivate workers to respond to the call for help in the event of disasters and pandemics and to continue economic activity, thus avoiding blockages and recessions.

Keywords: The employee motivation, the pandemic COVID 19, human resources

JEL Classification

Introduction

Motivation can be the flame one can have in order to finish a job. Motivation is a part of human resources domain and it is studied in the past 20 years in different sectors and in the last years in health sector (Papathanasiou, 2014).

Prithwiraj Choudhury, professor at Harvard Business School, said" the virus could act as a game-changer for remote work (…). This is an opportunity to essentially restructure organizations."

The COVID-19 pandemic highlighted deficiencies in the health system that are still unaware, such as the lack of medical equipment or protective equipment for employees. In this context, human resources management had to face this new challenge and the priority was to ensure sufficient staff for the proper conduct of hospital activities. The U.S. Bureau of Labor Statistics estimates a need for about 11 million nurses, given that the pandemic has caused a drastic drop in the number of hospital volunteers to be covered by new employees, while also affecting health care costs. The difficulty faced by human resources management in hospitals in terms of staff recruitment and training is even greater in this pandemic context, one of the current solutions being to use virtual methods of recruitment (Rice, 2020).

As a result of the global pandemic, health systems mobilized, creating new hospitals specially built to treat patients with COVID-19, an example being Huoshenshan Hospital, which required the recruitment of more than 10,000 medical staff. Another measure taken by the human resources management department was to call on retired staff due to their experience and the ability to train newcomers. Another measure taken during this pandemic period was to use the internet to conduct basic consultations through video conferences with patients, in order to provide time from

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specialists and space in hospitals for patients with serious health problems affected by this new virus. Management standards have been implemented regarding the online health sector, among which we mention: Internet hospital management measures, Internet diagnostic and therapeutic measures and Remote medical service management (Thoughts on healthcare management in an epidemic, 2020).

With the gradual reopening of companies and the resumption of activity during the pandemic, human resources management has encountered a number of difficulties on the part of employees regarding the minimum number of employees required for business activities, safety at work, and also employee motivation and reduction their stress during work hours. That is why the Organization for Economic Co-operation and Development has offered a series of solutions to support the management of human resources of organizations and public sectors.

In order to ensure the minimum number of employees needed to carry out the activity, it can be proposed as a solution for certain employees to increase office overtime so as to cover the time for colleagues who work remotely, introduce special bonuses for those employees or increase overtime pay, or hiring temporary employees, postponing the retirement of experienced and available employees to physically work in the office. In order to ensure safety at work, solutions involve modifying the work schedule by introducing a flexible schedule chosen by the employee, ensuring a well-sanitized and disinfected work space, encouraging the replacement of public transport with walking, cycling, etc.

Regarding the motivation of employees and the reduction of stress, some of the proposed measures would be to maintain a very close relationship with the staff, to communicate a lot and to constantly transmit the measures taken to protect them. The trainings are also proposed especially for managers, to supervise their teams and to support them emotionally, to provide adequate work equipment, to support employees to form a new work routine in this pandemic context (OECD, 2020).

A recent study conducted at West China Hospital of Sichuan University found that human resource management played an important role in providing management training for medical staff, both front-line and offline-related patient screening and security measures, in establishing a strict management of the working environment, imposing strict rules to be followed regarding the development of the activity inside the hospital, such as the disinfection of all objects, the ventilation of the rooms, as well as restoring working hours for medical staff so that the duration of exposure to patients with COVID-19 is as short as possible, and also restoring working shifts (Zheng etal., 2020).

Motivation of medical staff during the pandemic

The medical staff is the main component in a medical unit, they are the ones who provide care for the sick. During pandemics, the amount and complexity of health care increases greatly. In general, the need for medical staff is never satisfied, there is always a shortage of staff in this field, at this time we face a future in which there is too much work and too few workers.

The Dublin Declaration on Human Resources for Health estimated that we will need about 40 million health workers, with the risk to exist only 18 million, urging countries to increase funding for health and for the recruitment, development, training and retention of health workers (BRITNELL, 2019).

In order to have enough staff in the medical units it is important to have motivation, also performance and well-being are two other very important things for the employees. So managers need to find new tools to reinvigorate their teams and empathetically help employees solve their problems (Oak, 2020).

Many employees will get sick and unfortunately some will die. Those with symptoms will need to be quarantined. Studies show that quarantined staff feel guilty for colleagues left alone at work and for contaminated families, and because health work is done in a team, they suffer from loneliness, end up with mental health problems, become anxious and refuse to return to work (Walton, 2020).

Image1: The most important factors that influence your employees' experience and, therefore, motivation and productivity. (Martic, 2020)

One of the most important problem is lack of staff with influence over the morale of the working staff especially in the health system. Shortage of staff leads to uneven quality of care in hospitals. Health care workers need more communication with management regarding atmosphere at the work place and the resources they use (Aiken, 2001). Studies show that empowerment of the employees using autonomy and collaboration increases job satisfaction and lowers the number of sick leave days and with less burnout. Another observation is that competence is associated with lower levels of anxiety and insomnia. Higher levels of competence and meaning were associated with lower levels of depersonalization and emotional exhaustion (Hochwalder, 2005).

Emergencies are defined by highly demanding tasks with many obstacles that requires prompt resource allocation. Physicians do not have the ability to react in these situations in the first years and they have to learn step by step (Hershkovich, 2016).

Internal motivation of the employees depends on the level of confidence between them and the employer that arises from knowledge and correlation between information and experience (Rousseau, 1999).

In 2010 Hissei Imail & his collaborators conducted a study in Japan. They analyzed the absence rate of the medical staff during a real H1N1 pandemic. The goal of the study was to assess the availability of the medical professionals to work during a pandemic and the factors that influence the professional activity of the hospital employees during a real pandemic infection.

Workplace stress factors among healthcare professionals

Coronavirus is impacting our lives and we can admit it's a situation that put a lot of pressure on the professionals from the healthcare system. They may feel overwhelmed because of the amount of work that they have to do because

of the current situation. This might cause physical and mental exhaustion, insomnia, a general low mood, sadness or even depression.

In the graphic below we included the most present factors that currently have an impact and decrease the level of motivation among the medical staff. We want to add that the factors may differ depending on each person. Also, the intensity of each factor might differ. Therefore, when some peoples are stressed, they are almost on the verge of a breakdown while others are managing the stressful periods a lot better.

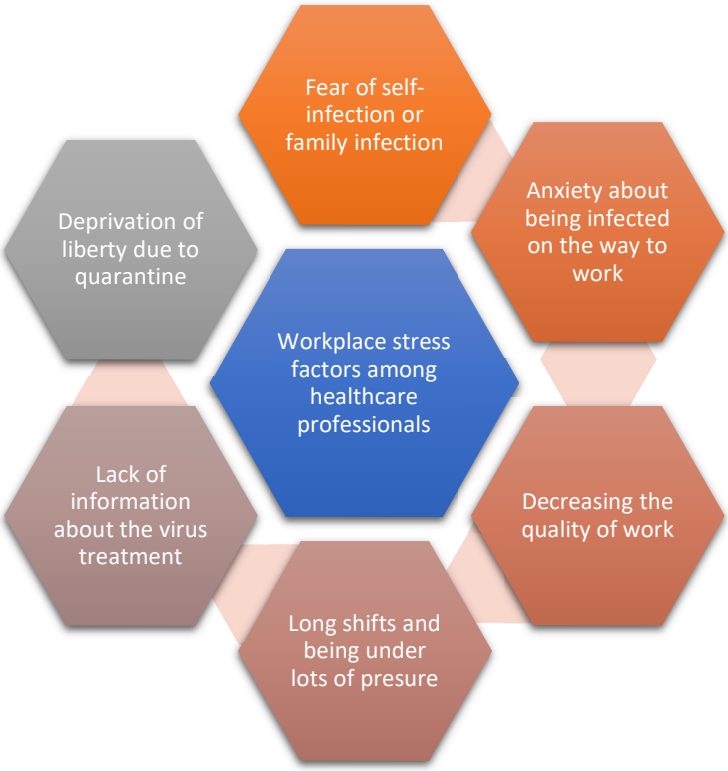

Image 2: Workplace stress factors among healthcare professionals

In addition to all the factors mentioned above, another component that could contribute to the stress level of the medical staff, is the possibility of people avoiding them, thinking the posibility of being infected is very high. That's not always true because currently the hospitals are offering protection measures against the virus. Perhaps this is an asumption caused by the beginning of the panteminc when the medical staff was not having enough protective clothes and equipment to avoid the infection.

The feeling of protection are providing trust among the medical professionals. Protection includes taking all reasonable precautions to prevent the infection of the medical staff, caring for those who become ill and reducing threats of malpractice for those working in high-risk emergencies.

The data from the scientific research shows that some factors can increase both motivation and hesitation in the same time. Giving workers the feeling that they are protected by the local government and the hospital is especially valuable because it increases their motivation and decreases their hesitation at work (Imai, 2010).

A study by Tommy Nichols and Christine D. Valdez conducted in 2013 showed that other factors that may determine and motivate health workers not to be absent during pandemics are also related to basic needs: food, shelter, water, rest. Assuring the basic needs may reduce the absenteeism. High concerns were also shown for the pets while at work or in case of quarantine. A way to increase the motivation might be by providing pet care services.

Financial motivation can be accomplished by providing financial support for the families of employees who died as a result of the exposure and also by offering financial incentives. Regarding non-finacial motivation ways to keep the employees engaged are verbal messages of gratitude and encouragement or merit recognition awards. (Nichols,T., ; Valdez, Ch., d., 2013)

The most important reason in keeping balance in a pandemic is devotion to the profession, followed by helping others despite the risk of getting sick. Appropriate protection supply like respiratory masks for medical personnel and families give confidence and willingness to work. (Valdez, 2013)

Research Methodology

The present article includes an analysis of the documentation found in various publications and scientific articles in order to illustrate the potential advantages of our country. Therefore, we conducted a comprehensive research into numerous sources of secondary data, such as articles, reports and books from the following areas: " the employee motivation, the pandemic COVID 19, human resources ".

For the research, we also used electronic databases, such as PubMed, Academia. EDU, BRILL and Wiley Online Library. Other sources were the archives of different journals.

The method used is a descriptive and quantitative one, given the fact that the subject is very widely discussed.

Results and Discussions

The current pandemic has managed to highlight the important role of human resource management in organizations but especially in health systems, becoming one of the key elements when it comes to business continuity and its development in optimal conditions. The adaptation to a new style of carrying out the activities within the job, the motivation and retention of the employees was possible through a good human resources management that was revolutionized through new technologies and new strategies, to correspond to the current needs.

Government programs to reduce deliberate absenteeism during disasters must first ensure the basic needs of employees, provide food and water during work, provide rest and breaks and secondly to ensure the safety of employees and their families, financial rewards, recognition of merits and psychological support.

On 28 September, the European Council - the Council of the European Union, approved financial support of 87.4 billion EUR under SURE (a temporary EU instrument to mitigate unemployment risks during the COVID-19 crisis).

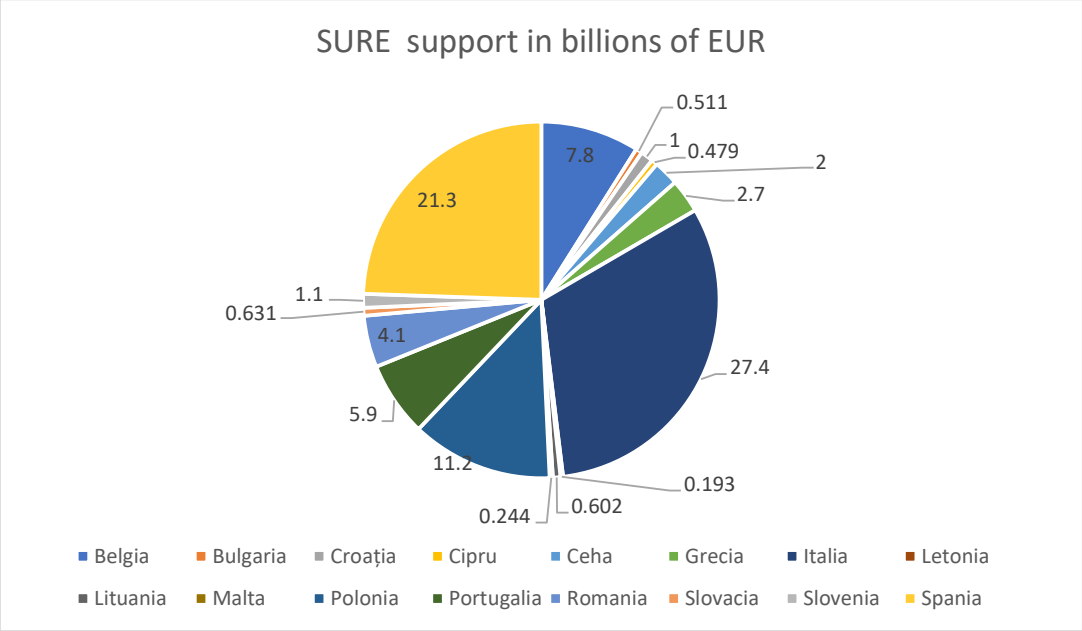

Image 3: Financiar support SURE

It is a temporary support tool for mitigating unemployment risks in an emergency, millions of workers across Europe benefit from this aid, and is part of the tools to motivate employees through policy decisions taken at EU level (Scholz, 2020).

Conclusions

It is essential that organizations have a plan for the likelihood of a crisis, either a public health emergency or a large-scale disaster. The biggest problem is ensuring a workforce that will be willing to work, that will ensure the continuation of the organization's activity, because the loss of this workforce and voluntary absenteeism can have serious repercussions for the victims of the crisis.

Analyzing the evolution of the COVID-19 pandemic, it is concluded that it will be long-lasting, so we must take breaks, we must take leave days to "reset", we must also have rest periods. It is essential to enjoy normal and simple things like food, drink, sleep and play sports, think positively and be grateful for the good things in ones life, for example family and friends.

The health leader should create adaptable, short term and flexible plans that include rotating of personnel, solutions to new problems and flexibility in group structure. Team leader should not work alone and communication and collaboration is essential to team cohesion (Kreiss, 2010).

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Machine Learning-Based Method for Recommendation of Missing Person's "Search Level"

Dariusz PIERZCHALA
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, dariusz.pierzchala@wat.edu.pl

Tomasz GUTOWSKI
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, tomasz.gutowski@wat.edu.pl

Przemyslaw CZUBA
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, przemyslaw.czuba@wat.edu.pl

Ryszard ANTKIEWICZ
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, ryszard.antkiewicz@wat.edu.pl

Abstract

The article presents selected decision-making problems concerning the actions of the Police in search of missing persons and proposes methods of *machine learning* (ML) to support decisions concerning the level of service activities (so-called *search level*). The problem of determining the scale of operations in searching for missing persons is extremely important, because the health and life of a missing person (often children or elderly people with illnesses) depends on the effectiveness of the search. In this issue, the time from the moment of disappearance to the moment of making a decision should be as short as possible. Equally, decisions taken with limited knowledge, should be appropriate to the situation and risk. A model of the decision-making situation is presented, including a description of information that is processed at all stages of proceedings. Due to the size of the detailed data vector, aggregation functions were proposed, which reduce the size of input data in ML methods. The analysis of historical data allowed to develop and calibrate several ML methods. Moreover, on the basis of formal documents (government act and other regulations), a decision tree was developed for cases which are qualified according to formal regulations. The article contains results of the tests performed on a set of anonymised data from the reality and synthetic data generated to increase the volume of information. In order to identify the most appropriate method of classification, the quality of classification and decision support was studied, which was then presented in the conclusions.

Keywords: machine learning, searching for missing persons, multiresolution modelling

Introduction

Every year about 15 thousand people go missing in Poland. The reasons for these disappearances vary and regardless of the cause, the most important thing is to find the missing person before any life-threatening event occurs. A significant part of the disappearances are minors, who are often unable to survive alone in hostile conditions. Depending on the age of the person, their ability to live independently, and other key factors, the search for persons must be adapted and planned accordingly. Due to the organization of the search the most important aspect is to determine the threat to the life of the missing person and the urgency of the search. Police statistics show that during the first 24 hours about 30% of all missing persons are found, during the first 48 hours about 54%, during the first 7 days about 77% and during the first 30 days after the police accepts the report more than 90% of all missing persons are found, this shows the need to prioritize the search activities for missing persons. The percentage of people found within specific time frames since the disappearance is presented on Fig 1.

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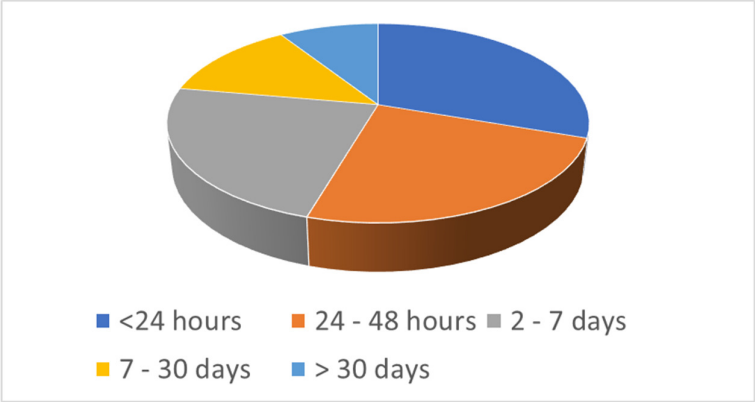

Fig 1 : The percentage of found missing people within specified times range. Source: https://www.policja.pl/pol/aktualnosci/115830,Zaginiecia-osob-w-Polsce-Fakty-i-mity.html

For every registered missing person case by the Polish National Police a search level is defined. The definition and description of three search levels is presented in the Chief constable Ordinance number 48 adopted on 28 June 2018. The ordinance defines three different search levels – I, II and III. The levels define the degree determining the urgency and scope of the search activity depending on the identified risk of threat to a person's life, health or freedom. The levels are assigned to reported cases of people who, as a result of an event that makes it impossible to determine his or her whereabouts, needs to be found to protect her life, health or freedom. The lower the number of the level, the more actions are taken in order to find the person. The ordinance specifies basic situations that allow for assignment of each of the levels.

The first level is assigned to a case of a person whose disappearance is related to a real, direct occurrence of a threat to his life, health or freedom, for whose rescue required direct and immediate search with the involvement of considerable forces and resources. The second level applies to a person whose disappearance is connected with a reasonable suspicion of risk to her life, health or freedom. The third level is assigned for a person whose disappearance is not directly and reasonably related a threat to her life, health or freedom.

In Poland, a project called "Developing a database and tools for semantic information and knowledge management in the area of disappearances and searches for people", financed by the National Center for Research and Development is coming to an end. The result of the project will be an IT system enabling, among other things, collection of data regarding completed and currently ongoing searches. Historical cases will be the basis for calibration of ML methods used to draw conclusions about: the level of searches, predicting the cause of the disappearance, building behavioral models of different types of missing persons, developing standard operating procedures for the police, indicating normative documents and searching from the database, documents related to the disappearance cases, similar to the currently implemented ones. A separate functionality is a GIS module supporting the field search process.

The subject of this article is the use of ML methods to suggest the search level of the missing person based on the data collected during the search process. It is sometimes difficult for unexperienced policeman to determine which level should be assigned and it is crucial in planning the search activities and decision making regarding the case. It may help indicate the places of search, appropriate operational activities and predict the behavior of the missing person. The prediction of the search level for newly defined cases is based on a hybrid approach, the ML methods learned using previously reported cases and a set of rules based on the ordinance in the form of a decision tree. In this article we present a method for both practical and new problem regarding a recommendation of “search level”. The novelty of the proposed method consists in combining the known ML algorithms with the generation of rules based on the law.

The rest of the work was divided into five parts. In the "Related work" section there will be an overview of missing persons' search methods, ML methods and GIS systems. The "Data description" section contains the definition of the data model describing the disappearances and the aggregated model and relations between the models. Aggregate model is used directly in ML methods. The real data available for the time being covers 717 cases. The section "Classification methods" reviews the ML methods that have been used to infer the cause of the disappearance. The "Multiclass methods validation" section discusses methods of quality assessment for classification methods when objects are classified into more than two classes. At the end, a section presenting the results of a computational experiment performed on data containing a large number of cases is presented.

Related Work

The search level (strictly speaking), defined by the Chief constable Ordinance, has not been found in any research work. However, plenty of research has been conducted in the area of searching for missing persons, this research includes general studies that focus on the statistics usage for analysis of current cases, "Search and rescue - SAR" issues and most importantly the usage of ML for searching missing persons.

The research conducted by NCA (2017) focuses on describing the problems of missing persons, it “provides key statistical data regarding missing people and unidentified individuals/remains reported to Great Britain police in 2015/16”. The report is based on data collected in the fiscal years 2012/2013 to 2015/2016 broken down by gender, age, reasons for the disappearance and the duration of the search. Collected results may help in prediction of the distance between the point of disappearance and the place of finding, the duration of the search from the moment of reporting the disappearance to finding. The handbook published by Morewitz et al. (2016) contains statistics data regarding missing persons, but also provides tools and methods that might help in finding the person, these methods are based on solutions taken from biology, genetics, anthropology, and archaeology. However, the Handbook does not include works on the use of IT systems, including artificial intelligence methods, ML or GIS.

A lot of research has been conducted in the area of search and rescue (SAR), named after military action of searching for missing ships or pilots of planes shot down or landed as a result of an accident in an unknown area. Out of the found research on the topic, the most interesting and most frequently quoted is the book by Koester (2008). It provides many types of disappearances, elements of behavioral models of persons missing in the field, tips and rules that help plan the search and schedule the performed activities in order to find the person. Another good quality research regarding practical guides for planning and conducting the search has been published by Bownds (2013).

Research also has been done in the area of finding missing persons using face recognition algorithms. Facial recognition systems based on deep learning methods such as convolutional neural networks are one of the approach to the problem. Bharath et al. (2019) used Convolutional Neural Network (CNN) for calculating face embeddings and then Support Vector Machine (SVM) algorithm to try to match missing person face in the database. Chandran et al. (2018) proposed similar architecture as in previously mentioned paper. Their system purpose was to find missing children. Model was composed of pre-trained CNN model with SVM classifier.

Delahoz-Dominguez et al. (2019) approached the problem from an angle of including personal and geographical information about the missing person. They used machine learning methods for predicting status of the missing people based on vector consisting of 20 variables. Random forest method performed better than decision trees and k-nearest neighbours.

The previously described work does not mention the utilization of machine learning methods in order to aid the process of finding the person. Detecting criminal activity using artificial intelligence and ML methods has been described by Larose (2015) and in the paper by Nath (2006) which presents the use of clustering methods to identify patterns of crime with regard to the spatial location of crimes. The usage of CCTV cameras to discover and track criminal activity has been mentioned in the article by Chackravarthy et al. (2018). Automatic detection of crime has also been presented by McClendon et al. (2015), he used regression algorithms to detect and compare crime patterns identified in two different crime data sets and by Wang et al. (2013), presenting a tool that can analyse different crimes to find which of them were committed by the same person.

Although the research regarding finding missing persons using machine learning methods have relatively numerous literature, the main problem (strictly speaking) of “search level” has not been widely published. One of the few studies on the topic have been conducted by Blackmore et al. (2002, 2003a,2003b,2005). They contain a precise description of research aimed at building an inquiry system to support police work in searching for missing persons. The research was commissioned by the New South Wales State Police in Australia and focused mostly on predicting the possible reason for disappearance using 357 cases. A complete and very inspiring study are outcomes of the ChildRescue Project (2019) - co-funded by the Horizon 2020 EU Programme. Authors examine a set of methods and algorithms for predictive analytics, aiming to enhance the techniques of profiling. The profile of missing person is conceptually quite close to our proposition related to data description - a vector of features.

The problem considered in this paper has not been described in any research yet, the main reason for this is the local character of the search level (it was defined in the Polish Chief constable Ordinance). The data being the basis for the analysis came from the archives of the Polish Police. In order to identify the best method of classification, several selected methods were studied: decision trees and random forests, naïve bayes classifier and multilayer perceptron.

Data Description

In consideration of the amount and diversity of information collected in the process of searching for missing persons, the police and other support services should rely on templates and schemes for describing case information. These

are the so-called questionnaires, which are readable to humans, however for the purposes of computer support methods (including machine learning) they must have a structured form. The formal model for the description of collected information about the missing person and his/her surroundings (including the circumstances of the disappearance, weather conditions, relations with other people) will ensure consistency and completeness of data in decision support, especially in regard to the search level.

Hence, we will further assume that:

- S – a set of "missing persons" cases;
- F^1 – non-empty and finite set of possible "detailed" features describing the case (first-order features). This is information collected in the course of the investigation;
- L^1 – number of features in set F^1;
- F^2 – non-empty and finite set of possible "aggregated" features describing the case. This is "the secondary" information, determined on the basis of the values of the features in set F^1;
- L^2 – the number of attributes in the set F^2;
- $F=F^1 \cup F^2$ – non-empty and finite set of all possible "aggregated" attributes describing the case;
- $f \in F$ – feature *f*, defined by the ordered pair $<id_f, D_f>$, where:
    - id_f – identifier of feature *f*,
    - D_f – domain of values for feature *f*;
- $D = \bigcup_{f \in F} D_f$ – domain of values for features describing the case.

Each case $s \in S$ is described by a feature vector consisting of two subvectors $s=<S^1, S^2>$, where:

- the vector of "detailed" features:
    - $S^1 = <s^1_1,\ldots, s^1_i, \ldots, s^1_{L1}>$, $s^1_i \in F^1$, $i=1..L^1$;
- vector of "aggregate" features:
    - $S^2 = <s^2_1,\ldots, s^2_i, \ldots, s^2_{L2}>$, $s^2_i \in F^2$, $i=1..L^2$.

The value of each feature of vector S^1 in the case *s* at the moment *t* – this is the so-called "information on the case" established at the moment *t*:

- $v: S \times F^1 \times T \rightarrow D$,
- $v(s,f,t) \in D_f$, $f \in F^1$, $s \in S$.

If the information is not time-dependent, a fixed value may be assumed:

- $V: S \times F^1 \rightarrow D$,
- $V(s,f) \in D_f$, $f \in F^1$, $s \in S$.

The value of feature *f* defined by the domain D_f might be:

- nominal - domain is an unordered set (i.e. for two values it is possible to define only the relationship of equality or difference);
- ordinal - domain is an ordered set (i.e. for attribute values it is possible to specify the relationship of equality, difference, minority or majority);
- numerical - domain is defined on numerical measurement scales: interval or ratio (on these scales, as opposed to ordinal scales, arithmetic operations are also possible).

The following are selected features from F^1 collection, constituting "information on the case":

- s^1_1: Gender of the missing person:
    - id_{s11} = "sex"
    - D_{s11} = {0: "male, "1: "female" }
- s^1_2: Previous suicide attempts:
    - id_{s12} = "suicide_attempts"
    - D_{s12} = {0: "Unknown",1: "Not registered ",2: "Simulated", 3: "Real"}
- s^1_3: Somatic illnesses:
    - id_{s13} = "somatic_illness"
    - D_{s13} = { 0: "hypertension", 1: "chronic coronary artery disease", 2: "cancer", 3: "chronic respiratory diseases", 4: "diabetes", 5: "life-threatening", 6: "non-life-threatening" }

- s^1_4: Traumatic events/experience:
  - id_{s14} = "traumatic_events"
  - D_{s14} = { 0: "abandonment by someone", 1: "death of a relative", 2: "unforeseen situations difficult to handle", 3: "rape of a person", 4: "violence against a person", 5: "formal/legal problems", 6: "change of marital status", 7: "birth of a child", 8: "a disappointment to sb./sth." }
- s^1_5: Relationships to other people:
  - id_{s15} = " relations_to_other_people "
  - D_{s15} = { 0: " conflict in the relatives ", 1: " conflict in the relatives ", 2: "conflict at work ", 3: " conflict in the environment ", 4: "rebellion against the family", 5: "rebellion against another person", 6: "rebellion against the situation", 7: "participation or cooperation with a criminal group", 8: "threat from a criminal group", 9: "contact with addicts", 10: "contact with sects", 11: "rejection by the environment", 12: "problems in many relationships", 13: "persecution", 14: "imaginary relationship with someone", 15: "abuse or blackmail", 16: "broken relationships with the environment"}

The data constituting "case information" are collected during the investigation of missing persons at different stages and therefore at different moments in time. This means that at a given point in time *t* not all of the features of the S^1 vector in case *s* have to be fixed and this can be considered, in simple terms, to be non-existent. In the proposed model we use a complete set of features with the length L^1, i.e. the vector S^1, and the presence of features' values in the vector will be evaluated by function *E*:

- $E: F^1 x T \rightarrow \{0,1\}$
- $E(f, t) = \begin{cases} 1, & when\ the\ i-th\ feature\ is\ determined\ at\ t \\ 0, & otherwise \end{cases}$, $f \in F^1$.

Aggregated Data Model

The number of features in the set of F^1 contains more than 30 "detailed" features describing the case ($L1 \approx 30$), with different levels of detail - they represent qualitatively different values. The domains of the features' values are relevant to the type of data collected in the case - they can be numeric, enumerated, ordinal or nominal. Most methods of data analysis require sets with a large amount of data - assuming that L^1 is the largest possible number of different "detailed" features, the number of all potential combinations of features can be determined as "2^{L1}-1".

It is obvious here that we reject the empty set as irrelevant, because it means no 'information on the case'. For L^1=30, and assuming that the features have at least 2-value domains, the number of all possible combinations of data is so great that in practice it would be difficult to develop algorithms for effectively recommending the cause of the lost/missing. The dimensionality is a significant problem for the effectiveness of all algorithms of data mining and machine learning - it has a negative impact on the quality of prediction, exceeds the requirements for computing power, worsens the response times of the implemented methods. In the literature, this problem is called the curse of dimensionality. In order to reduce the length of the features' vector, it is possible to (1) select significant features and discard excessive ones, and (2) apply aggregation of detailed features into generalised ones.

The first step is the selection of traits - in the proposed model we have selected a subset of mandatory features from set F^1, ensuring the consistency and completeness of the information collected in the case. For this purpose, we define the *O* function, which specifies the features necessary for the correct functioning of machine learning methods:

- $O: F^1 \rightarrow \{0,1\}$
- $O(f) = \begin{cases} 1, & when\ the\ i-th\ feature\ is\ mandatory \\ 0, & otherwise \end{cases}$, $f \in F^1$.

According to the *O* function a set of rule restrictions for GUI and database have been implemented.

The next step is to aggregate the "detailed" characteristics into "aggregated" characteristics. For this purpose, we specify a set of functions corresponding to methods, which for each case $s=<S^1, S^2>$, $s \in S$ determine the values of attributes in the S^2 vector (of length $L^2 < L^1$) on the basis of values of attributes in the S^1 vector:

- $X = \{X_i: (F^1)^{L1} \rightarrow F^2, i=1..L^1\}$

The idea of aggregation is illustrated in the figure below:

$$S^1 = \langle s^1_1, \ldots, \mathbf{s^1_3}, \ldots, \mathbf{s^1_{14}}, \mathbf{s^1_{15}}, \ldots, s^1_i, \ldots, \mathbf{s^1_{20}}, \ldots, s^1_{L1} \rangle,\ s^1_i \in F^1,\ i=1..L^1$$

$$\mathbf{X_3} \downarrow$$

$$S^2 = \langle s^2_1, \ldots, \mathbf{s^2_3}, \ldots, \mathbf{s^1_8}, \ldots, s^2_i, \ldots, s^2_{L2} \rangle,\ s^2_i \in F^2,\ i=1..L^2,\ L^2 < L^1$$

Fig. 1. The idea of determining the values of "aggregated" features from "detailed"

The aggregation function for characteristic s^1_3 ("Somatic diseases") is presented below:

- $X_3: (F^1)^{L1} \rightarrow F^2$;
- $X_3(s^1_1, \ldots, s^1_i, \ldots, s^1_{L1}) = \begin{cases} 0, & when\ s^1_3 = 0 \vee s^1_3 = 2 \vee s^1_3 = 4 \vee s^1_3 = 5 \\ 1, & when\ s^1_3 = 1 \vee s^1_3 = 3 \vee s^1_3 = 6 \end{cases}$.

Other aggregation functions concern the following characteristics are as follows: age, ability_impl, life_threat, adjustment, suicides, medication, health_condition, temporary_hardness, relations_to_other_persons, traumatic_events, higher_mood, negative_self, negative_others, behaviour_change, leave_preparation, weather, terrain.

To conclude, the applied functions for selection and aggregation of features let reduce a problem "curses of dimensionality".

Table 1: Examples of values of the aggregated features

sex	***suicides attempts***	***somatic illnesses***	***traumatic events/experience***	***relations to other persons***
male	real	no	abuse against a person	threat from a criminal group
male	no	cancer	difficult situations	no
male	simulated	no	death of a relative	conflict at school
male	no	no	abandonment by somebody	unknown
female	no	diabetes mellitus	no	unknown
male	no	no	unknown	no
male	no	hypertension	no	unknown
male	no	no	no	conflict at school
female	no	hypertension	unknown	conflict in the relatives
male	unknown	no	abuse against a person	threat from sects
female	no	no	difficult situations	conflict in the relatives
male	no	diabetes mellitus	formal/legal problems	conflict in the relatives
male	no	hypertension	no	conflict at school
female	no	no	yes	unknown
male	no	cancer	unknown	no
female	simulated	no	abandonment by somebody	conflict at school

Classification Methods

Decision Trees

Decision trees described by Sathyadevan & Nair (2015) are widely used classifies in problems where the rules for the classification must be easy to understand and should be possible to be visualized. Even though they are not the best classifiers, they are selected because of their comprehensiveness. In predicting the search level they play a very important role. Based on the examples defined in the Chief constable Ordinance (Table 2) a set of rules have been identified that allow to assign search levels in some cases with 100% certainty.

Table 2: Examples of cases defined in the ordinance that fit into the definition of three search levels

Level I	Level II	Level III
A minor under the age of 10 years	A person declaring once again an intention to commit suicide, or whose declaration of intent of committing suicide was considered real	A person expressing the desire to break off contacts with family, loved ones or the environment in which he last stayed
A minor between 11 and 13 years old, missing for the first time		
A person unable to exist independently	A minor between the ages of 14 and 18 missing for the first time	A person who moved away from his place of residence as a result of family disagreements
A person that requires continuous use of medication and failure to take them is life-threatening	A person capable of independent existence, but requiring care and constant intake of life-saving medication	A person for whom it is not possible to determine the causes or circumstances of the disappearance
A person missing due to a real suspicion of committing a life threatening crime against him	A person missing abroad, for whom there is a justified need to provide help to protect her life, health or freedom	A person with whom there is no contact, and declared a desire to leave or its disappearance is connected with departure or visit abroad
A person whose behavior in a real way indicated a direct intention to commit suicide if the immediate undertake of actions will most likely contribute to the prevention of a suicide attack		A person not requiring constant medical care or continuous medication that has willfully left the care facility, treatment facility, or other institution
A person lost in weather conditions threatening his life		A minor between the ages of 11 and 13 years missing once again

These rules have been joined together to form a decision tree that allows to predict the search level using the rules. The decision tree is presented on Fig. 2, it uses the rules identified for levels I and II. Some of the leaves contain the value ‘Unknown’, in this case an additional ML method is used for prediction the search level, the additional method is trained using 717 cases defined in the database.

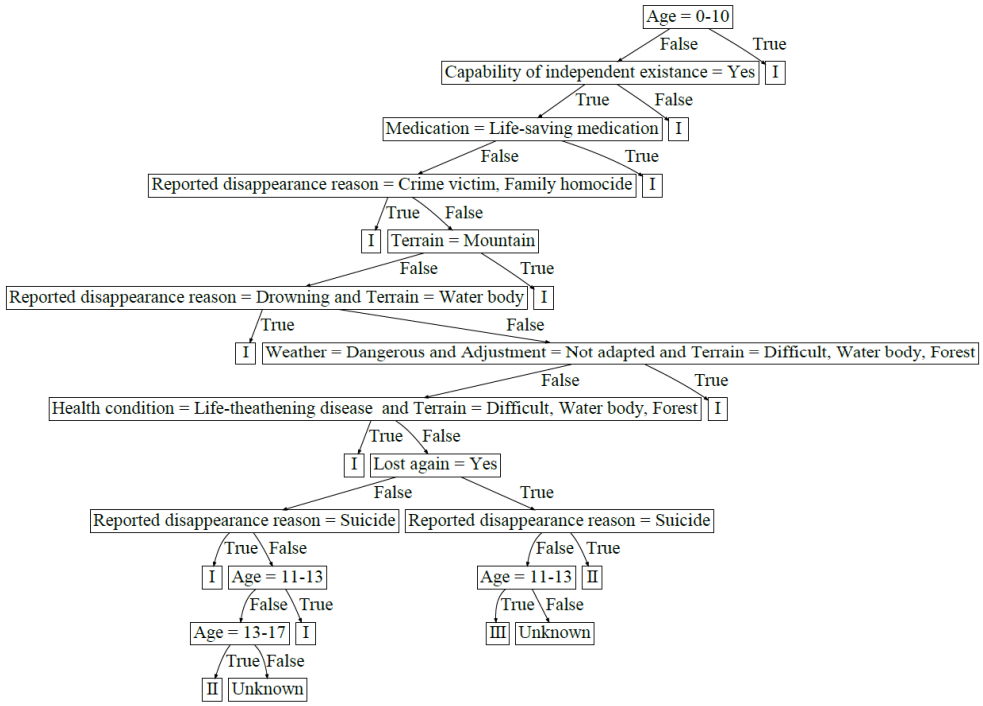

Fig. 2 : Decision tree built using rules extracted from the ordinance

One of the additional methods that can be used are Classification and Regression Trees (CART) provided by *scikit-learn*. They would be used only in situations of ending in the 'Unknown' leaf of the decision tree based on the ordinance. For generating the splits, usually, the Gini impurity or information gain ware. To reduce overfitting each of the trees was pre-pruned by limiting the number of leaves.

Random Forest

Random forests are an example of an ensemble ML method, which bases its prediction on decision trees (Sathyadevan & Nair (2015)). It usually provides better results than a single decision tree and reduces the chance of overfitting because each of the trees is smaller and concentrates only on a subset of training data. When the trees are learning each of them can choose the splitting feature from only a subset of the defined features in the training vector, this allows each of the trees to focus on different aspects of the training data, resulting in trees which are very different. During the classification process each of the trees is used separately for the classification and based on the chosen leaves from all of the trees the final result is determined.

The random forests chosen for predicting the recommended search level are built of CART trees with the Gini impurity or information gain as the splitting criteria.

Naïve Bayes Classifier

The naive Bayesian classifier is a special case of the Bayesian network. Its structure has a form (Jensen (2007, p.59)):

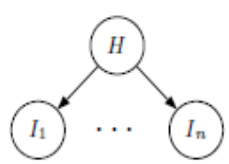

Let the possible cause of missing be collected into one hypothesis variable H with prior probability $P(H)$:

- For all information variables I, acquire the conditional probability distribution $P(I \mid H)$ (the likelihood of I given H).

- For any set of observations $f_1, f_2, .., f_n$ on the variables $I_1, ..., I_n$, calculate the product $P(f_1, f_2, .., f_{1n} \mid H) = P(H)\prod_{i=1}^{n} P(f_i)$. This product is also called the likelihood for $f_1, f_2, .., f_n$ given H.
- The posterior probability for H is then calculated as

$$P(H \mid f_1, f_2, .., f_n) = \mu P(H) P(f_1, f_2, .., f_{1n} \mid H) =$$

$$= \mu P(H) \prod_{i=1}^{n} P(f_i)$$

where: $\mu = 1 / P(f_1, f_2, .., f_{1n})$ is a normalization constant.

Multilayer Perceptron

Multi-layer perceptron (MLP or Artificial Neural Network) consists of layers, where first using a non-linear transformation, transforms and projects the input data into next layer, to a space where it becomes linearly separable. This next layer (referred as hidden layer) makes MLP a universal approximator which means that it finds any mathematical function $y = f(x)$ that can map features x to outputs y. In our paper inputs of neural network are missing persons reports (which can contain missing data) and outputs are disappearance reasons. In a paper published by Hornik, K., Stinchcombe, M. and White (1989) authors shows Universal Approximation Theorem which says that MLP can solve classification task for arbitrarily complex function $f(x)$ for any number of inputs and outputs.

In our system we used Multi-layer perceptron implementation provided by *scikit-learn.*

Support Vector Machine

SVM (Support Vector Machine) – described in a study by Cortes and Vapnik (1995) - is a non-probabilistic, binary linear classifier that performs supervised learning for classification or regression of data groups. After processing training examples, SVM can perform unsupervised learning. The method leads to achieve the best separation of data with the boundary around the hyperplane being that differentiates the two classes. The known 'cons' is that it doesn't perform well for large data set because the required training time is higher. Also, it cannot perform very precise if the data set has too much noises (i.e. target classes are overlapping).

Case Study

In this paper we conducted a study to see the usefulness of machine learning methods for predicting a search level. Dataset on which methods were learnt and tested consisted of 717 real life cases of missing persons reports. Distribution of classes in dataset is imbalanced which means that there is unequal number of classes within dataset. Table 3 shows the division of search levels in the dataset.

Table 3: Results of classification for various methods

Search level	Number of cases (%)
I	312 (43,5%)
II	334 (46,6%)
III	71 (9,9%)

Table 4 presents results of the conducted experiments. Best results were achieved by Decision Trees and Random Forest algorithms.

Table 4: Results of classification for various methods

Method	Fit
Decision Trees	0.81
Random Forests	0.83
Naive Bayes	0.52
Support Vector Machines	0.51
Multi-layer Perceptron	0.47

Confusion matrices for those two methods are being presented respectively in Table 5 and Table 6.

Validation method for all examined algorithms was k-fold cross validation where original dataset was randomly partitioned into four subsets.

Table 5: Confusion matrix for Decision Trees

		Assigned Class		
		I	II	III
Actual Class	I	204	49	8
	II	35	284	15
	III	12	7	52

Table 6: Confusion matrix for Random Forest

		Assigned Class		
		I	II	III
Actual Class	I	271	39	2
	II	40	287	7
	III	9	13	49

Conclusion

The issue of determining the scale of operations in search for missing persons is extremely important, because the health and life of a missing person (often children or elderly people with illnesses) depends on the effectiveness of the conducted activities. On the other hand, the amount of force and resources involved is important both economically and in terms of the safety of people in other areas from which the security services are redirected. In this issue, the time from the moment of disappearance to the moment of making a decision should be as short as possible. Equally, decisions taken by the police, with limited knowledge, should be appropriate to the situation and threat. Therefore, computer methods are necessary to support decisions made by police officers - the article proposes the use of machine learning methods. The solution we proposed allows to predict the search level regardless of the disappearance reason what is important considering: the planning of search activities, their timing, territory and the extent. To achieve that goal, the machine learning methods have been used.

For ML methods, dimension reduction is a key issue which determines the quality of classification results. In the proposed solution, the reduction of data volume was achieved by selecting features and aggregating retail features to generalised ones. This has reduced the complexity of the classification tasks, including the space of possible vectors of feature value combinations.

In the article, the methods were explored: Decision Trees, Random Forests, Naive Bayes, Support Vector Machines, Multi-layer Perceptron.

As a result of the conducted analyses, it was found that the most questionable results were obtained using the Multi-layer perceptron and SVM methods - this is probably due to the lack of an algorithm for selecting optimal parameters of the method. The value of the Fit factor obtained in the Decision Trees and Random Forests methods indicates their best adaptation to classified information. The weakness of the considerations presented in the paper is the small number of real cases, which is the basis for teaching ML methods. It is planned to carry out further verification of the methods used along with increasing the content of the missing persons database. It seems that the use of a combination of ML methods and rules generated under the law to inference for the level of the search is a significant improvement in the accuracy of the inference. This hypothesis will be verified in further research.

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Impact of HTML Structure and CSS on Web Performance

Petr FILIP
University of Pardubice, Pardubice, Czech Republic
st44001@student.upce.cz

Lukas CEGAN
University of Pardubice, Pardubice, Czech Republic
lukas.cegan@student.upce.cz

Abstract

Many statistics about websites and their structures and used resources are available. But those numbers are not clearly placed in web-performance context which can gives a closer notion about best-practices in web development.
In this paper, websites from the Moz Top 500 list have been used for the empirical research. The structure of each site was examined. It includes exploring of metadata about DOM and utilization of CSS. This gathered data has been combined with available web-performance statistics.
Observed values are visually presented and give a brief image about the current state of the web. With usage of statistical tools relationships in DOM structures have been found. The research also showed that, utilization of served CSS definitions is very low. This fact can directly influence user-experience, because unnecessary data is downloaded. The next part of the research outputs show the impact of website complexity on web-performance.

Keywords: Web performance, Web analysis, Dead-Code analysis, Core Web Vitals

Introduction

During the last decade, websites completely changed their purposes. From websites with static content, their utilization has moved to highly interactive web applications. Nowadays, usage of web applications is practically unlimited. Smaller desktop applications are moving to the web, because development for desktops is highly connected to a specific platform, needs installation, and not available everywhere. In comparison, web-applications which are available almost every which means availability on almost every device and without any installation. Noteworthy, are platforms for watching videos such as Netflix or YouTube (market leader in video streaming category) which, in many households, has replaced traditional TV. Another such example is Photopea which is a web-based replacement for Adobe Photoshop. They can be considered as proof of moving from desktop application to the web environment. Increased usage of web-applications requires adaption of user-interface for smooth interaction. The related visual appearance is highly related to web-design and user-experience (UX) which takes care of UI adaption. Each adaption usually adds a few lines of code. During the time of improving user-experience, the code-base size is increasing, and specific CSS styles rules are not applied. The "dead-code" can be marked as wasting of data-bandwidth which can be used for more useful data. The next side effect of the unused code is its impact on source code quality.

According to HTTP Archive ((HTTPArchive, 2020), median web-page size in 2011 was 600KB, now in 2020 it is more than 2MB. Thus, it has more than tripled during nine years. From that size, 26 KB is HTML and 71 KB is external CSS. The rest of the size is images, scripts, fonts and etc. From a performance point of view, each byte is counted.

Text 'Structural Profiling of Web Sites in the Wild' was the inspiration for this paper (Chamberland-Thibeault and Hallé, 2020). The aim of their text was to create a reference point for other studies which use samples of web pages for their own research. This paper follows up the idea and includes similar and different metrics.

To be more specific, this paper is focused on empirical research of website structure, usages of CSS and its overall impact on performance. The next aim of the research is awareness of responsive design impact in code bases.

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The following sections describe the process of gathering metadata about websites and gathering data from public data-sets. Combination of the data is composed into detailed result sections which are followed by discussion about the causes and effects.

Methodology

Typically, the research begun with gathering of a website collection to analyze. When the representative websites had been collected then processing occurred. The results of processing are gathered metadata about each website. With each type of metadata, it is possible to distinguish two types. The first type is data about the website structure itself. The second one is data about performance. With combining of data, a unique data-set has been created. The new data-set has been evaluated with a statistical method. Selected observed data has been compared with http-archive stats which serves as validation of gathered data.

The analysis is done only on website homepages. In the following sections, each step is described in more detail.

Input Data

As the input websites for this research, Moz500 (Moz, Inc, 2020) has been selected. The list contains the most popular sites in the world which are based on link metrics that models how Google ranks websites. From the website collection, duplicates of country specific version of same websites were removed. After data set cleaning 337 websites for analysis remain.

Website Structure Exploration

For scraping of websites and their contents, JavaScript script has been developed. To be more specific, NodeJs (Node.js, 2020) has been used which allows to user third-party libraries. It makes gathering of data easier and it allows reuse of invented works. One of the most important used libraries is Puppeteer (Puppeteer,2020). Puppeteer is a NodeJs library which provides a high-level API to control Chrome web-browser over the DevTools Protocol. In summary, it allows opening of the web browser in a programmatic way (in headless mode without GUI) and investigates the structure each element on the web page.

For each website gathering of following data has been made.

- Count DOM elements
- Count classes and ids attributes
- Deepest node of the DOM
- Transfer size, decoded size and number of resources
- CSS coverage (used and unused CSS styles)

For getting CSS coverage, build-in Google Chrome analysis have been used.

Data acquisition was performed with following parameters:

- UserAgent: Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/84.0.4147.105 Safari/537.36
- ViewPort: 1920x1080 (known as FullHD)
- Cache: disabled

For validation of the data, a screenshot of each website has been captured. Then each screenshot has been validated for correct data obtained.

Performance Information Gathering

For gathering of objective performance data, PageSpeed Insights API (Google, 2020) has been used. The tool is written by Google for testing web-performance and its API provides real-world data from the Chrome User Experience Report (CRUX) and data from the Lighthouse tool. In the CRUX, data from millions of real web-users

are gathered. From that data, a public data-set of key user-experience metrics for popular web-sites is created. Practically it means, for each visited web, it is possible to obtain the available user-experience metrics, and then send it to Google. The data can serve the website maintainer as tools for improving websites which helps to improve user-experience.

As the most useful performance metrics is possible to consider:

- Largest Contentful Paint (LCP) – metric represents render time of the largest object visible within view-port.
- Cumulative Layout Shift (CLS) – is calculated score of unexpected layout shifts. In the real world, it can cause issues when user has decided to interact with elements and the elements are shifted. This can lead to a very unpleasant situation for user.
- First Input Delays} (FID) – gives information about delay between user first interaction and time to start processing of the interaction. This metrics is useful for JavaScript based websites which are built mostly on the client side. This leads to a big delay between user first interaction and its processing.

Those metrics are known as Core Web Vitals (Walton, 2020) and they will be part of Google Ranking Factor in nearly future (Shepard, 2020). There are more available metrics but for the research, this brief introduction is enough.

For gathering data from the API, an existing automated online spreadsheet has been used (McNulty, 2019). The spreadsheet has been improved to gather other important information such as metric proportions. Each metric has three categories (slow, average, fast) with set limits. Data for each category represents percentage proportions allocated to it.

Data Post Processing

When both data have been gathered, joining and cleaning is required.

The final data-set has been processed in the R-studio which provides a very effective way to analysis data. For finding and proofing of the relationship between metrics, correlation has been used.

Results

HTML structure

In the order, the first data exploration is focused on metadata about the whole website collection. On figure 1, the chart of cumulative distribution of count elements across analyzed websites is shown. From the chart is possible to observe that 90% of websites have less than 3000 elements.

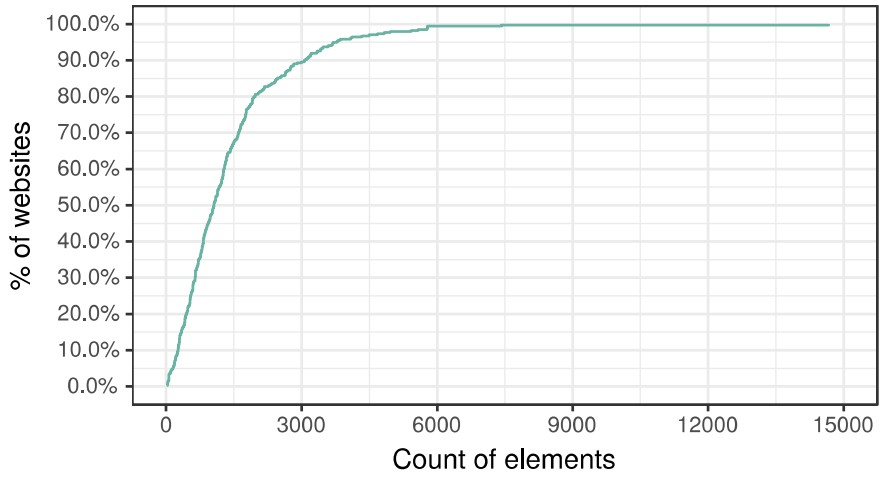

Fig. 1: Cumulative distribution of HTML elements on websites

The figure 2 shows distribution of element counts across researched websites, which describes distribution of values in more detail. Each line represents 50 elements. For better readability, extreme values have been omitted.

The next figure 3 shows usage of CSS class attributes against DOM length. Here, it is possible to see linear dependency between those metrics.

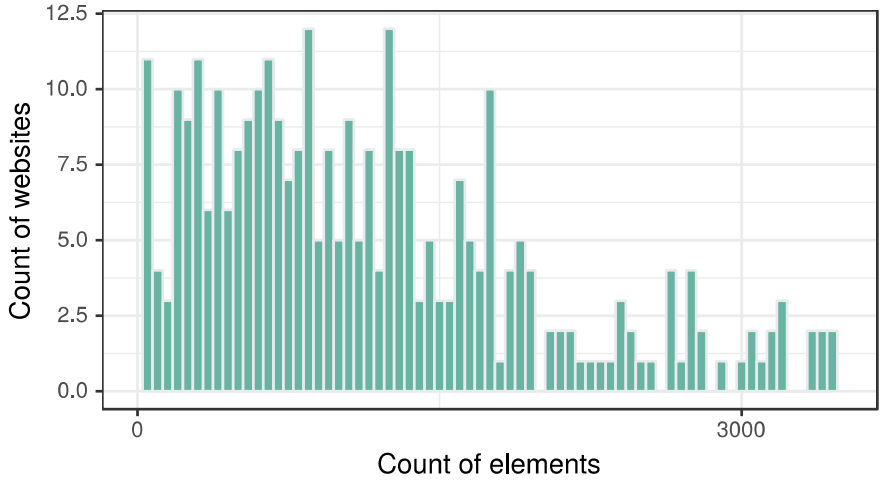

Fig. 2: Distribution of HTML elements on websites

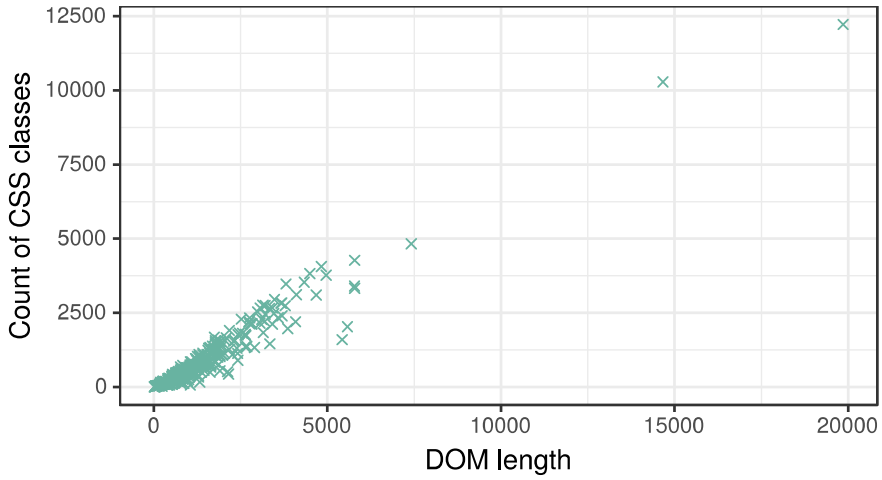

Fig. 3: CSS Classes on the DOM length

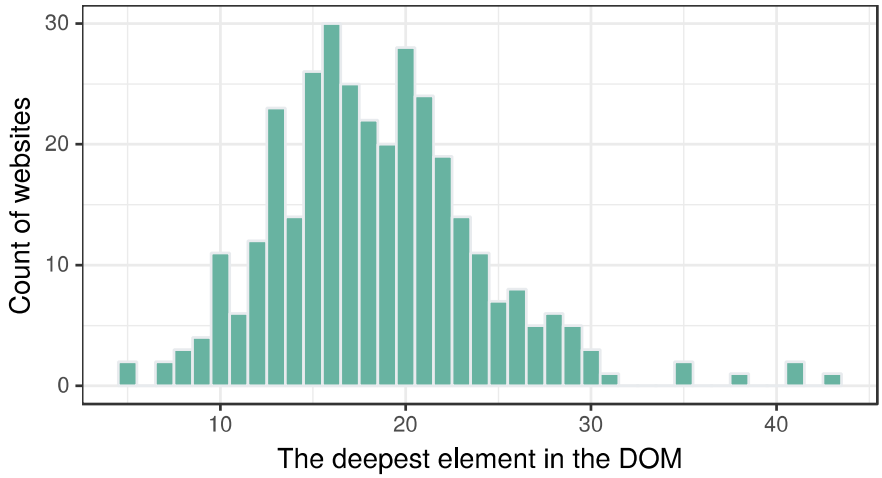

Fig. 4: Distribution of DOM depth elements

DOM depth may indicate increased source code complexity of the web-page. In the top three websites with deepest DOM, are placed yandex.ru (43 depth), twitch.tv (41 depth), and eventbrite.com (38 depth). The figure 4 describes whole data (bin width is 1).

Selected cases have been picked up in following list:

- translate.google.com – uses class attribute for almost every element. The ratio of usage class per HTML element is 96%.

CSS usage

Figure 5 shows distributions of CSS style usage across all tested websites. The metric of loaded CSS styles is composed from external and internal styles. In average number, it means that the total loaded CSS styles for the main page is 420 KB. From that size, only 40 KB is used and 380 KB is unused.

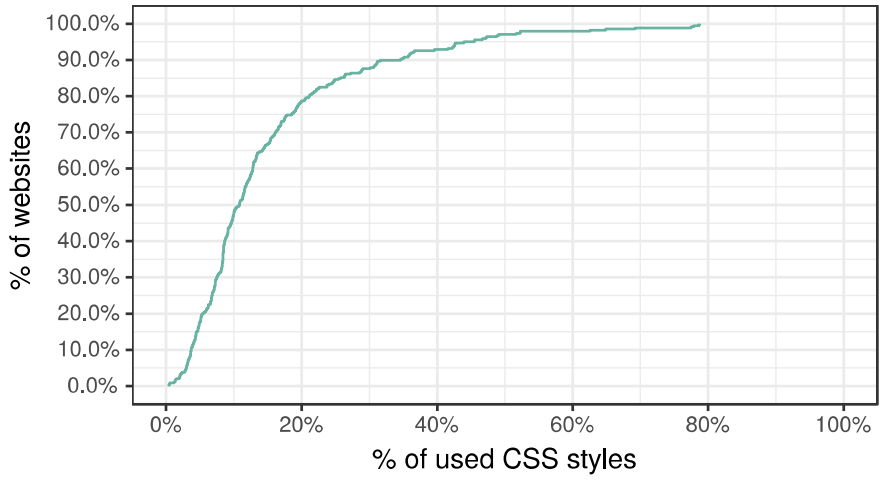

Fig. 5: Distribution of CSS styles usage on websites

The average size of downloaded CSS definition per HTML class attribute is 1 KB. The style definitions are not related only to class attributes, but also to HTML elements.

The selected CSS style definition has been investigated in more detail due to the high ratio of unused CSS code. The following reasons lead to non-utilization of all CSS styles:

- Media queries – is the main block for building websites with responsive design. This kind of CSS definition is activated only when conditions for displaying are met.
- CSS Frameworks – are very powerful and make website development much easier because they provide many predefined definitions which are immediately ready to use. They also contain the aforementioned media queries. For example, one of the most common used CSS frameworks is Bootstrap, which has 160 KB (Otto, et al., 2020).
- Too specific and repeating styles – is probably caused by generating of CSS.

Selected cases have been picked up in following list:

- apple.com – It is representative from the category of "Too specific and repeating styles". The CSS styles contain language variants which are not negligibly repeated. For improvement, it is possible to load only a country-specific version of the web. The dead-code ratio is 93%.
- espn.com – website targeted on sport which contains one of the longest CSS definitions which are more than 30000 lines long (formatted), takes more 650KB, and CSS dead-code ratio is 94%.

Some observed websites duplicates CSS directly to DOM optimizing (Jovanovski and Zaytsev, 2016).

Analysis has been done only on the website homepage, and it does not mean the CSS styles cannot be used on other pages of the website.

Performance Impact

As was mentioned before, performance values have been combined with gathered HTML statistics data for correlation evaluation. Even in variety and uniqueness websites, weak correlations between performance and DOM structure has been observed. Figure 6 shows selected results of the correlation analysis.

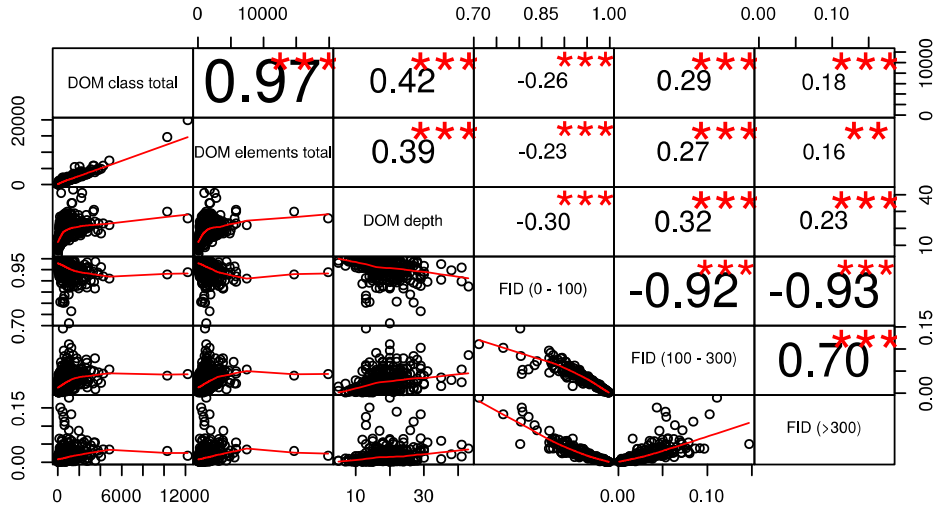

Fig. 6: Performance correlations

The first input delay proportion metrics are correlated with maximal DOM depth. The FID (0-100) represents the proportion of users who have First Input Delay under 100 milliseconds. It is similar with FID (100-300) and FID (>300).

The maximal DOM depth is negatively correlated with FID (0-100) and conversely, FID (>100) is weekly positive correlated. It means that websites with lower shallow DOM structure are faster. The DOM depth and length implicates more complex DOM structure.

Conclusion

In this paper, empirical exploring of HTML website structures, coverage of CSS definitions, and its impact on performance has been done. Selected properties of web-pages have been observed and described in more detail, such as DOM length, and usage of class attribute. Gathered values has been visualized in plots which better illustrate the whole situation. An interesting facts can be the perceived ratio of usage class attribute per HTML elements which is 15%.

As one of the most important gathered knowledge is utilization of loaded CSS code at homepages, around 40% of page use has only 10% of loaded CSS styles. This definitely has an impact on user-experience, because unnecessary code is downloaded and parsed to user's devices. The main impact will be observable especially on portable devices which are very often limited by available data (FUP). The results of this research should alert web-developers about the dead-code factor which causes downloading of unnecessary code and its parsing. Approach for reducing size of CSS is explored and ready to use (Mazinanian, et al., 2014).

The future work will be dedicated to exploring of subsequent web properties and their impact on web-performance.

Acknowledgment

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Artificial Vision System for the Classification of Green Lemons (Citrus latifolia)

Alex PACHECO
Universidad Nacional de Cañete, Lima, Perú, apacheco@undc.edu.pe

Consuelo ESPINO
Universidad Nacional Federico Villareal, Lima, Perú, coeespino@gmail.com

Marco AÑAÑOS
Universidad Nacional de Cañete, Lima, Perú, mananos@undc.edu.pe

Elizabeth MENDOZA
Universidad Peruana Unión, Lima, Perú, estherma@upeu.edu.pe

Liz PACHECO
Universidad Nacional Mayor de San Marcos, Lima, Perú, liz.pacheco@unmsm.edu.pe

Abstract

Technology ceased to be an exclusivity in the world, its current use is necessary and fundamental in the industrial field. In such a competitive and globalized world, technology optimizes the production processes of organizations. In the agri-food sector, exporting companies need to improve their processes of categorization and homogenization of their products based on the uniformity of its physical characteristics, such is the case of the Peruvian green lemon. Therefore, it is necessary to save time, cost and human effort in carrying out this process. Therefore, this research aims to implement an artificial vision system for the classification of the dimension of lemons. The artificial vision system consists of the processes of image capture, pre-processing, segmentation, description and recognition and interpretation. Where algorithms compare the characteristics of the lemon to obtain an optimal result. As a result, after using the artificial vision system, an efficiency of 85.1%, a sensitivity of 84% and a specificity of 100% were obtained. It is concluded that the detection of the caliber of the lemons works optimally allowing the number of hits to meet the objective of the investigation. The implementation of this system provides a solution to the problems of product homogeneity.

Keywords*:* Machine Vision, Selection of Green Lemon, Time.

Introduction

Today, the creation of increasingly fast, expert and autonomous computers is the trend in computer companies that provide computers with the ability to relate to their environment, just like the human being through the senses [1]. We are currently immersed in a technological revolution for computing that is based on access and information processing capacity.

A difficulty found in computers is providing sensory capacity since there are complementary elements such as sensors, signal adapter cards or environmental noise. Despite these drawbacks, there is great interest in giving computers one of the senses, which is the ability to see. [2]. Computers are currently capable of looking at and recognizing images in a way similar to how humans interpret a photograph, having a profound impact on the health, distribution and agriculture sectors.

Artificial vision reproduces the visual processes of man, analyzing and improving the quality of the image, such is the case of agriculture where there is a high interest in evaluating the quality of agri-food products [3]. This technology is based on simulating human vision for the classification and recognition of products in agriculture. Artificial vision has also been used to detect the size and color of a product in real time, positioning itself as an understandable and accessible technology [4]. The application of artificial vision contributes to 100% quality control in real time.

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In companies in the agri-food sector, the requirements for the export of Peruvian lemons are increasingly uncompromising in quality and presentation of products. The companies that export this product carry out the selection process manually, in which the lemons go through a metal grid of various sizes to specify their diameter and then the operators are in charge of classifying and selecting them visually [5]. The classification of lemons visually causes a greater demand for labor, generating a margin of error of 20% [6]. Visual recognition of agri-food products is a field where this technology is implemented and has spread rapidly, specifically in the automatic classification of fruits and vegetables [7], [8]. Therefore, this research aims to implement an artificial vision system for the classification of the size of lemons, which will provide a comprehensive solution to companies dedicated to the export of lemons.

Theoretical Background

Artificial vision: called computational vision that encompasses the processes of obtaining, characterizing, and interpreting information from images taken from a three-dimensional world. These are divided into 5 processes (capture or acquisition, preprocessing, segmentation, description, recognition, interpretation) and due to the complication of implementation they are grouped into 3 levels of vision which are: under acquisition and preprocessing processes, middle segmentation processes and description, high recognition process [9]. Artificial vision processes are fast and simple, capable of improving an image in the same way that human vision does.

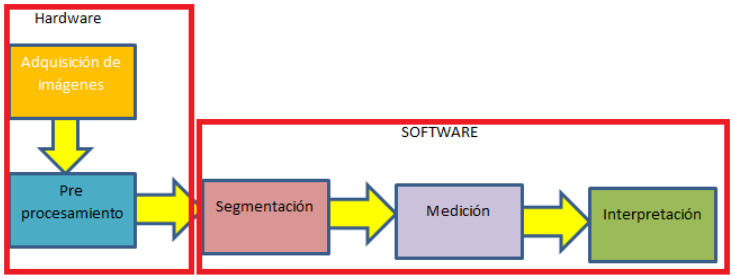

Figure 1: Procesos de la visión artificial.

Digital image: or digital graphic is a two-dimensional representation f (x, y), of an image from a numerical matrix, often in binary and is made up of a finite number of elements with a particular value and position, called pixels [10].

Digital Image Processing (PDI): Processes the images digitally by means of a computer, to do this, knowledge of physics, mathematics, and computation is applied. Its objective is to improve the images and make evident details that are not noticeable to the naked eye [11].

PDI Digital Image Processing Processes

1) Capture or acquisition: In this first stage, the image is captured and digitized from the physical to the digital by means of an image capture device such as the camera [12].

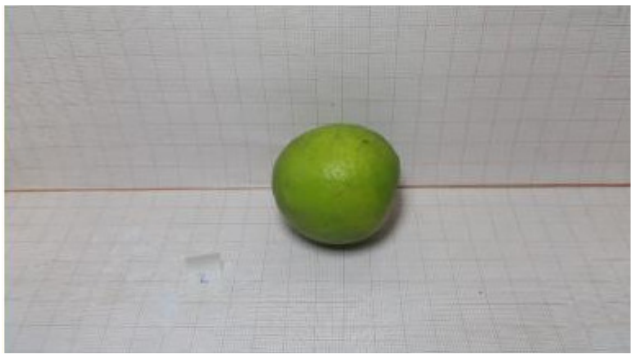

Figure 2: Acquisition phase.

2) Pre-processing: At this stage we use techniques to reduce noise, contrast brightness, or enhance features. which facilitates later stages, eliminating parts of the image that are not taken into account [13].

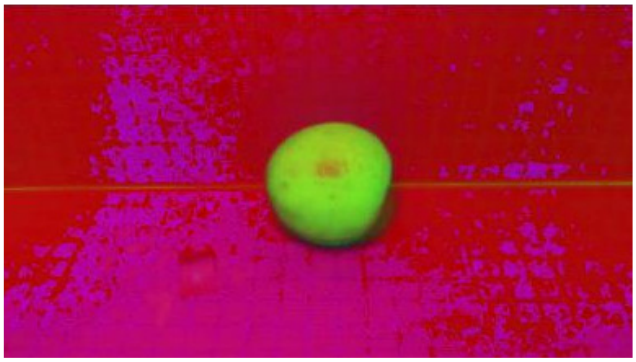

Figure 3: Pre-processing phase.

3) Segmentation: Pixels can be selected based on their RGB or HSV values. RGB, for its acronym in English Red, Green, Blue is a type of color that allows to represent all colors based on the primary colors of light and it is possible to highlight an object of a defined color [14].

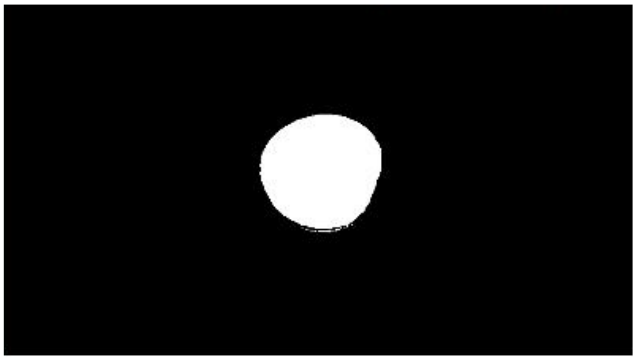

Figure 4: Segmentation phase.

4) Description: this process is where objects with common characteristics are classified within 3D space and the space is restricted by triangulation techniques so that a single image is selected and it can be interpreted [15].

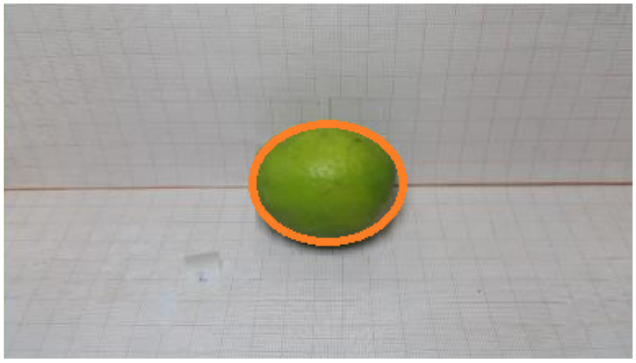

Figure 5: Description phase.

5) Recognition and interpretation: it is the process that associates a motive with a group of recognized objects such as an apple, a house and tries to imitate knowledge [16].

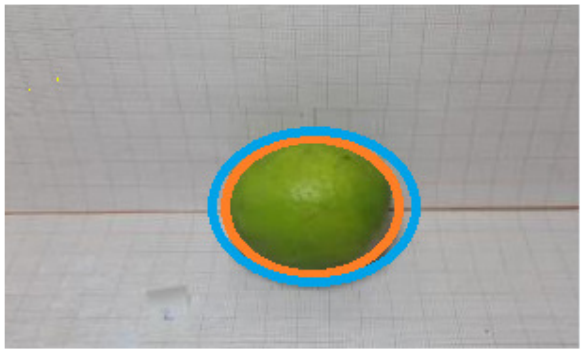

Figure 6: Recognition phase.

Materials and Methods

For the lemon classification tests, each process of the digital imaging technique was taken into account [17].

Table 1: Diameter of the lemons according to their classification.

Gauge code	Diameters (mm)
1	58 -67
2	53 – 62
3	48 – 57
4	45 – 52
5	42 - 49

The evaluation of the processes is based on a scale from 1 to 4.

Table 2: Device and algorithm rating measure.

1	2	3	4
Bad	Regular	Normal	Good

Phases of Image Processing

1. Capture or acquisition. A digital camera or a smart cell phone are ideal for capturing the images necessary for our project.

Table 3: Contrast chart of devices for image capture.

	Devices	
Criteria	Nokia 3.1 plus camera	Ultra compact sony rxo digital camera
Resolution	3	4
Memory	4	4
Transfer system	4	4
Capture speed	4	4
Total	15	16

Preprocessing

A.- Contrast enhancement: Histogram transformation is the most suitable and a transformation will be applied to HSV channels, to have a better image in contrast, saturation and brightness.

Table 4: Contrast chart between contrast enhancement techniques in the preprocessing stage.

Criteria	**Transformation of**	**Edge accent**	**Detection of**
	histogram		contours
Computational complexity	4	1	1
Uniform distribution of Gray levels in the image			
	4	2	3
Pixel enhancement of interest	2	2	4
Total	10	5	8

B.- Noise reduction: The Gaussian Filter is the most suitable to minimize noise in the image and segment correctly.

Table 5: Contrast chart between noise reduction techniques in the pre-processing phase.

Criteria	Opening (erosion, dilation)	Median filter	Gaussian filter
Preserves edges	3	3	2
Reduces impulsive noise	2	2	4
Smooth smoothing	3	2	4
Total	8	7	10

3. Segmentation. The threshold is considered low cost and the region technique is not necessary since the object is analyzed by image.

Table 6 : Contrast chart of the techniques of the segmentation phase.

Criteria	By threshold	By characteristics of regions
Threshold selection	4	3
Analytical equations	4	2
Total	8	5

4. Description: We have chosen the region description since the figure of the lemon in its composition contains many green pixels.

Table 7: Table of contrast between techniques of the description phase.

Criteria	Outline descriptors	Region descriptors
Pixel quantity dependency on the target	3	4
Using clustering	3	3
Object homogeneity	1	2
Total	7	9

5. Recognition and interpretation: the theoretical decision technique was chosen for recognition since the adaptation by correlation varies greatly and you must have a database to be able to use it.

Table 8: Contrast table between techniques of the recognition and interpretation phase.

Criteria	Theoretical decision for recognition	Correlation adaptation
Descriptor comparison	3	3
Search by proximity	4	1
Total	7	4

Results

The solution achieved through the software based on the algorithms indicated in the methodology To check the software activity, experiments were carried out each with 272 lemon figures, these figures were captured in different scenarios, resulting in the following:

True positive (VP):

At the moment that the lemon image is recognized by the artificial vision system (with the dimensions that comply with the standard) it is classified correctly. PV = 77.4%, equivalent to 211 lemons.

True negative (VN):
When the image of the lemon is recognized by the artificial vision system (with dimensions that do not meet the standard), VN = 6.5%, equivalent to 18 lemons, is not correctly classified.
False positive (FP):
At the moment that the lemon image is recognized by the artificial vision system (with dimensions that do not meet the standard), it classifies it correctly. FP = 0%, equivalent to 0 lemons.
False negative (FN):
At the moment that the lemon image is recognized by the artificial vision system (with dimensions that meet the standard) it is not classified correctly. FN = 16.1%, equivalent to 44 lemons.

Table 9: Representative table of the sensitivity analysis.

Criteria	Correct classification	Incorrect Classification
Lemons that meet standards	Vp	Fn
Lemons that do not meet standards	Fp	Vn

Table 10: Results in quantities of sensitivity analysis.

Quantities	True	False
Positive	211	0
Negative	18	44

Table 11: Results in percentages of sensitivity analysis.

Percentage	True	False
Positive	77.4%	0%
Negative	6.49%	16.1%

it was determined that, if possible, a machine vision system can perform a uniform selection of lemons. The selection time is 0.33 seconds per lemon, the effectiveness of a number of hits (true positives and true negatives) that the artificial vision system has, applying the software, resulting in 83.9% of a total of 272 lemons.

Discussion

This research aims to determine a uniform classification of lemons based on the use of artificial vision, processing the images and analyzing the results, the following was obtained:

The classification of lemons that were correctly detected through artificial vision is sensitivity, showing 84%, which represents 211 images of lemons out of a total of 272. After comparing the results of the software with a manual measurement, we can affirm that the difference Gauge ranges from ± 2 millimeters which can cause a lemon to rank to another gauge, automatically turning a true positive into a false negative. This is 11.40% lower than the automatic pattern recognition software for the discrimination of polished rice grains based on image processing [18].

When the image of a lemon does not meet the stipulated standards, it should not be assigned a size. In this work, the specificity is a true negative whose value is 100%, while in the research [19], a specificity of 91.91% was obtained, finding a difference of 9.09% in image processing.

The correct classification of lemons made up of true positives and true negatives in the efficiency of the imaging process is 85.1%. While the classification of wheat seed varieties is slightly more than 1% higher using computer vision [20].

Compared to the function that a worker performs in the classification of the lemon, the artificial vision system takes 0.33 seconds to classify each image.

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Artificial Intelligence as a Subject of a Crime

Andrey BAYBARIN
Southwest State University, Kursk, Russia, andrewbaybarin@gmail.com

Alexander GREBENKOV
Southwest State University, Kursk, Russia, grebenkov@gmail.com

Anton BAUMSTEIN
Southwest State University, Kursk, Russia, e-mail: 5068896@list.ru

Maria SINYAEVA
Southwest State University, Kursk, Russia, mari_sinyaeva@mail.ru

Abstract

The article examines the legal responsibility of artificial intelligence, identifies problematic aspects, suggests ways to solve them. It is concluded that it is impossible to talk about the possibility of recognizing its full legal personality. In our opinion, the legislator should not go along the path of creating the possibility of bringing artificial intelligence systems to justice, but on the path of ensuring more detailed control over the actions of their developers and operators, and the development of appropriate standards.

Keywords: Artificial Intelligence, Crime, Responsibility, System, Intellectual Activity.

Introduction

As stated by Vasil'ev, A. A., Shpopper, D. and Mataeva, M. H. (2018), The National Strategy for the Development of Artificial Intelligence for the period up to 2030 defines artificial intelligence as a set of technological solutions that allow simulating human cognitive functions, as well as obtaining high-quality results when performing specific tasks comparable to performing at least the results of human intellectual activity.

Methods

General and special scientific methods, traditional for theoretical and applied legal research, were used, such as formal-legal, system-structural, content analysis of various publications, comparative legal method.

Results and Discussion

Today, artificial intelligence is considered as a technology with the possibility of multifaceted use, for example, for civil, military, legal purposes. But due to the fact that the artificial intelligence system is capable of independent actions without direct impact on a person, a number of questions arise in the legal regulation of relations with the participation of artificial intelligence, including questions of legal responsibility.

The development of artificial intelligence creates new threats associated with minimizing the human factor, so, for example, with the correct formulation of the primary task for this system, it will be able to both block hacker attacks and create them independently.

Social engineering is being automated, an example of which is the so-called "bots" - programs that can perform certain actions in accordance with a specific algorithm through interfaces intended for people. Tirranen, V. A. (2019) provides example, stating that they can conduct a dialogue with forum visitors or answer questions on social networks.

It is worth noting that the state of criminal policy in the field of combating crimes committed using artificial intelligence algorithms leaves much to be desired.

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It is obvious that technologies based on artificial intelligence, their algorithms can be a tool for a wide range of crimes, including attacks on people, property, environmental safety, public and state interests. An example is the technology of "deep fakes", the use of which allows the creation of reliable video images. So, the technology of subject-independent face replacement and face reconstruction called Face Swapping GAN (FSGAN), regardless of the object, can be applied to any pair of faces. As a result, as stated in Red'kina, A.I. (2016), we can observe how famous people allegedly take part in provocative interviews, etc.

From a legal point of view, the production and distribution of such video fakes can be qualified as defamation. But in this context, the experience of Texas is interesting, when, on the eve of the 2020 elections, lawmakers criminalized the creation of political deepfakes, establishing punishments up to 1 year in prison.

Ponkin, A. V. and Red'kina, A. I. (2018) note that a new cyber-physical system is emerging, which is designed to solve the fundamental problem of modern society, namely, the inability to process the increasing amount of information.

Note that the very use of artificial intelligence systems causes the emergence of new problems and difficulties within the framework of existing models of responsibility, which are mainly based on the concept of a causal relationship between an action and its consequences.

In the case when the use of such machines led to the commission of a serious mistake, the question arises as to what exactly caused this: the original complexity of the equipment or its incorrect programming and training?

For example, in recent years, the use of unmanned vehicles is gaining more and more popularity. In this connection, the question also arises, in the event of a fatal traffic accident, who will be the direct culprit of this accident? A similar precedent already exists, namely, in August 2019 in the state of Arizona, an unmanned vehicle owned by Uber hit a pedestrian who died on the spot. It follows from the circumstances of the case that the driver was nevertheless present in the cabin, but did not have time to take control of the car. It should be noted that in this situation the driver was found guilty, and not the unmanned vehicle. However, in our opinion, this situation cannot be used as a sustainable practice. Since in most cases of using artificial intelligence, it is reasonable to hold the developers of this system accountable for mistakes made by it. But not in situations where the artificial intelligence system begins to function in a way that could not have been predicted earlier, especially, as Cukanova, E.Yu (2018) states, if such a system interacts with other agents. The essence of the autonomy of an artificial intelligence system just means that the introduction of some data and the programming of such a system in a certain way leads to a specific result in response to given circumstances.

Conclusion.

The complex and polymorphic nature of such systems makes it impossible to clearly define responsibility for the failures of such programs. In addition, if we talk, for example, about complex equipment, then decision making by such equipment is likely to be distributed among several different programs (developed, possibly, by different programmers unfamiliar with each other) and processors, based on data received from sensors of different types. Decision making with such equipment will also depend on the environment in which it is used, the context, and the tasks assigned to it. In this case, it is inappropriate and incorrect to assign responsibility to designers and developers. In addition, there is a serious problem related to the vulnerability of artificial intelligence systems to hacking, which can complicate the identification of the person responsible for the harmful actions of such a system.

Summarizing the above, we note that today there is an active development of artificial intelligence technologies and at this stage it is impossible to talk about the possibility of recognizing its full legal personality. In our opinion, the legislator should not go along the path of creating the possibility of bringing artificial intelligence systems to justice, but on the path of ensuring more detailed control over the actions of their developers and operators, and the development of appropriate standards.

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Conceptual Approach to Construction of Engineering and Technical Means of Security and Supervision in the Penitentiary System at Present Stage

Andrey BAYBARIN
Southwest State University, Kursk, Russia, andrewbaybarin@gmail.com

Alexander GREBENKOV
Southwest State University, Kursk, Russia, grebenkov@gmail.com

Vladimir TARYKIN
Southwest State University, Kursk, Russia, email: tarykin.vladimir@yandex.ru

Gennady PLOHIH
Southwest State University, Kursk, Russia, email: sader100zent@mail.ru

Abstract

The article proposes a conceptual approach to the study of the problems of building engineering and technical means of security and supervision (TMOSS) in the context of implementing the tasks of ensuring the safety of facilities and employees at the modern stage of the development of the penal correction system in the context of the application of various forms of innovation: information, organizational, social, technical and technological and co-responsible settlement at the legislative level. The conclusion is made that in the special conditions of the pandemic, the effectiveness of the activities of penitentiary institutions is largely determined by the competence of the penitentiary staff and the effectiveness of the use of modern TMOSS.

Keywords: Penal Correction System, Institution, Employee, Research, Technology, Means, Protection, Supervision, Threat, Safety, System, Analysis, Method, Factor, Program, Concept, Concept, Conceptual Scheme, Development.

Introduction

The conceptual approach to the study of the problems of building innovative TMOSS in penal institutions involves a comprehensive study of the results of the rapid introduction of modern information, organizational, social, technical and technological forms of innovation into the practical activities of the penal correction system and the corresponding changes in the basic provisions of criminal enforcement legislation and other regulatory legal acts, as the main factors for achieving the main goal - ensuring the safety of facilities and employees of the penal correction system.

Methods

This article, based on a conceptual approach, highlights an integrated set of provisions constituting a methodological framework for research into the problems of building innovative TMOSS in penitentiary institutions while differentiating them. The methodological basis of such a study is a systematic multi-vector factor analysis of information set forth in modern regulatory acts, scientific materials, official statistics and analytical documents, which provide the results of a study of emerging problems in the use of modern technical means of security, communication and information protection systems, organization of security and escorting.

Based on the conclusion of G.V. Nazarenko (2016) that... «the movement of scientific thought comes from the concept (initial idea) to the conceptual scheme (developed idea), then to the conceptual system (completed scientific theory)», we believe it appropriate in the course of the study to use such categories of conceptuality introduced by the author as a concept, conceptual scheme, conceptual system, concept and con-ceptualism.

At the legislative level, we consider the concept of building modern TMOSS in the penal correction system as a set of conceptual schemes, each of which represents a comprehensive set of criminal regulations (concepts) of the current editions of penal enforcement legislation and other regulatory legal acts, as means of designing criminal law norms,

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institutions and other regulatory blocks. In our view, it is precisely such a concept as a defining idea (strategy) that systematizes all the ideas (views) developed to understand the direction of the development of TMOSS in the penal system, provides an answer to the question of how to achieve the intended goal.

Results and Discussion

The main purpose of the concept of building modern TMOSS in the penal system is based on the priority of the constitutional norm on ensuring the rights and freedoms of the individual, which forms the basis of the State's criminal policy, as enshrined in federal legislation and other normative legal acts. In particular, the rights to personal safety of convicts, employees of penal institutions and members of their families are enshrined in the Criminal Enforcement Code (CEC) of the Russian Federation (CEC of the Russian Federation - FL of 08.01.1997 № 1-FL). At the same time, the practical bodies of the penal system should ensure: the humanitarian orientation of their activities, adherence to international norms and standards for the execution of criminal penalties, including on the construction and use of TMOSS.

As safety of penal correction system is an important component of public safety of Russia, and the concept of construction modern an TMOSS in penal correction system has to be formed also on the basis of «The strategy of national security of the Russian Federation» approved by the Decree of the President of the Russian Federation of 31.12.2015 № 683 and also provisions of Acts of the Russian Federation: «About the institutions and bodies executing criminal penalties in the form of imprisonment» of 21.07.1993 № 5473-I (an edition of 02.12.2019); «About detention of suspects and the crimes accused of commission» of 15.07.1995 № 103-FL (an edition of 27.12.2019); «On State Protection» from 27.05.1996 № 57-FL (ed. From 27.12.2019); «Criminal Code of the Russian Federation» dated 13.06.1996 № 63-FL (ed. from 18.02.2020); «Criminal Enforcement Code of the Russian Federation» dated 08.01.1997 № 1-FL (ed. from 27.12.2019); «On Safety» dated 28.12. 2010 № 390-FL; «On administrative supervision of persons released from places of deprivation of liberty» from 06.04.2011 No. 64-FZ (ed. from 01.10.2019) and other regulatory legal acts.

For example, article 12 of Act №5473-I of 21 July 1993 on institutions and bodies carrying out criminal sentences of deprivation of liberty discloses the general requirements for the organization of the security of penal institutions, and article 32 of the Act guarantees the protection of the State, both for personnel of penal institutions and for members of their families.

Article 83 of the CEC of the Russian Federation defines the rights of using TMOSS by the administration of the penal correction system to prevent escapes and other crimes, violations of the established procedure for serving a sentence and in order to obtain the necessary information on the behavior of convicts.

In this context, R.Z. Useev (2015) justifies the need to prepare a state paradigm for the security of the penal system and shows that «the central element of the study of the security of the penal system should be its facilities: people (personnel, convicts, suspects, accused and other persons) and his vital interests; the range of relationships and processes in the penal system; facilities and objects for ensuring the activities of the penal system; institutions and bodies (subdivisions) of the penitentiary system as structural units of the Federal Penitentiary Service of Russia, institutions of the territorial body of the Federal Penitentiary Service of Russia, subdivisions of a separate institution».

A.V. Kudryavtsev and A.V. Senatov (2014) bring the problem of ensuring the security of employees of the penal system and their relatives to the state level and note that... «the protection of employees of the penal system involves the implementation of a unified state policy in the field of security through a system of measures of an economic, political, organizational and other nature, adequate threats of vital interests».

Concepts (innovative ideas containing creative meaning) and conceptual schemes (systems of concepts interconnected according to certain rules) of building modern TMOSS in the penal system are determined today by current legislation and other regulatory legal acts of federal government bodies that form the penal policy of the state.

The basis of the conceptual scheme (system of concepts) for the construction of modern TMOSS in the penal system in the organizational and legal aspect at the legislative level are the concepts of «protection» and «supervision»? which at the level of conceptual knowledge - the most significant components in the area of knowledge under consideration - are disclosed in the relevant norms of articles of the current editions of the laws of the Russian Federation and other by-laws in all kinds of practical use in various types of institutions of the penal system for various situations.

In the «National Security Strategy of the Russian Federation», approved by Decree of the President of the Russian Federation dated 31.12.2015 № 683, the concepts of «protection» and «supervision» are disclosed:

- in paragraphs 45, 49 of the section «State and public security»;

- in paragraph 54 of the section «Improving the quality of life of Russian citizens»;

- in paragraph 62 of the section «Economic growth»;

- in paragraph 86 of the section «Ecology of living systems and environmental management».

The concepts of «protection» and «supervision» are also disclosed in articles of current federal laws:

Articles 2, 12, 37, 215.4, 274 of the Criminal Code of the Russian Federation;

Articles 1, 10, 12, 24, 60, 60.4, 60.6, 60.11, 60.18, 60.19, 81, 82, 83, 85, 101, 103, 104, 121, 129, 133, 156, 164, 173.1, 179, 184 of the Penal Enforcement Code of the Russian Federation;

- Articles 5, 12, 12.2, 13, 28, 30, 31.2, 32 of the Law of the Russian Federation «On Institutions and Bodies Executing Criminal Penalties in the Form of Deprivation of Liberty»;

Articles 7, 34, 42, 48, 49, 51 of the Federal Law «On the Detention of Suspects and Accused of Crimes».

The norms of the articles of these Laws served as the basis for the adoption of a number of targeted programs and concepts aimed at improving and developing the penal system in matters of ensuring the safety of their facilities and employees, and approved by resolutions and orders of the Government of the Russian Federation.

Today, the conceptual approach of building modern TMOSS in the penal system is being implemented within the framework of the main directions of the Concept of the federal target program «Development of the penal system (2017-2025)», approved by Order of the Government of the Russian Federation of December 23, 2016 № 2808-r.

At the executive level, conceptual diagrams of requirements, tasks and measures for the equipment of TMOSS facilities of the penitentiary system are established by the approved Order of the Ministry of Justice of Russia dated 04.09.2006 № 279 (ed. from 17.06.2013) the corresponding Manual, which was developed and approved in accordance with legislative and other regulatory legal acts of the Russian Federation and European penitentiary rules. In the sections, articles and annexes of this Manual, conceptual schemes (systems of concepts) of building modern TMOSS in the penal system are described in detail, the basis of which in the organizational, legal and engineering and technical aspects are the concepts of «protection», «supervision», «engineering» and «technical».

The manual (para. 4) contains a conceptual chart of 18 main tasks (concepts), the implementation of which should be provided by TMOSS in the penal system.

The manual (item 5) contains a conceptual diagram of 9 main organizational measures (concepts) that ensure the fulfillment of the main tasks by creating appropriate TMOSS in the penal system.

In general, the TMOSS complex (item 6. Instructions) is a set of fences, engineering barriers and structures for security and surveillance purposes, technical means for collecting and processing information, technical means for security alarm, security television, access control and control, operational communication and warning, as well as uninterrupted power supply and security lighting installed and used at the facility of the penal system. At the same time, together with the TMOSS complex, equipment can be used at the security facility to counter the unauthorized use of cellular communication devices, search and inspection and other special equipment that does not reduce the efficiency of using TMOSS.

Depending on the purpose, place of installation and tactical tasks solved by units and services of institutions of the penal correction system, the general conceptual scheme «TMOSS Complex» in the context of the essence of the concepts «protection» and» supervision» can be divided into two components:

a) the conceptual scheme «Technical Means of Protection» (TMP) includes 8 concepts of constructions, designs, the equipment and means of engineering arms which are established on object perimeter for ensuring performance of tasks of its protection and requirements imposed to access control on an object (from an object);

b) conceptual scheme «Engineering and technical means of supervision» (ETMS) includes 6 concepts of technical means, systems and devices for collecting and processing information, security alarm, video surveillance, access control and control, operational communication and notification, monitoring and inspection, which are installed on the internal territory of the facility, as well as in special buildings and premises to ensure the established regime for the detention of convicts and persons, Detainees and their supervision tasks.

In the context of the concept of «engineering» and «technical» general conceptual scheme «TMOSS Complex», depending on the physical and mechanical properties of the elements, the principle of operation and materials for the manufacture of devices, can be divided into engineering means of protection and supervision (EMPS) and technical means of protection and supervision (TMOSS).

P.M. Nikolaev (2018) in his study uses a system-wide approach to modeling the application of TMOSS and names three factors that can have a significant impact on the effectiveness of protection and supervision in institutions of the penal system, these are: 1) technical characteristics of TMOSS; 2) methods and tactics of using TMOSS; 3) types and number of TMOSS used. At the same time, the author of the study shows that... « improper tactics of using or insufficient TMOSS reduces the effectiveness of supervision and protection, as well as creates prerequisites for escaping or violating the regime. On the other hand, the excess of TMOSS leads to an overexpenditure of funds for their purchase, installation and operation, while the effectiveness of supervision and protection remains unchanged.

Let us consider the influence of socio-economic factors and criminal policy of the state as a whole on the development of institutions of the penal system on the basis of a decrease/increase in quantitative indicators. A comparative analysis of the dynamics of changes in the main indicators given in the analytical certificates «A Brief Description of the Penal Correction System» for 2013 and 2020 (as of March 01) of the Statistical Data section of the official website of the Federal Penitentiary Service of the Russian Federation showed the following results.

1. The total number of special continents held in all penal institutions decreased by 183509 (26.14%) from 701900 in 2013 to 701900 people as of March 1, 2020. At the same time, the number of women of the special continent decreased by 15,966 (27.67%) from 57,700 to 41,734 women, the number of children's houses remained unchanged (13 units), and the number of children in them decreased by 294 (41.18%) from 714 to 420 children.

2. **The total staff of all penal institutions** decreased by 42,533 people (12.57%) from 338,500 (2013) to 295,967 (2020), while the number of convicts per 1 full-time employee decreased by 15.39% from 2.07 to 1.75, respectively. Including the number of certified employees decreased by 21,216 people (8.61%) from 246,500 to 225284, and the number of convicts per 1 certified employee decreased by 18.98% from 2.84 to 2.30.

3. The number of correctional colonies (CC) decreased by 39 units (5.28%) from 739 to 700. At the same time, the number of special continents decreased by 166,566 (28.47%) from 585,000 to 418,434 people, the specific load on average by 1 CC decreased by 194 (24.49%) from 792 to 598 people.

4. The number of CCs for life sentences increased by 2 units (40.00%) from 5 to 7. At the same time, the number of special continents increased by 174 (9.57%) from 1819 to 1993 people, and the specific load decreased by 79 (21.78%) from 364 to 285 people on average per 1 CC.

5. The number of settlement colonies (SC) decreased by 9 units (6.92%) from 130 to 121. At the same time, the number of special continents decreased by 6,702 (16.97%) from 39,500 to 32798 people, the specific load on average per SC decreased by 33 (10.84%) from 304 to 271 people.

6. The number of pre-trial detention centers and premises in the pre-trial detention center mode decreased by 90 units (22.78%) from 395 to 305. At the same time, the number of special continents decreased by 15924 people (14.02%) from 113600 to 97,676, but the specific load on average on 1 institution increased by 32 people (11.20%) from 288 to 320.

7. The number of prisons increased by 1 unit (14.29%) from 7 to 8. At the same time, the number of special continents increased by 274 people (30.44%) from 900 to 1174, the specific load on average on 1 institution increased by 18 people (13.76%) from 129 to 147.

8. The number of educational colonies (EC) decreased by 23 units (50.00%) from 46 to 23. At the same time, the number of special continents decreased by 1093 people (49.68%) from 2200 to 1107, the specific load on average per 1 EC remained unchanged - 48 people.

9. The number of institutions of the Criminal Executive Inspectorate with branches decreased by 1,031 units (41.93%) from 2,459 to 1,428. At the same time, the number of special continents decreased by 20,319 people (4.36%) from 465,700 to 486019, the specific load on average per 1 EC increased by 151 (125.17%) from 189 to 340 people.

10. The number of penal correction facilities decreased: a) state unitary enterprises - by 22 (41.51%) from 53 to 31; b) centers of labor adaptation of convicts - by 18 (3.07%) from 587 to 569; c) production workshops - by 22 (23.66%) from 93 to 71; d) evening general education schools - by 52 (16.30%) from 319 to 267; e) training and consulting points (branches) - by 39 (7.10%) from 549 to 510; e) vocational schools - by 48 (14.41%) from 333 to 285.

11. The number of penal correction facilities increased: a) separate structural units - by 140 (46.36%) from 302 to 442; b) objects for religious ceremonies and ceremonies - by 289 (22.99%) from 1257 to 1546; c) healthcare institutions - by 11 (19.64%) from 56 to 67.

It should be noted that the decrease//increase in these indicators is determined not only by socio-economic factors and the criminal policy of the State as a whole, but also by the implementation of the requirements of legislative and other regulatory legal acts of the Russian Federation, the European prison rules approved by Recommendation Rec (2006) 2 of the Committee of Ministers of the Council of Europe, and the introduction of modern TMOSS in the penal system.

The characteristic features of the modern stage of development of institutions and organizations of the penal system are the dynamic introduction of «breakthrough» technologies into their practical activities, which S.I. Rodzin and I.N. Titarenko (2014) in their study denote the term «NBIC» (NBIC - acronym: N - nano; B - bio; I - info; C - cogno). Based on a systematic approach to the study, the authors showed that nano-, bio-, info-, cognitive technologies do not develop in isolation, but actively influence each other in a single complex of NBIC technologies, while the purpose of each component they disclose as follows:

- nanotechnologies radically change the possibilities of producing substances with pre-programmed properties;

biotechnologies manipulate the biological parameters of humans, living systems and plant organisms;

- information technologies, implementing the input, storage, processing and output of information of various levels of semiotic valence, ensure the functioning of complex man-machine complexes and the organization of social systems;

- cognitive technologies change the mental parameters of a person, transforming the states, properties, qualities of individual and social consciousness.

Today, the responsible for the integration trends of the components of the NBIC complex are information technologies and artificial intelligence technologies, which are beginning to be actively used in the creation of modern TMOSS in institutions of the penal system.

Consider the impact of the introduction of modern technologies in TMOSS on the reduction/increase of quantitative targets for the prevention and suppression of crimes and violations of the established regime of detention of convicted and detained persons.

To this end, we will carry out a comparative analysis of the dynamics of changes in the main indicators given in the statistical tables of the Statistical Data section of the official website of the Federal Penitentiary Service of the Russian Federation, which reflect changes in the characteristics of persons detained in various institutions of the penal system. The analysis of indicators for 2013 and 2019 showed the following results.

1. Remand centres and prison facilities. According to FSIN statistics for the period from 2013 to 2019, the number of special continents decreased from 134142 to 99948 people (by 25.49%).

The total number of crimes committed has increased - from 78 to 151 (by 93.59%) and the level per 1000 people - from 0.57 to 1.50 (by 163.16%). Of these, the following decreased: murders (st.105 of the Criminal Code of the Russian Federation) - from 4 to 3; intentional infliction of grave bodily harm (part 1-4 of article 111) - from 8 to 6; shoots (Art. 313) - from 8 to 1, of which attempts at shoots - from 2 to 0; hostage-taking (art. 206) - from 1 to 0; the number of convicted persons wanted (as of December 31) decreased from 18 to 6, and the number of criminal acts disorganizing the work of the penitentiary (part 3. Art. 321) increased from 0 to 1.

The total number of crimes prevented has decreased from 45,227 to 91. Including the number of: crimes against the person from 34,799 to 0; shoots - from 3192 to 0.

2. Adult correctional colonies. According to FSIN statistics for the period from 2013 to 2019, the number of special continents decreased from 559938 to 423825 people (by 24.31%). Of these, the number of persons sentenced to imprisonment decreased: for the first time - from 245546 to 195810 (by 20.26%), for the second time - from 129024 to 75117 (by 41.78%), three or more times - from 559938 to 423825 (by 24.31%).

The total number of crimes committed increased from 865 to 1015 (by 11.73%) and the level per 1000 people - from 1.23 to 2.34 (by 90.24%). Of these, the number decreased: murders - from 13 to 5; intentional infliction of grave bodily harm - from 43 to 27; shoots - from 138 to 110, including attempted shoots - from 8 to 1; hostage-taking - no. The number of actions that disorganize the work of the IU increased from 7 to 17. The number of convicted persons wanted (as of December 31) decreased from 133 to 75 (by 77.33%).

The total number of crimes prevented has decreased - from 59810 to 268. Including the number of crimes against the person - from 54361 to 0 and the number of escapes - from 2133 to 0.

The number of seized: money - from 5.06 to 1.38 million rubles; industrial and artisanal spirits - from 52666.3 to 29081.0 liters; narcotic drugs, psychotropic substances and their analogues - from 84504.199 to 65505.447 grams; cutting objects - from 7758 to 7363 units.

3. Juvenile Education Colonies. According to FSIN statistics for the period from 2013 to 2019, the list of convicts in the EC at the end of the reporting period decreased from 1974 to 1155 people (by 70.91%).

The total number of crimes committed decreased from 7 to 5 (by 40%), but the level per 1000 people increased from 3.46 to 4.26 (by 23.12%). Of these: no murders; actions that disorganize the IC operation - from 1 to 0; intentional infliction of grave bodily harm - from 1 to 1; hooliganism - from 1 to 0; escapes and attempts at escapes - no; hostage-taking (art. 206) - no.

The number of crimes prevented has decreased - from 1058 to 1.

The number of seized: money - from 35,000 to 0.00 rubles; industrial and artisanal spirits - from 57.7 to 0 liters; cutting objects - from 25 to 1 units. However, the number of seized narcotic drugs, psychotropic substances and their analogues increased from 1.2 to 8.84 grams.

4. Criminal and executive inspections. According to FSIN statistics for the period from 2013 to 2019, the number of persons registered in the reporting period increased from 947656 to 1003165 (by 5.86%).

The number of crimes committed increased from 16046 to 19413 (by 20.98%), and the level per 1000 people increased from 16.93 to 19.35 (by 13.51%).

Conclusion

It should be assumed that the increase in some of the above indicators is determined not only by the insufficient effectiveness of the implementation of modern TMOSS in institutions of the penal system, but also by the corresponding professional competence of their employees.

The conceptual approach to the study of the problems of building innovative TMOSS in penal correction institutions involves a comprehensive study of the results of the prompt introduction into the practical activities of the penal correction system of modern information, organizational, social, technical and technological forms of innovation and the corresponding changes in the main provisions of penal enforcement legislation and other regulatory legal acts, as the main factors for achieving the main goal - ensuring the safety of facilities and employees of the penal correction system. The results of the study were obtained in the context of a realistic scenario for the development of the penal policy of the Russian Federation, which is characterized by the relative stability of the current system of internal and foreign policy, economic, social, legal and spiritual factors.

On 30 March 2020, the Chief State Medical Officer of the Federal Penitentiary Service issued Decree № 29 «On the introduction of additional sanitary and anti-epidemiological (preventive) measures aimed at preventing the emergence and spread of a new coronavirus infection (COVID-19)». In connection with the continuing spread of a new coronavirus infection and in accordance with the requirements of article 48 of the Federal Law of 15.07.1995 № 103-

FL «On the detention of suspects and accused of committing crimes», a regime of special conditions has been introduced from 31.03.2020 to special instructions in pre-trial detention centers located in Moscow and the constituent entities of the Russian Federation. The operational headquarters of the Federal Penitentiary Service of Russia has been established, the tasks of which are to coordinate the activities of all units of the penal system on issues of prevention and timely detection of this disease.

The declared pandemic and measures taken in the state to combat coronavirus will inevitably lead to a deterioration of the economic component, a sharp and deep aggravation of foreign policy relations, a tightening of domestic policy: state borders, enterprises are closed, mass events are canceled, the authorities call on citizens to a regime of self-isolation and impose penalties for its violation. In the context of the pandemic, the State's penal policy will evolve under the influence of significantly changed key factors in the pessimistic scenario.

The results of the activities of institutions of the penal system in special conditions will largely be determined by timely changes in the penal policy of the State, the competence of the personnel of the penal system and the effectiveness of the use of modern TMOSS, including in the field of medical care.

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Cybersecurity Defence Systems for Malaysia Digital Economy

Muhamad Khairulnizam ZAINI
Universiti Teknologi MARA (UiTM), Selangor, Malaysia, khairulnizam.zaini@gmail.com

Norhayati HUSSIN
Universiti Teknologi MARA (UiTM), Selangor, Malaysia, yatihussin@gmail.com

Irni Eliana KHAIRUDDIN
Universiti Teknologi MARA (UiTM), Selangor, Malaysia, irnieliana@uitm.edu.my

Zainal Abidin MOHD JAIS
Fusionex Innovations Sdn. Bhd., Selangor, Malaysia, zainal69mj@gmail.com

Abstract

Cyber security risks and threats have increased in recent years, causing significant economic and social losses to public and private organisations as well as individuals. Discourses around these problems have driven government initiatives and academic research in Malaysia to focus on protecting critical national information infrastructure (CNII), the public and governments. In contrast, there has not been much attention given to the impact of cyber threats on business organisations, especially in the digital economy era. The recent data from Cyber Security Malaysia (CSM) stated that in the year 2019 alone, more than 10,700 cyber security attacks on corporations, business organisations and individuals nationwide for incidents such as ransomware, malicious attacks, data breaches were recorded, indicating that cyber-threats are together growing in digital ecosystems. There has not been much attention given to the impact of exposure of Malaysian businesses to high levels of cyber-attacks, especially those related to the digital economy era. The lack of attention to this research area indicates that cyber security management in this new age economy is an uncharted territory and requires further investigation. The objective of this paper is to discuss the comprehensive landscape of cyber security management in Malaysia's business context. Particularly, the aims of this paper are to propose on how organizations can develop a comprehensive defence system, incorporating situational awareness systems, threat intelligence analysis, and effective security operation platforms and trust technology for digital economy.

Keywords: Cyber Security, Digital Economy, Security Analytics, Blockchain, Digital Business

Introduction

In digital economy, business organisations must be able to innovate and guarantee competitiveness by leveraging the opportunities of the Fourth Industrial Revolution (IR 4.0), in which IR 4.0 are characterized by a convergence of technologies to support competitiveness in doing business (Schwab, 2016). The technological convergence and digitalisations are the state-of-art strategy to work in digital economy. Wider adoption of digital technology in Malaysia's business organisations implies the importance of cyber security in business setting. As reported by IDC Malaysia International (IDC Malaysia, 2019), it is predicted that by 2023, around 70% of all IT spending in Malaysia's business organisations will be on computing platform technologies. It is expected that over 50% of all enterprises will build "digital-native" IT environments to thrive in the digital economy, expecting an estimated RM 5bn investment by the Malaysian Government. It is also estimated that millions of devices will be connected to this digital ecosystem that will encourage the pervasive use of information and communications technology (ICT) in all aspects of the Malaysian economy. Technology applications in this ecosystem are promising, indicating that many business organisations are going to benefit from this digital ecosystem.

However, recent data from Cyber Security Malaysia have indicated more than 10,700 cyber security attacks on corporations and individuals nationwide through various security incidents in 2019 alone (MyCERT, 2019). This trend has suggested that cyber-threats are growing in such ecosystem and that organisations are required to improve their defence and strengthen their security posture in this new economy settings. The objective of this paper is to

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discuss the comprehensive landscape of cyber security management in Malaysia's business context. Particularly, the aims of this paper are to investigate how organizations can develop a comprehensive defence system, incorporating situational awareness systems, threat intelligence analysis, and effective security operation platforms for digital economy.

Malaysia and the Digital Economy

The "digital economy" is a term for all those economic processes, transactions, interactions, and activities that are based on digital technologies. In specific, the digital economy refers to a broad range of economic activities that use digitized information and knowledge as key factors of production. According to World Bank Group (2019), from 2010 to 2016, the digital economy grew by 9 percent per year in value-added terms and is expected to approach 20 percent of the economy by 2020 and continuously expected to grow in years to come. The digital economy which is based on adoptions of disruptive technologies to new business models and delivering products and services in a convenient manner, presents a huge opportunity for companies of all types and sizes. In Malaysia alone, e-commerce businesses are growing particularly quickly, and is expected to exceed RM 110 billion by this year, comprises nearly 40 percent of the digital economy. Interconnected capabilities of disruptive technologies are enabler for digital economy.

However, although interconnected capabilities of disruptive technologies bring many benefits, it also introduces a host of new vulnerabilities with far reaching implications. Disruptive technologies also have the potential to increase vulnerabilities to cyber-attacks which can lead to financial losses and disruptions to essential digital business and services. As the next generation of information technology is driving the digital economy, data has become a key asset as well as a new target for hackers. In 2017, cybercrime cost the global economy $600 billion. In 2018, the global financial damage exceeded $1 trillion, a 50% annual increase. Recent study by Microsoft in collaboration with Frost & Sullivan 2018 reveals that the potential economic loss in Malaysia due to cybersecurity incidents can hit a staggering US$12.2 billion, and indeed shows the potential impact on economic cost of cybersecurity breaches (Dashika Gnaneswaran, 2018).

This scenario emphasized that as the digital economy expands, so does the threat landscape. More efforts are needed to construct a comprehensive defence system at the early age of informatization, build the situational awareness systems, threat intelligence analysis and security operation platforms. In a digital world where cyberthreats are constantly evolving and attack surface is rapidly expanding, cybersecurity is becoming a compelling opponent against cyber-attacks, making it an increasingly vital element of any organizations' strategy. As the interconnectedness in the modern business environment has become more complex, digitally fuelled innovation has outpaced the ability to introduce adequate safeguards against cyber-criminals. This scenario lead to a real risk in which lack of safeguards could reduce the growth of the entire digital economy, hurting both individual companies and the economy.

In the context of this study, cyber security risk originates from the deep infiltration of IT systems and devices into business activities. Given the increased dependence on technology and the number of information and cyber-security breaches happening around the globe, organisations need to implement strategies to respond to security incidents accordingly. Therefore, cyber-security management must become an integral part of organisations' business strategies to scrutinise risks that may be associated to the business and ensuring that organisations are prepared to prevent or mitigate cyber security risks and breaches in their business environments. In this view, proper establishment of cyber security components will help protect organisations and reduce risks from both internal and external security threats.

Cyber security exposure on Malaysian businesses

Cyber security monitoring in Malaysia is proactively done by Malaysia The Malaysia Computer Emergency Response Team (MyCERT). MyCERT, one of Cybersecurity Malaysia's departments, serves as a benchmark for the country's Internet community in dealing with security incidents. MyCERT works closely with law enforcement agencies like the Royal Malaysian Police, the Securities Commission and Central Bank of Malaysia. MyCERT also collaborates closely with Internet Service Providers (ISP), network security response teams and numerous information security projects around the world (MyCERT, 2020).

For the recent year, the largest number of cyber-threatening incidents reported to Cybersecurity Malaysia were online frauds, with a total of 7,774 reports, followed by intrusions and intrusions attempt with 1,463 reports (MyCERT, 2019). The sources of incidents reported to MyCERT came from various parties in Malaysia and

abroad, including home users, private sectors, government sectors, industries, and cyber security organizations pro-active monitoring. The high dependence on the use of ICTs for the social, political, and economy spheres, has vulnerably increased the array of cyber threats around the world. Including Malaysia, as it is progressively pacing into becoming a global economic force, so thus its economy which is gradually transiting into a digital one. The danger that it is very rampant in the world that every digital economy faces cyber-assail threats or vulnerabilities, where cyber-criminals try to get involved in the intrusions of vital information belong to the government and private companies for fraud activities (Bakri Mat et al., 2019).

In this modern age, cyber-related fraud became the most prevalent form of cybercrime (Adnan Rizal Harris et al., 2017). In Malaysia cyber security exposure, online fraud cases mainly involves scams, phishing, or social engineering to mislead and obtain sensitive data and also intrusions which includes hacking or data breach attempts for personal and illegal economic gain is reported to high in numbers for the year 2019 (MyCERT, 2020). In accordance with the top cases in Malaysia cyber security landscape, the definitions of these cyber related to both threats are discussed as follows:

Table 1: Definitions of cyber intrusion and fraud

Threats	***Definition***	***Motives***
Intrusion	*Any kind of unauthorised activities that cause damage to an information system (Khraisat et al., 2019). This means intruder is gaining unauthorized access to a system- access to information belongs to particular individual or organization.*	*-political, personal, and economic gain.* *-to monetize stolen data on underground black markets.* *-impersonate someone financially.* *-competition - IP, blackmail, competitive intelligence, sabotage.* *-financial greed* *-financial difficulties* *-targeted data repositories (e.g., banks, retail companies, health care, cryptocurrency wallets and systems) that can be monetized*
Fraud	*An act of deceit by IT-experts/skilled person who use their expertise and computer resources to fulfil their selfish desires (Faisal Alanezi, 2015)* *For example, e-commerce frauds that are concerned more generally with fraudulent financial transactions linked to online retail sales, where businesses and clients are both victimized.*	

All these activities fall under Malaysia's COMPUTER CRIMES ACT 1997. Cyber Crime, also known as 'Internet Crimes' or 'Computer Crimes,' is any criminal activity that uses a computer as an instrument, target or means of perpetuating further crimes or offenses or offenses under any law (Binitha et al., 2007). According to Maziah Mohd Ali (2016), there are four major categories of cyber-crimes, such as cyber-crimes against individuals, cyber-crimes against property, cyber-crimes against organisations, and cyber-crimes against society. All these crimes ranges from individual attacks such hacking, email spoofing, spamming, cyber defamation and harassment, cyber stalking, to cyber-attacks on property such credit card fraud, intellectual property crimes includes software piracy, illegal copying of programs, distribution of copies of software, copyright infringement, trademarks violations and theft of computer source code. Apart from that, it is further recognized that cyber-crime against society can be in the form of forgery by computers and high-quality scanners and printers in currency notes, revenue stamps, mark sheets (Cybersecurity Malaysia, 2004).

While in digital economy the ecosystems require secured operating environment, the rising of cyber security challenges and its effect on-line digital businesses will be a major concern in the Malaysian digital economy climate. Based on this concern, a comprehensive discussion on strengthening a more inclusive landscape of cyber security management in Malaysia's business context for digital economy are exceedingly crucial. Particularly, needs for holistic view on how organizations can develop a comprehensive defence system, incorporating situational awareness systems, threat intelligence analysis, and effective security operation platforms and trust technology for digital economy is worthy and beneficials. This effort is in alignment to support the pervasive use of digital technology for National Digital Economic Initiative (Digital Malaysia) that eventually will allow a prosperous, sound, and safe economy for the nation.

Developing A Comprehensive Cyber Defence System for Digital Economy

As the Digital Economy takes the centre stage around the world, so thus the risk of cybersecurity threats. With threats becoming increasingly sophisticated, the need to handle it have grown exponentially and requires a very strong focus. Developing a comprehensive cyber defence system is an essential element to protect and enable digital economy. As reported in the Accenture 9th Annual Cost of Cybercrime Study 2019, the impact on organizations, industries and society from these cyber-attacks is significant (Bissell et al., 2019). In tandem with the growing amount of security breaches, overall cybercrime expenses for the business have been raised to a record peak of US$ 13.0 million in 2019, from US$ 11.7 million in 2017, an arise of 12% accumulatively for two consecutive years.

On the other hand, Asia Pacific (APAC) are also facing growing rates cybercrime and in recent years there have been instances of serious cyber security incidents reported in this region. According to a report by Marsh and McLennan companies (2017), Asia is 80 percent more likely to be targeted by hackers than other parts of the world. According to the report, the reasons for the comparatively higher cyber threat in APAC are twofold: one is because of the growing pace and scope of digital transformation, and second because the rising of vulnerabilities from the of growing IoT technology in businesses. Several recent high-profile cyber-attacks affecting several countries and industries throughout the region have highlighted the problem. The Figure 1 below exhibit some of the infamous APAC cybersecurity cases as highlighted in various sources for the past five years.

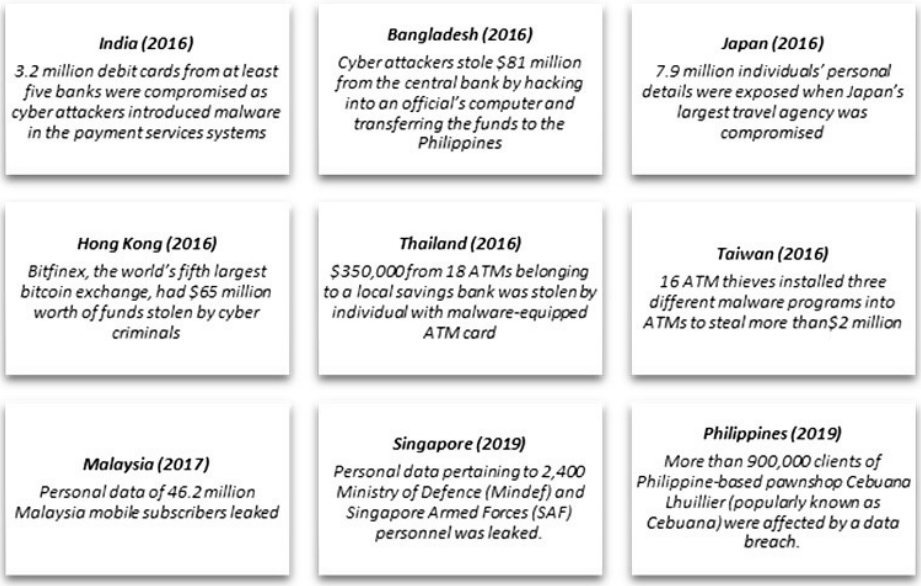

Fig. 1: Recent Cyber security cases in APAC
(source: Marsh and McLennon Companies Survey 2017)

From the reported cases, most were found to be financially motivated and economy related by its perpetrators. In this view, incidents in cybersecurity as illustrated in the APAC infamous cases may have very negative effects on numerous levels (individual, institutional, organizational, corporate, and national), causing direct financial damages at all levels. Based on the cases above, it is obvious that intrusions and data theft were among highly reported cases in APAC and has high impact on monetary and reputations of the organizations.

To combat cyber security, various approach has been discussed respectively at various levels. For example, administrative and coordinated approach such as international collaboration in protecting nation and defending against cybercrime, development of National Cybersecurity Strategy (NCSS), improvement of legal framework encompassing cyber security elements, enhancing cyber security investigation capabilities were all now globally implemented to battle security threats.

On the technical perspectives this study strongly implies that main root of cyber security incidents is often due to the poor management of information systems within the organization and lack of strong encryption mechanism in place for protecting critical data belong to the organization. In this view, a lower cyber security risk can be ensured

by having an effective and advance controls that has the capability to detect and cyber threats within the organization. According to Spremić & Šimunic (2018), security controls should be applied to detect and/or prevent unwanted events (unauthorized use, inaccurate data, ineffective processes, wrong algorithms or faulty system inputs etc.) or problems from external environment (external attacks, faulty data transmission, natural disasters, etc.). Application of emerging technology as part of logical security controls in this area is vital. New data encryption technology for example, could assist in preventing data breach and theft incidents that could cost millions of dollars to businesses.

Ability to analyse security events before it could happen is crucial. Detecting and analysing cyber security threats in real time for example could support business organizations in combating cyber security. Apart from that some new and emerging financial technology (fintech) such as Blockchain also can be considered as to offer a stable and efficient approach for cyber security and privacy protection (Schutzer, 2016). All organizations could benefit from the reduction in cybercrime cost enabled by further investment in advanced controls and technology in cyber security. Among technological approaches in combating cyber threats are Security analytics with big data and machine learning for threats detections and preventions, as well as Blockchain for fintech applications and anti-fraud. The Fig 2 below illustrates the proposed cyber defence systems for accommodating security needs of digital economy.

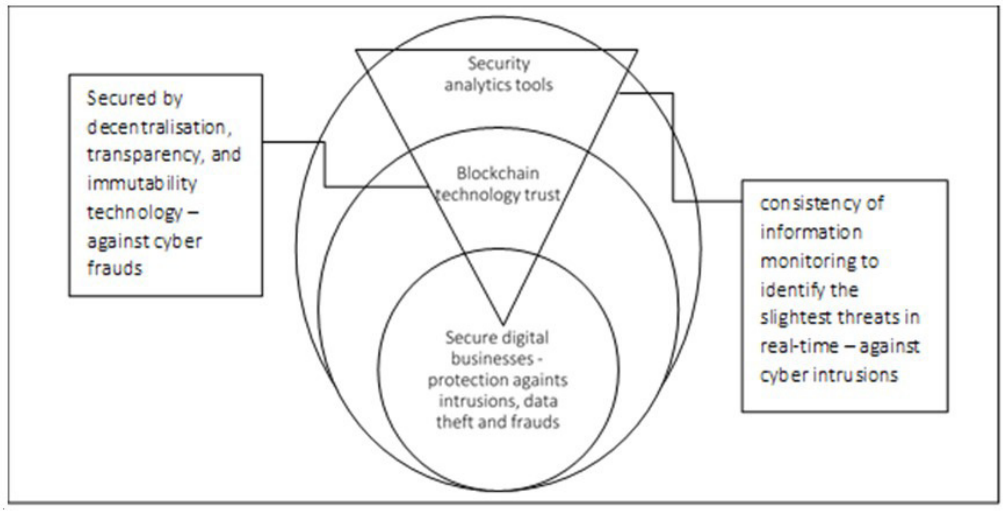

Fig. 2: Proposed layers of Cyber defence systems for digital economy

Security analytics with big data and machine learning

At its core, analytics entails the discovery, interpretation, and communication of meaningful data patterns. Relative to IS/IT, security analytics refers to the collective process by which a set of collected data, data aggregate, and analytical tools (software) are used for security monitoring and threat detection (Oprea et al., 2018). Ancient cybersecurity struggled to keep pace with attacker's new methods of penetration, and this is because it was difficult to predict threats of intrusion that was attributed to the then level of technological advancement (Cavelty, 2015). However, the case is different today, with modern day tools and techniques, Machine learning (ML) and Artificial Intelligence (AI) have greatly improved information security and cybersecurity in general (Das & Morris, 2018). ML is the application of AI that empowers systems to automatically learn and improve through experience as well as adapt to new patterns without intentional programming.

Big data is indeed one of the top reasons leading to improvements in the way decisions and transactions are made. The use of large-scale data and technologies available has contributed to innovation growth, an enhancement in delivery quality and value added across industries. In addition, the introduction of big data analytics and ML have revolutionised information security at an organizational and national level. Computer algorithm are used by these security tools to observe any abnormality or adjustment in data and their patterns. Because of the large data that is impossible to be manually analysed, ML uses algorithm to observe alterations in network traffic, endpoint and user behaviour data, cloud resources, business applications, Non-IT contextual data, Identity and access management

data, and external threat intelligence sources. Among other reasons, the goal of this is to fuel consistency in information monitoring and to be able to identify the slightest threats in real-time (Ford & Siraj, 2014).

Digital economy is focused on the interrelation between data, business value and business decision-making. With this digitization, more data will be consumed in the ecosystems offering more opportunities for business, human well-being, and the economic environment itself, if used effectively. Application of big data and business analytics within these ecosystems are significant and can pave the way towards digital economy (Pappas et al., 2018). Such ecosystems could facilitate competition, coordination, and co-operation between the various players to generate new possibilities for businesses and to fulfil the needs of customers. Additionally, it can also contribute to new market opportunities for entrepreneurs, innovators, and companies to build innovative digital based solutions, and are capable to assists in transforming agile and sustainable business model in this setting.

Despite advantages, with dependency upon internet-enabled business models, companies are more vulnerable to a wider array of cyberattacks and business disrupting events. Within that setting, the integration of cyber security into the given context will secure business data, which in turn creates trust in stakeholders, customers, and partners. For digital economy, security analytics that allow split-second insights into cyber risk in business environments is important for the organisation to rapidly eliminate it. With this technological paradigm of security intelligence and analytical platforms, organisations are able detect and analyse cyber security threats in real time, thus assists in a proactive ways of handling threats under a frequent changing business environment. This enables organisations to maintain their competitiveness and function in agile ways to success in the digital economy (Zaini et al, 2020).

Blockchain application to support technology trust in digital economy

Not literally, a blockchain is simply a chain of blocks that contains information. The term blockchain went wild after the renowned publication of Satoshi Nakamoto's bitcoin in 2008 (Nakamoto, 2008). In computer terms, a blockchain is a distributed database on multiple computer systems. Data is stored in series of blocks, hence the name (Sarmah, 2018). On the chain, each block is cryptographically identified with a unique alphanumeric that referred as "hash." Each block also retains the hash of the previous and next block on a chain, this creates timeline order for when each block is created and enables the sequential arrangements of the blocks (Ajao et al., 2019; Khairuddin and Sas, 2019). Today, blockchain transcends beyond the world of cryptocurrency down to cybersecurity. In the context of data and information security, blockchain provides a decentralised database with multiple nodes (servers and systems). In blockchain, data is stored in a form of ledger on all nodes, but it is presented as single copy and every node on the network has real-time access to it. Although there are studies highlight that blockchain could be threaten by the selfish miner's attack (Eyal & Sirer, 2018; Sapirshtein et al., 2018). There is however limited empirical evidence to proof that the chain is successfully breakable. This makes it near-impossible to delete or tamper with any data because all the nodes on that network will reject the tampered data and restore the original copy from over 50 percent of the nodes. Therefore, to successfully hack into a chain of blocks, a hacker must manually access more than 50 percent of the nodes on a network and make the same changes on a data. This, however, is impossible as there are thousands of nodes on a chain (Taylor et al., 2019).

The main keys that lured cybersecurity to adopt the cryptocurrency's blockchain are its decentralisation, transparency, and immutability. Decentralisation enables a single copy of to be stored on multiple databases but appear to all its users as a single entity. Any authorised alteration of a copy of the data on the network will be implemented on the whole node. Decentralisation eliminates the risks of data loss or inefficiency in an event where system upgrade is necessary. Blockchain transparency lies in the ability of the blockchain's mining work to timestamp each transaction (data creation and alteration), identify the user who initiated the transaction, present a prior state of a block before alteration, and then match the new chain against others on the network (Khairuddin and Sas, 2019). This makes it difficult for hackers to gain access to the blocks as each transaction must have a registered node before it can be validated. Immutability is believed to the strongest capability that a blockchain has. For each data or information stored in a block, a hash is created to identify the block, the hash determines the position of a of block on a chain, an addition or deletion of a data in a block automatically changes the hash code, thus crumbling the whole chain (Puthal et al., 2018)

In digital economy, application of blockchain is foreseeable to act as a platform to facilitate the exchange of digital assets and service over the internet via decentralized and transparent ledger. In e-commerce sector for instance, the C2C or consumer to consumer concept of purchase is mostly supported by the trusted escrow service with extra fee to the buyer and seller to ease the payment and exchange of goods. However, with the strong characteristics of blockchain including transparent, decentralized and ease of use, the application of this technology could eliminate the function of third party between those transaction (Sas and Khairuddin, 2017). Blockchain allow seller and buyer to make peer to peer transaction by creating a digital token embedded with a smart contract with the agreed terms

on its' transparent ledger for them to trace and track the movement of payment as well as goods (Khairuddin, 2019; Hu, et.al, 2019). Hence, it does not require both parties to pay any extra fee for the transaction as well as promote trusted exchange in digital economy. In this case, any sorts of fraudulent can be eliminated when both parties doing their businesses online.

Implications and Conclusion

This work addresses the needs for a comprehensive, coherent, and empirically tested study to be conducted to assess the requirement of new and emerging cybersecurity technology to fit into digital economy framework. As there is a dearth of research on the status and perception of cybersecurity management by digital business organizations, particularly in developing countries, such study is considered timely and could add an empirical evidence to Cybersecurity research. As a country that is moving towards digital economy, the findings of subsequent study are especially important as they may greatly empower the nation towards sustainable development and better economy. Cybersecurity management must be an integral part of this. Consequently, it allows this nation to improve economic growth and become a highly developed nation in 2050 through the competitiveness of business entities and organisations locally and globally. Future works on exploring the suggested cybersecurity technology; security analytics and blockchain as part of cyber defence layer for digital economy is vital and require urgent deliberation by researchers in this area.

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Region Scientific and Technological Development: Main Factors and Their Systematization

Marina DMITRIEVA,
Reshetnev Siberian State University of Science and Technology, Krasnoyarsk, Russian Federation, e-mail: dmiml@mail.ru

Yuri ERYGIN
Reshetnev Siberian State University of Science and Technology, Krasnoyarsk, Russian Federation, e-mail: yuri_erygin@mail.ru

Marina SAVELYEVA,
Reshetnev Siberian State University of Science and Technology, Krasnoyarsk, Russian Federation, e-mail: mvsavelyeva10@yandex.ru

Galina YURKOVSKAYA
Reshetnev Siberian State University of Science and Technology, Krasnoyarsk, Russian Federation, e-mail: yurk7@mail.ru

Abstract

The article represents the issues of systematizing various factors of the region scientific and technological development, as the basis of scientific technological and social economic development of individual regions and the country as a whole. The research significance is determined by improving the tools of strategic planning and management decision-making at the regional level in accordance with the requirements outlined in the "Strategy for scientific and technological development of the Russian Federation" approved by the Decree of the Russian Federation President.

Keywords: Scientific and Technological Development, Scientific and Technological Potential, Development Conditions, Development Outcomes, Factors of The Region Development.

Introduction

The globalization of the economy and markets, increased competition result in reducing the life cycle of products, increasing their technical complexity and demanding requirements for the level of quality; it necessitates the adaptation of economic entities at all levels to the rapidly changing macroeconomic conditions through the continuous development of science, technology and introduction of innovations. The fast digitalization of all spheres of human activity contributes to rapid spreading new products and technology, shortening the stages of the innovation cycle, developing international cooperation and integration in the field of technological innovation.

Effective innovation activity is the basis for reproducing scientific and technological potential, creating conditions for the formation and development of high-tech production, increasing the competitiveness and investment attractiveness of entities, both at the level of enterprises and at the level of countries or their individual territories (Gulin, K. A., Mazilov, E. A., Kuzmin, I. V., Alferyev, D. A., Ermolov, A. P. (2012)).

Approved by the Russian Federation President Decree dated 01.12.2016 No. 642, the strategy of scientific and technological development in the Russian Federation determines the necessity to focus on an innovative way of development to ensure long term sustainable, dynamic and balanced development and competitiveness in the world market of Russia. The document defines scientific and technological development as "the transformation of science and technology into a key factor in the development of Russia and support of the country ability to respond to major challenges effectively" (Putin. V. V. (2016)). An important role in this process is assigned to the regions, since their socio-economic, scientific and technological development determines the level of economic and innovative development of the state as a whole. Therefore, at present the issues of scientific and technological development of

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the regions are becoming more and more urgent (Belyakov, G.P, (2020), Oveshnikova, L.V.a, Sibirskaya, E.V.a, Tenetova, E.P.a, Kuznetsova, N.P.b, Grigoryeva, M.O.a, (2020)).

Systematizing factors of the region scientific and technological development

The research considers scientific and technological development to be "qualitative changes in the technological background of the territory economy, leading to economic growth, based on the development of science, the creation and use of advanced technology, the production of high-tech products" (Belyakov, G.P, Kochemaskin, A.N. (2014)). The definition highlights the region scientific and technological development as a part of its innovative development forming in the sphere of science and high-tech product manufacture.

Currently there are 85 regions in Russia, where the scientific and technological development is at different rates. This is influenced by natural climatic conditions, the availability of natural resources, demographic characteristics, industry specialization, the level of development of industrial production and digitalization, the provision of transport and energy infrastructure, the level of scientific and technological development, the level of education, the degree of integration of the industrial sector and innovation infrastructure inside the region and beyond, the population standard of living and many other factors (Gokhberg, L. (2020)).

The factor arrangement resulted in three main interconnected factor groups having an impact on the region scientific and technological development (fig. 1). The selected factor groups are:

– region scientific and technological potential;
– conditions to use the region scientific and technological potential;
– effectiveness to use the region scientific and technological potential.

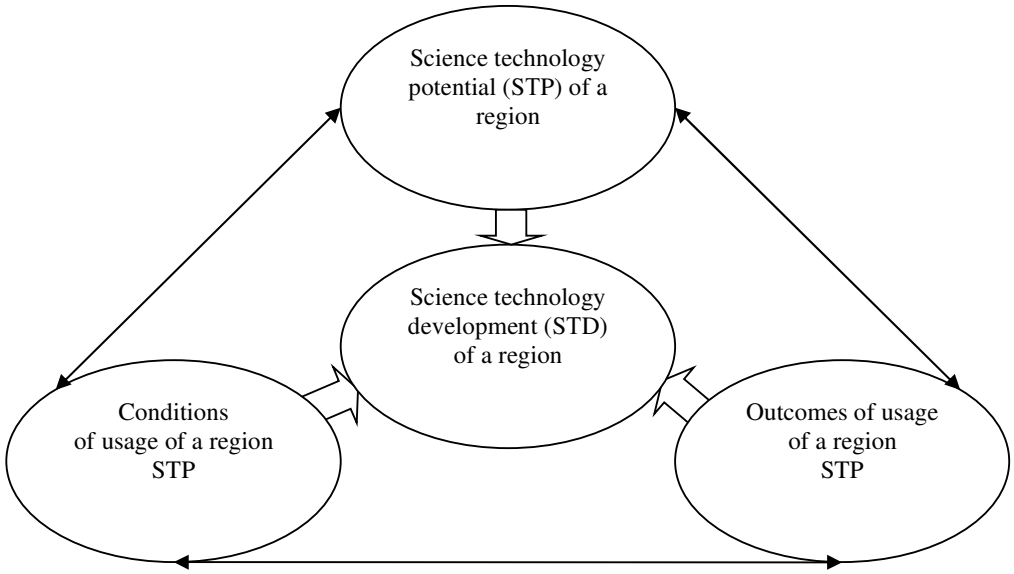

Fig. 1: Interrelation of factor groups of scientific and technological development

The scientific and technological potential (STP) of a region is a combination of various types of resources: human, material and technical, non-economic, information, organizational, managerial and financial used by the subjects of innovative activity - enterprises and organizations, within the framework of certain types of economic activities of the region at the stages of creation (field of science: fundamental and applied research, experimental design) and use (field of production: introduction and commercial transfer) of technology. The range and effectiveness of the use of the scientific and technological potential of a region depends on the conditions created in this territory for its implementation.

The conditions to use the scientific and technological potential of a region are determined by the combination of external and internal factors that contribute or hinder implementing the scientific and technological potential of

certain areas in a given territory. These factors can be grouped into the following terms: natural and climatic; market-based; institutional; general infrastructure; innovation infrastructure.

Some of the factors determining the conditions are objective in nature and they are taken for granted, since they cannot be influenced, or the range of influence could be insufficient; other factors are influenced by the regional development management system. Well-coordinated and effective work of the federal and regional authorities will contribute to the transition to a qualitatively new level of regional scientific and technological development as well as the involvement of the private sector in this process through interest in innovations and advanced technology. The better the conditions to develop innovations, the higher the innovative activity, investment attractiveness, intensity and efficiency of the use of the regional scientific and technological potential, both within individual territories and the region as a whole.

The effectiveness of the use of the regional scientific and technological potential reveals the results obtained due to the efforts by all subjects of innovation activity, as well as federal and regional authorities to ensure their effective interaction, to create favorable conditions to develop technological innovations. The main outcomes of using the regional STP are the created volumes of GRP and GDP. The nature of this group factors lies in the formation of the basis for the subsequent scientific and technological development, both of individual subjects of innovation activity, and of the region as a whole.

Therefore, the research proposes systematization of the factors influencing the scientific and technological development of the region; it is based on a number of provisions:

1. Scientific and technological development (STD) of a region is determined by the scientific and technological development of certain types of the region economic activities (hereinafter referred to as directions) and is reflected in the results of using the region scientific and technological potential (STP).

2. Each direction corresponds to the type of economic activity according to OKVED2, carried out by economic entities of the region in the field of science and the manufacture of high-tech products.

3. STD of each direction is influenced by three groups of factors related to:

– scientific and technological potential of the direction (STPd);
– terms of STPd use;
– the effectiveness of STPd use.

4. Scientific and technological potential of the direction is formed at the following stages of the technology life cycle:

– development, including the stages of fundamental and applied research, research and development;
– use implying the introduction of a new technology into manufacture and its commercial transfer.

5. At the stages of developing and using new technology, the scientific and technological potential of a direction is formed by the subjects of innovative activity, functioning within the framework of this direction. As a result, the following can be distinguished as separate elements of the assessment:

– scientific and technological potential of innovation subjects in the scientific sphere;
– scientific and technological potential of the innovative activity subjects in the sphere of manufacture of high-tech products.

Figure 2 illustrates the provisions of the proposed approach.

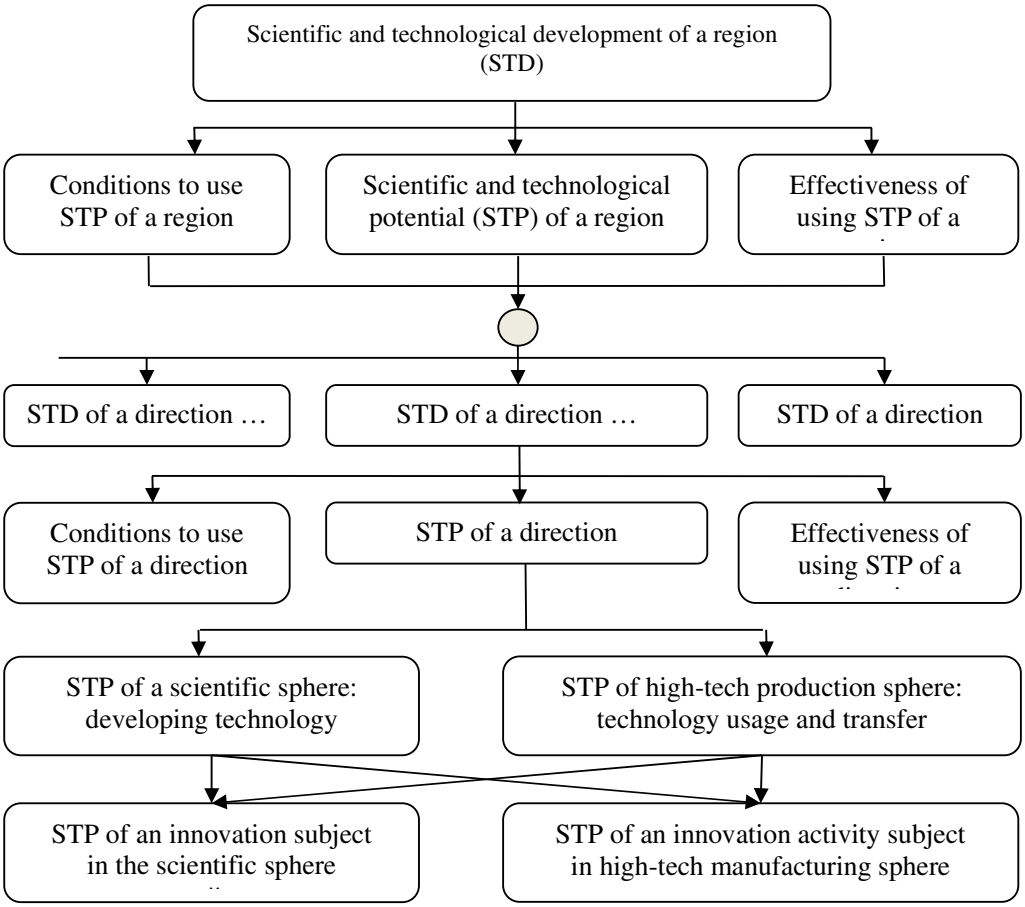

Fig. 2: Approach to the systematizing groups of factors of the scientific and technological development of the region.

The proposed systematization includes factor decomposition based on two features:

– on the selected factor groups related to the scientific and technological potential of a region, the conditions to use scientific and technological progress, the effectiveness of the use of scientific and technological potential;

– on the character of impact: external and internal.

The more detailed research proposes the groups of factors influencing the scientific and technological development of a region; table 1 demonstrates individual factors identified and systematized.

Table 1: Factors of region scientific and technological development

Group	Factors	
	External	Internal
Scientific and technologcal potential of a region (STP)	– global and national level of technological innovation development; – the degree of cooperation and integration of subjects of innovation in the global and national markets	– level of the material, technical and technological base of the regional industrial complex; – availability of joint ventures with foreign companies; – provision and of qualification level of managers, engineers and workers at scientific and industrial enterprises; – internal costs for research and development; – digitalization level at scientific and industrial enterprises; – patent and inventive activity in a region; – commercialization level of technological innovations.
Conditions of using STP of a region	*Natural and climatic:* – features of natural and climatic conditions of a country. *Market-based:* – demand for technological innovations nationally and globally; – national investment climate; – global and regional private sector interest in technological innovations. *Institutional:* – government policy in the sphere of scientific and technological development; – strategy of the national scientific and technological development; – government support of innovative and scientific and technological activity. *General infrastructure:* – structure of the national economy; – geographical location of a country. *Innovative infrastructure:* – national development and efficiency of the innovation infrastructure.	*Natural and climatic:* – natural and climatic conditions in a region; – availability of natural resources in a region. *Market-based:* – demand for technological innovations in a region; – investment potential of a region; – private sector interest in technological innovations in a region. *Institutional:* – regional policy in the innovation development; – strategy of the regional scientific and technological development; – regional support of innovative and scientific and technological activity. *General infrastructure:* – specialization and cooperation of enterprises of the industrial complex in a region; – cooperation range of scientific organizations, centers and universities; – availability of scientific organizations, centers and universities; – development and efficiency of the financial and credit system, transport, energy and social infrastructures in a region; – educational level of the employable population of a region; – personnel motivation system for the development of technological competencies. *Innovative infrastructure:* – development and efficiency of the region's innovation infrastructure; – integration of innovative infrastructure range in a country and a region.
Effectiveness of using STP of a region	– total GDP; – GDP per capita; – national salary level.	– total GRP; – GRP per capita; – regional salary level; – value of the additional cost from the creation and use of technological innovations; – export effectiveness of high-tech products and innovative technology; – publication activity in the sphere of technological innovation in a region.

Presented in the table, the factors demonstrate that the scientific and technological development of a region can be represented as a system complex of interrelated subjects and the conditions of their interaction; together they form the outcomes of the region scientific and technological development. To create a stable positive trend in the scientific and technological development of a region, the dynamics of changes in factors amenable to influence must be uniform, progressive and homogeneous, since it is almost impossible to compensate for the lack of other resources and conditions with an excess of individual resources and conditions in a region.

Conclusion

The identified and systematized factors are the key to understanding and formulating the fundamental principles to evaluate the scientific and technological development of a region. The principles could become the basis to form an indicator system and to develop evaluation methodology for the scientific and technological development of a region in the authors' further research.

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Formation of A Strategic Management Model for Enterprises on The Basis of a Fractal Approach

Svetlana DROBYAZKO
Doctor of Economics, Professor, President of the European Academy of Sciences, London, United Kingdom
svetlana.drobyazko@yahoo.com

Yuliia MELNIKOVA
Senior Lecturer, Dnipro University of Technology, Ukraine
melnikova_yuliia@ua.fm

Abstract
Based on fractal theory and the provisions on fractal structuring concerning socio-economic systems, the essence of the restaurant business has been defined as a complex, unstable, self-similar, fractal production and service system that seeks for self-development; a conceptual model of the system of the restaurant industry functional fractal determinants (range, technology, management, marketing, development dynamics and hierarchy) and a fractal model of the restaurant industry by organizational approach have been developed (person, position, unit, enterprise, merger of enterprises (network, cluster) restaurant services market). On the basis of the basic evolutionary principles system (necessity, sufficiency, controllability, self-organization, variability, structural-functional systematic, unity and infinity), a hierarchy of enterprises fractal determinants in the restaurant industry was formed.

Keywords: Fractal Theory, Strategic Management, Hierarchy, Determinants, Development.

Introduction

Fractal as an independent structural unit of the enterprise in the process of functioning set and formulate their tasks. Fractals can change, reappear and disintegrate. The peculiarity of fractals is their self-organization, which results in clusters occurrence. The clustering condition is the absence of external pressure and the formation of a common goal for the cluster as a higher-level organization system. Fractals also have centralized functions that are related to the special data that cannot be stored permanently in subfractals. An important point in demonstrating the feature of fractal self-organization is that good ideas come true no matter where they came from. Therefore, one of the most important requirements for an official, unit or enterprise within a merger, as a "fractal factory", is their ability to entrepreneurial thinking and activity.

Fractal does not always remain in the superfractal system, it can also become completely independent. Thus, the closely related companies occurs.

Literature Survey

Modern scientists distinguish separate rigid self-similarity regarding invariance of large-scale transformations and non-rigid (covariant) (Aguinis, H., Edwards, J. R., & Bradley, K. J. (2017)). That is, we are talking about linear and nonlinear fractals. The first is characterized by absolutely accurate adherence to the principle of self-similarity. In nonlinear fractals, the affine principle is maintained with less intensity.

Analysis of the literature allows us to formulate the major feature of fractals - self-similarity, which can be traced at any level of the functional hierarchy (Arsenyev, Y., et al. (2019); Drobyazko, S., et al. (2020)): striving for optimal organization of functional relationships; setting boundaries; formation of central structures; maintaining the fractal structures integrity; ensuring a certain defined development time (cycle); formation of periphery and formation of attractive goals.

The study of socio-economic processes should be based not on the geometric concept of self-similarity (fractality), but on its structural and essential content, that is, rather, on the fractality principle (Hitt, M., & Duane Ireland, R. (2017)). In this case, fractality can be viewed from two interrelated positions: the fractality of the systems (their

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structures, elements) involved in the process, and the fractality of the processes that determine the level of enterprise development.

Identifying self-similar structures gives new opportunities to manage the ability of choosing priorities based on the concordance of internal and external resources with the influence of environmental factors, of the external environment, which determines the scientific task of finding effective mechanisms for strategic management of the development processes and self-development of restaurants (Meyer, G. D., Neck, H. M., & Meeks, M. D. (2017)).

An important feature of fractals is their small dimension, the value of which for economic units is determined the following ways (Durmanov, A., et al. (2019)): the area of dimensional resources; functional and structural features of production and service; the goals and tasks of the enterprise, as well as it`s history.

At different hierarchical levels (region, enterprise, part of enterprise) it is possible to identify self-similar dimensional socio-economic structures and self-constructing ones, which have similar trajectories and elements of development (production, service, sales, cash flows, social, cultural, etc.) (Trigeorgis, L., & Reuer, J. J. (2017)).

Methods

The following set of general scientific and special research methods is used in the work: logical analysis - when constructing the logic and structure of work; systematization and comparison - to clarify and order the conceptual apparatus for strategic management of restaurant business; methods of data grouping and generalization - in the calculation of strategic development indicators by the group of selected enterprises for the restaurant industry; systematic and process approach - to substantiate methodological support for assessing the level of strategic management effectiveness of enterprises and its components.

Results

Based on the taxonomy method, it becomes possible to construct a generalized assessment of a complex entity, such as restaurant business or process, such as strategic management.

Relevant indicators are selected for assessment and further usage in the process of strategic management of the restaurant business according to the proposed fractal structure (Table 1).

Table 1: Fractal structure of the indicators system for assessment of strategic management effectiveness (author's development)

Fractal level	Fractal determinants of the enterprise	Strategic task	Indicators
Higher potential	Competitiveness	Ensuring the competitiveness of the enterprise and the effectiveness of strategic management	Effectiveness of the strategic management
Hierarchy	Hierarchy	Obtaining and consolidation of the enterprise in a certain hierarchical place in the industry and inter-branch space (type, network, format, cluster)	Profitability
Evolution	Dynamics of development	Providing the necessary dynamics of the enterprise	Rate of the turnover change
System composition	Marketing	Ensuring maximum compliance between supply and demand	Turnover Turnover in place
Information (energy information)	Management	Ensure maximum compliance between the subject and the object of management	Labor productivity Completeness of strategic management functions implementation

Energy	Technology	Optimization of service technologies and production of goods, as well as effective functioning of providing structures	Quality of service Production quality
Elements	Assortment	Optimization of the assortment, improving the quality of restaurant products	Menu compliance with customer expectations Quality of restaurant products

Assessment of the strategic management effectiveness, which is carried out using taxonomic analysis by defined indicators, makes it possible to rank enterprises.

The fractal approach allows to distinguish the rates at six fractal levels and to gain a fractal profile of the strategic management effectiveness in the field of restaurant business.
An important step in the strategic management process is to determine further directions of the enterprise`s development. In order to achieve this goal, the environment changes are forecasted in an optimistic, realistic and pessimistic scenario. Based on the evaluation of the strategic management effectiveness and the determination of the enterprise`s rank, it becomes possible to determine the optimal boundaries of the forecasted goals.

The major indicators in solving this problem are the indicators of the strategic management of the in the group within the companies under study, the outsider, as well as the enterprise that is the object of research. Goals due to the realistic prediction may lie between the levels of the research entity and the enterprise-leader. According to optimistic forecasts, fractal effectiveness indicators will exceed the level of the leader. According to the pessimistic forecast fractal effectiveness indicators will be lower than those achieved by the enterprise - the object of study (Table 2).

Table 2: Opportunities of fractal levels strategic development in the field of restaurant business according to different forecasts (author's development)

Forecast	Fractal levels of the enterprises in the field of restaurant business					
	1 Assortment	2 Technology	3 Management	4 Marketing	5 Development dynamics	6 Hierarchy
Optimistic	Exceeding the leader level by a certain group of enterprises or reaching the level of a leader by a certain group of enterprises					
Realistic	Reaching the leader level for a specific group of enterprises or maintaining the existing level of a company in a specific group					
Pessimistic	Maintaining an existing enterprise level by a specified group or reducing an existing enterprise level by a specified group					

However, this applies to indicators whose values are largely depend on consumer preferences. No one will reduce the quality of products, services and strategic management by the law of self-preservation. Strategic enterprise management includes the process of forming aim system. Achieving (maintaining) a certain level of competitiveness is a higher level aim.

Analysis of research regarding goal setting and strategic planning shows the diversity of approaches and classification systems of goals. In our opinion, the goals of the second hierarchical level should be grouped in three directions: improvement of structure and quality of goods, improvement of market relations, as well as optimization of internal resources.

For each direction, the goal is specified by the certain parameters - the nature and pace of change in the quality or amount of the object. Thus, for restaurant products, the technical and economic characteristics of quality are determined, as well as the period of its achievement. Target consumers, volume and specific weight are important for the market.

The second level goals are specified in the third level of the "goal tree". Thus, the direction of improving the "status" of a product is specified by improving product`s quality in accordance with the changed norms and

determining an adequate price. The direction of work concerning the market is specified by the work on market research and measures of influence on the market (advertising).

With regard to internal resources, it is advisable to clarify the obtaining methods of all types of resources (raw materials, equipment, information, finance, personnel, organizational and management resources, etc.), as well as establish their interaction within technological processes, and organize a strategic management system.

Personnel should be distinguished as a separate third-level aim due to it`s special nature. The created hierarchy of goals regarding the restaurant business becomes an important condition for choosing an effective algorithm of actions. The interaction of these elements is basic for a system (person, unit or enterprise) to achieve a high level of competitiveness.

Discussion

Taking into account the multidimensionality of the enterprises activity, as well as the fulfillment of special basic and additional functions, a conceptual model of the system of functional fractal determinants in the restaurant industry has been developed. Its essence lies in the hierarchical organization of fractal determinants (assortment, technology, management, marketing, dynamics of development, hierarchy), united on the basis of evolutionary principles, and a fractal model of the restaurant business by organizational approach (person, position, unit, enterprise, organization) merger of enterprises (network, cluster), restaurant services market).

Based on the strategic management analysis, it is proposed to define it as an activity that aims to create competitive advantages, achieve sustainability and flexibility of the enterprise in the long run due to human potential with the predominance of proactive management style, development and implementation of effective strategies that provide not only necessary reaction, but also capable of influencing the environment, based on the vision of the enterprise future image and due to the high dynamic organizational capabilities of fractal determinants to self-development. Taking into account the structure of the strategies as well as the main content and types of strategic activities, a list of strategic functions to be implemented by the restaurants is proposed.

Conclusion

Using fractal theory, the decomposition of the restaurant management system into main components was performed, which made it possible to form a system of qualitative (quality of restaurant products, concordance between menus and consumer expectations, quality of goods and service) and quantitative (completeness of strategic management functions, productivity, turnover, turnover per 1 seat, rate of change in turnover, profitability) strategic management performance evaluation indicators.

Taking into account, the high degree of uncertainty and variability of the environment, it is recommended to formulate an impact forecast of business environment factors using an optimistic, realistic and pessimistic scenario. In order to respond adequately to the environmental impact, for each variant of the forecasted scenario, expedient strategic development boundaries were outlined, which focus on the enterprise's own achievements and the achievements of the leader of the respective restaurant enterprise group.

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Determinants of The World Investment Market Development in The Context of Global Transformations

Henryk DZWIGOL

Ph.D., Habilitated Doctor in Economic, Silesian University of Technology, Poland
dzwigol_h@poczta.fm

Mariola DZWIGOL-BAROSZ

Ph.D., Habilitated Doctor in Economic, Silesian University of Technology, Poland
dzwigol_m@poczta.fm

Abstract

It is stated that investment is a factor of economic growth only if the financial system and real sector of economy interact closely, when financial flows of a cumulative, speculative, short-term nature gradually turn into long-term business investments. Financial markets development of the world countries and strengthening the role of in the global investment process has a complex nature and requires addressing many issues in the process of further economic transformations. Determining innovative direction of investment activity in the world countries is realized through the calculation of the relationship between the volumes of high-tech goods export and volumes of net portfolio investments at current prices for the period 2010-2016 in 130 countries.

Keywords: Economic Growth, Investment Market, Global Transformations, Net Portfolio Investments, Institutional Environment.

Introduction

The problem of financial markets further development of the world countries and strengthening the role in the global investment process has a complex nature and requires addressing many issues in the process of further economic transformations. Creating a favorable investment climate, building an effective financial market model, providing conditions for transforming savings into investments and moving investment capitals to the real sector of economy should be considered as components that will reverse negative trends in the national economies development and allow the country to enter the path of sustainable economic growth, despite unfavorable external factors and global environment at the same time.

The link between the economies of individual countries is growing in the context of globalization of the world economy, both in the field of production and dependent movement of capitals in the form of foreign investments, increasing rapidly and leading to the transformation of the world investment market, in the process of which becomes more urgent the need for the development of an institutional environment that supports a highly liquid and transparent market and provides opportunities for free and effective international movement of capitals.

The purpose of this work is to deepen the theoretical and methodological bases of research on the development of the global investment market in the context of global transformations.

Literature Survey

Global transformations lead to certain transformations that affect the entire planet. These transformations may be independent of humanity, objective nature or may be caused by subjective purposeful actions of certain participants in these transformations (Nur'ainy, R., & Adipati, N. M. (2018, October)). So, the process of globalization is a rather contradictory phenomenon in the world space (Nurianto, R. S., & Fata'al Chuzaibi, A. (2019)).

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The essence of the process is expressed within the limits that contribute to improving the efficiency of the world economy, economic and social progress of humanity (Dollar, D. (2017)).

But from another point of view, the forms of manifestation of these borders can sometimes infringe on the interests of the general population of the whole world, as well as individual countries that are not members of the states "club" of the "Golden billion" (Thede, S., & Gustafson, N. Å. (2017)).

The study of the processes of international capitals movement is of the greatest interest in the context of financing the world economy. Indeed, with the development of society, the relationship between the economies of individual countries increases, both in the field of production and dependent movement of capitals in the form of foreign (foreign) investments increase rapidly (Morris, M., & Staritz, C. (2017)).

Today, industrial capital is actively developing the world economic space through investments, that express the immanent flexibility of capital, the ability to combine or consistently use various forms and methods of foreign economic financial expansion, the ability to adapt to variable economic, socio-political and legal conditions in different countries and groups of countries(Perraton, J., & Spreafico, M. R. (2019)).

Investments are the most important resource source for the development of the country socio-economic system, determine the process of economic development in general, and affect the deepest bases of economic activity, the scales, structure and effectiveness determine the state, prospects and competitiveness of a country's economy (Chen, P., Karabarbounis, L., & Neiman, B. (2017)).

Investments with different national origins are intertwined and interact with each other (McSparren, J., Besada, H., & Saravade, V. (2017)).

They form international flows and develop into global investment resources that function in the global investment space (Sondermann, D. (2018)).

The development of market relations, the formation of a new ownership structure, change in the management system, the expansion of economic independence and other manifestations of global transformations of the world economic system require the search for and application of new methods and approaches to regulating the economy (Lee, T. K., Cho, J. H., Kwon, D. S., & Sohn, S. Y. (2019)).

Thus, the distinctive features that form the market approach to understanding the essence of investments are considered:

First, linking investments and generating income that acts as a motive for investment activity (Cho, S., & Kurtz, J. (2018));

second, consideration of investments in the relationship of two aspects: resources (capital values) and investments (expenses) (Capolupo, R. (2018));

third, the analysis of investments in dynamics, which allows to combine within the category "investments", on the one hand, resources, investments, and on the other – the return of money invested as a motive for this association (Somer, M., & McCoy, J. (2019));

fourth, the inclusion of any investments that give an economic or other useful effect in the investment objects (Tsai, I. C. (2017)).

Recognizing the significant contribution of scientists to the development of economic researches on this issue, it can be stated that the global determinants of the world investment market development as an immanent feature of the world economy functioning and the basis of spacial asymmetries in the world economy system remain poorly studied direction of modern economic science.

Therefore, despite the depth of contemporary research issues associated with complex generalization of preconditions, reasons and factors of asymmetric development of the global investment market, which define special influence on the state of the world economy, imperfect formation practice of balanced investment policy of the country, the investment attractiveness and conditions of full integration into the global investment space indicate the need for further developments in this direction.

Methods

Scientific statements, conclusions and recommendations are fully justified, which confirm the existence of a logical relationship between the formulated tasks and obtained results, reasonableness of theoretical conclusions, the use of a wide volume of statistical material and methods of scientific research.

The information and statistical bases of the study were results of the researches, monographic and other publications of scientists, official statistical and analytical materials of international organizations (groups of World bank, WTO, IMF, UNCTAD), expert valuations of rating agencies, materials of international information agencies, legislative and regulatory documents, statistical data of the European Commission.

Results

It is being formed industry 4.0- the era of innovations, when advanced technologies are radically changing entire sectors of economy at astonishingly fast rates at the present stage.
One of the most tangible aspects of the fourth industrial revolution is the idea of "service-oriented design". It can range from users who use factory settings to produce the products, to companies that deliver customized products to individual consumers.
However, when implementing the industry 4.0 concept are envisaged key issues – standardization, labor organization, availability of technologies and sufficient funding.

So, for a smooth implementation of" Industry 4.0", it is necessary to take the following measures:
providing affordable services in the network infrastructure and supporting them with international standards and policy- both national and global;
gradual replacement of old static, non-dynamic systems with new ones that work in real time and are service-oriented.;
creating new business models;
attracting employees from the beginning of modernization processes, improving the skills and technical development.

Institutional, spacial and structural transformations of the economic environment stimulate investment processes of development in an innovative direction. Innovation activity of countries in open economy is determined by the direction of global development and the desire to accumulate competitive advantages for long-term economic growth. Knowledge and information technologies form the environment for the formation of a post-industrial society and the corresponding level of production of knowledge-intensive goods and services. This process is accompanied by the emergence of fundamentally new management systems and contributes to the spread of network forms of organizational interaction of economic structures, including the Internet space. Policy to support the competitiveness of countries that set goals for sustainable socio-economic development based on the systematic use of investment factors and uniform special placement of innovation infrastructure.

The relationship between investment activity and scientific-technological progress has several aspects. The most important of them is to consider investments as a kind of catalyst for scientific researches, which is especially important in the conditions of turning science into a direct productive force of society. In this regard, it is necessary to form a model of financing economic growth based on innovations, which creates the possibility of developing the real sector of the economy on the basis of the latest achievements of the STP and forming an optimal structure of social production.

Investment activity currently plays a crucial role in ensuring sustained and high-quality economic growth. In this regard, we believe that the important moment is the country's ability to mobilize not only the internal but also external investment opportunities and resources.
Innovative activity is an engine of economic progress, a catalyst for economic growth and development. Today, the increasing factor of resources efficiency and business based on SRRCW and innovations has taken the first place, which has led to the formation of concepts of the innovative type of economic growth. This type of growth, to which developed countries have moved, is based not on the production and consumption of material goods, but on the creation and consumption of information products, that is, high-tech products. This means that this type of growth is not related to the "cost-output "problem and determined by the degree of information consumption. The main sources of such economic growth are innovations and accumulation of human capital.

Therefore, investments in innovation activity can be considered as one of the most important factors of the country's economic growth, the formation of an innovative economy.

Three fundamental measures can be attributed to the set of measures necessary for the formation of an innovative economy in the country: a) increasing the volumes of SRRCW financing and investment, improving the mechanisms; b) active use in practice of indirect methods of financial support for the innovation environment – tax incentives, customs preferences, targeted lending, leasing, state guarantees; c) formation of innovative clusters with subsequent targeted funding from the state and foreign investors.

There is a need to prioritize measures that serve as the basis for the development of innovative technologies in the context of global transformations of the world economy. Thus, investments in innovations is a central priority and main means of developing new technologies, which in turn is a catalyst for increasing activity in the global investment market.

We should consider such indicators as the volumes of venture investments in innovative technologies according to the rating of global investment index, the volumes of international investments in scientific-research and research-construct industries, that is, those that are based on knowledge ((R&D); global trends in global venture investments in innovation by sectors to study the innovative component of the global investment market.

The volume of investments in other innovative technologies, such as commercial services, recreation services were not stable during the study period 2013-2018. High volumes of investment in this industry were recorded in 2015 (21 % of total investments in innovation), 2018 showed a two-percent investment decline to 17.6 %.

Thus, the software remains the leader among the industries of innovative technologies in the global investment market, which consistently receives a share of venture investments in the amount of 35 to 47 percents. The main directions that are developing, are energy and media technologies, which together account for 12.6 % of global venture investments in 2018. Negative trend is observed in the investment of developments related to computer fitment: venture investment of such projects in 2018 decreased by half compared to the relatively high indicators of 2013 (up to 6.3 %).

We calculate the relationship between such indicators as to determine the innovation direction of investments in world countries:

export of high-tech goods, mil.dol USA, 2010-2016;
net portfolio investments at current prices, mil.dol USA, 2010-2016.
The results of the calculation are shown in Table 1.

Table 1: The results of correlation analysis*

Name of country	Coefficient	Name of country	Coefficient	Name of country	Coefficient
Australia	0,376	Kazakhstan	0,686	SA	0,314
Austria	0,694	Cameroon	0,105	Peru	0,222
Azerbaijan	0,553	Canada	0,653	Poland	0,515
Albania	-0,528	Qatar	-0,113	Portugal	0,393
Argentina	0,728	Kenya	-0,174	Russia	-0,336
Bangladesh	-0,371	Kyrgyzstan	0,229	Rwanda	-0,376
Barbados	0,512	China	0,341	Romania	0,796
Bahrain	-0,647	Cyprus	0,734	Samoa	0,269
Belgium	0,679	Colombia	-0,544	Sao Tome and Principe	-0,964
Benin	0,141	Congo	0,028	Seychelles	0,044
Belarus	0,176	Korea	-0,349	Senegal	-0,427
Bulgaria	-0,306	Costa-Rica	-0,364	St. Vincent and Grenadines	-0,886
Bolivia	0,853	Ivory coast	0,152	Saint Kitts and Nevis	-0,066
Bosnia and Herzegovina	0,094	Kuwait	-0,424	Serbia	-0,601
Botswana	-0,542	Laos	-0,551	Singapore	0,372

Brazil	-0,345	Latvia	0,511	Slovakia	0,087
Burkina Faso	-0,475	Lesotho	0,879	Slovenia	-0,603
Burundi	0,061	Lithuania	-0,119	Sudan	-0,218
Great Britain	0,219	Lebanon	0,455	Suriname	-0,115
Venezuela	0,109	Luxembourg	0,883	USA	0,586
Vietnam	-0,364	Mauritius	0.48	Sierra-Leone	-0,305
Armenia	-0,087	Madagascar	-0,121	Thailand	0,52
Ghana	-0,264	Macao	-0,258	Tanzania	-0,371
Guinea	-0,456	Macedonia	0,091	Timor	0,23
Hong Kong	0,543	Malawi	0.04	Togo	-0,53
Greece	0,127	Mali	0,003	Trinidad and Tobago	-0,108
Georgia	0,353	Maldives	0,085	Tunisia	0,094
Denmark	0,351	Malta	0,321	Turkey	0,404
Ecuador	-0,246	Morocco	0,274	Uganda	0,374
Estonia	0,618	Mexico	0.553	Hungary	-0,216
Egypt	0,087	Moldavia	0.814	Ukraine	0,399
Zambia	-0,074	Mongolia	-0.357	Uruguay	0,707
West Bank and Gas sector	-0,332	New Zealand	0.455	Philippines	0,512
Zimbabwe	0,181	Namibia	0.095	Finland	0,809
Jordan	-0,291	Niger	-0.077	France	0,54
Israel	0,911	Nigeria	0.364	Croatia	-0,039
India	-0,205	Netherlands	0.62	Czech	0,31
Indonesia	0,179	Nicaragua	0.219	Chile	0,06
Iraq	0,022	Germany	0.022	Montenegro	0,03
Ireland	0,2	Norway	0.573	Switzerland	-0,076
Iceland	0,48	Oman	-0.006	Sweden	0,557
Spain	0,834	Pakistan	0.713	Shri Lanka	0,393
Italy	0,33	Papua – New Guinea	0.284	Jamaica	-0,279
				Japan	0,127

**it is calculated by the author*

Let's analyze the results in more detail.

It is possible to identify countries (8) that have a strong correlation between the volumes of high-tech export and volumes of net portfolio investments for the period from 2010-2016, Fig.1 based on the results of the analysis.

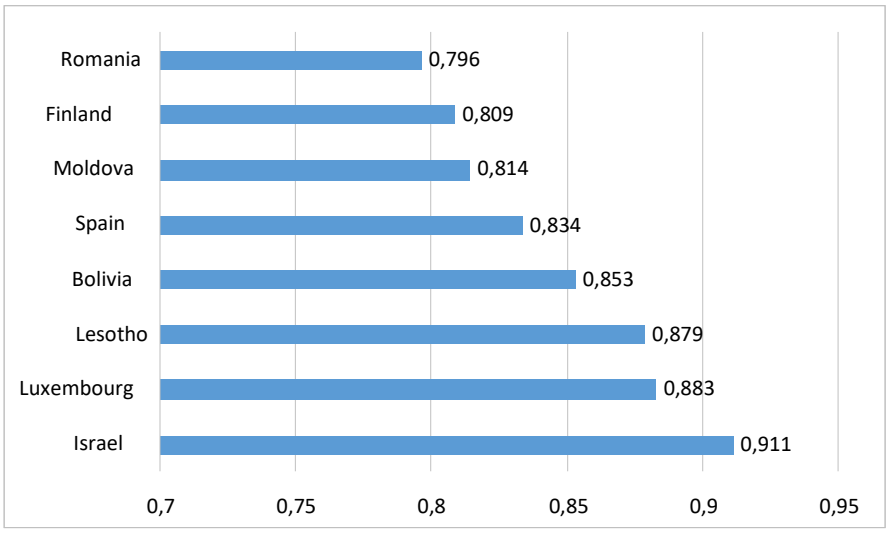

Romania (0.796-0.78), Finland (0.809-0.8-0.82), Moldova (0.814-0.8-0.82), Spain (0.834- 0.82-0.84), Bolivia (0.853-0.84-0.86), Lesotho (0.879- 0.88), Luxembourg (0.883-0.88), Israel (0.911- 0.9-0.92).

Figure 1: Group of countries with a high dependence between volumes of high-tech export and volumes of net portfolio investments, 2010-2016. *

We can make a conclusion that the definition of innovation area of investment activity in the world countries is possible through calculation of the relationship between the volumes of high-tech goods export and volumes of net portfolio investments at current prices based on the results of determining innovative investment area in the world countries.

Our correlation analysis for the period 2010-2016 for 130 countries allowed to identify 4 groups of countries:

8 countries (including Finland, Israel) that have a strong correlation between indicators, which indicates a high degree of portfolio investments efficiency in innovative sectors of economic development;

22 countries (including the United States and France) that are characterized by an average correlation between indicators, which may be the result of a significant diversification of financing sources for innovative sectors of economic development;

53 countries (including Germany, Japan, UK) where the financing level of high-tech industries of economy is not sufficient, which is the gradual reorientation of the countries on the strategy of industrialization by attracting foreign investment and requires significant development of science and the funding to other development strategies, in which the financing of innovative sectors of the economy requires much lower volumes and is not a priority;

46 countries (including Sao Tome and Principe and Saint Vincent and Grenadines) that have an inverse relationship between the volumes high-tech export and volumes of net portfolio investments, which may be the result of offshoring the economies of these countries.
In the world practice of financing innovation and investment activities is actively used venture financing, which is an effective mechanism that allows to implement advanced ideas, encourage business to move to an innovative path of development, and improve the efficiency of economy as a whole.

Discussion

Thus, the study of foreign experience in financing and stimulating innovative processes in the economy shows the leading role of the state, this role does not always involve direct financing. India and China pay great attention to international cooperation to attract foreign capital for the systematic development of a number of industries over the decades. Private companies and foreign investments have rapidly changed the economic systems of both countries, which have become important suppliers of high-tech products and services in the global market as a result of foreign technologies and know-how.

Thus, it is possible to determine the following global trends in stimulating innovative and investment processes on the basis of the conducted research:

Economically developed countries (USA, Europe) actively used financial incentives of stimulating, including the activity of financial development institutions (development banks, venture and investment funds), combining them with economic support for economic entities (in particular, applying tax incentives);

countries with developing economy(India, China) successfully use non-financial development institutions (free economic zones, techno-parks and techno-polises, business incubators and clusters), thus creating conditions for the development of high-tech industries.

Conclusion

Determining innovative direction of investment activity in the world countries is realized through the calculation of the relationship between the volumes of high-tech goods export and volumes of net portfolio investments at current prices for the period 2010-2016 in 130 countries. The correlation analysis allowed to identify 4 groups of countries: 8 countries (including Israel, Finland) which are characterized by a strong relationship between indicators, which indicates a high degree of portfolio investments efficiency in innovative sectors of economic development; 22 countries (including the United States and France) that are characterized by an average correlation between indicators, which may be the result of a significant diversification of financing sources for innovative sectors of economic development; 53 countries (including Germany, Japan, UK), where the financing level of high-tech industries of economy is not sufficient, which is the gradual reorientation of the countries on the strategy of industrialization by attracting foreign investment and requires significant development of science and the funding to other development strategies, in which the financing of innovative sectors of the economy requires much lower volumes and is not a priority; 46 countries (including Sao Tome and Principe, Saint Vincent and Grenadines) that have an inverse relationship between the volumes of high-tech export and volumes of net portfolio investments, which may be the result of offshoring the economies of these countries.

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Managers' Business & Corporate Education in The System of Sustainable Development of The Organization

Dmytro KILDEROV
Doctor of Pedagogical Sciences, Ass. Professor, Dragomanov National Pedagogical University, Ukraine
kilderov_d@i.ua

Stanislav PETKO
PhD in Economics, Docent, Kyiv National Economic University named after Vadym Hetman, Ukraine
stas_petko@ua.fm

Myroslava MALYSH
Candidate of Pedagogical Sciences, Docent, Ukrainian State Employment Service Training Institute, Ukraine
malysh_myra@i.ua

Maksym MOSKALOV
PhD in Psychology, Docent, State Institution of Higher Education, University of Educational Management of National Academy of Educational Sciences of Ukraine,
moskalov_max@i.ua

Olena KOVALCHUK
Candidate of social communication, Assistant, Kyiv National University of Culture and Arts, Ukraine
kovalchuk_o@i.ua

Abstract

Due to the changes taking place in all spheres of public life, the emphasis in the issues of staff's education and advanced training and their professional development is transferred from the national to the institutional level. Accordingly, the issue of creating, on the one hand, an effective system of education and advanced training, and on the other - an in-house system of methodical work becomes important. The set of components of the system of scientific and methodological support of the managers' professional development has been separated. The criteria for the classification of the forms and methods of managers training were systematized and substantiated, in particular: activity of the adult student; number of participants; place of study, time and duration of the study. Forms and methods of diagnosing the needs of managers, forms and methods of training, forms and methods of evaluating learning outcomes were structured and analyzed in detail.

Keywords: Business Education, Corporate Education, Transnational Company, Vocational Training, Human Resources.

Introduction

Scientific search is specified by the managers' professional development, because, as practice shows, the level of their professionalism, competence and personal qualities depends on the effective activity of the organization as a whole and, in particular, its competitiveness in the market Statistics demonstrates (Akinbola, O., Solomon, K., & Ibidunni, S. (2018)) that 10% of the companies annually fail due to the lack of management staff training, in particular because of they do not spend money on training their own managers or do not have the money to hire highly qualified professionals in the field.

A high level of professional qualification, as well as a well-structured and structured system of training and development for managers play a crucial role in the German management culture. Considering the costs for training managers as strategic investments, transnational corporations are at the same time developing a system of measures

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aimed at retaining trained professionals. There is a high level of corporate loyalty among German managers: the average length of work in one organization is 8 years, while it is 3 years in the US (Mizikaci, F. (2019)).

The purpose of the research: based on the system, personally oriented, competent, process and situational approaches to carry out a comprehensive scientific analysis of the systems of managers' professional development in transnational corporations of Germany and Poland, to identify constructive ideas of these countries' experience and to substantiate the possibilities of their creative use in the modernization of the system of professional education.

Literature Survey

A thorough analysis of the current state of its research in the philosophical, psychological and pedagogical, socio-economic scientists' achievements is important for the development of conceptual, theoretical and methodological foundations of this problem. (Zhaoqun, W., & Haiqing, H. (2017)).

Therefore, we consider it's expediently to carry out this analysis in the following areas:

philosophical and conceptual foundations of the personality development in the context of civilizational transformations (Jamali, D., Karam, C., & Blowfield, M. (2017));

fundamental provisions of professional development in the system of continuing adult vocational education in accordance with the concept of lifelong learning (Chen, Y., Xu, Y., & Zhai, Q. (2019));

organizational and pedagogical aspects of corporate training (Deering, D., & Sá, C. (2018));

methodological and didactic features of training, retraining and advanced training of managers (Avidov-Ungar, O., & Reingold, R. (2018)).

In general, the problem of professional and personal development of specialists is not new. Throughout human history, it has been and continuing to be the subject of research by philosophers, scholars, educators and practitioners (Milner, J., McCarthy, G., & Milner, T. (2018)).

Based on content analysis, we can distinguish the components of the staff's professional development in general and managers in particular, these are:

1) basic professional education obtained from educational institutions (Rubens, A., Schoenfeld, G.A., Schaffer, B.S., & Leah, J.S. (2018));

2) corporate training (Boiral, O., Raineri, N., & Talbot, D. (2018)):

a) short-term compulsory training, both at the enterprise and in specialized educational institutions and based on the problems solution specific to a organization with the involvement of its own or external lecturers, which is a system of educational, attestation and certification measures provided by the production system (da COSTA, F.R., Pelissari, A.S., & Gonzalez, I.V. (2018)):

school of young specialist in order to get acquainted with the specifics of professional activity and traditions of the company;
mentoring for the purpose of its quick and successful preparation for the execution of work duties and mastering the traditions of the labor collective;
school of production management, its aims is formation of the managerial competence of managers' enterprise;
learning a foreign language;
advanced training caused by the need to support the technological processes of the modern enterprise;
professional retraining caused by the need for production in connection with intensively changing techniques and technologies;

b) short-term additional training carried out out of the company related to the strategic objectives of the enterprise and provides only additional education that the manager receives in accordance with the area of work in which the company is going to use him in the future (Garber, R. (2017)):

temporary rotation as a form of self-study in order to acquire new skills (used in enterprises requiring polyprofessional competence);
professional retraining with assignment of additional qualification "manager of the specific specialty";
MBAs and Executive MBAs for managers of the highest level and personnel reserve;

3) long-term compulsory education for managers providing obtaining the second higher education, caused by the requirements of the enterprise due to the mismatch of the diploma of the first higher education to the company profile (Gunawan, J., Aungsuroch, Y., & Fisher, M.L. (2018));

4) post-professional education of managers, the difference from additional education is the following: it does not necessarily have system nature and may have nothing similar with the strategic tasks of the enterprise (postgraduate, doctoral studies, business education) (Padley, W., Long, J., Welyczko, N., Dowsett, D., Salter, N., Ford, K., ... & Brown, J. (2019));

5) post training accompaniment covering (Kangas, M., Kaptein, M., Huhtala, M., Lämsä, A.M., Pihlajasaari, P., & Feldt, T. (2018)):

organization and coordination of production, innovation, inventive, scientific and creative activities of young professionals;
organization and holding of the corporate thematic scientific and technical exhibitions;
participation in the corporate conferences;
individual consultancy and coaching;
organization of communities by professional interest, etc.

6) self-education and self-development (Choi, E.H., Kim, E.K., & Kim, P.B. (2018)).

Methods

The concept of the study is based on the position that the managers' professional development as a purposeful process, covering a set of interrelated components and has a continuous and adaptive nature, gains efficiency and effectiveness on case of the system approach to its organization, implementation of the holistic analysis of interacting mechanisms, related to theoretical and methodological, psychological and pedagogical, programmatic and methodological, legislative and regulatory support.

There are three interrelated concepts to implement this idea:

- theoretical and methodological, it substantiates a general methodological approach, covering the system and closely related synergistic approaches; personally oriented, its semantic field is expanded and specified directly related to it culturally, with acmeological and axiological components, and indirectly related to it of the subject-subjective and sociological-managerial, as well as competence, process and situational ones;
- theoretical, taking into account the leading theories, concepts and models of personnel management, first of all, from the standpoint of situational and process approaches and provides for the separation of components, stages, content and identification of features of managers' professional development in the corporate education system;
- practically oriented, aimed at revealing constructive ideas of the developed countries' experience and their creative use in the domestic practice of Ukrainian realities.

Results

Therefore, each transnational corporation can now be regarded as a learning organization, that is, a kind of educational institution which, on the one hand, provides employment and, on the other hand, provides its employees with the necessary educational opportunities for their professional development.

In order to effectively transfer these intangible assets, companies organize their own training centers, their tasks are to create supportive learning environment in which all employees can develop both professionally and personally. Obviously, there is not enough one specialist in the training department to implement such a large-scale activity.

It is necessary to create a separate structure with own mission, goals and objectives, regulatory base. This structure can be an internal training center. Its mission is to form and develop system staff training, which enhances the company's competitiveness.

Therefore, we consider it expediently to analyze the activity of the corporate training centers as a pedagogical phenomenon, according to the following logically constructed algorithm (Fig. 1).

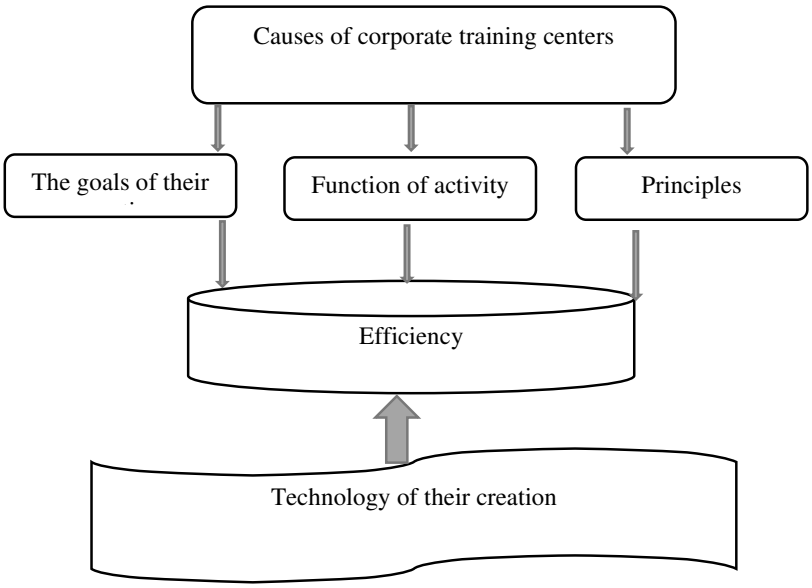

Figure 1: The algorithm of the activity analysis of corporate training centers (author's development)

Assessing the effectiveness of the corporate training center for business can be done by influencing business (ie, achieving the goals set for the corporation), adjusting to business processes (opportunities to make operational changes and improvements taking into account business development); ensuring the effectiveness of training (reducing costs through innovative combined education and training methods, and through continuous optimization of training costs); implementation and support of graduation business projects focused on the technology of the corporation.

The criteria for the effectiveness of the corporate training center can be: increase in sales and revenues of the company; cost reduction, including through the unification of management processes, introduction of unified technologies; increase of customer satisfaction; improving the quality of products and services; optimization of the order cycle time; waste reduction; improving safety indicators; increasing employee satisfaction; reduction of staff turnover. Instead, the priorities of corporate training centers are to fill the widespread shortage of mid-level managers and to establish a new management culture at a TNC. This is a key to qualitative changes, without them strategic development and success are impossible.

As we can see, all of the above components are interconnected and mutually reinforcing. This is explained by the fact that the corporate training center in the modern sense is a system of corporate training and personnel development, which is inextricably linked with the strategy of the organization's development. It should be emphasized that the basis of any corporate training center, like all classical universities, is a system approach to the learning process. However, the reasons for their emerging are different: the first were due to the need for knowledge of the world, systematization and transfer of knowledge, and the second one is due to the acceleration of the pace of life, the need to adjust to the constant growth of scientific and technological progress, although the prerogative of both are education itself.

Accordingly, there are two main trends in existing programs:

"individual" programs designed exclusively for company's employees (closed system);
special purpose programs open to employees of other companies (open system).
The first type of programs focuses not only on educational goals related to the provision of specific knowledge relevant to the organization, but also on their integration. In such programs, much greater importance is attached to the acquired knowledge which is consistent with the strategic goals of a particular company. Often part of the course is to increase the internal motivation and identification with the company, which allows the staff formation with high levels of intra-group cohesion.

The second type is experience-oriented. The company that wants to distribute it organizes programs (usually certified) where knowledge on a specific topic is available to all comers. The first option is more widespread as it is the cheapest and easiest way to create your own training center.

However, it should be emphasized that since the idea of corporate training centers began to appear in the personnel departments of different organizations, so before the model of their functioning has changed significantly. Initially, these were development centers located in large departments, over time they became autonomous centers of idea formation, creation of new concepts and initiation of changes.

Starting from the essence of the corporate training center, its purpose is to create the internal corporate knowledge system, the educational process should be directed by the company, and as many internal specialists as possible should participate (as trainers). The educational alliance with commercial and government institutions is usually not limited to the provision of textbooks and premises to the company. In this case the external training companies or other providers of training programs are needed to provide the company with a standard set of training aimed at familiarization and expanding of standard competencies. Identification, formalization and dissemination of THK's unique competencies should be carried out by the company itself.

Therefore, the main idea of the corporate training center is to create the corporate system of knowledge. That is why the training process should be coordinated by the company and internal specialists of the company (as trainers) should participate in it. In this case, the cooperation of the educational institution and the company must consist in mutual enrichment of knowledge. Those profile specialists of the company, who will conduct trainings and classes, transfer knowledge and experience to the next generation, receive the approved training method. Educational institutions, in exchange for the knowledge, provide the premises, get access to the information accumulated by the company.

Although interaction with traditional educational institutions is a good option for employee training, the formation of independent educational structures within the enterprise itself has become increasingly popular in recent years. If a company has multiple training programs for different categories of employees, if training and development programs are repeated and massive, if the proportion of unique training programs is large, and their relationship to the achievement of strategic goals is obvious, then it should be focused on creating an independent educational structure with internal trainers and training specialists.

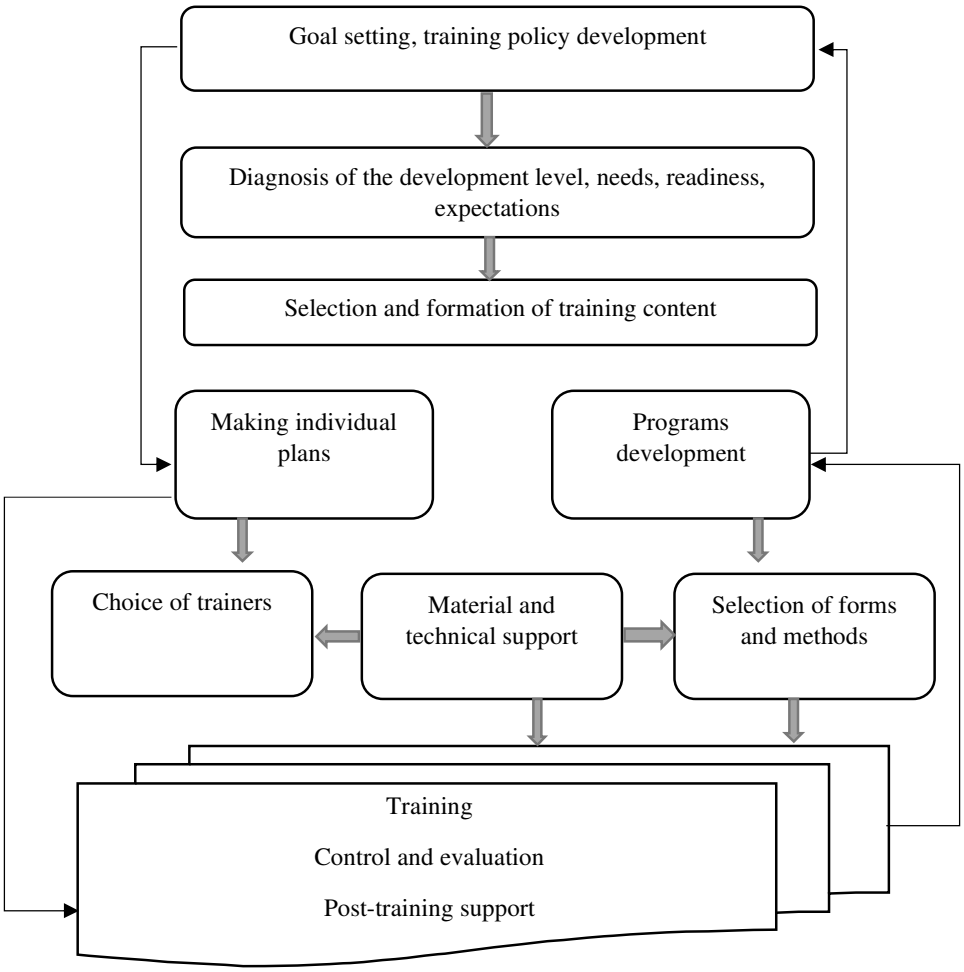

Figure 2: Components of the system of manages' corporate training (author's development)

Now there are separate corporate training centers considered as independent businesses entities and have educational licenses (such as Global Learning, created by IBM). After studying at this corporate university, students are issued certificates.
Due to the changes taking place in all spheres of public life, the emphasis in the issues of staff's education and advanced training and their professional development is transferred from the national to the institutional level. Accordingly, the issue of creating, on the one hand, an effective system of education and advanced training, and on the other - a corporate system of methodical work becomes important.

We proceed from the traditional understanding of methodological support as a professional interaction between the subjects of the pedagogical activity, which covers methodological support (curricula, programs, educational and methodical, normative, special literature, manuals, reference books, working materials, methodological recommendations, etc.), it assumes constant interconnection of all subjects of the educational process, taking into account the dynamics of specialists' professional development, flexible response to this process through the use of control and corrective procedures.

We propose to summarize a number of components of scientific and methodological support of the corporate training and managers' professional development in TNC (Fig. 2).

There are two main types of education for TNC:

criteria for economic effectiveness characterizing contribution of the program to the economic development of TNC on the whole, including both direct and indirect effects;
criteria for social effectiveness taking into account the expected contribution of the program to social development, its indicators cannot be expressed in the cost estimate.

We can distinguish the following two types of corporate training programs: the first ones are focused on enhancing external adaptation, the second ones are focused on internal integration. They can be specified thematically:

1. Specialized training programs by the areas of TNC activities (sales training, negotiations, etc.).
2. Team building programs (active group and intergroup activities with subsequent reflection, business and role play, problem analysis).
3. Programs for the development of interpersonal and intercompany communication, formation of conflict resolution skills (sensitivity training, role-playing games, imitation business games).
4. Programs of corporate culture design.
5. Management training programs (lectures, seminars, practical classes, educational business games).
6. Programs for preparation for organizational innovation (organizational mind games, project development, analysis of organizational situations).

Discussion

However, in our opinion, the main reason why major corporations spend money to build a corporate university is to introduce continuous improvement mechanisms in the company, to increase the return on project transformation, and in the context of our research, that is, directly for managers - to promote personal and professional development throughout life.

In addition to the above, there are several accompanying reasons:

interest of the corporation's management in the strategic development of its company;
need of the company for innovative and initiative employees;
need not only to acquire new knowledge from the outside, but also to translate it with their own experience in all branches and units in different countries or cities for the most effective learning;
necessity to train staff not only to solve urgent problems, but also to achieve medium- and long-term goals.

Instead, the primary purpose of creating a corporate training center is to provide system strategic staff training, that is, training enabling the company to solve strategic objectives and achieve strategic goals. It follows that the corporate training center should influence the competitiveness of TNC, assist in the implementation of its long-term strategy and plan its work in accordance with a single ideology that follows from the basic strategy of the company for the future.

The need for organizational changes and changes in the principles of personnel development management in the conditions of increasing competitive struggle implies increase of personnel productivity, quality of goods, improvement of customer service, creative and innovative attitude to business. But first, management should be aware of the benefits of corporate training, including:

creation and improvement of the system of experience transfer within the company;
training of "narrow" specialists of the specific direction of activity (cleaning, work with software products);
continuous advanced training for all employees;
dissemination of the best practices of divisions within the company;
decreasing the number of errors by thoroughly reviewing the procedures of current activity;
reducing the cost for expensive external training (in case of a well-developed corporate training system, it will be enough to send 1-2 employees who will share their knowledge with colleagues), etc.

It should be emphasized that these are not all the benefits of corporate training. Many problems can be solved by using a variety of low-budget methods of internal learning; through the development of intangible factors of stimulation of mentors, trainees, training project managers, the use of competitive schemes between structural units in the implementation of the training system; development of criteria and methods of evaluation of the training effectiveness by branch, evaluation of the training program in post-program support by trainees, managers (lecturers); team work, development of organizational culture, oriented to the development of the corporate training system.

Analysis of the well-known TNC activities in the organization of staff training enables us to find out which conditions are the most appropriate for work of the training system. The most important ones among them are:

when there is a close connection with the company's strategy, its goals, objectives, mission;
there is a real, not far-fetched, need for training: the staff sense very much "pseudo-education";

formed motivation: in order to fruitfully learn, one desire of the manager is not enough, employees' motivation is required;
the company has been created training environment, there is a positive internal PR training;
there is support from the company management at different levels;
environment was created for implementation (application), consolidation and continuous updating of knowledge;
knowledge bank was created enabling regular updating of knowledge;
the learning process is system and continuous.

Conclusion

The main directions and forms of managers' professional development within the corporate training centers can be: training within the company, distance learning in a computer network, participation in open seminars and conferences, internships in the company's departments, project management, mentoring, coaching, etc.

Scientific and methodological support, as professional interaction of subjects of pedagogical activity, involves considering the dynamics of specialists' professional development and constant interconnection of all subjects of the educational process. The components of scientific and methodological support for the managers' professional development at TNC are: defining goals and developing training policies; diagnostics of the existing level of personnel development, diagnostics of need and readiness for training, identification of expectations; selection and formation of training content; drawing up individual training and development plans; coordination of individual plans, drawing up the general corporate training plan; development of training and development programs; selection of types of training forms and methods; selection of trainees; logistical support; conducting training; post-study support (introduction of acquired knowledge, adaptation of new knowledge to real practice); a control system, tracking changes and evaluating the effectiveness of training, identifying gaps, which are both diagnostics at a new level; adjusting training plans and programs; staff motivation.

The study does not exhaust the problems of managers' professional development in multinational corporations. Issues of managers' cross-cultural training in the corporate education system, training of andragogues (trainees, instructors, coaches, tutors, etc.) for effective activity in corporate training centers remain relevant.

Perspective directions of further research are also theoretical, methodological and didactic substantiation of talent management and development of their creative potential, development of tools for stimulation and retention in the organization of managers who have been trained, study of experience in the development of the individual's leadership potential. The problem of formation managers' ethical behavior as a set of actions, social responsibility of management at the international level deserves special attention.

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Methods of Modeling of Managers' Competences in The Context of Sustainable Development

Olena KOTYKOVA,
Doctor of Pedagogical Sciences, Professor, National Aviation University, Ukraine
kotykova_o@i.ua

Oksana KOMAROVSKA,
Doctor of Pedagogical Sciences, Senior Research Officer, Institute of Problems on Education of the National Academy of Educational Sciences of Ukraine,
komarovska@com.ua

Oksana MATVIICHUK,
Ph.D in Pedagogic, Borys Grinchenko Kyiv University, Ukraine
oksana_m@i.ua

Maryna RADCHENKO,
Candidate of Psychological Sciences, Docent, National Aviation University,
radchenko@i.ua

Tetiana HOLINSKA,
Candidate of Pedagogical Sciences, Docent, Kherson State University, Ukraine
holinska_t@i.ua

Abstract

The factors influencing the formation and management of international teams of project managers in a multicultural environment are analyzed. The main problems in managing communications in international projects that are directly related to the human factor are identified and the existing approaches to solving such problems are analyzed. The set of key competences of project managers of international teams in a multicultural environment, which distinguish successful project managers, is defined. An approach to the development of project managers working in international teams in a multicultural environment has been developed taking into account the development of competences that determine a successful project manager.

Keywords: sustainable development, competence, manager, team, communication management.

Introduction

When forming and managing the team of project managers, these differences have a direct impact on the communication processes and interactions of the project team. As a result, this can negatively affect the success of the project as a whole, as well as the satisfaction of team members since errors and misunderstandings in communications, lead to a low level of trust and motivation in the project team.

Humanization involves increased attention to the individual as a whole, the creation of the most favorable development of its abilities, physical, and moral qualities.

Modern education aims to form an ecological and economic responsible person, ready for the conscious activity on the basis of acquired knowledge and established standards and rules of behavior in relation to the environment in the conditions of sustainable development.

Forming and managing the international team in a multicultural environment require harmonization of the competences of team members both cross-culturally and professionally, based on scientific methods and approaches. All this determines the relevance of the research topic.

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The purpose of the research is to develop models and methods based on competences aimed at the cross-cultural development of the project managers of international teams in a multicultural environment and balancing disagreements and misunderstandings in cross-cultural communications, ensuring the success of the project.

Literature Survey

The application of the competence-based approach is becoming increasingly common in project management practices, in particular, professional standards, since project managers are increasingly paying attention to the importance of this concept (Meng, X., & Boyd, P. (2017)).

The competence language is used in many organizations as the basis for personality characteristics (Putri, K. D. C., Sari, M. M. R., Ramantha, I. W., & Budiasih, I. G. A. N. (2019).

The concept of the competence is used and formed in accordance with the role that the individual performs; and is also considered useful for improving staff productivity when used for assessment, training, and other processes related to staff (Ahmed, R., & Anantatmula, V. S. (2017)).

Competences are key elements in the following cases: high-quality job descriptions, development of methods and criteria for selecting employees; staff productivity management; development of methods and tools for personnel assessment; description of processes for assessing individual competence and results; elaboration of staff development programs (Engelbrecht, J., Johnston, K. A., & Hooper, V. (2017)).

In general, the use of competence modeling as a method for assessing, training, and developing competences is a common practice in the field of Human Resource Management (HRM), science, which studies recruitment, distribution, development, leadership, retention, and dismissal of staff (Medina, R., & Medina, A. (2017), Rasnacis, A., & Berzisa, S. (2017)).
In the so-called competence models, competences are structured in a hierarchy or grouped in clusters with descriptors (Aragonés-Beltrán, P., García-Melón, M., & Montesinos-Valera, J. (2017)).

There are three types of sources for obtaining data for creating the so-called competence models: panel discussions and focus groups with experts in this field (Gunawan, J., & Aungsuroch, Y. (2017)); interviews about significant events with highly qualified specialists (Banihashemi, S., Hosseini, M. R., Golizadeh, H., & Sankaran, S. (2017)); general competence dictionaries (Maqbool, R., Sudong, Y., Manzoor, N., & Rashid, Y. (2017)).

There are a number of behavioral competences, or the so-called soft or flexible skills, which allow applying innovative approaches in situations where people have their own solutions to existing problems (Pinto, JK, Patanakul, P., & Pinto, MB (2017)).

Interpersonal competences are a trend of the future and part of the path to success.
Project management is an area where professional standards are actively used, in particular: ICB, PMBOK, PRINCE2, P2M, AIPM, and the like. Let's consider the concepts of "competency" and "competence" in these standards and the approaches available for managing international projects in a multicultural environment (Varajão, J., Colomo-Palacios, R., & Silva, H. (2017)).

ICB (Individual Competence Baseline) is a standard on the basis of professional knowledge and a system for assessing the competence of project managers (Radujković, M., & Sjekavica, M. (2017)), which is issued by the International Project Management Association (IPMA).
The authors summarize the analysis of the competence-based approach used in professional standards for project management. A competence-based approach is also experiencing fundamental difficulties.

First of all, it is necessary to clearly define a common understanding of each competency that needs to be developed and implemented between different departments or even organizations (for competences independent of organizational structure) (Artz, B. M., Goodall, A. H., & Oswald, A. J. (2017)).

Secondly, at the technical level, the various systems and services involved in personnel management, training and knowledge management must be semantically aligned so that competence-based approach es can meet their holistic expectations (Davis, K. (2017)).

Finally, compensation is crucial in competence modeling: more accurate, realistic, and well-defined competences become more complex management and control tasks (Ha, T. P. T., & Tran, M. D. (2018).

Methods

The theoretical basis of the study includes the scientific works of scientists in the management of international projects and programs. Theoretical research was based on the use of system analysis methods, set theory methods, as well as the methodological base of standards for project management, and international management and cross-cultural communications theories.

To verify the obtained methods and models and practical confirmation, pilot training for teams of young project managers originating from different countries and cultures was conducted in Germany and Belgium.

Results

Successful management of multicultural projects requires solving numerous challenges: legislative and political environment, security issues, economic factors, infrastructure limitations, and the like, which are unique for each country.

However, the human factor and communication management are the most important factors affecting the success of such projects. In general, cultural misunderstandings are caused by the fact that a message is composed, or “encoded” in one cultural context, sent, and then received or “decoded” in another cultural context.
Cultural beliefs and rules lead to behavioral differences. For example, in some countries, a certain model of behavior may be considered a manifestation of politeness, while in others it is quite the opposite.

There are also various cultural beliefs about informal communication at work. Some cultures tend to exclude informal communication, and some cultures view informal communication as part of business ethics. Various measurements of behavior such as space, touch, and eye behavior, form another cluster of cultural patterns that can cause conflicts and misunderstandings.
Hierarchical structure is a common tool in project management practice, which are used to distribute the logical components of large arrays of project elements to be managed. For example, common breakdown structures are the project work breakdown structure or the hierarchical structure of the project’s organization (English, “organization breakdown structure”).

The competence breakdown structure method is based on the generally accepted project management approach, which allows structuring a complex system into smaller manageable elements. The competence breakdown structure method allows detailing the concept of the competency, despite the approach to the use and determination of the concepts of "competency" and "competence".

The competence breakdown structure is a method that decomposes the concept of cross-cultural competence into smaller elements in their original form. In other words, competences related to cross-cultural development, are divided into sub-competences in several approaches to the desired degree of detailing. When applying this method, an international project team led by a specialist independently determines important competences and sub-competences, which are referred to cross-cultural relations and communications, enriching with specific finds, formalized during interactive discussions in cross-cultural training. This method helps to visualize the competences that will be developed by the project teams during the introductory phase of the project (cross-cultural training).

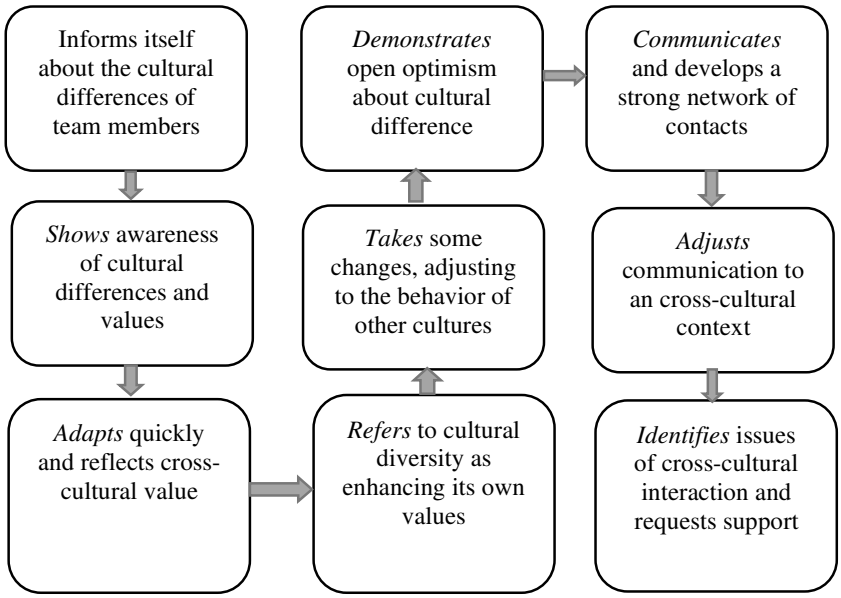

Figure 1: Cross-cultural profile of the manager competences (author's development)

Thus, the competence breakdown structure method provides the basis for self-reflection and focused development. The structure of breaking down the competences into subcompetences is also an approach to visualizing problems and suggestions that can be discussed on a virtual social platform.

The competence breakdown structure method offers a communication strategy for project team members on the basis of their own personal qualities and advantages, which is also the cause of misunderstandings in international teams. Thus, a basis for the joint contribution of the project team members, which is aimed at mitigating and preventing conflicts, is formed.
Given this statement and analysis of the literature conducted within the framework of this scientific work, a method that is called the cross-cultural profile of competences (Figure 1) for the formation of cultural consciousness and interpersonal interactions in international project groups has been developed.

The competence profile, that is, the set of competences of an individual, is tailored to predefine personal and organizational goals and has a unique form in each international project team.

The cross-cultural competence profile reflects the goals of the project team development, which are aimed at the results of individual development, motivating team members to change their behavior, attitude and development of self-esteem and motives that are more difficult to train. It offers a common language and a basis for self-reflection and self-improvement; provides a point of reference for team building, trust management, prediction of cross-cultural misunderstandings and motivation for personal development of cross-cultural competences.
The proposed sample of cross-cultural competence profile (Figure 1) aims to encourage project managers to plan and facilitate the process of cross-cultural development within multicultural groups.

However, this list may be expanded or reduced depending on the team characteristics (size, cross-cultural background) and the amount of time that can be devoted to the cross-cultural development of the project team, etc.
The cross-cultural competence profile is subject to further breakdown. Each element of the cross-cultural competence profile contains sub-competences that explain the effectiveness detail.

Figure 2 shows sub-competences that contain specific examples (A, B, C, ..., N, M, N, etc.) that are relevant to the project team. Sub-competences are flexible elements that are initially prepared by the project manager, project office, or cross-cultural experts.

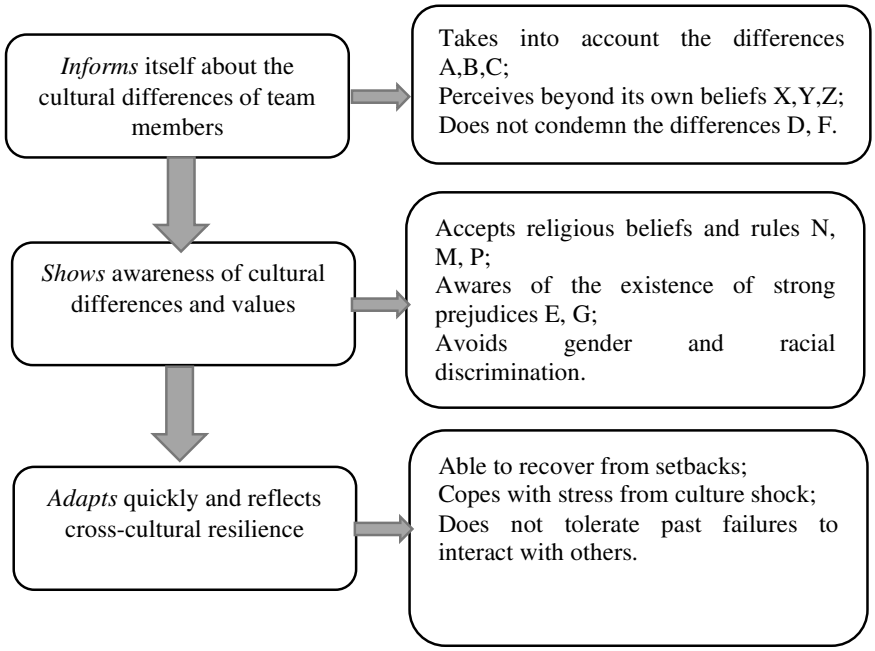

Figure 2: Model of sub-competences of international manager profile
(author's development)

During the kick-off meeting, the project manager can initiate a discussion and update elements and sub-competences based on project members' proposals. Thus, the cross-cultural profile of competences serves as a reference point for developing basic rules based on the multicultural specifics of the project team. During the implementation of the project, an updated and documented cross-cultural profile of competences should be disseminated and, in the future, serve as a point of discussion for identifying and updating cross-cultural differences and compromises. At the final project stage, the cross-cultural competence profile can be easily documented in the form of lessons learned from the project.

The main advantage of the cross-cultural competence profile is that it serves as one of the main success factors for each project, that is, the satisfaction of interested parties. The implementation of this method is aimed at predicting cross-cultural misunderstandings, preventing incorrect communication, and delaying information flow in the project.

The disadvantages of applying the cross-cultural competence profile can be, for example, cases when, in task-oriented teams, people do not want to waste time using such tools.

Moreover, the concept of the competency and competences can lead to some confusion when introduced for the first time. In conflict situations, people do not know what exactly they do not know if it is not presented in such a way that it causes a free and conscious choice. In other words, the international competence profile should highlight not the prescriptions in emergency cases but a combination of features and capabilities that it is desirable to strive for. The results of the introduction of this method by the author for the preparation of multicultural teams of project managers have confirmed its practical value.

Discussion

The introduction of cross-cultural training can take place in the following forms.

When carrying out an international project, the teams of which consist of three or more significantly different cultures in the project team, as part of the first project meeting and/or events to create the project team;
When implementing international project programs, whose teams consist of three or more significantly different cultures in the project team;
As one of the functions of the Project Management Office (PMO), which organizes training;
By inviting consultants who are specialists in conducting cross-cultural training;
In the program of events for team building both as a separate cross-cultural training and as one of the topics proposed to the project team during the kick-off meeting;

As a measure of summarizing the results of the project, formalizing the lessons of the project and the "emotional close-out" of the project. It is important to ensure the presence of positive emotions since when closing a project a "burn-out syndrome" quite often occurs when stress from the project ends. Conducting cross-cultural training, which concludes cross-cultural projects and emphasizes new discoveries and shared cultural traits.
As measures to prevent or resolve conflicts;
As part of the training on project management in a multicultural environment;
As part of the training program for undergraduates with a degree in Project Management or related subjects (for example, International Business).
During the implementation of cross-cultural training, the following challenges and problems are possible that may impede the effective establishment and functioning of this method:
Disagreement on the part of the project team members;
Disagreement from the management of the organization or experienced project managers;
The need to learn often causes resistance;
Conducting the first training without further monitoring and/or conducting the final training;
Insufficient budget in the project;
Lack of time, especially for intermediate and final training;
Force majeure circumstances.

Conclusion

High-level communications are built and structured in such a way that they help minimize and/or avoid unexpected delays and misunderstandings, warn applications of redoubled efforts, learn about problems in advance, and apply preventive measures.

According to the analysis of competences related to the management of international teams of projects in a multicultural environment, the existing classifications and approaches to formalizing and defining cross-cultural competences should be in-depth taking into account the specifics of the multicultural environment and the challenges associated with the human factor and problems in international communications.

Multicultural project managers must have a set of key competences. These competences constitute the asset of the project, ensuring its success. An analysis of world literature and scientific research indicates that the use of soft skills is the main tool that is used to solve problems and challenges related to the human factor and communications in international teams of project managers in a multicultural environment.

Therefore, when a project team is formed in a multicultural environment, it is necessary to formalize special requirements for the soft, in particular, cross-cultural competences of the project team members. In other words, the success of the project depends on the harmonization of the cross-cultural awareness and skills of the project team members. The manager of such a team should convey to the team members that one of the tasks of the team is to work with the existing team members and, accordingly, with the cultures involved.

The competence breakdown structure method is based on the generally accepted project management approach, which allows structuring a complex system into smaller manageable elements. The competence breakdown structure method allows detailing the concept of the competency, despite the approach to use and definition of the concepts of "competency" and "competence".

The proposed method was developed as part of scientific research and conducting cross-cultural trainings for international graduate students and masters who perform tasks for work or assignments in multicultural groups. However, further research and development are required to contribute to the field of competence management of international groups in a multicultural environment.

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Formation of The Virtual Educational Environment of The University in The Conditions of Education Informatization

Lyudmila PET'KO
Candidate of Pedagogical Sciences, Ass. Professor, Dragomanov National Pedagogical University, Ukraine
petko_l@i.ua

Vanda VYSHKIVSKA
Candidate of Pedagogical Sciences, Ass. Professor, Dragomanov National Pedagogical University, Ukraine,
vanda_v@ua.fm

Liudmyla OVSIIENKO
Ph.D in Pedagogic, Associate Professor, Borys Grinchenko Kyiv University, Ukraine
ovsienko_l@i.ua

Olena KULYK
Ph.D in Pedagogic, Associate Professor, Hryhorii Skovoroda University in Pereiaslav,
kulyk_o@i.ua

Oleksandra SHYKYRYNSKA
Candidate of Pedagogical Sciences, Docent, Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University, Ukraine
shykyrynska_o@i.ua

Abstract

The introduction of the unified technology platform for the deployment of the cloud-based educational environment in higher education institution helps to solve numerous problems of unifying the architecture of the environment, integrating the technological infrastructure of learning on a single basis, providing wider access to better samples of electronic resources and services. When designing a cloud-oriented learning environment, it is advisable to use a hybrid service model of its structure, its content covers electronic resources of educational and scientific purpose. The holistic model of specialist training in the cloud-oriented environment contains levels and components of competence that are inherent for the process of training scientific and pedagogical staff of the education informatization trained in a high-tech environment. The integration of different subsystems of the environment into a single training system ensures the integrity of this process through the separation of invariant factors inherent in different branches of education.

Keywords: Holistic Model, Electronic Resource, Environment Architecture, Hybrid Service Model, Educational Informatization.

Introduction

Formation and development of educational and scientific environment of higher education institutions on the basis of cloud computing technology is an actual direction of modernization of pedagogical systems of modern higher education. It is associated with the spread of more convenient, flexible, scalable systems for organizing access to electronic resources and services, facilitating teamwork with software applications, removing geographic and time constraints, mobility of all learning subjects using cloud technologies and other factors.

Prospective information and communication technologies (ICT) are an instrument for implementing the principles of human-centricity, equal access to education in pedagogical systems of higher education. The cloud technologies mostly meet the needs of solving urgent socio-economic, educational and cultural problems of modern society, the main of them are increasing the level of accessibility and quality of education, interconnection of processes of scientific research and training of scientific and pedagogical staff, improving the design, formation and provision of functioning of educational and scientific environment (OSE) of higher education institutions.

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The development of OSE is characterized by increasing requirements for the quality of electronic resources for scientific and educational purposes, expansion of more flexible, personalized, open organizational systems, which becomes possible with the use of cloud services.

The involvement of higher education institutions in cloud-based open information and educational space can also play a leading role in: deepening the links between education, science and production; expansion of cooperation between educational and scientific institutions; creation of various corporate structures, supported by cloud technologies, aimed at developing closer interaction with the higher education sector; solving urgent social and economic problems; improving the intensity of the scientific search and training process, etc.

Literature Survey

The current stage of society is characterized by the emergence and expansion of the digital market, which is constantly covering all new industries. Trends in the development of this market are largely determined by the progress not only of the technology sector itself but also penetration of advanced ICT into other fields of production and social activity (Feldman, J.D., et al. (2018)).

In particular, education is a prospective area for the introduction and application of new technologies. It will stimulate productivity and efficiency of activity in this field, make graduates more competitive, promote their professional realization, business development, economic growth (Pegalajar, M. C. (2018), Li, S. C., et al. (2006)). The dynamism of production processes, caused by the rapid change in technology, leads to the emergence of new areas of specialization, which may not have existed a few years ago, creation of new jobs.

The world's leading companies and governments are investing in advanced digital technologies such as mobile communications, social media, big data analytics, intelligent devices that control connected objects and sensors, and others (Idris, M.Y., et al. (2017)).

Among them cloud technologies using organizations around the world play a special role, and this growth is at an impressive rate (Wong, E. M. L., & Li, S. C. (2006)). The issue moves from a plane of competitive advantage to a plane of avoidance of backlog and overcoming a technological gap in comparison with more developed subjects of business in all spheres of economic and social development.

Global trends in cloud computing are characterized by data from leading market research companies in the IT sector.
Digital technologies are being introduced in education and education systems to make the learning process more efficient and up-to-date (Taylor, S. (2018)). Prospective learning systems are based on intellectual and interconnected environments.

But the existence of high-tech systems (infrastructures, environments) does not improve the quality of education yet. A key element in this process is the teaching staff (Paradarami, T.K., Bastian, N.D., & Wightman, J.L. (2017)). The lecturers and teachers should possess sufficient skills ICT use in order to become leaders of changes and to activate the processes of modernization of educational systems.

Methods

To solve the tasks set in the work scientific methods were used: theoretical - analysis of psychological and pedagogical, philosophical sources on the research problem to clarify the status of the issue development of formation and development of cloud-oriented educational and scientific environment of higher educational institutions, identifying research areas, principles and approaches to the environment design; analysis of current standards and regulations regarding the use of ICT in the process of education and informatization of educational institutions; generalization of domestic and foreign experience of using cloud services and technologies in higher education institutions to determine trends in development, to clarify the basic conceptual and terminological apparatus, establish conceptual bases of research; theoretical analysis, system analysis, systematization and generalization of scientific facts and patterns for the development and design of models of cloud-oriented environment, substantiation of the main conclusions and provisions.

Results

The design of electronic educational resources (hereinafter referred to as EER), which are elements of meaningful content of the environment, can be considered to some extent, regardless of the system means and resources of their

supply, which are also "in the cloud". Thus, the provision of system tools for network configuration, as well as the design of the filling itself, its quantitative and qualitative composition appear to some extent as separate tasks, separate stages of this activity. Therefore, the issues of justifying the ways of selecting and classifying the necessary electronic resources, ensuring the proper level of their quality play a more important role.

Electronic resources appear at the same time as objects and means of learner's activity, thus, they perform certain functions implemented in the process of mastering the subject area. It is expediently to characterize the types of activities conducted for ICT services in a cloud-based system which serve as its educational services. Obviously, not all functions that can be performed within a particular system are necessary, that is, not all of them need to be converted to services.

It will be necessary to determine the components of its content filling for the design of educational services on the basis of a hybrid model of the educational and scientific environment of a higher education institution. The components are electronic resources of educational and scientific purpose.

Electronic resources to support learning activities can be further classified according to the types of activities, including acquisition of theoretical material, consolidation of knowledge (tasks, exercises execution, skills development, and knowledge assessment (Table 1).

Table 1. Electronic learning resources in the cloud-oriented environment (copyright development)

Electronic resources	ACTIVITY		Electronic resources
	Essence of the activity	Type	
Resources for e-journal systems, e-libraries, information retrieval networks, collections, multimedia libraries, EOP reference and additional, text, editors of tables, images, presentations, EOP creation tools	Preparation of demonstration and printed materials, educational and reference literature processing	Preparation and search of learning material	
Resources of e-journal systems, e-libraries, information search engines and social networks, collections, multimedia libraries, EOP reference and additional, electronic textbooks, manuals, electronic training courses, linguistic analysis programs, educational expert systems, e-thesaurus	Processing of texts, formulation of statements, concepts, conclusions, syntactic and semantic texts processing, multimedia demonstration	Theoretical material processing	
Electronic text-books, tutorials, electronic training courses, learning expert systems on tasks solution, electronic tasks, activity environments, subject packages of applied programs (PAP), PAP modeling, simulator programs, training lab workshops	Tasks, exercises solving, skills development, execution of practical, laboratory work, modeling, data analysis and processing, construction, calculations, mathematical transformations	Consolidation of knowledge, formation of practical skills	
E-testing systems, automated knowledge assessment systems	Assessment, monitoring of educational activities	Evaluation of learning outcomes	

It is possible to suggest further detailing the types and varieties of electronic resources for educational purposes, which are a component of the educational constituent of the educational institution environment, by the criterion what place these resources occupy in the organization of the learning process.

Research pedagogical activity is an important component of practically all branches of education, where it is necessary to introduce modern innovative approaches, tools and technologies. Because of this identification of its

structure and functions, forms and levels of organization, processes and constituents becomes an urgent issue for the professional development of not only scholars, but also teachers-practitioners, lecturers and educators of many links.

Particular interest in this context is the issue of the activity aspects of the experiment organization, concerning the application of modern facilities and technologies, in particular means of informatization, to support certain stages of the process of scientific and pedagogical research, their role and place in the implementation of research activities, ways of their optimal selection and use.

Identification and systematization of different types of actions, as well as their corresponding forms of thinking is one of the areas of the activity approach application in the field of research of problems of scientific and pedagogical cognition.
In case of consideration of scientific and cognitive activity, the concept of cognitive action becomes a priority. It is an action with forms of thinking aimed at the realization of a function or correspondence. This approach assumes understanding of cognitive activity as a sequence of cognitive actions. Theory as a system of scientific knowledge (a system of various forms of thinking) in this sense can be considered from the point of view of the activity results fixed in thinking.

Consideration of scientific and pedagogical activity as a form of cognitive research activity involves the identification of the pedagogical knowledge of various structures and cognitive processes associated with them, which have a complex and multilevel structure. Such processes include, for example, hypothesing and their testing, scientific data collection and analysis, formulation and justifying conclusions, etc. It turns out that the isolation of certain types of activities and their procedural components often arises rather nontrivial methodological issues, because scientific theory provides in its structure a complex, multifaceted and hierarchical system of actions aimed at performing functions of various types.

Discussion

Identification and systematization of sets and systems of cognitive actions, their descriptions and conditions of implementation is an important area of analysis of the structure and functioning of pedagogical theory as a system of scientific knowledge. One of the ways to accomplish this task is to identify the types, varieties and levels of hierarchy in the structure of scientific and pedagogical activity and their systematization.

In order to successfully develop a procedure and technology for the implementation of a scientific and pedagogical activity of a certain type, it is necessary firstly to find out what kind of actions and in what sequence they will occur.

Technology and procedure, in this case, are a constructive description of a particular activity. An important element of technology research is the implementation of activities which also require typology in order to be able to organize their description, selection and place in the technology. Thus, systematization of types of activities in the structure of scientific and pedagogical activity is a prerequisite for the formation of technology of scientific and pedagogical research.

Conclusion

Pedagogically sound and appropriate introduction of cloud technologies into the educational process of the university, formation and development of educational and scientific environment on this basis is a factor of increasing access to electronic educational resources, increasing the efficiency of the use of ICT. An important prerequisite for it is the improvement of the ICT competency of researchers, teaching staff and students in the use of cloud technologies.

It is necessary to take into account the educational and scientific criteria for the formation of this competence, characterized by a number of indicators on the organization and effectiveness of scientific research, implementation of scientific results, forms and types of educational activities.

While designing the cloud-oriented educational and scientific environment of the university OSE, it is advisable to apply a methodological system for its formation and development, which is based on the use of certain methodological principles, methods and approaches, aimed at increasing access to electronic resources, using state-of-the-art tools and technologies, enhancing participants' ICT competencies, educational and scientific process.

The methodological system encompasses a number of techniques that are combined by a system-forming factor, which is a cloud-based approach that relies on relevant baseline characteristics and service models. The system includes: methodology of using the scientific-educational cloud of scientific / educational institution, aimed at improving the organization and increasing the efficiency of scientific research, implementation (publication, dissemination and use) of their results; techniques for using cloud-oriented components for educational purposes based on AWS hybrid cloud and a specialized service (SageMathCloud), focused on increasing the ICT competency of lecturers and students, improving learning outcomes.

Identifying and classifying different types of educational activities is a prospective subject of our research. It is consistent with the tendency to study the problems of technologicalisation of various aspects of pedagogical research. At the same time, identifying the types of activities and their procedural components within each stage is an important object of elucidating the structure of the study. These issues require further development and systematization, especially in the informatization aspect.

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Evaluating the Effectiveness of Forming Enterprises Competitive Advantages

Irina SIDANICH,
Doctor of Pedagogical Sciences, Professor, University of Educational Management, Ukraine
sidanich@i.ua

Anna ZAPLATYNSKA
Candidate of Pedagogical Sciences, Docent, Dragomanov National Pedagogical University, Ukraine
zaplatynska@ua.fm

Oleksandr POSTELZHUK,
Candidate of Pedagogical Sciences, Docent, Rivne State University of Humanities, Ukraine
postelzhuk@ukr.net

Larysa HARASHCHENKO,
Candidate of Pedagogical Sciences, Docent, Borys Grinchenko Kyiv University, Ukraine
harashchenko@i.ua

Bogdan OPALCHUK,
Candidate of Pedagogical Sciences, Assistant, National University of Life and Environmental Sciences of Ukraine
opalchuk@i.ua

Abstract

It is proposed methodological approach to assessing the impact of the external environment on the implementation of this process, which is based on general and specific principles of the system, process, value-oriented approaches and involves the use of a sound system of indicators of factors characteristic of global, national, sectoral and regional levels and formal methods of valuation, which increases the objectivity and decisions validity level in the process of achieving and retaining competitive advantages of trade entities based on an integral approach to the formation of competitive advantages. It is made implementation of the proposed methodological instruments, which used the results of internal possibilities valuation, realized the influence valuation of external factors and set a favorable factors impact of all given levels, as well as negative impact some of them.

Keywords: competitive advantage, internal possibilities, business processes, international trade, external factors.

Introduction

The formation of an effective system of enterprise competitive advantages of economic activity certain type requires concretization of the content and identification of features taking into account industry specifics. The significance of the study these issues in relation to trade activity can be explained by the fact that the competitive advantages of all participants in the reproduction process (suppliers, manufacturers, trade entities, etc) are considered if they are recognized as consumers, that is, at the final stage of commodity circulation, where retail trade operates. It is no coincidence that the emergence and formation of competitive advantages theory occurred in the context of the formation and development of international trade theory. Features of competitive advantages are also related to the ability of trade enterprises to form them due to the quality characteristics of goods. The absence of production processes does not allow trade enterprises to directly affect the quality of goods.

Retail entities exercise indirect influence on the quality characteristics of ware through purchasing, cooperation in creating and developing a trade mark, forming a range of products with high quality, etc.

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Literature Survey

Significant number of scientists consider competitive advantages based on the competence approach (Trigeorgis, L., & Reuer, J. J. (2017)).

The essence of this category is highlighted through the following characteristics (Zhao, E. Y., Fisher, G., Lounsbury, M., & Miller, D. (2017)): degree of development and efficiency of using competitive potential; combination of existing potential with experience of using and image; the function of resources and competencies; the consequences of having key and distinctive competencies; the set of competencies with internal and external capabilities, etc.

Proponents of this approach (Durmanov, A., et al. (2019)) as sources of forming competitive advantages distinguish not only internal capabilities and competencies in different areas of activity, but also external; note such integral features as the comparative, dynamic, effective nature and strategic orientation.

The developments of Ogunsiji, A. S., & Ladanu, W. K. (2017), who consider competitive advantages from the point of view of competencies and capabilities, mainly refer to the carriers and sources of formation, which somewhat blurs the essence of this category at the same time.

Scientists interpret competitive advantages from the point of view of an innovative approach as:

scientific-technical potential, new technologies and knowledge, any innovations that create an advantage over competitors, thereby focusing on modern sources of the formation (Caurkubule, Zh. L., et al. (2020); Zeibote, Z., et al. (2019));

innovative approach to business strategy and tactics, which is more in line with approach to forming competitive advantages (Meyer, G. D., Neck, H. M., & Meeks, M. D. (2017)).

Thus, while emphasizing the leading role of innovative factors in creating competitive advantages, the authors do not, in our opinion, fully disclose the meaning and nature.

Methods

Theoretical and applied aspects of the work were studied using the following methods: content analysis – for the development of conceptual and categorical apparatus; morphological analysis; scientific abstraction; analysis, synthesis, comparative analysis- to determine the features of competitive advantages of retail enterprises and the systematization, classification of influence factors the formation of competitive advantages; graphoanalytic, matrix- the effectiveness valuation of competitive advantages formation; graphic- for schematic display of a number of theoretical and practical provisions, etc.

Results

The process of forming the competitive advantages of a retail company is proposed to be carried out in a number of successive stages based on the basic approaches, principles and components of the applied bases.
It is the formation of maximum possible set of ideas about competitive advantages in all types (operational, financial, investment), areas of activity of enterprise retail trading, and sources – external (favorable legal framework, geographical location, etc) and internal (internal business processes, management, resources, etc) at the first stage.
The second stage is devoted to creating information base for the formation of competitive advantages of retail enterprises based on the use of both external and internal sources.
There are determined internal enterprise capabilities to ensure the implementation of individual ideas from the first stage formed by evaluating the set of potential and realized competitive advantages of the trading company according to appropriate criteria at the third stage.
Competitive advantages are identified depending on the stage of the life cycle or stated the absence based on the results of the evaluation. Accordingly, there are formulated targets regarding the nature of actions to form competitive advantages (Fig.1).

Identification conditions	Competitive advantages	Goals
$N_i K_j \to 1$	Generated and implemented	Support and development
$N_i \to 1, K_j \to 0$	Generated but not implemented	The maintenance, improvement and implementation
$N_i K_j \to 0$	Absent	Generation of new

Figure1: Identification conditions and goals of forming competitive advantages of retail trading enterprise (author's development)

Note. N_i *- areas of competitive advantages;* K_j *- positions of competitive advantages.*

It is carried out the valuation of the favorable conditions and environmental factors of retail trading enterprises for the implementation of competitive advantages with the set of ideas and behavior's type formed at the first stage (Fig. 2) at the fourth stage.

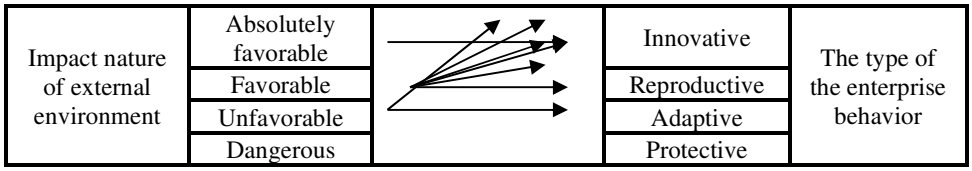

Figure 2. Type of behavior of retail trading enterprise depending on the impact nature of the external environment (author's development)

The fifth stage involves the creation of a set of relevant ideas of competitive advantages in various types\directions and sources of formation, which can be implemented by a retail trading enterprise due to internal opportunities and favorable factors of the external environment.

It is done by establishing the correlation of capabilities of the existing competitive potential and conditions of the external environment correspond to the implementation of certain ideas. Work is being carried out to form the competitive advantages of a retail company based on a set of current ideas identified at a previous stage, at the sixth stage.

Discussion

The issues of forming internal information, the competitive potential valuation and efficiency of forming competitive advantages are discussed in the previous sections. The next stages are related to the study of determinants of creating competitive advantages by retail trading enterprises and the influence of external environment on the process of the formation.
In our opinion, this approach is debatable, since the proponents identify the sources of competitive advantages with the factors of production, i.e. the resources necessary for the production of goods or services.

But we believe that the formation of competitive advantages is determined not only by sources, but also by the complex influence of numerous multidirectional factors that can both strengthen and weaken certain advantages. Enterprises can be provided with the same factors of production, but do not have competitive advantages.

This position is based on the generally accepted interpretation of terms. Thus, the source is defined as the basis, the initial beginning, that which gives rise to something, on which something is based, while the factor is the cause, the driving force of any process.

Our research, accordingly, is aimed at studying, identifying and systematizing factors that influence the formation of competitive advantages. Factors of competitive advantages are characterized not only by a significant number, but also are different depending on the scope of manifestation, attitude to the company, the nature and strength of the action, etc. Wide range of factors is due to the scale, multi-level, complex environment of business entities, as well as versatility of the competitive advantages and the specifics of the formation, implementation and development processes. Under such conditions the effective implementation of these processes on the basis of various factors requires the classification according to the directions and signs.
It is recommended type of behavior of the enterprise depending on the favorability of the external environment based on the influence valuation of external factors that occurred at the 4th stage.

It was revealed the adverse impact of information technologies development as a part of the innovation environment and the reduction in the number of market participants due to the overall positive influence of all levels of the external environment.
Adaptive behavior to the actions of competitors and decrease in the level of information technologies development was chosen to be adequate in the formation of competitive advantages in relation to these factors. The enterprise is recommended innovative and reproductive types of behavior in relation to the favorable influence of other factors.
Coordination of goals, directions, type of behavior, and measures for creating competitive advantages are shown in Fig. 3.

Competitive advantages \ Formation recommendations	Generated and implemented	Generated but not implemented	Absent
Goals	Support and development	The maintenance, improvement, implementation	The generation of new
Directions	The skill level of staff	The level of management competencies	Availability of commodity resources and capital
Type of behavior depending on the influence factors of external environment	Innovative. Reproductive. Adaptive to the competitors behavior in the industry and regional markets, to reduce the level of information technologies development	Reproductive on an innovative basis. Adaptive to the competitors behavior in the industry and regional markets, to reduce the level of information technologies development	Innovative (search and implementation of favorable opportunities). Adaptive to the competitors behavior in the industry and regional markets, to reduce the level of information technologies development
Formation activities	Increasing the level of staff abilities. Encouraging lower circulation costs. Creating conditions to optimize of circulation costs	Introduction of modern technologies in the trading process and customer service. Expanding additional services and price incentives for consumers	Expansion and revision of the assortment in the direction of forming assortment varieties of different price segments, improved quality and environmental characteristics, introduction of innovative products . Stimulation of consumers. Customization of the loyalty programs. Merchandising. The expansion and differentiation of the trade marks

Figure 3: Formation of competitive advantages based on the "internal business processes" projection (author's development)

Therefore, the proposed methodological instruments for the formation of competitive advantages of retail trading enterprises allowed to solving complex this problem, identify narrow spaces and critical conditions in comparison with the subjects of strategic group, as well as to determine measures for further actions to form competitive advantages and improve the competitive position in the strategic group and in the market.

Conclusion

Comprehensive methodological support for the formation has been developed, takes into account industry specifics, based on general and special principles of system, process and strategic-oriented approaches, the results of internal capabilities valuation and the pressure of external environment and provides for the sequential implementation of stages based on the conceptual provisions of creating competitive advantages of retail trading enterprises.

Scientific views on the allocation of environmental factors of retail trading enterprises are systematized and the classification is improved by: identifying features – directions and sources of competitive advantages, the role in providing competitive advantages; the company's response to changes in the external environment and directions of the development; details of specific factors in relation to retail enterprises by attributes- specialization of retail enterprises and the functional purpose of the range, organizational forms of trade and formats, components of business activity of retail enterprises based on the study of modern approaches to the classification of factors for the formation of competitive advantages.

It is developed a scientific-methodological approach to assessing the impact of the external environment on the implementation of this process, which unlike existing, based on a set of general and specific principles of the system, process and value approaches; involves the use of an integrated system of indicators characterizing the external environment of retail enterprises of world, national, sectoral and regional levels; focuses on the specifics of retail trading enterprises based on the conceptual foundations of competitive advantages formation.

As indicators, we selected indexes that are integral characteristics of factors in the relationship and calculated by authoritative international and national organizations, which increases the objectivity of the evaluation results and allows the use of formalized evaluation methods.

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Simulation of A Cloud Oriented Learning Environment at An Educational Establishment

Ganna TURCHYNOVA,
Candidate of Pedagogical Sciences, Ass. Professor, Dragomanov National Pedagogical University, Ukraine
turchynova@i.ua

Tetiana ALIEKSIEIENKO,
Doctor of Pedagogical Sciences, Ass. Professor, Institute of Problems on Education of the National Academy of Educational Sciences of Ukraine,
tetiana_alex@ua.fm

Stanislav KARAMAN,
Doctor of Pedagogical Sciences, Professor, Borys Grinchenko Kyiv University, Ukraine
karaman@i.ua

Svitlana KUSHNIRUK,
Doctor of Pedagogical Sciences, Professor, Dragomanov National Pedagogical University,
kushniruk@i.ua

Tetiana HLADUN,
PhD in Pedagogy, Dragomanov National Pedagogical University
hladun@i.ua

Abstract

The analysis and systematization of scientific and practical experience has made it possible to determine the following: requirements of the pedagogical and student community to the learning environment of an educational establishment are constantly increasing, which is caused by intensive development and active use of information and communication technologies both at educational establishments for solving educational problems and beyond. It is recognized that development of the Internet, transition of the general secondary education to various services contributes to rapid introduction of cloud-oriented learning environment for improving organizational and educational activities of subjects of education, which in the future may lead to improvement of the general secondary education system.

Keywords: cloud-oriented learning environment, information and communication technologies, educational establishment, competence, virtual learning environment.

Introduction

The relevance of the study is due to the fact that the requirements are growing for organization and quality of the educational process by the society, new opportunities emerge for comprehensive development of a student in the XXI century, new and more effective information and communication technologies (ICT) are rapidly developing, including cloud oriented learning environments (COLE), introduction of which into the general secondary education system will create the kind of management and training structures that will provide not only unrestricted access to e-learning resources, but also innovative conditions for communication and collaboration to those educational establishments that do not have relevant strong IT divisions, material and technical resources.

In a modern society open to everyone and aimed at development of general secondary education, the key role belongs to the teacher, who is entrusted with a comprehensive development of students, discovery of their potential and formation of a successful person. In addition, it is essential that professional and competent teachers with a high level of motivation work in schools, always ready to help their students. Professional activity of the teacher becomes more complex: new pedagogical technologies are introduced, the content of education is changing, new

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activities are emerging, which in turn requires a systematic development of the IC competence of all subjects of learning.

In recent years, interest in education has considerably improved and educators increasingly turn to the Internet to use ICT to communicate, collaborate and organize corporate work, and rapid development of cloud services has become a leading trend in addressing the educational mobility challenges of all educational process participants.

Solving these problems are socially important tasks of the pedagogical science.

Therefore, the basis of the cloud oriented learning environment is a series of scientific findings reflecting implementation of ICT in general educational establishments.

Literature Survey

Research on development of the learning environment of a general educational establishment is still relevant.

Interpretation of the concept of "learning environment", specifics of formation and development of learning environment, the importance of this concept for development of education is reflected in the works of scientists: Alsaadani, S., Bleil De Souza, C. (2019); Becker, L. R., Hermosura, B. A. (2019).

In the 21st century, the problem of environmental impact on development and formation of a student's personality becomes relevant, which is associated with implementation of personally-oriented learning.

In accordance with development of informatization of educational establishments, updating of the material and technical resources, emergence of computer classes, opinion of scientists regarding the term "learning environment" develops, and appear varieties characterizing its certain aspects (Yang, D., et al. (2018)).

Thus was defined the term "information and learning environment". The information and learning environment refers to a system-organized set of means of data transmission, information resources, interaction protocols, hardware, software and organizational-methodological software, focused on meeting the educational needs of users (Luo, N., Zhang, M., & Qi, D. (2017)).

Information and learning environment is defined as a set of conditions that contribute to emergence and development of processes of informational-educational interaction between students, teachers and means of new information technologies, as well as formation of a cognitive activity provided components of the environment are filled with proper content of a specific educational course (Raspopovic, M., Cvetanovic, S., Medan, I., & Ljubojevic, D. (2017)).

There are three main aspects of the "information environment": activity, communication, infrastructure (Huda, M., et al. (2017)).

The first aspect is participation of a person in the communication process, who, upon perceiving information, transforms it again into his personal knowledge.

The second aspect is communication, in which the level of education, awareness, human development is coordinated.

The third aspect is the infrastructure that enables communication activities (Internet, publishing, electronic libraries, information centers).

Scientists have identified the main types of learning environment (Machado, M. C., et al. (2018)): dogmatic learning environment (promotes development of passivity and dependence of a child); creative learning environment (promotes free development of an active child); career learning environment (promotes activity and dependence of a child); carefree learning environment (promotes free development and determines a passive life position of a child).

Some scholars (Cebrián, G., Palauand, R., Mogas, J. (2020), Lamb, R. L., Annetta, L., Firestone, J., & Etopio, E. (2018)) emphasize that the network (the Internet) led to emergence of the "network learning environment" concept. Such an environment is characterized by creating connections between people through the use of communication

technologies to achieve learning-related goals. Network learning involves storing and providing various information, email, message boards, software for organizing educational conferences, etc.

The advent of online learning games and simulators led to emergence of the concept of "virtual learning environment" (VLE) - a software system designed to support the process of distance learning with the emphasis on learning, as opposed to a managed learning environment, which is focused on managing the learning process. To create such an environment, it is typically necessary to use the Internet which provides assessment tools (in particular, an automatic assessment, e.g. a multiple-choice task), communication, downloading materials, returning assignments to students, peer evaluation, managing student groups, collecting and organizing assessment of students, surveys, etc.

Methods

To solve certain problems, a number of methods were used, in particular theoretical, methods of systematic and comparative analysis of pedagogical, psychological, philosophical, sociological scientific references, methodical, specialized literature to determine elaboration of the problem of designing a cloud oriented learning environment of a general educational establishment; legislative and regulatory documentation on development of general secondary education; analysis of pedagogical experience of using cloud oriented learning environment in education; synthesis, generalization and conceptualization for formulation of main provisions of the research; designing and modeling of cloud-oriented learning environment of a general educational establishment as a set of related components.

Results

To ensure functioning of education as a basis for sustainable development of a country, its competitiveness at the international level, it is necessary to ensure creation of new forms of organization of educational activities, transformation of organizational and educational practices, technical adaptation to new conditions of existence and activity.

An effective cloud oriented learning environment is developed on the basis of relevant policy of a general educational establishment, which defines basic aspects of comprehensive development of a student's personality and provides educational activity, is pedagogically balanced, creates conditions for educational mobility, develops IC competence, forms 21st century skills with the subjects of education and relies on both general scientific and specific principles and approaches.

Cloud computing is a progressive and promising solution, one of the elements of the revolutionary third IT platform. Its rapid spread is now a key trend that in the coming years will significantly affect the global development of education in general and secondary education in particular.
Today, it is obvious that even compared to the grid systems, not to mention the previous generation "hardwired" networks, the cloud service architecture is much more concise, more productive and less expensive.

First, cloud computing can significantly reduce capital costs for building data centers, purchasing server and network equipment, hardware and software. Most of these costs are borne by the cloud service provider. Additionally, a user saves on keeping IT staff and administration.

Second, cloud technologies provide the ability to quickly change configuration of the corporate IT infrastructure based on current needs, consuming (or buying) as many resources as needed at a given time. Cloud resources are usually enough to order a virtual "supercomputer" or infrastructure for a large corporation, and there are no problems with software updates (the latest versions are always available), compatibility of different operating systems.

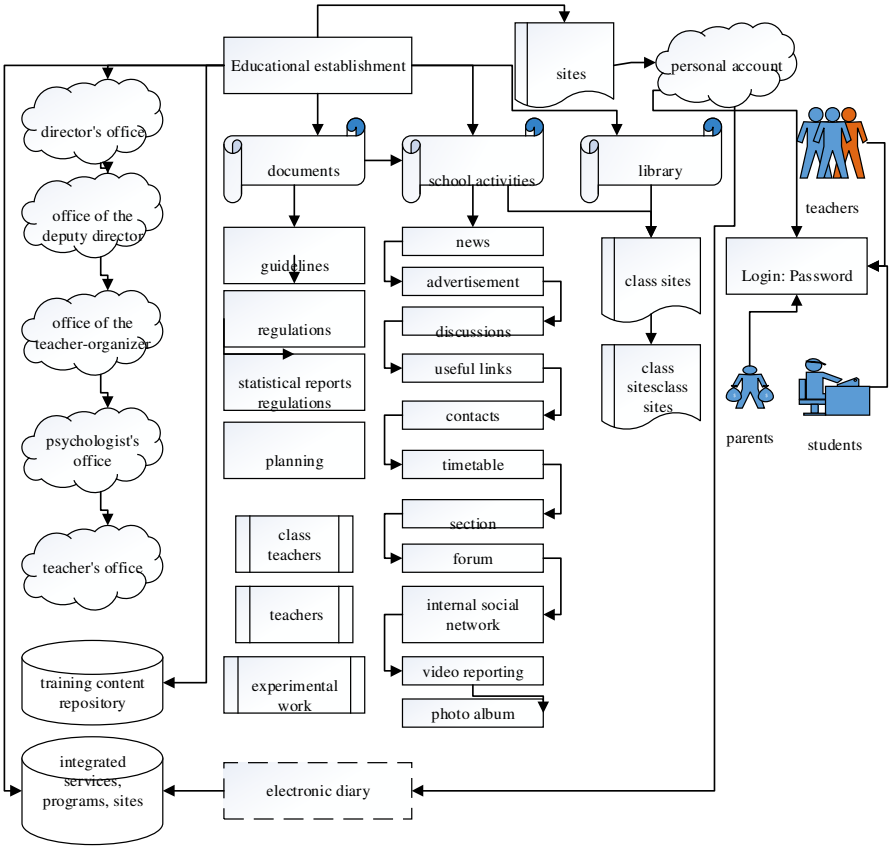

Figure 1: Space-semantic component of cloud oriented learning environment (COLE) (author's design)

Third, cloud services literally allow to "carry one's workplace with oneself" – if a proper gadget is available and there is access to the Internet, a user, regardless of his location, always has access to his own virtual computer, corporate networks, databases.
Fourth, the range of services offered by manufacturers and providers of cloud solutions is constantly expanding. Usually, their range is fully in tune with the ever-increasing capabilities of modern computer technology.

Significant cost savings for software acquisition; availability of resources regardless of location, type of computer hardware, and operating system; increasing opportunities for collaboration and communication; reducing data storage and backup issues – all this takes secondary education to a new level of development.

Along with the widespread adoption and development of cloud technologies, there is a problem of pedagogical design and development of a cloud oriented model of a learning environment for a general educational establishment and the use of Office 365 capabilities to ensure educational mobility of all participants in the educational process.
In the process of designing a cloud oriented learning environment, its structure and components play one of the most important roles and determine its internal organization, interconnection and interdependence between components, which determines its further use by subjects of educational activities of different ages, with different levels of educational achievements and IC competence.

Designing such COLE component as space-semantic (Figure 1) is aimed at taking into account capabilities of the above components, which will ensure functioning of the learning environment of a general educational establishment and create conditions for universal access to objects.

Discussion

Such components include a training content repository that is filled with electronic educational resources and can contain a number of elements:

electronic textbooks that include theoretical material, a glossary, as well as topics of laboratory and practical works, sample control questions;
lesson plans and practical assignments;
assignments for an independent work;
assignments for a final academic assessment;
various instructions for laboratory works;
electronic data bank of test forms;
mini-tutorials and reference notes;
links to online resources and additional services;
additional training materials (textbooks, manuals, journals, etc.).

Conclusion

At the present stage of development of general secondary education, it is necessary to ensure functioning of the learning environment, which makes it possible to implement conditions for educational mobility, communication, collaboration and cooperation between the teacher and the students. It is necessary to introduce such models of learning environment that would allow to satisfy the needs of teachers for organizing and conducting lessons of a new type, activating students' learning activities, forming IC-competence and comprehensive development of creative personality. Such opportunities are provided by the use of a cloud oriented learning environment.

Creation of cloud oriented offices for subject teachers and filling of information repositories is a means of managing normative-methodical, didactic provision of activity of a regular school, contributes to mobility of all participants of the learning process, improving quality of education.

The model of integration of various services allowed to analyze directions of prospective development, forms of combination of various services and methods of their integration in COLE.

A necessary prerequisite for learning by means of COLE is implementation of a personally oriented educational paradigm. It doesn't need to absolutize standard teaching methods. Specifics of planning subjects' activities in COLE are determined by different aspects of the learning process and by three frames of access (shared, group, personal).

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Planning of Sustainable Development of Tourism in Ukraine (On the Example of The Dnepropetrovsk Region)

Valentyna SHAPOVAL
Doctor of Economics, Professor of the Department of Tourism and Economics of the enterprise Dnipro University of Technology «Dnipro Polytechnic», Dnipro, Ukraine, e-mail: vmshapoval2017@gmail.com

Tetyana HERASYMENKO
Ph. D. in Geological, Associate Professor of the Department of Tourism and Economics of the enterprise Dnipro University of Technology «Dnipro Polytechnic», Dnipro, Ukraine,
e-mail: tatyana400@gmail.com

Iryna KYRYLIUK
Ph. D. in Economics, Associate Professor of the Department of Technologies and Organization of Tourism and Hotel and Restaurant Business Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: irina_kurul@ukr.net

Tetiana BERBETS
Ph. D. in Pedagogical Sciences, Associate Professor of the Department of Technological education Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, e-mail: berbec08@ukr.net

Oksana LYTVYN
Teacher of the Department of Technologies and Organization of Tourism and Hotel and Restaurant Business Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,
e-mail: okslit79@ukr.net

Abstract

The article contains proposals for the creation of a system for managing territorial tourism based on a tourist organization with a developed structure of departments and certain management functions and the creation of a specialized information and tourist portal of the region in the Internet with a system for monitoring the tourist resources of territories in real time. A range of factors influencing on the tourist potential of the area is determined.
A methodology for short-term planning of the development of domestic tourism has been developed and tested based on optimization of regional budgets investments. Research lies in clarifing and expanding the interpretation of the concept of "tourist territory", taking into account the rationale for the creation and maintenance of a management system, the construction of a factorologic model of tourism potential, including the coefficients of significance of the main factors of tourism development.
The developed proposals and recommendations allow the regional authorities to objectively assess the level of development of domestic tourism in the region, analyze processes and determine trends in domestic tourism, as well as the directions and scale of its development, rationally and effectively spending budgetary funds.

Keywords: enterprise of tourist complex, maximization of tourist potential, tourist territories, investments, management.

Introduction

Tourism in all its forms and types is recognized as one of the most promising sector of the economy. The multiplicative effect of tourism is enormous: the income received from one tourist exceeds the amount of money spent at the place of stay on the purchase of services and goods in the range from 1.5 to 4 times. Countries known as world centers of tourism have made it their state policy, taking on the functions of forecasting, coordination and control.

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In the international rating of the competitiveness of countries in the tourism sector, published by the World Economic Forum, Ukraine ranks only 76th out of 140 countries (Burnashov, 2015). This indicates a serious lag in the competition for the tourism market, especially since Ukraine has a rich cultural, historical and natural heritage, which is the primary factor in the development of tourism to the European level. For this, it is necessary to improve the legal framework, establish infrastructure, carry out various marketing activities and the like. Together, these and other measures will make it possible not only to integrate into the European community, but also to intensify the development of the domestic tourism industry, which can become one of the main directions of economic development. Improving the conditions for conducting tourism business will also provide an opportunity to establish closer relations with the member states of the European Union.

The integration process is aimed at introducing European norms and standards in education, tourism, dissemination of our own cultural, scientific and technological achievements at the EU. Ultimately, such steps will be aimed at increasing Ukraine's European cultural identity and integration into the European intellectual, educational and scientific and technical environment (Mal's'ka, 2009).

In Ukraine, with a huge tourism potential, there is practically no state support for tourism development. The competitiveness of Ukrainian organizations in the field of tourism depends directly on the state approach to this issue, and the course taken in Ukraine – accession to the European Union – is another reason for changing attitudes for the tourism. We need a theoretical understanding of new forms and principles of interaction both between executive authorities of different levels, and their interaction with organizations whose activities are related to tourism; development of laws and regulations governing the activities of all enterprises and organizations of the tourism industry; improving the methods of activity of all participants in the market of tourist services that meet the requirements of the modern stage of socio-economic development.

Discussion

Many theoretical aspects of the development and functioning of enterprises of the tourist complex were reflected in the works of foreign and domestic scientists, in particular, (Burnashov I/, 2015, Mikhailichenko G., 2012 and Tkachenko T., 2009) studied the problems and prospects of the tourism industry. Deferent aspects of assessing the investment attractiveness of tourism enterprises were considered in works by (Andrash O., 2012), problems in the management in tourist areas were studied by (Malskaya M., 2009, Muzychenko-Kozlovskaya O., 2012, Byrkovich V., 2007) etc. Despite the significant achievements of the aforementioned authors, it should be noted that researchers do not pay sufficient attention to the management of tourism development in tourist areas and also do not use the system and methods of tourism management as part of the overall strategy for the development of the territories. The need for a comprehensive study of the mechanisms for the creation and operation of tourism management systems in tourist areas determined the choice of the research topic, the formulation of its goals and objectives.

Material and Methods

The purpose of this study is to develop theoretical and practical recommendations for improving the planning system for sustainable tourism development at the regional level (on the example of Dnipropetrovsk region).

As practice shows, the development of tourism can lead to both positive and negative consequences for the tourist area. The main positive results of tourism development include:

– creation of new objects of the tourism industry, modernization and increasing the efficiency of the objects of tourism and related infrastructure (medicine and health care, transport, utilities);
– attraction of tourists' savings when they spend expenses during travel, recreation, etc. (multiplier effect);
– strengthening of the consumer market;
– increasing the well-being of the local population due to an increasing of its employment, improvement of living conditions due to care for tourist resources and social infrastructure, improvement of social protection by increasing the budgetary self-sufficiency of the region.

However, there are also negative consequences of tourism development, in particular:

– structural change in the traditional economic system (complete cessation or transfer to other areas of entire sectors of the national economy;
– direct change in the economic conditions of the local population (change in the capacity of the local consumer market and the level of income of the population under the influence of the factor of tourist seasonality);

– formation of a weak economic system in the future (the territory cannot offer to the market anything other than its own tourism product).

Overcoming the aforementioned negative and increasing positive consequences of tourism development within a tourist territory can be provided by a tourism management system, which is a certain structure of interactions between all stakeholders, which may include various institutional elements (Andrash, 2012; Tkachenko, 2009). It serves as the basis for sustainable and long-term development of tourism in the tourist area due to:

– selection of directions for the influence of tourism on the natural, cultural and social spheres;

– ensuring equal distribution of expenses and incomes, creation of jobs directly in the local tourism sector and related sectors of the economy;

– stimulation of increasing the efficiency of accommodation facilities functioning, catering establishments, transport, excursion facilities;

– ensuring investment in the regional economy and its diversification;

– stimulation of the basic infrastructure of the territory modernization;

– assistance in the creation of recreational facilities, search for new sources of funding for the preservation of excursion facilities;

– formation of national identity among the local population and ensuring deeper mutual understanding;

– assistance in supporting the tourist area at the domestic and international levels.

Results

To clarify the concept of "tourist territory", we have identified a number of relevant functions performed by the territories (Fig. 1), and also presented its classification (Fig. 2).

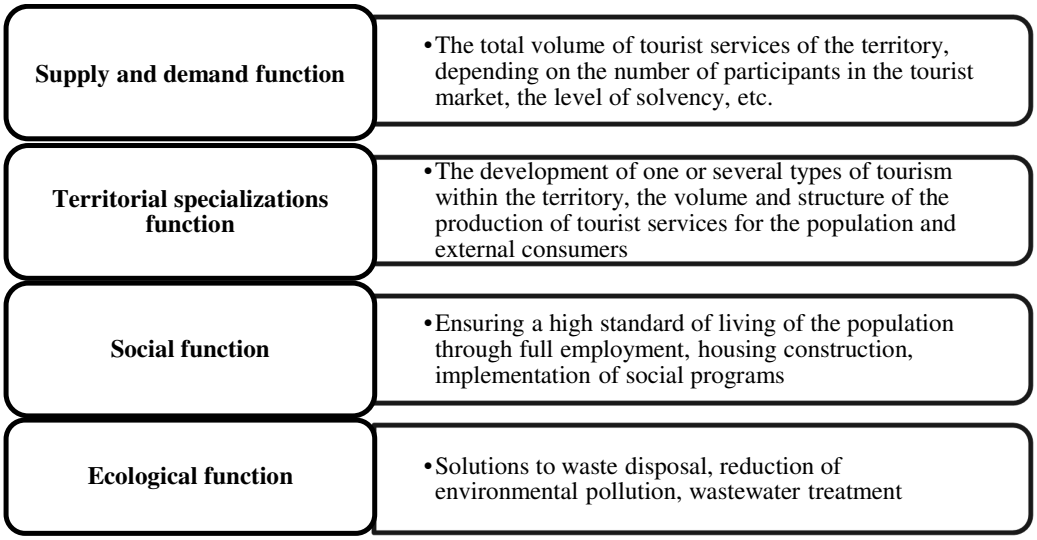

Fig. 1: Functions of the tourist area

Source: compiled by the authors.

Number of tourist arrivals and inhabitants of the territory	• the largest; • large; • medium; • small.
Significance of the territory in the field of tourism	• world significance; • national significance; • regional significance; • local significance.
Dynamics of tourist profit on the territory	• seasonal; • year-round.
The state of development of the territory	• highly developed; • sufficiently developed; • has potential for development.
Tourist resources available on the territory	• suitable for mass recreation; • suitable for holidays and vacations; • limited.

Fig. 2: Varieties of tourist areas

Source: compiled by the authors.

Consider the functions of the department of tourism and resorts development in Dnepropetrovsk region (Fig. 3).

Department of Tourism and Resorts Development in the Dnipropetrovsk Region

Environment, natural and cultural heritage (promoting the rational use of natural resources, financing protection measures and restoration works, maintaining a register of tourist resources in the Dnipropetrovsk region.

Infrastructure (regulation of the placement of facilities, planning of infrastructure development, investment).

Population (stimulating the population for recreation in the Dnipropetrovsk region, promoting the creation of jobs in the field of tourism, standardization and certification of the tourism activities).

Educational institutions (assistance in ensuring continuous training of personnel for the tourism sector, assistance in organizing advanced training courses for staff in the tourism sector).

Tourism enterprises (licensing, standardization, certification of enterprises, promotion of achievements in the field of tourism, support of priority areas of tourism activities, collection of indicators of enterprise performance, their calculation and forecasting).

Other subjects involved in the tourism sector

Population (stimulating the population for recreation in the Dnipropetrovsk region – advertising, information support).

Tour operators, non-governmental organizations in the tourism sector (participation and organization of their own exhibitions, forums and conferences on tourism topics, organization of advertising tours for representatives of organizations.

European countries

Population (stimulating the population for recreation in the Dnipropetrovsk region - advertising, information propaganda, reporting tourists).

Tour operators, non-governmental organizations in the tourism sector (participation in international exhibitions, forums, conferences on tourism topics, organizing promotional tours, monitoring new trends in tourism, monitoring the international competitiveness of regional tourism products, creating representative offices and branches abroad).

Fig. 3: Functions of the Department of Tourism and Resorts Development in Dnipropetrovsk Region

Source: compiled by the authors.

Groups of factors: external (exogenous);
internal (endogenous).

Possible impact – positive / negative.
The kinde of the impact – extensive / intense.

Types of factors: natural and climatic, cultural and historical, financial, social, political and legal, scientific and technical, logistical, personnel, information, market, management, time factor.

Fig. 4: Factors, which influence on the development of tourism and resorts in the tourist area

Source: compiled by the authors.

The authorities of the Dnipropetrovsk region for the development of tourism and resorts should be provided with reliable information about the territory and the external environment in various aspects in order to support the adoption of correct decisions on organizing the tourism sector as an effective sector of the economy, which allows the rational use of the natural and cultural heritage of the region, increase employment and income of the population, to provide an inflow of investments (Muzichenko-Kozlovs'ka, 2012).

An effective tourism and resorts management system will contribute to the elimination or reduction of the constraining influence on it, both external and internal factors (Fig. 4), strengthening their positive influence in key areas (Fig. 5).

Trends of tourism	Directions of activity within the tourism management system
Preservation and reproduction of tourist resources	Suporting of tourist resources of the territory in proper condition for further reproduction, environmental protection
Planning the allowable environmental burden from tourism development	Analysis and assessment of all components of the environment to determine the requirements for tourist infrastructure of the territory
Interaction with the population	Involvement of the local population in the process of tourism planning with the aim of to develop the most profitable directions for the population
Creation and promotion of a quality tourist product	Ensuring the appropriate ratio of price and quality of the tourist product of the territory, attracting tourists to the territory while preserving the conditions of the environment
Obtaining economic and social benefits from tourism development	Increasing the value of financial and social capital per capita

Fig. 5: Directions of achieving the development of tourism and resorts in Dnepropetrovsk
Source: compiled by the authors.

The interaction of business and the government is the key to economic development, especially when it comes to cooperation with local authorities, which is well aware of the problems and economic interests of entities operating on its territory (Andrash, 2012). This thesis is fully and completely confirmed by many examples of successful interaction of the tourism business with government authorities.

The authors of the article analyzed the total tourism potential of the Dnipropetrovsk region (table 1).

Table 1: Quantitative assessment of the total tourism potential of the Dnipropetrovsk region

№	Components of subpotential	Quantitative and qualitative indicators of objects
Historical and cultural potential		
1.	Monuments of history, culture and architecture of regional and local significance	over 750
2.	Historically populated places of national and local significance	8
3.	Theaters / museums	13 / over 100
4.	Folk crafts and handicrafts	over 100
Tourist resource potential		
1.	Lakes and ponds	approximately 200
2.	Rivers and streams	over 1000
3.	Natural heritage monuments (reserves / nature parks)	approximately 200
4.	Deposits of natural mineral waters / therapeutic muds	15/4
The potential needs of tourists		

1.	Accommodation (number of rooms)	over 10000
2.	Organizations of sanatorium profile	approximately 30
3.	Transport infrastructure, including: international airport railway stations in Dnipro bus station in Dnipro	 1 2 1
4.	Travel companies (per 100 thousand population)	over 8
5.	Catering companies	approximately 2000
	Economic potential	
1.	Place by volume of output and small business development	in 5 regions
2.	Density in the formation of the total gross product of Ukraine	over 25%
3.	Number of partner countries	over 100
	Ecological potential	
1.	Place among the regions of Ukraine by the level of environmental impact / (by the activity of environmental protection)	high and exceeds the average in Ukraine almost in 1.5 times

Source. Compiled by the authors from [10].

As a result of the performed analysis, it was concluded that certain components of the aggregate tourism potential of the Dnipropetrovsk region (management and informational potential in the field of tourism) are weak, which is shown in the following aspects:

– lack of a system for monitoring the state of tourist resources;
– lack of information database about objects of tourism infrastructure (accommodation, tourists' leisure, meals);
– lack of a clear marketing strategy for promoting the region's tourism product on the international and Ukrainian markets;
– lack of a tourist image of a significant tourist territory by Ukrainian standards;
– lack of a clear system of tourism planning, which allows to ensure a long-term perspective in the direction of tourism development;
– non-participation in the management of tourism activities of tourism organizers in the region,
– lack of due attention to cooperation with specialized higher educational institutions of the region;
– irregularity of activities aimed at the development of tourism;
– uncertainty about the role and place of tourism in the economic system of the region, as well as from the possible benefits from its development.

Proposals for the application of an integrated approach to tourism management of tourist territories in the Dnipropetrovsk region provide for decision-making in the main directions.

1. Creation and implementation in the future of a tourism development program for tourist areas, which will allow:
– to create conditions for the effective development of tourism in the region;
– to form a competitive regional tourism product;
– to develop a system for promoting the region's tourism resources in the Ukrainian and international tourism markets;
– to form a modern regulatory and legal regional base for tourism;
– to develop measures of supporting small and medium-sized businesses in the field of tourism;
– to ensure the development of tourism infrastructure, as well as support for new tourism resources.

The structure of the program should include the following sections: content of problems and justification of the need to solve them by program methods, aim and objectives, system of program activities, timing and stages of implementation, implementation mechanism, resource provision, organization of management and control over the progress of implementation, assessment of efficiency.

2. Creation of a territorial organization for the development of tourism with a certain structure, which will consist of various units and which should eventually become the main authority of tourism management in the Dnipropetrovsk region (Fig. 6).

The structure of the territorial organization for the development of tourism will be composed of various units with a certain set of functions:

– expert and analytical center of tourism: identification and study of changes and trends in the structure and processes of the external and internal tourist environment, research of topical problems of tourism in the territories, analysis of factors that contribute or hinder the achievement of goals set for the territorial organization for the development of tourism;

– scientific and methodological center of tourism development: development of tourism scientific foundations in tourist areas and generalization of the existing experience of its development; search and formation of mechanisms for solving tourist problems;

– marketing center: promotion of the regional tourism product, management of the region's tourism brand;

– information and logistics center: dissemination of tourist news, creation and support of a data bank on tourism, distribution of tourist flows for the most efficient use of tourist facilities, consultative and reference work with tourists and the local population;

– support center for small and medium-sized businesses in tourism: providing support for the most promising types of tourism and local manufacturers of tourism goods, works and services;

– coordination council for tourism development.

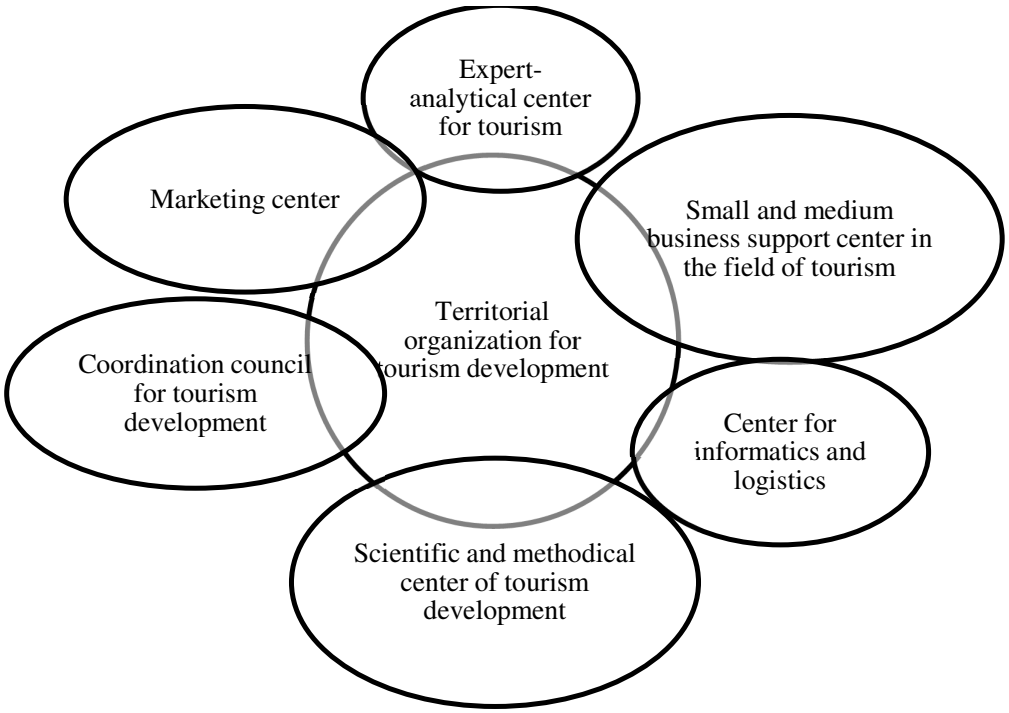

Fig. 6: The structure of the territorial organization for tourism development

Source: compiled by the authors.

Representatives of tour operators for inbound and domestic tourism, specialists in tourism development, scientists from specialized universities, representatives of tourism industry enterprises can and should enter into various structural divisions of the territorial organization for tourism development.

A self-regulatory organization can become a form of their interaction within a territorial organization for the development of tourism.

3. Creation of a unified information and tourist portal of the Dnipropetrovsk region on the Internet, which should contain the following sections:

– information about available tourist resources with their detailed descriptions and characteristics, as well as indication of locations, obtained through monitoring of tourist resources in real time;

– detailed information about accommodation facilities, transport infrastructure, catering establishments;

– a program of tourism development in the Dnipropetrovsk region, which highlighting the key activities, terms and status of implementation;

– information about the territorial organization of tourism development, its structure and main areas of activity;

– a list of the most interesting excursion routes to the settlements of the Dnipropetrovsk region with a detailed description;

– a detailed description of the proposed regional tourism product with its particular features and unique characteristics.

The creation of the portal will increase the popularity of the region in the tourism market, attract new tourists, strengthen the information potential, and at the same time provide the tourism management system with the necessary information. In the future, the sections of the portal can be modified and supplemented depending on the needs of tourists and the territorial organization for the development of tourism.

Evaluation of the effectiveness of each of the directions for improving the tourism management system of tourist areas can be carried out according to a number of indicators. The most difficult is to analyze the possible effects of the development and implementation of an information and tourist portal at the Dnipropetrovsk region (table 2).

Table 2: Criteria for assessing the effectiveness of recommendations for improving the tourism management system of tourist territories in the Dnipropetrovsk region

Direction of improvement of the tourism management system	The name of the performance evaluation criterion
Development and implementation of information and tourist portal of Dnipropetrovsk region at the Internet	The total number of visitors and the number of repeated visits to the portal over a period of time
	Increase the flow of tourists
	Increasing the popularity of Dnipropetrovsk region as a tourist area
	Strengthening the competitiveness of the tourist product of the region
	Development of interest in travel around the area among locals
Implementation of the program of tourism and resorts development	Increase in tax revenues
	Investment income growth
	Reduction of resource costs
	Achieving performance indicators within the program
Creation and functioning of the territorial organization of tourism development	Increasing the degree of satisfaction of the needs of tourists
	Increasing the volume of provided tourist services
	Increasing the profitability of tourism enterprises
	Increasing the equability of tourist infrastructure using

Source: compiled by the authors.

Note the possible indicators of the effectiveness of the portal functioning, namely:

– the total number of portal visitors and the number of repeat visits within a certain period of time;
– increasing the flow of tourists through the portal;
– increasing the popularity of the Dnipropetrovsk region as a tourist territory;
– improving the competitiveness of the region's tourism product;
– development of interest in travel by the region among local residents.

Moreover, the information of the portal should help in the work of various divisions of the territorial organization for the development of tourism due to constantly updated information and be updated with news on the development and state of tourism resources and the tourism market.

Initial (design and software development, purchase of the necessary equipment, etc.) and operational (equipment modernization, Internet connection, financial support, etc.) costs of suporting the portal functioning should be included in a long-term tourism development program in the direction of the center of marketing activities of the territorial development of tourism organization or the center of information and logistics.

The interaction between business and government is the key of the economy development, especially when it means cooperation with local authorities, which is well aware of the problems and economic interests of entities operating on its territory. This thesis is fully and completely confirmed by many examples of successful interaction of the

tourism business with government authorities [9]. Analysis and generalization of this experience allowed the authors of the article to formulate a model of such interaction.

According to this model, at the previous stage of planning, a factorological model is formed that reflects the priority directions of development of the tourism business at the moment. Then, taking into account the approximate indexes for the planned capital investments in the industry, accumulated from various sources, their optimal distribution is carried out. As a result of this task, the optimal structure of investments is determined, ensuring the maximum growth of the tourism potential of the region.

At the next stage, specific investment projects are considered within the framework of capital investments allocated in the areas of tourism development. And here an important role belongs to the system of indicators of the effectiveness of these projects: on its basis, targeted allocation of funds from the regional budget is carried out, the return of these funds and the amount of income that should come to the budget as a result of the project are estimated.

Such indicators, which perform such functions in the best possible way according to the authors, include:

– the volume of services provided by the subjects of the tourism market, expressed in monetary units (as the multiplication of the size of the tourist flow and the average amount spent by one tourist);
– the income of the local (regional) budget from the tourism industry (expressed in monetary units);
– the profitability of the tourism sector (the ratio of budget revenues to expenditures, %).

The range of indicators proposed by the authors is formed as a result of analysis and aggregation of project data and is used in the process of their selection and formation of investment projects portfolio.

The formation of the project-investment portfolio is an iterative procedure due to the fact that:
– a shortage of funds is possible;
– insufficiently developed infrastructure for project implementation;
– individual projects are complex in formation and cover several areas of tourism development, requires a combination of the planned structure of financial resources.

In this case, the authorities at the regional level take a set of decisions to eliminate the problem:
– change in funding by fundraising from both internal and external sources, including by appealing to the highest echelons of power;
– solving infrastructure problems and developing industries related to the tourism business.

As the deficit of budgetary resources is a typical situation, in the process of solving these problems the main burden lays on the interaction with the business sector. This interaction is iterative-negotiable and is built on a mutually beneficial basis: entrepreneurs involved in the development of tourism are provided with various benefits (tax holidays, deferred payment of loans, favorable orders, preferences for the distribution of land and other scarce resources, etc.). And the problems that have arisen are solved by the regional authorities, as a result of which the tourist potential of the region increases as a basis for future revenues [On approval of the State Strategy of Regional Development 2020 from, 2014).

The modern methodical base of substantiation of any standard decisions provides use of economic and mathematical methods. Thus, the problem of choosing investment projects can be solved on the basis of the well-known classical problem of discrete optimal programming on the criterion of regional budget revenues maximizing and by limiting the amount of investment allocated to each of the areas of tourism development.

At the same time, the task is formulated in a variant setting, depending on the results of interaction between the authorities and other participants in this process, and restrictions on investments change depending on the volume of additionally attracted financial resources.

The authors of the article also formalized the task of assessing the distribution of capital investments in the main directions of tourism development. The corresponding optimization model has the following form:

$$\begin{cases} \sum_{i=1}^{n} a_i x_i \leq I^r + I^b + I^g \\ x_i \geq 0, \\ \sum_{i=1}^{n} c_i x_i \to max \end{cases},$$

where x_i (16 variables) – the intensity of the i-th factor (direction) use of tourism: 1) saturation with monuments; 2) the frequency of traditional mass events; 3) the degree of popularity of the monuments; 4) the level of development of transport infrastructure; 5) the degree of orderliness of the municipal infrastructure; 6) the level of development of the entertainment sector; 7) the level of development of the sports sector; 8) the level of development of the public catering network; 9) security level; 10) the level of development of the trading sector; 11) the level of development of the banking sector; 12) the level of development of the hotel fund; 13) the level of socio-economic development of the territory; 14) geographical location; 15) the level of development of health care and resort business; 16) the level of communication development;

a_i – specific capital intensity of the i-th factor;

I^r, I^b, I^g – capital investments allocated at the previous stage of planning by regional authorities, business, government target programs;

c_i – significance of the i-th factor according to the model;

$\sum_{i=1}^{n} c_i x_i$ – target function of tourist potential maximization.

According to the target function, investments will be distributed in the most attractive directions of tourism development, the structure of supply and demand for tourism services will become more balanced, which will ensure a more complete satisfaction of the needs for these services and will lead increasing in the tourism potential of the region.

Within the framework of this aspect of the work, two series of calculations were carried out, tested on the example of the Dnipropetrovsk region:

– the optimal structure of financing for the tourism industry has been established in accordance with the task that was determined at the previous planning stage;

– an assessment of the effectiveness of potential investment projects for the tourism development in the territory of the Dnipropetrovsk region was carried out.

Estimated calculations to determine the optimal structure of financing the tourism industry are based on the above scheme. Its practical implementation presupposes the need for output data: specific capital-intensive of i-th factor – a_i; the volume of capital investments allocated at the previous planning stage – I; c_i – the significance of the i-th factor in accordance with the existing model.

At the same time, if the volume of investments is set based on specific conditions (consolidation of various sources of financing for the tourism industry of the region under consideration), and the significance is already set by the model, the specific capital intensity of various factors requires a separate definition.

The system is solved as a classical linear programming problem after substitution of the calculated values of capital intensity and other initial data into the scheme. The simplex method was used in this work, and the choice of this method was determined by its high efficiency precisely for performing the tasks of finding the extremum of a linear functional in a multidimensional space under given constraints. Since in our case the task contains of 16 variables, it was possible to perform it using standard Excel tools without using more complex software packages.

According to the results of calculations on the distribution of capital investments, the areas can be divided into three groups:

1) with intensive financing;
2) with reduced funding;
3) while supporting the level of funding.

In particular, it is necessary to make larger investments in such areas as landscaping, preservation of monuments, providing comfortable access to them. Considerable attention should also be paid to the entertainment and sports sectors, ensuring the transport accessibility of monuments.

These areas are very important not only for the tourism industry, but also for the development of the territory as a whole. The thesis that the tourism industry can be organically integrated into the economy of the Dnipropetrovsk region and is an indicator of the potential of its attractiveness as a comfortable place to live is confirmed.

Other areas are planned to be financed in approximately the same amounts as before. These areas of tourism, such as security, development of banking services, development of the hotel fund, testifies to the sufficient amount of their financing in earlier periods.

As for such areas as holding mass events, development of communication infrastructure, public catering, investments in these spheres are reduced by 45.58 and 12%, respectively. This is due to the fact that today in the Dnepropetrovsk region the communication infrastructure is already formed, and the catering network has a tendency to rapid capital turnover and expansion through domestic resources.

Conclusion

The effect of the implementation of the tourism development program in the Dnipropetrovsk region can be assessed by indicators of the expected and received usefulness of program activities. Performance indicators of the program can be divided into three groups: direct (the result of the program), indirect (the result of the impact of the program on related areas) and general (the sum of performance indicators of the first and second groups) indicators.

Assessment from the effect of the creation and operation of a territorial organization for tourism development can be based on performance indicators (qualitative or quantitative), characterizing the degree of compliance of the desired status of the tourism system with the actual at a particular time. These include the degree of satisfaction of the needs of tourists, the volume of provided tourist services, the amount of income from investments, the profitability of tourist enterprises and the possibility of their development, etc.

The authors calculated the optimal structure of the sphere of tourist services for the Dnipropetrovsk region. The proposed procedures are universal and can be used for any region of Ukraine. Calculations show that all projects pay off, therefore, it is not only a contribution to the development of the tourism business, but also the provision of taxes to the revenue side of the regional budget.

Thus, it is recommended to cooperate with the business community in the implementation of strategically important local government projects. However, this cooperation must go beyond passive subsidies, providing for full participation in tourism activities based on public benefit and pragmatic calculation.

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Game Equilibria and Unification Dynamics in Networks with Homogenous Agents and Knowledge Externalities

Vladimir MATVEENKO
National Research University Higher School of Economics
at St. Petersburg, St. Petersburg, Russia, vmatveenko@hse.ru

Maria GARMASH
National Research University Higher School of Economics
at St. Petersburg, St. Petersburg, Russia, mariagarmash06@gmail.com

Ilya GARMASHOV
National Research University Higher School of Economics
at St. Petersburg, St. Petersburg, Russia, iagarmashov@edu.hse.ru

Alexei KOROLEV
National Research University Higher School of Economics
at St. Petersburg, St. Petersburg, Russia, danitschi@gmail.com

Abstract

In this paper, we consider the following problem - what affects the Nash equilibrium amount of investment in knowledge when one of the complete graph enters another full one. The solution of this problem will allow us to understand exactly how game agents will behave when deciding whether to enter the other net, what conditions and externalities affect it and how the level of future equilibrium amount of investments in knowledge can be predicted.

Keywords: Network Game; Nash Equilibrium; Externality; Productivity.

Introduction

The processes of globalization, post-industrial development and digitalization of the economy make studying of the role of innovative firms in the world economic development extremely significant. In papers [1, 3] mathematical models of the international innovative economy are constructed, on the basis of which the behavior of innovative firms is analyzed. In particular, authors of this article consider an important topic: how do firms realize their investment strategy in the development of knowledge, including outside their own region or country. The behavior of agents is determined by various externalities, which can have a completely different nature. Description of secondary effects is one of the most important directions in network game theory that authors of different articles try to analyze (for example, [8] and [7]).

There is also another aspect of the question: how to structure and organize their behavior in the best way in constantly changing economic and social conditions. In [2], the authors of the article try to take a new look at the system of organizing the actions of agent-innovators. It is important to take into account the impact (externalities) that influence agents by the environment, including other network entities. The article [4] shows the necessity of creation of regional innovative systems based on clusters. From this follows the relevance of the model description of the process of creating more extensive innovative clusters based on existing ones.

In addition, there is a need to model the process of changing the Nash equilibrium investment values, as well as the search for new internal or angular ones.

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This article continues the study of Nash equilibria and its changes in the process of unification complete graphs. However, this paper contains a number of new elements in comparison with previous studies.

To begin with, we study dynamic behavior of agents, not only by generalizing the simple two-period model of endogenous growth of Romer with the production and externalities of knowledge (as in paper [10]), but also by using difference equations, which makes possible not to limit research to two time periods.

Secondly, our article describes all possible and impossible equilibria after the unification of two complete graphs. This simulation allows us to create a base, which has the potential for its complication and improvement in order to increase the applied nature of the model, for mathematical description of the game behavior of agents.

Thirdly, we show that at different levels of productivity and sizes of the united networks, the equilibrium investment values also change.

Fourthly, our article considers both internal equilibria and corner ones, which in studies, for the most part, were ignored by researchers.

In this article, we consider the case of unification two complete graphs with a single connection agent, which tends to another network for a number of different reasons: increasing the receiving externalities, the level of productivity, etc.

The main content of the article is focused on the analysis of changes in the Nash equilibrium investment values, as well as the description of angular solutions. We study necessary and sufficient conditions, and possible limitations for the appearance of new different equilibria.

The content of the article is as follows. Section 2 describes a two-period growth model, characterize new internal Nash equilibrium investments, and analyzes the behavior of network agents. Section 3 describes the following situation. There are two clicks with n_1 and n_2 edges respectively, with the same agents' productivity A and exists the agent of the first network, which connected to the all agents of the second network. Both the clicks are initially in inner equilibrium. Section 3 compares the inner equilibria in united networks with initial inner equilibria in both networks. Section 4 analyzes all possible and impossible equilibria in united network with the formulation of the conditions for their existence or absence. Section 5 defines adjusting dynamics in networks and dynamic stability of equilibria. Section 6 analyzes dynamic stability or instability of all possible equilibria in united network with the formulation of the conditions for their stability or instability. The section 7 describes the network dynamics model of net unification and the section 8 graphically depicts the results. Section 9 summarizes, and lists possible directions for future researches.

Two-Period Model

Model Description

There is a network (undirected graph) with *n* nodes, $i = 1, 2, \ldots, n$; each node represents an agent. In period 1 each agent *i* possesses initial endowment of good, *e,* and uses it partially for consumption in first period of life, c_1^i, and partially for investment into knowledge, k_i:

$$c_1^i + k_i = e, \;\; i = 1, 2, \ldots, n.$$

Investment immediately transforms one-to-one into knowledge which is used in production of good for consumption in second period, c_2^i.

Preferences of agent *i* are described by quadratic utility function:

$$U_i\left(c_1^i, c_2^i\right) = c_1^i\left(e - ac_1^i\right) + b_i c_2^i,$$

where $b_i > 0$; *a* is a satiation coefficient, b_i is a parameter, characterized the value of comfort and health in the second period of life compared to consumption in the first period . It is assumed that $c_1^i \in [0, e]$, the utility

increases in c_1^i, and is concave (the marginal utility decreases) with respect to c_1^i. These assumptions are equivalent to condition $0 < a < 1/2$.

Production in node *i* is described by production function:

$$F(k_i, K_i) = B_i k_i K_i, \;\; B_i > 0$$

which depends on the state of knowledge in *i*-th node, k_i, and on *environment*, K_i, B_i is a technological coefficient. The environment is the sum of investments by the agent himself and her neighbors:

$$K_i = k_i + \tilde{K}_i, \; \tilde{K}_i = \sum_{j \in N(i)} k_j,$$

where $N(i)$ – is the set of neighboring nodes of node *i*.

We will denote the product $b_i B_i$ by A_i and assume that $a < A_i$. Since increase of any of parameters b_i, B_i promotes increase of the second period consumption, we will call A_i "productivity". We will assume that $A_i \neq 2a, i = 1, 2, ..., n.$ If $A_i > 2a$, we will say that i-th agent is *productive*, and if $A_i < 2a$, we will say that i-th agent is *unproductive*.

Three ways of behavior are possible: agent i is called *passive* if she makes zero investment, $k_i = 0$ (i.e. consumes the whole endowment in period 1); *active* if $0 < k_i < e$; *hyperactive* if she makes maximally possible investment *e* (i.e. consumes nothing in period 1).

Let us consider the following game. Players are the agents $i = 1, 2, \ldots, n$. Possible actions (strategies) of player *i* are values of investment k_i from the segment $[0, e]$. *Nash equilibrium with externalities* (for shortness, *equilibrium*) is a profile of knowledge levels (investments) $\left(k_1^*, k_2^*, \ldots, k_n^*\right)$, such that each k_i^* is a solution of the following problem $P(K_i)$ of maximization of *i*-th player's utility given environment K_i:

$$U_i\left(c_1^i, c_2^i\right) \xrightarrow[c_1^i, c_2^i, k_i]{} \max$$

$$\begin{cases} c_1^i \le e - k_i, \\ c_2^i \le F(k_i, K_i), \\ c_1^i \ge 0, c_2^i \ge 0, k_i \ge 0, \end{cases}$$

where the environment K_i is defined by the profile $\left(k_1^*, k_2^*, \ldots, k_n^*\right)$:

$$K_i = k_i^* + \sum_{j \in N(i)} k_j^*$$

The first two constraints of problem $P(K_i)$ in the optimum point are evidently satisfied as equalities. Substituting into the objective function, we obtain a new function (*payoff function*):

$$V_i(k_i, K_i) = U_i\left(e - k_i, F_i(k_i, K_i)\right) = (e - k_i)\left(e - a(e - K_i)\right) + A_i k_i K_i =$$

$$= e^2(1 - a) - k_i e(1 - 2a) - a k_i^2 + A_i k_i K_i. \qquad (1.1)$$

If all players' solutions are internal $(0 < k_i^* < e, \; i = 1,2,...,n)$, i.e. all players are active, the equilibrium will be referred as *inner* equilibrium. Clearly, the inner equilibrium (if it exists for given values of parameters) is defined by the system

$$D_1 V_i(k_i, K_i) = 0, \; i = 1, 2, \ldots, n, \qquad (1.2)$$

or

$$D_1 V_i(k_i, K_i) = e(2a - 1) - 2a k_i + b_i K_i, \; i = 1, 2, \ldots, n. \qquad (1.3)$$

Let us introduce the following notations: $\tilde{A}$ - diagonal matrix, which has numbers A_1, A_2, …, A_n on the main diagonal, I – unit $n \times n$ matrix, M – network adjacency matrix. In this matrix $M_{ij} = M_{ji} = 1$, if there is the edge of the matrix, connecting vertexes i and j, and $M_{ij} = M_{ji} = 0$ – otherwise. It is believed, that $M_{ii} = 0$ for all $i = 1, 2, \ldots, n$. The system of equations (1.3) takes the form:

$$\left(\tilde{A} - 2aI\right)k + \tilde{A}M\,k = \overline{e}\,, \tag{1.4}$$

where $k = \left(k_1, k_2, \ldots, k_n\right)^T$, $\overline{e} = \left(e\left(1-2a\right), e\left(1-2a\right), \ldots, e\left(1-2a\right)\right)^T$.

Theorem 1.1. ([12], Theorem 1.1). The system of equations (1.4) for a complete network has only decision.

In this way, the system of equation (1.4) for a complete network has only decision k^s, components of which we will call stationary investment values, for the internal equilibrium - $k_i^* = k_i^s$, $k_i^* = k_i^s$, $i = 1, 2, \ldots, n$.

Characteristic behavior of agent

We introduce the following notation. Regardless of agent type of behavior the equation root

$$D_1 V_i\left(k_i, K_i\right) = \left(A_i - 2a\right)k_i + A_i\tilde{K}_i - e\left(1-2a\right) = 0$$

will be denoted by $\tilde{k}_i^s$. Thus,

$$\tilde{k}_i^s = \frac{e(2a-1) + A_i\tilde{K}_i}{2a - A_i}\,,$$

where $\tilde{K}_i$ – pure externality of agent i. It is obvious, that if agent i is active, then his investments will be equal to $\tilde{k}_i^s$ in equilibrium. To analyze equilibriums we need the following statement

Statement 2.1. ([12], Lemma 2.1 and Corollary 2.1) A set of investment agent values $\left(k_1, k_2, \ldots, k_n\right)$ can be an equilibrium only if for each $i = 1, 2, \ldots, n$ it is true that

1. if $k_i = 0$, then $\tilde{K}_i \le \dfrac{e\left(1-2a\right)}{A_i}$;
2. if $0 < k_i < e$, then $k_i = \tilde{k}_i^S$;
3. if $k_i = e$, then $\tilde{K}_i \ge \dfrac{e\left(1-A_i\right)}{A_i}$.

Lemma 2.1. ([12], Lemma 2.2) In equilibrium, the agent i is passive if and only if

$$K_i \le \frac{e\left(1-2a\right)}{A_i}\,; \tag{2.1}$$

the agent i is active if and only if

$$\frac{e\left(1-2a\right)}{A_i} < K_i < \frac{e}{A_i}\,; \tag{2.2}$$

the agent i is hyperactive if and only if

$$K_i \ge \frac{e}{A_i}\,. \tag{2.3}$$

In complete network there is the same environment for all agents, so we get the following consequence.

Corollary 2.1. *In equilibrium in a complete network, agents with the same productivity make the same investments. If all agents in the full network have the same productivity, then there is homophilia, that is, all agents behave identically.*

Remark 2.1. In a complete network, there cannot be situations when in equilibrium an agent with a high production value is active or passive, and an agent with a lower productivity is hyperactive, or when an agent with a higher production value is passive, and an agent with a lower productivity is active or hyperactive.

Speaking of a complete network, we will omit the index in the designation of the agent environment, since in a complete network the environment for all agents is the same. Thus, K is denoted the amount of investment of all agents of the complete network.

Corollary 2.2. ([12], Corollary 2.3) *The equilibrium, in which all agents are passive, is possible in a complete network if and only if*

$$K \le \frac{e(1-2a)}{\max\limits_i A_i} .$$

The equilibrium, in which all agents are active, is possible in a complete network if and only if

$$\frac{e(1-2a)}{\min\limits_i A_i} < K < \frac{e}{\max\limits_i A_i} .$$

The equilibrium, in which all agents are hyperactive, is possible in a complete network if and only if

$$K \ge \frac{e}{\min\limits_i A_i} .$$

Corollary 2.3. *Equilibrium, in which all agents are hyperactive, is possible in a complete network, if and only if*

$$\min_i A_i \ge \frac{1}{n} .$$

Equilibrium, in which all agents are passive, is always possible.

Unification of innovative nets

Let us consider the following situation. There are two clicks with n_1 and n_2 edges respectively, with the same agents' productivity: A.

There are three types of agents in the united network. The actors of the first type are all the agents of the first network, besides the agent of the first network, which connected to the agents of the second network. Actors of the second type are all agents of the second network. The third type of actors is only one agent – this is the agent of the first network that connected to all actors of the second network. Since all agents of the same type will have the same environment, they will behave in the same way, not only in equilibrium, but also in dynamics. Therefore, the investment of each agent of the type *i* will be denoted k_i, and the environment of each agent of the type *i* will be denoted K_i.

Both the clicks are initially in inner equilibrium. It follows immediately from (1.3) that the initial investment of agents is the following

$$k_1^0 = k_3^0 = \frac{e(1-2a)}{n_1 A - 2a} , \tag{3.1}$$

$$k_2^0 = \frac{e(1-2a)}{n_2 A - 2a} . \tag{3.2}$$

The system (1.3) for inner equilibrium in joined network is

$$\begin{cases} \left((n_1-1)A-2a\right)k_1+Ak_3=e(1-2a), \\ (n_2A-2a)k_2+Ak_3=e(1-2a), \\ (n_1-1)Ak_1+n_2Ak_2+(A-2a)k_3=e(1-2a). \end{cases}$$

Solving this system by Kramer method we obtain for inner equilibria new equilibrium investment amount:

$$k_1^*=\frac{2ae(1-2a)(n_2A-2a)}{(n_1-1)n_2A^3+2a(n_1-1)n_2A^2+8a^3-4a^2(n_1+n_2)A}, \qquad (3.3)$$

$$k_2^*=\frac{2ae(1-2a)\left[(n_1-1)A-2a\right]}{(n_1-1)n_2A^3+2a(n_1-1)n_2A^2+8a^3-4a^2(n_1+n_2)A}, \qquad (3.4)$$

$$k_3^*=\frac{e(1-2a)\left[(n_1-1)n_2A^2-4a^2\right]}{(n_1-1)n_2A^3+2a(n_1-1)n_2A^2+8a^3-4a^2(n_1+n_2)A}. \qquad (3.5)$$

Now we can analyze the difference between initial and final amount of investments. We will start from the first type agents. By directly comparing (3.1) and (3.3), we obtain the following lemma.

Lemma 3.1.

1) If $A<2a\frac{n_1n_2-n_1+1}{(n_1-1)n_2}$, then $k_1^0<k_1^*$.

2) If $A=2a\frac{n_1n_2-n_1+1}{(n_1-1)n_2}$, then $k_1^0=k_1^*$.

3) If $A>2a\frac{n_1n_2-n_1+1}{(n_1-1)n_2}$, then $k_1^0>k_1^*$.

We denote the factor from of Lemma 3.1 $\frac{n_1n_2-n_1+1}{(n_1-1)n_2}$ by *C*.

Remark 3.1. Note that $C=\frac{n_1n_2-n_1+1}{(n_1-1)n_2}=1$ if and only if $n_1=n_2+1$.

Corollary 3.1.

1. If $n_1=n_2+1$, then $C=1$, so

- $k_1^0<k_1^*$ if and only if $A<2a$, i.e. if and only if agents are unproductive;
- $k_1^0=k_1^*$ if and only if $A=2a$, i.e. if and only if there is a boundary case between non-productivity and productivity;
- $k_1^0>k_1^*$ if and only if $A>2a$, i.e. if and only if agents are productive.

2. If $n_1<n_2+1$, then $C>1$, so

- for all non-productivity agents, agents with the boundary value of productivity and a small part of productive agents, namely for the case

$$2a\le A<2a\frac{n_1n_2-n_1+1}{(n_1-1)n_2},$$

  it is true, that $k_1^0<k_1^*$;
- for productive agents, for which

$$A = 2a\frac{n_1 n_2 - n_1 + 1}{(n_1 - 1)n_2},$$

it is true, that $k_1^0 = k_1^*$;

- for all productive agents, for which

$$A > 2a\frac{n_1 n_2 - n_1 + 1}{(n_1 - 1)n_2},$$

it is true, that $k_1^0 > k_1^*$.

3. If $n_1 > n_2 + 1$, then $C < 1$, so

- for all productivity agents, agents with the boundary value of productivity and a small part of non-productive agents, namely for the case

$$2a\frac{n_1 n_2 - n_1 + 1}{(n_1 - 1)n_2} < A \le 2a,$$

it is true, that $k_1^0 > k_1^*$;

- for non-productive agents, for which

$$A = 2a\frac{n_1 n_2 - n_1 + 1}{(n_1 - 1)n_2},$$

it is true, that $k_1^0 = k_1^*$;

- for all non-productive agents, for which

$$A < 2a\frac{n_1 n_2 - n_1 + 1}{(n_1 - 1)n_2},$$

it is true, that $k_1^0 < k_1^*$.

Remark 3.2. Thus, if $C > 1$, then part of the productive agents (and the more *C*, the greater part) behaves as well as the unproductive agents, i.e. for them $k_1^0 < k_1^*$.

If $C < 1$, then a part of unproductive agents (and the less *C*, the greater part) behaves similarly to productive agents, i.e. for them $k_1^0 > k_1^*$.

Let us now consider the second type agents

Lemma 3.2.

1) If $A < \frac{2a}{\sqrt{(n_1 - 1)n_2}}$, then $k_2^0 < k_2^*$.

2) If $A = \frac{2a}{\sqrt{(n_1 - 1)n_2}}$, then $k_2^0 = k_2^*$.

3) If $A > \frac{2a}{\sqrt{(n_1 - 1)n_2}}$, then $k_2^0 > k_2^*$.

Remark 3.3. If $n_1 = n_2 + 1$, then $\sqrt{(n_1 - 1)n_2} = n_2$.

Corollary 3.2.

1) for all productivity agents, agents with the boundary value of productivity and a part of non-productive agents, namely for the case

$$\frac{2a}{\sqrt{(n_1 - 1)n_2}} < A \le 2a,$$

it is true, that $k_2^0 > k_2^*$;

2) for all non-productive agents, for which

$$A = \frac{2a}{\sqrt{(n_1 - 1) n_2}},$$

it is true, that $k_2^0 = k_2^*$;

3) for all non-productive agents, for which

$$A < \frac{2a}{\sqrt{(n_1 - 1) n_2}},$$

it is true, that $k_2^0 < k_2^*$.

Finally, consider an agent of the third type.

Lemma 3.3.

1) If $A = \frac{2a}{n_1 - 1}$ (i.e. if $n_1 = 2$, $A = 2a$), then $k_3^0 = k_3^*$.

2) If $A \neq \frac{2a}{n_1 - 1}$, then $k_3^0 < k_3^*$.

To sum up, we can make several conclusions.

Firstly, agents with very high and very low efficiency will increase and decrease the amount of investments respectively after the unification.

Furthermore, it is very important for the first net how large or small network will connect it.

Finally, the actor, which wants to join another net, should be prepared for increasing its investment expenditures for knowledge because of different externalities.

Adjusting dynamics in networks and dynamic stability of equilibria

After the description of two-stage model equilibria, we can go to adjusting dynamics. We introduce adjustment dynamics which may start after a small deviation from equilibrium or after junction of networks each of which was initially in equilibrium. We model the adjustment dynamics in the following way.

Definition 4.1. Each agent maximizes her utility by choosing a level of investment; at the moment of decision-making she considers her environment as exogenously given. Correspondingly, if $k_i^n = 0$ and $D_1 V_i(k_i, K_i)\big|_{k_i=0} \leq 0$, then $k_i^{n+1} = 0$, and if $k_i^n = e$ and $D_1 V_i(k_i, K_i)\big|_{k_i=e} \geq 0$, then $k_i^{n+1} = e$; in all other cases, k_i^{n+1} solves the difference equation:

$$-2ak_i^{n+1} + b_i K_i^n - e(1 - 2a) = 0.$$

Definition 5.1 implies that the dynamics in model under consideration is described by the system of differential equations:

$$\begin{cases} k_1^{p+1} = \frac{(n_1 - 1)A}{2a} k_1^p + \frac{A}{2a} k_3^p + \frac{e(2a-1)}{2a}, \\ k_2^{p+1} = \frac{n_2 A}{2a} k_2^p + \frac{A}{2a} k_3^p + \frac{e(2a-1)}{2a}, \\ k_3^{p+1} = \frac{(n_1 - 1)A}{2a} k_1^p + \frac{n_2 A}{2a} k_2^p + \frac{A}{2a} k_3^p + \frac{e(2a-1)}{2a}. \end{cases} \quad \text{where } p = 0, 1, 2\ldots \qquad (5.1)$$

Characteristic equation for this system is

$$\begin{vmatrix} \frac{(n_1-1)A}{2a}-\lambda & 0 & \frac{A}{2a} \\ 0 & \frac{n_2A}{2a}-\lambda & \frac{A}{2a} \\ \frac{(n_1-1)A}{2a} & \frac{n_2A}{2a} & \frac{A}{2a}-\lambda \end{vmatrix} =$$

$$= -\lambda^3 + \lambda^2 \frac{(n_1+n_2)A}{2a} - \lambda \frac{(n_1-1)n_2A^2}{4a^2} - \frac{(n_1-1)n_2A^3}{8a^3} = 0. \qquad (5.2)$$

Definition 4.2. The equilibrium is called *dynamically stable* if, after a small deviation of one of the agents from the equilibrium, dynamics starts which returns the equilibrium back to the initial state. In the opposite case the equilibrium is called *dynamically unstable*.

Lemma 4.1. In any network, a corner equilibrium, in which all the agents are passive, is stable.

Proof. As follows from (1.3), for any agent i the inequality $D_1V_i(k_i, K_i) \le 0$ holds as strict: $D_1V_i(k_i, K_i) = e(2a-1) < 0$. □

Lemma 4.2. In any network, an inner equilibrium is unstable.

Proof. Let the network consist of n nodes, and all agents have the same productivity A. Let M be the $n \times n$-matrix of difference equations system , describing the dynamics in the network. Then the matrix M has the form $M = \frac{A}{2a}(\mathrm{A} + I)$, where A – the adjacent matrix of the network, I – identity $n \times n$-matrix. In this way, the matrix M is symmetric and therefore has orthogonal basis of eigenvectors. Let $v_1, v_2, \ldots, v_n$ be an orthogonal basis, and x be arbitrary real n-dimensional vector. We expand it in terms of the basis:

$$x = \sum_{i=1}^{n} c_i v_i .$$

Then:

$$\frac{x^T M x}{x^T x} = \frac{\sum_{i=1}^{n} c_i v_i^T M \sum_{j=1}^{n} c_j v_j}{\sum_{i=1}^{n} c_i v_i^T \sum_{j=1}^{n} c_j v_j} = \frac{\sum_{i,j=1}^{n} c_i c_j \lambda_j v_i^T v_j}{\sum_{i,j=1}^{n} c_i c_j v_i^T v_j} = \frac{\sum_{j=1}^{n} c_j^2 \lambda_j}{\sum_{j=1}^{n} c_j^2} \le \frac{\sum_{j=1}^{n} c_j^2 \lambda_1}{\sum_{j=1}^{n} c_j^2} = \lambda_1, \qquad (6.1)$$

where λ_1 means the greatest eigenvalue. Choosing as a x vector, all components of which are equal to 1, we get:

$$\lambda_1 \ge \frac{A}{2a} \cdot \frac{2m+n}{n}, \qquad (6.2)$$

where m means the number of edges in network, and n means the number of nodes.

Let h be the number of node, having the greatest degree $d_{\max}$. Consider the vector x, the components of which are given in the following way:

$$x_i = \begin{cases} \sqrt{d_{\max}}, & \text{если} \quad i = h, \\ 1, & \text{если} \quad \mathrm{A}_{ih} = 1, \\ 0, & \text{иначе.} \end{cases}$$

Then

$$\sum_{j=1}^{n} M_{ij} x_j \geq \frac{A}{2a} \left\{ \begin{array}{ll} \sqrt{d_{\max}} + d_{\max}, & \text{если} \quad i = h, \\ \sqrt{d_{\max}} + 1, & \text{если} \quad M_{ih} = 1, \\ 0, & \text{иначе} \end{array} \right\} = \frac{A}{2a} \left(\sqrt{d_{\max}} + 1 \right) x_i . \qquad (6.3)$$

Multiplying both sides of (6.3) by x_i and summing over *i*, we obtain the inequality

$$x^T M x \geq \frac{A}{2a} \left(\sqrt{d_{\max}} + 1 \right) x^T x ,$$

and, applying (6.1), we get

$$\lambda_1 \geq \frac{x^T M x}{x^T x} \geq \frac{A}{2a} \left(\sqrt{d_{\max}} + 1 \right). \qquad (6.4)$$

Similarly to (6.1), we get

$$\frac{x^T M x}{x^T x} = \frac{\sum_{i=1}^{n} c_i v_i^T M \sum_{j=1}^{n} c_j v_j}{\sum_{i=1}^{n} c_i v_i^T \sum_{j=1}^{n} c_j v_j} = \frac{\sum_{i,j=1}^{n} c_i c_j \lambda_j v_i^T v_j}{\sum_{i,j=1}^{n} c_i c_j v_i^T v_j} = \frac{\sum_{j=1}^{n} c_j^2 \lambda_j}{\sum_{j=1}^{n} c_j^2} \geq \frac{\sum_{j=1}^{n} c_j^2 \lambda_n}{\sum_{j=1}^{n} c_j^2} = \lambda_n , \qquad (6.5)$$

where λ_n means the least eigenvalue of matrix *M*. We now consider the vector *x*, which components are given as follows:

$$x_i = \left\{ \begin{array}{ll} -\sqrt{d_{\max}}, & if \quad i = h, \\ -1, & if \quad \mathrm{A}_{ih} = 1, \\ 0, & otherwise. \end{array} \right.$$

Then

$$\sum_{j=1}^{n} M_{ij} x_j \leq \frac{A}{2a} \left\{ \begin{array}{ll} -\sqrt{d_{\max}} - d_{\max}, & if \quad i = h, \\ -\sqrt{d_{\max}} - 1, & if \quad M_{ih} = 1, \\ 0, & otherwise \end{array} \right\} = \frac{A}{2a} \left(-\sqrt{d_{\max}} - 1 \right) x_i . \qquad (6.6)$$

Multiplying both sides of (6.6) by x_i and summing over *i*, we obtain the inequality

$$x^T M x \leq \frac{A}{2a} \left(-\sqrt{d_{\max}} - 1 \right) x^T x ,$$

and, applying (6.5), we get

$$\lambda_n \leq \frac{x^T M x}{x^T x} \leq -\frac{A}{2a} \left(\sqrt{d_{\max}} + 1 \right). \qquad (6.7)$$

So, in the case when all agents have the same productivity and there is at least one edge in the network, the largest eigenvalue of the equation system, describing the dynamics, according to (6.4), is always greater than unity. If the network does not have any edges (all agents are isolated), then an internal equilibrium is possible only if all agents are productive

($A > 2a$), but then according to (6.4) the largest eigenvalue is greater then unit. □

Network dynamics model of net unification

To find the eigenvalues of difference equations (5.1) in general we need to impose the restrictions: $n_2 = n_1 - 1 = n$. Then the equation (5.2) takes the form

$$\begin{vmatrix} \frac{nA}{2a}-\lambda & 0 & \frac{A}{2a} \\ 0 & \frac{nA}{2a}-\lambda & \frac{A}{2a} \\ \frac{nA}{2a} & \frac{nA}{2a} & \frac{A}{2a}-\lambda \end{vmatrix} = \left(\frac{nA}{2a}-\lambda\right)\left(\lambda^2-\lambda\frac{(n+1)A}{2a}-\frac{nA^2}{4a^2}\right)=0,$$

hence

$$\lambda_{1,2}=\frac{(n+1)A}{4a}\pm\sqrt{\frac{(n+1)^2A^2}{16a^2}+\frac{nA^2}{4a^2}}=\frac{A}{4a}\left(n+1\pm\sqrt{n^2+6n+1}\right),$$

$$\lambda_3=\frac{nA}{2a}.$$

In this case inner equilibrium in joined network will be

$$k_1^*=k_2^*=\frac{2ae(1-2a)}{nA^2+2a(n+1)A-4a^2},$$

$$k_3^*=\frac{e(1-2a)(nA+2a)}{nA^2+2a(n+1)A-4a^2}.$$

Let us find the eigenvectors

$$\begin{cases} \left(\frac{nA}{2a}-\lambda\right)x_1+\frac{A}{2a}x_3=0, \\ \left(\frac{nA}{2a}-\lambda\right)x_2+\frac{A}{2a}x_3=0, \\ \frac{nA}{2a}x_1+\frac{nA}{2a}x_2+\left(\frac{A}{2a}-\lambda\right)x_3=0. \end{cases}$$

Thus, if $\lambda\neq\frac{nA}{2a}$, then $x_1=x_2=x$, $x_3=\frac{\left(\lambda-\frac{nA}{2a}\right)x}{\frac{A}{2a}}$, and if $\lambda=\frac{nA}{2a}$, then $x_3=0$, $x_1=-x_2$. Hence we may choose

$$e_1=\begin{pmatrix} 1 \\ 1 \\ \frac{1}{2}\left(1-n-\sqrt{n^2+6n+1}\right) \end{pmatrix}, \text{ corresponding to } \lambda_1=\frac{A}{4a}\left(n+1-\sqrt{n^2+6n+1}\right)$$

(we supposed $x = x_1 = x_2 = 1$, then $x_3 = \dfrac{\dfrac{A}{4a}\left(n+1-\sqrt{n^2+6n+1}\right)-\dfrac{nA}{2a}}{\dfrac{A}{2a}} =$

$= \dfrac{1}{2}\left(n+1-\sqrt{n^2+6n+1}\right)-n = \dfrac{1}{2}\left(1-n-\sqrt{n^2+6n+1}\right)$),

$e_2 = \begin{pmatrix} 1 \\ 1 \\ \dfrac{1}{2}\left(1-n+\sqrt{n^2+6n+1}\right) \end{pmatrix}$, corresponding to $\lambda_2 = \dfrac{A}{4a}\left(n+1+\sqrt{n^2+6n+1}\right)$,

$e_3 = \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$, corresponding to $\lambda_3 = \dfrac{nA}{2a}$.

Thus, dynamics in joined network is described with following vector equation

$$\begin{pmatrix} k_1^n \\ k_2^n \\ k_3^n \end{pmatrix} = C_1\lambda_1^n e_1 + C_2\lambda_2^n e_2 + C_3\lambda_3^n e_3 + \begin{pmatrix} k_1^* \\ k_2^* \\ k_3^* \end{pmatrix}.$$

The constants C_1, C_2, C_3 can be found from initial conditions. Before unification the both networks were in symmetric inner equilibria:

$$k_1^0 = k_3^0 = \frac{e(1-2a)}{(n+1)A-2a},\ k_2^0 = \frac{e(1-2a)}{nA-2a}.$$

Hence by $n = 0$ we receive the following equations

$$\begin{cases} \dfrac{e(1-2a)}{(n+1)A-2a} = C_1 + C_2 - C_3 + \dfrac{2ae(1-2a)}{nA^2+2a(n+1)-4a^2}, \\ \dfrac{e(1-2a)}{nA-2a} = C_1 + C_2 + C_3 + \dfrac{2ae(1-2a)}{nA^2+2a(n+1)-4a^2}, \\ \dfrac{e(1-2a)}{(n+1)A-2a} = \dfrac{1}{2}\left(1-n-\sqrt{n^2+6n+1}\right)C_1 + \dfrac{1}{2}\left(1-n+\sqrt{n^2+6n+1}\right)C_2 + \\ \qquad + \dfrac{e(1-2a)(nA+2a)}{nA^2+2a(n+1)A-4a^2}. \end{cases} \tag{7.1}$$

We add first two equations of the previous system. We receive the following system of two equations to define C_1 and C_2:

$$\begin{cases} C_1 + C_2 = \dfrac{e(1-2a)\left[(2n+1)A-4a\right]}{2\left[(n+1)A-2a\right](nA-2a)} - \dfrac{2ae(1-2a)}{nA^2+2a(n+1)-4a^2} > 0, \\ \dfrac{1}{2}\left(1-n-\sqrt{n^2+6n+1}\right)C_1 + \dfrac{1}{2}\left(1-n+\sqrt{n^2+6n+1}\right)C_2 = \\ \qquad = \dfrac{e(1-2a)}{(n+1)A-2a} - \dfrac{e(1-2a)(nA+2a)}{nA^2+2a(n+1)A-4a^2} < 0 \end{cases} \tag{7.2}$$

It is easy to check, that the right side of the first equation is positive, and the right side of the second equation is negative. It is clear, that λ_2 is the largest eigenvalue in absolute and it is positive as all the components of eigenvector e_2. Hence, the nature of transitional process will be determined with the sign of constant C_2. Further, the sign of C_2, is defined by sign of the following expression

$$\tilde{\Delta}_2 = 2\left(k_3^0 - k_3^*\right) + \left(\sqrt{n^2+6n+1}+n-1\right)\left(k_1^0 + k_2^0 - k_1^* - k_2^*\right),$$

where k_1^0, k_2^0, k_3^0 – initial investment values.

If $\tilde{\Delta}_2$ is positive, then after transition process the network pass to corner equilibrium, where all the agents are hyperactive ($k_i = e$). If $\tilde{\Delta}_2$ is negative, then after transition process the network pass to corner equilibrium, where all the agents are passive ($k_i = 0$). It is easy to see that in considering case when both networks were in inner equilibria with any parameters if $n > 1$, then $\tilde{\Delta}_2 > 0$ and the network pass to corner equilibrium, where all the agents are hyperactive. If $n = 1$ (dyada connects to single agent), then the nature of network behavior in transitional process depends on ratio of *A* and *a*. Namely, if $\frac{A}{a} \geq \sqrt{96+32\sqrt{2}} - 4$, then the network pass to corner equilibrium, where all the agents are hyperactive. If $\frac{A}{a} < \sqrt{96+32\sqrt{2}} - 4$, then the network pass to corner equilibrium, where all the agents are passive.

So it is obvious (with Kramer formulas), that $C_1 > 0$. Comparing first equation of system (7.1) and first equation of system (7.2) it is obvious that $C_3 > 0$.

Let us check that corner solution, where $k_1 = k_2 = k_3 = e$, is equilibrium:

$$D_1V_1(k_1, K_1)\big|_{k_1=k_2=k_3=e} = -2ae + Ane - e(1-2a) = Ane - e \geq 0, \text{ if } A \geq \frac{1}{n},$$

$$D_1V_2(k_2, K_2)\big|_{k_1=k_2=k_3=e} = -2ae + Ane - e(1-2a) = Ane - e \geq 0, \text{ if } A \geq \frac{1}{n},$$

$$D_1V_3(k_3, K_3)\big|_{k_1=k_2=k_3=e} = -2ae + A2ne - e(1-2a) = 2Ane - e \geq 0, \text{ if } A \geq \frac{1}{2n},$$

corresponding to Corollary 2.4 in [12].

4. Graph visualizing

We can visualize this dynamics with graphs. To begin with, we need to set several restrictions. Firstly, the number of first net agents is one more than the amount of the second cluster actors. Secondly, $A > \frac{1}{n_1}$. Thirdly, initial reserve *e* is equal to 1 for all agents.

We will distinguish agents between their productivity and measure of saturation of initial good consumption.

4.2 First example.

In this case we will consider efficient and low saturated agent. The value of *a* is $\frac{1}{6}$, coefficient A=$\frac{1}{3}$>2a, $n_1 = 4$.

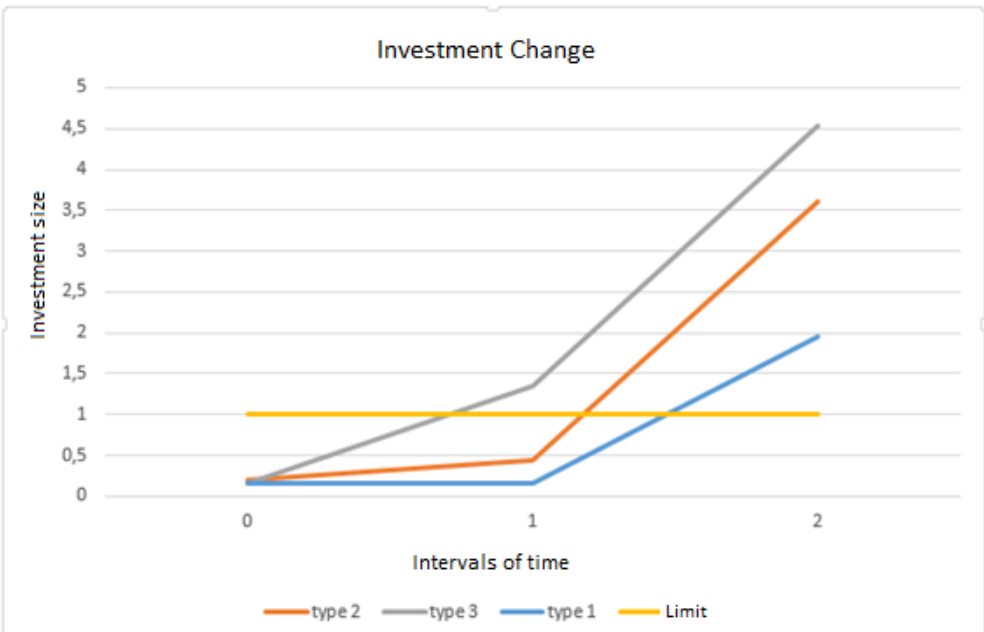

Figure 1: Investment change of efficient and low saturated agents

As Figure 1 provides, in the first period connected agent starts investing all its initial reserve of good in knowledge. It can be explained with large number of links with all other actors. Further, the second type agents start to invest all initial good and, finally, the first net actors become hyperactive.

4.3 Second example.

In this case we will consider efficient and high saturated agent. The value of *a* is $\frac{49}{50}$, coefficient A=2>2a, $n_1 = 4$.

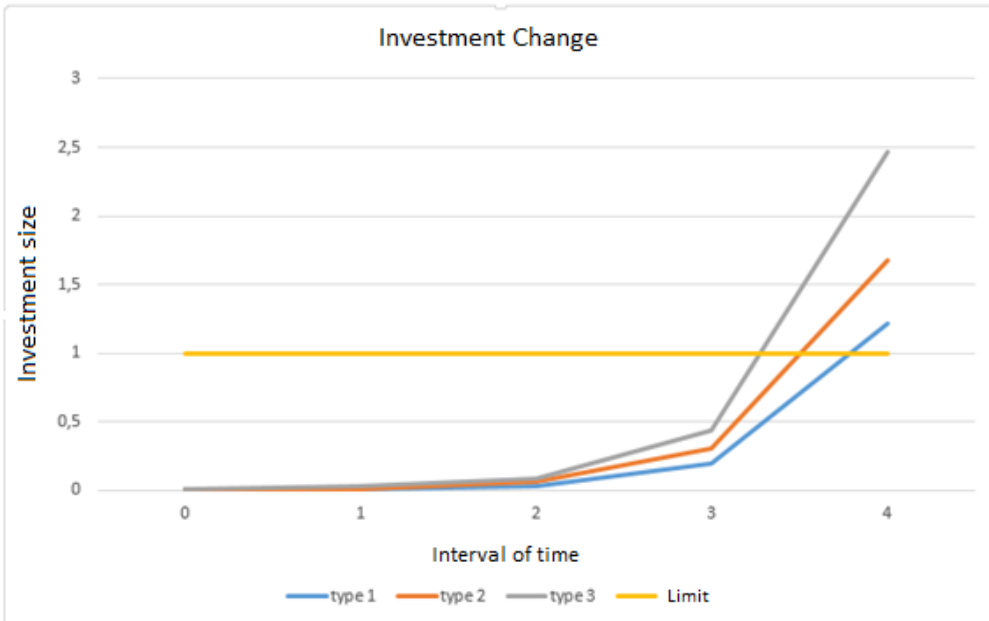

Figure 2: Investment change of efficient and high saturated agents

The conclusions are the same, except the number of time periods that are need for agents to become hyperactivity. It can be explained that increasing utility of initial good consumption decrease the motivation for investment in producing new knowledges.

4.4 Third example.

In this case, we will consider non-efficient and low saturated agent. The value of a is $\frac{}{50}$, coefficient A=$\frac{2}{3}$<2a, $n_1 = 4$.

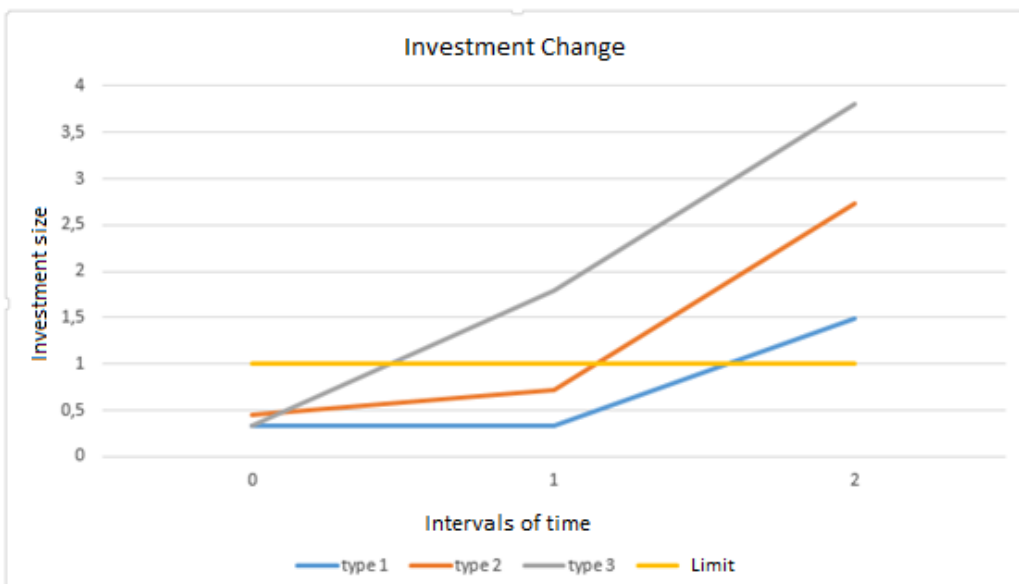

Figure 3: Investment change of non-efficient and low saturated agents

4.5 Forth example.

In this case we will consider non-efficient and high saturated agent. The value of a is $\frac{49}{50}$, coefficient A=1<2a, $n_1 = 4$.

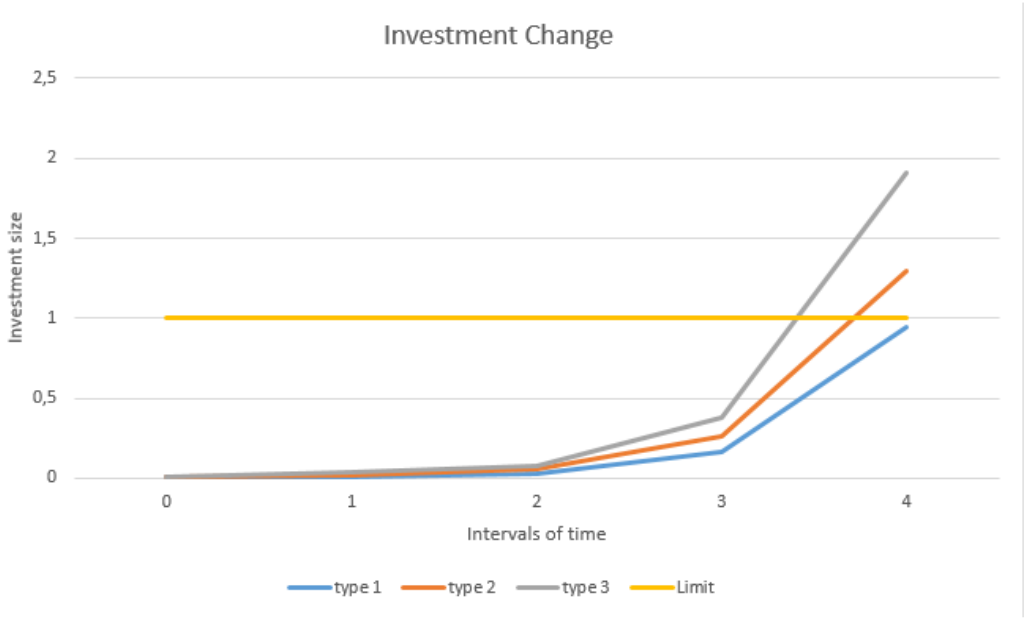

Figure 4: Investment change of non-efficient and high saturated agents

We can make several conclusions by comparing efficient and non-efficient agents: the increasing speed of investment amount is higher for productive actors than for non-productive ones.

Conclusion

In this paper, we have described the process of change in game equilibrium during graphs unification using two-stage and dynamics models. We have highlighted the significance of the productivity role that influence the agents' behavior. Moreover, we determined the importance of graphs sizes, which also effect on agents' decisions that they take during unification process.

Then we visualize dynamic process using different parameters to depict a change in low-productivity and high-productivity actors. In addition, we have listed all possible and impossible equilibria to identify necessary restrictions for its existing.

We believe that this article offers the base model of game equilibria change that can be improved with increasing the amount of parameters and modification graphs' type to incomplete nets or non-oriented graphs.

Acknowledgement

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Distributed Ledger Technology in Financial Sector – KYC/AML Aspect

Karol STRZALA

Lazarski University, Warsaw, Poland
k.strzala@lazarski.edu.pl

Abstract

New challenge to the AML/CFT and KYC was introduced by the technological developments and the emergence of cryptocurrencies. It became obvious that financial markets must become aware of currency based on distributed ledger technology. One of the key challenges for the financial system in terms of Blockchain technology development are the typical financial procedures related to AML and KYC. The paper aims to present the system of distributed ledger technology, show the impact it might have on the development of the financial system, show the problem of verification of clients that trade cryptocurrencies, and the threats related to money laundering using Blockchain technology. The paper also describes the method to fight money laundering by adopting the 5th AML Directive by the European Union.

Keywords: money laundering, know your customer, cryptocurrencies, blockchain, distributed ledger technology

Introduction

With the technology development, especially Internet banking, digital payments, and the creation of cryptocurrencies, it became clear that Anti-Money Laundering (AML) regulations have been lagging behind the technology development and the flow of money in the digital world. What is more, numerous terrorist attacks in Europe have pointed to the need to combat the financing of terrorism (CFT), which is closely linked to money laundering.

Financial market entities must become aware of Bitcoin and other cryptocurrencies based on Blockchain technology. Their daily market turnover is progressively increasing. At the time of writing the paper, the daily trading volume on the cryptocurrency exchanges amounted to $35,191 billion.[i] The development of Bitcoin gave rise to other cryptocurrencies. This diverse system of virtual assets has led to the emergence of numerous cryptocurrency exchanges and platforms for users to trade cryptocurrencies and exchange them for fiat money.

Distributed ledgers, smart contracts, consensus protocols, and cryptography allow for secure, transparent, and frequently less expensive transactions, which can be made in the financial system (Tschorsch and Scheuermann, 2016). As a result, there is an array of digital platforms and start-ups that implement Blockchain technology in their systems e.g., when it comes to micropayment, data storage, intellectual property, supply chain and logistics, and storage of financial assets (Davidson *et al*, 2018). Aside from i.a. determining the legal nature of cryptocurrencies (Hacker and Thomale, 2017), or security problems (Atzei *et al*, 2017), one of the key challenges for the financial system in terms of Blockchain technology development are the typical financial procedures: Know Your Customer (KYC), which allows for effective verification of identity of a cryptocurrency market participant, and (ii) Anti-Money Laundering, which is a set of procedures combatting money laundering using cryptocurrencies. In the Blockchain system, it is required that some proper access control systems ascertain who is allowed to access data and services. The security requirements change in distributed systems of different organizations that have their own independent access control capabilities (Ao and Minsky, 2003).

The paper aims to present the system of distributed ledger technology, show the impact it might have on the development of the financial system, show the problem of verification of clients that trade cryptocurrencies, and the threats related to money laundering using Blockchain technology. The paper also describes the method to fight money laundering by adopting the 5th AML Directive by the European Union.

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Distributed Ledger Technology – Introduction

Distributed ledger technology or Blockchain is directly linked to Bitcoin digital currency. In 2008, an unidentified person, or a group of people named Satoshi Nakamoto came out with the paper "Bitcoin: A Peer-To-Peer (P2P) Electronic Cash System". The paper describes that Bitcoin is a digital currency that allows for the peer-to-peer transaction, without any intermediaries (Nakamoto, 2008). Bitcoin remains a system that processes transactions without a central regulatory institution. That is why it needs to have mechanisms that would prevent data forgery, duplication of payments, and any cyberattacks. In order to achieve this, Bitcoin uses many technologies, such as cryptography, digital signatures, hashing, public key, P2P, and Proof of work (Low and Mik, 2020).

Blockchain can be characterized as a decentralized database to store information. The database is distributed across all the nodes, which makes it a decentralized network. All the nodes adopt a certain set of rules that define what is allowed and not allowed in the network as well as the structure of the information stored. The set of rules determines the goal and Blockchain functionality (Narayanan *et al*, 2016). Blockchain was designed so to keep the entire content it stores unchanged. Any piece of information saved in the Blockchain network can only be changed or deleted with a good deal of work (depending on the size and network integrity) (Bradbury, 2013). Immutability allows to create a ledger, which tracks particular assets. Due to the rules enforced by the network, it is guaranteed that the resources do not come at the request and cannot be duplicated. A distributed ledger allows for the creation and use of cryptocurrencies. Accordingly, Blockchain is often synonymously referred to as distributed ledger technology (DLT) (Walport, 2016).

Blockchain might be used in various ways. There are two groups that can be distinguished – users who supervise the network and the network public. There are three types of directing execution (Kruijff and Weigand, 2017): (i) decentralized, which means that Blockchain is managed by all users, (ii) hybrid, which means that the supervisors are pre-selected, and (iii) centralized, meaning that one entity establishes the rules and supervision over the network. Moreover, Blockchain may be public and private: (i) a public one means that anyone can obtain access to the network and read the information it contains, (ii) a private one implies that there is limited access to the network. Blockchain technology makes it possible to carry out transactions between clients without their having bank accounts. It is enough for people to have their own wallets.

How blockchain can change the financial system

The financial system relies on a network of interlinked financial institutions, markets, and other financial system elements. The current infrastructure comprises a large number of intermediaries who are in charge of registering and settlement of payments. The transactions are settled by the entities that are able to identify the owner of the assets and all the parties of the transaction at any given moment. Intermediaries fulfill their functions which all together facilitate concluding contracts and making transactions in a low trust environment. Intermediaries play a key role in the functioning of the financial system. They are nearly everywhere and are guarantors of trust. Banks, investment funds, insurance companies, pension funds are intermediaries, too, and the majority gets profits from the money they charge for each transaction. The model of incomes based on charges is typically slow and expensive for consumers (Sangwan *et al*, 2020), and contributes to the exclusion from primary access to financial service. Furthermore, a centralized system, which is the one with the intermediaries, is prone to crashes and attacks (Hua *et al*, 2018). According to the 2020 PwC company's research 47% of organizations that participated in the research, suffered some form of economic crime within the last 24 months.[ii] Most crimes were related to misappropriation of property, cybercrime, corruption, accounting fraud, and money laundering. Despite the flaws, right from the start, the financial system was based on centralization and financial intermediaries.

The invention and further development of blockchain and its technology initiated a transformation in the way the financial system works and will develop in the future. Blockchain technology provides a new kind of storage, use, control, and transfer of value in the financial system. The system changes the perception and functioning of the financial system as a whole. No individual and no organization manages the network and is responsible for its operation and crashes (Walch, 2015). Features such as decentralization and the perception of Blockchain technology as an anonymous one raised the interest of criminal organizations, which use cryptocurrencies as a financial instrument to conduct illegal activity, e.g., money laundering.

Blockchain and Money Laundering

Client identification and authentication is the primary responsibility of financial institutions. They must implement KYC and AML procedures. Financial institutions must identify a client in conformity with existing regulations. It is typically a time-consuming and complicated process as it is required to verify if people are who they say they are.

Blockchain technology can support the process of client identification because there is identity management in its structure. The entity signs each transaction in the system with the private key, which only they know. All the entities may verify a transaction by using a public key that is visible in the network. The combination of a private and a public key might be perceived as an identity, which expresses its will in the network e.g., by carrying out a transaction. The primary protocol is not linked to the actual user identity, and with a pair of keys, the users remain pseudonymous. Due to Blockchain it is possible to make a decentralized connection between real-world identity and a pair of keys (Fromknecht et al. 2014; Civic Technologies 2018). Currently, there are many projects that deal with client verification issues in Blockchain technology.[iii]

Cyberlaundering

Cyberlaundering is a type of money laundering in which mechanisms available on the Internet are used to hide the true source of funds in order to make law enforcement less suspicious. A new type of money laundering was invented along with the soaring "electronic" finance at the end of the 1990s. (Kellerman, 2004).

The Internet is widely recognized as a valuable source of information and communication channel (peer-to-peer communication). One can almost immediately contact from one place in the world to another. Initially, the Internet was a very limited source of information, however, in the era of technology development and ease of using the benefits of www resources, it is currently the largest source of information and the fastest way of communication between users. In 2019, more than 4.5 billion people worldwide have access to the network and use the Internet. The development of technologies and communication routes, such as mobile telephony and the Internet, significantly influenced the way of doing business and revolutionized the economy, trade and other aspects of life.

In the era of the Internet criminals are becoming more and more creative when it comes to money laundering. Fake book sales via the Internet (Flood, 2018), shopping in games (Carole, 2018), renting places via Airbnb (Cox, 2017a), shopping on auction sites (Maramont, 2017) or even fake Uber rides(Cox, 2017b) are just a few examples of new methods for legalizing unlawful funds. As AML/CFT regulations currently rely heavily on banking transactions, criminals are becoming more and more creative. It is estimated that currently 10% of all laundered money is laundered via the Internet annually. At the same time, according to research, due to the fact that economies are becoming more and more cashless, by 2020 the percentage of funds digitally transferred compared to traditional methods of money laundering will have been doubled (Bromium, 2018).

Along with the development of technology, there have been the development of e-commerce. Due to electronic platforms the trade between entrepreneurs (B2B) and between entrepreneurs and consumers (B2C) has improved. Ease of searching for goods, availability and quick transactions have made e-commerce one of the milestones in the global economy - it is estimated that e-commerce sales will reach around USD 4.5 trillion in 2021 (Orendorf, 2017).

The development of electronic commerce has forced the need to introduce new "electronic" payment methods. Traditional ones are not suitable for fast settling of payments, which is necessary in e-commerce. One of the most popular electronic payment systems is undoubtedly the PayPal platform, an intermediary portal that allows electronic transfer of funds through a virtual wallet. It is worth noting that cash flow intermediaries are under constant supervision and subject to applicable AML regulations. Traditional money transfers, payments by credit or debit cards and payments via intermediary portals have begun to be replaced by increasingly popular virtual currencies that are not under the supervision of another entity.

Virtual currencies, called cryptocurrencies, are a type of financial means that can be used to buy real goods and services. The use of cryptocurrency is decentralized because there is no authority that issues and controls these currencies. Cryptocurrencies also allow their users to remain completely anonymous. The creation of cryptocurrencies was the aftermath of the financial crisis in 2008, which significantly reduced confidence in financial institutions and the services they provide. There is currently no universally accepted legal definition of cryptocurrency. One of the definitions of cryptocurrencies was created by the European Central Bank in 2012, which is: „ *a type of unregulated, digital money, which is issued and usually controlled by its developer, and used and accepted among the members of*

a specific virtual community." (European Central Bank, 2012) Another definition was presented by the US Department of the Treasure: *„medium of exchange that operates like a currency in some environments, but does not have all the attributes of real currency.*" (FinCEN, 2013)

Currently, the best-known cryptocurrency is Bitcoin, with market capitalization of USD 152.5 billion[iv]. This is the first cryptocurrency created by an anonymous person or group of people, called Satoshi Nakamoto. Bitcoin transactions can occur between any two parties, and since there is no third party, no bank account is required. The transaction has no fees or limits. The technology used in this system, called Blockchain, works without central computers and does not have a centralized place to store data, used to record individual transactions, payments or accounting entries. It is encoded using cryptographic algorithms. It is based on cryptographic ciphers (Nakamoto, 2008).

The use of cryptocurrencies is becoming more common due to the ease and the swiftness of their use compared to traditional payment methods. Nevertheless, despite the advantages of cryptocurrency, they pose a serious threat to the financial system in terms of money laundering and terrorist financing. The system is not resistant to this risk due to greater anonymity than traditional electronic payment systems because it is not controlled by any authority. Payments through anonymous digital wallets allow the "launderers" to hide sources of illegally obtained funds and hinder the control of money flows. Additionally, the ease of transferring funds between countries accessible via the Internet, poses a significant risk in terms of money laundering and terrorist financing.

Digital Currencies, Virtual Currencies and Cryptocurrency

At this point it is also worth paying attention to the distinction between digital currencies, virtual currencies and cryptocurrencies. Digital currencies is a general term used to describe all virtual currencies as well as cryptocurrencies. They can be both regulated and unregulated. Unlike banknotes, they are immaterial and exist only in digital form. Digital currencies can only be stored and issued using electronic wallets or designated connected networks. No need of the third party means that transactions are usually immediate and do not entail high fees.

Virtual currencies are also a type of digital currencies, which are usually controlled by their creators and used by members of a specific virtual environment such as a payment platform or an online game. It is important that all virtual currencies are digital currencies, while not every digital currency is virtual currency, because they operate outside a strictly defined virtual environment. Virtual currencies represent a specific value, they are issued, managed and controlled by private issuers and used for peer-to-peer payments. Unlike fiat money, virtual currencies are not issued by a bank. They are therefore prone to price fluctuations. The use of virtual currencies is registered by network administrators.

Cryptocurrencies are distinguished by the fact that they use many encryption algorithms and cryptographic techniques to ensure their security on the network. This level of security also makes it more difficult to fake them. Cryptocurrencies are digital currencies because they exist on the Internet as well as virtual currencies created using cryptographic algorithms.

One of the most popular platforms that generate their own virtual currencies are WebMoney[v] and Perfect Money[vi]. Both platforms were associated with cybercrime and money laundering (Emerging Technology from the arXiv, 2013). However, according to the Europol report (Europol, 2018: p. 59). Bitcoin is currently the most popular virtual currency used on the Internet to exchange funds between criminals.

Bitcoin has already been used to finance terrorism in the past. In June 2015, an American court convicted a teenager for providing ISIS support on social media. A teenager used Twitter to advise others on how to use Bitcoin to support ISIS in an anonymous way (United States Department of Justice, 2015). Moreover, also in 2015, cyber security analysts identified an ISIS supporter who ran a website to raise funds for terrorist activities. At that time, he managed to gather about USD 1000 for criminal operations (Harman, 2015). Bitcoin can be used to exchange funds on both the WebMoney and Perfect Money platforms, as well as on virtual game-based currencies. This possibility leads to illegal activities. Criminals exchange cryptocurrencies for virtual currencies e.g. in games, and then again for cryptocurrencies in order to hide the real source (Town, 2018).

V AML Directive

Virtual currencies pose a serious threat in terms of money laundering and weaken the financial system of the European Union. The V AML Directive aims to reduce this risk by, among others, introducing the definition of virtual currency in EU legislation. The AML Directive defines virtual currency as „*a digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency, and does not possess a legal status of currency or money, but is accepted by natural or legal persons, as a means of exchange, and which can be transferred, stored and traded electronically"*.(European Parliament, Directive 2018/843) The definition does not explicitly refer to any distributed registries' technology, and therefore may also include centralized payment schemes not based on blockchain technology, such as e.g. currencies used in computer games, like Warcraft Gold in the game World of Warcraft, released by the private company as a game platform operator.

In accordance with the V Directive, providers of virtual currency accounts began to be subject to AML regulations. It imposes on them, among others such obligations as accurate identification and verification of clients, as well as supervision of transactions carried out through their services. V Directive contains definitions of virtual currency account providers that goes as follows: „*an entity that provides services to safeguard private cryptographic keys on behalf of its customers, to hold, store and transfer virtual currencies*" (European Parliament, Directive 2018/843). It is worth noting that the providers of virtual currency accounts have been recognized as obliged entities, even if they do not offer the conversion of virtual currency into fiat money and vice versa. The definition is limited only to providers who store private credentials. Therefore, the entities that offer programs enabling the saving of credentials on local devices will not be classified as obliged institutions.

The European legislator has considered the identification and verification of clients together with the supervision of transactions to be sufficient for effective and adequate prevention of money laundering in the European Union. However, taking into account the technical aspect of blockchain technology, due to the frequent lack of involvement of third parties in transactions using cryptocurrencies, this may be a more demanding task. One of the biggest values of cryptocurrencies and blockchain technology is undoubtedly the option that transfers can be made without third parties that process transactions. Users can transfer funds directly in a peer-to-peer style. Given the anti-money laundering context, this means that criminals can continue to make transactions for money laundering and terrorist financing or other criminal activities without any third party. It will undoubtedly be difficult for the EU legislator to solve this problem in the coming years.

Conclusions

Despite the fact that the market capitalization of cryptocurrencies is still little contrasted with conventional money, the innovation can bring key change to capital business sectors and the manner in which organizations raise, use, and disperse esteem. Money laundering is a phenomenon that has crossed national borders and has become a global problem long ago. Although a number of actions have been taken so far to prevent and combat money laundering, this problem has not been resolved. It is impossible to completely eliminate money laundering, but it can be reduced. One way to reduce money laundering is to adopt legal solutions that, on the one hand, prevent money laundering and, on the other hand, help combat it.

The economic boom and the development of new technologies, and in particular the creation of the internet network in 1990, have caused the world to become smaller, and thus money laundering and terrorist financing are becoming an increasingly important problem on an international scale. The cross-border nature of these crimes, combined with the anonymity provided by the Internet, and transactions carried out through virtual currencies, as well as the lack of relevant legislation and specialized knowledge in law enforcement, mean that cybercrime is still developing.

The current approach of the European legislator to enact the provisions of the V AML Directive in relation to virtual currency exchange services and virtual currency account providers, raises a number of serious doubts as to its effectiveness and adequacy, as transactions in cryptocurrencies do not necessarily include the participation of the third party in the payment or any other third party at all. At present, however, no better approach has been found to regulate anti-money laundering for cryptocurrencies. However, there should be further research and political discussion on this issue in the future. However, the application of traditional AML/CFT rules to providers of virtual currency trading services should not necessarily be considered as a step in the right direction, mainly because the traditional money laundering approach may not be the most appropriate. Virtual currencies are a rapidly growing and boundless technology that creates a number of threats. That is why it is extremely important that the European Union creates a regulatory framework that is effectively implemented today and will remain effective in the future.

Moreover, due to the cross-border nature of money laundering and terrorist financing, it would be desirable to create universal standards in this respect in jurisdictions outside the European Union.

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[i] Source: https://coinmarketcap.com/ [Retrieved October 31, 2020].
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Impact of Unpredictable Stress Factors of The Global Economy On the Functioning of The Digital Ecosystem of The Region

KRIVOSHLYKOV Vladimir Sergeevich
305000, Russia Kursk, Radishchev St., 33 e-mail Kri-Vladimir@mail.ru

ZHAKHOV Nikolay Vladimirovich
305021, Russia Kursk, to st. is 50 years of October, 94
e-mail: zhakhov@mail.ru

BRATISHKO Natalya Petrovna
109004, Russian Federation Moscow Oblast, Moscow Zemlyanoy Val, 73, e-mail: enigma3021@mail.ru

EMELYANOVA Olga Vladimirovna
305040, Russia, Kursk, st. 50 let Oktyabrya 94, e-mail: enigma3021@mail.ru

SHATOKHIN Mikhail Viktorovich
119049 Russia, Moscow, Leninsky prospect, 1/2, bldg. 1
e-mail: shato-hinm@mail.ru

Abstract

This article examines the impact of the economic crisis caused by the COVID-19 pandemic on the structure of the regional economy (using the example of five subjects of Central Russia). As a result of the study, opposite trends were identified, namely, the growth of industrial production of basic food products (meat, milk, bread) in large agricultural organizations and a reduction in the total effective demand of the population of these regions due to a decrease in real disposable income (due to inflationary processes in the economy). The most realistic scenario for the development of the current situation in the regional economy is stagnation and an increase in the decline in the welfare of the population.

Keywords: Regional Economy, Economic Crises, Digital Economy, Food Sector, Production Indices, COVID-19.

JEL Classification Codes C 10, L 10, Q 11.

UDC 332:122

Statement of the Problem

As a result of the pandemic caused by the COVID-19 epidemic, almost all States faced crisis phenomena in the economy. The most obvious consequences of the crisis were a drop in aggregate demand (due to falling incomes); reduced employment and increased unemployment, primarily in the segment of the economically active population; limited availability of financial resources (due to higher interest rates by credit institutions. For Russia, the impact of these factors was quite significant, since up to 60% of the state budget is formed as a result of the sale of hydrocarbon raw materials (oil, gas) to the foreign market. As the global level of industrial production declined, the demand for hydrocarbons decreased, which led to the need to find reserves to cover the state budget deficit. The complexity of the situation in Russia is also determined by the fact that forecasts of prices for hydrocarbons do not allow us to expect growth. Since Russia's financial structures cannot get loans from international credit organizations (due to sanctions), the economic situation in the country remains extremely tense.

Since the Russian Federation is a large Federal state, the impact of the crisis on different regions of the country was different. This article attempts to analyze the impact of the crisis on the Central regions of the country (Central-

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Chernozem economic region), which mainly have an agricultural profile of the economy. The volume of production of basic food products (meat, milk, bread), which are produced at large agricultural enterprises, was analyzed. The calculations did not use the production volumes of small farms and households, since their share in the structure of total agricultural production is not large (which allows them to be ignored).

Analysis of recent research and publications.

The problem of economic recovery after economic crises has always interested researchers. Most often in the scientific literature you can find studies that reflect the recovery of the economy after the global financial crisis of 2008/2009. Recent world events (the COVID-19 virus pandemic) have led to an increase in economic research on this topic. Researchers are interested in various aspects of the functioning of both the national economy [1-4] and the relationship of the national economy with global economic processes [5-8].

Studies on the impact of the global pandemic on the regions of the Russian Federation have appeared in the press. The paper [9] presents an analysis of indicators that describe the economic factors that cause a reasonable trend. The authors refer to economic factors that stabilize the decline in exports and imports in the Sverdlovsk region: reduced purchasing power and import substitution rates selected in a number of countries. Among the identified factors that provide a downward trend, the authors highlight the features of establishing and maintaining business contacts with business representatives from South Asian countries. The authors consider the competitiveness of regional products as a significant factor in stabilizing the decline in exports. The study concluded that taking into account positive and negative factors and further monitoring their impact can significantly reduce socio-economic losses in the region's economy.

The paper [10], which reflects the impact of the pandemic on the processes of interstate cooperation within the ASEAN countries, proves the need to expand interstate cooperation to level the threats of crisis phenomena in the economy.

In [11], the impact of the pandemic on the regions of the United States was investigated, while the issues of changes in the structure of the labor market in different States were investigated. It was proved that in those regions where telecommunications technologies are developed, the economic recovery was faster and the labor market recovered more dynamically.

In the study [12] focused on the problem of recovery of Pakistan's economy due to the pandemic proved to speed the recovery of aggregate demand in a country depends on factors such as infrastructure, degree of development of the health system, the system of social compensation. The more active the state provides direct financial injections into the economy, the faster the economic balance will be restored.

The paper [13] analyzes the effectiveness of government measures to contain the economic crisis in Africa. Conclusions are drawn about the important impact of decisions made by state structures and their impact on the economic processes of integration in the region.

In General, we can conclude that the pandemic, provoking the global economic crisis, led to the need to find new solutions to the existing problems. In particular, what are the most effective methods of state support for the economy? how should interregional unions be built to reduce the negative consequences of economic crises? what is the role of digital transformation of the economy in leveling the consequences of economic crises caused by various causes? Some of these questions are answered by this work because it was analyzed the production processes in several regions before the introduction of the pandemic and after the pandemic. The results show that production at large agricultural enterprises was practically not affected, production volumes increased during all nine months of 2020, but the decline in the purchasing power of the population led to the fact that some of the products produced simply cannot be purchased due to the depreciation of the income of the majority of the country's population.

Purpose of the article

The purpose of this scientific article is to demonstrate how unpredictable stress factors of the world economy (in this paper, we will consider the pandemic caused by the COVID-19 virus as such a factor) affect regional socio-economic systems.

Research Methods

The research methodology was based on both general scientific methods of cognition: analysis and synthesis, and specific economic methodology: index method (used to analyze the dynamics of production of basic food products in five subjects of Central Russia), graphic method (used to build graphs that reflect changes in the dynamics of basic economic indicators), factor analysis (used to determine the degree of impact of the pandemic on the structure of the regional economy).

The statistical data used in the study were obtained from open sources, in particular, the online platform unified interagency information and statistical system (EMISS) was used (https://www.fedstat.ru/).

The study period was five full years (from 2015 to 2019 inclusive) and nine months in 2020 (since only these data are available in statistical databases).

The aim of the study was to demonstrate how the pandemic affected the production of key food products in five regions of Central Russia (Belgorod region, Voronezh region, Kursk region, Lipetsk region, Tambov region).

Main Results of The Study

The Central Chernozem economic region consists of five subjects of the Russian Federation located in the historical center of the country and having a predominantly agricultural economic profile, which is explained by favorable natural conditions for the development of agriculture (high soil yield). This study analyzed the indices of industrial production of basic food products in all five regions of Central Russia. The General conclusion can be as follows: all five subjects are characterized by a General trend in the dynamics of industrial production indices. The trend is that by the end of 2019, the volume of production of basic food products in all the regions under consideration was the same. The variability in industrial production indices is small. However, since January 2020, the values of industrial production indices begin to fluctuate strongly and in some regions there is a downward trend in food production (although not very pronounced) (Fig. 1-4).

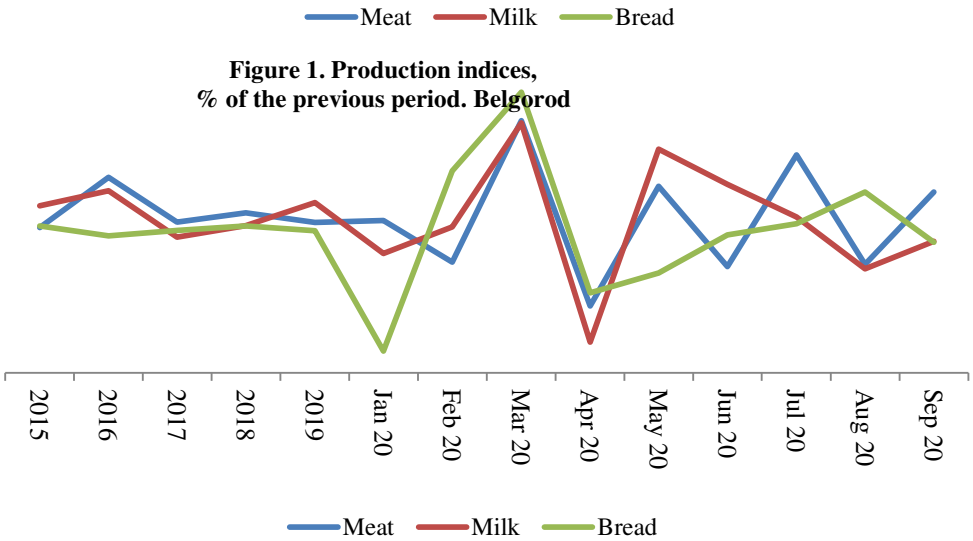

Figure 1. Production indices, % of the previous period. Belgorod

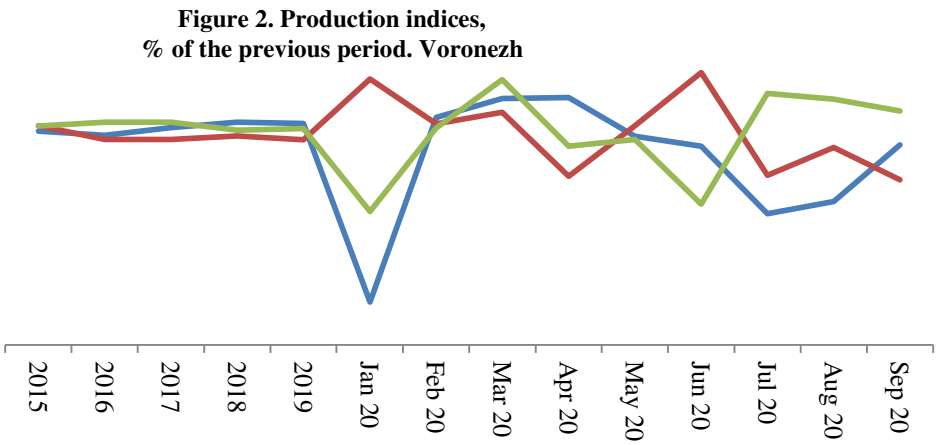

Figure 2. Production indices, % of the previous period. Voronezh

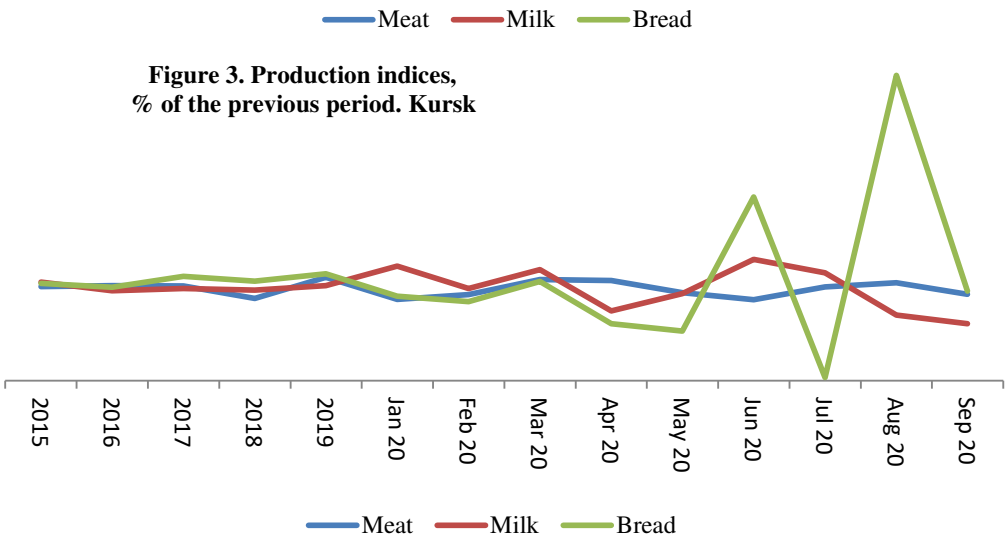

Figure 3. Production indices, % of the previous period. Kursk

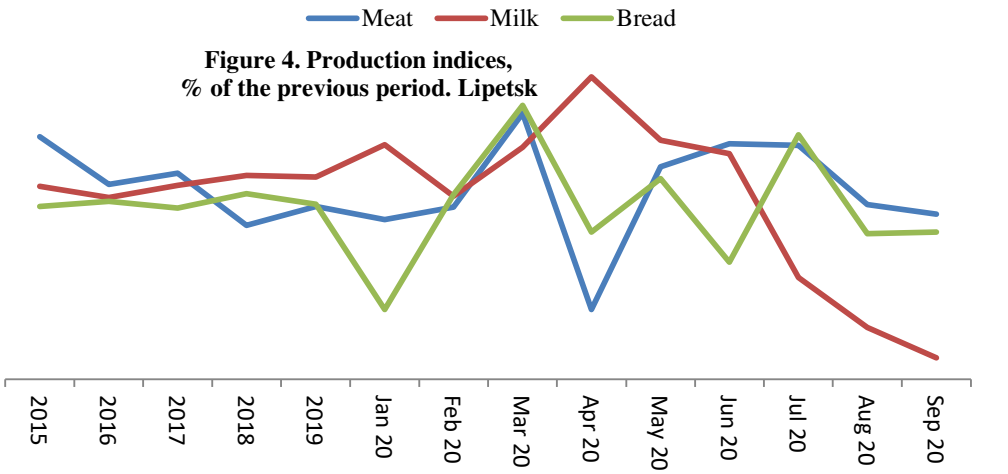

Figure 4. Production indices, % of the previous period. Lipetsk

The greatest variability in the indices of industrial production of basic food products is typical for the first months of 2020 (January, February, March). In the second quarter (April, may, June) of 2020, the volatility of industrial production indices slows down, which is particularly evident in the Belgorod and Voronezh regions. The rate of stabilization of industrial production is determined by the fact that it is in these regions that the level of industry is most developed compared to the Kursk and Tambov regions (where the volume of industrial production is not high). In other words, the regional economic systems of the Belgorod and Voronezh regions were more resistant to the impact of the economic crisis caused by the COVID-19 epidemic, since the structure of the regional economy of these regions is dominated not only by agricultural sectors, but also by industrial ones. This is a very important conclusion, because within one economic region we can see a difference between regions. the more balanced the economic structure of the regional economy (with a predominance of all industries), the less the impact of the economic crisis on the region will be.

Regions such as the Kursk and Tambov regions are characterized by a high degree of volatility in industrial production indices, and during the first two quarters of 2020, there was a slight downward trend in production volumes.

In order to demonstrate the trend that is developing on the eve of the economic crisis and immediately after the COVID-19 pandemic, we will display in figure 5 the dynamics of changes in milk production (for meat and bread, the trend is similar).

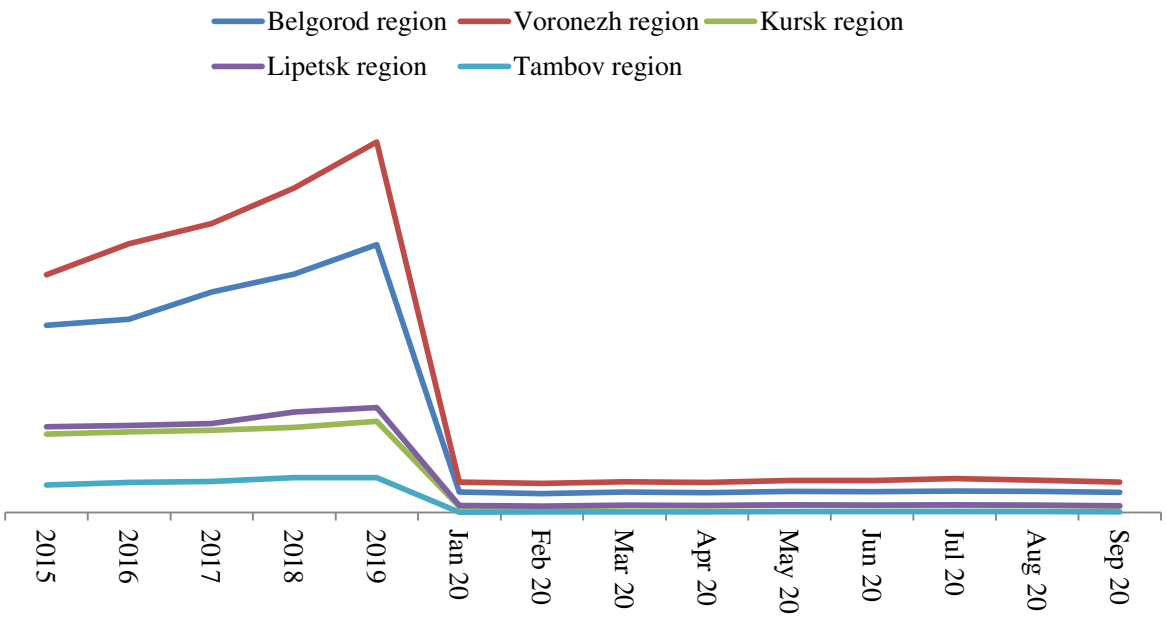

Figure 5: Milk production by agricultural enterprises, thousand tons

The figure clearly shows that up to the end of 2019, milk production volumes are increasing in all five regions of Central Russia (in this case, production is considered only by large agricultural producers). The largest production volumes are typical for the Voronezh and Belgorod regions, since the level of industrial development of these regions is the highest. And since the first months of 2020, there has been a sharp decline in production, which may seem to indicate a crisis. In fact, we used monthly data on output in 2020, and these values are less than the annual data that we used for the period from 2015 to 2019. We made this decision only because the year 2020 is not over yet and there is no data on the annual production volume yet. However, if we analyze the monthly production data for the first nine months of 2020, we can conclude that they fully correspond to the average (monthly) production volumes of 2019.

This allows us to draw a somewhat paradoxical conclusion that despite the restrictions imposed and the decline in business activity in large-scale industrial production, there is no clear trend towards a decrease in the volume of products produced. Monthly production data for the first months of 2020 correspond to monthly production data for 2019. Large industrial enterprises are the least affected by the economic crisis and the decline in business activity, restrictions on the movement of the population in General did not affect the producers of basic food products.

Despite the fact that large industrial enterprises were not affected (in terms of production) by the crisis caused by the COVID-19 pandemic, the population of the studied regions of Central Russia suffered significantly, as the real disposable income of the population decreased (Tab. 1, Fig. 6).

Table 1: Real monetary income of the population, % of the corresponding period

Regions	2015	2016	2017	2018	2019	1 quar 2020	2 quar 2020	3 quar 2020
Belgorod region	99.3	100.8	99.1	98.7	101.3	101.1	97.5	92.9
Voronezh region	101.1	93.6	97.4	100.0	101.5	101.5	89.3	76.1
Kursk region	100.4	93.2	99.1	100.1	101.3	101.2	95.6	87.8
Lipetsk region	96.1	96.8	100.1	100.1	103.0	102.3	90.1	77.9
Tambov region	98.5	95.8	97.0	98.8	98.0	97.8	87.5	73.2

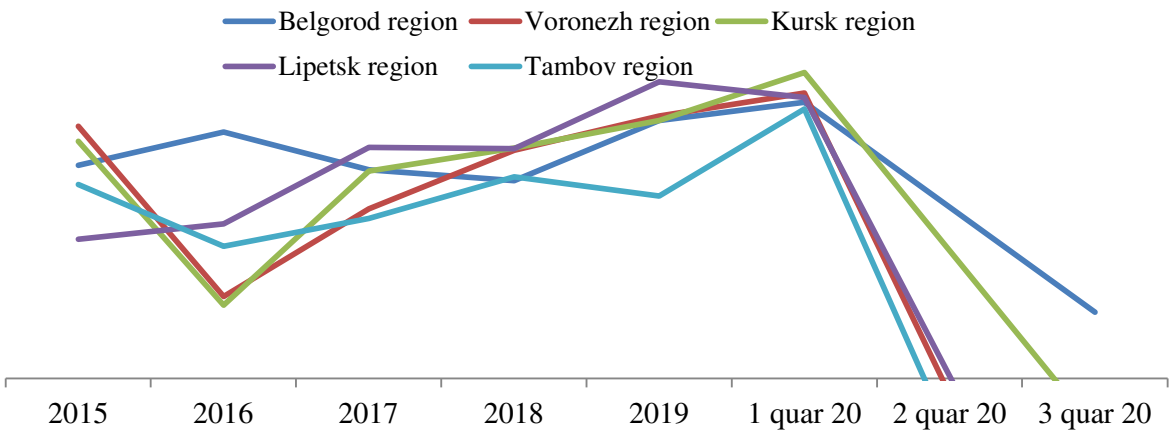

Figure 6: Real monetary income of the population, % of the corresponding period

From the numerical data in table 1 and figure 6, it is clear that the real disposable income of the population in all five subjects of Central Russia decreased to the values of 2019. This indicates that the population is getting poorer and can afford to buy less and less food per individual family member. Thus, we have identified two completely different (oppositely directed) trends. On the one hand, the volume of industrial production of basic food products (meat, milk, bread) is increasing, since enterprises have the opportunity and reserve to increase output, and on the other hand, the population cannot afford to buy food, since the monetary income of the population is decreasing. At the same time, the aggravating factor (in the context of the identified trend) is the increase in food prices, which is explained by the increase in production costs. This will further aggravate the already difficult economic situation of the population.

Conclusions

In the medium term, the most likely trends for the five subjects of Central Russia will be the following:

a) a significant decrease in the effective demand of the population caused by a decrease in real disposable income due to inflationary processes. For the regional economy, this factor is of the greatest importance, since the aggregate demand of the region's population is a stimulating factor for the development of the regional economy;

b) reducing the revenue side of regional budgets with a simultaneous increase in social expenditures and thereby increasing the gap between the expenditure and revenue parts of regional budgets;

c) liquidation of small and medium-sized enterprises, since they cannot compete with large producers in terms of production scale. Production volumes in large agricultural enterprises did not decrease even during the crisis.

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Factors Affecting Mergers and Acquisitions in A Changing Environment

Andris DENINS

Dr.oec., Professor, Departament of Management Sciences, University of Latvia, Latvia
denins_a@yahoo.com

Abstract

The purpose of this article is to set the main factors impecting the process of companies mergers and acquisitions. There are results of research explaned in this article. The research contents is arising from detailed wellknown scientists opinions review concerning companies mergers and acquisitions. On the bases of mathemacical statistics the author has set relationship between companies gained financial results and factors affecting process of mergers and acquisitions Statistical models have been elaborated by wich the efficiency of mergers and acquisitions is avaiilable assesed.

Keywords: mergers, acquisitions, verticsl integration, horizontal integratin, mathematical statistics, regression analysis.

Introduction

Companies in the world compete with each other, and there are always companies that are more successful than others. Businesses take every opportunity to succeed. Mergers and acquisitions are a form of restructuring that plays a significant role in the corporate finance world. Nowadays, companies, when choosing the type of merger, want to assess the potential benefits. In assessing the synergies it is necessary to determine not only the synergies that can be obtained, but also those that can form another merger case. That was the subject of author's research.

The terms merger and acquisition (takeover) are very vague. In practice, they are usually used explicitly. However, their terminology is different. A wide variety of definitions can be found in the extensive literature and on the internet. An acquisition is defined as the acquisition of one enterprise by another and the combination of assets of two enterprises of equal size. A merger requires the cooperation of the management of the target company to combine assets, whereas an acquisition does not. A merger is inherently friendly, while an acquisition can be both friendly and unfriendly. Merger of two or more independent market participants in a merger to become one of the market participants, or to obtain a decisive influence over other market participants. A merger can be when two separate companies decide to continue their activities in a single organisation. Whereas a business transfer is a transaction consisting of the purchase transaction, with one company taking over another company towards full management with the objective of making the second a subsidiary or incorporating it into the company's current business.

Literature Survey

The takeover process of a company's shares or assets of a sale to move another company owned. Effective acquisition strategy provides significant growth of the company (Ashon, Cook, Schmitz, 2003).

Mergers or acquisitions can be achieved by: horizontal integration; vertical integration; related or unrelated diversification. Horizontal integration merger transaction sector companies that are direct competitors of production and the market segment in the field. Horizontal takeovers may lead to increased productivity, especially if companies are similar, but some of them use different resources that complement each other (Kapoor, Lim, 2007). Vertical integration merging the customer and the manufacturer or the supplier and the manufacturer. This can happen by the merger of two or more undertakings or company launching new directions. Vertical integration is the acquisition of one or more suppliers or distributors of a company's goods and services (Gabrielsen, 2003). Vertical integration is used to increase and get more power to the market. Companies often use vertical and horizontal acquisitions in order to gain additional market power within it (Haleblian, Dever, McNamara, Carpenter, Davison, 2009).

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There is also the opportunity to join with a company that operates in another sector that is not related to the current activities of the company - this is diversification. Such transactions do not provide companies the opportunity to capture new clients or to control a larger market share - they can take this action to reduce risky activity income volatility with relatively stable income that provides courses of action.

If the synergies that can be obtained in the company are smaller than those which can be competitors, then the company will be the loser in this situation. The expected synergies may take various forms. Traditionally, companies are planning to get synergy to reduce headcount; achieve high volume efficiency; the acquisition of new technologies; better access to markets, control over the industry. Merger of companies also improves financing opportunities.

P. Drucker shows that mergers and acquisitions will only be successful if the purchaser knows it is sure to be purchased in order to promote the company (takeover of the object) operation. Mergers and acquisitions targets can be divided into business, investor, and shareholder business objectives include business development and ensure the increase in business diversification, the faster acquisition of new markets, disposal of competitors by buying competitors and by taking market share; the aim of investors is investing free funds, participation in profitable business and undervalued asset purchase; general objectives of the association (co-operation) or the establishment of strategic investor attraction of company shares in the sale, the willingness to sell the business as well as financial resources for this (Colliens, 2017).

M. Martynova, S. Oosting and L. Renneboog studied the results of mergers and acquisitions (profitability) in Europe; they found that the combined turnover significantly outperformed the average company in their performance industry before the merger, but the merged entity's commercial profitability dropped significantly after the takeover (Martynova, Oosting, Renneboog, 2007).

R. Noe observed that 60-80% of all mergers are financially unsuccessful, as measured by the results of the stock market or by profit growth. In turn, A. Fridman concluded that 58% of mergers do not reach the set goals. M&A success rate is very low - only about 30-50% (Martynova, Oosting, Renneboog, 2007). Therefore many researchers in the field of business strategy attempt to identify the variables that influence the success or failure rate. Integration speed is referred to as a success factor (Bauer, King, Matzler, 2016).

Methods

Researching the issue of merger failures, the author came to the conclusion that each mergers and acquisitions transaction is different, because each company involved in the process, is unique and different from others. However, the method used is similar. Used several methods to find a "winning formula" by which to predict the joint and the acquired company's results.

However, the fact is that until now, such a solution has not yet been found and the percentage of errors continues to be high. One of the reasons for the success or failure of the company's mergers and acquisitions lies in the way the integration is carried out between the companies. The author believes that the key factor for success of the company's mergers and acquisitions is to create and motivate the management team that will focus on new business objectives.

Results

Company managers are responsible for the achievement of corporate goals of performance and the methods chosen. In order for companies to implement their chosen development strategy through mergers and acquisitions, it must be based on mergers and acquisitions to evaluate the results - should try to calculate the company's results and the expected effectiveness both before and after the transaction.

Researchers and practitioners have carried out several studies on the results of mergers and acquisitions. Different sources of literature over the past three decades, describe a number of methods. The author became acquainted with a number of international studies, dominated by the company's purchasing activities and research merger results. Research findings vary depending on the chosen performance evaluation and methods, which is an important factor in both researchers and practitioners drawing conclusions on the success or failure of mergers and acquisitions. Some authors recommend the use of mergers and acquisitions in the evaluation method based on public research and direct such to corporate profitability check, stock market awareness or the efficiency aspect. Various methods used in one country may not work in another (Sethi, Krishnakumar, 2010). Earlier studies indicated that the impact of the transferred research can be measured by observing the reaction of the stock market or changes in the company's efficiency, at the same time looking at the accounting dynamics (Tang, 2015). Most researchers have

used profitability (gross and commercial profit margin, equity and assets profitability, EBITDA) performance data. By analysing and identifying the reasons for the balance sheet, changes can be identified in the company's financial stability improvement or deterioration. It is not always the case that the sales increase is positive, so this change must be analysed in the context of cost and profit changes in volume. Company's financial stability assessment of the financial statements in changes to be analysed in the context of the amount of profit and changes in equity for the assessment of the impact of the most important items on profit.

Mergers and acquisitions (M&A) represent a popular strategy used by companies for many years. In fact several reviews have shown that, on average, companies create little or no value by making acquisitions (Hitt, King, Krishnan, Makri, Schijven, Shimizu, & Zhu, 2009). Economists and venture capitalists are predicting an increase in M&A as nowadays organizations want to grow their market share and presence by building synergies (Jain, 2014). M&A in a broad sense can mean a number of different transactions ranging from buying and selling companies, the concentration between companies, alliances, cooperation and joint ventures in the formation of companies. Schuler and Jackson (2001) argued that a broad definition of M&A could be used confusion and misunderstandings, because it covers everything from pure merger to strategic alliance. In this paper the definition of M&A will be used in the narrow sense as purchases as purchases of shares or assets on another company to achieve full management and operational impact. M&A of the company is in particular because the relevant information about the target company is not available to the acquirer (Very & Schweiger, 2001). Although the M&As are motivated by the expected synergy between the target and the acquiring firms, some mergers are successful while others are not (Canina, Jin-Young, Qingzhong, 2010). In the last years, markets are characterized by disruptive changes as well as M&A activities (Kernstock, Brexendorf, 2012). M&A are undertaken on the assumption that the combined company will have a greater value than the two companies alone (Vazirani, 2013). M&A processes are complex processes with many challenges in the pre-deal and post-deal phases.

In the present context of the European Single Market and the globalization among economies, mergers and acquisitions represent the means by which companies increase their competitional capacity (Banulescu, Popescu-Cruceru, Leuciuc, 2012). A representative review of the extant research on M&A over the last 15 years produced a list of the most common value studied. The review of the academic literature consisted of computerized and manual questions about the published research reports.
The value of the company will reflect the contents of the solution for the various parameters that are evaluated for its operation:

• market share and competitive position stability;
• income;
• investment need;
• operational efficiency;
• the tax burden;
• cash flow management;
• the degree of risk.

The company is in the process of evaluating a company's or individual's direction value. Most often, the aim of evaluation is the determination of the market value. To successfully plan the further development of the company, merger of the whole or part of the company, buying and selling, capital injections in new directions of activity, new investment in the current transaction, as well as in other cases, the company carried out the evaluation. Company rating as it also helps entrepreneurs, potential investors to evaluate the financial situation and make the right investment decisions. Company evaluation process results in the entire company or its separate actions in terms of value for money. An organization can have multiple values depending on the scoring target.
There are different types of evaluation:

• market value;
• the value of an investment;
• the value of company workers;
• salvage value;
• balance sheet value, etc.

The value of the company is composed of several factors. The first – the ability of a company to make money, the second – company assets that belong to the company, i.e., the material base, the third – goodwill: the word, the technology used, a market where it's working, staff. Results also suggest that the asset specificity discount in the target return is more pronounced if target firms are financially distressed. Asset specificity of a firm is an important determinant of the firm's value (Kim, 2018). Operating cash flow increases the company's turnover and other revenue associated with the core, but it reduces production, administration, sales and other operating costs. The

difference between revenue and the cost is the company's profit before depreciation deductions, interest payments and taxes (EBITDA), so the higher the EBITDA is obtained; the higher cash flow from operating activities the company is obtained. This variable directly affects the company's turnover and costs. Developing and directing profitable products and running costs, the company increased cash flow from EBITDA. In Latvia, to determine the value of the company, also uses EBITDA factor. EBITDA is the base business profitability, which usually take into account the buyer (Pratt, Reilly, Schweih, 1996). Financial analysis of the company's important role in the M&A process management. Analysis tasks: to determine the effectiveness of the company's activities; identify potential business development directions. Analysis of economic activities is a prerequisite for planning. So the company can plan their actions in the future, it is necessary to analyse the results of the previous operation. Nowadays, more and more business owners and managers understand that company's evaluation is a tool used to assess how successful the company implements its strategy, and what are the main elements of its competitiveness.

From a theoretical point of view, due diligence process is largely in line with the prospect organizational learning theory (Barkema & Schijven, 2008), more explicitly teaching (March 1991). Under this perspective, the company learns with each of them and can transfer this learning effect to future M&A. Challenge the M&A process is such that the process is more complicated than the operating company, for example, production, pricing, distribution, etc. Traditional legality checking process is primarily focused on tangible assets or documents relating to the operation of the company resulting in a legal, accounting and tax issues (Harvey & Lusch, 1995). Consequently, the main legality checks are still financial and although the results of M&A transactions show a lack of traditional credibility testing approach (McGrady, 2005). Business consultants are based on regular experiences based on best practices, using experience and feedback from projects with your customers. Look for factors that are mostly simplified and suitable for a large number of M&A. The main role of the due diligence process for M&A is to evaluate the benefits and responsibilities of M&A of the company with the analysis methods relating to the company's past, present and future are expected to purchase business. An in-depth examination of business process occupies a significant role in the M&A. If this process is missing, there is a great possibility that in the future it could cause bad financial indicators of the company. It is important to create a management team that will make due diligence process, a team that evaluated the company systematically both before and after M&A. Due diligence process see the problems that must be resolved in the company's M&A to be successful. The due diligence includes: financial risk analysis, the financial position of the company and the determination of the value, legal risk analysis, tax risk analysis and evaluation, financial indicators for conditions where reliable information is difficult to obtain, risk analysis staff. Often M&A require the national regulator or another third-party authorization. Restrictions may be imposed by the competition law; the transaction may be required for other government agencies to agree. Due diligence indicates the existing and potential liabilities. With an in-depth exploration of the company is evaluating whether the agreements contain specific restrictions or obligations.

Due diligence is in the process of acquiring the company, which is testing a company takeover object for determining whether the proposed transaction, the justification is based on the financial and strategic indicators. Need to define questions, which is acquiring a company must establish a plausibility check (Cullinan, Roux, Weddigen, 2004). The operation and development of the company is associated with future prospects, opportunities, risks and uncertainties, the company's performance depends on the skills to use modern business management techniques and tools. The findings suggest that identifying and prioritizing relevant fields in the context of integration would improve the resource allocation decision and the effectiveness of post-integration evaluation (Chang, Chang, 2014). Most existing research on M&A of the results of the study results on the company's profitability, which is based on stock prices. However, there are studies that use information about the company's accounting results in annual reports. D. Mueller was one of the first to use accounting data analysis of mergers and acquisitions for evaluation. He analysed the merger transactions of 247 from 1962 to 1972 for the coming three years after the merger.

D. Mueller studied the return on assets, equity capital profitability. Similar studies on enterprise's accounting data after the merger was also D.Ravenscraft and F. Scherer (Ravenscraf, Scherer, 1989), A. Seth, P.M.Healy, A Ghosh who studied the profitability of the company, which is 315 merged during the period from 1981 to 1995 (Ghosh, 2001). Most of the risk factors mentioned in the practical studies have already been studied academic literature. Business consulting studies mainly focus on overcoming practical obstacles learning process and highlight the area in which the involvement of consulting companies provides added value. They are also regards the execution of operational transactions as the decisive criterion for success, which determines the potential impact on performance after the acquisition stage. Therefore, partial vertical integration is profitable since it constitutes a strategic device to relax competition (Fiocco, 2016).

Vertical integration brings better coordination within the integrated firm, which boosts its investment incentive at both upstream and downstream levels (Liu, 2016). An extensive body of research supports that firms acquire other firms in order to innovate and/or become more sustainable (Park, Krishnan, Chinta, Lee, 2017). The type of

knowledge is a critical distinction for the value of M&A implementation (Ranucci, Souder, 2015). When organizational leaders can no longer achieve their goals through internal growth engines, they often embark on a M&A (Recardo, Toterhi, 2015). M&A are the important mechanisms through which companies can achieve growth, gain access to new markets and diversify their activities (Savovic, 2017). Companies use mergers to increase their stability and improve economic parameters (Sobolev, 2015).

Most M&As fail to meet the expectations of the purchasers. It is clear that the due diligence, valuation analysis, and negotiation that precede the closing of a transaction cannot guarantee its success. Instead, the synergies and assumptions that supported the decision to acquire a target business will be realized only if the purchaser effectively integrates the target. Unfortunately, many purchasers either fail to plan the integration of the target adequately or conduct the integration process too slowly (Venema, 2012).

Mergers and acquisitions over the past 40 years have generated considerable interest and generated demand for strategic literature, focusing on the strategic and organizational compatibility of companies as well as the management of mergers and acquisitions themselves. Despite the popularity and visibility of this type of transaction, one of the most interesting findings of merger and acquisition studies is that the merger has not delivered the expected result. The outcome of a merger or acquisition can be evaluated from various perspectives, such as whether the transaction has resulted in a profit for the company's shareholders. One of the calculation criteria is profitability, which can be measured and measured in the short or long term.

The measurement of the business of a merged or acquired entity is carried out by comparing the accounting data before and after the transaction (for a period of at least 3 years) and by comparing the accounting data on turnover and profits. Process of mergers and acquisitions has identified an important aspect to consider in order to establish a successful merger and acquisition.

Today's business strategy is based on plans and actions designed to help companies compete successfully in their industry. Its mission is to help companies achieve and exploit their competitive advantage. Strategic planning, on the other hand, must ensure the long-term development of the company and high economic growth rates. Company strategy is an important element that helps to focus the efforts to achieve goals and has a long-term character. In turn, in the process of strategy planning, the company develops possible actions and receives an answer on how to move forward.

Scientific papers analyzed by the author show that financial statements data can be used to determine the activities of a company by calculating, comparing, combining and interpreting various absolute and relative indicators. One of the simplest methods of financial analysis for assessing financial stability is the horizontal method of analysis - studying changes in the absolute ratios of a company's financial statements (balance sheet, profit and loss statement, cash flow statement). Significant changes in the key financial statement items have a significant impact on the financial stability of the company. In order to carry out due diligence of the financial ratios of Latvian companies, as well as to reasonably select the variables of the model to be used, the author considers it necessary to calculate and investigate the correlation of indicators showing the closeness of correlation between two related variables. In order to determine the correlation between the company's financial performance, the author calculated the correlation coefficients, and in order to obtain a statistically significant rating interval for the correlation coefficient, both variables must correspond to the normal distribution. However, as mentioned in the previous section, this is not the case. Therefore, these ranges were not calculated and the correlation coefficients only give insight into the possible relationships and trends of the cash flow.

Regression analysis was used to show the regularities of these parameters. The obtained data were processed with Microsoft Office Excel and SPSS programs. Multivariate regressions were performed on data processing using the standard least squares (Ordinary Least Squares) method. This method minimizes the sum of the squares of distance in the observed measurements. In total, 21 regressions were performed: one for each firm over several years of operation. Note that there are only 21 measurements in total, which is the minimum number of observations to ensure a normal distribution. Accordingly, due to the limited amount of data, regressions may not produce statistically significant results. In addition, it is also noted that the models that will be used in the regression analysis are not specifically designed to explain all fluctuations in the psychological factor, but to find correlations and to provide an overview of the performance of physical tasks.

Due to the large number of variables, a list of financial variables with potentially 22 variable ratios was used for the study. Based on the results of the study, it was concluded that several financial ratios indicate the performance of the company. The result of the detection model depends on the choice of indicators, so the correct choice of indicators provides the possibility to form a precisely working model. Various financial ratios were selected for analysis. All analyzed financial ratios were divided into four groups according to their importance:

1. Liquidity;
2. Profitability;
3. Solvency;
4. Activity.

The M&A model is modeled on the principle that at least one factor is selected from each set of ratios that exhibits the most significant difference between related and unrelated companies in the merger process. The following procedures were performed to arrive at the variables in the equation:

1. Observation of statistical significance for various alternative functions, including each independent variable;
2. Evaluation of the correlation between the relevant variables;
3. Accuracy of observation forecasts between different profiles.

The author believes that it is important to find out what factors affect company merger and acquisition results, how high the company's EBITDA is, and how companies with high and low levels can be classified according to a regression function.
The following indicators are used in the following study:

• y - EBITDA / turnover;
• x1 - gross profit margin ratio;
• x2 - profitability before interest payments;
• x3 - profitability ratio of taxable profit;
• x4 - commercial profitability indicator;
• x5 - return on assets ratio;
• x6 - return on equity;
• x7 - return on equity;
• x8 - turnover of assets;
• x9 - turnover of fixed assets;
• x10 - current assets turnover ratio;
• x11 - total liquidity ratio;
• x12 - current liquidity ratio;
• x13 - absolute liquidity ratio;
• x14- EBITDA / assets;
• x15 - equity / liabilities;
• x16 - Turnover / Assets.

By performing a correlation analysis of the raw data, the dependent variable y - EBITDA / turnover with the independent variables analyzed is statistically significant with significance levels of 0.05 and 0.01, resulting in a correlation coefficient matrix in which the correlation coefficients for the dependent variable with the relevant independent variables excluded are statistically significant.

The measurement of the financial results of a business combination is closely linked to the assessment of the significance of financial ratios. If the variable is EBITDA / turnover, there is a strong positive statistically significant relationship between the pre-interest profit margin, the after-tax profit margin and the commercial profitability ratio, the return on assets ratio and the EBITDA / assets valuation.

Higher EBITDA / Turnover Ratio is associated with higher average financial ratios for profit before interest, taxable profit and commercial profitability, Return on Assets, and EBITDA / Assets as evidenced by Pearson correlation coefficient values, which are statistically significant probability.

Multivariate regression analysis was used to assess the dependency of the financial results of M&A. There is a correlation between the selected factors, which may influence the accuracy of the solution, but estimation of the correlation coefficients using inequalities: roi> rij; roj> rij; rock> rik; rock> rjk; where o - performance indicator (EBITDA / turnover ratio estimate), i, j, k - factorial indicators (significance of profit before interest, taxable profit and commercial profitability, return on assets and significance of EBITDA / assets), Since the correlation of the factorial features with the performance trait is closer than the correlation between the factors, therefore, it is useful to include the selected factors in the regression model, there is no multicollinearity between the factorial features.

Selecting only those variables for which the EBITDA / Turnover correlation coefficient is statistically significant with significance level 0.05 and 0.01, the following result is obtained: In the Model Summary block of Model Summary, the author found that the coefficient of determination (R Square) equals 0.862, indicating that 86.2% of

the variance in the performance attribute is explained by the factors included in the regression equation (profit before interest profit margin (x2), taxable profit margin (x3) and commercial profitability (x4), Return on Assets (x5) and EBITDA / Assets (x14),

Thus, the linear regression model by which to forecast EBITDA / Turnover values looks like this:

$$y_t = 0.956x_{2,t} + 0.108x_{14,t} + 0.011 \quad (1)$$

where yt - EBITDA / turnover at time t;
x2, t - profitability ratio before interest payments at time t;
x14, t - EBITDA / assets at time t.

The linear regression analysis included all 17 variables, of which the dependent y was EBITDA / turnover. In the linear regression analysis, the following results were obtained in the SPSS program: In the first statistical block of Model Summary we find that the resulting linear regression model - 89.5% of the variance of the result variable is explained by the factors included in the regression equation (gross profit margin (x1) profitability ratio (x2), taxable profit margin (x3) and commercial profitability (x4), return on assets (x5), return on equity (x6), return on equity (x7), return on assets (x9), working capital ratio (x10), total liquidity ratio (x11), current liquidity ratio (x12), absolute liquidity ratio (x13), EBITDA / assets (x14), equity / liabilities (x15) and turnover / assets (x16) () R Square = 0.895).Analyzing the parametric statistics of the optimized models, the author concludes that the best model with as many variables as possible and without the problem of multicollinearity (VIF <5) is as follows:

$$y_t = 0.932x_{2,t} + 0.001x_{7,t} - 0.012x_{12,t} + 0.074x_{14,t} + 0.007 \quad (2)$$

EBITDA / Turnover (y) is impacted by profitability before interest payments (x2), return on equity (x7), current liquidity ratio (x12) and EBITDA / assets (x14). The gross margin ratio (x1) does not participate in any optimized model.

Discussion

As a result of the merger, the EBITDA to turnover ratio is increasing. Based on the above analysis, it is possible to formulate a number of factors affecting a company's EBITDA:

1. Net Turnover Growth: Turnover growth rate, usually expressed as a percentage of the prior period, is one of the first things that creditors, executives and professional financial analysts pay attention to when evaluating a company's business. The reason is simple - sales revenue affects virtually all other metrics. If the other variables remain constant, significant changes in net turnover will have an impact on both the company's balance sheet and profit and loss account.

2. Profitability before interest payments: Profit before interest payments is the sum of the profitability of an activity, excluding interest payments and taxes.

3. Return on Equity: Shows the return on each euro invested by the owners in the equity of the company. This way you can compare returns with other potential types of investment.

4. Current Liquidity Ratio: Reflects the ratio of the company's current assets (excluding inventories) to current liabilities. A higher ratio indicates a higher level of liquidity (greater ability to meet a company's current liabilities). A ratio of 1.0 indicates that the carrying amount of current assets is exactly the carrying amount of the present liability.

5. EBITDA / Assets: Return on total assets is the ratio that measures EBITDA on a company’s total net assets. The ratio is considered as an indicator of how effectively a company uses its assets to generate income.

Conclusion

The company is responsible at the European Commission's position is in unity with the success of the company. If the company's activities comply with the social aspects that contribute to customer requirements, the ability to provide a parallel to the other community members such as employees, suppliers, local communities are respected. This in turn means that a positive force in society can bring direct benefit and ensure long-term competitiveness. Today's requirement is that businesses and organizations need a sane, professional manager. The driver, also a businessman, professional skills not only to work with the company's economic information (financial records,

analysis, control, forecasting). The driver must also be able to take decisions in the management of human resources, which the absence of economic and legal information is also necessary psychological, pedagogical, ethical and social basis. As the surveys show, the acquirer should consider using a consistent and scalable process evaluating such typical risks associated with M&A. This means giving the same meaning checking the legality of reputation as a legal, financial, operational and other traditional credibility check. Move to the next level of due diligence needs to be improved more than replacing the traditional credibility test activities. However, every M&A has its own personality and thus the process of expanding legality may vary depending on the situation.

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Monitoring Mechanism of Enterprise Industrial Marketing Management

Tetiana KHARCHENKO,
Ph.D. of Economic, Ass. Professor, Kyiv National University of Trade and Economics, Ukraine
kharchenko_t@i.ua

Olena KLIBANSKA,
Ph.D of Technical Science, Ass. Professor, Kyiv National University of Trade and Economics, Ukraine
klibanska_o@ua.fm

Tetiana CHUNIKHINA,
Ph.D. of Economic, Ass. Professor, Kyiv National University of Trade and Economics, Ukraine
chunikhina@i.ua

Liliia PRYIMAK,
Candidate of Philological Sciences, Ass. Professor, Vasyl Stefanyk Precarpathian National University, Ukraine
pryimak@i.ua

Abstract

The expediency of taking into account the dynamics of financial state of an enterprise and a competitive strategy at the present stage of strategic price management is substantiated. A matrix of situational price management at an industrial enterprise is developed, in which the choice of strategic guidelines is based on two approaches: the first is based on the needs of customers, the second is based on the technological capabilities of the enterprise itself. The matrix allows to identify a situation where it is appropriate to apply a particular approach. The article focuses on the importance of the monitoring function of industrial marketing management, which provides a specially organized systematic observation of the compliance of the results of industrial marketing management with the defined goals in order to make the necessary corrective management decisions in the modern competitive conditions of enterprises functioning and deepening crisis situations in the external environment.

Keywords: Monitoring, Industrial Marketing, Management Mechanism, Management Decisions, Strategic Management.

Introduction

In the industrial sphere, the situation is complicated by the specific features of production systems of enterprises and products, which increases the risk of their entry into the markets. Accordingly, in such circumstances, the role of marketing activity is growing significantly, but not as an independent function that can be observed in the practice of most manufacturers, but as one of the main systems of the enterprise, which provides communication with the external environment in close interaction with its production subsystem. Therefore, there is a need to develop an effective industrial marketing management mechanism at the enterprise, which will ensure implementation of its competitive strategy, closely coordinated with its production subsystem.

The purpose of the work is a scientific substantiation and development of theoretical and methodological foundations, scientific and methodological and practical recommendations on development of the mechanism of industrial marketing management for enterprises.

Literature Survey

In the conditions of constant increase of the cost of material resources, the main direction of increasing competitiveness of products is to reduce its material intensity (Rinallo, D., Bathelt, H., & Golfetto, F. (2017)).

Therefore, from our point of view, it is advisable to consider the process of managing the material consumption of products on the basis of marketing as one of the components of the process of managing competitiveness of the manufactured products (Anees-ur-Rehman, M., Wong, H. Y., Sultan, P., & Merrilees, B. (2018)).

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According to the goal of the study, one of the tasks that is solved in this paper is theoretical substantiation of the modern concept of marketing (Iankova, S., Davies, I., Archer-Brown, C., Marder, B., & Yau, A. (2019)). Since this concept is implemented in the field of production in the form of a management system of the enterprise and its units, it is necessary to define the essence of marketing as a system of management of production and marketing activities and to define the functions that it performs (Drobyazko, S., et al. (2019)).

However, according to experts, not all businesses, organizations, firms that declare or profess the marketing concept, put it into practice (Adrodegari, F., & Saccani, N. (2017)).

Such businesses are limited to the formal elements of marketing: introduction of positions of Vice President (Deputy Director) on marketing, product manager, development of marketing plans or implementation of its individual functions, such as market research (Payne, A., & Frow, P. (2017), Gummesson, E. (2017)).

In comparison to other types of marketing, industrial marketing has received insufficient attention in Ukrainian marketing science, although the industrial marketing is one of the most complicated and requires special attention and specific approaches at all stages of the enterprise activity: development, production and delivery of industrial products to the consumer (Wieland, H., Hartmann, N.N., & Vargo, S.L. (2017). Therefore, the importance of industrial marketing is explained by specific features of the industrial sphere itself.

Summarizing, we should note that in the current conditions of globalization of economic activity, which is often accompanied by economic and socio-political instability and uncertainty, it is impossible to ensure effective functioning of industrial enterprises without industrial marketing on the basis of a clear and modern system of managing their marketing activities (Kienzler, M., & Kowalkowski, C. (2017)).

Problems of managing competitiveness of production of an enterprise on the basis of marketing are sufficiently studied by many scientists-economists (Hallberg, N. L. (2017)).
However, they still require considerable effort in many scientific and practical fields. In particular, this concerns development and production of new competitive products, that is, the innovative activity of the company, as well as its promotion on the market, improving marketing strategies, i.e. using innovative marketing (Yang, M., & Gabrielsson, P. (2017)).

Insufficient use of marketing is caused, on the one hand, by a lack of full understanding of the needs and capabilities of marketing tools, and on the other hand, by lack of qualified specialists in this area (Bankvall, L., Dubois, A., & Lind, F. (2017)).

Analyzing various sources of information, it is safe to say that in most companies marketing is limited mainly by promotional activities and methods of promoting products or services (Cortez, R. M., & Johnston, W. J. (2017), Felix, R., Rauschnabel, P. A., & Hinsch, C. (2017)).
Excessive use of marketing is observed in those organizations that, for simple tasks, involve highly skilled professionals who should solve the problems, which leads to excessive marketing costs, impossible to compensate by business activities (Malshe, A., Johnson, J. S., & Viio, P. (2017)).

That is why, before deciding on the use of marketing principles in the activities of enterprises and organizations, it is necessary to determine the required level of application of marketing (Efrat, K., Gilboa, S., & Yonatany, M. (2017)).

Marketing activity is particularly important for industrial enterprises, which usually sell their products far beyond their location. In case of a boundary region, marketing is transformed into a regional and / or international (Cambra-Fierro, J. J., Centeno, E., Olavarria, A., & Vazquez-Carrasco, R. (2017)).

Methods

To solve the set problems, the following methods of scientific research were used: abstract-logical approach - for theoretical generalization of research results and formation of intermediate and final conclusions based on them; graphic-analytic method - for providing material clarity and schematic representation of a number of theoretical and practical provisions; experimental - for testing scientific and methodological approach to assessing effectiveness of marketing activities in industrial enterprises.

Results

The main goal of strategic price management is to establish the best price level, the level that will maximize profit, that is, provide rational marketing price management from a strategic perspective, integrate existing techniques and methods of price management when using marketing tools, and therefore creating a long-term competitive advantage.

Accounting totality of the last two components will allow to determine the most appropriate of the available alternative directions of competitive strategy for the enterprise. These three reduced variables - the dynamics of the financial state of the enterprise, strategic orientation and type of competition - are the axes of the matrix in Figure 1.

<table>
<tr><td>I. Dynamics of financial state</td><td rowspan="2">I
Improvement of basic, auxiliary, servicing production processes</td><td colspan="2" rowspan="2">IV
Improvement of existing products (marketing commodity policy) and production processes</td></tr>
<tr><td>Profit is added and growing</td></tr>
<tr><td>Profit is added and decreasing</td><td>II
Improvement of production processes and increase of production volumes</td><td colspan="2">V
Improvement of existing production processes (production marketing), development of new products</td></tr>
<tr><td rowspan="3">Profit decreased and grew negative</td><td>III
Changing the range of products that produced in the direction of increasing profits</td><td colspan="2">VI
Development of brand new products and methods of production (innovative marketing)</td></tr>
<tr><td>Technological</td><td>Marketing</td><td>II. Strategic orientation</td></tr>
<tr><td>Price</td><td>Innovative</td><td>III. Type of competition</td></tr>
</table>

Figure1: Situational price management matrix for an industrial enterprise (developed by the author)

In the proposed matrix, when selecting strategic guidelines, two main ones were used. The first guideline is technological, when both the well-established production of goods and search for new goods are based on available technologies that are inherent in the activity of the enterprise on the market. The second guideline is marketing, when all resources of the enterprise are focused on meeting the needs of consumers.

Traditionally, a product competitiveness indicator is a function of two variables: price (and, accordingly, its costs both for production of goods and its operation) and quality. It is established that in assessing competitiveness of a product it is also necessary to take into account another its parameter - maintenance, which means the whole range of branded services provided by the supplier to the consumer during the entire operational cycle.
In its turn, quality should include the technical and functional state of the product, uniqueness, environmental safety and innovation. Innovation should be understood as a set of new product features introduced at the enterprise for the first time.

Thus, the success of goods on the market is determined by a combination of three parameters - price, quality, service. Finding the right combination of these parameters is a promising way to manage prices.
In this connection, the author introduces a new concept of "space of product competitiveness", characterized by indicators of price, quality, service. Once in this space, the product will be sold to the benefit of the enterprise, provided the highest level of consumer satisfaction. Description of the parameters that form the space of product competitiveness are presented in Table 1.

Table 1: Description of parameters that make the space of product competitiveness (the author's research)

Parameters	Description
Minimum price level	The minimum acceptable price below which production of the goods at a given level of profitability is impossible at this stage of development of equipment and technology
Maximum price level	Characterizes the threshold price, the excess of which will dissatisfy buyers
Maximum quality level	The highest level of quality, exceeding which is impossible at this stage of development of equipment and technology
Minimum quality level	The lowest level of quality beyond which a product cannot be used for its intended purpose
Maximum level of service	Higher level of service beyond which it becomes intrusive for the consumer and not cost-effective (high-cost, unjustifiably expensive) for the manufacturer
Minimum level of service	The lowest rating of service beyond which goods cease to be attractive to consumers

Summarizing it should be noted, that modern economics and marketing do not have a versatile toolkit and methodology that would have allowed to predict optimal market prices for industrial products, while taking into account the impact on the pricing process of the entire spectrum of external and internal factors that simultaneously affect it.

Discussion

It remains problematic to ensure systematic monitoring in some areas, including marketing. Vulnerability of industrial enterprises to complex changes of the internal and external environment is largely explained by the lack of certain management tools for the enterprises, namely organizational and economic, information support of industrial marketing management monitoring.

The block diagram of monitoring in the system of innovative development process management of an industrial enterprise is shown in Figure 2.

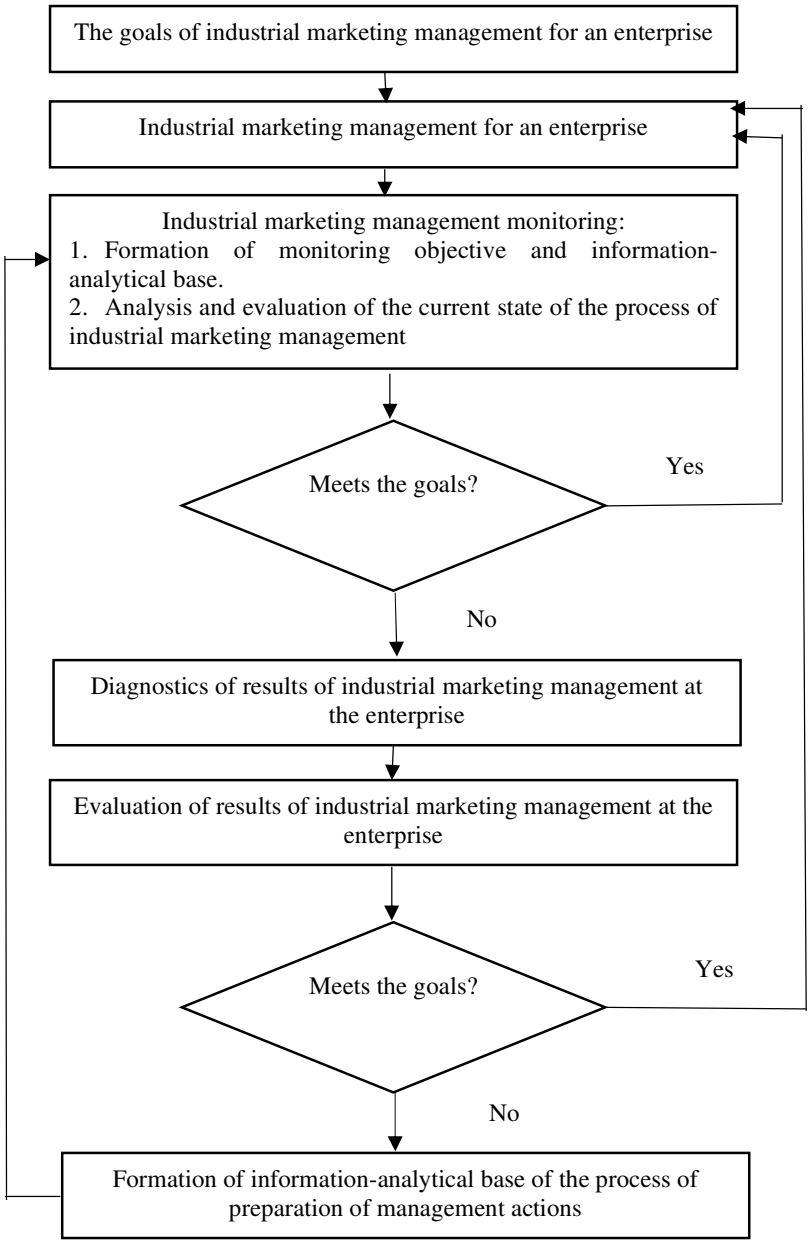

Figure 2: Industrial marketing management monitoring algorithm for an enterprise (developed by the author)

Industrial marketing management monitoring system is an information-analytical system of providing process of industrial marketing management of enterprise with timely qualitative and quantitative data for regulation and correction of organization of its marketing activity, effective management of current state of innovative activity and prospects of further innovative development.

Management accounting data are used to form the monitoring information-analytical base. An information-analytical monitoring base is a system of indicators that reflects a given state of marketing activity, which is determined by goals of industrial marketing management. It can vary in both quantity and composition of indicators according to adjustments to the goal and performance indicators of marketing activities, which can be conducted to eliminate the effects of factors and bring the object to the balanced state.

In modern economic crisis conditions, the system of monitoring performance of marketing activities of the enterprise should be dynamic, because changing external environment causes constant corresponding changes in the internal environment, and therefore, the indicators that form its basis require constant revision.

Conclusion

It is substantiated that vulnerability of industrial enterprises to the complex changes of the internal and external environment are largely explained by the lack of certain management tools for enterprises, namely organizational and economic, information support of industrial marketing management monitoring. Monitoring means a specially organized systematic surveillance of the compliance of the results of industrial marketing management with the defined goals in order to make the necessary corrective management decisions in modern conditions of functioning of enterprises and deepening of crisis phenomena in the external environment.

Organizational and economic support of industrial marketing management monitoring is aimed at creation of a special monitoring service and realization of the following complex tasks: organization of the process of gathering, accumulation and transfer of information; organization of information support of problem solving; control over implementation of management decisions in the mechanism of industrial marketing management.

Monitoring information support is its important component, enabling timely acquisition of reliable data on the current state of the enterprise, which is determined by the goals of industrial marketing management, and the prospects of its change taking into account the impact of the external environment.

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Internal Information Security Auditing in Public Finance Sector Institutions in Poland

Anna BOHDAN
Opole University of Technology, Faculty of Economics Management, a.bohdan@po.edu.pl

Agnieszka DORNFELD-KMAK
WSB University in Wroclaw, Faculty of Economics in Opole, Poland, agnieszka.dornfeld@wsb.wroclaw.pl

Bartosz MAZIARZ
University of Opole, Faculty of Political Science and Communication, Poland, bartosz.maziarz@uni.opole.pl

Abstract

In increasing share of IT in the public finance sector institutions' activity makes the assurance of information security by the institutions one of the most important challenges. One of the tools aimed at ensuring the meeting of the information security requirements in public finance sector institutions is the information security auditing.
The main purpose of the paper is to define, systematise and operationalise the principles of internal information auditing in public finance sector institutions in Poland as well as to determine the methodology of conducting it.
An analysis of the current normative acts on internal auditing allowed for the statement that the Polish legislator developed a formalised internal auditing procedure constituting the bases for isolating a multi-stage information security auditing methodology in public finance sector institutions, which due to their strategic importance for the state require applying special measures on broadly understood safety.

Keywords: Internal Audit, Units of The Public Finance Sector, Information Safety.

The paper presents the personal opinions of the authors and does not necessarily reflect the official position of the Opole University of Technology or the WSB University in Wroclaw or the University of Opole

Introduction

According to the Polish rules of law, the basis for information security system auditing in public finance sector institutions may include two sets of criteria: the criteria specified in the Polish Standard PN-ISO/IEC 27001 Information Technology - Safety Techniques - Information Security Management Systems – Requirements (hereinafter: Polish Standard PN-ISO/IEC 27001) for institutions in which the information security management system was incorporated based on the Polish Standard PN-ISO/IEC 27001 or, in the case of other institutions, the criteria specified in § 20 paragraph 2 of the Regulation of the Council of Ministers of 12 April 2012 on the National Interoperability Framework, the minimum requirements for public registers and exchange of electronic information and the minimum requirements for IT systems (Uniform text: Polish Journal of Laws; Dz. U. of 2017, item 2247, hereinafter: NIF Regulation).

Due to the elaboration's framework, the deliberations included in this paper will concern the principles of information security auditing in public finance sector institutions, conducted based on the latter set of criteria and do not cover auditing conducted based on the regulations of the Polish Standard PN-ISO/IEC 27001. The thesis of this elaboration is the statement that the Polish legislator developed adequate bases as well as formal and legal solutions, the purpose of which is to exercise adequate information security auditing in special organisations, such as the public finance sector institutions in Poland. The scientific methods used by the authors include the analysis of sources and individual in-depth interviewing of a representative of the head tax inspection office in Poland, i.e. the National Revenue Administration.

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Internal auditing. Definition Approach

The improvement in managing a public finance sector institution is reflected in the internal auditing institution. It was introduced into the Polish legal system in 2001 as result of amending the Act of 26 November 1998 on public finances (Act of 27 July 2001 on amending the act on public finances of 26 November 1998, Polish Journal of Laws; Dz. U. no. 102, item 1116). Over the years, action has been taken to adapt the regulations adopted in 2001 to the regulations developed by international auditing organisations (Sojka 2017). This also applied to the definition of internal auditing.

When deliberating on the definition issues, it is necessary to start with the statement that the definitions specified in the Act on public finances as well as in domestic and foreign doctrine items do not directly refer to the concept of information security auditing in public finance sector institutions, but generally to the concept of internal auditing. There are however no formal obstacles against transposing these definitions to the concept of internal information security auditing. A specific feature of the currently applicable formal and legal definition of internal auditing is the close correlation of auditing with management control. Article 68 paragraph 1 of the Act on public finances, management control in public finance sector institutions covers all activities taken to ensure the execution of objectives and tasks in a legal, effective, cost-efficient and timely manner. According to Article 272 (1) of the Act of 27 August 2009 on public finances (hereinafter: PFA), an internal audit is an independent and objective activity, the purpose of which is to support the minister in charge of the department or institution's head in the execution of objectives and tasks through systematic evaluation of management control and counselling activities. The auditing allows for obtaining an evaluation of the adequacy, effectiveness and efficiency of management control in a government administration department or institution (Article 272 (2) of the PFA). The internal audit definition most commonly cited in the doctrine is the definition quoted by the Institute of Internal Auditors (IIA), which specifies the basic objective, nature and scope of internal auditing (Eulerich and Eulerich 2020), (Dzikrullah et. al. 2020), (Turetken and al. 2019), (Chojna-Duch 2012), (Czerwiński 2002). The Institute of Internal Auditors defines an internal audit as "an independent and objective activity, the purpose of which is to provide the organisation with value and streamline its operating activity. It is based on systematic and orderly evaluation of processes: risk management, organisational governance and control, and contributes to their improvement. It helps the organisation to achieve its objectives by assuring the effectiveness of the processes, also through counselling" (IIA 2020; IIA Poland 2020).

Information security auditing obligation in public finance sector

Information security auditing is strictly related to the information security management systems (hereby: ISMS) established and incorporated in the institutions. Auditing is one of the obligations of the institution's management, related to the systems' functioning. In scientific discourse, when defining the ISMS, authors most often refer to the definition included in the Standard ISO/IEC 27001:2017 (Szczepaniuk et al. 2020), (Mirtsch et al. 2020), (Tatiara et al. 2018) (Lidermann 2017), (Grenda et al. 2017), (Górny 2016), (Banasikowski 2011), (Liderman 2006). According to its guidelines, the ISMS is treated as part of a complete management system based on a business approach to risk with the aim to establish, introduce, act, monitor, review, maintain and improve information security.

According to § 20 point 1 of the NIF, entities performing public tasks are obliged to develop and establish, introduce and operate, monitor and review as well as maintain and improve an information security management system ensuring information confidentiality, availability and integrity with consideration of such attributes as authenticity, accountability, incontestability and reliability. According to § 20 point 1 of the NIF, the main purpose of establishing and introducing the ISMS should be an adequate security of the information collected, possessed and processed with special consideration of security with maintenance of their confidentiality, availability and integrity. Information security management in a public finance sector institution related to the ISMS implemented in the given institution takes place by the institution management's assurance of conditions enabling the execution and exercise of the activities specified in § 20 paragraph 2 of the NIF regulation. According to § 20 paragraph 2 (1)-(13) of the NIF regulation, the scope of information security management in an institution covers thirteen activities:

1. ensuring the updating of internal regulations on the changing environment,
2. maintaining an up-to-date inventory of equipment and software intended for information processing, including their type and configuration,
3. conducting periodic risk analyses on loss of information integrity, availability or confidentiality and taking action minimising the risk according to the analysis' results,
4. taking action ensuring that persons engaged in information processing have relevant permissions and take part in the process to a degree adequate to the tasks carried out by them and duties aimed at ensuring information security,

5. prompt change of permissions in case changes in the tasks of persons specified in point 4,
6. ensuring the training of persons engaged in information processing with special consideration of the following issues: information security threats; effects of infringing the information security principles, including legal liability, use of means ensuring information security, including devices and software minimising the risk of human error,
7. ensuring the protection of the processed information against theft, unauthorised access, damage or interference, through the following: monitoring access to information, activities aimed at detecting unauthorised activities related to information processing and ensuring means preventing the unauthorised access at the level of operating systems, network services and applications;
8. establishment of basic principles guaranteeing the safe work on mobile processing and teleworking;
9. securing information in a manner that prevents its unauthorised disclosure, modification, deletion or destruction;
10. inclusion in service agreements concluded with third parties of provisions guaranteeing adequate information security;
11. establishment of principles of handling information, ensuring minimisation of the risk of information theft and information processing means, including mobile devices;
12. ensuring adequate security in IT systems, especially based on the following: care for software updating; minimising the risk of information loss due to failure; protection against errors, loss, unauthorised modification; use of cryptographic mechanisms in a manner corresponding to threats or legal requirements; ensuring system file security; reduction of risks resulting from the use of published technical vulnerabilities of IT systems; prompt action after detecting undisclosed IT system vulnerabilities to security breaches and controlling IT systems' compliance with relevant standards and security policies;
13. prompt reporting of information security breaches in a pre-determined manner enabling quick implementation of corrective action.

§ 20 paragraph 2 (14) of the NIF Regulation, which makes it obligatory to conduct internal auditing on the security of information processed in an IT system at least once a year, entered into force on 31 May 2012. The practice of its application featured numerous doubts related to the unclear phrases used by the legislator in the NIF Regulation, therefore the Computerisation Department of the Ministry of Administration and Digitalisation (MAiC) as well as the Public Finance Sector Auditing Department of the Ministry of Finances (MF) established a common position and guidelines concerning information security auditing (Common position of the MAiC and MF on ensuring internal information security auditing; guidelines on information security auditing by the internal auditing unit; hereinafter: Common position of the MAiC and MF; Guidelines of the MF on security auditing). The documents specify two methods of meeting the obligation of ensuring information security auditing. The first method concerns units in which the basis for developing and incorporating an information security management system are the regulations of the Polish Standard PN-ISO/IEC 27001. In this case, the information security requirements specified in § 20 paragraph 2 of the NIF Regulation were deemed met, because the establishment of securities, risk management and auditing takes place based on the Polish Standards related to Standard 27001. This results in the lack of obligation to conduct additional internal audits, because auditing constitutes one of the already functioning elements of the information security management system specified in the standards (Common position of the MAiC and MF). According to § 20 paragraph 2 (14) of the NIF Regulation, the obligation to conduct internal information security auditing at least once a year applies to institutions in which the information security management system was not incorporated based on the Polish Standard 27001.

Methodology of information security auditing in public finance sector institutions

The detailed method of executing an internal audit is specified in the Regulation of the Minister of Finances of 4 September 2015 on internal auditing and information about the work and results of this auditing (hereinafter: MF Regulation of 2015 on internal auditing). In the Ministry of Finances' opinion, an information security audit should be conducted in the form of assurance tasks. This should take place with consideration of the requirements included in the Act on public finances, MF Regulation of 2015 on internal auditing and information on the work and results of the audit as well as international internal audit standards (MF Guidelines). The "International internal audit standards for the public finance sector institutions" developed by The Institute of Internal Auditors as internal auditing standards for public finance sector institutions were published in the Announcement of the Minister of Development and Finances of 12 December 2016, in which three internal auditing standard groups were distinguished: attribute standards specifying the features of organisations and persons dealing in auditing; operating standards specifying the nature of internal auditing activities and qualitative criteria aimed at their evaluation as well as the incorporation standards developing them and describing the requirements on assurance (.A) or counselling (.C) services (Polish Journal of Laws; Dz. U. of 2016, item 28, hereinafter: Internal Auditing Standards). The international standards for internal auditing should constitute the basis for each internal audit, regardless of its subject. Their application constitutes the condition for meeting the internal auditor's obligations

and contributes to a uniform approach to internal auditing (Umaralievich and Temirkhanova-Mutabar 2020), (Aloudat et. al. 2020), (Jablonski, Robak 2019), (Burt 2016).

If the internal information security auditing is entrusted to an internal auditing unit, despite the lack of a binding nature, it is necessary to keep note of the MF Guidelines on security auditing. The institution's head, when making the decision on entrusting the information security auditing to an internal auditing unit, should take into account the fact that the designation of a fixed risk area for the annual assurance tasks may contribute to the limited execution of the assurance tasks in other risk areas due to the internal auditing unit's resources (MF Guidelines on security auditing). Furthermore, he should take into account the fact that the internal auditing unit's employees possess adequate competencies, experience and knowledge on the information security auditing methodology (MF Guidelines on security auditing).

The rules of law do not specify a separate methodology of internal auditing in this special scope of information security auditing. An audit is a multi-stage process, therefore, based on the regulations of the Act on public finances and the rules of the MF Regulation of 2015 on internal auditing, four stages of the information security auditing methodology were distinguished for the purpose of these deliberations. Diagram 1 presents the methodology of information security auditing in public finance sector institutions

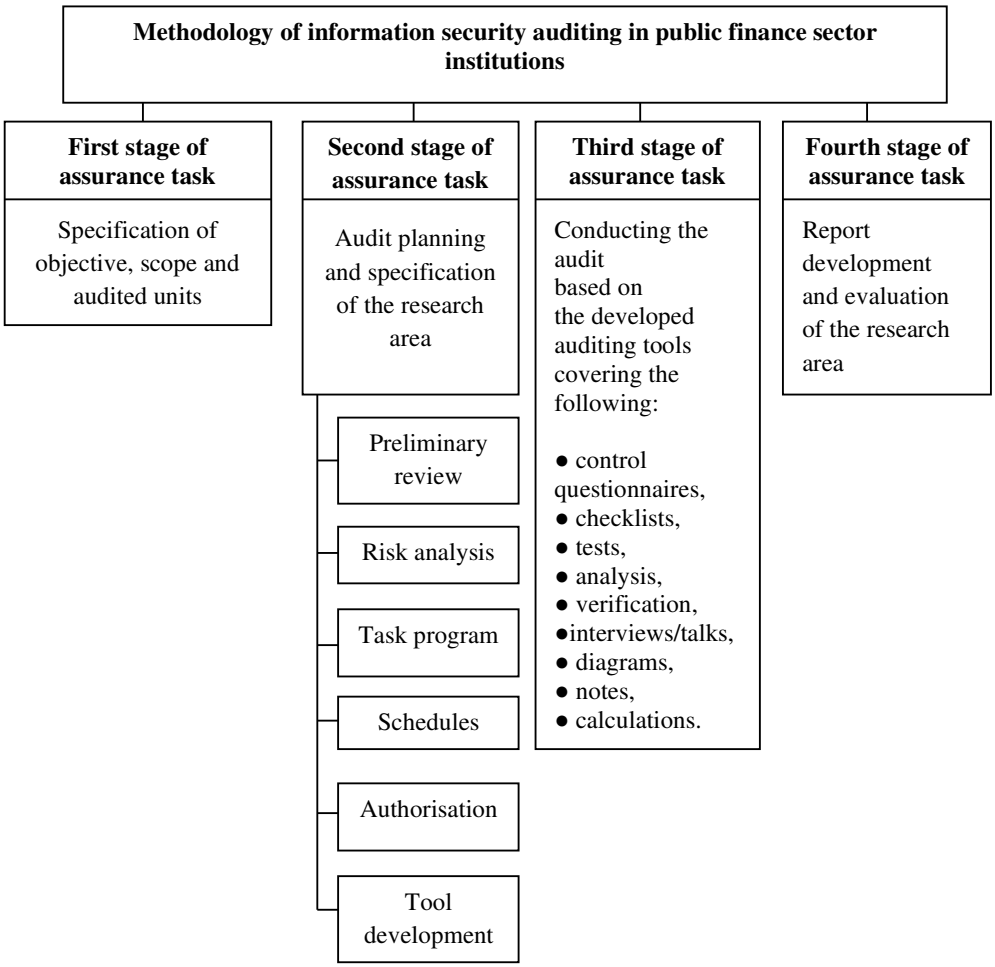

Diagram 1: Methodology of information security auditing in public finance sector institutions

The first stage covers the specification of the objectives, scope and audited units. This stage mainly features the specification of the task's objective, i.e. evaluation of the timeliness, diligence and correctness of the risk analysis on loss of information integrity, availability or confidentiality and the evaluation of action taken to minimise the risk. A risk is the probability of occurrence of any event, action or negligence that may lead to damage in the institution's property or image.

The assurance task's second stage covers the audit planning and specification of the research area. The area constitutes a starting point for conducting research and may include, e.g. in relation to area there of the information security auditing specified in the rules of the NIF Regulation related to conducting periodic risk analyses on loss of information integrity, availability or confidentiality as well as taking action minimising the risk according to the analysis' results, the following areas:

1. Introduction of regulations on information security risk analysis,
2. Acquaintance of employees engaged in the risk analysis with regulations on information security risk analysis,
3. Conducting the information security risk management analysis,
4. Categorisation of the risk effects in terms of information integrity, availability, confidentiality and accountability,
5. Specification of the acceptable risk,
6. Specification of the method of reacting to the analysed risk,
7. Specification of activities minimising the information integrity, availability, confidentiality and accountability loss risk.

The second stage of the assurance task during information security audit planning features six types of activities. A preliminary review in the information security audit comes down to the internal auditor's collection of information on the audited field. It includes a preliminary acquaintance with the documentation on information security in the institution without conducting a detailed analysis. It especially includes the following: getting acquainted with the objectives and field of the institution's activity in which the assurance task is executed; risk identification and evaluation after taking into consideration the existing control mechanisms and making arrangements with the audited institution or, in case of lack of such arrangements, with the institution's head, control mechanisms' evaluation criteria in the institution's field of activity subject to the task (§ 14 paragraph 1 of the MF Regulation of 2015 on internal auditing).

Risk analysis concerns the identification of potential risk in the research area and classification of results in the context of events. With consideration of the regulations of the Act of 27 August 2009 on public finances and the rules of the MF Regulation of 2015 on internal auditing and information on the work and results of the audit, the potential risks in the studied field of the institution's information security were identified for the purpose of these deliberations. An example of the method of classifying the results of information security auditing according to the audit's findings was determined. Two types of risks were distinguished: risk of failure to act or delayed action aimed at minimising the risk of loss of information integrity, availability or confidentiality. Table 1 presents an example of the method of classifying the results of information security auditing according to the audit's findings.

Table 1: Method of classifying the results according to the audit findings

Relevant	Average	Irrelevant
Findings that substantially affect the correct organisation of the information security management system – high relevance and/or non-compliance with the regulations (**high risk**).	Findings that affect the correct organisation of the information security management system – average relevance and/or non-compliance with the rules of law or procedures (**average risk**).	Findings that do not affect the correct organisation of the information security management system – low relevance and/or non-compliance with procedures (**low risk**).

The task's program and schedule constitute a specification of the audit task's stages distributed over time. It is developed after the preliminary review of the information security field to which the audit applies and especially includes the following: preliminary review result; institution head's and the audited entity's comments; resources required to execute the task, including possible need to obtain expert aid and the expected task duration (§ 15 of the MF Regulation of 2015 on internal auditing). According to § 16 paragraph 1 of the MF Regulation of 2015 on internal auditing, the auditor especially specifies the following in the assurance task's program: task topic constituting an answer to the identified and estimated risk; task objective constituting the starting point for designating the scope of the subject and object task as well as planning the method of executing the task in a manner that guarantees achieving the assumed objective; substantial risks in the institution's field of activity covered by the task; method of executing the task, especially a specification of the research sample and research techniques; agreed evaluation criteria as well as the date of task commencement and conclusion. The authorisation to execute the audit is a document issued by the head of the auditing unit. The authorisation to execute the information security audit includes: data identifying the auditor, i.e. his or her first name and surname; data

identifying the audited entity - the audited entity's name or the institution's name; date of expiry and signature of the institution's head (§ 4 paragraph 2 of the MF Regulation of 2015 on internal auditing). The preparation of auditing tools covers the development of internal audit questionnaires for the audited units, draft tests and a checklist completed by the internal auditor. Internal audit questionnaires is a document featuring questions concerning the management control system. The auditor uses the questionnaire by asking open-ended and multiple-choice questions to the audited unit's management and employees. Multiple-choice questions are formulated in a way that prevents answering them with yes or no, while open-ended questions allow the audited entity to freely describe the audit. The questionnaire can also be used during the initial stage of the audit to understand the control system's functioning principles. The auditor completes the questionnaire based on the answers provided by the audited entity or is completed jointly. Draft tests are use to determine the facts. We distinguish the following types of tests used by the auditor:

- roll-forward tests – used prior to the commencement of the audit activities. They are based on repeating specific control mechanisms that enable checking the process from start to finish,
- compliance tests – conducted to obtain sufficient evidence that the researched area operates in accordance with the rules of law and whether control mechanisms are applied,
- (real) reliability tests – they rely on checking whether the information specified in the documentation are complete, accurate and whether they reflect the facts. The tests can be conducted along with the compliance tests.

Checklist is a document that has a wide range of applications and can be used at each stage of carrying out the assurance task. It helps to unify the obtained information and ensures a standard approach to the conducted test.

Third stage of the task covers the execution of auditing activities. Their proper execution allows the institution's head to become sure that all information security processes taking place in the institution are proceeding well, i.e. that: the institution's objectives are achieved accordingly; the principles and procedures deriving from the current rules of law are implemented, complied with and incorporated by the institution's head and that the adopted control system is adequate and efficient, which enables a correct evaluation of the institution's activity (Szymańska 2012). The audit activities are executed based on the developed auditing tools. The main auditing tools include the internal audit questionnaire, tests and checklist. The internal audit questionnaire is aimed for audited units, which in an information security audit is the Data Protection Inspector or IT Specialist. Table 2 presents an example of the internal audit questionnaire for the Data Protection Inspector/IT Specialist.

Table 2: Example of an internal audit questionnaire for the DPI/IT Specialist.

Internal Audit Questionnaire for the DPI/IT Specialist				
	Scope of issue	**yes**	**no**	**Not applicable**
1.	Were regulations on information security risk analysis introduced, including: - designation of risk owner, - specification of team(s) to conduct risk analysis, - persons responsible for conducting the risk analysis.			
2.	Are directors at each organisational level engaged and do they support the information security risk analysis?			
3.	Was an inventory on the information security threats and vulnerabilities carried out?			
4.	Did the period covered by the audit include an information security risk analysis during the introduction of the IT system or public register?			
5.	Did the period covered by the audit include an information security risk analysis during the operation of the IT system or public register?			
6.	Did the risk evaluation include categorisation of the threat effects in terms of information integrity, availability, confidentiality and accountability?			

7.	Did the period covered by the audit include a risk evaluation? If so, please specify the dates.			
8.	Were acceptable risk (level) criteria specified? If so, please specify the date and name of document.			
9.	Was the method of reacting to risk higher than the acceptable risk specified? If so, please specify the date and name of document.			
10.	Were activities minimising the information integrity, availability, confidentiality and accountability loss risk specified? If so, please specify the date and name of document.			
11.	Are the activities minimising the risk specified in point 10 monitored and who is responsible for the monitoring?			
12.	Were regulations on risk analysis and business impact analysis (BIA) in terms of business continuity introduced, including: - designation of risk owner, - specification of team(s) to conduct risk analysis, - persons responsible for conducting the risk analysis.			

The second auditing tool is the test. The auditor is obliged to conduct the tests on a selected random population sample. The sample size depends on the given institution's population size. To ensure the result's reliability, it is recommended to test at least 50% of the population. Sample testing based on the collection of random samples with the use, among others, of the following sample selection methods:

- systematic sampling **–** requires estimating the fixed sampling interval. The interval is designated by dividing the population by the planned sample size. The first unit for the sample is selected randomly from 1 to the interval value. If the interval is marked as "i", the first sample unit as "p" and the sample size as "n", then the sample will include the following units: p, p+i, p+2i, p+3i,.....p+(n-1)i;
- random sampling – based on the internal auditor's selection without any conscious bias, i.e. without taking into account any reasons to include or discard a given element in/from the sample. It is applied when it is difficult to apply other sampling methods;
- stratification – the population is divided into two or more layers with specific features from which the sample is selected independently. When dividing into layers, it is possible to take into account, for example, the size of elements or risk to which the population elements are exposed – the same layer should include elements exposed to similar risk.

Table 3 presents the scope of the test on the specification of the correct low/average/high risk estimation

Table 3: Specification of the correct low/high/average risk estimation

Risk estimation correctness		Low/ average/ high risk						Identification of possible risks not taken into account in the risk analysis
Number of incidents	Procedure Yes / no	Incident	Number of incidents	Is there a procedure and is it applied	Actual risk estimate	As it should be	Incident	

The third auditing tool is the checklist completed by the auditor. In the checklist, the auditor specifies the information from the internal audit questionnaire for the Data Protection Inspector and IT Specialist as well as from the conducted tests. Table 4 presents the draft checklist completed by the auditor.

Table 4: Draft checklist completed by the auditor

Checklist completed by the auditor				
	Scope of issue	**yes**	**no**	**Not applicable**
1.	Were regulations on information security risk analysis introduced, including: - designation of risk owner, - specification of team(s) to conduct risk analysis, - persons responsible for conducting the risk analysis.			
2.	Are directors at each organisational level engaged and do they support the information security risk analysis?			
3.	Was an inventory on the information security threats and vulnerabilities carried out?			
4.	Did the period covered by the audit include an information security risk analysis during the introduction of the IT system or public register?			
5.	Did the period covered by the audit include an information security risk analysis during the operation of the IT system or public register?			
6.	Did the risk evaluation include categorisation of the threat effects in terms of information integrity, availability, confidentiality and accountability?			
7.	Did the period covered by the audit include a risk evaluation? If so, please specify the dates.			
8.	Were acceptable risk (level) criteria specified? If so, please specify the date and name of document.			
9.	Was the method of reacting to risk higher than the acceptable risk specified? If so, please specify the date and name of document.			
10.	Were activities minimising the information integrity, availability, confidentiality and accountability loss risk specified? If so, please specify the date and name of document.			
11.	Are the activities minimising the risk specified in point 10 monitored and who is responsible for the monitoring?			

In addition, during the execution of the audit task, it is possible (if necessary) to use methods such as analysis based on studying the audit documentation and verification based on breaking down the studied documentation. It is based on the comparison of data deriving from various sources to identify atypical situations or deviations from the desired state. Furthermore, during the test, in case of ambiguities, it is possible to ask the audited unit to file a statement confirming the correctness of the area's functioning. It is also possible to conduct a talk/interview, i.e. technique aimed at obtaining clarification and information from employees, the application of which must feature consideration of the basic principles applicable to the talk, i.e. specification of the talk's purpose and documentation of its important results, as well as the method based on graphical process analysis (chart), i.e. using a graphical mesh to develop a chart or scheme of activities that must be executed in order to complete the given task or activity. The purpose of preparing a graphical presentation is the better understanding of the process itself and identification of important control points and/or risks related to the audited process. Notes, i.e. auditor's notations on the executed audit activities are very often used by auditors. Calculations are used when the auditor breaks down various information requiring calculation.

The essence of stage four is the development of a report and evaluation on the research area. At this stage, the auditor develops the audit's initial results, which are agreed upon in writing with the audited entity. In case of failure to agree upon the initial audit results, the audited entity can file written reservations within the time specified

by the internal auditor of no less than 7 calendar days from the date of the audited entity's receipt of notification about the initial results (§17 paragraph 3 of the MF Regulation of 2015 r. on internal auditing). The report must include the following information: task topic and objective; task's subjective and objective scope; date of the task's commencement; findings and evaluation according to the criteria adopted in the assurance task program; recommendations; the auditor's response to objections; general evaluation of management control adequacy, effectiveness and efficiency in the institution's field of activity covered by the audit; date of the report's development as well as the first name and surname of the internal auditor executing the task and his or her signature (§18 paragraph 1 of the MF Regulation of 2015 r. on internal auditing).

Conclusion

Ensuring information security constitutes one of the biggest challenges faced by the public finance sector institutions. The strategic importance of the state's financial sector institutions requires the legislator to take special care to ensure their security. Aside from IT systems which in contemporary times are an absolute priority, it is also important to ensure information security in the institution's every day functioning. In each public finance sector institution we are dealing with various information and data which in principle are subject to protection by the power of law or due to the institution's important interests. Aside from technical and IT security, the information require an efficient administrative apparatus based on people. In Poland, thanks to the formal and legal changes, the recent years featured an introduction of effective tools and methods that substantially facilitated the issues of information security auditing. Thereby, thanks to the introduced changes, it became easier to execute audits and ensuring correct control over information security was expanded.

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Understanding the Cyclical Relationship between Stock Prices and Inflation

Alexander OMANKHANLEN
Covenant University, Ota, Nigeria, alexander.omankhanlen@covenantuniversity.edu.ng

Felicia OLOKOYO
Covenant University, Ota, Nigeria, felicia.olokoyo@covenantuniversity.edu.ng

Emeka UCHEAGA
Covenant University Ota, Nigeria, emekaucheaga@gmail.com

Areghan ISIBOR
Covenant University, Ota, Nigeria, areghan.isibor@covenantuniversity.edu.ng

Abstract

Households tend to increase their spending as income increases which could have significant impact on inflation in any economy. Millions of households have lost and made incredible wealth in the stock market; however, economic and finance literatures have not focused on how changes in stock prices which influence household wealth and spending behaviour could be useful in forecasting inflation. Therefore, this study investigates stock prices and inflation in Nigeria between 1985 and 2018. It employs a Cross Correlation test to establish the cyclical relationship between market capitalization (a proxy for stock prices) and inflation. The study found that inflation tends to rise when stock prices are falling and inflation falls when stock prices are rising. Based on the findings of this study, it was recommended that monetary policy makers may choose to use its control of the discount factor to influence stock prices movements and indirectly control future inflation through stock market cycles in both the short run and long run. Such that by extending stock market cycles, inflation could decline for an extended period of time.

Keywords: Cyclical relationship; Stock prices; Inflation; Market capitalization, Discount factor

Introduction

Economists have argued that there exists a theoretical link between stock prices and inflation; however, there is no consensus interpretation of the relationship existing between both variables. The Fed model according to Asness (2003) posits that the average earnings yield on the stock market yield must be greater than the average bond yield for an equity risk premium to be generated, thereby suggesting the existence of a highly positive correlation between both variables. While inflation moves with nominal bond yields for reasons explained by Fischer effect theory (which describes the relationship between inflation, real and nominal interest rate), the observed positive correlation between expected inflation and equity yields has long puzzled economists (Bekaert & Engstrom, 2009; Okunlola, F.A., Babajide, A., and Isibor, A.A. (2020). Stock & Watson (2001) explained that the positive relationship between equity yields and expected inflation stems from the fact that current stock prices are valued using forward-looking economic variables, therefore the stock prices themselves could be useful in forecasting future inflation and economic growth.

The inflationary problem in Nigeria is quite startling. In the 32-year period between 1985 and 2017, Nigeria suffered double digit inflation in 24 out of the 33 observations which led to a severe erosion of the value of Naira in the last 3 decades according to data compiled from CBN Statistical Bulletin (2017). The singular inflation objective for CBN during the period always remained to achieve single digit inflation in the country; however, this was only a reality in just 9 of the 33 inflation observations, translating to a low probability chance of 27.2 percent that CBN will achieve single digit inflation in Nigeria in any given year (CBN, 2017). The average inflation during the 32-year period was as

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high as 19.9 percent, up to 11 percentage point higher than the current single digit target band of 6-9 percent the Central bank is currently seeking to achieve (CBN, 2018).

An obvious challenge CBN has struggled within the last 32 years is: understanding the inflation dynamics enough to predict its direction and use monetary policy to steer inflation closer to its monetary target (Omankhanlen, 2011; Achugamonu, Adegbite, Omankhanlen, Okoye, and Isibor, 2019). Economists point to the fact that when monetary forecasts turn out to vary widely from reality in most situations is proof that the economic model used in prediction may be grossly inadequate by way of omission of certain important variables (Kurotamunobaraomi & Ebiware, 2017; Omankhanlen, Senibi, and Senibi, 2016; Omankhanlen, Senibi, and Senibi, 2018). One of the most important variables often left out in inflation prediction models is stock market performance as monetary economists are often confused with how to integrate stock market performance into monetary prediction models (Gali & Gambetti, 2014; Isibor, Olokoyo, Arogundade, Osuma, and Ndigwe, 2018). Since a significant portion of household wealth in any country is held in the stock market, it ought not to be strange that volatility in stock prices could influence inflation outcomes through a wealth transmission mechanism.

Although numerous empirical studies have shown the relationship that exists between the Nigerian Stock Exchange All Share Index (an index which tracks change the stock prices of all publicly listed companies on Nigerian Stock Exchange) and inflation, the extent to which the market capitalization ratio to gross domestic product will be useful in predicting future inflation is yet to be fully understood or well researched by economists and financial experts. This study therefore seeks to investigate the cyclical association between prices of stock and inflation.

Literature Review

Stock prices can provide useful guidance in predicting economic growth or cycles and this has long been established empirically by numerous authors. For example, Farmer (2015) found that the stock market decline in 2008 was the primary reason for the great recession that followed between 2008 and 2009 after establishing that there existed a granger causal relationship between the stock market and unemployment rate in America. After showing that stock prices Granger causes unemployment rate in America, the study went on to show using a vector error correction model, that absent of monetary intervention by Central Bank, a significant crash in stock prices could lead to a spike in unemployment rate over the next one to four quarters.

Empirically, higher unemployment in a country could lead to an economic recession which is only the occurrence of two consecutive declines in economic output. This phenomenon may explain the occurrence of the great recession in 2008 when unemployment figure almost doubled, and the country entered its biggest recession since the great depression of the 1930s. This was not the first time Farmer had established a link between stock market cycles and economic cycles in the country.

In an earlier paper, Farmer (2012) had shown that changes in stock market wealth can also lead to changes in unemployment rate. Since a change in household wealth could lead to variation in the level of aggregate demand which then causes labour to be hired (or retrenched) in order to meet increase (or decrease) production levels to match effective demand. The link between stock market wealth and unemployment was recognized by Fama & Schwert (1977) who observed that during the 1990s, growth in stock market capitalization was accompanied by growth in employment rate in the country and vice versa in America.

Philips (1958) had earlier developed the popular “Philips curve” which explains that there is a negative relationship between unemployment rate and inflation rate such that an increase in unemployment rate should lead to a decrease in inflation as aggregate demand level contracts. The theory has now been improved upon after the stagflation of the 1970s which discarded the Philips curve with professional views on the relation between unemployment and inflation now in its third stage of evolution (Friedman, 1977). However, economists agree that a theoretical and empirical link exists between the unemployment rate and inflation rate. Since Farmer (2015) posits that stock market wealth is useful in forecasting unemployment rate and Friedman (1968) explains that a link exists between unemployment rate and inflation, it seems rational to anticipate a Vector Error Correction Model (VECM) in which stock market wealth could be useful in forecasting future inflation which could prove useful for monetary policy and investment decisions. Since the direction of the stock market performance could then provide hints of future inflationary pressure in the economy.

According to Bernanke & Gertler (2001), changes in asset prices could lead to changes in Central Bank's forecast of inflation, ultimately pointing to a link existing between current asset prices and future inflation in the country such that stock (asset) prices could be useful in monetary policy analysis in predicting future inflation. According to Tripathi & Kumar (2015), there exist philosophies on stock returns and inflation.

One philosophy lies in Fisher's hypothesis as explained by Irvin Fisher in 1930. Fischer effect defines some form of capital asset pricing model in which the actual return on stocks will be modelled as the real return compensations for both assumption of risk and inflation. This idea therefore flows from the belief that equities act as a hedge against inflation.

According to Boons, Duarte, de Roon & Szymanowska (2018), high inflation beta stocks demand higher inflation risk premium that lower inflation betas stocks, making lower inflation beta stocks the best hedge for inflation during periods where the nominal-real covariance is positive, meaning that a positive shock to inflation implies good news for future consumption. Inflation beta is derived by analyzing the sensitivity of the stock returns to variation in inflation.

Boons et al (2018) argued about inflation being priced into returns of stock and that inflation varies over time. This further gives credibility to the theoretical argument that stock prices inherently contain information about market expectation on future inflation and can therefore provide guidance for policy decision making since variation in interest rate will also affect the market's opinion on the direction on inflation which again will then feed into stock prices in a continuous feedback cycle.

Methodology

This study adopts the monetary transmission mechanism framework proposed by Olufisayo (2013) wherein inflation could be determined by variations in monetary variables such as money supply, credit, interest rates, exchange rates and asset prices. Theoretically, movement in inflation is stimulated through the monetary transmission channel, as changes in any of the monetary variables holding others constant can lead to variations in inflation. However, economists differ in the weight or importance placed on any of the monetary variable to independently explain changes in inflation as their influence on inflation tends to evolve over time and differ among countries.

According to Olufisayo (2013), the monetary transmission mechanism is the process through which monetary policy decisions are transmitted into changes in inflation and real GDP over time. For the purpose of this empirical analysis, the influence of monetary policy decisions that leads to changes in inflation will be the core focus as we seek to determine the extent to which variation in asset prices (particularly, stock prices) is useful in predicting changes in inflation over time in Nigeria. The study expects that including stock prices into the econometric model will help explain changes in inflation not only from a money market perspective which focusses heavily on changes in money supply but also from a capital market perspective which includes performance of the capital market which impacts on the investment income of households.

Model Specification

Based on Olufisayo (2013), the original model is stated in its implicit form as follows:

CPI = f (M2, DC, EXR, MPR, MCAP) …… (1)

Where:

CPI represents the consumer price index

M2 represents the broad money supply

DC represents the total domestic credit

EXR represents the exchange rate

MPR represents the monetary policy rate

MCAP represents the stock market capitalization

From the above stated model, we can see that there exists a theoretical link between stock prices and inflation. We therefore use this model as a guide to deciphering the cyclical relationship between market capitalization which is the proxy for stock prices and inflation.

Findings

To achieve the first objective which is to examine the short run relationship between stock prices and inflation, this study employs the contemporaneous correlation test. The Market capitalization (MCAP) is used to represent stock price while Inflation rate is represented by the Consumer Price Index (CPI). To address the objective, the business cycle approach used to separate the time series data into cycles and trends. This is achieved by employing a filtering procedure referred to as the Hodrick-Prescott (HP) (Alege et al., 2017; and Agenor et al., 2000).

A process involved in carrying out this technique is as follows: The series will be transformed into their natural logarithm form; the stationary properties of the series will be tested; detrending the series by obtaining the cyclical element; obtaining the autocorrelation statistics and also the cross correlation of the series (Alege, 2008; Isibor, Felicia, Maria, Godswill, and Chisom (2018). A good business cycle filter is one that can eliminate unit roots, remove phase shift and also isolate business cycle frequencies (Baxter and King, 1999).

The HP filter is useful as it helps to account for volatility in the time series variables. Secondly, it can measure whether there is a change in the variable before or after the output changes and finally, the cross-correlation coefficient measures the contemporaneous correlation of the variables. This will ascertain if a series is pro-cyclical or countercyclical.

Table 1 presents the contemporaneous correlation between stock market and Inflation. The results show that the degree of contemporaneous correlation between inflation and stock market is −0.0305 showing countercyclical relationship. This means inflation tends to rise when stock prices are falling and inflation falls when stock prices are rising.

The cross-correlation test can show which variable leads of lags the cycle. Therefore, it can reveal whether stock price is a leading or lagging indicator to inflation rate. When the maximum value of the cross-correlation coefficient between stock price and inflation falls on the left-hand side (lag), it means that stock price is the lagging indicator. On the other hand, if the maximum value of the cross-correlation coefficient between stock price and inflation falls on the right-hand side (lead), it means that stock price is the leading indicator. From table 1, the maximum cross correlation coefficient is 0.3723 suggesting that inflation lags stock prices. This means that changes in inflation rate happen after changes or fluctuations in stock prices.

Table 1: Contemporaneous correlation between Stock Market Capitalization and Inflation

CPI_CY, MCAPCY(-i)	CPI_CY, MCAPCY(+i)	i	Lag	lead
. | . |	. | . |	0	-0.0305	-0.0305
. *| . |	. | . |	1	-0.0494	-0.0240
. | . |	. |**. |	2	-0.0169	0.1789
.**| . |	. |**** |	3	-0.1485	0.3723
.**| . |	. |**. |	4	-0.1845	0.1788

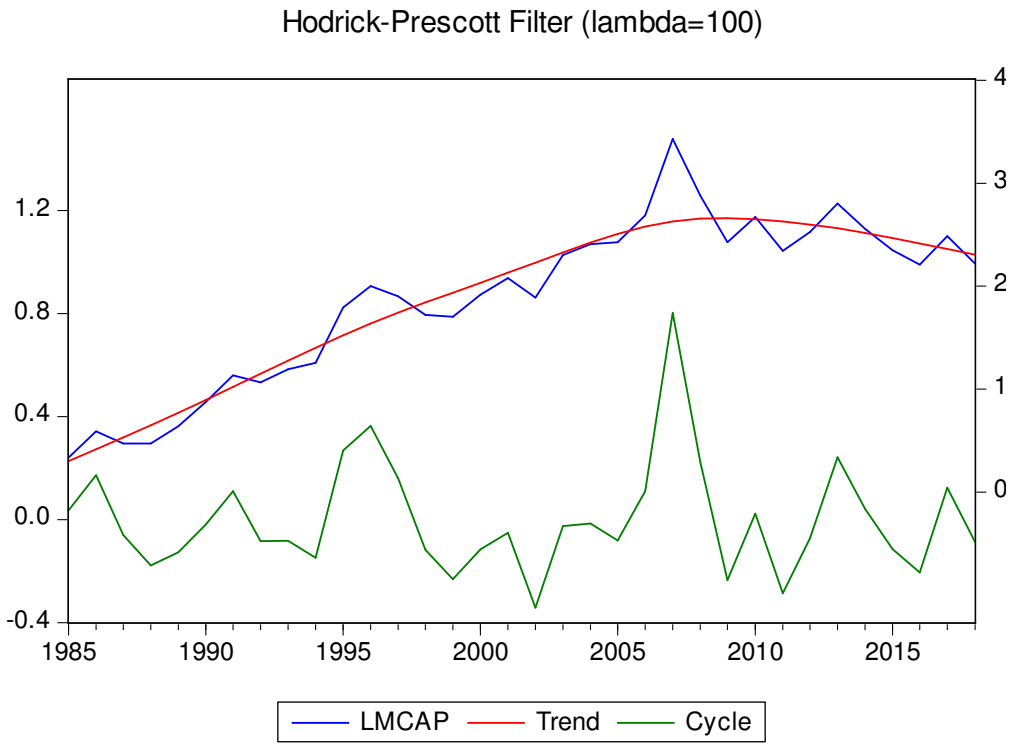

Fig. 1: HP Filter Results for Market Capitalization

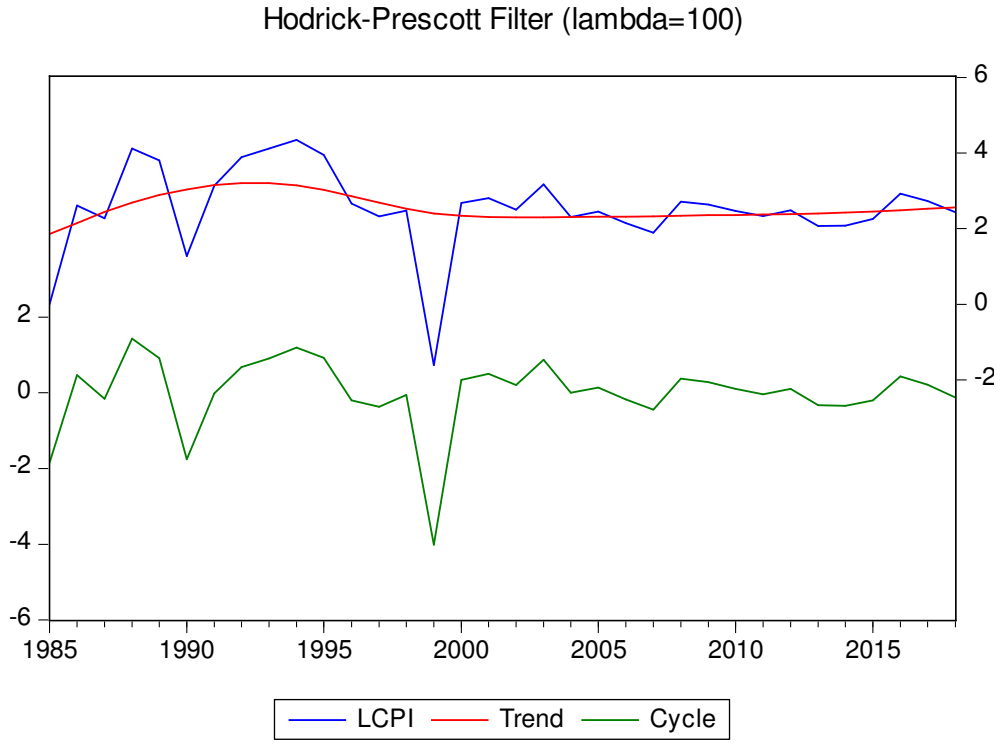

Fig. 2: HP Filter Results for Consumer Price Index

Discussions from the Contemporaneous Cross Correlation result

The first objective of the study is to examine the cyclical relationship between stock prices and inflation. From the result shown in Table 1, and as confirmed in both figure 1 and figure 2, it was observed that inflation tends to rise when stock

prices are falling and inflation falls when stock prices are rising. A major explanation for the result is that investors would want to take advantage of rising stock prices to invest in the stock market and this would reduce inflation because any excess money in circulation will be used to increase investment positions rather than to increase consumption. However, when stock prices decline, most investors would quickly sell-off their securities and hold on to cash rather than invest. This could increase the money in circulation and result in higher inflation. Therefore, if the expected future return on investment is less than households desire, they will retreat to cash which could cause a problem of excess cash holdings and increased spending.

Empirically, this relationship between stock prices and inflation is evident in the past behavior of inflation and stock prices. For instance, in 2007, inflation had fallen to about 6.6 percent its lowest point in almost a decade which corresponds with when stock prices were most elevated in Nigeria. Rising stock prices had pushed market capitalization to GDP to about 30.9 percent which is the highest value of market capitalization to GDP ever recorded in the history of Nigeria.

This shows that higher stock prices led people to invest more in the stock market, which eventually reduced inflation. However, at the wake of the global recession, Market Capitalization went down from 30.9% in 2007 to 17.8 per cent in 2008. Simultaneously, inflation increased from 6.6% in 2007 to 15.1% in 2008. The recession which occurred in Nigeria in 2016 also shows this trend. Total Market Capitalization decline from 10.5% in 2015 to 9.1% in 2016 and resultantly, inflation increased from 9.5 per cent in 2015 to 18.55 percent in 2016. This result was confirmed by the study of Albulescu, Aubin and Goyeau (2017), Marx and Struweg (2015) and Fama (1981) where a countercyclical relationship was observed between prices of stock and inflation.

Summary

From the result of the contemporaneous correlation, the result provided evidence that there is a countercyclical relationship between stock prices and inflation rate. This implies that inflation tends to rise when stock prices are falling, and inflation falls when stock prices are rising. This therefore shows that stock prices is useful in forecasting inflation and market capitalization should be included in critical variables used in evaluating and forecasting inflation to achieve price stability.

Conclusion

This study proves that changes in household wealth as proxied by variations in stock prices overtime has a stronger influence on inflation than all other monetary factors. This means that spending behavior in the country has very little to do with the rate of interest in the market or rate of growth in the supply on money but rather on the promise of high future expected return from investing household wealth in capital market. In cases when market return on equities is high, households tend to invest more and reduce consumption whereas when market return on equities is negative, households tend to respond by selling their equity investments, returning to cash and increasing consumption.

This study goes further to prove that the trickle-down effect that Central Bankers have longed believed occur when household wealth increases that this tends to lead to an increase in their marginal propensity to consume is wrong. Rather the marginal propensity to save and invest tend to increase as households become richer and aggregate demand tends to suffer, thereby causing inflation to drop during periods of high stock market gains. Apparently, the promise of more returns in the stock market far outweighs the desire to consume today. So if Central Bankers wish to control household spending and inflation, their best bet will be to offer returns in the market so high that there is low or almost no liquidity preference for households to prefer to hold cash instead of financial assets.

Recommendations

Based on our empirical findings, the following recommendations were suggested:

1. Monetary policy makers may choose to use its control of the discount factor to influence stock prices movements and indirectly control future inflation through stock market cycles in both the short run and long run. Such that by extending stock market cycles, inflation could decline for an extended period of time.
2. Investors may recognize that stocks may not be a good hedge for inflation since we show that it is stocks that drive changes in inflation rather than the reverse.
3. Policies should be put in place to develop the local industries to boost local production and reduce import dependence.

4. The Central Bank could set the monetary policy rate in such a way that ensures that the natural rate of interest is equal to the market rate of interest which keeps inflation low and stable, thus, encouraging economic growth, price stability and domestic investment.
5. Both fiscal and monetary policy makers must set up policies that will support a stable exchange rate.

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Calidad Del Servicio Prestado Al Turista Médico: Una Oportunidad De Fortalecimiento Para El Sector Hotelero En Barranquilla

María Isabel CASTELLANO
Universidad del Norte, Colombia, micastellano@uninorte.edu.co;

Olga BITTAR
Universidad del Norte, Colombia , obittar@uninorte.edu.co

Migdalia CARIDAD
Institución Universitaria Tecnológico de Antioquia, migdalia.caridad@tdea.edu.co

Resumen

El objetivo del trabajo presentado fue la determinación de la calidad del servicio prestado al turista médico como una oportunidad para el fortalecimiento del sector hotelero. Se determinó la calidad del servicio hotelero y para evaluar su nivel de satisfacción se seleccionaron turistas médicos durante su estancia de pos tratamiento. El análisis de los resultados mostró que el servicio recibido por el turista médico es deficiente. Este comportamiento se corresponde con el modelo de negocio que posee el sector hotelero en Barranquilla (orientado a la atención de turistas de negocios). Con base en los resultados del estudio, se sugiere que el sector hotelero podría introducir mejoras en su modelo de negocio, a través de una propuesta de valor diferenciadora dirigida a brindar atención al turista médico, constituyendo esto una alternativa para fortalecer su competitividad en el mercado.

Palabras clave: Calidad Del Servicio, Hotelería, Turismo Médico, Negocios.

Abstract

The objective of the work presented was the determination of the quality of the service provided to the medical tourist as an opportunity for the strengthening of the hotel sector. The quality of the hotel service was determined and medical tourists were selected during their post-treatment stay to assess their level of satisfaction. Analysis of the results showed that the service received by the medical tourist is poor. This behavior corresponds to the business model that the hotel sector has in Barranquilla (oriented to the attention of business tourists). Based on the results of the study, it is suggested that the hotel sector could introduce improvements in its business model through a differentiating value proposition aimed at providing care to the medical tourist, making this an alternative to strengthen competitiveness in the market.

Keywords: Quality of Service, Hospitality, Medical Tourism, Business

Introducción

Desde su génesis el turismo ha comportado cambios significativos a nivel de crecimiento y variedad, al punto que para el 2028 se proyecta que la industria de viajes y turismo sea uno de los segmentos económicos de mayor significancia a nivel mundial esperando un incremento del 11,7 % en el Producto Interno Bruto (PIB) global, según lo expuso la presidenta y CEO del Consejo Mundial de Viajes y Turismo (WTTC), Gloria Guevara Manzo en una sesión de medios en Madrid (Noguera, 2019). En este sentido, la predicción realizada por diversos organismos e instituciones internacionales estima un incremento sostenido a nivel mundial de los movimientos turísticos por el orden de 1.800 millones de viajes para el 2030 (OMT,2011).

En consecuencia, esta es una actividad que indiscutiblemente contribuye con el desarrollo económico de las localidades que lo adoptan como eje primordial de su dinámica comercial (Castro, Molina & Pablo, 2013). Adicional a ello, involucra en su cadena de servicio una serie de grupos de interés que generan diversas fuentes de empleo

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(Schenkel, 2019) de orden temporal o fija, lo cual abona al logro de los Objetivos de Desarrollo Sostenible (ODS), en especial aquellos orientados a promover el trabajo decente como un significativo impulso para el crecimiento inclusivo (Ribeiro, 2017). En la actualidad, las necesidades de las personas han impulsado el surgimiento de otros tipos de turismo, originado a su vez nuevos nichos de negocio, ejemplo de ello es el turismo médico el cual es muy solicitado por un segmento de la población cada vez más interesado en cuidar su salud, abriendo enormes posibilidades para la elaboración de bienes y servicios, mediante una técnica distintiva emparejada con un proceso sinérgico que apunte a la construcción de clústeres entre las empresas del sector turístico y el sanitario.

En este orden de ideas, Fetscherin & Stephano (2016), produjeron un índice para determinar los destinos de turismo médico más demandados por la población a nivel mundial, el cual denominaron Índice de Turismo Médico (ITM). Para su cálculo se basaron en 4 dimensiones: a) Entorno del país, donde evaluaron elementos como similitudes culturales y lingüísticas, estabilidad económica y niveles de corrupción; b) Destino turístico, estudiando entre sus indicadores el atractivo, popularidad, exotismo y condiciones climáticas del destino; c) Costes del turismo médico, considerando aspectos como asequibilidad de las tarifas aéreas, costes del viaje, costes del tratamiento y costes de la estancia; y e) Instalaciones y servicios, evaluando el entrenamiento, la experiencia y la reputación de los médicos, los estándares de calidad en los cuidados y los servicios, reputación del servicio médico, las recomendaciones de familiares y amigos, entre otros. Todo ello dio como resultado el Top 30 de los destinos de turismo médico a nivel mundial, el cual es liderado por Canadá (76,9); seguido por Reino Unido (74,8) y en tercera posición Israel (74,8), mientras que Colombia (67,4) alcanzó el décimoctavo lugar siendo antecedido en Latinoamérica por Costa Rica (72,8) en sexto lugar, Brasil (67,9) decimosexto lugar y Jamaica (67,7) en el decimoséptimo lugar (Sánchez-Vergara,2017).

Ante este panorama, es interesante destacar que las investigaciones en el campo del turismo se enfocan hacia el turismo habitual, ya sea asociado al servicio hotelero o destinos más demandados (Akbar, Wadood y Alzaidiyeen, 2010), mientras que desde la perspectiva del turismo médico enfatizan el servicio que presta el sector salud, (Heung, Kucukusta, Song, 2011; Chuang, Liu; Yachi, 2014, Lovelock & Lovelock, 2018), y son escasos los que lo asocian al sector hotelero y el turismo médico (Sadeh y Garkaz, 2018) es por ello que la presente investigación se orienta a determinar las oportunidades de fortalecimiento del sector hotelero mediante la calidad de servicio que ofrece al turista médico. Para ello se procedió a entrevistar a diferentes actores y grupos de interés involucrados en ambos ámbitos salud y turismo con el fin de tener su percepción sobre este tema.

Para el grupo de hoteles se aplicó el instrumento diseñado por el MinCit, denominado Guía Estándares de Evaluación para la prestación del servicio de turismo de Salud, y para el grupo de turistas de salud o médicos se seleccionó el instrumento diseñado por Parasuraman, Zeithaml y Berry, 1991 denominado SERVQUAL, debido a que ha demostrado su fiabilidad y validez para medir la calidad del servicio desde las expectativas y percepciones que tienen los usuarios.

El producto alcanzado permitió determinar que el modelo de negocio de la mayor parte de los hoteles estudiados, no contempla una propuesta de valor orientada a satisfacer las demandas de este creciente segmento de la población turística, por lo cual la calidad del servicio percibido por los clientes no le genera la satisfacción esperada.

Calidad de servicio en el sector hotelero

Hablar de calidad de servicios turísticos, sin tomar en cuenta la opinión de los turistas sería inadmisible, ya que lo que está fuera del control de la empresa es imposible medirlo y sin este proceso de evaluación es inviable conocer el estado en el cual se encuentra la empresa que la lleve a emprender estrategias de mejora (Morillo,2007).

Es por ello que diversos autores han dado su aporte para definir la calidad de servicios, unos la plantean como la medida en que un producto o servicio responde a los requerimientos de quien lo adquiere o utiliza (Montgomery, 2009). Mientras que para otros es la brecha existente entre las expectativas o deseos de los clientes (servicio esperado) y sus percepciones (servicio recibido), agregando que la calidad del servicio es calificada por el cliente como la excelencia del servicio o producto al comparar las expectativas del servicio a obtener con la percepción de las acciones de las empresas proveedoras del mismo (Parasuraman *et al*.,1991). Desde la posición de Martin (1986), citado en Ruiz, Vázquez y Díaz 1995, p.21)

> La calidad de servicio es una combinación de dos dimensiones, la relativa al procedimiento, que es la que depende de los sistemas técnicos utilizados para prestar el servicio y la relacionada con la sociabilidad, asociada con la habilidad del proveedor para relacionarse con los clientes y captar sus necesidades.

Esta correlación entre procedimiento y sociabilidad aporta a la dilucidación de lo que se pretende evaluar para dar una aproximación a la calidad del servicio más coherente al sector hotelero de hacia dónde debe enfocar las mejoras

que contribuyan a elevar dicha calidad y con ello abonar a la satisfacción del cliente. Es así que varios estudiosos han desarrollado investigaciones destinadas a evaluar la calidad del servicio desde diversas vertientes como el estudio de Akbar, Wadood, y Alzaidiyeen (2010) en Malasia con el fin de establecer la relación entre las fallas del servicio que presenta el hotel y los factores como el valor percibido, la satisfacción del cliente y la lealtad en la industria hotelera. Los resultados arrojaron que el valor percibido y la satisfacción del cliente son las dos variables principales para obtener la lealtad del cliente, mediando y redirigiendo el efecto de la calidad del servicio.

Por su parte, Kuei y Lu (2013), analizaron la necesidad de implementar políticas de calidad en entornos donde la demanda es variable, como en el caso de los turistas, quienes cuentan ahora con múltiples vías para obtener información sobre las propuestas que los lleven a contratar el servicio o producto, siendo estas formas de acceder a la información sumamente distintas a las utilizadas en años atrás, aun cuando este estudio se perfila hacia el marketing, variable que no fue considerada en esta investigación, es significativo por cuanto las expectativas del cliente están vinculadas a la oferta que hace el alojamiento.

Mientras que, Aznar, Bagur y Rocafort, (2016), buscaron relacionar percepción de calidad por parte de los clientes de los establecimientos hoteleros con los resultados económico-financieros de los hoteles. Con el fin de determinar si la percepción de mayor calidad por parte de los usuarios se traduce en mejores resultados empresariales. Encontrando que estos no se relacionan significativamente, lo cual es consecuente con otras investigaciones publicadas donde pueden destacarse como posibles agentes causales el sesgo en las respuestas de los internautas o la no existencia de motivaciones internas en la implementación de sistemas de calidad.

Finalmente, Wu, Qomariyah, Sa & Liao, (2018) se propusieron investigar sobre la integración entre el valor del servicio y la recuperación del servicio en la industria hotelera mediante la adopción de un enfoque de Despliegue de la función de calidad (QFD) que integra el método del Proceso Analítico de Red (ANP)al servicio. Los resultados permitieron identificar cinco grupos de fallas en el servicio hotelero, que los clientes clasificaron de mayor importancia como a) la habitación; b) la llegada, facturación y salida; c) restaurante, comida y bebida y d) instalaciones y otros servicios. Mientras que por el lado de la recuperación del servicio los medios más efectivos para tratar las fallas fueron: “Corrección inmediata del problema”; “Disculpa”; “Reemplazo”; “Descuento”.

Cada uno de estos estudios, arroja elementos que el sector hotelero debe interpretar para tomar decisiones conducentes a la intervención de su modelo de negocio, con mejoras que conlleven a corregir las falencias encontradas en su servicio elevando así su calidad, sin embargo ello demanda involucrar en cualquier ecuación la opinión de quienes la han recibido, permitiendo pulsar el nivel de satisfacción que ha experimentado cada cliente al recibir el servicio, como lo esperaba, o como se lo ofrecieron, pudiendo hasta superar su nivel de expectativas. Esta condición óptima (Sorensson y Friedrichs, 2013), se asocia con la percepción que los viajeros tengan del destino donde la calidad de los servicios ofrecidos es fundamental. Por otra parte, no puede pensarse la calidad como un concepto único (Zeithaml y Bitner, 2000), ya que es necesario que lo hoteles den respuesta a las aspiraciones y demandas de los usuarios de turismo que cada vez son más diversos (Izquierdo, Lazo, Andrade, 2018).

Es por ello que, en la actualidad, el sector hotelero no puede garantizar la eficiencia del negocio basado únicamente en las condiciones de infraestructura de alojamiento, ya que el turista exige también encontrar un tratamiento personalizado, amigable, accesible y agradable a la vista, lo cual revela que la calidad del servicio se basa en las percepciones que el cliente obtuvo acerca de los servicios (Gadotti and França, 2009). Esto es compatible con lo expresado por Monfort, Defante, de Oliveira and Mantovani (2013, p 279).

> Si las necesidades básicas no fueron satisfechas, es decir, si la habitación no estaba limpia, los empleados no eran serviciales o hubo fallas en la comunicación, las instalaciones no van a ayudar. Se trata de un conjunto dinámico que debe ser trabajado.

Ahora bien, el punto neurálgico para cualquier establecimiento es determinar, con la mayor objetividad posible, la calidad del servicio que presta, hecho que engloba muchas dimensiones lo cual implica ampliar su nivel de complejidad, por esta razón las dimensiones y su medición han generado instrumentos que permiten la evaluación del constructo. En este sentido, destacan dos escalas que han sido representativas, una basada en el modelo propuesto por Parasuraman *et al.* (1985-1988-1991) y la otra por el modelo propuesto por Cronin y Taylor (1992).

En este momento, es propio fijar posición sobre lo que es la calidad de servicio visto desde el Modelo SERVQUAL, la cual es entendida como la opinión que tiene un cliente sobre la excelencia del servicio percibido (Parasuraman, Berry y Zeithaml 1991), esta calidad es medida mediante la escala del mismo nombre constitutiva de 22 ítems distribuidos en cinco dimensiones, ya que los clientes no distinguen la calidad del servicio como unidimensional sino que discriminan la información para llegar a una valoración sobre el servicio recibido (Zeithaml y Bitner, 2000).

El modelo de Parasuraman es conocido como el modelo SERVQUAL (Quality Service), este abarca el estudio de las expectativas del cliente sobre el servicio a recibir y las percepciones sobre el servicio recibido, esto lo hace a través de cinco dimensiones de la calidad del servicio (en principio eran 10 que fueron redimensionadas producto de las críticas recibidas) las cuales denominaron tangibilidad, fiabilidad, capacidad de respuesta, seguridad y empatía. Por su parte el modelo de Cronin y Taylor es denominado SERPERF (Service Performance) debido a que su enfoque se centra en evaluar solo las percepciones por considerar que la escala debía enfocarse en medir el desempeño de la empresa o servicio prestado, determinando así su efectividad. (Cronin y Taylor, 1994)

Sin embargo, es de destacar que ambos modelos se generan a partir de los aportes de Grönross (1984) conocido como modelo nórdico, basado en dos dimensiones: la calidad técnica asociada al servicio que recibe el cliente y la calidad funcional asociada con la forma en que el cliente recibe el servicio, estas dimensiones a su vez se hallan mediadas por la imagen corporativa, la cual actúa como un tamiz de la apreciación de la calidad, es decir, mientras más positiva sea esta imagen menor significancia tendrán los errores y el cliente estará más satisfecho.

Auge del Turismo médico

Para entrar en este tema cabe hacer una distinción pertinente entre turismo de salud y turismo médico, ya que el primero es incluyente, es decir, constituye las diferentes intenciones de las personas que se trasladan a otro lugar, para mejorar las condiciones de su salud (Ross, 2001), lo cual involucra no solo la parte médica sino también la de bienestar, como se desprende de la definición propuesta por Yu and Ko (2012) el turismo médico implica no solo viajar por tratamientos médicos sino buscar aquellos destinos que involucren la competencia técnica asociada a precios mucho más competitivos combinando los servicios médicos con la industria del turismo.

Mientras que para el Programa de Transformación Productiva (PTP) (2013, p. 13) son "Viajes con el objetivo primordial de recibir tratamientos curativos, estéticos o preventivos (enfermedades, dolores o intervenciones quirúrgicas).". Por parte de la Organización Mundial de Turismo (OMT) el turismo médico representa una variedad turística asociada al sector salud abarcando tratamientos de orden invasivo o no invasivo de carácter empírico, es decir, va desde el diagnóstico hasta la rehabilitación (OMT, 2018). Para efectos de la presente investigación se tomará en consideración la definición propuesta por Yu and Ko (2012) por considerar que esta aglutina los aspectos fundamentales para que el turista médico opte por un destino en particular.

A nivel mundial, el auge que ha tenido el turismo médico es producto de cambios sustantivos que se han producido para darle atención a las personas que presentan algún trastorno de salud o quieren practicarse alguna intervención quirúrgica en el extranjero (Poveda y Gallegos, 2018) abriendo oportunidades que pueden ser aprovechadas por los hoteles, con miras a fortalecerse en el mercado. Este aporte proveniente del turismo médico estaría permeado por una propuesta de valor diferenciadora en su oferta de servicios. Por consiguiente, el turismo médico representa una modalidad turística en la cual se enlazan diversos sectores interesados, dándole carácter de transdisciplinariedad cuyo involucramiento tributa elementos sustantivos tales como organización, desarrollo y ejecución haciendo que cualquier destino turístico incluya en sus paquetes de oferta los servicios donde cada grupo de interés es experto. (Martínez, 2016).

Este auge global ha guiado el interés de los turistas médicos marcando preferencias por algunos destinos de África y Asica como: Sudáfrica, Tailandia, Mongolia, Hong Kong, Barbados, India, y Corea del Sur (Yang, Hu, Sun and Chen, 2018). Mientras que, en Latinoamérica, destacan Estados Unidos, Canadá, Costa Rica, Brasil, Colombia, Jamaica (Sánchez-Vergara, 2017), teniendo en cuenta algunos criterios asociados tecnología, reconocimiento de los profesionales médicos, certificación de los centros de salud, asequibilidad en costos de procedimientos y tratamientos, entre otros.

Sin embargo, este tipo de turismo sigue creciendo en Colombia siendo preferidas las ciudades como Bogotá, Medellín, Cali y Barranquilla, como bien lo refleja el estudio de Triviño, Ovalle y Díaz-Solano (2018), cuando exponen que la ciudad de Barranquilla es uno de los polos objetivo para el progreso de la Costa-Caribe colombiana debido a su posición geográfica tan cercana a las ciudades turísticas de Cartagena y Santa Marta, que coadyuva a que Barranquilla se convierta, turísticamente hablando, en un entorno competitivo ligado al proceso de transformación tanto urbanística como económica que ha comportado en las últimas décadas. Este progreso se complementa con varios factores como la buena conectividad nacional e internacional, las diversas opciones de tratamientos médicos asequible que ofrecen los centros de salud y la variada oferta hotelera que hacen de esta ciudad un destino atractivo para el turista médico.

Entre los estudios realizados en materia de turismo médico destacan el De la Puente, 2015, donde analiza la dinámica del turismo de salud para el caso colombiano hallando como principal impulsor el aporte de los actores privados a partir del aprovechamiento de ventajas competitivas asociadas a costos, facilidades de acceso al país y colaboración de oficinas nacionales para la promoción de este tipo de turismo. Aunque por el otro lado, se hallaron falencias que

limitan el desarrollo del mercado, destacando el bajo nivel de bilingüismo, escasa información entre paciente-médico desde el país de origen hasta el de destino generando sobrecostos al turista internacional.

Otro estudio significativo fue el desarrollado por Yan et al, 2018, orientado a dar respuesta a uno de los problemas más importantes que presentan los turistas-pacientes, la selección de un destino óptimo donde realizarse su procedimiento médico. Para dar respuesta a esta problemática presentaron una nueva forma de tomar decisiones grupales con criterios múltiples (MCGDM) permitiendo evaluar y clasificar destinos de turismo medico con vaga información. Acompañado del enfoque de las relaciones de preferencias difusas neutrosóficas (NFPR) dando como resultado que los turistas- pacientes que no contaban con información, tiempo o paciencia pudieran expresas su incertidumbre sobre la valoración de sus preferencias.

Finalmente, se presenta el estudio desarrollado por Triviño, *et al.* (2018), quienes se propusieron caracterizar y tomar el turismo médico como diagnóstico para la conformación de un clúster. Los resultados caracterizan la capacidad y calidad de los tres centros de salud acreditados en la ciudad de Barranquilla, de un total de 390, que se encuentran habilitadas para prestar este servicio. Adicional a ello detectaron el nivel de individualismo en la cultura del tejido empresarial del sector y las falencias en cuanto al manejo de una segunda lengua como elemento sustantivo para el servicio de turismo médico. En consecuencia, plantean la necesidad de incorporar un número significativo de empresas acreditadas en el sector salud, así como adoptar una visión turística de región que facilite la vinculación de servicios complementarios de turismo.

Este estudio, abre la posibilidad de incorporar el sector hotelero como actor complementario en la prestación de servicios acorde a los requerimientos, necesidades y condiciones del turista médico, quien tiene limitadas posibilidades de hallar un alojamiento que le brinde un espacio de confort y los servicios específicos para poder culminar su fase de recuperación con calidad. Como pudo observarse, la mayoría de los estudios tratan por separado el turismo médico y el hotelero, brecha que aspira disminuir esta investigación, sin embargo, ambos conforman un binomio que abre múltiples oportunidades de negocio para dar respuesta a este segmento, lo cual permitiría contribuir aún más con la economía de la región. Máxime cuando al sector hotelero se han incorporado diversas trasnacionales que le han dado vivacidad a este importante sector, demostrando con ello que la ciudad cuenta con la capacidad para afrontar volúmenes considerables de turistas incluyendo a los que vienen por motivos de atención médica.

> Durante la última década, en el sector salud en Barranquilla se ha dado paso a la modernización de estructuras, actualización tecnológica y creación de nuevas instituciones, fortaleciendo la oferta de servicios. Ha sido un cambio significativo que ha impulsado en la ciudad el desarrollo económico en diversos sectores —afines o conexos— en las instituciones de salud, el sector hotelero y gastronómico (Triviño, et al. 2018, p.144).

En este sentido, cabe destacar que Barranquilla registró el 3.4% durante el 2017 representado por un ingreso de 113.809 turistas en comparación con los 72.519 reportados durante el 2016. (Migración Colombia, 2017, p. 22). Ahora bien, son muchos los estudios orientados a evaluar, determinar y analizar la calidad del servicio prestado al sector turístico, sin embargo, todos convergen en el turista convencional, evidentemente es el mayor segmento del sector, pero en los últimos años el turismo médico ha entrado de manera firme en el espectro del mercado y requiere de elementos diferenciadores al momento de acceder a un alojamiento, búsqueda que regularmente no es exitosa.

Ante este panorama, se hace necesario que la industria hotelera conozca las necesidades de los turistas médicos en cuanto a infraestructura, recursos humanos, requerimientos alimenticios y demás, prestándoles un servicio que deje satisfechos a sus visitantes, dado que muchos de estos turistas requieren de alojamientos apropiados a su condición, es decir, con ciertos requerimientos que le colaboren en su recuperación de manera armónica e integral. Adicional a ello, es menester considerar, que este tipo de turista nunca viaja solo, por lo regular viene acompañado de algún familiar o amigo cercano que también requiere de un servicio de alto confort que le ayude a manejar la carga de estrés físico y mental generado por la atención a un paciente, para cumplir con su rol de acompañante eficientemente.

Si bien el sector hotelero no es una institución de salud, el turista médico tampoco es un turista convencional, por lo cual su condición de paciente está presente, y sus necesidades y requerimientos se enfocan en desarrollar un proceso de rehabilitación adecuado. En este sentido los alojamientos deben estar conscientes que el servicio que se le presta a este tipo de turistas debe ser especial, tratando de articularse de manera sinérgica con los centros de salud de donde provienen estos turistas, para lograr prestar un servicio de calidad. (PTP, 2013). Sin embargo, es de destacar que el sector hotelero en Barranquilla, tiene centrado su foco de interés en el turismo de negocios, indicando este comportamiento que no hay un aspecto diferenciador hacia el segmento del turista médico que la selecciona como destino turístico para sus tratamientos o procedimientos de salud.

Metodología

El estudio tiene un enfoque cuantitativo, determinándose como descriptivo, por cuanto se analizaron las variables de manera individual para establecer, a la luz de las teorías y los datos la calidad del servicio prestado a los turistas médicos como una oportunidad para el fortalecimiento del sector hotelero en Barranquilla. De acuerdo a su línea en el tiempo, fue transversal con diseño no experimental debido a que los datos fueron recolectados sin que hubiese modificación alguna de ellos. El procedimiento para la recolección de información se realizó en campo. El hilo investigativo estuvo distribuido en 3 fases, la primera basada en la revisión de diferentes bases de datos tanto físicas como electrónicas para dar soporte teórico al estudio, en consecuencia, se tomaron libros, artículos científicos completos, tanto en inglés como en español, memorias de congresos y conferencias, informes de organismos e instituciones, entre otros.

En la segunda fase se aplicó un instrumento denominado Guía Indicativa de Estándares para la prestación de servicios de Turismo en Salud por parte del Sector Hotelero (PTP, n.d.) a los gerentes hoteleros que aceptaron ser parte de la población objeto de estudio, 15 en total, cabe mencionar que esta fase se desarrolló durante los meses de marzo-abril del 2018. En la tercera fase se aplicó la escala SERVQUAL (Parasuraman, *et al*.,1991) a los turistas, a través de sus médicos tratantes, por cuestiones de confidencialidad de datos. Fueron entregados en total 300 instrumentos, esta fase se desarrolló durante los meses de julio-noviembre de 2018. Cabe destacar que solo fueron devueltos 200 instrumentos debidamente diligenciados conformando la totalidad a analizar.

Guía Indicativa de Estándares para la prestación de servicios de Turismo en Salud por parte del Sector Hotelero

Esta guía es la herramienta propuesta por el PTP, que permite a los establecimientos del sector hotelero identificar su forma de participación en la oferta de servicios de turismo en salud. Como se desprende de esta especificación, la guía es de carácter exploratorio, ya que indica a los gerentes de hoteles aquellas áreas que requieren mejoras para poder prestar servicio a los turistas médicos.

El instrumento constó de 7 dimensiones agrupadas en 93 ítems, el direccionamiento seis (6), el talento humano seis (6), la infraestructura veinticuatro (24), atención al turista de salud treinta (30), comunicación con los turistas médicos cuatro (4), medición, análisis y mejora cinco (5) y, por último, sustentabilidad con dieciocho (18) ítems. Las alternativas fueron diseñadas bajo escala Likert que fueron de 0 a 5. Los datos se organizaron por dimensión en una hoja Excel y fueron exportados al programa SPSS para su cálculo descriptivo expresado en frecuencias y porcentajes. Para su valoración se elaboró un baremo de criterios.

Tabla 1: Escala de Criterios

Rango	Criterios
0-19	Sin estándar
20-39	Escaso estándar
40-59	Bajo estándar
60-79	Mediano estándar
80-99	Alto estándar
100	Excelente estándar

Fuente: elaboración propia a partir de la información, 2018

Modelo SERVQUAL (Quality Service)

Con este instrumento se midió la calidad del servicio hotelero dado al turista médico, se realizaron algunas adaptaciones simples orientadas a contextualizar los planteamientos al sector hotelero. Para utilizar este instrumento se obtuvo autorización del Dr. Parasuraman, uno de los autores de la escala SERVQUAL La misma consta de cinco (05) dimensiones que miden la calidad del servicio ofertado desde dos vías, la primera las expectativas que tienen los clientes (turistas médicos) sobre las condiciones que esperan encontrar durante su estancia en el hotel y la segunda las percepciones de estos mismos clientes, sobre el servicio recibido durante su estancia. Las dimensiones corresponden a: elementos tangibles (mobiliario, equipos e instalaciones, apariencia personal y alimentación); fiabilidad, asociado a la forma como el hotel presta el servicio a los clientes primando un servicio cuidadoso y confiable; capacidad de respuesta, que engloba el cuidado y asistencia que el hotel da a sus clientes de manera oportuna y sin dilaciones, manejando la disposición y voluntad para colaborar con ellos.

La dimensión seguridad, mide los conocimientos, habilidades y respeto, que se lo ofrece al cliente y por último la dimensión empatía, mide la conexión con el cliente al ponerse en su lugar, interpretando y entendiendo su situación, sus necesidades y sus conflictos, todo ello con el fin de darle una atención personalizada. Este cuestionario utiliza la escala de diferencial semántico (Osgood, Suci y Tannenbaum, 1957) que va de 1 a 7, donde el 1 representa, en la escala de las expectativas, el criterio de muy insignificante y el 7 muy importante. Mientras que, en las percepciones, el 1 representa el criterio de totalmente insatisfecho y el 7 totalmente satisfecho. Como puede notarse, tanto las expectativas como las percepciones se estimaron por el grado de importancia que le conceden los sujetos a cada una de las 22 afirmaciones o ítems del cuestionario.

Los valores de la escala que miden la calidad del servicio esperado y recibido por los clientes se obtiene calculando la diferencia entre las medias obtenidas por cada uno de los 22 ítem, tanto de las expectativas como de las percepciones, en las cinco dimensiones. Mientras que para determinar el valor de la brecha definitiva que arroja la opinión sobre la calidad del servicio recibido, se procede a restar el valor medio de la percepción al valor medio de la expectativa (P-E), si este es positivo (P > E) entonces la percepción superó la expectativa del cliente, considerando un alto nivel de calidad recibido. En caso contrario, si lo valores son negativos (P < E) se estaría en presencia de un bajo nivel de calidad percibido, ahora bien, si hay igualdad entre ambas (P = E), se estaría en presencia de un modesto nivel de calidad del servicio recibido.

Resultados Y Discusión

Los datos del instrumento denominado Guía Indicativa de Estándares para la prestación de servicios de Turismo en Salud por parte del Sector Hotelero, se reflejan en la tabla 2 con los porcentajes de las frecuencias estadísticas arrojadas para los siete factores evaluados, en ella se evidencia que los factores con mayor estándar fueron la comunicación con los turistas médicos y la medición, análisis y mejora de los estándares para prestar un servicio de salud, ambos con un 100% cada uno, correspondiente a excelente estándar, seguidos de la sustentabilidad con un 89,87% , y el direccionamiento con 85,3% ubicándose todos en el criterio de alto estándar, según el baremo, lo cual representa una gran fortaleza. Sin embargo, al comparar los porcentajes generales de las frecuencias (73,94), con el baremo diseñado, los mismos se sitúan en el criterio de mediano estándar, situación está que pudo verse afectada por los valores alcanzados, en el talento humano (29,31%) e infraestructura (35,55%) de los alojamientos, ubicándolos en el criterio de escaso estándar.

Estos resultados son consecuentes con lo que plantean Triviño, *et al*. (2018) donde una de sus conclusiones evidenció las falencias en del Talento Humano en cuanto al manejo de una segunda lengua como elemento sustantivo para el servicio de turismo médico, coincidiendo igualmente con la opinión De La Puente (2015) donde se evidenciaron falencias que limitan el desarrollo del mercado, destacando el bajo nivel de bilingüismo, escasa información entre paciente-médico desde el país de origen hasta el de destino generando sobrecostos al turista internacional. Como se desprende de estos resultados, el talento humano del sector hotelero estudiado muestra no estar a la altura de las responsabilidades que implica la atención a un turista-paciente, muchos de estos clientes provienen de países de habla inglesa en consecuencia no solo el personal de check in-check out o customer service debe demostrar dominio de una segunda lengua, hace falta que todo el personal que esté en contacto con el cliente, además este personal debe estar capacitado para la atención de usuarios de servicios de turismo en salud, que incluya, formación en primeros auxilios, identificación de señales de alarma, reanimación cardiopulmonar básica (RCP) o curso de primer respondiente.

En correspondencia con lo anterior, la industria hotelera requiere conocer lo que necesitan este segmento de la población turística y darle la atención adecuada, en cuanto a infraestructura, recursos humanos, alimentación, entre otros para prestar este tipo de servicio y dejar satisfechos a sus visitantes. (Portafolio, 2014), lo cual corrobora que los clientes no distinguen la calidad del servicio desde la unidimensionalidad, sino que discriminan la información para llegar a una valoración sobre el servicio recibido (Zeithaml y Bitner, 2000)

Tabla 2: Resultados de la Guía Indicativa de Estándares para la prestación de servicios de Turismo en Salud por parte del Sector Hotelero

Factores	Excelente	Alto	Medio	Bajo	Muy Bajo	Nulo
Direccionamiento	85,3	0,0	14,7	0,0	0,0	0,0
Talento Humano	29,31	13,7	54,48	2,5	0,0	0,0
Infraestructura	35,55	20,34	43,62	0,0	0,0	0,0
Atención al turista	77,5	8,43	13,92	0,0	0,0	0,0
Comunicación con los turistas de salud	100	0,0	0,0	0,0	0,0	0,0
Medición, análisis y mejora	100	0,0	0,0	0,0	0,0	0,0
Sustentabilidad	89,87	0,33	9,8		0,0	0,0
TOTAL%	**73,93**	6,11	19,5	0,36	0,0	0,0
	Mediano estándar (60%-79%)					

Fuente: elaboración propia con base en los datos, 2018

En cuanto a los resultados generales de la escala SERVQUAL, que contemplan las brechas entre expectativas y percepciones denotadas por los turistas médicos encuestados se presentan en la tabla 3, donde se observa claramente que todas las dimensiones comportan valores negativos, lo cual evidencia que las expectativas de los turistas médicos no fueron superadas por el alojamiento, traduciéndose desde la interpretación de los datos en un bajo nivel de calidad del servicio recibido, es decir, el cliente no fue satisfecho.

Siguiendo con el análisis, los resultados arrojan que la mayor distancia se ubica en la dimensión elementos tangibles con una amplitud de -0,637 lo cual representa el más bajo nivel de calidad percibido, es decir, los turistas médicos, en líneas generales, no quedaron satisfechos con la apariencia del alojamiento, la modernidad de los equipos, la alimentación recibida, ni la apariencia del personal que los atendió. Es probable que la apariencia del hotel no haya sido un factor determinante, por cuanto la mayoría de ellos cuentan con instalaciones modernas, sin embargo, el hecho de no contar con habitaciones mínimamente acondicionadas para la atención del turista médico, así como el servicio de alimentación especializada, pudo haber afectado su percepción. En este sentido se ratifica que los huéspedes de hoteles son exigentes con la calidad de las instalaciones, es por ello que algunos alojamientos confunden, el nivel de las instalaciones con la calidad del servicio, pero si las necesidades básicas no fueron satisfechas (ejemplo si la habitación no estaba limpia, si los empleados no fueron serviciales, si el servicio fue tardío, entre otros), las instalaciones no van a ayudar. "Se trata de un conjunto dinámico que debe ser trabajado". (Monfort *et al.*, 2013, p. 279)

De igual manera, la dimensión seguridad comportó un valor de -0,542 lo cual representa que el servicio asociado con una conducta de respeto, tranquilidad, confidencia y privacidad en la atención al cliente, no fueron lo suficientemente cubiertas por el hotel, lo cual se tradujo en un bajo nivel de satisfacción para el turista médico. Si bien la mayoría de los hoteles cuenta con caja de seguridad para salvaguardar las pertenencias de los clientes, el turista médico requiere de otros mecanismos que le permitan el resguardo de los insumos médicos necesarios para su tratamiento de recuperación durante sus salidas, esto se afianza aún más cuando el personal que está en contacto directo e indirecto con el cliente no le inspira confianza. Acá se pone en relevancia el papel que juega la gerencia como cabeza principal, para dar la importancia requerida a las necesidades y requerimientos de los turistas de salud, debido a que la calidad se fundamenta en las percepciones que el cliente tiene sobre los servicios recibidos (Gadotti y França, 2009). Así las cosas, el valor percibido y la satisfacción del cliente son las dos variables principales para obtener la lealtad del cliente, mediando y redirigiendo el efecto de la calidad del servicio. (Akbar *et al.*, 2010).

Como se desprende de los resultados, el sector hotelero no está brindando a los turistas médicos un servicio diferente al que acostumbra a ofrecer al resto de turistas, lo cual corrobora lo expresado por Monfort *et al.* (2013) la calidad va más allá de un buen alojamiento siendo los huéspedes de hoteles muy rigurosos con esta, ya que la calidad del servicio es sistémico e integral y solo bastará con que alguna de las expectativas no sean satisfechas para que el alojamiento no sea bien valorado, como se evidencia en la tabla 3 de resultados,

Tabla 3: Brecha Integral Resultados de la calidad del servicio prestado a turistas médicos

	Expectativas		Percepciones		
	Media(e)	Desv. Estándar	Media(e)	Desv. Estándar	Brecha
Elementos tangibles	6,500	0,000	5,863	0,252	**-0,637**
Fiabilidad	6,280	0,274	5,790	0,220	-0,490
Capacidad de respuesta	6,600	0,250	6,075	0,264	-0,525
Seguridad	6,280	0,214	5,738	0,263	**-0,542**
Empatía	6,380	0,274	5,910	0,174	-0,47

Fuente: elaboración propia basado en los datos (2018)

Conclusiones y Recomendaciones

Colombia y en particular Barranquilla, siguen posicionándose en el radar de muchos turistas de salud, son muchas las características que la hacen un destino tentador en este ámbito, la facilidad de conexión, la tecnología de avanzada en las diversas disciplinas, la calidad probada y reconocida internacionalmente de sus médicos y centros de salud, la planta de hoteles de talla mundial, la competitividad en los costes de procedimientos quirúrgicos y de tratamientos de menor complejidad, entre muchos otros, sin embargo, se ha puesto en evidencia algunos aspectos que limitan el aprovechamiento de las oportunidades que se derivan del turismo médico: a) Inexistencia de una oferta de servicio diferenciadora dirigida a capturar al segmento de turismo médico; b) Un servicio homogéneo prestado al turista médico que no difiere de la atención prestada al turista convencional; c) Poca información y formación del talento humano para atender a un turista médico; d) Falencias en la demostración de competencias como el multilingüismo o en su defecto el dominio del idioma inglés, relaciones humanas, comunicación asertiva y capacidades técnicas para relacionarse con un turista-paciente.

En consecuencia, sería recomendable sugerir al sector hotelero iniciar una revisión de su modelo de negocios para poder iniciar un proceso de mejora que incorpore una oferta de valor diferenciadora, basada en el conocimiento específico de sus necesidades, requerimientos e incertidumbre, destinada a capturar la atención e interés del turista médico para seleccionarlo como alojamiento apropiado durante su recuperación, de igual manera, el sector hotelero fortalecería su competitividad en el mercado al visibilizarse en el espectro del turismo de salud y al vincular en su cadena de servicios a otros grupos de interés como agencias de viajes, enfermería privada, transporte, insumos médicos (farmacias, microempresas de equipos médicos, entre otros) lo cual a su vez lo haría parte del grupo de empresas que no solo tienen el propósito de lucrarse sino de contribuir a lograr algunos de los Objetivos del Desarrollo Sostenible, pues al vincular a otros grupos de interés minoritarios estaría abogando por un trabajo digno que minimice los índices de pobreza en la región.

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The Effectiveness of the Local Security Policy and Sustainable Development of Rural Areas in the Kuyavian-Pomeranian Province in Poland

Piotr SIEMIATKOWSKI
Nicolaus Copernicus University in Torun, Torun, Poland, piotr.siemiatkowski@umk.pl

Patryk TOMASZEWSKI
Nicolaus Copernicus University in Torun, Torun, Poland, patrykt@umk.pl

Joanna MARSZALEK-KAWA
Nicolaus Copernicus University in Torun, Torun, Poland, kawaj@umk.pl

Adrianna CZARNECKA
Nicolaus Copernicus University in Toru, Torun, Poland, a.czarnecka@doktorant.umk.pl

Abstract

Local communities in many countries are working hard to improve the level of sustainable development. It is important to pursue an appropriate development policy at the local level, including security policy in order to eliminate social, economic, political and environmental threats. Considering the above, it can be concluded that the main objective of the article is to analyze the relationship between the effectiveness of the local security policy, reflected in the high sense of security of the inhabitants of rural areas in the Kuyavian-Pomeranian Province (territorial unit in Poland), and the level of achieving sustainable development goals by the districts inhabited by them. As a research method, we used a survey and conducted it in the Kuyavian-Pomeranian Province. From all the empirical material, only records concerning rural areas were selected. Then a synthetic measure was constructed from the total of the obtained results. It has shown that the analyzed districts represent an integrated measure of development significantly in the analysis. This means that within one administrative unit (province), the area of areas significantly varies with proving ground development. The analysis of the statistical correlation proves the lack of a statistically significant correlation between the effectiveness of the local security policy and the level of sustainable local development in the rural areas of the Kuyavian-Pomeranian Province. So far, no research has been carried out on the effectiveness of local security policy and the sustainable development of rural areas in the Kuyavian-Pomeranian Province. The conducted research is an analysis based on a wide range of towels influencing the sustainable development of the region.

Keywords: Sustainable Development, Rural Area, Local Security, Security Policy

Introduction

Many of the challenges facing the mankind, such as climate change, water scarcity, inequalities and hunger, can be solved not only at the global level (Walewicz, 2018, 2019; Gierszewski, Siemiątkowski and Urbanek, 2020), promoting sustainable development, but, above all, at the local level. Local communities in a number of countries are working hard to improve the level of sustainable development. They are the decision-makers and catalysts of change that unite global goals with their own local ones. In the above context, it is important to conduct an appropriate development policy at the local level, including security policy.

Local security policy should strategically ensure the sustainable development of the local community, while eliminating social, economic, political and environmental threats.

Local security policy has two dimensions:

a) actions of the state aimed at ensuring security, especially in the context of the subject - systemic (but also, as mentioned by some researchers: public security or social peace);

b) political concepts of security, based on traditional political doctrines - implemented or to be implemented in accordance with the declarations of the winners or local elections (Siemiątkowski and Tomaszewski, 2020, p. 29).

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We can distinguish other approaches to politics, not only in relation to local activities. so both politics and policy. Politics is sometimes reduced to pragmatic executive actions implemented by local government, mainly based on the guidelines of central authorities. Politics is then treated as a way of performing these tasks. It has been observed that “the concept of security policy covers, generally speaking, the activities of a given entity in some area in order to achieve previously adopted goals. This means that first, far-reaching goals had to be set by politics in a given, important area of operation" (Pokruszyński, 2011, p. 9). In the model approach, local policy is influenced by the concepts of state policy (strategies, programs), followed by financial resources for their implementation. In addition, politics in the region is important; it refers to cooperation programs between local governments in a given field, as well as development strategies of individual local governments, which are assumed to implement the electoral programme announced by election committees gaining power in a given local government (Siemiątkowski and Tomaszewski, 2020, p. 35). Local security policy should be carried out in coherence not only with central guidelines and indications, but in cooperation with residents (public consultations, cooperation with non-governmental organizations) and the economic environment.

Polish strategic documents, in line with international policy, specify that actions taken in the context of local security policy should be consistent with the principles of sustainable development. Sustainable socio-economic development is one of the most important challenges of the modern world. This concept was defined by the G. Brutland World Commission for Environment and Development established in 1983. It defined sustainable development as one in which the needs of the present generation can be met without depriving of the ability to meet the needs of future generations. This development relates to environmental, economic and social aspects (World Commission on Environment and Development, 1987). There are several other definitions of sustainable development in the literature. The definition proposed by Polish researcher Barbara Piontek is: "sustainable growth is such a growth, the essence of which is to ensure lasting improvement in the quality of life of contemporary and future generations by shaping the right proportions between three types of capital: economic, human and natural" (Piontek, 2002, p. 27).

In Poland, the document "Strategy for responsible development" from 2017 states: “Responsible development is development in which the needs of the present generation can be met without diminishing the chances of future generations. It is important to properly shape the relationship between the competitiveness of the economy, care for the environment and the quality of life. Thus, responsible development relates to economic, social, environmental, territorial and institutional issues. This means socio-economic development in which the process of integrating political, economic and social activities takes place, while maintaining the natural balance" (Ministerstwo Rozwoju, 2017, p. 35). As noted in the document, local government is an important link in this development. It is possible to analyze the activities for local security in rural areas, which are the foundation for the sustainable and balanced development of the country. In Poland, the development of small and medium-sized towns, especially rural areas, is particularly important in the local area. These often struggle with security issues, which are undoubtedly weak points in sustainable development. They include:

- unemployment rate affecting the sense of economic security;
- access to education and childcare;
- access to health care, especially specialist;
- environmental protection, especially accessibility to landfills, sewage treatment plants, household sewage treatment plants;
- green areas and afforestation;
- access to public transport;
- access to services;
- social participation.

The main goal of the article is to analyze the relationship between the effectiveness of the local security policy, expressed in the high level and sense of security of the inhabitants of rural areas of the Kuyavian-Pomeranian Province – located in the central and northern part of Poland. The total population of the province in 2016 was 2,083,000. 1,239,000 people lived in cities, while 844,000 people inhabited rural areas. The province is divided into 23 districts – including four cities with district rights. These are, in turn, divided into smaller territorial units – communes (there are 144 of them – municipal, municipal-rural and rural ones). The paper identifies the level of achieving sustainable development goals by the specific districts. In addition, the specific objective was implemented, i.e. the ranking of rural districts in the Kuyavian-Pomeranian Province in terms of the degree of implementation of the sustainable development goals was created. It was prepared with the application of linear ordering methods. In order to identify the sense of security among the inhabitants of the Kuyavian-Pomeranian Province, we applied questionnaire studies conducted between November 2017 and February 2018. The sample was selected in a targeted random way. The study was carried out using the PAPI (Paper and Pencil Interview) questionnaire. Targeted sampling consisted in interviewing the inhabitants of 19 districts of the Kuyavian-Pomeranian Province, while its randomness stemmed from the character of the research - the respondents had to be

willing to provide answers. There were 4,400 participants of the study. They answered questions concerning economic, political and health security and evaluated the efficiency of services (police, fire service).

In the study, the following research questions were asked:

Q1: Do the rural districts of the Kuyavian-Pomeranian Province strive to implement the assumptions of the sustainable development strategy to an equal extent?

Q2: Does the effectiveness of the local security policy in the surveyed territorial units affect the implementation of sustainable development goals?

The research process requires the following hypotheses:

H1: The examined districts show significant differences in taxonomic distances between synthetic indicators of sustainable development.

H2: The level of sustainable development is strongly correlated with the level of effectiveness of the local security policy. Hypothesis number two formulated in this way has its substantive justification. Theoretically, there is a cause-and-effect relationship between the level of sustainable development and the level of safety. Security is a basic human need. Having satisfied it, we feel an urge to fulfil higher needs, such as sustainable development.

Theoretical Background

From the national and local perspective, when pursuing a sustainable development policy, the following principles should be taken into account:

- sustainable development (balance of economic and social goals related to environmental protection; a holistic view of economic, social and environmental issues);
- non-discrimination in political, social and economic life;
- solidarity (including solidarity within and between generations);
- cohesion (territorial, regional, regulatory);
- public good and a democratic state (GUS, 2010, p. 10).

There are numerous publications on the safety of the local community, also in relation to the Kuyavian-Pomeranian Province in Poland (Gierszewski, Siemiątkowski and Urbanek, 2020; Siemiątkowski and Tomaszewski, 2020; Siemiątkowski *et al.*, 2020). A lot of research was conducted on the role of local government in the process of local development (Akukwe, 1996). In the context of local development, it is important to effectively manage shared resources, which also include local security. It is worth searching for effective tools to influence both central authorities and, above all, local governments, in order to direct the entire public administration system to stimulate local communities to effectively use common resources (Ostrom, 2009; Hurynak and Kordonska, 2018).

Since sustainable development was defined in 1983, it has been the subject of numerous studies. Papers have been published on the possibilities and anomalies of introducing sustainable development in general (Cooper and Vargas, 2004; Littig and Grießler, 2005; Du Pisani, 2006; Polski, 2009; Elliot, 2012) and in the context of Poland (Parysek, 1995; Brol, 1998; Noworól, 2007; Senczy, 2013). There are also more specific studies concerning sustainable development, especially in the fields of economy and ecology (Marsden and Smith, 2005; Polski, 2009).

Due to the changing role of cities, more and more attention is paid to the issue whether cities can develop in accordance with the principles of sustainable development (Basiago, 1996; Newman, 1996; Satterthwaite, 2009; Menegat, 2016). Research focuses on their influence on human security in areas such as sustainable local development, human rights and environmental protection, which are components of human security. It is shown that cities can significantly contribute to the safety of people, and thus to local development, including the rural areas that surround them (Szpak, 2015; Satterthwaite, 2016).

Rural areas play a special role in the research on sustainable development. The specific subjects include sustainable development in rural areas is analyzed in terms of both human capital as a factor of rural development, education, health care, as well as social problems of renewable energy development in rural areas (Kapur, 2019). A lot of attention has been paid to the state's tasks within rural activities, examining various contexts of these activities, from technological development through comprehensive rural planning and cooperation with cities (Knaap and Chakraborty, 2007), to the sustainable development of rural tourism (McAreavey and McDonagh, 2011; Lane and Kastenholz, 2015). What is an important element is innovative management that can meet the challenges of sustainable development (Biermann, Kanie and Kim, 2017).

Another significant determinant of both the level of local security and sustainable development is the quality of life of the inhabitants of local communities. The higher the level of the quality of life, the greater the attachment to the place of residence (Jankowska, 2014). Differences in the quality of life, on the other hand, result in the emergence of migratory movements and the movement of the population (Jankowska, 2013).

Methods

Two types of methods were used in this study. First, a fragment of a wide-ranging survey conducted by the authors in the territory of the Kuyavian-Pomeranian Province located in central Poland was presented. From all the empirical material, only records concerning rural areas were selected. The number of observations obtained was N = 1715. A synthetic measure was constructed from all the results obtained.

For this purpose, linear ordering methods were used to assess the level of object differentiation using a closed set of statistical features (Grabiński, Wydymus and Zielaś, 1989). The adopted method was described, inter alia, in other studies by the authors (Siemiątkowski, 2017; Siemiątkowski *et al.*, 2019, 2020; Gierszewski, Siemiątkowski and Urbanek, 2020; Siemiątkowski and Marszałek-Kawa, 2020), so there is no need to discuss it in detail. It is only worth noting that the standardization of features was carried out based on model methods, assuming the existence of a model object in relation to which taxonomic distances of the examined objects were determined.

The synthetic measure was calculated using Hellwig's method according to the formula:

$$d_i = 1 - \frac{d_{i0}}{d_0}$$

where:
d_{i0} − Euclidean distance of the object x_i from the reference object x_0,
d_0 − the critical distance of a given unit from the pattern (Ostasiewicz, 1998).

The individual elements of the local security system assessed in the aforementioned empirical study were adopted as the features of the examined facilities (districts), assessment of the sense of security and the prospects of its changes.

The same method was used to create a ranking of rural districts in the Kuyavian-Pomeranian Province in terms of achieving sustainable development goals. The assessment of the degree of achievement of the sustainable development goals according to the methodology of the Main Statistical Office (*Główny Urząd Statystyczny* - GUS), consistent with the international methodology, consists of twenty-two groups of indicators. They fall into four main areas: social order, economic order, environmental order and institutional and political order. Almost 180 different types of measures have been defined in them, which help to track the progress of a territorial unit (a state or its part) in implementing the idea of sustainable development. These measures have been adopted in this study as the features of the examined objects (districts) when creating their ranking in terms of achieving the goals of sustainable development.

It is extremely difficult to compare this progress in aggregate terms, given the significant number of indicators. On the other hand, comparing territorial units by means of one or several selected indicators does not give an unambiguous answer to the question which provinces are faster and which are slower in implementing the sustainable development goals. In this case, the so-called multivariate analyses come in handy.

In order to carry out a taxonomic study of the progress in the implementation of the assumptions of sustainable development of districts in the Kuyavian-Pomeranian Province, 178 features of objects (districts) were determined on the basis of the Main Statistical Office data. It should be emphasized that the list of indicators taken into account in building the synthetic measure is limited by the assumptions of the sustainable development strategy themselves. This means that other features than those indicated in the statistics of the Main Statistical Office, compliant with the international guidelines on the goals of sustainable development, are not included here.

Table 1: The list of district features included in the process of building a synthetic measure

Order	Field	Indicator	Dimension	No
social	Demographic changes	Natural increase per 1,000 population	in total	X_1
		Balance of migration for the permanent	in total	X_2

		residence of people of working age per 10,000 working age population		
		Demographic dependency indicators	post-working age population per 100 working age population	X_3
			the number of non-working age population per 100 persons of working age	X_4
			post-working age population per 100 pre-working age population	X_5
	Public health	Infant deaths per 1,000 live births	in total	X6
		Share of deaths by cause in the total deaths	cardiovascular disease	X_7
			cancer	X_8
			respiratory system diseases	X_9
		Deaths of people aged up to 65 per 1,000 people at that age	in total	X_{10}
	Poverty and living conditions	Share of people in households using environmental social assistance in the total population	in total	X_{11}
		Average monthly gross remuneration (business entities employing over nine people)	in total	X_{12}
		Average usable floor space per 1 person	in total	X_{13}
	Education	Share of children covered by pre-school education in the total number of children aged three-five	in total	X_{14}
			in the countryside	X_{15}
		Indicators of the quality of education and the level of knowledge of students	passing the final exams in vocational upper secondary schools	X_{16}
			passing the final exams in general secondary schools	X_{17}
	Access to the labor market	Share of the long-term unemployed (longer than one year) in the total number of registered unemployed	in total	X_{18}
		The number of the registered unemployed in relation to the number of people of working age (as of December 31)	unemployed - women	X_{19}
			unemployed people with higher education	X_{20}
		Job offers for disabled people per 1,000 disabled unemployed	in total	X_{21}
		Share of graduates (not working yet) in the total number of unemployed	in total	X_{22}
			graduates - women	X_{23}
		Registered unemployment rate	in total	X_{24}

	Consumption patterns	Number of passenger cars per 1,000 population	in total	X_{25}
		Utilities consumption in households per year per capita	electric energy	X_{26}
			gas	X_{27}
			water	X_{28}
	Income adequacy in old age	Share of long-term registered unemployed (longer than 1 year) aged 55-64 in total unemployed aged 55-64	in total	X_{29}
		Share of people in retirement age in households using environmental social assistance in the total number of people of that age	in total	X_{30}
	Determinants of health	Injured in accidents at work per 1,000 employees	in total	X_{31}
		Outpatient clinics for 10 thousand. residents	in total	X_{32}
	Criminality	The rate of detection of perpetrators of crimes identified by the Police	in total	X_{33}
		Crimes identified by the police in total per 1,000 inhabitants	in total	X_{34}
			criminal	X_{35}
			economic	X_{36}
			road	X_{37}
			against life and health	X_{38}
			against property	X_{39}
	Road accidents	Victims of road accidents per 100,000 registered vehicles	wounded	X_{40}
			fatal accidents	X_{41}
economic	Economic development	Investment outlays in enterprises (current prices; excluding economic entities employing up to nine people) per one inhabitant of working age	per 1 inhabitant of working age	X_{42}
		Entities of the national economy newly registered in REGON per 10,000 working age population	in total	X_{43}
		Value of foreign capital of companies per capita of working age	in total	X_{44}
		Share of investment outlays according to Polish Classification of Activity in total investment outlays of enterprises (excluding economic entities employing up to nine people)	agriculture, forestry, hunting and fishing	X_{45}
			industry and construction	X_{46}
			trade; repair of motor vehicles; transport and warehouse management; accommodation and catering; information and communication	X_{47}
			financial and insurance activities; real estate market services	X_{48}
			other services	X_{49}

	Employment	Natural persons running a business per 100 persons of working age	in total	X_{50}
		Entities of the national economy entered in the REGON register according to size classes per 10,000 inhabitants of working age	in total	X_{51}
			micro (up to 9 people)	X_{52}
			small (from 10 to 49 people)	X_{53}
			medium (from 50 to 249 people)	X_{54}
			large (over 250 people)	X_{55}
	Transport	Length of bicycle paths	per 10,000 km2	X_{56}
			per 10,000 residents	X_{57}
		Length of local public roads per 100 km2	hard surface	X_{58}
			soil surface	X_{59}
		Share of municipalities' expenditure on public roads in total expenditure	in total	X_{60}
		Share of districts' expenditure on public roads in total expenditure	in total	X_{61}
environmental	Climate change	Carbon emissions from plants especially noxious to air purity	in total	X_{62}
		Municipalities' expenditure on air and climate protection per capita	in total	X_{63}
	Energy	Electricity consumption per capita	in total	X_{64}
			in the city	X_{65}
			in the countryside	X_{66}
	Air protectioon	Air pollutants emission from plants especially noxious to air purity	gas	X_{67}
			dust	X_{68}
		Share of impurities retained or neutralized in pollution abatement equipment in plants especially noxious to air purity in general	gas (without CO2)	X_{69}
			dust	X_{70}
	Land use	Forest cover	in total	X_{71}
		Afforestation intensity	in total	X_{72}
	Biodiversity	Share of legally protected areas in the total area	in total	X_{73}
		Share of green areas in the total area	in total	X_{74}
	Waste management	Amount of mixed communal waste from households collected annually per person	in total	X_{75}
		Share of communal and industrial sewage	in total	X_{76}

		subjected to treatment as percent of total amount of sewage requiring treatment		
		Number of household treatment plants	in total	X_{77}
		Illegal dumping sites	number per 100 km2	X_{78}
			area per 100 km2	X_{79}
institutional and political	Openness and participation	Number of registered foundations, associations and social organizations per 10,000 residents	in total	X_{80}
		Voter turnout in local elections	1st round	X_{81}
			2nd round	X_{82}
		Participation of women councilors and councilors with higher education in the legislative bodies of communes and districts	women	X_{83}
			people with higher education	X_{84}
	Economic instruments	Proceeds to municipal budgets due to service charges per capita	in total	X_{85}
		Funds from the European Union for financing EU programs and projects obtained by communes and districts per capita	in total	X_{86}
		Expenditure from budgets of communes and districts for servicing public debt per PLN 1,000 in the total revenues of communes and districts budgets	in total (communes and districts together)	X_{87}
		Share of investment expenditure of communes and districts in total expenditure	in total (communes and districts together)	X_{88}
		Share of the area covered by the valid local spatial development plans in the total area	in total	X_{89}

Additionally, it should be emphasized that the requirements of the adopted method impose certain rigours on the statistical features of objects. First of all, the data must be complete and collected according to the same methodology. Of the features meeting the above requirements, 35 were considered stimulants (X1t, X12t, X13t, X14t, X16t, X17t, X25t, X32t, X42t, X43t, X44t, X45t, X46t, X47t, X48t, X49t, X50t, X51t, X52t, X53t, X54t, X55t, X56t, X57t, X58t, X59t, X60t, X71t, X73t, X77t, X80t, X83t, X84t, X88t, X89t) and 24 were identified as destimulants (X3t, X4t, X5t, X7t, X8t, X9t, X10t, X11t, X18t, X19t, X20t, X22t, X23t, X24t, X26t, X28t, X29t, X30t, X31t, X64t, X65t, X75t, X76t, X87t). The remaining features did not meet the rigorous methodological requirements of synthetic taxonomic measures. The features qualified for further procedure did not show an excessive degree of correlation with each other, and therefore they were all included in the synthetic index.

Finally, the degree of statistical correlation of the two integrated measures described above was checked. This procedure was to verify hypothesis number two.

Research Results

After carrying out appropriate procedures (including the selection of a pattern and the standardization of features), the values of a synthetic measure reflecting the effectiveness of the local security policy in rural areas in the province under study were calculated. This measure was calculated on the basis of the results of empirical research on the level of the sense of security of the inhabitants of districts in the Kuyavian-Pomeranian Province (see Figure 1).

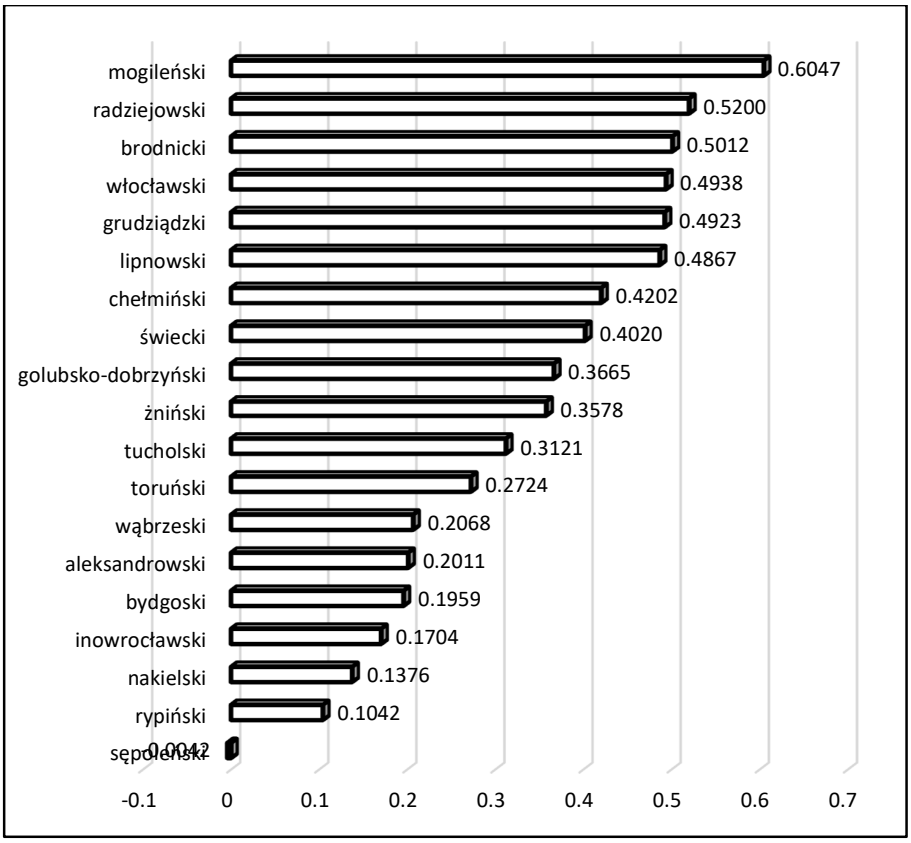

Fig. 1: A synthetic measure of the effectiveness of the local security policy of residents in the rural districts of the Kuyavian-Pomeranian province

The ranking presented in Figure 1 shows significant taxonomic distances between the synthetic measures of security policy effectiveness across individual districts. The difference between the best and the weakest district in the value of the synthetic measure was as big as over 0.6, which means serious differences in the level of the perception of safety in the local environment and in the assessment of the elements of the local security system between individual districts. It also means that despite the fact that they belong to the same province, the inhabitants of its particular areas show significant differences in the assessment of the effectiveness of the local security policy.

The maximum value of the synthetic index reflecting the level of the sense of security and the assessment of individual elements of the local security system was over 0.6 (for the Mogilno district). This means that it was in the second quartile of the index distribution, which corresponds to a high level of local security. Two other districts were in a similar situation: Radziejowski and Brodnica. Nine districts obtained the value of the synthetic index between 0.25 and 0.5, which means the assessment of local safety at the level of poor. The remaining local government units (7) were in the last quartile of the distribution with the measure below 0.25 (= very poor level of local security).

It is worth emphasizing that the research on which the ranking was based was not fully representative. However, due to the collection of a significant amount of empirical material, it has a significant informative value.

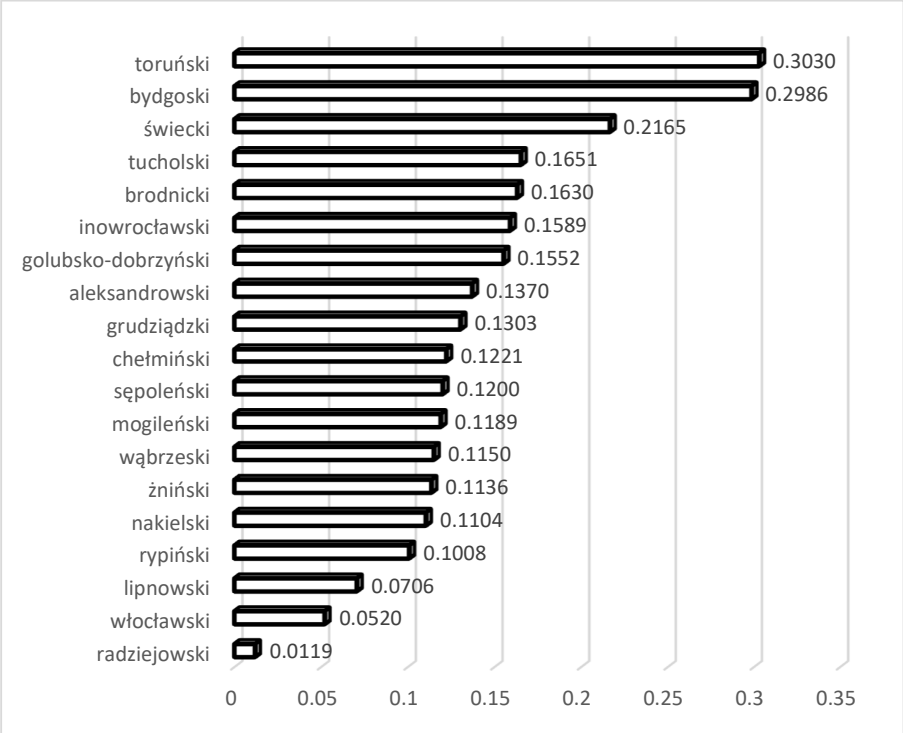

Fig. 2: A taxonomic measure of sustainable development for rural districts of the Kuyavian-Pomeranian Province

The second conclusion concerns the level of sustainable development in the rural districts of the Kuyavian-Pomeranian Province. One can see a clear difference both in the ranking positions themselves and in the value of the synthetic measure. The maximum value of the synthetic index was approximately 0.3. This means that all the examined districts are below the second quartile of the distribution of the index values. This can be interpreted as a low or very low level of sustainability.

It is worth emphasizing that the ranking of the level of sustainable development was constructed on the basis of objective indicators (see Table 1). Therefore, it is not burdened with the subjective assessment of respondents, as was the case with the ranking of the effectiveness of local security policy. It can thus be concluded that from the objective point of view it is more credible. On the other hand, the presented comparison proves that the objective assessments of economic reality do not always coincide with subjective social perceptions.

The analysis of the correlation between the size of both synthetic measures brings interesting results. Pearson's correlation coefficient is only -0.27. In fact, this means that there is no statistically significant correlation between the effectiveness of the local security policy and sustainable local development in the rural areas of the Kuyavian-Pomeranian Province. A deeper analysis leads to the conclusion that some indicators taken into account in the process of constructing a synthetic measure of the local safety level are correlated to a slightly greater extent with the taxonomic measure of development. In all cases, the correlation is negative. It also does not mean a statistically significant relationship. In statistical terms, integrated local development in the districts of the Kuyavian-Pomeranian Province may be influenced by: strong attachment to the local community (correlation coefficient -0.35), assessment of the sense of security (-0.34) and attachment to the place of residence (-0.34). However, the level of the correlation coefficient does not allow us to formulate unambiguous hypotheses in the discussed scope.

Summary

The use of a multidimensional taxonomic analysis to study the relationship between the effectiveness of local security policy and sustainable local development has undeniable advantages. First of all, it allows us to objectively show the differences between districts in terms of extremely complex, multifaceted issues. It shows these differences on the basis of a whole set of diverse characteristics rather than single parameters (e.g. growth rate).Thus, the multidimensional approach reflects the differences between the studied objects much more precisely.

The examined districts showed significant differences in the level of the integrated development measure. This means that within one administrative unit (province), there are areas that differ significantly in the level of sustainable development. Thus, the hypothesis number 1 was confirmed.

The analysis of the statistical correlation reveals the lack of a statistically significant correlation between the effectiveness of the local security policy and the level of sustainable local development in the rural areas of the Kuyavian-Pomeranian Province. A deeper analysis leads to the conclusion that some indicators taken into account in the process of constructing a synthetic measure of the local safety level are correlated to a slightly greater extent with the taxonomic measure of development. However, the low level of the correlation coefficient does not allow us to formulate unambiguous hypotheses in the discussed scope. Thus, hypothesis number two was rejected.

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The Assessment of the Efficiency of the Sustainable Development Policy in the Category of Economic Order across Polish Provinces

Piotr SIEMIATKOWSKI
Nicolaus Copernicus University in Torun, Torun, Poland, piotr.siemiatkowski@umk.pl

Patryk TOMASZEWSKI
Nicolaus Copernicus University in Torun, Torun, Poland, patrykt@umk.pl

Joanna MARSZALEK-KAWA
Nicolaus Copernicus University in Torun, Torun, Poland, kawaj@umk.pl

Kamila REZMER-PLOTKA
Nicolaus Copernicus University in Toru, Torun, Poland, krezmer@doktorant.umk.pl

Abstract

A comparative analysis of sustainable development in the category of economic order at the regional level has been carried out. A comparison of the level of implementation of the guidelines for economic order in Polish provinces has been made. The following research questions were formulated: Q1: What are the methods to apply in order to assess the level of sustainable development in the light of the plethora of the strategic goals of sustainable development and the implementation indicators of these goals; Q2: Do Polish provinces implement the assumptions of the sustainable development strategy with comparable efficiency. The following hypotheses were formulated: H1: The objects under research show significant differences in terms of the taxonomic distances between the synthetic measure of development which confirms the validity of applying the multidimensional analysis for measuring the levels of sustainable development; H2: Polish provinces differ significantly in terms of the level of sustainable development in the category of economic order. The aim of this article is to objectively measure the progress in the implementation of the goals of the sustainable development strategy in the category of economic order by Polish provinces. In order to meet the formulated goal, a synthetic measure was built with a view to defining the implementation level of the goals formulated in the sustainable development strategy in the category of economic order.

Keywords: sustainable development, economic order, provinces, Poland.

Introduction

Nowadays, sustainable development is one of the most popular concepts among researchers of multiple scientific disciplines, including economics, management, political science and administration, sociology, technical science and the science of security. The reason for this is the broad scope and interdisciplinarity of the concept. Several hundred indicators describing sustainable development are classified under the so called 'four orders', namely: social order, economic order, environmental order and political-institutional order.

The subject of analysis in this paper is economic order. A comparative analysis of sustainable development in the category of economic order at the regional level has been carried out. A comparison of the level of implementation of the guidelines for economic order in Polish provinces has been made.

The aim of this article is to objectively measure the progress in the implementation of the goals of the sustainable development strategy in the category of economic order by Polish provinces. In this case, the expression 'objectively' means embracing the advances in implementing all the goals within one single synthetic measure. This means that the assessment of the level of sustainable development in the category of economic order in particular provinces was carried out using a simultaneous analysis into the multiple aspects of this development. In order to meet the formulated goal, a synthetic measure (reflecting the plethora of sustainable development indicators) was built (using taxonomic analysis methods) with a view to defining the implementation level of the goals formulated in the sustainable development strategy in the category of economic order. The values adopted by the measure allowed creating a

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ranking of all the provinces under investigation in terms of their advancement in the implementation of the goals of sustainable development in the category of economic order.

Theoretical Background

The issue of sustainable development has been the subject of research for years. The concept has been developed since the 1980s as "an attempt to examine relations between development and the environment" (Banerjee, 2003, p. 151).

A number of definitions concerning this area have been formulated in the literature and many of them also emphasize its local dimension. What should be stressed, there is no single, universally accepted, definition of this notion.

Ruth Kelly, Lorcan Sirr and John Ratcliffe go as far as to call it "an intuitively defined concept" (Kelly, Sirr and Ratcliffe, 2004, p. 80). As Hartmuth,, Huber and Rink, indicate, this lack of a precise definition of sustainable development has made this concept become even more attractive and fashionable. Differences in interpretations dominated the scientific discourse at a certain stage, initiating a sort of a battle for the definition (Hartmuth, Huber and Rink, 2008).

Robert, Parris and Leiserowitz argue that the adaptability of the notion makes it an open and constantly developing idea which can change to fit situations and concepts that are very different in terms of time and space." (Robert, Parris and Leiserowitz, 2005, p. 20). What should be emphasized the notions of "sustainability" and "'sustainable development" are used interchangeably (Banerjee, 2003).

According to Patel , "Sustainable development approaches typically seek to recognize and act on common interests and hence focus on consensus building" (Patel, 2000, p. 386). The author also indicates that what is the most important element of the concept of sustainable development is the thinking of the future (Patel, 2000, p. 387). Patel Z. adds that it is necessary to maintain a large margin when undertaking to define the notion of sustainable development as this term is, by nature, quite susceptible to contextual changes – in specific conditions it needs to be re-interpreted (Patel, 2000). As Redclift put it, "it means different things to different people" (Banerjee, 2003, p. 152).

One of the most frequently quoted definitions of sustainable development is the one formulated by the World Commission on Environment and Development (WCED) in the 1987 Report Our Common Future (Bruntland Commission), according to which "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: 1. the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and 2. the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" (World Commission on Environment and Development, 1987).

Another definition was proposed by Agyeman and Evans, who perceive "sustainability as both an all-embracing concept and a long-term policy objective" (Patterson and Theobald, 1995). Moreover, they indicate that "there must be international, national and regional frameworks and guidance, it is local policy and action which will ultimately deliver sustainability" (Patterson and Theobald, 1995, pp. 197–198).

Having conducted an analysis of 100 definitions of sustainable development, "Gladwin et al. (1995) identified several themes, including human development, inclusiveness (of ecological, economic, political, technological, and social systems), connectivity (of socio-political, economic, and environmental goals), equity (fair distribution of resources and property rights), prudence (avoiding irreversibilities and recognizing carrying capacities), and security (achieving a safe, healthy, and high quality of life)" (Banerjee, 2003).

Another important aspect of the studies of sustainable development is the issue of the evaluation of efficiency in goal achievement in this respect. Devuyst defines this assessment as a process of recognizing, anticipating and appraising the influence that a variety of initiatives (including lawmaking, regulations, measures, programmes, plans and projects) and their alternatives may have upon the sustainable development of a society. The process encompasses the formulation of a formal report on the sustainability evaluation in such a way that it enhances the publicly accountable decision-making process (Devuyst, 2000, p. 68).

Stevart and Davis note that "the aspiration for sustainable development can only be achieved through an integrated system of functions and institutions" (Patterson and Theobald, 1995, pp. 29–36). They also point out the consensus goals and targets (specified in ratified treaties, documents and declarations) which focus on the basic definition of sustainable development that encompasses meeting people's needs, the reduction of hunger and poverty, and, at the same time, the preservation of the life support systems of the planet (Parris and Kates, 2003, p. 381; Jankowska, 2014).

Many of the challenges facing the humankind, such as climate change, water shortage, inequality, famine, etc. can be overcome not only at the global level (Walewicz, 2018, 2019) by promoting sustainable development, but at the local level in the first place. In many countries, local communities are working hard to improve the level of sustainable development. They are the decision-makers and catalysts of change who combine global goals with their own, local, ones.

By attempting to define the concept of sustainable development at the local level, the authors of the Local Agenda Planning Guide, "An Introduction to Sustainable Planning", a document prepared by the International Council for Local Environmental Initiatives (ICLEI) in 1996, stressed that "sustainable development requires that local economic development supports community life and power, using the talents and resources of local residents. It further challenges us to distribute the benefits of development equitably, and to sustain these benefits for all social groups over the long term. This can only be achieved by preventing the waste of ecological wealth and the degradation of ecosystems by economic activities" (ICLEI, 1996).

It should be pointed out, as Patterson, A., & Theobald, K. S. have proven in their studies, "the move towards sustainable development is being hampered by the creation of a new and less participatory form of local and regional governance, which is reducing the capacity of local communities to respond to the environmental agenda, in terms of establishing and implementing policies for sustainable development" (Patterson and Theobald, 1995).

That is why considerations on sustainable development on the local level significantly differ from those concerning the possibility of implementing sustainable development in general (Cooper and Vargas, 2004; Du Pisani, 2006, Jarosz, 2019), because local development is vastly dependent on the conditions of a given state, region, and local communities (Littig and Grießler, 2005). It is important to comprehend the specificity of applied solutions aimed to realize the assumptions of sustainable development adjusted to particular areas across the whole world (Patterson and Theobald, 1995; Patel, 2000; Cuthill, 2002; Corbiére-Nicollier, Ferrari and Jolliet, 2003; Hurynak and Kordonska, 2018).

Therefore, operationalization tries become very useful, while properly elaborated measurements simultaneously associated with the process of methodic planning make possible to efficiently design sustainable development on the local level (Brugmann, 1997; Hartmuth, Huber and Rink, 2008). It seems that the set of the measurements is opened and constantly extended. Among often omitted elements that may have a meaning for local development there are cultural heritage (Murzyn-Kupisz, 2012; Hełpa-Liszowska, 2013) or external intervention (Gorzelak, 2000). Significantly more often attention is paid to the meaning of innovations for management (Tuziak, 2005; Kozuch and Kozuch, 2012; Silvestre and Ţîrcă, 2019), cultural tourism (Małek, 2003; Istoc, 2012; Durovic and Lovrentjev, 2014), financial matters, such as civil budget (Redo, 2016; Redo and Siemiątkowski, 2017; Sobol, 2017), and infrastructure, which may directly or indirectly influence on the realization of the majority of sustainable development's goals (Thacker *et al.*, 2019). The increasing meaning in the process of sustainable development is assigned also to renewable resources (Østergaard *et al.*, 2020) and activities related to climate change (Cramer *et al.*, 2018), as well as to the studies on artificial intelligence (Vinuesa *et al.*, 2020) or cities and human security (Szpak, 2015). It is connected with the dynamic technological progress. Currently there are showing up first reflections on the meaning of the coronavirus pandemic for sustainable development (Berchin and Guerra, 2020; Pirouz *et al.*, 2020).

Methods

The assessment of the level of achieving the goals of sustainable development in accordance with the methodology of the Main Statistical Office (*Główny Urząd Statystyczny* - GUS), compliant with international methodology, is made up of twenty-two groups of indicators. They come under the following four major categories: social order, economic order, environmental order and institutional-political order. Under the economic order, there are the following groups of indicators: economic growth, employment rates, innovativeness, transportation and the pattern of agricultural productions. They define 17 indicators, characterised by 32 different types of measures which help track the progress of territorial units (a country or a part of it) in implementing the concept of sustainable development in the category of economic order.

Considering the significant number of indicators, a comparison of the total progress is extremely difficult. On the other hand, a comparison of territorial units with only one or a few particular indicators fails to give a clear answer to the question of which provinces are quicker and which are slower in implementing the postulates of sustainable development. In such an event, the so called multidimensional analyses can be of great help.

In this paper, the subject of taxonomic assessment is local sustainable development of Polish provinces in the category of economic growth. To this end, the methods of linear ordering, used for the assessment of the level of objects differentiation by means of a closed set of statistical features (Grabiński, Wydymus and Zielaś, 1989), were applied. The applied method has been described thoroughly by other authors so there is no need to give a detailed overview of it (Siemiątkowski, 2017; Siemiątkowski *et al.*, 2019, 2020; Gierszewski, Siemiątkowski and Urbanek, 2020;

Siemiątkowski and Marszałek-Kawa, 2020). However, it is noteworthy to say that for the purposes of this assessment pattern methods were applied, implying the existence of the model object against which taxonomic distances of the objects under research were set.

The synthetic measure was calculated on the basis of the Hellwig method according to the following equation:

$$d_i = 1 - \frac{d_{i0}}{d_0}$$

where:

d_{i0} – the Euclidean distance of object x_i from pattern object x_0,
d_0 – the critical distance of the particular unit from the pattern (Ostasiewicz, 1998).

In order to carry out the taxonomic research into the advances in the implementation of the sustainable development of Polish provinces in the category of economic growth 32 features of objects (provinces) were selected on the basis of the data. It should be stressed that the number of the indicators taken into account in constructing the synthetic measure is limited by the sustainable development strategy postulates themselves. This means that only the features included in the statistical data by GUS were taken into account. They are the features compliant with international guidelines on the goals of sustainable development in the category of economic growth. The following features were taken into account:

$X1_t$ – gross domestic product per capita (current prices) – total,
$X2_t$ – gross domestic product per capita (current prices) – Poland = 100,
$X3_t$ – the share of gross added value according to the Polish Classification of Business Activities (*Polska Klasyfikacja Działalności* - PKD) 2007 in the total gross added value – agriculture, forestry, hunting and fishery,
$X4_t$ – the share of gross added value according to PKD 2007 in the total gross added value – heavy and light industry,
$X5_t$ – the share of gross added value according to PKD 2007 in the total gross added value – construction,
$X6_t$ – the share of gross added value according to PKD 2007 in the total gross added value – trade, car repair, transportation and warehousing management, accommodation and gastronomy, information and communication,
$X7_t$ – the share of gross added value according to PKD 2007 in the total gross added value – financial and insurance activities, the property market servicing,
$X8_t$ – the share of gross added value according to PKD 2007 in the total gross added value - other services and natural persons conducting business activity per 100 persons in the working-age population,
$X9_t$ – investment outlays by sectors per capita (current prices) – total,
$X10_t$ – investment outlays by sectors per capita (current prices) – in the public sector,
$X11_t$ – investment outlays by sectors per capita (current prices) – in the private sector,
$X12_t$ – employment indicator by age – total,
$X13_t$ – employment indicator by age – 15-24 years of age,
$X14_t$ – employment indicator by age – 50 and more years of age,
$X15_t$ – employment indicator by gender - women,
$X16_t$ – employment indicator by gender - men,
$X17_t$ – employment indicator by education – higher education,
$X18_t$ – employment indicator by education – secondary and primary education,
$X19_t$ – natural persons conducting business activity per 100 persons in the working-age population,
$X20_t$ – outlays on research and development against GDP,
X21t – share of innovative enterprises by sectors in the total number of enterprises – in the service sector,
X22t – share of innovative enterprises by sectors in the total number of enterprises – in the service sector – in the manufacturing sector,
X23t – share of sold output of new or significantly improved products launched on the market over the past three years against the value of the total sold output,
X24t – length of express roads and motorways network per 100 km2,
X25t – length of railroads network in operation per 100 km2,
X26t – length of bicycle path network per 100 km2,
X27t – length of bicycle path network per 10,000 inhabitants,
X28t – average price of regular single ticket for city bus fare,
X29t – share of acreage of ecological farms (with certificate) in total agricultural acreage,
X30t – consumption of mineral fertilisers per 1 ha ,
X31t – total number of big farm animals per 1 ha,
X32t – share of large-scale farms in total number of farms.

It should also be noted that the requirements of the applied method put particular rigours on the objects' statistical features. Most importantly, data must be complete and collected under the same methodology. From amongst the

features meeting these criteria 27 of them were recognised as stimulants, 4 as destimulants, and one was eliminated. The features qualified for further procedure did not show excessive correlation in relation to each other as all of them were included in the synthetic indicator.

Research Results

Following the implementation of relevant procedures (including the selection of the pattern, features standardization), the values of the synthetic measure of sustainable development were calculated.

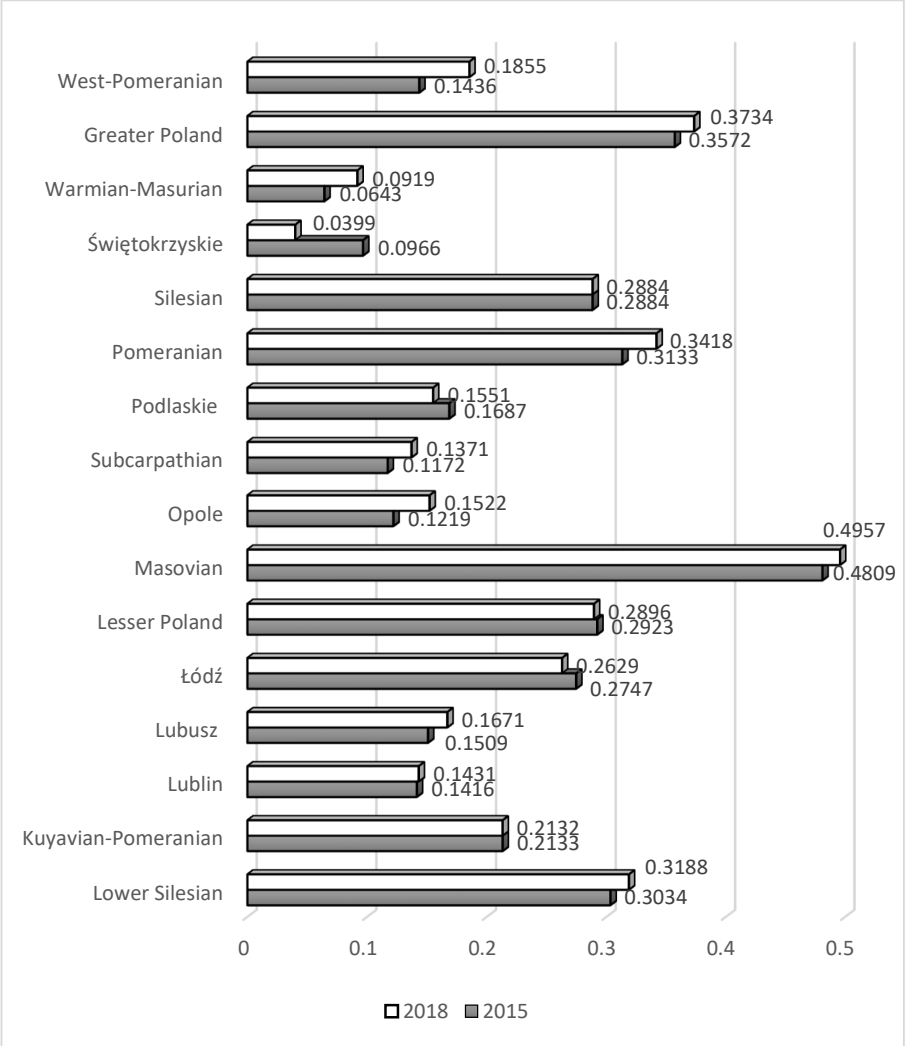

Fig. 1: The synthetic measure of sustainable development of Polish provinces in the category of economic order in the years 2015 and 2018

The ranking in Figure 1 shows significant taxonomic distances between the synthetic measures of particular provinces. The difference between the best and the worst province in 2018 in the value of the synthetic measure was as much as 0.4557. In 2015, the value was 0.4166. This implies considerable differences between particular provinces in achieving the goals of the sustainable development strategy in the category of economic order and significant development delays of some of the country's regions. What is more, over the three years covered by Figure 1 those differences became even bigger. The Masovian province with the country's capital city of Warsaw stands out for the better. It is probable, as the local government authorities of that province have stressed many times, that the capital on its own would achieve a much higher value of the synthetic measure.

The second conclusion regards the level of sustainable development in the counties of the Kuyavian-Pomeranian province. The maximum value of the synthetic indicator was almost 0.5. This means that all of the provinces under investigation are below the second quartile of the indicator's value distribution. This can be interpreted as a low and very low level of sustainable development. Once more, it is worth paying attention to the status and high level of the

economic development of Poland's capital city which 'pulls up' the counties and municipalities of the Masovian province.

High indicator values were also achieved by the Lesser Poland province, Pomeranian province and Lower Silesian province. They are provinces with large metropolitan areas and numerous business enterprises.

At the bottom of the ranking are the peripheral provinces, namely Subcarpation, Warmian-Masurian and Świętokrzyskie, i.e. the so called "eastern wall". It is noteworthy to say that the ranking covered a considerable number of features making it fully credible. They are economically underdeveloped regions. Despite pumping considerable resources in them over the past years (special 'Eastern wall' dedicated programmes financed from EU funds) they still lag behind central or western provinces of Poland in terms of economic development.

Table 1: The percentage change in the synthetic indicator and ranking positions of provinces between 2015 and 2018

Province	Percentage change in the synthetic indicator	2018 ranking position	Change in ranking position against 2015
Lower Silesian (Dolnośląskie)	5.09%	4	0
Kuyavian-Pomeranian (Kujawsko-pomorskie)	-0.04%	8	0
Lublin (Lubelskie)	1.10%	13	-1
Lubusz (Lubuskie)	10.70%	10	0
Łódź (Łódzkie)	-4.29%	7	0
Lesser Poland (Małopolska)	-0.94%	5	0
Masovian (Mazowieckie)	3.07%	1	0
Opole (Opolskie)	24.80%	12	1
Subcarpatian (Podkarpackie)	16.96%	14	0
Podlaskie (Podlaskie)	-8.05%	11	-2
Pomeranian (Pomorskie)	9.12%	3	0
Silesian (Śląskie)	0.00%	6	0
Świętokrzyskie (Świętokrzyskie)	-58.65%	16	-1
Warmian-Masurian (Warmińsko-Mazurskie)	42.92%	15	1
Greater Poland (Wielkopolskie)	4.55%	2	0
West Pomeranian (Zachodniopomorskie)	29.12%	9	2

To conclude this analysis, it is also noteworthy to point to the changes which occurred during the period under investigation. The data presented in Table 1 show explicitly that the position of many provinces over the three years changed significantly. As many as six provinces changed their ranking position. The West-Pomeranian province moved two places up, while the Podlaskie province fell two places down.

The values of the integrated measure changed considerably, too. The greatest 'loss' in this respect was reported by the Świętokrzyskie province. The value of the synthetic indicator fell by as much as 60%. This resulted in the drop of the province in the ranking by one position. The highest increase in the indicator value was reported by the Warmian-Masurian province – by almost 43%. This resulted in the shift of the province of one position up.

Conclusions

The application of the multidimensional taxonomic analysis in measuring the progress of provinces in achieving the goals of sustainable development has undisputable advantages. Primarily, it allows showing the differences in the level of achieving the goals of the sustainable development strategy between particular provinces. Furthermore, it shows the differences not based on single parameters (e.g. growth rate) but on a whole set of various features. Thus,

the multidimensional approach is much more precise in reflecting the differences between the objects under investigation (Siemiątkowski and Jankowska, 2020).

The researched group of entities is characterised by significant differences in the level of the indicators analysed within the framework of the sustainable development strategy in the category of economic order. Consequently, the level of the synthetic indicator is highly varied. It is noteworthy that as many as nine out of 16 provinces are in the lower quartile of the synthetic distribution indicator, i.e. below 0.25. The remaining provinces are in the second quartile of the distribution, i.e. between 0.25 and 0.5 of the synthetic indicator range.

The relatively big taxonomic distances between the synthetic measures for particular provinces with a relatively large number of features are a proof of significant differentiation of particular regions of Poland in terms of achieving sustainable development. Particularly, the Masovian province with the capital city of Warsaw stands out for the better. The provinces of the so called 'Eastern wall' fare the worst. Despite the considerable outlays under UE programmes towards economic activation of these regions their level of development still leaves much to be desired.

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Migration of Health Workers in COVID-19 Conditions

Emília KRAJŇÁKOVÁ[1]
A. D. University of Trenčín in Trenčín - Faculty of Socio-Economic Relations, Slovakia,
emilia.krajnakova@tnuni.sk

Jaroslav VYHNIČKA[2]
A. D. University of Trenčín in Trenčín - Faculty of Socio-Economic Relations, Slovakia,
jaroslav.vyhnicka@tnuni.sk

Abstract

In the current situation associated with COVID-19, radical measures concerning social distance and mobility are increasingly being introduced. Borders are closing, but life in hospitals is experiencing trials for which no one has been sufficiently prepared. Infected people who need health care come to the hospitals. At the same time, to protect those who are in the hospital due to other problems and not to put them at risk. We also encounter a number of problems associated with the provision of medical supplies and equipment, the organization of newly established health departments, the adoption of adequate legislative standards, etc. We are witnessing the emergence of cohesion between peoples and countries and, at the same time, egoism at various levels. These events develop in conditions of relatively intensive migration of health workers. Its causes are mainly related to differences in working conditions and remuneration of health workers in individual countries and their shortage. The occurrence of the coronavirus epidemic has updated and multiplied the need for health professionals around the world. At the same time, from a common point of view, it is not clear what is happening with the migration of health professionals in the conditions of COVID-19. Several events and measures taken in individual countries should strengthen the migration of health professionals, while others should dampen and even suspend or re-emigrate (return home). What is actually happening with the migration flows of health workers, especially in European countries, is the subject of analyzes and findings of the study.

Keywords: Migration, COVID-19, Health Workers.

JEL Classification: I15, J61, J62.

Introduction

Only after a while do we begin to realize how this epidemic is changing and changing our daily lives. In the context of COVID-19, radical measures concerning social distance are being introduced more and more. People are encouraged but also forced to remain isolated both at home and in work teams. The activities of educational institutions, leisure facilities, cultural and sporting events are limited. The borders have closed, but life in hospitals is experiencing trials for which no one has been sufficiently prepared. The occurrence of the coronavirus epidemic has updated and multiplied the need for health professionals around the world. At the same time, from a common point of view, it is not clear what is happening with the migration of health professionals in the conditions of COVID-19. The topicality therefore lies precisely in the issue of migration. Is it or is it not necessary? Where appropriate, to what extent we focus on the health system and health professionals. Several events and measures taken in individual countries should strengthen the migration of health professionals, while others should dampen and even suspend or re-emigrate (return home). Of course, in such a short time, we cannot expect radical changes in the migration flows of health workers in the conditions of COVID-19, which could be detected using conventional research methods and statistical data. Therefore, our goal is to find out, on the basis of available information and logical considerations, at least changes in the speed and direction of migration flows of health workers in the conditions of COVID-19, but also to look for possible opportunities that migrants provide for the health system. What is actually happening with the migration flows of health workers, especially in European countries, is the subject of analyzes and findings of the study.

COVID-19 epidemic and migration of health workers

The introduction and exchange of pathogens between distant communities is as old as the human movement itself. The spread of epidemics of infectious diseases is not new in human history. (Greenaway & Gushulak, 2017). The

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changing nature of crises and the increased expectations of pandemics, according to Karlsen (2016), are paving the way for many challenging crises in the future. Modernization and inequalities in a divided world also play a major role in this future, while organizational factors are often only responsible for inadequate crisis management. Karlsen's thinking in 2016 took on a formidable reality much earlier than we expected. COVID-19 is an infectious disease caused by a recently discovered coronavirus. It is a new virus and disease that was not known before the outbreak of the disease in Wuhan, China in December 2019 (Dong et al., 2020). A serious problem according to Zheng ate. (2020) is the fact that the increase in confirmed cases indicates an underestimation of preventive measures. Because health professionals are only human and are also exposed to this disease. Although they try to protect themselves to a high degree (if they have the equipment), it happens that the hospital staff also become infected. Of course, the hospitals of the countries are also counting on this possible scenario, and therefore they are creating personnel reserves, but in the event that the disease breaks out en masse at several epicenters, medical staff is not enough, nor is the equipment - for example Italy and the USA. According to the International Council Of Nurse (2020), Italian health workers have sacrificed and are sacrificing health in the fight against COVID-19, also due to a lack of protective equipment. Data from April 2020 showed an increase in cases of infected health workers, which accounted for up to 9%.

Jennifer Goforth Gregory (2020) also draws attention to a serious problem, who says that while America is currently facing a major health crisis, other factors also contribute to the very shortage of health workers. Most of the world is expected to face similar challenges in the next 10 years, and many countries are already in crisis. Its research direction includes the so-called The Baby Boomer generation, which includes 76 million Americans born after World War II from 1946 to 1964 (according to the United States Census Bureau). The oldest reached the age of 64 in 2010, and over the next 20 years, most of this population will be retired, many of whom are in the medical profession leaving many health care jobs. In addition, a large part of the aging population will require additional medical care from the health care system, which will be increasingly burdened by too many patients and a shortage of health professionals. According to Bidwell et al. (2014) estimate at about 4.3 million and these are the countries with the highest burden of various diseases. Wojczewski et al. (2015) argue that global health imbalances contribute to the malfunction of health services, especially in low-income countries. The loss of health workers, inadequately equipped health systems in poor countries makes this situation even worse. In many such countries, the vacancy rate for doctors and nurses is more than 50%. Thus, the brain drain has more far-reaching consequences. Following these findings, Stephen Khan (2020) also mentions the South African health system, which has a long-standing problem with a shortage of medical staff. The World Bank estimates that there are only 0.9 doctors for every 1,000 people in South Africa, compared to a global average of 1.6. The area has only 1.3 nurses and midwives for every 1,000 people, compared to a global average of 3.8. By mid-July 2020, COVID-19 would multiply this problem by 3% of the total number admitted to the infectious disease. The International Labor Organization (ILO, 2020) estimates that 244 million migrants live worldwide. A significant number of these migrants are low- or semi-skilled workers who live in conditions that raise concerns about social overcrowding and unsatisfactory hygiene. Although, according to the organization's findings to date, housing conditions have generally improved over the years, the conditions are not ideal for a pandemic situation. The current situation has highlighted the vulnerability of migrant workers as a working group. Following this, Ginsburg et al. (2018) states that the relationship between migration and health is multidimensional and two-way. Health can lead to migration, but such relocation can have an impact on health. Circular migration was also associated with the spread of health conditions or behavior between the target areas. Migration is a common manifestation of global trends in the labor market in all countries of the world, although from the perspective of European Union countries, this phenomenon develops in the conditions of the so-called free movement of labor within the Union (Krajnakova, Vojtovič, 2020). However, it is possible to talk about the emergence of large imbalances in the labor market, which are affected by the absence of balance sheets on the benefits and losses of labor migration for individual countries (Tupa, Vojtovic, 2018).

The reason for these migratory flows are, according to Shattuck et al. (2008) also motivate workers themselves in countries where low incomes cripple already fragile healthcare systems. Retaining health professionals is crucial to the performance of health systems, so it is how to best motivate and retain health professionals. . The International Organization for Migration (2020) adds that for more than a decade, the global shortage of health workers has been called a crisis, and programs to address human health resources need to be designed to overcome it. As early as 2006, the World Health Report drew attention to the unsatisfactory state of health care and the need for rapid progress towards improving the health care of the population, especially in view of the critical shortage of qualified health professionals in 57 countries. If we focus on the issue of migration of qualified health professionals. Thus, according to Schumann and Maaz (2019) in general and physicians in particular, it has become a global phenomenon of movement. This phenomenon has a significant impact on the quality of health care systems in the source countries, ie the countries of origin of the professionals who travel abroad for work, as well as in the destination countries that receive health workers. The Work Health Organization (2020) has the same opinion, confirming that even outside the epidemic, the migration of health workers is increasing. The number of migrant doctors and nurses working in OECD countries has increased by an incredible 60% in the last decade. Forecasts for the future point to a continuing acceleration of international migration of health professionals, with a growing

mismatch between supply and demand. It is necessary to understand the stimuli of the health worker to the migration itself. So what are the advantages and disadvantages or incentives for migration of health professionals? The summary in Table 1 will serve us for this.

Table 1: Select Advantages and Disadvantages of Circular Migration of Health Professionals

Source: Graziano Battistella (2020, ILO)

For The Migrands	For The Origin	For The Destination
Adventages	**Adventages**	**Adventages**
Preserve traditional and family associations.	Health workers return with greater skills and improved networks.	Savings in the training of health professionals.
Can still earn and professionally benefits of working with high incomes country.	Contribution to the health of the nation.	Part of a 'development friendly' national migration policy.
Able to contribute to the health of the homeland population.	Improved links with a destination country.	It can satisfy the shortage of health professionals in rural and remote areas.
Create opportunities for the family.	Brain drain human capital loss not as great.	Enhanced links with origin country.
Children can gain experience growing up in both countries.		Most health worker shortages handled in a flexible way.
Disadvantages	**Disadvantages**	**Disadvantages**
Disruption of moving.	Governance challenges.	Complications of organisation health system at destination.
Social costs of separation from family for part of the time.	Loss of skills for part of the time.	Governance challenges.
Complexity and costs of moving.	Difficulties with the organization of the health system with personnel only in the country for limited time.	Workers not available on a permanent basis.
Difficulties of adjusting to two work contexts.		Difficulties for immigration policy.

The issue of migration of health professionals can be viewed from different perspectives, as well as can be seen in the division according to Battistell (2020). Here are provided insights into the advantages and disadvantages in three basic areas (migrands, origin, destination). Of course, these can also differ from the preferences of the individual himself or the cultural society in which he works. Humphries et al. (2015) try to point out that the very stimuli for motivation change over time. Migration decisions are much more complex than the "binary scenario" often reported in the literature. The migration of health workers is affected by many factors, including those that are endogenous to the health system (such as the desire for better working conditions) and exogenous to the health system, such as the desire for better demands for citizenship and family reunification. Based on these studies, we note a great shortage of health workers in the future and thus their migration.

Objective and Methodology

All the above-mentioned events related to COVID-19 require the need for a larger number of health professionals and at the same time restrict their free movement and employment in specific health care facilities and in specific countries. Of course, in such a short time, we cannot expect radical changes in the migration flows of health workers, which could be detected using conventional research methods and statistics. Our goal is to find at least

changes in the speed and direction of migration flows of health workers in the conditions of COVID-19 on the basis of available information and logical considerations. This means that the intensity and extent of migration flows increased, remained at the previous level, or slowed down. In the article we use available statistical data on the migration of health workers from the OECD, thanks to which it was possible to point out the importance and nature of migrants working as health workers. At the same time, it is possible to assess how the individual affected countries approached this issue and from what sources they tried to obtain the necessary health workers. Because it was necessary to focus on the concepts that examined the phenomenon and the issue of the paper. In our case, it was a connection between the issue of viral disease (epidemic) and international migration of health workers. As a result, there were some opportunities for migration of health workers, but also threats associated with COVID-19 or the escape of health workers under better conditions. Subsequently, our findings allowed us to state the evaluations, but also to shape the very direction of the paper and its issues.

Problem Solution

Although the health care system has tried to gradually prepare for a larger number of patients with COVID-19 (coronavirus). It was necessary to transform some departments into so-called red pavilions, or in the worst crisis variant, transform the entire medical facility into a COVID hospital. During a pandemic, doctors have to deal with many problems, both they face enormous pressure and the fact that they deal with death more often than they are used to. Due to the restrictions that apply to a hospital visitor, they are often the last person to spend time with an terminally ill patient. This greatly affects their mental health, not to mention that these pressures weaken their immune system and are thus more susceptible to the disease itself. At the same time, it is necessary to point out that the medical staff where this disease appears among the employees, or is suspected of it, must go to quarantine (usually 2 weeks). So a paralyzed health system will receive another blow, not to mention if the burn is confirmed by doctors and they automatically drop out for an indefinite period. Many states have asked for help, or this help has been provided to them by other states as a show of solidarity, and so has the international migration of health workers. As the world faces pandemics, it is important that all authorities make every effort to confront xenophobia, including when migrants and others are exposed to discrimination or violence related to the origin and spread of the pandemic (United Nations Humans Rights, 2020). Migrants can be a driving force for hospitals that do not have enough staff. In response, a number of OECD countries (or states and provinces in the United States and Canada) have taken measures that have even enabled immigrant health workers to help cope with the sharp rise in demand for health care. These actions have facilitated the renewal of work permits, accelerated processing of the recognition of foreign qualifications, temporary and / or limited certification, or access to certain health jobs (OECD, 2020).

Examples of measures to facilitate the work permit of health professionals: In Chile, the National Health Service may employ foreign health professionals in the event of an emergency, even if their qualifications are not yet formally recognized. In contrast, the Spanish ministries had various urgent and coordinated measures to immediately employ foreign health workers willing to work in Spain. At the end of April 2020, about 400 people had been admitted. International nursing students can now work more than 40 hours every two weeks in Australia to ease the pressure on the workforce. In France, health professionals without a permit to study abroad can work as support staff in non-medical professions. Among other positive measures, we recommend free extension of visas in the case of a health worker (GOV-UK, 2020). Such measures have been introduced by the United Kingdom where health professionals are entitled to a free visa extension for one year. The condition is to have a visa, which expires between March 31 and October 1, 2020. Work for the NHS or an independent health care provider in an eligible profession. If the conditions are met, this benefit also applies to family members, who can also extend their visa for one year free of charge. According to Charlotter Oberti (Info Migrants, 2020), for example in France where health services were severely paralyzed during the coronary crisis, dozens of refugees and asylum seekers with medical knowledge in their home countries are ready to volunteer as a gesture of "gratitude". Because the inability to use their medical skills during this public health crisis has been very frustrating for them. As the pandemic continued to spread, on 25 March 2020, the French Ministry of Health called on active and retired people to help their colleagues voluntarily cope with the crisis. It was then a large-scale mobilization challenge in an industry known for its stringent authorization requirements. To facilitate the use of all volunteers, the French inter-ministerial delegation for the reception and integration of refugees stated that refugees with diplomas from outside the European Union who worked in their country of origin as doctors, dentists or pharmacists were entitled to work in French public institutions but "in contractual status ”and under the supervision of an accredited doctor. Even the government, in the urgency of the situation, extended these conditions during the crisis to "foreigners" who do not have refugee status in France.

It may be of interest, according to Dumpster and Smith (Center for Global Development, 2020), that the individual states affected rely on migrants, even though the policies of the states often restrict their movement. Studies show that in most high-income countries, migrants make up a large proportion of health workers. Today, one in six doctors in OECD countries has studied abroad, and the number of doctors and nurses born abroad has increased by an incredible 20% in the last decade. Migrants make up 12 percent of the UK's 1.9 million health workers and 17

percent of the US's 12.4 million healthcare workers. Thus, it can be stated that health systems rely heavily on migrant health workers. Confirmation of the following statements is also provided in the International Platform On Health Worker Mobility (2020). Who is tasked with maximizing the benefits and mitigating the adverse effects of labor mobility in the health sector through intensified dialogue, knowledge and cooperation. At the same time, they are trying to facilitate a strong political dialogue and measures in the field of health workforce mobility. In particular, through strong monitoring, country support, knowledge-sharing acquisition and sharing, and enhanced support for the implementation of the WHO Global Code and relevant ILO Conventions and Recommendations. The direction of their activities can be seen in the following diagram.

Scheme 1: International Platform On Health Worker Mobility

Source: Jim Campbell (Health Workforce Deparment, 2020)

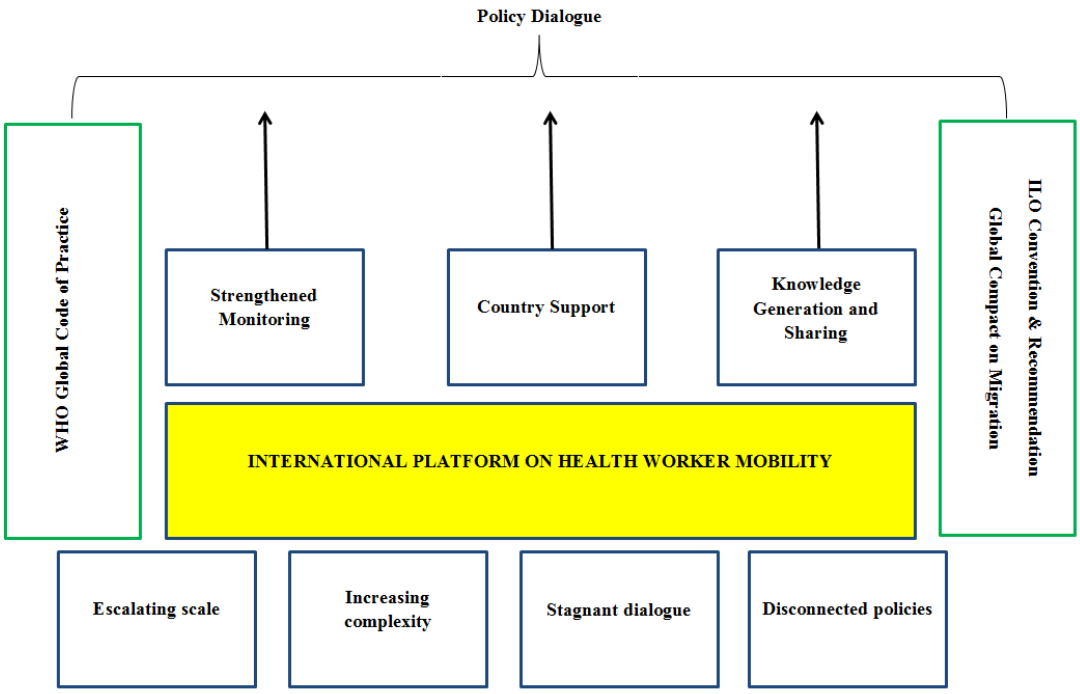

At the same time, the idea of the availability of a sufficient number of qualified and, above all, motivated health professionals, who are essential for the performance of any health care system, comes to the fore, as pointed out by the current COVID-19 pandemic. The deep-rooted challenge of staff shortages was highlighted, as was the significant contribution of migrant doctors and nurses who contribute to the health workforce in many OECD countries. Numerically, we will follow up on these data in the statistical overview of migrants working in these countries.

Table 2: Number and share of migrant doctors and nurses working in OECD countries

	Migrant doctors				Migrant nurses			
	foreign-trained (of which natives)1		foreign-born		foreign-trained (of which natives)1		foreign-born	
	number	% of total	number	% of total	number	% of total	number	% of total
Australia	29 000 (333)	32.1 (0.4)	47 154	53.9	52 860 (815)	18.4 (0.3)	104 272	35.3
Austria	2282 (399)	6.0 (1.0)	5 2 251	14.2	..	..	18 779	19.6
Belgium	8061	12.1	6 174	15.7	7889	3.7	15 281	11.2
Canada	24 587	24.6	38 780	38.5	32 346	8.1	92 530	24.4
Chile	11 038 (2030)	22.7 (4.2)	..	..	1135 (196)	2.0 (0.4)	9532	7.9
Czech Republic	3232	7.4	4 110	9.7	..	..	2600	2.7
Denmark	2111	9.2	3 904	21	1034	1.8	41 732	6.7
Estonia	262	3.9	742	14	20	0.1	1304	14.3
Finland	..	..	1917	9.5	..	..	2722	3.6
France	26 048 (715)	11.5 (0.3)	312 271	15.7	20 757	2.9	40 329	6.6
Germany	419 343	11.9	78 907	20.2	71 000	7.9	217 998	16.2
Greece	836742 (7 832)	12.8 (12.0)	2 103	4.2	451 (416)	2.5 (2.3)	3221	6.1
Hungary	2614 (400)	8.0 (1.2)	3 761	11.2	953 (17)	1.5 (0.0)	2238	4
Ireland	9583	41.6	5 565	41.1	..	..	13 778	26.1
Israel	17 133 (6 963)	57.9 (23.5)	13 753	48.7	5078 (2 125)	9.3 (3.9)	19 946	48
Italy	3378 (1 443)	0.8 (0.4)	10 163	4.3	21 561 (458)	4.8 (0.1)	41 935	10.7
Latvia	477	6	1 197	17.4	274	3.2	1334	16.6
Lithuania	72	0.5	..	..	113	0.4	..	..
Luxembourg	..	..	1 103	55	..	..	900	29.1
Netherlands	1336 (483)	2.2 (0.8)	11 247	17.1	978 (249)	0.5 (0.1)	11 643	6.2
New Zealand	7228	42.5	..	..	13 115	26.2	..	..
Norway	10 248 (5 492)	40.3 (21.6)	5 082	22.7	6065 (1 121)	8.7 (1.2)	12 418	12.1
Poland	2549	1.9	..	..	162	0.1	..	..
Portugal	6229 (2 865)	12.2 (5.6)	3 508	9.9	1212	1.8	6637	10.8
Slovak Republic	..	..	153	1.2	..	..	186	0.4
Slovenia	1085 (147)	16.9 (2.3)	..	..	27	0.4	..	..
Spain	..	..	25 8 751	13.7	..	..	10 302	4
Sweden	14 195 (2 117)	34.8 (5.2)	15 372	30.5	3269	3	14 455	13.1
Switzerland	12 570	34.1	23 438	47.1	18 403 (1 387)	25.9 (2.0)	32 264	31.6
Turkey	262 (223)	0.2 (0.2)	..	..	456 (397)	0.3 (0.3)	..	..
United Kingdom	51 115	29.2	86 866	33.1	104 365 (294)	15.1 (0.0)	151 815	21.9
United States	215 630	25	289106	30.2	196 2303	6.7	691 134	16.4
OECD Total	**587 933**	**18.2**	**716 432**	**24.2**	**558 343**	**7.4**	**1523 726**	**15.8**
	27 countries		**26 countries**		**22 countries**		**27 countries**	

Source: OECD Health Statistics (2019)

In the previous table, OECD statistics show why migrants are so important to health systems. High percentages and figures speak of country dependencies. For example, in Australia, foreign-born migrants make up 53.9% of total doctors and nurses make up 35.3% of total nurses. Another example is Israel where foreign-born migrants make up 48.7% of total doctors and nurses 48% of total nurses. Of course, there are also countries with a low percentage, such as Italy, where foreign-born migrant doctors make up 4.3% of total doctors and nurses 10.7% of total nurses. As this country has become one of the epicenters of the pandemic, it is questionable whether this issue speaks of the difficulty of enforcing and implementing migrants, or the attractiveness of this country for their scope. Of course, it is important to note that it was not possible to prepare for this situation in advance, but it is possible to anticipate with greater interest in migrants and their easier adaptation to the labor market in countries around the world. However, the number of migrants themselves is limited, so it is necessary to think about how to address the shortage of health workers in the future.

Conclusion

There is no doubt that healthcare workers are the backbone of the healthcare system. Because of their profession, millions risk their health and lives at work every day, and in the case of the COVID-19 pandemic, it was no different. This disease has given us cards of imperfections and mistakes in the health system, and it is now up to us whether we want to win in this unequal struggle. It is also necessary to learn from small mistakes, which take on wide proportions in the accumulation. We know that the number of health professionals around the world is constantly declining, and if they decide to pursue this demanding and often unappreciated profession, they will certainly think about where they want to take root their help. Thus, there is an international migration of health workers examined by us. So what needs to be considered? First of all, to realize and at the same time show respect for the work of these people, to create them decent working conditions. These are extremely important in the current situation, because health professionals have encountered a great lack of protective equipment, but also insufficient equipment of medical facilities. The system that fell in the most important areas, such as healthcare, was disrupted. As a positive perception of the cohesion that has taken place in recent months, the world seems to have stopped and the long-running disputes between countries have cooled. The countries became in solidarity with each other as much as possible, regardless of nationality, they were willing to help where it was currently needed. This also supported the very migration of health workers who were willing to take their lives, leave their families and go literally into the unknown. Into situations they had never experienced before, unaware of whether they would ever return home. This is a huge thank you to them, they are the heroes of modern times. Although they do not have a sword or clear armor, they have a heart and a determination to protect lives at all costs, even knowing that they will lose theirs. On the other hand, we are very critical of the underestimation of the situation and the selfish attitude of the representatives of certain countries, because they were able to decide on the lives of millions of people on their own behalf without hearing them. The situation with access to migrants in individual countries, who often became hope and rescue for infected patients, was also resolved. An interesting finding was the fact that migrants were willing to take the risk associated with COVID-19, based on the specifics of this profession where they are "produced" non-monetary gains and human values (Ciarniene, 2017) under the influence of culture, education and training (Krajňáková, Vojtovič , 2011). The integration of migrants provided an important workforce, which was in short supply. This opened up a new sphere that needs to be addressed urgently, namely faster and more effective integration of migrants who are willing to work, but a lengthy and often discouraging bureaucratic system does not allow them to do so. It is in a situation of global threat, but also the number of statistics that have been published has shown that migrants are a normal part of society and need to be considered as an important and inevitable part of the labor market.

Supplement

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E-Commerce Organizations in the Global Market Place: A Systematic Review of Digital Marketing Literature

OJO Kayode
University: Covenant University.
Country: Nigeria
E-mail Address: Kayode.ojo@stu.cu.edu.ng

OGUNNAIKE Olaleke
University: Covenant University.
Country: Nigeria
E-mail Address: olaleke.ogunnaike@covenantuniversity.edu.ng

WORLU Rowland
University: Covenant University.
Country: Nigeria
E-mail Address: rowland.worlu@covenantuniversity.edu.ng

SAMUEL Henry
University: Covenant University.
Country: Nigeria
E-mail Address: samuelhenryefe@gmail.com

Abstract

Despite the growing prominence of e-commerce organizations and digital marketing as a branch of marketing management, there is paucity of research that attempted to describe the trends of scholarly outputs in this field of research. In addition, literature search reveal that African scholars pay little attention to the dynamics to this emerging field. It is upon this premise that the primary objective of this study was to systematically collect documents, scrutinize and critically analyze the relevant literature on the field of digital marketing. The specific objective was to identify key literature in the field of digital marketing as they relate with e-commerce organizations within the global market place, discover relevant emerging themes from digital marketing literature and to identify top e-commerce organizations around the world. In order to achieve this objectives, the researcher carried out a systematic review of digital marketing literature using the basic steps given by Yannascoli et al., (2013) in conducting a systematic review, the researcher (1). Made an initial plan (2). Conducted a search and (3). Extracted Data for the discussion of the emerging themes. By reviewing 60 articles, the author was able to discover eight key recurring themes which were covered in relevant literature of digital marketing namely; social media marketing, search engine marketing, digital display advertising, digital content marketing, mobile marketing, viral marketing, affiliate marketing and email marketing. Key findings show that there is an increase in the trend of more published article and that, more articles are published under social media marketing than the rest of the other themes, North American and European authors were found to be prominent in the literature. The author recommend that scholars and practitioners in the field of digital marketing from developing continents especially Africa and South America should focus on publishing more articles.

Keywords: Digital Marketing; E-commerce; Search Marketing; Social Media Marketing.

Introduction

Information technology has made trade among people, companies and countries easier through the creation of easier routes in which buyers can easily access sellers. Technology has changed the way business environment operates (Agboola, et al., 2019; Mayowa, et al., 2017). According to Totonch and Kakamanshadi (2011), a new global economy which is driven by technology and fired by information and knowledge has emerged due to technological changes.

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According to Totonch and Kakamanshadi (2011), changes in technology and the use of technology has revolutionized the relationships within organizations and among organizations. Increased Productivity, customer participation, mass customization and reduction of cost are part of the advantages of changes in technology. The technology is used by different organizations to create and deliver product and services to different locations (Totonch and Kakamanshadi, 2011). The technology referred to here is the E-Commerce technology. E-commerce makes it possible for commercial transactions to cross cultural, regional and national borders in a way that is far more convenient and cost-effective than conventional trade permits (Laudon and Traver, 2018).

Globalization has created new opportunities which include access to new markets, access to capitals, greater income and employment opportunities (for individuals) and access to technology and information while challenges comes in form of threats from foreign competitors that come to the domestic market and reduce the cost of carrying out business (Totonch and Kakamanshadi, 2011). The market size for e-commerce is possibly the world population because the amount of people that can be reached through the internet is roughly the estimate of the world population (Laudon and Traver, 2018). According to Totonch and Kakamanshadi (2011), globalization and e-commerce is expected to change the economic structures of nations by increasing trades among nations. E-commerce reduces the cost involved in coordinating businesses among countries, eliminating the need for physical locations, manual processes and other expediting functions (Totonch and Kakamanshadi, 2011). The emergence of companies like Alibaba.com has helped with connecting many companies across the globe to companies in china (both small and medium scale) in sourcing for raw materials. Companies now find it easier to source for raw materials or outsource their production incapacities to manufacturing companies in china that produce goods and services at cheaper rates.

Objective of the Study

The primary objective of this study is to: systematically collect documents, scrutinize and critically analyze the current research literature on digital marketing. In order to achieve this primary objective, the specific objectives include to;

1. identify key literature in the field of digital marketing as they relate with e-commerce organizations within the global market place.
2. discover relevant emerging themes from digital marketing literature.

The History of Digital Marketing

It is very hard to identify the time when digital marketing began but it can be traced far back to the early 1980s (Tiwari, 2019). At this period, the first personal computer was launched by IBM. During this period, marketers were focused on creating relationships with their customers instead of pushing products. Companies were also able to gather information on their customers through the use of digital database. The emergence of digital database changed the buyer-seller relationship for the better. Kapost (2015), reported that by 1986, ACT, a customer management company introduced the first database marketing software to the business world. Several landmark database marketing solutions were provided by Robert Shaw and Robert Kestenbaum.

The use of customer relationship management software exploded in the early 1990s due to the popularity of personal computers. In the early 1990s, the first search engine (Archie) was launched. In 1993, the first clickable ad-banner was created. Google which is known as the most popular search engine was founded in 1998 (Tiwari, 2019). Lots of internet companies were created in this decade. Companies that provided several internet solutions were very popular in 1990 which created what was popularly known as the internet bubble. In the early 2000s the internet bubble busted which gave a lot of internet companies to rethink their business model. In the mid-2000s, digital behavior changed the dynamic between the buyer and the seller dramatically. In this period, consumers began to search online for products and services and started making buying decisions based on what information they got online (Tiwari, 2019). During this period, social media platforms began to emerge. People started networking online and companies started coming online to sell their products. LinkedIn in was launched 2002, Yelp and Facebook and google was launched 2004, YouTube was launched 2005 while Twitter was launched 2006 (Kapost, 2015). Marketers had to come up with new ways to sell to their consumers. During this period, new skills were needed to navigate the terrain of the online marketing world. Currently, more marketing automation companies have come up with the hope of simplifying the way things are been done.

A Profile of E-commerce Organizations in the Global Marketplace

E-commerce became possible around 1991 when the internet was opened for public use. Laudon, and Traver (2018) reported that the e-commerce business has grown to become an industry worth over several trillions of dollars. Most e-commerce companies has moved from just being an online retail store into something broader (Laudon, and Traver, 2018) especially amazon.com that started as an online book retailer, Alibaba.com which is a wholesaler marketplace also caters to retailer's needs, ebay.com not only provides a customer to customer (C2C) transaction, but also business to consumers (B2C) and many other e-commerce stores. Companies have also had to tap into the global marketplace in order to take advantage of various potentials in developing countries (Singh, Alhorr, and Bartikowski, 2010).

According to a report by E-commerce foundation (2018), over ¾ of the world population are between the ages of 25-54. Standardized marketing methods has helped the globalization of retail through the use of e-commerce platform. In the ranking of shopping websites according to the amount of visitors in the continent of South America, Mercadolibre.com had the most visitors in Argentina, Brazil, Columbia and Peru. E-commerce foundation (2018) reported that Brazil, Argentina and Columbia had the highest B2C turnover in South America respectively. See Appendix 1 for more details. In the ranking of shopping websites according to the amount of visitors in the continent of North America, Amazon, Mercadolibre and eBay are the leading ecommerce sites as reported by Ecommerce foundation (2018). United States, Mexico and Canada had the most Turnovers respectively. See Appendix 2 for more details.

Leading ecommerce sites in the continent of Europe are Amazon, eBay and Aliexpress while the top three countries ranked according to B2C turnover are United Kingdom, France and Germany respectively as reported by Ecommerce foundation (2018). See Appendix 3 for more details.

Ecommerce foundation (2018) reported that Amazon, Alexpress and eBay were the top three leading ecommerce sites in the Middle Eastern region while Iran, United Arab Emirates and Turkey were top three countries ranked by B2C turnover. See Appendix 4 for more details.

Souq, Avito and Gumtree were the top three ecommerce sites in the continent of Africa as reported by Ecommerce Foundation (2018), while Egypt, South Africa and Nigeria were the top three countries with highest B2C turnover in the continent of Africa. See Appendix 5 for more details.

Leading the ecommerce sites in the continent of Asia and Oceania are Amazon, eBay and Rakuten as reported by Ecommerce foundation (2018) while China, Japan and South Korea were reported as the countries ranked with the highest B2C turnover. See Appendix 6 for more details.

Gaps in Literature

The field of digital marketing is very vast. There are also numerous literature on this field. Several authors (Alalwan et al., 2016; Alalwan et al., 2017; Bala and Verma 2018) have written on specific aspect of digital marketing in a microscopic manner thereby looking at effects and impact of these so-called communication tools on consumer behavior, company's profitability and several other terms in which these tools can be measured against. Bala and Verma (2018) conceptually reviewed digital marketing as a whole but they didn't put in view the working and activities of E-commerce companies.

Despite the growing prominence of e-commerce organizations and digital marketing as a branch of marketing management, there is paucity of research that attempts to describe the trends of scholarly outputs in this field of research. Although series of literature review have been carried out on the field of digital marketing in a manner that shed light into the activities of marketers, none of these works has attempted to provide an outlook based on the recurring themes found in the literature.

Methodology

The researcher carried out a systematic review of digital marketing literature. A systematic review aims to compile, analyze and synthesize all available empirical data in a rigorous and reproducible way that satisfies pre-defined requirements to address a research question (Yannascoli, Schenker, Carey, Ahn, and Baldwin, 2013). Using the basic steps given by Yannascoli et al., (2013) in conducting a systematic review, the researcher (1). Made an initial plan (2). Conducted a search and (3). Extracted Data for the discussion of the emerging themes.

Step 1: Initial Plan

In this stage, the researcher used the PICO (population, intervention, comparison and outcome) mnemonic tool extracted from (Yannascoli et al., 2013) to identify and formulate relevant research questions which helped provide directions for the review.

Defining the Research Question

Who are the scholars and practitioners (ecommerce organization) in the field of digital marketing? What are the relevant literature in the field of digital marketing? What are the themes that emerged from the literature reviewed?

Study Justification

The researcher looked at previous literature on the field of digital marketing. Although series of literature review has been carried out on the field of digital marketing, none of these works systematically reviews the literature based on E-commerce organizations. The research aims to identify key literature in the field of digital marketing as they relate with e-commerce organizations within the global market place. The study also aims to discover relevant emerging themes from digital marketing literature.

Literature Search

The researcher analyzed several peer-reviewed journal articles since these are essential channels of communication for researchers, as noted earlier by (Creswell, 2009; Wilkie and Moore, 2003; Williams and Plouffe, 2007). Several selected marketing journals were also browsed by the author based on the advice given by Moussa and Touzani (2010 given the provision ofma well understandable quote-based marketing journal ranking. In addition, important search engines and databases were used, including the complete database of Google Search, Google Scholar, Scopus, JSTOR, ScienceDirect and Business Source (Ngai, 2003; Lamberton, and Stephen, 2016).

Selecting Search Terms

In selecting the search terms, some keywords were recognized in order to increase the quality of the searches and for the author to achieve a desirable outcome in terms of accomplishing the aim of the search which was to determine as much as possible all applicable identified in order to adequately address the research questions posed in the study. Such keywords included Digital marketing, E-commerce, and globalization. These keywords were matched with other recurring themes in order to get a large pool of literature in order not to repeat what has been done by other researchers. The first thing the researcher did was to investigate the article tittles. Many of these titles were highly suggestive of addressing digital marketing specifically. In order to ensure that applicable articles were not excluded in cases where they were not representative of a digital marketing emphasis in the article title, the author then reviewed their abstracts, keywords, and the complete length.

Inclusion and Exclusion Criteria

The author modified Petrosino (1995)'s inclusion criteria while selecting journal articles to review. The study reports were collected using the following criteria.

1. The article journal was published, printed or available between 1990 and 2019 were included.
2. Books were also included.
3. The title of the journals selected suggested that the content of the work discussed basically digital marketing subjects.
4. The articles selected also discussed or mentioned e-commerce in the abstract.
5. Articles less than 4 pages of content were excluded from the selection.
6. The researcher used themes discussed by Bala and Verma (2018) in navigating the prominent themes on the field of digital marketing.
7. The journal articles selected were all available in English language.

8. The researcher also selected articles that were indicative of e-commerce companies digital marketing practices.
9. Articles indicative of customer's behavior were excluded from the selection.

The researcher was concerned with articles that explained and described the prominent themes in digital marketing literature. The researcher noticed that emerging themes like search engine marketing, search engine optimization, social media marketing, and mobile marketing among other emerging themes. An article was considered qualitative when using qualitative methods for collecting, analyzing and presenting data was used while the use of quantitative methods such as survey, experiment and statistical package for social sciences was considered quantitative.

Data Base

In addition, important search engines and databases were used, including the complete database of Google Search, Google Scholar, Advanced Google Search, EBSCO, SAGE, Ebrary, Scopus, JSTOR, ScienceDirect and Business Source (Ngai, 2003; Lamberton, and Stephen, 2016).

Data Organization

In searching for digital marketing on different databases identified above, about 2,605,278 articles were identified. 2,570,000 were duplicates and removed while 35,228 articles were screened. Out of the 35,228 articles that was screened, the researcher excluded 35,000 articles because they were not related to the area of study and they did not fall into the date range that the researcher selected for study. Out of the 228 articles left, only 150 articles were related to e-commerce organizations. At the end of the screening process, the researcher systematically reviewed 60 articles.

Step 2: Conducting and Reviewing the Search

This stage is the implementation stage of the initial plan earlier discussed. A broad and thorough web search of important academic and business management related database was carried out to achieve the necessary requirements of a systematic review. Emphasis were laid on digital marketing and E-commerce. Google Scholar was the search engine employed. Peer-reviewed journals, periodicals, blogs and websites of industry players provided resource materials for this study.

Step 3: Data Extraction

In carrying out the data extraction, the researcher with the help of an independent reviewer carefully extracted the articles from the database in order to provide a thorough review of literature.

Findings: Evolving Themes from The Review

The study reviewed for this paper has been carried out in South America, North America, Europe, the Middle East, Africa, Asia and Oceania on various continents around the world. Most of the authors generated their data by themselves. These authors followed a qualitative approach when producing primary data, which offered rich insights to arrive at their conclusions and make useful recommendations. This analysis presents the topics and areas of study on digital marketing in the field of marketing and is discussed under various headings below.

A. Social Media Marketing (SMM)

One of the most prominent issue in the literature of digital marketing is social media marketing (SMM). Several authors' (Abed, et al., 2015; Alalwan, et al., 2016; Alalwan, et al., 2017; Hawkins, and Vel, 2013; Nwokah and Gladson-Nwokah, 2015; Zhu, and Chen, 2015) work were reviewed. Social media has been found to be one of the most progressive variables in the lives of people (Alalwan, et al., 2016; Hinz, et al., 2011; Zeng & Gerritsen, 2014). Social media marketing is an Internet marketing technique that uses websites for social networking as a marketing tool (Nwokah and Gladson-Nwokah, 2015). Hofer-Shall (2010) reported that the use of social media resulted in a significant increase in the number of listening platforms that regulate online discussions that demonstrated customer opinions through social media. Lea, et al., (2006) stated that social media plays an important role in commerce and the development of the economy. Social media marketing or SMM is an outgrowth of efforts from search engine marketing (Bala and Verma 2018). It includes moving traffic via

social media such as Facebook, Instagram, Twitter, Pinterest, Google+, LinkedIn, etc. to your media or company. Yadav and Rahman (2017)'s study provides e-commerce marketers with an important tool to evaluate the effectiveness of their Social Media Marketing Activities. The scale will help ecommerce firms understand and enhance the perception of whatever social media activities developed by their advertisers which will help marketers evaluate the existing perception and thereby create and enhance the positive perception of consumers Yadav and Rahman (2017). Ecommerce organizations' SMM efforts can be especially helpful for branding and driving sales (Bala and Verma 2018).

B. Search Engine

Yalçın and Köse (2010) describes search engine as a data collection software that gathers information on websites. The data the search engine collects include the web site URL, some keywords or groups of keywords that explains what the website contains or describes the content of the website, links provided on the website and the structure of the web page which is formed by the way the website is been coded (Yalçın and Köse, 2010). The search engine is a database in which all data and information gathered are been stored. The search engine software uses special programs which contains the crawler, spider and bot that goes through all the data collected in order to make meaning of the content of the website (Yalçın and Köse, 2010). Over 80% of internet users make use of the search engine in search for information (Yang, Shi, and Wang, 2015).

B. (I). Search Engine Marketing (SEM)

Search engine marketing was one of the influential topics explored in the literature of digital marketing. Search engine marketing is a type of internet marketing that includes particular actions taken by a marketer to increase the amount of searchers coming to the web by increasing the exposure of the web by paid organic means in search engine results (Moran and Hunt 2014). In search engines, SEM is all you do to improve the popularity of your site to draw more tourists. Brand equity is influenced by the order in which the search engine results are shown (Drèze & Zufryden, 2004; McCoy, et al., 2007; Rangaswamy, et al., 2009). A company's ranking on the search engine result page affects its revenue (Keane, O'Brien, & Smyth, 2008; Skiera, Eckert, & Hinz, 2010).Yang et al., (2015) reported that companies use SEM to increase sales of products and service by increasing specific keyword exposure. Search marketing is a vital way for your website to draw new users, regardless of the word you use (Moran and Hunt, 2014). The comprehensive strategy for driving traffic to your business, mainly through paid efforts, is Search Engine Marketing or SEM. Therefore, Paid Search Marketing is also named (Bala and Verma 2018). In their book titled "Search engine marketing, Inc.: Driving search traffic to your company's website" Moran and Hunt (2014) discussed the basic of web search, search and marketing mix and the challenges of search marketing. The basics of web search was categorized into kinds of search results and where searchers go. The kind of search result was divided into two parts namely organic results which is also known as natural results and paid results in which the marketer pays in order to be seen in the search results. Google is known to be the go to site of majority. According to Net Market Share (2019), Google holds 74.8% of the search engine market share. In their book, the authors Moran and Hunt (2014) explained the reasons why search engine marketing should be integrated into every companies' marketing mix. SEM 's world is diverse and confusing. Based on empirical studies of china's B2C e-commerce firms, Yang et al., (2015) concludes that a focus on SEM helps attract customers to the business thereby increasing financial performance (Bala and Verma 2018).

B (II). Search engine optimization

SEO stands for search engine optimization. Berman, and Katona's study (2013) focused on the roles of search engine optimization in search marketing. Search engine serves as an intermediary between the website and the customer (Berman, and Katona, 2013). Search engine optimization involves making changes to a website so your visitors can easily find it in a search engine. Web searchers prefer to click on organic links instead of the paid ones on the search engine and for this reason, advertisers try to game the algorithm (Berman, and Katona, 2013). Information about an unknown subject matter is usually searched on the first page of search engines (Yalçın and Köse, 2010). Users hardly get past the first five pages of the result page. Given this reason, advertisers try their best to move to the top list of search engines (Berman, and Katona, 2013; Yalçın and Köse, 2010). If the search engine optimization rules are followed, the advertiser and the web developer can move the page to rank on the first page (Yalçın and Köse, 2010). An attractive and a well-structured web page helps introduce the company's product or services better (Yalçın and Köse, 2010). SEO is the most cost-effective marketing strategy that will bring organic traffic to business (Bala and Verma 2018).

C. Digital Content Marketing

Another theme or area of interest for researchers under the field of digital marketing is digital content. Hollebeek and Macky (2019) worked on the role of digital marketing in fostering consumer engagement, trust and value. Based on the literature review, Hollebeek and Macky (2019) conceptualized digital content marketing as the creation and distribution of significant, value brand-related content to customers (both current and prospective) on various digital platforms in order to boost brand engagement, relationships and trust. Bala and Verma (2018) stated that digital content can be presented in a variety of formats, including blogs, white papers, e-books, case studies, guidebooks, questioning and answering articles, forums, news and updates, images, banners, info graphics, podcasts, webinars, videos or micro blogging and social media content (Bala and Verma 2018). Digital Content Marketing aims to increase the appreciation of the brand or company by adding value to the lives of the customers (Järvinen and Taiminen 2016). This can be done in form of educating the customers about the harm or usefulness of a certain product. DCM is based on the premise of a genuine and sincere desire to add value to the life of the consumer in a way that facilitates the acquisition or retention of customers (Taylor 2012). DCM helps the advertiser tell the brand story in a unique way that builds customer trust, encourage customer engagement and most importantly build customer relationship. (Gagnon 2014; Naidoo and Hollebeek 2016). Hollebeek and Macky (2019) also developed a conceptual framework that identifies significant consumer-based DCM backgrounds, including functional, hedonic, and authenticity-based motives for DCM interactions based on uses-and-gratifications (UandG).

D. Digital Display Advertising

Another recurring theme on literature is digital display advertising. Goldfarb and Tucker (2011) found out that matching an ad to the content of a website and increasing the obtrusiveness of an ad independently increases the intention to buy. Bala and Verma (2018) explains that digital display advertising is a part of search engine marketing efforts. Drèze and Hussherr (2003) found out that web browsers actively avoid looking at online banner ads. Lee, Fang, Kim, Li, and Palmatier (2018) explains how digital display advertising works. They made it clear that digital display advertising works in a pay per impression manner in a way that advertisers pay a predetermined or specified amount of money in order to expose their advert placement in form of banner, pop-up floating, or text advertisement. Bala and Verma (2018) reported that for e-commerce firs to get a good return on investment, they need a specialist or an expert advertiser which may be relatively expensive. In the study of 2,892 online display ad campaign Goldfarb and Tucker (2011) found out that customers dislike viewing highly visible or obtrusive ads.

E. Mobile Marketing

A study revealed that 50% of United States mobile consumers are mobile shoppers, 10% are heavy users while 40% are light users (Leo and Arc Worldwide, 2011). The Mobile Marketing Association (2011) define mobile marketing as the set of practices that allows organizations communicate and engage with their audience in a way that is interactive and relevant through any mobile device or network. Varnali and Toker (2010) reported that mobile marketing has transformed into an ultimate marketing vehicle which allows businesses establish their electronic presence with their customers anytime and anywhere because of the characteristics it possesses. Prominent issues that came up during the study were mobile marketing adoption (Aldás-Manzano, Ruiz-Mafé, and Sanz-Blas, 2009; Amin, 2008; Roach, 2009), mobile marketing use (Okazaki and Romero, 2010; Rau, Zhang, Shang, and Zhou, 2011), the value of mobile marketing to retailers (Okazaki, and Taylor, 2008), improved value of mobile marketing (Bellman, Potter, Treleaven-Hassard, Robinson, and Varan, 2011; Kim, and Jun, 2008).

F. Viral Marketing

The term viral marketing was introduced in 1997 by Steve Jurvetson and Tim Draper (Knight, 1999). Leskovec, Adamic, and Huberman (2007) related viral marketing to the diffusion of information about a product and the way the product is been adopted in a network. Viral marketing is also know as the electronic equal to what is known as the word of mouth (Bala and Verma, 2018). Lot of researchers focus on what motivates people to share a message online (Ho and Dempsey, 2010; Phelps, Lewis, Mobilio, Perry, and Raman, 2004). Empirical evidence shows that consumers depend on information from others when making buying decisions (Hill, Provost, and Volinsky 2006; Iyengar, Van den Bulte, and Valente 2011; Schmitt, Skiera, and Van den Bulte 2011). Viral Marketing is a strategy where a unique content spreads exponentially online, because the content is appreciated, shared and liked immensely. Pescher, Reichhart, and Spann (2014) reports that the focus of viral marketing campaigns is to capitalize on customers' referral behavior when it comes to disseminating information.

G. Email Marketing

E-mail marketing, as part of e-marketing, is used to increase site traffic and sales support (Kirš, and Harper, 2010). Hudák, Kianičková, and Madleňák, (2017) highlighted the importance and effectiveness of e-mail marketing as it relates to e-commerce. They concluded that it is necessary for companies to establish an explicit aim at the beginning of the campaign and also select the right metrics. When you send a commercial message through email to a list of potential customers, the strategy is called Email Marketing (Bala and Verma, 2018). Bala and Verma (2018) also explained that With effective email marketing software, you can maintain email lists that are segregated based on several factors, including customers‟ likes and dislikes, and spending habits.

H. Affiliate Marketing

Libai, Biyalogorsky, and Gerstner (2003) stated that affiliate marketing program is an important source of customer acquisition. Bala and Verma (2018) described Affiliate Marketing as a performance-based marketing program, where publishers that bring customers to an online platform are been paid by the platform. Duffy (2005) concluded that for affiliate marketing to be successful there has to be a construction of a win-win relationship the affiliate and the e-commerce company. The job of the affiliate marketers is to generate orders through his efforts (Duffy, 2005). A lot of e-commerce platforms use affiliate marketing (Dysart 2002; Fox 2000; Oberndorf 1999). Libai, et al., (2003) identified two payment plans used to pay affiliates which are pay-per-lead and pay-per-conversion. Bala and Verma (2018) stated that affiliate marketing is very useful for newly started online platforms.

Graphical representations of the emerging themes according to year and author's continent of origin.

In this section, three sets of bar chart were drawn (fig 1, fig 2 and fig 3) based on the emerging themes as well as the periods they were published. The continents of the authors were also represented in the bar chart.

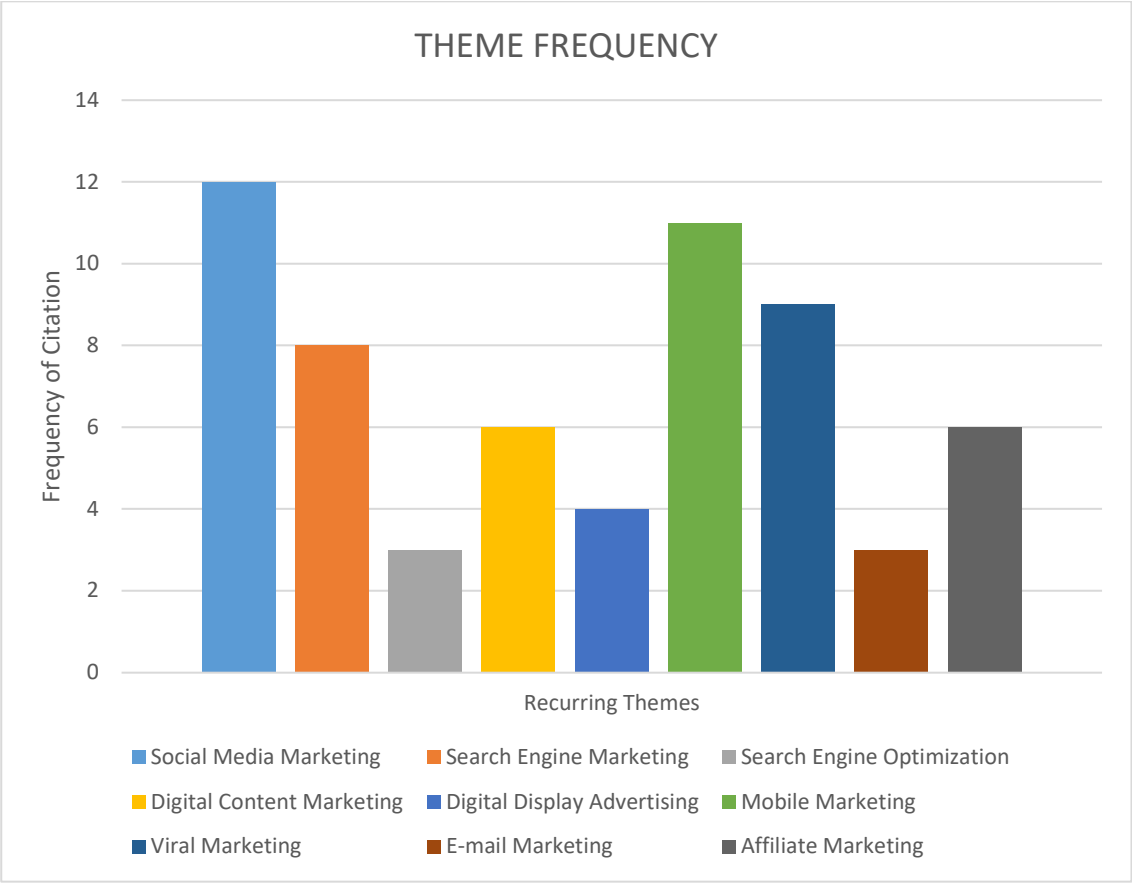

Fig. 1: Graph showing the frequency of the recurring themes according to citations in the digital marketing literature.

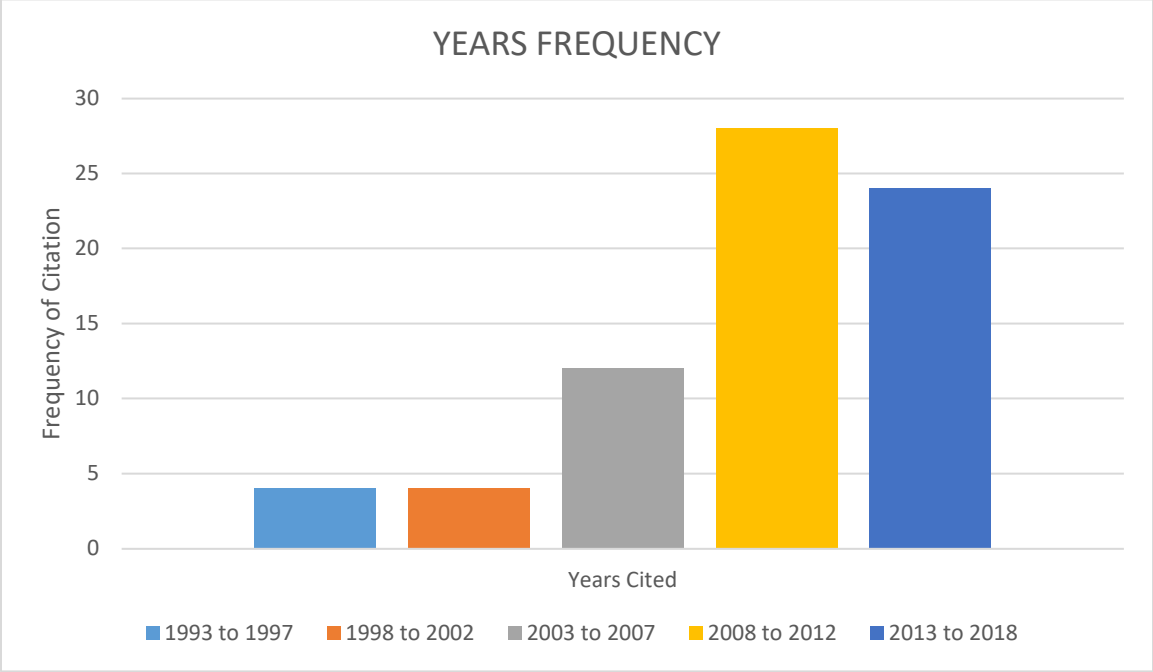

Fig. 2: Graph showing the frequency of the citations according to years they were cited in the digital marketing literature reviewed.

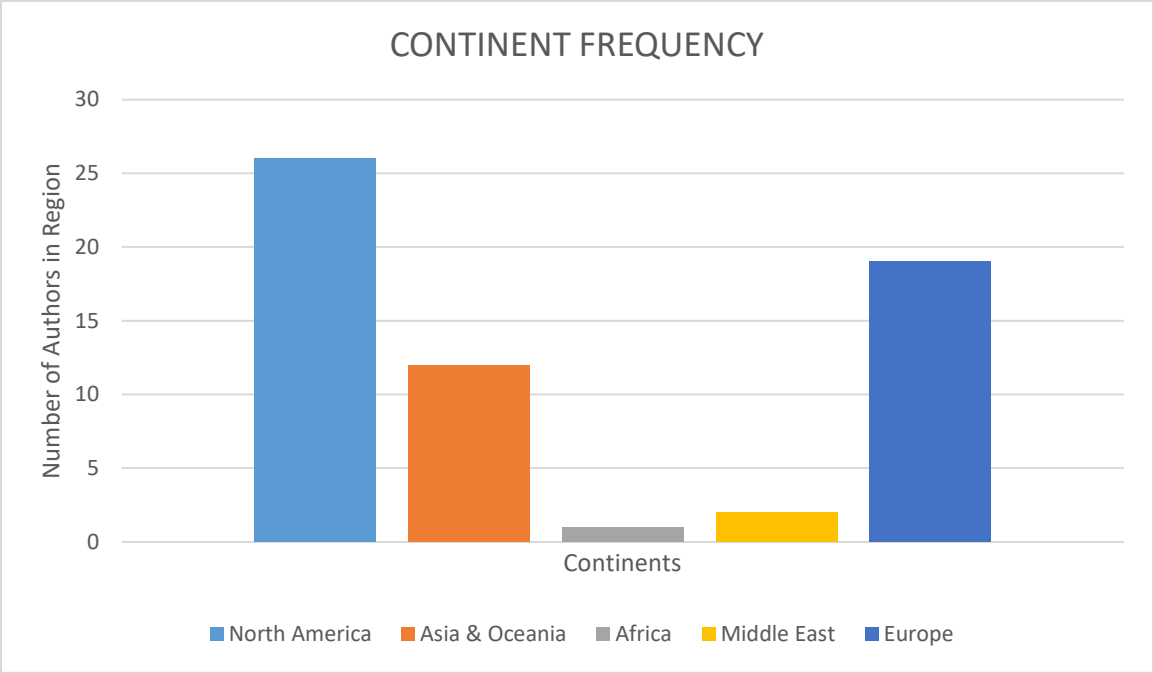

Fig. 3: Graph showing the number of authors cited according to the continents the authors were from in the digital marketing literature.

Interpretations and Discussions of Findings

This paper takes a comprehensive look at digital marketing on a global level through a systematic review of literature that exist of the field. In the course of reviewing the literature on digital marketing, the researcher found out that social media marketing was the most discussed theme. Several authors (Abed, et al., 2015; Alalwan, et al., 2016; Alalwan, et al., 2017;

Hawkins, and Vel, 2013; Zhu, and Chen, 2015) discussed how social media marketing affects the lives of consumers. Mobile marketing was also a theme that was discussed by several authors across the field of digital marketing. Several authors (Aldás-Manzano, Ruiz-Mafé, and Sanz-Blas, 2009; Amin, 2008; Okazaki and Romero, 2010; Rau, Zhang, Shang, and Zhou, 2011; Roach, 2009) were found to be key authors on this field. Based on the search and the literature reviewed according to the inclusion and exclusion criteria, the researcher reviewed 9 articles on viral marketing, 8 on Search engine marketing, 6 on digital content marketing, 6 on affiliate marketing, 4 on digital display advertising, 3 on search engine optimization and 3 e-mail marketing. All these are well represented in fig 1 above.

The researcher also classified the study according to the frequency of works published every five years beginning from 1993 to 2018. The researcher found out that from 1993 to 1997 only four articles were published according to the inclusion and exclusion criteria the author used. 1998 to 2002, four published articles were selected, from 2003 to 2007 twelve published articles were selected, from 2008 to 2012, twenty-eight published articles were selected and from 2013 to the 2018 twenty-four published articles were selected by the researcher according to the inclusion and exclusion criteria. All these were shown on the graph in Fig 2.

The researcher also classified this work according to the continents the authors came from. In this study, the researcher found out that most of the authors that published given the inclusion and exclusion criteria came from the continent of North America, that is twenty six main authors came from North America while nineteen authors came from Europe, twelve authors came from Asia and Oceania, two from the Middle East while one is from Africa. All these are shown in the graph in Fig 3.

The researcher found out that there has been a rapid growth of the field of digital marketing in the global market place although there were scarce works done in developing countries like Nigeria and other African countries as regards the growth of the field. The field of digital marketing got off with a quick start when personal computers were introduced to the market and since then there has been ground breaking innovations that has allowed marketers to get across with their customers (prospective and current) in ways and manners that are cost effective and measurable.

The paper discussed the major recurring themes found on the literature systematically reviewed on the field of digital marketing. These themes were analyzed and explained in the paper in order to help broaden the view of subsequent researchers on the field of digital marketing.

Areas for Future Research

Several issues have emerged from this article that may serve as potential for future research.

First, a large number of studies are qualitative in nature. The researcher found out that quantitative and mixed methods are less popular. Therefore it is necessary for researchers working on this field to pay more attention to developing more studies that combine qualitative and quantitative research methods in digital marketing studies.

This article focused on several studies that showed the practices of e-commerce or online shopping platforms in the global market place, I recommend that future studies should be made into other industries that relates to digital marketing for example banking industry or the healthcare industry.

Future studies could also be made on bringing together several theories surrounding the topic of digital marketing practices and adoption of technologies surrounding it. This will help shed more light on how well the field of digital marketing has been developed so far.

Other aspects of marketing can also be focused on for example, researchers can try to understand the field of digital marketing by looking at the behavior of the consumers been marketed to. The financial performances of the companies under study could also be looked at just to give it a more profound context.

Future researchers can also carry out a comparative study trying to understand digital marketing practices among different industries. Their relationships, similarities, differences and impacts can also be reviewed in order to understand the practices in different industries.

Appendix

List of Top E-commerce Companies around the world segmented by continents according to Number of Visitors.

Appendix 1
South America: Top Shopping Websites.

Country			
	1st	2nd	3rd
"Argentina"	**"Mercadolibre.com.ar"**	"Mercadolibre.com"	"Olx.com.ar"
"Brazil"	**"Mercadolibre.com.br"**	"Olx.com.br"	"Americana.com.br"
"Chile"	**"Yapa.cl"**	"Mercadolibre.com.cl"	"Falabella.com"
"Columbia"	**"Mercadolibre.com.co"**	"Olx.com.co"	"Amazon.com"
"Peru"	**"Mercadolibre.com.pe"**	"Olx.com.pe"	"Falabella.com.pe"

Extracted from ecommercefoundation.org/reports
Leading commerce sites in the region

1. "MercadoLibre"
2. "Olx"
3. "Yapo"

Top Countries ranked by B2C Turnover

1. "Brazil".
2. "Argentina".
3. "Columbia".

Appendix 2
North America: Top Shopping Websites

Country			
	1st	2nd	3rd
"Canada"	**"Amazon.ca"**	"Kijiji.ca"	"Amazon.com"
"Mexico"	**"Mercadolibre.com.mx"**	"Amazon.com.mx"	"Amazon.com"
"United States"	**"Amazon.com"**	"Ebay.com"	"Craiglist.org"

Extracted from ecommercefoundation.org/reports
Leading commerce sites in the region

1. "Amazon"
2. "MercadoLibre"
3. "eBay"

Top Countries ranked by B2C Turnover

1. "United States".
2. "Mexico".
3. "Canada".

Appendix 3

Europe: Top Shopping Websites

Country			
	1st	2nd	3rd
"France"	**"Amazon.fr"**	"Leboncoin.fr"	"Cdiscount.com"
"Germany"	**"Amazon.de"**	"eBay.de"	"Otto.de"
"Italy"	**"Amazon.it"**	"Subito.it"	"eBay.it"
"Romania"	**"Olx.ro"**	"Emag.ro"	"Aliexpress.com"
"Russia"	**"Avito.ru"**	"Aliexpress.com"	"Market.yandex.ru"
"Spain"	**"Amazon.es"**	"Milanuncios.com"	"Aliexpress.com"
"Sweden"	**"Blocket.se"**	"Trader.com"	"Prisjakt.nu"
"United Kingdom"	**"Amazon.co.uk"**	"eBay.co.uk"	"Argos.co.uk"

Extracted from ecommercefoundation.org/reports
Leading commerce sites in the region

1. "Amazon"
2. "eBay"
3. "Aliexpress"

Top Countries ranked by B2C Turnover

1. "United Kingdom".
2. "France".
3. "Germany".

Appendix 4

Europe: Top Shopping Websites

Country			
	1st	2nd	3rd
"Armenia"	**"Amazon.com"**	"Aliexpress.com"	"eBay"
"Bahrain"	**"Amazon.com"**	"eBay"	"Aliexpress.com"
"Israel"	**"Aliexpress.com"**	"Amazon.com"	"Yad2.co.il"
"Kuwait"	**"Amazon.com"**	"eBay"	"Aliexpress.com"
"Qatar"	**"Amazon.com"**	"eBay"	"Aliexpress.com"
"Saudi Arabia"	**"Amazon.es"**	"Amazon.com"	"Souq.com"
"Turkey"	**"Blocket.se"**	"Hepsiburada.com"	"N11.com"
"United Arab Emirates"	**"Amazon.co.uk"**	"Dubizzle.com"	9Amazon.com"

Extracted from ecommercefoundation.org/reports
Leading commerce sites in the region

1. "Amazon"
2. "Aliexpress"
3. "eBay"

Top Countries ranked by B2C Turnover

1. "Iran".
2. "United Arab Emirates".
3. "Turkey".

Appendix 5
Africa: Top Shopping Websites

Country			
	1st	2nd	3rd
"Egypt"	**"Souq.com"**	"Olx.com.eg"	"Jumia.com.eg"
"Morocco"	**"Avito.ma"**	"Aliexpress.com"	"Jumia.ma"
"Nigeria"	**"Jumia.com.ng"**	"Amazon.com"	"Aliexpress.com"
"South Africa"	**"Gumtree.co.za"**	"Takealot.com"	"Amazon.com"

Extracted from ecommercefoundation.org/reports
Leading commerce sites in the region
1. "Souq"
2. "Avito"
3. "Gumtree"

Top Countries ranked by B2C Turnover
1. "Egypt".
2. "South Africa".
3. "Nigeria".

Appendix 6
Asia & Oceania: Top Shopping Websites

Country			
	1st	2nd	3rd
"Australia"	**"eBay.com.au"**	"Gumtree.com.au"	"Amazon.com"
"India"	**"Amazon.in"**	"Flipkart.com"	"Amazon.com"
"Indonesia"	**"Tokopedia.com"**	"Bukalaak.com"	"Olx.co.id"
"Japan"	**"Amazon.co.jp"**	"Rakuten.co.jp"	"Kakaku.com"
"Malaysia"	**"Lazada.com.my"**	"Shopee.com.my"	"Mudah.my"
"Vietnam"	**"Shopee.vn"**	"Lazada.vn"	"Til.vn"

Extracted from ecommercefoundation.org/reports
Leading commerce sites in the region
1. "Amazon"
2. "eBay"
3. "Rakuten"

Top Countries ranked by B2C Turnover
1. "China"
2. "Japan"
3. "South Korea"

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Employment Quality and Employees' Satisfaction in The Nigerian Public Service: A Conceptual Review

Emmanuel O. EFE-IMAFIDON*
Business Management, Covenant University, Ota, Ogun State, Nigeria, and emmanuel.efe-imafidonpgs@gmail.com

Anthonia A. ADENIJI
Business Management, Covenant University, Ota, Ogun State, Nigeria, and anthonia.adeniji@covenantuniversity.edu.ng

Daniel E. GBEREVBIE
Political Science and International Relations, Covenant University, Ota, Ogun State, Nigeria, and daniel.gberevbie@covenantuniversity.edu.ng;

Odunayo P. SALAU
Business Management, Covenant University, Ota, Ogun State, Nigeria, and odunayo.salau@covenantuniversity.edu;

Olukemi ADE-ADENIJI
Business Management, Covenant University, Ota, Ogun State, Nigeria, and kemiadeadeniji@gmail.com

David ORENUGA
Business Management, Covenant University, Ota, Ogun State, Nigeria, and orenugadavid@gmail.com

Abstract

All over the world, the satisfaction of employees in an organisation through work flexibility for career advancement is vital to organisational sustainability. This study recognizes an essential strategy of motivating the corporate workforce for improved performance by managers of public and private organisations in their desire to stay relevant and achieve the stated organisational goals and objectives. However, in the Nigerian public service, there have been unresolved issues of employees' dissatisfaction in the area of work flexibility for career advancement. Therefore, this study, through conceptual review, examined the influence of work flexibility for career advancement of employees' performance within the public service in Nigeria. The study concluded that were employees in the Nigerian public service failed to experience work flexibility for career advancement, they are not likely to put in their best into their assignments to achieve the organisation's desire for improved performance.

Keywords: Career advancement, Nigerian Public Service, Work Flexibility.

Introduction

The contributions of employees are a vital factor that indicates the level of growth, and survival of any organisation both in public and private sector of any nation, including Nigeria. In Nigeria, a high level of employment opportunities, engagement, and employment quality is a means to enhance the standard of living and satisfaction of its working populace and create opportunities for national development. In the quest to attain satisfaction, many individuals seek employment both in the international and their local environments to satisfy their desire to earn a living. The satisfaction of employees is one of the most significant issues in a diverse workplace (Chatterjee & Chatterjee, 2015).

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Employers who rely on human resources competencies, skills, and experience are saddled with responsibilities to satisfy the needs of employees for performance. Employees' needs that are not satisfied by their organisations are likely to go a long way to negatively affect the performance, competitiveness, and existence of such organisations (Johnson, 2018). One of the ways employers in developed countries satisfy their employees' needs is the attempt to understand and provide adequate employment quality which affects the general well-being of the employees. Since the desires of individuals are generally different, then the value for certain employment aspects will be unique to them (Clark, 2015).

Aspects of good employment quality involve different dimensions (high job security, job content, pay, flexible work, interpersonal relationships and standard hours of work, quality training and development) in which participants in the labour market count as valuable to enable them achieve satisfaction. In previous studies, employee satisfaction has often been depicted as a function of the characteristics of the job itself among other things (Anh, Nguyen, Tuong Anh & Nguyen, 2018; Khalid, Salim & Loke, 2011). Furthermore, Ozguner and Ozguner (2014) state that employees' dissatisfaction is a common problem.

Studies backed by Fredrick Herzberg's hygiene theory have shown that low career advancement can lead to dissatisfaction. At the same time, perceived and consistent career advancement has revealed a reduction in the likelihood of an employee leaving an organisation which reflects their state of satisfaction (Stamolampros, Korfiatis, Chalvatzis & Buhalis, 2019; Dartey-Baah & Amoako, 2011). In the international environment, career advancement is explained to be improved by increases in the level of work flexibility which enhances employees' well-being in the workplace (Mansor, 2014; Shagvaliyeva & Yazdanifard, 2014). Yet, in Nigeria, few studies have been conducted on how career advancement can be enhanced by work flexibility, especially in the public service. Onah and Anikwe (2016) posit that work flexibility empowers individuals to facilitate healthier progressing careers, attracts and retain employees as well as appealing to all ages of the workforce. Hence, this study aims to examine the effect of work flexibility on career advancement.

In the developed countries, previous studies have revealed that job security is a determinant of employees' satisfaction and a part of Fredrick Herzberg's Motivators theory published on motivation to work in 1959 (Chatterjee & Chatterjee, 2015; Artz & Kaya, 2014; Dartey-Baah, & Amoako, 2011). Greater job security and employee performance was shown to be enhanced through training and development (Kum, Cowden & Karodia, 2014). However, in Nigeria, few studies have revealed that training and development can bring about job security leading to employees' satisfaction in the public service. Aborishade, (2016) posits that training and development can increase productivity, higher work flexibility, improved skills, and competences of workers that leads to the enhancement of employees' satisfaction. As a result, this present study aims to examine the influence of training and development on job security in an organisation with focus on employment quality, employees' satisfaction and work flexibility for career advancement in the Nigerian public service.

Concept of Employment Quality

The history of employment quality is dated back to the 1990s, where the concept was first seen as decent work (Sehnbruch, Burchell, Agloni & Piasna, 2015). The concept of decent work has been expanded by researchers and overlapped by other concepts like job quality, quality of employment, and employment quality (Kalleberg & Warhurst, 2013; Buchell, Sehnbruch, Piasna & Agloni, 2015). However, in this study, the concept is seen as employment quality. Clark, (2015) views employment quality as the weighted sum of the various job dimensions that matters to workers. He further explains that it is the job characteristics, job dimension, job aspect, and good quality/satisfying jobs offered by organisations to their employees. Employment quality enhances employees' happiness and well-being. It affects a worker's well-being, productivity, and organisation's performance (Oswald, Proto & Sgroi, 2015).

Concept of Work Flexibility

Work flexibility is a vital concept in today's world of works and it can be referred to as employment flexibility. The concept of work flexibility is yet to receive much attention from the public service within the work system of the Nigerian work environment (Akingbola, 2011). Furthermore, it has been rated as the most valuable option provided by employers (Oludayo, Gberevbie, Popoola & Omonijo, 2015). Mungania, Waiganjo and Kihoro (2016) stated that in a society filled with conflicting responsibilities and commitments, flexible work arrangement has become a predominant issue in the workplace. It has been noted that employees are increasingly clamoring for more flexible, autonomous, and creative functions. Consequently, there have been increasing interests on the part of employers on work flexibility and the majority of the employers have already started introducing a variety of flexible working

choices for their staff to encourage the creation of employee engagement within their organisations (Isiaka, Abdullah, Abogunrin, Aremu & Aliyu, 2015).

Work flexibility enables workers to fulfill their job duties while at the same time allowing them to act to a large degree in their non-working environment. Employees gain greater influence over time by advantageous flexible time policies or even seeking flexibility as to when and where they are employed (Oludayo, et al., 2015).

Concept of Employees' Satisfaction

The concept of employee satisfaction has been viewed in different ways by scholars. Employees' satisfaction is key to gaining the improved commitment of employees in the workplace. It represents a cogent factor that leads to a positive effect in the work environment, especially for organisations aiming to reach their planned goals and objectives (Saad, Muhammad & Rafi, 2012).

Also, employees' satisfaction is also a collection of positive feelings that an individual holds toward his or her job as well as part of his or her life's satisfaction (Singh & Mini, 2013). Employees' satisfaction has a significant effect on a person's life, as he/she spends a large portion of time and energy in the workplace (Abbas & Karage, 2015). It is also seen as a state that causes the workforce to feel hopeful and creates strong motivation that fosters a good work environment (Nayab, Shahid, Sadaf, Muhammad & Muhammad, 2015). And this is influenced by an employees' level of education, competence, ability, work experience, and identification with the job in question (Oyekunle & Onifade, Adigun, 2017). Employees' satisfaction represents a mental state that the workforce reach; it includes the knowledge and ideas gained about the reasons people work, how they are satisfied and the rate at which they derive satisfaction from their job in an organisation (Rahman, Gupta & Moudud-Ul-Huq, 2012; Saad *et al.,* 2012).

Concept of Career Advancement

Ugwu, Kekeocha and Chukwu (2018) argue that several organisations today have recognised the importance of career advancement and have designed programmes targeted to enhance the skills and expertise of their workers. Jauregui and Olivos (2017) see Career advancement as a promotion to higher levels in the organisational hierarchy or positions with greater responsibility. Fundamentally, career theorists and researchers explained that career advancement helps employees evaluate their skills so they can move to jobs that are more congruent with their personal goals and plans (Adewoye, Abioro & Hasimiyu, 2017). To establish the effectiveness of an organisation, captains of industry and business technocrats need to focus on aligning employees' career advancement to their organisational strategy of improved performance of their workforce. Pillay, Dawood and Karodia (2015) asserted that career advancement is the progression through the ranks of the organisational hierarchy. The lack of career advancement affects motivation and performance. In this regard, Adeniji and Osibanjo (2012) argue that career advancement can help reduce cost expended on recruiting and training new employees in organisations.

Theoretical Review: The theoretical review in this study is based on the Fredric Herzberg's Two-Factor theory.

Fredrick Herzberg's Two-Factor Theory

The Two-Factor theory, also known as the Motivators-Hygiene theory, was propounded by a behavioural scientist, Fredrick Herzberg, in 1959. According to Herzberg, some job factors result in satisfaction, which he calls motivational factors, while other job factors preventing dissatisfaction, which he calls Hygiene factors.

The Two-Factor Theory of Fredrick Herzberg believes that it is the motivators/satisfiers (non-financial aspects/indicators) that enables employees to get motivated in the workplace when present, and also the hygiene factors when available, will not necessarily motivate or satisfy employees but de-satisfy them when it is not present in the workplace. In essence, the theory is relevant to this study based on the fact that an organisation with a motivating/satisfying factor (s) like good job characteristics or aspects (employment quality) is likely to bring about enhanced employees' satisfaction for overall organisational performance. In this study, work flexibility is seen as a non-financial aspect/indicator that helps employers to bring about better satisfaction in different areas that concerns the employees in terms of career advancement, resulting in overall organisational performance.

Methodology

This study reviewed different concepts which are vital to the understanding of employment quality and employees' satisfaction in the Nigerian public service. These concepts include employment quality, work flexibility, employees' satisfaction and career advancement. It adopted Fredrick Herzbergs Two Factor theory to complement the knowledge of the key concepts reviewed in this paper. After that, the study developed a schematic model of employment quality and employees' satisfaction to support the proper understanding of the employees' work flexibility for career advancement in the Nigerian public service.

Nigerian Public Service

The Nigerian public service was established by the British in 1900, basically to implement the policies and programmes of the colonial government. However, at independence in October 1960, the role of the public service changed from that of maintenance of law and order to that of service delivery to the people (Gberevbie, 2010). Therefore, what was known at independence in 1960 as the Nigerian public service was a prototype of the British administrative system based on the weberian model "characterised by hierarchical patterns of authority, a division of labour and specialisation of a task and impersonal relationship" (Gberevbie, Ayo, Iyoha, Duruji & Abasilim, 2018:58).

The above characteristics played a significant role in the non-performance of the Nigerian public servants in the sense that the system did not allow for personal initiatives of the public servant to boost performance for career advancement. Furthermore, to reflect every segment of the Nigerian society in the public service, the federal character principle was introduced by the Federal Government of Nigeria at post-independence years (Gberevbie, 2010). The federal character principle, as contained in section 14(3) of the 1999 constitution of the Federal Republic of Nigeria as amended stated that:

The composition of the government of the federation or any of its agencies and the conduct of its affairs shall be carried out in such a manner as to reflect the federal character of Nigeria and the need to promote national unity and also to command national loyalty, thereby ensuring that there shall be no predominance of persons from a few states or from a few ethnic, sectional group in that government or any of its agencies (cited in Gberevbie, 2010:1449).

The above development of federal character principle introduced into the Nigerian work environment has brought about poor leadership, lack of work flexibility for career advancement and lack of the capacity to perform on the part of the Nigerian public servants (Gberevbie, Joshua, Excellence-Oluye & Oyeyemi, 2017).

Research Proposition

Work flexibility and Career Advancement

Career advancement is fundamental to employees who take part in the day to day activity of their organisation. It is the design of programmes targeted to enhance the skills and expertise of organisations' workforce. Career advancement is essential to increasing workforce satisfaction (Ugwu *et al.,* 2018). Scholars have found that career advancement opportunities lead to an increase in high employee satisfaction (Adewoye *et al.,* 2017). Ugwu, *et al* (2018) in their study on the impact of work-family conflict on career advancement, revealed that family obligation has a significant positive influence on career advancement of female professionals in the Nigerian banking industry. However, Oludayo *et al.* (2015) in their study on multiple work-life-balance initiatives in the Nigerian banking industry, revealed that flexible work arrangements made a unique influence on the employees' behavioural outcomes. This ranges from time-out for personal matters, compressed workweek, personal scheduling of work hours, teleworking and part-time working. The study further posits that most of the elements of work flexibility arrangements still run on the wheels of a co-worker and managerial support, which influences the level of an employee's satisfaction. Adewoye *et al.* (2017) in their study on functionality of career advancement and organisational effectiveness, showed that employees' career advancement in the workplace exerts a great influence on the operations of deposit money banks in Nigeria, and as such banks management should invest in employees development to stem employees' high rate of turnover and improve productivity.

Linge (2015) in a study, examined social-family factors and career advancement of Kenyan women employees and found out that social-family factors were not perceived as a barrier to the career advancement of Kenyan women employees. Also, Essien and Amah (2017) in their study, observed that the implementation of work flexible schedules in the banks positively impacts employee affective, continuance, and normative commitment to work.

Also, Ojo, *et al.* (2014) in their study on work-life-balance practices in Nigeria of three different sectors reported that when business organisations allow work flexibility in the workplace, employees accomplished their work and non-work needs better. Thus, based on the argument above, the study proposed that:

P1: work flexibility influence and enhances career advancement.

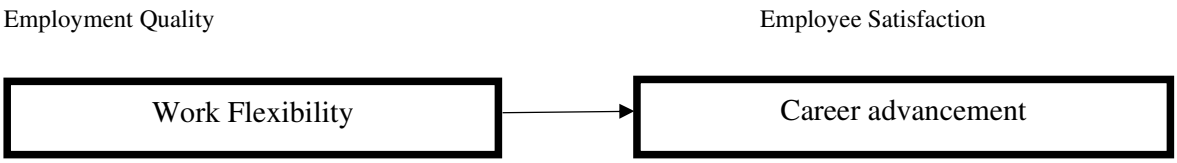

Fig. 1: Schematic model of Employment Quality and Employee Satisfaction

The diagram in figure 1 above, reveals how employees' satisfaction, such as career advancement, job security, and employee relationship management can be enhanced through employment quality provided by their organisations. These employment quality provided by an organisation is in terms of work flexibility. Where the diagram depicts that work flexibility influences and enhances career advancement in an organisation.

Conclusion

The importance of employment quality in the organisation cannot be underrated. Hence, the literature reviewed has been able to show the essentiality of work flexibility, the role it plays in improving employees' satisfaction in terms of career advancement that is noted as a motivator and hygiene factors in Fredrick Herzberg's Two Factor theory.

Implication and Recommendations

Career advancement is fundamental to employees' retention in an organisation, which tends to increase their satisfaction level in the workplace. Also, different things influence career advancement of which work flexibility plays a significant role. This study, therefore recommends that work flexibility under the aspect of employment quality should be implemented while making decisions to enhance employees' satisfaction in the Nigerian public service.

Contribution to Knowledge

This study contributes to knowledge by helping and enabling the Nigerian government to understand the concept of employment quality and the need to formulate employment quality policies that favour certain job aspects, which enhances the satisfaction of those in public service. In addition, the study stands out as a blueprint that would enable employees in the public sector to understand that their satisfaction is tied to the specific job characteristics offered to them at the point of employment and to seek those job characteristics such as work flexibility that would enhance their career advancement and well-being.

Suggestion for Further Study

To properly understand the role of work flexibility in the career advancement of employees for generalisation, further studies should be carried out comparatively in an empirical manner in the area of employment quality and employees' satisfaction in organisations both public and private sector. Furthermore, this is in addition to other job characteristics that form employment quality towards developing better employees' satisfaction for enhanced performance.

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Remote Work Security During The COVID-19 Pandemic: Threats – Challenges – Proposals.

Irina SURINA
Sociology Faculty, Sociology and Political Science Department, Safety and Management Institute, Pomeranian University in Slupsk, Poland, ORCID: 0000-0002-5038-1214;
e-mail: irina.surina@apsl.edu.pl

Joanna GRUBICKA
Cyberspace Protection Faculty, Security and Management Department, Safety and Management Institute, Pomeranian University in Slupsk, Poland, ORCID: 0000-0001-7934-6044; e-mail: joanna.grubicka@apsl.edu.pl

Malgorzata CHRZANOWSKA-GANCARZ

Sociology Faculty, Sociology and Political Science Department, Safety and Management Institute, Pomeranian University in Slupsk, Poland,
ORCID: 0000-0002-0712-4028; e-mail: machrza@apsl.edu.pl

Abstract

A sense of security - or the lack of it - essentially determines the quality of life of every human being. Contemporary man, thanks to the digitized reality, has unlimited potential for creating his own existence. Cyberspace is now becoming an inevitable reality of everyday life. We are wrapped in technological advances that not only make our lives easier, but most of all provide us with a sense of security. This virtual space shapes our safety, actions and choices, influences our relationships and mutual connections in almost every sphere. The global COVID-19 pandemic has made our relations even more dependent on cyberspace, as most of us perform professional duties in the remote work system. This sudden dependence on remote working, however, opened up a whole new range of security and privacy risks. The purpose of this article is to present the impact and implications of civilization, technological and epidemic changes on the security level of remote work.

Keywords: Cyberspace, Pandemic, Remote Work, Digital Security

Introduction

In early March 2020, the World Health Organisation (WHO) announced the COVID-19 or SARS-Cov-2 pandemic[1] around the world. This decision had to be accepted also by the authorities of our country. Due to epidemiological threats, human life has almost completely shifted to virtual reality, i.e. the World Wide Web, which was described in his memoirs by Timothy Berners-Lee,(Berners-Lee 2000) British physicist and computer scientist, one of the creators of the WWW system, known today under the name of Internet. "The rise of the Internet gives us a foretaste of what is coming. Cyberspace is now a key element of our daily life, economy and security"(Harari 2017: 420). The COVID-19 pandemic has also made most people in the world switch to remote work. They usually work from home and so digital technology has become an important proverbial lifeline for them. This sudden dependence on remote work, however, opened a whole new range of threats to security and privacy.

Interdisciplinary security issues

Interdisciplinary security issues elude any systematisation because there is a multitude of divisions and patterns of such a widely understood matter. Security is typically perceived from the perspective of a human being as an individual, human collectivity, the whole society or international communities, hence it is usually analysed in the social, cultural, ecological, military, political or legal context. When analysing the problem of security, one should

[1] According to the Ministry of Health of the Republic of Poland, The SARS-Cov-2 coronavirus causes a disease called COVID-19, most often manifested by fever, coughing, shortness of breath, muscle aches and fatigue.

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use research methods proven in social sciences that are characterised by methodological, epistemological, ontological and axiological pluralism.

It is difficult to unequivocally define security (if it is possible at all) because there are almost as many attempts to specify this concept scientifically due to the various area or thematic scope of the subject as there are subject experts. Despite this difficulty, the typologies of security most frequently cited in the literature on the subject are those distinguished on the basis of the following criteria: subjective, objective, time and source of threats. In the context of an individual's safety, one can refer to a dichotomous division which refers to structural and personal security. Structural security refers to social groups that are linked by common relationships. They can be formal and informal. This security was based on internal structures and ties and it is guarded by state institutions(Cf. Sztubrych 2006: 110). Structural security refers to the activities of individual structures of institutions and organisations in the local, regional, national and international context, the task of which is to shape social life in various aspects of human existence and thus ensure security in the personal dimension.

The subject of personal security is not only an individual, but also a social group or a community: national, regional, local, corporate, institutional, etc. Subjectivity is identified with conscious shaping of reality, transforming it in the direction consistent with one's own needs(Cf. Drabik 2013: 53). It is worth noting, however, that the awareness of individual entities is not very clear and difficult to grasp because in each collective entity there are usually differences in the awareness of specific groups and individuals. Personal security is usually associated with a sense of stability, durability, certainty and lack of threats, both in the physical and mental sphere.

Karen Horney pointed out that the need for security is the main motivation directing the way of life and human activity(See: Horney 2007: 28), which is related to the constant protection against the threat. Permanently experienced state of anxiety can be a source of personal threat. It can disorganise human activities, create unfavourable interpersonal contacts as well as lead to social isolation and limiting or avoiding contacts with other people. In certain situations it can also be a motive for aggressive behaviours. In the face of the growing awareness of threats, people feel the increasing need for security more and more often. The thought of a sense of security usually evokes associations relating to external aspects of broadly understood human existence and refers to an individual assessment of reality, the possibility of one's survival and growth. The quality of this security is determined by the state's ability to guarantee that people can fulfil their existential needs. In this context security can also be seen in an axiological context, as an aspect of human dignity(See: Chrzanowska-Gancarz and Gancarz 2019: 52–58). Thus, it can be concluded that security is not only the primary need but also a law of nature that determines survival and development not only of a human being but of all biological beings. As Wolfgang Sofsky notes, it was mainly for the sake of personal safety that people "laid down all weapon they produced over time and entrusted this weapon to several representatives, previously selected from among their own group"(Sofsky 1999: 20). An important, so far underestimated barrier to the proper development of civilisation, is the low level of awareness of personal security in cyberspace. The pandemic effectively impaired the sense of security, especially in the personal dimension.

Personal security and digital security of an organisation

Personal security faced with digital security of an organisation seems to be extremely important in the context of the currently developed digital economy and its challenges. The demand for new applications that support enterprises and organisations in digital transformation, automation of business processes and solving current problems is growing day by day. "Today, each and every organization operates on an information systems infrastructure that is internal as well as external(Kostopoulos 2013: 45)". This ensures the security of achieving the intended effect of the change. Therefore, modern management concepts focus on coordinating connections and relations between the links. Security of an organisation is the same as security in the personal sphere (employees, owners, suppliers, customers, etc.) because the main subject representing various categories of individual and collective stakeholders in a given organisation is a human being. In practice, it is almost impossible to analyse threats in the area of structural security without interfering with the personal aspect.

Structural security plays an ancillary role towards humans regardless of time and space, which makes it meaningful only when it is considered and implemented in the personal context. In order to reconcile all positions regarding the subjects of personal and structural security, three types of entities can be distinguished:

- individual personal entities,
- collective personal entities,
- structural entities, i.e. various types of organisations, including institutions that affect personal security. These entities fall under three basic categories of security: individual security, collective security and organisational security.

In digital reality, i.e. so-called fifth dimension, in which human beings stay more and more often, security has become an indispensable guarantor of normality and development in every possible area of modernity, i.e. politics, economy, health, education, culture, etc., hence it is the subject of multidimensional, interdisciplinary scientific research. This virtual space is also the subject of care and activities ensuring practical and proper functioning of both business and institutions of various levels(See: Berg, Freeman, and Schneider 2008: 34–37). For the economy 4.0 – so-called digital economy – it is the basis of its existence and a condition for innovation(Cf. Joint Task Force Transformation Initiative 2012). However, digital security is also a new type of "battlefield" in which entities that actually pose a threat (unfortunately, generated mainly by the human factor) must be constantly opposed even more actively – both through technology as well as creating appropriate, safe digital behaviours, especially from various stakeholders of the new digital reality: citizens, employees, customers. Despite having significant intellectual and technological resources as well as spending more and more money, digital security is an area where uncertainty and risk awareness is not decreasing but systematically growing.

At the level of functioning of an organisation there are more and more new faces of cyberthreats revealed. Their nature and effects have already exceeded the control of technical infrastructure, owned equipment and ICT devices. Currently, the greatest concerns connected with digital security relate to a wide range of technical and behavioural threats. Achieving a satisfactory level of digital security is a key challenge for decision-makers in various institutions as well as owners or managers of business entities. As various organisations develop and introduce innovative business models (e.g. e-business(Cf. Laracy and Leveson 2007)), the issue of cybersecurity is entering higher and higher organisational level. Providing cybersecurity within an organisation is a real challenge because as a rule organisations do not have their own ICT infrastructure and the condition for their operation is to distribute the services provided beyond the control of their own IT department. Digital security is thus becoming a problem at the interface between technology and the physical world in which humans play an immanent role. We are talking about information and communication technology (ICT), operational technology (OT) and the Internet of Things (IoT)(Cf, Grubicka 2018: 141–142).

The pace of e-business development is accelerating to algorithmic speeds as algorithms replace the human factor in making business decisions. Digital risks and digital opponents will continue to pose a challenge for organisations and we should expect an increasing number of threats and risks connected not only with data loss but also the assumed profits from operating activities. However, the complexity and range of systems, sectors and benchmarks where cybersecurity can and should be analysed means that looking for any effective approaches must necessarily be multifaceted and interdisciplinary. To this end, cooperation of specialists in many areas and specialities, both those representing the technical view of digital threats and the related security measures, as well as those from the field of social sciences, analysing the personal and subjective nature of digital risks in citizens' lives as well as an organisation's functioning and development opportunities, is necessary.

Cybersecurity is a dynamic process which actively involves entities that pose threats on the one hand and entities that oppose them on the other hand. The attacker–defender system, known from the military realities, cannot mean the defensive of the latter. Protecting digital security of an organisation is primarily prevention, improvement and innovation. It is equally important to search for effective business and operational strategies that can provide constant support for the creation of a threat-resistant organisational community that has the appropriate technology and competences and is capable of loyal cooperation in the name of a common goal. Technology, competences, ethics, cooperation – these are the key pillars of digital security of modern organisations. Recent technological advances in data processing, mass memory and Internet connectivity further emphasise the need to better understand general security systems which we rely on.

A current example of a situation in which the importance of cybersecurity has gained a new global dimension is the crisis caused by the COVID-19 threat. Therefore, studying digital security and its conditions in organisations of various types is necessary and extremely important, especially in the context of the new era of organisational behaviour in connection with the crisis caused by the epidemiological threat.

Threats to privacy and freedoms regarding remote work in the light of the COVID-19 pandemic

Coronavirus disease 2019 (COVID-19), which according to scientists first appeared in the city of Wuhan, Hubei Province, China, probably originated at the seafood and meat market called "Huanan." It belongs to the coronavirus family such as SARS and MERS. A pandemic caused by a virus whose genesis - so far - has proved to be quite difficult to determine, is not the only virus that has caused a pandemic to be declared. "The first of these epidemics (541–544) has been called the Plague of Justinian, since it occurred in the reign of the (eastern) Roman Emperor Justinian (527–565); the name has sometimes been extended to the entire 200-year period of the recurring epidemics

as well"(Hays 2005: 23). As we know from history, over the centuries there have been many pandemics that decimated humanity, such as:

- Smallpox Epidemic in Japan (735–737),
- disease called leprosy in medieval Europe, especially (but not only) between about 1000 and about 1350,
- The Black Death - the great epidemic of 1347–1353,
- The "French disease" at the end of the fifteenth century,
- smallpox (black pox) pandemic – in the 16th century it decimated South and North America,
- cholera in the 19th century – in Europe and America,
- Spanish influenza in 1918 and 1919 – the biggest flu pandemic in the history(See: Encyclopedia of Pestilence, Pandemics).

Certainly, the above-mentioned pandemics, like SARS-COV-2, made people change their previous habits, plans and dreams. A human being, as a social being and at the same time a part of a larger human community, usually strives for self-development but in a situation of insecurity – and a pandemic is undoubtedly such a situation – focuses mainly on satisfying the needs connected with survival. However, according to policy makers, the survival of citizens depends on introducing precautions suitable in the current situation. As it is commonly known, leaders of individual countries have decided to implement strict rules and regulations of conduct in the event of an epidemic emergency and state of epidemic, such as:

- obligation to wear face masks (when going outside and in all public spaces)
- wearing gloves in stores and supermarkets
- maintaining 2 metre distance between people
- remote learning
- no trips (as we probably remember, there was also a ban on entering forests and trips to the seaside)
- no business activity
- and many other rules and regulations which, if not complied with, meant (and still mean) imprisonment and high penalties.

These restrictions not only changed the current (and the only one we knew) lifestyle but also often cause fear and insecurity to constantly increase. People, fearing the rapid spread of the virus and out of concern for their own safety, are capable of attacking others who, in their opinion, do not strictly follow the pandemic-related guidelines. Moreover, the pandemic situation, forcing people to some form of isolation, causes stress which translates into a lack of motivation to continue living and to make plans for the future. Additionally, people who stay at home during the pandemic become lonely and fall into a state of discouragement, depression or even internal chaos. The existence of man is determined by certain actions, activities, leading a certain lifestyle, which Alvin Toffler equates with slavery(See: Toffler 1970: 312–313). Each activity has a specific purpose: we eat, drink and breathe to live; we want to be accepted by other people; we create and we learn to make our plans and dreams come true. We establish our own hierarchy and our own rules but to follow and apply them we need a sense of security.

Remote work system forced by the global pandemic. Cyber threats and ways to counteract online threats

Remote work, forced by the global pandemic, is exposed to a number of threats. This type of threats includes crimes involving the use of a stolen identity, which are usually committed online, although the process of identity theft does not always take place there. Identity theft offences are transaction-related frauds that harm so-called e-business. They consist in filling in the order form in the name of another person. The main difference that distinguishes this type of crime from traditional fraud is that in the virtual world it is possible to attack more stores in a very short time, often with impunity. Generally, identity is stolen in order to commit other crimes. It can be used to commit fraud, to resell it to other people or organisations that plan to commit fraud and to fabricate birth certificates, driving licenses or, for example, a passport. Stolen identity can also be used to access certain places online. Thanks to the Internet, the victim may not even know that someone is using their last name. Most often, the case is not discovered until this person receives a bank statement or when someone begins to demand payment for services and goods that the person did not order.

It very often happens that a criminal opens a new bank account using previously obtained information about a given person, such as name, date of birth, address or the mother's maiden name. This type of information can be obtained from the data available online, from companies that intercept it using "cookies" and, for example, from waste bins. It

happens that the criminal seizes the victim's bank account. To take over the account, the criminals need certain personal information which they can obtain in several ways:

- by using existing chat rooms; the criminal places a link to a website where a given topic can be discussed on the official list with the information on chat rooms; in fact this is the website where people are asked to fill in the form; this form includes questions and answers to these questions will give the fraud all the information needed to commit a crime; graphically the website looks like an original chat room and therefore it is easy to mislead other people
- by copying the seller's or service provider's website; it is a similar method to the one described above, however this time the criminal creates a page that is identical to the existing original page; the criminal collects orders, confirms them and receives the money without ever completing the orders
- by creating websites with pornographic content for which users do not have to pay but only provide their credit card details; such a website remains free but after obtaining the necessary information the criminal makes purchases on other sites.

Therefore, it is worth remembering to properly protect one's sensitive data against cyberattacks and, above all, invest in training to ensure safe work for yourself and your employees. Remote work presents a unique challenge for information security because its environments usually do not have the same security as in the office. In light of these changes, it is essential that the tools underlying sensitive and high-risk communication are carefully scrutinised. Digital security when working remotely comes down to many of the above-mentioned principles but we should also remember to:

- avoid using public Wi-Fi; if necessary, one should use personal hotspots or other means of encrypting the Internet connection
- use VPNs that allow you to connect to various services (websites, e-mail, SQL server, etc.) for remote access to many applications.

Cloud technology is another example of a concept that, on the one hand, brought great convenience (backup, data synchronisation, no need for large physical disks), and on the other, a great threat. By sending our files to an external server (i.e. the cloud), we do not get a total guarantee that they cannot be accessed (or that unauthorised person will not get the access to them by hacking or through leakage). Therefore, it is a reasonable solution to encrypt data before synchronisation. There are many applications available, including DiskCryptor, TrueCrypt or Gpg4win

Another threat from working online is spyware, which is becoming more common, but also dangerous. As a result of malicious use of spyware, all home and corporate users trying to take advantage of computer technology are at risk of serious losses. In addition to common malware, such as viruses, bugs, Trojans, backdoors, root user packages, telephone diallers, listening systems and spyware, a wide variety of different malicious programmes are infecting an increasing number of users and organisations. The set of problems that we call "spyware" is becoming more and more diverse. It is a particular expression of the complexity of the modern world.

The term "spyware"(See: Sun 2007: 555) covers a wide range of software that monitors computer usage without the user's knowledge or consent. Some versions of spyware appear in pop-up ads, while others track online activity, steal passwords or even hijack the user's computer(See: Crawford 2005: 1473–1474). Spyware is often classified into four types of software: (1) system monitors, (2) Trojans, (3) adware and (4) tracking cookies. System monitors pose a serious privacy risk as they can secretly intercept and transmit the user's personal information and passwords entered during online transactions. Trojans appear to be legitimate software, but they can be used to steal sensitive information, install malicious programmes, take control of a computer or compromise additional computers and networks. Adware tracks users' online activity to display targeted pop-up ads. Tracking cookies are small text files that are downloaded to the user's computer and retain preferences on certain websites. Once installed, spyware evades detection and is resistant to removal. Most spywares do not come with uninstallation software and even leave components behind when uninstalled. Such information may be used for legitimate data mining purposes or for identity theft and financial crimes committed by others.

One of the most modern spywares nowadays is Pegasus, which can be installed on iOS (Apple's operating system) and Android devices. In the second half of 2019 there were media reports saying that the Central Anticorruption Bureau could have purchased the Pegasus surveillance system. The software allows access to all phone content as well as the speaker and camera. The Pegasus system also enables downloading the content of instant messaging conversations, text messages and e-mails as well as access to photos and recordings stored on the phone. The spyware called Pegasus is an extremely sophisticated and dangerous cyberweapon that allows its operator to hijack the entire smartphone, including WhatsApp(Cf. Winstanley 2019: 1). The scope of activities on the Internet as well as the use of popular applications and the study of transparency and accountability mechanisms – important for relations

between corporations and state agencies in the field of personal data and other supervisory activities – have become the basis of research at Citizen Lab.

The report Citizen Lab published on April 3, 2020 (*Move Fast and Roll Your Own Crypto: A Quick Look at the Confidentiality of Zoom Meetings* 2020)highlighted the security issue with the Zoom's Waiting Room feature. In particular, it was found that the Zoom servers provided both the encryption keys and the Zoom meeting live video streams to all users in the Waiting Room, even if waiting users were not approved to join the meeting. This issue would allow any unauthorised Zoom user in the Waiting Room to intercept and decrypt "encrypted" video content(Cf. *Deibert:* 2020). Following the publication of the Citizen Lab report, Zoom took a number of security measures. The communication systems we rely on have seldom been designed with security in mind. Security has been routinely thought of as slowing the pace of innovation or as impossible to impose on basic systems that have chronic failures and that would require a complete overhaul of the communication infrastructure to become "secure". The consequence of such online contact solutions is that there is a wide variety of unpatched systems that leave constant security gaps behind. This risk covers the most basic layers of our shared infrastructure. For example, telecommunication and mobile networks still rely on a ten-year-old information exchange protocol called SS7, which has proved to be highly insecure and prone to abuse and illegal surveillance when sending credentials. The signs of cybercriminal attacks that are worth paying attention to when using a computer connected to the network include:

- the appearance of new programmes that have not been installed by us
- computer slowing down
- pop-up ads appearing on the screen
- loss of control over the mouse or keyboard.

A simple solution of updating modern anti-virus software may prove to be helpful in this situation. Ideally, employees should be able to use computers that are fast, well-maintained and dedicated to the tasks at hand(See: Grubicka 2019: 96–97). It is worth remembering that corporate and personal data should be stored separately. When it comes to cyberthreats in a company, employees are always the weakest link. About 90% of intrusions and problems connected with cybersecurity are caused by human error, which means that the best way to protect remote employees from cyberthreats is to invest in proper IT training. Taking care of one's privacy online, it is worth paying attention to every detail.

Conclusion

Functioning in virtual reality, in addition to the obvious, undeniable benefits – easy access to reliable information, the possibility of organising the process of remote education in a situation of having to limit direct contacts (see the SARS-COV-2 pandemic), the possibility of remote handling of civil and official matters, remote work, etc. – robs humanity of the sense of intimacy, sense of privacy, autonomy and freedom at the same time. What's more, the ever-changing formulas in the virtual sphere also force people living in modern times to accelerate the pace of life in the real sphere, which, paradoxically, results in a permanent lack of time for reliable performance of our daily duties, which our life and its quality depend on. Virtual reality has given the world a unique power, but also an unprecedented dependency and loss of privacy. It should be remembered that remote work is exposed to a number of risks. Digital espionage against civil society, documenting Internet filtering and other technologies and practices are more and more common examples of threats resulting from violating privacy on the Internet. The quoted examples of unlawful data analysis and information flow control have a huge impact on the sphere of both our freedom of speech and privacy. The solutions proposed in the article do not guarantee the protection of privacy on the Internet. Each software or technology has some weaknesses that can be exploited by a capable hacker or services with sophisticated equipment. It seems that the highest possible degree of anonymity in the cavernous abyss of human in the fifth dimension, if the simultaneous use of many of the options described, as well as using common sense, carefully disposing of information about yourself.

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Theoretical Aspects of Financial Support of Agricultural Enterprises in The Context of Modern Conditions

Serge KOLOTUKHA
Ph. D. in Economics, Associate Professor of the Department of Finance,
Banking and Insurance Uman National University of Horticulture,
Ukraine. e-mail: sergey.kolotukha@gmail.com

Nataliia GVOZDEJ
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University,
Ukraine, e-mail: gvozdej@ukr.net

Liudmyla CHVERTKO
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University,
Ukraine, e-mail:Luda_um@ukr.net

Oksana VINNYTSKA
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University,
Ukraine, e-mail: vinnytska.oksana@ukr.net

Tetiana KORNIIENKO
Ph. D. in Economics, Associate Professor of the Department of Finance, accounting and economic security Pavlo Tychyna Uman State Pedagogical University,
Ukraine, e-mail: kornienkoto@ukr.net

Abstract

Theoretical approaches to the definition of the essence of the concept of «financial support» of an enterprise are presented, the evolution of this concept is traced. The economic content of the financial support of an agricultural enterprise is disclosed. The relationship between the category «financial security» and such categories as «financial stability» and «financial stability» is considered. It has been substantiated that the financial support of an agricultural enterprise characterizes such a state of financial resources, in which the enterprise can maneuver cash to ensure a continuous process of financial and economic activities, as well as renewal and expansion of its funds. It has been established that at present agricultural enterprises, in addition to their own and borrowed financial resources, use attracted financial resources. The modern forms of financial support of the reproduction process in the agricultural sector are determined.

Keywords*:* Financial Security, Financial Resources, Own And Borrowed Financial Resources, Agricultural Enterprises, Financial Stability, Financial Stability

Introduction

Peculiarities of the development of financial relations within the state's economy, and in particular in the agricultural sector, are of great importance for understanding the essence of the concept of "financial security", the disclosure of the economic content that falls into this category.

Analysis of the views of domestic and foreign scholars, the wording given in the regulatory legal acts of Ukraine, economic dictionaries, indicates that there is a wide range of definitions that reveal the essence of the category of

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"financial security". The views and opinions of economists on the essence and content of this category have been transformed and developed, but the issues still remain finally unresolved.

Analysis of recent research and publications

Important contribution to the development of the theory and methodology of formation and use of financial resources was made by Ukrainian scientists O. Hudz, M. Demianenko, V. Zinovchuk, V. Oparin, P. Stetsiuk, O. Tereshchenko, S. Yurii, Yu. Tsal-Tsalko and others. Scientific studies of V. Aleksiichuk, V. Andriichuk, P. Haidutskyi, P. Kaninskyi, P. Laiko, M. Malik, L. Maslovska, V. Mesel-Veseliak, H. Pidlisetskyi, P. Sabluk, A. Chupis and others are dedicated to issues of development of financial relations of resource-forming and resource-consuming nature in the globalized market environment.

Thus, V. I. Kravchenko notes that "… financial security – the amount of funds allocated for the maintenance of the objects of the social-and-cultural sphere, production and social infrastructure, social services, social protection, social security, financing of management staff and the programs of social-and-economic development… » [1, p.117].

According to A. P. Kovaliov, the main tasks of the finances of economic entities, regardless of their organizational-and-legal forms are:

- formation, maintenance of optimal structure and increase of production potential of the enterprise;
- support of current financial-and-economic activity;
- support of the participation of the business entity in the conducting of social policy.

Based on this, the author identifies three functions that perform the finances of enterprises: support, distribution and control.

The support function is directly related to the definition of the essence of the category "financial security". The essence of the support function of the finances of the business entity is to create monetary funds at the enterprise in the optimal amount. All production expenses must be covered by own income. Temporary additional need in funds is covered by credit or other loan sources. Herewith, the optimization of sources of monetary funds is one of the main tasks of enterprise financial management, because the excess of funds reduces the efficiency of their use, and financial difficulties appear in their absence that can lead to serious consequences [2].

A more complete interpretation of the category of financial support is made by V. M. Rodionov: "Financial support of expanded reproduction is covering the costs through the financial resources accumulated by business entities and the state". It takes three forms: self-financing, crediting and state financing. Financial support of the reproduction of production expenses is one of the important areas of financial influence on the processes of social development along with financial regulation and financial stimulation [3].

M. S. Maizus appreciates this point of view and believes that the financial activity of the enterprise are directly aimed at its financial support and aimed at creating financial resources for production and social development, increasing income by rising the labour productivity, reducing the prime cost, improving product quality, enhancing the use of production assets [4].

M. L. Lyshanskyi emphasizes that it is impossible to achieve high financial results, carrying out integration processes in the branch without stable and effective financial support of agrarian formations. In addition, the author notes that the mechanism of the financial security is not once an ingrained phenomenon, but must be constantly improved [5].

Charles Blancart, a well-known Western economist, concludes that individuals in financial relations make decisions and act orienting primarily on maximizing their own benefits. In this case, it is implied that a representative adult is always focused on maximizing his own benefits [6].

Objectives statement

Within the conditions of economic instability, the range of problems in financing, crediting and government support of agricultural enterprises has increased significantly. This necessitates their assessment, identification of the causes of underfunding and further research aimed at finding the best ways to solve the above problems.

Presentation of basic material of the research

There is a danger of limiting the growth of the financial potential of enterprises because of the fact that they cannot fully realize their opprtunities for expanded reproduction when using just own funds for economic activity.

Loan sources of financing play no less important role in the economic process except own sources of financial resources. Bank crediting is the most common source of loan financing in Ukraine, as every enterprise has a need to receive a credit in the process of economic activity. The current stage of development of the market economy in Ukraine necessitates the search for its own credit model to support agriculture.

Leasing could be another alternative source of financing for agricultural enterprises since most agricultural enterprises take credits to purchase machinery. This significantly accelerates and improves the technology of the process of production and cultivation of agricultural products, maintains the competitiveness of all parties to the leasing agreement.

Agricultural enterprises use borrowed financial resources in addition to their own and borrowed sources of financial resources. One of the sources of borrowed funds is assistance to agricultural enterprises by the state, which is expressed in the provision of subsidies, grants, budget allocations [7].

Some economists directly connect financial support and its efficiency with a category such as the "rural financial system". The authors include not only commercial banks to the group of possible creditors but also credit unions, cooperative banks, credit providers who borrow their private funds, pawnshops, and can provide financial services to small and medium enterprises and households in rural areas. This system includes both companies on the supply of material-and-technical resources and processing plants. All these institutions coexist in many countries and provide services according to different customer requirements [8].

O. S. Filimonenko, the economist, understands financial support in an interesting way. The author notes that enterprises operating in the conditions of the market relations are fully responsible for their obligations to the sections of the financial-and-credit system, suppliers, their employees, as well as the results of their production-and-financial activity [9].

Thus, we favour the idea of the author that the financial support of the enterprise is the ability of the enterprise to repay timely its debt obligations to the subjects of financial-and-credit relations.

Some authors connect financial support directly with the financial condition of the enterprise to self-develop at a certain point in time [10].

We do not share the point of view of these authors, as they do not reflect the financial sources to ensure the self-development of the enterprise. In our opinion, the concept of such a category as the financial stability of the enterprise is more successful in terms of content, which implies the ability of the enterprise to provide activity at the expense of its own and borrowed funds and timely settle its obligations.

A number of authors consider the category of "financial support" in a broader financial range, believing that the financial support can be provided in three forms: budget financing, crediting and self-financing. Budget financing is carried out on a non-repayable basis at the expense of budgets formed in the process of distribution and redistribution of the part of national income. The state redistributes financial resources with the help of budget financing between productive and non-productive spheres, in intersectoral and territorial divisions, between individual forms of ownership.

Crediting based on mobilization and redistribution of temporarily free funds of market participants. Loans, in contrast to budget financing, are provided in accordance with the principles of crediting: security, target character, urgency, repayment and payment.

Self-financing is based on the use of own resources to ensure economic and social development. Enterprises and organizations must either reduce some expenses or take loans in the absence of their own resources.

Different forms of financial support can be used in practice simultaneously. The development of the financial support system is not by displacing one form of another, but by establishing the optimal ratio between them for certain stage of the society development. Determining such proportions is one of the tasks of the financial policy of the state [11].

In addition, some economists directly connect financial support with the system of economic relations. They believe that the financial-and-credit mechanism should provide a continuous process of expanded agricultural production by monetary resources and at the same time influencing the improvement of the resuls of the economic activity. We share the point of view of those economists who define the content of the financial support not only as a form of distribution relations, but also from the standpoint of mediating the stage of production to consumption associated with the formation and use of the monetary funds. Finance with the help of distribution relations and exchange influences the stage of production and consumption, the strengthen of cost accounting.

Based on this, the authors conclude that the problem of raising the efficiency of agriculture of the entire agro-industrial complex is associated with the improvement of the financial-and-credit mechanism. The search for a more rational system of the financial support for production is determined by the improvement of distribution relations. Herewith, it is expected a rational combination of three methods of financing: commercial self-financing, credit and budget [12].

In our opinion, the category of "financial support" should be associated with such categories as "financial strength" and "financial stability", which directly complement each other in economic terms. According to M. Ya. Demianenko, the financial strength of the enterprise is characterized by the ability to keep the balance of its assets and liabilities, keep constantly paying capacity and investment attractiveness, within acceptable risk, use efficiently financial resources and implement profitable activity. The financial strength of the enterprise reflects the balanced state of cash and commodity taxes, income and expenses, instruments and sources of their formation, optimal proportions of own and borrowed capital. In the author's view, the financial stability is the achievement of different levels of the financial strength. The first level is characterized by the level of the financial strength when self-financing of the production-and-economic activity at the level of simple reproduction is provided. This is typical of a crisis state in the economy, when stability is provided as an opposition to the decline in production and the destruction of the resource potential. Financial stability is characterized by progressive economic growth and ensuring the development of enterprises through their own sources of funding [13].

The essence and sources of the financial support of the enterprises is reflected in a number of regulatory acts of the state. Thus, the Law of Ukraine "On Enterprises in Ukraine" (Article 24, paragraph 1) states: "The source of formation of the financial resources of the enterprise is the profit (income), depreciation deductions, funds received from the sale of securities, share contributions of the members of the labour collective, enterprises, organizations, citizens and other income."

In addition, this Law provides that the enterprise may use a bank credit (Article 24, paragraph 2) and state support (Article 28, paragraph 2). This is confirmed by the traditional channels of the financial support of the business entities. However, it would be appropriate to supplement the mentioned sources with a category such as commercial crediting, that is providing a loan from one entity to another and vice versa. The functioning of such mechanism of crediting is especially relevant in the market conditions and the financial instability of the agricultural sector. Commercial crediting will significantly alleviate the need to attract a bank credit, which is quite expensive and not always available to agricultural producers.

However, sometimes financial support was identified with the category of financing in the works of Soviet economists. Thus, A. M. Aleksandrov believes that funding is the provision of the monetary funds to the enterprises and organizations through budget allocations and the direction of their own resources for continuous cover the costs of expanded reproduction. The author also notes that these are:

a) Identification of fund needs and sources of satisfaction;
b) Provision of credits, organization of cash servicing of the budget and use of own funds of the enterprise;
c) Control over the targeted and efficient use of funds.

Sometimes the term financing was used in a broad sense, also covering short-term and long-term bank credits [14]. This interpretation is consistent with the definitions of modern economists, who have combined all sources of financing into one category.

For example, "financial resources are own and borrowed money capital by the firms used to finance their assets."

In recent years, financial science has undergone radical changes. Knowledge of finance has now become indispensable for people of practical business. For their part, scientists have revised their theories to reveal the real situation. Financial markets encouraged the development of various investment techniques and methods of capital mobilization. From this point of view, the view of Canadian scientists of Ehsan Nikbakht and A. A. Groppeli on the formation of internal and external sources of capital is interesting. The capital used by the firm comes from both

internal and external sources. The origin of funds from internal sources can be found in the balance sheets and income statements, which report on the funds received from retained earnings and amortization.

Funds from the internal sources reduce the need in external financing. They should be considered those which have the optimal possible cost of capital, without which the firm would have to issue new shares or bonds, which would mean the payment of dividends or annual interest because they are an alternative source of financing. In finance, it is common practice, when the cost of capital assumes to these internal sources of funds, that is, the firm seems to have borrowed or issued new shares. Note that each source counts on a different cost of capital, and plays an important role in determining the total cost of the firm's capital.

External sources of funds are presented in the right part of the balance sheet. The balance sheet shows the relative value of the long-term and short-term sources of the firm's financing. All you need to do is to compare the amounts that are formed due to current debt (short-term loans), long-term debts (mostly bonds) of preferred and ordinary shares [15].

Sometimes some authors equate the category of "financial support" with the category of "self-financing". However, the definition of the category of self-financing provides for the type of activity of economic entities in which the financial support of own funds. Although self-financing provides for the normal bank crediting (repayment of credits within a particular timeframe) and does not preclude budget financing of targeted purpose. In our opinion, the financial support provides a wider range of sources of the economic activity financing, and self-financing provides financial support of expanded reproduction, mainly at its own expense.

A number of domestic and foreign scientists believe that the general category of market economy and the appropriate form of organization of the economic activity of producers is a commercial accounting [16]. Commercial accounting provides coverage of current and capital expenses exclusively from own funds and bank credits, complete independence in decision-making, effective financial interest, financial responsibility for the results of all current economic and investment activity.

Commercial accounting is the basis of the organization of business finance. The economic mechanism of self-development under the market economy is based on the following basic principles: self-regulation, self-sufficiency and self-financing. Commercial accounting corresponds to these principles, that is the method of management, which consists in a constant comparison (in monetary terms) of expenses and results of activities. Its goal is to obtain the maximum income at the minimum expenses of the capital and the minimum possible risk. The question of what to produce, how to produce, for whom to produce, under market conditions for the enterprise is determined by the main guideline - profit.

Commercial accounting has a significant impact on the organization of business finance. It stipulates that the financial relations of enterprises are regulated by the state mainly by economic methods – with the help of the levers of the relevant tax, depreciation, currency, protectionist policy. Losses (including lost profits) incurred by the company as a result of following the instructions of government authorities and officials, which are contrary to the applicable legislation, must be reimbursed by the relevant authorities.

The entity has true financial independence, that is the right to decide by themselves what and how to produce, to whom to sell products, how to distribute revenue from sales, how to dispose of profits, what financial resources to generate and how to use them. Full independence of enterprises does not mean, however, the absence of any rules of their conduct. These rules are developed and enshrined in law in the relevant regulatory acts. It is clear that enterprises can make decisions independently only within the framework of the current laws. The subjects of the financial relations bear real economic responsibility for the results of activities and timely fulfillment of their obligations to suppliers, consumers, the state, banks. The enterprise is responsible for its obligations with its own property and income. The enterprise is subject to a system of financial sanctions for non-compliance of its obligations. In fact, the independent enterprise covers its outgoings and losses from financial reserves, insurance system and from its own profit. It is obliged to compensate the losses caused by irrational use of land and other natural resources, pollution of the environment, violation of production safety. The source of formation of the financial resources of the enterprises is the actually earned income from sales and financial investments. The economic responsibility of the enterprise is so great that it can be declared a bankrupt in case of excessive losses and inability to fulfill obligations before the creditors.

A wider range of categories "financial support" is provided in the State target program for sustainable development of the rural areas for the period up to 2020 and it is noted "Financial and investment support for the tasks fulfillment of the Program provides for the development of a mechanism of financing of the sustainable development of the rural areas, private funds, credit unions, mortgage loans, formation of bank and non-bank specialized structures.

Financing is carried out at the expense of the funds of state budget, local budgets, funds of enterprises, private investments, funds of international organizations and other sources not prohibited by law, through the introduction of a special tax regime… " [p. 14].

We support the opinion of the authors [Finance: Textbook / V.I. Ospishchev, L.I. Lachkova, O.P. Blyzniuk and others; Ed. by. V.I. Ospishchev. – 2nd ed., rev. and supp. – K.: Znannia, 2008. – p. 12-13], that the financial support is one of the areas of the financial influence on the process of the social development. Financial support of the needs of the financial reproduction process is at the expense of own or borrowed funds. According to these authors, the financial support of the reproduction process is carried out in the following forms:

- budget financing on a non-repayable basis;
- crediting – providing funds on the basis of return, payment, maturity, support;
- self-financing – financing the activities of the enterprise from its own financial resources;
- renting (leasing) – transfer of the right to use the property to a business entity on a paid basis and for a period specified in the agreement;
- investing – the process of investing money in entities with the aim of receiving additional income.

Conclusions

Thus, in our opinion, the financial support of the agricultural enterprise characterizes the state of financial resources in which the enterprise can maneuver by monetary funds to ensure a continuous process of the financial-and-economic activity, as well as renewal and expansion of its funds, that is meets the needs of the enterprise in accordance with the strategy of its development.

We do not specify the sources of the financial support in the defining of the mentioned category, the main filling of the needs of the enterprise by the financial resources – is its stability and ability to conduct expanded reproduction. The analysis of foreign experience proves that in addition to state financing, the forms and methods of the financial support of the agricultural producers are: crediting of the agricultural sector by private banks and cooperative credit institutions.

It was studied that the activity of the agricultural enterprises of the country to attract external (loan) financial resources necessary for the successful operation and development of agricultural production are characterized by:

- the predominance of short-term loans from the private suppliers and budget funds in the structure of external financing of the agricultural enterprises;
- annual reduction of budget support of agriculture, along with the use of mainly "compensation-and-expenditure approach" in planning the a budget program;
- insignificant role of credit and investment resources in the financial support of the agricultural enterprises.

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Activity of Loan Funds and Guarantee Funds in The Aspect of Regional Development in Poland

Przemyslaw PLUSKOTA

University of Szczecin, Szczecin, Poland
przemyslaw.pluskota@usz.edu.pl

Abstract

The literature describes numerous research studies regarding the impact of financial institutions on the economy. Most of them pertain to the impact of national financial institutions on the national economy, proving their positive influence on economic development. However, there are studies that have shown a negative correlation. Generally, the correlation depends on the size of the financial sector and the kind of economy. However, there are few research studies and analyses that focus on regional financial institutions and their impact on development of the regions in which they operate. Even fewer address the activity of non-bank financial institutions and their impact on their environment. Global or national financial institutions serve local entrepreneurs without taking into account the specific nature of their businesses or benefits for the region. Therefore, it seems purposeful to have a look at the activity of regional financial institutions which many a time have taken root in the local community and support micro- and small enterprises in the regions. Even though the scale and effects of their operation are much smaller, their positive impact on the business and regional growth cannot be unappreciated. This article describes the functioning of non-bank financial institutions in Poland – loan funds and credit guarantee funds – and their impact on the regional economy. In most regions, a well-developed system of such institutions and their efficient operation in the area of granting loans and credit guarantees translate into improved economic indicators and benefits for enterprises. It is therefore possible to state that the financial institutions have a positive impact on both regional development and the operation of the the micro-, small and medium enterprises sector. Nevertheless, loan funds and credit guarantee funds will have to face some challenges. National authorities will need to recognise their contribution to business support, while regional authorities will have to meet the capital requirements so as to increase the effectiveness of their operation.

Keywords: Loan Funds, Guarantee Funds, Financial Instruments, Regional Development

Introduction

The regional market and the financial system creates numerous processes. In the theory of economics there are many concepts and views regarding the impact of the financial system on economic growth. Most of them indicate that development of the financial system stimulates economic growth. The mission of regional development should involve any and all local (regional) financial institutions, including those that are not banks, such as loan funds and credit guarantee funds. As research studies have shown, there is a positive correlation between development of the financial system and economic growth. Development of the financial system, also in the regional context, understood as increasing the availability of financial services, makes it possible to effectively fight the financial exclusion and to have a positive effect on the regional development [Beck. Demirguc-Kunt, Levine, 2010, pp. 1, 29; Beck. Demirguc-Kunt, Martinez Peria, 2008 p. 398]. In particular, this regards development of a business model which will significantly support the economic growth of the region, and will be favourably perceived by the local community in view of effective fulfilment of their needs and creating a potential for growth [Kulińska-Sadłocha E., Szambelańczyk J., 2014, p. 172].

The aim of this article to present the regional financial infrastructure in the in the aspect of regional development, as well as to specify the role and position of loan funds, credit guarantee funds, whose scope and area of activity are limited. Moreover, the article intends to indicate the relations between their activity and the condition of the regions.

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The article analyses the activity of loan and loan guarantee funds targeting their services at companies, as well as its regional diversification. These institutions operate all over Poland, however some are more active than the others. Although the scale of their activity in comparison with commercial banks is limited, a certain correlation may be observed between their number, the amount of a single support and the condition of regions reflected in GDP per capita, the level of investment, unemployment rate and enterprising behaviour. This is a topic that requires a deeper analysis of dependencies in a longer time horizon, which will be conducted by the author.

The Impact of Regional Financial Institutions on Business and Regional Development - Literature Review

All local (regional) financial institutions, including those that are not banks, such as loan funds and loan guarantee funds, should be involved in the implementation of the regional development mission. In particular, it should be aimed at creating a business model which significantly supports the economic development of the region and will be positively perceived by the local community due to the effective satisfaction of their needs and creation of development potential (Kulińska-Sadłocha, Szambelańczyk, 2014, p. 172). The regional market and financial system is the driver of many processes. In economic theory there are numerous different concepts and views on the impact of the financial system on economic development (A. Alińska, 2008a, p. 124). Many of these concepts confirm the beneficial effect (Luintel, Khan, Leon-Gonzalez, Li, 2016; Durusu-Cifci, Ispir, Yetkiner, 2017). Others indicate a non-linear relationship between financial market development and economic growth. Law and Singh (2014, pp. 36-44) analysed this relationship using data from 87 countries covering the period from 1980 to 2010. In their opinion, there is a certain threshold to which this relationship is positive and becomes negative when it is exceeded. This means that a larger financial sector is not always beneficial for the economy, as the financial crisis of 2008 demonstrated. The financial threshold varies and is lower for developing economies and higher for developed economies, while having a greater impact on the economy (Ruiz, 2018). The impact on developed and developing economies also varies, depending on the time horizon. In particular, a positive relationship exists in the medium term (Beck, Degryse, Kneer, 2004).

Other studies confirm that the development of financial intermediation in the economy determines the actual growth rate (Bencivenga, Smith, 1991), however this impact varies depending on the degree of development of the economy, the financial system (Beck, Demirguc-Kunt, Levine, 2010) and the target group (Bilau, St-Pierre, 2017). All of the above studies are focused on macro scale analysis. The solution, which provides valuable conclusions, involves the analysis of the impact of the development of the regional financial sector on the regional economy. Such an attempt was made by Gemzik-Salwach and Perz (2018) who analysed the relationship between the development of the financial sector and regional economic growth. By examining the impact of the five indicators[1] on the dynamics of GDP per capita in all voivodeships in Poland, she has proven the varied impact of the financial sector development level on the economic growth of individual regions. She observed a high positive correlation between the variables in two provinces, Zachodniopomorskie and Warmińsko-Mazurskie (Gemzik-Salwach, 2018).

Studies on refundable support in Central and Eastern European countries in the post-crisis period support the view that European Investment Bank (EIB) financing supported employment, income and profitability of SMEs (The impact ..., 2019). The reasonableness of refundable support for the enterprise sector, in which financial intermediaries participate, through loan funds, was confirmed by Amamou, Gereben, Wolski (2020). They recognised a positive impact of loans on employment, size of the company, level of investments and innovation capability. It is stronger in Central and Eastern and Southern Europe. In the western part of the continent it is also significant, however it is declining.

Moreover, the activity of loan guarantee funds has a positive impact on the activity of enterprises, in particular on the growth of assets, share of intangible assets, sales and employment. (Brault, Signore, 2019). Similar studies were carried out in Italy, Benelux and Nordic countries (Denmark, Finland, Norway, Sweden) between 2002 and 2016. The companies receiving the guarantee increased their assets, sales, employment and share of intangible assets compared to companies that did not receive such a guarantee (Bertoni et al., 2019). Petkovski and Kjosevski (2014), on the other hand, have not reached definitive conclusions on the impact of the financial sector on regional development. However, as they observed, it was influenced by the condition of financial institutions and the significant share of lost loans as a result of the financial crisis.

The funds set up by regional and local authorities are actively involved in many economic processes in the region, in particular by establishing cooperation with micro, small and medium-sized enterprises. In numerous cases, it is relational in nature, gaining a lasting advantage over global players. Financial intermediaries, both bank and non-bank, may eliminate the imperfections of the credit market, i.e. barriers to the inflow of capital to those most in need (Armendariz de Aghion, Morduch, 2009; Luintel, Khan, Leon-Gonzalez, Li, 2016; Pluskota, 2013). Those regional funds belong to microfinance institutions, which are very popular all over the world and increasing activities not only

in developing countries as well as in the developed countries.

Activity of the loan funds in Poland

Loan funds in Poland began to emerge with the advent of the market economy, when the emerging private property began to have problems with financing its activities. The first institutions of this type had a very simple structure and one purpose – to offer loans to businesses and business start-ups which did not meet banking criteria. They originate from the activities of microfinance institutions whose main purpose is to support people in need of external financing.

The term loan fund is understood as an institution which is not a bank, whose activity is focused on providing access to external sources of capital by granting loans to companies and persons starting their business activity, without a documented credit history, acceptable collateral and not meeting the banks' requirements in this respect (Bartkowiak, Flejterski, Pluskota, 2006). Since the beginning of the 1990s, loan funds have been supporting the development of Polish enterprises by creating a network of institutions providing external financing to micro, small and medium-sized enterprises (SMEs) available throughout the country. At the end of 2017, 80 loan funds operated in Poland, which had less than EUR 600 million in loan capital (last year its value dropped by 13.14%). In many cases, they are the only source of financing the entrepreneur's idea. In 2017, they granted 5,096 loans with a total value of over EUR 115 million. The average value of a single loan at that time was around EUR 26,000. Although these institutions are active throughout the country, in certain provinces their network is more extensive than in others (Table 1).

Table 1: Number and activity of loan funds by provinces at the end of 2017

Voivodeship	Number of Funds[1]	Number of loans	Value of loans (EUR)	Share in % of total loans	The average loan value (EUR)
Dolnośląskie	3	116	2702630	1,93	23299
Kujawsko-pomorskie	6	231	3465299	2,47	15001
Lubelskie	4	550	11375869	8,11	20683
Lubuskie	3	111	3492731	2,49	31466
Łódzkie	7	132	7024059	4,99	53049
Małopolskie	6	446	11327565	8,07	25398
Mazowieckie	9	350	7831305	5,58	22375
Opolskie	2	185	8394197	5,98	45374
Podkarpackie	5	431	6494829	4,63	15069
Podlaskie	7	175	6726126	4,79	38435
Pomorskie	7	847	17319439	12,34	20448
Śląskie	6	154	4839596	3,45	31426
Świętokrzyskie	6	192	7958172	5,67	41449
Warmińsko-Mazurskie	9	488	16304874	11,62	33412
Wielkopolskie	8	347	10417128	7,42	30021
Zachodniopomorskie	7	341	14682146	10,46	43057
Total	**95**	**5 096**	140334391	**100**	27538

Source: own calculations based on Fundusze pożyczkowe w Polsce, Raport 2017, Polski Związek Funduszy Pożyczkowych, p. 19, the average NBP euro exchange rate as of 31 December 2017 – 4.1709, was applied.

The loan funds, fulfilling the role of institutions which bridge the financial gap, primarily finance the smallest enterprises, both in terms of quantity and value (*Fundusze pożyczkowe w Polsce...* 2018). This reveals the needs of micro-enterprises which coincide with those of other EU countries with respect to access to capital (Kraemer et al. 2019; Rupeika-Apoga, 2014). These institutions have gained a lasting position on local and regional financial markets and in the awareness of enterprises, which is confirmed by the purposes of loans, mainly pro-growth (Table 2).

Table 2: Loans granted in 2017 by purpose

Purpose	Quantity (items)	Structure of quantities (%)	Value (EUR)	Value structure (%)
Working capital	1,696	13	25,242,731	18
Investment	3,445	68	96,194,958	69
Investment and working capital (investments account for over 50% of the loan value)	955	19	18,896,701	13
Total	**5,096**	**100**	**140,334,391**	**100**

Source: Fundusze pożyczkowe w Polsce, Raport 2017, Polski Związek Funduszy Pożyczkowych, p. 31, the average NBP euro exchange rate as of 31 December 2017 – 4.1709, was applied.

The loan funds market will be posed with challenges, transformations resulting from the need to face banking competition, centralisation of activities and lending programmes by government institutions and consolidation due to capital shortages. Less active institutions face difficult times, which may lead to a decrease in their number and fewer opportunities to support the development of the SME sector. This problem may be solved, inter alia, by the conclusion of consortium agreements between funds and joint financing of enterprises' activities.

Activity of loan guarantee funds

Loan guarantee funds are institutions providing companies with the required collateral to enable them to obtain external financing in the form of bank loans or loans to companies. The economic and financial impact of their activities is based on two assumptions. Firstly, these funds may provide the companies with or increase their access to bank financing. Secondly, they enable more risky yet reliable companies to obtain better financing conditions, e.g. higher amount of financing, extended time limits, lower costs. The loan guarantees provided replace the collateral, which minimises moral hazard by reduced rationing of the loan due to information asymmetry. This is particularly relevant in periods of increased risk and/or risk aversion (Brault, Signore, 2019). Guarantee institutions are an integral part of local financial markets, not only in Poland but also in Europe. The example includes an organisation integrating such entities from the Old Continent – AECM (European Association of Guarantee Institutions), associating guarantee institutions from 28 EU Member States as well as from Bosnia and Herzegovina, Serbia, Russia or Turkey.

At the end of 2017, there were 41 loan guarantee funds operating in Poland, two less than in the previous year (Table 3). The institutions held a total capital of less than a quarter of 1 million euro and active guarantees of 370 million euro. The year 2017 was another year in which the number and value of guarantees increased by 10% and 5% respectively (Gajewski, Kubajek, Szczucki, 2018).

Table 3: Regional characteristics of loan guarantee funds in 2017

Province	Number of funds	Guarantee capital (EUR)	Active guarantees (EUR)	Guarantees granted		Average value of the guarantee (EUR)
				Quantity	Value (EUR)	
Dolnośląskie	5	9446402	15751996	450	12970822	28824
Kujawsko-Pomorskie	4	17190534	34093361	859	14673092	17082
Lubelskie	3	19300391	12683114	336	11244576	33466
Lubuskie	1	11244576	10141696	176	6473423	36781
Małopolskie	3	22033614	30616893	201	14217555	70734
Mazowieckie	2	18149560	16447290	167	6065837	36322
Opolskie	1	3979956	3332614	157	3092858	19700
Podkarpackie	2	2373588	3644297	58	623367	10748
Podlaskie	2	18844854	10357477	207	4219713	20385
Pomorskie	2	11819991	25821765	427	16231509	38013
Śląskie	2	12587211	14840922	964	19684001	20419
Świętokrzyskie	2	9350500	5898008	77	3308638	42969
Warmińsko-Mazurskie	4	18677024	18677024	465	10693136	22996
Wielkopolskie	4	24455154	102016351	2494	74708097	29955

Zachodniopomorskie	4	41765566	77201563	1148	41501834	36151
Total	**41**	**241218922**	**381548347**	**8186**	**239708456**	29283

Source: own work based on: M. Gajewski, R. Kubajek, J. Szczucki,Raport o stanie funduszy poręczeniowych w Polsce – stan na dzień 31.12.2017r., Krajowe Stowarzyszenie Funduszy Poręczeniowych, Warszawa 2018, s. 17-18, the average NBP euro exchange rate as of 31 December 2017 – 4.1709, was used for calculations.

Guarantees of funds are supplementary to bank credit products, supporting entrepreneurs in their relations with the bank in terms of securing transactions. For many years the number of guarantees has been increasing year on year, however this is no longer the case. For the last two years, both the number and value of guarantees for banks has been decreasing (Table 4). This is due to competition from central programmes operated by the state-owned Bank Gospodarstwa Krajowego (BGK), such as the De Minimis Guarantee Line, or under the Intelligent Development Operational Programme (OP IR) and programmes distributed at European level, e.g. COSME (Programme for the Competitiveness of Enterprises and Small and Medium-Sized Enterprises), Horyzont 2020 or EaSI (EU Programme for Employment and Social Innovation).

Table 4: Guarantees granted depending on the financing institution in 2015-2017

Purpose	Number of guarantees			Value of guarantees (EUR)			Average value of the guarantee (EUR)		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Total	6,336	7,453	8,186	221,486,969	227,648,709	239,708,456	34,956	30,545	29,274
including for:									
Banks	3,939	3,548	3,033	182,502,577	170,778,489	156,560,934	46,321	48,143	51,596
Loan funds	766	634	486	13,234,554	11,172,649	7,432,449	17,286	17,622	15,440
Other entities	1,631	3,271	4,667	25,725,863	45,697,571	75,763,025	15,776	13,978	16,232

Source: own work based on: M.Gajewski, R.Kubajek, J.Szczucki, Raporty o stanie funduszy poręczeniowych w Polsce – stan na dzień 31.12.2015r., 31.12.2016r., 31.12.2017r., Krajowe Stowarzyszenie Funduszy Poręczeniowych, PAG Uniconsult, p. 18, the average NBP euro exchange rate as of 31 December 2017 – 4.1709, was used for calculations.

Loan guarantee funds, forced to pursue new avenues of active business, began to guarantee for liabilities to entities other than banks and loan funds. This group includes bid bonds which constitute 50% of the transactions. Sureties for leasing transactions and performance bonds are much less common in transactions, however they demonstrate the diversification of activities and the intention to find new solutions. The clear prevalence of bid bonds in the guarantee portfolios of the funds on the one hand indicates the flexibility of these institutions, however, on the other hand raises doubts about their initial objectives. It reflects a reduced role of the funds as entities providing collateral for debt transactions, complementing credit products. The competition from government programmes and little interest of commercial banks to continue cooperation with many regional agents render it necessary to pursue new avenues, in particular through smaller, local and regional funds. One option is to diversify activities, mainly in terms of products and close cooperation with loan funds and cooperative banks.

Results

The activity of loan and guarantee funds directly affects the activity of enterprises, mainly the smallest ones. It additionally affects, directly and indirectly, the regions in which funds operate and their development. Studies on the impact of the financial sector, state aid, repayable support for business activities and local and regional development indicate a positive impact, although this is not always a linear relationship.

As a result of the analysis of the regional microfinance institutions' activity in Poland, mainly loan funds and loan guarantee funds, several conclusions may be drawn. In terms of loan funds, an above-average activity in several regions, both in terms of quantity and value, may be observed. The average value of both the loan and the guarantee varies considerably. Their value depends on the number and size of funds operating in a given region and the value of their capital. The data contained in Table 5 reveal that in certain regions (Lubelskie, Podkarpackie, Kujawsko-Pomorskie) the low average loan value corresponds to low GDP per capita. This is also correlated with a higher unemployment rate, low investment outlays and low economic activity. On the other hand, regions where the value of loans and guarantees is relatively high in comparison with other regions (Łódzkie, Zachodniopomorskie) are characterised by moderate wealth, but high level of entrepreneurship and above average level of investment outlays.

In Łódź province only loan funds are present, no guarantee fund is registered there.

As a result of the analysis, it may not be unequivocally concluded that the current loan and guarantee funds have a significant impact on the condition of the region. This is certainly due to the scale of their impact and their activity, which is much smaller than that of bank lending campaign (Bilau J., St-Pierre J., 2017). Other elements matter as well, such as the amount of capital and the condition, willingness of enterprises to invest. The functioning of the examined microfinance institutions is useful and reasonable, however, as a great number of these institutions faces capital shortages, the impact and role in the region will diminish. The concept of their operation should be reconsidered. The analysed data do not indicate a clear correlation between the number of funds, their size and activity and the level of economic development of the region. In certain regions, there are several loan and guarantee funds that are active, however the analysed indicators are below the average.

Today, loan and loan guarantee funds must seek new solutions to increase their importance and role. One such solution is the consolidation and creation of macro-regional funds, which would be able to respond to the demand from enterprises in the event of limited bank lending. The analysed institutions must also face competition from central (government) initiatives, which are generally undertaken on a larger (national) scale. This is particularly true for loan guarantee funds (Gonzales A., Rosenberg R., 2006). Capital enhancement and greater territorial coverage would enable increased cost-effectiveness, the use of modern technological solutions for evaluation and customer service. Through the economies of scale, the funds could increase the quality of their products. Larger entities would motivate the banks to extend the range of services. Loans and guarantees are an alternative to bank financing, however they are also supplemental products, especially for young and small companies, for whom cooperation with the analysed funds is the first contact with a financial institution. Loan and guarantee funds are not and never will be competitors for banks – they are their supplement. Their aim is to support companies excluded from the banking sector or to intervene in a situation where banks' activity is restricted or the market is failing.

However their activity provides evidence of their importance to economies, especially local ones. Moreover, to increase efficiency and effectiveness, certain assumptions need to be considered. Larger funds would have a greater impact on the market, yet there is a problem of ownership. Most of the funds belong to regional and local authorities. Another solution is to develop a comprehensive programme addressed to loan and guarantee near bank institutions, e.g. in the form of special, dedicated products.

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Table 5: Comparative analysis of provinces in 2017

Province	average loan value (in EUR)	average guarantee value (in EUR)	GDP per capita in PPS in 2017 (as % of EU average = 28)	GDP per capita in EUR	average loan value/GDP per capita (in %)	average guarantee value/GDP per capita (in %)	Employment rate in 2017 (age 20-64)	Unemployment rate in 2017 (>15 years)	Investment outlays in enterprises per capita (in EUR)	Total investment outlays (in thousand EUR)	Number of enterprises per 10,000 inhabitants	Entities newly registered in the REGON register per 10,000 inhabitants
Dolnośląskie	22506.92	27844.69	76%	13,400	168	207.8	70.70%	4.70%	1375.30	3,178,998	1271	106
Kujawsko-pomorskie	14491.59	16501.21	56%	9,800	148	168.4	68.10%	5.50%	685.57	1,174,088	940	80
Lubelskie	19980.64	32328.92	48%	8,400	238	384.9	68.20%	7.20%	462.76	1,114,876	834	75
Lubuskie	30396.92	35531.1	57%	10,000	304	355.3	70%	3.70%	692.98	532,366	1110	95
Łódzkie	51246.64	0	64%	11,300	454	0.00	73.40%	4.60%	792.80	2,499,652	993	82
Małopolskie	24535.17	68330.76	63%	11,100	221	615.6	71.20%	4.20%	736.52	2,384,849	1121	101
Mazowieckie	21614.91	35088.24	59%	10400	208	337.4	69.9%	6.4%	1684.04	12,007,608	1503	125
Opolskie	43832.36	19090.39	55%	9,600	457	198.9	71.10%	4.30%	1133.50	535,302	1016	65
Podkarpackie	14557.20	10382.52	48%	8,500	171	122.2	68.20%	8.40%	676.76	1,051,607	803	73
Podlaskie	37129.09	19692.46	49%	8,700	427	223.4	71.10%	4.70%	613.77	558,386	854	72
Pomorskie	19753.21	36721.33	67%	11,700	169	313.9	72.70%	4.20%	934.55	1,899,115	1264	119
Śląskie	30358.19	19725.3	72%	12,600	241	156.6	68.60%	3.90%	1036.22	4,200,001	1033	77
Świętokrzyskie	39808.89	41509.35	49%	8,700	458	477.1	67.90%	7%	448.40	449,622	900	77
Warmińsko-Mazurskie	32276.39	22214.65	48%	8,500	380	261.4	65.60%	7.20%	559.11	490,655	874	75
Wielkopolskie	29000.53	28937.34	75%	13,300	218	217.6	74%	3.10%	1002.41	3,933,708	1210	100
Zachodniopomorskie	41593.22	34923.1	58%	10,100	412	345.8	67.50%	4.60%	703.40	837,901	1308	109

Source: own work based on: Eurostat, Local Data Bank.

[1] 1. Number of employees in the financial sector in the region/Number of employees in the region; 2. Salaries in the financial sector in the region/Salaries in the region; 3. Investment outlays and fixed assets of enterprises from the financial sector in the region/ Investment outlays and fixed assets of enterprises in the region; 4. Investment outlays in enterprises operating in the financial sector in the region/ Investment outlays in enterprises in the region; 5. Credit and loans as sources of financing investments in the region/ Sources of financing for total investments in the region.

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Online Classroom Game: Understanding the Advantages and Disadvantages among Postgraduate Students

Idaya Husna MOHD*, Sharizan SHARKAWI, Tuan Badrol Hisham TUAN BESAR, Muhammad Hafizi ZAMRI, Annurizal ANUAR, Muhammad Abdul Hadi ABDUL RAHMAN and Ainolfizy RUSLAN

Faculty of Business and Management
UiTM Cawangan Selangor,
Puncak Alam
idayahusna@uitm.edu.my*

Abstract

Being literate in the new era of technology is not only about being able to save, upload and download materials, share and chatting and responding to online activities in real time. University students nowadays are millennials and are more prone to technology usage in their daily life. In order to keep up with the current needs of millennials, it is crucial for educators to revise their teaching techniques coordinating it with not only with the knowledge on subject but also the current used of technology in education. This research looks into the usage of classroom game and identify the advantages and disadvantages of using online classroom game. This study was conducted qualitatively among 14 postgraduate students from the Department of International Business and Management Studies (Faculty of Business and Administration) particularly Human Resource Management. The students were selected among classes in which lecturers uses online classroom game in their teaching method. The findings of this study highlighted the Advantages and drawbacks of using online classroom game. This would make a significant contribution not only towards assessing the improvement of quality teaching and classroom engagement, but also involvement among students and lecturers that will help not only in terms of teaching improvement among lecturers but also in developing motivated, confident students, enhancing their learning abilities and to become lifelong learners towards this change.

Keywords: Online Classroom Game, Classroom Game, Classroom Engagement, Students Motivation.

Introduction

Classroom games, simulations and gamification are beginning to be assimilated in the traditional educational process. According to (Yang, Chen, & Jeng, 2010; Chiang, Lin, Cheng, & Liu, 2011) classroom games are deployed extensively in the field of education, with the intention to examine the relationship between games and education. Further, Mohd 2020, looks to examine the classroom engagement upon using classroom games as digital or web-based games have increasingly being used to support learning.

Classroom games used in higher education includes educational games (Çankaya & Karamete, 2009), digital game-based learning (DGBL) (Yang, 2012), and applied games (van Roessel & van Mastrigt-Ide, 2011). In addition, scholars, sometimes, include interactive exercises (Mueller, 2003), video games (Biddiss & Irwin, 2010), or even expand to next generation video games (Bausch, 2008), in the category of games. Gamification on the other hand, according to Deterding, Sicart, Nacke, O'Hara, & Dixon (2011) is defined as "the use of video game elements in non-gaming systems to improve user experience and user engagement" and has become a popular technique used across a variety of contexts to motivate people to engage in particular targeted behaviours. The popularity of gamification has been growing rapidly (Robertson, 2010). Classroom games, simulations and gamification show mixed effects across student performance, engagement, learning motivation and teachers' motivation. However, other studies focus only on certain disciplines which makes the gap in the literature concerning a clear framework of use across academic programmes still exist. The aim of this paper is to develop an understanding of the advantages and draw backs of online classroom games among postgraduate students

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Literature Review

Students and technology are inseperable. Students are constantly on their phones, laptops, gaming systems, and even televisions. Technology is literally their world. It's no wonder, then, that today's students crave some technological interaction in education. Obviously, using technology all the time may not be a positive thing — we want to see students interact with each other, and we want to see them come out from behind a screen. But technology in moderation can be a great tool for students (and teachers). It often inspires students to work harder. It helps make learning more fun, fast-paced, and individualized. And most importantly, it helps engage all students.

Wang,2015 shows that integrating online classroom game into regular classroom lectures contributes to improvements in student engagement. In addition, Rosas et al. 2003, suggested that such tools excite students to actively engage in lectures and contribute to the learning environment.

Educational games are a great way to help encourage students to get involved in classroom although sometimes, traditional classroom games (that is, ones that don't rely on technology) don't allow every student to fully participate. By incorporating technology into the classroom, you can create a more interactive experience for all students. If answers are being entered on a cell phone, tablet, or Chromebook, every student has a voice and a chance to shine. Digital games also make it easier to accommodate students with disabilities or special needs so they don't feel left out of fun classroom activities. Therefore, this research looks forward to examine the influence of online classroom game on the classroom dynamics and students' engagement,

In addition to enriching learning, the effectiveness of online classroom game depends on whether students perceive the games as appealing, accessible, useful and of high quality. Papastergiou (2009) also found that students rated online classroom game as more appealing and more valuable as an educational tool compared to other performance-tracking educational websites that contained the same content. In spite of a small "wear off effect" of long-term online classroom game use on student communication and enjoyment (Wang, 2015), students who continued to use online classroom game throughout the semester reported positive impacts on learning and engagement similar to the excited new users. Students also commented that, even after a whole semester of using online classroom game, they were still motivated to do additional study to prepare for the weekly quizzes. This research paper examines the understanding of the advantages and draw backs of online classroom games among postgraduate students.

Methodology

A qualitative research approach for this study was chosen because qualitative methods are especially useful in discovering the meaning that people give to events that they experience (Merriam, 1998). Specifically, the phenomenological method was used to understand the effects of online classroom game on classroom dynamics, the influence of online classroom game on students' engagement, motivation towards learning and students' experience.

This study, which was based in the constructivist paradigm, used a phenomenological strategy to explain the effects of online classroom game on classroom dynamics, the influence of online classroom game on students' engagement, motivation towards learning and students' experience. Constructivist researchers focus on understanding and reconstructing the meanings that people (including the researcher) hold about the phenomenon being studied (Guba & Lincoln, 1994). Constructivists create knowledge through interaction between the researcher and participants (Guba & Lincoln, 1994), using dialogue and reasoning as the primary methods of investigation. Finally, constructivist researchers return frequently to the sources of data, asking what they meant to the participant and trying to integrate those with their meaning to the researcher (Rudestam & Newton, 1992). Phenomenology is effective in studying a small number of subjects – in this case, 25 participants – to identify the core of their experiences with the phenomenon (**Creswell, 2003)** and to produce patterns and identify relationships of meaning that build new knowledge (Moustakes, 1994). Thus, for this study, semi structured in-depth interviews were conducted through Padlet with 14 Postgraduate students.

The qualitative research methods used for this study includes purposive sampling, open-ended interviewing, and systematic and concurrent data collection and data analysis procedures. Specifically, the grounded theory or constant comparative method (Glaser & Strauss, 1967) was used to analyzed the data and discover influence of online classroom game on students' engagement, motivation towards learning and students' experience.

In this study, data analysis occurred in three phases. First, interview transcripts were reviewed several times, searching for "recurring regularities" (Merriam, 1998). Then researcher highlights the quotes and phrases from the interviews that were significant to the study. Researcher look through the transcripts to find relevant categories by using the constant comparative method (Glaser & Strauss, 1967). The researcher then named, coded and labelled the transcripts according to each category (Merriam, 1998). Next, the researcher looked into the coded interviews and looked for

relationships within and across the data sources. A table were developed to compare various coded interviews. Finally, the researcher will integrate and refine the categories until themes solidified (Strauss & Corbin, 1998).

Findings and Discussion

14 students participated in this study are the first year students of Master in Human Resource Management. In terms of demographic distribution, respondents consisted of 20 % male and 80 % female students. The findings of this study highlighted the understanding of the advantages and draw backs of online classroom games among postgraduate students.

Advantages

In terms of advantages of online classroom game, the findings of this study found three main themes and they are engagment, meaningfulness and excitement. The following paragraphs explains the findings according to theme.

Engagement

The first advantages of online classroom games is engagement. Students felt more engaged with the usage of online classroom game. This is supported by Wang (2015) and Rosas et al (2003) where online classroom game , when integrated with the regular classroom lectures, improves the classroom engagements. The following are the response of R1, R4 , R9, R11 and R13:

> *Increase the rate of student engagement in class activity* – R 1-
>
> *No more dull and boring session through out the online learning because students will pay attention to answer the questions at the end of each chapter.* –R4-
>
> *Enhance student-lecturer engagement.* –R9-
>
> *Attract student attention and the lesson become more engaging.* –R11-
>
> *It is an exciting tool for engaging students having short attention span* – R13-

Meaningfulness

> *Due to high students engagement, lecturers are able to measure understanding of lectures that were covered more accurately. It is also a good way to keep students engaged and encouraged them to have fun among the class.* – R2-
>
> *Student engagement and motivation with Kahoot! is very high. Students are enjoy playing Kahoot! and will increase better understanding of the material covered earlier and increase students' knowledge.* –R8-
>
> *Easy to understand the topic On the spot we will know which part we dont understand* – R12-
>
> *Can refresh the student brain after each topic so that the student are alert on each topic they learn. Also act as kind of revision for the student after the end of the class.* –R10-

The above are the responses on the advantages of using online classroom game in the classroom. Based on the above, online classroom game also creates meaningfulness in terms of understanding the subject being taught. The online game used in this study allows the students to build up the focus that leads to the understanding of the subject thus making any other preceeding discussions more effective as claimed by R9 and R 7

> *The advantage is student a well prepared, focusing to lecture and explaination, giving focus and full commitment during online class.* –R6-
>
> *The advantages of using this Kahoot! are we are more alert and focus to current chapter, we can observe our understanding towards that topic.*-R7-

Advantages i. Enhance student-lecturer engagement ii. Increases focus and interest on subject learnt iii. Enhances attention and healthy competition iv. Suitable side, additional learning aid aside normal lectures v. Increases motivation toward interactive learning -R9-

Excitement

The third advantage of using online classroom game is excitement. The respondents find that online classroom game brings the class to live with fun and excitement. As claimed by R1, R2, R13:

Bring laughter and joy, it also as a stress relief after long talk and brainstorming in online class – R1-

Encouraged them to have fun among the class. –R2-

It adds fun and excitement to a boring lesson and increase class participation –R13-

This is supported by Papastergiou (2009) and Wang (2015). According to Papastergiou (2009), online classroom game have a positive impact on student communication and enjoyment while Wang (2015) contended that , students who used online classroom game are even more motivated and excited to prepare for their weekly games.

Disadvantages

In terms of the disadvantages of online classroom game, the findings of this study found three main themes and they are Demotivating, Time constraint and Speed over substance. The following paragraphs explains the findings according to theme.

Demotivating

The disadvantage is, to student didn't pay attention during class will lose and make them demotivated.-R3-

it demotivated for some that cannot answer the question correctly. –R10-

Student feels frustrated as they di not get the correct answer plus getting the last place is not a good feeling. –R11_

The above is the responses from R3, R10 and R11 who claimed that the drawback of online classroom game is that it demotivates students especially when students pay less attention in class and could not answer correctly during the game.

Time Constraint

The disadvantage is the time limit are too fast and we cant even have enough time to think of the correct answer.-R5-

Limited of time will allow the student to not give the correct answer and will respond accordingly-R14-

Time constrain is the second disadvantage stated by the respondents. R5 and R14 explained that the timing of the game is too fast that it messed up with their responses. However, the time are set on the game applications.

Speed over substance

R8 and R13 emphasized that :

Hard to track the student's progress since lecturer do not know which student answer it correct or wrong. Since students receive more points for quicker answer, it can emphasize speed over substance. –R8-

Extra credit emphasizes on reaction time, since students receive more points for quicker answers, it can emphasize speed over substance. –R13-

Conclusion

Using online classroom game-based technology is proven to be effective in enhancing language skills as well as useful in initiating and fostering classroom engagement. From the results, it is found that the students have grasped the classroom objective of mastering synonyms based on their textbook. From the students' responses, it is found that the advantages of using online classroom game includes engagement, meaningfulness and excitement while the drawbacks includes demotivating, time constraint and speed over substance. Through these findings, it is evident that online classroom game should be implemented in the classroom from time to time to engage the students in classroom participation.

This research has made some significant contributions in terms of theory building towards assessing the improvement of quality teaching, classroom engagement and involvement among students and lecturers using online classroom learning. This will help not only in terms of improvements in teaching among lecturers but also in developing confident students, enhancing their learning abilities and to become lifelong learners towards this change.

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Poland's Energy Security in The Baltic Sea Region

Miłosz GAC
Faculty of Finance and Management, WSB University in Gdańsk
Gdańsk, Poland, mgac@wsb.gda.pl

Ireneusz MICIUŁA
Faculty of Economics, Finance and Management, University of Szczecin
Szczecin, Poland, ireneusz.miciula@usz.edu.pl - corresponding author

Henryk WOJTASZEK
War Studies University, Faculty of Management and Command,
Warsaw, Poland
h.wojtaszek@akademia.mil.pl

Abstract

Energy security plays an extremely important role in the creation of geopolitical concepts and strategies of contemporary states. The constantly increasing demand for energy determines the foreign policy of many international entities, which aim atensuring the continuity of supply at both the lowest possible price and the best quality, to enable the productive use of energy while respecting the natural environment. This thesis is confirmed by the Polish strategy of energy security, which focuses on particular activities such as: ensuring a real diversification, development of the transmission and distribution system and conducting an appropriate storing policy. The Baltic Sea region plays a key role in the Polish energy supply system by creating the possibility for diversification of the supply of strategic resources. Additionally, geographical characteristic of this areais also used to create the superpower policy of the Russian Federation, which uses rich deposits of strategic resources as an instrument of political game.

Keywords: energy security, diversification, the Baltic Sea, LNG, Nord Stream.

JEL classification: A11, E20, E61, F52, G18, H42, O13, P48.

Introduction

Energy security is one of the primary areas of international security in the 21st century. The growing demand for energy on a global scale makes it a priority in the security strategies of modern countries. The crude oil and natural gas sector is a particularly important factor influencing contemporary energy relations. These resources can be an instrument of political pressure to maintain power or maximize income. An example of the existing resource dependencies and implications of energy policy is the Baltic Sea region.

This area, situated between the Scandinavian Peninsula and the central and eastern part of the European continent, is a mosaic of political and economic interests. Inhabited by 96.5 million people, it is of strategic importance for the countries of Central and Eastern Europe and the Russian Federation. Direct access to this body of water enables the creation of political and economic processes in order to increase the geopolitical advantage. This situation gives a privileged position to the Russian Federation, which, having the world's largest deposits of natural gas, can apply political pressure against the countries of Central and Eastern Europe. Thus, it is in the interest of the Polish security policy to become independent from the supply of hydrocarbons from the east. Achieving such a state will be possible when the gas balance is quickly supplemented with supplies from other directions. One of the methods of minimizing the risk associated with interruptions in the continuity of supplies of raw materials is the expansion of the energy infrastructure.

The aim of the article is to explore the most important factors and mechanisms determining the specificity of Poland's energy policy in the Baltic Sea region. In addition, the article focuses on diagnosing the relationship

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between Poland and Russia in the context of the existing interdependencies in energy relations, while attempting to define their current and future directions. With the above goals in mind, the article attempts to answer the following research questions:

a) what are the priorities of the Polish energy security policy in relation to the Baltic Sea?
b) to what extent do Russian energy projects in the Baltic Sea basin affect Poland's energy security?

Literature review - Poland's energy security strategy

The doctrinal basis for energy security in Poland is the Act of April 10, 1997 - Energy Law. In the document, the legislator specified that the goal of the state's energy policy is to ensure energy security, increase the competitiveness of the economy and its energy efficiency, and protect the environment (Journal of Laws of 1997, No. 54, as amended, Art. 3, p. 16). The definition of the Polish legislator refers to the state of the economy, which enables it to meet the demand for fuel and energy, taking into account environmental assumptions. This includes the diversification of imported fuel supplies, an increase in the share of energy from renewable sources, production capacity from domestic deposits - crude oil, natural gas, coal.

Another documents that attempted to define Poland's energy security were the Polish Energy Policy until 2030, of November 2009. The document defined the directions of development of the Polish energy policy, which include, among others: improving energy efficiency, increasing the security of fuel and energy supplies, diversifying the electricity generation structure by introducing nuclear energy, developing the use of renewable energy sources, including biofuels, developing competitive fuel and energy markets and reducing the environmental impact of energy. The need to reduce dependence on the supply of energy resources and the need to change the structure of the country's energy balance are also mentioned in the National Security Strategy of 2014, stating that: "access to energy resources, including abroad, diversification of sources and directions of fuel supplies and the construction of new capacities based on diversified production technologies, allows to balance the domestic demand for energy " (National Security Strategy of the Republic of Poland 2014, p. 15). More detailed data on the conditions for the development of the energy sector can be found in the document Energy Policy of Poland until 2050 of June 2015. According to the authors, the resources of hard coal and lignite are the stabilizer of energy security in Poland. The draft assumes that this raw material, which is the basis for the Polish energy sector, should be supplied at competitive prices from domestic deposits in order to maintain an adequate level of energy security (Draft Energy Policy of Poland until 2050).

The dominant role of coal results, above all, from the significant native deposits of this mineral from which over 80% of the energy generated in our country comes from. However, it should be emphasized that this raw material, ensuring Poland's energy independence, will have to be limited due to its combustion, which has a negative impact on the natural environment. Thus, the greatest challenge for Poland are and will be the climate packages due to the very difficult to achieve criteria of low gas emissions. Despite European trends assuming a gradual reduction in the role of coal, it is forecast that the demand for this raw material will remain at the level of 80-90 percent until 2030.
Hard coal production reaches 71.3 million tons, of which about 20 million tons is consumed by the heating and communal and living sectors (Rewizorski et al., 2013). On the other hand, the power sector exploits about 40 million tons of hard coal, 80 percent of which is consumed by electricity. It is expected that the share of electricity from hard coal will drop to 40 percent and lignite to 30% by 2025. It should be emphasized that these predictions will largely depend on the condition of Polish mines, the situation on the global market and the policy of reducing carbon dioxide emissions.

The gradual reduction of coal is mainly related to the introduction of nuclear energy and the use of renewable energy sources (RES). According to the Polish Nuclear Power Program of 2014, due to the expected long-term increase in fossil fuel prices and possible further burdens related to CO2 emissions and other atmospheric pollutants, it was found that nuclear power plants will be the most stable and economically effective source of energy (Polish monitor, 2014). The proposed scenario by the Ministry of Energy assumes that the share of nuclear energy in the energy balance will be 19 percent. It is worth mentioning, however, that the planned construction of a nuclear power plant, due to the lack of a long-term strategy, remains at the moment improvisation, \ the Ministry of Energy and the Parliamentary team for nuclear energy.

The time lag in the nuclear sector means that the Ministry of Energy began to attach great importance to the inclusion of renewable energy in the energy system. Such a policy is connected with new regulations imposed by the European Union (EU) on the member states. The latest regulations of December 18, 2017 obliged the EU to ensure that by 2030, at least 27 percent of total energy consumption should come from renewable sources (New Policy RES, 2017). The inclusion of renewable energy in the energy system is undoubtedly a challenge for the

Polish energy policy, which can be treated as an opportunity to overcome the barriers of habits, which is associated with the need to develop smart grids, not only in the power industry, but also in the heating sector.

Natural gas is also becoming an important fossil resource for the Polish economy. This fuel of organic origin, due to the possibility of storage in underground warehouses, is the most convenient energy carrier in economic and ecological terms. The growing demand for natural gas is primarily influenced by the development of technology, which prompts the development of new forms of transporting this raw material, in particular by sea.

In Poland, the production of natural gas amounts to over 4 billion m3, but it does not meet the total demand for this raw material. Consumption of this energy carrier is around 15 billion m3 per year. Thus, approximately 69 percent of this raw material is imported from abroad. Much of the country comes from Russia, which accounts for 3/4 of its total imports, based on a long-term contract with Gazprom. Small amounts of natural gas are also supplied from Germany (approx. 1.5 billion m³) and the Czech Republic (approx. 0.5 billion m³) (Czerniewicz, 2015). Additional opportunities for importing this energy carrier were created by the creation of the so-called reverse on the Yamal Gas Pipeline in the German Mallnow near Ko-strzyna on the Oder, thanks to which Polish companies can import 5.5 billion m³ of gas annually from Germany (Kublik, 2015).

The Polskie Górnictwo Naftowe i Gazownictwo SA (PGNiG) Capital Group is responsible for ensuring the security of supplies in the country and maintaining the necessary reserves of natural gas in Poland. The domination of the Polish gas sector by these two giants - with a poorly developed transmission and distribution infrastructure - gives a picture of the uncompetitive gas market in Poland. As a result, it should be stated that the market has a specific "pricing policy", including the necessity to tariff (Rewizorski et al., 2013).

The diversification of energy resources has a significant impact on increasing Polish security in the gas sector. LNG technology (liquefied natural gas) plays a key role in this respect. Liquefied gas is a fuel that is produced from conventional gas by a method of removing impurities and then changing the state of aggregation under the influence of pressure and very low temperature. After condensation, a clean, odorless fuel is obtained without corrosive and toxic properties (Kochanek, 2017). This raw material has many advantages in terms of use, which include:

• flexibility of supplies - due to the diversification of gas supplies for many countries

• efficiency - LNG has almost 600 times less volume;

• ecology - liquefied natural gas is additionally purified, which means that it has no toxic and corrosive properties;

• safety - liquefied gas, after contact with air, evaporates and is diluted in the air. Thus, it is a less harmful and safer fuel than crude oil or propane-butane.

In view of the shrinking fossil fuel resources in Europe and other parts of the world, in February 2016 the European Commission published a communication in which it emphasized the strategic importance of LNG in the diversification of energy sources (European Energy Security Strategy, 2014). This meant that Member States should have direct or indirect access to the gas market. In line with this intention, the expansion of energy infrastructure has become indispensable. In Poland, an investment in line with these assumptions was the construction of the LNG terminal in Świnoujście. The Świnoujście LNG terminal became the largest diversification project after 1989, which shows its enormous importance for increasing energy security not only of Poland, but the entire Baltic Sea region. LNG is delivered by sea, for which specially equipped tankers, called methane carriers, are used. After delivering liquefied gas to the port, the process of unloading, storage, regasification of the raw material and delivery to the natural gas transmission system takes place. The first LNG deliveries started at the end of 2015, pursuant to an agreement signed by PGNiG and LNG Qatargas. The agreement with Qatar provides for the supply of approximately 1.5 billion m3 of gas annually for 20 years, at a price of approximately USD 500 per 1,000 m3 of gas (Sawicki, 2017a). In addition to supplies from Qatar, the Świnoujście gas terminal is supplied with additional supplies based on short-term contracts, the so-called spot. The first load ordered on these terms from Statoil took place on June 25, 2016, when 140 thousand. m3 of LNG was delivered from the Norwegian port of Melkøya by "Arctic Princes".

Access to the international LNG market has resulted in the first mid-term contract for the import of American liquefied natural gas. Agreement signed on November 21, 2017 by PGNiG S.A. and Centrica LNG Company Limited, is a precedent on a European scale and the first contract for the supply of American LNG to Central and Northern Europe (Regular LNG deliveries, 2017). The contract provides for supplies of nine LNG loads, which is another step towards building Polish energy security and becoming independent from supplies from Russia.

The construction of the LNG terminal in Świnoujście, which is the first such a large stationary gas terminal in the Baltic Sea region, is of great strategic importance due to the concept of building the North-South Corridor. The idea is to create a network consisting of: LNG Terminal in Świnoujście, Croatian LNG Terminal Adria on the island of Krk in the Adriatic Sea (southern end) and interconnectors connecting the infrastructure in the Czech Republic, Slovakia and Hungary. The entire network is to be prepared to receive gas from the Norwegian direction, thanks to the construction of the Baltic Pipe gas pipeline at the bottom of the Baltic Sea. This investment would constitute a strategic infrastructure project aimed at creating gas transmission, directly from deposits located in Norway to the markets in Denmark and Poland. The Baltic Pipe offshore gas pipeline, as announced by the European Commission, would be built by 2022, which, from the point of view of Polish energy policy, would set the geopolitical context completely different, in particular in terms of negotiations with Gazprom. Poland's commitment to building a common energy market was confirmed by signing a declaration on energy cooperation with Denmark (Kubik, 2017). It should be emphasized, however, that the success of the investment will be largely determined by bilateral relations between Germany and Denmark and the political elections that will be held in the Nordic countries in 2019.

Results of the Research

Shaping energy interdependencies with the Russian Federation in the Baltic Sea region

Due to its specific location, the Baltic Sea region plays a strategic role in the energy policy of the Russian Federation. Having access to the Baltic Sea and, at the same time, enormous resource potential, Russia often uses the instrument of political pressure on the countries of the former Soviet sphere of influence. These activities are aimed at ensuring optimal conditions for economic cooperation and maintaining the position on the European energy market. The activation of the Russian energy policy in the Baltic Sea region has its origins in the doctrine of Valentin Fallin and Julij Kwiciński. This concept was aimed at developing new forms of cooperation with former satellites so that Moscow would retain its influence in them. Economic cooperation, and in particular their dependence on oil and gas supplies, was to be an incentive to maintain ties with Russia.

Russia's energy interests in the Baltic Sea region are pursued through companies owned in part or in full by the state. The most important of them is Gazprom, which is one of the largest gas producers in the world. The activities of Gazprom are of fundamental importance for the national economy of Russia, as evidenced by the company's revenues, which constitute 9.5 percent of Russian GDP (Młynarski, 2011). Moreover, the concern's activity generates 12 percent of industrial production in Russia and 16 percent of the value of Russian exports. Gazprom is also a tool for achieving political goals, consisting in maintaining control over the strategic transmission infrastructure in the Baltic Sea region and maintaining a monopoly on the distribution of raw materials in the Baltic basin. Such a strategy of the Russian company is unfavorable for Poland and is associated with a difficult policy of negation with the gas giant.

The beginnings of cooperation between the Polish gas sector and Gazprom date back to the nineties of the twentieth century. The most important event in this area was the inauguration of the construction of the first Polish section of the Yamal gas pipeline. The contract signed between PGNiG and Gazprom in September 1996 concerned approximately 10 billion cubic meters. gas transported via the Yamal-Europe gas pipeline. At that time, the pricing formula assumed that the only supplier of natural gas would be a Russian company. Moreover, the fact that the supplied gas provided for an overstated supply (250 billion m3 in 25 years) - the "take and pay" principle, had a negative impact. The adopted pricing formula for 1 thousand zlotys also turned out to be unfavorable. m3 of Russian gas, Poland paid 379 dollars, while Germany - 323 dollars (Pawlicki, 1996). This trend continues to this day, Gazprom supplies gas to Western countries at a rate related to spot prices, while for Poland the formula is related to the oil price (Czerniewicz, 2015). Thus, Poland pays the most for Russian gas in the European Union, in addition, in accordance with the agreement of the Polish and Russian governments in 2010, in the future the rates for the transit of Russian gas through Poland will be set by the Polish state-owned company Gaz-System. This means that with the current contract, where tariffs are set by EuRoPol Gaz, there will be no question of a simple extension of the current transit contract in the future.

Gazprom is also the main shareholder of Nord Stream. Nord Stream is a 1,224 km long gas pipeline designed to transport natural gas, the construction of which begins on the Russian coast near Vyborg and ends on the coast near Greiswald in Germany. The Russian-German project running on the bottom of the Baltic Sea has a capacity of 27.5 billion m3 of gas per year. In order to emphasize the importance of this undertaking, one should take into account its political nature, which focuses on strengthening the Russian position in the Baltic Sea region. The indication of political aspects is important due to the possibility of implementing the so-called "gas loop", which would facilitate bypassing Central and Eastern European countries in gas supplies. Thus, one of the main reasons for the construction of the Nord Stream gas pipeline was the desire to be marginalized

the transit importance of Belarus, Ukraine and Poland. The possibility of excluding both our country and the Baltic states, including Belarus and Ukraine, from the transit and supplies of Russian gas is an element of Moscow's strategic game, which consists in independence from the transit of oil or gas through Central European countries and preventing it countries to create an infrastructure that will allow them to overcome Russian domination in the field of supplies of energy resources.

A continuation of the Russian energy policy in the Baltic Sea region is the project to expand Nord Stream by two further lines with a total capacity of 55 billion m3 of natural gas annually (Ruszel, 2016). The venture in which Gazprom is the main shareholder has primarily a political dimension and concerns the suspension of the transmission of gas via pipelines that run through Ukraine. Eliminating the Ukrainian side from gas transit will result in even greater dependence on Russia, with which it has been in an armed conflict since 2014.

The project called Nord Stream II, based on German-Russian cooperation, hits not only the interests of other Eastern European countries, but also Poland for which Germany is the largest business partner and also a very influential member of the European Union. Therefore, it should be noted that the construction of another line of the Nord Stream gas pipeline will create certain instruments for playing the energy policy towards Poland in the context of a possible reduction in pressure in the Europe - Yamal pipeline. By accepting the hypothesis that the Yamal gas pipeline may no longer be needed, Russia may seek to sell gas without intermediaries. This would mean the need to re-orient the Polish transmission infrastructure towards obtaining raw material from Germany, as a result of which Poland would lose the status of a transit country, which would result in a lack of revenues from intermediation in transmission. To sum up, Polish energy policy finds itself in a difficult situation, where the sealing of the Russian-German economic partnership may sanction Gazprom's monopoly in Central Europe for decades. The implementation of the Nord Stream II project will cause the countries in the Baltic Sea region to increase their dependence on Russian natural gas, which in the context of Polish energy security may mean burying the plans to build a Norwegian gas pipeline, increasing imports of liquefied gas and creating a competitive gas market in Central Europe (Kublik, 2017b). Bearing in mind the above assumptions, Polish security policy should focus on preventing the situation in which Gazprom would be both the producer and seller of gas pumped through the planned Nord Stream II, and the owner of the pipe itself.

Recommendations for Poland's Energy Policy

The basic assumptions of Poland's energy policy include improving energy efficiency, increasing the country's energy security and reducing the environmental impact of the energy sector (Miciuła & Stępień, 2019). These goals result from the energy policy of the European Union, which assumes the creation of a competitive and efficient energy market, ensuring prosperity and increased competitiveness of Europe. The national legislation, similarly to the EU legislation, focused on introducing market mechanisms in electricity trading. The markets of the EU countries were liberalized, leading to the possibility of ordering electricity by end users from individual producers. However, while the sub-sector of generation and the supply of energy services can be considered the area of competition, the domain of natural monopoly is still the network structures in the field of transmission and distribution. This peculiar hybrid of competition and monopoly gives an important role to regulatory mechanisms that should prevent the tendency to collect monopoly rent. In recent decades, the development of renewable energy sources has become one of the main goals of the energy policy of the European Union countries. This was reflected in the establishment of mandatory national targets for the share of renewable energy sources in relation to total energy consumption. Undoubtedly, sustainable energy development based on the diversification of sources of energy raw materials, including renewable energy sources, brings with it many positive aspects and environmental, economic and social benefits.

Poland's membership in the IEA (International Energy Agency) preceded by many years of activities, including on changes and creation of new legal regulations in the field of maintaining an appropriate level of reserves or reducing demand, led to Poland becoming a member of the Agency in 2008. This significantly improves the safety of liquid fuels availability, but also allows Poland to participate in the work and shape issues related to the broadly understood issues of energy security (energy efficiency, use of renewable energy sources, counteracting the negative effects of disruptions in natural gas supplies, or clean coal combustion techniques) of the most important international organization in this area. However, we should not lose sight of the general assessment of the EU climate policy, which has been reduced to a role that is deaf to rational and, above all, financial arguments and doctrines (Miciuła et al., 2020). This maddening policy is driven by three engines: the interests, ideology and political need of the EU leaders, i.e. Germany and France, which are interested in selling renewable energy technologies and nuclear energy, respectively. Poland has to pay the highest gas prices in Europe, being the EU country best equipped with energy resources, one of the few European countries that could achieve energy independence, if only it did not allow colonial dependence on the West and energy dependence on the East. This is

also due to the ineptitude of the authorities and the lack of strategic investments in the country. For example, the condition of energy networks may pose a threat to the pursuit of an effective energy policy in the near future, and the possibilities of its expansion or modernization in the current legal state are limited. Despite the fact that the expansion of the grid is a public purpose investment, and the energy law obliges the operators of transmission and distribution systems to ensure an appropriate level and reliability of supplies, the Polish legal system does not provide adequate tools to meet these obligations (Stępień & Miciuła, 2016). In some matters, the lack of legal regulations, and in others, their multitude makes it a basic brake for Poland's energy development. Therefore, the recommendations for Poland's energy policy in the 2030 perspective include:

1. Improving energy efficiency
• consistent reduction of the energy consumption of the Polish economy to the EU - 15 level, incl. by modernizing the transmission system, regionalizing energy production and investing in infrastructure that favors innovative solutions,
2. Increased security of supply
• by diversifying the directions of supply, as part of strategic infrastructure investments (projects: LNG Świnoujście, the Baltic Pipe gas pipeline, the Odessa - Brody - Płock - Gdańsk oil pipeline, return to the project of connection with Norway, construction and expansion of interconnectors on four borders, with Germany and the Czech Republic, Slovakia and Lithuania,
• diversifying the share of energy sources in the energy mix means new jobs and more opportunities to obtain energy,
• maximum use of domestic energy resources, i.e. coal, as a step towards increasing Poland's energy independence,
• share in the EU internal energy market,
• increasing the storage capacity for inventories,
• new contracts for the import of liquefied gas from all over the world and an increase in domestic production, which currently amounts to 4 billion m3, which covers 25% of Poland's demand.
3. Investments in new production capacities
• implementation of ambitious government plans for the construction and expansion of coal-fired (15 blocks), gas (14 blocks), biomass (4 blocks), hydro and nuclear power plants.
4. Legislation favoring the development of competitive fuel and energy markets
• introducing market methods for shaping electricity and heat prices,
• lifting the barriers when switching electricity and gas suppliers,
• removing legal barriers, eg investment barriers or shale gas exploration.
5. Improving the management of the coal industry at the state level
• restructuring of unprofitable mines, the system of work and privileges, liquidation of intermediaries in trade in raw materials, reduction of taxation and increase in efficiency.
6. International politics
• instead of pursuing a policy of total dedication to the EU, skillfully negotiate in the interest of the country between EU countries and third countries, especially due to their geographical location,
• political negotiations along with maneuvering on the border of EU law in accordance with the examples (Germany - subsidies to hard coal mines until 2018, to the Rostock shipyard, and at the same time no consent to subsidies for other Member States, including Poland, lack of solidarity, the possibility of a loose interpretation of regulations, the possibility of renegotiating the goals to be achieved or failure to achieve them by some Member States).
7. Competitiveness
• an energy market should be created through infrastructure in order not to deal with a monopoly, and thus energy trading on market terms.
8. Investments in research and development of new technologies
• for example, the first in the world vertical wind turbine was built in Kodeń, the efficiency of which is higher by almost 50%, and its small size means that it can be installed on buildings, so the time for RES will come along with the new technology (Wojtaszek & Miciuła, 2019).
9. Promoting innovative and clean coal technologies
• the use and promotion of energy resources in line with energy efficiency and economic efficiency.

Poland needs a supra-political agreement on an energy strategy that would not change with the change of the ruling team. This would allow for the use of all favorable internal conditions and rational exploitation for the country's economic growth. In the near term, the most burdensome costs for coal-based countries will be the additional costs of CO_2 emission allowances, which will undoubtedly reduce the competitiveness of these economies. On the other hand, the situation of Poland in achieving the goals by 2020 is good, because the percentage of 15% of RES share will certainly be achieved, which amounts to 11.5% 5 years ahead of schedule. Also with regard to the reduction of greenhouse gas emissions, Poland is at the forefront of countries along with the rest of Central and Eastern Europe, and in terms of CO_2 emissions, it should be noted a significant improvement, in contrast to several EU countries that have achieved an intensive increase in its emissions. Due to the fact that many Member States have serious

problems in achieving the set goals, and some are not achieved by most EU members, e.g. a 10% share of biofuels, there will certainly be changes in the EU's climate and energy policy in the 2030 perspective. it is a shift towards economic growth and EU competitiveness in order to overcome the crisis to which climate policy contributed, which is currently observed on the international stage.

Summary

The energy sector is the basis of all economic activity, and thus the basis for the economic development of countries. It gained importance with the advent of the first industrial revolution, and the demand for energy has been growing ever since. Currently, it is impossible for societies to function normally without a constant energy supply. Energy is the driving force of economies around the world. Energy security plays an extremely important role in formulating the concept and geopolitical strategy of Poland. Its components include safety: oil, gas and electricity. The analysis showed that 30% of the energy consumed by Poland comes from raw materials, the production of which carries the risk of "political cut-off" or an increase in price for reasons impossible to eliminate. Oil and gas play a key role in the Polish energy sector. The high demand for these raw materials is still inadequate to the level of development of the manufacturing and transport infrastructure and the possibility of using political pressure by external entities. The strategic importance of energy security shows that the key role for Poland is to define the measures necessary to meet the current and future resource needs. The Baltic Sea region plays a special role in creating Polish energy policy and implementing its main goals. The stabilization of this area largely determines the possibility of diversifying sources of crude oil and natural gas. This applies above all to Russia, a state that is capable of resorting to political and military measures to increase European countries' dependence on supplies of energy resources from Moscow. In view of the above, the priority of the Polish energy security policy in relation to the Baltic Sea is the maximum reduction of Russian gas imports to Europe by supporting diversification projects and actions aimed at weakening Gazprom on the EU market. Moreover, a comparative analysis of Russian energy projects in the Baltic Sea basin showed that the construction of Nord Stream and the planned Nord Stream II is in line with the Kremlin's policy to date, which is a violation of the economic interests of Poland and other Baltic Sea countries.

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Environmental Disclosure in Oil Company Reports: Need or Order of The Day?

Bibigul AMANZHOLOVA
Doctor of Economics, Professor
Head of the Department of Audit, Accounting and Finance
Novosibirsk State Technical University,
Novosibirsk, Russian Federation
amanzholova@corp.nstu.ru

Tatiana DUDKO
Student of the Department of Audit, Accounting and Finance
Novosibirsk State Technical University,
Novosibirsk, Russian Federation
lolayot@mail.ru

Alina IMANSAKIPOVA
Student of the Faculty of Economics
M.V. Lomonosov Moscow State University,
Moscow, Russian Federation
alina.imansakipova@gmail.com

Abstract

Climate change and air pollution problems require socially responsible behavior from all participants in economic and social relations. However, pressure on mining and manufacturing companies has led to the widespread practice of greenwashing, which misleads not only consumers, but also government organizations and financial institutions.
The authors raised questions about: the need for environmental disclosure to ensure the efficiency of the mining companies; ecological disclosure as order of the day.
The authors have developed and tested their own approach to quantitative and qualitative analysis of disclosure of information on corporate social responsibility of an oil company. This approach allowed to make conclusions about the dominance of companies' own interests in the implementation of the openness policy. Environmental information is only disclosed fully and qualitatively in the "Legally established obligations of the company". This indicates the positive results of the government environmental policy, but rejects the subordination of the company's financial, investment and staff policies to achieving sustainable development goals. As a result, it provides fragmented disclosure and contributes to misleading users.

Keywords: CSR, reporting, ecological activity, greenwashing, disclosure indicators and targets.

Introduction

The problem of information openness of mining companies, which have a negative impact on the environment through their activities, does not lose its relevance over a long period. The pursuit of sustainable development goals requires continuous dialogue between stakeholders. Meanwhile, information openness and the quality of disclosed information may be evidence of the extent of implementation of social responsibility, especially the environmental aspect.

Accordingly, the draft strategic plan of the IFAC states: "Our goal is not only to react, but also to anticipate. The many challenges caused by COVID-19 have highlighted the fragility of our global ecosystem and the importance of creating a more sustainable world. Our approach is based on the UN Sustainable Development Goals (SDGs). Achieving the SDGs requires high quality information, while accountants and auditors generate this information for the benefit of all stakeholders" [1].

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In addition, this document notes the need to demonstrate and evaluate environmental performance: “Billions of people affected by climate change and the effects of unfair development demand results, not words. For example, the indicator "significant reduction in carbon footprint" is not important, but whether we consider our efforts to be successful” [1].

The authors of the project highlight the increasing attention to sustainable development issues as a trend which leads to certain consequences for the profession and provides favorable opportunities. These possible consequences may include the call for holistic reporting by stakeholders to ensure long-term sustainability. Therefore, it is recognized that the provision of traditional historical financial information is not sufficient to assess the impact on society and the company's performance.

Consequently, “professional accountants can add value to reporting by providing a holistic and relevant opinion of a company’s performance and sustainability. This view recognizes the complexity of modern business and encompasses financial and non-financial performance as well as plays a role in protecting the public interest” [1].

As a result, the authors indicate two important debatable issues on the current agenda:

1. Environmental disclosure is a prerequisite for the efficient operation of mining companies developing in the paradigm of sustainable development.
2. Environmental disclosure characterize the current trend of information openness without a strategic nature.

The authors base their search for answers to these questions not only on the analysis of existing studies, but also on their own research performed according to the data of the largest Russian oil company.

Greenwashing as A Modern Ideology of Information Openness

As society has become aware of the challenges of climate change and air pollution, the demand for eco-friendly products and the value of low-waste businesses increased. Consequently, companies are forced to produce and sell products without negative impact on the environment. However, this pressure has led to the widespread practice of greenwashing in the form of misleading claim to persuade the public about the environmental benefits of a product or service. Greenwashing is an advertisement for dishonest companies in corporate social reporting that distorts disclosed information.

Ziyuan Sun and Weiwei Zhang (2019) admit the paramount importance of government regulation to prevent greenwashing through public power, green supply chain management and the corporate social responsibility. In their study, they used evolutionary game theory to examine the greenwashing behaviors of enterprises from the perspective of government regulation. There are two bounded rational players, Enterprise-A and Enterprise-B, in this game model. Companies can choose three types of combinations of green innovation and greenwashing strategies.

1. If one player chooses the green innovation strategy, and another - the greenwashing strategy, then the latter as a speculative behavior will appropriate part of the income of the enterprise that initially chose the green innovation strategy.
2. If both players choose the greenwashing strategy, then they will fail and lose market income.
3. If both players choose the green innovation strategy, then they will share the benefits, and their market income is determined by the proportional heterogeneity coefficient. In this case, the cost of green innovation is less than the cost of greenwashing. Therefore, the government punishment mechanism effectively prevents both dominant and inferior enterprises from greenwashing under certain circumstances and promotes the development of green innovation.

As the government punishment amount increases, the dominant enterprises abandon the greenwashing strategy and choose the green innovation one, and then the inferior enterprises change their strategic choice. The government also needs to encourage the public, industry institutions and third-party supervisors to participate in overseeing corporate greenwashing behavior.

The authors also proposed the hypothesis about the impact of the tax subsidy mechanism for green innovation to prevent greenwashing. However, the hypothesis was not confirmed because a mechanism can effectively regulate the greenwashing of inferior enterprises only under certain circumstances. Therefore, the propensity of enterprises to choose the green innovation strategy will depend on the number of government subsidies.

The authors recommend the government to strengthen corporate social responsibility construction, which will reduce the need for government intervention and the cost of governance.
It is interesting to note a study by Ali Uyar, Abdullah S. Karaman and Merve Kilic (2020), in which the authors suggest that companies may publish corporate social reporting for signaling or greenwashing purposes. Thus, for signaling purposes, companies with greater CSR performance are more likely to publish CSR reports to emphasize their good CSR efforts. On the other hand, for greenwashing purposes, companies with poor CSR performance are more likely to publish CSR reports to change stakeholder perceptions of their actual CSR performance.

As a result, they found a strong significant positive relationship between CSR performance and CSR reporting, which can eliminate the danger of greenwashing, but confirms the validity of signaling theory. This link is also important to mitigate public concerns about the legitimacy of firms.

Therefore, a proven link between CSR performance and CSR reporting sends very important signals to investors that the information is reliable in the reports, free from greenwashing or window-dressing, and reflects the actual situation in the companies.

Due to the growing relevance of corporate social responsibility, more attention is paid to the problem of its assessment. The vast majority of methods are indices that create a rating of companies in terms of CSR level. This method can assess the extent of CSR disclosure of a company, but it is impossible to measure the effectiveness of its corporate social activities. As noted above, if stakeholders identify CSR effectiveness, this can remove their doubts about the company's greenwashing goals. Borzakov D.V. (2015) mentioned that the indices most often do not contain a well-developed system of indicators and do not carry out primary screening of companies.

Proshkin A.V., Dukart S.A. (2015) state that it is impossible to compare enterprises by the quantitative index of social investment because the assessment methodology is based on interval indicators. In most cases, they cannot obtain an exact quantitative value. It complicates the data processing that converts interval values into an average indicator and adversely affects the accuracy of the estimate.

In addition, the index of specific social investment may increase if the company starts to lay off employees with a constant level of social investment. However, this will not reflect an increase in social responsibility. Meanwhile, the qualitative index of social investment does not reflect the scale of social responsibility because there is no general index that combines the quantitative and qualitative index.

Shikhverdiev A.P. and Seryakov A.V. (2008) indicate that comparison on a qualitative index will only be in favor of big business and monopolies because they can allocate huge budgets for social programs. However, it is extremely difficult for them to be socially responsible due to the large number of stakeholders with different interests. Consequently, a growth in the number of stakeholders reduces the overall social responsibility and the company then has to increase social investment.

Also, the methodology lacks detailed indicators of the quality of relationship with stakeholders because the presence or absence of a feature in the sample cannot adequately represent this.

Adriana Galant & Simon Cadez (2017) state that CSR reputation indices have been developed in international practice which allow assessing the social responsibility of different companies. The disadvantage of such indices is that rating agencies limit the coverage of companies by their size, industry affiliation and geographic location.

Amanpreet Kaur & Balwinder Singh (2018) claim that corporate reputation indices have been criticized for lack of comprehensiveness because they only take into account the views of only one stakeholder group and inappropriateness for scientific research. Also, these indices have limited applicability and bias due to the existence of a financial halo.

Maignan and Ferrell (2000) found that corporate reputation indices are not suitable for assessment all companies and that the elements of the KLD and Fortune index are inconsistent with theoretical arguments. The CSID as a well-known database measures the sum of a firm's average net strength and weakness for seven dimensions, including environment, diversity, corporate governance, products and business practices, community, employee relations and international operations (Mahoney and Thorne, 2005; Turker, 2009). The main limitation of these databases is their limited scope of assessment firms in some specific countries rather than the general business environment. However, they explain some key stakeholder relationships.

To conclude, relevant research issue is the problem of analyzing the relationship between information openness and the company's performance indicators for various groups of stakeholders.

Methodology of Research the Relationship of Information Openness and Company's Performance

The authors state the need for a comprehensive implementation, i.e. in the analysis of all aspects of social responsibility - economic, environmental and social.

As noted above, the index method is the main method for assessing information openness. Its main idea is to assess the ratio of the amount of data actually disclosed in the reporting to the maximum amount of data. The latter amount of data can be calculated: from actually achieved amount of disclosure by a group of subjects of the production and economic chain; amount according to the needs of stakeholders and requirements of standards. With this approach, the index value can vary from 0 to 1 as a percentage. However, the key disadvantage of the index method is measuring the amount, but not the quality of the information disclosed.

However, some modifications of the index method demonstrates the interest. Company reporting indicators are assigned scores by actual disclosure in reporting. Thus, 1 score is assigned, if information is disclosed; 0 score, if not. As a result of calculating the indices of disclosure of information in the reporting, the company which received the minimum score is assigned 1 score. The indices of other subjects are defined as the ratio of the actually scored points to the points of the subject with the minimum level of information disclosure. The higher the index than one, the higher the amount of actually disclosed information.

Content analysis of reporting is gaining popularity in modern research. As part of the content analysis of reporting, the disclosure index can be defined as the ratio of the actual number of key concepts in the reporting to the total number of such terms used in the analysis.

The authors propose their own approach to the analysis of information disclosure. The originality of the approach is shown in the selection of various focuses of the analysis. They are determined by the different extents of "maturity" of the subjects in terms of goal-setting, policy and disclosure tools:

- ensuring economic, social and environmental efficiency in the long term in the interests of economic subjects;
- demonstration of involvement in the sustainable development agenda in order to ensure investment attractiveness;
- a basis for dialogue with stakeholders in their interests;
- a systematic presentation of sustainable development policies and practices to ensure sustainability.

The authors propose to conduct a disclosure analysis at the intersection of areas that are defined by the disclosure parameters, sources and disclosure channels. This allowed for an assessment of the amount and quality of information of mining companies. As a result, researchers had the opportunity not only to qualify different levels of maturity in terms of information openness, but also to identify areas of information deficit that limit the achievement of sustainable development goals.

To analyze the reporting of a mining company, the authors applied an approach of Amanzholova B. A., Fribus N. V., Khomenko E. V (2016) that consists a qualitative analysis of the environmental disclosure in public reporting. This approach is based on conducting morphological analysis in relation to the audited published reporting of the company. The morphological analysis method could implement the study of various aspects of corporate environmental responsibility with the legal prerequisites for the formation of public reporting of mining companies. The purpose of the analysis is to assess the level of presentation and disclosure of environmental information of companies based on public reporting data.

Applying of the approach allowed to identify the most significant indicators of public reporting for the purposes of analysis. They contain the types of reporting (X), the legal prerequisites for its formation (Y) and the aspects of corporate social responsibility of enterprises (Z) (Fig 1).

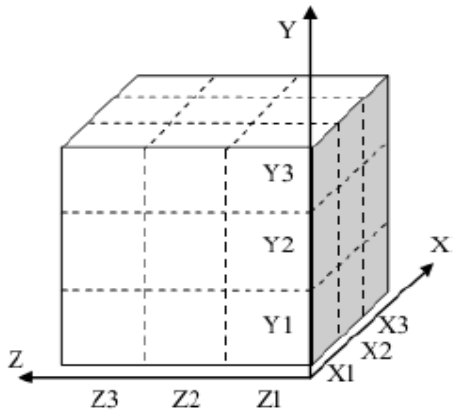

Fig. 1: "Morphological cube" as a basis for analysis company reporting

The types of public reporting are presented along the X-axis: financial statements - X1; annual report - X2; Sustainability Report - X3.

The legal prerequisites for the formation of public reporting are presented on the Y-axis: legislatively enshrined obligations of the company - Y1; voluntarily assumed obligations under agreements with stakeholders - Y2; philanthropy - Y3.

Areas of corporate social responsibility are presented along the Z axis: economic - Z1; ecological - Z2; social - Z3.

The morphological analysis method assumes that the combination of these factors allows to comprehensively analyze the content of financial and non-financial information about the environmental activities of companies. Possible combinations are:

1. The combination (X1, Y1, Z1) implies the disclosure in the financial statement of the company's legislatively enshrined obligations for the formation of economic indicators on environmental activities. They contain explicit, estimated and contingent liabilities in accordance with accounting standards. In this case, the level of disclosure of environmental activities is not sufficient, which is necessary for users to meet their needs, but complies with legal requirements.
2. Combinations (X2, Y2, Z1), (X2, Y2, Z2), (X2, Y1, Z3), (X3, Y2, Z2) and others imply disclosure of financial and non-financial information in accordance with accounting standards, sustainable development standards and internal regulations. This combination of factors can satisfy the needs of most stakeholders.
3. Combinations (X3, Y3, Z1), (X3, Y3, Z3) and especially (X3, Y3, Z2) are ideal disclosure that can satisfy the needs of all users. With such combinations, information is disclosed in all areas of corporate social responsibility on voluntary obligations under agreements with stakeholders.

To apply the listed approaches the authors did the following:

- read the reporting;
- emphasized the quantitative indicators of aspects of the company's social responsibility;
- performed the dynamic analysis of the indicators of aspects of the company's social responsibility over the years;
- formed the composition of significant indicators of aspects of the company's social responsibility over the years;
- performed the calculation and analysis of integral indicators.

All of these actions related on the quantitative indicators of social responsibility disclosed in the reporting.

The authors applied a matrix approach for the qualitative analysis which allowed to systematize the information presented on the legal prerequisites for the formation of public reporting and aspects of social responsibility. The authors applied the following assessment scale:

If the disclosed information is equal in each year, 25% is assigned.

If the disclosed information is not fully disclosed in relation to the next year, 0-24% is assigned.

If the disclosed information is fully disclosed than in the next year, 26-100 is assigned.

Thus, the suggestions of the authors will allow to identify the relationship between the environmental disclosure and the performance of mining companies.

Discussion of The Results

The authors studied the sustainable development reports for the period from 2015 to 2018 and systematized indicators by groups of social responsibility: economic, social, environmental. A dynamic analysis was made of each indicator within each group for the specified period. For each indicator, the average value of the growth rate was calculated over three years, and the indicators were sorted in descending order. Further, indicators were identified for detailed analysis according to the following selection criteria:

- significant changes over the indicated periods (the highest average value of the growth (decrease) rate);
- materiality of absolute or relative values;
- direct influence on the conclusions and decisions of stakeholders.

As a result, 15 indicators out of 66 were selected. The assessment of the dynamics of information transparency of an oil company was performed according to these indicators (Fig 2).

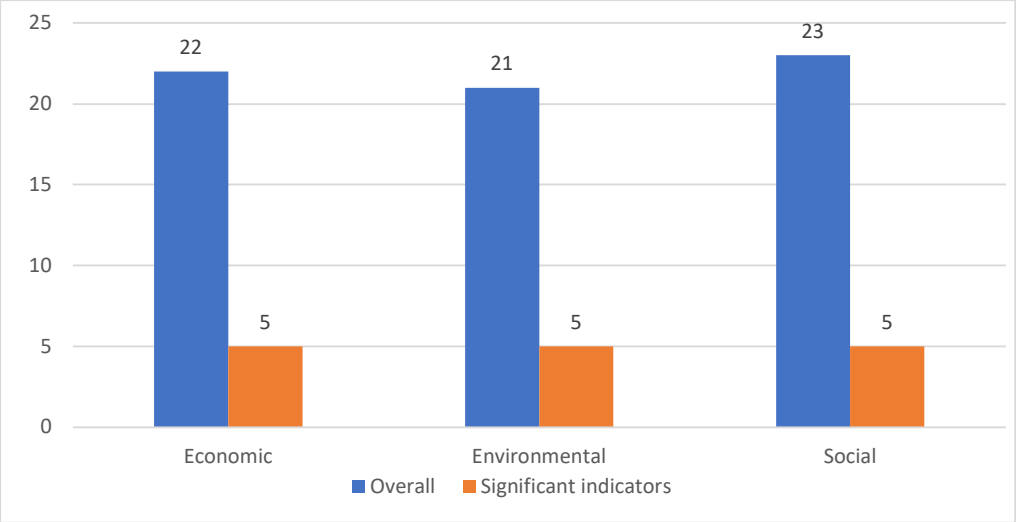

Fig. 2: Results of the selection of indicators for assessing the dynamics of information transparency of an oil company

Table 1: dynamics of significant indicators of the social responsibility of an oil company across 2016-2018

Indicators	2016	2017	2018	Average growth rate, %	Weight, %
Economic					
Dividends	44%	20%	159%	74%	39%
Accruals to funds suppliers	16%	31%	55%	34%	18%
Insurance premiums	7%	33%	46%	28%	15%
Assets	15%	27%	37%	26%	14%
Accrued taxes and duties	-11%	16%	72%	26%	14%
Environmental					
Total volume of spilled oil and oil products	-83%	-83%	-86%	84%	35%
Training on industrial safety, labor protection and environmental protection	20%	62%	62%	48%	20%
Specific emissions of pollutants from oil refining and petrochemicals	18%	53%	43%	38%	16%

Financial and material reserves for the prevention and response situation	-41%	-36%	-32%	37%	15%
Fines accrued for violations of environmental legislation	29%	29%	44%	34%	14%
Social					
Wage fund (including preferential payments, one-time bonuses and annual remuneration)	11%	38%	50%	33%	29%
Social benefit fund	11%	31%	45%	29%	26%
Headcount at the end of the year	11%	23%	26%	20%	18%
Average headcount	2%	22%	24%	16%	15%
Average monthly salary	8%	13%	20%	14%	12%

It is important to note that each group includes indicators of various aspects of social responsibility and focus of influence. For example, there were indicators of relationships with staff and the local community in the social indicators group.

Graphs were built for each group of indicators and conclusions were made about the multidirectionality in their dynamics. An example of the analysis of environmental indicators is shown in Fig 3.

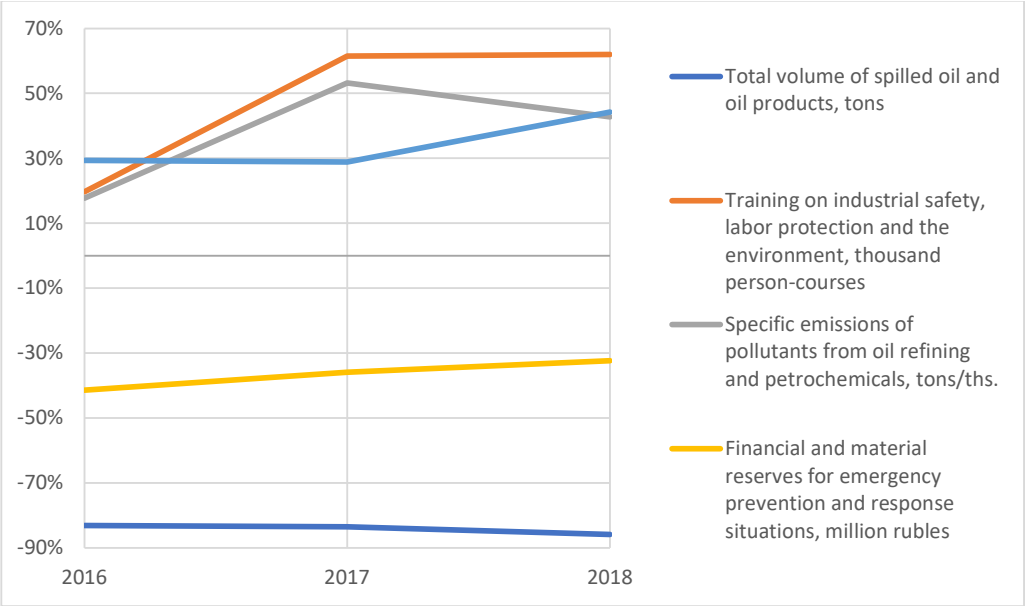

Fig. 3: Dynamics of environmental indicators disclosed in the reporting of a mining company for 2016-2018

Then, weights were calculated for the indicators from the average growth rate to form an integral indicator for each group. The value of the integral indicator was calculated for each year by the formula $y_i = \sum w_i * x_i$, where w_i is the weight of each indicator, x_i is the value of each indicator, $\sum w_i = 1$.

Table 2: dynamics of integral indicators of aspects of corporate social responsibility of an oil company for 2016-2018

Integral indicator	**2016**	**2017**	**2018**
Economic	22%	24%	94%
Environmental	-24%	-10%	-10%
Social	9%	28%	37%

Graphical interpretation of the behavior of integral indicators needs for a qualitative analysis of information disclosure in the reporting of an oil company (Fig 4).

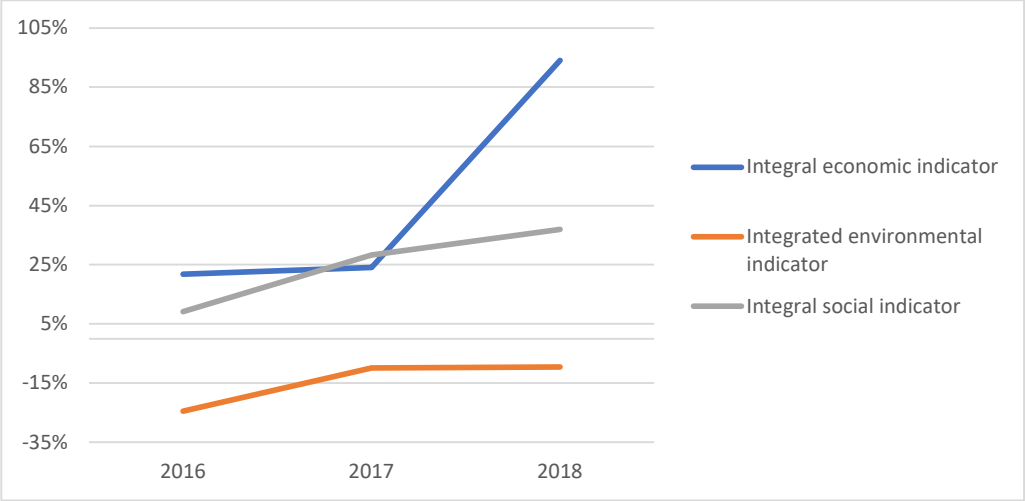

Fig. 4: Dynamics of integral indicators of the aspects of corporate social responsibility of an oil company for 2016-2018

There is a trend of positive dynamics in all groups. At the same time, a significant increase in economic indicators implies an increase in the effectiveness of activities, including through dialogue with stakeholders about the environmental and social activities.

This hypothesis allowed the authors to make a qualitative assessment of information disclosure. It is subjective, but built on systematized prerequisites for the formation of reporting (Table 3).

Table 3: qualitative analysis of information disclosure in the reporting of an oil company on the legal prerequisites for formation of reporting, %

Legal prerequisites for formation of reporting	Indicators	Years			
		2015	2016	2017	2018
Legislatively enshrined obligations of the company	***Environmental***				
	Risks in industrial safety, labor protection and environment	15	25	25	35
	Stakeholders engagement on ISLPE issues	25	35	30	10
	Innovative and scientific development	10	30	35	25
	Development of a labor protection and industrial safety management system	35	35	10	20
	Development of the environmental safety management system	40	25	20	15
	Key events in the ISLP	10	10	35	45
	Emergency warning and readiness to eliminate their consequences	5	25	35	35
	Conservation of biological diversity	10	5	35	50
	Waste management and remediation of contaminated land	15	15	10	60
	Economic				
	Payment of dividends	25	25	25	25
	Stakeholders engagement on the contribution to the development of the economy and infrastructure of the regions	15	20	30	35
	Corporate Pension and Veteran Care	30	20	25	25

	Import substitution and localization	50	15	25	10
	Compliance system development	30	30	20	20
	Social				
	Risks in staff management and social policy	25	25	25	25
	Stakeholders engagement on the social sphere, charity and education	20	15	35	30
	Employee Benefits	20	25	30	25
	Development of the staff training system	10	25	40	25
	Development of the staff health maintenance system	15	15	35	35
	Development of the staff management system	10	30	25	35
Voluntarily assumed obligations under agreements with stakeholders	***Environmental***				
	Implementation of the Gas Investment Program	25	25	25	25
	Measures to improve energy efficiency indicators	–	50	50	–
	Measures to improve the integrity of pipelines	–	50	50	–
	Greenhouse Gas Emissions Management	30	30	30	10
	Economic				
	Anti-fraud and corruption	25	20	20	35
Philanthropy	***Environmental***				
	Forest planting activities	20	20	30	30
	Environmental education of the population	30	30	20	20
	Economic				
	Allocation of funds to the budget for the development of regional territories	20	20	30	30
	Engaging with regions of presence	25	25	25	25
	Social				
	Organization of sports and entertainment events	30	35	15	20
	Implementation of charitable projects	5	30	40	25
	Support for the social sphere of the regions	25	25	25	25

Next, general assessments are summarized for reporting periods by groups of indicators and legal prerequisites for the formation of reporting (Table 4).

Table 4: assessment of the extent of disclosure of indicators according to the legal prerequisites for the formation of reporting, %

Basis for analysis		**Disclosure by years**		
Legal prerequisites for formation of reporting	Group of indicators	2016	2017	2018
Legislatively enshrined obligations of the company	Environmental	23	26	33
	Economic	22	25	23
	Social	23	32	29
Legislatively enshrined obligations of the company	Environmental	39	39	18
	Economic	20	20	35
Philanthropy	Environmental	25	25	25
	Economic	23	28	28
	Social	30	27	23

The score does not rise above 50%, which indicates the low quality of information disclosure about these indicators. The authors considered the dynamics of integral indicators in relationship with the assessment of the extent of disclosure.

Hypothesis for all groups of indicators. The better the integral indicator of the group, the higher the assessment of the extent of disclosure.

A correlation analysis was performed to assess the relationship in accordance with the legal prerequisites for the formation of reporting.

For the group "Legally enshrined obligations of the company", the authors believe that the hypothesis should be true for all groups of indicators because the level of government regulation is high in the oil industry. However, according to the results of calculations, the hypothesis is confirmed only in relation to the disclosure of environmental indicators (Fig 5).

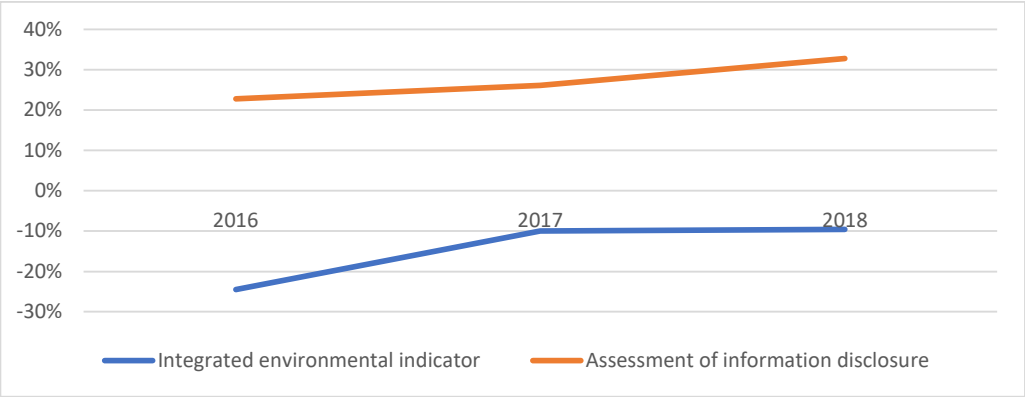

Fig. 5: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Environmental indicators")

Thus, there is a direct relationship and confirmation of the hypothesis.

According to economic indicators, we can say that the relationship is not obvious (Fig 6).

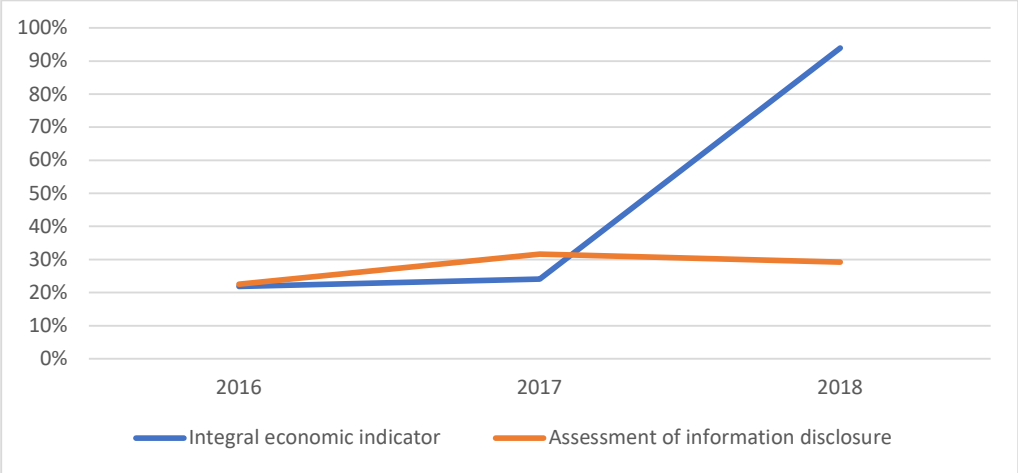

Fig. 6: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Economic indicators")

The correlation coefficient between the integral economic indicator and assessment of disclosure equal to 0.28 that indicates a weak relationship. Thus, the hypothesis is not confirmed.

An inverse relationship was revealed in social indicators. (Fig 7).

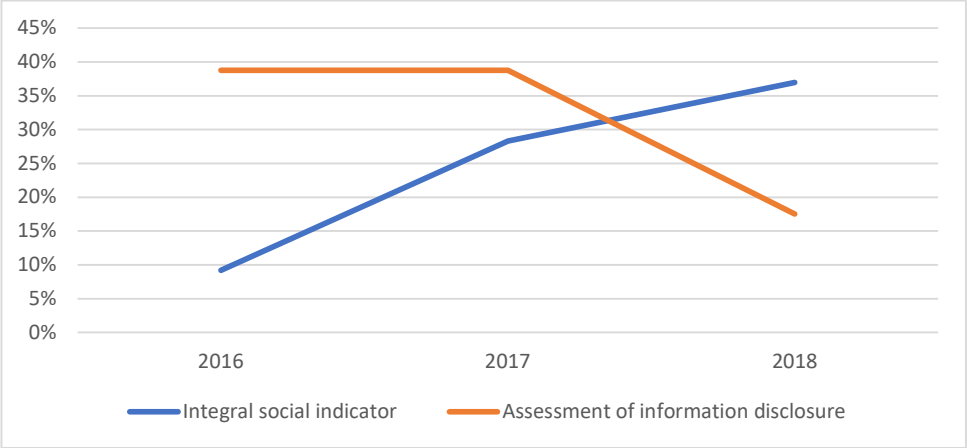

Fig. 7: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Social indicators")

Thus, the relationship analysis for the group "Legally enshrined obligations of the company" revealed that such a relationship is only for environmental indicators of social responsibility.

Regarding the "Voluntary obligations under agreements with stakeholders" group, the authors believe that the hypothesis of a relationship should be true due to the existence of obligations.

However, this hypothesis was confirmed only for the group of economic indicators (Fig 9), and a negative correlation was revealed for the group of environmental indicators - 0.52 (Fig 8).

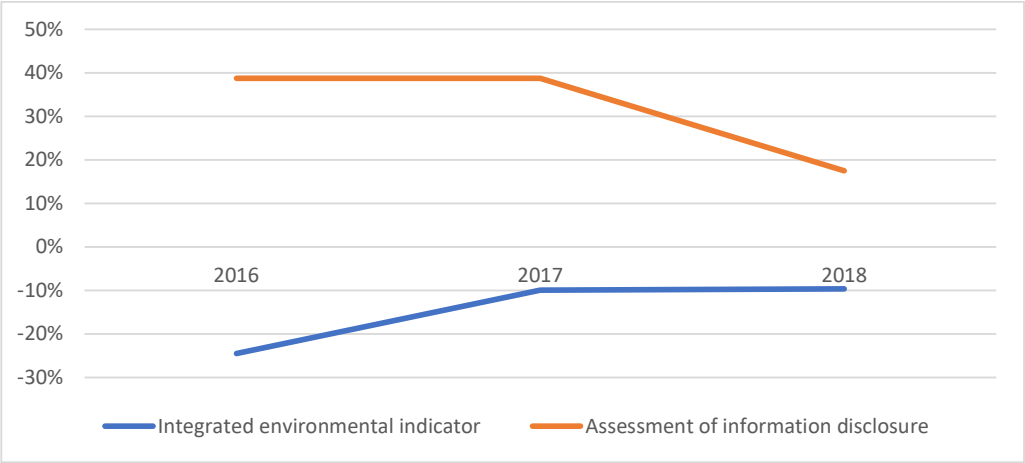

Fig. 8: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Environmental indicators")

Such results may be explained by inconsistent and incomparable disclosures of voluntary obligations under stakeholder agreements.

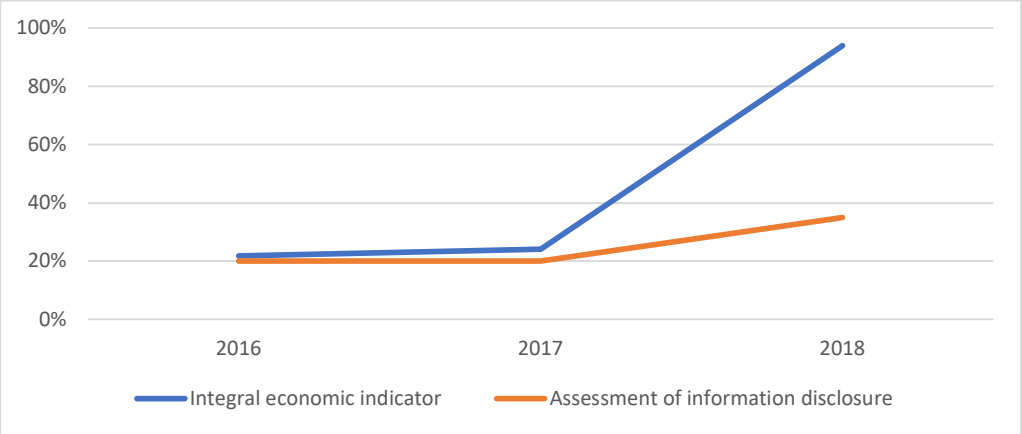

Fig. 9: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Economic indicators")

Regarding information on the “philanthropy” group, the authors suggest that the hypothesis of a relationship should also be true. Because such initiatives must be documented not only to improve the company's reputation, but also to improve investment attractiveness in a strategic context. However, according to the results of calculations, the hypothesis is not confirmed in relation to environmental (Fig 10), social (Fig 12), but is confirmed only in relation to the disclosure of economic indicators (Fig 11).

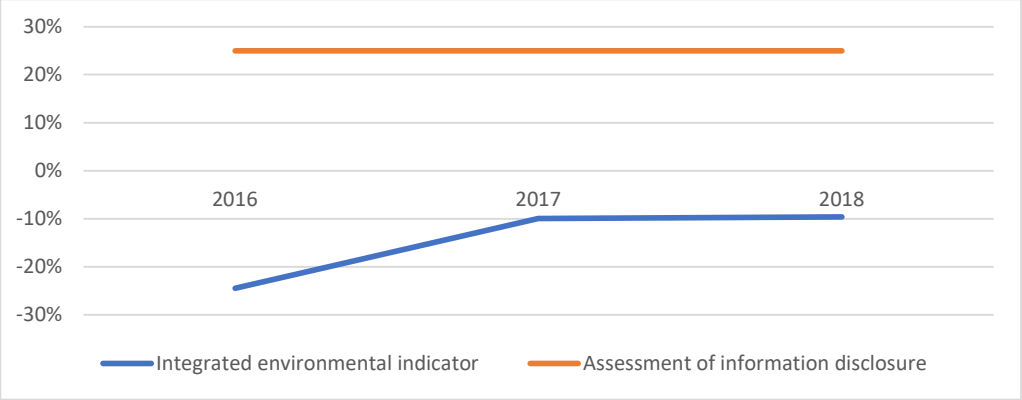

Fig. 10: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Environmental indicators")

The hypothesis is confirmed according to economic indicators because the relationship is positive and its strength is average - 0.52.

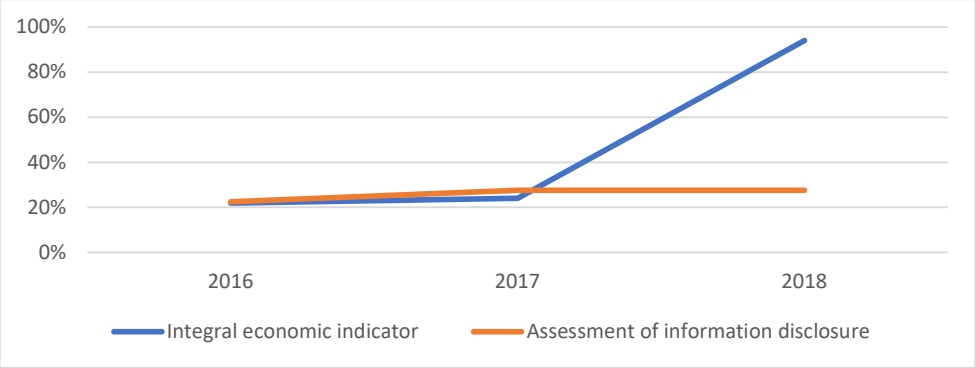

Fig. 11: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Economic indicators")

Lack of correlation on social indicators in relation to all legal prerequisites for reporting preparation raises questions.

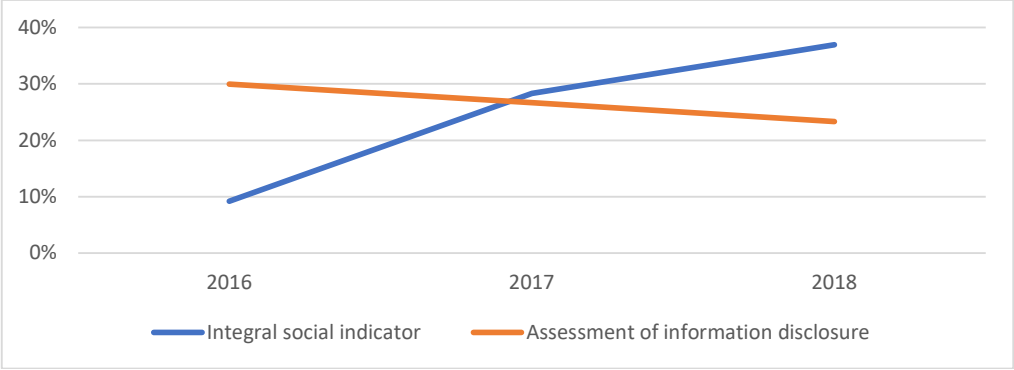

Fig. 12: Dynamics of the integral indicator and assessment of disclosure for 2016-2018. (group "Social indicators")

An inverse relationship was revealed in the group of social indicators in the section "philanthropy". It can be explained by the incomparability of the indicators selected for calculating the integral indicator and the information disclosed in the reporting.

Conclusions

The approach allowed to the conclude that companies are primarily focused on the lowest level goal - demonstrating economic and environmental efficiency. This is evidenced by the analysis of the relationship between the value of integral indicators and the results of the assessment of disclosure. It is important to note that the analysis of the legal prerequisites for the preparation of reporting only revealed the existence of a relationship between economic indicators.

According to the authors, a full and high-quality environmental disclosure only in the "Legally enshrined obligations of the company" indicates the positive impact of the government environmental policy. However, the disclosure policy and tools will evolve due to the penetration of the sustainable development ideology into the company's financial, investment and staff policy. Otherwise, information disclosure becomes not only fragmentary, but can also mislead users.

As a result, the author's approach is constrained by the limitations. They consist of analyzing data from only one large company, which did not allow making a model with environmental, economic and social indicators. In the future, authors plan to process data from a large number of oil companies, which will allow to systematize industry-specific features according to legal prerequisites.

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Assessment of The Use of Forward Sale for Property Transaction in Lagos State, Nigeria

Olayinka OLOKE
Department of Estate Management, College of Science and Technology, Covenant University, Canaanland, Ota, Ogun State, Nigeria,
yinka.oloke@covenantuniversity.edu.ng

Nelson AKINDELE
Department of Building and Real Estate, The Hong Kong Polytechnic University, Hong Kong.
nelson.akindele@connect.polyu.hk

Peter ADERONMU
Department of Architecture, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria
peter.aderonmu@covenantuniversity.edu.ng

Abstract

The study assesses the use of forward sale for housing delivery in Lagos state. The research was conducted to explore forward sale as a veritable instrument for reducing housing deficit in the State. The study was a survey research that involved the use of structured questionnaires administered to property developers, prospective buyers and estate surveyors and valuers. Data analysis was achieved using descriptive statistics and relative importance index while Student's T-Test was used to test the hypothesis of the study. The result of the T-test clearly showed that forward sale is not popular among prospective home buyers in Lagos state, although it is a preferred funding option among by developers. The study further revealed that insecurity of prospective buyer's interest, developer's default, poor construction standard and poor workmanship are key factors influencing potential buyer's decision to commit to forward sale arrangement. The study therefore recommends government regulation of forward sale market for the purpose of boosting buyer's confidence.

Keywords: forward sale, finance, housing, property, strategies

Introduction

There exists in both rural and urban areas across the world a definite gap between supply and demand for diverse real estate products. In some rural areas, arable or fertile land may be in short supply coupled with lack of good farmstead and produce storage facilities. In many urban centres however, the different competing uses for the available urban land makes land a scarce commodity, thereby driving prices or rents of landed properties out of reach for many. Over the years post-independence, the demand for real estates in many urban centers in Nigeria has surpassed supply. For instance, in Lagos state alone, housing needs every twelve months have been conservatively projected to be of 224,000 and at least, 17 million units throughout the country (FMLHUD, 2012). Even with the humongous deficit, quite a lot of housing development projects being undertaken by developers remain largely unsubscribed and therefore either abandoned or remain uncompleted for a long time. Housing development has turned a nightmare for many developers due to cost escalation and unstable market dynamics. In Nigeria, the cost of finance is often high and could lead to cost overrun. In addition, reduction of purchasing power as a result of inflation, poor currency exchange rate and rising prices of building material often result in cost escalation. As a result, many housing development projects have experienced unnecessary delay, partial or total abandonment due to insufficient funding, stifled, diverted funding or outright withdrawal of fund.

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Amongst the numerous sources of capital for real estate development projects in Nigeria is loan from financial institutions such as pension funds, insurance and commercial banks. Many a times, developers seek financial assistance in form of loan form these institutions and over the years, commercial banks have been patronized for providing such facilities albeit on short or medium term. Of recent however, the procurement of bank loan has become difficult and very risky because of the changing interest rate, difficult processing procedure, collateral requirements and unstable economy. Debt funding has always been combined with funds raised from private equity or public equity contributions such as forward sale. Forward sale is a popular strategy in Asian property market such as Hong Kong, Malaysia, Singapore, Taiwan, Japan and China. It is also used in America, Europe, United Kingdom and South Africa.

Forward sale involves the selling of upcoming project to end users, well before completion. Amongst the benefits is that the strategy boosts the flow of fund and facilitate timely completion of the project. Neug et. al. (2004) averred that forward sale provides access to smooth and sufficient fund, avoid payment of interest, make fund available in time, minimize cost overrun and anticipated profit in the long run. In spite of these inherent advantages, the construction field at various parts of the country is replete with uncompleted or totally neglected projects arising from paucity of development capital. It is also unclear whether this strategy is in use among developers and accepted among prospective buyers especially in Lagos. Arising from the foregoing, this study undertakes an assessment of the use of forward sale as a funding strategy for property development in Lagos State, Nigeria. This paper is structured into four sections namely; literature review, research methods, results and discussion and conclusion.

Literature Review

Development Finance

Ogedengbe and Adesopo (2003) describe property development as the process of carrying out a change in the use of land or the existing improvement or the extent of land use by means of tangible construction works. Variants of such developments include reconstruction, refurbishment, renovation, new development or the transformation of existing factory facilities into a multifunctional centre (Gehner, 2008). Sometimes such developments are finished on time, while others take longer period due to the quantum or size of the project as well as the accessibility and adequacy of development fund (Gehner, 2008). The accessibility, sufficiency and cost of finance procurement play significant roles in determining the profitability of a proposed project. Therefore developers look at different sources and means of raising capital. In processing the fund, investors consider sources that offer easy access to fund and are secured at minimal cost. Hence, understanding the various sources of finance available in the market is germane to investment decision making as this goes a long way to reducing the overall investment risk and maximize return in the long run. Availability and accessibility of finance is critical to rapid transformation and development of urban areas. Urbanization can be marred where capital is not available in sufficient quantity and easily accessed at minimal cost. Financing real estate projects becomes a problem as a result of the amount of funding required as well as the level of risks involved. Usually, the capital outlay exceeds financial capacity of the investor thereby necessitating arrangement for funds from other sources. Real estate financing according to Clauretie and Sirmans, (2006) means the procedure for acquiring funds specifically for the purpose of carrying out improvement on land. The authors further revealed that real estate finance entails observing relevant economic and markets indices, institutions and instruments engaged for the movement of credit facilities needed for developmental purposes. Since property development is always largely capital-intensive, funding is becomes critical, the nature of which is to provide capital to enable the enterprise operate commercially. According to Ogundipe (2020), the extreme volatile behavior of Africa's output and consumption is as a result of the level of exposure to external shocks in its trade earnings. This further indicates the rationale behind high cost of project in developing economies such as Nigeria.

Oloke, Ezema, Fayomi, E,metere, Omeje and Jesusegun (2020) in a study that compare the rental value of residential properties of border communities of Lagos and Ogun states observed that there is stark difference in values of properties due to the different level of development and infrastructure provision. The study further showed that majority of houses in the area was self-financed. Finance remains a vital input in all phases of project development. The timely completion of housing development project is a function of steady supply and unhindered access to fund. Availability and access to steady fund equip developers with the necessary state-of-the-art techniques and technologies to complete projects to time and specifications. Timely completion preserves project's value, anticipated profit and for this reason, developers have explored various financing strategies. These include debt capital from banks and mortgage institutions, credit unions, leaseback, reits, private equity, securitization and unitization, leases, pre-letting as well as presale (Hines 1995; Emoh and Nwanchukwu 2011). As much as these

funding strategies are available, the popularity and use of forward sale for property transaction in Nigeria, particularly in the study area have not being explored and is still not clear.

Real Estate Finance Strategies

According to Oloke, Iroham, Odetumbi and Oyedele (2020), real estate investment is capital intensive, time consuming and are often illiquid. Finance constitutes the lifeblood of real estate development. It is a critical pre-requisite for the conception, commencement, continuation and completion of any project development. Nkyi (2012) stated that developers most times encounter challenges in the process of raising finance for developmental purposes. In addition to this, optimizing developer's input and output constitute another aspect of development challenge. The judicious use of scarce means for alternative ends is a big task even in the construction industry. Consequently, financial strategies provide investors cum developers with the necessary ability to mobilize funds to execute a project. Bender and Ward (2002) described financial strategies as a way by which an organization source and maintain fund in a cost effective manner. By implication, this describes the process of ascertaining possible sources of funds, procurement requisites and approach to optimizing the resources. The authors further highlighted the characteristics of a good finance option as affordable, convenient and secured. According to Oloke, Olawale and Oni (2017), right prices of real estate products do not only facilitates transaction in property market but also encourages activities in the construction sector. As identified by Omuojine (1993), real estate funding methods include equity capital, loan, mortgage lending, and debenture and contractor finance. Hines (1995) further listed six methods. These are sale-leaseback, unsecured institutional lending, joint venture equity and debt financing, advance payment of key money, mortgage financing and sale of securities. Similar funding methods as pointed out in College of Estate Management, (1994); Emoh and Nwanchukwu, (2011) are convertible mortgages, pre-letting, sales and leaseback, securitization, lease and leaseback, partnership, forward contract, unitization, bank loan, mezzanine capital, finance lease, mortgage debenture, loan syndication. Therefore, aside debt capital or private fund, other funding arrangements have been explored in an attempt to meet the huge funding requirement of projects and one of such is presale. The understanding, benefits and regions where presale has been engaged are discussed in the following section. Not only this, the prospect of financing real estate development via liquid liabilities is still under investigation. As shown by Hassan, Osabuohien, Ayadi, Ejemeyowvi and Okafor (2020), controversies surrounding the effectiveness of growth finance in fostering liquid liabilities in Nigeria still abound.

Forward Sale

Also referred to as forward contract, presale, sell-then-build, forward sale according to Chau, Wong and Yiu, (2003) is a contractual agreement between two parties stating the details of sales price agreed of a property under construction, which will be transferred to the buyer upon completion. The author further opined that it is a risk sharing method of fund raising which involves the marketing and selling of units to end users or potential buyers prior to the starting or during the construction of the project. Leung and Hui (2005) posited that presale contract is an agreement between a buyer and a seller stating that the buyer undertakes to purchase a property under construction at a specified price and due for completion at a certain future date. Developers endeavour to advertise and dispose on-going developments by presale arrangement during planning or execution phase so as to boost the capital reserve especially for large-scale developments. This practice according to Leung and Hui (2005) is widespread among developers operating in urban centres with high population growth rates such as Kuala Lumpur, London, Toronto, Singapore, Beijing and Hong Kong. Chang and Ward, (1993) is also observed that presale is practiced in Asian countries such as Hong Kong, china, Taiwan and south America. Chau, Wong and Yiu (2003) opined that presale contract differ from the highly standardized commodity or financial futures traded in a centralized market. Nevertheless, It has been observed that majority of studies that exist on forward sales are found in Europe, Asia as well as North America (Wong, Yiu, Tse and Chau 2004). Furthermore, empirical studies on the use of forward sale as a strategy for consummating real estate transaction in emerging markets like Nigerian property market remains very scanty.

Institutional procedure for the forward sale transaction

Investors engage forward sale as a funding strategy primarily to raise capital at no cost. However, packaging the strategy differ significantly from one geographical property market to another. Chang and Ward, (1993) stated that in Asia, it is mandatory that developers who wish to raise fund through forward sale, complete a specific part of the development. In Brazil, the developers must submit schedule of quality and material quantity as well as the plan of execution and necessary designs to appropriate authority before the presale is allowed. In Hong Kong, government instituted a number of measures against speculation. These measures according to Chau, Wong and Yiu (2003) include;

- a period of nine months at most for the presale
- restriction of private sales quota from 50% to 10%. The rationale was that private sales encourage speculation since the vast majority of such buyers are not end-users"
- discouragement of short-term trading through increasing trading costs.
- Imposition of stamp duty (a kind of tax) imposed on the transactions of the Agreement of Sale and Purchase (ASP), rather than on the subsequent transactions of the Deed of Assignment

In the opinion of Renaud, Pretorius and Pasadilla (1997), these constraints created substantial impediment to purchasers and prevent them from engaging in aggressive short-term investment opportunities in the primary housing market. In addition, the government of Hong Kong further introduced consent scheme to monitor the sale of properties under construction.(Leung and Hui, 2005). Hence, the authority tried to protect the interest of prospective buyers in the presale housing market. Under the scheme, the major requirements that developers must meet include:

i. Legal documentations to show developer's financial ability to complete the project
ii. Developer's solicitor hold in trust, the stakeholder's payments.
iii. Payments only made for work certified by the architect as having executed
iv. sales brochures and price lists are made available to prospective buyers and the government prior to sales.
v. Purchasers are free to withdraw from the agreement or receive compensation if project could not be completed to date specified.
vi. Quality assurance is provided by the developer to ensure that the project is completed according to material and quality specification.

Leung and Hui (2005) averred that since the consent scheme was introduced, buyers of future projects have been protected against dishonest developers and associated risks significantly reduced. Unlike what obtains in Asia countries, Brazil, America and Europe, Oloke et. al. (2017) observed that the Nigeria housing market lacks necessary government laws that regulate forward sale transactions. This in turn has exposed prospective buyers to the danger of developer's defaults, speculation as well as the trap of advance fee fraud by those that take advantage of the loophole.

In view of the foregoing, it is established that forward sale is not only engaged as a method of raising development finance by developers, it also makes housing acquisition easy for prospective home-owners and facilitate the delivery of houses for different income groups. In addition, there exist institutional guidelines for engaging forward sale in countries that allow the use of forward sale in order to protect the interest of the parties involved in the transaction.

Research Methods

Primary and secondary data were involved in this study. Existing studies obtained from online published articles were reviewed. Structured questionnaires were also administered to developers, prospective buyers of housing projects and estate surveyors and valuers in the study area. The population considered in this study are the 343 estate surveying firms based in Lagos as obtained from the directory of the Nigerian Institution of Estate Surveyors and Valuers (NIESV, 2016) as well as the 372 registered Real Estate Development Companies obtained from the directory of Real Estate Developers Association of Nigeria (REDAN, 2015). However, the sample size was restricted to the population of each group in Ikeja area which has 84 development companies and 79 estate firms. Ikeja was selected because it has the highest concentration of development firms. Thus the total number of both firms sampled was 163. The population of prospective buyers who were sampled randomly was 158. This implied that the opinions of any two buyers of potential house buyers at each of the estate firm involved in the survey were obtained through the firm. Data were obtained from the respondents with respect to the sources of real estate finance, preference for financing strategy, popularity and acceptance of forward sale as well as the challenges of forward sale in the Nigerian property market. Hypothesis was also tested with Student's t-test in a bid to establish the popularity of forward sale among prospective house buyers while mean score and relative importance index was also used to determine the impact of the challenges. Results were presented in tables, percentages, and charts followed by discussion.

Findings and Discussion

Rate of response

The rate of response achieved in the administration of questionnaires is presented in Table 1.

Table 1: Response rate

Respondent class	Nr Distributed	Nr Retrieved	Rate of Response
Developers	84	62	74%
Estate valuers	79	69	87%
Potential buyers	158	133	84%
Total	321	264	82%

Key: Nr - Number

Table 1 showed the rate of response obtained from each category of respondents. The response rate from each category is above 50% and considered adequate for further analysis. Moreover, the response from prospective buyers and the overall response rate were encouraging and deemed fit for subsequent analysis.

Preference for funding source among developers

Respondents from development companies were asked to indicate the preferred source of finance for development projects by the company. Table 2 shows the analysis of the choices.

Table 2: Project financing used by developers

Finance strategy	Frequency	Percentage	Ranking
Mortgage	40	65%	4th
institutional lending	29	47%	5th
joint venture	46	74%	2nd
Debt	43	70%	3rd
sale-leaseback	11	18%	8th
forward sale	56	90%	1st
sale of securities	23	37%	7th
contractor finance	25	40%	6th
Syndicate loan	40	65%	4th

Table 2 showed amongst others that forward sale has the highest preference followed by joint venture equity and debt financing which ranked 2nd and 3rd respectively. This implies that the developers, under normal circumstances prefer to minimize their exposure to debt financing especially in a volatile and harsh economy like Nigeria's. This attests to the fact that forward sale is often used by developers especially for large development projects in Nigeria.

Prospective buyer's preference for forward sale

In this section, the preference of prospective buyers were obtained from the three categories of respondents, that is the potential buyers, developers and estate valuers who are the active and professional intermediary between developers and buyers of real estate products. Response were analysed and presented in Table 3.

Table 3: Preferred strategies for house acquisition

Respondents	Forward buy	Spot buy	Indifferent	Total
Potential buyers	17(13%)	104 (78%)	12(9%)	133(100%)
Estate Surveyors	9(13%)	53(77%)	7(10%)	69(100%)
Developers	10(16%)	50(81%)	2(3%)	62(100)
Total	36(14%)	207(78%)	21(8%)	264(100%)

From the Table, it is observed that spot buy has the highest preference of 78 percent of total responses obtained. This implies that majority of potential buyers prefer to procure houses that are already completed. This gives them the opportunity to inspect and explore or negotiate flexible payment plan once the house meet the standard. Nevertheless, about 14 percent also showed willingness to buy in advance in order to benefit from discount that comes with such arrangement while only 8 percent signifies indifference to either option. In addition, the high number of responses in favour of spot buy may not be unconnected to the opportunity to verify necessary documents and inspect the houses before commitment to purchase agreement with the developer. The low response recorded in favour of forward buy only revealed the general lack of confidence in presale arrangements among prospective house buyers in Nigeria as reflected in the responses of respondents in the study area.

Challenges facing forward sale

Presented in Table 4 are the challenges hindering the use of forward sale in the study area as indicated by respondents from each category of respondents.

Table 4: Challenges confronting the use of forward sale

Challenges	Developers			Estate Valuers			Potential Buyers		
	Freq	Perc	Rank	Freq	Perc	Rank	Freq	Perc	Rank
Poor quality	6	10%	13th	42	61%	5th	91	68%	4th
Substandard materials	10	16%	10th	41	59%	6th	98	74%	3rd
Furnishing problem	8	13%	11th	18	26%	15th	18	14%	15th
Insufficient information	7	11%	12th	44	64%	3rd	72	54%	8th
Payment default	51	82%	1st	51	74%	2nd	33	25%	14th
Developer's default	7	11%	12th	61	88%	1st	111	83%	2nd
Location	17	27%	7th	27	39%	13th	34	26%	13th
Design team acrimony	10	16%	10th	18	26%	15th	59	44%	12th
Poor management	10	16%	10th	20	29%	14th	65	49%	9th
planning permit problems	22	36%	5th	34	49%	11th	61	46%	11th
Title documents	14	23%	8th	38	55%	9th	89	67%	5th
Lack of regulatory policy	12	19%	9th	35	51%	10th	111	83%	2nd
Reputation of developers	23	37%	4th	40	58%	7th	91	68%	4th
Contractor's credibility	28	45%	3rd	32	46%	12th	62	47th	10th
Nature of development	14	23%	8th	39	57%	8th	77	58%	7th
Economic condition	31	50%	2nd	43	62%	4th	89	67%	5th
Activities of speculators	10	16%	10th	32	46%	12th	86	65%	6th
Vulnerability to fraudsters	18	29%	6th	39	57%	8th	126	95%	1st

Presented in Table 4 are the various challenges hindering the use of forward sale for property transaction as perceived by the developers, property brokers and prospective buyers. The table showed that payment default, economic condition and contractor's credibility are the top three factors hindering the use of presale among developers closely followed by developer's reputation, planning and regulatory challenges and activities of the fraudsters which ranked 4th, 5th and 6th respectively. On the other hand, developer's default, payment default and insufficient information constituted the top three challenges affecting forward sale arrangement from the perspective of the estate valuers. Next are economic condition, poor quality of construction and use of substandard building materials which ranked 4th, 5th and 6th respectively. Finally from the perspective of the buyers, vulnerability to fraudsters, developer's default, lack of regulatory policy and substandard materials are the top three hindrances to presale arrangement in Nigeria. These are closely followed by poor construction, problem of title

documents, economic condition and activities of speculators which ranked 4th, 5th and 6th respectively. It is also observed that majority of the challenges highlighted actually received above average of total responses from the perspectives of estate valuers and prospective buyers compared to the spread of response by the developers. The opposing stance indicates that the developers are still finding it pretty difficult to use forward sale in the property market in the study area.

Test of hypothesis

The hypothesis focus on these category of respondents because the mode of acquiring projects developed are suggested/designed by either the developer or the selling agent, that is the estate surveyors and valuers. The strategies are only introduced to potential buyers who decide whether to buy a completed project at the full market price (i.e. spot buy) or take advantage of the benefits offered with presale strategy. In order words, the developers market their products to prospective buyers with options to buy in advance or when completed. The estate valuers broker the transaction with the potential buyer. Therefore, in order to ascertain the popularity and acceptance of forward sale by potential buyers of real estate products in the study area, null and alternative hypotheses were set and independent sample t-test was carried out to test the hypothesis. The independent sample test was used to compare the means of two independent populations, the developers and estate surveyors and valuers.

Null Hypothesis:

Ho: There is no significant statistical difference in the response of developers and estate valuers on the popularity of forward sale among prospective home buyers in Lagos State, Nigeria

Alternative Hypothesis:

Ho_1: There is significant statistical difference in the response of developers and estate valuers on the popularity of forward sale among prospective home buyers in Lagos State, Nigeria

Table 5: Independent sample T-Test on the use of forward sale

Dependent (Test) Variable	Independent (Grouping) Variables	N	Sig.	T	Df	Sig. 2-tailed	Mean Diff.	Std Error Diff.
			Equal variances assumed					
Forward sale	Estate Valuers	133	.101	.178	193	.137	.3312	.2624
	Developers	62						

**Equal variances assumed **95% confidence interval of the difference*

With the Sig. value of .103, equality of variance is assumed. The t statistic under the assumption of equal variances has a value of .178 and degree of freedom (df) value of 193 with an associated sig. (2-tailed) value of .137. Since the sig. value of .137 is greater than .05, the null hypothesis which states that there is no significant statistical difference in the response of developers and estate valuers on the popularity of forward sale among prospective home buyers in Lagos State, Nigeria is accepted. The result of the hypothesis thus uphold and corroborates the conclusion in Table 3 that forward sale is still not popular among potential home buyers in the study area compared to spot buy.

Conclusion

This study examined the level of use of forward sales in Lagos property market transactions. The result have shown that all categories of respondents have a level of knowledge of forward sale as a method of carrying out property transaction in the Nigeria property market. Results have shown that while developers are predisposed to the use of forward sale, prospective buyers are careful or cautious about the strategy. Buyers are reluctant to pay in advance for housing units, the construction of which has not yet started or still under construction. Various factors affecting this decision were identified and ranked according to their significance from the perspective of each category of respondents. It was discovered that while buyers fears the prank of fraudster, poor construction, lack of policy protection, developer's default, developers are confronted with payment default, economic instability, contractor's

credibility and planning regulations challenges. These and others have seriously affected the use of presale in the Nigerian property market.

Arising from the foregoing, it is pertinent that government gets involved in the property market, especially in the use of forward sale. There is need for policy protection for the parties involved as it obtains in Asian market as well as Europe and America. Furthermore, developers need to involve users right from the planning and design stage in order to develop what the users want and completed with good workmanship, good construction, standard materials and adequate facilities. Government can also facilitate the delivery and completion if necessary planning and development permits are granted without undue delay and advance payments by prospective buyers are insured against default.

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Importancia Del Aprovechamiento De Residuos Sólidos Orgánicos Bajo Un Esquema De Economía Circular: Caso Bogotá

Jenny Alexandra SEGURA OSUNA

docente de investigación Uniminuto Administración de Empresas, Bogotá, Colombia,
jseguraosun@uniminuto.edu.co

Resumen

En el presente documento de investigación de tipo descriptivo se expondrán los usos que tienen los residuos sólidos orgánicos (RSO) al ser reciclados provenientes de las frutas y los vegetales crudos, bajo un modelo económico de tipo circular donde su premisa más importante es la utilización eficiente de los recursos disponibles en la producción de los bienes y la reincorporación de elementos reciclables al sistema productivo, minimizando el desperdicio de material aprovechable. Así mismo, a través de una encuesta aplicada a recicladores de la ciudad de Bogotá en Colombia se mostrará que proporción de ellos se dedican a la actividad del reciclaje de dichos residuos, la postura y conocimientos que tienen ante dicha actividad, como estrategia para aportar al medio ambiente y sus ingresos provenientes de la recuperación, dentro del esquema de la economía circular.

Palabras clave: Economía circular; residuos sólidos orgánicos; reciclaje; medio ambiente.

Introducción

Los residuos sólidos orgánicos que provienen de frutas y vegetales son un arma de doble filo, ya que si son recicladas y utilizadas como materia prima para obtener otros bienes aportan a la economía circular, generando ingresos para quienes intervienen en el proceso y aportando a la descontaminación del medio ambiente, pero en caso contrario son fuente de contaminación, ya que son fácilmente putrefactibles con lo que se generan malos olores que pueden provocar enfermedades de tipo respiratorio y gastrointestinal para quienes habitan en zonas cercanas a los rellenos sanitarios o sitios de disposición final.

Teniendo en cuenta lo anterior en el presente documento se busca mostrar los usos e importancia que se le pueden dar a los residuos sólidos orgánicos que provienen de los vegetales y frutas crudos, por parte de los recicladores de la ciudad de Bogotá, especialmente la elaboración de abono orgánico, bajo el modelo circular de la economía y a través de la aplicación de encuestas a recicladores.

Metodología

El presente artículo es resultado de una investigación aplicada cuya población objetivo fueron los recicladores de la ciudad de Bogotá, la cual tiene un enfoque mixto donde se ha tenido en cuenta lo cualitativo y lo cuantitativo con una metodología de tipo descriptiva cuyo principal objetivo fue caracterizar a la población objetivo y analizar si ellos perciben la actividad del reciclaje de residuos sólidos como una fuente para generar ingresos, mejorar su calidad de vida y aportar a la descontaminación del medio ambiente.

Importancia del reciclaje de residuos sólidos de tipo orgánico

A nivel internacional se ha identificado que es muy importante la conservación del medio ambiente y el uso correcto de los recursos que existen, sin importar si se trate de los renovables o los no renovables en un enfoque de sostenibilidad, ejemplo de ello son los Objetivos de Desarrollo Sostenible (ODS) de los cuales tres hablan del uso eficiente de los recursos (Naciones Unidas, s. f.) tal como se puede observar en la figura 1:

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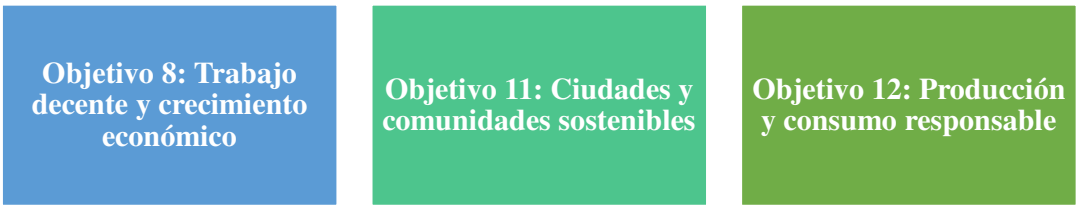

Fig. 1: Objetivos de desarrollo sostenible relacionados con el reciclaje
Fuente: elaboración propia

El objetivo 8 tiene que ver con la importancia de que las personas tengan un medio de sustento que les permita tener una vida digna y a la vez aporte al crecimiento de la nación en conjunto, tratando de disminuir las brechas de desigualdad. El desempleo es un problema global que afecta a las personas con más bajos ingresos, lo cual afecta su estabilidad económica y en general su calidad de vida.

En relación con el reciclaje y las oportunidades laborales que brinda a los recicladores, se tiene que ellos son un grupo de personas que muchas veces no cuentan con altos niveles de educación, con bajos niveles de ingresos y viven en condiciones de pobreza. La mayoría se dedica a la recolección de residuos inorgánicos como vidrio, metales de todos los tipos, elementos de construcción, cartón y papel, pero se deja de lado la recolección de residuos orgánicos que pueden ser una fuente importante de ingresos.

En cuanto al objetivo 11, se desea que a la par que las ciudades crecen y se expanden, estas estén en la capacidad de llevar a cabo políticas para que ese crecimiento no afecte la sostenibilidad de largo plazo del medio ambiente, teniendo en cuenta el bienestar y el futuro de las generaciones que vienen en camino.

En el caso de la ciudad de Bogotá, el relleno Sanitario doña Juana, recibe toneladas diarias de residuos, que año a año aumentan con los procesos de crecimiento y urbanización de la ciudad y otros seis municipios aledaños a la capital, el problema es cuando el relleno comienza a copar su capacidad, que de acuerdo Estupiñán (2019) se proyecta tiene una vida útil hasta el año 2022, que se extendería 37 años, si se amplía la duración de la licencia actual, optimizando las áreas, con lo cual se siguen afectando los habitantes de localidades del sur de la ciudad como Ciudad Bolívar y Usme, en zonas urbanas y rurales de la ciudad.

Por su parte el objetivo 12 hace referencia a que el consumo y la producción de bienes y servicios se haga de forma responsable, que se minimice el impacto negativo sobre el medio ambiente. Así mismo que no haya desperdicios de alimentos tanto en los alimentos ya procesados, así como los que provienen de las cosechas.

Los alimentos provenientes de frutas y verduras generan residuos que no se consumen y que al ser utilizados se convierten en fuente de aprovechamiento para la producción de otros bienes y servicios, especialmente en abonos de tipo orgánicos, libres de químicos los cuales hacen que al usarlos en actividades como la agricultura o la jardinería se aprovechen sus propiedades, para hacer crecer de forma fuerte y frondosa todo tipo de vegetación y mejorando las características físicas y químicas de los suelos.

Economía Circular

La Economía circular se concibe como una forma de contribuir con el uso eficiente de los recursos, que aporta al medio ambiente a través de la reducción de emisiones de carbono, según Economía Circular (s. f.) uno de los objetivos de este sistema es generar empleos y crecimiento económico para los países de Europa que permite además aportar, a continuación, se presentan los beneficios que se tienen al adoptar un sistema económico de tipo circular en el cual:

Fig. 2: Beneficios de la economía circular

Fuente: elaboración propia, con base en Economía Circular (s. f.)

El reciclaje de los residuos sólidos orgánicos provenientes de los vegetales y frutos crudos se puede considerar una estrategia que hace parte de la economía circular, ya que en un inicio son cultivados en la naturaleza, utilizando para ellos recursos de la misma, con el objetivo de alimentar a las comunidades, las cuales no aprovechan todos sus componentes en un 100%, siendo esos residuos aprovechables en actividades como la elaboración de abono orgánico que a su vez permite que el suelo tenga propiedades que permitan que de nuevo comienzo el proceso productivo a través de los cultivos de otros frutos y vegetales o actividades como la jardinería, a partir de los cuales los suelos son acondicionados para que no pierdan sus nutrientes y se puede seguir aprovechando este recurso escaso. Pon (2019) lo ilustra de acuerdo a la figura 3:

Fig.3: Economía circular

Fuente: Pon (2019)

Usos de los residuos sólidos orgánicos

El uso más conocido para los residuos sólidos orgánicos es la elaboración de compost, el cual devuelve la fertilidad a los suelos como lo ilustra Román, Martínez y Pantoja (2013) lo cual impacta el bienestar de las familias que se dedican a actividades como la agricultura con los cuales obtienen ingresos y generan puestos de trabajo y que para la humanidad es representa la seguridad alimentaria. Así mismo de los residuos sólidos orgánicos se pueden obtener además los siguientes bienes, ver figura 4:

Biocombustibles	•Alejos y Calvo (2015)
Alimentos para animales	•Vidales, Chávez, García, y Gómez (2004).
Elementos para naotecnología	•Mercado Castro (2016)
Hormigones para la contrucción	•Coloma (2015)
Papel reciclado	•González, Daza, Caballero y Martínez (2016)

Fig.4: Usos de los residuos sólidos orgánicos

Fuente: elaboración propia, con base en los autores consultados

Recolección de residuos sólidos orgánicos por los recicladores en la ciudad de Bogotá

Con el fin de conocer que tan difundidas entre los recicladores de la ciudad de Bogotá son los usos de los residuos sólidos orgánicos se realizaron encuestas en las diferentes localidades donde también se indagó si llevaban a cabo la recolección de estos materiales y si lo reconocen como una oportunidad para generar ingresos y mejorar sus condiciones de vida. Al indagar por la proporción de recicladores que recolectan residuos sólidos se encontró que solo el 32% del total de los encuestados recolecta residuos orgánicos frente a un 68% que dijo no dedicarse a ello, como se muestra en la figura 5.

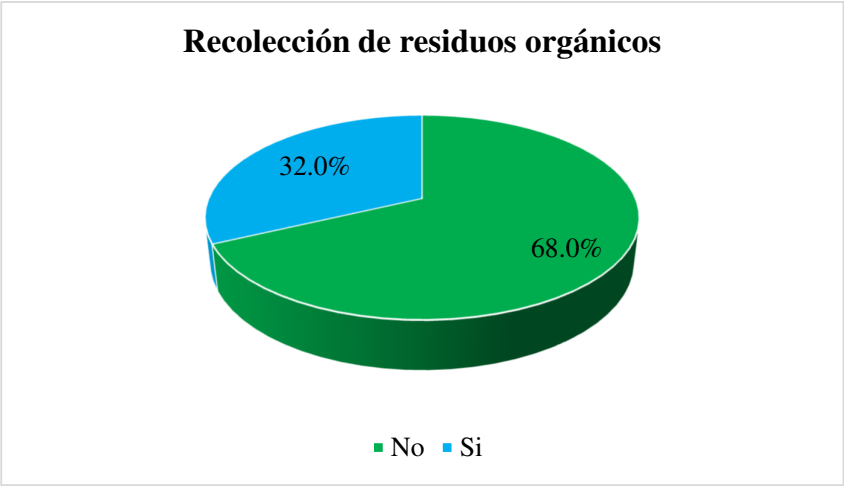

Fig. 5: Recolección de residuos de origen orgánico

Fuente: Elaboración propia

Entre los materiales que ellos recolectan se encuentra principalmente residuos de madera con un 46%, un 23% dice recolectar residuos de alimentos tanto procesados como crudos y en una menor proporción con un 8% aserrín, pese que el 64% de ellos manifiesta conocer los usos que tienen dichos residuos, como se puede apreciar en la figura 6.

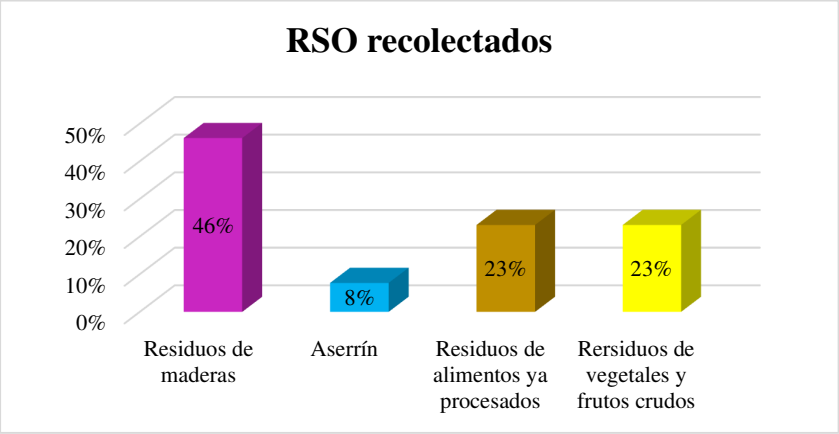

Fig. 6: Tipo de residuos sólidos recolectados
Fuente: Elaboración propia

Al preguntar si los recicladores encuestados conocen el uso de los residuos sólidos orgánicos se encontró que el 64% dice conocer los diferentes usos que se les puede dar a dicho material, mientras que un 36% manifiesta que no, lo cual indica que a pesar de que ellos tienen ese conocimiento no se dedican a la recolección de ese tipo de material, como se observa en la figura 7.

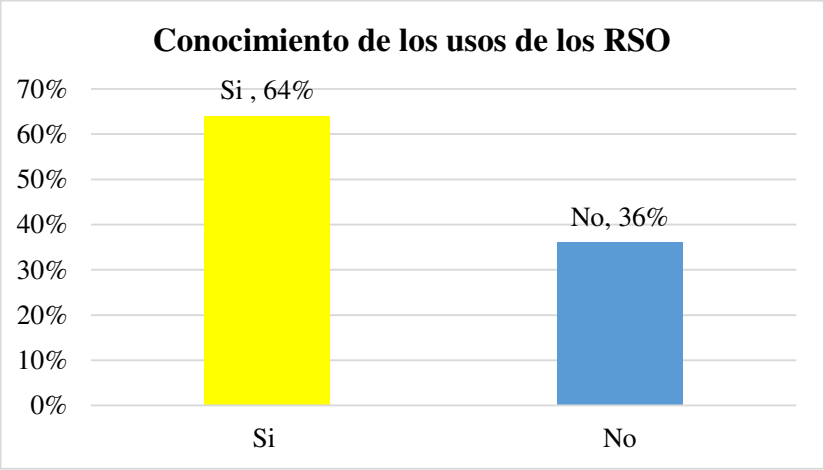

Fig.7: conocimiento sobre los usos de los RSO

Fuente: Elaboración propia

Respecto a los usos que se les puede dar a los residuos sólidos orgánicos se tiene que el más conocido para los recicladores es el papel reciclado con un 29%, luego el compostaje y colchones con 18.28% y 17.4% respectivamente y los menos difundidos son bloques de construcción y alimentos para animales con 10.1% y biocombustible y joyería artesanal con 7.2% cada uno, ver figura 8.

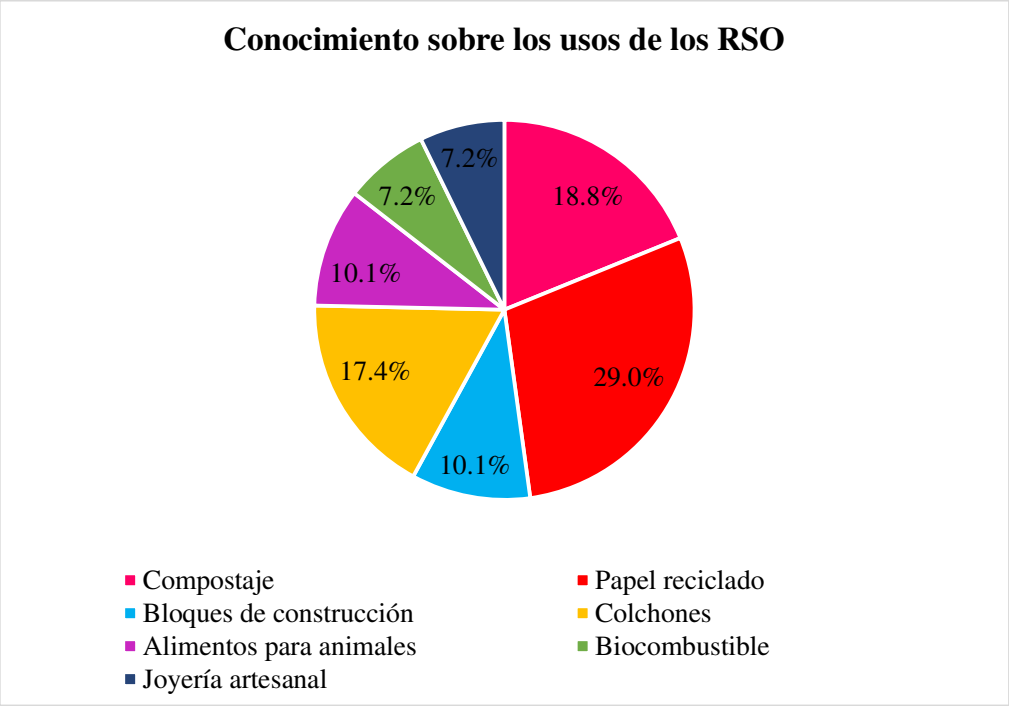

Fig. 8: Conocimiento de algunos de los usos de los RSO

Fuente: Elaboración propia

En cuanto a la apreciación que tienen los recicladores sobre una oportunidad para generar ingresos con el reciclaje de residuos sólidos orgánicos, la mayoría con un 76% percibe que si es una buena fuente de ingresos mientras que el 12% percibe que no y el otro 12% no sabe, ver figura 9.

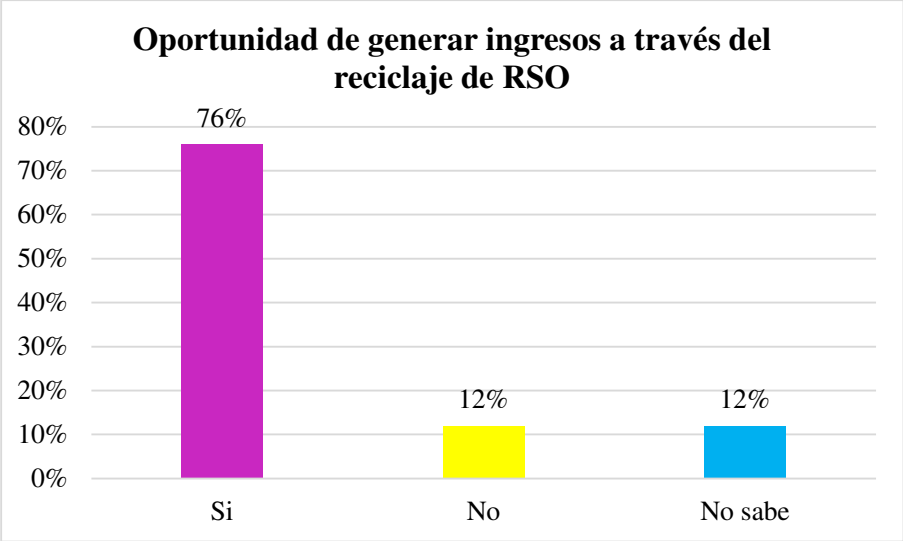

Fig.9: percepción de los recicladores frente a la recolección de RSO como fuente de ingresos

Fuente: Elaboración propia

Conclusiones

A través de la revisión bibliográfica y el trabajo de campo se encontró que el reciclaje de residuos sólidos orgánicos es una forma de contribuir a la generación de ingresos para los recicladores, el aprovechamiento de material aprovechable dentro del esquema de la economía circular y una forma de aportar al medio ambiente. Por su parte de la Organización de Naciones Unidas ONU, a través de los Objetivos de Desarrollo Sostenible, se identifica que el reciclaje de los RSO es una forma de aportar a los objetivos número 8, 11 y 12.

Entre otros usos los RSO se pueden utilizar para obtener papel reciclado, piezas de nanotecnología, colchones, bloques de construcción, alimento para animales y sobre todo abono orgánico también llamado compost que es reconocido por sus propiedades para acondicionar física y químicamente los suelos, que también es un aporte a las actividades de la agricultura y la jardinería.

Sin embargo, se encontró que esta actividad no se realiza con frecuencia por los recicladores pese a que tienen el conocimiento de sus usos y que ellos mismos los perciben como fuente de ingresos, debido a que en los mercados son más comerciados los residuos provenientes de elementos como el vidrio, el plástico, metales, entre otros.

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Educación Financiera Como Estrategia De Supervivencia Y Protección Ante Crisis Económicas Para Los Recicladores De Bogotá

Jenny Alexandra SEGURA OSUNA

docente de investigación Uniminuto Administración de Empresas, Bogotá, Colombia,
jseguraosun@uniminuto.edu.co

Resumen

La educación financiera es una herramienta que puede mejorar el bienestar de personas vulnerables dedicadas a la actividad económica del reciclaje en la ciudad de Bogotá, especialmente en la coyuntura sanitaria y económica actual, donde se han visto expuestos a mayores riesgos. Con una mayor estabilidad en materia económica y financiera vía sus ingresos, ellos tendrían la posibilidad de acatar medidas como el confinamiento obligatorio, pero dado que ellos perciben que sus ingresos son insuficientes y necesarios para su supervivencia y cubrimiento de sus necesidades no es posible llevarla a cabo. Con el estudio realizado en el cual se aplicaron encuestas a recicladores de la ciudad de Bogotá, se encontró que los ingresos para este grupo poblacional han disminuido, que no han tenido la posibilidad de tomar todas las medidas preventivas ante COVID-19 y que todo en conjunto hace que su situación empeore.

Palabras clave: Educación Financiera; Reciclaje; Crisis Económica; Informalidad.

Introducción

La actual crisis económica derivada de la pandemia del COVID-19 ha traído consigo lecciones para personas de todas las edades y los diferentes niveles socioeconómicos, siendo los de menores recursos y menores niveles de educación los más afectados, ya que dependen de trabajos informales y del día a día. En ese grupo de población se encuentran los recicladores quienes a nivel ambiental juegan un papel muy importante al recolectar, transportar y transformar el material que para algunos es "basura" pero que para ellos representa su sustento día a día.

La ciudad de Bogotá es la capital de Colombia y es el centro económico de mayor tamaño en todo el país, por lo que a diario hogares y empresas generan grandes cantidades de residuos los cuales muchas veces no son aprovechados y van a parar al relleno sanitario de doña Juana, el cual se ubica al sur de la ciudad y que de acuerdo al Departamento Nacional de planeación (DNP, 2018) para el año 2017 en promedio a diario se producen 6.265,46 toneladas de residuos. Sin embargo, hay personas que se dedican a la recuperación de elementos reciclables con lo cual no solo se le aporta al medio ambiente sino también a la salud de los miles de personas que viven en cercanías del relleno, las cuales frecuentemente sufren de afecciones respiratorias dado los vectores a los que a diario se encuentran expuestos, donde los más afectados son los niños y las personas de la tercera edad.

No sólo los recicladores se encuentran entre los trabajadores informales que están expuestos a los riesgos generados por la pandemia del COVID-19, Silva Mariños (2020) identifica que el personal doméstico, cargueros, recolectores de basura, domiciliarios, albañiles, personal de seguridad, vendedores ambulantes e informales, entre otros, sin embargo. La característica común de dichos oficios es que no son calificados y mal remunerados teniendo en cuenta el riesgo al que a diario se enfrentan y la labora social y comunitaria que cumplen.

Dada dicha importancia de la labor de los recuperadores de oficio, es importante generar políticas y acciones que les permita tener una mayor calidad de vida y un mejor aprovechamiento de los recursos que son generados a través de esta actividad. La educación financiera como la concibe la Organización para la Cooperación y el Desarrollo Económico (OCDE, 2005) es un conjunto de conocimientos y habilidades en temas como la inversión, el ahorro, los servicios del sistema financiero formal, los derechos del consumidor financiero, entre otros que le permite a la persona mejorar sus condiciones y calidad de vida.

Metodología

En el presente artículo se utilizo una metodología de tipo descriptiva en la cual se caracterizo de acuerdo a su información sociodemográfica a recicladores de la ciudad de Bogotá, teniendo en cuenta lo anterior en el presente

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documento se desea establecer la importancia que tiene la educación financiera como estrategia para que las personas dedicadas a la actividad económica del reciclaje en la ciudad de Bogotá tengan la posibilidad de enfrentar una crisis económica y de salud pública sin tener que exponer sus vidas y bienestar, a través de un estudio de tipo descriptivo con enfoque mixto donde se tiene en cuenta lo cualitativo y cuantitativo. Lo cualitativo en relación con las teorías que destacan la importancia de la educación financiera y los elementos de los que depende y lo cuantitativo a través de encuestas aplicadas a los recicladores de diferentes localidades de la ciudad.

Importancia de la educación financiera y la inclusión para las personas dedicadas al reciclaje

Lusardi y Mitchell (2011) señalan que el nivel educativo y la edad son factores determinantes en el grado de educación financiero y las buenas decisiones que propenden al bienestar de la persona. Por su parte Parra y Orjuela (2018) en un estudio aplicado a recicladores de la localidad de Suba, identificaron que el principal factor que afecta los bajos niveles de educación financiera en dicha población son los bajos niveles de escolaridad lo cual los excluye del conocimiento y uso de los servicios financieros del sistema formal. Respecto a este tema se encontró que el 58.3% de los encuestados alcanzaron un nivel educativo de bachillerato y el restante 41.7% solo la primaria.

Grifoni, et. al. (2020) señalan que una política en materia de educación financiera debe incluir principalmente a aquellas personas más vulnerables con bajos niveles de educación y bajos niveles de ingresos, especialmente a sectores como los trabajadores informales (donde se pueden incluir los recicladores) la Mipymes, mujeres, jóvenes, personas dedicadas a actividades relacionadas con la agricultura y áreas rurales. Para dichos grupos poblacionales es necesario identificar los servicios del sector financiero formal que se ajusten a sus necesidades, así como la implementación de sistemas tecnológicos que aporten a la inclusión financiera.

Anaya, Buelvas y Romero (2020) identifican que la inclusión y educación financiera en poblaciones vulnerables con altos niveles de pobreza es una herramienta que permite mejorar en el mediano y largo plazo las condiciones socioeconómicas de este tipo de poblaciones, a través de un estudio realizado a familias de la ciudad de Montería. Así mismo encontraron que si el jefe del hogar tiene educación financiera y la familia se ubica en el área rural, hace que en conjunto un hogar tenga mayor probabilidad de tener educación financiera.

Uno de los principales impedimentos que los recicladores perciben para ahorrar o invertir a partir de los recursos que son generados con su actividad es que son insuficientes, que muchas veces solo alcanza a cubrir sus necesidades básicas, por lo que siempre parecieran estar en una trampa de pobreza que no les permite avanzar a una mayor calidad de vida. Lo anterior se refleja en el hecho que de los encuestados el 75% afirma que son insuficientes y solo un 25% piensa que son suficientes. Dicho ciclo de pobreza de acuerdo como lo describe Samuelson y Northaus (2010) se visualiza de la siguiente forma:

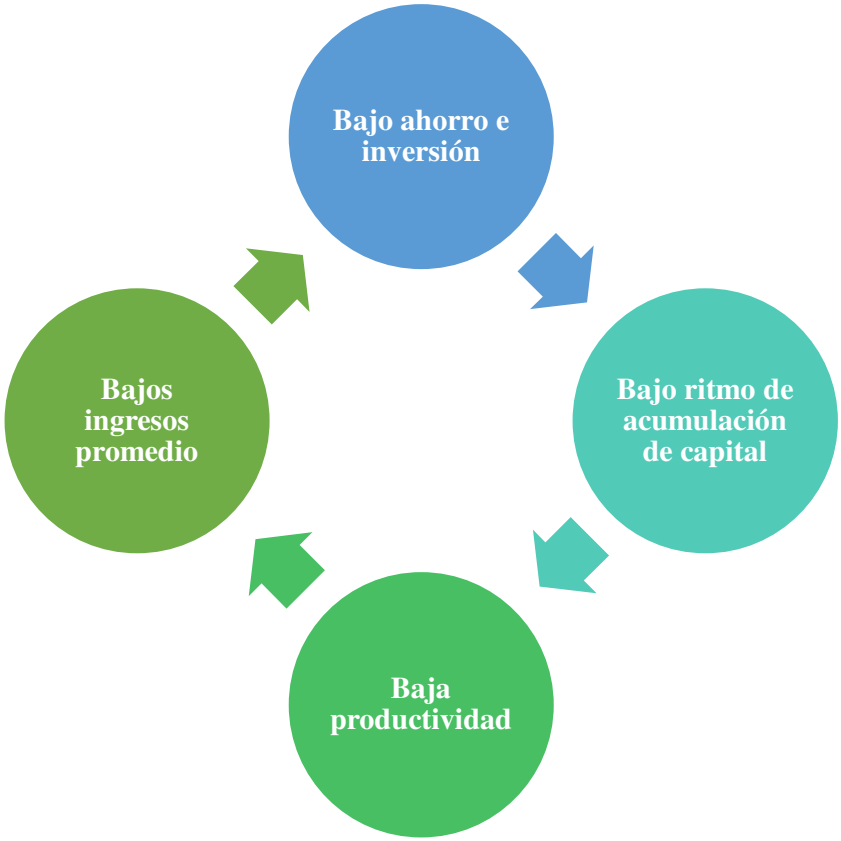

Fig. 1: Ciclo de la pobreza

Fuente: Samuelson y Northaus 2010

Como se puede observar en la figura dicha insuficiencia no les permite acumular el capital suficiente, propio del sistema capitalista moderno, por lo que muchas veces dependen de lo que les venden a los grandes centros de acopio, en los cuales el pago del material recuperado se hace a precios muy bajos, teniendo como resultado un ciclo de pobreza del que no pueden escapar. Una estrategia para escapar a esa trampa de pobreza es la educación en general, que sea integral y contenga conceptos del adecuado manejo de las finanzas personales y empresariales.

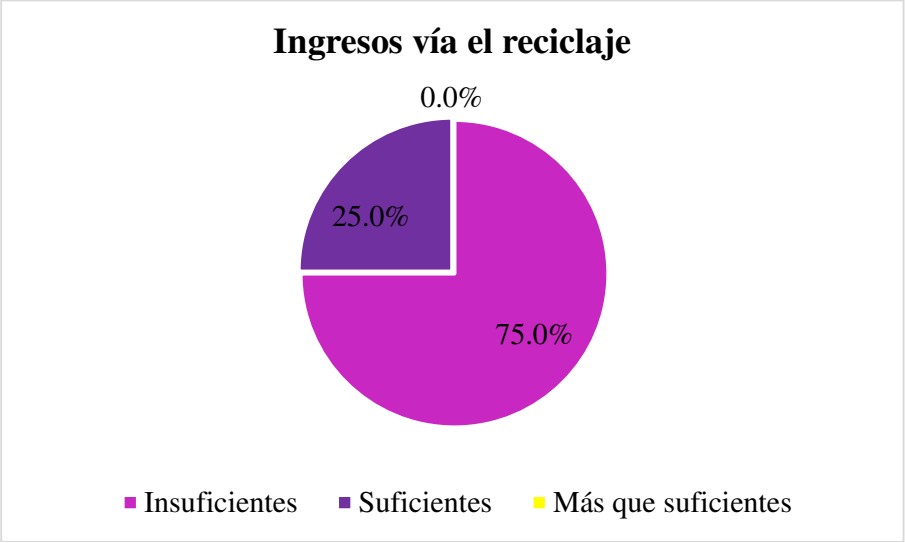

Fig. 2: Percepción de sus ingresos en la actividad del reciclaje

Fuente: elaboración propia

Como se puede observar en la figura 2, la mayoría de los recicladores encuestados percibe que la actividad del reciclaje no le genera los ingresos suficientes (75%), por lo que una estrategia de ahorro no es posible ya que hay necesidades básicas que ellos deben satisfacer con sus ingresos. Ninguno manifiesta que son más que suficientes y solo el 25% manifiesta que son suficientes en los que la posibilidad de ahorro también sería baja.

Hallazgos

A partir de las encuestas realizadas a los recicladores se encontró que ante la actual pandemia del COVID-19 las condiciones socioeconómicas de dicha población han empeorado, no sólo por lo que se refiere a los ingresos sino en general lo que tiene que ver con la percepción que ellos tienen respecto a su vulnerabilidad antes esa situación, dado que el 83.3% dice sentirse expuesto a mayores riesgos, el 16.7% no percibe cambios en su vulnerabilidad ante esta situación, ver figura 3.

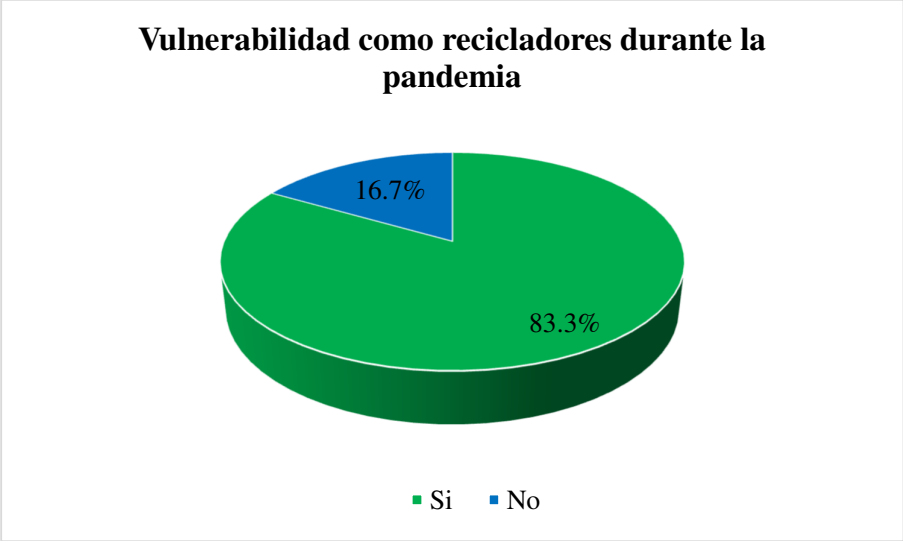

Fig. 3: Vulnerabilidad de los recicladores en tiempos de pandemia

Fuente: elaboración propia

Como se observa en la figura 4, la mayoría manifiesta de los encuestados que no ha podido tomar las medidas necesarias como el acatamiento de las cuarentenas obligatorias que se recomendaron desde el gobierno nacional y distrital, ya que solo el 16.7% del total de la muestra encuestada acato esta medida mientras que el 83.3% no lo pudo hacer, teniendo en cuenta que no tenían los recursos suficientes cubrir sus necesidades.

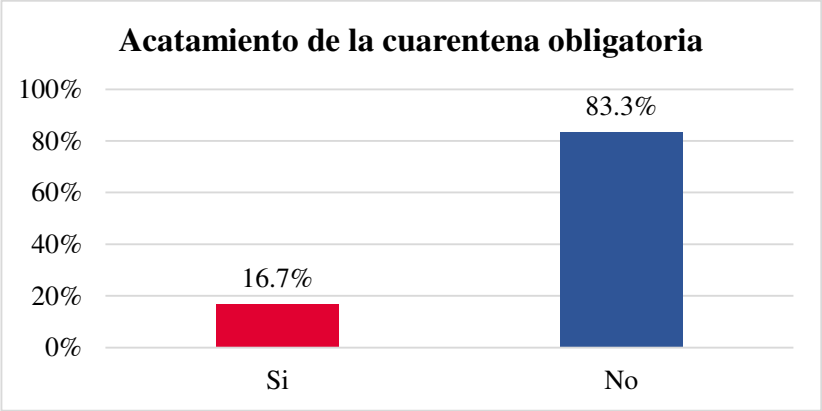

Fig. 4: Posibilidad de acatamiento de la cuarentena obligatoria por el Covid-19

Fuente: elaboración propia

Respecto a los ingresos desde el inicio de la emergencia sanitaria el 75% de los encuestados percibe una disminución en sus ingresos, mientras que el restante 25% dice que se han mantenido como se ve en la figura 5, pero a cambio de salir a las calles a realizar su labor diaria, donde el 87.3% se siente discriminado por el tipo de actividad que realiza, ver figura 6:

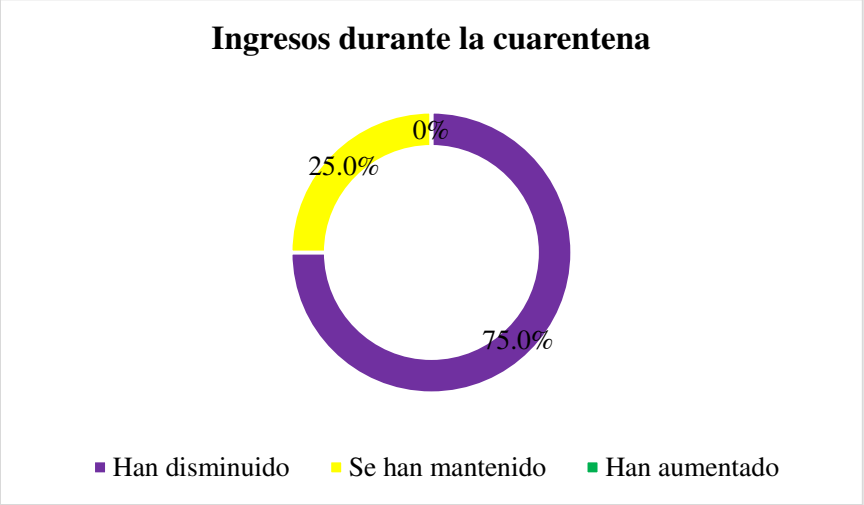

Fig. 5: Ingresos de los recicladores en cuarentena

Fuente: elaboración propia

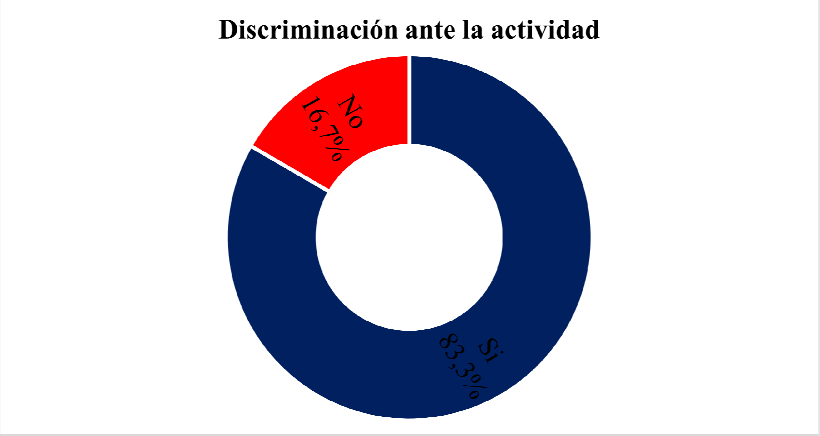

Fuente: elaboración propia

Conclusiones

Pese a que la actividad del reciclaje es muy importante a nivel ambiental, social y económico, aún no se le reconoce ni es bien visto por la mayoría de personas a tal punto que ellos sienten que son discriminados. En tiempos de pandemia aún más han sido golpeados por la situación económica mundial a tal punto que se sienten más vulnerables y sus ingresos han disminuido pese a que no han podido cumplir las cuarentenas que buscaban disminuir la velocidad de contagio.

Ante el panorama anterior una salida es la formación en educación financiera que les permita hacer frente a este tipo de crisis, sin que se expongan a contagios y otros factores negativos que atentan contra su integridad. Una cultura del ahorro, así sea en pequeñas proporciones puede hacer que ellos estén en la capacidad de expandir su consumo futuro, hacer frente a crisis que afecten sus ingresos e incluso a futuro proveer los medios para incrementar su capital de trabajo.

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L'habitant Au Cœur De La Gouvernance Territoriale

YASMINE ALAOUI

Professeur chercher à ESCA École de Mangement, Casablanca.
Alaouiyasmine1@gmail.com
Yalaoui2@esca.ma
00212660407293

Résumé

Le dessein de cette recherche est de s'interroger sur la manière dont les collectivités territoriales, et plus particulièrement les communes, devraient se centrer sur l'habitant pour déployer leurs stratégies territoriales.
L'étude de la gouvernance s'inscrit dans le champ de recherches sur la transformation de l'action publique locale et sur les nouvelles formes de coordinations multi-niveaux et multi-acteurs : quels rôles jouent les dispositifs et les outils en l'occurrence marketing dans la fabrique de la gouvernance locale pour une attractivité réussie, et comment favoriser une gouvernance basée sur une stratégie endogène ?
Ce document a pour principale vocation de constituer un outil de réflexivité pour renforcer la gouvernance territoriale, il en expose les enjeux et propose de contribuer à l'ingénierie de la gouvernance territoriale définie comme « l'ensemble des méthodes et outils permettant la coordination, la participation et l'apprentissage des acteurs ainsi que le pilotage des projets de territoires ».

Mots Clés : Gouvernance Territoriale, Stratégie Endogène, Attractivité Territoriale, Habitant.

Introduction

La gouvernance territoriale n'est ni un mythe ni une figure rhétorique mais bien un outil d'intelligence territoriale en faveur du développement partagé et harmonieux des territoires, c'est là la thèse défendue dans le projet « PSDR Gouv.Innov » mené au total par vingt-deux personnes, chercheurs et acteurs locaux engagés dans l'élaboration d'un guide, fruit d'une co-construction rassemblant des chercheurs de disciplines diverses et d'un panel d'agents de développement local de différentes collectivités ainsi que des conseillers spécialisés.

Le concept de la gouvernance territorial est font en signification et il est chargé de deux mutations la première concerne la gouvernance elle-même ainsi que ses modes, la deuxième se focalise sur le territoire lui-même.

Ces deux mutations sont essentielles pour la survie d'un citoyen dans un territoire et pour le développement d'un territoire dans un monde de plus en plus marqué par la complexité et une volonté féroce de s'inscrire dans la responsabilité sociale et sociétale durable.

Ce document a pour vocation de constituer un outil de réflexivité pour renforcer la gouvernance, il en expose les enjeux et propose de contribuer à l'ingénierie de la gouvernance territoriale définie comme l'ensemble des méthodes et outils permettant la coordination, la participation et l'apprentissage des acteurs ainsi que le pilotage des projets de territoires .

La Gouvernance Territoriale Est Un Processus Dynamique

Dans cette synthèse, la gouvernance territoriale peut être définie comme « un processus dynamique de coordination (hiérarchie, conflits, concertation) entre des acteurs publics et privés aux identités multiples et aux ressources (au sens très large : pouvoirs, relations, savoirs, statuts, capitaux financiers) asymétriques » ; l'accent est mis sur la nécessité de prendre en compte « les enjeux de coordination dans des situations asymétriques et sur la nature du processus, dynamique et collectif, qui nécessite des apprentissages et privilégie des démarches adaptatives tenant compte du long terme. Elle ne peut être réduite à de la participation, mais elle concerne aussi des formules de pilotage innovantes permettant : d'élargir les partenariats à des combinaisons public/privé, de privilégier le caractère intégré et transversal

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et de mettre en correspondance les moyens et les besoins entre échelles, tout en renforçant les solidarités des territoires autour des pratiques de mutualisation. »

Est alors proposée la grille d'analyse opérationnelle reportée ci-dessous :

Hiérarchie, conflits, concertation,		participation citoyenne…
Agencement de : Procédures, mesures, connaissances, savoir faire et informations diversifiées	Processus dynamique de coordination entre des acteurs publics et privés aux identités multiples et aux ressources asymétriques autour d'enjeux territorialisés (i) visant la construction collective d'objectifs et d'actions, (ii) en mettant en œuvre des <u>dispositifs multiples</u> qui reposent sur des apprentissages collectifs et participent des innovations institutionnelles et organisationnelles au sein des territoires.	Au sens large, en termes de : Pouvoirs, relations, savoirs, statuts, capitaux

Une autre analyse comparative conduite par Beuret et Cadoret, portant sur plus de 300 initiatives relatives à la conduite d'une gouvernance territoriale endogène de l'environnement fait émerger des proximités organisées à des échelles ajustées, contribuant à doter les territoires d'un capital social territorial spécifique et exposent les contours de ce que pourraient être des politiques d'appui à ces formes de gouvernance.

L'intérêt d'une telle étude pour notre objet de recherche réside dans le fait de pouvoir transposer la démarche proposée dans d'autres champs que celui de l'environnement.

En effet, des notions éclairantes sont alors explicitées dans cette analyse : les initiatives locales portées par des élus, des agents de collectivités locales, des associations ou de simples citoyens font partie de la gouvernance définie comme l'ensemble des formes de régulation qui ne sont ni marchandes, ni étatiques (Benko et Lipietz, 1992), une gouvernance qui émergerait au cœur des territoires, contrairement à d'autres formes de gouvernance qui elles, seraient impulsées par l'extérieur.

Envisagée ici comme un mode d'organisation des acteurs (institutions, entreprises, associations), cette régulation repose davantage sur l'accommodement que sur la hiérarchie ou la domination, destiné à concevoir et à mettre en œuvre un projet (Laganier, Villalba, Zuindeau, 2002), dans le cadre de la création d'un ordre qui résulte de l'interaction d'un grand nombre de gouvernants qui s'influencent réciproquement (Kooiman et Van Vliet, 1993).

La gouvernance mise en œuvre dans les territoires résulterait alors de deux types de dynamiques : une gouvernance territoriale exogène, mise en place par des autorités publiques externes au territoire, de manière coercitive et sur la base de procédures imposées ; et une gouvernance territoriale endogène, issue d'initiatives locales. La première serait issue d'une régulation de contrôle alors que la seconde s'inscrirait davantage dans une régulation autonome (Reynaud, 1989), même si les deux peuvent être combinées dans une régulation conjointe.

Il est aussi rappelé que de nombreux auteurs comme Leloup (2005), Hüfty (2008) ou Létourneau (2009) ont souligné le caractère polysémique du concept de gouvernance territoriale. Distinguons le recours à la « bonne gouvernance », c'est à dire à la transparence et à l'imputabilité des la gestion publique, de la gouvernance comme théorie qui vise plutôt les processus de décision sur des questions d'intérêt public, en faisant référence à une pluralité d'acteurs ou de groupes (Létourneau, 2009) ; c'est précisément cette deuxième acception qui sera ici retenue, en nous intéressant à des formes de gouvernance qui peuvent être indépendantes de politiques de décision publique mais qui les rejoignent par le fait de correspondre à de « nouvelles modalités de production de l'intérêt général » (Petrella et Richez-Battesti, 2010).

Citant Gilly, Leroux et Wallet (2004), qui énoncent que « la gouvernance locale est le processus de structuration d'une mise en compatibilité de différentes modalités de coordination entre des acteurs géographiquement proches », les auteurs de cette étude rapprochent cette notion-là de celle de développement local aussi qualifié d'endogène, compte tenu de l'implication croissante des acteurs privés dans ces démarches : « processus non seulement de

coordination des acteurs mais aussi d'appropriation des ressources et de construction de la territorialité (…) Y sont mises en valeur les vertus d'imagination, d'organisation et de coordination de ces acteurs locaux » (Leloup *et al.*, 2005).

La place qu'occupent l'Etat, le marché ou les coordinations multi-partenariales ont permis à Petrella et Richez-Battesti (2010) de distinguer une gouvernance multilatérale ou partenariale qui implique une diversité d'acteurs publics et privés où les pouvoirs publics joueraient un rôle de facilitateur, d'une gouvernance citoyenne de laquelle se rapprocherait davantage la gouvernance territoriale endogène dans sa fonction de révélation de demandes sociales émergeantes.

Riches de tous ces éclairages, les auteurs nous proposent la définition suivante de la gouvernance territoriale endogène comme étant « l'ensemble des initiatives de gouvernance qui émergent dans des espaces publics locaux et associent des acteurs aux statuts et prérogatives diverses qui se mobilisent autour d'un bien commun envisagé comme un construit territorial. »

De La Concertation A La Coopération

Avec Beuret et Cadoret, retenons que la concertation désigne des processus de construction collective de visions, d'objectifs, de projets communs, en vue d'agir ou de décider ensemble (Beuret, 2006), où l'orientation coopérative prédomine, l'intention partagée étant de construire ensemble (Touzard, 2006). La gouvernance territoriale endogène se développe dans des espaces publics, au sens où Habermas l'entendait en 1978 dans son ouvrage « Raison et légitimité », comme étant un lieu qui « repose sur la liberté et l'autonomie des citoyens pour la formation par la raison d'une opinion et d'une volonté collective qui viendraient influer la production de lois ».

La gouvernance territoriale endogène recouvre une large diversité d'interventions, selon que l'on se situe en amont, en aval ou au cœur de la concertation entre les acteurs.

L'étude de Beuret et Cadoret vient encore éclairer une dynamique portant sur la notion d'itinéraire de concertation qui comprend plusieurs étapes : celui ci débute bien par la mise en place d'instances de concertation, visant le plus souvent à mobiliser ou à rapprocher les participants, alors que d'autres peuvent favoriser la mise en œuvre d'idées issues de concertations ou peuvent se situer en fin d'itinéraire.

« Finalement, l'objectif des initiatives relevant de la gouvernance territoriale endogène peut être de rendre une catégorie d'acteurs prête au dialogue, de faciliter l'émergence du dialogue (en offrant des supports de dialogue, de rapprochement), de le conduire, de mettre en place une médiation dans un conflit, de traduire les idées issues du dialogue en actes, de consolider le dialogue en l'élargissant vers de nouveaux acteurs, ou de faciliter la reproduction du dialogue dans des situations similaires (essaimage). »

Dépassant la dichotomie entre démocratie représentative (les élus sont légitimes pour décider au nom de ceux qui les ont désignés) et démocratie participative (les citoyens et représentants associatifs sont invités à participer à la gestion publique), une voie permettrait l'émergence d'espaces de développement co-construits par et pour les acteurs, qui viserait moins à faire naitre un consensus autour d'avis ou de propositions (objectif principal des dispositifs de participation), que de construire de l'action collective par la coopération.

Dès lors, nous pourrions retenir avec Beuret et Cadoret (2010) la définition suivante pour la démocratie collaborative : « c'est une démocratie polycentrée (terme mis en avant par Létourneau, 2009) qui reconnaît comme un fait la distribution du pouvoir, des ressources et des informations entre de nombreuses mains et envisage la coopération comme l'un des moyens d'une coordination efficace. La démocratie coopérative vise à construire de l'action collective plus que du consensus (…) La place de l'Etat de droit est repensée avec un rôle d'animateur, de catalyseur, et de capacitateur (ce que Giddens appelle the enabiling state) (…) Enfin, c'est une démocratie appelée à reconnaître des initiatives prises en faveur d'un intérêt qui dépasse celui de leurs promoteurs, fondées sur un attachement au territoire et à certains biens communs localisés ».

Enfin dans cette même étude, le point de vue de Rusconi (1994), cité par Gaudin, (1999) met en lumière un point intéressant sur le fait que la mobilisation de chacun ne relève ni totalement de la recherche de l'avantage individuel et direct, ni uniquement de la quête d'un sens global et solidaire, mais d'un dosage variable de ces deux perspectives. Cette approche nous pousse alors à dépasser une vision des relations entre acteurs publics et privés centrés sur la contractualisation ou la négociation, pour tendre vers une prolifération de centres d'initiatives et de négociations multipolaires, parfois instables, il faut le reconnaître.

Se pose aussi la question de la place qu'occuperait la gouvernance territoriale endogène vis à vis des politiques publiques ; il semblerait opportun de leur trouver une place dans un espace global où elles seraient intégrées, là où se rencontreraient politiques publiques et initiatives locales, un espace régi par des règles édictées par l'Etat et d'autres construites par les acteurs locaux, l'exercice du gouvernement et les expérimentations pratiques de gouvernance.

Comment alors exploiter les complémentarités existantes ? Et quels en seraient les limites et les atouts ?

Du Réseau Au Partenariat

Progressivement dans la littérature péri-professionnelle, nous avons pu assister à un glissement sémantique du concept de réseau à celui de partenariat, mettant en exergue des problématiques relatives aux conditions de coopération. De toutes les définitions, proposons de retenir celle de Claude Neuschwander qui dans un article de la revue « Pour » en 1991, sur la proximité et la connivence des acteurs entre eux, définissait le réseau comme « un assemblage variable d'acteurs libres qui entretiennent entre eux une communication forte. » Celle ci compterait trois caractéristiques :

- premièrement, elle s'établirait autour d'un intérêt commun, un domaine de connaissances, de compétences, ou d'activités par rapport auquel le réseau permettrait d'établir des relations d'échange ;
- deuxièmement, cette communication ne se maintiendrait que s'il y a compréhension (concepts familiers, forme de culture commune et même des valeurs partagées) ;
- enfin, cette communication ne se réalise que s'il y a une crédibilité mutuelle quasi immédiate ; elle ne connaît ni délais, ni procédure ; elle ne tolère ni formalisme, ni hiérarchie ; elle ne concerne que les individus, jamais les institutions.

Considérer La Complexité Des Dynamiques Instituantes Impliquées (Règles, Sens Et Identité)

La centralisation et l'administration pyramidale ont laissé place à la décentralisation et à la territorialisation d'actions déclinées sous forme de programmes qui sont eux même au confluent de plusieurs politiques publiques. Les défis de l'action publique territoriale qui se présentent désormais sont intrinsèquement liés au pilotage de dispositifs portés par des organes composés de plusieurs institutions présentes sur le territoire conduisant des agents de culture et de métiers différents, à travailler ensemble, dans un objectif de transversalité des interventions. Il s'agit de développer des projets qui correspondent au problématiques locales et aux attentes des usagers pour faire émerger ce que Philippe Lyet a notamment présenté comme étant une « gouvernance partenariale ».

Citant lui même Jacques Ion, il précise encore que l'enjeu est alors « de faire parler un même langage à des intervenants (personnes ou institutions) usant de langages différents, ayant des intérêts qui ne sont pas convergents ». Il en ressort bien souvent que l'énergie dépensée à vouloir faire collaborer ensemble collectivités territoriales, services de l'Etat, associations, etc., est largement autant orientée à organiser et à réguler la collaboration (et par conséquent les conflits induits) qu'à réellement mettre en œuvre l'action.

Il ne suffit pas donc de vouloir articuler différentes politiques dans une dynamique territoriale, inciter à monter un dispositif d'élaboration collective de la décision autour de normes partagées et commune, pour arriver à travailler ensemble. Il faut aussi faire face à des tensions intra-institutionnelles et inter-institutionnelles et à une réelle capacité de résistance au changement ; dans l'esprit de ce qu'avait mis en lumière Michel Crozier, cette résistance tient à des conflits d'intérêts, à des identités parfois malmenées ou aux difficultés des personnes à trouver du sens à des compromis ou à des projets ayant pu être élaborés sans eux, les laissant comme en marge des décisions finales.

Comme le souligne Lyet, il est à regretter que la dimension extra-institutionnelle de quelques actions initiées de manière isolée et créative, doive faire face à un déficit d'appropriation de ces mêmes actions par les institutions. En effet, force est de constater que l' « on observe de manière générale un décalage entre ce développement d'initiatives (par création ascendante ou par appropriation descendante) et la faible capacité des organisations à, d'une part, accompagner leurs professionnels dans leurs tentatives pour créer un projet ex nihilo (…) et, d'autre part, permettre que les « inventions » locales soient diffusées aux autres agents et services de l'organisation pour éclairer et enrichir par capitalisation d'expériences d'autres initiatives du même genre. »

Il nous met également en garde contre le risque d'une stratégie de réorientation de l'action publique qui pourrait être rendue inopérante par déficit d'institution : en effet, on pourrait penser que le renouvellement d'une action confiée en mode projet partagé à plusieurs acteurs en capacité d'agir, et s'appuyant sur des particularités transversales et connues

d'eux, suffirait à échapper à des modes d'intervention trop rigides et uniformes ; mais tel n'est pas le cas : en effet, plusieurs objections pourraient être émises.

Premièrement, cette stratégie de développement de l'action publique s'apparenterait à un mode de management qui mettrait l'accent sur la capacité d'initiative de petits collectifs porteurs de projets et sur la responsabilisation de quelques acteurs, ceux-ci étant eux-mêmes réduits à une dimension individuelle (Boltanski et Chiapello, 1999), or il apparaît périlleux de séparer, d'une part, la question de l'action et de son développement et, d'autre part, la question du pouvoir ; pourtant c'est bien de cela dont il s'agit le plus souvent, dans la stratégie récente de l'action publique : le pilotage et le portage des actions restant déconnectés.

Deuxièmement, il est à craindre que le prix à payer pour cette stratégie ne soit que trop élevé : en effet, c'est parfois beaucoup d'effort dépensé pour un résultat incertain, pas toujours capitalisé et qui pourrait s'évaporer une fois le collectif dissout.

Troisièmement, une action n'est pas qu'une adaptation à un besoin ; son processus de construction est une création institutionnelle qui s'ancre dans une certaine conception des problématiques et des voies de solutions ; aussi ce qui s'invente dans un partenariat – s'il ne peut être transposé tel quel – reste toujours porteur de leçons pour d'autres parce qu'il permet de construire un cadre normatif ou symbolique, susceptible de produire de nouveaux développements, dans des articulations entre local et global, sur des tiers lieux par exemple.

« En résumé, pour la question qui nous intéresse, ces collaborations territoriales et transversales mobilisent, face à l'évolution des problématiques, des professionnels sur la recherche de nouvelles modalités d'action, en collaboration avec des intervenants avec lesquels il ne leur était pas habituel de travailler. Il s'agit de réaliser ce que Pierre Tesseirenc (1994) a nommé « création institutionnelle » à propos d'initiatives de développement local. Mais ce processus est rarement abouti pour des raisons qui conduisent à se demander si ces nouvelles formes d'action publique ne pècheraient pas par déficit d'institution. »

Tout semble montrer que la gouvernance partenariale est vécue de manière paradoxale. Si les différentes parties prenantes d'un territoire, mobilisées sur une action de co-construction, en reconnaissent l'intérêt et la valorisent ouvertement, leur engagement et implication « réels » dans ce partenariat aurait aussi tendance à être anxiogène parfois, les inscrivant dans une situation où ils seraient conduits à abdiquer une part de leur « pouvoir » dans un jeu collectif aux contours incertains.

Force est de constater que de nouvelles perspectives se profilent sur l'engagement même des parties prenantes ; l'article de Berthoin Antal et Sobczak en expose différentes approches
:
en effet, l'évolution des enjeux sociétaux conduit les acteurs locaux à porter une attente différente à l'égard des entreprises notamment : il ne s'agit plus seulement d'évaluer les performances réalisées, mais l'intérêt est porté sur de plus larges enjeux sociétaux nécessitant souvent des solutions complexes, comme la lutte contre le réchauffement climatique, la promotion de l'égalité des chances…

« En passant du terme de « relations entre l'entreprise et la société » vers celui de « responsabilité sociale des entreprises », on modifie cependant la perspective de l'analyse, mettant cette fois-ci l'entreprise, ses activités et ses modes de décision au cœur du débat. Cela s'est également traduit au niveau des cadres théoriques mobilisés par les chercheurs en sciences de gestion (Gond et Mullenbach-Servayre, 2003) – la théorie des parties prenantes, la théorie contractualiste et la théorie institutionnaliste – s'articulent toutes autour de différentes manières de concevoir le rôle de l'entreprise et ses relations avec les autres acteurs. »

Cela était déjà particulièrement d'actualité lorsque R. Edward Freeman en 1984 développait la théorie des parties prenantes en focalisant son analyse sur les relations entre l'entreprise et la société et encore plus sur la responsabilité sociale des entreprises ; cette théorie avait alors été reprise par les chercheurs comme Post, Preston et Sachs en 2002, pour définir les principes permettant aux entreprises de « manager » leur parties prenantes, dans une perspectives instrumentale.

Or dans un contexte mondial qui se complexifie, la question des enjeux économiques, sociaux et environnementaux implique de plus en plus souvent une co-construction de solutions collectives avec tous les acteurs, quel que soit leur statut. Bento, 2009, suggérait alors de tendre vers la notion plus élargie de responsabilité sociale des organisations (non pas seulement des entreprises). Dans cette même lignée, Berthoin Antal et Sobczak, 2004, proposent d'aller encore plus loin pour retenir la notion de responsabilité globale qui met aussi mieux en évidence que les intérêts à

prendre en compte ne sont pas uniquement sociaux, mais au moins aussi environnementaux et économiques et qu'ils doivent être abordés de manière transversales et dans un contexte international.

Gouvernance endogène et nouveau marketing territorial

La démarche du marketing territorial et donc le projet d'attractivité territoriale doit être communiqué au premier lieu aux habitants, et pourquoi pas coproduit et fait pour et par les résidents, partagé mais aussi compris et porté par les parties prenantes d'où l'importance de l'application d'une stratégie de gouvernance qui commence par le résident et qui émerge du cœur du territoire et ne peut aucunement etre impulsée par l'extérieur.

Il est dans ce sens important de se focaliser sur l'implication du citoyen constituant l'élément essentiel de la démarche d'hospitalité définie comme la capacité d'un territoire à garder sur place les ressources (résidents, touristes et investisseurs) déjà acquis.

L'implication de l'habitant n'est plus un choix mais une nécessité primordiale pour la réussite de la démarche d'attractivité territoriale, et ce pour deux raisons essentielles : la première étant d'impliquer d'une façon directe le citoyen dans la gestion de l'affaire public du fait le projet du territoire devrait traduire sa personne en général. et la deuxième conforte le nombre de voix qui se sont élevés dernièrement afin de plaider en faveur de la recherche des atouts immatériels des territoires consistant à toucher en premier la sensibilité, l'affection et le sentiment d'appartenance du résident. C'est sans doute ce résident qui construit et constitue le territoire au quotidien et qui, de fait, coopèrent à véhiculer ce que fait que le territoire est ce qu'il est d'après leurs perception propre et façonnent donc directement ou indirectement son image de marque.

Dans cette même veine il est important de rappeler que le résident peut jouer quatre rôles par rapport à son territoire : il est de prime à bord une cible directe, il peut être un argument valorisant du territoire, un partenaire dans construction du processus d'attractivité et finalement un ambassadeur et un avocat passionné pouvant facilement influencer la décision d'autres cibles.

Conclusion

La notion de gouvernance et/ou de « management » des parties prenantes a évolué vers celle d' « engagement » traduisant le fait que quelques entreprises innovantes soient passées d'un management réactif des enjeux sociétaux qui se limitait à respecter les normes, à la mise en œuvre d'initiatives plus proactives et interactives permettant de traiter ces enjeux de manière plus efficace par des stratégies d'engagement de leurs réseaux de parties prenantes (Andriof et Waddock, 2002).

La notion même d'engagement est alors à expliciter : dans la culture anglo-saxonne, ce terme évoque un mariage ou un accord mais aussi une lutte ; dans le dictionnaire français, on retrouve assez bien cette idée dans « un combat de courte durée et localisée », comme dans le fait de « prendre parti sur les problèmes politiques et sociaux par son action et ses discours ».

Il est rappelé que Greenwood (2007) proposait de définir l'engagement des parties prenantes comme un ou des processus de consultation, de communication, de dialogue et d'échange. Aussi, proposons avec Berthoin Antal et Sobczak de définir l'engagement des parties prenantes « comme la création active de relations d'apprentissage avec les différentes parties prenantes afin de trouver des solutions aux enjeux économiques, sociaux et environnementaux », sans perdre de vue que le conflit puisse y paraître quasi inévitable.

Cela illustre la diversité et la complexité des formes de gouvernance marquées par l'engagement des parties prenantes, différentes approches citées dans cet article révélant une dimension humaine inhérente à tout engagement, donnant un visage à chaque partie prenante considérée, l'énergie du conflit devant être transcendée pour entrer dans une relation plus constructive reposant sur des compromis fondés sur des solutions innovantes. D'autres approches ici reprises insistent sur la dimension affective la gouvernance endogène et de l'engagement des parties prenantes dans la responsabilité globale qui repose souvent sur la passion des individus, leur empathie et leur capacité d'influence ou d'entrainement des autres acteurs. Cette part de subjectivité ne doit pas être sous-estimée.

Notes

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[2] Jean-Eudes Beuret, Anne Cadoret, *Une gouvernance territori*
[3] Jean-Eudes Beuret, Anne Cadoret, *Une gouvernance territoriale endogène de l'environnement : contours et enjeux*, Géographie, économie, société, 2011, p.363-386
[4] Une gouvernance territoriale endogène de l'environnement : contours et enjeux*, op.cit., p.366*
[5] Une gouvernance territoriale endogène de l'environnement : contours et enjeux*, op.cit., p.367*
[6] Une gouvernance territoriale endogène de l'environnement : contours et enjeux*, op.cit., p.372*
[7] *op.cit., p.380*
[8] Philippe LYET, *L'institution incertaine du partenariat*, L'Harmattan, 2008, p.26
[9] L'institution incertaine du partenariat, op.cit., p. 31
[10] L'institution incertaine du partenariat, op.cit., p.33-34
[11] André Sobczak, Ariane Berthoin Antal, *Nouvelles perspectives sur l'engagement des parties prenantes : enjeux, acteurs, recherches*, Management Prospective Ed., 2010, p.116-126
[12] Nouvelles perspectives sur l'engagement des parties prenantes : enjeux, acteurs, recherches, op.cit., p.118-119

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The Importance of Key Performance Indicators When Eliminating Bottlenecks, Using Modern Research Methods in Process Management

Joanna LISOK

Silesian University of Technology, Gliwice, Poland
Joanna.Lisok@polsl.pl

Abstract

Implementation of the organization's basic strategic assumptions for measurable goals is a complicated and often tedious process. Most often it takes place behind closed doors, among the top management, whose determination and involvement in the implementation of the assumed tasks within the assumed period of time allow to realize actions aimed at achieving the assumed goal. Such an action is very important, because the guarantee of success is the assumption that the whole organization is going in one direction. It is a great challenge to build a clear and unambiguous way of communicating goals and the degree of their realization. The KPIs (Key Performance Indicators) and Result Indicators (RI) are the main tools to help. Tools supporting the Lean process approach in addition to indicators are the SMED method and the Spaghetti Chart method. The concept of SMED methodology was developed between 1950 and 1960, when Shigeo Shingo, a Japanese industrial engineer, in consultation with the Japanese company, considered its problems of inability to eliminate bottlenecks when creating TOYOTA car bodies using presses. The "bottlenecks" in the Japanese company were caused by long machine changeover times, which significantly affected production efficiency. Because Shigeo Shingo, considered to be the world's leading expert in production practices, was looking for the optimal solution for the factors that had a significant impact and control over the production processes that took place at the TOYOTA factory. The only effective solution was to reduce the company's expenses by minimizing the number of production batches, which shortened the machine changeover time. SMED system turned out to be a comprehensive tool. SMED (Single Minute Exchange of Die) is a one-digit minute changeover method. The machine change-over time for production is very important and significantly affects the flexibility and profitability of the production process. If we shorten the set-up time, it will be possible to produce more products in a shorter time, which will have a significant impact on the production flow. The change-over time will also allow to increase the range of manufactured components, which increases the company's attractiveness on the subcontractor market. Spaghetti chart is one of the tools of lean manufacturing. It is used to eliminate or reduce significantly losses in the production process. These include losses caused by overproduction, corrections, over processing, overstock, transport, and losses caused by waiting and movement. These losses occur in every production process and should be systematically reduced and eliminated. The spaghetti diagram is a visualization of movements and flows in the production process. With this method we can analyze both product, document and employee flows. With this tool you can find out which way an employee goes on the job, how much time it takes, what operations he performs and at what time. It also shows the distances and waiting times. When creating a diagram, it is necessary to pay special attention to the actual process, as it occurs in everyday work, with all its errors, flaws, problems. When creating a diagram, we focus on the real process even if it differs from standards and procedures. The Lean Management concept is based on delivering value to the customer. The current trend is to personalize services and products for its customers, optimize costs and processes. Managing a company is a big challenge, so it is worth trying to improve it with methods that are easy to implement. By using practical Lean Management solutions, production or sales results can be significantly improved.

In the article the author will analyze modern Lean methods in order to develop guidelines for Lean Management.

Keywords: Lean, SMED methodology, Kaizen, 5W.

SMED Methodology

SMED (Single Minute Exchange of Die) is a one-digit minute changeover method. The machine change-over time for production is very important and significantly affects the flexibility and profitability of the production process. If we shorten the set-up time, it will be possible to produce more products in a shorter time, which will have a significant impact on the production flow. The change-over time will also allow to increase the range of

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manufactured components, which increases the company's attractiveness on the subcontractor market. SMED methodology allows to reduce this type of costs in a very significant way and is described by means of 4 stages, namely: Stage 0 - changeover process analysis - filming, motion analysis and operation analysis; Stage 1 - internal and external changeover - control card, operation control, transport of parts and tools; Stage 2 - changeover transformation - advanced work preparation, standardization, intermediate clamping devices; Stage 3 - improvements - tool storage and management, parallel operations, clamping tools, elimination of regulation, mechanization.

Stage 0 - Activities of employees or machines on raw materials, components, finished products and machine parts are called operations. The changeover is the preparation or appropriate setting of the machine before and after the processing of each subsequent batch. The most important stage of SMED implementation is separation of internal and external changeover operations. Transportation and preparation of parts for work while the machine is in motion (other batches of goods are produced) allows to reduce the changeover time from about 30% to about 50%. The changeover operation consists of two types of operations;

- internal operations, that is, operations that can only be performed when the machine is switched off. An example of such an operation can be a matrix change. A new matrix can only be installed when the machine is turned off.
- and external operations, i.e., operations that are performed while the machine is in motion and running. An example of such an operation is the transport of the matrix from the storage location.

The idea of the whole SMED methodology is to bring the minimum number of internal operations to the point where the minimum number of external operations is performed while the machine is running.

Stage 1 - SMED implementation consists in separating the operations that should be performed when the machine is in motion from the operations performed during its shutdown. Some tasks can certainly be performed before the machine is switched off in order to change-over. For example, you can prepare people as well as all necessary tools and parts, or make necessary repairs and corrections, according to Sz. Kubik. Unfortunately, very often it turns out that such operations are performed only after the machine is switched off. However, these actions should be performed while the machine was producing the previous batch. Separation of these elements and making them within the framework of external change-over may bring us fundamental benefits in the form of shorter time from about 30% to about 50%. Practical solutions helping to separate internal and external operations include; Use of checklists, Checking the efficiency of tools, Improving the transport of dies and other parts. Checklists contain the elements needed to perform the changeover and setup the next operation. These elements are: Tools, Technical Specifications, Personnel performing the appropriate operations, Determining the correct operating conditions for the operation. It is very important to develop a separate list for each machine and operation, [1]. The use of generic checklists that are undifferentiated throughout the enterprise can be disappointing, as such lists are very often ignored by employees. A fitness check should be carried out in advance before the changeover begins, so that the necessary repairs can be made, which will result in fewer breakdowns, during start-up and later on. If, after starting the machine, we notice that the matrix is cracked, there are visible scratches on the mould and the transport handle is damaged, it should be stated that it will certainly extend the changeover time and increase production costs. A very important element during the changeover operation is the transport of parts and tools. Matrices, indicators, moulds and other parts needed during the operation should be transported between the storage place and the machine on which they are used.

Transportation of these elements must be carried out during the external changeover operation, in other words they must be delivered to the machine before stopping for the changeover. Tools and parts must be returned to their storage location after the machine has been properly started up and the detail is free from defects and complies with expectations and standards.

Stage 2. In stage 1 of the SMED implementation, we have separated the operations that require turning off the machine from those that can be performed during its operation. However, this is not enough to reduce the internal changeover operations to less than 10 minutes according to Sz. Kubik. During the implementation of SMED methodology the following steps can be distinguished:

- Analysis of the actual functions and goals of all current internal change-over operations.
- Finding ways to replace internal change-over operations with external ones.

Conversion of internal operations into external ones will be facilitated by three practical solutions. These are: prior preparation of operational conditions, standardization of the most important functions and use of intermediate handles according to Sz. Kubik.

The earlier preparation of operations determines the preparation of parts, tools and conditions before starting the internal changeover operations. While the above mentioned elements will be prepared on site, unproductive downtime will be avoided. SMED uses a method called function standardization according to Sz. Kubik. When creating dies, tools and parts, you can avoid waste by standardizing important elements for the set-up time, e.g. screw size. The function standardization is implemented in two stages:

- Analysis of the function during the changeover and determination of which functions should and can be standardized,
- Re-analysing and determining at which points in time you can increase productivity by replacing a small number of parts.

In processes, the conversion of internal to external conversion operations can be done using intermediate handles. Examples of such holders are plates or frames with standard dimensions, which can easily be replaced according to the Sz. Kubik. The grips enable the conversion of the operation as they allow to prepare dies and other elements while the machine is in motion. When one die is used in a running machine, another one is fixed in a special intermediate holder, it is centred and ready to use. When the machine finishes working with the first die, it can be quickly and easily replaced with the No. 2. The machine with the intermediate holders is restarted in just a few minutes.

Stage 3 - In the previous stages the steps of separating the internal and external operations were discussed, and the internal operations were transformed into the operations during operation. The final step of the SMED methodology is to improve all the circumstances during the changeover operation. In this phase all internal and external elements of the changeover will be improved. By implementing the third stage, we will in almost every case lead to the moment when the changeover time is below 10 minutes. Constructive solutions introduced in this stage can be divided into two:

- Improvements in external operations,
- Improvements in internal operations.

The improvement of external operations is connected with further improvement of parts and tools transport and their storage. In the case of smaller tools, blades, dies, chucks and gauges, the issues related to their management according to Sz. Kubik must first be resolved. These items should be properly arranged, kept in the best possible condition so that they are always ready for the next operation. Storage of dies very often causes many problems, especially when there are more of them. An improvement that can be made is the proper marking of their colors and shelf numbers to which they will be assigned. Such marking can also be applied to the above mentioned shelves, thanks to which it will be easier to identify or find them, and the employees will always put them in the right places. At this point it should also be noted that the best improvement is to store the matrices closest to the place where they are used, thanks to which it will be easier to access them. Improving internal operations includes:

- Introducing parallel operations,
- Use of functional terminals,
- Elimination of setting adjustments,
- Mechanization,

Parallel operations allow to divide the changeover between two people, working on both ends of the machine. Involving two people eliminates the need to walk back and forth, and thus reduces the time of the operation, which previously took about 12 minutes, to about 4 minutes, according to Sz. Kubik. When 2 operators work in parallel, activities are carried out much faster and more efficiently, and the key element is mutual communication, thus limiting the same activities and interrupting each other. It is important that before starting to work each of them is trained and knows exactly what activities they have to perform at the moment. In the traditional changeover method, screws are often used to attach the dies to the machine, which significantly slows down work. Very often also during the changeover, the screws are lost falling into the corners of the hall, which forces them to find or fit new ones, taking the valuable time of the employee. In the SMED system, such waste can be eliminated by using a solution called a functional clamp. This term defines the connecting elements, which allow to keep the object in the right position, using the minimum amount of time and effort. The role of such a "functional clamp" can be played by a screw after appropriate modification or a completely different connecting element, which can be easily clamped and released. Functional clamps are very often permanently attached to the machine, so in addition to saving time and energy, it is impossible to lose them or to connect them wrongly. The trial series in a traditional system and the associated adjustments can take up to half the time of the entire changeover. If you manage to eliminate the setting adjustments, the idle time of the machines will be significantly reduced and the size of the trial runs will be significantly reduced, thus the amount of raw material used for production will be saved. The size of the trial runs and the corrections related to the machine start-up will depend on the accuracy of the centring, dimensioning and conditions that will be prepared in the earlier stages of the changeover. Therefore, in order for the elimination of the corrections to be successful and to achieve the desired result, previous operations must be improved and standardized.

Solutions supporting the elimination of setting adjustments:

- Numerical scale and standardization of settings

Operators should rely on fixed numerical values rather than their own intuition when setting up the machine. For this purpose it is helpful to create a step-by-step scale that represents different settings. Using a measuring scale allows you to set the machine with an accuracy of 0.5 mm. Another method of numerical setting is to use gauge blocks or shims to determine the distance between two elements. The used gauge blocks and shims precisely determine a very large range of distances.
- Mark the center lines and reference planes
Clear determination of centerlines and reference planes is an effective method of eliminating later corrections according to Sz. Kubik. Center lines and reference planes in traditional conversion are often not clearly marked. Unfortunately, in practice this means that the operator's intuition and the trial and error method are invariably used to determine the correct tool or workpiece position. Determining the center lines and planes to which reference can be made will cause the size of the test series to be minimized and operators with more or less experience will be able to do the same work with the same efficiency.

The mechanization should be used for fine-tuning and not for making drastic changes according to Sz. Kubik. Mechanization should be the last step that will be considered only after all previous solutions are implemented. This principle should be strictly observed because:

- Using the earlier changes allows to reduce the changeover time from 1.5 h to 7 min. and mechanization can save us about 1 min.
- Mechanization of the operation, which is inefficient, may lead to shortening the set-up time, but it will certainly not bring benefits in the form of improving the process.

To sum up, mechanization should be an element used to tune the production process and not to introduce drastic changes during the process. Mechanization is necessary in case of handling large elements such as: dies, casting and injection moulds. Practical solutions allowing to mechanize operations are:

- Forklift trucks, cranes used for inserting parts into machines.
- Movable supports on which heavy dies are moved.
- Electric motors for distance control.
- Press energy used to move the dies.

Techniques and Methods to Support SMED

The SMED method is a way to reduce machine set-up time by reducing to a minimum the activities necessary for the proper execution of this process and completely eliminating unnecessary movements, steps, activities. Operations are supported by lean manufacturing techniques and methods. These techniques allow the analysis of the current state of affairs to be carried out correctly to show the information about the time of the current changeover method, the activities performed by the operators and the route they have to travel. SMED methods and techniques also allow to discover and see the bottlenecks in the process, develop optimal solutions to improve both the changeover time and new methods, activities and tools according to Sz. Kubik.

PDCA method - this method has different names such as: the Deming circle, the Deming cycle, the Shewhart cycle, the Shewhart cycle. Its beginning is attributed by some to Francis Bacon (1561 - 1626), an English philosopher considered to be a precursor of modern scientific methodology with a major emphasis on experimentation and induction. Bacon was also inscribed in history as one of the founders of the philosophical doctrine of empiricism. One of the main works of Francis Bacon is "Novum Organon" published in 1620, in which he included examples of his reflections, which he called true induction, which he included in the form of tables of presence, absence and degrees. It was a matter of capturing a form of warmth through comparative analysis. The author carries out experiments, analyses and draws conclusions. In the early 20th century, Walter Andrew Shewhart (1891-1967), an American statistician, physicist and engineer, also known as the father of statistical quality control, joined the Western Electric Company's quality engineering group at Hawthorne Works. At that time, industrial quality was underdeveloped, resulting in quality control only of finished products and removal of defective ones. The change took place in May 1924, when Walter Shewhart, PhD in physics, prepared a short memorandum that included a diagram and description of the schematic control card. He distinguished between two types of variations, the first "attributable variable" and the second "accidental cause. The diagram he created was a tool to distinguish between the two variables. Shewhart argued that reducing the production process to a state of statistical control, where only the variation of the case and its control appear, was necessary to improve quality and reduce production waste. Shewhart's second important achievement was to bring production down to statistical control, monitored in three steps: Specification, production, control. He also believed that this three-step process should be repeated after each

full cycle. This is the only way to gain scientific knowledge. The analyst should make a hypothesis, conduct an experiment and test the hypothesis, and repeat the steps after the cycle. A group of engineers working at Hawthorne have conducted experiments to improve quality and production processes. In the 1930s, a major crisis occurred, resulting in group layoffs at Hawthorne and ending the group of engineers at that plant. Shewhart's work has caught the attention of global manufacturers, but has not changed the global approach to production and control. Some thought Shewhart was a talented statistician and theorist, but was unable to pass on his qualitative ideas to production workers. Hawthorne engineers also included William Edwards Deming (1900-1993), an American statistician, who worked with Shewhart for several years, becoming a master of his techniques and methods. Deming himself admitted that his mentor was Shewhart. During the Second World War, Deming supported war production and taught employees the techniques of statistical control of production processes. At that time, war production was extensive and its production management and quality control methods were often used. After the war, he left for Japan, where he took care of the census. Over time, his knowledge and experience helped to rebuild the Japanese economy, which was in regression after World War II. In 1950, Deming gave the first symposium on statistical quality control. This speech was addressed to Japanese managers and top management. Deming's greatest work was the 14 points that concerned management and the PDCA model, which was developed by Shewhart, but refined and distributed by Deming. He called it the Shewharata circle in honor of his mentor, but many people use the name of the Deming circle because it was he who distributed it according to S. Lachowski. As you can see, the PDCA cycle has a long history that has evolved over the years. Backon, Shewhart and Deming have come to the conclusion that the hypothesis needs to be proved by experiments or observations in order to draw appropriate conclusions. The final cause-and-effect cycle of PDCA contains 4 steps that follow each other. Once the cycle is completed, it must be restarted. This means that the fourth part of the cycle does not end the cycle but starts step number one. This is the only way to continue to develop and move on to the next level of continuous improvement in order to eliminate quality defects and eliminate costs and losses, etc. The PDCA cycle starts with the first step P (PLAN/PPLACE). At this initial stage it is necessary to determine what we want to improve, improve or achieve. Do it by identifying and concretizing problems, opportunities or needs. At this stage, we also make analyses of the current state. We study, research and look at the actual production process and make evaluations by verifying available data, process maps, plans and production times, process operations etc. We plan the future state, i.e. what we want to achieve in the future. In order to pass through this stage correctly you will need appropriate techniques and auxiliary tools. These methods include: process mapping, cause and effect analysis, Pareto analysis, or brainstorming. At this point you should also designate a person or group responsible for the implementation of the project and assign appropriate completion dates for each stage. The second stage is D (DO/PRODUCT) At this stage, proposals for changes, improvement plan, processes, operations are implemented in the actual state. All changes, goals and assumptions from the first phase of the PDCA cycle are reflected in reality. In this phase you may encounter problems related to the implementation of the initial plan. Problems may result from unforeseen factors or situations. You can only use a smaller PDCA as a remedy for a specific problem. In this way the shortcomings of the first phase are eliminated. This is also where we start to check whether the attempt to change the plan is working. The important thing when making changes is to be able to solve problems. The employees responsible for the project should be trained and have knowledge of the experiment. The project manager should have leadership skills and supervise subordinates in an appropriate way. His duties include training and conflict resolution. Stage 3 C/S (CHECK/CONTROLL/STUDIES) This is the stage where the results of the conducted changes are compared with the planned assumptions and results of the first stage. It is at this point that we analyze new solutions, processes and changes. It is very important to make reliable and real measurements of the results of the changes. For the measurements you can use the change sheets and control cards. We compare the data and results with the intended objectives, results that were planned. We collect as much data as possible, which will be needed for the next stage. The fourth stage A (ACT/USTAW) Level four ends a single cycle. In this stage we implement changes if the results from the previous stage are satisfactory. We standardize the new process and prepare documentation. If the results are not satisfactory, we draw information from this trial what has not been improved and, if necessary, make corrections to solve the problem. At this stage we have the knowledge that will be used for the new PDCA cycle. Here, with the knowledge, information and experience we start planning from stage one. Please note that the Deming cycle is a loop that has no end. The processes, the effects of the changes made from now on begin to be the real state, the starting point, which should be improved. By finishing the fourth stage you should start PDCA from the beginning, so we plan future results to which changes will be made. In this way we move to the next level of improvement. The PDCA cycle was initially closely linked to the production processes. Later on, it was used in various activities that need to be changed or improved in efficiency. This model is effective because it breaks down the change process into smaller parts so that we are able to go through it step by step by step, gathering information, improving our experience and performing the experience. These changes are implemented gradually, so you can avoid untested changes in processes on a large scale. This can result in increased costs and risk of failure. A simple but effective Deming cycle also has some limitations that need to be taken into account before implementing this model. One of the limitations is the time to implement changes and achieve the intended effects. Urgent or emergency situations may not be dealt with. When introducing PDCA a lot of

knowledge about processes and control system is required. Creative initiative and innovative approach are also very important aspects. The model does not affect human resistance and lack of motivation according to S. Lachowski.
Kaizen method. Kaizen was initiated after World War II in Japan. It was then that Toyota introduced quality wheels into its production process. The group consisted of employees who did the same or approximate work. The meetings of the group were cyclical in nature, during which work related problems were analysed. Once a problem was identified, it was followed by a process of elimination. The introduction of such a method was greatly influenced by American engineers who came to Japan after World War II. Masaaki Imai is considered the father of Kaizen philosophy and in 1986 he published a book entitled "Kaizen. In it he contained all the principles and rules of philosophy. The expression Kaizen comes from two Japanese words "change". (kai) and "for the better" (zen). These words fully convey the message that this philosophy conveys. Kaizen is a way of continuous self-improvement which, although created for business and production processes, can be applied to any area of life. It is a way of engaging employees at all levels of the company's organizational structure, from the ordinary employees to the members of the management board, to improve processes, workstations, information flows, savings, elimination of losses. The improvement takes place gradually eliminating the problems and incompatibilities encountered. It is a continuous and endless process. Kaizen is based on PDCA principles, i.e., planning, execution, checking, operation. However, Kaizen is focused on making small changes at a fast pace. The philosophy is based on two fundamental principles. The first principle is about improvement and change for the better, while the second principle is about an ongoing process. The philosophy gives us 10 tips on how to strive for improvement and perfection according to J. Bicheno;

1) Improve everything and everywhere
2) Do not give in to traditional assumptions and concepts
3 Excuses are not acceptable and cannot be made
4 If something doesn't work properly, correct it
5. improving in small steps is better than looking for the ideal
6. search for information and knowledge from many people
7. apply principle 5 WHY
8 Try, check, approve, implement
9. there is a hidden opportunity in the problems
10. do not stop improving, it is an infinite process

The Major Kaizen method is a branch of Kaizen philosophy. The principle of use is the same. The difference is in the scope of application. Kaizen is oriented towards simple, quick changes. Major Kaizen deals with things that are more complicated to improve and require more time. It is used when the solution to the problem is not known at the start of the project. The basic support tools are: 5W+1H, 4M, 5WHY. The project involves larger teams than in standard kaizenie. The area manager is the project leader and controls the progress of work and verifies the use of appropriate tools and methods. Documentation is prepared in the form of a presentation, a visualization board is placed in the place where the problem occurs, divided into sections. The sections include descriptions and photographs of the work undertaken at each stage and the tools for their implementation. In the column "problem" we deal with defining the problem. Pareto analysis and data stratification should be performed. In individual cases you can use a historical loss monitoring chart. Then it is necessary to show what the loss is and to divide the losses into levels. In the "team" column we place the composition of the team and radar of the employees. To the team it is necessary to appoint persons adequate to the problem specification. It is necessary to know why specific people have been included in this team. The "plan" column is devoted to the team work schedule and deadlines. The action plan is based on the PDCA method, which focuses on determining the beginning and end of the next phase. The next step is to "describe the phenomenon" in which we characterize the problem, describing how the problem occurred, where and when the problem occurred and how it was noticed. The description of the phenomena is supported by the 5W 1H method. In case when the technical problem does not have a description of the phenomenon we use sketches and photographs. Section "system" is based on the description of machines and equipment. Moreover, we place in it a process map and links between processes. In the section "goal setting" we describe measurable goals. When losses are not completely eliminated, we need to know why and to what extent they should be eliminated. It should be based on an indicator, which will be the basis for calculating financial and material losses. We place terms on the timeline. In the "cause analysis" we make an Ishikawa diagram and/or the 5 WHY method for the causes marked on the arms of the Ishikawa diagram. The results of measurements, tests, expert opinions must be based on facts. We clearly state the root cause.

Metda Spaghetti Chart is one of the tools of lean manufacturing. It is used to eliminate or reduce significantly losses in the production process. These include losses caused by overproduction, corrections, overprocessing, overstock, transport, and losses caused by waiting and movement. These losses occur in every production process and should be systematically reduced and eliminated. The spaghetti diagram is a visualisation of movements and flows in the production process. With this method we can analyze both product, document and employee flows. With this tool

you can find out which way an employee goes on the job, how much time it takes, what operations he performs and at what time. It also shows the distances and waiting times. When creating a diagram, it is necessary to pay special attention to the actual process, as it occurs in everyday work, with all its errors, flaws, problems. When creating a diagram, we focus on the real process even if it differs from standards and procedures. We start creating a diagram by drawing or printing the workstation or process. This is a general view of the area that has been selected for analysis. There should be approximate distances between operations, paths, shelves, desktops, tables. On the template prepared in this way we place the first action - the beginning of the process. From this point on, we mark with different colors the direction arrows for next operations, route, stop or wait, transport. Lines should be drawn for each activity and each movement. Attention should be paid to each even the smallest movement, operation, route. The next step is to measure the time for each observed activity, and present the tool needed to perform the operation. After a thorough input of the data on the sheet, we proceed to the process analysis. We draw various variants of changes, improvements. We try to arrange the process in such a way that the operations follow each other as quickly as possible and do not contain unnecessary route and activities. We place the tools necessary to perform the activities as close to the operation as possible, which saves the route the operator has to travel. After the analysis and choosing the best option we test it in the real process. When our new methods have improved the process, we consider them a standard. Spaghetti greyhound at first sight looks like a mess or chaos, it is complicated and twisted, like a spaghetti dish, that is why its name comes from. But in practice it is a help and a very effective method to visualize problems and losses. Thanks to this diagram we can minimize or eliminate them. Among the strengths of Spaghetti Chart can be the identification of inefficiencies in the production process, help in identifying losses. It also helps to improve productivity and reduce overloads. It also reduces employee fatigue by reducing unnecessary movements. Improves safety at the workplace.

The 5 WHY- method, developed by Toyota Motor Corporation, was distributed in the 1970s. Its task is to reveal the original source of the problem and to find a solution to this shortcoming. The problem, which is repeated, generates a waste of time, resources and materials. Such a situation occurs when the cause of the problem has not been properly defined. In such a case, remedies do not eliminate the problem but act prophylactically on its symptoms. Such an action will lead to the problem becoming apparent in the future. The method is often used during the planning stage at PDCA. The method itself involves asking 5 questions about why, starting with the occurrence of the problem. To proceed to 5 WHY, we create a group of employees who know the process or system. However, employees should be from different departments such as production, quality, engineering. Each of the employees will bring their own autonomous point of view on the problem. The next stage of the group's work is to identify the problem, the revealed anomalies should be described in a clear and concise way. Wrong identification of the problem may result in prolongation of the problem solving process. After the problem is identified, a question should be asked why the problem occurred. The answers cannot be based on conjecture or conjecture. Facts and data are the elements that should appear in the answer. After that, we ask the next questions why and get an honest answer. We repeat the process until we discover the essence of the problem. In some cases it is not necessary to ask why 5 times, because the root cause can be found in question 3 or 4. In other cases, you will find the answer in question five or six. Thus, the number of questions depends on the structure of the problem and its symptoms. In case you manage to determine the main cause of the problem, we go to the next step. At this stage you should develop measures and methods of counteracting the essence of the problem. This is done with the question "how? We also repeat this question several times until we get the main solution. The 5 WHY method is a simple method in determining the source problems in each process. The employees who are part of the group do not need special preparation. It forces the group through analytical thinking and deduction to look for the real cause of the problem on their own. When using 5 WHY, attention should be paid to the logic of questions and answers. Failure to comply with this condition can result in mistakes that lead to wrong and inappropriate conclusions being drawn.

The Pareto Method - The Pareto Principle was created by the Italian economist Vilfredo Pareto from his name. During his research, Pareto noted that 80% of the wealth and gratuities in Italy went to 20% of the population living in Italy. Thanks to this observation, which also applies to other aspects of activity, Pareto has created a principle that illustrates the fact that 80% of problems are caused by 20%. In the 1950s, the American management theorist Joseph Juran, who was inspired by the research of Vilfredo Pareto, published a book in which he included the principle and the Pareto Diagram. The principles in question are also called the 80-20 rule, the Pareto or Pareto-Lorenzo Diagram. The diagram in question is a bar chart and a line diagram. The bars show the frequency of problems, costs, defects and where they occur. The bars are arranged in a decreasing way from left to right. The tall bars on the left are much more important than the bars on the right. In this way a visualization is created that helps to define the hierarchy and priorities according to M.Ben-Day and P.M.Charantimath. The bar chart is complemented by a linear chart, which contains the cumulative sums of each category, i.e. percentage shares in relation to the whole problem or phenomenon. Thanks to this visualization you can choose important problems, sources, defects from many or several other trivial ones. This allows you to completely reject or deal with factors having a marginal impact on the examined phenomenon at a later time. In order to make a Pareto diagram you need to perform a number of actions, starting from listing the action, cause or source and their frequency and placing

them in a table. Categories should be presented from the largest, left side, to the smallest, right side. Then you need to calculate the sum of all the categories that are in the table.

The next step is to calculate the total percentage presented by each cause, source or action and add this value to the table. The next step in creating the Pareto diagram is to put the causes on the x-axis and the cumulative percentage on the y-axis. The cumulative percentages from different sources and categories, marked with respect to the y-axis, should be combined by drawing a cumulative curve. On the same graph, place the causes on the x-axis and the percentage frequency on the y-axis using a bar graph. When the diagram is created, it is time for its analysis. Search for the breakpoint on the cumulative percentages chart that separates the more significant problems, costs, defects or places of their occurrence from the trivial ones. A significant change in the slope of the chart will help to determine this point. This point indicates where the analysis should be done in order to eliminate it as a priority [25]. The Pareto diagram is a tool used for total quality control and Six Sigma. It allows you to highlight the main critical factors. It determines which 20% of the sources caused 80% of the defects, errors or costs incurred in the production process. It indicates which categories or factors should be corrected, corrected or improved. Moreover, it provides information which categories are necessary to solve first. This method can also be used when checking changes already made to find out whether the improvement has had the intended effect.

Conclusions

1 Benefits of the SMED principle for the enterprise:

- Increased flexibility - companies can adapt to changing customer needs without spending on additional inventory;
- Faster deliveries - reducing the size of production batches reduces the duration of the production cycle and thus the lead time and delivery;
- higher quality - reducing the size of stocks means reducing the number of shortages resulting from the storage of the product or semi-finished product; at the same time, proper preparation and organization of equipment settings allows for the reduction of shortages resulting from setting errors and eliminates the need for test series for a new product;
- increased productivity - shorter set-up times reduce machine downtime, which means a higher equipment productivity factor.

Benefits of the SMED principle for the employee:

- Increased changeover safety - by simplifying tool changeover rules, with less physical effort or risk of injury;
- Facilitates production and increases safety - Reducing material inventory means less clutter at the workplace, making production easier and safer;
- workstation arrangement - rearming is standardized and simplified, which means fewer tool changes and therefore fewer things at the workstation.

The changeover time for internal operations has been reduced from 120 minutes to 9 minutes, i.e. by 89.2%. For the above results, it is worth mentioning the fact of gaining 56 minutes or 46%. This is related to the introduction of 5S rules and changeover standard for individual operations at the workstation, which has contributed to eliminating the need for unnecessary search for tools as well as unnecessary movement of operators. The introduction of 5S rules was only connected with cleaning up workstations with unnecessary materials and tools and assigning the necessary equipment to a fixed place.

The presented research analysis shows the validity of the method by achieving the goal of 15 minutes. It should be remembered that after introducing all the improvements in the production process, the level of 9 minutes will be reached. After the first stage of the project implementation, the machine time was reduced by 46%, with the amount spent on investments equal to 0 PLN. The introduced changes were associated with the transfer of a significant amount of internal works to external ones.

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Modern Tools and Techniques of Employee Training in The Era of Remote Work and Education

Joanna LISOK
Silesian University of Technology, Gliwice, Poland
Joanna.Lisok@polsl.pl

Abstract

In the twenty-first century a manager should be characterized by excellent performance, experience, supported by knowledge and knowledge of modern information technologies. Virtual reality (VR) is a three-dimensional image that was created by computer. VR can represent different objects, objects and even whole events. Depending on the concept, virtual reality is based both on elements of the real world and completely fictional. The easiest way to say it is to say that this term simply means a virtual imitation of reality. VR is the ideal solution in cases where the implementation could actually be extremely expensive or particularly dangerous. So now it can be used, for example, for various types of training of future pilots, or conducting surgery classes in medical studies. In such situations, virtual reality allows you to gain a real and valuable experience in a virtual and maximum safe world. In most cases it is also the most economical solution. More and more often in the field of logistics or management engineering effective methods of training management and employees are sought.
The young generation born in the era of modern IT solutions is more willing to undertake training based on modern solutions. One of them is the application of so-called augmented reality (AR), which combines the real world with the virtual world. The AR usually uses the image from a camera and then overlays the computer generated 3D elements on it. Nowadays, AR is used, similarly to VR, in aviation, medicine or automotive, as well as for marketing purposes, e.g. in applications for smartphones, which allow users to virtually change the color of the walls, or to place furniture from a given store in the room. There is no doubt that virtual reality is a technology that will be further developed - both in terms of entertainment and applications in various industries.
The ability to combine modern technologies and proven Lean management methods is undoubtedly a desirable feature among managers. In the article, the author will characterize the methodology of effective training of employees, with an indication of the group of society that shows particular predispositions for effective education.

Keywords: Lean, Virtual reality (VR), augmented reality (AR), IT.

VR Technology

In the XXI century there has been a development of information technologies and devices for visualization and tracking of user activities by observing their movements and location in a virtual environment. With the increasing use of modern visualization software dedicated not only to personal computers but also to smartphones, and due to the rapid development of computer technology to generate real-time images, universities are also looking for innovative solutions to reach students through the senses: sight, hearing and touch. The diversity of student learning strategies must be taken into account, so the use of Virtual reality (VR) in education is a response to the specifics of modern times and the expectations of future employers. As a creative creator, the student consciously seeks modern techniques of obtaining information, thanks to which he or she can educate many valuable skills, such as: independence in planning and performing tasks and cooperation in a team. In this context it is necessary to acquaint students with soft competences, but also with modern technologies supporting elements of teamwork.

Digitization has become a source of communication, information and knowledge acquisition, and in view of this reality, the traditional methods of educating students require significant improvement in terms of the form of communication, which is quite a challenge for university managers. To follow new trends in education, new technical solutions, such as virtual reality, are willingly introduced. The SAMR model developed by Dr. Ruben Puentedur can help in understanding the place and importance of new technologies in education. At this point it should be noted that the role of a lecturer should remain very important and boil down primarily to the position of a mentor or professional expert in knowledge and effective learning. The key to the optimal use of the available technology dedicated to educational purposes is a much greater knowledge of the lecturer as well as his experience in the tools he uses when working with students. The SAMR model describes four levels of introducing new

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educational technologies in didactics and allows to better understand how we use modern tools. SAMR stands for the first letters of the four words in English:

- Substitution,
- Augmentation (enlargement, extension),
- Modification (modification),
- Redefinition.

On the one hand, this model describes different ways of using technology in teaching, but on the other hand, it also shows how the most constructive change in the teaching process occurs. In the 1930s, thanks to Pygmalion - Stanley G. Weinbaum's glasses, the user could experience a fictional world through holography, smell, taste and touch. In hindsight, the experience Weinbaum described as a visionary of the development of technology, for those who wore glasses, allows to reproduce the experience of virtual reality. In the post-war period new possibilities were created, which focused mainly on experiences with the image of illusion. In the mid-fifties, another creator, Morton Heilig, developed Sensorama, the so-called analog virtual reality. The invention, patented in 1962, was a theater cabinet that would stimulate all the senses, not just sight and sound. The Sensorama included stereo speakers, a stereoscopic 3D display, fans, odor generators, and a chair that could be put into vibrations. Heilig, whose next invention was a telescopic mask (patented in 1960), was also the first example of a head-mounted display (HMD), with no tracking capability. The headset allowed to provide stereoscopic 3D vision and wide vision with stereo sound. In 1961, engineers at Philco Corporation (Comeau & Bryan) developed the first HMD, which is known today as Headsight. This device gave the ability to combine a video screen for each eye with a magnetic motion tracking system that was connected to a closed camera.

The system produced by Comeau and Bryan engineers was not a virtual reality due to the lack of computer simulation, but was definitely the first step in the evolution of VR HMD. The head movements, on the other hand, allowed the remote camera to be moved, thus allowing the user to look at the surrounding environment naturally. In the following years Ivan Sutherland, introduced an impression device as a 3D image. Three-dimensional images are created using stereoscopic and non-stereoscopic techniques, among them the most advanced is the hologram technique, currently used in cinemas and on mobile video devices. In 1969, Myron Kruegere, creator of computers with virtual reality, developed a series of experiences that he called "artificial reality". Projects such as: glowflow, metaplay and psychic space) is a phenomenon of immersion, which has found its fullest artistic expression in the field of video installation and interactive cinema. This technology enabled communication with each other in a friendly environment generated by the computer, regardless of the distance between the listeners. The term Virtual Reality (VR) was introduced in 1986 by an intellectual, Jaron Lanier, who defines VR as a technology that provides stimulation to the senses, causing the illusion of presence in digitally created spaces. Over the next few years, software companies have been working onThe games have been outdoing each other all the time in the inventiveness of their products. And so one of those that conquered the market were games on the Nintendo Virtual Boy console (initially known as VR-32). The 3D gaming console, VR-32, was announced the first portable console that can display real 3D graphics. In 1999. Witchowski's film - Matrix gave direction to the development of virtual reality, as the film showed characters who live in a simulated world. It should also be noted that although some earlier films, such as Throne in 1982 and Man in Space in 1992, began to present themselves in virtual reality, the company's "Matrix" had a major impact on culture and promoted the topic of simulation to the mainstream. In the era of globalization, access to smartphones has given new opportunities to individual customers, who can now use games and other mobile applications with virtually no major limitations. It is worth noting that a company such as Google has released temporary virtual real products (Google Cardboard), or an equal type of devices supporting basic human activities, as exemplified by a DIY headset, for calling and giving first aid using smartphones. A real specialist in novelties is Samsung, which has taken up this concept and is developing further with new products. Currently we are observing the development of VR, which has taken place since 2012, thanks to the goglomeration of virtual reality, e.g. the "VR": Oculus Rift, invented by Palmer Luckey, a teenager who used the existing solutions, adding some of his own ideas.

For many years in the field of cooperation between psychologists and engineers, the research work included, among others, video games, as a model of internally motivated science. Within an effective learning environment based on educational games, the student works in such a way as to achieve a certain goal, taking various challenges along the way, making key decisions with their consequences. Techniques such as control mechanisms, challenges, curiosity, cooperation or rivalry are a basic element of motivation theory. The basis for understanding the application of the VR technique in education is to become acquainted with the systems thanks to which a person can see at least on the display of virtual glasses so-called goggles (headset) the simulated environment, while at the same time being tracked by a device that imitates its movements and reflects them in virtual reality, which is something like moving in a created world. Because in order to immerse yourself in the virtual world from a technical point of view, you need the so-called game engine, which deals with the interaction of game elements. The engine can have built-in

modules for graphics, inputs, networks, or artificial intelligence (AI). It is most often performed using an object-oriented paradigm, in which programs are defined by means of objects - elements connecting the state described by means of data, most often called fields and behaviour, so called procedures and methods. New market. The technology is very resilient and dynamic, while following new trends. As a result, game engine manufacturers outdo each other in the ingenuity of new software applications. At present, on the global market of new technologies, two engines, which are products of leading brands, deserve attention. An example of such an engine is Unreal Engine created by Epic Games, whose main features are simulation of physics, possibility of animation, artificial intelligence, and the ability to add various algorithms. The second engine, in turn, which is used on a large scale, is Unity 3D, a product of the global Unity Technology platform, which is very popular in the world as an integrated environment for creating 3D and 2D computer games or other interactive materials such as visualizations or animations. This system is very often used by individual users as it allows to create applications also for web browsers, as well as personal computers, video game consoles or mobile devices. Such an action indicates that it can be said that new technologies are now available for every average user. On the basis of the latest statistics provided by the Virtual Reality Brief portal, it appears that almost 85% of educators have access to virtual reality devices, but they are used by only about 8% of the audience. Despite the fact that virtual reality technologies are entering the world of science very dynamically, there is still a concern about involving more experienced lecturers in the use of new teaching techniques. Perhaps the reason for such a belaying approach should be found in the ignorance of the advantages of VR or in the lack of an idea for implementing such scientific aids. However, the experts note the need to introduce virtual reality into education, as it allows to provide experiences that are directly compatible with the material given during lectures, using VR, which in their opinion is even advisable. Researchers involved in VR education should consider the benefits of developing experiences that reflect and support the existing curriculum, especially in cases where it is not possible to implement many experiences in the actual conditions of the university.

Technologies extending the current reality or allowing to create new realities, or combining them, are already ready, and the main potential of education based on the augmented reality technique lies in the VR method - i.e. the superimposition of information generated by the computer on real objects, as well as work on virtual objects, in the real environment. Education in combination with VR makes it possible to create artificial laboratories where research can be carried out - both amateur and professional for learning purposes.

The most obvious application of VR, for example: for the aviation industry, is the training of cabin crew. One aviation organization uses VR to support the training not only of pilots, but also of flight attendants and ground crews. Publicly available popular flight simulators have been used for years and can also be used at home. In professional space, companies such as Boeing have created simulators, based on the construction of a real airplane cockpit, replacing windows with film screens. It should be remembered, however, that this is only a training tool, because this type of simulators are expensive and unwieldy. Today, companies using VR technology aim to modernize the simulators. Various types of interactive simulations deserve attention, which have been operating for years on both the home and professional market. The combination of e.g., Oculus Rift DK2 type head displays, precise gesture sensor and Leap Motion controllers with D-BOX seats and their own landscape rendering engine make the new BIS simulator possible to experience virtually stunning sensations that exactly mimic every aspect of the flight, from control to switching on and off the engines with sound effects, as well as vibrations during turbulence. Future Visual from VR at the symposium of the International Air Transport Association (IATA), presented a concept for training airline personnel in external aircraft inspection. Using the Oculus Rift head display, participants could go through the whole process of walking on the aircraft before the flight, checking it for malfunctions or problems, and then locating the security equipment inside the aircraft. During the E3 fair in 2019.

Microsoft has announced that the new Flight Simulator is already advanced in production. Microsoft Flight Simulator is the next instalment of the valued flight simulator, which was launched on the market in 2020, as the team operating under the wings of the American giant completed the latest instalment of the Microsoft Flight Simulator series. It will give the opportunity to sit behind the wheel of a variety of aircraft, both larger and smaller, both during the day and night and in favourable or unfavourable weather conditions. The latest instalment of the popular simulation series will allow you to visit various corners of the planet, which have been mapped with great attention to detail, which was achieved, among others, thanks to satellite images. Microsoft producer informs that Microsoft Flight Simulator will allow to create and upload modifications, which in turn will satisfy both old and completely new fans of this series. To sum up, virtual reality is more and more appreciated in the scientific community, because every area of science, raises issues that are worth exploring, even tangibly. Thanks to the new technology, students can experience, among other things: remote places that would be too expensive, e.g.: in standard field trips. For example, thanks to VR, students can take part in a virtual trip to the airport to visit the airport infrastructure and learn about the organization of work at the airport. VR gives endless opportunities to move to places that are usually inaccessible such as space. There is also evidence that the experience of VR is very different from other learning techniques because it causes an emotional connection between the student and the

subject discussed during classes. Experts also suggest that information provided by VR is more easily absorbed and stored by the human brain. So far, virtual reality techniques have been known to be used in the military and medicine on a large scale. Nowadays their value has been appreciated both in safety, ergonomics and even mining. New technologies are used for various types of simulations and training of personnel in case of emergency situations. VR training is especially useful when training in natural conditions can endanger health or life. One of the proposals of the cabin manufacturer in the UK EDM are virtual reality headphones (VR) used in cabin crew training to meet the growing demand from airlines for modern technology. The headsets can be used in conjunction with existing EDM aircraft fuselage models, and the entire EDM range also includes replicas of aircraft doors to instruct stewardesses on how to open them in an emergency as well as in normal use. Crew training using the VR simulator has proven to improve memory and concentration, while simplifying complex training scenarios. VR training offers a pleasant way to learn, which allows for greater involvement and understanding during the training, taking into account different learning styles and skills.

3D Scanning

The author of the article will talk about 3D scanning on the example of a project carried out for the Police in the field of documenting the place of the event. The main part of the forensic event site inventory is its visual inspection. By following the forensic techniques, they allow to extract evidence, secure traces and identify the perpetrators of the event. These visual inspections are sometimes crucial for the whole procedure, as they allow for an accurate reconstruction of events using appropriate tools. A breakthrough in forensic technology is the possibility of using laser scanning technology during the inspection of the site of the event. Previously, this technology was used mainly in the geodesic, construction or reverse engineering industries. The main advantage of ground-based laser scanning of the event site is its accuracy. Depending on the complexity of the surveyed area, the number of sites to be scanned increases. The selection of this number of stations results from the necessity to eliminate the so-called dead areas, i.e. those places which cannot be covered by the laser. As a result of establishing the reference system and connecting the scan-scanning stations with each other, we usually obtain a point cloud of several million. This cloud, which is a combination of the components of the laser scanning files, reflects the area under analysis and is also an input image for further processing. Measurements, spatial analyses and various transformations can be performed directly in the native software attached to our scanner as well as in dedicated software available on the market. Dedicated software gives forensic scientist more possibilities for detailed analysis, because it has built-in functions and algorithms used in the reconstruction of events. Completing the selection of evidence based on the point cloud is the ability to create diagrams and site plans and simulations, which are a form of documentation of the performed activities. The laser scans used in the work were made during the inspection of the forensic event sites using the following scanners. The following software was used during the research and a number of operations on the laser scanners:

- Z+F LaserControl,
- VXElements,
- Maptek I-Site Forensic,
- SolidWorks,
- IronCAD,
- DXF online file browser,
- Adobe Acrobat Reader DC.

The digitalization process consists in converting a physical object into a digital object (reverse engineering), ready for further processing. The initial effect of this process is a point cloud, on the basis of which we can build first a surface model of the area under study and then a solid model. Laser scanning is one of the most modern and dynamically developing technologies used in practice today. The 3D scanners used in the process of laser scanning allow to quickly obtain detailed information on the topology of the environment and the characteristics of objects thanks to remote sensing technology. On the basis of this information, it is possible to map the real object in the form of its digital equivalent. It should be mentioned here that the digital model is created while maintaining the actual dimensions of the examined element. Laser scanning in relation to forensic examination is particularly important due to its accuracy and versatility. A very important aspect is the fact that the scanning is carried out using a contactless method, which is of great importance in forensic science due to securing evidence of crime. By taking measurements from several positions we are able to obtain an almost ideal reflection of the place of the incident. On the basis of a precisely performed scan we are able to easily determine, among other things, the braking distance of the vehicle, the degree of surface deformation, shoe imprint and other key aspects relevant to the evidence. An inseparable element of the scanning system right next to the 3D scanner itself is the control unit in the form of a computer. The scanner is connected to this unit with USB and VGA cables. The scanner is controlled by the software installed on the control computer. This software usually requires considerable computing power from the central unit. For research purposes, a computer with the following high parameters in terms of graphics

card, memory, and high-speed suction disk was used. A "strong" central unit is an essential element in the process of processing digital images resulting from digitalization. Laser scanning gives us almost unlimited possibilities for 3D visualization of the forensic inspection site. Computer programs adapted to work with scans process obtained digital images from single point registrations. The number of processed scans depends on the examined place of event. Depending on the area to be visualized and the range of the scanner, it is necessary to select an appropriate number of scan positions. In practice, usually this number oscillates around a dozen or so scan sites. After combining the scans from individual stations we get a 3D model of the entire room where the crime took place. The three-dimensional model is fully mobile, which means that it can be freely rotated, scaled, browsed, divided into batches and highlighted.

An important role in processing the resulting scan files is played by the method of combining them into one whole. Measurements taken from several scan locations should be recorded in one whole in order to create reliable documentation from forensic inspection sites. It is essential to have a model of scanner orientation in space. The Maptek environment allows the user to view the scanner orientation parameters recorded during the process of terrestrial laser scanning. By using the available settings, the user is able to accurately record the position of the scanner in relation to the individual steps of the scanned area. When registering the position of the scanner, the user is forced to provide the spatial coordinates of its location. Using the preview settings offered by the Maptek environment, the user only needs to enter a few numbers representing the scanner's location in space and its angular range. The software automatically downloads information about the 3D scanner model used. Depending on the number of scan locations of the inspection area, the user is forced to register the same number of component scans. Using the available configuration of the scanner settings, this process is not very cumbersome but only time-consuming. If all the component scans are registered correctly, the user should create a complete scan of the entire area. In order to do so, he has to register the global component scans. Figure below shows the global registration configuration window for the scans. The user specifies which component scans are to be merged into one whole. He also specifies the method of their rotation and displacement. It is possible to indicate which of the component scans will be the reference point for the rest of the component scans. The user can use a built-in algorithm to optimize the recording of scans. In case of choosing the intelligent filtering option, the algorithm omits points that may hinder more accurate registration. On the other hand, if the intelligent sampling option is selected, the algorithm selects fewer, more strategic points for faster recording of scans. However, the use of this procedure worsens the degree of accuracy of matching the component scans into one whole. Maptek environment has a built-in library of markers used to describe traces found at the crime scene (victim models, reference points, descriptive plaques, text fields, etc.). The illustration below shows a group of holes in the wall resulting from a gunshot with marked flight trajectories.

A number of operations performed in the Maptek environment and conversions to data obtained in the process of ground laser scanning, such as:

- geometric calculations and CAD capabilities,
- creating animations, reports, plans and diagrams,
- Intelligent linking and filtration of measurement data,
- analysis of blood splash trajectory,
- analysis of the bullet's trajectory,
- detection of surface changes,
- analysis of the bombing,

show that users using Maptek software can process measurement data in many ways.
A series of actions taken and research in the scope of possibilities and functionalities offered by the Maptek software allow to clearly state that the research hypothesis is correct. All actions taken in the work prove that Maptek environment allows the user to process the measurement data from the places where the event was inspected in such a way as to adjust it for the needs of the report from the place respected by authorities and court experts.

Automation of Information Flow

Knowing what is happening on the production floor and where is happening is essential to maintain continuity of production - especially when it comes to failures and malfunctions. The person in charge of maintenance in a given area must have current access to such information so that he or she can react quickly and plan to counteract the threats. Let's take a look at what this looks like in the Profesal Maintenance system, where it has been solved on the basis of the so-called "resource manager". The person assigned in the system with this role, as responsible for the machine or other object, gets an automatic notification in case of a failure or malfunction, by e-mail or SMS. The content includes information defined in the notification scenario, such as the cause of the failure, its priority,

description, and attached files. All persons with access to the system have access to information about the person who accepted the order, with whom they cooperated during repairs and how long it took. An interesting use of the system is one of the clients from the real estate industry. FM Solutions provides comprehensive technical services for large-area properties throughout Poland. Its aim is to constantly improve and respond to the needs of its clients and continuously optimize processes in order to provide even better services to its clients. Facility managers and a team of specialized technicians see clients from the complexes to which they are assigned as a supervisor. This solution significantly affects the timeliness and quality of services, raising them to an even higher level. In addition, they receive notifications with the necessary information, which minimizes the response time to new faults. If the system is integrated with SCADA or MES software, the application created in them is automatically sent to the system. Here, data exchange takes place much faster than in the case of traditional request creation, but it lacks a description of the situation created according to employee analysis. Such automation of information flow is close to the idea of Industry 4.0. and on its basis we can predict how in the near future service robots, having information from other systems, will be able to send each other information on servicing via Internet Things. For example, there may be an option to automatically send tools necessary for repair, via mobile robots, to a designated employee.

Conclusions

The use of newer and newer solutions to visualize processes, places and events is a real challenge in the 21st century, due to the many different applications and tools introduced to the market practically every day. A future-oriented engineer is one for whom operating modern tools is not a problem.

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Search and Rescue System in The Polish Zone of Responsibility, Planning Issues

Norbert CHAMIER-GLISZCZYNSKI
Koszalin University of Technology, Koszalin, Poland, norbert.chamier-gliszczynski@tu.koszalin

Jerzy FIUK
jerzyfiuk@op.pl

Roman STRYJSKI
University of Zielona Góra, Zielona Góra, Poland, r.stryjski@iizp.uz.zgora.pl

Abstract

The article deals with the planning and evaluation of the functioning of the maritime search and rescue system. Based on emergency flight reports collected over the 25-year period of the system's operation and numerical simulations, an analysis of the system's effectiveness was carried out. The analysis of experiences indicates the need to modernize the system due to the long flight times of rescue units and the large uneven distribution of arrival times in the area. With the use of mathematical modelling and programming tools, a number of simulations were carried out to reflect the actual rescue operations. The following criteria were adopted for the evaluation: time to the rescue point, flight speed taking into account wind, available operational time, length of the search path and fuel supply. The results indicate that virtual system simulations can be very useful in the processes of planning, risk assessment, cost analysis and planning logistic activities.

Keywords: Search And Rescue (SAR), planning.

Introduction

Provision of activities aimed at searching and saving life at sea and combating threats and pollution of the marine environment results from international conventions to which the Republic of Poland is a party: the International Convention on Sea Search and Rescue (SAR Convention - search and rescue) and the Convention on the Protection of the Marine Environment the Baltic Sea area (Helsinki Convention). The Polish Maritime Search and Rescue Service SAR was established on January 1, 2002. The Republic of Poland has accepted the obligation to ensure the operation of 24-hour air and sea service and SAR coordination in its territory, territorial waters and in the open sea. A search and rescue region is an area of the sea adjacent to the coast of a state, in a body of water to which it has committed itself to fully coordinate its search and rescue operations. Assistance in this area should be provided to any person in distress at sea, regardless of their nationality, status or the circumstances in which they were found. Each region of responsibility for search and rescue is created by an agreement concluded between states. The region of responsibility for search and rescue at sea in the Republic of Poland is limited by a line passing through the following points (Fig. 1):

a) a point with coordinates: φ = 53° 55′ 45.45″ N λ = 014° 13′ 40.78″ E,
b) point with coordinates: φ = 54° 55′ 00″ N λ = 014° 22′ 00″ E,
c) part of a circle with a radius of 16 NM deletion from Ronne airport on Bornholm,
d) point with coordinates: φ = 54° 55′ 00″ N λ = 015° 08′ 11″ E,
e) a point with coordinates: φ = 54° 55′ 00″ N λ = 015° 52′ 00″ E,
f) point with coordinates: φ = 55° 50′ 45″ N λ = 017° 33′ 15″ E,
g) point with coordinates: φ = 54° 27′ 28.63″ N λ = 019° 38′ 30.96″ E.

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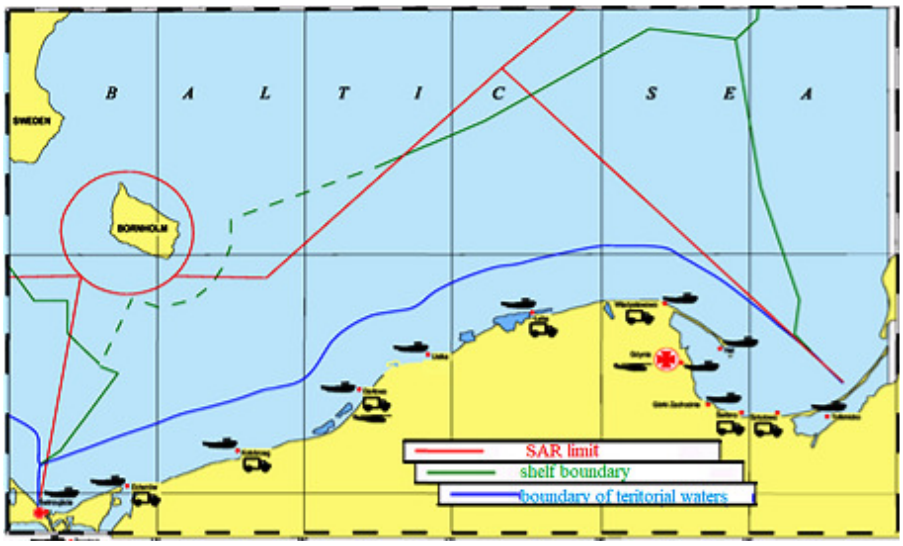

Fig. 1: The Polish zone of maritime search and rescue responsibility in the Baltic Sea (DZ. U. 1991)

The basic tool that secures the functioning of the SAR system in the Polish area of responsibility is a helicopter. Until recently, the following helicopters were used in Polish aviation for sea rescue: Mi14PŁ/PS, Mi-8MTW-1/Mi-17, PZL W-3RM Anakonda and Mi-2. Currently, only the Mi14PŁ / PSiW-3RM Anakonda helicopters are available to rescue services. M-28 Skytruck planes are also used, however, it is the helicopters that determine the effectiveness of rescue operations. There are plans to purchase modern equipment that will enable the effective functioning of the sea rescue system.

Taking into account the conditions of the functioning of the Polish responsibility zone in the Baltic Sea and the technical equipment of units participating in rescue operations, an important issue is the planning process of individual rescue operations as well as the aspect of the location of base stations where helicopters are stationed.The aim of the article is to present the issues of the location of base stations in the Polish SAR zone of responsibility and the issues of planning rescue operations.

Literature Analysis

In the article (Barbarosoğlu et al., 2002) the authors present a mathematical model of mission planning for a helicopter fleet during humanitarian aid operations during various types of disasters. The decisions inherent in the problem are hierarchically broken down into two sub-problems where tactical decisions are made at the highest level and routing and loading decisions are made at the basic level. Consistency between distributed problems is achieved through an iterative coordination procedure that brings the expected information from the baseline to improve decisions at the highest level. The existence of conflicting multiple goals in this hierarchical structure requires the development of a multi-criteria analysis, and an interactive procedure for assessing the preferences of alternative undominant solutions has been developed with the top decision maker.

The similarities of the presented model to the Search and Rescue System are as follows:

- the problem concerns the deployed base stations (warehouses),
- the location of the destination is non-deterministic and unknown beforehand,
- getting medicines from the warehouse to the first aid point is a similar transport issue,
- there is also the transport of injured persons to health care facilities, where the time of operation is the most important.

The mobilization of logistics resources within a mission includes both tactical and operational decisions, which can be briefly defined as follows:

1. determining the fleet composition, taking into account the operational parameters of the helicopters,
2. assignment of pilots according to training for a given helicopter type and day and night flight loads,
3. determination for one helicopter, the number of flights to the destination,

4. determining optimal flight plans, with partial satisfaction of the demand (many helicopters supply a single point),
5. plans for loading / unloading, delivery, handling and rescue of each helicopter during each route,
6. refuelling and airworthiness renewal planning.

The mathematical decision model at the tactical level concerns decisions 1, 2 and 3, it is in fact a model of integer mathematical programming whose criterion function is in the form (Barbarosoğlu et al., 2002):

$$\text{Min} \qquad Z_1 = \sum_i \sum_j \sum_k w_{ik} R_{ijk} + \sum_i \sum_j \sum_k \sum_m \sum_{q \in P_k} v_q^{ikm} Z_q^{ijkm} \qquad (1)$$

where:
w_{ik} is the cost of the assignment of a *k*-type helicopter from home base and base of operations, R_{ijk} is the cost of the assignment of a *k*-type helicopter from home base and base of operations, v_q^{ikm} is the cost of assigning pilot *q* on duty at base *m* to a helicopter type *k* from home base , Z_q^{ijkm} binary decision variable indicating that pilot *q* on service at base *m* is assigned to helicopter *j* of type *k* located at home base.

The Z_1 function is a function that minimizes the cost of selecting different helicopters and assigning crews to them to complete the mission.

The article (Azofra et al., 2007) presents a tool for determining the objective location of rescue resources in the study area. At the stage of building the tool, the authors took into account such factors as: incident characteristics (e.g. type of vessel, scale of damage to the vessel), type of incident, location of helicopters, tugs, patrol boats together with parameters describing their operation potential (e.g. range of operation) and Cost-effectiveness. An attempt was made to build two variants of models, i.e. an individual model in which the criterion function depends on individual rescue operations and a zone model in which each call is aggregated to the position of a super incident, and the criterion function is a function of the distance between the starting base and the incident site. The authors indicate that the developed tool makes it possible to identify an object-oriented solution that is independent of the interregional policy in a given country. Furthermore, they emphasize that further research should be directed towards predicting the occurrence of incidents requiring the intervention of search and rescue services.

In turn, in the work (Afshartous et al., 2009) the authors referred to the problem of the location of US Coast Guard air bases, from which rescue units set off for individual calls. A solution was determined that would be resistant to the uncertainty of the location of rescue operations. The approach of integer linear optimization was applied together with simulation of discrete phenomena based on statistics based on real data. A model of spatial statistics was developed, which on the basis of the available real data from rescue operations creates a measure of the statistical intensity of rescue operations.

In the article (Wagner and Radovilsky, 2012), the authors presented an integer programming model that optimally assigns rescue resources to databases. On the basis of the obtained results, it is possible to recommend changes that will contribute to the reduction of unnecessary supplies of rescue units in some bases and supplementing them in other bases. In addition, in crisis situations, the model takes into account the possibility of servicing the demand in the base by the rescue unit from the neighbouring base.

Razi and Karatas (2016) presented a multi-criteria optimization model for the location of search and rescue resources, in which the input data are rescue operations recorded by the Turkish SAR service. The authors point out that the activities of search and rescue services should be well planned, coordinated and optimized due to the aspect that time efficiency determines life and death. They postulate that a well-developed SAR service plan is one in which the number of rescue units has been appropriately and sufficiently assigned to incidents, there are optimal response times, low operating costs, a balanced distribution of loads between individual rescue units, and reasonable implementation of business and technical rules.

In the article (Wagner and Radovilsky, 2012), the authors presented an integer programming model that optimally assigns rescue resources to databases. On the basis of the obtained results, it is possible to recommend changes that will contribute to the reduction of unnecessary supplies of rescue units in some bases and supplementing them in other bases. In addition, in crisis situations, the model takes into account the possibility of servicing the demand in the base by the rescue unit from the neighbouring base.

Razi and Karatas (2016) presented a multi-criteria optimization model for the location of search and rescue resources, in which the input data are rescue operations recorded by the Turkish SAR service. The authors point out that the activities of search and rescue services should be well planned, coordinated and optimized due to the aspect that time efficiency determines life and death. They postulate that a well-developed SAR service plan is one in

which the number of rescue units has been appropriately and sufficiently assigned to incidents, there are optimal response times, low operating costs, a balanced distribution of loads between individual rescue units, and reasonable implementation of business and technical rules. This model is based on official maritime preparedness guidelines and can be used to evaluate various contingency system designs with regard to the number, capacity and location of search and rescue helicopters by modelling the extent of the area under consideration (for future research it may be interesting to took design thinking tools into consideration, Kostrzewski, 2018). The model uses environmental data. It contains a number of stochastic parameters that show a complex system of dependencies and interdependencies between the locations of base stations and incidents. As a result, a contour map is generated to visualize the rescue capability. The case study presented in the paper concerns the Barents Sea, which is characterized by long distances and difficult environmental conditions. It shows possible solutions of the crisis response system in this area. The model is based on the determination of the capacity matrix *C*, which is the number of people that can be taken from the sea by a rescue helicopter in time t^{max}, each C_{txy} element of this matrix is determined from the relationship (Razi and Karatas, 2016):

$$C_{txy} = \sum_{r=1}^{|R|} \frac{(t^{max} - t^{mob} - A_{rtxy})E_r}{P_{txy}} \tag{2}$$

where:
$r \in R$ is the *r*-th helicopter belonging to the set of all rescue helicopters assigned to the bases from which it is possible to reach the point *(x, y)*,t^{max} is the critical time of a man in a protective suit at sea, t^{mob} is the time to put the helicopter on standby, A_{rtxy} is the flight time matrix of the *r*-th helicopter in the *t*-th time period to points *(x, y)*,E_r is a modelled coefficient of cooperation effectiveness of many rescue units in one place of the operation (the more helicopters, the smaller their share in increasing the rescue capacity), P_{txy} is the calculated time needed to pick up one person from the sea in the *t*-th time period at the point *(x, y)*.

In the paper (Karatas et al., 2017), the authors presented a hybrid model of resource allocation of the SAR service, which includes an integer programming model, a simulation model and a rule-based algorithm. For example, the following input data were used in the simulation model, i.e. the distribution of the probability density of rescue actions (based on historical data), weather conditions, helicopter failures, the distribution of base stations and the helicopters stationed in them.

Akbari, Eiselt and Pelot (2018) conducted a multi-criteria analysis of the location of SAR resources in Canada. The activities were based on the service-customer structure, which is the same as the location of fire stations, the location of medical facilities or the location of ambulance stations. The following assumptions were made in the research process:

- the average speed used to calculate the SAR units journey time is equal to its cruising speed taken from the technical specifications,
- the access time is the same as the travel time, where the time of the survivor's taking operation is omitted in the model,
- environmental influences, e.g. wind force, sea state, visibility are not taken into account,
- time losses on coordination and planning of the action are not taken into account,
- the maximum admissible access time in primary and secondary coverage is six hours,
- the available units capable of responding to the call belong to the set of units assigned to the fleet.

Model of the SAR system in the Polish zone of responsibility

Identification of elements of the ***AR*** rescue action model:
- organization of a rescue flight with specification of the purpose of the flight, the level of readiness of the rescue operation, weather conditions (hydro meteorological),
- determination and indication of helicopter type used for the action, taking into account its operational capabilities (number of places on board, flight duration),
- helicopter crew with special regard to the level of training (daily, night, IFR, VFR flights), crew composition (presence of a doctor, lifeguard),
- implementation of the task, taking into account the readiness of the helicopter, the crew, the starting place for the action, the course of the action (searching for a person or persons, object), the costs of the action,
- logistics protection of the rescue operation.

The individual elements of the model are marked with individual symbols and the model of the ***AR*** rescue action is presented in the form of an ordered five, i.e.:

$$\boldsymbol{AR} = \langle \boldsymbol{OL}, \boldsymbol{ST}, \boldsymbol{ZS}, \boldsymbol{RZ}, \boldsymbol{ZLA} \rangle \quad (3)$$

where:
$\boldsymbol{OL}$ – organization of the rescue flight,
$\boldsymbol{ST}$ – means of transport (helicopters),
$\boldsymbol{ZS}$ – helicopter crew,
$\boldsymbol{RZ}$ – task fulfillment,
$\boldsymbol{ZLA}$ – logistic supply.

To build the SAR system model it is necessary to know the organization of the rescue flight, means of transport used for the action, information about the crew of the means of transport (helicopter), knowledge of the components necessary to perform the task.
For modelling purposes, we assume that the organization of an $\boldsymbol{OL}$ flight can be saved in the form of an ordered triplet:

$$\boldsymbol{OL} = \langle \boldsymbol{CL}, \boldsymbol{PG}, \boldsymbol{WP} \rangle \quad (4)$$

where:
$\boldsymbol{CL}$ – flight destination,
$\boldsymbol{PG}$ – readiness level,
$\boldsymbol{WP}$ – hydrometeorogical conditions.

The mapping of the flight order model, the level of readiness of a given rescue operation, weather conditions prevailing during the rescue operation are parameters of the system structure that may decide about the functioning of the system or its non-functioning. In accordance with the adopted assumption, the purpose of the $\boldsymbol{CL}$ rescue flight is the mapping of the structure of the SAR system in the Baltic area and in the designated area of land. For modeling purposes, we assume that the structure of the rescue flight is presented in the form of the SAR system model, i.e.:

$$\boldsymbol{CL} = \langle \boldsymbol{G}, \boldsymbol{F} \rangle \quad (5)$$

where:
$\boldsymbol{G}$ – graph of SAR system structure based on actions carried out in the past,
$\boldsymbol{F}$ – a set of functions defined on elements of the graph $\boldsymbol{G}$.

Further considerations using graph theory (Izdebski and Jacyna, 2018; Janecki et al., 2019; Soczowka et al., 2020; Izdebski et al., 2018; Wasiak et al., 2019; Zak, 2013; Zochowska et al., 2010; Kozlowski et al., 2020) will be the subject of subsequent publications. In this article, it is enough to mention that the SAR rescue system is a complex system in which characteristic subsystems can be extracted. In turn, each subsystem is characterized by a structure described by the transport network (Woźniak et al., 2016) of the system (all possible places located in the area of the rescue operation carried out).
For the purpose of modelling rescue operations, we assume that $\boldsymbol{ST}$ transport resources can be saved in the form of an ordered two:

$$\boldsymbol{ST} = \langle \boldsymbol{TS}, \boldsymbol{MO} \rangle \quad (6)$$

where:
$\boldsymbol{TS}$ – helicopter type,
$\boldsymbol{MO}$ – operationalcapabilities.

Means of transport are characterized by various technical, operational and economic parameters. Depending on the type of helicopter, its operational capabilities are different. Currently, two types of helicopters participate in rescue operations: Mi-14PS and W-3RM.
For a full description of the model (3) it would also be necessary to distinguish such model mappings as:

- representation of the crew of the $\boldsymbol{ZS}$ helicopter,
- mapping the implementation of the $\boldsymbol{RZ}$ task,
- mapping of logistic security for $\boldsymbol{ZLA}$ shares.

Simulation studies of the SAR system in the Polish zone of responsibility

A series of stochastic numerical simulations of the flight of the rescue unit to a point within the Polish SAR zone of responsibility, in the Baltic Sea and in the land part were carried out.
The simulation tests were carried out due to the fact that in the Polish zone there are two bases from which rescue operations are carried out. The simulations are intended to check whether increasing the number of bases will

improve the availability of rescue units operating in the SAR system. The following elements were taken into account in the simulation:

- meteorological conditions (wind direction and speed),
- operational and operational parameters of rescue units (fuel supply, flight speed, etc.),
- geographic location of base stations and geographic coordinates of the boundary points of the area of responsibility.

In the simulation, criteria indicators were calculated at randomly generated points within the area under consideration, especially that randomization is of high importance in simulation research Kostrzewski (2020), Kostrzewski et al. (2020), Gontarczyk et al. (2016). The simulation is based on the concept of assigning a base and a rescue unit to each point in the area. After assignment, the journey between the base and the point was calculated taking into account all simulation parameters, including variable wind conditions. Criterion parameter maps created in this way are used to evaluate the functioning and capabilities of the system.

Figure 2 shows the operational fuel supply for helicopters taking off from specific bases. There is a division into two areas assigned to both databases. Other types of helicopters with smaller fuel tanks take off from the EPOK base. Due to the fact that the fuel consumption of this type is lower than the helicopter starting from EPDA, it can achieve similar length of search path with less fuel reserve.

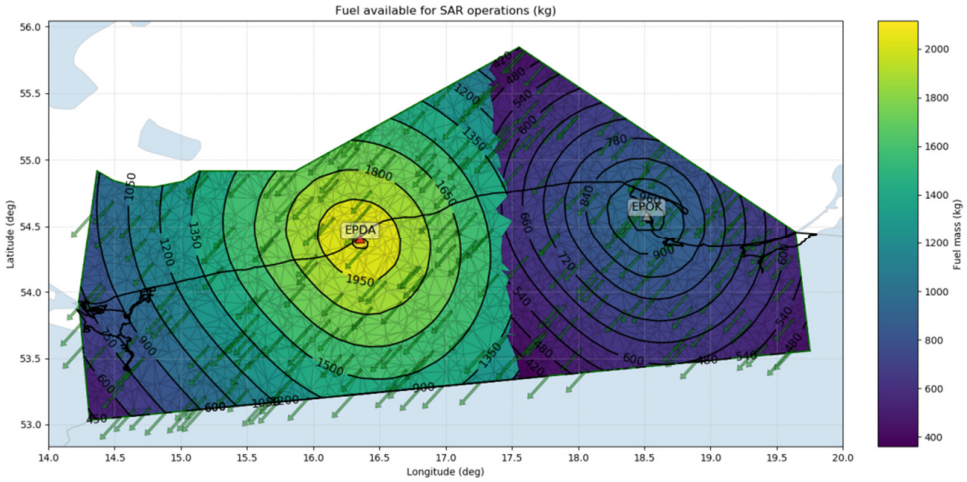

Fig. 2: Operational fuel reserve in search and rescue operation

Figure 3 shows the length of the search path that directly determines the search capabilities of the rescue unit at a given point. This length, depending on the size of the searched object and the hydro meteorological conditions (wind, sea state, visibility), translates into the surface area of the area that can be effectively searched; the longer the length the better. Despite the differences in the type of helicopter, these lengths are similar.

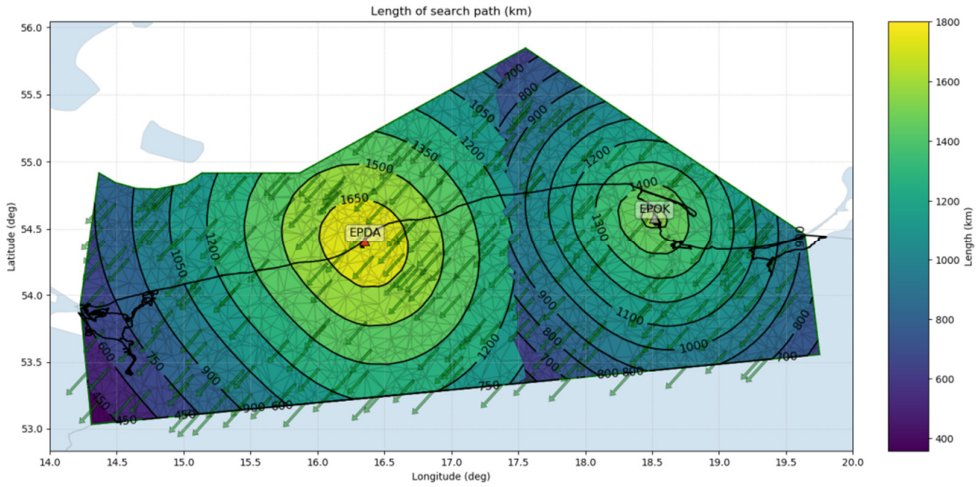

Fig. 3: Search Path Length

Figure 4 shows the available operating time, which is calculated assuming average fuel consumption under hovering conditions (maximum fuel consumption). This value takes into account the amount of fuel needed to return to base and all necessary supplies.

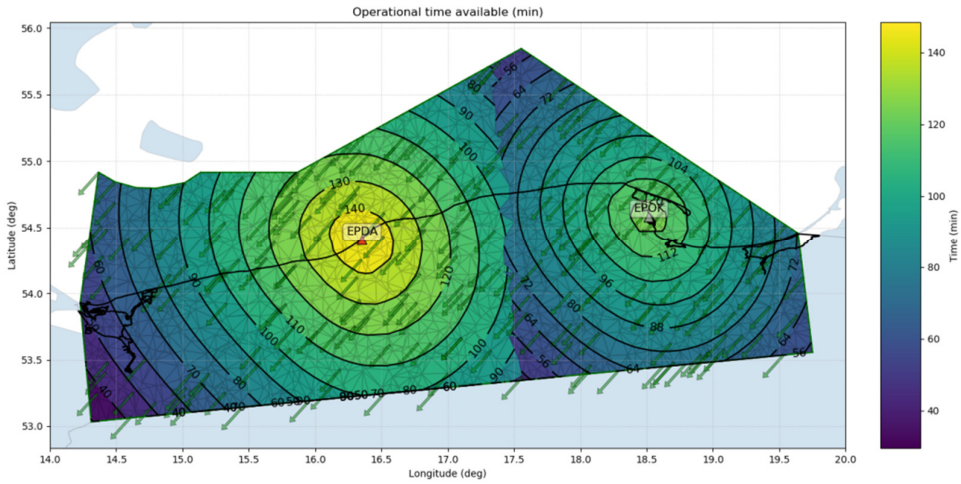

Fig. 4: Operating time available

Figure 5 shows the ground speed to the destination point, taking into account the effects of the wind. In the presented, exemplary scenario, the differentiation of the forward speed depending on the direction of flight has been shown. This translates directly into the time of reaching the point, as shown in Figure 6. This indicator is the main criterion in planning the allocation of rescue resources in the SAR system, because the shorter the time to reach the disaster point, the greater the chances of success and saving lives or property.

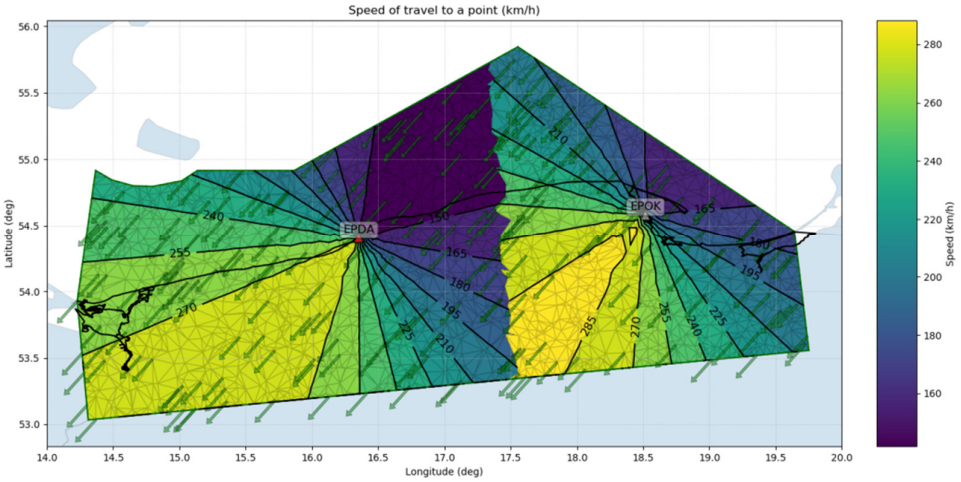

Fig. 5: Average speed of reaching the point

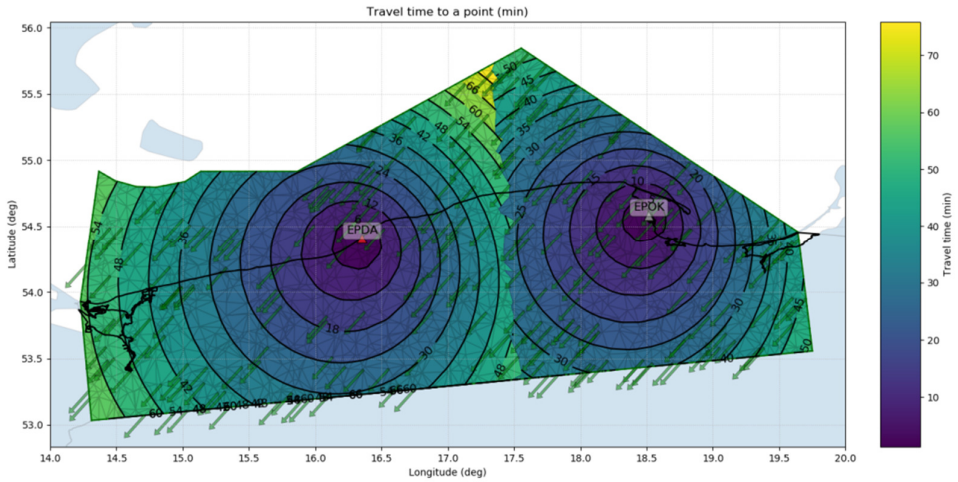

Fig. 6: Average time to get to the point

Conclusions

Both the analysis of the literature dealing with the SAR issue and the simulations carried out lead to the hypothesis that increasing the number of rescue bases and the use of helicopters with a high level of technical advancement, and thus reduced fuel consumption, increases the availability of rescue units and thus increases the level of safety of people and maritime units. Modern simulation tools make it possible to predict key performance and efficiency indicators of the system and the impact of nondeterministic parameters on the result. The presented simulation shows how the area of the Polish SAR zone is covered with indicators such as: rescue service availability time, search and rescue potential expressed in the length of the search path. Numerical simulations are characterized by a relatively short computational time, in addition, it is not required that the system function in reality. Nevertheless, it is possible to predict the key figures at the stage of planning the deployment of rescue resources and infrastructure. Performing virtual rescue operations using mathematical models and programming tools allows you to test a large number of system configurations and make a qualitative comparison. It is very useful in the processes of planning, risk assessment, cost analysis and planning of logistics activities.

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Organisation of Healthcare Systems In the Context of the Healthcare Models Implemented

Katarzyna ŁASIŃSKA,
University of Zielona Góra, Poland, e-mail: k.lasinska@adm.uz.zgora.pl

Ryszard STRYJSKI,
University of Zielona Góra, Poland, e-mail: r.stryjski@inz.uz.zgora.pl

Waldemar WOŹNIAK
University of Zielona Góra, Poland, e-mail: w.wozniak@iizp.uz.zgora.pl

Sławomir ZWIERZCHLEWSKI
Poznań University of Economics and Business, Poland, e-mail: s.zwierzchlewski@ue.poznan.pl

Abstract

This article presents the health systems of selected European countries. Different models of health systems and their implementation are presented. The solutions used in different European countries provide an opportunity for comparison and proposals that can improve the efficiency of the health systems.

Keywords: Health Policy, Public Health, Health Protection, Health System.

Introduction

According to the WHO (2000) definition, a health system is defined as a cohesive whole whose multiple, interrelated parts, collectively, have a positive effect on the health of the population. The health system is, in turn, an organised and co-ordinated set of activities, the aim of which is to implement preventive, therapeutic and rehabilitation services and services, aimed at securing and improving the health of the individual and the collective (Marcinów 2011). It is a conceptually isolated whole, the parts of which, together, contribute to the success of the whole and this success is understood as the fulfilment of the mission of health policy.

Models of Health Systems

A characteristic of the organisation of modern healthcare systems is the presence of an intermediary between the patient and the physician. Most frequently, this *rôle* is assigned to private and state insurance companies, central budgetary units and local budgets. This means that the health sector can be funded simultaneously, albeit to varying degrees:

- from universal insurance contributions paid by the employee and employer,
- from general taxes and
- from voluntary contributions

The classification of traditional health systems takes into account the three basic sub-systems and the related three models (Suchecka 2010):

- Bismarck's Universal Health Insurance model,
- Beveridge's National Health Service model,
- the private, free market insurance model,

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The Universal Health Insurance Model.

This model assumes the existence of mandatory health insurance (*public-contract model*, *social security contribution*). It was first created by the German Chancellor Otto von Bismarck in 1883. Its aim was to protect the population from the unintended consequences of unforeseeable random events that could contribute to loss of income and threaten the material existence of parts of society (Białynicki-Birula 2010); it displays the following characteristics (Depta 2011):

- the patient is free to choose the healthcare provider from among those who have entered into the relevant contracts.
- the expenses for benefits for the insured are covered by income from premiums collected by insurance institutions.
- local authorities who have no control over statutory funding are legally responsible.
- the global budget is a mechanism for funding hospitals,
- the remuneration of family doctors is linked to the agreed terms of the contract or they receive a fee for the benefits provided,
- treatment-related costs, such as medication, may be covered in full or in part,
- the state sets a precise legal framework for its operation and supervises the system.

The model of Universal Health Insurance is based on the assumption that diseases are treated in terms of social risk. In accordance with the principle of solidarity, its effects are reduced by spreading the risk to wider social groups, that is, to the co-insured. It assumes, to a wide extent, the use of the mechanism of the public contracting of benefits – the institution of the public funder (such institutions being both state agencies and insurance companies). The financial means collected from the insured are used in order to create funds for contracting health services with healthcare providers from different sectors. Hospital care is dominated by the public sector, while outpatient care is dominated by the private sector. In Bismarck's model, there are many healthcare insurers who compete for the insured and their premiums. Politicians do not have much influence over the allocation of health funds (Bundsministerium 2019).

The National Health Service Model

The National Health Service Model assumes funding for health services by allocating funds through a *publicly-integrated, tax-funded model*. This implies a dominant state position, as is evidenced by the fact that the majority of healthcare providers are in the public sector. It combines elements of Universal Health Insurance with a public guarantee of access to healthcare. It was introduced in 1948, in Britain, by Lord William Beveridge. The basis for this system was the much earlier Social Security Act of 1911. Beveridge excluded medical care from the social security system, creating a special fund financed by general taxes. The health service also became distinct, in terms of management and organisation, with universal health benefits receiving funding from the state budget. Characteristic of this model is the provision of services to all, regardless of social status. The state has a responsibility for universal access to health services and performs this duty through the National Health Service. Healthcare is funded through general, as well as through local, taxes.

The functioning of this system is governed by the following principles:

- all citizens are guaranteed health safety, or are excluded on the basis of a negative list
- health services for citizens are free and offered widely;
- health funding comes from the state budget, is mainly sourced from taxes and depends on state revenues; the amount is allocated annually by Parliament
- family doctors enter contracts as independent health sector players;
- decisions on the funding of health benefits are taken centrally;
- National Health Service employees, on employment contracts, are officially dependent on the state, which acts as a monopoly, creating strong subordination within the service;
- the healthcare system is governed by legislation.

The system, based on Beveridge's model, is dominated by the belief that the health of citizens is a public good and its protection is the duty of the state. The system is based on a bureaucratic model and has most of its flaws. The lack of competition and private operators reduces its effectiveness.

Also, in the countries of central and eastern Europe, the model of a centralised healthcare system was in place after World War II; it was, however, based on a model created in the 1930's in the Soviet Union by the People's Commissar for Health, one Nikolai Siemashko (Rutkowska-Podołowska et al 2011). The system built on this model had state

funding and, like Beveridge's model, was centrally managed. It was founded on the basis of full, equal and free access to health services for the whole of society. Co-funding only occurred when buying drugs.
The general principles of this model are:

- financing from taxes through the central budget;
- government control and organisational uniformity of the whole system under central management;
- the hiring, by the state, of the medical staff;
- a full range of completely free benefits, except for certain medicines available in outpatient care;
- nationwide attitudes towards prevention;
- public participation in activities promoting health and the protection, thereof;
- the health sector is considered a non-productive part of the national economy;
- no private service sector.

The Free Market Model

The Free Market Model is based on voluntary health insurance; it is a residual model with *a private insurance/provider; most of the systems are mixed and there is private financing*. The private health insurance model assumes the dominance of the private sector in healthcare, mostly operating on a profit basis. The benefits are funded by insurance companies and the absence of insurance means that the full cost of treatment is covered directly by the patient. Only strictly defined categories of people, such as pensioners and the disabled are covered by public health programmes (Prędkiewicz 2011).

The main principles of this system are that:

- the health of the individual is independent of public health because the state participates in a very limited range of healthcare organization;
- individuals themselves bear health risks by devoting a portion of their income to current or future entitlement to health benefits;
- healthcare is funded by private citizens and is treated equally with other sectors of the national economy;
- medical services are financed through private insurance;
- public health benefits are only available for certain groups of people, that is the seriously financially disadvantaged, the elderly and mothers and children in particularly difficult material situations.

The free-market model, which is not present in Europe, shifts responsibility for health from the state to the citizen. Healthcare is treated as a fully-fledged branch of the economy.

Legal basis and public sector expenditure on health in EU countries

The financing of medical care is not uniformly legally regulated in the European Union. Legal bases are diverse and reflect different social choices. Regulations have been limited in scope and have related mainly to public health since the 1990's. This is linked to the rapid development of this medical field. This situation was influenced by emerging epidemiological threats such as BSM, Avian Influenza and the rise of AIDS in Europe. On the other hand, financial crises in the European countries indicated that attention should focus on preventing disease and promoting health which, in the longer term, saves the national budgets' money. Health protection was first mentioned in the original law of the European Union in the Treaty of Rome, then in the Uniform European Act. It was only in the Treaty of Maastricht that clear regulations were made, which were later transferred to the Treaty of Amsterdam. These concerned the following issues:

- activities in the realm of health and safety at work (*the Treaty of Paris of 1951*)
- improving working and living conditions as one of the primary objectives of the community *(the Treaty of Rome of 1957*)
- striving for a high level of health protection (*provisions of Article 129 of the Maastricht Treaty of 1992, which is now the content of Article 152 of the Treaty of Amsterdam, 1997*)

Article 152 of the Treaty of Amsterdam, in force since 1 May 1999, imposes a high level of human health protection within EU countries, together with the removal of sources of health risks and the prevention of disease. The activities of the European Union in the field of healthcare organisations, generally cover the following areas:

1) establishing high standards of quality and safety in human organs, in substances of human origin, in blood and in its derivatives,
2) taking measures to protect public health in veterinary and plant protection areas,

3) protection and improvement of human health without interfering with the laws of the member states; it is the responsibility of the Member States, not the European Union, to provide and finance healthcare. It is the Member States who organise the health service and the health insurance system in their own right (Paszkowska 2006).

Despite differences in organisation and funding, health systems in EU countries are based on common values, as recognised by the Council (2006) of Health Ministers in 2006: universality, access to quality care, fairness and solidarity (European Commission 2017) .

The communication of the European Commission (Report 2016) on effective, accessible and resilient healthcare systems sets out a strategic agenda for healthcare systems in the EU. The public sector plays a crucial *rôle* in funding health benefits. It funds more than 70% of healthcare spending in 18 of the 27 EU Member States.

Member States with the highest share of expenditure on public health sector are the Czech Republic (83%), Denmark (84%), Germany (85%), Luxembourg (83%), The Netherlands (81%) and Sweden (84%).

In 2015 public spending on healthcare amounted to 7.8% of GDP across the EU. The ratio of healthcare expenditure to GDP, which is equal to *or higher than* the EU weighted average, was recorded in eight Member States: Belgium, Denmark, Germany, France, the Netherlands, Austria, Sweden and the United Kingdom. Member States with the lowest share of public health expenditure were Cyprus and Latvia (3.5%), while rates below 5% were recorded in Bulgaria, Estonia, Lithuania, Hungary, Poland and Romania.

Healthcare funding in OECD Countries

Depending on the healthcare model assumed, there are different methods of financing healthcare. For OECD countries, this is shown in Table 1. The following healthcare models dominate here: Universal Health Insurance and a National Health Service; these are used in a similar number of states. In the OECD group of countries, only the USA operates private health insurance, despite a reform introduced by President Obama, in 2010, that introduced mandatory insurance and from which President Trump's administration intends to withdraw, albeit partially.

Table 1: Healthcare financing in OECD countries in relation to the healthcare model implemented

Universal Health Insurance	National Health Service	Private Insurance
Austria, Belgium, the Czech Republic, France, Netherlands, Japan, Korea, Germany, Luxembourg, Mexico, Poland, Slovakia, Switzerland, Turkey, Hungary, Lithuania, Latvia, Estonia, Bulgaria, Romania	Australia, Denmark, Finland, Greece Spain, Ireland, Iceland, Canada, Norway, New Zealand, Portugal, Sweden, United Kingdom, Italy	the USA

Source: self-published by A. Wagstaff, (2009), Evansa and Etienne (2010),

Table 2 shows the evolutionary changes of healthcare models in OECD countries (1960-2006). Denmark, Greece, Iceland, Norway, Portugal, Spain and Sweden moved away from universal insurance in favour of the direct financing of healthcare from taxes; conversely, the countries of the former eastern bloc, *namely, the Czech Republic, Poland, Slovakia and Hungary* moved away from

Table 2: Healthcare Models in OECD countries

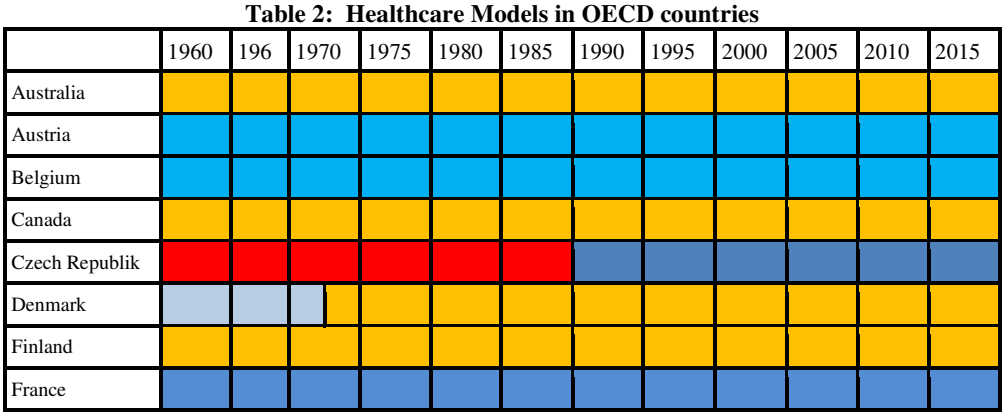

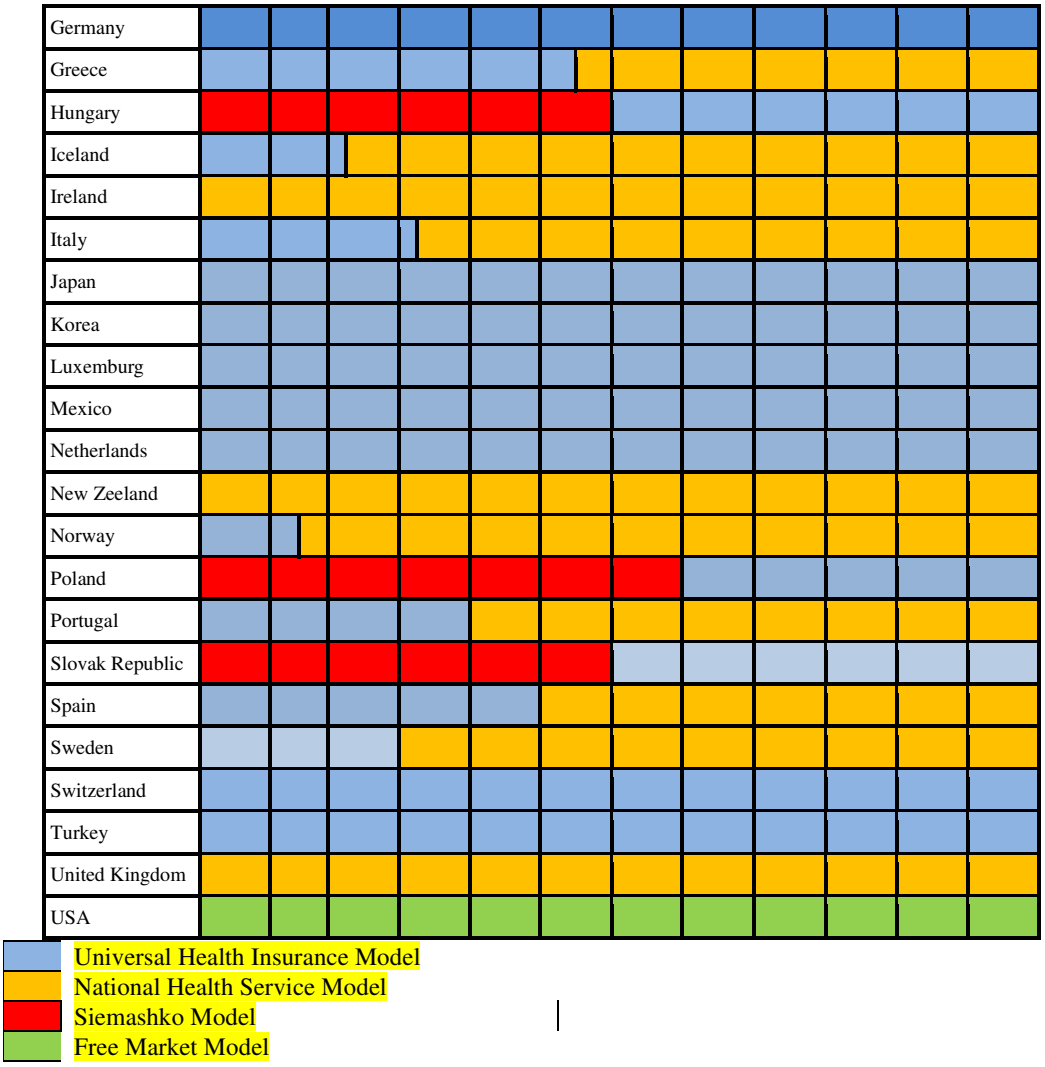

Source: self-published by Saltman and Dubois (2004), Carrin and James (2005), Rothgang et al (2010)

universal insurance, in favour of the direct financing of healthcare from taxes, *after* their regimes changed. In Poland, Universal Health Insurance was introduced in 2003 after the liquidation of the Healthcare Funds and the establishment of the centralised National Health Fund. After the changes that took place in 2016 *and thereafter,* the Health Fund has increasingly been a system based on budget funding.

Due to rising spending on healthcare, especially in relation to overall public spending, reforms are being implemented in almost all developed countries, to curb its growth. Therefore, typical model solutions are not used in their pure form (Białynicki-Biryla 2012).

On the one hand, societies want their health needs to be fully met, which is increasingly costly. On the other hand, however, there is a need to maintain solvency within a state's financial system. Therefore, two types of action are being taken:

- an increase in the efficiency and rationalisation of expenditure in the health sector, related to better healthcare management, and
- an improvement in access to healthcare by increasing the health protection coverage of the population.

Table 3 shows the mechanisms for consolidating healthcare funding in OECD countries, as well as their advantages and disadvantages. The main direction of the evolution of healthcare systems leads to the formation of intermediate systems.

Table 3: Mechanisms for consolidating healthcare funding in OECD countries

Mechanisms for the consolidation of financial means	Advantages	Disadvantages	Countries where the mechanism is dominant
Budgetary funds	- Broad access to benefits, – Differentiation source of funds	Dependence on the budgetary situation, - Necessity to compete with other sectors for budget resources	Australia, Canada, Denmark, Finland, Greece, Spain Iceland, Ireland, Norway Portugal, Sweden, United Kingdom, Italy,
Universal Health Insurance	– Stable amount of income, – Transparency of funding	- Effectiveness depends on social, - economic and political factors, - Generally higher costs of administering the system	Austria, Belgium, Czech Republic, Estonia, France, Netherlands, Luxembourg, Germany, Switzerland, Israel, Japan, South Korea, Poland, Slovakia, Slovenia, Hungary, Turkey
Private health insurance	– Less pressure on public funds	- Access to benefits limited to people with insurance policies - Vulnerability to market failure typical of insurance	the United States

Source: self-published by Gottret and Schieber (2012)

In most countries, public funds for health protection are collected at a national level, which means that there is a single risk pooling entity; this is the case for example, in Belgium, Canada, Japan, France, Hungary, Ireland, the Netherlands, Portugal and Poland.

The exception are countries where healthcare is co-financed by local taxes; these include Denmark, Finland, Italy, Sweden and countries where Universal Health Insurance funds are responsible for collecting contributions from their own members, such as in the Czech Republic, Germany, Slovakia, Greece and Austria. In the case of countries with local, tax-based funding, there is usually a compensatory mechanism aimed at redistributing funds to increase income and resources in regions with lower tax revenues. These mechanisms are characteristic of most countries and are designed to increase financial means in funds whose members have lower incomes or represent higher health risks. In countries where the organisation of healthcare is based on the model of Universal Health Insurance, systems, *proven in countries with similar national systems and vice versa,* are introduced. In most countries, the healthcare system is decentralised, resulting in regional health policies.

Payment, either partial or total, for certain medicines and patient health benefits and expenditure control mechanisms are introduced on a wider scale. The *rôle* of the state increasingly comes down to policing the effectiveness of health funding and making healthcare providers more efficient. The importance of the general practitioner (GP) acting as the guardian of the system is growing, especially in countries with Universal Health Insurance, which has hitherto been a hallmark of the National Health Service System. Market mechanisms in health allocation processes have been adopted and accepted. The internal market (*'quasi markets', so-called*) was created by separating the function of the funder, that is the fundholder, from the function of the service provider. In these systems, the implementation of health benefits is based on contracts concluded between public bodies acting as funders and service providers. In some countries, such as Switzerland, there is full freedom to contract benefits, while in others, like the Netherlands and the Czech Republic, there is a limited possibility of signing a contract, known as *'selective contracting'*. Similarly, in National Health Service Systems, the direct management of health units (*directly-financed facilities*) has shifted away from the predominant direct management of health units to self-reliance in the broad meaning of this term, enabling the introduction of *selective contracting rules.* For example, in the UK, the NHS, i.e., *the National Health Service***,** *which was hitherto a symbol of hierarchically integrated healthcare and where the production and funding of services took place under a single, organisational system*, internal market solutions have been successfully introduced, since the early 1990's.

Conclusions from the comparison of public health funding systems

When comparing public health funding systems, one can see that each has its own advantages and disadvantages.

Virtually none of them exists in pure form. Systems built primarily by developed countries exploit the advantages and try to minimise the disadvantages of individual models. Most European countries built their systems using the experience of their predecessors, such as the German Chancellor Otto von Bismarck and Lord William Beveridge in the United Kingdom and the People's Commissioner for Health in the USSR, Nikolai Siemashko.

In the free-market model that is not present in Europe, responsibility for health has been transferred from the state to the citizen and health protection is treated as a fully-fledged branch of the economy.

Regardless of the shape of the healthcare system and the value of the budget and the funding model adopted, the flow of funds between the funder and the providers of benefits is ultimately important. Changing the funder alone does not guarantee the proper quality of the funds.

The issue of the flow of funds between the funder and the provider actually consists of two questions: the quality of securing access to benefits and the quality of the management of public funds. That is, the *de facto* question of how effectively the state apparatus operates in this regard. It should be noted at the outset that this question should not be understood in terms of the sense of the Minister of Health and, above all, *sensu largo*, in terms of the foundations of the state.

The main determinant of the effectiveness of a health system is its ability to improve the health of the population. However, this condition is determined by a number of different factors.

According to M. Lalonde (1974) , Canada's Minister of Health and Welfare, the biggest impact on every person's health, up to 50 per cent, is lifestyle. This is followed by physical environment (20%) and genetic factors (20%). Healthcare has the least impact (10%). Meanwhile, healthcare systems provide some 100,000 jobs, equal to around 90% of all healthcare spending. Expenditure on health education and lifestyle development is only 1.5%, while its impact on mortality reduction is 43%. All of this must be taken into account when assessing the effectiveness of spending on the healthcare system. It follows from these considerations that it is necessary to invest in the health of citizens through education and prevention. It is better to teach society how to eat healthily and live actively than to treat the costly effects of being overweight or obese.

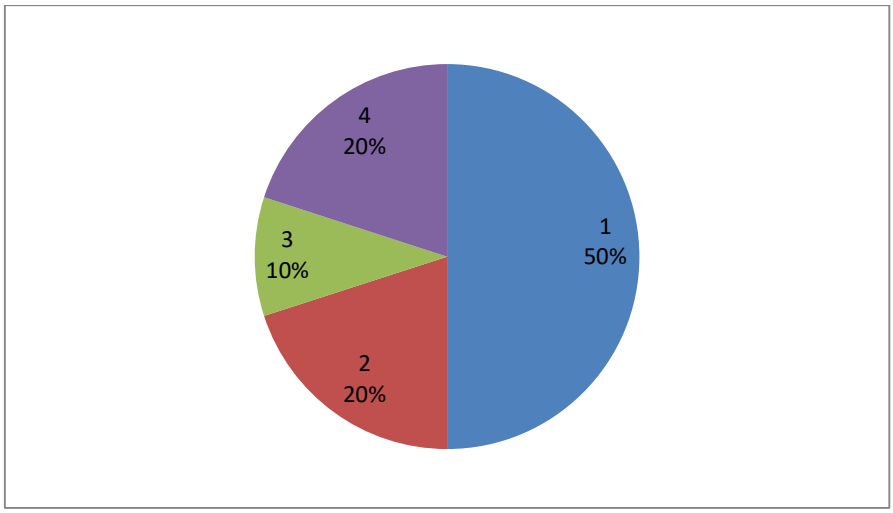

1 – factors related to life style
2 - genetic factors
3 - factors related to the model of healthcare system
4 - environmental factors

Fig. 1: Effects of various factors on health

Source: self-published by M. Lalonde (1974)

The promotion of healthy lifestyles, including physical activity and proper nutrition, should be the result of co-ordinated action by public authorities, medical bodies and patients' organisations. It is also necessary to define a coherent, comprehensive and multi-annual prevention strategy aimed at maintaining a healthy lifestyle and preventing disease.

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Development of Eco-Innovations in Polish Enterprises

Mariusz KOSTRZEWSKI
Warsaw University of Technology, Warsaw, Poland, mariusz.kostrzewski@pw.edu.pl

Magdalena MARCZEWSKA
University of Warsaw, Warsaw, Poland, mmarczewska@wz.uw.edu.pl

Norbert CHAMIER-GLISZCZYNSKI
Koszalin University of Technology, Koszalin, Poland, norbert.chamier-gliszczynski@tu.koszalin.pl

Wiesław STANIUK
STERLOG Polska Sp. z o.o., Gdańsk, Poland, w.staniuk@sterlog.pl

Abstract

The aim of this paper is to analyse, describe and discuss the processes contributing to the development of product eco-innovations in companies-suppliers of environmentally sound technologies (ETSs) in Poland based on Technology Readiness Levels (TRL) model. The key research question in this paper is: How do companies-suppliers of ESTs develop product eco-innovations? The paper is based on empirical data gathered through qualitative research techniques: in-depth, semi-standardized and semi-structured interviews. The research results allowed to identify and describe two main scenarios of developing eco-innovations in Polish EST companies. First, to use the idea of an innovator, and then develop it personally or with the help of specialists from previously existing company or research institution (this path was usually followed). Second, to set up a company specifically to create a new product. Common to both scenarios of creating eco-innovations are: the variety of knowledge areas necessary to create new technologies, the importance of knowledge, experience and competences of actors involved in the process of creating innovations, and the need to conduct research and development activities, cooperation between the entrepreneurs and users aimed at improving offered technologies and adjusting them to market needs. The detailed process of developing product eco-innovations was described based on TRL model. In case of Polish companies some phases TRL3 and TRL4, as well as TRL5 and TRL6 overlap, whereas TRL7 was not performed at all.

Keywords: Eco-Innovation, Environmental Innovation, Technology Development, TRL

Introduction

The paper covers an important and up-to-date topic related to eco-innovations. It is focused on new product solutions created in the environmental technologies (further: ETs) sector (eco-innovations). In the era of increasingly strong pressure from public policy to implement environment-friendly solutions, learning how to build them is crucial for further development of ETs management. This issue has not yet been fully developed in literature, especially with regard to Polish ETs suppliers (Piotrowska 2012; Urbaniec 2015; Ryszko 2016; Marczewska 2016). According to Ostraszewska and Tylec (2019), interest in the idea of sustainable development increased together with reorientation of companies towards eco-innovative strategies. Both terms are associated with the perception of the eco-innovations, which on the one hand are caused by necessity and on the other hand by a chance for promotion and development of a particular company. Although there is an increasing interest in this research topic, most of the existing research covered mainly developed countries and focused on process eco-innovations regardless of industry or within a specific industry, e.g.: Triguero et al. (2013), Noci and Verganti (1999), Brunnermeier and Cohen (2003), Frondel et al. (2008), Horbach et al. (2013), Nawrocki et al. (2018), Krolikowski et al. (2020), Jacyna et al. (2017), Kowal et al. (2018). Among the specific industry usually chemical, manufacturing industry and service sector were mentioned, as well as recently printing industry: Lipiak and Salwin (2019), steel production (manufacturing): Korol et al. (2016), Ryszko (2016),

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agriculture: Dudek and Wrzaszcz (2020), logistics planning for food grain industry (environmental conscious logistics): Maiyar and Thakkara (2019) and many others. The research of Ostraszewska and Tylec (2019) showed that less than one third of the EU countries can be treated as innovative and eco-innovative, nevertheless Poland was not mentioned among these countries.

The aim of this paper is to analyse, describe and discuss the processes contributing to the development of product eco-innovations in companies-suppliers of environmentally sound technologies (further: ESTs) in Poland Technology Readiness Levels (TRL) model ((Sanchez, 2011). The key research question in this paper is: How do companies-suppliers of ESTs develop product eco-innovations?

The next section of the paper focus on indispensable definitions' analysis in order to present the research area and settle it in overall methodology. It is followed by theoretical framework and a presentation of a research method. Subsequent section provides results of empirical research and describes the development of eco-innovations. The paper ends with conclusions.

Focus of Analysis

The paper aims to explain how companies-suppliers of ESTs develop eco-innovative products. The focus of this analysis is graphically presented in Figure 1.

In order to follow the logic of the paper, it is necessary to build a common understanding of the following terms and concepts, that were used as a basis of presented research:

- ESTs: "technologies that have the potential for significantly improved environmental performance relative to other technologies." (International Environmental Technology Centre, 2003: 16; European Commission, 2002: 5);
- Innovations: "implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations." (OECD, 2005: 46);
- Eco-innovations: "the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives." (Kemp and Pearson, 2007: 7); since production and logistics processes are similar to and accompanying each other, then this definition might include logistics processes, logistics products and services as well, Kostrzewski (2018: 41);
- Product innovations: "the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics." (OECD, 2005: 48).

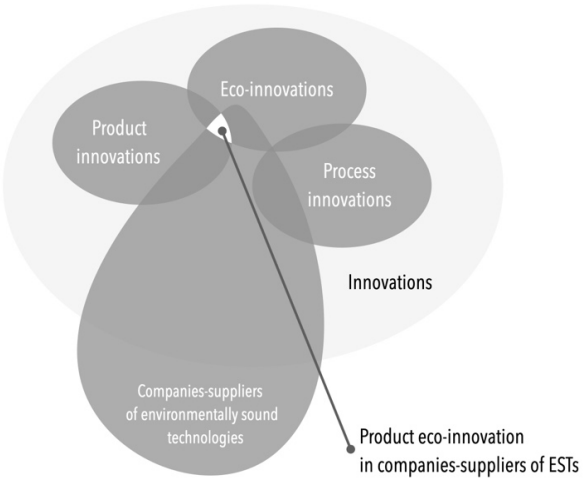

Fig. 1: Focus of analysis. Source: own elaboration based on International Environmental Technology Centre (2003: 16), European Commission (2002: 5), OECD (2005: 48-51), Kemp and Pearson (2007: 7).

The analysis of the above presented concepts and their graphical presentation (Figure 1) leads to the conclusion that not every ETS is innovative. Many of these technologies lack the novelty element therefore are hardly innovative. Such technologies are certainly important for the environment, nevertheless the most desirable are those technologies, which incorporate novelty since they lead to general development. Thus, the research presented in this paper is focused on innovative ESTs (eco-innovations). The study focuses exclusively on product eco-innovations developed in the ESTs industry, which in this paper are interchangeably termed eco-innovations, innovations or environmentally sound technologies.

Theoretical Framework

The emergence of ETs depends on many factors such as knowledge, experience, available products, services, equipment, procedures as well as organizational and managerial systems. A thorough, universal description of the ETs that would reflect their nature and the development process, and could be related to any geographical, technological and economic conditions seems to be a challenge. Environmentally friendly technologies in a given time and geographic context will certainly be replaced in the future by other, greener solutions. Similarly, what is considered eco-friendly in one country or region does not necessarily has to be seen this way in other regions (International Environmental Technology Centre, 2003: 16). That is why, companies while developing or transferring environmentally friendly technologies should consider specific socio-economic, cultural and environmental factors of the region they operate or wish to focus on (Tébar et al. 2005: 7).

The development of eco-innovations relies on existence of appropriate market mechanisms and regulatory instruments. Well-developed environmental standards can be one of the factors supporting their development, use and transfer (Chaudhuri and Mukhopadhyay, 2013: 206). The factors influencing the development of such solutions may vary depending on, inter alia, the type of technology, its individual characteristics and the sector in which it is created (Berkhout, 2005: 77-79). Fundamental differences regarding development process can be distinguished between innovative product and process solutions (Cleff and Rennings, 1999; Rehfeld et al., 2007). Findings on the impact of environmental regulation on product and process innovation development, given in Cleff and Rennings (1999), document their greater impact on the emergence of process innovation. Regulations and environmental policies are particularly important for the development of ESTs in the mature, heavily polluting sectors of the economy (Fukasaku, 2005: 251-267). On the other hand, other market forces (Cleff and Rennings, 1999) and investments in R&D (Rehfeld et al., 2007) are crucial for product innovation development. These in case of process innovations, have a negligible effect.

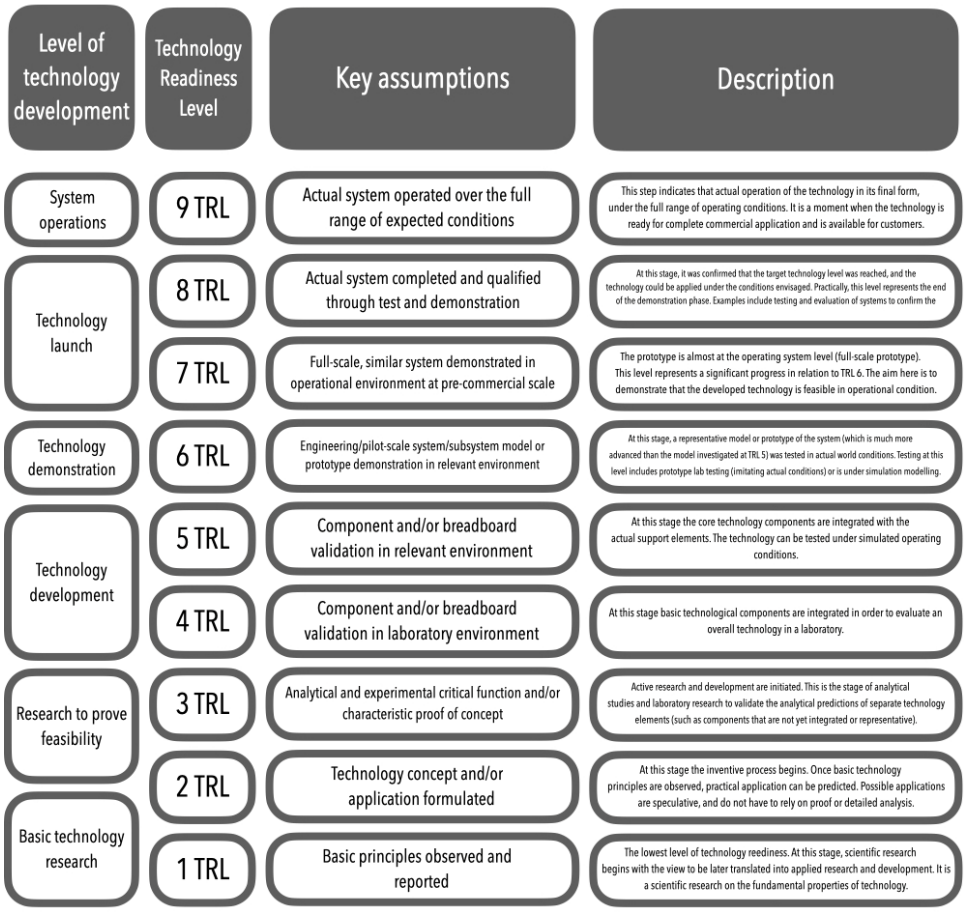

Fig. 2: Technology readiness levels in TRL model. Source: own elaboration based on Sanchez (2011: 22), Dz.U. MON 2007 nr 18, poz. 191: 964 and Dz.U. 2011 nr 18 poz. 91: 1315.

Rational resource management (along with resource logistics) and environmental management, including relevant use of natural resources in order to meet the basic needs of societies, with the least amount of raw materials involved, requires extensive knowledge in various fields. Making environmentally friendly investments is possible, inter alia, by increased R&D activities undertaken both by public institutions and companies, and by striving towards a knowledge-based organization. Introduction of such changes can facilitate the development of new production and consumption systems, consistent with the principles of sustainable development (European Commission, 2002: 4). Consequently, along with sustainable production and consumption, a need to create a strategy for the development of environmentally friendly technologies is observed (International Environmental Technology Centre, 2003: 18). To prepare such a strategy, extensive analysis of the ways in which individual technologies are developed is necessary. This can be done using the Technology Readiness Levels (TRL) model (presented in Figure 2), which consists of nine successive levels that describe the possible stages of technology development, from its creation to commercialization and deployment (Sanchez, 2011: 20-22).

Well-designed ESTs can be described using the following attributes:

- sustainability;
- “cradle-to-cradle” design (regenerative design);
- waste and pollution reduction by changing production and consumption patterns;
- alternatives to technologies that negatively affect health and the environment;
- contribute to the establishment of a center of economic activity around technologies and products that bring environmental benefits, accelerate their implementation and diffusion, and contribute to the creation of new jobs (Chakrabarti, 2014: 3-4).

Research Methods

The paper is based on empirical data gathered through qualitative research techniques: in-depth, semi-standardized and semi-structured interviews. The purposefully selected research sample included forty companies-suppliers of ESTs based in Poland, which were the winners of the GreenEvo - Green Technology Accelerator project (editions 1, 2 and 3), run by the Polish Ministry of the Environment. The researched companies were located countrywide, represented six broad technological areas, and developed product eco-innovations that are original, ecologically significant and have a great potential for development. The characteristics of these companies are presented in Figure 3.

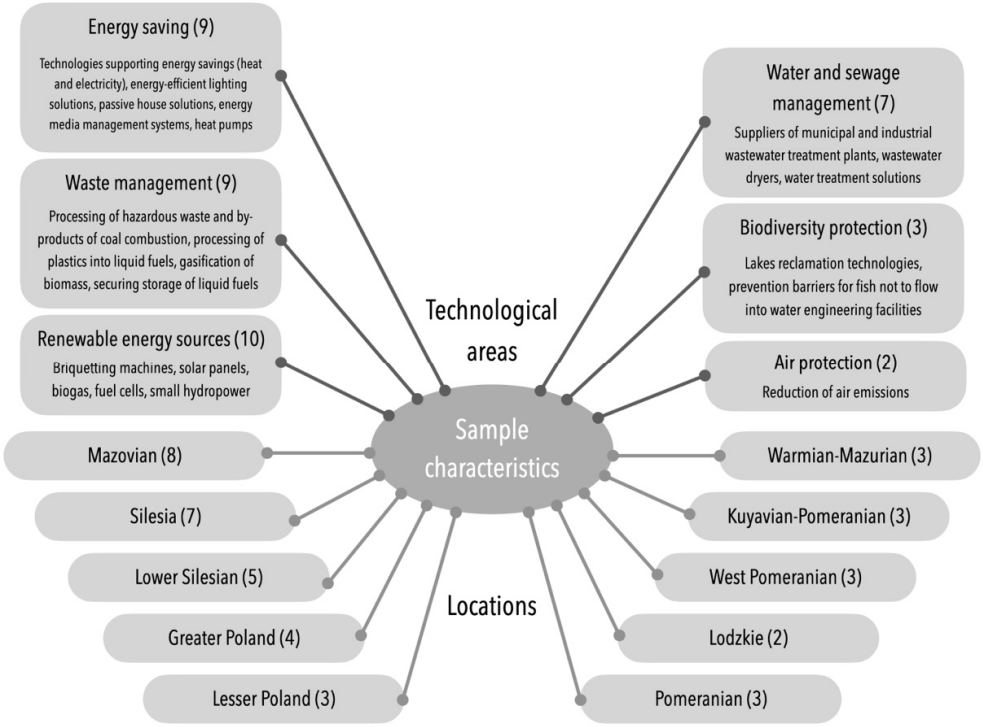

Fig. 3: Characteristics of the companies from the sample. Source: own elaboration based on interviews.

The study was based on a fifteen-page script. Interviews were recorded (average duration: 157 minutes), transcribed, anonymised, coded in a codebook of 77 codes and analysed according to the grounded theory approach (Glaser and Strauss, 2006). The research results presented in this article include information classified in 10 codes presented in Figure 4.

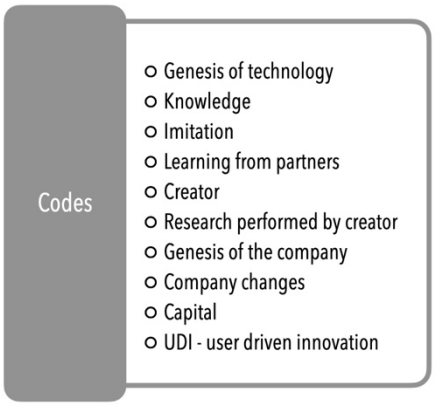

Fig. 4: Codes used to conduct this research. Source: own elaboration based on interviews.

Development of Eco-Innovations: Results of Empirical Research

Innovations are rarely developed by one person. It is usually a sum of efforts of many specialists. Therefore, it is difficult to determine quantitative contribution to innovation's success. As indicated in Figure 5, in the majority of interviewed companies, the development of technologies from the very beginning was influenced mainly by people working in the company. Interestingly, help from external partners, or representatives of scientific institutions have not contributed to this process at all or contributed only to a negligible extent.

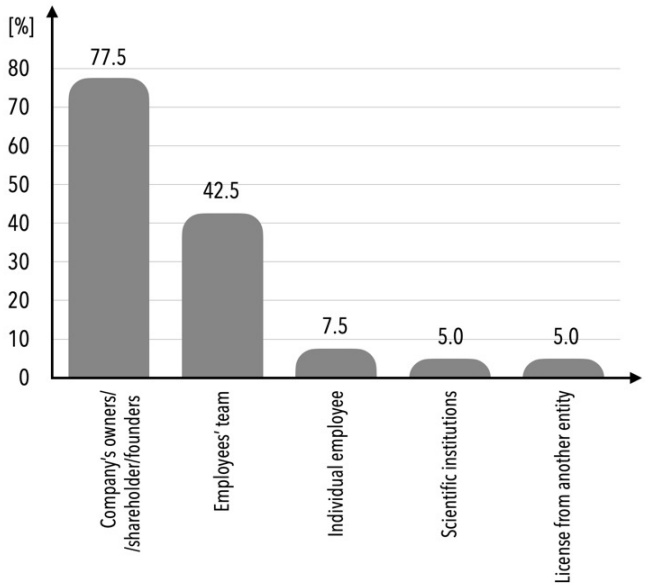

Fig. 5: Innovators / technologies' sources (explanations: percentages do not sum up to 100, because some of the interviewees gave several answers). Source: own elaboration based on interviews.

According to interviewees, in 77.5% of cases technology was created by the owners of the company, its shareholders or founders. These people often created ideas, and a technical refinement was done by specialists from a company who sometimes used advices or help from scientific institutions' experts. Such a model for developing new solutions was indicated most often in companies were already present on the market. The established business position of a company, own machine park, facilities, as well as employed specialists and constructors were undoubtedly a facilitation in the further development process.

"The idea came from the owners of the company and was passed on to employees for development and implementation. (…) A lot of people worked on the technology. (…) We spent over 5 years of work developing this solution. We are constantly developing this technology and also are implementing new solutions. We have a whole department of R&D, which is working all the time to develop this technology, implement new solutions, new instruments for even better management. It will be a permanent process."

[Enterprise 9] (further: *[E<No.>]*)

When companies with a stable market position develop a new solution, they may achieve more than competitors who have just entered a market. Companies expanding their offer with new technologies can fully use their employees and constructors to develop it without anxiety on a position among competitors. As the interviewees declared, resources and engineers who are constantly working on new solutions are an engine of a company's development. Despite the benefits from cooperation with specialized engineers, in a few companies from the analysed sample owners in person, without additional help, developed the technology from the scratch.

"I am the creator of this technology. And not just this one, because I have many patents. This one is patented around the world and is actually a novum."

[E25]

Almost a quarter of the companies from the sample were set up for the purpose and with the view to develop innovative

technology. These companies were created simultaneously with the development of an idea for a new solution. Some of them were detached from the mother company, others from the beginning were completely separate, new entities.

„It was a group ... it is still a group of people working in the company. Including the owners and employees ... I cannot say the department, but let's say the research group in our company (…) who dealt exclusively with this project and this group expanded overtime and still operates today."

[E40]

Some technologies were created thanks to companies' owners experience gained while working in competitive enterprises. It happened that the inspiration was very strong and led to the development of very similar technologies, however with higher usability potential (not a copy of already existing solutions).

"[The inventor] worked in minefields since graduation. He was managing mechanical devices. He knew these giant machines, how they operate, wear out, what are their problems. Eventually he took the risk of creating and developing the new device himself."

[E11]

A large group of companies developed their technologies through the joint work of originators: owners, research institutes and employees. These companies decided to implement and test their ideas in cooperation with clients, what led to efficient identification and improvement of technologies' deficiencies.

„We built and tested. We have also set up our solutions on stations owned by our friends to see how these works, what is happening. We were giving in return free service. (…) Some of them allowed us to [experiment] because of sympathy, simply with pure curiosity. These were former engineers, former directors. They did not even want this free service. Normally they paid, they looked at our work, they were looking for solutions themselves (...).

[E20]

Few companies used the global patent as the basis for their solution. Only two interviewees declared that this was the way of their technology development. Nevertheless, they claimed that created solutions are not copies of patents. They used longstanding patents only as part of general knowledge and inspiration for completely new, functional technologies.

"The technology is based on a particular patent, which is associated with production of electricity with hydrogen. And this is a global solution, most probably developed by many famous research institutes (...). [Our solution] is what the team has been working on for several years. At some point we got the EU grant for the development of this technology (...). This technology was created in cooperation with the Warsaw University of Technology (WUT). We did part of the work ourselves, part jointly with the WUT."

[E1]

The development of new technologies depends on experience and knowledge of innovators, and it is facilitated thanks to engagement of technical workers, constructors, and designers with different backgrounds. However, it is impossible to indicate a single scientific area that was the basis for the development of a given technology. Although the interviewees represented companies dealing with ETs, the variety of knowledge areas necessary to operate in this industry is surprisingly wide. Figure 6 presents the main areas of knowledge necessary to develop environmentally friendly technologies in Poland.

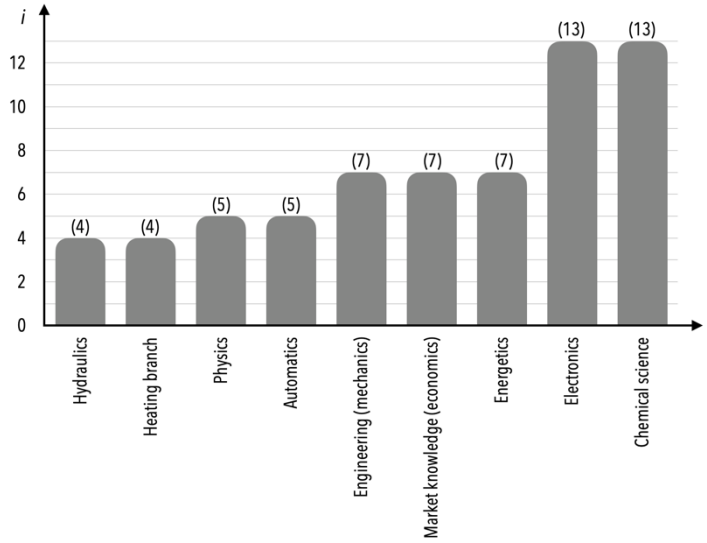

Fig. 6: Main areas of knowledge necessary to develop environmentally friendly technologies in Poland (*i* - number of indications for a given area of knowledge by the interviewed enterprises). Source: own elaboration based on interviews.

According to the interviewees, the knowledge of chemical science and electronics is the most useful for the development of ETs. These areas were indicated 13 times as the basis for creating a good solution, alongside other narrower branches of science given in Figure 7.

"Mainly topics related to biotechnology, chemistry and all technical issues, because here you have to know about the installation of technology, construction, electrics, automation. This is a broad ... broad concept. I would say, a wide range of knowledge is needed to build this type of product."

[E26]

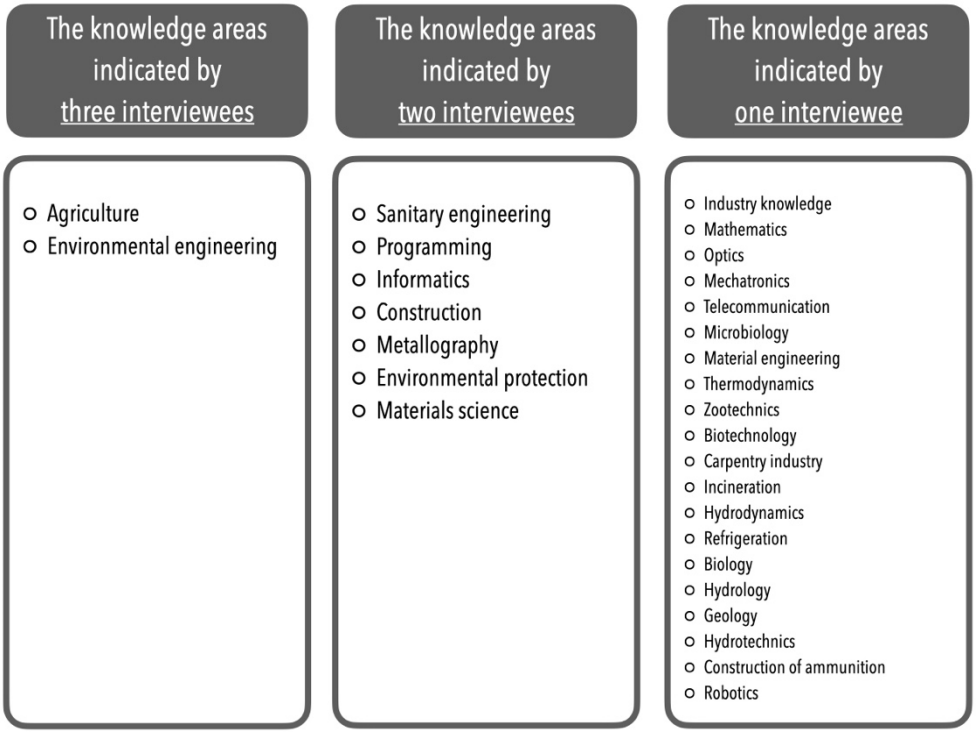

Fig. 7: Additional areas of knowledge necessary to develop ETs. Source: own elaboration based on the interviews.

Most of knowledge areas that were considered as necessary for new technologies creation by companies of the studied sample can be qualified as technical knowledge. A distinguishing area that was considered essential by many interviewees is business knowledge (with economics and management), including knowledge of the industry, market, and marketing and sales tools. A significant number of these entrepreneurs believed that developing a good technological solution is not the biggest issue. The ability to present and sell it on the market is more important.

"*Optics. Electronics, mechanics, mechatronics, programming, engineering. In the meantime, patent applications have arisen. Broad technical knowledge. But later at the sales stage, other tools - marketing and sales - were required."*

[E18]

The interviewees mentioned 39 knowledge areas in total that were necessary to create and implement their technologies. It is conceivable that this is not a comprehensive list knowing how broad of ETs field.

Based on the interviewees' answers concerning the science field, knowledge of which was essential to create the technology, it can be concluded that the solutions proposed by the companies from the studied sample required its appropriate use combined with the experience of innovators, constructors and designers. According to 27 interviewees (67.5% of respondents), the technologies were created on the basis of scientific research.

"[Research was conducted] on a model created in a laboratory scale (...) to determine optimal parameters of this technology (...). It was developed using external facilities, in a company where our technologist worked. (…) He did it as an extra work. He just wanted to create something, to build (...)."

[E26]

In order to succeed, companies developing ETs in Poland, carried out various kinds of research. Relatively few enterprises used the help of external units, cooperating with them or commissioning some research tasks. More interviewees declared that research on the technology was conducted in R&D departments or in company workshops, based on the knowledge and experience of employees working in the company.

"We have conducted scientific research, in our own way. It was not research for research institutions. We worked on projects, and that's why we had to do a lot of research. We had products that were not very successful. Fortunately, (…) we drew conclusions from these mistakes. We also investigated which technical solutions are optimal for our current flagship project (...). We have also investigated the electromagnetic compatibility of our equipment and various components, because this is very important, and it is a requirement to meet all EU standards and directives."

[E14]

Among the companies conducting scientific research, the largest group was made up of entrepreneurs associated in various ways with universities, both as research workers and members of project teams.

"Developer of the technology is a scientist, a doctor of chemistry. His field of expertise is really complex (...), which gives us a big step ahead of our competition."

[E37]

„The developer of the technology is very well known both in business and science. He holds a doctorate. "Thousands" of scientific papers he wrote, were written with doctors, professors of such universities as University of Gdansk, AGH, WUT, Wroclaw University of Technology (WrUT)."

[E4]

In a few cases, the technology was created as a result of research initiated during the studies of its creator and continued after graduation with the view to develop a new solution.

"[The creator of the technology] since his studies participated in a research association, where he was awarded. (…). We feel engineering, we are strongly connected with our universities."

[E18]

Twelve companies declare that their first environmental technology was not based on research. Most of them developed new solutions step by step, thanks to relatively quick introduction of its prototypes to the market, observation, constant

updates, verification of its original assumptions as well as continuous modifications and improvements.

"We are the company that implements. Therefore, we learn every day, while we implement and develop."

[E16]

Developing a technology based on research activities by the companies in the sample is largely the result of previous experiences of workers and business owners. Almost half of these innovators previously worked in the environmental protection or advanced technology industries, many of which had previous experience in international companies. More than one third of them were employed both in business and university.

"[Technology developer] worked abroad where he was involved in the installation of sewage treatment plants, but very complicated, very difficult to operate, where he needed a very large professional knowledge and training. And he came up with an idea for a solution, something so that the Pole would not break it. And it worked."

[E36]

Interviewees state that any experience, scientific or business-like, absolutely contributed to the technology. 38 people representing companies from the sample (95% of enterprises) confirmed that the experience from research, teaching or work in other companies had a positive impact on the parameters and pace of technology development.

"Any business experience was useful. Each year we have gained experience in the company. And earlier, experience from previous companies. (…) I cannot imagine a situation where the experience, understanding or new skills interfere with development. It helps the development rather than disturb."

[E14]

However, the development of even the best technology does not guarantee business success. Commercialization is the key and can be performed in various forms (sales, licensing, etc.). 23 companies (57.5%) existed before a particular technology was created, so new technology could be implemented with the use of existing institutional structures, while eight companies (20%) were established to refine and commercialize the technology (Figure 8).

"First, the company was founded and then the product was developed. However, the idea existed earlier in my head. (…) It is important to distinguish here that the ability to design a turbine was the knowledge gained at the university (…), during expert and laboratory work (I tested over 70 water turbines in a laboratory at WrUT). This knowledge was shaping up and, in my head, I developed the product."

[E38]

Over 30% of the previously existing companies modified their offer and industry over time. Six companies (15%) declared that since their founding, their scope of activity expanded significantly. It can be concluded that the entities from the studied sample develop dynamically over time.

"The company was founded much earlier. The new solution was added to the business, the company was rebranded, and we have built the sewage treatment plant. Before that the company was operating in a completely different industry, another sector."

[E36]

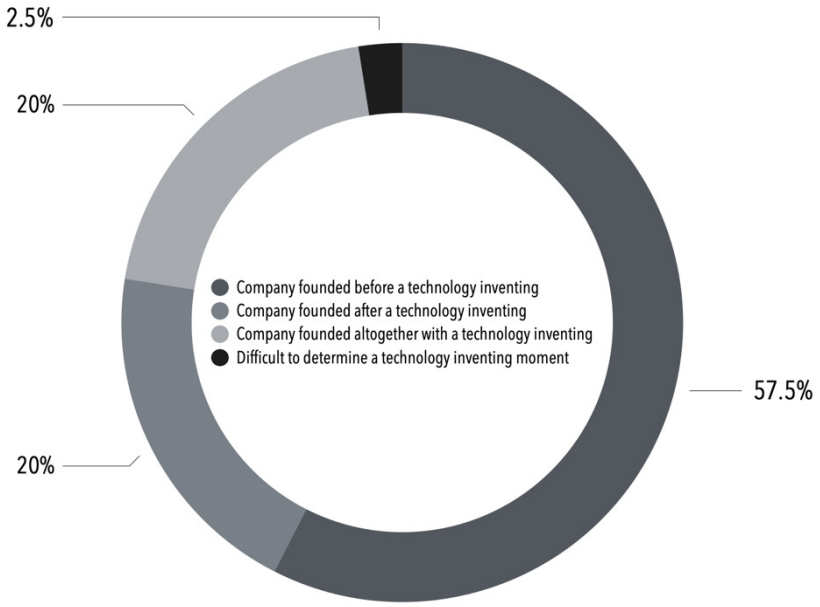

Fig. 8: The moment of developing the analyzed technologies in the context of establishing an enterprise. Source: own elaboration based on the interviews.

"We started as an installation company, later became an implementation and installation company, later implementation-commercial, later production-implementation-commercial and so far, we have remained such a company."

[E23]

Every fifth company was founded to finalize and deploy technology to the market. This approach was usually repeated when new solutions were developed with the use of human and machine resources of the parent company, which then established a new entity focused on the development and implementation of technology.

"Yes [the company was founded after the creation of the technology]. It is dedicated to this technology and to the development of all new technologies in our company that are currently being considered."

[E37]

According to some interviewees, it is a necessity, because conducting research is very expensive, and public funds for this purpose are relatively difficult to obtain for individuals who have an idea to develop a new technology.

"In general, it is very difficult for private companies in Poland to acquire funds for new technology, for new investments. As far as technological research is concerned, the research institutes are the main beneficiaries. (…) This is a great pain. That is why we really need to finance these initial studies somehow. That is why we started a company, to help finance our research."

[E37]

Some companies (8) were established much later than the technologies were developed. Some of the originators at the time of developing the technology had a different job, while others, at the stage of designing a new solution, had no intention of selling it, they only conducted research.

"First was an idea that there is a need for such technology. I mean… one day I told my partner that we have a very good idea to use ozone technology. I suggested that we just need to… to start a business, start selling it. Back then, we did not have money, resources, references, technology, nothing…"

[E24]

An idea or even a developed solution can be the base of a new enterprise only with relevant capital and funding. Enterprises from the sample are mostly private, often family enterprises, therefore it is not surprising that 75% of the initial capital of these companies came from private resources. Only 10% of the interviewees (4 companies) declared

that the entities they represented used bank loans.

"There was an investor who wanted to buy the latest type of system and invested his money in this. And so, the technology has grown. Another investor decided to buy another implementation, so we made another technological development and hence we had money to build it."

[E11]

Conclusion

The research results allowed to identify and describe two main scenarios of developing eco-innovations in Polish enterprises-suppliers of ETs. The first scenario for creating an eco-innovative solution was to use the idea of an innovator, and then develop it based on one of the following paths:

- refine it and further develop with the help of specialists from the company or research institutions (this path was usually followed);
- refine it and further develop personally (this path was rarely followed).

Such a model of developing new solutions most often took place in companies that previously existed on the market, i.e. in the case of 23 companies.

The second scenario for creating an eco-innovative solution was to set up a company specifically to create a new product. This was the case in 40% of the interviewed companies (16 companies). Some of them were separated from the mother company, others were completely separate, new entities from the very beginning. In most such cases, new solutions were created thanks to the joint work of the company's owners and employees.

Common to both scenarios of creating eco-innovations are: the variety of knowledge areas necessary to create new technologies, the importance of knowledge, experience and competences of people involved in the process of creating innovations, and the need to conduct research and development activities, cooperation between the entrepreneurs and users aimed at improving offered technologies and adjusting them to market needs.

The research results presented above describe the efforts that have to be undertaken in order to develop and commercialize ETs. The analysis of the cases of the companies from the analyzed sample shows that it is possible to successfully develop and implement eco-innovations on the Polish market of ESTs. The process of developing such solutions can be described based on TRL model (Sanchez, 2011) consisting of successive levels of technology development, from its inception to commercialization and implementation and supplemented with detailed information obtained during empirical research (Figure 9). At least it is worth mentioning that eco-innovations are challenge for production, logistics and other economy representatives, however worth elaborating.

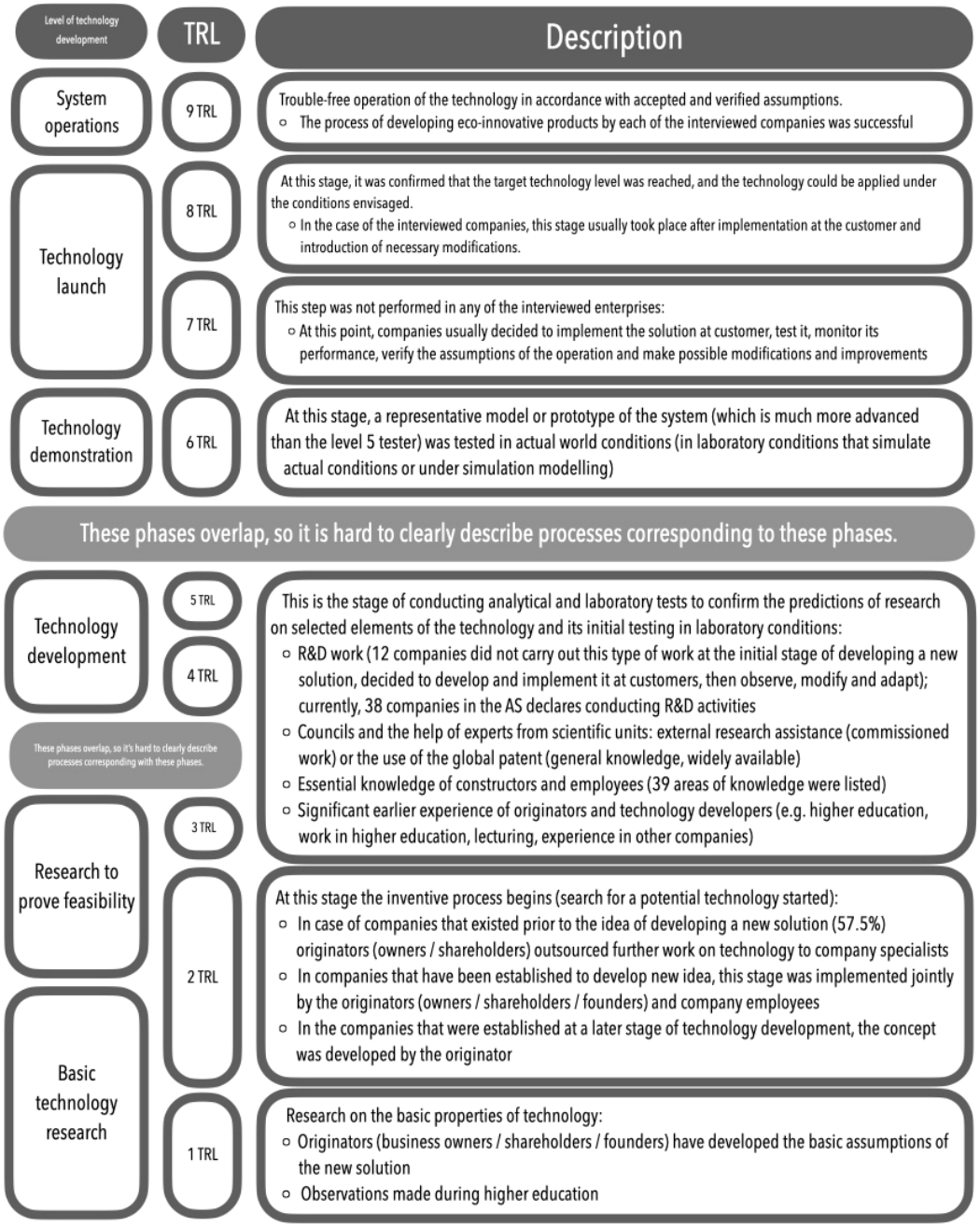

Fig. 9: The process of developing product eco-innovations by companies-suppliers of ETs based on TRL model. Source: own elaboration based on the interviews and Sanchez (2011), Dz.U. MON 2007 nr 18, poz. 191 and Dz.U. 2011 nr 18 poz. 91.

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PL9A Logistic Planning Method in Supply Chain Management

Wiesław STANIUK
STERLOG Polska Sp. z o.o., Gdańsk, Poland, w.staniuk@sterlog.pl

Norbert CHAMIER-GLISZCZYNSKI
Koszalin University of Technology, Koszalin, Poland, norbert.chamier-gliszczynski@tu.koszalin

Michał STANIUK
STERLOG Polska Sp. z o.o., Gdańsk, Poland, m.staniuk@sterlog.pl

Abstract

Are managers sentenced to carry out logistical planning processes using a spreadsheet? Is Industry 4.0 a distant vision of the future or maybe a reality? The article presents the implemented and proven in practice method of Logistics Planning 9A (PL9A), a process-integrated and computer-aided methodology with dedicated PL9A software. The presentation of the method used by STERLOG Poland allows planning in a complete, system-oriented manner, proven even in COVID-19 lockdown conditions. The solution brings managers closer to low-cost dynamic modelling of logistic resources covering all important areas of its functioning in the supply chain, such as delivery, storage, distribution in engineering as well as economic terms. The presented example of applying the PL9A method allows investigating the problem of optimization in the supply chain from a different perspective. The search for efficiency is transferred to the level of system optimization, limiting the impact of sub-optimization on results. The application of the PL9A method allows to carry out the process of modelling any number of objects integrated in the supply chain according to the same criteria and tools, for the comparability of the modelling results. The modelling process in the IT system allows developing instantaneous simulations and scenarios, with a low workload, shortening the whole planning process and increasing the efficiency of managers and teams responsible for planning. The authors present in the article a concept of building a structure for dynamic modelling of a logistic system based on logistic resources, flowing streams of goods and mathematical modelling.

In the article, the authors also discuss the issue of company evaluation in terms of the requirements of the Industry 4.0 UNITY Consulting & Innovation Roadmap concept: Logistics.

Keywords: Industry 4.0, logistics planning, management, supply chain.

Introduction

Management, command and leadership involves pursuing a goal, using necessary resources, as well as planning and defining how to achieve the intended goal. According to H. Fayol (Lachiewicz and Matejun, 2012) definition, management should be decomposed into planning, organizing, commanding, coordinating, and controlling. In commanding, which is used primarily in the military (Karaszewski, 2010) management is the process of planning, organizing, motivating and controlling operations. Leadership (Świerczek, 2006) can be understood as the ability to influence individuals or a group, oriented towards achieving specific effects and involving setting directions, providing inspiration, building teams, setting an example, and finally, being accepted.

Logistics management , on the other hand (Chamier-Gliszczyński and Staniuk, 2018) can be defined as a sequence of activities that comprise the process of creating a concept for logistics activities, the development of logistics planning in its entirety as well as the process of executing plans control and control systems.

The planning process is common to all the above mentioned methods (Cole and Kelly, 2011; Chamier-Gliszczyński and Staniuk, 2018) of structured action aimed at achieving the planned objective and outcome. Considering the progressive process of computerization in management as well as the consolidation and standardization of management methods aimed at achieving synergy (Mańkowski, 2010), a redefinition of the logistic management method can be proposed. Such a new definition of Logistic Management as a process initiated by the development of a logistic plan aimed at achieving the set out goal, based on the appropriate material resources and capital in order to ensure the implementation of the logistic task in accordance with 7R canon.

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The importance of planning in logistics

Planning in logistics is understood in many ways, from coordination and integration of key business activities from the procurement of raw materials to the distribution of the final products to the customer (Gupta and Maranas, 2003), minimalisation of transport and inventory costs (Berman and Wang, 2006) to coordination of production (Kowal et al., 2018; Bukowski and Karkula, 2004) and distribution planning (Chandra and Fisher, 1994) and designing of storage facilities (Jacyna et al., 2017; Jacyna et al., 2017a; Jacyna et al., 2016).

Authors define logistical planning as a structured process involving all company activities, which is related to planning future activities, making economic, business and operational decisions.

In business practice, logistical planning covers production, supply, storage and transport processes (Kozłowski et al., 2020), the aim of which is to adapt the production and logistical processes to:

1. Changes in the specifications of product manufacturing processes,
2. Technical and organizational changes to major production processes,
3. Technical and organizational changes to auxiliary production processes,
4. Changes on the supply side,
5. Changes on the demand side,
6. Changes in the legal and macroeconomic environment of the enterprise, determining market conditions on the demand and supply side,
7. Changes in the production technology (Krolikowski et al., 2019),
8. The occurrence of random events significantly affecting supply and demand and the safety and continuity of operations,
9. The existence of a state of emergency,
10. Changes in the distribution and supply system linked to changes in the distribution network or supply chain (Jacyna-Gołda, 2015; Jacyna-Gołda et al., 2017; Jacyna-Gołda and Lewczuk. K, 2017; Jacyna-Gołda et al., 2018; Wasiak et al., 2019; Jacyna-Gołda et al., 2016; Lenort et al., 2014; Bukowski and Feliks, 2014; Bukowski and Feliks, 2012; Wicher et al., 2012; Kiciński et al., 2019, Witkowski et al., 2012).

Acknowledging the impact of market changes on demand and supply is essential towards developing new strategic and operational plans for a company. The next industrial revolution - Industry 4.0 presented by UNITY Consulting & Innovation determines (Unity, 2020) new management methods and tools, which through the integration of outcomes towards synergy, allow the achievement of the economic goal.

Prior to the implantation of the method it is worth discussing the current guidelines of the Industry 4.0 (current solutions developed in the logistics context of Industry 4.0 were presented in Kostrzewski et al., 2020). The concept presented by UNITY Consulting & Innovation Roadmap Logistics does not provide clear directives which can be applied towards identifying the evolutionary stage of the company towards the new standard. The general concept reveals the limited possibilities of using Unity Roadmaps to assess the state of development of a company's logistics system due to the apparent references to the automotive industry and large companies. Instead STERLOG presents Stages of logistics evolution towards Industry 4.0 (Fig.1) concept distinguished by a versatile applicability and capability to evaluate both production and distribution enterprises of all sizes.

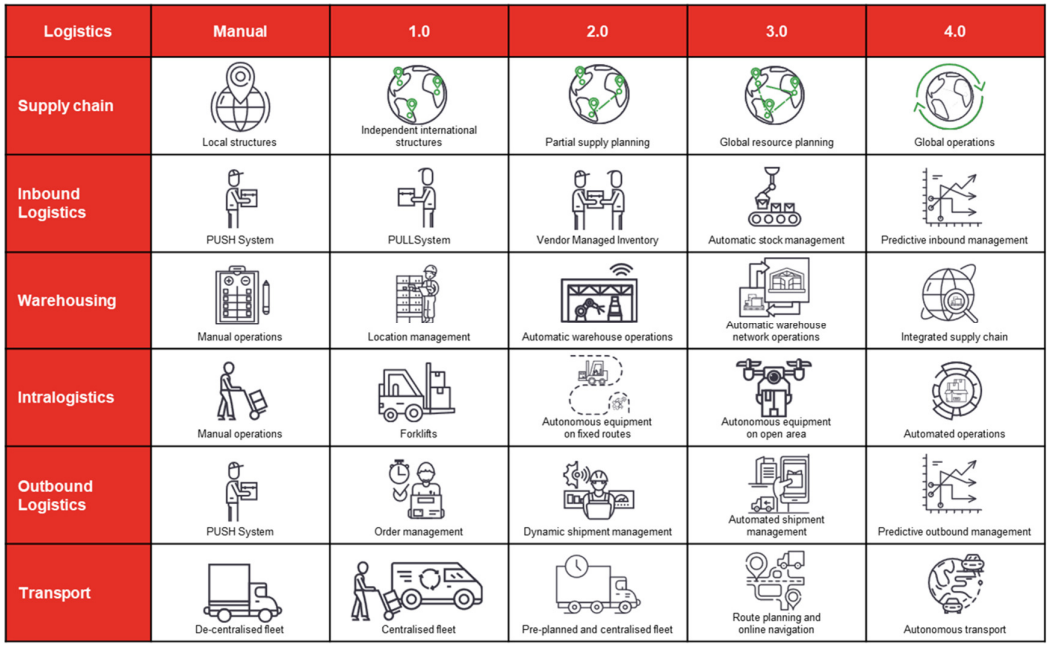

Fig. 1: Stages of the logistic system evolution. Source: STERLOG Polska 2020

The process of adapting the organization to the on-going changes provides a challenge for managers. The computerization of processes and transferring them to cloud platforms is not sufficient. The risk lurking in the process of implementing new information technologies is connected with the existing paradox of information technology productivity. This paradox has been widely described by Jelonek (2016). From the perspective of managers, high productivity of information technologies is not so obvious and certain. The problem of "unobvious high productivity of information technology" examined by Jelonek (2016) revealed the fact that benefits arise only "when IT enables tasks to be performed in a new, innovative way".

The aim of the study is to present a new method of logistical planning considers the paradigm of change and continuous adaptation of the technical and organizational system of enterprises to the new economic, social and legal reality.

Currently, multiple logistical planning methods are applied:

1. Planning methods according to the TOC limit theory, e.g. Drum Buffer Rope,
2. APS planning methods - Advanced Planning and Scheduling,
3. MRPII planning methods - Manufacturing Resource Planning,
4. APICS logistics planning,
5. Material Resource Planning MRP,
6. MRP II Generation Resource Planning,
7. Planning with demand forecasting DEM - Demand Management,
8. Production process planning according to REFA,
9. Methods and tools for planning order execution,
10. Planning of production resources.

An analysis of logistical planning found the above mentioned methods of high labor intensity and relatively low accuracy of results. These results are further supported by studies on the effectiveness of the implementing changes in production (PWC, 2017) and the published report "The effectiveness of the implementation of changes in production". This is also confirmed by research on the effectiveness of implementing of changes in production, described in the study conducted by PWC (Fig. 2) and the published in report "Industry 4.0 or the challenges of modern production". The effectiveness of the implementing changes is certainly important; and one of potential way of its examining are simulation models of logistics and production facilities, as Kostrzewski (2020), Kostrzewski (2017).

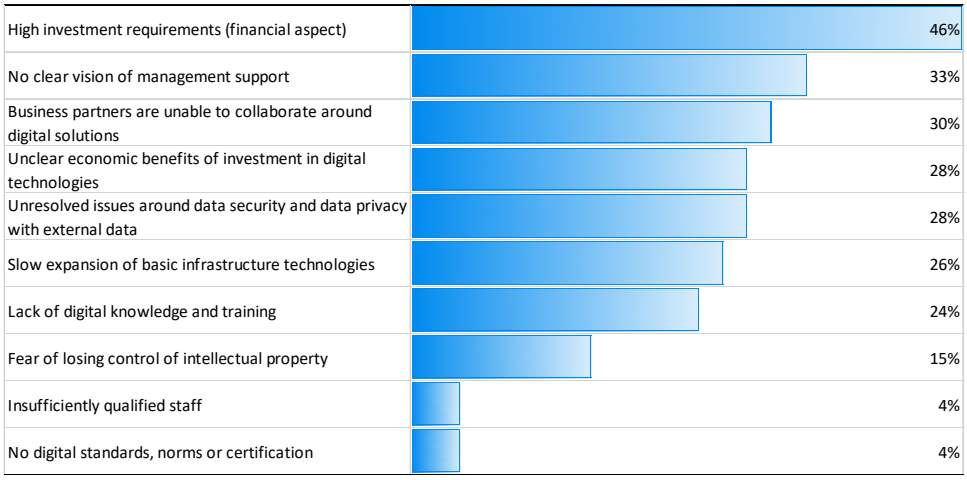

Fig. 2: Research on barriers to the implementation of projects modernizing production according to the Industry 4.0 concept. Source: Own study based on PWC report (PWC, 2017)

The high investment expenditures and a lack of clear vision and support from management are the main barriers for the development of companies. Of particular interest is the fact that the respondents indicated unclear economic benefits from computerization, thus confirming the information technology productivity paradox of Jelonek 2016.

The most recent STERLOG studies on planning indicate that logistics took over the main competence in planning processes (Fig. 3). The main reason for this aspect lies in broad access to information about resources and processes.

As means of overcoming the above mentioned challenges, the developed methodology of the Logistics Planning 9A is presented, together with the results of its application as an alternative to the currently existing and challenged methods.

Characteristics of the Logistic Planning 9A method

The Logistic Planning 9A method was developed by STERLOG Polska team as an alternative to spreadsheets and very sophisticated modeling and simulation applications such as FlexSim and Anylogic, which allow very precise modeling of processes but do not answer all logistics and planning questions. The aim of the project was to create an application allowing for very precise modeling and simulation of logistics depending on changes in important parameters of the supply chain, allowing planners to react faster to the internal and external environment changes.

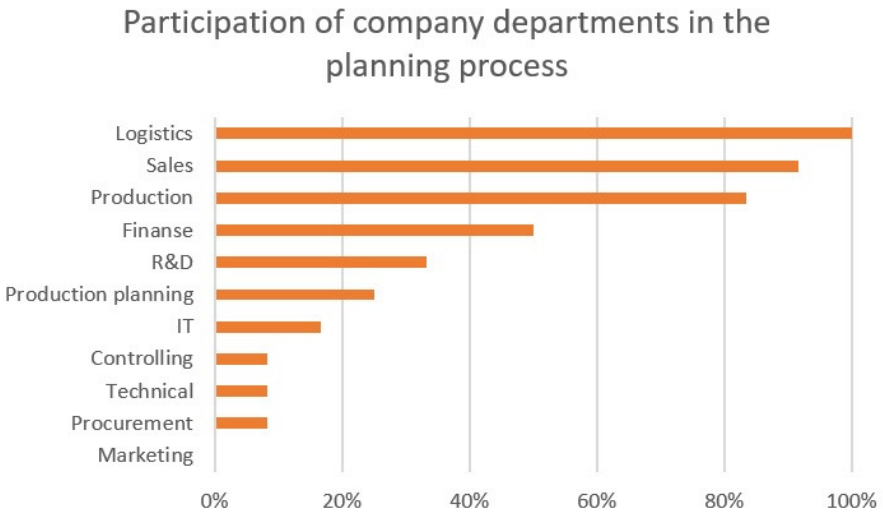

Fig. 3 : Research on planning process – Participants of planning process Source: Own study based on results from 2020 survey on planning process

Planning in logistics is a long-term process involving teams of managers, specialists and consultants. The labor intensity of the planning processes, together with the expected precision of results, time pressure and the necessity of multi-variant modeling of a logistics plan are the core of every logistical enterprise. An example of challenges embedded in the development of the logistics plan are provide by the 7R canon guidelines:

1. Identification and assessment of logistical resources,
2. Market analysis on the demand and supply side,
3. Assessment and planning of the material and cash flows,
4. Assessment of the risks affecting the implementation of the plan and its progress,
5. An assessment of the economic feasibility of implementing the operational efficiency plan.

These steps are further affected by changing legal and macroeconomic environments, as well as the accompanying social and political changes, which determine the intensity of implementing corrective measures.

The Logistic Audit 9A method (Chamier-Gliszczyński and Staniuk, 2018) as been applied since 2010, specifically towards integrating process examination together with the identification of areas, where system mismatch – so-called "bottlenecks" – occur, both in management and economic terms. The procedures and IT tools used in Logistic Audit 9A provide the auditors with the possibility of carrying out process testing and their subsequent mathematical modelling aimed at eliminating the impact of sub-optimization on the economic and operational efficiency of the company.

The research-based development of the methodology and IT tools was aimed at supporting logistic planning processes in order to satisfy the needs and expectations of managers. Such a multi-faceted solution was based on the report from the Logistic Audit 9A, which is a complementary source of information for the developed methodology. The development of the supporting computer application was experience- and literature-based thus providing a coherent structure for the dynamic modelling of the logistics system (Fig. 4).

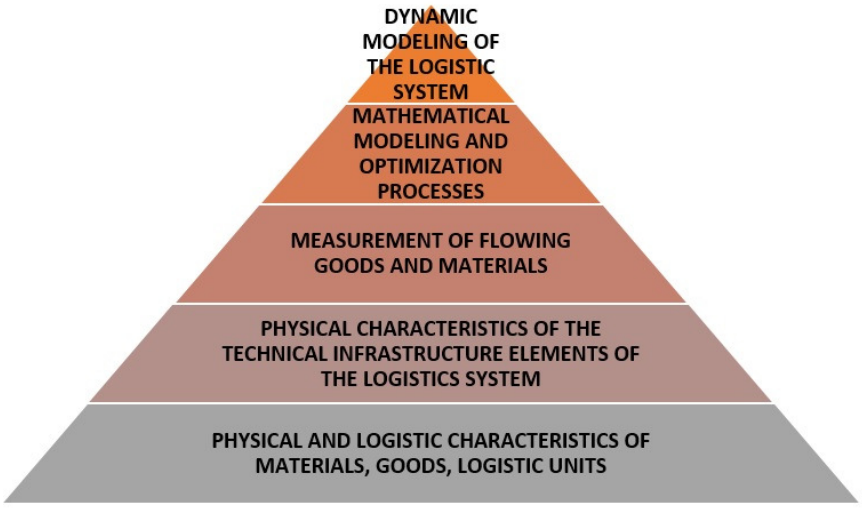

Fig. 4: Dynamic modelling of the logistics system - own elaboration

The dynamic modelling of the logistics system is associated with an integrated, multi-level and holistic approach to the process of adapting the logistics system to changes on the demand and supply side. The PL9A method is based on a process-approach towards its implementation and comprises of:

1. Testing of flowing streams of goods,
2. Inventorying and testing the suitability of logistical resources,
3. Establishment of reference quantities for the designed logistics system,
4. Development of a conceptual design for the logistics system,
5. Establishing a catalogue of logistical processes,
6. Carrying out the process of mathematical modelling,
7. Evaluation of the logistic system concept,
8. Approval and referral for further work.

The comparison of the PL9A method with those used in practice is shown in Figure 5.
An important innovation is the transfer of the logistical planning process from spreadsheets to a computer program.

Establishing reference quantities of the logistical system involves investigation of the logistical processes in relation to the results of analyzing good flows, including physical, logistical and economic parameters. In order to addresses these challenges, the classic ABC and XYZ analyses methods have been extended to better reflect the specificity of the market and logistical conditions.

Example of PL9A method implementation in supply chain management

In the year 2020, the PL9A method was used in the project to optimize the logistic system of a dairy products production company. In order to accomplish this task, the following objectives were defined in the beginning of the optimization process:

1. Improving the operational efficiency of the logistics system,
2. Reduction of external storage facilities,
3. Improving quality in logistical processes,
4. Ensuring the operational flexibility of the company's logistics system, ensuring its ability to adapt to market changes on the demand and supply side,
5. Preparation of the budget for investment outlays,
6. Development of mathematical models for the simulation of logistics cost accounting.

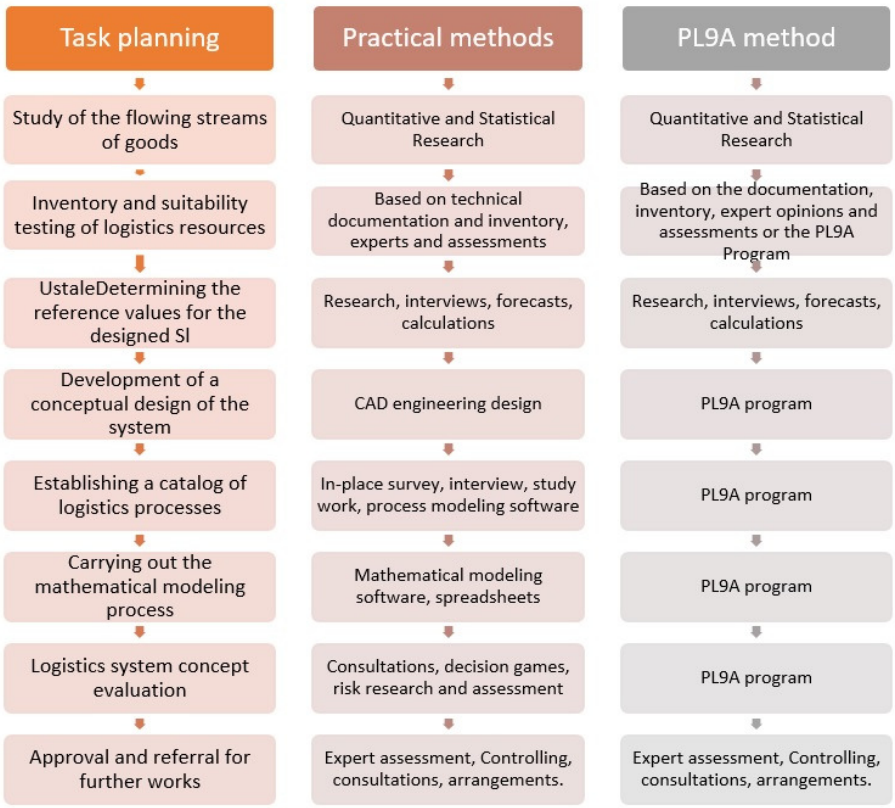

Fig. 5: Comparison of PL9A Logistic Planning method with the practical ones

The implementation of the work required the definition of the structure and scope of data necessary to conduct quantitative and statistical research. This required establishing the reference values characterizing the company's logistic system.

The following scope of work was conducted in order to develop a multi-variant concept for the reconstruction of the company's logistics system:

1. Process mapping,

2. Inventory and assessment of the suitability of technical infrastructure components,
3. Study and evaluation of the implementation of IT systems supporting logistics management,
4. Study of organizational structure and employment levels in logistical processes,
5. Calculation of logistics costs for the storage and distribution phase,
6. Identification of barriers and areas of systemic mismatch,
7. Development of multivariate concepts for adapting the logistics system.

The company's logistics system was characterized by the following sizes and values in Table 1.

Table 1: Characteristics of the enterprise logistics system

Pos.	Parameter	Unit	Audit phase
1	Capacity of the system	pallet unit	100%
2	Stock holding size	pallet unit	Minimum- 22% Maximum – 110 %
3	Optimal storage system capacity	pallet unit	161%
4	Balance of capacity	pallet unit	-61%
5	Number of storage facilities	unit	100%
6	Employment in warehousing processes	FTE	100%
7	Warehouse system area	m^2	100%

Eight concepts were developed in order to develop an optimal solution for the organization of the storage and distribution system. These concepts included equipment selection, cost estimates, simulating changes in logistics costs accounting for the specific nature of the technological solutions used. This included taking account of:

1. Storage equipment,
2. Internal transport equipment,
3. Systems supporting the management of logistics,
4. Construction of warehouse facilities,
5. Execution of construction works related to the adaptation of existing facilities to changes resulting from the planned changes.

Finally, the process of assessing economic efficiency included a comparison of the amount of capital expenditure related to the implementation of the planned changes and the amount of logistics costs, including costs of the storage and distribution phase.

For the purpose of this article, the two most effective concepts addressed by the project team consisting of design consultants and managers are presented. The team responsible for the development of these two concepts was responsible for production and logistical management, and was successfully evaluated by the company's Management Board.

The results of the research, conceptual and design work, as well as the costing of capital expenditure and modelling of operating costs are presented in Table 2.

The selection of the appropriate solution was preceded by an internal assessment of evaluating the effectiveness of its implementation, including:

1. Logistics cost account,
2. NPV cash flow analysis,
3. Malfunction costs,
4. Transport costs,
5. Costs of production program changes,
6. Complaint and quality maintenance costs,
7. Production and sales plans,
8. Timely delivery,
9. Costs of delays and management of changes,
10. Long-term forecasts of changes on the demand side,
11. Forecasts of long-term changes on the supply side.

The analysis and evaluation of the presented concepts, taking into account the above mentioned extended project evaluation, carried out by the management board and owners, showed the potential success of both presented variants. The final decision on which of the two variants would be chosen was postponed in order to assess the additional internal investment risk and to verify the impact of the proposed changes on the functioning of the supply chain.

Table 2: Selected results of the company's logistics system optimization using the PL9A method

Pos.	System parameter	Unit	Audit phase	Concept 1	Concept 3
1	Capacity of the system	pallet unit	100%	200%	172%
2	Optimal storage system capacity	pallet unit	161%	80%	93%
3	Balance of capacity	pallet unit	-61%	24%	7%
4	Number of storage facilities	unit	100%	33%	33%
5	Employment in warehousing processes	FTE	100%	200%	180%
6	Warehouse system area	m^2	100%	108%	108%
7	Total investment expenditures	EUR/unit	-	100%	125%
8	Investment expenditures on buildings and structures	EUR/unit	-	100%	100%
9	Investment expenditures on technological equipment	EUR/unit	-	100%	154%

The proposed logistics planning method PL9A allows quick generation of possible logistical solutions, with limited involvement and development of additional responsibilities for the operational level managers. The determination of the quantities characterizing the company's logistic system was conducted on the basis of the study of aggregated logistic data records, as well as the inventorying of resources and process mapping (similarly as published by Woźniak and Wojnarowski, 2015; Woźniak et al., 2015).

Embedding the logistic planning process in a computer application allows to shorten the process of modelling and developing a logistic plan with a limited amount of time, thus limiting the impact of risks affecting the quality of the planning process, in particular:

1. Risks of data scalability,
2. Data consistency risk,
3. Risk of elapsed time for the application process and accuracy of decisions,
4. Risk of managing dispersed, repeatedly processed data in a diverse IT environment.

In combination with the Logistic Audit 9A, the Logistic Planning 9A method allows analysis, modelling and development a project of changes in the company's logistic system within a period of up to 3 months, providing the operational level managers, management and owners a sufficient period of time to verify the project, select an appropriate option, and to convert it into an investment project with a specified payback period.

The project of optimization of the logistic system according to the PL9A method includes data verification processes and presentation of the results of analyses. The documentation, analyses and conceptual drawings prepared in electronic form make it possible to carry out the process of logistics design in conditions of limited accessibility to cost generating locations and recording logistic and economic events.

The availability of logistic data, ordered in time series, provides the consultants and designers with the opportunity to determine the size and values characterizing a company with a high level of confidence and accuracy.

Conclusions

The Logistics Planning PL9A method was applied and verified in streamlining and optimizing logistics in manufacturing and distribution companies operating in global supply chains, which are characterized by the following features:

1. From FMCG, DIY and AUTOMOTIVE industry
2. Working within international and open supply chains
3. Operating on market with independent demand

4. With both push and pull distribution system
5. With separated logistics function
6. Operating under commercial law or the capital market listed on stock exchanges
7. Size of medium and large companies
8. With implemented IT systems supporting ERP class enterprise management
9. With planning process based on S&OP method

The implementation of the PL9A method requires from organizations to meet the minimal conditions and standards:

1. Implemented ERP, WMS and TMS system
2. Separate organisational structures for logistics management
3. Recognise the function of logistics costs in management
4. Specified and quantified logistics system
5. Possessing structured logistic data from the period of min. 36 months

Logistic Planning PL9A initiates the process of implementation of integrated logistics management of enterprises operating in integrated supply chains based on resource efficiency.

For companies that do not meet the above mentioned requirements, the process of implementation of the PL9A method should be followed by identification and examination of the suitability of logistics resources combined with the assessment and determination of logistics flows according to the Logistics Audit 9A method.

In the implemented projects, the submitted changes in the supply chain management allowed companies to improve their operational efficiency ensuring a return on investment in a period of 2 to 5 years.

The application of the PL9A method is based on the study of logistics processes in combination with business processes inherent in supply chain management and the satisfaction of consumer needs. The research and the inference process, in a holistic way, reduces the risk of sub optimisation resulting from a mismatch between the logistical resources and the flows of goods described in the logistical task.

The application of the Logistics Audit 9A and Logistics Planning 9A method allows companies to identify areas of imbalance and focus on improving them in areas with a short payback period. It is worth noting that the findings of the Benefit Catalogue refer to a set of logistical resources and processes in the area of the supply chain of the surveyed company and as such improve the quality and efficiency of the supply chain performance.

Common strategic planning methods with an annual or long-term planning horizon, based on indicator and economic analyses and evaluations, do not ensure that companies are able to react quickly to demand and adapt to new trends or changes on the demand and supply side and changes in costs relevant to the economic calculation.

The close link between the consumer and the producer of goods resulting from the application of e-commerce technology, postulated in the fourth industrial revolution, shortens the distance and time to make managerial decisions, with simultaneous pressure on costs and efficiency measured by the level of consumer satisfaction with a wider range than just price. Is the decision made in the planning process carried out in the 4th quarter of the previous year still valid, effective and efficient after two quarters of the following year?

Practitioners already know how 2020 has verified the plans, methods and conclusions.

The PL9A method was successfully tested under COVID-19 lockdown conditions with 90% of work done remotely.

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Measures of Mutual in Deafferenting of Technical Condition Using Computer Software

Mariusz ZOLTOWSKI

Warsaw University of Life Sciences – SGGW, Warsaw, Poland
mariusz_zoltowski@sggw.edu.pl

Abstract

In the article author identifies a possible bone of mutual vibration energy measuring application used in the study of standard rail, as part of a dedicated research methodology and detailed methodologies developed in many previous author studies. Theoretical analysis and practical verification of susceptibility testing measurement information complex vibration processes indicates a possibilities for their use.
Recognizing the need to improve methods of machines and structures testing in order to assess their degradation state - this work presents important results of the research in the verification field of the proposed measures effectiveness of mutual research bench.

Keywords: construction loads, degradation state, vibration, statistical study.

Introduction

Ensure the safe and trouble-free operation of machines and structures requires a search or improvement of tools, methods and techniques for non-invasive assessment of the emergency state. A common trend in recent years is the scheme and to organize various business areas targeted for specific purposes. Ensuring repeatable perform actions leading to the intended purpose it is possible, using a variety of situations dedicated research developed methodological procedures allowing for action in various areas.

Developed in a number of author's publications [2,7,11] vibration research methodology dedicated to solving technical problems of discipline "building" gives useful procedures endearing research issues:

- acquisition processes in the vibration tests,
- processing processes by vibration, optimization algorithms,
- evaluate the vibration processes relationship in models of decision-making,
- sensitivity vibration parameters,
- statistical inference,
- visualization analysis.

The problem description and study of changes in the components destruction, materials, design and construction are carried out using the measurement of simple and complex vibration diagnostics methods based on modal analysis [1,3]. An important issue here is the description and propagation study of useful vibration energy is already widely used in diagnostic vibration and a little less used in modal analysis methods [10,12].

In this paper the suitability test measures in the monitoring complex process of the rail connections state with the base concrete, which is associated with many problems specific railway construction. The use of composite measurements mapping the interactions measured vibration process is simpler and less subject to error than the complicated procedures simulation based on numerical methods [8,9].

Mutual measures of vibration process

Research mutual similarities processes vibration through mutual estimators allows to specify:

- interdependencies between processes;

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- correlation between sources;
- compliance within one process;
- changes in the road propagation processes in the machine and structure.

Measurement processes mutual indicate a change of source or variation in the transfer passage ways signal extortion and answers. For these measures may include [4,5]:

- cross-correlation function;
- coherence function;
- transfer function;
- FRF function *(Frequency Response Function).*

The process of measurement of the vibration are determined from the measured numerical procedures base signal, which is the value of the measured process or the two measured signals: force and the system response to put force. The concept of using vibration energy propagation of measurement uses the value of the mean square amplitude of dynamic directly proportional to the energy of the signal and written in the form [1,6]:

$$U = \int_0^T x(t)^2 dt \tag{1}$$

A measure of the propagation efficiency of vibration energy ***H*** binding force signal ***x (t)*** of forcing ***F (t)*** takes the form:

$$H = \frac{\int_0^T x(t)^2 dt}{\int_0^T F(t)^2 dt} \tag{2}$$

Due to the large range of amplitudes of vibration signals is a deliberate to use logarithmic scale for comparing the numerical values of these measures:

$$H_{[\log\ ]} = \log(H) \tag{3}$$

Large potential research opportunities creates the analysis results described in the form of a matrix using measures built at different intervals integration or preprocessed waveforms.

The concept measures the propagation of vibration energy refers to the Parseval's theory [7], which indicates the identity of the signal energy presented in the time and frequency domains:

$$\int_{-\infty}^{\infty} x^2(t)dt = \int_{-\infty}^{\infty} \left|X(f)^2\right| df \tag{4}$$

It is thus possible to define the measure of vibration energy propagation also in the frequency domain, and then the equation (2) becomes:

$$H(f) = \frac{\int_{-\infty}^{\infty} |X(f)|^2 df}{\int_{-\infty}^{\infty} |F(f)|^2 df} \tag{5}$$

In this relationship ***X (f)*** is the power spectral density of the signal force, ***F (f)*** the power spectral density of the signal force, and ***f*** is ***the*** frequency in Hertz.

The essence of the measurement of input and response system for e designate of measures of mutual shown in Figure 1.

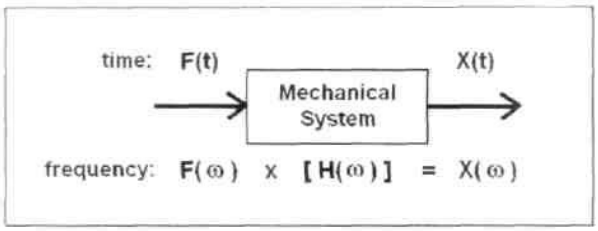

Fig. 1: Model components present measurement metrics mutual

The opportunities created by the presented approach allows to solve many technical problems during testing of real objects, which measure defined below each other are widely use [3,5,7,13].

Correlation Function of The Vibration Signal

Estimator function is signal that can be obtained by averaging in the time domain and examining the mutual relationship between the two segments of the delayed time interval *T*. It has the following form [16,18,19]:

$$R_{uu}(\tau) = \frac{1}{T}\int_{-T}^{T} u(t,\theta)u(t+\tau,\theta)dt \qquad (6)$$

In practical applications observation time *T* is chosen sufficiently high so that a correlation estimator properties are independent of the integration time *T*. A prerequisite for obtaining this property is the selection of *T,* that the time was much greater than the correlation time of the processτ_k. Defined correlation function may be in the range (-1,1). A very important and convenient property of this estimate is its relationship with the power spectral density (for operational modal analysis) by Fourier trans-formation, because:

$$R_{uu}(\tau) = \int_{-\infty}^{\infty} G_{uu}(f)\exp(2\pi jf\tau)df$$

$$G_{uu}(\tau) = \int_{-\infty}^{\infty} R_{uu}(f)\exp(-2\pi jf\tau)d\tau \qquad (7)$$

This shows that the correlation function and power spectral density are the same as if the estimators of the test process, but the area they determine is different. Therefore, some of the properties of the process can be better pinpoint the time-domain retardation τpressure than the frequency *f.*

Cross-Correlation Function

For the purpose of examining the similarity of processes at two points of the material and check if there is only one source of vibration in Fig. 2 shows the flow pattern signal *u (t)* of such a case.

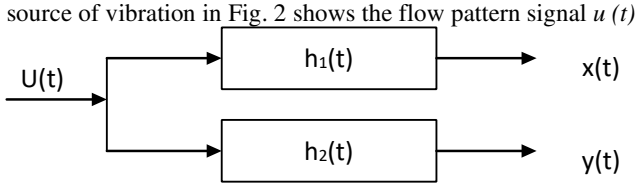

Fig 2. Signal flow model for assessing the similarity of processes x(t) and y(t)

The initial process of the vibration that two different ways by the dynamic systems of the pulse transfer function $h_1(t)$, $h_2(t)$ enters the measuring points X and Y to form new processes vibrating designated *x(t)* and *y(t),* [2,4,6].

The cross-correlation $R_{xy}(\tau)$, which is in the form of unor-plated should be equal to one if the signals *x(t)* and *y(t)* are the same, it is defined as:

$$R_{xy}(\tau) \equiv \frac{1}{2T}\int_{-T}^{T} x(t)y(t+\tau)dt \qquad (8)$$

$R_{xy}(\tau) = R_{yx}(-\tau)$, *and* $Q_{xy}(0) = 1$ if $x(t) \rightarrow y(t)$.

In terms of diagnostic correlation function makes it possible to detect changes in signal power ratio determined for the noise interference. It is therefore a measure of the functional arrangement of these moments of the process tested. In diagnostic applications it is sometimes used to measure the delay time determining signal path and signal detection in noise and playing them.

The Coherence Function

A measure of the consistency of the two vibration processes, *x(t)* and *y(t)* is the coherence function defined as follows [11,12]:

$$\gamma_{xy}^2(f) \equiv \frac{\left|G_{xy}(f)\right|^2}{G_{xx}(f)G_{yy}(f)} \qquad (9)$$

Calculating the spectral density of the source *of* the process *(t)* and the known

transfer function $H_1(f)$, $H_2(f)$, we have:

$$G_{xy}(f) = H_1(f)_2 * H(f)\, G_{uu}(f)$$
$$G_{xx}(f) = [H_1(f)]^2\, G_{uu}(f) \qquad (10)$$
$$G_{yy}(f) = [H_2(f)]^2\, G_{uu}(f)$$

Hence, we obtain:

$$\gamma_{xy}^2(f) = \frac{\left|H_1(f)H_2(f)\right|^2 G_{uu}^2(f)}{\left|H_1(f)\right|^2 G_{uu}(f)\left|H_2(f)\right|^2 G_{uu}(f)} = 1 \qquad (11)$$

Regardless of the nature of transmittance passageways coherence function always assumes the value *1* if only the signals *x(t) and y(t)* come from the same source. For more than one source coherence function which is a non-negative it is always less than unity (0-1). The coherence function as a measure of the consistency of the two signals has good diagnostic properties, because the appearance of a new signal failure violates the consistency of the previous ones, so that coherence function decreases.

It is the local measure of similarity between signals from different sources of vibration. In practical action, measured at different times living facility, detects the appearance of defects and changes in transmittance. The function, which of the two points defines it, which provides more information about the technical condition object.

Transmittance

The dynamic properties of linear with constant parameters can be described using a *transfer function* defined in the time domain or with a *transmittance* defined in the frequency domain. These measures fully characterize the dynamic behavior of the object (linear systems, for which it is satisfied superposition principle) and is defined as the ratio of output to input [2,7].

The transformation of input to output in the time domain can be written as:

$$y(t) = \int_0^{\infty} h(\tau)x(t-\tau)d\tau \qquad (12)$$

where: *y(t), x(t),* - input and output signals; *h(t)* - pulse transition function.

Pulse transition function is defined as a response to the force in the form of a Dirac's pulse:

$$y(t) = \int_{0\infty} h(\tau)\delta(t-\tau)d\tau = h(t) \qquad (13)$$

The transmittance of the frequency response is defined as:

$$H(j\varpi) = \frac{Y(j\varpi)}{X(j\omega)} \tag{14}$$

where: $Y(j\varpi)$ - Fourier Transform output signal; $X(j\omega)$ - Transform of the input signal.

Characteristics of the frequency (transmittance) is the size of the complex, m and the real part and the imaginary part:

$$H(j\varpi) = \mathrm{Re}\{H(j\varpi)\} + \mathrm{Im}\{j\varpi\} \tag{15}$$

The transfer function $H(j\omega)$ and *the* impulse response $h(t)$ are related to a clear relationship:

$$H(j\varpi) = \int_0^{\infty} h(\tau) e^{-j\varpi\tau} d\tau \tag{16}$$

Transmittance carries a lot of information about the behavior of the system under load. During the test masonry using transmittance are assessed changes in stiffness (real part) and damping (the imaginary part) reflecting the change in the destruction of the materials tested under varying load.

FRF – Frequence Responce Function

It is the function describing the frequency relation between the strength force ***F(t)*** and the vibration acceleration ***a(t)*** as ***the*** response signal measured at two points in the system under study. Spectral function of transition *(FRF - Frequency Response Function)* can be described as a quotient of the Fourier transform vibration exciting force $F(\omega)$, the Fourier transform of the response signal $A(\omega)$.

$$FRF = \frac{\sum F(\omega)}{\sum A(\omega)} \tag{17}$$

The *FRF* as the main measure of experimental modal analysis is an inversion defined previously transmittance *H(f)* and is referred to as real and imaginary parts. The method of its determination on the actual objects shown in Fig. 3.

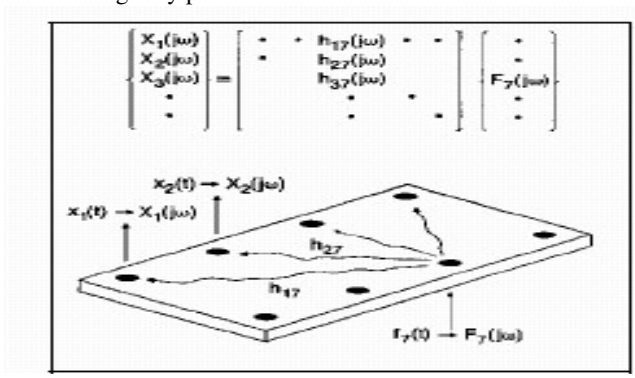

Fig. 3: Research *FRF* facility

The *FRF* is a complex function of the frequency, which the module shows the characteristics of amplitude - the frequency, and the argument is the angle of the phase shift between the power of forcing a response [4,6,]. The FRF is an inversion of the transmittance, which is an important observation resulting from the analysis and testing of these measures global propagation of energy [19].

Due to the possibility of the use of force or strength kinematic introduced different characteristics depending on the nature of the physical processes the input and output, highlighting: the vulnerability of dynamic mobility, acceleration, dynamic stiffness, impedance and dynamic mass [4.8,10].

Research Methodology

Verification of the indicated measures of mutual propagation of vibration energy was carried out at a laboratory in the EAFIT University of Colombia. Being investigated size vibration energy flow between the points of attachment rails to the sleepers of the track has been switched on Fig. 4.

Point 3 :
all bold O.K.

Point 4 :
bad bold: [b1]

Point 5 :
bad bold : [b1, b2]

Point 6 :
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Point 8:
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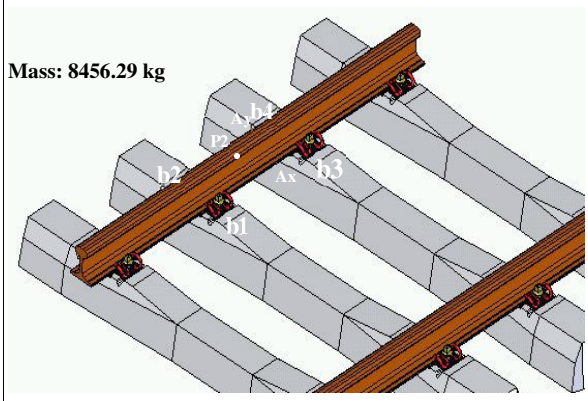

Fig. 4: Diagram of the test with the defined measuring points

Using the studies measured vibration signals extortion and response software was set appropriate measure of each other, where the sample waveforms are shown in Fig. 5-7.

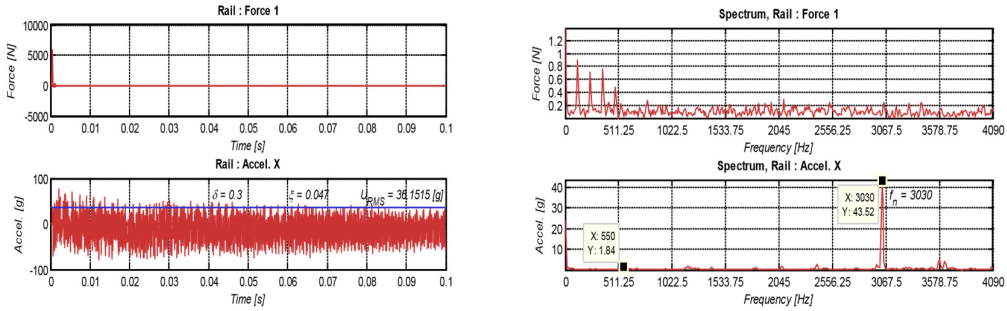

Fig 5. Examples of the results of the exciting force and response in the time domain and frequency

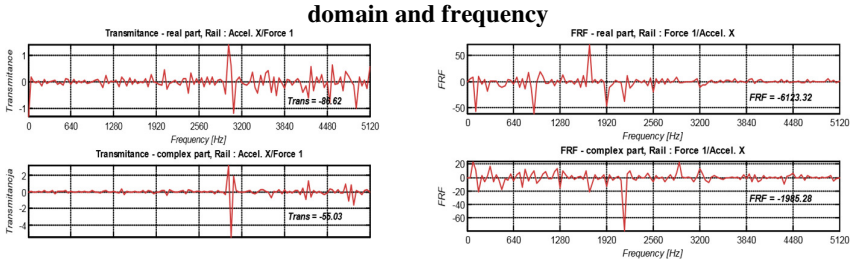

Frequency

Fig 6. The response signal and determined its coherence function

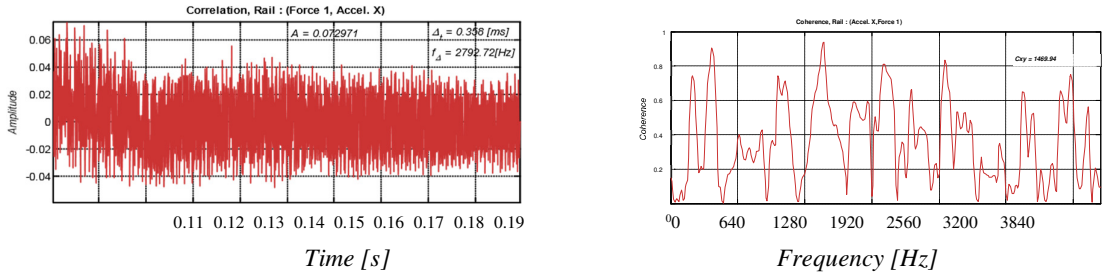

Fig 7. Examples of waveforms transmittance and FRF

The completed experiment studied a la the various states of attachment (pressure) between the indicated attachment points give a lot of diff s values (Table 1).

Table 1: Results of bench studies indicated measures of mutual

Reception points	FRFr	FRFu	H(f)r	H(f)u	Cohere
1 - 2	288.71	-15.05	137.47	4.91	197.03
2 - 1	327.21	248.69	5.67	4.32	112.65
3 - 4	163.73	352.91	-3.42	-0.54	89.41
4 - 3	380.32	-29.54	108,18	11.01	195.27
1 - 3	83,97	892.43	-9.88	-6.97	109.06
1 - 4	587.91	-15.35	55.93	1.92	192.37
2 - 3	456.41	506.42	7.73	18.02	139.29
4 - 2	639.01	-118.72	58.17	10.72	192.04
2 - 4	1,213.83	15.03	17,91	17.99	125.36
3 - 1	679.94	157.66	16,34	11.73	139.08
3 - 2	985.87	-64.41	39.13	6.75	183.6
4 - 1	799.05	38.18	4.55	24.81	106.61

Correct inference requires redundancy of information and statistical analysis to obtain a model of bonding between the assumed technical condition and the value of mutual measures. To implement this project proposed in the work of the author's methodology dedicated research facilities in the "construction" [1,3,9] uses redundancy procedures, OPTIMUM, SVD and modeling cause - effect. The essence and the algorithm good measure of changes in the method of OPTIMUM (Figure 8), and in the method of SVD (Figure 8B) is shown below.

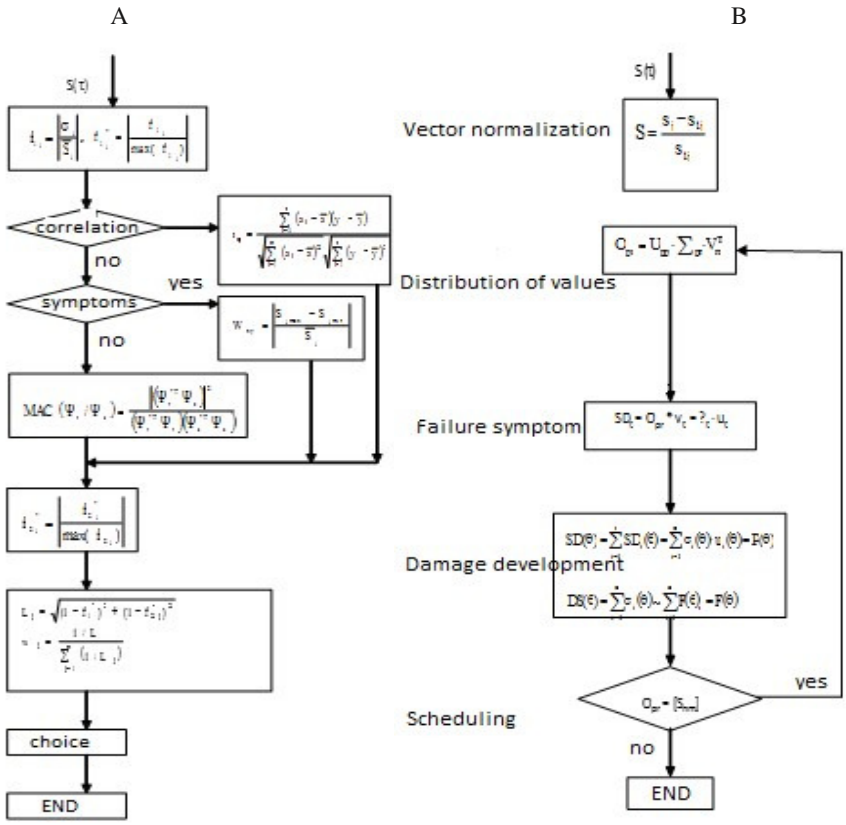

Fig. 8: Optimum algorithms for carrying out the method OPTIMUM (A) and SVD (B)

Examples of the results of the proposed optimization methods usefulness of measures of mutual shown in Fig.9.

Optimization

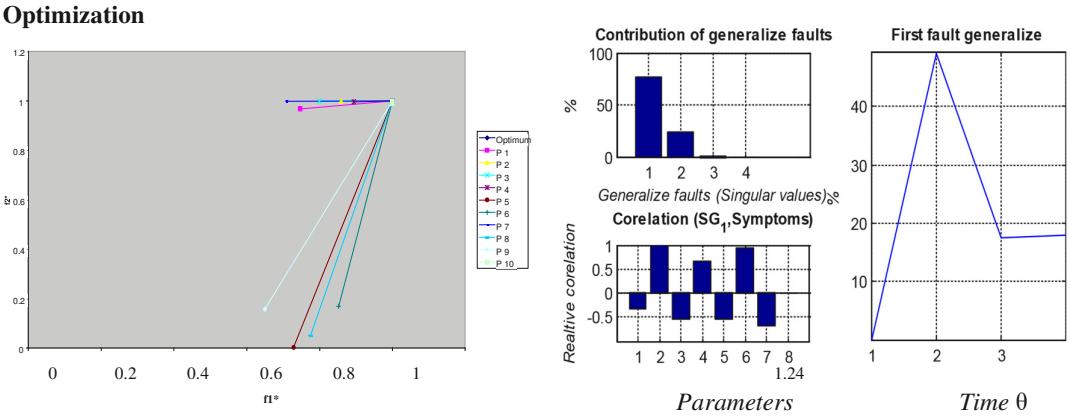

Fig. 9: The results of the OPTIMUM (A) and SVD (B) method

Using the information contained in Table 1 processed according to the proposed methodology can confirm the good properties of measurement destruction of the cases examined the destruction of joints in order: ***FRFr, FRFu, H(f y, H(f)u, cohere.***

Taking into account all conducted a sensitivity analysis of the proposed measures of mutual propagation of vibration energy, using different statistical methods used in this work can continue to propose the following as the main measure of the state of destruction:

$FRF_{y,,}H(f)_R$, cohere.

For the indicated reduction measures of destruction was determined regression model binding shown in Fig. 10.

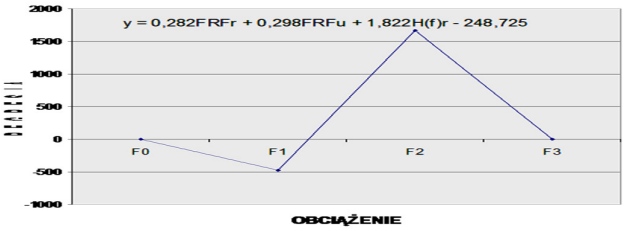

Fig. 10: Model binding measures of mutual technical condition of the

Summary

The substance of the development includes the results shows usefulness of mutual propagation measures of vibration energy than the various forms of applications in civil engineering. The main assumption was realized by exploratory research to present the possibilities of practical use of complex estimators vibration - as a tool to solve many fundamental problems with the condition of degradation and building construction elements dynamics.

These issues, it studies exemplify dedicated to the degradation state of the construction methodology procedure for determining the physical aspects and practical applications of propagation of vibration energy measures. The proposed methodology proceedings indicate that the important role and manner of acquisition and use of vibration composite measurements in the construction industry, revealing at the same time the need to take this issue in the area of research the destruction of existing structures. Served briefly elements of vibration theory focused on the physical aspects of the description and use of vibration estimators in the construction industry bring the issues of modeling the dynamic state of different structures and rules for their use.

Changes identification in the building structures degradation state becomes a method of assessing the structure operational status and modal analysis methods and related vibration estimates reflects well the elements and segments degradation.

New ways of obtaining and processing information contained in the processes of vibration often leads to improvement of various operating systems constructions, often leads to creative change existing practical solutions.

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Network Assessment of a Selected Organization from The Personnel Outsourcing Sector

Rafał TRZASKA

Wroclaw University of Economics & Business, POLAND,
e-mail: rafal.trzaska@ue.wroc.pl; ORCID: 0000-0003-0261-7496

Abstract

In the environment displaying more and more characteristics of a network paradigm, enterprises seek solutions helping increase their efficiency. At the same time, strategic management does not offer solutions (methods and techniques) of strategic analysis dedicated to this paradigm. It is a serious scientific problem. Admittedly, methods and techniques borrowed from other disciplines do appear, like the SNA method, but strategic management itself has not prepared its own methods or techniques of network analysis. The aim of this paper is to present a selected method of strategic network analysis. It concentrates on three essential parameters of network assessment. The method comprises: the stricte assessment of the enterprise network, the enterprise strategy assessment in terms of its possession of network characteristics, and the assessment of the environment in which the enterprise operates in terms of network indicators of this environment.
The article discusses the structure of the network analysis method in a network approach, with particular emphasis on the following steps: the enterprise network, the network strategy, and the environment in which the enterprise operates. The empirical part presents results of an assessment of an enterprise network, network strategy and environment, using the example of a selected organization from the sector of personnel outsourcing services.

Keywords: Management, Strategic management, Resource Based View, Network assessment.

Introduction

In the environment displaying more and more characteristics of a network paradigm, enterprises seek solutions to increase their efficiency. At the same time, strategic management does not offer solutions (methods and techniques) of strategic analysis dedicated to this paradigm. It is a serious scientific problem. Methods and techniques borrowed from other disciplines may appear, like the SNA method, but strategic management itself has not prepared its own methods or techniques for the network analysis.

The aim of the research in this paper is to present a selected method of strategic network analysis. It concentrates on three essential parameters of network assessment: the stricte assessment of the enterprise network, the enterprise strategy assessment in terms of its possession of network characteristics, and the assessment of the environment in which the enterprise operates in terms of network indicators of this environment.

The article discusses the structure of the network analysis method in a network approach, with particular emphasis on the following steps: the enterprise network, the network strategy, and the environment in which the enterprise operates. The proposed method is an original assessment method. It takes into account the latest solutions concerning the network paradigm, at the same time concentrating on finding elements which connect particular fragments of network knowledge. It is only a part of an overall procedure of strategic network analysis, yet important enough to merit a separate presentation here.

The empirical part presents the assessment of an enterprise network, network strategy and environment, using the example of a selected labour service organization. The analysed case study shows and verifies the presented method for network analysis.

The findings presented in the paper are based on selected solutions included in R. Trzaska's Ph.D. dissertation (2017).

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Method of Enterprise Network Assessment

The method of network assessment refers to the network paradigm. Its specific features include the following: the environment is composed of distinctive entities; the entities have various relationships with each other as well as with the firm; the organization partially controls the environment; opportunities arise in the network, which perceives, qualifies them and enables their use; resources do not have to be hierarchically controlled; competitive advantage depends on the structures, positions and relationships in the network; and conditions of the environment may be stabilised by networks (Czakon 2012, p. 19). The main problem is the choice of methods of network research. A. Zaheer, R. Gözübüyük and H. Milanov proposed the network perspective, they "develop an organizing framework based on three levels of network analysis (the dyad, the ego, and the whole network) and four theoretical mechanisms (resource access, trust, power/ control, and signaling) to organize and review the key findings and debates in the interorganizational network literature" (2019). Others, R. Gulati and D. Lavie "have proposed different perspectives on how such networks of ties shape organizational behavior and performance outcomes, but they have paid little attention to the underlying mechanisms driving these effects. (They) propose reach, richness, and receptivity as three fundamental mechanisms that jointly constitute a parsimonious model for explaining how network resources contribute to organizational performance (2011). S. Borgatti and D. Halgin suggest to use the theory of weaks ties and the structural holes theory in the network analysis (2011). In the literature on strategic management, there is still a discourse on methods of networks analysis and assessing their effectiveness. Most of the methods of network analysis come from works on Social Network Anlysis (Scott, 1988; Wasserman, Faust, 1994).

This way of thinking required the design of new methods of analysis which would be to a lesser extent connected with: the analysis of effects of experience curves (in the network world what matters is the right to access resources, not to own them), positioning in a sector (there are no sectors in the network world), and promoting innovation (innovation processes tend to be configured differently in the network world). That is why the existing methods of strategic analysis have a limited use in the new reality. This method was developed based on critical literature review, the use of deduction and analogy methods. The method was developed on the basis of SNA, graph theory, structure of network paradigm (Czakon, 2012) and the achievements of Niemczyk (2014).

The proposed method Network Assesment consists of three steps (stages). As mentioned above, they include:

- ***stricte* assessment of the enterprise** network,
- **enterprise strategy assessment** in terms of its possession of network characteristics,
- **assessment of the environment** in which the enterprise operates in terms of network indicators of this environment.

These three elements of the assessment take into account the three aspects of an organization's performance in a network environment. They verify whether the organization actually achieves the effects of network rents, whether the strategies have the characteristics of the network and whether the environment is already a network environment. Meeting these three conditions allows for effective application of methods appropriate for the network management.The first step in network assessment is the selection of a particular enterprise. The choice is difficult because it may concern an entire network of firms interrelated within a given network system or one particular node. In the selection process, it is worth taking into consideration that the research subject should be a real or potential strategic apex of a given network. Only after the choice of the subject has been made should the appropriate stage of network assessment be entered. The underlying assumption of the assessment is that *the inter-organisational network is a set of firms and relationships of contractual nature* (Niemczyk, Stańczyk-Hugiet, Jasiński 2012) *aimed at achieving the effects of network rents.*

The *stricte* network assessment may be carried out by means of a list of questions proposed by the author in Table 1, referring to the descriptive characteristics of network rents reported in the literature. The questions should be answered by a person who knows the operations of the entire organization, so preferably a senior executive. The procedure described here (Table 1) is based on the concepts of the network rent proposed in the works of J. Niemczyk (2013; 2014). The procedure assumes that if a half or more than a half of the answers to questions in Table 1 are affirmative, the enterprise is considered to be a network enterprise. In turn, when more than a half of the answers are negative, the enterprise is deemed to be following the classical paradigms of management, and thus requires methods of strategic analysis arising from traditional schools of strategic management.

Table 1: Enterprise network assessment

Part I (Williamson rent due to transaction costs)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Do the concluded contracts allow the reduction of costs of entering into next contracts?			
Does the enterprise optimize costs?			
Are the external contracting costs lower than the costs of solutions such as e.g. internalization?			
Part II (rent due to creating value in value network)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Is the enterprise open to using and implementing expert knowledge connected with the creation of the synergy effect?			
Does the enterprise continuously conduct research and implement solutions optimizing the value chain?			
Does the enterprise benefit from economies of scale with regard to production?			
Part III (rent due to appropriation of value)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise legally use organizational and market solutions generated by other entities?			
Does the enterprise protect intellectual property?			
In external operations, does the enterprise use its bargaining position in order to benefit from cost arbitrage?			
Part IV (rent due to knowledge diffusion)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise create tacit knowledge?			
Does the enterprise acquire knowledge from the market?			
Can knowledge diffusion be observed between various units of the enterprise?			
Part V (rent due to network effect)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise increase its efficiency as a result of incorporating a new entity into the network?			
Do the services, products delivered to the client increase efficiency owing to the extension of co-operation with other entities?			
Would a loss of one unit of the enterprise significantly affect the functioning of the enterprise?			
Mean			

Source: Own study based on Trzaska, R. (2017). Strategic analysis in the network approach, PhD Thesis, unpublished materials, Wrocław University of Economics and Business.

If the mean value calculated on the basis of the five parts is higher than, or equal to two, the enterprise is considered to be a network organization. If the resultant average is less than two, it is a classical organization.

The second stage of the procedure is assessment of the strategy pursued by the enterprise in terms of displaying characteristics of a network strategy. The first step is to select and to analyze elements of the enterprise which contain information about the strategy (Trzaska 2016). The next step is to assess those elements. The model used here base on the characteristics of network paradigms proposed by W. Czakon (2012), as well as characteristics of network

strategies listed by J. Niemczyk (2013). As a result, fifteen questions were formulated, also requiring "yes", "no" or "I don't know" answers.

Table 2: Network strategy assessment of an enterprise in terms of its possession of network features

Question	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
In the enterprise's environment, have all the entities with which the enterprise co-operates been identified?			
In the environment, do continuous changes take place in relationships between the entities and the enterprise?			
Does the environment have a significant impact on the enterprise?			
Does the enterprise benefit from the network relationships which may change the conditions of the enterprise's operations?			
Are the resources in the enterprise controlled in a non-hierarchical way?			
Does the enterprise's advantage depend on the structure of the environment?			
Does the enterprise's advantage depend on its position in the environment?			
Does the enterprise's advantage depend on its relationships with the environment?			
Are the conditions of the environment stabilized by relationships with competitors or mediation skills?			
Do the conditions of the environment change frequently and do they significantly influence the organization?			
Does the enterprise use and react to opportunities in the environment?			
Does the enterprise engage in continuous interaction with other economic entities?			
Does the enterprise carry out "non-financial" transactions with organizations from the environment?			
Does the enterprise continuously expand its network of partners and co-operators?			
Does the enterprise seek unique resources?			
Mean			

Source: Own study based on Trzaska, R. (2017). Strategic analysis in the network approach, PhD Thesis, unpublished materials, Wrocław University of Economics and Business.

The results are assessed according to the same principles as described earlier. If a half or more than a half of the answers are affirmative, it may be assumed that the enterprise follows a network strategy, or elements of a network approach to the strategy dominate in it. It may indicate that, more or less consciously, the enterprise applies the principles of the network approach in its operations. In turn, if more than a half of the answers are negative, it may be assumed that the enterprise displays characteristics of a classical approach to strategies, in which case it is recommended that it should follow classical strategies.

The third stage in the process of assessing the basic network aspects is assessment of the enterprise's environment. The first step is a preliminary analysis of the environment in which the organization in question operates. Possible methods used to this effect may include brainstorming, background research interviews, expert opinions or analyses of company annual reports. The next step is appropriate assessment of the enterprise's environment in terms of network characteristics, carried out by means of a questionnaire. The questionnaire was devised on the basis of an analysis of the network environment displaying characteristics of an ecosystem, as well as the definition of an ecosystem, proposed by Stańczyk-Hugiet (2015). Reference can be found in the bibliometric article L. Aarikka-Stenroosa and R. Paavo (2018).

The results are assessed according to the same principles as in the previous two cases. If a half or more than a half of the answers are affirmative, it may be claimed that the enterprise operates in an environment displaying characteristics of such a network ecosystem. It means that it actively initiates and creates contacts in groups of enterprises and organizations. It also maintains relationships, ensuring that the client remains loyal and the co-operators create added value for the client. In turn, if more than a half of the answers are negative, then the examined enterprise follows a

classical approach to the environment, operating in surroundings displaying the characteristics of an inactive environment. The questions listed in Table 3 do not constitute a fully separable classification.

Table 3: Assessment of the environment in which an enterprise operates

Question	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise co-operate with a group of enterprises or organizations (entities) which are interrelated?			
Does the enterprise co-operate with a group of enterprises or organizations (entities) which are within the clients' scope of interest?			
Does the enterprise use dependency relationships benefiting all the co-operating entities in order to create value for the clients?			
Are the relationships between enterprises and other entities symbiotic?			
Through its relationships, does the enterprise influence the formation of another product, including a product of the network leader?			
Does the enterprise participate actively in building relationships, exchange of knowledge and experience?			
Has the enterprise identified the clients and their needs?			
Does the enterprise belong to a network of entities oriented towards generating, or actually generating, innovations?			
Is the network of entities in which the enterprise operates resistant to changes taking place outside the network?			
Does the enterprise react dynamically to changes taking place in the environment?			
Does the enterprise ensure the maintenance of relationships, as well as initiate new business relationships?			
Does the enterprise engage in relationships with new clients?			
Does the enterprise have regular clients who enable its functioning?			
Does the enterprise expand the group of its regular clients?			
Does the enterprise ensure an influx of innovation into the main value chain?			
Mean			

Source: Own study based on Trzaska, R. (2017). Strategic analysis in the network approach, PhD Thesis, unpublished materials, Wrocław University of Economics and Business.

Assessing the three network components (*stricte* assessment of the enterprise network, enterprise strategy assessment in terms of its possession of network characteristics, assessment of the environment in which the enterprise operates in terms of network indicators of this environment) may lead to a clear indication whether we deal with a network organization. Putting the three variables on a radar chart will enable us to establish the distance to a perfect network model for the organization which is the subject of our study. The knowledge gained in this way will allow the organization to build new strategies and action plans fitting the criteria of success characteristic of the network approach.

Using the method of enterprise network assessment to analyze the selected company

The developed method of enterprise network assessment can be used to analyze enterprises in every sector. It is universal and easy to use. It allows to answer the question: is the organization a part of the network. It allows for the precise use of management methods adapted to the network economy. The following section shows the possibilities of using the method, pointing to the practical aspects of this use. .

The subject of the enterprise network study is X Company Ltd. In the author's view, the company serves as a good case in verifying this method. The opinion can be supported by the fact that the firm is founded on relationships and elements of continuous and temporary inter-organisational co-operation, which is an essential network characteristic.

Profile of X Company Ltd.

X Company Ltd. is a recruitment company contracting engineers. It specializes in broadly understood technological projects and hiring IT specialists. The sector may be classified as personnel outsourcing. The firm has been present on the market for nine years and during that period it has carried out over a thousand projects for more than 150 clients. Its main competency involves selecting the best-qualified engineering staff and implementing individually tailored solutions for the development of new technologies and innovation. It focuses its activities on the automotive, aviation and energy sectors.

X Company Ltd. is the leader in the recruitment of top-class engineers and IT specialists in Poland. It also co-ordinates projects in Germany and the Great Britain. It is a partner of the Association of Employment Agencies (SAZ) – Poland's biggest employer organization uniting agencies which specialize in providing selected HR services: hiring full-time staff to work in Poland and abroad, personnel consultancy, temporary employment and outsourcing. SAZ represents large, domestic and international entities, as well as regional and local ones, operating in several provinces or smaller locations. This kind of broad cross-section of operational profiles of SAZ members allows a comprehensive viewpoint on the HR sector.

X Company Ltd. is also a partner of the Polish-German Chamber of Commerce and Industry (AHK Polska). AHK represents the interests of around a thousand member companies, and has been advocating the development of Polish-German economic relations for the last twenty years. Membership in the chamber guarantees invitations to numerous business meetings, access to valuable information, opportunities to promote companies among the other members of the chamber, as well as many other privileges.

X Company Ltd. contracts and recruits engineers and specialists, reduces absenteeism, trains staff, prepares engineering projects and supports the establishment of R&D centres.

Its core business of contracting engineers aims to provide highly qualified staff whose expertise allows the client company to handle its services and products. Its recruitment offer, in turn, encompasses the entire process of recruitment: from a thorough examination and definition of needs and expectations, through consultations, to the final selection of candidates and employment guarantee. Absenteeism reduction is a service comprising daily analysis of data related to employees' absence from work due to sick leave. Staff training is an offer of relevant professional training courses provided for the client. X Company Ltd. co-operates with many experienced specialists in various fields to prepare training programmes according to the client's guidelines. This service is addressed to organizations which have specific requirements concerning the development of their staff but are unable to find satisfactory solutions on the training market.

Network assessment of X Company Ltd.

X Company Ltd. was selected to be the subject of network assessment. The examination was carried out on the basis of an analysis of the firm's documentation, as well as an interview with the CEO, during which questionnaires based on solutions presented in Tables 1, 2 and 3 were used.

The assessment was conducted by means of a structured interview and with the use of questionnaires. The first part included questions which verified the network orientation, summarised in Table 4. The interviewee frequently pointed to characteristics implying a network nature of the firm. , The final mean score of 2.6 points (where the value "0" means a classical enterprise, and "3" – a fully network-oriented enterprise) may indicate that the company can be considered as a network enterprise.

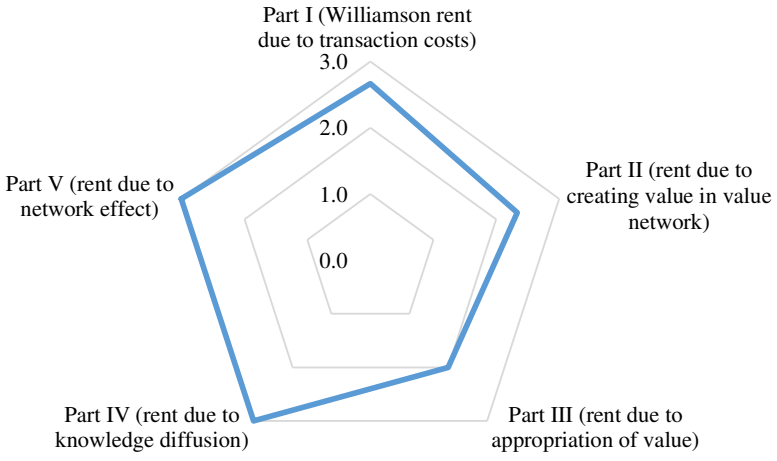

Fig. 1: Network assessment of X Company Ltd

Source: Own study.

Table 4: Network assessment of X Company Ltd

Part I (Williamson rent due to transaction costs)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Do the concluded contracts allow the reduction of costs of entering into next contracts?	3		
Does the enterprise optimize costs?	3		
Are the external contracting costs lower than the costs of solutions such as e.g. internalization?		2	
Part II (rent due to creating value in value network)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Is the enterprise open to using and implementing expert knowledge connected with the creation of the synergy effect?	3		
Does the enterprise continuously conduct research and implement solutions optimizing the value chain?			1
Does the enterprise benefit from economies of scale with regard to production?	3		
Part III (rent due to appropriation of value)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise legally use organizational and market solutions generated by other entities?	3		
Does the enterprise protect intellectual property?			1
In external operations, does the enterprise use its bargaining position in order to benefit from cost arbitrage?		2	
Part IV (rent due to knowledge diffusion)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise create tacit knowledge?	3		
Does the enterprise acquire knowledge from the market?	3		
Can knowledge diffusion be observed between various units of the enterprise?	3		

Part V (rent due to network effect)	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
Does the enterprise increase its efficiency as a result of incorporating a new entity into the network?	3		
Do the services, products delivered to the client increase efficiency owing to the extension of co-operation with other entities?	3		
Would a loss of one unit of the enterprise significantly affect the functioning of the enterprise?	3		
Mean	**2.6**		

Source: Own study.

On closer inspection of the particular parts of the survey (Fig. 1), as well as the influence of characteristics of a given rent on the enterprise, it can be observed that X Company Ltd. probably gains its competitive advantage mainly thanks to knowledge diffusion and the network effect. On the other hand, the elements potentially increasing synergy which might probably be optimized in the firm include those connected with creating value in value networks and optimizing the value chain, together with appropriation. It is worth stressing, though, that from the point of view of the principles of a network organization, the enterprise can be classified as a network enterprise.

Strategy assessment of X Company Ltd. from the perspective of its possession of network characteristics

The assessment of the enterprise in view of its network characteristics was conducted by means of a questionnaire containing fifteen questions (Table 5). The respondent was asked the questions during an interview. The final result of this part of the study was 2.6 points, which confirms the preliminary conclusion that the enterprise follows a strategy displaying features of a network strategy. It must be pointed out here that in the case of the investigated firm three of the research areas do not match the model network approach. They are contained in the following questions: *In the enterprise's environment, have all the entities with which the enterprise co-operates been identified?, In the environment, do continuous changes take place in relationships between the entities and the enterprise?* and *Does the enterprise carry out transactions in the non-financial sense?* These areas require adjustments. Failing to acknowledge them may lead to the company limiting itself to already identified elements, which may mean stagnation and gradual ossification.

Table 5: Network strategy assessment of X Company Ltd.

Question	**Yes** (value=3)	**I don't know** (value=2)	**No** (value=1)
In the enterprise's environment, have all the entities with which the enterprise co-operates been identified?			1
In the environment, do continuous changes take place in relationships between the entities and the enterprise?			1
Does the environment have a significant impact on the enterprise?	3		
Does the enterprise benefit from the network relationships which may change the conditions of the enterprise's operations?	3		
Are the resources in the enterprise controlled in a non-hierarchical way?	3		
Does the enterprise's advantage depend on the structure of the environment?	3		
Does the enterprise's advantage depend on its position in the environment?	3		
Does the enterprise's advantage depend on its relationships with the environment?	3		
Are the conditions of the environment stabilized by relationships with competitors or mediation skills?	3		
Do the conditions of the environment change frequently and do they significantly influence the organization?	3		

Question	Yes (value=3)	I don't know (value=2)	No (value=1)
Does the enterprise use and react to opportunities in the environment?	3		
Does the enterprise engage in continuous interaction with other economic entities?	3		
Does the enterprise carry out "non-financial" transactions with organizations from the environment?			1
Does the enterprise continuously expand its network of partners and co-operators?	3		
Does the enterprise seek unique resources?	3		
Mean	**2.6**		

Source: Own study.

The results strongly confirm, however, that the enterprise's strategy displays characteristics of a network strategy, which are more or less consciously used by the examined firm.

Environment assessment of X Company Ltd.

Assessing the environment in which an enterprise operates is essential for the model to work. As pointed out earlier, the environment must display certain characteristics in order to be classified as a network environment in which a given enterprise operates.

In this part of the research, the interviewee was asked whether his enterprise operates in a network, which for the purposes of this study is used to define the area of the enterprise's operation (Table 6). The final result, amounting to 2.7, indicates that it is highly probable that the enterprise operates in an environment welcoming a network approach. It is therefore possible to analyse the organization from the network perspective. The fact may point to the enterprise's characteristics, as well as its model and influence on the space within which it functions. It is worth emphasizing here that also in this part of the research certain anomalies occurred, inviting reflection. The first element which does not support the operating space of the enterprise is failure to use the dependency relationships benefiting all the co-operating entities in order to create value for the clients. Another is the question whether the network of entities in which the enterprise operates is resistant to changes taking place outside the network. As a result, just like in the previous stage of the study, it may lead to a degradation of the enterprise's co-operation with its surroundings, and at the same time also shutting itself out from external stimuli and failure to adjust to the changing environment and operating conditions.

Table 6: Assessment of the environment of X Company Ltd.

Question	Yes (value=3)	I don't know (value=2)	No (value=1)
Does the enterprise co-operate with a group of enterprises or organizations (entities) which are interrelated?	3		
Does the enterprise co-operate with a group of enterprises or organizations (entities) which are within the clients' scope of interest?	3		
Does the enterprise use dependency relationships benefiting all the co-operating entities in order to create value for the clients?			1
Are the relationships between enterprises and other entities symbiotic?	3		
Through its relationships, does the enterprise influence the formation of another product, including a product of the network leader?	3		
Does the enterprise participate actively in building relationships, exchange of knowledge and experience?	3		
Has the enterprise identified the clients and their needs?	3		
Does the enterprise belong to a network of entities oriented towards generating, or actually generating, innovations?	3		

Question	Yes (value=3)	I don't know (value=2)	No (value=1)
Is the network of entities in which the enterprise operates resistant to changes taking place outside the network?			1
Does the enterprise react dynamically to changes taking place in the environment?	3		
Does the enterprise ensure the maintenance of relationships, as well as initiate new business relationships?	3		
Does the enterprise engage in relationships with new clients?	3		
Does the enterprise have regular clients who enable its functioning?	3		
Does the enterprise expand the group of its regular clients?	3		
Does the enterprise ensure an influx of innovation into the main value chain?	3		
Mean	**2.7**		

Source: own study.

The analysis shows that the respective components of the method amount to:

- *stricte* assessment of the enterprise network – 2.6,
- enterprise strategy assessment in terms of its possession of network characteristics – 2.6,
- assessment of the environment in which the enterprise operates in terms of network indicators of this environment – 2.7.

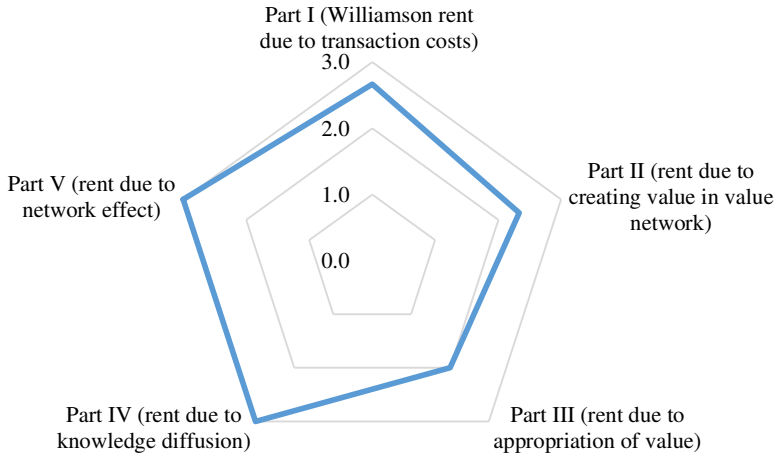

Fig. 2: Spider chart of network dimensions of X Company Ltd.

Source: Own study.

The indicated assessment values are exceptionally high. It is not surprising, however, as the company's profile itself implies its network potential. At the same time, it confirms the quality of the proposed method of network assessment, network strategy and network environment. Overall, X Comapny Ltd. may be considered a network firm consciously using network rents.

Conclusion

Networks are studied in many scientific disciplines. Despite this, there is a lack of research on network analysis and assessment for management purposes, especially in the strategic management literature. In Poland, especially in the works of: W. Czakona (2012), J. Niemczyk (2014), M. Zdziarski (2016), J. Światowiec-Szczepańska and A. Kawa (2018) and P. Klimas (2014), and in foreign literature apart from the already mentioned research of SP Borgatii, R. Gulati is, first of all, in all the achievements of M. Castell's (2007; 2011) and AL Barabasi (2009; 2016), we can find

a lot of knowledge about the network, helpful in defining also in the assessment of network. To this day, however, there is no full agreement as to whether network management is a completely new paradigm or just a new cognitive perspective. The described method shows that networks mean new knowledge and new research opportunities, as well as new management methods, not only interorganizational nets.

The presented method is only a preliminary step in the network management. If a given organization is assessed as networked, the next step will be to propose management methods suitable for network structures. Despite many works in this area, it is one of the most important directions of management development in the second and third decade of the 21st century.The results of the organization's network analysis presented in this paper point to the usefulness of the proposed approach. Obviously, the selection of the case in point was deliberate and resulted from a preliminary analysis, suggesting a network character of the organization. It is therefore gratifying that the proposed methodology led to a confirmation of the assumption. Networks in management appeared informally several decades ago, yet it has only been a dozen or so years since they were studied more extensively. An overall network theory is still lacking, though. In the author's opinion, it may be complemented by the study area of network assessment.

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Creating A New Development Path on The Example of The Łódź Special Economic Zone

Waldemar JAGODZIŃSKI
Pomeranian University in Slupsk, Poland
w.jagodzinski@slupsk.edu.pl

Ireneusz MICIUŁA
Faculty of Economics, Finance and Management, University of Szczecin
Szczecin, Poland, ireneusz.miciula@usz.edu.pl - corresponding author

Henryk WOJTASZEK
War Studies University, Faculty of Management and Command,
Warsaw, Poland
h.wojtaszek@akademia.mil.pl

Abstract

In this article a new development path was created on the example of the Łódź Special Economic Zone. The main research effort in this case is focused on finding an event that gives a particular phenomenon a "cause and effect sequence with deterministic properties. This event is not without cause, but one that contradicts the predicted results resulting from the explanatory model used. It may therefore be an individual decision, but it may also be a random, large-scale phenomenon. Such an event may, for example, be the creation of a special economic zone in a given region. The analysis of a number of activities undertaken by the Łódź Special Economic Zone leads to the conclusion that the process of creating a new path assumes that the economy will diversify into technologically related industries. This process is in partial opposition to the six rules of industrialization reflected in the development of industrial cities. In an innovative economy, standardization is being replaced by uniqueness and creativity, with soft skills taking the place of specialization, and therefore social capital is becoming increasingly important to respond quickly to changes in the environment.

Keywords: Economy, New Development Path, Łódź Special Economic Zone, Innovation, Entrepreneurship, Business Law.

JEL Classification: A11, E24, E61, H23, H43, I25, K22.

Introduction

The concept of path dependency is increasingly being used by representatives of various social sciences, which is explained by a turn towards historical approaches to explain the course of various processes, because "The legacy of the past influences the set of available possibilities and is therefore essential in explaining the processes of change" (Gwosdz and Micek, 2020). This concept is also applied to economic geography, as it allows to understand the development of formal and informal institutions present in a given area, influencing the economic development of local (regional) systems. Originally, the concept of path dependency served the purpose of analyzing the institutions responsible for the region's embedding in a given path of development and seeking an answer to the question of what event from the past made the region follow that path, being the "victim" of economic success achieved in the past. The main research effort in such a case is focused on finding the event that gives a particular phenomenon its "cause and effect character of a sequence with deterministic properties" (Gwosdz, 2004). As explains Gwosdz, this is not an event without a cause, but one that contradicts the predicted results of the explanatory model used. It may therefore be an individual decision, but it may also be random, large-scale phenomena. Such an event may, for example, be the creation of a special economic zone in a given region.

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Literature Review

The evolution of the concept of path dependency has also allowed research to focus on the issue of creating a new path of development by stimulating locally specific institutions to adapt the region to the changing economic environment. The creation of a path can be initiated by local actors if they are able to mobilize the necessary resources to leave the old path, but it can also be generated by decisions taken at regional, national or international level (Strambach, 2010). The sources of the new development path are presented in table 1.

Table 1: Mechanisms for creating a new development path

The source of the new development path	Characteristics	Recommended activities of institutions supporting innovation
Creating new economic activities "from within"	The emergence of new economic activities and technologies in a given region thanks to endogenous development, primarily through local innovation and *spin-offs* processes	- supporting breakthrough (*forefront*) research in social and technical sciences - aggressive patent policy - assistance in setting up new companies (business incubators) - cultivating links between scientists and entrepreneurs - creating an *industrial identity* - standard setting - the work of industry promoters ("evangelists") - conferences, workshops, business forums, etc.
Transplanting business and technology from other locations	Import of new activities and technologies through external investments or migration of people	- development of education and training (strengthening human capital) - *the corresponding curriculum* - technological support for subcontractors and suppliers
Diversification of the economy toward industries technologically related	The dominant industries are disappearing, but key competences are used by emerging, technologically similar but usually more advanced industries	- creating stakeholder links - filling "structural holes" - creating an industrial identity
Modernization (*upgrading*) existing branches economies	Restoring economic potential based on traditional industries that regain competitiveness through the use of new technologies or the introduction of new products and services	- solving problems in the industry through commissioned research, consultations *etc*. - development of education and training (strengthening human capital) - monitoring best practice in the industry - performing *foresight* analysis - organization of supplier forums with customers

Source: (Gwosdz, 2014).

The aim of the study is to show how a new development path was created in the Lodz Special Economic Zone in Poland. In the Development Strategy of the Łódź Special Economic Zone S.A. for the years 2016-2025 (Development strategy of the Łódź Special Economic Zone S.A. for the years 2016-2025), the zone was defined as a leader of integrated services for enterprises, supporting their innovation. This means the conscious creation of a new development path, in line with the trends set by the knowledge-based economy, while taking advantage of the existing economic potential of the region (Wojtaszek and Miciuła, 2019), especially specialization in the production of industrial products in the field of electrical engineering. However, it is worth reminding at this point the remark made years ago by Chojnicki and Czyż: "The growth and use of innovative knowledge in the region does not automatically shape the GOW [i.e. knowledge-based economy]. It occurs when the use of innovative knowledge leads to increasing market successes and economic benefits in those sectors of the economy where they are dependent on the absorption of technological progress and which acquire dominant importance" (Chojnicki, 2006). The new path is largely related to modern industries (mainly electronics and IT). Therefore, it is worthwhile to look at the institutional conditions created in the area of the zone in order to set a new path.

Within the Lodz Special Economic Zone, great importance is attached to supporting startups and coordinating activities aimed at establishing cooperation between the investor and the startup. Similar activities are carried out in the area of the Krakow Technology Park, with the difference that the Krakow acceleration program is aimed at startups that use Copernicus satellite data (Accelerator for satellite data startups, 2019). These activities gain particular importance in the face of the fact that in Poland 1 in 3 startups do not cooperate with any corporation (Beauchamp, 2018). Acceleration program Startup Spark 2.0 offered in the area of the Łódź SEZ, which is implemented under Measure 2.5 Acceleration programs, under Priority Axis II Support for the environment and potential of enterprises to conduct R&D&I activities of the Operational Programme Intelligent Development 2014-2020 is an example of stimulating the demand of large companies for innovative technologies and services (Kadłubek and Miciuła, 2019). Measure 2.5 aims at improving the innovativeness of the Polish economy by supporting startups in the development of solutions that will respond to the needs of the business client, with particular emphasis on solutions dedicated to the development of sectors indicated in the documentation. The aim of the measure is to increase the involvement of large and medium-sized enterprises in the development of startups by directing their own financial, personnel and technical resources into the acceleration process, gaining experience and creating a legal framework for such cooperation" (Ministry of Investment and Development, 2019). The program lasts 30 months and consists of four rounds of acceleration from 3 to 6 months each and four rounds of post-acceleration to 4 months each. In the current program at least 66 Beneficiaries will be qualified to all acceleration rounds, including at least 20 Beneficiaries that will fit into one of the three main industry tracks: Industrial Internet of Things (IIoT) / Augumented reality (AR), Artificial intelligence (AI) and Cyber security. The Startup Spark 2.0 acceleration program is aimed at the entities that are:

- are a micro or small enterprise and run their business in the form of a capital company, within the meaning of Article 4 § 1 point 2 of the Commercial Companies Code, for a period not longer than 5 years,

- have: full rights to dispose of the innovative business idea, solution, program or other project submitted in the application and to dispose of it on their own behalf,

- are free from any legal charges, security or any third party claim,

- are not listed on the exchange within 5 years from the date of registration in the relevant register,

- have not yet distributed the profit and have not been created by the merger,

- did not take over the activities of another entrepreneur,

- are in no way affiliated in capital or personal way with the Accelerator, Lodz Special Economic Zone, entities providing services within the acceleration program or the Recipient of Technology, which was indicated by the applicant for cooperation within the individual acceleration program.

Research Results

The application procedure assesses, among others, the innovativeness of the idea, its competitiveness, the team that has the applicant, the profitability and business model of the project, as well as the go-to-market strategy (individual criteria for project assessment are presented in Table 3.8.). Maximum single beneficiary may receive PLN 200,000.00 under the project, of which PLN 160,000 in cash and PLN 40,000 in a package of services.

Table 2: Selected criteria for project evaluation in the Startup Spark recruitment process 2.0

Quality criteria evaluated at stage 1 of recruitment		
Innovation		
Innovation (scale of innovation of the proposed project)	Local - innovation on the scale of a given Technology Recipient	0-3 points
	National - innovation on a national scale and other enterprises operating in Poland	4- 6 points
	Global - innovation on an international scale, companies operating in Poland and their global branches	7-10 points
The team		

Team potential	The applicant has sufficient team to produce the final product	0-3 points
	The applicant has a team that allows scaling of the product on a national scale.	4- 6 points
	The applicant has a team that allows scaling of the product globally	7-10 points
Quality criteria evaluated at stage 2 of recruitment		
Competitiveness		
Competitive advantages (scale of identified competitive advantages of the proposed project)	Local - competitiveness at the level of solutions already applied in a given Technology Recipient	0-3 points
	National - competitiveness at the level of solutions used in enterprises operating in Poland	4- 6 points
	Global - the project has a competitive advantage on a global scale	7-10
Cost-effectiveness and business model of the enterprise		
Cost effectiveness and business model	The applicant has a business model	0-3 points
	Reality of the business model of the Applicant for commercialization at OT	4- 6 points
	Business model has been validated (Applicant has customers)	7-10 points
Go-to-market strategy		
Go-to-market strategy	Defined sales channels/ potential for commercialisation due to sales channels	0-5 points
	Quality and replicability of the business model by industry	0-3 points
	Regulatory environment of the project	0-2 point

Source: (Rules of recruitment to the acceleration program Startup Spark 2.0 https://startupspark.io/storage/app/media/Regulamin_naboru_2019_02_11.pdf, 1.06.2019).

It should be emphasized that the program co-created by the Lodz Special Economic Zone crosses the borders of the zone and is also addressed to entities outside the zone - the regulations do not include the criterion of location of the entity applying for funding. The opening of the Łódź SEZ in January 2019 was an action which emphasized its involvement in the development of modern technologies. The "Fabryka" Centre of Creativity, which is a joint idea of the Łódź SEZ and the Digital Poland Association, which includes manufacturers of modern technologies such as Samsung, HP, Sony and Google. The Centre of Creativity is to inspire new initiatives, being an additional element of the ecosystem functioning around the Startup Spark gas pedal (Grzegorczyk, 2019).

In order to ensure the availability of adequately qualified human capital that could meet the demand for employees reported by the zone companies, the Education Zone Ltd., whose shareholder is, among others, the Łódź SEZ (75% of shares), established the Automation and Robotics Technical School, which is to educate in 4 professions: automation and robotics technician, electronics technician, mechatronics technician and automation technician. Companies have a 10% share in the company: Miele Technika Sp. z o.o. and Ceramika Tubądzin, while 5% of shares are held by Delia Cosmetics (Statute of the Technical School of Automation and Robotics in Łódź. The mission of the school is (in accordance with §7 point 1 of *the Statute*) "to prepare students to pursue a new profession necessary to accelerate economic development and stimulate innovation of the economy". Theschool pursues its goals through "cooperation with employers, scientific, educational, social and cultural institutions and non-governmental organizations". The Technical University of Lodz has been appointed the scientific and technical

supervisor of the Technical School. The Technical University of Lodz has agreed to make its technical and human resources base available to its students.

The establishment of the school, which educates in the directions for which the zone's enterprises are in demand, positively testifies to the strategic plans of the management board of the Łódź Special Economic Zone, which aim at saturating the zone's economic space with human (Becla and Czaja 2014) and social capital. Human capital consists of: a system of motivation to work, communication skills, predispositions and personal talents, creative, entrepreneurial and innovative attitudes, experience and practical skills, human health, fitness and motor characteristics, knowledge and education and skills (Miciuła, 2018). Social capital forms a network of elements which influence social and economic conditions of management. As a result, transaction costs are reduced and desired external effects appear. At the same time, unwanted external effects (effects) can be avoided. Relationships of trust and responsibility, recognized ethos and value systems as well as social and moral norms allow to build and maintain interpersonal and social communication networks". It also proves good cooperation at the level of institution-organization, which from the very beginning of the school's establishment is manifested by the commitment to the implementation of the educational experiment of the most important zone actors: the board, employers, future employees and, given the research and development potential of this organization, the Technical University of Lodz.

Due to the involvement of public and private companies' funds, the school is an effect of a kind of public-private partnership, which, as Zewald (President of the Education Zone) points out in an interview for *Dziennik Lodzki*, has not happened so far (Kałach, 2016). The involvement of the Technical University of Lodz in the educational process guarantees a high level of knowledge transfer, while the participation of future employers will not only ensure the practical use of the acquired skills, but will also allow future employees to gain such valuable experience on the labour market, develop their talents, as well as become acquainted with the specifics of various jobs offered by the companies located within the zone, become familiar with the organizational culture prevailing in selected companies, build relationships with future employers, as one of the pillars on which the idea of the school is based is, as W. Zewald put it. Zewald, the institution of "*growing up among employers*", which is primarily an informal institution. The great advantage of the close contact between students and employers is also the chance to acquire hidden knowledge, i.e. subjective knowledge that comes from personal experience and is therefore difficult to transfer. In such a case, a closer cooperation between education and business allows employers to get to know their future employees better, which has a positive impact on the reduction of transaction costs related to, among others, the recruitment process, shortens (and in the case in question properly eliminates) the period of several months of implementing an employee to his/her duties. Making entrepreneurs believe that in the future they will have no problems with finding highly-qualified staff may also encourage making decisions related to investing in the development of existing enterprises (Piotrowska, 2012).

Another event conducive to the creation of a new path of development organized by the Lodz Special Economic Zone in cooperation (Business Mixer Lodzkiej SSE) with the Polish-German Chamber of Industry and Commerce, the Netherlands-Poland Chamber of Commerce, the British-Polish Chamber of Commerce and the Scandinavian-Polish Chamber of Commerce was the 6th Business Mixer, a series of direct meetings of business representatives at round tables. The aim of the event was to enable the establishment of cooperation. The talks lasted over an hour and a half, during which 3 presentation rounds took place - each participant had 3 minutes to present his company and tell what business partners he is looking for. The talks were followed by networking. The event was attended by companies from eight provinces (including construction, IT, HR, legal services), which proves the supra-local range of the Lodz Special Economic Zone (Newsletter ŁSSE 2019).

The fact that the Lodz Special Economic Zone is focused on supporting innovative technologies and thus creating a new path of development can be proved by the pilot introduction of the fastest 5G Internet in Lodz. Łódź is to be covered by 5G by 2020, 5 years earlier than the rest of Poland. This measure may provide the zone with a competitive advantage over other regions and at the same time provide an investment incentive for entrepreneurs (*https://dzienniklodzki.pl/5g-dla-lodzi-ericsson-i-lsse-rozpoczynaja-wspolprace/ar/13328220*) .

Another activity that fits into the creation of a new development path for the region of Łódź is the establishment of the logistics cluster LODZistics - Logistic Business Network of Central Poland, which brings together, among others, companies from the logistics industry, research and development units and business environment institutions. Its statutory tasks are, among others:

- Stimulating innovation in the logistics industry and related industries by facilitating access to knowledge and assisting in technology transfer between science and business practice in logistics, including pro-ecological solutions related to improving the energy efficiency of products and services offered by members of the Association,

- Development of modern transport solutions to meet the challenges of supply chain management in the XXI century, such as intermodal transport, RFS system in air transport, eco-driving,

- Determining the quantitative and qualitative needs of the labour market in relation to logistics personnel, developing education profiles, study programmes, training and professional development for both operational and management logistics personnel,

- Supporting the cooperation of research centers with business practice,

- Support for obtaining patent protection of scientific research results.

Summary

The analysis of a number of activities undertaken by the Lodz Special Economic Zone leads to the conclusion that the process of creating a new path assumes the diversification of the economy towards technologically related industries (Marczyńska-Witczak, 2008). This process stands in partial opposition to six rules of industrialization reflected in the development of industrial cities (Kuciński, 2008). In the innovative economy standardization is replaced by uniqueness and creativity, the place of specialization is taken by soft skills, therefore social capital, which allows to react quickly to changes in the environment, becomes more and more important. Centralization, understood as a hierarchical set of competences, is being replaced by network structures. Interestingly, the creation of a new development path by the Łódź SEZ also has the characteristics of an endogenous path (especially through the development of local human capital and creation of bonds between investors and local human capital). The creation of appropriate institutional conditions to support this path includes both the creation of institutional infrastructure (e.g. the launch of a technical school for the local economy in the fields that have so far been reserved for university education) and the shaping of the institutional tissue in terms of formal institutions (e.g. statute of the technical school, cluster statute) and informal (development of attitudes conducive to entrepreneurship by organizing events such as Business Mixer or innovative attitudes by enabling cooperation with startups), conducive to building a network of business relationships.

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Demographic Change as A Factor in The Development of Social Infrastructure - A Planning Perspective on The Example of Germany

Waldemar JAGODZIŃSKI
Pomeranian University in Slupsk, Poland
w.jagodzinski@slupsk.edu.pl

Ireneusz MICIUŁA
Faculty of Economics, Finance and Management, University of Szczecin
Szczecin, Poland, ireneusz.miciula@usz.edu.pl - corresponding author

Henryk WOJTASZEK
War Studies University, Faculty of Management and Command,
Warsaw, Poland
h.wojtaszek@akademia.mil.pl

Abstract

One of the factors playing an important role in the process of growth and economic development of spatial units of different geographical scale is infrastructure. The aim of this study is to show the impact of demographic change on the development of social infrastructure in Germany, which is considered to be an element of spatial planning that primarily serves the interests of citizens. It can be pointed out that in German politics the issue of spatial order is strongly linked to the demographic changes taking place in German society. The increase in the number of senior citizens in society requires the social infrastructure to be adapted to their changing needs over time. In this respect, there is scope for entrepreneurial and innovative action, especially in the service sector.

Keywords: economy, demographic change, development of social infrastructure, planning perspective, Germany.

JEL Classification: A11, A13, C02, E25, H42, H54, J11.

Introduction

There is no doubt that one of the factors playing an important role in the process of growth and economic development of spatial units of different geographical scale is infrastructure. As explains Kuciński, it is a condition for "proper functioning, effective use, development and spatial integration of individual subsystems of the spatial socio-economic system and their components" (Kuciński, 2002). He defines it as a system of "devices, objects and institutions that serve these spatial systems and connect them into one whole". Ratajczak emphasizes that the infrastructure significantly contributes to the increase of territorial cohesion and reduction of the so-called social distance (Ratajczak, 2000). Broadly understood public infrastructure can be divided into two basic categories: economic infrastructure and social infrastructure (Blessing, 2018). Table 1 presents the detailed conceptual scope of both categories of infrastructure.

Table 1: Division of public infrastructure

Infrastructure	
Business	**Social**
1. Transport and communication	**1. Science and higher education**
- Roads	- Institutes of science
- Railroad lines	- Universities
- Airports	**2. Education**
- Sea and inland ports	- Nurseries
- Border crossing points	- Kindergartens
- Telecommunications links	- Schools
- Mail	**3 Culture**

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2. Power engineering - Power lines - Gas industry - Heating **3. Protecting and shaping the environment** - Waterways - Storage tanks - Flood embankments - Melioration - Water supply - Sewerage - Wastewater treatment plants - Landfills - Other	- Radio - Television - Auditoriums - Museums - Libraries **4 Health and social care** - Outpatient clinics - Hospitals - Emergency services - Sanatoriums - Nursing homes **5 Physical culture and recreation** - Sports facilities - Parks - Green areas - Other

Source: (Ćpak, 2016).

Literature Review

Economic infrastructure, also referred to as technical or economic infrastructure, is responsible for the proper functioning of individual departments of the national economy and for the integration of its spatial arrangements (Healey, 2009). In turn, the task of social infrastructure is to directly satisfy various human needs (European Commision, 2015). According to Leśniak, from the economic point of view, the purpose of the devices constituting the social infrastructure is to enable reproduction of the workforce (Leśniak, 1985). However, taking into account the demographic changes taking place, among others, in Europe, this view remains valid in the XXI century only in those areas where positive natural growth is recorded. It is also worth noting that in some countries (e.g. Germany) the demographic changes that are taking place are so important (see table 2) that they are an important factor determining the directions of development of the social infrastructure primarily at the local level (which to some extent also results from the legal solutions adopted in the Federal Republic of Germany).

Table 2: Population in Germany by 2060 by selected estimation variants*

Year (each 31.12)	Option 1	Option 2	Option 3
	Number of people in millions		
Total population			
2020	83,4	83,4	83,4
2030	83,1	83,3	84,3
2040	80,7	82,1	84,2
2050	77,6	80,2	83,6
2060	74,4	78,2	83,0
Population under 20 years old			
2020	15,3	15,3	15,4
2030	15,6	15,7	16,2
2040	14,6	14,9	15,6
2050	13,4	14,1	15,1
2060	13,3	14,1	15,4
Population aged 20 to 66			
2020	51,8	51,8	51,8
2030	48,4	48,6	49,2
2040	44,8	45,8	47,3
2050	43,2	45,0	47,4
2060	40,0	42,7	46,0
Population aged 67 years and over			
2020	16,2	16,2	16,2
2030	19,0	19,0	19,0

2040	21,4	21,4	21,4
2050	21,0	21,1	21,1
2060	21,0	21,4	21,6

Source: (Federal Ministry of Transport and Digital Infrastructure, 2016).

* Assuming a moderate development of the birth rate with an annual birth rate of 1.55 children per woman; assuming an increase in life expectancy at birth by 2060 for men to 84.4 years, for girls to 88.1 years, and assuming a different level of the average migration balance for each variant:

- Option 1: 147 000 people per year
- Option 2: 221 000 people per year
- Option 3: 311 000 people per year.

These demographic changes result in transformations that affect not only society but also spatial order, both locally, regionally and nationally (Parr, 2014). The growing percentage of elderly people in the region, combined with the decreasing number of young people, means that changes in the structure of the services provided must take into account the matching of the supply of goods and services offered with the local demand of the regions by a decreasing number of inhabitants. The general decline in the population (see table 3) results, among other things, in a decrease in municipal income, with a simultaneous increase in the cost of servicing the existing infrastructure per capita. In other words, one can say that demographic changes result in far-reaching socio-economic and spatial consequences (Zeffane and Morgan, 2003).

Table 3: Selected German regions with the lowest population density participating in the programme "Meeting Living needs from a regional perspective

	Area	**Number of inhabitants**	**Population density (os. / km2)**
Landkreis Uckemark	3 058 km2	129 378	42
Altmark Region	4 715 km2	212 762	45
Oderlandregion	811 km2	ok. 31 000	38
Spreewalddreieck	412 km2	34 500	84
County Elbe-Elster	1 890 km2	112 142	59
Amt Peenetal/Loitz	170 km2	6 700	39
Westmecklenburg	6 999 km2	481 000	69
Mitte Niedersachsen	2 320 km2	186 655	80

Source: (Federal Ministry of Transport and Digital Infrastructure, 2016).

Research Results

From an economic point of view, it must not be forgotten that older people will become an increasingly significant group of consumers in society. Therefore, when developing the social infrastructure it is necessary to take into account their various needs (Jack, 2016) (for example, health care is not only access to a hospital or a pharmacy located near the place of residence, but also the possibility to take advantage of cosmetic treatments or wellness services). Today, innovation has become the main pillar of the development of economies, regions and entities (Miciuła, 2018). This is very important in the global market, the originality of the business carried out through innovation and technology transfer processes makes it possible to achieve competitive advantage (Rokita, 2005). Innovativeness of the economy comprises the activity of enterprises, government and self-government authorities, research and development entities and institutions which make up the business environment (Snell, 1992). However, innovative economy is not only the sum total of the elements it is composed of, but it is a synergy resulting from broadly understood cooperation based on developed network relations (Tabuchi and Thisse, 2011). It should also be stressed that these changes are essentially irreversibleand can be at least partly controlled by appropriate measures, providing benefits to both society and the economy (Kabus and Miciuła, 2019). The aim of this study is to show the impact of demographic change on the development of social infrastructure in Germany, as an element of spatial planning that primarily serves the interests of citizens

The sources of planning law in Germany include the Landesplanning Act (hereafter: uzp), the Land Planning Act, the 1960 Building Code, and the Land laws regulating the issue of building permits and regulating the technical requirements for buildings. The concept of social infrastructure appears in § 2 of the upp, which outlines the principles of spatial order to be observed for the implementation of sustainable spatial development. According to one of them, access to services and elements of infrastructure to meet the livelihoods of all groups of the population should be guaranteed in such a way that the inhabitants of the subregions and sparsely populated regions are not discriminated against. According to another rule, the spatial development planning process should take into account, among others, the challenges of demographic change. The change in the age structure of citizens directly affects the change in demand for various types of services. Decreasing number of children and youth makes it pointless to invest in kindergartens or schools in the immediate surroundings. On the other hand, the increase in the share of elderly people in society means an increasing demand for services related to, among others, care for the elderly. Since the ongoing demographic changes are not of a temporary nature, it is necessary to provide appropriate social infrastructure to meet the changing needs of living.

One of the key concepts in German spatial policy is the concept of *Daseinsvorsorge*, which can be translated as a living needs satisfaction. Measures are taken at both national and local level to ensure that citizens have access to certain goods and services that are seen as necessary for the proper functioning of the individual. The prices of such goods and services must be socially acceptable and they must be easily accessible in spatial terms, i.e. the distance from the place of residence to the place of service provision should be reasonable. As "reasonable distance" is not a precise concept, it has been established precisely according to the means of transport used and with reference to the places from and to which it should go (see tables number 4 and number 5).

Table 4: Travel time between the element of social infrastructure located in the central center and the place of residence

Central hub	**Travel time in minutes**	
	car	**by public transport**
Basic center	< 20	< 30
Intermediate center	< 30	< 45
The overarching center	< 60	< 90

Source: (Federal Ministry of Transport and Digital Infrastructure, 2015).

Table 5: Travel time to the central center from a neighbouring central center of the same degree

Central hub	Travel time in minutes	
	car	by public transport
Basic center	≤ 25	≤ 40
Intermediate center	≤ 45	≤ 65
The overarching center	≤ 120	≤ 150
Metropolitan region	≤ 180	≤ 180

Source:(Federal Ministry of Transport and Digital Infrastructure, 2015).

The aim to meet living needs in the context of demographic change includes, among others, the development of social infrastructure in the area of accessibility of cultural offer, health services and services provided in the field of elderly care. It is worth emphasizing that while previously the issue of meeting living needs was perceived as a task of the state and municipalities, nowadays it is a task performed by both the public and private sector (Klaassen et al., 1982). This means that the state does not have to provide certain services, but only acts as a guarantor, ensuring that certain services, which are of a certain quality and available at an affordable price, are provided in certain places. Modern demographic development makes it necessary for the state to take into account the shrinking population in selected regions as well as to adapt the existing infrastructure to the changing needs of an ageing society, while avoiding spatial disparities in meeting living needs, i.e. without discriminating against those areas that are less populated. For this reason, an increasingly important function is played by the spatial planning process,

within the framework of which appropriate regional strategies should be developed, which will enable integrated actions to be taken in order to guarantee appropriate access to high quality services located at a convenient distance.

From the point of view of ensuring spatial order, the aspect of regional diversification of demographic development is important, meaning that the actions taken cannot be universal in nature, but must be tailored to the locally and temporally specific needs of the residents living in a particular area. The implementation of such actions is associated with a change in the existing paradigm of spatial management. We should move away from actions implemented in the framework of ensuring "controlled growth" towards actions aimed at transforming and adapting regions and cities to the needs of residents. The effectiveness of these actions depends on the degree of implementation of several objectives:

1) The overarching goal of spatial policy, even in times of a shrinking and aging population, is to ensure equivalent living conditions throughout Germany (the concept of equivalent living conditions does not mean that they are to be identical). Although there is no doubt that the changes in the structure of society will also change life in cities and regions, the goal is to maintain an adequate quality of life. Due to the decrease of revenues to the public purse, it is necessary to save costs in the scope of public services and increase the effectiveness of undertaken actions. Therefore, it is necessary to reorganize the process of providing public services, trying to maintain decentralized structures for meeting the needs of the local population, as they are family- and elderly-friendly.

2) In order to counteract the low birth rate, which is the main cause of population decline and ageing, cities and regions must strive to improve the living conditions and quality of life of children and families. An important factor is also to make it possible to live and work in the intergenerational dimension.

The process of adapting social infrastructure to the local specific needs must take into account the characteristics of the infrastructure, as well as a wide range of possibilities for modification of existing forms of meeting living needs, which includes, among others, such activities as increasing the availability of elements of the existing infrastructure, reducing their number, their decentralization or centralization. The possibilities of action and examples of their application are presented in table 6.

Table 6: Spectrum of infrastructure development activities

Action	Designation	Description of the action	Example
Increasing availability		Improve road connections to increase capacity utilisation	optimization of urban transport network; frequency of transport services depending on the demand for these services
Reduction in availability		Proportional reduction of infrastructure elements adapted to the needs of the local population	reduction of the number of buses
Decentralisation		Division into smaller, efficient units (in case of high connection costs)	Several biological wastewater treatment plants instead of one large
Centralisation (with an appropriate strategy to guarantee accessibility)		Combining unused infrastructure elements with improved accessibility to them	Coordinating the process of connecting schools with school bus transportation services
Temporary mobile solutions		Access to services provided for a limited period of time	Weekly trade fairs, mobile libraries

Restructuring Substitution		The goal is achieved by means of a new way of accomplishing the task	Ordering goods on the Internet, transporting individuals by cab instead of public transport

Source: (Federal Ministry of Transport and Digital Infrastructure, 2015).

Shaping the social infrastructure taking into account the generational changes is a task that does not concern one area of sectoral policy, but constitutes a complex political network of activities that includes children, youth, working age population and seniors, as shown in Fig. 1. Thanks to adapting the social infrastructure to the needs of the above mentioned social groups, the ideal of holistic development of society is realized.

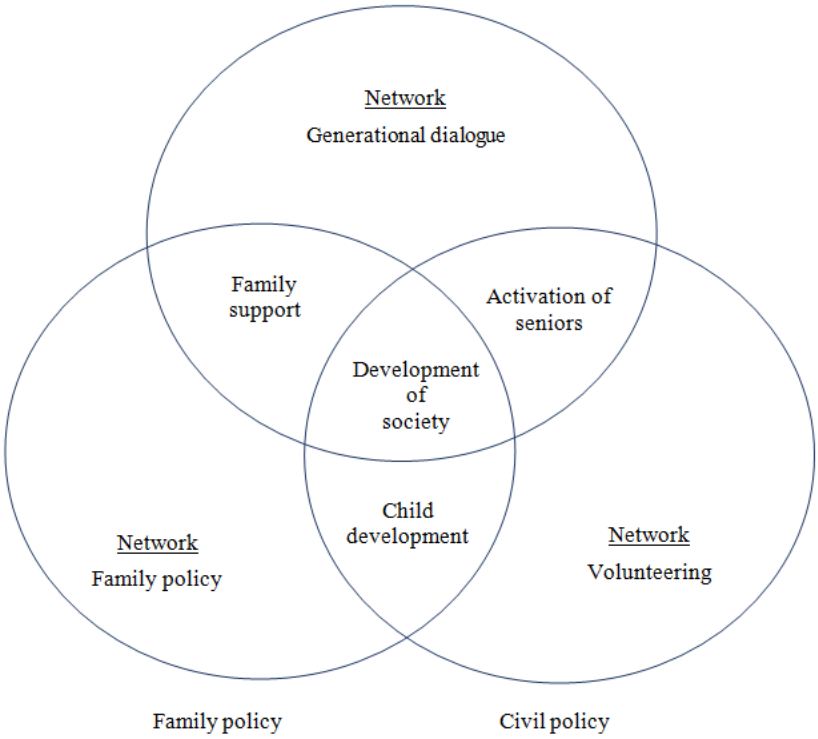

Fig. 1: Intergenerational policy

Source: (Federal Ministry of Transport and Digital Infrastructure, 2010).

Summary

As can be seen from the above considerations, the issue of spatial planning in German politics is strongly linked to the demographic changes taking place in German society. The increase in the number of seniors in society requires an adaptation of the social infrastructure to their changing needs over time. In this respect, there is scope for entrepreneurial and innovative activities, especially in the service sector.

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A Correlate Analysis of Residential Property Values at Border Communities of Ogun And Lagos States, Nigeria

Olayinka OLOKE
Department of Estate Management, College of Science and Technology, Covenant University. Canaanland, Ota, Ogun State, Nigeria
Yinka.oloke@covenantuniversity.edu.ng

Deborah JESUSEGUN
Department of Estate Management, College of Science and Technology, Covenant University, Canaanland, Ota, Ogun State, Nigeria
Deborah.jesusegun@stu.cu.edu.ng

Oluwole ALAGBE
Department of Architecture, College of Science and Technology, Covenant University, Canaanland, Ota, Ogun State Nigeria
oluwole.alagbe@covenantuniversity.edu.ng

Nelson AKINDELE
Department of Building and Real Estate, The Hong Kong Polytechnic University, Hong Kong.
nelson.akindele@connect.polyu.hk

Abstract

This study highlights the disparity in the property values of adjacent communities under different geographical and administrative jurisdiction. Also identified are the factors responsible for the variations and implications for the emerging megacity. Extant literatures were reviewed to establish divers' interests, perception and context of the study. Data were collected with structured questionnaires administered to two categories of respondents; residents in the neighbourhoods and professional property managers. A total of 236 questionnaires were administered. Statistical tools such as percentages mean and independent sample T-test statistics were used to analyse the data collected on rental values of residential properties and results presented in tables. Pearson coefficient of correlation was used to establish the degree of relationship. Results of data analysis showed that significant differences exist between rental values of residential properties in the two border communities while the Pearson correlation coefficient revealed a strong positive correlation between rental values of properties in the neighbourhoods. Significant amongst the factors affecting property values in the communities are the level of infrastructure development, adherence/enforcement of physical planning regulations, administrative jurisdiction, population density, proximity to CBD and level of commercial activities. The study concluded by recommending major investment in physical and socio-economic infrastructure in both communities and creation of joint development policy and programme by governments of Lagos and Ogun states so as to overcome administrative jurisdiction barrier militating against the actualization of the megacity project.

Keywords: Border, Infrastructure, Megacity, Residential, Value

Introduction

Growth and physical expansion of urban settlements is a global phenomenon which in recent times has gained momentum in regions regarded as less developed (Abiodun, Olaleye, Dokia and Odunaiya, 2011). The pattern of growth and development of urban areas is defined by several factors. While factors like presence of modern infrastructure such as pipe borne water, electricity good road network, access to social services and sporting facilities, employment opportunities, concentration of industrial and commercial activities, location of administrative and other government establishments etc. continues to attract population into urban areas, increase in

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crime rate, all forms of environmental pollution, rising cost of living, rising cost of housing and land procurement, traffic challenge, breakdown of existing infrastructure, retirement and old age related reasons and several other factors over the years have pushed human population out of urban areas to peri-urban and rural fringes in droves. Of recent, many peri-urban areas are witnessing population growth on a scale that is unprecedented. For instance, Adelekan, Olajide-Taiwo, Ayorinde, Ajayi, and Babajide (2014) stated that while the average population growth rate per year in Ibadan metropolis was 0.5 percent between 1991 and 2006, average growth rate for the peri-urban areas was 4.8 percent over the same period. Urbanization is the lead cause of peri-urbanization and this according to Adelekan (2016) is a process whereby extensive areas earlier characterized by rural features get absorbed into the city or transformed into peri-urban areas. Peri-urbanization gradually absorbs existing physical developments and paves way for modern structures, social as well as economic infrastructure developments. People move from overcrowded city centers to the less populated sub-urban areas. As population of these areas increase, demands for land for different uses such as housing, commercial, education, administration, financial services and other economic purposes also increase. In most developing nations where physical planning regulations are weak and suffer poor implementation, sub-urban growth and developments are often unplanned, uncontrolled and disorganized, exposing the residents to diverse environmental risks and hazards.

Bloch, Fox, Monroy and Ojo, (2015) observed that the growth of Nigeria's urban population has been accompanied by the expansion of existing built-up areas and the emergence of new and identifiably urban settlements. For instance, Lagos megacity according to Mehrotra et. al, (2009), is one of the fastest growing urban centres. Aside the official estimate of about 9 million according to NPC (2006), the UN-Habitat estimated the city's population to be about 15 million in 2006 with 600,000 additional migrants added each year. This has been projected to about 20 million in 2015. Lagos state according to Salau, Lawanson and Odumbaku (2013) has continued to grow in terms of population and space, spilling excess population into the neighbouring Ogun state. The Lagos megacity project covers the whole of Lagos state and four local governments in Ogun State which are at the border of Lagos State. These include: Ado-Odo/Ota, Ifo, Obafemi-Owode and Sagamu (Bello and Olatubara, 2014). The Ogun State Government report (2015) revealed that Lagos side of the megacity is made up of 74% of the built-up area and has 85% of the megacity population. Ogun state side on the other hand has 26% of the built up area and accounts for about 15% of the megacity population. The communities in adjoining local government to Lagos State that forms part of Lagos State continues to experience influx of population from the over-populated Lagos metropolis. Thus the dual character of the Lagos megacity which comprises communities from two different geographical and administrative jurisdictions prompted the study. The study analysed and compared residential property values of border communities under the umbrella of Lagos megacity project.

Literature Review

Urban growth and development pattern

Ogu (2005) described the post-independence urban development process in Nigeria in the form of growth by densification and growth by expansion. This as explained exists at the edges of existing urban areas and refers to the appearance of new parts of a city. Atu et. al, (2012) opined that this occurs when detached improvements and settlements that were not part of urban areas are absorbed at the city borders as a result of physical expansion. This aptly describes urban development process that saw the fusion of scattered neighbourhoods that were hitherto located within the fringes of Lagos metropolis. Growth by densification on the other hand describes the emergence of independent houses in areas previously occupied by single large housing structures (Bloch, Monroy, Fox and Ojo, 2015). This pattern of growth as explained in the study is common with urban cores or existing urban areas and has led to the appearance of various forms of development within the traditional core of Nigerian cities, notably the emergence of informal settlements. This not only explained the process of urban transformation witnessed in major city centers such as Ibadan, Abeokuta and Lagos, but also that of Ota town in Ado-Odo/Ota Local government area of the Lagos megacity. Ota was a core ancient town with distinct cultural and morphological characteristics and a largely homogenous population. The expansion cum explosion of Lagos population resulted have over the past decades diluted the homogenous population of the ancient Ado-Odo/Ota towns and triggered the appearance of various socio-economic, administrative structures and infrastructures typical of urban transformation process. Thus urban expansion connotes the improvement and expansion of urban areas in terms of size in order to create space for urban growth. Notwithstanding, Adewale, Ibem, Amole and Adeboye (2020) observed that the plight of residents of inner-city slum has attracted attention because of the degenerated state of infrastructure. Urban growth results from three processes namely; natural population growth, rural-urban migration and reclassification of rural into urban areas. The emergence of Lagos megacity and the physical and geographical coverage therefore reflects the underlying process of these three forces at work. However, Bloch et al., (2015) found out that urban growth and

development further depends on the prevailing political and economic situation as well as government control mechanism. Lack of good government control results in spontaneous patterns of growth around urban fringes while proper control sets unnecessary expansion within limits. Urban growth and development increases competition among land use and resources, urban land cost and ultimately, renters and owner's housing procurement costs.

Urban infrastructure development

Infrastructure development is one vital socio-economic factor that makes a human settlement urban and livable. Basic infrastructure that facilitate development in any neighbourhood include housing, good road network, drainage, electricity, decent water supply system, waste management system, primary healthcare facilities, educational facilities, effective security architecture combined with well-planned and coordinated developments. Urban infrastructure provision is not only the responsibility of the government alone. The influx of people into the sub-urban areas of a city only culminates in demand for more housing and other socio-economic infrastructures. These demands not only reveal urgent government intervention in many areas but also create viable opportunities for private sector participation. Infrastructure development is found to be a vital factor that determines the value of a neighbourhood and is reflected in land and property values in the area. According to Oloke, Simon and Adesulu (2013), the level of infrastructure development in a neighbourhood is very critical to determining housing prices and as well attracts huge investment in broad range of real estate products. Providing infrastructure throughout the country has almost become impossible for the government and as such, it has become important for private sector and other stakeholders to contribute to infrastructure provision. Bello, Adeniji and Arowosegbe (2015) identified four participants in the provision of urban infrastructures namely: the government, formal private sector, informal private sector, and residents of the affected community. Alyafei, (2017) revealed that the government of Quatar considers the involvement of residents as key to the country's progressive development. Ahuja and Priyadarshini (2017) also emphasized that the people affected by a development need to be duly informed in order for them to be involved in the development. It was also noted by Ahuja and Priyadarshini, (2017) that the goal of sustainable development is likely to be achieved when the affected communities are actively involved in the process so that they do not indirectly impede on the benefits of the infrastructures provided.

Urban infrastructure and property value

Urban infrastructure and property value are closely connected as the level of development or the state of infrastructure determines the value of property in the vicinity. Real estate products include vacant/virgin land, and developed land ranging from housing to industrial, commercial, administrative, health and educational facilities, recreational, entertainment and hospitality developments as well as market structures located in an area. Land and landed properties are either rented or purchased to meet these different purposes and coupled with the portion of land laid out for infrastructure provision, the competing uses for land resources most times results in enhanced value of land and landed properties in an urbanizing neighbourhood. Other dimensions of value largely grouped as statutory or non-statutory values though exist for properties, these values generally are affected by the level or state of infrastructure. Property value worldwide is a metric for assessing the level of development in any given area. Babalola et. al. (2020) submitted that quality and sustainable housing environment is germane to quality living in public housing estates. The higher the value of properties, the higher the level of development in that location and vice-versa. This explains why different places have unique property market as location to a large extent determines value. Different studies have investigated the impact of different infrastructure on residential property value. For instance, Qin, Yu, and Liu (2019) examined the impacts of the HOPSCA (Hotels, Offices, Parks, Shopping malls, Convention centers, and Apartments) facilities on housing prices and found that HOPSCA had both positive and negative impacts on accommodation values. It was observed that different cases of HOPSCA had different impacts on accommodation values according to the situation and mode of arrangement. Also, Gargiulo (2010) assessed the impact of city renewals, focusing on the construction of an extravagantly fast rail route and its effect on property prices. The study also concluded that the development of fast rail system drastically increased property values in the area. In addition, the larger developed city centres were very much affected as the transport infrastructure helped revived the blighted areas. Bello, Adeniji, and Arowosegbe (2015) examined the important of urban facilities to property values in Abeokuta's city center, Ogun state, Nigeria. It was concluded that the provision and condition of infrastructural services led to an enormous rise in price. In order to place the pace of development of communities under the Lagos megacity project on the same page with the agenda of the vision, this study was conducted to serve as development metric particularly for the border communities.

Research Methods

The study population comprises residential properties owners in Alimosho and Ado-Odo/Ota local government areas of Lagos and Ogun States, as well as estate surveyors and valuers in Ikeja, Lagos. Two border communities were purposely selected from each local government area. The communities were Joke Ayo community in Alimosho and Akeja community in Ado-Odo/Ota. The sample size was determined by measuring a radius of 1km on either side of the bridge that demarcates the boundary between the two communities. A total of 63 houses were counted within the 1km radius in Akeju community and 89 houses houses within the 1km radius of Joke-Ayo community making 152 houses. Thus the first category of respondents is the 152 adult residents or household heads from each of the 152 houses surveyed. The second category of respondents are the estate surveyors and valuers in the 84 estate firms in Ikeja, Lagos as obtained in the 2016 directory of the Nigerian Institution of Estate Surveyors and Valuers. Estate surveyors and valuers according to Oloke, Ijasan and Oyedele (2013) are those trained and authorized to carryout valuation and other related services such as property management, sales, letting, feasibility and viability study etc. Sample sizes for the target population are the owners/adult residents of the identified houses and estate valuers in the capacity of manager or partner in the firm. Structured questionnaire was administered to the two set of respondents. Rent per annum of the various types of residential property in the study areas was obtained over a six year period (2014-2020). The impact of the factors influencing residential property values in the neighbourhoods was assessed on a five point likert scale namely: nil, low, moderate, high and very high with weight ranging from 5 (very high) to 1 (nil). Statistical tools of mean and range were used to determine point estimates of rents of different accommodation types as well as the change in rental values. Karl Pearson product moment coefficient of correlation was used to establish the relationship between rental values in the two localities. Findings were presented in tables, charts and then discussed.

Result Analysis

Response Analysis

Table 1: Analysis of response

Questionnaires	Joke-Ayo (Lagos)	Akeja (Ogun)	Estate Firms	Total
No. Administered	89	63	84	236
No. Retrieved	73	54	65	187
Response rate (%)	82.0	85.7	77.4	79.2%

One hundred and fifty-two (152) questionnaires were administered to household heads within the selected border communities. A total of 122 were retrieved constituting 83.6 percent response level. This was sufficient for subsequent analysis. The pattern of questionnaire administration and retrieval rate is as shown in Table 1.

Types of residential property in selected neighbourhoods

Table 2: Types of residential property in the communities

Property Type	Property Description	Joke-Ayo (Lagos) No.	Percentage	Akeja (Ogun) No.	Percentage
Type 1	Tenement building	3	4.1%	12	22.2%
Type 2	Self-contained	5	6.8%	3	5.6%
Type 3*	Blk of 2 bdrm flats	11	15.1%	9	16.7%
Type 4**	Blk of 3 bdrm flat	17	23.3%	11	20.4%
Type 5	2 bedroom bungalow	3	4.1%	5	9.3%
Type 6	3 bedroom bungalow	17	23.3%	8	14.8%
Type 7	Semi-detached	7	9.5%	4	7.4%
Type 8	Fully-detached	10	13.7%	2	3.7%
Total		73	100	54	100

Key:
**Block of 2 Bedroom Flats*
***Block of 3 Bedroom Flats*

Table 2 contains the different types of accommodation of respondents in study area. The Table revealed that tenement accommodation are common in Akeju community having 22.2% of the number of houses captured compared to blocks of 3 bedroom flat and 3 bedroom bungalow that have 16.7% and 20.4% respectively within the same community. However, blocks of 3bedroom flats and r bedroom bungalow have the highest occurrence with 23.3% each in the Joke-Ayo community of Lagos State. The survey further revealed fewer types of modern design accommodation in Akeju compared to Joke-Ayo neighbourhood.

Table 3 presents the average rental value of accommodation types in the two neighbourhoods over a period of 6 years. This was obtained from the responses of professional property managers surveyed. The figures were estimates of range of values supplied by the valuers for each property type between 2014 and 2020. It was observed that average rental values increase in both communities during some periods but remain constant at some other periods. For instance, similar average rent was observed in 2019 and 2020. However, neither the rate of growth nor the relationship between the values was immediately clear from the Table.

Table 3: Average rental value of residential properties in Joke-Ayo and Akeja communities

Types	2014		2015		2016		2017	
	Joke-Ayo	Akeja	Joke-Ayo	Akeja	Joke-Ayo	Akeja	Joke-Ayo	Akeja
Type 1	30,000	12,000	45,000	15,000	50,000	18,000	60,000	24,000
Type 2	90,000	22,500	120,000	25,000	120,000	35,000	150,000	50,000
Type 3	150,000	60,000	160,000	90,000	180,000	120,000	200,000	130,000
Type 4	180,000	90,000	200,000	100,000	240,000	120,000	250,000	150,000
Type 5	220,000	100,000	250,000	120,000	280,000	130,000	280,000	150,000
Type 6	250,000	110,000	280,000	140,000	320,000	170,000	350,000	200,000
Type 7	260,000	120,000	280,000	150,000	350,000	180,000	360,000	240,000
Type 8	280,000	150,000	300,000	180,000	360,000	240,000	400,000	280,000

Types	2018		2019		2020	
	Joke-Ayo	Akeja	Joke-Ayo	Akeja	Joke-Ayo	Akeja
Type 1	75,000	30,000	90,000	50,000	90,000	50,000
Type 2	150,000	75,000	180,000	90,000	180,000	90,000
Type 3	240,000	150,000	280,000	180,000	280,000	180,000
Type 4	280,000	160,000	300,000	200,000	300,000	200,000
Type 5	320,000	180,000	350,000	220,000	350,000	220,000
Type 6	350,000	220,000	380,000	240,000	380,000	240,000
Type 7	400,000	250,000	420,000	260,000	420,000	260,000
Type 8	450,000	320,000	460,000	340,000	460,000	340,000

Arising from Table 3, the mean rental value of all types of residential properties in the two communities were determined for each year. The result was plotted on a line graph to reveal the trend of rental values between the two communities. This is shown in Figure 1.

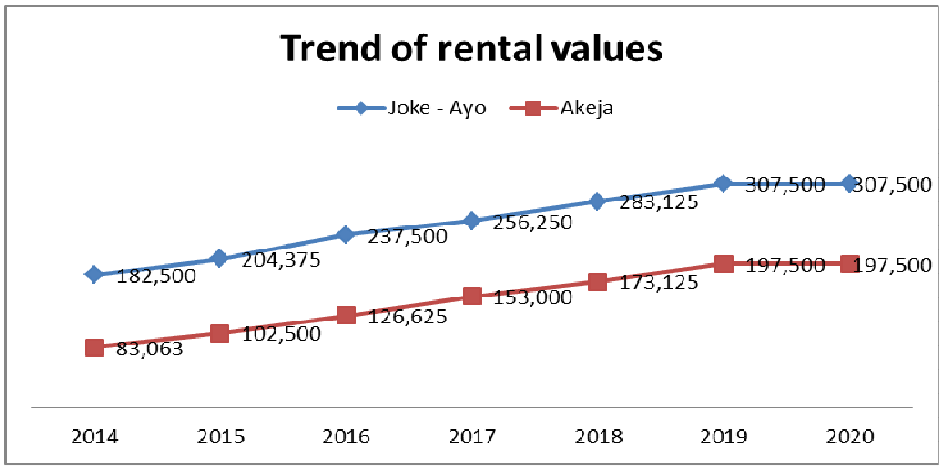

Figure 1: Trend of rental values at the selected border communities

Test of hypothesis

In order to ascertain the difference between the rental values of residential properties in the two communities, a null hypothesis was set and independent sample test was carried out to determine the veracity or otherwise of statement of the hypothesis. The hypothesis is as stated;

Null Hypothesis H_0: There is no significant difference between statistical mean of rental values of residential properties of selected border communities of Lagos and Ogun States.

Alternative Hypothesis H_1: There is significant difference between the statistical means of rental values of residential properties of selected border communities of Lagos and Ogun States. The result of the hypothesis is as presented in Table 4.

Table 4: Independent sample T-Test on rental values

Dependent (Test) Variable	**Independent (Grouping) Variables**	**N**	**Sig.**	**T**	**Df**	**Sig. 2-tailed**	**Mean Diff.**	**Std Error Diff.**
			Equal variances assumed					
Rental values	Residents	122	.043	.102	185	.032	.1017	.1964
	Estate valers	65						

**Equal variances assumed **95% confidence interval of the difference*

Arising from the Table, given the Sig. value of .043, equality of variance is assumed. The t statistic under the assumption of equal variances has a value of .102 and degree of freedom (df) value of 185 with an associated Sig. (2-tailed) value of .032. Since the sig. value of .032 is less than .05, the null hypothesis which states that there is no significant statistical difference between the mean rental values of residential properties in the selected border communities is rejected. By implication, the alternative hypothesis which states that there is significance difference between rental values of residential property values at border communities of Lagos and Ogun States is accepted. Furthermore, in testing the relationship between the two values of average rent per annum of residential properties in the two neighbourhood, Karl Pearson moment correlation coefficient was engaged to examine the direction and strength of the relationship. Data obtained from the professional firms were used for the analysis. A null and alternative hypothesis was set as follows;

Null Hypothesis H_0: there is no relationship between the average rental values of residential properties in the two border communities

Alternative Hypothesis H_1: There exists a relationship between the average rental values of residential properties in the two border communities

Table 5: Test of relationship of rental values between the two communities

Correlations		Rental value in Joke-Ayo Community	Rental value in Akeja Community
Rental value in Joke-Ayo Community	Pearson correlation	1	.672
	Sig. (1-tailed)		.209
	N	65	65
Rental value in Akeja Community	Pearson correlation	.672	1
	Sig. (1-tailed)	.209	
	N	65	65

As obtained in the Table 5, the Karl Pearson correlation coefficient is +0.672 and this showed that there is relatively strong positive correlation between rental values of residential properties in the two border communities. The coefficient of correlation shows that the rental values move in the same direction albeit at a significantly different magnitudes.

Factors affecting rental values in the study area

Respondents from the estate surveying and valuation firms were asked to identify the factors affecting property values in the neighbourhoods. The responses were measured against a 5-point Likert Scale ranging from very high impact (5), high impact (4), moderate impact (3), low impact (2) to no impact (1). Results of analysis were extracted and presented.

Table 6: Factors influencing property value

Factor	Joke-Ayo		Akeja	
	Mean	Rank	Mean	Rank
Population	3.891	4	4.312	1
Infrastructure development	4.512	2	2.918	5
Housing quality	4.512	2	3.212	4
Geopolitical Jurisdiction	3.891	6	2.183	8
Structural factors	4.733	1	2.702	6
Locational factors	4.132	5	3.691	2
Neighbourhood factors	4.306	3	2.433	7
Economic factors	4.141	4	2.918	5
Environmental factors	3.633	7	3.328	3

Presented in Table 6 are that factors affecting property values as obtained from the responses of the estate valuers. Also ranked is the significance of the each factor as perceived for each community. As shown, structural factors, level of infrastructure development, housing quality as well as locational and neighbourhood factors have high impact on residential property values in the neighbourhood in Joke-Ayo communities. On the other hand, population density, locational factor, housing quality are factors that have moderate impact on rental value of residential properties in Akeja communities.

Summary of findings and Discussion

Arising from the various analysis, it was observed that Joke-Ayo communities has more development density compared to Akeja community. This was attributed to the significant difference in the number of houses counted within the 1km radius of each community whereby, there are 63 houses as against the 89 within the 1km radius of each of the two communities. This reveals that Joke-Ayo is a sub-urban precinct experiencing urban fringe transformation. Figure 1 showed that the mean rental value of residential properties in the two communities increased between 2014 and 2019. This implies that the border communities witnessed similar growth pattern in the value of rental properties over the six year period. While the figure showed the pattern, Karl Pearson coefficient of correlation shows the direction and strength of relationship between the changes in the value of rents between the two communities. The coefficient of correlation clearly showed that there is strong positive correlation between rental values of residential properties in the two border communities although at different magnitudes. Finally, despite the closeness of the two border communities, the significant differences in rental value across the types of residential properties in the two communities corroborate the results in Table 5 where the study observed that different set of factors have very high influence on rental values in Joke-Ayo community compared to the factors that affect similar properties in Akeja community. The finding inherently indicates that population spill from Lagos into the border communities is an important factor contributing to the trend of rental value of residential properties in Akeja community of Ado-Odo/Ota local government of Ogun State.

Conclusion

The study investigated the correlation between residential property rental values of selected border communities of Lagos and Ogun states. The significant disparity observed in rental values as well as the pattern of rental growth revealed the blunt gap in the level of infrastructure development, neighbourhood density, housing quality, administrative jurisdiction and level of economic development in the two communities. This notwithstanding, the relatively strong positive correlation of rental values between the border communities is an indication of the enormous potentials of property market of the Ogun communities that border Lagos State. It is therefore recommended that Ogun state government invest in the development of socio-economic infrastructure, renewal programmes of Ota border communities. Recommendations from this study would facilitate the achievement of targets 9 and 10 of the United Nations sustainable development goals. The goals aimed at building resilient infrastructure, promote inclusive and sustainable industrialization, foster innovation and reduce inequalities among urban dwellers.

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Communication in Social Networks as Basis for Building Relations with Consumers in Retail Business in Latvia

Iveta LININA

Turiba University, Riga, Latvia, Iveta.Linia@turiba.lv

Velga VEVERE
EKA University of Applied Sciences, velga.vevere@gmail.com

Abstract

Retail sector has always been an important source of revenue for the national economy. The retail business processes and consumer formation differ in each particular case, but it always involves interrelation between several parties and serve a special purpose. Consumer satisfaction and its management have become the cornerstone of business competitiveness and an integral part of business. Social networks, in particular, can today become a tool for targeted consumer awareness formation, as entrepreneurs become more effective regarding marketing activities and communications, and consumers become more educated and selective. Market globalization also affects retail businesses, the smaller retailers can become competitive. The aim of this work is to find out the main factors of the formation of consumer loyalty in the retail sector and to define the features of this process that will enable the enterprises to improve their activities and ensure their competitiveness in the real situation. In order to determine consumer loyalty trends in Latvia and to make proposals to companies to improve consumer loyalty formation processes through social networks, 388 respondents were surveyed. The following research methods have been used: logical-constructive method - comparing theoretical material with empirical results, analyzing SPSS survey data and graphical method - visually summarizing information. The study concludes that using social networks can help retail businesses in their satisfaction and loyalty boosting factors.

Keywords: Consumer Satisfaction; Loyalty; Relationship Management; Retail; Social Networking

Introduction

Retail sector has always been an important source of revenue for the national economy. The retail business processes and consumer formation differ in each particular case, but it always involves interrelation between several parties and serve a special purpose. Consumer satisfaction and its management have become the cornerstone of business competitiveness and an integral part of business. Social networks, in particular, can today become a tool for targeted consumer awareness formation, as entrepreneurs become more effective regarding marketing activities and communications, and consumers become more educated and selective. Market globalization also affects retail businesses, the smaller retailers can become competitive. The aim of this work is to find out the main factors of the formation of consumer loyalty in the retail sector and to define the features of this process that will enable the enterprises to improve their activities and ensure their competitiveness in the real situation. In order to determine consumer loyalty trends in Latvia and to make proposals to companies to improve consumer loyalty formation processes through social networks, 388 respondents were surveyed. The following research methods have been used: logical-constructive method - comparing theoretical material with empirical results, analyzing SPSS survey data and graphical method - visually summarizing information. The study concludes that using social networks can help retail businesses in their satisfaction and loyalty boosting factors.

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Literature Review

Theoretical aspects of consumer loyalty

Consumer satisfaction is one of the prerequisites for building long-term and profitable business relationships with consumers, but loyalty is one of the most important end results of satisfaction. Loyalty is the result of the consumer perception of the offer (product, service, brand, etc.), leading to positive attitude (cognitive, trust and emotional) and favorable behavior towards the company (repeated purchases, additional purchases, high consumption intensity, etc.) (Linina and Zvirgzdina, 2016). Attracting new customers to businesses is significantly more expensive than retaining existing ones, as regular consumers spend more but pay less for the company (Karjaluoto et al., 2012). Researchers (Mueller and Riesenbeck, 1991) have found that maintaining only about 15-20% of the cost to attract new consumers is sufficient to sustain loyal consumers. Based on empirical research, other authors (Hermann and Huber, 1997) argue that acquiring new consumers is 5 to 7 times more expensive than retaining existing consumers.

Most empirical studies show that there is a strong correlation between consumer satisfaction and loyalty (Mittal and Kamakura, 2001). There is no unanimous agreement as yet on how this relationship manifests itself in a realistic way (progressive, degressive or otherwise). Some researchers believe that the type of relationship might depend on the market situation, supply characteristics, and the specifics of the target audience. In markets with high competition, the relationship between consumer satisfaction and loyalty has been shown to have a progressive graphical form, whereas in markets with relatively low competition intensity it is characterized by a degressive graphical form (Homburg and Giering, 2000). Empirical research has shown that there is a correlation between consumer satisfaction and loyalty, which can be graphically represented by the S-shape, because only when the consumer is seduced does loyalty increase very quickly when he is in the indifference zone and loyalty in the frustration zone leads to at the loss of loyalty (Matzler and Pechlaner, 2001). Other researchers have found that sometimes seemingly illogical situations occur when there are satisfied but loyal consumers and dissatisfied yet loyal consumers (Cano et al., 2001).

Service industry researchers (Giovanis et al., 2014) argue that customer loyalty is influenced by service quality, emotional satisfaction, and corporate image / reputation. The authors come to this conclusion after a survey of 600 respondents - clients of service companies in Greece. Other authors (Shukla, 2010; Ladhari and Soniden, 2011) have shown that product quality and company image directly or indirectly affect consumer loyalty in other industries. Although the authors of the research do not agree with the opinion, that emotional satisfaction is considered to be a factor influencing loyalty, because in essence, emotion is a component of the attitude dimension of loyalty and satisfaction is a result of consumption. In Norway, a special Consumer Satisfaction and Loyalty Rating (EPSI) rating was developed based on the model. The model implies that the values perceived by the consumer include the image of the company, the consumer's expected supply values, the actual quality of the product and the quality of service. These perceived values determine satisfaction and the resulting consumer loyalty (Pervaiz and Sudha, 2007). First, the model assumes that all factors that affect satisfaction can influence directly, i.e., without the consumer's perception. In the authors' opinion, this may be the case for consumers with a high degree of loyalty, when the pre-purchase selection process is practically automatic. Second, the image of the company and the quality of service can directly affect loyalty even without a satisfaction phase. Obviously, this relationship also depends on the level of consumer loyalty, that is, the higher it is, the less the importance of satisfaction in the process.

Perhaps the study of the attitudes and behavioral dimensions of loyalty would have led to other conclusions regarding the direct effect of value perception on loyalty. The authors of the current paper also disagree with the thesis that consumer supply expectations relate to values that affect satisfaction. Before determining satisfaction / dissatisfaction, there is a comparison between actual and expected offerings, and this largely psychological process is related to consumer perception. The monetary value (the price of the offer in relation to the consumer's costs), on the other hand, is wrongly excluded from the model.

Based on the analysis of the advantages and disadvantages of loyalty models, the authors suggest a conceptual consumer loyalty model for practical use (see Figure 1). This model is universal in nature, but it should be practically applied, taking into account industry / product / brand characteristics. As we can see, the consumer loyalty building processes include the following logically related elements:

- factors (values) affecting loyalty;
- perception of consumer values;
- characteristics of the target audience;
- consumer satisfaction;

• dimensions of consumer loyalty.

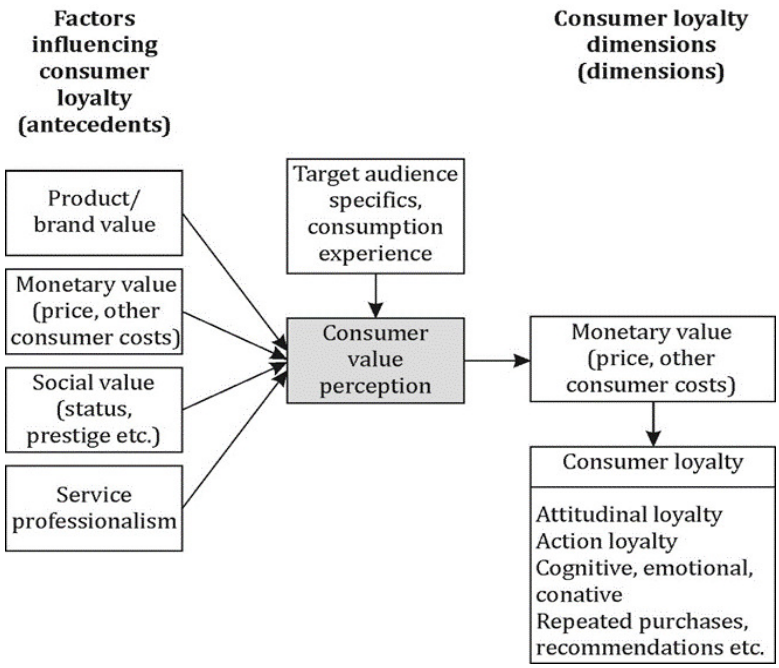

Fig. 1: Conceptual model of consumer loyalty building (Linina & Zvirgzdina, 2016)

The loyal consumers exhibit the following characteristics of market behavior: they buy more and stay loyal for longer, are less sensitive to price increases, advise other consumers to buy and consume / use a particular product / brand that is beneficial to the company because:

• Word-of-mouth communication costs nothing;
• Recommendations contain specific information based on consumption / use experience;
• Communication comes from friends and / or acquaintances you can trust.

In essence, the consumer loyalty increases the value and competitiveness of a business because it:

• Calls for lower consumer acquisition costs;
• Develops a solid consumer database;
• Allows to increase product / brand prices within certain limits.
• Promotes product sales and profit growth;
• Promotes a positive corporate image and reputation.

Of course, these characteristics of loyal consumer behavior and the benefits to the company depend on the level of loyalty. Therefore, it is necessary to investigate in more detail the process of loyalty building in a specific sector of the economy. Summarizing all of the above principles of consumer loyalty, it can be said that it is based on consumer satisfaction and relationship building. Social networks can be used to build long-term, high-quality relationships with consumers. The use of social networks is nowadays considered as one of the main tools for building relationships with consumers (Trainor, et al., 2014). Social networks can achieve high rates of information transfer, take a creative approach to information transfer, and also gain rapid feedback (Marolt, et al., 2020). Many researchers emphasize the availability and use of social networks precisely because of their low cost (Cappuccio, et al., 2012). With this information in mind, the authors of the study want to find out the quality of social networking applications from a consumer perspective in retail relationships with consumers.

Retail sector and its characteristics

Looking at the research of different authors, it can be concluded that there are differences in the satisfaction-building process in three sectors of the economy: the consumer goods sector (Swan, Combs, 1976), the industrial

goods sector (Homburg, Rudolph, 2001) and the services sector (Brandt, 1988; Cadotte, Turgeon, 1988). The proposition of the current research is the one that the retail sector belongs to the service sector.

As a member of the distribution channel, the retailing has the following functions (Praude, 2011), such as:

• elimination of the mismatch between supply and demand;
• management the stock of goods;
• promotion of product transportation efficiency;
• development an assortment of goods according to consumer needs;
• establishment of contacts and negotiate with product suppliers;
• serving consumers, sell goods and services to them;
• performing marketing activities (research, communication, etc.);
• assuming that the distribution channel operates smoothly.

Analyzing the retail situation in Latvia (see Figure 2), it can be seen that starting from 2016 the turnover of retail companies is growing rapidly. This is only one indicator of the sector, but does not indicate the processes within the sector as a whole.

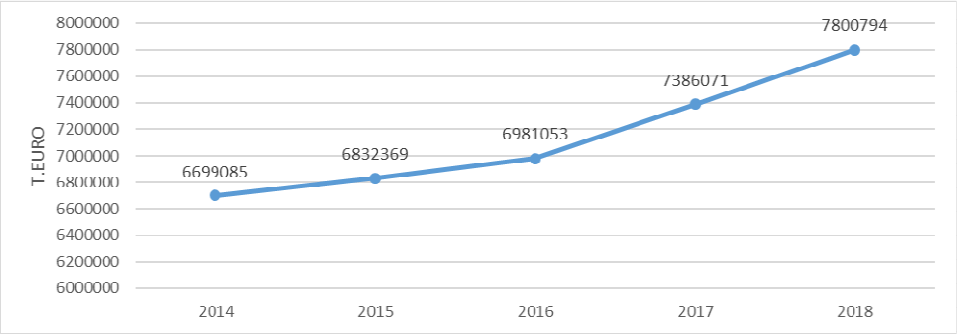

Fig. 2: Retail trade turnover Latvia 2014. – 2018 (thousands Euro) (csb.gov.lv., 2018a)

Looking at the dynamics of the number of companies in the retail industry, the opposite is true. The number of retail companies has been declining rapidly since 2016 (see Figure 3), which indicates irreversible processes within the industry. Businesses are either going out of business or joining the big chain stores without competing. Such a merger does not benefit the consumer as it reduces competition. Market globalization is increasingly affecting retailers, forcing them to look for solutions to ensure competitiveness and development.

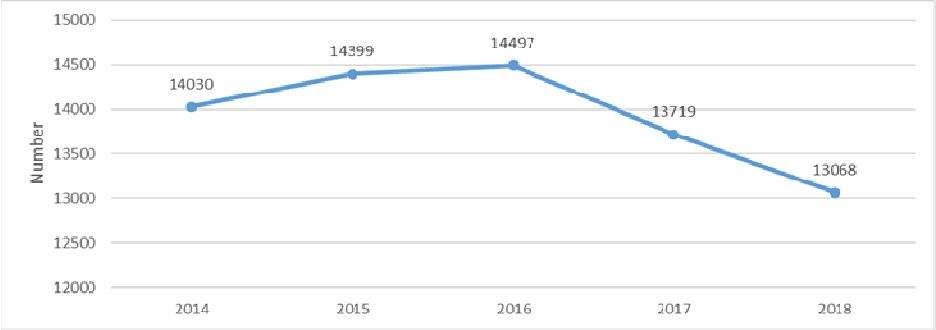

Fig. 3: Number of retail companies in Latvia 2014 – 2018 (csb.gov.lv., 2018b)

Despite the increasing internal competition within the industry, the retailers need a tool to ensure competitiveness and create the preconditions for building consumer loyalty.

Methods

Consumer and consumer behaviour surveys are used to study consumer attitudes and purchasing behaviour. In this study, a traditional method was used to directly and indirectly evaluate the activities of retail companies in the most popular social networks in Latvia - a questionnaire survey (Rust et al., 2004). The survey was conducted in Latvia to identify customer satisfaction factors and rank them in order of importance. The preparation of this method involves several steps.

First. Determining the degree of standardization and openness of the questionnaire. Given the purpose of the survey and the characteristics of the respondents, the authors chose a standardized open questionnaire. This means that all respondents were asked the same questions in the same sequence, which ensures an objective comparison of the answers. The questions were selected with a single-choice Likert scale on a 5-point scale.

Second. Defining the survey method. Out of all possible options - personal interview, mail survey, phone, fax, email and internet, the authors chose the following - the survey was created on the Google Forms website. Questionnaire with the random sample Snowball method (Kristapsone, 2014), via personal contacts of the authors of the work, was sent via e-mail to the respondents who further shared this link. 388 completed questionnaires were considered valid for the study. All residents of Latvia in 2018 were taken as general population. At 95% confidence level and 5% error margin, the minimum sample size was estimated at 385 respondents (Arhipova & Bāliņa, 2006). The expert survey was conducted between November and December 2019. Based on the research objectives and using the SPSS software, the authors calculated the following:

• average arithmetic expert evaluation ($\bar{X}$);
• median (Me);
• module (Mo);
• amplitude of variation;
• standard deviation;
• coefficient of variation (Kristapsone, Kamerādeu.c. 2011).

Based on the factors influencing loyalty and the opportunities offered by social networks, six blocks of questions were created for companies - total assessment of retail business activities on social networks, assessment of creative solutions on social networks, usefulness of published information, regularity of communication with consumers.

Results and Discussion

On the basis of methodology, then the authors of the thesis carried out the data processing and analysis of the assessments (see Table 1).

Table 1: Evaluation of retail activities on social networks (Facebook and Instagram)

Company activity in social networks	Arithmetic Mean	Standard error of Mean	Mediana	Moda	Standard deviation	Dispersion	Variation	Min	Max
Overall assessment of retail business activity on social networks	3.43	0.04	3.00	3.00	0.81	0.66	0.05	1	5
Opportunity to communicate with the company	3.03	0.05	3.00	3.00	1.04	1.07	0.08	1	5
Usefulness of published information	3.31	0.04	3.00	3.00	0.94	0.89	0.06	1	5
Regularity of communication with consumers	3.30	0.05	3.00	3.00	1.07	1.14	0.07	1	5
Business-generated content	2.99	0.04	3.00	3.00	0.89	0.79	0.07	1	5
Availability of current information	3.27	0.04	3.00	3.00	0.88	0.77	0.06	1	5

In order to assess the situation of retail business activities in social networks, the authors carried out in-depth processing and analysis of the survey results (see Table 1). As you can see, corporate content on social networks received the lowest rating ($\bar{X}$= 2.99; Me = 3.0; Mo = 3.00). This is a bad indicator because it is content that is crucial to building a relationship with a consumer. Table 1 also shows that consumers' ability to communicate with the company through social networks ($\bar{X}$= 3.03; Me = 3.00; Mo = 3.00) and access to up-to-date information ($\bar{X}$= 3.27) were underestimated ; Me = 3.00; Mo = 3.00). In-depth assessment of these issues further clarified the factors that influence them. Respondents pointed out the unprofessional nature of the company's employees involved in social networking activities. The regularity of communication with consumers ($\bar{X}$= 3.30; Me = 3.00; Mo = 3.00) and the usefulness of published information ($\bar{X}$= 3.31; Me = 3.00; Mo = 3) received slightly higher. In general, it should be noted that the overall rating of business activity is the highest (see Table 1), which indicates consumer attitudes towards this type of activity as a whole.

Conclusions

1. Consumer loyalty is the result of the consumer perception of the offer, which has led to a positive attitude and favourable behaviour towards the company.
2. The consequences of consumer loyalty vary, but the main manifestation is the repetition of purchases. Other signs of loyalty - low price sensitivity and positive word-of-mouth communication - are less common as they do not relate to the overall retail rating but to individual products / brands.
3. The survey found that the respondents rated the content created by the company in social networks the least ($\bar{X}$= 2.99). This is a bad indicator because it is content that is crucial to building a relationship with a consumer. Consumers' ability to communicate with the company through social networks ($\bar{X}$= 3.03) and access to up-to-date information ($\bar{X}$= 3.27) were also underestimated. One of the reasons was the lack of professionalism of the employees involved in the company to work in social networks.
4. The regularity of communication with consumers ($\bar{X}$= 3.30) and the usefulness of published information ($\bar{X}$= 3.31) were slightly higher.
5. The overall rating of retail business activity in social networks is highest ($\bar{X}$= 3.43), which indicates the attitude of consumers towards this type of activity in general. Based on the views of several researchers about using social networks as a basis for customer loyalty, the authors believe that retailing as a whole can use social networks to build consumer loyalty and ensure competitiveness.
6. In the retail sphere the consumer loyalty analysis deserves more detailed attention, this matter has not been researched enough until now.

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Viking Theme Festivals: Stakeholders Perspective in the North of Portugal and Galicia

Pedro LIBERATO*
Polytechnic Institute of Porto, School of Hospitality and Tourism, Vila do Conde, Portugal,
CiTUR research member
pedrolib@esht.ipp.pt

André SILVA
Polytechnic Institute of Porto, School of Hospitality and Tourism, Vila do Conde, Portugal
andre_silvapvz@outlook.pt

Dália LIBERATO
Polytechnic Institute of Porto, School of Hospitality and Tourism, Vila do Conde, Portugal,
CiTUR research member
dalialib@esht.ipp.pt

* *Contact author*

Abstract

In Galicia and the north of Portugal, from the 8th to the 11th century, Viking and Norman peoples were present. Initially through piracy activities that they developed and later through their support in crusades and holy wars. Local communities felt the need to revitalise these memories through thematic festivals, to assess the possibility of developing these events and to understand which strategies should be used to ensure the cultural sustainability of festivals. In this study the qualitative method was used, where the participants who are part of the scientific community, event organizers and tourism promoters with links to Viking thematic festivals in the Euro-region of Northern Portugal and Galicia were selected. The main results show that the biggest challenge for those responsible for organizing *Viking thematic festivals* is to maintain the levels of authenticity, following the principles of conservation of intangible heritage.

Keywords: Viking; Heritage; Authenticity; Theme Festivals; North of Portugal; Galicia.

Introduction

Tourism can be a powerful incentive to preserve and enhance intangible cultural heritage to support the long-term survival of existing intangible cultural heritage, and above all, to generate revenue for communities (UNWTO, 2020). Viking memory in an Iberian context could be revitalised through festivals that depict this hidden cultural heritage. The context of Viking festivals in northern Portugal and Galicia has not been the subject of empirical studies. The only study evidence is presented by Hannam & Halewood (2006) on Romaria de Catoira, an internationally recognised Viking theme festival, whose main activity is the recreation of Viking landing. The growing visibility and notoriety of the Catoira Pilgrimage has enhanced the birth of new Viking theme festivals in the region. The case of the locality of Foz which annually recreates the contact between the Galician and Norman people through the testimony of the miracle of Saint Gonzalo (Norman Festival, 2020); the Romaxe Vikinga which presents the passage of the Nordic people in the village of Moutillós with a parade of Christian knights and Viking warriors through the streets of the locality (Concello O Vicedo, 2020) and the Medieval and Viking fair which recreates a market and stages the historic battle of the capture of the Castle of Vermoim (Municipality Famalicão, 2020). Bakhtin (1984) and Hannam & Halewood (2006) have shown that certain Viking theme festivals have a carnival character and constantly mix periods of history. In this sense, this study aims to examine the tourism demand for Viking festivals in the Euro-region; the involvement of the local community in festivals; best practices as a strategy for developing a culturally sustainable Viking theme festival; and evaluate communication and performance in managing historical accuracy in festivals.

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Literature Review

Cultural Sustainability: Conservation Context

Cultural sustainability is a concept that has not yet been adapted as a strategic reality in tourism. Farsani et al. (2011) explain that cultural sustainability is a concept for the recovery and protection of culture and identity and linked to previous traditional practices through the celebration of local and regional histories and the transmission of cultural values to future generations. However, in tourism, according to the indicators proposed by Vebhi (2012) the most consensual way to measure culture is through the indicator of cultural wealth, in the field of social sustainability. Jamal et. al (2015) refer to the difficulty in addressing cultural sustainability due to the complexity and intangible aspects of culture. However, studies on cultural activities in tourism reveal the need to reflect on a potential cultural pillar within sustainability (Hawkes, 2001; Soini & Birkeland, 2014). Cultural vitality is defined as proof of the creation, dissemination, validation and support of the arts and culture, as a dimension of everyday life in communities, thus being resources that come out of communities and not just resources that are "brought" from outside into communities (Jackson, Green & Herranz, 2006). Soini & Birkeland (2014) warns about how cultural services, events and heritage manage changing consumer needs. In this sense, municipalities should implement tourism development strategies that focus on creative cultural events, based on, or inspired by intangible heritage, and that focus on authenticity, without causing harm to future generations (Ribeiro et al., 2019, p.37). According to Stebbins (1996), Seçkin Eser et. al (2013), and Jurigová & Lencsésová (2015) all tourist activities with the aim of art, knowledge of cultural values and historical areas linked to a particular culture, are included in the scope of cultural tourism, thus culture is understood as a route to our history. Historical memory is understood as a dimension of individual and collective (or social) memory, with a memory of the past and above all as a symbolic representation of that past (Repina, 2017). Tourism, in this case, should be a tool for the development or revitalization of communities' memories. Popular cultural tourism emerges instantaneously, and can surprise the actors in the receiving destination, since this type of tourism can have growth potential in the demand for the destination (Larsen 2013, p. 84).

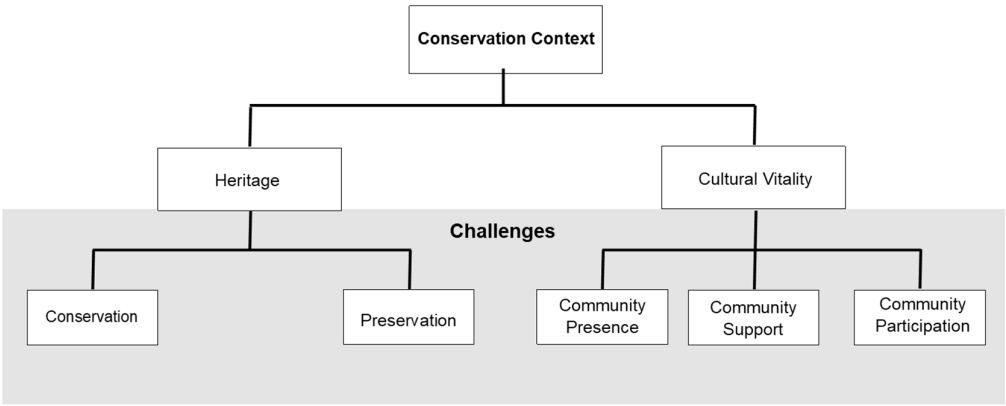

Figure 1: Challenges from cultural heritage conservation context base on Palmer & Richards (2010) and Soini & Birkland (2014)

Authenticity and tourist experience in local cultural festivals

The management of cultural festivals continues to be a subject of study in the international dimension, directed towards the sustainability of host tourist destinations. According to Palmer & Richards (2010) the agents producing activities are increasingly concerned with the production and marketing of goods and services with symbolic cultural content, reinforcing the cultural importance of a place to strengthen the attraction and invitation to participate. The study of Ma & Lee (2012) represents the creation of a conceptual framework for festival tourism at local and national level through the factors of historical and geographical dimension, which result in four types of events: Local Heritage Festivals, Local Contemporary Festivals, National Heritage Festivals, and Global Contemporary Festivals. Pine & Gilmore (2008a, 2008b) present authenticity in 4 perspectives: (a) natural authenticity when the perception of authenticity exists in its natural state, without human intervention; (b) original authenticity, has a character of originality and exclusivity, never being repeated or replicated; (c) exceptional authenticity, the perception of authenticity is in the quality of how it is processed, executed individually and extraordinarily by someone who demonstrates human care; (d) referential authenticity when it refers to some specific context, drawing inspiration from human history, and exploring our shared memories and desires. Jamal & Hill (2002) presents authenticity

applied to the tourism sector through objective, constructive and personal authenticity. Different perspectives are defined by Cohen & Cohen (2012) that distinguish authenticity, specifically for events, through the sensory dimensions "hot" and "cool", with "hot" authenticity being presented as emotionally charged, belief-based, rather than proof-based, in which it involves a high degree of commitment and self-investment in participating in, safeguarding, and amplifying the authenticity of the venue or event. On the other hand, "cool" authentication is a unique, explicit, often formal, or even official, performative authenticity, whereby the authenticity of an object, site, event, custom, paper or person is declared original, genuine or real and often certified in a similar but broader sense, this process being evaluated and recognised through compliance with certain predetermined standards or qualifications.

Table 1: Characteristics and challenges of local festivals

Local Heritage Festivals	Local Contemporary Festivals
Features	
• Historical and not touristic origin, more conservative posture. • They promote authenticity and are based on historical and geographical context. • Focus on the development of local identity and representation of authenticity, sense of presence and local historical significance.	• Developed for tourism purposes, more commercial posture. • They promote authenticity and are based on historical and geographical context. • Focus on offering activities for entertainment (opt for offering authentic replicas of traditions rather than local identity).
Challenges	
• Constant development of practices for the preservation of cultural identity as a reinforcement of the symbols of local identity. • Support in the development and creation of ritual shows and exhibitions to promote local heritage. • Promote the historical origin in the local heritage and if applicable the ancestral origin.	• The preservation of cultural identity must contribute to strengthening the symbols of local identity. • Reinforce its dynamics through new shows and ritual exhibitions in order to promote the local heritage. • Concern with the festival environment and the levels of experiential satisfaction they offer participants. • Role play and role reversal in festivals.

Source: Ma & Lee (2012), adapted

The Days Study (2019, p. 50), shows, in the medieval fair of Óbidos, in Portugal, the 3 types of authenticity conceptualized by Jamal & Hill (2002) being present the objective authenticity associated to the historical rigour of the medieval costumes, the town and walls and the siege of the castle; the existential authenticity through the expressions that denote an empathic adhesion to the values of the community and references to a symbolic complicity with the local community; and the performative authenticity involves references to the costumes and historical characters, the importance of the procession and the participation in the procession dressed up. Dias (2019) considers that the motivations for the participation of tourists are related to the fun factor and socio-cultural animation. However, Hjalager & Kwiatkowski (2018) warns that event organisations focus too much on gastronomic activities, crafts, technology, and pastime phenomena that make medieval festivals intensely materialistic, and points out that historical recreation is the most important point in maintaining authenticity in the tourist product.

Historic re-enactment in medieval festivals

Historical recreation is framed in re-enactment events that can be defined as forms of heritage festivals, considered one of the fundamental activities to replicate historical moments or environments. Baldacci (2019) reaffirms the importance of image revitalization, stories of parts of history that have been forgotten, never written, censored or largely without testimonies, and are now transmitted through the reconstruction of works of art and exhibitions. The re-enactment often comes close to a fanciful staging in its elastic appropriation of both the real and the imaginary past (Agnew, 2005). However, Carnegie & Mccabe (2008) argues that this activity should consider the strict association of history as a basic principle in its representation. For Zotica & Malaescu (2015) there should be a concern to reproduce exactly in the script, in the language, in the materials and costumes to achieve the accuracy of the staged period. Recreation episodes should stage aspects inherent in the cultural heritage or a specific historically significant episode in the history of a locality with the aim of raising the cultural heritage and income of the host locality for business and/or community development purposes, with Carnegie & Mccabe (2008) recommend that re-enactment events should often be represented in historical settings, or heritage landscapes, allowing the space of the heritage

landscape to become a carefully preserved environment (in the case of a castle or manor house), or agricultural landscape (in the case of many battle festivals), a living landscape, at that time and in the presence of these activities and people, and how they represent the past through objects, weaponry and period detail (Carnegie & Mccabe, 2008).

Viking Thematic Festivals: Features and activities

According to Puchalska (2015) interest in medieval Nordic printing was initially influenced by art, through 19th century novels and operas, and later adapting to the cinema through the legendary saga of Ragnar Lothbrok. Studies on the relationship between tourism and Nordic culture are still quite limited. Hannam & Halewood (2001) identify Viking Heritage Tourism as all activities that promote the Viking presence in their territories through museums, heritage centres, theme parks, village reconstructions, seasonal festivals, trade fairs or markets complemented by Viking re-enactment activities or "living history" societies. By adopting a very broad understanding of this term, it can be argued that people have attempted to re-enact the Nordic past as early as the Viking era by commemorating events, stories, myths, or prominent individuals at elaborate funerals and using role-playing techniques and characters (Gardeła, 2016). From the perspective of Hannam & Halewood (2006) Viking festivals are built on or around an existing tourist attraction involving proven material heritage such as an archaeological site, museum, or historical centre, but also the location factor with links to fateful events, is also seen as providing added authenticity and symbolic value. The relationship between atmosphere and attractiveness, from the perspective of Palmer & Richards (2010), points out that localities need to think carefully about the use of space for tourist entertainment, as this influences the satisfaction of the local population, tourist attraction and in turn inward investment. In Viking festivals historical recreations are considered key activities to educate, interpret and entertain the population, based on the recreation of historical events that have marked the history of a people. Smed, Dressler & Have (2016) follow the same approach stating that historical re-enactments have a crucial importance in the tourist experience, warning that the reincarnation of characters in Viking Tourism must be the closest to the historical context, in the same sense as the knowledge presented by the agents of the recreation, since the consumers of the Viking tourism product are experienced. In this sense Gamito (2011) also advocates that the role-plays should be performed by actors and should demonstrate true historical events. Obtaining experience from tourists should be valuable for Viking reincarnations, and the involvement of tourists, considered a crucial factor (Smed et.al, 2016).

Figure 2: Historical re-enactment in Viking Thematic Events (Smed et. al. 2016, p.98)

The Viking Cultural Route is an integrated European project certified by the European Council, which aims to represent the common Viking legacy in Europe by promoting art and literature, archaeological sites, and intangible heritage, supporting various activities, initiatives, and projects (Council of Europe, 2020). The Wolin-Jomsborg-Vineta Slavonic Viking Festival is an example that develops the recreation of life and battles of the early Middle Ages, accurately representing garments, utensils, and tools of the time, based on material heritage left by excavations at Viking burials in nearby locations (Curry, 2007). The Up Helly festival, also recognised at European level, is celebrated in Scotland through the burning of a Nordic ship which represents a funeral ceremony for a sea king (Leslie, 2011).

Methodology

The study instrument used was the qualitative method, through semi-structured questions to allow greater concentration in the approach to the themes. Whether at a scientific or geographical level, few studies on Viking thematic festivals can be observed. The selection of participants was evaluated through a set of criteria based on their geographical link with the northern region of Portugal and Galicia and their professional or academic performance on Viking thematic festivals.

Table 2: Participants and their role in Viking theme festivals

Participants	Area of operation
Interviewee 1 (E1)	*Cultural Animation*
Interviewee 2 (E2)	*Cultural Animation*
Interviewee 3 (E3)	*Event organiser*
Interviewed 4 (E4)	*Event organiser*
Interviewed 5 (E5)	*Event organiser*
Interviewee 6 (E6)	*Scientific community*
Interviewee 7 (E7)	*Scientific community*
Interviewed 8 (E8)	*Scientific community*

Source: Own Elaboration

Table 3: Categories and sub-categories of data analysis

Main Categories	**Subcategories**
Knowledge & Benefits	General interest Tourist Search Local community
Strategy	Location Activities Promotion Tourist participation
Current evaluation	Communication Sociocultural animation Physical space

Source: Own Elaboration

Considering this criterion, 8 participants were selected, including tourism experts, Scandinavian medieval studies researchers, tourism promoters, representatives of cultural animation and organisers of Viking thematic festivals. The interview was conducted remotely via online platforms due to the epidemiological context of Covid-19, with informed consent for recording the interview via email or at the beginning of the interview. The interviews lasted approximately 30 to 35 minutes and were then transcribed verbatim. The structure of the interview and the questions developed are based on the objectives proposed for this empirical study with the support of the perspectives of the Carnegie & Mccabe (2008), Smed et.al, (2016) and Hannam & Halewood (2006) studies. The categories of analysis are divided between: (a) Knowledge and benefits; (b) Strategy; (c) Current evaluation.

Results

Knowledge and Benefits

The Viking theme in medieval festivals is a factor of differentiation and exclusivity among other medieval festivals that compete for attention from the regional market for both local communities and tourism (E8, E7, E2). Viking theme festivals act as a pedagogical tool in the conservation and promotion of local heritage, especially from events experienced in the medieval period which are unknown or misunderstood in the communities (E7, E2, E4). The participants (E1, E2) affirm the need to demonstrate to the public the relationship between Iberian culture and Nordic culture.

E7: "I think it's interesting to have Viking theme festivals on the Iberian Peninsula, or other areas that have contact with Scandinavia on the Iberian Peninsula, even to know moments of medieval history that are misinterpreted or unknown".

The tourism demand for Viking events, especially in Galicia, shows a growing demand for tourism, mentioning that in recent years the number of visitors has grown exponentially (E3, E5, E1). There is a disparity between the knowledge of tourism demand in the North of Portugal and in the region of Galicia. It can be concluded that all participants are unaware of any link to the size and characteristics of tourism demand in Portuguese territory. All respondents recognise the international dimension and reputation of Romaria of Catoira. Some interviewees mention that it is the only reference of Viking Festivals (Galicia) of which they are aware (E2, E4, E7). During the interview, participants (E2, E7, E5) mention the repercussions of the media coverage of historical and documentary TV series on Germanic culture, more specifically the success story of the Vikings TV series, as an influential element in the increase of tourism demand and interest in the knowledge of medieval Germanic culture, confirming the perspective of Puchalska (2015). The tourist profile was mentioned in the participants' responses. Most of the interviewees mention that there are two types of tourists: a tourist who seeks a mostly pedagogical experience, are very careful in the way the activities are developed and a tourist who prefers a more hedonic experience, being less critical regarding the historical accuracy in the presentation of socio-cultural activities.

E3: "(...) for a long time, many people have participated in this festival in several places that have this tourist recognition (...) had influence on the demand due to the Vikings series, in the way of increasing interest and especially on the younger population in getting to know the culture".

Regarding the benefits that the local community can derive from holding these festivals, it was mostly mentioned: (a) the economic development factor, having been mentioned by the participants that the realization of this type of festivals generates revenues for the local community, and in peripheral areas, mainly for local commerce and hotels (E1, E3, E4, E5, E6); (b) increasing knowledge about the memory of communities and the history of the relationship between Nordic and Iberian culture was widely reported by the interviewees (E5, E7, E4, E6), who consider that this type of events/festivals aim to promote ancestral social and cultural memories; (c) festivals promote the recognition of localities at the international level, capturing the attention of the media, scientific and diplomatic (E7, E3, E5). Respondents state (d) that by actively contributing to and participating in festivals, residents enhance the social success and quality of the festival itself (E2, E4, E5).

Strategy

In the selection of the venue for the Viking theme festivals, the participants, in general, mentioned 4 indicators of relevance when choosing a place for the festival: (a) the historical link in the locations was an argument unanimously mentioned by all the participants in the study. This perspective was widely advocated by Hannam & Halewood (2006) when they considered that authenticity, for Viking festivals, must correspond through the historical link with the localities, whether through a fateful or imaginary event; (b) the presence of material heritage with a Romanesque profile close to the areas where the festival is held is presented as an added value to the recreational setting, if possible referring to stories surrounding this intercultural contact between Iberian and Viking peoples (E5,E7,E8); (c) the landscape elements also enter into the strategy of selecting the place where the festival will take place, recommending that this natural resource has the least human intervention possible, in order to maintain the authenticity of the place and the theme (E3,E5); (d) the proximity to the infrastructures and accessibilities that support the basic needs for the realization of the festival, since the majority of the localities where these festivals are held are of small dimension, they have to be prepared with infrastructures of lodging, restaurants and drinks and good accessibilities to the place in order to extend the tourist experience and satisfaction (E5, E6, E7).

E8- "I think that the cultural history of this place should have a relationship with the Viking world, there should be a significant link between Viking/Scandinavian people and local people during the medieval age. To choose a place, not only infrastructure but also historical significance is needed".

The main activity for the Viking thematic festivals is the recreation of historical events, in the same orientation as Gamito (2011) and Smed et. al (2016), in which all the participants indicated the activities that represent the heritage evidenced in the locations. Participants state that the main objective of Viking festivals is to recreate historical events based on historical or historiographic articles that assist in the representation and interpretation of these same events such as landings, battles, looting and kidnapping of historical figures. Everyday activities that represent the Nordic culture and its origin were widely mentioned by the interviewees (E2, E3, E5, E7), affirming the importance of presenting the sacrifices, funeral rituals, mythological tales, and daily life of the Nordic culture in medieval times, as well as the daily life of the native people attacked (E2, E8). Co-creation activities have an importance in increasing

the loyalty and experience of the tourist and above all increase the perception and knowledge of the heritage. Participants also mention the need to develop technical-scientific activities such as conferences, lectures and seminars that promote and increase the public's knowledge (E3, E5). The parades were also mentioned as a complementary entertainment activity to the festival (E3, E7). The last element presented as a strategy to extend the tourist experience is the gastronomic offer. The participants affirm the importance of gastronomy in the region and the need for this element to be present in this type of events, configuring the space through properly represented food markets, inserting Iberian and Nordic gastronomy (E4, E7). Most of the participants recommend that the activities should be thought in a pedagogical way, without neglecting the public's entertainment nature, that is, they warn that festivals should be neither "carnival" nor too "academic".

E5- All kinds of activities that can be offered to the tourist/visitor, so that he/she feels protagonist in the historical immersion, because in activities that can participate, in recreations or digital experiences, things that... make the visitor enter this world, and above all look for different things, offer the visitor something different from what he/she has not seen in other territories.

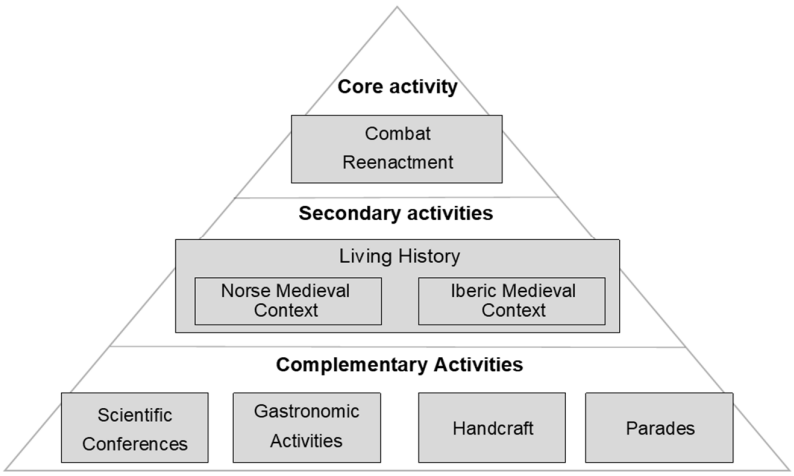

Figure 3: Activities by importance based on respondents' responses

Source: Own Elaboration

According to the analysis, the answer to the question of how to promote a Viking theme festival is not very consensual among the interviewees. One party state that to promote the festival it is necessary to present demonstrations of activities carried out through social networks and the media (E2, E1, E6). Another group mentions that Viking thematic festivals should be promoted as a tourism product on a regional level to reach a wider target audience (E6, E4, E3). The interviewees (E3, E5) propose that promotion should include partnerships with other entities at international level to prioritise tourism reach and visibility. The latter proposal is based on a more internal aspect, i.e. the need for stakeholders to adopt a joint promotion strategy in which they mainly integrate residents in these same actions (E3, E4). Regarding the participation of tourists, the interviewees state that the hedonic aspect is an important factor in tourist satisfaction and loyalty. The interviewees affirm the need to create, together with the local community, a historical immersion festival to enhance the evaluation of the tourist experience (E2, E3, E4, E5). The need for entertainment activities with a pedagogical and social aspect for the public to be involved in the activities is defended (E1, E6, E7).

E4- First of all, the local population, but also tourists should be involved in the imaginary of these festivals. And if we are talking about medieval festivals and Viking festivals why not get people more involved in the activities, by participating actively in the festival, first of all, how to dress, being able to participate in the parades, being able to participate in the banquets, in the various activities.

However, they warn that the participation of the tourist should be mostly passive, i.e. the tourist should play the role of spectator during the historical recreation shows. They affirm the difficulty the organisers feel in maintaining the levels of authenticity and historical rigour in festivals when integrating the tourist in the interpretation of historical characters (E6, E7, E8).

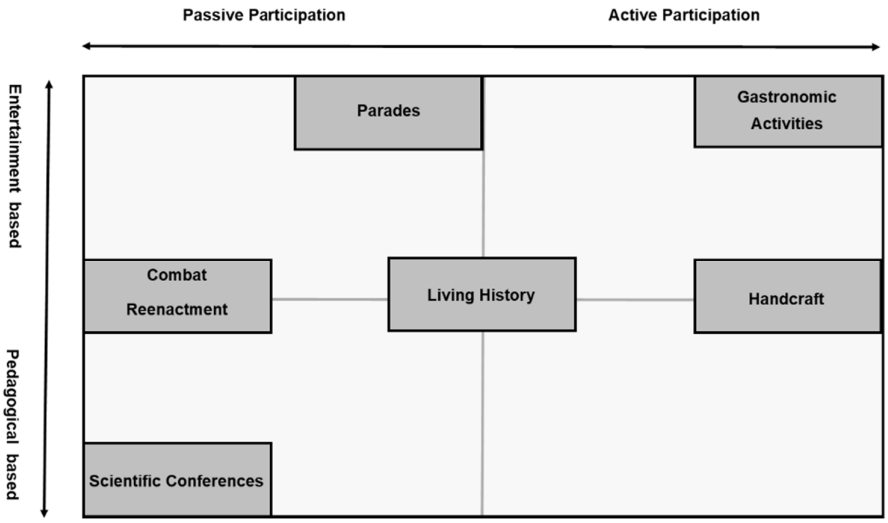

Figure 4: Tourist participation based on respondents' answers

Source: Own Elaboration

Current Evaluation

Participants (E3, E5, E7) state that certain festivals have good cooperation with the scientific community, seeking to request and promote scientific papers, lectures and conferences. On the other hand, they also point out that certain festivals have not sought to remain close to the scientific communities (E7, E8).
Economic viability is a factor that currently damages the relationship between organizers, promoters and the scientific community. The interviewees state that they find it difficult to find a balance with the partners in the development of the physical spaces and activities at the festival between rigour and investment cost (E1, E2). Some interviewees state that the promoters' knowledge of Nordic culture is low and carefree. Consequently, it affects the relationship between the main stakeholders (E2, E4). Organisers and cultural animation show to be based on scientific documentation and articles to justify the recreation of cultural animation activities (E1, E2, E3, E4). The scientific community states that the levels of rigour in the participation of the tourist are far below what is expected and that they negatively affect the tourist experience, highlighting fewer positive cases as in Romaria of Catoira (E6, E7, E8). Some interviewees state that certain festivals misinterpret the characters and do not present the costumes according to records dating from the Nordic culture (E1, E7, E8).

E4- *"We do indeed try to recreate through the historical facts we know from literature, but also to imagine what it must have been like, because we have few records".*

Economic feasibility is mentioned once again as the main obstacle to involving the Viking theme in the physical spaces of the event (E1, E2, E3). They claim that these tools are very expensive and difficult to buy; however, event organisers and representatives of cultural entertainment claim to have a set of materials easily identifiable with Nordic culture for the recreation of rituals, boats, camps, war materials, among others (E1, E2, E3, E4).

E1- *"Here in Galicia, there are festivals, for example, in a bar you can see a drakkar (it has a dragon's head and is quite curious) represented. In Catoira and Viveiro for example they use certain shields, representative pieces, or symbols like runes".*

Regarding the scientific community, they state that at the level of support materials for cultural animation, those that exist are well represented (E6, E7, E8). On the other hand, the interviewees affirm that there are some stalls that are well characterized and others that have difficulty in adapting to the festival theme (E1, E2, E7). The event and tourist animation organisers feel that the involvement of traders in the characterisation and decoration of the stands has evolved positively over the years (E1, E5).

Conclusion

Authenticity has a clear link with cultural vitality since, according to Soini and Birkland (2014), people's participation in using and sharing cultural capital makes cultural heritage accessible in a sustainable way so that it can be preserved in an authentic way without harm to future generations. Historical rigour is thus linked to authenticity. The greatest

challenge for those responsible for organising *Viking* theme festivals is to maintain levels of authenticity, following the principles of conservation of intangible heritage. Based on the conceptual perspective of Ma & Lee (2012), Viking Thematic Festivals in the Euroregion of Galicia and Northern Portugal are assessed against their strategy as modern local festivals. The historical recreation is recognized as the main activity of Viking thematic festivals where they portray the lived contacts between the two peoples. However, historical contextualisation activities on Nordic and Iberian culture should be approached to broaden the interpretation of the main activity. Organizers seek the support of local communities as the main reinforcement in the organisation, participation and promotion of the events as opposed to the case study of Hjalager & Kwiatkowski (2018) in which the festival organisers show limited ambition as regards the productive combination of community and social objectives. However, according to the results, the local community hosting these events remains unaware of the historical events that marked the interaction between Iberians and Nordics. In this sense, it is important to develop pedagogical activities with the scientific community to educate and consequently improve the way authenticity is built in festivals. To enable the active participation of tourists, it is necessary to have the participation of a local community properly instructed in the processes of recreation, as advocated by Smed et. al (2016). Communication among stakeholders is hampered by a lack of knowledge and understanding of each entity's mission and objectives. In this context, the performance of socio-cultural animation activities, more specifically the elaboration of strict criteria in the application of the activities, are conditioned by the problems highlighted in the communication between stakeholders. The distance with the scientific community allows researchers to describe their experience at festivals since the last time they experienced it, denoting some inconsistencies in the way the organisers and the cultural animation defend it. The scientific community, the promoters and the organisation of the event should prioritise a closer link to jointly plan best practices, correctly highlight intangible heritage and establish a balance between conservation and economic viability at festivals. As Soini and Birkland (2014) point out, the authenticity of the venue does not have to be thought of exclusively in the sense of "traditional" or "pure".

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What are the perspectives of Blockchain for the Supply Chains?

Vincenzo VARRIALE

Department of Industrial Engineering, University of Salerno, Via Giovanni Paolo II, 132,
84084 Fisciano (SA), vvarriale@unisa.it

Abstract

The success of blockchain technology in the field of cryptocurrencies has achieved considerable success, but its potential in other sectors is still unexplored. This study aims at analyzing the current state of the art of blockchain technology in the supply chain. In particular, the strengths and weaknesses of the technology within supply chains are highlighted. In addition, possible future developments of blockchain application are analyzed with the integration of new emerging technologies in order to automate processes management following the Industry 4.0 plans. Finally, research ideas on environmental, economic and social sustainability regarding the use of the technology for the supply chain are provided.

Keywords: Supply Chain, Emerging Technologies, Sustainability,

Introduction

In recent years, the term Blockchain has achieved great successes in the financial field thanks to the Bitcoin platform created by Satoshi Nakamoto in 2008 (Nakamoto, 2008). Gartner has ranked Blockchain as one of the top ten strategic technologies for 2020 (Cearley et al., 2019). However, in that report, the Blockchain technology in the hype cycle resulted in a phase called "Trough of Disillusionment", as interest has decreased in both technology and markets because experiments and implementations failed to guarantee suitable performances. Despite this, for other mature markets, such as banking, Gartner expects the final implementation of the Blockchain in 2023.

Certainly, the rise to the success of the Blockchain has depended on its operating mechanism for the exchange of cryptocurrencies which avoids the risk of fraud and counterfeiting (Smith and Kumar 2018). Recently, the Blockchain has penetrated several markets starting from tourism (Önder and Treiblmaier, 2018), health services (Meng et al., 2019), transport (Qu et al., 2019), energy (Hou et al., 2020), intellectual property management (Park et al., 2020) and waste management (França et al., 2020). However, research in these different areas is still in its infancy and is being tested. This technology is also taking its first steps in industry and in Supply Chains (SCs). On the one hand, it can revolutionize organizational dynamics by integrating it with other operations for production management to improve the companies' performances (Hughes et al., 2019; Mickiewicz and Rebmann, 2020). Therefore, the Blockchain will certainly modify the technological strategies of companies (Cammarano, Michelino, Lamberti et al., 2019, Cammarano et al., 2020). On the other hand, in the field of SCs, the technology would allow several improvements for the batch tracking and the anti-counterfeiting systems (Hastig and Sodhi 2020; Kamble et al., 2020). Another issue concerns sustainability, which has become increasingly strategic for businesses, also in consideration of the now consolidated link between sustainability and innovation (Michelino et al., 2019). Therefore, it is necessary to verify whether new technologies such as Blockchain are suitable for sustainable approaches.

The current state of the art of Blockchain for SCs will be described below and the strengths and weaknesses of the technology are identified. In addition, the Blockchain scenario integrated with new emerging technologies in relation to the Industry 4.0 plan is shown. Subsequently, the attention will focus on how the Blockchain can improve the sustainability of production and logistics processes in current SCs. Finally, discussions and conclusions will close the work.

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Blockchain and SCs

One of the goals of SCs is to serve customers quickly and at the lowest cost (Flint, 2004). In recent times, one of the many risks in SCs is the opportunistic behavior of SC actors, especially for global SCs (Cole et al., 2019), as well as issues related to shipments optimization. Therefore, the adoption of new technologies is necessary to solve these problems. Several studies have shown that using Blockchain would make transactions in the SC faster, reducing order delivery times and paperwork (Kshetri, 2018). One of the strengths of the adoption of Blockchain for SCs is the authentication and certification of any asset (Choi, 2019; Bai and Sarkis, 2020). In fact, since the Blockchain is a distributed ledger, those who can carry out transactions must have credentials guaranteeing the ownership and authenticity of the traded asset. This process greatly facilitates the bureaucratic effort required to authenticate goods during cross-border shipments (Bai and Sarkis, 2020). For example, Tradelens shipping project aims at providing information to participants authorized to enter transactions into the Blockchain, allowing them to comply with regulatory frameworks by reducing administrative time and the risks of fraud and counterfeiting (Jensen et al., 2019). In addition, another important feature is the immutability of the distributed ledger (Pedersen et al., 2019; Schmidt and Wagner, 2019). This peculiarity makes it possible to avoid changes and alteration of the data within the distributed ledger and guarantees complete traceability of the goods exchanged between the participants. In this way, each participant knows all the transactions starting from its origin to the destination. Blockchain-based traceability would allow to solve many SC problems (Lezoche et al., 2020; Yadav and Singh, 2020). In the agri-food sector, knowing the origin of certain products allows the consumer to be sure of the authenticity of the good (Kamble et al., 2020). Additionally, in the pharmaceutical sector, monitoring and tracing the history of climate-sensitive drugs can help improving procurement practices and constantly monitoring physico-chemical properties (Hastig and Sodhi, 2020). The distributed ledger is fully visible to those who own the keys in a private Blockchain, but at the same time the consumer can be provided with all the information of the product he is purchasing thus ensuring the privacy and security of the actors (Pournader et al., 2020). Therefore, the mechanism of the Blockchain guarantees trust to all the actors of the network thanks to the strengths mentioned above (Chang et al., 2020). On the technological side, the Blockchain is efficient and reliable as it allows a reduction in the number of operations and time spent on process management (Manupati et al., 2020; Bai and Sarkis, 2020). Indeed, highly volatile demand could be managed using Smart Contracts that would ensure automation of the entire procurement process (Hasan et al., 2019). Furthermore, the distributed ledger contains all the transactions that the actors exchange in the platform, which can be goods, money, bureaucratic documents and certificates. This ensures greater collaboration between members who work in the same SC (Longo et al., 2019). Thanks to the Blockchain it is possible to manage flows of information, knowledge, intellectual property and intellectual capital deriving from collaborations, alliances and relationships with partners (Michelino et al., 2014; Cammarano et al., 2017). Other important features of the Blockchain are decentralization and disintermediation (Kamilaris et al., 2019; Wang et al., 2019). In the first case, each actor accesses the Blockchain autonomously through its own device and carries out its actions without a common purpose with other participants. On the contrary, disintermediation allows several devices to collaborate with each other while remaining physically far. In this way, intermediaries such as banks or central authorities are eliminated and this leads a reduction in transaction costs (Min, 2019).

Obviously, there are not only positive sides to the adoption of the Blockchain. One of the first obstacles to be considered for the adoption in SCs is the lack of skills of the managers and the network participants (Hastig and Sodhi, 2020). Furthermore, the actual gain from using the technology is not known by comparing it with the implementation costs of the entire architecture (Kamble et al., 2019). Furthermore, there are no standards or regulations that establish the procedures to be carried out for its correct use (Saberi et al., 2019; Chang et al., 2020). For these reasons, entrepreneurs are increasingly reluctant to adopt this new technology. Indeed, privacy issues arising from the full visibility of the distributed ledger must be considered (Chang et al., 2020). The participants of the SC could perform opportunistic behaviors by analyzing the transactions made by a partner (Montecchi et al., 2019). Finally, the biggest drawback is certainly the performance of the technology in terms of storage capacity, scalability, throughput and latency (Zhao et al., 2019; Pournader et al., 2020). These problems are related to the slow speed of storage data, reading transactions and data management. As Blockchain platforms for SCs need Smart Contracts, these programs could slow down the system by far. Table 1 summarizes the strengths and weaknesses.

Table 1 : Strengths and weaknesses of the Blockchain for the SCs

Strengths	• Authentication & Certification (Choi 2019; Bai and Sarkis 2020) • Automation (Hasan et al., 2019) • Disintermediation & Decentralization (Kamilaris et al., 2019; Wang et al., 2019) • Efficiency (Manupati et al., 2020; Bai and Sarkis 2020) • Immutability (Pedersen et al., 2019; Schmidt and Wagner 2019) • Partner Support (Michelino et al., 2014; Cammarano et al., 2017; Longo et al., 2019) • Reliability (Manupati et al., 2020; Bai and Sarkis 2020) • Risks Reduction (Cole et al., 2019) • Security (Pournader et al., 2020) • Traceability (Tracking & Tracing) (Lezoche et al., 2020; Yadav and Singh 2020) • Transaction Cost (Min 2019) • Transparency (Visibility) (Chang et al., 2020) • Trust (Chang et al., 2020)
Weaknesses	• Implementation Cost (Kamble et al., 2019) • Organisation (Montecchi et al., 2019) • Regulation (Saberi et al., 2019, Chang et al., 2020) • Privacy (Chang et al., 2020) • Standardization (Saberi et al., 2019; Chang et al., 2020) • Technical Skills (Hastig and Sodhi 2020) • Technology Performance (Zhao et al., 2019; Pournader et al., 2020)

Blockchain with the emerging technologies for the SCs

In literature it is known that Blockchain works with the bits and helps to improve processes when there is a digitization of assets (for example cryptocurrencies). Therefore, Blockchain in SCs must be integrated with other technologies in order to transform a physical asset into a digital one. For this reason, research is moving towards the mixed use of multiple technologies to ensure the optimization of business processes. In particular, in the food sector, the combined use of sensors, drones, Internet of Things and Big Data would ensure greater efficiency and safety of food production (Astill et al., 2019). For example, traditional traceability systems with the Internet of Things can monitor and store information from all stages of production, processing, distribution and consumption using sensors such as RFID. However, this system is based on the centralized server-client paradigm which from the IT point of view could be hit by hacker attacks. As a result, most actors find it difficult to acquire comprehensive transaction information and trace product origins (Feng et al., 2020). With Blockchain this problem could be solved thanks to its characteristics of immutability and security. With this configuration, sensors would collect information, the Internet of Things would communicate information and, finally, Blockchain would allow secure access to the transactions (Venkatesh et al., 2020). The transparency of information and its accuracy will improve managers' abilities to make the right decisions. Finally, the study of big data deriving from Blockchain archiving would allow manufacturers to make decisions on inventory flows and evaluate the placing on the market of new products in response to demand. In this way handlers will be able to see where their supplies are and actually know their arrival (Zelbst et al., 2019). Depending on the industry, this leads to savings on inventory storage costs and associated labor. In practice, the cost of recalls should be reduced thanks to the ability to know where defective products are located (Ivanov et al., 2019). This system could be combined with two other emerging technologies such as artificial intelligence and machine learning. Indeed, machine learning algorithms can be used to predict delays in outbound and inbound shipments, optimization of vehicle routing and better fleet management. The use of machine learning will ensure real-time monitoring of products allowing product traceability, monitoring of food safety regulations and recall of products in case of contamination or identification of fake products (Sharma et al., 2020). In addition, information on customer purchasing behavior will help Artificial Intelligence technologies to predict customer preferences and needs. This will also improve supplier relationships by reducing supplier-related delays and the accuracy of inventory forecasts (Lezoche et al., 2020). In other sectors this automatism is completed with 3D printing technology that would allow the on-site production of the asset in order to reduce congestion in the SC by creating an alternative source of fulfilment and the quick recovery of the emergency due to rejects or recalls (Rodríguez-Espíndola et al., 2020).

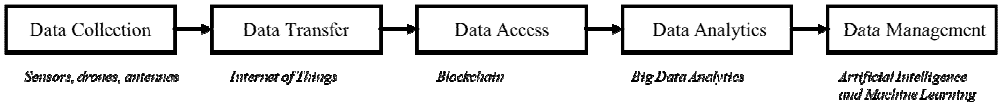

Figure 1: Processes management using the combination of several emerging technologies

SCs with Blockchain from a sustainability point of view

It is known in both the business and academic fields that the Bitcoin platform is unsustainable as it wastes huge amounts of electrical resources for mining (Köhler and Pizzol 2019). However, this condition is not valid for other platforms such as Ethereum that use other mechanisms for block validation. Therefore, Blockchain may improve sustainability within SCs. From an environmental sustainability point of view, the Blockchain can act in SCs in relation to the carbon tax (Saberi et al., 2019; Bürer et al., 2019). In traditional systems, the carbon footprint of each product is difficult to measure. With Blockchain technology, tracing the footprint of a company's products becomes easier. In fact, the technology can determine the amount of carbon tax that should be charged to a company. In this way, participants are encouraged to find a solution for reducing emissions to achieve economic benefits and have a good reputation (Astill et al., 2019). Additionally, a visible distributed ledger that tells the story of the products ensures consumers that the purchased goods are supplied and manufactured from sources that have been verified and certified. Smart contracts can automatically follow the tracking and control rules of sustainable procedures and, consequently, apply the appropriate corrections. Finally, monitoring of expired or damaged products can help to reduce rework and recall, thus reducing resource consumption and greenhouse gas emissions (Saberi et al., 2019). On the social sustainability side, a significant reputational risk concerns the fashion sector, relative to the high intensity of labor and its low cost (Cole et al., 2019). Blockchain technology could allow companies to extend the visibility of their SCs to have greater transparency for slavery legislation (Howson, 2020). Still in the field of luxury goods, the diamond SC is controlled by groups that finance activities in war zones. These so-called "blood diamonds" and the use of child labor in mines (Epstein and Yuthas, 2011) are known problems in the SC. Therefore, increasing the transparency and traceability of diamond SCs should improve their social sustainability because it offers a better guarantee of human rights and fair working practices (Helo and Hao, 2019). Few papers have analyzed the economic sustainability of Blockchain in SCs. Scholars speculate that the economic value created by Blockchain through sustainable practices - such as improving recycling or carbon reduction plans - can lead to an increase in both reputation and profitability (Saberi et al., 2019). Finally, the economic advantage created by implementing sustainable practices through Blockchain against its implementation costs is unclear (Choi and Luo, 2019).

Discussions and conclusions

Since the Blockchain was born as a virtual currency platform, the amount of financial documents has a greater share. However, the vision on the Blockchain is changing, thanks to its features including decentralization and disintermediation. Indeed, the Blockchain can be considered as a decentralized computer running programs publicly. In this case, the computer is not physical, but its operations consist in the collaboration of several computers belonging to different organizations. However, if compared to other IT systems, data entered in the Blockchain are verifiable by everyone, making it a transparent and anti-counterfeiting tool. Of course, the road to new horizons is still long: few articles focus on the implementation of some processes through Blockchain. Currently there are few real case studies or virtual simulation models. Consequently, SC is a fertile ground for the application of technology. Using Blockchain as an anti-counterfeiting tool is one of the many reasons that pushes companies to adopt this technology. The use of Smart Contracts will modify and facilitate the purchasing and control processes of the products shipped. Daily monitoring of the product phases (e.g. product conditions or payment status) will allow to place greater trust in the supply system. On the other hand, the use of Smart Contracts could slow down the Blockchain system. Therefore, technological performance decreases when the code implemented by these contracts increases. This is one of the biggest challenges in Blockchain that slows down its adoption. Furthermore, implementation costs for all SC actors can be a huge problem for adoption, as it is necessary to consider not only big organizations but also small and medium-sized enterprises that may have difficulty accessing to these new technologies. Furthermore, the Blockchain works through bits and helps to improve processes when there is a digitization of resources (for example cryptocurrencies). Therefore, Blockchain must be integrated with other technologies in order to transform a physical asset into a digital one. For this reason, it is necessary to integrate multiple technologies in the context of Industry 4.0 plans. The combined use of these technologies would produce huge savings for companies and increase their reputation in terms of innovation and sustainability. The application of the Blockchain within SCs can achieve new goals in terms of economic, environmental and social sustainability. Future research needs to address the problem of implementing Blockchain

for agri-food and luxury goods SCs to achieve energy, economic and resource savings. Moreover, it should be investigated how much the Blockchain will impact on innovation strategies and how it can facilitate the adoption of open innovation (Michelino et al., 2015; Lamberti et al., 2017; Cammarano, Michelino and Caputo, 2019). The proposed work provides a first starting point for the evaluation of SC using Blockchain, showing strengths and weaknesses of the technology. Furthermore, although some ideas for future research have been proposed, these are entirely theoretical in view of real future developments.

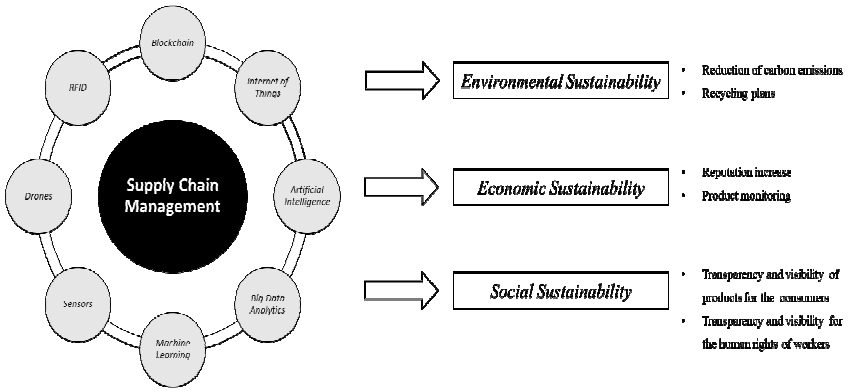

Figure 2: The integration of new emerging technologies in Supply Chain Management improves environmental, social and economic sustainability outputs

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An Explorative Analysis of The Relationship Between Legal Status Event Data and Patent Quality Metrics

Andrea CELONE

Uniroma2 Tor Vergata, Via del Politecnico, 1 00133 – Roma –Italy

acelone@unisa.it

Abstract

The work presents an explorative analysis of the relationship between legal status event data and patent quality metrics. Indeed, legal status event data might disclose a list of events that have changed the likelihood of exploitation of a patented technology, and consequently its quality. A classification based on 124 categories of events is presented and such categories are studied for a sample of 118,850 patent applications. The correlation analysis between legal status event data and traditional patent quality metrics confirms the usefulness and the potential of legal status event data, since the occurrence of specific events is related to the quality associated to a patented technology.

Introduction

The aim of this work is to present preliminary results about an explorative analysis aiming at uncovering a relationship between legal status event data and traditional patent quality metrics. Indeed, the life of a patent is featured by events that will change the status and the effectiveness of the patent itself. Therefore, legal status event data refer to a series of "forward events" and "updates" reported in the "legal status" section of a patent application. These events might change the usefulness of the patent legal protection and, consequently, it is likely that the value and the quality of a patented technologies correlate with some events. Since patents are proxy of the innovation and technological performance of a firm, this exploratory analysis aims at uncovering the relationship between legal status events and a company's capability of exploiting its own technologies.

After a literature review about the elements under investigation, the patent-based framework is presented and the explorative analysis performed on a sample of 118,850 patents filed in 2008. Findings are discussed and conclusions will close the work.

Literature Review

Patent Data and Innovation Quality

Technological innovation is one of the drivers of technological progress and economic growth of companies. The ability of a company to develop technologies and products is strongly conditioned by its wealth of knowledge, skills and technologies deriving from previous research and development activities (Arts, 2012; Cammarano et al., 2020; Michelino et al., 2014). The knowledge base of companies is the output of the investment activities carried out during the exploration phase of research and development. This asset positively contributes to the future financial performance of companies and, consequently, to its market value (Hall et al., 2005; Lamberti et al., 2017; Michelino et al., 2015). The higher the level of innovation of the invention, the greater the expected technological and financial impact. The analysis of technological innovation needs objective and standardized data, which is why scholars often refer to patents (Griliches, 1990). Patents are the direct result of the inventive process, and more specifically, of those inventions that are expected to have a commercial impact; moreover, they measure the competitive and proprietary dimension of technological change (Archibugi & Pianta, 1996). Patents have been treated as the most important output indicators of innovative activities and patent data has become the focus of many techniques and tools for valuing innovation (Cammarano, Michelino, & Caputo, 2019; Ma et al., 2009). Among the information available in such documents, technology classification, assignee field, patent families and citations are used to define different innovation metrics (Ahuja & Lampert, 2001; Belderbos et al., 2010; Flores et al., 2009; Geum et al., 2013; Graff, 2003). When a patent is cited by other inventors (**forward citation**) it can be assumed that it has a higher technological quality: the cited patents are more relevant (Albert et al., 1991; Alcácer & Gittelman, 2006; Dahlin & Behrens, 2005), innovative and important than ignored ones (Lahiri, 2015; Miller et al., 2007; Rosenkopf & Nerkar, 2001). Fleming & Sorenson (2004) argued that the number of forward citations of a patent is highly correlated with its technological

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importance, as measured by expert opinion, social value and industry awards. Furthermore, highly cited patents usually lead to higher economic profits than patents that are cited less frequently (Cammarano et al., 2017; Hall et al., 2005; Harhoff et al., 1999). Instead, the analysis of data on **backward citations** provides important information on the extent of reliance on previous technology (Jaffe, et al., 2017), defining the incremental nature of innovation (Lanjouw, et al., 2001) and identifying the patent as basic or trivial (Trajtenberg, et al., 1997). This can also define the value (Harhoff, et al., 2003), technological importance (Von Wartburg, et al., 2005), originality (Hall, et al., 2001) or quality of the patent, when linked to other data (Lanjouw, et al., 2004). Scope and clarity of patent **claims** have been interpreted in the academic world as indicators for the quality of patents (Petherbridge, 2009; Rai, 2013; Wagner, 2009), impacting on innovation in some business sectors (Choi & Gerlach, 2015; Rai, 2013). In literature, the number of countries in which patent protection is requested (the **family size**) is positively correlated to the value of the patents (Lanjouw & Schankerman, 2001; van Zeebroeck, 2011), while the presence over the years of a payment of the patent **maintenance fees**, provides a measure of the private value of the patent (Schankerman & Pakes, 1986). Finally, the fact that an application has become a **granted** patent or not, may indicate the potential value of the patent itself (Guellec et al., 2002; Guellec & Pottelsberghe, 2000).

Legal status event data and innovation quality

The information on the legal status mainly concerns the future of the granted application and records operations such as changes in ownership, forfeiture of terms or expiration and extension of these (Adams, 2003). Studies on the innovative impact of patents have shown that long-term patents are of greater importance than short-term ones (Guellec et al., 2002; Guellec & Pottelsberghe, 2000; Pakes & Schankerman, 1984). The explanation provided by the researchers is that patent holders are willing to pay the annual fees required to keep patents if the economic return is positive (Griliches, 1990; Schankerman & Pakes, 1986). This idea was implemented through studies of grants, legal status, oppositions and disputes (Guellec et al., 2002; Guellec & Pottelsberghe, 2000; Harhoff & Reitzig, 2004; Lanjouw & Schankerman, 2001; Pakes & Schankerman, 1984). In particular, the legal status of patents was analysed in the entrepreneurial strategies regarding the useful life of patents (Gans et al., 2008; Régibeau & Rockett, 2010), observing the behaviour of patent applicants. Dirnberger (2016) argues that tracking the progress of patent applications over time can serve as an initial indication of the performance of even academic inventors' efforts to commercialize their patented research results and, as legal status data can be linked to expenses associated with the phases of the patent pursuit process, they can be used in the control of academic budgets dedicated to patents. For these reasons they suggest that legal status data in combination with patent counts can be used for research evaluation. For example, according to Hoock & Brown (2020), an opposition at the EPO seems to be a good idea to test the arguments of invalidity, if you are a third party worried about the scope of the patent. Bessen (2008) notes that, in some areas, litigated patents are of significantly higher quality if compared to non-litigated ones.

Methodology

The sample was extracted from PATSTAT database 2018 version. All the patents filed in 2008 at the EPO, WIPO and USPTO offices were considered. Since 2008 is the filing year, information is downloaded for the period 2008-2018, leaving a time interval of 11 years to allow events to "happen". The priority date of patents was considered, which relates to the earliest filing of each patent family, i.e. the first granted patent applications filed to protect an invention. In fact, having analysed only the priorities claimed, only high value applications are considered (Harhoff et al., 2004; Johnstone et al., 2012). For each patent, the dependent variables (quality metrics) and the independent variables (the count of each legal event recorded) were extracted. In particular, the following dependent variables, which are widely acknowledged and employed by scholars (Cammarano, Michelino, Lamberti, et al., 2019; Michelino et al., 2019), were used:

- number of backward citations, providing an indication of originality and level of pioneering;
- number of forward citations, exhibiting the technological value;
- patent family size, proxying the marketability of the invention;
- number of claims, showing the scope of the patented technology;
- number of backward non-patent literature citations, underscoring the existence of knowledge flows between scientific and technological actors and industry-science relations;
- year of renewal of the patent, i.e. "10" means the renewal fees have been paid for ten years, giving information on the commercial response. Renewing the fees presumably means that the revenues from the use of a patent are higher than the maintenance costs;
- granted, a dummy variable that indicates the presence of the initial requirements for patentability, a formally correct submission process that has been successfully completed.

As to the independent variables, since the dataset consists of thousands of events, it was necessary to define macro-categories through a careful analysis of all the legal status events. A macro-category was assigned to each event, according to their description. The goal was to define in which macro-category events fall, based on their characteristics and with respect to their location in the patent process. The classification work starts from a base

of events already classified, i.e. the INPADOC classification, that foresees only 21 macro-categories of events: “Application filing”, “Re-publication of document after modification”, “Application discontinuation”, “Document publication”, “Application revival”, “Party data change”, “Search and examination”, “Information on licensing and similar transactions”, “Pre-grant review request”, “Administrative procedure adjustment”, “IP right grant”, “Payment”, “Protection beyond IP right term”, “Appeal”, “IP right cessation”, “Other”, “IP right revival”, “Correction and deletion of event information”, “IP right review request”, “Classification pending and IP right maintenance”. However, one of the most important aspects of legal status data is the question of data quality: in fact, transposition of little information, missing information, an incorrect reformatting algorithm at the time of automatic database loading or manual errors can cause chaos, not only in research but also in the commercial consequences of decisions made in the light of research (Adams, 2003). Furthermore, events with mixed impacts (both positive and negative) on the patent process could be included within the same macro-category. For this reason, the definition of the individual macro-categories and of the events falling within them was achieved using a further and more specific classification with respect to the INPADOC one. The items identified, which will provide the pool of independent variables to be analysed, were called sub-categories: 124 sub-categories were found. Table 1 shows as an example the events belonging to the “Failure to grant” sub-category, which falls within the INPADOC macro-categorization under the heading “search and examination”, considering codes employed in all the countries. This labelling activity has been performed for all the other 123 sub-categories in a similar way.

Table 1: An example of event labelling within an INPADOC macro-category. Failure to grant is a sub-category of the macro-category classified in the INPADOC "Search and examination", and indicates the events for which the patent is not granted by the competent offices, in the absence of one of the requirements, after careful analysis.

Country	Code	Event	Sub-category
BR	B09Z	DECISAO: DECISAO ANULADA	Failure to grant
NL	NP1	NIET AUTOMATISCH VERLEENDE OCTROOIEN	
MC	PED	PAS ENCORE DELIVRE	
US	XB	PATENT (REEXAMINATION CERTIFICATE) NOT ISSUED	
BR	HIFF	DESPACHO DE DEFERIMENTO ANULADO	
DE	8231	ZURUECKWEISUNG	
BR	MT	EXIGENCIA SEGUNDO ARTICOS 230 and 231 DA LEI 9279/96	
NL	NZ80	AANVULLING BIJ OCTROOI	
JP	A765	WRITTEN ABANDONMENT OF PRIORITY CLAIM BASED ON THE PARIS CONVENTION FOR THE PROTECTION OF INDUSTRIAL PROPERTY	
US	DJB	ALL REFERENCES SHOULD BE DELETED, NO REEXAMINATION CERTIFICATE WAS ISSUED	

Therefore, for each sub-category a counter variable disclosing the number of occurrences associated to the focal patent is estimated. Since no event was present in the sample for some sub-categories, the analysis was conducted only on the useful sub-categories that is, those with at least one occurrence (70 out of 124).

Findings

A sample of 118,850 patent applications has been extracted from PATSTAT database. Table 2 displays descriptive statistics for the dependent variables under investigation, allowing a focus on the traditional patent quality metrics. In particular, an average patent records about 13 backward citations, 9 claims and 1 non-patent literature citation, as well as receives 8 forward citations and belongs to a patent family consisting in 2 patent applications. On average, during the time interval 2008-2018, i.e. 11 years, renewal fees are paid until the 6th year. Only about the 63% of patents has been granted by the patent office.

Table 2: Descriptive statistics (dependent variables)

Variable	#	Min.	Max	Avg.	Std. dev.
# backward citations	118,850	0	444	13.46	18.567
# forward citations	118,850	0	483	7.69	12.406
# family size	118,850	1	105	2.41	2.627
# claims	34,340	1	203	9.00	8.967
# non-patent citations	118,850	0	239	0.60	3.994
fee renewal year	57,613	3	11	5.78	2.509
granted	118,850	0	1	0.63	0.483

As to independent variables, i.e. the variables counting the number of events associated to the focal patent, Table 3 displays descriptive statistics. It emerges that the most frequent events are:

- related to the application phase, such as “PCT application”, “extension designation”;
- linked to the patent examination process, such as “notification”, “proceedings” and “application filed”;
- referring to the payment of fees, i.e. “fee paid”;
- associated to the termination of the patent protection, such as “patent revoked”, “patent lapsed through no payment” and “application not submitted”;
- signalling changes in the ownership of the patented technology due to the transfer of rights, i.e. “change ownership”.

Regarding correlations between patent quality metrics and the count of each legal event, Table 4 exhibits a wide group of statistically significant relationships, confirming the potential of usefulness of the information stored within the “legal status” of a patent application. For an explorative summary of such relationships, only few correlations are presented, focusing on the most statistically significant. The number of backward citations is negatively correlated to the PCT application, i.e. PCT applications are likely to be more original. The number of forward citations is positively correlated with events of changes in the ownership of the patented applications: this means that the new owner recognizes the value of patents highly cited and decides to buy them. Family size, being a proxy of the market impact of a technology, is associated to events of limitation, amendment or discontinuation of the patent protection, resulting from complaints and legal disputes with third parties, which are stimulated to limit the patent’s commercial exploitation. Similarly, the higher the number of claims, the higher the likelihood of findings events of correction or modification of the original patent application, i.e. to limit the scope of the patent protection. Regarding the occurrence of non-patent literature citations, it is associated with events of error correction or extension of the patent application. This means that such documents are attached by the applicant to prove the scientific, technological and industrial value of the patent. Many correlations, but no conceptually significant relationships, have been uncovered for the variable “fee renewal year”, since it is clear that the higher its value, the higher the likelihood of finding events, being the life of the focal patent larger. A similar behaviour characterizes the label “granted”, since a granted patents exhibits a larger number of events compared to non-granted ones.

Table 3: Descriptive statistics (independent variables - N = 118,850)

Variable	Min	Max	Avg	Std dev	Variable	Min	Max	Avg	Std dev
Transfer deleted	0	2	0.00	0.030	Application withdrawn	0	2	0.05	0.216
Patent invalid after re-examination	0	1	0.00	0.006	Application expired	0	2	0.00	0.020
Patent amended	0	2	0.04	0.189	Errors corrected	0	2	0.00	0.006
Patent modified amended	0	2	0.04	0.244	Erratum	0	1	0.00	0.005
Patent annulled	0	2	0.01	0.094	Procedure phase	0	1	0.00	0.003
Patent expired	0	9	0.04	0.245	Licence	0	1	0.00	0.006

Patent invalid withdrawn	0	2	0.00	0.006	Change addresses	0	4	0.00	0.070
Patent maintained	0	2	0.00	0.032	Change inventor	0	1	0.00	0.004
Patent maintained modified	0	3	0.00	0.036	Change representative	0	12	0.02	0.227
Patent maintained after re-examination	0	2	0.00	0.021	Change ownership	0	138	1.90	4.032
Patent revoked	0	13	0.09	0.523	Change registered	0	3	0.00	0.055
Patent restored	0	3	0.00	0.081	Change redundant	0	6	0.00	0.039
Patent withdrawn/ refused	0	1	0.00	0.005	Change owner	0	13	0.01	0.180
Cancellation event	0	2	0.00	0.042	Notification	0	39	1.00	5.128
Certificate issued	0	3	0.04	0.196	Declaration	0	1	0.00	0.003
Patent classification	0	4	0.00	0.066	Proceeding opened/closed	0	1	0.00	0.003
Concession	0	7	0.01	0.131	Proceedings closed	0	2	0.00	0.025
Changeover application	0	2	0.00	0.015	Appeal terminated	0	1	0.00	0.003
Revision refused/ withdrawn	0	2	0.00	0.016	Proceedings	0	5	0.11	0.335
Revision	0	2	0.00	0.010	Publication deleted	0	1	0.00	0.014
Revision event	0	62	0.06	0.606	Publication	0	1	0.00	0.025
Patent lapsed through non payment	0	7	0.17	0.551	Registration published	0	1	0.00	0.012
Decision taken	0	2	0.00	0.015	Licence registration	0	1	0.00	0.038
Extension designation	0	14	0.33	1.089	Report granted	0	2	0.04	0.206
Rights restored	0	2	0.00	0.008	Appeal filed	0	2	0.07	0.257
Licences available	0	8	0.00	0.045	Restoration after appeal	0	2	0.00	0.008
Document not published	0	17	0.02	0.244	Recovery	0	2	0.00	0.013
Amended document	0	2	0.00	0.015	Suspension	0	1	0.00	0.012
Application filed	0	7	0.01	0.116	Fee paid withdrawn	0	2	0.02	0.156
Divisional application	0	2	0.00	0.008	Fee paid	0	41	0.80	1.783

Application not admitted	0	1	0.00	0.003	Fee returned	0	1	0.00	0.003
Application not submitted	0	3	0.07	0.384	Patent application translation	0	1	0.00	0.017
PCT application	0	13	0.33	1.024	Transaction	0	2	0.00	0.034
Application refused	0	2	0.01	0.092	Other	0	1	0.01	0.097
Revival application filed	0	2	0.00	0.006					

Tabel 4: Correlations between quality indices (dependent variables) and sub-categories (independent variables). **. The correlation is significant at the 0.01 (two-tailed) level. *. The correlation is significant at the 0.05 (two-tailed) level. b. Calculation impossible to perform because at least one of the variables is constant.

Variable	# backward citations	# forward citations	# family size	# claims	# non-patent citations	Fee renewal year	Granted
Transfer deleted	-0.015**	-0.001	0.026**	0.018**	0.006*	0.073**	0.022**
Patent invalid after re-examination	0.004	0.017**	0.011**	0.004	-0.001	0.004	0.005
Patent amended	-0.068**	-0.035**	0.152**	0.208**	0.029**	0.436**	0.147**
Patent modified amended	-0.062**	-0.032**	0.161**	0.193**	0.026**	0.415**	0.139**
Patent annulled	-0.033**	-0.023**	0.068**	0.093**	0.000	0.210**	0.072**
Patent expired	-0.051**	-0.031**	0.133**	0.157**	0.014**	0.316**	0.113**
Patent invalid withdrawn	0.000	0.001	0.002	0.002	0.006*	0.007	0.002
Patent maintained	-0.008**	0.002	0.040**	0.031**	0.014**	0.073**	0.021**
Patent maintained modified	-0.006*	0.001	0.042**	0.026**	0.027**	0.052**	0.015**
Patent maintained after re-examination	-0.003	0.005	0.018**	0.019**	-0.001	0.047**	0.015**
Patent revoked	-0.058**	-0.031**	0.120**	0.181**	0.022**	0.368**	0.127**
Patent restored	0.008**	0.006*	-0.004	0.032**	0.001	-0.002	0.035**
Patent withdrawn/refused	-0.002	-0.002	0.007*	0.006	-0.001	0.000	0.004
Cancellation event	-0.015**	-0.004	0.021**	0.039**	0.008**	0.052**	-0.008**
Certificate issued	0.084**	0.087**	0.040**	0.154**	0.007*	-0.052**	0.144**
Patent classification	-0.022**	-0.011**	0.033**	0.073**	0.012**	0.136**	0.043**
Concession	-0.035**	-0.017**	0.048**	0.119**	0.032**	0.218**	0.054**
Changeover application	-0.003	-0.002	0.007*	0.010	-0.001	0.019**	0.001
Revision refused/withdrawn	-0.002	-0.005	0.003	0.006	0.006*	0.003	-0.019**
Revision	-0.001	-0.003	-0.001	0.005	-0.001	0.011**	0.004
Revision event	-0.028**	-0.012**	0.079**	0.117**	0.050**	0.184**	0.035**
Patent lapsed through non payment	0.018**	-0.010**	-0.024**	0.119**	-0.015**	0.093**	0.233**
Decision taken	0.008**	0.017**	0.010**	0.002	-0.001	0.003	0.009**

Extension designation	-0.104**	-0.068**	0.214**	0.354**	0.136**	0.471**	-0.053**
Rights restored	-0.001	0.000	0.002	0.012*	0.001	0.001	-0.003
Licences available	-0.002	-0.002	0.000	0.010	0.000	0.013**	0.012**
Document not published	-0.030**	-0.012**	0.187**	0.090**	0.035**	0.193**	0.057**
Amended document	-0.003	0.004	0.056**	0.023**	0.068**	0.034**	0.010**
Application filed	-0.005	0.014**	0.066**	0.053**	0.011**	0.098**	0.039**
Divisional application	-0.002	-0.002	0.011**	0.000	-0.001	0.012**	0.003
Application not admitted	-0.001	-0.002	0.003	0.007	0.000	0.007	0.002
Application not submitted	-0.069**	-0.040**	0.127**	0.200**	0.023**	0.440**	0.146**
PCT application	-0.149**	-0.049**	0.262**	0.196**	0.012**	0.221**	-0.355**
Application refused	-0.023**	-0.016**	0.075**	0.094**	0.077**	0.050**	-0.120**
Revival application filed	0.001	0.001	0.003	0.002	0.000	0.009*	0.002
Application withdrawn	-0.077**	-0.063**	0.118**	0.238**	0.167**	0.122**	-0.290**
Application expired	-0.008**	0.001	0.034**	.[b]	-0.001	0.015**	-0.024**
Errors corrected	0.001	0.001	0.037**	0.006	0.159**	0.009*	0.003
Erratum	-0.002	0.000	-0.001	-0.001	0.002	0.002	0.004
Procedure phase	-0.002	-0.001	0.000	0.002	0.000	0.007	0.002
Licence	-0.003	0.009**	0.012**	0.004	-0.001	0.016**	0.001
Change addresses	-0.019**	-0.007*	0.045**	0.041**	0.016**	0.113**	0.035**
Change inventor	-0.002	-0.002	0.002	0.006	0.000	0.012**	0.003
Change representative	-0.032**	-0.016**	0.082**	0.097**	0.017**	0.210**	0.068**
Change ownership	0.129**	0.124**	0.012**	0.257**	-0.026**	-0.138**	0.181**
Change registered	-0.018**	0.002	0.052**	0.044**	0.008**	0.110**	0.034**
Change redundant	-0.005	-0.002	0.042**	0.026**	0.000	0.040**	0.012**
Change owner	-0.021**	-0.008**	0.060**	0.063**	0.002	0.154**	0.047**
Notification	-0.061**	-0.036**	0.131**	0.194**	0.024**	0.390**	0.143**
Declaration	-0.002	-0.001	0.001	0.001	0.000	0.009*	0.002
Proceeding opened/closed	-0.001	-0.001	0.001	0.007	0.000	0.004	0.002
Proceedings closed	0.009**	0.010**	0.015**	0.023**	0.001	0.012**	0.014**
Appeal terminated	-0.001	-0.001	0.000	0.002	0.000	-0.003	0.002
Proceedings	-0.160**	-0.078**	0.143**	0.080**	0.003	0.176**	-0.375**
Publication deleted	-0.003	-0.004	0.013**	0.011*	0.002	0.006	0.011**
Publication	-0.011**	-0.008**	0.037**	0.018**	0.029**	0.035**	-0.017**
Registration published	-0.003	0.002	0.038**	0.014**	0.041**	0.033**	0.009**
Licence registration	-0.019**	-0.007*	0.013**	0.029**	0.006*	0.056**	-0.010**
Report granted	-0.074**	-0.044**	0.101**	0.243**	0.058**	0.337**	-0.029**
Appeal filed	-0.102**	-0.057**	0.154**	0.287**	0.056**	0.447**	-0.044**
Restoration after appeal	-0.001	0.000	0.002	0.002	0.000	0.015**	0.004
Recovery	-0.004	-0.004	0.002	0.015**	0.003	0.017**	-0.005

Suspension	-0.003	-0.004	0.001	0.015**	0.002	0.007	-0.012**
Fee paid withdrawn	0.032**	0.023**	-0.039**	0.057**	-0.003	-0.069**	0.121**
Fee paid	0.002	0.042**	0.210**	0.286**	0.045**	0.407**	0.302**
Fee returned	-0.002	-0.001	-0.002	b	0.000	0.004	0.002
Patent application translation	-0.005	-0.002	0.085**	0.022**	0.044**	0.043**	0.013**
Transaction	-0.016**	-0.001	0.024**	0.020**	0.007*	0.078**	0.024**
Other	-0.039**	-0.025**	0.108**	0.084**	0.004	0.213**	0.065**

Conclusions

Considering the existence of many statistically significant relationships between legal status event data and traditional patent quality metrics, this work has demonstrated the potential of such explorative research. Future advancement will be addressed to an enlargement of the sample under investigation. In addition, regression analyses will be performed to add more statistical robustness to the relationships under investigation. Furthermore, other patent quality metrics will be added to the model, such as those proxying the radicalness of the invention. Finally, results suggest a deepening of the role of oppositions and disputes, i.e. to understand if they are motivated by a relevant quality of the patented application and they block the market exploitability of the patented technology.

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Firm Characteristics and Timeliness of Financial Reporting of Listed Nigerian Financial Services Companies

Osariemen ASIRIUWA
Department of Accounting, Covenant University, Nigeria
Corresponding Author: Email: osariemen.asiriuwa@covenantuniversity.edu.ng

Semiu B. ADEYEMI
Department of Accounting, University of Lagos, Nigeria
Email: sadeyemi@unilag.edu.ng

Olubunkola. R. UWUIGBE
Department of Accounting, Covenant University, Nigeria
Email: bukola.uwuigbe@covenantuniversity.edu.ng

Uwalomwa UWUUGBE
Department of Accounting, Covenant University, Nigeria
Email: uwalomwa.uwuigbe@covenantuniversity.edu.ng

Damilola F. ELUYELA
Department of Accounting, Landmark University, Nigeria
Email: eluyela.damilola@lmu.edu.ng.,

Olayinka ERIN
Department of Accounting, Covenant University, Nigeria
Email: erinolayinka@yahoo.com

Oise A. AKALAKINI
Department of Accounting, Covenant University, Nigeria
Email: oise.akalakini@covenantuniversity.edu.ng

Abstract

The study investigates the effect of firm characteristics on timeliness of financial reporting of listed Nigerian financial services companies between 2012 to 2018. The study makes a substantive methodological advancement in the measurement of timeliness of financial reporting by adopting the regulatory requirement instead of the financial reporting lag and audit reporting lag. The study population comprises of fifty-seven quoted firms listed on the financial sector of the Nigerian Stock Exchange as at 31st December 2018. Using purpose sampling technique, sample size of fifty (50) companies was selected. Data was obtained from corporate annual reports and websites of the selected firms listed on the NSE from 2012 to 2018. Results from the study reveals that a significant relationship exists between firm characteristics and timeliness of financial reporting of listed financial services firms in Nigeria. This implies that the composition of the firm characteristics affects the timeliness of financial reporting. The study therefore recommend that regulatory agencies and standard setters should take into cognisance the firms attributes that affect timely reporting of financial report in order to reduce delay.

Keywords: Audit Type, Cashflow, Firm Size, Leverage, Profitability and Timeliness.

Introduction

Timeliness is a key qualitative feature of accounting information that defines the significance of information to decision makers in annual reports. The only means through which the investors and other market players can assess the activities of the firm before taking any investment decision is through the financial report (Li, Zhang & Wang 2014). The major objective of the financial report is to provide information to users to enhance their economic decisions. However, the information provided should be made available at the shortest time possible otherwise, it will become irrelevant (Al-Ajmi, 2008). The usefulness of published corporate report depends on their accuracy and

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timeliness. The information contained in the financial report becomes less relevant for decision making as time passes (Efobi & Okougbo, 2014). In ensuring timeliness, attention needs to be given to accuracy because of the trade-off between timeliness and accuracy (Bakare, Taofiq & Jimoh, 2018). A firm might be timely in releasing its annual financial reports, but the required information might not be available in such reports. The accuracy of information also constitutes the quality of the reports. Accuracy of financial reporting is the common concern of standard setters and practitioners.

In various countries, the current law on the timing of corporate entities' annual reporting varies. Section 345 of the Company and Allied Matters Act of 2004, as revised, mandates businesses in Nigeria to furnish stakeholders with their annual reports three months after the end of the financial year. The Security and Exchange Commission (SEC), which is the Nigerian Stock Market Regulator, sets March 31 for each public company to file its audited financial statements that ended the previous year on December 31. However, firms' financial report takes much longer than this date (Modugu, Eragbe & Ikhatua 2012). Also, the National Insurance Commission (NAICOM) also sets the 30th of June for every insurance firm to submit its annual financial report. Despite these, few listed insurance firms only meet up with the deadlines, while the remaining firms submit their report after the deadline dates. According to SEC, early filers are those firms that submit their financial report four (4) weeks before the deadline. The SEC compliance report of 2017 showed that out of the 28 listed insurance firms on the stock exchange, none of these firms submitted four weeks before the deadline, its financial reports for 2014, 2015 and 2016 financial year-end. The Nigerian Stock Exchange (NSE) recently levied a fine of N429.5 M on 38 companies who did not file their financial accounts as at due for the 2018 reporting year in an attempt to enforce prompt reporting of financial details to market participants (Popoola, 2019).

Corporate governance is the procedures or actions, by which firms are run and thereby meet shareholders, employees and the society demand (Eslami, Armin & Jaz 2016). McGee and Yuan (2012) asserted that financial reporting timeliness is one of the characteristics of good corporate governance defined by the World Bank and OECD as knowledge is required by investors when it is still new. The more time that information is delayed, the more the information gets stalled and the less importance it will have. Because corporate governance has always drawn considerable attention at all times. Its existence is like a pillar for any business that stresses its role in the long term for survival and sustainable development (Odit, 2015). Maintaining consistent procedures and reporting practices is one characteristic of strong corporate governance for the organization. The concept of transparency implies clarity of information both in the decision-making process and in the disclosure of the company's material and related information. The theory of openness must provide information that is timely, sufficient, clear, specific, comparable and readily available to stakeholders (Fujianti, 2016).

Several studies have been conducted on the timeliness of financial reporting both in developed and developing countries using diverse characteristics. For instance, Iyoha (2012), Al-tahat (2015), Adebayo and Adebiyi (2016) examine company characteristics and timeliness of financial reporting in Nigeria. However, several studies have been conducted using determinants of timeliness of financial reporting both in Nigeria, and developed countries provided evidence on the effect of corporate governance on timely reporting. Still, the results from their studies were found to be inconsistent. However, most of all these studies measure their timeliness using the time lag of the firms which is from the financial year-end to the time the annual report was signed for publication while neglecting the statutory requirement for reporting. Most of these studies have viewed timeliness from the perspective of audit reporting lag (ARL) which is measured as the numbers of days from the financial year-end to the day the auditor signs the audit report which does not actually depict delay. Some of the studies carried out also addressed the financial timeliness from the date of the financial year-end to the date of the Annual General Meeting.

Detailed review of previous studies did not determine whether, within the legislative deadline of ninety days, any of the companies analyzed in their studies released their annual reports (90) as needed by the Security and Exchange Commission, as well as other related regulatory bodies, such as the Central Bank of Nigeria (CBN) 2004 and the Banking and Other Financial Institution Act (BOFIA). Alternatively, what is required is that, after the required financial reporting deadline, the corporation would have published its annual report in order for there to be a delay. This study therefore suggests a different approach for calculating delay using a dummy variable when there is a delay, i.e. the analysis codes it as 1 above the regulatory criteria, but otherwise we code it 0.

Against this background, this study investigates the influence of firm characteristics on the timeliness of financial reporting of listed financial services companies in Nigeria. Also, the study ascertains whether there are significant relationships between firm characteristics (firm size, auditor type, profitability, leverage and cashflow) and timeliness of financial reporting in Nigeria. Hence, this research expands the knowledge of timeliness of financial reporting and fill these obvious gaps. This study contributes to body of knowledge in two ways. Firstly, it makes a substantive methodological advancement in the measurement of timeliness of financial reporting by adopting the regulatory requirement instead of the financial reporting lag and audit reporting lag. Secondly, beyond the common cross-sectional and pooled data studies, this study provides empirical evidence using the binary logistic regression technique, which has not been used in other studies in Nigeria.

The remaining part of this article is structured as follows: section two includes literature review and theories relating to firm characteristics and timeliness of financial reporting; section three consists of materials, design and model specification adopted in the study; section four is the data analysis and discussion of results; lastly, section five includes the conclusion, recommendations, limitation of study and suggestions for further studies.

Literature Review

Timeliness ensures that reports to be made public as soon as possible to recipients of financial information, and if annual reports are to be useful, it is a required requirement to be met. The shorter the time between the end of the financial year and the date of reporting, the more the annual statement will be of value to the users (Turel, 2010). Lack of timeliness or delay of financial reports could render the information irrelevant for decision-making. The Financial Accounting Standards Body (FASB) and the International Accounting Standards Booard (IASB) have identified timeliness as "having information available to decision-makers before it loses its capacity to influence decisions" (IASB, 2008, p.40). Liu, Jaikaeo, Shen and Hwang (2009) conclude that information is relevance when it is timely. Therefore, the timeliness of financial statements is to ensure that financial information meets the recipients of the target financial statement early enough to enable investors with accurate and relevant decision-making information.

Turel (2010) averred that one important attribute of financial reporting quality is timeliness. It is noted that timeliness is an essential requirement to meet the quality of the financial statement that is useful for decision-making, regardless of whether one considers timeliness as a characteristic of useful accounting knowledge. Accounting standards setters have regarded the timely reporting worldwide as the overall critical quality of financial statement, and delays in its release will result in costs for decision-makers as well as relevant consumers (Brown et al., 2009; Aldaoud, 2015).

Further highlighting the value of financial reporting was the SFAC No.2 of the FASB (FASB, 1980). It noted that annual reports should offer information in a timely manner to prospective buyers, borrowers and other consumers who are expected to make investment decisions in the fiscal year at an acceptable period. This is aligned with the accountancy practice and the SEC (1970) definition of timeliness of financial reporting as being one of the key standard accounting goals.

Measures of Timeliness of Financial Reporting

Several researchers on the timeliness of financial reports have measure timeliness from various viewpoints. Some research assessed timeliness from the point of view of Audit Report Lag (ARL), (Dibia & Onwuchekwa 2013; Fagbemi & Uadiale, 2011; Modugu et al., 2012; Sharinah, et al., 2014), which is measured as the date between the end of the financial year and the date of the annual report, thus ignoring the period after the audit. The Ibadin et al. (2012) research regarded timeliness as the number of days from the close of the fiscal year before the date of signing of the notice of the Annual General Meeting (AGM). Similarly, three indices of financial reporting timeliness were established by Oladipupo and Izedonmi (2013); audit delay (AD), management delay (MD) and absolute delay (TD).

Theoretical Review

This research adopts the principle of stakeholders because of the need to interact efficiently with internal and outside investors regarding the issues that influence the organization's timeliness of financial statements (Ozordi et al., 2020; Uwuigbe, Olorunshe, Uwuigbe, Ozordi, Asiriuwa, Asaolu, & Erin, 2019). The concept of stakeholder was spearheaded by Freeman (1994) as "any group or individual who can affect or is affected by the achievement of the firm's objectives". The equal expression is "any human agency that can be influenced by, or can itself influence the activities of the organization in question" (Gray, Owen & Adams, 1996, p.33). Evan & Freeman (1988) further buttress the definition by describing stakeholders as "those groups who have a stake in or a claim on the firm". Thus, the major stakeholders of a company initially include consumers, trade suppliers, shareholders, lenders, financial institutions, competitors, industries, the community and governmental bodies (Okere et al., 2019).

Firm characteristics and timeliness of financial reporting being an integrated and structured system suitable for complex and dynamic organisation fits in properly with stakeholders' management theory which believes that organisation is a complex network of multidimensional relationships (Zsolnai, 2006). There are several benefits from consulting with stakeholders, these include: stakeholders are in the best position to contribute to risk decision affecting their future; it places them in a better position to understand their risks and take collective responsibility in managing them; it places higher level of trust with stakeholders group and stakeholders feel their interests are being protected (Eluyela et al., 2019b; Asiriuwa, Akperi, Uwuigbe, Uwuigbe, Nassar, Ilogho & Eriabie, 2019). Based on this premise, this study adopts stakeholder as a theoretical framework underpinning this work.

Empirical Review on Firm Characteristics and Timeliness of Financial Reporting

Prior review has shown that firm's characteristics are the major determinaning factors of financial reporting timeliness. Karuna (2009) suggested that a firm's characteristics determine its internal governance mechanisms and

affect the performance of the organisation. Engel et al., (2002) divided firm features into three classes: characteristics that are controllable, partly controllable and uncontrollable. Uncontrollable qualities are those that are not in the company's influence. Partially controllable qualities are ones that the corporation cannot modify at will that are vulnerable to long-term adjustment and require organizational capital and operational sophistication. Controllable characteristics are those that fall within the organization's control (Iyoha, 2012). In order to investigate the impact of company features on the timeliness of financial statements, this study review variables such as organizational size, auditor type, performance, debt and cash flow.

Akingunola, Soyemi and Okunuga (2018) analyzed client characteristics and audit report lag. A sample size 27 listed companies were surveyed for the period 2010-2015 on the NSE. To evaluate the data obtained, OLS regression analysis was introduced. The result reveals that with audit report lag, firm size was statistically important. Similarly, Adebayo and Adebiyi (2016) investigated the impact of firm attributes on the timeliness of corporate financial statements. Data was obtained from 15 firms in the banking sector from 2005-2013. In evaluating the data obtained, the analysis used the OLS and the panel estimation process. The study showed that, company size is statistically significant with financial reporting timeliness. Also, Ohaka and Akani (2017) evaluated the timely financial report and relevance of financial reporting in Nigeria quoted firms. The study surveyed 50 firms listed on the NSE from 2000 – 2011. The independent variables of firm size, board independence, firm performance, debt and age were analysed using the pool regression technique. The study showed that company size was statistically significant association between firm size with timely financial reporting.

Rahmawati (2018) examined variables such as company size, earnings quality, audit opinion, profitability, capital structure, accounting complexity and audit firm. The study surveyed 434 firms from the Indonesian Stock Exchange from 2003 – 2008. The study revealed that the audit firm was statistically significant. This was also in agreement with the study of Septiyan and Puspitasari (2017) who conducted a study on company attributes and audit-relevant variables on the timely financial statement. The result from their study showed that audit firm has was statistically significant with timely financial statement. Hassan (2016) examined factors determining audit report lag in Palestine. A sample size of 46 listed companies was selected from the Palestine Stock Exchange for the year 2011. The study evaluated the data obtained with the use of multiple regression analysis from the sampled firm. The result revealed auditors' type was statistically significant.

Adebayo and Adebiyi (2016) investigated the impact of company attributes on the timely financial reporting. The result found out that profitability exhibited a significant association with the financial statement timeliness. Similarly, AL-Tahat (2015a) in his analysis of the timeliness of Jordanian public companies' audited financial accounts. Showed that profitability has a significant correlation with the timeliness of financial reporting. AL-Tahat (2015b) also examine companies attribute and interim financial statement timeliness in Jordan. The result from the study revealed that profitability was statistically significant.

Hamidi and Rasouli (2016) conducted the research on accounting factors affecting timely financial report in Tehran Stock Exchange. The study selected a sample size of 160 firms using a systematic sampling method for the period 2009 – 2015. The study employed a multivariable model for the data analysis, and the result revealed that leverage exhibit a significant association with timely financial statement. Similarly, Maggy and Diana (2018) conducted a study on the internal determinants of audit delay in Indonesia. Data were selected from 42 manufacturing companies that are listed on the Indonesian Stock Exchange from 2013 – 2015. Result revealed that debt is statistically significant with audit delay.

Methodology

This study adopted the use of ex-post facto research design (Creswell, 2008; Adesina, Oyero, Okorie, Amodu, Adeyeye, & Yartey, 2020). The ex-post facto research design helps to establish the causal effect among variables between dependent and independent variables. This study is based on dynamic panel data since it involves the combination of time series and cross-sectional method in pooling the required data (Adegboyegun et al., 2020; Adeyeye, Amodu, Odiboh, Okorie, Adesina, Yartey, & Ekanem, 2019; Eluyela et al., 2019a: Uwuigbe, Felix, Uwuigbe, Teddy & Falola, 2018). The method of data analysis is the Panel binary logistic regression. The reason for the choice of binary logistic regression was due to the dichotomous nature of the dependent variable. Data for this study was sourced from the corporate annual reports and websites of the selected firms quoted on the Nigerian Stock Exchange from 2012 to 2018.

The sample population consists of all the fifty-seven companies listed as of 31 December 2018 on the Nigerian Stock Exchange's financial market. This research was of interest to the Nigerian financial industry because of its attractiveness of companies quoted on the Nigerian Stock Market. The reason for choosing of this industry is based on the premise that on the Nigerian Stock Exchange, the financial industry accounts for 32 percent of the overall market capitalization (NSE Factsheet, 2018). The sample size that was used for this study is 50 companies (see table 1). The sampling technique used is the purpose sampling via filtering technique (Amodu, Omojola, Okorie, Adeyeye, & Adesina, 2019; Nwanji et al., 2020). The justification for the selection of 50 companies are based on the criteria

that these companies must be active, and also, they must have existed for ten years consistently and publishing their complete financial statements.

Table 1: Sample of Firms in the Financial Sector

Sector	Industry	No of Firms (Population)	No of Firms (Sample Size)
Financial	Banks	15	13
Financial	Insurance Firms	32	28
Financial	Investment Firms	10	9
Total		57	50

Source: Researcher's Computation (2020)

Model Specification

Timeliness of financial reporting is posited to be a function of firms' characteristics. The research adapted the model of Adebayo and Adebiyi (2016). This can be stated explicitly in equations 1 and 2, respectively.

$$TRF = f(FSIZE, AUDTYP, PROFIT, LEV, CASHFLOW) \quad 1$$

Adding time series and cross-sectional properties to equation 1, we have:

$$TRF_{it} = \beta_{0it} + \beta_1 FSIZE_{it} + \beta_2 AUDTYP_{it} + \beta_3 PROFIT_{it} + \beta_4 LEV_{it} + \beta_5 CASHFLOW_{it} + \mu_{it} \quad 2$$

Where, TFR = Timeliness of Financial Reporting; $FSIZE_{it}$ = Firm Size; $AUDTYP_{it}$ = Auditor Type; $PROFIT_{it}$ = Profitability; LEV_{it} = Leverage; $CASHFLOW_{it}$ = Cash flow; β_0 = Intercept of the regression line, regarded as constant; β_{1-5} = Coefficient or slope of the regression line or independent variables; μ = Error term that represents other independent variables that affect the model but not captured. '*t*' = year or period and *i* = *firm*.

Measurement of Variables

The dependent variable is timeliness of financial reporting. The independent variable is firm characteristics. The proxy for independent variables are firm size, auditor type, profitability, leverage and cashflow. Table 2 present the measurement of each variables.

Table 2: Measurement of Variables

S/N	Variables	Symbols	Measurement	Used by	A priori Sign
	Dependent				
1	Timeliness of Financial Reporting	**TFR**	Measured using the dichotomous procedure of 1 and 0. A firm will score 1 if they disclose their financial report within the statutory requirement with the 90 days and 0 if they disclose outside the period.	Schwartz and Soo (1996)	
	Independent Variable				
2	Firm Size	**FSIZE**	Measured as the natural log of total asset of the firms.	Ibadin et al., (2012), Efobi & Okougbo, (2015)	+
3	Auditor Type	**AUDTYP**	Measured using a dichotomous variable of 1 and 0. Assign 1 if the firm is audited by the Big 4 and 0 otherwise.	Owusu-Ansah and Leventis (2006), Wu, Wu and Liu (2008))	-
4	Profitability	**PROFIT**	Measured as the ratio of profit after tax to a total asset of the firm	Kingunola, Soyemi & Okunuga (2018)	+
5	Leverage	**LEV**	Represented as the proportion of total debt to total asset	Ezat & El-Masry, (2008)	+
6	Cash flow	**CASH**	Measured as the net operating cash flow of the firm in the financial year	Al-Shwiyat (2013)	+

Source: Researcher's Computation (2020)

Results and Discussion

This segment provides a detailed description of the varied findings contained in this study. Firstly, it provides a detailed description of the findings through the use of descriptive statistics and correlation analysis to show the level of association between firm characteristics and timeliness of financial reporting in Nigeria. Secondly, it provides the result, through binary logistic regression on the impact of firm characteristics and timeliness of financial reporting in Nigeria.

Table 3: Descriptive Statistics

	FSIZE	PROFIT	LEV	CASHFLOW	AUDTYPE	TFR
Mean	7.77000	0.008770	0.832131	2.080000	0.721311	0.523256
Median	3.10000	0.020000	0.700000	3.040000	1.000000	1.000000
Maximum	5.96000	1.130000	8.880000	6.0600000	1.000000	1.000000
Minimum	3.82000	-0.56	0.000000	-4.890000	0.000000	0.000000
Std. Dev.	1.33000	0.112481	1.040518	1.1700000	0.449276	0.500430
Skewness	1.952368	2.389738	5.476153	1.641372	-0.98722	-0.093124
Kurtosis	6.134627	47.74852	36.03054	12.87794	1.974599	1.008672
Jarque-Bera	254.9073	20590.28	12311.52	1101.560	50.32340	43.00081
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1.8900000	2.140000	203.0400	5.080000	176.0000	135.0000
Sum Sq. Dev.	4.300000	3.074431	263.0905	3.3500000	49.04918	64.36047

Table 3 shows the descriptive statistics of firm characteristics and timeliness of financial reporting in Nigeria. The dependent variable, which is the timeliness of financial reporting (TFR) has a maximum value of 1 and a minimum value of 0 and a reported mean value of 0.523256. This implies that 52% of the selected firms in the financial sector present their report within the stipulated time frame of 90 days. From the independent variables point of view, firm size (FSIZE) reported a mean value of 7.77 billion, a maximum value of 5.96 trillion and a minimum of 3.82 billion. This suggests that the sampled financial firms are large in size. For leverage (LEV), the maximum value reveals 8.88, a minimum value of 0.00 and a reported mean value of 0.832. This implies that suggests that on the average, the sampled companies are highly reliant on debt financing.

Profitability (PROFIT) has a maximum value of 1.32, while the minimum value shows -0.56, with a reported mean of 0.0087. This indicates that on the average, the sampled companies yielded a return of 1%, which implies that the investments in those companies have not yet yielded the desired effects. In the same vein audit type (AUDTYP), has a maximum value of 1, a minimum value of 0 and a reported mean value of 0.721. This suggests that 72% of the sampled companies engage the services of the big four audit firms. The cash flow from operating, reported a maximum value of 6.060 billion, while it reported a minimum value of -4.89 billion. The cash flow from operating reported a mean value of 2.08 billion. This implies that on average, the sampled companies are not having a problem with cashflow. From the descriptive analysis, the skewness value falls within the normal range of ±1.96 (Creswell, 2014) while the kurtosis figure falls within the range of ±3 (Wong & Millington, 2014). It is assumed that the data are normally distributed data falls within this range.

Table 4: Correlation Analysis

Probability	FSIZE	PROFIT	LEV	CASHFLOW	AUDTYPE	TFR
FSIZE	1.000000					

PROFIT	0.063795	1.000000				
	0.994448	-----				
	0.3210	-----				
LEV	0.006812	-0.280836	1.000000			
	0.105970	-4.551965	-----			
	0.9157	0.0000	-----			
CASHFLOW	0.407669	0.030960	0.001470	1.000000		
	6.945167	0.481852	0.022866	-----		
	0.0000	0.6303	0.9818	-----		
AUDTYPE	0.324469	0.090097	-0.141685	0.098442	1.000000	
	5.336269	1.407307	-2.226568	1.538868	-----	
	0.0000	0.1606	0.0269	0.1251	-----	
TFR	0.121284	-0.065829	-0.088449	0.009633	0.147494	1.000000
	1.900776	-1.026289	-1.381358	0.149863	2.319838	-----
	0.0585	0.3058	0.1684	0.8810	0.0212	-----

Table 4 reveals that a variable's correlation coefficient with regard to itself is 1,000. This means that a variable has a perfect association with respect to itself result displays the correlation coefficients of the variables tested used in the analysis. The main focus in the research is the connection between the timeliness of financial statements (TFR) and firms' characteristics of the selected listed companies. TFR is positively associated with FSIZE (r= 0.121284), CASHFLOW (r= 0.09633) and AUDTYP (r= 0.147494), as observed. The result shows that TFR interacted adversely with PROFIT (r= -0.065829) and LEV (r= -0.088449) respectively. The outcome, however, demonstrated a poor association with financial reporting timeliness. For most variables, the inter-correlations between the explanatory variables do not appear to suggest the existence of risks of multicollinearity.

Table 5: Binary Regression Analysis

Dependent Variable: TFR				
Method: ML - Binary Probit (Newton-Raphson / Marquardt steps)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
FSIZE	0.00000000000229	0.000000000000109	2.095792	*0.0361
AUDTYPE	0.52069	0.158835	3.278176	*0.001
PROFIT	-2.261025	1.518819	-1.488673	0.1366
LEV	-0.093682	0.141963	-0.659907	0.5093
CASHFLOW	-0.00000000000834	0.000000000127	-0.656996	0.5112
C	-0.276798	0.148449	-1.864597	0.0622
McFadden R-squared	0.085784	**Mean dependent var**		0.485893
S.D. dependent var	0.500586	**S.E. of regression**		0.475927
Akaike info criterion	1.304263	**Sum squared resid**		70.8964
Schwarz criterion	1.375081	**Log likelihood**		-202.0299
Hannan-Quinn criter.	1.332545	**Deviance**		404.0598
Restr. deviance	441.9739	**Restr. log likelihood**		-220.987
LR statistic	37.91413	**Avg. log likelihood**		-0.633323
Prob (LR statistic)	*0.000000			

*5% significance level

Source: Researcher's Computation (2020)

The table above revealed the result of the binary regression analysis. The McFadden R-squared value has an explanatory influence of 8.5 percent which indicates the degree of impact on the dependent variable (TFR). This means that the independent parameters (FSIZE, AUDTYP, PROFIT, LEV and CASHFLOW) taken collectively contributed to approximately 8.5% of the cross-sectional disparity in timeliness of financial reporting, which leave the residual accounted for by the stochastic term. It was observed that the overall model was statistically significant since the LR statistic and the related prob value of 37.914 and 0.000000 (p-value<0.05) respectively. This means that there exists a significant linear association between financial reporting timeliness and all the independent variables taken together. Based on the specific significance level of the variables, as shown by the Z-stat and their associations with the (TFR), the findings revelead that firm size (FSIZE) has a significant positive relationship with TFR having a Z-value of 2.095 and probability value of 0.0361 is greater than the critical Z-value of 1.96 at 5% level of significance. This implies that a percentage increase in firm size will result in about 1% increase in timeliness of financial reporting. Similarly, auditors' type (AUDTYP) also showed a significant positive relationship with TFR having a Z-value of 3.278 at a p-value (0.0010<0.05). This implies that a change in auditor type will result in 52% increase in timeliness of financial reporting.

However, profitability (PROFIT) revealed an insignificant negative relationship with TFR through a Z-stat of -1.488 at a p-value (0.1366>0.05). It therefore suggests that an increase in the firm's profitability will result in 2.26 decrease in timeliness of financial reporting but not significantly. In the same vein, leverage (LEV) reported an insignificant relationship with TFR having a Z-value of -0.659 with a p-value (0.5093>0.05). This implies that an increase in leverage will result in 9% decrease in timeliness of financial reporting but not at a significant level. Cashflow (CASHFLOW) also showed negative insignificant relationship with timelines of financial reporting through a Z-stat of -0.656 and a p-value (0.5112>0.05). This signifies that a percentage increase in the firms cashflow level will result to about 1% decrease in timeliness of financial reporting.

Table 6: Results of the Test of Goodness of Fit

	Quantile of Risk		Dep=0		Dep=1		Total	H-L
	Low	High	Actual	Expect	Actual	Expect	Obs	Value
1	0.3478	0.9041	5	4.91880	30	30.0812	35	0.00156
2	0.9049	0.9183	2	3.09765	33	31.9024	35	0.42672
3	0.9183	0.9252	1	2.74516	34	32.2548	35	1.20386
4	0.9253	0.9313	4	2.51922	31	32.4808	35	0.93790
5	0.9318	0.9412	4	2.24551	31	32.7545	35	1.46482
6	0.9415	0.9544	1	1.86019	34	33.1398	35	0.42009
7	0.9545	0.9683	2	1.37078	33	33.6292	35	0.30060
8	0.9704	0.9865	1	0.68993	34	34.3101	35	0.14216
9	0.9865	0.9922	0	0.38620	35	34.6138	35	0.39050
10	0.9924	0.9995	0	0.16657	35	34.8334	35	0.16736
		Total	20	20.0000	330	330.000	350	5.45558

H-L Statistic	5.4556	Prob. Chi-Sq(8)	0.7080
Andrews Statistic	71.6977	Prob. Chi-Sq(10)	0.0000

Source: Researcher's Computation (2020)

To test the accuracy of the stated model, the Hosmer-Lemeshow test of goodness of fit was used. The goodness-of -fit H-L test registered a surprisingly high likelihood value of 0.7080, which did not support the mis-specified model's null hypothesis. The effect of the finding is that our model of regression was well established. Therefore, the null hypothesis is denied. Therefore, the model matches the results.

Table 7: Expectation-Prediction Evaluation for Binary Specification

Expectation-Prediction Evaluation for Binary Specification

Success cutoff: C = 0.5

	Estimated Equation			Constant Probability		
	Dep=0	Dep=1	Total	Dep=0	Dep=1	Total
P(Dep=1)<=C	1	0	1	0	0	0
P(Dep=1)>C	19	330	349	20	330	350
Total	20	330	350	20	330	350
Correct	1	330	331	0	330	330
% Correct	5.00	100.00	94.57	0.00	100.00	94.29
% Incorrect	95.00	0.00	5.43	100.00	0.00	5.71
Total Gain*	5.00	0.00	0.29			
Percent Gain**	5.00	NA	5.00			

Source: Researcher's Computation (2020)

The assessment of the model depending on the anticipated and expected outcomes as seen in table 7. To measure the model 's success, the test uses a 0.5 cut off mark. Higher cut off points should be used for more rigorous checks. The model provides for the grouping of persons subject to the priority of the judgment given to them. The results of testing this study in the table above shows that overall prediction accuracy reaches 94.29%, with a sensitivity of 100% so it can be concluded that the model is quite good.

Discussion of Findings

The research investigated the impact of firms' characteristics (firm size, type of auditor, profitability, leverage and cashflow) on timeliness of financial reporting of listed financial services firms in Nigeria. Quite a number of studies have shown that the size of a firm positively influences the quality of financial reporting (Adebayo & Adebiyi, 2016; Akingunola, Soyemi & Okunuga, 2018). In the same vein, big corporations rely more heavily on external sources of funding, which makes them more vulnerable to the high-quality knowledge needs of current and future investors. The result from the analysis (see table 5) reveals that firm size (FSIZE) has a positive significant relationship with

timeliness of financial reports (TFR) having a Z-value of 2.095 and probability value of 0.0361 is greater than the critical Z-value of 1.96 at 5% level of significance. This implies that large firms have the capacity (financial and human resources) to prepare timely financial reports in order to meet up with the regulatory requirement and satisfy the needs of investors. The result is in agreement with previous literature (Dibia and Onwuchcka, 2013; Ohaka and Akani, 2017) which confirms that firm size contributes to the timeliness of financial reporting. This is consistent with stakeholder theory claiming that large firms voluntarily disclose full information within regulatory period in order to fulfil their social contracts with stakeholders.

Also, one of the proxies for firm characteristics is auditors' type, the result of auditors' type (AUDTYP) showed a positive significant relationship with timeliness of financial reports (TFR) having a Z-value of 3.278 at a p-value (0.0010<0.05). This implies that a change in auditor type will result in 52% increase in timeliness of financial reporting. Big accounting companies are argued to have a greater desire to perform their accounting work on schedule in order to preserve their credibility and identity. Normally, major accounting companies have a more effective audit staff as they have more personnel to perform preparation with their employees, as well as being able to use more powerful audit tools to minimize audit work time. Therefore, it is expected that firms with big external auditors tend to prepare their financial statements to meet up with regulatory deadlines. The findings of this study show that auditors' type have significant impact on timeliness of financial reporting. This empirical evidence is in agreement with other studies like Owunsu Ansah & Leventis (2006); Septiyan & Puspitasari (2017).

Further analysis of the regression result showed that profitability (PROFIT) revealed an insignificant negative relationship with TFR with a Z-value of -1.488 at a p-value (0.1366>0.05). This means that an increase in the firm's profitability will result in 2.26 decrease in timeliness of financial reporting but not significantly. This implies that the level of profitability has not contributed meaningfully to the timeliness of financial reporting of financial firms in Nigeria. This result is consistent with previous studies (Ibadin et al., 2012; Septiyan & Puspitasari, 2017; Akingunola et al., 2018; Rahmawati, 2018). However, there have been a divergent view in literature as to the impact of firm's profitability on timeliness of financial reporting. Prior literature argued that firms with negative performance (profitability) delay the publication of their financial report than firms with positive performance (Owusu-Ansah, 2000, Al-Ajmi, 2008). While studies also opine that firms with positive performance tend to publish their financial report on time because of the positive impact of market share/share price.

Furthermore, the result of leverage (LEV) reported an insignificant relationship with TFR having a Z-value of -0.659 with a p-value (0.5093>0.05). This implies that an increase in leverage will result in 9% decrease in timeliness of financial reporting but not at a significant level. The same result is observed in the analysis of cash flow (CASHFLOW) which showed negative insignificant relationship with timelines of financial reporting with a Z-value of -0.656 and a p-value (0.5112>0.05). This signifies that an increase in the firm's cash flow level will lead to a decrease in timeliness of financial reporting.

Conclusion and Recommendations

The research deals with the impact of firms' characteristics on timeliness of financial reporting of listed financial services firms in Nigeria. It aggregated the various characteristics of firm variables. The research concludes that a significant relationship exists between firm characteristics and timeliness of financial reporting of listed financial services firms in Nigeria. This implies that the composition of the firm characteristics affects the timeliness of financial reporting. However, in terms of individual significance, firm size and auditor type documents a positive and significant relationship with timeliness of financial reporting. While, profitability, leverage and cashflow revealed a negative and an insignificant relationship with timeliness of financial reporting in Nigeria. The study therefore recommend that regulatory agencies and standard setters should take into cognisance the firms attributes that affect timely reporting of financial report in order to reduce delay.

The study observed a few limitations which could be a basis for future research. First, the sampled data is limited to firms in the financial sector only, thus the result cannot be used to conclude on firms in the non-financial sector. Second, this study is country specific and the findings cannot be used to compare other country reporting regulations. Further studies could consider the impact of market reaction to timeliness of financial reporting. This study only examined the firms operating in the financial sector. Therefore, the non-financial sector could offer fruitful areas for future research, and a comparative study could be conducted between the financial and non-financial sector. Also, future research could examine other variables such as penalties and merger and acquisition on timeliness of financial reporting either at a country level or cross-country setting. This will help to provide better understanding of the reporting regulations of different countries and the level of implementation.

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Digital Tools for Natural Risk Management in Arctic and Subarctic while Covid-19 pandemic

Valery M. ABRAMOV*
Russian State Hydrometeorological University, Saint Petersburg, Russia
val.abramov@mail.ru

Tatiana M. TATARNIKOVA
Russian State Hydrometeorological University, Saint Petersburg, Russia
t.tatarnikova.00@mail.ru

Vyacheslav G. BURLOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vyach.burl@mail.ru

Mikhail B. SHILIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
mik.shilin@mail.ru

Evgeniy A. BAIKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
e.baykov.00@mail.ru

Vladimir A. BOLSHAKOV
Russian State Hydrometeorological University, Saint Petersburg, Russia
vl.boll@mail.ru

Vladimir N. ZAVGORODNIY
Russian State Hydrometeorological University, Saint Petersburg, Russia
vla.zav@mail.ru

Eugene P. ISTOMIN
Russian State Hydrometeorological University, Saint Petersburg, Russia
eug.istom@mail.ru

Ekaterina M. KORINETS
Russian State Hydrometeorological University, Saint Petersburg, Russia
katt.korr@mail.ru

Tatiana V. VEKSHINA
Russian State Hydrometeorological University, Saint Petersburg, Russia
tat.vekk@mail.ru

Abstract

In paper, we present results of digital technologies development for natural risks management technologies for Arctic and Subarctic, adapted to Covid-19 pandemic. In studies, we used methods of data bases constructing within digital educational platforms, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties, risk management approach. From the point of view of geo-information management, we structured geo-space to allocate the interconnected components of the solution space. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we proposed a structural model, that combines the investment objectives with cost of adequate managerial

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support, adapted to Covid-19 pandemic. While research, we used platform https://www.researchgate.net/profile/Valery_Abramov2/ for data exchange and preliminary discussion.

Keywords: Digital Tools, Natural Risks, Arctic, Covid-19 Pandemic.

Introduction

Last year, the Covid-19 pandemic shocks the global economy, including education at university level (UL). Note, this pandemic shock matched the time with Industry 4.0 period, during which a lot of enterprises plan and implement wide spectrum of information technologies (Drabenko, 2019), (Grobitski, 2016), (Frolova, 2019), (Lukyanov, 2019), (Sikarev, 2020), (Trunin, 2019). Industry 4.0 leads to serious technological changes in natural risk management (Berboushi, 2014), (Ershova, 2018), (Garcia, 2018), (Isaev, 2015), (Istomin, 2018), (Shilin, 2019), which requires the development of new educational technologies, especially for UL (Averkiev, 2020), (Estrin, 2020), (Korinets, 2020), (Popov, 2019), (Tatarenko, 2020).

In the article, the authors describe results of digital technologies development for natural risks management in Arctic and Subarctic, adapted to Covid-19 pandemic, in geo-information management area (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), in large environmental projects (Burlov, 2018), (Gomazov, 2018), (Fokicheva, 2016), (Lednova, 2014), (Malakhova, 2014), (Yaily 2019), (Zavgorodniy, 2020), within environmental economics (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016). Significant attention in the implementation of such industrial projects should be paid to geo-information support systems (GISS) of natural risk management (NRM) in the context of climate change (Bidenko, 2019), (Golosovskaya, 2014), (Karlin, 2014), (Karlin, 2009), (Kolbina, 2020), (Popov, 2016), including the issues of information collection and processing (Fokicheva, 2019), (Khaimina, 2014), (Popova, 2019), (Tatarnikova, 2019), (Ya, 2019). The educational technologies, discussed in this article, take all above mentioned factors into account.

Methods and Data

In research, we used Foresight technologies, theory of decision making under uncertainties, risk management approach, methods of data bases constructing, web-technologies and virtual reality tools. Also, we used big data technologies (Popova, 2019), (Yaily, 2019) From the point of view of geo-information management, geo-space is structured to allocate the interconnected components of the solution space (Bidenko, 2019). While study, we used data bases and tools of geo-information digital online platforms (GIDOPs) Earth (Sanina, 2020) and EOS, including its Land Viewer (LV) product (Bolshakov, 2020), (Prostakevich, 2020).

Results

Currently, economic activity in the Arctic (EAA) is a hot place in global environmental economy. We made a statement, that EAA in modern stage is to be carried out in the sustainable development paradigm as related set of large natural-industrial projects (NIPs) within common space area and time period. In figure1, we present a block model of investment structure while EAA, that combines the investment objectives of such NIPs (blocks 1-5) with cost of adequate managerial support (blocks 6-8), including NRM's goals and tasks (block 7). Our analysis shows that the largest part of the cost of managerial support is the environmental monitoring (block 8), the essence of which is determined by the content of block 7. Significant part of the cost in block 8 is hardware and software, the cost of which varies significantly. Now, in Covid-19 pandemic conditions, cost of NMR for EAA can arise greatly because of general economic situation. On basement of above mentioned model, we proposed to develop the managerial support system (MSS) for EAA with combined structure for access, storage and analysis of information from open geo-spatial data sources, including archives and operative mode web tools. As a result of the research performed using foresight technologies, we suggest to use geo-information distributed online platforms (GIDOP) as the main technological solutions for MSS for EAA. We give preference to open platforms like Google Earth. Also, we recommend to use GIDOP EOS eos.com, including its product LV https://eos.com/lv/, which allows to operate with space images from the Landsat-8 and Sentinel-2 satellite systems with limited open access.

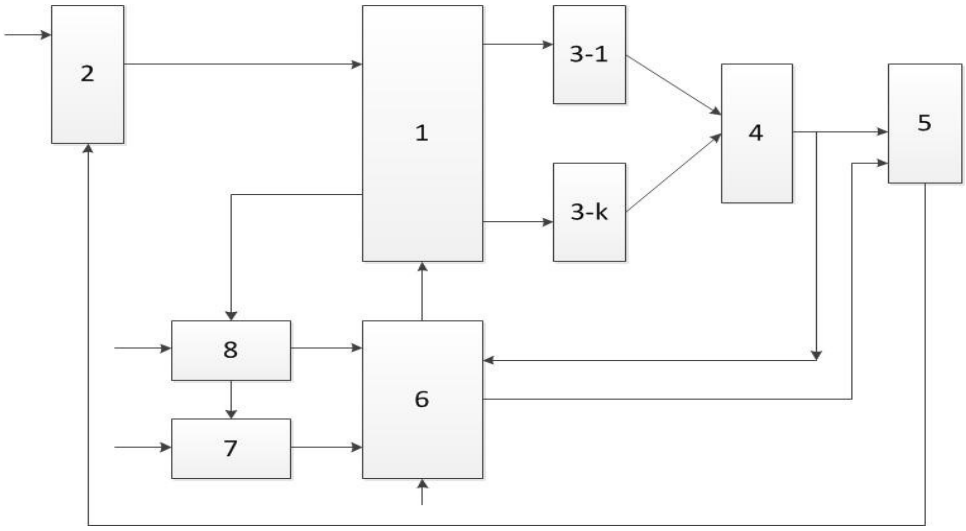

Figure 1: Block model for investment structure while EAA: 1 – block of distribution of resources; 2 – block of formation of resources; 3 - block of formation of private income; 4 - block of formation of total income; 5 – block of formation of the investment share of resources; 6 - block of comparison with the permissible level of risk; 7-block of formation changing in time set of natural risks, including climate risks and ; 8 – block of environmental monitoring while Covid-19 pandemic conditions

In our research, essential goal is block of environmental monitoring within MSS for EAA while Covid-19 pandemic conditions. Reducing the cost of MSS is an important question for EAA while Covid-19 pandemic conditions. We propose to use GIDOP EOS eos.com, including its product LV https://eos.com/lv/, as basement for low-cost MSS while EAA while Covid-19 pandemic.

Let's go to examples. In figures 2-4, we show the results of sequential operations performed online with LV for the port of Pevek, the largest Russian port in East Siberian Sea. In figure 2, there is space image on 12th May 2020 (general view by DOP EOS LV) visualized with Natural Colors Application of LV.

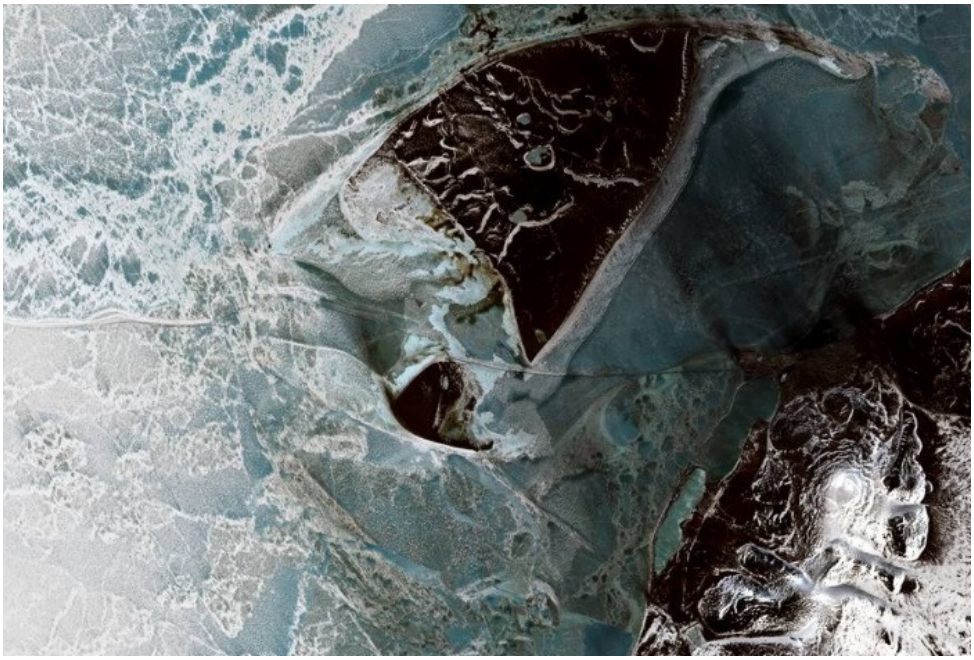

Figure 2 - Port of Pevek space image on 12th May 2020 visualized with Natural Colors Application of LV

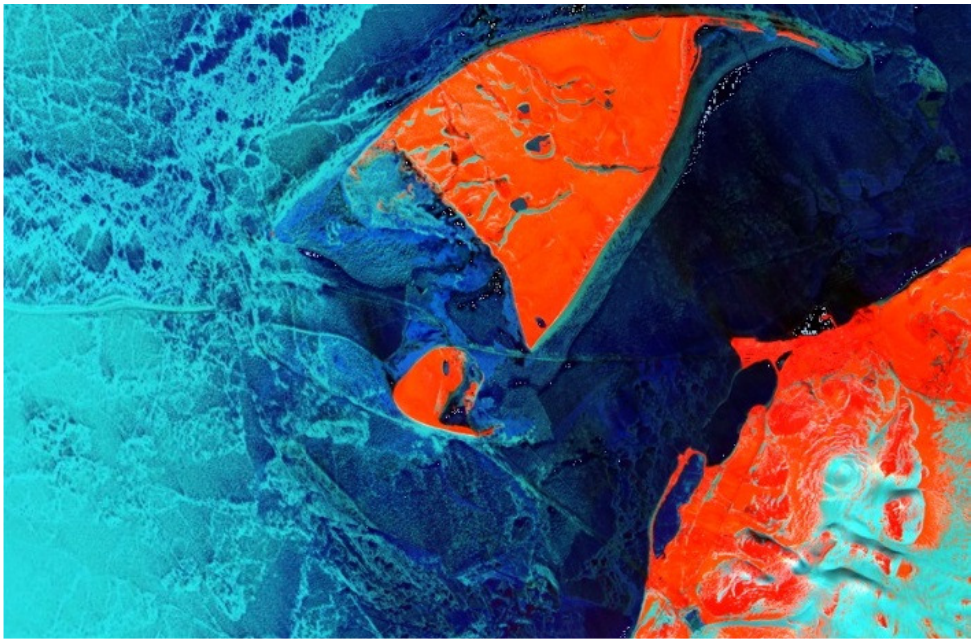

Figure 3 - Port of Pevek space image on 12th May 2020 visualized with Atmospheric Removal Application of LV (as in figure 2)

In figure 3, there is the same as in figure 2, space image, visualized with Atmospheric Removal Application of LandViewer. Obviously, that figure 3 is more informative for space decoding. Note, space decoding was not goal of this article.

As essential result, we propose to use GIDOP EOS eos.com as basement for low-cost MSS for EAA while Covid-19 pandemic.

Discussion

Also, we propose to use GIDOP EOS for long-period monitoring for important maritime infrastructure area. For example, in figures 4 and 5, we post port Pevek space images on 5th June with roughly three weeks' gap to pictures 2 and 3.

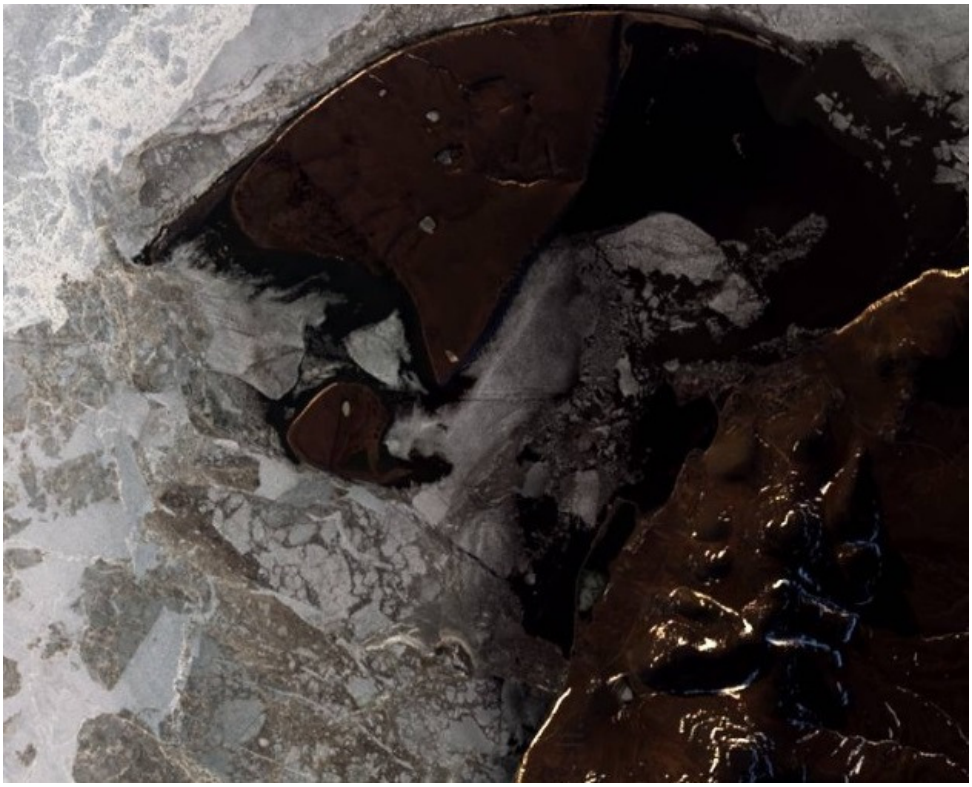

Figure 4 - Port of Pevek space image on 5th June 2020 visualized with Natural Colors Application of LV

Figure 5 - Port of Pevek space image on 5th June 2020 visualized with Atmospheric Removal Application of LV

In figure 5, there is the same as in figure 4, space image, visualized with Atmospheric Removal Application of LandViewer. Obviously, that figure 5 is more informative for space decoding, which was not goal of this article.

Discussion

Note, GIDOP EOS can be used in educational and training purposes. The essential task of university practical learning (UPL) will be to teach students the practical aspects of work with GIDOP EOS tools, which requires a developed learning base within special geo-information systems (GIS) laboratory. In some cases, real practical work in special GIS laboratory can be undergoes with virtual reality (VR) technologies, that can reduce total cost of learning process while Covid-19 pandemic.

Conclusion

We consider results of digital technologies development for natural risks management technologies for Arctic and Subarctic, adapted to Covid-19 pandemic. In studies, we used methods of data bases constructing within digital educational platforms, web-technologies and virtual reality tools. Also, we used Foresight technologies, theory of decision making under uncertainties, risk management approach. From the point of view of geo-information management, we structured geo-space to allocate the interconnected components of the solution space. As digital tools, we propose to use digital online platforms, which integrate heterogeneous hardware and software resources with the use of web-technologies in distributed networks and wide application of cloud services. As study result, we proposed a structural model, that combines the investment objectives with cost of adequate managerial support, adapted to Covid-19 pandemic conditions. The research results presented in this article has significant scientific novelty and can be useful for private investors, public environmental organizations of the civil sector and state environmental control bodies. They can be used in the preparation of master's programs in environmental economics.

As essential result, we propose to use GIDOP EOS eos.com, including its product LV https://eos.com/lv/, as basement for low-cost MSS for EAA while Covid-19 pandemic.

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Scoring A Data Warehouse Model for Homeland Security Applications

Semeh BEN SALEM
Science and Technologies for Defense (STD) Laboratory, Military Academy, TUNISIA,
Military Research Center, Aouina Military Base, cité Taieb Mhiri 2045 Tunis, TUNISIA
semehbensalem0@gmail.com

Sami NAOUALI
Science and Technologies for Defense (STD) Laboratory, Military Academy, TUNISIA,
Military Research Center, Aouina Military Base, cité Taieb Mhiri 2045 Tunis, TUNISIA
snaouali@gmail.com

Zied CHTOUROU
Science and Technologies for Defense (STD) Laboratory, Military Academy, TUNISIA
Military Research Center, Aouina Military Base, cité Taieb Mhiri 2045 Tunis, TUNISIA
ziedchtourou@gmail.com

Abstract

The increasing growth of the amount of noisy and unorganized data on the Internet made the processing of such data a challenging research issue. Data Warehouses (DW) and online analytical processing (OLAP) are some of the widely recognized and used technologies to process and analyze structured data. Providing an accurate DW model with the appropriate facts, measures and dimensions in the context of Homeland Security is a key issue for Intelligence agencies and homeland security tasks. In this paper, we propose a DW model for Online Social Networks (OSN) to assist Security Intelligence agencies in retrieving sensitive information. This model would have a great impact in assisting cyber security specialists in identifying terrorist and crime trends online. The proposed model will be enriched using the Global Terrorism Database (GTD) that reports worldwide events related to terrorism. Besides, these two models will be enriched using a scoring capability to put forward the most imminent information.

Keywords: Data warehousing, online social network analysis, online analytical processing, generic data models, multidimensional modeling

INTRODUCTION

DWs as initially detailed by Kimball et al (2011) and Vaisman et al (2014) and Ariyachandra et al (2010) provide analysts with an advanced analytical methodology called OnLine Analytical Processing (OLAP). This approach has great capabilities to rapidly retrieve sensitive and pertinent knowledge related to a specific content from huge data repositories. DWs use structured and unstructured data from disparate sources for forecasting, analytical reporting, and business intelligence. Some major applications of DWs across different industries can be given as follows:

- Banking: Identify risks and performance analysis of each product, service, interchange, and exchange rates; track accounts performance and user data; provide feedback to bankers regarding customer relationships and profitability.
- Finance: Evaluation of customer expenses trends; maintain transparency in transactions and predict/spot defaulters and act accordingly;
- Government: Maintain and analyze tax records, health policy records, and their respective providers; predict criminal activities from patterns and trends; searching terrorist profile; threat assessment and fraud detection.
- Retail: maintain records of producers and consumers; track items, their promotion strategies, and consumer buying trends (trend analysis);

DWs are huge data repositories that can incorporate data integration, analysis and reporting capabilities. The results will be retrieved by executing advanced and complex queries that differ from traditional SQL and are unfortunately, very time and memory consuming as explained by Roelofs et al (2013) and Al-Azmi et al (2013) et Chung et al (2013). Analyzing Online Social Networks (OSN) steams is one of the most motivating applications in

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the field of intelligence. Online posts can encapsulate valuable information to collect and analyze related to users, topics discussed, sentiment, behavior, etc.

In this study, we propose a method to model and analyze data collected from OSN. To be more productive, an open source database related to terrorist attacks worldwide called the Global Terrorism Database (GTD) will also be used to make joins when necessary. In addition, the model will be enriched using a weighting method to assign an appropriate score to each stored information in the DW. This scoring capability would permit spotting most important information within the DW related to our context of investigation.

The rest of the study is organized as follows. Section 2 describes related works in Warehousing OSNs such as Twitter. In Section 3, we provide the corresponding architecture of the proposed model and its main benefits. Section 4 presents the experiments conducted on a set of data collected from Twitter and finally a conclusion is provided in section 5.

RELATED WORKS IN WAREHOUSING OSN

To the best of our knowledge, most existing studies mainly focused on a specific analysis of tweets including enrichments for sentiment analysis and topic detection or extracting specific dimensions to a given domain. Using OLAP analysis capabilities on large volumes of data collected from various OSN has motivated all fields of research such as the topics investigated by Khan et al (2012) and Ortiz et al (2010). Due to the diversity of communication channels on social media, it is possible to consider a multidimensional model for this kind of applications as stated by Kazienko et al (2011). In Bringay et al (2011), the authors proposed a star model to analyze textual tweets. NLP is then applied on the text collected for the Tweets for topic understanding and investigation. An adapted measure, called "TF-IDF $_{adaptive}$", was also proposed to identify the most significant words according to some levels of hierarchies. This method permitted spotting valuable trends such as top-*k* most significant words that appeared over a given period of time or the most representative word of a city or country, for a certain month, in a year, etc. A multi-layered system for warehousing Streams from Twitter was proposed in Rehman et al (2012). The original Tweets stream collected was transformed into a structured multidimensional dataset consisting of measures *(#friends, #followers, #status, #favorited, #listed*) and dimensions. Additional enrichments were incorporated by means of derivation, data mining, linking to additional sources or using external APIs such as language and topics detection. As an extension of the previous work, Rehman et al (2013) integrated extensive OLAP Natural Language Processing (NLP) capabilities to perform multidimensional text analysis.

In Mansmann et al (2014), the authors converted the semi-structured data provided by the Tweet API to a multidimensional data cube. Besides, a data enrichment layer was introduced to detect new structural elements such as user activity, popularity, messaging behavior, as well as to classify messages by topic, impact, origin, method of generation, etc. The authors proposed a new measure called ranking and defined as follows: *ranking = 0.8* x *#followers+0.2* x *#friends* to classify the users according to their popularity: *superstar*, *celebrity*, *popular*, *regular*, and *unpopular*.

In Ben Kraiem et al (2014), the authors proposed a conceptual and logical generic constellation model to analyze the OSN content of Twitter. In the proposed model, two facts were identified:

- A conventional fact called *Activity-Twittos*: this fact corresponds the user accounts observations and used to analyze the user activity over a given period of time. This fact is composed of the following numerical measures: *Fav_C* (Number of favorites tweets this user has), *Sta_C* (Number of tweets this user has), *Fre_C* (Number of friends (users) this user is following), *Follow_C* (Number of followers for this user).
- A reflexive fact called *Activity-Tweet*: this fact represents the links between a given tweet and the person answering that tweet. Being reflexive, this fact links instances of the same entity. It is composed of a textual measure, a measure list of elements (Hashtags) and a numerical measure (Retweet-c) characterizing the number of times a tweet was re-tweeted.

In the proposed model, four dimensions were used to create the DW: USER, PLACE, TIME and SOURCE.
In Ben Kraiem et al (2015), the authors proposed the OLAP4 Tweets platform, which is a model dedicated to the OLAP of tweets with some enrichments. The proposed enhancements correspond to two additional types of attributes initially not returned by Twitter given as follows:

- *ETL (Extract, Transform and Load) calculated data*: four additional attributes are introduced: *Tweet-Type*, used to classify the Tweets into four types (normal tweet, mention, responses and Retweet), *Tweet-Language*, *Tweet–Sentiment* and *Tweet –Topic and entities* in Michelson et al (2010). These new elements are grouped

into a newly generated dimension called *Junk Dimension.*

- *Runtime calculated data*: Two new hierarchies, *User Category* and *User-Activity* are added. User category permits classifying the users into three categories -Information Seeker, Information Sharing and Friendship relationship. User-Activity classifies the users into four clusters: Old-Active, New-Active, Old-Passive, and New-Passive.

Other studies aimed to associate a tweet to a specific geographic location in order to facilitate the multidimensional analysis. The content of the tweets was analyzed in order to retrieve the relevant terms that might correspond to a specified location as given in the works of Bouillot et al (2012) and Benhardus et al (2013) and Hecht et al (2011). Then, the location information is retrieved from the meta-data tweets and the geographic location was determined.

OLAP MODELING FOR HOMELAND SECURITY APPLICATIONS

The Multidimensional Model

A DW is composed of a *fact table* containing the *measures* and connected to a set of *dimensions* that provide the context surrounding the topic of interest. The concept of dimension gave life to the broadly used metaphor of *cube*s to represent multidimensional data such as given in Figure 1.

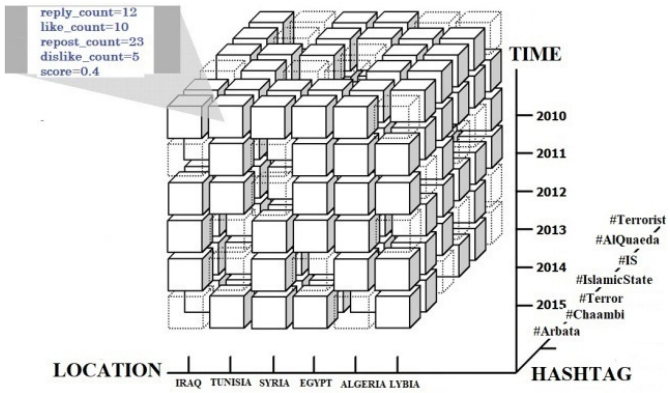

Figure 1: An OSN cube with the dimensions and the measures

The cube corresponds to posts on an OSN that an intelligence service wants to analyze. The given cube is composed of three dimensions:

- DIM_LOCATION (IRAQ, TUNISIA, SYRIA, EGYPT, ALGERIA, LYBIA).
- DIM_HASHTAG (#Arbata (A famous location in the south of the country known for its terrorist activities), #Chaambi (A famous location in the south of the country known for its terrorist activities), #terror, #IslamicState, #IS, #AlQuaeda, #Terrorist).
- DIM_TIME (2015, 2014, 2013, 2012, 2011 and 2010).

Four measures are associated with the given cube: *Reply_count*: the number of replies for the post; *Like_count*: number of times the post was liked; *Repost_count*: number of time the post was reposted; *Dislike_count*: number of times the post was disliked and *Score*: the score of relevance of the post

THE DW MODEL FOR OSN: THE EXAMPLE OF TWITTER

On Twitter, the proposed model includes the users of the platform, their posts (tweets), and the relationships within those two classes such as the “follow”, “tag”, “author of”, “retweet” relations. In the model, we consider a central fact table, FACT_TABLE_PUBLICATION to analyze the tweets posted by the users, groups, pages, etc online. The following dimensions can be defined:

- DIM_USER: user information.
- DIM_STATUS: post information.
- DIM_COMMENT: comments about the post with various types (text, photo, image, url, etc).
- DIM_PHOTO and DIM_VIDEO: multimedia content.
- DIM_HASHTAGS: define specific topic.
- DIM_USER_MENTION: a person’s @username.
- DIM_LOCATION and DIM_TIME: geospatial and temporal characterization of the facts.

- DIM_SOURCE_DEVICE: source of the post (Facebook, Twitter, etc) and the device represents the equipment that was used for that.

The measures are as follows: *reply_count* (Number of comments), *repost_count* (Number of reposts), *like_count* (number of likes for the publication), and *dislike_count* (number of hates for the publication).

The Proposed Data Warehouse Model For The GTD

The GTD is an open-source database including information on worldwide terrorist events since 1970. The proposed multidimensional model for the GTD is composed of a central fact table (FACT_TERRORIST_ATTACKS) to analyze terrorist attacks associated with the following dimensions:

- DIM_TIME and DIM_LOCATION.
- DIM_INCIDENT: data about the attack.
- DIM_WEAPON_TYPE: weapons used in the attack.
- DIM_ATTACK_TYPE: The method of the attack (*Assassination, Hijacking, Kidnapping, etc*).
- DIM_TARGET: targets of the attacks.
- DIM_TARGET_SUB_TYPE: the target subtype.
- DIM_TARGET_CORP: the specific person, building, installation, etc., that was targeted.
- DIM_PERPET: the group that carried out the attack.

The measures are: *Nkill* (number of persons killed), *nwound* (number of wounded), *nreleased* (number of hostages who survived the incident), *Ransom_amount* (amount of money demanded by the terrorists), *Propvalue* (amount of damage caused), *nperp_cap* (number of arrested perpetrators) and *Nper* (total number of perpetrators). The two proposed models will be joined to form a unified model as given in Figure 2.

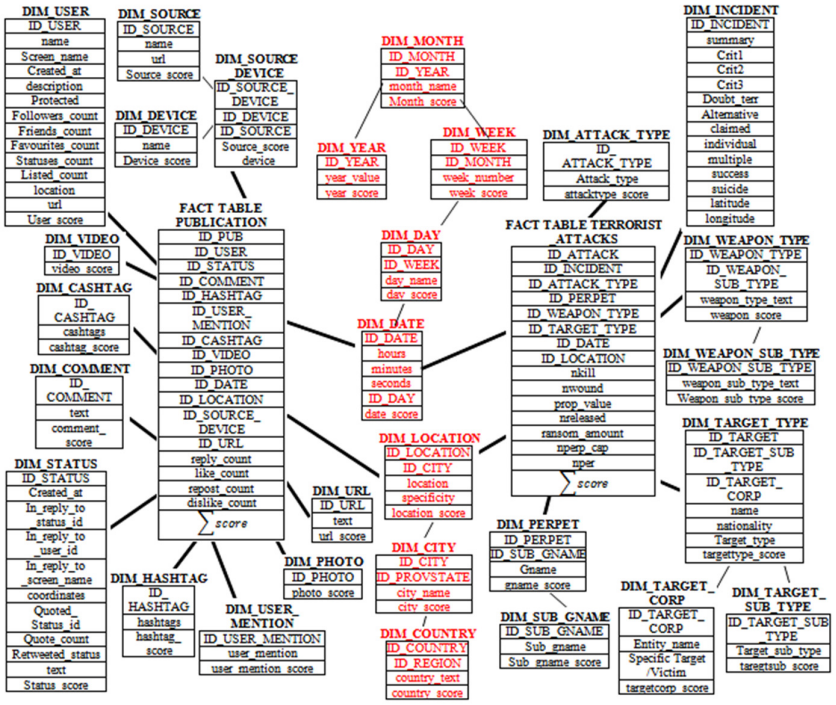

Figure 2: The proposed unified Snowflake DW model.

EXPERIMENTS AND DISCUSSION

In this section, several experimental datasets are used and python was used to scrap twitter data. The information related to the targeted accounts are given in Table 1.

Table 1 : Experimental datasets

User name	@alqaeda	@Abou_Cha_ bouche	@alsomood	@Hashimi Qureishi	@Daish_ OnLine_01	@Abo_ al_hassan
Nb_follwers	35439	4043	2569	99	1297	42
Created_at	07/2017	11/2011	06/2009	06/2015	03/2015	25/2014
Nb_friends	2	790	0	414	160	214
Nb_lists	1249	72	37	2	6	1
Nb_likes	318	57589	0	22	7	120
Nb_statuses	1590	23553	1518	184	1332	596
Nb_tweets_collected	200	200	200	180	155	200
First_tweet_ Scrapped_date	23/11/2017 13:44:35	14/07/2019 03:35:42	17/03/2014 03:14:37	15/07/2015 19:34:14	25/07/2015 14:24:25	27/05/2015 22:33:03
last_tweet_ Scrapped_date	11/08/2019 02:05:16	05/08/2019 15:26:26	28/03/2017 07:21:22	26/05/2016 22:52:42	07/09/2015 07:56:42	25/08/2015 02:36:19

In the other hand, the computation of the scores in the DW is also problematic. These scores have a great impact on the identification of the most pertinent insights to be extracted from the collected data such as the most cited user (user_mention) and hashtag or the most shared photos and videos. These scores will also contribute to identify the most pertinent posts. In the DW, it is possible to distinguish three types of information and thus three types of scores to be computed:

- *Score on categorical data:* such as *user_mention* and *hashtags* contained in each tweets. The score of a categorical measure will be computed as follows:

$$\mathcal{S} = f_r(mod_i|att_j) = \frac{nb_occ_{mod_i}}{N}$$

  (f_r) is the relative frequency of the modality *i* in attribute *j*, *nb_occ* is the number of occurrences (repetitions) and *N* is the cardinality of the dataset. Thus, if the score is high then the considered categorical value is more and more frequent in the dataset and thus is more pertinent.
- *Score on numeric data:* two types of numeric data were collected in our experiment: *user data* (number of followers, statuses, friends, etc) and the *measures* given in the fact table of the model such as the number of retweets and favorites. For user data, the score would be computed as follows:

$$\mathcal{S} = \frac{att_j}{\sum_{j=1}^{l} att_j}$$

  att_j corresponds to the value of the numerical attribute and *l* is the total number of accounts considered (an example is given in Table 1).
  For the measures, the score of a given measure will be computed as follows:

$$\mathcal{S} = \frac{m_k^T}{\sum_{j=1}^{p} m_k^{T_j}}$$

  m_k^T corresponds to the kth measure in the fact table for the current Tweet *T* and *p* is the total number of Tweets collected for that user (an example is given in Table 1).
- *Score on unstructured data:* for unstructured data such as photos, videos and text, additional and more complex analysis can be performed using NLU/NLP and visual recognition capabilities to derive the scores and identify the most interesting patterns. This case was not considered in this study.

As an example, consider the following table that contains data related to five posts collected from Twitter:

Table 2 : Tweets sample

	measures		User_data			Categorical_data	
T	Nb_retweet	Nb_likes	Nb_followers	Nb_friends	Nb_lists	hashtags	User_mention
1	15	3	1254	65	32	#alqaeda	@abu_jihad
2	12	15	5613	10	23	#aqmi	@abu_sofien
3	5	19	1254	65	32	#alqaeda	@abu_jihad
4	4	20	5613	10	23	#aqmi	@abu_jihad
5	26	1	120	1	3	#aqmi	@abu_jihad

In Table 2, it is supposed that (*post 1, post 3*) and *(post 2, post 4)* correspond to the same user. For each attribute in Table 2, a score will be assigned for each post. In this case and according to what was explained before, the score of the Nb_retweets for post 1 will be 15/(15+5)=0.75 and for Nb_likes the score will be 3/(3+19)=0.13. The score of the Nb_followers for post 1 can be computed as follows: 1254/(1254+5613+120)=0.17. The score for hashtags #alqaeda is 2/5=0.4

In the experimental dataset, data related to the tweets were collected: *created_date, user_name, text, url, user_mention, user_followers, user_friends, user_listed_count, retweet_count, favorite_count, user_favorite_count, statuses_count*.

In Figure 3, the most cited user mentions in the dataset are reported. In fact, a highly cited user (@) in the dataset would correspond to a high activity and interest for that user. The most cited account corresponds to the user *@Censored31q* with 22% of the total user citations.

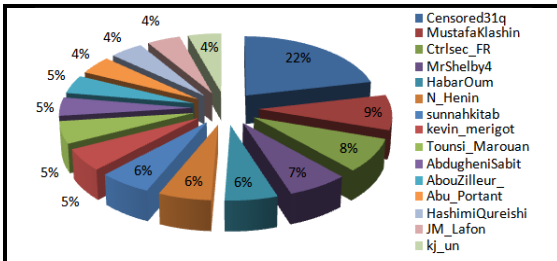

Figure 3. Most cited users in the collected tweets.

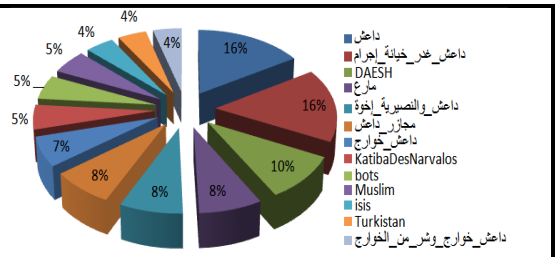

Figure 4. Most cited hashtags in the collected tweets.

However, when trying to access the account and inspect the content, it was found that it was unfortunately deleted from twitter. For example, in the following Tweet, the user *@Censored31q* is not accessible.

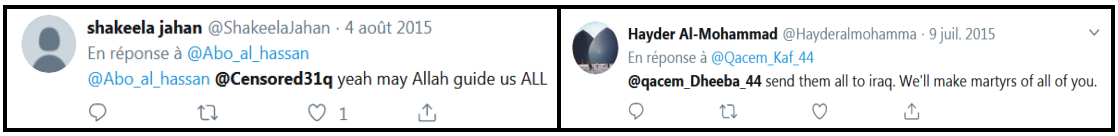

Deleting suspicious accounts on Tweeter is part of tweeter's security policy towards blocking extremist content. Using this method, it would be first possible to identify most pertinent suspicious profiles and remove them from the user monitoring list if they are suspended. When investigating the list of user mentions, it is found that some accounts were related to Tunisian users such as @Qacem_Ariana_44, @qacem_Djerba_44, @qacem_Gafsa_44, @qacem_Nabeul_44, @qacem45_sfax, @qacem_Remada_44, @Qacem_Tbarqa_44, @qacem45_sousse, @Tounsi_Marouan, @tunsi_marwan, @qacem_Dheeba_44. These accounts were all suspended.

In Figure 4, the results regarding the citation of the hashtags are represented. According to these results, the most cited hashtags were (#داعش, *i.e* daesh) and (#داعش_غدر_خيانـة_إجرام, *i.e* ISIS_treachery_betrayal_crime). As mentioned before in the scoring procedure, in the dataset, the user mention *@Censored31q* registered a score of 0.031, followed by @MustafaKlashin with a score of 0.012. (#داعش, *i.e* daesh) and (#داعش_غدر_خيانـة_إجرام, *i.e* ISIS_treachery_betrayal_crime) registered a score of 0.009 both. Thus, it is expected that Tweets that mention one of these elements will have higher scores and thus will be spotted and can depict more interesting patterns. The *retweet_count* and *favorite_count* related to each tweet were also scored since they can highlight how important is the tweet under consideration.

In the proposed classification, the post published by Abou_Cha_bouche on 27/07/2019 at 08:46:28 AM "*@davidperrotin: Après la mort de Mamoudou Barry, des députés LR (G. Larrivée, Valérie Boyer, Eric Ciotti..) ont relayé des intox*", was the tweet with the highest score. In fact, the tweet corresponds to the user @ Abou_Cha_bouche that has according to Table 1, high values for the *nb_followers*, *nb_friends*, *nb_likes* and *nb_statuses* that were incorporated in the scoring method and thus will increase the total value of the score for the tweets belonging to that user.

The second most scored tweet also corresponds to the same user published on 31/07/2019 at 08:27:58 "*@AbouZilleur_ Qu'Allah te facile les vacances akhy*"'. In the Tweet, @AbouZilleur, that was cited 10 times in the dataset as given in Figure 3, was also cited. Although the tweet was not retweeted, it was liked 11 times.
Considering the following Twitter post:

The translation of the previous Tweet is: "*Paktika: Two puppet soldiers killed in Xerok: two puppet soldiers killed in attack by Mujahideen in Sri Medan district*". Using the proposed snowflake model given in Figure 4, it becomes possible, based on the time and location common dimensions to gather more information from the GTD especially when the spotted event to be investigated and initially identified on the OSN is related to a terrorist attack. The information that were reported in the GTD and related to this Tweet is as follows:

- The location of the event: the GTD provided more details regarding the *country* (Afghanistan), the *region* (South Asia), the *province/state* (Paktika), the *city* (Ziruk district) and even the *latitude* (33, 158056) and *longitude* (69, 312778) of the location.
- Description: 04/28/2014: Assailants attacked an Afghan National Army (ANA) checkpoint in Ziruk district, Paktika province, Afghanistan. This was one of two attacks targeting checkpoints in Ziruk on the same day. At least 65 people, including 5 soldiers and 60 assailants, were killed and an unknown number of people were injured in the assaults. Additionally, at least one soldier was abducted across the two incidents and the outcome is unknown.
- The attack type used: Hostage Taking (Kidnapping) and Armed Assault.
- The targets: Military Checkpoint of the Afghan National Army (ANA) and their nationalities Afghanistan.
- The terrorist group involved: Haqqani Network, *i.e* (شبكة حقاني) which is an Afghan guerrilla insurgent group using asymmetric warfare to fight against US-led NATO forces and the government of Afghanistan.
- The motive: unknown; however, Afghan defense ministry officials stated that the attack was meant to be a high-profile event after the Taliban had failed to mount significant opposition to the presidential elections on April 5, 2014.
- The total number of terrorists participating in the incident (*nperps*=500).
- Number of persons captured *nperpcap*=0.
- The number of kills in the attack *nkill*=33.
- The number of perpetrator fatalities *killterr*= 30.

CONCLUSION

The analysis of OSNs is a complex task that requires dealing with a huge amount of structured or unstructured data. In this paper, a scoring capability was implemented to analyze OSNs according to the published Tweets. For this purpose, a multidimensional model was proposed to incorporate multiple distinct databases (OSN, GTD, etc) according to several dimensions and various data types. The proposed model for OSNs was enriched using the GTD to provide a wider understanding of our topic of research. It is also possible to use other databases and integrate them with the current model in order to enhance the capabilities of the system.

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Design and Validation of Interview to Analyze Social Representations in the School Field

Leidy Diana GONZÁLEZ RINCÓN

Bogotá, Colombia, leidy.gonzalez.r @uniminuto.edu

[1] Corporación Universitaria Minuto de Dios - Uniminuto, Bogotá, Colombia.

Abstract

The objective was to design and evaluate an interview to learn how the social representations of the indigenous in the school environment between teachers and students are processed. This construction process was based on Rosana Guber's theory, working from three categories: imaginary, speeches and practices.
The instrument was applied to 10 public school teachers who voluntarily participated in this study. It was evaluated by three professionals in the area of education. The results of the analyzes show that the instrument is capable of implicitly revealing the imaginary, speeches and practices, and that it is possible to arrive at an in-depth analysis about its visions on education and its pedagogical work.

Keywords: School, Non-directive interview, social representations, school practices.

Introduction

Society has been historically configured through different relationships that we establish through language. This is impossible to understand, capture or measure in its entirety, since it is the result of a multiplicity of interventions that converge with each other and constitute the historical framework in which we are all involved. Each era and each society has been configured for itself, in order to respond to the established hegemonic models, which prevail and regulate the conditions, thoughts and attitudes in the face of an endless number of social representations that we all feed and reconfigure through individual and collective experience.

To ask about the imaginaries, discourses and practices that are developed in the school environment, turns out to be of great relevance, since it responds to the need to understand the contents and meanings that are processed in the school environment, specifically in relation to social representation. The conception that moves around these contents is fundamental to understand, on the one hand, the pedagogical task and its correspondence with the hegemonic reconstructions that are made in relation to "the other" and the representations for people in formation.

The development of a methodological tool for the tracking of these imaginaries, discourses and practices was thought from a reflective approach, in order to attend as a priority, the voice of the others; the reflexivity can contribute to detect interpretative frameworks, as well as to identify the way in which they give account of their experience (Guber, 2001). Given that there are no instruments "prefigured for the extraordinary variability of socio-cultural systems, not even under the apparent uniformity of globalization" (Guber, 2001; 7) it was necessary to recognize through the own experience of the researchers the pertinence of a method that gives account of those practices for which it is investigated, in such a way that "the instrument is the same researcher with his socio-culturally considered attributes -gender, nationality, race, etc.- in a social relation of the field" (Guber, 2001; 7).

With this exercise, it was determined that the interview would be the most consistent tool for teachers to show what they know, what they think, and what they believe about their representations of what is indigenous and the practices that are developed in the school environment, which allow them to reconfigure and process ideas that feed stereotypes and generate gaps between what is considered habitual and what is called "other". The need to create and use an effective and valid tool to obtain information through oral exercise has been the reason for initiating this study. In this way, the design of an instrument that would become an adequate and specific tool for the treatment of this information was promoted in order to provide new research material that could be used in studies such as those presented here.

Different elements are presented for the construction of a semi-structured interview oriented towards "non-directivity" proposed by Rosana Guber (2004) through an exercise of piloting, expert validation and analysis of the questions

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proposed by the research group, which aims to trace in the discourse of interviewed teachers their imaginaries, discourses and practices in relation to the social representation of the indigenous.

The interview is one of the most appropriate techniques to recognize the meanings of people, it is a social relationship through which statements and verbalizations are obtained that can later be analyzed (Guber, 2004). From the positivism, it has been established that orthodox interview in which questions are made that look for a concrete, unique answer and that gives account of the true thing, nevertheless, as Guber affirms (2004) this turns out to be "partially true" since it supposes that the questions formulated by the researcher belong to the same universe of sense that the answers of the interviewed.

By posing the questions as researchers, interpretative frameworks of the answers are established, that is, the relevant information within the research, this will be decided from the moment the topic, the categories of interest and the terms of the questions for the subsequent analysis are established; of course, this implies the recognition of the universe of the interviewee, which contains different meanings and preconceptions from that of the researcher, "even though they apparently handle the same language, they talk about different things, but they do not know it" (Guber, 2004)

Non-directivity can help to introduce us into the cultural universe of the interviewee, since it presents us with indications to understand its logic and to dialogue within the same terms and meanings: the floating attention of the researcher that is an exercise of the researcher and consists of listening to what the interviewee says without privileging any point of the discourse beforehand, the free association of the informant that unfolds from the interrogations carried out by the researcher, these must be very general, since they are simple provisional links that will allow the interviewee to pour out by free association themes and concepts through conversations that are related to the object of investigation, but are not in themselves, conversations about the object itself, and the deferred categorization of the researcher which consists in the first place, in the formulation of open questions that intend to generate a basic substratum of the interpretative framework of the interviewee, this, supposes an active role of the interviewer in order to identify the interstices of the informant's discourse to understand its logics, and in second place to register the information "that apparently has no reason to be" (Guber, 2004) but that will become his new questions, categories and concepts.

Methodology

Participants

Two types of participants were used for the development of the research. First, the support of three experts in the area of education was requested for the evaluation of the development of the questions; the selection of experts was made through the consensus of the research group, following the theory of Landeta (2002) which states that "there is no way to determine what is the exact optimum number of experts" (P. 62), in this way we chose to work with three professionals in the area of education who could contribute to the research work and motivate through their validation exercise the initiation of the Delphi method which consists, as stated by Linstone and Turoff (1975) in a technique of structuring a group communication process in order to deal with a complex problem. Taking into account these definitions we chose and responded positively to the project three professionals in the area of education (table number one).

Table 1*:* Characteristics of the experts group selected for the investigation.

professional qualification	research area	age range
Master degree in direction and management of educational institutions	Education and educational management	1 – 15 years
Master degree in education	Education and Society	1 – 10 years
Master degree in education	Education	1 – 10 years

Secondly, an interview (pilot) was conducted with teachers in the areas of social sciences, humanities and arts in the elementary and middle cycles of district schools in southern Bogotá.

Ten (10) teachers from different public schools in southern Bogotá participated voluntarily in this study. The pilot sample was made up of six male teachers, aged between 31 and 65, and four female teachers, aged between 39 and 60.
The investigation procedure was made up of several phases, in which the concepts with which to work for the construction of the definitive instrument were defined. The first phase consisted of the theoretical development of the

central concepts of the interview, the second phase was the development of the first version of the instrument and the review by experts, the third phase was based on the pilot exercise and finally the fourth phase consisted of the reworking of the questions for the final instrument.

PHASE 1: Theoretical development of the central concepts of the interview.

In this first phase a theoretical construct was developed based on three specific items: Imaginaries, discourses and practices, in order to determine how these, relate implicitly to the teaching task, relating them to the phases of the interview oriented to non-directivity:

Imaginary:

The imaginaries are a tool that allows to endow with meaning the world instituted in the margins of the social ones, through this it is possible to give meaning to the individual experience, being configured as a transitory form of social reproduction, a historical cultural substance and articulation between them to give a sense. (Pintos, 2001)

For Castoriadis (2006), imaginaries characterize humanity and are configured as a tool of language, ways of doing and values, that is, everything that imposes with or without sanction ways of acting and thinking; circumstances are those that guide this construction in a constant recreation of society and the way it is expressed:

"The language, the customs, the norms, the technique, cannot be explained by external factors to the human collectivities, so it is absolutely natural to call this faculty of radical innovation, of creation and of imaginary and imagination formation" (Castoriadis 2002: 94).

In such a way, the imaginaries are an interweaving that penetrates the psyche of the individual and directs him/her to act in society, it is a grammar to interpret the "legitimated social reality", the human being goes to his/her power of creation and formation to give an explanation to those institutions immanent in human collectivities and in their singularities, such institutions are "made of socially sanctioned meanings and of procedures that create meaning. These meanings are essentially imaginary -and not rational, functional or reflections of reality- they are social imaginary meanings" (Castoriadis, 2002: 133)

The real, is always something significant for a subject, the social imaginary is the element that allows to grant a particular meaning to reality, in this sense Castoriadis (2002) affirms that it is necessary that this imagination is "dominated, channeled, regulated and turned into suitable for life in society and also for what we call reality" (Castoriadis 2002: 97)

This process of channelling towards meaning will take place through socialization, at first, through a direct encounter with the main institutions such as the family and later, more diverse institutions such as religion, morality, the nation, traditional education and the state that will embody the psyche of the individual in the same way in order to orient our lives.

"Each society defines and elaborates an image of the natural world, of the universe in which it lives, trying each time to make of it a significant conjunct, in which must certainly find their place the objects and natural beings that matter for the collective life, but also this same collectivity, and finally certain order of the world" (Castoriadis 1989: 258).

Therefore, the world is never a pre-existing ontological entity, but it is an interpretation that carries an anchored meaning, which provides the individual to be able to communicate and cooperate collectively, the imaginary constructs the idea, creates it and gives it form; thus, it can be affirmed that what exists around that idea is the work of the human and therefore of the social imaginary.

Finally, the imaginary is always an interpretative construction, therefore, it must be understood as a matrix of determined sense that hegemonically imposes itself as reading of social life, the individual assumes it above his own experience and deals with it as a symbolic element, a set of plausible senses to which one accedes in certain social situations and that determine the regulatory entities that constitute us and make part of society.

Speech:

The discourse has become a term that is developed in different disciplinary spaces, its allusion refers to all the processes of linguistic production that are put into play to produce something, it can be seen from the discursive materiality as much as the behavior of its producers and interpreters (Karam, 2005).

According to Karam (2005) this can be conceived from three big aspects, the first one refers to the discourse as source of itself, an approach towards the syntactic or the narrative, as for construction of story, a glance of the discourse as linguistic unit major to the sentence; a second perspective, considers the discourse as part of a communication model, a determined circumstance of place and time in which a subject of enunciation organizes his language in function of his addressee, and the materialistic perspective, which understands the discourse as a social practice linked to its institutional, social, ideological and cultural production.

For the previous thing, the speech is understood from the materiality that constitutes it, and that this permeated by different social processes, we are born and we are constructed in society, we learn the language that structures the thought, allows the communication, grants meaning and constantly mutates through the historical happening, the interweaving of all these elements is what composes the speech. This, in turn, constitutes units with complete meaning, ideologies, culture, individual thought and collective construction.

Therefore, it is the compilation of unifying actions, permeated by power, persuasion, value, ideology and communication regarding a concrete way of understanding things and acting on them, it is a way of accessing the world, representing and reproducing society.

"with words we not only say -semantic dimension- but also do things -pragmatic dimension-. And if what is said so much designates things -referential component- as it allows us to relate some words with others -structural component-, the study of doing of what is said, allows us to know (speaking with more property, allows us to infer) an image of who says what he says; since when saying we remain said in what is said -sociolinguistic commitment- "(Montañés 2010: 2).

The language is the tool by means of which we construct ourselves, interact and relate with other subjects, for Mota de Cabrera and Villalobos (2007: 413) the language "is the mechanism through which the meaning negotiation occurs", it is there where the speech occurs, in that elaboration between the interior, the individual, the collective and the attributed meanings, the speech is dynamic, changing and multiple, it is always dialogical and conative. The speakers provide varied, contradictory and constant perspectives, going to their social world that is not unique or finished, but rather a collective production that is at the service of all and is interchangeable according to the perspective and the moment. (Wetherell and Potter 1996 and Gee 2005).

Practices

In a very broad sense, pedagogical practices are those actions that the teacher constructs, plans and executes in order to provide the student with an integral formation, which requires the use of didactics, as well as of constitutive elements that are presented in the school environment and that are determinant in the formation processes. For Huberman (1999: 25), pedagogical practice is a "conscious, deliberate, and participatory process implemented by an education system or an organisation with the purpose of improving performance and results, stimulating development for renewal in academic, professional, and labour fields, and forming the spirit of commitment of each person to society and particularly to the community in which he or she works". Pedagogical practices involve a conceptual analysis of the relations that are established through pedagogical communication, not only from the individual of a subject, but from an analysis of the structures in which all educational entities converge, among these, society.

Society can be identified in the educational context from the simplest and most complex interactions, from the micro (the practice) and the macro (the social structure) as meanings to which we respond due to the representations that have been established as generic logic for all; pedagogical practice responds on the one hand, to the large scales instituted and hierarchized within society, but also to individual processes, primary preferences, and interactions that are natural to the educational environment.

In this sense, the pedagogical practices, are at the same time social practices, Bourdieu (1984) defines the Habit as a mediating element, a set of principles of perception, valuation and action due to the introjection in society, these generate characteristic habits of synchronic and diachronic positions, which make people close, perceive and act in a similar way before the same situations. In this way, education and specifically the school as an institution contribute to the social structures to reproduce them.

This means that pedagogical practices are representations that explain the contextualization of the educational environment that are crossed by subjectivities that converge among themselves by all the entities that are involved in the specific environment, it is the space in which all the ideas and meanings that have been constructed and re-constructed in society converge and that are processed in the constant contact between what is done, what is said and what is thought.

Opening and focusing/deepening.

In the first stage of the interview, the frames of reference of the interviewees are constructed from the "free association", from these frames, the most significant questions and topics for focusing and deepening are extracted; This is achieved through what Guber (2004) calls "the art of not going to the point" in which "questions to discover questions" are used, that is to say, using descriptive questions in which the interviewee is asked to talk about a certain topic, its social context, the places in which it plays, inviting it to expand as much as possible its answers, improve its descriptions, including what it considers trivial or secondary. (Guber, 2004)

After this, comes the stage of focusing and deepening, this is only possible when it is obtained a "dense" material in words of Geertz quoted by Guber (2004) that has been obtained from deep descriptions, assessments and explanations that are analyzed at the same time in the field, in this stage, the direction of research is determined, expanding, By deepening and systematizing the material obtained and for this purpose using the categories or recurrences that have been traced in the first moment of the interview, these are obtained in the common expressions of the interviewee, so it will be the task of the researcher to investigate not by the definition, but by the use of the category, to later analyze them and create by himself the definition that accounts for the object of investigation.

PHASE 2: Development of the first version of the instrument and expert review

Once the draft of the "non-directivity" interview has been designed, it has been passed on to the group of selected experts made up of three suitable people in the research topic (information referenced in table one). To facilitate the verification of experts, a Likert scale from 1 to 5 has been applied to each question (table number two), where 1 is in disagreement and 5 is in total agreement, in terms of relevance, clarity, form and exploration of the category oriented in the question. Likewise, at the end of each one of the items contained there is a space for observations so that the evaluator may qualitatively expose any comment that he/she considers appropriate.

Table 2*:* Likert Scale

Likert Scale				
1	**2**	**3**	**4**	**5**
Non-compliance The question does not comply with the evaluated item	Lack of relevant information compared to what was evaluated	The question does not fulfill the necessary aspects	The question meets most aspects for the evaluated item	The question fully complies with the evaluated item

After the expert review was elaborated, the information collected was analyzed and tabulated, thus reducing the number of questions, generating changes in form and wording, effectively using the contents of the questions and the associations that were intended to be tracked with the instrument.

PHASE 3: Pilot test

Once the sample selection was made and the draft for the pilot exercise designed, we organized the spaces for the interview and the way it would be conducted, we gave each interviewee a copy of the interview evaluation matrix, a consent form that they read and signed before the exercise, and each interviewer had a copy of the draft interview for note taking and category organization.

The interviews, in paper format, and recorded on audio, were conducted during the school day in the mornings (6:00 am to 12:30 pm), although no time limit was established, the interviews lasted between 22 and 30 minutes per each interviewee. The dynamic of the interview consisted of a discussion that began with the basic question and was broken down into the categories that the interviewee himself proposed, in such a way that the interviewee was asked to answer the question and the interviewer was in charge of tracking down the categories that he or she considered relevant to the research process.

The interviewed teachers completed at the same time with the interview exercise the validation rubric for the instrument in order to specify through a Likert scale, relevance, clarity, form and exploration in each of the questions.

PHASE 4: Data sources, reworking questions for final instrument

In order to evaluate the teachers of basic and secondary education of the public schools located in the south of Bogotá with respect to their social representations and specifically, to the practices, imaginaries and discourses that they process in the school environment, we developed a semi-structured interview oriented to "non-directivity" (Guber, 2004), after an exhaustive analysis of relevant scientific articles. This interview, formed by open questions of implicit type, had as main base Rosana Guber's theory and the concepts that guide the evolution of this work, described in the previous phases. The first part of the interview (from question 1 to 5 "1-4") aims to evaluate the practices of teachers from their pedagogical work. The second part of the interview (from question 6 to question 10 "5-8") aims to evaluate the discourses presented by teachers in the spaces converging with the students and the third part (from question 11 to question 15 "9-12") aims to evaluate the teacher's imaginary in relation to specific aspects of their pedagogical work and the relationship that they present with the students.

Evaluation rubrics were constructed (applied later to the interviews) in order to clarify the relevance and intention of the question, as well as to request explanations and clarifications of the questions used.

Discussion/ Conclusions

The objective of this study was to design and develop an interview instrument that tracks the imaginaries, discourses and practices in relation to the social representations of what is indigenous in Bogotá's public schools. The results obtained in the research show that the design and elaboration of an interview focused on "non-directivity" requires the execution of different phases, as well as the judgment of experts.

Interviews are crucial because they allow for more complete and detailed concepts to be traced through the interviewees' discourse from their experience, and it is important to apply them in qualitative studies. The internal consistency has proven to be efficient, which facilitates its applicability in different contexts. The validity here evidenced shows an adequate development through Rosana Guber's (2001) theory and technique, leading to the adaptation of the initially selected items and a greater tracking of the analyzed categories.

This study provides, not only a theoretical construct, but also an instrument that allows to establish more assertive communication bridges between the researcher and the interviewee, in order to trace through the cultural codes in which we live, how social relations and representations are given in the educational field. In this sense, the instrument can be used by teachers and management teams to obtain information that allows them to propose new strategies or mechanisms for the different difficulties that arise in the school.

From the reviews that were elaborated during this qualitative work, it is presented that there are different interviews and/or questionnaires that intend to measure the relationships in the school environment. Most of the studies are aimed at inter-subjective relationships in order to improve the quality of education.

The piloting exercise and the re-elaboration of questions based on the experience of the first two phases of the research support the reliability of the instrument, formed by 12 questions, grouped in 3 contents (imaginary, speeches and practices). Thus, the interview instrument for tracing social representations of the indigenous in public schools in Bogotá has a high level of validity for the persons interviewed and the overall research. This instrument will allow a qualitative analysis, through "non-directivity", of how relationships are handled in the school environment. However, this study presents certain limitations that should be taken into account, such as the dependence of the factors that intervene in the context, as well as the pre-concepts of the interviewee and the interviewer that may bias the information obtained through the instrument.

Finally, one may conclude that, after this procedure aimed at creating a qualitative instrument to track the imaginaries, discourses, and practices that influence relations in the school, the results are satisfactory, since it allows for the collection of sufficient information to establish consistent theories in qualitative studies with which the instrument may be related.

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Assessment of the Impact of the Energy Factor on the Economic Development of the SCO Countries

Tatyana Mikhailovna SHPILINA,
Russian State Social University, Moscow, Russian Federation
vladimir736@yandex.ru

Natalia Yurievna SOPILKO,
Russian State Social University, Moscow, Russian Federation
SopilkoNIu@rgsu.net

Sergey Vladimirovich SHAMSHEEV,
Russian State Social University, Moscow, Russian Federation
shamsheevsv@rgsu.net

Abstract

The power industry holds a prominent place in the activities of the Shanghai Cooperation Organization member countries. The main players in the intergovernmental organization under analysis in the energy sector are China, Russia, India and partly Kazakhstan. It is due to the results of their activities that the SCO achieves high figures in the development of the fuel and energy complex, which are reckoned with and competed with outside its borders. However, absolutely not all countries of this alliance play a significant role not only in the world stage, but also within the SCO. These states are Uzbekistan, Kyrgyzstan and Tajikistan that hinder the development of the energy sector not only in their region, but also in the organization as a whole. However, all the members of the alliance benefit from cooperation in the energy sector. Russia and Kazakhstan have expanded their market outlets for energy resources, supported a more efficient use of the existing potential and resource advantages; China, India and Pakistan got the opportunity to diversify energy resource imports in a higher degree and increase the volume thereof in order to satisfy the domestic needs of the economy and population. Uzbekistan, Kyrgyzstan and Tajikistan have acquired advantages in the shape of a certain status due to cooperation with world powers, the acquisition of energy resources at special rates, and the solution of acute social issues.

Keywords: Shanghai Cooperation Organization, world energy markets, sustainable economic development.

Introduction

So far, the SCO has become one of the largest regional associations. With India and Pakistan acceded, the total area of the SCO is about 25% of the total area of the world, the total population of its member countries is about 3.4 billion people, or 43% of the world, and the SCO occupies about 60% of the area on the European continent. The SCO includes four nuclear-armed nations, two of which are permanent members of the UN Security Council.

The SCO intergovernmental organization has a great weight on the world stage due to the successes of co-operation in border security in the region. The development of relations between the SCO member countries have gradually begun to expand and affected many sectors, including the economic one. The Shanghai Cooperation Organization includes countries with a high level of economic development. For example, in 2019, the share of the SCO countries in world GDP was 31.635% – almost 1/3, and if this indicator is examined over time, then since 2013, it has been stably grown: + 4.285% for 6 years.

The main contribution to the total GDP of the SCO countries is certainly made by China with a share of 74.2% in 2019, followed by India with 14.88% and Russia with 7.65%. It is these countries that are the main players and competitors at the Shanghai Cooperation Organization, that determine, in most instances, the vector of the development of the organization.

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The fuel and energy complex is one of the priority areas of the Shanghai Cooperation Organization countries; according to its constitutional document, this is due to the availability of significant reserves of various energy resources, which divide the countries of the alliance into exporters and importers. As there are common and inter-complementary interests, the development of energy markets in the region should strengthen relations within the organization (Ishmeeva, 2015). From the creation of the Energy Club in 2013, the share of the SCO countries in the global FEC turnover has grown by + 2.25%, reaching 26.37% in 2018, when it exceeded for the first time the figure of 2015 and rose after a sharp decline in 2016. It should be noted that the unstable behavior was due to changes in energy prices. In order to prevent their fall, in 2016, the OPEC + countries signed an agreement on the reduction of oil production, which remedied the situation in the market, increased demand and prices.

The Shanghai Cooperation Organization includes countries that have a significant reserve of energy resources that play an important role in the economy of those countries. Certainly, the main energy resources are oil, natural gas, coal, uranium and electric power, more attention in the development of which has been given to renewable energy sources, including solar and wind power, and hydroelectric power plants (Vikhoreva, 2016). Thus, according to official data, the proven resources of the Shanghai Cooperation Organization countries are shown in Figure 1.

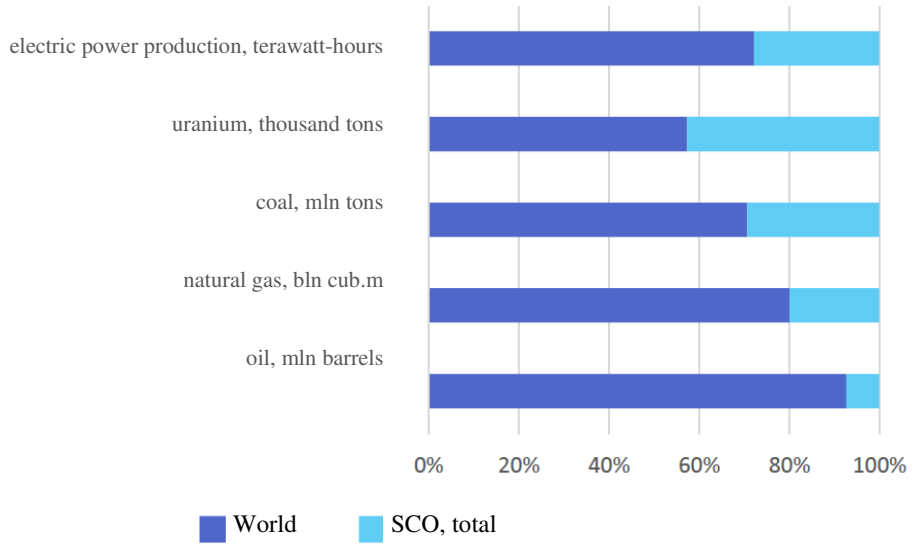

Fig. 1: Share of the SCO countries in the world reserves of energy resources and in the world electricity production in 2019 (Source: Enerdata and EconomicData).

When compared to the world figures, given that the SCO includes 8 countries only, the reserves of hydrocarbons, uranium and electric power potential are imposing. Indeed, oil reserves account for about 8% of the world's reserves, those of natural gas about 25%, those of coal over 41% and those of uranium over 74%. In addition, the production of electricity should be noted, since the share of the SCO countries in its generation is 38.42%, and on average about 40% of the generated electricity are generated by alternative sources, including solar and wind power plants, and hydroelectric power plants (Vikhoreva, 2016).

However, energy resources are unevenly distributed among the member countries of the alliance. The main oil reserves are in Russia – 4.5% of world reserves, in Kazakhstan – 1.7% and in China – 1.4%, natural gas reserves are in Russia – about 20% and in China – more than 3%, coal reserves are in Russia – more than 15%, in China – more than 13%, in India – about 10 % and in Kazakhstan – almost 2.5%.

As for the uranium potential, here, the undoubted leader is Kazakhstan with uranium reserves of 29.67% of the total world reserves, followed by Russia with about 23% and Uzbekistan with about 9%. In electric power production, China ranks first not only among the SCO countries, but also in the world, due to the power-consuming production of high-tech products, and to its large population. The situation in electric power generation using alternative sources is of special interest, this figure is 97.48% in Tajikistan and 86.97% in the Kyrgyz Republic. This is due to the features of the terrain in these countries and to the lack of alternative options for its production.

Therefore, a conclusion can be made that most reserves of energy resources among the SCO countries are in Russia; moreover, they play a large role in its economy with about 40% of the turnover and more than 62% of exports. Although the reserves of Kazakhstan are not so large if compared to those in Russia, they hold pride of place in its economy, accounting for about 74% of total exports, respectively. As noted earlier, the Shanghai Cooperation

Organization includes both energy suppliers, with Russia, Kazakhstan as the main suppliers, and large ever-growing importers (China and India). Based on this, the energy industry has taken a priority place in the further development of the organization. However, it should be noted that it is these countries whose contribution determines the position of the SCO on the world stage as a whole, the contribution of the other countries is insignificant.

In order to determine the place of the SCO countries in the world energy market, and a particular share of influence on it, the member states of the organization should be analyzed in comparison with the leading countries in the especially important energy sectors. These energy sectors are the oil and gas producing industries, as well as the increasingly developing renewable power industry.

Methodology

During research, the following general scientific methods were used: the content analysis method, designed to analyze the semantic content of text arrays and products of communicative correspondence on the research subject, as well as inductive and deductive analysis tools, which allowed us to combine individual authors' conclusions on this problem and formulate the author's vision of the problem. Special methods were also used during the research: absolute and relative statistical indicators, dynamics indicators, and research finding visualization methods. When constructing and describing models, the authors tried to adhere to the principles of an integrated approach that allows establishing the most significant relationships and trends of events and processes in the world energy markets and formalize the most significant effects

The research database consisted of official statistical and analytical materials of the International Energy Agency, energy research and consulting company EnergyData, the World Bank, the State Committee of the Republic of Uzbekistan on Statistics, the Ministry of National Economy of the Republic of Kazakhstan, the Committee on Statistics of the National Statistical Committee of the Kyrgyz Republic, National Portal of India, National Bureau of Statistics of China, Pakistan Bureau of Statistics, Federal Customs Service of the Russian Federation.

Results

Today, the most demanded resource is oil. It has become one of the tools of political influence, the object of wars between countries wanted by many. Figure 2 shows the SCO countries: Russia, China and Kazakhstan, and the USA and Saudi Arabia – the main producing countries of the world. Russia is in the Top 3 for crude oil production, behind the USA and Saudi Arabia, and China is in the Top 7. In general, the behavior over time shows a gradual increase in production, with an interruption in 2016-2017 due to lower oil prices, except for China. Since 2013, this figure has decreased by 10% in the country. This is due to the depletion of developed oil fields in China.

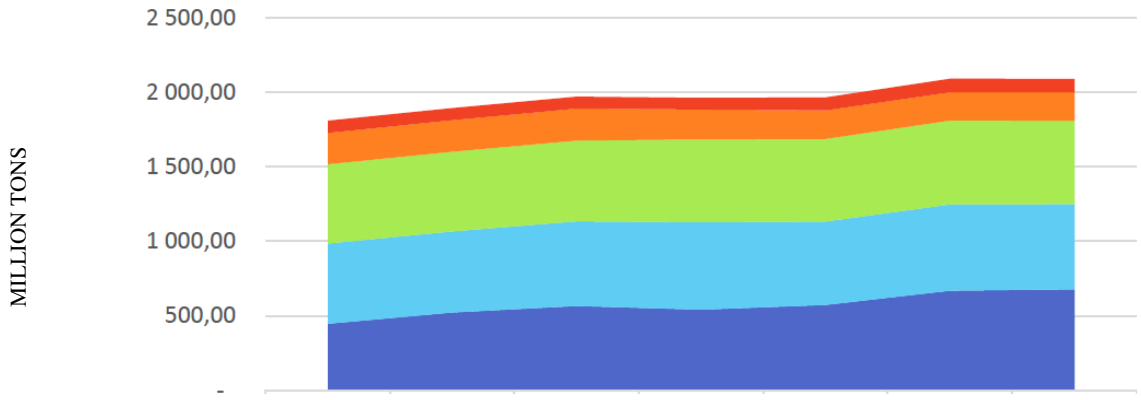

	2013	2014	2015	2016	2017	2018	2019
Kazakhstan	82.31	81.11	80.17	78.59	86.98	91.21	90.50
China	209.96	211.43	214.56	199.69	191.51	189.11	190.00
Russia	532.22	535.11	541.79	555.90	554.29	563.34	560.20
Saudi Arabia	538.41	543.82	568.03	586.71	559.32	578.34	571.40
USA	447.16	523.00	566.61	541.94	573.91	669.37	678.50

Fig. 2: Amounts of oil production in the USA, Saudi Arabia, Russia, China and Kazakhstan in 2013-2019 (Source: International Energy Agency).

The self-cost of oil production includes capital, production, transportation (transportation to oil storage facilities) expenses and taxes. These figures reflect the profitability of crude oil production in conjunction with its prices. As the curve in Figure 3 shows (Shabaeva, 2017), the cheapest oil production is in Saudi Arabia and in general in the OPEC countries. This is due to the fact that oil deposits are shallow and the Saudi Arabian producers are exempted from production taxes in respect to this natural fossil. The self-cost of oil production in Russia averages US$ 32 per barrel, but the price varies with the location, for example, according to RusEnergy's estimates, the self-cost of producing Arctic oil is about US$ 150 per barrel, since the complexity of extracting "black gold" is different. In these selected countries, China has the highest production self-cost. Oil is being extracted from hard to extract areas due to the rapid decline in fossil fuels with insufficient development of new fields. In Kazakhstan, this figure was $ 48.5 per barrel in 2019.

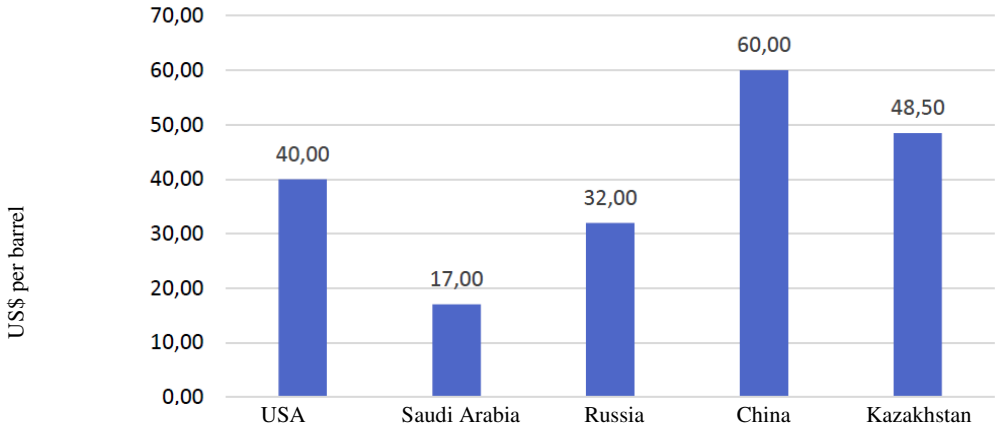

Fig. 3: Self-cost of oil production by country in 2019 (Source: International Energy Agency).

Global pricing is mainly related to the behavior of prices of Brent and WTI grades. Brent is considered the benchmark for its quality and is used by many countries to evaluate their own oils. With such a large impact of the Brent grade on global oil pricing, worldwide agitation about the latest trends starting in 2016 is easy to understand. When the price of Brent crude oil reached its lowest value. This is due to a number of causes, the main one being the increase in oil supply over its demand. For example, the production of OPEC countries in 2015 showed a record value and was 2524.8 million tons. In this regard, the OPEC countries – the largest exporters of oil, and Russia agreed to a cut in the output of "black gold". This decision delivered benefits and prices began to rise. The growth was + 24% already in 2017. However, in 2019, prices declined again; according to Reuters, the cause of the fall in prices for these grades of oil was the trade war between Washington and Beijing.

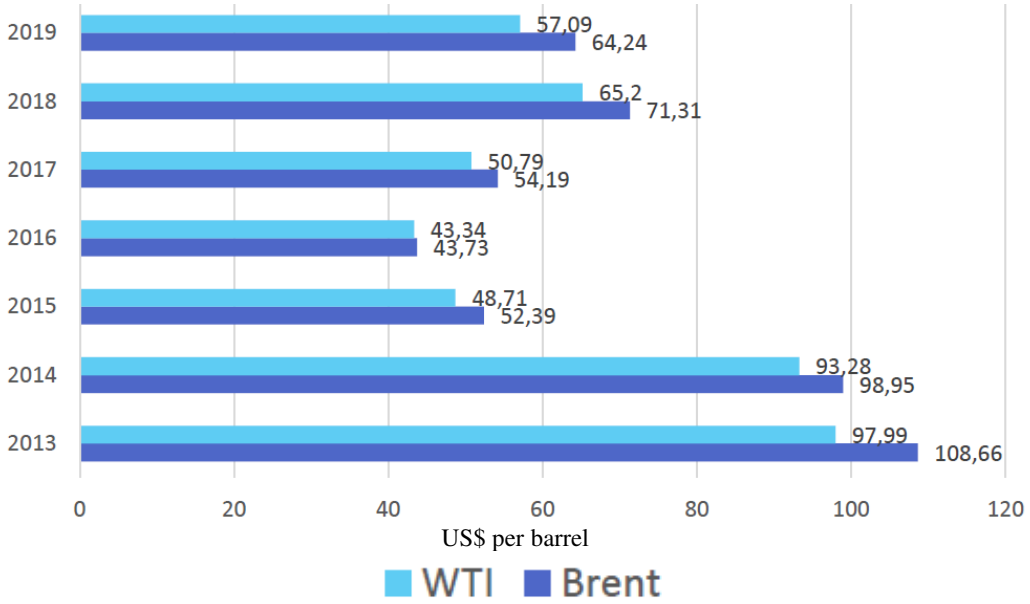

Fig. 4: Behavior of prices of Brent and WTI oil grades in 2013-2019 (Source: International Energy Agency).

As for natural gas production, there are two main producers – the USA and Russia, which top the list in this area (Fig. 5). During the whole period under analysis, gas production in China has been growing steadily. Russia saw a period of decline to 502.5 tons of oil equivalent in 2015 due to the reduction in domestic demand and export supplies. However, already in 2016, this changed due to an increase in gas supplies to boiler houses and power plants of the Unified Energy System of Russia, and due to an increase in exports to Europe in 2017.

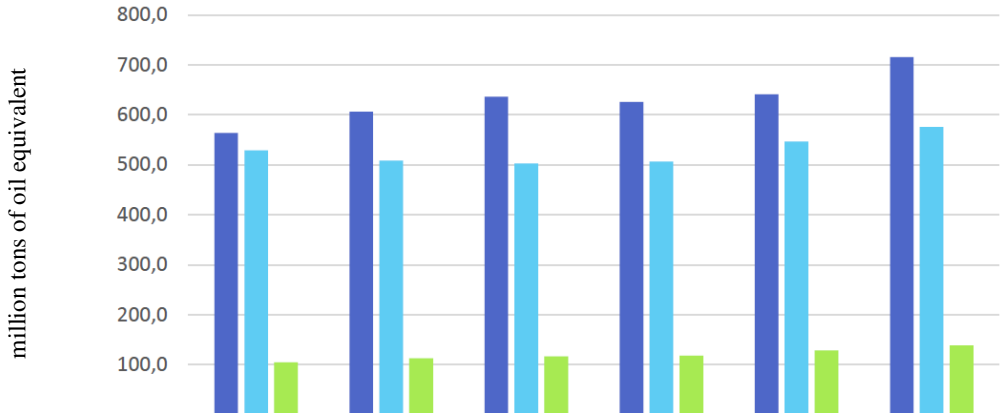

	2013	2014	2015	2016	2017	2018
USA	536.8	606.0	636.5	625.4	641.2	715.2
Russia	528.4	508.3	502.5	506.7	546.5	575.6
China	104.7	112.8	116.7	118.6	128.3	138.9

USA Russia China

Fig. 5: Natural gas production in the USA, Russia and China in 2013-2018 (Source: International Energy Agency).

Globally, the major nuclear energy producers are the USA, France, China and Russia, which are major nuclear powers and, therefore, their development in this industry is obvious (Fig. 6). Moreover, the main players among the SCO countries – China and Russia – are annually increasing electric power production due to NPPs. Thus, in Russia, 35 power units with a total capacity of 132.2 MW are in service at 10 operating NPPs. The nuclear power industry in China has 46 operating industrial nuclear reactors at 17 NPPs with a total capacity of 42.8 GW (as of October 2018) (Yakushkina, 2019). In addition, 12 units are under construction and about 30 are planned to be built. This development of the Chinese nuclear power industry is connected with the gradual abandonment of coal

utilization for power production due to the global problem of environmental degradation, climate change, and a general lack of sufficient energy resources for its own domestic consumption, not to mention exports.

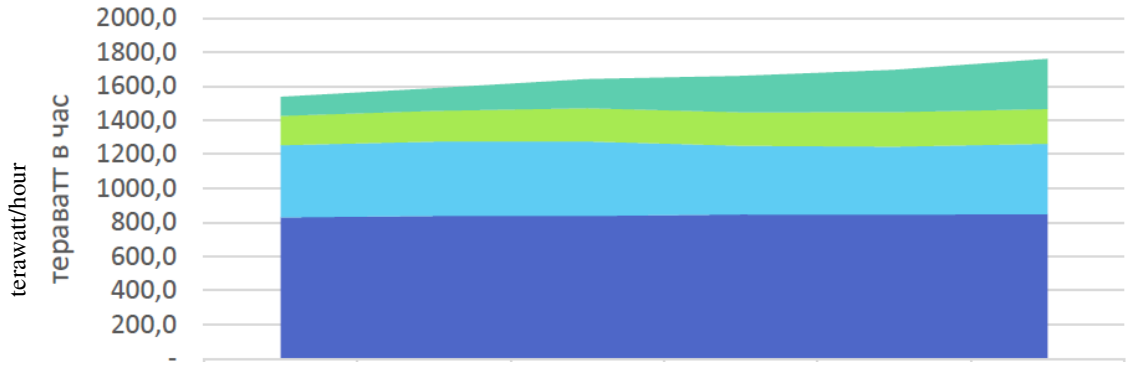

	2013	2014	2015	2016	2017	2018
China	111.6	132.5	170.8	213.3	248.1	294.4
Russia	172.5	180.8	195.5	196.6	203.1	204.5
France	423.7	436.5	437.4	403.2	398.4	413.2
USA	830.5	839.1	839.1	848.1	847.3	849.6

USA France Russia China

Fig. 6: Nuclear power production in the USA, France, Russia and China in 2013-2018 (Source: International Energy Agency).

In electric power production using hydro resources, the undisputed leader in generated electricity is China, which is 3 times as high as its closest competitor – Canada. Together with Russia, it maintains gradual growth, increasing its potential and share in this energy sector, given instability seen in Canada and Brazil. And India reached its record value of 139.7 terawatts per hour in electric power production using hydro resources in 2018, which is almost 6% higher than in 2013.

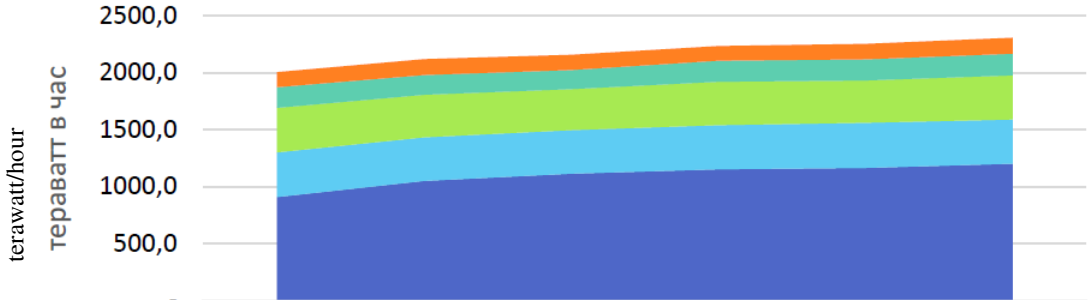

	2013	2014	2015	2016	2017	2018
India	132,0	139,0	133,3	128,4	135,7	139,7
Russia	181,2	173,4	168,0	184,8	185,3	190,2
Brazil	391,0	373,4	359,7	380,9	370,9	387,7
Canada	391,8	382,5	382,2	387,2	396,5	387,3
China	909,6	1051,1	1114,5	1153,3	1165,1	1202,4

China Canada Brazil Russia India

Fig. 7: Hydropower production in China, Canada, Brazil, Russia and India in 2013-2018 (Source: International Energy Agency).

As earlier noted, in connection with the global environmental concern – pollution of the atmosphere, water resources, carbon dioxide emissions, climate change and much more – society encountered a serious challenge of solving this problem, so those countries that have sufficient financial resources began to develop alternative sources – mainly solar batteries and wind-powered generators. From 2013 to 2018, a stable growth was seen in all the countries shown in Figure 8. However, China is distinguished, which has by now become the leader in power production using renewable sources, a sharp increase in which in 2016 was + 27% per year, and that of India was +19 %. At the moment, the figures continue to grow at a quick pace.

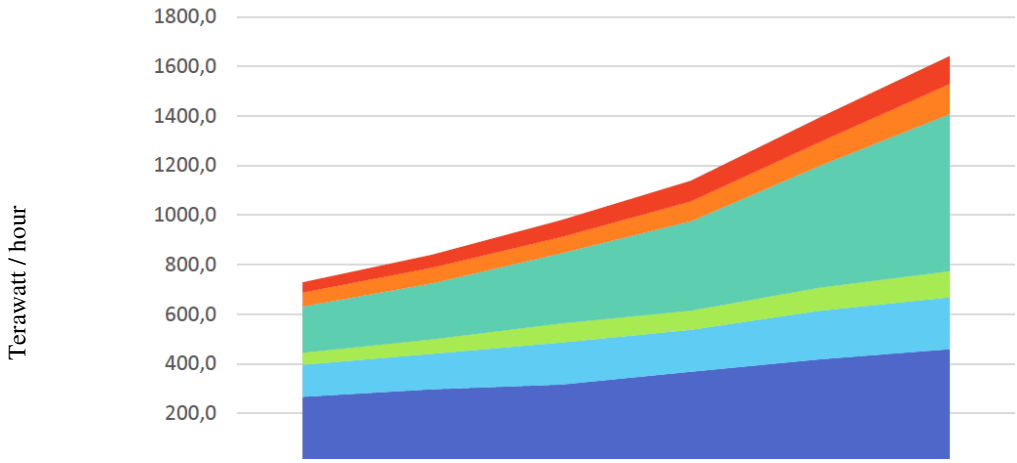

	2013	2014	2015	2016	2017	2018
Japan	41,2	52,2	68,2	83,1	98,8	112,1
India	55,9	63,0	65,1	79,8	95,8	121,5
China	186,9	226,0	283,4	360,9	492,4	634,2
UK	48,5	58,6	77,1	77,7	93,4	105,6
Germany	129,3	142,9	169,8	169,1	196,2	209,2
USA	266,2	296,8	315,8	367,4	417,8	458,5

Fig. 8: Renewable energy production in the USA, Germany, UK, China, India and Japan in 2013-2018 (Source: International Energy Agency).

The main sources of renewable energy are wind and sun. Figure 9 shows the ratios of the countries where this industry is most developed in electric power production using the above sources. The wind potential still plays a great role, since it tends to prevail over the solar potential in the USA, Great Britain, Germany, China, India. An interesting situation is in Japan, where more than 90% of renewable energy is produced using solar resources, which confirms the second name of the nation: "the Land of the Rising Sun".

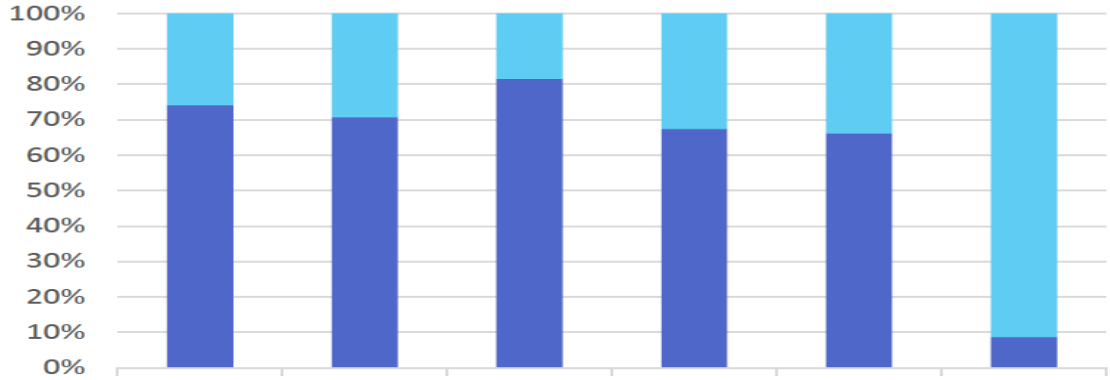

	USA	Germany	UK	China	India	Japan
Sun	97.1	46.2	12.9	177.5	30.7	71.7
Wind	277.7	111.6	57.1	366.0	60.3	6.8

Fig. 9: Renewable energy production in 2013-2018 (Source: International Energy Agency).

The analysis of the resource availability of the SCO countries makes it possible to conclude that half of the organization's countries do not have sufficient reserves of energy resources that could contribute to the sustainable growth of the nations' economies. In comparison with other leaders of the Shanghai Cooperation Organization, the figures of Uzbekistan, Tajikistan, Kyrgyzstan and Pakistan in the energy sector are insignificant at the world level, and, therefore, interaction among the SCO countries is inefficient and hinders the progress of the whole organization (Koldunova, 2013). Then, what are benefits for Russia, China, Kazakhstan from cooperation with them, or benefits for other countries from the main players of the SCO, and what are the reasons for this interaction?

Internal trade turnover among the SCO countries and the share of the fuel and energy complex in its structure are shown in Figure 10. The behavior over time shows a relatively symmetrical change in the internal total trade turnover and internal FEC trade turnover, that is, the observed trends of the two indicators coincide on the chart. In 2018, the share of the FEC in internal trade between the SCO countries reached a record value in the entire period under analysis, that is, the growth was + 10.7% from 2013 to 2018. However, there was a sharp decline in 2016. This was due to a sharp drop in oil prices, therefore, the turnover in terms of value also showed the decline, given that the main energy resource is oil despite the development of alternative energy sources.

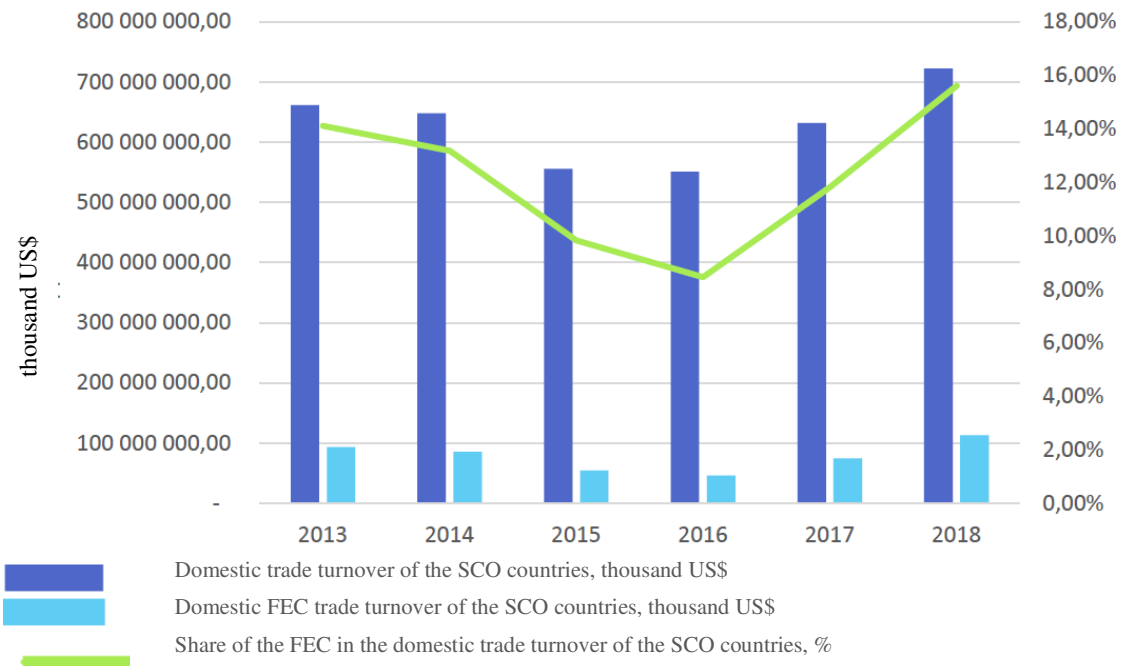

Fig. 10: Share of the FEC in the domestic trade turnover of the SCO countries in 2013-2018 (Source: TrendEconomy).

Figure 11 shows a diagram as evidence discussed earlier regarding the contribution to the development of the energy sector of the Shanghai Cooperation Organization member states. It shows the contribution of the SCO countries in the internal trade turnover of fuel and energy resources in 2013-2018. Thus, there are two main leaders in interaction in the SCO energy sector – China and Russia. It is they that have figures that are several times higher than those of the other countries. For example, in 2018, trade in the energy sector reached record values of + 40% for Russia and + 59% for China. In most cases, this awesome growth is due to the trade war between China and the USA and the rise in oil prices. This resulted in the decrease of the export of energy resources from the United States to China by -43%, unleashing the floodgates for Russian exports of fuel and energy resources. The next countries that are gathering pace in energy cooperation among the SCO countries are Kazakhstan and India. The growth of India's contribution to the domestic FEC trade turnover starting from 2017 – when the state acceded to the SCO –

shows good growth rates: + 128.5% in 2016 against 2017 and + 44.24% in 2017 against 2018. After a decline seen from 2013 to 2016, Kazakhstan is gradually attempting to return to previous volumes. Upon recovered from the oil price shock in 2015-2016, the growth rate was 119% in 2017and + 46% in 2018. An increase in the turnover of the fuel and energy complex is also typical for Uzbekistan; in 2018, the record value of this indicator for the period of 2013-2018 was US$ 2.5 billion. Trade of the other countries within the SCO in the fuel and energy complex is also in gradual increase, but does not show significant success.

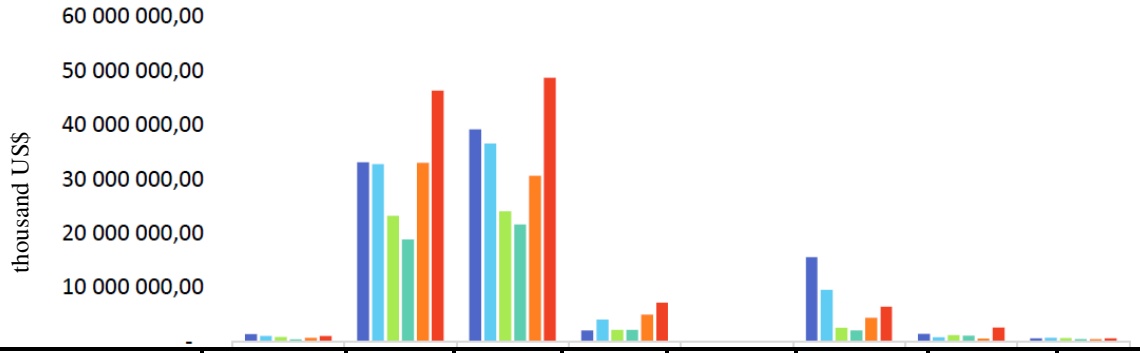

	Kyrgystan	Russia	China	India	Pakistan	Kazakhstan	Uzbekistan	Tajikistan
2013	1,366,4	33,102	39,174	2,037,7	63,926.	15,553	1,401,2	546,609
2014	986,531	32,700	36,551	4,007,9	73,909.	9,573,2	755,360	692,362
2015	798,952	23,228	24,064	2,114,1	57,005.	2,506,4	1,143.4	628,250
2016	410,529	18,853	21,596	2,164,3	53,576,	2,004,9	1,045,1	422,095
2017	682,744	32,983	30,610	4,924,8	95,036,	4,383,1	512,996	435,333
2018	978,671	46,294	48,294	7.103,4	121,987,	6,404,6	2,539.9	578,444

2013 2014 2015 2016 2017 2018

Figure 11: Trade turnover of the FEC within the SCO countries in 2013-2018 (Source: TrendEconomy).

Based on the figures of China and Russia, their dependence on the rest of the organization's countries should be analyzed. To this end, Tables 1 and 2 have been compiled, which clearly show the contribution of all the members of the organization to the turnover of China's and Russia's FEC in the Shanghai Cooperation Organization.

Table 1 shows the importance of the SCO countries in the trade turnover of Chinese fuel and energy resources, and also shows the interaction structure in export-import operations.

Table 1: Place of the SCO countries in China's trade turnover (Source: TrendEconomy)

Country	Domestic FEC trade turnover with China, thousand US$	Share of FEC exports to China in total exports within the SCO countries, %	Share of FEC imports from China in total imports within the SCO countries	Balance
Russia	41,359,375.37	99.68%	0.32%	41,093,454.03
Kazakhstan	2,187,577.97	98.29%	1.71%	2,112,806.88
India	4,360,484.55	73.89%	26.11%	2,083,689.32
Pakistan	41,192.52	0.00%	100.00%	-,41,192.52
Uzbekistan	491,370.33	55.40%	44.60%	53,035.57
Kyrgyzstan	13,938.21	94.23%	5.77%	12,329.11
Tajikistan	251,230.00	44.51%	55.49%	-,27,570.82

Most countries of the group have a surplus in energy resources trade with China (Fig. 12). This indicates that China's participation in the Shanghai Cooperation Organization means expansion of import opportunities for the

country. The main partner in this alliance is Russia (the share of exports in the commodity structure of China's FEC was more than 95%), followed by India with a share of about 9%, then followed by Kazakhstan with about 4.5% and Uzbekistan with a little more than 1%. The share of the other countries is less than 1%.

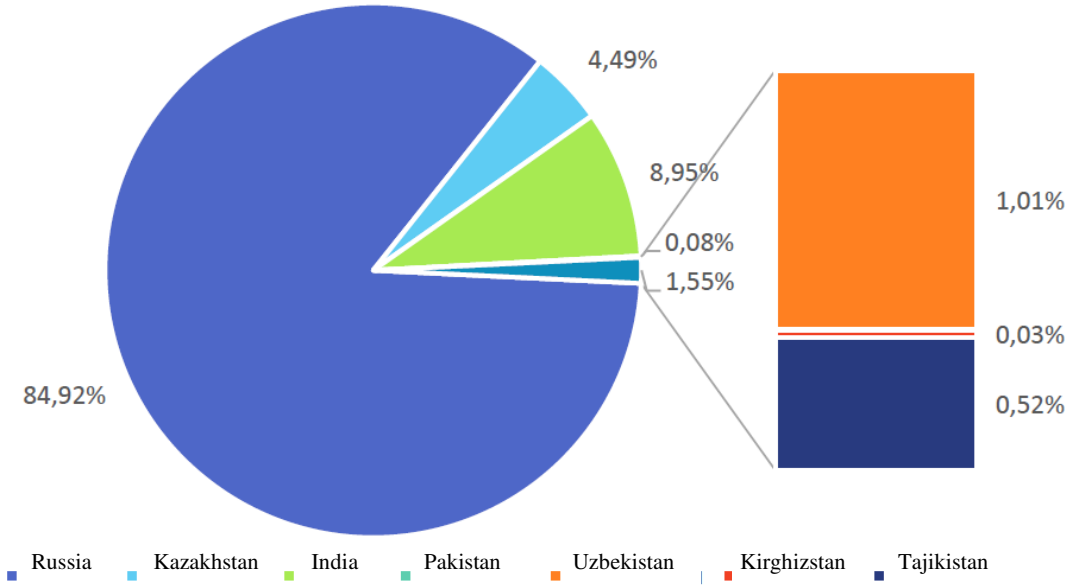

Fig. 12: Country's share in the trade turnover of China's FEC within the SCO, % (Source: TrendEconomy).

According to ICIS, China's dependence on energy resource imports will increase from year to year. The causes of the increased dependence on imported raw materials are:

firstly, an increase in refining capacity in China, i.e., due to increase in energy consumption, in particular, by power-consuming industries that form the core of the country's exports (China plans to become the most powerful energy-processing power ahead of the USA by 2024),

secondly, the transition from the utilization of coal to natural gas due to the aggravated environmental situation (intensive coal combustion for power generation has resulted in large carbon dioxide emissions),

thirdly, an increase in the population, despite restrictions imposed by the authorities.

In the aggregate, all this means that the SCO has a potential for development in this area, and not only for Russia, but also for other members of the organization (Alexandrova, 2020).

The fuel and energy complex in the structure of the Russian economy is much more important than in developed countries. In Russia, the fuel and energy complex serves not only as an infrastructure, but is also the main complex of the national economy, providing a considerable part of the country's revenues: 2/3 of export revenues, more than 40% of tax revenues to the budget and more than 27% of the GDP. For that reason, most attention is by default paid to the prospects for the development of this complex (Sinyak, 2017).

The situation in the FEC of the other SCO member states is different (Table 2). All the countries of the organization have a trade balance deficit in the FEC. This indicates that Russia is a net exporter of energy resources, and the SCO countries are more or less dependent on fuel and energy exports to satisfy domestic demand, primarily that of the industrial sector (Minakir, 2017).

Table 2: Place of the SCO countries in Russia's trade turnover (Source: TrendEconomy)

Country	Domestic FEC trade turnover with Russia, thousand US$	Share of FEC exports to Russia in FEC trade turnover within the SCO, %	Share of FEC imports from Russia in total imports within the SCO countries, %	Balance
China	41 359 375,37	0,32%	99,68%	- 41 093 454,03
Kazakhstan	1 827 981,36	25,21%	74,79%	- 906 240,58
India	1 722 282,27	0,38%	99,62%	- 1 709 253,85
Pakistan	54 550,79	0,00%	100,00%	- 54 550,79
Uzbekistan	723 170,44	7,64%	92,36%	- 612 704,34
Kyrgyzstan	425 003,78	1,06%	98,94%	- 415 960,17
Tajikistan	182 232,60	2,64%	97,36%	- 172 604,80

Thus, the priority area of the Russian development of export relations is China (the share of energy resource exports to this country from the Russian Federation was 89%). The next country in the share of the trade turnover of the Russian FEC is Kazakhstan – 3.9%, and the share of exported energy resources to Kazakhstan was about 75%. Next is India with a share of 3.7% in the FEC trade turnover with Russia, almost 100% of this share are imports. The share of each of Uzbekistan, Kyrgyzstan, Tajikistan and Pakistan is less than 1%, and the imports of the FEC from Russia is more than 90% in their figures.

Upon considering the place and influence of the SCO countries in the fuel and energy resources trade turnover of the leaders of the Shanghai Cooperation Organization, we will analyze how, in general, the countries depend on interaction in the energy industry within this organization. This will make it possible to determine the advantages of cooperation between the SCO member states.

The data of the official statistical agencies of the countries and foreign TrendEconomy Open Data Portal were used to draw up Table 3, which reflects the degree of the member countries' dependence on the FEC trade turnover within the SCO (the percentage ratio of the FEC trade turnover of the SCO countries within the organization to the total FEC trade turnover of the SCO countries).

Table 3: Dependence of the SCO countries on the FEC trade turnover within the organization in 2013-2018, % (Source: TrendEconomy).

Country	2013	2014	2015	2016	2017	2018
Russia	3,92	4,18	4,42	4,03	5,65	6,73
China	11,40	10,60	10,28	11,22	10,64	12,18
India	0,72	1,47	0,81	1,41	3,79	4,10
Kazakhstan	24,12	15,90	8,24	9,04	14,50	15,18
Pakistan	0,10	0,12	0,19	0,24	0,31	0,29
Uzbekistan	31,60	19,00	33,53	45,31	56,71	71,51
Kyrgyzstan	94,47	76,15	79,02	71,40	94,27	94,04
Tajikistan	81,27	85,02	95,99	80,54	84,40	90,07
Domestic FEC trade turnover of the SCO countries, %	**5,80**	**5,59**	**5,02**	**5,41**	**7,00**	**8,35**

As a result, it can be noted that the share of dependence of India and Pakistan was the lowest and was 4.1% and 0.29%, respectively, that of Russia and China was 6.73% and 12.78%, respectively, and that of Kazakhstan was 15.18%. These countries show a gradual increase in dependence on the FEC trade turnover within the countries, which indicates progress in cooperation with one another. As expected, in spite of insignificant figures at the global level, Uzbekistan, Kyrgyzstan and Tajikistan are most dependent on energy interaction within the organization with their share of dependence of 71.51%, 94%, 90.07%, respectively. However, this dependence implies a slowdown in the development of the SCO in the energy sector, as a large share of the trade turnover of these countries is formed by their imports due to the lack of energy resources (Romashkina, 2017).

After the collapse of the USSR, where there was a well-defined specialization of countries, Russia, Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan had to rebuild their states. Russia was the luckiest due to its significant reserves of energy resources. Kazakhstan was a little less lucky, but compared to the other countries, the situation has more or less stabilized due to oil and uranium. However, the fortune turned away from the other countries of the former USSR that were SCO members. As they had little or no FEC, the economies of the countries have not seen economic growth, since there is no investment object. Due to their unattractive investment position, these countries do not receive funds that could be invested for development. Up to now, these countries have used outdated infrastructure left after the collapse of the USSR (Kolegova, 2013).

Conclusion

The analysis of the resource availability of the SCO countries allows the following conclusions:

1. Russia and China are two countries that have significant energy resources and a certain weight in the world market. India and Kazakhstan also have a resource potential, which is definitely not so significant compared to the world leaders, but which plays a significant role in some energy sectors;

2. compared to Russia, whose national well-being depends on the extraction and export of energy resources, China, on the contrary, depends on imports thereof due to its powerful economy, which is primarily focused on the production of high-tech products, therefore, there is a shortage of its own resources, and a growing population size only aggravates the situation. This is also the case of Kazakhstan – an exporter and India – an importer. However, the role of the other countries (Uzbekistan, Kyrgyzstan, Tajikistan and Pakistan) is extremely minor, and their share is so miniscule that it is not taken into account on the world stage. This explains the significant slowdown in the development not only of the energy industry, but also the Shanghai Cooperation Organization as a whole.

3. our analysis made it possible to identify the benefits of the Shanghai Cooperation Organization member states from common interaction in the energy sector and their role in the further development of the alliance. Russia and China are a kind of engine rooms for the SCO. China is developing economic cooperation with the SCO countries, in particular, in provision of reliable energy resource supplies to the country, and in creation of transport corridors for the export of Chinese products to Europe and to the internal markets of the SCO member states. Russia, first of all, is interested to develop economic cooperation with China, as it is China that is a growing importer of energy resources, and expand sales markets in the Asian region, similarly to Kazakhstan. Uzbekistan, Kyrgyzstan and Tajikistan are interested to obtain privileges in respect to the imports of energy resources in order to at least maintain the operation of their economies, mainly from Russia, and big up their status in connection with participation in the alliance with world powers. India needs reliable supplies of raw materials and energy resources, so does Pakistan, for their rapidly growing economies and they are interested in this respect in cooperation with the countries of the region, including within the SCO.

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Navigating Uncharted Waters – The Shipping Sector's Response to the COVID-19 Pandemic and Its Impact on The Perishable Food Supply Chains

Magdalena KLOPOTT

Gdynia Maritime University, Poland
m.klopott@wpit.umg.edu.pl

Abstract

The global reefer trade of perishable food products (e.g. meat, vegetables) safeguards rising demand for food globally, contributing to the struggle against famine or malnutrition worldwide. Unfortunately, the COVID-19 pandemic has not spared shipping. Although the maritime sector has experienced many crises in its history, the recent global upheaval seems to be quite different, impacting the industry in two critical ways: a steep decrease in demand for shipping services, as well as by huge operational disruptions that no one was prepared for.
Therefore, in the light of the current development of the coronavirus situation globally, the aim of this article is to scrutinize how shipping lines have managed disruptions caused by the pandemic and to investigate the ripple effects of measures taken by them on the perishable food supply chains (PFSC).
The article starts with a glance at the global trade and maritime transport of perishable chilled or frozen food products and highlights the unique features of the PFSC, which make them significantly more vulnerable and prone to operational disruptions than other supply chains. Further on, disruptions in the maritime reefer shipping unleashed by the COVID-19 pandemic are examined as well as measures undertaken by ocean carriers in response to these disruptions. Finally, the ripple effects of these disturbances on PFSC management are scrutinized.
The article reveals, that COVID-19 has placed unprecedented stress on the perishable food supply chains on a global scale and highlights certain limitations in the containerised trade of refrigerated products. First, congestion in seaports caused by measures taken after the coronavirus outbreak had detrimental effects on reefer operations, as they led to a massive shortage of electrical plug points in the ports to connect the reefer containers. Moreover, as a response to the congestion and to declining demand for shipping services, ocean carriers have restructured their service scheme by ships' capacity management (e.g. by the cancellation of sailings). This, in turn, has had a huge repercussion on PFSC globally, resulting in an urgent need to address challenges such as enormous delays in cargo deliveries, shortage of reefer containers, and a lack of container ships' capacity for perishable cargo. Furthermore, shippers have experienced increasing difficulties in keeping up with carrier scheduling changes, that rendered mid-term and long-term planning extremely difficult. Generally, the ripple effects of the pandemic have been more pronounced for the cold logistics of perishables than for those for dry cargo. The regrettable consequences of these disruptions are huge perishable food cargo losses and food wastage along the entire supply chain.

Keywords: Reefer Shipping, Disruption Management, Coronavirus Disruption, Perishables, Cold Supply Chains, Port Congestion, Reefer Shortage.

Introduction

Along with an increase in the world's demand for food, the global demand for perishable commodities (chilled and frozen food products) is also growing, which is reflected by the steady growth of perishable trade since 2000, with a CAGR 3,9% (Klopott, 2019). This trend is particularly visible in the most promising markets of Asia Pacific, South America, and the Middle East.

Consequently, the same tendency is observed in seaborne reefer traffic, which, according to Drewry forecasts (Drewry, 2020), will reach 156 million tonnes by 2024, representing a CAGR of 3.7%, which is more rapid than the growth

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anticipated in the dry cargo trade. Despite of a smaller increase in 2019 (only 1,7%, and 130.5 million carried tones of perishables), that was caused by natural disturbances (weather, diseases etc.), it is forecasted that reefer trade will be more recession proof (Drewry, 2020), given the broader resilience of the food supply chains (Stone and Rahimifard, 2018).

The contemporary global trade of perishables relies more on shipments in refrigerated containers on container vessels than on dedicated, specialized reefer ships, which was a norm some time ago. In 2019 as much as about 80% of total perishable cargo was carried on-board container vessels, carrying about 10.6 million TEU, whereas the conventional reefer fleet started to sink into oblivion (Drewry, 2020; Waals, 2019). It has a certain repercussion on global PFSC, since it caused their strong dependence on the liner shipping services[i] and the need to comply with ocean carriers' schedules and organisational procedures.

It is essential to note, that supply chains (SC) of perishable food (PF), are very complex and require continuous and uninterrupted cooling for preservation, as well as controlled humidity and air composition throughout the whole SC. Perishables deteriorate easily, have a limited shelf life and their prices are time-sensitive (Klopott, 2019), therefore breaking the cold SC integrity (i.e. any deviation from precisely defined conditions as e.g. temperature), as well as delays in transit, may potentially lead to losses of food cargo (Aung & Chang, 2014; Klopott, 2019). All this makes the PFSC significantly more vulnerable and prone to operational disruptions than other SC.

The recent outbreak of a new coronavirus SARS-COV-2 has come as shock on all stages of the PFSC, but it did not equally affect different parties of the chains. (OECD, 2020c) Therefore, in the light of global pandemic, and having in mind the importance of global perishable food supply chains, their complexity and fragility, as well as the role of container reefer shipping in safeguarding those chains, three research questions arise:

1. What kind of disruptions in the PFSC were caused by the COVID-19 pandemic?
2. How did shipping lines respond to these disruptions? What measures have been put in place by ocean carriers?
3. What are the repercussions for the PFSC caused by measures undertaken by ocean lines?

In order to answer these questions, information and data from ocean carriers' websites (carriers belonging to one of the three global ocean alliances: 2M, THE Alliance, Ocean Alliance) have been systematically gathered and scrutinized since the end of January until the end of August 2020. Furthermore, circulars, newsletters, and documents issued by those carriers, referring to rate announcements and route scheduling, since the end of January until the end of August 2020, have been carefully analysed. In order to augment gathered data with expertise opinions, qualitative research interview (Qu and Dumay, 2011) with seven professionals working in the maritime freight forwarding and logistics business was conducted in the end of August 2020.

Maritime Reefer Transport Disruptions Generated by the COVID-19 Pandemic – Ocean Carriers' Response

Shipping sector has experienced many economic crises in its history, however the recent global upheaval, generated by the outbreak COVID-19 is quite different, impacting the industry in two critical ways: by a decrease in demand for shipping services, as well as by huge operational disruptions that no one was prepared for. (Heiland and Ulltveit-Moe, 2020)
At the beginning of 2020, a lot of measures were put in place in countries attacked by SARS-COV-2 virus in order to prevent or slow the spread of the new disease COVID-19. Then, a serious looming risk as congested ports and changes in ocean carriers' schedules have started to jeopardize the functioning of perishable food supply chains on a global scale.

Congestions in Seaports

First, the coronavirus outbreak has severely impacted some of the Chinese ports like Shanghai, Ningbo, Xingang, Shenzhen or Yantian (Kelly, 2020). The everyday management of container terminals' operations have been inhibited by measures and preventive actions undertaken by port authorities and government. It resulted in unprecedented congestions, that is to say, that in a lot of cases vessels had to queue up outside the port waiting for available berth to unload or load the cargo. Among factors that have triggered seaport congestion are:

1. the scarcity of terminal and port workers due to mandatory quarantine and lockdown,
2. changes in terminal work organization,
3. the slowdown in the clearance of imports,
4. deferring or delaying receipt of containers after clearance by some consignees,
5. restricted access to roads,
6. restriction on container movements,
7. the shortage of truck drivers, and
8. enormous backups at storage facilities.

Considering the fact that China is home for 7 of the world's top 10 container ports (UNCTAD, 2019), the ripple effects on the PFSC management was really noticeable worldwide. Along with spreading the coronavirus, subsequent ports experienced Covid-19-driven congestion in India, North and South America, and Philippines. Unfortunately, in August, when the situation eased slightly, shippers[ii] experienced the second wave of congestion, this time cause by additional screening and other preventive measures taken in ports (e.g. in China) after coronavirus was found on cargo packaging from Brazil and Ecuador. (Putzger, 2020)

In particular, congestion has detrimental effects on reefer operation (Manaadiar, 2020), as it leads to a massive shortage of electrical plug points in the ports to connect the reefer containers, that should be done immediately after discharge in order to safeguard uninterrupted cold chain. Unfortunately, many shipping lines were unable to discharge reefer containers at the designated ports because most reefer plugs were totally utilized. The situation was the more severe because, as mentioned previously, perishable cargo is time-sensitive, has limited shelf life, and its market value is decreasing the longer time of transit is.

Ocean carriers addressed the congestion problem in a similar way by:

1. giving customers an option to divert cargo to different port or even ship it back to the port of loading,
2. invoking clause 19 of Bill of Lading[iii], and
3. introducing a Port Congestion Surcharge (PSC) to the basic freight rate.

In order to avoid congested ports, ocean carriers (e.g. Maersk, CMA CGM, MSC, ONE, Hapag Lloyd) recommended diverting containers to other ports or even countries. This recommendation was of particular importance for the perishable, time-sensitive and chilled cargo. In the case, when goods were already in transit, some carriers offered free of charge possibility to change the destination port (e.g. Maersk). However, in a case, when customers insisted on shipping to congested ports, they had to accept that the routing, transit and delivery time to these ports were not guaranteed.

Amid all of this, ocean carries started to exercise their rights stipulated in one clause of Bill of Lading (usually clause 19 of terms and conditions), written in very tiny print, of which customers were not always aware. This includes the right of a carrier to discharge a reefer container at an intermediate or alternative port without the consent of the merchant, where the goods could be stored ashore or afloat until it is possible to forward them to the designated port of discharge. And in case when it was not be possible, even to abandon the voyage.

Furthermore, shipping lines, due to the ongoing terminal reefer plug shortage, have also implemented a congestion surcharge per every reefer container, in order to cover losses and additional expenses caused by congestion and idle time for vessels serving the port. Shippers had to pay in addition to the basic freight rate (FAK) an incomparably high surcharge e.g. USD 1000 (Maersk, ONE) or even USD 1250 (CMA CGM) per reefer container for cargoes to specified Chinese ports, whereas the FAK rate was about USD 2500.

Reduction in number of vessels' calls and liner shipping services

Port congestions, however, have not been the only gripe of shippers. At the beginning of 2020, as a result of the lockdown in China, many shipping lines announced changes in their liner schedules and services connecting China with other major shipping ports around the world. The primary reason for it was the need to significantly reduce the spread of the highly contagious coronavirus, as well as to bypass congested ports. However, thereafter, ocean carriers started to

restructure their service scheme by efficient ships' capacity management in order to meet declining demand and to avoid freight rates collapse.

Capacity management and reorganization of services took the form of:

1. so called blank sailings (void sailings), that refer to:
   - a sailing bypassing one or more specific ports on the route (while still traversing the rest of the scheduled route), e.g. because of operational inefficiency of congested ports,
   - reduction of the number of vessels on the routes,
   - skipping one particular voyage of one vessel;
2. cancelling or suspending the entire sailing route (loop) for a given period of time, or only outbound or inbound voyages belonging to these routes (e.g. 2M alliance partners Maersk and MSC suspended Asia-Europe AE2/Swan and AE20/Dragon services for the full third quarter of 2020);
3. merging strings from different routes, thereby introducing a new rotation;
4. adjustments of vessels' capacity (e.g. m/v "HMM Algerciras", the world's largest containership, with a capacity of 24,000 TEU, was idled for indefinite period and was substituted by vessels with a capacity of 7,500 – 11,000 TEU on the FE4 loop from Quingdao in China).

From the beginning of the pandemic cancellation of voyages were increasing and reached historic highs during this period. According to data provided by Ocean Insights (2020) the number of blank sailing announcements between mid-March until the end of April 2020 reached as much as 386. In numbers, these cancellations in the trans-Pacific routes amounted to the equivalent of 198,500 TEUs, and to 151,000 TEUs between Europe and Asia. (Moss, 2020)
Regarding the service suspension plans of sea carriers, as they still struggle to match capacity with falling demand, there have been announced 191 blank or suspended services across the world for the months of August and September (Ocean Insights, 2020). Shipowners operating on Asia- Europe liner services intended to void 17% of Asia-Europe capacity during September (Wacket, 2020). Similar plans involve North America routes as well. THEA and 2M alliances alone announced 75 blank services for September.

Overall, the efficient capacity management by ocean carriers yielded better results than it was expected, and, considering the Q2 figures published by container lines, they are, in general, actually more profitable than a year ago, despite decreasing volumes and revenues. It seems, that ocean carriers weathered the crisis relatively well.

Repercussion of the ocean carriers' measures on the PFSC

The research has revealed that measures undertaken by ocean carriers as a response to port congestions, as well as to a falling demand for ocean services had a ripple effect on the entire PFSC management, as disruption in one part of the supply chain causes a bottleneck and will trigger disruption elsewhere (Ivanov et.al., 2019). Although, operations on the main sea terminals have revived to some extent, the knock-on effects are still noticeable.

Freight forwarders and logistics providers are among many parties in supply chains grappling with these logistical disturbances. As their role is to facilitate the movements of goods worldwide, they are generally used to work in uncertain environment. However, this pandemic brought unseen turbulences to their everyday work, and consequently to their customers' businesses, especially those trading the perishable food. Enormous delays in cargo deliveries, constant changes in rates, frequent last-minute cancellations of sailings, a shortage of reefer containers, lack of ships' capacity for perishable cargo were among challenges that had to be answered immediately. The need for exceptional SC management has become more important than ever.

From the beginning of 2020, reefer operations have been dominated by **delays unseen on such a scale**: delays in deliveries to destination ports, delays in getting empty reefer containers back, delays in reception of reefer containers after clearance. In some regions and routes delays have taken as long as 3-4 weeks, and shippers had to wait for FAV (i.e. first available vessel) for weeks. It constituted additional risk to perishable food cold chains, because, as it was mentioned earlier, any increase in transit time can negatively affect the quality of cargo and shorten its shelf life, leading to losses and wastage.

Furthermore, congestions and restrictions on container movements have led to **the refrigerated containers shortage** in particular. It is worth noting, that, regardless of whether there is a pandemic or not, the availability of refrigerated container equipment always remains a challenge due to the highly imbalanced nature of reefer trade routes, as well as because reefers manufacturing does not keep pace with projected cargo demand. Therefore, once the pandemic went global, it was nearly impossible to get reefer containers when and where they were needed. Delays in reefer container collection by importers, as well as liner schedule changes only exacerbate the shortage of reefers. Shippers really struggled to get reefer containers, which was often impossible, and exporters were not able to ship their perishable cargo at all! This have had a huge repercussion on major fruit exporting countries (e.g. Chile, Equador), which need a constant flow of empty reefer boxes, and their shortage have affected a multitude of trade routes.
As mentioned earlier, an increasing number of operational limitations around the world have also triggered ocean schedule changes at a rapid pace. Given the high likelihood of changes, **maritime PFSC planning has become virtually impossible in mid-terms and long-terms** in some directions, as majority of sea carriers decided to limit booking approvals to only several weeks out, as for longer terms they were not able to provide reliable, accurate vessel outlook. For shippers it has become increasingly difficult to keep up with carrier scheduling changes. The chaos has been exacerbated by **a lot of inefficiencies in communications systems** among carriers, ports, terminals, and shippers. Interviewed freight forwarders have complained about insufficient, inconsistent and non-coherent information, as well as different and changing means of communication, even among the alliance partners. They also pointed out confusions over whether a service was blanked or suspended, and over sometimes different information, that came from alliance partners as to when a loop would be reactivated. Moreover, they indicated the lack of uniform patterns in cancellations between the alliances, that only added uncertainty to PFSC planning.

Another, but probably the most acute repercussion for PFCS managers has been **the lack of capacity of containerships for perishable cargo**, as ocean lines continue to suspend their loops as there is no sufficient quantity of cargo to utilize the capacity of the existing fleet. However, having in mind, that on every ship there is only some limited space (TEU electric plugs) for reefer containers, shippers of this kind of cargo are facing the problem of moving it forward to the place of destination. Moreover, as mentioned earlier, shipping lines have also responded to the lower trade volumes, not only by changing schedules, but also by **replacing large volume vessels, e.g. with a capacity of 24,000 TEU, with smaller ones of capacity from 5,000 - 11,000 TEU**. This practice had an adverse effect on the PFSC management, as there was too little space for reefer containers and shippers faced difficulties with ensuring enough capacity for their perishable cargoes.

In the light of a severe capacity crisis, a shortage of reefers, and uncertainties in scheduling, shippers were forced to **search for alternative ways to ship perishable goods**. Some highly skilled freight forwarders managed to ensure perishable cargo shipments by chartering vessel for a voyage(s) between specific ports or for a given period of time. In other words, they returned to conventional, dedicated reefer ships – with containers on deck and pallets in the hold – that were neglected in the recent years. Being a charterer means, that shippers can dictate loading and discharge schedules and no longer need to rely on ocean container services, so they can completely safeguard their shipments. Consequently, while container lines continue to see large downfalls in demand resulting from the pandemic, traditional reefer ships are seeing an uptick in business. (Whelan, 2020) Ripples from the global pandemic helped specialized reefer sector make a comeback. (Sowinski, 2020) Probably, this trend will continue, and some interviewees expressed the opinion that it is highly probable that cancelation of routes will be the rule, as keeping the vessels capacity below demand allows ocean carriers to keep freight rates high and thereby remain profitable, notwithstanding the repercussion on the global PFSCs.

All these disturbances involve **additional costs** for shippers and cargo owners and could be finally pass on to the final customer. Thus, firstly, the costs of delays: containers were off loaded in an alternate location (even in a different country) or waited for reception by a cargo owner in various ports, which incurred additional expenses to shipper e.g. port storage, demurrage[iv] and plugging, that can at times accrue up to 20 times the value of the container itself. Therefore, some countries (e.g. the Indian government) decided to obligatorily waive all extra charges such as demurrage or detention and this measure was a real relief for cargo owners (OECD, 2020b). Secondly, unexpected costs resulting from congestion surcharges and rising freight rates on some routes, that were not driven by economic situation, but by organizational issues. While it is not unusual for shippers, that the freight rates change on a regular basis, the magnitude of these changes was sometimes shocking (on some Europe-Asia routes from 40 to 60 percent).

Conclusions

The level of disruptions in global supply chains caused by the COVID-19 pandemic was not heterogenous, and, generally, the greater the role of a country in a maritime trade, the more noticeable and severe was the impact on supply chains. It is worth pinpointing, that the Asia Pacific countries, mainly China, are a case in point. And although maritime transport operations revived to some extent, the knock-on effects are still noticeable.

Overall, the ripple effects of the pandemic have been more pronounced for perishable food logistics than those for dry cargo. Rapidly changing shipping schedules, a shortage of reefer containers, a lack of capacity of containerships for perishable reefer cargo, have made the PFSC management increasingly difficult for all stakeholders, especially for cargo owners, freight forwarders and logistics operators. Moreover, it has had a huge repercussion on major fruit and meat exporting countries. In turn, as noticed by OECD (2020a), it has had flow-on effects for the price of cargo, including food products. Unfortunately, the regrettable consequence of PFSC disruptions are huge perishable food cargo losses and food wastage along the entire supply chain. A lot of cargo in reefer containers lost its market value or were unsuitable for human consumption, therefore an avalanche of insurance claims may be expected and as well as an increase of insurance premiums in the near future.

The current events associated with the coronavirus pandemic has also highlighted certain limitations in the containerised trade of refrigerated goods. It should prompt the PFSC managers to rethink if it is reasonable to rely only on ocean lines reefer services and to consider diversifying modes of reefer transport by utilizing specialized, dedicated reefer fleet, which proved to be reliable at this volatile time.

Moreover, the pandemic has demonstrated the need for exceptional management and contingency planning in the PFSC. Cargo owners and freight forwarders should take steps to minimize risk in everyday operation during the existing pandemic, especially resulting from schedule changes and reefer container shortage. The crisis has also revealed a lot of inefficiencies in communications systems. The ability to provide real-time information to others in the supply chain has become paramount, as awareness of arrival times and container availability are more important now than ever.

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[i] Liner shipping is the service of transporting goods by means of high-capacity, ocean-going ships that transit regular routes, on regular intervals, between predetermined ports at regular intervals, under publicly advertised schedule.

[ii] In this paper shipper means a person who is responsible for transportation of goods (usually cargo owner, freight forwarder or logistics operator).

[iii] Bill of Lading is a main document in maritime transport, stipulating the terms and conditions of carriage and being the proof that goods were loaded on a ship's board.

[iv] Demurrage refers to the additional charge that the merchant pays for the use of the container within the terminal beyond the free time period.

Selected Methods for Supporting The Growth of Economic Efficiency in Transportation Orders Originating in Electronic Transport Exchanges

Roman STRYJSKI
University of Zielona Góra, Zielona Góra, Poland
r.stryjski@iizp.uz.zgora.pl

Waldemar WOŹNIAK
University of Zielona Góra, Zielona Góra, Poland
w.wozniak@iizp.uz.zgora.pl

Maciej NIEDZIELA
University of Zielona Góra, Zielona Góra, Poland
m.niedziela@wmie.uz.zgora.pl

Abstract

The article presents a research problem considered in the context of the analysis and selection of optimisation algorithms which are used to solve the tasks of assigning vehicles to transport orders and measuring their economic efficiency. Two optimisation algorithms were compared and used for the present analysis. The first was the Hungarian algorithm, which is a classic transport algorithm, used in most TMS systems, that is, in the Transportation Management System, the second was an original algorithm, based on heuristic methods and implemented in some selected transport companies under the name: the Improvement Algorithm.

Keywords: Allocation Issue, Heuristic Method, Algorithm, Economic Efficiency

Introduction

In economics and business practice, there are many methods with which to measure economic efficiency; these methods depend on what has been assumed as an effect and what has been assumed as an expenditure. Usually they express the ratio of the effects obtained, in such as production, added value, national income, profit, etc.,) to the expenditure incurred *vis-à-vis* employment, fixed assets, investments, raw materials and materials consumed and energy and fuel, etc. On this basis, it is possible to examine, analyse and draw the conclusions necessary for conducting economic policy and enterprise management. In theory, economic efficiency should ensure maximising the effects of given inputs and minimising the inputs of given effects. The basic efficiency relations are work efficiency, the productivity of fixed assets and the effectiveness of investment, where their growth and the reduction of material and energy consumption, taken up in production and services, are expected (Lenort et al 2019, Szajna et al., 2018).

The concept of economic efficiency in transport processes is a very important factor in logistics (Chamier-Gliszczyński and Staniuk, 2018) and supply chain management, as much for a single enterprise as it is for the entire sustainability of a development. In the literature on the subject one can find more and more complex, differentiated and complicated methods of examining the economic efficiency of transport processes, which further hinders analysis of this issue. These difficulties are related to the ambiguity in assessing the effectiveness of the transport processes examined and, in particular, in measuring the costs incurred (Chamier-Gliszczyński, 2016). In the context of the national and global economy, cost reduction is a very current topic. However, it is worth considering how the problem of costs is solved in enterprises carrying out transport orders in the field of road transport. Bearing in mind the fact that the basic assumption in transport should be an increase in economic efficiency and then maintaining it at a set, acceptable level, it is difficult to relate this to the *dynamics of change* in transport orders, *vis-à-vis* supply and demand and the irregularity and unpredictability of transport orders for various geographical locations! Electronic exchanges and transport platforms support the problems identified, so that the goals are achieved of increasing revenues and reducing "*empty*" journeys, *so-called,* or at least partially covering travel costs until the start of the next transport order planned. As the name implies, the general concept

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of an exchange is related to the conscious trade of transport orders between service providers and service recipients. However, the values of these services (*contracts listed on the exchange*) do not represent the actual costs of carrying them out. Even if there is no information about how to get to the place where the transport order starts, the current costs of obtaining it, i.e. *by purchasing it on the transport exchange*, or the invisible costs of ecology and the problems of sustainable development are prohibitive presented by Ambroziak et al (2014). Research showed that the strength of the relationship between transport infrastructure and freight transport performance differ in various circumstances therefore it is also worth considering such aspects, Gnap et al. (2019). Hence, economic efficiency in road freight transport services can be assessed through the selection of methods that enable quick decision-making when obtaining transport orders from electronic exchanges (one-off transport orders) and/or transport platforms (obtaining transport orders for the entire transport fleet submitted). Developing of such solutions is of high importance, especially that development of services is based on the knowledge of employees working with mentioned methods (Marczewska, 2016).

In turn, such methods should strive to determine the best- or, at least, the most acceptable- solutions for the transport company analysed, in terms of economic efficiency (Ambroziak, 2015).

Identification and Complexity of The Process of Obtaining Orders from Transport Exchanges

Obtaining transport orders from transport exchanges is a complex process and relies on the ability to observe and analyse quickly, taking into account the multiple criteria for purchasing them. By doing such activities for a single means of transport, the freight forwarder can buy an order that is optimal for one or even several criteria without much of a problem. The work of the forwarder, however, is very different since he/she must obtain several or even several dozen transports offers for transport means which could be available at any given moment and then optimise those offers according to the criterion adopted; then and only then, may the forwarder carry out the purchase procedure.

Despite the wide range of activities that the forwarder carries out in his/her position, the criterion for assessing his/her work by the owner of a transport company boils down to an analysis of the economic effectiveness of the orders commissioned and introduced into the planning which was purchased on the transport exchange. On the other hand, the economic efficiency of the order is essentially affected by the full cost of its execution, in particular the forwarder's working time, in terms of indirect costs and in reaching the loading bays, in terms of direct costs. In practice, it is rare to find a loading bay, to load up a new transport order, in the very same place where it had previously been unloaded, without carefully following the freight exchange and sending hundreds of enquiries to bidders.

It is also difficult, even impossible, for competing companies which use the services of a freight exchange at a given moment, to define uniform costs for completing an order. Hence, the important function of the forwarder, who is, in many cases – the owner of a small transport company, consists in the ability to quickly assess the economic efficiency of transport orders, presented on transport exchanges and, simultaneously, also assess the possibility of taking those orders on, from the perspective of his/her own transport company. In addition, this assessment is associated with the analysis of parameters such as: loading regions (industrialised regions of Europe guarantee the transport of more volumes, which means that the likelihood of finding further loads is very high); route length (the longer the transport route, the higher the price and the lower the travel costs); deadlines (a short deadline is, in most cases, a determining factor when it comes to increasing the price for the customer; and price (the ability to estimate the cost of travel to the loading-up area and the cost of travel to the place of unloading, in support of the calculation of the order), etc. In practice, the freight forwarder's experience largely relates to the ability to quickly locate available transport resources on a digital map and to then estimate the costs of carrying out the transport orders issued or observed on transport exchanges.

Methods Supporting Quick Decision Making in The Obtainment of Transport Orders from An Electronic Transport Exchange

An important factor to be taken into account when making the correct decisions regarding the economic efficiency of transport orders acquired, are the results of analyses, supported by computer calculations, and implemented on the basis of accepted models resulting from observations of the situation on the transport market. The constant development of programming methods and computer technology, conditions the increase in computing potential, resulting in an increase in the possibility of using computer-aided decision-making.

Both of the methods for planning specific transport routes, as well as for making decisions in the field of obtaining transport orders from electronic transport exchanges, focus on solving the transport issue – *using transport tasks interchangeably*- where the key is to explore the issue of assignment and the '*travelling salesman problem'*, *so-called*. In this regard, classic and modern methods can be distinguished. Classic methods, which are also exact methods, allow the best differential and continuous functions to be calculated. The limited practical application of these analytical methods comes as a result of the complications which occur when solving non-differential or non-linear equations. Classic planning methods are used, *inter alia*, for tasks with many variables or one function, both with and without restrictions. Hungarian or Little's, classic planning method algorithms can be distinguished, along with those of Dijkstra and Simpleks. The second group of methods, known as modern or approximate, uses heuristic algorithms that look for the best solution within a group of solutions available, but do not guarantee finding the optimal solution. Thus, the general use of heuristic algorithms is to improve the efficiency of solving complex problems. This group of methods uses, among other methods, genetic algorithms, ant or neural networks, modelling transport system as in Chamier-Gliszczyński (2013) and simulation modelling of road transport distribution network as in Kostrzewski (2017), Kostrzewski and Grzybowska (2016) and modelling transport system.

The article presents and compares two methods supported by the Hungarian algorithm and the proprietary "improvement" algorithm, respectively. The purpose of the comparison was to determine economic efficiency as the time it takes to allocate transport orders, *obtained from electronic transport exchanges*, to available resources. Economic efficiency was measured by the cost of the execution of the transport order and was expected to be minimised with the assumption of full coverage, *or allocation*, of all available resources, *or transport means,* for transport orders obtained from available exchanges.

In addition, both algorithms were compared with respect to the quality of the result, that is, the obtaining of the best result, although in the case of the "Improvement" algorithm, only an acceptable solution was expected. The Hungarian and "Improvement" algorithms had already been compared in articles by Woźniak et al. (2015) in terms of time complexity and then, the "Improvement" algorithm showed a much higher efficiency and time to obtain the result.

The Hungarian algorithm and its application in solving transport issues

One of the most common algorithms used to plan routes and solve the problem of allocation is the Hungarian algorithm**,** in other words, the Hungarian method. It allows 'n' transport tasks to be assigned to 'n' transport modes. On the basis of the above, a matrix with 'n' *x* 'n' dimensions is created, in which, for example, a cost, time or other characteristic parameter is assigned to the means of transport during the implementation of a given transport task. The Hungarian method can be divided into three steps.

Step I is to strive to obtain zero in each column and row of the matrix. The lowest value of the assigned, or analysed, parameter found in the matrix is subtracted from each row; if these actions do not bring the expected result, an analogous subtraction follows, but this time in relation to the columns.

Step II consists in deleting the smallest possible number of lines from all columns and rows containing zero elements. If the number of lines necessary to delete all the zeros is equal to the dimension of the matrix, the result obtained is optimal and the transport tasks are assigned to that means of transport.

Step III. If the number of lines is lower than the dimension of the matrix, the minimum is determined among the undefined elements. This minimum is subtracted from the remaining, unspecified elements and added to the elements lying at the intersections of the lines. Elements that have only been deleted with one line, remain unchanged. One then returns to Step II**.** In the above method, there may be a situation in which it is impossible to clearly indicate the optimal solution. In this case, the selection should be made intuitively.

In mathematical terms, the algorithm described solves the problem of optimal allocation or the problem of set covering.

In the implementation of transport orders, the use of the above algorithm is used to minimise the selected parameters, which include the cost of the transport order, the travelling "*empty*" to the loading place, the length of time taken to complete transport orders and so on. Transport industry problems mean that the issue of getting the means of transport to the best places is much more complicated and leads to the creation and analysis of much more complex mathematical models, especially when considering the dynamics of changes in transport orders on the transport exchange. The complexity of the issue, and especially the changing restrictions which are often

difficult to define, create the problem of the multi-dimensionality of the relationship: the order, the driver and the vehicle as a function of time and were already explained by Kostrzewski and Likos (2019), Trojanowski (2015), Kozieł (2014), Jacyna et al (2018), Jacyna (2014), Pisz et al (2016). The Hungarian algorithm is able to solve very complex tasks and it is complete. However, the waiting time for the result limits its efficiency.
The idea of this heuristic algorithm is to determine the best initial result, known as the *base solution*. In the next steps, *as in the in-depth search algorithm*, the base solution is expected to be improved. The algorithm finishes its operation as soon as the result shows no improvement in the following step. The mathematical model of the "*improvement*" algorithm is presented below

Mathematical model of the "*improvement*" algorithm:

Algorithm A: Determining the initial base solution
Step 1: Based on the cost matrix C = $[c_{ij}]$,
specify the set of order indices J = {1,2, ..., n}.
Step 2: For each vehicle Pi, $_i$=1,2, ..., m, perform
(a) For the Pi vehicle, assign the order Z_k for which the transport cost is

$$Cik=\min_{j \in J} Cij \quad (1)$$

(b) J=J\{k} (2)

Step 3: Calculate the transport cost *Kb* for the base solution

Algorithm B: Find the minimum base solution
Step 1: Find the initial base solution with the transport cost *Kb*
Step 2: If there is a *Zl* order with a *lower* cost for the Pi vehicle than in the base solution, then:
(a) Assign a Zl order for the *Pi* vehicle, while selecting the order with the lowest possible cost for the vehicle that has the Zl order assigned in the base solution
(b) Calculate the transport cost *Kl*
(c) If $Kl<K$, set the solution obtained as the base solution with the transport cost $Kb=Kli$, and return to Step 2.

The mathematical model of the developed "improvement" algorithm is broadly described and supported by an example in the next chapter.

A comparison of Hungarian and "Improvemment" algorhithms vis-à-vis economic efficiency – case study

The comparison of the "*improvement*" algorithm with the Hungarian algorithm in the aspect of analysing the economic efficiency of orders obtained from electronic transport exchanges was presented on the basis of the following case study. The example under consideration is based on a situation reflecting the work of a forwarder who searches transport exchanges and analyses transport orders that, in terms of economic efficiency, will be acceptable for implementation in the transport company serviced. Due to the problem of the selection of orders for available means of transport, the principle was adopted that there is an excess of them in relation to vehicles. Therefore, not all orders will ultimately be assigned to the vehicles. It is expected that the decision to choose orders will be supported by mathematical calculations determining the optimal or acceptable solution due to their short availability on the stock exchange. In the case studied, based on the same data, it was limited to determining the solution through the "*improvement*" algorithm due to its presentation and understanding. In the case of the Hungarian algorithm, it was limited to providing only a relation of orders with means of transport and the result of optimal costs in contractual units.
The improvement algorithm is presented as follows, according to the mathematical model previously written:
1. A relationship matrix was built, in which a column number indicates the order that can be obtained from the exchange and a row number, indicating the means of transport available for deployment, while the cell values present the costs of the orders being carried out by vehicles, as presented in contractual units. The matrix is three-dimensional, because in each cell an additional priority is set, namely, the lowest number – in brackets- meaning the highest priority or the highest economic efficiency of the lowest cost of the order, being carried out by the vehicle (Table 1).

Table 1: The cost matrix of orders that can be carried out by the available means of transport – an example

Orders/ Vehicles	Z1	Z2	Z3	Z4	Z5
P1	100 (2)	150 (2)	50 (1)	300 (2)	250 (2)
P2	50 (1)	200 (3)	100 (2)	250 (3)	250 (3)
P3	200 (3)	120 (1)	150 (3)	200 (1)	200 (1)
P4	250 (4)	300 (4)	200 (4)	400 (4)	500 (4)

2. It was then checked whether each vehicle was assigned the first (best) order in the sorted matrix (Table 2)

Table 2. The cost matrix of orders sorted, by priority, to available means of transport – an example

Vehicles/ Priority	P1	P2	P3	P4
(1)	Z3 50	Z1 50	Z2 120	Z3 200
(2)	Z1 100	Z3 100	Z3 150	Z1 250
(3)	Z2 150	Z2 200	Z1 200	Z2 300
(4)	Z5 250	Z4 250	Z4 200	Z4 400
(5)	Z4 300	Z5 200	Z5 200	Z5 500

3. In the next step, the base solution was determined (Table 3), i.e. from the first to the last vehicle, the first (best) order from the sorted matrix that was not selected before (i.e. selected by another vehicle) was assigned. The same colours indicate the conflict of priorities in the allocation of orders to vehicles with yellow indicating the only possible solution in this configuration for assigning orders to a P4 vehicle. Therefore, this allocation is treated as a base solution.

Table 3: Matrix of costs for orders sorted and allocated according to available means of transport

P1	P2	P3	P4
Z3 50 (1)	Z1 50 (1)	Z2 120 (1)	Z4 400 (4)
Z1 100 (2)	Z3 100 (2)	Z3 150 (2)	Z3 200 (1)
Z2 150 (3)	Z2 200 (3)	Z1 200 (3)	Z1 250 (2)
Z5 250 (4)	Z4 250 (4)	Z4 200 (4)	Z2 300 (3)
Z4 300 (5)	Z5 200 (5)	Z5 200 (50	Z5 500 (5)

4. In the next step, it was checked which vehicle was assigned the best order and then it was checked whether a better result than before would be obtained. If there is an improvement, the orders remain. If not, the next order that is before the given order in the matrix, is checked. If there is even one change, the loop starts working from the beginning.

The whole process was presented using bipartite graphs. Figure 1 indicates the base solution for which economic efficiency is 620 contractual units (the sum of: P1Z3, P2Z1, P3Z3, P4Z4). The symbols and captions contained in the drawings are consistent with the mathematical model previously presented. In turn, the base cost and transport cost are determined on the basis of data from Table 1 in the contractual units accepted.

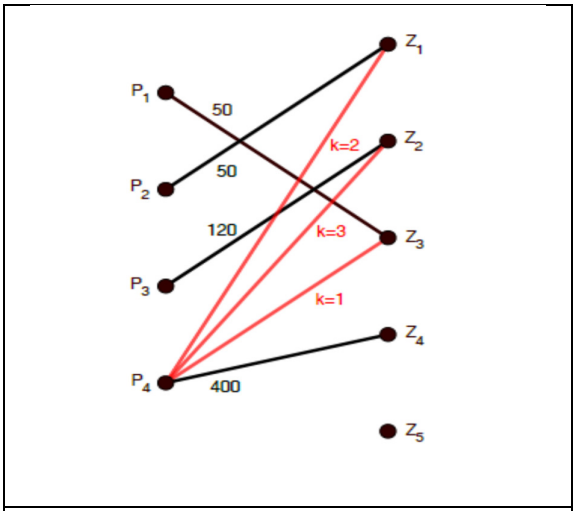

Fig.1 Bipartite graph of transport costs for the initial base solution with the cost of Kb = 620 (step 1, algorithm A). Orders with a lower cost for a P4 vehicle are marked in red, in ascending order, according to previously assigned priorities / according to index k = 1,2,3.

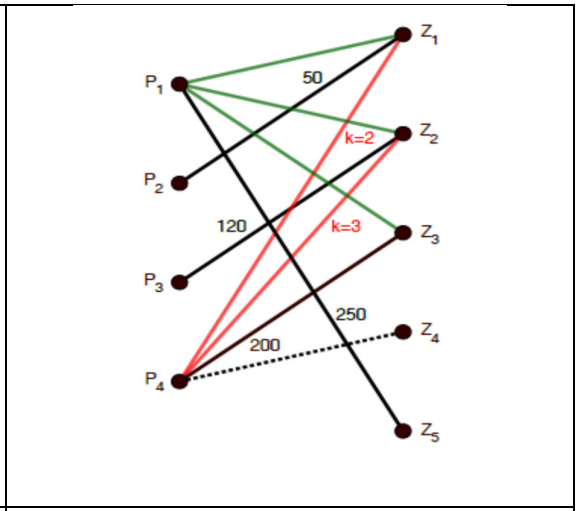

Fig.2 Bipartite graph of transport costs when assigning a Z3 order to a P4 vehicle (k = 1) with a cost of Kl= 620> =Kb (step 2a, 2b, B algorithm). Orders with a lower cost for a P1 vehicle are highlighted in green.

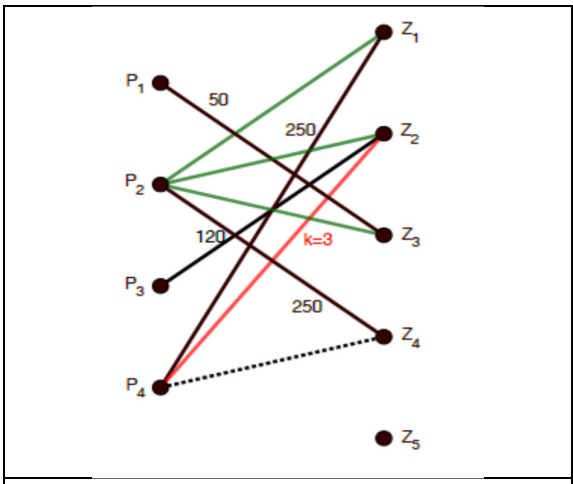

Fig.3 Bipartite graph of transport costs when assigning a Z1 order to a P4 vehicle (k = 2) with a cost of Kl= 670> =Kb (step 2a, 2b, B algorithm). Orders with a lower cost for a P2 vehicle are highlighted in green.

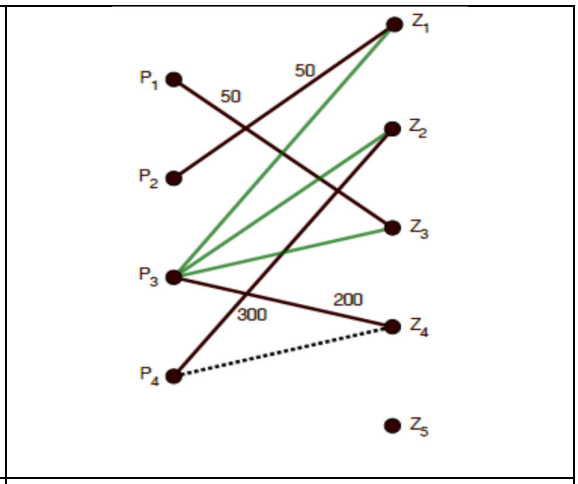

Fig.4 Bipartite graph of transport costs when assigning a Z2 order to a P4 vehicle (k = 3) with a cost of Kl = 600 <Kb (step 2a, 2b, algorithm B). Orders with a lower cost for a P3 vehicle are highlighted in green.

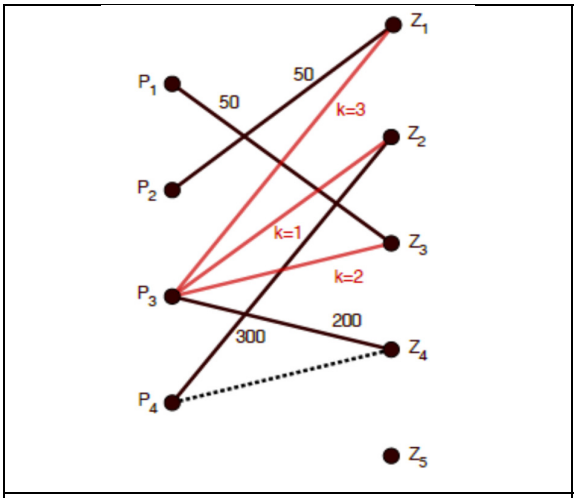

Fig.5 Bipartite graph of transport costs for a new base solution with a cost of Kb = 600 (step 2c, algorithm B). Orders with a lower cost for a P3 vehicle are marked in red in ascending order according to the index k = 1,2,3.

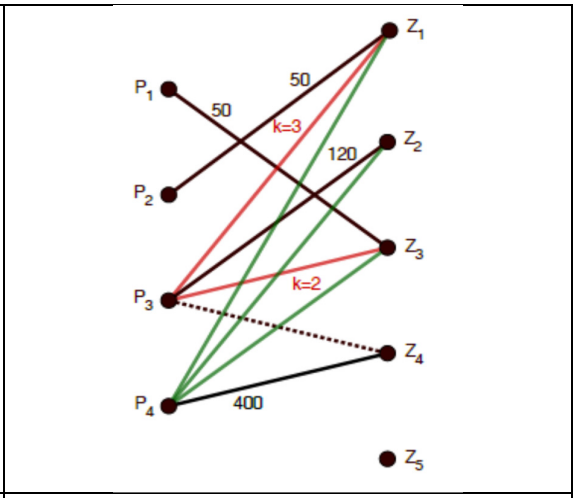

Fig.6 Bipartite graph of transport costs when assigning a Z2 order to a P3 vehicle (k = 1) with a cost of Kl= 620> =Kb (step 2a, 2b, B algorithm). Orders with a lower cost for a P4 vehicle are highlighted in green.

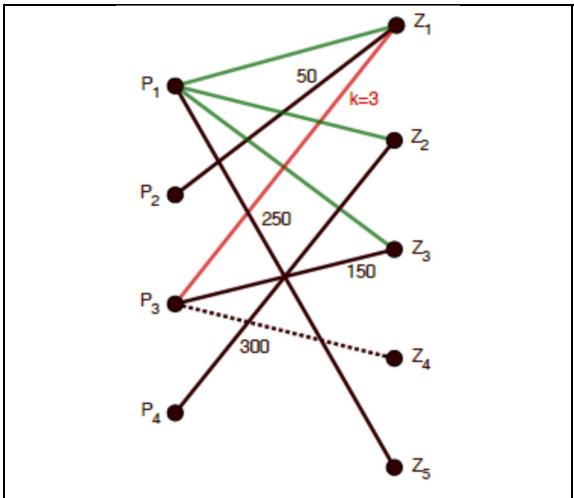

Fig.7 Bipartite graph of transport costs when assigning a Z3 order to a P3 vehicle (k = 2) with a cost of Kl= 650> =Kb (step 2a, 2b, B algorithm). Orders with a lower cost for a P1 vehicle are highlighted in green.

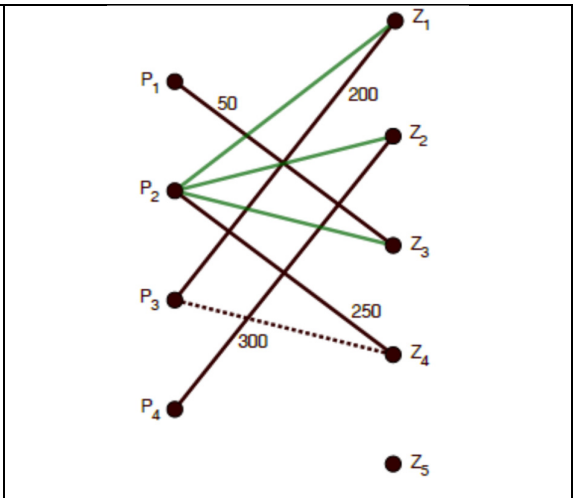

Fig.8 Bipartite graph of transport costs when assigning a Z1 order to a P3 vehicle (k = 3) with a cost of Kl = 800 <Kb (step 2a, 2b, algorithm B). Orders with a lower cost for a P2 vehicle are highlighted in green.

As can be seen from the calculations presented through bipartite graphs, the base result at the beginning of the assignment of orders to vehicles was 620 contractual units (P1Z3, P2Z1, P3Z2, P4Z4). By improving the result with the method described above, economic efficiency was obtained at the level of 600 contractual units as a consequence (P1Z3, P2Z1, P3Z4, P4Z2). For P1 and P2 vehicles, the orders assigned in the first step remained unchanged. Only the order allocation for P3 and P4 vehicles changed. On the other hand, by using the Hungarian algorithm, representing the exact optimisation method, a result of 600 contractual units was also obtained, but in a different allocation system: P1Z2, P2Z1, P3Z5, P4Z3.

Summary

In most cases, the Hungarian algorithm solves the transport issue and returns the optimal result in terms of economic efficiency adopted for the analysis of transport orders. However, as previous and current research has

shown, the time to obtain a result increases in a polynomial way, due to the construction of the algorithm itself. This, in turn, limits the ability to calculate and make decisions to obtain transport orders from electronic transport exchanges. In the case of solving a transport problem, the aim of which is to increase or maintain a constant level of economic efficiency with dynamically changing offers of transport orders, its incompleteness may lead to loops. Then, even with very simple matrices, the algorithm will not be able to assign data and will be interrupted, without returning any result at all.

In the case of the "improvement" algorithm, calculation of the economic efficiency of the transport orders analysed on electronic transport exchanges strongly depends on the initial solution. The better solution we get at the beginning, the faster the algorithm will end its activity. Due to the use of heuristic methods, the "improvement" algorithm does not guarantee that the optimal solution will be found and strongly depends on the forwarder's experience. However, in the case of the acquisition and analysis of a significant number of transport orders, the "improvement" algorithm can be a very good tool for making decisions and calculating the economic effectiveness of the orders observed on the transport exchange or for verifying decisions made by the forwarder.

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The Impact of Foreign Direct Investment on Comparative Advantages in Foreign Trade – The Case of The CEE Countries

Katarzyna TWAROWSKA

Maria Curie-Skłodowska University, Lublin, Poland, k.twarowska@umcs.pl

Małgorzata TWAROWSKA-RATAJCZAK

Maria Curie-Skłodowska University, Lublin, Poland, k.twarowska@umcs.pl

Abstract

The aim of the paper is an assessment of the impact of foreign direct investments (FDI) on the achievement by the Central and Eastern European (CEE) countries the revealed comparative advantages in exports. The panel regression analysis with random effects are used, which allow to examine the relation between the FDI inflow to particular industries and the having the revealed comparative advantage (RCA) in these industries. The analysis covers the period 2005-2015. The analyzed CEE countries are: Poland, Hungary, the Czech Republic, Lithuania, Latvia, Estonia, Slovenia, Slovakia. The analysis indicates that in the CEE countries FDI inflow was a significant factor influencing the export competitiveness measured by the RCA index. Furthermore, in the CEE countries the inflow of FDI in the manufacturing sector was relatively high and with economic development the importance of FDI inflow to the service sector increased. The structure of FDI inflow to the service sector is dominated by financial services. In industries with high FDI inflows, the improvement in RCA rates is noticeable. A new value of the analysis is the study of both the inflow of FDI and the achievement of comparative advantages at the level of industries. In addition, a particularly innovative analysis is for the service sector, which receives a significant part of FDI.

Keywords: Foreign Direct Investment, Exports, Comparative Advantage, Central And Eastern Europe

JEL classification: F10, F14, F15, F17

Introduction

Foreign direct investment (FDI) is one of the factors supporting structural change and economic development. They directly contribute to the growth of investments in fixed capital, increase the employment rate, technology transfer, as well as increasing the value and dynamics of exports and improving its structure. Eventually, these factors affect economic growth. Observed dependencies between FDI inflow and export are a premise for undertaking an empirical analysis, the aim of which is an assessment of the impact of foreign direct investments on the achievement by the Central and Eastern European (CEE) countries the revealed comparative advantages in exports of goods and services. In order to achieve such a goal, the following hypotheses have been adopted for verification:

1) The inflow of foreign direct investment to CEE countries increases the export potential of these countries.
2) FDI inflows contribute to the achievement of revealed comparative advantages in industries where foreign capital is invested.
3) In the CEE countries the inflow of FDI to innovative industries is significant, which improves the technological advancement of exports of these countries.

A new value of the analysis is the study of both the inflow of FDI and the achievement of comparative advantages not at the level of entire national economies, but at the level of industries. In addition, a particularly innovative and valuable analysis is for the service sector, which receives a significant part of FDI. In 2017 average in CEE countries 70% of total FDI stock was in service sector (OECD 2019). Another pioneering feature of the analysis is the value-added export survey, which allows to assess the real impact of FDI on the production and export potential of the economy, since goods and services that have previously been imported from another country are eliminated.

Theoretical background and literature review: linkages between FDI inflow, economic growth and trade

The rich world literature provides many theoretical and empirical studies on the impact of foreign direct investment on host country's exports. Studies concern the impact of FDI on the export volume and export potential of countries,

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changes in the export structure and its competitiveness, but also on the technological advancement of the host country, which also affects exports. There are also more comprehensive studies that focus on the impact of FDI on economic growth, but usually include the trade channel.

T. Ozawa (1992, 27-54) formulated the basic assumptions of the theory explaining the influence of foreign direct investments on the economic development. He was interested in the changes taking place in the structure of the foreign direct investment inflow in transition economies. According to the Ozawa's concept, at lower levels of economic development, the inflow of FDI is invested primarily in labour-intensive sectors, and the basic motive for investment is access to the cheap labour force. With the increase in physical asset and specialisation in skilled labour-intensive industries, market factors related to the economic potential of the host country are becoming increasingly important. Whereas, in the last phase the role of human capital is growing and indexes of the revealed comparative advantage are improving in technology-intensive sectors.

Moreover, E. Akalper and H. Adil have studied the relationship between FDI and economic growth. The main conclusions of their analysis are as follows:

- the absence of a long-run relationship or causality that runs from gross savings, foreign direct investment, trade and gross fixed capital formation,
- negative associations between GDP and gross savings as well as FDI and international trade,
- positive relations between gross fixed capital accumulation and economic growth.

A. Cieślik and M. Tarsalewska (2008, p. 1 - 13) studied the relationship between international trade, foreign direct investment and economic growth using the open economy version of the expanding product variety growth model for the CEE countries. They demonstrated that both international trade and foreign direct investment lead to the increase in the level of per capita income in the long run and affect the speed of convergence. The estimation results show that both trade and FDI are positively related to economic growth in the CEE countries, although the significance of these variables crucially depends on the employed estimation method.

B. Mucha-Leszko and K. Twarowska (2018, 1054-1067) analyzing the role of investment as a determinant of the sustained economic growth in the European Union after crisis 2008-2009, noticed that investment, TFP and labour productivity growth are key prerequisites for closing the economic gap in new EU member states. In the years preceding the crisis, the inflow of foreign direct investment and access to low-interest loans contributed to high economic growth rates in the Baltic states (Lithuania, Latvia and Estonia), Romania and Bulgaria. FDI also caused growth of TFP, labour productivity and exports. But in the second half of 2008, when the financial crisis began, the Baltic states have suffered the greatest losses in GDP. The crisis increased the risk and led to withdrawal of foreign investors, which took place mainly in Estonia, Latvia, Lithuania and Romania (European Central Bank 2010, 87-88).

A popular issue for research is the impact of FDI on exports, including export potential, changes in the structure of exports and their competitiveness. OECD experts (Fontagne 1999, 7-12) have developed many analytical works in order to explore the nature of these links in quantitative terms. These empirical works revealed the complexity of these links but, at the same time, showed the main and positive influence of foreign direct investment on international trade particularly after the mid–1980s. The results of the research carried out by L. Fontagne (1999, 23-24) show that foreign direct investment abroad stimulates the growth of exports from countries of origin and consequently this investment is complementary to trade. W. Zysk and S. Śmiech (2014, 7-18) analysed the influence of FDI on foreign trade in the Visegrad Countries from 2001 to 2011 using the linear gravity model. They confirmed the hypothesis that FDI makes a significant impact on Visegrad Countries' foreign trade.

P. Folfas (2018, 22-26) focused his research on the impact of FDI on structural changes in exports and was searching for an answer to the question whether FDI inflows to Poland affect branch structure of Polish exports (gross and value-added exports). The results of his research covering the years 1996-2011 indicated that FDI inflows do not influence on the branch structure of Polish exports. Only in case of value-added exports there were weakly statistically significant dependencies. He also presented a rich literature review grouped into two categories: 1) studies answering the question whether international trade and FDI are substitutable or complementary to each other, and 2) studies containing research on the impact of FDI inflows on host country exports.

S. Jaksic, N. Erjavec and B. Cota (2018, 835-849) investigated the role of foreign direct investments (FDI) and labour productivity in describing export dynamics for the period from 2004 to 2015. The results of the estimated panel models confirmed the importance of strengthening manufacturing as well as strong comovements of exports and imports as a consequence of the internalization of product chains. Ł. Ambroziak (2016, 23-42) investigated the extent to which foreign direct investment (FDI) influenced intra-industry trade (IIT) in automotive products in six New EU Member States (NMS: the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia) in the 1995-2014

period. He confermed that FDI inflow to the automotive sector of the NMS has been a key factor shaping IIT in automotive products.

Furthermore, the impact of FDI on the technological advancement of developing and developed countries, on the example of China and Japan, was studied by C. Liu, X. Zhang, and T. Tamamine (2019, 536-545). They confirmed the occurrence of the following phenomena:

- the influence of technology spillover of inward foreign direct investment (IFDI) and outward foreign direct investment (OFDI) on improvement of a country's technological innovation level,
- the weaker one-way causality intensity of inward FDI to technological innovation in China than that in Japan,
- the stronger FDI volatility in China than that in Japan,
- the low one-way causality intensity of outward FDI to technological innovation both in China and Japan, and not identical patterns of long-term and short-term effects.

The subject of the research of T. Białowąs and M. Wojtas (2014, 31-40) was the role of foreign value added in creating Poland's comparative advantage in world's merchandise exports. They analysed the development of comparative advantage using the Balassa index calculated on the basis of the traditional method (gross export) as well as the alternative method (national value added). The application of such an approach to analysing exports has revealed a significant increase in the importance of foreign value added.

The presented studies indicate that the relationship between FDI, export volume and its competitiveness, technological advancement of the host country and its economic development are not straightforward and the same across all countries, although many analyses confirm the significant positive impact of FDI on the indicated fields.

In the further part of the paper, the author, inspired by the conclusions of T. Ozawa and other scientists, will attempt to assess the impact of FDI on the competitiveness of exports of Central and Eastern Europe developing countries that have undergone transformation.

Data and Methods

An analysis of the relationship between FDI inflows and export competitiveness was conducted for eight developing countries in Central and Eastern Europe. These countries are: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia. The analysis was carried out at the level of 17 industries divided into 3 sectors: primary sector, manufacturing, business sector services, which are presented in Table 1. The following industries have been considered as technologically advanced within business sector services: information and communication (15), financial and insurance activities (16) and within manufacturing: computers, electronic and electrical equipment (8), chemicals and non-metallic mineral products (6) and transport equipment (9).

Table 1: The classification of sectors and industries

Sector	No.	Industry
Primary sector	1	Agriculture, forestry and fishing
	2	Mining and quarrying
Manufacturing	3	Food products, beverages and tobacco
	4	Textiles, wearing apparel, leather and related products
	5	Wood and paper products; printing
	6	Chemicals and non-metallic mineral products
	7	Basic metals and fabricated metal products
	8	Computers, electronic and electrical equipment
	9	Transport equipment
	10	Electricity, gas, water supply, sewerage, waste and remediation services
	11	Construction
Business sector services	12	Wholesale and retail trade; repair of motor vehicles
	13	Transportation and storage
	14	Accommodation and food services
	15	Information and communication
	16	Financial and insurance activities
	17	Real estate activities

Source: own compilation based on (OECD 2019).

Exports are analysed on the basis of trade in value - added (TiVA) (OECD 2012, compare: Ceglowski 2017, 275-296). For the assessment of export competitiveness, the Balassa index of revealed comparative advantages (RCA) was used (more about the advantages and disadvantages of using the RCA index you can find in: Laurse 2015, 99-115). RCA index (Balassa 1965) is calculated according to the formula:

$RCA_j^A = \frac{s_j^A}{s_j^R}$, where

RCA_j^A – index of revealed comparative advantage of country A

s_j^A – share of j - product group (industry) in exports of country A

s_j^R - share of j - product group (industry) in exports of the reference group R

The reference group consists of the European Union member states (28). The index ranges from 0 to infinity. Values between 0 and 1 mean that in a given product group/industry country A does not have a revealed comparative advantage relative to the reference group. Values greater than 1 indicate that country A has a revealed comparative advantage for that product group/industry.

In order to verify the formulated hypotheses, empirical studies have been carried out, including a descriptive comparative analysis of statistical data (point 4) and panel regression analysis (point 5). In the first step of the panel regression analysis, the model was built using the generalised method of the least squares, and then, using the Breusch-Pagan test, the hypothesis of the existence of individual effects was verified. The Breuscha-Pagana test has shown the validity of introducing individual effects, which may have two types: fixed effect or random effect, so panel regression analysis with fixed and random effects was used. In the next stage, the Hausman test was used to select the model. The Hausman test showed that a model with fixed effects was better.

Therefore, panel regression analysis with fixed effects using least squares dummy variables method (LSDV) has been applied, which allowed to examine the relation between the FDI inflow to particular industries of the economy and the having the revealed comparative advantage (RCA) in these industries. To test how FDI inflow influences comparative advantages in export, the analysed equation for the model of panel data has taken the following form:

$RCA_{i,t} = \alpha + \beta * FDI_{i,t} + \varepsilon$, where:

$RCA_{i,t}$ – explained variable has been defined by having revealed comparative advantages in exports in particular industries, $RCA_{i,t} \in [0, \infty]$,

$FDI_{i,t}$ – vector of explanatory variables [share of particular industry in FDI position - inward]

α, β – estimated coefficients describing the impact of explanatory variables on the explained variable

ε – random.

The data are from the OECD database. The analysis covers the period 2005-2015, which is determined by the availability of statistical data (data for exports in value added is available for 2005-2015 and data for FDI inflows by industry is available for 2005-2017).

An assessment of comparative advantages in foreign trade and the structure of FDI inflow in CEE countries - descriptive comparative analysis

The aim of this part of the paper is to identify the structure of the FDI inflow (by sectors and industries) and to assess in which industries countries have a revealed comparative advantage. Changes in the structure of FDI inflows over time will also be analysed.

Table 2: Structure of FDI inflows to CEE countries by industry (in %, average 2005-2017)

Countries/Sectors	Primary sector (1+2)	Manufacturing (3+4+5+6+7+8+9+10+11)	Business sector services (12+13+14+15+16+17)
Czech Republic	2,3	28,8	47,7
Estonia	2,0	16,0	66,9
Hungary	0,9	25,3	40,0
Latvia	3,5	17,0	61,1
Lithuania	1,9	22,0	63,1
Poland	0,7	30,5	50,8
Slovak Republic	1,1	35,2	44,8

Note: the shares do not sum up to 100% due to exclusion of public services and industries classified as other.
Source: own calculations based on (OECD 2019).

In all analysed countries, FDI was focused on the service sector (see tab. 2). The largest amount of FDI was invested in financial and insurance activities (16), wholesale and retail trade, repair of motor vehicles (12) and real estate activities (17) (see tab. 3).

Table 3: Structure of FDI inflow to CEE countries (in %, average for 2005-2017) and changes in the shares of particular industries between 2017 and 2005 (in percentage points)

Countries/ industries	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Shares (in %)																
Czech Rep.	0,2	2,1	3,1	0,5	1,6	4,7	3,7	1,4	8,9	3,6	1,5	10,1	1,4	0,5	5,8	21,5	8,4
Estonia	1,5	0,5	2,8	0,9	3,4	1,7	1,1	0,8	0,6	3,0	1,9	12,4	5,0	0,5	2,3	30,9	15,7
Hungary	0,6	0,3	2,5	0,2	1,3	6,4	2,0	3,1	5,5	3,0	1,2	11,6	2,1	0,7	6,7	11,9	7,1
Latvia	2,9	0,7	1,8	0,3	3,0	0,5	0,6	0,1	0,5	5,2	5,1	13,1	4,4	0,9	3,7	28,6	10,4
Lithuania	1,3	0,6	3,3	1,0	2,0	9,4	0,4	0,1	1,0	2,7	2,2	12,3	2,4	0,5	7,6	26,5	13,7
Poland	0,5	0,3	5,9	0,3	2,6	5,5	4,0	0,9	5,4	2,1	3,8	15,4	1,3	0,5	5,3	20,7	7,6
Slovak Rep.	0,3	0,8	1,9	0,3	1,4	7,4	5,8	2,2	7,0	7,8	1,3	10,5	1,9	0,3	4,3	21,5	6,4
Slovenia	0,1	0,3	1,8	0,5	3,6	12,0	1,7	0,9	3,1	3,0	1,1	19,3	1,8	0,4	4,4	25,1	6,0
	Change (in percentage points)																
Czech Rep.	0,1	0,8	0,2	-0,1	-0,2	-0,4	-1,2	0,6	-2,4	4,3	0,2	0,2	0,7	-0,3	-1,8	8,2	1,9
Estonia	1,1	-0,1	0,1	-0,7	-1,8	0,0	-0,1	0,0	0,5	-1,3	-0,9	3,7	1,5	0,1	3,1	-21,2	4,0
Hungary	0,4	0,3	0,2	-0,1	0,8	4,5	0,1	1,6	7,3	2,6	0,3	0,5	0,9	0,3	-3,3	-0,5	-0,3
Latvia	2,6	0,3	-1,0	-0,2	-0,1	-0,1	0,4	0,0	0,4	-8,7	-0,1	1,4	-0,2	-0,1	-2,7	-1,4	7,7
Lithuania	0,5	-0,5	1,1	0,0	0,2	-8,3	0,2	0,0	0,1	-2,7	0,0	2,8	0,4	0,3	-1,5	3,3	0,6
Poland	0,0	0,1	-0,1	0,1	0,3	-0,3	-0,7	-0,8	1,7	2,3	3,3	-4,3	-0,1	0,0	1,8	0,5	2,3
Slovak Rep.	0,0	-0,3	-0,6	0,0	-0,6	-0,7	-0,4	0,1	-1,7	7,6	0,2	-2,7	2,6	0,0	0,0	4,9	0,9
Slovenia	0,0	0,3	4,2	-0,1	-0,2	-0,7	0,8	0,0	0,2	3,0	1,5	0,8	0,7	0,4	2,4	1,7	4,5

Note: the shares do not sum up to 100% due to exclusion of public services and industries classified as other.
Source: own calculations based on (OECD 2019).

Some trends in the changes in FDI inflow structure can also be observed in the analysed countries. These changes led to an increase of service sector share (see tab. 3 i tab. 4), with the largest increase in the financial and insurance activities (16) in Czech Republic (8,2 percentage point), Slovak Republic (4,9 pp), Lithuania (3,3 pp) and in real estate activities (17) in Latvia (7,7 pp), Slovenia (4,5 pp) and Estonia (4,0 pp). In the other service sector industries growth was not so strong, and in the information and communication (15) there was a decrease in Hungary, Latvia, Lithuania and Czech Republic. Relatively high increases were also observed in such industries: electricity, gas, water supply, sewerage, waste and remediation services (10) in Slovak Republic (7,6 pp) and Czech Republic (4,3 pp), transport equipment (9) in Hungary (7,3 pp), chemicals and non-metallic mineral products (6) in Hungary (4,5 pp), food products, beverages and tobacco (3) in Slovenia (4,2 pp), wholesale and retail trade, repair of motor vehicles (12) in Estonia (3,7 pp) and construction (11) in Poland (3,3 pp). In all analysed countries, the share of primary sector in the inflow of FDI decreased.

Table 4 presents detailed data on the share of business sector services in the inflow of FDI to CEE countries over the years. In all countries there was an increase in the share of business services, with the exception of Estonia. The largest increase took place in Slovenia, Slovak Republic and Hungary.

Table 4: Shares of business sector services in the inflow of FDI to CEE countries (in %)

Years/countries	Czech Rep.	Estonia	Hungary	Latvia	Lithuania	Poland	Slovak Rep.	Slovenia
2005	29,2	76,7	20,2	58,5	bd.	38,8	30,3	bd.
2006	27,7	71,6	22,6	59,3	bd.	36,7	27,9	37,7
2007	26,6	73,1	24,1	61,3	bd.	35,9	30,0	53,7
2008	46,3	66,2	45,1	64,7	bd.	36,1	43,6	65,7
2009	45,9	60,4	33,5	65,2	bd.	34,9	43,6	55,6
2010	38,4	62,3	40,5	59,2	bd.	52,2	42,1	57,7
2011	47,7	61,1	42,7	61,1	bd.	47,9	44,6	58,6
2012	48,6	62,9	40,6	60,1	bd.	51,3	44,8	57,0
2013	6,1	65,6	41,6	55,5	58,4	52,3	47,4	52,8
2014	43,1	67,8	39,1	62,7	63,5	51,5	48,7	55,2
2015	28,9	67,2	43,9	61,6	64,2	49,4	49,9	54,2
2016	32,8	67,1	34,7	62,0	65,0	50,7	47,3	56,7
2017	bd.	67,9	37,0	63,1	64,2	51,7	bd.	54,7
change 2017-2005 (in pp.)	3,6	-8,8	16,8	4,6	5,9	12,9	16,9	17,0

Source: own calculations based on (OECD 2019).

The average indices of revealed comparative advantage in 17 industries for CEE countries are shown in table 5. These indices were calculated as the arithmetic mean of RCA indices for the years 2005-2015.

Table 5: RCA indices for CEE countries (average in 2005-2015)

Countries/industries	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Czech Republic	1,4	1,0	0,9	0,9	1,3	0,8	1,4	1,8	1,9	5,0	1,4	0,7	0,7	0,8	0,9	0,1	0,9
Estonia	2,7	0,6	1,3	1,6	5,0	0,5	0,8	1,7	0,2	4,4	1,9	0,8	1,9	1,5	1,4	0,3	1,7
Hungary	2,8	0,1	1,0	0,7	0,8	0,8	0,8	2,9	1,7	2,2	1,2	0,7	0,6	0,9	0,8	0,1	1,2
Latvia	6,2	0,6	1,8	1,6	6,2	0,3	0,9	0,3	0,1	2,1	2,1	1,1	2,4	1,1	1,1	1,0	1,2
Lithuania	5,0	0,2	2,2	1,6	1,8	1,9	0,3	0,3	0,1	2,0	2,2	1,1	2,1	0,6	0,5	0,1	2,0
Poland	1,5	2,0	1,6	1,0	1,9	0,9	1,2	1,1	1,2	1,5	2,5	1,4	0,9	0,6	0,9	0,2	1,6
Slovak Republic	1,8	0,5	0,6	1,1	1,5	0,9	1,9	1,9	2,1	1,1	2,3	0,9	0,5	0,6	0,5	0,1	0,8
Slovenia	1,2	0,2	0,5	1,5	2,3	1,1	1,9	1,2	1,0	7,8	2,8	0,8	0,9	1,4	0,9	0,2	1,2

Source: own calculations based on (OECD, 2019)

In the analysed period, all countries had revealed comparative advantages in the following industries: agriculture, forestry and fishing (1), electricity, gas, water supply, sewerage, waste and remediation services (10) and construction (11). All countries with the exception of Hungary: wood and paper products, printing (5), all countries except Latvia and Lithuania: computers, electronic and electrical equipment (8) and all other than the Czech Republic and Slovakia: real estate activities (17).

In the most innovative industries (except 8: computers, electronic and electrical equipment and 9: transport equipment), only a few countries had a revealed comparative advantage in exports. In industry 16 (financial and insurance activities) only Latvia, and in industry 15 (information and communication) only Estonia and Latvia had a revealed comparative advantage. Thus, as the analysis of tables 3 and 5 shows, only in a few cases in industries receiving a significant part of FDI, countries had a revealed comparative advantage over the whole analysed period. As theoretical considerations and earlier empirical analyses show (see point 2), it can be assumed that an inflow of FDI will improve competitiveness in the industries where it is concentrated. This assumption can be verified by analysing data from table 6, which presents average RCA indices in the analysed countries at the level of 17 industries in the years 2005-2015.

Table 6: RCA indices by industry in 2005-2015 (average in the analysed countries)

Year	1	2	3	4	5	**6**	7	**8**	**9**	10	11	12	13	14	**15**	**16**	17
2005	2,62	0,51	1,22	1,71	2,67	**0,90**	1,22	**1,33**	**0,99**	2,29	2,18	0,96	1,14	0,89	**0,84**	**0,24**	1,51
2006	2,62	0,64	1,24	1,62	2,58	**0,89**	1,25	**1,33**	**1,03**	2,26	2,13	0,94	1,21	0,86	**0,86**	**0,24**	1,55
2007	3,14	0,52	1,33	1,41	2,66	**0,86**	1,19	**1,35**	**1,11**	2,12	2,00	0,96	1,20	0,84	**0,85**	**0,28**	1,34
2008	2,74	0,54	1,20	1,23	2,31	**0,93**	1,13	**1,32**	**1,11**	2,75	2,26	0,93	1,23	0,92	**0,95**	**0,38**	1,09
2009	2,75	0,71	1,22	1,20	2,37	**0,87**	1,04	**1,38**	**1,12**	3,80	2,55	0,92	1,30	1,04	**0,96**	**0,30**	1,47
2010	2,90	0,69	1,25	1,12	2,50	**0,87**	1,10	**1,52**	**1,06**	3,65	1,95	0,91	1,19	0,98	**0,89**	**0,29**	1,35
2011	2,69	0,72	1,22	1,10	2,62	**0,94**	1,12	**1,51**	**1,01**	5,04	1,89	0,87	1,24	0,93	**0,83**	**0,28**	1,26
2012	3,40	0,55	1,25	1,12	2,57	**0,94**	1,12	**1,51**	**0,96**	4,21	1,88	0,89	1,27	0,96	**0,86**	**0,26**	1,22
2013	2,85	0,63	1,28	1,10	2,69	**0,95**	1,12	**1,46**	**0,97**	3,85	1,87	0,90	1,28	0,95	**0,89**	**0,24**	1,31
2014	2,80	0,66	1,27	1,11	2,90	**0,90**	1,13	**1,47**	**1,04**	3,35	1,84	0,88	1,28	0,95	**0,85**	**0,26**	1,28
2015	2,60	0,87	1,17	1,19	2,88	**0,86**	1,20	**1,50**	**1,09**	2,76	1,89	0,90	1,28	1,00	**0,79**	**0,27**	1,29

Source: own calculations based on (OECD, 2019)

The indices have improved in industries: 2, 5, 8, 9, 10, 13, 14, 16, of which 8, 9 and 16 can be considered as high-technology industries. There was a lot of FDI inflow to financial and insurance activities (16), which may indicate that the improvement of competitiveness of financial services export took place thanks to foreign capital.

Relationship between FDI inflow and obtaining comparative advantages in exports - panel regression analysis

In order to assess the impact of FDI on export competitiveness panel regression analysis have been carried out. Models with fixed and random effects were tested. The Hausman test showed that a model with fixed effects was better. This means that the fixed effects estimator is unbiased and random effects estimator is biased. Results of estimation for all analysed countries are presented in table 7.

Table 7: Fix effects model describing the impact of FDI inward on export competitiveness (RCA)

	Coefficient	Std. error	T - Statistic	P – value
Agriculture, forestry and fishing (1)				
α_1 (const.)	1.44424	0.158591	9.107	<0,0001 ***
FDI_1	141.094	12.2391	11.53	<0,0001 ***
ε_1 - Residual standard error	1.046474			
R – $square_1$	0.639247			
Mining and quarrying (2)				
α_2 (const.)	0.604845	0.100008	6.048	<0.0001 ***
FDI_1	12.3149	10.3994	1.184	0.2400
ε_2 - Residual standard error	0.608546			
R – $square_2$	0.018117			
Food products, beverages and tobacco (3)				
α_3 (const.)	0.822701	0.136182	6.041	<0.0001 ***
FDI_3	14.4345	4.62555	3.121	0.0028 ***
ε_3 - Residual standard error	0.495112			
R – $square_3$	0.141670			
Textiles, wearing apparel, leather and related products (4)				
α_4 (const.)	0.940970	0.0840060	11.20	<0.0001 ***
FDI_4	60.7544	14.2238	4.271	<0.0001 ***
ε_4 - Residual standard error	0.382111			
R – $square_4$	0.233170			
Wood and paper products; printing (5)				
α_5 (const.)	0.0702648	0.542851	0.1294	0.8974
FDI_5	119.728	20.2568	5.911	<0.0001 ***
ε_5 - Residual standard error	1.651696			
R – $square_5$	0.367982			

Chemicals and non-metallic mineral products (6)				
α_6 (const.)	0.363115	0.0357887	10.15	<0,0001 ***
FDI_6	7.80667	0.548215	14.24	<0,0001 ***
ε_6 - Residual standard error	0.168359			
R – $square_6$	0.771674			
Basic metals and fabricated metal products (7)				
α_7 (const.)	0.780936	0.0793287	9.844	<0,0001 ***
FDI_7	16.0343	2.67060	6.004	<0,0001 ***
ε_7 - Residual standard error	0.379744			
R – $square_7$	0.379260			
Computers, electronic and electrical equipment (8)				
α_8 (const.)	0.703097	0.0934022	7.528	<0,0001 ***
FDI_8	66.3040	6.06282	10.94	<0,0001 ***
ε_8 - Residual standard error	0.462926			
R – $square_8$	0.669652			
Transport equipment (9)				
α_9 (const.)	0.641838	0.0846363	7.583	<0,0001 ***
FDI_9	15.1005	2.01416	7.497	<0,0001 ***
ε_9 - Residual standard error	0.614520			
R – $square_9$	0.395249			
Electricity, gas, water supply, sewerage, waste and remediation services (10)				
α_{10} (const.)	3.69263	0.445609	8.287	<0,0001 ***
FDI_{10}	−7.63738	8.03503	−0.9505	0.3448
ε_{10} - Residual standard error	2.738304			
R – $square_{10}$	0.011450			
Construction (11)				
α_{11} (const.)	1.80671	0.139142	12.98	<0,0001 ***
FDI_{11}	9.41621	4.91231	1.917	0.0591 *
ε_{11} - Residual standard error	0.707775			
R – $square_{11}$	0.046703			
Wholesale and retail trade; repair of motor vehicles (12)				
α_{12} (const.)	0.642843	0.110188	5.834	<0,0001 ***
FDI_{12}	1.99214	0.807103	2.468	0.0159 **
ε_{12} - Residual standard error	0.234130			
R – $square_{12}$	0.076066			
Transportation and storage (13)				
α_{13} (const.)	0.411588	0.121336	3.392	0.0012 ***
FDI_{13}	32.3044	3.80733	8.485	<0,0001 ***
ε_{13} - Residual standard error	0.497262			
R – $square_{13}$	0.541325			
Accommodation and food services (14)				
α_{14} (const.)	0.831316	0.105615	7.871	<0,0001 ***
FDI_{14}	25.2048	18.6615	1.351	0.1808
ε_{14} - Residual standard error	0.358605			
R – $square_{14}$	0.023440			
Information and communication (15)				
α_{15} (const.)	1.25538	0.0909383	13.80	<0,0001 ***
FDI_{15}	−7.15344	1.86839	−3.829	0.0003 ***
ε_{15} - Residual standard error	0.273494			
R – $square_{15}$	0.196343			
Financial and insurance activities (16)				
α_{16} (const.)	−0.151373	0.104777	−1.445	0.1526
FDI_{16}	1.93204	0.427967	4.514	<0,0001 ***
ε_{16} - Residual standard error	0.288741			

R – square$_{16}$	0.211458			
Real estate activities (17)				
α_{17} (const.)	0.900138	0.146950	6.125	<0,0001 ***
FDI_{17}	4.59412	1.45984	3.147	0.0026 ***
ε_{17} - Residual standard error	0.432556			
R – square$_{17}$	0.148028			

**** indicates significance at the 99% level*
Source: own calculations by using Program GRETL, (OECD, 2019)

R^2 is varied among industries and has the highest values in: chemicals and non-metallic mineral products (0.77), computers, electronic and electrical equipment (0.67), agriculture, forestry and fishing (0.64). This means that from 64% to 77% of changes in the RCA index in the industries mentioned above can be explained by the inflow of FDI. The FDI variable is statistically significant at the level of 99% with the exception of the following industries: 2, 10, 11, 12 and 14.

Conclusion

Carried out analysis indicates that in the CEE countries FDI inflow was a significant factor influencing export competitiveness measured by the RCA index. In addition, differences between industries have been found and the greatest impact of FDI has been observed in high-tech sectors.

The inflow of FDI in the manufacturing sector in CEE countries was relatively high, and as the level of economic development increased, the importance of FDI inflow to the service sector increased. This confirms the Ozawa's concept (Ozawa, 1992, 33-40), that at lower levels of economic development, the inflow of FDI is invested primarily in labour-intensive sectors/industries, and with the increase in physical asset and specialisation in skilled labour-intensive industries, market factors related to the economic potential of the host country are becoming increasingly important. Whereas, in the last phase, the inflow of FDI to innovative industries is increasing, which means that the role of human capital is growing and indexes of the revealed comparative advantage are improving in technology-intensive sectors and industries.

In the case of CEE countries, this pattern can be observed in particular in the service sector. The structure of FDI inflow to the service sector is dominated by financial services. In technology-intensive industries with high FDI inflows, the improvement in RCA indices was noticeable. However, due to the characteristics of services, the provision of many services still requires direct contact between a service provider and recipient, and even if it is now possible to provide various services at a distance, in many areas it is the most appropriate way of delivering services to foreign clients, especially in those areas where trust plays an important role, for example in financial services. Therefore, the domination of the service sector in FDI flows is a normal phenomenon, and the definition of trade in services according to the WTO even assumes that it is one of the four modes of service delivery to foreign markets (mode 3 - commercial presence, which accounts for about 50% of all transactions in international trade in services).

However, on the basis of the conducted research it is not possible to conclusively assess that a high inflow of foreign capital results in an improvement of the country's competitive position in international trade. It may have a positive impact, but in some industries it has not been significant.

Discussion: limitations and directions for future research

The applied method of analysis is not free from defects and limitations. It should be noted that obtaining a competitive advantage in exports is influenced by many factors other than the inflow of FDI, some of which are specific to particular industries. The most important factors include: natural environment and availability of raw materials, the quality and cost of labour force, participation in international production chains, the possibility of achieving economies of scale in production, access to technological facilities, the development of global sourcing (outsourcing and offshoring) and the resulting development of trade in intermediates, which significantly intensifies these links etc. Some factors are of a qualitative nature and are difficult to measure. Another aspect that should also be considered is the diversity among countries. Although the analysed CEE countries have many common features, the structure and specificity of their economies differ. Moreover, it should be noted that the period analysed is quite specific as it covers the years of the financial and economic crisis of 2008-2009. Therefore, cyclical factors may have distorted the results. A limitation of the conducted research is also the relatively short period of analysis, which is due to the availability of data at the level of sector/industry.

The results of the analysis and the knowledge of the limitations of the conducted research allow to formulate certain recommendations for the directions of future research. The proposed issues for further analysis are: 1) to compare the results for CEE countries with highly developed countries and Asian developing economies, 2) to consider a longer analysis period, if the availability of data allows, 3) to compare the results of the method used in this paper with other methods. This could lead to interesting conclusions.

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The Issues Concerning the Management of Cross-Border EU Projects During the Covid-19 Pandemic

Agnieszka MALKOWSKA
University of Szczecin, Institute of Management, Faculty of Economics, Finance and Management, Szczecin, Poland,
agnieszka.malkowska@usz.edu.pl
ORCID ID: 0000-0002-3857-8946

Karolina DRELA
University of Szczecin, Institute of Management, Faculty of Economics, Finance and Management, Szczecin, Poland,
karolina.drela@usz.edu.pl
ORCID ID: 0000-0003-0358-7938

Abstract

The aim of the research was to identify problems of Polish-German cross-border cooperation during the COVID-19 pandemic, including those related to the implementation of projects under the Interreg programmes. The research carried out in the article was based on quantitative secondary data, primary information and analysis of available source literature. The research methods used in this paper include: critical analysis of the source literature, the method of secondary data analysis and the method of in-depth interviews.
The purpose of the article is to indicate the degree of implementation of the selected, Polish-German cross-border cooperation Interreg programme, to identify related problems resulting from the COVID-19 pandemic and to assess their impact on the effects of the cooperation. The identified problems include: delays in the implementation of subsequent stages of the project; failure to achieve all the effects of the project, including e.g. indicators of the number of people participating in the planned activities; problems with the organisation of the required tenders; problems with the financial liquidity of partners implementing the project or the need to replace on-site activities with online forms.
The analysis and assessment carried out in the article indicated that the COVID-19 pandemic and its consequences have affected in particular border areas of the European Union and their inhabitants, and have adverse effects on cross-border cooperation, including on the implementation of joint projects. The results obtained may be used to develop programmes to counter the effects of the crisis in border areas and in the implementation of EU programmes carried out as part of cross-border cooperation.

Keywords: management of cross-border, project management, Covid-19, pandemic, EU.

Introduction

In the age of globalisation of world economy, international cooperation is inevitable and necessary for the development of countries' economies (Krugman, Obstfeld, Melitz, 2018) and strengthening their position internationally. Cross-border cooperation is one of its forms and occupies a special place in the European Union. The EU promotes joint actions of neighbouring Member States, based on the principles of the territorial cooperation model (Medeiros, 2018). European Cross-border cooperation aims to tackle common challenges identified jointly in the border regions and to exploit the untapped growth potential in border areas, while enhancing the cooperation process for the purpose of the overall harmonious development of the Union (European Commission, 2014). Cross-border cooperation has been identified as having real added value for Europeans (White Paper…, 2017). There is also no doubt that it has so far proved to be the most effective tool for overcoming the border barriers, integrating border areas and improving the quality of life of citizens in border regions (People-to-people…, 2017).

The COVID-19 pandemic caused by the SARS-CoV-2 coronavirus has affected virtually all levels of the global economy, leading to unprecedented disruption (del Rio-Chanona at al., 2020; Açikgöz, Günay, 2020; Barua, 2020). One of the most pronounced consequences of the pandemic was the exceptionally rapid closure of national borders, even within the EU, in order to ensure the safety and health protection of the citizens. The national borders began to serve

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functions (Canale, 2020; Kolosov, Więckowski, 2018) which were not a priority until the outbreak of the pandemic (Eckardt, Kappner, Wolf, 2020). There is no doubt that the effects of border closures and related restrictions have particularly affected border areas located on both sides of state borders. These areas naturally live in a certain symbiosis with each other, which is enhanced by cross-border cooperation and which has been disrupted in an unprecedented manner. The implementation of numerous EU-funded cross-border projects, including Interreg, encountered a number of unexpected problems (Ambrušec, 2020) which required additional and unplanned action.

The aim of the research was to identify problems of Polish-German cross-border cooperation during the COVID-19 pandemic, including those related to the implementation of projects under the Interreg programmes. The research carried out in the article was based on quantitative secondary data, primary information and analysis of available source literature. The research methods used in this paper include: critical analysis of the source literature, the method of secondary data analysis (online database of Interreg VA projects) and the method of in-depth interviews. The research was preliminary and covered ten projects. The interviews were conducted in July 2020.

Cross-border cooperation in the German-Polish border area

Poland borders with three German states: Brandenburg, Saxony and Mecklenburg-Western Pomerania. Due to the difficult history of both countries, the beginnings of cooperation on the Polish-German border were not easy. It was not until 1990s that institutional cooperation was established in this area. At that time, the idea of creating a Euroregion emerged, which, inter alia, was an effect of the local government cooperation promotion. In 1995, the Pomerania Euroregion was established on the northern German-Polish border. It initiated euro-regional cooperation in the area under discussion and, thereafter. other forms of cooperation. During this period, Poland also began to benefit from the so-called EU pre-accession funds. Cross-border EU Interreg programmes played an important role in the process of European integration of the Polish-German border area and in overcoming peripheral and regional disparities of these areas (Drela, Malkowska, Zieziula 2020; Greta, 2007). The name Interreg is commonly used in public communication regarding EU programmes, precisely in the field of cross-border cooperation.

Before Poland's accession to the European Union, the cross-border cooperation of Polish border regions with neighbouring German regions was established in the years 1994-2004 under two EU programmes: Interreg IIA (for the German side) and Phare CBC for Poland. Since 2004, when Poland became a member of the EU, Polish regions located along the western border have participated in three such programmes, i.e: INTERREG IIIA (in the years 2004-2006), INTERREG IVA (in the years 2007-2013), and INTERRREG VA (in the years 2014-2020). These programmes are implemented in accordance with the programming periods adopted by the EU.

The Structural Funds, including Interreg, are the main instrument for implementing Community regional policy in the European Union, including in border areas. It should be stressed that in practically every programming period, the cross-border cooperation programmes have placed emphasis on social issues related to the integration of the inhabitants of the border areas. Hence their significant role in the context of building an integrated EU.

The current programming period for 2014-2020 EU funds is certainly marked by the outbreak of the global COVID-19 pandemic caused by the SARS-CoV-2 coronavirus, which has affected the EU projects, including cross-border cooperation. One of these is the INTERREG VA Cooperation Programme Germany Mecklenburg-Western Pomerania/ Brandenburg/ – Poland under the "European Territorial Cooperation" objective of the European Regional Development Fund (ERDF). For the purposes of the article, this programme is abbreviated to INTERREG VA 2014-2020.

The programme is implemented in the northern German-Polish border area. Its aim is to further develop cross-border cooperation between institutions and administration in all areas of social life and meetings between inhabitants of the assisted area. This includes the northern section of the Polish-German border and areas located on both sides of the Oder and its estuary. It is almost 42.2 thousand sq km and has 2.9 million inhabitants (including 1.7 million in its Polish part and 1.2 million in its German part). Its largest urban centre is the city of Szczecin. However, it should be stressed that the discussed area is also influenced by the Berlin metropolis and the Baltic Sea.

Interreg cross-border cooperation programmes are among the ones with the lowest EU funding. The budget of the programme under examination for the period 2014-2020 was EUR 157.6 million, of which EU funds amounted to EUR 134.0 million. Projects under this programme could receive funds of up to 85% of their value. Only projects which

comply with the individual priorities assigned to the main objectives of the programme could apply for funding. Four priority axes were identified in the area under examination and they were assigned five objectives (see Table 1).

Table 1: Objectives and funds allocation under the Programme INTERREG VA Mecklenburg-Western Pomerania and Brandenburg and Poland (Zachodniopomorskie Province) for 2014-2020

Priority axes	Allocation of funds	
	[million EUR]	[%]
Priority axis I Nature and culture 1. Increasing the attractiveness of the common natural and cultural heritage 2. Joint maintenance and development of biodiversity	50.45	32
Priority axis II Transport and mobility 3. Addressing deficiencies in cross-border transport infrastructure	31.53	20
Priority axis III Education 4. Expanding the joint general and vocational education services	15.76	10
Priority axis IV Cross-border cooperation 5. Intensifying cooperation between institutions in a cross-border context	50.44	32

**No technical assistance. As at 8 June 2020.*
Source: own study based on: https://interreg5a.info/pl/ (accessed 15 September 2020).

The largest share of the budget was allocated to cross-border cooperation, or rather its enhancement, and to projects to support the region's natural and cultural heritage and the development of its biodiversity (see Table 2).

Table 2: Use of funds according to the priority axes under the Programme INTERREG VA Mecklenburg-Western Pomerania and Brandenburg and Poland (Zachodniopomorskie Province) for 2014-2020

Priority axes	Number of projects	Value [million EUR]	Utilisation rate
Priority axis I Nature and culture	17	30.270	60.0%
Priority axis II Transport and mobility	2	26.798	84.9%
Priority axis III Education	5	9.005	57.1%
Priority axis IV Cross-border cooperation	17	33.144	65.7%
TOTAL	**41**	**99.217**	**62.9%**

**No technical assistance. As at 8 June 2020.*
Source: own study based on: https://interreg5a.info/pl/ (accessed 15 September 2020).

The total eligible expenditure of the contracted projects was nearly EUR 99.3 million. This expenditure is co-financed by the European Union from the European Regional Development Fund for a total of almost EUR 84 million. It is worth noting, however, that approx. 37% of the funds of the said programme have not been contracted yet (see Table 2).

Problems with managing cross-border projects in the COVID-19 period

In March 2020, the Managing Authority, the Joint Secretariat of the Cooperation Programme Interreg V A Mecklenburg-Western Pomerania / Brandenburg / Poland and the partners of the Interreg VA Programme introduced restrictions which involved meetings in smaller groups, limiting contacts with others and cancelling joint (German-Polish) meetings and events (Informacje Sekretariatu Technicznego…, 2020). It was proposed that the participants of the Cooperation Programme should stop going on any business trips, not only those abroad, and request reimbursement of costs incurred for hotels, tickets, catering, conference rooms, etc. in accordance with the terms of the concluded contracts. As regards the non-reimbursable funds, the recovery of which was requested and documented, the expenditure incurred was to be considered eligible. Additionally, with the COVID-19 pandemic, a special call for applications for the Small Project Fund was issued, which was implemented innovatively, only in the Euroregion of Pomerania. The call had to be targeted at new objectives: reducing the consequences of the pandemic by working out

solutions for maintaining and developing social and cultural cooperation in the border area, developing cross-border activities to combat coronavirus (e.g. cooperation of health care institutions, information campaigns, prevention activities) and model activities for remote education.

Moreover, it should be noted that the inability to cross the border freely by the inhabitants on both sides of the Polish-German border was very unfavourable. The immediate closure of the borders not only hindered the lives of thousands of inhabitants and workers who, for example, commuted to work on a daily basis or lived on the other side of the Polish-German border, but also shook one of the pillars of the European Union, which is the free movement of persons.

Cross-border cooperation between Germany and Poland did not pass the test during the coronavirus pandemic. Germany is Poland's main trading partner. Approximately 125,000 Polish citizens were commuting to Germany every day and this was by far the largest group of cross-border workers in the Community (People on the move…, 2020). Many of them worked in production plants, health care centres and nursing homes in the eastern German states. Therefore, the lack of preparation and coordination of crisis management activities at the common border may come as a surprise. Approx 17 000 people commuted to work every day in Berlin and Brandenburg alone. Poles and 3.4 thousand workers to Mecklenburg-Western Pomerania (Metropolregion Stettin…, 2020).

Both governments decided to close the border relatively quickly (Poland in March 2020) and the Polish government decided to introduce a 14-day quarantine for all Poles who wanted to return to the country. From 27 March 2020, everyone who crossed the border had to go to a 14-day quarantine in Poland. As a result, commuting to work in Germany has become almost impossible. Even tens of thousands of people could lose their source of income. These activities impeded the daily lives of a large number of cross-border workers. Thousands of them had to make the difficult decision of staying home with their families or looking for temporary accommodation close to their place of employment. For example, the Germans offered Polish doctors and nurses to stay in Germany to help fight the coronavirus epidemic. Polish doctors could receive 85 euros a day to support themselves and their families in Germany. Some of them stayed on the German side, leaving their families on the Polish side. The governments' decisions to close the border have caused dissatisfaction among hundreds of people and have led to protests against restrictions. It took almost two months for cross-border workers to be able to cross the border freely again. From 4 May 2020, the mandatory quarantine was abolished for persons who crossed the Polish border for the economic, business, professional and educational purposes (however, this did not apply to medical professionals and those employed in social welfare centres) and on 15 June 2020 the Polish-German border was opened, with a minor exception. It was only on 4 September 2020 that the government of Mecklenburg-Western Pomerania opened its borders to one-day tourists (Jaszczyński, 2020).

Therefore, in order to prevent such difficult border situations, the task of developing common cross-border procedures in crisis situations should be undertaken. In the context of close socio-economic ties between Poland and Germany, cooperation during the crisis is insufficient. For example, there have been no bilateral consultations on the economic impact of the pandemic, and overcoming difficulties of the neighbour will benefit both Poland and Germany due to trade relations (Jurczyszyn, Wissmann, 2020).

The closure of the border and the related restrictions had a significant impact on the implementation of cross-border projects under the Programme Interreg VA in the German-Polish border area. The following problems were identified on the basis of in-depth interviews with the project contractors:

- delays in the implementation of subsequent stages of the project and the need to extend the project duration;
- inability to achieve all effects of the project, including e.g. indicators of the number of people taking part in the planned activities;
- problem with the organisation of the required tenders;
- problems with the financial liquidity of project partners;
- problems in reporting expenses according to guidelines;
- the need to replace activities carried out on-site (such as training courses, events, meetings, etc.) with online forms, using Internet platforms (videoconferencing, webinars), websites, social media, etc;
- limited access to equipment such as laptops, headphones or appropriate online meeting software;
- the need to replace the planned forms of promotion, e.g. travelling abroad to the fair;
- the need to abandon some of the planned activities and expenses, e.g. room rental, catering;

- the need to replace some of the expenses with others, related to the allocation of funds for other purposes directly related to the reduction of the negative impact of the COVID- 19 pandemic on the project, e.g. purchase of access to Internet platforms;
- the problem with finding partners from abroad to implement new projects;
- the problem with contacting the Joint Technical Secretariat staff;
- the need to bear the costs of the electronic signature.

The above problems occurred unexpectedly and required immediate reactions and solutions. The research indicates that some of the problems were solved systematically by introducing new, non-standard guidelines of the Managing Authority of the Interreg VA Programme. National legal regulations have also proved helpful, e.g. the Act on special solutions supporting the implementation of operational programmes in connection with COVID-19 in 2020 of 3 April 2020. Unfortunately, as the project contractors admit, certain problems have still not been solved, which determines the implementation of cross-border cooperation projects. Their aim is to achieve the so-called cross-border effects, which due to the COVID-19 pandemic may prove to be less significant in the future than originally assumed. This in turn may have a negative impact on the processes of integration of local communities in the Polish-German border area and the functioning of the area.

Conclusions

The COVID-19 pandemic caused by the SARS-CoV-2 coronavirus has had and continues to have an unprecedented impact on the global economy and its real consequences may only be assessed in the future. Undoubtedly, one of the most evident consequences of the pandemic was the closure of national borders and the various accompanying restrictions, the aim of which was to ensure the safety and health protection of the citizens of each country. Adverse effects of these events additionally affected the border areas and its inhabitants, and it seems that their impact there was much greater. This situation was also faced in the European Union, which treats border regions in a special manner, aiming at their development and integration of the inhabitants of the neighbouring regions on both sides of the borders, by allocating special EU funds for this purpose, including Interreg. They are dedicated to the implementation of projects based on cross-border cooperation. The studies carried out showed that they were also adversely affected by the pandemic. The study identified a number of unexpected problems that were faced by Interreg contractors. The most significant problems included the difficulties with the implementation of the established result indicators and problems with acquiring partners for new projects. A significant part of the projects in the discussed area is concentrated on tourism, which may further increase the difficulties in implementing and managing Interreg projects. The problems indicated in the paper may reduce the expected so-called cross-border effects of the projects, which will have an adverse impact on the development and functioning of border areas in the European Union and the cross-border cooperation, which has already been impaired. Overcoming the problems identified in the paper and finding solutions is a challenge for all partners implementing and managing cross-border projects co-financed by the EU.

In general, the results of the study showed that employees of PKP CARGO S.A. Cargo Carriage Enterprise in Szczecin value their work, are loyal to the employer and most of them work in the railway industry out of passion and family traditions. Despite the currently good situation on the Polish employment market where low unemployment and increase in demand for work are observed, many respondents would not make an immediate decision on transfer to another enterprise should such an opportunity arise, 69% of employees would have to think about it and 31% stated that they are not interesting in changing their job at all.

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Public-Private Partnership in The Sphere of Conservation of Cultural Heritage Objects: Legal Security and Economic Efficiency (On the Example of F.N. Plevako's Manor Located in The Village of Vishnevoe In Staroyuryevsky District in Tambov Region)

Yana Yu. Radyukova
Derzhavin Tambov State University, Tambov, Russia
radyukova68@mail.ru

Adamov Ernest Valeryevich
Derzhavin Tambov State University, Tambov, Russia
ernest-adamov@ya.ru

Dorozhkina Natalia Igorevna
Derzhavin Tambov State University, Tambov, Russia
natasha_16.06@mail.ru

Makareva Elena Afanasyevna
Voronezh State University of Forestry and Technologies named after G.F. Morozov», Voronezh, Russia,
elenaf_mak@mail.ru

Abstract

Description of a main objective of research. In 2018, the population of Tambov region began to show much more interest in cultural services and cultural objects. About 12.2 million people visited cultural institutions and took part in cultural events in 2018, which was 7.0% more than in 2017. The authors of the study made an attempt to develop a mechanism of interaction between the state and private investors to conserve cultural objects. The researchers proposed the measures to preserve the manor of the famous Russian lawyer F.N. Plevako which is a cultural heritage site of regional significance. Apart from that, the authors gave some recommendations on how to stimulate state bodies and private investors to develop mutually beneficial cooperation and preserve the historical heritage.
Short description of methodology. The authors of the study used the following methods: analysis, synthesis, deduction, induction and classification. In addition, the researchers applied such methods as desk research, study of documentation, description and modeling.
Compilation of the most important research results and their significance. The research is practically oriented as it contributes to the restoration of F.N. Plevako's manor located in the village of Vishnevoe in Staroyuryevsky district in Tambov region. The authors determined the market value in accordance with the Federal Valuation Standards and calculated the total amount of investments for the reconstruction of the estate. The financial model of the return on investment was developed in accordance with the methodological recommendations proposed by the Ministry of Economic Development (recommendations for the implementation of PPP projects).

Keywords: public-private partnership, cultural heritage objects, concession agreement, concessionaire, concessioner.

Introduction

The state cultural heritage monuments are part of people's history and past. They are considered as the traces of the material and spiritual life of the society. However, natural and anthropogenic forces have a negative effect on the cultural heritage. Thus, as Lytkina K.D. (2019), it is crucial to preserve and restore the country's cultural wealth. As for the state, it annually allocates funds for the restoration of cultural sites: 5.5 billion rubles in 2016, 7.3 billion rubles in 2017 and 9.8 billion rubles in 2018. Thanks to these allocations, in 2016, 161 objects were restored, in 2017 - 283 objects, in 2018 - 240 objects. Nevertheless, currently, more than 34 000 objects need to be restored, which proves

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the need to search for alternative sources of funding (Abankina, T.V., Derkachev P.V. (2016)). For this reason, the authors of the research claim that it is vital to promote public-private partnership.

Today public-private partnership plays a great role in many areas of public life: social sphere, energy and utilities sphere, transport sphere, urban environment and infrastructure and agriculture.

The public-private partnership mechanisms are widely applied to protect cultural heritage. Today they turn out to be quite effective.

The Aigins' manor located in Pushkinsky District in Moscow Region can serve as a good example of efficient public-private partnership in the field of protection of cultural heritage objects in Russia. The complete process of restoration of the estate took more than two years, and the investor ActiveSaleGroup spent 250 million rubles on it. The expected payback period of the investment is approximately 15-20 years. The restored estate contributes to the socio-economic development of the village and attracts a considerable number of tourists to Moscow region. Nowadays, guided tours are offered in the merchant's estate (tourists find this place attractive since such famous personalities as I.S. Turgenev, S.T. Aksakov, M.Ye. Saltykov-Shchedrin stayed there) (Bolekhov I.Ye. (2012)).

Methods

The project financial structure was developed on the basis of the recommendations proposed by the Ministry of Economic Development (recommendations for the implementation of PPP projects).

Calculating the cost of reconstruction, the authors determined the land rent and rental payments, and applied the unit cost method and the method of recapitalization within the cost approach. To employ these methods, the researchers used appraisal guidelines (the directory under the editorship of L.A. Leifer, directories on consolidated index of construction cost and Ko-Invest, and Internet sources).

Results

Table 1: Approximate terms for signing a concession agreement

Stage	Term
Development of the project implementation plan	60 days
Consideration of the proposal	up to 40 days
Making an offer on the website	45 days
Making a decision on concluding a concession agreement	up to 65 days
Creation and operation of facilities	10-49 years

Table 2: Calculating the costs of reconstruction of the cultural heritage object

Indicators and adjustments	Building, purpose: non-residential, total area 247.5 sq. m, number of floors: 2, object address: Tambov region, Staroyuryevsky district, Vishnevoe village, st. Plemzavod, house number 23
Complexity of architectural design	Average
Structural system class	КС-2
Volume / Area of the appraisal object, cubic meters/square meters	1675
Reference indicator, rub / cubic meter	22 574,00
A source of information	Objects of architectural heritage, 2015, A3.01.001, 22
The first group of adjustments (rubles per 1 cubic meter (sq. m.) (+ rise in price, - reduction in price) related to	
- missing part of the outer walls	0
- the difference in floor heights	0
- basements	0
- special service and equipment	0
- the difference in the strength of soil, the depth of the foundation and the degree of water encroachment	0
- different constructive solutions	0
Total (for the first group of adjustments)	0
The second group of adjustments (in the form of correction factors) related to	

Indicators and adjustments	Building, purpose: non-residential, total area 247.5 sq. m, number of floors: 2, object address: Tambov region, Staroyuryevsky district, Vishnevoe village, st. Plemzavod, house number 23
- the difference in the volume of the building	1
- regional and economic differences	0,751
- the amount of other unforeseen costs	1
- the prices that changed after the publication of the reference book (from 01.01.2015 to 01.04.2020)	1,148
General correction factor related to the second group of adjustments	0,862
Adjusted cost indicator, rub / m3.	19 459
Amount of replacement costs for the appraisal object on the estimation date, excluding VAT, (rounded numbers), rub	32 593 825
Physical deterioration	0,94
Market value of the object, rub	1 955 629
Costs of reconstruction of the appraisal object, rubles	30 638 196

Table 3: Terms of lease

Legal acts regulating the procedure for leasing	
Lease term	10-49 years
Market rent (rub/month) (A grantor can establish a preferential rent)	23 423 (95 rubles per 1 sq. m)
Land rent (rubles / month) (A grantor can establish a preferential rent)	15 444,33

Table 4: The fundamental commitments regarding object restoration (conservation)

Information about the characteristic features of the cultural heritage object	The appearance of the building and the land should remain unchanged.
The ways to use it	It can be used as an office building where certain activities are carried out (the activities are aimed at increasing legal literacy / providing legal advice)
List of basic works on restoration (repairs, reconstruction) of the object	Reconstruction of the building. It compensates for 94% of physical deterioration and preserves the cultural heritage object. A full list of works is compiled when a contract on reconstruction is concluded
Execution period	Implementation deadlines are set when a contract on reconstruction is concluded
Other requirements and restrictions for restoration, reconstruction and modern use	Compliance with the requirements established in accordance with the preservation order of the legal owner (approved by the Department for State Protection of Cultural Heritage Objects of Tambov Region No. 333 dated 28.12.2018)
Reconstruction costs, rub	30 638 196

Here is the project financial structure (Fig. 1).

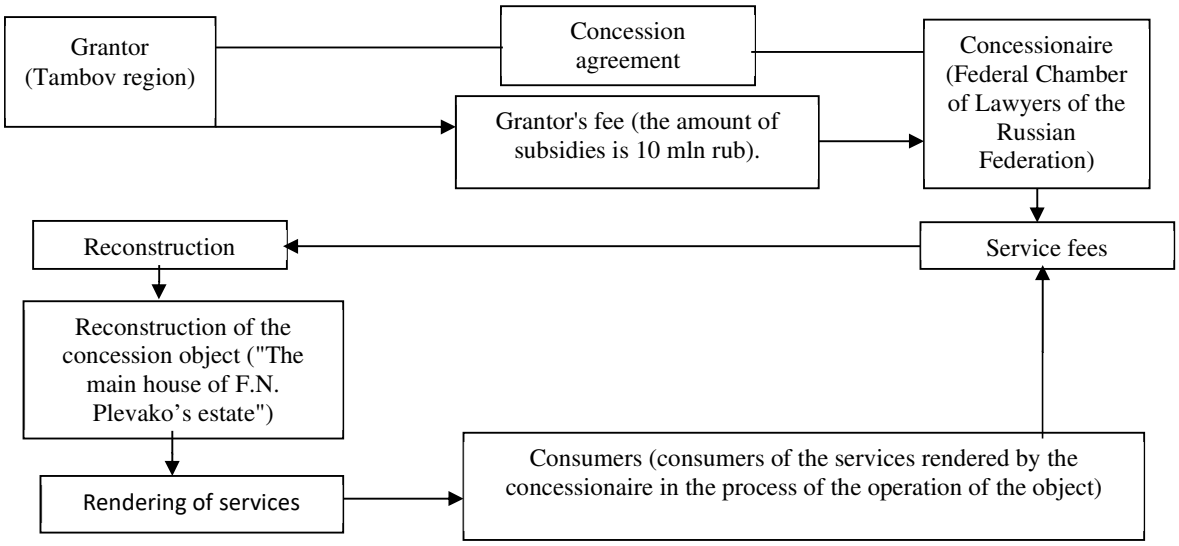

Fig. 1: Project financial structure

In Tables 5-7 there is a description of the financial plan.

Table 5: Description of monthly income

Service	Anticipated average sales volume per month	Cost (rub)	Revenue (rub)
Consultation	85	1000	85000
Client representation in court	12	2000	24000
Conducting the case	6	15000	90000
Total			199000

Table 6: Description of monthly expenses

Consumption	Amount / rub.
Concessionaire's fee (land rent and rental payments)	720
Key staff salaries and social security contributions (3 lawyers and 1 advocate)	120000
Advertising and website maintenance	150000
Working capital	5000
Tax	15000
Total	155720

Table 7: Final financial result

Index	Amount / rub.
Total income	199000
Total expenses	155720
Net profit	43280

To attract investment for the reconstruction of a cultural heritage site, the authors have developed an investment passport for a cultural heritage object.

The investment passport contains data on the market value — the building rental costs, land rent, the cost of reconstructing the cultural heritage object. The reconstruction expenditure was calculated as 94% (the degree of physical deterioration of the cultural heritage object, taken according to the technical passport data) of the market value of the property.

Discussions

Varnavsky V.G., Klimenko A.V., Korolev V.A. (2010) the basis of public-private partnership for the preservation of cultural heritage sites is the system of interaction between authorities and private investors. The more efficient the system is, the more targets can be achieved through the partnership channels. Implementing such projects provides municipalities and regions with the opportunity to ensure a higher standard of living for the population as well as their own investment and social appeal. At the same time the federal authorities obtain a tool for the effective promotion of national tasks. According to Belitskaya A.V. (2012) the State has an interest in attracting massive investment in the region's economy, while business is concerned with securing political and administrative support for long-term projects and dealing with the emerging challenges. Furthermore, competent interaction between government authorities and private business allows not only for preserving cultural heritage objects, but also for adapting them to performing socially significant tasks (Lebedev V.N., Yakushev A.Zh. (2010)). In the course of this research, the authors have developed a plan for the use of a reconstructed cultural heritage object ("The main house of F.N. Plevako's estate").

The project will be of interest to investors and has the following social and economic consequences:

1. Commemoration and tribute to the great Russian lawyer F.N. Plevako, a famous legal adviser who pioneered the judicial rhetoric in Russia.

Restoration of F.N. Plevako's manor will contribute not only to perpetuating the memory of the outstanding Russian counsel, but also to the development of the cultural sphere and tourism industry of Tambov region alongside with reinforcement of legal education of the general public.

2. Reinforcement of legal education of the population (the establishment of a law center named after F.N. Plevako, where the Federal Chamber of Lawyers will provide legal advice).

The concession contract appears to be the most effective form of the public-private partnership for the project implementation, since privatization of a cultural heritage object is impractical, and the mechanism of a concession agreement is the most well-ordered.

In accordance with Article 14 of Federal Law No. 73-FZ of June 25, 2002, an investor in restoration of cultural heritage sites is granted benefits for the building rental costs and land rent for these particular sites. The amount of the preferential rent is determined by the owner of the property.

Since the municipality, which owns the estate, has a minimal chance of attracting the required reconstruction investment compared to the resources of a federal subject of Russia, the authors of the article consider it advisable to transfer the estate to the property of Tambov region. In this regard, the authors assume that Tambov region, represented by the State Legal Bureau of Tambov Region, will act as the grantor for the agreement.

One of the objectives of the Federal Chamber of Lawyers of the Russian Federation, which is enshrined in the charter of the organization, is legal information and legal education of the general public. Therefore, in the opinion Zolotukhin A.D. (2017), this institution will be motivated to establish the Legal Center named after F.N. Plevako at the site of the manor. Accordingly, the Federal Chamber of Lawyers of the Russian Federation appears to be the most probable concessionaire, as it will provide both free and chargeable consultancy in the legal center.

The concessionaire undertakes to develop scientific and project documentation for the preservation of the cultural heritage site. In compliance with the planned agreement, the concessionaire will be held accountable for conducting a range of works to maintain the cultural heritage object: restoration of load-bearing and enclosing structures; restoration of facades, including windows and doors; restoration of the roof and roofing cover; restoration of interiors; restoration of engineering systems.

The stages of the public-private partnership project implementation can be presented as follows: project development / consideration; project evaluation; decision-making on the project implementation; publication of a private alternative; development and coordination of the concession contract, the tendering process, agreement conclusion; development and operation of the object; control and monitoring of the project implementation.

Since the appraisal object is a cultural heritage site - a unique entity, the market value was calculated by means of the unit value methodology and by means of calculating replacement costs based on the Consolidated construction indices.

To calculate the cost of the object development (the construction cost), the authors referred to the directory of the Consolidated renovation and restoration work indices "Objects of architectural heritage 2015". Rescaling to the price level as of the estimation date for Tambov region was based on the system of price indices in construction specified in current regulations in the building and construction industry. It also proceeded from cross-regional information and analytical bulletins "Price indices in construction" issue No. 90, 110 (hereinafter KO-INVEST).

The appraisal object is a cultural heritage site of regional significance - “The main house of F.N. Plevako’s estate" with an area of 245.7 sq.m. The object that is closest in its characteristics was adopted as a counterpart. Namely, it implied the residential buildings of the estate type and monastery residential premises (two-storeyed stone facilities without a basement), the construction cost of which in per unit volume is 22,574 rubles in prices of the year 2015. (see Coll. "Objects of architectural heritage 2015", No. AZ.01.001 pp. 22-23) (Fig. 1).

Adjustments to the benchmark costs:

1. Adjustments determined in rubles per 1 cubic meter (square meter):

1.1. outer walls partially missing - unchanged;

1.2. the difference in floor heights - unchanged;

1.3. special works and equipment required- unchanged;

1.4. differences in the soil strength, the foundations depth and the degree of water encroachment in soils - unchanged;

1.5. design differences:

- underground part, including the foundation - unchanged;
- walls, pillars, columns, abutments - unchanged;
- partitions - unchanged;
- ceilings, vaults, arches - unchanged;
- stairs, steps - unchanged;
- windows, doors - unchanged;
- floors, porch areas - unchanged;
- interior finishing and external cladding - unchanged;
- decor - unchanged;

2. Adjustments determined as correction factors:

2.1. The correction factor for the difference in volume / area was not given since the volume of the estimated object falls within its counterpart range.

2.2. The correction factor for regional economic differences. The coefficient was taken as equal to 0.751 based on the values for Tambov region for the correction factor (КСр-2) (see section 4.1 of the Collection “Objects of architectural heritage 2015”, page 143) (Figure 3);

2.3. The correction factor for the contingency and other costs. The coefficient is obtained by applying the formula:

$$K_{пз} = \frac{П_о}{П_{спр}}, \quad (1)$$

where $П_о$ is the region-specific ratio between the total estimated cost of real estate construction following all the twelve chapters of the summary cost estimate plus contingency works and costs according to local estimate calculations. Those include direct expenses on works accomplished, overhead costs and estimated profit. For Tambov region, $П_о$ is equal to 1.15;

$П_{спр}$ is the ratio described above and recorded in the KO-INVEST appraiser's directory as equal to 1.15. Thus, the correction factor for the contingency and other costs stands at:

$$K_{пз} = \frac{1,15}{1,15} = 1$$

2.4. The correction factor for price volatility succeeding the Directory issue is to rescale the construction cost of the estimated object, which has been determined on the basis of KO-INVEST, to the price level as of the estimation date. The coefficient is obtained by applying the formula:

$$K_{инфл} = \frac{И_о}{И_{спр}}, \quad (2)$$

where: Ио is the average regional index calculated by 01.01.2000 in relation to the actual prices of April 2020 (the estimation date), excluding VAT. $И_о$ is equal to 10.413 (Ko-INVEST 110).

$И_{спр}$ is the average regional index calculated by 01.01.2000 in relation to the actual prices of January 2015 (the reference date of the price level in the directory "Objects of Architectural Heritage 2015"), excluding VAT. $И_{спр}$ stands at 9.071 (Ko-INVEST 90).

Consequently, the correction factor for price volatility will be equal to the ratio of indices 10.413 / 9.071 = 1.148.

Determination of expenses on replacing the appraisal object is presented in Table 2.

Therefore, the reconstruction cost of the appraisal object will amount to 30,638,196 rubles.

The concessional rent will be set by the grantor. The minimum preferential amount of rent for a cultural heritage object is 1 ruble per 1 square meter annually, i.e. 247.5 rubles per year. The concessional land rent will be determined as 1,5% of the land cadastral value per annum, i.e. 8403.19 rubles. It is calculated in accordance with the resolution of Tambov region administration No. 270 "On approving the Procedure for determining the amount of rent for the use of land plots in the state ownership of the Tambov region, leased without bidding" dated as of March 18, 2015.

In accordance with the Resolution of the administration of Tambov region (18.03.2015) within the framework of the public-private partnership model, it is advisable to enforce a mixed concession pattern. Thus, the concessionaire will gain income from entrepreneurial activity by operating the object of the concession agreement for its intended purpose. Besides that, allocation of subsidies from the budget at the rate of 10 million rubles has been planned. In this case investment arrangements will be as follows.

The concessionaire is obliged to provide security in the form of pledging the concessionaire rights to the grantor under the bank deposit agreement for a period of 1 year with subsequent annual prolongation until the termination of obligations. The bank deposit is to hold 3.1 million rubles (approximately 15% of the private investment amount - the average collateral in concession agreements with a similar investment volume).

Within 60 calendar days after signing of the concession agreement, the financial close is scheduled, i.e. the concessionaire is required to document access to funding sufficient for fulfilling the obligations.

Having restored the manor, the concessionaire is entitled to establish a legal center. According to the plan, with the legal center generating a net profit of 500 thousand rubles, which corresponds to a moderate legal center's average yield (Tables 3, 4, 5), the project will pay off in 41 years and 10 months. The calculation considers the costs of project documentation, reconstruction, lease of the cultural heritage object and land during reconstruction as well as the expenses for ensuring business activities. The term of the agreement is 49 years. Therefore, the concessionaire will gain revenue for 4 years and 2 months. The project is a typical public-private partnership pattern as regards cultural heritage preservation. As noted Chachkiev G.G. (2017) the concession discussed is not comparable with those in the housing and public utilities sector or road construction, because in this case the cost-efficiency is extremely low or totally unavailable.

Therefore, the anticipated outcomes of the proposed project are preservation and reconstruction of the cultural heritage site - F.N. Plevako's manor located in the village of Vishnevoe, as well as establishment of a legal center named after F.N. Plevako on the premises of the estate. The Federal Chamber of Lawyers of the Russian Federation will provide both free and chargeable consultancy in the legal center.

Conflict of Interests

The authors argue that the data presented in the article do not contain a conflict of interest.

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Estimation of The Share of Land in Industrial Real Estate by The Method of Regression Analysis

Yana Yu. Radyukova
Derzhavin Tambov State University, Tambov, Russia, radyukova68@mail.ru

Sutyagin Vladislav Yuryevich
Derzhavin Tambov State University, Tambov, Russia, vl.sutyagin@gmail.com

Svetlana V. Zenchenko
North-Caucasus Federal University, Stavropol, Russia, zen_sveta@mail.ru

Chernyshova Oksana Nikolaevna
Derzhavin Tambov State University, Tambov, Russia, optmb@yandex.ru

Abstract

Purpose: The purpose of this study is to develop methods for indirectly assessing the value of land in a single property. **Design / Methodology / Approach:** This study proposes an alternative approach to calculating the value of a land plot (by analyzing the share of a land plot in the value of a single property). In the article, the authors consider the share of a land plot in the value of a single property as a result of the action of various pricing factors. The method of regression analysis was used as a methodological basis. **Findings**: Based on the results of the regression analysis, the authors gave recommendations on the use of each of the formulated factorial models and made conclusions about their applicability. **Practical Implications:** The results of this study can be used in cadastral valuation practice as well as market valuations used to challenge the cadastral valuation results. **Originality / Value:** The presented study is an alternative way of calculating the value of land in a single property, which is especially valuable in the face of a lack of initial information required to implement the traditional methodology of comparative sales.

Keywords: Cadastral Value, Reliability of Cadastral Valuation, Share of A Land Plot in A Single Real Estate Object.

Introduction

According to Decree of the Government of the Russian Federation (1999) cadastral valuation in Russia as an institution in August 2019 celebrated its 20th anniversary. For quite a long time, the cadastral assessment concerned only land legal relations. One of the most acute problems of cadastral valuation is the accounting/exclusion of land values from a single real estate object.

However, if such land is not excluded from the value of the real estate, then this increases the taxable base, and therefore overestimates the tax.

Summing up, we can conclude that the option of assessing land based on the methodology of a comparative approach with its subsequent deduction from the value of a single property has extremely narrow practical application.

An alternative and, as it seems, more promising option for calculating the value of land in a single real estate object looks based on an assessment of the share of a land plot in the value of a single real estate object (the so-called distribution method, widely used in the assessment of built-up plots). According to this method, the market value of a land plot is calculated as:

$$MV_l = SC_l * MV_{sp} \quad (1)$$

MV_l – market value of the land plot; SC_l - the share of the cost of the land plot in a single real estate object (hereinafter for convenience "share of the land plot");

MV_{sp} – market value of a single property.

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If it is necessary to assess the value of a capital construction object (MV_{cco}) (for example, as in an assessment situation for the purpose of challenging the results of a cadastral valuation), its market value can be obtained as:

$$MV_{cco} = (1 - SC_l) * MV_{sp} \quad (1)$$

Justification of the size of the share of the land plot is the subject of this study.

Methods

The general theoretical basis of the study was the logical method, as well as the methods of analysis and induction.

In addition to general scientific methods, the study widely used statistical methods, such as sample observation, grouping (clustering), structural analysis, and correlation-regression analysis.

In the sample observation, the analysis was made of the results of evaluations of real estate objects of a number of Tambov appraisal firms for the period from 2012 to 2019, and a sample of 139 objects was formed at the preliminary stage. In the course of selective observation, an analysis was carried out for the presence of "gross errors" in the sample based on the Smirnov-Grubbs test and atypical objects were excluded. The final sample was 132 objects.

The cluster "Industrial and warehouse real estate" contains information about the appraisals of real estate (buildings, rights in common ownership and premises) for industrial, warehouse, garage (vehicle maintenance) purposes.

The structural analysis involved the study of the values of individual elements (land plot and capital construction object) of each single real estate object included in the sample, with the subsequent calculation of the relative indicator - the share of the land plot.

Within the framework of the correlation-regression analysis, the factors influencing the cost of capital structures and land plots were identified. The identification of these factors was carried out on the basis of an analysis and generalization of the main pricing factors taken into account in the assessment reports. In particular, in relation to the sample for the cluster " Industrial and warehouse real estate", the following factors were identified and analyzed: "Floor / number of storeys"; "Technical condition"; "Finishing"; "Location"; "Heating availability"; "Availability of railway lines"; "Construction material". The identified factors are largely qualitative, which required their digitization.

As a result, factorial models of the dependence of the share of a land plot in the value of a single property (function) on the values of the main pricing factors (function arguments) were compiled. Within the framework of this study, functions with 3, 4, 5, 6 and 7 factors were compiled. The alignment was carried out on the basis of a linear function. Further, the quality of the obtained functions was analyzed (using indicators of the coefficients of correlation, determination, average error of approximation and F-test of Fisher) and recommendations for their use were given.

The informational basis of the study was the archival database of appraisal reports for the period from 2012 to 2019 of a number of appraisal firms and individual entrepreneurs-appraisers of the Tambov region.

Results

A number of scientific studies have been devoted to the assessment of the share of a land plot in the scientific community, among which there can be distinguished works by such authors as Demidovoy P.M., Gorelikova V.G. (2015), Morozovoy E.V. (2015), Leifera L.A. (2003), Gladkikh N.I., Kuznetsovoy V.V. (2015) and Sutyagina V.Yu. (2019).

As a rule, the efforts of the authors are reduced to assessing the average value of the share of a land plot in the value of a single object for different segments of land (type of development), and in some cases, assessing the most likely range in which such a share is concluded. And most often such studies are carried out on the material of any region.

There are still no studies based on the material of the Russian Federation (except perhaps Real Estate Appraiser Handbook – 2018; Real Estate Appraiser Guide – 2018).

Within the framework of this study, an alternative approach to calculating the share of a land plot is proposed - calculating the share based on a regression model. Let us briefly recall: the essence of the correlation-regression analysis is to identify the tightness of the relationship between the independent variables (hereinafter the cost factors) and the resulting indicator (hereinafter the share of the land plot), as well as obtaining the equation (regression) that characterizes the nature of this relationship. For practical purposes, it is advisable to use multiple regression, since most often the cost depends on several factors (and not one).

The regression analysis algorithm in this case will look like this:

I. Formulation of the initial economic hypotheses. In contrast to purely mathematical and statistical problems, the use of correlation and regression analysis is based on the formulation of initial economic hypotheses, including:

- a hypothesis about the nature of the relationship between the cost factors and the share of the land plot;
- hypothesis about the number of independent variables in regression;
- a hypothesis about the economic nature of the digitization of non-quantitative regression factors.

The essence of the first hypothesis is that the selected function, on the basis of which the alignment is carried out, should be consistent with the nature of the influence of factors on the share of the land plot (and in fact, on the proportion of the value of the land plot in the value of a single real estate object). In this case, the economic meaning of the nature of the relationship of the factor should prevail over the purely mathematical one. Please note that all the factors described below significantly affect the value of a single property (and, consequently, its elements), which is illustrated by their use as pricing factors in assessing (in the assessment reports).

Second, economic processes are more consistent with the logic of linear alignment, that is, economic factors are most often summed up, that is, they contribute to the final result, and do not interact in any other way. This means that the choice of a linear function is preferable; in this regard, in the future, a linear function will be used for alignment.

The third important aspect concerning the choice of the function is taking into account (or not taking into account) the intercept of the regression. The free term in our situation, from an economic point of view, describes: what is the share of the land plot with zero values of all arguments. A preliminary analysis of the formation of models with a free term showed that in the overwhelming majority of cases its value is negative, which is devoid of economic sense.

II. Formation of the initial sample and its analysis for the presence of gross errors. To this end, the authors selected 139 objects for the period from 2012 to 2019. We draw your attention to the fact that the use of data for such a long interval is permissible, due to the fact that the analysis is subject to the relative indicator in which the influence of inflationary processes is eliminated.

When forming the initial sample, it is important to analyze for the presence of gross errors ("statistical outliers") in it. An explanation of the nature of such gross errors can provide additional information about the effect of unaccounted factors. In the framework of this study, the test for the presence of outliers was carried out on the basis of the Smirnov-Grubbs test (t). The pre-sample is ranked, and the mean and standard deviation of the sample are calculated. And then the maximum and minimum values of the sample are analyzed for the presence of a gross error, for the purpose of which the $t_{val.}$

$$t = \frac{|x_i - x_{aver}|}{\sigma} \quad (3)$$

The calculated value is compared with the tabular t_α. If $t_{calc} > t_\alpha$, the result x_i is considered a gross error and discarded.

According to the results of screening out, 132 objects remained (the full list of objects is posted on the Ocenka + portal http://ocenka-plus.pro/f/povesit_ps.xlsx). The results of the analysis of the final sample for the presence of gross errors are given in table1.

Table 1: Sample analysis for gross errors

Indicator	Quality rating	Critical value
Average value(x_{aver})	0,269	
Confidence levels (P)	0,95	
Standard deviation (σ_{ch})	0,109	
Sample size (n)	132	
X_{max}	0,417	
t_{max}	1,363	3,350
X_{min}	0,036	
t_{min}	2,140	3,350

III. Selection of the type of function by which the alignment will be carried out. As we noted, economic processes are most often associated with a linear contribution to the result. In this regard, the alignment was carried out on the basis of a linear function, in general form looking like:

$$f(x) = b + a_1 * x_1 + a_2 * x_2 + \ldots + a_n * x_n + \varepsilon \quad (4)$$

f (x) - the resulting feature; x_1, x_2, x_n - independent variables; a_1, a_2, a_n - coefficients for independent variables (degree of sensitivity of the resulting feature to the independent variable); b - free term of the regression; ε is the influence of unaccounted factors.

The resulting regression equation and its terms are tested for adequacy (statistical significance) (for example, by evaluating the mean approximation error and Fisher's F-test). Only then can the obtained regression equation be used for practical purposes.

IV. Identification of independent variables - cost factors. The choice of independent variables was carried out on the basis of an analysis of typical pricing factors taken into account when assessing the corresponding types of real estate. The following factors were analyzed as arguments:

1. "Floor / number of storeys";
2. "Technical condition";
3. "Finish";
4. "Location";
5. "Heating availability";
6. "Availability of railway line";
7. "Building material".

Below is a description of the economic meaning of the identified factors and the gradations they accept. It should be noted that conditionally all factors can be divided into factors of "land" (that is, influencing mainly the value of land) and "capital construction objects". The former increase the value and share of the land plot; the latter, on the contrary, reduce it. The logic is as follows: improvement of the condition (by some factor, for example, finishing or technical condition) of the capital construction object redistributes the share in its favor, on the contrary, the deterioration of the factor increases the share of the land plot.

Note that, in the overwhelming majority, all the indicated factors do not have a quantitative nature, which naturally complicates their use and requires their digitization, that is, the assignment of digital labels for each qualitative state of one factor or another.

One more nuance: the gradations of factors in Table 2, in accordance with the economic hypothesis put forward, are given in accordance with the logical hierarchy, that is, as we move from top to bottom, the share of the land plot increases.

Considering that almost all factors are of a qualitative nature, let us assign them digital labels, where 1 is the minimum contribution to the share of the land plot, and as it increases, the contribution to the share of the land plot increases. Initially, the labels are evenly spaced (i.e. 1, 2, 3, etc.).

Table 2: Numeric labels of value factors

Cost factor	Cost factor gradation
Floor / number of storeys	Accepted values: The ratio of the number of floors in the assessment object to the total number of floors in the building is calculated Accepted values: from 0 to 1.
Technical condition	Accepted values and digital labels: • Good - 1; • Satisfactory - 2; • Unsatisfactory - 3.
Finishing	The nature of the factor: qualitative (characteristics of the object of a capital structure) Accepted values: • Standart finish - 1; • Without finishing (or in a condition requiring replacement of finishing) - 2.
Location	The nature of the factor: qualitative (characteristics of the land plot) Accepted values: • Rural settlements -1; • Other cities of the region - 2; • Center of the subject of the Russian Federation - 3.
Availability of heating	The nature of the factor: qualitative (characteristics of the object of a capital structure) Accepted values: • Yes - 1; • No - 2.
Availability of railway line	The nature of the factor: qualitative (characteristics of the land plot) Accepted values: • No - 1;

	• Yes - 2.
Construction material	The nature of the factor: qualitative (characteristics of the object of a capital structure) Accepted values: • Brick / concrete - 1; • Wood - 2; • Metal / sandwich panels / quick production structures - 3.

V. Derivation of the regression equation and analysis of indicators characterizing its quality. Within the framework of this study, 12 regression equations were derived with a different number of factors (from 7 to 3). It is worth noting that as the number of factors decreased, the quality of the regression increased, and its compliance with the put forward economic hypotheses improved.

The alignment was carried out on the basis of the least squares method using MS Excel tools.

Table 3: Regression equations and regression quality indicators

	Number and list of factors	Regression equation	Regression Quality Indicators r - multiple correlation coefficient (r> 0.7); r^2 is the coefficient of determination; A_{aver} - average approximation error (A_{aver} <15%); F_c - the calculated value of F-statistics of Fisher; F_{crit} - critical value of Fisher statistics (F_c> F_{crit})
1	***7 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Finishing (x3); • Location (x4); • Availability of railway line (x5); • Availability of heating (x6); • Building material (x7).	$y = 0{,}290*x_1 + 0{,}047*x_2 - 0{,}070*x_3 + 0{,}018*x_4 - 0{,}019*x_5 - 0{,}018*x_6 - 0{,}006*x_7$	r = 0,968; r^2=0,937; A_{aver} = 36,4%; F_c = 265.52; F_{crit} = 2.11
2	***6 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Finishing (x3); • Availability of railway line (x4); • Availability of heating (x5); • Building material (x6).	$y = 0{,}292*x_1 + 0{,}051*x_2 - 0{,}054*x_3 - 0{,}012*x_4 - 0{,}015*x_5 + 0{,}002*x_6$	r = 0,967; r^2=0,935; A_{aver} = 38,2%; F_c = 303.35; F_{crit} = 2.23
3	***6 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Location (x3); • Availability of railway line (x4); • Availability of heating (x5); • Building material (x6).	$y = 0{,}259*x_1 + 0{,}044*x_2 + 0{,}008*x_3 - 0{,}036*x_4 - 0{,}021*x_5 + 0{,}011*x_6$	r = 0,966; r^2=0,933; A_{aver} = 49,5%; F_c = 292.19; F_{crit} = 2.23
4	***5 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Availability of railway line (x3); • Availability of heating (x4); • Building material (x5).	$y = 0{,}264*x_1 + 0{,}047*x_2 - 0{,}030*x_3 - 0{,}019*x_4 + 0{,}013*x_5$	r = 0,966; r^2=0,933; A_{aver} = 57.4%; F_c = 350.95; F_{crit} = 2.39
5	***5 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Location (x3); • Availability of heating (x4); • Building material (x5).	$y = 0{,}257*x_1 + 0{,}036*x_2 - 0{,}001*x_3 - 0{,}021*x_4 + 0{,}010*x_5$	r = 0,964; r^2=0,930; A_{aver} = 39.4%; F_c = 338.07; F_{crit} = 2.39
6	***4 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Location (x3); • Availability of heating (x4).	$y = 0{,}263*x_1 + 0{,}035*x_2 + 0{,}001*x_3 - 0{,}019*x_4$	r = 0,964; r^2=0,930; A_{aver} = 39.3%; F_c = 423.17; F_{crit} = 2.62

7	***4 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Availability of heating (x3); • Building material (x4).	$y = 0{,}257*x_1 + 0{,}035*x_2 - 0{,}021*x_3 + 0{,}010*x_4$	$r = 0{,}964$; $r^2=0{,}930$; $A_{aver} = 39.5\%$; $F_c = 425.87$; $F_{crit} = 2.62$
8	***4 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Location (x3); • Building material (x4).	$y = 0{,}241*x_1 + 0{,}032*x_2 - 0{,}003*x_3 + 0{,}007*x_4$	$r = 0{,}964$; $r^2=0{,}929$; $A_{aver} = 41.3\%$; $F_c = 417.63$; $F_{crit} = 2.62$
9	***3 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Availability of heating (x3).	$y = 0{,}264*x_1 + 0{,}036*x_2 - 0{,}018*x_3$	$r = 0{,}964$; $r^2=0{,}930$; $A_{aver} = 39.2\%$; $F_c = 568.56$; $F_{crit} = 3.02$
10	***3 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Building material (x3).	$y = 0{,}238*x_1 + 0{,}030*x_2 +0{,}006*x_3$	$r = 0{,}964$; $r^2=0{,}929$; $A_{aver} = 41.9\%$; $F_c = 560.49$; $F_{crit} = 3.02$
11	***3 factors:*** • Floor / number of storeys (x1); • Technical condition (x2); • Location (x3).	$y = 0{,}246*x_1 + 0{,}032*x_2 - 0{,}002*x_3$	$r = 0{,}964$; $r^2=0{,}929$; $A_{aver} = 41.2\%$; $F_c = 559.42$; $F_{crit} = 3.02$
12	***3 factors:*** • Technical condition (x1); • Location (x2); • Building material (x3).	$y = 0{,}076*x_1 + 0{,}026*x_2 + 0{,}047*x_3$	$r = 0{,}934$; $r^2=0,\ 873$; $A_{aver} = 63.3\%$; $F_c = 294.58$; $F_{crit} = 3.02$

Discussions

All regression equations (see Table 4) have a high level of statistical significance, which follows from the analysis of Fisher's F-statistic indicators. Moreover, the correlation coefficient shows that there is almost a functional dependence between the share of the land plot and the identified cost factors, since the latter is more than 0.96. Further, from the point of view of the analysis of the coefficient of determination, the result (share of the land plot) by more than 93% (with the exception of the last function) is explained by the action of these factors, that is, the influence of unaccounted factors is minimal.

At the same time, the predictive nature of the functions is rather limited, which is illustrated by the high average approximation error. Comparatively good results are given only by 4- and 3-factor models.

More important is the fact that in a number of regression equations the presence of a negative factor in the arguments, which is a violation of the formulated economic hypotheses, because with the growth of the factor, the share of the land plot does not grow, but falls (which does not correspond to reality).

From the point of view of the formulated economic hypotheses, models No. 10 and 12 look the most adequate.

The quality of the regression can be improved by means of optimization procedures, the essence of which boils down to changing the numerical values of the labels and the distances between them. This problem can be solved in several ways: sequential recoding or using optimization procedures [20, 21]. Both methods are based on the fact that the distance between the labels affects the quality of the regression. In fact, the question is only a toolkit for assessing such tags.

During sequential recoding, the expert sets the numerical value of the labels, after which the regression analysis procedures are repeated. However, this raises the problem of the subjectivity of labeling. The following expert rating scale can somewhat increase the objectivity (see table 4).

Table 4: Ordinal scale of expert assessments (according to Anisimova I.N., Barinov N.P., Gribovskiy S.V. (2004))

5	Ordinal scale value
Worst value of the cost factor	1-2
A slight advantage of a factor over another	3-4
A significant advantage of a factor over another	5-6
Significant advantage of a factor over another	7-8
The absolute advantage of a factor over another	9

Considering the fact that the first two ratios are quite high, their further increase is not significant. In this regard, the indicator of the average approximation error was the optimization criterion.

The results of the optimized functions are shown in Table 5.

Table 5: Regression equations and regression quality indicators

Number and list of factors	Digital tags	Regression equation	Regression Quality Indicators
7 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}293*x_1 + 0{,}013*x_2 - 0{,}059*x_3 + 0{,}022*x_4 - 0{,}015*x_5 - 0{,}015*x_6 - 0{,}003*x_7$	$r = 0{,}968$; $r^2=0{,}938$; $A_{aver} = 35.7\%$; $F_c = 268.16$; $F_{crit} = 2.11$
• Technical condition (x2);	Good-1; Satisfactory-4; Unsatisfactory-9;		
• Finishing (x3);	Standart - 1; Without finishing (or in a condition requiring replacement of finishing) - 2;		
• Location (x4);	Rural settlements -1; Other cities in the region - 2; Center of the subject of the Russian Federation - 3.		
• Availability of railway line (x5);	No -1; Yes -7		
• Availability of heating (x6);	Yes -1; No - 2		
• Building material (x7).	Brick / concrete - 1; Wood - 2; Metal / sandwich panels / prefabricated structures - 3.		
6 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}299*x_1 + 0{,}018*x_2 - 0{,}044*x_3 - 0{,}003*x_4 - 0{,}011*x_5 + 0{,}002*x_6$	$r = 0{,}967$; $r^2=0{,}935$; $A_{aver} = 35.7\%$; $F_c = 303.08$; $F_{crit} = 2.23$
• Technical condition (x2);	Good-1; Satisfactory-4; Unsatisfactory-7;		
• Finishing (x3);	Standart - 1; Without finishing (or in a condition requiring replacement of finishing) - 2;		
• Availability of railway line (x4);	No -1; Yes -3		
• Availability of heating (x5);	Yes -1; No - 2		
• Building material (x6).	Brick / concrete - 1; Wood - 3; Metal / sandwich panels / prefabricated structures - 7.		
6 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}257*x_1 + 0{,}016*x_2 + 0{,}009*x_3 - 0{,}007*x_4 - 0{,}007*x_5 + 0{,}007*x_6$	$r = 0{,}966$; $r^2=0{,}932$; $A_{aver} = 38.7\%$; $F_c = 288.94$; $F_{crit} = 2.23$
• Technical condition (x2);	Good-1; Satisfactory-2; Unsatisfactory-7;		
• Location (x3);	Rural settlements -1; Other cities in the region - 2; Center of the subject of the Russian Federation - 3.		
• Availability of railway line (x4);	No -1; Yes -4		
• Availability of heating (x5);	Yes -1; No - 3		
• Building material (x6).	Brick / concrete - 1; Wood - 2; Metal / sandwich panels / prefabricated structures -4.		
5factors			

• Floor / number of storeys (x1);	0 to 1	$y = 0{,}282*x_1 + 0{,}012*x_2 - 0{,}007*x_3 - 0{,}002*x_4 + 0{,}004*x_5$	$r = 0{,}965$; $r^2=0{,}931$; $A_{aver} = 37.2\%$; $F_c = 342.75$; $F_{crit} = 2.39$
• Technical condition (x2);	Good-1; Satisfactory-2; Unsatisfactory-9;		
• Availability of railway line (x3);	No -1; Yes -2		
• Availability of heating (x4);	Yes -1; No - 7		
• Building material (x5).	Brick / concrete - 1; Wood - 3; Metal / sandwich panels / prefabricated structures - 9.		
5factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}269*x_1 + 0{,}016*x_2 - 0{,}001*x_3 - 0{,}017*x_4 + 0{,}005*x_5$	$r = 0{,}966$; $r^2=0{,}932$; $A_{aver} = 37.9\%$; $F_c = 350.15$; $F_{crit} = 2.39$
• Technical condition (x2);	Good-1; Satisfactory-4; Unsatisfactory-7;		
• Location (x3);	Rural settlements -1; Other cities in the region - 4; Center of the subject of the Russian Federation - 5.		
• Availability of heating (x4);	Yes -1; No - 2		
• Building material (x5).	Brick / concrete - 1; Wood - 3; Metal / sandwich panels / prefabricated structures - 9.		
4 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}274*x_1 + 0{,}013*x_2 + 0{,}001*x_3 - 0{,}014*x_4$	$r = 0{,}965$; $r^2=0{,}932$; $A_{aver} = 38.1\%$; $F_c = 436.92$; $F_{crit} = 2.62$
• Technical condition (x2);	Good-1; Satisfactory-4; Unsatisfactory-9;		
• Location (x3);	Rural settlements -1; Other cities in the region - 4; Center of the subject of the Russian Federation - 5.		
• Availability of heating (x4).	Yes -1; No - 2		
4 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}274*x_1 + 0{,}013*x_2 - 0{,}014*x_3 + 0{,}005*x_4$	$r = 0{,}966$; $r^2=0{,}930$; $A_{aver} = 37.5\%$; $F_c = 441.32$; $F_{crit} = 2.62$
• Technical condition (x2);	Good-1; Satisfactory-3; Unsatisfactory-9;		
• Availability of heating (x3);	Yes -1; No - 2		
• Building material (x4).	Brick / concrete - 1; Wood - 3; Metal / sandwich panels / prefabricated structures - 7.		
4 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}252*x_1 + 0{,}012*x_2 + 0{,}0004*x_3 + 0{,}006*x_4$	$r = 0{,}965$; $r^2=0{,}932$; $A_{aver} = 39.5\%$; $F_c = 435.93$; $F_{crit} = 2.62$
• Technical condition (x2);	Good-1; Satisfactory-3; Unsatisfactory-9;		
• Location (x3);	Rural settlements -1; Other cities in the region - 3; Center of the subject of the Russian Federation - 4.		
• Building material (x4).	Brick / concrete - 1; Wood - 3;		

	Metal / sandwich panels / prefabricated structures - 5.		
3 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}280*x_1 + 0{,}013*x_2 - 0{,}011*x_3$	$r = 0{,}965$; $r^2=0{,}931$; $A_{aver} = 37.8\%$; $F_c = 583.83$; $F_{crit} = 3.02$
• Technical condition (x2);	Good-1; Satisfactory-3; Unsatisfactory-9;		
• Availability of heating (x3).	Yes -1; No - 2		
3 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}255*x_1 + 0{,}013*x_2 +0{,}005*x_3$	$r = 0{,}9654$; $r^2=0{,}932$; $A_{aver} = 39.1\%$; $F_c = 586.73$; $F_{crit} = 3.02$
• Technical condition (x2);	Good-1; Satisfactory-3; Unsatisfactory-9;		
• Building material (x3).	Brick / concrete - 1; Wood - 4; Metal / sandwich panels / prefabricated structures - 7.		
3 factors			
• Floor / number of storeys (x1);	0 to 1	$y = 0{,}259*x_1 + 0{,}012*x_2 +0{,}001*x_3$	$r = 0{,}965$; $r^2=0{,}931$; $A_{aver} = 39.5\%$; $F_c = 579.98$; $F_{crit} = 3.02$
• Technical condition (x2);	Good-1; Satisfactory-3; Unsatisfactory-9;		
• Location (x3).	Rural settlements -1; Other cities in the region - 3; Center of the subject of the Russian Federation - 4.		
3 factors			
• Technical condition (x1);	Good-1; Satisfactory-3; Unsatisfactory-5;	$y = 0{,}041*x_1 + 0{,}044*x_2 + 0{,}024*x_3$	$r = 0{,}931$; $r^2=0{,}867$; $A_{aver} = 62.7\%$; $F_c = 281.11$; $F_{crit} = 3.02$
• Location (x2);	Rural settlements -1; Other cities in the region - 3; Center of the subject of the Russian Federation - 4.		
• Building material (x3).	Brick / concrete - 1; Wood - 3; Metal / sandwich panels / prefabricated structures -5.		

Note that the optimization procedures for the most part had little effect on the coefficients of multiple correlation and determination. On the other hand, in many models the average approximation error has noticeably improved (although it does not reach the recommended values).

In a number of cases the sign changed (from negative to positive) with the argument multiplier, which means that these functions began to correspond to the formulated economic hypotheses (now these are models № 8, 10, 11, 12).

The second method is based on optimization procedures and implies an iterative selection of labels, which increases the regression quality indicators. This approach usually works well with spreadsheets. In particular, MS Excel has an add-in "Search for a solution" (Sutyagin V. Yu. (2015), Anisimova I.N., Barinov N.P., Gribovskiy S.V. (2004)). At the same time, the analysis showed that this approach is unsatisfactory in practical terms. In the course of its implementation, the regression quality indicators increased, but the economic sense of digitization was lost. So, the order of digitization of marks often changes (for example, it often turned out that in a satisfactory condition the share is higher than in an unsatisfactory and good one). In this regard, the results of optimization procedures in the framework of this study are not presented.

Finally, a few words should be said to summarize the economic meaning of the derived regressions, as well as basic recommendations for their use.

First, the predictive nature of using the models is rather limited, which is associated with a relatively high approximation error. In this regard, the use of the obtained models is most in demand in the absence of the possibility of direct calculation of the cost of land.

Second, the most popular models look like № 8, 10, 11, 12, since the formulated economic hypotheses "work" in them.

The third, 5-, 6- and 7-myth-factor models are of a general nature and are applicable for any type of industrial estate and land plots below them, since they cover a fairly large list of cost factors.

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Entering the Civil Service in Eastern Europe as A Stage of Professional Socialisation: A Camparative Analysis

Galina BANNYKH
Ural Federal University, Yekaterinburg, Russia, g.a.bannykh@urfu.ru

Svetlana KOSTINA
Ural Federal University, Yekaterinburg, Russia, s.n.kostina@urfu.ru

Ekaterina ZAITSEVA
Ural Federal University, Yekaterinburg, Russia, e.a.zaitseva@urfu.ru

Abstract

The reform of state-political systems in Eastern Europe included the creation of a new public service institution. One of the most important issues in the formation of a professional public service is recruitment. The purpose of this article is to conduct a comparative analysis of the features of entering the civil service in Eastern Europe as the initial stage of professional socialisation of a servant. The study consists of the following: first, it provides an overview of civil service recruitment practices in Eastern Europe; secondly, the theoretical aspects of the study of recruitment for civil service in post-Soviet states as the initial stage of professional socialisation of an employee are generalised, and, thirdly, on the basis of the data obtained, a comparative analysis of technologies and methods of recruiting for civil service is carried out. service is carried out in the countries of the European Union. Research results have shown that these systems are not uniform or universal; integration into the EU has a significant impact on regional (country) characteristic.

Keywords: recruitment, public service, civil service, entering the civil service, assessment, professional socialisation, Eastern Europe, European Union.

Introduction

The professional activity of public servants is an object of close attention of researchers, because the achievement of the main goals of public administration depends on its effectiveness. Professional activity begins from the moment of entering the public service and the "entry" of the individual into the professional environment. In general, this process is called professional socialisation. The previous stage of professional training or professionalisation is not always and not in all countries is mandatory, therefore, we will consider the features of the system of hiring public service personnel as the initial stage of professional socialisation of an employee.

Admission to the civil service is a fundamental moment on which the quality of public administration personnel and its effectiveness depend. The recruitment system should ensure that the objective characteristics and individual qualities of a person meet the requirements of the public service as a professional activity. The formation of personnel selection systems in the civil service in national states was influenced by such factors as the political regime, civic culture, and the socio-economic status in the state. Thus, joining the civil service is a historically determined system of searching and selecting citizens who are most suitable for this type of activity.

The collapse of the communist system in the 1990s forced Eastern European states to independently lay the foundations of public service in the new economic and political conditions. However, even now, after 30 years at the institute of public service in European Union, there is no uniform approach to the organization of the recruitment system.

What are the results of public service reform in Eastern Europe today regarding recruitment procedures? This study examines the question of filling this gap in research and highlighting the national characteristics of civil service in Eastern Europe. In our study, we included the following states in these studies, according to the UN definition:

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Belarus, the Republic of Bulgaria, Hungary, Moldova, Poland, Russia, Romania, Slovakia, Ukraine, the Czech Republic.

The purpose of this article is to conduct a comparative analysis of the current state of the public service personnel recruitment system in Eastern Europe. Reform of public service admission is one of the most important stages in the democratization of the public service, increasing its openness and effectiveness. And the current state of the hiring system is a reflection of national characteristics, the communist past and the need to comply with European requirements for countries integrated into the Eurozone.

Theoretical and methodological foundations of the study of the results of reforming recruitment system in public service

Changes in the system of recruitment for public service were due to reforms of the system of state and municipal government. Public administration reforms began actively not only in Eastern, but also in Western Europe at the end of the XX century. The new management approach as a new methodological approach that attracts the attention of researchers, says Toonen (2007). Against this background, the key task of establishing the executive branch of the post-communist countries was to build their capacity in the development of politics and to increase the professionalism of its employees (Goetz & Wollmann, 2001).

The reform of public service employment relations in Eastern European countries, based on the approach of the new public administration (NPM), has led not only to positive trends in European integration. Some authors see the main reason for this as neglecting the hallmark of the employer (state) as a political institution and excessive attention to moral hazard and agent costs (Bordogna, 2008). For other authors, the reason is the difference in the goals of reform and European integration themselves - for the countries of Central and Eastern Europe, the initial positions, problems, ability to change and the initial goals were very different from most countries of Western Europe (Bouckaert, 2009).

However, the development of Eastern European countries in the new capitalist conditions led to their desire to be in the European Union, and, therefore, to fulfill a number of requirements for the government structure (Schimmelfennig & Sedelmeier, 2005). Indeed, the formation of the European Union required states to rethink politics, administrative power, organise public service and allocate financial responsibility (Nunberg, 2000).

In a number of Eastern European countries that have joined the EU or intend to do so, civil service reforms have been carried out in preparation for this process. The development of administrative capacity was one of the conditions for EU membership (Dimitrova, 2005). The civil service reform policy was based on the “principles of the European administrative space” that were developed by the Sigma program in the late 1990s in line with the continental tradition (SIGMA, 1999). Membership in the European Union requires that each administrative branch and industrial sector of an EU member state comply with the acquis communautaire (community rules). Therefore, the main direction of the reform was to be a review of the basic laws of the member countries and EU candidates. During the first decade of the XXI century, in order to solve this problematic system, a meritocratic, but very static hiring system was set up and it was based on formal qualification rules and hiring competitions (Kostina, Zaytseva & Bannykh).

In 2004, the following European Union countries joined the EU - Hungary, Slovakia, Poland and the Czech Republic, and in 2007 - Bulgaria and Romania. Ukraine and Moldova are currently candidates for EU membership. As noted in the Sigma report, after entering the EU, public service reforms lost an external incentive and were carried out entirely on their own initiative (SIGMA, 2009). Also the 2009 report noted that in all countries that joined the EU in 2004, there was a departure from reforms in the spirit of following European principles. However, exams and selection were additionally deregulated, and they no longer reach the average level of compliance with European principles of administration.

The remaining countries of Eastern Europe - Belarus and Russia - have paid quite a lot of attention to the reform of their civil service over the XXI century. At the same time, although they were not limited to the pan-European principles of public service organisation, they also generally proceeded from them, including with regard to the openness of contests upon entering the service/

Methods

The study assessed the procedure for admission to the civil service of Eastern European countries according to several criteria that imply adherence to general European principles. First of all, who could be considered as a public servant in a nation-state is essential. In this case, the most important issue is, inter alia, the allocation of

political posts and senior service in the public administration system. It was also assumed that the particularities of revenue would depend on the organisation of the public service itself - i.e. its division into types and categories (classes, groups). Secondly, the features of the national requirements for candidates entering the public service were studied.

The procedure for recruitment itself was evaluated in terms of, firstly, the presence of uniform conditions (order) of admission. Secondly, the selection and assignment of candidates were examined, including how open these procedures are.

So the hypothesis of the study are:

1. Recruitment systems are not uniform or universal
2. Integration in the EU has a significant impact on regional (country) features
3. The proximity of the state to the West or East in the course of ongoing reforms matters

The study is based on an analysis of modern legislation in Eastern Europe, including changes that have occurred in the past few years, as well as a secondary analysis of studies conducted on similar topics. In the course of the study, we use qualitative and quantitative research methods: content analysis of laws and other normative documents, analysis of documents and statistical information.

The results of the study

Civil Service Organization

The basic principle of organization of public administration in Europe indicates the need to separate the political and administrative spheres, which involves the separation of senior positions in the service and special selection procedures for these positions. As a result of the reforms in the analysed countries, a limited concept of public service was generally adopted, when only professionals in public administration and administration and professionals with public authority are public servants. In a number of countries, legislative regulation of the recruitment and passage of public service took shape in the early 2000s and was only being amended; in other countries, new laws on public service were adopted quite recently (see Table 1)

Table 1: legislative regulation of public service

Country	First law in force	First changes to law
Romania, Bulgaria	1999	2000
Belarus	2003	2019
Russia	2003-2004	2006
Poland	2006	2008
Moldova,	2008	2009
Hungary	2011	2014
Czech Republic, Slovakia	2014	2017
Ukraine	2015	2018

The analysis showed that all national public services have sufficient uniqueness, and sometimes significant complexity of the internal organization, which affects the systems used to hire employees. First of all, we are talking about the separation of political and administrative services, as well as the allocation of senior services. In a number of countries, political positions are excluded from the civil service corps. In Russia, the highest positions in government bodies (deputies of all levels, top officials of the subjects of the federation, ministers, judges, ambassadors, representatives, etc.) are excluded from the number of state employees. In Slovakia, on the contrary,

employees of state and local authorities, the police, the army, customs, members of parliament and politicians are recognized as public servants.

The status of senior civil service is formalized in Romania and Poland (secretaries general, deputy secretaries general, prefects, sub-prefects and government inspector). There are no special conditions for senior service in Bulgaria, Hungary and the Czech Republic, Russia, Belarus, Moldova.
In addition, the structure of the public service itself, which can be quite complex, also influences the organisation of recruitment. So, for example, in Russia there is a division of public service into state (service in government) and municipal (service in local government). In turn, the civil service is divided into three types (civil, military, other types) and two levels (federal and regional). Civil service posts fall into three categories and five groups.

Большой проблемой в последнее время остается политизация старших служащих, фаворитизм и тенденция к патронажу в найме служащих, что отмечается и в материалах OECD (OECD, 2011).

Qualification Requirements

In the CE countries, mainly qualification requirements consist of two parts - general requirements established for all civil servants centrally, and special ones established by state bodies independently. General qualification requirements could be established in laws on public service (Russia), or in separate legal acts. For example, in a number of EE states, documents such as the National Qualifications Framework (Republic of Bulgaria) and the unified Qualification Directory “Public Positions of Public Servants” (Belarus) have been adopted.

General requirements, for example, include citizenship, legal capacity, lack of criminal record, medical fitness, knowledge of the state language, and the level of professionalism. But even these requirements have their own specifics. So, in Ukraine, upon entering the civil service it is necessary to provide a document confirming knowledge of the state (Ukrainian) language and its receipt is in a paid form.

Some countries require their employees to know not only the state, but also foreign languages. For example, in Moldova, knowledge of the official languages of interethnic communication functioning in the respective territory is required. Since 2018, in 2018, knowledge of English or French is required to fill the so-called new posts in the public service category “A”. A certificate of proficiency in English, German or French is also required for public servants in Hungary. In Poland, a mandatory requirement is knowledge of at least one foreign language from the working languages of the European Union.

Criminal record restrictions may also vary. While civil service laws in Russia and Belarus provide for the absence of any outstanding criminal record, in Poland this is the absence of a criminal record for a deliberate crime or deliberate financial crime, as well as the absence of a ban on filling managerial positions in government bodies or the performance of functions related to the availability of public funds.

The issue of citizenship of civil servants has been resolved in various ways. The criterion for applying the provisions of the EU Treaty on the Free Movement of Labor between EU Member States was also the concept of exercising state powers or protecting the common interests of a state or local government. From then on, jobs in the public sector should be open to any EU citizen from any EU member state, with the only exception being those positions that are directly intended for citizens of the state in accordance with internal rules on public service. It is estimated that today between 60 and 90 percent of public service posts in EU member states are open to citizens of all EU member states [Sigma, 1999]. For EE states, the application of this rule is ambiguous. In some countries, only a citizen of a given country (Russia, Belarus, Ukraine, Moldova, Hungary) can be a civil servant. In other countries, mainly EU members, national legislation allows citizens of EU countries to enter the service, and in some cases also countries of other confederations. For example, in the Czech Republic citizens of another member state of the European Economic Area may enter the service, and in Bulgaria also the Swiss Confederation; in Poland - other countries that, in accordance with international agreements or legislative provisions, have the right to employment on the territory of the Republic. In Romania, according to the law (Section 50 of Law No. 188 of 1999, reprinted in the Statute of Civil Servants), a person who meets conditions such as citizenship and residence in Romania can apply for a civil service position. Slovak law provides for the possibility of entering the civil service of a citizen of another state, in this case, the applicant for the position must submit an extract from the criminal registry of his country.

In addition, among the general requirements, next one can be distinguished: providing information on income and property (Russia, Belarus), expenses (Russia), presence on the Internet (Russia); lack of membership in a political party (Poland); impeccable reputation (Poland), lack of defamatory biography (Czech Republic), impeccable lifestyle (Hungary); anti-corruption obligations.

Of particular interest is the system of requirements for professionalism. They may include requirements for education, work experience and possession of specific competencies (Bulgaria), knowledge and skills (Russia, Ukraine, Poland), personal and business qualities (Romania, Ukraine).

First of all, consider the requirements for formal education. They are established starting from the opportunity to enter the service with secondary school education (Czech Republic, Romania, Slovakia, Hungary), and ending with the requirements of only higher education (Bulgaria, Belarus, Ukraine). Education requirements are generally differentiated depending on the type of public service posts. For example, in the Czech Republic, job titles are indicated in the basic law and depend on the education received: the assistant assumes a secondary education with a certificate of apprenticeship, and the head assumes a higher education obtained as a result of training in a magistracy. In Romania, the necessary level of education for the implementation of a public function is established as follows: for class I - 4 years or more at a university; for class II - short-term licensed courses at the university; for class III - high school. In Ukraine, category “B” posts are accepted with a bachelor’s diploma, and categories “A” and “B” - a master’s degree (Ukrainian law). In the Russian Federation and Moldova, candidates with secondary vocational education can be accepted for lower positions. Only persons with a diploma of specialty and master's degree can apply for leadership positions in the Russian Federation. In Hungary, only candidates with higher education can be admitted to the central administration. In some cases, requirements may be established not only for the level of education, but also for its orientation in accordance with the content of the duties performed (Russia, Ukraine), or profile (Hungary).

As for the requirements for professional experience, they are present in one form or another in most countries of EE. In a number of countries (Belarus, Russian Federation, Bulgaria), the requirements for the length of service and experience in the specialty are established depending on the position.

However, there are exceptions to these rules. For example, in the Republic of Belarus it is allowed to hire people who do not have the necessary education and work experience if they carry out the duties assigned to them in full, show initiative and a creative attitude to work. In Hungary, it is allowed to hire municipal employees who do not have special education and training, but only for the time that they need to receive it - from a year to two. If during this period the employee has not received the necessary education, the contract with him is terminated.

Types of Admission

The most important characteristic of the system of admission to the civil service is the way of occupying a position. European traditions provide for various approaches to solving this issue - an open or closed system. In any case, a competitive selection system is provided for non-political posts. In all EE countries, the competition system in one form or another is present, although it was introduced in different countries at different times. However, the question of the procedure for joining the service in different countries has not been resolved unambiguously. If in some countries the competition is the only and mandatory way to fill posts, in others there is a non-competitive procedure for admission, the conditions and technologies for conducting competitive procedures vary quite a lot.

The competition is considered the most democratic procedure and the most effective method of selection, because it allows you to select the most capable. Legislation of EE countries provides for both an open and closed competition. An open competition for filling public service positions suggests that any person who meets the established requirements has the right to submit an application (Bulgaria, Russia, Moldova).

In most EE countries, the competitive procedures are mixed (i.e. there is an open and closed competition). For example, in Ukraine, an open tender is provided as the main procedure, but for a number of posts related to ensuring defense and national security, it is closed. The legislation of Belarus provides for two options for the competition - open and closed. All citizens of the Republic of Belarus who meet qualification requirements have the right to take part in the open competition. A closed competition is held among the civil servants in the reserve.

In Poland, all bodies have open competitive selection posts. There is also a closed selection system - appointments of civil servants. It can be attended by employees who have at least three years of service, a master’s degree, speak at least one foreign language from the number established by law, are a reserve soldier.

There are three types of competition in Slovakia: all citizens applying for public service can take part in an “open” competition, a “closed” competition is held among public servants in the relevant authority, and both active and freed people can take part in the “intermediate” competition civil servants.

From the point of view of organizing competitive procedures, the range of options for conducting a competition ranges from centralized to decentralized. To ensure the principle of openness, it is very important who conducts the competitive procedures, and to what extent subjective evaluations are excluded in this case.

The decentralized nature of the competition implies that each state body (organization) independently determines the rules for the competition, and the competition itself is conducted by the commission created in the body. This procedure has been adopted in Bulgaria, Hungary, Moldova, Russia, the Czech Republic. In Hungary, the composition of the commission is determined on the basis of the conditions of a particular competition, the composition of the commissions is quite numerous, but however, it does not have outside representatives of other organizations, including public ones.

In a number of EE countries, there is a semi-centralized version of the competition - when some part of it is held centrally, and the rest - by the body itself. So, in Bulgaria, the order of the competition involves two stages. The centralized stage of the competition is organized by the Institute of Public Administration and is carried out through tests to determine the level of general competencies and basic knowledge required to perform public service. Candidates who have successfully completed the centralized stage are admitted to the second stage - the decentralized one, which is carried out by the competition committee of a specific state body and is aimed at determining the level of specific competencies, professional and business qualities of candidates necessary for a certain position. In Ukraine, the task of holding a competition for employees of category “A” is assigned to the Commission on issues of the highest corps of public service, for categories “B” and “C” - to the competitive commission of a state body. In Romania, contests for vacant managerial positions, with the exception of the head of the office and the head of the service, are organized by the National Agency for Civil Servants, and for the rest - by government bodies and central and local administration institutions, a competition commission created to hire civil servants.

Methods for selecting and evaluating candidates. The essence of the competitive procedures is the selection of candidates who most meet the qualification requirements for the civil service position. It is precisely this that makes it possible to form a highly professional corps of public servants capable of solving new tasks of public administration. Although the set of methods for assessing candidates would seem to be standard in nature, its application for each BE country is unique. The most common methods are document verification, testing, interviews, and written examinations. However, very specific methods can be applied - for example, a polygraph (Russia). In many ways, the choice of methods is associated with established qualification requirements for public servants.

In Moldova, the selection procedure includes verification of application documents, a written exam, consisting of several tasks and interviews. A written exam tests the knowledge and skills necessary to complete the tasks and responsibilities of the public service. Candidates who pass the exam are accepted for an interview. The main questions asked during the interview are aimed at assessing professional and personal abilities relevant to this position; factors that motivate and demotivate the candidate; and behavior in various situations, including crisis situations. For leadership and managerial positions in the civil service, issues are also related to leadership style, ways to motivate subordinates, team work, etc.

In the Slovak Republic, the selection committee will examine the general knowledge, professional knowledge, skills and personal characteristics of the candidate. The following assessment methods are applied - a written test to verify the applicant's knowledge; a written test to test general knowledge, in particular the constitutional order, the organization of state power, about public service; written test to test knowledge of the national language; a written test to check the level of knowledge of a foreign language (if its knowledge is included in the requirements); written testing to test the skills and personality of the applicant; case study; a personal interview with candidates to test for the necessary skills and personality characteristics.

In Hungary, the following methods are most often used when applying for public service: suitability tests (health, physical, mental), screening (medical and psychological health), regulatory requirements checking (for example: incompatibility, compliance with national security), interviews (group, structured and stress interviews), the use of screening tests, an assessment method (competent choice, an assessment center), a letter of motivation, a questionnaire on life paths, a request for recommendations, internships and programs graduates probationary period.

In Ukraine, the competition involves testing. Candidates for the posts of categories "A" and "B" must solve situational tasks - the number of such tasks is determined by the competitive commission. After passing the test, candidates are interviewed, the purpose of which is to assess the conformity of the professional competence of the candidate with the established requirements, were not evaluated at the previous stages of the competition.

In Belarus, for those who enters the civil service for the first time, a qualification exam is held on the same issues for all (except for those who fill public positions, military personnel, employees of the internal affairs bodies, and a number of others). The form of the qualification exam (exam, interview, testing) is determined by the state bodies (organizations) in which the examination commissions are created.

Conclusion

The article analyses the system of admission to public service in the Eastern Europe countries in the context of reforming the public service system. The specificity of the analysis of changes in the recruitment system for public service in Eastern Europe is that the national civil service systems of post-communist states were at different stages of its development by the time of European integration, which significantly complicated the process of qualitative changes and the implementation of European principles by all participating countries

The analysis of the characteristics of recruitment systems was carried out according to several parameters: consolidation of the status of a civil servant in national legislation, differences directly between civil service and "senior" service, qualification requirements for candidates, selection procedures for public service. The analysis showed that in the first two decades of the new century, as a result of reforms, the selection procedures, qualification requirements for candidates and other characteristics underwent changes in Eastern Europe. For example, today the selection procedures in all analysed countries are based on information technologies, qualification requirements in individual states include knowing not only the state language of their country, but also other European languages, and not only citizens of the state can act as candidates for public service , but also citizens of other European countries. Part of these changes was due to a change in the paradigm of public administration, the need for greater transparency and accountability, and the other - to European integration.

However, in the analysed countries there is no uniformity of procedures for all categories of civil servants, which confirms the first hypothesis. The second hypothesis was also confirmed: for countries that joined the eurozone, there was a need to adjust the conditions for entering the civil service in accordance with European principles. This condition was met by the eurozone member states with certain differences, expressed in the status of a civil servant, qualification requirements and competitive procedures. The third hypothesis has not been confirmed: the geographical proximity of states to the West or East does not matter for recruitment system.

Thus, the organization of public services in Eastern Europe countries is significantly different and bears the imprint of national traditions. The use of acquis in the administrative sphere as a whole, and in the hiring system in particular, depends on the availability of state capabilities and resources in this sphere, on the structures and horizontal management systems.

A comparative analysis of recruitment systems made it possible to understand what changes have occurred in the civil service recruitment system in Eastern Europe. Harmonization of the legislation of Bulgaria, Hungary, Czech Republic, Slovakia, Romania in accordance with the requirements of the European Union, increased the transparency and accountability of the activities of state bodies of these countries. At the same time, the implementation of laws and the introduction of procedures and institutions were not enough to create an effective public service system. The best conditions for fulfilling the requirements of SIGMA are in Hungary and Poland. Belarus, Russia, and Ukraine have also made changes to democratise the public service, open recruitment procedures and accountability, but additional reforms are needed to implement European principles of public administration

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The Subject-Matter of Judicial Proceedings Against Insurance Companies for Compensation for Traffic Accidents in Poland

Karolina ZIEMIANIN

ORCID 0000-0001-6076-7471
University of Szczecin, Szczecin, Poland, karolina.ziemianin@usz.edu.pl

Abstract

A lot of cases for compensation for traffic accidents against insurance companies are adjudicated by Polish courts. Reports of the Institute of Justice show that a vast majority of them (over 90%) are cases won by the parties injured in these accidents. This state of affairs has a special legal meaning, but it also plays a significant economic role. This results from the determinants of the insurance market in Poland. The functioning of the society and economy and the activity of the courts has grave effects. The subject-matter of court cases against insurance companies does not only cover disputes between the parties of these proceedings, but also their negative social implications. The purpose of this study is to demonstrate the possible legislative and non-legislative solutions that lead to a reduction of the number of court cases against insurance companies and, in consequence, positive social and economic changes. The analysis covers judicial decisions, including the case-law of the Polish Supreme Court, and also reports on the functioning of the judiciary and the insurance market in Poland. The starting point for the research was to present legal approaches to liability for damages in the Polish civil code. The method of interpretation of applicable law and the statistical method were used in the analysis. The research produced a conclusion that the activity taken up by state authorities should be focused on ensuring that insurance companies observe the law and good practices, whereas legislative steps should primarily include the strengthening of the position of the injured party at the stage of pre-jurisdictional dispute resolution with the insurer.

Keywords: Compensation, Traffic Accidents, Insurance Companies

Introduction

A lot of cases for compensation for traffic accidents against insurance companies are adjudicated by Polish common courts of law. According to a report of the Institute of Justice, the number of such cases grew more than fourth-fold in 2004-2017 (Siemaszko A., Ostaszewski P., Włodarczyk-Madejska J. 2019, p.15). The rising trend continued in subsequent years. The data gathered in the research conducted by the Institute of Justice shows that the courts adjudicated in favour of the aggrieved party in more than 90% of cases, awarding them compensation in full or in part (Krajewski 2017, p. 12).

A high number of cases for compensation for traffic accidents and a significant majority of cases lost by the insurance companies have a special legal significance, but they also play an important economic role. A question arises, about the reasons of such a state of affairs and its resulting effects. The starting point of reflections in this regard is the legal basis of claims pursued in courts by the aggrieved parties and the reasons that underlie the judicial decisions.

A high number of cases concerning compensation for traffic accidents is especially essential in the context of the courts' burden and its economic effects. From the economic perspective the problem of costs borne by the parties to proceedings is also important, in particular by the losing party, and also the problem of profitability of losing court cases by these companies from the point of view of the consequences for car owners who are burdened with higher premiums for the obligatory third party insurance. This question affects the functioning of the society and the economy.

Liability for damages in traffic accidents in Poland

Liability for damages resulting from traffic accidents is regulated in the Polish legal system in the Civil code (hereinafter: CC). It is based on the principle of risk and the principle of fault (Nestorowicz, Ludwichowska-Redo 2014, p. 15). In the case of liability under the principle of risk, the issue of fault of damage perpetrators is irrelevant.

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In such a case it is sufficient to establish that the damage was done and that it was done due to the vehicle's being in motion, and there is a cause-and-effect relationship between the damage and this vehicle's movement. In cases where liability is based on the principle of fault, the premise of the liability for damages also involves the damage's perpetrator's fault-inducing actions.

Pursuant to Article 436 in conjunction with Article 435 CC, the owner-like possessor of a mechanical vehicle propelled by natural forces is liable for personal or property damage done to anyone by the motion of this vehicle, unless the damage is due to force majeure or solely to a fault on the part of the aggrieved party or a third party for whom he is not responsible. However, if the owner-like possessor has given his vehicle over for dependent possession, the liability is borne by the dependent possessor. Vehicles propelled by natural forces include i.a. cars or motorbikes. In the light of the above regulation, liability for the movement of the vehicle in based on the principle of risk. The risk is also the basis of liability for damages in traffic accidents that involve one vehicle driving into another while the other vehicle is not moving.

The case is different when vehicles propelled by natural forces collide. Article 436 § 2 CC stipulates that in the event of a collision of vehicles owners-possessors may claim remedy of damage suffered only on general terms. Those persons are also liable only on general terms for any damage caused to persons they transport out of courtesy. This means that in the case of a collision of vehicles, liability is based on the principle of fault.

Liability based on the principle of risk and the principle of fault is irrelevant from the point of view of the amount of compensation. This issue is regulated under Article 363 CC. This article points out that damage should be remedied, at the aggrieved party's choice, either by the previous condition being restored or a relevant sum of money being paid. If, however, restoration of the previous condition is not possible or it results in excessive difficulties or costs for the obliged person, the aggrieved party's claim is limited to monetary performance. If the damage is to be remedied by payment of money, the amount of the compensation should be set according to prices as at the compensation determination date unless extraordinary circumstances require that prices existing at another time be taken as the basis. In the light of this provision, damage may be remedied in two ways: by natural restitution or by recompense. Both of these forms are equivalent. However, in some situations the aggrieved party has no possibility to make a choice. This concerns a situation e.g. when the thing is unique or when it results from the debtor's legitimate interest.

The insurance for owners-possessors of vehicles for third party liability is obligatory in Poland. In the light of Article 822 CC, by a third party liability insurance contract, the insurer commits to pay the compensation set forth in the contract for any damage caused to third parties with regard to whom liability for damage is borne by the policyholder or the insured, while the loss payee, in connection with an event covered by a third party liability insurance contract, may raise claims directly against the insurer.

Judicial decisions in cases for damages

Disputes for compensation due to traffic accidents between the aggrieved parties and insurance companies are, in principle, of a standard nature. Their subject-matter may be brought down to a few basic threads, among which the concept of the manner of remedying the damage is most important, including the type of spare parts used and methods of vehicle repair, the sum of the compensation and its payment forms or the issue of total loss and renting a replacement vehicle. The courts have given decisions on these matters numerous times, including the Supreme Court, by issuing judgements and passing resolutions which set a line of judicial decisions which is favourable to the aggrieved parties. Manners of establishing compensation in traffic accidents was also the subject of studies prepared by the Polish Financial Supervision Authority which oversees insurance risk (KNF, 2014).

In the light of judicial decisions, it is assumed i.a. that the insurer's obligation involves the payment of the monetary performance which constitutes compensation for damages caused by the insured to third parties. The aggrieved party may therefore claim hypothetical restitution which corresponds to the costs of restoring the vehicle to the previous condition or compensation calculated according to the method of difference in the aggrieved party's property. The payment by the insurer of the sum due to compensation does not depend on whether the aggrieved party did have their car repaired and what the cost of such repair was, or even on whether they intend to do so. The sale of the damaged vehicle remains irrelevant in this respect. The vehicle should be repaired using original spare parts and only in exceptional, particularly justified cases, by using replacement spare parts. In terms of assessment of the amount of the partial and total loss the same criteria should be applied. The aggrieved party is entitled to a replacement vehicle for the time of the repair, irrespective of whether they have access to other forms of transport (i.a. decision of the Supreme Court of 7.12.2018, III CZP 72/18, www.sn.pl).

Reasons for a large number of cases lost by insurance companies

The cited report of the Polish Institute of Justice shows that for cases brought by the aggrieved parties, in 32.5% of them (out of the 244 analysed cases) the claim was awarded in full, whereas in a further 60.2% of cases the claim was awarded partially. Only 7.3% of cases ended with dismissing the claim in full in favour of the insurance company. In cases where the aggrieved party's claim was awarded in part, on average 74.65% of the claim was awarded (Krajewski 2017, p. 12). The number of cases for compensation due to traffic accidents at the same time increases each year (Siemaszko A., Ostaszewski P., Włodarczyk-Madejska J. 2019, p. 15). Such a state of affairs triggers controversy. Most of all a question arises of why so many cases for compensation for traffic accidents are heard by common courts of law, since most of these cases are adjudicated in favour of the aggrieved party.

The basic reason for which the courts deal with a great number of traffic accidents compensation cases involves the widespread nature of such accidents and the obligatory nature of third party insurance for vehicle owners. In fact, almost any traffic accident involves vehicle damage. Determining the principles of liability, fault and circumstances of the incident is often affected by the facts established by Police officers on the scene. The obligation to remedy the damage by the perpetrator is taken over by the insurer under obligatory insurance, which encourages certainty that the compensation will be paid irrespective of the solvency of the perpetrator himself. A greater number of court cases is a result of growing social awareness in terms of the existing right to justice.

The popularity of cases associated with traffic accidents is not, however, the only reason for the multiplicity of court disputes against this background or the significant majority of cases lost by insurance companies. The most important reason for this situation must involve inappropriate practice of insurance companies in terms of settling damages caused due to traffic accidents. Such conclusions result i.a. from a Supreme Audit Office's report entitled "Consumer Protection on the Insurance Market" of 23.07.2019. Detailed guidelines on compensation for traffic accidents have not changed the practice of insurance companies concerning its payment. Settlement proceedings conducted by these companies in a majority of cases result in the payment of low compensation, which is only raised in the course of judicial proceedings. An analysis of settlement proceedings' files leads to a conclusion that in a vast majority of cases insurance companies use ready-made model answers and do not take into account the basic assumptions of establishing compensation pursuant the provisions of civil law or guidelines resulting from the views of the judicature and of the Polish Financial Supervision Authority. They use incorrect argumentation which is mainly based on the fact that decisions taken by the insurer do not generate additional costs of vehicle repair. Lowering the sum of compensation is explained by caring for the economy of repairs, despite of such economy violating the aggrieved party's interest in most cases. Such practices are also applied by companies that dominate on the insurance market.

Reasons for such opinions of insurance companies are based on an inadequate interpretation of regulations and judicial decisions i.a. by referring to judgements of courts of the lowest instances which are often non-final and amended in the course of further proceedings by subsequent courts. Correspondence of insurance companies at the pre-jurisdictional stage is not based on solving a specific dispute and presenting counterarguments against the aggrieved party's claims, but only on giving their own mode to the reasoning, which often does not refer to the essence of the problem. Responses from insurance companies are greatly based on the aggrieved parties' ignorance and mislead as to the legitimacy of their arguments. Such findings come from i.a. a report of the Insurance Ombudsman (2015) entitled "Case-law of the Supreme Court and the settlement practice in traffic accidents".

This is why in compensation cases practically no negotiations are held at the stage of the so-called settlement procedure, nor are other attempts made to resolve the dispute amicably. The use of arbitration is not widespread at that. Therefore, the aggrieved party is only left with pursuing their claims before a common court of law. Such a solution is most often applied as a consequence of privately obtaining an opinion of a valuator specialising in the operation of vehicles, the content of which confirms the legitimacy of the aggrieved party's claim. However, bringing in a claim preceded by obtaining an expert opinion on one's own is costly, which is why only some of the aggrieved parties decide to do so. The activity of the so-called compensation firms which deal with obtaining unpaid compensation is helpful in this respect. Their activity is, however, not regulated and raises doubts.

Consequences of a large number of cases lost by insurance companies

Unreliable behaviour of insurance companies and a large number of court cases which end with the aggrieved party winning is not irrelevant to the functioning of society, economy and the judiciary. The statistics of over 90% of court cases concerning compensation for traffic accidents which are lost by insurance companies – where there are significant numbers of such court cases in general – contribute to lowered trust in the activity of insurance companies and state authorities which review and supervise insurance activity. The fact that the State Treasury is the main shareholder of the largest insurance company on the market is also important in this regard.

Obtaining compensation only at the court stage also results in blocking the financial liquidity of the aggrieved parties, who get their due performance only after the court procedure has been conducted, thus often a few years after the damage occurred. Such negative consequences concern primarily business operators whose business activity depends on functioning vehicles.

Resolving compensation disputes only at the court stage also leads to a significant increase in damage settlement costs and to the burdening of the aggrieved party with the need to credit these costs when initiating the proceeding and also in their course. The aggrieved party who brings the claim is forced to pay a court fee dependent on the sum of the claim, and in the course of the proceedings - to cover the costs of a deposit for the remuneration of an expert witness whose opinion is the basis of the judgement in a vast majority of cases. Obtaining compensation in court is, therefore, often unavailable for the poorest and those with lesser legal awareness. Higher costs of settlement of traffic damages also result in raised premiums for third party insurance for vehicle owners.

A great number of compensation disputes additionally result in a considerable burden placed on courts, extending court proceedings and difficulties in obtaining a ruling without undue delay. This does not only concern excessive length in compensation cases, but also other court cases with a more serious weight.

An increase in the number of compensation cases led to the development of a branch of economic activity which involves professional handling of disputes for unpaid compensation due to traffic accidents. The activity of these so-called compensation firms raises controversy. They concern i.a. their establishing the remuneration dependent on the result of the case (success fee) where establishing such remuneration by professional procedural representatives is prohibited by statute. The development of entities dealing with compensation for traffic accidents and a greater number of court cases brought by them resulted, inter alia, in a change of insurance-related settlement procedures. One may assume that this activity, therefore, has a positive and negative impact on the possibility to pursue compensation claims by parties aggrieved in traffic accidents.

Possible solutions to the problem

The problem of the number of court cases lost by insurance companies which concern damage due to traffic accidents has far-reaching social effects. Therefore, specific actions need to ne undertaken, signalled i.a. in MP questions (MP question no. 9141 to the Minister of Finance regarding the activity of insurance companies of 24.07.2020). However, a question arises whether such steps should have a legislative nature.

In the light of the presented civil law regulations and also in the light of judicial decisions, it seems that taking the legislative initiative with regard to liability for damages resulting from traffic accidents is not necessary. These provisions, interpreted consistently by the judicature, in particular by the Supreme Court, give a clear basis for pursuing compensation claims and for specifying the amount of these claims.

The change in the activity of insurance companies, and also an introduction of observance of good practices as part of the conducted activity, have a basic significance for resolving the problem of the great number of court cases for compensation. Certain legislative activity may prove purposeful in terms of the manner of conducting settlement proceedings by insurance companies. The state authorities' taking appropriate supervisory steps should also provide a significant solution. Developing relevant and fair legislative and supervisory solutions requires participation of representatives of insurance companies and representatives of the social side in the consultations. It would be reasonable, as part of the undertaken supervisory activity, to impose severe penalties in the event of finding activities that are contrary to the Guidelines developed by the Polish Financial Supervision Authority, which do not only concern exceeding the time limit for compensation payment. Increasing costs of court proceedings for parties who lose evident court cases should be also considered. However, one needs to point out at that, that insurance companies in part transfer the burden of financing the costs of compensation proceedings onto vehicle owners by raising premiums for third party insurance.

It is also necessary to streamline the procedure of pursuing claims for compensation. A conclusion about creating the measure of an additional, independent valuer at the stage of settlement proceedings should also be viewed positively. Due to the large number and standardization of cases for compensation which concern traffic accidents, an additional pre-jurisdictional opinion obtained in the course of negotiations between the aggrieved party and the insurance company may result in the dispute ending at the pre-jurisdictional stage. Promotion of arbitration, which also deals with resolving insurance-related cases, also seems beneficial. Focus needs to be given to taking into account the equality of parties is such proceedings, which is often distorted in the practice of conduct between consumers or small companies and actors with a significant position on the insurance market. In the context of liability for damages, it is also important to raise social awareness in terms of the rights of the aggrieved parties and to regulate the activity of the so-called compensation firms.

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Clustering Terrorist Groups Using Their Activity and Lethality Measures

Semeh BEN SALEM
Science and Technologies for Defense (STD) Laboratory, Military Academy, TUNISIA,
Military Research Center, Aouina Military Base, cité Taieb Mhiri 2045 Tunis, TUNISIA
semehbensalem0@gmail.com

Sami NAOUALI
Science and Technologies for Defense (STD) Laboratory, Military Academy, TUNISIA,
Military Research Center, Aouina Military Base, cité Taieb Mhiri 2045 Tunis, TUNISIA, snaouali@gmail.com

Zied CHTOUROU
Science and Technologies for Defense (STD) Laboratory, Military Academy, TUNISIA
Military Research Center, Aouina Military Base, cité Taieb Mhiri 2045 Tunis, TUNISIA
ziedchtourou@gmail.com

Abstract

Analyzing terrorist groups' trends using innovative Data Analysis techniques was widely used in many research fields related to fighting terrorism. Data analysis models are used to identify crime trends, investigate unsolved attacks, predict potential threats, etc. One motivating issue that was not widely developed in the literature is the clustering of terrorist groups based on some parameters to provide actionable information. In this study, a set of armed groups identified between 1970 and 2016 in North Africa and Middle East are investigated. These groups were partitioned based on their activity and lethality parameters that can provide highly valuable results concerning their spread and fame. This study was carried out using the open source Global Terrorism Database (GTD) dataset.

Keywords: Terrorism, North Africa, Global Terrorism Database, Terrorism Groups Profiling, Data Mining, clustering, pattern recognition

Introduction

The economic development and prosperity of a country are directly linked to its national security and can be seriously affected by the political and social instability that they may incur, especially with the raise of terrorism as stated by Meierrieks et all (2013). Brutal and bloody actions characterize the lethality of a terrorist group and attract the public opinion and the mass media, especially when a high number of casualties is registered. Homeland Security departments and intelligence agencies are increasingly implementing new counter-terrorism strategies based on data collection and analysis techniques including Data Mining and Machine Learning. One of the most effective actions in fighting terrorism is to identify the factors that are related to the formation of armed groups and the conditions that enable them to operate and find support for their activities.

Numerous researches were proposed to dissect the terrorist threat based on a data analysis perspective. Very large datasets were collected and statistically processed to help specialized departments better investigate terrorism. In this line of research, we attempt to bring a methodologically robust approach by employing Data Mining. Data Mining is the process of analyzing data to find meaningful patterns and previously unknown relationships. Data Mining is a useful technique for studying the complex phenomenon of terrorism. One of the applications of classification techniques in the field of terrorism is to reveal which countries are especially prone or immune to terrorism, when and why. In this endeavor, we focus on a dataset that includes all religiously motivated terrorist attacks between 1970 and 2017 in North Africa and Middle East. To this end, new form of Data Mining dedicated to counter terrorism known as Investigative Data Mining (IDM) has emerged initially defined by Wadhwa et al (2013) and also reconsidered in the study of Hassani, Hossein, et al (2016). This research contributes to the growing literature on the determinants of behaviors of individual militant groups and some results can be interpreted to be

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broadly in line with prior researches into militant group characterization.

This paper is organized as follows: in the second section we explain the usefulness of Data Analysis methods in investigating terrorism trends as well as the open source dataset used in the case study. In the third section, the proposed parameters to characterize the activity and lethality of terrorist groups, the means used and the targets selected by these groups are presented. In the fourth section, a case study of the Islamist terrorist groups in North Africa and the Middle East is provided. The last section presents the conclusions and perspectives.

Previous Works in Investigating Terrorism Using IDM

Terrorism was investigated from several perspectives and the researches motivated by the extensive use of new technologies by terrorist groups during the last years including Jailun et al (2010) and Klein et al (2016). The activity and lethality of terrorist groups are among the characteristics that, in our opinion, require further consideration and study. Identifying and classifying militant groups according to these two parameters is a promising research line that was considered by Danzell et al (2013) and Mierau et al (2015). However, this kind of analysis does not differentiate between lethality and activity; groups that produce a high number of casualties may be very active groups, but not necessarily highly lethal. Besides, Choi et al (2014) focused on which organizational characteristics are associated with lethality and which are associated with activity by classifying militant groups' strategy choices, in terms of ideology, capacity and environment. It was shown that groups from countries with intermediate levels of democratization are significantly more lethal than groups from either very autocratic or very democratic countries. In Choi et al (2014), the authors proposed a two-step method to characterize the activity and lethality of terrorist groups in terms of ideology, architecture and environmental parameters. Their results showed that ideological factors such as religion were more determinants of lethality than other factors while capacity and environment such as economic development factors matter more for activity. However, in their research, the authors did not provide an extensive statistical analysis to classify terrorist groups based on their lethality and activity. In Gartner et al (2019), the authors proposed a method to classify web documents to reveal and identify terrorism-topic related documents. Thus, it would be easier to focus on specific portion of the documentation under consideration. Internet provides a lot of valuable information to the users and the amount of web contents is progressively increasing. This fact makes the identification of potentially dangerous patterns more challenging and prone to error. Simply extracting keywords from documents is not enough to classify the contents. In the study, a method based on word similarity using WordNet hierarchy is used. In Alsaedi et al (2019), the authors used the Global Terrorism Database and the South Asian Terrorism Portal to apply "shallow Machine Learning models" to train themselves and facilitate the exploration and the understanding of the complex dynamics of terrorism, state and society. In Mo et al (2017), the authors also applied Data Mining and Machine Learning techniques to the Global Terrorism Database to acquire valuable information about the predicted attacks and attackers. The study focused on two tasks: predicting the success of an attack and predicting the identity of the terrorist organization that is behind the attack. To implement this, the authors used three Machine Learning algorithms: K-nearest neighbor (KNN), Naive Bayes (NB) and Random Forest (RF) to train the models. Each algorithm was used to construct two models, one for each task. In Byman et al (2014), the authors demonstrated how Machine learning can be applied to predict terrorist events hidden in terrorist attack events and by which the experts expect to get a clear picture of what the terrorists are thinking about in order to step up defense against these organized acts. The Global Terrorism Database (GTD) was then used. Support Vector Machine (SVM), Naive Bayes (NB) and Logistic Regression (LR) were adopted in the study. Two feature selection methods including Minimal-redundancy maximal-relevancy (mRMR) and Maximal relevance (Max-Relevance) are used to further improve the classification accuracy.

The Experimental Dataset

Traditional sources and means of intelligence, including human intelligence, intuition and continual hypothesizing, have provided accurate and valuable results during main international crises as stated by Mattern et al (2014), Stottlemyre et al (2015) and Freilich et al (2014). However, nowadays the extensive use of new information technologies requires focusing on improving our abilities in collecting and analyzing large amounts of data automatically. Accurate datasets were extremely difficult to obtain until recently, since dealing with such information was considered confidential and restricted. Open source databases previously motivated by many researchers such as Sheehan et al (2012), Giroux et al (2013) et LaFree et al (2014) dedicated to terrorist activities have gained popularity and consideration in the recent decades. In this study, a subset extracted from the Global Terrorism Database (GTD) is employed as in the work of Berkebile et al (2017). The last online published version of the GTD can be downloaded from https://www.start.umd.edu/gtd/contact/. The GTD is an open-source database including information on terrorist events around the world since 1970 with more than 180,000 cases recorded. For each incident, the date and location of the incident, the weapons used and the nature of the target, the number of

casualties, and the group or individual responsible are given, when identifiable.

In our study, the dataset is composed of entries including 21097 terrorist attacks with additional information, such as: the date of the attack (year, month, day), the region, the country, the city, the location, the type of the attack, the target, the number of casualties and victims, the terrorist group involved. These attacks took place in the region of North Africa and the Middle East, spanning over 20 countries (Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, United Arabs Emirates, Western Sahara, Yemen, Gaza). Notably, the number of casualties (killed and wounded) for each attack was also reported and it will be used in determining the lethality of the group.

Case Study: Middle East and North Africa Armed Attacks Between 1970 And 2017

Terrorism Trends Between 1970 And 2017 In North Africa And Middle East

The number of terrorist groups and their affiliates has grown exponentially especially since 2011. In figures 1(a-b), we report some trends related to terrorism in North Africa and Middle East.

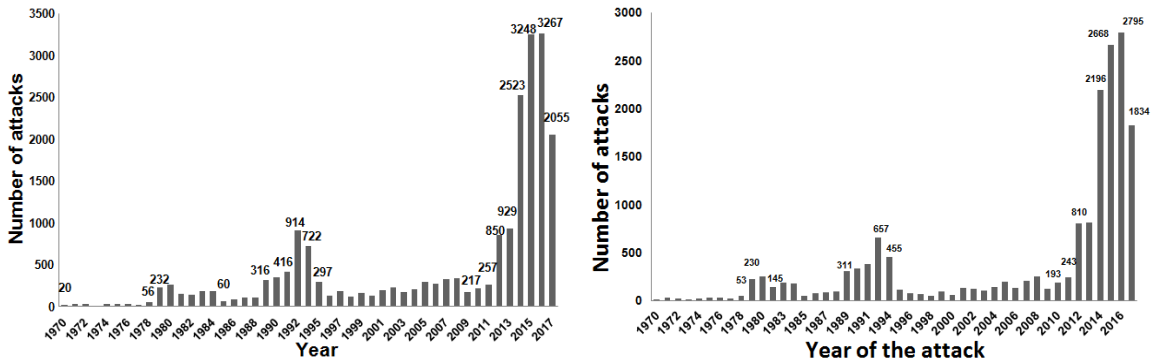

Figure 1(a). Number of terrorist attacks in North Africa

Figure 1(b). Number of terrorist attacks in Middle East.

Figure 1: Terrorist trends in North Africa and Middle East betwenn 1970 and 2017.

According to the figures 1(a,b), the region of North Africa and Middle East was hit by several terrorist attacks almost every year since 1970. Three main periods can be reasonably outlined: 1979-1984, 1989-1995 and starting from 2011 to 2017. By interpreting the terrorist trends separately in North Africa and the Middle East, it is shown that the same features are shared over the same periods of conflicts respectively: 1979-1984, 1989-1995 and finally 2011-2017.

Evaluating the Activity of Terrorist Groups: The Activity Parameter

The activity of a terrorist group is determined by the total number of attacks carried out by that group. An increase in the number of terrorist attacks suggests a higher activity for that group. The activity parameter characterizes the impact of a group on the public community: most active groups will be most famous among the international community and this would increase their impact and influence. A group‘s period of activity is an important parameter in the evaluation process. The proposed activity measure proposed in this study and denoted by (A) is given as follows:

$$A(year)=\frac{NB_total_attacks}{period_of_activity\ (age)}$$

This value measures the number of attacks carried out by a terrorist group per year. The age of a terrorist group represents the number of years between the first and the last attack carried out according to the information given in the database. Groups with a higher activity may correspond to groups containing more affiliates, which could help them to perpetrate attacks more frequently or simultaneously.

Evaluating the Aggressiveness of Terrorist Groups: The Lethality Parameter

In this section, the second parameter proposed to characterizing a terrorist group is the lethality measure. This parameter can evaluate the aggressiveness of a terrorist group. The lethality measure (L) is defined as follows:

$$L = \frac{(NBkills + NBwounds)[group]}{NBkills + NBwounds}$$

It is possible to carry out the computation over a specific period covering a finite number of months or years (some periods considered immanent for Islamist terrorist groups). This could flag specific periods where the lethality increased or decreased, which may be then further investigated and explained according to specific context.

Experiments

Based on the measures of the lethality and activity, it is proposed to cluster these groups to identify the most prominent ones. The experimental dataset is composed of 740 armed groups extracted from the GTD. In the obtained results, the values for the lethality and activity parameters range from 0 to 0.074 and from 0.068 to 148.3 respectively. On the other hand, it is important to standardize the range of the values of the attributes to obtain better results. In the first step, we performed a standard scalar standardization on the experimental dataset. The implementation of the approach was performed using the python coding language and the sickit learn library dedicated to the development of Machine Learning models. StandardScaler will transform the data such that its distribution will have a mean value 0 and a standard deviation of 1. The standard scalar (SS) can be defined as follows:

$$SS = \frac{x_i - \mu}{\theta}$$

Where μ is the mean of the attribute x_i and θ is the standard deviation. The mean and the standard deviation are defined as follows:

$$\mu = \frac{1}{N}\sum_{i=1}^{N}(x_i) \qquad \theta = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

In this study, clustering is used to partition armed groups. It is then necessary to identify the most appropriate number of clusters to consider. To tackle this issue, the Elbow method is used. The idea of the elbow method is to run k-means clustering on the dataset for a range of values of K, and for each value the sum of the squared errors (SSE) is computed. The average internal sum of squares is the average distance between points inside of a cluster. Mathematically, it is given as follows:

$$W_k = \sum_{r=1}^{K}\frac{1}{n_r}D_r$$

Where K is the number of clusters, n_r is the number of points in cluster r and D_r is the sum of distances between all points in a cluster defined as follows:

$$D_r = \sum_{i=1}^{n_r-1}\sum_{j=i}^{n_r}\left\|d_i - d_j\right\|_2$$

In Figure 2, the Elbow method is given for two cases: without and with standardization.

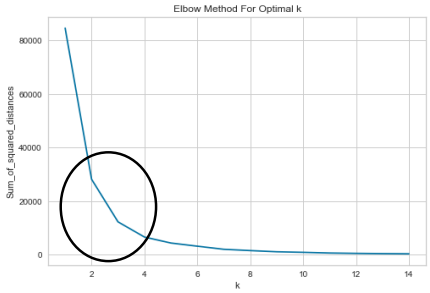

Figure 2(a). Elbow method for the original dataset.

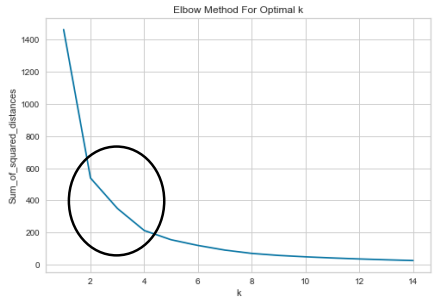

Figure 2(b):Elbow method for the standardized dataset.

According to the Figures 2 (a,b), it is evident that the second Figure provides more reliable results concerning the value of K=4. In the third step, several clustering methods were used to observe and interpret the formation of the clusters either with or without standardization. The clustering methods used are the *k*-means, an agglomerative method and BIRCH (Balanced Iterative Reducing and Clustering using Hierarchies), which is an unsupervised data mining algorithm used to perform hierarchical clustering over particularly large data-sets.

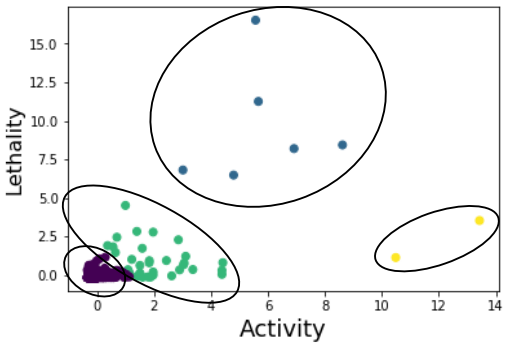

Figure 3. *k*-means clustering for standardized experimental dataset.

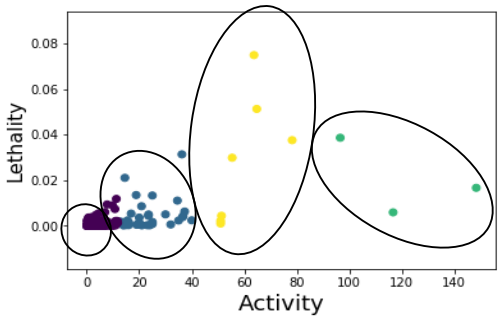

Figure 4. *k*-means clustering for the original dataset without standardization

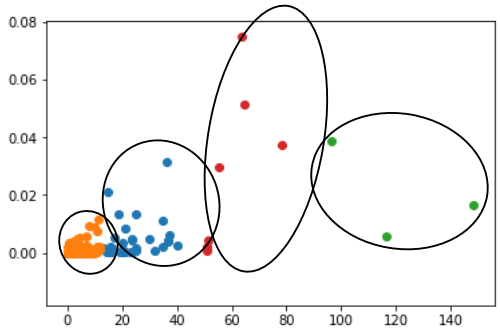

Figure 5. Agglomerative clustering for the original dataset.

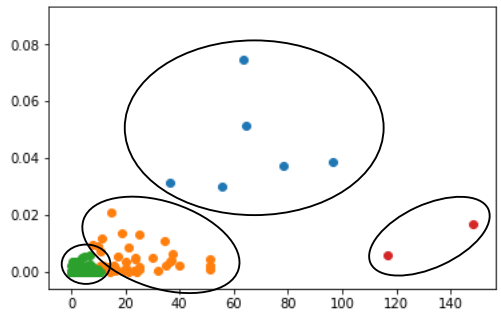

Figure 6. Agglomerative clustering for standardized dataset.

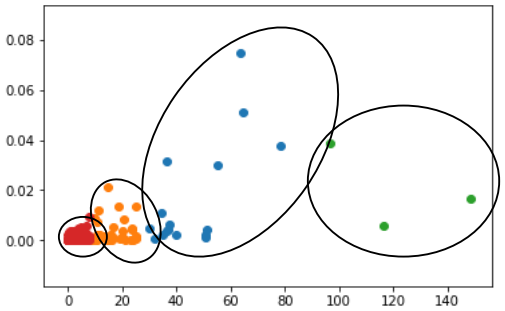

Figure 7. BIRCH clustering for the original dataset.

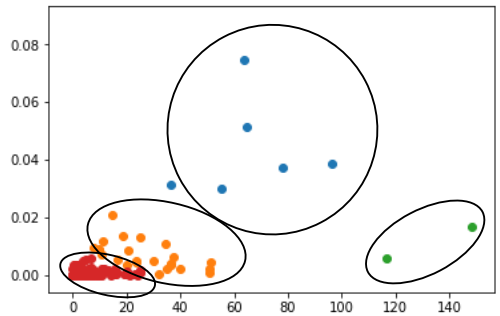

Figure 8. BIRCH clustering for the standardized dataset.

According to the Figures 3 to 8, the same results are almost obtained using the three clustering methods either for standardized or original datasets. However, better clustering outcomes are evident using the standardization approach. In fact using standardized dataset permitted ensuring uniformity within the values and thus resulting in more compact and separated clusters.

According to the terrorist groups dataset considered, the ISIL (Islamic State of Iraq and the Levant) group registered the highest values of the activity and lethality computed, 1,390.75 and 0.4 respectively. The group has perpetrated 5564 terrorist attacks in 4 years mainly in Iraq (86.21%). In fact, a lethality value of 0.4 corresponds to an average of 40% of the total number of victims (kills and casualties) that were registered in the database for almost 50 years.

This also indicates that the ISIL terrorist group that appeared in 2013, and had only four years of existence at the temporal limit of the dataset, has generated almost the same number of victims as of all the other terrorist groups that appeared in North Africa and Middle East since 1970.

On the other hand, even in terms of the activity, this group showed the greatest value with 1,390.75 attacks per year, that is almost four attacks daily.

In the Figures 3-8, four clusters were identified as depicted by the Elbow method.

- The first cluster is composed of two elements with very high activity but low lethality corresponding to the SPIS (Sinai Province of the Islamic State) and TPIS (Tripoli Province of the Islamic State). This cluster represents groups with high activity (activity≥116) and low lethality (lethality≤0.02). The two groups SPIS and TPIS had an activity value of 148 and 116 respectively which means almost 3 and 2 attacks per week, but are not lethal (1.6% and 0.5% respectively). This class represents more active terrorist groups, but not necessarily the more aggressive ones.
- The second group is composed of six elements. The lethality of these groups ranges from 3% to 7.5% and their activity from almost 36 to 97. These groups are more lethal than those given in the first cluster and are as follows with their corresponding activity and lethality parameters: Houthi extremists (Ansar Allah, 96.54, 0.0385), Al-Qaida in the Arabian Peninsula (AQAP, 78.23, 0.0375), Kurdistan Workers' Party (PKK, 64.75, 0.0512), Al-Qaida in Iraq (63.7, 0.0748), Al-Nusrah Front (55.4, 0.0298), Islamic State of Iraq (ISI, 36.25, 0.0312). These groups have an activity measure higher than 36 which almost corresponds to one attack per ten days.

- The third cluster is composed of elements with low activity and low lethality. This cluster is composed of 72 terrorist groups. The activity parameter of these groups ranges almost from 10 to 50 and their lethality reaches almost 2% in the best cases.
- The fourth cluster is composed of armed groups with very low activity (activity ≤16) and very low lethality (lethality ≤0.01). This class represents the least active and lethal terrorist groups including BPIS, MR, AQMI, IE, GSPC. These are arguably the least priority groups and fewer resources should be devoted to them compared to the others. 627 groups were classified in this category.

In the second part of the experiments, it is proposed to compare the armed groups for both regions: North Africa and Middle East in a way to highlight some main features:

Table 1: Number of attacks by country and region

Region	Countries	#of attacks	% from total
North Africa	Morocco, Algeria, Tunisia, Libya, Egypt	3,705	17.56%
Middle East	Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Qatar, Saudi Arabia, South Yemen, Syria, Turkey, United Arabs Emirates, West Bank and Gaza Strip, Western Sahara, Yemen	17,392	82.43%
		21,097	

In North Africa, 170 armed groups were spotted from an experimental list composed of 730 groups. This corresponds to a percentage of 23.28% of the total number of groups. These North African armed groups perpetrated almost 3.705 attacks from 21,097 total attacks registered in the two regions (17.56%). It is also important to report that this number corresponds to all armed groups that appeared in the region since 1970 according to the data provided by the GTD. According to our clustering results and the clusters generated, the first cluster contains two groups: TPIS in Tripoli (351 attacks) in Lybia that started action in 2014 and the SPIS (446 attacks) in Egypt that started action since 2014.

In this section, the means of the attacks used by these armed groups are investigated. In fact, the classification of the means of attacks is a key determinant in the lethality and activity of an armed group: some types of attacks are more deadly than others such as armed assault and bombing. In Table 3, the total number of attacks carried out for each attack type is reported.

Table 3: Number of attacks according to the type of attack.

Attack type	Bombing/ Explosion	Armed Assault	Hostage Taking (Kidnapping)	Assassination	Unknown	Facility/ Infrastructure Attack	Unarmed Assault	Hijacking	Hostage Taking (Barricade Incident)
#Number	10705	4328	1808	1790	1539	638	132	81	76
#average	50,74	20,51	8,56	8,48	7,29	3,02	0,62	0,38	0,36

According to the results, the most widely used attack type is Bombing/ Explosion followed by Armed Assault. These two means represent more than 80% of the total attacks in North Africa and the Middle East. These two means correspond to 321,502 victims out of 400,648 with an average of 80.24%. Considering the first cluster of our dataset composed of SPIS and TPIS that are two very active groups but not highly lethal. These two groups perpetrated 796 attacks in three years (2014 → 2017) with an average of almost 5.5 attacks every week. In these attacks, the Armed Assault and Bombing attacks were deployed in 480 attacks (60.30%). In the other hand, the second cluster, with active and very lethal groups, contained groups that perpetrated 6070 terrorist attacks (1984 → 2017). In these attacks, 4305 attacks were executed using Armed Assault and Bombing (71%). This outline identifies that these two types of attack means have a great contribution in the lethality of an armed group.

Conclusions and Perspectives

This research represents an investigation on terrorism with a focus on North African and Middle East armed groups. More generally, the study characterizes most prominent terrorist groups based on their activity and aggressiveness using two measures: the activity and lethality. Their tactical and strategic behaviors were also investigated in terms of the attack types used and targets selected.

According to results previously obtained, it is evident that military and security efforts combined with intelligence-enhanced capabilities have a great positive impact on combating these groups.

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Problems of Leasing Reporting in The Context of Sustainable Development

Vojtech BOCOK
Czech University of Life Science, Prague, the Czech Republic, bocok@pef.czu.cz

Jana HINKE
Czech University of Life Science, Prague, the Czech Republic, hinke@pef.czu.cz

Abstract

The aim of the paper is to conduct a desk research of the current state and development of the use of leasing financing to address the operational needs of companies in the field of circular economy, which is one part of problematic of sustainable development, and to identify research opportunities in this area. After specifying the views on the concept of circular economy and its possible use today, which emphasizes the need for environmental measures in business behavior, the description will continue in the field of research opportunities in this areas. The benefit of this study is the identification of research areas that would be feasible in the Czech or Central European conditions. After the analysis, it can be argued that leasing is not a new form of external financing within the new approach of circular economy, but only that, while meeting certain parameters, it is part of one of its parts, within the product-services system and the use-oriented services model. The authors consider the research through which it would be possible to verify the research question within the Czech companies that the adoption of a "greener" business model, as in the case of leasing, does not promote companies economically, but it is a catalyst for increasing their performance.

Keywords: Circular Economy, Leases, Leasing, IFRS 16, Tangible Assets, Reporting.
JEL classification: M14, M21, M41.

Introduction

Like the circular economy, the concept and issue of leasing is a very broad area. Leasing is currently used to deal with a large number of corporate investments. It is largely about securing operational needs such as the issue of a vehicle fleet, renting a business unit for the needs of an establishment or production plant, or gaining the possibility of an operative way of handling and managing operational and production resources. Leasing as a form external financing solution in the case of strategic and long-term investments is not very common. These investments are usually solved by financing in the form of one of the bank loans or other capital market instruments. A closer look at the concepts associated with leasing financing will also be the subject of this paper.

The aim of the paper is conduct a desk research of the current state and development of the use of leasing financing to address the operational needs of companies in the field of circular economy and to identify research opportunities in this area. After specifying the views on the concept of circular economy and its possible use today, which emphasizes the need for environmental measures in business behavior, the description will continue in the field of research opportunities in this area. The benefit of this study will be identification of research areas that would be feasible in the Czech or Central European conditions.

The paper deals with the issue of leasing financing in companies focusing on the circular economy. The second chapter is devoted to the definition of its concept for the purposes of this paper and at the same time to the possibilities of using the given principles from the point of view of corporate finance. It also analyzes existing research using citation databases of research works Scopus and Web of Science. The third chapter contains research possibilities arising from the second (description) part and identifies the connection between the issues of leasing, circular economy in connection with accounting, respectively financial reporting of individual entities. By comparing the findings, the authors propose research opportunities in the third chapter and the fourth chapter of the conclusion synthesizes the findings.

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Research of Scientic Works

The circular economy is an interesting and yet so far innovative approach in companies in the EU and the US, which could be expressed as a model aimed at resource efficiency through waste minimization, long-term value retention, reduction of primary resource requirements and product loop closure., parts of production or material in the context of environmental protection and socio-economic benefits. The circular economy should lead to sustainable development, which will also be separated from economic growth with negative consequences of resource depletion and environmental degradation (Murray, 2017). The financial crisis at the turn of the last decade raised many questions about how to increase the economic performance of companies or even entire sectors and countries. One of these options is to find external ways of financing to support growth. These external sources can be traditional bank loans or just leasing financing options (Ghisellini, 2016).

The circular economy is essentially linked to sustainable development, the use of natural resources and the issue of climate change, etc. This is also related to government initiatives or initiatives at European Union (EU) level aimed at promoting the circular economy in the Member States. These programs include, for example, the "A zero waste program for Europe" (European Commission, 2014), ongoing initiatives on plastic waste (European Commission, 2018), energy recovery from waste (European Commission, 2017) and still initiatives in general renewable energies, eco-design and energy efficiency (European Commission, 2015).

One of the terms that could be associated with the economic level of the circular economy is the older term "environmental accounting", which essentially a general term is based on a combination of information and environmental costs based on different uses of accounting methods based on mutual study of relationship between accounting and ecology, in particular by distributing the costs of environmental awareness, environmental costs and their distribution into relevant environmental products and processes, environmental policies and organizational strategies (EPA, 1995).

Environmental accounting is basically used to identify business benefits gained from the use of existing natural assets with a comparison of the costs arising from their use (Bengü, Can, 2009).

Like other financial reporting systems, environmental accounting aims to share information and provide relevant reports to other stakeholders. Among other things, environmental accounting provides information on the interaction between the corporate level and the environmental level, by taking into account the macroeconomics aspect of creating the value of these resources. From a microeconomics point of view, it is possible to observe and recognize fiscal added value from the use of natural resources (Kırlıoğlu and Can, 1998 a Eray, 2011).

Thanks to the added value of environmental accounting and social developments, the use of data from these sources and procedures in creating circular economy analyzes and implementing management and accounting procedures of natural resources management companies to ensure cleaner production has become more widespread in the EU (Burrit at al, 2019). The established term for the application of these tools is "Environmental management accounting" or EMA. Burritt et al., (2019) thus defined accounting as an effective tool for providing relevant sources of information within the circular economy to ensure operational planning and decision-making processes, especially in aspects related to material flows and waste management.

The management system and application of the EMA principles is very key in grasping other dimensions of the issue of circular economics in relevance to corporate finances, especially in the field of agrarian culture. As Scarpellini (2020) states, the EMA will contain a large amount of other information depending on the nature of the business, such as:

- tangible and intangible assets related to environmental legislation,
- investments and expenditure related to carbon trading,
- assets related to contaminated soil, groundwater or air or hazardous substances,
- waste disposal issues,
- fines and periodic penalty payments and dangers arising from them,
- investments to improve the environment, reduce the impact of pollution risks and support wildlife, etc.

In such a case, companies applying EMA principles may have costs included in their financial reporting, according to other authors (Qian et al., 2011 and Zhou et al., 2017):

- life cycle management,
- the cost of environmental commitments,
- other environmentally oriented investment projects,
- direct costs, material flows and eco-innovation

In her study, Albelda (2011) demonstrated the demonstrable added value of managerial accounting for the purposes of environmental policy, resp. economy. Nevertheless, according to Scarpellini (2020), so far no study has demonstrated sustainability in the application of EMA procedures in all types of companies, not even in companies that have already applied EMA principles to their managerial accounting.

The behavior of market entities, which aim to apply not only the principles of EMA, but also other possibilities of environmental behavior within their market operations, are highly associated with the concept of "corporate social responsibility", or CSR or corporate social responsibility.

CSR is a form of voluntary activity of companies meaning the integration of social and environmental practices and responsibilities into their business model to all stakeholders (Andronie et al., 2019). As Dinu (2011) points out, CSR is not only about following certain set rules, but also about being willing and actually investing in human and environmental capital in a civic, political and social commitment that will benefit the whole community in a broad sense. Other authors also focused on the differences in this concept from the point of view of geographical specifics, where this perception is understood differently in the USA, Spanish America, Japan or Australia (Dinu, 2011). For this reason, as mentioned by some research and summarized by Dinu (2011), it would be appropriate to find international agreement on the development of program initiatives supporting the measurability of social, civic and socially responsible initiatives and measures on an international scale.

Large companies and multinational corporations increasingly report in their published reports activities related to environmental and social responsibility, from which the interested partners (banks, investors, competitors, customers) continue to draw. These resources are also used for academic research (Scrapellini, 2020). Gupta et al. (2019) in his research, which, like other authors, called this connection "triple bottom line" of sustainability. More or less, it is said here that mutual coordination and support of all stakeholders from the supply chain allows the creation of a quality basis for achieving the so-called triple bottom line of sustainability, which is meant the economic, environmental and social level.

However, investment in the activities of the circular economy requires large financial and other resources. Several authors have researched the model of circular economy in terms of the interconnectedness of individual activities that bring about improvements in the social or environment (Banaité et al., 2016). Likewise, the effects of improving the relationship with the customer and the subsequent resilience of the organization to other market fluctuations were investigated (Pauliuk et al., 2018). Nevertheless, much research has not focused on the specific effects and market (customer) pressures causing the introduction of the principles of the circular economy at a specific microeconomic level. Scrapellini (2020) found a look at how to solve this problem in her study, which focused on Spanish companies with more than 50 employees who participated in the Spanish government's call for an industrial, transport, logistics, waste, energy, etc. company that decides to innovate in the circular economy. The resulting sample was further selected from these companies - 87 companies (using the EU-SABI database). In the quantitative part of their research (Scrapellini, 2020) they based on metrics based on the proposed indicators based on MFCA and LCA, which were previously defined as methods for evaluating the environmental strategy of companies (Pauliuk et al., 2018). An example of the metrics used is given in Table 1 below.

Table 1: Selected metrics used in Scrapellini research, 2020

CW1	% of recycling waste within the company itself (treated to be recycled)
CW2	% of waste recovery and reuse within the company
DR1	% of resources replaced by other fully recycled materials to manufacture products or provide services
DR2	% of products' design or services modified to reduce resource intensity
CSE1	% of products' design or services modified to increase function (multifunction)
CSE2	% of products' design or services modified to extend life
CSE3	% of products' design or services modified to increase recyclability (waste prevention)
SR1	% of equipment or facilities replaced and/or improved to reduce energy consumption
SR2	% of processes and operating procedures replaced or improved to reduce energy consumption or exploit renewables
SR3	% of components of products or services replaced with innovative components to comply with environmental regulations

Source: Scrapellini, 2020

Standardized indicators were used, which are ROE, ROS, ROA, number of employees, total turnover and total value of assets (Scrapellini, 2020). The above indicators were subsequently analyzed using SmartPLS software using the

PLS method, where the measurement model was first estimated and then the structural relationships of the model were outlined. The study found several areas where there are links between economics of performance and the application of the principles of circular economics in given microeconomic conditions. Possibilities for further research or decision-making processes for the management of the companies concerned have been identified (Scrapellini, 2020).

The individual aspects of the circular economy as such were specified above and a basic overview of current research was made, which aims to demonstrate this model as sustainable and economically interesting for companies that decide to apply these principles at their microeconomic level. The intention of the authors of this paper was also to search for the context of the circular economy with financing by leasing. Based on the research performed in the Scopus and Web of Science databases, this dimension resp. so far, none of the authors has gone deeper into the interconnectedness, with one exception. This was the team of Romanian authors Ion and Mihaela Ionașcu from the Bucharest University of Economic Studies (Romania), who basically followed up on the possibility of using leasing financing mentioned, but not further explored, in the works of Italian author Patriza Ghisellini (2016) and her colleagues from the University of Bologna. An interesting contribution of the research (Ionașcu, 2018) was a closer analysis of the usability of leasing and renting in the circular economy for the reuse of products and services in business.

Circular economy models include a very wide range of activities - such as recycling raw materials or waste, ensuring minimal pollution, adapting and innovating products and services in current and potential portfolios, or providing services for today's dynamic economic environment through leasing, renting or simultaneous use of goods) by several users, or so-called sharing (Lewandowski, 2016). Thus, in a circular economy, companies do not provide services or produce goods with the aim of selling them as such, but should sell their functionality or usability in their business model (Mont, 2002).

Some large companies have in the past approached the practical application of the circular economy and the further / longer use of their products. For example, since 2007 Michelin has been selling its tires to hauliers for mileage limits. Therefore, in order to extend the service life, it built a network of mobile workshops for repairs and pruning. To complete the circulation of tires, they are also sent to regional plants for refurbishment and re-use (Stahel, 2016). A similar procedure was applied by the Swiss company Elite to hotel mattresses, uniforms, hotel and hospital textiles or tablecloths (Stahel, 2016).

One of the other dealer models is the so-called product-service system (PSS), which can be understood as a system of products and services of several partner networks and other support infrastructures that are competitive, meet customer needs and at the same time have less impact on the environment compared to other models on the market (Mont, 2002).

Another of the authors (Tukker, 2004) defined the three main currents in this PSS model, which are:

Product-oriented services

A model that is characterized by the fact that there is still pressure to sell the final product, which is only supplemented by some extra after-sales service. This may include servicing and maintenance, consulting, securing or arranging financing, training, securing consumables to ensure the operational activities of the product, or subsequent repurchase. It is the dimension of this repurchase that is often crucial in the context of the circular economy.

Use-oriented services

This model is just typical for leases or rentals. The target and final product is still the main object of the business activity and the relationship with the customer. However, he acquires the right to use the asset only and the ownership rights are left to the original owner (supplier). Often, this use-oriented services model can often be supplemented by activities and products from previous product-oriented services (typically service, maintenance and provision of consumables). In the case of this model, it is very often possible to encounter reuse by multiple users, so-called "product pooling".

Result-oriented services

A business model where the supplier and customer agree in advance on the desired result without specifying a specific product or using specific tools. The supplier then ensures the delivery of the required result to the customer through

its own resources and its own management (management). Typical examples are outsourcing services in general (cleaning, accounting, tax consulting, call centers, etc.)

Leasing is in some cases complicated to define. Nevertheless, thanks to a recent change in International Financial Reporting Standards (IFRS), it is most appropriate from today's globalized perspective to proceed from the definition of the new IFRS 16 Leases, which refers to a lease as a contract that gives the lessee the right to use the underlying asset for a period of time, in exchange for consideration to the lessor. It has benefits and control over the underlying asset for the duration of the lessee's leasing contract (IFRS Foundation, 2016).

Many authors deal with leasing in their research. E.g. Giner & Pardo (2018) examines the impact of IFRS 16 on the reporting of operating leases in Spanish listed companies. The authors of Grosu & Hlaciuc (2018) analyze the consequences of reporting leasing under IFRS 16 on Romanian companies, arguing that leasing is closely linked to the country's economic development and that Romania appears to be more prone to negative changes in the economy.

In order for a lease to be considered part of the circular economy, it must include after-sales services and goods recycling, which brings new possibilities of use - such as partial renewal, renovation, product reorganization, material recycling and environmental disposal after termination of the lease contract (Ghisellini, 2016). Therefore, the leasing model is divided into two components (Ionașcu, 2016):

- Ownership of the supplier, who remains the owner of the underlying asset according to legal standards
- Economic ownership of an operator who, for pre-agreed payments, acquires the right to use the underlying asset and thus enjoys most of the economic benefits.

This makes the possibility of leasing financing an alternative to the traditional “Buy and own” model (Lewandowski, 2016).

One of the research (Ionașcu, 2018) was therefore conducted on listed companies of the Bucharest Stock Exchange in 2013-2016 from the premium and standard level, reporting according to IFRS and which were not in insolvency proceedings. The resulting sample contained 266 companies. The most represented companies were from the manufacturing and financial industries. The source of information was the Thomson Financials database, with all the missing data being subsequently used from documents published on the website of the Bucharest Stock Exchange. In addition, four performance indicators were selected. Two of them were classic profitability ratios, namely ROA and ROS. The other two indicators were based on stock market indicators. The first is Tobin's Q, which is measured as Equity market value / Equity book value, ie the ratio between the sum of the market value and the book value of the company (Herciu 2018). The fourth indicator was the size of liabilities and a comparison of their book and market value (Ionașcu, 2018).

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- the size of the board members,
- age of society,
- number of years listed on the stock exchange,
- investment opportunities (measured by the size of the assets invested),
- internal investments in assets (inventories, land, buildings).

The results of the research discussed that leasing transactions can be an illustrative business model for a circular economy that allows products to be recirculated both through multiple uses and through renewal or renovation. Nevertheless, the aim of the research (study) was to prove the fact that leasing does not penalize companies deciding to follow the path of a circular economist on their performance, but enables them to develop them sustainably (Ionașcu, 2018).

Further research (Richardson, 2014), which linked leasing transactions to financial performance, analyzed the financial impact of various types of air leasing in the period 2011-12 at major US airports. The research was conducted on the basis of structured interviews with airport representatives, airline financial managers and financial officials. Based on these interviews, quantitative indicators relevant for obtaining the possibility of measurable financial performance were identified. They are (Richardson, 2014):

- revenue data (based on dozens of indicators from the Transport ResearchBoardReports),
- capital investment,
- commercial performance,
- cost-effectiveness,
- financial profitability.

The resulting indicators from airlines were analyzed in relevance to the cost structure of selected airports in the USA and further compared with performance indicators (usability) of individual airports. After data collection and analysis of individual selected indicators, benchmarking of both individual airports and the airlines themselves was performed. The results of the research found links between the chosen model of operation of the airport, the form of investment and also the collection of fees from airlines. Conversely, opportunities for airlines to increase financial performance through the use of leases or leasing options have been identified (Richardson, 2014).

Research Opportunities

Based on the desk research performed in the previous chapter, several options for future research can be identified.

Following the research by Ionașcu (2018), it is important to mention that leasing is not a new form of external financing within the new approach of circular economy, but only that while meeting certain parameters it is part of one of its parts, within the product-services system as model use-oriented services. The research activity could be carried out similarly to the Romanian authors Ionașcu (2018) by starting from companies traded on the Prague Stock Exchange and using publicly available sources published in stock exchange database (Thomson Financials, etc.) or by the companies themselves after classification into a representative sample. Furthermore, for the purposes of comparison, the indicators of financial analysis ROA and ROE and subsequently also two of the stock indicators, which are the Tobin coefficient Q, could be used as the sum of the market value of shares and liabilities of companies. The second indicator will be the Market to Book indicator, which determines the ratio between the market and book value of shares. Based on the performed simulations and financial analyzes, the result should be to determine whether leasing in the circular economy model has sufficient potential to promote sustainability with an ecological dimension, which would, however, sufficiently inspire investor confidence.

It would also be possible to continue the latest research of the author´s team around Scrapellini, where the possibilities of further research in the field of efficiency and demonstration of financial stability in the case of large corporations that have decided to apply circular economy models in their paper, or in the research itself, this is a relatively new fact in the world economy and much empirical evidence and research has not yet been done.

Research by Richardson (2018) could also provide an inspiring look at the possibilities of using leasing financing to obtain higher or comparable performance in the case of a circular economy. In terms of applicability in Czech or European conditions, it would be interesting to conduct research, for example, on bus carriers and in the strength of competitiveness when using the model of operating leases. Especially in the case of Student Agency and its new strong competitors on the Czech market, namely FlixBus. The model of behavior of a stronger competitor (FlixBus), which disrupts the dominant positon of the current market leader (Student Agency), has been observed very similarly in the past in the case of the position of Student Agency vs. ČSAD and local carriers.

Conclusion

The paper summarized the current and latest research in the field of circular economics in relevance to the use of leasing financing to address the capital and operational needs of business in the market. Following this research, opportunities for further research were identified. The authors consider the research through which it would be possible to verify the research question within the Czech companies that the adoption of a "greener" business model, as in the case of leasing, does not promote companies economically, but it is a catalyst for increasing their performance.

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Digital Twins as Innovation in The Era of Industry 4.0

Mariusz KOSTRZEWSKI
Warsaw University of Technology, Warsaw, Poland
mariusz.kostrzewski@pw.edu.pl

Magdalena MARCZEWSKA
University of Warsaw, Warsaw, Poland
mmarczewska@wz.uw.edu.pl

Norbert CHAMIER-GLISZCZYNSKI
Koszalin University of Technology, Koszalin, Poland
norbert.chamier-gliszczynski@tu.koszalin.pl

Waldemar WOŹNIAK
University of Zielona Góra, Zielona Góra, Poland
w.wozniak@iizp.uz.zgora.pl

Abstract

Digital twins have become a phenomenon of global interest with the incensement of Industry 4.0. The aim of this conference paper was to provide a brief overview of the selected academic research on digital twins as innovation, especially in the context of logistics circulating around the concept of Industry 4.0 (Logistics 4.0). The authors of this paper reviewed existing literature on digital twins (published in the recent period) in order to map this research stream and identify the most substantial contributors to this area of interest. This brief overview uses particular bibliometric tools and techniques to present most influential authors, journals, and publications. The analysis allowed to map and describe overtime evolution of publications on digital twins in logistics in the early phases of digital twins research.

Keywords: Digital Twin, Innovation, Industry 4.0, Logistics 4.0.

Introduction and background

The concept of digital twins gained attention and importance in recent years (Hu et al. 2020; Greif et al. 2020). Its implementation and development seem promising especially in the era of Industry 4.0. and more technology-dependent societies (Kuehn, 2018; Sun et al., 2020; Liu et al., 2020; Machado et al., 2020, Saniuk S. et al., 2019). The digital twins is a technology, which based on data from different sources develops a digital representation of products, processes, machines or components (Schmetz et al., 2020). This technology fits into the concept of innovations within the Industry 4.0, which refers to, among others, means of automation and data exchange in manufacturing technologies including Internet of Things, cloud computing, Cyber-Physical Systems, big data and analytics, simulation and augmented reality (Tay et al., 2018; Trotta, Garengo, 2018; Muhuri et al., 2019, Szajna et al., 2018).

The study attempts to build on research related to digital twins and its potential as an innovation in the era of Industry 4.0 and context of Logistics 4.0, published in recent years. As of 2020, many important contributions to the knowledge on this topic have been made, thus it seems beneficial to map this research stream in order to identify most important publications, authors and topics, as well as define future paths of studies. Since until 2020, the only one review article has been published on this topic (Gregor et al., 2017), this conference paper seeks to fill this gap in the study by presenting research results of a bibliometric analysis. Precisely, it aims to provide a brief overview of the selected academic research on digital twins as innovation, especially in the context of logistics circulating around the concept of Industry 4.0 (Logistics 4.0). The review addresses the following research questions:

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1. What are the size and publication evolution of research publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0?
2. What sources, papers and scholars have been most influential in research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0?
3. What are the most important clusters of keywords related to the topic of digital twins in the context of Industry 4.0 with the focus on Logistics 4.0?
4. What are the future research directions of the studies on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0?

This conference paper contributes to existing body of knowledge in the following ways: it presents quantitatively the knowledge base related to digital twins in the context of logistics circulating around the concept of Industry 4.0 (Logistics 4.0); identifies most influential research of the topic based on highly-cited journals, papers and scholars; describes the most important clusters of topics related to the research area; concludes with the identification of future promising research directions.

The article proceeds as follows. First, the focus of the analysis and the theoretical background related to the concept of digital twin as an innovation within the framework of Industry 4.0 with the focus on Logistics 4.0 was presented. The next section describes methods used for the analysis, along with data selection and extraction process. It is followed by research results. The paper ends with conclusions and outlines research limitations.

Method and Data

The article is based on bibliometric analysis and graphic mapping of research base on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0. The data used in this research was retrieved from Scopus database on 20th of September 2020. It was processed with the use of Microsoft Excel and VOSviewer software (van Eck and Waltman, 2010). The following set of keywords was analyzed: TITLE-ABS-KEY ("Digital twin*" AND "Logistics"). Such search resulted in 74 records, which were briefly screened (based on titles, abstract and keywords) in order to confirm their relevance to the analyzed topic. Among all 74 records there were 71 written in English, 2 in Chinese and 1 in Russian, thus the screening was possible to perform. Since all the records extracted from database were relevant, a final research sample included 74 records.

Research Results

The Scopus-indexed knowledge base related to digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 included 74 documents published between 2017 and 2020 and demonstrates an increase in scholarly interest in the topic. Annual increase in number of publications is presented in Figure 1. More than 25% of these publications come from authors with German affiliations and additional 16% from Chinese ones. Other important contributions are affiliated in United States (10%), Russian Federation (8%), South Korea (8%), Hong Kong (6.75%). Since the last quarter of 2020 is still ahead, we can expect that the total number of publications related to digital twins and Logistics 4.0 will increase and probably exceed the total number of publications from 2019.

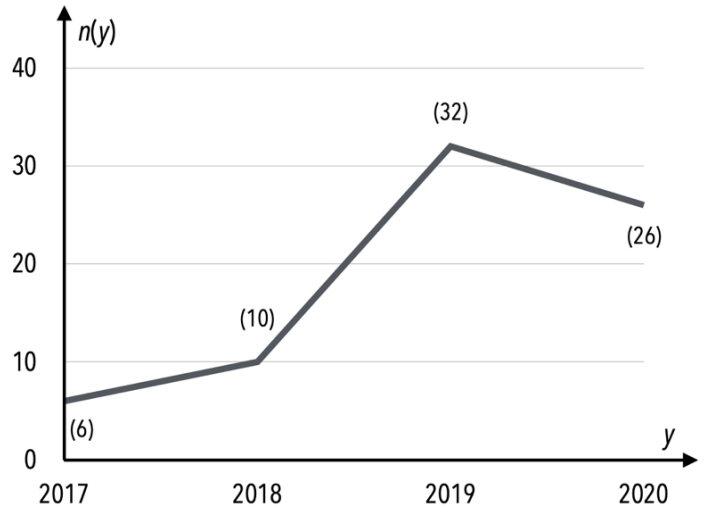

Figure 1: Evolution of publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0, 2017-2020 (n = 74). Source: Own elaboration based on Scopus database.

The publications from the research sample, although related to Industry 4.0 with the focus on Logistics 4.0, are classified under various subject areas, with engineering and computer science being the most common ones. Figure 2 presents details on all areas of these publications' classification.

The studies on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 include articles, conference papers, book chapters, conference reviews and reviews (Figure 3), where articles and conference papers account for almost 92% of all publications related to this research topic. Interestingly, looking at year-to-year distribution of these publications, it can be concluded that articles constantly gain importance, whereas conference papers picked in 2019.

Since digital twins is a relatively new topic of researchers' interest, there are many sources (journals, conference proceedings and books) that constitute a knowledge base of this topic, most of which published only one research contribution (Table 1). Three titles stand out - IFIP Advances in Information and Communication Technology with 4 publications in total, International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management (SGEM) with 3 and Proceedings of the Summer School Francesco Turco with 3. However, in order to identify the most influential research, one should take into account not only number of papers published, but most importantly most cited papers, authors and sources.

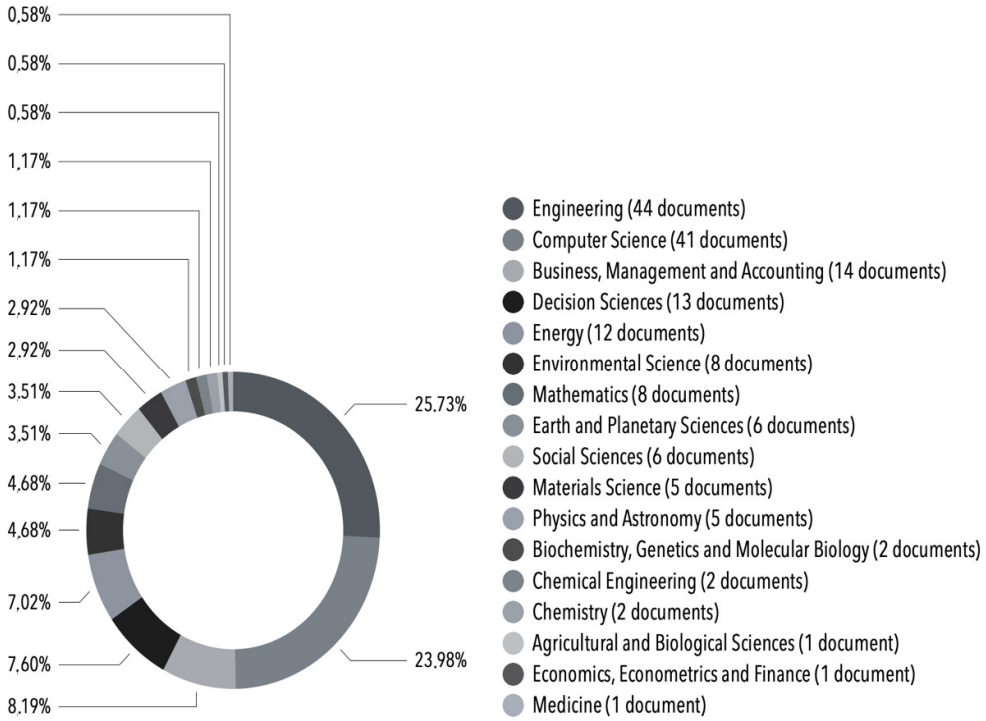

Figure 2: Publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 by subject area indexed in Scopus database. Source: Own elaboration based on Scopus database.

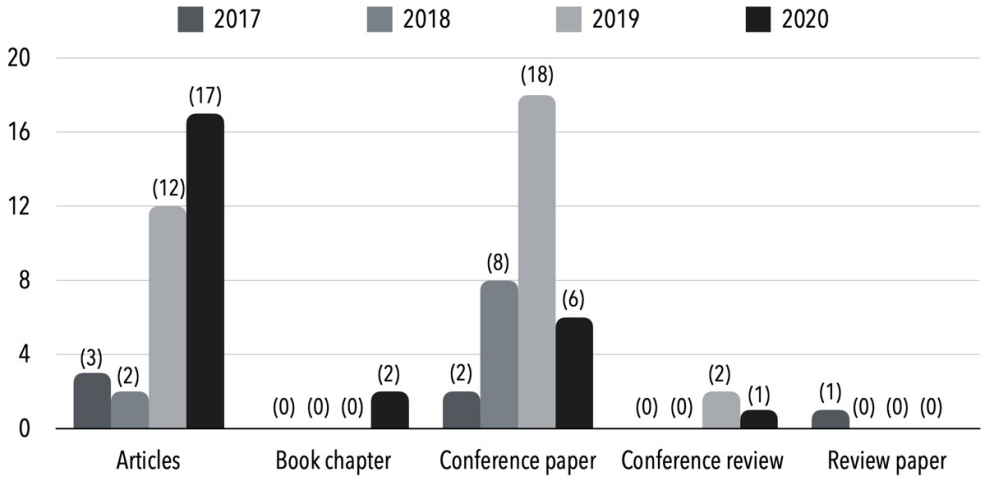

Figure 3: Publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 by type indexed in Scopus database. Source: Own elaboration based on Scopus database.

Table 1: Sources by number of published publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Rank	Source title	Number of publications
1	IFIP Advances in Information and Communication Technology	4
2	International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM	3
3	Proceedings of the Summer School Francesco Turco	3
4	Applied Sciences (Switzerland)	2
5	ASME International Mechanical Engineering Congress and Exposition, Proceedings (IMECE)	2
6	Communications - Scientific Letters of the University of Zilina	2
7	EAI Endorsed Transactions on Energy Web	2
8	International Journal of Computer Integrated Manufacturing	2
9	Journal of Manufacturing Systems	2
10	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	2
11	Procedia Manufacturing	2
12	Proceedings of International Conference on Computers and Industrial Engineering, CIE	2
13	Robotics and Computer-Integrated Manufacturing	2
14	Sensors (Switzerland)	2
15	2018 IEEE 7th World Conference on Photovoltaic Energy Conversion, WCPEC 2018 - A Joint Conference of 45th IEEE PVSC, 28th PVSEC and 34th EU PVSEC	1
16	ACM International Conference Proceeding Series	1
17	Chinese Journal of Engineering Design	1
18	Computers in Industry	1
19	E3S Web of Conferences	1
20	IEEE Access	1

21	IEEE International Conference on Emerging Technologies and Factory Automation, ETFA	1
22	IEEE International Conference on Industrial Informatics (INDIN)	1
23	IFAC-PapersOnLine	1
24	Interconnected Supply Chains in an Era of Innovation - Proceedings of the 8th International Conference on Information Systems, Logistics and Supply Chain, ILS 2020	1
25	International Journal of Computer Applications in Technology	1
26	International Journal of Design and Nature and Ecodynamics	1
27	International Journal of Logistics Management	1
28	International Journal of Mathematical, Engineering and Management Sciences	1
29	International Journal of Mechanical Engineering and Robotics Research	1
30	International Journal of Precision Engineering and Manufacturing - Green Technology	1
31	International Journal of Production Research	1
32	International Series in Operations Research and Management Science	1
33	Jisuanji Jicheng Zhizao Xitong/Computer Integrated Manufacturing Systems, CIMS	1
34	Journal of Ambient Intelligence and Humanized Computing	1
35	Journal of Cleaner Production	1
36	Lecture Notes in Electrical Engineering	1
37	Logistics Journal	1
38	Neftyanoe Khozyaystvo - Oil Industry	1
39	Proceedings - 2018 Global Smart Industry Conference, GloSIC 2018	1
40	Proceedings - 2018 IEEE International Conference on Big Data, Big Data 2018	1
41	Proceedings - 2019 IEEE International Conference on Engineering, Technology and Innovation, ICE/ITMC 2019	1
42	Proceedings - 2019 IEEE International Conference on Industrial Cyber Physical Systems, ICPS 2019	1
43	Proceedings - IEEE 16th International Conference on Industrial Informatics, INDIN 2018	1
44	Proceedings of the 2017 Federated Conference on Computer Science and Information Systems, FedCSIS 2017	1
45	Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020	1
46	Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science	1
47	Resources, Conservation and Recycling	1
48	RINA, Royal Institution of Naval Architects - 19th International Conference on Computer Applications in Shipbuilding, ICCAS 2019	1
49	Simulation Series	1
50	Society of Petroleum Engineers - Abu Dhabi International Petroleum Exhibition and Conference 2019, ADIP 2019	1
51	Society of Petroleum Engineers - SPE Offshore Europe Conference and Exhibition 2019, OE 2019	1
52	SPE/AAPG/SEG Unconventional Resources Technology Conference 2018, URTC 2018	1

53	Strojniski Vestnik/Journal of Mechanical Engineering	1
54	Studies in Computational Intelligence	1
55	Sustainability (Switzerland)	1
56	Transportation Research Procedia	1

Source: Own elaboration based on Scopus database.

Table 2: Most cited sources on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Rank	Source title	Cited by total
1	Procedia Manufacturing	43
2	Robotics and Computer-Integrated Manufacturing	28
3	International Journal of Computer Integrated Manufacturing	26
4	Applied Sciences (Switzerland)	13
5	Proceedings of the Summer School Francesco Turco	13
6	Journal of Cleaner Production	12
7	International Journal of Design and Nature and Ecodynamics	10
8	International Journal of Computer Applications in Technology	9
9	Proceedings - 2018 Global Smart Industry Conference, GloSIC 2018	9
10	Proceedings - IEEE 16th International Conference on Industrial Informatics, INDIN 2018	8
11	Proceedings of the 2017 Federated Conference on Computer Science and Information Systems, FedCSIS 2017	8
12	Resources, Conservation and Recycling	7
13	SPE/AAPG/SEG Unconventional Resources Technology Conference 2018, URTC 2018	5
14	Communications - Scientific Letters of the University of Zilina	4
15	IEEE International Conference on Industrial Informatics (INDIN)	4
16	Journal of Manufacturing Systems	4
17	International Journal of Precision Engineering and Manufacturing - Green Technology	3
18	IFIP Advances in Information and Communication Technology	2
19	Logistics Journal	2
20	ACM International Conference Proceeding Series	1
21	IEEE Access	1
22	IEEE International Conference on Emerging Technologies and Factory Automation, ETFA	1
23	Neftyanoe Khozyaystvo - Oil Industry	1
24	Proceedings - 2018 IEEE International Conference on Big Data, Big Data 2018	1
25	Proceedings - 2019 IEEE International Conference on Industrial Cyber Physical Systems, ICPS 2019	1
26	Sensors (Switzerland)	1
27	Simulation Series	1
28	Society of Petroleum Engineers - Abu Dhabi International Petroleum Exhibition and Conference 2019, ADIP 2019	1
29	Sustainability (Switzerland)	1

Source: Own elaboration based on Scopus database.

When it comes to most influential sources in research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 (defined based on citations), Procedia Manufacturing (ranked 11th in terms of number of publications) is the leader with 43 total citations (Table 2). Two other journals also stand out - Robotics and Computer-Integrated Manufacturing with 28 citations (ranked 13th by number of publications) and International Journal of Computer Integrated Manufacturing with 26 citations (ranked 8th by number of publications). Among top ten sources there are most cited, there are six journals and four conference proceedings.

In order to identify most influential scholars, it is worth to look at least at two variables – number of papers published on certain research topic and number of total citations of these papers. Tables 3 and 4 present such data ranked accordingly. It seems that in terms of author's productivity there are only twenty authors that published more than one paper. Such a productivity of individual authors publishing papers on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 can be justified by relatively young research field, thus yet not many research contributions have been made. Looking at an increasing interest in this research topic, it can be expected that this should change in the coming years.

Table 3: Most productive authors publishing papers on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Rank	Author	Number of publications	Number of citations	Total link strength
1	Zhong R.Y.	3	21	9
2	Huang G. (Huang G.Q.)	3	2	17
3	Kavka L.	3	0	8
4	Kodym O.	3	0	8
5	Qu T.	3	0	17
6	Kuehn W.	2	11	0
7	Bayhan H.	2	10	6
8	Venkatapathy A.K.R.	2	10	6
9	Zeidler F.	2	10	6
10	Harrison R.	2	9	5
11	Grznar P.	2	4	6
12	Fusko M.	2	2	4
13	Skokan R.	2	2	4
14	Varga P.	2	2	4
15	Frankó A.	2	2	4
16	Guo H.	2	0	11
17	Marmolejo-Saucedo J.A.	2	0	4
18	Wiktorsson M.	2	0	9
19	Wu Z.	2	0	5
20	Zhang K.	2	0	12

Source: Own elaboration based on Scopus database.

Interestingly, only one author among top 15 most cited authors published more than one paper on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 (Table 4), namely Zhong R.Y. (Xu et al., 2018; Wang et al., 2020). Consequently, this means that in most cases most influential authors are the authors of most cited papers (see: Table 5) (e.g. Brenner, Hummel, 2017; Nikolakis et al., 2019; Wang et al. 2020).

Table 4: Most cited authors publishing papers on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Rank	Author	Number of publications	Number of citations	Total link strength
1	Brenner B.	1	43	1
2	Hummel V.	1	43	1
3	Alexopoulos K.	1	26	3
4	Chryssolouris G.	1	26	3
5	Nikolakis N.	1	26	3
6	Xanthakis E.	1	26	3
7	Zhong R.Y.	2	19	2

8	Wang. W.	1	19	2
9	Zhang Y.	1	19	2
10	Bottani E.	1	13	3
11	Cammardella A.	1	13	3
12	Murito T.	1	13	3
13	Vespoli S.	1	13	3
14	Kuewunruen S.	1	12	1
15	Lian Q.	1	12	1
16	Kuehn W.	2	11	0
17	Bayhan H.	2	10	6
18	Vemkatapathy A.K.R.	2	10	6
19	Zeidler F.	2	10	6
20	Harrison R.	2	9	5
21	Mukhametdinov E.	1	9	5
22	Reinau K.H.	1	9	5

Source: Own elaboration based on Scopus database.

Table 5 presents publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 ranked based on their total citations that attract attention of other researchers. Among top 12 highly cited papers there are eight articles and four conference papers. Four of these publications were published in 2017, three in 2018, four in 2019 and one in 2020. Interestingly, the paper by Wang et al. (2020) is available online for less that a year and managed to already collect 19 citations.

Table 5: Most cited papers on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Rank	Document title	Authors	Year	Source	Document type	Cited by
1	Digital Twin as Enabler for an Innovative Digital Shopfloor Management System in the ESB Logistics Learning Factory at Reutlingen - University	Brenner, B., Hummel, V.	2017	Procedia Manufacturing 9, pp. 198-205	Article	43
2	The digital twin implementation for linking the virtual representation of human-based production tasks to their physical counterpart in the factory-floor	Nikolakis, N., Alexopoulos, K., Xanthakis, E., Chryssolouris, G.	2019	International Journal of Computer Integrated Manufacturing 32(1), pp. 1-12	Article	26
3	A proactive material handling method for CPS enabled shop-floor	Wang, W., Zhang, Y., Zhong, R.Y.	2020	Robotics and Computer-Integrated Manufacturing 61,101849	Article	19
4	From the cyber-physical system to the digital twin: The process development for behaviour modelling of a cyber guided vehicle in M2M logic	Bottani, E., Cammardella, A., Murino, T., Vespoli, S.	2017	Proceedings of the Summer School Francesco Turco 2017-September, pp. 96-102	Conference Paper	13
5	Digital twin aided sustainability-based lifecycle management	Kaewunruen, S., Lian, Q.	2019	Journal of Cleaner Production 228, pp. 1537-1551	Article	12

	for railway turnout systems					
6	Digital twins for decision making in complex production and logistic enterprises	Kuehn, W.	2018	International Journal of Design and Nature and Ecodynamics 13(3), pp. 260-271	Article	10
7	Human intention estimation based on hidden Markov model motion validation for safe flexible robotized warehouses	Petković, T., Puljiz, D., Marković, I., Hein, B.	2019	Robotics and Computer-Integrated Manufacturing 57, pp. 182-196	Article	9
8	Possibility of Digital Twins Technology for Improving Efficiency of the Branded Service System	Shubenkova, K., Valiev, A., Mukhametdinov, E., Shepelev, V., Tsiulin, S., & Reinau, K. H.	2018	Proceedings - 2018 Global Smart Industry Conference, GloSIC 2018 8570075	Conference Paper	9
9	Cyber-physical systems: A case study of development for manufacturing industry	Choi, S., Kang, G., Jun, C., Lee, J.Y., Han, S.	2017	International Journal of Computer Applications in Technology 55(4), pp. 289-297	Article	9
10	Smart cyber-physical manufacturing: Extended and real-time optimization of logistics resources in matrix production	Bányai, Á., Illés, B., Glistau, E., Coello Machado, N. I., Tamás, P., Manzoor, F., & Bányai, T.	2019	Applied Sciences (Switzerland) 9(7),1287	Article	8
11	Optimizing the Scheduling of Autonomous Guided Vehicle in a Manufacturing Process	Yao, F., Keller, A., Ahmad, M., Ahmad, B., Harrison, R., & Colombo, A. W.	2018	Proceedings - IEEE 16th International Conference on Industrial Informatics, INDIN 2018 8471979, pp. 264-269	Conference Paper	8
12	Human machine synergies in intra-logistics: Creating a hybrid network for research and technologies	Venkatapathy, A.K.R., Bayhan, H., Zeidler, F., Ten Hompel, M.	2017	Proceedings of the 2017 Federated Conference on Computer Science and Information Systems, FedCSIS 2017 8104684, pp. 1065-1068	Conference Paper	8

Source: Own elaboration based on Scopus database.

Interesting insights into the research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 can be concluded from the analysis of keywords listed by authors in their publications. Authors listed in total 691 keywords. Not surprisingly, more than 60% of papers were tagged with “digital twin” or “digital twins” (Table 6). Other frequently used keywords include Industry 4.0, manufacture, embedded systems, life cycle, decision making, simulation, logistics, cyber physical system(s), real time systems, supply chain and supply chain management.

The keywords most frequently used to describe research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 form four clusters. Clusters were formed based on an assumption of minimum number of occurrences of a keyword set to five. This resulted in twenty keywords in total. The most important clusters with the relationships and links between keywords are presented in Figure 4 and consist of:

- Cluster 1 (yellow): digital twin, Industry 4.0, life cycle, information management,
- Cluster 2 (green): digital twins, logistics, simulation, big data, decision making, supply chain management,
- Cluster 3 (blue): cyber-physical systems (cps), cyber physical system, embedded systems, manufacture,
- Cluster 4 (red): Internet of Things, real time systems, supply chain, materials handling, discrete event simulation.

These clusters present the topics related to digital twins that are highly interesting to researchers and can be treated as a direction for the future research.

Table 6: Most occurring keywords on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Rank	Keywords	Occurrences	Total strength
1	digital twin	40	97
2	industry 4.0	15	40
3	manufacture	11	38
4	embedded systems	10	43
5	life cycle	10	21
6	decision making	9	25
7	simulation	9	20
8	logistics	8	17
9	cyber physical system	7	35
10	cyber-physical systems	7	33
11	real time systems	7	31
12	supply chains	7	19
13	digital twins	7	18
14	supply chain management	7	16
15	information management	6	20
16	big data	6	19
17	materials handling	6	19
18	internet of things	6	17
19	decision support systems	5	18
20	discrete events simulation	5	16

Source: Own elaboration based on Scopus database.

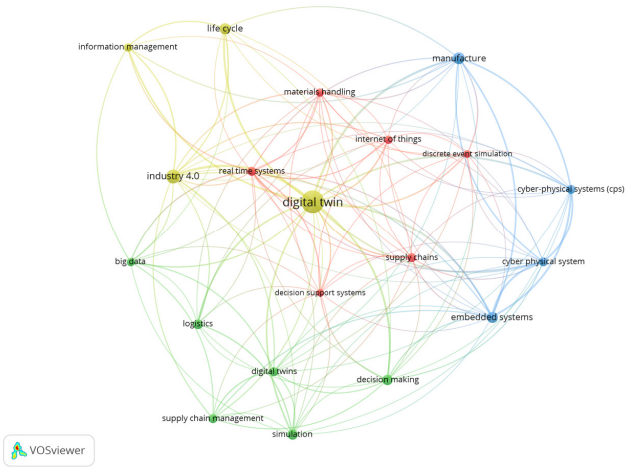

Figure 4: Clusters of keywords related to digital twins in the context of Industry 4.0 with the focus on Logistics 4.0.

Source: Own elaboration based on Scopus database and VOSviewer software.

Conclusions

The review addressed four research questions aimed to characterize the size and publication evolution of research publications on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0; identify the most influential sources, papers and scholars; characterize the most important clusters of keywords and describe the future research directions.

The analysis of knowledge base related to digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 performed based on data obtained from Scopus confirms the novelty of the research field and its increasing importance in recent years. The interest in the topic reflected in publications dates back to 2017, until when there were 74 research contribution published by various authors, 25% of which have German affiliations. Most of these publications were published in different journals and conference proceedings. Eleven sources published two papers related to the topic, two sources - International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management (SGEM) and Proceedings of the Summer School Francesco Turco published three each, and only one - IFIP Advances in Information and Communication Technology - published four. However, none of the sources listed above, apart from Proceedings of the Summer School Francesco Turco, can be classified as the most influential sources in research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0, because their citation rate in the field is relatively low. Top three most influential journals include: Procedia Manufacturing, Robotics and Computer-Integrated Manufacturing and International Journal of Computer Integrated Manufacturing. The same trend can be observed with regards to the most influential scholars. Since only a few scholars published more than one paper in the research field (maximum two or three), and these papers are not highly cited, the conclusions related to the most influential researchers had to be drawn based on total number of citations per each researcher. Consequently, the most influential scholars in research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0 are: Brenner B., Hummel V., Alexopoulos K., Chryssolouris G., Nikolakis N., Xanthakis E., Zhong R.Y., Wang. W. and Zhang Y. These authors also prepared the most influential and highly cited contribution to this research field entitled:

- Digital Twin as Enabler for an Innovative Digital Shopfloor Management System in the ESB Logistics Learning Factory at Reutlingen – University, by Brenner, B., Hummel, V., published in 2017 in Procedia Manufacturing and cited 43 times,
- The digital twin implementation for linking the virtual representation of human-based production tasks to their physical counterpart in the factory-floor, by Nikolakis, N., Alexopoulos, K., Xanthakis, E., Chryssolouris, G, published in 2019 in International Journal of Computer Integrated Manufacturing and cited 26 times,
- A proactive material handling method for CPS enabled shop-floor, by Wang, W., Zhang, Y., Zhong, R.Y., published in 2020 in Robotics and Computer-Integrated Manufacturing and cited 19 times.

The analysis also allowed to identify the most important and frequently used keywords. Out of 691 keywords used to describe research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0, more than 60% of papers used digital twin or digital twins, whereas among other popular ones there were Industry 4.0, manufacture, embedded systems, life cycle, decision making, simulation, logistics, cyber physical system(s), real time systems, supply chain and supply chain management. The keywords allowed to classify them in clusters based on their co-occurrence, which seem to form interesting future research directions:

- Research direction 1 (Cluster 1): digital twin, Industry 4.0, life cycle, information management,
- Research direction 2 (Cluster 2): digital twins, logistics, simulation, big data, decision making, supply chain management,
- research direction 3 (Cluster 3): cyber-physical systems (cps), cyber physical system, embedded systems, manufacture,
- Research direction 4 (Cluster 4): Internet of Things, real time systems, supply chain, materials handling, discrete event simulation.

The research allowed to draw some interesting conclusions; however, some research limitations should be taken into account while drawing general conclusions related to research on digital twins in the context of Industry 4.0 with the focus on Logistics 4.0. Firstly, the research results presented above are based on data extracted from Scopus database, which does not include all ever-published papers related to the research topic. Secondly, the analyzed research field is relatively young and at the same time dynamically developing. This means, that we can expect that there will be more research contributions to this research field in the near future. Thus, these research results should be interpreted considering the period covered. Thirdly, the research results presented in this paper are meant to be informative, not aimed at discrediting any publication, author or journal.

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Impact of Initial Phase of COVID-19 Pandemic on Operations of Stevedore Companies in Seaports: A Case Study of Poland And Ukraine

Michal PLUCINSKI
University of Szczecin, Institute of Management, 8 Cukrowa St., 71004 Szczecin, Poland, E-mail: michal.plucinski@usz.edu.pl

Ludmila FILINA-DAWIDOWICZ
West Pomeranian University of Technology, Faculty of Maritime Technology and Transport, 41 Piastów Ave., 71065 Szczecin, Poland, E-mail: ludmila.filina@zut.edu.pl (corresponding author)

Marta MANKOWSKA
University of Szczecin, Institute of Management, 8 Cukrowa St., 71004 Szczecin, Poland, E-mail: marta.mankowska@usz.edu.pl

Iryna SAVELIEVA
Odessa National Maritime University, Institute of Marine Business, 34 Mechnikova St., 65029 Odessa, Ukraine, E-mail: savirina@gmail.com

Volodymyr SHEMAYEV
Ukrainian Sea Ports Authority, Strategic Development Department, 14 Peremohy Ave., 01135 Kyiv, Ukraine, E-mail: v.shemayev@gmail.com

Abstract

The COVID-19 pandemic has significantly affected the transport industry functioning. Changes in the volume of transported cargo were observed in particular transport modes, and above all in ports transshipments. The aim of the article is to investigate the impact of the COVID-19 pandemic on the selected stevedore companies functioning in seaports during the initial stage of the pandemic. Selected companies operating in Polish and Ukrainian seaports were analyzed as a case study. The condition of chosen transshipment terminals was examined during the first four months from announcement of pandemic in these countries. Survey method was used to conduct the research. On the basis of the prepared questionnaire, the survey was conducted among representatives of cargo transshipment terminals and the impact of the pandemic on the functioning of stevedore companies was examined. It was found that all companies had to introduce changes to the organization of terminal's operation. However, the impact on the volume of cargo transshipments, ships service and cargo handling was varied. The article presents preliminary research results that will be continued in the future.

Keywords: COVID-19, seaport, stevedore company, cargo handling.

Introduction

The COVID-19 pandemic has introduced significant changes in transport and logistics industry. These changes mainly affected the goods trade on the world market, that caused changes in the demand for transport services and the volume of cargo handling in seaports.

Seaports, as key nodes of global supply chains, had to take measures to adapt to current changes. Under the influence of the situation caused by the COVID-19 pandemic, seaports were obliged to introduce a number of organizational changes in their daily functioning, associated, inter alia, with the need to comply with sanitary standards to prevent the spread of coronavirus. These changes covered various areas of ports' operation, including handling of bulk and general cargo, as well as providing services to passengers.

According to the Notteboom and Pallis (2020), ports located in different regions of Europe and the world have been affected by the pandemic differently. It could deal with cooperation with various geographic markets and economic ties of countries, which directly influenced the volume of imports, exports and transit of different groups of goods handled through seaports.

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The impact of the pandemic was felt both by port authorities and companies providing transshipment and storage services for various cargo. Stevedore companies, that perform services for cargo, ships and hinterland transport means, had to implement restrictions and changes in current approach to conducting their business.

The aim of the article is to investigate the impact of COVID-19 pandemic on the functioning of selected stevedore companies operating in seaports during the initial phase of the pandemic. The case study was considered, and selected companies operating in seaports of Poland and Ukraine were analyzed in detail. An additional goal of the article was to compare the situation observed in selected seaports of Poland and Ukraine in the analyzed period. Surveys were used to conduct the research.

The article consists of a literature review, research methodology, and the obtained results analysis. The study is summed up with conclusions and definition of further research directions.

Literature Review

The spread of the COVID-19 pandemic had a global impact and poses tremendous threat to human health (Chakraborty and Maity (2020); Hoehl et al. (2020); Liu et al. (2020); Organization (2020); Pongpirul et al. (2020); Sohrabi et al. (2020)). The economic shock centralized within the rapidly-escalating pandemic was felt globally (Corbet et al. (2020)). It was noted that the widespread lack of regulation and international legislation pose serious challenges for decision-makers to resolve the occurring problems. The need to determine the possible ways in which the disease can be controlled was pointed out (Chakraborty and Maity (2020)).

The impact of the pandemic was observed in global supply chains functioning (Gostin and Wiley (2020); Ivanov (2020); Loske (2020); Luo and Tsang (2020)). These chains should be planned and arranged appropriately in order to deliver benefits to their users (Kostrzewski and Kostrzewski (2019); Mańkowska et al. (2020); Postan and Filina-Dawidowicz (2017)). Gray (2020) noted the influence of COVID-19 crisis on agriculture and transportation, including some disruption in intermodal containerized movement of grains and food products from the lack of empty containers in North America.

Available literature analysis revealed that attempts were made to analyze the impact of COVID-19 pandemic on the functioning of the transport and logistics industry, however, it was done to a limited extent.

The available literature put attention, among others, to the impact of pandemic on air transport (Abu-Rayash and Dincer (2020); Amankwah-Amoah (2020); Browne et al. (2016); Nakamura and Managi (2020); Nižetić (2020)). Abu-Rayash and Dincer (2020) analyzed the mobility trends during the coronavirus pandemic and explored the impacts on global aviation and travel in selected cities. Wang et al. (2020) stated that air freight and ocean-going ships play a non-negligible role in spreading COVID-19 due to frequent visits to countries with infected populations, and introduced a method to dynamically assess the infection risk of ships based on a data driven approach. Conducted analysis demonstrated that some airlines and industrial bodies sought to sidestep environmentally friendly commitments and practices to overcome new challenges, such as cost pressures, survival threat and deprioritizing environmental initiatives in the wake of COVID-19 (Amankwah-Amoah (2020)). Moreover, scenarios of air travel restriction were considered, and the change in the risk of importation and exportation of COVID-19 were calculated by Nakamura and Managi (2020). The attempts were done to estimate and project air passenger traffic during the COVID-19 outbreak and its socio-economic impact (Iacus et al. (2020)).

The impact of coronavirus disease on road safety was also investigated (Vingilis et al. (2020)). It was stated that preliminary information on factors such as the increased stress and anxiety brought about by the COVID-19 pandemic, more “free” (idle) time, increased consumption of alcohol, and greater opportunities for speeding and stunt driving, could have the opposite effect on road safety. Dzisi and Dei (2020) explored the adherence to social distancing and wearing of masks within public transportation during the COVID 19 pandemic. Initial research was conducted on volume and capacity dynamics in road haulage (Loske (2020)).

Regarding to maritime transport, it was stated that the effects of national lockdown policies on maritime settings of the region should be systematically analyzed using Automated Identification System (AIS) data from fishing vessels, passenger ships, tanker and cargo vessels collected through the Aqua Alta Oceanographic Tower (AAOT) (Depellegrin et al. (2020)). Michail and Melas (2020) explored the reactions of freight rates for dry bulk, clean, and dirty tankers impacted by COVID-19. Liu and Chang (2020) pointed out that COVID-19 has severely impacted the global cruise tourism industry. The authors concluded that for a long-term mechanism construction, three aspects need to be considered: i) risk emergency management mechanism of cruise lines, ii) health and epidemic prevention supervision mechanisms, and iii) international cooperation mechanisms of infectious disease prevention. Aggressive efforts are required to contain spread, including cruise shipping (Moriarty et al. (2020)). A

comprehensive outbreak response was implemented, including surveillance, provision of essential medical care and other activities (Nakazawa et al. (2020); Yamagishi et al. (2020)). Precautions have to be taken to prevent the effects of a pandemic (Sun and Zhai (2020)). Chokepoints usage was proposed to rapidly and efficiently vaccinate and prophylax the transportation worker cohort and to implement transmission prevention measures and thereby protect the ability to move goods (Luke and Rodrigue (2008)).

In the research studies the issue of the impact of COVID-19 pandemic on the seaports functioning is still undertaken to a limited extent. Donnan et al. (2020) paid attention that it is critical to simultaneously formulate and adapt multiple strategic plans of individual ports to the stressors such as pandemic. That is why ports and terminals should develop and assess strategic plans to manage the port during such disruptions. The detection of the virus in a ship's crew member affects the behavior in the ports where the ship calls (Fernandes et al. (2020)). Proper and early risk communication of ship, seaport and media may prevent panic, facilitate good support and prevent false communication (Subramaniam and Madala (2020)).

Zhang et al. (2020) evaluated COVID-19 impact on different market segments, impacts on ports, containers, tankers, dry bulk cargoes, cruise ships and other subdivisions. As a result of the research, it was found that the recovery will be a slow process. It was stated that COVID-19 will continue to have a negative impact on the shipping and port industry. Zhang et al. (2020) suggested that some measures should be put forward such as strengthening overseas port policy and port linking tracking, avoiding ship charter disputes and legal risks, improving the system of prevention and control of cruise ships, as well as promoting the development of smart ports and smart shipping.

An extensive study of seaports' functioning during the pandemic is presented by Notteboom and Pallis (2020). Based on statements sent by seaports, the volumes of transshipments and ship calls at ports were determined. It should be noted, however, that this report presents the general situation on the world market and does not analyze the problems faced by ports' companies that handle and store the cargo. There is also a lack of studies describing the condition of Ukrainian and Polish port's companies involved in reloading of various cargo groups.

Methodology

In order to conduct the research, a survey method was selected. Based on the observations of transport market development and preliminary discussions with representatives of port companies, a questionnaire was elaborated. This questionnaire was developed in Polish and Russian, and was divided into two parts. The first part concerned the data about a person completing the survey, as well as the type of a stevedore company. The second one examined the companies' functioning during the COVID-19 pandemic.

The scope of the research covered the first four months of companies' operation (March-June 2020) and aimed at getting answers to the following questions:

1. What was the impact of COVID-19 initial phase on the operation of stevedore companies?

2. What has changed in port companies functioning throughout the initial phase of the pandemic?

3. What are the forecasts of industry representatives regarding the further impact of pandemic on the seaports functioning?

Using the developed questionnaire, the survey was conducted among representatives of seaports' companies in Poland and Ukraine. These two countries were considered, due to the possibility to analyze the viewpoint of enterprises, operating in seaports of Baltic Sea and Black Sea, servicing different economic hinterland markets (Poland, Ukraine, other countries of this region). The companies which provide handling and storage services for various types of cargo in these ports were selected as the research sample. It was assumed that this sample should include enterprises that operate general cargo and bulk cargo terminals, as well as companies that have experience in handling wide range of cargo (universal terminals) and specific cargo groups (specialized terminals). Therefore, certain terminals willing to take part in the survey were chosen.

In Poland the survey was carried out in form of direct interviews. During telephone calls and interviews conducted using MS Teams platform, the answers to the developed questions were received. The persons directly responsible for managing the stevedore company took part in interviews. In turn, in Ukraine the questionnaire was distributed in electronic form by the Ukrainian Sea Ports Authority. The questionnaires were filled in by people involved in companies' management.

On the basis of obtained responses analysis, it was possible to indicate the opinions of the surveyed enterprises' representatives about the impact of COVID-19 on Polish and Ukrainian stevedore companies' operation and to compare the results. Then, the relevant conclusions were drawn.

Results

Thirteen stevedore companies operating in seaports of Poland and Ukraine participated in the study (Table 1), with one company B serving two transshipment terminals located in ports of Szczecin and Świnoujście (opinions of 14 terminals were examined).

Among the surveyed enterprises, 6 companies operate in Poland and 7 in Ukraine. These were companies handling various types of cargo, both bulk and general cargo (universal terminals), as well as handling a selected cargo group (specialized terminals).

The questionnaire was completed by the companies' managers with experience and knowledge related to company's operations. The respondents included companies directors (5 respondents), deputy directors (5 respondents), terminal managers (2 respondents) and operational director (1 respondent).

While answering the question "Does the COVID-19 pandemic have/had an impact on the company's operation?", the representatives of surveyed enterprises unanimously replied that the pandemic had an impact, however, the type of impact was varied (Fig. 1). All analyzed terminals had to introduce the changes in organization of their work. In turn, changes in the volume of transshipments, organization of ships and cargo handling were not indicated by all enterprises, greater number of these changes was noticed by representatives of Polish companies.

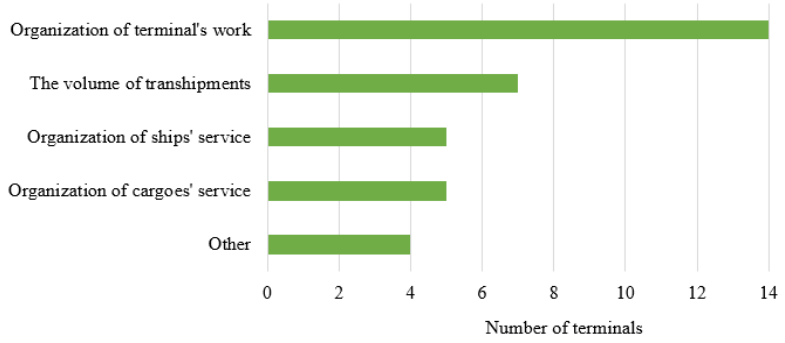

Fig. 1: Responses to the question: "What type of COVID-19 impact on the operation of stevedore company was observed during initial phase of the pandemic?"

Table 1: The surveyed companies of the Polish and Ukrainian seaports

No.	Abbre-viation of company	Sea (seaport)	General cargo terminal		Bulk cargo terminal		Comments
			uni-versal	specia-lized	uni-versal	specia-lized	
1	A	Baltic Sea (Szczecin)	v*	-	v	-	company that handles various groups of bulk and general cargo
2	B	Baltic Sea (Szczecin and Świnoujście)	-	-	-	v	company operating two liquid bulk cargo terminals, dominant import relationship
3	C	Baltic Sea (Szczecin)	-	-	-	v	two capital-related companies operating specialized grain cargo terminals, one export and one import terminal
4	D	Baltic Sea (Szczecin)	v	-	-	-	company operating universal

							conventional general cargo terminal
5	E	Baltic Sea (Gdańsk)	-	v	-	-	company operating a specialized container terminal
6	F	Baltic Sea (Gdańsk)	-	v	-	-	company operating a specialized frozen cargo terminal
7	G	Black Sea (Kherson)	-	-	-	v	company operating specialized grain terminal
8	H	Black Sea (Odessa)	v	-	-	-	company operating a universal general cargo terminal
9	I	Black Sea (Odessa)	v	-	v	-	company operating universal terminal that handles various groups of bulk and general cargo
10	J	Black Sea (Odessa)	v	-	-	-	company operating universal general cargo terminal
11	K	Black Sea (Odessa)	-	-	-	v	company operating a specialized grain terminal
12	L	Black Sea (Odessa)	-	-	-	v	company operating a specialized liquid cargo terminal (vegetable oils)
13	M	Black Sea (Odessa)	-	v	-	-	company operating a specialized container terminal
* v – indication of terminal's kind							

Among other areas of influence, representatives of companies mentioned i.a. extension of the storage period for bulk cargo (e.g. in company A), while company (F) noticed a shortening of the storage time of cargo due to the increase in demand for food. Attention was also paid to the impact of the pandemic on delays in delivering investments in the terminal's expansion (company B), as well as extended time of cargo clearance at the beginning of pandemic (company E).

The respondents were asked to indicate the nature of COVID-19 pandemic impact on company's operations. Responses analysis revealed that this impact was varied. Representatives of 7 terminals described the impact as negative (3 Polish and 4 Ukrainian terminals), which was mainly related to the decrease in terminals' throughput, as well as other difficulties. A positive impact was indicated by one Polish terminal, which recorded an increase in transshipments in the analyzed period, that had a positive impact on the company's performance. The remaining 6 terminals (3 from Poland and 3 from Ukraine) indicated that it is difficult to determine the impact type, because the changes mainly concerned the organization of the terminal's work.

The next question aimed to examine the impact of pandemic on the transshipments' volume. Among the analyzed enterprises 6 terminals (3 from Poland and 3 from Ukraine) recorded transshipments decrease. The increase in transshipments faced one Polish terminal. In turn, other 7 terminals stated the lack of significant changes compared to previous years. This allowed to draw the conclusion that the impact of the COVID-19 on analyzed enterprises functioning in initial period of the pandemic was different, and it cannot be clearly stated that it had a negative nature.

The representatives of the companies were also asked about the dynamics of pandemic impact on the company's throughput during the period of March-June 2020, and detailed phases (stages) of this process (Fig. 2). Terminals that experienced decrease in transshipments' volume have determined the phases (stages) of pandemic influence. These terminals included universal general cargo terminals and specialized terminals for containerized cargo, as well as specialized terminals servicing grain and vegetable oils. Three of the analyzed Polish terminals noticed the

pandemic impact on the structure of goods being transshipped. None of the Ukrainian terminals indicated changes in this regard.

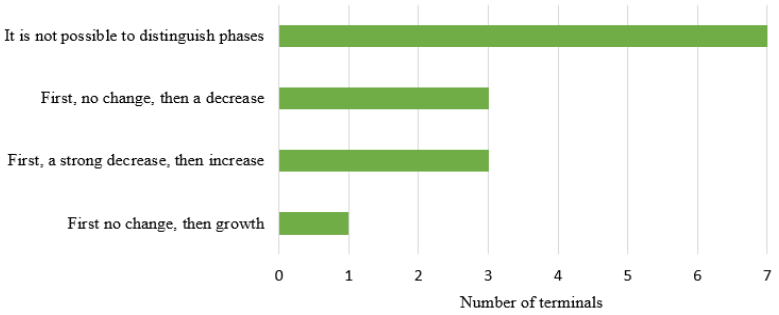

Fig. 2: Responses to the question: "Was the impact of pandemic on the company's operation constant during March-June 2020, could the detailed phases (stages) of this impact be distinguished?"

The research showed that changes also were observed in freight transport relations. The surveyed terminals recorded changes in the volume of imports, exports and transit within the selected cargo groups. In case of some enterprises, the decrease in imports of goods was compensated by the increase in exports. A detailed analysis of cargo transshipments in selected global seaports was presented in report developed by Notteboom and Pallis (2020).

Changes in the organization of ship service were noticed by all Polish terminals and one Ukrainian. These changes covered mainly the application of more restrictive sanitary procedures necessary for control and inspection of vessels. The same observations were applied to the organization of cargo handling. Some terminals introduced the reduction of work shifts duration and number of shift workers. Several terminals paid attention to the extension of cargo and ship handling times in seaports, but this did not result in downtime penalties. In turn, one terminal noticed that the procedures related to the workflow of documents within the company were simplified, this terminal implemented electronic exchange of documents, which influenced the time needed to prepare the necessary documentation accompanying cargo transport. Some terminals were forced to accept longer storage periods for cargo and set more loyal cargo storage conditions for their customers. Moreover, resignation from subcontractors of services was also observed, at the time the terminals began to provide services on their own. This action was related to the need to reduce the level of current costs and protect terminals' staff against dismissal.

The respondents also indicated the scope of actions that terminals had to undertake under COVID-19 pandemic influence (Fig. 3). All terminals introduced regular disinfection of premises. Numerous points with available means for disinfection were established. At the entrance to 4 Ukrainian and 2 Polish terminals, temperature measurements were carried out for visitors and employees.

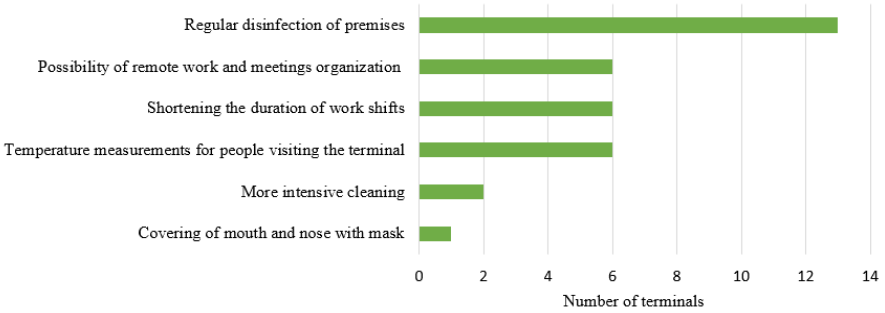

Fig. 3: Answers to the question: "What actions related to pandemic occurrence have been undertaken in the stevedore company"?

The last survey question concerned the examination of respondents' opinions on the impact of COVID-19 pandemic on the further operation of terminals (Fig. 4). Representatives of all Polish terminals and one Ukrainian indicated that the pandemic would leave a permanent impact on terminals' operation. At the same time, experts from Poland mentioned that this permanent trace may have clearly positive nature, which they associated with:

- optimization of employees' work and remote work,
- improvement of documentation flow,
- implementation of a management system for the company's secretariat,
- progressive computerization/digitization within the company,
- implementation of new technologies,
- usage of autonomous devices,
- monitoring of employees' health - temperature tests,
- increasing of hygiene among employees, etc.

The opinions of the majority of Ukrainian experts were different: 4 experts pointed that the influence would not remain, while 2 people did not have an opinion due to the dynamically changing economic situation.

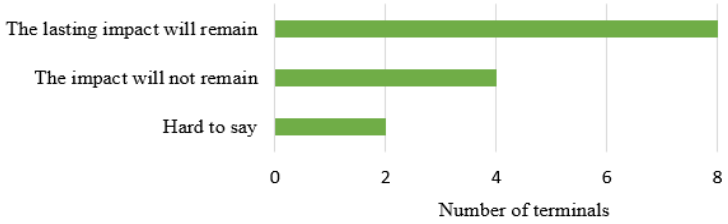

Fig. 4: Answers to the question: "Will the impact of pandemic remain permanent trace on future operation of company?"

In order to summarize, it could be stated that both Polish and Ukrainian terminals suffered the effects of the pandemic. The terminals pointed to the increase in their operating costs in the analyzed period due to the need to purchase disinfectants and personal protection means and equipment, that faced significant prices increase at the beginning of the pandemic. Moreover, companies' management boards were deeply involvement in challenging activities striving to minimize the negative impact of the pandemic. The difficulties to access the terminals for older people (over 60 or self-isolated) were also mentioned.

Conclusions

This article presents the preliminary results of research on the impact of COVID-19 on the operation of selected stevedore companies located in the seaports of Poland and Ukraine in the initial phase of the pandemic. The obtained research material allowed to determine the opinions of representatives of selected companies regarding their functioning during COVID-19 development. Therefore, it may be important to define models of enterprises behavior considering changes in economic environment.

On the basis of the conducted research, it was found that the surveyed companies were influenced by the pandemic, especially in the field of work organization. The impact was varied in other areas of examined companies' operation.

It should be noted that representatives of the surveyed companies operating in Poland were willing to describe the impact of the pandemic on their functioning in more detail, while representatives of Ukrainian companies were more cautious in their statements. The results of the research could have been influenced by the level of accuracy to complete the questionnaires by respondents, however, it was possible to identify the basic problems encountered by stevedore companies during the initial phase of COVID-19 pandemic.

Moreover, it should be noted that seaports of both Baltic Sea and Black Sea serve not only domestic markets, but also various foreign markets (e.g. transit), which directly affects the volume of transshipped goods. Furthermore, the perception of the pandemic was influenced by economic relations and world trade. Taking into account these factors, as well as conditions of companies' operation, it is possible to have a better look at the reasons for occurring changes. Therefore, the future directions of the authors' research will focus on a detailed analysis of the sea-land supply chains running through the seaports. Changes to the ports' transshipment structure should also be analyzed in more detail. That will allow to identify types of cargo that were more or less exposed to the impact of the pandemic. A valuable knowledge may also deal with the identification of new cargoes that possibly appear within sea-land transport chains, which prior to the pandemic were carried only by land transport. These issues are important in face of possibly occurring second and further COVID-19 virus infection waves (Loske (2020)).

The obtained research material may be interesting for companies operating in transport and logistics industry, and may constitute the basis for development of decision-making models supporting key future decisions in the conditions of rapid changes. The results can also provide an important information base for decision makers responsible for setting up support mechanisms for entities affected by pandemic.

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Job Satisfaction and Employees' Productivity: A Study of Federal Airport Authority of Nigeria (FAAN), Lagos

Osayande Q. ITUA
Department of Political Science and International Relations, Covenant University, Ota, Nigeria
[Correspondence: osayande.itua@covenantuniversity.edu.ng Tel: +2348034028331]

Fadeke E. OLU-OWOLABI
Department of Political Science and International Relations, Covenant University, Ota, Nigeria
[Correspondence: fadeke.owolabi@covenantuniversity.edu.ng Tel: +2347034353823]

Daniel E. GBEREVBIE
Department of Political Science and International Relations, Covenant University, Ota, Nigeria
[Correspondence: daniel.gberevbie@covenantuniversity.edu.ng Tel: +2348023628562]

Oluwatoyin A. MATTHEW
Department of Economics and Development Studies, Covenant University, Ota, Nigeria
[Correspondence: oluwatoyin.matthew@covenantuniversity.edu.ng Tel: +2348023918301]

Romanus A. OSABOHIEN
Department of Economics and Development Studies, Covenant University, Ota, Nigeria
[romanus.osabohien@covenantuniversity.edu.ng Tel: +2348064545217]

Abstract

This study investigates the effect of job satisfaction on employees' productivity in the Nigerian public sector with specific reference to the Federal Airport Authority of Nigeria (FAAN), Lagos. The study employed a descriptive survey research design based on primary and secondary data. Out of 939 population which is made up of 729 senior staff and 210 junior staff employees in FAAN, 281 copies of structured questionnaire were administered to FAAN and 213 (75.8%) was returned while 68 (24.2%) was not returned. A simple random sampling technique was used. Secondary data were sourced from published materials and analysed textually. The Statistical Package for Social Science (SPSS) statistical tool was used for the analysis of data. This study adopted the Herzberg two-factor theory which rejuvenated the discussion and findings. The study unveils that there is a positive significant relationship between job satisfaction and employees' productivity in Nigeria. Therefore, the study concludes that employees are an integral part of any organisation, and as such their satisfaction should be a priority for improved and optimum performance and a high opportunity for a competitive edge, especially in the public sector. Therefore, based on the findings of this study, it is recommended that; it is imperative for managers to make acceptable incentives to mitigate employee dissatisfaction at the workplace to improve productivity.

Keywords: Employee Productivity, Job Satisfaction, Public sector, Nigeria

Introduction

The contemporary business environment is very competitive in terms of different strategies or rewards that organisations apply to attract highly skilled workers and also to maintain a fulfilled, motivated and satisfied employee. Public organisations in Nigeria operate in a profoundly competitive environment due to the global business competition (Muna, Zain & Shaju, 2017). Job satisfaction is a vital factor of competitive edge for employee productivity since it requires human capital for the success and achievement of the organization (Morozov, Murashova, Lustina, Panova & Danilova, 2017). The human resource of an organisation has been recognized as the most significant assets of that organisation as its success relies to a great extent upon their effective and efficient commitments. The task of human resources management is to recruit the right kind of individuals that are morally justified with quality abilities or skills as when required, but for the Nigerian public sector, it is a reverse case (Dibie, Edoho & Dibie, 2015). As posits by Abasilim, Gberevbie and Osibanjo (2018) leaders in some organisations are

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blamed for the adoption of leadership style that suits only the top-down as well as the chain of command to lead their subordinates. Hence, the subordinates react negatively most times to some forms of leadership style, as it demotivates their workforce.

Sikowo, Namusonge, Makokha and Nyagechi (2016) posit that every organisation that intends to encourage good work relationships with their workforce would need to invest in their development and ensure their satisfaction in the workplace. Some organisations perceive job satisfaction as a significant factor that inspires employee retention to work willingly and apply considerable effort towards their job in that organisation and keep up a solid relationship, thereby leading to increased productivity. (Miah, 2018). As agreed by Shaju and Subhashini (2017) agree that when employees are satisfied, it motivates them to deliver maximally in that organisation. The outcome and performance of every organisation largely depend on employees' job satisfaction. A satisfied employee would have a cordial relationship with the organisation and be motivated with high morale (Toban & Sjahruddin, 2016).

The public and private sector, around the world, depend on employees for ensuring maximum delivery thereby leading to productivity. This initiates the demand in ensuring that employees are satisfied as a matter of necessity in an organisation. An organisation that lacks employee motivation can lead to low productivity which is harmful to the continuous development of that organization because job satisfaction is linked to productivity in terms of emotional and behavioural components that are attached to job satisfaction (Mohammd, Rand & Ra'ed, 2019).

The incessant industrial conflict of workers in the public sector emanated from workers' complaints on the dissatisfaction of workers due and non-payment of salaries, denial of various benefits, low compensation, and little attention to employee welfare programmes. All these lead to confrontations between government and workers thereby result in low productivity. As observed by Oyebamiji (2018), over 90 percent of patients died due to this incessant strike in the health sector. This was attributed to the misunderstanding between the union and the government.

There is a consensus of opinion about the fallen standard of workers which is due to poor welfare package. Nigerian Governments has recorded and experienced poor attitude and low productivity of workers from both public and private corporations. This sad experience is still experiencing today. The government has done a lot in their effort to increase their performance but all was to no avail and has become a persistent challenge facing the Nigerian public sector.

Moreso, the shortage of training and capacity development is an increasing challenge in the public sector. Poor attitude and support training and career development is an increasing challenge in the public sector inadequate funding of training and development for an employee. The low response of support and cooperation from the effectiveness of manpower training in the public sector would lead to job dissatisfaction Aluko, Adewusi, & Kalejaiye, 2016; Adiele & Ibietan, 2017). Inadequate or denial of workers employees' participation in the training programme might lead them to develop a poor attitude and low productivity of workers leading to the negative perception that is against the overall organisational goals.

In view of the foregoing, this study investigates the effect of job satisfaction on employees' productivity, a study of Federal Airport Authority of Nigeria (FAAN), Lagos State with a specific objective to examine how training and career development as it affects the productivity of the staff of Federal Airport Authority of Nigeria (FAAN), Lagos. In view of the stated objective, the hypothesis is formulated and stated in null form viz:
H_0: There is no significant effect of training and career development on employees' productivity in the Federal Airport Authority of Nigeria (FAAN), Lagos State, Nigeria.

The place of job satisfaction cannot be over emphasised in every organisation as every as they depend on their employee for achieving organisational goals and objectives. This can be realised if their workforce is satisfied and productive. Professionals believe that job satisfaction trends can affect the behaviour of labour market and also attract organisational growth (Lopes, & Bandura, 2020). This study is relevant especially in the Federal Airport Authority of Nigeria (FAAN), Lagos in improving productivity and mitigate against job dissatisfaction among the employees. The study analyses the effect of job satisfaction and would serve as a measuring parameter for the Federal Airport Authority of Nigeria (FAAN), Lagos for addressing the issue of job satisfaction. Policymakers in Nigeria and of human resource managers will derive valuable lessons as it would help improve the level of workers' attitude to work, provide training and re-training to employees, provides a good working environment and improve worker's wages in the Nigerian public sector among others. In addition, it would enhance the leadership style and administration in the public sector as they adhere strictly to the recommendations provided by in this study for improvement in support for training and career development for a high level of productivity and competitive advantage. Finally, the study would serve as a basis for further research to other scholars who intend to research job satisfaction and employee productivity and will also broaden their knowledge and understanding on the subject matter using other variables or study.

This study was chosen due to the fact that; in FAAN the productivity of the employees seems to be very low compared with other government-owned parastatals, and this is largely due to low job satisfaction morale enjoyed by the employees.

Literature Review and Theoretical Framework

Concept of Job Satisfaction

Job satisfaction refers to the degree to which an employee contends with their work in terms of work itself. Sikowo, Namusonge, Makokha and Nyagechi (2016) agree that job satisfaction is a psychological state of someone, feelings or attitudes in terms of intrinsic and extrinsic characteristics towards their job and in the organisation in which they perform their work. In the same vein, it is the view as the character which an employee possesses in terms of the task work which is an indication of being satisfied or dissatisfied with the work or not (Armstrong & Taylor, 2014). Bello, Ogundipe and Eze, (2017) view by identifying five factors that are associated with job satisfaction namely: satisfaction with salary, work itself and work relationship with colleagues at work. They are also of the opinion that quality supervision and relationship with managers and co-workers is key to the success or failure of a worker in a given task. Castaneda & Scanlan (2014) sees satisfaction as a worldwide inclination about one's work or a connected bunch of perspectives about different aspects of the workplace. Sikowo et al., (2016) see job satisfaction as a concept used in describing whether employees are happy with their desires and needs. Ndulue and Ekechukwu (2016) explain that job satisfaction is caused by employees' thought on satisfied their task was able to deliver those things that are perceived as crucial. In addition, it is viewed as a positive emotional state of an employee is an achievement of the pleasure from the job (Jyoti, 2020).

Concept of Employee Productivity

According to Embuldeniya (2017), productivity is the quantity of output produced per unit of input, and it could be a term of output per unit of time. It is the available resources, time, materials, and capital effectively and efficiently utilized that culminates into productivity in an organisation (Bhatti, 2015). Employers expect their workforce to be productive as it is believed that they are the most relevant resources in an organisation (Mayson, & Barrat, 2016; Shaban, Al-Zubi Ali & Alqotaish, 2017). This implies that employee low productivity would reduce their morale for motivation. Employee Productivity is referred to a measure of quality and quantity of an accomplished job, with the understanding of the cost of capital incurred. Chukwudumebi and Kifordu (2018) posit that the more organisational productivity, the higher the competitive advantage. Bhatti and Qureshi (2007) perceived productivity as the measure of performance which comprises of their efficiency and effectiveness. This implies that productivity is likened to a total measure of capacity and transforms the inputs which is the raw material into finished products and services. Jonathan, Sunday, Ayobami & Iruobe (2012) posits that quality can be determined by accessing the performance, reliability, conforming to the required standards, and also complying with customer requirements which will, in turn, lead to employee productivity and then organisational growth. Mustapha and Omorede (2017) explained that productivity can be referred to the ratio of input such as cost of labour and production, number of hours spent on a particular task and cost of equipment while output includes profit, sales and market share. It could also be defined as the combination of all the factors of production as well as output needed to get the desired results. The vital issue in an organisation is employee productivity, for this reason (Ezeamama, 2019) research further on employee productivity and posit that productivity can be referred to all the desire of the organisation from discrete conduct test of every individual during the explicit timeframe.

Determinants of Job Satisfaction

Diverse factors are involved to intrigue satisfaction in an organisation, for example, adequate welfare package, promotion, incentives, training and career development, job security, work environment and adequate infrastructure among others.

Adequate Welfare Package

According to Mabaso and Dlamini (2017), organisation who adequately pay their employees would enjoy a demonstration of a pleasurable attitude in return from their employees because the workers would deliver their tasks satisfactorily this will improve employee's performance as well as increase the productivity of that organisation. Mayson and Barret (2016) also support that organisation can experience greater performance and productivity if the salaries they pay are competitive salaries as this would attract qualified employees. Sule, Amuni, Obasan and Banjo (2015), posit that salary and wages are in the form reward in exchange to services rendered in an organisation and it is called "human endowment" which is in form of rewards. They further mentioned that salaries are as a fixed annual amount, paid monthly while wages are paid daily or weekly. It is mandatory by law for the employer to pay employee

salaries or wages as stated in section 1 of Labour Act, LFN 2004 CAP L1. Every employer either public or private is expected to pay for his or her work as agreed. An employee who decided to enter a contractual agreement with an organisation to render services is entitled to a return in form of a reward. As declared by Agburu (2012), paying adequate wages and salaries is not fully satisfactory but it must be paid in line with fairness and equity because in as much as we are human, the absence of this would make the employee dissatisfied. This would help to retain and motivate employees of that organisation and also improve the employee's performance thereby enhance organisational productivity. Organisation should ensure that what they pay their workers is equitable, fair, and in line with the internal and external regulations. Wang & Seifert (2017) added that an employee whose wages are cut would have a negative feeling and also affects employees' performances and leads to employee dissatisfaction. He further explains that most organisations lay off employees rather than cut their salaries.

Promotion

The vital role of an employee in an organisation cannot be overemphasized due to the fundamental role they play. Many scholars agreed that manpower in any company is important (Tahmeem & Sadia, 2018; Lestari, Syabarudin, Zurnali & Murad, 2018; Kimani, Ngui & Robert, 2017). It has been proven that workers are the most relevant asset of an organisation. Promotion is defined as an employee's upward movement from a lower position to a higher rank within the organization that leads to more responsibility (Magaji, Akpa and Norom, 2018). Karunarathna and Weligamage, (2018) posit that promotion encourages employees for job satisfaction especially if within the stipulated employment contract. Promotion is seen is an opportunity for advancement from a lower designation to a higher designation. Adler, Campion, Colquitt, Grubb, Murphy, Rob Ollander-Krane & Pulakos (2016) posits that a weak performance appraisal system is one of the causes of employee poor performance as this jeopardise the activities and success of any organisation.

Incentives

Incentives also are one of the factors responsible for employee satisfaction to deliver beyond expectation in any given tasks. According Cross (2019), employees as seen as a key human capital that occupies a strategic position in an organisation. They carry out the tasks of converting inputs into outputs for organisation productivity. George (2015) also agrees that is the major source of competitive advantage in every organisation that helps bring out the goals and objectives in an organisation, if the workers are well compensated. It was further stated that incentives are in two categories namely monetary and no- monetary incentives. Financial incentives are paid directly as cash while non-financial incentives may be in form of participation and engagement in decision making, promotion, flexible time, etc. Financial incentives are basically to encourage employees to boost their efficiency, effectiveness and employee's productivity to improve their output in order to increase the sales turnover, cost reduction, quality customer service and also improve the organisation productivity (Cross, 2019). Jean, Ngui and Robert (2017) assert that incentives, rewards or fringe benefits could be paid directly or indirectly, financial or non-financial and could also be limited to weekly or monthly cash payment in exchange for their work done.

Training and Career Development

Training and Career Development is necessary for employee performance and increased productivity and it also enable the organisation for a competitive edge. Although, some organisation in Nigeria embrace the support to engage their workforce in skills and knowledge but many of these executives still pay less attention to encourage the necessary skills and development of their workers. To support this Al Ali, Yusoff, Ismail, and Kazi, (2018) opine that employee training and development is vital to feature that impacts positively on employee's productivity. Maslow (1954) in one of his research on "human motivation" agrees that training is a motivational factor for employees due to self-esteem (ego) needs, this can be acquired if employees are trained in order to boost employee's self-confidence. He further explained that training and development helps an employee to develop their competence. Ofobruku and Nwakoby (2015) posit that some scholars see training as imparting knowledge or being enlightened. This implies that the characteristics of training and development are important and helps to develop an employee for effective performance in order to cope with the advanced technology and be able to compete in the industry. Kurtessis, Eisenberger, Ford, Buffardi, Stewart and Alihodzic, Tuba and Tuba, 2017 and Mayson & Barrat, 2016) agree that employee being assets or human capital and have received comprehensive training for advancement is important to any organisation because it motivates the employee to be satisfied and more certain that the employee would remain in that organisation and also increases employee productivity and job satisfaction leading to productivity.

In the work of Borst, Kruyen and Lako (2019) with the aim to observe job demand resources and the strategy of engaging a worker using insight from public administration review of the literature. It was discovered that there is a link between work engagement and public service motivation. Kappagoda (2017) studied job satisfaction and its

impact of psychological capital on the job satisfaction of the non-managerial employees in the banking sector. The study shows that there is a positive correlation between the psychological capital of the non-managerial employees and that of job satisfaction. Edet, (2017 in his study, identifies what should be done to achieve maximum performance in the civil service in spite of various reforms embarked on. The result revealed predication upon the level of commitment and fidelity by the leading operator of the service. Qureshi and Hamid (2017) investigated the impact of supervisor support on job satisfaction. The study reveals that empirically, supervisor support has a positive relationship with job satisfaction and is a significant predictor for several organisational feedback such as employee performance, commitment, citizenship behaviour and so on. Vann (2017) also investigate the nexus between employee job satisfaction and supervisor support. The study shows that supervisor support improves a high level of employee job satisfaction.

Theoretical Framework

This study employs Herzberg two-factor theory popularly known as motivator-hygiene theory. The two-factor theory was propounded by Fredrick Herzberg, who is a behavioural scientist (Herzberg, 1959). Herzberg's Two Factor Theory explains that satisfaction and dissection are being driven by motivator or hygiene factors. This theory anchors on the attitudes that lead to job satisfaction and job dissatisfaction. It also concentrated on the following determinants of job satisfaction which are: work itself, recognition, responsibility, growth, achievement and advancement. These determinants help an employee. This research employs this theory in order to achieve the effect of job satisfaction on employee performance as it relates to FAAN employees and what they want from their job for productivity.

The theory is relevant to this study because it unveils the hygiene aspects for example supervision, benefits, organisations' policy and administrative style, job security, quality supervision, good inter-personal relationship at work, work environment, employee welfare and other benefits and allowances. All these factors are very essential as it would help cube job dissatisfaction and encourage satisfaction such as training and career opportunities, recognition for performance, advancement and growth opportunities and promotion. According to Bayraktar, Araci, Karacay and Calisir (2017) job satisfaction is attributed to the value of what an individual wants from his or her job. It is also relevant to this study due to the fact that motivator and hygiene factors are the cause of the push of human's prospective needs for excellence. A satisfied employee is a productive employee and would be easy to achieve psychological growth, overcome an environmental challenge and self realisation thereby productivity is assured.

Methodology

The study adopted a survey design. The survey design was used in order to describe the variables and to explore the effect of job satisfaction on employee productivity using the data collected from a field survey. The idea of survey design was employed becomes is because the data is given at a point in time across a sample population of the study.

The population for this study is the staff of the Federal Airport Authority of Nigeria (FAAN), Lagos. The total population of workers as of June 2020 is 939 (I.T. Unit, FAAN Headquarter, 2020).

A simple random sampling technique was used to select the sample. This technique was used to ensure that every segment in the random sample has an equal chance to be selected or drawn. It would also help to avoid bias during the selection process and results. The total population for this study is 939 - FAAN employees. This consists of 729 senior staff and 210 junior staff. Two hundred and eighty-one employees were used as the sample size to participate in the survey by filing and return the questionnaire. Taro Yamane formula (1973) was used to calculate the sample size as shown below:

$$n = \frac{N}{1+N(e)^2}$$

Where: n = sample size, N = Population size, e = 0.05 (5%) Margin error, 1 = constant

$$n = \frac{939}{1+939(0.05)^2}$$

$$n = \frac{939}{1+939(0.0025)}$$

$$n = \frac{939}{1+2.3475}$$

$$n = \frac{939}{3.3475}$$

$$n = 280.50 = \text{approx. } 281 \text{ staff}$$

This implies that the sample size is 281.

The sample size was necessary to determine and applied in order to generate accurate data from the total population of study 939 of FAAN employee. A structured questionnaire was administered to 281 FAAN employees being the sample size in the course of this study. It would enable the researcher to gather all necessary information required for effective research and to also elicit the views from the respondents. Two hundred and thirteen questionnaire representing (75.8%) were returned while sixty-eight questionnaire representing (24.1%) was not returned. Secondary data was sourced from published materials and were analysed textually. A simple random sampling technique was used to select the sample. This technique was used to ensure that every segment in the random sample has an equal chance to be selected or drawn. It would also help to avoid bias during the selection process and results. The descriptive analysis was used for this study with the aid of frequency table, percentage and regression. The regression method is popularly used to ascertain whether which of the variable is dependent on each other or combining other variables. Regression can also be employed to test hypotheses for the study. A statistical package for social sciences (SPSS) was used to analyse the data.

Data Presentation

Table 1: Qualification of Respondents

Qualification	**Frequency**	**Percentage %**
OND	26	12.2
HND	45	21.1
B.A/B.Sc/B.Eng	90	42.3
M.A/M.Sc/M.Eng	50	23.5
Ph.D	2	0.9
Total	**213**	**100**

Source: *Researcher's Fieldwork, 2020.*

Table 1 result shows that 26 (12.2%) respondents have OND, 45 (21.1%) respondents have HND, 90 (42.3%) respondents have B.A/B.Sc/B.Eng, 50 (23.5%) respondents have M.A/M.Sc/M.Eng while 2 (0.9%) have Ph.D. The above data reveals that respondents with B.A/B.Sc/B.Eng has the highest percentage of 90 (42.3%), followed by respondents with M.A/M.Sc/M.Eng, 50 (23.5%) but respondents with Ph.D have the lowest 2 (0.9%).

Table 2: Work Experience of Respondents

Work Experience	**Frequency**	**Percentage %**
1 - 5 years	26	12.2
6 - 10 years	62	29.1
11 -15 years	59	27.7
16 -20 years	48	22.5
21 years and above	18	8.5
Total	**213**	**100**

Source: *Researcher's Fieldwork, 2020.*

Table 2 shows that out of 213 respondents, 26 (12.2%) are with work experience between 1 – 5 years, 62 (29.1%) respondents have work experience between 6 - 10 years, 59 (27.7%) respondents are between 11 - 15 years work experience, while 48 (22.5%) have 16-20 years of work experience while 18 (8.5%) respondents have work experience of 21 years and above. This analysis indicates that the respondents between 6 - 10 years of work experience 62 (29.1%) have the highest percentage while the respondents between 20 years and above have the lowest percentage.

Table 3: Training and Career Development
FAAN encourages and sponsor me for training regularly and as at when due

Responses	Frequency	Percent %
Strongly Agree	16	7.5
Agree	48	22.6
Disagree	90	42.5
Strongly disagree	58	27.4
Total	212	100

Source: *Researcher's field survey Result (2020).*

Table 3 shows that 7.5% of the respondent strongly agreed that FAAN encourages and sponsor me for training regularly and as at when due; 22.6% of the respondents agreed that FAAN encourages and sponsor me for training regularly and as at when due; 42.5% of the respondents strongly disagreed that FAAN encourages and sponsor me for training regularly and as at when due; while 27.4% of the respondents disagreed that FAAN encourages and sponsor me for training regularly and as at when due. This means that majority of the respondents who choose disagree (42.5) and strongly disagree (27.4) total of (69.9%) are against the view that FAAN encourages and sponsors them for training regularly and as at when due. Therefore, FAAN should support and invest adequately in manpower training to enable their staff development in their career, learn new skills and increased productivity for a competitive edge.

Data Analysis

Test of Research Hypotheses

The hypothesis for this study was tested using regression analysis. Regression analysis requires that, when the significance level (sig) value is less than 0.05 for 95% confidence level or less than 0.01 for 99% confidence level, we reject the null hypothesis and accept the alternative hypothesis and vice versa.

There is no effect of Training and career development on employees' productivity of Federal Airport Authority of Nigeria (FAAN), Lagos.

To test the hypothesis, the linear regression technique was used. The dependent variable is employee productivity while the independent variables are a set of indicators of adequate training and career development for FAAN staff.

Table 4: Model Summary

Model Summary				
Model	**R**	**R Square**	Adjusted R Square	Std. Error of the Estimate
	.147a	.022	.017	.606

Source: *Researcher's Fieldwork, 2020. Note, Predictors: (Constant), Training and career development.*

Table 5: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.713	1	1.713	10.860	.001b
Residual	77.564	211	.368		
Total	79.277	212			

Source: *Researcher's Fieldwork, 2020. Note: a. Dependent Variable: Employee productivity; b. Predictors: (Constant) Training and Career Development*

Table 6: Coefficient

Table 6 Regression analysis illustrating whether there is no significant relationship between training and career development and employee productivity						
Training and career development	efficients		Standardized Coefficients			
	B	Std. Error	Beta	t	Sig.	95% CI
Training and career development	.157	.073	.147	2.158	.032	0.009-0.283

Source: *Researcher's Fieldwork, 2020.*

The result in Table 6 shows the standardized co-efficient of 0.147 (p-value<0.05), significant at 5 percent level. This, therefore, indicates the training and career development effect of 0.147 percent on employee productivity. This further suggests that human capital development constitutes an integral component of employee motivation for higher productivity impact in an establishment. Based on the result in Table 6 therefore, the null hypothesis is rejected while the alternate hypothesis is accepted.

The reliability test of the study was carried out using Cronbach's Alpha. It reveals that measurement is consistent because a measurement that is not reliable lacks validity. As mentioned by Ojo (2003), measurement is said to be reliable when tested reputedly and it yielded the same outcome. This study shows that reliability is accepted when it falls between 0.70 and above, however, 0.60 may be acceptable. The reliability test of the construct was produced using Cronbach's alpha as shown in Table 7:

Table 7: Reliability Test

Construct	**Cronbach's Alpha**	**Items**
Welfare Package	0.781	6
Training and Career Development	0.654	7
Employee Productivity	0.706	5

Source: *Researcher's Fieldwork, 2020*

Summary of Findings

The study finds that training and career development have a significant impact on employee productivity in Federal Airport Authority staff (FAAN), Lagos. This finding also endorses the Herzberg's two-factor theory. This is necessary as organisastion need their goals to be achieved and hence, would need the positive attitude of the worker to achieve optimum employee behavior for organisational productivity.

The findings in Table 4.5.3 clearly shows the effect of training and career development on the productivity of the Federal Airport Authority staff (FAAN), Lagos. The standardised beta co-efficient of 0.147 (p-value<0.05) indicates the positive and significant impact of 0.147 percent on employee productivity in FAAN, Lagos. In terms of the direction of effect, a positive effect is also observed. This implies that as expected from theory, an increase in training and career development of the workers in the agency of interest leads to an increase in job satisfaction. With regard to the magnitude of the impact, the value '0.147' implies that a one-unit increase in the training and career development of the FAAN workers will lead to a 0.147unit increase in the job satisfaction derived on the job. This further suggests that human capital development constitutes an integral component of employee motivation for higher productivity impact in an establishment. This finding supports and extends the studies by Al Ali, Yusoff, Ismail & Kazi, (2018).

Conclusion and Recommendations

Employees are dissatisfied due to inadequate training and career development as it is revealed in their responses. The study concluded that job satisfaction has a significant relationship with employee productivity. It also concludes that employees are an integral part of any organisation and as such their satisfaction should be part of organisational priority for improved and optimum performance and productivity and a high opportunity for a competitive edge,

especially in the public section. Also, the satisfaction of FAAN employees would enable them to be more committed to their job, hence the need to plan in the area of satisfying their employee for productivity. The findings validate Herzberg two-factor theory, one can conclude that a lot of workforce generally sees job satisfaction as that which affect them most psychologically with respect to productivity. Also, the study reveals that job satisfaction is key to employee productivity; however, it affects them psychologically majorly but preferably as a part of the entire package given to a worker in an organisation.

This study recommends the following based on the findings and conclusions:

i. It is therefore recommended that FAAN management should concentrate on those factors that enhance job for satisfaction such so as to spur their commitment to their work and high-level productivity.
ii. Promoting career and development training need to be a continuous exercise which organisation should encourage for the increase and sustainable productivity. Moreso, FAAN's management should see this as a matter of necessity to invest on valuable time and resources in ensuring the continuous training of its workforce so that productivity would be assured for increased satisfaction among workers and for a competitive edge.
iii. Finally, FAAN Management should provide an avenue for feedback or an opinion box for complaints, suggestions or observations would be harvested and addressed afterwards for increased productivity.

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Crisis Management in The Nonprofit Organizations – The Case of North Portugal on COVID-19

Luisa LOPES

Instituto Politécnico de Bragança, CiTUR, Campus de Santa Apolónia, 5300-253 Bragança, Portugal
luisa@ipb.pt

Lara SANTOS

Instituto Politécnico de Bragança, Universidade Lusófona do Porto, Portugal
lara.santos@ipb.pt

Abstract

Unfortunate, unpredictable, and catastrophic events can happen and nonprofit organizations (NPOs) are not immune. Crisis management seeks to help organizations, in general, to cope with these events, and although it continues to be a hot topic in public relations literature, there has been little attention paid to crisis response strategies in one of the largest sectors that continues to play an increasingly influential role in social and economic life: NPOs. This study uses the context of the new coronavirus (SARS-CoV-2) and its spread disease (Covid-19), to identify the level of crisis management preparedness of the North Portugal NPOs, in response to an actual infectious disease pandemic, with enormous numbers of spread disease and deaths, mainly in their senior segment. Considering the topic of research, a qualitative approach is developed with an exploratory and explanatory study based on six semi-structured interviews. The results of this study demonstrate that NPOs were not prepared or had any type of planning to face a pandemic crisis, such as the Covid-19. The study adds to previous research on crisis management on NPOs, by proposing the identification and exploration of a set of activities that accurately enables the assessment of crisis management strategies within the context of NPOs, on an emergency event. This study argues that NPOs need to actively engage in everyday maintenance and updating to prevent crisis activities to build organizational security, transparency, and accountability.

Keywords: Nonprofit organizations, crisis management planning, North Portugal, coronavirus (Covid-19).

Introduction

Organizations operate in highly volatile environments (Spillan and Crandall, 2002). As the environment is becoming increasingly complex, the crisis that organizations face will also increase not only in extent but also in impact (Spillan, 2003). As Mitroff and Anagnos (2001, p. 3) state "crises have become an inevitable, natural feature of our everyday lives". The demands of day-to-day operations and crisis management are very important and challenging, and organizations need to implement crisis management plans and teams to achieve business continuity (Spillan, 2003). The level of crisis preparedness as well as the ability to detect crises at an early stage are crucial (Schwarz and Pforr, 2011). For decades, planning and crisis management have been recognized as important areas of management, both by practitioners and academics (Spillan, 2003). According to Caponigro (2000) and Spillan (2003) crisis management is the function that works to minimize the impact of unexpected, unfortunate, and catastrophic events and helps the organization to gain control of the situation. Crisis management, the impact planning process and crisis mitigation, are an important strategic concern that must be incorporated into an organization's overall planning process (Spillan and Crandall, 2002). The ability to manage a crisis can determine survival and disaster (Spillan and Crandall, 2002), however, there are organizations that consider crisis planning and management important, others less so (Spillan, 2003).

The extent to which the NPOs are strategically prepared to deal with crises is an unknown fact (Schwarz and Pforr, 2011). The literature on crisis management is abundant, but regarding NPOs, little has been written on the subject, given that few studies have explored the crisis management of the NPOs (Spillan, 2003). In the same way, the preparation of the NPOs crisis communication has received little attention in the investigation (Schwarz and Pforr,

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2011), where although crisis communication remains a hot topic in Public Relations literature, there has been little attention to strategic responses to the crisis in NPOs. This may be an indicator that many managers of these organizations are not aware of or ignore the risks and vulnerabilities that exist in their organizations (Spillan and Crandall, 2002). Most of the crisis management literature addresses the profit sector. However, NPOs must also plan for the unthinkable (Spillan and Crandall, 2002).

Addressing this literature gap, the forthcoming qualitative study aims to know better about crisis in NPOs, specifically it intends to capture the critical issues of concern by leadership, the level of preparedness for crisis and, if it is the case, the reasons or motives for the lack of preparation and planning, and finally, get to know better what are the activities and practices that can expand crisis management planning and prevention.

The article proceeds as follows. First, with the research background in mind, it separates crisis management, in general, from crisis management planning in the NPOs sector. Doing so allows knowledge of this field to be adapted to this specific context, browsing themes as types of crisis and their phases. Second, it presents the methods carried out in this phase of the study and clarifies the data collection process. It, also, examines and discusses preliminary results obtained on this exploratory field study to be explored. Finally, conclusions and implications for further research are drawn.

Crisis Management

With the perspective that time allows, one can easily identify today the 60s of the 20th century as the beginning of the literature about organizational crises (Mendes and Pereira, 2006). One of the first authors to write about this subject was Charles Hermann, in 1963, and his concern was to analyse the consequences that certain disruptive phenomena, which he called crisis, had on the viability of organizations. This author defined a crisis as something that threatens the fundamental values of the organization, allows only a limited period of time for decision making, is unexpected by the organization and originates in the relevant environment of the organization (Hermann, 1963). Fink (2002, *cit. in* Wrigley, Salmon and Park, 2003), one of the leading authors in the field, conceptualizes crisis as something that impacts positively and negatively an organization and as something (time, phase, or event) that is decisive or crucial. Devlin (2007, p. 5) refers that a crisis is "an unstable time for an organization, with a distinct possibility for an undesirable outcome. This undesirable outcome could interfere with the normal operations of the organization, it could damage the bottom line, it could jeopardize the public image, or it could close media or government scrutiny". Seeger et al (2003, *cit. in* Jordan, Upright and Tice-Owens, 2016, p. 162) add on the definition of crisis as "a specific, unexpected and non-routine organizationally based event or series of events which creates high levels of uncertainty and threat or perceived threat to an organization's high priority goals".

A crisis starts from an onset of illness, which is accentuated and draws the attention of the organization and causes disruption of the business routine and, consequently, threatens the reputation and financial viability of the organization (Fink, 2002, *cit. in* Wrigley, Salmon and Park, 2003). Pauchant, Mitroff and Ventolo (1992) and Ulmer (2001) also share the crisis trilogy developed by Fink (2002, *cit. in* Wrigley, Salmon and Park, 2003): disruption, threat, and potentially negative consequences for the organization. The authors highlight that a crisis is a serious and critical phase in the evolution of things or situations. It is a rupture, a disturbance in the organization's balance. It is a turning point characterized by great instability that can result in undesirable consequences, affect the organization's reputation, and hence produce negative public notoriety.

Although crises can arise in infinite sizes, shapes, intensity, complexity, uncertainty and magnitudes (Eriksson and McConnell, 2011), in the opinion of Marcus and Goodman (1991) different types of crises can be distinguished, such as: accidents, scandals, product safety and health incidents. According to Devlin (2007), there is a panoply of types of crises, which can range from fires, floods, tornadoes, bombings, earthquakes, product failure, a product market-shifts, a product safety issue, an incident that results in a poor image or negative reputation, a financial problem, and so on. Regarding the types of crisis, it should be noted that any organization is sensitive to an endless number of crises. For this matter, there is an immense number of classifications of crisis events in the literature. Crisis management researchers have classified crisis into 2x2 matrix (e. g. Meyers and Holusha, 1986; Marcus and Goodman, 1991; Coombs and Holladay, 1996), through cluster analysis Pearson and Mitroff (1993), and by categories (Spillan, 2003; Devlin, 2007; Crandall, Parnell and Spillan, 2014).
Also, recommendations for crisis management usually take a developmental stage approach (Jordan, Upright and Tice-Owens, 2016) as models range from three to five stages or phases.

Because the world, and in particular, the North of Portugal, is still in a pandemic situation, this study focuses on the first two phases of Coombs (2012) and Coombs and Laufer (2018): pre-crisis phase, and crisis phase. In this sense, the pre-crisis phase involves the prevention, and preparation for crises to minimize damage to the organization (Coombs and Laufer, 2018). This stage includes activities, such as signal detection and prevention which include

knowing potential areas of vulnerability, evaluating potential crisis types, preparing a crisis management team, selecting and training an organizational spokesperson, developing a crisis management plan, and preparing organizational communication systems (Coombs, 2012). The crisis management plan (CMP), developed during the pre-crisis stage, as some advocate (Coombs, 2012), should explain whom to contact, when to contact them, and how to contact them (Seeger et al, 2003, *cit. in* Jordan, Upright and Tice-Owens, 2016). Additionally, within this stage, organizations should expand their issue management to their active social media platforms because problems or concerns of individuals may now go viral (Jordan, Upright and Tice-Owens, 2016). Coombs (2012) agrees that social media has implications for crisis management and has a role in crisis management ranging from pre-crisis monitoring of warning signs to postcrisis communication. Concerning the crisis phase, this phase represents the response to the crisis, including the response of the organization and its stakeholders (Coombs and Laufer, 2018). The crisis response is what management does and says after the crisis hits (Coombs, 2012) in order to limit the effects. Pearson and Mitroff (1993, p. 53) call this phase "damage containment". Effective management of this phase must go through plans to prevent a localized crisis from affecting other uncontaminated parts of the organization or its environment. For example, through evacuation plans or procedures for neutralizing or damage containment mechanisms and activities (Pearson and Mitroff, 1993).

Crisis management planning in the NPOs sector

Despite their status, NPOs are some of the at least understood segments of society, they are among the most crucial ones (Waters, 2014), and are not immune to crisis (Spillan, 2003; Wrigley, Salmon and Park, 2003; Schwarz and Pforr, 2011; Sisco, 2012; Jordan, Upright and Tice-Owens, 2016). NPOs play an increasingly influential role in economies and societies as a catalyst for new approaches, service provision and a crucial actor in social and economic life (Salamon and Anheier, 1992; Spillan, 2003; Crandall, Parnell and Spillan, 2014).

NPOs are extremely vulnerable organizations in times of crisis (Sisco, 2012). Patterson and Radtke (2009, *cit. in* Jordan, Upright and Tice-Owens, 2016) refer that nonprofit organizations face one of two types of crises: emergencies and controversies. On one hand, an emergency may result in injury to individuals, damage to or loss of facilities, financial loss, or lapses in services (Patterson and Radtke 2009, *cit. in* Jordan, Upright and Tice-Owens, 2016). Emergencies differ from routine events in critical and timely information requirements and a high level of uncertainty (Kapucu, 2007). On the other hand, controversies may damage an organization`s reputation as a result of fraud or accusations, legal difficulties or challenges to organizational leadership integrity and effectiveness (Patterson and Radtke 2009, *cit. in* Jordan, Upright and Tice-Owens, 2016). According to Jordan, Upright and Tice-Owens (2016), during crises, NPOs face increased pressure for accountability through different organizational practices, as organization, its stakeholders, and the community at large try to move from the crisis. Furthermore, these entities should be prepared for common potential crises considering that time spent preparing helps leaders to navigate through the crisis (Coombs, 2012).

Methods

This investigation uses a two-part data collection process. Qualitative and quantitative data will be connected during the phases of research, following a mixed method approach (Creswell, 2003). Based on the literature review, it started with an exploratory qualitative data collection, where data analysis and its results will be used to inform the quantitative phase developed subsequently. The qualitative study included six in-depth semi-structured face-to-face online interviews with key informants of six Northern Portuguese NPOs, including 36 different social facilities, carried out in May 2020 (see Table 1). Both authors were present in all interviews. All were taped, transcribed, and analysed. Data were categorized, and transcripts repeatedly read during this analysis.

Table 1: Methodological overview of the interviews

Temporal basis	*Cross-Section*
Sector	NPOs (charities)
Unit analysis	Executive directors representing 36 social facilities
Sample	6 interviews; 236 minutes.
Data collection	Semi-structured face-to-face online interview
Date	May 2020
Data analysis	Qualitative: exploratory and explanatory

The sampling for the interview process was carried out for convenience, encompassing a total of six executive directors of NPOs in the North of Portugal, according to the stratification (Table 2) here described. The respondents are familiar with the context considering their experience amount. The NPOs they represent deal with a variety of social issues such as drug dependency, elderly, childhood, homeless, among others.

Table 2: Sample stratification for the interview

Interviewee	Age	Northern City of Portugal	N. of social facilities
JR	49	Melgaço	7
JB	49	Porto	3
CR	54	Vila Real	5
AG	66	Mirandela	13
AC	65	Bragança	5
PA	40	Braga	3

Results and Discussion

Based on the script and taking into account the research objectives, it was possible to outline an analysis grid (Table 3) for the interviews carried out with the six executive directors, from which the presentation of the data will be structured, illustrated by explanatory excerpts of the positions taken by the interviewees in relation to each of the categories and subcategories considered.

Table 3: Categorization structure of the interview process

Categories	Sub-categories
Pre-crisis (prevention and preparation)	• Crisis definition • Types of crisis • Critical themes before and in the beginning of a crisis • Level of preparedness • Motives for the lack of preparation and planning
Crisis phase (response)	• Reactive or proactive actions • Contingency planning practices • Procedures and activities of crisis management planning and prevention

Source: Based on Coombs and Laufer (2018)

Following is presented, in a structured way, some of the data and information obtained through the interviews, for each of the categories under analysis.

a. Pre-crisis (prevention and preparation)

Crisis definition

When people think about a crisis, they think about unprecedented events that result in catastrophic damage and mass casualties. However, not all crises fall into this category. So, the problem with associating only catastrophic events with a crisis is that they sound so dramatic that most leaders assume an "it can't happen to us" mentality (Crandall, Parnell and Spillan, 2014). The interviewees mention this clearly:

> "We think it only happens to others and it doesn't happen to us." (CR)

In common with the interviews, literature reveals that researchers when defining crisis use words as surprise, insufficient information, event escalation, loss of control, intense scrutiny, panic, urgency, loss, disruption of normal activities, and threat to financial stability, creditability, and reputation (Coombs, 2002, *cit. in* Jordan, Upright and Tice-Owens, 2016). For instance:

> "Crisis is everything that differs from what is normal functioning and always causes a moment of adaptation." (PA)

> "This crisis that fell on us ... has a very heavy burden ... so hell fell on the institution, literally overnight." (JR)

Some respondents stated that this crisis was unpredictable, they felt that it constrained and changed the course of events, organizational models, and practices, as following:

> "A crisis is always something that can condition it, so it's always in the negative aspect. The crisis always changes the course of events, changes the organizational models, changes practices, therefore changes the regular functioning of the institutions, forces us to, in a very short period, reformulate everything and get out of the box, so we cannot be in a functionalist structure, we have to rethink all the strategies, all the organizational models, the practices, the intervention models and adapt them to the moment of crisis." (JB)

Types of crisis

Although crisis can arise in infinite sizes, shapes, and magnitudes, concerning the types of crisis, there is no agreement on the universal classification of crisis events (Marcus and Goodman, 1991; Pearson and Mitroff, 1993; Spillan and Crandall, 2002; Devlin, 2007). Some respondents mentioned unpredictable, health/diseases/pandemics crisis, economic and financial crisis, and political crisis as the types of crisis faced by NPOs. Others referred to catastrophes, disasters, and sabotages. Some examples are advanced here:

> "We have an unpredictable crisis and it is catastrophes, disasters, sabotages and other things that can happen." (CR)

> "Financial crisis, health or public health crisis (...)." (AG)

> "The types of crisis that can negatively impact a nonprofit organization are those of a political dimension, an economic-financial dimension and a disease dimension." (JB)

Critical issues before and in the beginning of Covid-19

With regard to previous critical issues, it's important to remember that issue management represents a valuable proactive method of potential threat analysis, understanding external issues potentially affecting the organization and its stakeholders (Coombs, 2012; Mitroff, 1994 *cit. in* Jordan, Upright and Tice-Owens, 2016). For the respondents of this study previous critical issues are related to: low economic capacity and scarce financial resources, high dependence on the supervisory entity, establishment of partnerships with support institutions and networking, lack of equipment and human resources, unemployment; demographic aging and changes, the ignorance and devaluation of risk and planning. Some interviewees highlighted this in a clear way:

> "Critical issues before this?... any situation that affects the well-being of the population… unemployment, of course, but it has to do with the financial crisis. There is an aspect that harms us immensely, which is the desertification of the interior, the demographic issue (...). The lack of revenue, of course, is reflected in the financial health of the institution." (AG)

> "(...) in an initial phase there was a sharp devaluation of risk, perhaps associated with ignorance." (JB)

> "(...) we are doing what the social security institute asks us to do." (CR)

> "(...) we can solve or help to solve, because the institution alone does not solve the problem." "We have partnerships (...)." (AC)

> "We have a series of partnerships (City Council, Fire Department, Civil Protection, Social Security, Health Delegate) that in such situations, they are always available." (PA)

Also, respondents mentioned that in the beginning of the crisis, they were exposed to public opinion, attacks on the institution's good name and reputation arose, depending on the goodwill of employees, confirming that NPOs are extremely vulnerable in times of crisis (Sisco, 2012). Literature suggests that the more an organization is held responsible for the crisis, the more accommodative a reputation repair strategy must be, in order to protect the NPO´s reputation (Coombs and Holladay, 1996).

> "But right now, everyone is looking at institutions." "(...) some attacks that we have been feeling that jeopardize our ability as managers and even as an organization, to deal with this." (JR)

> "(...) we are not omnipotent, and we do not have infinite resources." "Human resources are never enough. But we tried to manage (...) we formed two teams to work in a mirror regime (...) and we managed to articulate all these people. Of course, it depends on their goodwill." (AC)

Level of preparedness for the crisis

In what emergency preparedness concerns, crisis management involves four interrelated factors: prevention, preparation, response and revision (Coombs, 2015, *cit. in* Coombs and Laufer, 2018). All respondents stated that they were not prepared at all, no one could plan a pandemic crisis like Covid-19, given its size and seriousness. Interviewees stated that clearly:

> "Predict a situation like this, with this magnitude? Nobody is prepared for a hurricane. (…) What is normally required, we try to comply and try to have minimally legal things." (PA)

> "Nowhere was predicted a situation like this (…) it never crossed my mind, going through the situation I did (...) in March I had very bad days! (…). Before Covid-19 we had no plans." (AG)

> "We were neither prepared nor mentalized." (AC)

Reasons for the lack of preparation and planning

According to Pearson and Mitroff (1993) the preparation/prevention stage includes the creation of a crisis team as well as crisis training and simulation exercises. In this study, interviewees point out as reasons for the lack of preparation and planning: issues of leadership, non-professional management, lack of human resources, insufficient training in management and planning, historical reasons, among other reasons.

> "Have I delegated in the technic staff responsible for each valence (...) to specify it in detail? What are the steps? It doesn't pass me by." (PA)

> "We have "big ships" coping with non-professional management for years. (…) We had contingency plans, we followed the guidelines that came from different public institutions. (…) We had some human resources that allowed us to organize, creating offices/teams." (JR)

> "We are talking about structures that have an administrative and bureaucratic system that is often very slow, which obeys very strict criteria that are framed in specific legislation. (…) There is also a devaluation of planning, on one hand, and on the other, there is little training and awareness in the areas of planning. (…) NPOs do not think like market companies (...) are dependent on subsidies and state funding. (…) They are controlled by the State that gives NPO guidance. Not receiving guidelines, these structures consider that there are no reasons to do so, they are not obliged to do so, and therefore they do not do it. (…) Structures that work a lot from volunteering and with people's solidarity. (…) People have no training in management and planning." (JB).

b. Crisis phase (response)

In this phase, the purpose is the "damage containment, is to limit the effects" with detailed plans for preventing a localized crisis from affecting other uncontaminated parts of the organization through an evacuation plan or procedures or mechanisms or activities (Pearson and Mitroff, 1993, p. 53).

Reactive or proactive actions, and contingency planning practices

Spillan and Crandall (2002) and Spillan (2003) state that there are two ways to observe a crisis: ignore the signals and react to the crisis or prepare to prevent or manage a crisis. As an accomplished result, it is possible to confirm that the NPOs, of this sample, tend to respond and react to the crisis events, simply following the guidelines of official bodies, and creating contingency plans oriented by these entities. The following sentences demonstrate this:

> "It was reactive in the sense that we were reacting, we started adapting what were the guidelines that were left by the official and public organisms." (JR)

> "We are going to react a little to situations." (CR)

> "The structures are reactive and not proactive." (JB)

Procedures and activities of crisis management planning and prevention

As for this phase, the respondents referred that there is a need to create entry and exit circuits, operationalize mirror teams, reintroduce hygienic-sanitary practices, concept and implement internal and external communication teams and offices, create segmented routing, reception and transport protocols, list and prepare different volunteer platforms (of health, care and support staff) along with recruitment mechanisms and partnerships to provide emergency human force.

> "Regardless of the contact with the family and communication with the population in general, it must be well defined who does this, how they do it, what information should be conveyed and how often, in each type of crisis." (JR)

> "Updated phone book"; "signage"; "routines"; "mirror teams." (PA)

> "Complaints management"; "A specific plan for each social facility." (CR)

Conclusions and Future Research

In summary, the data collected, and here discussed, echo a reality, partial, it is true, shared by researchers who focus on the subject under study. Despite the exploratory nature of these results, most of the arguments of recent literature are confirmed.

Pre-crisis activities were suggested, namely: a plan for each social facility, the preparation of different crisis teams and offices (e.g. internal, external, and digital communication, recruitment and voluntary). It must be well defined who does what, how it does it, what information should be conveyed and how often. Other processes should be in practice in a continuous way, as systems of alert and trend awareness for a proper risk evaluation. For the crisis preparation, specific plans should include complaint management mechanisms, in and out flows, alternative teams, reception, routing and transport protocols, proper signage, routines, and the reintroduction of hygienic practices.

Specifically, for the pre-crisis phase, future research suggests two fundamental areas: risk assessment, diagnosing crisis vulnerabilities, and crisis management plans as primary tools for crisis managers (Coombs and Laufer, 2018). The lack of preparedness can be further exploited in what reasons and explanation mechanisms concerns. Further research could, also, confront leadership perspectives with the perception of technical staff and its operational lenses, as they have a fundamental role to play and are immersed in each specific context.

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Crisis of Liability for Medical Injuries - Global Trends Aimed at Remedying Damage Caused During A Medical Treatment

Michal Bialkowski
University of Szczecin, Szczecin, Poland
ORCID 0000-0002-3366-6883

Abstract

The aim of the paper is to present changes occurring in the area of liability for medical injuries through the lens of experiences of Poland, New Zealand and Sweden. Basic research methods applied in the paper are the legal comparison method and the method of interpretation of applicable law. The paper presents transformations that have occurred in the Polish legal order around the traditionally understood tort liability for medical injuries and two proven out-of-court systems of pursuing claims for damages known from Sweden and New Zealand. Insurance, i.e. indemnity insurance and patient-injury insurance, takes a special place in legislative works that aim at facilitating the patient in obtaining the compensation pay. The increasing role of insurance, a transformation in understanding tort liability and its function allow an assumption that the future of tort liability departs from the principle of fault and repression directed against the injuring party. The main task that legislators face is to create conditions in which the patient obtains the payment regardless of the doctor's fault. This is why the experience of New Zealand or Sweden should be an inspiration to create good and financially balanced no-fault systems.

Keywords: No-Fault System, Compensation, Insurance, Medical Error, Health Care System

Introduction

Protection of the patient who got injured in the course of a treatment definitely goes beyond civil law thus becoming a subject of interest to the theory and practice of other branches of law, in particular administrative and insurance law, or even social security law (Jończyk 1999, p. 5). This thesis, undoubtedly valid on the ground of Polish law, is also valid in the light of global trends referring to indemnification of an injury caused in treatment. This search for new solutions also on the ground of branches of law which are associated with regulating traditionally understood principles of civil liability is proof to the existence of a crisis which in Western literature is called the malpractice crisis (Furrow, Greaney, Johnson, Jost, Schwartz 1997, p. 283). Attempts to amend legislation in countries such as New Zealand, Sweden, France or some US states aim at introducing no-fault or arbitrary systems intended to make it possible for the patient to obtain recompense for the injury suffered in the course of a treatment process fast and fully, without the requirement of proving fault of a specific health care professional (Tunc 1978, p. 31). Poland too began to see views in the literature in the late 1960s according to which the traditional model of civil liability for injuries caused in a treatment does not fulfil its role and in practice often does not lead to ensuring at least partial indemnification to the injured party (Karkowska, Chojnacki 2014, p. 31).

Reasons for a crisis in the subject-matter of remedying damage caused during medical treatment need to be sought primarily in difficulties in proving premises of liability (Tunc 1978, p. 30), in particular fault and a cause-and-effect relationship, in excessive lengths of compensation lawsuits or in costs of court proceedings (Lean1993, p. 134). The existence of the crisis and its reasons have been extensively discussed in the literature. The time has come in this context to answer the question about how the world is doing in dealing with the crisis, how it perceives the problem, whether it identifies its causes adequately and whether it is trying to apply relevant measures that mitigate its effects. The aim of this paper is to demonstrate the existing models of repairing damage caused during medical treatment that aim at making it easier for the patient to obtain compensation and to attempt to assess whether these systems fulfil their role. The paper's prime goal at that is to demonstrate that no-fault systems introduced in some countries provide an answer to the malpractice crisis. In order to accept them, however, one needs to understand the change in the function of liability for damages and to depart from repressions against the injuring party towards, most of all, compensation for the injury suffered by the patient.

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The role of insurance and verification of the function of liability for damages in court proceedings - Poland's example

The first, one may say traditional, model that affects further development of alternative routes to indemnify personal injury was an introduction of third-party insurance to continental legal orders. As early as the 19th century, due to economic changes (industrial revolution) and social and economic changes (the clash of liberal doctrines with pursuits to ensure broader protection of employee rights), the process of departing from the principle of fault as the basis of liability for damages began, which entailed dynamic development of insurance (Eyben 2000, p. 34). The development of insurance was also associated with the problem of a growing discrepancy between the "potential of causing damage" and "the compensation potential", which was especially evident in the case of damage caused by the movement of the company (Kowalewski 2012, p. 271). Insurance as a method of compensation of damages gave a very positive impetus to obtain indemnification, because it was a tool that allowed efficient, comprehensive and certain repair of damage, at the same time being a safety buffer for risky economic projects, thus positively affecting the development of entrepreneurship. This is why at the beginning legislative works in this area intended to introduce systems of compensating damage caused as a result of performing one's work, motion of vehicles, water transport or motion of companies (Bączyk-Rozwadowska 2013, p. 215). However, with time, as is the case in e.g. the European Union countries, the practice of higher risk professions (e.g. medical professions) involved an obligation to sign a third-party insurance agreement, which greatly improved the patient's chances to obtain a compensation payment. In Poland, entities who carry out a medical activity and those that practice medical professions (doctors, nurses, laboratory diagnosticians) are obliged to enter into a third-party insurance agreement as a requirement for providing health care services (Article 25(1) and (5) of the act of 15 April 2011 on medical activity).

However, the requirement to obtain a compensatory performance in such a case still involves the need to demonstrate premises for liability for damages of the insured doctor, including his fault. This is why the scholarship has also started to address the need to objectify liability for damages, i.e. the need to detach it from the subjectively understood fault and to only investigate violations of the principles of practising the profession of a doctor (Safjan 1998, p. 85). In Poland it is visible in particular on the ground of a medical entity's liability for damage caused by a task delegated by a doctor, which is done by means of a broad application of the so-called concept of anonymous fault (Pytlarz 2013, pp. 146-148). It involves the exclusion of an obligation on the injured party to demonstrate which hospital employee caused the occurrence of the injury, which in consequence truly excludes even the possibility of examining a subjectively understood fault, making it easier for the injured party to pursue their claim. However, it is worth pointing out that objectification, and in consequence expansion, of civil liability, has certain negative effects too. It makes doctors and health care institutions' apply the so-called defensive medicine, understood as an attempt to secure oneself against possible patient claims by running numerous additional (most often unnecessary) test (Merry, McCall Smith 2001, p. 215), which may lead to extending the treatment process and raising its costs.

The dynamic development of insurance and the progressing objectification of liability are coupled with the evolution of the function of liability for damages (Bagińska 2012, pp. 74-76), which must be stripped of the repressive function if compensation for damage in no-fault systems - due to no need to attribute fault to a given injuring party - is to be possible This problem is associated with a departure in many foreign systems from individualised liability for damage, towards liability based on insurance (Kowalewski 2012, pp. 282-285). The economic factor was also significant in terms of the function of liability for damages, which demonstrated itself in a disproportion between the damage caused and the real possibility of equalising it by the injuring party. This provided a stimulus for strong development of insurance, which "cushions" financially the burden of repairing the damage (Kowalewski 2012, p. 278). Transformations of the function of liability for damages are also reflected in the development of a given society (Warkałło 1972, p. 34). This development, moving away from repression towards a preventive-educational function, reached a point in which the function of liability for damages involves primarily reparation of the damage suffered by the injured party (in Polish literature this process is called economization of civil liability) (Warkałło 1972, p. 35-36). Thus, transformations in terms of the function of liability were coupled with the said development of insurance, which allowed one to "bail out" of liability for the price of an insurance premium (Kowalewski 2012, p. 280).

Attempts to move away from litigation in seeking redress - examples of New Zealand and Sweden

The turn of the 20th and 21st centuries brought a phenomenon called "collectivisation" of tort law, which on the one hand involves considerable expansion of insurance, acceptance of liability for the company's dangerous activity and introduction of legal instruments that allow distribution of the burden of damage repair among a number of entities (internal collectivisation); on the other, it boils down to excluding specific types of facts from general rules of tort liability and subjecting them to special out-of-court indemnification regimes (Bagińska 2012, pp. 74-75). The aim of collectivisation is to streamline redress and to lower its costs by considering the possibility of moving indemnification

of personal injury towards public law by creating funds or systems of compensation with a strictly administrative or mixed nature (in terms of combining public funds with funds coming from private insurance) (Bagińska 2012, p. 75).

As has been pointed out above, many European countries and the USA (Cooper, Egeberg, Stephens 1977, p. 262) have introduced various proposals to create a more effective mechanism for recompensing injuries that were through the doctor's fault and through no fault of a doctor. On the basis of comparative research, it may be concluded that two fundamental systems (not related to third-party insurance) have been developed in this scope: the system of patient-injury insurance and the idea of creating a guarantee fund for compensating injuries suffered by patients (Nesterowicz 2002b, pp. 15-24).

The former was introduced in Sweden (1975), followed Finland (1987), Norway (1988) and Denmark (1988) (Farrell, Devaney, Dar 2010, p. 37). It is a good idea to present the construction of this system on the basis of the Swedish experience. The currently applicable system in Sweden has evolved from the system introduced in 1975 on the basis of an agreement concluded between the National Association of District Councils (twenty-one district councils are responsible for the organization of health care in the territory of Sweden) (Cooper 1976, p. 1268) and a consortium of four largest private insurance companies (*Scandia*, *Folksam*, *Trygg-Hansa* and *Länsförsäkringsbolagen*) (Danzon 1994, p. 455). A crisis of tort liability in Sweden led to a practically complete stop of patients' pursuing claims for compensation for injuries suffered in the course of medical treatment (Cooper 1976, p. 1268). The reason for the stagnation in pursuing claims involved difficulties in obtaining compensation under tort liability based on fault (Cooper 1976, p. 1268).

On 1 January 1997 provisions of the Patient Injury Act (Patientskadelag) (hereinafter: PIA) entered into force (Farrell, Devaney, Dar 2010, p. 39), which shaped the currently applicable system by the introduction of obligatory insurance for the benefit of patients which covers operators from the private sector and the public sector alike (Wendel 2004, p. 372). The system introduced in Sweden is an alternative for court proceedings, which means that the patient may still take the case to court, thus avoiding the functioning system (Farrell, Devaney, Dar 2010, p. 42).

In the Swedish system, the award of compensation and recompense does not depend on demonstrating fault of the injuring party or on identifying them (no-fault system) (Farrell, Devaney, Dar 2010, p. 40). In PIA provisions liability is based on a principle according to which the proceedings involve examining whether the damage could have been avoided if e.g. different treatment had been applied (avoidability rule) (Farrell, Devaney, Dar 2010, p. 40). This principle, introduced in place of the principle of fault well-known in the Swedish system, makes it possible to recompense the damage suffered by the patient if the damage could have been avoided (Farrell, Devaney, Dar 2010, p. 40).

In the discussed system, compensation covers six categories of personal injury:

1. treatment injury;
2. material-related injury;
3. infection injury;
4. accident-related injury;
5. diagnostic injury;
6. drug-related injury (Hodges 2006, p. 150).

It is worth noting that the Swedish system allows recompensing "accident-related injury", which includes all bodily injuries and health disturbances caused as a result of sudden and unexpected incidents that do not fall under the scope of medical actives and are not related to a general health status or organism's properties. Hospital accidents include injuries caused i.a. by slipping on a wet floor, falling off the stairs, an ambulance accident, fire or an explosion in a hospital (Bączyk-Rozwadowska 2011, p. 45-46). Patients benefit from the fact that "the prerequisite for compensation of accidental injury is that the accident some way be related to the care" (World Bank 2013, p. 30), from which one must conclude that proving a cause-and-effect relationship in the discussed group of incidents occurs only when the injury is caused to the patient during his stay in a medical entity.

It is also worth noting that the Swedish system assumes a restriction of the amount of compensation pay and is subsidiary towards compensation for damage which the patient may obtain on the basis of the social insurance system (Bączyk-Rozwadowska 2013, p. 267). The principle on which compensation for damages is based in the Swedish system is the principle of full compensation (Strömbäck 2009, pp. 431-432) established according to the principles of civil liability limited by adopted thresholds for repairing the damage (Strömbäck 2009, pp. 431-432). PIA provisions regulate amount limitations that cover benefits paid under the Swedish system where the limit is 1,000 times the base amount (which is about EUR 4,000) for each injury and 200 times the base amount for one patient (Nesterowicz 2002a, p. 125). Inclusion of the social insurance system in the system of repairing an injury caused

during medical treatment leads to a situation where the limits introduced by PIA are sufficient (Bączyk-Rozwadowska 2011, p. 53). It is a consequence of a very extensive system of social security benefits which also in part directly compensate health injuries (e.g. health insurance that covers costs associated with a loss of earnings) (Strömbäck 2009, p. 432).

Positive opinions of the Swedish model of repairing injuries dominate in scholarly writings (Strömbäck 2009, p. 432). This is evidenced by statistics which point to an increase in the interest in the discussed procedure among citizens of Sweden. In 1990 4,500 claims for compensation were filed, in 1999 there were 8,600 of them, while from 2010 onwards - about 10,000 a year (Farrell, Devaney, Dar 2010, p. 40). The attractiveness of the model adopted in Sweden is also proven by the fact that the injured parties turn to litigation only sporadically (Bączyk-Rozwadowska 2013, p. 277). A great virtue of the system adopted in Sweden is the possibility to obtain compensation very quickly or no fees for initiating the proceedings (Farrell, Devaney, Dar 2010, p. 37).

The second type of the system is the idea of establishing a guarantee fund to compensate patients' injuries. This concept was discussed in particular in France, New Zealand, USA, Belgium or Lithuania (Nesterowicz 2002b, pp. 19-23). According to a general assumption, such a fund is fed by contributions from doctors and medical entities or possibly also patients themselves. The fund's task is to repair the damage regardless of the reasons or the doctor's fault. However, the performances paid from the fund have a limited character and this is why they are an alternative route (other than litigation) to pursuing compensation or recompense. The fund operates automatically to a certain degree, allowing limited but inexpensive, quick and certain recompense of the experienced damage (Nesterowicz 2013, 457-460).

The system introduced in the1960s in New Zealand is an example of such a system (Farrell, Devaney, Dar 2010, p. 14). The system originally entered into force on 1 April 1974 (The Accident Compensation Act), and after a few amendments it is based on the provisions of the Injury Prevention, Rehabilitation, and Compensation Act 2001 (Public Act 2001 No 49) (hereinafter: IPRCA), which entered into force on 1 April 2002 (Farrell, Devaney, Dar 2010, p. 14). In 2005 a reform was introduced which gave the New Zealand no-fault system the current shape. It is crucial that this system is comprehensive and includes not only injuries caused in treatment, but also e.g. accidents at work or injuries caused as a result of traffic accidents (Brown 1985, p. 977).

At the moment, meeting the treatment injury prerequisites provides the basis for compensating the damage (section 32.1 IPRCA), where the said injury is understood as injury suffered by a person seeking treatment from a registered health professional. In order for the injury to be eligible for compensation under the discussed system, it must result from the treatment and at the same time it may not constitute a regular (predictable) consequence of the treatment (e.g. a scar after a surgery). When assessing the last premise, one needs to take into account the current state of knowledge at the time of causing the injury (Manning 2006, p. 703) and the patient's health status at the time of receiving medical treatment (section 32.1 a-c IPRCA) (Farrell, Devaney, Dar 2010, p. 19). According to the views of legal scholars and commentators, the term personal injury was constructed by the New Zealand legislator in such a way so as to include all injuries caused in treatment, those that can be foreseen and prevented and those entirely unforeseeable (Farrell, Devaney, Dar 2010, p. 27). At that, it is not, however, a necessary premise that the injury be caused during the treatment itself (Manning 2006, pp. 698-699).

In terms of the scope of compensation, the New Zealand system has evolved away from the system based on the principle of full compensation (real compensation) to a system based on the principle according to which the amount of payment is to be at the level that corresponds to the injured patient's needs on the one hand, and on the other it must guarantee financial stability of the system (financial affordability) (Bączyk-Rozwadowska 2013, p. 238). The change in question was necessary due to rising costs of maintaining the system (Farrell, Devaney, Dar 2010, p. 27). Due to the adopted rule, the amount of compensation for a loss of earnings and the amount of a disability pension granted in the event of permanent or temporary incapacity to work was limited to 80% of the general sum that the injured would have received if the injury had not occurred (Bączyk-Rozwadowska 2013, pp. 238-239). In turn, the compensation covers reimbursement of all costs incurred by the injured party as a result of medical treatment, rehabilitation, transport, purchasing food to follow a certain diet, purchasing medicine or medical equipment (Farrell, Devaney, Dar 2010, pp. 25-26). Moreover, as of 1 August 1999, the New Zealand system does not allow for pursuing recompense for non-financial injury to a person (Lean 2011, pp. 29-31).

A characteristic feature of the New Zealand system involves the way funds for its operation are obtained. While in the Swedish system recompense for damage is done through the payment from the obligatory insurance taken out by doctors for the benefit of patients, in the New Zealand system the funds are obtained from premiums paid obligatorily by entities operating i.a. a medical activity which form the Accident Compensation Account (Dute 2004, p. 464).

The New Zealand system allows reparation of an injury caused due to treatment, without conditioning the compensation on demonstrating that the injury was a consequence of a medical fault. At the moment, the system operates as entirely detached form fault, which frees doctors and other medical personnel from individual liability for the injury. Despite the limitation of the scope of recompense, the amounts of repairing the damage are specified in such a way that litigation motivated by an unsatisfactory degree of repairing the injury occurs extremely rarely (Bączyk-Rozwadowska 2013, p. 241). Despite that, one must refer critically to the absence of a possibility to repair a personal injury involving grief or loss of joy in life. Unfortunately, the system's financial burden proved too great and in order to maintain the possibility of obtaining compensation quickly and with certainty, a decision was made to limit the scope of indemnification.

Conclusions

Changes in compensation of damage caused in medical treatment have occurred in various legal systems. Firstly, by adopting legal solutions which modified the legal situation of the injured parties in the existing model of tort liability based on the principle of fault; and secondly, at the same time, by linking the liability of a medical entity with the obligatory third-party insurance. The development of insurance along with progressing objectification of liability and a departure from the principle of fault have somehow become a foundation for the "development of a civilisation of indemnification" (Warkałło 1972, p. 28). It centres on the injury suffered by the aggrieved party and on pursuing its effective reparation. Both above factors driving changes in approaching civil liability are associated with the development of capitalist societies and a dynamic development of industry, which with time have also translated onto the legal situation of injured patients. These transformations lay a foundation for changes in understanding the very function of liability for damages, which to a lesser degree focuses on repression and to a greater degree aims at compensating the damage.

The second variant proposed by legislations involved a departure from traditional rules of compensating "medical injuries" and an introduction of a system of compensation detached from the principle of fault. More and more countries follow into this direction. The presented system of compensating no-fault medical injuries meets the principles of a system which is quick, does not burden the injured patient financially, facilitates pursuit of compensation by eliminating a premise of fault and actually intends to repair the damage done. The history of the New Zealand system teaches us that it is not always possible to fully repair a personal injury and that it will be necessary to limit the performance claimed by patients in order to balance the principle of full compensation with the principle of obtaining the payment within a reasonable time and at a low cost. A system functioning in such a way may be supplemented by - as is the case in Sweden - an extensive system of social insurance which would take over in part the costs associated with recompensing medical injuries, thus relieve the strain of no-fault system.

A consequence of transformations presented above involves a further departure from perpetrator's liability and moving towards guarantee liability. The future should bring dynamic development of insurance aimed at further objectification of liability for damages. At the same time one needs to expect a limitation of the role of tort liability based on the principle of fault in the socially most important areas and development of simplified no-fault systems of compensation based on insurance. It is natural that a great share of injuries caused during medical treatment are not due to the doctor's fault. Does this mean, however, that such an injury should be left without a recompense? Looking at the system systemically, not only from the perspective of the doctrine of civil law, it seems that there is no axiological reason for differentiating between the situation of the injured patient who suffered an injury due to the personnel's fault and one who suffered an injury as a result of a simple fall. Both injuries deserve reparation. This is why when one adopts such a point of view it is necessary to depart gradually from the concept of fault as the basis of construction of the system of liability for damages and to look for a system which will enable injured patients to obtain just compensation. Arguments that liability for damages deprived of its preventive or repressive function does not fulfil its role end up in a void as regards systems of criminal, professional and disciplinary liability prescribed for medical personnel that exist in democratic states.

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Legal and Financial Aspects of Participatory Budgeting in Poland

Jakub BARANOWSKI

University of Szczecin, Szczecin, Poland, jakub.baranowski@usz.edu.pl
ORCID 0000-0002-9863-7864

Abstract

Citizens' budget (used alternately with the term "participatory budgeting") is one of the key ways for local residents to meaningfully engage in local government processes. Since late 1980s, when first participatory budgeting projects were implemented, this form of public participation has gained popularity and wider acceptance. It translates into tangible benefits, such as collaborative city development and residents' involvement in participatory democracy.
In Poland, participatory budgeting was initiated in 2013. It was only after five years from this first edition that the Polish legislator decided to regulate the legal status of the participatory budget. An obligation to create annual participatory budget was introduced for large cities, i.e. above 100,000 inhabitants, also setting the guaranteed minimum of funds to be spent under the participatory budget. It has been two years since these legislative changes were made, shaping a new attitude of municipalities towards civil society participation, so it is a good time to look at the consequences of these changes, in particular at the issue of financing participatory budget schemes from municipal funds. The future of the participatory budgeting movement depends on continuous improvement of the budgeting procedure which in turn is conditioned by legal regulations and growing citizen engagement.

Keywords: Local Government Funds, Participatory Budgeting, Citizens' Participation.

Introduction

Continuous development of civil society in Europe should remain one of the key priorities of EU member states in the years to come. The development of civic society and citizen participation will depend on people's engagement in community welfare, from simple supporting one another to electoral participation, that is involvement in social and political life. Indeed, social participation is treated today as the foundation of modern democracy which encourages citizens' participation in the management of public affairs (Gralak, 2018, p. 153). Social participation inspires and enables personal fulfillment, and also gives a sense of belonging to a local community and a sense of agency or empowerment (Gawroński, 2015, p. 273). In semantic terms, the word "participation", "to participate" means to partake, to take part – and combined with the word "public" it denotes participation in public life. According to one of many definitions of citizens' participation, the latter can be understood as consideration of the needs of others in decision-making processes (Pietraszko-Furmanek, 2012, p. 63).

Participatory budgeting (PB) is one of the key participatory tools used by local communities. By amending the Act on municipal self-government at the level of municipality ("gmina"), the Polish legislator attempted to regulate the legal status of the participatory budget. Among the most important changes was enforcing the obligation to draft citizens' budgets in larger cities, while indicating the minimum percentage of funds to be spent on the year to year creation of the PB. However, having regulated this issue successfully, the legislator did not regulate some other issues of participatory budget funding. First of all, the legislator did not determine how the operating costs of investment ventures established under such participatory schemes should be funded. After almost two years since the amendment, a question should be posed whether the applicable regulations ensure adequate funding mechanisms for local government units that are obliged to produce a citizens' budget.

This paper attempts to shed light on the legal and financial situation of participatory budgets in Poland. By applying the method of interpretation of the law applicable in Poland with regard to the participatory budget, and the empirical method, i.e. a case study analysis of PB funding principles applied in one of the largest Polish cities, the author attempted to highlight the consequences of actions taken by the Polish legislator in this regard. The secondary goal of this paper was to identify the issue of funding for investments implemented under the PB, which lack regulation under Polish law.

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Participatory Budgeting – Introductory Remarks

Participatory budgeting is a citizen engagement process that was initiated in Porto Alegre in late 1980s in a conjunction of top-down and bottom-up processes. In result of growing interest, this form of social participation and grassroots democracy is now proliferating around the globe, including European countries. The PB is an instrument enabling civil society to play a greater role in local governance (Augustyniak, 2017, p. 374). The goal of participatory budgeting is to empower community members to realize the influence on local governance and decision-making they have (Gilman, Rousson, 2016, p. 3) by suggesting changes needed in the neighborhood and immediate environment. Participatory budgeting is a kind of social and civic innovation, which emerged in result of the process encompassing the state and civil society (Novy, Leubolt, 2005, p. 2023). It is often emphasized that the PB is one of the most effective participatory processes of recent years (Džinić, Murray Svidroňová, Markowska-Bzducha, 2016, p. 33).

At its core, participatory budgeting is a politically neutral tool given directly to community members. Such approach aims to promote the idea of innovation and entrepreneurship among local residents, as well as to strengthen the confidence residents have in the local government and its representatives (Kębłowski, 2013, p. 14). Moreover, the PB procedure improves both the resident-to-local government and the resident-to-resident interactions. Indeed, it is when talking to local residents when one can really get an insight into the local community life and identify its actual needs. The effect of the participatory process is the creation of groups of local leaders who inform what are the priorities for their community, thus building their position as efficient, involved citizens.

The participatory budget can also be an element of long-term municipal policy, thereby engaging local residents to take part in shaping the cities and towns they inhabit. This model of engagement can also point to certain directions of development by identifying the most urgent needs of the community. Furthermore, the PB allocates funds to the most pressing tasks in given parts of the city, and it is also able to engage social groups which thus far have not participated in the public debate (Kębłowski, 2013, p. 16). The PB model of democracy may result in enhancing the quality of life local residents have, including their overall satisfaction with the way the city operates.

Participatory Budget – Effects of Normative Changes Implemented in The Polish Legal System In 2018

The first edition of participatory budget took place in 2013 in Sopot. At that time, the process of PB implementation was not regulated under the Polish legal order – it was treated as a form of public consultations with residents, in absence of legal regulations that would address this specific process of collaboration. After a few years from the first PB edition, the Polish legislator attempted to work out the legal framework of participatory budgeting. In 2018 the Act on municipal self-government was amended, imposing an obligation on large cities to create participatory budgets on an annual basis. Moreover, the obligation was correlated with specific budget amount which, from 2018 till this day, is closely related to municipal expenditure. The legislator decided that the minimum amount of funds to be spent under PB should not be equal to at least 0.5% of the municipality's expenditure as presented in its last submitted budget execution report. Moreover, the legislator imposed on local government units an obligation to adopt a resolution determining minimum formal requirements to be met by a proposed participatory budget (Act on municipal self-government, Article 5a, sections 3-8).

Equipped with the five-year long experience of participatory budgets schemes operating in some cities, the Polish legislator decided to create a new form of public consultations. From 2018 onwards, participatory budget is recognized in Poland as a "special form" of public consultations. In reality, the implementation process of PB schemes had always differed from the standard public consultation procedure. First of all, citizens' interest in participatory budgeting is much bigger. To exemplify that, let us look at the numbers: in 2019 in Szczecin, as many as 31,690 persons voted for participatory budget proposals in contrast to the standard public consultations on where certain monument should be erected- the number was down to only 35 persons he guaranteed minimum amount of funds to be spent under PB should not be less than 0,5% of municipality's expenditure, contained in the last submitted report from the budget realization he guaranteed minimum amount of funds to be spent under PB should not be less than 0,5% of municipality's expenditure, contained in the last submitted report from the budget realization (Public Information Bulletin of the City Council of Szczecin, 2019; Public Information Bulletin of the City Council of Szczecin, 2019). The growing interest in participatory budgeting schemes also encourages residents to identify with the entire process of building a civil society in a local context. This special form of public consultation ends in voting on the participatory budget, in which residents act as involved citizens and select tasks to be implemented by local government.

The growing interest in this form of citizen participation also translates into youth being more engaged in community governance. For this very purpose in 2019, in Szczecin, a new project was initiated called the Youth Citizens Budget, which is an offspring of the municipality's participatory budgeting. Its main role is to encourage active participation

of young people (students) in the matters of local community, develop their civic knowledge and build political efficacy. During the first edition of the project, students of 38 secondary schools were given the opportunity to submit their proposals. Pursuant to the principles set by the Youth Citizens Budget, projects related to the so-called hard actions – e.g. class equipment or creation of leisure space, as well as soft actions, such as trainings and conferences. (Szczecin Education Portal, 2019). Even though the total budget for all participating schools was not big, it allowed each of them to work on some civil society tasks. This form of engagement of young people proved to be very successful, as the participation rate was as high as 92% in one of the high schools, and among the winning projects were bins for proper garbage segregation (Voting protocol, 2019). Such a big engagement proves that the best way of citizen education is to give young people a hands-on experience with self-governance.

Funding of participatory budgets – case study of the city of Szczecin

The aforementioned legislative changes made the creation of annual citizens budgets obligatory in large cities to and placed emphasis on funding them. The obligation to allocate a percentage amount of funds to the PB means that its actual size depends on how well the city did in a given year in terms of revenue. A great example here is the case of the city of Szczecin where in 2019, the amount of participatory budget was ca. EUR 2,852,000, whereas just a year later, in 2020 – ca. EUR 3,275,000 (Ordinance No. 204/19; Ordinance No. 272/20). This difference is solely the result of Szczecin's increased municipal expenditure, as both in 2019 and 2020 the city allocated toward the participatory budget schemes only the minimum statutory amount of 0.5% of municipal expenditure. Nevertheless, such budget enabled implementation of roughly 30 projects in 22 sub-districts of the municipality of Szczecin, as well as other city-wide projects.

At present, the amount of funds intended for the creation of PB in a given year is specified in the city budget plan under "tied-up reserve", which cannot be used to fund other tasks. The legislator stated explicitly that a certain part of the city budget must be allocated to the PB – and there are no exemptions from that in the statute. Large Polish cities have experienced that firsthand in the early stage of SARS-CoV-2 pandemic, as without the legislator's intervention they could not re-allocate the PB funds to fund emergency management or public safety initiatives. In consequence, the participatory process was conducted as usual in the year of global SARS-CoV-2 pandemic.

Moreover, the legislative changes led to a redistribution of funds by the city authorities within the PB framework. Till 2019 Szczecin was divided into 4 districts – each receiving an equal amount of funds, while city-wide projects were allocated a different amount of funds (Rules of Procedure, 2016). At present, the city is divided into 22 sub-districts, which mostly include residential areas, and 1 central city district which is supposed to meet the needs of wider population, i.e. residents of more than one sub-district (Rules of Procedure, 2019). The participatory budget funds are no more divided equally to each sub-districts, as a special algorithm was introduced which allows to calculate funds to be spent. The total PB funds is now divided in the proportions 30:70, which means that 30% funds are allocated to the central city district projects and 70% to projects intended for sub-districts. Furthermore, the distribution of funds among sub-districts follows the aforementioned percentage based algorithm, where 70% of the funding depends on a sub-district's population and 30% on its land area in km^2. In other words, the most populated and largest sub-districts receive the most PB funds. Distribution of funds based on an objective algorithm seems to be a more just solution than the mere territorial division, as it was the case before the amendment of PB procedure in Szczecin. The previous division of the city into just 4 districts, which differed drastically in terms of land area and population, did not provide equal opportunities to all residents of Szczecin (an issue rightly pointed out during the public consultation on the new Rules of Procedure of the Szczecin Citizens Budget). To exemplify that, let us say that one district encompassed 10 residential areas. According to the old rules, the largest residential areas were most likely to implement the biggest number of projects, which instilled a sense of unfairness among residents of smaller residential communities. This is why the redefinition of the territorial division of Szczecin (shifting from large districts to smaller territorial units – sub-districts consisting of residential areas) and the algorithm-based distribution of funds is definitely a positive change. Its effects were also reflected in the increased number of winning projects – in 2019 there were 28 projects compared to 13 in 2018, prior to the procedure's change.

These changes are being underlined by the author deliberately. The city's new territorial division and the creation of sub-districts encompassing aggregate and single residential communities allowed Szczecin's inhabitants to experience participatory budgeting as an empowering process. The rules that govern Szczecin citizens budget clearly state that if at least one project is submitted from a given sub-district, it will be selected in voting and implemented. Building on this assumption, it can be said that Szczecin as a city has made a huge step towards encouraging its residents to participate more actively in improving their residential areas.

Aside from the positive changes arising from legislative reforms regarding the legal status of PB in Poland, consideration should also be given to another element, important from the perspective of funding, i.e. the issue of maintenance of the projects realized under the PB framework. The legislator specified the percentage of the city's

expenditure that must be allocated to the enabling of the participatory process, and thus, to the funding of the projects selected. However, the Polish legislator has completely overlooked the finance needed to maintain the projects implemented, and this fact is a significant challenge to local governments. A good example here is the park revitalization projects. The amount of investment specified by municipal investment experts was spent on the creation of parks. A problem arose when it was time to carry out some green maintenance works. It turned out that in such case it is the municipal entity in charge of the city's green areas that has to cover all the maintenance costs. Till today, there is no statutory mechanism that would ensure funds to maintain in proper condition such kind of investment projects after their implementation. Municipal entities receive funds only for the realization of investment projects, and receive no funds for further maintenance of the investments.

The aim of participatory budgeting is to encourage citizen engagement in projects that enhance the quality of life in the cities. However, the lack of regulations on the funding for maintenance of investment projects after their implementation may lead to a situation in which the municipality will not be able to pay for the maintenance of investments delivered in each consecutive year. If the institution of participatory budgeting is to continue its empowering role, regulating the issue of PB finance should become the legislator's priority. Since, undoubtedly, it is the proper maintenance of the projects carried out that has more meaning to the community than the mere fact of their implementation.

Summary

Participatory budgeting is becoming increasingly popular all across Europe and it is a fundamental tool enabling civic engagement in local communities. However, this enthusiasm should be supported by legal mechanisms that would regulate the legal and financial situation of the participatory budgeting model. The fact that an attempt to regulate these issues was also made in Poland deserves a positive reception, although we should bear in mind that this kind of solutions have to evolve parallel to community development trends.

The creation of participatory budgeting in Poland, in particular in large cities, is obligatory. The size of participatory budgets has been correlated with the size of the cities' expenditure. In consequence, the amount of participatory budget depends on the financial situation of municipalities in a given calendar year. Continuous development of cities, including new investments, is the reason why Urban dwellers can spend more funds under the participatory budget scheme in each consecutive year.

An issue that requires further regulation is the financing of maintenance of PB projects after their implementation. Due to the absence of such regulations, municipal budget is charged with all maintenance costs. Formally, it is the city that is burdened with the task and additional spending, without being allocated any funds towards that goal. If the present situation continues, cities may not have sufficient funds to cover expenses related to the maintenance of PB projects in the years to come, which may eventually lead to the shutting down of some projects.

To answer the question posed in the introduction, legislative changes that regulate the legal and financial situation of participatory budgeting in Poland are definitely a good step towards a more comprehensive regulation of the participatory budgeting procedure. Nonetheless, as cities and costs of participatory budgets continue to grow, a separate, comprehensive regulation of participatory budgeting in form of an act on citizens budget may be necessary. To accommodate the future, such solutions should be contemplated today, in particular among the theorists and practitioners of participatory budgeting.

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Important Public Interest as A Constitutional Basis of Limitations of Freedom of Establishment in Poland

Jerzy CIAPALA

University of Szczecin, Szczecin, Poland
jerzy.ciapala@usz.edu.pl
ORCID 0000-0002-5062-3834

Abstract

Freedom of establishment in defined in the Polish Constitution of 2 April 1997 as freedom of economic activity. It is a basic pillar of social market economy. It is followed in the Constitution by private ownership, and solidarity, dialogue and cooperation between social partners as the second and third pillar. Pursuant to the Constitution "limitations upon the freedom of economic activity may be imposed only by means of statute and only for important public reasons" (Article 22). The problem in the practice of judicial decisions of the Constitutional Tribunal and courts involves ongoing specification of what incidents, facts and circumstances may fall under important public interest.
The aim of this paper is to compare in constitutional terms the said goods and values, that is the basis of limiting all constitutional freedoms and rights (Article 31(2) of the Constitution), with the category of "important public reasons" and to accentuate the changeable ways of understanding this term by the Polish Constitutional Tribunal and by the Court of Justice of the European Union. In this context it is important to establish the relationship of the term "important public interest" with "public interest", "social interest" and also with "state interest". The analysis cannot avoid the growing impact of the EU law and CJEU case-law due to the fact that the Polish Constitutional Tribunal and legal scholars and commentators accept - so far - the pro-EU interpretation of the Constitution. The Author's intention is to convince readers how destructive domination of political factors is on the functioning of the legal and institutional system.

Keywords: freedom of establishment and its limitations, important public interest, decisions of the Polish Constitutional Tribunal and the Court of Justice of the European Union

Introduction

During the works of the Constitutional Committee of the National Assembly it was argued that limitations of freedom of establishment must involve strictly interpreted exceptions. This is why Article 22 features the term "only" twice (Bulletins XXXI and XLV KK ZN, 1996, 1997). Therefore, historical interpretation, invoking the so-called will of the legislative authority, should encourage the legislator to maintain restraint and cite well-founded reasons when introducing limitations of freedom which results from natural human dignity. This freedom includes spheres of activity in the following scopes: a) the very decision to take up the activity, b) identifying its objects, c) selection of legal forms of operation, and d) freedom to limit or cease operation. The gravity of this provision is justified by it being placed in Chapter I of the Constitution entitled "The Republic".

The practice of constituting law has not confirmed these principles. In the period of transformation of the economic system the legislator standardized (and still is standardizing) the discussed freedom too often and too restrictively. The opinions of the Constitutional Tribunal (hereinafter: CT) were not uniform or consistent. On the one hand, the CT believed that the introduced limitations are inadequate, violate the principle of proportionality and do not take into account the "axiological balance" (OTK 2008, K 46/07). On the other hand, it pointed out that limitations of freedom of establishment can be more restrictive, especially compared to personal and political rights and freedoms (OTK 1998 – K 10/97; OTK 2003 – SK 24/02; OTK 2004- SK 21/03). It is also very important that the CT established that the freedom formula cannot refer to entrepreneurs who operate on the basis of a public capital, that is state or self-government capital (OTK 2001, K 19/00).

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Understanding important public interest and its relation with other constitutionally protected goods

In Article 22 of the Constitution the term "important public reasons" was considered a general clause, that is a provision with an under-defined expression. When interpreting it, it is important to refer to non-legal assessments, to the state of affairs and to facts and circumstances which the legislator will consider as "co-shaping" the important public interest. It needs constant redefinition and specification in judicial decisions, relevant to the varied economic and social context. Article 22 gives authorisation to invoke economic criteria and parameters, e.g. economic balance, budget balance, or anti-trust practices, and also non-economic criteria, e.g. protection of human health, animal welfare, or rights and freedom of another person. The scholarship used to assume that it is an expression which should encourage interpretation *in favorem libertatis* (Garlicki 2005, pp. 6-7), because general clauses due to their nature formulate a specific type of desired argumentation (Ziembinski 1980, pp. 242-243, 472-475). This provision creates "open, intentional, oriented and controlled clearance" for the legislator and may be used to de-formalize the law application process (Leszczynski 2001, p .36).

The author assumes that there is no absolute primacy of public interest over private interest in a democratic rule of law, and the entrepreneurs' interest must be taken into account in the context of legal changes which serve to implement state policy objectives. The basic problem, however, involves the degree of interference and the frequency of changes (e.g. in tax law, in statutes that regulate the activity in specific branches of the economy). No long-term strategy of social and economic development has been developed in Poland since 1990 that would go beyond a term of office of a given parliament and a government legitimised with its support. In consequence, regulations of economic activity are too frequent and devoid of consequences as to liberalisation (Hausner 2019, p. 355).

As stated above (Abstract), the Polish Constitution also features a provision of Article 31(3) included in Chapter II "The Freedom, Rights and Obligations of Persons and Citizens". It seems that it has basic significance in limiting all rights and freedoms. Four essential elements of content (interpreted jointly) were included in it: 1) it names goods and values that justify limitations: security of the state, public order, protection of the natural environment, health or public morals and protection of freedoms and rights of other persons; 2) the principle of proportionality of limitations was emphasized by the expression "when necessary in a democratic state"; 3) a requirement that limitations be imposed only "by statute" was introduced; 4) it was concluded that limitations cannot violate the essence of a given freedom or right, and thus they cannot preclude or exclude them. When it comes to economic freedoms, the Constitution stipulates, however, for one exception - nationalization made in the form of a statute (Article 216(3) of the Constitution), which must correspond to restrictive constitutional requirements. The significance of the principle of proportionality, accepted among Polish legal scholars and commentators, has special importance. In order to comply with it one needs to answer three questions: 1) is the introduced regulation able to bring about intended results? (praxeological rationality); 2) is the regulation really necessary for the protection of public interest?; 3) are effects of the regulation proportional to the burdens imposed on its addressees? (axiological account) (Wojtyczek 1999, pp. 159-161).

In the author's opinion, invoking public interest which, as must be emphasized, needs to be "important" cannot leave the legislator with discretion in specifying the type of the protected interest. When establishing it, goods and values listed in Article 31(3) must be taken into account as well as a general hierarchy of constitutional values that results from a democratic rule of law. Therefore, one must first invoke the goods and values enumerated in Article 31(3). Then, since the semantic scope of the term "important public reasons" under Article 22 is broader than the one under Article 31(3), one needs to "extract" other goods and values from further provisions of the Constitution or from the European Union law. In the author's opinion, the term "important" requires a high and extensive standard for justifying limitations. This is related to the need to prefer a communicative and argumentative dimension law making and application (Matczak, p. 195-199).

In the context of the coronavirus pandemic, it needs to be emphasized that limitations of freedom of establishment in Poland are also determined by constitutional and statutory provisions on extraordinary measures. Provisions on a state of a natural disaster were also introduced with prevention of infectious diseases in mind. Therefore, the government's 2020 policy related to the coronavirus pandemic needs to be severely criticised: instead of introducing a state of a natural disaster, the government decided to pass regulations in a chaotic and inconsistent way in the form of a few statutes and government regulations. In order to pursue the political interest of the "Law and Justice" party (choosing a convenient time for presidential elections) a few violations of the Constitution were made, including the discussed freedom of establishment. Unconstitutional prohibitions concerned both limitations on and exclusion of activity of many entrepreneurs, especially those from the services sector.

Constitutional principle of protection of economic activity and important public interest

The order to protect economic freedom has properties of the constitutional principle of law in the Polish study of constitutional law and the theory of law. A constitutional principle of law is a legal norm or group of legal norms with a particular significance for operative application of the Constitution. It is similar in other law branches (criminal, civil, administrative law) which identify principles which are "reference points" to their interpretation and application. Only certain provisions of the Constitution have properties of principles of law (Zielinski 1997, pp. 58 -78). Their axiological and political significance and, as has been pointed out, usefulness in interpretation and application of the Constitution decide here. This fact cannot be irrelevant in understanding important public interest. A few functions of the principle of protection of freedom of establishment can be identified:1) in terms of specifying objectives and directions of constituting law; 2) as an interpretative directive in the law application process (*in dubio pro libertate, in favorem libertatis);* 3) as justifications of derogations of sub-constitutional norms that are inconsistent with it, and 4) as a basis to reconstruct basic law.

Given the weight of this principle, one may identify a few goods and values which the Constitutional Tribunal attributed to important public interest in its decisions: 1) introducing sanctions on such a level that infringements of law are unprofitable (OTK 2004, SK 40/01); 2) counteracting tax fraud which leads to evasion of tax obligations (OTK 2002, K 45/01); 3) protection of children and young people against demoralization resulting from alcohol consumption (OTK 2011, P 26/09); 4) an order to protect social market economy (OTK 2014, SK 20/12); 5) protection of health of citizens by facilitating the use of medicine refunding procedures (OTK 2014, SK 20/12); 6) guaranteeing artists and authors minimum royalties for using their works and rights (OTK 2006, SK 40/04); 7) the need to regulate immediately the legal state of real estate due to quick implementation of public road construction plans or improvement of road infrastructure (OTK 2006, K 23/05); 8) ensuring architectonic and spatial order for the safety of users of facilities (OTK 2011, Kp7/09); 9) the need for necessary changes in the organization of the fish market (OTK 2010, Kp 1/09); 10) eliminating from the market game entities that influence rules of this game, that is political parties (OTK 2004, K 25/03); and 11) introduction of a limited obligation to purchase energy and heating from unconventional and renewable sources (OTK 2016, P 24/05). It needs to be added that in its reasoning to many judgements, the CT often referred to "public interest" without the quantifier "important" and specified what values and goods it had in mind.

European Union law context

The term "important public interest" has not been worded in the treaty law of the European Union. However, the term "interest" features multiple times independently or with modifiers. For instance: "its interest" (Article 13(1) of the Treaty on European Union, hereinafter: TUE, "interest of the Union" (Article 17(1) TUE), "interests of Member States" (Article 13(1) TUE), "public or private interest" (Article 15(3) of the Treaty on the Functioning of the European Union, hereinafter: TFUE), "general economic interest" (Article 14, Article 106(2) TFUE), "financial interests of the Union" (Article 85(1), Article 86 TFEU), "interests of consumers" (Article 169(1) TFEU), "public interest" or "general interest" (Article 17 of the Charter of Fundamental Rights). Limitations of freedom of movement of goods may be justified by reasons of public morality, public order and security, protection of health and life of people and animals, protection of cultural goods with an artistic or historical value, and protection of industrial or trade property. Such limitations may be a product of arbitrary discrimination or hidden limitations in trade between Member States (Article 36 TFUE). In turn, TFEU provisions on establishment do not apply to activities which in that State are connected, even occasionally, with the exercise of official authority (Article 51 TFUE). The above comments prove a significant degree of similarity of the provisions of EU law with provisions of the Polish Constitution.

On the other hand, the term "overriding reasons relating to the public interest" was shaped in the CJEU case-law concerning Article 43, Article 46, Article 49 and Article 55 TFEU. Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market is reliable for specifying and summarising this interest. In line with the CJEU case-law and recital 40 of the Directive, the framework of overriding reasons relating to the public interest covers more than 20 goods and circumstances, i.a.: public order, public security, public health, social policy objectives, protection of the recipients of services, preservation of the financial balance of the social security system, prevention of unfair competition, safeguarding the sound administration of justice, promotion of the national language, veterinary policy or need to ensure a high level of education (OJ L 376, 27.12.2006, p. 36–68). These examples prove that the "overriding reasons relating to the public interest" were specified in the EU law more frequently and in more detail than "important public reasons" under the Polish Constitution.

The context of constitutional interpretation of freedom of establishment and important public interest in the light of EU law outlines the principles of Poland's Constitution: the principle of observance of international law binding upon it (Article 9) and the principle of supporting processes of European integration, derived by legal scholars and commentators from CT decisions under Article 90 and Article 91 of the Constitution. The Union's *acquis communautaire* is therefore often a reference point to specify boundaries of freedom of establishment and to concretize important public interest. The author believes that we may be dealing with a specific co-application of the Constitution and the EU law, because the content of constitutional norms would be specified by EU norms. It is proven by at least three legal facts: 1) amending the content of Article 55 of the Constitution in order to introduce the European arrest warrant to the Polish legal order; 2) CT declaring the act relating to the so-called bio-fuels unconstitutional due to violation of freedom of movement of goods and non-discrimination under Treaties (OTK 2004, K 33/03); and 3) declaring the introduction of restrictions for entrepreneurs managing large trade facilities unconstitutional due to the risk of violation of the Union's non-discrimination order in the sphere of economic activity (OTK 2008, K 46/07).

Freedom of establishment versus humanitarian aspects of animal protection and animal welfare - Poland's example

On 18 September 2020, the Sejm (lower house of the Polish parliament) adopted an act on amending the animal protection act and certain other acts (The Sejm Paper no. 597 of the 9th term of office). The statute, which as at 15 October 2020 had not entered into force, triggered a severe political conflict. It is because it included a ban on fur farming and on ritual religious slaughter, i.e. raising and slaughtering cattle then mainly exported to Arab countries and Israel. The important public interest that underlay such regulations was specified by reasons of public morality, humanitarian reasons and the need to protect animal welfare. Without a doubt, the act would infringe on the freedom of establishment because it threatened the existence of interest of thousands of entrepreneurs - breeders and their employees. Journalists assessed its negative impact on the life of over 150 thousand people. Moreover, the act would also greatly affect the volume of the entire Polish export. Thus, a problem of weighing "important public interests" emerged and so did the problem of axiological and strictly economic balance.

In the author's opinion, axiological, praxeological and economic reasons are key here, while a very difficult legal assessment would have to be based on an analytical use of the principle of proportionality. It would involve establishing a long, multiannual intermediate stage - *vacatio legis* and a fair specification of the amount of equivalent compensation which would take into account both the real damage and the lost benefits, i.e. *damnum emergens* and *lucrum cessans.* The assessment of the adopted act points out that it does not meet such requirements. Therefore, a judgement of the Constitutional Tribunal or the political will of a prevailing (qualified) parliamentary majority should determine the case here.

The author believes that it will not be possible to prejudge a real important public interest and to solve the legal and political dispute. First of all, the act does not have a chance to be confirmed by a qualified majority in the Sejm (opposed by the Senate and the President). Second of all, after 2015 the authority of the Constitutional Tribunal was definitely disregarded by the dominant political class, especially persons from the "Law and Justice" party: violation of the rule of law, significant limitation of independence of the judiciary, or "politicising" the composition of the Constitutional Tribunal.

Summary

Reflections presented in this paper lead to a few basic conclusions.

The first conclusion boils down to stating that "important public interest" is classified as a provision on the ground of Polish legal culture – a general clause which includes an under-defined term. It is important in so much that the Polish legal culture differentiates between provisions, i.e. editorial units of law texts and norms (orders, prohibitions, authorisations) which are derived on the basis of interpretation of provisions. Important public interest cannot be interchangeably defined and invoked by means of expressions such as: "public interest", social interest, or "state interest". The terms above need to be adequately "reinforced" with axiological, economic or political arguments so that their justification leads to the adoption of "particular importance of the interest".

The second conclusion relates to specifying important public interest. It is possible thanks to the introduction of norms and values and identification of goods referred to in Article 22 of the Constitution, that is in a provision that addresses general principles of limitation of all constitutional freedoms and rights. A holistic interpretation also encourages reaching then to norms, values and goods enumerated in other constitutional provisions, in texts of primary legislation, in EU secondary legislation and in the CJEU case-law. The Polish constitutional scholarship and the line of judicial decisions of the Constitutional Tribunal (at least until 2015) prove this. When giving reasons for and specifying

important public interest it is truly valid to note the argumentative and communicative dimension of interpretation and application of the law, including judicial activism which does not manifest itself sufficiently in Poland.

The third conclusion concerns the institutional practice in Poland. To this end, one may identify a period from 1986 (first decisions of the Constitutional Tribunal) to 2015 (electoral victory of the "Law and Justice" party). The Tribunal managed to establish - though not without a shadow of doubt - a relatively consistent line of judicial decisions. It tried to "catch up" with frequent changes made by the legislator and to correct them. Solving constitutional problems is markedly difficult after 2015 as a result of undemocratic changes in the country's political system, the questioning of the division of power and the erosion of the Tribunal's authority. The example of the conflict against the background of freedom of establishment of farmers and breeders presented in the final part of this study proves the dominance of political factors and – though difficult to accept - constitutional nihilism.

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Using the Information Capabilities of Cloud Services and Digital Nodes in Managing the Development of Regional Economic Activity and Its Functional Areas

Sergey KRETSY
Kuban State Technological University, Moskovskaya st., 2, Krasnodar, Krasnodar region, 350042
kretshu@mail.ru

Natalja POLYJANOVA
Belgorod National Research University, st. Victory, 85, Belgorod, Belgorod region, 308015
nvp-nir@ya.ru

Sergey KRYMOV
Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
skrymov@yandex.ru

Oksana EVSEEVA
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
evseeva@spbstu.ru

Abstract

The key areas of implementation of digital technologies in the regional economy management system that are available at the current level of ICT technology development: creation of systems for objective control of the state and activity of all economic entities operating in the region (both endogenous residents and representatives of exogenous structures localized within the RES); organization of digital monitoring of key socio-economic processes, differentiated by us depending on the source of origin and significance for the results of the RES operation; monitoring the composition, intensity and effectiveness of management impacts at the local (local), regional, sub-Federal, and Federal levels based on a specific set of quantitative indicators generated and verified in digital format. The creation of a regional digital information and economic space based on the author's initiative - the regional target program "Digital enterprise - the leader of the region's economy", even within the exclusively corporate sector of the region's economy, will significantly realize the existing reserves for accelerating regional development through the implementation of incentives for preferential access of "digitized" economic entities to municipal and regional public procurement procedures; through the formation and operational calculation of a system of regional ratings that reflect not abstract economic assessments, but indicators of financial condition, operational activities and their derivatives in terms of real credit load, creditworthiness, investment attractiveness, financial stability and bankruptcy forecast, etc.; when using corporate and regional ratings in the development and implementation of appropriate regional / Federal programs of targeted incentives/ support/ demotivation and elimination.

Introduction

The existing theoretical approaches to implementing the technological foundations of the "digital revolution" at the regional level of management currently look as follows:

- new opportunities in the organization of regional socio-economic processes and management associated with quality growth implementation of functional and system digital technology mean in the short and medium term a major breakthrough in the implementation of state management functions to the regional economy associated with a sharp increase in the availability of factual information on the status and activities of subjects and objects of economic management, speed of collection, verification, scale accumulation and primary processing in real-time;
- the best regional practices for implementing modern digital technologies have a significant potential for scaling and can be widely applied in the management of modern Russian regions at the regional, macro region, and Federal district levels;

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- for the applied implementation of the "regional" digital revolution and the implementation of the existing fundamental groundwork in specific management technologies, functions and mechanisms, an up-to-date digital infrastructure is needed that is adapted to the specifics and content of regional socio-economic management processes and provides a real increase in its functionality, quality and efficiency.

Method of Research

Current state and dynamics of development of the regional digital infrastructure of the southern Federal district was estimated on the basis of: regional indicators of development of the digital economy, based on a study of the Ministry of digital development, communications and mass communications of the Russian Federation, Rosstat, HSE "Indicators of the digital economy:2018"; data on the number of subscribers with broadband and mobile Internet access by regions of the Russian Federation; Rosstat information about the availability of computers and levels of Internet corporate actors of the regional economy.

On average, in the Russian Federation and its constituent Federal districts, the level of subscriber access to broadband Internet opportunities in 2017-2018 was quite high, totaling almost 100% of the potential subscriber base. As part of the southern Federal district, the Krasnodar territory had the highest infrastructure opportunities in terms of the Internet, while the Republic of Crimea and the city of Sevastopol had the lowest, which was due to the international community's sanctions pressure.

On average, 72.6% of households in the country had broadband Internet access.even the international embargo did not prevent the high value of this indicator in the Republic of Crimea and Sevastopol.

In the total population of the country, more than 83% were active users of the Internet, 29.1% used its opportunities for consumer activity, and another 64% converted the document flow with state and municipal authorities to electronic form, feeling all the advantages of such a technical solution (these estimates in the Federal districts and regions of the southern Federal district were quite close to the national average).

More than 80% of corporate entities in the regional economy actively used the information and communication capabilities of the Internet, although only 20.5% of organizations reported effective use of cloud services as an element of the corporate management system.

It should be noted that despite the ranking of Federal districts and regions of the Russian Federation presented by HSE specialists in the implemented study, the actual level of digitalization of economic processes in the whole country was approximately the same and steadily growing, reflecting the continuous growth in the number of digital innovations and the effectiveness of their application.

There is an almost linear relationship between the proximity of the territory to Federal cities and the level of availability of fixed / mobile Internet access, although the total volume of infrastructure opportunities already suggests that there are objective regional infrastructure opportunities for the introduction of digital technologies in the economy and management. It should also be noted that the growth of infrastructure and management regional capabilities is closely linked: the growth of the number and functionality of digital services contributes to the growth of demand for infrastructure services and Vice versa.

In General, in the Russian Federation and its constituent Federal districts, more than 90% of enterprises and organizations used modern computer technology in their own activities (the lowest level of penetration in 2018 was characterized by the city of Sevastopol, where only 73% of organizations used the appropriate equipment). At the same time, the availability of modern computer technology or access to the Internet are only the initial basic conditions for the implementation of economic processes in a digital format, including within the framework of the concept of electronic document management and information flows of regional scale and significance proposed by the author.

The readiness of corporate entities to implement electronic document management and digital technologies in the regional economy and management in 2014-2018 should be recognized as high across the entire territory of the Russian Federation: on average, 89.2% of enterprises and organizations actively used information and communication functional capabilities of the Internet (in the southern Federal district, this indicator in 2018 was on average 86.8%, in the leading region – the Republic of Crimea – 99.1%, in Sevastopol – 68.7%).

To sum up, we once again emphasize the very significant infrastructure opportunities of private and corporate economic entities in the regions of the Russian Federation to digital opportunities and Internet resources, which allow us to effectively transform document flow and regional socio-economic processes into a digital form, achieving their continuous coverage, systematic growth in speed, reliability and security. At the same time, the current level of use

of digital capabilities of regional economic entities is mainly associated with private and corporate digital initiatives, and to a certain extent – with the national digital initiative "Public services". Regional digital systems and services are currently at the initial level of their development and are more likely to be in the field of scientific research, rather than applied implementation and maximum possible expansion of the scale of digital activity.
The implemented research was developed as a field research component containing the results of author's research in terms of evaluating the potential of participation of corporate entities located within the Krasnodar territory in the organization and implementation of regional digital economy processes.

In order to clarify the current state of Affairs regarding the involvement of corporate entities of the economy of the Krasnodar territory in the process of its digitalization, we conducted a field author's study, the plan and methodology of which are presented in table 1.

Table 1: -Plan and methodology for research on the use of digital technologies in the economy and management of corporate entities in the Krasnodar territory (January-March 2019) (author's result)

Stage	The maintenance phase
1	2
Development of the research concept	
Definition of the problem	To determine the specifics of the perception and use of digital technologies at the corporate level of the regional economy, to highlight the problems of mass implementation of ICT at the regional level and to characterize possible ways and prospects for their solution
Goal setting	Screening of organizations participating in the study. Assessment of the importance and functionality of the ICT sector in the economy of the Krasnodar territory. Assessment of the availability, state and functionality of the regional digital infrastructure. Availability and efficiency of internal electronic document management. Experience in using electronic document management in interaction with corporate contractors of the region's economy. Experience in using electronic document turnover in interaction with municipal and state contractors of the regional economy. Plans for the development of digital corporate culture in 2019-2020
Formulation of the working hypothesis of the research	The economy of the Krasnodar territory is characterized by a sufficient level of formation and development of digital infrastructure that allows to implement the Foundation for the transition to the digital form of regional economic processes based on the introduction of the concept of regional electronic document management and ensuring the functionality of digital localized nodes " Bank-business entity»
The selection of information sources	
Secondary information	Data of the territorial Department of the Federal state statistics service of the Russian Federation for the Krasnodar territory. Data from the statistical collection based on the results of the research of the Ministry of digital development, communications and mass media of the Russian Federation, Rosstat, and HSE " Indicators of the digital economy: 2018»
Primary information	Sources of primary information - information received from the heads of commercial organizations of the Krasnodar territory that issued an electronic digital signature in 2018-2019 for the implementation of specific types of economic activity within the region
Information collection	
	The array of empirical information was formed on the basis of a survey of 121 organizations-subjects of the economy of the Krasnodar territory, which had an internal digital structure, management system and used elements of electronic document management (electronic digital signature) in economic activities
Field stage	
	The period of the field stage of the study is January – March 2019.
Analysis of information, development of conclusions and recommendations	
	After receiving the primary information corresponding to the problem and goals of the author's research, it was subjected to verification procedures, primary statistical processing, scaling and generalization. The obtained estimates allowed us to confirm the working research hypothesis, achieve solutions to the array of research goals, and characterize the problems and prospects of digitalization of the regional economy of the Krasnodar territory in the near and medium term

Infrastructure provision processes of digitalization of the regional economy in the Krasnodar region as of 2019 is almost nonexistent, the main elements of the regional information system have not been formed, which will affect the almost universal pessimism of respondents in terms of the availability and functionality evaluation of regional digital infrastructure, experience and satisfaction with the level of functionality of regional digital infrastructure.

The plans for the development of digital corporate culture in the organizations of the economy of the Krasnodar territory, represented by respondents, in 2019-2020 were as follows. Respondents positively evaluated the plans for the development of a digital corporate culture in organizations they represent in the short and medium term, considering the most promising directions of upgrade of corporate digital infrastructure (98,35% of answers), the increased use of cloud services (86,78%), training of specialists in ICT (81,82% of responses), development of corporate personnel reserve of ICT specialists (46,28%).

Optimism about the prospects for the development of the digital economy in the Krasnodar region was almost absent: only 3.31% of respondents planned to participate in the regional program for the development of the digital economy in 2019-2020, and 0.83%-in the corresponding municipal programs.

We note the existing real deficit of efforts and funding for the development of the digital economy of the Krasnodar region by the structures of municipal and regional management, which is expressed in the almost complete absence of specialized regional digital infrastructure, situational attempts to organize electronic document flow, and the concentration of digital interactions mainly within the corporate sector of the region's economy.

In our opinion, this state of Affairs requires the development and implementation of a long-term regional target program for digital economic development, including the use of theoretical and methodological innovations proposed by us in the author's dissertation research.

We also note the progressiveness and optimism of the corporate sector of the region's economy, which has long appreciated the advantages of digital organization of interaction between regional economic processes and is actively implementing its specific forms in its own operational activities. The administration of the Krasnodar territory can and should play the role of initiator of the processes of creating and developing a regional digital economy, which directly affects the long-term socio-economic development and regional competitiveness of the Krasnodar territory.

For practical implementation of target comprehensive programs of economic development of the regional economy of Krasnodar region, we suggest a pre-program "Digital enterprise – the leader of regional economy".

Implement regional core facilities should be massive (ideally complete) translation accounting and reporting functions of the corporate entities within the cloud services servicing commercial banks (regional credit institutions and localized representations of foreign banks), which will provide application solution of complex economic problems:

- formation of a relevant digital system of accounting and reporting on a regional scale, which allows to increase the speed of presenting, processing and issuing economic information about the state and results of the activities of individual entities and their formations (strategic groups, clusters, etc.) within the regional economic system;
- system saving of resources that accompany analog exchange of economic information between corporate entities of the regional economy and the system for collecting statistical information;
- system saving of resources of corporate entities for the implementation of synthetic accounting, reporting and audit functions based on the use of outsourcing tools;
- a qualitative increase in transparency of regional economic processes in the corporate sector, the ability to track, analyze, evaluate and correct regional dynamics in real time (in contrast to the current state of Affairs, which allows for primarily incremental impacts and adjustments).

A significant advantage of the proposed approach for the subjects of the corporate sector of the regional economy is the possibility of free and representative audit of accounting and reporting systems due to the implementation of the principle of mandatory audits of the activities of modern commercial banks (which can easily be extended to the services they offer).

The creation of a regional digital information and economic space, even within the exclusively corporate sector of the region's economy, will significantly realize the existing reserves for accelerating regional development:

- based on the implementation of incentives for preferential access of "digitized" economic entities to the procedures of municipal and regional public procurement;
- through the formation and operational calculation of a system of regional ratings that reflect not abstract economic estimates, but indicators of financial condition, operating activities and their derivatives in terms of real credit load, creditworthiness, investment attractiveness, financial stability and bankruptcy forecast, etc. It should be noted that

the data of the author's estimates, calculated in an automated manner using the system of "digitized" economic entities, can be further aggregated into regional indices and indicators based on real (and not as currently covered by Rosstat) regional economic processes and the effectiveness of the functioning of regional economic entities;
- when using corporate and regional ratings in the development and implementation of appropriate regional / Federal programs of targeted incentives / support / demotivation and elimination.

A special feature of the technical implementation of the proposed program is the need to implement two stages of complex automation:

1. the stage of pairing of the existing information system of accounting of the corporate entity of the regional economy with about personal service supports the credit of the organization (analysis of the needs and characteristics of conjugation, optimization of accounting and reporting procedures and processes, a formalized statement of accounting and reporting tasks, creation and adaptation of software and technical infrastructure of the digital hub, project implementation, staff training, testing of the project, at the digital host, the beginning of release of information in incorporated and integrated);
2. phase conjugation information system digital informational node, "Bank – economic entity" with the regional data center and information systems users, regional economic information of the next level (the structure of state management of the economy of the region, regional users: the population, economic entities, the structure of the meso-level, in originally users).

Integration of the regional information system into the national information process requires the following specific tasks:

- implementation of the accounting process and analysis of the level of use of components of the regional accounting system);
- implementation of tools for primary and in-depth processing, processing, analysis, evaluation and archiving of regional, sub-Federal and Federal socio-economic information;
- optimization of expenses of subjects of regional and sub-Federal information systems for their creation, operation (including joint) and modernization;
- providing customized modes of access for certain categories of users to regional, sub-Federal and Federal arrays of socio-economic information.

A specific institutional innovation planned for implementation based on the results of the author's proposals is the creation of a regional rating Agency that can provide a relevant assessment of the socio-economic situation of the corporate sector of municipalities, districts and the territory of the Krasnodar territory as a whole. This structure will be able to automatically generate and inform interested users about the financial condition and operating results of enterprises in the main branches of the regional economy (residents, localized structures), calculate and publish industry and regional ratings and rankings, and provide the opportunity to implement comprehensive socio-economic research on a municipal and regional scale.

Specific national economic results of creating and functioning such a structure, the mission of which can be considered an objective control of the economic condition and dynamics of the corporate sector of the region's economy should be:

- qualitative growth of information efficiency of the management decision-making base at the municipal and regional levels;
- formation of an alternative digital information source that ensures the rapid formation, issuance and interpretation of regional economic information;
- qualitative improvement of the regional investment climate by ensuring confirmed transparency of reporting of the corporate sector of the regional economy, improving the efficiency of procedures for selecting potential counterparties, the ability to analyze their credit / investment history, the ability to apply quantitative models for assessing creditworthiness and investment attractiveness, both according to Russian and international research and evaluation criteria and procedures.

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Promising Digital Telecommunications Trends and Their Regional Economic and Management Capabilities

Sergey KRETSY
Kuban State Technological University, Moskovskaya st., 2, Krasnodar, Krasnodar region, 350042
kretshu@mail.ru

Nadezhda VAKHRUSHEVA
Kuban State Technological University, Moskovskaya st., 2, Krasnodar, Krasnodar region, 350042
vnv-n@ya.ru

Valery LEVENTSOV
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
va@leventsov.ru

Sergey SALKUTSAN
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
salkutsan@spbstu.ru

Abstract

Modern concept of organizing electronic document management on a regional scale based on the digital information and telecommunications network of the regional scale "Bank – economic entity", as well as the possibility of localized banking structures as nodes of the regional digital infrastructure that can provide the formation of architecture and information and management flows in the regional economic management system can be implemented in the Big Data format and has very significant information and communication and management capabilities in terms of improving the efficiency and targeting of regional efforts and impacts in terms of promising regional initiatives: improvement of the regional investment climate based on a systematic increase in information security of existing and potential subjects of the regional investment process; implementation of targeted personnel programs to ensure the regional economy; regional technological platforms and initiatives; regional social and infrastructure initiatives; regional programs for the formation and use of regional human capital.

Keywords: Telecommunications Trends, Regional Economy, Digital Infrastructure, Big Data.

Introduction

Evaluation of the current level of theoretical and methodological approaches to the implementation of the state function of economic management of the Russian regions are as follows:

- a single and universal definition of the regional economy or regional economic system in the modern theory of regional economy no, the most reasonable scientific approaches to management of economy of the Russian regions is a systematic approach G. B. Kleiner and analog imaging V. Akishina;
- among the problems that hinder the growth of efficiency in managing regional economies are: the lack of a unified national strategy for territorial development, the multiplicity of centers and levels of management and the resulting unjustified fragmentation of managerial functions, the accumulated Agency costs of personnel at each level of management in the region, the lack of differentiation of goals and objectives of sectoral and territorial development, the disparity between the needs and opportunities of regional development, and the predominantly fiscal nature of interaction " region – Center", the real lack of a Federal government structure that can implement the function of state management of the region from the macro level;

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- a separate and independent national economic task of the regional level, the solution of which can contribute to addressing the above questions, we believe the lack of information efficiency that accompanies the operation of the regional economic systems and their actors, which justified the use of outdated methods, technologies and media-centric traditional workflow.

Method of Research

The main trends of digital evolution and their application on a regional economic scale are systematized in table 1.

Table 1: Promising digital telecommunications technologies and their capabilities at the regional level of economic management (compiled by the author)

Digital trend	Technical features	Opportunities for use in managing the region's economy
1	2	3
Big Data	Formation of practically unlimited digital arrays describing multi-parametric economic processes and phenomena	Formation of an array of information that characterizes the state and economic activity of subjects of the regional economy Predictive Analytics of regional socio-economic development
Quantum technology	Processing Big Data arrays in real time	Creation and development of regional data processing centers based on quantum computers with the ability to monitor, analyze, model and predict the activity of individual regional economic entities, as well as their meso-level structures and levels of regional economic systems
Robotics and sensor technology	Replacement of skilled labor with machinery, displacement of employees at the level of qualification "labor force" and " personnel»	Managed modernization of regional industrial complexes in order to increase regional competitiveness, the scale of GRP and the balanced financial result of regional economic entities
Neural capabilities of artificial intelligence	Formation, training and use of machine intelligence systems focused on solving system problems at the global level	Implementation of regional intellectual systems for modeling and forecasting local and regional socio-economic processes and functioning of the region's economy as a whole, as well as its individual subsystems
New materials	Increasing the quality and functionality of consumer goods and services while increasing their environmental friendliness	Managed modernization of consumer behavior for the purpose of environmental protection of regional markets, growth of social responsibility of business and ensuring sustainable functioning and development of regional economic systems
Industrial Internet	Growth of the scale of application and functionality of industrial information and analytical systems	Growth of the share of high-productivity jobs and disposable incomes of the working-age population employed in the region's economy
Registry systems for distributed storage and access (blockchain)	Streaming information systems at the regional, national and global levels	Creation and implementation of regional standards for electronic document circulation covering all levels of the regional economic system
Wireless communication and telecommunications technologies	Increasing the coverage of the territories of countries by the Internet and increasing the speed of connections, which	Full coverage of the territory of the Russian Federation and its regions and the ability to access the Internet in 4G and 5G formats (1.0 GB / s) Harmonization and synchronization of regional socio-economic processes

	makes it possible to use progressive software solutions and services	
Virtual and augmented reality	Improving the efficiency and reducing geo-graphic barriers in terms of training and joint activities of national and global scales	Joint search and innovation activities between the subjects of regional economic systems and beyond The possibility of implementing a number of regional-scale economic activities at the national level (education, health, employment, etc.)

Let's consider the most promising of the presented digital trends – Big Data-and describe its current and future opportunities in terms of using it as part of the regional economy management function.

Big Data technology in the modern sense of the word includes components for collecting, storing and processing arrays of information, the size of which exceeds the current level of development of computing power and requires the use of qualitatively new technical and software solutions. According to researchers AT the HSE, the key indicator of the implementation of Big Data capabilities in managing economic processes at the micro, meso and macro levels is the dynamics of global IP traffic, shown in figure 1, whose growth in 2021 should exceed the indicators of 2016 by 2.5-3 times.

Fig. 1: Dynamics of global information exchange, (Petabytes per month)

Unfortunately, these authors do not provide specific economic forms and tools for using Big Data technologies in management at the regional or national level, limiting themselves to forecasting the following technological changes:

- growth of research opportunities for relatively large and ultra-large socio-economic systems;
- increasing the speed of verification and research of ultra-large information arrays;
- implementation of new standards for collecting, checking and selecting, storing and processing socio-economic data and facts;
- implementation of qualitatively new features for personal data protection;
- the possibility of implementing new models and forecasts of a predictive analytical nature, using a set of socio-economic parameters of the functioning of systems and the identified patterns of "factor-indicator" between them;
- the emergence of new professions and the creation of a number of jobs in research technologies of large and ultra-large dimensions.

According to open research data, the real management capabilities of Big Data technology at the regional level are currently associated with the activities of state / infrastructure enterprises that carry out economic activity within localized socio-economic systems.

It must be emphasized that the implementation of specific techniques and technologies of Big data as applied to the specifics of virtually any structure of municipal / regional management, regional Institute or company is able to provide a system of effects available today, only the most progressive corporate structures, oriented to the non-linear nature of economic impact of such targeted investments.

At the same time, the implementation of Big Data projects at the regional level is almost non-existent, which can be explained by the following systemic problems that are typical for both the micro and meso - and macro levels.

Unfortunately, the current level of digital management solutions at the regional level (as of the beginning of 2019) is represented by a very vague impulse of the Agency for Strategic Initiatives.

At the same time, the authors of the initiative see only functional areas that lie outside the competence of regional authorities as the main directions of regional digital solutions:

- segment of public services (actually implemented as a portal "Public services" with the ability to integrate a specific regional block);
- healthcare segment (national scale with subordination to the Ministry of health of the Russian Federation);
- education segment (Ministry of education, Ministry of science and higher education of the Russian Federation);
- land management and cadastral accounting segment (Federal cadastral chamber of the Federal service for state registration, cadaster and cartography»);
- agriculture segment (Ministry of agriculture of the Russian Federation);
- tourism and culture segment (Federal Agency for tourism, Ministry of culture of the Russian Federation);
- segment of the social sphere (system of the target ministries and agencies);
- solutions for creating / modernizing the urban environment (the only segment that has a meaningful meaning for the regions of the Russian Federation, but is not available due to budget restrictions).

We emphasize that the regions themselves should formulate specific regional management of problems amenable to solution-based technology solutions Big Data that, in the opinion of the initiators of the competition, will contribute to the "tree" specific targeted research projects (in practice the design correct definition and formalization of the problem represents a 50 to 70% of the total research project and require the most skilled performers, which directly affects the actual level of implementation of the research initiative and its informational value).

In our opinion, the prospects for the implementation of the competition look absolutely vague:

- improvement of the regional socio-economic situation – on the basis of what and to what extent, the authors of the competition do not explain;
- reduction of regional costs for the development of digital management technologies-not confirmed in terms of the maximum cost of the stage of setting and formalization of the research task;
- prevention of violations of regional legislation is not confirmed in the absence of specific goals and objectives of competitive initiatives that are obviously relevant for each specific region;
- formation of a Big Data array of regional scale and specificity-it is obvious that it can be standardized and unified, as well as solutions at the national level for managing socio-economic processes;
- the growth of the competence of regional management teams in the field of ICT is obviously an indirect result that has no direct relation to the results of the functioning of the economies of specific regions of the Russian Federation, Federal districts and the country as a whole.

Conclusion

In conclusion, we note that the southern Federal district is among the regions with very significant potential of all types of economic resources, but lacks their level of use as in comparison with the average indicators and comparison with the performance areas – the leaders of the Russian regional development. Among the main problem assessments that indicate the possibility of intensifying the level of use of economic resources in the southern Federal district of the Russian Federation and its constituent regions, we include the GRP of territories included in the southern Federal district, normalized by population and employment factors, which throughout the period under review was significantly lower than the national values, which required increased attention to applied problems of reproduction and effective use of labor resources in target territories, this includes reducing unproductive costs and increasing the coverage and speed of socio-economic processes.

The author's research has identified very significant infrastructure opportunities for private and corporate entities of the economy of the regions of the Russian Federation to digital opportunities and resources of the Internet, allowing to effectively transform the document flow and regional socio-economic processes into a digital form, achieving their continuous coverage, systematic growth in speed, reliability and security. At the same time, the current level of use of digital capabilities of regional economic entities is mainly associated with private and corporate digital initiatives,

and to a certain extent – with the national digital initiative "Public services". Regional digital systems and services are currently at the initial level of their development and are more likely to be in the field of scientific research, rather than applied implementation and maximum possible expansion of the scale of digital activity.

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Telecommunications Techniques in Remote Banking: Focus on the Innovative Development

Viktoria BONDARENKO
Rostov state University of Economics (RINH), Rostov-on-don, Russia
b14v@yandex.ru

Svetlana SHKHALAHOVA
Rostov state University of Economics (RINH), Rostov-on-don, Russia
sveta03081990@mail.ru

Natalya MUKHANOVA
Peter the Great St.Petersburg Polytechnic University, Saint-Petersburg, Russia
nmukhanova@spbstu.ru

Vladimir SHCHEGOLEV
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University
Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
vshchegolev@spbstu.ru

Abstract

The article deals with the role of telecommunications techniques and the digitalization in the innovation-oriented economy. The authors note that digital solutions and the telecommunications infrastructure development are of key importance for the banking sector. The authors prove that in terms of innovative digital and telecommunications solutions it is reasonable to focus on two key directions, such as: the offer and the introduction of new banking products to the market and the offer of neobanking products designed within the framework of an ecosystem approach in combinatorics with business partners. Consumers can also access these products remotely using telecommunications. It is necessary for this to determine the main trends in the banking sector development and to study the telecommunications techniques role in remote banking. It is important for the study of the telecommunications techniques role in remote banking focusing the industry innovative evolution to determine the main trends in the innovative development of the banking sector; to analyse the existing solutions and the situation in customer service involving modern telecommunications techniques. The compliance with ecosystem requirements based on the digital platform, introducing new digital banking and neobanking products to the market involving telecommunications techniques, as well as implementing process innovations based on telecommunications are the main trends for traditional banks in the new conditions. Advanced telecommunications techniques and, accordingly, the digital interaction with consumers make it possible to detail their capabilities and requests significant in remote banking and to conduct their enlarged refined segmentation. Based on the opportunities offered by modern telecommunications in segmenting consumers and interacting with target segments, banks can offer targeted products and services, as well as use the joint promotion of banking and neobanking products in which the target audience is interested. Telecommunications techniques are the driver of the banking sector's development in remote services, their use makes it possible to implement an innovative scenario of functioning. A certain lag in remote banking services in Russia in comparison with a number of foreign countries can be considered as a growth potential that will be realized thanks to the innovative development of telecommunications in the banking sector.

Keywords: Telecommunications; Banking Sector; Remote Banking Services; Main Trends; Innovations

Introduction

The modern economy is innovation-oriented. Innovations determine the leadership of companies in developing markets and countries in the world. The innovative scenario in the economic systems is possible, in many respects, due to the innovative achievements in the sphere of telecommunications today and the potential for creating digital business ecosystems operating on the updated communication platform that allows to bring new products, introduce techniques and further modernize them, according to new business requests, the business models of interaction with

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partners and customers. This is true for the banking sector. It is the economy digitalization development and the telecommunications infrastructure that determine the innovative potential possibilities of economic systems and some industries. For this reason, it is important to determine the digital component share in the countries' GDP (Figure 1).

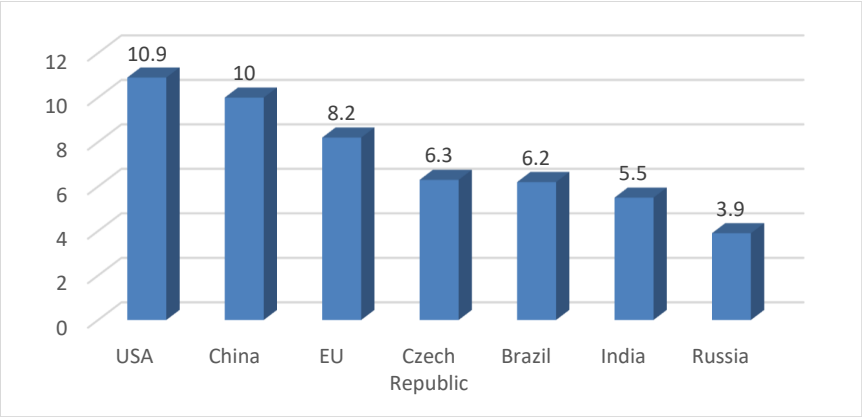

Fig. 1: The digital economy contribution to some countries' GDP in 2017, % [1]

As we can see, now the digital component share in Russia's GDP is lower in comparison with the indicators of other countries, however, according to expert forecasts by 2025 this indicator will reach 34% [1], providing new opportunities for the national economy.

In relation to the banking sector, the expert community predicts significant prospects in the development predetermined by the capabilities of telecommunications and digital techniques [2]. Technological solutions and strengthening relationship with consumers in the remote service capabilities have become the key to the growth of banking sector assets (Figure 2).

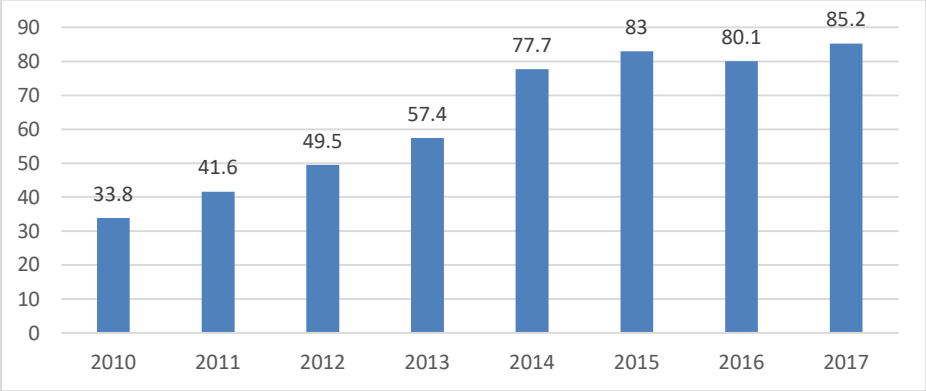

Fig. 2: The banking sector assets growth in Russia in 2010-2017, trillion rub. [2]

As for innovative digital and telecommunications solutions, there are two key trends, such as: the offer and the introduction of new banking products to the market and the offer of neo-banking products designed within the framework of the ecosystem approach in combinatorics with business partners. Consumers can also access these products remotely using telecommunications. It is necessary for this to determine the main trends in the banking sector development and to study the telecommunications techniques role in the remote banking focusing on the industry innovative evolution.

Research Method

It is important for the study of the telecommunications techniques role in remote banking focusing the industry innovative evolution:

- to determine the main trends in the innovative development of the banking sector;
- to analyze the existing solutions and the situation in customer service involving modern telecommunications techniques.

Defining the main trends in the innovative development of the banking sector

For attracting and retaining customers, as well as building relationships with partners, banks make innovative solutions in the three main areas (Figure 3).

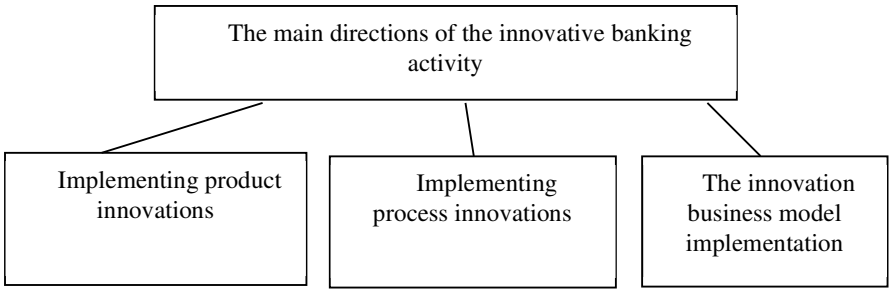

Fig. 3: The main directions of the innovative development in the banking sector [2]

For the innovative development banks focus on the remote availability of new product services, the ability to offer products using the consumer profile determined by the artificial intelligence. Thus, based on digital and telecommunications capabilities, banks take into account the behavioural characteristics of customers, and accordingly, the specific behaviour of consumption, along with financial capabilities [3]. In their loyalty programs, banks focus on the active use of the Internet and social networks by their clients [4]. Telecommunications and digital techniques play a key role in the product innovation process, as they determine the speed of launch and contact with customers, which contributes in reaching the success and increasing the competitiveness [5].

Process innovations in banking are directly connected with the digitalization and the telecommunications infrastructure, which allow monitoring the interaction with consumers and using the customer data similar to the data base of mobile operators [6, 7].

The innovative development in the cooperation between banks and partners, including the non-banking sector, is aimed at the ecosystem approach, which creates digital business ecosystems that include key consumers in addition to counterparties. The cooperation with business partners and the interaction with them in the market, combining co-branding and co-promotion on the digital and telecommunications basis, contribute to attract consumers, their loyalty and to get a foothold in a certain ecosystem [8].

Accordingly, the compliance with ecosystem principles based on the digital platform, introducing new digital banking and neo-banking products to the market involving telecommunications techniques, as well as process innovations based on telecommunications are the main trends for traditional banks in the new environment.

As for business model, traditional banks can become niche players focused on customer requests; service providers under the client's brand, managing balance services; ecosystem owners, major players involving non-banking partners and key consumers in their "orbit"; a fully digital bank, diversifying its various remote consumer services [2].

The analysis of solutions and the situation in customer service involving modern telecommunications techniques

Describing the situation with the remote banking segment development, it is necessary to take into account the active use of Internet techniques in the world. According to the report of the International telecommunication Union in 2018, about 3.9 billion people are Internet users (more than 51% of the world's population) [9]. Figure 4 illustrates the situation in Russia.

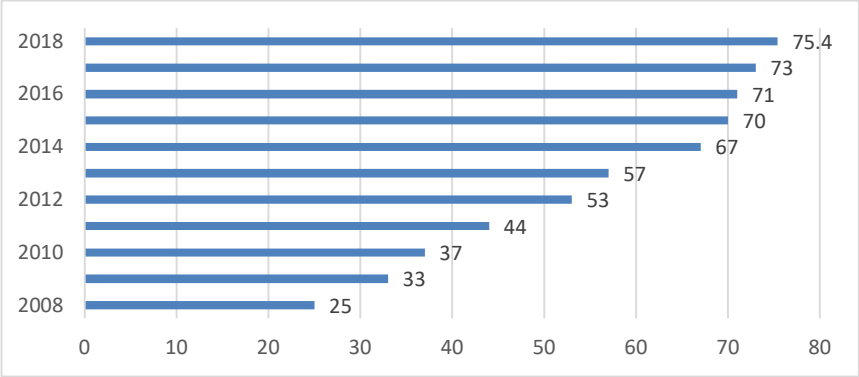

Fig. 4: The internet users' share dynamics in Russia aged 16 and older, % [10]

As we can see, the Internet users' segment is increasing as well as the number of potential stakeholders in the use of remote banking services based on telecommunications techniques. At the same time, the number of persons involved in financial transactions via the Internet in Russia is lower than this indicator in a number of foreign countries (Figure 5).

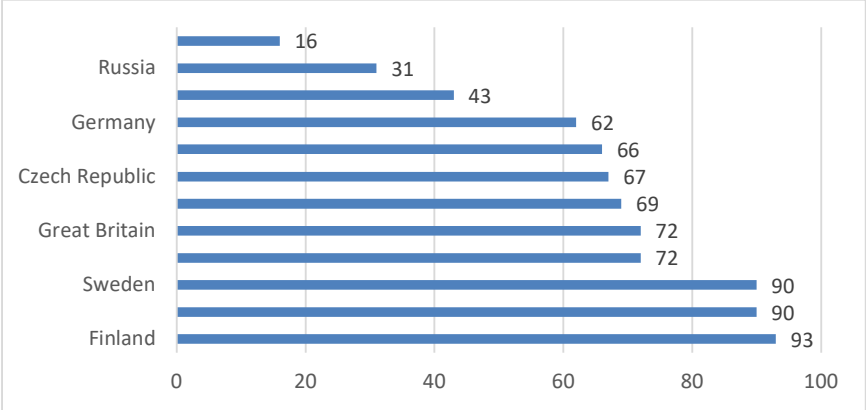

Fig. 5: The Internet use by the population of a number of countries in their financial transactions (% of the number of Internet users aged from 15 to 74 years old) in 2017, % [11]

At the same time, the number of persons involved in financial transactions via the Internet in Russia is lower than this indicator in a number of foreign countries

According to the data, the number of persons involved in financial transactions via the Internet in Russia is lower than this indicator in a number of foreign countries, but it is possible for it to develop this segment. Experts also note that remote banking or electronic banking, including SMS banking, mobile banking and Internet banking, has great prospects for increasing in Russia [12]. For example, according to the empirical data, Russians already use remote banking techniques based on the telecommunications infrastructure development (Figure 6).

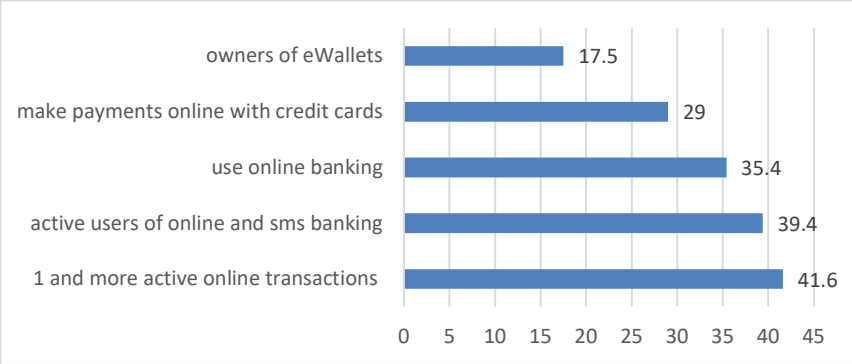

Fig. 6: The involvement of Russians in certain types of remote banking services in 2018, million people [13]

At the same time, it is interesting that various components of payments are dominant in the structure of the remote service option selected by clients (Figure 7).

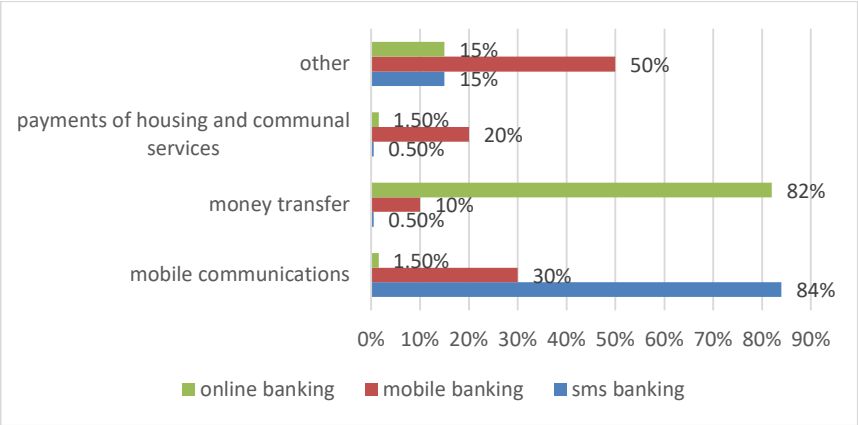

Fig. 7: The payments structure via remote banking channels in Russia in 2018 (according to the empirical data) [14].

The main criterion for choosing a specific channel for a particular operation is the convenience and the simplicity for consumers. Currently, the leader in the parameter of provided services and the share in the market in the B2C segment within the framework of remote services is Sberbank, building its business ecosystem and actively implementing its product and process innovations with the use of telecommunications techniques. Five leading players, including Sberbank, occupy about 75% of the remote banking market [12].

The remote banking services development is possible thanks to the innovations in telecommunications and improving through the process innovations introduction. Banks are interested in remote banking services not only because of the integration in the digital ecosystem and the extension of the serviced persons segment, but also because this service allows to earn commissions and to invest funds, including telecommunications development for reinforcing their market position. For example, advanced telecommunications techniques and, accordingly, the digital format of the interaction with consumers allows banks to detail their capabilities and requests important for remote service and conduct their enlarged, refined segmentation.

In this way, the researchers aggregated the data on remote banking users, their income, volume and list of consumed remote banking services, which allows to determine the average portrait of the consumer ("Budget Employee", "Specialist", "Director") and offer them the required remote services (Figure 8).

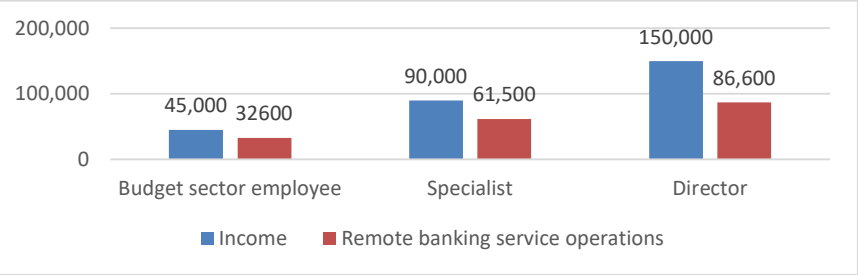

Fig. 8: Typical profiles of the remote banking services customers [12]

Based on the opportunities offered by modern telecommunications in segmenting consumers and interacting with target segments, banks can offer targeted products and services, as well as the joint promotion of banking and non-banking products for target audience.

Nowadays, telecommunications techniques allow to improve and expand remote banking services, including through actively implemented mobile applications that reduce time costs for consumers and simplify their access to various services. Accordingly, telecommunications techniques are the driver of the banking sector's development in remote services, their use makes it possible to implement an innovative scenario of functioning. We believe that a certain lag in remote banking services in Russia in comparison with a number of foreign countries can be considered as a growth potential that will be realized thanks to the innovative development of telecommunications in the banking sector.

Information and telecommunications technologies are actively used not only in the banking sector, but also in the sphere of commodity circulation. Integration of the banking sector and commodity circulation will facilitate the use of innovative tools, in particular through the use of telecommunications technologies [15,16,17,18,19,20].

Conclusion

1. The modern economy is innovation-oriented, this is its significant feature which determines the competitive positions and potential opportunities of the state on the world stage, and also allows innovative companies situated on the territory of the country to separate from competitors.
2. The innovative scenario of functioning is possible largely due to the digitalization of economy and telecommunications infrastructure development, which determines the growth potential of economic sectors.
3. In the banking sector, telecommunications techniques and digital business ecosystems allow to bring new products, introduce techniques and further modernize them, according to new business requests, the business models of interaction with partners and customers.
4. The compliance with ecosystem requirements based on the digital platform, introducing new digital banking and neo-banking products to the market involving telecommunications techniques, as well as implementing process innovations based on telecommunications are the main trends for traditional banks in the new conditions.
5. Remote banking or electronic banking, including SMS banking, mobile banking and Internet banking are very promising in Russia. Telecommunications techniques make it possible to improve and expand remote banking services. Telecommunications techniques are the driver of the banking sector development in the remote services, allow to implement an innovative scenario of functioning.

Acknowledgements

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The Impact of Information and Communication Techniques on the Russian Industrial Sector Development: Current Trends and Future Consequences of the "Industry 4.0» Introduction

Viktoria BONDARENKO
Rostov state University of Economics (RINH), Rostov-on-don, Russia
b14v@yandex.ru

Innessa EFREMENKO
Rostov state University of Economics (RINH), Rostov-on-don, Russia
efremenko@yandex.ru

Ekaterina ABUSHOVA
Peter the Great St.Petersburg Polytechnic University, Saint-Petersburg, Russia
abushova_ee@spbstu.ru

Vladislav TERESHCHENKO
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University
Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
v.v.tereshchenko92@gmail.com

Abstract

The article analyzes the impact of information and communication techniques on the Russian industrial sector development in terms of revealing the trends that have already appeared and the expected positive prospects. Enterprises and organizations in all the federal districts of Russia actively invest in information and communication techniques, as well as use special software and communication tools, which indicates their practical interest in this issue.

Currently, according to experts, the share of Russian production in the information and communication sector in the structure of world GDP is no more than 0.2%. At the same time, to successfully integrate into the global economy in the context of widespread digitalization, Russian enterprises need to increase the implementation of modern information and communication techniques contributing to successful development and compliance with the emerging realities.

As the current trends emerging due to the introduction of information and communication techniques in industry are enterprises competitiveness growth and market risks reduced through an advanced research function and high-quality information about markets, partners and consumers in real time. Due to the results of empirical studies the formation of business models based on new communication techniques; innovation in electrification; active introduction of techniques of artificial intelligence and machine learning; scaling the Internet of things; strengthening attention to the issue of cybersecurity because of the widespread use of communication techniques are considered to be trends affecting the industrial enterprises.

The main predicted positive effects of the "Industry 4.0" introduction are supposed to be increasing the labor productivity and the efficiency of production processes based on full-fledged analytical study, widespread automation of routine procedures, strengthening relationship with partners and consumers, which is necessary for the industrial sector development and strengthening its competitive position.

Keywords: Information and Communication Techniques; Current Trends; Expected Consequences; Industrial Enterprises; "Industry 4.0"

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Introduction

The information and communication techniques play a key role in modern conditions transforming the quality of work in the enterprises that reorient their activity on consumers and their interests as well as use marketing techniques involving telecommunications to increase their competitiveness. Enterprises and organizations in all the federal districts of Russia actively invest in information and communication techniques, as well as use special software and communication tools, which indicates their practical interest in this issue.

A number of researchers note the importance of modern telecommunications in providing competitive advantages for business, which is achieved through coverage, automation of processes and procedures, ability to conduct periodic research, feedback, and economies of scale [1]. This is confirmed by the interest of enterprises and organizations in costs on information and communication techniques, data on which in the context of federal districts of Russia are shown in Figure 1.

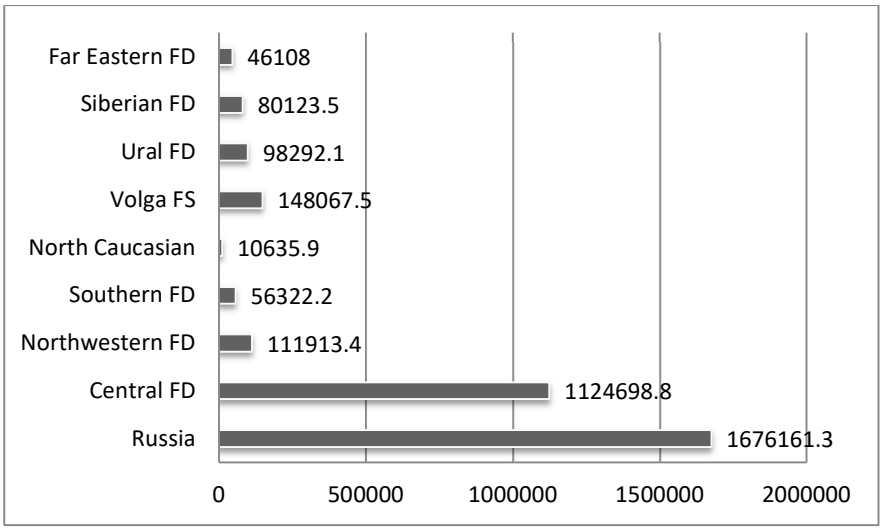

Fig. 1: Costs of organizations on ICT, including communication services, telecommunications equipment, and personnel training in 2018 in federal districts (FD) of the Russian Federation, million rubles [2].

According to the presented data, the Central Federal district (67%) is the leader in costs on this component, it is followed by the PFD (8.8%) and the NWFD (6.7%).

Another criterion that indicates the interest of enterprises and organizations to actively implement information and communication techniques in their activities aimed at the business competitiveness growth is the use of special software and communication tools (Figure 2). The information in Figure 2 shows similar trends in the interest of enterprises and organizations in various federal districts of Russia to use special software and communication tools.

The introduction of information and communication techniques into production changes the demand for labour skills and competencies of human resources. And human resources in turn tend more and more to get high technological skills and the ability to work effectively in the digital environment [3].

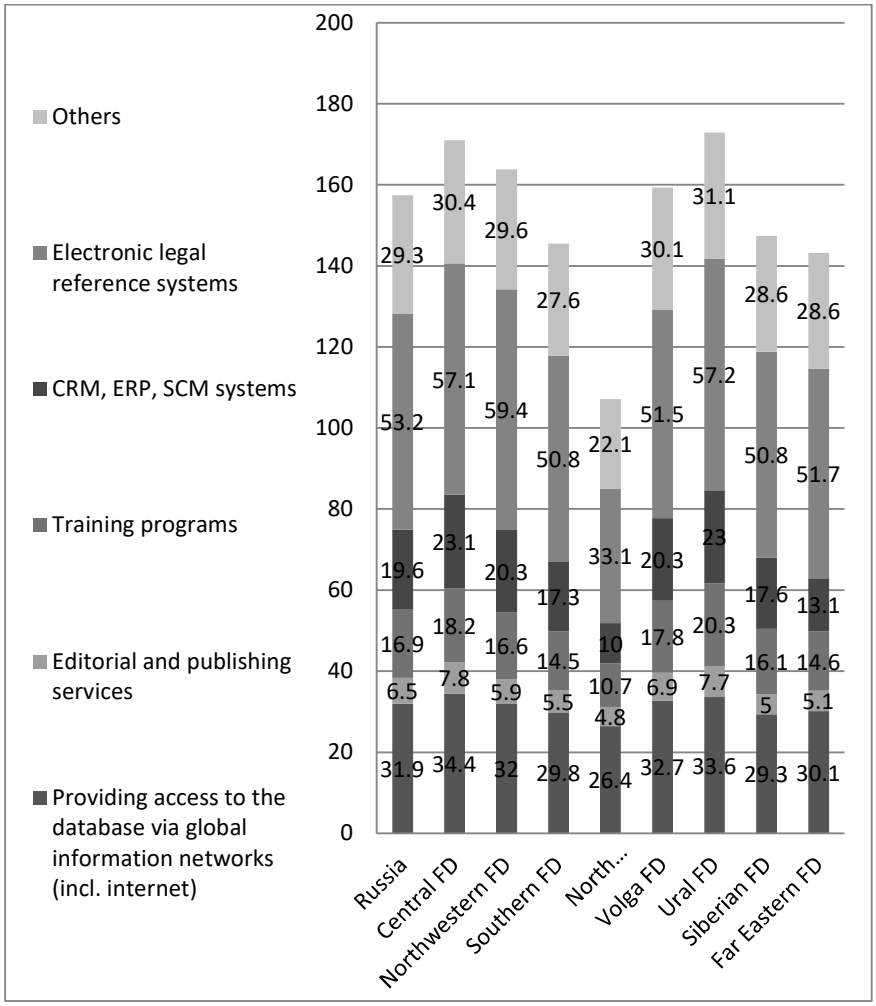

Fig. 2: The share distribution of special software and communication tools in 2018 by Federal districts (FD) of the Russian Federation, million rubles [2]

Russia is currently focused on the active development of information and communication techniques, that is reflected, for example, in the national program "Digital economy of the Russian Federation" [4].

However, until recently, according to large-scale research and expert conclusions [5, 6] Russia was significantly behind a number of other countries in the world in terms of the development of information and communication techniques. Today, despite the general trends focused on the development of information and communication techniques, their implementation in various federal districts of Russia is still uneven [12].

Increasing the role of digitalization means a constant increase in the volume of stored data based on the latest technologies. Simplification of multimedia, including images, tests, and videos created the conditions for the transformation of digital channels. In the center of the digital channel is the consumer. The consumer's communication channel is based on media technologies [7, 8].

According to experts, despite the interest in the development of information and communication techniques in Russia and the efforts to implement them in various sectors of the economy, as well as the significant growth of this sector the Russia's production share in the information and communication sector in the structure of the world GDP is no more than 0.2% [13]. At the same time, to successfully integrate into the global economy in the context of widespread digitalization, Russian enterprises need to increase the implementation of modern information and communication techniques contributing to successful development and compliance with the emerging realities [19].

It is very important to understand the further development of the real economy under the influence of modern information and communication techniques. Taking into account the significant role of industry for the Russian economy and its national security, it is important to study the key trends in the impact of information and

communication techniques and evaluate the long-term consequences of the "Industry 4.0" introduction in the Russian industrial sector.

Research Method

Identifying the impact of information and communication techniques on the of the Russia's industrial sector development presupposes the following:

- evaluate the main theoretical aspects and empirical results that indicate trends in the industry under the influence of information and communication techniques;
- validate the long-term consequences of the "Industry 4.0" introduction in the industrial sector of Russia.

The evaluation of the main theoretical aspects and empirical results that indicate trends in the industry under the influence of information and communication techniques

Information and communication techniques in the context of digitalization create new opportunities in the work of enterprises, which is provided by artificial intelligence, which allows, for example, to process massive information resources. Based on the introduction of information and communication techniques in their work, industrial enterprises strengthen their work with consumers in the production and consumer markets [15].

Foreign scientists, such as V. Delon, E. Mclins and S. Petter in terms of evaluating the security opportunities for the industrial development, pay special attention to the information and communication component in cooperation with partners and consumers [16]. Russian researchers such as G. Bagiev, L. Bushueva, O. Tretyak and others wholly agree with them on this score [17].

For substantiating the current trends in the introduction of information and communication techniques in the context of generalizing the theoretical views of specialists on this issue, along with strengthening work with consumers and, as a result, increasing the enterprises competitiveness, their role in validating and reducing market risks through an expanded research function and high-quality information about markets, partners and consumers in real time are supposed to be important [7,8].

Today, in Russia, industrial enterprises on digitalization and automation of production, and the use of modern telecommunications techniques are significantly behind a number of successful foreign counterparts [18].

Evaluating the empirical results of changes in the industry under the influence of information and communication techniques, it is reasonable to cite the results of a study by Mckinnzie experts in 2017-2018.

The problem field of research is unplanned and unreliable results for substantiating current trends in the introduction of information and communication technologies in the context of generalizing theoretical views of specialists on this issue, along with increasing work with consumers and, as a result, increasing the competitiveness of enterprises, their role in justifying and reducing market risks by expanding the research function and quality information about markets, partners and consumers in real time [9,10, 11].

The study is a survey of 300 managers of industrial enterprises (in the mechanical engineering sector), which resulted in the following promising trends that affect the work of industrial enterprises: the formation of business models based on new communication techniques; innovation in electrification; active introduction of techniques of artificial intelligence and machine learning; scaling the Internet of things; strengthening attention to the issue of cybersecurity because of the widespread use of communication techniques [3].

The survey also revealed a difference between the readiness of the industrial sector to change in these areas and the potential positive effect on the industry (Figure 3).

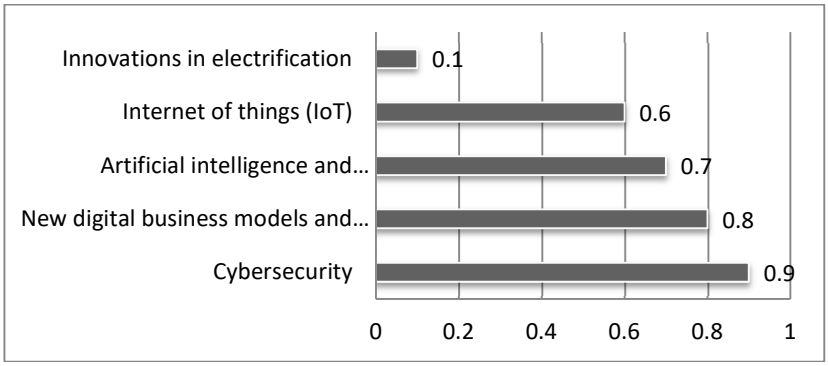

Fig. 3: The difference between the industrial sector readiness to change in these areas and the potential positive effect for the industry according to expert data [3]

The given theoretical basis and empirical research data indicate significant manifestations of information and communication techniques in the development of industry in Russia, which causes interest in the study of the future consequences of the "Industry 4.0" introduction, based on the full-scale digitalization and modern telecommunications.

The validation of the long-term consequences of the "Industry 4.0" introduction in the Russian industrial sector

As part of the evaluation of the development prospects of the industry in Russia, the full-scale penetration into the practical sphere of the "Industry 4.0" is very important. It means the introduction of communication techniques, the Internet of things and the IT component in all the functional areas of the industrial sector. Based on the forecasts, it is reasonable to take into account the following expert data on the positive consequences of the introduction of the Internet of things in a number of industries in the world (Figure 4).

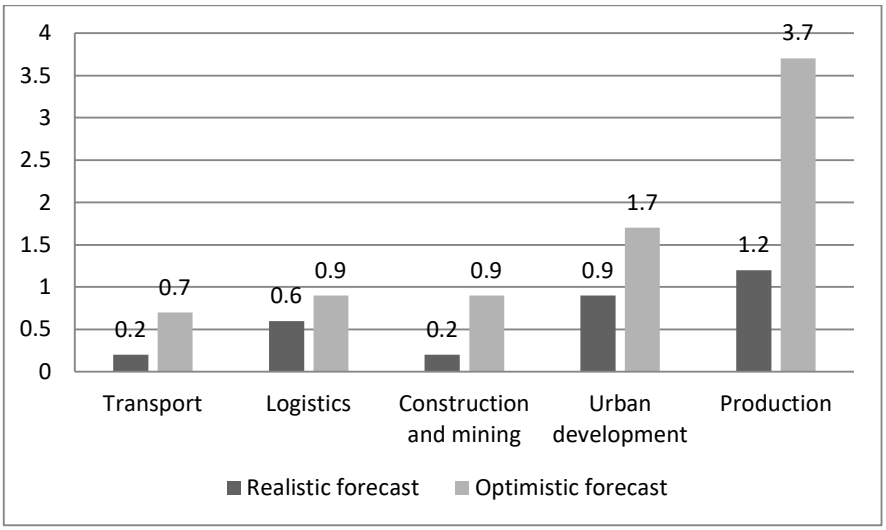

Fig. 4: The expert evaluation of the impact of the Internet of things on the world economy in a number of industries by 2025, trillion US dollars [14]

According to the data, the future impact of the Internet of things on the world economy is significant both in a realistic forecast and in an optimistic one. In particular, the full-scale growth of this influence is predicted in the industry. Also, as part of expert evaluation, it is possible to get information about the main benefits for the industry from the introduction of elements of "Industry 4.0" in daily practice of enterprises (Figure 5).

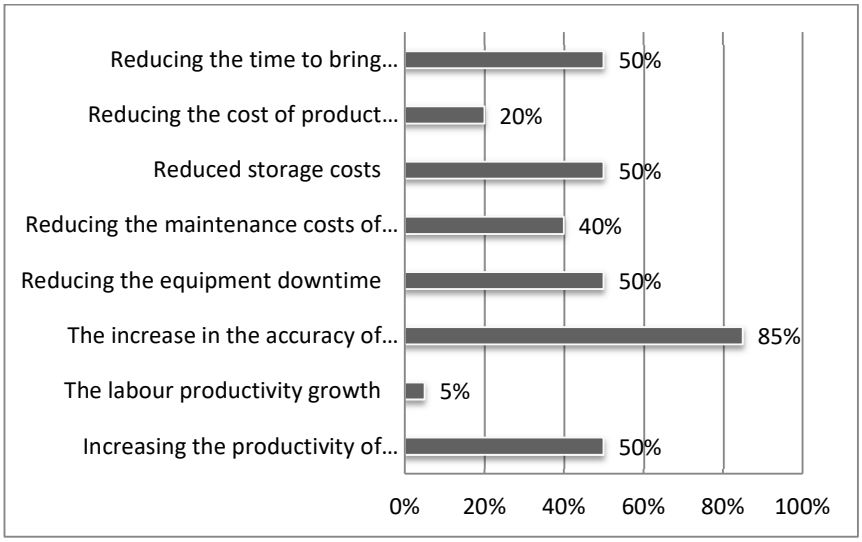

Fig. 5: Expert evaluation of the benefits of implementing "Industry 4.0" by 2025, % (an optimistic forecast) [14]

It should be noted that these promising positive consequences are very important for Russia's industry, where the labour productivity, for example, lags behind foreign counterparts. Despite the objective difficulties in the global and national economy, there are also positive forecasts of the introduction of information and communication techniques in the Russian industry in the format of "Industry 4.0" and connected with these circumstances results of influence on a number of industries (Figure 6).

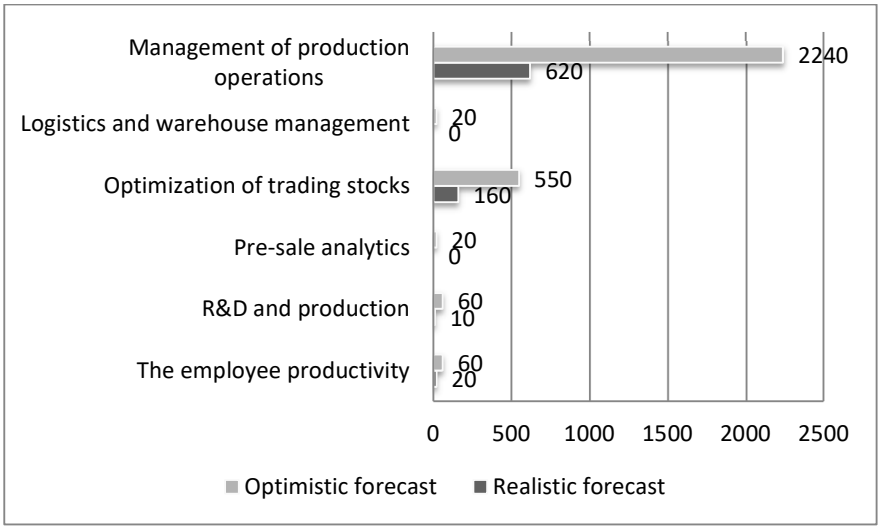

Fig. 6: The expert evaluation of the effectiveness of implementing elements of "Industry 4.0" in Russia by 2025, billion rubles [19]

These positive effects are, in many respects, defining for the Russian industrial sector, which needs innovative updates and overall improvement in the efficiency of production processes, which can be achieved through the full implementation of information and communication techniques.

In many respects, the positive results of the implementation of ''Industry 4.0'' are aimed at improving full-fledged analytical processes, the widespread automation of routine procedures, and strengthening communication with partners and consumers, which is necessary for the development of the industrial sector and its competitiveness.

Conclusion

1. The interest of enterprises and organizations in investing in information and communication techniques in Russia in the context of federal districts presents that the real sector of the economy and industry are aware the importance of information and communication techniques in the competitiveness of enterprises and organizations.
2. Despite ongoing initiatives to digitalize the economy and to introduce information and communication techniques in all the areas of the national economy, there is a lag in this criterion from a number of other countries, which can be considered as the potential necessary to achieve in the foreseeable future.
3. As the current trends emerging due to the introduction of information and communication techniques in industry are enterprises competitiveness growth and market risks reduced through an advanced research function and high-quality information about markets, partners and consumers in real time.
4. Due to the results of empirical studies the formation of business models based on new communication techniques; innovation in electrification; active introduction of techniques of artificial intelligence and machine learning; scaling the Internet of things; strengthening attention to the issue of cybersecurity because of the widespread use of communication techniques are considered to be trends affecting the industrial enterprises.
5. The main predicted positive effects of the "Industry 4.0" introduction are supposed to be increasing the labour productivity and the efficiency of production processes based on full-fledged analytical study, widespread automation of routine procedures, strengthening relationship with partners and consumers, which is necessary for the industrial sector development and strengthening its competitive potential.

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Formation of Relational Strategies of The Enterprise in The Conditions of Network Info communication Interactions

Sergey KRYMOV
Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
SKrymov@yandex.ru

Valery LEVENTSOV
National Technology Initiative Center for Advanced Manufacturing Technologies based on the Institute of Advanced Manufacturing Technologies of Peter the Great St. Petersburg Polytechnic University
Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
va@leventsov.ru

Nellie KLASSEN
Peter the Great St. Petersburg Polytechnic University Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
nellieklassen@gmail.com

Abstract

In the article, new strategic guidelines for enterprise development are associated with the formation of relational strategies based on infocommunication interactions with other network entities. The purpose of this work is to develop and study a model for forming relational strategies of an enterprise operating in the conditions of network interactions. Norms of behavior of relational actors are regulated not only by formal obligations, but also by largely informal agreements. The theoretical and methodological concept of the work is based on the idea that relational relations between partners in interaction due to a high level of self-organization, adaptation to infocommunication interactions and ordering of activities can ensure the achievement of strategic targets for the development of the enterprise. The results of the work consist, first, in expanding the category of relational rent: its content is supplemented with a network component, which actively contributes to the inclusion of potential partners in the processes of information relationships; second, in updating the system of principles for the formation of relationships based on additional principles of networking and giving new content to the known ones; thirdly, in the development, clarification of the definition of "relational strategy", resulting in the addition formulas of the relational space connected with two-way interactions, the concept of the perspectives of a network of relationships; fourth, the modernization approach to the development of integral indicator of assessment of the potential and outcomes of relational interactions that are based on multivariate models by incorporating additional components, reflecting slavishly. These results determine the theoretical and practical value of the work, have signs of scientific novelty, which is significant for specialists in the field of strategic planning at the enterprise. The relevance of the research is due to the incorporation of a set of issues related to the relational network component in the theory and practice of strategic planning.

Keywords: Interactions, Relational Contract, Strategies, Factors, Principles, Network, Model.

Introduction

Rapid development of infocommunication technologies and NTP leads to radical changes in the structure of companies operating on the market. Classical value chains include an increasing number of transactions related to both the processes of production and exchange, distribution, exchange. The processes of creating goods begin to imply not a one-way flow along the main trend, as was the case earlier, in a sequential traditional chain. Now the movement of resources is transformed into mutually connected and multidirectional relationships, including flows of their own suppliers, suppliers for suppliers, customers, and so on. This is the only way to ensure high rates of enterprise development and widespread introduction of innovations. Innovation activity leads to a transition from vertical network interactions with subject-object relations, often with non-equivalent exchange, to horizontal subject-subject economic relations. M. Castells points out that «the Network form of organization ... is made up of many cultures, many values, many projects, representing ... more like a patchwork quilt sewn from the experience of interests than a Charter of rights and responsibilities. This is a diverse virtual culture» [1]. A new mechanism of interaction is being created that allows agents to maintain their independence in terms of functional (production-economic) relationships. Autonomous enterprises should build bilateral relations based on the conclusion of contracts with network participants.

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Full (classic) contracts are aimed at fully formalizing the future terms of joint activity. Models of behavior of actors in incomplete (neoclassical) contracts assume less strict details of actions. However, the company's actions for both types of these contracts do not extend to a long, strategic period, often the agreement covers only one transaction. Relational contracts are more acceptable for achieving long-term goals.

Relational contracts are a contract that contains a set of mutual obligations between independent partners -participants of the agreement for a set period [2], fixing only the most priority relationships. For relational relationships, informal relationships prevail over formal ones, and joint business processes are focused on self-organization. Trust determines the priorities of relational contracts [3]. The agreement is self-fulfilling, the presence of formal agreements only forms the direction of the joint vector of relations [4]. The object of contractual obligations are highly specific assets that cannot actually be used alternatively, so it becomes not rational for the transaction actors to break the contract. The defining feature of specific assets is not their uniqueness, but the impossibility of copying, the presence of «isolation mechanisms» [5]. In relation to interactions, this is achieved by the complementarity of assets, the complexity and cost of switching to new actors. The long-term nature of relational relationships leads to the need for the formation of relational strategies, which was recently proposed by the authors [6]. However, at present, the relational strategies of the enterprise are not sufficiently studied, which actualizes the authors appeal to the analysis of a new concept that makes up the content of the presented work.

Method of Research

The following scheme is proposed for the process of explication of the method for forming relational strategies:

- system analysis of the main categories and basic patterns of relationships;
- research of existing models of relational strategies and unified basic relational strategies;
- content of the key principles underlying the methodology of relational strategies;
- suggestions on the method of calculating the integral index of the relation.

Basic categories and basic patterns of relationships

Let's consider a number of fundamental categories of relationships, the source of which is the object of the relationship. the Category reflects the direction of two-party interactions.

«The object of relation is a limited specific area of production, economic, innovation, investment, market and other activities of the enterprise, within which relational relations are implemented» [7].

Many two-way relationships are represented by another category.

«The relational space of an enterprise is a set of two-party system interactions, both inside and outside the borders of the enterprise, with other economic entities» [8].

This definition reveals, on the one hand, the opportunities to attract the resources of actors, and on the other hand, indicates the formation of the enterprise's own security area, created through cooperation with a partner. The presence of a security zone is aimed at reducing the risk of unstable development of the enterprise due to the threat of losing a partner, its opportunistic behavior, and eliminating possible problems with the search for new actors.

An important characteristic of the strategic development of an enterprise that develops the previous definition is the category «portfolio of relationships». This is a set of real and potential interactions, including intra-company and inter-organizational relationships. In fact, this is a higher-level space containing all possible relationships, including information about prospective contracts that can potentially be concluded [9].

Most modern views of enterprise strategy are based on resource theory (RBV). It is postulated that the priority factor for obtaining competitive advantages of the enterprise is the extraction of rent from the effective allocation of resources, which is provided on the basis of the abilities (special qualities) of firms [10], [11].

G. B. Kleiner proposed to generalize the resource theory, moving from the firm (RBVf), as an object of analysis, to the economic system (RBVs) [12]. The subject of research is now becoming both larger associations (corporations, clusters, holdings, etc.) and other subjects of economic systems (projects, processes, environments, etc.). the Key concept of the resource theory of the system organization of the economy is the category of «partner advantages», which reflects «the conditions that ensure the inclusion of this subject in mutually beneficial relations with other

subjects» [13]. Interaction of enterprises within the economic system will allow attracting additional resources that the enterprise cannot develop independently, or it is not rational for any reason. The perspective of access to the resources of the economic system allows you to carry out the processes of production, consumption, distribution, exchange at the enterprise, using the potential of the formed relational space and relational portfolio as a mechanism for implementing strategies.

The effect of relational partnerships can be measured using the «relational rent» category. This rent, according to J. Dyer and X. Singh is defined as «a superprofit that is jointly obtained as a result of an exchange relationship that cannot be shared by any of the partners in isolation from each other and that can only be created by the joint idiosyncratic efforts of the partners specialized in their alliances» [14].

We will use the following concept of relational rent extended by the authors in the framework of partnership relations.

Relational rents from the use of partner resources can provide the following benefits:

– first, various types of economic rents: Ricardian (possession of limited valuable resources); monopoly (market power of Association); entrepreneurial (joint innovation projects and risk sharing), which causes the receipt of income, the formation of which cannot be carried out independently;
– second, quasirents in the form of: increase goodwill; expand the field of safe development; create a Foundation for obtaining possible synergies from relationships, which creates the potential for the formation of new competitive advantages.
– third, network rent in the form of acquiring network advantages: increasing the speed and intensity of interactions; increasing the scope of activities; organizing joint team work.

The given interpretation of relational rent allows us to formulate the following author's definition of a relational strategy.

Relational strategy – a strategy aimed at fostering the relational space between the enterprise and other economic entities, which create partnership benefits businesses, with the aim of: firstly, obtaining relational rents – the profit received based on the exchange relationship, which can form only the total stress s partners; secondly, creating conditions in the form of goodwill growth, expanding the area of safe development of the enterprise, and strategic prospects for obtaining a synergistic effect as a result of joint actions of partners, third, obtaining network advantages associated with the creation of a new economic entity – a local network, which contributes to improving the competitiveness of the enterprise, allows you to form a local network market.

The strategy provides allocation of resources in the specified areas of enterprise development, as a result of using the opportunities and reserves of the economic system (network of interacting agents) to which the enterprise belongs. In fact, the content strategy is determined, on the one hand, the potential to use certain resources partner with other identifying necessary resources provided in return that pay back of own contribution and interest to partner, as well as de-termination of period of validity of the contract. In addition, relations also contribute to the formation of a set of opportunities that improve the market conditions for the development of the enterprise based on the growth of goodwill and other partner advantages within the framework of the relationship.

The basic attitudes of relational actors are largely reflected in table 1, which contains a set of motives that guide the subjects of relational interactions to achieve their respective strategic goals.

Table 1: Motivational behavior of actors in implementing relational interactions

Motives for implementation interactions	Стратегическая цель
1. The impossibility of an Autonomous achievement of the goals of the company	The solution is achievable when solving problems together
2. High uncertainty of market development, the need to adapt the company to various forecast situations	The risk of costly competition is reduced when market participants cooperate
3. Cooperation with competitors that have approximately equal levels and rates of overall development	Stability of development and the need for complementary market, production and other resources
4. Availability of technical, managerial and other relationships between market agents	The need to complicate the complex of existing relationships
5. Diversity, heterogeneity of available resources, competition for the possession of other necessary resources	Getting access to additional resources using a partner

6. The presence of a complex of problems that dominate the actors	Cooperation will solve some of the lateral problems
7. The Need to expand the scope and scale of the enterprise	The growth of the interaction space, which can be interpreted as the expansion of the enterprise boundaries, the scale effect is achieved without mergers
8. Industry innovation activity	Integration of competencies, investment potential, etc.
9. Need for support in various projects, establishment of framework agreements on cooperation	Coordination of production and other activities on a soft associative basis, increasing the potential of actors

Motives represent the organizational and economic conditions that shape the behavior of actors in the implementation of relational relationships. each motive corresponds to its own strategic goal-a reference point. At a higher level of goal-setting, the determining motive, which covers the entire set of goals-guidelines, is the achievement of goals-systems (interpreted in the well-known terminology used in management, in particular, by A. Prigozhin [15]), which for relational relations can be identified as target installations aimed at: a) attracting certain complementary resources; b) forming a zone of stable, safe development.

The strategic focus on attracting complementary resources is often considered to be the main motive behind relational interactions and related to the actor's needs for new opportunities that cannot be obtained independently. This is the content of the 1st goal-the system. This setting should probably be significant, but it is not the only one possible.

You can count on getting partner advantages without resorting to «dense», effective interaction, limiting your economic interests not to enhancing the potential of the enterprise by obtaining resources from the partner, but on the basis of reducing market uncertainty under the simple assumption that positive interactions strengthen the enterprise. Ensuring safe development is the content of the 2nd goal-the system. An enterprise in a number of market situations, instead of maximizing profits and steadily minimizing costs, seeks to find an «economically satisfactory» solution that would significantly reduce the level of uncertainty and risk in the market. In fact, instead of looking for directions of development related to maximizing profits with acceptable security, the company tries to increase its own security with acceptable profitability. The concept of providing high security with acceptable returns often comes to the fore in relational relationships [16], [17], [18].

Existing models of relational strategies

Currently, there are two approaches to the formation of relational strategies. The first one is based on the model of Krymov S. M. (2015), developed with co-authors [6], [7] based on the assessment of the relational effect, i.e. on the appearance of additional opportunities for the enterprise in the implementation of relation. However, the prospects for exchanging material and technical resources between partners in the production and technological chain are actually being explored. For infocommunication network interactions, such an exchange cannot be taken as a basis, since it is not sufficiently focused on obtaining key sources of intangible, specialized values, and is poorly represented in accounting reports, which is typical for the digital age.

The second approach was developed by V. A. Liventsov (2019), another co-author of the presented study [19]. The basis of this model is the following innovations, discussed below:

– key principles of relationships are proposed;
– unified basic relational strategies have been developed;
– developed a method for calculating the integral index of the correlation, taking into account the indicators determined by the specified key principles underlying the methodology for implementing relationships.

As special principles that define the relational strategy, we suggest using the following four most significant ones. Trust, valence, congruence, and pertinence.

The principle of trust. Coordinating the interests of participants in relational interactions is based on trust. This is the basic principle of relationships. After all, relational contracts, as noted above, are also called trust contracts.

By K. Arrow «Trust is a commodity that has real economic and practical value: it increases the efficiency of the entire system as a whole, allowing more goods to be produced» [20]. In fact, this statement of the Nobel laureate allows us to identify trust with an economic resource, which determines the significance of the principle.

The principle of valence. The ability of actors to implement relationships – the valence of relationships – should reflect the requests and requirements of participants to implement interactions. The possibility of interaction implies a high degree of expectation from the implementation of the correlation. Valence indicates the value of relationships: the implementation of interactions should lead to the improvement of various characteristics of the enterprise, the achievement of the intended strategic orientations.

The principle of congruence. A high level of congruence, i.e., the integrity of relationships, is required. Interaction requires, as any exchange in modern economies, according To D. North [21], institutional reliability. Congruence reflects, first, the consistency and mutual correspondence of actions of relational actors. It can be manifested in maintaining coordination of structures, volumes of manufactured and sold products. Second, in Economics, congruence is often identified with the correspondence of informal and formal rules. Since informal relations prevail over formal ones for relationships, there must be a faciliation of interaction processes between the actors of the relationship. Only by using soft associative interactions can the initial settings of a relational contract be fulfilled [22].

The principle of permanence. Pertinence expresses the share of useful information in the total information about the relationship. It is necessary to be able to obtain a high level of reliability and significance of information about the interaction, which reflects the measure of pertinence of the correlation.

In this model, basic relational strategies have been developed that reflect universal methods for achieving competitive (partner) advantages.

First, the strategy of complementarity. For inter-firm interactions, this is achieved due to the complementarity of partner firms ' resources and the potential for new opportunities. In addition, due to the synergistic effect of the relationship. The latter is most clearly seen when combining efforts to implement a project related to the creation of new products and various technologies. Strategies reflect new ways to gain competitive (partner) advantages.

Second, security strategies. Strategies reflect new approaches to the understanding of the methodology development. For inter-company interactions, this means abandoning the traditional strategic guidelines related to maximizing profits with satisfactory security. The company does not want to take risks, so it chooses to maximize security at an acceptable yield. Based on reducing market uncertainty with the simple assumption that positive interactions strengthen the enterprise.

The integral correlation indicator is a weighted sum of confidence (T), valence (V), congruence (K), and pertinence (P) indicators, i.e. it is a 4-factor model. The content of each of the indicators T, V, K, P is determined based on the explication of the above principles. A multivariate model is also used to evaluate the confidence, valence, congruence, and pertinence indicators, in which proper factors are identified [9]. Factors and weights are determined by an expert method.

The choice of a specific type of basic strategy, complementarity or security, is determined by the values of the integral indicator: at high values, it is possible to count on the exchange of resources with the partner, i.e., on the complementarity strategy; for lower values, you can only count on the security strategy. At the same time, indicators below a certain threshold (depending on the industry, life cycle, and other conditions) indicate that building joint strategic guidelines is difficult.

Author's network model of relational strategies

In the development of the existing model Of V. A. Liventsov, a model is proposed that takes into account the features of network interactions.

To do this, we have expanded the set of key principles that reflect the methodology of relational interactions. In addition to the principles of trust, valence, congruence, and pertinence, the principle of networking is used.

The principle of networking-economic networks are created from firms that are difficult to develop independently in a high market competition, so they are combined to isolate the firms in the network, which allows you to form a local network market.

The integral indicator will now represent a multi-factor model containing the sum of five weighted indicators:

$$I_и = w_t T + w_v V + w_k K + w_p P + w_s S, \quad (1)$$

where wt, wv, wk, wp, ws are the weight coefficients; factors: T – trust, V – valence, K – congruence, P – pertinence, S – networkings.

The method of calculating the confidence, valence, and congruence indicators is determined in full accordance with the Leventsov V. A. model, which is already noted above, by using multi-factor estimators, as described in [19]. Based on them, basic relational strategies of complementarity or security are formed.

For a wide network of interactions promising another view of the underlying relational strategies – a strategy for the formation of local networks. Their formation requires the use of estimates of the networked indicator based on the following content interpretation of the networked principle.

The formation of infocommunication networks is associated with the search for economic niches where it is possible to aggregate resources to create local production and economic systems. In this case, the niches become a platform for production, distribution, exchange and consumption of resources. There are wide opportunities for relationships with other niches [23]. The reason for the emergence of niches is the presence of strategic development prospects that cannot be implemented in many areas at the same time. After all, the enterprise infrastructure is simply not able to provide competitive advantages in all business processes, and there are not enough resources. Niches are filled with networks created by small and medium-sized firms. Partnership with niche participants not only creates opportunities to reduce the degree of industry concentration, but also creates a new local market, which is primarily aimed at the principle of networking.

Factors of technical and economic indicators of niches can be used to assess the networked indicator. In many ways, the effectiveness of networking depends on the coordination of actions (coordination) of actors involved in network interactions. The list and perspectives of measuring these factors are determined by the current situation in the industry.

Conclusion

The following main results were obtained during the research:

1. A Relational contract, as a mechanism that forms trust relationships, can be a means of developing relational strategies of enterprises, including not only two-state, but also network interactions. The relational strategy allows us to ensure allocation of resources on the basis of mutually beneficial relationships between actors in promising areas of enterprise development.
2. The basic patterns of correlations associated with the formation of the inter-relationships between enterprises, based on partnerships from the relations. The prospect of access to the resources of the economic system, the network allows you to carry out production and economic processes at the enterprise, using the potential of the formed real space as a mechanism for implementing strategies.
3. The Methodology for forming relational relationships is related to the following important principles that were developed earlier: confidence, valence, conruence and pertinence of relationships. In addition to them, the principle of networking has been developed. Economic networks are created from firms that find it difficult to develop independently in a highly competitive market, so they combine to isolate the firms that are part of the network, which allows partners to form a local network market.
4. Basic relational strategies that reflect universal methods for achieving partner advantages can be divided into the following types:

- complementarity, which is carried out due to the complementarity of resources of partner firms, the potential of new opportunities, due to the synergistic effect of relationships;
- security based on maximizing security with acceptable returns. They are implemented on the basis of reducing market uncertainty with the simple assumption that positive interactions strengthen the enterprise;
- strategy for the formation of local networks. The formation of networks is associated with the search for economic niches where it is possible to aggregate resources to create local production and economic systems. Niches become a platform for the production, distribution, exchange and consumption of resources; there are wide opportunities for relationships with other niches.

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The Utilization of Modern Industrial Engineering Methods of the Workplace Design

Filip RYBNIKAR
Department of Industrial Engineering and Management, Faculty of Mechanical Engineering, University of West Bohemia, Plzen, Czech Republic, rybnikar@kpv.zcu.cz

Ilona KACEROVA
Department of Industrial Engineering and Management, Faculty of Mechanical Engineering, University of West Bohemia, Plzen, Czech Republic, ikacerov@kpv.zcu.cz

Pavel VRANEK
Department of Industrial Engineering and Management, Faculty of Mechanical Engineering, University of West Bohemia, Plzen, Czech Republic, vranek@kpv.zcu.cz

Michal SIMON
Department of Industrial Engineering and Management, Faculty of Mechanical Engineering, University of West Bohemia, Plzen, Czech Republic, simon@kpv.zcu.cz

Abstract

The article deals with the use of rationalization methods for the proposal to improve the current state of the workplace. The design of the new workplace is focused on increasing the efficiency and productivity of the workplace while respecting ergonomic limits and considering work safety. The proposal consists of the initial discovery of the potential for improvement and subsequent implementation of measures at the workplace to achieve higher efficiency. The study aimed to develop a proposal for the modification of the workplace to increase its efficiency while adhering to the principles of ergonomically appropriate work and the principles of safe work.

Keywords: Design, Industrial Engineering, Ergonomics, EMG

Introduction

At present, one of the basic priorities of companies is to improve their production to achieve the highest possible efficiency and productivity. Tools and methodologies for rationalizing work and workplaces have long been used for this purpose. With the correct use of these approaches and the implementation of methodologies, it is possible to achieve an efficient production system or partial production units.

Kosturiak (2000) mentioned that increased productivity can also be achieved by constantly searching for, identifying, and eliminating waste in the workplace. Such waste is mainly related to long material flows, long transition distances of workers, incorrectly designed transport and handling routes, or inappropriate arrangement for work safety and ergonomics. One of the main goals of companies is to eliminate or at least reduce any waste, reduce production costs, and achieve higher production productivity. Bures mentioned that one of the possible solutions to increase the efficiency of the workplace is to spatially arrange the production unit in a suitable way. It is necessary to support and verify the change of the spatial arrangement with sufficient input data, devote sufficient time to the design, and ensure the correct input data. Any changes to an already established proposal are often complex and costly. The solution of the spatial arrangement is closely related to the nature of the workplace, type of production, product base, etc. These factors must be thoroughly addressed during the design of the workplace.

Vranek and Simon (2018) mention that due to the rapid progress of various support tools in connection with industry 4.0, spatial solutions are supported by software and programs enabling not only classic 2D layouts, but also 3D visualization, models for superstructure using devices supporting virtual reality, or visualization and display of material flows of products or product lines. Kosturiak also mentioned that all proposals for changes must be based on sufficient input data obtained by observation and analysis of the current state. Part of the analysis is the definition of factors influencing production productivity, which must be addressed in the next phases.

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The article is focused on improving the production of the selected workplace according to the approaches and methodologies of improving and rationalizing the production unit.

Measurement and analysis of time consumption – time studies

Commonly used methods of detecting and measuring time consumption are designed to detect, assess, and evaluate time consumption. They determine the expected consumption of working time by measuring and analyzing individual events. Miller et al (2013) mention that the time aspect is the focus of the study of work and it allows us to quantify the events in the system that is under study. Various methods are used to determine time consumption, including time studies and motion studies. The basic methods used for measuring time consumption are briefly described by Miller et al (2013) in Figure 1.

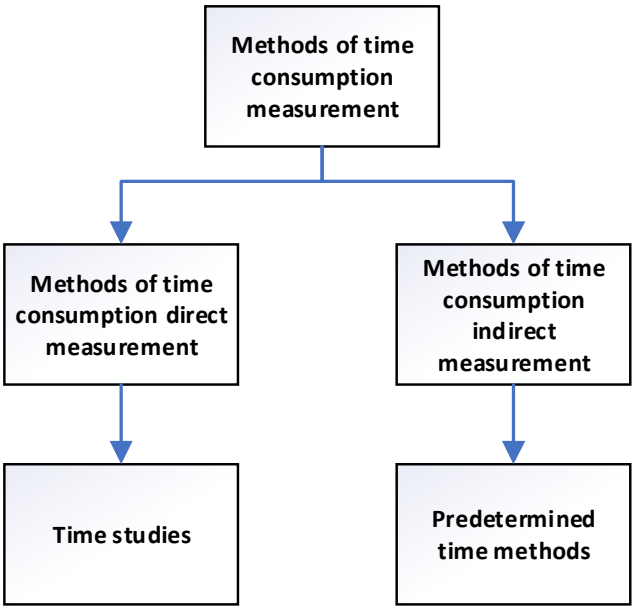

Fig. 1. Basic Methods of Measuring Time Consumption – Miller at al (2013)

Kosturiak (2000) mentions that the standard procedure for measuring time consumption consists of several sub-steps, starting with the selection of the work to be measured. Subsequently, a detailed study and assessment of the work process, the sequence of movements, and working conditions is done, including the division into groups of productive and unproductive times. Furthermore, the measurement of time consumption itself is carried out using appropriate techniques according to the nature of production mentioned by Rybnikar and Kleinova (2019).

Novak et al (2007) mention that time studies are one of the basic tools of industrial engineering. They are based on the principle of time measurement and serve as a basis for improving work processes. Time studies can be divided according to their nature into continuous-time studies and instantaneous observations. For the input analysis, it is appropriate to choose the method of continuous observation to obtain the data by continuous monitoring and measurement of work. The output of the continuous observation most often used in practice is snapshots of the operation (chronometry) or snapshots of the whole working day described by Simon et al (2013). Snapshots of operations detect the time consumption of repetitive operations or tasks, while snapshots of a working day track the consumption of time by continuous monitoring throughout the whole work shift. It is to some extent a universal method, which can with certain adjustments be used to observe not only the work of a worker, administrative or manager, but also the activity of production equipment as described by Pavelka (2007).

Spatial Study

Simon and Miller (2014) mention that input analyses of the spatial arrangement of the workplace are usually based on various steps. Using these steps, deficiencies in the spatial arrangement of the work unit, in the organization of the work unit, and waste are gradually identified. There are several options to choose from in the spatial arrangements of the work unit. It depends mainly on the nature of production and the basic structure of the material flow.

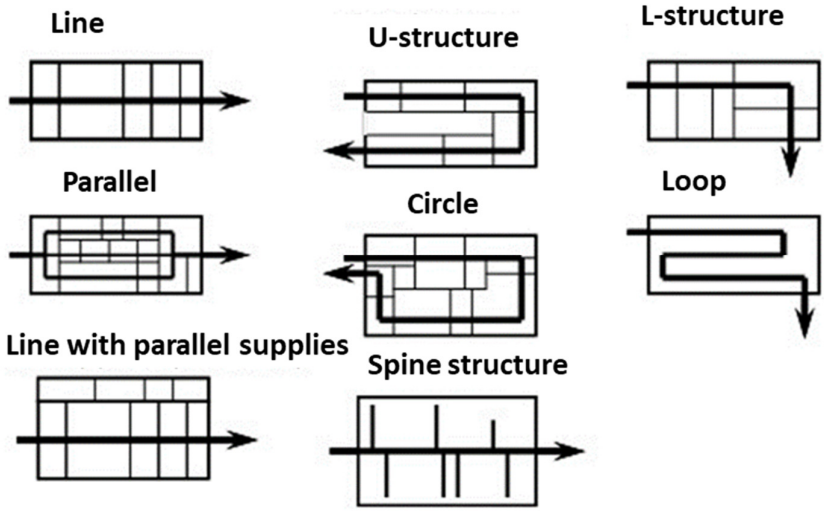

Fig. 2: Basic material flows structures – Hlavenka (2005)

When designing production units, it is very important to pay attention to the spatial arrangement. The design of the spatial arrangement of the production unit or the creation of the layout significantly affects the efficiency of the process. By designing the layout of the workplace, we mean a graphical representation of the area, which shows the arrangement and layout of the production space described by Vranek and Simon (2018). The basic distribution methods include the CRAFT method mentioned by Hlavenka (2007), the Spaghetti diagram, the Sankey diagram mentioned by Srajer (2014), two of the oldest methods – triangular or center of gravity method mentioned by Zelenka and Kral (1995). The design and representation of the spatial arrangement of the production unit should be supported by 2D and 3D visualization in one of the available software (for example, the visTable tool from Plavis GmbH) mentioned by Srajer (2014).

Ergonomic Study

Dianat et al (2020) mentioned that one of the methods used for the evaluation of working positions is the RULA method. The RULA method was created in 1993 at the University of Nottingham. It is known worldwide and recognized for the assessment of ergonomic risks in the working position and when handling loads. RULA is mainly used to assess damage to the upper limbs arising in connection with work activities. Within the RULA evaluation, the position of the upper limbs (arms, forearms of the wrist), neck, torso, and legs are evaluated. Each body part is assigned a score. The points are then corrected for muscle and strength and then the total score is calculated as described by McTamney and Corlett (1993).

The total score is divided into 4 risk categories mentioned by Middlesworth (2018):

Category 1 - work is acceptable, no need for changes in the workplace,
Category 2 - the work is slightly hazardous, it is appropriate to make certain changes,
Category 3 - hazardous work, it is very desirable to make changes to improve the workplace,
Category 4 - extremely hazardous work, there are urgent requirements for workplace changes.

Kacerova and Bures (2018) mentioned that the division of works into categories by RULA analysis does not correspond to the division of categories of works within the categorization of works in the Czech Republic. This division is a basic tool that contributes to the evaluation of the impact of work on the health of the employee. Individual categories are defined by the degree of exceeding hygienic limits and the risk of health hazards.

The obligation to categorize works is given by §37 of Act No. 258/2006 Coll., On the protection of public health, incl. Decree No. 432/2003 Coll., which divides works into 4 categories according to established rules.

Within the categorization of physical factors, workplaces are divided into three working categories:

Category 1 - there is no likelihood of adverse effects on workers' health.
Category 2 - adverse effects on workers' health are rare, they may occur in sensitive individuals. Hygienic limits are not exceeded.
Category 3 - hygienic limits are exceeded, it is necessary to use personal protective equipment, statistically, there is also a more frequent occurrence of occupational diseases.

According to statistical data, the most common assembly workplaces in the Czech Republic are manual or semi-manual described by Kacerova and Rybnikar (2020).

Bures and Cadkova (2020) mentioned that manual work can be understood in different ways. One way is to understand the concept of manual work as an operation performed by a worker using basic hand tools. A second way is a person performing the work without any support in the form of tools. This way considers work to be manual only if it is completely performed by a person based on his abilities, and no human function is replaced. Bures and Cadkova (2020) also mentioned that most production systems combine human work and automation. Therefore, tasks are divided between manual work and automatic work. Production is considered to be semi-automatic if at least one of the tasks of the human worker is performed by another source. That is the reason why the local muscular load is measured in the workplace.

The local muscular load is measured by integrated electromyography. Electromyography is an examination method, thanks to which we can evaluate the condition of the human nervous and locomotor system. Integrated electromyography aims to record the electrical activity of a selected muscle, which is caused by a change in the electrical potential that arises due to muscle activation. Activity is recorded from nerves or muscles. Muscle activity is induced either by stimulation of the proband or by the will of the subject.

Kaba and Kacerova (2019) mentioned that many instruments can be used to measure local muscle loads, such as Biometrics from DataLog or EMG Holter from GETA. The results of these gauges are the same, but in the Czech Republic, the only gauge permitted by the legislation for measuring local muscular load is the EMG Holter device from GETA, see the figure below. The package contains a measuring device (EMG Holter), an interface for connection to a computer, electrodes, and EMG modules. The electrodes are disposable and are removed from the proband after measurement.

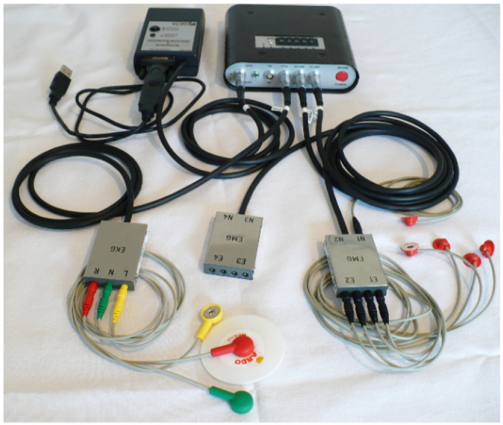

Fig. 3: EMG Holter – GETA

The skin impedance must be reduced before the electrodes are glued, the skin must be dry and clean. Previously, the skin used to be degreased with a fatty solvent (ether, acetone, ethyl alcohol, propyl alcohol). If the skin impedance persisted, it was recommended to scarify the skin with sandpaper or a special abrasive paste. Nowadays, the skin is cleansed with an abrasive gel, then the designated electrodes are glued to the forearm. Two electrodes, approximately 3 to 10 mm apart, are glued to each of the mentioned muscles. The electrodes are glued to musculus extensor digitorum and musculus carpi radialis. The ground electrode is glued in the elbow area - outside the musculature. For better attachment, the glued electrodes are further covered with a hypoallergenic patch. EMG modules are attached to the forearm or arm so as not to interfere with work activities. The cables are wrapped to reduce noise and secured with an elastic bandage to the worker's upper limb mentioned by Kaba and Kacerova (2019).

Due to the effect of BMI on EMG measurements, people with a BMI higher than 30 kg / m2 were omitted as described by Nordander et al (2003). Subsequently, the measurement parameters in the computer are set. After the measurement, the data is dragged into the special software EMG Analyzer and evaluated according to NV 361/2007 Coll.

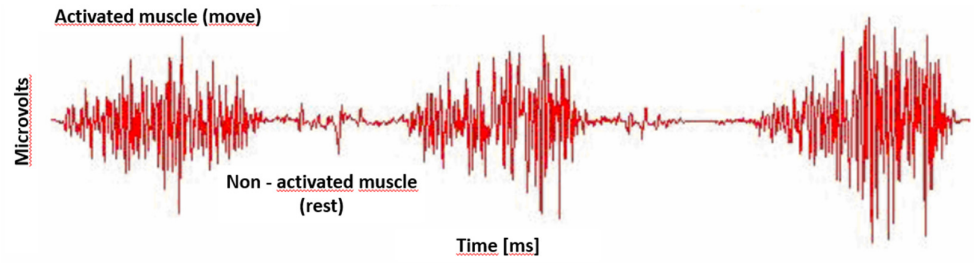

Fig. 4: Example of captured muscle EMG signal – Tichacek (2008)

Methodology Application on Real Workplace

Within the time analysis, a total of 5 snapshots of the working day were taken at the workplace, which was measured over the entire shift (8 hours). Three snapshots were taken on a morning shift at weekly intervals, two snapshots on an afternoon shift at weekly intervals. Production takes place in two shifts. Based on observations of the workplace and workers, the main activities and operations were defined. The measured activities of the employee were noted in a prepared document, which indicates the time consumption of individual activities of employees. The document was analyzed to identify waste, its causes, the potential for improvement, and reveal mistakes made by employees, including personal and organizational losses. The snapshot of the working day divides the individual activities into groups of productive, conditionally necessary, and loss-making activities. Productive activities are value-adding, which means that the customer is willing to pay for them, they transform the material, and they are carried out correctly on the first try. Conditionally necessary activities are activities that do not add value but are necessary to ensure productive activities, they should be eliminated or reduced by appropriate adjustments. Loss-making activities are activities that need to be eliminated and can be caused by employee errors or organizational deficiencies.

It is evident from the graph that a high percentage of the time was spent on productive activities associated with gluing, grinding, drilling, and cutting products. 6 % of the total time was spent on personal needs, which include staff breaks and personal needs (toilet, refreshments, snacks). Organizational losses, with a share of 7 %, include downtime not caused by the employee (for example, caused by missing material). Personal losses represent a waste caused by the worker, eg. the worker is not working, even though there is no break (cigarette, personal interview). Non-productive activities include, for example, employee movements and transitions, an inspection of the finished piece, work with documentation or manipulation.

The following graph shows the productive activities in green, the conditionally necessary activities in orange, the loss-making activities in red. Productive activities here include gluing, grinding, drilling, and cutting activities. Loss-making activities are divided into personal losses caused by the employee and organizational losses caused by the insufficient organization of work. Other activities were included among the activities conditionally necessary.

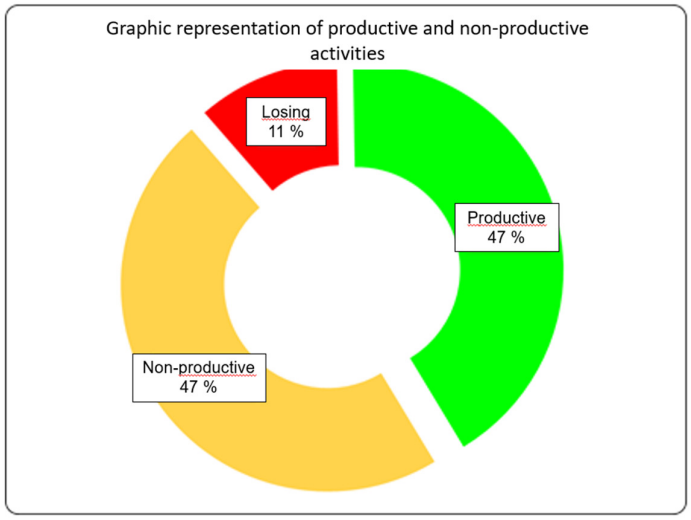

Fig. 5: Graphic representation of activities

More than half of the average time consumption per work shift is spent on unproductive activities and loss-making activities. In these activities, it is necessary to further look for the potential for eliminating waste, improving, and thus increasing productivity. Loss-making activities should be eliminated according to the correct procedure, the responsibility of the employee, and the organization of work. The issue is unproductive activities, which cannot be completely excluded from the process, as they are necessary to ensure productive activities. However, there is often a hidden waste in these activities, which has the potential to increase efficiency, and some improvements can be made by introducing appropriate remedial measures in the form of rationalization approaches and methodologies.

The following Figure shows a 3D model of the workplace created according to the spatial analysis of the current state of the workplace. The location of the tables and input/output material in the current layout do not provide a sufficient amount of workspace for the worker. The input and output material is indistinguishable and is located on a pallet on the ground, while the handling of pieces from the pallet to the work table and back is performed manually by a worker. Tool cabinets also do not meet the requirements of the workplace, the tools are neatly stored in them and do not have enough capacity.

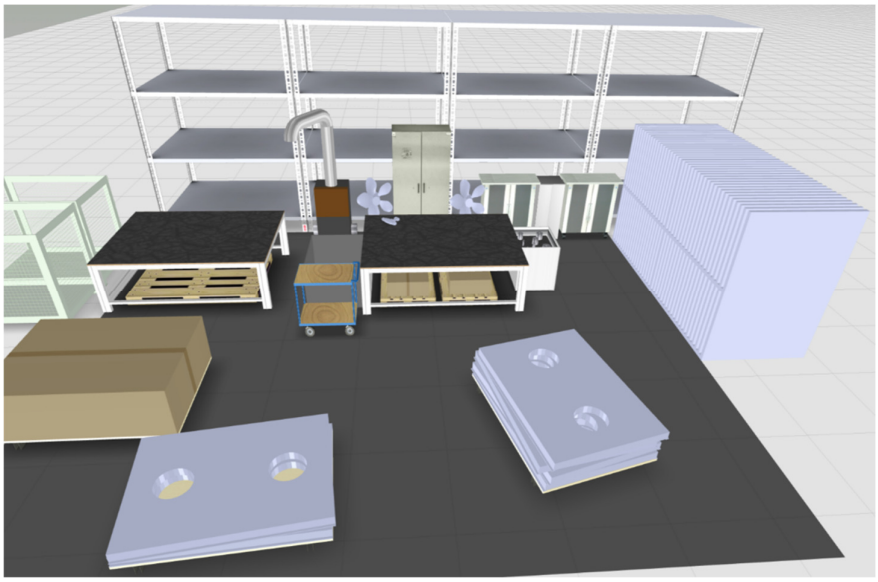

Fig. 6: 3D visualization of the current state of the workplace

The last step of the initial analysis was the implementation of an ergonomic audit, which included the evaluation of working positions according to RULA, Government Regulation 361/2007 Coll. and measuring local muscle load. As part of the observation of work procedures, a video recording was made for a more detailed capture of work tasks and work positions. The video recording was then subjected to a detailed analysis of individual activities and working positions of the angles of the assessed body parts. The analysis was performed in Tecnomatix Jack software.

The output of the RULA analysis was the finding that the workplace falls into the 3rd Category, ie hazardous and it is desirable to make changes leading to the improvement of the workplace. The RULA analysis does not correspond to the categorization of occupational safety concerning Czech legislation. For this reason, an analysis was performed according to NV 361/2007 Coll. Green boxes indicate positions that are acceptable to the worker, yellow boxes are conditionally acceptable, and red boxes stand for unacceptable positions. According to NV 361/2007 Coll., the worker can only spend 160 min from the average 8-hour shift in a conditionally acceptable position, in case of unacceptable positions the limit is 30 min from the average 8-hour shift. It is clear from the table down hat the worker has a back, neck, and left wrist in a conditionally acceptable position, the back and neck are mainly caused by an insufficiently high table, which is very unsatisfactory for the worker. The worker´s shoulders and wrists are both in an unacceptable position. The following Figure shows the evaluation of the working position according to Czech legislation.

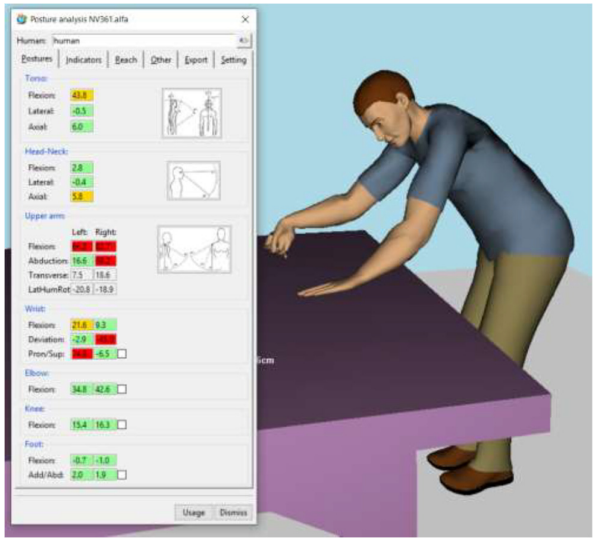

Fig. 7: Ergonomic evaluation of working positions according to Czech legislation

Another examined position was the position where the worker carries the foam part of the boiler over his head. Even though this position is unsatisfactory at first glance, the workers transfer the foam parts from and to the workbench in this way. The following figure shows the evaluation of the working position when handling the load according to Czech legislation.

Fig. 8: Ergonomic evaluation of working positions whe handling the load

According to Government Decree 361/2007 Coll. the working position is unacceptable for the neck, both hands (shoulder, wrist). The foot position is OK. It should be noted that workers should not carry any burdens this way.

The most problematic areas were the positions of the upper limbs, which are not suitable due to their position and can cause health complications for workers, such as carpal tunnel syndrome. Due to the negative indications of the RULA analysis and the evaluation of working positions according to Czech legislation, it was decided that the workplace will be re-measured in terms of local muscle load using integrated electromyography. During the measurement, electrophysiological biopotentials are sensed from the examined muscle groups of the hand and forearm (extensor, flexor). The measurement results are the relative values of the muscular forces expended in the so-called % Fmax. As part of the research, the results of EMG measurements were synchronized with a video of the work process. Thanks to the synchronization, the operations, where the used force exceeded the limit of 70% Fmax, were found. The figure shows the EMG evaluation curve.

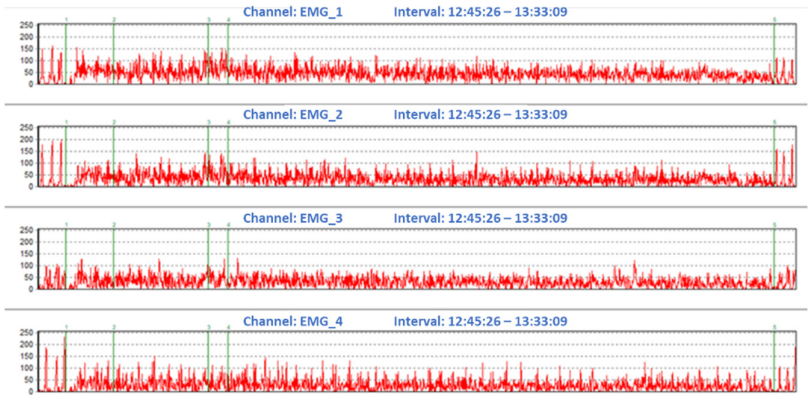

Fig. 9: Example of EMG evaluation curve

Due to the sensitivity of the data, the measurement results cannot be published. However, the measurements confirmed the current concerns. The position of the upper limbs was marked as unacceptable and urgent corrective action had to be taken.

Potential for Workplace Improvement

During the analysis of time frames, shortcomings were revealed, and thus also the potential for a gradual improvement of the production unit. By introducing appropriate measures, it is possible to improve this unit and achieve higher efficiency and productivity in the workplace. The analyzes revealed the following shortcomings causing hidden waste:

- clutter in the arrangement of tools and implements,
- a long route between the individual workplaces used by the worker,
- input/output material designation is missing,
- lack of space,
- clutter in the tool cabinet,
- clutter on the desk,
- unmarked places for trucks,
- trolleys are too high or too low,
- poor handling of trucks,
- mixed templates on the work table,
- storage space is too high,
- spray guns and other tools on the work table,
- uncleaned pieces,
- tables are too low or too high,
- reading documentation, searching in drawings.

One of the basic approaches that will help improve this production unit is the principle of the 5S methodology. This methodology, consisting of several basic steps (categorize, organize, clean, standardize, improve) helps to maintain a clean, organized, and efficient workplace that can be used in any workplace. The methodology aims to remove excess material, tools, implements, templates, and other workplace equipment that is not used. Another principle of the methodology is the introduction of a workplace standard for its sustainability in a clean and organized state. At the same time, every object in the workplace should have its place and should be found at this place at any time. To prevent inappropriate handling of the material from ergonomics and work safety, it would be appropriate to purchase ergonomic trolleys at the workplace to facilitate handling. The introduction simplifies handling, ie saves time required for handling and at the same time ensures ergonomically suitable working conditions for the worker. At the same time, it is necessary to consider the evaluation of working positions and local muscle load according to NV 361/2007 Coll.

A similar problem from the ergonomic point of view is caused by workbenches, which are too high for some lower-ranking workers and, conversely, too low for taller workers. Therefore, it is advisable to introduce ergonomically suitable height-adjustable workbenches into the workplace.

A mess in the form of chaotic and confusingly stored tools and instruments, or a mess in the tool cabinet and on the desk, also has to be addressed to increase workplace efficiency. This deficiency can be solved by using suitable storage spaces with defined spaces for tools and implements. To avoid the problem of confusing storage of templates,

it is necessary to create suitable spaces, for example, using a shelf for these templates. Some tools lie freely on the worker's desk, even though he is not working with them at the moment. This problem can be avoided by simply inserting the holders under the tabletop.

To store material in storage spaces, it is possible to use a solution that utilizes carousel cabinets, which can accommodate a large amount of stored workplace equipment with a defined location for each of them. One of the major shortcomings of the process is the fact that the worker spends a lot of time reading the drawing documentation to figure out how to carry out the production. According to the snapshot of the workday, the employee spends approximately 10% of his time searching for information in the documentation.

Workplace design and visualization

Several variants were created during the design of the workplace. Due to the company's criteria, a suitable solution was selected and applied to the workplace.

The design of the new spatial arrangement of the production unit was created concerning ergonomics and work safety. At the same time, proposals for measures to reduce the hidden waste caused by shortcomings were applied, which were observed in the temporal, spatial, and ergonomic study.

The following Figure shows a 2D layout of a new workplace spatial arrangement. The proposal is based on the identified shortcomings and the potential for improving the efficiency and productivity of the production unit. Due to the spatial arrangement, larger working space was created around the workbenches by pressing the tables together, which also extended the workspace. The tables are rotated 90 ° for better access to the input and output material. The workbenches have been significantly innovated, containing balls that help the worker to handle larger and heavier pieces. The tables are height-adjustable and are placed on secured castors for possible movement. Holders for tools and implements needed at this workplace (spray guns, drills, cutters, grinders) are located under the worktop of the table due to respecting ergonomic rules (not raising the arm above 60 °, etc.), the worker does not have to bend to reach this tool, everything is located in a comfortable range. A corner carousel cabinet was placed at the workplace, where it is possible to store all the tools, templates, drills, etc. In addition to the carousel cabinet, there is also a cabinet for storing personal belongings - food, drink, etc. The worker has a PC with a monitor, equipped with a reader for reading documentation and projecting drawings. To facilitate material handling, the workplace is equipped with scissor pallet trucks.

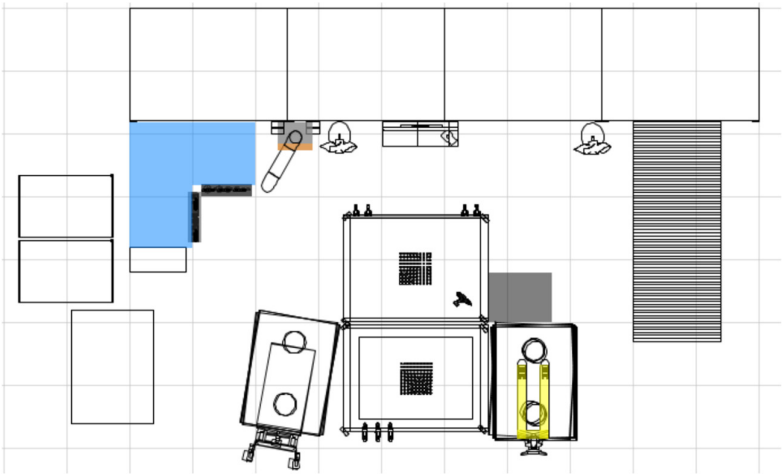

Fig. 10: 2D layout of a new spatial arrangement

The following Figure shows a 3D visualization of the design of a new spatial arrangement of the workplace, including the introduced rationalization elements increasing the efficiency, ergonomics, and safety of the workplace.

Fig. 11: 3D visualization of a new spatial arrangement

Conclusion

Workplace rationalization is one of the important methods of industrial engineering. There are many approaches to solving the rationalization of the workplace, and the benefits of implementation are always a significant advantage for the company. One of the possibilities of rationalization of the workplace is to understand the functioning and mapping of workplace activities, perform temporal, spatial, and ergonomic analyzes, then determine the shortcomings and potentials for improvement and finally make these changes and then maintain them in the long term. This kind of approach was used in this study when a new spatial arrangement of the workplace was created, reflecting the proposed changes concerning the elimination of waste. The design was created concerning workplace ergonomics and work safety.

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SA8000 Certification and Firm Profitability, Wages and Sales: Evidence from A Small Sample of Italian Firms

Eva ABRAMUSZKINOVÁ PAVLÍKOVÁ
Mendel University in Brno, Faculty of Forestry and Wood Technology, Brno, Czech Republic, Email: eva.pavlikova@mendelu.cz

Marcela BASOVNÍKOVÁ
Mendel University in Brno, Faculty of Business and Economics, Brno, Czech Republic, Email: marcela.basovnikova@mendelu.cz

Peter HUBER
Austrian Institute of Economic Research, Vienna, Austria, Email: peter.huber@wifo.ac.at

Abstract

We use synthetic control group methods to analyze the economic performance of a small set of Italian single establishment manufacturing firms that underwent SA8000 certification in 2009 or 2010. We find positive and weakly significant effects of SA8000 certification on firms' turnover to assets ratios, but no evidence of a positive or negative impact of SA8000 certification on firm profitability and wages. We conclude that SA8000 certification may be a viable marketing tool that increases company sales but has no strong impact on firm profitability and wage costs.

Keywords: Corporate Social Responsibility, Synthetic Control Groups, SA8000 certification, Company Performance

Introduction

The number of firms resorting to voluntary but costly external certification for social and environmental standards has rapidly increased in the last decades. According to Kitzmueller and Shimshak (2012) more than one third of the large firms in the US resort to such certifications. As a consequence also research on the impact of corporate social responsibility (CSR) and of the certification of CSR activities on the economic performance of firms has boomed in recent years. Within this literature the analysis has so far mainly focused on the impact of environmental standards such as ISO 14001 (e.g. Koe Hwee Nga 2009, Boulash *et al.* 2010, Heras-Saizarbitoria *et al.* 2011 and De Vries *et al.* 2012). The impact of social accountability standards (e.g. ISO 28000 or SA8000) on financial performance has been much less considered. This especially applies to the SA8000 standard. For this widely used international social accountability standard two recent surveys (Hiscox et al., 2009 an Sartor *et al.*, 2016) state that they are unaware of any evaluations of their impact on the financial performance of firms.

The current paper therefore extends previous research by using data on a small group of Italian firms to assess the impact of the SA8000 standard on company profitability, wages and sales. One important methodological challenge in such an evaluation is the potential endogeneity of the CSR practices (see Hiscox et al., 2009 for a discussion of this in the context of SA 8000 certification). We address this issue by using a synthetic control group method (Abadie and Gardeazabal, 2003 and Abadie et al. 2010).1 As argued for instance by Fremeth et al. (2016) this method is particularly well suited for constructing comparison groups in cases where the sample of treated units is small as it avoids the arbitrariness involved in defining control groups.

Background

The starting point of our discussion is the rather large literature on the impact of CSR implementation on a firm's financial performance (see Margolis and Walsh 2003, Orlitzky *et al.* 2003, Margolis *et al.* 2009, Hiscox *et al.*

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2009, Benabou and Tirole 2010, Kitzmueller and Shimshack 2012 for surveys). This has followed two lines of reasoning to explain the impact of CSR on financial performance. The first is based on the assumption that consumers, investors and workers are indifferent as to how a good or service is produced, but that managers or owners prefer socially responsible production.[2] Proponents of this line of argument (e.g. Reinhardt *et al*. 2008, Melo 2012) suggest that CSR is undertaken to satisfy the preferences of managers or owners. Since, more profitable firms are (all else equal) better prepared to cover the additional costs of CSR, this line of reasoning predicts that firm profitability causes CSR adoption, because higher profits allow managers and owners to implement CSR.

The second line of reasoning, assumes that investors, consumers or workers prefer socially and environmentally responsible production and holds that CSR has a causal impact on a firms' financial performance through sales, credit and labor market channel. The sales channel arises if customers prefer socially responsibly produced goods. This implies that CSR adoption increases the demand (or the willingness to pay) for a firm's produce. This will result in increased sales and higher profits if net revenues from increased sales exceed the costs of CSR implementation. The credit channel, by contrast, stresses that investors have a preference for CSR and will thus be willing to accept a lower returns (interests) on funds provided to firms applying CSR. If the savings from lower interest payments exceed the costs of adopting CSR, this too will improve a company's financial performance. Finally, the labor channel argues that if workers (all else equal) prefer to work at socially responsible firms, this will increase their productivity either because working at such firms increases motivation or because socially responsible firms have more applicants and can thus choose to employ more productive workers. If this increase in productivity exceeds the cost of CSR adoption, this will also increase firm profitability.[3]

A large empirical literature aims to measure the correlation between CSR adoption and firm level financial performance. This literature has recently been surveyed in encompassing meta-studies by Margolis *et al.* (2009) and Orlitzky *et al.* (2003). Margolis et al. (2009) survey 251 estimates the correlation between CSR and financial performance. They show that in average these studies find a weak positive correlation (of 0.13) between financial performance and CSR-adoption. Orlitzky *et al.* (2003) find a positive association between corporate social responsibility and firm financial performance, which is stronger for accounting-based measures of financial performance and CSR reputation indices.

Similarly, in the recent literature on the separate channels through which CSR adoption may affect firm performance El Ghoul *et al.* (2011) use a sample of over 12,000 US firms to show that investments into CSR, are significantly negatively correlated to a firms' cost of equity. Tamm *et al*. (2010) focusing on the labor channel by using survey data from Estonia, Lithuania and Latvia show that employees in firms that are deemed more socially responsible also have higher job satisfaction and work ethics and Korschun *et al.* (2014) find that employees in Fortune 500 firms that implement CSR policies are more customer-oriented. Furthermore Saedi (2015), in line with the sales channel, finds higher customer satisfaction among Iranian firms following CSR policies.

These contributions have differed in the definition of CSR and financial performance. With respect to the definition of the CSR-status of a firm some authors (e.g. Flammer 2015) use corporate disclosures, while others (e.g. Lin *et al.* 2009) focus on charitable donations and quite a few resort to various indices measuring the reputation of firms in implementing CSR (Wu 2013, Cavaco and Crifo 2014, Bechetti and Ciceritti 2009) or CSR awards (see Dasgupta, Laplante, and Mamingi, 2001; Jacobs, Singhal, and Subramanian, 2010; Klassen and McLaughlin, 1996). One drawback of these measures is that they provide only limited information on compliance with CSR practices. As a consequence a number authors (e.g. Hiscox *et al.* 2009) advocate the use of industry standards or certifications to measure CSR implementation. This is because compliance to these is controlled by external auditors and because recent experimental evidence suggests that such standards are considered more credible signals of CSR by customers (Etile and Teyssier 2015).

With respect to the measure of financial performance authors focusing on firms listed on the stock exchange have used measures of a firm's value such as Tobins Q or the market value of a firm as these are likely to better reflect the long run profitability of a firm than bookkeeping measures (Becchetti and Ciciretti 2009, Becchetti *et al.* 2013). By contrast, contributions focusing on smaller enterprises or enterprises not listed on the stock exchange (e.g. Lin *et al*. 2009, Tsoutsura 2004, Wu and Shen 2013, Belu and Manescu 2013) have mostly focused on accounting measures of profitability such as returns on assets and returns on equity.

The SA8000 Standard

In this paper, CSR adoption is measured by the implementation of SA8000 certification. This is one of the internationally most widely used social accountability standards for retailers, brand companies, suppliers and other organizations.[4] It is based on international agreements (including the International Labor Organization

convention, Universal Declaration of Human Rights and the Convention of the Rights of the Child) and requires certified firms to adhere to a set of norms related to working hours, health and safety, prevention of discrimination, work of children and adolescents and forced labor. It also requires certified firms to respect the freedom of association, to follow a specific code of conduct with respect to disciplinary practices, to provide sufficient remuneration, to meet the basic needs of workers and to implement continuous control systems for improving working conditions. In addition SA8000 certified firms are required to provide a safe and healthy workplace environment and to take effective steps to prevent potential health and safety incidents and occupational injury or illness associated with, or occurring in the course of work. They are also required to abide to existing laws with respect to working hours and remuneration (Social Accountability International, 2015).

Any organization seeking certification with SA8000 must apply to an auditing firm accredited by Social Accounting Accreditation Services (SAAS), which acts as a certification body for the standard. The process consists of a preliminary assessment at the beginning of procedures. In this, any necessary improvements to meet the requirements in the standard are identified. This is followed by a certification audit, where the auditing firm examines whether the necessary improvements have been implemented and provides the certification if this is justified. After this the firm is subject to regular (annual or semi-annual) surveillance audits for three years, after which the certificate expires and must be renewed under simplified procedures. These surveillance audits ensure the continued compliance to the standard as well as continued improvements in meeting the standard, and may result in a list of suggested improvements or even withdrawal of the standard in cases of severe abuse (see Gilbert 2001 and http://www.saasaccreditation.org/certification).

The out-of-pocket costs of certification consist of the costs of taking corrective and preventive action in order to comply with the standard, preparing and conducting the audit by an SAAS-accredited certifying body as well as the costs of taking corrective actions to resolve problems if nonconformities are identified. The certification bodies base their auditing activities on market prices depending on the size, scope, and location of the facility, at prices that typically range between $500 and $1,500 per day (Gilbert 2001 and http://www.saasaccreditation.org/certification-costs).

Method

The central methodological issue arising in evaluating the impact of the standard on firms' financial performance is the potential endogeneity of applying the standard. This arises because firms choose to adopt SA8000. Profit maximizing firms will therefore only do this if they expect certification to increase profits. Comparing firms implementing SA8000 to firms not implementing it, therefore implies comparing firms that expect to profit from SA8000 to firms that do not. Such a comparison will overstate the true effect of SA8000 adoption, if firm expectations of profitability of SA8000 adoption are met. To assess the impact of CSR certification on a firm's sales, profitability and productivity, therefore a comparison group of non-adopting firms that can be expected to have developed similarly to SA8000 adopting firms in the absence of adoption must be sought for.

In the current paper, we use synthetic control methods to define this comparison group. This method (introduced by Abadie and Gardeazabal 2003 and Abadie *et al.* 2010), has recently been used in many studies relating to various fields of economic analysis (e.g. Peri and Yasenov, 2015, Kreif *et al.* 2016, Billmeier and Nannicini 2013). It provides a systematic way to avoid the arbitrariness necessarily involved in defining ad-hoc control groups (e.g. industry averages) and to identify the impact of an event on a treated unit relative to a control group of untreated units at the hands of a control group that is derived by statistical methods. Furthermore, as emphasized by Fremeth et al. (2016) this method is particularly well suited in contexts such as ours, where few occurrences of treated units preclude the possibility of making strong inferences from traditional regression analysis.

The method consists of, in a first step, using data on firms that did not adopt SA8000 (referred to as the donor pool) to define a fictitious untreated firm (the synthetic control) that has developed as similarly as possible to the firm adopting the treatment prior to treatment. In a second step, then, the post-adoption development of the firm adopting SA8000 is compared to this fictitious firm. This method therefore allows for an identification of a reasonable control group and to conduct a difference-in-difference analysis on the outcomes of the certifying firm relative to the endogenously defined synthetic group. The method consists of considering N+1 firms (indexed by n) over a time period (indexed by $t \in [1 \ldots T]$). Assuming that, without loss of generality, the first of these firms has certified for SA8000 for the first time in period τ, the vector of observed firm characteristics (X_n) can be defined, such that X_1 denotes the treated firm's characteristics and $X = (X_2, \ldots, X_{N+1})$ the characteristics for firms in the donor pool in the pre-treatment period. The synthetic control method then consists of first estimating weights that produce a convex combination of firm characteristics among the donor pool so as to as closely as possible approximate the behavior of the variable vector (X_1) of the treated firm in the pre-treatment period (i.e. up to τ). This is done by choosing a vector of firm specific weights $W=(w_2, \ldots w_{N+1})$, with $\sum n=2N+1 wn=1$ and

$$0 \leq wn < 1$$

, to solve the minimization

$$W* = \text{argmin} W(X1 - XW)'V(X1 - XW)$$

(1) subject to

$$\sum N+12wn=1$$

with V a kXk positive definite diagonal matrix (and k the number of firm characteristics included in X) which determines the weight for the contribution of each characteristic in the objective function and is chosen so as to minimize the standard error of the estimate. In a second step the weights calculated from this optimization are used to calculate hypothetical post treatment variables for the "synthetic control". These are thus compared to the development of the variables of interest in the post treatment period in SA8000 adopting firms.

One issue related to this method is that it does not directly allow for hypotheses tests as is it is not clear what the standard deviation of the estimated effect is. Abadie *et al.* (2010) suggest applying procedures of classical permutation tests for inference in the synthetic control group analysis. These consist of applying the synthetic control method to a number of untreated observations in the sample and to simulate the distribution of deviations between the treated and synthetic control group. Through this the size of the difference between the synthetic control and the treated firm relative to the effects estimated for randomly chosen placebo firms can be assessed by standard difference-in-difference methods. To implement this approach, we conducted a synthetic control group analysis as above for a set of 250 randomly selected placebo firms from the donor pool and imposed a fictitious adoption in the same year as the treated firm.

A further issue with the synthetic control group method is that it is not entirely clear how to deal with multiple treated units. Abadie *et al.* (2010) suggest that in such a case, the treated units should be collapsed into a single unit by taking averages across the individual observations (see Kreif *et al.* 2016 for an application). We follow this suggestion by taking averages for all firms treated in 2009 and 2010 respectively and performing the synthetic control group analysis for these two aggregated firms. An advantage of this approach is that it reduces issues related to measurement error. A disadvantage is that it also masks heterogeneity in treatment effect across firms. As a consequence we also conduct a firm by firm level analysis.

A third issue with the method is whether the estimated effects are causal. Abadie et al. (2010) show that this is the case if the outcome indicators of the treated unit and the synthetic control follow a slightly weaker version of the parallel trend assumption in standard difference-in-difference estimates (i.e. if the synthetic control would have developed similar as the treated firm in the absence of treatment). Although this hypothesis is cannot be formally tested, it is usually suggested that it is more credible if the synthetic control and the treated unit behave similarly prior to treatment (see e.g. Fremeth et al., 2016, and Lechner 2010). Thus in the subsequent analysis we will take care to compare the pre-treatment development of the treated firm and its synthetic control.

Data

We use data on Italy, as this country provides the largest number of SA8000 certified firms in the EU (see Sartor, 2016) and merge data from two sources. The first is a list of manufacturing firms that received CSR certification in the years from 2009 to 2010. This was acquired from the SA8000 accreditation homepage (see http://www.saasaccreditation.org) and provides the name of all establishments that received SA8000 certification and the year in which this certification was first granted. It also provides information on the address of the establishment and its industry affiliation.

The second is the Amadeus data base of Bureau van Dijk. This was used to extract bookkeeping data on firm profitability, sales and total wage costs as well as total assets for all Italian single establishment manufacturing firms for the years 2007 to 2012.[5] Using an exact matching algorithm on names and address to merge these data sets we were able to identify 10 single establishment firms that received an SA8000 certification in the years 2009 or 2010, retained the standard until 2012[6] and have a full panel of observations from 2007 to 2012 for all indicators. These firms were defined as the treated firms, while single establishment firms that never received SA8000 certification and had a full panel of observations for 2007 to 2012 were used as the donor pool.

This data was also used to calculate values of firm level return on assets (ROA), turnover to assets ratios and total wage costs relative to total assets[7] which are the variables in the current analysis. Returns on assets are used as a measure for the firm's overall financial performance, while turnover to assets ratio and wage costs relative to assets account for the importance of the sales and labor channel, respectively.

The left-hand side panel of Table 1 provides descriptive statistics for these indicators for the 10 firms adopting SA8000 for the first time in the years 2009 or 2010 by reporting the average ROA, turnover to assets ratio and wage costs as a percentage of assets in the period before and after SA8000 adoption. Of the 10 establishments two operate in manufacturing of leather and related products (i.e. NACE 2 digit industry 15)[8], other non-metallic mineral products (NACE 2 digit industry 28) and in manufacturing of fabricated metal products (excluding machinery and equipment - 25) and one each in the manufacture of beverages (11), chemicals and chemical products (20), basic metals (24) and other non-metallic mineral products (23). Six received SA8000 certification in 2009 and four in 2010. Only one firm is a public limited liability company all others are private limited liability companies.

The descriptive statistics for the indicators in the pre- and post-treatment period for firms that are potential members of the donor group by NACE-2digit industry groups shows that in general, the industry level trends between the pre- and post-treatment period of these indicators accord with the firm level trends over that time period. In the majority of cases analyzed ROA, turnover to assets ratio's as well as wage costs relative to assets were lower in the post-treatment period than in the pre-treatment period both among the firms applying SA8000 as well as in the average firm of the respective industry group these firms belonged to. Standard difference-in-difference tests for differences among the treated firms relative to the developments in the respective industry group, however, are mostly statistically insignificant[9] and a comparison of the pre-treatment mean of the indicators suggests substantial differences between the firms applying the SA8000 standard relative to their respective industry averages. In particular 9 of the 10 SA8000 applicant firms have higher turnover ratios than their respective averages, while 6 respectively 5 have higher ROA and wages to assets ratios. This suggests that a comparison with industry averages may be invalid as SA8000 applying firms and their respective industry averages already differed prior to SA8000 adoption and thus provides justification for the synthetic control group approach.

Results

Results for aggregates

The key results of the synthetic control group analysis for the pre- an post-treatment period compare the evolution of the respective outcome indicators (ROA, turnover to assets ratio and the wage costs as a share of assets) of the average firm applying the SA8000 standard in 2009 and 2010 to the respective synthetic control in the period from 2007 to 2012. In all of these results the lines for the treated firms and their respective synthetic control are very close to each other in the period before SA8000 adoption for all outcome variables. This provides (ex-post) validation of the method used, as it indicates that the treated and the synthetic control group follow very similar trends before treatment.

In the post-treatment period, however, the developments of the treated firms and the synthetic control start to diverge. The evidence on ROA suggests a positive impact of SA8000 adoption on firm profitability for firms that adopted this standard in 2009, as their average ROA is by around six percentage points higher at the end of the observation period than among the synthetic control group. For firms that adopted the SA8000 standard in 2010, by contrast, results indicate a decline in profitability after the introduction of the standard relative to the synthetic control, as the ROA of firms adopting SA8000 certification in 2010 is by around three percentage points lower throughout the post- treatment observation period than that of their synthetic control group.

Evidence with respect to the turnover to assets ratio is more compelling. Both firms adopting SA8000 in 2009 and 2010 experienced a noticeable increase in their turnover to assets ratio relative to their synthetic control after SA8000 adoption. This difference amounts to over 20 percentage points (i.e. around one third of a standard deviation of this indicator among non-adopting firms) throughout the post-treatment period for firms adopting SA8000 in 2009 and to five to ten percentage points for firms adopting SA8000 in 2010. Finally, the results with respect to the total wage costs of the firm suggest a sizable negative impact of SA8000 adoption on total wage costs for firms adopting the SA8000 standard in 2009 but a sizeable positive one for firms adopting SA8000 in 2010.

These results, must, however, be interpreted in the context of the variability of the variable of interest among untreated firms. To allow for such an interpretation, we observed the estimated gaps for the first 50 of a total of 250 placebo treatments estimated for firms not adopting SA8000 and compares them to the estimated gap for the average firms treated in 2009 and 2010. Again in this figure in the pre-treatment period most series are located very close to zero. This indicates a good fit of the placebo treatments. Furthermore, in the post-treatment period the placebo effects – although varying more than in the pre-treatment period - are well centered on zero. This provides further ex-post validation to the method used, as in average no effects are found in the post-treatment period for firms where no treatment occurred.

Furthermore, we were interested in the empirical distribution of the placebo treatment effects for all 250 placebo treatments. These are defined as the differences-in-differences between the treated firms and the control group over the pre- and post-treatment period in the outcome variable generated. The results show the estimated effect for the average of the firms adopting SA8000 in 2009 and 2010, which is for the respective group of firms positive and large relative to the placebo treatments, while it also indicates a large negative effect of SA8000 adoption. We tried to compare the estimated pre- to post treatment differences in pre-tax profits, sales and wage costs to the average pre- to post-treatment differences in the placebo treatments in a difference-in-difference estimate of treatment effects. This can be interpreted as a test of the null hypothesis that SA8000 had no effect on firm level returns on assets, turnover to sales ratios and wage costs relative to assets. A number smaller than 0.1 suggests a statistically significant positive impact of SA8000 certification on the respective indicator at the 10% significance level, while a value larger than 0.9 indicates statistically significant negative impact of SA8000 certification on the respective indicator at the 10% level.

Taken together the evidence presented, it indicates that in the average firm adopting the SA8000 standard in 2009 ROA increased by 2.8 percentage points, while the turnover to assets ratio increased by 21.7 percentage points and total wage costs as a share of assets reduced by 4.7 percentage points. By contrast, in the average firm adopting the SA8000 standard in 2010 returns on assets reduced by 1.3 percentage points while the turnover to assets ratio and wage costs as a share of assets increased by 8.4 and 1.4 percentage points. Comparing these figures to the effects found for placebo treatments suggests an average treatment effect on the treated (ATT) for firms adopting in SA8000 in 2009 of 3.2 percentage points for ROA, 24.4 percentage points for the turnover to assets ratio and 5.1 percentage point for wage costs as a percentage of assets, with all these effects except for the one on turnover to assets ratios statistically insignificant at conventional significance levels. For the firms adopting SA8000 in 2010, by contrast, the estimated ATT is -0.9 percentage points for ROA, 10.1 percentage points for the turnover to assets ratio and 1.0 percentage points for wage costs as a percentage of assets, with all effects statistically insignificant at conventional levels of significance.

Heterogeneity in treatment effects and results for individual firms

The results of a similar analysis for each firm in the sample are almost always statistically insignificant at conventional significance levels for the development of ROA and wages as a share of assets, and often also disagree in sign for these outcome indicators. Thus ROA increased statistically significantly (by 17.8 percentage points) only in firm number 3, while wages as a share of assets decreased statistically significantly in firm number 2 but increased statistically significantly in firm number 7. This also suggests an insignificant or at least highly heterogeneous impact of SA8000 on wage costs.

The only outcome indicator where results are statistically significant more often is the turnover to assets ratio. This increased statistically significantly in 3 of the 10 firms considered. In addition for these firms this increase is also of economic significance as it amounts to 19.0 to 30.3 percentage points (i.e. around one third of a standard deviation of this measure in the industries to which the firms were affiliated).

Furthermore, correlating the average treatment effects on a firm level with indicators of firm size such as the number of employees and total assets before SA8000 adoption, suggests that larger firms are more likely to profit from SA8000 adoption than small ones in terms of turnover ratios. The correlation coefficient of the treatment effect for the turnover ratio with the number of employees at a treated firm is 0.46 and with total assets 0.60. By contrast for ROA and wages as a share of total assets the correlation of the firm level treatment effects with firm size are much smaller. They amount to 0.13 respectively -0.14 with the number of employees, and to 0.09 respectively 0.29 with total assets.

Regression Results

Finally, we follow Peri and Yasenov (2010), who use a difference-in-difference analyses to assess the significance of the estimated effects from the synthetic control group method. This approach consists of a regression analysis in which the pre- to post-treatment difference in the outcome variable under consideration between treated firms and their synthetic control group as well as the same difference for the 250 placebo treatments are entered as observations. Thus dividing the output from the synthetic control group method into a subset of observations (R) that refer to the differences of the treated firms to their synthetic control group and another subset of observations that refer to the same differences for the placebo treatments, the impact of SA8000 adoption can be assessed by the significance of the parameter

d

in a regression of the form:

$$yit=biDi+\lambda Dt+dDt\geq tDi\in R+xjit$$

(2)

where [Equation] is a disturbance term and [Equation] is the respective outcome variable of the firm adopting the SA8000 standard or of its respective synthetic control group and [Equation] is a dummy variable for each firm and [Equation] for each year, while [Equation] and [Equation] are indicators for the post treatment period and the set of SA8000 adopting firms.

Table 1: Difference-in-difference Regression Results

	ROA	Turnover to assets	Wagest to assets	ROA	Wagest to assets	Turnover to assets
	DiD Synthetic versus treated			DiD treated with placebos		
	Average of firms					
Treatment dummy	2.0	17.8*	-1.4	-2.0	21.4*	-2.0
	(1.6)	(8.1)	(1.9)	(3.4)	(12.5)	(3.4)
Observations	24	24	24	2480	2480	2480
R squared	0.42	0.4	0.13	0.01	0.02	0.01
	Firm level analysis					
Treatment dummy	3.6	5.4	4.5	3.3	9.5*	5.2
	(2.7)	(3.0)	(3.7)	(3.2)	(4.7)	(4.2)
Observations	120	120	120	1536	1536	1536
R squared	0.09	0.12	0.02	0.03	0.11	0.02

*Notes: Table report result of the estimated treatment effect in a regression as in equation (2). Values in parentheses are standard errors of the estimate, ***, (**), (*) signify significance of the coefficient at the 1%, (5%), (10%) level. ROA= Return on assets. Treatment dummy is interaction of post treatment period with indicator for treated firms (i.e. Dt≥tDi∈R in Equation 2)*

The results of this analysis is reported in Table 4. In this table the right-hand side presents results for the regression in which differences between the treated firm and the synthetic control as well as placebos are analyzed while the left-hand side focuses on the comparison of treated firms to their respective synthetic control. In addition, the top panel reports the regression results for the analysis on the level of averages across firms, while the bottom panel presents the same analysis for the analysis at the firm level. Once more these results do not suggest a significant impact of SA8000 certification on either firm level profitability or wages, as the coefficient on the interaction term on the treated firms and the post treatment period are insignificant in all specifications. Also the sign of these coefficients differs between specifications. By contrast, SA8000 certification has a weakly significantly positive impact on sales as a share of assets in three of the four specifications and the coefficient on the treated firms and post treatment period interaction is positive in the fourth of these specifications.

Conclusion

In sum, using a synthetic control group analysis to identify the effects of SA8000 certification as one of the internationally most often applied standards for social accountability, we find little evidence of either a positive or negative impact of SA8000 certification on firm profitability and wages. Our results, however, indicate a potential impact of such certifications on sales. This suggests that SA8000 may be a viable marketing tool that increases company sales.

Given that most of our firms do not operate in consumer industries we would argue that firms may use such a certification to strengthen their position in world-wide delivery networks. Our results, however, also indicate substantial heterogeneity in the impact of SA8000 certification on different firms. Exploring these sources of heterogeneity, using larger data sets than those available to us, may therefore be an interesting task for future research.

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Quality of Information Obtained from IT (ERP) Systems and the Organization's Agility

Anna STRONCZEK
AGH University of Science and Technology, Faculty of Management, Krakow, Poland,
astroncz@zarz.agh.edu.pl

Beata BASIURA
AGH University of Science and Technology, Faculty of Management, Krakow, Poland,
bbasiura@zarz.agh.edu.pl

Abstract

In a complex, turbulent environment, the ability to sense changes and promptly respond to them is an important determinant of the company's success. A desirable feature of every organization is agility, understood as ease and speed with which companies can adapt their processes. Simultaneously, centralized information processing using ERP systems gives a possibility to obtain a set of stimulating signals even to those users who have not noticed any specific dependencies so far. The purpose of the article is to determine whether the implementation of ERP class systems affects business agility. In order to achieve the adopted goal, a discourse has been conducted in order to obtain an answer to the questions: What is agility? What are the attributes of an agile enterprise? How does the application of integrated ERP systems affect the quality characteristics of information? How does the application of integrated ERP systems affect the parameters defining the organization's agility? Is there a relationship between the quality of information acquired from ERP systems and business agility? As the research method, the authors have used literature research and dependency analysis in the form of rank correlation significance and contingency analysis.

Keywords: ERP, Managerial Information, Agility, Statistic Dependences Between Factors.

JEL Classification: M10, M20

Introduction

The contemporary reality is very demanding for enterprises. Technological progress, growing competition, increasing customer requirements, uncertainty in the field of legal regulations - these are just some of causes of this situation. In a complex, turbulent environment, the ability to sense changes and promptly respond to them is an important determinant of the company's success. This means that a desirable feature of every organization is agility, understood as ease and speed with which companies can reconfigure, redesign and adapt their processes in order to respond to the needs, threats and opportunities (Raschke, David 2005) resulting from the turbulent environment. Simultaneously, the popularity of IT management systems is growing, and a fundamental feature of these systems is integration of information. As emphasized by Newell et al. (2003), centralized processing gives a possibility to obtain a set of stimulating signals even to those users who have not noticed any specific dependencies so far.

One of the most important factors increasing the organization's competitiveness is efficient information management, therefore, the decision to implement an integrated ERP system becomes a strategic decision. However, the question appears: can integrated ERP systems contribute to an improvement in the organization's agility. And perhaps, as suggested by White (2004), companies are not fully taking advantage of the analytical potential embedded in integrated systems and other software?

Bearing in mind the above, the purpose of the study was to try to determine whether ERP class system implementation projects affect the quality of management information obtained, and thereby business agility. In order to achieve the adopted goal, a discourse has been conducted in order to obtain answers to the following questions: What is agility? What are the attributes of an agile enterprise? Is there a relationship between the quality of information obtained from ERP systems and business agility? As the research method, the authors have used literature research and dependency analysis in the form of rank correlation significance and contingency analysis.

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Literature Review

The "agility" concept, with a special focus on agile manufacturing, was introduced by scientists from the Iacocca Institute in the report *21st century manufacturing enterprises strategy: An industry-led view* (1991) and has attracted unchanged interest as a concept for years, both among academics and in business. When defining business agility, the subject literature specifies many attributes that are assigned to the term, stressing them with varying intensity. And so, business agility is the ability to instantly and effectively react to (unexpected) market changes (Brown and Bessant 2003), in order to meet varying customer requirements in terms of price, specification, quality, quantity and delivery (Prince, Kay 2003). Agility is also reflected in the company's ability to produce and supply new products in a cost-effective manner (Swafford et al., 2006; Tsourveloudi, Valavanis 2002, p. 330). According to Kidd, agility can be reached by integration of the organization, highly qualified and experienced people and advanced technologies (Kidd 1994). On the other hand, Banaszczyk sees business agility in that (Banaszyk 2014, p. 204):

- is close to the market and the end customer,
- is characterized by strategic leadership,
- has a flexible operating potential,
- efficiently cooperates with suppliers,
- utilizes IT management support systems.

The organization's agility capabilities were organized by Sharifi and Zanga (2000). These researchers proposed four, mutually dependent, areas of agile capabilities: ability to react, competence, flexibility and speed. They assigned the respective skills to each area (Tab.1).

Table 1: The capabilities that an agile organisation should have to be able to make appropriate response to changes taking

Capabilities	Specific skills
Responsiveness	– sensing, perceiving and anticipating changes, – immediate reaction to change by effecting them into system, – recovery from change
Competency	– strategic vision, – appropriate technology (hard and soft), or sufficient technological ability, – products/services quality, – cost effectiveness, – high rate of new products introduction, – change management, – knowledgeable, competent, and empowered people, – operations efficiency and effectiveness (leanness), – cooperation (internal and external), – integration.
Flexibility	– product volume flexibility, – product model/configuration flexibility, – organisation and organisational issues flexibility, – people flexibility
Quickness	– quick new products time to market, – products and services delivery quickness and timeliness, – fast operations time

Source: (Sharifi, Zhang, 1999)

Sharifi and Zanga also proposed a model of agility implementation based on: agility driving forces, agile skills (features) and agility providers. The driving forces behind agility are changes in the environment and pressure exerted on the organization, forcing the company to seek new ways to gain competitive advantage. Agile skills allow the organization to react quickly enough to changes (also in search of opportunities to capture). On the other hand, agility providers (practices, methods and tools), supported by proper organization, technology, people and innovation, allow the desired agility skills to be obtained and maintained.

Making the right business decisions depends on access to valid information concerning the business (e.g. balance of assets, costs and revenue, balance of receivables and liabilities, relationships with clients and other). Information, in particular management information, is the entity's resource that ensures that the management function can be realized and the foundations can be determined for making decisions on the organization's different levels. This type of information allows the organization to adapt to the changing environment. Therefore, a demand appears for tools that allow information to be collected, systematized, analyzed. The answer to this demand are ERP-class IT systems.

ERP systems are systems intended to integrate business functions, defined as configurable IT system packages, which integrate information processes and information-based processes within various business areas (Metaxiotis, Zafeiropoulos, Askounis 2005). The profile and the history of integrated ERP-class IT systems have been described in great detail in the literature (for instance: Lech 2003; Hadaś, Cyplik (ed.) 2012). The latest versions of ERP systems (referred to as ERP II) have enriched functionalities, e.g. sharing of system databases by means of a web browser (to employees, customers, suppliers). They are also linked to team work support systems and labor flow support systems. Also, they have connections to data warehouse-based analytical systems. All these functionalities ensure support for the company in many areas, e.g.: actions intended to adapt to changing market requirements, efficient realization of processes related to cooperation with suppliers and customers, instant analysis of collected data, effective performance of internal processes and other.

According to Oosterhout, Waarts and Hillegersberg (2006, p. 120) such systems as resource management (ERP), customer relationship management (CRM) or supply chain management (SCM) help companies to build agility. This agility takes the form of "sensing agility" and "responding agility". These authors created a model under which every organization can be classified on the basis of these dimensions. The abilities to detect and respond can therefore be recognized as types of dynamic capabilities (Sambamurthy et al. 2003). It is important that there is coherence between the potentials to detect and to respond, in order to effectively capture business opportunities. If organizations are not able to work out the effective sensing capability, the opportunities will be lost, the responses will be ineffective, and the resources will be wasted. Referring to examples of well-known companies, the effect of modern IT solutions on the formation of "agile capabilities" was emphasized by improving detectability and speed of response (Overby et al. 2006).

Before choosing the IT system, the areas in which it will bring the greatest benefits for the entity should be identified. In the first place, it has to be examined which information should be collected and processed, in order to ensure that the executed process proceeds in an optimal manner (Stronczek, Krajewska, 2015). J. Unold (2005, p.19) defines an information need as "*forwarding to the organization's IT system a request for such information as is necessary to solve management problem k using algorithm i*". It results from the above that the basic structural components of an information need are (Unold, 2005, p. 19-20): the entity reporting the need, a management problem, a set of possible algorithms to solve the given problem, the required deadline for satisfying the need, the frequency of the need, postulated characteristics of the information sought.

Many years ago H. Miller (1996) claimed that managers have to understand the dimensions and the dynamic nature of information quality, in order to effectively use it as an element of manufacturing processes and as a planning and management control tool. He assigned a set of features to management information, namely:

- relevance - information increases the effectiveness of any decisions made
- accuracy – information reflects the reality,
- timeliness – up-to-date information is supplied in real time (the timeliness problem consists in new information still being generated, resulting in the presence of a "replacement" cycle, dependent on how quickly new information may be processed and transferred to the recipient). This characteristic is sometimes also identified as the speed of obtaining information,
- completeness – understood as full, complex – complete information includes all aspects of a phenomenon,
- coherence – means that information is internally coherent.
- format – it is presented in a proper way, dependent on the recipient,
- accessibility – specifies that the resource can be used on request, in the assumed time, by authorized persons,
- compatibility – consists in the possibility to refer the given information to other data, previously delivered to the user.
- security - the attribute which can be examined in two aspects: information protection from unauthorized recipients and information protection from natural calamities,
- validity – credible information can be verified as true and meeting respective standards concerning other dimensions such as: accuracy, relevance, completeness and safety.

Research Question

A positive impact of the implementation of the integrated IT system on the organization's agility is demonstrated by Gattiker et al. (2005), referring to the fact that ERPs have embedded mechanisms for flexibility, integration of processes,

integration of data and accessibility of "additional" applications to serve agility. Interesting conclusions were also drawn from the research by Mondragon, Lyons and Kehoe (2004). The companies they examined demonstrated a substantial support from the IT system in some organizational processes (e.g. in the production process). However, they stated that, although information systems are frequently used to support efficiency, information systems themselves are not sufficient to obtain business process agility. None of the companies they studied identified IT systems as a critical factor required to improve business process agility. Their study found out that information systems are not a prerequisite for efficiency, although use of an information system, allowing information about demand needs to be obtained quickly may improve the ability to respond in the area of the production process.

In our earlier research we found that:

1. the implementation of ERP has a positive influence on quality characteristics of information (Stronczek et. al, 2017),
2. the implementation of ERP has a positive influence on the organization's agility (Stronczek, 2018).

Therefore, następujące informacje o hypothesis can be asserted:
H: An improvement in the quality parameters of the characteristics of information obtained as a result of the implementation of ERP has a positive influence on the organization's agility.

The conceptualization of the conducted research has been presented in a visual way in Figure 1.

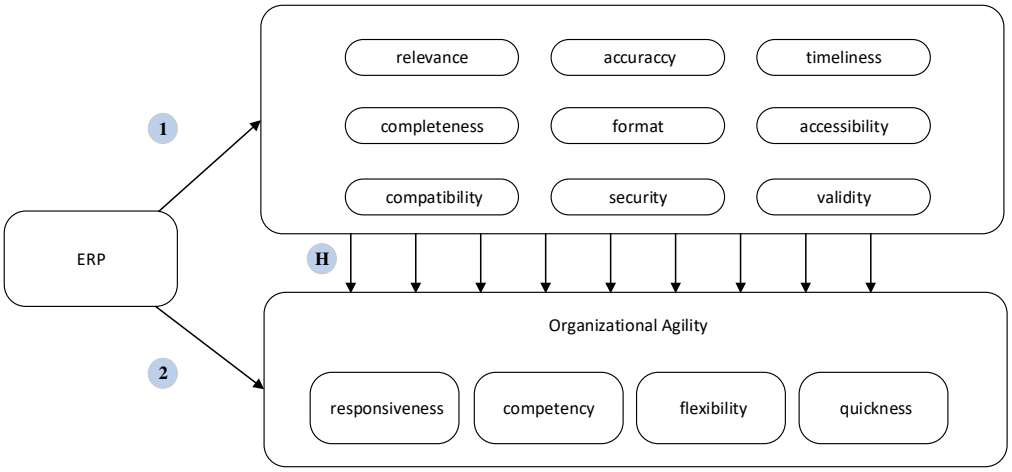

Figure 1. Research model

At the beginning, a general model was shown of the dependencies between the quality properties of information created with the help of ERP systems, and agile skills supported by the implementation of these systems. On the basis of the collected data, the initial dependencies were determined as Spearman's rank correlation coefficient (Bruce &Bruce 2016; Dalgaard 2008). Owing to a small data quantity, the authors used the correlation coefficient significance test.

The next stage was the application of the chi-square independence test (Bruce &Bruce 2016; Dalgaard 2008) in comparison with the pairs of all the mentioned quality characteristics of information created with the help of ERP systems, with particular agile skills supported by the implementation of these systems.

Then, with the use of proper coding data, the contingency table was put together, specifying, on the one hand, high and low assessments concerning the quality of information obtained from ERP systems, and, on the other hand, the indicated high and low assessments of agile skills supported by the implemented systems. The presented general model of associated positive and negative dependencies was then discussed in detail according to the strength and direction of the effect of ones on the others.

All data preprocessing and analyses were conducted using R 4.0.2 (R Core Team, 2020) and RStudio (Version 1.3.1093). For preprocessing data, we mainly used the R package dplyr (Wickham et al., 2019). The correlation analysis was performed by the R package Hmisc (Harrell et.al., 2020). For data visualization, we applied ggplot2 (Wickham, 2016) and corrplot (Wei & Simko, 2017).

Research Design and Methodology

The source of empirical materials for this article was a questionnaire survey, conducted in 2017 using the intentional selection method (snowball method). This method is a typical example of nonrandomized sampling, consisting in a completely subjective choice of the examined entities (Noy, 2008). The sample number was 30 surveys. The research was conducted among SME companies from southern Poland (Silesian voivodeship) as a pilot study of a study plan being prepared concerning, among others, the discussed problem area. Entities having an ERP system, intending to purchase such a system, or having other developed IT solutions, were selected for the survey.

The methodology employed in this research was quantitative approach which falls within the positivism paradigm.

The data collected through the questionnaire were subject to quantitative analysis using software. This approach helped to bring coherence to the research while leading to an enriched understanding of perceptions and events.

The respondents were asked to evaluate the effect of IT system implementation on agility. In the questions, reference was made to the agility attributes specified by Sharifi and Zanga. The assessment was made in the scale 1 to 5, where 5 means that the given characteristic is significantly connected with ERP system implementation. A summary of the received results is collected in Table 2.

Table 2: Agility capabilities that, according to the respondents, are supported by ERP implementation

	5	4	3	2	1
Benefits related to responsiveness					
immediate reaction to change by effecting them into system (R1)	60,00%	26,67%	13,33%	0,00%	0,00%
sensing, perceiving and anticipating changes, (R2)	46,67%	26,67%	13,33%	13,33%	0,00%
Benefits in the area of competency					
strategic vision (C1)	13,33%	26,67%	56,67%	0,00%	3,33%
cost effectiveness (C2)	43,33%	26,67%	16,67%	13,33%	0,00%
operations efficiency and effectiveness (C3)	50,00%	30,00%	20,00%	0,00%	0,00%
change management (C4)	40,00%	30,00%	20,00%	10,00%	0,00%
cooperation (internal and external) (C5)	46,67%	26,67%	26,67%	0,00%	0,00%
Benefits in the area of flexibility					
product model/configuration flexibility (F1)	30,00%	26,67%	26,67%	13,33%	3,33%
people flexibility (F2)	6,67%	20,00%	23,33%	23,33%	26,67%
Benefits in the area of quick					
quick new products time to market (Q1)	26,67%	56,67%	13,33%	3,33%	0,00%
products and services delivery quickness and timeliness (Q2)	23,33%	23,33%	26,67%	6,67%	20,00%
fast operations time (Q3)	23,33%	23,33%	26,67%	6,67%	20,00%

Source: Own study

The surveyed respondents gave a high assessment to the impact of the implementation on the skills that are typical of agile organizations. In particular, benefits were observed in creating and supporting skills in the area of responsiveness and competency.

The respondents were also asked to assess the quality of information generated by ERP systems, referring to the characteristics specified by Miller. The assessment was made in the scale 1 to 5, where 5 meant that the given characteristic is significantly assigned to the information generated by the system. The absence of this characteristic is 1. The obtained results are presented on Fig. 2.

The surveyed respondents gave a high assessment to the quality of information generated by the implemented systems, particularly its validity, accessibility and accuracy. The other characteristics were evaluated equally well. Taking account of the fact that "changes of information needs in the field of management" was one of the most important reasons for the implementation, such indications prove that this expectation has been met.

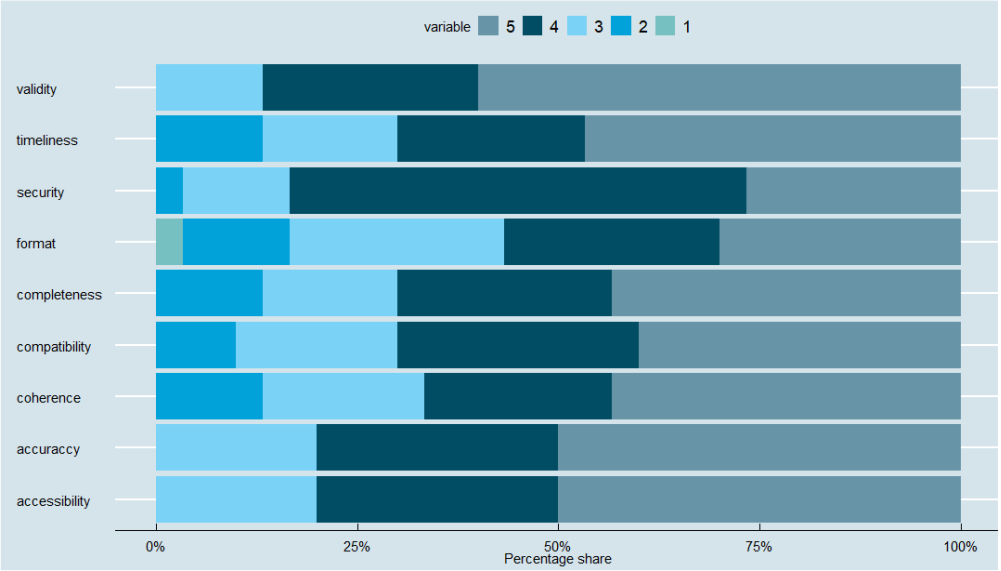

Figure 2: Quality characteristics of information (according to Miller) generated, according to the respondents, by ERP systems

Source: Own study

The general model of the dependencies between the quality properties of information generated with the help of ERP systems and agile skills supported by the implementation of these systems, received on the basis of the collected data, has been presented as rank correlation in Table 3 and in Figure 3.

Table 3: List of Spearman's rank correlations between information characteristics and selected agility capabilities; significant correlations have been distinguished in bold font

	R1	R2	C1	C2	C3	C4	C5	F1	F2	Q1	Q2	Q3
accuracy	0.28	0.19	0.04	**0.49**	0.20	**0.59**	**0.48**	0.19	0.24	**0.43**	**0.55**	**0.55**
timeliness	0.27	0.04	-0.13	0.24	0.08	0.18	**0.33**	**0.62**	**0.44**	0.30	**0.50**	**0.50**
completeness	**0.37**	**0.38**	-0.06	-0.03	-0.01	0.13	0.13	0.04	-0.08	0.05	0.15	0.15
coherence	-0.03	0.10	0.03	-0.13	0.13	0.01	0.01	-0.10	-0.25	-0.04	-0.05	-0.05
format	0.10	0.21	0.13	0.23	0.14	0.03	0.21	-0.28	0.05	0.16	0.26	0.26
accessibility	**0.36**	0.20	0.22	0.09	**0.31**	**0.50**	0.28	0.19	-0.03	0.15	**0.40**	**0.40**
compatibility	-0.06	0.10	0.17	0.13	0.14	0.07	0.09	-0.23	-0.10	0.00	0.16	0.16
security	0.02	0.12	-0.17	0.09	0.16	-0.01	0.13	0.23	0.05	0.07	0.05	0.05
validity	0.16	0.09	0.14	0.16	0.12	**0.46**	0.26	-0.23	-0.09	0.02	0.00	0.00

Source: Own study

In Table 3 rank correlations are presented (with verification of the correlation coefficient significance test), significant ones have been distinguished in bold. In Figure 2 the same correlations have been marked with larger and darker circles expressing the strongest dependencies between the studied assessments. In particular, both in the matrix and on the drawing, the assessment of data accuracy is characterized by high values of rank correlation coefficients with agility skills such as: cost effectiveness, rational management of company's resources, improved cooperation inside and outside the company, faster pace of introducing new products, speed of product and service delivery, speed and punctuality of deliveries. Timeliness of information is correlated with improvement in cooperation inside and outside the company, but also with product model/configuration flexibility, flexibility of employees, faster pace of introducing new products and services as well as speed and punctuality of deliveries. Completeness of information contributes to a faster response to market changes and to sensing, perceiving and anticipating changes on the market. On the other hand, the accuracy of received information contributes to a significant extent to faster response to market changes, improvement in overall business efficiency, rational management of company's resources, speed of product

and service delivery, speed and punctuality of deliveries. Validity of information is related to rational management of company's resources.

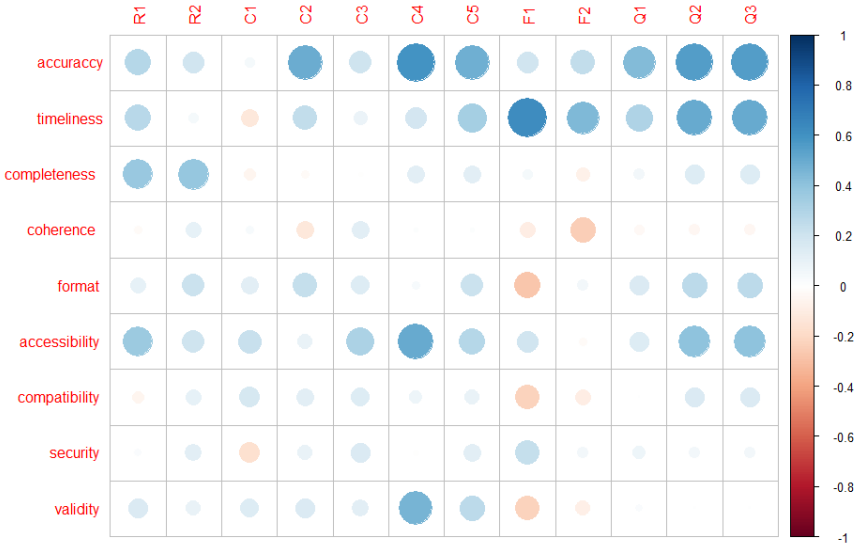

Figure 3: Spearman's rank correlations. The greater and darker the circle, the more important the dependence between the characteristics

Source: Own study

Owing to a small data quantity (the data set was represented by 30 entities) the authors used the correlation coefficient significance test, the results of which are shown as a diagram in Figure 4.

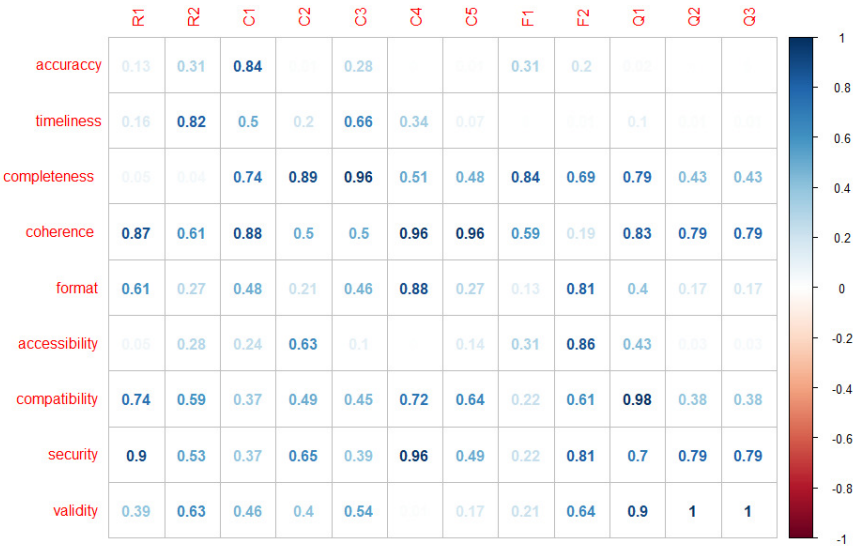

Figure 4: p-values for Spearman's correlation coefficient from Table 2. Significant are values $p < 0.05$

Source: Own study

The next stage was the application of the chi-square independence test in comparison with the pairs of all the above-mentioned quality characteristics of information created with the help of ERP systems, with particular agile skills supported by the implementation of these systems. The collected results of the calculated significance level (p-value) have been compiled in Table 3. Significant p-value levels ($p < 0.1$) have been distinguished in bold font. The significance level limit α=0.1 has been adopted.

Table 4: The calculated significance levels for the chi-square independence test; significant p-value amounts have been distinguished in bold font

	R1	R2	C1	C2	C3	C4	C5	F1	F2	Q1	Q2	Q3
accuraccy	0.17	0.65	0.79	0.12	0.10	**0.00**	0.11	0.21	0.85	0.17	**0.03**	**0.03**
timeliness	**0.06**	0.86	0.42	0.56	0.46	0.78	0.10	**0.00**	0.68	0.32	**0.01**	**0.01**
completeness	**0.00**	**0.02**	0.96	0.24	0.30	0.49	0.35	0.39	0.73	0.32	0.57	0.57
coherence	0.98	0.73	0.28	0.92	0.30	0.33	0.13	0.72	0.33	0.56	0.72	0.72
format	0.66	0.70	0.95	**0.01**	0.37	0.64	**0.01**	0.27	0.48	0.39	**0.00**	**0.00**
accessibility	**0.07**	0.12	0.45	0.73	**0.06**	**0.02**	0.44	0.51	0.45	0.59	0.44	0.44
compatibility	0.33	**0.04**	0.37	0.36	**0.09**	0.13	**0.03**	0.71	0.89	0.68	0.33	0.33
security	0.97	0.82	0.34	0.34	0.42	0.48	0.53	**0.08**	0.94	**0.00**	0.80	0.80
validity	0.86	0.91	0.21	0.62	0.36	0.16	0.33	0.51	0.30	0.97	0.76	0.76

Source: Own study

Repeated presence of some dependences from the rank correlation can be observed here. Namely, accuracy of information substantially affects rational management of company's resources as well as speed of product and service delivery and speed and punctuality of deliveries. Timeliness is significantly connected with faster response to market changes, production flexibility/configuration flexibility, speed of product and service delivery and speed and punctuality of deliveries. Completeness of information has strong linkages to faster response to market changes and sensing, perceiving and anticipating changes. Format affects cost efficiency, improved cooperation inside and outside the company, speed of product and service delivery, speed and punctuality of deliveries. Accessibility of information is a factor contributing to faster response to market changes, improvement in overall business efficiency and rational management of company's resources. Compatibility of information is related to sensing, perceiving and anticipating changes, improvement in overall business efficiency and improvement in cooperation inside and outside the company. Security contributes to product/configuration flexibility and faster pace of introducing new products.

The data set received from the completed questionnaire survey was encoded so as to allow for a distinction into assessments lower than the value 3 (namely values 1 and 2 marked as weak /w/) received in the results of the completed study as low assessments and assessments with values 3, 4, and 5 as high assessments (strong) encoded as a positive effect (strong marked as /s/).

Then, with the use of this data coding, the contingency table was put together, specifying, on the one hand, high and low (strong/weak) assessments concerning the quality of information obtained from ERP systems, and, on the other hand, the indicated high and low (strong/weak) assessments of agility skills supported by the implemented systems. The prepared contingency table, verified the using chi-square test, allows to fix the so-called Pearson residuals (r) for each cell (or standardized residuals). These residuals have been presented in Fig. 5.

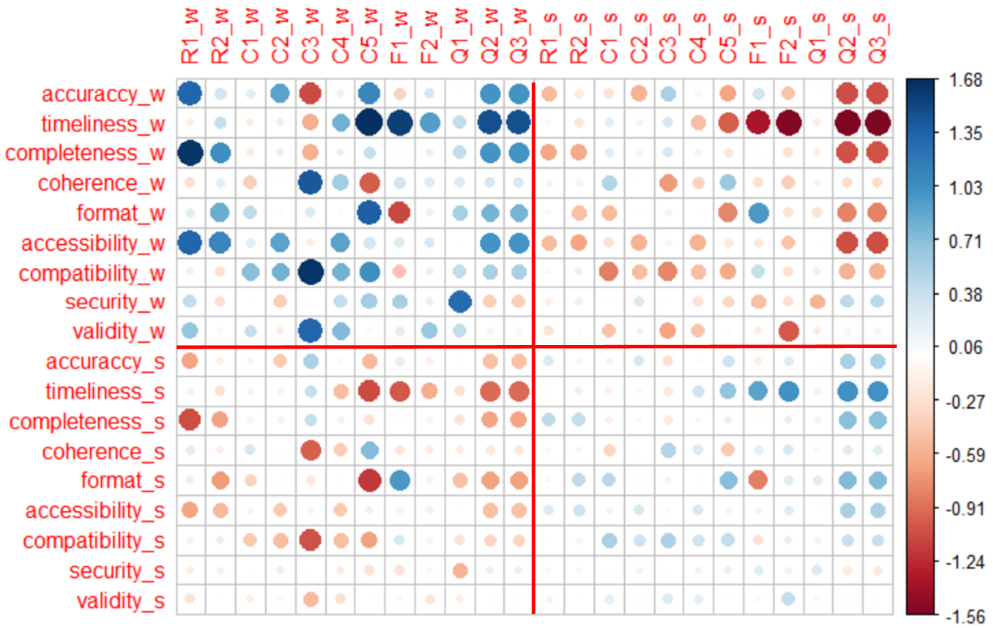

Figure 5: Pearson residuals received from chi-square test. Positive residuals are in blue opposite negative ones are in red. Positive values in cells specify an attraction (positive association) between the corresponding row and column variables. Negative values in cells describe negative association.

Source: Own study

An important initial piece of information resulting from Figure 5 is the observation that in most cases there are positive relationships between weak assessments in both areas (most blue circles are in the top left part of the diagram). In the bottom right part, namely for associations between strong assessments, there are definitely fewer such dependencies. The bottom left and top right part are dominated by negative associations, which is natural. Strong assessments of the quality characteristics of information created with the help of ERP systems will naturally be negatively connected with weak assessments of the agility skills supported by the implementation of these systems. Likewise, the top right part of the screen is dominated by red circles and there are a little bit more of them than in the bottom left part. This means that weak assessments of the quality characteristics of information from ERP systems have a stronger impact on positive assessments of agility skills.

Figure 5 allows distinguishing of four very strong consistent associations, and two relatively strong negative associations in the left part of the diagram. The strongest positive dependence (the largest and the darkest blue circle) is between data timeliness with low assessments and the agile ability, also having low assessments, to improve cooperation inside and outside the company. The second significant positive dependence is related to a low assessment of completeness of data obtained from ERP systems and a weak assessment of faster response to market changes, which seems to be a natural consequence. The third and the fourth dependence are, respectively, a weak assessment of compatibility and a low assessment of improvement in overall business efficiency and low relevance with a low assessment of product or configuration flexibility. On the other hand, the following are indicated among negative associations: a negative effect of low assessments of data validity on weak assessments of improvements in overall business efficiency and a weak assessment of data format, which has a negative effect on production flexibility/configuration flexibility. Among the dependencies between good assessments (the bottom right part of the diagram) three positive and one negative association can be mentioned. In particular, positive associations are the effect of data validity on flexibility of employees, speed of product and service delivery and speed and punctuality of deliveries. The distinguished negative dependence is between data format and production flexibility/configuration flexibility.

The high assessments of the quality characteristics of information created with the help of ERP systems are naturally a factor that negatively affects low assessments of agility skills supported by the implementation of these systems. Such an example are four strongly negative associations: data validity and improved cooperation inside and outside the company; data completeness and faster response to market changes; data format and improved cooperation inside and outside the company as well as data compatibility and improvement in overall business efficiency. One strongly positive association stands out among these associations, namely data format and product flexibility/configuration flexibility. On the other hand, the low assessments of the quality characteristics of information created with the help

of ERP systems are naturally a factor that negatively affects high assessments of agility skills supported by the implementation of these systems. Here, an important factor contributing to the negative effect on high assessments of agility skills is low data validity level. It negatively affects, among others, product flexibility/configuration flexibility, flexibility of employees, speed of product and service delivery and speed and punctuality of deliveries. The only positive association is high assessment of data format with a low assessment of product flexibility/configuration flexibility.

The presented general model of associated positive and negative dependencies was analyzed in detail according to the strength of effect of ones on the others (see Fig. 6).

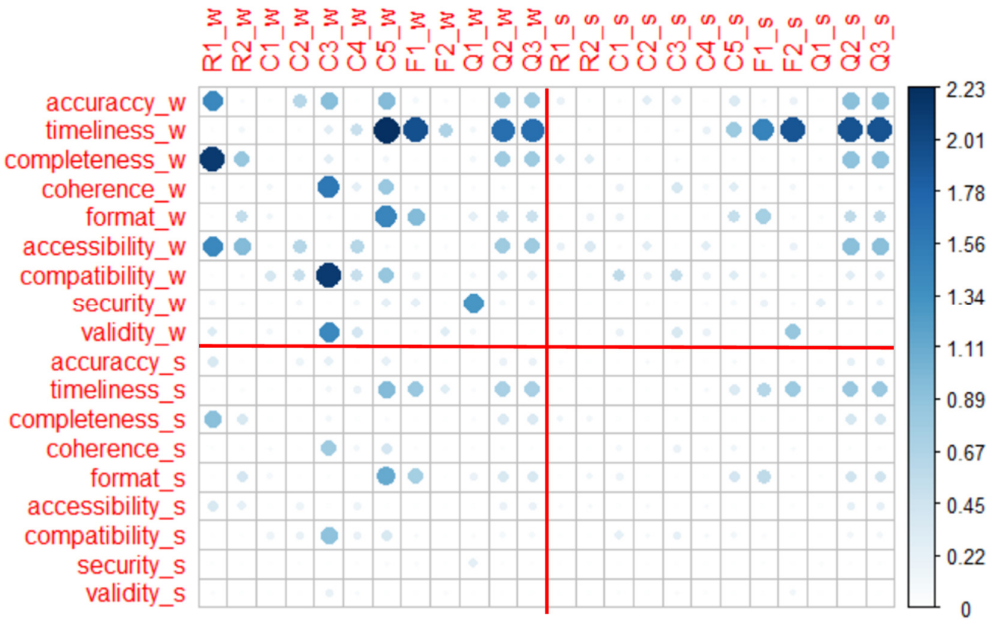

Figure 6: The contribution (in %) of a given cell to the total Chi-square score;

Source: Own study

The contribution (as %) of a given cell to the total Chi-square score was calculated and presented in Fig. 6. As it can be noticed, the strength of the association is greatest in the top left part of the diagram. Here, three significant points stand out: relevance and improved cooperation inside and outside the company (timeliness and cooperation (internal and external)), completeness and faster response to market changes (completeness and immediate reaction to change by effecting them into system) and compatibility and improvement in overall business situation (compatibility and operations efficiency and effectiveness). Also, three largest and darkest points can be noticed in the top right part of the diagram, and in all the basic contributing factor is a weak assessment of data validity. This factor has the strongest associations with flexibility of employees, speed of product and service delivery and speed and punctuality of deliveries. An interesting conclusion is the lack of any clear associations in the bottom part of the diagram i.e. for higher assessments of the quality characteristics of information created with the help of ERP systems.

Conclusion

The common use of enterprise resource planning (ERP) systems fundamentally affects the approach to business information, its collection, storage, dissemination and utilization. This change of the information processing orientation affects many areas of business operations. The possibility to use integrated ERP class systems offers the following benefits: shortens the time of answering requests for quotation and the lead time of the delivery itself, increases the possibility to complete the offer professionally as well as flexibility in formulating the offer, provides direct contacts with people involved in the entire process, facilitates customer identification at the next order and improves the quality of customer service by collecting information about the parameters of their previous deliveries and the course of the cooperation process (Lech 2003, p. 62-63).

After implementation of the ERP-class IT system, the management should have the possibility to immediately react to changes in economic parameters, a result of which will be the streamlined decision-making process. All these benefits are at the same time those parameters that build the organization's agility. However, the relationship between

the organization's agility and the quality properties of information from the implemented ERP system seems to be ambiguous. It seems that the examined companies have not been able to take advantage of the potential of the implemented systems to the fullest. Building agility in business processes and their implementation is not easy and depends not only on the IT infrastructure, but also on many other factors: organizational culture, possibility to manage business processes or specific processes typical of the particular organization (Seethamraju, Sundar 2013, p. 147).

In the opinion of the authors, there is a need for in-depth research in the problem area addressed in the article.

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Theoretical-Methodological and Practice-Oriented Approach to Factor Analysis of The Performance of The Production Company in Management Decisions

Marina A. CHAPLYGINA
Southwest, State University, Kursk, Russia, chaplyginam@mail.ru

Viktoria B. PASECHKO
Kursk Institute of Cooperation (branch) Belgorod University of Cooperation, Economics and Law, Kursk, Russia, viktoria.pasechko@yandex.ru

Irina N. Dorenskaya
Kursk Institute of Cooperation (branch) Belgorod University of Cooperation, Economics and Law, Kursk, Russia, metodvik@bk.ru

Anzhelika A. Alyohina
Kursk State University, Kursk, Russia, molz@yandex.ru

Mariia A. Gololobova
Southwest, State University, Kursk, Russia, masha.gololobova68@gmail.com

Abstract

In this article groups performance indicators, which in the economy of industrial and commercial companies include profit as an absolute indicator, and profitability as a relative indicator. The presented approach allows management to see the current situation in the management process, which negatively or positively affects the effective financial results of work (profit or uncovered loss). Therefore, the presented theoretical and methodological approach with a practice-oriented approach, including the use of a factor-based estimated method, gives financial analysts a reason to identify factors that negatively affect the profitability of companies and develop a strategy to eliminate them. The purpose of the research is to describe the theoretical, methodological and practice - oriented approaches of the factor method of performance analysis and demonstrate the calculation and analytical approach in the management process by relative and absolute values of profitability and efficiency of activities on the example of a production company.

Keywords: performance indicator, asset profitability, profitability of sale, overall profitability, profitability of current assets, profitability of production assets.

Introduction

At the moment, every day there are more and more companies that present their products and services on the market and strive to get the maximum return in the form of profit with minimal costs and expenses [2,4]. An entrepreneur can achieve this goal only if he/she has well-thought-out planning of his/her organization's activities.

In the economy there are two main indicators that show the efficiency of an organization, which are: profit, as an absolute indicator, and profitability, as a relative indicator.

Profit is the very purpose of the organization's existence, and the profitability indicator helps to understand and analyze the level of effective development of the organization [1,3].

Profitability is an economic indicator that shows whether such resources as raw materials, cash, personnel, and other tangible and intangible assets are effectively used [5,7]. It is possible to calculate the profitability of a single individual asset, and the total production enterprise as a whole.

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Also, in other words, profitability can be characterized as a value that determines how amount of money is invested in the production, sale of goods, works, and services, and as a result - the amount of profit received.

In summary, profitability is a relative indicator that shows how much profit is returned from each ruble invested in the business, in production.

Material and methods

From the point of view of the authors I. A. Blank, M. A. Chaplygina, A. I. Zolotarev, [1.14.16]. the analysis of profitability coefficients in dynamics for different periods of time, and subsequently their comparison, are necessary for an effective assessment of the profitability of production. The mentioned economists note that an increase in the profitability indicator will show that there is a positive dynamic in the development of the economic entity, and production is profitable. World-class economists U. Brigham and J. C. Van Horne note that the definition of profitability is also necessary in order to determine the level of development of the company in comparison with its competitors. As a result of the analysis presented below, we can conclude whether the company should continue to conduct production in the chosen direction, or whether there is a need to change something in order to increase profitability, or whether it is necessary to re-profile the existing production.

Results and Discussion

The profitability coefficient, as indicated earlier, shows whether resources are being used effectively in the enterprise. It is defined as the ratio of the profit received to the resources invested to get it [6,8].

This indicator is calculated in numerical expression or as a percentage, but it can also be reflected in the amount of resources spent to get a fixed amount of profit.

The profitability threshold is the minimum amount of profit that covers costs. It is also common to use the term «break-even point» as a synonym.

Profitability indicators are calculated:

- when drawing up a business plan,
-when analyzing management,
- when selling an economic entity,
- when planning income and expenses,
- to determine pricing, etc.

The calculation of the coefficient of profitability is the necessary business parameter.

The analysis of profitability coefficients [10,13] is also required if it is planned to issue a loan, or expand production, to notify investors, and so on.

The main indicators of profitability:
1) return on equity (assets);
2) product profitability;
3) indicators that are calculated based on cash flows;
4) overall profitability;
5) return on current assets;
6) profitability of production assets.

The indicator of profitability on capital (assets) is defined as the ratio of profit to various [9,12]. Indicators of advanced funds, where all assets of the organization are considered the most important; investment capital (long-term liabilities + equity) and equity (equity) capital.

$$\frac{\text{net profit}}{\text{all assets}}; \frac{\text{net profit}}{\text{investment capital.}}; \frac{\text{net profit}}{\text{share capital}} \quad (1)$$

The profitability of products is formed in connection with the calculation of levels, as well as profitability in terms of profit, which are reflected in the reporting of organizations.

$$\frac{\text{profit from the sale}}{\text{sales}};\frac{\text{balance sheet profit}}{\text{sales}};\frac{\text{taxable profit}}{\text{sales}};\frac{\text{net profit}}{\text{sales}} \quad (2)$$

To determine the profitability of products, use the indicators of the reporting (K_1) and base (K_0) period, as an example:

$$K_0=\frac{P_0}{N_0}\times 100 \quad (3)$$

$$K_1=\frac{P_1}{N_1}\times 100, \quad \text{or} \quad (4)$$

$$K_0=\frac{N_0-S_0}{N_0}\times 100 \quad (5)$$

$$K_1=\frac{N_1-S_1}{N_1}\times 100; \quad (6)$$

$$\Delta K = K_1 - K_0, \text{ where} \quad (7)$$

K_1, K_0 – are the profitability of products for the reporting and base period;
P_1, P_0 – reflect profit from sales for the same periods;
N_1 , N_0 – sales of products for the reporting and base period;
S1, S_0 - cost of production for the reporting and base periods;

To calculate the change in profitability in the reporting period compared with the base one, it is determined by the formula:

$$\Delta K = K_1 - K_0 \quad (8)$$

The last profitability indicator is calculated similarly to the first two groups presented above, but net cash flow is taken into account instead of profit.

$$\frac{\text{NCF}}{\text{sales}};\frac{\text{NCF}}{\text{total capital}};\frac{\text{NCF}}{\text{own capital}}, \quad (9)$$

where NCF – net cash flow.

These calculations help management get information about the company's ability to meet its obligations.
The profitability is determined in such a way as:

1. Total profitability is the most common indicator used to determine the profitability of an organization's operations. This indicator is defined as the ratio of profit before tax to the revenue received by the organization from the sale of manufactured products.

$$R_{\text{общ}}=\frac{\text{П}_{\text{дн}}}{\text{В}_{\text{реал}}} \quad (10)$$

where $\text{П}_{\text{дн}}$ – profit before tax;
$\text{В}_{\text{реал}}$ - sales revenue.

2. Return on current assets. It is calculated as the ratio of net profit before tax to the current assets of the organization. The higher this indicator, the more efficiently the organization's working capital is used.

$$R_{\text{обА}}=\frac{\text{ЧП}}{\text{ОА}}, \quad (11)$$

where ЧП – net profit received by the organization;
ОА - average annual value of the organization's current assets.

3. Profitability of production assets. It is calculated as the ratio of the balance sheet profit to the average cost of fixed assets, intangible assets and working capital in goods and materials.

$$R_{\text{Пф}}=\frac{\text{П}}{\text{ПФ}}, \quad (12)$$

where П – profit before tax;
ПФ - average annual cost of the organization's production assets.

4. And other types of profitability required and used for calculation by companies.

5. These indicators are an integral part of the financial analysis and assessment of the organization's condition. They reflect the organization's performance, profitability, and cost coverage. The calculation of profitability shows the final results of the organization's activities to the greatest extent than the profit.

The presented methodological part of the profitability indicators is summarized in one table.

Table1: Grouped profitability indicators

Name of the indicator	Mathematical calculation formula	Descriptive characteristics of the indicator
Profitability of sales	$\frac{\text{net profit}}{\text{sales}}$	Shows the amount of profit received by the business entity from each ruble of products sold.
Profitability of assets	$\frac{\text{net profit}}{\text{all assets}}$	Shows the degree of effective use of the property
Total profitability	$R_{общ}=\frac{П_{вал}}{Себест.}$	Characterizes the share of profit in each earned monetary unit
Profitability of current assets	$R_{обА}=\frac{ЧП}{ОА}$	Shows the amount of profit per ruble invested in current assets.
Profitability of production assets	$R_{Пф}=\frac{П}{ПФ}$	Characterizes whether the fixed assets of the business entity are used effectively

Based on this table 1, you can trace the dependence of some indicators on others and understand that their calculation allows you to analyze the enterprise.
Table 2 shows the initial data for calculating the profitability indicators of the production enterprise of JSC « LLL».

Table2: Initial data for calculating the profitability of a manufacturing enterprise

Indicators	At 31 December 2017	At 31 December 2018	At 31 December 2019	Changes (2018 from 2017)	Changes (2019 from 2018)
1. Revenue from sales of products	3 511 044	4 312 001	3 905 576	800 957	-406 425
2. Gross profit	319 997	449 888	432 479	129 891	-17 409
3. Profit before tax	252 141	369 850	375 746	117 709	5 896
4. Profit from sales of products	267 519	413 865	375 215	146 346	-38 650
5. Net profit	202 924	279 050	288 971	76 126	9 921
6. Total cost of sales	(3 191 047)	(3 862 113)	(3 473 097)	(671 066)	389 016
7. Balance sheet currency (value of the company's property)	2 367 924	2 360 458	2 305 265	-7 466	-55 193
8. Own capital	460 332	674 382	693 473	214 050	19 091
9. Long-term loans and borrowings	31 355	27 495	48 330	-3 860	20 835
10. Current liability	-	-	201 143	0	201 143
11. Cost of working capital	380 724	334 483	630 665	-46 241	296 182
12. Cost of fixed assets	165 296	191 129	202 521	25 833	11 392
13. Cost of the active part of fixed assets	162 369	187 885	190 206	25 516	2 321

According to table 2, you can see that the company's activities are profitable, because in each of the years under review, net profit was obtained, which increased every year. Compared to 2017, profit in 2018 increased by 76,126 rubles, and compared to 2018 in 2019, it increased by 9921 rubles.

The analysis of profitability was carried out according to the balance sheet and the report on financial results of JSC «LLL» using the method of calculating profitability using formulas 1-12.

Table3: Analysis of profitability of JSC « LLL»

Indicators	At 31 December 2019	At 31 December 2018	At 31 December 2017	Changes (2019 from 2018)	Changes (2018 from 2017)
1. Total profitability, %	12,45	11,65	10,03	0,8	1,62
2. Profitability, %	10,80	10,71	8,38	0,1	2,3
3. Profitability of implementation, %	9,61	9,59	7,62	0,02	1,97
4. Sales margin, %	7,39	6,47	5,78	0,92	0,69
5. Asset profitability, %	12,53	11,82	8,65	0,71	3,17
6.Profitability on working assets, %	13,1	9,3	12,07	3,8	-2,77
7. Profitability on assets, %	187,9	141,5	153,39	46,4	-11,89

Thus, it is possible to track the company's position, draw conclusions about its condition for the years under review, development prospects and opportunities. According to table 3, it can be concluded that each of the types of profitability calculated above only increased every year, which indicates an improvement in the financial condition and activities of this economic entity.

We will calculate the factor analysis of the overall profitability ($R_{общ}$).

The index model of total profitability is presented in the formula 13:

$$R=\frac{pq-qz}{zq}=\frac{pq}{qz}-1, \quad (13)$$

where pq- gross income,
qz- production cost.

Levels of overall profitability that allow you to identify the impact of each of the factors:

1. $R_0=\frac{p_0q_0}{p_0z_0}$ – calculation of basic profitability; (14)
2. $R_1=\frac{p_1q_1}{p_1z_1}$ – calculation of profitability for the reporting year; (15)
3. $R_1^1=\frac{p_0q_1}{p_1z_1}$ – calculation of actual profitability calculated in base year prices (16)
4. $R_0^1=\frac{p_0q_1}{p_1z_0}$ – calculation of basic profitability in the form of the actual volume of the product range by an economic entity. (17)

Calculation of profitability according to the formulas (14-17) presented above and the available data of the company «LLL» (balance sheet and financial results report), in table 4, we present below:

1. Underlying profitability (2017):

$R_0=\frac{319\,997}{3\,191\,047}=0{,}1003\times100=10{,}03\%$;

2. Profitability for the reporting 2017/2018 years:

$R_1=\frac{449\,888}{3\,862\,113}=0{,}1165\times 100 = 11{,}65\%$; (2018 г.)

$R_2=\frac{432\,479}{3\,473\,097}=0{,}1245\times 100 = 12{,}45\%$; (2019 г.)

When making actual calculations in the prices of base periods, we take into account the index factors of the Federal state statistics service that allow us to recalculate the volume of sales of the previous period in the prices of the reporting period (calculated data with the price index are presented in table 4).

1. The price Index for 2017 = 1.028
2. The price index for 2018 = 1,041

3. Actual profitability, at basic prices:
$R_1^1 = \frac{437\,634}{3\,862\,113} = 0{,}1133 \times 100 = 11{,}33\%$;
$R_2^2 = \frac{415\,445}{3\,473\,097} = 0{,}1196 \times 100 = 11{,}96\%$;

4. Basic profitability in the form of the actual volume of the range of products produced by the business entity:
$R_0^1 = \frac{437\,634}{3\,756\,919} = 0{,}1165 \times 100 = 11{,}65\ \%$
$R_1^2 = \frac{415\,445}{3\,336\,308} = 0{,}1245 \times 100 = 12{,}45\ \%$

A detailed and visual calculation of profitability based on these formulas is presented in table 4.

Table4: Calculation of the basic profitability in the form of the actual volume of the product range of JSC «LLL»

Indicators	2017	Indicator 2018 in 2017 prices	2018	Indicator 2019 in 2018 prices	2019
1. Gross profit, thousand rubles.	319 997	437 634	449 888	415 445	432 479
Gross profit symbols	$p_0 q_0$	$p_0 q_1$	$p_1 q_1$	$p_1 q_2$	$p_2 q_2$
2 Cost price, thousand rubles.	3 191 047	3 756 919	3 862 113	3 336 308	3 473 097
Cost symbols	$p_0 z_0$	$p_1 z_0$	$p_1 z_1$	$p_2 z_1$	$p_2 z_2$
3. Profitability,%	10,03	11,65	11,65	12,45	12,45
Profitability symbols	R_0	R_0^1	R_1	R_1^2	R_2

Finding the quantitative impact of factors on the example of calculations and data of the company «LLL»:

1. In order to determine the impact of price changes on the overall profitability of $R_{\text{общ}}$ the actual profitability in the prices of the base period should be deducted from the profitability indicator for the reporting period.
$\Delta R_{\text{p1}} = R_1 - R_1^1$; (18)
$\Delta R_{\text{p2}} = R_2 - R_2^2$. (19)

Substitute the data found and calculated earlier for the company in question in the formula:

$\Delta R_{\text{p1}} = 11{,}65 - 11{,}33$=0,32 %;(2018 г.)
$\Delta R_{\text{p2}} = 12{,}45 - 11{,}96$=0,49 %. (2019 г.)

2. In order to determine the impact of changes in cost on $R_{\text{общ}}$ the base profitability, which will be calculated on the actual volume and product range, should be deducted from the actual profitability in the prices of the base period:

$\Delta R_{z1} = R_1^1 - R_0^1$; (20)
$\Delta R_{z2} = R_2^2 - R_1^2$. (21)
$\Delta R_{z1} = 11{,}33 - 11{,}65$= -0,32 %; (2018 г.)
$\Delta R_{z2} = 11{,}96 - 12{,}45$= -0,49. (2019 г.)

3. In order to determine the impact of changes in the product range on $R_{\text{общ}}$, you should subtract the base profitability from the actual profitability, which will be calculated on the actual volume and range of products:

$\Delta R_{\text{ассорт1}} = R_0^1 - R_0$; (22)
$\Delta R_{\text{ассорт2}} = R_1^2 - R_1$. (23)
$\Delta R_{\text{ассорт1}} = 11{,}65 - 10{,}03$=1,62 %; (2018г.)
$\Delta R_{\text{ассорт2}} = 12{,}45 - 11{,}65$=0,8 %. (2019 г.).
The results of the factor analysis of the total profitability of the production enterprise are presented in table 5.

Table5: Results of calculating the impact of factors on total profitability for 2017-2019

Factors that caused changes in profit in the current period	The size of the impact of factors on the overall profitability	
	Absolute changes in 2018 to 2017 (+/-), thousand rubles	Absolute changes in 2019 to 2018 (+/-), thousand rubles
1. Price changes, %	0,32	0,49
2. Cost change at the expense of resource prices,%	-0,32	-0,49
3. Changing the range of products,%	1,62	0,8
Total	1,62	0,8

The aggregate result of the company's calculations allows us to note that the factor calculation was performed correctly, since the results converged, and specifically the «total» line in table 5 is equal to the deviation:

$\mathbf{\Delta R_{2018/2017}} = R_1 - R_0 = 11{,}65 - 10{,}028 = 1{,}62\%$
$\mathbf{\Delta R_{2019/2018}} = R_2 - R_1 = 12{,}45 - 11{,}65 = 0{,}8\%$

Thus, on the profitability in the 2017-2019 years have affected price changes in the direction of growth by 0.32% in 2018, and an increase of 0.49% in 2019; a reduction of production costs by 0.32% in 2018 and 0.49% in 2019; and changing the range of products increase by 1.62% in 2018 , 0,8% in 2019.

Conclusions

For more effective work of the considered enterprise of JSC «LLL», we can assume the following ways to improve the work and increase its efficiency: increase and diversity of output, in particular, expanding the range of output.

Ways to improve efficiency:	
1.	Increase in output and volume of products
2.	Improving the diversity of the range
3.	Reducing material intensity
4.	Rational use of the company's resources
5.	Finding new markets
6.	Using scientific and technological advances and improving production

The abundance of profitability measures allows you to choose the most convenient and effective method individually for each enterprise. A significant factor of survival and profitability of the company's activity is the constant expansion of its markets, improving the quality and competitiveness of products and reducing its prices for consumers.

However, it is important to reduce production costs, increase output and other internal factors.

Based on the calculations, we can conclude that:

- when the profitability of the products produced increases, the profitability of the company's assets increases;
- with an increase in the turnover rate of current assets and the return on non-current assets, and with a decrease in total costs, the return on assets indicator increases;
- when the return on sales indicator decreases, it is necessary to accelerate the turnover of assets.

It is also important to note that a separate analysis of any factors is inefficient and not appropriate, due to the fact that the dynamics, level and other indicators of profitability are affected by a combination of factors, such as:
- quality, volume of output and product composition;
- production costs and production costs;
- profit and its direction of use;
- the level of use of production resources of the enterprise;
- and other factors.

The purpose of periodic analysis and management of the company's profitability is to establish ways to develop and

optimize the company's profit. The cycle consists of the following stages:
- forecast of financial indicators;
-analysis of factors that affect the profitability and profit of the enterprise.

The main task of analyzing profitability indicators is to reveal the trends that have formed in the distribution of income and profit for the current period in comparison with the basic dynamics.

According to the results of the analysis, prescriptions and recommendations are developed for generating profit and using it more effectively by the enterprise.

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Legal Supervision of China's Internet Insurance Information Security under the Background of Digital Economy

MARINA V. CHARAEVA
doctor of science, professor
Southern Federal University, Russian Federation, mvcharaeva@mail.ru

LAIBING SUN
graduate student of Southern Federal University, Russian Federation
teacher of Henan University of Economics and Law, China, 343633283@qq.com

Abstract

In the context of the digital economy, while promoting the development of network insurance, it has brought unprecedented risks to the traditional insurance model. The data involved is usually very private and important identity information. Once leaked and used illegally, it will cause more serious problems. s consequence. This has brought huge challenges to personal information security and supervision. Therefore, with regard to the information security of the Internet insurance market in the context of the digital economy, China can only learn from the successful experience of Western developed countries, combined with the actual situation in China, and on the basis of strengthening security technology research, adhere to the law as the main supervision method and formulate With the improvement of personal information protection laws and the promotion of the establishment of an Internet insurance credit system, the information security issues of China's Internet insurance can be effectively resolved.

Keywords: Digital Economy, Insurance Information Security, Legal Supervision, Risks, Internet Financial Platforms, Internet Insurance Market

Introduction

With the advent of the "digital economy era", China's big data, mobile Internet, Internet of Things, cloud computing, artificial intelligence and other technologies have been rapidly updated, and the Internet insurance industry has developed rapidly. "The Father of Big Data" Victor Meyer Schönberg wrote in "The Age of Big Data": "Today, data has become a valuable company asset, an important economic investment and the cornerstone of new business models."[i] In 2014, the State Council of China issued the "Several Opinions on Accelerating the Development of Modern Insurance Service Industry", clearly supporting financial insurance companies to actively use modern Internet technologies such as cloud computing and big data to innovate sales channels and service models, which will undoubtedly be the Internet. The development of insurance provides a broad space for development. By the end of 2016, more than 200 insurance companies in China had launched Internet insurance business, accounting for 74% of the total number of insurance companies nationwide, five times that of 2011.[ii] On January 29, 2019, the Bank of China Insurance Supervision Committee released the 2018 insurance data statistics

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report. According to statistics, in 2018, the original insurance premium income of the insurance industry was 380.162 billion yuan, a year-on-year increase of 3.92%.[iii]

Although the development of China's Internet insurance is strong, the huge economic value of information data in the digital economy era has led to the illegal acquisition and use of personal information, and the use of Internet technology, the leakage and improper use of personal information in the digital economy era. The hazard is broader and farther than the traditional data age. According to the “China Netizen Rights Protection Survey Report 2016” (hereinafter referred to as “Report”) published by the Internet Association of China, As many as 84% of Internet users in China have personally experienced the adverse effects of personal information leakage, and 21% of them believe that the information leakage is very serious. The "Report" estimates that in 2016, Chinese netizens suffered economic losses of 133 yuan per capita due to spam, fraudulent information, and personal information leakage, and the overall economic loss was approximately 91.5 billion yuan. Internet Society of China: "Investigation Report on the Protection of Chinese Netizens' Rights and Interests 2016."[iv] It can be seen that the issue of personal information security in China has become very serious.

Literature Review

Scholars have discussed the legal supervision of China's Internet insurance information security in the context of the digital economy from different perspectives. Zhu Junsheng and Zhu Shuangshuang, in the article "Innovation and Development of Internet Insurance in China" published in "Financial Research", analyzed the current situation of China's Internet; Zeng Dejun and Liu Zeyi in the article published in "Shanghai Finance".Personal Information Security Issues and Governance in Internet Finance",ZhaoXu's article "On the Protection of Internet Financial Consumer Information Security" in the "Business Economics" article, they conducted an in-depth analysis of personal information security issues under the Internet background; Wang Shu’s doctoral dissertation in Jilin University "Comparative Research on Insurance Regulatory Systems in Major Developed Countries", and Ge Tinglei’s article "Experiences and Enlightenments of Foreign Government Internet Insurance Supervision" in "Liaoning Economics", introduced the insurance regulatory system in western developed countries in more detail. Duan Yan's master's degree thesis in Jiangxi University of Finance and Economics "Research on China's Internet Insurance Laws and Regulations in the Era of Big Data", Shan Lei's article "Public Information Protection Paradox and Legal Challenges in the Big Data Era" published in "Internet Finance Legal Review", Liang Junju's article "Research on China's Internet Insurance Legal Supervision System", from different perspectives of the law, It sorts out and analyzes the legal supervision of Internet insurance information security.

Although the above-mentioned Chinese scholars have conducted research on this topic from various angles, they all have their own shortcomings. These articles and studies either did not put the issue of Internet information security in the context of legal supervision, or although they were under legal supervision Discussed in the background but did not specifically address the field of insurance information security. There are only a handful of articles that can conduct in-depth and detailed analysis on this topic.

Research Methodology

For the information security problem of the Internet insurance market under the background of digital economy, in theory, many concepts need to be clarified, and some theoretical problems need to be systematically combed and analyzed, and theoretically provide guidance. In practical terms, the issue of information security in the Internet insurance market is related to whether the legitimate rights and interests of citizens can be guaranteed, and whether

the national supervision is effective or not is an important issue that needs to be resolved urgently.

The existing regulatory concept of the Chinese government is lagging behind, and the existing legal supervision system cannot cope with the risks of Internet insurance. Therefore, in the digital background, how to maintain institutional and citizen information security and improve existing legal supervision and supporting systems has become a problem that must be seriously studied.

There are two main research methods used in this paper: the first is literature analysis. Through the channels of libraries, the Internet, and electronic databases, we collect theoretical results related to the digital economy and Internet insurance legal supervision system. Through the systematic reading and learning of digital economy and insurance theory and related literature, we can understand the current status of Internet insurance development at home and abroad. It has a general understanding of the Internet insurance supervision system of major countries in the world, and discusses the analysis of the lack of information security legal supervision system in China's Internet insurance market. The second is comparative analysis. It is to read foreign papers and books on the Internet insurance legal system, and to compare the development status of China's Internet insurance legal system.

Information Security Supervision Risks Faced by China's Internet Insurance Market

In the digital economy, the continuous innovation of information technologies such as mobile Internet, big data, cloud computing, Internet of Things, and blockchain has changed the lifestyle of consumers and made consumers have a high dependence on the Internet. The Internet risks faced by consumers when they use the Internet for insurance consumption are also the problems that Internet insurance development will face. Brown J.R. Goolsbee A proposed that Internet insurance is a new marketing model that has emerged with the development of society. The sales model of traditional insurance companies is being changed by the rapidly developing network. There are many risks in this new sales model, which requires the government and industry organizations to pay more attention.[v]

I classify the insurance market information security risks into four categories: insurance market information security technology risk, insurance market information security moral risk, insurance market information security legal relief risk, insurance data monopoly risk.

Insurance market information security technology risk

The technical basis of Internet insurance lies in the improvement of information technology systems. At present, the development of China's Internet finance is still in the early stage of development. The various information technology systems are not yet mature. The basic technologies of Internet financial platforms such as big data, cloud computing and mobile Internet need to be improved. Firewall technology and information isolation technology still need to be improved. The customer information and personal data collected by the Internet insurance platform are still difficult to be effectively protected.

In terms of transaction data security risks, Internet insurance services have higher requirements for network technology, The series of processes such as insurance, underwriting, insurance premiums and insurance payments are dependent on the network. Although it is relatively fast, insurance companies use cloud technology to store data, data management is more dispersed, and it is difficult to control data processing for consumers. The location cannot distinguish the legitimacy of the user. If the computer operating system fails and the database is vulnerable, it is very easy to constitute a security risk of the insurance transaction data.

In terms of customer information security risks, the acquisition of big data is crucial to the development of Internet insurance. The vast amount of customer information exists in the form of electronic data, which makes transmission and use very convenient, greatly increasing the risk of customer information leakage or abuse. Once an insurance company is attacked by a "hacker", customer information is tampered with, stolen, deleted, or even abused, insurance funds are stolen, and the insurance company's product pricing, operation management, and business development will be seriously affected, thereby harming the interests of the insured.

Insurance market information security moral hazard

In addition to the technical risks of information security, the information security of the Internet insurance market, especially the information of insurance consumers, faces great moral hazard.

On the Internet platform, consumers can choose whether to provide personal information, but the insurance industry often needs to provide detailed personal information, such as ID number, home address, bank account number, etc.In order to confirm the identity of the insured, even the insurance company in the process of business development. It collects a lot of customer's private data, such as medical records, living habits, family property status, etc., and if this information is not provided, it is likely to affect underwriting and claims, but it is difficult for consumers to understand the personal information provided. Where does the insurance company use it? In fact, insiders of insurance companies are likely to leak or sell customer information, including publicizing or privately disseminating personal information of policyholders, insureds, and beneficiaries, tampering with others or disclosing information of others without the permission of the parties.

In addition, organizations or individuals that illegally obtain information on the consumer insurance market also have the possibility of illegally using personal information. For example, fraudulent use of other people's information, damage the legitimate rights and interests of insurance consumers, and even use insurance market information to implement fraud. □

Insurance data monopoly risk

The core of insurance lies in the actuarial and determination of risks through big data. Under the Internet insurance model, the traditional law of large numbers will bear the brunt of the impact and change of Internet technology. Under this trend, data competition will become the biggest competition in the insurance industry in the future. An insurance team with more user data and more powerful data processing capabilities will take the lead in the Internet insurance innovation tide and gain the advantage of Internet insurance development.

On the other hand, under the characteristics of the development of technology in the digital economy era, the industry gap will become more and more significant. Insurance companies and Internet platforms with platform and technology advantages will have a stronger monopoly in the Internet insurance model. The survival space of some emerging Internet platforms and small and medium-sized insurance companies is likely to be squeezed by the big platform because of the disadvantages of acquiring and processing data. This trend is not conducive to the long-term development of the Internet insurance industry. Therefore, in the development stage of Internet insurance, while encouraging and actively pursuing innovation through big data technology, we should establish a sound data sharing mechanism to avoid the negative impact of the formation of data monopoly on the development of the Internet insurance industry.[vi]

Insurance market information security legal relief risk

There are not many laws in China to protect the information security of citizens in the insurance market. The supervision of insurance is mainly based on the Insurance Law of the People's Republic of China. The Electronic Signature Law promulgated in 2004 determines the legal effect of electronic signatures. This is an advancement of the law in the Internet and provides legal protection for Internet insurance transactions. On July 18, 2015, the People's Bank of China and other 10 ministries and commissions issued the “Guiding Opinions on Promoting the Healthy Development of Internet Finance”, of which Article 11 provides guidance on information security and financial security in the Internet insurance market. On July 22, 2015, the China Insurance Regulatory Commission issued the Interim Measures for the Supervision of Internet Insurance Business (hereinafter referred to as the “Interim Measures”). Although the “Interim Measures” also stipulates that insurance institutions should keep confidential customer information, without the consent of the customer. Disclosure, causing adverse consequences, ordered rectification, and administrative punishments were severely imposed, but the regulations were still too general and insufficient to create a shock to insurance companies. Moreover, the level of legislation is too low to be effective.

China's current Consumer Protection Law is mainly aimed at consumers in the real economy. Articles 14 and 29 stipulate that personal information is protected according to law and the confidentiality obligations of operators are clearly defined, but consumers of Internet insurance Compared with the consumers of the real economy, it is unique. If the protection of its rights is only protected by the Consumer Protection Law, it cannot effectively solve the real problem. In addition, although the Insurance Law of the People's Republic of China also stipulates the protection of the privacy of policyholders, insured persons and beneficiaries, it is also not detailed enough to meet the special needs of the Internet insurance field.

In China's regulatory positioning, traditional insurance and Internet insurance have not yet been distinguished. The current insurance laws and regulations are based on traditional insurance, which leads to the use of traditional insurance supervision methods and means. Relevant legislative bodies and regulatory agencies have not fully prepared for the speed of Internet insurance development, which has led to the lag of the construction of relevant laws and regulations, and the legal system of insurance supervision is not perfect. Insufficient legal system construction has led to a lack of regulatory system. At present, there is no comprehensive set of regulatory supporting laws and regulations that cover the development of Internet insurance, such as Internet insurance access, business rules, risk prevention, and consumer rights protection.

At the same time, the lack of understanding of Internet technology and information security knowledge by relevant departments has also led to the vacancy of some relevant security technology laws. The current e-commerce regulations are still not perfect. The general Internet supervision laws and regulations cannot meet the regulatory requirements of Internet insurance. The legal effects of the transaction, customer privacy protection and other issues still cannot be relied upon, and these are easy to cause transaction disputes.

This kind of legal supervision will have the following adverse effects: First, with the development of Internet insurance, some regulatory policies can’t adapt to the new model of Internet insurance, which has long been inapplicable and has become a factor restricting the development of Internet insurance, affecting the regulatory effect. Second, the regulatory policy has not kept pace with the times and has been unable to regulate the new situation triggered by the development of Internet insurance, which has led to a vacuum in supervision. However, the risks caused by Internet are not available in traditional insurance. If not regulated and regulated, it will have

serious consequences for the healthy development of Internet insurance.

The Enlightenment of America and Europe's Internet Insurance Market Information Security Supervision System to China

Internet information technology has arisen in the United States and has since spread to the world. First enter the developed countries, such as the United Kingdom, France, Germany, Japan, etc., and then enter the developing countries. Internet insurance has developed earlier in these countries and has developed rapidly. Therefore, it is necessary to absorb and learn from foreign related information security supervision experience in the Internet insurance market, and to develop a legal supervision system that conforms to China's national conditions.

US Internet Insurance Market Information Security Supervision System

In the mid-1990s, the financial environment of the US economic market was quite mature, and the country has been focusing on the development and application of Internet technology, which led the US financial industry to expand to the Internet. Undoubtedly, in such a big environment, the United States has also become the first country in the world to have Internet insurance. After more than two decades of development, almost all insurance companies in the United States have launched Internet insurance services on their official websites. According to statistics, as of 2014, 71% of Internet users in the United States shop online, and 61% of consumers choose to search for insurance products online.[vii]

Internet insurance in the United States started early and developed rapidly, enjoying the technological advantages of platform big data, cloud backup, cloud computing, etc., which is inseparable from its efficient and reasonable regulatory policies.

The US Internet insurance agencies are the state's insurance regulatory agencies, which use a loose and prudent regulatory model. In the US Internet insurance market, it emphasizes the leading role of the market and avoids excessive government intervention in the development of the Internet insurance industry. The maintenance of the Internet insurance market order mainly relies on the self-discipline of the industry. The government provides policy guidance, the company provides funds to support the establishment of non-profit organizations, and formulates and implements industry trading standards and self-discipline clauses, which provide a good foundation for the development of the Internet insurance market. Order specification.

According to Ge Tinglei’s research, The US government has successively issued a series of laws and regulations to promote and regulate the healthy and orderly development of the Internet market, and provide institutional guarantee for information security in the Internet insurance market. For example, the National Information Infrastructure Plan promulgated in 1993. In 1996, the Uniform Commerce Code included Article 2B-Licenses to regulate Internet insurance sales; The 1997 Framework for Global Electronic Commerce stipulates five aspects of regulatory principles and nine areas of international collaboration, which indicates that the US government has formed a systematic policy in the development of e-commerce. In 2000, the Electronic Signatures in Global and National Commerce Act promoted the process of electronic data signing, providing a good legal framework for Internet transactions in terms of reliability and security. This is the basics of Internet insurance in the United States. legal protection. Protect the information security of the Internet insurance market from various aspects.[viii]

In 1998, the National Association of Insurance Supervisors (NAIC) detailed the provisions on the effectiveness of electronic signatures and privacy principles of Internet insurance in "Marketing Insurance over the Internet", and in 2000, "Electronic Insurance Supervision" The Regulatory Issues Associated with the Provisions of Insurance Electronic ally proposes and explains the three major rules of Internet insurance: information preservation, information transfer, jurisdiction and licensing.

Vance Gudmundsen believes that the emergence and development of the Internet has had a profound impact on the insurance industry and overturned the traditional sales model. Under the new situation, the supervision of the insurance industry should also follow the trend, including market access, electronic signatures, and rate determination. The US Federal Trade Commission and the American Association of Insurance Supervisors are obliged to formulate relevant regulatory systems for the current development of Internet insurance.[ix]

The United States insists on cautious and appropriate supervision of the Internet insurance market by means of legal means, administrative means and technical means. On the one hand, it pays attention to Internet technology and information security, and guarantees transaction security in a timely manner; on the other hand, it encourages innovation in the Internet insurance market, timely updates and perfects relevant laws and regulations, and maintains market vitality and healthy development.[x]

EU Internet Insurance Market Information Security Supervision System

The development of Internet insurance in Europe lags far behind the United States. Its main reason is that it is composed of different countries. The establishment of the regulatory system is difficult to keep up with the speed of Internet insurance development. However, the EU has legal supervision and protection of information security in the insurance market. It is far more systematic than the United States. "

European countries have established separate insurance regulatory agencies for independent regulatory principles. The "consistency" regulatory principle is the basis of European Internet insurance regulation, supervising the effective coordination of the regulatory authorities, and paying attention to the efficiency and fairness of supervision. These have clarified the responsibilities and regulatory scope of the regulatory authorities and created a good regulatory environment.

Take the General Data Protection Regulation adopted by the European Union in April 2016 as an example. This regulation applies to all EU countries and unifies the previously loosely distributed personal data protection regulations of the European Union, which came into effect in May 2018. This regulation is more rigorous from all angles and will have the following major impact on European insurance companies:

2.2.1. Authorization, the insurance company can use personal information only after the customer gives clear and clear authorization. More importantly, the customer has the “right to be portable” and “right to be forgotten”, and can take the initiative to request, modify and recover his own authorization, thus requiring the insurance company and the third-party enterprise shared by the insurance company to delete relevant information;

2.2.2. In the process, the insurance company needs to add the authorization and modification process of the customer, the internal use supervision and evaluation of personal information, and the privacy protection of personal information to the current operational process;

2.2.3. IT systems need to further enhance the data center's IT capabilities for personal data management, hacker attacks, data breaches, etc., otherwise it will be subject to a sky-high ticket that can reach up to 5% of the

company's global annual revenue;

2.2.4. In terms of compliance, the insurance company shall report to the personal information regulatory agency regularly the operation of personal information management and leave a draft;

2.2.5. In terms of organizational structure, more than 250 employees must have a DPO (Data Protection Officer), which is solely responsible for the personal information security protection of the company.

The adoption of the General Data Protection Regulations is a challenge for companies planning to innovate insurance business through big data analysis of customer personal information, increasing the cost of insurance companies to obtain authorization, collecting information, using information and managing information, and increasing information. Once the leak is punished. European insurance companies must update their business processes in personal information management and increase IT investment in information security in order to properly use personal information big data to carry out business innovation.[xi]

The Enlightenment of the Information Security Supervision Experience of the Extraterritorial Internet Insurance Market to China.

By understanding the development of Internet insurance in developed countries and the comparison of their regulatory models, it is not difficult to see that although the regulatory models adopted are not the same, they have promoted the development of the local interconnected insurance industry and established developed insurance. The market, the useful experience is worth learning and learning from.

On the whole, from the perspective of the regulatory focus of Internet insurance in various countries, the United States focuses on solvency supervision, and Europe focuses on the prevention of Internet insurance fraud, but they all regard the protection of consumer rights, including information security, as an important factor in Internet insurance supervision. content.

Moreover, the United States and European countries have relatively complete legal supervision systems. A sound legislative system is the premise of Internet insurance supervision. Developed countries have experienced decades of development and practice, and gradually formed a relatively perfect legal system. From the information security protection of Internet insurance, the access and exit mechanism, the conclusion of insurance contracts, and information disclosure, they are highly targeted and Practicality.

Internet insurance market information security legal supervision and improvement of supporting system

The China Insurance Regulatory Commission proposed in the "13th Five-Year Plan for the Development of China's Insurance Industry" issued in 2016 that it is necessary to adhere to the unity of institutional supervision and functional supervision, adhere to the unity of macro-prudential supervision and micro-prudential supervision, and adhere to risk prevention and consumers. Both rights and interests are protected. Improve the three core regulatory systems of corporate governance, solvency and market behavior, and establish a comprehensive risk management system.[xii] It can be seen that China's Internet insurance supervision must improve corporate governance supervision, solvency supervision, and market behavior supervision system under the legal system.

There is not much research on the Internet insurance market in China's insurance academic circles. Especially in the legal supervision system, the accumulated Internet insurance theory is not enough to support the improvement

of relevant Chinese legislation. Therefore, it is necessary to discuss the Internet insurance supervision system from the perspective of legal supervision and supporting systems, and find out the problems existing in the process of supervision of China's Internet insurance. Learn from the experience of Internet insurance supervision in the United States and European countries, and the health of China's Internet insurance. Development proposes feasibility recommendations.

Improve personal information protection legislation

Although on June 1, 2017, the "Network Security Law of the People's Republic of China" (hereinafter referred to as the "Network Security Law") was implemented, which involved the protection of personal information in cyberspace. The "Insurance Law of the People's Republic of China" only provides general provisions for the protection of personal information of policyholders, insured persons and beneficiaries. Its practicality is not strong, and it is difficult to apply to the virtual Internet insurance field. In addition, the general provisions of the Chinese Civil Law and the protection of personal privacy in the criminal law are also regulated accordingly. Saizheng believes that, in general, China's current protection of personal information has not yet formed special legislation. The relevant provisions are mainly scattered in laws, regulations, departmental rules and normative documents in various fields, showing a decentralized regulatory status. And because different norm-setting subjects can only proceed from the value orientation of their respective functions and norms, the current norms on the security protection of personal information lack systematic and coordination, which easily lead to regulatory conflicts and gaps. Legislation to improve personal information is of paramount importance to the protection of personal privacy in the era of big data. At present, personal information is frequently leaked, digital top-level security design is missing, and digital transaction security supervision is absent. In this context, the individual suggested that a system of Personal Information Protection Act be established as soon as possible. [xiii]

In my opinion, in order to regulate the acquisition and use of personal information more comprehensively and effectively, the following issues should be clarified in the process of perfecting the personal information protection legislative system: First, personal information protection legislation should balance the protection of personal privacy and public interest. The starting point is the realization of technological innovation and the promotion of conflicts in the development of the digital economy. In the era of big data in the Internet, there is an eternal contradiction between the protection of personal privacy and public interest and the realization of the commercial value of the Internet. How to balance the conflict is the most critical core of network information security legislation, and it is also the most difficult pain point. Therefore, in the legislative technology, the reserve of flexible space is the key to the effective operation of the personal information security protection system.[xiv]

On the whole, China's current legal norms do not have a clear and specific description of citizens' information security rights and remedies. The only provisions are only general and not practical. The Internet has developed so rapidly that if the relevant laws are not formulated in time, more Internet insurance disputes will arise, which is not conducive to the stable development of the economy.

Therefore, in the construction of the legislative system for personal information protection, the improvement of relevant mechanisms and technologies, such as the establishment of sharing mechanisms, the supervision of databases, and the use of blockchain technology, can achieve the full process of personal information utilization. Supervision. In the supervision, it is necessary to improve the information disclosure and punishment mechanism, and strictly manage and punish the behavior of the Internet insurance policyholders.

Strengthening security technology research to establish a private network

Internet insurance uses information technology to carry out business development. At the same time, the technology of relevant regulatory departments should be improved accordingly, so as to better regulate Internet insurance transaction activities and find problems in time.

It is necessary to handle the relationship between data disclosure and personal information security. On the basis of not infringing on the security of personal information, publicly disclose data that is beneficial to social development, and at the same time effectively use the public data of other industries to broaden the thinking for the development of Internet insurance. Strengthen technical research and establish a private network for Internet insurance as soon as possible to ensure the security of information technology in the Internet insurance market. When the financial system is in a period of change and transition, the integration of new technologies such as blockchain, cloud computing, artificial intelligence and the Internet of Things will guarantee the process of sustainable development.[xv]

Promote the construction of Internet insurance credit system and avoid moral hazard

Establish a complete and systematic insurance basic data information platform. We will build an open credit hierarchy, improve the system of trustworthiness and encouragement, and reduce the system of credibility and credibility. We will encourage honest enterprises in a variety of ways, publicize and punish untrustworthy enterprises, and those who are seriously untrustworthy must withdraw from the market. Guide Internet insurance operators to operate in good faith, and reduce the adverse selection and moral hazard caused by information asymmetry in Internet insurance transactions. Refine insurance statistics indicators and accumulate diversified data for strategic decisions in the development of Internet insurance.

Research and development of unified Internet insurance supervision database

In the context of the rapid development of the current Internet insurance market, the regulatory authorities should actively consider how to improve regulatory efficiency and improve supervision. The use of modern information technology to establish a database is a key link in modern insurance regulation. Through the establishment of the official database, the regulatory response of the regulatory authorities will be improved, data sharing and regulatory disclosure will be promoted, various problems in Internet insurance supervision will be resolved, and scientific basis for regulatory decision-making will be provided.

Actively develop a unified Internet insurance regulatory database. The database should include unified data standards such as corporate information and systems, regulatory records, rewards and punishments records, and related data statistics and analysis functions to achieve scientific and informational decision-making. At the same time, on the basis of the unified database of insurance supervision, build a unified database of the financial industry to achieve regulatory cooperation. It is also possible to establish a cross-industry database based on this, so that insurance supervision can integrate data resources across industries and regulate the behavior of insurance institutions from different dimensions. The establishment of a broad and unified database platform can link the originally isolated insurance market information with a variety of data, making the information value of the insurance market higher, and providing strong support for the regulatory decisions of insurance regulatory agencies.

In the opening and sharing of public data resources, the government, as the main data resource controller, should further strengthen the opening of public data and the construction of sharing platforms without jeopardizing national interests and public interests.

Conclusion

In the context of the digital economy, Internet insurance, which began with traditional insurance channels, has continued to enrich its connotation and extension with the continuous development of Internet technologies such as big data. The development of Internet insurance is increasingly inseparable from the use of Internet technologies such as big data, and the use of technologies such as big data is also promoting the development of Internet insurance, bringing with it unprecedented risks under the traditional insurance model. huge challenge.

This paper analyzes the information security supervision risks faced by Internet insurance in the context of digital economy, and proposes that Internet insurance faces four major risks: insurance market information security technology risk, insurance market information security moral risk, insurance market information security legal relief risk, insurance data monopoly risk. Through the combing of the information security supervision experience of the US and European Internet insurance market, the author draws the enlightenment to China that the perfect legislative system is the premise of Internet insurance supervision. Next, the article answers one by one how to improve the information security legal supervision and other supporting systems in the Internet insurance market under the background of digital economy, and draws up the improvement of personal information protection legislation, strengthens the research of security technology, establishes a private network, and promotes the Internet insurance credit system. The construction and research and development of a unified Internet insurance regulatory database is a very targeted and feasible proposal.

In summary, the innovation and development of Internet insurance is inseparable from the improvement of the digital supervision system, especially the legal supervision. To build a sound digital supervision system, it is necessary to use the relevant infrastructure construction and technical level as the hardware foundation and the legal system. The soundness is the institutional guarantee, and the intervention of government supervision is the main means. Although China's Internet insurance market faces many problems, as long as it can learn the successful experience of Western developed countries, and combine the actual situation of the country, adhere to the premise of legal supervision, and cooperate with other measures, the government's supervision can be more effective, China Internet Insurance Information security issues can be effectively resolved.

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Paths in and Out of Academia in Russia: Implementation of Situational Approach

Anna SVIRINA
Kazan National Research Technical University named after A.N.Tupolev - KAI, Kazan, Russia
AASvirina@kai.ru

Maksim SOLODUKHO
Kazan National Research Technical University named after A.N.Tupolev - KAI, Kazan, Russia,
MNSolodukho@kai.ru

Natan SOLODUKHO
Kazan National Research Technical University named after A.N.Tupolev - KAI, Kazan, Russia,
NMSolodukho@kai.ru

Abstract

The paper analyzes the reasoning behind entering and exiting academia in case of Russian universities. It investigates the issue of coming in and out of academia in case of constant changes that occurred in the academic world in the past 25 years. They have led to drastic changes in the academic world and greatly influenced the paths one had to and out of academia. In this paper, we try to see whether the motivation to become an academician or leave this world is different for the Russian setting compared to what exists in the Western academic world

Keywords: Academia, Career, Situational Approach.

Introduction

The perception of academic careers in Russia and the majority of the USSR has changed significantly in the past 30 years, leading to a changed assessment of academic jobs. In this paper, we have analyzed interviews of 15 Russian academicians, who either spend their whole life at the university, or joined academia from business, or the ones left academia as a result of changes in the sphere. Their different perception allowed comparing their motivation with the mainstream discussion in the existing literature and figuring out specific features of academic careers in transition economies.

In this paper, we investigate the issue of coming in and out of academia in case of constant changes that occurred in the academic world in the past 25 years. They have led to drastic changes in the academic world and greatly influenced the paths one had to and out of academia. In this paper, we try to see whether the motivation to become an academician or leave this world is different for the Russian setting compared to what exists in the Western academic world.

Literature overview

The issue of academic careers is widely discussed in the existing literature. The problem drew attention due to dramatic changes in the sphere, starting in the 1960s (Geppert & Hollinshead, 2017). According to their study, the first substantial change was a shift in the volumes of higher education. For centuries, academia was a place for a few (mainly privileged), while from the second half of the XX century, the world experienced mass higher education. Nowadays, about 20% of the appropriate age population is involved in higher education (Frank&Meyer, 2007).

Moreover, even more in the continents where populations were usually undereducated (Aspiring Minds, 2016; British Council, 2016). Thus, universities required much more academicians to lead the teaching and research process, making the career massive, and academicians are rarely residents of the ivory tower nowadays. The second transformation of the higher education system is led by the emerging knowledge society that is unimaginable without a high share of the educated population.

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Some researchers indicate that these changes led to the implementation of the American higher education model all over the world in the first place (Juusola et al., 2015). One of the primary outcomes from the late shift is the rise of technocratic management systems that measure academicians' performance by a set of indexes, rankings, number of publications, and others. According to Beyes and Michels (2011), this had driven pedagogical excellence out of the modern universities; and, on the other hand, according to Rutherford and Van der Voet (2017), inspired growing share of educational managers who transformed universities into service sector organizations rather than temples of teaching and science. These changes provoked moving of a few academicians out (Boltanski&Thevenot, 2006) while a different type of teachers and researchers (often coming from the business due to calling) start fleeing in (Buzzanel & Goldzweig, 1991).

The other issue of importance, but relatively uncovered by existing literature, is the specifics of academic motivation, which is an issue for us in this paper. Existing literature includes several studies regarding motivation, which is considered one of the critical management functions, each of these using different evaluation instruments that include experimental studies. The most significant experimental studies were conducted by Duke University (Ariely, 2008) and state predictably irrational behavior of humans, including their behavior in the workplace. Similar results are present in one of the cybernetics branches (Eccles&Pyburn, 1992; Von Hipel, 1994), which states that incentives and stimulus. Those are created for developing systems that would not necessarily work correctly in case of complex self-organizing systems: an opposite result to what is expected might occur. Both approaches lead to the same statement – for human-based systems, the natural outcome of a stimulus is rarely the outcome that appears in reality, which is a consequence of self-organized systems stochastic nature. In this paper, we analyze a natural experiment in one of the Russian universities where a fully quantitative approach to measure teaching and research staff performance was implemented four years ago and try to evaluate outcomes of this approach and relevant managerial practices. This setting is to be kept in mind, especially for academicians, as most experimental studies assess irrational behavior and motivation within the academic setting. Though existing literature assesses the following factors which are essential to creating incentives for employee behavior: creation and promotion of positive organizational values (Barrett, 1997), implementation of creative capital to ensure organizational development (Cushing, 2001), providing personnel with high quality challenging tasks to develop intrinsic motivation to work (Greenberg&Baron, 2000), continuous evaluation of organizational culture and creation of relevant stimulus for organizational change (Mengis&Eppler, 2008), creation of high-quality teams to ensure motivation and learning process. Still, the studies indicate that these incentives are not always directly related to academics' reasoning when describing their paths in and out of academia.

In terms of existing definitions in management, theory academics are more often driven by what is called intrinsic motivation. Intrinsic motivation has emerged as an essential phenomenon for educators. It was assessed as "a natural wellspring of learning and achievement that can be systematically catalyzed or undermined by parent and teacher practices" (Ryan & Stiller, 1991). It is associated with coming to academia since this is the area related to high-quality learning and creativity, as the main intrinsic motives are considered to be a sense of achievement, curiosity, and interest. At the same time, extrinsic motivation is focused on some external rewards (money, gratitude). In this study, we argue that intrinsic motivation, which is not always well-defined by the person himself, is the key to understanding one's path in or out of the academic world.

The changes leading to the introduction of the "American model" are more or less global. In the academic setting for our research objective, the Russian Federation, higher education evolved a bit differently. In the 1960s, when global higher education and science started the transformation, the USSR preserved the system in the state of a protected sphere. Up to the breakdown of the Soviet Union, both professors and scientists were both better paid (than the majority of the population) and acquired many privileges, such as extra vacation period, the possibility to take fully paid sabbatical for a year once in 10 years, get access to limited property like "the dachas" or less working hours than average (with better salary – for example, an associate professor's salary was at least two times higher than the one of an engineer) (Zdravomyslov&Yadov, 2003). After the breakdown, things changed: the higher education sector was living on government money, and when the state cut spending, professors and scientists could await their salary for 8-10 months. Those who were to feed the family left academia at these times.

Later in the 1990s, the lack of state financing was compensated by a boom of interest to higher education – leading Russia to the situation the world witnessed in the 1960-1970s when higher education stopped to be a privilege for the elite. During 1992-1999 the number of higher education institutions increased five times (both private institutions and new campuses of state HEI were established), and up to mid-2000s, almost everyone who wished to acquire education did so. Then the universities experienced the boom of Ph.D. thesis defenses. Massive defenses were partly due to increased demand for university professors, and partly – to the prestige of having a degree; as the process was relatively easy at the time, higher education system created a huge number of PhDs and habilitated doctors (compared to Soviet times). Finally, in the 2010s, the government started questioning the quality of education at the higher education institutions, created its non-customized monitoring system (see, for example, MICCEDU, 2017) and shut down about 400 higher education institutions out of existing 1000+.

After the introduction of state monitoring in 2012, the Ministry of Education and Science imposed a KPI-based system first for higher education institutions, then for professors and finally – on scientific institutions (united within the Russian Academy of Sciences) and scientists in these organizations. An example of KPI systems used by the Russian universities can be found in Table 1.

Table 1: the evolution of stimulus for academics (systematized based on 5 KPI systems from different universities in Russia)

Measure	Points awarded		
	2015	**2016**	**2017**
Development of teaching materials	60 points per 10 pages	60 points per 10 pages	Excluded
Conference presentations	30 points per conference paper	30 points per conference paper	Excluded
Journal papers published	120 points per 10 pages	120 points per 10 pages (national journals), 180 points per 10 pages (Scopus and WoS journals)	180 points per 10 pages (national journals), 360 points per 10 pages (Scopus and WoS journals)
Textbooks published	180 points per 10 pages	180 points per 10 pages	180 points per 8 pages
Supervision of student contest teams	40 points per student/team	30 points per student/team, 45 points for winners	30 points per student/team, 45 points for winners
Grant applications	60 points per application, 120 points per winning	60 points per application, 120 points per winning application	90 points per application, 180 points per winning application
Involvement in grant implementing teams	1 point per each 15000 rubles earned	1 point per each 15000 rubles earned	1 point per every 60000 rubles earned, maximum 5000 points
Assessing classes of other professors	Maximum 4 visits, 15 points per visit	Maximum 4 visits, 15 points per visit	Excluded
Foreign language fluency	120 points per language	120 points per language	100 points per language
Monographs	240 points per 40 pages	240 points per 40 pages	240 points per 40 pages
Monographs published abroad	-	240 points per 20 pages	240 points per 20 pages
Textbooks published abroad	-	480 points per 40 pages	480 points per 40 pages
Ph.D students supervised (for successful defence)	120 points per student	120 points per student	120 points per student
Winner of teaching excellence competitions	100 points	100 points	120 points
Teaching materials in e-teaching environment			120 points per 1 course
Professional education	1 point per every 2000	1 point per every 2000 rubles earned	1 point per every 2000 rubles earned, maximum 1500 points

(teaching)	rubles earned		
Patent	60 points per patent	60 points per patent	60 points per patent
h-index	-	-	100 points multiplied by h-index in the national database, 300 points multiplied by h-index in Scopus of WoS
Citations			120 points per each citation in the national database, 180 points per each citation in Scopus of WoS
International conferences			30 points per conference paper

From Table 1, one can see how requirements were changing for the academics – these changes indicate how the focus was shifting towards internationalization and research; during the same time, period teaching workload was increasing drastically. An average professor was teaching 3-4 courses in 2015 (2 in the fall and 2 in the spring semester), while by the end of 2017, it became usual that full professor was teaching 10-12 courses (approximately five both in fall and spring semester). Due to that Russian academic environment experienced another wave of those who left it – mainly for non-traditional education and business.

At the same time, a massive PR campaign was started by the state, indicating the gap between higher education and science and the needs of the real sector of the economy. This combination provoked a new wave of leaving academia and an opposite wave – starting 2010s, several industry people entered academia, mainly led by the idea to bring the practice to the university classroom (Syupova&Bondarenko, 2014). Hence, one can see that compared to international experience, the Russian higher education sector had undergone the transformation, which took Western universities more than half a century, in less, than 25 years. The corresponding changes are analyzed in this paper to see the main academic motivation patterns and to compare them with the global ones

Method and Sample

To perform this analysis, we carried out 17 1-hour long (in average) interviews with (a) academics, who entered academia after finishing the university, (b) academics, who became educators after having some business experience and (c) academics, who left academia. In the sample, we had ten females and seven males (representing the average structure of teaching and research staff in the social sciences in Russia, which is dominated by women). In the sample, we had representatives of the new generation of educators (aged 25+, graduated from the university in 2000-2010s), mid-career generation of educators (aged 30+ to 40+, graduated from the university in 1990-s) and senior educators (aged 60+ to 70+, graduated in 1960-1970s). Seven of our respondents started their careers in academia but left it; 4 came from the industry, and six started in academia and stayed there for the lifetime.

In the interviews, we asked the following questions:

1) were you planning to become an academician?
2) how and why did you come to the academic world?
3) what do you like and dislike about academia?
4) how the things in academia changed during your lifetime?
Besides these questions, we let the respondents accurately share their experiences and thoughts.

The Main Findings

The main findings are presented along the line with the fundamental questions present in the interview outline above.

Planning to become an academician and actual coming to academia

Out of 15 respondents, we talked to only one indicated that he was always oriented to join the academic world.
I always dreamed of being a professor…yes, it is getting more difficult, but I cannot imagine being in any other place (associate professor, 35).

Everyone else was referring to a situation that led him/her to the academic world.

I was offered to apply for a job at the university; they were short of assistant professors. It seemed much better than to start my career in an assistant in the tax collector office, and I felt I could do it (full professor, 37).

I was never thinking about being an academic, and I already had a job for three last year in the university. However, when my diploma supervisor offered me to stay, I thought – I was always told I am good at teaching, why do not give it a try? (department head, 39).

Here it is worth mentioning that when those who are about 40 entered the world of academia, the salaries there were barely enough to provide one's living – the situation changed in about ten years, so for this generation acceptance of academic job meant the necessity to have another source of income. A couple of years after they started, it appeared to be opportunities to earn money, but at the moment of making a choice, they were not aware of that. The situation was very different both for 60+ and 25+ academicians – both were entering the academic world when it was both prestigious and profitable to seek an academic career. So their testimonials look a bit differently.

It was the Soviet system, and as I was one of the best in my class, I was offered Ph.D. studies in Saint-Petersburg…it was a daydream (dean, 59).

I was in a scientific institute for my whole life, when 20 years ago, I was offered to come to the university and teach. Moreover, I felt – this is what I was missing in my research career (department head, 63).
I was already working in the bank during my graduation year when our department head asked if I would be interested to send a resume to the university. I was happy to do, and they accepted me (associate professor, 29).

The way the majority of respondents speak about their path into academia, refer to as "being lucky," "having a feeling of a lifetime commitment," and indicate they did not think they can be chosen for the job (and it was valuable even though proposed income was quite low). Such feeling refers to the issue of "calling," raised by Hall and Chandler (2005). As the concept of calling is not common in a Russian setting, the respondents were using a different word to describe the feeling. Based on interviews, we can claim that our results prove the findings in existing literature, and in the case of academicians, the "calling" is one of the essential reasons to accept an academic job. Some of the similar indications are provided below.

The moment I walked into the university as a teacher, I felt this could be my place for the lifetime (full professor, 37).

It was like magic – I already decided where to go after graduating, but then the dean said they have a scholarship for my Ph.D. studies, but then I will need to return and teach (associate professor, 61).

The testimonials of business-world incomers support this finding.

I wanted to bring some real-world into the classroom. I do not understand how people who never walked out of the classroom can teach entrepreneurship. (company CEO, department head, 62).
(after teaching) I had a feeling I never experienced: I was shining from inside like a small Sun. It was worth all the time I invested (company CEO, 37).

The reasons people name for staying an academician despite the negative tendencies (especially widely mentioned increased paperwork) are almost the same – academics indicate they are not ready to leave a job which was brought by luck and is seen as calling. This brings up the issue of leaving academia – those in our sample who did so, describe their coming to the higher education and scientific institutions in basically the same words. Still, they have changed their career path in their mid-life.

Leaving Academia

The main reason for leaving academia for those who left in the 1990s is predictable: at some point, it was not possible to feed the family.

We had two children, and my wife was also at the university. When we had to wait for a salary for eight months, I decided that I was out of it (company CEO, 49).

Leaving was not my choice. We even stayed in the same building, but instead of teaching, we were making our business there (IT-company CTO, 51).

I enjoyed teaching and research, but the financial issue became most significant when we had the first child, so I left. However, I still feel almost a traitor when I meet my former colleagues from academia (IT-company employee, 45).

Later the reasoning became different – as we indicated above, universities started to earn money from the students. For those who wanted, it became possible to provide the necessary level of living. However, in line with increased financial well-being, the bureaucratic workload increased, driving the sense of calling, which brought academicians to work (coming to a peak in the 2010s).

My Dad started asking me two years ago – you are losing your health at this work, maybe you can find a regular job? (full professor, 36)

I started this job to make the world a better place – and what I see now? I am being told every single day that we need to serve the students, and if they fail the course, it is my fault, never theirs. It would make sense if they have at least impose any selection, but they accept everyone! (associate professor, 42)

I have fought for six years explaining how to teach to bureaucrats. I came here to teach, not to fight (full professor, vice-dean, 63)

When I thought that I should upgrade the contents of my subject, it would mean I will have to re-write all the papers. Moreover, I thought – well, it is good enough the way it is. However, this is not how I usually work – and I understood it is time to quit (associate professor, 38).

I understood I was not able to spend the time with my family: I did not have any days off – I was either in the university, catching up on work, or at home by my desktop computer. I felt somewhat a traitor, but I had to choose – life versus academia (associate professor, 39)

From these testimonials, one can see that a crucial reason for leaving academia is the opposite of calling. When academics see that their work is being treated as something unimportant, they tend to leave. In this case, they do not intend ever to come back, as they feel they have been used and mistreated.

I do not believe the things can ever change here in academia. We have got accountants ruling, what treatment one can expect? (full professor, 63)

Becoming a cashier is a better option…I never thought I would say that – but really, I would prefer selling tomatoes to listening to my guru-dean, who did not come to a classroom for eight years, telling me how easy it is to do. Moreover, she earns 15 times more than I do! (full professor, 36).

Interestingly enough, these people, who left academia, often use the word "traitor" or an analog or try to explain why they had to leave and what brought this decision up. This part of the interview is the most uncomfortable for the person who left. At the same time, when they talk about coming to academia, even having the negative experience they are describing, they still refer to it as "luck":

If it were not for the academic world, I would never get the job I have now. If I did not get the offer to teach, I would never know how great it is to be a researcher…I still miss that (associate professor – company engineer, 38).

What do you like and dislike about academia

What people like and dislike about academia corresponds to the theoretical framework of intrinsic motivation and continues the reference to calling – most of the respondents indicate how their expectations in working in the classroom were fulfilled.

I was preparing to teach my first lab work for two weeks. I still remember the rewarding feeling I had when it was over (associate professor, 38).

It was as I expected – I felt in the right place! (associate professor, 35)

I was given seminars in accounting – when we got started, everyone was given seminars in accounting, no one wanted to teach it. I was lucky to find an excellent textbook, and I could explain the theme, and they understood! I could jump after the class! (department head, 39)

When I was shown a list of subjects I could choose from, I was scared – I did not understand what half of them were about. So I said: "physics" – it was something I knew (dean, 59)

I am always trying to get something new for an upcoming class – a bit of news, a fact, or even a citation from a blog – I see how the students appreciate they I am updated (full professor, 36)

As I was coming from the industry, I chose what I knew – and it was a surprise to find out they do not listen like my employees do. But next time I spend time preparing and got full attention, much more rewarding than compliments at work (company CEO, 37)

I worked at the plant for 35 years as an HR and thought I knew everything about the people. However, students surprise me every day, and I feel alive (former HR manager, 69).

From these testimonials, it is impossible to distinguish who are the newcomers to academia from business, who is there for the lifetime being, and who had left the academic world for different reasons. Almost all of the testimonials are about teaching, not research, and more or less, each respondent mentioned "reward" or "rewarding feeling," which correlates to the intrinsic motivation of academics as an essential stimulus. Interestingly, in the interviews, almost no one mentioned extrinsic motivation – the issue of money was raised concerning "earning the leaving," especially by those who left academia in the 1990s and early 2000s. However, it was never an issue described as something one liked about academia.

Same intrinsic motivation relation is valid for the negative sides of the academia:

When I came to the university, I thought I would be researching and developing new teaching materials, using new technologies. However, after a year, I understood that it is not always possible with the continually changing papers we have to write. This was devastating; I was not prepared (assistant professor, 26)

We have never stopped re-doing papers after the last accreditation in 2012; it is now five years in a row. I would prefer preparing new teaching materials, but instead, I am re-writing learning outcomes in a different format for the N-th time (associate professor, 38)

I found my way through meaningless hours of junk paper development – I try to think about it as a quest I need to pass to do what I like. But it is hard to keep on going – the worst is that I understand it is meaningless (department head, 39)

He wanted to talk to me as I was the youngest full university professor, and I was about to quit. Know what he told me? "You are an underdeveloped person; you will have problems everywhere you will go." I cannot imagine working for him ever in the future (full professor, 36)

I am fine with an increased workload; I am OK even with the paperwork. But I am mad that all the rules for academia are made by accountants, who had never been to the classroom (full professor, 63)

For the past five years, my life is an endless "Groundhog day." I am starting over the same things we have just finished, and I don't believe it could ever end (dean, 59)

I was always complaining about the papers we have to prepare for the tax office. However, that was before they brought me the papers from my department – just to sign. I have no idea how to keep doing his job well when he continually spends time on these tons of paper (department head, company CEO, 62).

As in the previous case, it is hard to distinguish when you see a testimonial from the one who stayed in academia in comparison to the one who left. The main things mentioned are not even paperwork, but its meaninglessness, and also much attention is given to the attitude from the ruling institutions – the feeling is described as an insult, thus leading to thoughts about leaving. Academics mention they are losing a sense of achievement and do not have time to do something that is of interest to them. As in terms of what they like in academia, the reasoning stays in the terminology of intrinsic motivation. Moreover, in several cases, we asked a direct question about a salary increase, respondents say they were more motivated with smaller salaries but more free time and the possibility to define their schedule and thus spend more time on something exciting and rewarding.

How the things in academia changed during your lifetime

In this part of the study, we talked about the issue over only with the respondents in their mid- or senior career, as the others did not have enough experience to evaluate the changes in the academic world. In line with existing literature, the majority of assessments of the changes were negative; some of the testimonials referred to new positive experiences:

I was educated to do all statistical calculations manually. When I was first shown statistical software, I felt I was given a hammer after trying to build a wooden house with a brick (department head, 39)

I was against presentations in the classroom, but when I've done them I realized how much time they save, and how the classes became more efficient and engaging (full professor, 63)

When I was a student, it was just chalk and blackboard, but when I came to teach from industry, they'd shown me the progress – even in the IT sector, I had to catch up with some things in their e-learning environment! (company CEO, 37)

So, the main positive changes are related to the use of new information and teaching technologies, which provide a better understanding and engagement in class. The main reason the respondents refer to them as positive change is that the time is being saved and can be used to explain some extra things in the classroom. The things could have been different for online studies, but these are not widespread in Russian universities.

On the other hand, quite a few testimonials refer to the negative changes in the academic world – besides already mentioned paperwork.

Due to information technologies, I am expected to be forever online – my department head writes me any time day or night, or calls up – and I have to pick up the phone, though it is 11 pm already (full professor, 36)

We have to deliver more and more and more. First, it was beautiful to have a grant application and one paper to fulfill KPI. But it is growing, and now I need to win a grant, publish at least three papers and teach my nine classes simultaneously (full professor, 63)

I liked research before it became a speed relay for publication. When I started, we did 1-2 papers if we had a grant. But now I am asked to deliver at least 5, and they say this is "inefficient" (associate professor, 38)

I left almost 20 years ago, and when I meet colleagues, I wonder – how do they fulfill their KPI requirements? Some of them seem impossible (company CTO, 51)

What surprises me most is that I have a KPI with a fixed number of citations my papers need to get every year – and I cannot explain to anyone, that this is something no one can guarantee (department head, 39).

When I graduated from Saint Petersburg and returned to university, I wrote a course description on five pages, and students read it. Now I write 70 pages and expect that no one will ever open them (dean, 59).

As it appears from the testimonials, the most significant problems are requirements that do not take into consideration individual strengths, weaknesses, and even workload. Due to that, it becomes almost impossible for the teaching and research staff to make a contribution, which would allow them to be proud of the work done – instead, they are asked to deliver the number of publications, and the quality is not significant. Most of the respondents mention that the result is adverse selection, and those who spend time trying to deliver quality gain less KPI points than those who are finding the way to deliver what is required.

The summary of the findings in relation to existing literature is presented in Table 2.

Table 2: Comparative analysis of the findings in relevance to existing literature

Feature	Russian setting	Difference from existing literature
The concept of luck	Fully revealed in the Russian setting. Only 6% of sample accepted the academic career as something expected	No difference revealed: within the existing research the majority of academicians speak about luck and unexpectancy in how they entered academia
Leaving academia	Two main reasons revealed: the need to earn the living, as academic world did not provide enough money; and loss of intrinsic motivation	The first reason is different from what is know in Western world; the second reason appears to be in line with existing research
Bureaucratization of academia	Fully revealed in the Russian setting. All respondent who left academia lately or consider leaving mention this reason	No difference revealed with the existing research: bureaucratization is being widely mentioned. The Russian setting is different in terms of teaching hours workload
Lack of respect	Revealed in the Russian settings. Some of the respondents mention this reason as main one for leaving	Corresponds to the findings in existing literature, especially published in 2014-2017, in line with global tendencies
Use of metaphors	Revealed in the Russian setting. Some of the metaphors were hard to translate, but almost every interview provided a few bright ones	In line with existing literature. Academics are considered to be the ones using metaphors to illustrate their findings and conclusions
New technologies	Significance revealed in Russian setting. The respondents refer to those mainly in positive way, even the older ones	Not fully in line with the literature, that states there is a huge debate about technology in classroom. For Russian setting the issue of saving time is very important (due to workload), that can explain the difference
KPI system introduction	Revealed in the Russian settings. Some of the respondents mention this reason as main one for leaving	Corresponds to the findings in existing literature, especially published in 2014-2017, in line with global tendencies
Intrinsic motivation	Fully revealed in Russian setting. Appeared to be the main motivation for academics	In line with existing findings. In some literature academics are being viewed as best example of intrinsic motivation
Negative selection	Revealed in Russian settings. Some of the respondents mention this reason as main one for leaving	Not clearly stated in existing literature. It could be fully Russian problem, or may appear to be better seen in this setting

As it can be seen from the Table, the majority of the findings are in line with existing literature; however, some issues, like implementation of new technologies or negative selection, appear to be different from what one can find in existing literature. Those findings indicate directions of future research.

Conclusions

The evaluation provided by midterm and senior academicians is mainly revealing lack of respect; respondents indicate the shift in decision-making – while in the early stage of their career major decisions were made by academicians (Scientific councils), now they are made by administrative staff, in full accordance with global practice (Rutherford&Van der Voet, 2017). In Russia the tendency is made worse by incoming managers with no educational or scientific background (for example, the head of the Russian education, monitoring system was accused of plagiarism in 2014 (Disseropedia, 2014), but it did not affect his position). Thus, our respondents claim that introduction of various KPI systems led to negative selection – it became easier to fake the quality rather than pursue it, driving academicians out to business world. This refers to the framework of intrinsic motivation which appeared to be the most important for defining paths in and out of academia; and intrinsic motivation, according to existing literature, can not be raised by implementing KPI system.

The main findings of the study are in line with the existing literature: Russian academicians view their career as a lifetime commitment, are motivated by the job itself and in many cases see it as a calling (Beyes&Michels, 2011; Hall&Chandler, 2005). The same is true in case of reasons for leaving academia: growing bureaucracy, demoralization, increasing share of administrative staff in higher education and science (Geppert&Hollinshead, 2017; Rutherford&Van der Voet, 2017). Still, one can find some specific features in entering and leaving the academic world in Russia. In almost all cases, our respondents indicate they felt they were to help universities, both with investments and experience to increase the quality of education and science (no matter, are they from business or the academic world, they don't rely on institutions to supply all the necessary equipment). In terms of leaving academia, our respondents indicated as specific reason their inability to keep the quality when both teaching and research volume was jeopardizing (some of the respondents started their assistant professor career with teaching one subject, but now they teach 14 different ones).

Finally, the majority of the findings are in line with the existing literature; in terms of increasing workload, the situation in Russian universities is not different from the one described by Berg&Seeber (2016). Still, Russian setting can provide better options for studying outcomes of increased workload, as here academics are to deal with double growth of workload – academics at the universities are expected to run more teaching hours and do more research at the same time. Thus this setting can reveal some tendencies which might occur later in the Western academic world.

It is significant to mention, that the study has some limitations. First, our sample seems to have a gender bias (which reflects gender bias in higher education sector of Russia). Second, we have same age misbalance in the sample: only 2 respondents represented the younger generation of educators, while the sample is dominated by midterm career respondents. Third, the respondents are coming from European part of Russia, where higher education is more linked to Europe and North America, while in Asian part the ties with Asian universities are much stronger. All of the above can lead to possible biases in the findings

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Excise on Electricity as an EU Own Resource in The Light of Sustainable Development: The Case of Poland

Maciej Cieślukowski
Poznań University of Economics and Business, Poznań, Poland, e-mail: m.cieslukowski@ue.poznan.pl

Sławomir Zwierzchlewski
Poznań University of Economics and Business, Poznań, Poland, e-mail: s.zwierzchlewski@ue.poznan.pl

Roman Stryjski
University of Zielona Góra, Zielona Góra, Poland, e–mail: r.stryjski@iizp.uz.zgora.pl

Waldemar Woźniak
University of Zielona Góra, Zielona Góra, Poland, e–mail: w.wozniak@iizp.uz.zgora.pl

Abstract

The European Union (EU) own resources system should support sustainable development, understood as integrated social, economic and ecological growth. However the current system meets the sustainability criteria poorly and requires change. The High Level Group on Own Resources (HLGOR) recommends an Electricity Tax on consumption as one of the new bases for the EU own resources system. Taxes on electricity are recognized as environmental ones. They can be implemented at the stage of electricity production, distribution and consumption, and most analyzes indicate consumption as the most appropriate stage for reasons of simplicity and fairness. In addition, presently excise on electricity consumption is harmonized in EU Member States with minimum rates. The paper examines, on the example of Poland as the EU Member State, whether the excise duty on electricity supports sustainable development by fair taxation of households and thus is a suitable candidate for the EU own resources scheme. An empirical part of the paper consists of excise on electricity analysis in the context of incidence and distributional effects. Respectively, multi-variable regression model and Pearson concentration coefficient are used. The analysis shows that in the years 1993 – 2014 the excise duty on electricity could even be more than full shifted on households. Additionally the excise duty charged was not a significant fiscal burden for households, although it led to a regressivity in the taxation on their disposable income. The excise duty had no significant effect on the distribution of disposable income among households. With reasonable rates the Electricity Tax-based EU own resource is acceptable.

Keywords: excise on electricity, tax incidence, EU own resources, sustainable development

JEL codes: H2, H87, Q01.

Introduction

The European Union (EU) should develop in a sustainable way, i.e. maintain a relative balance in economic, social and ecological development (Treaty on European Union; Commission 2010). One of the main tools for achieving this goal is the EU general budget, with the primary focus being on the budget expenditures allocated to the co-financing of various Member States' programs. However, the impact of the budget on sustainability should be integrated in order to increase its effectiveness, and therefore also include a revenue aspect. It means that no own resource may affect any aspect of sustainable development in a negative way.

Unfortunately, research confirms that the current EU own resources scheme supports sustainable development poorly (e.g. Cieślukowski 2016, Schratzenstaller et al. 2016, HLGOR 2016). These resources are assessed according to various economic, social and ecological criteria with the use of various research methods. One of the most important social criteria is fairness in the taxation of households or individuals. However, the conclusions of the studies are very similar. The main controversy is the contributions from EU Member States on Gross National Income (GNI), which, on the one hand, are the most efficient fiscally and guarantee budgetary balance (e.g. in 2015 and these payments

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represent 69,1% of total budget revenues), but on the other they are pure national contributions and do not represent real own resources, such as taxes. As a result they are not linked to the EU socio-economic policies, do not guarantee the EU financial independence and are opaque to EU citizens. Contributions based on VAT, which accounted for 12,4% of total budget revenues in 2015, are also assessed similarly. The only true own resources the EU possesses are traditional (customs duties and sugar fees). They are directly imposed on entrepreneurs and sugar factories, but they account for only 12,8% of total revenue in the budget for 2015 (Commission 2016). Such a system is not conducive to EU policy. The overwhelming direct national contributions make the Member States look at the budget from the point of view of the reimbursement of sums involved.

The literature on the subject argues for almost complete replacement of GNI resource with new real own resources, which ensure greater financial independence and directly support the EU socio-economic policies, including sustainable development. GNI payments, on the other hand, could be maintained in order to safeguard the budget balance. Many types of resources are considered in the literature, which can replace GNI payments. An important document in this field is the report of the High Level Group on Own Resources (HLGOR 2016), which includes a synthesis of current assessments of potential EU own resources carried out by various expert and scientific centers. Among others HLGOR recommends an Electricity Tax on consumption (paid by households and companies) as one of the new bases for EU own resources, which can replace the GNI resource. This resource was even rated the highest of all other possibilities for new EU own resources. Taxes on electricity can be implemented at the stage of electricity production, distribution and consumption. Most analyzes indicate consumption as the most appropriate stage for reasons of simplicity and fairness. Presently excise on electricity consumption is harmonized in EU Member States with minimum rates (ETD 2003). The harmonization is justified on the grounds of the internal electricity market integration which is expected to deliver tangible benefits such as security of supply, more choice in electricity sellers and reduction in electricity prices to consumers. The excise is included and shown in mandatory electricity bills, thus it is transparent for the consumers and easy to collect for public authorities. Fairness results mainly from the macroeconomic perspective due to the fact that electricity is consumed in all regions of EU Member States and richer regions consume more electricity than the poorer.

On the other hand there is empirical evidence testifying to the rather regressive nature of electricity taxation in in the case of households. In this situation some correction mechanisms are also recommended. Unfortunately research on the subject in the case of Poland is very limited. In fact, only Cambridge Econometrics carried out a comprehensive assessment for all EU Member States on the distributional effects of a 10% increase in minimum rates of excise on electricity (Commission 2011). However the results show that this change in rates (both for business and non-business use of electricity) is completely neutral for Poland as it does not change current excise rates. The objective of the paper is to investigate whether the excise on electricity in Poland supports sustainable development by fair taxation of households and thus is a suitable candidate for EU own resource. To reach the goal two main research questions should be answered:

1) to what extent is the excise duty on electricity placed on households?
2) what are the distributional effects of the excise duty on households?

To solve the first problem we need to investigate the excise incidence that aims to find out who (households or electricity suppliers) and to what extent pays the tax in fact. There is strong empirical evidence showing that environmental taxes may not be shifted forward entirely. The analysis covers households in Poland in the years 1993 – 2014 and is carried out with the use of the multiple regression function. The function is based on key market factors that determine the price of electricity in Poland and is also inspired by the model presented by Alm, Sennoga and Skidmore (2009) who investigated the impact of an increase in excise rate on the average retail price of unleaded petrol in the US in the years 1984 – 1999, although the analysis in this paper is not a panel data research. Analysis of regression is carried out with the help of the program Statistica 12.

Further investigation in distributional effects is justified if the excise is shifted in some part on households. In this case, if the excise burden is significant and poorer households bear a higher tax burden than the richer, the excise on electricity is regressive and does not support sustainable development. Then the European Union should refrain from introducing this resource in the general budget or should apply some compensation mechanisms to increase fairness. The distributional effects of the excise are assessed for the years 2009 and 2015 by comparing the excise paid on electricity to disposable income of households classified in quintile groups and by types of households. This method is usually used to investigate regressivity in taxation. The years of analysis and division in quintile groups result from available surveys on households in Poland. Finally, the Pearson concentration coefficient (K) is applied to measure the decomposition of disposable income among households before and after taxation.

Previous research on potential new EU own resources

The subject literature indicates three main scenarios of the reform of the EU own resources' system (de Feo and Laffan (ed) 2016; Fuest et al. 2015): 1) a simplification of the system by replacing traditional and VAT resources by GNI resource, 2) replacing GNI resource by new resources mainly in order to increase the financial autonomy of the European Union, improve transparency of the system for citizens and make the system more in harmony with EU policy and 3) the reform of the present correction mechanisms with the aim of greater transparency and fairness for Member States. Table 1 shows a ranking of potential new EU own resources in selected studies. The ranking is based on information and various evaluation methods contained in the studies analyzed. In the case where two or more resources receive the same score, this means that the author of the study assessed them identically or very similarly.

Table 1: Ranking of potential new EU own resources resulting from different studies (1 – first place)

Type of own resource	European Economy 1993	Keen 1995	Begg and Grimwade 1998	Gretschmann 1998		Cattoir 2004, 2009	Cieślukowski 2005	Begg, Enderlein, Le Cacheux, Mrak 2008; Begg 2011	Schratzenstaller 2016	HLGOR 2016
				Quantitative analysis	Qualitative analysis					
Personal Income Tax (PIT)	5	5	5	6	7	2	5	6		
European Corporate Income Tax (ECIT)	2[1], 3[2]	3[3], 4[4]	4	1	1	5	6	1, 2[5]	3	2
Withholding Tax	4	2	7	7	4		3			
Financial Transaction Tax (FTT)						7		5[7]	2	6
Financial Assets Tax (FAT)/bank levy									2	5
Modulated VAT	3	1	1	8	5	3	1	3	4	3
Communication Taxes			2	5	8	5	4	3		
Environmental Tax/CO_2 levy/ Energy Tax	1	2	6	2	6	1, 4[6]	2	1[6], 2[8], 7[9]	1[6], 2	1[10], 2[8], 4[9]
Excises on Alcohol and Tobacco Products	4	4	3	4	3	6	7			
Wealth Tax	5									
Seigniorage Revenues	2	3	8	3	2	5	8	4		6

Source: own study based on (European Economy 1993; Keen 1995; Begg and Grimwade 1998; Gretschmann 1998; Cattoir 2004; Cieślukowski 2005; Begg et al. 2008; Begg 2011; Comission 2011; Schratzenstaller 2016; HLGOR 2016, p. 87).

[1]on cashflow; [2]on profit; [3]with common tax base; [4]based on current national systems; [5]Begg 2011; [6]airplane charge on CO_2 emission; [7]no numerical assessment of fiscal efficiency and stability but it seems to have huge fiscal potential, [8]petrol charge, motor fuel levy; [9]revenues from the trade of CO_2 emission, [10]electricity tax-based own resource.

The most often studied and usually best rated candidates for EU own resources are modulated VAT, European corporate tax and environmental tax (CO_2 levy). However the latest studies from the years 2005 – 2016 pay more attention to financial sector taxes and various forms of environmental taxes. The first are related to the financial crisis from 2008 and the second – to the climate warming problem. Until the HLGOR report 2016, the taxation on electricity was not a special subject of analysis in the context of a potential EU own resource.

The HLGOR assessed the highest Electricity Tax based own resource of all other candidates for EU own resources. In comparison to the motor fuel levy it is fairer and more efficient with regard to the cost of collection and needs less political transaction costs. Additionally, in comparison to CO_2 levy it seems to be more fiscally sufficient and transparent for citizens (HLGOR 2016, p. 87). Previous studies on potential EU own resources can be characterized by the following features:

1) Particularly in Commission reports the link between criteria and theory is very loose,
2) The number of criteria used in evaluations is limited and the main attention is put on fairness between Member States. Additionally qualitative criteria outweigh the quantitative and the results of research are more debatable. Current statistical methods allow huge possibilities to conduct more objective evaluations,
3) Criteria are not weighed. Weighing improves the credibility and objectiveness of an evaluation,
4) In most cases resources are evaluated in short periods of time which creates difficulties in drawing reliable conclusions about changes in quality of the whole system over a longer period of time,
5) The evaluations do not compare particular resources,
6) The evaluations do not consider sustainable development objectives in an integrated and balanced way.

Studies on potential EU own resources need further improvement to achieve more objective and convincing results. Analysis should:

1) better link assessment criteria with theory,
2) apply a bigger number of detailed, weighed, qualitative and quantitative criteria,
3) use multi-variable exploration that allows the integration of different criteria, compare resources, achieve more objective results and evaluate the whole system over a longer period of time,
4) apply sustainable development criteria; the latest example of such criteria and analysis is given e.g. by Schratzenstaller et al. (2016) and Cieślukowski (2016).

Investigations on Tax Incidence

Economic theory usually draws a distinction between the statutory and economic incidence of taxation. Statutory incidence refers to those who legally pay the tax, while economic incidence refers to those who really bear the burden of the tax (Kosonen 2012). Environmental taxes may have various forms (tax, excise, duty, levy, charge, etc.), may be imposed on various items (eg. CO_2, energy sources, electricity, transport) and may be imposed on various stages of economic activity (production, distribution or consumption). Environmental taxes are usually classified as indirect and consumption taxes which are imposed on final consumers. It is assumed that producers or importers of goods are subject to the tax, however they only play the role of the formal tax payer whereas actually it is the consumer. Entrepreneurs add the tax to a price that is paid by consumers. The consumers usually do not know about it because the excise is not shown on receipts and invoices. VAT works in a similar way with the provision that it is imposed on the final (net) price (price with the excise) and is shown on the invoices. However it must be emphasized that the state, in imposing indirect taxes, is not able to predict who and to what extent bears the real tax burden. Such a distribution is mainly determined by the market mechanism.

The incidence of taxation changes the equilibrium both on the market of goods and production factors and therefore the only way to find out who bears the real tax burden is to analyze the changes of prices on the market. Tax incidence takes place if a tax added to a price changes the actual tax payer. This situation occurs when the tax imposed on an entrepreneur increases the price of a good it sells. Then the tax is shifted forward and a recipient of the product becomes the real tax payer as he pays the tax in the price of the purchased product. Instead, when the tax is paid the entrepreneur's suppliers or workforce (by reducing wages or salaries) – we can talk about backward tax shifting.

Analysis of indirect tax incidence is based on partial equilibrium models or empirical data from various market segments (Bernal 2014). With an assumption of perfect competition, tax shifting depends on demand and supply price flexibility. In an oligopoly market tax shifting depends on demand, the function of cost production and number of companies. On the basis of the Cournot model we can state that if the competitors are stronger in a particular sector, tax shifting is easier (Fullerton and Metcalf 2002). In a monopoly market, in the case of heterogeneous goods, the total value added tax can be shifted on to the consumers and the excises can be even more than full shifted (Dixit and Stiglitz 1977).

Empirical studies mostly concern forward tax shifting. For example Poterba (1996) analyzes the influence of the sale tax on the price of clothes in some US cities in the years 1925 – 1939 and 1947 – 1977. Before the II World War two thirds of the tax was shifted on to consumers and after the war – the total amount of the tax. Besley and Rosen (1999) investigate tax shifting in the case of 12 types of goods in 155 US cities in the years 1975 – 1997 and find that the tax over-shifted in a very short period of time after the tax rate changes.

The problem of VAT shifting in some European Union States (Sweden, Italy, Portugal and Ireland) in the case of different rate changes and different goods and services (books, shoes, magazines, drinks, restaurant and hairdressing services) is presented in the report *Study on Reduced VAT* (SRV 2007). In general the report indicates that the increase of VAT rates increases the final prices more than proportionally, whereas the decrease of VAT rates decreases the prices less than proportionally. Carbonnier (2007) analyzes the results of a VAT rate increase in France on the 1st of September 1987 on cars and on the 1st of September 1999 on renovation services. In the first case 57% of the additional tax burden is shifted on to consumers and in the second – 77%. The author also indicates that in both cases the tax is shifted very quickly, - two months after the changes.

Alm, Sennoga and Skidmore (2009) investigate the shifting of excise on unleaded petrol in 50 US states in the years 1984 – 1999. The analysis shows that a 10% increase in the tax rate causes an average retail price increase of 9,98%. The analysis also shows that in the rural states the extent of the shifting is lower than in the industrial states. Similar results were also received by Borenstein, Cameron and Shepard (1997) who investigated changes in the retail prices of petrol as a consequence of changes in the prices of the oil.

Investigation in backward tax shifting is very limited. Felix (2009) analyzes the relationships between corporate income and sale taxes in the United States on the amount of wages. The author states that the sales tax reduces wages very slightly. The extensive investigation on VAT shifting (forward and backward) on prices in the case of books in Poland is made by Bernal (2014). The author analyzes the 5 p.p. increase in VAT rate on books which took place on the 1st of January 2011 and states that the additional burden is rather more divided between consumers and publishing houses. However the reform causes more than a proportional increase of the average retail price of the book (over-shifting) and it differs between particular segments of books. The reform also reduced the demand for books. As a consequence publishing houses suffered a decrease in their income and capital profitability which also meant that they are subject to a part of the additional tax burden. The analysis also confirms the decrease in salaries in publishing houses, although it is not statistically significant.

Distributional effects of environmental taxes

Environmental taxes result in a series of distributional effects on the market. The literature on the subject classifies them into direct and indirect or static and dynamic (Kosonen 2012). Direct effects are mainly expressed in the increase in the cost of the taxed goods to the consumer. Instead indirect effects relate to the situations when taxes increase the input costs and thus affect the prices of other goods and services. The evidence on the last issue is rather scary. Jacobsen et al. analyzed both the direct and indirect effects of environmental taxes in Denmark (Kosonen 2012). The results show that the indirect costs of the taxes are much smaller to the consumers than the direct, although they are a higher burden for low-income households which makes the whole system of environmental taxes regressive. The dynamic effects of tax incidence, in contrast to the static, relate to behavioral changes of consumers. These take place when the price of a good is increased by a tax which causes the consumers to reduce their consumption of the good depending on the availability of substitutes and in this way they can reduce the burden of the tax. Some empirical evidence shows that low-income households are more responsive to price increases and reduce their consumption more than the higher-income households (Kosonen 2012). However Smith (1992), taking the example of a carbon tax in the UK, indicates that the effect of behavioral change is very small and does not change the regressivity of the tax.

The distributional effects of environmental taxes are usually considered in the context of their impact on household income. The analysis consists of two main stages. First, the households are classified in several groups of equal size (eg. quartiles or deciles) in ascending order of their disposable income. Then the share of income spent on taxes paid on the good is calculated for each income group. If this share increases with decreasing disposable income, the tax is regressive and progressive in the reverse situation. Global empirical evidence indicates various effects of various environmental taxes. Taxes on electricity and heating tend to usually be regressive while taxes on transport fuel are not always so (Boyd and Kouroush 2016; Commission 2011). However the final effects of taxation depend on various factors. Poterba (1990) indicates lifetime utilization whereas Cambridge Econometrics - how the tax revenues are used. The latter also shows that both economic efficiency and a distributionally neutral tax reform can be achieved if tax revenues are recycled in the form of cuts in the employers' social security contributions. The empirical evidence also indicates that the extent of regressivity differs among countries. For example the US energy taxation system is

more regressive than in the European countries, whereas the systems in Ireland and the UK are more regressive than in other EU Member States (Kosonen 2012).

The market, prices and taxes imposed on electricity in Poland

The energy market in Poland has been in existence since 1990. The process consists of three main pillars: 1) demonopolization consisting of separation of the production from trade, 2) liberalization by giving access of other participants to the energy infrastructure and 3) privatization of state companies. The main institutional solutions on the market, important with regard to the excise incidence, are presented in Table 2.

Table 2: Main institutional changes in Polish electric energy market

Date	Institutional changes
01.07.1993	Introduction of VAT (7% on electricity) and excise duty (although electricity is free of the duty)
01.01.1997	Energy Regulatory Office (ERO) is established. President of ERO i.e. regulates and promotes the market, counters monopoly practices, approves the tariffs (regulated prices of electricity) energy companies use in trading electricity. First the companies calculate prices based on official tariffs set by Ministry of Finance.
01.01.1999	Replacement of official tariffs for electricity set by Ministry of Finance by the separate tariffs for the electricity produced and its distribution. The new tariffs are calculated (according to official rules) by the producers and distributors. President of ERO controls and approves the tariffs every year.
07.12.1999	Polish Power Exchange (PPE) is opened
01.07.2001	President of ERO liberates prices for energy producers - he stops approving the tariffs
26.03.2002	Introduction of the excise duty on electricity (0,02 PLN*/KWh). The tax is paid by electricity producers
01.05.2004	Poland enters the European Union and is obliged to meet the rules of the electric energy market Directive (2003/54/WE). VAT rate on electricity increases to a standard rate 22%
01.07.2007	Division of the electricity distribution sector into distribution and trade. Liberalization of the electricity trade market. The final consumers (including households) are free in their choice of the electricity direct supplier (a trade company) on the domestic market
01.03.2009	The subject of excise duty is shifted from electricity producers to traders. The traders are formally allowed to shift the excise duty on to the final consumers and the tax is shown in electricity bills
01.01.2010	VAT standard rate increases to 23%

Source: own presentation based on (Energy Regulatory Office, online).
**PLN – Polish zlotys.*

In 2014 the Polish electricity market consisted of: 25 producers (power, heat and power plants), 1 transmission operator managing of the highest voltage cables, 5 main distributors transmitting energy with the use of medium and high voltage cables, 5 main trade companies (partnerships of main distributors) selling electricity directly to the final consumers or to another 59 trade companies. In the years 1993 – 2014 the total generation of electricity increased in Poland from 132,6 to 159,1 TWh, although its main source was still solid fuel. In 2014 solid fuel was used to generate 81,4% of electricity, whereas renewable sources (mainly from hydro and wind installations) generated about 12,8% of all electricity.

With reference to the wholesale market producers sell electricity mainly on the PPE (53,5% of TWh in 2014) and directly to the 5 main distributors under contract (35,6% of TWh in 2014). Next, distributors sell the electricity mainly to other traders (38,7% of TWh), directly to the final consumers (34,6% of TWh) or on the PPE (17,3% of TWh). In the years 1993 – 2014 the share of households consuming electricity slightly decreased from 20,8 to 18,9 Mtoe, however since 1999 the households have become the biggest final consumers of electricity. In 2014 there were 17,05 million electricity final consumers including 14,4 million (84,5%) of households. In the years 1993 – 2014 the yearly consumption of electricity per capita increased from 2244,2 to 3270,5 KWh.

The final cost of electricity for the households that is shown in the bill consists of four main elements: 1) cost of electricity consumed, 2) charge for transport (distribution) of electricity, 3) the excise duty which is imposed only on electricity used and 4) VAT. The prices are calculated by two companies: the distributor of electricity and the trade company which buys electricity from the producer and sells it directly to the final consumers by utilizing the distributor's lines. The prices are based on tariffs regulated by the state and the President of ERO controls and

approves them every year. Tariffs approved by the President of ERO should particularly: 1) cover the real costs of the economic activity of the electricity companies (production, distribution, trade) and give a reasonable rate of return and 2) protect the final consumers against an unjustified level of these prices.

The excise duty on electricity was introduced in Poland on the 26th of March 2002. The rate was 20,00 PLN per MWh and it was imposed on producers of electricity. Due to the fact that from 2001the President of ERO stopped approving the tariffs for producers, the producers officially could not calculate the excise in the prices, but they could shift the burden of the excise on to distributors and traders. In turn these companies expected the President of ERO to let them increase the prices. Since March 2009, according to European rules, those subject to excise duty has been shifted from producers to trade companies that sell electricity to final consumers. The excise rate was not changed. Since then the excise duty is added to the final price for the electricity used and is shown separately in the electricity bill. VAT is calculated on the final net retail price that contains the excise duty. In the years 1993 – 2015 the VAT rate on electricity increased twice, in 2001 from 7 to 22% and in 2010 up to 23%.

Empirical framework of the excise incidence

Methods and data

The incidence of the excise on electricity on households in Poland arises in two formal situations. The first concerns the period 2002 – 2008 when the excise was imposed on electricity producers whose prices are liberated. In turn producers were able to shift the duty on to traders in the prices and the traders – on to households. The second concerns the period 2009 – 2014 in which the traders were subjected to the excise duty and they were allowed to officially shift the duty on to households by adding it to the tariffs approved by the President of ERO. The excise was shown in the electricity bills. However in order to catch the impact of adding the excise to price the analysis covers the period 1993 – 2014. To investigate the extent of excise incidence the typical multi -variable regression model was built that assumes that the linear relationships between the price of electricity, the excise and other demand- and supply-side characteristics that may determine the price. The model is as follows:

$$(1) \quad P_t = b_0 + b_{1t}x_1 + b_{2t}x_2 + \ldots + b_{kt}x_k + \varepsilon_t,$$

where P_t is the real (inflation-adjusted) yearly average tax inclusive, end-user price of 1 KWh of electric energy in Poland in the period t, b_i (i=1, 2, 3…k) are regression coefficients, x_i (i=1, 2, 3…k) are independent variables representing demand- and supply-side characteristics that determine the price P_t, ε_t is a random error term and b_0 – a free term which is not interpreted.

The primary regressor is the inflation-adjusted excise duty on electricity in PLN per 1KWh. To assess the impact of the excise on the electricity price, it is necessary to check other factors (independent variables) that can potentially affect electricity prices. The below table 3 shows these factors with the sources of their collection.

Table 3: Independent variables

Symbol	Independent variable	Details	Source of information
e_t	Excise duty	The inflation-adjusted excise duty on electricity in PLN per 1KWh (may be lagged)	Statistical yearbooks of the Republic of Poland for the years 1994 – 2015
V_t	VAT	The VAT rate in percentage points on electricity	Legal acts on VAT from the years 1993, 2004, 2010 and 2016
Pl_t	Population	Population in thousands of people	Statistical yearbooks of the Republic of Poland for the years 1994 – 2015
E_t	Electricity consumption	Total electricity consumed by the households in GWh	Statistical yearbooks of the Republic of Poland for the years 1994 – 2015
Id_t	Disposal income per household	Average monthly inflation-adjusted disposal income per household in PLN	Statistical yearbooks of the Republic of Poland for the years 1994 – 2015

H_t	Heating degree-days	Heating degree-days	Information Portal of Central Statistical Office in Poland (http://www.stat.gov.pl)
S_t	Electricity suppliers	Total number of suppliers of electric energy to households (trade companies)	Country datasheets 2016 http://ec.europa.eu/energy/en/statistics/country; Reports of Energy Regulatory Office for the years 1998 – 2015 (http://www.ure.gov.pl/pl/urzad/informacje-ogolne/sprawozdania/2916,Sprawozdania.html)
C_t	Households that changed electricity supplier	Total number of households that used the right of a free choice of electricity supplier	Report of Energy Regulatory Office for the year 2015 (http://www.ure.gov.pl/pl/urzad/informacje-ogolne/sprawozdania/2916,Sprawozdania.html)
W_t	Wages in the section of electricity, gas, steam and air conditioning supply	Average monthly inflation-adjusted gross wages in the section of electricity, gas, steam and air conditioning supply (PLN)	Statistical yearbooks of the Republic of Poland for the years 1994 – 2015
I_t	Investment outlays in the section of electricity, gas, steam and air conditioning supply	Inflation-adjusted yearly investment outlays in the section of electricity, gas, steam and air conditioning supply (mln PLN)	Statistical yearbooks of the Republic of Poland for the years 1994 – 2015
Wp_t	Wholesale average prices of electricity sold by producers	Inflation-adjusted yearly wholesale average prices of electricity sold by producers (PLN per MWh) – data only for the years 1999 - 2014	Reports of Energy Regulatory Office for the years 1998 – 2015 (http://www.ure.gov.pl/pl/urzad/informacje-ogolne/sprawozdania/2916,Sprawozdania.html)
Ec_t	Installed electricity capacity	Installed electricity capacity (MW)	Country datasheets 2016 (http://ec.europa.eu/energy/en/statistics/country)

Source: Own presentation.

The analysis is made for the whole of Poland in the years 1993 - 2014, so it does not meet the criteria of panel data research. The selection of independent explanatory variables was inspired by the methodology presented by Alm, Sennoga and Skidmore (2009) who used panel data analysis to investigate the impact of an increase in the excise rate on the average retail price of unleaded petrol in the US in the years 1984 – 1999. Independent variables also reflect the specificity of electricity market in Poland and they are recognized as the key factors affecting the price of electricity. The variables concern the most important aspects of electricity market activity, i.e. production (eg. investment expenditure, cost of wages, electricity capacity), distribution (eg. wholesale prices, electricity suppliers), consumption (e.g. population, electricity consumption, disposable income of households) and external conditions (eg. excise duty, VAT, heating degree-days). All variables come from the sources indicated in Table 3 and from additional regular surveys in the field of the energy market in Poland carried out by the Polish Central Statistical Office (CSO 2012; CSO 2014; CSO 2017; GUS 2016).

In order to find the logic and significant relationship between the price, the excise duty and other independent variables various many typical l operations on data were carried out:

1) Analysis in different periods of time (data segmentations):
   - in the years 1993 – 2014 and 1993 – 2008 to find the difference before and after the change of formal excise payer (in 2009 the electricity producer was replaced by the electricity supplier),
   - in the years 1993 – 2004 to catch the moment of the excise duty introduction in 2002 and 2005 – 2014 to catch the effects of changing the formal tax payer (in 2009),
   - in the years 1993 – 2001 and the years 2002 – 2014 to find the differences before and after introduction of the excise duty.

2) All the investigations indicated were carried out without the control variable "wholesale real average prices of producers" (Wp_t) because of data limits. An additional investigation was carried out for the years 1999 – 2014 with the control variable Wp_t.
3) All investigations were carried out with one year lag and one year acceleration in the introduction of the excise duty. The acceleration is justified by the fact that producers, after the release the prices by the President of ERO in 2002, significantly increased the prices of electricity for 1 KWh from 0,30 PLN in 2000 to 0,37 PLN in 2001. It is assumed that electricity producers could anticipate the excise duty in 2002, thus they could increase their prices earlier in 2001 before the excise was introduced. However the model with one year acceleration was rejected because it did not bring satisfactory results.
4) All investigations were carried out in real (inflation-adjusted) prices and for the analysis in the years 1993 – 2014 the interpretation variable was applied (0 – for the years without the excise duty and 1 for the years with the excise duty) in order to emphasize the influence of excise duty on the price.
5) All investigations were carried out with the use of the forward and reverse progressive regression that helps to capture optimal and statistically significant results.

Estimation Results

Reasonable results are obtained by the analysis of the period 1993 – 2014 without a time lag (Model 1) and with one year time lag (Model 2). Statistically significant variables at 5% are: the excise duty (e_t), households that changed electricity supplier (C_t), electricity suppliers (S_t) and wages in the section of electricity, gas, steam and air conditioning supply (W_t). The statistically significant results of regressions in both cases are presented in Table 4.

Table 4: Main Results of regressions without a time lag (Model 1) and with a one year time lag (Model 2)

Independent variable and other indicators	Model 1	Model 2	Model 3
P_{t-1}			0,414334992*
e_t	1,708371/50 = 0,0341674*		0,186038098
e_{t-1}		1,513876/50 = 0,030278*	
W_t	0,000107***	0,000109***	0,0000679**
S_t	-0,001500**	-0,001754**	-0,000954129
C_t	-0,000000**	-0,000000**	-0,00000022**
Intercept	0,083735723***	0,090345464***	0,057345912*
R^2	,9952	,9944	,9953
Test F	859,996	761,267	640,3729
$S(\varepsilon_t)$	,01444	,01535	,01393
Durbin-Watson statistic	2,6654	2,0886	2,3886

** p<0,05 ** p<0,01 ***p<0,0001*
Source: Own calculations with the use of the program Statistica 12.

Both regressions have been verified according to the following criteria: 1) significance of the model, 2) significance of independent variables, 3) lack of commensurability between independent variables, 4) homoscedasticity, 5) lack of autocorrelation of the residuals (Durbin-Watson statistic), 6) normality in residuals' decomposition and 7) an expected value of a random error term ε_t is 0.

The Durbin-Watson statistic (2,665445) indicates that in the case of Model 1 the autocorrelation between residuals can exist. It can be caused by a limited quantity of data (22) or by other factors that affect the price. In order to account for the autocorrelation of residues, a model with autoregression of a dependent variable was also estimated. Estimates of this model were not satisfactory (see table 4, Model 3).

Taking into consideration other criteria, in all cases the regressions meet those criteria at a satisfactory level. As a result it can be assumed that particularly Model 2 matches the empirical data in a satisfactory way.

In all cases the poorest aspect of the models is the suspicion of a correlation between some independent variables. The results of the analysis for the case of Model 2 are presented in table 5.

Table 5: Linear correlation coefficients between variables in the case of Model 2

	P_t	e_t	W_t	S_t	C_t
P_t (dependent variable)	1,000000	0,840821	0,992327	0,797787	0,519414
e_t	0,840821	1,000000	0,826652	0,824132	0,330879
W_t	0,992327	***0,826652***	1,000000	0,830479	0,585695
S_t	0,797787	***0,824132***	***0,830479***	1,000000	0,472713
C_t	0,519414	0,330879	*0,585695*	0,472713	1,000000

Source: Own calculations with the use of Statistica 12.

Table 5 above shows that the variable S_t is correlated slightly higher with the excise and wages than with the price P_t. A similar situation exists in the case of the number of consumers who change their suppliers (C_t) and wages. However the results of the commensurability analysis (table 6) show that the tolerance for all variables is acceptable (higher than 0,1) and the influence of variables S_t and C_t on the price (P_t) is not substantial. As a result the variables S_t and C_t, which are statistically significant, can be kept in the model. Table 6 also shows that the excise duty affects the price in a very limited way (the semi-fragmentary correlation equals 0,038). It seems to be reasonable if the excise is only 0,02 PLN per KWh.

Table 6: Commensurability analysis between independent variables in the case of Model 2

Variable	Tolerance	R^2	Fragmentary correlation	Semi-fragmentary correlation
e_t	0,222598	0,777402	0,457060	0,038289
W_t	0,184540	0,815460	0,987207	0,461339
S_t	0,245691	0,754309	-0,637056	-0,061581
C_t	0,571573	0,428427	-0,619138	-0,058746

Source: Own calculations with the use of Statistica 12.

Then the analysis shows that if the excise duty rises about 0,02PLN per KWh, the average real gross price of 1 KWh of electric energy will rise about 0,03 PLN. It means that the excise duty is forward over-shifted. This result seems to be quite rational because in the years 2002 and 2003 the real price of a KWh increased from 0,38 to 0,41 PLN. First, the excise duty is shifted from electricity producers to trade companies and next the trade companies shift the duty on to the final consumers. An additional explanation of a total excise duty shift is that electricity belongs to the group of basic consumption goods which are rather less elastic or even inelastic with regard to prices and demand. In the case of such goods and services it is easier to shift the tax. Another important result is that it was impossible to capture the price effect when the excise duty payer was changed from the energy producer to the trader in 2009. However, because the duty is calculated in the final retail price, then it can be assumed that the reform did not affect the electric energy price significantly and the duty is completely shifted on to consumers. The regression also indicates that the real prices of electric energy in the period analyzed were mainly affected by the real wages in the energy sector. An increase of real average wages of about 1 PLN causes the increase of the real average gross price of 1 KWh of about 0,000109 PLN. Other results also seem to be rational. Every new supplier of electric energy causes the decrease in the real price of 1 KWh by about 0,001754 PLN. However the increasing number of consumers who change the suppliers does not affect the final price of 1 KWh.

Distributional effects of the excise duty on electricity

Analysis of the Quintile and types of household groups

The distributional effects of the excise tax is analyzed with the assumption that the whole amount of the tax (0,02 PLN) is shifted on to the final consumers. The investigation is carried out using the example of Polish households in the years 2009 and 2015 and covers two stages:

1) The comparison of the excise paid on electricity on the disposable income of households classified in quintile groups and by types of household ,
2) Calculation of the Pearson concentration coefficient (K) to measure the decomposition of disposable income of households before and after taxation.

This analysis is based on empirical data collected in four surveys carried out by the Central Statistical Office in Poland: Energy Consumption in Households in 2015 (CSO 2017), the Household budget survey in 2015 (CSO 2016),

Energy Consumption in Households in 2009 (CSO 2012) and the Household budget survey in 2009 (CSO 2010). Tables 7 - 10 and 12 – 19 based on these surveys are to be found in the Annex.

Tables 7 and 8 show the method of calculation used to ascertain the average monthly electricity excise duty burden for households in the years 2009 and 2015 classified in quintile groups (case I) whereas Tables 9 and 10 show the same calculation for the different types of households (case II).

The results of the analysis in two cases indicate that the excise duty is not a significant fiscal burden for households. It mainly results from the low excise rate and the stable prices of electricity. Let us remember that since 2007 households in Poland may choose their electricity supplier in a free market. On the other hand, the excise duty leads rather to regressive taxation of the disposable income of households. In case I the analysis was carried out with different prices of electricity for each quintile group. The prices come directly from the surveys of Central Statistical Office in Poland on energy consumption in households in 2009 and 2015 (CSO 2012, Tab. 22; CSO 2017, Table 22) and they are calculated on the basis of data on electricity consumption and expenditures of the households surveyed. The last rows of Tables 7 and 8 in both years show similar relationships in the excise burden among households. The households in the first quintile group (with lowest disposable income per capita) bear the highest excise burden, whereas households in the last group (with the highest disposable income) bear the lowest excise burden. Taxation in II, III and IV quintile groups seem to be fairer as the excise burden increases with an increase of disposable income. In the second case the relationships in the excise burden among households are more complex. Unfortunately the analysis was carried out at fixed average prices of electricity in each year due to the lack of data (there is no data on electricity prices broken down into types of households). In 2009 non-manual labor job households recorded the highest disposable income and the lowest excise burden whereas the households of pensioners (with the lowest disposable income) recorded the highest excise burden. In 2015 non-manual labor job households also recorded the highest disposable income with the lowest excise burden whereas pensioners (rated in third place with regard to the lowest income) recorded the highest excise burden. Then it seems that in 2015 relationships in the excise burden among households are slightly fairer than in 2009. The comfortable situation of households in non-manual labor work results mainly not only from the fact that they record the highest income but also from the fact that they, relative to other households, use less electricity (only households of manual labor jobs use less electricity). It may testify to their outdoor lifestyle. On the other hand pensioners and retirees noted a significant increase in 2015 in comparison to 2009 in relation to most other households, both in disposable income and electricity consumption. These people spend rather more time at home than outside which translates into a higher consumption of electricity.

Pearson Concentration Coefficient

The extent of decomposition in the disposable income of households caused by the excise duty is assessed with the use of the Pearson concentration coefficient (*K*):

$$(2) \quad K = 1 - \sum_{i=1}^{k} (F_{z_i} + F_{z_{i-1}}) \cdot w_i ,$$

where: $w_i = \frac{n_i}{N}$ - structure indicator, F_{w_i}, F_{z_i} - empirical cumulative distributions. The Pearson concentration coefficient (*K*) receives values in the bracket $0 \leq K \leq 1$. If *K=0*, it means equal decomposition, whereas K=1 means a complete concentration.
Table 11 shows the Pearson concentration coefficient (*K*) for households in Poland in the years 2009 and 2015.

Table 7: Pearson concentration coefficient (*K*) for households in Poland in the years 2009 and 2015

Research profile	2009		2015	
	Before the excise	After the excise	Before the excise	After the excise
Quintile groups	0,8019841	0,8019845	0,7974962	0,7974943
Types of households	0,7730145	0,7730385	0,7665509	0,7665606

Source: Own calculations based on Tables 12 - 19.

The rate of coefficiency in all cases is very similar and very high which means that there was a significant concentration of disposable income among households in Poland the years analyzed. The results show that in the best case (K = 0,7665509) less than 25% of households had over three quarters of the income. Thus the decomposition of

analyzed income analyzed is similar to the weak distribution. The excise duty on electricity does not affect significantly the decomposition in disposable income among households. It results mainly from the fact that the excise duty in the years analyzed was not a significant burden for households.

Conclusions

The paper investigates whether the excise on electricity in Poland, as part of the EU own resources system, may support the sustainable development by fair taxation of households. The analysis consists of two main stages. In the first an attempt was made to examine the extent of the excise incidence on households. An analysis was made on the example of households in Poland in the years 1993 – 2014 and with the use of a multi-variable regression model. The analysis shows that the excise duty on electricity could even be even over-shifted on to households. In the case of a one year time lag the increase of the excise rate of 0,02PLN in 2002 (when the excise was introduced) affects the electricity (1 KWh) price increase by 0,03 PLN. This phenomenon can be explained by the fact that the excise was imposed at the stage of electricity production (in 2002) after the ERO liberated prices for these producers in 2001. As a result the producers could increase the prices more than the amount of excise duty and could shift the excise on to traders very easily and the latter – on to consumers. In the years 2002 and 2003 the real price of 1 KWh increased from 0,38 to 0,41 PLN. It should also be stressed that in 2002 electricity was produced and traded in Poland rather than on the oligopoly market and was characterized by low price flexibility. As a result the producers could raise the prices to a certain level without the fear of creating falling demand.

The second stage of analysis concerns the distributional effects of the excise on electricity. It shows that the excise duty in Poland in the years 2009 and 2015 was not a significant fiscal burden for households which mainly results from the low excise rate and the stable prices of electricity. However it must be stressed that the excise duty in the years analyzed led to a regressivity in the taxation of the disposable income of households classified in both ways: quintile groups and types of household. Thus it confirms the previous broad empirical evidence of the regressivity of electricity taxes. The Pearson coefficient shows in all the dimensions of the analysis that the disposable income of households in Poland was very concentrated which testifies that the distribution of income is very unequal. On the other hand the amount of excise duty paid by the households had no significant effect on this distribution.

From the perspective of fair taxation of households in Poland the introduction of an Electricity Tax-based with reasonable rates on the concept of Own Resources seems to be quite safe in respect of effects on the EU general budget. In this regard the new resource is also quite reasonable from the perspective of sustainable development.

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Annex

Table 8: Calculation of the average monthly electricity excise burden per capita in Poland in 2009 for households classified in quintile groups

Stages of calculation		Average	Quintile group				
			I	II	III	IV	V
Average monthly consumption of electricity/capita (KWh)	1	66,76	32,50	45,12	64,38	93,64	136,67
Average price of 1KWh (PLN)	2	0,53	0,48	0,50	0,52	0,56	0,60
Excise duty rate per KWh (PLN)	3	0,02	0,02	0,02	0,02	0,02	0,02
Average monthly amount of excise duty/capita (PLN)	4=1*3	1,34	0,65	0,90	1,29	1,87	2,73
Average monthly disposable income/capita (PLN)	5	1 071,67	***359,95***	671,72	911,55	1 224,31	**2 196,16**
Share of excise duty in disposable income/capita	6=4/5	0,001246	***0,001806***	0,001343	0,001413	0,001530	***0,001245***

Source: Own calculation based on the (CSO 2012).

Table 9: Calculation of the average monthly electricity excise burden per capita in Poland in 2015 for households classified in quintile groups

Stages of calculation		Average	Quintile group				
			I	II	III	IV	V
Average monthly consumption of electricity/capita (KWh)	1	64,72	33,38	46,96	66,67	96,13	136,71
Average price of 1KWh (PLN)	2	0,64	0,55	0,60	0,63	0,67	0,71
Excise duty rate per KWh (PLN)	3	0,02	0,02	0,02	0,02	0,02	0,02
Average monthly amount of excise duty/capita (PLN)	4=1*3	1,29	0,67	0,94	1,33	1,92	2,73
Average monthly disposable income/capita (PLN)	5	1 337,87	***444,38***	853,01	1 162,27	1 539,72	**2 697,38**
Share of excise duty in disposable income/capita	6=4/5	0,000967	***0,001502***	0,001101	0,001147	0,001249	***0,001014***

Source: Own calculation based on the (CSO 2017).

Table 10: Calculation of the average monthly electricity excise burden per capita in Poland in 2009 for different types of households

Stages of calculation		Average	Manual labor work	Non-manual labor work	Farmers	The self-employed	Retirees[1]	Pensioners[2]
Average monthly expenditure on electricity/capita (PLN)	1	37,52	14,43	19,92	28,96	43,84	46,80	43,72
Average price of KWh of electricity (PLN)	2	0,56	0,56	0,56	0,56	0,56	0,56	0,56
Number of KWh used monthly/capita	3=1/2	67,00	25,76	35,57	51,71	78,29	83,57	78,07
Rate of the excise duty per KWh (PLN)	4	0,02	0,02	0,02	0,02	0,02	0,02	0,02
Average monthly amount of the excise duty paid/capita (PLN)	5=3*4	1,34	0,52	0,71	1,03	1,57	1,67	1,56
Average monthly disposable income/capita (PLN)	6	1071,67	839,50	***1 435,98***	856,60	1 340,99	1 114,42	***825,23***
Share of the excise duty in disposable income/capita	7=5/6	0,00125	0,00061	***0,00050***	0,00121	0,00117	0,00150	***0,00189***

Source: Own calculation based on the (CSO 2010).
[1]retired people, they stopped working because of old age and receive old-age pensions; [2]disabled persons who stopped working and receive social security benefits from the state.

Table 11: Calculation of the average monthly electricity excise burden per capita in Poland in 2015 for different types of households

Stages of calculation		Average	Manual labor work	Non-manual labor work	Farmers	The self-employed	Retirees	Pensioners
Average monthly expenditure on electricity/capita (PLN)	1	45,71	17,27	23,84	36,31	52,93	56,16	51,26
Average price of KWh of electricity (PLN)	2	0,64	0,64	0,64	0,64	0,64	0,64	0,64
Number of KWh used monthly/capita	3=1/2	71,42	26,98	37,25	56,73	82,70	87,75	80,09
Rate of the excise duty (PLN)	4	0,02	0,02	0,02	0,02	0,02	0,02	0,02
Average monthly amount of the excise duty paid/capita (PLN)	5=3*4	1,43	0,54	0,75	1,13	1,65	1,76	1,60
Average monthly disposable income/capita (PLN)	6	1337,87	1054,03	***1702,78***	1017,33	1678,76	1433,24	***1063,77***
Share of the excise duty in disposable income/capita	7=5/6	0,00107	0,00051	***0,00044***	0,00112	0,00099	0,00122	***0,00151***

Source: Own calculation based on the (CSO 2016).

Table 12: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2009 before the excise duty (quintile groups)

Quintile group	Available income per capita (x_i)	Population of the households (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
I	359,95	22190	0,20553	73,97900	0,06967	0,20553	0,06967	0,01432
II	671,72	21846	0,20234	135,91556	0,12800	0,20234	0,12800	0,02590
III	911,55	21593	0,20000	182,30662	0,17169	0,20000	0,17169	0,03434
IV	1 224,31	21285	0,19714	241,36485	0,22732	0,19714	0,22732	0,04481
V	2 196,16	21053	0,19499	428,23971	0,40331	0,19499	0,40331	0,07864
Total	**5363,69**	**107967,00**	**1,00000**	**1 061,80573**	**1,00000**	**x**	**x**	**0,19802**

Source: Own calculation based on the (CSO 2011).

Table 13: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2009 after the excise duty (quintile groups)

Quintile group	Available income per capita (x_i)	Population of the households (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
I	359,3	22190	0,20553	73,84541	0,06964	0,20553	0,06964	0,01431
II	670,817583	21846	0,20234	135,73296	0,12801	0,20234	0,12801	0,02590
III	910,262367	21593	0,20000	182,04910	0,17169	0,20000	0,17169	0,03434
IV	1222,43718	21285	0,19714	240,99563	0,22728	0,19714	0,22728	0,04481
V	2193,42667	21053	0,19499	427,70672	0,40337	0,19499	0,40337	0,07866
Total	**5356,24**	**107967**	**1,00000**	**1 060,32983**	**1,00000**	**x**	**x**	**0,19802**

Source: Own calculation based on the (CSO 2011).

Table 14: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2015 before the excise duty (quintile groups)

Quintile group	Available income per capita (x_i)	Population of the household (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
I	444,38	19015	0,18813	83,59933	0,06167	0,18813	0,06167	0,01160
II	853,01	20079	0,19865	169,45257	0,12501	0,19865	0,12501	0,02483
III	1 162,27	20634	0,20414	237,26977	0,17504	0,20414	0,17504	0,03573
IV	1 539,72	20803	0,20582	316,89813	0,23379	0,20582	0,23379	0,04812
V	2 697,38	20545	0,20326	548,27726	0,40448	0,20326	0,40448	0,08222
Total	**6696,76**	**101076,00**	**1,00000**	**1 355,49705**	**1,00000**	**x**	**x**	**0,20250**

Source: Own calculation based on the (CSO 2017).

Table 15: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2015 after the excise duty (quintile groups)

Quintile group	Available income per capita (x_i)	Population of the household (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
I	443,085667	19015	0,18813	83,35583	0,06155	0,18813	0,06155	0,01158
II	852,342333	20079	0,19865	169,31993	0,12503	0,19865	0,12503	0,02484
III	1161,33083	20634	0,20414	237,07804	0,17506	0,20414	0,17506	0,03574
IV	1538,38667	20803	0,20582	316,62371	0,23380	0,20582	0,23380	0,04812
V	2695,45733	20545	0,20326	547,88645	0,40456	0,20326	0,40456	0,08223
Total	**6690,60**	**101076**	**1,00000**	**1 354,26397**	**1,00000**	**x**	**x**	**0,20251**

Source: Own calculation based on the (CSO 2017).

Table 16: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2009 before the excise duty (types of households)

Type of the household	Available income per capita (x_i)	Population of the household (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
Pensioners	825,23	5306	0,05077	41,89394	0,03890	0,05077	0,03890	0,00198
Manual labor work	839,50	36627	0,35044	294,19207	0,27319	0,35044	0,27319	0,09574
Farmers	856,60	8349	0,07988	68,42605	0,06354	0,07988	0,06354	0,00508
Retirees	1 114,42	21136	0,20222	225,36196	0,20928	0,20222	0,20928	0,04232
The self-employed	1 340,99	8 557	0,08187	109,78828	0,10195	0,08187	0,10195	0,00835
Non-manual labor work	1 435,98	24543	0,23482	337,19797	0,31313	0,23482	0,31313	0,07353
Total	**6412,72**	**104518,00**	**1,00**	**1076,86**	**1,00**	**1,00**	**1,00**	**0,226986**

Source: Own calculation based on the (CSO 2010).

Table 17: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2009 after the excise duty (types of households)

Type of the household	Available income per capita (x_i)	Population of the household (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
Farmers	824,06	5306	0,05077	41,83459	0,03890	0,05077	0,03890	0,00197
Manual labor work	837,91	36627	0,35044	293,63325	0,27302	0,35044	0,27302	0,09568
Pensioners	855,57	8349	0,07988	68,34357	0,06355	0,07988	0,06355	0,00508
Retirees	1112,74	21136	0,20222	225,02287	0,20923	0,20222	0,20923	0,04231
The self-employed	1339,82	8 557	0,08187	109,69246	0,10199	0,08187	0,10199	0,00835
Non-manual labor work	1435,02	24543	0,23482	336,97287	0,31332	0,23482	0,31332	0,07357
Total	**6405,12**	**104518,00**	**1,00**	**1075,50**	**1,00**	**1,00**	**1,00**	**0,226961**

Source: Own calculation based on the (CSO 2010).

Table 18: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2015 before the excise duty (types of households)

Type of the household	Available income per capita (x_i)	Population of the household (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
Farmers	1017,33	6512	0,06684	67,99463	0,05022	0,06684	0,05022	0,00336
Manual labor work	1054,03	32239	0,33089	348,76502	0,25760	0,33089	0,25760	0,08524
Pensioners	1063,77	4445	0,04562	48,53085	0,03584	0,04562	0,03584	0,00164
Retirees	1433,24	20710	0,21256	304,64735	0,22501	0,21256	0,22501	0,04783
The self-employed	1678,76	7849	0,08056	135,23880	0,09989	0,08056	0,09989	0,00805
Non-manual labor work	1702,78	25677	0,26354	448,74663	0,33144	0,26354	0,33144	0,08735
Total	**7949,91**	**97432,00**	**1,00000**	**1 353,92328**	**1,00000**	**x**	**x**	**0,23345**

Source: Own calculation based on the (CSO 2016).

Table 19: Calculation of the Pearson concentration coefficient (*K*) for households in Poland in 2015 after the excise duty (types of households)

Type of the household	Available income per capita (x_i)	Population of the household (n_i)	$w_i = \frac{n_i}{N}$	$m_i = x_i \cdot w_i$	$z_i = \frac{m_i}{M}$	F_{w_i}	F_{z_i}	$(F_{w_i} + F_{z_i}) \cdot w_i$
Farmers	1015,60	6512	0,06684	67,87881	0,05022	0,06684	0,05022	0,00336
Manual labor work	1051,78	32239	0,33089	348,02098	0,25750	0,33089	0,25750	0,08520
Pensioners	1062,28	4445	0,04562	48,46306	0,03586	0,04562	0,03586	0,00164
Retirees	1430,56	20710	0,21256	304,07821	0,22499	0,21256	0,22499	0,04782
The self-employed	1675,86	7849	0,08056	135,00496	0,09989	0,08056	0,09989	0,00805
Non-manual labor work	1700,24	25677	0,26354	448,07619	0,33153	0,26354	0,33153	0,08737
Total	**7936,32**	**97432**	**1,00000**	**1 351,52222**	**1,00000**	**x**	**x**	**0,23344**

Source: Own calculation based on the (CSO 2016).

The Impact of a Quality Management System on the Efficiency of Operations in a Company

Julian Jakubowski
University of Zielona Góra, Zielona Góra, Poland, e–mail: j.jakubowski@iizp.uz.zgora.pl

Katarzyna Łasińska
University of Zielona Góra, Zielona Góra, Poland, e-mail: k.lasinska@adm.uz.zgora.pl

Roman Stryjski
University of Zielona Góra, Zielona Góra, Poland, e–mail: r.stryjski@iizp.uz.zgora.pl

Abstract

The primary focus of quality management is to meet customer requirements and to strive to exceed customer expectations. Every aspect of customer interaction provides an opportunity to create more value for the customer. Understanding current and future needs of customers and other interested parties contributes to sustained success of the organization. The work provides an assessment of the use and effectiveness of the quality management methods used by the selected company. Methods, tools and principles for supporting and building quality were analyzed not only during production. Areas that are constantly in need of improvement and objectives that can be achieved in accordance with the principle of continuous improvement are distinguished, affecting the degree of implementation of the customer's requirements. The results of the improvements carried out are described, according to the individual tools.

Keywords: Quality Management, Overall Equipment Effectiveness

Introduction

This paper assesses the degree of the utilisation and effectiveness of the quality management methods used by a selected company. The methods, tools and principles to promote and build quality were analysed, including during production. The areas in constant need of improvement and objectives that can be achieved, in accordance with the principle of continuous improvement, affecting the degree of fulfilment of the customer's requirements, were highlighted. The results of the improvements carried out are described, according to the various tools.

Total Quality Management is a universal method of improving the performance of human teams. This method has a very wide application and is used both in the management of public administrations, education, health services and businesses as well as in the police and military. According to the standard currently in force, the quality is the degree to which a set of inherent qualities meets the requirements (Rose 2005, Bettina 2017).

The 9000-2015 series, ISO standard are not technical standards describing the technical parameters to be met by a product or service, but they do govern the organisational rules of an undertaking which are intended to ensure the appropriate quality of the product or service. In the interpretation of ISO 9000 standards, a company's actions are generally referred to as a '*process*'. The implementation of the process management concept is based on the outline of strategic objectives, as described in the company's quality policy; these include the identification of processes taking place in the company, the main distinguishing and ancillary processes, defining the target scheme of the organisational structure, setting strategic objectives, specifying long-term objectives, providing periodic targets to be achieved, implementing the system and the processes and measuring customer and party satisfaction (Thareja 2008, Littlefield 2012, Szczepańska 2011, Matejun 2009).

Characteristics of the object of analysis

The company, which analysed the functioning of the Quality Management System, combining the logistics and manufacturing industries, is a global, specialist provider of integrated logistics services and has countless warehouse spaces and production lines.

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The production process is based on the *one-piece flow* principle, which is an extremely important element in optimising the flow process of raw materials and shaping working methods, as well as improving ergonomics at workplaces. Each piece is immediately transferred to the next post after the components are installed, and in its place the next enclosure appears, which requires the same elements to be installed, i.e. the product flows as a *one piece* batch. The basic assumptions for improving the process by implementing the *one-piece flow,* **are a reduction in** stocks of material, the phenomenon of over-production, the elimination of unnecessary movements, the fact that production is possible on a smaller surface and that order execution time is possible and also that time loss is eliminated. It is the responsibility of each operator performing a sequence of actions to check the accuracy of the installation of the previous station. Self-inspection aims to remove the defective product from circulation as soon as possible. Current inspection methods eliminate the costs that can be incurred with standard socket production where errors are only detected *after* the entire batch of the product has been produced. The continuous flow system significantly reduces the length of the product's stay in the plant.

Control is divided into three stages: *Drop test, Print test* and *Drain test* according to the process (Fig. 1.) and is carried out on any product from the production line, selected on a given production day.

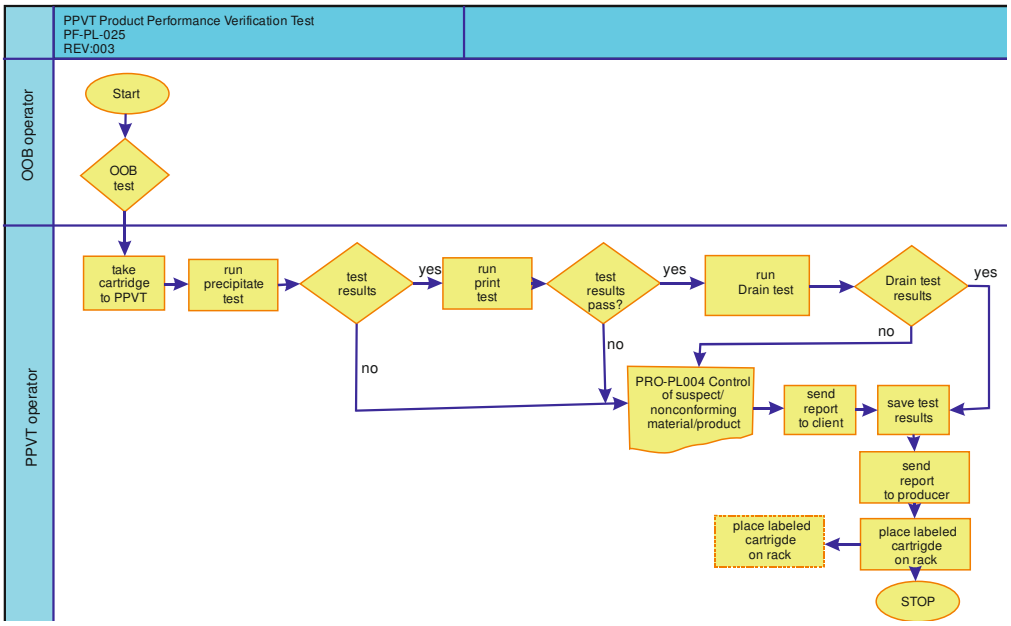

Fig. 1: Block diagram of the PPVT process. [own study]

Input control must be carried out on a representative sample, the size of which depends on the findings and the type of material controlled. The basis for sample selection is ISO 2859-1. A measure of the quality level, described in the standard, is the fraction of non-compliant units expressed as a percentage, or the number of non-compliant units per 100 units. The sample size is selected at the *acceptable quality limit (AQL)* - Table 1. The AQL limit is the worst quality one can afford in the sense of the accepted measure of quality for which the batch is considered compatible with the requirement. In this standard, the limit is 0.01%÷10% when the fraction of non-compliant units is taken into account and 0.01÷1000 when the level is the number of non-compliant units per 100 units. According to the accepted findings of control level 1.0, **a sample of N=20 (letter code F)** taken from the batch **is compatible** when the number of non-conformities in the sample does not exceed 1 (Ac=1 pcs). If the batch exceeds 2.0, it should be discarded.

Table 1: Table - AQL the acceptable quality limit. [Own study]

Inspection table acc. to AQL										
Batch size	Code	Sample size	Level of inspection							
			0.65	1.0	1.5	2.5	4.0	6.5	10	15
2 to 8	A	2						1	1	2
9 to 15	B	3					1	1	2	2
16 to 25	C	5				1	1	2	2	3
26 to 50	D	8			1	1	2	2	3	4
51 to 90	E	13		1	1	2	2	3	4	6
91 to 150	F	20	1	1	2	2	3	4	6	8
151 to 280	G	32	1	2	2	3	4	6	8	11
281 to 500	H	50	2	2	3	4	6	8	11	15
501 to 1200	J	80	2	3	4	6	8	11	15	22
1201 to 3200	K	125	3	4	6	8	11	15	22	
3201 to 10000	L	200	4	6	8	11	15	22		
10001 to 35000	M	315	6	8	11	15	22			
35001 to 150000	N	500	8	11	15	22				
150001 to 500000	P	800	11	15	22					
500001 and above	Q	1250	15	22						

The process is reviewed daily during a 20-minute ***Gemba walk***, *Gemba* from the Japanese meaning "place of work". According to the Toyota rule, the first step to solving any problems in a production area should be *to undertake a Gemba*, that is, to have a walk around the workplace. Only a walk in the area where there are inconsistencies allows you to know the actual situation and gain knowledge from direct experience (Woźniak et al. 2017).

Key performance indicators used in the entity under investigation

KPI - key performance indicators, in a company, play a huge *rôle* in a company's ongoing supervision (Kostrzewski et al. 2020). KPIs influence the development and success of an organisation by controlling individual areas of activity. Success is defined as achieving defined goals, which is helped by indicators that measure the fulfilment of requirements imposed by the customer or by management. The selection of indicators depends on the strategy of the organisation. Key performance indicators are inseparable from *Visual Management*, the visual representation of the indicators studied in the subject.

This data is the basis for calculating the productivity of availability and quality, i.e. components of the OEE index, which is presented at level two of '*Operational Performance Meetings'*, a daily meeting between employees of all departments, including the Manager and the Quality Engineer, the Manager and the Process Engineer, Shift Manager, trainers, the lean engineer, the logistics manager, the planner and *operations* and the HR manager. All key indicators and the problems of the previous shifts are discussed at this meeting. The indicators presented by the quality department are mainly Pareto sums of the most common errors during production; errors most frequently occurring or having the greatest impact on production in the quality and production departments are dealt with by the A3 Kaizen Report in a separate meeting.

Another indicator discussed is the percentage created after dividing the sum of errors at each quality control station by the quantity produced on a given day. This is an indicator that accurately reflects the situation in production. Figure 2 provides data from the visual inspection station. The limit imposed by the customer is marked with a red line. The trend marked with the blue line clearly shows a decrease in the number of errors and indicates that the preventive measures implemented have had the expected effect.

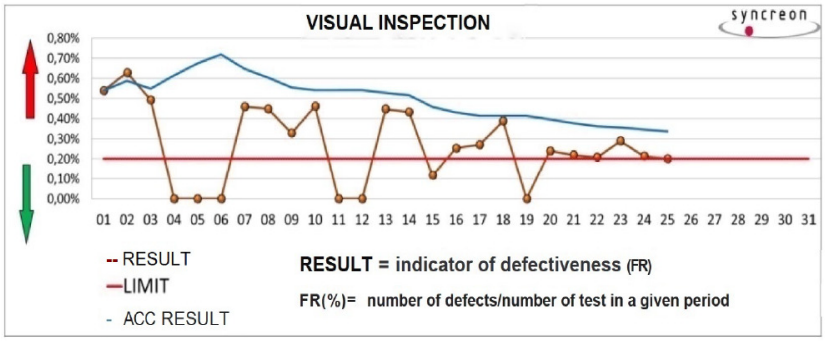

Fig. 2: Visual inspection defectiveness index [Own study]

The next item on the agenda at the Operational Performance Meeting is a discussion by the quality Department regarding repairs performed by line leaders on products produced during the process. Figure 3 represents the quantities withheld and processed, *due to the error* and divided into the types of errors.

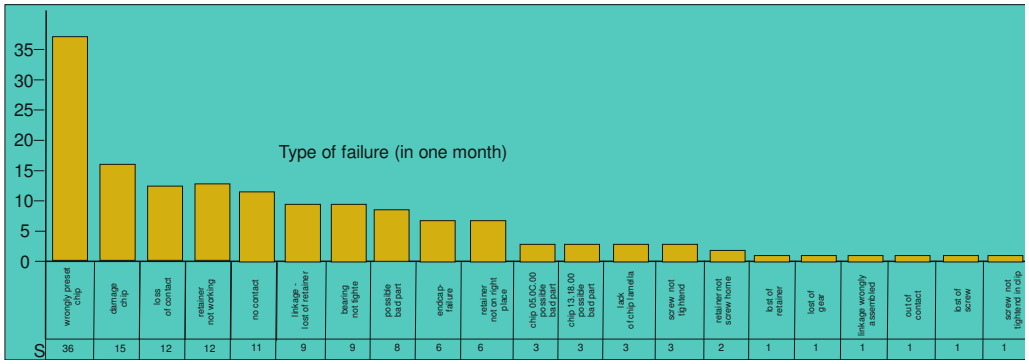

Fig. 3: Pareto graph of errors occurring on lines and resulting in repairs. [own study]

Another measure used in the enterprise is PPM (Part Per million). This measure shows the number of defects per million. A lower rate shows fewer defects and a greater likelihood of meeting customer requirements. In practice, the PPM is used to assess the supplier (Figure 4.). The number of defects, detected by the line operators, is measured by the quantity produced, multiplied by 1,000,000.

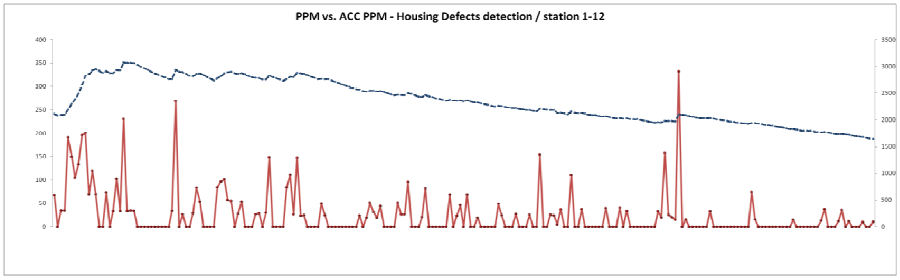

Fig. 4: Number of defective enclosures detected by operators - supplier's defects, [own study]

The main indicator is the OEE chart (Overall Equipment Effectiveness), an indicator showing losses caused by unplanned events on machines such as failures, unplanned downtime, problems regarding quality and extended machine cycle time. The indicator shows the level of loss in the assumed lifetime of the machine. The implementation of the OEE index results in improvements in machine performance, improved quality of the products produced, reveals the real needs to purchase more machines, allows constant control of the process, machines and problems and introduces an element of competition between the teams, leading to improved results. OEE consists of three components:

- availability - that is, the ratio of available time to total time; available time is total time (e.g. 8 - hour shift) less loss of availability (re-tooling, failures, repairs, settings, cleaning)
- efficiency -described as the ratio of productive time to available time; productive time is the time available, minus losses of efficiency (micro-stops, start-up losses)
- quality - described as the ratio of effective time to productive time; effective time is productive time minus losses in quality (deficiencies, defects, alterations).

After receiving the individual components, the OEE index is calculated from the formula:

OEE = (availability x efficiency x quality) x 100%

The use of methods and tools to support quality and production management is an element that contributes to an improvement in quality.

One of the tools used in the company is the Ishikawa Diagram, which helps to systemise the causes of the error. On the basis of the data collected by the quality department - *q.v. Fig. 5*- the problem of incorrect programming occurred 194 times during the month, with 85,600 checked pieces.

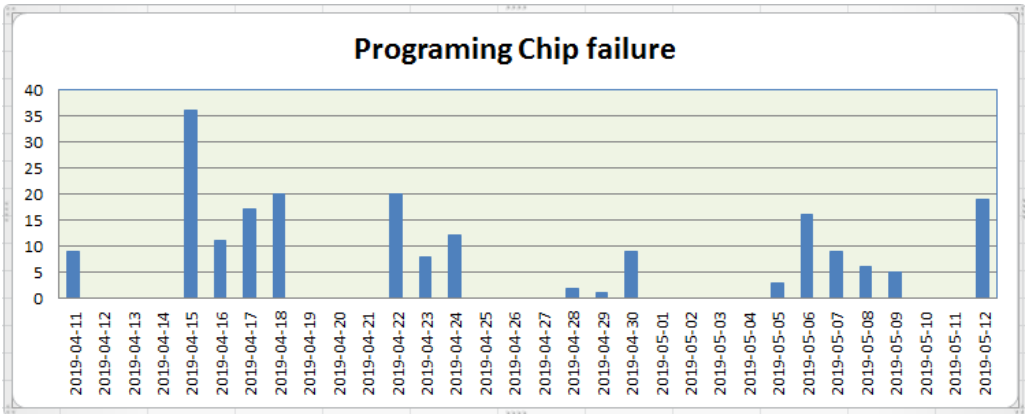

Fig. 5: Number of defects – un-programmed chips [own study]

Identifying the *root cause* and selecting the most relevant factors allows the project team to focus attention on the root cause that has impacted the most on the appearance of defects.

Assessment of the impact of the implementation of the quality management system, in the undertaking under investigation

The implementation of the Quality Management System in the company under investigation turned out to be a time consuming and labour intensive process, requiring the involvement of employees and, above all, the management of the organisation. The main problems observed by the Quality Representative were too much strain on staff due to the need to work in parallel with the implementation of the system and the fulfilment of day-to-day duties. The unwillingness of the employees to make changes, along with their lack of commitment and their fear of excessive red tape are cited as another problem. Companies also consider the cost of implementation and the cost of change, to be future problems which would crop up when implementing the system. Low-level management involvement is the main problem; the project should go ahead; the management team should have confidence in the success of the system development team.

Complicated forms of documentation can also be daunting, especially when people working on implementation do not have the right experience and skills. Depending on the size of the companies implementing the system, then the multiplicity of processes - *and therefore documentation* - is a legitimate factor causing employee reluctance, but a properly constructed system and the choice of the necessary documentation should not hinder the work of the employees; the definite benefit of the introduction of the ISO standard of the 9000 family promotes minimisation of the number of documents, with the ISO helping to organise and streamline the circulation of documentation in the enterprise.

Implementation and certification costs are a point to pay attention to, when planning to implement a system. Large companies have high implementation costs associated with consultancy fees, the purchase of measurement and control equipment and research, along with certification and employee training. Investment in employee training will be as cost-effective as possible in the future; since a well-trained employee knows full well what benefits the system can bring to the company, the employees who create the system have more confidence to convince others of the merits of change. Therefore, spending on training as a forward-looking investment will quickly bring tangible returns to the company and influence its correct implementation, since mistakes made during the construction of the system will have a significant impact on the operation of the activities implemented in the future (here: simulation methods might be used as well, as in Kostrzewski 2020). Mis-interpreted requirements result in the development of inappropriate and unsatisfactory documentation for the company. In addition, documentation, inconsistent with current processes, causes even greater resistance from employees. Mistakes made at the beginning are difficult to correct in the future.

Assessment of the benefits of implementing the system

An effective Quality Management System is one that produces measurable effects of the changes made, thereby increasing the value of the organisation. The quality management system requires a huge amount of work from the company in all areas of the organisation. It was time-consuming and labour-intensive not only to create a process approach to actions but also to reduce losses, as only planned and systematic actions throughout the organisation are effective. ISO 9001-2015 is a tool designed to improve work organisation, optimise processes and minimise losses. The correct functioning of the standard requires a process approach, qualitative objectives and continuous improvement. Only consistent and systematic actions by the entire team can achieve goals effectively and minimise losses.

A correctly implemented system positively influences how the company is perceived externally, how it adapts to the requirements and expectations of customers. When dealing with new contractors, the system is a convincing element, increasing the prestige of the company and competitiveness in the market; whether or not a company has an ISO system in place, too, is an increasingly common requirement in various tenders.

The standard, implemented through its provisions, requires systematic work to best meet the customer's requirements. This is influenced by the principle of customer orientation and the ordering of customer processes; the management of complaints and the supervision of the progress and history of complaints have become easier; this is the basis for assessing suppliers and enforcing reimbursement of costs incurred in the use of non-compliant materials. The ISO standard and the established quality objectives allow activities, important to the company, to be coherently implemented. The monitoring and measurement of products, as well as the supervision of the control equipment, as required by the standard, have a positive effect on increasing the quality of the products produced and reducing the costs associated with "poor" quality. The creation of the required procedure for dealing with non-compliant devices and monitoring and measuring of the effects in the process approach, leads to improved quality, along with reductions in losses and efficiency

The ISO standard is a tool that directly affects performance, it does not have such an issue in its requirements, but, because it prompts the ordering of the processes and activities undertaken in the company, it makes productivity more efficient. The standard refers to the necessary planning in producing the products, in order to meet the required deadlines without excessive stock in post-production. Monitoring production and eliminating losses not only of material but also of time, eliminating unnecessary movements also leads to *time gained* and increased productivity. Streamlining internal communication, proper reporting and requiring documentation in line with current processes provide huge benefits for the company, increasing efficiency along the way. Standardisation of processes is the starting point for further actions and the implementation of an IT system makes it much easier to control documentation. The cost principle of "poor" quality 1x10x100 with costs incurred at the design, production and customer stages, is reflected in ISO 9001. The standard systemises design and development elements to eliminate waste, which is a tangible benefit for the company. The ISO standard requires constant internal audits, which is a huge benefit because the periodic review of procedures and processes keeps processes and the documentation up to date with each other. The standard encourages the collection and analysis of data affecting the quality of products and services.

Due to the nature of the operation of the company under investigation, i.e. the production of products for the OEM sector, the quality requirements of one of the main customers created the need to implement the QMS. The primary objective of the implementation of the quality management system was to ensure the fulfilment of customer requirements and expectations and to continuously improve the ability to meet its needs. It has also become an additional objective to determine the way in which products (*printer cartridges*) are made, in order to ensure their high quality, safe processing and reprocessing with the assumed economic efficiency. Achievement of the objective is

accomplished by monitoring all work related to the course of the production process, monitoring the non-compliant product, i.e. one that has deficiencies and defects, analysing the amount of waste that arises in the production process, *that is, the number of cartridge casings misidentified by the assembly station operator.*

The implementation of the quality management system obliged the company, in accordance with EN ISO 9001:2015, to prioritise continuous improvement as one of the requirements of the standard. It involves constantly increasing the efficiency of processes in the organisation and system, in order to better meet the customer's expectations (Jazdon 2001Babica 2006, Hamrol 2015). Internal audits, reviews by management, as well as procedures for corrective and preventive action processes, are used to improve the processes of the audited entity and the tasks of the quality system. These actions are usually undertaken by interdisciplinary task forces to address the causes of non-compliance and potential non-compliance. The standard tool in this entity, to eliminate non-compliance, is the 8D report model. The use of the 8D reporting method facilitates identification of the cause of non-compliance and provides an indication of how the problem has been solved, as well as the possibility of verifying the actions carried out. 8D problem analysis was undertaken at the request of the main customer. In the first stage (1D), a task force was formed consisting of several individuals who were responsible for the implementation of the individual stages of the 8D programme. The size and composition of the group depended on the nature of the problem and the decisions taken, and consisted of employees of various departments: Process engineer, Operations manager, Quality manager, Quality Engineer. The leader was selected from the group to oversee the 8D programme with the authority to implement an appropriate solution to the problem. The next step was to describe the problem as accurately as possible (2D). In order to properly describe the problem, which is the starting point for the next step, the task force focussed its attention on a precise description of the phenomenon, where the problem was detected, as well as the determining of the scale of the problem. The problem, detected six months later, was found to be incorrect label graphics. The scale of the problem was estimated at 3,600 items, labelled in an incompliant manner. In the third stage (3D), immediate action was ordered to prevent an escalation of the problem by stopping production, by stopping shipping also and by segregating products into those products labelled with proper graphics and those products labelled in an incompliant manner. In addition, visual control was implemented at stations for packaging the finished product. The customer was informed of the problem in order to verify the product. Step four (4D) began to identify the actual root cause of the problem using the 5 - WHY methodology. It was determined that the cause lies both with the supplier and the customer. The corrective action (5D) was subsequently determined, namely the department responsible for making labels available, on behalf of the client, implemented *"first off"* control for printed labels and created a book containing golden samples. After one month, the corrective action was reviewed (6D). An inspection of the printing of the first label found no incompatibility. As a result, changes were made to the Quality Management System by defining preventive measures (7d) to ensure that the problem did not occur in the future. To this end, a process of improvement was developed, based on systemic improvements, namely, the permanent addition of the visual control element of the print and instruction at the work position. The final element is the evaluation and closure of the 8D report. The scale of the problem (described in 2D) was assessed with the results obtained during the checks of production lots (6D – 7d). A baseline positive assessment of the measures used was obtained.

The ISO Standard sets minimum requirements for the standardisation of an organisation's process. The preparation of the quality management system gives a positive effect in standardising and controlling the circulation of documents in the organisation. The audited undertaking should endeavour to pay attention to the quality level of its performance, which should go well beyond the requirements of EN 9001:2008, in the achievement of each objective in the unit and should also use other quality management techniques and tools, such as lean management. Employees of an entity, thus analysed, slowly become aware of the need to mentally go beyond the boundaries of hierarchy and functions in order to meet the expectations and requirements of the client. The terms of reference and responsibilities begin to be structured and clear. Attention is also gradually beginning to be paid to the employment of people with the appropriate skills required, in order to carry out specific actions. All of this demonstrates a company's maturity of process.

Summary and Conclusions

An analysis of the implementation of QMS in the selected entity showed that the process was successful. The implementation of EN ISO 9001:2015 had an impact on the systematisation of the situation in the company. All documentation has been standardised in procedures such as the handling of non-compliant devices, corrective, preventive and other actions, by which the work of persons of different departments know the procedure at the time of a defect or complaint. The work of the operators on the lines was described by process; responsibilities were assigned; work instructions were created. By separating and describing individual sub-processes, it has become easier to improve and eliminate losses. As one of the first branches of the company to implement the lean philosophy and work on Kaizen's continuous improvement programme, entity X became a leader in harnessing employee potential

and eliminating waste. Reducing unnecessary movement, material losses and properly evening out the line, by eliminating bottlenecks meant that one station was completely eliminated within a year of the start of production and the time cycle was reduced from 30 to 25 seconds per station, increasing the line's capacity to 150 units in a single production day. The requirement of the standard to collect and analyse qualitative data has made it possible to reduce the number of complaints and to analyse actions, in order to increase detection and minimise the possibility of error. Therefore, it is safe to say that the use of SJ tools and methodology, together with lean tools, facilitates a shorter production time and a higher level of quality at a lower operating cost, compared to the traditional production system.

Problems were also encountered during the implementation of the Quality Management System in the entity under investigation. The employees' fear, both of change and excessive red tape, proved to be the main reason for the slowdown in implementing the Quality Management System. Another factor affecting product quality and the level of losses incurred was the *one-piece flow* principle, socket production, while the buffers created between stations effectively **hid** equipment problems, the supply of parts and quality issues **from operators and from their** supervisors. The elimination of buffers between stations and the excess inventory of components quickly reveals real production problems that result in a failure to execute the daily schedule, which is the main task of the production department. Creating buffers also increases the cost of poor quality, as defects are only detected after a certain amount of time. The work incorporates elements of the Japanese philosophy pioneered by Toyota lean management. Lean ideology or lean management, through its tools, produces remarkable results in reducing production costs, improving ergonomics and increasing productivity. The main lean idea is to eliminate waste. Individual problems are solved according to W. Deming's concept of continuous improvement (Nawrocki et al. 2018). Kaizen Yellow and Green Belt projects are continuously implemented in the company; these significantly improve organisational efficiency and customer confidence.

The material gathered in the work confirms the validity of implementing the quality management system, with elements of lean ideology in production companies.

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Restructuring Proceedings - New Regulations in the Polish Economy

Andrzej TOKARSKI
WSB University in Torun, Poland
andrzej.tokarski@wsb.torun.pl

Abstract

The problem of the accuracy of choice between the liquidation of an enterprise and its restructuring is one of the main topics of interest for practitioners and theorists dealing with the bankruptcy of enterprises. The decision to restructure constitutes an alternative to declaring an enterprise bankrupt.
The article presents kinds of restructuring proceedings taking into account their characteristics, advantages and disadvantages, benefits and threats resulting from the multitude of restructuring proceedings including.

Keywords: Restructuring Proceedings, Restructuring Of Enterprises, Second Chance Policy, Restructuring Law

Introduction

The new Restructuring Law is an implementation of the European principle of „the second chance" for entrepreneurs in Poland. It alters the philosophy of the approach to restructuring of companies. The purpose of such proceedings, apart from satisfying creditors, is mostly to suport restructuring activities and to leave these entities in business ((Tokarski, 2018).

The new regulations are to implement the state economic strategy aimed at protecting businesses, workplaces, intellectual capital and *know-how*. (DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, 2016).

In accordance with the principle of survival formulated by H.I. Ansoff: *if any organisation faces the prospect of liquidation, it focuses all its energy on finding the way to survive*. Here, the objectives of the government and entrepreneurs become convergent, but a so-called survival capital is necessary. Naturally, the companies with a staged crisis or bankruptcy should (Masiukiewicz,2018) .
The decision to restructure a business entity constitutes an alternative to filing for its bankruptcy. *Reccomendations*, 2012).

This decision must be a thoughtful one because it creates an opportunity for entrepreneurs to continue their business activities without detrimental effects to creditors. Most of the creditors, mainly suppliers or employees, are not interested in the liquidation of the business unit (Banasik P., Morawska s., 2016).

In recent years, the approach to doing business has also changed. The general public understood that financial problems of entrepreneurs do not always the result from the bad will of managers. Many of them should be granted a second chance with the support of the legal system of the country. This help should be well thought out and supported with methods that will allow you to assess whether the decision related to restructuring has been right.

The aim of the article is to present types of restructuring proceedings taking into account their characteristics, classification, advantages and disadvantages, benefits and threats resulting from the multitude of restructuring proceedings including.

The descriptive analysis, the analysis of legal provisions and statistics on the functioning of the bankruptcy of enterprises as well as the implementation of the provisions of the restructuring law or the remedial restructuring in Poland and the analysis of literature on the subject were adopted in the article as the principal methods.

The solutions adopted by the legislator should therefore combine a particular individual element (the interest of the debtor and its creditors) with the interest of the society which should be understood as the safety of all market participants, including consumers, and thus affecting the wider the general public.

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The state plays a particular role as it is responsible for shaping the legal environment for bankruptcy, which influences, inter alia, the possible scenarios of bankruptcy proceedings or the balance between the powers of debtors and creditors.

The decision to restructure a business entity constitutes an alternative to filing for its bankruptcy. This decision must be a thoughtful one because it creates an opportunity for entrepreneurs to continue their business activities without detrimental effects to creditors (Csikosova, Culkova, Antosova, 2016; Altman, Hotchkiss 2007).

In recent years, the approach to doing business has also changed. The general public understood that financial problems of entrepreneurs do not always the result from the bad will of managers. Many of them should be granted a second chance with the support of the legal system of the country (Tokarski, A, Tokarski, M, 2018).

The main aim of the article is to make an assessment and to show the directions of counteracting the bankruptcy of enterprises in the Polish economy with respect to the implementation of the restructuring law (remedial restructuring) in the years 2016-2018.

The descriptive analysis, the analysis of legal provisions and statistics on the functioning of the bankruptcy of enterprises as well as the implementation of the provisions of the restructuring law or the remedial restructuring in Poland and the analysis of literature on the subject were adopted in the article as the principal methods.

The Concept and Types of Restructuring Proceedings in the Polish Economy – an Analysis of Restructuring Law Regulations

Restructuring proceedings are organised by means of legal and procedural relations activities of judicial and non-judicial authorities restructuring proceedings involving concerned entities, aiming at the protection of social and individual interests expressed in striving to avoid declaring bankruptcy of the debtor through enabling them restructuring by means of an arrangement entered into with creditors, and in the case of sanative procedure also by conducting sanative actions aiming at restoring the debtor's abilities to perform obligations while safeguarding the legitimate rights of creditors through using in factual circumstances relevant provisions of law ((Zimmerman P., Filipiak P., 2018).

Restructuring proceedings by definition are of collective nature (STATEMENT OF REASONS, 2014, p.1). Its participants according to Article 65 paragraph 1 of the RL are: (LAW)
1)the debtor;
2) the debtor's personal creditor who is entitled to undisputed debt;
3) the debtor's personal creditor who is entitled to disputed debt and who rendered their debt credible and was admitted to take part in the case by a judge-commissioner.
Restructuring proceedings are conducted in relation to a company which is insolvent or threatened with insolvency (*Upadłości, 2017)*.

The subject of the proceedings is "a restructuring case" (see Article 15 paragraph 1 of the RL and Article 342 paragraph 1 of the RL). "A restructuring case" means a civil matter the subject of which is a comprehensive solution to the conflict of interests between the debtor and creditors and between creditors themselves in connection with debtor's insolvency or a risk of insolvency in a way adopted by the debtor and a specified majority of creditors.

Restructuring proceedings consist of an organised sequence of activities. They are addressed to companies which are insolvent or threated with bankruptcy. The Treasury, self-government units, state-owned banks, insurance companies, reinsurance offices and investment funds are exempted from the possibility of using restructuring proceedings (Antonowicz A.., Antonowicz P., Próchniak J.. 2018),

The aim of restructuring proceedings is to avoid debtor's bankruptcy by enabling them to restructure by means of entering into arrangement with creditors, and in the case of a sanative procedure also by conducting sanative activities while safeguarding the legitimate rights of creditors (Antoniewicz P., Banasik P., Chrusciak M., Morawska S., Prusak B., 2018).

Public perception of a particular legal regulation and proceedings of restructuring is of crucial importance for conducting successful restructuring of an enterprise. Practice shows that declaring debtor's bankruptcy itself repeatedly excludes any possibility of conducting a successful restructuring, whether it is bankruptcy with the possibility of concluding an arrangement or liquidation bankruptcy. Associating bankruptcy with ending business activity, insolvency and not being able to recover debts is so strong that in many cases creditors do not want to

negotiate with the debtor. For those reasons, the draft assumes separating restructuring proceedings from stigmatising bankruptcy proceedings. For clear and transparent separation, restructuring proceedings are regulated by a separate law – Restructuring Law.

As the new restructuring proceedings we include:((The law, 2011)
a) arrangement approval proceedings
b) accelerated arrangement proceedings,
c) arrangement proceedings,
d) sanative proceedings.

Restructuring proceedings differ in terms of the degree of involvement of a bankruptcy court in the course of individual proceedings and of interference in a debtor's assets matters. Basically, all of them relate to a debtor's liabilities being restructured (Tokarski A., Tokarski M., 2020).

Additionally, the fifth procedure can be distinguished, which is particular and different form the others, so called partial arrangement addressed only to selected creditors of a debtor, entered into in restructuring proceedings conducted according to general procedures in forecasts (it can be entered into as an element of a bigger arrangement, alongside it, like and as a separated arrangement, if it is enough for repairing a debtor's situation) (Tokarski, A., Tokarski, M,.2019).

A common characteristic of those procedures will be restructuring of the debtor's company – firstly, of their liabilities and also, to a varying degree, of their assets, the way of business management and employment (FAMIELEC, KOŻUCH, 2018). Prescribed procedures are supposed to ensure that the form of restructuring will be selected to meet the needs of a specific enterprise in a specific financial situation. In all restructuring proceedings identical regulations will be applied concerning the scope of debt covered by the arrangement, arrangement suggestions, entering into and approval of the arrangement and its consequences and also the rules of its changing and cancelling.

Table 1. Restructuring proceedings set out in the Restructuring Law

Type of proceedings	Main assumptions
Arrangement approval proceedings	– independent collection of creditors' votes by the debtor without the participation of the court, – active negotiations with creditors and presenting their results to the court, – the debtor independently selects a licensed advisor who verifies arrangement suggestions in legal and formal terms
Accelerated arrangement proceedings	– drawing up a list of receivables by the debtor, – convening the assembly of creditors by the court, – approval of debt under a simplified procedure, – suspension of the execution against debts subject to an arrangement (security on the debtor's property)
Arrangement proceedings	– drawing up a list of claims by the debtor, – convening the assembly of creditors by court, – approval of debt under a simplified procedure, – leaving control over the property to the debtor, – liabilities towards ZUS covered by an arrangement
Sanative proceedings	– the debtor or a creditor, and in specific cases an administrator, submits a request for the opening of sanative proceedings, – liabilities, assets and employment are subject to restructuring, – a judge commissioner manages and supervises proceedings, – the debtor's assets are secured by appointing a temporary court administrator (limitations in managing assets) or sanative assets administrator (the debtor loses the right to manage assets), – the court administrator or sanative assets administrator draws up a sanative plan together with the debtor, – authorisations granted by the debtor expire and execution against assets included into the sanative assets is suspended, – ban on encumbering assets in order to secure liabilities incurred before the opening of proceedings, – legal and administrative proceedings conducted only by the administrator, – ban on terminating renting, leasing, insurance, loan etc. contacts with the debtor.

Źródło: Famielec J., Kożuch M., Restrukturyzacja sektorów gospodarki i przedsiębiorstw wybrane zagadnienia (Restructuring of Sectors of Economy and Enterprises, Selected Issues), UE Kraków, Kraków 2018, p. 190;

Table 2. Advantages and disadvantages of restructuring proceedings from the debtor's and creditor's perspective

ARRANGEMENT APPROVAL PROCEEDINGS	
Advantages	**Disadvantages**
• the possibility of an independent collection of creditors' votes by the debtor without the participation of the court. The debtor presents creditors with voting cards with the methods of debt restructuring (arrangement suggestions). The votes are collected in the written form without the necessary participation of a notary public, • the debtor remains entitled to manage their assets and conduct the management's activities, including those of ordinary management, • proceedings are confidential at the pre-court stage, and the court stage is very short. Proceedings allow minimalizing a negative market message connected with a financial crisis, • proceedings give the opportunity to negotiate individually without the rigors of court proceedings and without security of the debtor's property • the proceedings administrator becomes the implementation of the arrangement administrator after its legal approval • proceedings is ideal for entering into a partial arrangement, with financial creditors in particular.	• the main disadvantage is the lack of protection of the debtor's assets from debt recovery. In the arrangement approval proceedings regulations on security re not used, therefore, an execution cannot be suspended, or seizure of bank accounts cannot be cancelled. It means that until the arrangement is approved, a creditor can collect receivables without limitations. Only after the arrangement is approved are execution proceedings suspended and is initiating an execution unacceptable. • creditors can also terminate contracts including financing agreements and renting or lease agreements during the proceedings, • additionally, selecting the arrangement administrator and establishing the arrangement day have no influence on the exemption of the debtor's board (of a member of the board) from liability for damages. Execution of bankruptcy application submitted by creditors is not stopped either. • lack of trust between creditors and the administrator selected by the debtor is also observed – the administrator is often seen as the debtor's proxy pursuing their interest, • time is a kind of limitation in these proceedings because the debtor has only three months from a fixed arrangement day for collecting votes and preparing with the administrator an application to court for approving the arrangement. If the liabilities structure is distributed, the time can be too short to obtain votes. • the capital majority required for approving the arrangement amounts to 2/3 of creditors entitled to vote the arrangement – in other restructuring proceedings this majority is calculated by reference to the sum of voting creditors. Therefore, the arrangement can be rejected when over 1/3 of creditors will be passive or will vote against. It is negative for active creditors that have reached a agreement with the debtor. • creditors do not possess means of appeal I the scope of the list of receivables, which does not constitute an enforcement order either. They can only submit a written reservation with respect to the compliance with law of the independent process of collecting votes or indicating other circumstances which may have an impact on the approval of the arrangement.
ACCELERATED ARRANGEMENT PROCEEDINGS	
Advantages	**Disadvantages**

• as early as on the day of the proceedings opening the debtor obtains assets protection in the form of the suspension of execution proceedings concerning liabilities covered by the arrangement by law, and their initiating after the opening of the proceedings is unacceptable; • execution proceedings concerning liabilities not covered by the arrangement by law can be suspended for three months, and a creditor secured by collateral by the debtor's assets can after that period conduct an execution against security (collateral) exclusively. • a short period of the proceedings prevents stigmatising the debtor in connection with conducting business with the existing company with the label "in restructuring"; • the administrator can give an agreement to conduct activities beyond the scope of ordinary management ex post, which eliminates the risk of decision-making blockage in current activities and of payment delays for contractors; • creditors obtain the decision on accepting and approving the arrangement much faster, therefore, they can benefit from the arrangement or resume suspended execution proceedings much faster.	• pressure resulting from short duration of the proceedings – restructuring unclear for contractors and employees accompanied by the fear with respect to their own situation can result in their moving away from the debtor when their need to obtain beneficial and reliable financial results inspiring creditors' confidence in the arrangement is the greatest. • lack of the debtor's protection when the period of suspended execution proceedings is over – creditors secured by the debtor's assets can conduct an execution against security (collateral), which is necessary for the debtor for conducting activities; • eliminating the institution of an objection to including a liability in the list of liabilities, because of which creditors cannot question its amount or omission; • too long period of "suspension" between a non-final decision to close unsuccessful restructuring proceedings and a declaration of bankruptcy.
ARRANGEMENT PROCEEDINGS	
Advantages	**Disadvantages**
• the fact that the management of a company should stay in the debtor's hands and only in an exceptional situation the court gives it to the administrator is an unquestionable benefit for the debtor, • the moment the arrangement proceedings are open, executing proceedings concerning receivables covered by the arrangement are suspended. New executions cannot be initiated. It is undoubtedly a beneficial regulation, because it allows the debtors to conduct uninterrupted negotiations with creditors aiming at negotiating an optimal method of debt restructuring, • creditors have a real influence on the proceedings under the board of creditors, which can be appointed by the judge-commissioner both ex offcio and when requested by the debtor or at least three creditors or a creditor or creditors having al least one fifth of the sum of receivables in total. The board is supposed to among others controlling the activities of the court administrator and giving consent to conducting activities which can be conducted only when allowed by the board of creditors. The board of creditors also provides opinions when requested by the judge-commissioner, court administrator or the debtor.	• arrangement proceedings are not initiated towards debtors as often as accelerated arrangement proceedings and sanative proceedings. Most likely it results from the fact that the provisions concerning these proceedings do not predict benefits which debtors are offered by other proceedings, • arrangement proceedings cannot be conducted as fas as (as assumed) accelerated arrangement proceedings, neither do they ensure such possibilities of such deep restructuring as sanative proceedings (e.g. withdrawal from unfavourable contracts or making employees redundant).
SANATIVE PROCEEDINGS	
Advantages	**Disadvantages**
• inadmissibility of obtaining execution against the debtor's assets included into sanative assets, also execution of receivables not covered by the arrangement – including those incurred after opening sanative proceedings and secured by collateral; • the possibility of withdrawing from contracts unfavourable for the debtor regardless of the mode specified by them to terminate a given contract earlier, • the possibility of terminating employment contracts	• inadmissibility of execution causes concerns relating to cooperation with the debtor and forces solutions such as a demand of early payments, which hinders business and maintaining liquidity; • loss of full control over an enterprise by limiting or taking away management form the debtor; • real inability to obtain new financing in the banking sector.

without personal situation limitations, which enables rationalisation of the employment structure and retaining staff necessary for conducting activity of an enterprise (e.g. admissibility of termination of contacts of employees using pre-retirement protection); • the possibility of declaration of no effect of legal actions undertaken by the debtor within one year before submitting a sanative application, e.g. establishing securities on their assets despite the lack of direct connection with the debtor obtaining a benefit, thanks to which the assets of a sanated entrepreneur is released from economically irrational securities; • the possibility of introducing so called "over-collateralisation", i.e. a situation of posting collateral higher than 150% of receivables on the sanative assets at the moment of providing collateral, which allows rebalancing for individual creditors; • the possibility of selling the debtor's assets with executive effect, i.e. without encumbrances, which facilitates selling redundant assets.	

Źródło: Zimmerman P. Filipiak P., Restrukturyzacja w Polsce w latach 2016-2017 (Restructuring in Poland in the Years 2016-2017), SPOTDATA, Warszawa 2018, p. 23-31.

Division Criteria and Characteristics of Restructuring Proceeding Classification in the Polish Economy

A. Hrycaj distinguishes the following division criteria of restructuring proceedings in the Polish economy (HRYCAJ 2015, pp 7-9):

- division from the point of view of the level of involvement of bodies of the court,
- division according to the subjective criterion
- division according to the scope of the debtor's protection
- division with reference to the debtor's limitations in assets management

From the point of view of the level of involvement of bodies of the court in the proceedings, there are proceedings conducted on the basis of court decision to open proceedings and under the supervision of a judge-commissioner (accelerated arrangement proceedings, arrangement proceedings and sanative proceedings) and proceedings the main part of which is of out-of-court character – arrangement approval proceedings. However, arrangement approval proceedings cannot be classified as clearly and entirely out-of-court proceedings. It results from the fact that in these proceedings the role of the court is not limited only to examining the procedure of collecting votes and the content of the arrangement, but it is much more complex. From the moment of submitting an application for the approval of the arrangement, the proceedings is of court character. The submission of an application itself implies the necessity to initiate a number of activities by the court. In particular, according to Article 222 paragraph 1 of the RL, the court immediately informs using means of long distance communication, particularly by phone, fax or electronic mail, the founding body or the competent minister in charge of the State Treasury, who can submit an opinion to the court, about the submission of an application for the approval of the arrangement which concerns a government-owned corporation or a company wholly owned by the State Treasury. The lack of an opinion does not suspend the examination of the case. Moreover, the fact of submitting an application is announced (Article 222 paragraph 3 of the RL). According to Article 224 paragraph 1 of the RL, from the day of issuing a decision as to the approval of the arrangement to the day of its validation, the arrangement administrator exercises the powers of the court administrator. At this stage of the proceedings, until the day of the validation of the decision as to the approval of the arrangement the provisions of Article 259 of the RL and Article 260 of the RL are used. Consequently, it must be stated that arrangement approval proceedings is divided into two stages. The first stage has the character of civil proceedings. It starts with a conclusion of an agreement with a person holding a licence of a restructuring advisor for playing the role of the arrangement advisor, and it ends with a successful submission of an application for the approval of the arrangement to the restructuring court. The second stage has the nature of court restructuring proceedings and it starts with a submission of an application for the approval of the arrangement, and it ends with the validation of the decision as to the approval of the arrangement or of the decision to reject the application or to discontinue proceedings.

From the point of view of the subjective scope, there are proceedings that can be conducted by the debtor in relation to whom the sum of the disputed debt entitling to voting the arrangement does not exceed 15% of the sum of debt entitling to voting the arrangement (arrangement approval proceedings, accelerated arrangement proceedings), and proceedings that can be conducted by the debtor in relation to whom the sum of the disputed debt entitling to voting the arrangement exceeds 15% of the sum of debt entitling to voting the arrangement (arrangement proceedings, sanative proceedings). Establishing the upper limit of 15% results from the necessity to ensure that in every situation the decision concerning entering into an arrangement can be taken by the required majority of creditors. In the situation when for entering into an arrangement it is crucial to obtain acceptance of creditors holding at least 2/3 of the sum of receivables owed to the voting creditors (Article 119 paragraph 1 of the RL), even omission of all creditors with disputed debts (maximum 15%) means that the decision can ba taken by creditors with at least 50% of the sum of receivables owed to the voting creditors. In the proceedings belonging to the first group, a simplified procedure of creating a list of receivables is provided.

Using the scope of specified in the law measures designed to restructuring of the debtor's company as a division criterion, there are proceedings in which the scope of the debtor's protection is small (arrangement approval proceedings), proceedings in which the scope of the debtor's protection amounts to the protection against execution proceedings conducted by creditors (accelerated arrangement proceedings and arrangement proceedings), and proceedings which enables initiating activities allowing deep and multidimensional restructuring of the debtor's enterprise (sanative proceedings).

Taking into account the division criterion of restructuring proceedings on grounds of the debtor's limitations in assets management, there are proceedings in which the debtor is not at all limited in assets management (arrangement approval proceedings), proceedings in which the debtor is limited in assets management by the necessity to obtain the court administrator's agreement to conduct activities beyond the scope of ordinary management (accelerated arrangement proceedings, arrangement proceedings), and proceedings in which the debtor has no right to manage assets (sanative proceedings).

Conclusion

The approach of the European Commission to insolvency issues can be considered revolutionary, as the legal bankruptcy is to be the last resort, if the ways of helping an entrepreneur are exhausted (Palmer, Rapisardi, 2009). Even despite insolvency, an entrepreneur should – with the support of various institutions – have a second chance to conduct its business activity again (European Commission Communication, 2008).

Polish companies have new possibilities of implementation of recovery restructuring processes and should use them in the interest of the entire economy (Krajewski J., Tokarski A., Tokarski M., 2020).
The priority now and in the future is the recovery and not insolvency of a company (Tokarski, A., Tokarski, M, 2019).

Moving from the liquidation to restructuring model of bankruptcy requires changes adopted by lawyers, economists, managers, business representatives and represetatives of the State because they create a group of interest whose main objective in this case is to conduct skilfully a bankruptcy process which leads to paying liabilities to creditors with simultaneous preserving a good economic and financial situation of an enterprise. Only meeting these conditions a restructuring agent becomes a real guide in a difficult reorganisation process, who creates new patterns of effective behaviours in favour of both a bankrupt enterprise and its creditors (Tokarski, A., Tokarski, M, 2019a).

In the opinion of the Ministry of Economy, in accordance with the assumptions of the New Chance Policy more emphasis should be placed on popularising the process of corporate reorganisation (Polityka, 2015). It implies the necessity to decide on inititating a recovery proceedings first, then an arrangement procedure and only in the case of the lack of reasons for starting restructuring – liquidation proceedings. One of the main objcetives of proceedings should be continuing activity of functioning economic entities in all those cases where it is consistent with rational management. It gives the chance to maintain jobs among others. The guideline for keeping those enetrprises (or their organised parts) which have made efforts to restructure and adjust to the changed economic environment in business should result directly from the amended legal regulations.

The role of the State should be to minimise negative effects of a crisis situation in an enterprise, and the objective of the New Chance Policy is not to prevent bankruptcy at any cost, but, when activity must be terminated due to financial difficulties, to conduct the process quickly and inexpensively.

The new Restructuring Law has changed the perspective of the restructuring and bankruptcy process in Poland (Tokarski, 2018). Emphasis has been placed on enabling a debtor to reach an agreement with creditors and save a company and not to liquidate it. In the place of one arrangement bankruptcy (which worked under the previous regulations in 1% of the cases) and one recovery proceedings (which did not work at all) as many as four restructuring procedures were introduced, with each one for a different situation.

For the first time in the history of Polish bankruptcy law, creditors hold the strongest position. Earlier creditors' interest was protected on paper only and decisions allegedly protecting their interests were taken without consulting creditors themselves.

Currently, Restructuring Law limits the role of court to controlling formal correctness and creditors are given a voice. It is by all means right, because it is their money and they have the right to make a debtor (as well as a liquidator in bankruptcy proceedings) accountable for the effectiveness of activity and care for creditors' interest. Such an approach to the problem results in creditors more often agreeing to restructuring and participating in the process referring to a simple economic calculation. It is for them simply more profitable than bankruptcy. At the same time jobs, taxpayers and GDP generators are saved. Creditors can raise a future service client or deliverer.

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An Empirical Study on Factors influencing Apparel Brand Loyalty among Malaysian Women

Jayanty KUPPUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
jayanty.kuppusamy@mmu.edu.my

Ajitha ANGUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
ajitha.angusamy@mmu.edu.my

Kavitha BALAKRISHNAN
Faculty of Applied Communication, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
kavitha.balakrishnan@mmu.edu.my

Kai Ting TEO
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
1161200151@student.mmu.edu.my

Abstract

The apparel industry is a very competitive industry. In Malaysia, the apparel industry consists of players from both the international and local brand. Due to the high competition, it is critical to attract and retain loyal customers. One way is to create brand loyalty where the customers will not switch to a different brand easily. Therefore, the main purpose of this research is to study the factors influencing apparel brand loyalty. The target respondents are the Malaysia women. The factors studied included price, product quality, service quality, uncontrolled communication and store environment. The data was collected from 200 respondents through the survey method. The multiple regression analysis identified that all the factors studied contribute to brand loyalty. Therefore, the retailers need to ensure these factors are considered and matched with the customer expectations to create brand loyalty.

Key words: brand loyalty, product quality, service quality, store environment

Introduction

According to Euromonitor report (2019) the apparel industry is still growing. In Malaysia, the industry consists of both domestic and international brands competing among themselves. The global market for apparel in terms of revenue is projected to reach around USD 445.3 billion in 2020. The revenue shows an annual growth rate (CAGR 2020-2024) to be 9.9%. By 2024 the project market volume is expected to be USD649.6 billion (Statisca.com). In Malaysia, the apparel industry is forecasted to grow at a CAGR of 3.6% between 2019-2024 and expected to reach MYR48.8billion. Womenswear growth is projected at 3.9% and expected to reach MYR21.5 billion by 2024 (marketresearch.com). This shows that the apparel market globally and in Malaysia is on the growing trend.

With e-commerce on the rise, it is putting pressures on the physical stores. While the offline is still the main mode of shopping, the online purchase of apparels is expected to increase. Online retail shopping sites include Lazada, Zalora and Shopee while Padini Holdings is the leading store for women apparel. It has a variety of brands such as Padini, PDI, SEED, Brands Outlet and Padini Authentics.

A number of researchers has highlighted the importance of branding to businesses such as ability to establish strong ties with customers and generate loyalty towards the brand. In addition, brand enables businesses to achieve higher profitability, cost-effectiveness as well as sustainability for the business (Drennan et al., 2015; Pappu & Quester, 2016; Hegner, Fenko, & Teravest, 2017).

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Literature Review

American Marketing Association (AMA)'s 2017 report associated brand with the buyer's experience. Branding is done through a set of images or ideas and may include name, symbol, logo, slogan and even design. Kotler and Keller (2006) stated that when the brand's loyal customers percentage goes up, the market share increases and the profitability level of the brand becomes higher. Therefore, brand loyalty is the outcome of the consumer behaviour which is impacted by a person's preferences (Selvarajah, 2018). With brand loyalty, the consumers will keep purchasing their preferred brands since they like the brand and price do not impact their decision. They will also not buy substitute products. Similar definition was provided by Tweneboah-Koduah & Farley (2016) where brand loyalty holds commitment to repeatedly and consistently patronise a preferred brand in the future. According to Erdogmus and Ergun (2016) brand loyalty is a critical asset in apparel brands. This is because it provides continuity in consumer lifecycle and through that a positive advocacy for the business.

Alvarez et al. (2000) indicated that brand loyal consumers uses current market price as a comparative element for brands of a set choice. Price is referred to as the amount of money paid to get the product (Kotler & Armstrong, 2008). Devi and Setiawan (2018) found perceived price have a positive relationship with brand loyalty. Earlier studies supporting the influence of price on brand loyalty are Shih (2012), Beneke and Zimmerman (2014), Dewi and Anggraeni (2015), Tomida and Satrio (2016). They all found that the relationship is positive and significant.

Batra et al. (2012) pointed out that quality is an important factor in contributing towards brand loyalty. An earlier study by study by Cater & Cater, (2010) who tested the relationship between product quality and customer commitment as well on the combined effect on brand loyalty and found that there is both direct and indirect effect. This means product quality has both direct and indirect effect on brand loyalty. According to Khan et al. (2016)'s study of quick service restaurant a positive relationship was found between product quality and behavior base brand loyalty. Similarly Devi and Setiawan (2018)'s study on fashion products in Indonesia indicated that perceived quality have a significant positive relationship with brand loyalty. Saif et al. (2018) found that high perception on product quality influence strong brand associations with lead to brand loyalty.

According to Kuo et al. (2009) service quality has no direct effect on brand loyalty, nevertheless it does lead to brand loyalty as well as repeat purchases. This is through the moderating variables of customer satisfaction and enhanced perceived value. Their study was on mobile network loyalty. A later study by Alireza et al. (2011) in the Iran's telecom sector found service quality serves as the key factor of brand loyalty. Their study identified perceived value as the mediator between service quality, corporate image and satisfaction. Zehir et al. (2011) also found service quality leads to brand trust and brand loyalty in their study of automobile sector in Turkey. In other words, there is positive impact of service quality on brand loyalty through brand trust and positive brand image. Khan et al. (2016) found there is a positive relationship between service quality and behavior base brand loyalty in their study of quick service restaurant.

Uncontrolled communications are through modes such as word-of-mouth, non-paid publicity, or tertiary communication. It is found that uncontrolled communication influence customers' awareness and attachment towards the brand (O'Cass & Grace, 2004; Melewar et al., 2017). According to O'Cass and Grace (2004) customer believe on views through uncontrolled communication since the information is provided by other customers or other parties based on their expectation and post purchase experience of the brand. Yeap et al. (2018) in their study of Malaysian's millennials perception towards Japanese brand found there is a positive relationship between uncontrolled communication and brand loyalty. They pointed out that views from such mode are regarded more authenthic and trustworthy.

Store environment is the experience retailers provide for customers (Tong & Hawley, 2009). It is an important aspect in marketing and focus on the physical environment which includes music, lighting, layout of store and arrangement of the merchandise (Hu & Jasper 2006; Wang & Ha 2011). In creating a unique store environment, it provides a powerful tool for market differentiation (Wu et al., 2013). Store environment is found to influence customer loyalty by Ailawadi, Pauwels and Steenkamp (2008) and Hansen and Singh (2008). Fox et al. (2004) pointed out unique store experience is an essential added value in addition to other factors such as price, quality and product assortment. They found that these factors significantly influence store loyalty. A later study by Venter et al. (2016) in South Africa found store environment significantly influence brand loyalty. Based on the review of the literature, the research framework was developed and five hypotheses were formulated. There are presented as follows:

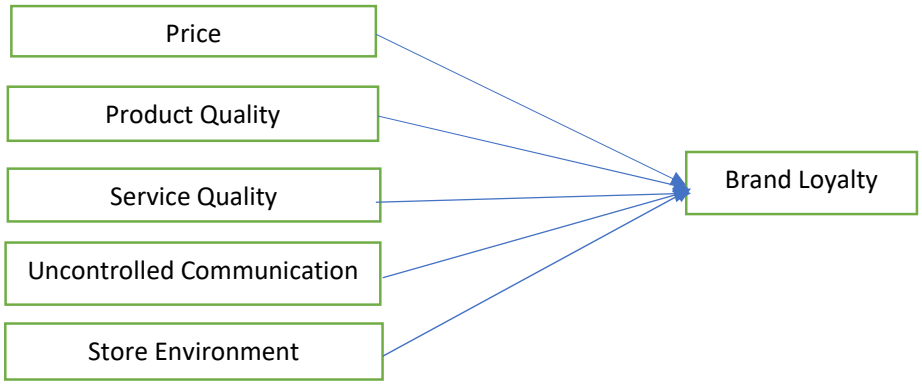

Figure 1: Research framework

H1: Price has a significant influence on apparel brand loyalty among Malaysian women.
H2: Product quality has a significant influence on apparel brand loyalty among Malaysian women.
H3: Service quality has a significant influence on apparel brand loyalty among Malaysian women.
H4: Uncontrolled communication has a significant influence on apparel brand loyalty among Malaysian women.
H5: Store environment has a significant influence on apparel brand loyalty among Malaysian women.

Methodology

The study applied the quantitative research method. Respondents consists of Malaysian women. In order to collect the data, questionnaire is used as a research instrument. The questions were selected from various researchers such as Dai and Chen (2017), Hyun-Joo et al. (2010), Su and Chang (2018), Yeap et al. (2018), Yee and Sidek (2008), Hamza (2011), Alice (2010) and Raj (2018). The scale used to measure the constructs is a 5-point Likert Scale. The sample size is 200 and purposive research sampling is used as the sampling method. The respondents are Malaysia women especially located in Melaka, Johor, and Kuala Lumpur. The data was collected through google form and also through personally administering to respondents. SPSS software version 26 was used to analyse the data collected. Among the tests applied to analyse the data include descriptive test, reliability test, and the multiple linear regression analysis.

Results and Discussion

Two hundred sets of questionnaires were collected and all the received questionnaires were acceptable and can be used for the study. Questions related to demographic characteristics include age group, race, spending range, occupation and source of brand. The highest percentage of respondents is from the 20-29 age group (36%), while the lowest was below 20 (13.5%). The rest is around 16-17% for other age groups. In terms of ethnicity majority is Chinese which around 76%. The respondents consist of manager/executive (8.5%), engineer/IT (10.5%), teacher/lecturer (9.0%), administrative assistant (17.5%), housewife (15%), students (31.5%) and others (8.0%).The average amount spent on product is below RM100 and this accounted for 60.5% of respondents. Around 25% respondents indicated they spend RM 100-200 on average. Majority of the respondents purchase both the international and local brand which is around 64%.

Table 1: Profile of respondents

Demographic Characteristics	N	%
Age		
Below 20	27	13.5
20-29	72	36.0
30-39	34	17.0
40-49	35	17.5
50 and above	32	16.0
Race		
Malay	18	9.0
Chinese	152	76.0
Indian	29	14.5

Others	1	0.5
Occupation		
Manager/Executive	17	8.5
Engineer/IT	21	10.5
Teacher/Lecturer	18	9.0
Administrative Assistant	35	17.5
Housewife	30	15.0
Student	63	31.5
Others	16	8.0
Amount Spent on Average		
Below $100	121	60.5
$101-$200	50	25.0
$200-$300	19	9.5
$300 and above	10	5.0
Source of Brand		
International	49	24.5
Local	23	11.5
Both	128	64.0

The respondents' brand preference is presented in Table 2. The highest is H & M (24%), followed by Padini (22.5%) and Uniqlo (22%) and Cotton-On (10%). The preference on the rest of various brands is found to be below 10%.

Table 2: Brand Preference

Brand Preference	Frequency	Percent
Uniqlo	44	22.0
H & M	48	24.0
Mango	6	3.0
Hush Puppies	7	3.5
Giordano	4	2.0
Cotton-On	20	10.0
Vior	7	3.5
Padini	45	22.5
YFS Concept Store	3	1.5
Others	16	8.0

Hypotheses testing is done using the multiple regression analysis and the result is presented in Table 3. The R Square value is 0.520, which mean that 52% of brand loyalty can be explained by the independent variables which include price, product quality, service quality, uncontrolled communication and store environment. The Anova result showed that the F value is 42.065 and the p-value is 0.000. This means there is a model fit. This result indicates all the independent variables predicts brand loyalty. The values as indicated are price (Beta = 0.140, p value = 0.049) , product quality (Beta = 0.225, p value = 0.001), service quality (Beta = 0.180, p value = 0.011) uncontrolled communication (Beta = 0.110, p value = 0.041) and store environment (Beta = 0.193, p value = 0.003). The p-values for all the variable are below 0.05. This means that all the hypothesis (H1, H2, H3, H4 and H5) are all accepted.

Table 3: Results of Multiple Regression Analysis

R = 0.721	**R square=0.52**	**Adjusted R Square= 0.508**	**F = 42.065**	**Sig value = 0.000**
Variables	B	t	Signficance	Results
Constant	.486	2.139	.034	
PR	.140	1.978	.049*	Supported
PQ	.225	3.354	.001*	Supported
SQ	.180	2.573	.011*	Supported
UC	.110	2.062	.041*	Supported
SE	.193	2.969	.003*	Supported

Dependent variable: Brand Loyalty

Price (Price), Product quality (PQ), Service quality (SQ), Uncontrolled communication (UC)
Store environment (SE).

Discussion and Conclusion

Brand loyalty is an important factor to be considered in the apparel industry. Due to the high competition business looks into ways to ensure there is brand loyalty among their customers. The purpose of the study is to identify the factors that influence apparel brand loyalty among Malaysians women. The factors studied include price, product quality, service quality, uncontrolled communication and store environment. It is found that all the factors influence apparel brand loyal. Price is found to influence brand loyalty. The result is similar with the study by Devi and Setiawan (2018) who indicated that price and brand loyalty have a positive relationship. Another factor critical to brand loyalty is product quality. The result of this study is supported by various studies such as Batra et al. (2012) and Saif et al. (2018) where product quality is essential to influence the brand loyalty of apparels. The current study found that service quality also influences brand loyalty. This finding is in line with previous study by Zehir et al. (2011) and Khan et al. (2016). Therefore, to ensure there is brand loyalty the service rendered must be of high quality. The uncontrolled communication which is among others from the mode of word of mouth is another factor found to be critical for brand loyalty. The result indicated that uncontrolled communication influences brand loyalty. This result is supported by previous studies such as Melewar et al. (2017) and Yeap et al. (2018) who all found that uncontrolled communication to be an essential influencer towards brand loyalty. The last factor studied is store environment which the study found to influence brand loyalty. This result is also similar to previous studies such as by Hansen and Singh (2008) and Venter et al. (2016). This means to increase brand loyalty, business need to put effort on their store environment in order to appeal to their customers.

The finding of this study contributes to the existing body and knowledge on factors influencing apparel brand loyalty especially from a Malaysia context. This study presents an insight regarding the determinants of brand loyalty of apparel among Malaysian women. Moreover, this study able to assist apparel industry in establishing strong relationship with Malaysian consumers. This can be done by focusing on the factors that are important to compete more effectively. Factors such as price, product quality, service quality, uncontrolled communication and store environment are essential towards building a stronger brand loyalty in apparels. Those in the industry need to utilise their resources in these areas. It also helps in reaching out customers through having a better understanding of the women consumers' need, intention and behaviour when they purchase the product.

There are a few limitations that have been identified in this study First, the sample size collected might not represent the overall population of the Malaysian women. This is because data was collected only in Melaka, Johor, and Kuala Lumpur. Next, the study focuses on five variables. Recommendations for future study are to consider a bigger sample size and other demographic characteristics in conducting the study. The respondent in this study consist of only Malaysian women. Future research can include the male respondents as well.

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An Empirical Study on the Determinants of Electronic Payment System

Ajitha ANGUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
ajitha.angusamy@mmu.edu.my

Jayanty KUPPUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
jayanty.kuppusamy@mmu.edu.my

Kavitha BALAKRISHNAN
Faculty of Applied Communication, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
kavitha.balakrishnan@mmu.edu.my

Adeline Chow Mei YIN
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
adelinechow2601@gmail.com

Abstract

The world is rapidly changing and becoming even advanced with the existence of technologies. One of the major changes is the evolvement of traditional payment methods to electronic payment systems (EPS). EPS, which was accepted globally when e-commerce was introduced, has provided many benefits to its users. Individual's life has been enhanced as EPS provides ease in payment and is less-time consuming. Irrespective of innovations in e-payment methods, studies reveal that e-payment usage rate is lower in developing countries. Among the existing literature, very few studies focus on the consumers' point of view. In this paper, a research model is proposed to examine the effect of transaction procedures, technical protection and usability of EPS on the perceived security and perceived trust of EPS, and also the effect of perceived security and perceived trust on the usage of EPS is studied. The model is evaluated empirically and the findings reveal that transaction procedures, technical protection and usability of EPS have a significant impact on the perceived security and perceived trust of EPS. Perceived security and perceived trust of EPS are found to be significant factors of EPS usage. The study is useful for companies and businesses that would like to enhance their payment system through electronic transactions. Findings suggest that managers should focus on providing the best in transaction procedures, technical protections and usability in order to enhance the perceived security and perceived trust EPS, which in turn will have a positive impact on the EPS usage.

Keywords: Perceived security, Perceived trust, Transaction, EPS, Usage.

Introduction

Electronic payment system (EPS) has improved the lives of individuals through ease of payment for online transactions. As the world develops further technologically, it can be perceived that many devices are used to process the payments electronically. The e-commerce world offers many advantages compared to conventional commerce like anonymity, swiftness, openness and global ease of access, simplifying life and enhancing individual's life quality (Lee, Yu & Ku, 2001). This has created a financial requirement which cannot be satisfied by traditional payment system and initiated an investigation on electronic payment system also known as EPS; a conventional payment system that applies digital currency technology (Sumanjeet, 2009). As a part of e-commerce transaction, e-payment comprises of electronic payment for buying and selling goods available on the internet (Tella & Abdulmumin, 2015). Different types of EPS

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are being developed to accommodate the growing e-commerce business so that consumers are able to complete their online transactions conveniently.

The development in the universal business atmosphere summons most of the organizations to change inevitably from the traditional money transactions to EPS (Kabir et al., 2015). EPS was created based on conventional cash-based and account-based payment model framework (Kim et al., 2010). EPS is generally understood as a platform where the payments are made for goods and services bought online using Internet (Roy & Sinha, 2014). EPS existence caused the world's payment system to be aligned with the latest trend of cashless deal among consumers, businesses and governments (Odi & Richard, 2013). This resulted in the world payment system to slowly change from traditional cash-based money to electronic forms that offer an even convenient, rapid and safe process to make payment between consumers and organizations (Premchand & Choudhry, 2015).

Usage of EPS in early economies is restricted, but literature revealed a few models and studies that explicate innovation acceptance linked with information and communication technologies (Eelu & Nakakawa, 2018). Even with the expansion of e-commerce, not all businesses and consumers immediately accept the idea of EPS. With e-commerce come e-payments. E-payments are done through the Internet without the use of paper instruments (Junadi, 2015). Though EPS are seen as a significant constituent in the achievement of e-commerce dealings, studies revealed that e-payments were not entirely successful in replacing conventional payment methods because of their weaknesses. Some of EPS flaws include security threats and complex infrastructure of physical receipts and lack of awareness. In turn to solve these obstacles, EPS designers have to be more detailed in including security features which can address consumers' perceived risk, security and trust. Usage of web assurance seals and websites usability should also be suitable for consumers' use.

Fatonah et al., (2018) reviewed the literature for e-payment system highlighting the need for more research to be carried out in enhancing customers' trust, interest and security in EPS. According to Fatonah et al., (2018), 46% of the empirical studies on EPS is done in Asia, 23% in Africa, 20% in Middle East, and the rest of the research conducted in Europe and America. Although majority of the research on EPS is conducted in Asia, very few studies has been done in Malaysia. Chavosh et al., (2011) carried out a study on the bank customers' satisfaction with the EPS, and a recent research by Intan et al., (2018) studied the adoption of EPS. Although several studies have been conducted on EPS, no research has been particularly conducted on the usage of EPS in Malaysia. Therefore, the current study focuses on the factors influencing the usage of EPS from the Malaysian consumers' perspective. The main objectives of the study are as follows:

1. To study the effect of transaction procedures, technical protections and usability on perceived security and perceived trust.
2. To study the effect of perceived security and perceived trust on EPS usage.

Literature

The emergence of Information and Communication Technology (ICT) has caused a dynamic change in the business's world environment, where business transactions are switching from cash-based transactions to electronic-based transactions (Al-Laham, Al-Tarawneh & Abdallat, 2009). EPS is a method for a consumer to make online payment for goods or services purchased without physical transfer of cash and cheques, regardless of time and location (Singh, Supriya & Joshna, 2016). Services offered by EPS appear as websites user-interface which entitle consumers to distantly control and handle their bank accounts and online transactions (Weir, Anderson & Jack, 2006; Lim, 2008). For businesses which are operating electronically, a crucial factor of accomplishment would be EPS. While comparing EPS and traditional payment methods, EPS techniques are more favourable as it is more secure, reliable, scalable, anonymous, acceptable, private, efficient and convenient (Linck et al., 2006; Cotteleer et al., 2007; Kousaridas et al., 2008). However, an EPS would only contribute to a business success if it is secure, an important requirement needed in the global e-commerce setting (Tsiakis & Sthephanides, 2005; Linck et al., 2006; Cotteleer et al., 2007). Based on previous studies, less human interaction and public relationships in EPS produce a security threat for EPS (Kim et al., 2010; Tsiakis & Sthephanides, 2005). Lack of privacy and trust are the two main causes for consumers' disinterest for engaging in e-commerce transactions (Van Dyke et al., 2007; Eastlick et al., 2006). In addition, other factors that could affect consumer's perceived security and trust were also analyzed to further understand the research phenomenon.

Security is considered among the most significant and well experimented fields of research in financial systems (Abrazhevich, 2004). One of the main concern of the EPS customers is the perceived security of EPS (Linck et al.2006; Kim et al. 2010) Security can be described as safeguarding the transaction details of consumers from interior and

exterior deceptions or illegal practices (Bindusara et al., 2009). Security is one of the highly considered reasons that affect EPS usage among consumers and has a significant relationship with EPS usage among consumers (Oney et al., 2017).

Trust is described as "desire, in the anticipation of advantageous results, to cause one to be susceptible to others based on assessment of resemblance of aims or principles" (Earle, 2009). Another definition of trust is the person's assurance that their belongings such as cash and private details would not be leaked and used against their personal interest (Bindusara et al., 2009). Consumers' professed trust of EPS is specified as consumer's personal view that e-payment transaction will be carried out according to their outlook (Tsiakis & Sthephanides, 2005; Mallat, 2007). According to Lim et al. (2007), superior intensity of consumers' assurance and faith in EPS is a major causal determinant for them to successfully adopt EPS in their online transactions. Trust has been recognized as a highly important factor affecting EPS usage among consumers, and consumers with a high level of trust would be willing to adopt EPS (Kim et al., 2010; Tsiakis & Sthephanides, 2005). Studies that revealed perceived trust has a significant impact on the EPS usage include by Bindusara (2009), Kim et al., (2010) and Oney et al., (2017).

Transaction procedures are a critical part of EPS that individuals have to be aware of for them to utilize EPS securely and professionally (Oney et al., 2017). If certain procedures are not done correctly, it may affect the transaction and cause problems. Therefore, it is advisable for consumers to understand the transaction procedures thoroughly before entering into any transactions. According to Barkhordari et al. (2017), transaction procedures are unique structures used by EPS to guarantee a successful electronic transaction. The transaction procedures in EPS were discussed frequently in previous literatures (e.g. Linck et al., 2006; Hwang, Shiau and Jan, 2007; Kousaridas et al., 2008). This shows that transaction procedures have been one of the factors that were considered to affect EPS usage.

Technical protections are also one of the determinants that could shape consumers' perceived security and trust on EPS. Kalakota and Whinston (1997) reviewed certain issues regarding EPS's security; the study revealed that EPS security should be strengthened in order to minimize security breaches as EPS's vulnerability is something that should be viewed seriously. Various technical methods were implemented and applied to guarantee the protection of electronic payment (Linck et al., 2006). Technical protections were claimed to be a key antecedent for EPS's safety (Kim et al., 2010). Technical safeguarding which includes stability, confidentiality and reliability have a constructive result on perceived security and trust (Kim et al., 2010; Chellappa & Pavlou 2002). In another words, by providing adequate technical protections, consumers' perceived security and trust in EPS would amplify (Oney et al., 2017).

Davis (1989) stated that when consumers are able to exert less effort in utilizing the machine, the more helpful they view it to be. Adopting any internet equipment depends strongly on the user's insight, abilities and proficiency in internet uses (Goudarzi et al., 2013). Besides security, other psychological determinants are also accountable in increasing trust from consumers' perspective which includes usability, accessibility, safety, reliability and confidentiality (Lichtenstein & Williamson, 2006). Perceived ease of use has a strong impact on purpose to transact (Sanayei & Noroozi, 2009). Consumers who are unaware of the ease of use (technology) would not be able to operate it effectively (Curran & Meuter, 2005). According to Polančič et al., (2010), continuous usage of a technology depends heavily on the purpose to use and view of convenience. Moreover, Goudarzi et al. (2013) mentioned that not understanding the EPS usage procedure would cause consumer to be hesitant in performing electronic payments, at the same time reducing the amount of faith and safety a consumer has while using EPS.

Review of existing studies on EPS reveals that transaction procedures, technical protections and usability have a significant impact on perceived security and trust which in turn has a significant effect on EPS usage.

Research Model and Hypotheses

Studies that examined the relationship between perceived security, perceived trust and EPS usage are scarce. Two of the noteworthy studies are Kim et al. (2010), and Theodosios and George (2005). From both studies, it can be concluded that perceived security and perceived trust has a positive impact on EPS usage. Theodosios and George (2005) also mentioned that EPS providers are advised to consider trust and security as significant determinants of EPS usage among consumers. This study borrows Kim et al.'s (2010) research model, which is designed to find out the impact of perceived security and trust on EPS usage among consumers. If an EPS does not sufficiently provide secure transaction environments, consumers will treat the system with wariness, which may reduce consumers' trust and eventually their use of the system (Guan & Hua, 2003; Mukherjee & Nath, 2003; Linck et al., 2006; Kousaridas et al., 2008). This is why it is important to examine the factors that manipulate consumers' perceived security and trust. However, this

research framework identifies a new factor usability which is also believed to be a prominent determinant for consumers' perceived security and trust. The research framework is as follows (see Figure 1)

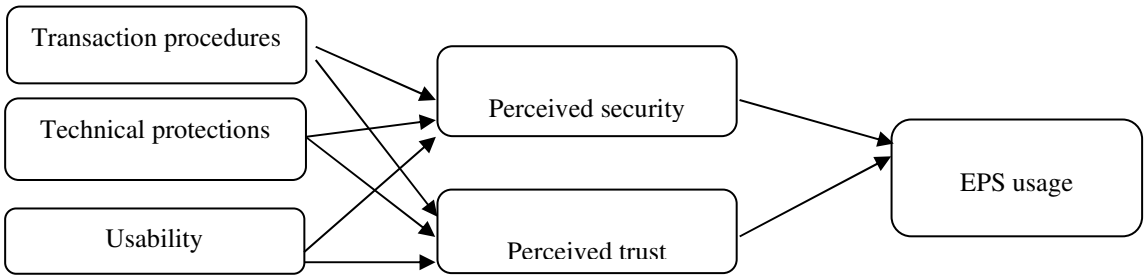

Fig. 1: Research framework on The Determinants of Electronic Payment System Usage among Consumers

A well-defined transaction procedure guide the customers properly to ease their security concerns (Hwang et al., 2007; Kim et al., 2010). Kim et al. (2010) in their study acknowledged technical protections to be an important antecedent for EPS security. This is because EPS is vulnerable to security threats, and consumers would prefer a technically protected EPS to conduct their online transaction. Continuous usage of EPS mostly depends on consumers' intention to use and perception of usefulness (Polancic et al., 2010). Being vague about the usage procedure of EPS would make consumers hesitant to perform payments electronically, at the same time decreasing the consumers' perception of trust and security when using EPS (Goudarzi et al., 2013). The degree of perceived security has a huge impact on consumers' decision on EPS usage. According to Kim et al. (2010) and Tsiakis & Sthephanides (2005), consumers who have a low perceived security towards EPS are unlikely to engage in a transaction. Trust has been acknowledged as one of the significant factors to influence EPS usage among consumers, and that consumers with high level of trust would be more likely to adopt EPS (Kim et al., 2010; Tsiakis & Sthephanides, 2005). Mallat (2007) identified that trust is more important than security, if there is no trust consumers would not use EPS. Based on these findings the following hypotheses are developed.

Hypothesis 1: There is a significant relationship between transaction procedures and perceived security.

Hypothesis 2: There is a significant relationship between transaction procedures and perceived trust.

Hypothesis 3: There is a significant relationship between technical protections and perceived security.

Hypothesis 4: There is a significant relationship between technical protections and perceived trust.

Hypothesis 5: There is a significant relationship between usability and perceived security.

Hypothesis 6: There is a significant relationship between usability and perceived trust.

Hypothesis 7: There is a significant relationship between perceived security and EPS usage.

Hypothesis 8: There is a significant relationship between perceived trust and EPS usage.

Methodology

Data was collected from a sample of 150 respondents using questionnaire. The instruments were developed based on the studies by Oney et al.'s (2017), Barkhordari et al. (2016) and Özkan, et al., (2010). Convenient sampling method was used in this study. The respondents were students and working adults who had experience in using EPS or intend to use EPS or never used EPS. A total of 150 responses were collected, and the data was analysed using SPSS software version 25. Descriptive statistics and Multiple Linear Regression analysis were used for demographic analysis and hypotheses testing respectively.

Findings

Demographic Profile

The results of the demographic profile reveals that 56.7% of the respondents were male and 43.3% of the respondents were female. Majority of the respondents are in the age group of 21 to 24 years old (43.3%) followed by respondents aged 20 years old and below which makes up 32.7% of the total respondents. Respondents aged 25-29 years old and 30 years old and above each make 12.0%. 72.7% of the respondents were Chinese followed by 15.3% Malay respondents, 11.3% of Indian respondents and 0.7% under the 'other' category. 71.3% of the respondents have a monthly income of RM 2,000 and below, 14.0% respondents with RM 2,001-RM 4,000 monthly income. 7.3% of the respondents each have a monthly income of RM 4,001 – RM 6,000 and RM 6,001 and above. 86.7% of the respondents are single while only 13.3% of them are married. Academic qualification of the largest group of respondents are Degree holder with 49.3% and second largest group are certificate level with 30.0%. Remaining number of respondents were Secondary, Diploma and Master/PhD holders with 4.7%, 12.0% and 4.0% respectively. Students made up a large portion of respondents with 67.3%, followed by private employees of 19.3% respondents. Government employees and unemployed were 4.7% of the respondents each. The remaining 4.0% of the respondents were in 'Others' category. The highest number of EPS chosen was online banking and debit card with 32.7% and 31.3% of the respondents respectively. This is followed by credit card and ATM transfer with same number of respondents (18.0%). None of the respondents used electronic cheque. 40.0% of the respondents used EPS 1-2 times a month and 26.7% of the respondents used EPS 3-4 times a month, 23.3% of the respondents used EPS more than 5 times a month and 10.0% of the respondents never used EPS.

Hypotheses Testing

Multiple Linear Regression analysis was performed three times to test the hypotheses due to the unique structure of the research framework.

Multiple Linear Regression Analysis 1

The effect of perceived security and perceived trust on the EPS usage is shown in this part. The R^2 value of is 0.618 which reveals that the predictors have a symbolic effect of 61.8% variability in relation to the EPS usage. The adjusted R^2 of the study is 0.613 which explains that 61.3% of variance in EPS is due to at least one of the variables namely perceived security and perceived trust. The ANOVA table shows a F value of 119.021 and p-value less than 0.001, which proves that the overall regression model is significant.

Based on the coefficients table, both the variables perceived security (Beta =0.251, p value < 0.05), perceived trust (Beta = 0.492, p value < 0.001) has a significant effect on the EPS usage. Therefore, H7 and H8 are supported.

Table 1: Multiple linear regression analysis 1 model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.786[a]	.618	.613	.50893	1.494

a. Predictors: (Constant), IV5, IV4

b. Dependent Variable: DV

Table 2: Multiple linear regression analysis 1 ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.656	2	30.828	119.021	.000[b]
	Residual	38.075	147	.259		
	Total	99.730	149			

a. Dependent Variable: EPS usage
b. Predictors: (Constant), Perceived security, Perceived trust

Table 3: Multiple linear regression analysis 1 coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.222	.179		6.811	.000
	Perceived security	.251	.105	.276	2.396	.018
	Perceived trust	.492	.107	.530	4.607	.000

a. Dependent Variable: EPS usage

Multiple Linear Regression Analysis 2

The effect of transaction procedures, technical protections and usability on the perceived security is shown in this part. The R^2 value of is 0.687 which reveals that the predictors have a symbolic effect of 68.7% variability in relation to the perceived security. The adjusted R^2 of the study is 0.681 which explains that 68.1% of variance in perceived security is due to at least one of the variables namely transaction procedures, technical protections and usability. The ANOVA table shows a F value of 107.066 and p-value less than 0.001, which proves that the overall regression model is significant.

Based on the coefficients table, all the variables transaction procedures (Beta =0.371, p value < 0.001), technical protection (Beta = 0.360, p value < 0.001) and usability (Beta = 0.231, p value < 0.001) has a significant effect on the perceived security. Therefore, H1, H3 and H5 are supported.

Table 4: Multiple linear regression analysis 2 model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.829[a]	.687	.681	.50812	2.065

a. Predictors: (Constant), transaction procedures, technical protection, usability
b. Dependent Variable: perceived security

Table 5: Multiple linear regression analysis 2 ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82.928	3	27.643	107.066	.000[b]
	Residual	37.695	146	.258		
	Total	120.623	149			

a. Dependent Variable: perceived security
b. Predictors: (Constant), transaction procedures, technical protection, usability

Table 6: Multiple linear regression analysis 2 coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	.145	.201		.720	.473
	Transaction procedures	.371	.087	.372	4.247	.000
	Technical protection	.360	.095	.344	3.807	.000
	Usability	.231	.049	.247	4.740	.000

a. Dependent Variable: perceived security

Multiple Linear Regression Analysis 3

The effect of transaction procedures, technical protections and usability on the perceived trust is shown in this part. The R^2 value of is 0.663 which reveals that the predictors have a symbolic effect of 66.3% variability in relation to the perceived trust. The adjusted R^2 of the study is 0.656 which explains that 65.6% of variance in perceived trust is due to at least one of the variables namely transaction procedures, technical protections and usability. The ANOVA table shows a F value of 95.59 and p-value less than 0.001, which proves that the overall regression model is significant.

Based on the coefficients table, all the variables transaction procedures (Beta =0.479, p value < 0.001), technical protection (Beta = 0.203, p value < 0.05) and usability (Beta = 0.237, p value < 0.001) has a significant effect on the perceived trust. Therefore, H2, H4 and H6 are supported.

Table 7: Multiple linear regression Analysis 3 model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	.663	.656	.51676	2.297

a. Predictors: (Constant), transaction procedures, technical protection, usability

b. Dependent Variable: Perceived Trust

Table 8: Multiple linear regression Analysis 3 ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.580	3	25.527	95.590	.000[b]
	Residual	38.988	146	.267		
	Total	115.568	149			

a. Dependent Variable: Perceived Trust

b. Predictors: (Constant), transaction procedures, technical protection, usability

Table 9: Multiple linear regression Analysis 3 coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.216	.205		1.054	.293
	Transaction procedures	.479	.089	.491	5.394	.000
	Technical protection	.203	.096	.198	2.113	.036
	Usability	.237	.050	.259	4.776	.000

Discussion and Conclusion

The potential of the e-commerce market has attracted many businesses to enter this field (Junadi[a], 2015). To cope with the fast-moving e-commerce business, EPS was introduced to make transactions easier and more convenient for consumers. However, not everyone is keen on using EPS even when it offers many advantages like convenience, low cost and availability. Therefore, the current study identified the significant factors which affect one's usage of EPS. The study consists of two parts, the first part investigates the effect of perceived security and perceived trust on the usage of EPS, the second part studies the impact of transaction procedures, technical protection, usability on the perceived security and perceived trust.

Results indicate that both perceived security and perceived trust have a significant impact on the usage of EPS. This shows that the consumers are more confident and willing to use the EPS if they perceive the system to be secured and trustworthy. The findings are consistent with the existing literature (Kim et al., 2010, Maroofi et al., 2012, Barkhordri et al., 2017, Oney et al., 2017). The second part of the results indicate that transaction procedure has a significant effect on the perceived security and perceived trust. The results are consistent with Romdhane (2005), however contradicting the studies by Kim et al (2010) and Oney et al., (2017). Technical protection is found to be a significant determinant of perceived security and trust, which is similar to the findings by Kim et al (2010) and Oney et al., (2017). Finally, the results show that there is a direct impact of usability on perceived security and perceived trust, the findings are consistent with the past studies by Juwaheer et al. (2012), Nasri and Charfeddine (2012).

In conclusion, simple transaction procedures that are easy to follow would enhance the consumer's perceived security of EPS. In other words, when consumers are able to complete a successful EPS transaction by following the procedures, their perceived security and trust will increase. Technical protections have also been determined to one of the strong determinants for perceived security and trust. Therefore, the proof shows that the existence of technical protections for EPS users can enhance consumers' feelings of security. If an EPS system implements technical actions to decrease the chances of payment delays and transaction times, or provide a final step of confirmation before conducting the financial transaction, consumers would definitely feel more secured towards EPS. Furthermore, if an EPS system has insufficient technical protections, consumers would not trust to use it (Barkhordari et al., 2017). This is because consumers' personal information can be stolen any moment if the technical protection is not strong enough. EPS usability has a

significant effect on the perceived security and perceived trust. When consumers understand how to use EPS, the transaction can be done easily. Goudarzi et al. (2013) stated that lack of understanding on the use of EPS would decrease the trust level of consumers. It is common for people to treat something they do not know with distrust. If EPS is user-friendly and easy to use, it provides convenience and builds trustworthiness in consumers. Improving perceived security shows intensification of EPS usage among consumers (Barkhordari et al., 2017). It is absolutely normal for consumers to reject EPS if they are unable to trust the system to complete the task required. Barkhordari et al. (2017) stated that EPS usage among the consumers intensifies when perceived trust is enhanced.

Implementing EPS in a business definitely makes it more convenient and quick to conduct any financial transaction, especially when the numbers of EPS users are increasing nowadays. Hence, managers should understand the impact of the influencing factors. The current study shows that perceived security and perceived trust increases EPS usage. Managers should implement ways to generate user's perceived security and perceived trust. Through this study, it is found that transaction procedures, technical protections and usability affects perceived security and perceived trust. Therefore, managers should focus on providing the best in transaction procedures, technical protections and usability. The EPS system should not leak user's personal information and uphold user-friendly features and reliability. Besides, the results show that consumers are more secured and trust to use EPS when it is easy to use and hassle-free. Thus, it is essential for managers to monitor consumer's satisfaction and act accordingly if there are any sign of dissatisfaction. Future studies may include other critical factors such as past experience, access to security guidelines, social influence that affects the usage of EPS. The model can be tested using structural equation modelling.

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Business Model Innovations in the Age of Digitalization and Industry 4.0

Dragos TOHANEAN
Bucharest University of Economic Studies, Bucharest, Romania
tohanean_dragos@yahoo.com

Loredana Nicoleta ZAINEA
Bucharest University of Economic Studies, Bucharest, Romania
loredananicoleta.zainea@gmail.com

Sorin-George TOMA
University of Bucharest, Bucharest, Romania
tomagsorin62@yahoo.com

Abstract

The aims of the paper are to present the relationship between the concepts of innovative business models and digitalization in Industry 4.0, and to illustrate the impact those components have on current companies. In times of increasing dynamics, complexity and digital transformation of society and market, the demand for innovation applies not only for products, services and processes or day to day activities, but also for business models. Digitalization represents a key feature of the fourth industrial revolution or the so-called "Industry 4.0", a new phase in the development of industry all over the world. In Industry 4.0, products, logistics and services are technically and organizationally merged with one another by using cyber-physical systems in such a way that an increased and self-controlling production flow is created. For the economic success, it is of central importance to recognize future developments and trends in time, and to initiate corresponding measures and thus to address them by anticipating them with the goal of future market requirements and to generate long-term competitive advantages. Business model innovations in Industry 4.0 and digital transformation have reached companies. Yet, there are big differences in the speed of implementation of business model ideas. Most companies prefer a slow development of business models, as this does not radically change the evolution of the company. But there are also companies who enhance radical shifts which affect their whole logic of value creation. In order to reach the aims of the paper the authors used a quantitative research method and a case study. The findings of the research showed that digitalization and innovative business models improve the performance of today's organizations and, in the case of European companies, lead to providing safer products for customers and achieving better results. The paper contributes to the development of the scientific literature by emphasizing the key role played by digitalization and business models in Industry 4.0.

Keywords: Innovation, Business Model.

Introduction

The benefits of digitalization can be reduced to one simple definition: the increase of efficiency, process quality, sales and other factors as well as the reduction of costs and error rates (Tohanean et al., 2018). Depending on the industry and orientation, for example, the development of new markets is desired or innovative services for existing customers are to be offered. Similarly, the development of completely new business models is often sought. Like every innovation step, the digitization of business processes and models requires well-founded preparation from initial potential analysis to practical implementation and continuous further development. The fields of action range from the inclusion of appropriate consultants, through the selection or development of software, to questions of training and qualification or IT security.

The term business model starts with the challenge: although there is broad consensus in the literature that the development of new business models is of fundamental importance for successful positioning in the course of digital transformation. However, the definitions of which components actually make up a business model are very different. Nevertheless, some basic ideas can be summarized: In essence, a business model is derived based on corporate strategy (Puranam, 2016) and business idea and includes a number of different elements and an appropriate architecture, on the basis of which money is finally earned. Typical elements are customer segments, the cost

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structure, distribution channels, required resources, etc. These elements show possible starting points for the development of new business ideas in the course of digitalization.

Of crucial importance here is the understanding that "the one" digital business model does not exist, but business models (independent of digitization) must be either continuously re-developed or by using a variety of methods further developed in a differentiated manner. At the same time, it makes sense to consider existing business models of third parties and to discuss the transfer of various elements to one's own concept. This poses a major challenge to business model development: if these were limited to adopting obvious technologies or software products or copying specific ideas, all the competitors in an industry would be in the same position within a very short time. Demand and potential of the business model development are to identify those approaches and customer requirements, for which no technical solutions or business processes were yet found.

Literature Review

The main concepts of the paper are digitalization, business models and the Fourth Industrial Revolution. The concept of digitalization has been defined in different ways. Some researchers consider that the fresh thinking induced by digitalization leads to value creation (The Economist, 2017) while others see digitalization as the implementation of a new product/process, or a new way to think about business strategies (Kuczmarski, 1996). A business model shows the way an organization creates, delivers, and captures value (Osterwalder et al., 2014). On its turn, the Fourth Industrial Revolution refers to the fusion of several technologies (e.g., nanotechnology, quantum computing) and their interaction across the following three domains: physical, digital and biological (Schwab, 2017). As Industry 4.0 creates an integrated relationship between business and technology, digitalization is increasingly representing a key element of today's business models (Mandapaty and McClure, 2016). Moreover, successful business model digitalization leads to value creation (Wirtz and Daiser, 2017). Therefore, there is a link among digitalization, business model and the Fourth Industrial Revolution.

Research Methodology

In order to achieve the research objective, the authors used a quantitative research method combined with a case study. The information was gathered from numerous sources of secondary data, such as books and articles from the domains of management, IT, and digitalization, or corporate reports of business models in different industries, through a desk research. The literature review was carried on mostly on sources that have been found both in electronic databases (e.g. Springer, Wiley Online Library and Amazon) and in libraries (e.g. Central University Library "Carol I", British Council Romania). The case study had as focus existing business models from companies and countries all over Europe, companies like: UiPath, Continental Automotive Romania, Dell, BMW AG, SC Database for Commerce and Industry Romania SRL, DriveNow, IBM or SAP SE.

Digitalization in the context of Business Model

The current phenomenon of the economy-accelerated digitalization, known as the "Industry 4.0", will generate both an increased productivity, connectivity and several transformations on the labor force skills (Androniceanu et al., 2020).

For many companies, digitization seems at first glance to be an intangible phenomenon. Many classify you as a gentle breeze. But in truth, it is a hurricane that changes the existing industry landscape. Due to their cross-sectional characteristics, the upstarts of digitization cannot be limited to individual sectors, fields of application or company divisions (Wirtz and Daiser, 2017).

This change creates new germ cells, both at the product and business model levels. Changes in one area lead to adjustments in other areas, making opportunities or threats difficult to identify. Businesses need to rethink and see digitization as an opportunity (Kompetenzzentrum Geschäftsmodelle in der digitalen Welt, 2017). To do so, it is necessary to understand both the core and the patterns of digitization and their impact on business models, and thus on the implementation of corporate strategy.

Digital business models are performance transaction systems based on networked digital technologies. The transactions are recordable, process able, repeatable and exploitable. The exchanged services and considerations can be both digital and analog.

At the heart of digital business models (Kompetenzzentrum Geschäftsmodelle in der digitalen Welt, 2017) is the economic transaction of services and not just the human with its needs. The interface to humans takes place via

technical end devices. This fundamental difference between digital and analog business models requires rethinking the design of processes, products, and new business models in a digital context.

Industry 4.0 not only leads to technical changes, but especially to digital business models and processes. Against the background of this digital revolution, work must be redefined. A prerequisite for the implementation of Industry 4.0 in companies is the establishment of "networked thinking, working and leading". What is required are “free-thinking” employees and a start-up mentality that enables creative work.

Model of Digitization

Due to the manifold possibilities, a kind of gold-digging mentality has emerged. Everyone wants to bring forth the next Big Bang Disruption. Many try, and yet most fail. Looking at the development of the digitization wave from a bird's eye view, characteristic patterns of digitization can be identified.

Rising Dematerialization

The central pattern of digitization is the transfer of physical products / services into their digital images (Hoffmeister, 2017). Services can be consumed regardless of location and time, see for example music streaming services. Another aspect of dematerialization is the virtualization of hardware, that is, the replication of a hardware or software object by a similar virtual object. This digital twin is used, for example, in machine and plant engineering to optimize machine designs, make commissioning more efficient, improve process times and, last but not least, ensure fault-free operation. An intermediate stage of dematerialization are hybrid services that enable physical products, e.g. IoT.

Merging Domains

As a cross-cutting topic, digitization leads to cross-sector linking, imitation and recombination of services and business models. Digital business models do not have analogous boundaries and rules. The industry loses its importance as a reference point for strategic orientation and orientation. With its business model Clickapoint.com (Fortune 2018) dissolves the boundaries between ride-sharing and freight transport and between private and commercial.

Increasing benefits from more users

When the utility of a service or business model changes with the number of users, it creates a network effect (Hoffmeister, 2017). He's driving the tremendous speed and reach of digital business models. Contact platforms like Facebook (Fortune 2018) or auction platforms like eBay (Fortune 2018) are prominent examples of the exploitation of this pattern.

Falling Marginal Costs

Digital services or dematerialized physical performance have a zero marginal cost property, that is - both the production / reproduction and distribution of an additional unit results in only marginal costs. The effort for the duplication of a once generated digital music album is negligible. The copy has the same high quality as the original. Furthermore, there are negligible costs for the storage of digital services as opposed to physical services. Falling marginal costs lead to new degrees of freedom regarding the design of the revenue mechanics of digital business models.

Falling Transaction Costs

Transaction costs are all costs incurred from the inception of the transaction until its completion. If these are high enough, it is more economical to produce them than to procure them from the market. Digitization leads to falling transaction costs. The lower they become, the more inefficient the in-house production of services becomes. Falling transaction costs lead to decreasing benefits of integrated business models. Digital business models in which the

economic transaction is in the foreground become more attractive. For example, tripadvisor.de (Fortune 2018) reduces the search, comparison and booking costs for its customers through its business model.

Increasing Demonetization

The increasing demonetization is mainly due to falling frontier and transaction costs. As a result, digital business models can be designed that offer services "for free" (Hoffmeister, 2017). Thus, numerous software providers provide a free basic version of their program. However, once the user wants more functionality, they must purchase the paid upgrade.

Continuous Resource Access

Digital business models, such as the Airbnb (Fortune 2018) business model or the FlixMobility (Fortune 2018) business model, facilitate finding and accessing unused resources / capacities. The transition from ownership to benefit leads to increased flexibility and reduced fixed costs. The development costs of resources are also eliminated. This pattern is essential for exponential growth and opens up new degrees of freedom in the use of digital business models.

Rising Personalization

Digital services can be more easily adapted to individual customer needs than physical services, since the transactions are detectable, process able and recoverable. This affects both the content, the functionality and the performance. A basic software package can be adapted by extensions to the respective user. Furthermore, digital services can be further developed after sales and adapted to changing needs - e.g. update of software.

Increasing Decentralization

The increasing number of networked, internet-enabled devices creates new degrees of freedom for customer benefit and thus also for digital business models (Hoffmeister, 2017). There is a shift from localized to an anytime, anywhere consumption. Customers are becoming more and more independent and consuming content / services when they want it and need it, not when it is offered to them. This new status quo requires new digital business models that effectively and efficiently implement emerging degrees of freedom. The company Shpock (Fortune 2018) (flea market app - SHop in your POCKet) has recognized the potential. Customers can browse through offers in their area on their smartphones, or hire their own products.

Unlimited Growth

The economic peculiarity of digitization lies in the almost free scaling of its products. Therefore, unlimited growth is both a characteristic of digital products, processes and business models as well as a result of digitization itself. Prerequisite for this is the networking of people and things and the dematerialization of services. This leads to minimal marginal and transaction costs, i.e. the cost of copying and distributing digital services is close to zero.

These patterns of digitization should, on the one hand, sharpen the understanding of the success factors of digital business models and, on the other, provide food for thought for the development of new digital business models. Digital business models often have a resounding success because they combine multiple patterns and cover existing needs at a "higher level".

Types of digital business models

There are now a variety of business models in the digital environment (Wirtz and Daiser, 2017). However, there is still no uniform characterization and structuring of these business models in order to use them as an incentive for the development of new digital business models. Furthermore, there is a lack of embedding the different perspectives in an overall picture. However, the fields of application can be summarized in the optimization of processes, the improvement or redesign of products, adoption of platforms and the optimization or redesign of business models.

Company activities in the digital economy usually take place on their own or third-party platforms. Own platforms can include websites, online shops and apps. External platforms include, for example, Google, Facebook, Amazon and other high-reach companies. The own platform must generate relevance in order to assert itself on the market. Activities on third-party platforms must generate relevance in order to prevail against other platform participants. Some companies - such as Trivago - use the system of digital transformation KPIs to lead the organization around people. They also work internally as a platform and generate relevance, value, benefit and significance for customers, managers and employees.

With the help of the digital transformation KPIs, success and failure in companies of the digital economy can be measured beyond financial KPIs. They are to be understood as an indicator of the change from the industrial to the digital economy.

As a rule, companies in the digital economy replace the missing financial KPIs with measured values that are geared towards relevance. Relevance is the currency of every major platform. And as a company in the digital economy, they will either integrate external digital platforms into their business model (e.g. Facebook, Google, Amazon, Twitter) or set up their own platforms. And in both cases, they have to identify where and how relevance arises. Only those who generate relevance are welcome partners on foreign platforms. Only those who generate relevance with their own platform will remain in the market.

A key aspect to be taken into consideration is the migration from human resources to machines, by means of standardization, automation and robotization. Below image highlights the main differences and key activities performed by humans or machines.

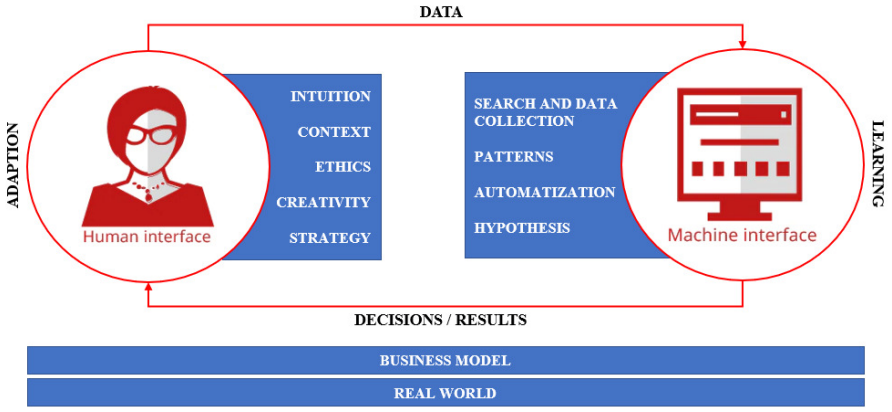

Fig. 1: Migration from human resources to machines

Such a change applies the appearance of multiple or new digital business models. In the following a structuring by clustering and abstraction of the functional fulfillment of different digital business models takes place. The aim is to unite the different perspectives and definitions in this area in order to increase transparency and thus understanding and provide stimulus for the design of digital business model innovations (Tohanean & Toma, 2018).

Dematerialize

This business model type is mainly about the digitization of analog products and business models. In this context, digitization means the transformation of previously analogous products and business models into a digital environment.

By virtualizing production processes, for example, machine efficiency and thus overall process efficiency can be increased. This digitization is the basis for further services in the context of "as a service".

A hybrid form represents data-infused products, smart products. Intelligent, networked products offer users added value through supplementary data services based on sensor integration. These new services can only be monetized by means of a suitable digital business model. In the future, products will be data-centered, intelligent, networked, communicative, modal and customizable.

Materialize

Business models in the field of materialization deal with the transfer of digital data into a physical structure.

An exciting application, for example, is the long-term guarantee of spare parts. Siemens (Fortune 2018) depicts spare parts availability without bearings based on 3D data and additive manufacturing (EOS, 2018). Shapeways (Fortune 2018) transforms customer ideas into genuine, affordable and personalized products. The customer only has to upload their 3D data, which they can create on their own or through designers, and can then choose between numerous materials. Shapeways takes over the printing, post-processing and sending of the object for him.

Supply

One of the largest and at the same time imperceptible areas of digital business models is the provision of services / functions and resources / capacities. Resources are not physically acquired, but can be obtained and consumed over the Internet as needed. This continuous access to resources increases customer flexibility, opening up new levels of freedom.

In this context, the Xaas approach (Everything as a Service) (Search Cloud Computing, 2017) provides a valuable orientation and source of inspiration for the development of future digital business models. The core of the approach is that "everything" is provided and consumed as a service. For example, Dropbox (Fortune 2018) provides storage capacity. Amazon (Fortune 2018) provides its sales platform to other merchants. The XaaS approach is growing and has become indispensable in our private and working lives.

Analyze and process

These business model types focus mainly on analyzing and evaluating data. Due to the increasing data availability, big data, it becomes more and more important to select the relevant data and information in order to be able to derive developments from it.

Google (Fortune 2018) makes it possible with its product Google Analytics, for example, to analyze the traffic on a website.

Network

These business model types connect people for the purpose of communication, interaction, and knowledge sharing. Prominent representatives are social platforms like Facebook (Fortune 2018) or Instagram (Fortune 2018).

Selling

Business models of this type distribute goods via digital channels. Both digital products, dematerialized products and physical products are sold. This field is characterized by a high variety of variants and requires a specialization to be successful. Amazon or Zalando are prominent examples.

Connect / Transfer

This business model type merges demand with relevant offers. The supply side receives a market access or digital distribution channel as service. In contrast to the business model type networking, business models in the field of connecting / brokering focus on an exchange of services between companies or companies and individuals. There are fees for a completed transaction. The monetization of this service can be done both by the participants and by third parties.

Comatch.de (Fortune 2018) brings consultants together with companies, Google Search (Fortune 2018) brings searchers together with content, and MyTaxi (Fortune 2018) delivers customers to drivers. Crowdfox (EU Startups, 2017) has a business model that is on average 10% cheaper than Amazon. This is achieved by the merchants on the Crowdfox (EU Startups, 2017) platform pay no fees for the sale of their goods. These savings are passed on directly to the end customer, which allows internet best prices to be achieved.

Compare

Business models (Kompetenzzentrum Geschäftsmodelle in der digitalen Welt, 2017) of this type are similar to the transfer type, but are based on the demand-side transparency increase. By reducing the information asymmetry between the demand side and the supply side, individual best solutions can be achieved for the customer. Booking.com (Fortune 2018) or Trivago.de (Fortune 2018) are well-known companies with this business model.

Share / Replace

This business model type is based on collaborative consumption among individuals through sharing, trading, trading or giving. The focus here is on resource conservation through access to private resources. Airbnb brings together unused living space with guests, Uber (Fortune 2018) brings vehicle owners and passengers together.

Conclusions

Practice shows that many companies stick to the established, successful business models of the past. The protection of the existing and not the design of the new is in the foreground. The types of digital business models described are intended to provide inspiration for expanding existing business models and designing new digital business model innovations.

Digital business models are often based on already tested and functioning analog business models. In doing so, they focus on the industry-related weaknesses of analogous business models in terms of benefits or costs. The established business models are sometimes radically reconfigured.

Looking at evolved digital business models, they often combine multiple functions / business model types to create ecosystems, see Apple, Google or Amazon. Digital business models are often more agile, customer- and demand-oriented than traditional business models, creating forward-looking solutions beyond today's barriers to thinking.

When designing new digital business models, the focus should be on superior value for one or more demand groups and scalability. The observance of the digitization patterns increases the probability of success.

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Competitive Perspective on Drivers of Research and Development

Branislav ZAGORSEK
Department of Management, Faculty of Business Management, University of Economics in Bratislava, Dolnozemská Cesta 1, 852 35 Bratislava, Slovakia; branislav.zagorsek@euba.sk

Stefan SLAVIK
Department of Management, Faculty of Business Management, University of Economics in Bratislava, Dolnozemská Cesta 1, 852 35 Bratislava, Slovakia; stefan.slavik@euba.sk

Natalia ZAGORSEKOVA
Department of International Economic Relations and Economic Diplomacy, Faculty of International Relations, University of Economics in Bratislava, Dolnozemská Cesta 1, 852 35 Bratislava, Slovakia; natalia.zagorsekova@euba.sk

Richard BEDNAR
Department of Management, Faculty of Business Management, University of Economics in Bratislava, Dolnozemská Cesta 1, 852 35 Bratislava, Slovakia; richard.bednar@euba.sk

Abstract

This paper studies the drivers of company spending on research and development from a competition perspective. We study whether there is a mechanism that leads companies to spend on research and development. We proposed a model describing company spending on research and development explained by competitive forces. Our research helps to understand how the competition drivers of company spending on research and development work and may be useful as a framework for companies to assess their situation and help them find better than chance solutions. We describe a model consisting of competitive forces derived from the Porter's Five Forces framework and how these factors significantly impact the company spending on R&D, using multiple linear regression of variables selected from the World Economic Forum database. Our major contribution is that we identified a model of company spending on research and development majorly and significantly described by means of competition, which is addressing a problem of insufficient research of this topic stated in the literature.

Keywords: research and development; innovation; competition; competitive environment; competitive advantage

Introduction

In our paper we focuse on conditions for research and development from competitive perspective, so the companies can better understand the competitive environment and can work with it towards the research and development and sustainable businesses. Due to the explosion of technological innovation during the past decades, we witnessed the globalization of the economy with manifestations in foreign trade, the spread of technologies, the flow of capital and market integration (Shangquan, 2000) , this has a non-deniable impact on companies by intensifying competition. For companies, it is no longer sufficient to consider their direct neighbors as competitors because they now compete with companies all over the world. As information technologies develop, competition intensifies even more. The easily accessible and fast disseminated information might shorten the lifecycle of technologies and competitive advantage. Effective research and development of the company's products, processes, technologies or business model itself is a necessary reaction to this development. Therefore, it is crucial to understand the mechanisms and factors influencing research and development as well as competitiveness so the economies as companies can adjust to new conditions of the global environment.

In the terms of research gap, in this paper, we study the drivers of company spending on research and development (R&D) from a competition perspective. The justification, as well as the need for our research, can be summarized by the conclusion of Becker (2013) who in his survey of empirical research on determinants of research and development argues that there is some evidence of competition affecting the research and development, but direct evidence is still scarce. In this paper, we contribute to the reduction of this deficiency by enhancing the knowledge about the

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mechanism of R&D as we provide new evidence to this issue. In this era of increasing technological progress, it is important to understand the relationship between R&D and competition. We study the mechanism that encourages companies to spend on R&D.

We describe a model consisting of competitive forces derived from the Porter's Five Forces framework (Porter, 2008) and how these factors significantly impact the company spending on R&D, using multiple linear regression of variables selected from the World Economic Forum database.

Theory and Hypothesis development

In the literature review, we focus on studies in three main areas: competition and research and development, competition and competitiveness and research and development and technology. In this paper, we make and test an a priori assumption that the competition has a significant impact on research and development. We consider this assumption fundamentally sound because companies compete for a limited number of customers by proposing different technologies with different attributes, which are a result of some research and development. We assume that customers have a reason to buy a product with a notion of its purposeful use and so implicitly valuing the product attributes that were made possible by the research and development either of the technology or the product itself.

We found several interesting sources dealing with research and development and a competitive environment. In summary, there is convincing evidence of the relationship between competition and research and development in the literature. However, the depth of the understanding is insufficient, and the request for more research is prevalent in the literature. Besides, there are some suggestions regarding the linearity of the effect (Becker, 2013), risk-taking (Thako – Lo, 2015)) and possible bidirectional effects (Dereli, 2015). Regarding competitiveness, there is a need for companies to innovate to stay competitive (Krugman, 1994) and we found evidence in the literature that competitive advantage is associated with spending on research and development (Dutz- Hayri, 1999 ; Porter, 1998). While competitive advantage and performance are arguably two different terms(Ma, 2000), competitive advantage is among barriers of entry (Greenwald – Kahn, 2005) so we may see the pathway leading from research and development to creating barriers as a potential defensive strategy and in opposite direction so the barrier makes the research and development viable. Some sources mention the need for some mechanism for interaction with other subjects by openness or partnership influencing the competitiveness and research and development (Siriphattrasophon, 2017; Malecki-Oinas, 1999). In our literature research, we found three different perspectives of research on research and development. First is the research and development itself, the second part of the research focuses on partnerships, and the third part on the protection of the intellectual property. Companies can use partners to obtain technology and enhance their competitiveness (Malecki-Oinas, 1999; Collins – Troilo, 2015) though this may have a downside that these companies rely on partnership and so will miss the opportunity to learn what could have negative long-term impact (Hamel, 1991). The intellectual property rights protection seems to be an important part of companies' motivation for research and development (Rapp-Rozek, 1990; Lai, 1998; Evenson-Kanwar , 2003) as its absence may weaken the company and make it vulnerable compared to its competitors.

Competition and Research and development

Competition is an important factor that affects the company's spending on research and development, as is reasoned in several sources. In the work of Becker (2013) five main driving factors of investment in the research and development were identified such as company or industry characteristics, competition in product markets, government policy, location and resources, cooperation with research entity, and spillover from foreign research and development. He further argues that while most of the empirical studies assume a positive linear effect where the companies use the research and development as a defensive strategy responding to competition, the impact of competition on the research and development might not be linear. He argues that increasing evidence suggests a relationship of competition and research and development in the shape of the inverted U-curve. The intensity of competition has a positive impact until a certain level is reached, and after its passing, it decreases the interest in investing in research and development because businesses are less able to extract the rent from the innovations that are the result in the research and development. This seems to be aligned with our argument used later in the paper, that companies might not be motivated to innovate if there is not enough protection as the cost of research would not be returned before competitors start to copy the technology or the product. According to Blazsek and Escribano (2016), the increase in competition intensity is a driver for innovation resulting in patent applications as well as in propensity to patent. A similar conclusion was made by Thakor and Lo (2015) who, based on biopharmaceutical industry evidence, imply that with the increase in competition, there is an increase in investment in research and development. However, they argue that their results are applicable to other sectors with intensive research and development as well. Gu (2016) argues a strong positive effect of competition on investments in research and development. He also argues that businesses that invest heavily in research and development are taking more risks.

However, they are also earning more than businesses with less intensive research and development, especially in highly competitive sectors. This is an interesting perspective especially compared to our argument that high risk may result in a low willingness to invest in research and development. Another empirical literature (Lee-Hwang, 2003; Rezaei-Schroder, 2017; Autor et al., 2017), which examines the linear effect, concludes that competition has a positive effect on the research and development. However, quantified evidence of the direct effect of competition on research and development is rather scarce. Dereli (2015) argues that innovation and competition influence each other. While competition initiates the need for innovation, innovation then makes the competition more intense. Even more arguments for the relation between innovation and competitiveness can be found in the works of Petrakis et al. (2015) and Huang (2011). Furthermore, Petrakis et al. (2015) stress the role of innovation culture over macroconditions. Huang (2011) argues that companies prefer being reactive rather than proactive to changes in the environment. The technology is then dictated by companies that are more confident in their research and development. Huang (2011) argues that different environment requires different technology and that this variety of different conditions might contribute to the company's innovativeness.

Competitiveness and competition

Competitiveness was studied by Krugman (1994). Krugman argued that a company must be able to maintain its position on the market to be competitive. He further claimed that a company that cannot increase its performance would leave the market. Krugman by defining a competitive company, considers the bottom line to be the ability of the company to pay employees, suppliers, and investors. Krugman also made a comparison of the competitiveness of businesses and countries. He concluded that because countries cannot end their existence as regular companies can, the concept of competitiveness on the country level is rather vague. Ma (2000) studied the association of competitive advantage and performance. He claims that competitive advantage and performance are rather two different constructs. He further argues that competitive advantage is not defined sufficiently. Dutz and Hayri (1999) and Porter (1998) argued for a positive association between competition and higher economic growth or progress. Ireland and Webb (2007), as well as Dyer and Singh (1998), are claiming that a possible competitive advantage is associated with spending on research and development. Dollinger (2008) in his book, wrote that a sustainable competitive advantage arises when a company creates and captures value and succeeds to protects it against competitors. In his book, Dollinger describes which four conditions affect the higher intensity of competition. Among conditions affecting intense competition are numerous equally balanced competitors, slow growth in the industry, high fixed costs and a commodity-type product. How rare is the real competitive advantage is argued by Greenwald and Kahn (2005). In their paper, they claim that competitive advantage is among the barriers to entry. They differentiate between competitive advantage that leads to lower costs and one that leads to higher demand. They identified three factors of creating a competitive advantage. These factors are customer captivity, proprietary technology and economies of scale. They argue that the limitation of technology as a source of competitive advantage is its short lifespan as it becomes rapidly available to everyone. Kapler (2007) considers the competitive success, growth and internalization of the company's activities for indicators of a company's success. The problem of keeping a company competitive was examined by Rocha and Abreu (2018). They argue for creating conditions for flexible governance regimes as this might help to reduce the power of the large retailers that set prices and production standards across the value chain. They further argue that this could reduce the financial pressures on producers to cut costs continuously, and would create the opportunity for investment in technological and organizational development. Siriphattrasophon (2017) examined the internal and external factors that affect the competitiveness of small and medium-sized companies. Siriphattrasophon argued that more competitive are companies with more international activities. He concludes that companies should continuously assess and monitor their readiness for the organization and product standard and assess their strengths and weaknesses, opportunities and threats. He claims that in order to build a competitive business, the development of organizational strategies is the most important step. He divides the strategy into a business, entrepreneurial and business unit strategy. Important part of sustainable and competitive business is its revenue model as studied by Remenova et al. (2020). Slavik and Zagorsek (2017) studied the association between company success, business model and strategic factors. They made an argument for the necessity of the compatibility of business model and strategy. They show that the idea of a company's competitive behavior must be supported by an appropriate strategy. In our research, we drew some inspiration from the works of Porter. While they might not always be identically applicable, we argue that they are well suited as an inspiration. For example, the mechanisms on industry level should be able to tell us something about mechanisms on the company level. We use Porter's work as a description of competition and justification of the need to understand competition. Porter (2008) identified and described five competitive forces. They can be used by the companies to describe the competition and the competitive environment and then to make appropriate changes to the strategy. Porter's model of five competitive forces is formed of supplier power; buyer power; the threat of new entry; the threat of substitution and competitive rivalry. According to him, it is necessary to understand the mechanism of the five competitive forces and how they are associated with profitability in the industry. This understanding will then allow for selecting the right strategy. Furthermore, Porter (1979) by focusing on competitive forces that have influenced the competitiveness of the companies concluded that the knowledge of competitive forces might allow the company to occupy the best defensible position on the market.

In another paper, Porter (1986) argued that the environment is changing due to international competition and this creates an environment that cannot allow the state parochialism to obstruct competitors' ability to turn a global position in a competitive advantage. How to use Porter's model of five forces framework in the analysis of industry was studied by Dobbs (2014). Dobbs found that Porter's framework of five forces is somewhat misapplied. He argues that it is not primarily used as it should be a tool assessing how a company can compete in the industry more effectively by getting a strategic insight into the competitive environment. Dobbs proposed templates for application of the five forces framework, by creating questions on an 11-point scale between low and high threats level for each of the five forces. Within evaluated forces, the number of questions varied. Porter's framework was also used by Beblavy and Kurekova (2014) in their study of competitive advantage of the antivirus industry. They argue that they found a possible weak point in this tool as it does not consider the needed level of internationalization to the full extent. While this study uses a different framework, it may be indicative of possible deficiencies in the globalized time.

Research and development and technology

Bharati and Chaudhury (2009) studied what the role of the information system in the competitiveness of small and medium-sized companies is. They argue that small and medium-sized companies are the innovators among companies despite not being known for their own technology demands. Compared to large companies, per employee in a year, they produce 13 to 14 times more patents. Dosi et al. (2015) studied what role the technologies and costs play in the international competitiveness of enterprises. They found that while market shares at the country level are influenced primarily by technology, the cost had rather an ambiguous impact. The argument that technology adoption does not have to be dependent on its superiority was made by Katz and Shapiro (1986). They identified the mechanism of technology adoption and its competitive advantage based mainly on whether the technology is sponsored and whether it is superior now or in the future. How national factors impact the competitiveness and innovation of companies was studied by Collins and Troilo (2015). They argued for public-private partnerships for innovation because this might increase the small and medium-sized companies' competitiveness. How the international alliances between companies focused on skill and technology transfer impacted the companies' competitiveness was studied by Hamel (1991). He argued that a company that has no ambition outside the investment avoidance and substitution of its partner's competitiveness for its own lack of competitiveness would likely not learn from its partner. Furthermore, a situation where a company fails to learn what undermines the competitiveness and independence of the company should not be considered as an indication of collaborative success. Off course, the innovation and the previous research and development must not be in the technological field but may be in the field of managerial innovation as studied by Jankelova et al. (2019). Malecki and Oinas (1999) claim that the level of innovativeness and competitiveness of companies depends on both local and external levels of embeddedness within supplier networks and markets. How intellectual property rights protection affects the research and development was studied by Lai (1998). He found an association of product innovation and the strength of intellectual property rights protection. He identified both positive and negative effect that the strength of intellectual property rights protection has, depending on the conditions of production transfer. Here we have to mention, that according to Blstakova et al. (2020) the values of companies that they consider as important for future success do not depend on the level of technological innovations. Rapp and Rozek (1990) argued that if the property rights are not protected sufficiently, the innovator has fewer incentives to devote resources to innovation and therefore, fewer new products and processes are introduced to the market. The positive impact of intellectual property rights protection on investments to research and development was also argued by Evenson and Kanwar (2003). However, they also present an opposite alternative argument against strong intellectual property protection, that weak intellectual property protection might help to keep lower market prices. Innovation for sustainability was studied by Leach et al. (2012) who proposed a three-dimensional model consisting of direction, diversity and distribution. Seebode et al. (2012) suggest that companies need to innovate and give up old approaches to innovate for sustainable development.

Objective and Methods

In this paper, we aim to identify the drivers of company spending on research and development from a competition perspective. We want to find out whether the research and development of companies could be described in the mean of competition and how well we can do it. We argue that the competitive environment has a significant impact on the company's research and development. However, the direction of the impact, as well as the factors with the most impact, are not well known yet. In our initial position, we believe that the competition might have two opposite directions of impact. The first direction could be one emerging from the need to differentiate the company in a competitive environment. The opposite direction could be the result of strategic thinking and uncertainty as more intense competition would make the pioneering innovation and research and development less desirable. Companies do not know which technology will become the industry standard. That is why their innovation effort might be wasted,

either due to easy access to information where the winning technology will finally become widely available or just by betting on the wrong horse.

Our research effort can be formulated in the following hypothesis.

H1: The spending on research and development can be majorly and significantly described by means of competition.
H0: There are too many factors influencing research and development to be significantly and majorly described by competition.

To reject the H0 hypothesis, we need to create a significant model of research and development consisting of variables depicting competition with adjusted R-squared over 0.50.

We were analyzing the data obtained from the World Economic Forum database. We used the Global Competitiveness Index dataset. The dataset holds the data for 137 countries of the world. Each country is represented by one data point per variable representing the mean value of the variable for the country. For this study, we used the dataset that was acquired between the years 2017 and 2018. The general construction of survey data is that data values can range from 1 to 7, where 1 being the lowest and 7 being the highest level of the variable. However, the variables number of days and the number of tasks required before starting a business are not from a scale, but they represent the real values in each country. Further information about survey questions and variables are available to greater detail in the Global Competitiveness Report 2017-2018. We describe the variables in Table 1.

Table 1: Variable description

Variable	N	Avg	St. d.	Med	Min	Max
Company spending on R&D	137	3.55	0.91	3.27	1.88	6.07
Intensity of local competition	137	5.04	0.58	5.09	2.82	6.21
Intensity of foreign competition	137	4.53	0.76	4.52	2.60	6.40
Intellectual property protection	137	4.28	0.99	4.06	2.02	6.58
Number of days to start a business	137	19.37	26.15	11	0.50	230
Number of procedures to start a business	137	6.78	3.14	6	1	20
Buyer sophistication	137	3.46	0.75	3.39	1.75	5.26
Degree of customer orientation	137	4.65	0.72	4.61	2.37	6.24
Domestic market size	137	3.72	1.22	3.69	1	7
Ease of access to loans	137	3.87	0.83	3.89	1.51	5.67
Quality of overall infrastructure	137	4.08	1.12	4.13	1.52	6.65
Production process sophistication	137	4.01	1.06	3.80	1.96	6.53
Local supplier quality	137	4.39	0.74	4.35	2.43	6.28
Local supplier quantity	137	4.46	0.57	4.55	2.37	6.16
Nature of competitive advantage	137	3.76	1.11	3.47	1.96	6.55

The variables that we used in our model were carefully selected on the basis of Porter's Five Forces framework (Porter, 2008). In this work, he identified five groups of factors that impact the competition: supplier power; buyer power; the threat of substitution; the threat of new entry and competitive rivalry. Using Porter's model of five competitive forces, we then evaluated the variables available in the World Economic Forum database, whether they are aligned with this concept. Here it is important to declare that we understand that Porter is applying his model on the industry level, and we use the model on the data of individual company responses averaging at a national level. We needed a strong, established framework that would lead us by selecting the relevant variables for our study. We further argue that while Porter's framework is set on industry level, it should tell us something about the company level and so if we inspire our variables selection by his framework, we will be better off than choosing the variables solely by chance or by other not well established frameworks. All selected data deal with the issues of individual companies. By using the national averages, we were able to dampen the volatility and focus on the fundamental associations. Meanwhile, there is still enough variability in the features so we can use them as a predictor. We also argue that if associations are present, our model should be able to show them.

We did the first processing of data with a spreadsheet processor. Then, we exported them to the statistics program PSPP for the descriptive statistics. Finally, we imported the database into a Python program that we wrote, where we used the Numpy, Pandas, Matplotlib, and Statsmodels packages. We subjected the data to graphical analysis and inductive statistics. The package Statsmodels that we used for multiple linear regression analysis is further described

by Seabold and Perktold (2010). When analyzing the data, we used the methods of descriptive statistics and graphical analysis to review and describe the data. Consequently, we performed multiple linear regression, ANOVA, Jarque-Bera test for normality, Breusch-Pagan and Goldfeld-Quandt tests for homoscedasticity, variation inflation factor to account for multicollinearity and a graphical evaluation of observed values, residuals and predicted values to assess the linearity. After testing, we found the need to apply a nonlinear quadratic transformation on the endogenous variable to adjust for the linearity assumption. The method of multiple linear regression was used as a tool for assessing and comparing the effects of individual exogenous variables on the endogenous variable. We are using it in a way to assess the impact and relationship between the variables but not to predict a certain outcome. We set the level of statistical significance at significance level $p \leq 0.05$ as is common scientific standard to consider the results to be valid. Moreover, we used Bonferroni correction to account for the larger number of variables that resulted in a required p-value of 0.008 in the final model.

Results

We created the regression model of company spending on research and development by the method of elimination of nonsignificant variables regarding the overall goodness of fit. Finally, we reached a model shown in Table 2.

Table 2: Regression model of the company spending on research and development (square root).

	coefficient	**standard error**	**p**	**VIF**
Intensity of local competition	-0.0828***	0.099	0.001	3.50
Intellectual property protection	0.0755***	0.067	0.000	4.76
Buyer sophistication	0.0368	0.078	0.079	3.65
Degree of customer orientation	0.0670***	0.082	0.008	3.75
Production process sophistication	0.0866***	0.082	0.000	7.97
Local supplier quantity	0.0575*	0.097	0.014	3.28
R^2	0.854			
Adjusted R^2	0.847			
F (6,130)	126.8***			
Durbin-Watson test	2.228			
Jarque-Bera test	1.394			
Breusch-Pagan test	7.691			
Goldfeld-Quandt test	0.793			
*p≤0.05 **p≤0.01 *** p≤0.008 Bonferroni 0.05/6=0.008				

The model is statistically significant F(6,130)=126.8 and explains the spending on research and development with R2 adjusted 0.847. The model also meets the requirements of multiple linear regression as the residuals are normally distributed (Jarque-Bera, Q-Q plot) and have no significant autocorrelation (Durbin-Watson). After testing for linearity, we found improvement of the model by application of a nonlinear quadratic transformation on the endogenous variable to adjust for the linearity assumption. Please note that because of this transformation, the coefficients may seem rather small, but this is because they are in relation to the square root of the endogenous variable. Both the Q-Q normal plot of regression model residuals, and linearity test after nonlinear transformation can be seen in Figure 4. Our model shows the factors influencing the company spending on research and development. We found that the factor influencing the spending on R&D positively and the most was the production process sophistication. Next, there was the negative impact of the intensity of local competition, followed by the positive impact of intellectual property protection, and the degree of customer sophistication. The local supplier quantity missed the threshold set by Bonferroni correction closely. The buyer sophistication missed the cutoff closely. However, we think both should be further investigated in future research.

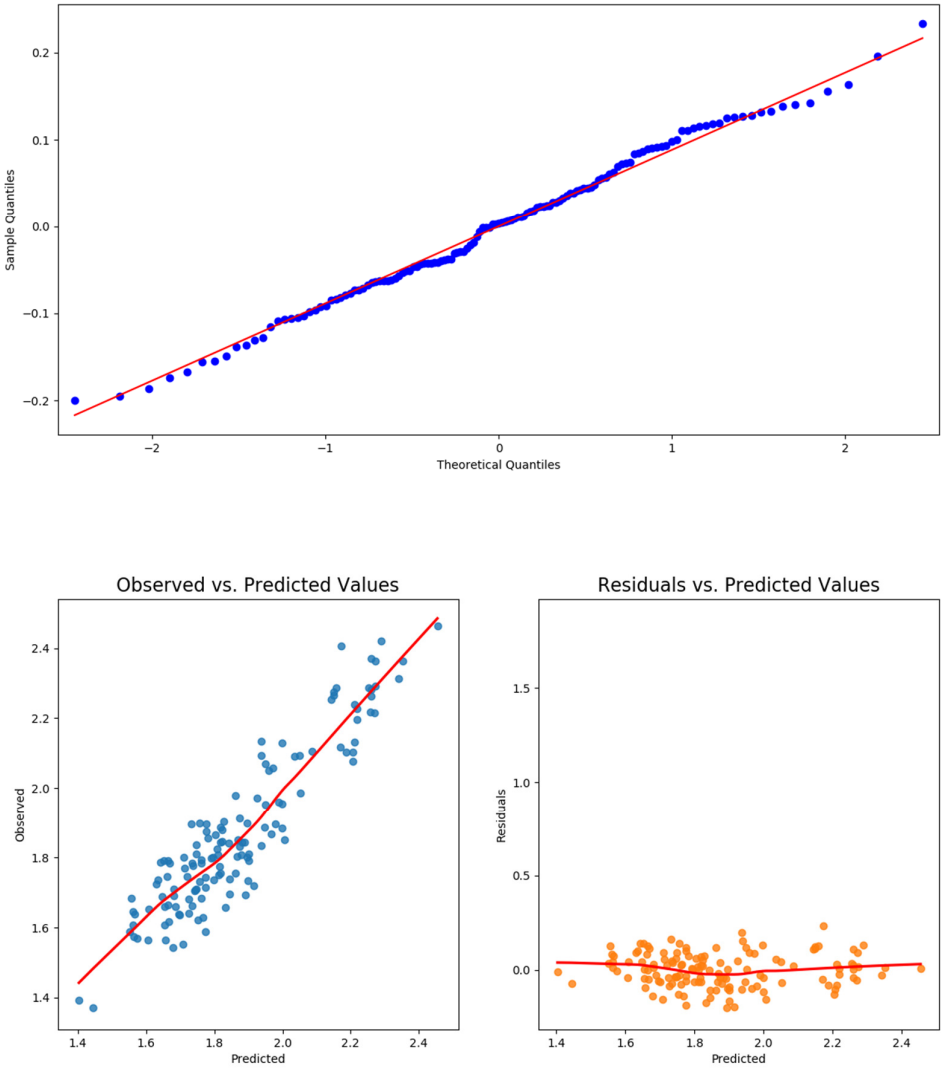

Figure 1: Q-Q normal plot of regression model residuals, and linearity test after nonlinear transformation

Discussion

Using the multiple linear regression analysis, we created a model of company spending on research and development. Our model suggests that company spending on research and development is significantly influenced by production process sophistication, the intensity of local competition, intellectual property protection, and the degree of customer orientation. Local supplier quantity missed the threshold 0.008, and buyer sophistication missed the significance level 0.05 closely. Some of these factors are more obvious, and some are less, as we further describe in this section.

The most obvious and the one with the greatest impact is the production process sophistication. A more sophisticated production process signalizes a more sophisticated product (or a regular product with the need for sophisticated production process) that may be more receptible to setbacks due to errors in the production process as well in imperfection in product design. The more complex product has more ways for errors to emerge. This means that more development is needed to deal with such a problem. Also, if the product or the production process is more complex, there are more degrees of freedom and so more overall possibilities of how to arrange the variables. Thus more research and development is needed to find the right arrangement. Additional perspective on company spending on research and development and production process sophistication might be that companies whose competitive advantage emerges from unique products and processes need to do some research and development to get to these unique products and processes. We tested this with linear regression, where we found results supporting this argument. When the company spending on research and development was predicted, we found that the nature of

competitive advantage (coef = 0.7291, S.E.= 0.033, p<0.001) was a significant predictor. The model fit was R2 = 0.787.

The second biggest impact on company spending on research and development in our model is by the intensity of local competition. This impact has on a first sight surprising direction of influence as it is a negative one. The more intense is the local competition, the less is company spending on research and development. This might be due to several reasons. First, the situation where more companies are spending on research and development might be riskier. The reason is that if there are more competitors on the market, more ways how to improve the product or processes are invented. Additionally, in the early stage of technology development, companies do not know whether they are not spending all their money on an inferior improvement. Thanks to information dissemination, it might be of a benefit to wait until the innovations are tested. Then companies can improve the technologies and products of their competitors and so nobody might have the intention to commit to extensive research and development fully. A similar argument was made by Huang (2011), who concluded that committing to R&D might have a negative impact on innovation. He argues that if companies focus too much on developing old existing technologies, they might miss new opportunities. As the past showed that some superior technologies were unsuccessful, compared to their inferior competitors (Katz – Shapiro, 1986), it might be of a greater benefit to investing into marketing than to R&D and maybe take the way of buying technology startups to develop the product or process. Another reason might be that companies do not have enough financial resources due to intense competition and cannot allocate as much as they would like into R&D. An alternative explanation could be that because there might be more competitors in a more intense local competition, the company does not have to spend as much on R&D because it can see what works by observing the competitors and can partially use this knowledge, so it does not have to start from zero.

Better intellectual property protection impacts the company's spending on research and development positively as they are more motivated to do so. If there is less intellectual property protection present in the country, the risk of being copied or otherwise damaged is bigger, and so companies are less inclined to invest in R&D. Similarly, the negative effect of a lower level of intellectual property rights protection on R&D was argued by Lai (1998), however different directions, both positive and negative, were observed depending on conditions of production transfer. Our findings are consistent with the arguments of Rapp and Rozek (1990) that lower property rights protection may result in lower innovation of processes and products and with arguments of Evenson and Kanwar (2003) whose research implies that a lack of intellectual property rights protection might mitigate technological change.

The degree of customer orientation is also a significant factor influencing the company's spending on research and development. The regression analysis implies that more orientation on customers positively influences the company spending on R&D. The explanation might be that to be highly responsive to customers and seeking their retention either a higher level of product customization or some mechanism of gathering the customer feedback and working it in the product are needed. This has to be researched or developed, and this is where we see the major causality of customer orientation on company spending on R&D.

Local supplier quantity missed the threshold set by Bonferroni correction p=0.008 so its significance is disputable and should be further studied. It is potentially positively impacting the company spending on research and development. If there are more local suppliers, this supports the research and development because the company has the resources and flexibility available right on the spot. Being situated close to suppliers might also help to cooperate if there is a need for some customization or if the company needs to know what is possible and whether there is a suitable component available, or if the company might be able to choose which supplier fits the need the best.

Finally, we included the buyer sophistication in our model, although it closely missed the set level of statistical significance (p=0.079). The reason is that the borderline significance indicates a possible influence, this influence can be well explained, and the overall regression model gets more precise when we keep the buyer sophistication in. The explanation for this factor would be that higher buyer sophistication leads to higher company spending on research and development because if customers are better informed and are deciding based on product performance, companies are driven to develop better products aligned with customers' expectations.

However, the direction of causation is not completely clear and might be a case of a virtuous cycle, where companies that need to customize their product because their customers are well informed about the market. To customize their product means that the production process has to take into consideration more inputs and so become more complex and needs to be more sophisticated.

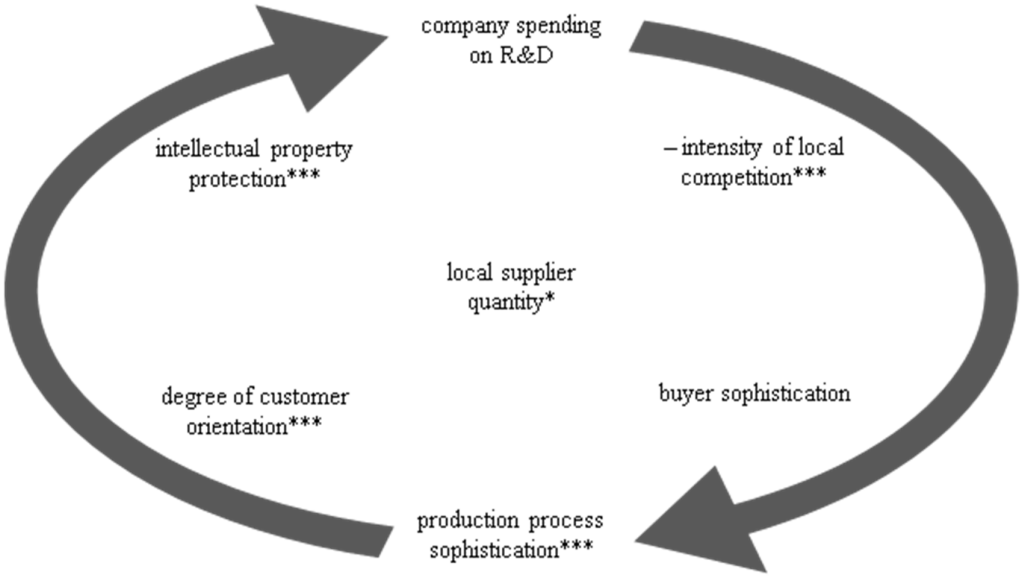

Figure 2: Virtuous cycle of spending on research and development (*p≤0.05,p≤0.01, ***p≤0.008)**

This creates the intention for companies to increase the spending on research and development, so the product and the production process meet the requirement. Finally, the research and development lead back to the more sophisticated production process, and the virtuous cycle starts over. The virtuous cycle of company spending on research and development is pictured in figure 2.

With the regard on Seebode et al. (2012) highlighting the need for innovation for sustainable development, our results support a company's understanding of what drives the research and development from competitive perspective. A company looking for a sustainable approach to business may look for a rather low local competition place with good intellectual property protection and with a number of local suppliers. Then by setting goals to create sophisticated product for sophisticated customers it will increase its chance of driving it to R&D and ending up with an innovative and sustainable business.

Conclusion

This paper investigated the drivers of company spending on research and development from a competition perspective. Using multiple linear regression, we created a model with variables selected from the World Economic Forum database, which selection was inspired by Porter's five competitive forces.

Based on the results, we are rejecting the H0 hypothesis and accepting H1 hypothesis that the spending on research and development can be majorly and significantly described by means of competition.

We found a model describing company spending on R&D consisting of production process sophistication, intellectual property protection, degree of customer orientation impacting positively and significantly, intensity of local competition impacting negatively and significantly, local supplier quantity that had positive impact but missed the 0.008 p-value threshold, and buyer sophistication that impacted the company spending on R&D positively; however it missed the cut off 0.05 p-value.

In our model, we potentially identified a virtuous cycle between product process sophistication and company spending on research and development.

At first sight, surprising was the negative impact of the intensity of local competition on the company spending on R&D. However, there might be several explanations as covered in the discussion; we lean to one that suggests that increased competition increases the risk of the spending on R&D being unsubstantiated. The developing technology might not be better than the technology of competitors. Meanwhile, the lifecycle of technology is shorter in an environment of more intense local competition. Here we want to emphasize that we do not think that the companies would not benefit from R&D and that we have rather a game theory view that considering the downside, the companies might not have the stimulus to do so.

A company that wants to shift to more sustainable business may do so by setting challenging goals by addressing knowledgeable customers an providing sophisticatedly produced products in combination with the right environment in less intense local competition, with a number of suppliers, and good intellectual property protection.

There are also many other interesting implications coming out of our research. This may be of importance for state dotation and subvention, as they can allocate more of these to industries with the more sophisticated production process.

In our research, the role of intellectual property protection emerged on several occasions. If a country wants to become more competitive and host more companies with sophisticated state of the art technology, they need to protect intellectual property rights. It seems to play a significant role in the competition and innovation field of research and should be focused on in future research.

An added value of ours is that in this paper, we used the data from the World Economic Forum database which has mainly macroeconomics use. Here we carefully selected the data that was relevant for study at the company level. Our results are providing a different viewpoint on company spending on research and development. Studying a problem from different perspectives is the foundation of scientific research.

Limitations

However, our research is not without some limitation; they are as follow. Some causation directions might not be entirely clear and in future research should be closely investigated in the best case with a natural experiment. There might be a possible generalization of the study. As a model represents a simplification of a complex system, there are more variables, and some of them might be more influential considering the individual basis of every case, so confounding variables might exist. This individual case would not show in our statistical analysis as it is a generalized model. Also, there might be some hidden variables that we did not consider in the model. Nevertheless, here needs to be mentioned that our model has a high coefficient of determination, so it should be considered as one of relatively high informative value. As we used the data from the World Economic Forum database, we had limited control over data collection.

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Reengineering in The Process of Company Restructuring

Krzysztof WASOWICZ
Department of Finance for Sustainable Development
Cracow University of Economics, Cracow, Poland
E-mail address: wasowick@uek.krakow.pl

Renata ŻABA-NIERODA
Department of Finance for Sustainable Development
Cracow University of Economics, Cracow, Poland
E-mail address: zabar@uek.krakow.pl

Abstract

This elaboration is to present the general theoretical considerations connected with restructuring, particularly with the process of reengineering. The purpose of this article is to depict the key issues with the process of reengineering. The aim has been to discuss, based on literature and own scientific reflections, the general assumptions behind one of methods used for organizational enhancements, the so-called Business Process Reengineering (BRP) method which, like no other solution, allows a comprehensive approach towards issues of a company and, simultaneously, results in higher effectiveness of its operations. As the methodical goal, presentation of the reengineering process in a company has been deemed. To enrich the cognitive value, the article includes many diagrams.

Keywords: Reengineering, restructuring programmes, recovery plan

Introduction

Nowadays, management is becoming more and more sophisticated. It is the result of various circumstances, which one may synthesize and narrow down to ever increasing changeability and complexity of the world. Management has been currently considered as one of the most important factors of economic and social development in countries [St. Sudoł 2016]. Today, it is crucial for companies to apply modern processes that directly influence the functioning and efficient management of a company. Enterprises must operate as dynamic organizations that exhibit great responsiveness to changes in their environment. The market situation requires or even forces application of advanced methods, auxiliary techniques, information improved through processing, strategic decisions, as well as complex process-related changes in the company. Among such solutions, one may distinguish reengineering as the subsystem of modern management; its implementation, combined with the decentralization of process and decision-making competences, is to increase the effectiveness of an organization.

The aim of this article has been to discuss, based on literature and own scientific reflections, the general assumptions behind one of methods used for organizational enhancements, the so-called Business Process Reengineering (BRP) method which, like no other solution, allows a comprehensive approach towards issues of a company and, simultaneously, results in higher effectiveness of its operations.

The article discusses the general theoretical considerations connected with restructuring, particularly with the process of reengineering.

Reengineering vs. basic principles of company restructuring programmes

Companies that struggle with difficulties need help in restoring their economic stability by preparing and implementing a recovery plan. The challenge, however, is to choose and introduce a management concept that will be strictly connected with the company's tradition, its current condition, and external factors resulting from the system environment. Business Process Reengineering is one of the few concepts that helped companies avoid bankruptcy [J. Myszak 2011, p. 169].

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The term reengineering has recently become extremely popular. BPR (Business Process Reengineering) is defined as the method of thorough transformation of whole processes in a company in order to optimize three general indicators of effectiveness: quality, costs, and delivery date, which is necessary to maintain the flexibility and competitiveness of the company. This method assumes the need for comprehensive changes in functioning processes and a proposition of re-development of the whole organization (as an institution), if it is to preserve profitability and solvency and improve customer service [K. Zimniewicz 2003, p. 23].

Reengineering is based on many ideas that had been known before. For instance, it focuses on customers' current needs and reduction of redundant costs already utilized in the concept of value analysis, which was developed in the 1960s, Reengineering also assumes cross-cutting thinking characteristic of inventive methods developed in the 1970s. Remedial restructuring involves restoration of the original, standard condition of the company's economy [Stabryła A. 2010, p. 318]. Reengineering serves as a type of stimulator of growth within the scope of sales, personnel effectiveness, and profitability of an enterprise [Berztiss A. 2012, p. 13].

Other major elements of reengineering include approaches popularized in the 1980s, i.a. benchmarking, just-in-time or total quality management. Reengineering, however, should not be considered as a conglomerate of old management methods; their elements are defined under new rules, which gives an amplified effect of synergy. One of the novelties of the discussed concept is the idea of organizing work around processes instead of functions. It owes its importance to the development of information technology, i.e. company information systems based on integrated computer networks. In consequence, effective management requires tools that will facilitate immediate flow of information on the company situation. Today, implementation of all organizational enhancements mainly involves computer technology. However, the improving contribution of computerization as such, in terms of company functioning, is insufficient to achieve a competitive advantage. Many enterprises "fell into the trap" of computerization. They automated all possible processes within their structure which directly led to an information overload that became one of the most significant reasons for creation and development of the concept of reengineering. In order to achieve organizational improvements, reengineering assumes redesigning the existing processes rather than automation of the current manner of business handling. Just like any proposed method of action, reengineering has solid support. It does not mean, however, that it is free from any criticism. Just as any other management tool, reengineering has its advantages and disadvantages, which have been listed in Table 1.

Table 1 Pros and cons of applying reengineering in companies.

Pros	Cons
• development of the concept of process management replacing functional management • assigning the highest priority to customer needs, declaring opinions on effectiveness of processes through the prism of customer satisfaction • very high potential advantages in many aspects of business activity • combination of well-known methods resulting in a synergy • usage of information technology • comprehensive thinking and actions, • increased efficiency, • shorter duration of processes • broad range of offered goals and benefits, • increased customer satisfaction, • higher position on the market, • positive radicalism, • flexibility and variety of methods applied simultaneously.	• an authoritarian management system during implementation of a concept, • a radical change in the course of processes and organizational structures that is rarely focused on the changing needs and expectations of customers, • excessive focus on cost reduction in the enterprise with respect to adjusting the offered bundle of values to the needs of selected customers • lack of recognition for intangible resources that develop values for the customer, particularly knowledge and experience of employees whose interests were affected • concentration on production (manufacturing) processes, negligence of promotion, distribution, R+D works the reengineering of which was difficult; in consequence, the interest in the enterprise on the market may decrease and this will expose it to financial losses • employees and personnel are unprepared for changes, • the aspect of employees is skipped during preparation of the reorganization, cultural aspects are neglected as well; this creates the risk of strong resistance to changes, which is

	tantamount to high risk regarding the implementation of reengineering • high costs of implementation, increased costs of employment • difficulties in implementation

Source: Own analysis based on [Brilman J., 2002], [Kisielnicki, J., 2004], [Martyniak Z., 2002], [Myszak J.M., 2001], [Toffler A., Trzecia fala, 2006]

Managers consider a market as effective when they are able to utilize its high potential. The utilization of human potential and operational resources might be deemed as the most effective use of company resources. Process effectiveness requires processes aimed at objectives of the corporation. Between those parameters, there is a conflict. Despite those conflicts, there is a strong pressure on process orientation in business. Companies make attempts to gain a position on an effective market by increasing their competitiveness. Effectiveness of resources is achieved when the factors of human potential in terms of efficiency and functioning are extremely flexible. Reengineering is a fundamental reconsideration, radical redesign of processes in the company which leads to a drastic (ground-breaking) improvement (...) of performance (within the scope of costs, quality, service and speed). [M. Hammer, J. Champy 1996, p. 57].

Reengineering specialists claim that reengineering is more than just a set of methods and techniques used to achieve a significant improvement with regard to: reduction of costs, increased quality, enhancement of speed of action. According to the referred subtitle of the general work by M. Hammer and J. Champy (A Manifesto for Business Revolution), reengineering is treated like philosophy of an organization the purpose of which is to revolutionize the structure and functioning. Such changes should translate into great and measurable effects. In order to implement such objectives, reengineering has developed general rules of procedure the application of which should allow better functioning of an organization [op. cit, p. 57]. The concept of engineering is constituted by fundamental reconsideration, restoration, and radical redesigning of an enterprise and its core processes by using advanced information technology [Czekaj J. 2009]. Detailed principles of reengineering provided by M. Hammer [Martyniak Z. 2002]:

1. action should be focused around results, not on tasks,
2. users of the process results should be organizers of the process concerned,
3. dispersed spatial resources must be treated as if they were in one place,
4. parallel processes must be coordinated while they are performed,
5. decisions must be made on-site of the process realization while the spatially dispersed management has only the right to supervise the decision,
6. gathered information should be transferred to one generally available data bank.

The first general condition to be met for reengineering, to revise HR management, is to create a working group that would fulfill the entrusted goals and form a partnership of people who know how to cooperate with each other. The team would need to be connected with strong bonds and will to succeed. In advance, the method assumes that the organization is bad and the first phase of the procedure is to determine the issue that requires improvement. A map must be created for the specific problem (Figure 1).

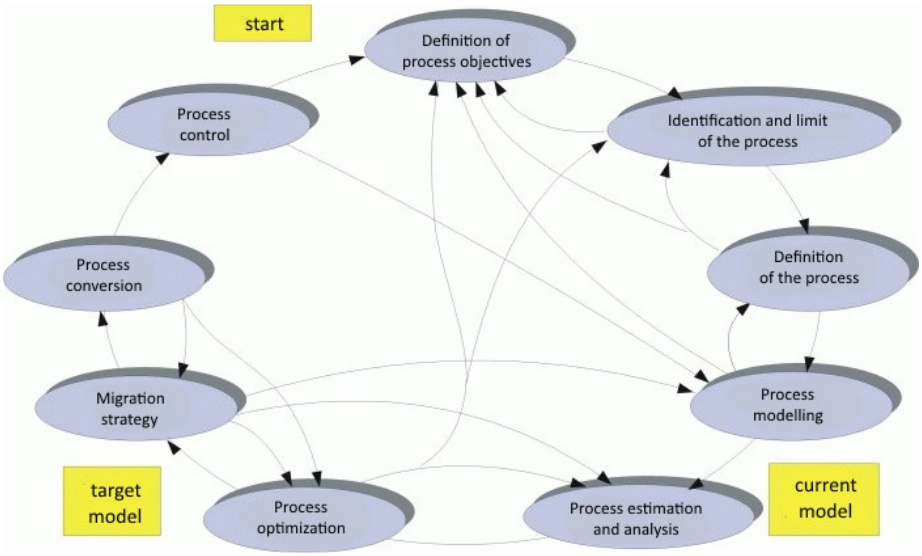

Fig. 1: Process analysis

Source: Own analysis based on W. M. Grudzewski, I. Hejduk 2000, p.17.

By using the map presented in Figure 1, one has to analyze the organizational system from the perspective of the following basic criteria:

1.What is the degree of intermediation, i.e. how many people and organizational cells is involved in solving a particular problem?

2.What is the degree of cooperation between executors with regard to problem solving?

Depending on the formed correlations between the listed criteria, namely: cooperation and intermediation, it is attainable to depict the following four general patterns of functioning of an organization (Figure 2):

- High intermediation and low cooperation - 1st quarter,
- High intermediation and high cooperation - 2nd quarter,
- Low intermediation and high cooperation - 3rd quarter,
- Low intermediation and low cooperation - 4th quarter.

high cooperation		B **B'**
low cooperation	A	
	high intermediation	low intermediation

Key:
A initial condition of the management system (before reengineering),
B condition of the management system after the 1st phase of reengineering,
B' condition after the management system after t time.

Fig. 2. Patterns of management processes

Source: Own analysis

. A centralized human resources management system is characterized by many decision-making levels. The decision is made at the highest level; it must pass through many organizational levels before it reaches the executor. In reality, the distance is duplicated. The first time is considered as the route that information must travel through from the executor's level, the second time is constituted by the route of information in form of the executor. The latter involves various types of information distortions. The general designing principle states that the longer the route, the higher

the probability that the conveyed information will be distorted. The time requirement is also extended. It is assumed that a centralized system features high degree of intermediation. A democratic human resources management system, on the other hand, means low intermediation and high effectiveness of operation. The first and the second quarter characterize a centralized system while the third and the fourth – a decentralized one.

The second analyzed criterion, namely cooperation, can be determined on the basis of frequency and intensity of exchange of information between members of the cooperating team. It may be concluded that the first and the fourth quarter feature a low degree of cooperation among team members, while the second and the third depict a situation in which the said cooperation is adequate. Thus, we may conclude that the situation illustrated by the first quarter is unfavorable for the organization while the best situation is when the organization can be described with the use of the third quarter. As to the remaining two quarters, one may claim that they are satisfactory, but the managerial team could still achieve more.

If a conducted analysis decides that the situation of the tested organization is best illustrated by point A in the Figure, the course of action should be focused on achieving point B.

There are many paths to follow. The choice of an optimum direction of improvements can be considered as the next step in the procedure aimed at improving the functioning of an organization. The said choice, first of all, depends on the type of an organization and on mobilization and dedication of its employees to strive for perfection. Next steps include implementation of improvements and determination of further directions of the procedure. The procedure can be presented as a loop of activities that lead to increased competitiveness of the organization and the adjustment of its development strategy to the market requirements, since achieving point B is unsatisfactory for the managers, so better solutions are sought for. After the t time, such a better solution is represented by point B'. The described approach is consistent with the general rule of reengineering, i.e. the continuous search for the best solution possible. In this philosophy, there is a consentient relation between the reengineering approach and the approach presented in the so-called "Kaizen" system. However, the methods used to reach perfection are different. Kaizen uses the method of "baby steps", which means constant yet slow improvement. Reengineering, as it has already be mentioned, involves revolutionary and dramatic changes. These two global principles of improvement (low intermediation and high cooperation) are realized, among others, thanks to partial improvements in the management process. The set of such partial changes is quite extensive. Among the most crucial actions, one may include:

1. Elimination of processes that are performed multiple times. If something is conducted two or several times, it will increase costs and result in acquisition of various information. Such duplication is sometimes used in situations that involve safety factors and special tasks.

2. Elimination of activities that contribute no new values to a particular procedure. Very often, a particular case is sent for reference to other organizational units that do not contribute anything to the case. It is very often used in order to disperse responsibility, but it leads to extended time of information flow and process realization, as well as it gives rise to risk of errors in the conveyed information. Elimination of the said process will accelerate case handling by an organization and, consequently, increase the functional efficiency of the organization.

3. Determination of priorities, i.e. implementation of the 30/70 rule. In practice, 30% of actions decides on 70% of the operations of an organization. Then, it is important to determined such most important actions and first of all focus on completing them.

4. Simplification of the formula, i.e. the language. Process standardization. Whenever possible,
individual processes should be standardized and adjusted to international norms, such as resulting from, e.g. ISO 9000. One may claim that all the listed rules of improvements are compliant with the general idea of reengineering, namely the constant improvement of quality, i.e. realization of CQJ rules (Continuous Quality Improvement) [S. Slatter, D. Lovett 2001, p. 145]. The main tendencies that affect the use of reengineering in companies are: the intent to implement strategic objectives by the management, problems of the company with competitors (i.e. when the position of those companies on the market is diminished, profits become lower, costs increase), expecting results of reengineering by managers within a period shorter than one year, the companies "comprehension" of the market and customer need, the impact of reengineering on the project realization time is more important than the risk and cost of a particular undertaking, realization of a goal connected with functioning of the company, namely, for instance, increased profits, evoking customer satisfaction, minimization of costs, increase in turnover.

Tools and techniques to support restructuring programmes

Reengineering was incontestably the key method used to improve organizations in the mid-1990s. Its application requires thorough reconsideration of every aspect and radical reconstruction of operating processes in order to achieve

a significant enhancement of critical and basic metrics, such as: costs, quality, level and speed of service. The managerial personnel of the organization is the most important factor that facilitates reengineering. It results in an upgraded management system and shorter time needed to make decisions and handle customers. The success of reengineering depends on many factors. Application of the BPR methodology will help the company make a great step forward. Reengineering is a process as a result of which the company constantly seeks for more and more effective methods thanks to which it will develop competitive advantage. One should bear in mind that implementation and application of the complete BPR methodology is quite risky and the challenge results from the difficulty of planning all the processes and changing people's mentality that accompanies such transformations [A. Toffler, 2006]. Reengineering should be supported with other methods, such as, for instance:

- Lean Management - the process of organization leaning,
- Outsourcing - the "make or buy" analysis,
- TQM - management through quality.

The process approach in management has been best reflected in concepts such as: quality management (TQM), restructuring of economic processes (BPR) and economic process management (BPM) [Nowosielski S. 2009, p. 273].

Tools applied during reengineering and their advantages

Business Process Reengineering is a concept that, despite it short existence on the market, has developed certain general conditions and rules of procedure that facilitate achieving a significant improvement both in functioning of an organization as well as in its structure. Implementation of the Business Process Reengineering concept, however, is demanding. The enterprise must be creative, eager to take action, as well as focused on constant changes in management processes that, in general, never end. Organizations that conduct reorganization are mostly those that learn eagerly and utilize the potential of modern technology. Execution of changes in the scope of a new vision, organizational culture, or a completely new management style forces the modern managerial personnel to make serious decisions: should they act with some risk involved or avoid the risk but hinder the company's development? [Myszak 2011, p. 169]. When selecting the tools that we intend to apply, we must be very tentative. If we utilize an incorrect tool, a lot of time will be wasted for familiarization. If we decide on an excessively complicated computer system, we will stay focused on learning the techniques and computer software while our objective (the tools were supposed to help achieve) will become set aside [C. Suszyński 2003, p. 98]. With proper tools it is possible to avoid the trap of an excessively high level of detail and the system will be improved at great speed. Every utilized tool must be treated like an investment that one expects to bring profit, but with different rules that apply.

Organizations willing to create a process-oriented structure should [Bitkowska A., Żyłko W. 2009, p. 151 - 155]:

- convince all its members to the positive influence of process development on the effectiveness of operation (with simultaneous identification of potential hazards);
- identify and describe their processes (create a map);
- introduce measurement for individual processes as the basis used to manage their effectiveness;
- implement a structure favoring an organizational system working towards process management;
- shift to active process management, establishing higher maturity of the process organization.

Effective management more and more often appears to be a process compliant not with functional structures, but rather with organizational processes since that is where added value is generated [Brzeziński M. 2016]. Proper tools used during process enhancement may also include: a pen, paper, a board, simple computer systems and advanced ones to facilitate process design.

Advantages of tool application include [M. Hopej 2000, p. 87]:

- improved productivity,
- increased quality,
- shortened task implementation time,
- elimination of redundant work and concentration on generated added value.

What is more, one should bear in mind that in order to achieve the above, every person implementing the project must familiarize with and learn how to use the tools. Despite the fact that there exist companies which succeeded thanks to reengineering, literature on the subject provides three main reasons of failure in implementing changes so radical like reengineering. The first reason: people generally avoid changes; they are afraid of them and resist them; it is a so-called psychosociological problem. Most often, employees criticize changes. Thus, in order to implement reengineering, it is necessary to introduce changes in a specific way, so that employees criticize them not as third-parties, but as someone who is involved in the innovation. The second reason of failure is wrong organization of the reengineering team. Such a group must comprise of people who are synchronized and cooperate with each other. According to the said rule, criticism is aimed at the concept and not its authors, while ideas belong to the whole

team. The third obstacle is about tradition, habits, customs. It is the more difficult than the previous to since it is invisible. These barriers constitute the existing culture of the organization. Introduction of information technology has changed the nature of individual jobs, affected the insights on them. According to the definition proposed by M. Hammer and J. Champy, the core idea of reengineering is the radical change and focus on organizational functioning based on processes. Although the term is evolving and the approaches of various authors towards reengineering differ from each other, all of them are consensual in terms of the two above-mentioned factors. What is more, these factors differentiate reengineering from other improvement plans, particularly from continuous improvement programmes, such as: total quality management, employment optimization, restructuring, or automation. What the said programmes have in common is that they introduce partial changes to improve the current manner of operations [I. Durlik 2002, p. 85]. They implement only selected goals or individual objectives at the cost of others. Reengineering, on the other hand, aims at simultaneous improvement of quality, reduction of costs, increase in flexibility, speed and accuracy of operation, as well as at improvement of customer satisfaction. To make it feasible, reengineering utilizes the process approach, whereby other programmes are concentrated on functions (TQM uses the process approach, but in a slightly different manner) [R. Muller, P. Rupper 2000, p. 127]. It also stimulates deep a deep analysis and thorough reconsideration of the current method of process realization. Occasionally, it leads to a complete replacement of the manner of operation. Reengineering employs a holistic approach towards organization; it considers both the technical as the social aspects of functioning of an organization. At the same time, reengineering is a viewpoint that involves various concepts of management and improvements as well as of methods they apply.

Financial restructuring stands for financial reconstruction based on a fundamental change in the finance management and capital structure, with the acknowledgment of changes in assets and ownership, in order to increase the company value in favor of shareholders and owners and improve relations with other stakeholders [Porada-Rochoń M. 2009, p.80]. There are many techniques that facilitate the decision-making process, yet the majority of present tools and methods is of financial nature, which indicates that efficient management of a modern company is allowed by economic optimization (so-called financial management). The measurement generally adopted by lending institutions or analyzing the reliability in order to assess the condition of companies in terms of, e.g. the rate of return on invested capital or the capability to generate profit, etc. must undergo special transformations. Thus, from the practical point of view, financial management of a municipal company involves adhering to the principal of financial balance, which is expressed through:

- efficient management, i.e. the ability of economical use of production factors available at disposal of a business entity,
- profitability, i.e. the expression of acceptance of products (services of a particular business entity by its environment.

Starting from the first attempts to measure effectiveness of conducted business activity, costs constitute the subject of thorough research, analyses, assessments and verification. Careless approach towards costs, reflected in undue trust in causative factors, high revenue and, consequently, lack of their control in the context of generated effects, is the best way to forfeit hopes for the profitability of undertaken actions. That is why managing business activity requires exhaustive calculations of the expected revenue, with regard to connected resources in a retro- and prospective setting. It means that each economic decision requires an estimation of future needs within the scope of financing by creating forecasts that constitute the core element of planning and the grounds for preparing a budget based on the analysis (diagnosis) of the current condition.

The above strategy requires a special system to coordinate specific management actions, mainly in the scope of planning and control as well as collection and processing of information, i.e. controlling (Figure 3). Development of market economy, the volatile environment of companies, increase in competitiveness, globalization, growing difficulties in coordination of company units - all these factors complicate company management which should be aimed at the future; they result in a need to conduct ongoing quality control of the decisions made. In this case, operational controlling is utilized. It facilitates creating a rational structure of competences and responsibilities at various levels of management and associating the achieved results with the incentive system [Sierpinska M. 2017 p. 15].

Elements of controlling, budgeting, and a cost theory were used in a recovery plan of a municipal local collective transport company operating in a large Polish city by introducing a large-scale programme of managerial contracts. It mainly comprises of a system of data regarding costs and revenue assigned by ranges of responsibility. The system is based on a premise that the manager should be liable for the implementation of tasks they were entrusted with, performance of their subordinates, as well as for any actions taken within their subordinated responsibility center. Settlement of responsibility in the categories of efficient management and profitability of undertaken actions:

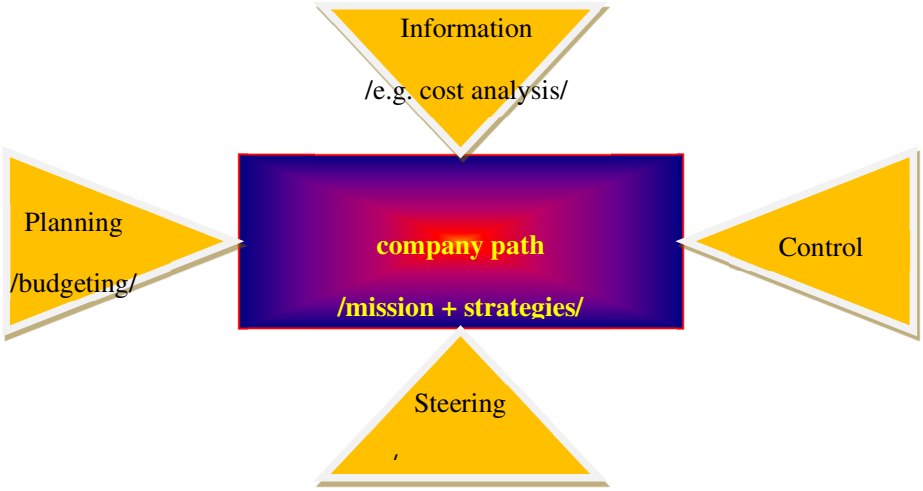

Fig. 3. The idea of controlling

Source: Own analysis.

1. it decentralizes the decision-making process; decentralization of management means expanding rights and increasing the independence of lower-level organizational units; it provides the possibility of developing initiatives and creativity, using reserves and reducing the amount of information (also shortening the time of information flow). As a result, a simulation of market conditions and application of free market tools is created;
2. it helps the management with realization of the management concept through objectives; according to the concept, managers determine a certain set of objectives and the work of each manager is then assessed through the prism of set goals that have been achieved. Apart from ongoing effects, it will allow constructing a system of norms based on economic parameters and applied indicative planning.
3. it constitutes a point of reference to assess work results and help in determining task realization standards;
4. it allows effective usage of the management concept through exceptions; it means drawing the managerial staff's attention to any deviations from adopted standards and planned deliverables.

In order to create an effective system of responsibility settlement, three general conditions must be met:.

1. the organizational structure must be well-verified, all its levels must feature balanced responsibilities and competences, whereby both these parameters must be clearly specified and acknowledged;
2. standards in scope of costs, revenues and investments must be properly determined and precisely defined;
3. reports on settlement of responsibilities, i.e. achieved results, should include only those positions that are controlled by the manager of a particular responsibility center, as well as they should indicate the issues that require particular attention of the management at a given time.

To conclude, it should me mentioned that thanks to the application of reengineering methods a company may make a great step forward. Reengineering is a process as a result of which the company constantly seeks for more and more effective methods thanks to which it will develop competitive advantage. Reengineering requires an analysis of the whole system, not just one department or division of it. Actions must involve cooperation of many people and relevant HR management. Corporate changes mean incurring quite significant costs in order to modernize Information Technology as well as analyze the functioning system. Reengineering results in reduced costs and increased competitiveness of the organization.

What is more, one should mind the necessity of incurring (sometimes pretty high) costs to apply state-of-the-art Information Technology. Saving will forfeit the chance to utilize the process of reengineering**.**.

Conclusion

In times of intensified competition, success will be possible only for companies that are able to skillfully shape the incentive system, as well as of observe own costs, analyze their structure, and draw conclusions for future reference. The changing management conditions force the company to make difficult decisions while managers need fast solutions for diversified and urgent economic problems. Reengineering, as an applied company recovery plan, is considered to be an example of such solutions.

Reengineering is broader in literature than in the practice among Polish companies. Traditional tools, such as budgeting and budget control, can be used effectively, provided that they are mainly oriented at future development

of the company. One of the methods is delegation of decisions and creation of autonomous units. The next phase means mutual determination of objectives and their skillful translation into operating activities in form of well-constructed budgets with simultaneous division of costs into those dependent on and independent from the management of a particular unit. Association of work results with the remuneration system through determination of budget parameters that bonuses or allowance will be calculated from.

To sum up, reengineering stands for reorganization of processes. However, it rather refers to certain philosophy of conduct rather than reorganization as such. It can be understood as implementation of radical changes in business processes in order to achieve maximum effectiveness along with cost reduction. Reengineering does not provide a complete procedure formula. It is an expensive, complex model used to design processes in an enterprise. Thus, reengineering changes almost everything: it covers work positions and people who are to assume them, changes people's relations with managers, their career paths, employee assessment and remuneration methods, roles of managers and the management board, it even changes the mindset and culture of the company [Penc J. 2005. p.55]. In general, reengineering turns the company upside down.

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Information Resources Structuring to Support Decision-Making Process for Organization of Sensitive Cargo Transportation in the COVID-19 Crisis

Iouri SEMENOV
West Pomeranian University of Technology, Szczecin, Faculty of Maritime Technology and Transport, 41 Piastów Ave., 71065 Szczecin, Poland, iouri.semenov@zut.edu.pl

Ludmila FILINA-DAWIDOWICZ
West Pomeranian University of Technology, Szczecin, Faculty of Maritime Technology and Transport, 41 Piastów Ave., 71065 Szczecin, Poland, ludmila.filina@zut.edu.pl

Piotr TROJANOWSKI
West Pomeranian University of Technology, Szczecin, Faculty of Maritime Technology and Transport, 41 Piastów Ave., 71065 Szczecin, Poland, piotr.trojanowski@zut.edu.pl

Abstract

Transport companies often obtain differentiated and incomplete information, that obstruct the organization of cargo transport process. This issue is becoming increasingly current during the ongoing COVID-19 pandemic. The article presents the methodology for structuring information resources, used to make the right decisions when organizing transportation of sensitive cargoes. The application of classification procedures, clustering, as well as analysis and synthesis of ordered information resources for the sensitive cargo carriage as an integral approach have been proposed, which allow for ordering the information used by transport companies. Verification of offered methodology was presented on selected transport route example. Implementing the presented approach make it possible to group the information resources that may be beneficial for the decision making process, i.a. when selecting the route for sensitive cargo transportation during COVID-19 crisis.

Keywords: transport, information structuring, sensitive cargo, COVID-19.

Introduction

The development of sensitive cargo transportation was observed in last several years. During transport, these loads require ensuring of special conditions or use of specialized rolling stock, which is usually associated with the need to observe more restrict regulations comparing to conventional cargo transport. These include loads requiring controlled temperature, dangerous and oversized ones, and live animals. Organization of their transport enforces the decision makers to collect and analyze different information resources, including these that alter together with environmental conditions changing.

Currently, numerous changes in the road transport sector are observed, including:

- rising demand for specialized transport services, which forces sensitive cargoes carriers to be more accurate in development of transport routes, considering emergency situations occurrence,
- fast development of road transport infrastructure, which makes it necessary to use more effective technologies of possible threats prevention,
- high road accidents rates, even with their fall in recent years their level is still relatively high, which influence risk of failure to perform the transport task,
- increase in the consignor/consignee requirements, which is associated with the need to deliver undamaged cargo on time,
- use of computerized subsystems in vehicles, which in the event of their failure require specialized service stations to repair,

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- COVID-19 pandemic influence on road traffic and drivers' behavior etc.
- These changes mean that transport companies dealing with planning and organizing of freight transport, including sensitive cargoes, analyze a lot of information that should enable them to make appropriate decisions related to cargo transport activity. Therefore, two issues should be taken into account:

1. The need to acquire structured information that will enable, among others:

- proper classification of sensitive cargo, taking into account the entire spectrum of transported sensitive loads and their properties,
- mapping the road safety condition,
- identification of important factors of safety loss on particular sections of planned routes.
- Maintaining the quality of obtained information resources, including its searching, selection, sorting, aggregation, ordering, knowledge mining, etc. Data processing by transport companies may include:
- processing data acquired in past research - refers to transformation of databases accumulated during simulation, optimization of transport task draft, etc. into ordered information files. Consequently, the phenomenon of so-called "out-of-date information" may occur and it cannot be used to solve current issues,
- processing data over time - refers to the data acquisition and processing phase, during which the data may be subjected to change, e.g. fuel prices, customer preferences, etc. As a consequence, the data collected in the past does not always reflect the present reality, nor future situations,
- operational processing - refers to the stage of transforming information during the development of cargo delivery plan, when collected information can be utilized to support the decisions made. In consequence, the decision-maker may make mistakes when assessing the credibility of the previously collected information.

Incorrect information (e.g., false, out-of-date, inaccurate) used by transport companies to make decisions regarding transport of sensitive cargoes may result in losses, the magnitude of which may threaten their competitiveness or operations. Therefore, a new insight both for data itself and on how to process and organize them is required to establish and increase the credibility of information available to transport companies.

The objective of the present article is to introduce an information structuring methodology, which - once applied - may be helpful in decision making in the field of organization of freight transport of both conventional and sensitive cargoes, especially during COVID-19 crisis. The article presents a general view of the issues raised, and identifies areas, where this structuring is particularly needed.

Literature Review

Current knowledge of road safety and freight transport is quite extensive. The literature presents research on the impact of economic changes on the level of road safety (Girasek and Tylor, 2010). Various factors influencing the selection of freight route are analyzed, including vehicle ownership, household structure, family size, characteristics of road infrastructure, etc. (Galkin et al, 2019; Pulugurtha et al., 2013). The impact of demographic and infrastructure changes on traffic accident rates was also examined (Noland and Oh, 2004).

However, little attention was paid to the issues of sensitive cargo transportation. The need to secure appropriate transport conditions for these loads is usually stressed. The issue of their appropriate classification, when taking into account diversity of their characteristics (e.g. the LNG is both a dangerous cargo and one requiring controlled temperature), is observed.

Available subject literature also investigates information processing methods (Anderson, 2009; GUS, 2007; Ossorio, 1966), including those applied to road traffic safety. Jovanis and Chang (1986) point to the fact that the use of accident statistics segmentation techniques allowed for a much better understanding of the effects of road accidents than the one, which could be obtained from aggregate data contained in various crash analysis reports. In a number of subsequent studies, such an analysis was repeated (Miaou, 1994), while Levine et al. (1995) performed the analysis of relationship between spatial traffic characteristics and number of road accidents in order to isolate the so-called Black Spots. The advantages of information segmentation techniques finally allowed to conclude that it is possible to discover knowledge in already known sets of information (Thomas, 1996) by investigating the influence of infrastructure segments length on distribution of accident frequency. The research results proved that this frequency is variable.

Observed high level of road accidents contributes to development of another trend in research, which concerns the development of road transport accident models as a tool supporting making effective decisions. Such models are usually based on the use of "traffic analysis zones", i.e. territorial units commonly used in transport task planning models (Martinez et al., 2009). Lee (2014) showed that the majority of road safety studies concern urban traffic (75-82%) and only 18-25% of research relates to extra-urban traffic. Whereas the research conducted in Germany demonstrated that over 50% of accidents occur on just 10% of total length of transport routes (Brannolte et al., 2009).

Conducted literature review made it possible to conclude that there are systematic inaccuracies in data sources, which constitute one of the basic origins of erroneous inference about the condition of road safety (Bohanec and Rajkovic, 1988; ESMA, 2017). According to Iaych (2017) there is a number of independent institutions dealing with collection of statistical data on the effects of road accidents with the use of various methodologies. Available reports analysis revealed that, in Poland for example, there are six institutions dealing with the collection of data on road accidents, including: police units registering traffic accidents, medical facilities drawing up their own documentation of accepted patients, civil registry offices issuing death certificates, emergency rescue facilities, insurance companies, and the Office of Technical Inspection (Pol. "UDT"). This practice is the source of information noise (Table 1).

Moreover, discrepancies in terminology, used in institutions dealing with the collection of statistical data on effects of road accidents, were observed (Table 2). The problem with acquisition of data that would be detailed enough to allow understanding the issue of road traffic safety in a selected areas was also indicated (World Bank, 2014).

Table 1. Discrepancies in data on deaths in result of road accidents (own elaboration based on (Iaych, 2017))

Country	According to police reports	According to medical facilities	Deviation (%)
Egypt	6700	11000	64.2
Belgium	724	1014	40.1
Japan	4373	5971	36.5
Chile	1623	2116	30.4
Korea	5092	6374	25.2
Italy	3385	4192	23.8
Netherlands	570	650	14.03
Spain	1680	1915	13.9

Table 2. Discrepancies in terminology concerning deaths due to road accidents (own elaboration based on (Iaych, 2017))

Accident result	Place of death	Time of death
Deceased	on the site of the disaster	-
Deceased	undetermined	– within 24 hours after the accident
Deceased	undetermined	– within 7 days after the disaster
Deceased	undetermined	– within 30 days of incident
Deceased	undetermined	– within a year of the disaster
Deceased	undetermined	– time of death after the accident unspecified

During the last two years (2019-2020) a new factor in the formation of distortions in information about accidents has occurred, resulting from the COVID-19 pandemic. This factor influenced the mobility decrease of both passengers and goods, in particular cross-border traffic (Kraemer et al., 2020; Oguzoglu, 2020; Saladié et al., 2020). The attention was paid that the economic recession reduced the demand for transport services, which positively influenced the improvement of road safety. However, the analysis carried out by the authors of this study indicated that the decline in demand for transport services is only one of the effects of the pandemic, which could mislead researchers about the reported reductions in road traffic collisions, injuries and fatalities. Therefore, two suggestions may be formulated:

1. Contrary to the positive trend in road safety, a pandemic creates a number of negative factors that affect the level of road accidents. Such factors include increased stress and anxiety among drivers caused by the pandemic, increased alcohol consumption (Vingilis et al., 2020) etc. This contributes to the shift of smooth driving style to an increasingly dangerous one, which in turn causes an increase in speeding on urban roads and highways. During a pandemic, collisions caused by aggressive driving behavior become more noticeable against the background of reduced traffic, which in turn causes stress for other drivers. It is obvious that the relationship between the factors reducing the number

of collisions and the factors increasing their number is not simple. However, distorted information, convincing about increased security during a pandemic, can complicate the situation.

2. As restrictions of COVID-19 pandemic are eased, the likelihood of new patterns of road users' behavior will increase. Those who return to work will be reluctant to use crowded public transport and will choose to commute by private vehicles. Such a trend is likely to increase the number of hazardous incidents on roads. OECD (2015) research revealed that there is a relationship between economic growth and the number of fatal accidents. Studies carried out in various OECD countries showed that the existing relationship can be described by the following formula:

$$Ft = a\left(\frac{GDP}{h}\right)^2 + b\left(\frac{GDP}{h}\right) + c + \varepsilon t, \quad (1)$$

where:

F(t) - the annual number of deaths at the national level,
$\frac{GDP}{h}$ - GDP per capita,
a, b, c - coefficients, which values vary depending on the country,
εt - limit of possible statistical error.

The aforesaid situations influence the growth of significance of efficacy of cognitive processes, directed towards the investigation of potential events and phenomena capable of disrupting the transport processes organization. It justify the need to undertake the research on structuring information required to plan and organize the sensitive cargoes transportation.

Methodology

General assumptions of the methodology

Any attempt to broaden the knowledge is based on data collection and processing procedures aiming at their ordering (structuring) according to certain parameters, e.g. the hazards level within traffic flow, likelihood and consequences of road accidents, etc. Clustering or classification may be performed in order to organize the acquired data, thus allowing taking into account the requirements for subsequent analyzes within the so-called knowledge discovery process. Therefore, it was possible to identify groups of information processing procedures related to sensitive cargoes transportation (Fig. 1).

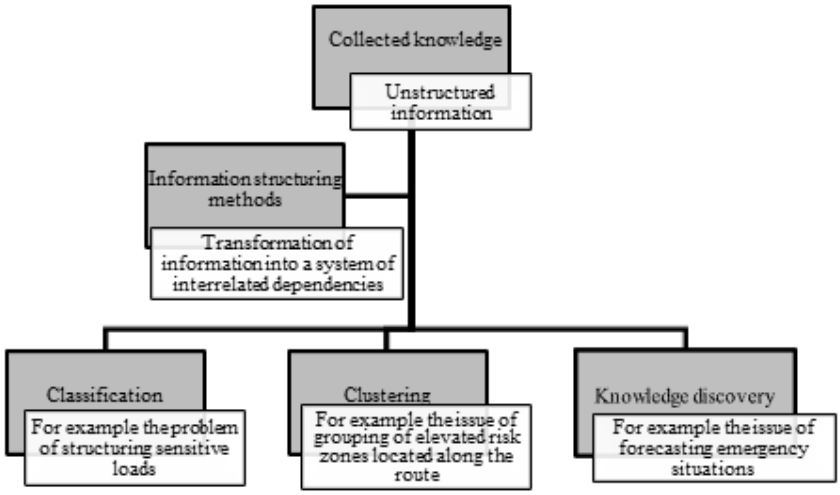

Fig. 1: The components of the cognitive process

Specific procedures may be created within specific groups and may include:

1. Procedures for organizing the set of information by dividing it (classification). Classification is understood as systematized division of group (e.g. units, objects or phenomena) into parts according to the adopted rules and

contractual criteria, where each of these parts is distinguished by features that the other ones fail to exhibit, as measured for the purposes of present statistical data. The classification structure can be both hierarchical (e.g. the classification of activities or products), as well as unstratified (GUS, 2007). It is performed on the basis of the division criteria (supervised classification). Such criteria will allow, e.g., for allocation of each sensitive load to one of the predefined classes, which can solve the problem of proper classification of such cargoes, and allow for more reliable planning of their carriage. These criteria may include sensitivity of cargo to, e.g., haulage conditions, transport duration, road geometry, damage or criminal activities (theft) etc.

The number of classes in an ordered set of information can be predetermined, e.g., by the variety of sensitive cargo characteristics. The loads with similar physical and chemical properties, as well as their transportability included in the same class of created classification, may differ from that of loads grouped in other classes.

2. Procedures for organizing the set of information by grouping it (clustering). This group of procedures includes sorting procedures for unstructured sets of information. An example of such a procedure may be sorting aimed at the separation of high risk zones located on the routes of sensitive cargo transport. The threat level of liquidity of supplies in such zones can be measured by an integral threat level indicator, where the variables are:

- the degree of imperfection of road infrastructure - taking into account the lack or excess of road signs, limited visibility fields, too-tight corners, high road curvature, low number of parking bays, etc.,
- the working order of road transport means,
- the severity of road accidents - taking into account the number of deaths, injuries of road traffic participants, amount of economic losses due to the accident or its negative impact on the environment, etc.

In order to properly group possessed information, the criteria are adopted, taking into account, for example:

- similarity of road accidents according to their effects using the criterion of minimizing the so-called distortion measure of collected information,
- black spots located along the analysed route, where extraordinary situations already took place in the past or they may occur in the future, etc.

The resulting groups, detected in ordered information set, form the basis for their concentration and are called clusters (e.g. high risk zones, where accidents with similar causes or consequences occurred or may occur). The result of sorting is the determination of all possible clusters.

3. Procedures for analysis and synthesis of an ordered information system. Properly structured information gives the opportunity to conduct the cognitive processes involving active processing (analysis and synthesis) of ordered information system. In this case, the cognitive process initiates with the compilation of individual elements in subsets of information (analysis according to their characteristics) and terminates with the synthesis of possible scenarios for carrying out transport tasks, i.e. prediction of future events (discovering knowledge in structured information databases - following the previously presented procedures).

Information structuring procedure

The procedure for structuring information on the transport of sensitive cargo was proposed. This procedure initiates with the analysis of information sets e.g.: cargo types , their features, errors in road transport infrastructure, directions of cargo transportation, working order of vehicles, road accidents, high risk zones, etc. As part of the performed research, three methods based on statistical indicator systems were used, reflecting the homogeneity of the phenomena and/or processes investigated, including:

1. Method for assessing the reliability of information utilizing the analogy principle. It is based on the procedure of comparing information on similar phenomena or processes from the past.
2. The method of assessing the reliability of information using the so-called standard deviation, the value of which indicates how much the values of tested feature deviate from the arithmetic mean. Standard deviation σ can be calculated using the following formula:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i-\mu)^2}{N}} = \sqrt{\frac{\sum_{i=1}^{N}{x_i}^2}{N}} - \mu^2, \tag{2}$$

where:

x_i - values of the feature elements collected in the statistical data set,
μ - expected value,
N - number of objects in the statistical data set.

The following assumptions may be applied. If information about the analyzed phenomenon/process falls within:
- one standard deviation, the probability of this information is 0.68,
- two standard deviations, the probability of this information is 0.95,
- three standard deviations, the probability of this information is 0.995.

3. Method for assessing the reliability of information utilizing the correlation coefficient, i.e. the measure of the linear relationship between the *X* and *Y* characteristics.

   The assumptions applied are as follows. If the correlation coefficient:
- $r_{XY} < 0.2$, there is no interrelation and the analysed information is unreliable,
- $r_{XY} = 0.2 \div 0.4$, it denotes weak interrelation, and the analysed information is questionable,
- $r_{XY} = 0.4 \div 0.7$, it denotes moderate interrelation, and the analysed information requires additional verification,
- $r_{XY} = 0.7 \div 0.9$, it denotes quite strong interrelation, and there is high probability that the analysed information is reliable,
- $r_{XY} > 0.9$, the analysed information is reliable.

On the basis of test results analysis (Table 3; Ossorio, 1966; Singh and Raj, 2004), the concept of the space of the structuring process may be formulated, as an organizational structure containing a description of features of the research objects, which may differ. From the modeling theory it is known that each object can be described as a vector of certain functions of its geometric, functional, economic, and other features:

$$x = [f_1(x), \dots, f_n(x)], x \in X, \tag{3}$$

where:

$f_1(x), \dots, f_n(x)$ - functions of geometric, economic, etc. features of the object,
x - object described by listing its geometrical, economic, etc. features,
X - a set of homogeneous objects.

Table 3: Evaluation of information reliability in the analyzed databases

Reliability of information regarding:	Values of reliability of information		
	Analogy rating	**Standard deviation rating**	**Correlation coefficient rating**
Event scenarios	0.86	0.91	0.54
Collision kinematics	0.97	0.995	0.85
Parameter values	0.98	0.995	0.91

In analogy with (3), we suggest that it is possible to create a space for a set of homogeneous *X* objects, where the process of structuring recognized objects is executed by describing, verifying and ordering their attributes:

$$F_p: (X \rightarrow D_f), \tag{4}$$

where:

F_p - a function of creating the structuring space for unstructured databases containing information about the set of homogeneous *X* objects,
D_f - a set of possible attribute values for the set of homogeneous *X* objects.

Taking into account that structuring should be performed on all groups of objects, the concept of integrated space *P(f)* have been introduced and understood as a structuring containing descriptions (attributes) of all homogeneous sets of recognized objects D_f (a structuring space for unstructured databases):

$$P(f) = D_{f1} \times D_{f2} \times \ldots \times D_{fn}. \tag{5}$$

This space may contain the following types of attributes:

- binary, taking only two values (usually 0 and 1);
- compartmentalized, ordered and measured at fixed intervals (e.g. carriage temperature for perishable goods etc.);
- relative, determined by reference to their point of reference (e.g. transportability of oversize cargo, etc.).

Taking into account the results of classification techniques analysis (Table 4), the k-nearest neighbors algorithm was adopted as the basic scheme for conducting further consideration within the discussed topic.

Table 4. Classification schemes (own elaboration based on (Anderson, 2009))

Classification scheme	Description	Drawback
Bayesian belief networks	They are used to present dependencies between events based on the probability of their occurrence. They consists in predicting the probability of the object belonging to one of the classes.	The method requires extended classification time (depends on the number of classifiers used)
Decision tree algorithm	Made as acyclic graphs, in which there is only one path between two different nodes. It involves recursive division of the data set, up to construction of the maximum tree.	Possibility of drastic classification error in case of mistaken tested attribute.
Artificial neural network	Usually applied in research where there are no simple classification rules. It involves the processing of data by their grouping into layers. Results are obtained using learning process, which involves assessing the weights of examined objects.	Best results are achieved in the case of a connection with an expert system.
SVM (Support Vector Machines) algorithm	Applied in classification tests, when there is high level of information noise. It consists in searching for the direction of the fastest growth of the segregation function of the data set with the most accurate fulfillment of the optimization conditions possible.	It requires the use of methods for solving optimization problems in the field of programming.
K-nearest neighbors algorithm	The use of the concept of neighborhood taking into account not only the proximity, but also the spatial layout of the set of studied objects. Conceptual simplicity.	This method is sensitive to data unreliability.

The suggested steps for structuring process may be as follows:

1. Creation of a survey set *X*, i.e. a data file for the analysed area for cargo transportation.
2. Analysing the data file according to the reliability criterion, thus creating complete, reliable databases.
3. Data normalization, consisting, for example, in the transformation of the analysed values into an interval [0, 1].
4. Generating a decision rule, according to which objects will be assigned to particular classes:

$$R(x) = [+1, if\ f(x) \geq w(m)] \text{ or } [-1, if\ f(x) < w(m)], \tag{6}$$

where:

R(x) - classification rule,
w(m) - threshold value of inhomogeneity measures.

Applying this general approach to solving different problems of information structuring related to sensitive cargo transportation, the detailed procedures may be developed.

Results

The verification of the proposed approach to structuring information resources on the transport of sensitive cargo was carried out on the example of the analysis of the route running through Poland from Szczecin to Kalisz (see Fig. 2, Table 5).

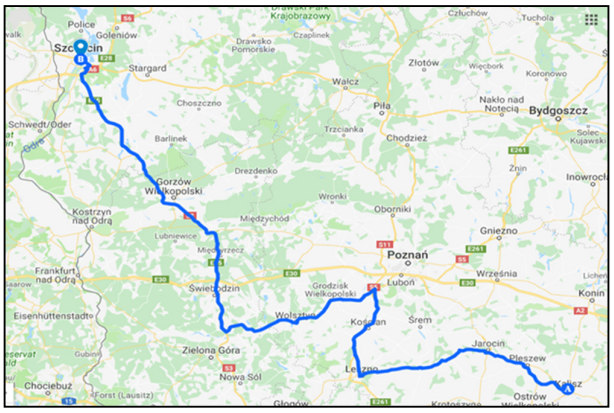

Fig. 2. The analyzed route from Szczecin to Kalisz

Table 5. Preliminary results of the reliability test for information concerning the analyzed route from Szczecin to Kalisz

Parameters analyzed	Values
The length of the route	460 km
Locations on the route	Kalisz DK25/DK12 – Jarocin DK12 – Leszno DK12/DK5 – Strykowo DK32 – Grodzisk Wielkopolski DK32 – Wolsztyn DK32 – Sulechów DK32/S3 – Świebodzin S3 – Gorzów Wielkopolski S3 – Szczecin S3/A6/DK10
Number of examined sections	92 pcs.
Number of information reliability checks in the context of conceptual inaccuracies	– The range of possible inaccuracies (x_k), k= 20 – Verifications carried out - 1840 items
Number of information reliability checks in the context of design miscalculations	– The range of possible miscalculations (x_p), p= 20 – Verifications carried out -1840 items
Number of information reliability checks in the context of exploitation miscalculations	– The range of possible miscalculations (x_e), e=8 – Verifications carried out - 736 items
Results of assessing the reliability of the information analysed	– 0.68 in case of 2% of the analysed data – 0.95 in case of 12% of the analysed data – 0.995 in case of 86% of the analysed data

The regular traffic of heavy goods vehicles (HGVs) transporting cargo requiring controlled temperature (namely meat products) was observed on the selected route. During route audit in October 2018, it was possible to identify infrastructure errors along the route and to check the reliability of relevant information. Based on the analysis of these errors, and using the iterative classification scheme, the clusters of individual road sections, where the high risk zones are found, were created. The statistical data of the Polish Central Police Headquarters on accidents on the tested route in the years 2015-2017 was also analyzed.

In the result of the analyses carried out, the collected information was structured, enabling not only to determine the high risk zones on the studied route, but also to group the route sections, taking into account its reliability level (Table

6). Information on these zones and reliability classes made it possible to cargo delivery plan with omission of these sections, where high risk of undesirable events involving HGVs carrying sensitive loads prevails.

Table 6. Examples of reliability classes of road sections together with the corresponding level of reliability

Reliability class	Range of reliability level
Kl.1	1-0,980
Kl.2	0,979-0,959
Kl.3	0,958-0,938
Kl.4	0,937-0,918
Kl.5	0,917-0,897
Kl.6	0,896-0,876
Kl.7	0,875-0,855
Kl.8	0,854-0,834
Kl.9	0,833-0,814
Kl.10	0,813-0,793
Kl.11	0,792-0

The research enabled to carry out information structuring, which may be useful for making a decision on the carriage routes for sensitive cargo in different situations, including COVID-19 pandemic continuation. It was demonstrated that the impact of factors that threaten the transport processes in the case of:

- development of a cargo delivery plan, based on well-structured databases, gives the opportunity to avoid the appearance of an emergency situation with a probability of 79-86% (standard deviation - 0.372),
- development of cargo delivery plan, based on a non-structured database, provides the opportunity to avoid such situations with a probability of 44 - 51% (standard deviation - 0.637),
- lack of cargo delivery plan's chances to avoid the appearance of an emergency situation was estimated at 20 - 26% (standard deviation - 0.826).

Conclusions

The article presents the methodology for structuring of information resources required when organizing transport of sensitive cargoes, that may be useful during COVID-19 crisis. The particular attention was paid to various problem areas of information required to make key decisions related to transport of analyzed load group.

It should be highlighted that information structuring brings many benefits, allowing to organize distributed data and eliminate information noise. Nevertheless, the use of classification procedures carries a number of issues therewith. This is due to the poor formalization of these procedures, which results in a high sensitivity to errors made, e.g. during the selection of the classifier or the number of classes, dependence on the characteristics of the data being processed and the accuracy of the rules for assigning these data to classes, etc. During classification the attention should be paid to elimination of errors concerning incorrect selection of attributes (classifiers), as the main reason for decreasing the operating quality of classification algorithms, and deletion of false data that may distort the information contained in databases.

The proposed approach verification on the example of analysis of information related to selected route for sensitive cargo transport proved that the suggested methodology allows for information structuring, and may be used for making decisions related to the organization of sensitive cargo transportation.

Our further research will focus i.a. on the development of the detailed procedures related to the classification, grouping and synthesis of information used in the planning and organizing of sensitive and conventional cargo transportation.

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The Impact of Blockchain Technology on The Financial Services Industry

Diana-Cezara TOADER[1], Corina RĂDULESCU[2], Grațiela BOCA[3], Rita TOADER[4], Diana IGHIAN[5] and Cezar TOADER[6]

[1,2,3,4,5,6] Technical University of Cluj Napoca, Romania
[1] diana.cezara@gmail.com, [2] corinam.radulescu@gmail.com, [3] bocagratiela@yahoo.com, [4] rita.toader@gmail.com, [5]dianaighian@yahoo.com and [6] cezar.toader@gmail.com

Abstract

The blockchain technology with its disruptive nature has brought dramatic changes to the financial services sector in the last few years. The current environment marked by the coronavirus pandemic has further revealed its strong potential for providing tangible and unique solutions for individuals and companies, while also accelerating its implementation. The underlying technology behind cryptocurrencies, such as Bitcoin, promotes disintermediation, mutual consensus and the rethinking of value chains and is expected to inevitably induce architectural changes in how firms create and capture value within markets. This paper describes the blockchain technology, the main benefits that organizations can derive by exploiting it and well as its major applications in the financial services sector and beyond. The authors also presented the world of cryptocurrencies and opined on the future state of blockchain technology by presenting the investment plan of global organizations who want to be at the forefront of business models' innovation. In order to sustain and succeed in this constantly emerging economy, it is vital for companies need to develop a clear understanding of the driving forces behind blockchain technology so that they can best exploit its myriad of opportunities.

Keywords: Blockchain Technology, Distributed Ledger, Cryptocurrencies, Disruptive Technology.

Introduction

Blockchain is a disruptive technology which yields implications for a number of industries. A new digital society status quo has emerged as a result of the current coronavirus pandemic, one that will push forward major innovations such as the blockchain technology. Blockchain technology was developed as a distributed and immutable transaction ledger that replaces a central authority with algorithms. Blockchain technology offers numerous opportunities for capturing strategic value, while opening new market segments for current incumbents in the financial services and new players alike (World Bank, 2017).

Blockchain technologies can be used as public means of transactions as well as private ledgers for inter-company transactions and record keeping. The latter promotes a greater degree of control and privacy, suitable for companies with proprietary information where a trust-based system can be developed among participants in the network (Kimani et al., 2020).

First applications arose in the financial services sector with the cryptocurrency, which puts the payments industry at the center of innovations around blockchain technology. The core functions of the financial sector are closely aligned with the transformative nature of blockchain when it comes to the verification and transfer of financial information (McKinsey, 2018). The blockhain translated as a decentralized replicated ledger underlies Bitcoin and other cryptocurrencies, while successfully mitigating the challenges imposed by traditional transaction business governed by third party intermediaries (Upadhyay, 2020; Varma, 2019). Bitcoin, the first and most popular cryptocurrency, was launched shortly after the bankrupty of Lehman Brothers by no coincidence. (Athey, 2016). Bitcoin was developer as a peer-to-peer version of electronic cash that facilitates the direct online transactions among parties without going through a financial institution (Nakamoto, 2008).

The blockchain technology has many other potential applications in the financial services sector that go beyond cryptocurrencies. Blockchain can be used to secure the Know Your Customer (KYC) and Know Your Business (KYB) processes when onboarding new customers, for mainstream payment and settlement, for credit scoring of Small Medium Enterprises (SMEs), securities issuance, capital markets post-trade settlement, derivatives and other financial instruments, trade repositories, and many others. (Polyviou et al., 2019; Varma, 2019).

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Another major area of applications is the asset management industry, where venture capitalists, private equity firms, real estate funds, need to significantly improve the liability risk management and engage in dynamic decision-making process under constantly changing regulations. Asset management firms can leverage blockchain technology to automatize the fund launch and administration, to ensure a seamless engagement with stakeholders by using digitized portfolios and many more.

Besides the wide array of applications in the financial services industry, the blockchain's great potential is starting to be leveraged in other industries as well, such as insurance, supply chain, healthcare.(Catalin, 2017). Worldwide spending on blockchain solutions is expected to grow to an estimated 15.9 billion by 2023 (Statista, 2020), as companies in nearly every industry are rushing to take advantage of the perceived benefits of the blockchain technology.

Figure 1 presents some of the sectors that will benefit from the disruptive nature of the blockchain technology.

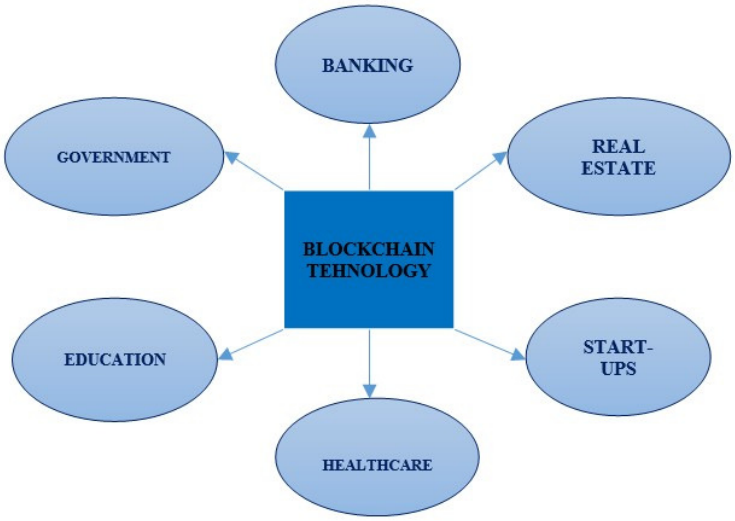

Fig. 1: Blockchain potential applications

Source: By authors

According to a McKinsey's report (2017), besides the financial services industry, government and healthcare would be the sectors that would capture the greatest value by leveraging this technology. Governments can achieve large savings by enabling key record-keeping and verifying capabilities thorough blockchain-based records. The same applies to the healthcare sector, where blockchain-based records improve the administrative efficiency by exploiting the value of information availability and exchange across patients, doctors, insurers, researchers.

The number of blockchain users worldwide has increased since the creation of the Bitcoin virtual currency in 2009, reaching over 54 million users of Blockchain wallets in October 2020 (Figure 2).

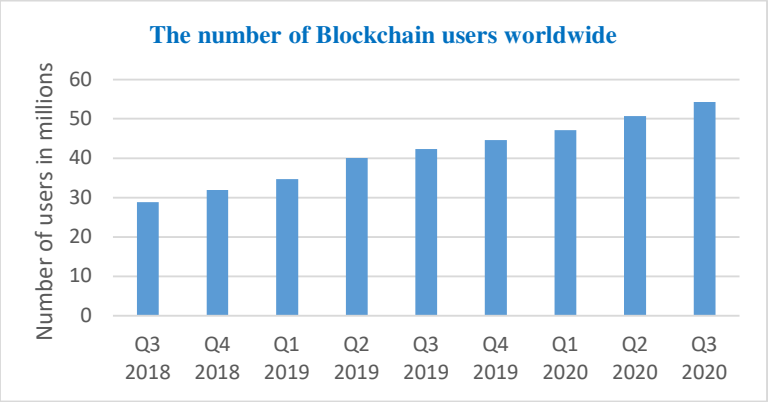

Fig.2: The number of blockchain users worldwide

Source: By authors

Blockchain technology provided a number of attractive benefits for the financial services industry, that are synthetized below:

- Decentralization and independence from central repositories;
- Lower costs and faster processing of transactions;
- No intermediaries for transactions authorization;
- All the transactions and data are attached to the block, they are time-stamped and cannot be altered;
- The transactions that take place are transparent;
- It uses protected cryptography to secure the data ledgers.(Beck, 2016)

First, decentralization implies that all participants in the network have access to a full audit trail (Varma, 2019). Also, the decentralized ledgers are resilient and they do not require a central authority. As they operate as open source protocols, they secure transparency and integrity and eliminate the role of a third-party intermediary to execute transactions. This capability of removing intermediaries allows for lower transaction costs. Moreover, the distributed ledgers ensure the trustful sharing of information (Polyviou et al., 2019) while allowing users to operate with confidence because transactions are immutable- they cannot be altered or reversed (Treleaven et al. 2017). Lastly, the cryptographic integrity checks ensure requires a verification process by all of the nodes in the network (Varma, 2019).

Literature Review

Blockchain technology is a distributed database of records or shared public/private ledgers of all digital events that have been executed and shared among blockchain participating agents (Crosby et al. 2016).

In blockchains, value is represented in transactions recorded in a shared ledger and secured by providing a verifiable, time-stamped record of transactions, which provides secure and auditable information (R Collins, 2016). Trust is a main consequence of decentralisation since there is no need to assess the trustworthiness of the intermediary or other participants in the network (Nofer et al. 2017) and information is easily viewed and compared. Participants are able to view the ledgers and analyse transactions. This feature provides transparency (Tian 2016) while simultaneously ensuring anonymity through preserving records behind cryptographics (Crosby et al. 2016).

Blockchains can be generalised and used to implement an agreed upon set of rules that no one, neither the users nor the operators of the system, can break. They rely on a unique system architecture platform for applications involving multiple parties who require little trust in each other; for example, fragmented supply chains. (Maurer 2017).

Meanwhile, a new generation of transactional applications that establish trust, accountability, and transparency is fostered by means of blockchain technology; these applications are managed by a so-called smart contract. A smart contract is typically a software programme that stores rules and policies for negotiating terms and actions between parties. It automatically verifies that contractual terms have been met and executes transactions (Swan, 2015).

Blockchain technology first gained popularity as a platform for managing Bitcoin, a digital cryptocurrency. Apart from the digital currency, blockchain technology is a new computing and information flow paradigm with broad implications for future development in supply chain management and logistics (Maurer 2017).

The blockchain technology can highlight and detail at least five key product dimensions: the nature, the quality, the quantity, the location and the ownership. In this way, the blockchain removes the need for a trusted central organization that operates and maintains this system and allows customers to inspect the uninterrupted chain of transactions. (Maurer 2017).

Blockchain reliability and transparency are meant to more effectively facilitate material and information. This transformation may result in a broader shift from an industrial durable, commodity, products economy to information, customization economy. (Pazaitis, 2017).

Blockchain impacts both supply chain process and product management, and financial transactions between different network parties (Hofmann, Strewe, and Bosia 2018). A key potential blockchain supply chain advantage is the disintermediation of financial intermediaries, including payment networks, stock exchanges, and money transfer services.

The blockchain technology context facilitates trading in a trust-free environment. Transactions are verified by the majority of supply chain participants, who define the consensus rules, and there is less need for building trust between supply chain partners (Crosby et al. 2016).

Blockchain technology, with transparent systems that are distributed, may be more conducive to operational partnering rather than strategic partnering. The visibility of information, which may include cost, materials, capabilities, and performance measures, may cause organizations to seek out short-term relationships.

The smart contract may decide how often a bid goes out and how it is met. Given these situations, it is foreseen that operational relationships, rather than strategic, will become the norm in blockchain-enabled supply chain. Overall, new managerial decision making and governance models will be needed (Oliveira and Handfield 2018).

Blockchain applications in the financial services industry

The emergence of the distributed ledger technology has challenged many traditional players in the financial services sector by demonstrating new opportunities to deliver value across the entire financial value chain. Since in its most fundamental form, the blockchain technology was created for recording transactions, it can potentially found many applications across the financial services sector (Varma, 2019). In this section, we provide several practical examples to demonstrate the myriad of blockchain applications that can be implemented in the financial sector.

In 2016, we noted a wider applicability of the blockchain applications in the financial services industry. For example, Westpac, one of Australia's largest banks, partnered with Ripple, a distributed ledger start-up in order implement a low-cost cross-border payment system based on blockchain technology, with the ultimate goal of improving their payment experience. Also, the Federal Reserve of Atlanta partnered with IBM to automate its clearing house processing platform. In the same year, Ornua, an Irish manufacturer of dairy products, partnered with Barclays and succeeding in engaging and completing the first trade transaction based on blockchain technology worldwide (Barclays, 2016).

Other players, such as Credit Suisse worked with Symbiont, R3 and Ipreo successfully completed the first stage of a project related to the use of blockchain technology for loan market Improvements. This demonstrated that blockchain technology has the potential to fundamentally reshape the syndicated loan market and the capital markets more broadly (Credit Suisse, 2016). Two years later, seven international banks, namely BNP Paribas, BNY Mellon, ING, Natixis, HSBC and State Street Global Advisors have enjoyed in a join initiative to pilot Fusion LenderComm. This was the first commercially available blockchain-powered platform for syndicated loans which went live on R3's platform.

PricewaterhouseCoopers; report on blockchain technology (PwC, 2018) presented the year 2017 as one marked by plenty of functional, proof-of-concept projects that are leveraging blockchain for various applications such as: internal payments, custody and trade finance, and custody.

Moreover, some securities exchanges started to launch blockchain-based platforms, while working closely with the regulators on how to ensure the proper oversight. In the following year, PricewaterhouseCoopers announced the launch of the first auditing service based on blockchain technology that will check the manner in which fintech

blockchain is being used by companies. When it comes to blockchain in fintech, cryptocurrencies occupy a big share in the fintech market. As Bitcoin was considered as the most successful blockchain application that gained consumers' trust, many fintech startups have built their businesses around this cryptocurrency.

According to a Harvard Business Review article on blockchain technology (Iansiti & Lakhani, 2019), much of the private blockchain-based development is undertaken in the financial services sector. For example, Nasdaq worked with a blockchain infrastructure providers, Chain.com, in order to develop a technology for streamlining the processing and validation of financial transactions. Other big banks such as J.P. Morgan, Bank of America, Fidelity engaged in testing of blockchain applications for replacing paperwork and manual transaction processing in areas like foreign exchange, trade finance, securities settlement.

The world of cryptocurrencies

The world of cryptocurrencies has grabbed the attention of many investors as well as regulators. As the first application of the blockchain technology, cryptocurrencies introduced a paradigm shift into the world of payments. Besides Bitcoin, which was the first cryptocurrency and currently the most traded one, we can currently find around 1600 cryptocurrencies that are exchangeable on the market (Deloitte, 2018).

The common element shared by all these cryptocurrencies is their underlying technology, namely the public ledger that is shared among network participants as well as the use of native tokens to motivate participants to run the network in the absence of a central authority (Hileman & Rauchs, 2017).

As of October 2020, the most expensive cryptocurrencies worldwide were Yearn.Finance, Bitcoin, Wrapped Bitcoin, DFI.Money, Maker and Ethereum (Table 1). While Yearn.Finance was the most expensive virtual currency, with one coin valued at USD 24345.98, the second most expensive virtual currency, Bitcoin, could be purchased for USD 10917.02.

Despite the rising interest in other cryptocurrencies, Bitcoin remains the leader both in usage and market capitalization. Bitcoin (BTC) is described as a virtual and decentralized cryptocurrency that is not backed by any sovereign obligation and it cannot be exchanged into any commodity, not even gold (Grinberg, 2011).

Table 1: The most expensive Crypto globally

GLOBAL CRYPTOCURRENCIES	U.S. DOLLARS
Yearn. Finance	24345.98
Bitcoin	10917.02
Wrapped Bitcoin	10891.36
DFI. Money	3237.77
Maker	593.12
Ethereum	368.38

Source: Statista (2020)

The underlying technology for Bitcoin is an open and permission less blockchain. This implies that any user is allowed to join and leave the Bitcoin network, without being (pre-)authorized by any entity. All that participants in the Bitcoin network need is the relevant software installed on their computer. (Lewis.R, 2017)

One advantage associated with Bitcoin is the fact that this cryptocurrency is supported and used by the majority of wallets, exchanges and payment service providers, hence benefitting from this network effects (Hileman & Rauchs, 2017). Bitcoin is considered to be the easiest cryptocurrency to be directly converted into fiat currency on a wide range of cryptocurrency exchanges such as Coinbase or Kraken. At the same time, Bitcoin is a medium of exchange, being accepted by many large companies including Microsoft, Expedia or LOT Polish Airlines (Houben & Snyers, 2018). Moreover, given that the blockchain technology underlying Bitcoin offers a self-contained alternative to the traditional payment systems, this functions as if all bitcoin users are engaging in trasanctions with the same bank (Fatás & Weder di Mauro, 2019). Another benefit provided by Bitcoin is the ease of transferring funds between two participants in a transaction which is facilitated through the use of public and private keys for security purposes (Bunjaku et al., 2017).

Besides the previously mentioned benefits, there is a variety of vulnerabilities associated with cryptocurrencies: Bitcoin has proved the security of its proof-of-work system, but its scalability is limited and it uses a lot of energy when mining pools. Also, Bitcoin experienced strong volatility and almost all of the ups and downs in its value were a direct result of government's statements in different countries. This volatility creates a problem in the short term. However, there are also medium and long-term risks associated to Bitcoin, such as the absence of a central issuer to provide a backup in case of bankruptcy as well as the risk of money laundry, terrorist and illegal activity financing (Bunjaku et al., 2017). Lastly, the customers' association of Bitcoin with a venue for malicious activity, based on previous massive theft of cryptocurrencies and fraud by promoters of initial coin offerings represents a serious challenge to its widespread adoption (Wharton, 2018).

Discussion. The Future State of Blockchain Technology

Blockchain technology provides individuals and organizations with the opportunity to self-custody and exchange digital assets without the need for traditional intermediaries. However, significant work is needed before organizations can reap the full benefits of this technological innovation.

Looking ahead, the integration with law, regulation and governance will be critical. Even though the blockchain technology implies a new form of trust itself, the only way to secure its successful adoption is by ensuring it is sufficiently trustworthy, and this goes beyond the security of distributed ledgers (Wharton, 2018).

Decision makers in business are increasingly looking into blockchain applications in order to improve efficiency, reduce costs as well as risks. The blockchain technology has the great potential of creating synergies among multiple, permissioned organizations, which enables the creating of new business models to capture strategic value.

The application in financial services and the impact of blockchain and it's application in financial accounting was conducted by Trautman (2016), Omar et all (2020), Chang, et all (2020). Yu et all (2018), Fanning and Centers (2016) and Trautman (2016). For that reason a vision for the global organizations investment plan it is resented in Figure 3 and the impact for blockchain technology.

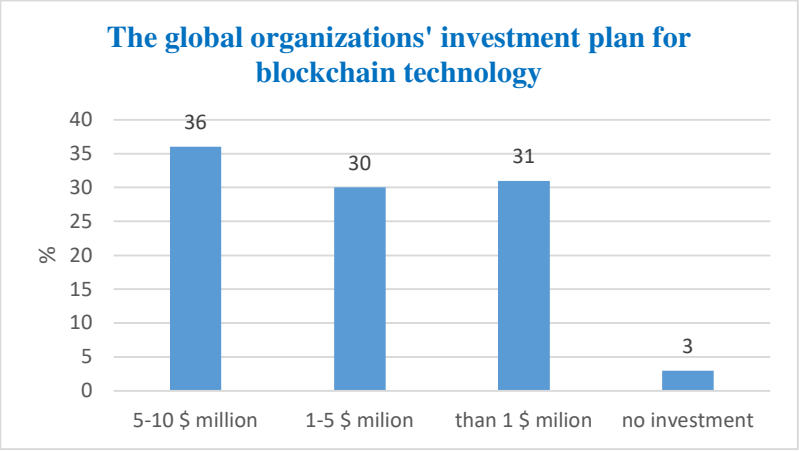

Fig. 3: The global organizations' investment plan for blockchain technology as of 2020
Source: By authors

Blockchain it is simply behind the Bitcoin, also with potential to transform through cryptography for that reason it is in five top priority in different countries as we can see from Figure 4.

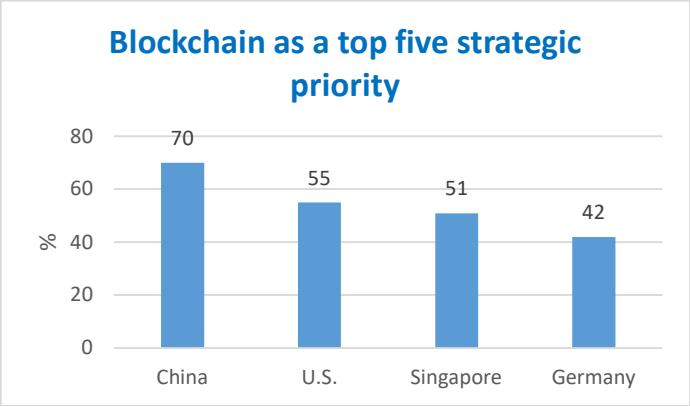

Fig.4: Blockchain as a top five strategic priority

Source: By authors

Conclusions

Despite being a relatively new technological innovation, blockchain already started to leave its mark on multiple industries. As a distributed ledger technology, blockchain promises to change the way companies are operating by reducing costs and allowing for the creation of ecosystems where value can be derived from network effects.

The blockchain technology will also stimulate people to up-skill themselves, while companies with traditional business models will have to completely reconsider their processes. Currently, there is a lot of excitement about the distributed ledger technology since it is expected to provide a better, more efficient and more resilient form of recordkeeping across multiple industries.

When it comes to the financial services industry, digitized assets and innovative financial channels are creating new paradigms for financial transactions and promoting alternative ways of capital raising. Blockchain-based payments can streamline the entire transaction process by removing bureaucracy and time-consuming paperwork, while also reducing the redundancy of information and improving performance. This disruptive technology is likely to become mainstream in the financial services sector within the next decade and it is expected to successfully reduce the massive duplication of information that creates confusion, error and delays in so many aspects of the financial services sector. Also, any operation that does not grant transparency and traceability is prone to be disrupted by the blockchain technology.

Although, there are some areas where cryptocurrencies and other blockhain application were effectively deployed effectively, the blockchain technology is still immature. In order to secure adoption, organizations need to build confidence in the new blockchain systems there needs to be transparency around how the processes work and what the benefits are, and in order to secure adoption, they need to be straightforward to use.

Besides the financial sector, blockchain will also revolutionize business processes in many other industries, but its adoption requires time, efforts and a global alignment in terms of legal, regulatory and governance frameworks. Nevertheless, the current Coronavirus pandemic facilitated the acceleration of the innovation process and some of the largest global companies will speed up the adoption of blockchain solutions to fill the informational gaps and delays.

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Reconciling of Work and Family Life of Mother with Employee Status

Silvia TRELOVA

Faculty of Management Comenius University in Bratislava, Bratislava, Slovak Republic,
e-mail: silvia.trelova@fm.uniba.sk

Abstract

The issue of employing women with maternity, respectively parental responsibilities relating to childcare is still a frequently discussed topic today. Women, especially in the position of mothers, do not have a simple return to work, but they do not want to neglect their parental responsibilities at the expense of work. The paper summarizes the tools for reconciling work and family life that the mothers of children can use when choosing to return to work. We analyze and compare the various flexible forms of work performance that are admitted and regulated by national legislation (legislation of the Slovak republic) and we are considering the appropriate form of work depending on the age of the child.

Keywords: Reconciling of Work and Family Life, Maternity Leave Parental Leave, Parental Allowance, Flexible Forms of Work, Part-Time Job, Home Work, Telework.

Introduction

In the last period, one of the reasons for postponing motherhood is the fear of an unfavourable economic situation that occurs in a young household in connection with childbirth. There is no doubt that the costs of upbringing of children are rising and these costs are often perceived by parents as an unbearable financial burden. An important tool of the state supporting families with children is the system of social security, which represents an effective means of enforcing the family policy of the state through appropriate social benefits (maternity, compensation benefit) and especially state social support benefits (childbirth allowance, allowance for multiple concomitant children, child allowance, parental allowance, childcare allowance, childcare allowance for alternative care). (Treľová, 2015)

We point out the fact that there are reserves not only within the system of state social support (e.g. lower amount of parental allowance), but also other areas of support for families with children are not at a sufficient level, e.g. persistent low capacity in kindergartens. Even a few years ago, Hlásna et al. stated that in terms of support for families with children, there is a large lack of support for the compatibility of family and work life. (Hlásna, Horváth and Köksal, 2013). At present, however, we must point out that various positive measures are being taken, as well as to support the reconciliation of work and family life. An example of legislative measures is Directive (EU) 2019/1158 of the European Parliament and of the Council of 20 June 2019 on the work-life balance of parents and carers, repealing Council Directive 2010/18/EU, which aims to involve fathers to care for the child to a greater extent, which we evaluate positively.

At the time of expectation and birth of the offspring, as well as especially in the first months of his life, the family is often provided with only one income due to the care of the child, respectively. in some cases, the income is only state benefits provided in connection with the birth of a child and the period immediately following it (e.g. a single woman who has not fulfilled the condition of entitlement to maternity benefit). After maternity leave, mainly due to low financial security, many women in particular are considering returning to work and would like to harmonize work with their families (about whether family or work are also considered Freel and Ligasová, 2017). Various flexible forms of work performance, which are permitted and regulated by Slovak legislation, should help them to reconcile work with their families.

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Tools to reconcile work and family life of the child's mother

Important tools for reconciling work and family life are maternity leave (maternity benefit), parental leave, parental allowance and childcare allowance, which have gradually changed their functions and meaning in the conditions of the Slovak Republic. (see also Hamuľák, Freel and Nevická, 2020) Parental leave on the one hand and parental allowance as well as childcare allowance on the other are two different instruments. While parental leave is an institute of labour law, parental allowance and childcare allowance are institutes of social security law and, namely state social support benefits. Unlike maternity leave, which in accordance with Act no. 311/2001 Coll. the Labour Code, as amended (hereinafter referred to as the "Labour Code"), is a justified working time off provided by the employer to an employee (a woman) in connection with childbirth and the care of a newborn child, parental leave is intended to encourage a parent to choose more freely between employment and childcare. (see also Hamuľák and Nevická, 2018) Relevant leave provisions can be organised into two categories whose features, at times, overlap: gender specific (maternity and paternity leave) and gender neutral (parental leave). (Torella and Masselot, 2010)

In connection with maternity leave, we note that the female employee temporarily suspends the performance of work duties during maternity leave and if she meets the legal conditions under § 48 -51 of Act no. 461/2003 Coll. on Social Insurance, as amended (hereinafter referred to as the "Social Insurance Act"), will receive maternity benefits from the Social Insurance Agency. The amount of the benefit provided to the entitled person may be different (the daily assessment basis of the entitled person is decisive). As part of the amendments to the Social Insurance Act, the maternity percentage was gradually increased from the original 55% to 60%, later to 65% and then to 70%, while currently (from May 2017) this benefit of sickness insurance is 75% of the daily assessment basis. The Social Insurance Agency pays maternity benefit in the maximum amount of EUR 1 498.70 per month (for a 30-day month) or in the amount of EUR 1 548.70 per month (for a 31-day month) - these amounts apply for this year 2020. It is a big shiftin the issue of material security for mothers, as the child's mother receives an income almost comparable to her salary she received in employment. We emphasize the very important fact that, however, entitlement to maternity benefit does not preclude a woman from having at the same time an income which is not considered to be the basis of assessment from which maternity allowance was calculated (§ 30 letter b) and § 138 par. 1 Act no. 461/2003 Coll. on Social Insurance, as amended; on the performance of work in addition to receiving maternity leave, although in relation to fathers also writes Freel, 2018). This means that a woman on maternity leave who receives a maternity benefit could conclude e.g. an agreement to perform the work, even with an employer with whom she has an obstacle to work due to maternity duties. The condition of caring for the child must be maintained. In this way, the mother can legally have another income.

During parental leave, the woman's previous income is to be compensated by a state social support benefit, namely parental allowance (Act no. 571/2009 Coll. on parental allowance and on the amendment of certain laws as amended) or childcare allowance (Ac no. 561/2008 Coll. on the childcare allowance and on the amendment of certain laws as amended). There has been no major change in recent years regarding the increase in the amount of parental allowance. Since 2014, the parental allowance has been provided in the amount of EUR 203.20 per month. The change occurred in May 2017, when as a result of its increase by 10 euros, the parent began to receive a parental allowance in the amount of EUR 213 per month. Another negligible increase has occurred since January 2018, when parental allowance of EUR 214.70 began to be paid, due to an increase in the amount of the subsistence minimum. The following year (2019), the parental allowance increased to EUR 220.70. These are the amounts of parental allowance per child. In the case of several children born at the same time, the amount of the parental allowance increases. It means if the beneficiary provides proper care for two or more children born at the same time, the parental allowance is increased by 25% for each additional child born at the same time. Very important is the fact that this parental allowance is always only one, regardless of the number of children under the age of three, respectively up to six years.

A more fundamental change in the use of parental allowance has occurred since January 2020, when the amount of parental allowance was adjusted differently: EUR 270 per month (twins EUR 337.50 and triples EUR 405) if the woman has not previously received maternity benefit and EUR 370 per month (twins EUR 462.50 and triples EUR 555) if the woman who applied for parental allowance was paid a maternity benefit before she became entitled to parental allowance.

The parental allowance differs from the maternity benefit in that the woman can receive it not only while taking parental leave, but also while not taking it. The mother can therefore return to work after maternity leave, where she will receive her full salary again and can also apply for parental allowance. Receiving a parental allowance enables active employment. The condition is that she must provide care for another person during her absence.

The childcare allowance is also a social benefit provided by the state to the mother (parents) to cover the costs of caring for a child under three years of age (up to six years of age in the case of a child with a long-term unfavourable health condition). The minimum amount of childcare allowance is EUR 41.10 per month if the mother does not prove the costs of childcare. Conversely, in the case of childcare expenses, a woman as a parent can receive an allowance of up to EUR 280 per month (maximum amount). The actual amount of the allowance provided depends on the proven childcare costs. If childcare is provided by a provider who is a kindergarten included in the network of schools and school facilities of the Slovak republic established by a municipality or local state administration body in education, the childcare allowance is a maximum of EUR 80 per month. Unlike parental allowance, childcare allowance is provided for each child separately. The positive effect of this benefit is clearly to support the employment of parents caring for a child. This means improving these parents' access to the labour market and, together with childcare providers, enabling them to reconcile their work and family life.

The relatively low level of these two benefits, zero dependence on the amount of previous income, problems resulting from many years of absence from work as well as loss of experience in the profession, led to gradual changes in the state social support system. The valid legal regulation for both benefits enables the performance of gainful activity, respectively in the case of childcare allowance, this gainful activity is a condition for its recognition. It follows from the above that while the mother may or may not be economically active in receiving parental allowance, gainful employment or study at a secondary school or university is required for entitlement to childcare allowance. With regard to the childcare allowance, Matlák points out that “the establishment of a condition of economic activity may in some cases be discriminatory, as for example a mother who takes care of a child with a long-term unfavourable health condition, respectively a child with a severe disability, has minimal preconditions for gainful employment. The same applies if the mother is a person with a disability or a person with a severe disability and has a child under three years of age”. (Matlák, 2014)

As parental allowance and childcare allowance are provided up to three years of age (up to six years of age in the case of a child with a long-term unfavourable health condition), it is the combination of benefits and income from dependent activity that allows a woman as a mother caring for a young child not only to combine work and family responsibilities, but even to improve financially. Although psychologists say parental care is very important for a child's further development and should not be disrupted by other responsibilities, often women do not take the full length of parental leave to return to work and rather return to work.

Just as children have the right to parental upbringing and care, Slovak legislation grants parents the right to care for and raise their children. (Gabrhelová and Čepelová, 2019). If a woman as a mother caring for a young child is considering returning to work, she also has several tools at her disposal that can help her reconcile family and work responsibilities. The female employee can agree with the employer on various flexible forms of work performance. The employer may propose individual working hours to the female employee, when, "the essence consists of different staggered hours". (Šipikal et al., 2007) The female employee individually chooses the work schedule, but must work the prescribed number of hours, which can be determined on a daily, weekly, monthly or yearly basis. In terms of working time arrangements, the employer can agree on flexible working hours with the female employee, where she will work full time, but can choose the beginning and end of the working day. Only certain hours are fixed when the female employee must be available to the employer at work. Such flexibility of working time gives the mother the opportunity to e.g. take your child to kindergarten or school in the morning.

Recently, also due to the constant development of information and communication technologies, the use of home work and telework has been expanding (§ 52 of the Labour Code), especially on a full-time basis. This way of performing work takes into account the family environment of the female employee and gives her the opportunity to work not only whenever she can in addition to fulfilling her parental responsibilities, but also in any place, it means not only from home. Russian study (survey, conducted in April-May 2019 in 69 settlements of the Russian Federation) has proved that „the format of teleworking appears to be attractive for women and effective in terms of balancing paid work and parental/family functions. Most often, women indicated that if they worked remotely, they would have more time to develop and educate children as well as attend cultural and entertainment events with them.“ (Tonkikh, Pesha and Markova, 2019)

We consider the use of the distance form of work (home work, telework) to be a suitable way of harmonizing family and work life, which also enables the mother to perform her work task in an efficient and effective way. Today, domestic work and teleworking form „an integral part of non-standard employment relationships and make a significant contribution to labour market flexibility". (Olšovská, Hodálová, Lacko and Valčuhová, 2008) The advantage (as opposed to shorter working hours) for an female employee is the same rules as for other employees (with a few exceptions). Even for employees working from home or elsewhere, as well as "classic" employees, the employer must provide equal pay, meals, equal career growth, access to training, provide leave, benefits, etc.

Although the advantage for the employee as a mother is the possibility of scheduling working hours, this precludes, for example, the right to compensation for wages and bonuses for overtime and holidays. Wage benefits for night work and wage compensation for difficult work performance are also not eligible, unless the employee and the employer agree otherwise. With the exception of the death of a family member, the Labour Code completely excludes the provision of compensation for the salary of an employee working from home due to important personal obstacles at work.

Female employees „who have a longer working week are more likely to find it more problematic to reconcile work and family life." (Križan, 2015) In addition to full-time employment, there is also a shorter employment period - employment for shorter working hours (§ 49 of the Labour Code). The possibility of adjusting working hours is enshrined in § 164 par. 2 of the Labour Code so that if a woman or a man permanently caring for a child under the age of 15 requests shorter working hours or other appropriate adjustment of the specified weekly working hours, the employer is obliged to comply with their requests, unless prevented by serious operational reasons. Working part-time may be a suitable choice for a woman in the position of a mother. The female employee can have the work distributed evenly or unevenly during the week, it all depends on the agreement between her and the employer. This type of employment is advantageous because the female employee enjoys the same employment and social benefits as full-time employees. The disadvantage is the amount of wages, which corresponds to shorter working hours. „Part-time work can be a chance, especially for women - mothers of young children, to maintain work habits and skills. After the end of the greatest burden of family responsibilities, it will allow them to move more smoothly among full-time employees." (Šipikal et al., 2007)

If the female employee voluntarily agrees with the employer on a shorter working time, she can use the institute of a divided job (49a of the Labour Code - job sharing). This form of work is based on work sharing, where one job is shared by several employees (usually two employees). The advantage is that the female employee agrees with her colleague who shares the job with her on the schedule of working hours and on the job description of this job.

Conclusion

Recently, there have been many positive changes in the use of women's human capital, which also has a positive impact on the sustainability of their jobs. (see also Szarková and Krásna, 2016) These changes occurred mainly as a result of legislative changes in the field of employment and the labour market in the form of new jobs, flexible forms of work performance (e.g. job sharing, home work, telework). "The offer of flexible working arrangements is a new contemporary solution to women's employment, designed to relieve the tension between women's dual work and family roles. While information technologies are developing and the range of positions in the remote employment segment is expanding, women are getting the opportunity to combine work and household responsibilities successfully." (Pesha, Tonkik and Markova,2019)

In the case of female employees with small children, a gradual return to work is suitable, so at the beginning, we recommend using a part-time job, job sharing. Telework is also not a bad choice, but the time allocated to work can exceed and reduce the time devoted to the family. The performance of telework requires great discipline of the employee. If the female employee already has older children, children in pre-school and school attendance, she can fully integrate into working life and work full-time. Due to parental responsibilities, it is advantageous to agree on flexible working hours or home work and telework.

There are still several shortcomings in reconciling work and family life, and this area has great potential, as it would certainly be much easier for many parents to combine their work and family life in the case of a more comprehensive and affordable system offering parents the opportunity to provide adequate childcare. life. Whereas „the taking of maternity and parental leave to a large extent affects the operation of employers" (Macková, 2015), in the conditions of the Slovak republic the part-time employment, home work and telework should be used to a much greater extent (Krásna, 2015), and employers should be motivated to employ parents of young children, to set up company kindergartens, etc. (Treľová, 2015) At a working mother considerable adjustments are necessary at the individual level and at the workplace, which help the mother to fulfill the dual responsibilities of career and motherhood. (Poduval and Poduval 2009)

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Private Health Insurance in Poland As A Response to Increasing Cancer Costs

Marta BORDA

Wroclaw University of Economics and Business, Wroclaw, Poland
marta.borda@ue.wroc.pl

Abstract

Demographic factors, epidemiological factors, and persistently low level of financing for oncological treatment in Poland create opportunities for further development of private health insurance providing services in the event of cancer. The purpose of this paper is to provide an overview of private health insurance products that are available in Poland for covering the various financial consequences associated with cancer risk. The study confirmed among others that most insurance is provided in lump sum benefits, pointing to a need for further development of current product offer, especially in the field of products that ensure compensation for incurred costs and income loss.

Keywords: Private Health Insurance, Oncological Treatment, Cancer Risk.

Introduction

The prevalence of cancer diseases is one of the most serious problems in the health care system in Poland. For many years, malignant neoplasms have been the second most common cause of death in Poland, right after cardiovascular diseases. As Statistics Poland (2020) reports, malignant neoplasms caused 26.4% of all deaths in 2018. It is also important to emphasize that in the case of people over 60, the mortality rate caused by malignant neoplasms is higher than in other age groups. As regards the European region, the European Commission 2020 estimates reveal that 62% of new cancer diagnoses and 76% of deaths that resulted from malignant neoplasms occur in people over 65 years old (European Commission 2020). For men aged 60 and older in Poland, the death rate from neoplastic diseases is almost 6 times higher than for those aged 45-59. For women, the rate is 4.5 times higher.

Data from the Organisation for Economic Co-operation and Development (OECD) shows that although the rate of cancer incidence in Poland is still lower than in most European countries, the mortality rate from cancer is much higher. As Table 1 presents, there was a decreasing trend in death rates from neoplasms recorded in European countries in the years 2000-2017. However, Poland (along with Hungary, Slovenia, Latvia, and Denmark) ranks among the top five European Union countries with the highest mortality from malignant neoplasms.

Due to the global aging trend, it can be expected that the number of patients with neoplastic diseases will increase since the risk of these diseases usually increases with age. Recent forecasts predict an increase in the incidence of malignant neoplasms for Poland in coming years, with a simultaneous decrease to mortality rates (see, e.g. Didkowska et al 2009; Węgrzyn 2020). As a result, an increasing number of people living with cancer can be expected, and it will be necessary to provide most with financial support to cover the costs of treatment and other expenses related to oncological diseases. Considering the problems faced by the public health care system (including the low level of oncological treatment financing and difficult access to innovative drug therapies), the increase in health awareness across society, and the growing level of household incomes, one can expect an increasing interest in private health insurance (PHI) that provides benefits in the event of oncological diseases.

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Table 1: Standardised death rates from malignant neoplasms per 100,000 population in selected European countries in 2000–2017

Year	2000	2010	2017
Country			
Austria	229.7	204	184.7
Belgium	242.7	217.1	193.9 (2016)
Czech Republic	300.4	250.3	215.6
Denmark	285.5	252.5	230.4 (2015)
Estonia	241.1	233.4	227.5
Finland	198.9	182.5	170.9
France	236.9	207.7	196.8 (2016)
Germany	234.8	206	194.7
Greece	213.8	196.5	199.2 (2016)
Hungary	345.4	292.2	275.4
Ireland	265.3	225.3	219.2 (2015)
Italy	234.5	207.1	191.4 (2016)
Latvia	235.3	248	235.9 (2015)
Lithuania	242.9	232.2	220.7
Netherlands	258.3	240.1	217.7
Norway	228.4	212.7	189.8 (2016)
Poland	267.3	244.2	231.6
Portugal	204.6	198.4	194.8
Slovenia	260.7	257.3	239.3
Spain	218.2	197.5	180.9
Sweden	205,5	189,1	180
Switzerland	209.9	181.6	171.8 (2016)
United Kingdom	--	226.3	216.4 (2016)

Source: data extracted from OECD.Stat.

The aim of this paper is to provide an overview of PHI products that are available in Poland to cover the risks from cancer and to examine the possibilities for financing various consequences of oncological diseases within the insurance coverage provided. In the study, the following research hypothesis is adopted: despite the recent dynamic growth of interest in insurance related to cancer risk, there is still a need for innovative insurance products that provide comprehensive coverage for the various consequences of this risk, and thus, are better suited to growing customer expectations.

The structure of the paper is organized as follows. First, the financial consequences of cancer risk are identified, and from these, the broadest possible catalogue of insurance products that cover the costs and/or income losses related to oncological diseases is indicated. Next, the analysis of PHI products available in Poland with respect to the possibilities of covering various consequences of cancer risk is conducted. To conclude, potential directions for further development of cancer insurance in Poland are formulated.

Effects of cancer risk in the context of insurance coverage

Sickness risk (also called the risk of poor health) belongs to the category of personal risks, defined as risks that directly affect an individual and can cause financial consequences such as reduction or loss of earned income, extra

expenses, and the depletion of financial assets (Black and Skipper 2020; Rejda 2003). In the field of insurance, this risk is considered in a negative sense, i.e. as a threat, the possibility of not achieving the expected effect (in the considered case as the possibility of worsening human health status as a result of cancer). Regardless of the adopted dimension of the analysis, the consequences of sickness risk, including cancer risk, always have direct effects on a given person and other members of his/ her household and have indirect influence on the activity of enterprises and the entire economy in a given country. In this study, cancer risk is examined as one of the risks associated with an individual or a household, regardless of its broader macroeconomic and social consequences.

The loss for a household resulting from the realization of the risk of poor health may apply both to resources already owned (e.g. the necessity to incur health expenses) and to expected ones (e.g. loss of income). Cancer risk includes both types of consequences: the payment of medical expenses and the loss of earned income from a person being unable to work. Under the first case, the risk is related to the necessity to cover various health expenses. In European countries, including Poland, the provision and financing of health services for the treatment of oncological diseases, in particular services provided in hospitals, is the domain of public health care systems. Treatment of oncological diseases requires a comprehensive approach and therefore generates huge costs, often spread over a long time horizon. As Hofmarcher et al (2020) indicate, over the last two decades in Europe, health spending on cancer has increased faster than the increase in cancer incidence. Costs incurred in the furtherance of cancer diagnosis include not only the costs directly related to the treatment process (e.g., oncological diagnostics using modern equipment, consultations with medical specialists, surgical procedures, hospital stays, costs of modern drugs, chemotherapy, or radiotherapy), but also indirect costs for patients and their families (including, e.g., access to medical facilities, appropriate diet, rehabilitation services, prostheses, psychological care, or home care for patients after hospitalization) (also see: Holecki et al 2020; Węgrzyn 2020).

The increasing costs of oncological treatment are accompanied by significant funding shortages in this area of medicine in Poland. The financial resources allocated to oncology in Poland are relatively small compared to other European countries. According to the report of the Supreme Audit Office (NIK 2018), the average expenditure on oncology in Poland is only EUR 42 *per capita*, compared to EUR 85 in the Czech Republic, EUR 156 in France, and EUR 171 in the United Kingdom. The low level of financing results in limited availability of many services, including specialist diagnostic tests and rehabilitation services. In Poland, patients suspected of having cancer wait too long for diagnostic tests (often several weeks or months) or the results of histopathological examinations, losing valuable time in the treatment of the disease. The geographic dispersion of cancer treatment facilities and the lack of centers specializing in the treatment of specific types of cancer mean that insufficient human resources also hinder the improvement of the effectiveness of cancer treatment.

Another important problem is the lack of availability of modern medical procedures and drug therapies, and it is made worse by the lack of reimbursement services for when they are available. The costs of many innovative medical procedures used in cancer treatment are not reimbursed by the National Health Fund, which makes it necessary to look for other sources of financing (e.g., charity campaigns). In Poland, patients with oncological diseases have access to a much smaller number of modern anti-cancer drugs compared to those in other European countries. Thanks to the progress in precision medicine, it is possible to use the so-called targeted therapy that includes the selection of molecular drugs tailored to a specific patient, which can enable faster, more effective, and more comfortable treatment. An example of such innovative therapy still not available in Poland is immunotherapy with the use of chimeric cells to treat lymphoma patients (Witkowska 2019). Unfortunately, more than half of modern oncological drugs registered in Europe are not covered for reimbursement by the National Health Fund. Patients in Poland have either limited or no access to approximately 70% of anti-cancer drugs used in European standards (NIK 2018).

In the scientific literature, increasing attention has been paid to the costs of informal care provided by family members or friends for patients suffering from cancer. It is important to emphasize that this cost category is especially difficult to estimate due to the frequent lack of reliable and comparable data in this area. Based on the results of a study conducted by Hofmarcher et al (2020), the costs of informal care related to cancer in 2018 in Poland were only EUR 15 *per capita*, compared to EUR 132 in Denmark, EUR 85 in Italy, and EUR 48 in the United Kingdom (European average was EUR 50 *per capita*).

Another important category of financial consequences of cancer risk is the loss of all or part of household income resulting from a patient's inability to work. The need to undergo treatment and rehabilitation causes a break in the professional activity of a sick person, and recovery does not always entail regaining full ability to perform the current job, which may result in the loss of the current position and the need to take a lower paying job. Particularly threatening to households is the situation in which the sole breadwinner falls ill. The productivity loss due to sickness incapacity includes the income lost during sick leave or the permanent loss of the ability to work. Cancer may also result in a complete loss of productivity due to the patient's death. In this case, the indirect cost of cancer

includes the lost future income that the person would have received until retirement. In 2018, the costs related to the loss of productivity due to cancer in Poland were estimated at EUR 21 *per capita*, and in the case of death resulting from cancer, it was EUR 47 *per capita* (Hofmarcher et al 2020). Temporary or permanent loss of an employee as a result of cancer is also a heavy burden for the employer (e.g., costs of remuneration payment for the period of inability to work or costs related to the retraining or recruitment of another employee).

Taking into consideration the variety of the financial consequences associated with cancer risk occurrence, adequate insurance coverage can be provided under a number of health insurance products, including:

- critical illness insurance and its specific type for oncological disease (so-called "cancer coverage health insurance");
- hospital stay insurance – providing a flat-rate daily benefit related to hospitalization, regardless of incurred treatment costs;
- drug insurance – covering the costs of purchasing medicines and auxiliary materials;
- medical expenses insurance, including the costs of treatment abroad;
- disability income insurance;
- premium insurance – available as an option to the life insurance contract in the event of a diagnosis of cancer (no premiums are required and the insurance coverage remains in force);
- medical assistance insurance, including oncological assistance – usually supplementing the critical illness insurance or comprehensive medical expenses insurance.

Analysis of health insurance offers related to cancer risk in Poland

The PHI products offered in Poland can be classified into:

- life insurance – if it is applied as a health or accident insurance option supplemental to the main life insurance coverage;
- non-life insurance – in the form of separate health and accident insurance products designed mostly to cover medical expenses.

In Table 2, the share of health and accident insurance in life and non-life segments in 2010–2019 is presented. As the trend in Table 2 shows, the Polish health insurance market is still developing. Health and accident insurance options that supplement life insurance products are more popular than similar insurance products offered by non-life insurance companies. During the examined period, dynamic growth has been recorded in the share of health insurance purchased in the life sector (an increase of 16.1%). This has resulted mainly from easier access to the customer (while purchasing life insurance policy or/and using bancassurance) and greater activity of life insurers in this segment of the market. Accident and sickness insurance belonging to the non-life insurance segment accounted for only 5.8–7.8% of the property and casualty insurance portfolio in 2010–2019. In Poland, the role of PHI is to supplement the public health care system, which at the time of consumption should provide almost all health care services to patients without additional cost. In practice, there are many difficulties with quick access to specialized health care.

Table 2: The share of health and accident insurance in gross written premiums in Poland in 2010–2019 (in %)

Type of insurance	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Health and accident insurance supplemental to life insurance	13.6	14.0	12.9	15.4	18.1	19.7	22.8	22.4	27.2	29.7
Accident and sickness insurance (non-life segment)	7.1	6.6	6.8	7.2	7.6	7.8	6.3	5.8	6.1	6.4

Source: Polish Insurance Association (2019).

By purchasing PHI, it is possible both to have quick access to health services (the public system has long queues for specialists) and to use high-quality private services (e.g., a private hospital). Health insurance products cover medical expenses resulting from ambulatory care, hospitalization, medical assistance, and the costs of medicines. Typical insurance coverage usually lasts one calendar year and can be renewed for the next one-year period (Borda 2016).

In the Polish insurance sector, cancer risk coverage is provided mainly by the life insurers as an option to the primary life insurance contract in the form of critical illness insurance. These contracts are of growing interest because they guarantee the payment of certain cash benefits in the event of a diagnosis of a serious disease (e.g., cancer, heart attack, stroke, or renal failure) and subsequent treatment. Moreover, they are usually supplemented with coverage for medical assistance (in particular oncological assistance), including: organization and coverage of the costs of medical transport, drug delivery, the rehabilitation process, rehabilitation equipment rental or purchase and its delivery, home care after hospitalization, childcare, food delivery, reimbursement of wigs or prostheses, and more. A comprehensive analysis of the origin, product design, and market development of critical illness insurance is presented by Gatzert and Maegebier (2015). It should be added that the lump sum benefits paid in the event of cancer diagnosis (or other critical illness) do not directly relate to the actual costs of treatment, which are often very high. Comparative analyses of critical illness insurance products offered in Poland have been conducted lately by Michalak (2017), Osak (2018), and Węgrzyn (2020).

Insurance products that are aimed at covering the real costs of oncological treatment and recovery have been offered, but only recently and to a much smaller extent. From the insured's perspective, insurance that allows quick and easy access to oncological services and covers the actual expenses related to treatment may constitute an effective instrument for financing cancer risk in households. However, from the insurer's point of view, offering this type of insurance is more difficult. The product design must consider not only the level of risk which is insured, but also the current costs of medical services available under the insurance coverage. The existence of a wide catalogue of costly services that can be used by a person with cancer may lead to excessive consumption of services (moral hazard) from this perspective.

Table 3 presents a comparison of insurance coverages for cancer costs from selected insurance companies in Poland (compensation type products). The analysis intentionally includes examples of insurance products differentiated by the scope of services available in the event of a cancer.

Table 3: Comparison of the selected health insurance products against cancer costs offered in Poland

Criterion	Insurance Company		
	PZU Życie S.A.	**PKO Życie T.U.S.A.**	**Towarzystwo Ubezpieczeń Allianz Życie Polska S.A.**
Name of insurance product	Additional individual critical illness insurance	OnkoPlan	Allianz Best Doctors
Age of the insured	18-60 years, protection until reaching age of 65	18-60 years, protection until reaching age of 65	18-65 years, protection until reaching age of 85
Insurance period	5 years with possibility of renewal	1 year with possibility of renewal	1 year with possibility of renewal
Grace period	the same as in the main life insurance contract	90 days	180 days
Sum insured	no specified sum insured, benefits provided within quantitative limits	maximum limit of sum insured is EUR 500,000 for the policy year; EUR 1 million for the whole duration of the policy	EUR 1 million for the policy year, in the case of the contract renewal – EUR 2 million in relation to all the events of a lifetime
Services provided under the contract	medical consultations, diagnostic tests, rehabilitation services, psychological care, caregiver support	coverage of medically necessary costs of treatment outside Poland and the United States, costs of travel or medical	organisation and coverage of medically necessary costs of treatment abroad, including: costs of hospital stay, diagnostic tests,

		transport of the insured together with an accompanying person or donor, accommodation costs of the insured together with an accompanying person or donor, reimbursement of drugs after treatment abroad in Poland and the United States, daily hospital benefits (max. 60 days)	surgery, anaesthesia, radiotherapy, chemotherapy, drugs during hospitalisation, medical transport, reimbursement of the costs of purchasing drugs after returning to Poland (not reimbursed by the National Health Fund), daily hospital benefits
Limits of services	quantitative limits of benefits, not longer than 3 years from the diagnosis of the disease; for only one detected severe disease	amount limits for individual types of benefits, e.g. reimbursement of drugs up to PLN 100,000, but the insurance does not cover the costs of drugs reimbursed in part or in full under the National Health Fund relating to the reimbursed part, other costs are covered by insurance	upper amount limits for particular types of benefits, e.g. reimbursement of the cost of purchasing drugs after returning to Poland to EUR 50,000
Health care providers	medical providers in Poland designated by the insurer	foreign medical providers designated by the insurer, with the exception of the United States	selection from three foreign medical centres designated by the insurer
Additional services	preventive laboratory examinations every two years - from the second and fourth anniversary of the contract, psychological support for relatives in the event of the insured's death	second medical opinion (foreign)	second medical opinion (foreign) and *medical concierge* services

Source: own study based on: Allianz Życie (2018), PKO (2018a), PZU Życie (2019).

In the design of insurance products covering cancer costs, specific solutions are used in order to reduce moral hazard on the part of the insured. These include:

- precise definitions of covered risk – e.g., types of malignant neoplasms covered by an insurance;
- duration of the contract – typically for a specified period (1 or 5 years), with the possibility of continuing the insurance coverage after this period (a new premium amount is calculated based on the level of risk, which usually increases with the age of the insured person. For example, for a person aged 18-39, the premium in the fullest variant of the "OnkoPlan" insurance is PLN 89 per month, while for a 55-60-year-old insured it is PLN 262, respectively (PKO 2018b);
- age limits of the insured – typically the insured must be aged 18-60 to begin coverage, and standard insurance coverage lasts until age 65, with the exception of the "Best Doctors" insurance, which guarantees protection until age 85 (considering demographic trends, it can be expected that the percentage of older people with cancer, including those who have been using innovative anti-cancer therapies for many years, will increase);
- obtaining the right to benefits – usually the insurers require diagnosis to be supported by a histopathological examination, but in practice, a surgical operation is usually necessary to obtain this type of examination;
- grace periods – typically up to 180 days;
- limits on the amount, quantity, and time of provided medical and rehabilitation services;

- territorial scope of medical providers – usually limited to health care providers in the country and/or abroad, indicated by the insurer.

Conclusions

Malignant neoplasms constitute a complex medical problem, and to diagnose and treat them requires the cooperation of specialists from many fields. Considering the expected increase in cancer incidence, as well as the emergence of innovative treatment options offering the potential for many years of life after cancer diagnosis, it can be expected that the interest in PHI products providing comprehensive coverage of cancer costs should increase. However, it should be noted that the demand for cancer insurance products largely depends on households' incomes and the level of health awareness in the society. The analysis conducted regarding health insurance products offered on the Polish insurance market covering cancer risk showed that most critical illness insurance provides lump sum benefits that are not likely to match the real costs of treatment. There is an increasing need to develop insurance products that compensate all of the incurred costs and lost income resulting from cancer. Some of the most important challenges facing insurers in designing new cancer insurance products include: extending insurance coverage for people older than 65, including preventive examinations, and financing the use of drug therapies not reimbursed by the National Health Fund. Finally, information and mobile technologies represent valuable tools within the cancer insurance sector which can be used to monitor health status and to promote a healthy lifestyle among insured persons.

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Modern Methods of Quality Management

Anastasia Kurilova
0000-0003-1540-5388, Togliatti State University, Togliatti, Russian Federation, aakurilova@yandex.ru

Dmitry Savenkov
Togliatti State University, Togliatti, Russian Federation, savenkov03661@yandex.ru

Abstract

The relevance of improving quality management methods at enterprises is explained by the fact that in recent years, modern progressive enterprises are aimed at improving the quality of products and services by introducing quality tools and methods into the organization. Quality management is a lever for the economic development of the organization, the improvement of quality management methods directly affects the increase in the productivity of the enterprise, leads to the optimization of production costs. Improving quality management methods increases one of the most important criteria for assessing an organization - its competitiveness.

Keywords: Quality, Quality Management, Competitiveness, Costs, Costs, Statistical Process Control, Systems Approach, Quality Management.

Introduction

The relevance of improving quality management methods at enterprises is explained by the fact that in recent years, modern progressive enterprises are aimed at improving the quality of products and services by introducing quality tools and methods into the organization. Quality management is a lever for the economic development of the organization, the improvement of quality management methods directly affects the increase in the productivity of the enterprise, leads to the optimization of production costs. Improving quality management methods increases one of the most important criteria for assessing an organization - its competitiveness.

Quality management is one of the main activities of the enterprise, since it allows not only to produce high-quality products that meet the requirements of the consumer, but also to quickly respond to new market requirements. Consequently, the improvement of quality management methods will allow the production of relevant, high-demand products with the latest manufacturing technologies and high product quality. With the improvement of quality management methods, the work of all departments is integrated, which increases the level of quality knowledge among employees, leads to overall involvement and improvement of the work of all departments of the organization. Thus, the improvement of quality management methods directly affects the socio-economic indicators of the enterprise and its niche in the industry.

In general issues related to quality management methods, the works of famous foreign scientists became famous - Albert Feigenbaum, Joseph Juran, Genichi Taguti, Edwards Deming, Kaoru Ishikawa, Yoshio Kondo, Philip Crosby.

One of the most famous scientists in the field of quality is Edwards Deming, in his teachings he proposed 14 principles of quality management. His approach to quality management is divided into 4 critical components:

statistical process control;

scientific foundations of management;

psychology of management;

a systematic approach.

Based on Edwards Deming postulates, any work is a process during which people transform the raw materials received from suppliers, materials, information into the results offered to the consumer (Deming, 1993).

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The system of total quality control TQC (Total Quality Control) is described in the works of Feigenbaum, 1945. This system represents quality as a method of business vision - a solution to the problem of quality and its price in relation to the benefit of the consumer. This system assumes quality not only on the result of the production of a product, but also on the result of quality at each stage of its creation:

design control;

incoming control;

control of technological processes;

control of the manufactured product and its delivery to the consumer.

Summarizing the above, Albert Feigenbaum defined quality control as an effective system for coordinating quality work across all departments of an organization, continually improving these works, minimizing investment and cost to meet customer requirements (Feigenbaum, 1945).

Philip Crosby has proven in his writings that it is possible to optimize costs in quality management. The main point that Philip Crosby put into his teachings is that products should be produced immediately of high quality without modifications and alterations, since any revision and alteration are additional useless costs (Crosby, 1999).

Considering the economic interpretation of the concept of quality, the American professor H. James Harrington understands by quality the satisfaction of the consumer's expectations for the price he can afford when he needs it, and high quality is the excess of the consumer's expectations for a lower price than he assumes.

Consequently, exceeding consumer expectations is a tool for increasing demand for a manufactured product and increasing the share occupied in the industry, which leads to an increase in profits. And this, in turn, is the main goal of any acting organization.

In the Russian economy, the emphasis is on more highly specialized issues: planning, control, accounting and analysis of quality costs, issues of the direct impact of quality indicators on the technical and economic indicators of the enterprise.

Among the Russian scientists who have made a great contribution to the development of the theory of quality management practice, we should highlight Vasily Boytsov, Yuri Adler, Svetlana Shchepetova.

Formulation of the problem

With the existing economic feasibility of the direct influence of the quality of the manufactured product on the economic indicators of the organization, some issues of improving the quality to optimize the economic indicators remain not fully disclosed. Currently, most organizations do not fully understand the importance of quality management, and it is it that allows organizations to survive in a certain area of the industry in the current conditions of a market economy. Consequently, quality management should be viewed as a lever for the global improvement of the organization's system, for its modernization to meet the latest technologies and constantly changing demand for the product.

But even with the understanding of the importance of the quality management system at the enterprise, it must be continuously improved and optimized for quality costs, focusing on the most effective costs.

The main idea of modern quality management is that quality management brings the maximum effect during the production process of manufacturing a product, that is, quality management is not effective after the production of a product. But it is also necessary to carry out quality assurance activities prior to the product manufacturing process.

Results

Quality management techniques are the ways in which controls affect the manufacturing process of making a product. This provides a process for achieving and maintaining the planned degree of product quality. These methods fall into 4 categories:

organizational;

organizational and technological;

economic;

socio psychological.

Quality management is carried out using special means, which include:

office equipment, communication facilities used by management bodies and persons who control the performance of certain functions in quality management systems;

normative documentation that regulates the quality indicators of the manufactured product and organizes the implementation of special quality management functions;

metrology means, which include measuring instruments and state reference samples;

GSI (documents that regulate ensuring the uniformity of measuring instruments);

GSSD (base of the state service of standard reference data on the properties of substances and materials).

The functions that an organization performs in relation to quality as an object of management include:

rationing (includes standardization, certification and attestation);

raising personnel qualifications, stimulating personnel;

information and metrological support for monitoring the progress of the production process;

technological supply of the production process (enough material and technical support).

The quality of the manufactured product as a control object is also characterized by possible deviations from the quality indicators required by the consumer. In this regard, it is necessary to identify, evaluate and measure these deviations and be able to influence the manufactured products to eliminate possible deviations from the quality indicators determined by the consumer.

Decrease in quality indicators can occur due to physical wear of components, transformation of the internal structure or properties of the manufactured product, its physical obsolescence. Quality parameters can vary within certain tolerances for several reasons during the manufacturing process. They directly depend on the production technology of the product, the quality of the supplied components, the technological state of machine tools and production equipment, measuring instruments and tools, personnel motivation and many other factors of both internal and external organizational environment (Petrichenko, 2015).

In general, the principles of quality management are related both directly to the quality of the manufactured product and to the methods of managing this quality.

The quality indicators of the manufactured product are reflected in the terms of reference (TOR), plans and contracts.

Quality requirements are fixed in the existing standards, certain technological conditions and technical specifications for modernization and design, in the descriptions of the nature of the service and technological standards.

The quality management sequence plan contains:

setting a plan (task) for quality;

implementation of the plan and its support;

continuous comparison of the reproduced quality with the established plan;

implementation of corrective measures in the event of deviations to eliminate them.

The quality of the product produced also depends on numerous random factors that occur at all stages of the product's production. The introduction of a quality management system is necessary to prevent the occurrence of these factors through the coordinated activities of all departments in the organization. The quality management system in this case provides for corrective measures with a constant impact on the production process and the implementation of the manufactured product with an appropriate level of quality that satisfies the end user.

In quality management, concepts such as system, environment, goal, program, etc. are constantly used.

There is a command and control system. Numerous levels of enterprise management appear to be a managed system.

The quality management system is created and maintained by the management system.

Quality management concepts are divided into:

Quality System (QS) - quality system;

Quality Driven Management System (QDMS) - a management system based on quality management;

Total Quality Management (TQM) - total quality management;

Quality Assurance (QA) - quality assurance;

Quality Control (QC) - quality control;

Statistical Quality Control (SQC) - statistical quality control;

Quality Assurance System (QAS) - quality assurance system;

Product Assurance (PA) - product guarantee;

Total Manufacturing Management (TMM) - total production management;

Good Manufacturing Practices (GMP) - best manufacturing practices;

Environmental Management System (EMS) - production resource management system;

“We Care” - the system “we are concerned”;

“Responsible Care” - system of “concern of responsible persons”;

Environmental Total Quality Management (ETQM) - overall environmental protection quality management;

Total Manufacturing Assurance (TMA) - total production assurance;

Integrated Process Management (IPM) - integrated process management;

Management for Quality Improvement (MQI) - quality improvement management;

Total Quality and Productivity Management (TQPM) - total quality and performance management;

Integrated Quality Management (IQM) - integrated quality management;

Continues Improvement Implementation System (CIIS) - a system for implementing continuous improvement;

Total Quality Transformation (TQT) - total quality transformation;

Quality System Management (QSM) - quality system management.

These quality management concepts contain different quality management methods that are used in the Total Quality Management methodology to solve quality problems.

Total quality management plays a critical role in the management of a modern organization. The management system originates from senior managers. They are the ones who build the organization's strategy aimed at improving the technical and economic indicators of the current year in relation to the previous period. In the structure of the organization there are special departments that coordinate the work on quality management and its improvement.

For quality, considered as an object of management, all sections of modern management, such as planning, analysis and control, are characteristic.

Actual quality management is based on research on quality management carried out by renowned foreign companies such as Hewlett-Packard, etc. Quality policy in these organizations in the 1980s was influenced by the works of foreign scientists Albert Feigenbaum, Joseph Juran, Genichi Taguti, Edwards Deming, Kaoru Ishikawa, Yoshio Kondo, Philip Crosby.

The activities of the largest foreign corporations began to be determined based on the following factors:

involvement of top-level managers in quality management activities;

the interest of all employees in the continuous improvement of the organization's processes;

the creation of groups to improve quality at all stages of the product life cycle;

guaranteeing both collective and individual participation in quality management activities in the organization;

involvement of suppliers in improving the quality management system, both in the organization and on the territory of the suppliers;

creation of plans for quality improvement on a short- and long-term basis, implementation of these strategies, according to the plan;

quality assurance of functioning management systems;

introduction of incentives for the work done.

It should be noted that it is important to ensure the quality of the functioning of control systems, since Many quality management teams make the mistake of focusing specifically on identifying and correcting errors, ignoring preventive measures and working only with the production process and the departments directly involved in it. Thus, a deviation management system is organized that does not consider preventive measures to eradicate these deviations. When analyzing this error, experts in the field of quality concluded that quality management is dependent on the control systems that regulate the production and economic activities of the organization.

The activities of each organization should be aimed at involving all employees of the enterprise in improving the quality of the manufactured product, i.e. each employee must be individually and collectively responsible for ensuring that their operations meet quality standards. Any production activity should be aimed at full satisfaction of the consumer and the fulfillment of all his requirements in the production of a product or the provision of services.

In total quality management, internal and external aspects are distinguished. In any production activity, a large profit directly depends on the level of satisfaction of the requirements of the end user. The competitiveness of an organization in a area of product production depends on the level of customer satisfaction. Total quality management proves that the effectiveness of the organization and the quality of the product produced depends on the quality of the activities of each department in the organization. Each department consists of a network of interaction with other departments of the organization, as a result of this interaction, the internal flow of materials, processing and assembly operations are provided from the moment of production start until the moment the finished product is received and sold to the end consumer (Gudkova & Shazamova, 2016).

Total quality management establishes common interests and ensures the involvement of all departments in the work related to the compliance of their activities with the established standards in force at each level of the organizational structure. The main direction of total quality management is to minimize the costs (both money and time) incurred to control the quality of the manufactured product, that is, it is necessary to continuously optimize the costs to prevent the occurrence of defects in both components and the finished product.

Improving employee motivation for quality management can be achieved using quality circles and employee participation programs.

Quality circles are bodies that are made up of employees of the organization who meet regularly under the leadership of a senior manager. Quality circle meetings discuss possible ways to improve quality and organizational processes during the production of a product or the provision of a service.

Employee participation programs are increasing employee motivation by dividing organizational shares among employees. Nowadays, in industrial production, an important factor in improving the relationship of senior management and workers is the membership of employees in the share capital of the organization; introduction of a lower-level representative into the current board of directors to ensure the involvement of employees of all levels in the management of the organization. Total quality assurance requires coordination of actions of all functional departments to improve the performance of the organization (Smolyaninova & Trapeznikova, 2020).

Philip Crosby noted the employee reward system as an integral part of the quality management system - rewarding achievements leads to incentives for the employee to ensure high performance in all departments of the organization.

The Deming Prize, established in 1951, forms the basis of the Total Quality Control system. It is based on the analysis of information flow from a wide range of specialists and offers a new way to consider quality. It is widely applicable

in Japanese quality. This was followed in 1987 by the Baldrige Prize. The European quality award model became its development, its essence was to assess the results of business and the impact on society.

Conclusions

Now, the quality policy in organizations in the field of market economy is formed so that it covers not only the quality of the product produced and the services offered, but also the production activities of each employee of the organization. It clearly fixes the components of the quality management system and quality standards for an organization, considering that the manufactured product will be delivered to the end consumer within a certain time frame, in certain volumes and at a certain price.

Having a certified quality management system in a modern organization is essential for the successful development of this organization. The certified quality management system guarantees high stability and sustainability of the quality of the manufactured product. The quality management system certificate ensures maintaining competitiveness in area of production.

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Macroeconomic Stability of The European Union Member States in The Light of The Macroeconomic Imbalance Procedure

Bogdan WLODARCZYK
University of Warmia and Mazury, Olsztyn, Poland
E-mail: bogdan.wlodarczyk@uwm.edu.pl

Aleksandra OSTROWSKA
University of Warmia and Mazury, Olsztyn, Poland,
E-mail: aleksandra.ostrowska@uwm.edu.pl

Abstract

Macroeconomic stability, which is represented by an appropriate combination and levels of macroeconomic indicators, lays the foundations for attaining sustainable economic development over a long time horizon. Maintaining macroeconomic stability is particularly important in the EU countries, which compose a heterogenous structure in terms of both national economies and the development of financial markets. The EU member states are at different stages of their integration with the union. Most (19) are in the eurozone, having adopted the common currency, thereby abandoning autonomous monetary policy and transferring it to the European Central Bank. Critics of the common currency point to the risk of integrated monetary policy implementing the tools that might not be adequate for sustaining the stability of all national economies. Surveillance of the current economic situation is therefore crucial for the economic growth of these countries. The research subject raised in this paper is important for the present and future situation of the countries in the euro area and ones considering the date of access thereof. Monitoring macroeconomic stability is also significant in view of the current global situation, including the struggle with the COVID-19 pandemic.

The purpose of this study has been to evaluate the macroeconomic stability of the EU countries based on data published under the framework of the Macroeconomic Imbalance Procedure (MIP) in 2011-2018. The research results suggested an overall improvement in the macroeconomic stability of the countries submitted to the analysis, which was implicated by the decreasing number of cases when the thresholds set for particular indicators were exceeded. Moreover, regardless of whether given countries belong to the eurozone or not, most cases of exceeding the thresholds were observed in the areas of public and private sector debt and in the international investment position as well as export market share. These findings point to the areas that require improvement in the analyzed countries.

Keywords: macroeconomic stability, European Union countries, Macroeconomic Imbalance Procedure

Introduction

Macroeconomic stability, testifying to the effectiveness of the implemented economic policy, is an essential prerequisite for the achievement of sustainable economic development. Maintaining macroeconomic stability is particularly difficult in the EU countries, which are distinguished by diversity in many areas, including the historical or geographical background, as well as the financial and economic situation. Regarding these countries, it is especially important to consider the diversity in terms of the economic policy, including monetary policy, that they pursue, which is due to the different stages of integration at which they operate. Most EU countries (19) have already accessed the euro area, thereby adopting the common currency, which meant abandoning autonomous monetary policy in favour of the policy conducted by the European Central Bank. Critics of the common currency claim that integrated monetary policy gives rise to a risk that the tools implemented under its umbrella may not correspond adequately to the stability needs of every national economy. Moreover, it is believed that the effectiveness of traditional monetary policy instruments is becoming exhausted. On the other hand, the eurozone states adhere to different fiscal policies, which – despite the implemented policy mix tools - may contradict the solutions envisaged in monetary policy. The other EU countries (8) that have not accessed the eurozone conduct autonomous monetary and fiscal policies, although they respond to the general EU regulations (Kotliński 2012, p. 130).

Due to differences among the EU countries, especially in the economic sphere, and because of the recent deterioration of the macroeconomic situation caused by the latest financial crisis, with its earliest symptoms identified back in 2007

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and the consequences felt in the following years, several reforms of economic governance have been introduced in order to improve the situation. An example is the MIP, an instrument which enables surveillance of the macroeconomic stability of all EU member states, with instruments to take immediate measures to improve thereof. Surveillance of macroeconomic stability is significant for both the authorities and citizens. For the latter, macroeconomic stability is a determinant of wealth.

The variety of definitions of macroeconomic stability in the literature results in the absence of a uniform method applied to measure it. In view of the greater attention paid to the stability of economy by both researchers and economic authorities as well as the consequences of the latest economic crisis, which brought to light some irregularities in the functioning of the EU, the objective of this article has been defined as follows: to evaluate the macroeconomic stability of the EU states based on the indicators published in compliance with the MIP in 2011-2018.

Macroeconomic stability as a major objective of economic policy

Economic policy is a premeditated strategy of state authorities, institutions and international organizations to influence economy – its dynamics, structure, functioning and economic relations (Winiarski 2006, p. 18). Macroeconomic stability and the attainment of a positive economic growth rate are major goals of economic policy (Włodarczyk, Heller, Ostrowska, 2018, p. 130). Despite having the objectives defined as above, we are still lacking an unambiguous definition of macroeconomic stability. Moreover, rather than trying to define what macroeconomic stability means, the focus is on the conditions that must be fulfilled to be able to speak of macroeconomic stability (Ionita 2015). Macroeconomic stability can be defined as an appropriate set of macroeconomic indicators which best corresponds to the conditions of sustainable economic growth (Gorynia, Łaźniewska, 2009, p. 145). Likewise, macroeconomic stability has been defined as a combination of factors derived from the macro-environment the aim of which is to accelerate the dynamics of economic growth in a country, or at least not to hinder such growth (Kupiec, Wierzbicka, 2017, p. 53). These two definitions suggest that macroeconomic stability is a broad concept, which is modelled under the influence of many macroeconomic factors. The subjects interested in the level of macroeconomic stability include: fiscal authorities, monetary authorities, national institutions, credit rating agencies, investors, and any entities that make business decisions (Janecki 2017, p. 124-125), including companies and households.

The concept of macroeconomic stability is also associated with the idea of economic balance. Macroeconomic stability is equated with the occurrence of balance, both internal and external, over a long time period. Internal balance is a situation where actual production obtained in an economy is generated with the full use of production factors, the unemployment rate is equal to a natural unemployment rate, inflation is low and stable, and public finances are in the state of balance, as verified by acceptable values of the deficit and public debt. External deficit refers to economic exchange with other countries and signifies balanced payments and stable exchange rates (Puszer 2014, p. 42). Maintaining internal and external balances, both strongly interconnected, ensures that the economy in question is resilient to external shocks (Sameti, Isfahani 2012, p. 38), that is sudden, undesirable changes in the environment, which can undermine the country's macroeconomic condition. Macroeconomic stability is one of the fundamental elements of the economy's competitiveness (Kirikkaleli, Ozun, 2019, p. 351, Luylov, Chygryn, Pimonenko, 2018, p. 143). Any fluctuations in macroeconomic indicators may therefore weaken the resilience of the economy of external shocks or affect its attractiveness on the international arena, e.g. due to a lowered level of investments. Any case of economic imbalance is an impulse activating various adaptation mechanisms, the effectiveness of which depends on the extent to which economic balance has been affected, the degree of flexibility of markets, type of economic policy instruments applied, and the external circumstances in which the given economy functions. The interdependence between internal and external balance strengthens as the share of a given economy in the international labour division is higher while the liberalization of its economic system and economic relations with foreign countries are stronger (Puszer 2014, p. 46).

Noteworthy is the fact that the lack of an unambiguous definition of macroeconomic stability is compounded by the absence of a uniform method to measure thereof (Melnyk, et. al., 2018, p. 106). Among the methods applied to explore macroeconomic stability, the ones used most often are: evaluation through the prism of convergence criteria (Pietryka 2009), Macroeconomic Stability Pentagon (Lyeonov, Lyulov 2018) and Macroeconomic Imbalance Procedure (Kämpfe, Knedlik 2017). An authorial comparison of these three methods is presented in table 1.

Table 1: Methods for evaluation of macroeconomic stability – a comparison

Question/method	Macroeconomic Stability Pentagon	Convergence criteria	Macroeconomic Imbalance Procedure
When was the method developed?	1990	1992	2011
How many partial indicators does the method include?	5 indicators	5 indicators	11 basic indicators, auxiliary indicators and 3 labour market indicators
Does an application of the method generate a synthetic indicator?	Yes	No	No
Are there thresholds for evaluation of macroeconomic stability?	No	Yes, for 4 of the 5 conditions	Yes, for the basic indicators but not for the auxiliary ones
Are data for evaluation of macroeconomic stability available for broad public?	Yes	Yes	No
Does the method take into account macro-finance data?	Only regarding public debt relative to GDP	Only regarding public debt and deficit relative to GDP	No

Source: elaborated by the authors

The method chosen in this research for making further assessment of macroeconomic stability is the Macroeconomic Imbalance Procedure, as it provides a wide range of indicators, which are easily available and interpretable (owing to the inclusion of threshold values).

The Macroeconomic Imbalance Procedure as a method for the measurement of macroeconomic stability

The research interest in macroeconomic stability has been stimulated by the consequences of the latest financial crisis, which revealed the imperfections in how the EU structures operated (Graj 2015, p. 22). The expansive fiscal and monetary policies, errors in economic governance and disruptions in financial markets resulted in a rapid increase in deficit and public debt, which was most severe in peripheral EU states, such as Spain, Portugal and Ireland (Widerski 2016, p. 236-237). One of the shortcomings identified then was the lack of an early alert mechanism for the eurozone countries, which were worst stricken by the crisis. In response to the emergence of certain undesirable phenomena and the need to supervise the current economic situation of the EU member states, MIP was implemented in 2010, as part of the so-called six-pack of economic governance reforms (Erhart, Becker, Saisana, 2018, p. 3).

The main instrument for measuring the level of macroeconomic stability with the use of the mentioned method is the scoreboard published by the European Commission in annual Alert Mechanism Reports. Based on the MIP scoreboard, the presence or absence of harmful economic imbalances is confirmed. When a case of imbalance is verified, the Commission issues recommendations to the EU member state in question. If these recommendations are not implemented, the European Commission can impose penalty fees on this EU country (Rymarczyk 2017, p. 300). Table 2 shows the MIP scoreboard. Beside 11 headline indicators that define the level of internal balance, external balance and competitiveness in the EU states, the European Commission employs several auxiliary indicators. However, no threshold values have ben set for these indicators. In 2015 three labour market indicators have been added to the MIP Scoreboard.

Table 2: The MIP Scoreboard

Indicator	Unit	Thresholds
External imbalances and competitiveness		
Current Account Balance (CA)	% of GDP (3 year average)	-4% / +6%
Net International Investment Position (NIIP)	% of GDP	> -35%
Real Effective Exchange Rate (REER)	42 trading partners, HICP deflator; 3 year % change	+/- 5% (EA)
		+/- 11% (Non-EA)
Export Market Shares (EMS)	% of world exports; 5 year % change	> -6%
Unit Labour Costs (ULC)	(2010=100); 3 year % change	< 9% (EA)
		< 12% (Non-EA)
Internal imbalances		
House Prices Index (HPI)	(2015=100), deflated (1 year % change)	< 6%
Private Sector Credit Flow (PSCF)	Consolidated; % of GDP	< 14%
PSD – Private Sector Debt (PSD)	% of GDP	< 133%
Gross Government Sector Debt (GGSD)	% of GDP	< 60%
UR – Unemployment Rate (UR)	3 year average	< 10%
Total Financial Sector Liabilities (TFSL)	Non-consolidated; 1 year % change	< 16,5%
Employment indicators		
Activity rate	% of total population aged 15-64 (3 year change in pp)	> -0,2%
Long-term unemployment rate	% of active population aged 15-74 (3 year change in pp)	< 0,5%
Youth unemployment rate	% of active population aged 15-24 (3 year change in pp)	< 2,0%

Source: developed by the authors, based on the Report from the Commission to the European Parliament, the Council, the European Central Bank and the European Economic and Social Committee, Alert Mechanism Report 2020.

The European Commission justifies the selection of indicators included in the MIP as follows (European Commission 2012, p. 4):

- first, the set of indicators takes into account a broad approach to potential disturbances in economic balance, including macroeconomic stability and competitive position of economies, based on both economic literature and the experience gained thus far. The MIP takes into consideration indicators that identify internal balance, external balance and competitive position.
- secondly, the indicators and their permissible thresholds were determined in such a way as to create an efficient early alert mechanism indicating a potential threat to macroeconomic balance and therefore to economic competitiveness. The thresholds were established with the help of statistical methods, according to the lower or upper quartile of the historical data distribution.
- thirdly, the scoreboard plays a very important communication role. To this end, it displays a limited, clearly presented set of indicators so that the information is understandable to third parties. Another significant contributor to the communicative function is the open access to collected data, which are available online.

- finally, the indicators must be of high quality, reliability and comparability between the states, which is ensured by the European Statistics Code of Practice. EUROSTAT is indicated to be a reliable source of statistical data, and if some data are unavailable there, it is recommended to use other reliable sources, such as the European Central Bank database.

MIP, same as the Excessive deficit procedure, is composed of the preventive and the corrective part (Kotliński 2013, p. 171). The former applies to all EU member states, and the latter is valid for the eurozone countries only. The preventive part consists of an analysis of indicators and detection of imbalances in macroeconomic stability. Next, an in-depth analysis is performed and if any of the detected imbalances is deemed to be excessive, the corrective part if activated. In this part, an EU member state in question is obligated to publish a corrective plan, the implementation of which is then surveilled by the Commission. Once completed, the procedure is terminated.

Table 3: Advantages and disadvantages of the MIP as a method for evaluation macroeconomic stability

Advantages	Disadvantages
Takes into account a wide range of indicators (microeconomic, macroeconomic, real estate market data, financial data)	Lack of a synthetic indicator of macroeconomic stability
Contains cautionary thresholds for each headline indicator	Cases of exceeding cautionary thresholds may indicate macroeconomic instability, hence it is necessary to apply also a qualitative analysis and descriptive analysis, and to establish a broader context
Apart from economic indicators, it takes into account financial indicators, which is significant from the point of view of financialization of economy	Short time of the application as the MIP was created only a few years ago, in 2011
Contains a qualitative analysis of the results	The method is applied exclusively to evaluate macroeconomic stability in EU countries
Provides a uniform measurement of macroeconomic stability in the EU countries; when modified, it is applicable to measuring stability in countries outside Europe	Despite pointing to imbalances in some EU countries, the European Commission has never imposed sanctions
Provides a possibility of rapid response to disturbances in macroeconomic balance	Discretion of the Commission assessment of the imbalances; a member state which not respect more thresholds of the indicators may not be included in the category of the countries with imbalances if Commission consider this. There are also cases when Commission include a member state in the category of countries with imbalance if the member state fails to respect only one threshold of the scoreboard
The possibility of imposing sanctions on the euro area countries, which do not follow the recommendations of the European Commission as part of the macroeconomic balance	Some recommendations of the Commission are supporting objectives that contradict each other

Source: developed by the authors

Advantages and disadvantages of the MIP according to the authors of this article are contained in table 3.

Measurement and evaluation of macroeconomic stability through the prism of the MIP scoreboard

The level of macroeconomic stability in the EU countries has been measured with the help of 11 headline indicators, published by the European Commission in annual Alert Mechanism Reports, and compared with the threshold values. The employment indicators introduced in 2015 are not included in the analysis due to the adopted research period. It has been agreed that more cases of exceeding the set thresholds implicate a lower level of macroeconomic stability. Because of the high number of the EU member states and the limited length of this article, only general trends were analyzed, without exploring specific causes underlying the macroeconomic stability in every country. It should be emphasized that in depth-reviews (IDR) are published in relation to the countries that the European Commission finds that there is an imbalance, which allows to show the long-term trends leading to it.

In 2011-2018, there were fluctuations in the macroeconomic stability levels in the EU member states, which was manifested by the number of cases where the threshold values of the indicators published in the MIP scoreboard were exceed. There were 87 such cases in 2011, increasing to 97 in the following year, then declining to 90 in 2013. Since 2014, the number of cases surpassing the permissible thresholds for the MIP published indicators decreased, down to 67 in 2017, which was the lowest number over the analyzed time period. The highest number of excessive indicator values occurred in 2012 (97). During the analyzed period of time, some improvement in the general level of macroeconomic stability of the EU member states was achieved, which is confirmed by the decreasing number of excessive values of the MIP indicators (from 87 in 2011 down to 67 in 2017). In the last year submitted to our analysis, that is in 2017, the number of such cases increased again, up to 71, which should alert one to make detailed analyses of the macroeconomic situation in these countries.

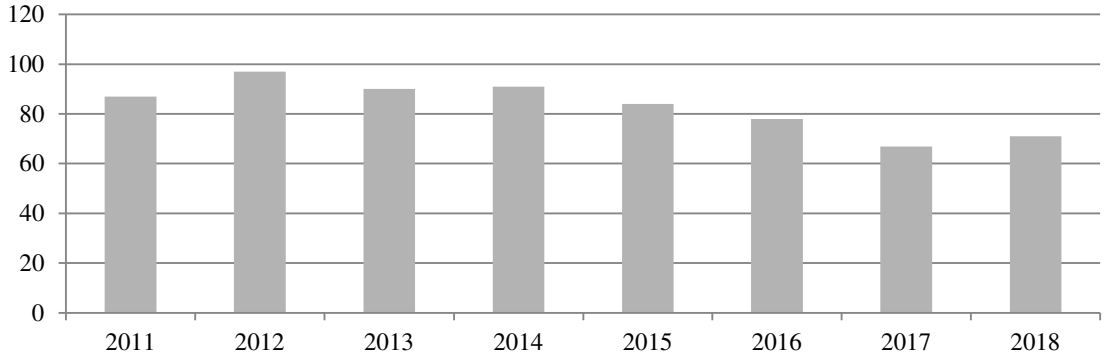

Fig. 1: Number of cases where the threshold values of the MIP indicators were exceeded in the EU member states in 2011-2018

Source: developed by the authors, based on the Report from the Commission to the European Parliament, the Council, the European Central Bank and the European Economic and Social Committee, Alert Mechanism Report 2020.

Despite positive overall tendencies leading to some improvement in the level of macroeconomic stability, the EU countries in 2011-2018 were distinguished by certain variation in this regard. Most cases of surpassing the indicator threshold values were observed in Cyprus (47), while the smallest number was noted in the Czech Republic (11). Other countries with a high number of such cases, apart from Cyprus, were Ireland (46), Portugal (39), Greece (37) and Spain (37), that is the eurozone peripheral countries, which are considered to be less developed. The European Commission has identified the existence of imbalances or excessive imbalances in these countries in recent years but without imposing any sanctions. In turn, the countries with the smallest number of cases where indicators exceeded their threshold values included Romania (12) and Poland (12). The analysis justifies the conclusion that the eurozone countries in that time period were characterized by a lower level of macroeconomic stability than the countries outside the common currency area.

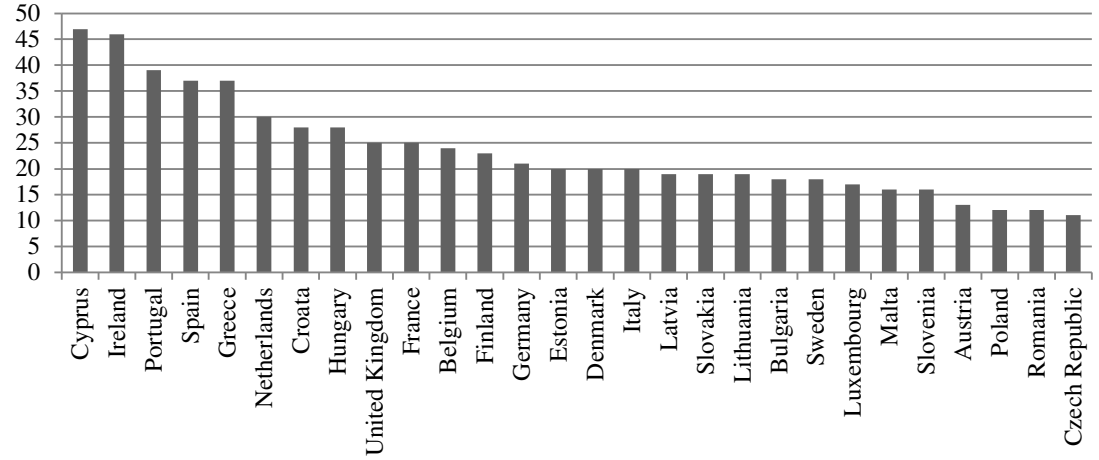

Fig. 2: Number of cases where the threshold values of the MIP indicators were exceeded in each EU member states in 2011-2018

Source: developed by the authors, based on the Report from the Commission to the European Parliament, the Council, the European Central Bank and the European Economic and Social Committee, Alert Mechanism Report 2020.

Cases of exceeding the allowable values were observed for all the indicators in the analyzed countries, although their number was not higher than 20 in any of these states. The threshold value was exceeded most often for the indicators NIIP, EMS, PSD, GGSD and UR. However, the number of excessive values for most indicators tended to decrease, from 16 to 12 for the NIIP, from 16 to 1 for the EMS (the highest decrease), from 13 to 12 for the PSD and from 10 to 7 for the UR. An increase was only recorded for the GGSD indicator, from 14 to 15 cases. The thresholds were least often exceeded for the following indicators: TFSL, REER, ULC, HPI, and PSCF. There was a slight increase for the TFSL, from 1 to 2 cases of values above the threshold, and for the ULC, from 3 to 4 such cases. The highest increase was detected for the HPI, from 0 to 6. For the other indicators, the number of cases above the thresholds decreased, namely from 3 to 0 for the PSCF and from 3 to 2 for the RRER.

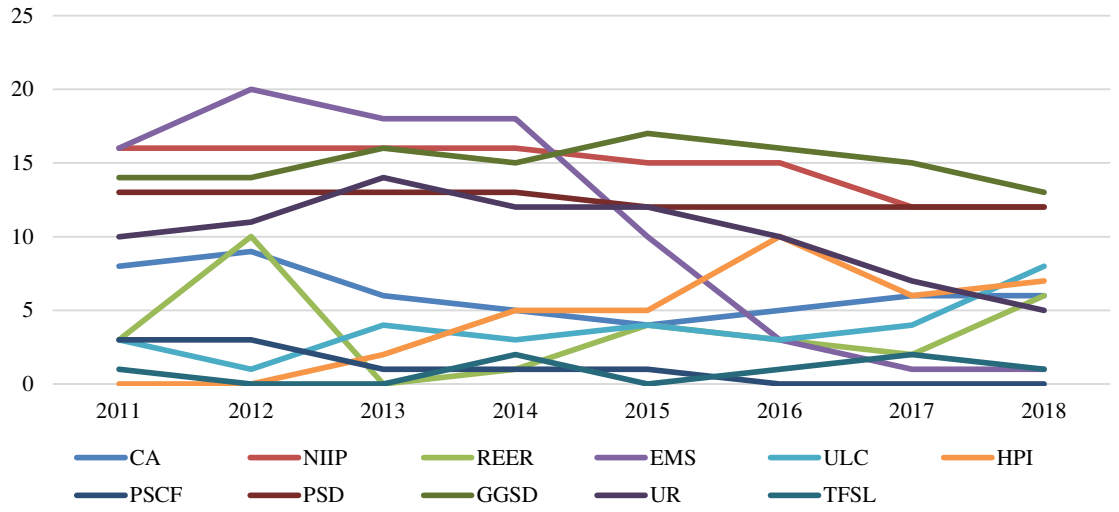

Fig. 3: Number of cases where threshold values of indicators were exceeded, in 2011-2018

Source: developed by the authors, based on the Report from the Commission to the European Parliament, the Council, the European Central Bank and the European Economic and Social Committee, Alert Mechanism Report 2020.

Among the eurozone states, the indicator pertaining to external balance that most often scored above its threshold value was the NIIP (68), followed by the EMS (64), while the CA (28), REER (22) and ULC (19) were least often above the threshold values. As for internal balance and competitiveness, the GGSD (89), PSD (67) and the UR (59) most often exceeded their thresholds, while the HPI (16), PSCF (9) and the TFSL (4) least often reached values above their thresholds. Thus, there were disturbances in both external and internal balance among these countries. The most serious problem in terms of external balance was identified to appear in the net international investment position and in the export market share. Regarding internal balance, most troublesome was the debt of both state institutions and the private sector, although certain problems also occurred in the social sphere, e.g. unemployment.

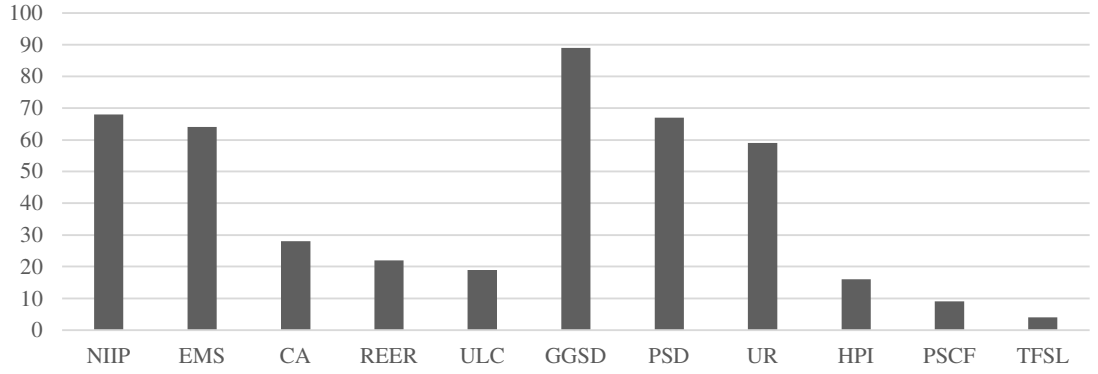

Fig. 4. Number of cases where thresholds of the MIP indicators were exceeded in the eurozone states, in 2011-2018

Source: developed by the authors, based on the Report from the Commission to the European Parliament, the Council, the European Central Bank and the European Economic and Social Committee, Alert Mechanism Report 2020.

The situation in the countries outside the eurozone was similar to the one observed above. Most cases of exceeding the threshold values of indicators measuring external balance concerned the NIIP (38), EMS (23) and CA (15), while the least cases were noted for the ULC (6) and REER (1). As for internal balance and competitiveness, most such cases were connected with the PSD (21), GGSD (18) and the UR (15), whereas values of the HPI (12) and TFSL (2) least often surpassed the relevant thresholds. Values of the PSCF were never higher than its permitted threshold over the entire analyzed period of time.

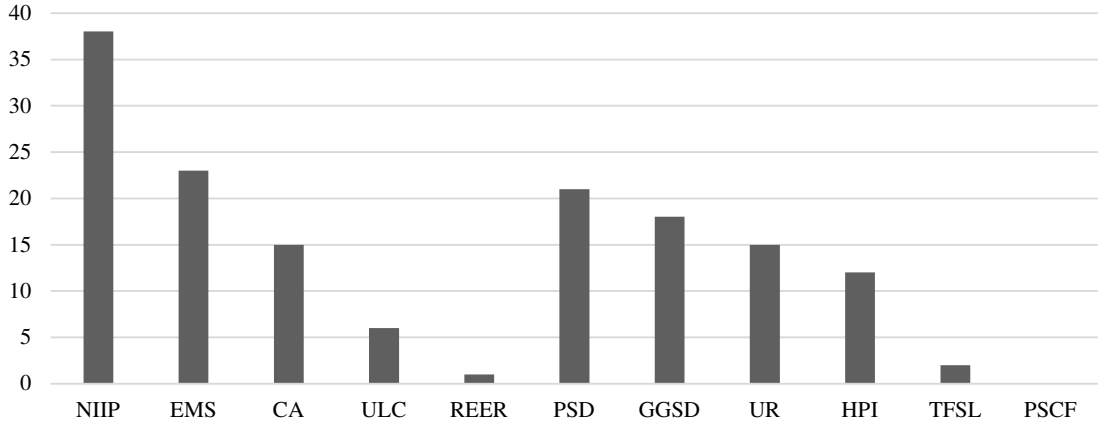

Fig. 5. Number of cases where threshold values of the MIP indicators were exceeded in countries outside the eurozone in 2011-2018

Source: developed by the authors, based on the Report from the Commission to the European Parliament, the Council, the European Central Bank and the European Economic and Social Committee, Alert Mechanism Report 2020.

The above analysis of macroeconomic stability in the EU countries has implicated an overall improvement in the level of this parameter. A small and decreasing number of cases where the thresholds set for the MIP indicators were exceeded is a positive finding. Both in countries using the common currency and the ones outside the eurozone, the net international investment position and export market shares need some improvement, as they could enhance the investment attractiveness of the EU countries while helping them to better the current account balance. Attention should be drawn to the problem that is already broadly discussed in the literature and in public debate, namely to excessive debt, which appears in both public and private sectors (Włodarczyk 2018, p. 97). It is also crucial to take measures for the sake of improving the situation of the social sector, for instance to combat unemployment. This is also important for the current situation in global economy because unemployment certainly entails poorer macroeconomic stability in both the EU countries and outside the union.

Conclusions

The macroeconomic Imbalance Procedure, implemented in 2011, can serve as a useful instrument to evaluate economic situation. Advantages of this method certainly include a broad range of proposed indicators, which take into account economic indices (both internal and external balance) as well as financial ones, in addition to a series of auxiliary indicators, with employment indicators. This is important from the standpoint of the growing importance of financial factors as well as fiscal ones, and their impact on the economic position of every country (Wichowska, Ostrowska, 2018, p. 339-340). Another advantage lies in the publication of threshold values of the MIP indicators, which enables rapid detection of any disturbances in the macroeconomic stability within particular areas. The method, however, is not free from shortcomings, such as the lack of a possibility to react instantly to cases where thresholds are exceeded, or the fact that published data are averaged values. The other disadvantage of MIP is discretion of the Commission assessment of the imbalances and no sanctions against countries with imbalances.

The analysis of macroeconomic stability presented in this paper suggests some improvement in this parameter during the analyzed time span which occurred in most EU countries, and this is confirmed by the decreasing number of cases where the MIP indicator threshold values were exceeded. However, the countries outside the eurozone proved to possess higher macroeconomic stability. Possible reason could be sought in the lack of adequate tools for application in common monetary policy in the eurozone, or in an autonomous fiscal policy of the countries outside this group of EU states. Another possible reason might be the different degree of development of financial markets, which national economy in each country is to some extent dependent on.

A further challenge in research dedicated to macroeconomic stability should be to continue surveillance of levels of macroeconomic indicators in the analyzed countries, and to seek for solutions which could strengthen the

macroeconomic stability of these countries. It is also worth bearing in mind that global economy in most countries across the world, not only in Europe, is facing new challenges connected with the COVID-19 pandemic.

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The Impact of EU Regional Policy on Economic Growth, Promoting Access to Employment and Social Inclusion

Małgorzata GORZAŁCZYŃSKA-KOCZKODAJ

Institute of Spatial Management and Socio-Economic Geography; University of Szczecin; Szczecin, Poland
malgorzata.gorzalczynska-koczkodaj@usz.edu.pl

Abstract

Regional development is largely an economic process, involving the transformation of regional factors and resources (internal and external) into goods and services. Its main feature is the growth of the region, i.e. the increase in the production of goods and services as a result of a quantitative increase in used factors of production (material and personal) and improvement of their efficiency.
The aim of the article is to analyse the EU funds and determine the impact of EU funds received by Poland under the financial perspective 2007-2013 and 2014-2020 for reducing unemployment and for economic growth. The article shows the important role that the European Union plays in supporting employment through the implementation of the main objective of cohesion policy supporting employment, business competitiveness and economic growth and sustainable development, as well as improving the quality of life of citizens. The objectives of this policy are addressed to all regions and cities in the European Union.
Detailed data cover different periods in the analysed range, due to their availability. The presented results form the basis for further, extensive research, in order to fully specify factors affecting the described phenomena and their role. Due to a limited space, many details as well as factors directly affecting the analysed phenomenon, such as changes in social policies in the country, are not taken into account.

Keywords: EU funds, GDP, Registered Unemployment, Relative Poverty

Introduction

Regional development can be understood as harmonized and systematic activities of the local community, local government and other entities operating in the region aimed at creating new and improving the existing conditions of the region's economy and ensuring spatial and ecological order [17,21,19]. The most synthetic categories of regional development explain the definitions Szlachta, Kudłacz i Klasik. According to Szlachta [25], "regional development is a systematic improvement in the competitiveness of business entities and the standard of living of the inhabitants, as well as an increase in the economic potential of regions, contributing to the socio-economic development of the country". Kudłacz defines regional development as "a permanent increase in the standard of living of the inhabitants and economic potential in the scale of a given territorial unit". In contrast, Klasik defines regional development as "the sustainable growth of three elements: the economic potential of regions, their competitive strength and the level and quality of life of residents [18,15,14]. Increasing the quantity and improving the quality of manufactured goods and services is the basis for changes in the way, level and quality of life of the region's inhabitants. Economic growth affects social development, which is the second aspect of regional development [16]. The development of local government units is associated with planning and management efforts, using appropriately designed methods and instruments of impact [20,22].

A process of integration with the European Union has contributed also to significant changes in the policy of rural development in Poland [31]. Despite the increased availability of jobs also in rural areas, there is still high international emigration (temporary and permanent). This phenomenon mainly concerns young people who may no longer return to their places of residence, which reduces the potential of the regional labour market and the possibilities of increasing the region's economic potential [30,3].

Essential is Article 9 of the Regulation (EU) No 1303/2013 [7] of the, in which they are written thematic objectives for the ESI Funds. In order to contribute to the Union strategy for smart, sustainable and inclusive growth as well as the Fund-specific missions pursuant to their Treaty-based objectives, including economic, social and territorial cohesion, each ESI Fund shall support the following thematic objectives:

1. strengthening research, technological development and innovation,

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enhancing access to, and use and quality of, ICT,

2. enhancing the competitiveness of SMEs, of the agricultural sector (for the EAFRD) and of the fishery and aquaculture sector (for the EMFF),
3. supporting the shift towards a low-carbon economy in all sectors,
4. promoting climate change adaptation, risk prevention and management,
5. preserving and protecting the environment and promoting resource efficiency,
6. promoting sustainable transport and removing bottlenecks in key network infrastructures,
7. promoting sustainable and quality employment and supporting labour mobility,
8. promoting social inclusion, combating poverty and any discrimination,
9. investing in education, training and vocational training for skills and lifelong learning,
10. enhancing institutional capacity of public authorities and stakeholders and efficient public administration.

Thematic objectives shall be translated into priorities that are specific to each of the ESI Funds and are set out in the Fund-specific rules.

The main objective of cohesion policy is to reduce economic disparities between regions and inhabitants of the European Union. The adequate use of funds should aid those regions which are socially and economically disadvantaged. The funds are distributed on the basis of a measure of Gross Domestic Product. Nevertheless, the level of affluence of the inhabitants is one of the criteria for providing a given region with funds [10].

Regional statistics are employed when allocating funds. The NUTS classification is used to define regional boundaries and determine geographic eligibility for structural and investment funds. Regional eligibility for the European Regional Development Fund (ERDF) and the European Social Fund (ESF) during the programming period 2014–20 was calculated on the basis of regional GDP per inhabitant (in PPS and averaged over the period 2007–09). NUTS 2 regions were ranked and split into three groups:

- less developed regions (where GDP per inhabitant was less than 75% of the EU average);
- transition regions (where GDP per inhabitant was between 75% and 90% of the EU average); and
- more developed regions (where GDP per inhabitant was more than 90% of the EU average).

For the programming period 2021-2027, the Commission envisages the continued use of the NUTS classification for determining the regional eligibility for support from the ERDF and the ESF.

In accordance with the provisions of the Treaty on the Functioning of the European Union (Articles 174 to 178)[26], the aim of regional policy is to reduce economic, social and territorial disparities between EU regions by supporting job creation, competitiveness, economic growth, improved quality of life and sustainable development. These assumptions are specified in the provisions of "Europe 2020" document, which sets out detailed guidelines for achieving the objectives to be met by the end of 2020 at the latest. The issues raised in the article include, inter alia[1]:

- achievement of at least 75% of the employment rate for people aged 20 to 64;
- reduction of the percentage of school leavers to less than 10% and increasing the number of university graduates by at least 40%;
- reduction by 20 million of the number of people at risk of poverty or social exclusion.

In addition, the importance and gravity of the problem was recognised by the Permanent Representatives Committee of the Council of the European Union, which in December 2019 adopted a conclusion entitled "Inclusive labour markets: Improving the employment of people in a vulnerable position in the labour market". According to this document, the European Union's recognised objective is to increase employment opportunities for all. The European pillar of social rights also emphasises the right of all people to receive support in improving employment prospects or self-employment and access to the labour market. Moreover, workers in the Union are protected against discrimination on grounds of religion or belief, age, sex, sexual orientation, disability, racial or ethnic origin [11].

[1] Its aim is also to reduce greenhouse gas emissions by at least 20%, increase the share of renewable energy to 20% and increase energy efficiency by 20%, investing 3% of gross domestic product in research and development.

Labour and, in particular, skills shortages have an adverse impact on economic growth, labour productivity and European competitiveness [4]. For this reason, it is crucial to promote the employment of young people who are outside the labour market or unable to realise their potential due to their disadvantages or obstacles in the working environment, such as lack of accessibility. Disadvantaged people in the labour market are often an untapped resource and their integration into the labour market is an important means of achieving overall higher employment rates, social cohesion and inclusion. This is especially crucial for people with disabilities. Without this access and participation, they may experience greater social isolation, stigma and financial burden than people without disabilities or in a better position on the labour market. Moreover, the accumulation of disadvantages further increases the risk of long-term unemployment, inactivity or withdrawal from the labour market. It should be noted that Article 27 of the Convention on the Rights of Persons with Disabilities [2], signed by the EU and all Member States, commits the parties to "protect and promote the right to work" by, inter alia, creating and providing employment opportunities in all forms, including self-employment. However, according to Principle 17 of the European pillar of social rights2, "Persons with disabilities have the right to receive income support which ensures a decent living; services which enable them to participate in the labour market and in society and to be provided with a working environment appropriate to their needs".

Public authorities may increase employment among different groups of disadvantaged people in the labour market by taking into account social aspects, and in particular employment criteria, in public procurement procedures [1]. EU funding, in particular the European Social Fund, is crucial to reach out to and aid disadvantaged people to integrate them into both the labour market and society, for example by supporting social innovation and implementing multi-sectoral initiatives [13].

Regional policy is implemented through three main funds: European Regional Development Fund (ERDF), Cohesion Fund (CF) and the European Social Fund (ESF) [5]. Most cohesion policy funding focuses on the less developed European countries and regions to help them bridge the gap and redress the economic, social and territorial disparities that still exist in the EU.

Materials and Methods

The analysis focuses in particular on economic growth per capita, the broadly understood labour market and the socially excluded. The analysis concerned primarily the Zachodniopomorskie province which has significantly improved its socio-economic situation on account of EU funds. The article concentrates on the cohesion policy and excludes other funds received by Poland, e.g. under agricultural policy. In the study, a detailed determination was made of the impact of the EU budget only on the Zachodniopomorskie Voivodship, due to the first stage of research, which will then be extended to all Polish regions to compare Polish regions with neighboring regions in the last stage. To explore the research problem, the key macro-economic figures which have improved on account of the EU funding, as well as the main areas of their allocation will be identified. The methods adopted to examine and evaluate the discussed issues include the review of literature and Internet sources. Empirical data available on the websites of individual ministries, Statistics Poland and portals dedicated to European funds were additionally used.

The role and importance of the EU in promoting employment - Results and Discussion

Upon Poland's accession to the European Union, the period of implementation of the Community's cohesion policy has commenced. It is aimed at promoting harmonious development through measures leading to the reduction of disparities in the levels of development of its regions, and thus enhancing the economic, social and territorial cohesion of the Community. EU regional policy is considered by some researchers to be the policy implementing the largest number of programmes aimed at supporting development, if not the largest integrated development policy of the modern world.[24]

The impact of the cohesion policy on the social and economic development of Poland to date should be assessed as clearly positive. European funds had a significant impact on economic growth, investment activity and the labour market in Poland, as well as on the internal and external economic equilibrium. Figure 1 illustrates the amount of funds received by Poland from the European Union budget under the individual financial perspectives.

[2] A European Union document signed jointly by the European Parliament, the Council of Europe and the European Commission on 17 November 2017 at the Social Summit for Fair Employment and Economic Growth held in Gothenburg, Sweden.

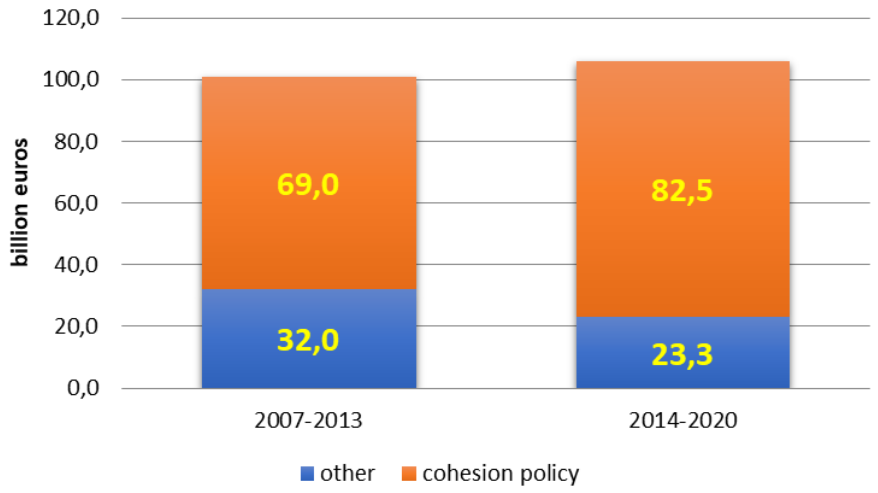

Fig. 1: The amount of the European Union funds for Poland in the years 2007-2020, including funds allocated to the cohesion policy in billion euro.

Source: Own work based on www.funduszeeuropejskie.2007-2013.gov.pl, www.funduszeeuropejskie.gov.pl [28,29]

Although the European Union's budget has been reduced (in 2007-2013 it was 1,035 billion euros to 997 billion euros in 2014-2020), Poland has received more funds. This encouraged greater investments, which resulted in an increase in employment, and this contributed to economic growth and improvement of the economic situation of the population in Poland. EU support provides a great opportunity for the Polish economy and human capital. The provision of EU funds led to numerous investments in Poland, even during the economic crisis [24].

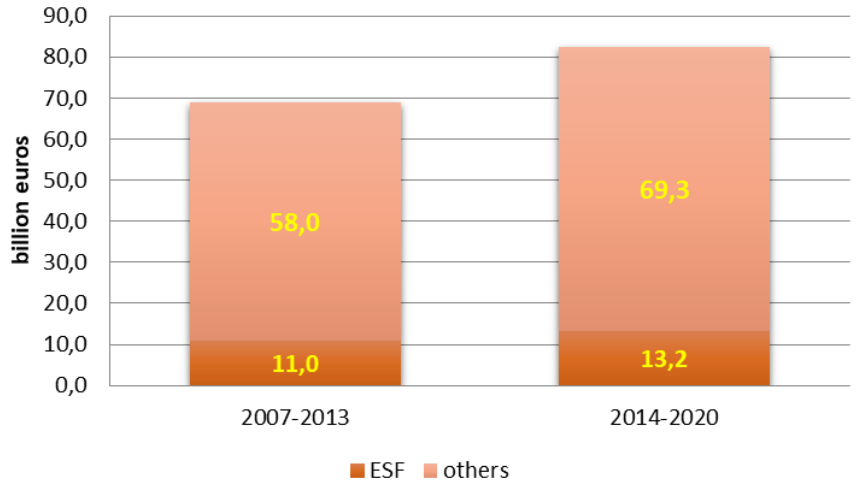

Fig. 2: Amount of European Social Fund resources under the cohesion policy for Poland in the years 2007-2020.

Source: Own work based on www.funduszeeuropejskie.2007-2013.gov.pl, www.funduszeeuropejskie.gov.pl [28,29]

To achieve the objectives related to the reduction of the unemployment rate, improving professional qualifications, acquiring education and skills in the years 2007-2013 the Human Capital Operational Programme was primarily used, which in the 2014-2020 perspective, in response to the needs for reforms in the areas of employment, social inclusion, education, higher education, health and good governance, was transformed into the Operational Programme Knowledge Education Development (OP KED) and approved by the European Commission.

The programme is intended to support social innovation and transnational cooperation in these areas. More than €4.4 billion is available from the European Social Fund and €252.4 million from the dedicated budget line of the Youth Employment Initiative.

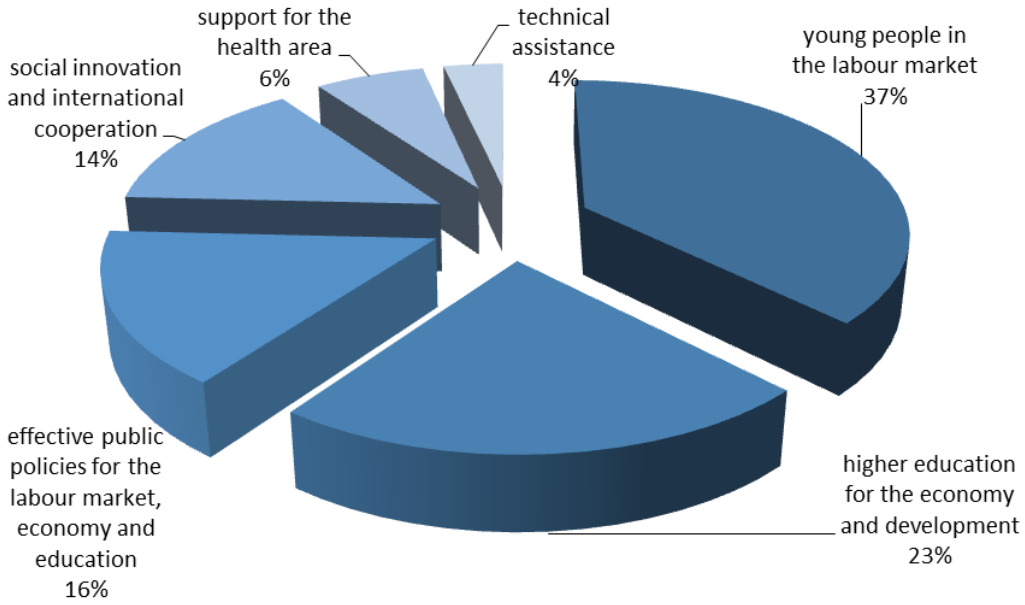

Fig 3. Share of funds under OP KED.

Source: Own work based on https://www.power.gov.pl/ [8]

The following priorities have been determined under the Operational Programme Knowledge Education Development, within which support is to be provided:

1. Young people on the labour market. This priority involves measures to be taken towards unemployed young people aged 15-29 (in particular those who do not participate in education and training, the so-called Youth NEET), which will contribute to their professional activation and improvement of the situation on the labour market (EUR 1,757 billion).

2. Effective public policies for the labour market, economy and education – implementation of reforms of systems and structures in selected areas of key public policies from the point of view of the Europe 2020 strategy and the National Reform Programmes (EUR 739 billion).

3. Higher education for economy and development – supporting quality, effectiveness and openness of higher education as an instrument for building a knowledge-based economy (EUR 301 billion).

4. Social innovations and transnational cooperation – implementation of atypical, innovative, transnational measures, leading to development of solutions which may be tested before the implementation, which in most cases will take place on a regional level, and additionally implementation of programmes in terms of transnational mobility (EUR 1,056 billion).

5. Support for the health care – adoption of measures concerning, inter alia, implementation and development of preventive programmes with regard to diseases that have a negative impact on labour resources, dedicated to persons at the age of professional activity and implementation of pro-quality measures and organisational solutions in the health care system facilitating access to inexpensive, permanent and high quality health services (EUR 670 billion).

6. Technical assistance (EUR 164 billion).

Impact of EU funds on unemployment, GDP and poverty rate

According to the source literature, the term "unemployment" was introduced by the English economist J.A. Hobson in the mid-1890s. He defined unemployment as "involuntary inactivity of workers", emphasising its adverse consequences both for individuals and society as a whole. As this definition implies, the negative impact of unemployment on two main levels, individual and general, was recognised already at that time. Due to a difficult situation prevailing on the labour market in Poland at the beginning of the 21st century, it was necessary to implement a social and economic policy which was conducive to creating new jobs and eliminating unemployment. The aim of this policy was, on the one hand, to counteract unemployment through active labour market programmes and mitigate its effects through protective measures, and, on the other hand, to promote productive employment and undertake measures to maintain existing jobs. The former of the above mentioned objectives of the labour market policy was implemented by means of active programmes (involving trainings, intervention works, public works, loans for the unemployed and employers), special programmes addressed to specific categories of the unemployed (e.g. women, youth, etc.) and passive programmes (involving unemployment benefits, pre-retirement benefits, early retirement financed by ZUS [Social Insurance Institution]) [6]. Active programmes could be implemented on a large scale though the provision of funds from the European Union dedicated to combating unemployment. Figures 4 and 5 depict the figures related to the unemployment rate and the number of unemployed.

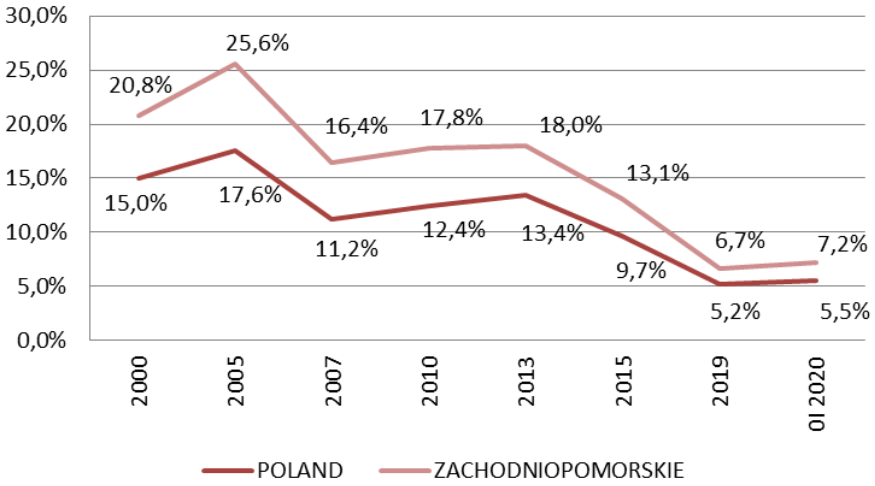

Fig.4: The rate of registered unemployment in Poland and in Zachodniopomorskie province in the years 2000-2020.

Source: Own work based on: https://bdl.stat.gov.pl/BDL/dane/podgrup/ [9]

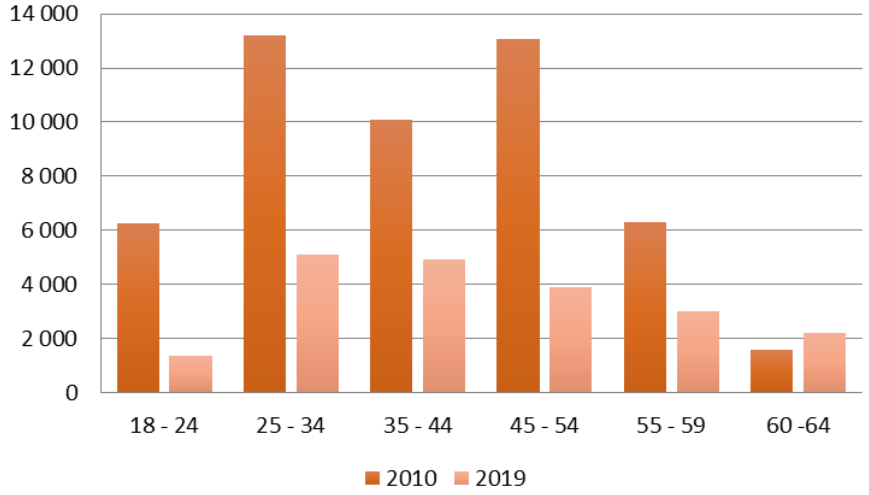

Fig. 5: Number of unemployed in Zachodniopomorskie Voivodship in 2010 and 2019 by age.

Source: Own work based on: https://bdl.stat.gov.pl/BDL/dane/podgrup/ [9]

The data presented in the figures (figures 4 and 5) relate to the registered unemployment rate in Poland and in the Zachodniopomorskie province in the years 2000-2020. The years 2000 and 2005 were presented as a visual reference to illustrate the situation that occurred before the two financial perspectives in which Poland fully participated. It is clearly evident that the registered unemployment rate has significantly decreased [27]3 both in Poland and in the Zachodniopomorskie province. The analysis of the age of the unemployed in the examined province clearly indicates that the greatest decrease in the number of the unemployed occurred in the 25-34 and 45-54 age range. This is a very positive phenomenon, which proves that people of working age are active on the labour market, contributing to the economic growth of their region and the increase of their wealth. It should be noted that unemployment among people over 60 has slightly increased.

The change in GDP per capita over the period of EU funds utilisation is presented in Figure 6.

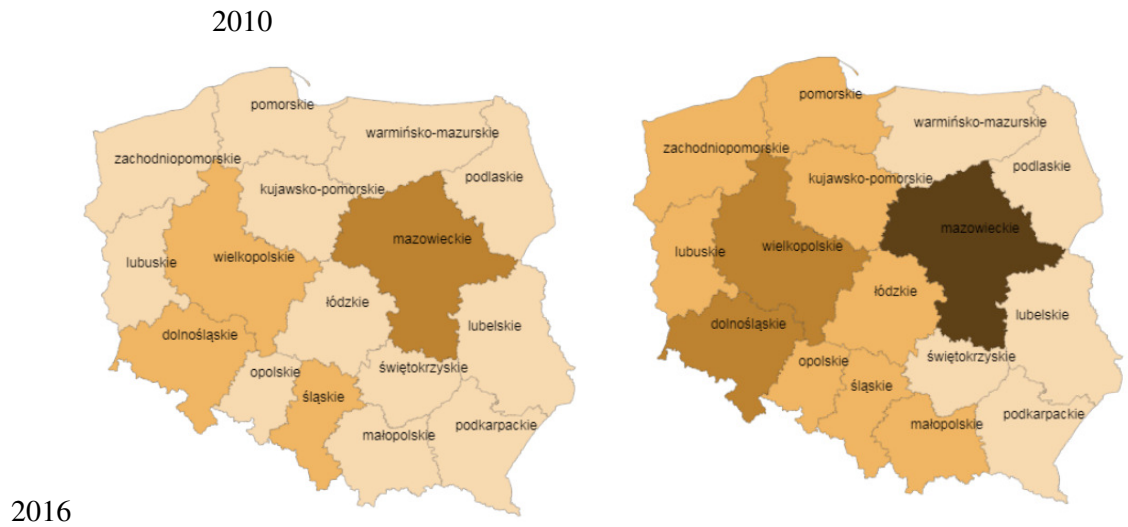

Fig 6. Gross domestic product per capita in Poland in 2010 and 2016.

Source: Own work based on: https://bdl.stat.gov.pl/BDL/dane/podgrup/ [9]

When comparing data from 2010 and 2016 (figure 6), it is clear that the level of affluence in the majority of provinces has clearly improved. Six provinces achieved in 2016 GDP per capita in the same range as in 2010, and five of them still reach the lowest values from the range
of PLN 25,875 to PLN 38,000 (this concerns the Warmińsko-Mazurskie, Podlaskie, Lubuskie, Podkarpackie, Świętokrzyskie provinces).
In the case of the Zachodniopomorskie province, an increase in GDP per capita may be observed from the lowest level to a level between PLN 38 001 and PLN 51 000 per capita.

[3] The positive impact of EU funds is also visible in the reduced unemployment rate. The unemployment rate of people aged 15+ in the Zachodniopomorskie province in the year of accession to the EU (2004) was as high as 23.8%, and in 2018 only 3.8%.

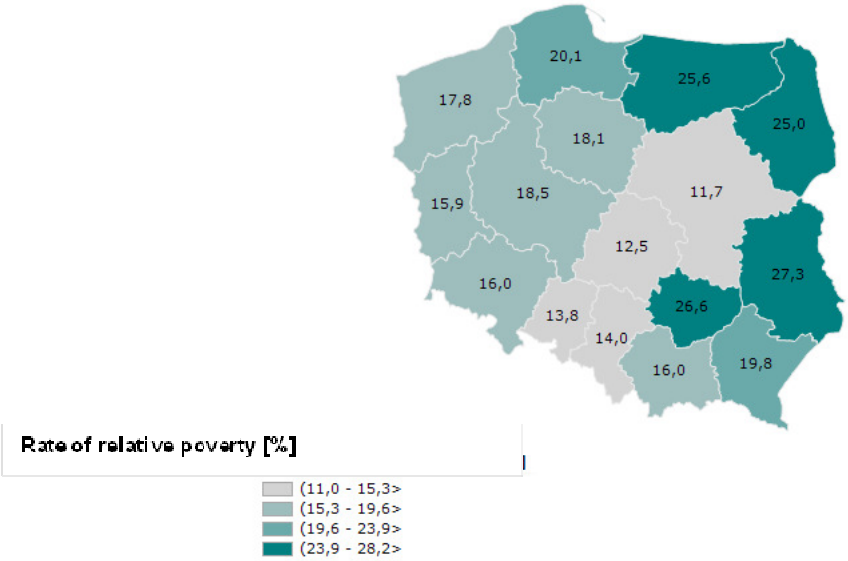

Fig. 7: Rate of relative poverty4 in Poland in 2010.

Source: Own work based on: https://bdl.stat.gov.pl/BDL/dane/podgrup/ [9]

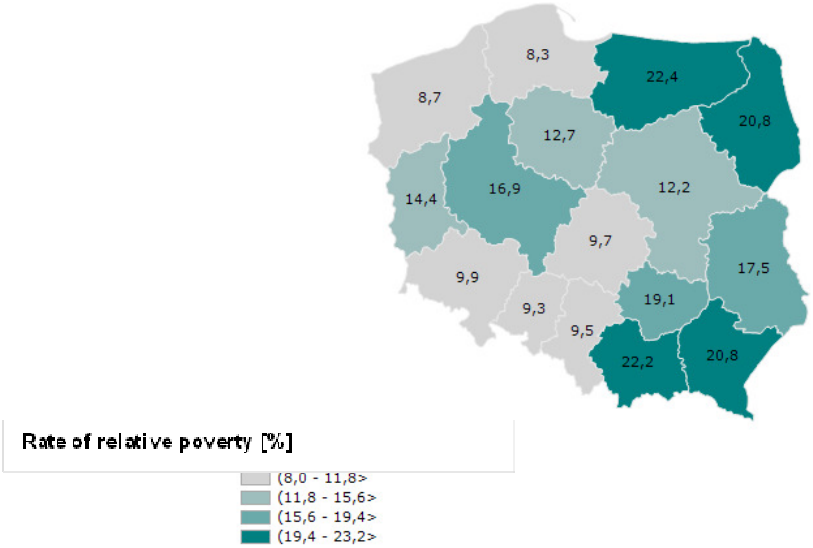

Fig 8. Ratio of relative poverty in Poland in 2018.

Source: Own work based on: https://bdl.stat.gov.pl/BDL/dane/podgrup/ [9]

[4] relative poverty has a variable value and refers to the average standard of living in a country, generally measured by the amount of average income (expenditure). In this respect (relative), as opposed to the concept of absolute poverty, the emphasis is not so much on absolute income but on the level of disparity, i.e. the gap between the standard of living of certain population groups which results from income levels. The supporters of the relative approach believe that the poverty primarily stems from the functioning of the socio-economic system. Unemployment is the main cause of poverty, as it is beyond the control of the poor. It is followed by low wages in certain occupations, regions or for certain discriminated groups. Insufficient income resulting from circumstances beyond the awareness and will of the poor is the primary cause of poverty.

The reduction in the unemployment rate and the increase in GDP per capita resulted in a decrease in the number of people eligible for various forms of social welfare benefits (figures 7 and 8). Undoubtedly, this is also the effect of the "500 +" programme, however, the mere implementation of the programme, which was introduced in April 2016, without providing new jobs as a result of, inter alia, projects financed by EU funds, various forms of support for the unemployed and those professionally excluded, would certainly not have led to such an improvement.

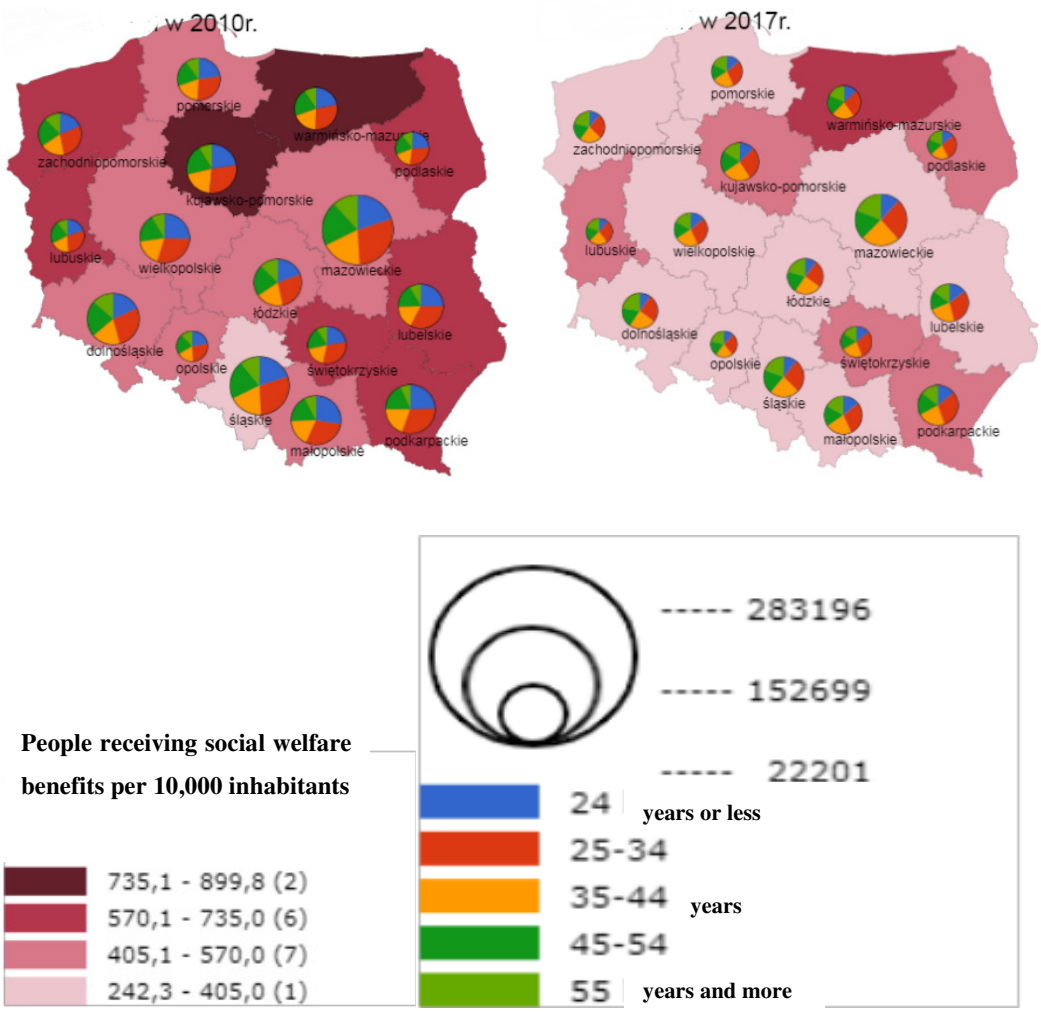

Fig 9. Registered unemployment rate and the number of people receiving social welfare benefits in Poland in 2010 and 2017.

Source: Own work based on: https://bdl.stat.gov.pl/BDL/dane/podgrup/ [9]

The presented data (figure 9) clearly demonstrate that the number of beneficiaries has decreased significantly. Only one province, Śląskie, in 2017 remained at the 2010 level, however with a clear reduction in the number of unemployed, especially those under 34 years of age.

The number of persons receiving from social welfare benefits in Zachodniopomorskie province dropped from the range of 570.1 – 735.0 persons per 10,000 inhabitants to the range of 242.3 – 405.0 persons per 10,000 inhabitants, which is a very positive trend.This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

Conclusions

Despite the improvement of the social and economic situation, combating unemployment and persistently high poverty rates remains a priority for the entire EU. Social and employment issues are crucial for European citizens,

who expect the Union to become more involved in this area. The additional challenges which the Union is still facing are related to [26]:

- a deficiency of specific skills by certain professional groups;
- insufficient achievement of objectives by active labour market policies and education systems;
- challenges posed by new technologies, such as automation and, consequently, new forms of work;
- the social exclusion of marginalised groups;
- low mobility of workers.

The above requirements must be imposed and fulfilled on an ongoing basis in order to fully achieve their objectives as soon as possible.

Zachodniopomorskie province is one of many provinces in Poland, which has significantly improved its socio-economic situation as a result of EU funds. This is evidenced by the data and information presented in the article, as well as information from various analyses and studies. An important indicator reflecting the qualitative changes is, inter alia, the employment rate, which in the year of Poland's accession to the EU (2004) for the Zachodniopomorskie province amounted to 54.1%, (employment of persons aged 20-64), while in 2018 the value of this indicator was 70.4% [12]. The presented research results clearly indicate that the EU funds constitute an important support for the Polish economy and are the basis for its stable development.

The analysis of data presented in the article proves that although the years 2007-2013 saw an increase in unemployment in Poland by more than 2 percentage points, i.e. from 11.2% to 13.4%, it may be concluded that without funds from the European Union the unemployment rate would be much higher, especially in the context of the economic crisis. The European funds have contributed to the mitigation of the effects of the crisis on the Polish economy.

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Potential Application of Land Art in Marketing

Denis VASILIEV
Turiba University, 68 Graudu Street, Riga, LV-1058, Latvia
*denisksil@gmail.com

Abstract

Modern companies intend to implement and communicate sustainable business practices. Moreover, marketing communications aim to attract attention of target audiences through differentiation. At the same time, philosophy of Land Art movement and high visibility of its artworks have a great potential to be appealing to environmentally conscious customers and to allow the company to "stand out from the crowd". Surprisingly, application of Land Art in marketing is not discussed in scientific literature and the opportunity to use this synergy is largely overlooked by companies. Thus, using conceptual research approach – theory adaptation, I demonstrate how Land Art can be used by modern companies to enhance their branding, place marketing and PR activities, as well as achieve high level of customer engagement. I also discuss potential use of Land art as a part of integrated marketing communications, with particular emphasis on enhancement of digital communications effectiveness. Exploration of all these areas of Marketing leads to a conclusion that there is an urgent need for research and practical application of Land Art in marketing.

Keywords: Earth art, environmental art, advertising, branding, PR

Introduction

Land Art movement emerged in the middle of the last century in the USA and in Western Europe as an expression of the protest against limiting culture to art galleries (Hogue, 2004). Also known as environmental art or Earth art, the movement is based on the principles of placing artworks within the landscape using natural materials and sculpting the land (TATE, 2020). Pioneer land artists, such as Robert Smithson, Richard Long and Andy Goldsworthy were inspired by ancient indigenous art pieces, such as Nazca lines, Carnac Stones and Stonehenge (Tilley et al., 2000). Later on, the movement has evolved from being limited to purely natural materials to use of textile, metal and other substances, including for example famous fiber art works of French artist Edith Meusnier (Meusnier, 2020). Moreover, Land Art greatly ranges from monumental art works, such as famous Robert Smithson's Spiral Jetty made of stones (TATE, 2020), to increasingly fragile temporary installations that exist just several days or even hours, such as works of Andy Goldsworthy made of autumn leaves, twigs or snow (Artnet, 2020). Nevertheless, core philosophy of the movement has remained remarkably consistent, intending to demonstrate the link between human culture and nature. This core idea of Land Art movement actually is consistent with the philosophy of sustainability and sustainable development (UN, 2020). Given the fact, that modern business in general and marketing in particular are intended to become truly sustainable, finding opportunity of synergy between Land Art and marketing becomes increasingly relevant task.

However, to my best knowledge, Land Art is neither discussed in the literature nor used in Marketing practice. In fact, outdoor media has been used for advertising purposes historically, with billboard advertising being between the most common forms of marketing communications in Europe and in the USA for centuries (Norris, 1980). Sculpture and installations are also used by companies to attract attention of their target audiences to products, services, or brands (e.g. Amifor, 2016). These advertising methods, however, are usually not linked to green thinking. Furthermore outdoor marketing communications are often seen as causing visual pollution (Chmielewski et al., 2016). Given the philosophy of Land Art and the synergy between the art works and the environment I believe that integration of the movement with modern marketing that focuses on sustainability has a great promise. Thus, the objective of this work is to demonstrate potential opportunities of application of land art in modern marketing. For this purpose, possible role of Land Art in branding, place marketing and PR are discussed. Application of Land art as a part of integrated marketing communications mix, including digital strategies is considered, too. Particular emphasis is placed on sustainability, engagement with the audiences and achievement of strong differentiation.

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Methodology

Conceptual research becomes an increasingly important method that allows bridging several disciplines, and it is considered to be particularly important in the field of marketing (Jaakkola, 2020). According to Jaakkola (2020) there are four main approaches to conceptual research, including theory synthesis, theory adaptation, typology, and modeling. Given the fact that discussion of Land Art applications in marketing currently is virtually absent from scientific literature (e.g. search string "Land AND art AND marketing" at Scopus resulted only in 38 hits all of which were not relevant to the topic discussed in present article), methods based on existing literature were considered not to be suitable. Thus, theory adaptation approach was chosen (Jaakkola, 2020). The approach allows exploring concepts that are not yet discussed in existing scientific literature and is focused on proposal of the novel insights (Jaakkola, 2020). Theory adaptation seeks to amend existing theories and practice using evidence and theories from several disciplines (Malclnnis, 2011). Present paper brings together marketing theories and examines how Land Art can be applied in modern marketing practice, this way bridging the two disciplines. First, potential adaptation of Land Art in branding is discussed, considering theoretical aspects of effective brand building. Second, possible applications of Land Art in Place marketing are explored, based on theories of place branding, as well as more general considerations of 'place' element of marketing mix. Then, possible uses of Land Art in PR are considered, with particular emphasis on achievement of customer engagement. Finally, application of Land Art as a part of integrated marketing mix is discussed.

Major Arguments

Branding

Strong brands are based on solid value system, which reflects the values that are relevant to the customer (Urde, 2003). Today with increasing environmental consciousness, customers want to associate themselves with sustainable brands (Lin and Niu, 2018). Philosophy of the Land Art movement and the fact that artworks are organically integrated into the environment, perfectly match the value system of environmentally conscious consumers. One could see the tendency of Land artworks to be placed outside the city as an obstacle for effective application of the tool for branding. However, large Land Art objects that are well integrated into natural environments may be placed as an effective outdoor advertising tools along motorways. Moreover, works of famous Land artists, such as Edith Meusnier (Meusnier, 2020) are often integrated into urban parks, while many works of a prominent representative of the movement – Dennis Oppenheim were installed directly in urban environments (Ketcham, 2010). So, potential use of Land Art works are not limited to certain environments and may be used as widely as traditional outdoor advertising for purposes of brand building.

Along with communication of sustainability and green values, Land Art has a great advantage for branding over traditional marketing communications. According to Chris Fill (2016) one of the most important strategic dimensions of brand include brand differentiation. Indeed, in line with the salience framework advertising works by standing out, by being different from competitor communications (O`Malley, 1991). At the same time, works of Land artists have proven to attract attention of viewers, by being remarkably unusual, large and aesthetically perfect, often utilizing natural phenomena, such as changes in light, movements of water and wind etc. For instance, famous ''Lightning Field'' created by Walter de Maria in Mexico, consists of metal posts that magnet lightning, attracts attention of visitors and of media. Less radical works include famous Spiral Jetty, which appears from the water during undertow. Indeed potential of Land Art is unlimited and use of it by a company in collaboration with good artists has a great potential to differentiate marketing communications from the ones of competitors and maximize corporate brand visibility.

Finally, brands are often based on signs and symbols that intend to be memorable and convey corporate values (Berthon, 2007). Land Art is also based on symbology and underlying meanings (Najafi and Abbas, 2014). For instance famous Vietnam Veterans Memorial in Washington created by famous Land artist Maya Ying Lin is full of symbology, inducing thinking in visitors. This characteristic of Land Art indicates potential to convey brand values and other important communications messages through use of symbology. Overall, capability of Land Art to enhance modern corporate branding is immense and is currently underutilized.

Place Marketing

Place marketing, also known as place branding, is primarily focused on promotion of a geographical location in order to attract tourists, entrepreneurs, visitors or investors (van Ham, 2008). Famous works of Land artists, such as aforementioned "Spiral Jetty" (the USA), as well as "Green Cathedral" by Marinum Boezem (the Netherlands), "Storm King Wavefield" by Maya Lin (the USA), "Synergy" by Martin Hill and Philippa Jones (Australia), "Strading Arches" by Andy Goldsworthy (Scotland) and many others, naturally attract interest of tourists. However, such works

are usually created with an intention to become a 'brand' of a certain place, that could attract relevant stakeholders. At the same time, artworks and in particular Land Art have great potential to create place identity, making a geographical location unique and distinguishing it from other places (Hull et al., 1994). Thus, deliberate use of Land Art as one of the key tools in place branding could potentially provide a powerful tool for this area of marketing.

Another less noticeable prospective use of Land Art may be attracting attention of consumers to the point of sale. Remarkably, artworks that could be used for attracting customers to a location, may be inexpensive, using either natural materials, colored materials, or textile (Hahner and Varda, 2014). A good example of such urban artwork is a recently emerged (2005) separate movement within Land Art – "yarn bombing", also known as urban knitting, that due to their colorfulness have high visibility (Hahner and Varda, 2014). In addition to attractiveness and contrast that may be achieved through use of the art works within urban environment, Land Art can provide great flexibility. Temporary installations, that can be created for a short time period – from several hours to several weeks, can be regularly applied at different locations, thereby avoiding target audiences getting used to the artwork and getting blind on it. Such approach could potentially make marketing communications cost effective, flexible, and consistently delivering results by attracting attention to company locations.

PR

Key goal of PR is to engage with broader society, which is mainly achieved through attracting attention of media (Lasson, 2009). In this respect Land Art has a lot to offer. First of all, the art pieces are often very unusual and have high visibility, potentially attracting interest of media. For instance, famous "Bus Home" sculpture by Dennis Oppenheim, installed in California, has attracted huge attention from media and was able to provoke a serious public debate (Artcritical, 2011). Another important function of PR is to convey companies' stance on controversial issues of public concern (Frankental, 2001). Land Art is a conceptual art and therefore is particularly strong at conveying opinion (McFadden, 2014). A great example of the artists opinion expression on an environmental problem of forest loss in Western Europe is "Disappearing Forest of Germany", by Alan Sonfist.

Not only the art works themselves can attract attention of media, but the events, such as "Land Art" workshops, if organized or sponsored by a company can create a great PR and ensure engagement with customers and border public (Hulubei and Avasilkai, 2020). Such workshops due to their interactivity can be particularly effective in case not only artists participate, but also general public is involved. The events may be in a form of masterclasses that can include participation of local community, schoolchildren or students, potentially achieving high level of engagement and attracting attention of local media. Creating temporary installations may be a part of such event program and may also support place marketing. In fact, there is a great potential to integrate Land Art PR strategy with other elements of companies marketing communications mix, this way achieving high visibility, customer engagement and increasing cost-effectiveness of marketing operations (Kitchen et al., 2008).

Integrated marketing communications

One of the key principles of integrated marketing communications is that cumulative effect of marketing activities is greater than if each activity is implemented separately (Keller, 2016). Inclusion of Land Art could potentially enhance other elements of marketing communications mix, especially on-line activities. Indeed, "standing out from the crowd" becomes increasingly problematic in the digital media landscape (Miah et al., 2008). Inclusion of Land Art works and/or events into marketing communications mix, may substantially increase visibility of the digital content, increase engagement with the target audiences (Harmeling et al., 2017). Additionally, similarly as with off-line PR, Land Art may provoke interest of influential bloggers, thereby enhancing online PR (Xifa and Huertas, 2008). Moreover, given the uniqueness and unusual nature of the art pieces, Land Art could form a core of viral campaigns, where the content is actively shared on social media by viewers themselves (Ewing et al., 2014). Creative approaches may further enhance engagement with target audiences by, for example, announcing contests and sourcing ideas for Land Art based advertising or PR activities from public. Overall, applications of Land Art in integrated marketing communications may be diverse and may greatly enhance communications effectiveness.

Conclusions

The aim of this paper was to demonstrate potential opportunities of application of Land Art in modern Marketing. Expiration of particular characteristics of Land Art allowed to reveal its great potential for enhancing branding, place marketing and PR activities in the modern enterprise. Sustainability based Land Art philosophy, visibility and unusual nature of the art works makes it particularly suitable for effective marketing communications. Allocation of Land Art also has great perspectives for generating high levels of engagement with the audiences, and thereby could enhance integrated marketing communications strategies, including digital marketing. Lack of the literature and practical

application of Land Art in marketing suggest an urgent need for research in this area and adaptation of the approach by modern businesses.

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Regulation of Segregation of Agri-Food Flows in The EAEU Countries

Svetlana V. IVANOVA

Plekhanov Russian University of Economics (PRUE), Moscow, Russian Federation
Ivanova.SV@rea.ru

Abstract

The article is devoted to identifying global and regional trends in the segregation of agricultural flows. We are talking about the production and turnover of agricultural goods produced a) by traditional industrial intensive technology; b) using genetic modification; c) based on organic farming technologies.
A conclusion is made about the world tendency of outstripping the growth of areas for sowing GM crops relative to areas of organic farming. The state, possibilities and problems of the introduction of organic farming technologies in the EAEU (Eurasian Economic Union) are investigated.
The analysis of the current institutional environment for the formation of organic farming in the EAEU countries and the main regulatory acts concerning the turnover of GM products on the territory of the Union, taking into account the concepts of food security of the Russian Federation and the EAEU. According to the author, biotechnologies are a priori dual-use technologies, that is, they can be used both to the detriment and benefit of humans and the environment. The lack of evidence of the safety of GMOs (taking into account long-term effects) means the validity of maintaining the ban on the cultivation of GM crops in the territory of the EAEU countries. When importing a GM product, the precautionary principle must be followed.
It is concluded that there are discrepancies in interpretations in a number of legal documents with a general trend towards convergence of the positions of the five countries.

Keywords: EAEU, institutional environment, food security

Introduction

In the format of the Eurasian Economic Union (EAEU), agriculture is recognized as a priority area of cooperation. The relevance of the study is due to the growing importance of Russia (as the nucleus of the Eurasian Union) in the world markets of agricultural products, especially cereals. According to forecasts of the Ministry of Agriculture of Russia, in the 2019-2020 agricultural year at least 132 million tons of cereals and legumes will be harvested, a significant part of which will be exported [Ministry of Agriculture of the Russian Federation, 2020]. Currently, these products are produced on the basis of traditional for the end of the 20th century technologies: using means of chemical protection of plants from pests and diseases, chemical fertilizers, means of mechanization and automation. Meanwhile, in the practice of different countries, other technologies and methods of organizing production, circulation, and processing of agricultural products are increasingly being used. The EAEU countries are improving the institutional environment for the development of two alternative flows of agricultural products: genetically modified and organic. It is of scientific interest to analyze this process in the context of the problem of preserving national and regional food security.

In Russia, within the framework of the priority project "Export of agricultural products" in 2017, a program was launched to develop the export of niche products with high margins, which included the branch program "Organic agriculture" [Union of organic farming, 2017]. From the point of view of the legal environment, a number of standards and programs aimed at legitimizing organic agriculture have been adopted and are in force in Russia. In particular, GOST 33980-2016 “Organic products. Rules for production, processing, labeling and sale "(recognized by the standardization bodies of Belarus, Kyrgyzstan, Tajikistan); GOST R 57022-2016 “Organic products. The procedure for conducting voluntary certification of organic production "; GOST R 56104-2014 "Organic food products". However, in the EAEU format, the task is to create a single agricultural market, which implies coordination of actions in the field of organic farming development.

Along with the technology of creating an organic product, there is a very active development of the agricultural business based on the production of genetically modified organisms. The new stage of scientific and technological progress - the "gene revolution" - continues to be the subject of heated discussions. The problem is that the widespread use of GMOs certainly creates new business opportunities in terms of increasing the productivity of plants and

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animals, their resistance to diseases while reducing the use of pesticides, increasing the duration of the marketable appearance and, ultimately, increasing the profitability of the agricultural business. Proponents of promoting GMOs emphasize the unprecedented possibilities of combating hunger and malnutrition in the world, expanding the economic accessibility of food for the most disadvantaged groups of the population due to the reduction in the cost of a unit of the product obtained. In particular, the President of the Russian Grain Union A. Zlochevsky believes that Russia can maintain its position as a major exporter of wheat only by using the capabilities of GM wheat [Zlochevsky A., 2020]. Opponents of GMO promotion emphasize the excessive risks of widespread commercialization of this technology [Engdahl W. F., 2009]. Let's mark the most significant ones. Poor knowledge of the impact of consumption of a GM product on human health, including future generations. A possible decline in reproductive function among consumers essentially means managing the population's fertility through food. Other extremely negative consequences are possible, including those associated with a decrease in immunity and metabolic disorders. The second danger is the extreme degree of monopolization of this business by global companies such as Monsanto, which makes farmers and consumers heavily dependent on the business decisions of a global company, that is, destroys national food security. The third danger is the lack of knowledge of the long-term effects of GMOs on the environment, in particular the destruction of biodiversity and natural ecosystems, the emergence of mutant organisms with unpredictable properties, and a number of other risks [GMOs: real and potential risks, 2014]. The conflict of interests in the field of expanding GMO practices is certainly reflected in the institutional environment of the EAEU countries.

Methodology

The research methodology is based on a generalization of the practices of regulating the production and turnover of GM products in the EAEU countries and an analysis of the legal framework for the formation of the organic products market in the Union countries.

Methods used: abstract-logical, historical, statistical, comparative analysis and content analysis.

The scientific novelty of the study consists in identifying trends, factors, problems and possible prospects for the segregation of agricultural products in the EAEU countries.

Results

Legal regulation of the turnover of GM products

The high marginality of the implementation of advances in the field of biotechnology led to a rapid increase in the global area under crops of GM crops, which in 2019 amounted to 191.7 million hectares [ISAAA, 2020]. This trend is set, first of all, by the companies of the USA, Brazil and Argentina. The EAEU member states belong to the group of countries in which cultivation is prohibited, but the import and use of GMOs as food, animal feed or for research purposes is allowed. In accordance with the Customs Code of the EAEU, a unified customs regulation is carried out in the Union, which includes the establishment of the procedure and conditions for the movement of goods across the customs border of the Union, their location and use in the customs territory of the Union or outside of it, the procedure for performing customs operations related to arrival / departure goods to the customs territory of the Union [Customs code of the Eurasian Economic Union, 2017].

Scientific experiments with GMOs are taking place in all EAEU countries, especially in Russia, Belarus and Kazakhstan. One of the main goals of such research is the development of methods for the qualified tracking of the import of imported products containing GMOs. This is especially important in an environment where products created using the latest genomic editing technologies are increasingly difficult to identify and account for. In Kyrgyzstan, GMO products are prohibited in principle.

Russia, Kazakhstan, Belarus and Armenia signed the Cartagena Protocol to the Convention on Biological Diversity. The member states of the Protocol are obliged to ensure that safety measures are observed during the processing, packaging and transportation of GMOs. The importing country decides on the admission of products based on scientifically reliable risk assessment. To this end, the Protocol establishes principles and methods for conducting risk assessment. If there is not sufficient scientific information on the issue under consideration, then the importing country, when deciding to import GMOs, can apply the “precautionary principle” and refuse to import or postpone the decision. National legislation in this area is just being formed. It is based on the Model Law on the Safety of Activities Related to Genetically Modified Organisms, which was adopted at the 27th plenary session of the Interparliamentary Assembly of the CIS Member States (Resolution No. 27-9 of November 16, 2006).

In accordance with the new version of the Food Safety Doctrine of the Russian Federation (clause 21), in order to ensure the quality and safety of food products, it is necessary to: “a) control its compliance with the mandatory requirements of the technical regulations of the Eurasian Economic Union; b) ensure control over food products obtained from genetically engineered plants and using genetically engineered microorganisms ”[Decree, 2020].

In Russia, such control is exercised by a number of bodies: the Ministry of Health of the Russian Federation and the Federal Service for Surveillance in Healthcare (regarding the use of GMOs in the manufacture of medicines and medicines); the Federal Service for Veterinary and Phytosanitary Surveillance (regarding GMOs used in agriculture); The Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor) (in relation to GMOs used for the production of food and raw materials).

In the first half of 2019, Rospotrebnadzor examined more than 16 thousand samples of food products for the presence of GMOs, of which more than 0.9% of GMO content was detected in 11 samples - 0.06% of the samples examined (flour and cereals, fruits and vegetables) without information for the consumer on the presence of GMOs in the product. From July 1, 2019, the import of fresh papaya production from China to the territory of the Russian Federation has been suspended, all products have been withdrawn from circulation. [Rospotrebnadzor, 2019].

The beginning of the formation of the legal field in the field of GMOs was laid by the Federal Law "On state regulation in the field of genetic engineering" [Federal law, 1996]. Resolution of the Government of the Russian Federation of September 23, 2013 N 839 "On state registration of genetically modified organisms intended for release into the environment, as well as products obtained using such organisms or containing such organisms, including the specified products imported into the territory of the Russian Federation" [Decree, 2013] a number of clarifications. In particular, a new requirement was introduced for importers of GMOs. If previously only GMOs themselves were registered, now it is the duty of importers to register products that contain GMOs. The country provides for the maintenance of a register of modified organisms. On September 1, 2017, a new technical regulation came into force in Russia, which toughens the requirements for the production, storage and sale of fish food products, which "should not contain hormonal preparations, natural and synthetic substances, as well as GMOs." [Rospotrebnadzor, 2017].

In 2017, an interdepartmental group was created to control the import of GM products into the country and their processing for the purpose of export without release into circulation on the territory of the Customs Union [GARANT.RU, 2017].

The main document in force on the territory of the EAEU governing the circulation of GM products is the Union technical regulation "Food products in terms of their labeling", which concerns the labeling of food products obtained using genetically modified organisms. Starting from June 26, 2020, the labeling of food products obtained with the use of GMOs must have, next to a single product circulation mark on the market of the Eurasian Economic Union (EAC), the same shape and size mark of the “GMO” marking [Eurasian Economic Commission , 2020]. If the manufacturer did not use GMOs in the production of food products, that is, their content in it does not exceed 0.9 percent, is considered an accidental or technically irreparable impurity. Such goods are not classified as containing GMOs, and they do not need to be labeled with appropriate information. In Russia, 18 GMO lines are officially allowed to be used for food production, including three varieties of soybeans, six varieties of corn and four varieties of potatoes.

The merger of the two largest GMO companies, Bayer and Monsanto, has also impacted Russia. The Federal Antimonopoly Service of Russia, where Bayer AG operates, has approved the international corporate merger. According to the agreement, the German side will organize the transfer of molecular breeding funds for corn, rapeseed, wheat, soybeans, and a number of vegetable crops and will provide Russia with non-discriminatory access to digital farming technologies (digital applications and platforms). It should be noted that counterparties from the Russian side (for example, the Pavlovskaya Niva agricultural company) fear excessive control by the Bayer company over the production process of new selection products in Russia. Legal regulation of the transfer of intellectual property in the field of agriculture is just being formed. The use of Bayer's genetic material, in particular germplasm, with unclear identification of new Russian varieties and vague conditions of licensing agreements, may lead to the imposition of royalties on all seed production in Russia and the destruction of this (still weak) segment of the Russian agro-industrial complex.

In June 2020, the Federation Council of the Federal Assembly of the Russian Federation held a meeting dedicated to "Improving state regulation in the field of production and circulation of genetically modified organisms and products obtained using such organisms or containing such organisms." The question was raised about the clarification of the used conceptual apparatus and the consistency of different legal acts. Thus, Russia is in the process of finalizing the legal environment for businesses related to GM products.

Perhaps the most liberal (“soft”) approach to the GMO issue has developed in Kazakhstan. Here, the emphasis is placed on the creation of domestic GM plants, in particular drought-resistant wheat, on the monitoring of crops and strict control over imported seed and planting material.

Since all the EAEU countries, except Belarus, have joined the WTO, we note that none of the provisions of this international organization obliges any country to allow the cultivation of GM crops on its territory. But the practice of regulating the import of GM products must comply with the spirit of the most favored nation and national WTO regime. According to the author, the main conflict is possible around the question of "a similar product". It is legally

controversial whether GM seeds and conventional seeds (eg wheat) are similar commodities. Simultaneously with the debatable issues in the legal field of the WTO, there are agreements, in fact, allowing to impose a ban on the import or cultivation of GMOs. Thus, the Agreement on Sanitary and Phytosanitary Measures allows nation states to protect themselves from goods that are harmful to human and animal health. Although there is no clear, generally accepted evidence of the harm of GMOs, due to their manifestation in the long term. The agreement on technical barriers to trade allows national states to resolve the issue of labeling imported goods. The legal framework of the WTO requires revision in connection with the introduction of new technologies, goods and methods of trade. This refinement should be based on the precautionary principle or “do no harm”. The author is close to the position of a number of European countries (Switzerland, Austria, Luxembourg, Scotland and a number of others), where the moratorium on the cultivation of GM products is constantly extended, and local residents prefer to consume the products of organic farming.

Institutional environment, trends and problems of organic farming technologies implementation

According to FiBL & IFOAM - Organic Agriculture, the global area of organic agriculture is 71.5 million hectares. (2018) and has a moderate upward trend. [Willer, Helga, Bernhard Schlatter, Jan Travnicek ..., 2020].

Analysis of data from the latest FiBL & IFOAM research showed that several business models for the production and circulation of organic products are being formed in the world. Let's note two opposite options. Specialization in organic farming with the aim of producing an organic product: a) mainly to meet domestic demand (Liechtenstein); b) exclusively for export to other countries (Samoa).

An important milestone in the development of Russian organic farming is the adoption of the Federal Law "On organic products and on amendments to certain legislative acts of the Russian Federation" [Federal law, 2018]. The law came into force on January 1, 2020. This legal document regulates relations related to the production, storage, transportation, labeling and sale of organic products. The concepts, requirements for the production of organic products, requirements for the confirmation of the conformity of the production of organic products, the unified state register of producers of organic products, labeling, the transition to organic agriculture, state support for the manufacturer, information and methodological support in the field of production of organic products. The criteria to be met by the production of organic products that receive the Russian ORGANIK mark are determined by the interstate standard GOST 33980-2016 Organic products. Rules for production, processing, labeling and sale ". In accordance with GOST R 57022-2016, the procedure for conducting voluntary certification of organic production has been determined. Changes have been made to the Federal Law "On the Development of Agriculture" dated December 29, 2006 N 264.

An important limiting factor in the development of the organic direction is the incompleteness of harmonization of the standards of Russia, the EAEU countries and the main international standards EU 834/2007 and USDA organic; underdevelopment of the national certification system for organic producers. In this regard, the accreditation of certification companies in the importing countries has begun. It is necessary to carry out the allocation of organic products by a separate code of the commodity nomenclature of foreign economic activity. The support system for organic producers is relevant. Small and medium agricultural enterprises do not have the financial resources to pay for the certification procedure, as well as to restructure the entire business to meet the requirements of organic farming.

In Russia, the area of agricultural land was 656.9 thousand hectares, or 0.3% of the area of all agricultural land in the country. According to the Union of Organic Agriculture, there are only 70 certified organic agricultural producers in Russia. As of August 2020, 46 agricultural enterprises in Russia are certified according to international organic standards of the EU, USA and Japan. The largest number of producers is concentrated in the field of plant growing and wild plants. The most successful organic exporters are B2B exporters. The volume of organic products certified according to the international standards of the EU and the USA amounted to more than 11 million euros in 2019. The leader in the export of organic products is the Tomsk region, where economic measures have been taken to support producers of organic products (per hectare support). In Russia, there are still no federal government support measures for organic producers. Meanwhile, according to the Union of Organic Agriculture in European countries, there is a high demand and readiness to purchase organic products certified according to international standards in Russia, especially wheat, soybeans, sunflower and grass seeds (clover, alfalfa). Market prices for organic products are significantly higher than prices for products grown in a traditional way.

The original document regulating organic agriculture in the post-Soviet space was the Model Law, adopted in 2014. [National organic Union, 2014]. The EAEU countries are characterized by a different-speed formation of the legal environment for the functioning of organic agriculture. Thus, in Armenia, the law "On organic agriculture" was adopted in 2008, in the Republic of Kazakhstan - in 2015, in the Republic of Belarus - in 2018, in the Kyrgyz Republic in 2019.

At the moment, the issue of harmonizing the approaches of the EAEU member states to the legal regulation of the production and circulation of organic products within the Union is of the greatest relevance. Apparently the most productive is the idea of recognition by the EAEU countries of international standards harmonized with the Codex Alimentarius standard for the production, processing, labeling and marketing of organic food products CAC / GL 32-1999. However, not all participating countries agree with this position. In addition, it makes sense to take into account the experience of the International Federation of Organic Agriculture Movement (IFOAM) and intensify cooperation of the EAEU countries with the regional branch of this organization - "IFOAM - Eurasia".

Conclusion

In the world, the area under GM crops is more than twice the area of organic farming. This is due to the high margins in the production of GM goods. According to the author, biotechnologies are a priori dual-use technologies, that is, they can be used both to the detriment and benefit of humans and the environment. The lack of evidence of the safety of GMOs (taking into account long-term effects) means the validity of maintaining the ban on the cultivation of GM crops in the territory of the EAEU countries. When importing a GM product, the precautionary principle must be followed. The central issue is the availability of independent laboratories, effective methods / procedures for the detection and control of GMOs (goods containing GMOs), which implies the active implementation of scientific research in the field of biotechnology by scientists from the EAEU countries. In general, this approach is typical for all EAEU countries.

The foundations of the national and union institutional environment for the development of organic farming have been laid. The prospects of this technology are due to the availability of basic natural resources and compliance with the spirit of achieving food security in the Eurasian space. According to the EEC forecasts, organic products of the EAEU countries could occupy a fifth of its world market. It is this form of greening agriculture that has widespread support in society. The main limiting factors of the process remain: underdevelopment of a unified all-Union system of organic product certification and high certification costs; incomplete harmonization of the relevant standards for the circulation of organic products in the internal and external markets of the EAEU countries; the fragmentation of the financial and economic mechanism of the complex transition to the system of organic farming; lack of systematic state support for the production of organic products at the federal level.

On the side of market demand, the segregation of agri-food flows reflects the intensified stratification of the population into rich and poor in recent years. Expansion of production and sale of GM products and organic products requires further improvement of the regulation of their turnover at the international, regional and national levels in the interests of wide layers of society.

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Risk Analysis in E-Commerce (E-C) Through the Method HAZOP (Hazard and Operability)

Patricia Simona LUP
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara, Romania, patricia.lup@student.upt.ro

Gabriela Ioana PROȘTEAN
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, 14 Remus Street, 300191 Timisoara, Romania,
gabriela.prostean@upt.ro

Denisa PAP GHERASIM
Politehnica University of Timisoara, Faculty of Automation and computers, BulevardulVasilePârvan 2, Timișoara 300223, România,
denisa.pap@student.upt.ro

Abstract

This paper identifies the potential risks to which consumers are exposed when trading via e-commerce. In order to increase consumer confidence in e-commerce and get them to choose this method for future purchases, we must first understand where this lack of trust comes from, what are the potential risks, but also the dangers to which consumers are exposed, and only then to combat the risk in the E-C, by proposing concrete measures and developing such a necessary tool, through the HAZOP method.

Keywords: E-Commerce Risks, HAZOP, Risk Matrix, E-Commerce Risk Mitigation;

Introduction

According to Wikipedia, HAZOP - (Hazard and operability) technique was originally developed in the 1960s and is believed to be based on the Heavy Organic Chemicals Division of the Imperial Chemical Industries (ICI). The main reason why this technique was created involves the analysis of major chemical process systems, but over time the use of this technique has expanded to other areas. Gupa J. (2014) mentioned that this technique, being qualitative, aims to stimulate the imagination to identify potential hazards and operability problems. Hazard and operability study is a method used to identify the operational hazards and concerns of a system in order to analyze them. This study provides the possibility to perform a step-by-step analysis regarding the security of a system. HAZOP analysis can be performed both at the level of specifications and at the level of code, in the first case it can help to identify any specifications that are missing or incorrect and thus lead to unwanted behavior or in terms of code level, it can help to finding errors, introducing results from implementation. The HAZOP method was introduced to define and delineate the principles needed to perform interoperability studies and risk analysis due to the increasing complexity of processes, which can no longer be examined using conventional approaches according to Lawley (1974). HAZOP is a qualitative technique based on „guide words", which generates ideas about how to deviate from the expected operating conditions, which can lead to dangerous situations and operability problems. Risk analysis refers to the recognition and assessment of threats and is the process of identifying and measuring risk. The HAZOP technique is not 100% certain for risk identification mentioned Prostean et al (2014). Starting from the risk management analysis, which can be defined as a systematic application of management policies, procedures and practices, which include the identification, analysis, evaluation, monitoring and review of risk, is identified by HAZOP, the way in which the online trading process line may deviate from its original design conditions. The HAZOP study is extremely effective in identifying deviations of a process in relation to its prescribed mode of operation, involving the application of a formal systematic review and analysis of processes. A HAZOP report can improve all possible deviations, as well as their causes and consequences. It is noted that HAZOP is the ideal methodology for identifying unwanted events in a system. Also, according to Schuller, the soundness of the methodology is a function that extends the known interactions evaluated, as well as the level of detail of the analysis and the consequences identified, in the depth of the study. Schuller also argues that the success of a

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HAZOP study depends on knowledge of the process and its technical deviations metioned Galante et al (2014). In a research study by Rossing et al (2009), the Hazop study can be based either on a simple process flow diagram or on a P&ID diagram, pipeline and tool diagram used in the process industry. The present paper used a simple process flow diagram in risk assessment to investigate deviations from operating rules or design intent, such as the purpose of an E-C site.

Methodology

The main objective of the traditional HAZOP study is to identify the operability problems of potential hazards and to propose risk prevention actions. HAZOP, qualitatively is able to estimate the risks following the research of consumer behavior, the study of several factors of trust in e-commerce, as well as the protection offered by the company providing E-C. This technique uses the systematic approach to identify possible deviations from normal operations and to ensure that appropriate safeguards are in place to help prevent risks by testing consumer confidence in E-C, thus observing which deviations from the conditions of safety. HAZOP quantitatively develops scenarios and finds deviations of the causes, in order to identify safety functions and estimate the final effects. At the same time, it completes the assessment of severity and probability, thus allowing the selection of several important preventive recommendations in implementation. Although the basis of the HAZOP method came from the need to identify the hazards of handling hazardous substances in the chemical industry, it has expanded into various fields of research. The purpose of using this method in this paper is to identify the risks to which consumers who use e-commerce are exposed and to minimize or completely eliminate potential sources of risk by proposing concrete measures. HAZOP is a systematic safety study, based on the systemic approach, to an assessment of the safety and operability of complex process equipment or the production process. The objective of the present study overlaps with the main one of the traditional HAZOP method, which consists in identifying the potential problems of operability of the encountered dangers; thus, consumers face certain dangers in the online trading process, and as a consequence, risk prevention actions are proposed mentioned Kotek et al (2012).

It is considered that, in testing consumers' confidence in E-C, if the analysis and identification effort will be performed by experienced specialists, using the HAZOP technique, it is possible to identify at least 80% of the potential deviation that may occur during normal of an online transaction accordin to Prostean et al (2014). The framework of this study was conducted in order to test consumer confidence in E-C in 2020. The first step was to identify all the risk factors integrated in the two aspects associated with the risk: economic, technological and psychological. In the second step, the research team identified and analyzed on an individual basis, each risk factor that may occur in the EC, following the correlation of confidence factors with reliable sources, as well as with the dimensions of confidence in the testing models. consumer confidence (21 risk factors were identified in Table No. 1) and the probability of occurrence of each risk factor in percentages was estimated.Four models of testing consumer confidence in EC were examined to highlight confidence factors and to identify risks: Model I B2C of perceived confidence (Brian J. Corbitt et al, 2003), Model II testing of factors affecting the confidence in e-commerce (Musfiq Mannan, Choudhury, 2008), Model III for testing the dimensions of consumer confidence in e-commerce (Tiago Oliveira et al 2017), Model IV for testing the confidence of Romanian consumers in e-commerce (Lup et al 2019).

***Model I**:* Trust is a critical factor that governs consumer behavior. According to Corbitt, both market orientation and trust in web technology are extremely important. On the one hand, the perception of trust can be seen as a combination of benevolence and credibility; on the other hand, on the other hand, there is the decision of consumers to engage in technologically risky purchasing decisions. Corbitt points out that the web browsing experience is also important, so the higher it is, the more consumers are more likely to proceed with online purchases. The capacity of the website also contributes to gaining an advantage over the competition, while also attracting consumer confidence. A complex site has a better reputation and uses high quality consumer protection technologies. In this first model, trust as a critical factor in e-commerce is predominantly influenced by 3 sources: the reputation of e-commerce in general, consumers and the specificity of the website.

Model II: A first test hypothesis of this model verifies whether consumer confidence in E-C is negatively correlated with the risks involved in this type of trade. Perceived technological trust and security - are based on two major components: user security / privacy and technical capabilities to complete the transaction. Market orientation - the activity through which constantly, the needs and desires of buyers must be met. Social presence is positively correlated with buyers' trust in online commerce sites. The quality of the user interface (navigation and comfort) - takes into account the appearance of the system, the navigation part and the convenience of searching for a product or information. Quality of perceived information about products and services - updating information about products and services, to help the buyer make a decision.The importance of the reputation of websites - safe signals and clues, through which the buyer decides to buy online or not. Experience on user's websites - the experience, ideas,

knowledge and all the clues gathered and developed by a user regarding online transactions mentioned Musfiq Mannan, Choudhury (2008).

Model III: In the model of Tiago Oliveira et al (2017), tests of e-commerce trust were performed in order to conceptualize the sources of consumer trust in e-commerce (consumer characteristics, company characteristics, website infrastructure and interactions), verifying as well as how the sources influence the dimensions of consumer confidence in e-commerce: competence, integrity and benevolence and verify the significance of total consumer confidence in e-commerce. The hierarchy of the model components are of reflective-reflective type with the secondary constructs: the characteristics of the consumers, the characteristics of the company and the interactions, being essential in explaining the three dimensions of the consumer confidence. Also, following the testing of the effect of total trust in e-commerce, it was concluded that it is a partial mediator of competence in purchasing intention, integrity and benevolence.

Model IV: It has five sources of consumer confidence in e-commerce, which are grouped as follows: 1) The psychological profile of the consumer; 2) The company providing E-C - composed of the following factors: brand recognition, reputation, site accessibility, variety of products, online payment security; 3) Delivery infrastructure with three factors: traceability, promptness and easy return of products; 4) The guarantees offered by the supplier company being quality data that affects the consumer's satisfaction; 5) The dimensions of consumer confidence in e-commerce, which are: agility, integrity rate and adaptability of the e-commerce provider, influence all other sources of trust; they affect the final purchasing decision according to Lup et al (2019).

Following the detailed study and the analysis performed on the four models, 21 risks and 6 scales were configured, respectively, identified in Table no. 1, showing a classification of the probability of occurrence in percentages, for each risk factor separately. The difference between these tables stems from the fact that each risk factor affects the consumer (CONS) or the E-C company (COMP), having a certain high, moderate or low impact depending on the stage of the purchase trading. E-C has become the engine of the modern economy, replacing all the more in the current context of the Covid 19 pandemic, the traditional stores with a lot of companies, which are specialized in online transactions. Opening an online business involves certain risks, both for the company and for consumers. In Table no. 1 a classification of risks has been made, the probability of their occurrence indicates their severity, so it is necessary to take strong measures to counteract them; while other risks are insignificant and do not affect E-C companies or consumers according to an on-line study Running a Risk Assessment of Your e-Commerce Business (2020).

Table 1: Risks identified in E-C confidence testing

No.	Risk (B2C)	Category E (economic) P (psychological) T (technological)	Probability	What is affected?	Impact	The trust phase I - information U- understanding P - purchase
1.	Fraud	E, T, P	50%	COMP/CONS	SEVERE	I, U, P
2.	Previous experiences	E, T, P	73%	COMP/CONS	SEVERE	I, U, P
3.	Manipulation of decisions	P	80%	CONS	MODERATE	I, P
4.	Infrastructure defective site	E, T	38%	COMP/CONS	MAJOR	I, U, P
5.	Lack of logistics	E, T	77%	COMP/CONS	MODERATE	P
6.	Quality failure	E, T	70%	CONS	MAJOR	P
7.	Warranty failure	E, T	48%	CONS	MAJOR	P
8.	Low accessibility	E, T	65%	CONS	MAJOR	I
9.	Behavior changing	E, P	30%	COMP/CONS	MODERATE	I, U, P
10.	Misleading advertisements	E, P	65%	COMP/CONS	MODERATE	I, P
11.	Misperception of information	E, P	9%	COMP/CONS	INSIGNIFICANT	I
12.	Low reputation	E	81%	COMP	SEVERE	I, U
13.	Cyber security of the transaction	E, T	70%	COMP/CONS	SEVERE	P
14.	After-sales irresponsibility	E, T	80%	COMP/CONS	MAJOR	P
15.	Short description of the product	E	56%	COMP	MAJOR	I, U
16.	Changing preferences	E, P	70%	COMP/CONS	MODERATE	I, U
17.	Negative reviews	E, P	69%	COMP	SEVERE	I, U
18.	Data Privacy Infringement (G.D.P.R.)	E, T	85%	CONS	MAJOR	P
19.	Excessive costs	E	77%	CONS	SEVERE	P
20.	Wrong market orientation	E, P	54%	COMP/CONS	MODERATE	I, U, P
21.	Lack of customer support	E, T	20%	CONS	MODERATE	P

(Source: Lup Patricia Simona et al, 2020)

FRAUD: According to Soviany (2007), E-C fraud is based on three factors, namely: motivated criminals (who carry out cyber attacks), fraudulent consumers as a reasonable target audience, and the lack of relevant security measures, which should be taken by the company, E-C providers. Given that E-C fraud is distributed as follows: 70% of fraudulent websites that promote cheap electronic products but never deliver, followed by sales of used cars, 45% of consumers were deceived. At the same time, over 41% of consumers face counterfeit products, and 30% reported a large number of complaints about free trials of products mentioned Prostean et al (2014). Realizing the most common types of fraud at European level, it turned out to be an average of 50%, with an almost certain probability of E-C fraud occurring.

PREVIOUS EXPERIENCES: According to Dunne (2020), 73% of consumers mentioned that previous experiences influence their choices online. About 42% prefer to pay more for a friendly and welcoming experience, so improving E-C has increased buyers expectations. Customers are increasingly emancipated and with extensive online experience, anticipating access to customer service: fast, polite and useful orders through a wide range of channels, from social media to e-mail.

MANIPULATION DECISIONS: (The case of consumers manipulated by other competing companies): According to online checks of consumer behavior mentioned Hagai (2018), that over 80% of site visitors will buy elsewhere following clicks on ads, which appear on retailer sites that offer the same or much lower price for the product you are looking for.

INFRASTRUCTURE: (E-C provider's website) According to an online survey by Allen R. (2016), almost 38% of consumers will abandon an E-C web-site if its interface and design are unattractive and inaccessible, while 39% of site visitors will not purchase anything if the loading time of the site takes extremely long.

COSTS AND LOGISTICS: Consumers were asked to mention the main reasons for purchasing online, they indicated four specific reasons: price, shipping, selection and delivery time. 77% of respondents also pointed out that transport and other additional excessive costs would cause them to give up the online basket mentioned Hagai (2018).

QUALITY and PREFERENCES: ADI Consumer Electronics Report (2020) mentioned that Google Analytics measures over 80% of the transactions of the largest web retailers in the world, making anonymous reports on consumer behavior. The analysis of the products is performed following the daily study of millions of orders. From the analysis of purchases of electronic products, it emerged that they are most often followed by consumers, and in making the purchase decision 70% of the priority is the quality of the products.

WARRANTY: The conformity guarantee is mandatory according to the law in force, unlike the technical guarantee, which refers to the repair of the product, consumers following sites, which offer a guarantee as long as possible; according to the study of Allen (2016) where 7 risks identified in launching an online business, 48% of shoppers consider guarantees to be extremely important.

ACCESSIBILITY: For consumers, the online shopping experience is extremely important, requiring detailed information that is accessible and includes clear descriptions. According to online consumer behavior checks, the importance of simplicity and ease of navigation on the e-commerce website, easy search and simple navigation prevails for 65% of consumers, otherwise they will go to another retailer mentioned Hagai (2018).

BEHAVIOR REMODELING: In the analysis of consumer behavior, Adlum (2020), highlighted that over 30% of desktop transactions are followed by a mobile click. Thus, if a consumer views a product on their mobile device while on the way to work, they can later view the same product in the shopping cart on their laptop or tablet desktop. In recent years, consumer behavior has been reshaped and there has been a growing shift towards m-commerce (mobile commerce).

ADVERTISEMENTS: In most online shopping sessions, shoppers are diverted from visiting the online store by being exposed to unauthorized advertising. About 65% of the ads analyzed introduce unauthorized ads, which causes a decrease in visitors mentioned Etzioni (2020).

MISPERCEPTION OF INFORMATION: An informed consumer is determined to know all the relevant details before buying online. An E-C company must clearly and concisely show the value of the products by providing a comprehensive description. Otherwise, inaccurate and vague descriptions lead them to turn their attention to another retailer, in 9% of consumers can differentiate the exact information about the correct description of product quality according to Foot (2019).

REPUTATION: Many consumers resort to researching a product before purchasing it, about 81% check from other sources. If the website is reliable and offers complex services, the purchase decision is made quickly according to Hagai (2018).

SECURITY: According to Etzioni (2020), in a consumer survey, he found out that they consider that over 69% of E-C companies are exposed to cyber attack and their personal data is negligently managed.

AFTER-SALES IRRESPONSIBILITY: Awkward return policies discourage 80% of consumers from turning to the online store, which provides poor return services to customers, in a study By Expert commentator (2018).

SUMMARY DESCRIPTION OF THE PRODUCT: There are consumers who currently spend a lot of time researching product descriptions and posting various reviews online, following their documentation from several sources. They are the discerning rational consumers who can make a clear line between the useful content of a product description and advertising mentioned Stradling, (2019).

NEGATIVE REVIEWS and G.D.P.R.: In survey no. 20 global CEO of PwC, 69% of CEOs of many digital companies, said it is becoming increasingly difficult to gain consumer trust, which varies by industry. E-C companies must implement clear privacy policies, ensure transparency and responsiveness to consumer needs. In an increasingly technology-dependent world, consumers fear an overwhelming proportion of personal data breaches by 85% of consumers who will no longer approach a company if they have doubts about data protection. „Unlike the European Union's approach to regulating the confidentiality of personal data - the General Data Protection Regulation (GDPR), in most US data privacy laws vary by sector, type of data or state to State".

MARKET ORIENTATION: Zoovu Blog (2018) mentioned that the Waitrose's report on consumer trends, showed that 64% of consumers occasionally feel overwhelmed by the choice they make when they experience shopping online. Another recent consumer report found that about 54% of consumers are so frustrated that they abandon E-C sites if they can't choose what they want. In more than ten years of research, several psychologists have investigated the psychological effects of „choice overload". It turned out that the wide range of options discourages consumers from making purchasing decisions. A famous example is the experiment carried out by Iyengar and Lepper (2000), in which a table with „free samples" was installed at a grocery store and customers were presented with either: 6 or 24 jam flavors. The experiment showed that when only 6 options were presented, 30% of people made a purchase; unlike only 3% of consumers, who made a decision when faced with 24 options. In another similar experiment, Procter & Gamble found that: „decreasing the choice available for any given product leads to a 10% increase in revenue, so fewer choices, eliminates the cognitive burden and helps us act faster" mentioned Popova (2017).

LACK OF CUSTOMER SUPPORT: Recent surveys made by Dunne (2020), show that over 80% of consumers assume that E-C customer support teams will respond to an e-mail within 24 hours. So the lack of customer support is against policy and has a negative impact on the costs of e-commerce. In conclusion, there is a risk that 20% of companies will not have a call center for customer support, because over 80% of buyers said they expect to be answered and interact with them in real time mentioned the Salesforce research report.

For example, in Table no. 2 shows the probability of classification of the occurrence of the risk in Table No. 1. As described above, according to consumers, these factors represent a high risk of impact in online transactions, with an almost certain probability of occurrence.

Table 2: Probability of occurrence of risk factors in B2C

Scale	Probability of occurrence	Explication	Probability of occurrence refers to risk factors
6	Almost certain	>=50%(1 in 2)	1, 2, 3, 5, 6, 8, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20.
5	Likely	>=25%(1 in 4)	4, 7, 9.
4	Possible	>=20%(1 in 5)	21
3	Unlikely	>=10%(1 in 10)	-
2	Rare	>=5%(1 in 20)	11
1	Almost never	>=2%(1 in 50)	-

(Source: Lup Patricia Simona, 2020)

In the third step, the research team, individually analyzed each risk factor, listed in Table no. 1 and established, through estimates based on brainstorming and experience, the risk severity classification table. The severity classification estimates the worst potential consequences, affecting online transactions. For example, it is also considered that factor no. 1 - The risk of fraud, which is an operational risk, investigates both the possibility of losing personal data of consumers and financial losses associated with fraud suffered by the company. According to some studies, fraud involves other losses in addition to financial costs, for example the negative impact on the reputation of the company providing E-C. The estimated impact for this risk is expressed in Table no. 3 and it can be observed that it has a high impact, related to the losses that both the consumer and the E-C company can suffer, it is translated into: „Severe impact", being assigned the value 6 on the value scale, according to Table no. 3.Following the study of the specialized literature, a classification of the severity of the risk was made according to table no. 3. The risks with severe impact in E-C are the following: fraud, previous experiences, logistics, company reputation, cyber security of the transaction, negative reviews and excessive costs.

Table 3: Aspect of severity classification for risk factors

Scale	Severity of classification	Classification of risk factors
6	Severe impact	1, 2, 5, 12, 13, 17, 19
5	Major impact	4, 6, 7, 8, 14, 15, 18, 20
4	Moderate impact	3, 9, 10, 16, 21
3	Minor impact	-
2	Insignificant impact	11
1	No impact	-

(Source: Lup Patricia Simona, 2020)

In the fourth step of the risk analysis in e-commerce is identified, the position of each risk factor in the risk matrix (Figure no 1) according to the individual scale established for the probability of occurrence and severity.

Significance		Severity (Consequence)					
		1 - No impact	2 - Insignificant impact	3 - Minor impact	4 - Moderate impact	5 - Major impact	6 - Severe impact
Probability of occurrence	1 - Almost never	Very low	Very low	Very low	Low	Moderate	High
	2 - Rare	Very low	Low	Low	Moderate	Moderate	Very high
	3 - Unlikely	Very low	Low	Moderate	Moderate	High	Very high
	4 - Possible	Low	Low	Moderate	High	Very high	Sever
	5 - Likely	Low	Moderate	High	High	Very high	Sever
	6 - Almost certain	Low	Moderate	High	Very high	Sever	Sever

Figure 1: Risk Matrix (Source: adapted by a standard matrix of risks)

The risk matrix is a visual diagram of risk analysis based on the probability and significance of the risks. From left to right, a risk classification is made starting with the lowest, moderate risks and gradually ascending to the most severe risks. Risks that have a high probability of occurrence also have a severe impact, which is why they require a thorough risk assessment, efficient management and countermeasures. The color codes in the risk matrix contribute to risk mitigation in the sense that they increase the visibility of risk classification, thus making it easier for companies to take risk mitigation measures according to an online article Running a Risk Assessment of Your eCommerce Business (2020). Based on the risk theory in management and integrating the HAZOP method, the risks of e-commerce were detailed as comprehensively as possible. To date, no particular attention has been paid to their assessment, according to Daijang Hao (2011), who adds a new concept aimed at ensuring management risks in e-commerce.

Significance		Severity (Consequence)					
		1	2	3	4	5	6
Probability of occurrence	1						
	2		11				
	3						
	4				21		
	5				9	4, 7	
	6				3, 10, 16	6, 8, 14, 15, 18, 20	1, 2, 5, 12, 13, 17, 19

Figure 2: Integration of risks in the risk matrix (Source: Lup Patricia Simona, 2020)

The HAZOP study is a process analysis technique that aims to systematically identify risks, malfunctions and operational problems that may compromise the personal safety of consumers or the operation of the E-C system. Hazop has the capacity to estimate the outcome of the risk deviation, having the ability to come up with measures to rectify the system. Hazop has proven to be extremely effective in recognizing the disadvantages of systems, but also in creating or developing new systems contributing to risk management mentioned Baradits (2007).

Conclusions and Recommendations

HAZOP analysis involves identifying hazards and assessing risks, which lead to undesirable consequences. Based on a structured and systematic approach, it is an important part of the risk management process, because no action can be taken to avoid or reduce unidentified hazards. In the risk matrix, a systematic review of the E-C process is performed and the severity of the risks, their causes and consequences are identified. The HAZOP study examines the consequences of failure and is a systematic and comprehensive technique mentioned Glossop (2000). Through E-C, buyers have access to a practical method of shopping and at the same time, easy for sellers, but that comes bundled with certain risks. The risks that may arise are, among others, of a financial nature, caused by fraud, improper use of access to various sources by buyers, lack of trust, lack of security, etc. These risks can be combated through a system in which buyers have a chance to become members. Consumers can become active participants in the trading process, can thus view the products offered, can make purchases and can follow the transaction process, as well as prove the payment according to Sahara et al (2019). Consumers also have the ability to assess the risks of online transactions as follows: the likelihood that the E-C provider will deliver on its promises and the assessment of potential damages in the event that the order is not honored. The first could be assessed from reviews or various indications found on the seller's profile, which indicate the seller's confidence, and the second is most directly reflected in the purchase price mentioned Nancy et al (2018).

The present study showed that some consumers, who used E-C, perceived an increased risk in terms of: technology, costs, performance, time, privacy, financial insecurity and in some cases even psychological risks. Thus, the following solutions were proposed:

- Effective ways to leave opinions / reviews - consumers' perception of risks, which may arise in relation to a supplier, will be improved, if there is such a mechanism by which consumers are allowed to share positive experiences and negative from online.
- Awareness of the brand's reputation - achieving this awareness among buyers, by promoting it through various electronic means: TV, Radio, posters, physical campaigns abroad, as well as on social media, targeting different market segments. A proper information campaign can reduce the risks / concerns of potential consumers.
- The option to pay on delivery - in Romania, there is still a fear of payment and not receiving the product after it has been paid. This fear is found among shoppers who make occasional online purchases. That is why it is useful to be able to pay when the product is delivered, thus reducing the risk of fraud in the provision of bank details.
- Commitment from the seller of E-C - transparency regarding delivery time, prompt shipping, warranties must be maintained.
- Providing details about the product, order, invoice helps buyers. If changes / problems occur, they must be communicated to the buyer.
- Return and warranty policy, efficient return policy / compensation / repair - product quality is always the one that creates uncertainty among buyers, in terms of E-C. The possibility of returning the product will increase confidence in „online shopping”. The existence of guarantees will determine consumers to „buy back”, to become loyal customers. The possibility of return, if the buyer is not satisfied, increases confidence and encourages online shopping.Collecting as little personal data as possible - collecting only the data that is necessary and important, so as not to create doubt among customers.
- Providing seals and security certification from trusted suppliers - certification of the website with services that ensure customer safety in terms of purchases, will increase trust and provide impartial approval of the sale, it becomes an assurance that what is delivered to the buyer, is reliable.
- Effective methods for complaints / support for buyers - the existence of such a method, the resolution of complaints by the E-C company, in the shortest possible time, the existence of a unique number of emergencies and a call center 24/7 for registration of complaints, clarifying misunderstandings / doubts and solving problems. Call center for providing information, finding out the degree of satisfaction / dissatisfaction among buyers, in terms of previous shopping experiences.

- Combining „kiosk" models with the virtual store - setting up a center where orders can be placed, but be in a public space, on the model of bank ATMs mentioned Jitendra et al (2017).
- In a study made by Bluestone Team, it is mentioned that providing the most accurate, complete and compact product information leads to the comparison of the consumer's interaction with the website compared to the seller in the physical store. The best possible view of the ideal product page must coincide with consumers' expectations in accordance with the latest trends: „particular descriptive titles, unique, extensive and complex descriptions; detailed specifications and attributes to answer all customer questions; the buttons should be prominent and colored: „Add to cart" and „Checkout"; mandatory high-resolution product image on white background (with zoom option); appropriate metadata for images; high quality videos showing how the product can be used; clearly presented shipping information and return conditions; related products and accessories; customer reviews".

According to Wylder (2004): „there are several risk mitigation strategies, including access control policies, physical and perimeter security policies, remote access policies and methodologies". According to Miyazaki and Fernandez (2001), the best way to increase consumer confidence in E-C is to display privacy and security seals on E-C websites. As many technical security measures as possible, in terms of security and confidentiality, need to be set up in order to protect the sensitive information of consumers and companies regarding: „the security system on connection, third party verification and seals on the Internet". Companies providing E-C services should develop mechanisms to ensure the confidentiality of consumerspersonal data and the secure transfer of electronic funds through cooperation with third-party systems for purchasing and implementing internet seals according to Vos et al (2014).

Abbreviations:

1. e-commerce – E-C;
2. Hazard and operability – HAZOP;
3. Company/Consumer – COMP/CONS;
4. Business to consumer – B2C;

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Impact of Corporate Social Responsibility on Customer Satisfaction in Retail Enterprises in the Baltic Countries

Iveta LININA
Turiba University, Riga, Latvia
Iveta.Linia@turiba.lv

Velga VEVERE
EKA University of Applied Sciences
velga.vevere@gmail.com

Abstract

Domestic consumption is one of the cornerstones of any national economy. Particularly in the retail trade, the corporate social responsibility is a guarantee for the company's sustainable development and its competitiveness. To identify the impact factors of the corporate social responsibility, the authors have set out to investigate the customer satisfaction from three aspects - customer service quality, marketing activities, as well as product placement and shopping convenience. The authors examine the theoretical background of customer relationship formation and corporate social responsibility. Then they describe retail trade development tendencies in the Baltic countries and, by conducting a customer survey (1446 respondents) determine the main factors underlying the socially responsible relations with customers. This study gives retailers an understanding of the need for a socially responsible relationship with customers and points to specific aspects of this process in retailing that ensure the customer loyalty. The authors conclude that by understanding the main principles of customer relationship formation, the retail enterprise can manage these processes in the socially responsible way and that responsibility can be one of the tools for enhancing business competitiveness.

Keywords: Customer Satisfaction, Corporate Social Responsibility, Retailing, Customer Loyalty.

Introduction

Domestic consumption is one of the cornerstones of any national economy. Particularly in the retail trade, the corporate social responsibility is a guarantee for the company's sustainable development and its competitiveness. The ground factors of the consumers' choice are the ones of the product assortment and quality, price, point of sales, service according to expectations and necessary information. In the current market situation customer can obtain information about the best offer quite easy, therefore the retailers have search for new ways to attract and retain customers and create a long-term relationship. Retailers need certain mechanisms to ensure their competitiveness, customer satisfaction and loyalty. In the era of the new technologies the retail trade also exhibits new developmental tendencies:

- Growing number of enterprises;
- Expansion of mega-retailers;
- Rapid development of new types of retailing (e.g. internet selling);
- Use of new technologies in retailing;
- Increase of competitiveness in retailing. (Berman & Evans, 2013)

Therefore, it is very important to find new ways and methods for successful development within the dense competitive environment. Unfortunately, many enterprises to ensure their competitiveness chose unethical and/or illegal course of actions. To avoid such threat and to function in the sustainable mode, the social orientation of the enterprise plays more and more important role. To identify the impact factors of the corporate social responsibility, the authors have set out to investigate the customer satisfaction from three aspects - customer service quality, marketing activities, as well as product placement and shopping convenience. The authors examine the theoretical background of customer relationship formation and corporate social responsibility. Then they describe retail trade development tendencies in the Baltic countries and, by conducting a customer survey (1446 respondents) determine

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the main factors underlying the socially responsible relations with customers related to the customer satisfaction and loyalty. Accordingly, the research question of the current investigation is: What are the main impact factors of the corporate social responsibility upon customer satisfaction and loyalty?

Literature Review

Corporate Social Responsibility in Retailing – Concepts and Issues

The European Commission's "Green Paper: Promoting a European Framework for Corporate Social Responsibility" as of 2001 describes CSR "as a concept whereby companies integrate social and environmental concerns in their business operations and their interaction with their stakeholders on voluntary basis." (European Commission Green Paper, 2001) The definition stresses the main points, that CSR involves social and environmental issues of business strategies, and it is based on the principle of voluntarism. Besides that, the definition points out the importance of engagement of internal and external stakeholders, the internal stakeholders being primarily employees and shareholders (this involves such issues as investing in human capital, health and safety, and managing change), while the external stakeholders are business partners and suppliers, customers, public authorities and NGOs representing local communities, as well as the environment. (Ibid.) The Green paper strives to answer four main questions regarding CSR. (1) What is the role of CSR in corporate business strategies? (2) What are the best ways to establish and develop a process of structured dialogue between companies and their various stakeholders? (3) What should be the respective roles of the main actors? (4) What are the best means to develop, evaluate and ensure the effectiveness and reliability of CSR instruments? Another approach is related to the problem of corporate social performance, i.e., the ways companies act in the society and how responsive they are to the societal demands. Donna J. Wood (1991) admits that the basic idea of corporate social responsibility is that business and society are interwoven rather than distinct entities; therefore, society has certain expectations for appropriate business behavior and outcomes. However, a review of the literature shows that attempts to specify principles of CSR have not distinguished among three conceptually distinct though related phenomena: expectations placed on all businesses because of their roles as economic institutions, expectations placed on firms because of what they are and what they do, and expectations placed on managers (and others) as moral actors within the firm. When these three phenomena (institutional, organizational, and individual) are being distinguished, it is possible to stress the performance aspect of the corporate social responsibility. The author proposes the following scheme: principles of corporate social responsibility comprise legitimacy (the institutional principle; public responsibility (the organizational principle); managerial discretion (the individual principle). This helps to define processes of corporate social responsiveness (environmental assessment, stakeholder management and issues management), and outcomes of corporate behavior, such as social impacts, social programs, and social policies. (Ibid.) The identification of specific responsive processes shows the channels through which companies act out their involvements with the external environment, whereas incorporating social impacts, policies, and programs as the collective outputs of a company's environmental interactions accounts for more pragmatic approach on the strategic management level.

Impact of corporate social responsibility on companies' competitiveness has been discussed among others by M. Porter and M. Kramer (2006) in their article "The Competitive Advantage of Corporate Philanthropy." In their opinion, corporations can use their charitable efforts to improve their *competitive context* – the quality of the business environment in the location or locations where they operate. Using philanthropy to enhance context brings social goals into alignment and improves a company's long-term business prospects. (Ibid.) According to them, the company's competitive context consists of four interrelated elements: factor conditions, or the available inputs of production; demand conditions; the context for strategy and rivalry; and related and supporting industries. Analysis of these factors can identify areas where economic and social values overlap and possibilities for increasing business competitiveness in a more context-focused way. The similar problem is being brought about also by R. Dobrea and A. Gaman in their article "Aspects of the correlation between corporate social responsibility and competitiveness of organization." (2011) Summarizing vast amount of literature on the subject the authors have pinpointed three main approaches to the corporate social responsibility. First, addressing CSR as an obligation to the shareholders, activities designed to increase its profits so long as it stays within the rules of the game. This entails that maximizing profits for shareholders is the central concern of any organization, while socially responsible activities and initiatives are not the companies' concerns. Second, addressing CSR as an obligation to all stakeholders. According to this point of view, the organizations are not only responsible to their shareholders / owners, but they also should take into account the divergent interests of those social groups affected by the company activities, or those who can also influence the fulfillment of corporate goals. Third, addressing CSR as an obligation to society. This perspective emphasizes that organizations are responsible to society, by the fact that they are open systems and constantly interact with the social environment. (Ibid.) The authors find positive correlation between corporate social responsibility and microeconomic competitiveness that leads to better economic performance. These common issues are: guidance on the values of ethics; common interests of the stakeholders,

employees and shareholders; dependence on the production process or service quality; dependence on the quality of human resources; dependence on organizational culture and performance orientation, as well as medium and long-term orientation. Although the main goal of business organizations is to produce profit, under the pressure of they must redefine their strategic goals to achieve business success that complies with obligations to shareholders, social welfare and environmental protection. De Sousa Filho and others address the question of the strategic corporate social responsibility management. They state that there are three types of social investment (altruistic, selfish and strategic) and that the strategic investment creates better results for companies that try to simultaneously achieve the maximization of both profit and positive advantages to society and local community. It also consists of additional benefits to the company – enhanced reputation and qualifies staff, the differentiation of products and extraction of premium price. Thus, companies can add value and obtain competitive advantage through socially responsible activities. It is important that they should relate to the corporate strategies. (De Sousa Filho *et.al*. 2010) All these approaches, however different, seek create and exploit win – win situations for enterprises and for society at large. CSR is increasingly recognized as being about having good business practices and its impacts are contributing to an organization's reputation and performance. The latter is becoming more and more important as the value of business becomes more and more reliant on intangible elements. (Vasilescu et.al*.,* 2010)

Still our interest of the current study lies specifically with the corporate social responsibility in retailing, therefore in what follows we present a brief overview of the literature in the field. Although, in general, all the categories and characteristics of the CSR are applicable to the sphere of retailing, there are some idiosyncratic features to be mentioned here. Thus J. Anselmasson and U. Johansson (2007) distinguish three main attitude-based dimensions – human responsibility, product responsibility, and environmental responsibility. The human responsibility is related to the principles of fair-trade, the product responsibility refers to full and user-friendly information about the content of goods, whereas the environmental one regards the eco-friendly, free of chemicals shopping opportunities for customers, as well as eco-disposable packaging. There are studies devoted to the supply chains in the retail sector that conclude that in the case of mega-retailers there exist a myriad of social risks, such as, threat of child labor, local farmer and natural environment abuse. (Jones et al., 2007) In other words, the longer the retailing supply chain, the greater possibility of irresponsibility. All in all, the CSR issues in the retail sector can be divided along the following lines (Martinuzzi et al., 2011):

- Fair-trade, support of local producers; organic produce
- Protection of natural environment, energy use and waste reduction, recycling;
- Product safety, distribution of eco-goods and local produce;
- Ethical trading
- Employment policies and working conditions, health and safety at work, discrimination, corruption, foreign labor;
- Sustainability, corporate reputation;
- Charity, philanthropy, support for local communities, social, educational and environmental programs;
- Consumer loyalty and purchasing behavior.

The specific role of e retailer is the one of the gatekeeper between the producer and the consumer in the supply chain, therefore, it is important to study the impact of corporate social responsibility from the viewpoint of consumers. One of the most recent investigations in the field is the one conducted by H. Schramm-Klein and others, entitled "Retailer corporate social responsibility is relevant to consumer behavior" (2016). The authors have developed the according conceptual model that consists of six interrelated elements: perceived CSR activities+perceived retailer attributes lead to consumer loyalty and eventually to purchasing behavior; the process is influenced by CSR credibility and CSR orientation. The authors conclude that in retail consumer perception of the combined CSR activities and retailer's attributes has a greater impact on loyalty rather than purchasing behavior. Generally, the study also reveals that most consumers are not fully aware of the CSR activities, thus the ongoing communication at the point of sale is very important for keeping consumers informed about company activities. (Ibid.) E. Herpen and others (2003) distinguish two main aspects in perception of the retailers' social initiatives - the beneficiary of the activity and the intrinsic contribution of the retailer. In other words, consumers want to know profit of the beneficiary and how much the retailer invests in the activity. This entails that the best way to convey a high level of CSR, and thereby increase consumer trust and store evaluation, is to focus on activities that both benefit society and require a high level of contribution. T. Wagner and others (2008) in their research have tried to identify the critical spheres of corporate social responsibility in retailing, that is, the spheres that could be perceived as irresponsible by the consumers. They have put forward 14 different aspects (in the ranking order): societal rules, employee discrimination, local working conditions, dishonesty, pricing policies, natural environment, employee benefits, foreign labor, employee wages, local businesses, local employment, offensive material, foreign economies and sales practices.

Customer satisfaction and loyalty in retailing

Customer satisfaction is a significant indicator of any company performance. It can be defined as S. M. S. Rana and others define it as felling or attitude of a consumer towards a product/service after it has been used. It can be measured by the fact if consumer's expectations have been met fully, partly or not met at all. (2014) Still, by and large, the main determinants of the customer satisfaction, according to the previous research, are: customer service, brand variety, store environment, location, shopping convenience, product quality, service, price, promotional campaigns, personnel interaction, etc. (Ibid) Though all these factors are of a real importance from the customers' viewpoint, it should be mentioned that this list has some serious omissions, namely, we can't see here customers evaluation of the retailers' social, environmental and communal activism. In our opinion, the social dimension of the retailing that includes, for example, such aspects as responsible attitude to environment and recycling, employment policies and participation in social projects can strengthen company's competitive power. The satisfied customer also will recommend and patronize to other customers for choosing the according retailer, this is a basis of good reputation and a dimension of sustainability. (Irshad et al. 2017; Luo & Bhattacharya, 2006)

It is possible to classify the description of the customer satisfaction in relation different marketing tasks (see Fig 1).

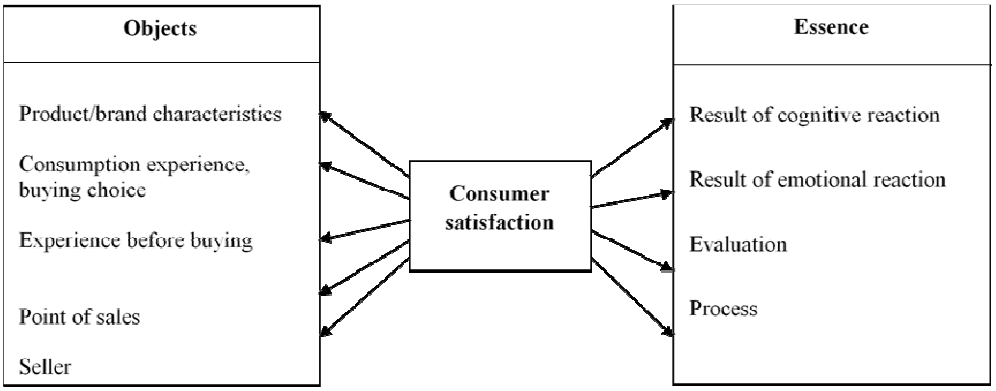

Fig. 1: Characteristics of consumer satisfaction approaches

Thus, for example, I. Howard and I. Sheth state that the customer satisfaction is a cognitive situation of the customer, that comes about because of the adequate or inadequate award (the result of shopping). (Howard & Shets, 1969) Emotional reaction has been stressed by R. Oliver (2010) who concludes that the customer satisfaction is a complex psychological state grounded in combination of expectations and after buying experiences. I. Engel and R. Blackwel (1993), in their turn, pinpoint the aspect of alternative choices, namely, evaluation if the chosen alternative meets the expectations. The situation with customer satisfaction in the retail trade is rather different since the retailer is a mediator in the distribution channel between the producer, the supplier and the end user. Therefore, to ensure the customer satisfaction the retailer must influence producers and/or distributers (wholesalers) by the means of orders, contracts, etc., as well as they must foster collaboration with them. Besides that, the retail trade adds an additional value to the goods through the sorting, prepacking, packing and other actions. The retailers provide the customer service in the traditional shops, outside the shops and through the internet sites. From these specific features of the retailing there follows that the customer satisfaction rests upon provision of both material products (goods) non-material products (services). This influences the (all stages of the customer satisfaction formation in the realm. The level and intensity of the impact depends on service level (large outlet, small store, etc.), sales mode (traditional shop or selling outside the shop) and other factors. These factors are well described in the article "Consumer satisfaction in retail stores: theory and implications" (Paul et al., 2016) The authors conclude that the consumer attitudes which are the significant predictors of shopping satisfaction are being classified in the following way: those favorable to large formats, those favorable to small formats and those who hold neutral attitudes (no specific preferences). Their research suggests that there are two factors (deal proneness and shopping economy) that have a reasonable predictive power regarding shopping satisfaction, while there are differences in other attitudinal dimensions among regarding the large outlets and small stores. Namely, the small store customer satisfaction depends on the social desirability, the shop location, the staff friendliness, but the outlet customer satisfaction is closely tied with overall shopping experience (including the entertainment and dining facilities), the shopping ambience (atmosphere, announcement, music, navigation, etc.) and family shopping opportunities (including, for example, the kids' corner with adult supervision). (Ibid.) The customer satisfaction is a step toward the customer loyalty.

Building customer loyalty in retailing

The phenomenon of customer satisfaction is one of the preconditions to long-term and profitable relationship with customers formation that, in its turn, leads to the customer loyalty. Attraction of new customers to businesses is significantly more expensive than retaining the existing ones, since the regular consumers spend more, but cost less to the company itself. (Karjaluoto et. al., 2012). The research in the field has demonstrated that the acquisition of new consumers costs 5-7 times more than serving the existing consumers. Essential also are the studies about the importance of developing consumer attitudes towards the offers before the purchase process (attitudinal loyalty). (Backman & Compton, 1991; Day, 1969) The one the most influential research of loyalty has been accomplished by R. Oliver (2010). He does not object to the statement that the process of loyalty formation is rooted in the customer attitude, nevertheless he offers his four consecutive dimensions model (see Fig 2).

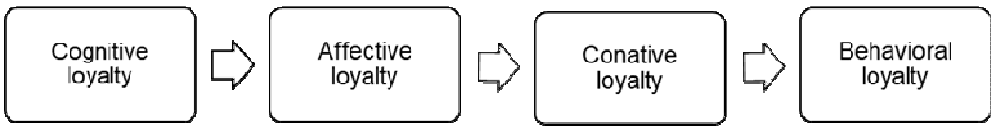

Fig. 2: Loyalty model of four consecutive dimensions (Oliver, 2010)

This model presupposes the knowledge/information about the produce and the store, the emotional attitude (I buy because this offer appeals to me), the aspect of reliance (I buy because I trust this offer), everything comes together in the behavioral loyalty. So, the loyal customer exhibits such characteristics: they are buying more and buying more often, they maintain their loyalty in the case of price increase, they recommend brand/store/service to other potential customers.

Summing up the previous research in the field, the authors of the current article have come up with the specific features of the customer loyalty in the realm of retailing:

1) Customer can be loyal to the outlet/store due to the following factors: availability of the product/brand he is satisfied with, satisfaction with the product/price ratio, satisfaction with the service quality, social factors;
2) Perception of the afore mentioned factors depend on the geographic, demographic, economic, social and psychological characteristics of the target audience, though the importance of the factors can differ (e.g., despite the satisfactory price level, service quality the customer can still be not loyal in case of unavailability of the necessary product/brand);
3) Unlike other industries, the retail trade can have a fairly large number of the false loyal customers (making purchase only due to the advantageous location of the store) and the ones who although satisfied, are not re-purchasing, since they focus on sales and price discounts;
4) The attitudinal loyalty relates mainly to the product/brand values and the relation "product / brand value - consumer expenses", but the behavioral loyalty - to service quality. Therefore, it is imperative to pay attention to both dimensions of loyalty;
5) The consequences of consumer loyalty are different, but the main thing about it is to make repeated purchases. Other signs of loyalty - low price sensitivity and positive "mouth-to-mouth" communication are less typical because they concern specific products/brands rather than retailers.

A few researchers have paid attention issues regarding the impact of the corporate social responsibility to the customer loyalty. (Berens et al. 2005; Golob et al., 2008; Stanaland et al., 2011; Sindhu & Arfi, 2017) The studies disclose both theoretically and empirically that the ethical standards as determinants of commitment to the corporate social responsibility activities have a significant impact on the customer loyalty. They show also that it is a matter of high relevance to inform customers about the CSR activities of the retailer (via Facebook page, Instagram, newsletter, printed statement, etc.).

To the current investigation the authors have worked out the conceptual model of the CSR impact on the customer satisfaction and eventually on their loyalty (see Fig 3).

Figure 3: Conceptual model of CSR impact on customer satisfaction and loyalty

The current model puts forward three aspects of the corporate social responsibility that are decisive in the realm of retailing – (1) employment policies and attitude to employees; (2) responsible attitude to environment (including retailers' orientation toward the local and eco produce, recycling, etc.); (3) organization of and participation in the social projects decisive (different charity projects, social marketing activities, etc.).

Results and Discussion

Retail enterprises as a member of the product distribution chain fulfill such functions: eliminates the disproportion of demand and supply, conducts the inventory management, facilitates the efficiency of product transportation, assembles goods in accordance with the consumer needs, establishes contacts and organizes discussions with product suppliers, serves consumers, sells goods and services to them, carries out marketing activities and takes on the risk that the process of goods distribution works smoothly. Because of these functions, the value of products and the value of consumption increase. (Kotler & Keller, 2006; Best, 2005)

The role of the retail trade in the development of the country's economy is evidenced by such indicators as turnover and its fluctuation (see Fig 4).

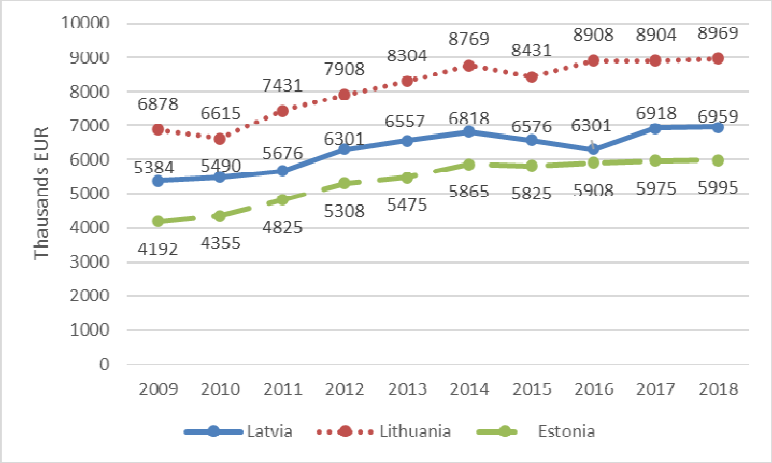

Fig. 4: Retail trade turnover in the Baltic countries (csb.gov.lv., 2018)

To evaluate the factors of consumer satisfaction and loyalty formation and their relation to the corporate social responsibility in Baltic countries the authors employed the survey method (the questionnaire). (Rust et al., 2004) The survey was carried out in all three Baltic countries – Latvia, Lithuania and Estonia. Considering the aim of the research and characteristics of the respondents the standardized questionnaire was used. All respondents were offered the similar statements in the identical order, the evaluation was according to 5-point Likert scale. The non-probability snowball sampling method was used to gather information, namely, the first set of respondents were contacted by the means of e-mail, they, in their turn, identified the next set of respondents, and so on. As the result 1446 questionnaires were admitted as valid: 673 from Latvia, 388 from Lithuania, and 385 from Estonia (the population – residents of all countries). According to 95% data accuracy, the research sample size was calculated as 385 respondents (min.). (Doane & Seward, 2011) The respondents (consumers) answered questions about factors that influence their choice of supermarket – assortment of goods (including the local and eco produce), price level, product placement and shopping convenience, marketing activities, service quality, attitude to employees and

employment policy, responsible attitude to environment, as well as participation in the social projects and organizing them. The results are depicted in the Table 1.

Table 1: Factors influencing consumers' choice of supermarket

Customer service quality	Mean	Median	Mode	Standard deviation	Dispersion	Variation	Min	Max	Sum
Product assortment, incl. local and eco produce	3.97	4.00	4.00	0.75	0.57	0.04	1	5	1753
Price level	3.54	3.00	3.00	0.82	0.67	0.05	1	5	1565
Product placement and shopping convenience	3.05	3.00	3.00	1.04	1.09	0.08	1	5	1346
Marketing activities	3.94	4.00	5.00	1.09	1.19	0.06	1	5	1742
Service quality	3.99	4.00	4.00	0.96	0.92	0.05	1	5	1762
Attitude to employees and employment policy	3.33	3.00	3.00	0.87	0.76	0.06	1	5	1472
Responsible attitude to environment	3.68	4.00	4.00	0.77	0.59	0.05	1	5	1627
Participation in social projects	2.68	3.00	3.00	1.08	1.16	0.09	1	5	1185

The answers to all the questions were processed and analyzed by the SPSS program. As it follows from the table 1, the respondents regard quality of service as the most important factor ($\bar{X}$ = 3,99; Me = 4,00; Mo = 5,00). Then there follows assortment of goods, including also availability of the local and eco products (3,97; 4,00; 4,00), marketing activities (3,94; 4,00; 5,00), responsible attitude to the environment (3,68; 4,00; 4,00), price level (3,54; 3,00; 3,00), attitude to employees and employment policies (3,33; 3,00; 3,00), as well as placement of goods and shopping convenience (3,05; 3,00; 3,00). Of all criteria the lowest value was assigned to the one of participation in social projects and organizing them (2,68; 3,00; 3,00). It should be noted, that variation level in all criteria was slight (0.04-0.08), it means that the differences in customer opinion are quite insignificant.

After evaluation of the supermarket choice factors, the respondents were asked to evaluate the impact of these factors while really shopping. To do that the blocks of questions were formed, the answers allowed us to see the reasons behind the answers and to verify their credibility. Results are depicted in the Table 2.

Table 2: Consumers' evaluation of supermarkets

Customer service quality	Mean	Median	Mode	Standard deviation	Dispersion	Variation	Min	Max	Sum
Product assortment, incl. local and eco produce	3.64	4.00	4.00	0.84	0.71	0.05	1	5	1608
Price level	3.78	4.00	4.00	0.99	0.97	0.06	1	5	1670
Product placement and shopping convenience	3.38	3.00	3.00	0.96	0.92	0.06	1	5	1496
Marketing activities	3.42	3.00	3.00	0.81	0.66	0.05	1	5	1510
Service quality	3.15	3.00	3.00	0.93	0.86	0.07	1	5	1393

Attitude to employees and employment policy	2.88	3.00	3.00	0.94	0.89	0.07	1	5	1271
Responsible attitude to environment	3.15	3.00	3.00	0.93	0.86	0.07	1	5	1393
Participation in social projects	3.99	4.00	4.00	0.96	0.92	0.05	1	5	1762

As we can see from the table 2, the customers assigned the highest value to company's participation in and organizing the social projects ($\bar{X}$ = 3,99; Me = 4,00; Mo = 4,00), then follows price level (3,78; 4,00; 4,00), assortment of goods and shopping convenience, including availability of the local and eco products (3,64; 4,00; 4,00), marketing activities (3,42; 3,00; 3,00), product placement and shopping convenience (3,38; 3,00; 3,00), the similar value are assigned to service quality and responsible attitude to environment (3,15; 3,00; 3,00). Of all criteria the lowest value was assigned to the attitude to employees and employment policies (2,88; 3,00; 3,00). There is insignificant variation level regarding all criteria.

It is useful to compare the factors of customers' supermarket choice and evaluation of the real situation. The graphical depiction of these indicators (see Fig. 5) and their comparison allows us to conclude that the mean indicators of the assortment of goods (including the local and eco produce), the marketing activities, the attitude to employees and the employment policy, as well as the responsible attitude to environment in the view of supermarket evaluation are lower than the ones of the supermarket choice. These differences entail that the consumers' expectations were not fully met, and supermarkets must work to improve the situation. On the other hand, the mean indicators of the price level, the product placement and the shopping convenience, as well as the participation in the social projects are in the view of supermarket evaluation are higher than the ones related to the consumers' choice of supermarkets. Still, we believe that here is the place for improvement. The situation in the market can change rather quickly due to changes in the internal and external environment of the retail trade enterprises. At the same time, the certain steps taken in the direction of the ethical business practices can facilitate changes in the consumption patterns (for example, the corporate social responsibility of the enterprise can become a significant factor of the supermarket choice).

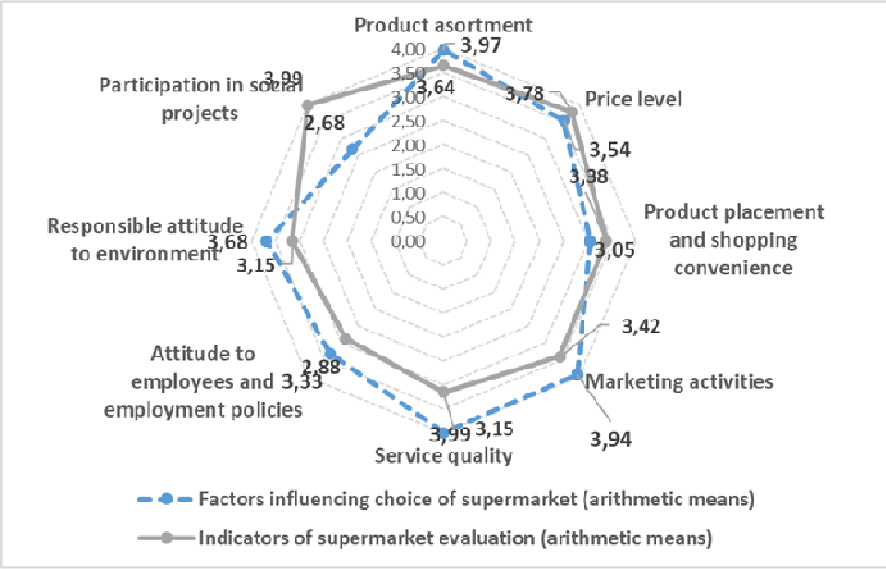

Fig. 5: Comparison of the factors influencing consumers' supermarket choice and indicators of supermarket evaluation (arithmetic means)

Conclusions

The results of the research make it possible to come to the following conclusions:

1. The consumers in the Baltic states exhibit comparatively low level of the loyalty coefficient to the enterprise. The retailers do not use all possibilities to attract and retain customers yet. The increase of the consumer loyalty would entail the increase of the company value, on one hand, and, on the other hand, it would bring profit to the economy in general.

2. Comparison of the factors influencing the supermarket choice with the supermarket evaluation by the consumers show that five criteria of supermarket choice (the assortment of goods, including the local and eco produce, the marketing activities, the service quality, the attitude to employees and the employment policy, the responsible attitude to environment) received higher scores than the same criteria in the actual evaluation.
3. The fact that in supermarket actual evaluation the highest score was assigned to the social activities of the enterprise attests to the changes in the consumers' perception, namely, activities related to the corporate social responsibility can significantly increase the customers' loyalty to the enterprise level.

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Multicriteria Assessment of The Use of Water Resources for Coordinating the Sustainable Development of Society

Jitka SISKOVA
Czech University of Life Sciences, Prague, Czech Republic
E-mail: siskova@pef.czu.cz

Jana HINKE
Czech University of Life Sciences, Prague, Czech Republic
E-mail: hinke@pef.czu.cz

Abstract

The sustainable development of society is based on the synergy of many sub-areas and approaches relating to the development of society and conservation of natural resources. The social development is, in many cases, achieved regardless of sustaining the stable environment. The contemporary society has been evaluating these conflicting requirements for decades by means of intersectional solutions of multicriteria mathematical models.
Having evaluated scientific publication sources, this paper aims to identify sets of criteria that can be used for multicriteria assessment of the use, protection, and maintenance of water resources. The results of multicriteria models are used as an evaluation factor within the framework of ensuring the sustainable development of the society and as a factor of competitiveness and adaptability of accounting units.
The outcome of this work is to design a structure of criteria for the use of multicriteria assessment of management processes of organisational units, based on which it is possible to evaluate approaches to the protection and maintenance of water resources in terms of sustainable development in production and non-profit organisations.

Keywords: Water resources, sustainable development, multicriteria evaluation, competitiveness.

Introduction

Water resources are an indispensable element to life on the entire planet. Their protection and rational use pose a significant problem of the present social consciousness. Water resources are classified as free goods, which historically led to the underestimation of their importance and uneconomical use. In recent decades, the limitation of their usability due to changing climatic conditions has been added, which leads to the deterioration in the availability and quality of drinking and service water resources.

The sustainability of water resources as an essential part of human life is faced with the insurmountable boundary of synergy of society´s main requirements - increasing production to meet human needs. As surface water is becoming scarcer and precipitation is more and more variable, the reliance on groundwater reserves for agricultural use is expected to increase. In this respect, nature conservation measures and economic incentives for agricultural production to maintain the vitality of agricultural communities come into play. Tools for conservation planning and management of groundwater, the use of suitable land resources and the protection and maintenance of biological diversity are being put into practice. (Bourque et.al., 2019)

The issues of the use of water resources are becoming evident on a global scale. In connection with the increasing population and improving living standards, the demand for water is also increasing. Reducing the availability of fresh water across the Earth can cause harm to human health and reduce or eliminate crop yields. Monitoring the status and level of water resources is included among the security risks of states.

Problem Formulation

Based on the need to determine the current state, there are models of water resources availability that have been used for several decades and which should monitor the development of this issue and support the sustainable development (Kaewmai et al. 2019 or Li, Chen, Singh et al. 2020).

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Current research in individual countries focuses on a comprehensive overview of groundwater use and evaluation of its renewability. Groundwater (GW) resources provide a large share of the world´s water demand for various sections such as agriculture, industry, and drinking water (Naghibi, Hashemi, Berndtsson et al. 2020). A special attention is paid to the interaction between groundwater consumption, its replenishment, and the quantity of surface water, which is crucial in the assessment of sustainable groundwater consumption. The authors (Mukherjee and Singh 2020) show that the overexploitation of groundwater impairs its properties and increasingly leads to situations when arid/semi-arid rural areas are more and more vulnerable to the risks of groundwater scarcity. Many studies use the groundwater analysis to identify the impact of climate fluctuation - for example, Margues et al. (2020) specifically in the Alto Grande basin in north-eastern Brazil.

To reuse water shows to be one of the ways of how to use water resources sparingly. Water reclamation and ecological reuse are gradually becoming a popular solution to address the high pollutant load and insufficient ecological flow of many urban rivers. However, emerging contaminants in the water reuse system and related risks to human health as well as environmental risks need to be assessed (Lin, Xu, Keller et al. 2020). Reclaimed water can be used in different applications that affect performance in economic, environmental, and social dimensions. However, the inadequacy of technologies and the economic burden in the case of new technological processes do not allow this issue to be assessed appropriately in full and estimates of the future availability of water resources are therefore very uncertain. It is necessary to overcome significant problems in data acquisition and research (Bierkens and Wada 2019). A separate group of studies focused on the removal of undesirable elements from water for the purpose of its further use can be traced. These include the removal of manganese, ferrum and antibiotics from water simultaneously by oxidation (Du, Yang, Liu et al. 2020) or the removal of arsenic in groundwater using Slag based calcined layered double hydroxides (Zhou, H., Ai, J., Gao, H. et al. 2020) and, last but not least, the removal of fluorides (Yan, Chen, Zhang, et al. 2020).

Continuous and local monitoring of the use, protection and sustainability of water resources is one of the fundamental issues to evaluate the society´s sustainable development within the selected state. This situation must be evaluated by the multicriteria mathematical models using specific criteria and by determining their significance by the criterion weight. An interesting approach to selecting weights is the one of Sun, Li and Deng (2020), who combine the negation of probability distribution with the theory of evidence to reduce the uncertainty caused by the subjective determination of weight coefficients of various criteria using a questionnaire survey, and who propose a method to determine weights for multicriteria decision based on the negation of probability distribution. According to them, the quantitative evaluation of the criterion fuzzy degree reduces the uncertainty caused by human subjective factors and the subjective error is corrected to a certain extent.

Results

Water resources have two basic functions in the sustainable development of society:
1) the natural function - the basis of all life and
2) the utility function – the production potential.

Water consumption must be assessed not only in terms of the internal impact (economic costs), but also from the external impact on the environment (sustainable development). This issue therefore applies not only to production units, but must also be addressed in non-profit organisations, state administration and even in individual households. Problems in the protection and sustainability of water resources can be grouped into the following problem areas:

- falling groundwater levels due to climate change,
- pollution of water resources due to intensive production activities in agriculture and industry,
- excessive economic burden of development and use of new technologies to reduce water consumption,
- improper use of foreign chemical substances in large-scale farming,
- accumulation of antibiotics and hormones from wastewater due to imperfect technologies of sewage treatment plants,
- reducing water seepage into the lower layers due to soil solidification and compaction as a consequence of the use of heavy mechanisms,
- groundwater contamination due to floods,
- low level of literacy of the population concerning the issue of using water sparingly.

The observed criteria in the field of protection and maintenance of water resources can be divided into three areas (economic, environmental and social), which are interconnected, and in terms of sustainable development it is necessary to seek solutions in the intersection sets of their impact by means of multicriteria models.

Economic area:

- Economic results of accounting entities
- Costs of availability of water resources in the monitored area
- Competitiveness of accounting entities
- Setting and regulating the government´s subsidy policy
- Penalisation of interventions in the landscape due to production activities
- Financial risks - diversification of water resources
- Investment intensity of new technologies when using water resources
- Financial costs of operation of new technologies

Environmental area:

- An amount of annual precipitation in the monitored area
- Deviations of precipitation from the average during the year
- Capacity and availability of water resources
- Quality and availability of water resources
- Biodiversity of crops in sowing procedures
- Landscape biodiversity in the monitored area

Social area:

- The employment rate in the monitored area
- The cost of living in society
- The educational policy in relation to the issues
- The population´s access to information
- The moral approach and responsibility of entities in relation to the conservation of water resources
- Crisis situation management (droughts, floods)

Decision-making situations are based on the above-mentioned interconnected criteria, where the output solution consists of a compromise set of variants, which contains the optimal impact of decision-making criteria. All monitored parameters must complement and interconnect one another in order to achieve sustainable availability of the essential resources. For this purpose, multicriteria evaluation models are used where values of subjective or generally beneficial preferences of decision-makers also enter into the analysis of decision-making situations. These are based on the values of proposed variants V = (v1, v2,…, vn) and on the list of evaluation criteria K = (k1, k2,…, kk). Each variant Vi (i = 1, 2,…, n) is described by a vector of criterion values (y11,…, ynk) for which a mathematical model of the criterion matrix containing vectors of criterion values is constructed.

$$Y = \begin{bmatrix} y_{11}, y_{12}, \ldots, y_{1k} \\ y_{21}, y_{22}, \ldots, y_{2k} \\ \ldots \\ \ldots \\ y_{n1}, \ldots\ldots\ldots, y_{nk} \end{bmatrix}$$

Fig. 1 : Multicriteria matrix for assessing the selected indicators. Source: own processing, 2020.

The monitored criteria are variable in terms of evaluation and their quantities are:
a) objectively identifiable - quantities of absolute values,
b) ratio - the probability of occurrence,
c) scale - subjective, technical scoring.

To calculate the multicriteria model, real values must be entered for the individual criteria. This is exceedingly difficult when addressing the environmental impacts, as most of the criteria in this area are based on subjective assessment. Grading and rating scales are used for this purpose. Various methods (classification, scoring, binary scale, ratio, interval, etc.) can be used to set the values. To express the preference of certain criteria, it is possible to use

either the order of importance or to determine the weight of individual criteria, which can again be based on numerous methods of determination (the scoring method, the weighted sum, etc.) (Triantaphyllou 2000).

The criteria are significantly influenced by the weighting value of individual factors that are variable in time series, which requires setting the coefficient of determination. Model situations must be assessed in longer time series with respect to the variability of natural conditions in a given locality (Kraatz et al., 2019). The decision-making space is not only determined by the structure of the process, but also by the structure of their mutual relations and objectively existing constraints. The individual criteria are set as minimizing or maximizing. The basic problem in solving decision-making situations by quantitative methods is their system quantification and approaches to limit the set of permissible variants of this decision-making space.

A set of the so-called non-dominant variants, containing the best evaluation of the mentioned criteria set in varied proportion, is created by solving the mathematical model. It is possible to identify the theoretically best (ideal) variant and the worst (basal) variant from the output solutions.

Research Limitations

The use of multicriteria models for assessing the use and protection of water resources in production and other organisational entities enables us to better understand the structure of the observed issues and to better focus on selected criteria.

When evaluating the observed issues, it is necessary to consider the two main risks, namely the risk of incorrect selection of evaluation criteria and the risk of incorrectly set weights of criteria. Both risks can be eliminated by using experienced and highly competent evaluators from various areas of the issues under consideration. To use multidisciplinary teams of researchers is a complete must in order to solve these situations.

Conclusion

This paper proposes the structure of multicriteria assessment of the use, protection and conservation of water resources. A similar multicriteria modelling approach was used in the study by Karunanidhi, Aravinthasama, Deepali et al., 2020, namely to understand the chemical evolution of groundwater, the entropic water quality index to assess the suitability of groundwater for human consumption and the overall hazard index to determine possible non-carcinogenic risks to children, women and men in the industrial area (South India). The multicriteria analysis using the Fuzzy UTASTAR method was also used by Haider, Singh, Ali et al. (2015) to assess the sustainability of surface water quality management in developing countries. Five main sustainability criteria (SSC) are considered in this model - including cost (capital, land and operational), land requirements, operation and maintenance issues, environmental impacts, and socio-economic impacts. In addition, several sub-criteria (impacts) have also been included to rationally justify the assessment of SSC by the decision makers.

The multicriteria approach to the evaluation of the mentioned water issues also found justification in the field of water erosion (authors: Guidoum, A., Nemouchi, A. and Hamlat, A., 2014), or more precisely in the sustainability of water management (authors: Chung, E-S. & Lee, K. S., 2009) - in this study, the authors also dealt with the appropriate way to determine the criteria weights and decided on the process of analytical hierarchy.

The research by Latinopoulos (2008), which aimed to develop a methodology that would be suitable for estimating possible environmental, economic and social impacts of irrigation water prices, is the closest one to the proposed model in this article, composed of sets of economic, environmental and social aspects. The authors of this article have thus verified the applicability of the model and will apply it in their further research, namely on water resources of the Czech Republic.

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Non-uniform Application of International Uniform Law – Reasons, Consequences, Remedies

Daniel DABROWSKI

ORCID 0000-0003-3072-5267
University of Szczecin, Szczecin, Poland, daniel.dabrowski@usz.edu.pl

Abstract

Conventions that include private law norms play a special role among international agreements. Their objective is to streamline rules concerning a specific legal measure. Convention on Contracts for the International Sale of Goods (CISG) and conventions on contracts of carriage of goods in individual branches of transport have such a character. Provisions of these conventions regulate legal relationships between entities under private law. They are applied directly by national courts if a given convention is applicable to a given legal relationship.

Adopting a convention and bringing it into force does not end the process of unifying the law. Law is truly uniform if it is uniformly applied by national courts in individual countries which are parties to conventions. However, it is difficult to achieve.

The aim of this paper is to demonstrate obstacles in courts' uniform application of conventions that comprise private law norms and negative effects of non-uniform application of such conventions. Methods that can serve to strengthen the unity of application of conventions are also specified. Appointment of advisory bodies which issue non-binding opinions on the interpretation of provisions of a given convention is a plausibly effective solution when certain conditions are met.

The analysis of legal acts and of judicial decisions of national courts from various countries and the European Union are the research methods applied by the author. Literature studies have also been carried out in order to obtain the broadest possible picture of the discussed issue.

Keywords: uniform law, unification of law, transport law, CISG, CMR.

Introduction

Unification of private law, which started in the 19th century, greatly facilitates international trading. Significant success in this area was achieved mainly in the field of transport. Contracts for carriage of goods in all most important branches of transport were uniformly regulated under a convention. Carriage by sea and by air was uniformed on a global scale, while carriage by rail, by road and by inland waterways on a regional scale. Contracts for carriage of passengers by air and by rail and (though to a small degree) by sea were also uniformed. Many world countries signed the Convention on Contracts for the International Sale of Goods (CISG). Other conventions on various types of contracts did not get such popularity, though they also play a certain role in international trading.

Reaching an agreement while working on a convention is not an easy task. It is because various, often conflicting interests of countries that are to become parties to the convention need to be taken into account. Searching for solutions that can be accepted by states with different traditions and legal systems (especially the common law and the civil law system) also causes difficulties. Likewise, it is difficult to ensure uniform application of the convention by national courts of countries that are its signatories. Failure to apply the convention uniformly ruins the effects of unification of the law. Such trends, called renationalisation of unified law in the literature, can be observed especially in relation to some conventions and are a serious obstacle to unification of private law (Munday, 1978, pp. 451-452; Gebauer, 2000, p. 684; Rajski, 1999, pp. 415-416).

Two elements make up uniform application of a convention. First of them is uniform interpretation of its provisions. It is essential that provisions of a convention be interpreted autonomously, that is without reference to terms and concepts characteristic to a national legal system (Gebauer, 2000, p. 686; Felemegas, 2002;

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Ribeiro-Bidaoui, 2020, pp. 146-147). Such a rule of interpretation results i.a from the provision of Article 31 of the Vienna Convention on the Law of Treaties (VCLT) which are applied also to conventions unifying private law (Gebauer, 2000, 692; Czapski, 2006, p. 553-554; Hoeks, 2010, p. 137-141; Verheyen, 2016, p. 442). Due to the fact that the Convention codified earlier norms of customary law, these rules may be applied as well in the interpretation of international agreements which entered into force before VCLT. Pursuant to the said Article 31 VCLT, "a treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose". Conventions unifying private law (their preamble or the content itself) usually name their purpose, which involves unification of rules on a specific legal measure. This purpose needs to be taken into account when interpreting the convention's provisions. Similar interpretative guidelines also include some conventions unifying private law: CISG (Article 7(1)) "In the interpretation of this Convention, regard is to be had to its international character and to the need to promote uniformity in its application and the observance of good faith in international trade") and Convention concerning International Carriage by Rail (COTIF) (Article 8(1): "When interpreting and applying the Convention, its character of international law and the necessity to promote uniformity shall be taken into account").

The second element of uniform application of the convention is related to the method of removing the so-called internal gaps in the convention, that is issues which were not regulated therein despite the fact that they do, as a rule, fall under the matter regulated by the convention. Such gaps should not be removed by reference to national law but by application of other methods allowing similar results in different countries irrespective of the content of the national law. CISG includes clear guidelines on removing the gaps. Pursuant to Article 7(2) CISG "Questions concerning matters governed by this Convention which are not expressly settled in it are to be settled in conformity with the general principles on which it is based or, in the absence of such principles, in conformity with the law applicable by virtue of the rules of private international law". There is no precise equivalent of this provision in carriage conventions, but the views developed on its ground may be helpful to a significant degree in solving problems arising against the background of the carriage conventions (Dąbrowski, 2018, p. 94-99).

"Renationalisation" of unified law - causes and effects

Ensuring uniform application of law is a difficulty not only in reference to conventions unifying private law. National law also often features discrepancies in judicial decisions or views of legal scholars and commentators on interpreting specific provisions. The main reasons for such discrepancies is language deficiency, where the language is a tool of communication, and a lack of precision in non-linguistic methods of interpretation. However, other reasons hamper a uniform interpretation of provisions of international conventions.

First of all, conventions are made in one or two authentic languages. Texts of conventions in these languages should be the basis of interpretation of these conventions (Article 33(2) VCLT). Discrepancies in individual language versions may cause a certain difficulty, but Articles 33(3) and (4) VCLT give guidelines on removing them. However, what is more important is the fact that authentic languages of a convention are usually not official languages of countries-parties to this convention. Then a natural trend among entities applying the law (usually courts) is to reach for a translation of the convention into an official language of a given country. Meanwhile, the translation is already in itself a certain "interpretation" of the authentic text; interpretation that is not always perfect and often defective (Ambrożuk, 2018, pp. 166-171). Basing on a translated text may, then, lead to erroneous outcomes of interpretation and result in non-uniformity of application of the convention.

Secondly, rules of interpretation feature great differentiation in legal systems of individual countries. As a principle, these rules should not be applied in interpreting provisions of international agreements. As pointed out above, in such a case the court should use interpretation according to the guidelines provided in Articles 31-33 VCLT, or analogical rules resulting from established international customs. However, in practise it is difficult to get detached from the adopted behaviour patterns. Also, the methodology of the profession of a lawyer is differentiated in different countries. Common law lawyers first refer to case-law, look for precedence. Civil law lawyers are first likely to look for answers in commentaries and literature. Results of interpretation may also be significantly affected by differences in legal culture and tradition.

Thirdly, in the national law there are usually mechanisms that encourage unification of interpretation of provisions. The discrepancies that occur in the case law are usually removed in a longer run thanks to judicial decisions of higher instance courts, especially national supreme courts. Their decisions, even if not binding on lower instance courts in a given legal system, outline directions of interpretation of the law. Therefore, they help maintain uniformity of its application. This also refers to provisions of conventions that unify the law, which thanks to judicial decisions may be uniformly applied in the territory of a given country. However, positive effects of judicial activity do not usually cross country borders. Judicial decisions issued in reference to a specific convention by national courts are not usually known in other countries and adjudicating courts do not take them into account. There are, in fact, exceptions from this rule, though not frequent. At the same time, there is no international court which could uniform interpretation of conventions on a global scale, that is in reference to all countries that are its

contracting parties. Only the Convention on the Contract for the International Carriage of Goods by Road (CMR) stipulates the possibility of appeal at the International Court of Justice (ICJ). Pursuant to its Article 47, "Any dispute between two or more Contracting Parties relating to the interpretation or application of this Convention, which the parties are unable to settle by negotiation or other means may, at the request of any one of the Contracting Parties concerned, be referred for settlement to the International Court of Justice". This provision, however, is a dead letter and during close to sixty years of validity of the convention, no dispute concerning its interpretation or application was filed at the ICJ. The clause included in Article 47 CMR is typical to international agreements that govern relationships between countries (entities under international law). However, it cannot fulfil its function in the case of conventions that unify private law (Wesołowski, 2013, p. 77). Discrepancies in the application and interpretation of conventions affect individuals, not countries. Individuals cannot be parties to proceedings before the ICJ and courts cannot refer questions to the ICJ for a preliminary ruling in individual cases.

Fourthly, results of the process of interpretation of uniform law may also be affected by political factors. Countries which are parties to conventions - even those which unify private law - often have divergent interests. It is clearly noticeable on the example of sea conventions. A marked dispute between "biggest flag states" and countries without their own fleet has been noticeable for years, which in fact makes it impossible to adopt a new convention governing carriage of goods by sea which would replace the old-fashioned Hague–Visby Rules. This conflict of interests may also play a role in the process of interpretation of the law. The courts of "biggest flag states" may tend to interpret it in favour of carriers, while courts of countries that do not have their own fleer may tend to favour shippers. Another example is a conflict about application of the so-called unimodal conventions (that is concerning a specific branch of carriage) to multimodal carriage. This dispute is especially significant on the ground of CMR. The problem boils down to answering the question whether CMR applies to the road leg of the journey where one agreement for multimodal carriage was signed (e.g. involving carriage by air and by road). In the well-known ruling of the English Court of Appeal of 27 March 2002 in *Quantum Corporation Inc. and others v. Plane Trucking Ltd.* the English court ruled for application of CMR in such a case assuming that the term used in Article 1(1) CMR "contract for the carriage of goods" applies also to an agreement on the basis of which the carrier committed to carry by a vehicle or by other means of transport (in separate legs of the carriage). It needs to be emphasized that the ruling in the discussed case was given excellent reasoning. The court examined both language versions of the Convention, reviewed case-law of foreign countries, etc. However, it is not ruled out that the final result of the process of interpretation could have been influenced by the English courts' inclination to "appropriate jurisdiction", that is to favour an expanding interpretation of provisions on jurisdiction so that the English legal system achieves a leading role in examining international disputes. It is interesting that the same problem was resolved differently by the Dutch Hoge Raad in a ruling of 1 June 2012 in *Goðafoss*, where the court abstracted from the previous, seemingly regulated, line of judicial decisions. The judgement could also have been politically motivated here. Interpretation which excludes application of CMR to a road leg of multimodal carriage eliminates the conflict between CMR and the Rotterdam Rules - a new convention regulating carriage performed at least partially by sea (including multimodal carriage). Therefore, it is possible that adopting such an interpretation of Article 1 CMR was influenced by a desire to promote the Rotterdam Rules and to "fit" CMR to them.

Fifthly, uniform application of the convention may also weaken the manner of filling internal gaps in the Convention. Filling gaps should occur either by means of the so-called analogy within a convention or by reference to general rules on which the convention is based (Felemegas, 2002; Brander, 1999; Dąbrowski, 2018, pp. 94-99). Only when these rules prove inefficient should one refer to the relevant national law. Meanwhile, thoughtless recourse primarily to solutions that result from national law is relatively frequent. Such a measure is to some extent understandable since usually it is the easiest way to fill the gap, though it does not encourage unity of application of the law.

It may also be added on the side that non-uniformity of application of the convention may be also a result of a reference to the national law included in the convention (Calme, 2016, p. 61). There are relatively many references like this in carriage conventions, especially in CMR and Uniform Rules concerning the Contract of International Carriage of Passengers by Rail (CIV – Appendix A to COTIF). An example here may be a reference in Article 29(1) CMR, which stipulated that "the carrier shall not be entitled to avail himself of the provisions of this chapter (...) if the damage was caused by his wilful misconduct or by such default on his part as, in accordance with the law of the court or tribunal seised of the case, is considered as equivalent to wilful misconduct". As a result of this reference, the degree of due care which is required from carriers by e.g. German courts is significantly higher than the one required by the courts in the Netherlands (Hoeks, 2010, p. 115).

Non-uniform application of conventions unifying private law results basically in a lack of legal security. Parties to an agreement are not certain as to the regime under which the agreement will be performed, especially which regime will apply in the event of failure to perform or the improper performance of the obligation. Resolution of this dispute may be different depending on the country in which the dispute will be examined. One needs to add at that that usually more than one country has jurisdiction for adjudicating the dispute. Lack of legal security increases the so-called friction costs thus hindering the operation of small and medium-sized enterprises (Hoeks, 2010, p. 16).

The phenomenon of forum shopping is also a consequence of non-uniform application of conventions. It involves the contracting parties looking for jurisdiction which in a given situation may be "more favourable" to that party. This phenomenon, naturally, has plenty more reasons than non-uniform application of international conventions (Fuchs, 2005, pp. 407-423). In cases examined under CMR which usually concern damage to the cargo it often adopts the form of a "race" to court. Each party of the dispute tries to initiate proceedings earlier in a jurisdiction that is favourable to it. The claimant, therefore, initiates proceedings for damages before a court of a country in which the line of judicial decisions is less favourable to carriers. Whereas a carrier tries to initiate proceedings to establish that they are not liable for the damage in a country known to have a more lenient approach to carriers. Initiating proceedings before one court excludes - in line with the Court of Justice's case-law - conducting proceedings before another (Ambrożuk, 2015, pp. 197-209). This is why each party tries to be quicker than the other in filing a claim. A side effect of such rivalry may involve higher litigation costs (Fuchs, 2005, pp. 410-411).

Methods of Counteracting The "Renationalisation" of Unified Law

Counteracting non-uniform application of conventions is not an easy task. There are profound reasons for this. Exchange of information about rulings passed in national courts, manner of interpretation of provisions of conventions, manner of filling internal gaps, etc. are especially important. Such activity is taken up by i.a. international organizations, research centres and also organizations of stakeholders of specific conventions. One of the aspects of information activity involves creating databases (Ribeiro-Bidaoui, 2020, pp. 155-157). A huge database concerning CISG kept for more than 20 years by the Institute of International Commercial Law operating at the Elisabeth School of Law at Pace University is especially noteworthy. This database includes convention-based decisions issued by courts of many countries that are parties to the convention, as well as scholarly materials and abundant references. A similar database, though significantly smaller, concerning CMR is kept by Institut du Droit International des Transports. United Nations Commission on International Trade Law (UNCITRAL) keeps the CLOUT database which includes decisions of national courts of various countries of the world that address legal instruments developed under the auspices of UNCITRAL. The significance of the discussed databases cannot be appreciated enough. They allow comparative studies, a search for solutions that are common to various systems and a search for established lines of judicial decisions. Undoubtedly then, they counteract "renationalisation" of unified law

A more direct method would be to appoint an international court which could issue preliminary rulings for questions referred by national courts, or possibly examine complaints for national courts' decisions based on the provisions of conventions. Establishing such a court (regardless of whether it would be to deal with one convention only, or a selected few or all conventions unifying private law), it does not seem possible (Ribeiro-Bidaoui, 2020, p. 152). It would require cooperation of many countries and a political will which is missing. However, it is worth noting the significant efficiency of this manner of ensuring uniformity of law application, which is confirmed by the activity of the Court of Justice of the European Union. Admittedly the activity of the Court of Justice is sometimes criticised, but there are no doubts that it is a guarantee of uniform application of European Union law. One needs to add at that that the Court's case-law may also influence the unity of interpretation of the discussed conventions. This stems from two reasons. First of all, in the light of Article 267 of the Treaty on the Functioning of the European Union, the Court of Justice may adjudicate in preliminary rulings i.a. on the interpretation of international agreements that the European Union is a party to. Therefore, the Court may interpret provisions of COTIF (and under its framework – the appendices to COTIF concerning transportation of passengers by rail (CIV) and carriage of goods by rail (CIM)), of the Convention for the Unification of Certain Rules for International Carriage by Air (MC) and of the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL). These are the conventions that the European Union acceded to. Irrespective of this, CIV and PAL were implemented into the Union's law thus becoming annexes to regulations issued by the European Parliament and the Council. The Court of Justice can also interpret these regulations. Of course interpretation done by the Court of Justice will not be binding on countries that are not members of the European Union. However, one may assume that due to the prestige of the Court of Justice they will be taken into account also by courts of countries that are not part of the Union. Secondly, the Court of Justice has already issued decisions which formally interpreted provisions of acts of Union's law, but in practice the Court interprets convention provisions in them. The judgement of 4 May 2010 in *TNT Express Nederland BV v. AXA Versicherung AG* (C-533/08) and of 19 December 2013 in *Nipponkoa Insurance Co. (Europe) Ltd v. Inter-Zuid Transport BV* (C-452/12) may provide examples here. In both of these judgements the Court indirectly interpreted provisions of Article 31(2) and (3) CMR. Legal commentators point out that the Court exceeded its competence in these judgements and violated autonomy of international law (Wesołowski, 2011, pp. 133-142). Not questioning this allegation, one needs to note a positive aspect of the Court's decisions, that is unification of application of Article 31(2) and (3) CMR, at least in countries that are EU members.

Unification of law may also be supported by the activity of committees that issue opinions on certain problems associated with the interpretation of a convention. Such a committee which deals with CISG ((CISG Advisory Council (CISG-AC)) has been operating since 2001 at the aforementioned Institute of International Commercial

Law. At the moment it is composed of 17 members, mainly scholars, specialists in international trade law. So far CISG-AC has issued 20 opinions concerning interpretation of the convention. These opinions were cited in 29 national courts' decisions in cases examined on the basis of CISG. The activity of CISG-AC is assessed positively enough to formulate a postulate on appointing a similar body which would interpret CMR provisions (Legros, 2017, pp. 27-30). This postulate is justified in all respects. CMR has great significance to carriage by vehicles. The scope of its application is still growing and covers practically the entire Europe, part of northern Africa and a significant part of Asia. It translates into the number of cases examined on the basis of provisions of this convention. Expanding the scope of application of the convention increases the risk of non-uniform interpretation of its provisions. Hence the greater need to take actions intended to maintain this uniformity. Efficiency of such an advisory council would depend on a few factors. Firstly, it would have to be composed of persons with great prestige, renown specialists of transport law. Secondly, it would have to be an independent body not influenced by CMR stakeholders. In particular, such a council could not act under the auspices of any organization of carriers, since there would be a risk of failure to maintain the necessary balance between interests of carriers and claimants. Thirdly, the activity of the council would have to be adequately publicised, promoted, so that national courts that apply CMR are familiar with them.

Summary

Unification of private law is a long process. It does not stop at adopting a convention that standardizes a specific measure. What is necessary is to ensure uniform application of its provisions. In a majority of cases there is no such institution that could safeguard this. European Union's accession to certain conventions relating to the contract of carriage creates an opportunity for the Court of Justice to issue rulings concerning provisions of these conventions, which may significantly affect national courts, also in countries that do not belong to the European Union. Irrespective of this, it is necessary to use other methods that encourage uniform application of unified law - information, education or promotion of certain solutions. Responsibility for uniform application of law rests with national courts. Failure to understand the weight of this responsibility may lead to disintegration of unified law and its renationalisation.

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The Subject Matter of Mandate Contract as Defined by The Polish Civil Code – Polish Codification and Foreign Influence

Krzysztof KUBASIK

ORCID 0000-0002-3122-4539
University of Szczecin, Szczecin, Poland, krzysztof.kubasik@usz.edu.pl

Abstract

Contracts of mandate have a long history and date back to the law of ancient Rome. Over the centuries, mandate contract has been substantially modified, in particular with regard to its subject matter and admissibility of remuneration. Another important aspect is the historical connection between mandate contract and the power of attorney. Mandate contract has also undergone major changes in the Polish law. Under the current Civil Code, its subject matter is the performance of acts in law, which is a significant limitation compared to the previous model. The aim of the paper is to analyze its legal status and modifications made, including comparison of with the Swiss model which served as a benchmark for the Polish codification, in particular the mandate contract governing provisions set out in the 1933 Code of Obligations. However, adoption of solutions similar to the Swiss model caused a lot of interpretative confusion. In consequence, its legal status had to be amended and its subject matter narrowed down to the performance of legal acts. Ultimately, after long years, the Polish model took a different shape. The main goal of changes implemented in the Polish legal system was to prevent interpretative doubts created by the too wide contract's subject matter. However, the objective has not been achieved. In view of the above, the opinion that mandate contracts with broad subject matter, encompassing legal and factual acts, would be a better response to current social and economic needs is justified.

Keywords: mandate contract, service contract, Polish legal system, Swiss legal system, proper application of law

Introduction

Foreign influences on the shaping of legal institutions in other legal systems are often fairly strong. Such practice is justified as it allows to adopt proven solutions and eliminate ones that do not meet the needs of social relationships. Analysis of legal solutions applied in other states is not an easy task, as it has to take into account the political, economic and cultural specifics of legal systems, without discounting national differences and the conditions they will operate in.

From the historical perspective, the way the mandate contract, being a key agreement regulating the provision of services, evolved over time in the Polish law is interesting. Analysis of these changes allows not only to follow the path of its evolution that culminates in the present day model, but also appreciate the significance of legal and comparative research.

Mandate contract was already known in ancient law, and over the centuries, its role and conceptualization underwent significant, and sometimes even dramatic, changes with regard to the contract's subject matter as encompassing performance of legal and factual acts, remuneration for the acts performed and the connection with the power of attorney. Each of these key aspects was regulated differently, often in the extreme, over the centuries, from mandate contract covering only legal acts for which remuneration was not payable and bound to the power of attorney, to the other extreme, that is a contract whose subject matter is also the performance of factual acts, both paid and unpaid, clearly distinct from the power of attorney.

The complexity of the subject matter inspired the author to analyze the Polish legal system in this respect, and to make an overview of historical evolution and foreign influences on the Polish mandate contract model.

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Mandate contract in Polish civil law; reference to proper application of mandate contract governing provisions to other service contracts

Mandate contract is regulated in the Polish law by art. 734 et seq. of the Act of 23 April 1964 – the Civil Code (CC)(Journal of Laws 2020, item 1740). A number of factors, including political and economic, influenced this regulation since the process of codification of the Polish civil law was initiated in the interwar period and continued after world war II in the socialist system which focused on production geared towards satisfying economic and human needs, and marginalized the "un-productive" service sector.

However, an analysis of the solutions adopted in the Polish Civil Code reveals that these regulations draw from other legal systems and, interestingly, Western European systems despite Poland being in the Soviet sphere of influence.

The observation that the mandate contract model that took decades to shape drew, to a high degree, from other legal systems, will be followed by a historical and legal and comparative analysis. What is more, in recent decades the regulation was not amended, therefore the author dares to ascertain that the final model is not only stands the test of time, but also performed well in completely different socio-economic conditions.

As already mentioned, the regulation of the subject matter started with the provisions of art. 734 Civil Code, with § 1 stipulating that the mandatary entering into a mandate contract is obliged to perform a definite act in law for the mandator. The Polish Civil Code does not mention the historical connection of the mandate contract with the power of attorney, and while this connection is not that strong in the Polish system as in other legal systems, still art. 734(2) CC provides that in the absence of other agreement, the mandate contract gives authority to perform acts or transactions on behalf of the mandator. This provision does not preclude the provisions on the power of attorney. Adoption of the principle that a mandate contract includes also authority to perform legal acts is justified inasmuch as the subject matter of the mandate contract is limited only to the execution of legal acts. Essentially, conclusion of a mandate contract has a binding effect, i.e. imposing an obligation on the mandatary to perform a definite legal act, but also an authorizing effect by conferring the power to perform a definite legal act for and on behalf of the mandator. However, the parties may agree that the mandatary will act for the mandator, but on his own behalf, and will be obliged to return to the mandatory whatever they gained from the contract. The Polish legislator adopted a principle that for the performance of mandate contract remuneration must be paid save as otherwise provided in the contract (art. 735(1) CC).

The narrow subject matter of a mandate contract certainly affects its practical significance, thus questioning the above thesis that it is fundamental to contracts for the provision of services, in particular with regard to the important role of services consisting in the performance of factual acts or a combination of factual and legal acts. It should be pointed out that the regulation of mandate contract has an additional, and broad scope of reference arising from art. 750 CC. The provision stipulates that: "Mandate contract governing provisions shall apply to service contracts which are otherwise not regulated by other provisions of law". Thus, the subject matter of a mandate contract is the performance of a legal act, yet through reference to proper application of the mandate contract provisions, these provisions are also applicable to other legal relationships which may consist in performance of factual acts or a combination of factual and legal acts. The formula used ensures some flexibility since proper application of the provisions means that some of them will be expressly applicable (without any modifications), whereas others will need to be modified, and yet other will not be applied as not relevant to the nature of a legal relationship (e.g. provisions about the power of attorney cannot be applied to services consisting in the performance of factual acts) (Nowacki, 1964, p.372).

Such regulation gave rise to significant interpretative doubts. Essentially, the scope of reference is analyzed each time, depending on the kind of unregulated service provision agreement doubts pertain to. It was also noted that the reference contained in art. 750 CC may in fact asserts the fundamental role of mandate contract among various service contracts, making it a benchmark model and, moreover, complementary to the legal regime for regulations of "other service provision contracts". However, the dominant view is that in fact, this reference is applicable to other service contracts which are not, or only in part, statutorily regulated. Thus, the reference would encompass a variety of unnamed contracts, but would not apply to other, named service contracts, i.e. regulated by law. Some also claim that by virtue of art. 750 CC, the mandate contract provisions can be properly applied to other named service contracts with regard to aspects which have not been regulated by the legislator (however, in case law such practice tends to be explained as interpretation *per analogiam*).

The subject matter is even more complicated by the confusion about the set of service contracts regulated by law and contracts included therein (Ogieglo, 1985, p. 56. According to this author "the codified service contracts include: mandate contract, agency agreement, commissioned sales agreement, transport agreement, forwarding agreement, storage agreement, warehousing agreement, bank account agreement and the so-called hotel agreement. Contract for specific work and construction work contract are treated as a separate group of contracts based on their material scope

and construction distinction"). Significant differences in this regard can be seen in the legal doctrine, focusing mainly on the nature of specific work contract and construction work contract.

The issue presented above still raises doubts, definitely compelling from the theoretical perspective, but also having important practical implications. It seems that a legal and comparative analysis of the said regulation, including an overview of its historical evolution, may have some significance for the proper interpretation of the said provisions of law.

The influence of the Code of Obligations on regulation of the contract of mandate by the Civil Code

The act which has the biggest impact on the currently applicable regulation of the contemporary law of obligations was the Ordinance of the President of the Republic of Poland of 27 October 1933 – Code of Obligations (Journal of Laws 1933, No 82, item 598). It also set out legal provisions regarding the provision of services which, to a large extent, were re-enacted in the present Civil Code. Sosniak (1981, p.61) points out that, quote, "Regulation of service contracts by the CC was in fact, as most of the regulations detailed in book III, a modified replica of the interwar legislation". Grzybowski (1967, p.1278) argues that, quote, "The new code approached the contract of mandate traditionally, re-enacting most of the content and structure of provisions from the Code of Obligation.". Therefore, it is essential to look into the legal environment that became the foundation for the future legal system.

Pursuant to art.498(1) Code of Obligations (CO), the contract of mandate is an agreement under which the mandatary undertakes to perform a definite act in law for the mandator. Compared to the presently applicable regulation, the difference is that in the CO the material scope of the mandate contract encompassed both legal and factual acts. Thus, there is another essential difference in the defining scope of the contract application which today is limited to legal acts only, and had a much larger scope in the previous code. This is why the mandate contract's leading role among service contracts was only logical, both with regard to service contracts regulated by the CO, and referred to the Ordinance of the President of the Republic of Poland of 27 June 1934 – the Commercial Code (Journal of Laws 1934, No 57, item 502). The broad material scope lay grounds for the mandate contract as one of the basic service contracts, justified even more by the absence of subjective limitations and the contract's flexibility (Ogieglo, 1985, p.51, including references cited therein).

However, the material scope of mandate contract was extended beyond that by the provisions set out in art. 498(2) of the Ordinance, which provided that, quote, "Service contracts, unregulated as a special kind of contracts, are subject to provisions regarding the contract of mandate.". In consequence, the mandate contract became a legal framework for regulation of a broad variety of commercial relationships consisting in the performance of both factual and legal acts. The role of art.498(2) CO was to extend the scope of application of the mandate contract provisions to encompass also "all kinds of factual acts provided that there are no features of other service contracts" (Szpunar, 1976, p.389, including references cited therein). It is worth adding that even in the early stages, that is when the drafts of the obligation law were being developed, in the works by Longchamps de Berier and Till the mandate contract had a narrower scope, limited only to legal acts.

Since the mandate contract could encompass the execution of legal acts, art. 499 CO adopted a principle that in such situation, in absence of another contract, the contract of mandate should embrace the authority to perform acts on behalf of the mandator. The historical connection between the mandate contract and the power of attorney was reflected also in this regulation as justified by the subject matter of the obligatory relationship. Another principle was that remuneration was due for the performance of the mandate contract.

However, the very broad material scope of the mandate contract regulation and its flexibility gave rise to interpretative confusion. At the time of defining the subject matter of the mandate contract as a "definite act", almost all relationships in which one party assumes the obligation to perform some acts for the other party qualified under the regulation (Sosniak, 1981, p.64, including references cited therein). In attempts to resolve the issue, prior to subjecting a given legal relationship to the mandate contract regulation, a "negative qualification" was made, i.e, mandate contract governing provisions were applied to a contract only if it did not fall within the regulation of other service contracts. Moreover, the Ordinance contained a separate chapter (chapter XI) titled "Service contracts" with seven sections regulating various commercial relationships, including work, specific work contract and mandate contract. However, there were also other kinds of service contracts operating in the legal system, such as e.g. the ones regulated by the Commercial Code.

Now, therefore, the applicatory scope of the mandate contract in the CO was much broader than the model in force today. Interpretative issues that occurred with regard to the understanding of the "acts" triggered a change in the defining elements of the mandate contract. The model applicable today, despite the fact that a vast majority of the

provisions of the Code of Obligations was reenacted in the Civil Code, is significantly different from the old model, a change inspired by the experience of using a too-broad a definition of mandate contract (Ogieglo, 1985, p.53).

The other elements that affected the shape of the subject matter of the mandate contract, i.e. the foreign models, are also worth analyzing.

Swiss law and its influence on Polish codification

It is commonly claimed that the way mandate contract and in general, service contracts, were regulated in the CO was affected by the solutions adopted in the Swiss law (Ogieglo, 2011, p.559; Szpunar, 1976, p. 389).

First, it should be noted that the detailed part of the Code of Obligations, often referred to separately, provided a grouping of contracts according to their similarities or economic purpose (Longchamps de Berier, 1938, p. 443). The structure of the act, i.e. the pooling of different types of contracts into systemic categories was modeled on the solutions adopted in, i.a. the Swiss and German law (Longchamps de Berier, 1938, p. 443).

The Polish legislation on mandate contract was significantly influenced by the Code of Obligations adopted in Switzerland on 30 March 1911, becoming the fifth book of the Swiss Civil Code (Bundesgesetz betreffend die Ergänzung des Schweizerischen Zivilgesetzbuches. Fünfter Teil: Obligationenrecht). In turn, this regulation was hugely modeled on the earliest version of the Code of Obligations, adopted in 1881, which was influenced by French and German legislation (Macierzynska-Franaszczyk, 2014, p. 103; Schwenzer, 2012 p. 2; Bucher, 2004, p. 107).

The mandate contract was regulated by Title XIII of the act, with section 1 regulating what was called a "simple agency contract". Pursuant to art. 394 (1), quote, "By concluding an agency contract, the agent undertakes to perform certain legal or factual acts, remuneration for which is payable or not, in the interest and according to the will of the principal." (translated by: Macierzynska-Franaszczyk, 2014, p. 106; cf. Zabinski, 1972, pp. 114-115). The scope of application of the agency contract regulation is extended by the next provision – art. 394(2) which provides that „Contracts for the provision of work or services not covered by any other specific type of contract are subject to the provisions governing agency" (Zabinski, 1972, p. 115). Pursuant to art. 394 (3), remuneration is payable where agreed or customary. The scope of agency is defined in art. 396 (2), which provides that an agency contract includes, in particular, the authority to carry out transactions as are required for the performance of the contract. It can be thus concluded that one of the key elements of a mandate contract is the concern for the best interest of the principle and readiness to act as required for the performance of the contract.

The mandate contract has major practical significance in the Swiss law, in particular the simple agency contract (Macierzynska-Franaszczyk, 2014, p. 106), which is due to, i.a., the option to ensure the right to remuneration (Zabinski, 1963, p.12). The mandate contract covers a very broad scope of legal relationships regarding the performance of both legal and factual acts. In this way, the regulation comes close to the original conceptualization of this contract as expressed in the Roman law, and additionally, a definite separation of mandate contract from contract of lease was made. However, it should be noted that such a broad scope of the said contract may raise doubts when classifying specific relationships according to statutory types of contracts. To solve this issue, Swiss lawyers refer to the division of contracts into contracts of due diligence and contracts of result (Macierzynska-Franaszczyk, 2014, p. 106; Honsell, 2012, p. 7).

It is thus evident what inspired the authors of art. 498 Polish Code of Obligations. The material scope of mandate contract in the Swiss law is rather broad, as it encompasses legal and factual acts, and the obligation to perform legal acts is connected with the authority to undertake such acts on behalf of the principle. The provision of such services may be for a fee or free of charge (though this principle looks different in the two legal systems). In essence, the main solutions of the Polish codification are remarkably similar to the Swiss legislation, thereby confirming that the Swiss model was the source of inspiration for the authors of the Polish CO.

Despite the fact that the currently applicable CC re-enacted the provisions regarding the contract for specific work contained in the Code of Obligations and that the two regulations are tellingly similar, they differ significantly with regard to the material scope of the contract. However, the practice of application of provisions demonstrates that the limitation of mandate contract to the performance of specific legal acts did not, in fact, eliminate interpretative doubts. And yet, this is not due to the imprecision in defining the subject matter of the contract, since the subject matter of the obligation consisting in performance of certain legal act may constitute sufficient grounds to distinguish this contract from other types of service contracts. In fact, the interpretative confusion is created by the second scope of reference of the mandate governing provisions set out in art. 750 CC which instructs that these provisions should be applied to otherwise unregulated service contracts. It seems thus that the mere narrowing of the subject of the mandate

while retaining the principle of proper application of its provisions to other types of service contracts, the subject matter of which may be the performance of factual acts, could not have brought about a desired result.

In fact, the model adopted in Poland perpetuates the classification problems regarding the distinction between specific work contract and mandate contract, in the case of which – and it is same under the Swiss law – the division into contracts of result and of due diligence is applied. Furthermore, a narrow subject matter of the mandate contract also creates another problem regarding the separation of a traditional mandate contract, i.e. performance of legal acts, from contracts which are a combination of legal and factual acts. Such situation is unwished for, therefore today there are proponents of the old regulations, modeled on Swiss law, calling for their reenactment.

Summary

Polish codifiers of the interwar period carried out a lot of legal and comparative studies, the findings of which often influenced the regulations adopted. This was also the case with the mandate contract modeled, to a large extent, on the Swiss law, which in turn reflected the influence of the great 19th century codifications, including the French and German civil codes.

The main goal of the Polish mandate contract governing provisions was to eliminate interpretative doubts and the confusion regarding the qualification of legal relationships. However, these problems have not been solved and the role of mandate contract, with a narrow subject matter application, was limited.

Based on the experience gained from application of mandate contract's governing provisions in the Swiss and Polish legal system, the Polish legislator adopted different solutions with regard to the subject matter of the contract. As a matter of fact, the narrow model adopted in the Civil Code while maintaining the reference to proper application of the mandate contract's governing provisions to unregulated service contracts is a factitious measure, and – as it seems today – not suitable to the needs of present day market which is overly dominated by the service sector.

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Celebrity Endorsement in Advertising in The Context of Consumer Protection Law

Weronika WOZNA-BURDZIAK

ORCID 0000-0002-1271-6028
University of Szczecin, Szczecin, Poland
weronika.wozna-burdziak@usz.edu.pl

Abstract

There is a maxim repeated by goods and services providers in Poland which says that „advertising is the leverage of trade". In market economy, new goods and services proliferate causing market expansion and increased competition. In such a challenging environment businesses have to strive to reach the target audient with their products and services. Therefore, advertising is ubiquitous in modern day society, and its volume is increasing dramatically worldwide. Whatever advertising media are used, it is undeniable that endorsement - which uses images or names of public figures or celebrities who command a high degree of trust or recognition to promote a product or service - increases the chance that a potential consumer will purchase the product advertised. Unsurprisingly, increasingly more businesses opt for celebrity endorsement as there is an undeniable appeal in a famous actress lending her image to a face cream or a famous footballer to a sneakers' brand. However, from the perspective of consumer protection law, using celebrity endorsement in advertising is not so indisputable and arbitrary. Consumers are the weaker party of the legal relationship, and they are protected by the law not only the moment they enter into an agreement and after its conclusion, but also prior to that, which is why the use of celebrity endorsement is to some degree restricted.
This paper explores the issue of celebrity endorsement in the context of consumer rights and consumer protection law on the basis of case studies exemplifying the presentation of medicinal products by celebrities or health professionals. The author applied a number of research methods, and focused mostly on the analysis of Polish regulations in the context of the legal doctrine and case law. The research methodology also includes references to consumer protection laws of other countries, an approach that enabled a comprehensive analysis of the subject.

Keywords: Consumer, Advertising, Consumer Protection, Image Advertising.

Introduction

Television, Internet, public space – advertising surrounds us from all sides. For some, it is a way to generate funding for their ventures, whereas for others it is a way to present their products and brand. Interestingly, according to the data collected by the National Broadcasting Council of Poland for 2015, a staggering 24% of all commercials broadcasted in popular tv channels were commercials of drugs and pharmaceuticals (KRRiT report). Moreover, as per the data collected by Starcom, an international media network, the value of the pharmaceutical industry advertising sector in Poland in 2019 was just second to the entire goods and services advertising sector (Starcom report prepared by nowymarketing.pl).

These data vividly demonstrate the huge spending on pharmaceutical advertising and its significance for the entire advertising sector. Multinational pharmaceutical corporations go to great length, just as other businesses, to reach their target groups and increase sales through advertising. In fact, advertising is an important driver of the whole economy. The attractiveness of advertising messages and credibility of celebrity endorsers are the factors that sell or do not sell a product. i.e. determine whether people succumb to advertising or not. It has been proven that the appeal or attractiveness of an advertisement is enhanced if celebrity endorsement is used, in particular if the celebrity or public figure is recognized as a credible person, lending his/her credibility to the brand or product (Mylek, 2015, p. 84).

The aforementioned issue has significant consequences in the legal context in view of the fact that one of the primary tasks of the legislator is to protect the weaker parties of a legal relationship. In the entrepreneur – consumer relationship, the consumer is, undoubtedly, the weaker and more vulnerable party (Judgment of the Supreme Court, III SK 24/14, LEX). Therefore, it is so important for the consumer law to encompass not only the moment of entering into a legal relationship, but also the things that happen prior to that, such as the way goods and services are presented

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in advertisements. And although in Poland there are no major restrictions on using celebrity endorsement for the promotion of general goods and services, such restrictions exist with regard to the marketing and advertising of pharmaceuticals.

Pharmaceutical products, that is prescription drugs and over-the-counter drugs, are a special kind of products, as their consumption directly affects people's health and life. A complete, unregulated freedom in creation of drug commercials would infringe on safety of potential consumers. Definitely, a recipient of commercials has little information about the promoted drug than its producer, and very often is not able to interpret the advertiser's intentions if they are not conveyed clearly enough. Therefore, both the Polish and European legislator have enforced a number of restrictions on endorsement of drugs, i.e. the use of images of some persons, in order to protect consumers against unfair market practices.

The using celebrity images in advertising from the perspective of consumer protection law is very complex, which is why in this paper this issue was explored in the context of pharmaceutical products' advertisements. The paper's purpose was to analyze Polish regulations in this regard in correlation with the doctrine and case law. This research was supplemented by a comparative analysis of equivalent regulations applicable in other countries.

Misleading Advertising

Since this paper intends to explore the relationship between product endorsement advertising and consumer protection law on the example of pharmaceutical ads, the aspect of misleading advertising will also be analyzed in relation to the advertising of drugs. In Poland advertising of medicinal products is primarily regulated by the Act of 6 September 2001 Pharmaceutical Law (Journal of Laws 2020, item 944, as amended (PhL)). The Polish legislator divided medicinal product advertising into two categories – advertising of medicinal products addressed to the general public (advertising of over-the-counter drugs) and advertising of medicinal products addressed to professionals, that is persons qualified to prescribe them or to persons trading in them (mostly prescription drugs). Such division stems from the EU regulations and is the result of implementing the Directive 2001/83/EC of 16 November 2001 on the Community Code relating to medicinal products for human use (OJ L 311, 28.11.2001, p. 67–128, to date). The advertising of drugs has been similarly regulated in Australia, where it is also prohibited to advertise prescription drugs to the general public (Doran, 2013, p. 24). In contrast, in the United States, advertising of prescription drugs can also be targeted at the general public (information retrieved from the U.S. Food and Drug Administration official website, Parekh, Shrank, 2018, Makowska, 2016, p. 156).

In the context of consumer law, advertising of drugs addressed to the general public are more important as they affect consumers directly and impact their purchase decisions.

Misleading advertising may also be involved in celebrity endorsement advertising. This is why first the author shall explain how "misleading advertising" is understood in the general context.

Advertising of medicinal products, just as all other types of advertising, may not be misleading as one of the basic consumers' rights is right to (truthful) information, which was also emphasized by J.F. Kennedy's speech on 15 March 1962. Advertising may not convey false, misleading or deceptive information about the product and its features or effects (Nowinska, 2012, LEX). According to the Polish case law and legal doctrine, an instance of misleading advertising (alternately, false advertising) occurs even if the purchase agreement is not concluded. A consumer may not buy the drug advertised, but it is sufficient that the advertising generates false beliefs about the product in an individual (Judgment of the Supreme Administrative Court, NSA II GSK 962/08, Kondrat, 2016, LEX, commentary to art. 52 PhL).

The misleading of consumers by drug advertising was regulated, e.g. in Great Britain (Human Medicines Regulations 2012 "the Regulations" – SI 2012/1916) and Germany (Gesetz über die Werbung auf dem Gebiete des Heilwesens (Heilmittelwerbegesetz - HWG). It is worth adding that according to the Polish law, misleading or deceiving of a consumer also constitutes an act of unfair competition, and is thus subject to the general clause laid down in the Act of 16 April 1993 on combating unfair competition (Journal of Laws 2019, item 1010, as amended), (Judgment of the Administrative Court, SA I ACa 149/05).

It is rather obvious that "misleading" should be understood as conveying false information to consumers. However, conveying insufficient or incomplete information may also create false beliefs in the ads' recipients, and thus be misleading or deceptive. This means that information does not necessarily has to be (objectively) false to judge advertising as misleading (Judgment of the Supreme Administrative Court, NSA II GSK 20148/17, Judgment of the Supreme Administrative Court, NSA II GSK 2466/15). For example, a research conducted in the United States research on pharmaceutical ads showed that many of them not contain false information, but rather provide incomplete information on the side-effects or risks involved in their use (Faerber, Kreling, 2014). Certainly, the goal of

advertising of medicinal products is to entice consumers to buy a given product, and thus increasing its sales, yet one of the court judgments rightly emphasized that advertising must comply with the law and, most importantly, may not mislead consumers (Judgment of the Provincial Administrative Court Judgment, WSA VII SA/Wa 556/08).

Celebrity Endorsement and Consumer Protection

Endorsing products by famous people has become a very popular form of advertising and statistical data show that approximately in every 4th advert a celebrity is involved (Knoll, Matthes, 2016, p. 55). Research was conducted in Japan on response to drug advertisements endorsed by famous persons. The findings show that there is a correlation between who endorses the product and how the brand and the product are received by consumers (Morimoto, 2020). It should not come across as a surprise that consumers identify the brand/ product advertised with the endorser (Kozlowska, 2005, p.1).

Nonetheless, as it comes to the advertising of medicinal products which are not an ordinary type of goods, the issue of who endorses them requires special regulation. Under Polish legislation, medicinal products cannot be advertised by any public persona, scientists, medical or pharmaceutical professionals, or any persons that suggest they might have such qualifications (art. 55 s.1(1) PhL). Certainly, doctors' endorsement of medicinal products would be beneficial for pharmaceutical businesses as doctors are perceived by consumers as experts, lending credibility to the medicinal products endorsed (Grzegorczyk, 2012, p. 150). However, one must bear in mind that a recipient of drug adverts is a special kind of consumer, one that needs special protection ensured by, i.a., endorsement restrictions (Ganczar, Szewczak, 2017).

The said prohibition to endorse medicinal products is very often breached in Poland, which is reflected in the decisions taken by the Chief Pharmaceutical Inspectorate (CPI), which in Poland is the supervisory authority responsible for the monitoring of medicinal product advertising and their compliance with the law (art. 62 s.1 PhL).

The Polish legislator highlights that a medical professional is forbidden to appear in commercials or ads. Thus, definitely, a doctor may not endorse any pharmaceutical product. The responsibility for a doctor's appearance in advertising pharmaceuticals rests on the advertiser and the doctor himself. In Poland, any medical professional who endorse pharmaceuticals breach, first of all, the Code of Medical Ethics which states, i.a., that a doctor should not consent to his name and image to be used for commercial purposes. Medical Courts in Poland (which adjudicate issues of medical liability) tend to use, in the first instance, a letter of reprimand (Skrzypczak, 2017, p.227). However, from the perspective of consumer protection, reprimanding the entity responsible for advertising is not sufficient as they should, first of all, put an end to the broadcasting of such commercials. This is what the Chief Pharmaceutical Inspectorate is trying to do whenever a commercial violates applicable provisions of law.

Apart from prohibiting medical professionals to endorse drugs, the law also prohibits endorsing of drugs by persons whose looks or behavior could make the audience think that they have medical qualifications. Very often advert recipients are not able to verify whether a real medical expert or just an actor with a façade of a doctor appears in the commercial. To illustrate that, a commercial was aired that was staged in a pharmacy. One of the actors was looking for some meds, and the other actress, dressed in a white lab jacket was trying to find out what ailment that the guy was suffering from. The Chief Pharmaceutical Inspectorate stated that the visual representation breached the aforementioned prohibition, as the behavior and dress code of the actress plainly suggested pharmaceutical qualifications. However, the advertising entity denied that by emphasizing that not a single word or statement was uttered in the commercial to unanimously imply that the actress is a pharmacist, and that the white lab coat is no more than a piece of outerwear, and not a uniform of a person employed in a pharmacy. Yet, the CPI did not accept this argumentation and highlighted that associations of a pharmacist giving advice on best medication were evoked in the audience, which is in breach with the law. Moreover, the CPI also debunked the advertiser's argument that the lab coat did not suggest that the actress is a pharmacist by stating that her behavior conveyed self-confidence and knowledge of the medication stock as if she was working in the pharmacy. In conclusion, such visual deception makes the consumer mistake the actress for a pharmacy employee, whereas pursuant to the Polish law only pharmacists and pharmacy technicians are allowed to work in pharmacies (CPI Decision PR.600.28.2017.JD). The logic used by the CPI is sound, as the audience had practically no chance to verify whether the actress starring in the commercial had – or did not have – qualifications required by law to work in a pharmacy, and that the typical white lab coat she was wearing must have been misleading for consumers.

Another commercial showed scenes from a lab, with people dressed in white lab coats in the background. The voice-over said "in our lab we have found a solution to (…)". In the opinion of the CPI, such portrayal violates the statutory prohibition of employing images suggesting the actor is a medical professional. The CPI argued that portraying people dressed in white lab coats typical of scientists conveys to consumers a clear message that the persons shown have medical or similar qualifications as only such qualifications would have made it possible to discover "a drug". The opposing party argued that the commercial was not in breach of the law since the actors dressed in white coats did

not present a drug per se, and that there was no overt mention of their education in the commercial. The latter arguments could not be rebuked, but the CPI responded that it was the combination of the visual layer with the voice-over that suggested to the audience that the persons presented were the inventors of the advertised drug (CPI Decision GIF-P-R-450/9-4/ZW/11).

Yet another commercial showed a man dressed in white lab coat with a stethoscope hanging around his neck. There can be no doubts that such a commercial violates the said prohibition. The CPI issued an order to immediately stop the broadcasting of this commercial (CPI Decision GIF-P-R-450/72-5/JD/11)/

The above examples refer to tv commercials, i.e. audiovisual advertising, which does not imply that the prohibition may be breached in other forms of advertising, such as radio spots or print ads (Szafranska, Szyszka, 2012, p. 81-93).

It should be emphasized that the cases analyzed above do not only breach statutory regulations on the prohibition of drug endorsement in advertising, but they also affect the audience in the way discussed before – they mislead consumers (Ignatowicz, 2016, LEX). If in a commercial an actor is made to look/ behave in a way that suggests him to be a medical professional, although this is not true, then definitely it is a case of misleading consumers. In the case of drug advertising, the misleading does not have to be in the form of false information about the medicinal product's features, but also refers to the visual deception which makes consumers mistake actors for medical professionals.

Aside from the ban on drug endorsement by medical professionals or persons suggested to be healthcare professionals, the legislator also imposed a ban on drug advertising by persons known to the general public. In the Polish legislation a word for "a person known to the wide public" is lacking, therefore frequently the English term "celebrity" is used, which denotes highly-visible entertainment and media figures. Appearance of a celebrity in a drug commercial affects the consumer almost in the same way as the appearance of a medical professional – the advertised content becomes more attractive and more credible to the consumer.

So far, the author has discussed the ban on presentation of medicinal products by scientists, medical professionals and celebrities, and persons standing in for them in terms of directly using the "image", but such an image can also be used indirectly, as stated in art. 55 s.1(2) PhL. The provision lays down that the drug advertising should not involve any reference to recommendations by celebrities, scientists, healthcare professionals or persons suggested to be healthcare professionals. It is worth illustrating what is meant by "referring to" expert recommendation with a real life example. There was a case of a poster advert which, besides a graphic presentation of the medicinal product, included also a caption saying that the drug is recommended in certain ailments while patients wait for a consultation with a physician. This utterance was signed by a name of a well-known medical expert, citing his degrees and position. Upon analyzing the said content, the CPI pointed out that citing a healthcare professional on a drug advertising poster makes people respond to the utterance quoted as if it were a recommendation to use the said drug. The advertising party argued that the graphic layout which visually separated the citation from the rest of the poster does not provide sufficient grounds to believe that the citation is a recommendation within the meaning of the statutory prohibition. Moreover, the advertiser highlighted that the utterance quoted was not made by the person whose name was contained in it, which should be treated as an argument that the said advert did not violate the prohibition to refer to recommendations of medical professionals. Notwithstanding this, the CPI rebuffed these arguments as well, insisting that the visual "separation" did not really disconnect the citation from the content of the poster. Furthermore, the fact that the quotation was not made by the undersigned person in fact means just the opposite, i.e. is a proof of violation, as an average consumer has no way of verifying whether the undersigned person authored the words quoted or not. The average consumer, as a recipient of advertising, has the right to assume that the quotation posted is a recommendation to use the product advertised, and also, that the recommendation comes from a renown medical expert (CPI Decision GIF-P-R-450/25-6/JD/15). Lastly, it should be underlined that signing the statement quoted with a name of a person who has not authored it is definitely a case of consumer misleading.

Summary

It has been emphasized in this paper that medicinal products constitute a special type of products and therefore, for the sake of consumer safety, special restrictions are needed to regulate how they are presented in advertising. Undoubtedly, advertising also has positive effects for consumers such as allowing them to get to know new products and services, and enabling them to choose what is best for them. However, it is very important for the consumer to be able to make informed decisions, dictated by their actual needs, in particular when purchasing a medicinal product. To ensure that, advertising of medicinal products must be devoid of endorsement by celebrities and public figures since such endorsement, i.e. the use of their image, name and likeness or recommendations distort the reception of information conveyed in commercials and advertisements.

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Polish Investment Zone - Legal Assessment of The Two Years of Operation of The Mechanism of Public Aid Given to Entrepreneurs

Dominika WROBLEWSKA

ORCID 0000-0001-6805-0547
University of Szczecin, Szczecin, Poland, dominika.wroblewska@usz.edu.pl

Abstract

The Polish Investment Zone (PIZ), which in 2018 replaced Special Economic Zones (SEZ) operating from 1994, is a new mechanism of providing support to entrepreneurs in taking up new investment. The support is given in the form of income tax exemption and falls under regional aid consistent with the European Union's community law. Public aid under PIZ is not limited to a specific location, as is the case with SEZs, but covers the entire Poland with its scope. The study compares PIZ and SEZs in terms of the aid's reach, criteria for obtaining support and also goals that both support instruments were supposed to serve. The main aim of this paper is to verify whether principles of public aid granted under PIZ are simpler and quicker, and whether tax advantages are greater than in the case of SEZs. Moreover, the study aims to assess the effects of PIZ's functioning from the perspective of two years of operation and to verify whether PIZ is a tool supporting Poland's uniform and sustainable development.

Various different research methods are employed in the study: examination of applicable laws, analysis, and legal comparison. It will be reasonable to base the methodology of the conducted research not only on the analysis of the Polish and EU legal order, but also on the views of legal scholars and commentators and data published by the Ministry of Development, Labor and Technology.

Keywords: support system for new investments, decision on support, Polish Investment Zone, Special Economic Zones

Introduction

An entrepreneur is a natural person, a legal person or an organisational unit not being a legal person that is granted legal capacity by a separate act of law, conducting economic activity**.** The new mechanism of providing support to entrepreneurs in taking up new investments on the territory of Poland which involves granting an income tax exemption was introduced on the basis of the Act of 10 May 2018 on supporting new investment (Dz. U. (Journal of Laws) item 1162 as amended (hereinafter: SNI)). In practice, exercising this support was only possible from 5 September 2018 after entry into force of implementing rules for the SNI Act, that is Regulation of the Council of Ministers of 28 August 2018 on public aid granted to certain entrepreneurs for implementing new investments (Dz. U. (Journal of Laws) item 1713 (hereinafter: Regulation)).

The support is granted on the basis of a Decision on Support (DoS) in the form of exemption from income tax, under the terms and conditions specified accordingly in the provisions of the act of 26 July 1991 on personal income tax (consolidated text: Dz. U. (Journal of Laws) of 2020 item 1426 as amended) or in provisions of the Act of 15 February 1992 on corporate income tax (consolidated text: Dz. U. (Journal of Laws) of 2020 item 1406 as amended). Exemption form income tax is a regional aid, which is why the aid given to entrepreneurs must be compliant with Commission Regulation (EU) No 651/2014 (GBER Regulation), which is one of legal acts that regulate public aid at the Union level.

Thanks to the SNI Act, entrepreneurs who meet quantitative criteria (relating to the sum of investment outlays) and qualitative criteria (relating to the manner of taking up activities for sustainable social and economic development) may enjoy a tax exemption regardless of where the investment is located. PIZ replaced the system of tax exemptions functioning in Poland for more than 20 years under the Act of 20 October 1994 on special economic zones (consolidated text: Dz. U. (Journal of Laws) of 2020 item 1670 as amended) (SEZ Act).

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Due to the fact that the new mechanism of public aid has been functioning for two years now, it is possible to assess whether it has met the adopted goals and whether this has translated into entrepreneurs' interest and investments under PIZ.

Reasons for introducing the Polish Investment Zone

In the legal approach, a special economic zone is an enclave in the territory of a state where regulations governing domestic economic activity do not apply. Is a specific legal and political construct created point-by-point on the basis of adopted regulations, establishing more favourable conditions for development of companies than those applicable outside the zone (Bazydło, Smętkowski 2000, p. 17). According to the position of another representative of legal scholarship, Waligórski (1997, p. 15), norms applicable within special economic zones are to secure, that is enable and facilitate, implementation of the country's economic tasks and goals.

The promotion of special economic zones is an attempt to deal with infrastructural deficiencies, procedural complexities, bureaucratic hassles and barriers raised by monetary, trade, fiscal, taxation, tariff and labour policies. Since country-wide development of infrastructure is expensive and implementation of structural reforms would require time, due to given socio-economic and political institutions, the establishment of industrial enclaves (SEZs) is seen as an important strategic tool for expediting the process of industrialisation in these countries. (Aggarwal 2006, p. 4533)

SEZs cover 14 administratively dedicated zones with the surface area as of 230 km^2, that is 0.07% of Poland's area, as at 31 December 2019 (Sejm Paper no. 397). Until PIZ was introduced, entrepreneurs could obtain preferential conditions for conducting economic entity including, i.a. a tax exemption, only for economic activity carried out in the territory of SEZs. Availability of a tax exemption under SEZs was territorially limited, which is why the most essential change introduced by the SNI Act was to remove this restriction. Carrying out a new investment on the territory of the entire Poland, both on private and public grounds, allows the use of public aid. The requirements for obtaining support depend on the size of the company, the sector in which the investment is carried out and also unemployment rates in a given district. The company size is established pursuant to the GBER Regulation taking into account the average annual employment and annual turnover or annual balance sheet total.

It needs to be remembered that the SEZ Act was introduced in a different social and economic reality. The choice of the model of a special economic zone would depend on the degree of the country's economic development and also on the goals that this instrument of economic policy is to serve. After 1989 at the beginning of the period of political transformation, the greatest barrier to the development of Polish economy was lack of investment outlays sufficient for necessary structural transformations in the economy. Strong competition in this period from companies with foreign capital caused the collapse of many Polish companies and in effect numerous job losses (Lichota 2016, p.101). SEZs and their appropriate location were to be the tool for increasing investment outlays in the economy (Miłaszewicz 2011, pp. 7-8). One of the fundamental reasons for introducing preferential conditions for carrying out economic activity under SEZs was a wish to bind the investor with the region and to incorporate new economic undertakings into this region's economy (Typa 2003, p. 83).

The main aim of creating SEZs was to create jobs in regions marked with high structural unemployment (and thus reducing budget expenditure for unemployment benefits) by directing new investments there thanks to the application of a portfolio of investment incentives. The establishment of SEZs was to result in breaking industry monoculture and diversification of production structure in individual regions, in generating GDP growth in them and in supporting local technical infrastructure (Ministry of Economy and Labour, 2005).

As pointed out by Warżała (2013, p. 3), from the macroeconomic point of view, SEZs did not reduce disproportions in regional development of the country, but reinforced them. Regions with a strong position in the country attracted most investments which were willingly located in SEZs operating there.

This is why reasons for establishing preferential conditions for conducting economic activity in the territory of the entire Poland (the so-called establishment of a special economic zone throughout Poland) were mainly economic and resulted from the need to adjust the principles and mode of supporting new investments to the changing social and economic realities. The legislator pointed to the need for lasting economic development and territorially sustainable development. Due to this fact, the SNI Act emphasized the development of all territories by reinforcing smart specializations of each region, removing barriers and including in the developmental processes regions which face restructuring- and adaptation-related difficulties, mid-size towns which are losing social and economic functions and other towns and villages which are located in the territories of districts where unemployment exceeds 160% of the national average (Sejm Paper no. 2307). Expansion of the scope of support for implementation of new investments

by means of the SNI Act deserves credit, since SEZs deepened economic and social disproportions among Poland's regions.

Rules for obtaining public aid under the Polish Investment Zone

According to the SNI Act, DoS may be issued in relation to the implementation of a new investment. A new investment means investment in tangible and/or intangible assets relating to i.a.:

- the setting-up of a new establishment,
- the extension of the capacity of an existing establishment
- the diversification of the output of an establishment into products not previously produced in the establishment, or
- a fundamental change in the overall production process of an existing establishment, excluding establishments for which insolvency proceedings have been initiated or a request to the court has been made to declare the establishment insolvent.

The Polish legislator, pursuant to the Act of 19 June 2020 on subsidising interest of bank credit granted to entrepreneurs affected by COVID-19 and on summary proceedings on approving the composition due to the occurrence of COVID-19 (Dz. U. (Journal of Laws) item 1086), expanded the above catalogue with another type of new investment - acquisition of assets of an insolvent company. Such a type of initial investment was taken into account in the SEZ Act and in the GBER Regulation as investment which may be covered with support. Therefore, the SNI Act was more restrictive than national regulations applicable in SEZs and Union's regulations alike. As a result of the changes, from 24 June 2020 onwards a new investment is considered to include also an acquisition of assets belonging to an establishment that has closed or would have closed had it not been purchased (where the assets are bought by an investor unrelated to the seller and sole acquisition of the shares of an undertaking is excluded).

Unification of the definition of a "new investment" with the definition of an "initial investment" of the GBER Regulation deserves credit since it enables managing the property of companies which are in a difficult situation. This is a particularly important aspect due to difficult economic conditions caused by the COVID-19 pandemic. This is, however, the only change in the SNI Act aimed at counteracting negative economic impact of COVID-19 pandemic.

Public aid in the form of exemption from taxation may be granted solely to those entrepreneurs who conduct their economic activity on the basis of market rules, that is those who perform economically substantiated acts in their activity. This means that the Polish legislator excludes granting aid to entrepreneurs who avoid or evade taxes. It is a specific way to combat abuses and aggressive tax optimisation and to improve the efficiency of combating tax fraud and taxation evasion that fall under activity undertaken on the European Union forum (Communication from the Commission to the European parliament and the Council, COM (2012) 722).

A Decision on Support, on the basis of which public aid is granted, may be issued for new investments from the sector of modern business services (e.g. call center, accounting and book-keeping services, data processing, IT, financial auditing, research, development works, architectural and engineering services, environmental consulting, head offices and management consulting), research and development (R&D) and the industry sector. Under PIZ, similar to the case of public aid granted under SEZs, there are strictly defined areas of economic activity that do not qualify for support. According to the Regulation, DoS is not granted for economic activity involving e.g. the manufacture of explosives, the manufacture of tobacco products, production, bottling and processing of alcoholic beverages, operation of a gambling establishment, sewage disposal and treatment, construction, trade and hospitality. Moreover, pursuant to the GBER Regulation aid cannot be granted for a new investment in i.e. the steel and iron sector, the coal sector, the shipbuilding sector or the synthetic fibres sector, the transport sector, energy generation, distribution and infrastructure, and financial and insurance activities.

A Decision on Support is given for the period of 10 years when the new investment is located in a region of maximum aid intensity of 10%, 20% or 25%, 12 years if the maximum intensity is 35% or 15 years when the intensity is 50%. What is essential, as in the case of SEZs, an entrepreneur seeking public aid under PIZ cannot launch an investment project before receiving a DoS. A basis for exercising public aid granted under the SEZ Act was a permit to conduct economic activity on the territory of a given zone. Entrepreneurs who obtained public aid under the Special Economic Zones (SEZs) may enjoy it till the end of 2026. This means that the period of exemption from income tax for entrepreneurs who obtained the permit in 2018 is 8.5 years.

In order for the income to be exempt from taxation on the basis of a DoS the following requirements must be met jointly: (i) the economic activity is carried out on the territory indicated in the DoS, and (ii) the income was obtained from the economic activity indicated in the DoS by means of the Polish Classification of Goods and Services

(PKWiU) - up to the available limit resulting from this DoS. Because this aid is granted in the form of an exemption from income tax, an entrepreneur will truly enjoy it if the activity conducted on the basis of the DoS brings profit and income tax is due.

The way of calculating the tax relief under PIZ was the same as in the case of SEZs. This is why entrepreneurs may enjoy the existing abundant judicial decisions from the almost twenty-year long period of operation of SEZs. The limit for the tax exemption is calculated as a product of eligible costs and aid intensity for a given area established on the basis of a regional aid map for 2014-2020 (Regulation of the Council of Ministers of 30 June 2014). The intensity means the percentage of costs eligible for aid. Additionally, maximum intensity of regional investment aid is increased by 20 percentage points in the case of micro- and small enterprises, and in the case of medium-sized enterprises by 10 percentage points.

Eligible costs of a new investment include, for example, (i) two-year employment costs, or (ii) costs of acquisition of land, leasing land or buildings, acquisition, production, extension or modernisation of fixed assets (e.g. machines and devices) and also costs of acquisition of intangible assets (e.g. know-how, licences). Most often entrepreneurs who carry out investment from the modern business services sector exercise the calculation of the exemption limit on the basis of two-year costs of employment of newly taken-on staff. Projects from the services sector do not need significant investment outlays in the form e.g. purchase of land, machinery or devices.

The table below refers to the quantitative criterion, i.e. it indicates a minimum value of eligible costs that need to be borne by an entrepreneur who applies for public aid in the form of a DoS. The sum of investment expenditure depends on the company size or object of investment, but also the unemployment rate in the district relevant for the place of implementation of a new investment.

Table 1: Minimum eligible costs [in PLN] PLN 1 = EUR 0.22

Unemployment rate in the investment's district		**Minimum eligible costs**			
as % of national average*	(in %)	Large enterprise	Medium-sized enterprise	Small enterprise investment in the scope of: modern businesses services, R&D	Micro enterprise
≤60% national average	0/-3.66	100 million	20 million	5 million	2 million
from 60% up to average	3.67/-6.1	80 million	16 million	4 million	1.6 million
above average up to 130%	6.11/-7.93	60 million	12 million	3 million	1.2 million
130%-160%	7.94/-9.76	40 million	8 million	2 million	800 thousand
160%-200%	9.77/-12.2	20 million	4 million	1 million	400 thousand
200%-250%	12.21/-15.25	15 million	3 million	750 thousand	300 thousand
>250%	from 15.26.	10 million	2 million	500 thousand	200 thousand

** The average unemployment rate nationwide and in the territory of districts is established on the basis of the annual Notice of the President of Statistics Poland and as at 30 June 2020 it was 6.1% (GUS, 2020b).*

As demonstrated in the table, the smaller the enterprise and the higher the unemployment rate in a given district, the higher the value of required investment outlays. The lowest investment thresholds, typical to districts with an unemployment rate higher than 250% of the national average, apply also in medium-sized towns which are losing social and economic functions (the Regulation enumerated them) and in municipalities that neighbour such towns.

Making the amount of investment outlays dependent on the company size has significantly facilitated carrying out investments and may be key from the perspective of obtaining a DoS especially by micro, small and medium-sized enterprises (MSE).

The quantitative criterion for obtaining public aid for investment implemented in the area covered with the SEZ status was minimum EUR 100,000 (equivalent to PLN 417,010 at the exchange rate for 2 January 2018) regardless of the company size. When a location outside a SEZ was chosen, entrepreneurs could request that the area be included in the SEZ. This required between PLN 17 to 350 million worth of investment outlays or the creation of 50-500 new jobs, and the procedure itself of expanding the SEZ territory was time-consuming and complicated. In turn, a DoS is issued within 30 days from submitting an application.

When comparing outlays-wise an investment of a large enterprise from the industry sector on the territory of a SEZ with an investment under a new support instrument in a district with the unemployment rate equal to or lower than the national average, large enterprises must bear eligible costs of PLN 100 million, that is more than 220 times more than under SEZs. From this perspective it seems that the criteria for the size of investment outlays with regard to large enterprises were tightened under PIZ. However, these changes should not limit investment of large enterprises significantly, because when planning a new investment, they can choose an adequate location suitable for the value of the planned investment.

In the case of investment in the modern business services sector carried out in a district where the unemployment rate is more than 250% of the national average, PIZ obliges the entrepreneur to outlay PLN 500 thousand for the investment. In turn, where it is necessary to conduct the procedure of expanding the PIZ area he would have to invest PLN 20 million or create 150 jobs and maintain them for 5 years. This example shows that new rules for support are less restrictive than in the case of investment carried out outside the SEZs.

As has been pointed out, entrepreneurs interested in obtaining a DoS are also obliged to meet qualitative criteria along with quantitative ones. When implementing a new investment in areas with intensity of 10%, 20% or 25%, entrepreneurs are obliged to meet at least 6 criteria presented in the table below. The minimum of investment in the region with public aid intensity of 35% is 5 criteria, and for a 50% intensity - 4 criteria.

Meeting one criterion presented in the table below awards 1 point to the entrepreneur. As a rule, qualitative criteria are similar for investment carried out in the services sector and the industry sector.

Table 2: Comparison of qualitative criteria for a new investment carried out in the services sector and the industry sector

SERVICES SECTOR	INDUSTRY SECTOR
CRITERIA OF ECONOMIC SUSTAINABLE DEVELOPMENT	
Investment in projects supporting industries compliant with the current state development policy (strategic sectors)	
Achieving adequate level of sales outside the territory of Poland (in 2019 - 23.2%)*	
Carrying out research and development activity	
Creating a modern business services centre with a scope reaching outside the territory of Poland	Belonging to a Key National Cluster
Having a SME status	
CRITERIA OF SOCIAL SUSTAINABLE DEVELOPMENT	
Creating highly-paid jobs and offering stable employment	Creating specialised jobs to conduct economic activity falling under the new investment and offering stable employment
Conducting economic activity with a low negative environmental impact	
Locating the investment in medium-sized towns which are losing their social and economic functions or in municipalities that border these towns, or in districts where the unemployment rate is at least 160% of the average unemployment rate	
Supporting education and obtaining professional qualifications and cooperation with vocational schools	
Undertaking activity with regard to caring for employees (e.g. providing additional employee benefits in terms of culture and education, sports and recreation, insurance, health care plans; minimum cost of the benefit is PLN 800 gross per employee per year;	

* Intensity of sales outside the territory of Poland, understood as a share of revenue from these sales in net revenues on the sales of company products, goods and materials is equal to at least an average intensity of such sales of non-financial companies in the national economy for a calendar year, established on the basis of a report of Statistics Poland "Financial results of economic actors" (GUS, 2020c).

Qualitative criteria formulated in this way show that the aim of introducing PIZ is to create new stable highly-paid jobs for qualified employees, to develop inter-community delivery to Member States as well as export to non-EU countries, to mitigate the growth of differences in the development of regions, to develop innovative technologies and also to enhance competitiveness of goods produced in Poland and Polish services, which translates directly into Poland's economic development.

It seems that compared to investment carried out under SEZs entrepreneurs planning to obtain a DoS have more obligations, because they must additionally meet the qualitative criterion. Whereas a detailed analysis of the manner of verification of meeting this criterion leads to conclusions that entrepreneurs will not have trouble obtaining 4 to 6 points from the above table.

As much as in the case of existing SEZs it was essential primarily to create a great number of new jobs, with PIZ the quality of the created jobs was key in obtaining support. This change results most probably from the difference in the rate of registered unemployment noted in Poland. In 1994 the average annual level of unemployment was 16.49%, in 1999 - 11.99%, in 2004 - 19.51%, in 2009 - 10.97%, in 2014 - 12.33%, whereas in 2016 this value dropped to 8.94% and in 2018 to 6.08% (GUS, 2020a).

Impact of introduction of a new system of supporting entrepreneurs on the level of investment

As results from the data made available by the Ministry of Development, Labour and Technology (2020), in the two years of PIZ's functioning 580 DoSs have been issued for 556 entrepreneurs, and the joint declared sum of investment was PLN 25.2 billion (as at July 2020).

The first DoS was issued in September 2018, that is as early as 2 weeks after entry into force of implementing rules to the SNI Act (Pomorska Specjalna Strefa Ekonomiczna, 2018). In the period from September 2018 to the end of that year, a total of DoSs issued was 83 and the total number of issued permits, that is declared investment under SEZ, was 264.

The number of investments in 2017 (last full year of SEZs' functioning before the changes) and in 2019 (the first full year of PIZ's functioning) was similar, where 348 permits were issued in 2017 and 358 DoSs were issued in 2019. However, their total declared value was significantly higher for SEZs in 2017 (PLN 19,1 billion) than for PIZ in 2019 (PLN 15 billion). In my opinion, uncertainty as to what the conditions for obtaining support under new rules will be like has encouraged entrepreneurs recently to invest in SEZs and to obtain public aid on old, familiar terms. The reason for a decline in the value of investment may be also sought in unclear regulations on accounting for the granted tax exemption for a new investment involving extension of the capacity of an existing establishment (Sienkiewicz, Zwolenik, 2020, pp. 19-25). Certainly, explanation of doubts about using the exemption would make PIZ more attractive to entrepreneurs.

In 2019 as much as 74% of the total number of declared investments in PIZ were from entrepreneurs with Polish capital. Whereas from the perspective of the value of declared investments, Polish entrepreneurs carry out smaller investments compared to investors with foreign capital and in 2019 they declared 44% of the total value of new investments. In 2019, 54% investments were located outside the territory of existing SEZs, and this rate grew to 71% by the end of July in an annual average approach. This demonstrates that introducing the SNI Act and extending the scope of the support was necessary and PIZ is a tool which supports Poland's even and sustainable territorial development.

From January to July 2020 139 DoSs were issued for new investments with the value of PLN 4 billion. The situation associated with the COVID-19 pandemic, which brought critical outcomes for the entire world, has certainly contributed to the absence of an increase in the number of investments and a significant drop in their value compared to 2019. Restrictions on economic activity resulting from the epidemic threat are observed in a majority of countries throughout the world. Due to the dynamic situation, it is difficult to specify at the moment the precise scale of the phenomenon. Nevertheless, the data available for the date of preparation of this study points to a significant deterioration of the economic situation (GUS, 2020d).

PIZ enables the development of SMEs, which seems particularly essential for the fact that their contribution to providing new jobs which are created in the PIZ is important and amounts to 79% of new jobs created in the PIZ.

Conclusions

The support system under the PIZ is an important and effective tool encouraging entrepreneurs to invest all over the country. The expansion of territories on which enterprises may apply for public aid leads to an interest in new locations that are outside the existing SEZ territories. Detachment of the possibility of supporting entrepreneurs by income tax exemptions from a specific area as well as unification and acceleration of the procedure for obtaining public aid are unquestionable values which encourage entrepreneurs to make further investments in Poland and also attract new foreign investors. New rules of support have greatly increased attractiveness of districts with the greatest unemployment and towns which are losing their social and economic functions, thus giving them an opportunity for development. In future it will be possible to even out significant economic and social disproportions between Polish regions thanks to the granting of public aid (which so far has only been available under SEZs) on terms that favour less developed regions. Introduction of minimum thresholds of investment outlays dependent of the size of the enterprise and unemployment in the district where the investment is to be located, and also increasing the maximum regional aid intensity for SMEs is a change that mitigates the advantage of foreign companies, which have a much greater capital at their disposal than smaller Polish companies. The changes have resulted in the increase of the investment rate among SMEs.

The change in the social and economic realities required adaptation of a portfolio of tax incentives and the rules introduced by the SNI Act fulfilled their task in this respect.

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Risk and Vulnerability Assessment of e-Government Framework using Blockchain Technology

Haitham ASSIRI
University of Technology Sydney, Sydney, Australia and Jazan University, Jazan, Saudi Arabia,
haitham.assiri@student.uts.edu.au

Priyadarsi NANDA
University of Technology Sydney, Sydney, Australia,
priyadarsi.nanda@uts.edu.au

Manoranjan MOHANTY
University of Technology Sydney, Sydney, Australia,
manoranjan.mohanty@uts.edu.au

Abstract

e-Government system leverages Information and Communication Technology (ICT) to transform the relationship between government bodies and citizens, businesses and other government ministries, department, and agencies. The primary aim is to make government services more seamless, efficient and timely for every citizen and organisation. However, e-Government systems are now faced with security threats and cyberattacks, and these challenges have raised concerns about users' privacy as well as the confidentiality and integrity of user data. Therefore, this paper assesses the degree of risk and vulnerability associated with websites used for e-Government function. We consider one such website, the Saudi's e-government website, Yesser by using three penetration test tools namely Zap, Rapid7, and Nessus. The results show that Yesser website does not have critical vulnerabilities but, has severe and medium-level vulnerabilities. The paper proposes a new framework which can integrate blockchain based scheme into Saudi e-Government system. The framework represents a hierarchical model and involves use of blockchain between De Militarized Zone (DMZ) and Secured Intranet zone.

Keywords: Blockchain, e-Government, Cyber threats, Penetration Test Tools.

Introduction

Technology has shaped the world and turned the universe into a global village. The developments in information technology cut across both public and private sectors. Basically, the integration of IT into business to provide public services online as well as increase government's efficiency is called e-Government. However, as promising and great as e-Government is, it faces the challenge of cyber threats. According to Rehman *et al.* (2016), concerns about cyberthreats have affected user acceptability of e-government systems. Users perceive that hackers or third parties may have access to confidential information like credit card details.

Meanwhile, it is government's responsibility to protect user data and strengthen the e-Government system against any form of security threat. Blockchain technology is a good option to secure e-Government. Blockchain technology, the concept behind cryptocurrencies such as Bitcoin, Ethereum etc., can be used for the benefit of the public sector. It can make government operations and services more secured, more efficient and guarantee improved public service delivery. Ultimately, there will be an increase in public trust. Blockchain is a distributed ledger shared among parties participating in a network. The majority of the participants must agree before a transaction can be approved.

Ølnes and Jansen (2017) noted that blockchain technology can be easily mastered, adopted and adapted by a large number of people. The study revealed that the blockchain technology is now an emerging technology for new innovations and development not only in the financial systems but also in the government agencies and organizations.

In this study, we take a closer look at identifying the vulnerabilities and risks associated with present e-Government systems around the world. As a matter of example case study, we conduct our study on the e-Government system created and implemented by the government of Saudi Arabia. In Saudi Arabia, the government has embraced a new

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technological era in which technology is utilised as an instrument to make communication, government services, and connectivity more seamless. Saudi's e-Government system, Yesser, is pivotal to the realization of the Saudi Vision 2030. As a result, it is important that Yesser website has adequate security. This paper aims to determine the level of security of Yesser website by utilizing three penetration test tools to scan the website. The tools include Zap, Rapid7 and Nessus. Based on the analysis, this paper proposes a new framework with the use of blockchain into **Yesser.** The framework represents a hierarchical model and involves use of blockchain between De Militarized Zone (DMZ) and Secured Intranet zone.

The specific objectives of this paper include the following:

a. To determine the degree of vulnerability of e-government services to breach of privacy, trust, confidentiality and security.
b. To determine the degree of vulnerability of Saudi e-government system (Yesser) to cyberattacks.
c. To propose a new framework that leverages blockchain to secure Saudi e-Government system.

The structure of the paper is as follows: Section II presents a review of the existing literature. In Section III, the methods used in the study are discussed. Section IV presents the results and discussion. Finally, Section V concludes the paper while setting the stage for further research works.

Literature Review

Vulnerability of e-Government Services

According to AlGarni (2015), hacking, terrorism and software error constitute the major types of vulnerabilities of Saudi e-government systems. On the part of the government and employees dealing with e-government services, there are issues like lack of professionalism and accountability, poor IT infrastructure, lack of awareness of security perspectives at customer level, and inadequate laws and policies guiding e-Government services.

Choejey *et al.,* (2015) noted that the lack of or limited use of a standard web security policy and risk management practices have led to cybersecurity threats like malware, phishing scams and hacking in Bhutan. Alsmadi and Abu-Shanab (2016) used Rapid7 security and penetration testing tools to explore the vulnerabilities of major e-government websites in Jordan. The outcomes of the tests carried out indicated that most of the websites are prone to attacks.

Also, having realised that only little efforts were made towards evaluating the security level of Saudi Arabia's e-government websites, Al-Sanea and Al-Daraiseh (2015) assessed 150 websites owned by financial, governmental, academic and commercial organisations. The paper noted that vulnerabilities in e-government websites are caused by wrong configuration, weaknesses in programming, or lack of updates. The result of the assessment revealed that the websites are faced with low, medium and high impact vulnerabilities. For instance, 61% are vulnerable to Clickjacking, 17.5% are vulnerable to SQL injection and 13.5% are vulnerable to Shell injection. Based on the number of vulnerabilities found, a comparison was made between government and commercial websites. The result of this comparison showed that commercial websites are more secure than government websites.

Using tools like Google Speed Insight, Pingdom, Acunetix, and w3c Checker, Elisa (2017) assessed the accessibility, usability, and web security vulnerabilities of seventy-nine (79) selected e-government websites in Tanzania. The outcomes on web security vulnerabilities showed that forty (50.6%) out of the 79 websites assessed have one or more high-severity vulnerability (cross site scripting-XSS or SQL injection) while fifty-one (64.5%) have one or more medium severity vulnerabilities (Denial of Service or Cross site request forgery).

Bissyandé *et al.* (2015) carried out an empirical assessment of e-government websites' security in Burkina Faso. A systematic scanning of the websites for simple and well-known vulnerabilities showed that there are serious security issues calling for urgent attention. For example, it was possible to crawl all information (including hostname and password) from temporary backup files in a government website to read and write directly in the database thereby impersonating the website's administrator.

Murah and Ali (2018) evaluated 16 Libyan e-government websites using a penetration testing framework. Content analysis was also carried out to determine how far the privacy and security policies on the websites have been implemented. The results of the test revealed that nine out of the sixty websites have high to medium vulnerabilities. Most of these vulnerabilities were due to miss-configuration of the systems and outdated software. Only two of the websites have privacy and security policies published on their websites.

Pandya and Patel (2017) explored the relationship between technology in relation to the vulnerability severity and vulnerability type in 26 e-government applications and websites of Gujarat, India. Most of the websites made use of Microsoft technology while some used Apache technology. It was observed that there are more medium to low vulnerabilities in websites using Apache technology compared to those using Microsoft technology. Meanwhile, informational vulnerabilities and validation-type vulnerabilities are higher in Microsoft technology than Apache technology.

Use of Blockchain for e-Government Systems

As noted by Choejey et al., (2015), the existing e-government services are highly centralised making them vulnerable to outside attacks. Due to its reliance on human controls, the likelihood of errors is high. Inside rogue users can compromise the data for selfish purposes. Since blockchain is completely descentralised, it becomes a strong option. Yang *et al.* (2018) proposed a framework of descentralised, privacy preserving and secure e-government system using artificial intelligence and blockchain technology. The paper noted that intrusion detection and blockchain technology can complement each other. Blockchain will ensure security, trust and privacy while intrusion detection will help in detecting anomalies during blockchain transactions.

In their own research, Diallo *et al.* (2018) proposed the use of decentralised autonomous organisation (DAO) and blockchain technology to improve the e-government system. A high-level architectural description of the model was made after which a detailed design was carried out. The design involves user registration, preparation of contract, monitoring contract execution, and auditing. Through this, the researchers were able to demonstrate that a blockchain-based government DAO can allow monitoring and analysis of e-Gov services as well as provide accountability, transparency, better national resource management and immutability.

In another research, Elisa *et al.* (2018) noted that information security and privacy can be further improved by data encryption and distribution over the entire network. A blockchain-based peer to peer exchange and transactions of an e-government system was proposed by the authors as given in Figure 1. In the figure, G2C means Government to Citizens, G2G means Government to Government, while G2B means Government to Business. The figure typically shows how citizens and businesses interact with government services in a blockchain-based e-government system.

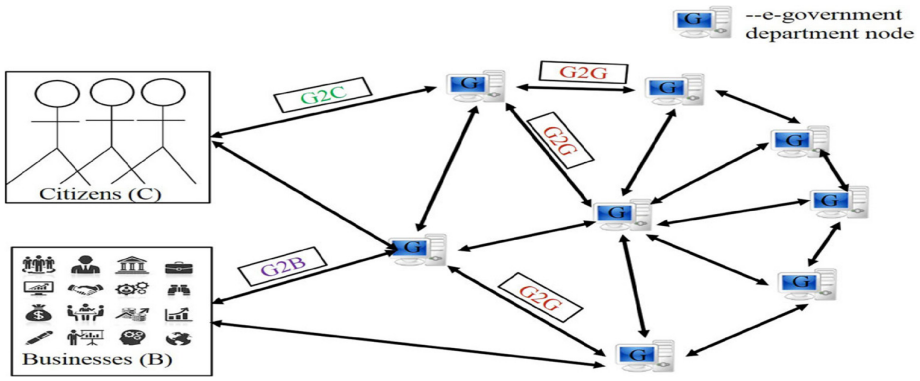

Figure 1: A blockchain-based e-government system (Elisa et al., 2018).

According to Swan (2015), blockchain technology can be used for information exchange and any transaction that occurs in government. The study noted that blockchain can be implemented in asset registry, information exchange, inventory, intangible assets (like votes, patents, health data, reputation, information etc.) and hard assets like physical property. With blockchain, government agencies can keep track of a ledger and the immutable history of transactions. Swan (2015) noted that blockchain applications in government include keeping record of judicial decisions, marital status, digital identity, e-voting, criminal records, tracing money, tax records, passports, business licenses, etc.

Challenges and Difficulties of applying Blockchain to e-Government Systems

Carter and Ubacht (2018) noted that the challenges facing the adoption of blockchain in e-Government include scalability, flexibility and security. From organisational perspective, the challenges relate to acceptability and the necessity of a new governance model. Meanwhile, from environmental perspective, lack of regulations is the main challenge. Carter and Ubacht (2018) also opined that the lack of an overall application platform where the scalability, flexibility, security, reliability, and interoperability of blockchain technology for e-Government system are dealt with

calls for the need to make a proper design solution. In addition, the adoption of blockchain technology will lead to organisational transformation leading to significant changes in process, structure, culture and strategy.

Hou (2017) noted that the application of blockchain in Chinese e-government system offers some benefits like greater accessibility and transparency of government information; improvements in the quality and quantity of government services; and development of information-sharing across different organizations. However, the system still faces the problems of reliability and information security (Hou, 2017). Therefore, it is important to create a general application platform of blockchain technology while also developing management standards to ensure an effective integration of blockchain into e-government.

Analysis Methods

Research Objective 1: PRISMA format for a Systematic Literature Review (SLR)

To determine the degree of vulnerability of e-Government services to breach of privacy, trust, confidentiality and security, this research leverages the outcomes of existing related literature by carrying out a Systematic Literature Review. The SLR follows the PRISMA format (Mohrer, 2009). The steps adopted include Database Search, Exclusion and Inclusion Criteria, Quality Evaluation and Data Analysis. The search sources used are EBSCO Information Sciences (www.ebsco.com/), IEEE Xplore (www.ieexplore.ieee.org/Xplore/), Elsevier ScienceDirect (www.sciencedirect.com/) and Google Scholar (www.scholar.google.com.au/). The search terms entered into the databases include “e-government frameworks”, “effectiveness of e-Government”, “cyber security of e-Government systems”, “blockchain technology” and “blockchain in e-Government”.

Research Objective 2: Use of Penetration Testing tools on Yesser’s website

This research leverages three penetration testing tools to determine the degree of vulnerability of Yesser’s website (www.yesser.gov.sa) to cyber threats and attacks. The three tools used include the following:

1. Rapid7
2. Nessus
3. Zap

These penetration testing tools are used because they make it easy to bypass local network restrictions in order to scan from external IP addresses. They also make it possible to create reliable proof-of-concepts to prove the risk of vulnerabilities. After scanning the Yesser website using each of the three tools the results have been collected and analysed.

Research Objective 3: New e-Government Framework

e-Government systems are vulnerable to external and internal threats and attacks due to various reasons as discussed before in this review. Watching for such attacks and taking appropriate remedial steps is necessary. Based on this, we propose a new framework which integrates blockchain technology into e-Government for security and privacy protection of the system and users. This directly addresses research objective 3. The framework is shown in Figure 2 below.

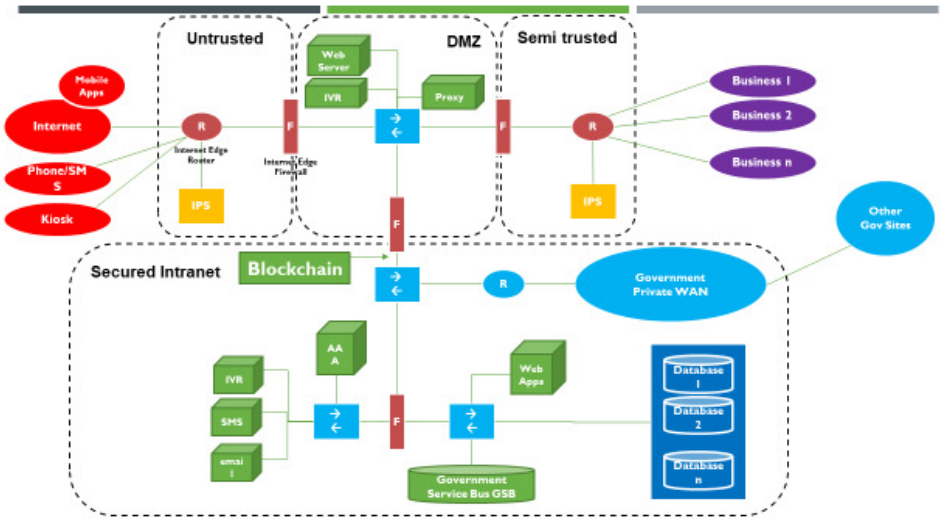

Figure 2: A Proposed Framework with Integrtion of Blockchain for e-Governemment

In Figure 2, "R" represents Blocks, "F" represents router firewall, and "→" represents switches in an enterprise government network. IPS is a standard intrusion prevention system.

Looking at the schematic presented, the left side is termed as untrusted as this is public internet where the end users' system security policy is open and cannot be regulated as per government organisations' mandates. The right-hand side involves connection to different businesses which are required to make e-government system meet users' service request. The zone in-between is DMZ (de militarized zone) acting as a connection termination point for both untrusted and semi-trusted zones. DMZ is secured with three firewalls acting as a perimeter security system and two individual IPS for any malicious traffic. The Blockchain technology is put between DMZ zone and Secured Intranet zone. Adding blockchain between the two secure zones will create a high level of confidentiality, trust, data integrity, privacy, and access control. Blockchain technology protects security and privacy through separate personal keys and public keys for access, distributed blocks of the database, consensus rules for authentication, peer-to-peer endorsements, and decentralisation.

Results and Discussion

In this section we discuss our research findings addressing directly the three research questions mentioned in previous section of this paper. The first research question relates to our finding analysing various works on e-fovernment adopted by different countries. This gives us scopes to move to the next research question in which, we demonstrate how different penetration tools are being used to assess the risks and vulnerabilities in one specific e-government website, Yesser. Based on our findings, we then propose a new e-government framework to address our third research question.

PRISMA format for a Systematic Literature Review

After the search terms were entered into the search sources, 138 papers were identified. Out of these papers, 36 duplicates were found thereby reducing the number of papers to 102. The remaining papers were then screened to determine their relevance based on titles, abstracts and full texts. At the end of this screening, 66 studies were eliminated resulting in 36 articles. These 36 papers are then evaluated for quality and the results give 10 papers that are ultimately included in this SLR as provided in Table 1 below.

Table 1. Summary of Papers on Privacy and Security of e-Governance

Paper	Description	Method	Weakness & Limitations	eGov Security Requirements		
				Confidentiality	Trust/ Privacy	Integrity
Zhao, J. and Zhao, S. (2010)	Carried out an assessment of e-government sites owned by United States to look for the opportunities and the threats the sites offer to the users. Less than half of the sites clearly stated their security measures. 98% of the sites used SSL encryption to secure user accounts.	Information Security Auditing, Computer network security mapping and Web content analysis	Paper identified a lot of security lapses but failed to provide solutions for all.	No	Yes	No
Alshehri, M., and Drew, S. (2010)	The paper identified the challenges and barriers affecting the adoption of e-government by Saudi citizens.	Online Survey and Data Analysis	Paper did not explore the security requirements of eGovt. in detail.	Yes	Yes	No
Bertot, J., *et al.* (2014)	The paper examined the ways current information policy framework failed to address different policy challenges in e-government. The paper then offered recommendations as starting point to revise the policy.	Survey	The paper is limited to the US only	No	Yes	No
Rehman, M., Esichaikul, V., and Kamal, M. (2012)	The study explored the factors that promote end-user adoption of e-government services in Pakistan. The factors revealed revealed by the findings include user data privacy, performance expectancy, awareness, and social influence.	Unified Theory of Acceptance and Use of Technology (UTAUT) model. Online survey. Statistical descriptive analysis	Data sample used is small as the survey had 115 respondents	No	Yes	No
Rodrigues, G., Sarabdeen, J., &Balasubramania	The research identified the factors that influence adoption of e-government services in UAE. Factors identified	UTAUT model, Exploratory factor analysis, Regression analysis,	The study failed to provide the ways the factors	Yes	Yes	Yes

n, S. (2016)	include confidentiality, users' attitude, and trust.	Correlation analysis	identified can be addressed.			
Osman, I. H., Anouze, A. L., Irani, Z., Al-Ayoubi, B., Lee, H., Balcı, A., . . . Weerakkody, V. (2014)	The study proposed a COBRAS (Cost; Opportunity; Benefit; Risk; Analysis for Satisfaction) framework which balances user's risk and cost of engaging with an e-government service with the associated opportunity and benefit.	Proposed COBRAS framework. 79 questionnaires filled by 2785 users of Turkey e-govt portal. Utilized structural equation modeling & confirmatory factor analysis.	The security requirements of e-government were not thoroughly explored.	No	Yes	No
AlKalbani, A., Deng, H., and Kam, B. (2015)	This examined how organisational security culture affects information security compliance in public agencies and organisations e-government development. The study showed that information security awareness, accountability, social pressure and management commitments positively influence information security compliance in public organisations.	Developed an information security model and hierarchical regression analysis	No insight was provided on how to improve accountability, information security awareness and management commitments, which were the factors identified to have positive influence on information security compliance.	Yes	No	Yes
Botchwey, G. (2018)	This paper assessed the level of public trust and confidence in the integrity of data and systems exchanged on Ghana's e-Government platform, with a specific focus on data protection and integrity. The study showed that there is a huge weakness concerning the issues of confidentiality, services' continuous availability and data integrity on e-Government platforms.	Cross sectional survey with respondents drawn from four regions with a high concentration of e-government services.	While the study identified major challenges that need to be addressed like lack of national database to verify information, service exclusion, poor internet etc., it did not provide any solutions.	Yes	Yes	Yes
Riswan, M.M. and	The study examined the cause of low participation in e-	120 respondents selected on	Sample is small; the study noted	No	Yes	No

Rajandran, K.V.R., (2017)	Government in Thanjavur district and found out the causes include level of awareness, acceptance, attitude towards sustainable development and security of e-Government.	the basis of random sampling, regression and correlation analysis	that e-Government web security needs to be improved but did not state the specific improvements to be made and how.			
Haran, M. (2016)	The study identified the relevant stakeholders who are insiders as far as e-Government IT infrastructure is concerned and listed the threats that may be caused by these insiders. The paper then provided ways to mitigate such threats.	Proposed a robust framework mechanism for early detection and mitigation of insider threats.	The paper is limited to insider threats alone	No	Yes	No
Choejey, P., Fung, C. C., Wong, K. W., Murray, D., and Xie, H. (2015)	An assessment of factors affecting the implementation of cybersecurity program in government agencies in Bhutan. The research showed that several organisations are affected by cybersecurity threats like hacking, phishing scams and malware. The recommendations provided include technological and managerial practices to improve people's level of confidence and trust in e-government services.	Survey with 157 respondents	Sample for the survey is small	Yes	Yes	No

Use of three Penetration Testing tools on Yesser's website

We use three different penetration tools; Rapid7, Zap and Nessus to analyse the risks and vulnerabilities associated with e-government websites.

1) Rapid7

The Yesser website was scanned using InsightVM from Rapid7 LLC on February 24, 2020. The website was found to be active and its vulnerabilities by severity are represented by Figure 3. The vulnerabilities by severity are divided into three parts; critical, severe and moderate.

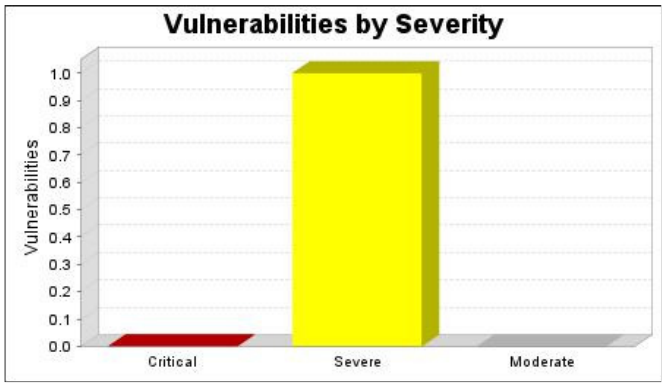

Figure 3: Yesser Vulnerabilities by Severity

As shown in Figure 3, there were no critical vulnerabilities found during the scan of Yesser website. Also, there was no moderate vulnerabilities discovered. However, there was one severe vulnerability. The severe vulnerability detected was that the subject common name (CN) field in the X.509 certificate is different from the name of the entity providing the certificate.

By vulnerability categories, the Rapid7 scan found 1 vulnerability instance each in the HTTP and Web categories, thereby making them the most common vulnerability categories as shown in Figure 4.

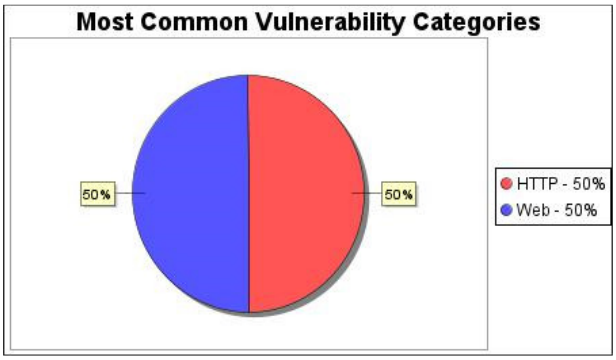

Figure 4: Yesser's Most Common Vulnerabilities

The HTTP and HTTPS services were found on the Yesser website, making them the most common services (Figure 5).

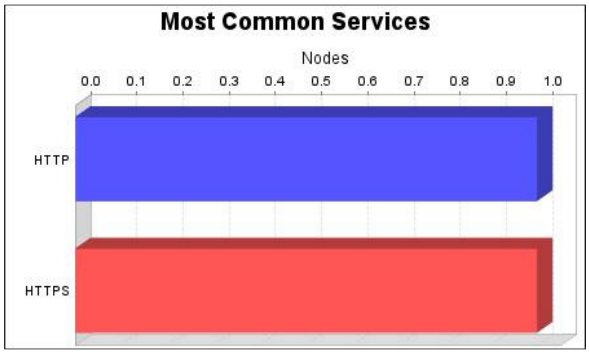

Figure 5: Yesser's Most Vulnerable Services

1) Zap

The Zap scan of the Yesser website was carried out on June 13th, 2020. The summary of the scan is provided in Table 2 below:

Table 2: Summary of Zap Scan of Yesser Websites

Risk Level	Number of Alerts
High	0
Medium	1
Low	10
Informational	2

The medium alert received showed that the X-frame options header is not set. The simple solution to this is to ensure that X-frame options HTTP header is set on all pages on the Yesser website. The low impact vulnerabilities detected by the scan include Absence of Anti-CSRF Tokens, Cookie Without SameSite Attribute, Cross-Domain JavaScript Source File Inclusion, Cookie Without Secure Flag, Cookie No HttpOnly Flag, Web Browser XSS Protection Not Enabled, Incomplete or No Cache-control and, Secure Pages Include Mixed Content, Private IP Disclosure.

The following are the two informational vulnerabilities detected by the scan:

(a) Information Disclosure - Suspicious Comments. The solution to this is to remove all comments that return information capable of helping the and solve any underlying problems.

(b) Timestamp Disclosure – Unix. Here, the solution is to manually confirm that the timestamp data is not sensitive, and that the data cannot be aggregated to disclose exploitable patterns.

2) Nessus

The Nessus penetration test tool was used to scan www.yesser.gov.sa on February 24th, 2020. The results (Figure 6) showed that there were no critical or high vulnerabilities in Yesser. However, two medium-level vulnerabilities were found. Also, 22 informational vulnerabilities were detected.

Figure 6: Result of Nessus Scan of Yesser Website

The first medium vulnerability is F5 Big-IP Cookie Remote Information Disclosure. The remote load balancer suffers from an information disclosure vulnerability. The second medium vulnerability is that web application is potentially vulnerable to Clickjacking.

Proposed e-Government Framework

The current e-government framework in Saudi Arabia (Yesser) uses a centralised database thereby having low level of confidentiality and trust (Al-Mushayt *et al.,* 2012). The proposed model (shown in figure 2) offers a better security as it is completely based on a descentralised database.

In the proposed framework, there are three different access scenarios. These include Consumer to Government (C2G), Government to Business (G2B), and Government to Government (G2G). For C2G and G2B, the customer node and business node made lightweight nodes. However, for G2G, the node becomes a full node. In C2G, the government service bus connects directly with internet, mobile apps, kiosk etc. (consumers); in G2B, it connects with business providers; and in G2G, it connects with a government website (which can be owned by a government agency or ministry). As shown in Figure 2, these three relationships are secured by putting the blockchain technology between DMZ zone and Secured Intranet zone. By adding the blockchain technology to the new framework is to make the GSB more secure by distributing GSB across multiple sites and running blockchain in making any one site's security

compromise not affecting the information integrity as a whole. The benefit of using blockchain is decentralized which does not rely on a central point of control, blockchain is resistant to modification of data, blockchain brings Trust in a trustless world and blockchain is beyond securing Financial Transactions.

Conclusion and Future Work

The study presented in this paper explores most existing literature on securing e-Government systems in different countries. Our study reveals that there are several security and privacy issues (particularly as regards confidentiality, trust and integrity) which the existing e-government frameworks have not been able to address thoroughly. While many researchers have made efforts to address security challenges in e-Government system, our study shows that, there are still some loopholes that need to be blocked. For example, most of the existing frameworks and models do not capture the necessary e-government security requirements; have a lack of trust in internet-mediated transactions, and unauthorized access to systems with the help of insiders. In particular, this paper showed that the Yesser website has a few security issues which are majorly categorised as severe, medium-level and low-impact vulnerabilities. Also, this paper proposes a new framework that leverages blockchain to secure Saudi e-Government system. This proposed model brings decentralisation, access control, confidentiality, and privacy and trust into e-Government service. It is believed that future researchers will explore the extent to which blockchain integration has helped in solving the current issues of Yesser and improve the Saudi e-government services in general.

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Instruments to Support Short Food Supply Chains And Local Food Systems in France

Anna KAPALA
Wrocław University of Environmental and Life Sciences; Wroclaw, Poland
anna.kapala@upwr.edu.pl,

Abstract

The purpose of the study is to identify what legal instruments supporting short food supply chains and, more generally, local food systems are implemented in France. These rules have been drawn from a variety of domains and levels, including national laws, government policies, and local government initiatives and analysed in relation to various forms of short circuits present in French territory, which are the key components of local food systems, such as direct marketing, producers' stores, basket systems, urban agriculture, and deliveries to public catering. Overall, the French instruments are multiple, diverse, mostly innovative, taking into account social, environmental, and solidarity values, and can be a good example to follow. Most of them are established on the local level, being thus an expression of new models of local food governance, corresponding to the values of participative economy and food democracy.

Keywords: local food systems, short supply chains, direct sales, French law.

Introduction

Short food supply chains (SFSCs), "*les circuit courts*" in French, are part of local or also referred to in the literature as "alternative" or "territorial" food systems. In France, SFSCs is not a new phenomenon. From the very beginning of agriculture, farmers sold their produce to consumers on the farm or at a nearby market and often supplied stores in large cities. Direct sales at marketplaces remained important until the 1950s for some products. Self-sourcing farming has been practised for a long time in rural areas and has not completely disappeared in developed countries, contributing to the protection of rural and suburban areas, as observed by Philipon, Chiffoleau, Wallet (2017).

The authors pointed out that SFSC began to disappear after World War II when the American model of agriculture was promoted, aiming at mechanization, intensification of production based on chemicals, enlarging the area of farms and their specialization, the concentration of the agri-food industry and supply chains in the country in the hands of several large entities. In the '50s and '60s first self-service stores were opened which started hypermarkets. Since then, food has been packaged, labelled, standardized, often processed and sold cheaper than local shopkeepers, who are more likely to buy from local farmers than wholesalers. The methods of producing and selling the products of the land have changed dramatically. However, since the beginning of the 21st century, direct selling, or more broadly the SFSCs, have been making a comeback, along with grassroots movements initiated by consumers concerned about the quality and origin of food and dissatisfied with the "dehumanized" way in which it is being sold (Philipon, Chiffoleau, Wallet, 2017).

New forms of SFSCs have emerged, such as French associations for the support of peasant agriculture (AMAPs) or collective sale points. Short circuits have also appeared in legal texts and national food policy. For some, according to Philipon, Chiffoleau, Wallet (2017) the choice of short supply chains is an expression of a global approach, opposing the concentration of distribution in the hands of giants and an economic model in which the producer does not receive fair remuneration for his work and often runs a type of agriculture that is harmful to the environment.

The concept of local food systems (LFS) is not defined in French law. In the literature, the term "territorial food systems" is used more often, however it is also not a legal concept. Bodiguel and Bréger (2018) noticed that it has been gradually developed in response to changing farming and food practices. The concept of "Territorialised Food Systems" was defined by Rastoin (2017) as "a set of agri-food chains that meet the criteria of sustainable development, located in a geographic area with a regional dimension and coordinated by territorial governance. These systems develop according to several principles: the sustainability of agricultural systems and the ability to renew the natural resources of the territories; food democracy and building the local economy; participatory management; and finally

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corporate social responsibility. The concept of territorial food systems, according to Bodiguel, Bréger (2018) can therefore be analysed as a "third way" between a globalized production-oriented model and a subsistence (family) farming model.
The purpose of the study is to identify what legal instruments supporting short food supply chains and, more generally, local food systems are implemented in France. It is not an easy task, as the regulations concerning the SFSCs and LFS cannot be found in one single act devoted to this issue. Instead, they need to be drawn from a variety of domains and levels, including national laws, government policies, and local governance initiatives. These rules will be analysed in relation to various forms of SFSCc which are the key components of local food systems, such as direct marketing, producers' stores, basket systems, urban agriculture, and supplies to public catering.

National policy supporting SFSCs and the definition of "*circuit court*"

SFSCs appear in legal texts, in the 2010 law on the national commitment for the environment, and in the 2010 law on modernization of agriculture and fishing. The latter act included "the development of short circuits and the promotion of geographical proximity between producers and processors", likewise, "the supply of local agricultural products in public and private collective catering" in the objectives of the agri-food policy set forth in the Rural and Maritime Fisheries Code (RMFC). Furthermore, the 2014 Law of the Future for Agriculture, Food and Forestry encourages the "territorial anchoring of the production, processing and marketing of agricultural products". Thus, the territorial anchorage of food and the development of the SFSC are the priorities of the national food policy. The law on modernization of agriculture and fishing brought also some novelties in the institutional area. Besides the classic forms of producers grouping, it is possible to create economic and environmental interest group which can bring together all the actors of the SFSCs at the territorial level and promote the emergence of new food governance and new forms of contractual regulation adjusted to SFSCs as pointed out by Friant-Perrot (2016).

An important tool for the territorial food systems development are the "territorial food projects" (TFPs), defined in RMFC, as they should bring together all the actors concerned; and the sector should be locally organized around production, processing and local consumption (Bodiguel, Bréger, 2018). Essentially in the form of contracts, these projects are carried out "in concert with all the players in a territory and meet the objective of structuring the agricultural economy and implementing a territorial food system. They participate in the consolidation of localized sectors and the development of the consumption of products from short circuits, in particular relating to organic production".

The TFPs often form public-private partnerships involving local authorities, local communities and farmers with the aim of developing urban agriculture, supplying public catering with local food or creating brands of local products. The instruments used by TFPs, as listed for example by Bodiguel, Bréger (2018), include public land policies to reclaim peri-urban agricultural space and regulate the land market (town planning and land use planning), the use of protected geographical indications, or even the creation of local brands to promote local productions and better inform the consumer.

Regarding the concept of "short food supply chains" in France, although the term "short circuits" appears in the legal provisions (Articles L. 1 and L. 111-2-2 (RMFC), it is not legally defined and there is no consensus on its concept. In the Action Plan for the development of short circuits of June 2009, prepared by the Minister of Agriculture, "short circuit" means "a method of marketing agricultural products that is exercised either by direct sale from the producer to the consumer, or by indirect sale on condition that there is only one intermediary between the farmer and the consumer". This definition refers to a method of commercialization and the number of intermediaries and no to the production method. There is no criterion of geographical proximity between the producer and the consumer. While it is generally accepted that short chains contain this condition, the kilometre limit is not defined by any norm. In a research study by Grimonprez (2016) it was emphasised that the proximity of the places of production and purchase and a relationship as direct as possible between the producer and the consumer should be included in the definition. The buyers, as well as the producers, care about direct social relations, far from the anonymity of large-format stores. Thus, these two criteria, geographical and social, distinguish SFSCs from long chains.

Certainly, geographical proximity is not a guarantee of all expected non-market values, such as the quality of a product and more solidary commercial relations as was aptly observed by Friant-Perrot (2016). According to some views, presented by Philipon, Chiffoleau, Wallet (2017) the definition lacks the requirement of environmentally friendly production methods as well as a reference to the farmer's fair revenues. Likewise, important in these distribution methods are higher margins where there are no more (or fewer) middlemen. Producers not only want to take over a greater share of the added value of their products but also to be independent in their work and overcome the limitations of long supply chains (Philipon, Chiffoleau, Wallet 2017).

The EU definition, laid down in Article 2 of Regulation (EU) No 1305/2013, is more complete. It includes the criterion of geographical proximity and also takes into account values such as close relations between SSC participants, which are the basic element that distinguishes these chains from long ones. However, the distance that determines geographic proximity is also not defined.
While the national authorities in France wish to promote the SFSC, they have not imposed a specific model of the legal framework for these alternative forms of distribution. At the local level, the conditions for achieving food policy goals have not been defined. It is left mainly to the initiative of the regions and local stakeholders to take legal or organizational action on this matter. Hence, this is done through a bottom-up approach where consumers, various social organizations, professional farming organizations such as the CIVAM Farmers Network and rural actors are involved in creating the regulatory model for the SFSC. The chambers of agriculture and agricultural trade unions (*la Federation nationale des syndicats d'exploitants agricoles*) also play an important role in promoting them (Philipon, Chiffoleau, Wallet 2017). In 2015, for example, the chain "*Chaines alimentaires courtes de proximite pour ue alimentation durable*" was established - bringing together entities to exchange their experiences and create an expert platform on SFSCs.

SFSCs facilitate food governance by mobilizing all the players, such as local authorities, farmers, artisans, traders, consumers, restaurants, being an expression of food democracy at the local level. In this model of the food system, power is exercised by the community, rather than by the state or the market, therefore activities are decentralized, involving local institutions and entities in elaborating of rules (Friant-Perrot, 2016). Thus, on the one hand, government policy is of great importance for the development of the SFSCs, but on the other hand, local authorities are generally designated by law as the most relevant primary initiators to support projects concerning local food systems (eg, local food projects, short circuits, urban agriculture) and implement them (Bodiguel, 2018).

Forms of short food supply chains in France

There are various forms of SFSC, both traditional and innovative. The traditional ones include sales on farms, e.g. on a wine farm or in agritourism, and sale at marketplaces. More innovative forms are producers' markets, reserved only for producers, to which wholesalers, traders, intermediaries have no access. Other innovative forms, listed by Philipon, Chiffoleau, Wallet (2017) are online ordering system, itinerant shops, local products supply for public catering (school canteens, hospitals, prisons, retirement houses, etc.), collective public gardens in cities, crops on terraces and balconies, baskets systems, where the producer sells a set of products corresponding to the average weekly consumption, adapting to the type of consumer. Well established practice in France, inspired by the "Community-supported agriculture" developed in the USA and the Japanese *teikei* system, are the AMAPs (consumer and producer associations in which the consumer undertakes to purchase the farmer's products as baskets and to participate in his work or sale).

Producers sell their products individually or collectively. Some of the collective groups are formally organized, eg in the form of cooperatives or in the association of "1901 law" type. Sale practices are most often purely contractual, although in some cases self-regulatory statutes are used, as in the case of AMAP. There are also local brands ("*Iles des France*", "*Aubagne*"), which have been established on the basis of dialogue between local economic actors (producers, restaurant owners), consumers and local authorities (Friant-Perrot, 2016).

Direct sales

Direct sale is the primary form of commercialization in short food supply chains. It may take place directly to the consumer, to large stores, local stores or mass caterers. In the legal terms, the sale of agricultural products (as well as their processing) directly by the farmer is considered as part of an "auxiliary" agricultural activity which is the "extension of the act of production" (as defined in Article L.311-1 (RMFC). In order not to qualify as a commercial activity, direct sales must be carried out by the farmer and concern only products from his farm (Bodiguel, Cardwell, 2005). The Internet is used as a direct sales support tool, such as popular in France websites „*drives fermier*".

Under the social security regulations, processing, preservation and commercialization of agricultural products is an activity qualified as an extension of the act of agricultural production. Thus, a farmer carrying out these activities benefits from the social security scheme established for "self-employed in agricultural professions". Likewise, under tax law, the sale and processing of agricultural products are assimilated to agricultural activity (Rochdi, 2016). These agricultural, tax and social legislation qualifying direct sales as an agricultural activity is an important instrument to facilitate direct sales of agricultural products, both basic and processed.

However, within the legal framework, there are some issues and ambiguities regarding this activity. Firstly, as observed by Rochdi, (2016), although direct sales, under the RMFC, is a "civil" activity, not subject to commercial regulations, its legal regulations are derived from commercial law. Thus, even though a farmer retains his status he

cannot be exempt from the rules which apply to any sale operation, concerning safety, hygiene, labelling, etc. Formally, the commercial regime remains complementary to the agricultural regime. Secondly, while the sale of products produced on the farm remains an agricultural activity, a farmer who sells products purchased from another farmer is not only a farmer but also becomes a trader, because such activity under the Commercial Code is a commercial activity. In practice, often a farmer, to expand his offer and retain customers, buys products and adds them to his own to produce a new product. Such an action meets the definition of a commercial act. If he is then considered a farmer, his actions may result in unfair competition against sellers, and under tax regulations may conflict with equality in terms of public charges (Rochdi, 2016). Furthermore, in the case of innovative forms of sale, the issue of qualifying direct sales as an agricultural activity arises. As a rule, only sales by the farmer himself at fairs, markets, on the farm, in baskets, shops or public catering establishments can be considered as "agricultural". So, when it passes through an intermediary such as a collective structure, there is a risk that the sale will turn into a "commercial act" (Grimonprez, 2016).

Therefore, in the research study by Rochdi (2016) a postulate has been put forward to redefine the boundaries of agricultural status, which is necessary for the development of short supply chains. In the absence of clear legal boundaries for the activity that remains agricultural, the delimitation of which has in practice been left to a court decision, the producer-seller remains exposed to re-qualifying his sales activity and subordinating it to various statuses of farmer, merchant or artisan. This is often the case with AMAPs that are taxed on commercial profits due to the lucrative nature of their business, as will be discussed later in the study In terms of social insurance, the disqualification of sales as an agricultural activity will also result in the farmer being subject to various social insurance regimes (Rochdi, 2016).

Collective Sale Points

Producers' stores are defined in art. L 611-8 RMFC, under which groups of local agricultural producers market their products in their stores within the framework of a short circuit. They can offer only their products whether raw or processed which must represent in value at least 70% of the total turnover of this point of sale. A maximum of 30% of the products sold can come from agricultural cooperatives, food artisans and, or producers who are not members of the store. Thus, this kind of collective sale by agricultural producers is officially recognized by French law. By excluding situations where producers sell products that have not been proven to be of local origin or that are wholesale, the law aims to ensure that products sold and presented as "local" is indeed such. Other products would not correspond to the authenticity of the short circuit model. The purpose of this provision is also to ensure that, under the Law of Consumption of 17 March 2014 collective selling is not a deceptive commercial practice. The formula nevertheless leaves uncertainties about the notions of "local" agricultural producers and "organized short circuits".

Producers' stores are particularly popular in the Rhône-Alpes region, where the association "*Terre d´envies*" has even registered a trademark with the French National Institute for Industrial Property for products sold in these points. Word and figurative mark "Products from our farms sold by us" (*Produits de nos fermes, vendus par nous- mêmes*) may be used by farmers with the consent of the association.

From a legal and organizational point of view, as there is no legal category for collective outlets, such points can be run in the form of a limited liability company, economic interest groups, agricultural cooperative or association of the "1901 law" type. An important event took place in 1997 when the AVEC Rhone-Alpes association convinced the Minister of Agriculture to recognize the producer stores as a form of direct delivery to consumers, the same as selling on the market or the farm. Such recognition makes it possible to qualify the collective sales to the so-called "extension of the agricultural activity of the farm", which translates into benefits in many areas (sanitary requirements, fiscal law, social security system).

Baskets Systems and AMAP

The basket system is quite diverse and purchasing groups are very common in France. Many of them operate informally, being set up by producers or consumers. In general, baskets are organized in form and structure at the initiative of producers or consumers themselves. The basic principles of their functioning are relatively simple. A group of producers or consumers organizes to jointly sell or buy products, mostly agri-food products. Consumer-initiated baskets are often organized in the legal form of an association of the "1901 law" type. However, there is no ready-made scheme for creating a basket system. An example of a basket system is *Les Paniers de Saint-Gilles*, established on the initiative of the municipal association of environmentalists in 2006. Only consumers and producers from closely adjacent municipalities participate in the basket. The system is based on the principles of supporting local agriculture that creates jobs and promotes economic dynamism by focusing on environmentally respectful production and supply systems (Maréchal, 2008).

Another example is the original form of a basket with a strong social vocation, organized in the form of the collective ecological garden *Les Jardins de Cocagne*. Founded in 1991 as associations under the law of 1901, aimed at social and professional integration. Through the production and distribution of organic vegetables in the form of weekly baskets but also on the markets, to members-consumers, these gardens allow adults in difficulty to find a job and rebuild a professional project. Thus, they are a part of the social economy and solidarity *sensu stricto* (Maréchal, 2008).

The AMAP *(*Association for the Preservation of Peasant Agriculture) is the formal and networked result of the "baskets system". It first appeared in France in the early 2000s and is now an important phenomenon in French territorial food systems. This model is based on a partnership agreement between consumers and producers, referred to by Rochdi (2016) as a solidarity contract. Consumers contractually commit to purchase the farmers' production in advance and make a prepayment of the costs of products that will be delivered to them, thus allowing these farmers to have working capital or sufficient cash to meet their expenses and investments. Through their activity, AMAPs allow producers not only to obtain outlets but also to provide them with an income. The box prices are fixed in the "fair manner" so that the farmer receives a fair revenue and the price for the consumer is affordable (Friant-Perrot, 2016).. Their legal form of organization is the associations of the "1901 law" type, the purpose of which is to create a direct link between consumers and a farmer.

The activity of AMAPs is considered from the point of view of tax principles as lucrative and they are subject to commercial taxes regardless of their size and the amount of their income. However, as these associations receive in principle only modest revenues, the consequences of the taxation of these structures are in practice limited. Producers and consumers contractually undertake to comply with the AMAP Charter created in 2003 by Alliance PEC. It combines several goals: economic, social and solidarity aspects; environmental protection; a healthy and varied diet and in sufficient quantity, as well as the civic and political dimensions. AMAPs and more generally basket systems were characterised by Lamine and Perrot (2008) as phenomenon promoting the logic of "peasant, socially just and ecologically healthy" agriculture and the defence of "local farms" in the form of an alternative agri-food system as opposed to the dominant agri-food system characterized by a coupling of intensive farming and mass distribution.

Supplies to Public Catering

In general, it is difficult to adopt criteria such as "local origin" of products or "proximity" in public procurement law as this may be contrary to the EU principle of free movement of goods and free competition. However, an important amendment to Art. 53 of the Public market's code was established, which consequently allows for the selection of tenders for deliveries to mass caterers "the development performance of direct supplies of agricultural products". The direct delivery criterion opens up the possibility for short circuits of supplying school canteens, hospitals, retirement houses, and other collective catering points. At the same time, it does not prohibit deliveries in long chains, provided that the criterion of direct delivery is met as observed by Rochdi (2016).

In 2014 the French government in the Practical Guide issued by the Minister of Agriculture fixed the objective that till 2017 in the collective restaurants 40% of products should be local. To achieve this goal local authorities create and carry local food projects. To supply school canteens, municipalities decide to develop their local agriculture while controlling the distribution channels. These strategies take many forms, from simple contracts with suburban farmers (after calls for tender), to the placement of one or more farmers on the municipality's own land ("agricultural pole of proximity") to the creation of "agricultural boards" which are municipal structures in charge of production" as defined by Grimonprez (2016). Thus, in France, in order to secure the supply of fresh produce for the benefit of local collective catering, a whole range of partnerships and public-private agreements are established. Many producer groups in the form of associations, economic interest groups and cooperatives of interest have also been established to offer a more complete range of products.

Another important legal initiative to develop local (territorial) food systems was launched in 2018 through the law of 30 October 2018 for the balance of trade relations in the agricultural and food sector and healthy, sustainable and accessible food for all, which set the goal to "Promote healthy, safe and sustainable food". As part of this target, public catering is required to source at least 50% of local products or with indications of origin and quality, including 20% from organic farming by 2022. This obligation would allow local farmers to have a stable market for fresh, seasonal products, and state institutions to have nutritious food. Although the law is not in force, it proves the nation's commitment to supporting local growers and thus supporting the regional food system.

Urban Agriculture

Since 2017, the Biodiversity Law requires the production of renewable energy or greening systems on the roofs of retail stores in commercial zones. In cases where edible plants are planted on rooftops, this law can play a role in

promoting local food security and strengthening community resilience. It can also contribute to increasing connections between green zones for local nature. Apart from this act undertaken at the national level, as a general rule, the legal instruments in favour of urban and suburban agriculture are based on the will and resources of local authorities. This is the case, as observed Bodiguel (2018), with the protection of agricultural land, in particular, land in urban and peri-urban areas, which involves town planning documents blocking the artificialization of agricultural land. An interesting example of local land use policy beneficial for local farming in the urban and peri-urban area is the Rennes Métropole "local plan for agriculture". This document aims to support the concept of an "urban archipelago", which is supposed to hinder the city's expansion beyond the ring road and to maintain "green" areas between the city and the "satellite municipalities" while preserving land for the cultivation and development of the SFSC. Thriving agriculture is considered under this policy to be the best and most economical way to maintain the "green belt". Another example is Mouans-Sartoux town, where the municipal agricultural office manages four hectares of the municipality land to produce vegetables for the school catering (Bodiguel, 2018).

Conclusions

The considerations have shown that instruments supporting short food chains and local food systems in France can be identified at the national and local level. The decisive role to play in the development of short circuits and LFS has been left to municipalities and regions. Thus, the effectiveness of SFSC development activities depends on local governance. As the agricultural policy is traditionally decided and conducted at European and national level, for a long time local authorities have not dealt with a topic that was not clearly within their remit. Consequently, local agriculture is suffering from a lack of governance.

However, for ten years, municipalities have started to participate in local agricultural policy, including the protection of arable land in suburban areas, the creation of local agricultural centres, assistance in the creation of short circuits, etc.(Grimonprez, 2016). The inclusion of local authorities in agricultural governance is called in the literature by Bodiguel and Bréger (2018) as a process of "reterritorialization" of agricultural and food policies. Nevertheless, there is still uncertainty over the distribution of administrative powers.

Also important are the initiatives taken by local actors to embody the food democracy, which are numerous in France and of which only a few examples are presented in this study. AMAPs are the best example of formalisation of solidarity relations on the local level. They represent the will to ensure a better revenue for farmers and bigger independence from other links in the chain, as well as to respond to the consumers' needs and preserve the local economy. SFSCs thrive on these new forms of partnership between consumers and producers. Their further expansion depends on the involvement of players in support, in particular organizations and communities involved in the development of agriculture.

Unfortunately, there is no legal system tending to contractual justice (willingness to provide a fair income for farmers) and food democracy (citizen participation), which has been identified by Friant-Perrot (2016) as a real obstacle for the SFSC to develop and to be more than a marginal but a meaningful distribution chain. Consequently, as a fruit of the new food governance, the short circuit legal framework is derived from private and public regulations, often taking into account environmental and social standards (AMAP charter, paralegals standards of various organizations, ministerial Practical Guide), the normative force of which varies (Friant-Perrot, 2016). Therefore, as it was aptly noted in the literature by Friant-Perrot (2016), the normative structure of the SFSC is characterized by legal pluralism: a plurality of legal orders (European, national, regional, local), a plurality of entities (farmers, consumers, social and agricultural organizations, local authorities) and a plurality of regulations (legal provisions, legal judgments, private norms, technical standards).

Overall, it can be said that the French SFSC and LFS development instruments are multiple, diverse, mostly innovative, and well-established, and can be a good example to follow. However, the law in force does not yet provide an ideal framework for the development of a global project of local agriculture (Grimonprez, 2016). Therefore, state and local authorities should continue to become more involved in the development of LFS, using the existing support instruments, expanding them and creating new ones. Short circuits do not have to be a marginal model of agriculture, they can be an alternative model that should be considered by the political and legislative authorities, both national and local.

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Selected Methods and Algorithms for Data Classification

Oleksandr PETROV [0000-0001-9453-0755]
AGH University of Science and Technology, Faculty of Management, Krakow, Poland,
asp1951@gmail.com

Beata BASIURA [0000-0002-5753-4893]
AGH University of Science and Technology, Faculty of Management, Krakow, Poland,
bbasiura@zarz.agh.edu.pl

Anton PETROV [0000-0003-3731-4276]
Federal State Budgetary Educational Institution of Higher Education "Kuban State Agrarian University named after I.T. Trubilin", Russia,
anton.a.petrov@gmail.com

Abstract

In the first part of a paper were detailed study of the discriminant analysis, based on the concept of distance between elements, and on the criterion of proximity constructed on calculating a cosine of the angle between two vectors was conducted. Also, all constructions relying on the example of texts classification are provided. In the second part of the article the method of support vector machines (SVM - Support Vector Machines), included in the set of algorithms called as "supervised learning" was examined. They are also effectively used in problems of classification as a method of discriminant analysis too. Thus, the article analyzes in detail the problem of data classification. In particular, it is proposed to modify the particle swarm optimization algorithm and use it in conjunction with the SVM algorithm.

Keywords: data classification, genetic algorithms, support vectors, data preprocessing, discriminant functions.

Introduction

The overload of information generated by everyday life today has led to the concept of automating the extraction of knowledge from text and beyond. This direction is related to a wide range of tasks - from recognizing blurred images to event detection and opinion classification. Sometimes it is hard to believe that more than 80 percent of business data are in text form. Examples of the analyses under consideration include call center transcriptions, online reviews, product surveys and customer opinions as well as other text documents such as legal contracts. Most of this data is unused and is a mine of interesting conclusions waiting to be discovered. One of the methods of studying these texts is text exploration and analysis supported by innovative technologies. The proposed method is a contribution to the big issue of text mining.

One of the most effective classification algorithms is support vector machine (SVM). It is easy to use for linearly separable sets. For non-separable sets, it requires a kernel transformation in special cases. One of the most difficult choices is to adapt the kernel type to the problem under investigation in such a way as to achieve high accuracy of data classification. This paper shows an example of using swarm intelligence as a way to optimize classification accuracy.

Literature Review

Text information processing tasks are very often based on classification and grouping concepts, see e.g. Domingos & Pazzani (1997), Ghazanfar & Prugel-Benet (2010), Gordon (1999), Reiten (2017), Sebastiani (2002), Shah & Patel (2016). The classification refers to the determination in advance of the belonging of certain elements to one of the classes created. Clusterization consists in breaking down a set of elements into clusters, the number of which is defined, and locating the elements of the cluster in such a way that they are close to the natural centers of these clusters. The realization of the classification problem must initially be based on a set of demands, the basic ones being a priori information about the original set of objects and ameasure of closeness, similarity of elements and classes.

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The Bayesian classifier is based on the assumption that the previous probabilities of the P(c_i) hypothesis are known, i.e. in particular the probability of losing the c_i classes (i = 1.2,..., k). Unfortunately, the answer to the question how to determine them, the Bayesian classifier does not give (see e.g. Domingos & Pazzani 1997, Zheng & Webb 2005, 2008). The naive Bayesian classifier, however, allows for a poor estimate of these probabilities, but sometimes it is better than nothing. The most commonly used area of the naive Bayesian classifier belongs precisely to the problem of text classification, where this method gives relatively good results as it has been shown by Reiten (2017) or Sebastiani (2002). The naive Bayesian classifier assumes conditional independence of attributes, and especially when processing texts, these assumptions are absolutely discouraging. After all, the probability of a word appearing does not depend on other words in the document, and moreover, it does not depend on the size of the document. Surprisingly, naive Bayesian text processing classifier is relatively effective and has been widely used, especially to filter spam The example has been shown by Ghazanfar & Prügel-Bennet (2010).

One of the most frequently used procedures to find models with mixed empirical distributions is the EM (Expectation Maximization) algorithm proposed by A.Dempster, M.Laird and D.Rubin (1977). The basic example are tasks in which the algorithm should include a linear combination, for example normal distributions. On the basis of selected mixed normal distributions, the discrimination or classification of objects is determined.

Many text classification methods such as supervised text classification algorithms, (decision trees, carrier vector machine, Naive Bayesian, k-nearest neighbors) can be found in the literature (Pitigala et. al. 2011, Reiten 2017, Sebastiani 2002, Shah & Patel 2016, Soucy & Mineau 2001, Zheng & Webb 2005, 2008)

Other approaches were also proposed for this purpose. One of them is evolutionary algorithms that apply to solving grouping and classification problems due to their ability to avoid local optimal solutions and come close to a global solution. Examples of such applications can be found in the literature. Basic content analysis procedures with single term indexing models were introduced as early as 1988 by Salton and Buckley (1988). Several examples of the use of genetic algorithms for text classification are described in the literature. Shumeyko & Sotnik (2009, 2010), Wang & Li (2013) have been applied such examples. Text classification is the process of dividing documents based on their contents into a predefined set of categories. The choice of features here is essential to improve the effectiveness of classification. The use of genetic algorithms to select attributes using classifiers Naive Bayes (NB), Nearest Neighbours (KNN) and Support Vector Machines (SVM) were presented by Noria Bidi and Elberrichi Zakaria (2016). Latent semantic indexing (LSI) together with the genetic algorithm was used in the work Uosal and Gunal (2014).

One of the most effective classification algorithms treated as unattended learning is the support vector machine (SVM) (Bidi & Zakaria 2016, Cortes & Vapnik 1995, Vapnik & Lerner 1963, Vapnik & Chervonenkis 1974, Cristianini & Shawe-Taylor 2000, Rossi & Villa 2006, Hamel 2009, Kim & Choi 2014). It is simple to use for linearly separated sets, but for linearly unseparable sets, it may require kernel transformation like proposed by Cristianini & Shawe-Taylor (2000) or Bordes et. al. (2005). One of the most difficult choices is to adapt the kernel type to the problem under investigation in such a way as to achieve high accuracy of data classification. This paper shows an example of using swarm intelligence as a way to optimize classification accuracy.

In the further part of the article, after defining the criterion of similarity constructed on the basis of calculation of cosine angle between two vectors (Chapter 2.1), the control vector was used, which allowed to determine appropriate classes. Then the approach using Voronoi diagrams is described (Chapter 2.2). In both cases the genetic algorithm was used to determine the optimal division. Chapter 3.1 is an introduction to the SVM, which together with the swarm intelligence (Chapter 3.2) allowed to perform a trial classification. Finally, the conclusions are briefly presented.

Using of genetic algorithms for creation of the vector classifiers

Reduction of class dimensions in text classification

In the discriminatory analysis under consideration, the basis is a measure of similarity of objects usually based on the concept of distance between elements. The similarity measures used here are very different as it has been shown by Gordon (1999), Reiten (2017), Sebastiani (2002). The introduced criterion of closeness constructed on the basis of the calculation of the cosine angle between two vectors seems to be relatively promising especially when applied to the classification of texts The examples have been applied by Shumeyko & Sotnik (2009, 2011), Yesin et. al. (2019).

The first stage of the analysis consists of preliminary data processing, i.e. creating sets of statistics for available classes. For the creation of the set of statistics all sets of word forms $b^{\nu},\ \nu = 0,\ldots,M-1$ are consistently processed, for text belonging to one class $B = \{b^{\nu}\}_{\nu=0}^{M-1}$. On the set of word forms of each processed text b^{ν} the set of the unique (not repeating) word forms and their counters is under construction : (w_i^{ν}, n_i^{ν}) $(i = 0,\ldots,N^{\nu}-1)$. Here N^{ν} is a quantity of unique word forms for the text b^{ν}. After that data for each document separately are normalized in the form presented in equation (1).

$$\underline{n}_i^\nu = \frac{n_i^\nu}{\sqrt{\sum_{j=0}^{N^\nu-1}(n_j^\nu)^2}} (i = 0, \dots, N^\nu - 1) \qquad (1)$$

Then, we arrange all words for each document in the same order (the word order is not essential, the main thing that words in each of structures $(w_i^\nu, \underline{n}_i^\nu)(i = 0, \dots, N^\nu - 1)$ went in the same order) and we find the sum of all vectors $n_i(B) = \sum_{j=0}^{M-1} n_i^\nu \ (i = 0, \dots, N(B))$ (where $N(B)$ is a quantity of unique word forms for the class B in general) also we normalize it by its unit as it is shown in equation (2).

$$\underline{n}_i(B) = \frac{n_i(B)}{\sqrt{\sum_{j=0}^{N(B)}(n_j(B))^2}} \qquad (2)$$

For the received central point of the class we create the set of statistics, writing down in it values $\left(w_i(B), \underline{n}_i(B)\right) \ (i = 0, \dots, N(B))$.

For creating the central vector of classes $\{B^\mu\}_{\mu=0}^{K-1}$ where each class B^μ is described by the central vector $(w_i(B^\mu), \underline{n}_i(B^\mu))(i = 0, \dots, N(B^\mu))$, it is necessary to find their sum, having summed up all coordinates from all vectors for each value of the word form, that is for the word form ω we receive the coordinate is described by equation (3).

$$n(\omega) = \sum_{\mu=0}^{K-1}\{\underline{n}_i(B^\mu) | \omega_i(B^\mu) = \omega, \quad i = 0, \dots N(B^\mu)\} \qquad (3)$$

Therefore, it is necessary to make the list of unique word forms on all central vectors of classes $\{B^\mu\}_{\mu=0}^{K-1}$ and to sum up their coordinates. The set consisting their unique (not repeating) word forms and their coordinates can be written as (4),

$$\left(w_i\left(\{B^\mu\}_{\mu=0}^{K-1}\right), n_i\left(\{B^\mu\}_{\mu=0}^{K-1}\right)\right) \ (i = 0, \dots, N(\{B^\mu\}_{\mu=0}^{K-1})) \qquad (4)$$

where $N(\{B^\mu\}_{\mu=0}^{K-1})$ is a quantity of unique word forms of the set of classes $\{B^\mu\}_{\mu=0}^{K-1}$. It is necessary to normalize the received coordinates (see eq. (5)).

$$\underline{n}_i(\{B^\mu\}_{\mu=0}^{K-1}) = \frac{n_i(\{B^\mu\}_{\mu=0}^{K-1})}{\sqrt{\sum_{j=0}^{N(\{B^\mu\}_{\mu=0}^{K-1})}(n_j(\{B^\mu\}_{\mu=0}^{K-1}))^2}} \qquad (5)$$

From here the received vector $\left(w_i\left(\{B^\mu\}_{\mu=0}^{K-1}\right), \hat{n}_i\left(\{B^\mu\}_{\mu=0}^{K-1}\right)\right) (i = 0, \dots, N(\{B^\mu\}_{\mu=0}^{K-1}))$ can be the central vector of the set $\{B^\mu\}_{\mu=0}^{K-1}$.

Ideally created classification of the vector method is such set of classes $\{B^\mu\}_{\mu=0}^{K-1}$, for which the following condition (6) is satisfied: $\forall b \in B^\mu, \mu = 0, \dots, K-1$ the inequality takes place.

$$\langle \underline{n}(b), \underline{n}(B^\mu)\rangle < \langle \underline{n}(b), \underline{n}(B^\nu)\rangle, \ \ \nu \neq \mu \qquad (6)$$

Let's consider the vector Λ (control vector) of dimension $N(B^\mu)$, which coordinates accept only the one or the other admissible values (zero) $\lambda_i = \{0\ 1\}$.

Through Λ*b* let's designate the direct product of vectors Λ and *b*, that is

$$\Lambda b = (\lambda_0 \underline{n}_0(b), \lambda_1 \underline{n}_1(b), \dots, \lambda_{N(B^\mu)} \underline{n}_{N(B^\mu)}(b)).$$

The control Λ let's call admissible on the class $B^\mu = \{b^k\}_{k=0}^{M-1}$, if the condition (7) is satisfied.

$$\langle \underline{\Lambda n}(b^k), \underline{\Lambda n}(B^\mu)\rangle < \langle \underline{\Lambda n}(b^k), \underline{n}(B^\nu)\rangle, \ \nu \neq \mu, \ k = 0,1, \dots, M-1 \qquad (7)$$

Admissible control vector Λ for which this inequality (2) and at the same time which is fulfilling the condition $\sum_{k=0}^{M-1}(\Lambda b^k)^2 \to \max$, is called the optimum.

If for $\nu \neq \mu$ the set of admissible controls is degenerated, the class $B^{\mu} = \{b^k\}_{k=0}^{M-1}$ is defined incorrectly, i.e. it is inseparable from the class B^{ν} .

The problem of finding the optimum control by classical methods is rather difficult therefore we will apply genetic algorithms to its decision (Rana 1999).

For that matter, the single-point crossing over (single-point crossover) is used. It is modeled as follows: Let there are two parent individuals with chromosomes $X = \{x_i, i \in \{0, \ldots, L\}\}$ and $Y = \{y_i, i \in \{0, \ldots, L\}\}$. In a random way the point in the chromosome is defined (discontinuity point) in which both chromosomes are divided into two parts and exchange them. After processing reproduction we can get mutation. It is reached because accidentally chosen gene in the chromosome changes.

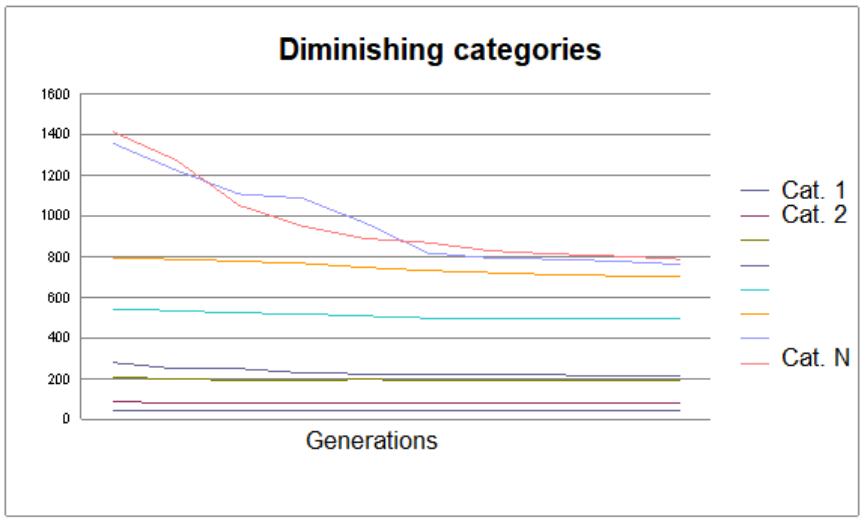

Fig. 1: The chart of reduction of dimension of categories when using genetic algorithms.

For creating new population we used the elite selection. Intermediate population which includes both parents, and their descendants are created. Members of this population are evaluated, and behind that N of the best get out of them (suitable) which will enter the next generation.

The result of applicating the genetic algorithm to the problem of reducing class dimension, is given in the figure 1.

Reduction of class dimensions in the text classification using Voronoi polyhedron

Let's notice that the vector method as a criterion of quality uses the size of the scalar product of basis vectors, thus, the class of unit vectors (documents) is limited on the sphere by the circle with the center at the end of the central vector of the class. As sphere cuts on the circle cannot densely pack all surface of the single sphere, there is the point set (basis vectors) which cannot essentially get to one class. Thus, there is the need to break the point set on the single sphere so that elements of this splitting densely packed all surface of the single sphere, that is allowed to classify any document unambiguously.

For any center of system $\{A\}$ it is possible to specify area of space which all points are closer to this center, than to any other center of system. Such area is called the Voronoi polyhedron or Voronoi diagram. The Voronoi diagram usually carry to the polyhedron also its outer surface. In three-dimensional space the Voronoi diagram for any *i* center of systems $\{A\}$ is the convex polyhedron, in two-dimensional space it is the convex polygon. Formally Voronoi polygons T_i in R^2 are defined as follows:

$$T_i = \{x \in R^2 : d(x, x_i) < d(x, x_j)\ \forall j \neq i\}.$$

where *d* is a distance function.

Creating an approximation relies on fundamental property for randomly selected *n* set points on the plane *S*. For any node from *n* on the plane, there is the great number of natural neighbors *N*. The concept of natural neighbors is closely connected with splitting the Voronoi diagram cells. For the nonempty Voronoi cell *V*(*R*), where $R \subset S$ the natural neighbors for a vertex of Delon's triangles $r \in R$, are points incidental to *V*(*R*).

The two-dimensional Voronoi polyhedron (polygon on the plane) is shown on the Fig. 2. The lines Voronoi which generated edges at the polygon are called the forming lines and the relevant centers of system are the geometrical

neighbors of this center A. Among geometrical neighbors (natural) we can distinguish two kinds of them. For the first kind is the bisecting point of a segment connecting it to the central node lies on the verge of the Voronoi polyhedron. For the second kind the bisection point is out of the edge and, therefore, out of the polyhedron.

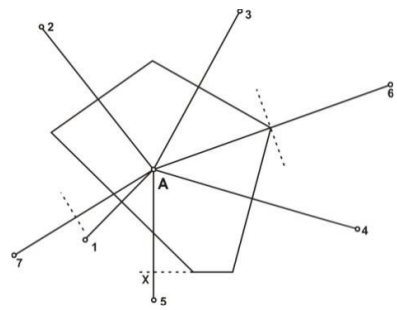

Fig. 2: The Voronoi polyhedron (polygon) for the center A in two-dimensional system.

Polyhedrons Voronoi, the systems constructed for each center $\{A\}$, give the mosaic of polyhedrons - splitting Voronoi points (see Fig.3). Polyhedrons Voronoi systems $\{A\}$ do not enter each other and fill the space, being adjacent on the whole edges. Splitting space into Voronoi polyhedrons unambiguously is defined by system $\{A\}$ and converse uniquely defines it.

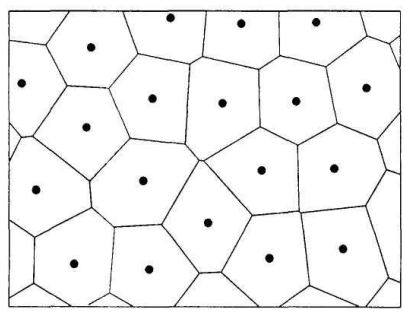

Fig. 3: The Voronoi chart on the plane.

Using the design of Voronoi diagrams in relation to points on the multidimensional single sphere, we receive splitting all basis vectors of documents into natural classes. Borders of classes will be the hyper planes dividing spherical Voronoi polyhedrons. Points on the single sphere, which in relation to all hyperplanes limiting this class lie on the same side of sphere, as the central vector of this class, will belong to one class.

Let classes of documents be checked for the splitting correctness C_ν and C_μ. For corresponding basis vector (the central vectors) $\hat{C}_\nu$, $\hat{C}_\mu$, we build the difference vector

$$\vec{\Delta}_{\nu,\mu} = \hat{C}_\nu - \hat{C}_\mu = \{\hat{n}^\nu(w_i) - \hat{n}^\mu(w_i)\}$$

and sum vector

$$\vec{\Xi}_{\nu,\mu} = \frac{1}{2}(\hat{C}_\nu + \hat{C}_\mu) = \frac{1}{2}\{\hat{n}^\nu(w_i) + \hat{n}^\mu(w_i)\}.$$

The half-sum of vectors begin coordinates of this vector in number. Let's designate it through $\Xi_{\nu,\mu}$. Let's carry out through the point $\Sigma_{\nu,\mu}$ the plane with the normal vector $\vec{\Delta}_{\nu,\mu}$

$$\Omega_{\nu,\mu} = \langle \vec{\Delta}_{\nu,\mu} \cdot (P - \Xi_{\nu,\mu}) \rangle = 0\ . \qquad (8)$$

This plane splits classes. In order to the method correctly splits classes, it is necessary that all points (documents) of one class are on the one side of the planes, that is if $b \in C_\nu$, then

$$\langle \vec{\Delta}_{\nu,\mu} \cdot (\hat{C}_\nu - \Xi_{\nu,\mu}) \rangle \langle \vec{\Delta}_{\nu,\mu} \cdot (\hat{b} - \Xi_{\nu,\mu}) \rangle \geq 0.$$

Points in which this condition is not satisfied need to be considered relating to belonging to category C_μ.

For the solving this problem the following method can be taken into account. Let's consider categories C_ν and C_μ. Let's split them by the plane (3), and all points lying on the one side, we will collect in new two categories C_ν^* and C_μ^*.

Let

$$d(B, \Omega_{\nu,\mu}) = \frac{|\langle \vec{\Delta}_{\nu,\mu} \cdot (B - \Xi_{\nu,\mu})\rangle|}{|\vec{\Delta}_{\nu,\mu}|}$$

be a distance from the point $B = \{b_i\}$ to the plane $\Omega_{\nu,\mu}$.

If the condition is satisfied (that is, after cutting off of data both categories are removed from each other)

$$\{d(C_\nu^*, \Omega_{\nu,\mu}) - d(C_\nu, \Omega_{\nu,\mu}) > 0, d(C_\mu^*, \Omega_{\nu,\mu}) - d(C_\mu, \Omega_{\nu,\mu}) > 0\},$$

that categories C_ν and C_μ have nonempty crossing $\tilde{C}$, which can be defined as follows, $b \in \tilde{C}$ if $b \in C_\nu$ and at the same time

$$\langle \vec{\Delta}_{\nu,\mu} \cdot (\hat{C}_\nu - \Xi_{\nu,\mu})\rangle \langle \vec{\Delta}_{\nu,\mu} \cdot (\hat{b} - \Xi_{\nu,\mu})\rangle < 0,$$

or, if $b \in C_\mu$,

$$\langle \vec{\Delta}_{\nu,\mu} \cdot (\hat{C}_\mu - \Xi_{\nu,\mu})\rangle \langle \vec{\Delta}_{\nu,\mu} \cdot (\hat{b} - \Xi_{\nu,\mu})\rangle < 0.$$

It is natural that the problem of classes dimension reduction is also urgent for the method constructed on Voronoi diagrams.

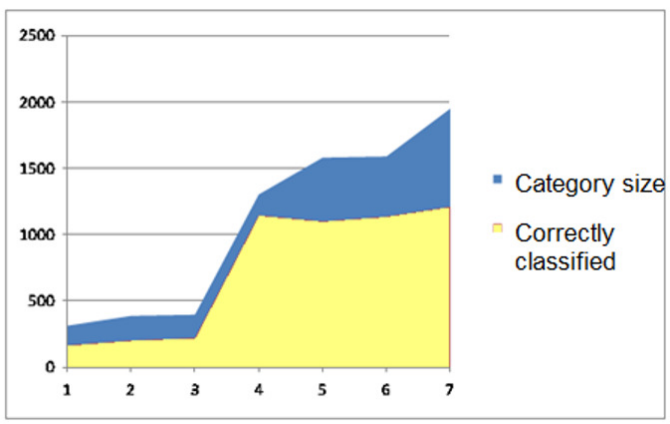

Fig. 4: The result of applicating the algorithm of Bayes.

Comparative analysis of application of different discriminatory analyses to test base of documents (from Reuters-21578 text categorization test collection) is given in the following figures (see fig. 4; fig. 5; fig. 6).

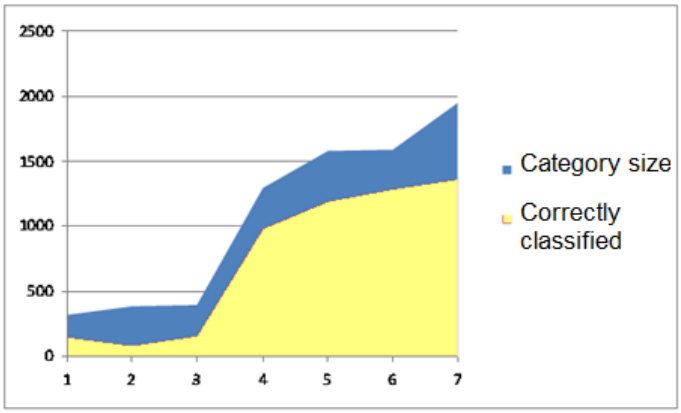

Fig. 5: The result of applicating the vector algorithm.

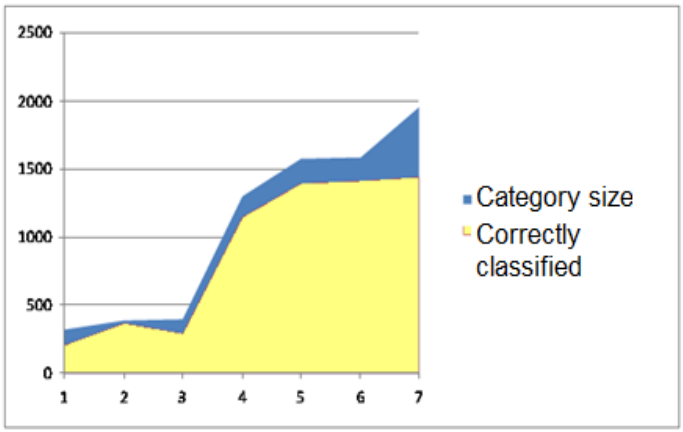

Fig. 6: The result of applicating the algorithm based on Voronoi diagrams.

Thus, for given test base on condition of hit in the class not less than 90% of documents, dimension of classes from 10% was succeeded to reduce to 50%.

Application of swarm intelligence in matching the SVM classifier

Introduction to Support Vector Machine (SVM)

The method of support vectors (SVM) is included in the set of algorithms called as "supervised learning". They are effectively used in problems of classification. In 1963 Vapnik and Lerner (1963) proposed an algorithm which if the data are linearly separable then finds the maximal margin between the fixed boundary and the nearest points of each class. The next work by Vapnik & Chervonenkis (1974) is the cornerstone of SVM. Work on the SVM has been developed and its application can be found in many areas. The support vector network is a learning machine for two-group classification problems developed by Cortes and Vapnik (1995).

Classification models using active collection techniques were described and made available by T. Joachims (2008). In his publication you can also find the use of SVM in text classification (Joachims 2009).

One of the first comprehensive introductions to the Carrier Vector Machines (SVM), a new generation learning system based on the latest advances in statistical learning theory, was described by Cristianini and Shawe-Taylor (2000). They show that SVMs provide state-of-the-art performance in real-world applications such as text categorization, manual character recognition, image classification, biosecurity analysis, etc., SVMs are now recognized as one of the standard tools for machine learning and data mining. SVM method belongs to family of linear qualifiers.

The simplest discriminating functions of the linear classifier can be illustrated as lines separating data belonging to different classes (see Fig. 7). It can be written down in the form $g(x) = w^t x + w_0$, where $g(x) > 0 \Rightarrow x \in Class[1]$ and $g(x) < 0 \Rightarrow x \in Class[2]$.

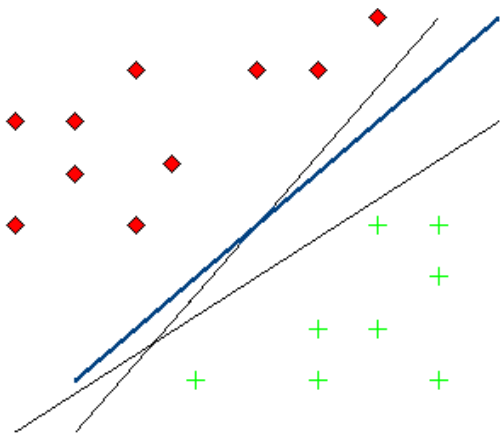

Fig. 7: The simplest discriminating functions

Thus the discriminant function is described by the equation $g(x) = 0$. Distance between the point x and the point of dividing function $g(x) = 0$ is equal to $\frac{|w^t x + w_0|}{\|w\|}$.

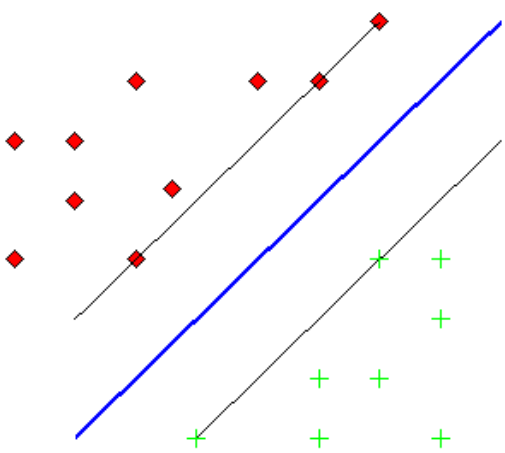

Fig. 8: The maximum dividing corridor.

Let x_i lie on short circuit of border, that is $|w^t x_i + w_0| = 1$. Border width of the dividing margin, is chosen as wide as possible (see Fig. 8). Considering that short strip of border meets the condition $|w^t x_i + w_0| = 1$, then distance from x_i to $g(x) = 0$ is

$$\frac{|w^t x + w_0|}{\|w\|} = \frac{1}{\|w\|}, \tag{8}$$

thus, width of the dividing strip is equal $\frac{2}{\|w\|}$ (see Fig. 9).

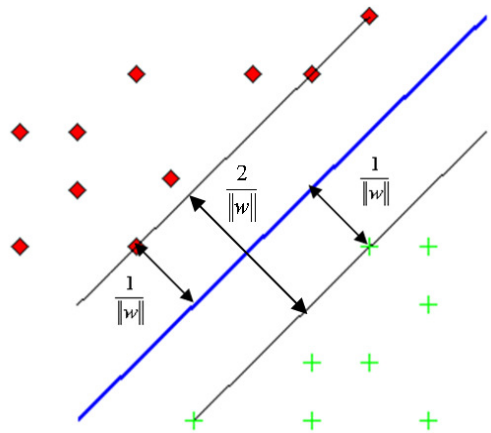

Fig. 9: Illustration of creating support vectors.

To exclude points from the dividing margin, we will write out the condition (9) of belonging to classes.

$$\begin{cases} w^t x_i + w_0 \geq 1 & \text{if } x_i \text{ belongs to class } 1 \\ w^t x_i + w_0 \leq -1 & \text{if } x_i \text{ belongs to class } 2 \end{cases} \quad (9)$$

Let's enter the index function (10).

$$\begin{cases} u_i = 1 & \text{if } x_i \text{ belongs to class } 1 \\ u_i = -1 & \text{if } x_i \text{ belongs to class } 2 \end{cases} \quad (10)$$

Thus, the problem of estimating the dividing function generating the corridor of the greatest width is possible to write down as a problem of minimizing in the following form given as (11).

$$J(w) = \frac{1}{2}\|w\|^2 \to min \quad (11)$$

under the condition $u_i(w^t x_i + w_0) \geq 1$ for all i.

As the objective function is a square function, so this task has the only one resolve.

According to Kuhn-Tucker's theorem the condition (11) is equivalent to the following task

$$L(\alpha) = \sum_{i=1}^{n} \alpha_i - \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} \alpha_i \alpha_j u_i u_j x_i^T x_j \to \max \quad (12)$$

provided that $\alpha \geq 0$ for all i and $\sum_{i=1}^{n} \alpha_i u_i = 0$, where $\alpha = \{\alpha_1, \ldots, \alpha_n\}$ are new variables. Let's rewrite $L(\alpha)$ in the matrix form

$$L(\alpha) = \sum_{i=1}^{n} \alpha_i - \frac{1}{2}\begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_n \end{bmatrix}^T H \begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_n \end{bmatrix}$$

Where coefficients of the matrix H are calculated as follows

$$H_{i,j} = u_i u_j x_i^T x_j \ .$$

The task $L(\alpha) \to max$ is solved by methods of quadratic programming.

After finding the optimum $\alpha = \{\alpha_1, \ldots, \alpha_n\}$ for each i there is verified the conditions

- $\alpha_i = 0$ (it corresponds i is not a support vector);
- $\alpha_i \neq 0$ and $u_i(w^t x_i + w_0 - 1) = 0$ (it corresponds i is a support vector);

Then w from the ratio (4) can be found $w = \sum_{i=1}^{n} \alpha_i u_i x_i$ and the value w_0 is calculated considering that for any $\alpha_i > 0$ and $\alpha_i[u_i(w^t x_i + w_0) - 1] = 0$

$$w_0 = \frac{1}{u_i} - w^t x_i.$$

Then, at last, the discriminant function is received

$$g(x) = (\sum\{\alpha_i u_i x_i \mid x_i \in S\})^T x + w_0.$$

Notice that summing is carried out not on all vectors but only on the set S which represents the set of support vectors i.e. $S = \{x_i | \alpha_i \neq 0\}$.

Unfortunately, the described above algorithm is implementable only for linearly separable sets. In practice this sets are not met frequently. In 1995 there was proposed modified algorithm for solving the problem for nonlinear separable sets. More examples reader can find in works by Cortes & Vapnik (1995), Cristianini & Shawe-Taylor (2000) and Hamel (2009) Let's give the modernization of the algorithm for the case of nonlinearly separable sets.

In order to allow for misclassification in the model, it is entered additional variables ξ_i, which characterize the mistake size on each object of x_i. In the objective function, the penalty for the aggregate error is introduced in the equation (13).

$$\begin{cases} \frac{1}{2}\|w\|^2 + \lambda \sum_{i=1}^{n} \xi_i \quad \rightarrow \quad \min, \\ u_i(w^t x_i + w_0) \geq 1 - \xi_i, \quad i = 1,\ldots,n, \\ \xi_i \geq 0, \quad i = 1,\ldots,n, \end{cases} \qquad (13)$$

Here λ is the parameter specifying the cost of misclassifications. It allows to govern the relation between maximizing width of the dividing strip and minimization of the aggregate error (Bordes et. al. 2005, Hamel 2009).

Penalty size ξ_i for the corresponding object x_i depends on the arrangement of the object in dividing strip. So, if x_i lies on the opposite side of discriminant function, then the penalty size is $\xi_i > 1$. If x_i lies in the dividing strip, but on the same side of discriminant function as the class, then the corresponding weight can take a value $0 < \xi_i < 1$. For the ideal separable case the penalty size is taken as $\xi_i < 0$ (see Fig. 10).

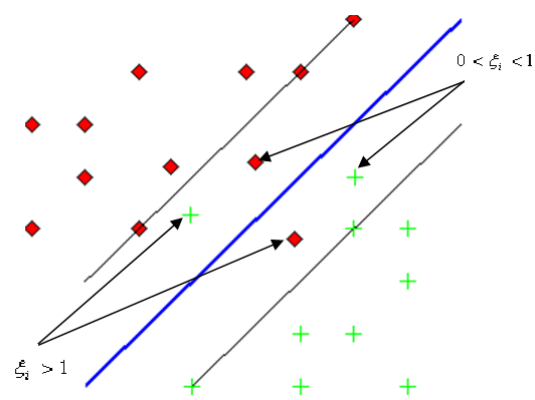

Fig. 10: Points to which penalties are applied.

Then the task (13) can be rewritten in the form below (14)(see Borser et.al. 1992)

$$J(w, \xi_1,\ldots,\xi_n) = \frac{1}{2}\|w\|^2 + \beta \sum_{i=1}^{n} I(\xi_i > 0) \ \rightarrow \ \min, \qquad (14)$$

that is in the way of minimization elements which do not represent the ideal case participate. Here

$$I(\xi_i > 0) = \begin{cases} 1, & \xi_i > 0, \\ 0, & \xi_i \leq 0, \end{cases}$$

when fulfilling conditions $u_i(w^t x_i + w_0) \geq 1 - \xi_i$ and $\xi_i \geq 0$. In the formula (14) the constant β is the weight considering the bandwidth. If β is not enough, then we allow to arrange relatively many elements in the imperfect position, that is, in the dividing strip. If β is big, then we demand existence of small quantity of elements in the imperfect position, that is, in the dividing strip.

Unfortunately, in (14), the problem of minimization is rather difficult, in view of discontinuity $I(\xi_i)$. Instead we will consider a value minimization

$$J(w, \xi_1, \ldots, \xi_n) = \frac{1}{2}\|w\|^2 + \beta \sum_{i=1}^{n} \xi_i$$

with restrictions for all i in the following form

$$\begin{cases} u_i(w^t x_i + w_0) \geq 1 - \xi_i \\ \xi_i \geq 0 \end{cases}.$$

Using Kuhn-Tucker's theorem, from here we receive

$$L(\alpha) = \sum_{i=1}^{n} \alpha_i - \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} \alpha_i \alpha_j u_i u_j x_i^T x_j \ \rightarrow \ \max \qquad (15)$$

Provided that $0 \leq \alpha_i \leq \beta, \ \forall i$ and $\sum_{i=1}^{n} \alpha_i u_i = 0$.

From the ratio (13) we can find $w = \sum_{i=1}^{n} \alpha_i u_i x_i$. The value w_0 is also possible to find, considering that for all i $0 \leq \alpha_i \leq \beta$ and $\alpha_i[u_i(w^t x_i + w_0) - 1] = 0$.

The other idea of the SVM method (in the case when a linear division of classes is impossible), is transition to space of bigger dimension in which such division is possible. Some exaples can be find in works by Bordes et.al (2005), Christiani & Shawe-Taylor (2000), Hamel (2009), Rossi & Villa (2006) and Swidan et.al. (2013).

For solving the nonlinear classification problem by the linear qualifier it is necessary:

- to design data x in space of higher dimension by means of transformation $\Pi(x)$.
- to find a symmetric discriminant function for data $\Pi(x)$.
- the received nonlinear discriminant function can be written down in the following form

$$g(x) = w^t \varphi(x) + w_0.$$

The received symmetric discriminant function for two-dimensional X data can take a form:

$$g\left(x^{(1)}\ x^{(2)}\right) = [w_1\ w_1\ ]\left[x^{(1)}\ x^{(2)}\ \right] + w_0.$$

The one-dimensional discriminant function for nonlinear separable data using the function $\Pi(x)$ = (x, x^2) is written as follows:

$$g(x) = w_1 x + w_2 x^2 + w_0.$$

The example is shown on Fig. 11. For transferring data in space of higher dimension it is used so-called kernel functions.

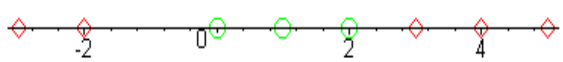

$$\downarrow \ \varphi(x) = (x, x^2)$$

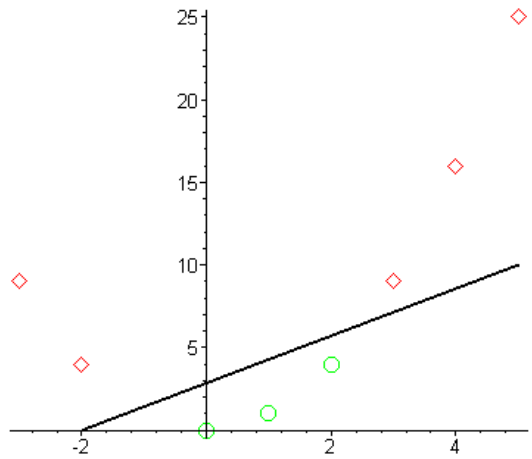

Fig. 11. An example of linear division of sets upon transition to space of higher dimension.

Let's go back to written above (15) the extremum problem of the method of support vectors in the following form

$$L(\alpha) = \sum_{i=1}^{n} \alpha_i - \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} \alpha_i \alpha_j u_i u_j x_i^T x_j \to \max.$$

Let's notice that the optimization depends on the formula $x_i^T x_j$. If we transfer x_i to space of higher dimension using the display function $\Pi(x)$, then it is necessary to calculate the similar formula in space of higher dimension $\Pi(x)^T \Pi(x)$.

The idea of the method consists that it is necessary to find kernel function $K(x_i, x_j) = \Pi(x_i)^T \Pi(x_j)$ and to maximize the following objective function

$$L(\alpha) = \sum_{i=1}^{n} \alpha_i - \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} \alpha_i \alpha_j u_i u_j K(x_i, x_j) \to \max.$$

Let's review the new example and take kernel function in the form$K(x, y) = (x^T y)^2$. It is simple to find out the display $\Pi(x)$ corresponding to the kernel function.

$$K(x, y) = (x^T y)^2 = ([x^{(1)}\ x^{(2)}][y^{(1)}\ y^{(2)}])^2 = (x^{(1)}y^{(1)} + x^{(2)}y^{(2)})^2 =$$

$$= (x^{(1)}y^{(1)})^2 + 2(x^{(1)}y^{(1)})(x^{(2)}y^{(2)}) + (x^{(2)}y^{(2)})^2 =$$

$$= [(x^{(1)})^2, \sqrt{2}x^{(1)}x^{(2)}, (x^{(2)})^2][(y^{(1)})^2, \sqrt{2}y^{(1)}y^{(2)}, (y^{(2)})^2]^T.$$

Thus, the display function can be written in the following form $\Pi(x) = [(x^{(1)})^2, \sqrt{2}x^{(1)}x^{(2)}, (x^{(2)})^2]$.

It is important to noticed that the choice of kernel function is rather difficult.

Let's review the example but more examples in paper by Joachims (2008,2009).

Class [1]: x_1=[1,-1], x_2=[-1,1].

Class [2]: x_3=[1,1], x_4=[-1,-1].

It is illustrated on Fig. 12.

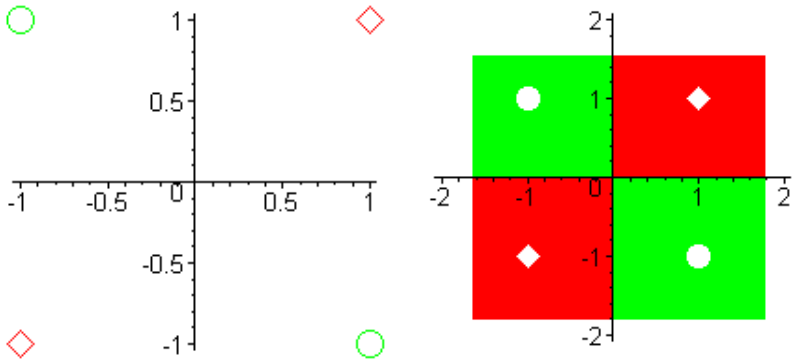

Fig. 12: An example of linearly inseparable sets.

For creation of nonlinear discriminant function we use kernel function in the following form

$$K(x_i, x_j) = (x_i^T x_j + 1)^2.$$

The display function Π corresponding to the kernel function can be written as follows

$$\Pi(x) = [1, \sqrt{2}x^{(1)}, \sqrt{2}x^{(2)}, \sqrt{2}x^{(1)}x^{(2)}, (x^{(1)})^2, (x^{(2)})^2\ ].$$

Further it is necessary to maximize the objective function

$$L(\alpha) = \sum_{i=1}^{n} \alpha_i - \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} \alpha_i \alpha_j u_i u_j (x_i^T x_j + 1)^2 \to \max$$

with restrictions

$$\alpha_i \geq 0,\ \alpha_1 + \alpha_2 - \alpha_3 - \alpha_4 = 0.$$

Let's rewrite the task in the following form

$$L(\alpha) = \sum_{i=1}^{4} \alpha_i - \frac{1}{4}\alpha^T H \alpha\ ,$$

where $\alpha = [\alpha_1 \quad \alpha_2 \quad \alpha_3 \quad \alpha_4]^T$ and $H = \begin{pmatrix} 9 & 1 & -1 & -1 \\ 1 & 9 & -1 & -1 \\ -1 & -1 & 9 & 1 \\ -1 & -1 & 1 & 9 \end{pmatrix}$.

For finding the maximum, we can calculate the partial derivatives with regards to unknown parameters α_i and equate zero these derivatives to zero. Then, we will find values of unknown on which the maximum of the objective function is reached.

$$\frac{d}{d\alpha} L(\alpha) = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} - \begin{pmatrix} 9 & 1 & -1 & -1 \\ 1 & 9 & -1 & -1 \\ -1 & -1 & 9 & 1 \\ -1 & -1 & 1 & 9 \end{pmatrix} \alpha = 0.$$

Solving the system equations, we receive $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \frac{1}{4}$, and

$$w = \sum_{i=1}^{4} \alpha_i u_i \Pi(x_i) = \frac{1}{4}(\Pi(x_i) + \Pi(x_2) - \Pi(x_3) - \Pi(x_4)) = [0 \quad 0 \quad 0 \quad -\sqrt{2} \quad 0 \quad 0]$$

and, at last, the nonlinear discriminant function can take the following form

$$g(x) = w\Pi(x) = \sum_{i=1}^{6} w_i \Pi_i(x) = -\sqrt{2}(\sqrt{2}x^{(1)}x^{(2)}) = -2x^{(1)}x^{(2)} .$$

The result is shown on Fig. 13.

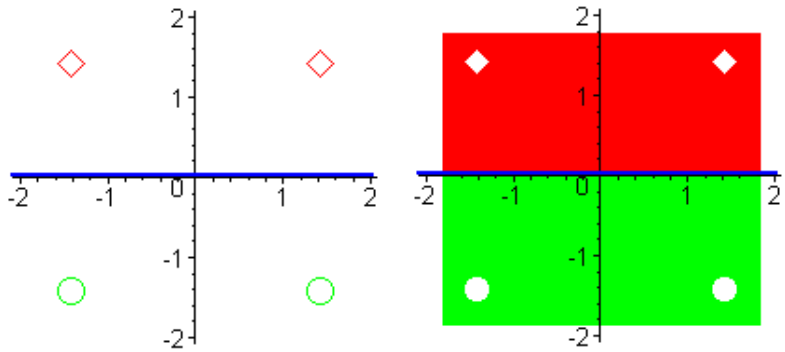

Fig.13: An example of linearly inseparable sets after using the kernel function

In conclusion we give a few of the most widespread kernel functions used for division of classes:

- The polynomial homogeneous kernel $K(x_i, x_j) = (x_i^T x_j)^d$.
- The polynomial heterogeneous kernel $K(x_i, x_j) = (x_i^T x_j + 1)^d$.
- The radial basis function (RBF kernel) $K(x_i, x_j) = exp(-\frac{\|x_i - x_j\|^2}{2\sigma^2})$.
- The sigmoid kernel $K(x_i, x_j) = \tanh\big((x_i^T x_j + 1)\big)$

As a result of training the SVM classifier, support vectors are determined that are closest to the hyperplane separating the classes and carry all the information about the separation of classes. The main problem that arises when training an SVM classifier is the lack of selection recommendations values of the regularization parameter C, kernel function $K(x_i, x_j)$, and as well as the values of the parameters of the kernel function itself, at which high accuracy of data classification will be ensured. This problem can be solved by replacing optimization algorithms with an algorithm using swarm intelligence (PSO).

Quality assessment of the SVM classifier can be performed using various classification quality indicators as it has been shown by Demidova et. al. (2017). This can be for example an indicator that consider cross-validation data, indicators of classification accuracy and completeness, an indicator based on the analysis of the ROC curve, etc.

Using Particle Swarm Optimization (PSO) in ensemble with SVM

When implementing the traditional PSO algorithm, the *n*-dimensional search space (where *n* is the number of parameters to be optimized) is inhabited by a swarm of *m* particle agents (elementary solutions). The position (position) of the *i*-th particle is determined by a vector that defines a certain set of optimization parameter values. Moreover, in the analytical record of the objective function of the optimization algorithm (the optimum is, for example, the minimum of which must be found), such parameters may occur in either explicit or implicit form coding as $x_i = (x_i^1, x_i^2, \dots, x_i^n)$, $u(x) = u(x^1, x^2, \dots, x^n)$. During the swarm initialization process, particles are randomly located throughout the search area. Moreover, each *i*-th particle has its own velocity vector, which at each particular moment of time corresponding to a certain iteration of the PSO algorithm and in a certain way affects the coordinates of the position of the *i*-th particle These coordinates in the *n*-dimensional search space uniquely determine the value of the target function, which is some solution to the optimization problem $(i = 1,\ 2, \dots, m)$ $v_i \in R^n$.
For each position of the n-dimensional search space visited by the *i*-th particle, the value of the objective function *u* is calculated. In this case, each *i*-th particle remembers what the best value of the objective function it personally found, as well as the coordinates of the position in *n*-dimensional space corresponding to this value of the objective function. In addition, each *i*- th particle "knows" where the position is located, which position is the best (from the point of view of achieving the optimum objective function) among all the positions that the particles "explored" (tested). Thanks to this, an instant exchange of information between all swarm particles is simulated. At each iteration, the particles adjust their speed so that, on the one hand, they are closer to the best position that the particle found itself, and at the same time closer to the position, which is currently globally the best (among the totality of positions found by all particles). After a certain number of iterations, the particles should gather near the best position

(globally best according to the results of all iterations). However, it is possible that part of the particles of the swarm will remain somewhere in a relatively good local optimum or several such optima.

The convergence of the PSO algorithm depends on how the particle velocity vectors are corrected.

In this case it is possible to "degenerate" a particle, i.e. to change its coordinate by the type number of the kernel function whose particles show the highest possible classification quality. With "rebirth", it is possible to change the values of the parameters x_{i1}, x_{i1}, and C_i so that they correspond to a new type of kernel function (consider, the ranges of changes in their values). Particles that have not undergone "degeneration" carry out movement in their own search space (of a certain dimension).

The proportion of particles participating in the "degeneration" is determined before the algorithm is launched, it is recommended to choose from 15 to 25% so that the particles can explore their search space, but do not stay there for long if their indicators turn out to be the worst.

In the course of experiments conducted for various experimental data, for a specific set, several SVM classifiers were trained with different types of kernel functions, different values of the parameters of the kernel function and the regularization parameter; at the same time, training and test samples were randomly generated from the initial data. After that, the principle of maximum decorrelation (for selecting private classifiers into an ensemble) and various strategies for the formation of an aggregated classifier were applied to trained classifiers. In determining the aggregated decision, the majority voting method was also used.

The proposed modification of the PSO algorithm will be described in more detail in the next publication.

Conclusions

In summary, the article considers the classification problem. It is a task in which there are many objects that need to be divided in some way into classes. The algorithms that are able to classify any object from the original set are analyzed.

In the first part of the paper a text classification is proposed. Two measures were considered as a measure of similarity of documents: one based on the cosine angle between vectors, while the other used Voronoi polyhedrons. Since the problem of finding an optimal solution by classical methods is quite difficult, a genetic algorithm was used. Proposed methods were tested on the Reuters document collection and proved to be relatively more effective.

In the second part of the work on selection of kernel functions in non-linear SVM methods the use of swarm intelligence (PSO) was proposed. Modified PSO algorithm allows to determine the best type of kernel functions, the values of kernel function parameters and the value of the regulation parameter, which ensures high quality object classification at reasonable time costs, which are much lower than in case of using traditional PSO algorithm. Good results were obtained thanks to "degeneration" of particles in modified PSO algorithm. Particles participating in the "rebirth" process change their type of kernel function to the type corresponding to the particle with the highest classification accuracy. In addition, these particles change the parameter values according to their ranges of change, if necessary. Further research will be related to the development of recommendations for the application of detailed description of PSO algorithm modifications.

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Application of the TOPSIS Method for Assessing Sustainable Development in the Context of Education and Health Determinants in ASEAN Countries in 2019

Adam STECYK

Professor of the Univeristy of Szczecin, PhD
Institute of Spatial Management and Socio-Economic Geography, University of Szczecin, 70-453 Szczecin, Poland, adam.stecyk@usz.edu.pl

Abstract

The aim of the paper is to present the practical use of a multi-criteria TOPSIS method for linear ordering of multi-feature facilities, in order to expertly assess the level of sustainable, education and health development of South East Asia countries (ASEAN) in 2019. The article has been divided into two main parts. The theoretical (methodological) part contains the characteristics of TOPSIS method and in the empirical part, the results of the analysis were presented. The main source of statistical data is the annual report published by The Association of Southeast Asian Nations: ASEAN Statistical Yearbook 2019, which contains information on most important development areas (e.g. population, education and health, employment, macroeconomics, transport, tourism, agriculture, etc.). The proposed research concept can be used to build the computational models and indicators in order to look for more complex dependencies among factors which determine sustainable development of studied phenomena and objects.

Keywords: sustainable development, education, health, social governance, mcdm, topsis, asean

Introduction

In the era of progressing globalization and the information society, the wealth of knowledge and flow of information is essential for sustainable development and economic growth. The big problem with which modern decision makers meet is, above all, a very large amount of information and difficulties in the interpretation of statistical data. It is true that many institutions and government agencies conduct research on the development of individual continents, countries, areas and social groups, resulting in integrated indicators describing changes in the social and economic development (Hummels and Argyrou 2020), (Glavic and Lukman 2007), (Steffen, et al. 2015), (T. Borys 2011), (Gasparatos, El-Haram and Horner 2008), (Ness, et al. 2007), (Stagl 2007). Nevertheless, the presented results have the character of an aggregate that synthetically describes the studied phenomena or objects. An example of this can be SDG index (sustainable development goals), published for years by the UN and pointing to the main areas of development such as: poverty and hunger, health and education, economic growth, reduction of inequalities, quality of life, climate change, etc. This view is very useful in making comparisons at the global level in very general terms. An investigator who wants to make a more detailed analysis must be equipped with tools and skills to build his own computational models and indicators in order to look for more complex dependencies. In other words, it is time to prepare for the searching of such data analysis methods, which on the one hand, will give the best description on the studied objects, but also will be easy to use in analyzing significant problems. The contemporary analytical issues are of interdisciplinary nature, therefore research on sustainable development must take into account a wide range of economic, social, demographic, ecological and legal factors which can be compared with each other and lead to meaningful conclusions. One of the proposals that meets such expectations is the application of the multi-criteria decision making methods (MCDM) in the study of dynamically changing reality (Saaty & Ergu, 2015), (Ruano, 2018), (Nermend, 2017), (Bedir, Özder, & Eren, 2016), (Trzaskalik, Wielokryterialne wspomaganie decyzji. Przegląd metod i zastosowań, 2014), (Behzadiana, Kazemzadeh, Albadvi, & Aghdasi, 2010), (Saaty R. , 2002), (Diech, Korbicz, Rutkowski, & Tadeusiewicz, 2000), (Bana e Costa & Vansnick, 1999), (Edwards & Barron, 1994), (Saaty T. , 1988) (Brans & Vincke, 1985).

Multi-criteria decision-making approaches allow selection of the variant best suited to specific targets and preferences (selection problem) and positioning of the considered decision-making alternatives from the best to the worst (ranking

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problem). In other words, the MCDM methods spotlight the decision issues in which the set of all satisfactory decisions is a discrete, containing a finite, predetermined number of possible variants of the solution (Bewszko, 2004).

The main methods include such tools as ELECTRE (Elimination et Choice Translating Reality) I, II, III, IV (Banayoun, Roy, & Sussman, 1966); SMART and SMARTER (Simple Multi-Attribute Ranking Technique and Simple Multi-Attribute Ranking Technique Exploiting Ranks) (Edwards & Barron, SMARTS and SMARTER: improved Simple methods for mulitiattribute measurement, 1994); MACBETH (Measuring Attractiveness by a Categorical Based Evaluation TecHnique) (Bana e Costa & Vansnick, Sur la quantification des jugements de valeur: L 'approche Macbeth, Cahiers du LAMSADE, 1999); PROMETHEE I, II, MAPPACC, PRAGMA (Diech, Korbicz, Rutkowski, & Tadeusiewicz, 2000); DEA (data envelopment analysis) (Charnes, Cooper, & Rhodes, 1978); TOPIS (The Technique for Order of Preference by Similarity to Ideal Solution) (Boutkhoum, Hanine, Agouti, & Tikniouine, 2017), (Jahanshahloo, Hosseinzadeh Lotfi i Izadikhah, 1999); AHP/FAHP (Fuzzy/Analytic Hierarchy Process) and ANP (Analytic Network Process) (Saaty R. , 2002).

The aim of the paper is to present the practical use of a multi-criteria TOPSIS method, in order to expertly assess the level of sustainable, education and health development of South East Asia countries (ASEAN) in 2019.

Methodical assumptions and analysis

The research procedure proposed in the article has the following stages:

1. Discussing the methodical issues of the TOPSIS method.
2. Presenting the source data and analytical model.
3. Conducting research.

The multi-criteria method used in the discussed example is the TOPSIS method, which consists of determining the distance of the analyzed phenomenon or object (set with a finite number of elements) from the so-called, ideal and anti-ideal solution, resulting in a final, synthetic indicator that allows to create a ranking of the tested objectives (alternatives). The best element in the study is the one whose distance from the ideal solution is the smallest and at the same time has the largest distance from the anti-ideal solution. The use of the TOPSIS method includes the following steps:

1. Determination of weights for selected criteria; in the analyzed example the weight of the ech criteria is the same: 12,5%.

2. Creating a normalized data matrix according to the formula.

$$z_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \quad (1)$$

where i=1 ,2,…, m and j=1,2,…,n

3. Weight application according to the formula $v_{ij} = w_j \otimes z_{ij}$

4. Determination of the vector value of the ideal solution A^+ and anti-ideal A^- (positive ideal solution, negative ideal solution)

$$a^+ = (a_1^+, a_2^+, \dots, a_n^+) := \left\{ \left(\begin{matrix} max v_{ij} \\ i = 1,.,m \end{matrix} | j \in J_Q \right), \left(\begin{matrix} min v_{ij} \\ i = 1,.,m \end{matrix} | j \in J_c \right) \right\} \quad (2)$$

$$a^- = (a_1^-, a_2^-, \dots, a_n^-) := \left\{ \left(\begin{matrix} min v_{ij} \\ i = 1,.,m \end{matrix} | j \in J_Q \right), \left(\begin{matrix} max v_{ij} \\ i = 1,.,m \end{matrix} | j \in J_c \right) \right\} \quad (3)$$

where J_q is a beneficial criteria, and J_c is a non-beneficial (cost) criteria.

5. Calculation of the Euclidean distance of the tested objects from the ideal and anti-ideal solution:

$$S_i^+ = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - a_j^+\right)^2} \quad (4) \qquad S_i^- = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - a_j^i\right)^2} \quad (5)$$

where i = 1,2, ..., m and j = 1,2, ..., n

6. Calculation of the performance score R_i for the examined objects, according to the formula:

$$R_i = \frac{s_i^-}{s_i^+ + s_i^-} \quad (6)$$

The performance score R_i of the highest value are the best solution (the best alternative) in the considered problem of linear ordering (ranking).

The presented TOPSIS method can be used to build an original indicator on selected aspects (such as health and education) regarding sustainable development in the countries of south-east Asia (ASEAN). The main source of statistical data is the annual report published by The Association of Southeast Asian Nations: ASEAN Statistical Yearbook 2019[1], which contains information on such development areas as: population, education and health, employment, macroeconomics, trade in goods and services, investments, transport, tourism, agriculture, manufacturing etc. The main assumption in the study was the construction of an original indicator in the area of education and health, containing the following 7 variables (the statistics refer to 2019, and in the absence of information for individual countries, data from previous years were used):

- C1 – Crude Death Rate;
- C2 – Prevalence of Malaria per 1000 population;
- C3 – HIV Prevalence Rate Among 15-49 Year Old People;
- C4 – Adult Literacy Rate;
- C5 – Life Expectancy at Birth;
- C6 – Access to safe drinking water;
- C7 – Access to improved sanitation.

Table 1: Statistical data for selected variables.

Country	C1	C2	C3	C4	C5	C6	C7
Brunei Darussalam	0,039	1,700	0,000	0,966	80,700	1,000	0,920
Cambodia	0,061	8,900	0,050	0,844	69,900	0,650	0,760
Indonesia	0,071	0,800	0,004	0,954	71,100	0,720	0,680
Laos	0,067	7,800	0,003	0,847	67,000	0,780	0,750
Malaysia	0,049	7,600	0,004	0,942	75,500	0,970	0,960
Myanmar	0,081	2,300	0,007	0,897	66,700	0,800	0,810
Philippines	0,065	0,500	0,001	0,965	69,200	0,920	0,740
Singapore	0,048	0,000	0,002	0,970	83,100	1,000	1,000
Thailand	0,079	1,600	0,003	0,929	75,500	0,980	0,930
Vietnam	0,058	35,000	0,011	0,950	76,500	0,980	0,820

Source: Own elaboration.

An important element in the TOPSIS analysis is to understand the nature of the assessment, which can take on the characteristics of benefcial or non-beneficial (cost) criteria. In the analyzed example, criterion C1 – Crude Death Rate, C2 – Prevalence of Malaria per 1000 population and C3 – HIV Prevalence Rate Among 15-49 Year Old People, are cost criteria (the desired value should be kept to a minimum); the remaining C4-C7 criteria are beneficial criteria for which the desired values are going to the maximum.

According to the TOPSIS methodology, a normalized weighted matrix was created (equivalence of criteria was adopted, which means the same weights for each criterion), and then vectors for ideal and anti-ideal solutions were calculated (table 2 and table 3).

[1] https://www.aseanstats.org/publication/asyb-2019/

Table 2: A normalized weighted matrix for the ASEAN countries.

Country	C1	C2	C3	C4	C5	C6	C7
Brunei Darussalam	2,7931	0,6419	0,0000	4,7097	4,9506	5,0885	4,9334
Cambodia	4,3687	3,3604	13,6969	4,1149	4,2880	3,3076	4,0754
Indonesia	5,0849	0,3021	1,0958	4,6512	4,3617	3,6638	3,6464
Laos	4,7984	2,9450	0,8218	4,1296	4,1101	3,9691	4,0218
Malaysia	3,5093	2,8695	1,0958	4,5927	4,6316	4,9359	5,1479
Myanmar	5,8011	0,8684	1,9176	4,3733	4,0917	4,0708	4,3435
Philippines	4,6552	0,1888	0,2739	4,7049	4,2451	4,6815	3,9681
Singapore	3,4377	0,0000	0,5479	4,7292	5,0978	5,0885	5,3624
Thailand	5,6578	0,6041	0,8218	4,5293	4,6316	4,9868	4,9870
Vietnam	4,1539	13,2149	3,0133	4,6317	4,6929	4,9868	4,3971

Source: Own elaboration.

Table 3: Euclidean distance from the ideal and anti-ideal solution and a performance score for the ASEAN countries.

Country	S^+	S^-	R_i
Brunei Darussalam	0,78618	18,99088	0,96025
Cambodia	14,3959	9,96924	0,40916
Indonesia	3,47372	18,07015	0,83876
Laos	4,21371	16,51733	0,79674
Malaysia	3,20203	16,62809	0,83853
Myanmar	4,08555	17,09747	0,80713
Philippines	2,53283	18,80242	0,88128
Singapore	0,84595	18,99004	0,95735
Thailand	3,10734	18,16315	0,85391
Vietnam	13,6631	10,99384	0,44587

Source: Own elaboration.

On the basis of the obtained results, a performance score R_i was calculated, enabling the ranking of ASEAN countries according to specific education and health criteria C1-C7. Table 4 contains a list of ASEAN countries, ordered by the score (descending sorting). Detailed analysis of the results obtained, exceeds the scope of this study (for this purpose a specific expert sensitivity analysis of individual criteria should be carried out), nevertheless, it is possible to group countries according to the education and health factor and a subjective reference point based on expert knowledge in the area of development. The group achieving a satisfactory level of development may include countries that achieved the $R_i > 0.9$, which is Brunei Darussalam and Singapore. The group of countries for which the ranking belongs to the range from 0.5 to 0.8 may be defined as a set with a sufficient level of development. The remaining countries can be included in the group with insufficient level of development and requiring special attention in the future.

Table 4: Ranking for the ASEAN countries in education and health area in 2019.

No.	Country	Ranking
1	**Brunei Darussalam**	0,96025
2	**Singapore**	0,95735
3	**Philippines**	0,88128
4	**Thailand**	0,85391
5	**Indonesia**	0,83876
6	**Malaysia**	0,83853
7	**Myanmar**	0,80713
8	**Laos**	0,79674
9	**Vietnam**	0,44587
10	**Cambodia**	0,40916

Source: Own elaboration

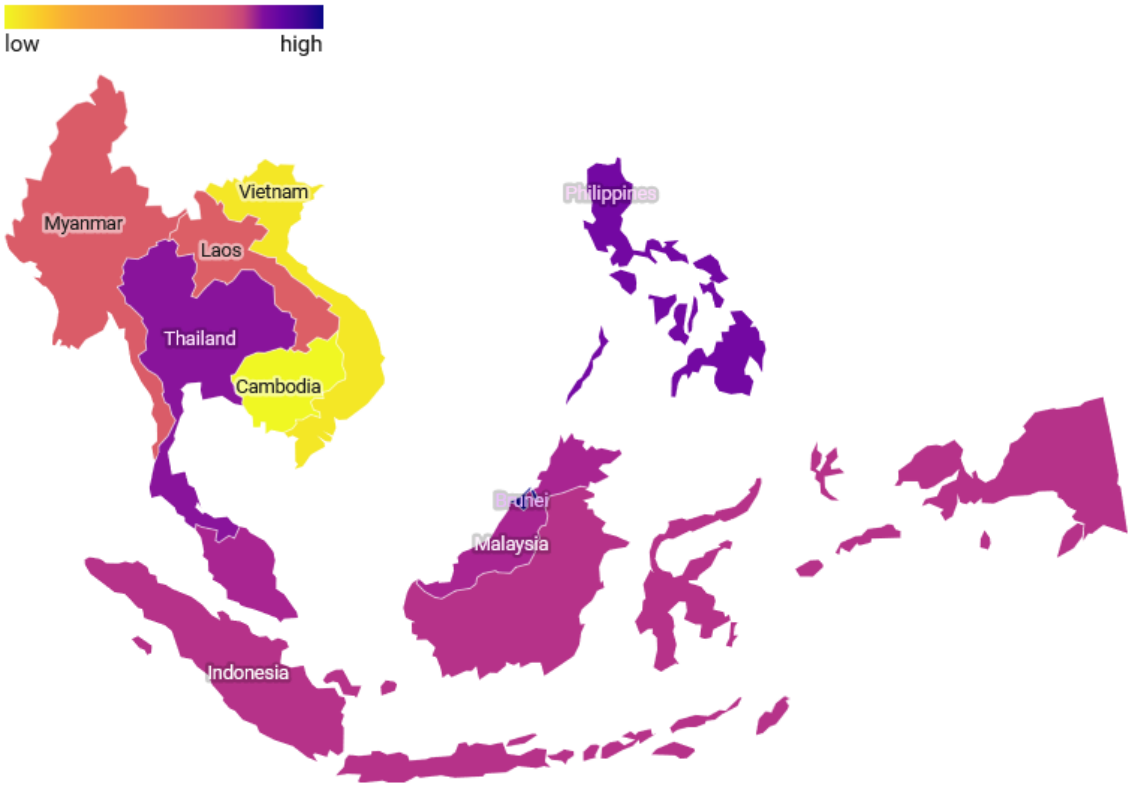

Figure 1: Map ranking for the ASEAN countries in education and health area in 2019.
Source: Own elaboration

Summary and conclusions

An important element of conducting scientific research is a critical approach to the obtained results and the selected research model. From this point of view, it is assumed that the proposed concept is universal, but it can also be a starting point for further, in-depth analyzes and scientific discussions, indicating potential modifications of specific elements, both in terms of content and methodology. However, it is already possible to make a preliminary summary of both the methodological and substantive areas in the context of sustainable development of ASEAN countries in 2019. The most important applications include:

1. The key stage of the analysis is the proper selection of criteria determining the level of assessment of education and health development of the ASEAN countries. From this point of view, the proposed C1-C7 factors are a subjectively selected set that can be subjected to any modifications, depending on the purpose of the analysis. What's more, the concept proposed is of a general nature. It seems reasonable to specify the purpose of the analysis within a more limited or completely different area, such as ecology, demography, macroeconomics, etc. and the selection of the new appropriate characteristics.
2. In terms of methods, the proposed methodology, based on a TOPSIS method, deserves attention. The question arises about the possibility of modifying the computational model both in the area of choice (eg parallel analysis based on other models and comparison of results), and in the method itself (eg, using fuzzy numbers in TOPSIS analysis, etc.)

Summing up, it should be noted that regardless of the substantive (eg choice of criteria) and methodical problems (method selection), the use of multi-criteria methods will be increasingly applicable to decision-makers responsible for both local and central politics, as well as managers in commercial enterprises. Any such study, allows a new look at an analised problem; the comparisons between results and carrying out a sensitivity analysis enables a deep understanding of the socio-economic processes taking place in the researched areas. What's more, experimenting with new computational models allows to strive for the best description of the world around us and understanding the complex relationships within it.

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Convergence of Communication Systems as The Foundation of a Digital Information Ecosystem in The Context of Sustainable Development

Agnieszka BUDZIEWICZ-GUŹLECKA

University of Szczecin, Szczecin, Poland
agnieszka.budziewicz-guzlecka@usz.edu.pl

Anna DRAB-KUROWSKA

University of Szczecin, Szczecin, Poland
anna.drab-kurowska@usz.edu.pl

Abstract

Rapid changes of technology have forced economies and societies to shift their activity to the digital environment. The article highlights the use of new business opportunities in the context of convergent services that lead to the development of digital information ecosystems. Objectives of the article are as follows:

- defining the concept of convergence,
- defining the concept of a digital information ecosystem,
- determining the level of convergent services in the business environment, and
- developing a model of action for those who create the digital information ecosystem.

In order to achieve these objectives, the article refers to the essence of the ecosystem, which is a basis for the research problem. Additionally, literature analysis is presented which has enabled to develop a model action to enhance convergence in the digital information ecosystem.

The article uses research methods, such as critical analysis of scientific literature, synthesis and generalization, questionnaire survey and graphical visualization.

Keywords: Information Ecosystem, Convergence, Digital Economy

Introduction

Advancement in information technology contributes to the development of the digital economy. Technology is the ultimate driving force of the evolution toward the information society and a basis of the process. The development of technology has translated into the development of telecommunication and information technology, and thus into the development of a broad information technique. The process of building a digital information ecosystem is based on the creation of an appropriate ICT infrastructure, where technology (Internet) forms the basis of the information society and e-economy. Access to and range of the Internet are particularly important. The development in this area has created better communication opportunities, while at the same time led to the amalgamation of previously separate technologies and services, in other words their convergence[1]. It should be noted that the growing convergence has caused the expansion of communication technologies in all spheres of social and economic life. This is a subject of a number of studies (Jabłoński, 2008, Quah, 1996, Delgado, Porter, Stern, 2014, Borsi, Metiu, 2015). The expansion is reflected in digital information ecosystems.

The concept of convergence

It should be noted that convergence trends have been observed for many years and they result from the development of telecommunications, globalization of networks, and the introduction of innovative technologies. In Europe, the convergence began in 1987. The first step in the process of defining the convergence was the publication by the

[1] The word "convergence" comes from the Latin *convergere* which means to converge.

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European Commission of a Green Paper on the convergence of telecommunications, media and information technology sectors and the implications for Regulation - towards the information society approach (*1997)*. This document was developed as a response to the growing impact of modern technologies on narrowing down differences between telecommunications and audiovisual sectors and the growth of services which no longer could be attributed to one sector, in particular due to new information media.
As defined in this document, convergence is:

- capability of different networks to convey similar services,
- process of combining computers, TV sets and telephones into a single device.

D. C. Moschella (1997) in the book: *Waves of power: The dynamics of global technology leadership* defined convergence as 4C: Computers, Communications, Consumer Electronics and Content. He noted that in the future we can expect dynamic amalgamation of communications, content, information technology and consumer electronics, as we observe it today.

Therefore, the description of convergence should relate to the following key areas:

- service convergence (Babis, 2011), i.e. the possibility of providing identical or similar electronic communications services via different networks and terminals. Service convergence my involve the following (1) migration of services, which previously have been typical of a given sector, to another sector, most often through other technologies, (2) provision of common services, both known and offered in traditional networks, as well as entirely new ones developed because new opportunities have been created in converged networks, (3) creation of services to support network substitution, i.e. Services that make one network similar to another, and (4) substitutability. The convergence changes communication patterns and determines communication roles of
- technological convergence (Noll, 2002), which involves transmission of all types of electronic communication signals, regardless of their source, in a single digital form within a common transmission medium:

- convergence of networks by the integration of multiple multimedia applications (data, voice, video, photos) on a common IP-based platform with the global Internet. The convergence of telecommunications and information networks has led to the creation of so-called smart networks.
- convergence of devices (Gilder, 1994, Carey, 2015) involves the combination of different functions within a single device. According to some authors (Jenkins, 2001, Vukanovic, 2018), we live surrounded by media and we will use all types of media that are interconnected.

- economic convergence:

- convergence of markets, which means the merger of telecommunications, information technology and media markets,
- corporate convergence which involves merger of businesses to concentrate capital (joint venture), form consortia, strategic alliances, and equity mergers to promote synergies. They write about such synergy Budziewicz-Guźlecka, Czaplewski, Drab-Kurowska (2018),
- regulatory convergence, or harmonization of regulations due to the convergence of services and markets. It is very difficult to determine the role of the regulator in industry convergence. The challenge for regulators is to develop coherent and suitable regulations that do not hamper the development of a given sector, but instead encourage technological innovation.

The authors claim that all these areas are components of convergence.

On the one hand, a rapid technological convergence results in the creation of new services, new distribution platforms and new devices. On the other hand, it extends the convergence market to include new actors, which have so far been active only in one sector (e.g. telecom operators) (Budziewicz-Guźlecka, 2009).

For example, next generation networks (NGN) have eliminated the separation of voice and data, and provided a transmission of single IP pocket network which is common to all multimedia (voice, data, video). The convergence of telecommunications and information networks has led to the creation of so-called smart networks. However, we also need to emphasize the social aspect. C. Mercer (2003) has payed particular attention to the social aspect. He sees convergence as "a new, powerful force based on the interaction between producers and consumers, in which consumers, by virtue of their interactivity, can become creators. Furthermore, "progressing integration of production and consumption through various media, culture and creative industries marks the emergence of a global convergence culture based on increasingly participatory and interactive involvement of different media and industries, between people and their media, as well as professionals and amateur media creators" (Deuze, 2009, Hardy, 2017). As Budziewicz-Guźlecka (2019) claims that convergence is not, however, self-existent, it fulfills as a result of human

actions, decisions, goals, and impact assessment. Convergence is therefore a social phenomenon resulting from what is happening in and with the society.

According to L. Zachera (2007), convergent services offered by networks not only generate or enable new types and forms of activity but also create a new space for people to live and create. It needs to be emphasized that the development of technologies includes both telecommunication networks and devices used by individuals to communicate, as well as functionalities of these devices and software that supports complex communication processes. Key technologies that have significantly influenced communication over the past decades include personal computer, accessible public computer network – the Internet, electronic mail, mobile phone, mobile devices, e.g. smartphone, tablet, instant messengers, and social networks.

The proliferation of these solutions has led to a major change in communication behavior and in the economy as such. These changes are global and virtually affect almost entire societies and their ecosystems.

The Essence of the Business Ecosystem

The classic approach of the business ecosystem is the analogy to biological ecosystems. It means that activities undertaken by enterprises have some sort of impact on the quality of the network, which in turn has a positive or negative impact on the efficiency. It should be stressed that the business ecosystem is a purposeful structure of multilateral arrangement between actors who focus their activities on a key value and aim to create a product or service that is in line with consumer demands (Adner, 2017). Definitions found in the specialist literature indicate that this is an arrangement involving many organizations from different sectors which comprise a strategic community of interests and values (Kiyotaki, Moore, 1997). The structure of a classical business ecosystem consists of suppliers (indirect and direct), producers of leading and complementary products or services (including ecosystem leaders), competitors (direct and potential), stakeholders (investors, owners, business associations, trade unions) and the government and quasi-governmental regulatory agencies (Kiyotaki, Moore, 1997). Interactions between parties involved are based on the flow of resources and information, from highly specialized to highly generalized (Kandiah, Gossain, 1998).

The main features of ecosystems include:

– diversity, or the number of real-time participants of a given system, and
– resilience to system disturbances related to the diversity of participants/species.
It should be stressed that a more versatile system is more stable and adaptable to change.

Convergence and The Digital Information Ecosystem

The phenomenon of convergence has undeniably affected the contemporary digital information ecosystem. The influencing of economic processes that take into account information resources in ecosystems is one of the pillars of the knowledge-based economy, which is a precondition of sustainable development. It needs to be stressed that the analysis of information should be seen as a method supporting economic processes streamlined to promote sustainable growth. In this context, the analysis of the information ecosystem allows to explore the structure of phenomena, processes and information flows within ecosystems and in the cybernetic context of the ecosystem, as shown in Figure 1.

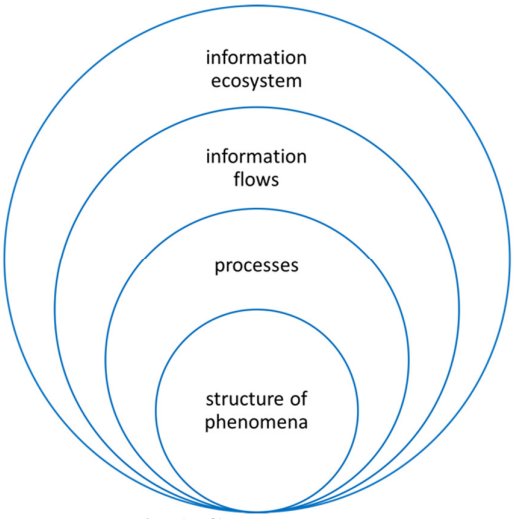

Fig. 1: Cyber-ecosystem

Source: the authors

It should be stressed that ecosystems are increasingly often digital. This leads to the convergence of digital platform standard and benefits participants of the process. The current digitization promotes integration of the inter-organizational actors of the digital information ecosystem. Moreover, it is also an important factor inducing changes to competition and the organization of information sectors. Today, businesses, consumers, products and services are connected via digital networks. This leads to increased network effects and value-creation in information ecosystems (Paulus-Rohmer, Schatton, Bauernhandel, 2016). The phenomenon is shown in Figure 2.

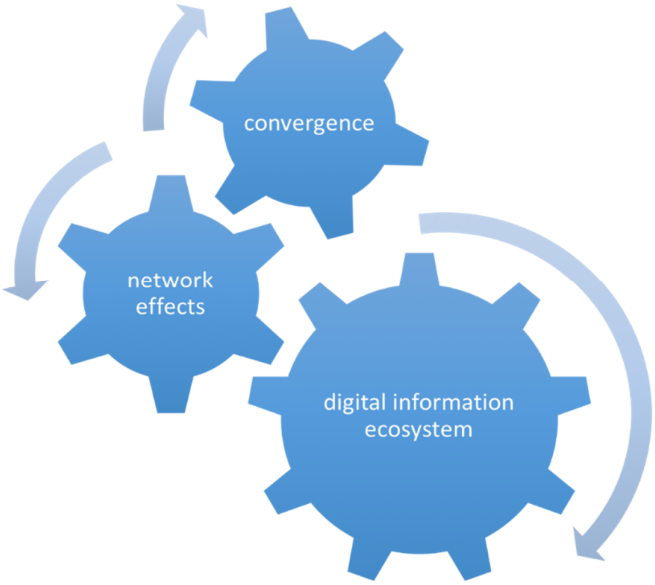

Fig. 2: Creation of value in information ecosystems

Source: the authors

A digital information ecosystem in the context of convergence

The literature indicates that due to the rapidly changing conditions in ecosystems, businesses need to undergo agile digital transformation (Markus, Loebbecke, 2013). This is linked to platforms that enable ecosystem participants to use services, tools or technologies with the aim to increase benefits for individual companies and improve their performance (Iansiti, Levien, 2004). This applies to a specific ecosystem – a digital ecosystem based on platform technologies. The ecosystem, which uses the platform as an integrating component, consists of a stable platform provider, businesses and people – platform-based products and services providers and end customers. In many instances, end customers also include companies, not just individuals (Corallo, Passiante, Prencipe, 2007).

Platforms are described as places that create virtual environments. Such environments offer new opportunities to create value based on the involvement of participants and highly accessible web-based technologies (Bertot, Jaeger, Grimes, 2010). These technologies include the following: Internet, software, multimedia, virtual reality tools, intelligent agents (Nambian, Baron, 2007). These platforms can take different forms.

The ecosystem research focuses primarily on constituent elements, the role of the ecosystem and its strategy. It shows that key players form a platform while niche players add value to it (Stanczyk-Hugit, 2015). This is linked to the digital policy of linking business processes through platforms (Budziewicz-Guźlecka, Drab-Kurowska, 2017 and 2012) (mainly digital ones). It is worth adding that, in line with the digital business policy, the processing of designing products or services itself is geared toward convergence. The adoption of the digital policy by businesses should be preceded by a detailed examination of interactions between organizations that comprise the business ecosystem, its structure and roles. The impact of digitization on interactions between digital policy and the business ecosystem is shown in Figure 3.

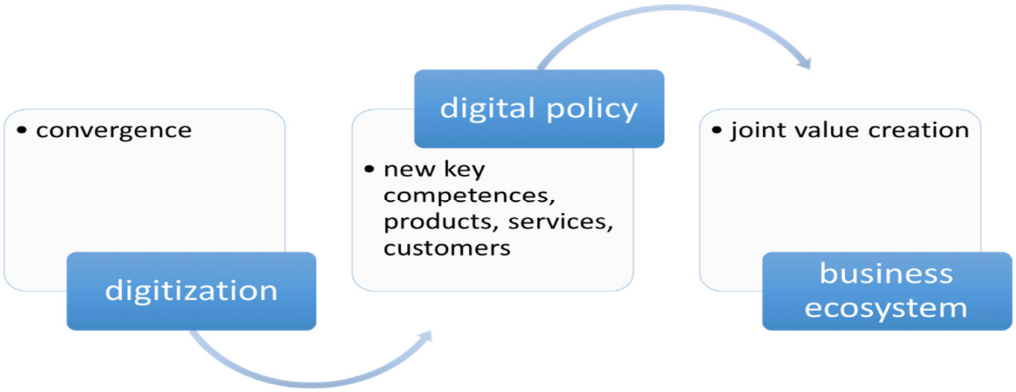

Fig. 3: Impact of digitization on interactions between digital policy and business ecosystem
Source: the authors

The digital business policy emphasizes the resource-based approach to business, while stressing the importance of cooperation and business-to-business relations. This implies ecosystem-specific properties, while maintaining principles and assumptions of the resource theory. As Drab-Kurowska (2019) claims that the digital policy focuses mainly on intangible, digital assets. In this context, the literature stresses that material resources are no longer considered as the main source of competitive advantage (Kunasz, 2006). This condition is met by resources that are not susceptible to imitation and substitution, e.g. relationships and knowledge (Grabowska, 2014). Sources of the relational competitive advantage include convergent resources: intangible resources, long-term relationships, knowledge exchange between companies, and effective coordination of activities.

Research Methodology

In order to verify the main goal of the paper, the analysis focused on results of a survey involving a group of 84 respondents – enterprises located in the Western Pomerania Province, Poland. The questionnaire survey was developed by the Authors, members of the Information Ecosystem and Society 5.0 Team.

The choice of the method was based on the low cost of such studies, speed of collecting information and the need to acquire general information.

Sampling scheme:

1. Non-random choice.
2. Convenience sample.
3. Determination of sample size.

The significance factor was set at α=0.1 and the permissible error at d=0.09. The sample includes 84 companies.

Survey Findings

The survey covered 84 companies from the Western Pomerania Province, Poland. Service and commercial companies prevailed in the sample, respectively (56%) and (37%). More than half of the companies (71%) had up to 9 employees, while every fourth company (25%) had between 10 and 50 employees. In the sample, 4% of companies employed more than 50 people.

Almost half of the companies (46%) have concentrated their activities on local and regional markets. On the other hand, almost every fourth company offers its services or products not only on the domestic market but also on foreign markets.

The survey used a questionnaire. Empirical studies have been designed to:

- determine the extent to which converged services are used in business activity,
- identify where converged services are used, and
- determine the degree of converged services offered to businesses.

The survey has shown that the highest level of converged services can be found in medium-sized enterprises. However, the lowest use of the services examined is small companies, which is the result of lower investment in modern technologies and innovation, as shown in Figure 4.

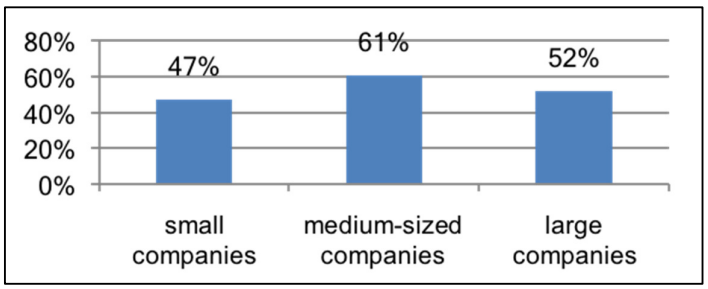

Fig. 4: The level of use of convergent services in business operation

Source: the authors

The survey has also examined areas where converged services are used. This may apply to both the operational area (voice communication + IMP services + Internet services) and the commercial area, as shown in Figure 5.

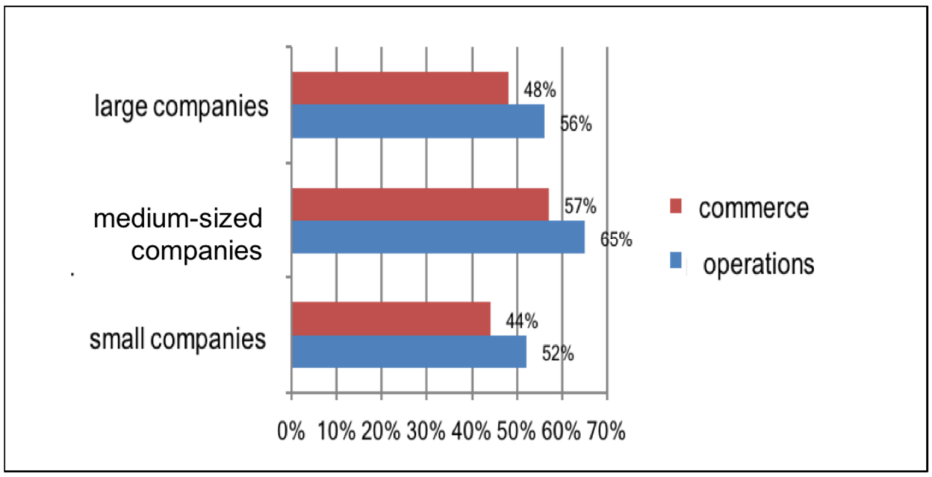

Fig. 5: Areas of convergent services

Source: the authors

The survey has shown that companies use the operational area more often. These services are essential to support processes within the organization. Medium-sized companies also had the highest score in this area (57% and 65%). This can be interpreted as major openness to modern technologies and innovation used within company's internal processes.

The survey also covered willingness to offer convergent services. It seems that companies had the lowest score in this area.
The level of converged services offered is less than 50%. The highest score was in the group of medium-sized companies (45%). In the case of small businesses, only every fourth company expressed their willingness to offer convergent services.

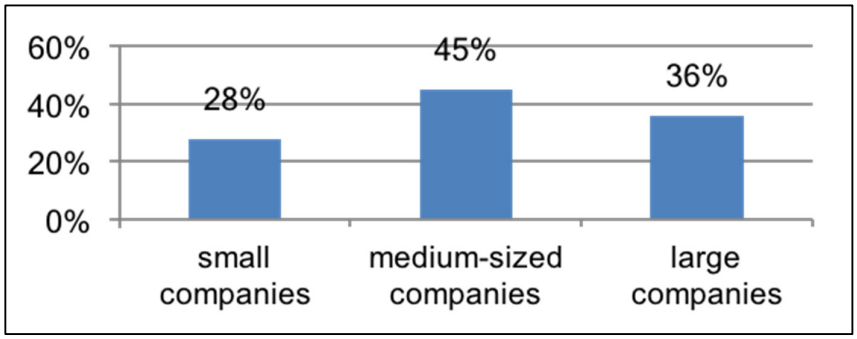

Fig. 6: The level of convergent services offered to businesses

Source: the authors

Summarizing, it should be noted trends among companies to use and offer convergent services are very clear. Although the scale of the phenomenon is still limited, the outlook is optimistic. Activity in this area is going to increase in the coming years. It should be stressed that the digital ecosystem forces companies to develop services by permanent use of modern technologies and implementation of innovation.

A model of the effective digital information ecosystem in the context of convergence

The survey has shown that it is important to make entrepreneurs aware of the need to enter a digital information ecosystem. However, particular attention should be paid to the quality of the ecosystem. The most common criteria for ecosystem quality are efficiency, strength and the creation of new niches (Iansiti, Levien, Levin, Regine, 1999), as shown in Figure 7.

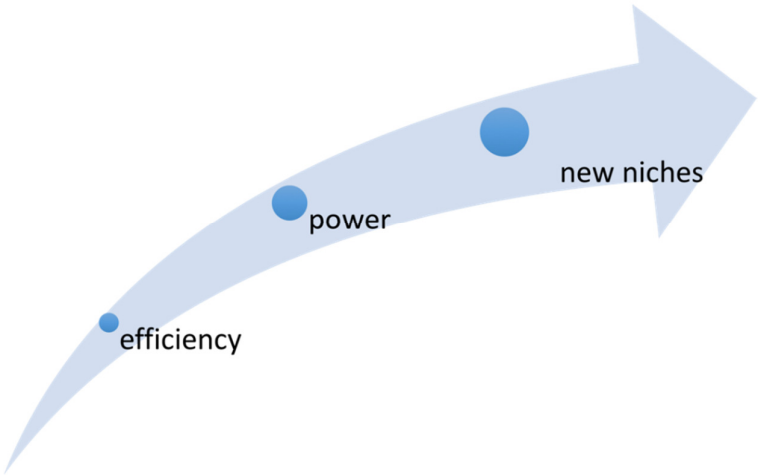

Fig. 7: The way to high-quality information ecosystem

Source: the authors

The efficiency of the information ecosystem is expressed by its capacity to transform technologies and other sources of innovation on a sustainable basis to promote cost reduction and development of new products. A number of indicators can be used to measure ecosystem efficiency. The most common are the return on capital investment in a given ecosystem. When ecosystems show higher return on investment, both competitors involved in the system and external organizations are more inclined to work together long-term and develop cooperation. This trend will evolve depending on the return on capital invested.

While determining the effectiveness of the ecosystem, we need to examine the access to innovation. The analysis primarily covers the speed and cost of innovation transfer, ease of assimilation and implementation, and benefits for members of the business ecosystem who leverage these innovations in their strategic actions. The strength of the business ecosystem is reflected in possibilities to overcome threats to the ecosystem environment, in particular unforeseen technological changes.

Ecosystem strength is also demonstrated by the sustainability of the ecosystem structure and its aging rate. Ecosystems where links between members are durable and the structure of links clear can be considered strong. Ecosystems with increased strength compared to other systems are more inclined to create and develop cooperative relationships. Competitors prefer to cooperate with systems that protect parties from external attacks and create conditions that help to predict innovation.

The criterion for creating new niches demonstrates the ability to create new functionalities or market opportunities as a result of the implementation of technological innovations created by the business ecosystem. This does not mean that once new opportunities appear we should abandon our previous activity. The ecosystem shapes new business opportunities with rational use of its own standards and technological innovation. While developing the portfolio of business opportunities, ecosystems seek to avoid risks of excessive growth, inefficient use of their resources and excessively narrow identification of niches that may result in missed opportunities. The model efficiency of the system is shown in Figure 8.

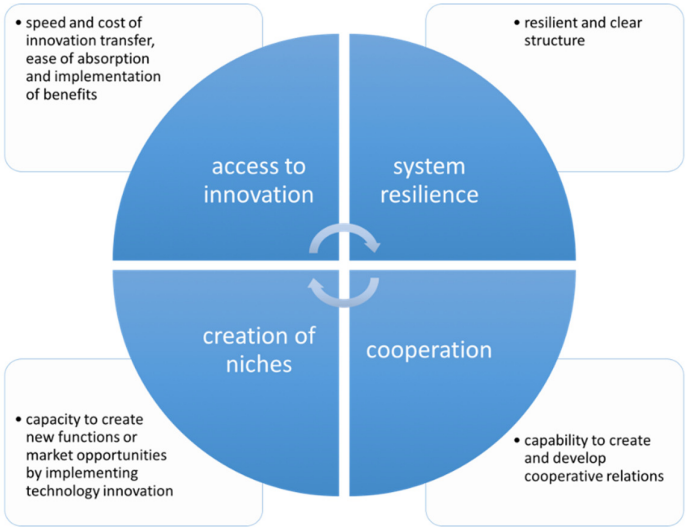

Fig. 8: The model efficiency of digital information ecosystems in the context of convergence
Source: the authors

Conclusion

Convergent services should be seen as a key vehicle and environment for the transfer of knowledge, information and the development of ideas as well as information society services. The economic and social potential of these services is enormous, primarily due to their unique versatility. Convergence is a driving force for the development of digital information ecosystems whose effectiveness is crucial for the resilience of the ecosystem. It should be pointed out that cooperative relationships are growing when the business ecosystem is able to generate new growth prospects for business opportunities (niches). This is particularly evident when ecosystems spread to include new sectors or geographic markets with a high strategic potential and at the same time a high risk of activity. Leaders of digital information ecosystems seek to maintain and/or improve system resilience. By initiating technological innovation, they engage new actors in the ecosystem and individual projects, thus stimulating the transfer of knowledge within the digital ecosystem. Convergence is taking place in the pursuit of new applications for existing technologies and skills and the implementation of new solutions. Convergence provides ecosystem members with access to new knowledge and information. Consequently, the resilience of the ecosystem improves both within the system and between competing ecosystems together with the tendency to cooperate.

Acknowledgement

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Comercio Y Denominación De Origen (DO): El Caso Del Aguardiente De Vino "Pisco"

Cristian MORALES LETZKUS
Universidad Católica del Norte, Coquimbo, Chile, E-mail: cmorales@ucn.cl

Willmer GUEVARA RAMÍREZ

Universidad Tecnológica de Chile (INACAP), La Serena, Chile, E-mail: willmer.guevara@inacapmail.cl

Constanza LAGUNAS ALVARADO
Universidad Tecnológica de Chile (INACAP), La Serena, Chile, E-mail: constanza.lagunas@inacapmail.cl

Tamara GONZÁLEZ SOTELLA
Universidad Tecnológica de Chile (INACAP), La Serena, Chile, E-mail: tamara.gonzalez20@inacapmail.cl

Resumen

El comercio internacional del producto aguardiente de uva (pisco) por parte de Chile y Perú está sujeto a una controversia debido a su denominación de origen desde hace varias décadas. El objetivo de este trabajo es analizar el desempeño del comercio internacional de este producto por parte de ambos países mediante indicadores de competitividad, eficiencia y redes comerciales. Los resultados muestran un claro predominio de Perú, a pesar de que su estrategia comercial es más reciente y que ambos países establecieron estrategias distintas para validar, proteger y posicionar su denominación de origen (DO) en los mercados internacionales. La evolución del precio en los mercados analizados ha presentado un comportamiento al alza. El reconocimiento de la DO no ha ofrecido una ventaja especial a ninguno de los dos países. En tal sentido, una estrategia binacional para la promoción del producto, así como la creación de un organismo regulador que vele por la calidad en los procesos de producción y evaluación de la calidad del pisco les puede ayudar a alcanzar mayor visualización en los mercados internacionales.

Palabras Claves: Denominación de Origen, Exportaciones, Pisco, Competitividad.

Abstract

The international trade of the product grape brandy (pisco) by Chile and Peru is subject to a controversy for its designation of origin for several decades. The objective of this work is to analyze the performance of international trade of this product by both countries through indicators of competitiveness, efficiency, and commercial networks. The results show a clear predominance of Peru, despite the fact that its trade strategy is more recent and that both countries established different strategies to validate, protect and position their denomination of origin (DO) in international markets. The evolution of prices in the analyzed markets has shown an upward trend. The recognition of the DO has not offered a special advantage to either country. In this sense, a binational strategy for the promotion of the product, as well as the creation of a regulatory body to ensure quality in the production and quality assessment processes of pisco can help them achieve greater visibility in the international markets.

Keywords: Designation of Origin, Exports, Pisco, Competitiveness.

Introducción

El pisco o el agua ardiente de uva es un licor que se obtiene al destilar el producto final de la vid. Se produce en el norte de Chile y el Sur de Perú en Sudamérica, regiones semiáridas que presentan un clima y suelo similar, lo que permite la producción de las uvas pisqueras de origen europeo, desde la época de la colonia española (Mitchell & Terry, 2011). Ambos países mantienen una controversia respecto al origen de la bebida alcohólica.

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La norma técnica peruana (NTP 211.001 del 2002), indica que el pisco es el aguardiente obtenido exclusivamente por destilación de mostos frescos de "Uvas Pisqueras" recientemente fermentados, utilizando métodos que mantengan el principio tradicional de calidad establecido en las zonas de producción reconocidas (Quebranta, Negra Criolla, Mollar, Italia, Moscatel, Albilla, Torontel y Uvina). Por otra parte, en Chile la Ley 18455 (1985) fija las condiciones de la Denominación Origen (DO) del pisco. Éste indica que es el aguardiente producido y envasado, en unidades de consumo en las Regiones de Atacama y Coquimbo, elaborado por destilación de vino genuino potable, proveniente de las variedades de vides plantadas en dichas regiones y que se determinan en el reglamento 521 del Ministerio de la Agricultura.

El pisco peruano difiere del chileno, y de destilados similares de otros países, porque no implica la rectificación (la adición de agua) ni el envejecimiento. Lo anterior, con el objetivo de retener los compuestos aromáticos derivados de las uvas y su fermentación y la destilación en alambiques de cobre (Cacho et al., 2013).

Para el siglo XVI y XVII Perú lideraba la producción de pisco al ser el mayor exportador, y Chile constituía un actor secundario. Sin embargo, debido a las relaciones políticas y sociales de Chile, y su condición de país minero especializado en cobre (materia prima para la elaboración de artefactos usados en la fabricación de este producto), las lamentables catástrofes naturales que afectaron a Perú en el siglo XVIII junto a la revolución industrial inglesa que lo obligó a cambiar el pisco por la caña de azúcar, pusieron a Chile como principal exportador, entrando incluso al mercado de Perú. En el siglo XX se retoma la industria del destilado de uvas en Perú, mejorando su calidad, ganando una mayor promoción y un importante desarrollo en la industria. De esta manera, volvieron a poner al país en competencia, obteniendo una cuota de mercado y de producción similar a la de Chile (Lacoste el at., 2013).

La disputa entre países vecinos sobre el origen del pisco está aún vigente. En 1931, Chile logra la DO (más antigua de América), logrando delimitarlo y protegerlo mediante el decreto n°181 del 15 de mayo de 1931, lo cual logra asegurar una calidad reforzada para este producto. Perú logró esta denominación en 1991, creando una disputa para obtener el reconocimiento exterior sobre esta DO. A través del tiempo la confrontación entre ambas naciones continúa, y cada una ha obtenido ganancias o distinciones en el comercio internacional. En el caso de Chile, la Organización Mundial del Comercio y la Organización Mundial de la viña y el vino establecieron los derechos de este sobre la DO del pisco (Pszczólkowski & Lacoste, 2016).

Las investigaciones históricas sobre el origen del pisco son muy importantes debido a que sirven como base a los países para defender sus posturas ante la comunidad internacional. Sin embargo, analizar la efectividad de las estrategias comerciales en el comercio internacional puede ayudar a comprender si los esfuerzos en materia de reconocimiento de la DO son efectivos, o se debe apostar a nuevas estrategias, ya sea en conjunto o cada país por separado, con el fin de maximizar los resultados de este producto.

En este contexto, esta investigación tiene como objetivo determinar de manera empírica cómo los flujos del comercio internacional del pisco avalan la posición comercial de Chile y Perú, determinando si el reconocimiento de la DO ha significado algún tipo de ventajas para ellos. Para su desarrollo se analizaron los flujos de comerciales mediante análisis de redes. Además, se evaluó el desempeño de Chile y Perú en el comercio internacional del pisco mediante matrices de competitividad aplicadas sobre los principales importadores de pisco en el periodo 2010-2019. Se analizó, además, la evolución del crecimiento utilizando las variables volumen y precio de las exportaciones.

Antecedentes Teóricos

La importancia de la DO está regida por el vínculo del producto y su lugar de origen. Esta otorga un nivel de exclusividad y originalidad, ligado también a los lazos históricos y culturales que caracterizan al producto, así como a los factores naturales y humanos que lo hacen único, aumentando su calidad (Harrel, 2009).

Uno de los ejemplos más emblemáticos a nivel internacional es el caso del champagne originario de Champagne en Francia. Este vino, fabricado masivamente alrededor del mundo, llevó a Francia a una gran disputa con Estados Unidos por el nombre del licor. Éste último aseguraba que el consumo mayoritario de la bebida fue principalmente en su país y en Inglaterra durante los últimos dos siglos, por lo que los franceses no se podían apropiar de la palabra. Posteriormente Suiza entró en la disputa por la DO del champagne, debido a que poseen un pueblo con el nombre Champagne donde se produce el licor. Francia ganó el debate de la DO del Champagne alegando que es originario del pueblo Champagne y es fabricado a través de procesos ancestrales y con uvas originarias de la región, por lo que el producto resultante es de una calidad superior al resto de los vinos espumantes, por lo tanto, de mayor exclusividad (Jay & Taylor, 2018).

Otra controversia por la DO fue el caso del queso feta originario de Grecia. Olushola (2017) indica que el proceso por la denominación del queso entre Grecia, Alemania y Dinamarca estuvo en juicio por quince años. Si bien el queso feta se originó en Grecia, este ha sido fabricado y vendido alrededor del mundo durante el último siglo con el mismo nombre. Grecia obtuvo la DO a mediados de 1980, y se otorgó un periodo de cinco años a los demás países para que cambiaran el nombre a "queso tipo griego". Se ha planteado que la DO debe establecerse en el plazo más breve posible, debido a que el producto puede perder sus características únicas que le agregan valor y exclusividad (Olushola, 2017). Estos beneficios que la DO consigue son de gran apoyo al desarrollo económico del país, mediante el aumento de las ventajas competitivas, oportunidades de exportación, atracción turística de la región y el desarrollo de áreas rurales.

La disputa entre Perú y Chile se basa principalmente en obtener la DO del pisco. El argumento de Perú son los lazos históricos que tiene con el pisco, por otro lado, el de Chile es el aporte al desarrollo industrial del licor a nivel nacional e internacional. Harrell (2009) menciona que, con una indicación geográfica homónima, los países podrían compartir la DO del pisco, y así poner un fin al conflicto, pero eso significaría que el licor pierda exclusividad al ser considerado un producto con distintos orígenes y de similares características, lo que conlleva a una menor competitividad en el comercio internacional.

Pero ¿por qué es tan importante el comercio internacional para el pisco? Krugman (1980) destaca que el intercambio de productos entre un país y otro se produce por la diferencia de costos de producción y porque aumenta el bienestar económico de cada uno al permitirle obtener productos que no produce y a menores costos. Las industrias locales se benefician al ampliar su mercado y aprovechar las economías de escala al aumentar la producción. La DO será esencial para la promoción de este producto y asegurar alianzas o redes internacionales con los países con los que se distribuye (Aranda, Gómez & Molina, 2015).

En los últimos años, ha aumentado el consumo de pisco en el mercado interno chileno, así como su exportación a países desarrollados, al considerarse un producto de alta calidad y de menor precio en comparación a otros destilados.

Según Mitchell & Terry (2011), Perú exporta mayormente a los Estados Unidos y curiosamente a Chile, sin embargo, la producción chilena es considerablemente mayor. Desde 1990 ambos países comenzaron a establecer nuevos acuerdos y relaciones comerciales, con el fin de ampliar el mercado potencial de sus sectores de exportación. Por ejemplo, el FTA (Free Trade Agreement) entre Estados unidos y Chile establece que ningún otro país puede vender el producto como "pisco chileno". Sin embargo, otros países pueden vender su propia versión de pisco sin que esté etiquetado como producto de ese otro país.

Perú ha perseguido agresivamente la aprobación internacional del producto exclusivamente peruano, ganando su reconocimiento en la India (2010) donde actualmente ninguno de los países en disputa exporta este producto, lo que puede ser estratégico a la hora de proyectar el mercado asiático (Mitchell & Terry, 2011). Perú en búsqueda de su reconocimiento se ha adherido al pacto de Lisboa lo cual le dio reconocimiento de la DO en un número importante de mercados (Nudman, 2007). Por su parte, Chile ha intentado compartir la denominación para gestionar y promocionar el producto conjuntamente, pero Perú se ha mantenido firme en rechazarlo con el argumento de que ambos productos son diferentes.

A través de la DO, los países buscan mejorar su competitividad en el mercado internacional. Para evaluar el desempeño del comercio internacional es usual utilizar indicadores como el índice de las ventajas comparativas reveladas VCR (Laursen, 2015; Stellian & Danna-Buitrago, 2019; Valencia, & Zetina, 2017). Este indicador permite diferenciar países con una ventaja competitiva en ciertos productos con los que no la tienen, y la comparación competitiva con otros países que se encuentran en el mismo mercado (Guevara & Morales, 2018a y 2018b). Otro método muy usado para el análisis de competitividad es la cuota de mercado constante (CMS), que sirve para estudiar el crecimiento de flujos comerciales de exportación de un grupo de países en un determinado periodo de tiempo (Guevara & Morales, 2018a; Liu, Shi, & Laurenceson, 2020).

Los métodos analizados anteriormente son muy útiles para analizar mercados muy competitivos o de alta concurrencia en cuanto a exportadores. En el caso del pisco, es útil utilizar las matrices de competitividad, las cuales buscan analizar la relación entre el comportamiento de las exportaciones con el dinamismo de la cuota de participación y el dinamismo del mercado importador (Guevara & Morales, 2018a; Fernández & Curado, 2019). Hasta el momento, no se evidencian estudios que evalúen la competitividad de Chile o Perú mediante el uso de estas metodologías, u otras similares.

Metodología

Fuente

Las bases de datos utilizadas provienen del Servicio Nacional de Aduana de Perú y Chile, los que abarcan el periodo 2008 al 2019.

Se utilizaron dos códigos arancelarios diferentes para cada país debido al problema existente de DO. Para Chile el código es 22082010 y para Perú el código 2208202100. Con el fin de obtener una matriz única se sumó ambos códigos por cada destino. Además, se utilizó el código 22082090 para el producto sin la DO para Chile (Brandy) y la suma de los códigos 2208202200, 2208202900 y 2208203000 para Perú. Esto, para un mejor estudio del efecto del precio del agua ardiente sin DO "Brandy" contra el agua ardiente con DO "Pisco".

Los países importadores se escogieron siguiendo los siguientes criterios: que la suma de sus exportaciones de pisco supere los 2 millones de dólares en el periodo analizado y que reciban exportaciones desde ambos orígenes con valores superiores a los 30 mil dólares en el año 2019. Estos países son Alemania, Argentina, España, USA, Francia y Reino Unido.

Método

Se realizó un análisis del flujo de comercio entre los países estudiados y sus principales importadores de pisco, representándolo de forma simplificada mediante un gráfico de malla elaborado en el software UCINET. Esta herramienta representa redes que analizan la interacción entre individuos u organizaciones (Botella, Stuart & Gadea, 2015).

Además, se evaluó la competitividad con el índice de participación de mercado o competitividad, y el índice de participación sectorial o dinamismo. Mediante ambos índices se realizó el análisis de matrices de competitividad.

Índice de participación de mercado o competitividad (MS)

Este índice refleja la capacidad de un país de incrementar su participación en un determinado mercado en relación con el resto de los países que exportan al mismo (Guevara & Morales, 2018a y 2018b) y estima la competitividad (Obschatko & Von Bernard, 2003). Puede interpretarse analizando el comportamiento de la participación, debido a que si esta aumenta significa que el sector o producto gana competitividad y viceversa. De esta manera, este índice vincula la competitividad con el desempeño exportador. Se puede calcular con la siguiente expresión algebraica:

$$\mathrm{MS} = \frac{X_{ij}}{\mathrm{M}_i} \quad \textbf{(1)}$$

Donde Xij son las exportaciones del producto i en el país j hacia el país considerado, Mi es el total de las importaciones del producto i del país considerado.

Índice de participación sectorial o dinamismo (PS)

Este índice permite observar para un momento en específico, la relación de las importaciones de un producto dado en un mercado determinado (independiente del origen del producto), y el total de importaciones de aquel mercado (Picardi, González & Valls, 2015). Este puede ser dinámico cuando aumenta, constante cuando se mantiene o en retroceso cuando disminuye, y su cálculo se realiza a partir de la siguiente fórmula:

$$\mathrm{PS} = \frac{\mathrm{M}_i}{M_t} \quad \textbf{(2)}$$

Donde M_i es el total de las importaciones del producto i del país considerado y M_t es el total de importaciones del producto i por el mundo.

Matriz de competitividad

Esta herramienta se utiliza para representar los datos de un estudio y analizar el estado de competitividad de la cuota de mercado, o la participación del mercado y el dinamismo, o la participación de las exportaciones del bien.

Para su representación usaremos la matriz modificada usada por Guevara & Morales (2018 a), la cual se divide en nueve cuadrantes como se muestra en la figura 1. Estos muestran el estado del mercado en tres fases (No dinámico, estancado o en transacción y dinámico) y la cuota de mercado o la participación que muestra cada país (pierde cuota, se mantiene o gana cuota).

Participación del mercado (competitividad)				
	Creciente (Sectores competitivos)	Ganador en mercado deprimido	Ganador en mercado estable	Ganador en mercado en auge
	Constante (Sectores en transición)	Persistente en mercado deprimido	Persistente en mercado estable	Persistente en mercado en auge
	Decreciente (Sectores no competitivos)	Perdedor en mercado deprimido	Perdedor en mercado estable	Perdedor en mercado en auge
		Decreciente (Sectores estancados)	Constante (Sectores en transición)	Creciente (Sectores dinámicos)
		Participación Sectorial (Dinamismo)		

Fig. 1: Matriz de Competitividad.

Fuente: Guevara & Morales (2018 a)

La matriz que resulta de combinar estos dos indicadores da a conocer que no es suficiente solo aumentar la competitividad sino también desarrollarla en sectores dinámicos, con el fin de lograr una exitosa inserción en el comercio internacional y lograr la categoría de "estrella naciente" o ganador en mercados en auge para este caso (Obschatko & Von Bernard, 2003; Guevara & Morales, 2018a).

Otra variable relevante desarrollada en este estudio es el precio de exportación a cada mercado analizado. Este se obtuvo mediante la división de los valores exportados en dólares ($) por la cantidad expresada en kg, como resultante el precio unitario se expresa en $/kg.

Eficiencia exportadora

Para analizar el desempeño exportador global de Chile y Perú en los mercados escogidos, se aplicó una descomposición del crecimiento anual que se compone del valor exportado. Este método consiste en explicar la tasa de crecimiento del valor exportado mediante la descomposición de la tasa de crecimiento del valor exportado y la tasa de crecimiento del precio exportado. Para su mejor compresión se plantea la siguiente ecuación:

$$GR_{vj} = \left[(X_{(k+n)j}/X_{kj})^{(\frac{1}{n})} - 1\right] + \left[(P_{(k+n)j}/P_{kj})^{(\frac{1}{n})} - 1\right] \qquad (3)$$

Donde

GR_{vj}: Tasa de crecimiento anual compuesto del valor exportado por el país j.

n: Cantidad de periodos analizados.

X_{kj}: Volumen de exportaciones del producto en el periodo k (inicial) por el país j.

$X_{(k+nj)}$: Volumen de exportaciones de del producto en el periodo k+n (presente) por el país j.

P_{kj}: Precio del producto en el periodo k (inicial) del país j.

$P_{(k+nj)}$: Precio del producto en el periodo k+n (presente) del país j.

Análisis De Resultados

La red de comercio mostrada en la figura 2, visualiza las relaciones del comercio del pisco para el año 2019. En su conjunto se logró una exportación total de 9.1 millones de USD con una participación de 68% para Perú y el 32%

para Chile. Los principales flujos de comercio son hacia USA, España y los Países Bajos. USA concentró un 42% de las compras totalizando 3,9 millones de dólares, de los cuales el 80% son importaciones de Perú. El segundo mercado de mayor flujo es España con 10% seguido de Países Bajos con un 6%. En ambos casos Perú es el principal proveedor con 84% y 98% en cada mercado, respectivamente.

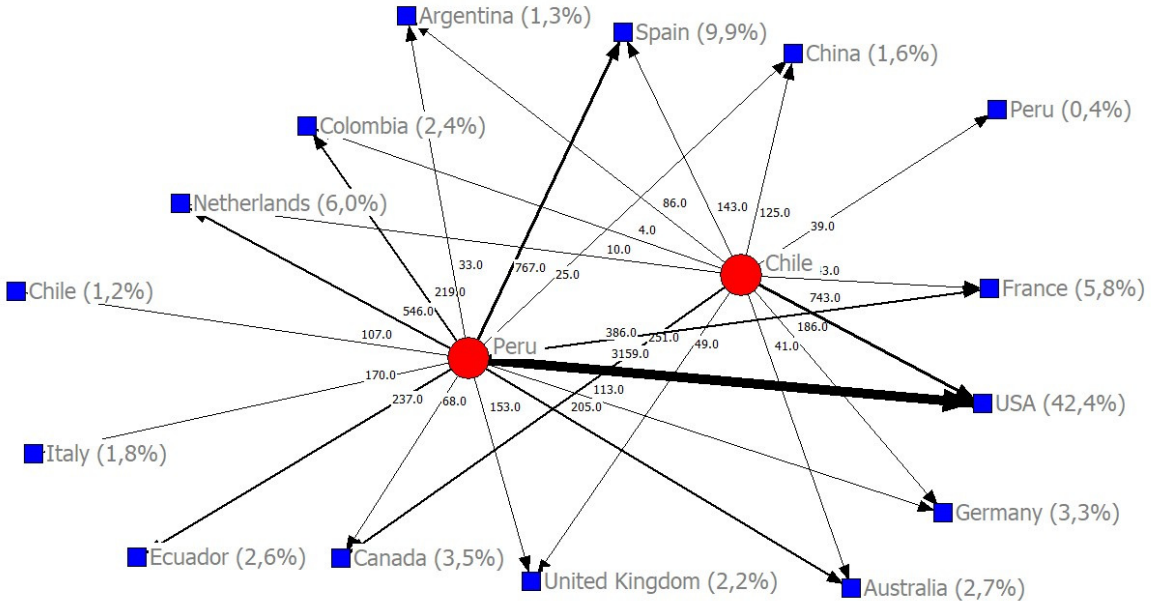

Fig. 2: Flujo de comercio de Perú y Chile para el producto pisco en el año 2019.

En la mayoría de los mercados coinciden las exportaciones de ambos países, aunque se observa que Perú ha abierto nuevos mercados como es el caso de Italia y Ecuador. Resulta interesante que pese a la existencia de un litigio entorno a la DO de este producto existe un comercio bilateral entre Chile y Perú, siendo las exportaciones de este último las más significativas.

Análisis de competitividad en los principales destinos.

Luego del análisis de la competitividad global, se analiza la competitividad hacia los principales destinos. En el caso del mercado de USA (Fig. 3), el mayor importador muestra una función ($y = 0.0012x + 0.3644$) con un valor de $P = 0.8$, lo que indica que el país no tiene una tendencia. Perú muestra ventaja debido a que se ubica como ganador en el mercado estable, con una cuota del 75% para el periodo analizado, ganando una mayor competitividad. Debe destacarse que USA firmó un tratado de libre comercio con ambos países donde reconoce el pisco tanto de origen chileno como peruano. Esto hace suponer que para el caso del mercado estadounidense no es determinante la DO, entre estos dos países.

Por otro lado, la Unión Europea estableció el reconocimiento de la DO del pisco para productos originarios de Chile y la protección geográfica del pisco para productos originarios de Perú. Dentro de los países pertenecientes a la Unión Europea analizados en esta investigación se encuentra España, con una función ($y = 0.0057x + 0.0273$) y un valor de $P = 0.03$, lo que lo ubica en un mercado en crecimiento, siendo tanto Chile como Perú constantes en un mercado en auge, este último con una mayor cuota con un 74% (Fig. 3).

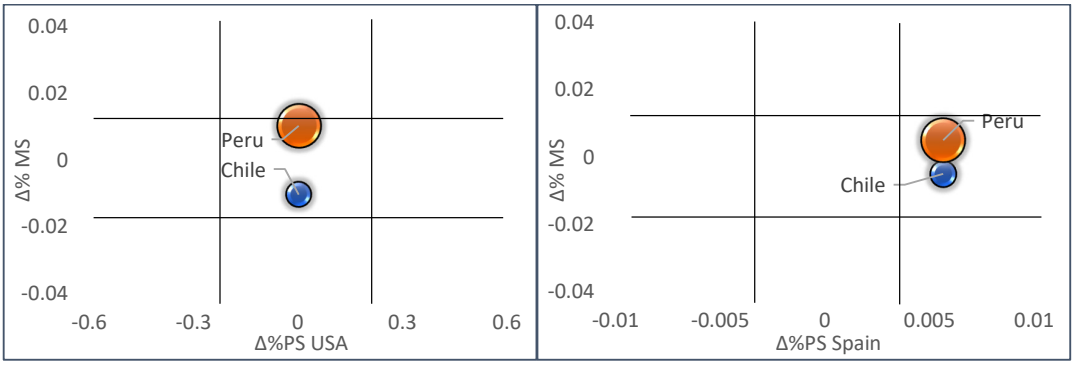

Fig. 3: Matrices de competitividad de los mercados del pisco en USA y España, 2008 a 2019.

El mercado de Argentina (Fig. 4), el más cercano geográficamente de estos dos países exportadores, tiene una función (y = -0,0055x + 0,087) con un valor de P = 0.001. Se encuentra en un mercado en decrecimiento, en el cual Chile se encuentra como el ganador de competitividad con una cuota del 80%, a pesar de que este país no ha reconocido la DO del pisco a favor de ningún país.

Por otro lado, el mercado de Alemania (Fig. 4) obtuvo una función (y= -0.0006x + 0.049) con un valor de P = 0.5, lo que lo ubica en un mercado estancado, ubicando a Chile como el ganador de competitividad con una cuota del 56%.

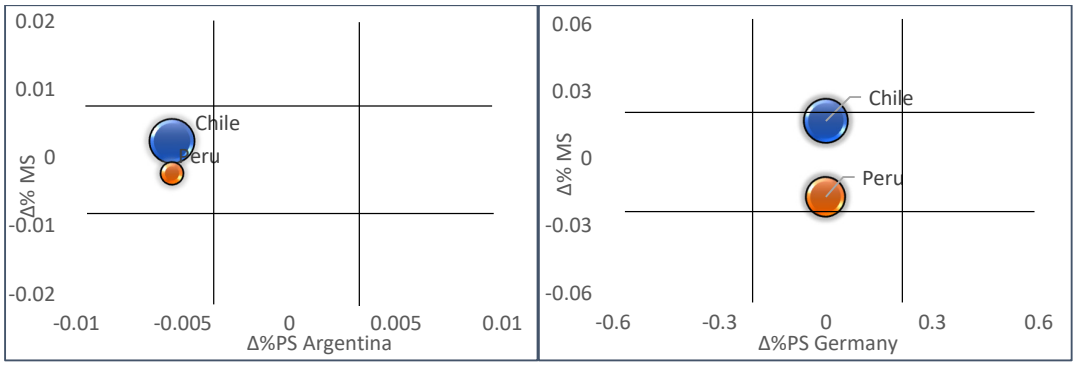

Fig. 4: Matrices de competitividad de los mercados del pisco en Argentina y Alemania,

periodo de 2008 a 2019.

Al analizar el mercado de Francia (Fig. 5), se obtuvo una función (y= 0,0007x + 0,0312) y un valor de P = 0.7, demostrando que no tiene una tendencia aparente. A pesar de que Chile cuenta con una cuota de mercado del 52%, superior a la de Perú, este último ha ganado competitividad en el mercado estable francés.

En cuanto al mercado de Reino Unido (Fig. 5), se obtuvo una función (y = 0,0027x + 0,011) y P = 0.02, encontrándose en un mercado creciente. Perú tiene una cuota de mercado de un 62% en este mercado encontrándose como un ganador de competitividad.

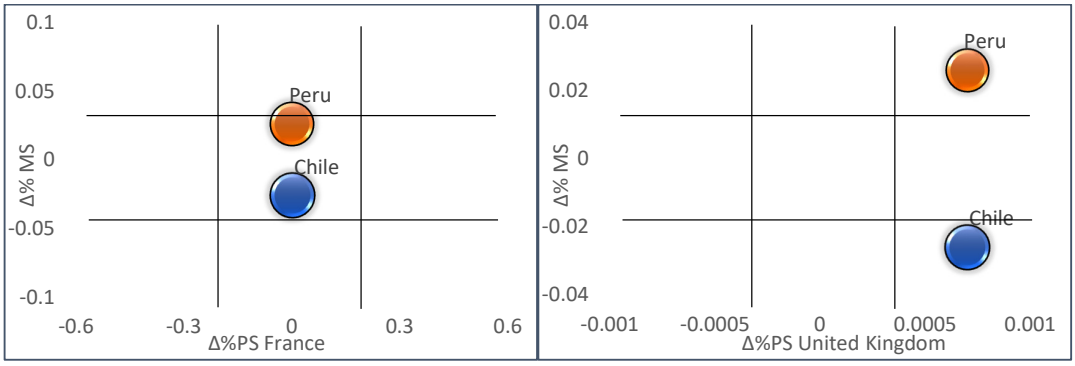

Fig. 5: Matrices de competitividad de los mercados del pisco en Francia y Reino Unido, periodo de 2008 a 2019.

En la tabla 1 se puede observar que para los 6 países importadores de pisco estudiados no existe una ventaja especial para Chile o Perú mediante el reconocimiento de la DO. Es decir, en todos los destinos se le ha reconocido la DO, específicamente al producto de cada país como pisco chileno o como pisco peruano, excepto Argentina que no ha reconocido a ningún de las dos naciones.

Tabla 1: Reconocimiento de la D.O. según los mercados analizados.

País Importador	Principal Exportador	Cuota de mercado	Reconocimiento de la D.O.
USA	Peru	75%	Chile- Peru
Spain	Peru	74%	Chile - Peru
Germany	Chile	57%	Chile - Peru
Argentina	Chile	80%	—
France	Chile	52%	Chile - Peru
United Kingdom	Peru	62%	Chile - Peru

Fuente: Elaboración propia en base a Acuerdo de Asociación entre la Comunidad Europea y sus estados miembros y Chile. (2002); Unión Europea (2013). Ministerio de Relaciones Exteriores de Chile (2004). Ministerio de Relaciones Exteriores de Perú (2009).

Análisis de precio y eficiencia exportadora.

En el análisis de los precios de la figura 6, se puede observar que la evolución del precio en los mercados analizados ha presentado un comportamiento al alza en la mayoría de los mercados para ambos productores.

Fig. 6: Precios del pisco para Chile y Perú en los distintos mercados, para el periodo del 2008 al 2019.

Perú presentó un mayor precio promedio que Chile, diferencia que se presenta en todos los mercados analizados con excepción de Francia. El precio del producto chileno ha crecido de manera importante en Francia y España. Para el caso del pisco peruano, el único mercado en el cual el precio disminuye fue en Reino Unido. Para el producto sin DO "Brandy", los precios son muy similares y estables en el tiempo para ambos países, sin embargo, en los último 3 años Perú muestra mayor valor que Chile.

En términos absolutos en el periodo analizado, la variación del precio en los mercados analizados es importante. Chile presentó un incremento del precio de 74% (de US $ 2,4 a US $ 4,2) y Perú de un 17% de (US $ 3,9 a US $ 4,6).

Las tasas más altas de crecimiento del volumen y valor se presentan para el caso del producto sin DO para Perú, aunque es el único que en promedio disminuyó sus precios (Fig. 7). Para el caso del pisco el mejor desempeño en términos de valor y volumen lo presenta Perú, aunque Chile lidera el crecimiento en precios, marcado por su desempeño en Francia. En términos generales se observa que la denominación de origen no está agregando valor para ninguno de los dos países respecto al aguardiente sin DO en cuanto a demanda, pero si en cuanto al crecimiento del precio.

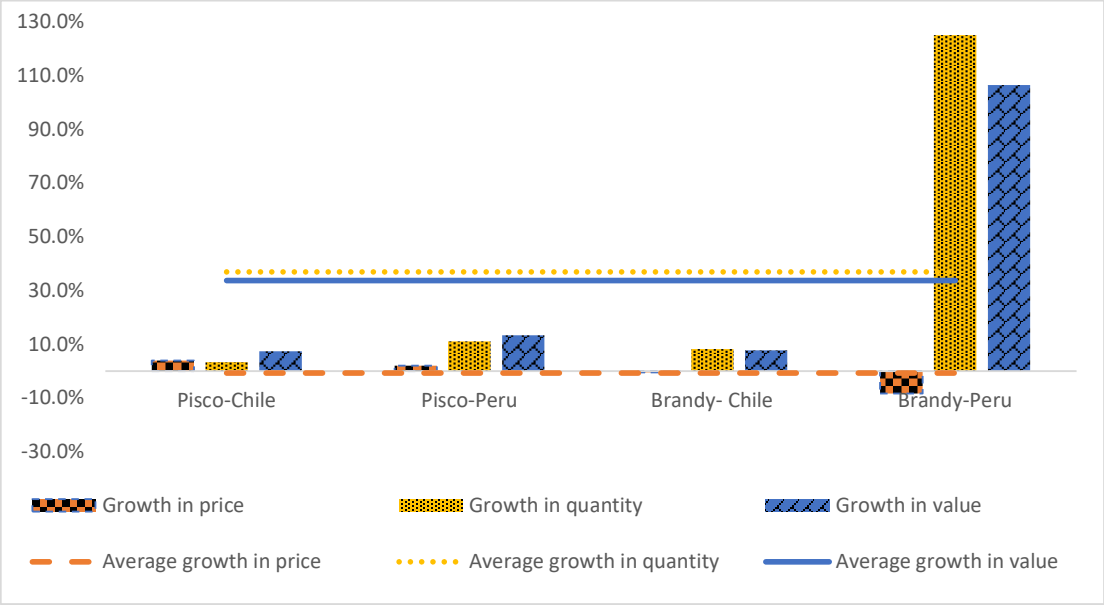

Fig. 7: Tasa de crecimiento anual compuesto por precio, volumen y valor del pisco vs el aguardiente.

Conclusiones

El predominio de Perú en los mercados internacionales del pisco es innegable. Sus resultados en términos de crecimiento de valor y volumen exportado, participación de mercado y precios es superior para la mayoría de los mercados analizados en comparación con Chile.

Ambos países establecieron estrategias distintas para validar, proteger y posicionar su DO en los mercados internacionales. Chile realizó una estratega activa de reconocimiento de la DO en base a las suscripciones de tratados de libre comercio (TLC) desde el año 1997 (19 en particular, que le dan presencia en América del Norte, la Unión Europea, Asia y Oceanía) y contados registros de DO extranjeros (Costa Rica, El Salvador y Chile). Por su parte, la estrategia peruana se basó en el arreglo de Lisboa del 2006 que le concede registro de DO en 19 países y una agresiva estrategia registral desde 1998 (con 22 inscripciones), y recientemente la suscripción de TLC.

En términos comerciales la estrategia peruana ha sido mucho más exitosa, siendo la estrategia chilena más bien reactiva ahora con juicios pendientes con Perú en los mercados de India, Tailandia y el Salvador. La participación del estado en tales estrategias es fundamental, siendo el estado peruano un actor clave en la consolidación de su producto. Por otra parte, el éxito peruano también se le atribuye a una mayor integración a canales como hoteles, restaurantes y cafeterías basado en su gran prestigio culinario.

Dado que no se puede concluir que el reconocimiento de la DO haya ofrecido una ventaja especial a ninguno de los dos países, se recomienda una estrategia binacional para la promoción del producto, así como la creación de un organismo regulador que vele por la calidad en los procesos de producción y evaluación de la calidad del pisco. Esto, teniendo en cuenta que otros países con cuestiones similares de indicaciones geográficas transfronterizas, han trabajado activamente juntos para resolver el problema de cómo proteger conjuntamente sus productos y alcanzar mayor visualización en los mercados internacionales (Mitchell & Terry, 2011)

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The Impact of the COVID-19 Pandemic on a Selected Automotive Industry - a Case Study of Poland

Wojciech LEWICKI

Faculty of Economics, West Pomeranian University of Technology Szczecin, Poland.
e-mail:Wojciech.Lewicki@zut.edu.pl

Abstract

The coronavirus pandemic has greatly affected the European economy. No one doubts in today's commercial reality. One of the key industries that has obviously suffered from the effects of the economic crisis is the automotive industry. The COVID-19 situation is changing dynamically and, because that industry is increasingly internationalized, possible effects will certainly continue to result from the supply shock and be observed as a global demand shock. The aim of the research is to present current challenges which are being taken on to tackle the economic and social crisis, based on the example of the European automotive industry – a Poland case study. Therefore, the article presents only selected research results relating to the impact of the COVID-19 pandemic on the particular segments of the industry. Specifically, an attempt was made to identify changes taking place in the sales and distribution systems for new cars and spare parts, as well as maintenance and repair services. The research study may contribute to the faster development of universal solutions in the field of addressing the crisis by means of identifying the areas which require adaptation to the new market rules. In addition, our presentation and interpretation of the results may be a basis and incentive to conduct further research on the topic related to the impact of the pandemic on the industry in terms of identifying further consequences for both the supply and the demand part of the industry.

Keywords: automotive, market, crisis, COVID-19.

Introduction

The most frequent statement in the literature on the subject is that the automotive industry is one of the most complex industries in terms of multiplicity and various relationships with the environment(Wells,2013;Mohammad Nazir, and Shavarebi,2019).Companies producing passenger cars create extensive networks of connections with numerous market entities, i.e. sub-suppliers, influential and opinion-forming organizations, as well as financial institutions (Bailey et.al 2010;Kallstrom,2015). It is estimated that an average final vehicle manufacturer produces only 15% of their vehicle parts. (Ha et al. 2009). The rest are manufactured by numerous sub-suppliers located in various national markets. In many countries, distribution and / or retail sales are also carried out by third parties. Despite such a complexity of the process, researchers find the automotive industry to be one of the most innovative. (Vaz et al.2017;Blankesteijn, 2019; Wang et al.2018). At the same time, its important role in the global development of entrepreneurship is emphasized. (Kallstrom, 2015; Vošta& Kocourek, 2017). Reports and studies show that, until recently, the automotive sector provided jobs for 13.8 million Europeans, which accounted for 6.1% of the total employment figure in the European Union. The automotive industry is particularly important for the Polish economy, not only because it generates hundreds of thousands of jobs both directly and indirectly, but also has a direct impact on other sectors of the economy. Moreover, according to the available data, like in other countries, the industry is highly dependent on exports, the value of which totaled over PLN 130 billion in 2019, which accounted for almost 13% of the total exports of goods from Poland (Statista, 2020).

As emphasized in the literature on the subject, the current crisis in the automotive industry has been caused by both the demand and supply factors. This means that the scale of negative effects will significantly exceed the previous crises (OECD, 2020a; OECD 2020b; Mahalingam, 2020). The high sensitivity of the automotive sector to disruptions in the supply chains and susceptibility to changes in the economic situation will only intensify that effect, which will result in reduced production, lower levels of exports and declining employment. (Ludvigson et al. 2020; Baker et al. 2020). Consequently, both the position and the role of the automotive sector in the EU and Polish

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economy will change in the near future, which certainly requires in-depth analysis and research conducted with academic and practical considerations taken into account (Piparsania, 2020; Kaitwade, 2020; Queiroz, et al. 2020). Analysis of the literature on the subject showed that it is limited in terms of taking considerations for the automotive industry into account. In particular, there are no publications describing changes caused by the crisis in the automotive industry in relation to the European market, based on the example of the Central European countries, including Poland, and focusing on issues related to the distribution of new passenger cars and spare parts, or identification of problems arising in the automotive services sector - both service and repair. The study is therefore an attempt to fill the gap in the literature on the subject by not only identifying changes taking place in this market, but also pointing out to likely scenarios. At the same time, it provides an incentive for further reflection on developing methods and ways for the automotive sector to deal with the COVID-19 pandemic.

Therefore, this article has numerous important practical implications, both political and economic. The aim of the research was to obtain extensive knowledge regarding the impact of the COVID-19 pandemic on goods and services provided in the modern automotive market. Chapter 2 of the article contains a detailed description of the purpose, scope and research method used in response to the research questions. Chapter 3 describes the results of experimental research and their interpretation. Chapter 4, however, discusses the results achieved by the author and presents the conclusions. It shows their limitations in the context of research that has been conducted to date and points out to future research directions in relation to the problems of the crisis that the European automotive market is currently undergoing.

Materials and Methods

Conceptual Assumptions

The aim of the entire research project was to obtain extensive knowledge on the impact of the global COVID-19 pandemic on selected sectors of the automotive industry in Poland. The description of the selected issue concerning the subject of the impact of the coronavirus on particular industries has therefore been presented in a multi-sectoral perspective (both in relation to the demand and the supply part of the industry). The research area focused on identifying changes caused by the coronavirus and how it affected the sales and distribution systems for new passenger cars and spare parts, as well as service and repair services. As a result, an attempt was made to answer the following research questions:

- What changes have occurred in the sales and distribution of new passenger cars?
- How have the distribution channels for new spare parts changed?
- What changes have been made in the field of maintenance and repair services?
- In which areas of their operation do entities from the automotive sector forecast the most significant changes?

Method of sample selection

Affirmative actions were taken with regard to the correct selection of research participants by sending questionnaires to these entities which conduct their activity only in the automotive industry. Therefore, the awareness criterion was the main factor determining participation of a particular person in the study. The potential respondents were first asked if they were related to the automotive industry. During the survey, all the respondents confirmed that and answered positively to the first question asked in this regard.

The selection of respondents for the survey was made amongst vehicle manufacturers, sub-suppliers of automotive parts and components, car dealers, as well as repair and service workshops. The selection was not classified according to the size of the entity, form of ownership or type of business. The respondents were quality engineers, directors, traders, managers, and service managers. Because the respondents diversed in terms of age, gender, and type of business they were involved in, part of research was conducted using one communication channel, i.e. the Internet. 450 interviews were collected during the research phase. The adopted strategy recognized the sample as sufficient for the adopted analysis scheme and, therefore, enabled to answer the research questions.

Description of the tool

The CAWI method (computer-assisted web interviewing) was used as part of the study. The questionnaire form to be filled in electronically was sent to the relevant entities related to the automotive industry. The survey was anonymous, which enabled the respondents to express their opinions freely. The completed questionnaires are reflected in the layout of the results.

Analysis Scheme

During the research 450 completed answer sheets were obtained in electronic form by means of an online questionnaire. The research was conducted in Poland, an EU country, from March 2020 to June 2020, during lockdown, i.e. the first phase of the pandemic. The survey contained 8 questions (answers to 4 of them are presented in the article) related to the impact of the pandemic on the automotive industry in Poland. In the scheme adopted the questions pertained to changes in the channels and distribution of new cars and spare parts, service and repair services, and forecast changes in particular operational areas of the entities in that market sector. The study contains substantive comments and charts including answers to the questions contained in the forms. After entering the answers into a spreadsheet, the obtained research data was subjected to statistical and substantive analysis. In order to increase readability of the obtained answers, the results are presented in percentages (simplest form possible) using figures 1 to 4.

Unless otherwise stated, the percentages were added up to 100% of the surveyed group of respondents. The answers, which were less than 10% of the total, were considered irrelevant and were left out at a later stage of the analysis. However, in the case of multiple-choice questions and more than one answer provided, the percentage distribution did not add up to 100%, but was calculated as a percentage by comparing the number of people providing an answer with the total number of respondents.

The technical notes on the data presentation method are placed in the titles and footnotes to the figures. Since the respondents were not required to answer all the questions in the survey, the number of valid answers varied for different questions , which did not affect the final result as the number and percentage losses were not significant. The layout of all analyzes corresponded to the objectives of the study.

Results

At the first stage of the research, the respondents were asked to reveal changes in the sales and distribution of new passenger cars. (fig. 1).

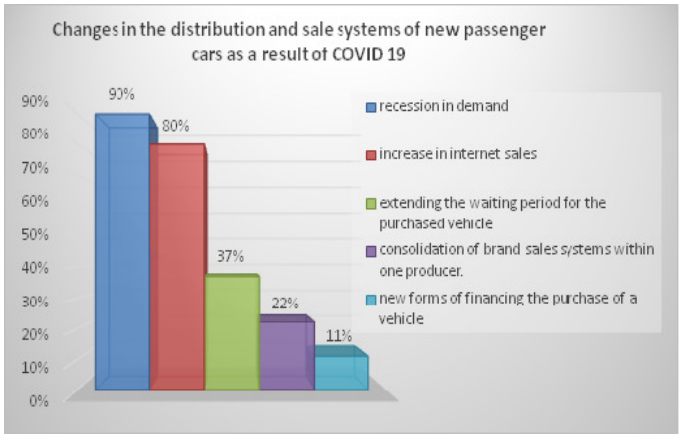

Fig.1: Changes in the distribution and sales systems of new passenger cars

Source: own study

The analysis of the obtained response results showed that the most important change revealed by over 90% of the respondents was a noticeable fall in demand for new vehicles. In addition, in terms of distribution and sales systems for new passenger cars, the most significant change was observed in the transition from direct sales to online sales. This fact was revealed by 80% of the respondents. 37% of the respondents pointed out that the waiting period for new vehicles (particularly for models with customized equipment) was extended. It is worth noting that 22% of the respondents indicated consolidation of the sales systems operated by particular dealers carrying several makes of vehicles from the same business group. However, only 11% emphasized the fact that new forms of financing purchase of a vehicle were introduced.

At the next stage, the respondents were asked to indicate changes in the distribution systems for new passenger car spare parts (fig.2).

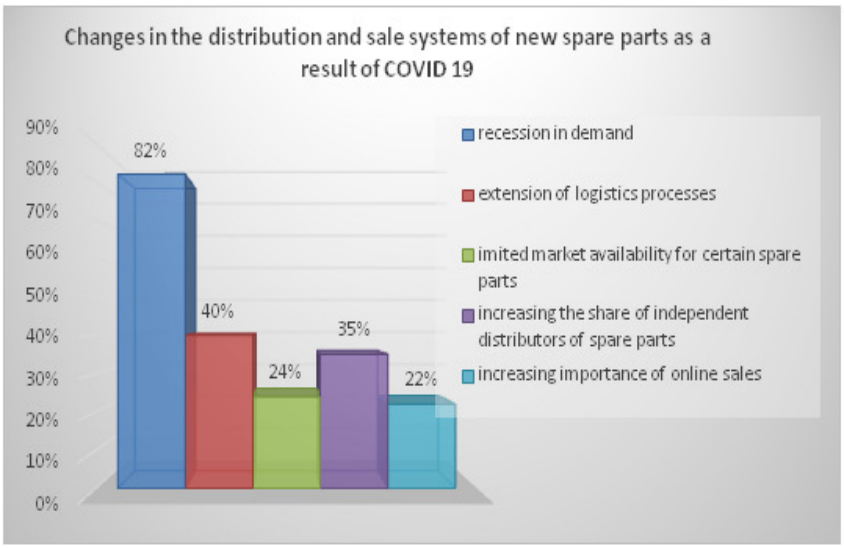

Fig.2: Changes the systems for distribution and sale of spare parts systems sector in connection with the COVID-19 pandemic

Source: own study

The research shows that 82% of the respondents revealed a decrease in demand for new spare parts. Over 40% of the respondents emphasized that the logistics processes related to the delivery of new original spare parts were extended, and 24% of the respondents indicated limitations in their market availability (particularly in the case of spare parts and components whose inventory levels were kept at a low level before the pandemic). Moreover, 35% of the respondents revealed changes in the distribution systems, consisting in an increase in the market share of independent distributors of spare parts. It is worth noting that only 22% of the respondents indicated that changes occurred in the systems for selling spare parts, i.e. a decrease in direct sales and an increase in online sales. At the next stage of the research the respondents were asked to reveal changes in the scope of maintenance and repair services. (fig.3).

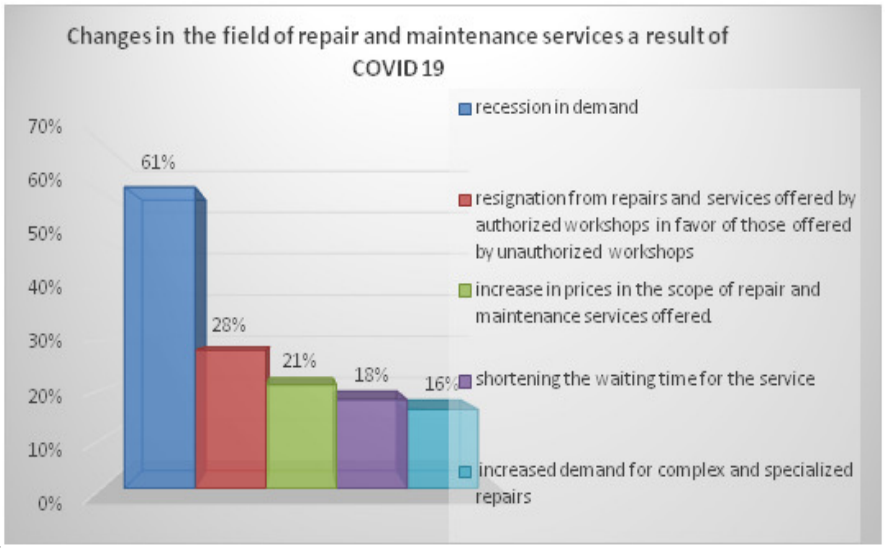

Fig. 3: Changes in repair and maintenance services sector as a result of the pandemic COVID-19

Source: own study

The results from the obtained responses show that in as many as 61% of service and repair workshops a decrease in demand for their services was observed. 28% of the respondents pointed out to the fact that customers depart from services offered by authorized garages and choose unauthorized ones. 21% of the respondents revealed a noticeable increase in the prices of repair and maintenance services offered. Over 18% of the respondents pointed out to the

fact that the waiting time for the service was shortened. It is worth noting that 16% of the respondents showed an increase in demand for complex and specialized repairs, including repairs of the gearbox or power units.

The last stage of the research included answers to the question in which areas of their operation the entities from the automotive sector forecast the most significant changes. (fig.4)

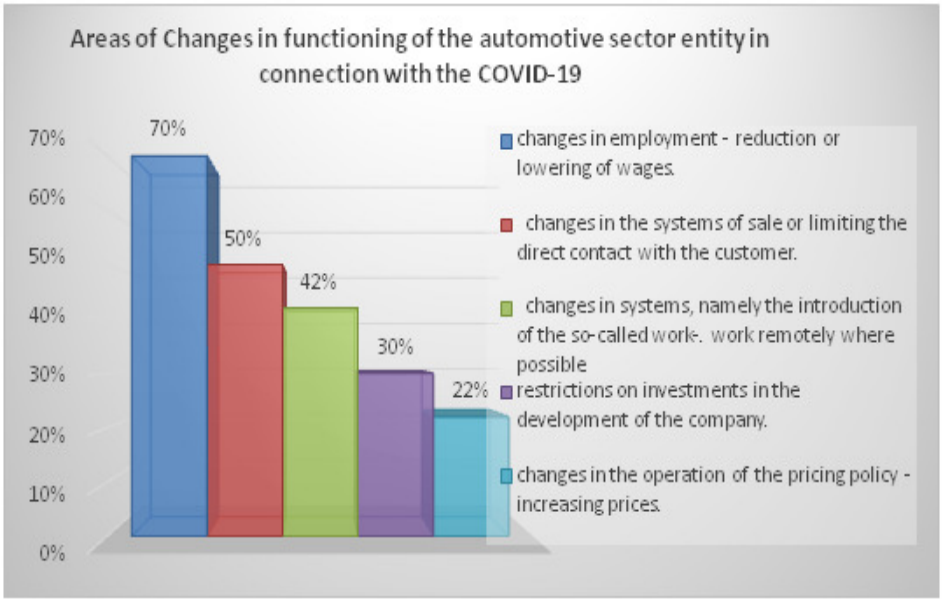

Fig. 4: The areas of changes in the functioning of an entity from the automotive sector in connection with the COVID-19 pandemic

Source: own study

The results from the obtained responses show that the largest number of respondents, i.e. over 70%, indicate possible changes in the field of employment - redundancy or reduction of salaries and wages. Over 50% of the respondents confirmed changes in the sales systems, i.e. limited direct contact with the customer. In addition, 42% of the respondents confirmed changes in the working systems, i.e. introduction of the so-called work from home, if possible. About 30% of the respondents emphasize that there will be limitations in terms of investment in the company's development. On the other hand, 22% of the respondents confirmed changes in the pricing policies (an increase in prices).

Discussion and Conclusions

Although the car industry was subject to various trends related both to the changes occurring within it and to the development of the entire world economy, it was, until recently, one of the fastest growing sectors of the economy of the European Union (Dooley, 2020). Experts from the automotive industry agree that the industry has not faced a crisis of such scale to date, and that it will have global economic effects (Ivanov, 2020; Bloomberg, 2020; Melin & Kim, 2020). Many researchers point out that one of the key elements in the analysis of the environment of enterprises operating in a particular market should be identification of changes and trends they are affected by. (Baldwin &Tomiura, 2020; Kotler et al.2020). Because, as one of the researchers emphasizes, the correct analysis of their impact on the functioning of entities in a particular market enables to take appropriate measures, e.g. addressing threats and emerging crises (Anwar & El-Bassiouny,2020;Baldwin & Weder di Mauro,2020). Therefore, the main objective of the research was to present the current challenges faced by the European automotive industry in order to tackle the COVID-19 crisis.

The author shares the opinion of other researchers, who analyzed previous crises, that the impact of the COVID-19 pandemic is much wider and will, to a greater extent, affect many European markets related to the automotive sector. (Foldy, 2020;Word Bank, 2020). It is due to three main factors. Domestic demand was very quickly reduced by the pandemic. Therefore, all the European markets, which are closely related to the domestic markets (for example the Polish automotive industry analyzed in this article), are also affected by the pandemic. In addition, in the last dozen or so years, China's role in the global automotive industry has increased significantly. It has become the world's largest car manufacturer and one of the largest suppliers of components for the automotive sector

(Bloomberg,2020). As one researcher emphasizes, a significant delay in the delivery of one component from China may result in the suspension of the operation of numerous plants in Europe, which rely on just-in-time supply management.(Gereffi, 2020; Kano et.al,2020; Demirel, 2019).

The research results relating to the Polish automotive industry seem to confirm that. Over 90% of the respondents revealed a noticeable decline in demand for new vehicles, which was confirmed by other authors' studies relating to the analyzes of automotive industries in other countries. The author claims that it is the result of forced social isolation and restrictions on movement. This also translates into supply opportunities. The overcapacity that emerged in connection with the pandemic had a negative effect on financial liquidity. In addition, research results show that vehicle sales have moved from direct to online sales. This change in the method of distribution and sales of vehicles results from the need for maintaining an even greater social distance in direct contacts. In this regard, the author agrees with other researchers (Anwar & El-Bassiouny. 2020; Kraus et al. 2020) that presenting a car and conducting tests online may be an effective solution to increasing sales in the COVID-19 era. It is worth noting that 37% of the respondents revealed that the waiting period for new vehicles was extended (particularly for models with customized equipment). According to the author, this resulted from the closure of some factories and reduced production, as well as from the need to get rid of excess inventory in the range of the most sold vehicle models with standard equipment.

In terms of changes in the distribution of spare parts, the majority of respondents revealed three important trends: a decrease in demand for new spare parts, extension of logistics processes for the supply of new, original spare parts, and an increase in the market share of parts from independent distributors. The author argues that this resulted from two processes: a fall in production of new original parts by sub-suppliers, and a sudden, rapid decrease in mobility and number of vehicles on the roads. Only 22% of the respondents pointed out to a change in the systems for distribution and sales of spare parts. The author claims that B2C sales on-line on the spare parts market have been operating for several years. Therefore, the situation related to COVID-19 has only led to an increased role of e-commerce in this market. From being an auxiliary or additional means of selling spare parts, this channel has turned into the main tool for accessing customers. In terms of changes in the field of maintenance and repair services, the majority of respondents revealed two key trends, i.e. a decrease in demand for their services as well as departure of customers from the services provided by authorized garages and migration to those offered by unauthorized garages. Like in the case of the previously analyzed cases, according to the author and other researchers (Zhang et. al. 2020), this state of affairs is influenced by the lower mobility of the society, i.e. reduction in vehicle operation processes. On the other hand, according to the author of the research, the departure of customers from authorized garages in favor of unauthorized ones, is related to the attempts of users to reduce repair costs. In the current economic crisis, this trend is absolutely natural.

As regards the anticipated changes in the functioning of entities in the automotive sector, research shows changes in three key areas. Over 70% confirm possible employment changes, i.e. redundancies or reduced wages and salaries. This may result from the fact that the downtime in car production caused by the coronavirus resulted in a reduced volume of manufactured goods, as well as further reduction in demand for automotive products. In addition, 50% of the respondents declare further changes in the sales systems, i.e. limiting direct contact with the customer. About 42% of the respondents revealed changes in the working systems, i.e. introduction of the so-called work from home, if possible. On the other hand, what is worrying is probable limitations with regard to investments, which was shown by 30% of the respondents.

On the other hand, the prices anticipated within the pricing policy are a matter of dispute with other authors (Verma & Gustafsson, 2020;Ashraf,2020). The author claims that first of all COVID-19 has led to a drastic reduction in demand and consequently reduction in profits. Restarting production is associated with an increase in costs (securing personnel, searching for new business strategies, etc.). Therefore, the supply part of the industry will want to recover as soon as possible. The upward trend in prices might be one of the ways to do so.

The analysis of research results shows that the COVID-19 pandemic has an obvious impact on both the supply and the demand part of the industry. At the same time, it paves way for changes taking place in the automotive industry, which is certainly an answer to the research questions posed. The research confirmed the thesis promoted in the literature by other researchers (Buruzs & Torma, 2017;Cioca et.al. 2019, Zhang et. al, 2020) that in the automotive industry we often deal with long chains of connections and cooperation, which means that the situation faced by the market of one country not only affects other domestic markets but also all related entities in this industry. It all leads to the so-called "domino effect" described in the economic literature.

Although the research focused on the analysis of changes in relation to the Polish automotive industry, the author argues that the conclusions of the research may be implemented in the automotive industries operating in particular countries of the European Union.

The paper uses data from a survey performed on a specific research sample: 450 entities from the Polish automotive sector. Certainly, in the near future, much wider analyzes will be necessary, particularly with the use of time series variability. For example, it will be necessary in the case of comparing the effects of the first and second phases of the pandemic on the industry. In addition, further research on this topic should focus on aspects related to analysis of the impact of the COVID-19 pandemic on sectors related to the automotive industry, including the banking or motor insurance sector.

Summing up the research results on the impact of the COVID-19 pandemic on the automotive industry for the case study 'Poland', one might say that they do not fully cover the whole issue, but are an attempt to signal the complexity of the presented research problem. Certainly, the subject requires further analysis and research to understand how that industry functions and what impact a global pandemic has on a micro, macro and global scale. Therefore, such analysis will be the subject of future work to identify key factors for tackling the crisis in that sector of the industry.

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Financial Liquidity Strategies of Mining Enterprises in Poland And in The World

Aneta MICHALAK

Silesian University of Technology, Gliwice, Poland
aneta.michalak@polsl.pl

Abstract

Financial liquidity strategies are one of the most important decision-making problems in an enterprise. The article attempts to discuss and examine the liquidity strategies used in the hard coal mining industry in Poland and in the world. The paper puts forward a thesis that due to the high degree of immobilization of assets, mining enterprises use conservative liquidity strategies. The nature of the liquidity strategy was defined on the basis of the financial liquidity ratios: current ratio, quick ratio and cash ratio. The analysis was complemented with the establishment of the working capital. This allowed to characterise the liquidity strategies used in the hard coal mining industry. The research was based on literature studies and data from the financial statements of the surveyed enterprises. The conducted analysis is of preliminary study nature and will be extended in further works by extending the methodology of liquidity measurement.

Keywords: Financial Liquidity, Working Capital, Mining Enterprises.

Introduction

Managing the financial liquidity of enterprises in the current turbulent economic conditions is a difficult task. This is even more of a challenge in industries, such as hard coal mining. The activity of mining enterprises is extremely difficult, due to the occurrence of natural hazards related to the geological and mining conditions of the extracted deposits. This is additionally overlapped by international, EU and national political and legal conditions, the frequent lack of support from trade unions, as well as local and regional communities or environmental organisations. The financial dimension of the efficient and effective management of such enterprises is the maintenance of sufficient financial liquidity. Managing financial liquidity in mining enterprises involves making decisions related to acquiring short-term and long-term sources of financing the mining enterprise, which affects the final shape of the capital structure and working capital. Such decisions, due to the high level of risk associated with this activity, pose a serious challenge for the extractive industry.

The main **goal** of this article is to systematise the issues of financial liquidity management of enterprises, taking into account the specificity of mining enterprises, and to identify the strategies adopted in this regard by the largest Polish and global mining enterprises. The implementation of such a defined goal takes place in two stages. In the first one, the author reviews the literature in the field of financial liquidity management of enterprises, trying to highlight the industry conditions. In the second stage, the liquidity strategies implemented in selected mining enterprises are analysed. The paper puts forward a thesis that due to the high degree of immobilization of assets, mining enterprises use conservative liquidity strategies.

Literature Review

Financial liquidity is the enterprise's ability to pay its liabilities on time. It is a complex category, that requires a comprehensive and multi-faceted approach, especially in the case of mining enterprises. At the same time, it is an extremely topical issue, and of great importance from the point of view of ensuring the enterprise's survival on the market (Meijer et al., 2019, pp. 114-126). The magnitude of this issue is so high, that we can talk about financial liquidity management in enterprises. It is understood as keeping assets easily convertible into cash and reserves of cash and securities at the level optimal for the enterprise (Ding et al. 2013, pp. 1490-1507; Enqvist et al. 2014, pp.36-49; Lind et al., 2012, pp. 92-100; Vahid et al. 2012, pp. 1313-1318). If the enterprise has insufficient financial liquidity, it may become insolvent, which is one of the most important causes of bankruptcy. In turn, too high financial liquidity, defined as excess liquidity, reduces the profitability of the enterprise, as part of the capital is frozen (Wędzki, 2003, p. 34).

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The term working capital management is used interchangeably with the term financial liquidity management (Bei and Wijewardana, 2012, pp. 695-700; Opler et al., 1999, pp. 3-46; Aktas et al., 2015, 98-113). It is defined as shaping the level and structure of the part of the current assets financed with equity and long-term liabilities. Equity increased by long-term liabilities is the so-called fixed capital of the enterprise. This capital should be high enough to finance all the enterprise's fixed assets and part of its current assets. That part of the current assets that is financed with fixed capital is called net working capital or working capital.

Maintaining sufficient financial liquidity largely depends on the availability of cash, which – in turn – is determined by the possession of assets that are easily convertible into these funds (Zimon, 2019, p. 366). In the case of mining enterprises, there is a high degree of immobilisation of assets, which are generally difficult to sell. Underground buildings, technical equipment and machinery play an important role in the fixed assets of these enterprises, which, due to them being underground, practically cannot be liquefied. Their sale and conversion to cash would entail high costs of dismantling and transport, which could exceed the revenues gained from their sale. Having easily marketable fixed assets is an important determinant of financial liquidity, though not the only one.

The technology used and the organisation of the production process are also important. They determine the length of the production cycle and the level of inventories and, therefore, affect the degree of immobilisation of current assets. The more time passes from the production of the product to its sale, the greater the risk of a lack of cash for the current payment of liabilities. In the case of mining enterprises, there is a significant level of immobilisation of assets in inventories of finished products. Coal with the best quality parameters is sold relatively quickly, while the remaining coal can be stored for a long time. This overlaps with the problem of seasonal demand, which is an additional factor affecting the length of the inventory turnover cycle and the freezing of cash (Czekaj, Dresler, 2006, p. 187).

In addition to internal factors, financial liquidity is influenced by a large group of factors independent of the enterprise, coming from its environment. One of them is the economic situation. Its influence on liquidity is especially visible in periods of economic downturn. Then the risk associated with running a business increases, which creates the need to have a larger reserve of funds to pay off current liabilities, in the event of difficulties in collecting receivables or liquidation of inventories (Okręglicka, 2015, p. 387). During an economic downturn, managers find it difficult to predict the enterprise's cash flow in the context of increasing macroeconomic uncertainty, so they may decide to maintain higher cash reserves to maintain liquidity (Baum et al., 2006, pp. 289-304).

Another determinant of financial liquidity is monetary policy. It consists in the influence of the state on the demand for money and the supply of money in the economy, mainly through interest rates. They translate into interest rates at commercial banks, at the same time influencing the preferences of enterprises regarding investing capital in banking products and taking out credits and other interest-bearing liabilities.

The level of taxes is also of great importance in the area of financial liquidity of enterprises. A higher rate of income tax reduces the net profit that can be credited to your working capital. The list of factors determining financial liquidity is long (cf. Grabowska, 2012, p. 20). Those listed above are only examples of them. The influence of each of these factors may be of different intensity, depending on the specific situation, industry in which the enterprise operates, the period taken into consideration etc. (Sierpińska, Rzeszowski 2012, p. 199).

Materials and Methods

The research problem undertaken in the article is the identification of the financial liquidity strategy used in hard coal mining in Poland and in the world. In order to examine the financial liquidity strategy, data from financial statements of the surveyed enterprises was used, taking into account the book values of selected items. On their basis, a set of financial ratios was calculated and the level of working capital was examined. The years 2016-2019 were adopted as the research period.

The subject of the research is an analysis based on the three classical ratios of liquidity and net working capital. The examined ratios include:

- current ratio,
- quick ratio,
- cash ratio.

The **current ratio**, also known as the current liability coverage ratio, gives an overview of the financial liquidity. It is calculated according to the following formula:

$$W_{pb} = \frac{A_b}{Z_b}$$

where: W_{pb} – current ratio,
A_b – current assets,
Z_b – current liabilities.

The structure of this ratio is based on the assumption that the enterprise's liquidity, i.e. its ability to pay its liabilities on time, depends on the value of its current assets, i.e. assets that can be easily converted into cash. These assets, according to the balance sheet approach, include inventories, receivables with maturities of up to 12 months and short-term investments. The enterprise's financial liquidity will be positively assessed if the value of current assets is higher than the value of current liabilities. Due to possible issues related to the liquidation of these assets, the assumed standard is a prudent assumption, in which current assets exceed the value of current liabilities by 20-100%. The optimal value of this ratio in enterprises should, therefore, range from 1.2 to 2.0 (Czekaj, Dresler, 2006, p. 211). Taking into account the specificity of mining enterprises, and in particular large immobilization of assets in the form of underground fixed assets and hardly tradable coal stocks on dumps, this value may be even closer to the upper limit of this norm. Below this level, there is a risk of liquidity or lack of liquidity, and above this level, there is excess liquidity. Financial excess liquidity is a condition which, on the one hand, may indicate that current assets are too large or insufficiently rotated and, on the other hand, insufficient use of current liabilities in the structure of financing current assets. The liquidity is then maintained, but the enterprise incurs high costs for its excessive maintenance, related to the entrapment of capital in current assets (costs of maintaining stocks, financing recipients). The current ratio is the most commonly used measure for assessing the enterprise's liquidity, but it does not take into account the various possibilities of converting individual current assets into cash. Some of them, such as inventories, are converted into cash over a relatively long period. In order to overcome these shortcomings, the second measure is proposed, which is the quick ratio.

The **quick ratio**, also known as the ratio of increased liquidity, determines the degree of coverage of current liabilities with assets of high liquidity. To calculate it, the current assets shown in the numerator of the current ratio are reduced by the least liquid components, i.e. inventories and deferred charges. The ratio formula takes the form:

$$W_{psz} = \frac{A_b - Z - RM_{cz}}{Z_b}$$

where: W_{psz} – quick ratio,
RM_{cz} – deferred charges,
Z – inventories.

The optimal value of the ratio is in the range from 1 to 1.2. This means that current liabilities should be fully covered in the most liquid assets of the enterprise, i.e. receivables and short-term investments. The value of the ratio below 1 means lack of quick liquidity, i.e. problems with timely payment of current liabilities. On the other hand, a level above 1.2 suggests excess liquidity, which may result from an excessive level of receivables and short-term investments.

Another ratio is the **cash ratio**, which only takes into account the most liquid assets of an enterprise, in the form of short-term investments. These are those components of current assets that, in a given period of time, are not related to the operational process, i.e. short-term financial assets, as well as cash and other cash assets. The value of this ratio informs about the degree of coverage of current liabilities from these assets and can be calculated according to the formula:

$$W_{śp} = \frac{I_k}{Z_b}$$

where: $W_{śp}$ – cash ratio,
I_k – short-term investments.

The literature does not provide standards for this ratio, so the enterprise should monitor its value over time and adapt it to the environmental conditions and economic conditions (Sierpińska, Jachna, 2007, pp. 80-88). This means the necessity to continuously monitor the most mature current liabilities, so that they can be settled with the use of cash and short-term financial assets (Brigham, Houston, 2005, p. 108).

Another variable that has been considered to be an important ratio of the financial liquidity strategy is the **level of net working capital**, also known as **working capital** (Wysłocka, 2008, pp. 127-137). Net working capital is calculated as the difference between the fixed capital and fixed assets or as the difference between current assets and short-term sources of their financing (Lamberg and Vålming, 2009, p. 17). Working capital is a guarantee of financial liquidity for the enterprise in situations of delays in payments or difficulties with selling products. This capital may have the following value:

- positive – it is an indicator of a conservative liquidity strategy, which is characterised by the fact that part of the current assets is financed with fixed capital. This reduces the risk of losing financial liquidity, but – at the same time – makes it impossible to invest the employed fixed capital in more profitable fixed assets,
- zero – means that current assets are fully financed with short-term capital. Such a situation in enterprises usually occurs temporarily. The level oscillating around zero is equated with the moderate strategy,
- negative – it means that the fixed capital is not sufficient to cover the fixed assets and, therefore, the assets are – to some extent – also financed with short-term capital. In such a case, the enterprise has a high probability of losing financial liquidity, because it may not be possible to change the fixed assets to cash when short-term liabilities mature, due to their low conversion rate. This applies in particular to mining enterprises, which are often characterized by fixed assets that are difficult to sell stationary underground, e.g. coal shearer. The occurrence of negative working capital is only considered acceptable in situations, where the enterprise is able to renew its short-term liabilities on a permanent basis. This type of liquidity strategy is known as an aggressive strategy.

While the first and second situations should be considered correct, the fact that fixed assets are financed by liabilities with maturities shorter than one year may involve the risk of losing financial liquidity. This will happen when it is not possible to pay due liabilities with liquid assets. This is a particularly risky situation in the case of capital-intensive industries, such as mining, where we are dealing with high immobilisation of high-value assets, which, for the most part, are very difficult to monetise (buildings and underground engineering structures, pits, specialised mining equipment etc.).

The **subject of research** in this article are selected enterprises from the hard coal mining industry in Poland and in the world. The two largest enterprises listed on the Warsaw Stock Exchange were selected as representatives of the Polish hard coal mining industry:

- Jastrzębska Spółka Węglowa SA (JSW),
- Lubelski Węgiel “Bogdanka” SA (LWB).

An enterprise not listed on the capital market was not included in the research sample of Polish mining enterprises, due to the unavailability of financial data. Nor did the study include an enterprise that is part of a large energy concern, which could only misrepresent the analysis relating to the hard coal mining industry. Moreover, the smallest mining enterprises operating on the Polish market in the form of limited liability companies were excluded from the analysis.

For the needs of the research, for comparative purposes, the largest global mining enterprises in terms of hard coal mining were included in the research sample, with the exception of those that do not provide their basic financial data. Selected entities are listed on the world's largest stock exchanges, such as:

- New York Stock Exchange (NYSE) in New York, USA,
- Shanghai Stock Exchange (SSE) in Shanghai, China,
- Hong Kong Stock Exchange (HKSE) in Hong Kong, China,
- Australian Securities Exchange (ASX) in Sydney, Australia,
- London Stock Exchange (LSE) in London, UK,
- National Stock Exchange of India (NSE) in Mumbai, India

The selection of enterprises for this sample was governed by the principle of business homogeneity, i.e. all selected enterprises make a significant part of their revenues (over 50%) from hard coal mining. Among the selected mining enterprises, there are American, Chinese, Australian, English and Indian companies listed on the global stock exchanges. Polish and foreign enterprises being the subject of the research are listed in Table 1, in the order corresponding to the stock exchanges, on which their shares are listed. Their short characteristics are presented below, based on the websites of individual companies, www.statista.com and stock exchange reports.

Table 1: List of Polish and foreign mining enterprises surveyed

No	Name	Headquarters	Listed since	Exchange	Business area
1	Jastrzębska Spółka Węglowa SA (JSW SA)	Poland	2011	WSE Poland, Warsaw	Poland
2	Lubelski Węgiel Bogdanka SA (LWB SA)	Poland	2009	WSE Poland, Warsaw	Poland
3	CONSOL Energy	USA	1999	NYSE, USA, New York	USA
4	Peabody Energy Corp.	USA	2001	NYSE, USA, New York	China
5	Rio Tinto	UK	1990	NYSE, USA, New York	Australia, North and South America, Asia, Europe and
6	Inner Mongolia Yitai Coal	China	2012	SSE, China, Shanghai	China
7	Yanzhou Coal Mining	China	1998	SSE, China, Shanghai	China, Australia
8	China Coal Energy	China	2007	HKSE, China, Hong Kong	China
9	Shenhua	China	2005	HKSE, China, Hong Kong	China
10	New Hope Corporation	Australia	2003	ASX, Australia, Sydney	Australia, Japan,
11	Whitehaven Coal Ltd	Australia	2007	ASX, Australia, Sydney	Australia
12	Anglo American Coal	UK	1999	LSE, UK, London	Australia, South Africa, India
13	Coal India	India	2010	NSE, India, Mumbai	India

Source: own study based on data from the financial website of yahoo.com and the market service on the Financial Times website – available on the World Wide Web: http://finance.yahoo.com/, http://www.ft.com/intl/markets.

Jastrzębska Spółka Węglowa SA was established on 1 April 1993. It is the largest producer of ortho-coke coal in the European Union, characterised by high quality parameters, which is primarily used in the production of the highest quality blast furnace coke. The company employs about 28,000 people.

Lubelski Węgiel Bogdanka S.A. is a mine extracting hard coal in the Lublin Coal Basin. The beginnings of this enterprise date back to 1975. Currently, the enterprise operates as an independent mine – joint stock company. The energy hard coal sold by the enterprise is primarily used for the production of electricity, heat and cement production. The company employs about 5,000 people.

CONSOL Energy – The company was founded in the USA in 1864. It has been operating in its present form since 1991. It extracts hard coal for the energy and metallurgical markets. It also processes steam coal for the energy industry and metallurgical coal for steel and coke producers. It employs over 9,000 people. It is regarded as one of the most modern (technologically) and safest companies in the world. In the USA, it satisfies 6.5% of the energy demand for hard coal.

Peabody Energy Corp. was founded in 1883 in St. Louis, Missouri, USA. It deals with mining, processing and sale of steam coal for power plants and metallurgical coal for industrial customers. Peabody has stakes in 30 coal mines located in the USA and Australia. It employs approximately 8,000 people.

Rio Tinto was founded in 1873 in London. The company is engaged in exploration, extraction and processing of mineral resources on a global scale. It has open-pit and underground mines, as well as refineries and processing plants. Rio Tinto extracts steam and coking coal, as well as other mineral resources, such as copper, gold, molybdenum and others. It conducts business in Australia, North and South America, Asia, Europe and South Africa. It employs over 66,000 people.

Inner Mongolia Yitai Coal was founded in 1997, with its headquarters in China, manufactures, transports and sells hard coal and fuel products. The coal extracted by the company is marketed under the Yitai brand name. Its annual production is about 35 million tonnes of coal. The company mainly operates on the domestic market. It employs over 6,000 people.

Yanzhou Coal Mining, with its headquarters in China, extracts, processes and sells steam and coking coal in China, Japan, South Korea and Australia. Coal is extracted in 6 mines. The company employs nearly 40,000 people. **China Coal Energy** was founded in 1999. It is an enterprise extracting hard coal in China. The enterprise has 17 active hard coal mines and 29 mines under construction. The company employs over 40,000 people.

Shenhua is the second largest coal mining company in the world. It was founded in 1995 and mining is carried out in China. It employs around 150,000 people and has 30 active hard.

New Hope Corporation was founded in 1904. Its main activity is hard coal mining, but its activities also include the extraction of oil and natural gas. Its hard coal mining operations are mainly located in Australia, but it also mines in Chile, Taiwan, China and Korea. It employs over 42,000 people

Whitehaven Coal Ltd – founded in 1999, with its headquarters in Australia. It has both open-pit and underground hard coal mines. Its extraction activities are mainly conducted in Australia. It employs around 5,000 people

Anglo American Coal was founded in 1917 in Johannesburg and reorganised in 1999 as Anglo American plc., with its headquarters in London. The enterprise extracts mineral resources, including hard coal, conducting operations all over the world. Hard coal is mainly extracted in Australia and South Africa. The enterprise employs around 100,000 people.

Coal India, founded in 1975, is the largest coal mining company in the world. It employs over 357,000 people, owns 470 mines, of which 164 are open-pit, 275 underground and 31 mixed. The company for – the most part – mines in India, but has a subsidiary in Mozambique.

Results

The first step to identify the financial liquidity strategies of the surveyed mining enterprises was the calculation of three liquidity ratios. Table 2 presents the level of the first one, i.e. the current ratio.

Table 2: Current ratio of Polish and foreign mining enterprises in the period 2016-2019

No.	Name	2016	2017	2018	2019
1	Jastrzębska Spółka Węglowa SA (JSW SA)	1.02	1.57	0.95	0.96
2	Lubelski Węgiel Bogdanka SA (LWB SA)	1.16	0.98	1.05	1.98
3	CONSOL Energy	0.53	0.95	0.96	0.86
4	Peabody Energy Corp.	2.07	1.76	1.85	1.65
5	Rio Tinto	1.60	1.65	1.92	1.56
6	Inner Mongolia Yitai Coal	1.01	1.24	1.24	1.43

7	Yanzhou Coal Mining	0.82	1.05	1.12	0.87
8	China Coal Energy	0.73	0.78	0.80	0.66
9	Shenhua	1.19	1.14	1.89	1.68
10	New Hope Corporation	3.61	2.78	1.23	1.97
11	Whitehaven Coal	1.40	1.17	1.25	1.39
12	Anglo American Coal	1.91	1.99	1.95	1.94
13	Coal India	1.62	1.35	1.51	1.72

Source: own work.

The current ratio gives a general view of financial liquidity. The optimal value of this ration should range from 1.2 to 2.0. Above this range, we are dealing with excess liquidity, which is manifested in maintaining too high levels of current assets. In the case of mining enterprises, these may be excessive amounts of hard coal inventories or high receivables. As shown in Table 1, the mining industry has no problems with excess liquidity. Only one of the surveyed enterprises, in two years of the analysed period, significantly exceeded the recommended standard for the current ratio. This being the New Hope Corporation. Most of the surveyed enterprises maintain the standards. However, in order to fully evaluate their liquidity strategies, further ratios should be taken into account. Table 3 presents the level of the quick ratio.

Table 3: Quick ratio of Polish and foreign mining enterprises in the period 2016-2019

No.	Name	2016	2017	2018	2019
1	Jastrzębska Spółka Węglowa SA (JSW SA)	0.88	1.37	0.77	0.64
2	Lubelski Węgiel Bogdanka SA (LWB SA)	1.07	0.90	0.86	1.71
3	CONSOL Energy	0.40	0.82	0.86	0.72
4	Peabody Energy Corp.	1.86	1.53	1.58	1.31
5	Rio Tinto	1.29	1.34	1.61	1.24
6	Inner Mongolia Yitai Coal	0.85	1.15	1.17	1.30
7	Yanzhou Coal Mining	0.68	0.97	1.05	0.83
8	China Coal Energy	0.60	0.66	0.68	0.56
9	Shenhua	1.07	1.04	1.81	1.55
10	New Hope Corporation	3.05	2.52	0.78	1.39
11	Whitehaven Coal	0.94	0.73	0.81	0.82
12	Anglo American Coal	1.34	1.39	1.29	1.26
13	Coal India	1.40	1.23	1.39	1.59

Source: own work.

The quick ratio shows whether enterprises are able to cover their current liabilities with assets of high liquidity, i.e. assets not including inventories. 6 out of the 13 surveyed mining enterprises have problems with maintaining liquidity. This group includes Polish enterprises, CONSOL Energy operating in the USA and Chinese enterprises: Yanzhou Coal Mining and China Coal Energy, as well as Australian Whitehaven Coal.

In the surveyed group, one can also observe a situation, in which there is excess liquidity, which may result from the excessive level of receivables and short-term investments. New Hope Corporation has a significant excess liquidity throughout most of the period. The following entities also maintain quick ratio levels above the recommended limit of 1.2: Coal India, Anglo American Coal, Shenhua (in the last two years), Peabody Energy. Periodically, there are also single cases of exceeding or not achieving the recommended levels of the standard.

The financial liquidity ratio analysis is complemented with the cash ratio. Its level in the surveyed enterprises is presented in Table 4.

Table 4: Cash ratio of Polish and foreign mining enterprises in the period 2016-2019

No.	Name	2016	2017	2018	2019
1	Jastrzębska Spółka Węglowa SA (JSW SA)	0.05	0.40	0.41	0.31
2	Lubelski Węgiel Bogdanka SA (LWB SA)	0.72	0.58	0.38	1.02
3	CONSOL Energy	0.04	0.36	0.48	0.20
4	Peabody Energy Corp.	0.86	0.81	0.93	0.75
5	Rio Tinto	0.65	0.83	1.11	0.78
6	Inner Mongolia Yitai Coal	0.44	0.81	0.93	1.03
7	Yanzhou Coal Mining	0.39	0.45	0.56	0.37
8	China Coal Energy	0.25	0.30	0.35	0.31
9	Shenhua	0.45	0.70	0.85	0.89
10	New Hope Corporation	2.13	2.07	0.27	0.50
11	Whitehaven Coal	0.40	0.39	0.35	0.34
12	Anglo American Coal	0.93	1.06	0.96	0.88
13	Coal India	0.75	0.62	0.70	0.56

Source: own work.

The literature does not provide standards for this ratio. In the studied group, a large differentiation in this respect can be noticed, both in relation to the individual markets, on which the surveyed enterprises operate, and in the individual years of the studied period.

Another examined item is **net working capital,** also known as working capital. Its positive level proves that some of the so-called fixed capital (equity and long-term liabilities), after covering fixed assets, finances current assets. This is a feature of enterprises that follow a conservative funding strategy that limit their funding risk. The negative level of working capital means that part of the fixed assets is financed with short-term liabilities. It is a very risky situation from the point of view of losing financial liquidity and characterises enterprises in a financial crisis or applying an aggressive strategy aimed at minimising the cost of capital. The nature of working capital is presented in Table 5, marked with "+" for positive and with "-" for negative net working capital.

Table 5: The nature of working capital of Polish and foreign mining enterprises in the period 2016-2019

No.	Name	2016	2017	2018	2019
1	Jastrzębska Spółka Węglowa SA (JSW SA)	+	+	-	-
2	Lubelski Węgiel Bogdanka SA (LWB SA)	+	-	+	+
3	CONSOL Energy	-	-	-	-
4	Peabody Energy Corp.	+	+	+	+
5	Rio Tinto	+	+	+	+
6	Inner Mongolia Yitai Coal	+	+	+	+
7	Yanzhou Coal Mining	-	+	+	-
8	China Coal Energy	-	-	-	-

9	Shenhua	+	+	+	+
10	New Hope Corporation	+	+	+	+
11	Whitehaven Coal	+	+	+	+
12	Anglo American Coal	+	+	+	+
13	Coal India	+	+	+	+

Source: own work.

Negative working capital predominates in the analysed period only in two mining enterprises. These are: China Coal Energy and CONSOL Energy. The ratio analysis already shows that these enterprises do not have sufficient current or quick liquidity. The liquidity strategy used in these enterprises has the characteristics of an aggressive strategy. The financial risk of these enterprises is high and carries the risk of insolvency.

The lack of a stable liquidity strategy can be observed in both Polish mining enterprises (JSW SA and LWB SA) and in Yanzhou Coal Mining. The financial liquidity ratios and the level of working capital of these enterprises are constantly fluctuating. In each year of the analysed period, the surveyed enterprises alternately have sufficient liquidity or are losing liquidity. Amid such changes, the relatively high level of cash and other liquid cash assets is noteworthy. In these enterprises (except for one year), it does not fall below 31% of the value of current liabilities.

Positive working capital can be observed in most enterprises from the hard coal mining industry. It indicates that fixed assets and part of the current assets are financed with fixed capital, i.e. equity and long-term liabilities. These enterprises try to avoid financial risks. It should be borne in mind, that mining enterprises mainly have firmly immobilised fixed assets, that are hard to turn into cash. Therefore, they cannot afford to finance it with short-term liabilities. In most cases, a conservative financial liquidity strategy is used. On the one hand, it provides current financial liquidity at an acceptable level, but on the other hand, there are higher financing costs and there may be a smaller positive financial leverage effect. As a result, the efficiency of capital use and profitability in these enterprises is lower than in entities leaning towards an aggressive strategy.

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E-Health for Diabetes Self-Management in Saudi Arabia: Barriers and Solutions

Fuhid ALANAZI
University of Technology Sydney, Australia
Fuhid.alanazi@student.uts.edu.au

Valerie GAY
University of Technology Sydney, Australia
Valerie.Gay@uts.edu.au

Abstract

The need to give support to patients with diabetes through the use of e-health has become increasingly necessary in recent times. This study aims to determine how e-health applications can benefit the self-management of diabetes in patients in Saudi Arabia through a systematic literature review. Barriers and solutions e-health for the self-management of diabetes are the core focus of this study. Google Scholar, JSTOR, PubMed and Research Gate were used to access articles published. Mobile-enabled and e-health applications were consistently found promising in most of the papers. The search yielded 20 usable papers, described then categorised according to the topic and direction of findings. Some barriers found in the study are; integration of patient records at the national level, training of people operating and maintaining the system, etc. The study found that cultural, religious and social practices of the societies significantly affect the effective use of e-health in the study area and everyone including parents need to be educated.

Keywords: Diabetes management, e-health, telemedicine.

Introduction

The United States National Centre for Health Statistics defines a chronic disease as any disease which lasts long, typically over three months or more (Shiel Jr, 2018). The long-term care of chronic diseases consists of multiple approaches. This makes many chronic diseases amenable to self-management. One such chronic disease is diabetes. Musaiger (2011) conducted a study in Saudi Arabia (SA) where he found that food intake and the lifestyle of people in SA has contributed greatly to one's propensity of getting the disease and exacerbating it thereafter. He noted that fast food which includes large amounts of sugar and fat, is produced in large quantities and is widely available in the country.

These findings were also supported by Naeem (2012) in the study "Increasing trend of Junk food use in Saudi Arabia and health implications". The study found that diet is a key determinant that can dictate whether an individual will suffer from diabetes or not. Naeem (2012) added that the culture specific diets determine food intake and can aid a chronic disease such as diabetes. It was however mentioned that the increase in the consumption of junk food in Saudi Arabia might be attributed to lifestyle changes owing to work, career, profession etc. Assessing the impact that e-health via self-management can have on diabetes patients is the focus of this study; the barriers, as well as the solutions of effective use of e-health, are also discussed. This study also illustrates how cultural factors play a significant role in disease management and treatment.

Diabetes

Shrivastava, Shrivastava, and Ramasamy (2013) saw diabetes or more precisely, Diabetes Mellitus (DM) as "a chronic progressive metabolic disorder characterised by hyper-glycemia mainly due to absolute (Type 1 DM) or relative (Type 2 DM) deficiency of insulin hormone. The seven essential components of self-management of diabetes include healthy eating, being physically active, monitoring of blood sugar, compliance with medications, good problem-solving skills, healthy coping skills and risk-reduction behaviours.. These were further identified by Shrivastava, Shrivastava, and Ramasamy (2013) in their study. Clearly, all these practices may not be essential for all patients at all times. Some of them may be more critical than others. These include closer monitoring of blood

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sugar levels when the person already has a high level of blood sugar. To what extent the diabetes patients follow these practices and in what contexts are an important aspect.

Similarly, observations have further shown that diabetes, when not well managed, can lead to other health complications in the patients. Hence, the prevention and self-management of diabetes especially through diet change and fitness is key. Aside from diabetes, hypertension, obesity, mellitus and other coronary heart diseases could be the aftermath of poor dietary intake and a sedentary lifestyle.

e-Health

e-health may be defined in many ways. Eysenbach (2001) defined the term as, "emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies" (Eysenbach 2001:20). E-health is therefore, an online platform that provides healthcare services for people with or without offline activities. E-health remains functional regardless of the location of the patients. Boslaugh (2013) noted that secondary care centres via an online platform should be created for patients so that they can have access to some level of treatment through awareness, knowledge and self-management.

In a broader sense, e-health represents not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology. This is one of the reasons why e-health should be promoted irrespective of culture, religion, tribe and social norms. Stiffler, Cullen and Luna (2014) contend that some patients have difficulty to access e-health services because of the bias that exists in their culture and religion against e-health services and processes. Mayberry (2014) enhanced Stiffler, Cullen and Luna's (2014) argument by stating that for patients who may miss their scheduled clinical appointments, e-health via self-management,would bring about ease for both the patient and their family members catering for them. A vital concern, however, pertains to the level of access that patients may have. This would be access to technology as well as access to the ability to make use of e-health facilities.

e-Health and Self-Management of Diabetes

The relevance of self-management of diabetes in Saudi Arabia arises from the fact that it is a serious demographic threat to the country. In a recent review by Abdulaziz Al Dawish, et al. (2016), it was noted that the WHO established that Saudi Arabia tops the Middle East and is seventh in the world regarding the population affected by diabetes. Therefore, out of a population of 7 million, 3 million have been affected by diabetes. Shara (2010) further noted that the high rate of diabetes in Saudi Arabia may bear a correlation with it being one of the largest producers of red meat, carbohydrates, and sugar. This combination makes the citizens of the country have easy access to food that is detrimental to health and can increase the propensity of an individual to be diagnosed with diabetes. These studies point to the context specific reasons for the high prevalence of diabetes in the country. Understanding this context is vital as it will pave the way for culturally sensitive and suitable policies and interventions that can address this health concern.

An article by Jennifer Bell in Arab News (2019) cited Colliers International, which estimates that 17.9% of the Saudi population is currently affected by diabetes. In addition, about 35.4% of the Saudi population is obese, which is a predisposing factor for diabetes. Translated into numbers, the Saudi population in 2019 is 34.1 million and 17.9% of this will be about 6 million diabetics and 12 million obese. Thus, Saudi Arabia needs to focus on approximately 20 million of its population. The Saudi Vision 2030 has targets to increase fitness and sports participation of youth by 25%. This strategy will play a vital role in addressing and in reducing diabetes in the country as well.

In order to effectively manage their diabetes, the patients must learn to manage their diabetes on their own and without the constant need for hospital visits. The seven elements of diabetes self-management prescribed by Srivastava et al. (2013) listed above are relevant here. The usefulness of self-management in producing positive outcomes for diabetic patients in Saudi Arabia was demonstrated by AlShareef, (2017) through a survey. However, in another survey by Saad, et al. (2018) it was found that only foot care and medication self-management were practised by the majority of diabetic patients.

In line with the aforementioned, diet control, exercise and blood glucose monitoring were not being practised as a part of self-management by most of them. Since these were the factors which enhanced self-efficacy, it was low in the surveyed population. Low level of self-management practices except medication was also reported by Al Johani,

Kendall, and Snider (2015) from their survey. Jackson et al. (2014) added that for e-health and self-management to be effective and successful, there is a need for healthcare providers to create awareness among people regarding its value. In a review of research on self-management of diabetes in the Gulf Cooperation Council or GCC countries, Al Slamah, Nicholl, Alslail, and Melville (2017) mentioned three papers that argue for culturally relevant self-management practices. This may be an important factor in the case of strongly Islamic states like Saudi Arabia. As was discussed earlier, the country has specific reasons that point to a rate of diabetes among its population and so culturally specific interventions may prove to be useful.

The discussions thus far reveal that self-management practices in treating diabetes can produce positive outcomes for patients. However, compliance levels were found to below. Alsomali (2018) listed culture and religion, gender, stigma, social support, and healthcare environment and support from spouse, friends and healthcare professionals as affecting self-management of diabetes. Similar and more detailed factors at micro, meso and macro levels were identified by Alharbi (2018). Different opinions from family, friends, and colleagues have been reported as some of the factors that confuse diabetes patients regarding the use of e-health and self-management.

Considering e-health applications in self-management of diabetes, Aldahmash, Ahmed, Qadri, Thapa, and AlMuammar (2019) pointed out the ability of e-health applications to reach inaccessible and remote localities. It improves access and affordability of diabetes care through self-management. The availability of internet facilities determines accessibility in rural and remote areas. Hospital visits are kept to a minimum, as patients can seek medical advice through remote access when in need. This makes e-health for diabetes affordable and accessible. The use of cloud medical records, online patient records, computer-based health records, and electronic patient records have been noted as some of the advantages of e-health by Al Otaibi et al. (2016). The internet penetration was noted as being high in Saudi Arabia in the year 2018. However, as earlier mentioned in the study, there are limitations to access due to regional, social and religious cultural barriers and other factors. For comparison, the global access figure is 58% for 2019 (Clement, 2019). Except for Africa, Asia and Lain America/Caribbean, all other regions have over 80% internet penetration as per Internet World Stats (2019). The average for the Middle East, however, is 67%. More than 90% penetration has been reported for Bahrain, Qatar, Kuwait, Lebanon, Saudi Arabia and UAE. Thus, Saudi Arabia is well-placed when compared to many other countries in the region as well as the world. Therefore, internet access cannot be a limiting factor for e-health application for self-management of diabetes in the country.

Healthcare is treated as a "right" in Saudi Arabia. So, all the costs to the patients at the point of care are free for Saudi citizens and expatriates. However, increasing costs have forced a review of this issue. Privatisation and insurance schemes are considered to cover the costs to the government. A survey study by Al-Hanawi, Alsharqi, Almazrou, and Vaidya (2018) showed that some dissatisfaction over the quality of care, the availability of appointments, waiting times at the hospitals and the availability of medicines and other materials existed among the patients.

From the discussion so far, it is clear that diabetes and obesity are two major demographic health problems for Saudi Arabia. Self-management of diabetes by patients is a partial solution to the cost burden of both patients and the country. E-health offers scope to reduce this cost further with increased accessibility and affordability within the high internet penetration scenario of Saudi Arabia. However, there are problems and barriers at various levels for the successful implementation of e-health. These problems need to be identified and solutions found. Such solutions would benefit from being context specific and taking into consideration the cultural sensitivities of the country. This systematic review aims to identify and solve the problems of implementing e-health for self-management of diabetes in Saudi Arabia.

Methodology

The study sought to review how e-health applications can benefit the self-management of diabetes in Saudi Arabia using a systematic review. This review made use of key words such as diabetes management, e-health, telemedicine. These keywords were used to narrow down on the pool of useful and relevant articles. A total of 60 articles were obtained by searching the first five pages of Google Scholar, JSTOR, PubMed and Research Gate using articles published from the year 2005 and beyond as time frame. An additional 10 articles were obtained by cross-references. Thus 70 articles were identified. In the next step of screening 30 papers were excluded because they did not have direct relevance to the topic of the review. This step yielded 20 papers for further screening.

Inclusion Criteria

This study was carried out after the following inclusion criteria were met; i. the study identified the essential components of self-management of diabetes in Saudi Arabia, ii. The study ascertained the relevance of self-management of diabetes in Saudi Arabia, iii. The study determined the rate of increase in diabetes in Saudi Arabia, iv. the study examined the usefulness of self-management in producing positive outcomes for diabetic patients, v. the study determined the foot care and medication self-management and vi. the study further examined the healthcare problems for Saudi Arabia. Abstracts that contained useful information were also included.

Exclusion Criteria

Out of the 30 papers yielded for use in the study, 10 papers were excluded because they were not specific to Saudi Arabia or discussed e-health in more theoretical than practical manner. This filtering resulted in the final selection of 20 usable papers for this review.

Search Methods

A systematic literature search was conducted to identify articles, journals and literature about the benefit of self-management of diabetes. The search was comprehensively done through Google search engine, Google Scholar, JSTOR, PubMed, Research Gate, and several other viable tools. The topic was used as the search term to collect literature from five web pages each for three different time frames. Works in the English language were collected. These papers used are listed and briefly described below categorised in various ways to derive findings and conclusions.

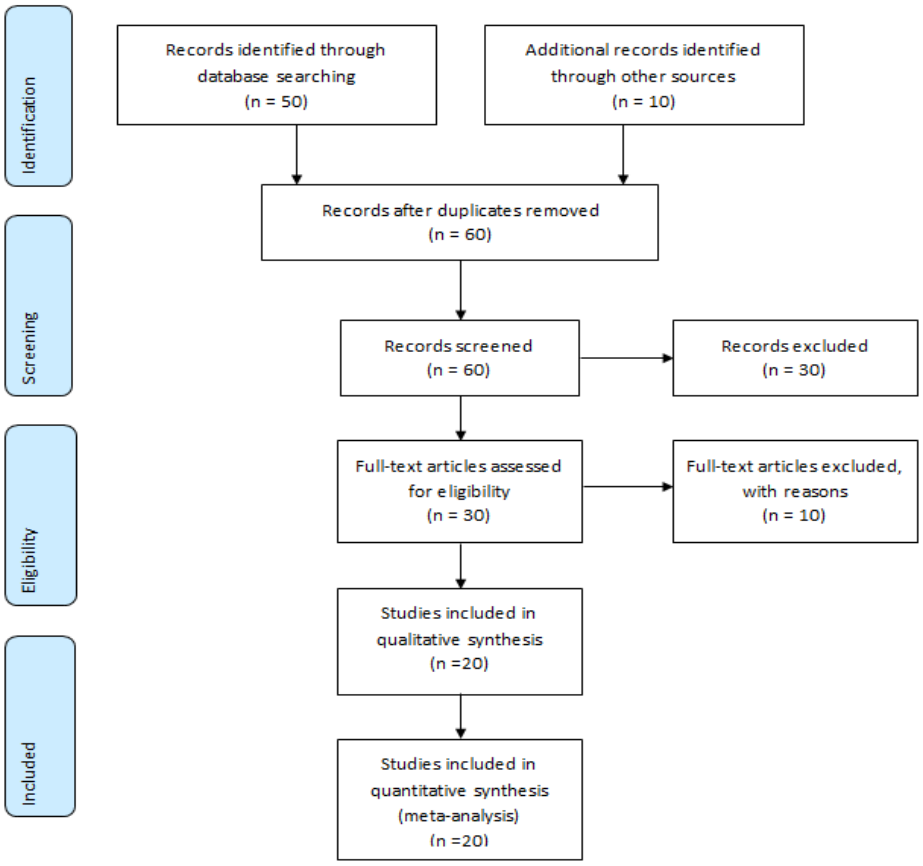

Fig. 1: PRISMA diagram

Results

Mobile/smartphone

An intelligent mobile application for diabetes management and educational system for patients in Saudi Arabia with type 2 diabetes, SAED, was developed by Alotaibi, Istepanian, Sungoor, and Philip (2014). It has a patient/healthcare component and an intelligent diabetes management component. The first of these has two units, one for the patient and the other for the diabetes specialist unit. In the intelligent management system, there is a database module, intelligent decision support based on fuzzy logic, an SMS reminder module and a diabetes education module. Stored clinical data like test results, medication and other interventions, along with the decision support system, facilitates monitoring and recommending suitable interventions by clinicians as and when required. Trials to validate the system were to be undertaken. The SAED system was validated for its effectiveness in reducing HbA1C levels in a pilot trial by Alotaibi, Istepanian, and Philip (2016),. Similarly, a six-month study on the feasibility of mobile messages to control type 1 diabetes in children was conducted by Bin-Abbas, Jabbari, Al-Fares, El-Dali, and Al-Orifi (2014). This study showed a small reduction in the blood sugar glucose level. In the trial, parents of 200 children were sent daily information and weekly interaction messages were sent to the parents. The knowledge of parents about diabetes and its management improved due to this effort. Such mobile messaging serves as a useful intervention between clinical visits.

It was revealed that a high percentage of youngsters favoured the application of mobile technologies and social networking for diabetes self-management in the studies of Alanzi, Istepanian, Philip, and Sungoor (2014). Although there was no significant impact of screen size of mobile phones on the comprehension of content of diabetes related information, small screens reduced the speed of reading the contents. This finding was reported by Alghamdi, Yunus, and Househ (2013). Based on surveys and interviews, Alotaibi M. M. (2015) concluded that there is a high level of support from youngsters for the use of mobile technology for effective management and health awareness of fasting diabetes in Saudi Arabia. The study was done during Ramadan time. Thus, cultural congruence was ensured in this study. A mobile information and education system for gestational diabetes was proposed by Alotaibi and Albalawi (2018). It integrates the patient information and ongoing interventions and their outcomes with the already available information on the topic, so that continuous contextual updating happens. The framework is to be tested through randomised controlled trials on a wide scale in Saudi Arabia.

Problems and predictors of e-health or smartphone applications

The barriers associated with implementation of e-health initiatives were discussed by Almuayqil, Atkins, and Sharp (2015). Absence of systems to connect health information systems available at various levels to integrate at national level was one such barrier. Additionally, the lack of technical and computer skills to use design and use health information systems was also found. The absence of guidelines on using health information records and poor maintenance of networks and computers, slow connections and old terminals were included here. Human barriers such as negative perceptions of healthcare professionals about new technologies, a lack of trust towards computer-based solutions constituted the third barrier. Cultural barriers were also found to stand in the way of virtual contact in favour of physical contact. The possibility of medication safety due to lack of communication or miscommunication is another barrier. Communication gaps among healthcare institutions and limited use of technology to compensate for illegible prescriptions are also included in this barrier. The high cost of transferring paper records into digital records is another barrier. Security and privacy problems of the internet is a major barrier. To solve this problem, the authors proposed knowledge management and knowledge discovery. Alanzi (2018) identified the lack of mHealth expertise and human shortage, inadequacies of funding and infrastructure investments, legal, privacy standardisation and regulatory obstacles, health care organizations and bureaucracy problems, as barriers for implementing m-health for self-management of diabetes. In the same vein, inadequate functional health literacy, overall effective self-care affected by depressed mood were noted from the survey results by Almigbal, et al. (2019). However, functional health literacy was not associated with self-management. Functional health literacy was significantly influenced by age, gender, educational level, employment status and level of the depressive symptoms were significantly.

Alwin Robert, et al. (2016) noted that over the last two decades, there was a 500% increase in the expenses in healthcare and treatment of diabetes in Saudi Arabia. In 2014, out of the total health care budget of SR180 billion, about 25 billion (13.9%) was spent on diabetic care alone. To mitigate the situation, a comprehensive epidemic control program using a multidisciplinary approach needs to be stringently enforced. The authors identified the rising prevalence rate of diabetes and its pre-conditions, increasing prevalence among children and younger population, lifestyle risks, obesity and delayed diagnosis as the major challenges of implementing effective diabetes

control programmes. The same obstacles are relevant in self-management and e-health applications for self-management.

Combining the Theory of Planned Behaviour and Technology Acceptance Model, AlBar and Hoque (2018) examined the factors influencing patient acceptance of e-health services in Saudi Arabia. Perceived usefulness and perceived ease of use strongly influenced attitude towards e-health. Attitude and subjective norm highly influenced patient behavioural intention to use e-health services. On the other hand, perceived behavioural control did not affect patient behavioural intention to use e-health services. These findings may be applicable in the case of e-health applications for self-management of diabetes also. Also, Musaiger (2011) conducted a study in Saudi Arabia where he found that food intake and the lifestyle of people in SA has contributed greatly to having the disease. He noted that fast foods which include large amounts of sugar and fat products are greatly produced in the country.

Naeem (2012) on the study of "Increasing trend of Junk food use in Saudi Arabia and health implications" where it was found that diet is a key factor that can dictate if diabetes will come to stay or not. Almalki et al. (2011) noted that the reason for Saudi Arabia has a high rate of diabetes is because the country is the world's biggest extractor and transporter of oil. Shara (2010) further noted that Saudi Arabia is a large producer of red meat, carbohydrates, and sugar- making citizens have access to enough fat and oil.

E-Health Literacy Measuring

An e-health literacy scale (SeHL) was developed by Zakaria, et al. (2018) to facilitate self-management of chronic diseases like diabetes. Four key aspects of e-health literacy were identified for measurement of e-health literacy and implementation of strategies to enhance e-health literacy of chronic patients. These four were – the use of technology/media, information-seeking, usefulness and confidence. Mashi, et al. (2019) found from a survey that health literacy level was high among Saudi diabetes patients, but it was not used for effective glycaemic control. Abdullah (2018) tried to identify predictors of Saudi female diabetic patients' intention to use smartphones for self-management of diabetes. Performance expectancy, effort expectancy, social influence and patient-centred factors were tested as likely predictors. The results showed that Saudi female diabetic patients were using and intended to use smartphones in the future also for self-management of the disease. The current use of such technology by them influenced their intention for future use. Only effort expectancy was a significant predictor of intention to use smartphones in future. The use of cloud medical records, online patient records, computer-based health records, and electronic patient records have been noted as some of the advantages of e-health by Al Otaibi et al. (2016).

Education through RNs in PHCs

Asiri (2015) recognised the importance of diabetic education programmes for diabetic patients to manage their problems better to reduce complications and thereby reduce costs. PHCs can play an active role in this respect through their registered nurses. The author proposed an educational plan for PHC centres in the southern region to meet this objective of Saudi Arabia. AlShareef et al. (2017) found that self-management is a tool for producing positive outcomes for diabetic patients when well monitored via viable knowledge and content. Jackson et al. (2014) found that for e-health and self-management to be effective, healthcare providers should create awareness among people for the need to use e-health.

Social Robotics for Children

An innovative social robotics system for diabetes management and educational system for diabetic children in the Kingdom of Saudi Arabia was proposed by Alotaibi and Choudhury (2015). The system made use of Aisoy1 v5 robot applicable in mobile health technologies. The system was aimed to improve type 1 diabetes management by empowering them with relevant knowledge about diabetes and its management to create awareness among them. Similar to the social robotics system for children for diabetes management and education (Alotaibi & Choudhury, 2015), a social robotics system for obesity management for children was also proposed by Alotaibi M. (2018). A systematic review by Alotaibi M. (2017) revealed the usefulness of social robots to improve the diabetic management and awareness among Saudi children.

Knowledge Creation and Management

The knowledge creation model, Socialization, Externalisation, Combination and Internalisation (SECI) facilitates interaction of tacit and explicit knowledge by applying the four conversion modes implied in the model. Almuayqil, Atkins, and Sharp (2017) proposed a framework to support diabetic patients and healthcare professionals to enable

self-manage by patients. It has two components: data mining and the SECI model integrated suitable for this purpose.

Findings from International Studies

In their study, Öberg, Orre, Isaksson, Schimmer, Larsson, and Hörnsten (2018) explored the perceptions of Swedish nurses of using digital e-Health systems to support patient self-management. As per the authors, if nurses are to adapt to the new policies and practices that go with the digitalised development in Swedish primary healthcare, the concept of a nurse's traditional work role needs to be amended. The study highlighted the need for greater research to enable eHealth systems/services to be designed to fulfil multiple requirements. The authors recommend that digitised systems should be a tool for achieving good quality self-management support as well as for giving the primary healthcare nurses adequate resources to support patients' self-management while still maintaining the values associated with person-centred care.

Wake, He, Czesak, Mughal, and Cunningham (2016) explored the evidence for online interventions in diabetes in the context of current and ongoing developments for MyDiabetesMyWay (MDMW), a national electronic personal health record and self-management platform for diabetes patients in Scotland.

The 2017 study by Gao, Zhou, Liu, Wang and Bowers explored the features and contents of Chinese diabetes mobile applications in terms of their suitability for use by older adults with diabetes. Out of a set of 552 diabetes apps, 71 diabetes apps were randomly selected. The results of the study showed that though the usability of all tested apps was rated moderate to good, the features of most apps failed to include content areas of known importance for managing diabetes in older adults.

According to Saha, Riemenschneider, Müller, Levin-Zamir, Van den Broucke, and Schwarz, in their 2017 study, Diabetes Self-Management Education (DSME) is considered as an integral part of diabetes care. Due to this, the study aimed to carry out a comparative analysis of existing DSME programs (DSMEP) implemented in the European Union member states. Comparative analysis of the data indicated that a majority of programs are aimed at adults and only a minority at children and elderly. Only a small percentage of the programs utilise information technology for teaching and learning, and only one out of five programs pay attention to depression. The identified DSMEP aimed primarily to empower patients through increasing knowledge and changing attitudes and beliefs towards diabetes.

Some Trends

Topics of the selected papers

Some interesting trends were observable in the selected papers. A large majority of the papers dealt with mobile/smart phones applications as e-health tools. The trend of papers virtually meant that e-health means m-health. More trends on the topics of the papers are given in Table 1.

In the table below, the numbers given in the references are the item numbers in the brief description of the papers. EH-e-health, SM-smartphone/mobile. FHL-Functional Health Literacy.

Table 1: Topics dealt by the selected papers

Topic	Number	References
Mobile/smartphone	6	1,2, 3, 4, 8, 11
Problems/challenges/barriers/obstacles/factors/predictors of e-health or smartphone applications	11	5 EH, 6EH, 12SM, 13FHL, 14EH, 18SM, 19EH, 23, 24, 24, 26,
e-health literacy measuring	4	7, 16, 18, 27
Education through RNs in PHCs	3	9, 21, 22
Social robotics for children	3	10, 17, 20
Knowledge creation and management	1	15

As Table 1 shows, 6 papers dealt directly with mobile phone or smartphone as e-health tool, often termed as m-health. An additional two papers dealt with problems and challenges related to m-health. Together, out of 20 papers, 8 (40%) were m-health related. The papers are dealing with e-health mostly dealt with problems and challenges.

There were 4 such papers. Three papers dealt with functional health literacy, FHL. Out of these, two were related to its measurement and one was related to factors affecting FHL. Thus, only seven papers dealt with e-health topics. Social robotics for diabetes education of children was the subject of three papers, all led by a single author. One of these was a review. Only one paper dealt with knowledge creation and management, although as said above, three papers measured FHL, which is a product of knowledge creation and management.

Direction of Findings

Some problems affect generalisability and identifying common trends via meta-analysis of quantitative data across the papers, as discussed below. Instead, a simple method of categorising the direction of the overall findings was done in Table 2. It answers the question: Does this paper support or reject e-health applications for self-management of diabetes as an effective method to control diabetes in Saudi population.

Table 2: Direction of findings for e-health applications in Self-Management

Direction of findings	References	Number of papers
Positive	2, 3, 4, 7, 8, 9, 10, 17, 18, 19, 20	11
Negative	5, 6, 12, 13, 14, 16	6
No trend	1, 11, 15	3

From the table above, it is evident that 11 out of 20 papers are positive towards e-health as a self-management tool for diabetes and more so, with mobile/smartphone applications. Those papers that discussed the predictors came to be classified as 'positive'. Negative findings related to the challenges and barriers for e-health were also found but were outweighed by the positives. These papers focused on the problems, challenges and barriers. It may be inferred, therefore, that once these problems are sufficiently addressed, e-health has the potential to become a positive tool for self-management of diabetes. Only three papers were found to describe some aspects without fully assessing all the components of e-health and hence could not be categorised either way. These were grouped as 'No Trend' papers.

Discussion

The main finding of this review is that e-health for self-management can be implemented successfully using mobile/smart phones in Saudi Arabia. This is evident from the large number of positive findings in the study conducted. Since this paper has already discussed the high internet penetration rate in the country, it follows that problems of connectivity, especially in remote areas, and slow connections can be effectively addressed. This would mean that the majority of the diabetic population can be covered with e-health for diabetes self-management in the country. This can reduce the cost both at the patient side and the government side, ultimately leading to desisting from privatisation of health insurance for reducing cost.

Many challenges, problems and barriers of various types and at various levels (Almuayqil, Atkins, & Sharp, 2016) were identified by many papers. These challenges and problems lead to negative results of e-health applications for diabetes self-management. As long as these barriers are not addressed, the implementation of e-health for diabetes self-management will not be successful. The government and health experts need to consider how these problems and challenges can be tackled and implement the solutions while implementing e-health for diabetes self-management. This review sees the scope for future studies to be conducted on solutions rather than identifying and measuring the challenges and problems are. This is especially the case since the current papers only provide some broad recommendations about addressing the problems rather than specific ones.

The role of cultural factors, especially relevant to countries like Saudi Arabia, cannot be underestimated. Some papers advocated for culturally compatible e-health steps. This would entail matching the e-health strategies with Islamic religious rules. The paper by Alotaibi M. M. (2015) on diabetes self-management during the Ramadan fasting period touched upon this but provided no clear answer on what to do when sugar levels are beyond control during Ramadan fasting, as people tend to overeat after fasting time of the day is over. Not only Ramadan, but other religious observations also need to be researched similarly, but with the aim of finding solutions. Hence, as has been discussed in this paper already, there is a scope for context specific studies and solutions to be found. This too would provide a valuable avenue for future research.

Another crucial aspect for the successful use of e-health for diabetes self-management, is patient awareness so that the patient may be adequately equipped with all the relevant information. Knowledge creation and management of

that knowledge for applications in e-health for diabetes self-management should aim at gaining functional health literacy. Thus, the two types of papers are inter-connected. There are two ways of achieving this. One way is using the registered nurses of PHCs as was suggested by Asiri (2015) or training community workers and using them as diabetes educators. In both these cases, e-health is applied when nurses or educators provide round-the clock services through mobile applications, in addition to personal discussions.

The incidence of diabetes and obesity are increasing among the younger population including children in Saudi Arabia. This trend leads to a potential for continued high incidence of diabetes for a long time, resisting any serious attempts to control diabetes at the population level. It may be worthwhile to educate children also about diabetes and obesity and how to control them. Two papers of Alotaibi M. (2017) and Alotaibi M. (2018) deal with these aspects. However, children are often forced by their parents to overeat leading to obesity and diabetes. Therefore, simultaneous education of parents is also required. Although the author did mention this, it was not given sufficient importance in the papers, probably because the papers were about the system architecture and actual validation awaited further research.

Diabetes management of women during pregnancy and self-management of type 1 diabetes among children are two aspects on which only one paper each was seen. The need for more research on these two aspects is evident.

Limitations of this Review

The time frame sitting for the selection of papers may restrict selections. An attempt was made to address this by searching with three overlapping time frames. Using only the first five web pages of databases used may miss out papers after the fifth page. To address this, a cross-check was done beyond the 5th page to assess the number of papers not accessed. No significant problem was noted.

Many systematic reviews include meta-analyses across the quantitative data to find common trends and generalise the findings. Being a review related to a single country, meta-analysis of data across the papers might seem to be useful. However, the variety of topics within a small range of only 20 papers lead to too many variations to be accounted for and this means, when applying normal statistical procedures, many basic assumptions need to be diluted and many new assumptions to be made. Hence, meta-analysis was not attempted.

Conclusion and Future Work

The reviewed papers clearly point to mobile-enabled e-health systems for diabetes self-management as the most effective and efficient route. However, there is a need for patients to be educated through a direct approach, mobile applications and social networking through mobile phones. Internet connectivity and speed need to be improved to reach even remote locations. Other infrastructures need to be provided. Patient information scattered in different provider units at different places needs to be integrated at the national level. People involved in operating and maintaining the system need to be trained, including the nursing staff. Nurses need to learn to adapt around the change in their job descriptions due to the increasing use of e-health solutions for diabetes self-management. All the problems, challenges and barriers need to be addressed.

Future research on the problems and challenges must focus on the solutions rather than just identification of the issues and barriers. There is also a need for further research on the education of children through social robotics along with education of their parents is highlighted. Apart from Ramadan, the impact of other religious practices on adaptation of diabetes self-management needs to be researched. Two other aspects needing attention of researchers are: type 1 diabetes self-management among children and self-management of diabetes by women during pregnancy. The question to be answered may be: How smartphone enabled e-health can serve these two purposes. The study therefore, concludes that several barriers and challenges become the effective use of e-health via self-management for diabetes patients- therefore drafting functional and context specific solutions to make self-management via e-health work is key.

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Post-Cloud Solutions for Power Industry Digitization

Ireneusz TOMECKI

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland
ireneusz.tomecki@polsl.pl

Abstract

This article presents a revolutionary approach to the construction of IT infrastructure for such a critical sector as power industry, based on the ideas of fog computing.
Fog computing enables the power industry to store measurement data reliably and safely on a large scale. No theoretical algorithm, even the most sophisticated one, can withstand the challenge of rapid real-time analysis of large measurement data quantities. This is what fog computing used in critical infrastructure areas, such as power grids, provides, and it is currently the most promising tool. Undoubtedly, apart from a strategic discussion on the scale and depth of changes, it will be vital to carry out a number of pilot solution tests that will allow for the development of the ICT layer used in the energy sector, and to support the reached position with the analysis of current solutions. Pilot tests are currently being carried out in the Polish energy sector for applications of IT systems based on fog computing technologies. If scaling up to the entire power industry is possible, it will mean a leap forward in improving the stability and efficiency of power networks.

Keywords: cloud computing; smart grid; fog computing; resource management;

Introduction

In the power industry, both in the field of energy production and distribution, there is a growing problem with opening up to modern solutions and innovations in the ICT area. At the same time, the threat of cyber-attacks is steadily growing, becoming a major barrier to their spread. So, is this opening up even possible in the near future? Will power industry, as a particularly sensitive area, benefit from the opportunities offered by the fourth industrial revolution? This is a broader issue and concerns many sensitive areas, but it is especially magnified in energy generation and distribution fields. It affects almost all of them indirectly, as electricity is becoming the primary energy carrier in large agglomerations.

The introduction of safe solutions to the power industry will be crucial and will determine the scale and pace of change in this industry. The accelerating fourth industrial revolution is primarily about an exponential increase in the amount of processed and analysed data so that we are able to make faster and more rational business decisions. This data are the main element of modern smart grid class systems, and the procedures related to their processing, storage, transfer and security should be the primary determinant in support of the decision-making process about the use of specific technologies or an architectural model in the power industry.

Deciding on the core technology for digitization of this sector is of huge importance. Its outcome will make changing the adopted solution and introducing another one impossible for many years. This will have a major impact on the pace of change, local market simulations and, above all, the efficiency and security of critical IT infrastructure, as well as being the starting point for creating a new paradigm of building IT systems for critical infrastructure.

Current state

The energy infrastructure is characterized by a large geographical spread and a high level of heterogeneity. Its elements take years to develop and have been modernized for decades. Many of them have been monitored and even remotely controlled for a long time. The knowledge gained during this long-term process is an excellent basis for defining the objectives of future smart grid system. However, this happens at the highest, high and only partially medium voltage network levels with a low-density measurement system. Going to the next lower level, i.e. medium and low voltage, exponentially increases the number of measuring points, which already struggle with the amount of

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transmitted and processed data even in the current low-density measuring system. The use of instantaneous measurements of voltage, current and power obtained from sensors at all or most of the network outlets, and collected by the system operating in real time will result in an exponential increase in the demand for IT systems and will not be possible without the use of completely new technologies. Currently existing control & measurement, and automation solutions are local and closed. They carry out a specific task in a strictly defined area. In most cases, they consist of a control & measurement or sensory layer, and a local SCADA class data aggregation system. This solution is very natural and stems from the current paradigm of IT systems building. Each element of the system is designed for one specific task and there is no sharing of resources between them. In practice, unnecessary duplication of infrastructure elements is a very common occurrence. With the current state of the infrastructure and the security system, using measurement data by two or more organizational units of an operator is very difficult. Consequently, nowadays we are dealing with a decentralized IT infrastructure with many decision-making centres which are in no way connected or correlated. This is sufficient until there is an analysis or business decision to be made based on datasets from several locations.

The reason for adopting such an infrastructure model was quite simple. Considering that these systems act as controllers, low response time to events and full local autonomy were required. These are the basic features of critical infrastructure system operation. Operational security was a determining factor in favour of local autonomy. This means that systems must operate independently and concurrently. In other words, if one stops working, the other systems will not be affected. In turn, low response times have become crucial as they allow for quick business or operational decision making. In this situation, the existing model of IT architecture has been preserved and no good solution has been found with the current state of information technology.

Post-Cloud Solutions for Power Industry.

Historically, the development of information systems has undergone cyclical changes of centralization/decentralization. It was no different in the power industry.

The first phase of energy systems development - centralization - was closely related to the level of information technology development. During this phase computers occupied entire large rooms and centralization was the only possible solution.

Phase two – decentralization - a phase of PC systems and portable computing units development, and the creation of Ethernet networks. A completely distributed model of IT systems in the power industry is created and it remains in place until now.
Phase three - centralization - is the phase of cloud computing of huge data centres and centralized IT systems. For the reasons shown above, this is the phase currently being used in the power industry in a limited way.

Phase four - decentralization - for improvement of calculation speeds and reducing the strain on communication links based on post-cloud solutions. Phase four is also a fundamental element of the fourth industrial revolution and a response to cyber-security demands.

Having the already available solutions in mind, if we know that there will be a change of trends in architecture, we should answer the following question: what should the target IT system look like and what kind of challenges does it face? Universal Internet access, widespread technology and growing automation are trends that exert a significant impact on the development of the young generation. Due to this, the operation of IT systems becomes the basis of education while simultaneously the number of specialists in other fields, such as power engineering, is decreasing. This trend will inevitably force the digitization of industrial sectors on a scale that we have not witnessed so far. Not because of the desire to progress, but through the need to improve the quality of the services provided while the expert resources dwindle. This means that aforementioned IT systems will become the basic working tool for the next generation. The time to make directional decisions as to how to prepare for this has come. The fourth industrial revolution and the introduction of 5G technology translates into millions of connected devices, computers and smartphones and, above all, machines and sensory devices that emit the data sets based on which decisions are made. The problem of IT systems will be not so much the collection of information, as its transmission and processing. The role of the next generation of employees will be reduced to that of the system operator and decision maker approving the scenarios developed by the IT systems. This will allow us to maintain an increase in service levels, for example in the energy sector. Artificial Intelligence (AI) support will also play an increasing part in the development of optimal scenarios. For this purpose, it is already necessary to consider the collection of historical data, which will serve as the basis for the development of optimal decision-making models.

Observing market trends and cycles, we can expect a rapid growth and an increase in the sensory layer, followed by the amount of stored data and the need for computing power capable of processing these resources. The current decentralized architecture is highly inadequate in the face of the upcoming scale of the problem and going further in this direction will cause an exponential increase in problems concerning the maintenance of data integrity and, above all, security. Having multiple disconnected systems forces a separate security policy for each system, which increases the risk of undesired events. Introducing master units in the form of central operators of both information and the maintenance will be sufficient, at least temporarily, however, in the long run it will carry a significant risk of hindering market development. The introduction of a central operator and a consistent data warehouse solves the previously mentioned problem of interoperability and work on data sets coming from different regions. However, it does not solve the problem of disparate security policies related to the maintenance of the entire system. Such a solution also carries performance risks. Currently, there is no computing centre in our country that would be able to collect measurement information of the entire energy sector for the predicted number of sensors and measurement systems even for low-frequency processes. Under the consideration are also scenarios introducing a centralized system based on building and self-maintaining the infrastructure in the form of large server rooms or on implementing calculation clouds located in the country and under local control. There is a strong temptation to introduce centralized solutions, however, it may enable the establishment of a vendor lock in the newly emerging smart grid market. Therefore, it has to be asked, whether these systems meet the fundamental objectives and goals that the energy industry sets for itself for the coming years, and how will they fit into the nation's public security policy if we consider the energy sector as a sector under special supervision? We can assume that large computing centres may prove sufficient for performance in the context of a digital wave, at least up to a point. However, with the current performance level of the communication infrastructure, they will not be able to perform an efficient and quick analysis due to the inability to deliver data from a large number of sensors in the time required for analysis. Therefore, they will not meet the aforementioned requirement that a modern smart grid system should support the operating process, and not only the analytical process performed afterwards. Another important aspect is the data security, which raises considerable doubts in the case of storing it on servers outside the country. In turn, the decision to create local data centres in the country will also force the construction of redundant systems, while the possibility to incur such costs in the foreseeable period is doubtful. The introduction of the central system will result in the local autonomy condition not being met. It will be necessary to introduce special operational procedures in case of destruction or failure of the central node, which raises a number of additional problems that a modern IT system supporting the work of the entire sector should not be burdened with. Thus, centralized architecture does not meet the fundamental objectives of security, scalability and interoperability that modern smart grid class infrastructure should have in the age of the fourth industrial revolution. For this very reason, the business and technical circles are debating the future of distributed systems. We bear witness to the turbulent process of adopting distributed systems based on blockchain technology, which are rapidly conquering the trading market and are a real threat to the long-standing status quo. 2017 saw the birth of the blockchain based distributed data storage market, which aims to completely abolish the monopoly of large data centres in favour of small local infrastructure providers. Currently, large financial institutions, including the largest Polish banks, are introducing this technology into their transaction systems, which additionally confirms their usefulness and guarantees further development. Such decentralization, thanks to post-cloud technologies, also opens up the market for local services, enabling local suppliers to compete openly for local customers while at the same time being part of a global system. Their major advantages will be flexibility and quick access to data for local users. Exactly the same trend is followed by a concept called fog computing, which is supposed to erase the need to build wide-area networks and large computing centres for local infrastructure providers.

Fog Computing as an Alternative to Cloud Solutions.

The conceptual model of the fog computing was already described in March 2018 by the American Institute of Standards and Technology (NIST). It defines a new architectural model, an important part of which is the distributed infrastructure layer working on local data centres and edge computers. Its task is to aggregate and process data swiftly using available, dynamically allocated resources.

The concept of fog computing perfectly meets the requirements and directions of smart grid systems development. It introduces a unified infrastructure management mechanism and eliminates maintenance problems defined at the centralized system level. It does not have a central unit, thus measuring up to the objectives of local autonomy. The concept of fog computing described by NIST precisely defines the direction in which the market will go and what expectations should be met by IT systems in the era of total digitization. Smart grid is a technological challenge which goal is to combine coherently operating IT systems and the entire energy infrastructure of both the modern automated, as well as the older ones in order to optimize energy production and distribution in a given area. That is why distributed systems are a breakthrough for Industry 4.0. The most important features are location awareness and low latency. Computing nodes belong to an extensive p2p-class network that can locate the nearest computing resources

and data warehouses. By fog computing we mean solutions characterized by minimal communication delays, with simultaneous dynamic resources allocation and lossless calculations performed on demand. The fog computing systems will process data much faster, more efficiently and ultimately cheaper than current cloud systems.
The local allocation of resources results in a drastic reduction of costs related to data storage and an equally drastic reduction of the strain on telecommunication links. Fog computing uses distributed networks (p2p), which is primarily a different model of communication based on connections, where nodes can connect with many other nodes in the network and establish communication with each other even using other nodes as intermediaries. If they are not able to establish a direct connection, the cloud computing software has a number of functionalities that enable the teaming up of distributed networks operating even without Internet access.

Another crucial feature is the dynamic allocation of resources. The main challenge of fog computing is quick adaptation to current calculation requirements and resource release when they are no longer needed. The distributed processing system contains a mechanism that allocates resources in the nearest server room and at the exact time when they are needed. Thanks to a specific data addressing system, fog computing gives the data set a unique identifier with which we query the whole network and the knowledge of the network node to which the set belongs is not required.

If we have generated the redundancy mechanism by allocating selected collections not in one, but in several nodes, then we will be able to receive them automatically from several sources at the time of reading. This approach allows us to introduce the previously described local autonomy in which the system works properly, even without access to the Internet, and provides the data continuously.

Managing extensive infrastructure of up to thousands of nodes in different locations can be difficult without the right tools to support the process. Priority is given to the implementation of the private blockchain concept serving as a distributed fog computing control & management mechanism. It is thanks to this that all resources can be controlled in complete safety without introducing the central unit.

The listed functionalities are only some of those that a well-designed fog computing solution should have. Introducing this kind of consistent environment into the power industry will make it possible to build a scalable IT system and a structure independent of external suppliers. Solutions already available on the market should be used as additional data warehouses and computing units that are not critical to the capacity and security of the whole system.

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The Addressability and Impact of Projects Submitted and Financed Through Local Action Groups Between 2014 And 2020 - Case Study Calarasi County

Rares-Alexandru IONESCU

The Bucharest University of Economic Studies, Bucharest, Romania, ionescu_rares00@yahoo.com

Emil MUSAT

The Bucharest University of Economic Studies, Bucharest, Romania, emilmusat@yahoo.com

Abstract:

For a better understanding on how projects implemented by Local action Groups can contribute to the development of Romanian rural areas, one should start from analyzing the interest shown in submitting projects on sustainable development of rural areas.
The present paper analyzes how those local communities from Calarasi, which through the territorial administrative unit are members of a LAG, have responded effectively to local development strategies and measures proposed by them for rural development by modernizing localities, investments in agricultural and non-agriculture activities, supporting entrepreneurship and farmers young generation, as well as through social and cultural investments.
By examining the Local Development Strategies and their evaluation, the proposed measures and the submitted projects, it can be seen that, the most interested in accessing the available funds are the public beneficiaries, who submit projects aimed at ensuring public comfort and public safety, ensuring the conditions for recreational activities or improving local social services. If we are to talk about private beneficiaries, it can be highlighted that they have submitted projects late, especially in the agricultural field, and the number of projects is significantly smaller than that of public beneficiaries is at least reluctant.
The most accessed areas have been stimulating the development and modernization of localities, followed by the promotion and young farmers support, and also investments in agricultural activities.
Main causes for the smaller number of projects submitted by potential private beneficiaries are represented by the lack of knowledge for drafting projects and obtaining the necessary approvals, but also fear of consuming resources without completing the process with the conclusion of a contract.

Keywords: Local Action Groups, Impact, Local Development Strategies.

Introduction

Local action groups are practically set up as an interface between the community and the public financier, and through their activity they have the mission to ensure the transposition of the community's needs in projects of the widest possible interest. Although the whole process of establishing the need for intervention is, according to the characteristics of the LEADER program, from the bottom up, theoretically assuming local population active participation in planning and making decisions for implementing the local development strategy, the funded projects practically do not solve the economic problems of the area, these projects being more a tool to increase citizens' confidence in the idea of European Union.

Through LAG practically is being realized the perception that the local public administration has the possibility to decide on the distribution of money from the European Union, approaching in this way, at least at the level of perception, two essential components: the local community and the European Union. This does not mean that the money allocated to the projects carried out through the LAG has the aim of ensuring the perception of the population and increasing confidence in European structures, this is a subsidiary effect, the main effect being the project implementation`s result, achievement of proposed result indicators but to some measure also growth of rural areas quality life.

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However, in order to understand how the implementation of the Local Development Strategy, developed at the level of Local Action Groups, can influence the development of the Romanian village, it is important that, before analyzing the results, to proceed to an analysis of interest shown by potential beneficiaries to actively participate in the process of rural community development, with projects that meet both their needs and the community`s.

In order to observe the behavior of the actors in the activity of generating local development, the specific activity of the three LAGs operating in Calarasi County (Baraganul de Sud-Est, Colinele Argeșului and Valea Mostiștei) was analyzed. The evaluation process of the implementation of the local development strategy found that in the middle of the strategic period for implementing the measures proposed for the development of areas covered by LAGs the project submission process is unsatisfactory, which led to an intensification of contacts of LAG partners with various categories of target audience in order to increase the number of submitted projects. This effort has largely borne fruit, ensuring that the measures proposed for the development of the rural area are covered by projects. Despite all the efforts made by LAG`s representatives, the number of private beneficiaries who submitted projects remained under expectations. The public beneficiaries, having either specialized staff or greater opportunities to access consulting services, have mobilized much better and managed to submit projects to cover not only the measures proposed by local development strategies but even to cover a very wide range of community needs. Establishing the context in which this activity completed with the submission of projects took place will be a useful tool to better understand the effects of the implementation of each local rural development strategy.

Literature Review

The literature review provides many materials that develop the subject of ensuring the sustainable development of rural areas through the LEADER program. The history, characteristics and advantages of the LEADER program as well as the establishment and operation of LAGs as its beneficiaries are widely discussed.

One approach that needs to be considered is that according to which this program is based on a model of economic development of rural areas called Community-*led Theory of Rural Development* which, however, in oder to generate sustainable economic development in rural areas requires the existence of community capacity to function efficiently on the basis of self-help (Albu and Chițu, 2014). We consider that in this context, in which Romanian villages are aging due to the migration of young people to urban areas and many of the Territorial Administrative Units have serious budgetary problems, the concept of self-help can only refer to identifying rural areas most pressing problems , as well as identifying those issues that underlie the emergence of new community issues. It could also refer to the wise selection of projects that are to be funded.

In a critical approach on how communities act in order to generate their own development, starting from the "Community-led Theory of Rural Development", I.J. Terluin (2001) concludes that, from this point of view, many regions and rural communities face genuine difficulties in generating economic development, largely due to insufficient capacity to solve economic problems, an inadequate institutional environment and a lack of political responsibilities (Albu and Chitu, 2014). It is unanimously acknowledged that there is a strong link between the way institutions work and the development of the community / society. Behind any economic success story, there are always efficient institutions. The same goes for regional development, which, in addition to efficient institutions, needs a solid administrative background and a decentralized decision-making procedure. Romania is characterized by institutional weakening and limited administrative capacity, despite the implementation of concrete steps towards decentralization (Mosora and Mosora M.H., 2012).

In theory, there are also approaches that challenge the LAG's ability to play its role of involvement in the decision to generate local community development, thus "in a scenario where it should promote direct contact and cooperation between subjects not only with commercial interests, LAGs, on the other hand, seem to be able to offer only a very limited participation. Moreover, ordinary citizens could not exert any real influence on LAGs " (Belligiano and Salento, 2017). However, despite all the critics, it is undeniable that this bottom-up approach, even imperfectly put into practice, proved its worth and aroused in many local actors the feeling of belonging to the rural area, determining their involvement in implementing Local Development Strategies.

At some point, LAGs were seen as the new intermediary institutions that would ensure the territory governence and support the economic development of specific areas. Due to their structure, both with public and private subjects, they were expected to promote the cohesion and strengthening of local communities (Belligiano and Salento, 2017). Although, through their activity, the LAGs have determined a change in the attitude of the administrative and business segment of the community, the idea that it could become an intermediary institution with a role in governing the territory is not current, this being impossible to achieve, at least in Romania, especially due to the legislation on territorial organization.

The LAG remains what was initially established: partnerships consisting of various representatives of the socio-economic sector from territory, representing the interests of residents and the rural community, being the engine of the LEADER Program, responsible for developing an integrated local rural development strategy and ensuring its implementation. Due to its specificity, the LEADER Program can remain relevant for a long time, but one must consider that in order to maintain the innovative feature of the Leader approach, it is important to fund actions to enhance local resources and promote local specificity (Albu and Chițu, 2014).

General overview of Local Action Groups in Calarasi county

The research was carried out on the activity of the three LAGs operating in Calarași County: Baraganul de Sud-Est, Colinele Argeșului and Valea Mostistei.
A documentation of the way in which the local development strategies were carried out was made. Official statistics and public information on the activities of the mentioned entities were used, such as the evaluation reports of the local development strategies as well as information obtained by interviewing the presidents of the 3 LAGs.

Baraganul de Sud-Est LAG - (21 public partners, 17 private partners, 9 civil society partners) comprises 21 rural localities and, according to the 2011 census, covers a population of 86,281 inhabitants. The area of the LAG is 248,835 hectares, of which the agricultural area is 210,395 hectares. LAGs territory is poorly industrialized.
Objectives proposed by the local development strategy are the followings: 1. Promoting the competitiveness of agriculture; 2. Achieving a balanced territorial development of rural economies and communities, including job creation and maintenance, and fostering the competitiveness of agriculture.
The amount allotted to finance the submitted projects is 3.873.883 euro (Baraganul of South-East LAG, 2019, SDL).

Colinele Argeșului LAG– (11 public partners, 32 private partners, 3 partners from the civil society) embraces 11 rural localities and according to the census of 2011 the population covered by the LAG is of 44,795 inhabitans. It is noticed a descending trend of the population at the census of 2002 this being of 46,716 inhabitants. Causes: the ageing of the population, the low natural growth rate, the migration of young people from the rural areas and their establishment, for economical reasons, in towns. The average population density is 64,25 inhabitants/km2. The LAG's area is of 69,719 hectares from which the agricultural area is 56,333 hectares. The LAG has also 368 hectares of non-productive areas.

Objectives proposed by the Local development strategy: 1. prompting the competitiveness of agriculture; 2. achieving a balanced territorial development of rural economies and communities including the creation and maintenance of employment.

The amount alloted to finance the submitted projects is of 1,804.218 euro.

Valea Mostiștei LAG - (16 public partners, 26 private partners, 14 partners from the civil society) embraces 16 localities, from which 15 rural localities and small town. The population covered by the LAG, according to the census of 2011 is of 57,042 inhabitants. The average population density is 45,3 inhabitants/km^2. The population dynamics highlights a decreasing starting with 2002, when almost 9% of the population was lost. Objectives proposed by the Local Development Strategy: 1. Promoting the competitiveness of agriculture; 2. Ensuring sustainable management of natural resources and combating climate change; 3. Achieving balanced local development of rural economies and communities, including the creation and employment maintenance.
The amount assigned to finance the submitted projects is of 2,441.476 euro.

It can be observed that all the three LAGs have proposed as an objective to promote competitiveness of agriculture. We consider that the investment of small amounts in agriculture it is not enough to ensure an important contribution to the development of the rural area, because, unfortunately, the impact won't even be a local one. Moreover, it can not be mentioned an impact on the development of the region of the financed projects in the agricultural domain. The modernization of agricultural holdings, either by acquisition of machinery or by building new spaces, can't assure and give the desired value for the development of the local rural area, the results limiting themselves to increasing of efficiency and profitability of the concerned holdings.

A bigger impact could have, nonetheless, the projects concerning the establishment and the sustainability of young farmers, if they were to be continued with projects aimed to ensure, in certain conditions, the development of their farms. Perhaps this way it will grow the number of small agricultural holdings with high efficiency and raised profitability, the development of the rural areas can be significantly influenced through projects financed by the LAG. We can't state that the measure comes without an impact, there is a positive one, but until now, and still further extremely limited, to a very limited number of people, namely the beneficiaries of the projects, the people in

their proximity and their contract partners. We make this statement knowing the results of other projects implemented for the development and the modernization of some agricultural holdings, which made of the implemented agriculture in Calarasi county, a performant, efficient and profitable agriculture carried out on big surfaces. However, the reality proves that the development of the agriculture does not automatically involve the development of the rural area. One possible explanation is that a small number of people own large-scale agricultural holdings, and the modernization involved the production of high-performance machinery served by qualified personnel and in smaller numbers. Another possible explanation of the low impact of small-scale investment in agriculture is that agricultural products are not subject to a process by adding value through processing in the community or in the region but are put to direct use by the holding, it has nothing to do with the community.

However, the impact of SDL deployment is ensured by the contact of as many inhabitants as possible with the final outcome of the projects.

So far, the projects with the local public authorities and various structures with public attention (cultural, religious and social welfare entities) have proved to have a great impact as beneficiaries. This is because a project, regardless the value ,it serves a wider category of inhabitants (Baragan South-East LAG, 2019, SDL Evaluation report).

Even projects carried out under the measures to support entrepreneurship, non-agricultural income-generating activities, have proved to have a greater effective impact by ensuring access to various categories of products or services for the community residents.

The status of submitted and selected projects

Baragan South-East LAG

58 projects were submitted, of which 44 were selected and 14 were not selected

Measure	Number of projects submitted	The amount value of the grant claimed-euro	The amount allotted through SDL-euro
M1/6B-Stimulating territorial development of LAG Bărăganul	20	2.006.984	2.014.677
M2/6A - Establishment and development of non-agricultural businesses in the LAG territory	6	629.674	630.242
M3/6B-Establishment, modernization or rehabilitation of worship monuments of local importance	6	297.174	300.000
M4/2B-Flat-rate support for setting up young farmers	6	240.000	240.000
M5/2A- Improving the performance of the agricultural holding on the LAG territory.	6	678.642	678.962
M6/6B- Minorities and their integration into the local Community	0	0	10.000

M1/B6 - Stimulating the development of the South-East Baragan LAG – 20 projects submitted
As in the other LAGs, the beneficiaries being public entities, the projects submitted under this measure can have the greatest effective impact felt by the inhabitants of the region. The 20 projects submitted are aimed at modernizing public lighting systems, building sports grounds, purchasing machines and equipment for voluntary emergency services, setting up a day center for older people as well as modernizing a street. The non-refundable aid requested through the projects submitted is worth 2.006.984 euro, and the measure allotted for the implementation of the projects is 2.014.677 euros.

M2/6A Establishment and development of non-agricultural business in the LAG — 6 projects submitted. Projects addressing to different areas are being submitted: building a complex of leisure activities, wood-processing pits, a center for the maintenance and repair of agricultural machinery, but also acquisition of a veterinary ambulance. The non-reimbursable aid requested is 629.674 euros and the measure allotted for implementation of the projects amount is of 630.242 euros. The beneficiaries are 5 Commercial Societies with Limited liability (SRL) and one Individual Entrepreneurship (ii).

M3/6B Establishment, modernization or rehabilitation of worship monuments of local importance-6 projects submitted. It is the only measure on the county territory within the framework of this program that aims at intervention on religious monuments of local importance. The projects submitted under this measure are aimed at rehabilitating churches as well as restoring some church paintings. The measure is allotted 300.000 euros and the non-reimbursable amount aid requested by the projects submitted is of 297.174 euros. This projects implementation can have a major impact, providing a large number of inhabitants with improved access to religious services. The beneficiaries are units of worship covered by LAG's territory.

M4/2B - Flat-rate support for setting up young farmers – 6 projects submitted. The amount allotted for the implementation of this measure is 240.000 euros and the amount of non-reimbursable aid requested by the submitted projects is 240.000 euros.

M5/2A - Improving the performance of the agricultural holding on the LAG territory-6 projects submitted. The activities proposed by the submitted projects are aimed at achieving the objectives of this measure, they mainly concern the purchase of agricultural machinery as well as to insurance the conditions under which the work is carried out on the agricultural holding by placing lighting poles. This measure is allotted to finance the projects submitted the amount of 678.962 euros, and the amount of non-reimbursable aid requested by the projects submitted is 678.642 euros.

M6/6B - Minorities and their integration into the local Community – 0 projects submitted. The measure is allotted 10.000 euros.

Valea Mostistei LAG
53 projects were submitted, of which 42 were selected and 11 were not selected

Measure	Number of projects submitted	The amount value of the grant claimed-euro	The amount allotted through SDL-euro
M1-Promotion and support of young farmers	7	230.000	190.000
M2 - Support for initiation of the entrepreneurship and of the non-agricultural income-generating activities	5	250.000	150.000
M3- Investments support in non-agricultural activities and the rural development of micro-regions	2	398.214	397.514
M4- Investments in agricultural exploitations	11	652.047	639.512
M5- Supporting the associative forms and cooperation between the local stakeholders	0	0	60.000
M6- Sustaining the development of the LEADER zone by organizing public events	1	5.231	23.836
M7 – Investments in creating a prosperous society with a high collective responsibility level	2	48.677	50.000
M8- Small scale local development	14	880.000	930.614

M1- Promoting and supporting the young farmers -7 projects submitted, from which 4 submitted by Individual Entrepreneurship (ii), 2 by Limited Liability Companies (LLC) and one by Registered Sole Trader .The amount allocated to the measure is 190.000 EUR. The amount of the non-refundable aid requested through the projects submitted in this measure is equivalent to 230.000 EUR.

M2- Support for initiating the entrepreneurship and the non –agricultural income generating activities – 5 projects submitted . This concerns a pottery creation workshop establishment ,a photo studio and acquisition of equipment and machinery. The applicants beneficiaries are 3 Limited Liability Companies (LLC) , one Individual Entrepreneurship and one Registered Sole Trader. The amount allocated to the measure is 150.000 EUR. The amount of the non-refundable aid requested through the projects submitted in this measure is equivalent to 250.000 EUR.

M3- Investments support in non-agricultural activities and the microregion rural development – 2 projects submitted. The amount of the non-refundable aid requested through the projects submitted in this measure is equivalent to 398.214 EUR. By these projects it is proposed to be acquired the equipment and to be established a leisure activities centre . The beneficiaries are LLC-s. The amount allocated to the measure for funding the projects submitted is 397.514 EUR.

M4- Investments in agricultural exploitations -11 projects submitted. The amount of the non-refundable aid requested through the projects submitted is equivalent to 652.047 EUR. By analyzing the projects , it is concluded that the investments requested in agriculture in this Local Action Group are exclusively represented by acquisition of agricultural machinery . The beneficiaries are 6 Sole Traders, 4 Limited Liability Companies and one Registered Sole Trader. The amount allocated to the measure for funding the projects submitted is equivalent to 639.512 EUR.

M5 - Supporting the associative forms and cooperation between the local stakeholders- 0 projects submitted .To this measure it is allocated the amount 60.000 EUR and until September 2020 there was no project submitted.

M6 - Supporting the development of the LEADER area by organizing public events-1 project submitted .
Within this measure, it was submitted only one project , by an NGO , which aims at keeping the Romanian traditions and folklore alive among the children and young people . The amount of the non-refundable aid requested is equivalent to 5.231 EUR. The amount allocated to the measure for funding the projects submitted is 23.836 EUR.

M7- Investments in creating a prosperous society with a high collective responsibility level-2 projects submitted. The projects submitted in this measure aims at social services provision. The amount of the non-refundable aid requested through the projects submitted is equivalent to 48.677. The amount allocated to this measure for funding the projects is 50.000 EUR.

M8- Small scale local development -14 projects submitted. This is the measure which has aroused the most interest , especially as the beneficiaries are public institutions. By this measure, it was requested carrying out the pavements and the pedestrian walkways, a bike path, some parks arrangement, some sports fields establishing and modernizing, outfitting with equipment necessary to the public services for emergency situations and the acquisition of some backhoe loaders. By what it is proposed to be carried out, this is the measure which may have the highest impact, the objectives of the projects could influence the life quality for a very large number of the region inhabitants. The amount allocated to this measure for funding the projects submitted is 930.614 EUR and the amount of the non-refundable aid requested through the projects is equivalent to 880.000 EUR.

Colinele Argesului Local Action Group

33 projects have been submitted from which 24 selected and 9 nonselected.

Measure	Number of selected projects	The amount of the non refundable aid requested - EUR	The amount allocated by SDL - EUR
M1- Modernizing the localitaties on the Local Action Group territory	13	936.000	990.000
M2- Modernizing and establishing vegetal and	6	500.609	429.386

animal farms			
M3 – Encouraging the entrepreneurship by non-agricultural investments	4	313.630	300.000
M4- Social Investments for minorities integration in local communities	1	84.795	84.832

M1- Modernizing the localities on the Local Action Group territory -13 projects submitted. In this Local Action Group this is the measure which could have the highest impact, by the number of the inhabitants who will benefit of the submitted projects implementation results. The projects submitted aim at the backhoe loaders acquisition by the town halls, rehabilitation of the public lightening, a sports field establishment as well as some town hall premises rehabilitation and endowment. The amount allocated to this measure for funding the projects submitted is 990.000 EUR and the amount of the projects which have submitted until now is equivalent to 936.000 EUR.

M2 - Modernizing and establishing vegetal and animal farms-6 projects submitted. In Colinele Argesului Local Action Group, by the projects submitted in this measure it is intended to be purchased the agricultural machinery for modernizing and establishing the agricultural exploitations. The amount allocated to this measure is 429.386 EUR and the total amount of the non –refundable aid requested by the projects submitted is equivalent to 500.609 EUR.

M3 - Encouraging the entrepreneurship by non-agricultural investments - 4 projects submitted.Within this measure, it is very important to notice that 2 from those 3 projects submitted aim at ensuring the population access to the medical services (investments in medical centers). The amount allocated to this measure for implementing the projects is equivalent to 300.000 EUR and by the projects submitted it is requested a non refundable aid equal to 316.630 EUR.

M4 - Social investments for minorities integration in local communities-1 project submitted. Within this measure there is 7 an interest in setting up a daycare center for children. The nonrefundable aid requested is equivalent to 84.795 EUR and the amount allocated to this measure for implementing the projects is equivalent to 84.832 EUR.

Conclusions

At the level of these three Local Action Groups from Calarasi county, 144 projects have been submitted , from which 110 have been selected for a possible funding and 34 project remained unselected. The economic and administrative deficiencies of the area and the people needs were the basis for finding out the measures and the amounts allocated to each measure . It was also taken into account to be selected those measures with the highest funding percentage, as it was taken into view that the financial effort upon the applicants to be as less as possible.
The most attractive measures are those aimed at localities modernization, as without the support given, most part of the members communes were not able to carry out the investments proposed by them, due to the fact that they were not able to support such investments from the local budgets and the private investors could not have the chance to develop the activities they were carrying out or to carry out other new activities.
The analysis upon the types of eligible beneficiaries show a different ability of them to prepare the projects, the public beneficiaries having an advantage because of the qualified staff employed and the possibility to employ consultancy.
Taking into account that the amount of the non –refundable aid is sensible equal to the amount allocated for the projects funding, show that the animation activity accomplished by the Local Action Groups had an important role in involving the beneficiaries to write and submit the projects. As well as taking into account that the beneficiaries are part of all the juridical organization categories , both from the public institutions and commercial companies , sole traders or registered sole traders it is an indicator that the stakeholders who could have become interested in, benefited from the necessary information. The fact that there are not more beneficiaries applicants is due to, as it results from the assessment reports , the deficit of specialty consultants and the possible beneficiaries difficulties to carry out the eligibility conditions.

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Agricultural Land Lease Analysis as a Phenomenon Continuously Connected to the Social and Economic Realities of the Romanian Society

Emil MUSAT

The Bucharest University of Economic Studies, Bucharest, Romania
emilmusat@yahoo.com,

Rares-Alexandru IONESCU

The Bucharest University of Economic Studies, Bucharest, Romania
ionescu_rares00@yahoo.com

Abstract

The paper analyses the way and the rhythm in which the land lease regulation has evolved, in Romania, as a legal and economic operation necessary for the reintegration in the production process of agricultural land that was returned to former owners since 1991, in order to reduce the fragmentation of agricultural land and to increase size agricultural holdings, and to streamline the agricultural activity after strengthening the segment of agricultural professionals. The land lease legsilation was adopted in Romania in response to the need to organize the agricultural activity and the land market in the context of the agrarian reform started in 1991.
By researching of the initiatives to amend the law, of the reasons invoked and of the parliamentary debates, are highlighted, at some point, the needs of the business environment represented by the land lessee, of the landowners as lessors, as well as how the legislature manages to respond to them and to keep the land lease continuously connected to the realities of the Romanian society. The social interests of each moment are also reflected. This analysis is a useful tool for an in-depth understanding of the land lease operation and for understanding how this economic phenomenon impacts the society as a whole. This paper represents an approach supporting the idea that the land lease must benefit from a special regulatory law.

Keywords: lease, history, law amendment.

Introduction

Since 1990 when the political, social and economic system changed in Romania, on the background of the ownership right reconstitution for the agricultural land in the extravilan of localities, many Romanians were in the position to become owners of agricultural land.

In fact, it was reconstituted the right of ownership over the land that had belonged to their families fifty years ago, land that had been abusively confiscated by the communist regime.

The new agricultural land owners, due to the advanced age of most of them and in the absence of specific minimum production means, could not cultivate the land, thus being removed from the production process. Given the very high sense of ownership of Romanians, especially the elderly, to ensure the reintegration of agricultural land in the production process, but also due to the lack of an adequate legal framework, the sale of agricultural land was not an agreed option, so the best option for achieving this, in the absence of a specific legal regulation, was land leasing to natural or legal persons who had the production means necessary for the land exploitation for economic efficiency. However, as there was no legal regulation in this regard either, amid skepticism by the new owners and the lack of private professionals in the field of agriculture, most of the land remained uncultivated. For example, we present the following situation:

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	Agricultural area - hectares	The cultivated area with the major crops -hectares	Grain production	Wheat production
1990	14.769.028	9.402.113	17.173.539	7.289.344
1991	14.798.278	9.127.291	19.306.621	5.473.156
1992	14.790.125	8.909.111	12.288.452	3.206.382

Source: National Institute of Statistics - TEMPO online database

As can be seen, compared to 1990, the first year after the political regime changed, although the agricultural area increased, the area cultivated with the principal crops decreased steadily in 1991 and 1992, so that in 1992 it was lower than in 1990 with almost 500,000 hectares, representing 5.2%.

In this context, in 1994, the Romanian Parliament adopted the Lease Law (Law no. 16/1994 on lease), a law that tried to put order in ensuring the introduction of agricultural land in the production process by reintroducing the land lease into the Romanian legal system, an institution that had been abolished by the communists in the 1950s on the grounds that it encouraged the exploitation of man by man (art. 1 of Decree no. 115/1959 “the partition or lease of agricultural land, as well as any other exploitation of foreign labor by agricultural producers shall be prohibited”).

The Lease Law was in force for seventeen years, during which time it underwent several changes, each change reflecting how the needs of some participants active on the land market were covered, according to each time period, but also reflecting the political, economic and social challenges of Romanian society in the period prior to Romania's accession to the European Union. Each law amendment kept the lease at the forefront of operations on the Romanian land market. Currently, unfortunately, the land lease is no longer regulated by a special law. It is regulated by the Civil Code, at art. 1836 - 1850 as a variety of the lease contract.

The current state of the topic analysis

In the specialized literature, after the adoption of Law no. 16/1994 on lease, analyzes of the law were made especially from the point of view of the legal characteristics of the lease contract, and the lease was the subject of research especially from the perspective of its quality as the main factor in increasing the size of agricultural holdings.

Through the analysis of the legal characteristics of the lease contract, it is noted that although it is a contract named, with its own legal regulations, the lease contract according to the Romanian legislation is considered a variety of the lease contract. Thus, according to the provisions of art. 2 of Law no. 16/1994 on lease, "Lease means the contract concluded between the owner, usufructuary or other legal holder of agricultural goods, called lessor, and lessee, regarding the exploitation of agricultural goods, for a determined duration and at a price established by the parties" .

As legal characters (Belu Magdo, 2012), it is noted that the land lease is a synallagmatic contract (the contract is synallagmatic when the obligations arising from it are reciprocal and interdependent. Otherwise, the contract is unilateral even if its execution implies obligations on both parties), onerous (for a fee) (the contract by which each party seeks to obtain an advantage in exchange for the obligations assumed is for a fee), commutative (the contract in which, at the moment of its conclusion, the existence of the rights and obligations of the parties is certain, and their extent is determined or determinable), with successive execution, solemn (formal) (the contract is solemn when its validity is subject to the fulfillment of some formalities provided by law), non-translatable property and intuitu personae (concluded with a certain person) (Civil Code).

The initial legal regulation of the lease contained insufficiently detailed or confusing procedures, deadlines and notions, which meant that the specialized doctrine frequently included analyzes on unclear topics, especially about the submitting term and lease registering with the local council, more precisely if this term is likely to influence the contract validity or likely to influence the opposability to third parties. As the law does not clarify the above, nor does it establish any explicit penalty for non-compliance, it remained at the court discretion to decide. The text of the law contains only a general provision, at art. 24, namely "Leases concluded in violation of the provisions of this law are void or voidable". Even this legal provision is unclear, as nullity and annulment are different sanctions.

Although the registration of the land lease contracts with the local council was the subject of amendments over time of Law no. 16/1994, it was not taken into account the provision of a normative framework that would regulate the centralization of these contracts, in order to have a more complete picture of the land lease phenomenon (Luca, 2010).

Another controversial aspect in practice and which has been the subject of multiple analyzes in the specialized doctrine, is a legal provision that establishes the obligation to use the contract model provided in the annex to the Lease Law. Thus, the question arose whether the model contract in question changed the formal requirements required ad validitatem for the land lease. More precisely, if the written form as one of the conditions of solemnity, it must be that of the contract from the annex of the Lease Law (Patrascu and Berindei, 2009). The conclusion of these analyzes in the doctrine is that although the law establishes the obligation to use it, because it does not use the term "standard contract" but uses the term "model contract", in case of non-compliance can not operate the sanction of nullity. All the more so since, from the content of the model contract it results that it refers to the lease of lands, while according to art. 1 para. 2 of Law no. 16/1994 regarding the lease, the goods that can make the object of a lease contract are „agricultural lands, namely: productive agricultural lands - arable land, vineyards, orchards, vineyards, orchards, fruit bushes, hop and nozzle plantations - forested pastures, occupied lands with agro-zootechnical constructions and installations, fisheries and land improvement facilities, technological roads, platforms and storage spaces that serve the needs of agricultural production and non-productive land that can be arranged and used for agricultural production, as well as animals, constructions of any kind, machines, machinery and other similar goods intended for agricultural exploitation".

It is necessary to specify that in the Romanian legislation it is forbidden both sublease and setting up lease offices.

Also, in order to understand the existing context in the analyzed period, it is relevant to know that, after the adoption of the Land Fund Law in 1991, there were disputes in Romanian society, between agricultural land owners and the state (Rusu et al. 2011), generated mostly by the application of the law of the land fund regarding the location or the land restitution surface.
From another perspective, the land lease is seen as a legal and economic operation necessary to increase the size of agricultural holdings in Romania, after the agrarian reform of the post-communist period. Also, in the new economic, social and legal context, the reactivation of land lease was seen as a normal economic phenomenon, normality being justified both by the historical role that land lease played in Romanian agrarian relations, but especially by the experience and by the results obtained in this segment of the land market of some developed European countries, in increasing the farms size (Popescu, 2007).

Theorists in the field of agriculture, although in the legislation no distinction is made, given that the law stipulates that the natural person lessee must have agricultural training or a certificate of agricultural knowledge or agricultural practice and the legal person lessee must be subject to activity of exploitation of agricultural goods, they noticed that in practice, depending on the economic agents that lease the land, there are several types of lease:

- lease directly to the grower; the lessor cultivates the land areas with his own forces or those of the family persons, covering in full or for the most part the necessary labor force;
- lease to a person who cultivates the land areas using payed labor force;
- lease to a producer company - association or cooperative;
- lease to a company with state capital, majority state (former IAS etc.), mixed (with foreign capital participation) or private (Popescu, 2000).

Considering all of the above, it can be seen that after the appearance of the law governing the lease, the doctrine made an analysis both from a legal point of view of the contract and from an economic point of view of the phenomenon, highlighting the legal characteristics of the contract, the precariousness of the regulation of some aspects, as well as the impact that the lease has on the local and national economy by determining the increase of the size of some agricultural exploitations.

History of the amendments to Lease Law

As a result of the changes that took place in the Romanian society, in the agriculture and in the Romanian economy, new needs of the farmers and of the owners of agricultural land and other agricultural goods appeared. In order to identify how the legislator responded to these new requirements and to understand in depth the phenomenon of land lease, an analysis of the legal regulations, of the changes brought in time to the Lease Law is necessary.

To this end, the archives containing the amendments to the law, the explanatory memoranda, the opinions of the committees and the parliamentary debates will be researched.

By comparing the draft amendments to the law with the adopted normative texts, we will try to understand to what extent the legislator managed to cover with legal norms the new needs of the participants in the land lease market.

The first amendment of the Lease Law took place in 1998, by the adoption by the Romanian Parliament of Law no. 65/1998 for amendment and completion of the Lease Law no. 16/1994. The regulations regarding land lease and other agricultural goods that were adopted by Law 16/1994 took into account the historical period in which the country was at that time and were related to the tradition of our country and the provisions of common law, respectively the Civil Code. In this respect, the rules contained in the law are of particular importance in the relations between lessees and lessors and were likely to be a real support for individuals and legal entities interested in concluding leases. At the same time, these norms constitute a legal protection for both the lessor and the lessee, parties to the lease contract (Government of Romania, explanatory memorandum, 1997).

Thus, the Government proposes the following amendments to the Lease Law:

- the possibility of sublease agricultural goods;
- the possibility of assigning the lease contract to the spouse co-participating in the exploitation of the agricultural property or his descendants who have reached the age of majority;
- extending the category of natural persons who can be leased to Romanian citizens who have regained their Romanian citizenship, regardless of whether or not they have established their domicile in the country;
- extension of the category of legal persons that can be lessee to companies with part or all foreign capital established as Romanian legal entities;
- establishing the duration of the contract by the parties, without being conditioned by a legal term;
- granting the parties full freedom to set the level of the lease;
- regulation of the transmission of the lease contract for the cause of death.

After almost a year of debates, both in the Parliament and in the specialized commissions, the amendments to the Lease Law were approved by law in March 1988, being legislated that all Romanian citizens can be leased regardless of the country where they reside, as well as companies commercial companies with part or all foreign capital constituted as Romanian legal entities, these being an important step in modernizing legal regulations in the field of land market, modernization that will continue over the coming years, thus preparing Romania's accession to the European Union. Also, by Law 65/1998 the notion of lessor was introduced, allowing the parties to determine the lease and the term of its payment, and allowed the parties full freedom to determine the duration of the lease (we consider that this regulation was not favorable to the development of investments in agriculture, tenants needing long-term security in order to be able to invest in agriculture and to benefit from the fruits of the investment made). Regarding the land sublease, it was not approved, the historical argument and the fear of introducing an intermediary in the relationship between the lessor and the lessee, winning the case in the Romanian Parliament.

Considering all the above, even if the intervention on the land fund legislation was the International Monetary Fund requirement, in a broader framework that involved the restructuring of the Romanian economy (Land Fund Law no. 18/1991, art. 1-44, Law No. 169/1997 for amending and completing Land Fund Law no. 18/1991), we can say that through the amendments to the Lease Law in 1998, the Romanian legislature responded to the need of Romanian society to start the process of integration into European structures, responded to the current needs of agricultural professionals, to improve the legal instrument used to merge agricultural land, and responded to the need of the Romanian economy and agriculture to start creating the framework needed to attract investment in agriculture.

Another amendment to the Lease Law was made by Emergency Ordinance issued by the Government in 2002, four years after the previous amendment. In the Government's explanatory memorandum, the need to adopt the proposed amendments is justified by the need to promote changes in the sense that the lessee provides some guarantees in favor of the lessor.
Thus, in addition to those already provided by law, it was necessary to establish coercive measures for non-fulfillment of contractual obligations in order to determine the lessee to perform its contractual obligations. At the same time, taking into account the climatic conditions of Romania, the law will be supplemented with provisions stipulating the introduction in the lease contract of some clauses regarding the insurance of agricultural goods (Government of Romania, explanatory memorandum, 2002).

Following this initiative, the Government Emergency Ordinance no. 157/2002 which contains, among others, the following provisions: “The parties will include in the land lease contract insurance of agricultural goods clauses, which are the responsibility of the lessee” and “Leases concluded in writing and registered with the local council constitute enforceable titles for the payment of the lease on the terms and in the manner established in the contract ”. This emergency ordinance was approved by Law no. 350/2003, with some additions that do not affect the way in which the legislator complied with the initiator's request.

By Law 65/1998, which we previously analyzed, it was established at art.3 para.2 that “the tenants, natural persons, may be Romanian citizens, regardless of whether they have their domicile in the country or abroad”. This

amendment was only an intermediate step towards another amendment of the law, which definitively established that “tenants, natural persons, may be Romanian citizens or foreign nationals” and that “tenants, legal entities, may be of Romanian or foreign nationality". The Government was the initiator of this amendment, which in the explanatory memorandum made the following clarifications: in the process of implementing the acquis communautaire, Romania has assumed a series of commitments aimed at eliminating restrictions on the right of establishment and free movement of capital for foreign natural and legal persons. One of the commitments concerns the identification and elimination from national legislation of existing restrictions on foreign nationals and companies regarding the acquisition of real estate by foreigners. Thus, it is necessary to eliminate the existing restrictions in the national legislation regarding the lease of agricultural goods by foreign citizens, stateless persons or foreign companies (Government of Romania, explanatory memorandum, 2005). There were no relevant parliamentary debates.

An amendment that provoked debates and doctrine analyzes, was that of 2006 by which a model of the land lease contract was introduced in the law, to be used in the relations between the lessor and the lessee. As we have previously mentioned the legal implications, we will further analyze the way in which this regulation appeared in the Romanian legislation, the positions of the participants in the legislative process and the implications on the land market.

Thus, the initiators of the amendment were eleven senators and deputies from the Romanian Parliament. The explanatory memorandum states that the lack of a framework contract on lease, led in practice to the drafting of incomplete contracts, which led to overcrowding of courts with disputes arising from non-compliance or misinterpretation of the clauses in leases (Chamber of Deputies, explanatory memorandum, 2005). The draft law received a favorable opinion from the Committee on Agriculture, Forestry, Food Industry and Specific Services, but received a negative opinion from the Committee on Legal Affairs, Discipline and Immunities, because it was found that through the amendments proposed by the initiators, the model contract lease becomes mandatory, so that the principle of the autonomy of the will and contractual freedom is limited.

During the parliamentary debates, it was argued that this draft law it is necessary because neither the land laws nor the Lease Law no.16 provides a framework land lease and what the initiator proposes through this law is an extraordinarily great simplification of bureaucracy, including the direct relationship between the lessor and the lessor. It is a framework lease contract with which it is much easier to solve extraordinarily complicated problems that exists and come from the lease of agricultural lands (Chamber of Deputies, 2006). Another argument made by parliamentarians refers to the need to cover a gap in the lease legislation in the sense that the adoption of a model for the land lease contract would certainly help the landlords, thus eliminating the risk of concluding incomplete contracts and, at the same time, offering the possibility of using a unitary contracting method at national level.

We note that despite the fact that neither the Government nor the Legal Committee of the Chamber of Deputies gave a positive opinion to this amendment to the Lease Law by introducing a model framework contract, Parliament adopted this amendment (Law no. 223/2006), providing to landlords an instrument to cover a wide range of rights and obligations in the contractual relations of agricultural land lease.

Conclusions

In the context of the agrarian reform started in 1991 and of the new economic and political reality, when many Romanians were in the situation of becoming owners of some agricultural lands due to the reconstitution of the property right over the agricultural lands outside the localities, on the background in Romania, the Lease Law (Law no. 16/1994) was adopted as a necessity, a law that tried to put order in ensuring the introduction of agricultural land in the production process by reintroducing it in the system of Romanian Land Lease Law.

Being a new regulation, in a social, political and economic context that Romania was going through for the first time, lease as a legal operation and as an economic phenomenon was perfected over time, under the continuous action of the Parliament, that was able to identify problems regarding the land fund and the land lease, but also under the close and constant monitoring of international bodies that knew how to intervene with government authorities to determine the adoption of legal measures to restructure the economy and, implicitly, the Romanian agriculture.

As long as the lease had an independent regulation, it was managed, by successive amendments of the law, to ensure a response to the development needs of Romanian agriculture and economy, agricultural professionals being the main beneficiaries of this situation.

For 17 years, as long as the special law regulating it was in force, the land lease managed to remain continuously connected to the social and economic realities of the Romanian society. From this perspective, we believe that the current situation of land lease regulation in the Civil Code should be rethought, as a variety of location, by returning to regulation through special law, as it was until the entry into force of the new Civil Code in 2011.

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Job Satisfaction as a Non-Wage Factor of Employee Motivation

Zaneta NEJMAN
Faculty of Engineering Management, Poznan University of Technology, Poznan, Poland,
zaneta.nejman@put.poznan.pl

Aleksandra KAWECKA-ENDLER
Faculty of Engineering Management, Poznan University of Technology, Poznan, Poland, aleksandra.kawecka-endler@put.poznan.pl

Beata MRUGALSKA
Faculty of Engineering Management, Poznan University of Technology, Poznan, Poland,
beata.mrugalska@put.poznan.pl

Abstract

Employees are the guarantee of the company's success and survival. Their satisfaction, which is a result of fulfilment of their internal needs, contributes to the increase of economic efficiency of the company. Moreover, their work motivation determines the readiness to take diverse actions at work. Therefore, incentive systems are more and more often implemented to increase the level of employees satisfaction and their key competences such as innovation, entrepreneurship and flexibility in the enterprises. The appropriate development of such systems stimulates the actions of employees and influences their behavior to create safe work environment. It guarantees not only the improvement of health and safety at work, but most of all the reduction of the number of accidents and increase of work comfort. In the paper, an attempt was made to assess whether demographic variables affect the differentiation of the effectiveness of the non-material motivation factor that derives satisfaction from the performed work.

Keywords: Motivation, Non-Wage Factor, Satisfaction.

Introduction

Work is an essential part of human life. The desire to improve its quality increases the number of actions the employees engage in the enterprise (Kawecka-Endler, 2004; Mazur & Marczewska-Kuźma, 2015, Mrugalska et al. 2020). Therefore, the basic task of managers is to motivate their employees to perform the task as good as possible (Kozioł, 2002). However, it has to be emphasized that it is the staff who decides about their effectiveness and efficiency (regardless of the nature of the activities) (Wyrwicka, 2011; Sterna et al. 2020). Currently, more and more employers are aware that employee satisfaction, which is influenced by the increase of job satisfaction, contributes to an increase of economic efficiency of the company (Gabryelewicz I. et al., 2017). However, it has to be underlined that satisfaction is defined as: "the degree of positive or negative well-being, performed as a result of the tasks in specific physical and social conditions" (Gros, 2003). The issue of satisfaction is present in the literature and research results related to human resource management. Regardless of the fact that motivation of employees is the subject of interest of researchers from the various fields of science, no solutions have been developed to ensure satisfaction with a job well done (Sadłowska-Wrzesińska & Nejman, 2016; Gabryelewicz I. & Sadłowska-Wrzesińska J., 2016).

The aim of this paper is to determine whether demographic variables affect the differentiation of the effectiveness of non-material motivation factor – satisfaction derived from the performed work. The research was carried out in the period 2015-2017 and referred to employees working in micro and small production family enterprises in the Greater Poland Voivodeship. In the study, quota selection was used, taking into account professional activity and employment sector as well as the demographic factors of the employees.

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Motivating Employees

Motivation is an ambiguous concept which is defined as the state of human readiness to take action (Koźmiński & Piotrowski, 2002). It is expressed as: "intention, will, desire, wish, interest in something" (Bartkowiak, 1995). According to Reykowski, it is "a process of mental regulation where the direction of human activities depends on the amount of energy that a person is willing to allocate to implement a given direction. It is an internal process that determines the pursuit for specific goals ”(Reykowski, 1977). Vroom defines it as "a process of making a choice between alternative forms of voluntary behavior" (Vroom & Deci, 1992). On the other hand, Griffin believes that it is "a set of forces causing people to behave in a certain way" (Sekuła, 2008; Hitka et al., 2020). It is an internal state of a person having an attribute dimension, characteristic of each of us (Borkowska 1985; Nejman & Kawecka-Endler 2014). Three levels of motivation can be distinguished (Cox & Hoover, 2005):

- subordination, i.e. carrying out the orders of the superior, who treats employees as if they could not think and reason, did not have any talents, or were not involved in the performance of work,
- goal identification is a type of investment that stimulates the employee to achieve it, and therefore, it has a positive effect on increasing motivation,
- commitment, which occurs when employees consider the company's goals as their own and understand that a good job is also in their interest.

Different types of motivation are presented in Table 1.

Table 1: Types of motivation (www.mfiles.pl)

Types of motivation	From the point of view of the scope of impact	Inner
		Outside
	From the point of view of the form	Payroll
		Non-wage
	From the point of view of the direction of impact	Positive
		Negative
	From the point of view of the manner of impact	Individual
		Team

On the basis of the applied tools, motivation can be analyzed as tangible and/or intangible. Material motivation is considered as a process which has an impact on human behavior by income from work whereas non-material motivation uses psychological features related to the internal motivation (Listwan, 2006). In the literature, there are several models of motivational process. One of them is Steers and Porter’s model which is shown in Fig. 1.

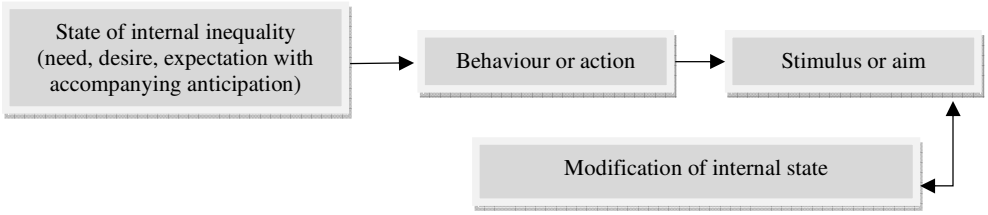

Fig. 1: Generalized model of motivational process (Adopted from: Kozioł, et al., 2000)

The model contains three basic assumptions related to human behavior such as: the influence of certain factors, relation to the goal, and being influenced. Employees have specific needs, desires and expectations that increase to a different extent. Some employees show the need for belonging and acceptance to work in a team, for others the most important thing is to achieve higher remuneration, bonuses or promotion. As soon as the goal is achieved, the stimulus stops working (Kozioł, et al., 2000). Motives, similarly to needs, can be divided into three basic groups: primary, general and secondary. Primary motives are innate and have a physiological basis whereas general motives have no physiological background and cannot be learned. The examples of general motives are: curiosity, influencing others and emotional attachment, and help to reduce tension and lead people to increase stimulation. Secondary motives are the result of learning (i.e. the motives of power, achievement, belonging, security or status) (Sikorski, 2004).

Incentive System

Incentive system is a structured set of tools and factors motivating individuals to act in the interest of the organization. Its effectiveness can be considered from the point of view of the enterprise and the employee. When we have a look at it from the first point, the degree of the achievement of objectives will be the measure of effectiveness. However, from the employee's point of view, we will talk about the level of satisfaction and contentment, or their lack (Borkowska, 1985; Rožman et al., 2017). The exemplary model of the incentive system shows Figure 2.

Motivation factors	Task working time system	Costs	Employee participation system
- working environment (social environment, company location, technical equipment), - incentive environment (material and non-material incentives), - means of persuasion (influence of superiors, information)	- catalog of task units, - formulation of tasks (function costs, order system, objectives management, situational approach), - task settlement (quantitative and qualitative reception, expert evaluation of work results, job evaluation and review)	- total labor costs (salary, insurance premiums, employee commuting, health and safety maintenance, staff training, social activities), - total cost of ownership - value of net production sold	- exclusive decisions of employees, - co-decision of employees and management, - negotiations (wages, working conditions, social matters, personnel matters), - joint control, - consulting and giving opinions

Fig. 2. Model of incentive system (Sępek, 2010)

In order to make the incentive system work effectively, it is required to have (Pocztowski, 1998):

- high level of work organization and good technical equipment,
- proper determination of tasks for individual employee teams,
- employees planned rewards,
- innovative forms of remuneration,
- defined unambiguous criteria to obtain awards.

Performed Work and Satisfaction

Job satisfaction in the workplace is related to the ability of an employee to fulfill his needs, goals, values and beliefs (Bartkowiak, 2009). V.H. Vroom defined satisfaction as "attitude". Accordingly, in the theory of expectations, in order to be satisfied you have to meet your expectations (Vroom, 1964). It is subjective feeling to: work, working conditions, payment (Kowalska, Marcinkowska, Jośko, 2010) and represents organizational behaviors, which reflect key competences such as: innovation, flexibility, and ability to development (Juchnowicz, 2013). Generally, it is a positive feeling but as it is very subjective, a similar situation may cause satisfaction to one person but not to another. It results from many factors that have another value for different people. Satisfaction may or may not arise as a result of individual requirements, expectations, or through specific experience. The individual and differentiated evaluation of factors makes it difficult to predict which activities will prove to be satisfactory for specific employees (Mrówka, 2011). The increase of satisfaction undoubtedly contributes to the improvement of employee engagement and performance. On the other hand, its decrease may increase the risk of an increase in employee turnover and absenteeism and the number of work accidents. A decrease in job satisfaction for a certain group of employees may contribute to, for example, an increase in absences, and may even become a reason for changing the workplace (Springer, 2011).

In the development of human resource management techniques, the Vroom concept deserves attention, as he perceived employee satisfaction as a consequence of, inter alia, (Sikora, 2000):

- value of the expected reward,
- effort put into achieving the desired result,
- perception of the subjective probability of success,
- assessment of the validity of the award received,

- consistency of own goal with the goal of the organization,
- lack of excessive physical overload (work not exceeding strength),
- fair and adequate remuneration to individual aspirations,
- physical working conditions that enable the objectives to be achieved and meet the needs of the employee.

The level of employee satisfaction and motivation is the subject of many analyses since the 1990s. Their results prove the existence of a strong correlation between the level of employee satisfaction and the level of motivation. For the measurement of employee satisfaction and motivation to be fully effective, it is necessary to ensure that the research tool meets the following features (Skowron, Fojutowski, Sak-Skowron, 2011):

- allowance for the identification of motivational factors and their impact on the overall level of employee satisfaction and motivation,
- determination of the level of motivation to work and the perception of the company and its management,
- determination of the most effective incentive system adjusted to the specificity of enterprises.

Satisfaction as a Factor of Motivation in Work

Methods

The research was carried out in 2015-2017 in the Wielkopolskie voivodeship. The survey questionnaire consisted of two parts, the first (marked with the Roman number I) contained 18 questions related to the workplace, while the second part covered factors of motivation to work (marked with the Roman number II). The second part (related directly to the subject matter of this study) consisted of 34 questions in which 3 areas were distinguished: non-material motivation factors, material non-monetary motivation factors, material monetary motivation factors. The answers to questions related to motivation factors can be treated as discrete quantitative variables, assigning each answer a score on a scale of 0 to 4 points. Marked scores 3 and 4 were treated as an effective motivation factor:

0 – it does not motivate me
1 - it motivates me very poorly
2 - it motivates me moderately
3 - it motivates me
4 - very motivating.

As a result of the research, the means and standard deviations for the factors motivating to work were calculated. In order to check the significance of differences in motivational factors, the Mann-Whitney test was used for comparison in two groups and the Kruskal-Wallis test for comparison in at least three groups. Correlations between workplace opinions and motivational factors were checked using the Spearman's Severity Correlation Factor Test. The value of $p<0.05$ was assumed to be statistically significant. Statistical calculations were carried out with the statistical package STATISTICA 10 PL. The Mann-Whitney test was used to determine the differences in the position of two unrelated samples when the measurable variable is described at least on an orderly scale.

Results and Discussion

The respondents were employees of micro and small family production enterprises of various industries which are presented in Figure 3.

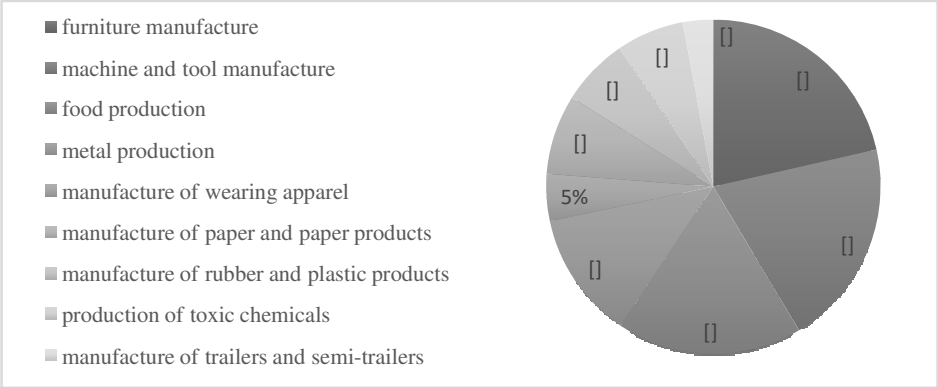

Fig. 3: Types of surveyed companies.

In the study, quota selection was used, taking into account the type of surveyed companies and the employment sector as well as the demographic factors of the employees. 449 correctly completed questionnaires were obtained. 66.8% of men and 33.2% of women participated in the research. The dominant group of the respondents were employees aged 20-30, who constituted 39.6% of the respondents. 27.2% of people represented the group of 31-40 years, and 22.7% of people aged 41-50. Only 10.5% of the respondents were over 50 years old. A significant group were people with secondary education - 46.8%. Another group of respondents with higher education - 26.9%, and 21.8% - vocational education. The remaining respondents had primary education - 4.5% of the respondents. 35.9% of the respondents declared that they had been working in the current enterprise for at least 3 years, while 26% for a year. 25.8% of people worked for no more than 1 year, and 21.6% - for over 10 years. The remaining respondents worked for 1-3 years - 16.7% of the respondents.

The use of the Kruskal-Wallis Test was to determine the differences in the position of at least three unrelated samples when the measurable variable is described at least on an ordinal scale.

The results for the work satisfaction factor were coded as II.13. and are presented in Table 2.

Table 2: Means and standard deviations of intangible factors motivating to work

Factors motivating to work - immaterial	Factor number	n	Mean	Standard deviation
Having satisfaction from the performed work	II.13	449	2.94	1.04

Table 3 shows the means and standard deviations of non-material motivators to work on the 0-4 scale and the results of the Mann-Whitney test.

Table 3: Means and standard deviations of intangible factors motivating to work

No	Gender				Mann-Whitney Test	
	Woman n=149		Man n=300			
	Mean	Standard deviation	Mean	Standard deviation	Z	P
II.13	2.97	1.03	2.92	1.05	0.53	0.5982*

** statistically significant, p <0.05*

The data in Table 3 show that for the factor of getting satisfaction from work performed, there was no statistically significant difference in the responses of women and men.

Table 4 shows the means and standard deviations of intangible motivational factors on the 0-4 scale in age groups and the results of the Kruskal-Wallis test.

Table 4: Means and standard deviations of intangible work incentives

No	Age								Kruskal-Wallis Test	
	20-30 years n=178		31-40 years n=122		41-50 years n=102		above 50 lat n=47			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	H	p
II.13	2,76	1,10	3,16	0,93	2,89	1,09	3,11	0,81	10,90	0,0123*

** statistically significant, p <0.05*

For the analyzed motivation factor, the multiple comparison test showed a significant difference between people aged 20-30 and 31-40 (p = 0.0148). The respondents aged 31-40 indicated this factor more often than those aged 20-30.

Table 5 shows the means and standard deviations of non-material motivators on the 0-4 scale in the education groups and the results of the Kruskal-Wallis test.

Table 5: Means and standard deviations of intangible work incentives

No	Education						Kruskal-Wallis Test	
	Primary and vocational n=118		secondary n=210		higher n=121			
	Mean	SD	Mean	SD	Mean	SD	H	p
II.13	2.81	1.04	2.95	1.02	3.03	1.07	4.10	0.1286*

** statistically significant, p <0.05*

The analysis of the data contained in Table 5 shows that there were slight statistically significant differences for the tested factor, but the multiple comparison test did not show any differences between the groups.

Table 6 shows the means and standard deviations of intangible work incentives.

Table 6: Means and standard deviations of intangible factors motivating to work

No	Workstation						Kruskal-Wallis Test	
	executive n=255		specialist n=127		managerial n=67			
	Mean	SD	Mean	SD	Mean	SD	H	P
II.13	2,85	1,08	3,07	0,89	2,99	1,13	3,31	0,1912

** statistically significant, p <0.05*

The analysis of the data contained in Table 6 shows that there was no statistically significant difference for the factor gaining satisfaction from the work performed. The responses of employees working in executive, specialist and managerial positions are at a similar level.

Table 7 presents the means and standard deviations of intangible motivating factors to work on the 0-4 scale in the salary groups and the results of the Kruskal-Wallis test.

Table 7: Means and standard deviations of intangible work incentives

No	Compensation						Kruskal-Wallis Test	
	Up to 2000 PLN n=182		2000-4000 PLN n=215		above 4000 PLN n=52			
	Mean	SD	Mean	SD	Mean	SD	H	P
II.13	2,76	1,08	3,07	0,95	3,02	1,15	9,65	0,0080*

statistically significant, p <0.05

As it is shown in Table 7, it can be concluded that the multiple comparison test showed a significant difference only between people earning up to 2,000 PLN and 2,000-4,000 PLN for obtaining job satisfaction (p = 0.0080).

Conclusions

The possibility of achieving satisfaction is a determinant of motivation at work. It results from the internal needs of the employee and leads to his positive behavior. For the employer, a satisfied employee is an employee more effective and committed at the same time. The feeling of satisfaction influences lower absenteeism and greater loyalty, and also determines pro-social behavior.

The specificity of production activities based on cooperation and teamwork requires specific solutions in the field of human resource management. In practice, entrepreneurs usually use traditional motivational solutions, not taking into account the diverse and often subjective needs of employees. The appropriate development of the company determines the introduction of incentive programs that stimulate the actions of employees. For this purpose, it is necessary to prepare an individual incentive system focused on the needs and expectations of employees. The most popular, however, less and less effective way to reach the potential of motivation, is financial incentives. The entrepreneur can also use non-financial motivation factors, such as the sense of job satisfaction.

It should be noted that entrepreneurs (regardless of the legal regulations in Poland, imposing the obligation to ensure safe working conditions for employees), understand more and more that the guarantee of the company's

success and survival are employees, who should be provided with safe working conditions, enabling the development of skills (training, professional development) and increased motivation.

The presented analysis was based on the research of a relatively large number of respondents with significant differentiation. Its results allow to conclude that the analyzed motivational factor has a similar effect on both women and men. The respondents between the ages of 31 and 40 indicated this factor more often than the group of younger respondents who were in their twenties. On the other hand, small statistically small differences occurred for respondents with different levels of education and the amount of remuneration.

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Influence of Technological Progress on Clusters Success

Alina N. POP
Tehnical University of Cluj-Napoca, Romania, alinanataliapop@gmail.com

Corina M. RADULESCU
Tehnical University of Cluj-Napoca, Romania, corina.radulescu@cunbm.utcluj.ro

Rita TOADER
Tehnical University of Cluj-Napoca, Romania, rita.toader@gmail.com

Florina HAHN
Tehnical University of Cluj-Napoca, Romania, ffllloorina@yahoo.com

Izabela RUS
Tehnical University of Cluj-Napoca, Romania, iza.ormenisan@gmail.com

Abstract

Clusters are the trigger for new technology through continuous involvement in an effective approach in attracting as many members as possible to streamline industrial progress. These networks aim to capitalize on resources, the effects of results, reduce costs, improve quality, innovation, productivity and thus develop the strategies of emerging economies. Also, the economic development is in a continuous process of modernization, integration of the innovative activities through their competitive advantage. The integration of innovative clusters at the economic level brings positive effects on industrialization through technological challenges, by improving the way in which smart specialization propels this industrial sector through competitiveness. Industry 4.0 is a concept that confirms these challenges for maximizing digitization through the evolution of industrial manufacturing and harnessing the capacity of new technologies. This paper aims to highlight the importance of successful implementation of this new concept of economic development, by ensuring the factors involved in achieving the objectives related to cost, time, performance, competitiveness. The study responded to cluster managers in the northwestern region of Romania with a positive correlation of technological performance variables on competitiveness, but with a more reluctant vision of implementation in certain industrial areas on changes that may cause certain staff restructuring.

Keyword: Cluster, Digital Innovation, Performance, Competitiveness.

Introduction

Economic practices and theories implemented the national and international level give clusters the role of catalysts for competitiveness through innovation and internationalization. Each region is close to a prosperous, equitable society with a competitive, efficient and modern economy. Implementation of new technologies, intense cooperation of value chains by mobilizing industrial actors towards a circular and prosperous economy. According to the European Green Deal of 2019, it shows that "the role of clusters in the implementation of European industrial policy, they catalyze strategic and structured cooperation along European value chains; supports European policy initiatives as an important tool for promoting industrial modernization at regional level; facilitate SMEs' access to global markets and strategic value chains, encourage smart specialization and strengthen cross-sectoral cooperation, facilitating structural change and the development of emerging sectors. " We can say that at the regional level, clusters have a significant role in

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"operationalizing smart specialization strategies", and at the national level, clusters consider: - innovative industry - smart and sustainable economic growth

- the importance of links in global value chains
- the innovative cluster - an instrument of smart economic policy

Clusters during this period of global pandemic gaps have continued to find effective solutions to the efficiency of the mobility of industrial actors in a changing society. Considered at European level as "engine of economic development", they depend on the interaction between the business environment, academia, private sector, public environment and the availability of capital resources involving risk elements to boost economic activity, microeconomic and macroeconomic area research. Through the various European approaches, the clusters become the pillars of economic development and at the same time directing financial instruments towards an empirical research of activities.

In the current competitive situations, organizations create business models, strategies based on competitive advantage, resource efficiency, increase productivity, stimulate creativity, innovation, research among all actors involved to transfer technological progress in products and services tailored to national and global economy.

The innovative cluster is a “group with legal personality, aiming to stimulate innovation, by promoting sustained interactions between its members, supporting the involvement of SMEs in research, development, innovation, and through the effective contribution to these activities, facilitating the transfer technology, know-how, expertise, networking and dissemination of information between cluster members. ” This type of cluster offers economic progress, economic value added on competitively produced at regional level.

The new European industrial strategy on digital innovation provides support and services at national, regional and local level with 3 starting pillars: green transition, global competitiveness, digital transition.

In order to become competitive, clusters in all sectors of activity must benefit from the advantages of digital transformation, relying on a network of digital innovation centers that lead to the improvement of technological processes, products, services by using these concepts on testing, support investment, training and networking in an innovative ecosystem.

Technological evolution is a constantly evolving process that offers the possibility of human resources to use skills, abilities and competencies in the labor market. The introduction of Industry 4.0 at the cluster level offers innovative solutions for the organizations of the future through intelligent, interconnected applications. The term Industry 4.0 has its origins in Germany since 2011 as a model for modernizing the industry.

"The Industry 4.0 movement is a strategic and intentional approach to shaping the future, while accessing an industrial revolution shows us what has already changed and what are the trends in industrial change." (Https://www.greensoft.ro/industria- 4-0 /).

The customer is the one who pursues a low cost, an exceptional quality and freedom in his choice.

The use of this technology offers certain advantages, of which the most relevant are represented below:

Improved efficiency - organizations have the opportunity to maintain a high quality, a degree of efficiency maintained at the highest standards, decision-making in a shorter time.

Increased productivity - occurs more and faster while allocating resource efficiency from the perspective of cost integration.

Flexibility, agility - creating the means to carry out a manufacturing operation, a diversified range, the introduction of new products on the production line, etc.
Reduced costs - initial costs of investment, but decrease in manufacturing costs due to systems integration, data management, etc.

A better customer experience - opportunities to improve services and customer experience, more efficient delivery.

Achieving a return on investment - industry benefits, potential return on investment, competitiveness for an industrialized future.

But these advantages are also offset by some disadvantages related to technology such as:
Delimited creativity - limiting the creative process through new technology, due to the multitude of automated processes that perform work tasks, reducing staff.

Increasing unemployment - reducing human resources at the level of automated organizations.

Changes in the environment - the large number of equipment and technologies incorporated in production facilities, fuel sources, with a major impact on the environment.

Internet of things security - a keen interest in covering the gaps in internet security.

Complicated tasks cannot be performed - automation technology has failed to achieve complex production, even if it offers an increase in quality.

High initial costs - significant initial investment

Requires maintenance and training - employees must be trained, specialized in various seminars to integrate knowledge in the proper operation and maintenance of equipment. (www.greensoft.ro/industria-4-0)

"The transition from automated to digitized industry occurs in all industrialized countries, but at different rates and with different expectations from country to country.

At the Romanian level, even in Germany or France - industrial companies face challenges in terms of culture, vision or digital skills in order to start the process of data collection and automation of decisions." The diversity of the forms of expression of the intellectual creation determined in a relatively short time an accentuated dynamically aiming at the economic direction.

Following a detailed analysis of the crops it can be said that they provide advantages at national level by integrating new technological approaches.

We can say that market access, providing strategic information for business, creating human resource centers, reducing transaction costs, the existence of financial resource centers, increasing productivity and competitiveness are just some of the advantages of innovative clusters. "A strong, innovative, competitive, cluster-based industry and an efficient patent system encourage the development of an innovative network at a national and European level, as they are a means of economic recovery, opportunities for collaboration in an innovative and entrepreneurial society." (Sölvell, Ö., And Williams, M., 2013).

Investing in ecosystem focused collaboration networks such as clusters improves performance and transition of their actors towards greener and more resilient.

By implementing the innovative cluster at European level, it can be seen that it has an overwhelming effect on the growth of startups by 141% and a growth of companies by 77%, which has a positive effect on the economy, on the effects of hub development. Human resources, and in particular revenue, as exemplified by the European Panorama of Clusters and Industrial Change:

- 13,5% higher average wage
- +0.7% higher annual wage growth rate
- +0.5% higher annual employment growth rate
- 143% more global frontier firms
- 77% more high-growth firms
- 141% More rapidly growing start-ups in specialised clusters than in other locations (https://www.clustercollaboration.eu)

The situation of clusters at national level

The Cluster Police Coordination Directorate as part of the Romanian industrial policy (Industrial Policies and Competitiveness Directorate) has 76 clusters, and these in turn 47 clusters are members of the Romanian Cluster Association - CLUSTERO, an association that offers good practices and models of regional development, with large-scale representation at national, European and global level of clusters in Romania. By integrating cluster management at European level by the European Secretariat for Cluster Analysis in order to certify excellence, the following were awarded:

- 3 clusters in the Gold Labe category);
- 17 clusters in the Silver Label category;
- 58 clusters in the Bronze Label category.

In terms of geographical distribution and thematic concentrations, the clusters in
Romania is brought together in the form of regional and thematic consortia, as follows:

- "Cluster Consortium from Northern Transylvania (North West Region);
- Consortium of Clusters from Transylvania (Center Region);
- Consortium of Clusters from the North East Region;
- Consortium of "Lower Danube" Clusters (South East Region);
- Wallachia Hub (South Muntenia Region);
- Consortium of Clusters from the Bucharest - Ilfov Region;
- 'Noatex', the thematic consortium of textile industry clusters;
- Thematic consortium of wood and furniture industry clusters;" (http://clustero.eu/wp-content/uploads/2020/04/situatia-clusterelor-din-romania-aprilie-2020.pdf)

All these consortia have concluded partnership agreements at regional level over the number of CLUSTERO members, being a quasi-totality at country level of the clusters.

The following is the statistical situation of the number of companies, employees, sales and exports at the end of 2019 of the North-West region of Romania.

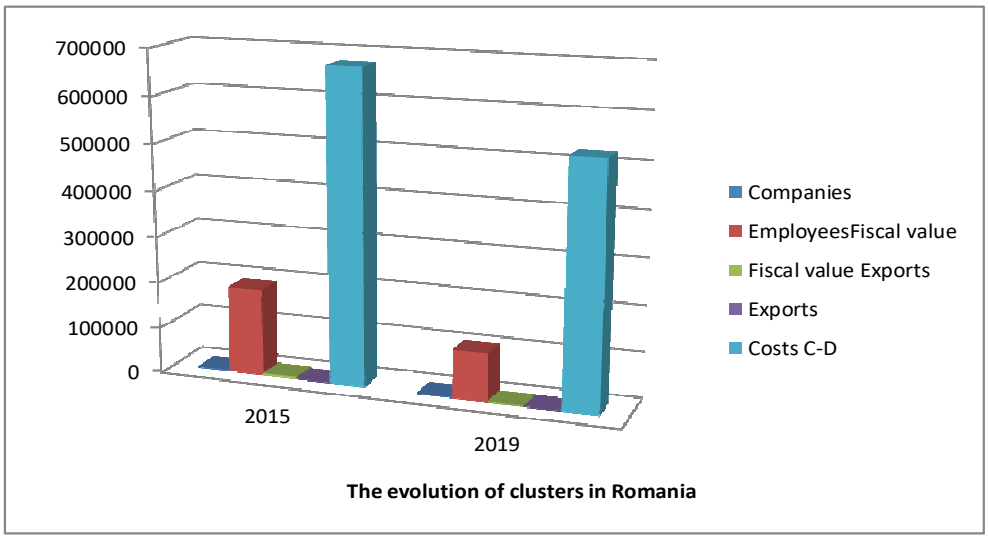

Fig. 1: The evolution of clusters in Romania

Source: Adapted Clustero

Following the analysis of the graph on the evolution of clusters, we can see a significant increase in 2019 in the number of clusters from 233 to 2348, even employees to over 33,000, with a turnover of over 7.6 billion lei and exports of 770 billion lei , all this shows that interest in these cluster networks is growing and with benefits for regional development.

These performances were achieved through the development of business models, various tools to support the needs of catalysts, some government policies that came to meet SMEs towards better visibility at European level. All the steps of development and integration in the network of European enterprises facilitated the participation in international conferences, innovation and internationalization audits, consultancy for accessing funds, integration of business support services, increasing the value chain at regional level, presence in Horizon 2020 projects, INTERREG, through clusters and member organizations

Research Methodology

The main objective of the research was to highlight the importance of successful implementation of new technology, the concept of economic development, by ensuring the factors involved in achieving objectives related to performance, competitiveness, cost, time, human resources, and last but not least performance.

The research is based on human resources, their behavior on technological progress, the integration of skills in the cluster, based on a questionnaire that was applied to cluster managers at the national level. The criteria in which the new technologies are applied, affiliation in consortia, excellence in management, internationalization were taken into account as criteria.

Data and Methods

The managers of the cluster members are the ones who monitor the evolution of the efficiency of the relations between the cluster members and the integrated technological performances, through the allocated financial resources, time and competitiveness.

The perception of cluster managers on the importance of performance factors and technological progress are elements that lead to increased competitiveness.

At the level of the northwest region, there are 8 clusters active in the field of wood and furniture, IT sector, agri-food industry, creative industries, renewable energies and materials. A number of 7 clusters are members of the Romanian Cluster Association, being the most performing both nationally and internationally, been awarded with gold medals 3 clusters, silver medal 2 clusters and bronze medal a number of 3 clusters.

The managers within the 8 clusters provided answers based on the questionnaire applied online, appreciating the importance of the factors on the interval l-5, where for 1 we have Total Disagreement, and for 5 we have Total Agreement.

With the help of centralized data, table 1 was made in order to achieve the vector importance, size, innovation and export.

Table 1: Qualitative analysis at regional level

	Important	Sector	Size	Innovation	Export
Wood	2,84	2,62	1,05	0,88	6,56
Research	7.43	4,89	10,7	9,43	4,52
Agriculture	5,9	3,21	10,04	8,94	0,86
Renewable energy	2,63	3,73	6,99	11,03	1,67
Creative industries	7,7	2,97	11,4	11,47	1,2
Sustainable environment	3,3	2,57	13	38,66	6,39
IT	26,9	30,1	23	28,02	49,97

Source: Eurostat (2019)

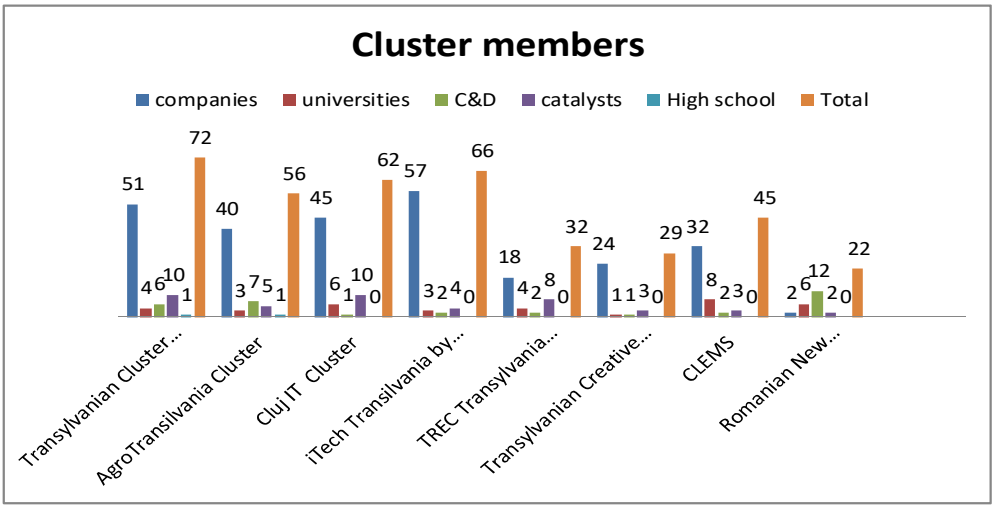

Fig. 1: Cluster members of the North-West region of Romania

Source: The authors

Based on the graph above, it can be noticed that the Mobile Transilvan cluster has the most members, followed by Transilvania IT Cluster by ARIES, on the second place. The 8 clusters within the North-West region of Romania have 362 members from various industrial fields, research and development, universities, high schools, governmental organizations, various associations, which capitalize on the interconnections related to knowledge, relationships, connections, motivation to market requirements. All these members provide information, specialized training, research, education and technical support.

The next section of the questionnaire looked at how managers have a decision-making role of the factors that lead to cluster performance and increased competitiveness at the regional level.

Testing Research Hypothesis

Hypothesis H 1: The correlation between technological progress and managers' perception of cluster competitiveness is positive and significant.

Hypothesis H 2: The correlation between cluster performance factors and industry 4.0 is positive and significant.

The research is based on the hypothesis that managers, resource efficiency influence the performance of the cluster. Investing in technological progress as an independent variable with an effect on performance, we can say that the dependent variable is performance, and these values fluctuate depending on the importance of technological progress (Popa M., 2015).

The analysis of these variables shows an abstract degree of approach to the efficiency of technological progress, cluster performance, but also a visible functional degree on the appreciation values. Depending on the abstract level, the way of their operationalization will be opened, the operationalization of the efficiency of industry 4.0 can be achieved by using an appreciation scale with which the respondents' responses on the investment in cluster development are totaled.

Industry 4.0 requires cooperation at regional and national level to develop partnerships between stakeholders in the process of clustering, industrial and technological performance in accordance with the common EU position. It will also have effects on human resources, social relations, a greater motivation for improvement taking into account the links between training programs, educational facilities, the acquisition of digital skills and social cohesion.

Technological progress is quantified by increasing productivity, increasing quality, attracting a more significant number of customers, members, which leads to a yield and at the same time to the increase of profit, innovation. It leads to an evolution of technologies, clusters, managerial decisions towards the new industrialization.

Performance, functionality can have several means of assessing managers, knowing employees, through various indicators related to how to perform activities, results, and the period of their measurement in a defined time frame.

Table 2: Frequency of responses received by cluster type

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Transylvanian Cluster Furniture	51	23,39	23,39	23,39
AgroTransilvania Cluster	42	19,26	19,26	42,65
Cluj IT Cluster	35	16,05	16,05	58,5
iTech Transilvania by ARIES Cluster	49	22,47	22,47	81,17
TREC Transylvania Energy Cluster	15	6.89	6.89	88,06
Transylvanian Creative Industries	5	2,31	2,31	90,37
CLEMS	16	8,26	8,26	98,63
Romanian New Materials Cluster	2	1,37	1,37	100
Total	215	100,0	100,0	

Source: (data resulting from the analysis of the answers received with SPSS statistical program 20,00)

There is a high interest in completing the questionnaire launched online, by the managers of the furniture cluster (23.39%), the ARIES cluster (22.47%) followed by the agro cluster (19.26%), the IT cluster (16, 05%), Clems (8.26%), TREC cluster (6.89%), creative industries (2.31%), last position Romanian new materials cluster (1.37%).

Regarding the quality (position held) of the respondents within the selected organizations, it was found that the vast majority were people with management positions, either people who are part of specialized departments or hold the status of administrator, graphic representation made in Figure 2. from lower:

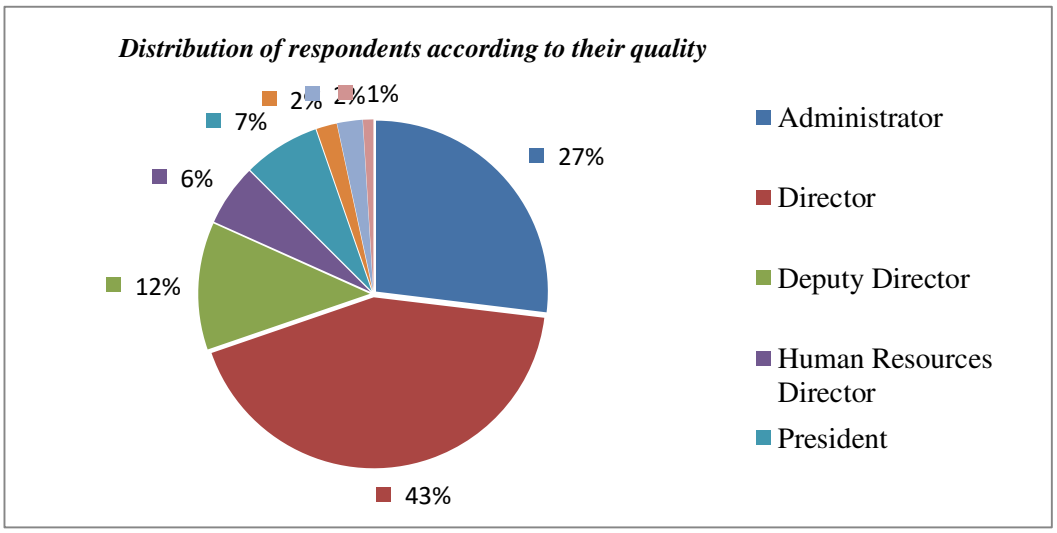

Fig. 2: Distribution of respondents according to the quality held within the organization
Source: (data resulting from the analysis of the answers received with the SPSS 20,00)

The vast majority hold a management position, either as director (43%) administrator (27%) or deputy director (12%), or hold other qualities within the organization, which is why we can conclude that the data collected are representative

of the study. research, because the respondents are part of the higher, hierarchical echelon of the target group, they have technical and practical knowledge about the organizational culture.

Results

The SPSS 20,000 and Microsoft Office 10 statistical data package provide statistical tools for verifying the fidelity and internal consistency of the questionnaire, the correlation between variables as well as methods for analyzing multiple linear regressions, in which several such methods are available, as follows: (Opariuc C., 2009)

To test the fidelity of the elaborated scales (5 dimensions consisting of a number of 170 items) and the internal consistency of the questionnaire, the calculation of the internal consistency coefficients Cronbach's Alpha (α) and Guttman was used, taking into account the data distribution and their nature.

After testing the internal consistency, it resulted in a total of 170 items, a total Cronbach's Alpha coefficient with the value of .832, and for the 5 main domains a value of .763 was registered, which indicates that there is a high internal consistency.

This result was predictable, because the items were selected and adapted from other survey tools (questionnaires), used with the consent of the authors of the studies mentioned in previous theoretical chapters, items that also in these questionnaires recorded individually and as a whole, high values of the Cronbach's Alpha coefficient, which confirms the reliability of the questionnaire conducted for the research study, thus providing concrete and real data and information.

The same aspects can be deduced from the analysis of the data with the help of the Guttman model, a model that proposed fidelity coefficients in a number of 5, and are the existing lower fidelity limits, which was found to record high values, coefficients that are found in table 3, as follows:

Table 3. Reliability Statistics

Lambda	1	,666
	2	,841
	3	,832
	4	,759
	5	,845
	6	,828
N of Items		5

Source: (data analyzed in the statistical program SPSS 20,000)

The first coefficient (λ1) represents a simplistic estimate of fidelity, which is the "cornerstone" for the other estimates, once again proving the existence of the fidelity of the questionnaire.

The coefficient (λ3) is the Cronbach's internal consistency coefficient, calculated for all 171 items (.841). The fourth coefficient (λ4) Guttman is the precise one, fact for which, through statistical procedures, it turned out that the use of this questionnaire, which is faithful, consistent, is viable and will generate the data expected from the research study.

From the application of the above-mentioned statistical processes, it can be concluded that the analyzed scale is faithful, the items are correlated and have a high degree of consistency, such as the existence of true fidelity.

Following the analysis of the data from Pearson analysis, it resulted that the variables are positively correlated, an aspect that can be seen in the scatterplot graphs, correlations presented in Table 4. as follows:

Table 4: Correlations

		Investing in technological progress	**The importance of the cluster**	**Effects within the cluster**	**Cluster performance**	**Investment results**
Investing in technological progress	„Pearson Correlation	1”	,721**	,411**	,521**	,526**
	Sig. (2-tailed)		,000	,000	,000	,000
	N	215	215	215	215	215
The importance of the cluster	Pearson Correlation	,721**	1	,501**	,535**	,499**
	Sig. (2-tailed)	,000		,000	,000	,000
	N	215	215	215	215	215
Effects within the cluster	„Pearson Correlation	,411**	,501**	1	,409**	,472**
	Sig. (2-tailed)	,000”	,000		,000	,000
	N„	215	215	215	215	215
Cluster performance	„Pearson Correlation	,521**	,535**	,409**	1	,550**
	Sig. (2-tailed)	,000”	,000	,000		,000
	N„	215	215	215	215	215
Investment results	„Pearson Correlation	,526**	,499**	,472**	,550**	1
	Sig. (2-tailed)	,000	,000	,000	,000	
	N”	”215”	215	215	215	215
”**. Correlation is significant at the 0.01 level (2-tailed)”						

Source: (data analyzed in the statistical program SPSS 20,000)

It is found that we are dealing with positive and significant correlations, because the significance thresholds are lower than 0.01. At the same time, the correlation is positive, aspects resulting from the sign of the correlation coefficient and from its value.

We can therefore say that there is a moderate, significant and positive correlation between the variables, namely Investing in technological progress (0.526), The importance of the cluster (0.499), Effects within the cluster (0.472) Cluster performance (550) and Investment results.

Based on the non-directional hypotheses by which the premise of analyzing the existence of a significant link between performance variables and those of increasing competitiveness was created, by analyzing the correlation coefficients, their link was analyzed by using parametric statistics.

Consequently, being calculated the Bravais-Pearson correlation coefficient, it turned out that it records the significant value of the correlation, at a significance threshold $p < 0.01$. Up to this point, we can say that the null hypothesis can be rejected and there is a positive and significant correlation between the analyzed variables.

By applying the Kendall procedure, which is based on the analysis of pairs from two ordered sets of data, normal values with a positive impact resulted, represented according to table 5, below:

Table 5: Correlations

			Investing in technological progress	The importance of the cluster	Effects within the cluster	Cluster performance	Investment results
Kendall's	Investing in technological progress	”Correlation Coefficient	1,000	,534**	,356**	,394**	,387**
		Sig. (2-tailed)	.	,000	,000	,000	,000
		N	215	215	215	215	215
	The importance of the cluster	Correlation Coefficient	,534**	1,000	,384**	,450**	,350**
		Sig. (2-tailed)	,000	.	,000	,000	,000
		N	215	215	215	215	215
	Effects within the cluster	Correlation Coefficient	,356**	,384**	1,000	,378**	,404**
		Sig. (2-tailed)	,000	,000	.	,000	,000
		N	215	215	215	215	215
	Cluster performance	Correlation Coefficient	,394**	,450**	,378**	1,000	,383**
		Sig. (2-tailed)	,000	,000	,000	.	,000
		N	215	215	215	215	215
	Investment results	Correlation Coefficient	,387**	,350**	,404**	,383**	1,000
		Sig. (2-tailed)	,000	,000	,000	,000	.
		N	215	215	215	215	215
Spearman's	Investing in technological progress	Correlation Coefficient	1,000	,677**	,440**	,505**	,485**
		Sig. (2-tailed)	.	,000	,000	,000	,000
		N	215	215	215	215	215
	The importance of the cluster	Correlation Coefficient	,677**	1,000	,472**	,568**	,448**
		Sig. (2-tailed)	,000	.	,000	,000	,000
		N	215	215	215	215	215
	Effects within the cluster	Correlation Coefficient	,440**	,472**	1,000	,447**	,495**
		Sig. (2-tailed)	,000	,000	.	,000	,000
		N	215	215	215	215	215
	Cluster performance	Correlation Coefficient	,505**	,568**	,447**	1,000	,476**
		Sig. (2-tailed)	,000	,000	,000	.	,000
		N	215	215	215	215	215
	Investment results	Correlation Coefficient	,485**	,448**	,495**	,476**	1,000
		Sig. (2-tailed)	,000	,000	,000	,000	.
		N”	215	215	215	215	215

Source: (data analyzed in the statistical program SPSS 20,000)

It can be seen that the variables used to register the minimum value of the correlation, namely Investing in technological progress (0.385), The importance of the cluster (0.350), Effects within the cluster (0.404), Cluster performance (0.383) and Investment results. $p < 0.01$.

And by this process, the null hypothesis are not recognized, leading to a positive link at the level of variables and the performance of the innovation cluster.

Considering that we cannot limit ourselves only to the calculation of the coefficients, we used non-parametric methods, respectively the significance threshold was calculated, which shows that the chances of obtaining errors in the analyzed sample are quite visible. To accept the meaning, the value of the hypothesis must be below 0.05.

To test the hypotheses launched to identify the importance of the coefficient of ranks ρ, we can analyze comparatively, its value with the reference, on which occasion we used the Sperman model, due to the existence of ordinal data with a different distribution than normal.

The table above shows that the significance level for all variables is less than 0.01, which indicates that there is a probability of less than 1% that the calculated correlation coefficients lead to some sampled errors.

It can be observed that the variables used to register the low value of the correlation, respectively Investing in technological progress (0.485), The importance of the cluster (0.448), Effects within the cluster (0.495), Cluster performance (0.476) and Investment results.

Following the data resulting from the application of statistical procedures, it is found that all the links between the above-mentioned variables are positive and significant p <.01.

It is also found that the most relevant correlation between two variables is between The importance of the cluster and Investing in technological progress (.666**) and the weakest correlation is between Investing in technological progress and Effects within the cluster (.440**). Given that positive and relevant data have resulted, we can say that the hypotheses launched are confirmed.

This organization chart highlights the way in which the investment in the integration of technological progress results in the performance and importance of each node formed.(Figure 3)

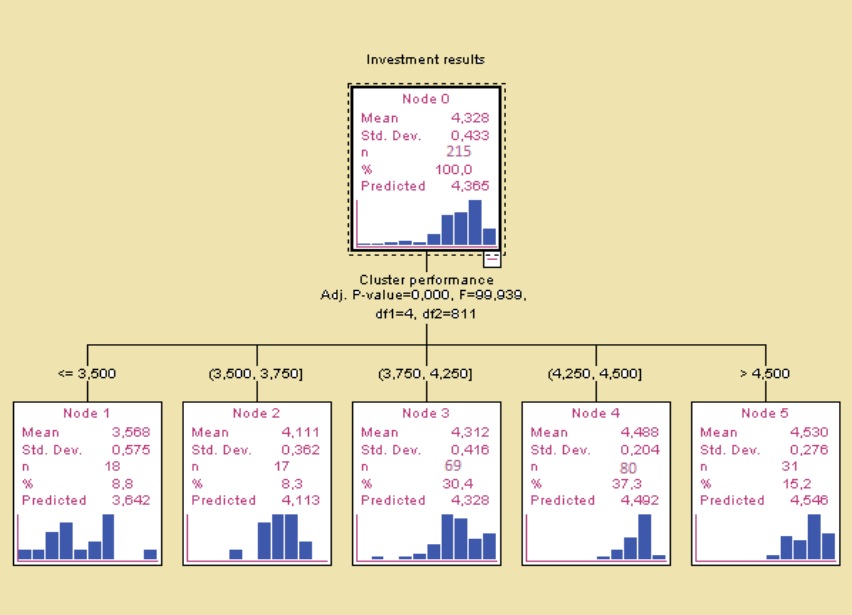

Fig. 3 : Cluster level relationships

Source: (data analyzed in the statistical program SPSS 20,000)

Table 6: Iteration History[a]

„Iteration”	”Change in Cluster Centers,,	
	”1”	”2”
”1	1,226	2,007
2	,100	,254
3	,057	,131
4	,031	,068
5	,014	,031
6	,019	,040
7	,009	,018
8	,009	,019
9”	,000	,000

Source: (data analyzed in the statistical program SPSS 20,000)

Following the analysis of the resumption of the number of changes in the level of clusters, which can be significant, leads to the fact that the absolute maximum deviation of the positions of each basket has a value of .ooo. These clusters have a repetition of 9, and the minimum distance between the starting centers is 4,309.

Next we can see the initial centers and the final cluster centers to which the repetition procedure was applied and the values were adjusted according to the repetition mode, leading to an increase of values for case 2 of the final situations, and for situation 1 they were decreased. (Table 7)

Table 7: Iteration cluster

”Initial Cluster Centers”			**”Final Cluster Centers”**	
Variable	”1”	”2”	”1”	”2”
The importance of the cluster	4,89	3,33	4,43	3,76
Effects within the cluster	5,00	5,00	4,40	4,00
Investment results	4,78	2,78	4,49	3,99
Investing in technological progress	4,71	2,29	4,38	3,24
Cluster performance	5,00	2,50	4,44	3,87

Source: (data analyzed in the statistical program SPSS 20,000)

Conclusions

In the activity of predicting the evolution of the factors of increasing the efficiency of human capital, with the help of models based on econometric methods, we start from the hypothesis according to which the investment in human capital will continue to have, in a predictable period of time, an increasing trend, with the involvement of organizations, cluster members and related to the national and European legislative framework in force. For relevance in the

innovative framework of the organization, the analysis of the implementation of industry 4.0 subject to research is necessary to highlight the market ballistics, the actors involved in the cluster and its performance. In the current situation when the market has a more active pace than the clusters, we can notice a certain gap in terms of competition in the market.

The role of statistical-econometric methods and models is very dynamic, with a strong impact on technology and human resources, financial resources at the cluster level, an involvement of managers in this framework of performance and market competitiveness, based on professional experience. , an opening to the new information leap, to the era of robotization and openness to international partners to facilitate qualitative results and economic progress.

Regarding hypothesis 1, we can say that it is confirmed, it can be observed in their vast majority, the intersection points between the two scales, they are located within the confidence interval, presenting a direct association.

Given the issues found, we can say that there is a positive correlation between the knowledge-based economy is a trigger for investment in human capital, respectively its development within the clusters in the chosen development region.

Regarding hypothesis 2, we can state that this can also be confirmed, due to the reasonable values resulting from the parametric and non-parametric tests performed, on the data provided by the surveyed managers.

The conclusions drawn from this research study are delimited primarily by the subjectivity of human resources surveyed, there is a fairly open attitude on the part of managers, showing a high interest in participating in this research, there are some who do not pay much attention these investments.

Although, we managed to collect data from the clusters, where we meet various types of organizations, plan an attitude of superficiality, imitating the behavior adopted by managers or officials who completed the questionnaire, because, at the time of interviews, they showed a lack of interest, a quick completion of the questionnaire, in order to satisfy the researcher.

Also, organizations that have proven to be more involved in human resource development, in allocating funds for the formation of a prosperous and efficient framework, in providing logistics and know-how, will implicitly increase their notoriety through a degree of higher competitiveness among the existing members at the market level in the North-West development region of Romania.

Although due to their diversity, the activity differs within the three analyzed clusters, the main common goal is the performance of the organization, obtained both by implementing marketing strategies, personnel strategy, innovative solutions attracted by European funding, which will add value to the activity, and implicitly a higher degree of financial performance of the company.

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Evolution of The Health Care System in The USA – Obama And Trump Reforms[1]

Joanna NIZNIK

Department of Finance and Financial Policy, Faculty of Economics, Finance and Law,

Krakow University of Economics, Krakow, Poland

niznikj@uek.krakow.pl

Abstract

The evolution of the American health care system observed in recent years, caused by the reform of Barack Obama and the activities related to taking up office by Donald Trump, raises questions about the impact of the introduced changes on the health care system. In order to address the research problem, the article presents the most important stages of the development of the health care concept from the USA, the construction of the system, the evolution of the system in the years 2014-2016 and indicates the key adjustments to the system brought about by the decisions of the current president. Research methods based on inductive reasoning connected with studies of the subject literature, search of the Internet resources and available databases were employed. On the basis of information included in the aforementioned sources in the theoretical part, the analysis of a theoretical and compilation character was carried out. Within the empirical part, a secondary research was carried out, including in-depth analysis of the organisation and financing of the health care in the USA, the collected material was synthesised and the most important changes taking place in the health system were pointed out. The current shape of the health system was strongly influenced by the reform called Obamacare, which imposed on residents under threat of penalties the obligation of insurance, while at the same time introducing a whole catalogue of incentives in the form of reliefs and tax exemptions. Public funding was extended by lowering income criteria of persons covered by such assistance. The support was provided for the creation of new institutions - health platforms - to facilitate the comparison of insurance offers and the purchase of insurance. For the first time, 10 types of benefits were indicated, which must be part of every health plan (including prophylactic measures) and the only criterion differentiating the amount of health care contributions was age. At the same time, insurance companies were required to conclude insurance contracts. The American health system will evolve in the direction determined by the health policies of successive presidents and parliaments. The current measures are designed to reduce the financial burden on businesses, the insured people and insurance companies, as well as on federal and state budgets, by waiving penalties for non-insurability and by eliminating subsidies provided to insurance companies for low-income individuals, which may in the future slow down the trend of increasing numbers of people having access to medical services.

Keywords: Health Care System, Obama Reform, America Health Care System.

Introduction

The United States is the country with the highest level of development in the world, which is the only one in the group of developed countries to have a health care system that does not guarantee universal access to medical services for its citizens. The reluctance to create a universal health system is usually explained by the American culture of individualism, which means that health is not treated as a right of everyone, but as a private good, which, like all other goods, can be purchased on the market. Another reason is the resistance of influential interest groups associated with the medical professions to change the existing status quo.

It does not mean, however, that the health care system is not subject to modification. The evolution of the system observed in recent years, caused by the reform of Barack Obama and the activities related to taking up office by Donald Trump, raises questions about the impact of the introduced changes on the health care system. In order to address the research problem, the article presents the most important stages of the development of the health care

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concept from the USA, the construction of the system, the evolution of the system in the years 2014-2016 and indicates the key adjustments to the system brought about by the decisions of the current president.

The Health Care System Organisation

The state's regulatory activity in the field of health care organisation involves the creation of a legal framework for the functioning of entities of different organisational and legal status and defining their mutual relations. Government agencies, headed by persons appointed by the President with the consent of the Senate, play an important role. The most important institution operating at the state level is the Department of Health and Human Services (HHS), whose tasks comprise the implementation of the recommendations of the Congress and the White House regarding finance, planning, coordination, administration, regulation and access to health services. The unit has a budget of 25% of federal spending and coordinates, monitors, and finances many state and local programmes. It also collects data concerning health.

There are organisations at the state level that cooperate with federal agencies to finance, plan, administer, and provide access to health services through Medicaid institutions, mental health organisations and public hospitals. They also monitor and support environmental activities, license medical professions, and regulate the sale of health insurance.

Despite the market nature of the health system, there are four organisations in the United States that provide a large part of the population with access to health services financed in whole or in part from public funds. Two of them, Medicare and the Federal Health Programme for Government Employees (FEHBP), are of an insurance nature. The other two, Medicaid and Children's Health Insurance Programme (CHIP), which are financed from the budget, can be used only if income criteria are met.

Medicare was established in 1966 and is a health program co-financed by the federal, state and local governments. Eligible for this program are people over 65 years of age and younger persons after kidney transplantation who require dialysis and who have specific disabilities mentioned by White (2013).

Medicaid was established in 1965 and is financially supported by federal and state funds. The poor, the disabled, the elderly covered by Medicare and those on low incomes are entitled to benefit from the indicated programme noticed Migheli and Di Novi (2017). A person can be admitted to the programme if the income per household does not exceed the amount determined by a given state and is calculated in relation to the Federal Poverty Level (FPL). The range of services available through Medicaid varies from state to state. Only non-residents are not entitled to services financed by Medicaid.

The State Children's Health Insurance Programme SCHIP (since 2009 CHIP) was established in 1997 to fund health services for children up to 19 years of age, raised within the employee family on low incomes but high enough to prevent them from taking advantage of Medicaid. Most often, the income threshold providing access to the benefits is set by the US at 200% FPL. It is a federal-state programme in which the national authorities cover on average about 72% of expenditures incurred under the programme.

A programme that substantially benefits from federal funds is the Federal Government Workers' Health Programme (FEHBP), established in 1959 as a scheme for co-financing health expenditures of the civil workers in the federal sector and congressmen. 24 health plans were distinguished under the programme, 19 - nationwide in scope. The amount of insurance premium is dependent on the adopted insurance plan. The share of public funds is, on average, about 70-75% of all contributions made by employees (Federal Employees Health Benefits Program, 2017).

A substantial part of the health insurance market is owned by private providers of insurance. In this respect, two main sectors of the market can be distinguished: the employer-sponsored insurance market and the individual insurance market.

Employers conclude health insurance agreements on behalf of their employees. The relationship between employer, insurer and healthcare providers is determined by the scope, degree and potential for combining the roles of an insurer and a provider of health services. (Robinson & Steiner, 1998). The principal forms of coordinated healthcare include: Health Maintenance Organizations (HMO), Preferred Provider Organizations (PPO), Point of Service Plans (POS), High Deductible Health Plan (HDHP) and Conventional Plan (FFS)(HMO, PPO, and POS — PROS and CONS; High Deductible Health Plan (HDHP)).

Persons who are not employees and do not meet the criteria for using Medicare or Medicaid shall conclude individual health insurance agreements. This situation is so uncomfortable that the insurance costs are higher than in the case of

group insurance. It is related to higher charges resulting from administrative costs (25-40% of total costs) as well as individual estimation of health risk or significant costs of co-payment or co-insurance.
The health insurance market is highly concentrated, with several dominant entities: Anthem Inc., Aetna Inc., UnitedHealth Group Inc., Humana Inc., and Cigna Corp. Their market share in 2016 was 80% (https://www.transparencymarketresearch.com/health-insurance-market.html).

The Health System Reform - Obamacare

President Barack Obama signed The Patient Protection and Affordable Care Act - ACA - the act on the protection of the rights of patients and access to health care called the Patients' Rights Protection Act (The Patient Protection and Affordable Care Act, H. R. 3590) on 23 March 2010, allowed for the commencement of activities aimed at the implementation of health reforms changing the organisation and financing of health care to a large extent. The aim was to establish a universal health system by expanding the number of health insurance holders. Various mechanisms have been introduced to encourage or impose certain types of behaviour on health market participants, functioning from 2014 onward.

The key elements of the new concepts include the imposition of insurance obligations on citizens or residents. New institutional solutions have been introduced, which, by adapting to the income possibilities of the citizens, have allowed those who have not yet had insurance to acquire it. At the same time, income criteria allowing access to health programmes financed entirely from public funds, i.e. Medicaid and CHIP were liberalised. Through the system of financial incentives and penalties applied to individual persons and employers, the number of insured persons was additionally increased.

Thanks to the creation of two health platforms, publicly funded and administered by government or state agencies, and jointly by federal and state agencies: American Heath Benefit Exchange and Small Business Health Options Programme (SCHOP) known as 'Exchanges' – marketplaces (The Patient Protection and Affordable Care Act, H. R. 3590), persons running small and medium-sized enterprises (employing up to 100 people) and persons concluding individual contracts were covered by the healthcare insurance. Individual states were able to set up regional health platforms and allow several 'marketplaces' with different territorial coverage to operate in the same state.

Health platforms include health plans, developed exclusively by private insurance companies, with an acceptable price and quality for low-wage consumers and an appropriate range of services. The following assumptions have been made with regard to the health plans offered by 'Exchanges' according to Manchikanti at al. (2017):

• the basic scope of 10 benefits, which must be provided by all insurers (basic health care, in-patient care, emergency care, mother and child care, psychiatric care, medicines, rehabilitation, research, paediatrics, prevention), has been established,
• patient expenditure on prevention in new health plans has been discarded to stress the role of the indicated services and to reduce healthcare costs in the longer time horizon,
• health expenditure incurred by patients from their own resources during the year has been reduced,
• annual limits on health care expenditure in health schemes have been set,
• the requirements regarding the eligibility criteria concerning the appropriate network of service providers, meeting the quality-related requirements for the measurement of the quality of services provided, the use of uniform principles of patient registration and the presentation of information concerning the health insurance agreement were introduced,
• the information requirements on redress, registration, de-registration, number of rejected claims and the sharing of costs.

The health plans offered within the framework of 'marketplaces' provide access to basic health services, reducing patient expenditure from their own resources. The maximum amount of funds allocated to health insurance may not exceed the amount equivalent to the limits set forth in the *Health Savings Account* (HSA)[2]. In 2016 it was USD 6400 per person and USD 15000 USD per family (Private Health Insurance Premiums and Federal Policy, 2016). Health plans vary only in financing the healthcare costs and fall into 4 categories. The Bronze Plan covers 60% of the cost of benefits, the Silver Plan covers 70% of the cost of services, the Golden Plan covers 80% of the cost, and the Platinum Plan covers 90% of the cost of health services under the Health Plan.

The provisions of the Health Acts have created a basic health basket in which public authorities set annual benefits and annual limits on patients' share of health care costs, however, not beyond the scope of a typical health plan offered

[2] HSA is a special account to finance health expenditure owned by a natural person; the funds on this account are not subject to taxation, the limit of funds transferred to this account is set annually.

by employers. The newly created health plans within the framework of 'Exchanges' must offer services at a level not narrower than the ones in the basic health basket.

Parallel to the health plans suggested by 'marketplaces', each state has the option to create its own *Basic Health Plans* for uninsured individuals with incomes between 138% and 200% of FPL. In such a situation, health insurance agreements are concluded which give the insured the right to benefit from services of at least the same standard as the basic basket. Simultaneously, premiums cannot exceed those paid by health platforms, and the share of costs incurred by patients from their own resources cannot be higher than the expenses of a platinum plan for persons with income lower than 150% of the FPU or in other situations of the golden plan.

The changes also included insurance companies, which were obligated to conclude insurance contracts with each person, regardless of their health condition or gender. Health plans must cover benefits in the scope of at least a basic basket with prophylaxis, there is a limit of additional payments from the insured's own funds, insurers cannot limit the duration of the insurance agreement when concluding it. The only criterion differentiating the premium level is the age of the insured. In the case of family insurance, children under 26 years of age are covered by the agreement together with their parents mentioned by Béland *at al*. (2016).

The criteria for acquiring rights to use two publicly funded programmes, i.e. Medicaid and CHIP, were made less stringent. The only criterion allowing use of the first programme is an amount of income at a level not higher than 138% of the federal poverty level noticed Courtemanche *at al*. (2017). Persons who will be entitled to benefits for the first time are guaranteed health-care services of a standard not lower than specified in the basic health basket. The Federal Government shall reimburse additional costs arising from the admission of new insured persons. Between 2014 and 2016, the federal government financed 100% of expenditures, 95% in 2017, 94% in 2018, 93% in 2019, and 90% of expenditures are expected to be covered from 2020 onwards.

In the case of CHIP, individual states have a duty to maintain the existing rules for the use of the indicated programme. As of 2015, federal co-funding for the scheme has been increased. The children with no entitlement to health care due to restrictions on the annual admission limit for new insured persons introduced in some States are permitted to seek public funding through health plans offered by health platforms.

In addition to institutional solutions, the State uses financial tools that oblige society to have health insurance. Penalising is the imposition of criminal charges on those who do not comply with the aforementioned obligation. Their amount results from the comparison of two values: a fixed amount set each year or a certain amount of income per household and the selection of a higher one. A sanction is imposed on each person in the household, up to a maximum of three times the fixed amount. This means that in 2016, for example, a person without insurance was charged with a fine of USD 695 (USD 2085 per household for at least 3 persons in a family) or 2.5% of annual income, depending on whichever is higher.

Employers who work with more than 50 employees and who do not offer group insurance are penalised by a fine of USD 2160 paid for each full-time employee (excluding 30 persons from the calculation), when at least one employee receives public funding by participating in a healthcare scheme on a health platform. The same is true when employees are covered by group health insurance and one of them benefits from state-subsidised insurance. In this case, the amount of the penalty fee is set at the lower of the two possible amounts, i.e. USD 3140 USD per each person receiving a premium surcharge or 2160 USD noticed Harrington (2010) from any full-time employee. In addition, an employer providing employee health insurance, where an employee has opted for Exchanges, should finance his or her participation in the selected health plan. In such a case, the employee's income should be lower than 400% FPL and his/her participation in the health contribution should not exceed 8% or 9.8% of his/her income. The value of the funds transferred on behalf of the employee is equal to the amount by which the employer contributes to the costs of the occupational pension scheme offered by him/her. An employer who covers expenses for the purchase of insurance by an employee is not subject to a penalty fee for employee participation in a health plan on a health platform.

In order to increase the public involvement in the health insurance system, in addition to penalties, a system of incentives linked to lending health insurance premiums to encourage its payment and subsidise the costs of health insurance resulting from co-payment, own contribution and co-insurance has been created. The right to participate in 'Exchanges' is vested only in those employees whose employers offer occupational health insurance, and their participation in the contribution is so high that it exceeds 9.5% of income. In the case of acquiring health insurance by individuals and families, premiums are credited if the income of an insured person exceeds 133% of FPL and does not exceed 400% of FPL. The amount of premium subsidy is related to the lowest cost of a silver health plan offered in a given State and is determined on a floating scale, for which the contribution to insurance costs may not exceed a specified amount of individual (family) income expressed in relation to the federal poverty rate. The amount of discount depends on the ratio of income to poverty. For example, in 2015, with an income of 150% FPL, it was 4.02%

of income, 200 FPL - 6.34% of income, and between 300 and 400 FPL - 9.56% of income (Harrington, 2010, pp. 705). In order to be eligible for co-financing of other costs related to the medical service payments, it is necessary to meet the condition of subsidising the health care contribution and the income in a household should not exceed 250% FPL mentioned Harrington (2010) (The 2015 Long-Term Budget Outlook, 2015).

A mechanism of financial support for persons and families with low income level was also introduced, consisting in the provision of subsidies to insurance companies with which health insurance agreements are concluded. Public funds reimburse 70% to 94% of health insurance costs for persons with earnings between 100% FPL and 400% FPL.

Small entrepreneurs are treated differently as compared to large and medium-sized companies, i.e. entities employing up to 50 employees, as they are not under obligation to conduct group insurance. In order to encourage employers to purchase employee health programmes, the State creates opportunities to use public funds. Employers are entitled to public aid if they employ up to 25 workers and the average annual salary per employee in their workplace does not exceed USD 50, 000. When they purchase health insurance for their employees, they benefit from tax relief. An employer with up to 10 employees with an average wage per employee of less than USD 25,000 is entitled to full government subsidies for premiums paid on behalf of employees.

New solutions include the creation of a temporary reinsurance programme for employers who insure pensioners over 55 years of age, not benefiting from Medicare. The programme reimburses employers or insurers for 80% of the value of pensioners' claims between USD 15,000 and USD 90,000. Payments from the reinsurance program are intended to reduce the cost of participation of people with high health risks in the health care system.

The introduction of the reform had to involve spending certain amounts of money on its implementation and subsidising insurers and insured persons, which should be connected with increasing public financing and thus public debt. However, estimates in this respect are divergent. The first calculations referred to the amount of additional public expenditure in the amount of USD 940 billion in the first 10 years, which was to result from the increased funds for Medicaid and CHIP in the amount of USD 434 billion, tax reliefs for small businesses in the amount of USD 40 billion, the creation of 'Exchanges' in the amount of USD 358 billion and subsidising people who would not buy insurance of USD 106 billion without the indicated support. The CBO estimated the expenditure at USD 1.76 trillion. There are also calculations, which even indicate a surplus of USD 143 billion, which would be the result of increased taxation of certain entities and reduced expenses. An increase in budget revenues was assumed due to a new tax imposed on hospitals in the amount of USD 212 billion, health plans of the highest standard of USD 32 billion, medical equipment and insurance companies of USD 107 billion, and resulting from an increase in the limit of medical deductions by 10% - USD 104 billion and an increase in the tax base of USD 64 billion. In addition Amadeo (https://www.thebalance.com/cost-of-obamacare-3306050) noticed, the plans include increased savings resulting from the reduction in drug subsidy costs for the rich of USD 87 billion, lower payments to hospitals providing services to Medicaid and the uninsured of USD 37 billion and Medicare of USD 197 billion and Medicare part of USD C 135 billion, and elimination of costs resulting from servicing loans from the Sallie Mae USD 20 billion. A comparison of spending of USD 940 billion with savings of USD 567 billion and USD 477 billion gives a surplus of USD 143 billion. The only problem is that the aforementioned measures were not implemented immediately.

It is difficult to find data to assess the changes from a public expenditure perspective. The available information is only partial. Subsidies for the purchase of insurances through marketplaces increased by $23 billion in comparison with 2014 to reach the amount of USD 38 billion in 2015, before increasing by a further USD 18 million to USD 56 million in 2016. They exceeded the assumed targets by USD 11 million in 2015 and by USD 17 million in 2016 (US Health Policy Gateway). The number of people insured with Medicaid increased by 6.1 million in 2014, by 9.6 million in 2015 and by 31 million in 2016 compared to previous years. In consequence, the spending on marketplaces increased by two-thirds due to an increase in the number of health care users thanks to ACA.

In 2016, the costs related to the payment of health care contributions subsidised through federal funds through direct and indirect contributions amounted to approximately USD 300 million. It is estimated that the tax exemption of health care contributions purchased by employers cost the federal budget about 250 billion USD, whereas crediting health care contributions amounted to about 40 billion USD, and subsidies to costs of people below 250 FPL were about 8 billion USD.

Public expenditure is reduced by taxes imposed on insurers. In 2014, the insurers who did not use 'Exchanges' paid USD 8 billion, in 2015 and 2016 USD 11.3 billion each, while those on health platforms paid USD 0.4 billion, USD 0.9 billion and USD 1.4 billion respectively (Private Health Insurance Premiums and Federal Policy, 2016).

The announcements of the liquidation of Obamacare by President Donald Trump, after taking power by him in 2016, did not materialise due to the lack of parliamentary approval for the above-mentioned reorganisations. Nevertheless,

he took a number of measures to change the health system. In October 2017, he signed a decree that abolished the refunding of costs related to the reduction of insurance prices for people with low incomes to insurers (resulting from their reduced participation in the costs in the form of own contribution and co-payment) it was mention in a book of Peal, Haberman and Abelson (2017). The Tax Cuts and Job Act, enacted in December 2017, abolished tax imposed on uninsured persons, to be enforced from 2019. It is estimated that around 13 million people will give up health insurance, which will result in budget savings of USD 338 billion said Amadeo (2018). In February 2018, the United States was allowed to specify additional requirements concerning the take-up of employment by beneficiaries of Medicare, aimed at increasing employment mentioned Pear (2018). In May 2018, a draft of the American Patients First Act was presented, which aims to reduce the cost of medicines by negotiating their price between pharmaceutical companies and Medicare as well as drafting a list of medicines (American Patients First, The Trump Administration Blueprint to Lower Drug Prices and Reduce Out-of-Pocket Costs, 2018). The Trump administration seems not to have given up its efforts to amend or repeal the ACA.

Summary

Referring to the American health care system as residual does not explain the complexity of its internal design. It is formed by a network of financially and organisationally related entities of various forms of ownership. The primary source of funding is constituted by private health insurance, but public health insurance and funds from the federal, state and local budgets are equally important. They are supported by private resources of residents.

The current shape of the health system was most strongly influenced by the reform called Obamacare, which imposed on residents under threat of penalties the obligation of insurance, while at the same time introducing a whole catalogue of incentives in the form of reliefs and tax exemptions. Public funding was extended by lowering income criteria of persons covered by such assistance. The support was provided for the creation of new institutions - health platforms - to facilitate the comparison of insurance offers and the purchase of insurance. For the first time, 10 types of benefits were indicated, which must be part of every health plan (including prophylactic measures) and the only criterion differentiating the amount of health care contributions was age. At the same time, insurance companies were required to conclude insurance contracts. Limits were set for private annual expenses of patients, and health plans together with parents could be extended to persons up to 26 years of age.

The introduction of the new system is accompanied by an increase in public fund expenditures, which should be balanced with the proceeds from fines imposed on large companies which do not offer health insurance to their employees and on uninsured individuals, as well as from taxes and fees paid by insurers and pharmaceutical companies.

Before the reforms in 2010, approximately 258,4 million people (83,7%) was insured, 106,8 million people was covered by public plans, 201 million people had private health insurance coverage, 50,3% million people was uninsured[3].

In 2019, approximately 293,5 million people (92% of population) had health insurance, 114,3 million people was covered by public plans, 217,8 million people had private health insurance coverage, 29,6 million people was uninsured noticed Keisler-Starkey and Bunch (2020).

The American health system will evolve in the direction determined by the health policies of successive presidents and parliaments. The current measures are designed to reduce the financial burden on businesses, the insured people and insurance companies, as well as on federal and state budgets, by waiving penalties for non-insurability and by eliminating subsidies provided to insurance companies for low-income individuals, which may in the future slow down the trend of increasing numbers of people having access to medical services.

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Inclusive Innovation Policies as a Way Towards Inclusive Growth in CEE Countries

Dorota MURZYN

Pedagogical University of Cracow, Cracow, Poland
dorota.murzyn@up.krakow.pl

Abstract

The aim of the paper is to achieve two objectives. Firstly, it examines the level of inclusive growth in CEE countries; secondly, it explores the role of inclusive innovation policies in fostering inclusive growth. From a methodological point of view, the author uses a descriptive analysis and statistical analysis. This paper contributes to theoretical debates on inclusive growth processes in CEE countries, but it also provides policy insights on the relationship between inclusive innovation policy and inclusive growth.
CEE countries differ in terms of the level of inclusive growth, with the highest being observed in Slovenia and the lowest in Romania. We can observe an increase in the level of development in each country (in the years 2008-2018), with some developing faster than others - the highest increase occurred for Latvia and the smallest for Slovakia and Hungary. There is a need for inclusive innovation policies in CEE countries, and a wide range of such policy approaches can foster inclusive growth. To achieve such growth, it is necessary to remove barriers for disadvantaged groups, laggard firms and regions to enable all segments of society to participate in and benefit from innovation. The success of inclusive innovation policies relies on the stronger involvement of target groups and often requires strong capacity-building efforts and adequate financial support.

Keywords: Inclusive innovation policy, inclusive growth, CEE countries.
JEL codes: O20, O30.

Introduction

Innovation has long been recognised as a key driver of economic growth, but recently some see it as a way to promote social inclusion (OECD 2017). First of all, social innovation (developing new ideas, services and models to better address social issues) can help achieve active inclusion by enhancing the effectiveness of services in order to maximise a positive social impact. Secondly, innovation could serve inclusive growth through a proper innovation policy. There is a new concept emerging – inclusive innovation policies, which is understood as removing barriers for disadvantaged groups (social inclusiveness), laggard firms (industrial inclusiveness) and regions (territorial inclusiveness) to enable all segments of society to participate in and benefit from innovation (Plannes-Satorra & Paunov 2017). Although considerable research has been devoted to economic growth and innovation policies, less attention has been paid to inclusive growth and inclusive innovation policies, especially in the regions of Central and Eastern Europe.

The aim of the paper is to achieve two objectives. Firstly, it examines the level of inclusive growth in CEE countries; secondly, it explores the role of inclusive innovation policies in fostering inclusive growth. The research questions are as follows: (1) What is the situation regarding inclusive growth in Central and Eastern Europe? (2) How can inclusive innovation policies influence the achievement of inclusive growth? (3) What are the challenges associated with the implementation of an inclusive innovation policy in CEE countries? From a methodological point of view, the author uses a descriptive analysis, analysis of strategic documents and statistical analysis, such as linear ordering methods (TOPSIS). The CEE region is understood according to the OECD definition, but only EU Member States were chosen for further analysis. The study covers the years 2008-2018. This paper contributes to theoretical debates on inclusive growth processes in CEE countries, but it also provides policy insights on the relationship between inclusive innovation policy and inclusive growth.

The structure of the paper proceeds as follows. First, after a short introduction to the inclusive growth concept, the level of inclusive growth of CEE countries will be assessed. In the next part, the concept of an inclusive innovation policy will be outlined together with its relations with inclusive growth. The final section summarises the core

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findings, suggests directions for future research (focusing on expanding the scope of the analysis) and provides theoretical and policy implications derived from empirical results.

Inclusive growth in CEE countries

The classical approach advanced the hypothesis that inequality is beneficial for economic development in the post-industrialisation period (Kaldor 1955). This has been challenged in the past three decades, as both theories and subsequent empirical evidence have demonstrated that income distribution has a significant impact on the growth processes. Literature concerning the impact of income inequality on long-term growth is mixed (a review of multi-faceted literature on this subject is beyond the scope of this paper), but there is growing evidence that excessive inequalities have a negative impact on human capital accumulation, and this determines their inhibitory effects on economic growth. From the other side, if economic growth is not able to stop the process of stratification of the population in terms of financial standing, it cannot guarantee the implementation of such important development goals as universal access to economic benefits, reduction of the poverty and improvement of the standard of living. High inequalities also have consequences for political stability and social cohesion, which are necessary for sustainable development. Hence, reducing inequalities has become a major concern of a development policy, and a problem that has generated interest in inclusive growth (Stiglitz 2016).

One universally applicable definition of inclusive growth has not been developed so far. OECD defines it as: "economic growth that creates opportunity for all segments of the population and distributes the dividends of increased prosperity, both in monetary and non-monetary terms, fairly across society" (OECD 2014). Inclusive growth goes beyond one-dimensional GDP growth. Employment prospects, skills, educational opportunities, health, the environment and active participation in the economy and society also matter. There are two categories of inequality which are central to discussions of inclusive growth: inequality of opportunity (in access to education, jobs, finance or the judicial system) and inequality of outcomes (such as income, wealth, health and educational attainment).

Inclusive growth is also a top priority in the European Union's overall strategy. In 2010, the European Commission placed it at the heart of its economic, employment and social agenda — the Europe 2020 strategy. The strategy was launched to help the European Union navigate a stable course towards the three key objectives of smart, sustainable and inclusive growth. Building on the Lisbon Agenda, it incorporated a new social dimension to the blueprint for EU growth, and the EU has set itself ambitious targets on inclusive growth. All EU Member States shall, among others, strive for: an employment rate of 75 per cent for people aged 20 to 64 by 2020; a school drop-out rate of less than 10 per cent; a rate of at least 40 per cent with a (tertiary) academic degree (or equivalent) related to the 30 to 34 age cohort. Last, but not least – and this goes clearly to the heart of the inclusion goal – 20 million people shall not be under the risk of poverty any more (European Commission 2010). The reduction of poverty risk is targeted at three dimensions: first, to the income poverty risk, i.e. the risk of earning less than 60 per cent of the median; second, the risk of severe material deprivation, i.e. the inability to afford some items necessary to lead an adequate life; third, to the risk of people aged 0 to 54 living in a household of low employment intensity (Frazer, Marlier & Nicaise 2010). Member States have set national targets to help achieve the overall EU targets, and they are reporting on them as part of their annual national reform programmes. Selected indicators of inclusive growth in the CEE are presented in Table 1. The CEE region is understood according to the OECD definition, but only EU Member States were taken into consideration for further analysis. The study covers the years 2008-2018. At the last indicator, there is no "target" column, because the target in this case was marked by the number of people, and to make the data more comparable, the indicator expressed as a percentage was used.

Table 1: Indicators of inclusive growth in CEE countries

Member State	Labout market			Education						Poverty and social exclusion	
	Employment rate (%)			School drop-out rate (%)			Tertiary educational attainment, age group 30-34 (%)			People at risk of poverty or social exclusion (%)	
	2008	2018	Target	2008	2018	Target	2008	2018	Target	2008	2018
EU-28	70.2	73.2	>75	14.7	10.6	<10	31.1	40.7	>40	23.7	21,7
Bulgaria	70.7	72.4	76	14.8	12.7	11	27.1	33.7	36	44.8	32.8
Czech Rep.	72.4	79.9	75	5.6	6.2	5.5	15.4	33.7	32	15.3	12.2

Estonia	77.1	79.5	76	14.0	11.3	9.5	34.4	47.2	40	21.8	24.4
Croatia	64.9	65.2	62.9	4.4	3.3	4	18.5	34.1	35	31.1**	24.9
Latvia	75.4	76.8	73	15.5	8.3	10	26.3	42.7	34	34.2	28.4
Lithuania	72.0	77.8	72.8	7.5	4.6	9	39.9	57.6	48.7	28.3	28,3
Hungary	61.5	74.4	75	11.7	12.5	10	22.8	33.7	34	28.2	19.6
Poland	65.0	72.2	71	5.0	4.8	4.5	29.7	45.7	45	30.5	18.9
Romania	64.4	69.9	70	15.9	16.4	11.3	16.0	24.6	26.7	44.2	32.5
Slovenia	73.0	75.4	75	5.1	4.2	5	30.9	42.7	40	18.5	16.2
Slovakia	68.8	72.4	72	6.0	8.6	6	15.8	37.7	40	20.6	16.3*

**2017 data, ** 2010 data.*
Source: [Eurostat, http://ec.europa.eu/eurostat/data/database (10.05.2020)].

The situation in terms of inclusive development varies widely in CEE countries. There are countries that have already achieved most of their goals (Latvia, Slovenia), and there are those that have set those goals even at a more ambitious level than the EU (Estonia). Finally, there are those that currently (2018) perform better than the EU average (highlighted in colour). But there are also countries that still have problems in this area.

To show the position of individual countries in the field of inclusive development, a synthetic indicator was calculated using the TOPSIS method. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is a linear ordering method which produces a synthetic indicator of development, built on the basis of partial measures reflecting its different aspects (Hwang & Yoon 1981). This facilitates analysis of similarities of the studied objects and their linear systematisation. The construction of the TOPSIS synthetic measure is as follows (Bąk 2016):

a) normalisation of variables (quotient conversion): $z_{ij} = \dfrac{x_{ij}}{\sqrt{\sum_{i=1}^{n} x_{ij}^2}}$,

b) coordinates of the pattern (positive ideal solution):

$$z_{0j}^{+} = \begin{cases} \max_i \{z_{ij}\} & \text{for stimulant variables} \\ \min_i \{z_{ij}\} & \text{for destimulant variables;} \end{cases}$$

c) coordinates of the anti-pattern (negative-ideal solution):

$$z_{0j}^{-} = \begin{cases} \min_i \{z_{ij}\} & \text{for stimulant variables} \\ \max_i \{z_{ij}\} & \text{for destimulant variables;} \end{cases}$$

d) distance of objects from the pattern: $d_{i0}^{+} = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_{0j}^{+})^2}$;

e) distance of objects from the anti-pattern: $d_{i0}^{-} = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_{0j}^{-})^2}$;

f) values of the synthetic variable (inclusive development): $q_i = \dfrac{d_{i0}^{-}}{d_{i0}^{+} + d_{i0}^{-}}$, $q_i \in [0;1]$; The measure q_i is expressed in values from 0 to 1, with higher values indicating a higher level of inclusive development.

For research purposes, the EU headline indicators were used as variables. The included specific variables are relative rather than absolute, which made it possible to reduce the impact of interferences associated with objects exhibiting certain features confounding the analysis (e.g. much greater population than the other objects). The limited number of indicators is used to keep the concept of inclusive growth as close as possible to its meaning defined in the Europe 2020 strategy. The positions of CEE countries in terms of inclusive growth and changes in this respect for 2008-2018 are presented in Fig. 1. CEE countries differ in terms of the level of inclusive growth, the highest is observed in Slovenia, the lowest in Romania. We can observe an increase in the level of development in each country, with some developing faster than others – the highest increase occurred for Latvia, and the smallest – for Slovakia and Hungary.

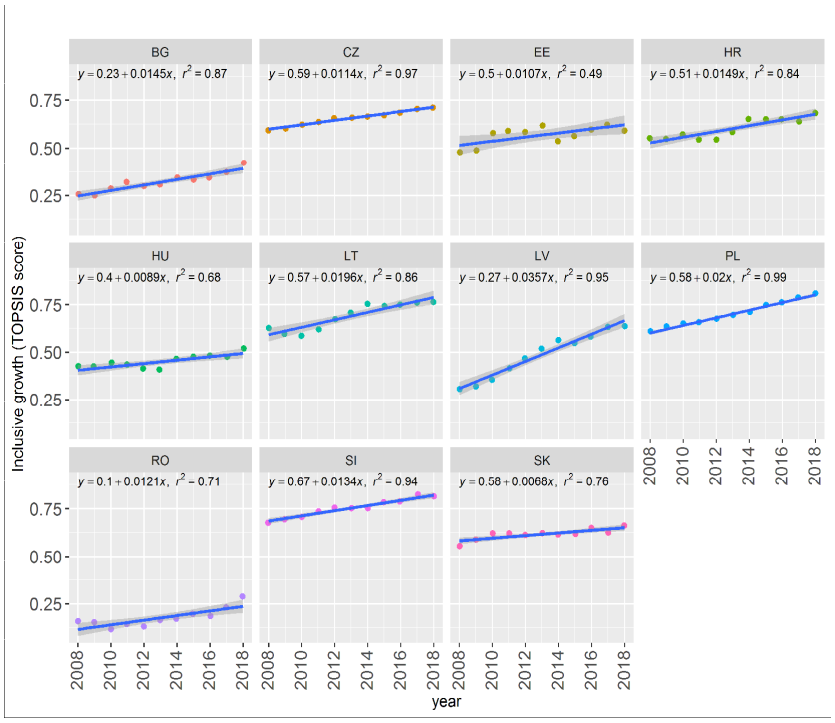

Fig. 1: Linear regression models for inclusive growth (TOPSIS score) of CEE countries

Source: own elaboration.

The question arises, how can we help achieve inclusive growth and can innovation help in this? The question seems to be justified in case it can be demonstrated that there is a relationship between innovation and inclusiveness for European Union countries (Fig. 2).

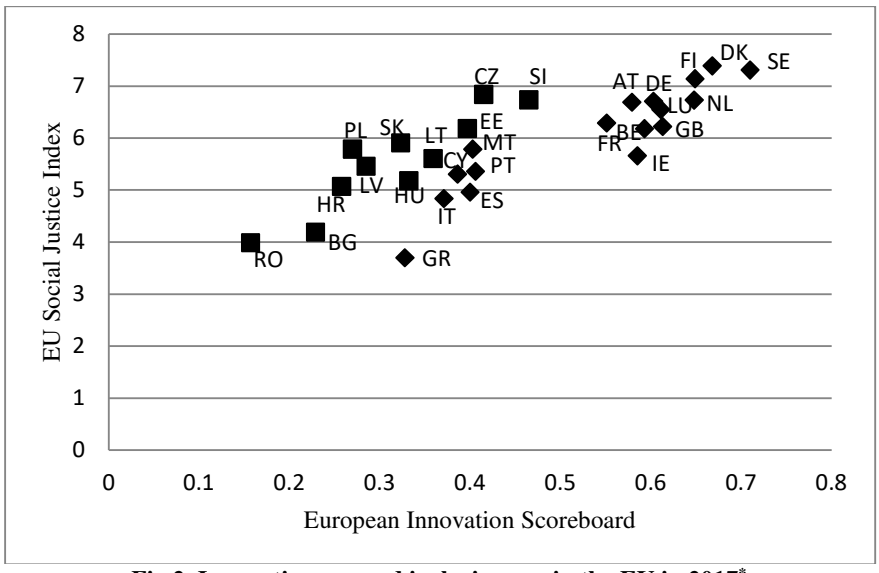

Fig.2. Innovativeness and inclusiveness in the EU in 2017*

**2017 is the last year for which a social justice report was prepared, hence the analysis was carried out for that year.*
Source: own elaboration based on: Hollanders H., Es-Sadki N., European Innovation Scoreboard 2018, European Commission, Brussels 2018 oraz Schraad-Tischler D., Schiller Ch., Heller S. M., Siemer N., Social Justice in the EU – Index Report 2017. Social Inclusion Monitor Europe, Bertelsmann Stiftung 2017.

This relationship can be pre-determined by correlating the innovation and social justice indexes, assuming that these indexes are a certain approximation of the position in innovation and inclusiveness, respectively. This assumption seems justified, as is confirmed by empirical literature. The summary innovation index is a measure used in assessing the innovative level of EU Member States. In turn, the EU Social Justice Index is a kind of monitoring of

social inclusion in EU countries and is prepared taking into account issues such as preventing poverty, equal access to education, the labour market and health protection, social cohesion and intergenerational equality. This correlation shows the positive impact of care for social inclusiveness on innovation. On the other hand, an innovation policy can be an alternative and complementary tool for inclusive growth.

Inclusive innovation policies for inclusive growth

Inclusive innovation policies are defined as "policies that aim to remove barriers to the participation of under-represented individuals, social groups, firms, sectors and regions in innovation, research and entrepreneurship activities" (Plannes-Satorra & Paunov 2017, p. 6). Their goal is for all segments of society to have opportunities to successfully participate in and benefit from innovation. Inclusive innovation policies have explicit aims to contribute to one or more of the following objectives: social inclusiveness, industrial inclusiveness and territorial inclusiveness (Ibid.). These different dimensions of inclusiveness are related. When innovation capacities are not widely distributed across sectors and regions, the well-being of some groups in society is negatively affected. This is particularly true for individuals working in less innovative sectors and/or living in less innovative regions that suffer from multiple factors of disadvantage (e.g. low skills, low income), as they are less able to move to more innovative activities.

Social inclusiveness (in the context of innovation) is associated with participation in innovation activities. This means not only contributing to the processes, but also by all individuals and segments of the population benefiting from them, regardless of their socio-economic background, gender, age, place of residence, ethnic origin or disability status. It is closely related to the inclusive innovation concept. Inclusive innovations are understood as innovative solutions that include in the process of their creation groups of society traditionally not involved in development, for example the poorest (Foster & Heeks 2013). Some authors use the terms "inclusive innovation" and "innovation for inclusive growth" interchangeably (George, McGahan & Prabhu 2012). Depending on the extent of inclusion of the excluded group in relation to innovation, Heeks, Foster and Nugroho (2014) have distinguished different levels of inclusive innovation. According to them, innovation is inclusive if: the intention of that innovation is to address the needs of the excluded group; it is adopted and used by the excluded group; it has a positive impact on the livelihoods of the excluded group; it is created within a structure and a framework of knowledge and discourse that are themselves inclusive if that group is involved in the development of the innovation. The innovation systems approach shows that inclusive innovations must be fostered by means of interactive processes, where different actors play effective roles (Arocena, Göransson & Sutz 2018).

Social inclusiveness is also closely related to the inclusive entrepreneurship concept, which contributes to social inclusion to give all people an equal opportunity to start up and operate businesses. The target groups are those who are disadvantaged and underrepresented in entrepreneurship and self-employment, including youth, women, seniors, ethnic minorities and immigrants or disabled people. Most country-level evidence shows that entrepreneurs from under-represented and disadvantaged groups are, on average, less likely to operate high-growth firms, because they lack the skills, networks and access to finance needed for growth; they are also less likely to express motivation to grow their business (OECD & European Union 2019). The same situation occurs in CEE countries that have a similar pattern of entrepreneurial inclusivity for youth, women and seniors, as far as their engagement into start-ups and established businesses is concerned. However, these countries are behind Europe in the engagement of women and seniors in entrepreneurship (Pilková, Jančovičová & Kovačičová 2016).

Innovation policies for social inclusiveness aim to include in innovation activities individuals and groups that are not usually participating in innovation (e.g. women, lower income groups), so as to broaden the group of innovators. Policies addressing social inclusiveness proceed either by building the innovation capabilities of disadvantaged groups or by facilitating their access to opportunities to participate in innovative activities. Some inclusive innovation policies address labour market discrimination, which is detrimental to well-being and economic performance.

Industrial inclusiveness is understood as the extent to which the capacity to participate in innovation activities is evenly distributed across firms (regardless of their size and age) and industry sectors within a country (Plannes-Satorra & Paunov 2017, p. 11). Innovation tends to be concentrated within some firms and sectors. The uneven distribution of innovation capacities across firms has contributed to widening the gap in productivity performance between the most productive and less productive firms. SMEs in most countries are usually active in mature, traditional or low-technology sectors characterised by low knowledge intensity and weak innovation capacities. In CEE countries, only 10-40% (at an EU average of over 46%) of SMEs can be considered as innovative – they have either introduced an innovation or have some kind of innovation activity (Fig. 3). The differences between countries are, at the same time, considerable.

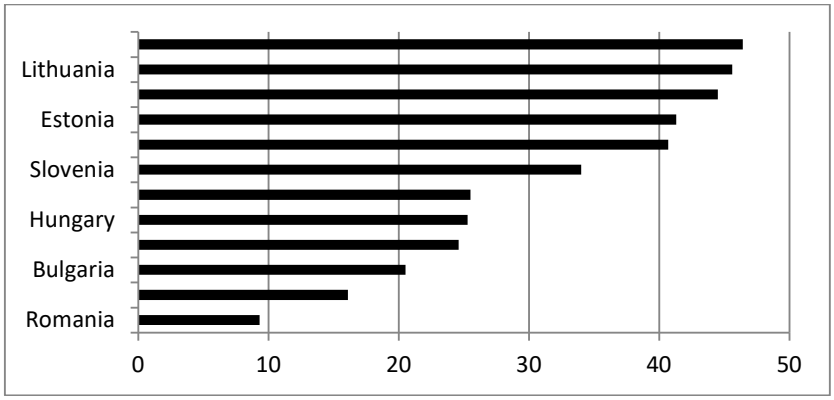

Fig. 3. Share of innovative SMEs, 2016 (%)

Source: Eurostat [inn_cis10_type]

Innovation policies for industrial inclusiveness aim to support innovation activities in less innovative firms (including micro-entrepreneurs, small and medium-sized enterprises and start-ups) and traditional sectors. The focus is on strengthening their innovation capacities, as well as on building an adequate business environment for innovation.

Territorial inclusiveness is the extent to which the capacity to participate in innovation activities is evenly distributed across regions within a country. Evidence shows that innovation tends to be concentrated in metropolitan areas, and spatial concentration of knowledge economy factors persists. The top 20% of regions in CEE countries account for: 56% of R&D employment (in Bulgaria, the top 20% of regions account for 90% of R&D employment, in Hungary – 85%, Romania – 64%, Czech Republic – 55%, Poland – 52%; 2016 data) and 58% of patent application to European Patent Office (2012 data). We could choose many other indicators, and most of them show that "islands of excellence" concentrate high-performance innovators. This is also confirmed by innovation research. Literature has emphasised that innovative activity is not uniformly or randomly distributed across the geographical landscape and that the tendency towards spatial concentration has become more marked over time despite a wide spread of information and communication technologies and increased globalisation (Kourtit, Nijkamp & Stough 2011).

The Regional Innovation Scoreboard, which is a comparative assessment of regional innovation based on the European innovation scoreboard methodology, has always shown a remarkable gap between capital/metropolitan regions and the rest of the country. The most innovative region within each CEE country is the capital region (Fig. 4).

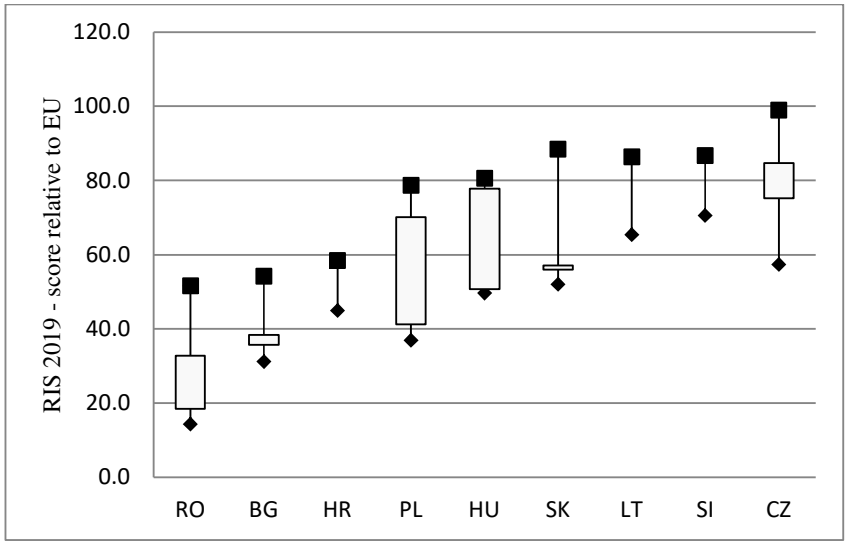

Fig. 4. Regional Innovation Scoreboard 2019 – performance of CEE regions relative to the EU

■ Capital regions

Source: own elaboration based on: European Commission, Regional Innovation Scoreboard Database, https://ec.europa.eu/growth/industry/policy/innovation/regional_en (03.05.2020).

Innovation policies for territorial inclusiveness target lagging and less innovative regions, with the aim of narrowing the performance gap with leading innovation regions. They foster the innovation capacity of individuals and firms located in peripheral regions, as well as in disadvantaged neighbourhoods within large urban areas. Braczyk, Cooke and Heidenreich (1998) and Cooke et al. (2011) proposed the Regional Systems of Innovation concept to examine how governance, institutionalised learning and culture may impact innovation at the regional level.

The co-existence of multiple goals and instruments points to complexities inherent within policy mixes that present significant challenges for effective policy implementation. Policy mixes are defined as combinations of policy goals and policy instruments that emerge over time around a specific policy issue (Howlett & Rayner 2007). Specific strategies are needed to make it possible for knowledge and innovation to contribute to social inclusion and foster inclusive development. Inclusive innovation policies are complementary to other policies in promoting social inclusiveness – particularly education policies aimed at ensuring equal access to high-quality education (from early childhood education to tertiary education) and promoting high educational attainment by all segments of society. There is a need for coordination in designing a coherent and optimal set of instruments to achieve policy goals. According to Havas, Izsák, Markianidou and Radošević (2015), an innovation policy mix is dependent on the socio-economic political and historical context of the given country where it is applied. It can also be reasonably assumed that the technological position of a country should have some effect on its policy mix. From the strictly Schumpeterian growth theory perspective, it would be expected that countries at different innovation levels would have different policy mixes (Aghion, Akcigit & Howitt 2013). However, the research results show that this strictly Schumpeterian perspective is not supported by data (Izsák, Markianidou & Radošević 2013). This may not be surprising, as it has already been hinted at that policy mixes are an outcome of a variety of factors, and only one of these is technological distance. Other factors are path dependencies, policy fashions and perceptions of the best practice in an innovation policy.

Conclusion

There is a need for inclusive innovation policies in CEE countries, and a wide range of such policy approaches can foster inclusive growth. Policy instruments that address social inclusiveness include, for example, the provision of grants to researchers from disadvantaged groups, as well as mentoring programmes to tackle stereotypes or to popularise science and technology. Innovation policies aimed at addressing industrial and territorial inclusiveness can also support inclusive growth, because they shape the opportunities individuals in different firms, industries and regions have to participate in innovation. To address industrial inclusiveness challenges, innovation policies may focus on addressing the main barriers to entrepreneurship encountered by disadvantaged groups, such as obstacles to access finance, talent or other support services (e.g. through the provision of business counselling, assistance to access new markets, etc.).

In seeking to make growth more inclusive, governments should also focus on the broad policy areas: ensuring broad access to quality education and upskilling; increasing the quantity and the quality of jobs; addressing labour market insecurity and segmentation. Inclusive innovation policies, by focusing on disadvantaged groups and laggard industries and regions, are often confronted with a number of specific implementation challenges that apply less to other innovation policies. These include the low involvement of the target group in policy programmes, for example due to low awareness of their existence or low trust in governmental intervention, and the low capabilities among the target group to undertake activities promoted by the programme. In consequence, the success of inclusive innovation policies relies on the stronger involvement of target groups and often requires strong capacity-building efforts and adequate financial support. A closer connection between innovation and inclusion may give new forces to the welfare state and political democracy in the CEE region.

Innovation policy is an important element in stimulating change and directing the activities of various actors to ensure a greater degree of participation in creating innovation and the benefits from them. However, further analysis is needed to understand where and when this might be effective. There are a number of gaps in our knowledge concerning inclusive growth and how it can be fostered through innovation policy. Further empirical and theoretical development needs critical evaluation by all relevant stakeholder groups, as well as careful integration of the feedback received.

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Hiding and Disliking Fashion Brands Posts or Page in Social Media Among Generation Z – Case of Poland

Magda STACHOWIAK-KRZYŻAN

Poznań University of Economics and Business, Poznań, Poland
e-mail: magda.stachowiak-krzyzan@ue.poznan.pl

Abstract

The advent of social media has revolutionized the approach to marketing activities. The presence of brands on social networking sites is not only an obligation but also a big challenge for marketers and people responsible for managing these activities. Social media provide the possibility of two-way communication, engaging consumers not only in promotional activities but also often in the process of developing new product concepts. Generally, in social networking sites, users can take steps to establish and maintain their relations with brands. They can like, subscribe or follow other pages to show their positive attitude towards brands, their support and interest. On the other hand, more and more social networking sites offer an opportunity to limit some pages activity. This means that the user can also stop displaying posts published by a brand page (for a while e.g 30 days or for forever), or can take a more drastic decision, which is removing a brand page from the likes, subscribers, or followers list. These decisions are more and more popular and based on different information and reasons. These behaviors are the consumer's direct expression that he or she no longer wants to be involved in brand communication activities. This means that research is needed to understand consumers' reasons for stop engaging in social media communication by exploring why people stop like fan pages or decide to hide activity. This study examined what drives consumers to hide brand posts and unlike brand pages on social media sites which are most often used by fast fashion clothing brands – Facebook, Instagram, Youtube, Pinterest and Snapchat. Analyzing responses from 1000 research participants using the face-to-face interview method who has ever liked a fast fashion clothing brand on social media, this study found that the intention to hide brand posts or dislike brand pages was caused by two key factors: bad consumer experience with a brand and by errors in brand communication.

Keywords: Consumer Behavior, Social Media, Social Networking Sites (SNS), Fashion Brands, Generation Z.

Introduction

Social media has revolutionized the world. Social networking sites have become not only a tool for communication, maintaining contacts and interpersonal relationships or entertainment purposes, but also a tool used for commercial purposes. According to the latest data, social networking sites are currently used by 3.80 billion users, which is 49% of the population. Facebook is one of the most used platforms all over the world. More and more companies and brands treat social media as a communication and promotional tool. Social media enable two-way communication. Recently, social media has played an increasing role in the marketing efforts of many companies because it is easily accessible to everyone in the world who has access to the Internet. Social media marketing enables direct access to the desired target group and additionally reduces the costs of marketing activities. Social media marketing uses customer engagement on social networking sites, to a brand or product. Consumers show their commitment in various ways - they like the profiles of their favorite brands, actively engage in communication activities by commenting and sharing content. At the same time, as easy as liking brand pages, consumers can hide brand posts or unsubscribe and remove brands by unliking them from their liking lists on social media (Xu et al., 2013). Such action may be the result of a continued lack of commitment or a desire to break the relationship with the brand. If consumers choose to 'hide' or 'mute' brand activity, the brand posts will not appear on their profile or wall with feeds while their relationship with the brand continues as 'fans' or 'followers' or 'subscribers'. When consumers decide to discontinue the relationship, they can remove brands from their liking lists by 'unliking', 'unsubscribing', or 'unfollowing' the brand pages (Kwon, Kim, Chung, 2020). Literature analysis revealed a lack of empirical research on consumer behavior related to unliking brand pages or hiding their posts. The aim of this article is to narrow the literature gap and provide insights for fashion brand managers and social media marketers to help them manage more meaningful relationships with consumers on social media sites.

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Social media as a tool to engage consumers

Social media is defined as a group of online and offline applications that allows for the exchange of user-generated content including the exchange of knowledge and opinions (Kaplan and Haenlein, 2010). Social media comprise a variety of online information-sharing platforms including social networking sites (e.g. Facebook), content-sharing sites (e.g. YouTube, Instagram, Pinterest, Tik-Tok), collaborative web sites (e.g. Wikipedia) and microblogging sites (e.g. Twitter, Tumblr) (Yannopoulou et al, 2019). Nowadays, almost every single company is promoting its products or services on social media.

Facebook brand pages have become one of the first channels through which consumers can interact with brands directly by liking, sharing or commenting on brands' posts and messages (Machado, Antunes, Miranda, 2018). With the emergence of new social networking sites (e.g. Youtube, Instagram, Pinterest, Tik-Tok, Snapchat and others), their importance in the context of building customer engagement grew (Niyonkomezi, Kwamboka, 2020; Weitzl, Einwiller, 2018; Miranda, Antunes, Machado, 2016). The like, share and comment features of social media sites allow anyone to easily interact with a brand. A single brand post can receive thousands of comments from social media sites users all over the world who interact with the brand and other users, providing a platform for dialogue from which to easily get information and feedback. Consumers, social media sites users, can increasingly integrate and act as co-creators of brand messages. They have a great opportunity to engage and actively participate in communication on the brand's pages on social media. These actions strengthen consumers' ties with brands, turning them into committed fans (Niyonkomezi, Kwamboka. 2020).

More and more research is conducted in the context of consumer engagement in social media. Previous studies in the field of customer engagement in brand communities focused mostly on the consequences of engagement, including concepts of satisfaction (Bowden 2009), commitment and emotional attachment to the brand (Chan, Li, 2010), empowerment (Cova, Pace 2006; Fuller et al. 2009), consumer value (Gruen et al. 2006; Schau et al. 2009), trust (Casalo et al. 2007; Hollebeek 2011) and loyalty (Andersen 2005; Casalo et al. 2007). Currently, various measures are used to explore consumer engagement. Most often, researchers use the likes, shares and comments index (Vries, Gensler and Leeflang 2012; Cvijiki, Michaheles, 2013).

Predictors of hiding and unliking on social media

There is still little research conducted to identify the reasons why consumers do not want to be more long involved in the activities of brands in social media. While it is undoubtedly useful for brands to know this, it should be of interest to both academics and practitioners to understand better what motivates consumers to stop engaging with communication activities on social networks, and how brands can avoid these behaviors. These can decrease sales, levels of loyalty toward the brands and may lower positive influence on other users within the consumers' network to engage with the brands (Nitzan, Libai, 2011) because they may recognize that their friends are not following the brands through their social media profiles or no longer endorse the brands.

At the same time, it is often emphasized in publications related to research on behaviors leading to breaking relations with brands in social media (stopping liking, hiding activity) that these activities may be an extension of consumer behavior related to avoiding advertising

The most important reasons that may lead to a break in engagement are (Kwon, Kim, Chung, 2020):

- information overload,
- consumer attitude toward social media marketing,
- brand detachment,
- self-identity and social-identity expression.

Consumers today are surrounded by a great deal of information. Information overload is a determinant and direction the by-product of the information society Internet and social media sites has become an additional source of information where you can find information about products and brands. As a result, consumers and social media users very often feel overwhelmed by the overload of information. Moreover, according to information theory, humans are only able to process a limited amount of information at a time. The phenomenon of information overload is a kind of discomfort mental, related to our attitude to receiving information, permanent concentration and readiness to receive it. When a consumer feels overwhelmed by the amount of information, his purchasing decisions deviate from the norm. The consumer may feel distracted, nervous and more frustrated or irritated. The most important problem is the question of verifying this information, which of them should be considered credible and reliable, and which not. To deal with this problem, consumers use various actions, such as filtering information,

prioritizing information sources, or ignoring certain information. Concerning social media, this may just result in hiding certain information/posts or removing pages from the liking list.

Consumer attitude toward advertising is defined as a 'learned predisposition to react in a consistently favorable or unfavorable manner to advertising' (Lutz, 1985). Nowadays, consumers have become resistant to advertising, they are distrustful of it, and more and more often want to avoid it. Research shows that only one in four Poles (26%) trusts advertising (Buzz Media and Maison, 2012). Nowadays, consumers place their trust in their friends, family members or communities in social media (IR Center, 2015; Ipsos Media CT, 2014). This proves that consumers primarily trust content and information created or transmitted by other people (their friends or not) (Stachowiak, 2018). Personal information sources are more reliable and trustworthy. Consumer's attitude toward advertising plays a significant role as an indicator of their advertising avoidance behaviors. This is also reflected in social media. The most important difference is that in the case of social media, consumers themselves voluntarily consent to receive brand messages on social media (Kwon et al., 2014) by liking the page, which makes them less likely to avoid advertising than with other media.

Brand detachment is defined as 'the psychological state of distance with regard to a brand, resulting from the weakening or the dissolution of the affective bond existing between the consumer and the brand' (Pierrin-Martineq, 2004). The consumers 'relationship with brands can influence their future behaviors towards brands' communications activities (Kwon, Kim, Chung, 2020). Conducted studies have shown that consumers' previous negative experiences with brands or their marketing activities influence their willingness to accept future advertising activities (Rosengren and Dahlén, 2015). Consumer dissatisfaction can lead to avoidance (Seyedghorban et al., 2016) and further to relation break up (Mai, Coti, 2007). The literature mentions three determinants that may be an explanation for the dissolution of the relationship between the brand and the consumers: indifference, rejection and a sense of deterioration of quality (Mai, Coti, 2007). Social media enable consumers to quickly break relations with the brand by simply clicking one button – unlike, unfollow, unsubscribe. Reasons for this behavior may vary, and the most important challenge for brands is trying to identify them.

Self-expression is one of the most important functions of a brand, especially a clothing brand. Fashion is included in the category of products consumed in public. It often reflects the lifestyle, views, opinions and personalities of its users. This is even more important for young consumers. Young people through their outfit express personality and create their own identity (McNeill & Moore, 2015). Fashion is extremely important in the creation of their self-evaluation (Isaksen & Roper, 2012). For young people, personal appearance is crucial (Ceballos, Bejarano, 2018; Jurgensen, Guesalaga, 2017). Young consumers demonstrate a desire to keep abreast of the latest product and brand trends, it is a way of gaining acceptance from the environment and peers. Social media platforms are an ideal tool for self-identity and social-identity expressiveness. By 'liking' a particular brand on social media, a consumer may use that brand to reveal to others what kind of person he or she is (Kwon, Kim, Chung, 2020).

Method

Data necessary to conduct exploratory factor analysis were obtained by survey resources. The entire study concerned the communication activities of the fast-fashion clothing segment in social media in shaping the purchasing behavior of the Z generation and the results presented in the article present some of the results obtained. The measuring instrument consisted of 24 questions, including 6 demographic questions. The survey was anonymous and contained primarily closed-end, matrix and ranking questions. The results presented in the article include three survey questions constructed using a five-point Likert scale, where '1' meant a strong disagreement and '5' meant full agreement.

The study was conducted from June 2017 until January 2018. After an initial assessment, 1,000 correctly completed questionnaires were accepted for further analysis.

To identify the hiding and unlinking factors of Generation Z with profiles of clothing brand in social media analysis method was used. Exploratory factor analysis has been done. Data obtained from empirical research was statistically analyzed using IBM SPSS Statistics version 21.

Therefore the main aim of the study was to identify the role and importance of content published in social media on purchasing decisions of young consumers (generation Z) in the fast-fashion clothing market in Poland. Detailed research goals concerned the identification of activity of generation Z in social media, in the context of the decision to purchase clothing, in particular:

- the activity of generation Z on the profiles of clothing brands in social media;
- key determinants of disliking or hiding fashion brand profiles and posts in social media among generation Z.

Sample

The survey was conducted among pupils and students in Poznań. To ensure the credibility of the research, the structure of the studied population was reflected in the structure of the sample, the variables being gender, age and level of education. An example structure is shown in table 1.

Table 1 Sample structure according to age, gender and level of education (%)

Variables		Percentage
Sex	Woman	58,4
	Man	41,6
Age	16-17	2,6
	18-20	53,1
	21-23	38,5
	24-26	5,8
Level of education	Upper secondary school	15,2
	States universities	84,8

Source: own study

Result

Unliking brand pages or removing it from friends is an interesting and quite popular phenomenon among young people in Poland. More than half of the respondents declared that they had performed such an action. It happened more often to women (62.6%) than to men (49.3%).

Table 2: The phenomenon of disliking profiles of hiding posts of clothing brands in social media (%)

	TOTAL (%)	WOMAN (%)	MEN (%)
Yes. I have stopped liking or hidden brands profile or posts	57,1	62,6	49,3
No. I have never stopped liking or hidden brands profile or posts	42,9	37,4	50,7

Source: own study

When it comes to the frequency of such an action, it turns out that it is usually not a one-off action. More than half of the people who declared that they happened to stop liking the fanpage of a clothing brand on social media did so 2-3 times. Every fourth person declared that it had happened to them more times. And about 16% of respondents have done it once. There were no significant differences in gender analysis.

Table 3: The frequency of disliking profiles or hiding posts of clothing brands in social media (%)

	TOTAL (%)	WOMAN (%)	MEN (%)
once	16,3	15,2	18,4
2-3 times	57,1	58,1	55,1
more often	26,6	26,7	26,5

Source: own study

Publishing uninteresting, from the respondents' point of view, content ($\bar{x}$ = 3.33) was among the main reasons why the respondents stopped liking a given profile. Actions related to removing a brand from friends or the group of liked pages are the result of unfavorable experiences of respondents with the products of a given brand (i.e. defective products, their rapid wear, etc.) ($\bar{x}$ = 3.20). The third most important reason is too much activity of the clothing brand in social media ($\bar{x}$ = 3.04), which means publishing too often too many entries that "clutter" the wall, which means that other information important to them may become invisible, they can get lost in the crowd.

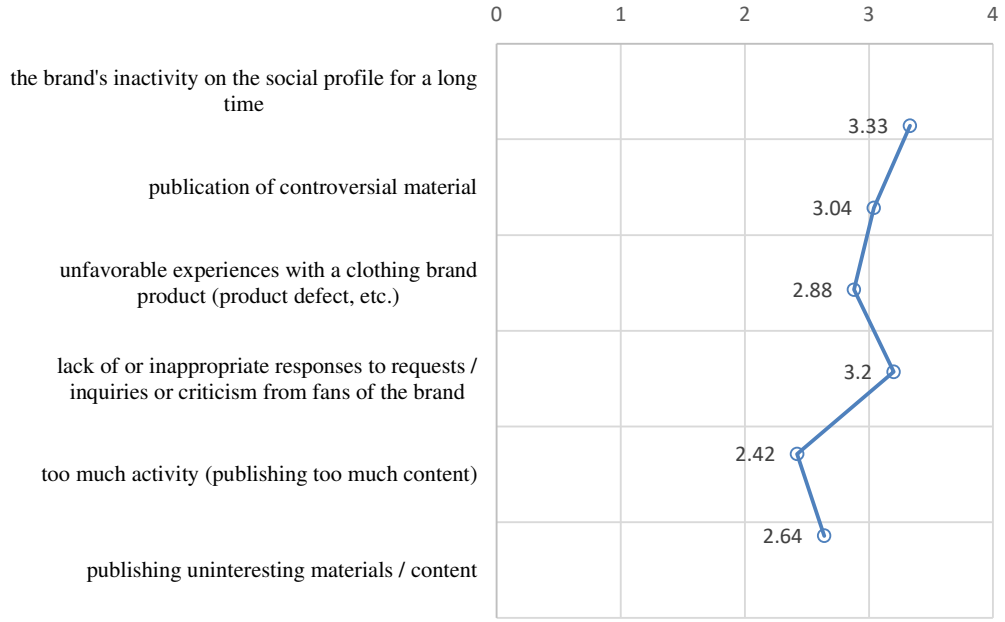

Figure 1: Reasons for not liking the profiles of clothing brands in social media ($\bar{x}$)

Source: own study

Key determinants of disliking or hiding fashion brands profiles in Social Media Sites among generation Z

To identify the key determinants of disliking brands pages or hiding posts in Social Media Sites among generation Z, factor analysis was used. In accordance with the procedure for verifying the correctness of the application of this method, firstly the results were subjected to Bartlett's sphericity test and the KMO (Kaiser-Mayer-Olkin) measure was calculated. Both the obtained measurements confirmed the basis for performing factor analysis (Table 4).

Table 4: The Kaiser-Mayer-Olkin and Barlett's test

The KMP measure of sampling adequacy		**.679**
Bartlett's sphericity test	Approximate chi-square	234.704
	Degrees of freedom	15
	Significance	.000

Source: own study

The analysis was conducted using the method of Principal Component Analysis. Based on Cattell's scree test (a scree plot), two groups of factors were created. Then, adopting a factor loading level of 0.5 as a cut-off point, all the factors were assigned into specific groups (Table 5). The two factors combined explain nearly 51% of the common variance: the first one explains 32% and the second 19%.

Table 5: Results of EFA

Items	Components/values of factor loadings	
the brand's inactivity on the social profile for a long time	0.538	-
publication of controversial material	0.613	-
unfavorable experiences with a clothing brand product (product defect, etc.)	0.731	-
lack of or inappropriate responses to requests / inquiries or criticism from fans of the brand	0.708	-
too much activity (publishing too much content)	-	0.848
publishing uninteresting materials / content	-	0.568

Source: own study

The results of factor analysis included in table 5 allow to identify the following key determinants of unliking brand pages or hiding fashion brands posts in social media among generation Z:

- Factor 1: bad consumer experience with a brand (the brand's inactivity on the social profile for a long time, a publication of controversial material, unfavorable experiences with a clothing brand product, lack of or inappropriate responses to requests/inquiries or criticism from fans of the brand);
- Factor 2: errors in brand communication (too much activity and publishing too much content, publishing uninteresting materials/content).

To sum up - for young consumers, the main reasons for unliking or hiding fashion brands profiles on social media sites among generation Z is their bad experience with a brand. It may be the aftermath of direct contact with the brand's products and general dissatisfaction with them - e.g. poor product quality or product defects. Bad brand experiences can be caused by the brand's inappropriate communication on social media. First of all, it may be the inappropriate activity of the clothing brand in its social media, including publishing inappropriate, controversial content, publishing too much content or the lack of activity and response to fan criticism. Consumers do not want to feel ignored, which is why it is so important to communicate with them also in uncomfortable situations for the brand, e.g. when they receive critical remarks or comments from their fans. Secondly, young consumers do not like or hide profiles of fashion brands on social networks, because the brand makes mistakes in communication activities - it publishes too often and too much content (generates spam on fan walls) and publishes unattractive, uninteresting content for its recipients. It is very important to understand that it is not just about communicating, but about high-quality content. Two-way communication is to bring mutual benefits, both for the sender and the recipient, therefore the content must be properly prepared and adapted to the expectations of the audience.

Conclusion

An increasing challenge for fashion brands in social media is not to gain a large number of fans, but to maintain them, in order to prevent behaviors aimed at removing profiles from the group of liked pages and hiding posts. Therefore, it is very important to find out what might be causing such undesirable behavior. This information can be extremely important in formulating a social media marketing strategy.

The findings of this study not only contribute to the theoretical understanding of the current consumers' break-up with brands on social media but also provide practical insights for social media marketers and brand managers. Consumer behavior related to disliking brand profile and hiding social media posts reflects a clear desire by consumers to avoid marketing messages and end consumer-brand relationships on social media, even though they have expressed interest in brands and have voluntarily joined them. Identifying factors influencing such behavior can help brands predict consumer behavior and prevent it in the future. Bad consumer experience with a brand and brand communication errors are key reasons for breaking consumer relationships with apparel brands among generation Z. These findings suggest that the extent to which consumers maintain a positive brand attitude and relationship strongly influences their connection with brands on social media. Clothing brands not only have to ensure the quality of their products all the time, but also the quality of their marketing activities in social media. Marketers should avoid publishing too many irrelevant posts while keeping consumers interested in their messages. The consumer's liking of the profile does not guarantee that the relationship is concluded forever, and the phenomenon of terminating the relationship is becoming more and more common.

Limitation

This study has several limitations and further investigation is still needed. One of the limitations of this study is the fact that only several, selected by author predictors of hiding behavior were analyze. Another limitation of the study is the limited sample, the results cannot be generalized to all consumers. The results cannot be also generalized to all clothing brands on the market. The survey covered the fast-fashion clothing segment. Future research might consider focusing on different market segments or specific brand. It should also be noted that the conducted research included only selected social media (Facebook, Snapchat, Instagram, Youtube and Pinterest).

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Challenges for The Ferry Shipping Operation in The Baltic Sea Region in The Time of COVID-19 Pandemic

Ilona URBANYI-POPIOŁEK

Gdynia Maritime University, Poland, i.urbanyi@wpit.umg.edu.pl

Abstract

Ferry shipping is a type of maritime transportation where passengers and cargo are transported in one ship and form one market. The demand for transportation is created by two segments – people travelling in different purposes and hauliers transported cargo in trailers. Baltic Sea constitutes the prime area of ferry operation in Europe. The network of international and prime domestic ferry connections included 60 services with 116 ferries operated (ro-pax, cruise-roro i high-speed). As the ferry business is concentrated, the operations are provided by 16 main ferry operators. On international and main domestic ferry lines the traffic amounted to around 49 million passengers, 9 million cars and 3 million trailers. In previous decades changes in internal factors determining operation were to a certain extent predictable. COVID-19 epidemic started unexpectedly and created new challenges for shipowners they have to face. The latter factor suddenly hit the ferry business. The purpose of the paper is to research into the ferry operation in the time of pandemic and evaluate the activities of the operators to reduce the negative effects in turnover decline.
The paper begins with introduction (Section 1) and methodology (Section 2). The main body comprises the theoretical background of ferry shipping and presentation of the Baltic ferry operation, as well as discussed, the management of operation in time of pandemic.
The methods used in this study are the analyses of literature, analyses of original data and in-depth interviews.

Keywords: Ferry Operation, Baltic Sea, COVID-19, Ferry Carriers, Cargo Transportation, Ferry Tourism.

Introduction

Ferry shipping is well developed in many areas of the world. North Europe and Mediterranean are regions of high concentration of ferry network connections with Baltic Sea Region being one of the prime world market (Kizielewicz & Urbanyi, 2015). Ferry shipping is a type of maritime transportation where passengers and cargo form one market. The simultaneous transport of two different segments creating demand for services constitutes the prime characteristic of ferry business.

Trade relations and the volume of commercial exchange between Nordic and continental European countries influence the cargo flows in the region and constitute the regional supply chains in Baltic Sea Region. The majority of cargo between Nordic states and continent are carried by vessels, particularly by ferries and pure cargo ro-ro ships. Serry underlines that those vessels carry up to 80 per cent of total internal cargo turnover in the region (Serry, 2014).

Baltic Sea represents attractive region for maritime tourism. Passenger ferry traffic is highly developed and people undertake sea voyages for various reasons, as the needs to get to specific places, participation in mini cruise trips and conferences at sea as well as traveling for shopping and business purposes. Mini cruises, sea conferences and shopping trips are particularly popular in Scandinavian countries, Finland and Estonia.

Ferry business is sensitive to changes in the market environment. However, both segments react differently to economic shocks. Cargo traffic is strictly dependent on the economic activity and level of international commerce. In example, during 2009 crisis, due to slow down in industries and decrease in trade the majority of ferry links recorded decline of 25% in number of transported units. Particularly services between Germany and Sweden were affected by a 30% drop in cargo traffic (Market:10, 2010). It took 8 years to achieve the level of transported cargo unites before the crisis.

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The passenger segment reacts differently during recession. The latter usually is not deeply affected. Many Baltic Sea Region residents renounce longer holiday voyages to Mediterranean states or beyond Europe due to costs of stay and transport fares. They choose as destinations Aland Islands, Bornholm and Gotland, as well as ferry cruises in the region with stay in interesting places like Stockholm, Helsinki, Tallinn, Riga, Oslo or Gdansk, for example. We did not observe drop in passenger traffic in the whole region during slowdown in economy and some destinations show growth in turnover like services to the mentions islands. The fuel crises of 1974 and 1981 as well as past recession are the examples.

The COVID-19 pandemic started in Northern Europe in early March 2020 deeply affected ferry business. The lockdown particularly hit the passenger sector as the Baltic states closed the border. As a consequence of travel restrictions, the traffic was stopped and cruise trips were cancelled. Ferries operated as cargo ships only and some cruise ferries were laid up. The COVID-19 crisis that wiped out the passenger sector shows that ferry companies need both passengers and cargo to operate business profitability.

Methodology

The research concerns the impact of COVID-19 on ferry business in Baltic Sea Region and focuses on activities of ferry carriers in the time of pandemic. The prime aim of the paper is to analyse the new challenges faced by the operators and what operational solutions were implemented by them to minimize the negative effects of drop in turnover.

The research questions are formulated as follows:

- How did the epidemic affect the passenger and cargo segments of ferry business?
- What actions were undertaken by ferry carries to reduce the negative effects of COVID-19 pandemic?

The research methods were the analysis of literature concerning ferry shipping, analysis of statistics and interviews. The data were collected from the ShipPax Information, known as a reliable publisher and provider of consulting services for ferry shipping industry, as well as from interim half year reports of selected ferry operators. A detailed analysis comprises passenger traffic and cargo turnover before and in time of pandemic in the Baltic Sea Region. The study focuses also on results achieved respectively on cargo oriented and passenger oriented routes. Moreover the analysis of incomes of selected operators was conducted. The research examines the activities undertaken by prime ferry operators to minimize the negative impact of pandemic on operation results. In-depth interviews were conducted with chosen operators` representatives on -line. The questions concerned the actions undertaken by individual carrier.

The paper is organised in the following way: Section 1 comprises an introduction and a presentation of the problem undertaken in the research, Section 2 presents the methodology, Section 3 presents the theoretical background of ferry business, Section 4 analyses the ferry operation in the Baltic Sea, Section 5 discusses the operational decisions undertaken by carriers based on in-depth interviews and reports and finally Section 5 consists of conclusions and further comments.

Theoretical background of ferry shipping

There is not a uniform definition of ferry shipping and a ferry ship used in theory and practice. The reason for it is connected with continual changes of this type of ships, changes in supply and demand on ferry market, as well as approach of the authors to the presented issues. However, carriage of passengers and cargo by one ship using ro-ro technology for loading and discharging wheeled units and private cars is the prime characteristic of this maritime transport. Ferry operation is therefore defined as a type of liner shipping where passengers and cargo form one market. Ferries ply the regular routes, usually between two or three ports according to schedules. (Urbanyi -Popiołek, 2009). Similar approach to ferry business presents Kotowska, who states that the ferry shipping transports two segments: passengers and cargo (Kotowska, 2014), as well as Stapford who points out that ferries transport people, goods and vehicles over short distances by sea (Stapford, 2009).

Ferry shipping is the prime mode of general cargo transportation within the Baltic Sea Region. Cargo segment comprises different vehicles, as semitrailers, lorries, trucks and containers on roll-trailers. The function of ferries results from the economic connections between Nordic countries as well as between Scandinavia and continental Europe. Cargo traffic flows from Continent to Nordic states and vice versa are complementary to mutual trade turnover. In

mutual exchange dominate valuable commodities as automotive, electronic appliances, machinery, construction equipment, medical equipment, textiles, furniture, household appliance and medicines. The other segments are food and agriculture commodities, wood and paper products, as well as steel and semi-finished products. Presented commercial intercourse, in regard to volumes and commodity structure, is the prime determinant developing the cargo flows between continental Europe and Scandinavia and creating the demand for ferry transport of cargo.

Ferry shipping form basic transport connections in regional supply chains. Ferry links are elements of road – sea transport systems from Nordic states to continental Europe and vice versa (Daduna et al. 2012). Ferry business constitute prime elements of regional transport chains and multimodal transport systems (Paixao Casaca, & Marlow, 2009). Musso, Casaca, & Lynce describe ferry services as a segment od short sea shipping market (Musso, Paixao Casaca, & Lynce, 2010). Moreover ferry shipping is also considered as alternative for land transportation in context of sustainable transport development (Castelss, Usabiaga, & Martinez, 2012, Chen, Yang, & Notteboom, 2014). The growth of short sea shipping as an alternative for road haulage is mainly aimed at discerning social benefits resulting from lower external costs generated in maritime transport, lower number of accidents and reduced congestion (Kotowska, 2015).

The concept of carriage of valuable goods is based on house to house formula. Such merchandises generally are loaded into trucks in sender premises and unloaded in receiver place. The ferry services link the continental Europe transport system with Scandinavian roads. This maritime transport enables efficient and effective carriage of goods transported in lorries and trucks via Baltic Sea. In accordance with the scope of the article, the prime function of ferry shipping is its "floating bridge" role and it is considered as essential links in European supply chains.

Passenger traffic is the second segment of ferry industry and is usually analysed in terms of tourism functions of ferry shipping (Wild & Dearing, 2000, Kizielewicz & Urbanyi-Popiołek, 2015). Research on market segmentation has been carried out by Kizielewicz and et al. The authors analysed the generic structure of the tourist demand for ferry travel in terms of demographic variables and purchasing behaviour of passengers on-board ferries. The motives for ferry travel were defined generally as tourists, visiting relatives, business-/work-related and combinations of specified needs (Kizielewic and et al., 2017). Pantouvakis examines the factors and the ways that influence the passenger to select a ferry operator and states that ferry passengers form satisfaction perceptions on the basis of their evaluation of four primary dimensions: service quality, price, convenience and availability. (Pantouvakis, 2007).

The passenger demand is created by people travelling in different purposes, e.g. visit chosen destination in connection with various needs, package trips, shopping, business. For the purpose of this study the travellers are divided into categories (Urbanyi-Popiołek, 2018):

- Liner passengers – travellers taking a trip in various reasons (visit an interesting destination, participation in culture or sport event, visit relatives etc.), ferry crossing is only a part of whole trip,
- Cruise passengers – travellers participating in package trips of diverse nature, e.g. round trips for pleasure, trips with short stay in port of destination etc.,
- Conference passengers – participants in conferences and seminars organized on-board within liner trips,
- Shopping passengers – people who travel to purchase commodities on-board or in port of destination,
- Business passengers – passengers travelling in connection with their professional activities, in this category lorry drivers are included.

Business passengers – passengers travelling in connection with their professional activities, in this The presented selection is based on the prime factor generating the demand. In practice, assigning the travellers to given category is not clear because passengers traveling e.g. as conference participants also do some shopping and enjoy entertainment. The assignment of traveller to a given segment results from the main transport need (Urbanyi-Popiołek, 2018).

Ferry shipping operation in the Baltic Sea

Baltic Sea constitute one of the world prime ferry markets. In 2019 275,054 million passengers and 105,6 million private cars were transported in the region. The cargo traffic amounted to 11, 06 million road units. The numbers include the whole turnover with short routes between islands and mainland. On international and main domestic Danish and Swedish ferry lines (e.g. Bornholm and Gotland) important for tourism and regional transport systems, around 49 million passengers, 9 million cars and 3 million cargo units were carried (ShippaxMarket 20, 2020).

Baltic ferry business is highly concentrated. According to Shippax data, in January 2020, 16 major carriers operated on the main international and domestic markets. In terms of transport capacity and market share the leaders are Finnlines, Stena Line, Tallink Group, Viking Line, TT-Line, Color Line, Unity Line. Among others are Fjord Line, Scandlines and Polferries. The network of ferry connections included 60 services with 116 active ferries of different types - ro-pax, cruise-roro and high-speed.

Ferry business in the Baltic Sea Region includes three prime ferry markets:

- West Baltic - comprises lines from Denmark to Sweden, Norway and Germany, services from Sweden to Norway and Germany and Germany – Norway connection; the west market accounts for 54% of passenger and 62% of freight traffic,
- East Baltic - covers services from Sweden to Finland and Estonia, from Estonia to Finland and Russia; the east market accounts to 37.5% of passenger and about 19% of freight turnover,
- South Baltic/ Central Baltic - comprises lines between Sweden and Poland, Sweden and Latvia and Lithuania and the connections between Germany and Lithuania, Latvia and Finland; the central market constitutes the 8.5% of passenger transport and about 19% of freight.

These markets differ in terms of the demand for transport services and the functions the ferry lines perform. In west and south Baltic cargo turnover dominates. Both markets accounts for 81% of ferry loads in region. Most services are cargo-oriented routes. An exception are lines from Norway to Sweden Denmark and Germany where passengers traffic dominates due to tax-free sales and cruise trips offers.

The Eastern Baltic Sea is characterized by the highest concentration of ferry tourism. This is due to several reasons. Firstly, for many decades the Swedes and Finns have undertaken ferry trips due to the possibility of making purchases in the duty-free zone, which is still preserved in this area (lines via the Aland Islands). Moreover, the purpose of the journey undertaken by the Scandinavians on these routes is the journey itself and the attractions on the ferry and the shopping, not only in ferry shops, but also in Estonia and Latvia.

Ferry operators` revenues depend on sales of services. Theirs incomes comprise two different areas. The companies get their incomes from passenger and cargo segments. Revenues of the ferry company consist of:

- sales of tickets,
- sales on-board services,
- other passengers revenue,
- sales of cargo transport.

Sales of ticket is the first item of passengers revenue and include transport fares, sales of cabins and private vehicles transportation fares. Sales on-board services include sales in restaurant and shops as well as entertainment. This item is the prime revenue that flows to the company operating services on passenger oriented lines. It is estimated that sales on-board generates 30-55% of total revenues of cruise ferry. In case of ro-pax, this category has minor importance in relation to cargo transportation and has a share of 20-30% of total earnings (Urbanyi-Popiołek, 2015).

Other passengers revenues contain incomes which are not recognised as sale on-board, such as sales of packages by tour operators, transfer passengers, marketing, sales of hotel accommodation onshore etc.

The second important items are revenue from cargo segment. This incomes have a significant share on ro-paxes where cargo transportation dominates (up to 70%-80% of total incomes).

Incomes of cruise ferry operation differs in structure compared with ro-pax. On-board services generates on average as much as 40% of total revenue. Catering and entertainment generate the expenditures of passengers being the primarily source of cruise ferries income. Cargo segments amounts on average to 15-20% of this ferry type revenue.

Tallink Group is an example of carrier operated cruise ferries on passenger oriented lines. For the group passengers service is the prime source of income. Sales on-board generate more than half revenue of the group. In total, this item with ticket sales give 85% of yearly income. Freight has 11% share due to high cargo turnover on Tallinn – Helsinki route.

Alike Viking Line is a cruise- roro operator. Passenger segment generates 93% of incomes and reflects tourist feature of company`s business. The carrier offers low ticket prices and concentrates on sales at shops and restaurants. Taking into consideration the level of costs related to purchase of goods for on-board services, one can assume that the structure of operator income from passenger segment is the same as Tallink Group.

TT-Line, Finnlines and DFDS Seaways are carriers operating more cargo oriented services among others. The incomes primarily come from freights paid by hauliers. Lorries, trailers and other wheeled cargo are carried upon freight tariffs. The basic rates are charged per length of the vehicle or per unit.. Typically for liner services pricing, ferry companies charge freight additions, like Bunker Adjustment Factor (BAF), Low Sulphur Surcharge (LSS), Charge for vehicles containing dangerous goods or Peak Season Charge (Urbanyi-Popiołek, 2015).

For companies operate cruise ferries the basic are on-board services, for those having ro-paxes obviously cargo segment is essential. Cost and revenue are variables significantly influences the financial results and performance of ferry industry. The position of ferry company is inflexible due to operation the vessels on fixed routes according to sailing lists. The carriers incur costs irrespective of utilization of ship`s passenger and cargo capacity. The majority of costs in ferry business should be regarded as fixed items. The management of cost and revenue are the key issues for financial performance of the ferry operator.

Ferry shipping operation in the Baltic Sea

The COVID-19 pandemic has caused great disruption to the ferry industry. All countries in Baltic Sea Region had taken far-reaching measures which had directly influenced the ferry business. Borders were closed and Baltic states introduced entry restrictions. Furthermore, the countries were placed in lockdown.

The new situation has strongly affected the sector, however the negative impact on both segments differed. Table 1 presents the ferry traffic of selected operators and reflects the situation of the business. Passenger traffic decreased from 50 to 90% in the first half of the year compared with the same period of 2019. Cargo transportation dropped of 15-20% in numbers of trailers.

Table 1: Ferry turnover of selected operators in 2019 – 2020

Operator	H1 2020		H1 2019	
	passengers	cargo units	passengers	cargo units
Tallink Group	1 988 212	186 386	4 507 615	192 660
Color Line	621 781	85 759	1 634 408	89 503
DFDS	342 607	126 135	428 255	125 156
Viking Line	998 483	62 409	2 772 427	69 030

Source: own elaboration based on: Q2 2020 Interim Report – DFDS, Tallink Grupp AS, Q2 2020 Tallink Grupp AS, Half-year Financial Report Viking Line, 2020, Color Line Interim Report 2020.

The decrease in traffic resulted in decline in revenue. Tallink reported 3.4% fall in incomes in the Q1 from route operation and drop by 75% in Q2 compared to the same periods in 2019. The biggest contributors to the overall revenue fall were the 82% drop in shop and restaurant sales, 81% drop in tickets sales and 29% drop in cargo sales (Q2 Tallink, 2020). Viking Line results show similar decrease. Passenger-related revenue decreased by 89% during the second quarter, while cargo revenue decline by 11% (Viking Line, 2020). The other passenger - oriented carries were affected alike.

The carriers were forced to undertake actions to minimalize the effects of coronavirus crisis. The measures taken by the operators can be classified as follows:

- temporarily suspension of services and laid – up of ferries,
- streamlining of calls frequency,
- focus on cargo segment,
- restart of services and operate according to pandemic requirements,

- seasonal destinations introduced by the operators,
- reduction of the crews and ashore staff,
- state aids.

The passenger sector was hit first and foremost. The majority of passenger – oriented ferry links were suspended, and the cruise ferries were laid-up. Norway was one of the first countries in the region to close its borders. As a result, the international services operated by Color Line, Fiord Line, DFDS Seaways and Stena Line to Sweden, Denmark and Germany were temporarily discontinued, e.g. Sandefjord – Stromstad, Oslo – Kiel, Oslo – Copenhagen.

Alike ferry links from Sweden to Finland, Estonia and Latvia were suspended, as these countries sealed the borders and introduced restrictions in traveling. Helsinki – Stockholm operated both by Tallink – Silja and Viking Line, as well as Tallinn – Stockholm and Riga – Stockholm plying by Tallink are the examples. Seven of the thirteen Tallink ships were temporarily sidelined in Tallinn, Helsinki, Stockholm and Riga. Likewise four Viking Line ferries from seven were laid up from mid-March to early June. The rest of fleet operated as cargo ships.

Moreover, a number of services were ceased permanently. In the middle of March Stena Line closed temporarily passenger link between Norwegian capitol Oslo and Frederikshaven in Denmark and the ship was sidelined in Gothenburg. Later the carrier announced that the route would not be reopened when the COVID-19 crisis was over. The other permanently closed passenger – oriented ferry route is service between Trelleborg in Sweden and Sassnitz in Germany operated by Stena Line as well.

The cargo – oriented links in south and west Baltic were less affected. The passenger traffic in this region was suspended either, however ro-pax ferries operated transporting road units with cargo. The ferry connections from Germany, Poland, Lithuania to Denmark and Sweden are important elements of regional supply chains between continental Europe and Scandinavia. The economic slowdown in the Baltic states undoubtedly affected trade in the region, but the need to ensure supplies allowed for the continuity of line operation, so ferry operators servicing these countries continued to operate, albeit in freight – only mode. However, the slowdown resulted in drop in cargo traffic in this area by an average10%. In east Baltic as well as is in Skagerrak some routes operate emergency freight links subsided by the states.

On most connections, carriers have cut the frequency of trips. Rostock – Travemunde, Rostock – Gedser or Świnoujście - Trelleborg in west Baltic are the examples with average reduction by 12% in number of calls.
The COVID-19 pandemic affected the employment in ferry industry. Some operators were forced to reduce the staff.
The actions were as follows:

- Stena Line was the first major carrier that cut jobs, about 950 people employed on board and ashore were temporarily redundant as passenger traffic was stopped,
- DFDS Seaways was the next with 600 staff being reduced, however due to financial aid package from Danish government, staff was remained paid,
- Norwegian Color Line laid off temporarily 2000 people with an economic stimulus package to secure salaries,
- Eckero Line due to surplus in the on board staff terminated contracts for 300 employees,
- Tallink reduced workload and remuneration of Estonian and Latvian personnel to 70% for two months, Sweden staff to 40-50%, and Finish were on unpaid leave, except the staff on duty on vessels.

The reduction of the employment on board and ashore made it possible to cut costs in the most affected weeks from mid-March till June. It is estimated that the crew costs of cruise ferries have a 20-25% share in operating costs of the vessels. The actions resulted in average 15 % decline of operating costs, depending of the carrier. Lower operating cost savings come from the need to maintain the skeleton crew on sidelined ferries.

From the mid-June the Baltic states began to lift the travel restrictions, the passenger- oriented ferry services were gradually restarted. Among others were Oslo – Kiel operated by Color Line or Copenhagen – Oslo serviced by DFDS Seaways. Moreover DFDS included call to Frederikshaven on the latter route. The Sandeford – Stromstad route remained suspended as the latter Sweden port was located in red zone.

When analysing the management of fleet operation, it is clear that Tallink made the largest reorganisation of its network, as well as offered new summer cruise destinations. The first was the Helsinki – Riga route operated every second day by cruise ro-pax Silja Serenade, normally plying the iconic Helsinki – Stockholm service. The latter was suspended during summer season due to further travel restrictions. According to the rules travel of Swedish citizens to Finland has been

restricted. In addition to work-related or other essential travel, entry was allowed e.g. for persons who own a property or residence, however persons arriving from Sweden were encouraged to spend 14 days in conditions corresponding to quarantine.

The Stockholm – Visby route was the other new summer destination. The cruises we rounded via Marienhamn, which enables tax – free sales on board and were dedicated to Swedes. The other ferry cruises were offered on Tallinn – Helsinki - Marienhamn route and Tallinn – Turku with short call at Langnas at Aland Island for tax – free sales. Similar network for summer season offered Viking Line.

During pandemic crisis some operators were granted state aids. The ferry connections between Finland and Sweden, as well Estonia are regarded as prime elements in supply chains of essential products, as food, medicines etc. The Finish National Emergency Supply Agency came to agreement with Tallink and Viking Line to maintain a number of ships in service to carry freight. Shippers paid the ferry companies freights upon tariffs and the agency paid additional sums to ensure that the operation is not loss making. These payments covered variable traffic costs and some fixed costs, but were reduced by revenue from cargo traffic and the contribution from passenger one. The agreement comprised the operation Tallink`s Megastar ferry plying Tallinn – Helsinki route, as well as Turku-Stockholm route vessels and Viking Line ships on Turku – Stockholm line. The support was crucial to cover the operating expenses, however, there was no contribution to earnings. The measures were temporary, and valid from mid-March till mid- June. Moreover, Tallink received temporary salary compensation measures offered by the states, while Viking Line received aid from Aland provincial government. The other example is Norwegian Fjord Line operating passenger-oriented ferries. The carrier received the aid of 700 million NOK from government and two main shareholders.

State aid granted to operators was an external action, the former presented activities were undertaken by the carriers.

Conclusions

The COVID-19 crisis strongly affected the ferry industry, however not to the same extend as cruise shipping or airliners. The passenger sector was hit deeply due to restrictions in traveling, however cargo freight also dropped as the economy slow down.

The carriers have undertaken several activities to adapt to the new market conditions.

Cruise ferry operators oriented on passenger transport and on-board services sidelined the ferries and temporarily suspended the operation. Only ships with greater cargo capacity were in service and operate as cargo ships. The late spring and summer months new destinations were offered to safe the peak season and improve the incomes. However, without state aid the operation would not have been possible. The seasonal destinations were cut in September. The companies will analyse the feedback from the customers, as well as volumes, fares and on-board sales. The information will be used to evaluate what cruise destinations might be offered in the future.

Carriers to whom cargo is a core business adjusted services to customers requirements. The ferry and logistics operation have been expanded and adopted to freight forwarders and hauliers.

Customer behaviour and economic results are the key elements for the companies in the ferry industry. The COVID-19 crisis has proved once again that ferry sector needs both passengers and cargo in order to operate in the market.

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Disclosure of Intangible Assets: Are We Getting Better? Evidence from Poland

Olga GRZYBEK

University of Economics in Katowice, Poland
olga.grzybek@ue.katowice.pl

Abstract

The purpose of this paper is to examine the compliance level regarding mandatory information about intangible assets reported in financial statements and its change over time. The research method adapted is content analysis of financial statements prepared by all listed IT companies in Poland for accounting years 2012 and 2017. The research tool - disclosure index - comprises all mandatory disclosures about intangible assets (34 items) according to IAS 38. The findings of this paper show moderate level of compliance with only little increase in disclosure level in 2017 comparing to 2012. Entities disclose rather general information without many details needed to deep understanding of intangible value of business. They rewrite information from one year to another and from IAS 38 to the accounting policies without adapting it to their specific. Accounting policy is very often excessively complicated because it includes all possible choices, even though they do not apply to a particular company. It should be a priority to make financial statements more user-friendly and at the same time to create stronger enforcement mechanism (for example during the external audit) to encourage companies to expand their disclosure policies.

Keywords: Disclosure, Intangible assets, Reporting pattern, Compliance level.

Introduction

This paper investigates in detail the scope of intangible assets mandatory disclosure and its change over time. The topic of disclosure is very often discussed among researchers, regulators and practitioners (Ritter & Wells, 2006; Saha, Morris, & Kang, 2019; Schipper, 2007) as it is crucial to understand the economic condition of a company. Although the need for disclosure is generally accepted, there is no agreement about the form of disclosure. Researchers argue that absent market imperfections, companies would have incentives to optimally trade off the cost and benefits of voluntary disclosure and to produce the efficient level of information to the investors (Healy & Palepu, 2001). Thus, market imperfections as well as the information gap between sophisticated and unsophisticated information users might be seen as the reason for mandatory disclosure. Nevertheless, Schipper (2007) stated that there is no agreed-upon objective function for required disclosures and no generally accepted theory of them.

IASB in *Conceptual Framework for Financial Reporting* (2018, chapter 7) highlights that presentation and disclosure of information in the financial statement is a communication tool with the primary users and effective communication needs a balance between flexibility to provide relevant information and comparability of information form period to period for a reporting entity and in a single reporting period across entities. From the insiders' point of view managers trade off between making accounting decisions and disclosures to communicate their superior knowledge of firm's performance to investors, and to manage reported performance for contracting, political or corporate governance reasons (Healy & Palepu, 2001).

Although there are some disagreements concerning overall expected disclosure, in regard to intangible assets it is desirable to disclose detailed information (Agyei-Mensah, 2019). First of all it is because of their increasing and unquestionable importance. Moreover, relatively strict requirements of International Accounting Standard 38 (IAS 38) do not allow to recognize as asset many of intangibles. At the same time expenditure to internally generate some intangibles is recognized as an expense while the same expenditure to acquire the same intangible item is recognized as an asset. It causes concern about appropriate valuation of entities and hence optimal capital allocation in economy.

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Given the crucial role of disclosure for understanding the financial condition of a company, it is important to investigate reporting pattern of companies, its determinants and consequences for the market, economy and society. The literature relatively often investigates the last two areas (Gomes I., Semuel, & Devie, 2019; Ibadin & Oladipupo, 2015; Kamel & Shahwan, 2014; Omoye, 2013) whereas the empirical evidence in the first field is limited. Some previous research indicate the need for studies in the topic of disclosure pattern across years and developing the compliance with required disclosure over time (Agyei-Mensah, 2019; André, Dionysiou, & Tsalavoutas, 2018; Carvalho, Rodrigues, & Ferreira, 2016). On the one hand, researchers assume that the companies tend to maintain the disclosure level over time. On the other hand, standard setters put emphasis on the rule "comply or explain" which assumes that the companies ought to follow the requirements and if not, they should explain the reason for deviation. It should encourage the companies to improve their disclosure. The research questions of the study are as follows:

RQ1: What kind of information about intangible assets is disclosed most often / rarely?

RQ2: Is there any significant change in disclosure level of intangible assets?

This study contributes to the literature on intangible assets as it provides country-specific evidence on the compliance level with IAS 38 and its change over time. It adds to the debate about improving disclosure usefulness. The findings suggest that there is some kind of information which is generally not disclosed by companies. First of all, it concerns disclosures about intangible assets with indefinite useful lives and the amount of research and development expenditure recognized as an expense during the period. The evidence shows moderate level of compliance with IAS 38 which, considering the nature of disclosed and not disclosed information, is insufficient to a deep understanding of a financial statement.

The remainder of the paper is organized as follows: the second section provides the theoretical framework and reviews the literature on intangible assets. The third section presents the research sample and the disclosure index used in this study. The fourth section includes the empirical results. The final section summarizes and concludes.

Theoretical background

There are at least several literature reviews in the field of intangible assets disclosure (Castilla-Polo & Gallardo-Vázquez, 2016; Castilla-Polo & Ruiz-Rodríguez, 2017; Cuozzo, Dumay, Palmaccio, & Lombardi, 2017; Jeny & Moldovan, 2016). As these literature reviews summarize comprehensively the most significant research on intangible assets, in this paper I give only a brief view on the most vital issues in regard to disclosure of intangible assets from recent years.

A few theories have been used to explain the reason for disclosing the information about intangible assets. The major premise is that companies disclose information to improve transparency, legitimate their status and enhance reputation (Gomes I. et al., 2019). According to agency theory disclosure is a tool to reduce agency cost as it contributes to reduction of information asymmetry between the shareholders and the managers. Agency theory posits that disclosure is a mechanism to control managers' performance and that managers disclose information to maintain their position and compensation arrangements (Oliveira, Lima Rodrigues, & Craig, 2006).

Under the signaling theory information asymmetry is reduced by sending signals by party possessing more information to other interested parties. Disclosure of positive information is perceived as the signal about the good performance of a company facilitating its appropriate valuation. Signaling theory posits that highly profitable companies tend to disclose more information to avoid undervaluation of their shares (Oliveira et al., 2006) and to signal their excellence. It is emphasized that the signal should be favorable for the signaler (An, Davey, & Eggleton, 2011) as organizations have little incentives to report negative information (T. A. De Silva, Stratford, & Clark, 2014).

Third main theory in regard to disclosure of information is the legitimacy theory. It concerns the relationship between the organization and society at large. Legitimacy theory assumes that a company disclose information in order to be perceived as legitimate by stakeholders whereby the legitimacy status is crucial for the survival of organization. Companies ought to follow the society expectations and norms to ensure the inflow of capital, labor and customers (An et al., 2011).

It is worth noting that most disclosure literature is devoted to investigate the compliance level with accounting standards (Devalle, Rizzato, & Busso, 2016) but it is not the case of intangible assets. Regarding the intangible assets two approaches - voluntary disclosure research and compliance level with mandatory requirements research - seem to be of the same importance. Liao (2011) investigates the role of stock-based incentives in encouraging more voluntary disclosures about firm-specific intangibles and the impact of corporate governance on these incentives.

His findings suggest that stock-based incentives are positively associated with firm's voluntary disclosure about intangibles. Other studies concentrate on determinants of voluntary disclosure investigating factors that influence the level of information content. According to García-Meca & Martínez (2005) the information about intellectual capital is more specific in larger firms, more profitable and with less debt. These kinds of companies are not only more proactive in their disclosure of intellectual capital information, but are also more transparent in their communication by reporting the information on intangibles in precise and convincing way. Corporate-specific factors such as the adoption of IFRS/U.S. GAAP, industry type, and price-to-book ratio are key influences significantly associated with the level of intangible assets voluntary disclosure (Kang & Gray, 2011). Ibadin & Oladipupo (2015) reveal that age of company and the size of audit firm are positively and significantly related to overall voluntary disclosure of intellectual capital. Kumar (2013) indicates that larger firms, firms with greater ownership dispersion, and firms with lower leverage provide more voluntary disclosure of intangibles what confirms previous results obtained by García-Meca & Martínez (2005). Moreover, it appears that domestic culture does affect the voluntary disclosure of intangibles. Also Kang & Gray (2011) emphasize the influence of country-specific factors, including risks associated with economic policies and legal systems, which are found to be significantly associated with the level of intangible assets disclosure.

These results are consistent with the evidence investigating the country-level determinants of mandatory disclosure. According to the findings obtained by Glaum, Schmidt, Street, & Vogel (2013) the strength of the enforcement system and the size of the national stock market are associated with compliance. Tsalavoutas, André, & Dionysiou (2014) extend these findings by providing evidence that enforcement increases compliance because it incorporates audit components. At the country-level determinants a legal system also seems to be important. Companies form a country with a legal system of French origin exhibit lower level of compliance (countries were categorized as having legal system of English, French, Scandinavian or German origin).

At the company-level researchers indicate various factors that have significant influence on mandatory disclosure: industry, leverage, auditor type (Agyei-Mensah, 2019), financial costs (Devalle et al., 2016) and internationalization level (M. de L. R. Da Silva, Gomes Rodrigues, & Muñoz Dueñas, 2011). Azevedo, Oliveira, & Freitas Couto (2019) report that companies' size is the most influencing factor in their analysis, indicating that larger companies disclose information on intangible assets basically to reduce agency costs, political costs related to their public visibility, and in such a way manage the relationship with their relevant stakeholders.

Research sample and Methodology

The research sample is made up of all companies listed on the Warsaw Stock Exchange (Poland) and belonging to IT sector on 30 June 2019 (31 entities). I chose this branch since intangible assets are material for IT companies so I expected to observe the best practice on the market. I examined individual financial statements (IFS) as well as consolidated financial statements (CFS). Financial years 2012 and 2017 were selected to compare changes in the level of intangible assets disclosure. The research sample consists of all available financial statements prepared in accordance with IFRS (79 financial statements). To investigate the change in disclosure level over time, I decided to use matched pairs of observations for the same reporting entity being examined twice: for the financial year 2012 and 2017 (see Table 1).

Table 1: Research sample

	2012	2017	Total	Paired data
Individual FS	17	21	38	16 pairs
Consolidated FS	17	24	41	16 pairs
Total	34	45	79	-

The disclosure index is computed as a ratio between the sum of disclosure scores for checked items and the maximum disclosure level applicable to a particular financial statement. In other words, disclosure index presents the amount of information disclosed by a company as the proportion of information that shall be disclosed in its case, without penalizing for not disclosing information that is just not applicable.

$$DI = \frac{\sum_1^m d_i}{m}$$

where:

i = item analyzed
di = 1, if item i is disclosed and 0 if item i is not disclosed
m = the maximum number of items a company may disclose

There are 34 mandatory items on my checklist but not all these items must be disclosed by every company. For example if a company does not have any intangible assets acquired by the way of a government grant and initially recognized at fair value, items 24-26 on the checklist are not applicable for it. Thus, the maximum number of items this company may disclose is 31. Following the methodology of Glaum et al. (2013), companies were given the benefit of the doubt when it was not possible to determine whether a disclosure was applicable. In fact, there is no financial statement in the sample for which all items have to be disclosed (m = 34).

To minimize errors of overlooking the disclosure each financial statement was reviewed completely with special attention paid to accounting policy and additional notes about intangible assets. As there is no single accounting policy or pattern of financial statement and notes, it is impossible to make such research fully objectively. I assumed however that my approach is similar to the point of view of a diligent financial statement user. To ensure the reliability and to mitigate researcher bias, I checked every financial statement twice, where the second time was about 1 month after the first time.

Results and Discussion

The first step of my research is the analysis of disclosure of items that are regularly presented or omitted in financial statements. The checklist and the frequency of disclosure are presented in Table 2.

Table 2: Mandatory Disclosures of Intangible Assets – Checklist and the Frequency of Disclosure

Item		Disclosure requirement	% of companies disclosing item 2012	% of companies disclosing item 2017
1		distinguishing between internally generated and other intangible assets	32%	56%
2		whether the useful lives are indefinite or finite	76%	78%
3	for assets with definite useful life	the useful lives or the amortization rates used	68%	82%
4		the amortization methods used for intangible assets with finite useful lives	85%	100%
5		the line item(s) of the statement of comprehensive income in which any amortization of intangible assets is included	24%	38%
6	for assets with indefinite useful life	the carrying amount of that asset	30%	21%
7		the reasons supporting the assessment of an indefinite useful life	5%	18%
8		the gross carrying amount at the beginning of the period	100%	91%
9		any accumulated amortization (aggregated with accumulated impairment losses) at the beginning of the period	100%	91%
10		the gross carrying amount at the end of the period	97%	91%
11		any accumulated amortization (aggregated with accumulated impairment losses) at the end of the period	97%	91%
12	a reconciliation of the carrying amount at the beginning and end of the period showing:	additions - internal development	35%	64%
13		additions - acquired separately	77%	80%
14		additions - acquired through business combinations	78%	83%
15		assets classified as held for sale or included in a disposal group classified as held for sale in accordance with IFRS 5 and other disposals	60%	13%
16		increases or decreases during the period resulting from revaluations	na	na
17		increases or decreases during the period resulting from impairment losses recognized or reversed in other comprehensive income in accordance with IAS 36 (if any)	na	na
18		impairment losses recognized in profit or loss during the period in accordance with IAS 36 (if any)	100%	83%
19		impairment losses reversed in profit or loss during the period in accordance with IAS 36 (if any)	67%	100%
20		any amortization recognized during the period	100%	93%

21		net exchange differences arising on the translation of the financial statements into the presentation currency, and on the translation of a foreign operation into the presentation currency of the entity	50%	33%
22		other changes in the carrying amount during the period	100%	90%
23		a description, the carrying amount and remaining amortization period of any individual intangible asset that is material to the entity's financial statements	na	100%
24	for intangible assets acquired by way of a government grant and initially recognized at fair value	the fair value initially recognized for these assets	na	na
25		their carrying amount	na	na
26		whether they are measured after recognition under the cost model or the revaluation model	na	na
27		the existence and carrying amounts of intangible assets whose title is restricted	26%	29%
28		the carrying amounts of intangible assets pledged as security for liabilities	100%	na
29		the amount of contractual commitments for the acquisition of intangible assets.	100%	100%
30	revaluation model	the effective date of the revaluation	na	na
31		the carrying amount of revalued intangible assets	na	na
32		the carrying amount that would have been recognized had the revalued class of intangible assets been measured after recognition using the cost model	na	na
33		the amount of the revaluation surplus that relates to intangible assets at the beginning and end of the period, indicating the changes during the period and any restrictions on the distribution of the balance to shareholders	na	na
34		the aggregate amount of research and development expenditure recognized as an expense during the period	30%	18%
35	*not required*	*a description of any fully amortized intangible asset that is still in use*	*0%*	*2%*
36		*a brief description of significant intangible assets controlled by the entity but not recognized as assets*	*3%*	*2%*
Disclosure Index			**67%**	**69%**

It may be observed that companies do not use revaluation model while subsequent measurement of intangible assets. This remark confirmed worldwide findings (Agyei-Mensah, 2019; Christensen & Nikolaev, 2013; Kumar, 2013; Oliveira, Rodrigues, & Craig, 2010).

None of the sampled companies is obliged to disclose information about intangible assets acquired by way of a government grant and initially recognized at fair value. Most commonly IT companies benefit by various grants but these are usually by way of cash for financing of research and development activities.

In regard to item 23 I assume that individual material intangible asset is only this one which is recognized separately in a statement of financial position. Only one company recognized such a position disclosing necessary additional information.

There are some items with complete or almost complete disclosure in all financial statements analyzed. Commonly companies disclose the amortization method used (always straight-line), the gross carrying amount and any accumulated amortization at the beginning and at the end of the period.

Some concern arouses the low compliance level of items 6-7 for intangible assets with indefinite useful lives. As indefinite useful life may be considered as an earnings management tool, companies shall explain it very carefully.

It is not the case in my research. While companies disclose accounting policy regarding intangible assets with indefinite useful lives, they rarely indicate their nature, carrying amounts and essentially the reasons supporting the assessment of an indefinite useful life.

It appears that entities just rewrite IAS 38 requirements, often without adapting them to their own specific situation. Such behavior limits the usefulness of a financial statement as its user is not able to assess the potential of intangible assets of a company appropriately.

In the next step I computed the disclosure index (DI) for each financial statement analyzed. Descriptive statistics are presented in Table 3. It indicates that the average compliance level is 68% with only little improvement in 2017 compared to 2012 (69% and 67%, respectively). Considering the rule of giving the benefit of the doubt, it means that the companies report at most only 68% of required information being only partially compliant with IAS 38 disclosure requirements. It confirms previous findings of considerable non-compliance with accounting standards for companies claiming to have adopted them (Agyei-Mensah, 2019; Glaum et al., 2013; Gorgan & Gorgan, 2014). There was no single financial statement with all required information disclosed.

Table 3. Disclosure index - descriptive statistics

DI_2012		DI_2017		DI_Total	
Mean	0,6731	Mean	0,6893	Mean	0,6824
Median	0,6754	Median	0,7222	Median	0,7059
SD	0,1531	SD	0,1781	SD	0,1670
Skewness	-0,1140	Skewness	-1,1766	Skewness	-0,8034
Min	0,4118	Min	0,2000	Min	0,2000
Max	0,9333	Max	0,9375	Max	0,9375
N	34	N	45	N	79

To examine how financial statements of a particular reporting entity changed in 2017 compared to 2012, I use paired samples tests preceded by Shapiro – Wilks normality test. Table 4 give the descriptive statistics with more details and Table 5 summarizes the results.

Table 4. Change in DI - descriptive statistics

Change_IFS		Change_CFS		Change_Total	
Mean	0,0430	Mean	0,0585	Mean	0,0508
Median	0,0183	Median	0,0433	Median	0,0309
SD	0,1209	SD	0,1599	SD	0,1397
Skewness	0,6365	Skewness	0,7221	Skewness	0,7244
Min	-0,1731	Min	-0,2227	Min	-0,2227
Max	0,3382	Max	0,4222	Max	0,4222
N	16	N	16	N	32
DI_2017>DI_2012	10	DI_2017>DI_2012	10	DI_2017>DI_2012	20
DI_2017<DI_2012	4	DI_2017<DI_2012	5	DI_2017<DI_2012	9
DI_2017=DI_2012	2	DI_2017=DI_2012	1	DI_2017=DI_2012	3

where: Change = DI_2017 – DI_2012

I compare the disclosure level separately for individual and consolidated financial statements (IFS and CFS, respectively) and then for all paired financial statements. The average change in disclosure index is about 5pp, indicating some improvement in disclosure level of intangible assets during the research period. In most cases entities report more information in 2017 than in 2012. The change is statistically insignificant separately for IFS and CFS. Nonetheless, for paired financial statements altogether the change is marginally significant confirming slight increase in disclosure level about intangible assets within given research period.

Table 5. Significance of difference and change in DI

Variable	N pairs	Shapiro-Wilk's W statistic	p_{s-w}	Result: Are the differences normally distributed? α=0,05	Chosen test	Statistic	p	Result: Are the differences significant? α=0,05
Change_IFS	16 (14*)	0,9474	.4493	Yes	Student's	1,4212	.1757	No
Change_CFS	16 (15*)	0,9380	.3256	Yes	Student's	1,4643	.1638	No
Change_Total	32 (29*)	0,9432	.0923	Yes	Student's	2,0553	.0484	Yes

** number of differences observed between variables; for the remaining observations DI was the same in 2017 compared to 2012.*

These findings are consistent with some other research. Ragini (2012) proves the significant increase in disclosure level of intangibles (mandatory and voluntary disclosures) in three countries under review: Japan, US and India between 2001 and 2005 (about 8pp for Japanese, 7pp for US, 5pp for Indian companies). Gorgan & Gorgan (2014) find some improvement in DI without checking its significance. However, they indicate that the intangible assets disclosure level is almost constant every year (2010-2012), proving the fact that companies tend to maintain the disclosure of the same information from one year to another and even to copy the same sentences without adapting them to that particular year. These findings support those previously observed by Teodori & Veneziani (2010). Cuozzo et al., (2017) in their structured literature review identify no recent study demonstrating significant trend towards more voluntary or regulatory intellectual capital disclosure in publicly available reports. Some other researchers, although the research period comprises a few years, do not analyze the change in disclosure index over time (M. de L. R. Da Silva et al., 2011). Overall, research findings seem to confirm that there is only little change in the level of disclosure about intangible assets. Some results suggest improvement and other the opposite. However, the fact remains that contrary to the stakeholders' expectations there is no great increase in compliance level even if some improvement is noticed.

Conclusion

There are several practical implications of this study for academics, practitioners and standard setters. The study contributes to the accounting literature on mandatory disclosure and reporting behavior. The results suggest that entities are reluctant while disclosing information about intangible assets. They rewrite information from one year to another and from IAS 38 to the accounting policies without adapting it to their specific. Accounting policy is very often excessively complicated because it includes all possible choices, even though they do not apply to a particular company. As disclosure reduces information asymmetry it is important to maintain high quality of it. Auditors should pay more attention to checking the disclosures. The implications for the standard setters are twofold. Firstly, it should be noted that the revaluation model is not used at all. It has to be considered if it is needed at all, and if so, maybe the requirement of referring to an active market is too strict? Either way, it seems that the current revaluation model unnecessarily complicates the accounting standards. Secondly, as the disclosure requirements are more and more detailed, there is considerable concern about the disclosure overload (Radin, 2007; Saha et al., 2019). Instead of principles-based accounting, IFRS unintendedly transform towards rules-based standards. It should be a priority to make financial statements more user-friendly and at the same time to create stronger enforcement mechanism (for example during the external audit) to encourage companies to expand their disclosure policies.

Research limitations are related to some subjectivity in determining whether a particular disclosure requirement is fulfilled or not. To measure the DI I used a manual technique of content analysis which is related to inherent subjectivity. To limit this concern I analyzed every financial statement twice (the second time 1 month after the first one). Another limitation is relatively small sample size from only one industry – IT. Research findings may not be observed in other industries and samples.

Future research might be conducted within longer research period as well as on larger sample size. This research considers neither determinants of disclosure nor the impact of disclosure on financial market which is the relevant field of research.

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An Empirical Study on Attitude and Behavioral Intention to Use Mobile Learning

Ajitha ANGUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
ajitha.angusamy@mmu.edu.my

Jayanty KUPPUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
jayanty.kuppusamy@mmu.edu.my

Kavitha BALAKRISHNAN
Faculty of Applied Communication, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
kavitha.balakrishnan@mmu.edu.my

Shi Jie LIM
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
1132703119@student.mmu.edu.my

Abstract

The mobile adoption in this study also known as m-learning refers to the use of personal electronic gadgets through the social media and interactions in learning process. The use of new technologies influences young generation, and learning through multimedia and web technology effectively enhances individualised learning which is becoming a popular alternative for formal education. The objective of this paper is to identify the significant determinants of the students' behavioral intention to adopt mobile learning based on the Unified Theory of Acceptance and Use of Technology model. The data was obtained from 300 students through a survey questionnaire. The questionnaire developed includes two sections, the first section consists of the demographic information of the respondents while the second section measures the factors namely the social influence, performance expectancy, effort expectancy, facilitating conditions, attitude and the students' behavioral intention to adopt mobile learning. Partial Least Squares structural equation modelling was used for the data analysis. The present study substantiates the importance of attitude on the behavioral intention to adopt mobile learning (m-learning). The findings revealed that facilitating conditions and social influence have a significant impact on the attitude towards m-learning; however, performance expectancy and effort expectancy does not have a significant impact on the attitude. The study provides prominent implications for the future research and learning apps development.

Keywords: Mobile learning, adoption, attitude, social influence, behavioral intention.

Introduction

Learning process is universal but varies from country to country. In the modern world, several new technological methods are used in learning. E-learning initiates that the learning materials are delivered by the instructor. The traditional, classroom-based teaching is replaced by the technology-based teaching (Chang, Shen & Liu, 2014). As the technology develops, new techniques are developed to suit new technology. Growth in new technology and usage by consumers increases the demand for mobile devices and usage. Mobile devices include smartphone and tablet computer. Learning through these devices can be classified as mobile learning. The mobile adoption in this study also known as m-learning refers to the use of personal electronic gadgets like smart phone, MP3 players, notebook, and tablets which uses social media and interactions for learning purposes (Athanasios & Pantelis, 2017). The use of new technologies influences young generation, and learning through multimedia and web technology effectively enhances individualised learning which is becoming a popular alternative for formal education.

Advantages of using mobile learning (m-learning) include its use anywhere, anytime by anybody, and the users can use different electronic supporting system. M-learning is developing fast and offers great value to learners (Bob Little, 2012). The use of mobile phones has gained popularity among young adults to initiate and maintain social

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relationships (Santhalingam et al., 2011). Mobile learning has attracted the higher education organizations and has been accepted within higher education (Tan et al., 2014). Earlier study suggests that university students generally have a positive attitude towards the use of mobile devices in education and mobile learning (Liaw & Huang, 2015). Mohammad (2016) identified the factors that has significant impact on mobile learning acceptance among the higher education students and concluded that positive attitude has a significant impact on the behavioral intention to use m-learning, Crompton and Burke (2018) also provided a systematic review on the use of mobile learning in higher education. Among the research conducted on m-learning, 50% of the studies are from Asia followed by North America (21%), Europe and Australia (13%) and Africa (3%). The studies also reveal that out of 72 researches conducted all over the world, only one research is conducted in Malaysia. This indicates a need for research on m-learning in the Malaysian context, and stimulated the interest in the current study.

The main objective of this study is to determine the significant factors affecting students' behavioral intention to adopt mobile learning based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The proposed model includes factors like performance expectancy, effort expectancy, facilitating conditions, social influence, attitude and behavioral intention.

Literature Review

Numerous models have been developed in the literature to study the effect of users' attitude and intention to adopt the latest technologies or information systems (Saroia & Gao, 2018). Technology Acceptance Model (TAM) by Davis (1989), is the key model to understand the predictors of behavior towards acceptance of the technology (Marangunić & Granić, 2015), followed by Theory of Planned Behavior (TPB) (Ajzen, 1991), Innovation Diffusion Theory (IDT) by Rogers (1995), and the Unified Theory of Acceptance and Use of Technology (UTAUT) by (Venketesh et al, 2003). Later these models are also applied in the education context. Studies that used TAM and modified models are Alharbi & Drew (2014), Hsu and Chang (2013) and Park et al., (2012) Khanh and Gim (2014). In particular, studies that addressed m-learning using UTAUT models include Liu (2008), Lowenthal (2010), Iqbal and Qureshi (2012), and Abu-A-Aish (2013). These studies revealed that performance expectancy, effort expectancy, social influence are significant factors of behavioral intention of m-learning acceptance.

The usefulness of m-learning, such as real time access, anytime, anywhere by anybody at their convenience, may improve the individual's learning efficiency, and improve their attitude towards learning. Earlier studies demonstrated the relationship between attitude and behavioral intention (Yu & Yu, 2010, Gan et al, 2017). Attitude is found to positively affect behavioral intention. The learner should have consistent attitude and eagerness towards learning and have state of mind to receive such learning materials. Attitude towards use of mobile apps depends on emotion, familiarity, frequency and eagerness, awareness of the importance of such apps and usability of the devise (Harrison et al. 2013). Student perceived mobile apps as a good source of fun and pleasures (Yang, 2013). Therefore, using the apps devise can help in achieving and increasing the output. College students are increasingly using mobile devices in their studies in or outside the classroom (Reychav et al, 2015) because mobile learning allows better flexibility and joy for the learners beyond their regular school hours (Anshari et al, 2016).

Performance Expectancy (PE) is defined as "the degree to which using a technology will provide benefits to consumers in performing certain activities" (Venkatesh, et al, 2012) or performance expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al, 2003; Kong et al, 2013). Users are ready to pay for downloading new apps if the apps bring them values like improved performance in their studies (Kang, 2014). Studies by Ju et al, (2007), Jairak et al., (2009), Khanh and Gim (2014), Sario and Gao (2018) found PE to be a significant factor of attitude towards m-learning.

Effort expectancy is "the degree of ease associated with the use of the system" (Venkatesh et al, 2003). An information system that is being used and perceived by people on the level of how easy it can be used is Effort Expectancy (Samuel & Hillar, 2014). From the previous model, the three constructs on the concept of effort expectancy are complexity, usability and also perceived usability relate. The effort expectancy is likely to most strongly affect behavior during the initial and early stages of mobile use of academic or library content, and is expected to decline over time as user gain more experience (Jambulingam, 2013). Li et al., (2008), Gao et al., (2014), Saroia and Gao (2018) in their studies found a significant relationship between effort expectancy and attitude.

The degree of user's perception towards the support and resource available in performing a behavior refers to facilitating conditions (Venkatesh et al, 2003). Iqbal and Qureshi (2012) found a significant relationship between facilitating conditions and attitude; however, Jairak et al. (2009) found that facilitating conditions does not have a significant effect on the attitude. Furthermore, past experiences and age can influence facilitating conditions on

usage. Thus, the more the experience of using the mobile learning, the stronger the effect. If no performance expectancy and effort expectancy are presented, facilitating conditions is also an important predictor.

Social value can be inferred as a person or an individual's motive of buying and using a product or even a service which depends on how they wish to see themselves or others. The individuals can disclose their self-image openly to others through their product purchasing and usage. Both old and young generations use mobile apps and consider them as trendy, and they use mobile apps to promote their self-image. Social value can be generated through friends or even through family members of the users by adopting mobile apps for learning purposes. An individual will be influenced by his/her friends or family members when they communicate with each other (Guo, 2014). By joining a social community, people will be influenced by others or even influence others of their social value. Social influence has been considered as a crucial element for decision making in sociology and behavioral science.

Fishbein and Ajzen (1975), who are the founder of the first behavior intention idea, describe intention as "the motivational factors assumed to capture and influence behavior". Behavioral intention is individual's intention to perform a given act which can predict corresponding behaviors when an individual act voluntarily (Nurdan & Nandy, 2015). According to Naincie et al. (2016), the intention of students to use mobile apps to learn a language through mobile apps is affected by their perception of ease and usefulness of mobile apps. This perspective then directly influences their behavioral intention of using mobile apps for learning.
Based on the above studies, the following hypotheses are developed.

H_1: Attitude has a positive impact on behavioral intention towards m-learning.
H_2: Performance Expectancy has a positive impact on the attitude towards using m-learning
H_3: Effort Expectancy has a positive impact on the attitude towards using m-learning.
H_4: Facilitating conditions has a positive impact on the attitude towards using m- learning.
H_5: Social Influence has a positive impact on the attitude towards using m-learning.

Methodology

Convenience sampling method was used to collect the data through survey questionnaire. The target population were the university students from different education levels namely foundation, diploma, undergraduate and postgraduate. The target respondents come from all over the country and consist of different races, backgrounds and religions to closely well represent Malaysia's population. A total of 300 responses were obtained. The questionnaire developed includes two sections: the first section consists of the demographic information of the respondents, while the second section measures the factors namely the social influence, performance expectancy, effort expectancy, facilitating conditions, attitude and the students' behavioral intention to adopt mobile learning. Partial Least Squares structural equation modelling was used for the data analysis.

Data Analysis and Findings

Demographic Profile

The results of the data analysis show that out of 300 respondents, 55% of the respondents were females and 45% of them were males. Majority of the respondents (64%) belonged to the age group of 22 and above, followed by 30% in the age group of 18 to 22, and 6% of the respondents in the age group of 13 to 17. 57% of the respondents were Chinese, 31% Malays and the remaining 12% belonged to the Indian ethnic group. In terms of education level, most of the respondents were pursing their Bachelor degree students (67%), followed by diploma and pre-university with 33% each, and 11% of the respondents were postgraduate students.

Structural Equation Modelling

Partial Least Squares structural equation modelling was used to test the hypotheses. Data analysis using the Smart-PLS was conducted in two stages. In the first stage, the measurement model was tested for its convergent and discriminant validity in order to ensure that the measured variables in the model are reliable. Then, the model was assessed to identify how well the variables were associated with one another.

Measurement Model

Values as shown in Table 1, the obtained Cronbach's alpha coefficient is more than 0.7 for all factors; therefore, the scales are deemed to be acceptable. The results shown in Table 1 indicate that the factor loadings of all the items are more than 0.7, except EE2 (0.665). However, the item is retained due to its contribution to the content validity. Two items FC3 and SI5 with standardised factor loading less than 0.7 were deleted. The AVE obtained are in the range of 0.586 and 0.697, and the CR values are within the range of 0.85 to 0.92. Thus, the convergent validity is adequate as suggested by Hair et al., (2017). Discriminant validity is assessed by using the Fornell-Larcker (1981) criterion and Heterotrait-monotrait (HTMT) (Henseler et al., 2015). The results show that all the variances extracted by the constructs (diagonal values) are more than the correlation coefficients between the constructs (off-diagonal values) indicating an adequate discriminant validity. Furthermore, the results shown in Table 3 fulfil the criterion of $HTMT_{0.9}$(Gold et al, 2001), and the $HTMT_{inference}$ that does not show the value of 1 in the confidence interval confirms the discriminant validity.

Table 1: Measurement Model

Factors	Items	Loadings	Cronbach's Alpha	CR	AVE
Attitude	AT1	0.833	0.878	0.911	0.671
	AT2	0.829			
	AT3	0.803			
	AT4	0.799			
	AT5	0.831			
Behavioral Intention	BI1	0.905	0.89	0.92	0.697
	BI2	0.797			
	BI3	0.813			
	BI4	0.874			
	BI5	0.777			
Effort Expectancy	EE1	0.745	0.831	0.876	0.587
	EE2	0.665			
	EE3	0.801			
	EE4	0.825			
	EE5	0.785			
Facilitating Conditions	FC1	0.792	0.765	0.85	0.586
	FC2	0.784			
	FC4	0.701			
	FC5	0.782			
Performance Expections	PE1	0.791	0.836	0.883	0.603
	PE2	0.771			
	PE3	0.802			
	PE4	0.741			
	PE5	0.780			
Social Factors	SF1	0.829	0.796	0.867	0.621
	SF2	0.744			
	SF3	0.855			
	SF4	0.715			

Table 2: Discriminant Validity Using Fornell Lacker Criterion

	1	2	3	4	5	6
1. Attitude	**0.819**					
2. Behavioral Intention	0.729	**0.835**				
3. Effort Expectancy	0.544	0.658	**0.766**			
4. Facilitating Conditions	0.67	0.719	0.721	**0.766**		
5. Performance Expectancy	0.539	0.655	0.479	0.578	**0.776**	
6. Social Influence	0.605	0.608	0.418	0.553	0.714	**0.788**

Table 3: Discriminant Validity Using HTMT Criterion

	1	2	3	4	5	6
1. Attitude						
2. Behavioral Intention	0.811 $CI_{0.9}$(0.741,0.86)					
3. Effort Expectancy	0.584 $CI_{0.9}$ (0.47,0.67)	0.729 $CI_{0.9}$(0.63,0.81)				
4. Facilitating Conditions	0.806 $CI_{0.9}$ (0.73, 0.87)	0.861 $CI_{0.9}$ (0.79,0.91)	0.887 $CI_{0.9}$ (0.82,0.94)			
5. Performance Expectancy	0.615 $CI_{0.9}$ (0.53,0.69)	0.757 $CI_{0.9}$ (0.67,0.83)	0.575 $CI_{0.9}$ (0.41,0.70)	0.709 $CI_{0.9}$ (0.60,0.79)		
6. Social Influence	0.704 $CI_{0.9}$ (0.63,0.77)	0.692 $CI_{0.9}$ (0.62,0.76)	0.481 $CI_{0.9}$ (0.33,0.62)	0.699 $CI_{0.9}$ (0.59,0.78)	0.856 $CI_{0.9}$ (0.79,0.90)	

Structural Model and Hypotheses Testing

Structural model developed using the Smart PLS is shown in Figure 1. Bootstrapping procedure with a resample of 5000 as suggested by Hair et al., (2017) was used to test the hypotheses and the results are presented in Table 4.

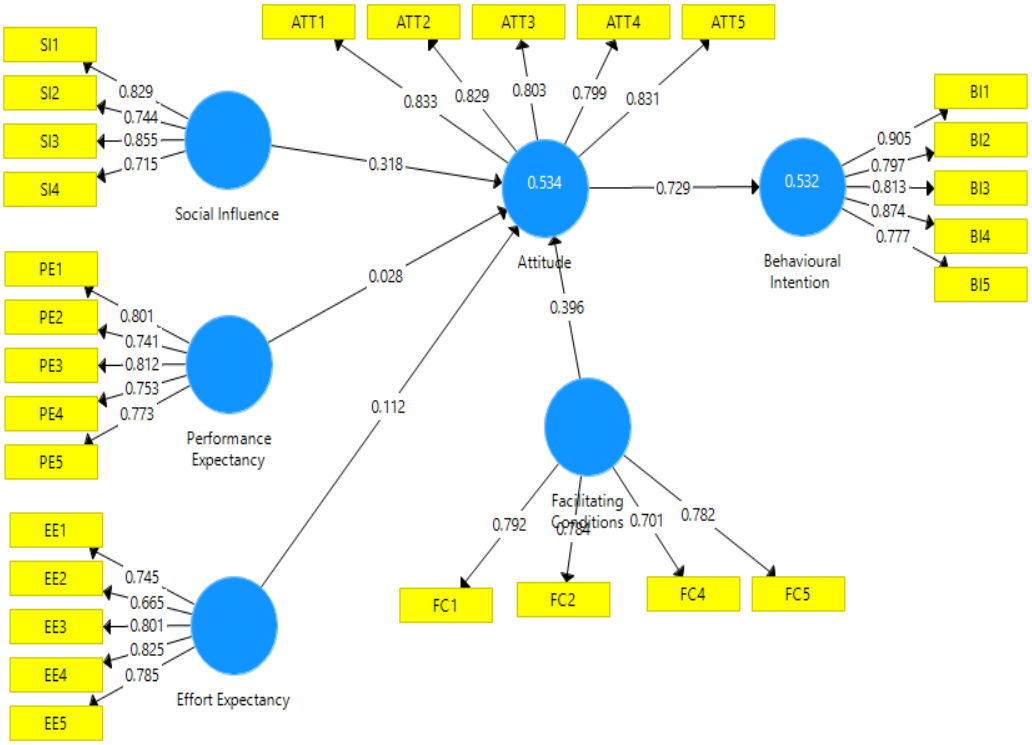

Fig. 1: Structural Model

The R^2 value for behavioral intention is 0.534 and for the model to predict the attitude is 0.532, which means that 53.4% of the variation in the behavioral intention can be explained by the attitude, and 53.2% of the variation the attitude can be explained by the variations in the predictors. Since the coefficient for the attitude is positive and p-value less than 0.001, attitude has a positive impact on the behavioral intention to use mobile learning. Furthermore, social influence and facilitating condition have a positive effect on the attitude, while the performance expectancy and effort expectancy does not have a significant impact on the attitude. Moreover, the effect size f^2 for all the

significant variables are more than 0.02. Predictive relevance for the model is assessed using the blind folding procedure. Since the Q^2 for both the models are greater than zero as suggested by Hair et al., (2017), the models have predictive relevance.

Table 4: Results of Partial Least Square

H	Relationship	Beta	t-value	P Values	Decision	R^2	Q^2	f^2	VIF
H1	Attitude → Behavioral Intention	0.729	20.819	0	Supported	0.534	0.353	1.135	1
H2	Performance Expectancy → Attitude	0.028	0.462	0.644	Not supported			0.001	2.289
H3	Effort Expectancy → Attitude	0.112	1.593	0.111	Not supported			0.013	2.108
H4	Facilitating Conditions → Attitude	0.396	5.459	0	Supported			0.132	2.557
H5	Social Influence → Attitude	0.318	4.684	0	Supported	0.532	0.363	0.1	2.171

Discussion and Conclusion

In achieving the objective of the mobile learning in educational programme, it is important to understand the dimensions that affects the students' attitude and behavioral intention with regards to mobile learning. The current study intends to identify the effect of performance expectancy, effort expectancy, facilitating conditions and social influence on the attitude and the impact of attitude on the behavioral intention towards mobile learning among higher education students. Attitude is found to have a significantly positive impact on behavioral intention towards mobile learning. The findings are consistent with the studies by Yu and Yu (2010), Gan et al., (2017), Saroia and Gao (2018). This shows that students with positive attitude are more willing to adopt the mobile learning.

The results indicate that performance expectancy does not have a significant impact on the attitude towards m-learning contradicting the studies by Jairak et al., (2009), Ngo and Gim (2014), Saroia and Gao (2018). This shows that the students in this study intend to use m-learning not because they think it will help them to perform better. Another factor that does not have significant effect on the attitude is the effort expectancy. The findings are inconsistent with the studies by Li et al, (2008), Gao et al., (2014), Saroja and Gao (2018); however, quite similar to findings by Khanh and Gim (2014). The findings show that technology restrictions do not influence the attitude towards m-learning.

Facilitating conditions found to have a significant impact on the attitude in contrast to the findings of Jairak et al's (2009) study. Although the performance expectancy and effort expectancy are found in the model, they are found to have insignificant effect on the attitude; findings show that facilitating conditions are important in order for the students' attitude towards m-learning. Another factor that has a significant impact on the attitude is the social influence. The findings are consistent with the studies by Jairak et al., (2009), further supported by Abu-Al-Aish (2013) and Guo (2014), which indicates that social value has an influence on the adoption of mobile aps and other technical devices.

Through this study it can be concluded that facilitating conditions and social influence have a positive impact on attitude towards m-learning, whereas, performance expectancy and effort expectancy do not have a significant impact on the attitude towards m-learning. Furthermore, this study also reveals that attitude has a significant positive impact on the behavioral intention towards m-learning. The implications of the study illustrate that due to the exposure of the modern technology, students do not consider performance expectancy and effort expectancy as important factors for their attitude towards m-learning which in turn does not have any impact on their behavioral intention. Since facilitating conditions and social influence play a vital role in the attitude, academics and university management should motivate the students and also provide support in terms of technical assistance and ensure that students can use m-learning efficiently. This study is carried to gauge the students' perspective, hence, future studies may be done on teachers' perspective. Since not many studies have been carried out in Malaysia, more research can be done by including other variables such as academic relevance, students' academic performance and personal innovativeness.

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The Determinants of Malaysian Consumers' Green Products Purchase Decision

Jayanty KUPPUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
jayanty.kuppusamy@mmu.edu.my

Ajitha ANGUSAMY
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
ajitha.angusamy@mmu.edu.my

Kavitha BALAKRISHNAN
Faculty of Applied Communication, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
kavitha.balakrishnan@mmu.edu.my

Yi Hern TAN
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Malacca, Malaysia,
1141128648@student.mmu.edu.my

Abstract

Concern for the environment has been growing over the years. One area of concern is the awareness towards green product. A number of studies have been done on the green product purchase decision. However, limited studies have been done from the Malaysian perspective. Therefore, the current study's purpose is to examine which factors influence consumers' green product purchase decision of Malaysian consumers. The respondents are Malaysian adults and data was collected from 181 respondents. The factors studied include social influence, green product experience, supporting environmental protection, drive for environmental responsibility and attitudes toward green purchasing. The result indicates all except for supporting environmental protection, influences the green products' purchase decision. Therefore, marketers of green product should focus on these factors in order to encourage increase in purchase of green products.

Keywords: Purchase Decision, Social Influence, Green Product Experience, Environmental Protection.

Introduction

Studies related to environment such as green product, ecological product, environmental sustainability has increased over the years since the concern for the environment is more widespread now. According to Braga Junior et al. (2014) the current consumerism of modern society affected the industry, retailers and consumers. Previous studies were done in Brazil (Braga Junior et al., 2014), India (Mishal et al., 2017; Bukhari et al., 2017; Kumar & Ghodeswar; 2015), Finland (Tarkiainen & Sundqvist, 2005), Switzerland (Tanner & Kast, 2003), Hong Kong (Lee, 2009; 2010). Comparative studies are also done such as Maram (2007) who did an East-West comparison study, Chan and Lau (2002) who did a comparative study between American and Chinese consumers. The studies in Malaysia include Mohd Nazri et al. (2016), Hasan and Ali (2015), (Nizam, 2011), (Ismail, 2015) and (Zakersalehi, 2012).

This shows the studies done is limited from a Malaysian context compared to the importance of the area of research. Therefore, this research will study on consumers' green product purchase decision and looking into factors such as social influence, green product experience, supporting environmental protection, drive for environmental responsibility and attitudes toward green purchasing to study on their influence towards consumers' green product purchase decision.

Literature Review

Researchers in green marketing research are focused in studying on green consumers decision in purchasing green products. Those who purchase green products are referred to as green consumers. Therefore, when consumers consider how their consumption pattern impact the environment and due to that are willing to change their behaviour

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on purchasing, these consumers are called green consumers (Luzio & Lemke, 2013; Ritter et al., 2015). Green purchase decision is influenced by factors such as values, attitudes, information among others (Kumar & Ghodeswar, 2015). Albayrak et al. (2013) indicated that green purchase decision is related to supporting green companies, involves looking into environmental issues in purchasing green products as well as conform to the social condition. In addition, green purchase behaviour is also looking into the adoption of sustainable consumption practices (Gadenne et al., 2011; Young et al., 2010) and possibility of spending more to purchase products (Hasan & Ali, 2015*;* Essoussi & Linton, 2010).

Social Influence

According to Wahid (2011) social influence is proxy of subjective norm. Due to the impact of social influence there will be difference on how an individual acts or practices (DeLamater, 2010). Among the groups said to have social influence are companions, family, teachers, managers, proficient associates, specialists and the media (Klobas, 2001). Similar opinion is provided by Maram (2007). This is because according to Qader and Zainuddin (2011) various information regarding the product are received and shared during the interaction process. The evaluation on the product value is done continuously based on the input in the social system where comments and opinions are posted (Peattie, 2010; Tarkiainen & Sundqvist, 2005). Based on the research of Barr and Gilg (2006) and Young et al. (2010), most of the consumers in developed country have the perception on the need to adopt green lifestyle as the way to life now. Thus, through deciding to purchase green product indicates their self-image as well as their concern on the environment which also conform to the perception socially (Jamal & Goode, 2001; Qader & Zainuddin, 2011). However, Mohd Nazri et al. (2016) found social circle's relationship with green product purchase decision in Malaysia which is a developing country is insignificant. Nevertheless, a number of studies found that the social influence will affect the consumer's green product purchase decision (Kong et al., 2014; Zhu, 2013). Based on this, the following hypothesis is formulated:

H1: Social influence has significant effect on consumers' green product purchase decision.

Green Product Experience

Green Product Experience refers to learning and gaining knowledge about the product which includes ingredients, impact of product on the environment, functionality of the product among others (Laroche et al., 2001). This is supported by (Luzio & Lemke, 2013; Ritter et al., 2015). According to Khare (2014) friends also share among themselves their knowledge and the information they have regarding the green products. In addition they also learn from each other. This is also reported by an earlier study by Cheah and Phau (2011). Chen (2010) and Mobley et al. (2010) pointed out that one of the reasons that consumers purchase green products is because of their experience and knowledge about them. According to Cegarra-Navarro and Martinez (2010), due to the learning process, consumers are able to evaluate the product and know about the environmental benefits of green product which makes them to have better predisposition on it. All this effects their purchase decision, make the right choice and thus, are willing to pay higher for green products (Zhou et al., 2014). Other studies that support the that green product experience has a positive relationship with the purchase behavior are D'Souza et al. (2006), Kim and Chung (2011) and Oliver and Lee (2010). Kumar and Ghodeswar (2015) and Bukhari et al. (2017) found that green product experience has significant impact on green purchase decision although Mohd Nazri et al. (2016) found the results to be insignificant between the two factors. Therefore, the following hypothesis is developed:

H2: Green product experience has significant effect on consumers' green product purchase decision.

Supporting protection of environment

Being environmental friendly and conscious of the environmental sustainability is referred as being supportive of the protection of the environment (Barr & Gilg, 2006) Gadenne et al. (2011) pointed out that consumers become environmentally friendly in their purchase decision where they are protective of the environment. An earlier research by Lee (1990) states that consumers search for attributes that are environmentally friendly and make a difference towards environmental protection. The attributes can be in terms of product design or usage. Escalas and Bettman (2005) further indicated the products should not cause harm to animals or nature, are recyclable and causes less pollution when used. They recognise how green products play a role in increasing the quality of the environment and in turn purchase and own green products. According to Pickett-Baker and Ozaki (2008) the consumers are able to link that higher price of green products since there is will be environmental benefits through their usage. They see their lifestyle is connected to green product in a way that is environmentally friendly. According to (Han et al., 2010) consumers shows their predisposition on being environmental supportive through actual purchase of environmentally friendly products. This occurs when there is a preference on green products compared to the non-green products. Both Kumar and Ghodeswar (2015) and Bukhari et al. (2017) found supporting the protection of the environment influences the green product purchase decision. Therefore, the following hypothesis is developed:

H3: Supporting protection of environment has significant effect on consumers' green product purchase decision.

Drive for environmental responsibility

Drive for environmental responsibility refers to the commitment of customers on issues related to environmental protection. This is in addition to individual activities which can improve the environmental quality (Kumar & Ghodeswar, 2015). According to Gadenne et al. (2011), consumers know the need of their reasonability towards protection of the environment. Failure to do so will negatively affect all living being. Lee (2008, 2009) and Griskevicius et al. (2010) pointed out consumers will be emotionally involved in environmental protection and engage in conservation of the environment respectively. Kumar and Ghodeswar (2015) and Bukhari et al. (2017) found that drive for environmental responsibility influence green purchase decision. Therefore, the following hypothesis is developed:

H4: Drive for environmental responsibility has significant effect on consumers' green product purchase decision.

Attitudes toward green purchasing

Attitude based on the Theory of Planned Behaviour (TPB) can shape the actual behavioural action (Ajzen, 1991). Attitude refers to activities' consumer take in their behavior towards purchase (Ajzen, 2001). It is a quick evaluation of a psychological object which can be positive or negative. The results of the studies on attitude are mixed. Numerous studies are done to identify the role of attitude towards that green product buying behavior (Arvola et al., 2008; Smith & Paladino, 2010; Tarkiainen & Sundqvist, 2005). It is found the relationship is weak in terms of the attitude of consumers toward purchasing green products as well as the actual purchase behaviour (Tanner & Kast, 2003; Vermeir & Verbeke, 2008; Wheale & Hinton, 2007). Mishal et al. (2017) indicate that the attitude relationship towards green behavior is significant but the relationship with purchase behaviour is insignificant. However, green purchase attitude eventually leads to green purchase behaviour and it said that for a better understanding there is a need to extent the study in other parts of the world (Chen, 2007; Chan & Lau, 2002). Therefore, there is a need to study from a Malaysian context. Therefore, the following hypothesis is developed:

H5: Attitude towards green purchasing has significant effect on consumers' green product purchase decision.

Methodology

The research design of this study is the quantitative method. The respondents of this study focused on Malaysian adults. Convenience sampling is used to select the respondents. The instrument used to gather the data is through the questionnaire survey. The questionnaire is divided into three sections which are the demographic profile of the respondents, their view on the factors studied such as social influence, green product experience, supporting environmental protection, drive for environmental responsibility and attitudes toward green purchasing and finally on the dependent variable which is green products' purchase decision. The research framework is presented in Figure 1. The questions were adapted mainly from past literatures; Kumar and Ghodeswar (2015), Taylor and Todd (1995) and Wang (2014). A total 200 questionnaires are distributed to the target respondents and 181 questionnaires were received. The method of face-to-face is utilized for it and this technique would be able to reduce the doubts of the respondents. Data collect is analysed through the SPSS software and multiple regression was used to test the hypotheses.

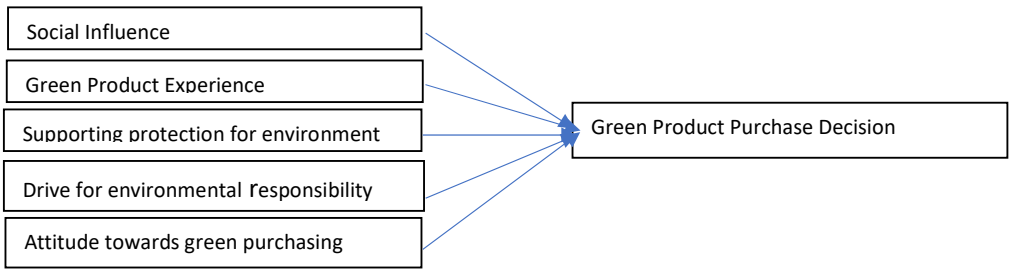

Figure 1: Research Framework

Results

The demographic profile of respondents is presented in Table 1. Out of the total respondents of 181, 58% are male compared to 42% female. Majority of the respondents are in the age group of 21-30 years old (54.1%), followed by 31-40 years old (21%) while the lowest is from the age group of 51 years and above (1.7%). Respondents who are single is more than those who are married, which is 74% and 23.2% respectively, while those who are divorced represents 2.8%. In terms of ethnicity, the highest number are Chinese (52.5%) followed by Indian (27.6%) and Malay (17.1%) and others (2.8%). Respondent in the Bachelor level are the majority at 64.1%, followed by Diploma (25.4%).

Table 1: Profile of respondents

Demographic Characteristics	N	%
Gender		
Male	105	58
Female	76	42
Age		
Below 20	28	15.5
20-30	98	54.1
31-40	38	21.0
41-50	14	7.7
51 and above	3	1.7
Marital Status		
Single	134	74
Married	42	23.2
Others	5	2.8
Race		
Malay	31	17.1
Chinese	95	52.5
Indian	50	27.6
Others	5	2.8
Education		
SPM	6	3.3
Diploma	46	25.4
Bachelor	116	64.1
Masters	10	5.5
Others	3	1.7

Multiple regression analysis is used to test the hypotheses. The result is presented in Table 2. The r-square value is 0.552 which means that 55.2% of the total variation in consumer's green product purchase decision is explained by variables tested such as social influence, green product experience, supporting environmental protection, drive for environmental responsibility and attitudes toward the green purchasing. In addition, the F value is 43.046 and the significance value for F-test is 0.000. This indicates that the overall model is significant. This also means that at least one of the variables is significant in this study. The variables that are found to influence green product purchase decision are social influence (B= -314, p value =0.004), green product experience (B=0.169, p value =0.038), drive for environmental responsibility (B=0.326, p value =0.022) and attitudes toward the green purchasing(B=0.436, p value =0.000). This means H1, H2, H4 and H5 are supported. However, supporting environmental protection was found not to influence green product purchase decision. Therefore, H3 is not supported.

Table 2: Results of Multiple Regression Analysis

R = 743	R square=0.552	Adjusted R Square= 0.539	F = 43.046	Sig value = 0.000
Variables	B	t	Signficance	Results
Constant	.528	2.457		
SI	-.314	2.889	-.004*	Supported
GPE	.169	2.096	.038*	Supported
SPE	.116	0.849	.397	Not Supported
DER	.326	2.309	.022*	Supported
ATG	.436	3.646	.000*	Supported

Dependent variable: Green Product Purchasing Decision

Social influence (SI), Green product experience(GPE), Supporting protection of environment (SPE), Drive for environmental responsibility(DER), Attitudes toward the green purchasing(ATG).

Discussion and Conclusion

Research on environmental issues such as green marketing has increased over the years. Due to such attention, the need to identify the factors influencing green product purchase decision have motivated researchers to study on the area. This research's objective was on identifying the factors influencing consumers' green product purchase decision in Malaysia. Factors such as social influence, green product experience, supporting environmental protection, drive for environmental responsibility and attitudes toward green purchasing are considered and tested on their influence towards consumers' green product purchase decision.

The result found that out of the five factors study, four factors (social influence, green product experience, drive for environmental responsibility and attitudes toward green purchasing) influence consumers' green product purchase decision. Social influence has been found to have a significant negative relationship with consumer's green product purchase decision. This finding is different from another study done by Mohd Nazri et al. (2016) in Malaysia where the relationship is found to be insignificant. Although majority of the studies found social influence to have relationship with the consumer's green product purchase decision (Kong et al., 2014; Zhu, 2013), there are a few studies that showed societal norm to have negative influence with green purchase behavior (Connell, 2010; Lee, 2011). This is probably because consumers are not totally dependent on the view from the social groups. In fact, the more it is being said on the product, the less the consumers take into consideration to influence their purchase decision on the green product.

The findings of the study found the relationship between green product experience and consumer's green product purchase decision is positive and significant. Therefore, green product experience significantly influences the consumer's green product purchase decision. According to Cegarra-Navarro and Martinez (2010), consumers are able to evaluate the product and know about the environment benefits of green product due to the learning process. The finding of the study is line with previous studies by Kumar and Ghodeswar (2015) and Bukhari et al. (2017) where it is found that green product experience has significant impact on green purchase decision. In terms of drive for environmental responsibility, the study found there is a significant relationship between drive for environmental responsibility and consumer's green product purchase decision. Therefore, drive for environmental responsibility significantly influences the consumer's green product purchase decision. Previous studies that support the current study finding include Kumar and Ghodeswar (2015) and Bukhari et al. (2017) who found that drive for environmental responsibility has significant impact on green purchase decision. There is also a significant relationship between attitudes toward green purchasing and consumer's green product purchase decision. This means attitudes toward green purchasing does significantly influence the consumer's green product purchase decision. The finding of the study is supportive of views by Chen (2007) Chan and Lau (2002) where green purchase attitude will eventually lead to green purchase behaviour.

However, there is a no significant relationship between supporting environmental protection and consumer's green product purchase decision. This result of this research is in accordance with the finding by Mishal et al. (2017) where the consumers' environmental consciousness does not lead to green purchase intention. Earlier research by Kuhl and Beckman (1985) found cognition and behaviour's link is weak. According to them the behaviour may not be

consistent with beliefs, values, attitudes or intentions. According to Braga Junior and Silva (2013) and Braga Junior et al. (2014) showing concern for the environment is not related to green consumption or purchase of green products.

This study has contributed to the existing literature. It is critical that the firms that is involved in green products to focus on enhancing their social media to encourage green product purchase decision. However, the firms must ensure the content and the reputation of the social influencer can attract the target customers. Using reputable experts or personalities can assist customers to relate green products with environmental sustainability. By sharing such information, it can help to improve the usage of green products. Information on green product experience is essential since it can influence the green product purchase decision. Firms should identify which information are critical from the point view of customers. Only then the information can be tailored according to the needs of the target customers. Emphasis on the benefits, sharing of usable features, instructions are among the information to be considered. Firms should also identify their target customers appropriately. This is because those who support environment sustainability, are the ones that are likely to be potential customers. The more positive the attitude towards green purchasing, there is a higher chance that they will make the green product purchase decision. Therefore, the marketing methods of the green product should be attractive and convincing to ensure there is a positive feeling towards green product and this can lead to purchase of the green product. The study has some limitations. One of the limitations is the sample size which is recommended to be increased for future studies. Future study may include qualitative method or mixed mode. Other suggestions include to study on barriers to green products' consumer purchase decision.

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The Use of Optical Current Transformers In The High Voltage Grids

Silvia – Carmen VASILE
CNTEE Transelectrica S.A., UNO – DEN DET Bucuresti Bucharest, România
silvia.popescu@transelectrica.ro

Madalina ARHIP – CALIN
Departamentul Sisteme Electroenergetice, Fac. Energetica, Universitatea
Politehnica din București Bucharest, România,
madalina.arhip@upb.ro

Catalin URCAN
Department of Electrical Engineering and Information Technology,University of Medicine
Pharmacy Sciences and Technology Târgu Mureș, Romania
catalin.urcan@umfst.ro

Valentina ROHAT
Departamentul Sisteme Electroenergetice, Fac. Energetica, Universitatea
Politehnica din București Bucharest, România,
valentinarohat@yahoo.ro

Abstract

Optical Current Transformers (OCT) have been developed as an alternative to traditional current transformers. Significant improvements were achieved in these last years in order to find a suitable alternative to the classic measurement instruments. The development of digital technology has impacted power systems as well. Optical current transformers are an example of digital system applications in power systems. They have become more available and continue to develop over time. They are also called electronic transformers since their hardware is based on electronics. Optical transformers not only provide high accuracy but also eliminate the saturation problem that magnetic classical current transformers face. The following paper will show the use of such optical current transformer within o high voltage substation from the Romanian National Grid.

Keywords*:* Optical Current Transformers, Grid, Power Systems .

INTRODUCTION

Traditional measurement and protection systems within a substation consist of measurement transformers, such as magnetic current transformers (CT) and voltage transformers (VT). Measurement transformers are used for conversion of voltage and current from one level to another [1-7]. The primary sides of the conventional transformers are supplied by the network voltage and current [8-14]. The secondary side supplies the protection relays and/or energy measurement systems [15,16]. Signals generated by the measuring transformers are transported through electrical cables to the substation control room [17-21].

The Romanian National Transport System Operator, Transelectrica, according to its procedures and guidelines emsures granting acces to the electricity network to all paticipants. Therefore, it is imperative to know and define all energy transits between the public electric network, under the management of TSO Transelectrica and consumers and/or energy producers. [2,22,23] This is the reason why, within the substations, there have been installed protection relays but also electrical meters for settlement at the point of the electricity network where the electricity metering unit is installed [24-29].

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At this moment, within the Romanin power system grid, there are two electrical substantions, in which optical current transformers are installed [30-33]. They are operating at the same time and with the same purpose as the conventional magnetic current transformers [34].

The substations in discussion are 220/110/20 kV Targoviste substation and the 220/110/20 kV Turnu Magurele substation. The optical current transformers are installed in the 110 kV voltage substations and are connected in series with the conventional current transformers for metering applications.

This began as a testing process in order to compare and verify the stability and performance of the optical technology within the Romanian power grid network.

Instrument transformers used in power systems, especially those used for metering applications, must maintain stability of measurement over time, and through different environmental conditions.

The changing of scale factor due to temperature, or scale factor drift over time and contributes to less than intended metering accuracy, impacting revenues and it may require continual calibration of revenue meters.

Some conventional instrument transformers, especially CCVTs, and some polarimetric-based optical sensor systems have experienced a drift in accuracy as they age, and due to temperature conditions.

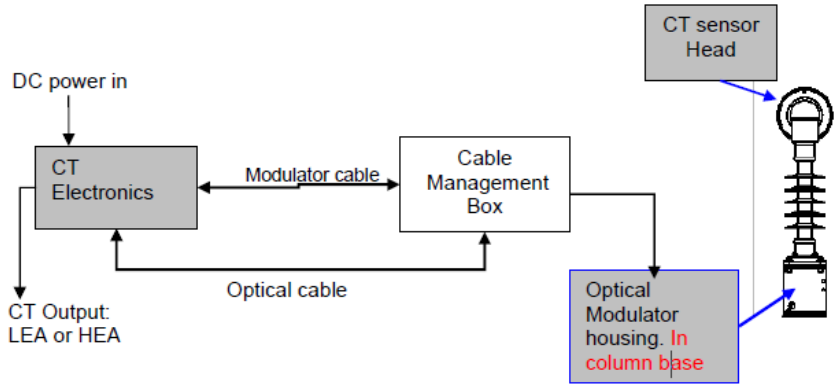

Fig. 1: NXCT single phase Diagram

The NXCT has two major classes noted as Active or Passive. The Active NXCT is designed for metering applications. The Passive NXCT is designed for protection applications only.

The paper analyzed the connection diagrams of the NXCT optical transformers and some the learnt lesson from using the optical technology within the substation metering applications [35].

FIBER OPTIC CURRENT SENSOR OPERATION PRINCIPLES

The NXCT is a fiber optic current sensor, which produces a low voltage output in direct proportion to the primary current on the bus. This secondary voltage output can be converted to a current output using a precision trans-conductance amplifier. The system derives its measurement based on a phase shift between two optical signals in the measurement fiber that is created by the primary bus current. The sensor offers many advantages over existing types of high current measurement devices including:

- High performance sensor design
  - o True current measurement
  - o High accuracy, linearity, & stability over temperature
- No geometric dependence allows sensors to be placed anywhere around the bus
- Light weight fiber-optic design allows ease of installation & maintenance
- Sensor is immune to nearby magnetic fields. [3]

The Active NXCT is a highly linear, highly accurate fiber optic current sensor, which measures AC and DC bus currents up to 4000A for AC applications. There are three main components to the sensor: CT Electronics, Optical Modulator Box and the Sensing Loop.

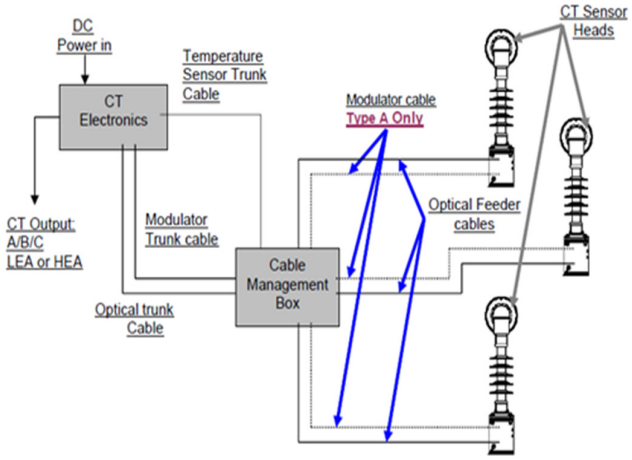

Fig. 2. NXCT Diagram

The CT Electronics provide the intelligence for the sensor. The sensor module, inside the sensor chassis, contains a light source and circuitry to interrogate the return signals to derive a current measurement from the phase shift changes caused by the measured current. There is no periodic maintenance of the system.Power supplies and various types of current amplifiers can be use to interface the voltage output to conventional secondary equipment. The Optical Modulator (containing the optical Phase Modulator) is packaged in analuminum housing located in the column base The Sensing Loop starts and terminates in the Optical Modulator. The Sensing head fiber is mounted in a "donut style" housing that surrounds the bus. The sensing fiber extends from the modulator housing inside the insulator column base up through the insulator and finally into the CT ring [3,36].

Signals representing current from NxtPhase optical sensors are available in three formats: digital, low energy analog (LEA), and high energy analog (HEA). The fundamental (and most valuable) signal is the digital signal. However, given that digital signal inputs to meters and relays are in early stages of development, high and low level analog signals are available in the interim until digital inputs to secondary devices are more commonly available. Signal processing in the current and voltage electronics is inherently digital in nature and is accessible in a format consistent with IEC standard 60044-7 and draft standard 60044-8. These standards define the digital data format from the sensor electronics (contains the relevant signal information associated with several current and voltage sensors). Additional to these two standards, IEC draft 61850-9-1 and 61850-9-2 also recognize the data structure outlined in the 60044-7 and 60044-8 [4] standards, but also permit an Ethernet physical layer with the same overall data structure [37-41].

NxtPhase is one of the companies that manufacture optical current transformers in the market. The company provided a CT marked NXCT to Transelectrica for testing and installing in the 110 kV network within 220/110/20 kV Targoviste substation and the 220/110/20 kV Turnu Magurele substation [42-47].

ANALYSIS OF SYSTEM OPERATION

NxtPhase current sensing technology is based on the Faraday Effect. Magnetic field created as current flows through a conductor influences the polarization of light on a path encircling that conductor.The NxtPhase design results in superior accuracy over dynamic range, over temperature, and during vibration. The sensor measures the difference between the effect on 2 polarizations, rather the absolute effect on a single signal.

Since instalation in Romania's power grid substations, the Active NXCT for metering application did not need any maintenance work done. Figures 3 and 4 show the positioning of the OCT within the substations.

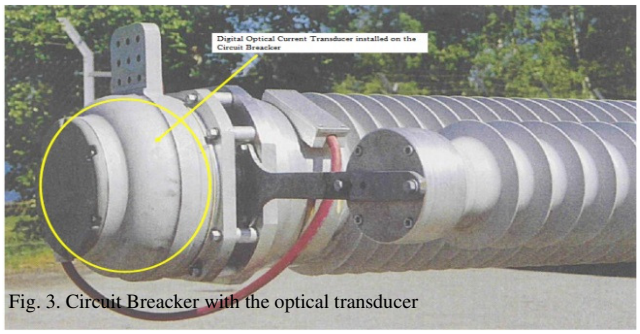

Fig. 3. Circuit Breacker with the optical transducer

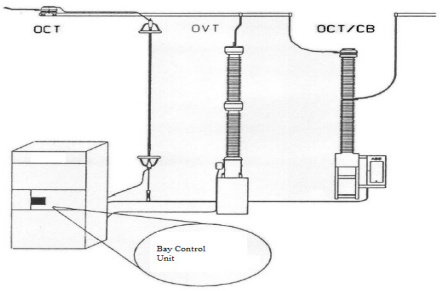

Fig. 4. Installation of the optic current transformer within the substation

NUMERICAL EXAMPLES AND MEASUREMENTS

A low energy analog (LEA) signal from each sensor is available in several formats, each tailored to its specific sensor and end use. The tables below, summarizes output signals and applicable standards.The results are been presented in table 1. These signal amplitudes were chosen based on widely acceptable outputs levels from digital to analog converters.

TABLE I
LOW ENERGY SIGNAL LEVELS AVAILABLE

NXCT Current Sensor	
Metering Output	4VRMS (meets IEC 60044-8) 4VRMS (ANSI P1331)
Protection Output	200 mVRMS (meets IEC 60044-8 and ANSI P1331)

The high energy analog signal is available in a format that would typically be used for metering applications. Amplifying a current signal to be used for protection applications is possible, but is impractical as the required over range for fault currents would require a very large and expensive amplifier. In this particular situation, Transelectrica has chosen to install optical current devices only for metering applications. Low energy signals are more suitable for relaying applications. For similar reasons a 1A signal, but not a 5A signal, is available for metering applications. Table 2 below summarizes the available high energy analog signals:

TABLE II
HIGH ENERGY SIGNAL LEVELS AVAILABLE

NXCT CURRENT SENSOR	
METERING OUTPUT	1 A, 2.5VA BURDEN
PROTECTION OUTPUT	NOT AVAILABLE

CONCLUSIONS

A logical step to overcome the problems caused by electromagnetic interference on the sensor signal is to use a signal transmission that is immune to electromagnetic fields. Optical signal transmission using optical fibres are the best solution for that purpose. Normally, the optical signal is not influenced by electromagnetic fields.

The advantage of direct magneto-optic transducers using optic-magnetic active materials is the absence of additional disturbance variables caused by mechanical or electrical sensor parts such as hysteresis, saturation, induction, temperature influence and damping.

Nowadays, numerous current measurement systems based on optical devices have been developed. Optic current transformers have numerous potential advantages over conventional current transformers, depending on their sensor principle.

Potential advantages are:

- immunity to electromagnetic interference (EMI);
- high electrical insulation;
- large bandwidth;
- potentially high sensitivity;
- ease in signal light transmission;
- being compact and lightweight;
- no danger of explosion;
- ease of integration into digital control systems;
- no saturation - hysteresis-free .

The Romanian TSO, CNTEE Transelectrica SA is keen in implementing and further utilizing the optical technology for its metering applications, as it has proven to be a suitable alternative to the conventional metering possibilities.

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State Policy for Digitalization in Agriculture: Institutional Approach

Tatyana OZHELEVSKAYA,
Kyiv National University of Trade and Economics, Kyiv, Ukraine
t.ozhelevska@knute.edu.ua

Lesya OVCHARENKO,
National Academy of Internal Affairs, Kyiv, Ukraine
ovch_lesya@ukr.net

Kateryna NIKOLAIETS,
Kyiv National University of Trade and Economics, Kyiv, Ukraine
k.nikolayets@knute.edu.ua

Victoriya KHRUSTALOVA,
Kyiv National University of Trade and Economics, Kyiv, Ukraine
v.khrustalova@knute.edu.ua

Iryna SOKOLOVSKA,
Kyiv National University of Trade and Economics, Kyiv, Ukraine
i.sokolovska@knute.edu.ua

Abstract

Authors did a critical review of the publications on negative consequences of digitalization of agriculture. Such consequences (that could threaten the food security of the country) were outlined using the methodology of institutional theory research. This problem and the role of the state in its prevention is barely explored in modern publications. Authors emphasize that modern research does not take into account the opportunistic behavior of digital technology producers in agriculture, sellers-competitors in agricultural markets, as well as political rent seeking bureaucracy, scientists and agricultural advisory service workers, who are influenced by digital technology producers. Authors claim that digital technologies in agriculture belong to Network goods and not to Public goods, so the main task of state policy for digitalization of agriculture is not to promote its spread over as large area as possible, but to protect farmers and the population from the negative consequences of its implementation. Effective digitalization of agriculture is possible only after the establishment of strong institutional environment, which would provide comprehensive and sustainable security for all businesses of the agricultural sector in conditions of the rapidly growing cyber-threats. Such environment should guarantee the country's food security.
Authors also claim that the rapid digitalization of agricultural advisory services, which are funded by the state, lost their relevance and do not require further government funding.

Keywords: Digitalization of Agriculture, Agricultural Advisory Services, Cybersecurity, Network Goods.

Introduction

The 21st century marked the beginning of the Fourth Industrial Revolution, which led to the creation of a single digital ecosystem as a result of a combination of material and virtual worlds. In these conditions, the competitiveness of any business entity or the whole country now depends on whether they use digital technologies (DT), such as 3-D Printing, artificial intelligence, the Internet of Things, energy storage etc.

The rapid spread of digitalization to all areas of human activity could not miss the most backward sector of the economy - agriculture. The introduction of DT in agriculture is associated with hopes not only to dramatically increase productivity and profitability in agriculture, reduce the risks of agricultural production, reduce resource costs, but also to solve the problem of famine on the planet, which is a possibility according to experts by 2050 due to the increase in the planet's population, limited natural resources, severe farmland degradation, adverse climate change, and environmental degradation (Clercq, 2018). According to FAO experts, digital agriculture will create systems that are

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highly productive, anticipatory and adaptable to changes such as those caused by climate change. This, in turn, could lead to greater food security, profitability and sustainability. In the context of the Sustainable Development Goals, digital agriculture has the potential to deliver economic benefits through increased agricultural productivity, cost efficiency and market opportunities, social and cultural benefits through increased communication and inclusivity and environmental benefits through optimized resource use as well as adaptation to climate change (Trendov et al., 2019).

Emphasizing the positive consequences of digitalization of agriculture (DA), the euphoria from the expected incredible results of its implementation leaves negative external effects and consequences that require government regulation and prevention barely studied. At the same time, digitalization in other sectors of the economy is already gradually showing its negative side and colossal losses, for example, as a result of cyber attacks.

While the digitalization of all areas of human life is rapidly spreading on the planet, scientists are only taking first steps in the study of this process, its positive and, most importantly, negative consequences. Thus, FAO experts have only just begun to formulate the concept of realizing the potential of digitalization to improve the agri-food system (FAO, 2020).

Therefore, in our opinion, the problem of state policy for DA requires a comprehensive and in-depth use of the methodology of institutionalism as the most applied school of economic theory.

When the wrong input or methodology is chosen for research, the results will usually be wrong. Economic science, which for 200 years relied in its research on the methodology of orthodox economic theory, has moved so far away from real life that it has been unable to explain or predict the extremely devastating world crises of the twenty-first century. And only after that the scientific community appreciated the applied nature of the methodology of institutionalism, many of whose representatives were awarded the Nobel Prize for the applied value of their developments. Unfortunately, agricultural scientists, like farmers, find it difficult to adapt to innovation and rarely actually use the latest research methods. That's why, in our opinion, the problems of the state policy for DA requires a comprehensive and deep usage of research methodology of institutionalism as the most applied school of economics.

Analysis of recent researches and publications.

The DA problem is quite new and barely studied. Despite the rapid spread of digitalization, in agriculture in particular, scientists still do not have a holistic view of its challenges and opportunities (Ayre et al., 2019). At the same time, most publications on DT in agriculture are based on research either only by specialists in computer and information sciences who are poorly versed in the methods and objectives of social science research, or by specialists in social sciences (Deichmann et al., 2016; Krell et al., 2012) who do not understand the processes of DT. As Roth S. et al. aptly put it: «Most social theorists know of computers and programming languages as little as illiterate medieval farmers knew of the Bible» (Roth et al., 2012). Therefore, research results either describe the «extraordinary» technological and technical possibilities of using DT in agriculture, or look for ways to implement DA as the only way to maintain the competitiveness of farmers in national and global markets (Qiang et al., 2012; Stitzlein et al., 2020). We agree with C. Eastwood, L. Klerkx and R. Nettle (2017): «Successful complex agricultural innovations require a collaborative R&E approach».

Of particular note are the collective DA process management studies conducted by the staff and consultants of the World Bank. It is very important that their research team consisted of specialists in both Computer and Information Sciences and Economics. In particular, C.Z. Qiang, S.C. Kuek, A. Dymond and S. Esselaar summarized the experience of implementing mobile communications technology in agriculture in Africa, Asia and Latin America. They investigated the impact of mobile applications for agricultural and rural development (m-ARD apps) on «ecosystems, and business models to provide an analytical framework for policymakers and development practitioners» (Qiang et al ., 2012). Research has identified the problem of spreading programs after a pilot phase of concept testing in small target markets, when there is a transition from public to private funding. The researchers found that only «some m-ARD apps are achieving scalability, replicability, and sustainability» (Qiang et al., 2012). At the same time, they emphasize the importance of governments and donors to cover the initial capital costs of mobile communications technology providers. They also claim that «participation in modern supply chains can increase farmer incomes by 10-100 percent» (Qiang et al., 2012). However, despite the fact that the team of authors consists of specialists in the field of Computer and Information Sciences and Economics, the researchers took as an axiom the thesis that DA will only promote agricultural and rural development. And the primary role of the state in DA they see in financial support both during the pilot phase of the new ARD-m apps, and at the stage, where m-ARD apps are being scaled up and trying to enter new markets. In our opinion, any scientific and technological revolution carries great threats that need to be anticipated, investigated and secured. Precisely because the scientific community has paid little attention to the study of the negative effects of the introduction of new scientific products, the world is

now on the brink of ecological catastrophe. Therefore, the role of the state, in our opinion, cannot be limited to solving the problem of finding ways to finance the development of the country's DA.

The question of the role of corporate social responsibility (CSR) in the development of DT in agriculture is raised in different ways. Thus, C.Z. Qiang, S.C. Kuek, A. Dymond and S. Esselaar (2012) see it only in the financial support of agricultural DT producers. We are closer to the position of K. Bronson, who drew the attention of the scientific community to the unfair uneven distribution of agricultural DT between different actors in agricultural production. «Social actors shaping innovation hold a narrow set of values about good farming and good technology and their data selection choices privilege large-scale and commodity crop farmers by focusing on agronomic crop data and data mapping unusable to organize growers» (Bronson, 2019, p.1). But, in our opinion, the role of the CSR should not be limited to these two areas and needs to be significantly expanded. First of all, agricultural DT producers must carry the CSR for the consequences of introducing their product. In addition, we hold a view that contradicts the modern scientific paradigm of the concept of CSR: the state has no right to relinquish control over the activities of economic agents who advertise themselves as companies' CSR practice. The level of human consciousness is not yet ready for the introduction of the informal institution of the CSR. The moral and spiritual values, which are really adhered to by the representatives of especially big business, are far from altruistic, they are only interested in the growth of their own income, not public welfare. Even when they sponsor and patronize, they still count on how their profits will increase through such advertising.

Unfortunately, the negative consequences of DA for farmers and for society as a whole are not sufficiently disclosed in the publications. There are even fewer publications on the role of the state in eliminating these consequences (Klerkx et al., 2019) and at the same time research does not use the methodology of institutional theory, scientists are limited to using the categories «institute» and «institution».

The *purpose of the research* is to determine the role of the state in the development of DA using the institutional research methodology.

Main Material

The COVID-19 pandemic, which is destroying both the world's population and the economy, has shown the invaluable importance of digitalization of the economy to achieve all the 17 Sustainable Development Goals declared by the United Nations for the next 10 years. E-commerce, e-government, E-learning etc. received a new impetus in their development. According to the Global Information Technology Report, «full effects of new technologies such as the Internet of Things, artificial intelligence, 3-D Printing, energy storage, and quantum computing unfold… The future of countries, businesses, and individuals will depend more than ever on whether they embrace digital technologies» (World Economic Forum, 2016). Therefore, most highly developed countries, such as the USA, UK, Germany, Japan and others, have identified the digitalization of the economy as a priority for the country's development. ICTs have become a key factor in «bridging the digital divide and achieving the three dimensions of sustainable development: economic growth, environmental balance and social inclusion. They have proved to be instrumental in health, education, finance and trade, providing information and services, and have contributed to greater transparency and accountability» (ITU & FAO, 2020, p.2).

The development of digitalization in agriculture occurs in following areas: produce differently using new techniques; use new technologies to bring food production to consumers increasing efficiencies in the food chain; incorporate cross – industry technologies and applications (Clercq et al., 2018).

Studies by international organizations have shown a very uneven spread of digitalization. The researchers from ITU's Telecommunication Development Bureau examine this process by regions (Africa, The Americas, Arab States, Asia & Pacific, CIS, Europe) and by level of development (Developed/developing countries) (ITU, 2019 *b*). But then hidden from researchers is the uneven spread of digitalization within a group of countries. Thus, fig.1 shows the outsider position of most post-Soviet countries.

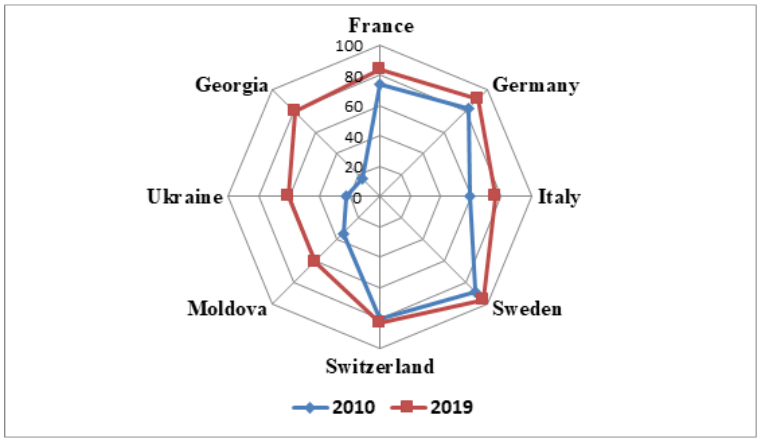

Fig. 1: Percentage of households with Internet in some developed countries of Europe in 2010 and 2019, %
Source: ITU, 2019 a.

A feature of DT development is the high volatility, as a result of which the new technology quickly becomes obsolete and when it becomes available to outsider countries, its usefulness is minimal. Thus, users from such countries continue to «play catch up» (Trendov et al., 2019). One such country is Ukraine (Fig . 2).

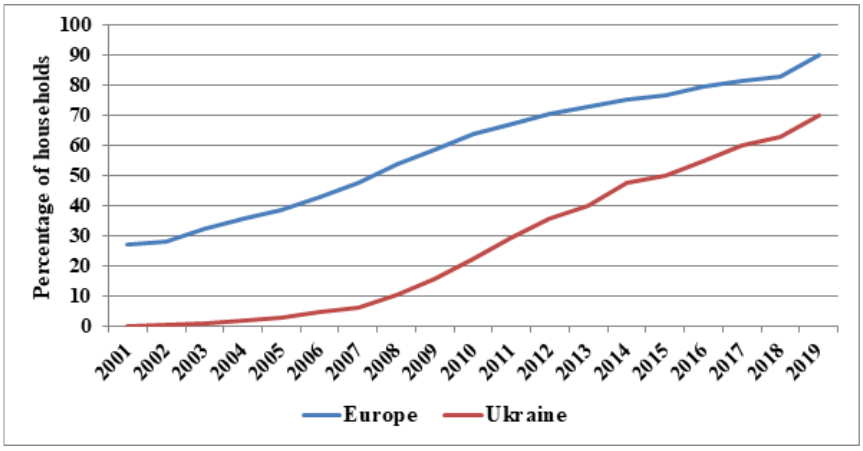

Fig. 2: Percentage of households with Internet, %
Source: ITU, 2019 a; State Statistics Service of Ukraine, 2018; Eurostat Statistics Explained, 2020.

The process of digitalization in rural areas is even slower (Fig. 3). In order to use DT in agriculture, you must at least have access to the Internet. Currently, a little more than half of the population in Ukraine has it. That is why Ukrainian farmers, who work on the 25 per cent of the world's most fertile black soil, did not have any chance to be competitive not only in the world but also in the national markets. Because «agro-holdings, with about 70 agricultural companies engaged in relative monoculture on 25 per cent of the arable land» (ITU & FAO, 2020) and who are destroying fertile Ukrainian land, in contrast to the farmers, have financial opportunities to use agricultural DT. Thus, Ukrainian farming as a result of DA is doomed to destruction.

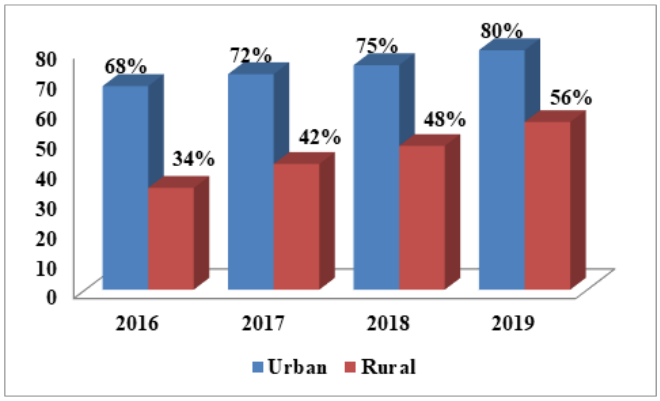

Fig. 3: Percentage of households with Internet in Ukraine in rural areas and urban areas, %
Source: State Statistics Service of Ukraine

The main reasons for slowing down the development of the Internet in rural areas are outdated telecommunications networks, lack of electronic literacy and digital skills, low levels of computerization, low incomes, small number of information and communication technology specialists. Each country has a number of other specific reasons. For example, in Ukraine, farmers determine that the reasons for the slow implementation of DA are agricultural producers' mistrust in the effectiveness of digital technology and lack of knowledge and skills and absence of equipment (Fig. 4). Also cause inhibition of DA in Ukraine, in our opinion, is the underdevelopment of cooperatives, which would have increased the purchasing power of small and medium farmers.

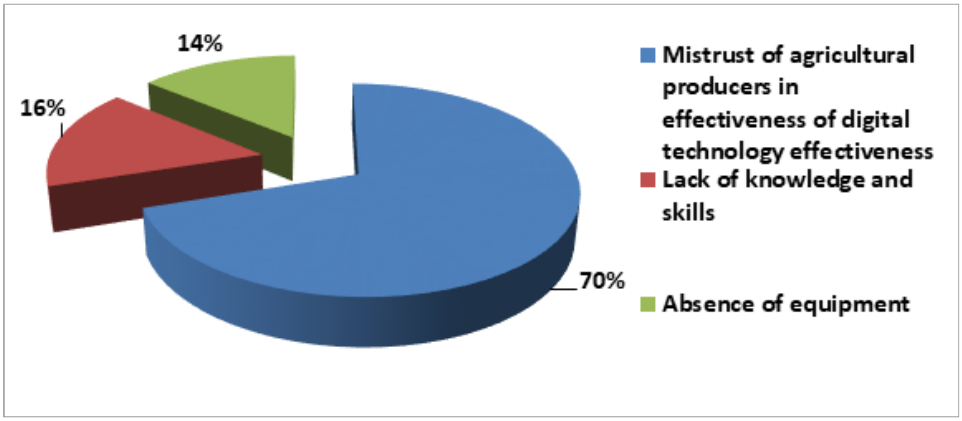

Fig. 4. Factors that inhibit digitalization in agriculture in Ukraine (according to the results of a sociological survey of farmers), %
Source: Developed by the authors based on Bakun & Saiapin, 2020.

We should not forget that agricultural DT is the same product as any other, created and produced for profit. Large investments have been made in its production, from which large profits are expected. Therefore, the main goal of producers is not to increase the welfare (profitability) of farmers, but to maximize their own profits. Manufacturers and investors are extremely interested in the rapid spread of the product in national and global markets. Even aware of all the risks and negative consequences of farmers using agricultural DT, they not only advertise the incredible potential of their products, using the market asymmetry of information, but also lobby their interests in government. They resort not only to civilized methods of product promotion, but also to opportunistic behavior: logroling, bribing scientists, politicians and representatives of various public influential institutions to advertise and promote an innovative product.

Agricultural advisory services, which were once set up to advise farmers who did not have the Internet and other sources of up-to-date information, found themselves in a difficult position. Their workers are at risk of unemployment. When they were funded by the state, they did not have much motivation to provide quality, much-needed agricultural advisory services for farmers. Not surprisingly, they are now busy convincing society, scientists, and most importantly, government agencies that fund them, that in the DA their advice is especially important (Fielke et al., 2020), that without the help of agricultural advisory services technologies can lead to negative consequences (Eastwood et al., 2019).

An article by Ukrainian scientists Yu. O. Bakun and S. P. Saiapin (Bakun & Saiapin, 2020), who are employees of the agricultural advisory, is quite indicative of the real value of state-funded agricultural advisory services. They try to prove the need for agricultural advisory services for Ukrainian farmers, but when they start to provide statistics, it turns out that Ukrainian farmers underestimate the work of the services, because they do not want to receive services even on a free basis. Thus, in Ukraine, 0.15 million euro were provided from the state budget to finance agricultural advisory services for farmers and agricultural cooperative since 2019, of which only 10% were actually used (Bakun & Saiapin, 2020, pp. 84-85). Employees of agricultural advisory services, funded by the state, recognize that the system agricultural advisory services in Ukraine are ineffective and mostly formal (Bakun & Saiapin, 2020, p. 82, 90). We question the results of a survey conducted by representatives of the public organization "National Association of Agricultural Advisory Services of Ukraine", who are interested in a particular result and claim that the results of a survey showed the need for advisory services 68% of respondents (Bakun & Saiapin, 2020, p. 85).

Research Methods

In the study was used a truly invaluable discovery of institutional economics - a model of a person with opportunistic behavior, developed by O. Williamson (1985), which «involves the pursuit of the individual's interests, including fraudulently, meaning obvious forms of deception, such as lies, theft, fraud, but hardly limited to them» (p. 47). Our study takes into account the presence of opportunistic behavior:

a) of DT producers for agriculture, who are using information asymmetry in the market of agricultural DT and hide from agricultural producers during the sale of their innovative product important negative consequences of using DT, which can lead farmers into bankruptcy;

b) of agricultural producers who are competitors in agricultural markets and can use any methods of unfair competition;

c) of bureaucracy, scientists and agricultural advisory services, which are influenced by producers and investors who finance the production of agricultural DT.

Therefore, to analyze the behavior of the subjects mentioned above we are using the principle of methodological individualism, which examines society not as a faceless mass of people, but as the sum of individuals. The study is also based on the following main statements of institutional economic theory:

1. Rationality of individual assumes that every person, regardless of their status in society (for example politicians or the president of any country), in making decisions and in their actions are guided, first and foremost, by economic principle, which means comparing their own marginal benefits and marginal costs.

2. Individuals always seek to maximize their usefulness and can use opportunistic behavior to achieve it. Representatives of institutionalism and behavioral economics believe that fear is an important motive for individual behavior. Therefore, in order to prevent manifestations of opportunistic behavior, a state apparatus of violence is needed, which would guarantee the inevitable punishment of individuals for actions that harm society.

3. The state is considered not as an impersonal substance, but as a number of individuals who hold positions in the legislative and executive branches of government and who are guided primarily by their own interests (which often conflict with the public) while making decisions.
Political rent is an advantage obtained through special government benefits, subsidies, and other privileges. It is achieved through lobbying for regulations, legislation and corruption.

4. The actions of the individual are influenced by institutions – which are, according to D. North's definition (North, 1991), «humanly devised constraints that structure political, economic and social interactions». These constraints consist of formal and informal «rules of the game» that ensure order and security in the market and in society. The effectiveness of institutions depends in particular on the level of coercion used by the government.

We consider K. Kosior's categorizing of «agricultural DT», like «smart farming systems», as Public goods a methodological error (Kosior, 2019). We consider it Network goods, demand for which grows with increase of the number of its users. It is characterized by an increase in utility for an individual consumer with an increase in the number of consumers. The development of Network good requires significant initial investment, but once a sample of an innovative product is obtained, its copying and duplication require almost zero or extremely low additional costs. Therefore, its manufacturers are interested in the widest possible market coverage. The erroneous attribution of agricultural DT to Public goods leads to erroneous conclusions about the need for state participation in the promotion of this product on the market.

Results

Since DT belong to Network goods, the amount of profit of their producers depends on the scale of distribution of their product, as the cost of copying an innovative product is extremely low. This leads to fierce competition between powerful DT companies, the dominance of monopoly power in the market and the creation of large barriers for the new companies to enter this market. Therefore, the desire to win as much market shares as possible motivates DT manufacturers to use not just civilized methods of competition.

One of the methods of unfair competition used by agricultural DT producers is to reduce sales and advertising costs through the involvement of scientists, media, public authorities and influential international organizations to spread information about the benefits of DA, persuading governments and donors to reimburse initial capital costs to DT suppliers (Qiang et al., 2012). Moreover, the ability of the DT producers to impose the idea of DA as a «universal good» is so powerful that it is perceived by the world community as an axiom that does not need proof. And instead of examining the negative effects and network effects of the implementation of DA, creating a powerful institutional countering to these effects, researchers, bureaucracies and international organizations are working on ways to motivate farmers to implement agricultural DT (Stitzlein et al., 2020; Trendov et al., 2019; Ukraine 2030E, 2018).

As farmers begin to use more sophisticated DTs, they face threats they never even imagined before. When scientists and manufacturers try to adjust the design of agricultural DT to the wishes of farmers, farmers fall into the trap, because they cannot predict, for example, what cyber attacks may await them in the future and the scale of such consequences.

As the government does not study the negative effects of digitization on the economy, in most developed post-Soviet countries, the indicator «Trust, Security and Privacy» is practically not monitored and not analyzed (Fig. 5).

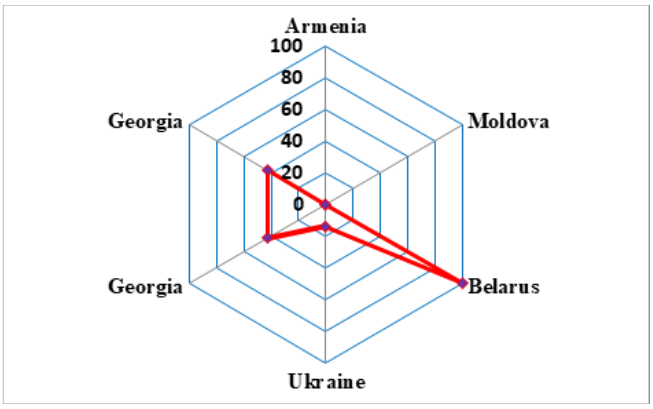

Fig. 5: The share of information collected on the «Trust, Security and Privacy» indicator in some developed post-Soviet countries in 2018.

Source: Developed by the authors based Yegorov & Gryga, 2019, pp. 59.

As a rule, the introduction of agricultural DT does not take place in a single farm, but in a large agricultural holding or in farms that are united in an agricultural cooperative. Such entities implement DT on large farmland. If the competition between them intensifies in the agricultural market, some of the competitors will want to resort to unfair competition and order a cyber attack on competitors - to change the dosage parameters of pesticides in their smart agricultural system for example. As a result, the crop will die in a very large area and will affect not only producers and their employees, but also a country that will not receive a significant number of agricultural products. Thus, with the introduction of DA, competition will move to another level - cyber competition, which can also be, for example, in the form of cyber raiding, when in virtual documents of ownership of land or agricultural products, a hacker can change the name of the owner. The consequences of cyber attacks and lawsuits are very costly, but scientists are not yet considering this side of the increase in transaction costs of implementing agricultural DT.

Countries cannot distance themselves from the problem of cyber threats and instruct economic entities to defend themselves. Only the state on national and supranational levels can solve this problem. It is necessary to create a cyber security team that will be responsible for the security of all economic entities.

The rapid development of the ICT industry suggests that the creation of any quality cyber defense system is an extremely short-term protection against cyber-attacks. Therefore, the creation of institutionally provided cyber

defense system on national and supranational levels is, in our opinion, a more effective mean of cyber security. This is, first of all, the creation of a regulatory framework that would provide severe punishment for cybercriminals. Protecting food security on the country and worldwide level means the punishment for such crimes should be lifelong imprisonment.

In addition to «the rising threat of cyber attacks that expand into the physical world, privacy issues, and the polarizing effects of technologies on labor markets» (World Economic Forum, 2016), each country that has its own national development characteristics may have its own specific risks. For example, Ukraine has a high potential of highly qualified IT specialists, but at the same time, incomes in Ukraine are extremely low, the unemployment rate is high, as well as the extremely imperfect legal framework for the protection of private property, especially with the help of IT technologies. This creates favorable conditions for the rapid development of cybercrime when the DA of Ukraine takes place.

The problem of CSR should be singled out, since it has now became an additional effective advertising move for companies that work with a violation of legitimacy and simple decency, and position themselves as CSR companies. This applies in particular to companies that create agricultural DT. Unfortunately, the development of STP has not changed the consciousness and behavior motives of an average person, who is stopped from criminal acts only by the fear of severe punishment. Only dreamers, like the French utopians, can believe today that the giant business sharks that invest billions of dollars are more concerned with human values, the well-being and prosperity of the planet, than their own profits. Therefore, we do not support the modern concept of CSR, which is based on the principles of voluntariness and belief in the sincerity of companies that position themselves as CSR companies. We also do not support the belief of Simone van der Burg, Marc-Jeroen Bogaardt and Sjaak Wolfert «to set preconditions for trust between stakeholders and - eventually - develop appropriate guidelines and codes of conduct for future farming digitalization trajectories» (Burg et al., 2019). The responsibility of each company and the inevitability of punishment for actions harmful to society must be established in formal institutions.

In our opinion, state-funded agricultural advisory services have outlived themselves. Today, farmers must «vote with the dollar» to determine the need for these services. The state should focus its funding on the creation of pilot DA centers at large universities, where it is possible to combine the skills of top industry experts in computer and information sciences, economics, ecology and cyber security to study the advantages and disadvantages of agricultural DT. These centers should be an educational base for current and future farmers.

Advice for farmers on the implementation and use of agricultural DT should be provided by economically and legally responsible producers - professionals who are well aware of all the nuances of their product. When purchasing an innovative product, agricultural DT manufacturers must add mandatory technical support throughout the period of use of the purchased agricultural digital technology. Observation by producers of the work of the innovation system for farmers will give full information on its further improvement.

In the 90s Ukrainians went to the United States and EU countries to study the experience of farmers, but, tasting strawberries or tomatoes without taste and smell, sincerely rejoiced that STP has not yet reached the agriculture of Ukraine and they can afford to eat an organic product. Today, Ukrainians eat the same as the population of developed countries and are willing to pay a higher price to eat organic products. We are not supporters of the idolatry of STP, in particular the digitalization of the economy. In this regard, the development of DA should be, as in medicine, under the slogan «Do no harm». DA is an objective and unrestrained process that carries both benefits and threats. Therefore, the consequences of this process need to be investigated, anticipated and directed in a useful for society way.

Conclusions

The study allows us to draw several unpopular conclusions for the scientific community:

1. In studies of the DA problem the following thesis considered as an axiom: the consequences of digitalization in agriculture can only lead to increase of its productivity and sustainability, to reduction of production costs and, consequently, to the welfare of farmers. The lack of an institutional approach and the disregard of opportunistic behavior by players in the agribusiness lead to erroneous conclusions.

2. Opportunistic behavior of producers of agricultural DT, competitors in the agricultural market, as well as political rent seeking bureaucracy, scientists and agricultural advisory services, which are influenced by producers and investors who finance agricultural DT production, can lead to irreparable consequences of DA not only for farmers and their employees, but also for the food and environmental security of the country. The current over-enthusiasm for the development of DA turns a blind eye to its future socio-economic and environmental consequences, and its scale can be catastrophic.

3. Studies of the consequences of DA should be based on a multidisciplinary approach and consider the results of experimental research of agricultural practices. To produce and implement a truly high-quality product, the DA implementation team must consist of scientists in the fields of computer and information sciences, economics, ecology and cyber security, manufacturers of these technologies and farming representatives.

4. DA can threaten the country's food security without proper institutional support, when the farmer is protected from cyber attacks, cybercrime is severely punished (up to life imprisonment), and the producer bears full unavoidable economic and legal responsibility for the quality of his digital technology in agriculture, which has a legal basis. Effective DA is possible only after the establishment of institutional environment to ensure the full and stable cyber security for agriculture in the conditions of rapidly growing cyber threats.

5. With the spread of digitalization to all areas of human life, the entry of the Internet into every family, state-funded agricultural advisory services have lost their relevance and the state should not continue to fund them. Only those counseling centers that are really needed by farmers should remain, but only with farmers willing to finance them privately.

Further DA research authors intend to continue after the creation of an effective team of researchers, which will consist of specialists in various fields of science. This will provide an opportunity to conduct a detailed study of the issues of negative externalities from the implementation of DA and to form a concept of state regulation of this process.

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Management of The Industrial Equipment Life

Vasile DRAGU
University Politehnica of Bucharest, Bucharest, Romania, e-mail: vasile.dragu@upb.ro

Eugenia-Alina ROMAN
University Politehnica of Bucharest, Bucharest, Romania, e-mail: ea_roman@yahoo.com

Mihaela POPA
University Politehnica of Bucharest, Bucharest, Romania e-mail: mihaela.popa@upb.ro

Ştefan BURCIU
University Politehnica of Bucharest, Bucharest, Romania, e-mail: stefan.burciu@upb.ro

Abstract

The quality requirements imposed on the economic activity can be achieved only by complying with the conditions in which the equipment used in the production process is replaced, at the right time, with others that satisfy the restrictions imposed by the increase of the productivity addressed to the system. The establishment of an equipment life is a problem of economic balance. Due to the wear that occurs over time, the maintenance and operating costs increase. The costs increase until they exceed the acquisition costs of new equipment. The research methodology consists in establishing the most suitable functions for the maintenance and operation costs and for the acquisition costs of new equipment and in identifying the minimum value of the sum of the two categories of costs. For considering the real situations, a value for costs update in time is also included in this calculation. The theoretical considerations are supported by a case study in which the economic moment of replacing an equipment is established by using one of the mathematical models presented.

Keywords: Industrial Management, Maintenance and Operation Cost Functions, Equipment Life

Introduction

Among the optimal problems of economic activities is that of obtaining expected results in conditions of industrial equipment efficient operation. They can be operated rationally/ optimally until the costs for maintenance and operation exceed the acquisition cost of a new equipment. This is the moment when new equipment needs to be purchased. (Atanasiu, 2018; Nistoreanu, 2019) These statements did not consider that other equipment with superior/ improved performance may appear during the operation of an equipment and then the replacement of the existing one is made for reasons of *moral wear* and not for reasons of *physical wear*.

The problem of equipment replacement is predominantly a problem of strategic management of a company, which aims to maximize economic and financial results, as well as maintaining on a permanently competitive market. (Dragu, 2003)

The activity of equipment replacement is manifested in all areas of socio-economic life, perhaps more predominantly in the transport system due to the special safety conditions imposed by the specifics of the activity. Like any system, which is a set of interdependent objects brought together to achieve a common goal, the transport system is characterized by transport tasks, structure and technology. (Raicu, 2007)

The requirements of the socio-economic system users are more and more demanding in terms of quality and costs involved, which makes it necessary to operate the component subsystems of the economic system at the designed parameters. Productivity and quality requirements are matched by flexibility and adaptability to rapid changes in the marketplace in the face of globalization (Rădăceanu, 2008).

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In this context, the equipment as parts of a complex economic system must be maintained in good working order throughout its life. This raises the question of the optimal replacement time, that time when the maintenance and operating costs together with the acquisition costs as well as the related interest rates have a minimum value. The life cycle of a product or system is a sequence of phases, each containing activities that cover the life of the system, from the initial design, to decommissioning. The life cycle scheme provides a framework for programming, conducting, controlling and supervising the system in all its aspects as it goes through different stages of development. (Ionescu et al., 2015; Roşca et al., 2014)

Any equipment gets obsolete as to its operation and maintenance if it is not properly maintained and repaired. In some situations, instead of performing the necessary repairs, it is more economical to replace the entire equipment. Often, replacement is not made because performance has dropped significantly, but due to the emergence of new equipment with superior performance (Ackoff, 1975).

In Romania, the life cycle of a system is provided in EN 50126 and incorporated into Romanian legislation under the SR EN 20126/2003 and aims to specify the reliability, maintainability and availability of the system (Ghionea, 2011).

Literature (Dima, 2007) presents several models for the renewal of the equipment. One of these is the 4 step model (Meredith and Martel, 1985) applied in the process of implementing new machines and for which the stages are defined: the management team must try to change the organizational culture of the enterprise; the management team must accept that the new machines may also have negative effects; a higher level of communication between the manager and the contractor regarding the new machinery; a change in the company's strategy as the new machines roam the roots.

The problem addressed in this paper is related to the evolution of maintenance costs to which are added the depreciation costs of the machine on which an update value may or may not act. The solution of the problem consists in finding the most suitable costs' functions whose amount should have a minimum in time.

Mathematical Models

Mathematical models that address the issue of establishing the optimal time to replace the equipment can be classified as follows:

A. models that do not take into account the variation of the acquisition cost,
B. models that take into account the variation of the acquisition cost,
C. models that also take into account cost updates.

The three models are presented in chronological order, the appearance of a new model being considered a refinement and an enrichment of the previous model. The choice of the model that will be used in the practice of optimal equipment replacement depends on the existence of statistical data (maintenance costs, as well as the variation over time of the selling price of the equipment) in the databases that define the company's activity.

A. Models that do not take into account the variation of the acquisition cost

The economic replacement time is chosen so that the amount of maintenance and operating costs and the cost of purchasing a new transport mean is minimal (Sbora et al., 1984).

In each time period, the maintenance and operating costs are known: C_0, C_1,..., C_n. For a period of n + 1 years the total costs will be:

$$C_t = C_0 + C_1 + C_2 + ...+ C_n \quad (1)$$

The first step in modeling is to determine how these costs vary over time. For this, we try to find a regression curve that tracks as accurately as possible the data recorded over time. The regression curves can be polynomial, exponential, logarithmic, etc., but their type is limited by the fact that not always the extreme point (minimum point) can be rigorously mathematically determined.

The expression of the polynomial function of the maintenance costs is:

$$y = a_0 + \sum_{k=1}^{p} a_k t^k , \quad (2)$$

with a_0, a_1, a_2,..., a_k parameters of the model.

This value is expressed by the least squares method given by the expression:

$$\sum_{i=1}^{n}\left(y_i - a_0 - \sum_{k=1}^{p} a_k t_i^k\right)^2 = U \to \min . \tag{3}$$

By calculating the partial derivatives of the adjustment function and equaling them by zero, the parameters of the model are obtained.

$$\frac{\partial U}{\partial a_k} = 0 \text{, pentru } k = 0, 1, 2, ...,p. \tag{4}$$

Model parameters are obtained by solving the system of equations:

$$\begin{cases} \sum_1^n y_i - na_0 - a_1\sum_1^n t_i - ... - a_p\sum_1^n t_i^p = 0 \\ \sum_1^n t_i y_i - a_0\sum_1^n t_i - a_1\sum_1^n t_i^2 - ... - a_p\sum_1^n t_i^{p+1} = 0 \\ \vdots \\ \sum_1^n t_i^p y_i - a_0\sum_1^n t_i^p - a_1\sum_1^n t_i^{p+1} - ... - a_p\sum_1^n t_i^{p+p} = 0. \end{cases} \tag{5}$$

In order to annihilate the influence of time variation, the condition is set $\sum_{i=1}^{n} t_i = 0$.

The exponential model of regression analysis has the form $y = ae^{bt}$ and the coefficients are given by the expressions: (Neacșu, 2009)

$$a = e^{\frac{\sum_{i=1}^{m}\ln y_i}{m}} \quad \text{and} \quad b = \frac{\sum_{i=1}^{m} t_i \ln y_i}{\sum_{i=1}^{m} t_i^2} . \tag{7}$$

Once the form of the costs' variation over time has been established, the amount of the annual maintenance and operating costs is determined. Considering that the variation of costs over time is a linear one, their total value is determined by integrating the function within the limits t_0 and t_n. For costs with a linear variation it is written: (Dinu et al., 2017)

$$C_t = \int_{t_0}^{t_n}(a_0 + a_1 t)\,dt . \tag{8}$$

Since the minimum cost must be determined by taking into account the acquisition (purchase) of a equipment, the acquisition costs (I_0) must also be added, and the following shall be obtained:

$$C_t = \int_{t_0}^{t_n}(a_0 + a_1 t)\,dt + I_0 . \tag{9}$$

The minimum cost must be found for a period of time which means the optimum time interval (t_{op}) in which the equipment must remain in service. In the equation, this is expressed by dividing both members with t_{op}. As the upper integration limit is introduced t_{op} and the lower limit $t_0 = 0$.

$$\frac{C_t}{t_{op}} = \frac{1}{t_{op}}\left[\int_0^{t_{op}}(a_0 + a_1 t)dt + I_0\right] = \frac{a_1 t_{op}}{2} + a_0 + \frac{I_0}{t_{op}} \tag{10}$$

The minimum cost for each time period is obtained by derivation with respect to t_{op} and zero equaling.

$$\frac{dC_t}{dt_{op}} = \frac{a_1}{2} - \frac{I_0}{t_{op}^2} = 0 \Rightarrow t_{op} = \sqrt{\frac{2I_0}{a_1}} . \tag{11}$$

For maintenance and exploitation costs with a parabolic variation (C_{t2}):

$$\frac{C_{t2}}{t_{op}} = \frac{1}{t_{op}}\left[\int_0^{t_{op}}\left(a_0 + a_1 t + a_2 t^2\right)dt + I_0\right] = a_0 + \frac{a_1 t_{op}}{2} + \frac{a_2 t_{op}^2}{3} + \frac{I_0}{t_{op}} . \tag{12}$$

As before, minimum is obtained by derivation with respect to t_{op} and zero equaling.

$$\frac{dC_{t2}}{dt_{op}} = \frac{a_1}{2} + \frac{2a_2 t_{op}}{3} - \frac{I_0}{t_{op}^2} = 0 \tag{13}$$

$$4a_2 t_{op}^3 + 3a_1 t_{op}^2 - 6A_0 = 0 .$$

It was obtained a third degree equation the t_{op} that is observed to have a solution in the range $\lfloor 0, t_{op} \rfloor$, but this is difficult to get.

For maintenance and exploitation costs with exponential variation (C_{te}) it is written:

$$\frac{C_{te}}{t_{op}} = \frac{1}{t_{op}}\left[\int_0^{t_{op}} ae^{bt}dt + I_0\right] = \frac{a}{bt_{op}}e^{bt_{op}} - \frac{a}{bt_{op}} + \frac{I_0}{t_{op}} \tag{14}$$

from $\frac{dC_{te}}{dt_{op}} = 0$ it is obtained $e^{bt_{op}} = \frac{I_0 b - a}{a(b-1)}$, hence the value for the optimal time of keeping the equipment in service is:

$$t_{op} = \frac{\ln\frac{I_0 b - a}{a(b-1)}}{b} . \tag{15}$$

B. Models that take into account the variation of the acquisition cost

In this case, the problem is a classical problem of economic equilibrum because the maintenance and operation costs of the equipment increase over time and the resale price decreases over time. The sum of the two functions of maintenance and operating costs, respectively resale, has a minimum after a certain number of years. Depending on the expressions used, this minimum may or may not exist. (Neacșu, 2009)

We note by $C_{mo}(t)$ the function of maintenance and operating costs; it is monotonously ascending; $P_r(t)$ – selling price after a certain time t; $P_r(t)$ it is a monotonically decreasing function.
The total cost of using the equipment for a time period t is $C_T(t)$.

$$C_T(t) = I_0 - I_0 P_r(t) + C_{mo}(t) . \tag{16}$$

And the medium cost is:

$$c_T(t) = \frac{C_T(t)}{t} = \frac{1}{t}[I_0 - I_0 P_r(t) + C_{mo}(t)]. \tag{17}$$

The minimum value is:

$$c_T^{'}(t) = \frac{t C_T^{'}(t) - C_T(t)}{t^2} = 0 \Rightarrow t C_T^{'}(t) - C_T(t) = 0 \tag{18}$$

That is for:

$$C_T^{'}(t) = \frac{C_T(t)}{t} . \tag{19}$$

In practice, $c_T(t)$ is evaluated for different values of time t and the minimum value is found. The usual forms of the P_r and C_{mo} functions are linear, exponential or exponentially negative.

a) when P_r and C_{mo} functions are linear:

$$P_r(t) = 1 - \frac{t}{\theta} \tag{20}$$

$C_{mo}(t) = k\,t$ where $0 < t < \theta$ is the time frame in which the equipment operates.
By writing the expression of the function $c_T(t)$ it is observed that the moment of the equipment's replacement is independent of t.

$$c_T(t) = \frac{1}{t}\left[I_0\left(1 - 1 + \frac{t}{\theta}\right) + k\,t\right] = \frac{I_0}{\theta} + k . \tag{21}$$

b) when P_r has a negative exponential function and C_{mo} has a liniar function by. (fig. 1)

$$P_r(t) = e^{-\lambda t} \tag{22}$$

$$C_{mo}(t) = kt\,. \tag{23}$$

In this case a minimum for $c_T(t)$ cannot be obtained.

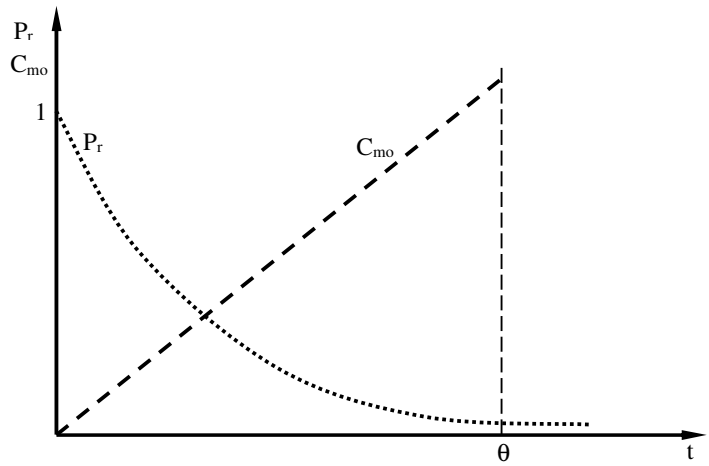

Fig. 1 Exponentially negative functiob for P_r and a linear function for C_{mo}

c) when $P_r(t)$ has a negative exponential function and C_{mo} has an exponential function

$$P_r(t) = e^{-\lambda t} \tag{24}$$

$$C_{mo}(t) = k\left(e^{\mu t} - 1\right). \tag{25}$$

Figure 2 shows these variations from which it can be seen that there is a minimum point.

In this case the expresion of medium costs is:

$$c_T(t) = \frac{1}{t}\left[I_0\left(1 - e^{-\lambda t}\right) + k\left(e^{\mu t} - 1\right)\right] \tag{26}$$

The parameters of the model k, λ and μ can be easily determined only for small values of t (t = 3 units of time). A time unit can be one year, two years, etc. and it is conveniently chosen for calculation.

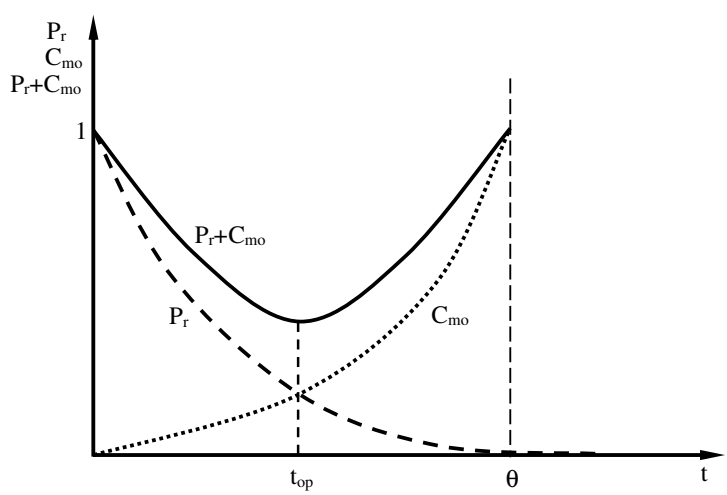

Fig. 2. negative exponential function of the P_r and exponential function of the C_{mo} (surce: processed after Dinu et al., 2017)

C. **Models that also take into account costs updates**

The purchase cost of the equipment can be very high and their acquisition is made with investments financed by bank loans. In efficiency calculation the interest rates paid on loans must be take into account. In order to make calculations with amounts paid or available in different years they must be updated with interest rates. The updating factor (f_a) for the interest rate *i* is (Popa, 2009):

$$f_a = \frac{1}{1+i}. \tag{27}$$

The total cost of maintaining and operating a transport mean for *k* years is:

$$C(k) = I_0 - S_k f_a^k + \sum_{n=0}^{k-1} C_e f_a^n , \tag{28}$$

where S_k represent the price obtained by selling the mean of transport after k years of service;

C_e – the cost of maintenance and operation in year *n* paid at the beginning of the year:

n – index for the calculation year;

k – the number of years for which the calculation is made.

Paying *C* Euro now is equivalent to paying *x* Euro at the beginning of each year for *k* years, so the updated amounts form a geometric progression. (Dinu et al., 2017)

$$C(1-f_a) = x(1-f_a^k) \Rightarrow x = \frac{C(1-f_a)}{1-f_a^k}. \tag{29}$$

After substituting the value of *C* it is obtained:

$$x = \frac{\left(I_0 - S_k f_a^k + \sum_{n=0}^{k-1} C_{e,n} f_a^n\right)(1-f_a)}{1-f_a^k}. \tag{30}$$

The part of the expression that depends on k is replaced by f(k):

$$f(k) = \frac{I_0 - S_k f_a^k + \sum_{n=0}^{k-1} C_{e,n} f_a^n}{1-f_a^k}. \tag{31}$$

The problem is to find the value of *k* for which f (k) is minimal.

Case Study

The case study addressed the issue of determining the optimal time to replace an industrial equipment when it is known that the Pr(t) has a negative exponential function and the $C_{mo}(t)$ has an exponential function.

It is necessary to find out the optimal replacement time for an industrial equipment for which the cost of the new equipment is $I_0 = 92 \cdot 10^4$ Euro and after 3 years it can be sold at the price $P_r^{(3)} = 73{,}6 \cdot 10^4$ Euro. In the first year the maintenance and operation costs are $C_{mo}^{(1)} = 26 \cdot 10^3$ Euro and after 3 years (t_n =3) they are $C_{mo}^{(3)} = 91 \cdot 10^3$ Euro. In the case study, the chosen numerical values are test data used to validate the model. The size of the values agrees with the usual practical values in the theory of equipment replacement.

As demonstrated in Chapter 2, paragraph B, the expression of average costs in this case is:

$$c_T(t) = \frac{1}{t}\left[I_0\left(1-e^{-\lambda t}\right) + k\left(e^{\mu t}-1\right)\right] \tag{32}$$

The parameters of the model k, λ and μ can be easily determined only for small values of t.

It is observed that in this case, a unit of time is one year, the period of the known data is 3 years and it is convenient for a calculation without using the electronic calculation tools. Since it is known that the variation of the sale cost after a certain number of years $P_r(t)$ is exponentially negative, it is written:

$$\frac{P_r^{(3)}}{I_0} = \frac{e^{-\lambda t_n}}{e^{-\lambda t_0}} = e^{\lambda(t_0 - t_n)}; \quad \ln\frac{P_r^{(3)}}{I_0} = \lambda(0-3) \Rightarrow \lambda = 0{,}07438. \tag{33}$$

It is known that the value of maintenance and operating costs varies exponentially ($C_{mo}(t) = k(e^{\mu t} - 1)$) and it can be written:

$$\frac{C_{mo}^{(3)}}{C_{mo}^{(1)}} = \frac{k(e^{3\mu} - 1)}{k(e^{\mu} - 1)} = \frac{(e^{\mu} - 1)(e^{2\mu} + e^{\mu} + 1)}{(e^{\mu} - 1)} = e^{2\mu} + e^{\mu} + 1 = 3{,}5 \quad (34)$$

By substituting $e^{\mu} = x$ a second degree equation in *x* is obtained, whose solutions are, $x_1 = 1.4365$ and $x_2 = -2.4365$ (a solution without a physical meaning).

$$e^{\mu} = 1{,}4365 \Rightarrow \mu = 0{,}3622 . \quad (35)$$

From expresion: $C_{mo}^{(1)} = k(e^{\mu} - 1) \quad \Rightarrow k = \frac{C_{mo}^{(1)}}{e^{\mu} - 1} = 59564{,}64 .$ (36)

After the determination of the model parameters, the function of the average cost of using the equipment can be written:

$$c_T(t) = \frac{1}{t}\left[92 \cdot 10^4 (1 - e^{-0{,}07438t}) + 59564{,}64(e^{0{,}3622t} - 1)\right]. \quad (37)$$

In table no. 1 calculations are exemplified for determining the year in which the average annual costs are minimal and therefore the optimal moment to replace the equipment that has the characteristics described in the model.

Table 1: The determination of the optimal time of replacing the industrial equipment

t	I_0	I_0 A	k	k B	$C_T(t)$	$c_T(t)$
1	92 10^4	65946.64	59564.64	25999.14	91945.79	91945.79
2	92 10^4	127166.16	59564.64	63346.56	190512.71	95256.36
3	92 10^4	183997.39	59564.64	116995.60	300992.98	100330.99
4	92 10^4	236754.89	59564.64	194061.70	430816.60	**107704.15**
5	92 10^4	285730.67	59564.64	304766.10	590496.78	118099.36
6	92 10^4	331195.82	59564.64	463791.50	794987.28	132497.88
7	92 10^4	373401.97	59564.64	692229.20	1065631.15	152233.02
8	92 10^4	412582.74	59564.64	1020377.00	1432959.55	179119.94

The notations were made: $A = (1 - e^{-0{,}07438t})$ and $B = (e^{0{,}3622t} - 1)$.

As can be seen from table no. 1, the average annual costs are minimal in the fourth year after the equipment comes into operation.

Conclusions

The management of the industrial equipment life is a problem of finding out the minimum costs that occur during the entire service. The moment when this minimum appears, in some situations, can be found when the statistical evolution of the costs involved is known, and this evolution can be modeled mathematically. If the variation of the acquisition cost of a new equipment in time is not taken into account, it was observed that for a polynomial variation of degree two or higher, obtaining the solution becomes difficult because solving the higher degree equations is difficult, and more, the solution is not unique. This leads to great uncertainty about the solutions obtained.

The mathematical models presented can be used only if the company has the statistical data required by each model. Another limitation in the application of these models is that the existence of a statistical series of data that follows a certain trend must be demonstrated. For this purpose, the least squares method can be used, in which the utility and correlation coefficients can provide pertinent information on the linear, parabolic, exponential or logarithmic evolution, etc. of data collected through time series. Data processing and storage is done through computer systems that also have maintenance and operation costs, which increases the share of operating costs of the equipment under discussion. These costs are not taken into account in the models presented but can be considered as representing a share of the costs of the equipment in question.

If the depreciation of the equipment is also taken into account, the problem becomes a classic problem of optimal, having two functions; one ascending and one descending. Even in this case the solution does not always exist and depends on the shape of the two functions. For an exponential function of maintenance and operating costs and an exponentially negative function of the selling price after a few years, the model parameters $(k, \lambda$ și $\mu)$ can be found relatively easily only for small values of t, which limits the domain of the models. This was noted and used in the case study conducted in this paper. In the case study it was observed that the replacement of the equipment must be done in the fourth year of service. In that year year the acquisition costs and those of maintenance and operation have a minimum, after which they start to increase.

In the case of models that also take into account the update of costs over time, it is noted that these models try to model as accurately as possible the situations in practice but other uncertainties arise. It is found that the optimal replacement time is not the same for the model without costs update and for the model with costs update. It is noted that the minimum value is not obtained for the same year for both models but when the cost update is taken into account the equipment can be kept in service for a longer time. (Dinu et al., 2017). For a better understanding of the optimal equipment replacement models, a cost sensitivity analysis according to the interest rates must be performed.

The originality of the paper consists in highlighting, through the case study, the limits of the equipment replacement models when taking into account the depreciation of the equipment over time and especially the shape of the function of maintenance and operating costs and the sale price after a certain number of years. Thus, the possibility of solving without the use of electronic calculation techniques only for small values of t is emphasized.

Even if each model has its own limitations, they represent a step forward in assessing the optimal time to replace equipment, as it provides a mathematical tool for decision makers and as it bring benefits to the companies using them. It is very important to collect as accurately as possible the data regarding the annual maintenance and operation costs of the equipment while their are in service.

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Communication between Citizens and Public Institutions in Times of Crisis: A Study Based on a Generation Z Perspective and Relationship Marketing Principles

Felicia A. STANCIOIU
The Bucharest University of Economic Studies, Bucharest, Romania,
felicia.stancioiu@mk.ase.ro

Nicolae A. POP
The Bucharest University of Economic Studies, Bucharest, Romania,
nicolae.al.pop@mk.ase.ro

Raluca NASTASE ANYSZ
The Bucharest University of Economic Studies, Bucharest, Romania,
r.nastase.anysz@gmail.com

Cristina A. BABA
The Bucharest University of Economic Studies, Bucharest, Romania,
baba.andrada@gmail.com

Abstract

Public institutions are gaining in prominence as they are called upon to respond to the COVID19 pandemic. The communication between citizens and institutions is increasingly important for managing the crisis, preserving society's civic fabric, and ensuring the maintenance of trust in the aftermath of the crisis. It is relevant to look at communication in an anticipatory way because once society's normal functioning resumes, albeit in a changing environment, citizens' trust and commitment and the maintaining of civic ties are paramount. This research studies the communication patterns between citizens and public institutions in a time of crisis, evaluate the levels of trust in public institutions, as trust is a main concept and indicator in relationship building and predictor of commitment, and provides recommendations based on relationship marketing communication principles. The research was conducted qualitatively, based on 86 interviews carried out in Romania with Generation Z participants.

Keywords*:* COVID19, public institutions, communication, trust, relationship marketing, Generation Z, Romania.

JEL*:* M31, M38, D73
pp: 1-14

Introduction

Public institutions are gaining in prominence during the current sanitary crisis. The communication between citizens and institutions is increasingly important for managing the crisis, preserving society's civic fabric, and ensuring the maintenance of trust in the aftermath of the crisis. It is relevant to look at communication in an anticipatory way because once society's normal functioning resumes, albeit in a changing environment, citizens' trust and commitment and the maintaining of civic ties are paramount. The objectives of the research are to (1) study the communication patterns between citizens and public institutions in a time of crisis caused by the COVID19 pandemic, (2) evaluate trust levels in public institutions, as trust is a main concept and indicator in relationship building and predictor of commitment, and (3) provide recommendations based on relationship marketing communication principles.

Literature Review

The public sector's communication has to involve the threefold implication of public institutions at legislative, executive, and judiciary levels, in an accountable, transparent, and efficient manner. This produces a domino effect

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on other areas of society, such as business, academia, and civil society, empowering them to define their role and represent their interests and rights. The functioning of the public sector depends on an interwoven complexity of relationships and interactions between the executive, the legislative, the judiciary, the national, regional and local administrations, the armed forces and the police, the business, the academia, the media, the non-profit sector, the trade unions, and the religious organizations. (Uphoff, Krishna 2004)

A healthy public system is based on commitment, loyalty, credibility, and combating corruption (Dimant and Tosato, 2017). We follow the established view that there are two main influencing factors of commitment and loyalty: an attitude dimension and a behavior dimension (Day, 1969, Dick and Basu, 1994; Kiesler, 1969; Knox, 1998; Lee and Zeiss, 1980; Mowday *et al.,* 1979; Mägi 1999; Söderlund, 1999; Williams and Hazer 1986). The behavior dimension refers to the fact that people show greater commitment when making more effort to obtain something (Cialdini, 1988; Grusky, 1966; Kiesler, 1971; Söderlund, 1999). Making a sacrifice or a renunciation can lead to self-justification and increase commitment (Kanter, 1968; Farrell and Rusbult, 1981; Lund, 1985; Rusbult, 1983; Salancik, 1977). Commitment is increased when the end-user, in this case, the citizen, participates, and creates value (White, 1959; Bateson, 1985; Stott and Walker, 1995). Participation contributes to reduced perceived discrepancy between expectations and results. Therefore, people tend to give less importance to problems when investing in an outcome or course of action (Raaij and Pruyn, 1998). These findings point out that public institutions need to increase commitment and loyalty by involving citizens in a participatory, voluntary, and effort-based engagement in public consultations and policymaking.

The relationship of the citizen with public institutions revolves around the added value of the public Institution, the co-creation of value with the citizen, and trust and communication (Cătoiu and Ţichindelean, 2012; Gummesson, 2008; Payne and Frow, 2005). In the following paragraph we analyze the relationship of the citizens with public institutions through the prism of Surej's (2019) four relationship marketing pillars:

1. Trust - is the "confidence in exchange partner's reliability and integrity" (Morgan and Hunt, 1994, p.23) and it is at the centre of the capacity to develop a relationship and let it mature (Miquel-*Romero et al.,* 2014; Moorman et al., 2006; Verma *et al.,* 2016; Churchill and Surpernant, 1982). The essence of relationships and exchanges is trust, therefore the concept of trust is central in relationship marketing (Gummesson, 2008) and it applies to the public sphere through the challenge of building trust with constituents and citizens (Andrei, 2018). Trust, in the sense of delivery and fulfilment of promises, is indispensable for a healthy public sector climate. Studies using factor analysis make an attempt at measuring trust, although its measurement is difficult (Pop and Pelău, 2017). Particular care should be given to the relationship marketing approach in relation to trust, as there is an unintended consequence of making consumers more distrustful of organizations which apply its principles, because it risks to become associated with self-interested rhetoric or intrusive practices. On the contrary, trust starts with delivery of promises, cooperation, and mutual respect for each other's values. (O'Malley and Prothero, 2004).
2. Commitment - is the institution's " enduring desire to maintain a valued relationship with its stakeholders" (Verma, Sharma, & Sheth, 2016, p.209), it is at the centre of relationship marketing research (Addison, Lingham, Uslay, and Lee, 2017; Morgan and Hunt, 1994) and it has the capacity to determine the success of a relationship marketing campaign (Miquel-Romero, Caplliure-Giner, & Adame-Sánchez, 2014; Ndubisi, 2007; Moorman, Deshpande, and Zaltman, 2006). Attention is also required for the frequency of the communication flow, as private sector experience shows that a much too dense or scattered communication flow risks to produce an information overload and has counter-productive effect on commitment (Bright *et al.,* 2015; Sasaki *et al.,* 2015; Bawden and Robinson, 2009).
3. Service - the service culture aims to convince citizens that the institutions deliver on their promises. Reality looks worrying both in the public and private sectors, as levels of trust in public interventions is low (Ortiz-Ospina, 2016) and service feedback in private sector is equally disconcerting, with consumer complaints increasing in the US for example (Fournier *et al.,* 1998) and customer loyalty decreasing in the UK, as complaints management seems not be effective in generating loyalty (Management Services, 2000).
4. Information technology - in an era where privacy concerns and data theft are threats, the importance of ethical practices and of trust is crucial (Kushwaha *et al.,* 2020). Communicating with the citizen gains in importance during times when disinformation is pervasive. The communication of public institutions covers two aspects: 1) managing citizen's information in a responsible and respectful manner and 2) making use of new informational technologies and new media (Henning-Thurau and Hansen, 2000).

As indicated by Andrei (2019), there is currently a widespread anti-establishment mood characteristic of contemporary societies. Globalization has a double effect: firstly, a divisive result is characterized by disrupted traditions, and secondly, a uniting effect based on similar goods, mobility across borders, and simultaneous trans-border dialogue and exchange via the internet. There seems to be a "global mirroring of the self" (Andrei 2019, p. 304), in the sense of globalization of fears, emotions, expectations, needs, and ideas. In terms of relations with public

institutions, internationalization adds an extra disruptive dimension, namely, global events influence perceptions of public institutions and markets beyond the influence of public leaders and national market leaders. Such disruptive processes are magnified by phenomena such as fake news, internet trolling, pervasive myths, or just, plainly, criticism from other world areas.

In terms of image, a country's image consists of a real image and a projected image (Picazo and Moreno-Gil, 2017). For this reason, a regional approach is often considered to be fairer as a representation of an area (Margarisová and Vokáčová, 2016), especially for big countries with large differences between areas. Like a political campaign, in the long run, an effective country policy considers regional differences and the different interests of the stakeholders (Anholt, 2008). The so-called "halo effect" (Nisbett and Wilson, n.d.) designated the loyalty that a satisfied consumer develops towards the producer of a product or a service that they are satisfied with is applied for countries as well and can be fostered by an image branding exercise.

Communication of public institutions towards citizens has to consider whether the object of communication is services or products. Communication about services is different from communication about products because of the services' intangibility (Hill and Gandhi, 1992) and a higher level of perceived risk when accessing a service due to the lack of assurance that expectations will be fulfilled (Mortimer, 2002). The challenge of the marketer is to demonstrate benefits that are more experiential than the material in nature. Experiential marketing aims for creating pleasant, exciting, and memorable consumption experiences of products and services (Shobeiri *et al.,* 2018; Pine, Gilmore, 1998; 1999; Schmitt, 1999; Mathwick, Malhotra and Rigdon, 2001). It adds a range of sensory-emotive mechanisms added to rational and benefit-seeking motivations (Holbrook and Hirschman, 1982; Schmitt, 1999).

Services and products have different nature, symbolic meaning, and meaning that the citizen invests it with (Hakkio & Laaksonen, 1998), while the marketer acts as a mediating filter between the nature of the product and its role for the consumer (Pelau and Chinie, 2018). The development of the service sector is a defining feature of the modern economy market and it requires the continuous improvement of applications in the field of quality, manifested by a considerable evolution in terms of service quality management (Teodorescu et al., 2009). Currently, citizens have increased possibilities to review and comment on public services and goods on internet platforms. Studies show that 84% trust online reviews of services and products (Schuckert *et al.,* 2015). Word of mouth, and its electronic equivalent, online forums, is a significant differentiating factor among private brands (Shardanand and Maes, 1995), and a logical evolution will be the spread of such tools to public brands.

Emotional appeals effectively influence a favorable attitude towards services (Mattila, 1999; Zhang *et al.,* 2014). The most effective advertising strategy for services is to showcase the citizen using the service and, secondly, to show a physical representation of the service (Décaudin and Lacoste, 2018). Both ways indicate that the crux of communication in the service sector is to reassure the audience and help them identify themselves emotionally and anticipatory with the advertised service. Tangible attributes are more objective than intangible ones because they reveal themselves to the consumer's mind through the senses instead of intangible ones, which are a projection of the consumer's mind (Hirschman, 1980). The marketer has available a series of strategies for tangibilization (Hill, Gandhi 1992; Mittal, 1999, 2002; Mortimer, 2002, 2008): (1) the use of documentation to prove the service's competitive advantage or value; (2) providing visual examples of the service situation, like the way it is used or sold; (3) stressing physical components (Mittal and Baker, 2002), e.g., an ambulance for medical emergency services, a car and bags for home delivery, books and school premises for education, a fire brigade car for emergency interventions, etc.; (4) by using an established brand image (Pina *et al.,* 2006; Brodie, Whittome and Brush, 2009).

An important factor impacting the communication between citizens and public institutions is culture. Understanding the national or regional culture's specificities is crucial for designing effective services (Davis, Wang, Lindridge, 2008; Laroche *et al.,* 2000), including for public services. Hirschman and Holbrook (1982) point out these cultural differences in experiential consumption. From nation to nation, there are perceptible differences in trust, level of civic commitment, different expectations, and preferred types of confidence-building displays, such as campaigns. One of the most widely spread frameworks for cross-cultural studies was developed by Hofstede (2011). Hofstede's model contains six societal dimensions, individualism vs. collectivism, long-term orientation vs. short-term orientation, uncertainty avoidance, power distance, masculinity vs. femininity, and indulgence vs. restraint, in order to explain the differences among national cultures (Hofstede and Minkov, 2010; Hofstede, 2011; Pelau and Pop, 2018). Societal features such as individualism, masculinity, short-term orientation, uncertainty acceptance, and indulgence lead to a pragmatic approach towards public services, preferring fast delivery and electronic formulas, despite eventual risks or procedural shortcomings.

Methodology

The present article is a qualitative research, using the method of semi-structured discussion and the technique of the interview based on the conversation guide tool. Based on the research objectives mentioned in the introduction, a fundamental literature review, including COVID related literature, was carried out starting with May 2020 and until August 2020. Based on this, the following hypotheses were drawn to form the basis of the research:

H1: The communication between the young generation (Z generation) of citizens in Romania and public institutions depends first and foremost on trust;

H2: The young generation (Z generation) of citizens in Romania expects increased use of IT and electronic means;

H3: The measures undertaken by the Romanian public authorities in response to the COVID19 crisis are timely and effective;

H4: The young generation (Z generation) of citizens in Romania trust the public institutions;

H5: The young generation (Z generation) of citizens in Romania avoid the traps of disinformation in times of crisis.

In order to research these hypotheses, 86 interviews based on a conversation guide were carried out with students from the University of Economic Studies in Bucharest, Romania, throughout September and October 2020. The condition to take part in the study was to have contacted public institutions within the former 6 months preceding the study, from March onwards, since the start of the COVID19 pandemic. Several 150 students were contacted, out of which 86 accepted to participate in the study. The study's age demographics are the following:

- 79 participants are between 18 and 25 years old.
- Four participants are between 26 and 35 years old.
- Two participants are between 36 and 45 years old, and one participant between 45 and 65 years old.

Given the overwhelming majority of participants under 25 years old, the perspective obtained is characteristic of Generation Z, comprising individuals born after 1995 (Dabija *et al.,* 2017). The majority of participants are women. Most of the participants originate from Romania, Bucharest, and they live in an urban area. The interviews were conducted online with the help of e-mails. Following the answers' receipt, the authors returned to some of the respondents with additional clarifying questions in written or through Skype. Anonymity was guaranteed to the participants.

Discussion

The interviewees ranked the public services they used in the former past six months in the following decreasing order of interaction frequency: education, health, tax collection, community facilities (water supply, gas, sewage, sanitation, thermal energy, public lighting, public transport), population registration services, culture, environmental protection and restoration, and the police.

The following parameters influence the communication between the participants and public institutions in decreasing order: trust, reciprocal commitment, relationship building, direct interaction, the objective, rational attributes of the citizen's area of action, personalized interaction, national and local culture, the demonstration of the added value of the public institution's activity, negotiation and, finally, the demonstration of value-added of the citizen's request or initiative. As an example, an interviewee emphasized that, in her perception, public institutions are antiquated from both a physical and moral perspective. Based on the synergy of all these observations, H1 (communication between the young generation (Z generation) of citizens in Romania and public institutions depends first and foremost on trust) is confirmed.

Interviewees were asked to provide recommendations about the way communication with public institutions can be improved. Unsurprisingly for the nature of the sanitary crisis, an overwhelming majority of participants named the use of electronic means, such as e-mail, internet, video conferencing, web streaming, and online public administration services indispensable to better communication followed by the use of social media. A minority of interviewees mentioned the improved use of classical communication means, such as TV, radio, printed publications, and face-to-face communication. The automatization of data processing and the official documents issued, coupled with the client service's enhancement, was proposed only by two interviewees about the age group between 26 and 35 years old. We conclude that H2 (the young generation (Z generation) of citizens in Romania expects increased use of IT and electronic means) is confirmed.

When asked to evaluate the measures taken by the Romanian authorities in response to the pandemic, the interviewees considered that the most useful measures were, in descending order, the (1) possibility to work from home, including for public servants, (2) the organization of online university courses, and (3) the digitization of institutional processes, in order to avoid going to the counter, (4) the social distancing measures, including the closure of public spaces, (5) the granting of technical unemployment, (6) the postponement of fees and bank rates during the crisis, (7) the surveillance and treatment measures for suspected or infected persons and (8) the subsidies provided by the state to companies in severely affected industries. An interviewee points out that although most measures are useful theoretically, they are not implemented effectively.

Almost a third of the interviewees rate the management of the COVID19 crisis in Romania by the public institutions at 6 out of 10 on a Likert scale. A fourth of the participants rate the said crisis response at 7 out of 10 on a Likert scale. Only 10 interviewees rate the crisis response of Romanian authorities at 8 out of 10, and 3 interviewees are very satisfied with a rating of 9 out of 10. Overall, 56 out of 84 interviewees rate the crisis response over 5 out of 10, while the rest of the 30 rates it under 5, with a sixth of the interviewees giving a rating as low as 3 out of 10. The sample of 84 was retained for this, as 2 participants did not answer this last question.

Therefore, we conclude that H3 (the measures undertaken by the Romanian public authorities in response to the COVID19 crisis are timely and effective) is disproved. However, we note the positive reaction of interviewees to the measures (1) to (7) mentioned in the former paragraph and of the majority of participants being fairly positive towards the crisis response by rating more than 5 on a 10-point Likert Scale.

Interviewees were invited to rate the most common community public services according to their level of trust on a Likert scale from 1 to 10, with the results portrayed in Table 1 below.

Table 1. Levels of trust in public services (Source: data collection made by the authors)

Service	Number of interviewees with a trust level from 1 to 5 on a 10 point Likert scale	Number of interviewees with a trust level from 5 to 10 on a 10 point Likert scale	The most prominent rating of trust out of 10 (the highest proportions of participants)
Social security	36	50	6 out of 10 (aprox. a fifth of participants)
Tax collection	37	49	5 out of 10 (aprox. a third of participants)
Culture	19	67	8 out of 10 (aprox. a fifth of participants)
Urban development	40	46	7 out of 10 (aprox. a fifth of participants) 5 out of 10 (a further fifth of participants aprox.)
Education	12	74	8 out of 10 (aprox. a third of participants) 7 out of 10 (aprox. a fifth of participants)
Population register	25	61	9 out of 10 (aprox. a fifth of participants) 8 out of 10 (a further fifth of participants aprox.)
Public roads and bridges	55	31	4 out of 10 (aprox. a fifth of participants)
Environment protection and restoration	50	36	6 out of 10 (aprox. a fifth of participants)
Health	39	47	7 out of 10 (aprox. a third of participants)

Community emergency services (mountain rescuer, lifeguard, first aid)	31	55	8 out of 10 (aprox. a fifth of the participants) 5 out of 10 (aprox. a fourth of the participants)
Community services of public utility (water supply, gas, sewage, sanitation, thermal energy, public lighting, public transport)	29	57	8 out of 10 (aprox. a fifth of the participants) 7 out of 10 (aprox. a fifth of the participants)
Police	35	51	6 out of 10 (aprox. a fifth of the participants) 5 out of 10 (aprox. a fifth of the participants)
Sport	31	55	8 out of 10 (aprox. a third of the participants)

Source: Own creation.

The interviews show a high amount of trust in education and culture, most and foremost, followed in decreasing order by the population register services, community services of public utility (water supply, gas, sewage, sanitation, thermal energy, public lighting, public transport), community emergency services (mountain rescuer, lifeguard, first aid), sport and the police. The lowest levels of trust are, by far, bestowed upon public roads and bridges and environmental protection and restoration. The grey areas of trust are decreasing trust, urban development, health, tax collection, and social security. We, therefore, conclude that H4 (the young generation (Z generation) of citizens in Romania trust the public institutions) is tested and proved for the sectors of education and culture, population register services, community services of public utility, community emergency services, and, in a lesser measure, for the sectors of sport and the police. The said hypothesis is disproved for public roads and bridges and environmental protection and restoration.

The interviewees were also questioned about the fake news phenomenon. It resulted that almost half of the participants are reading only news from sources that they trust and select based on personal selection criteria. Almost a third of participants consider that they can differentiate between accurate information and attempts of disinformation. Eleven interviewees admitted to having given up all news or social media lectures, while six interviewees affirmed not trusting any source any longer. This adds up to almost a fifth of the respondents showing signs of resignation towards disinformation and a withdrawal from information sources altogether as a fatigue response. Fifteen out of the said interviewees are within the age group 18-25 years old, and only 2 are from the age group 36-45 years old. Therefore, we consider that this resignation occurs very early in the participants' lives and might pose a threat to future citizens' morale and attitude, in case this phenomenon is not curbed. In particular, in times of crisis, the disinformation phenomenon is taking dangerous, life-threatening proportions. Nevertheless, the vast majority of the interviewees acknowledge the phenomenon and build a "defense" strategy. Therefore, we conclude that H5 (the young generation (Z generation) of citizens in Romania avoids the traps of misinformation in times of crisis) that is neither proved nor disproved.

Conclusions and Recommendations

The research confirms trust as the main vehicle of communication between the young generation (Z generation) of citizens in Romania and public institutions. We recommend that that trust is built upon anti-corruption measures and whistleblowing mechanisms. Direct, personalized interaction with the young generation, particularly through the use of IT and electronic means, is a priority. The digitization of institutional processes should be a priority and facilities in terms of teleworking, unemployment safety net, and financial and fiscal mechanisms to support the youth in bridging the crisis. Positive examples such as education and culture can be emulated to conceive an action to improve urban development, health, tax collection, and social security services. Urgent intervention is needed in the area of road infrastructure, bridges, and environmental protection and restoration. Urgent measures are also required in the area of disinformation in order o prevent fake news fatigue from creating victims of resignation and civic withdrawal. We propose creating an internet policing unit, able to patrol and sanction online disinformation and intimidation.

Limitations

Given the nationality homogeneity of the cohort investigated, the research specifically aims the situation in Romania. However, a wider national study can lead to nationwide conclusive results. A deeper sociological analysis has to be made regarding whether Generation Z in Romania shares the same features as the members of this generation in other parts of the world. The historical and socio-cultural context indicates a similarity with post-communist eastern European countries. Moreover, the interviewees are students with a high level of education and scholarization. We can see that education is one of the services valued at its highest, which is both an indication of the student's perspective and a vote of confidence and appreciation for the education system in Romania, which largely subsidizes students based on filtering admission exam grades.

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How May Digital Transformation Help Boosting Your Business

Marius BULEARCĂ
Center for Industry and Services Economics, Bucharest, Romanian Academy
mariusbulearca@yahoo.com

Cătălin POPESCU
Petroleum-Gas University, Ploiesti, Romania
cpopescu@upg-ploiesti.ro

Abstract

In this complicated year 2020, COVID-19 made what was once optional into a mandatory part of business strategy, and 2021 will only move the needle further to the digital side. In respect to digital business in 2021, big changes will be seen coming as the post-pandemic era continues to rapidly transform the business landscape. Thus, what many considered optional became imperative overnight speaking of digital business as the majority of businesses will invest in having a full-fledged digital presence. Digital transformation involves using digital technologies to remake a process to become more efficient or effective, as digital transformation can involve many different technologies like cloud computing, the Internet of Things, Big Data, and artificial intelligence. The idea is to use technology not just to replicate an existing service in a digital form, but to use technology to transform that service into something significantly better. Therefore, we start a larger research dedicated to digital transformation and digitalization issues and their influences over the business's performances. Thus, in the beginning, this paper explains what digital transformation is, why it matters, and what its big trends are. The remaining part of the paper deals with identifying ways to find the best talent to drive the cloud and digital transformation in every business. However, businesses must make good on their commitments to embrace a digital model in order to stay relevant and competitive in today's market, as well as to provide better employee and customer experiences.

Keywords: digital transformation, information technology, cloud computing, the Internet of Things, Big Data, artificial intelligence

Introduction

Faced with unprecedented uncertainty, businesses now more than ever need their technology leaders to be resilient, agile, and future-focused. At the same time, current market, economic, and social conditions indicate this is the time for transformational, not incremental, change - and who better than technology leaders to help drive this change?

Information Technology[1] (IT) and business leaders are increasingly under pressure to find ways to apply digital practices to business processes and operations. However, many analysts point to a large divide between the goal of digital transformation and companies' ability to achieve it. This paper considers some of the biggest obstacles standing in the way of that transformation, as well as strategies to overcome them.

Digital transformation efforts are underway to varying degrees at virtually every company, with projects typically

[1] Information Technology (IT) refers to anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies. Many companies now have IT departments for managing the computers, networks, and other technical areas of their businesses. IT jobs include computer programming, network administration, computer engineering, Web development, technical support, and many other related occupations. Since we live in the "information age," information technology has become a part of our everyday lives. That means the term "IT," already highly overused, is here to stay (Source: https://techterms.com/definition/it#:~:text=Stands%20for%20%22Information%20Technology%2C%22,that%20work%20with%20these%20technologies).

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spearheaded by the Chief Information Officers[2] (CIO) or Chief Technology Officer[3] (CTO). However, these efforts are often driven in pockets of the enterprise by individual employees with expertise and passion for digital, and a vision for how it can help their company become more competitive. Dubbed "digital change agents," these individuals come from different backgrounds and skill sets, but all advocate for the same thing: using digital tools and processes to improve the business. These are the individuals in the organization who are most likely not in a leadership role, and maybe not even in a management role. But they are exceptionally passionate, informed, and experienced in digital and its impact on business and markets. They're going out of their roles to try to send that message up the corporate ladder[4].

CIOs and the Chief Marketing Officer[5] (CMO) often battle to spearhead digital transformation efforts, with the CIOs taking a technology-first approach and CMOs taking a customer experience path. Digital change agents tend to see how customers and employees are changing and that efforts need to be cross-functional. However, these individuals are not experienced in change management—one of the largest barriers to digital transformation success. Digital transformation has less to do about digital, and more about good old-fashioned change management. The common challenges for digital transformation to go enterprise-wide were all things related to the fear of executives and their colleagues - things like self-preservation, egos, and politics. Things that digital change agents aren't well-versed in how to navigate.

As 2020 comes to its end, the complete impact of COVID-19 is not fully known. But it's clear that the pandemic has significantly increased business dependency on digital technologies and accelerated the timeline for technology adoption and business digitization, presenting tech leaders with an unprecedented opportunity to help shape the future of their organization. On the technology leader's journey, the board and other C-suite executives will be critical partners.

What is Digital Transformation

We begin our research by showing what digital transformation is, why it matters, and what the big trends are, as digital transformation involves using digital technologies to remake a process to become more efficient or effective.

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[2] A Chief Information Officer (CIO) is the most senior technology executive inside an organisation. The job title is used widely around the world in business and in government and in charitable and non-profit organisations. The role of the CIO is to help to set and lead the technology strategy for an organisation, in concert with the other C-level executives. As such, one of the many roles of the CIO it to provide an executive-level interface between the technology department and the rest of the business (Source: https://www.zdnet.com/article/what-is-a-cio-the-chief-information-officer-role-explained/).

[3] The chief technology officer (CTO) is the executive responsible for managing technology within an organisation; that can include everything from creating a technology strategy though to cybersecurity and onto product development. They need to understand broad technology trends and be able to align innovation with business goals. The CTO has overall responsibility for managing the physical and personnel technology infrastructure, including deployment, integration, systems management, and the development of technical operations personnel. CTOs also manage vendor relations to ensure that service expectations are delivered. In a sign of the increased expectations of top-class CTOs, the role is moving beyond infrastructure management and towards driving technology innovation and leading digital product development. The analyst says CTOs should be looking to evolve their responsibilities in response to the business' demands for digital transformation (Source: https://www.zdnet.com/article/what-is-a-chief-technology-officer-everything-you-need-to-know-about-the-cto/).

[4] The difference between the CIO and the CTO depends very much on the type of business we're talking about. Some businesses only have one or the other – and in these organisations, the person holding the title, whether CIO or CTO, is the most senior tech chief in the enterprise. Many big businesses, however, have both – and that's where things get complicated. In firms with both, the traditional split is that the CTO is responsible for the operational concerns associated with technology implementation. CTOs drill down into the details of technology. They have a strong systems focus and they know how technology works, making it more of a chief architect role. CIOs, on the other hand, tend to focus more on engaging with the business. So while the CTO might go and speak with vendors to source technology, the CIO makes sure the internal business gets the secure and governable systems and services it wants. In technology companies, **w**hile the CIO focuses on internal applications of technology, the CTO is very much externally focused. In these companies, the CTO – as well as being an expert technologist – becomes the external face of the vendor's technology offering (Source: https://www.zdnet.com/article/what-is-a-chief-technology-officer-everything-you-need-to-know-about-the-cto/).

[5] The chief marketing officer (CMO) is a C-level corporate executive responsible for activities in an organization that have to do with creating, communicating and delivering offerings that have value for customers, clients or business partners. A CMO's primary mission is to facilitate growth and increase sales by developing a comprehensive marketing plan that will promote brand recognition and help the organization gain a competitive advantage. In order to achieve their own goals and effectively shape their companies' public profile, CMOs must be exceptional leaders and assume the voice of the customer across the company. CMOs typically report to the Chief Executive Officer (CEO) or Chief Operating Officer (COO) and hold advanced degrees in both business and marketing. A CMO who has a strong background in information technology may also hold the job title Chief Marketing Technologist (CMT). In some larger organizations, however, those positions are separate, and the CMT reports to the CMO (Source: https://searchcio.techtarget.com/definition/CMO-chief-marketing-officer).

The idea is to use technology not just to replicate an existing service in a digital form, but to use technology to transform that service into something significantly better.

But it's not just about the technology: changing business processes and corporate culture are just as vital to the success of these initiatives. Digital transformation projects are often a way for large and established organisations to compete with nimbler, digital-only rivals. These projects tend to be large in scope and ambition, but are not without risks. While digital transformation is one of the most commonly-used - and over-used - phrases in the IT industry, definitions vary. What everyone can agree on is that, beneath the hype, the fluff and the confusion, digital transformation involves some pretty important changes to business culture.
Digital transformation can involve many different technologies, but the hottest topics right now are: ***cloud computing***[6], the ***Internet of Things***[7] ***(IoT)***, ***"Big Data"***[8], and ***artificial intelligence***[9] ***(AI)***.

How Important is Digital Transformation?

Worldwide spending on digital transformation technologies - hardware, software, and services – hit $1.3 trillion in 2017[10], according to IDC. The tech research company expects spending to almost double between now and 2021, when the total amount spent on digitalisation globally will surpass $2.1 trillion.

In a survey of 460 execs by IT analyst Gartner[11], 62% said they had a management initiative or transformation program to make their business more digital. Just over half (54%) said that their digital business objective is transformational, while 46% said the objective of the initiative is optimization.

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[6] Cloud computing is the delivery of on-demand computing services - from applications to storage and processing power - typically over the internet and on a pay-as-you-go basis. Rather than owning their own computing infrastructure or data centres, companies can rent access to anything from applications to storage from a cloud service provider. One benefit of using cloud computing services is that firms can avoid the upfront cost and complexity of owning and maintaining their own IT infrastructure, and instead simply pay for what they use, when they use it. In turn, providers of cloud computing services can benefit from significant economies of scale by delivering the same services to a wide range of customers (Source: https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/).

[7] The Internet of Things (IoT), refers to the billions of physical devices around the world that are now connected to the internet, all collecting and sharing data. Thanks to the arrival of super-cheap computer chips and the ubiquity of wireless networks, it's possible to turn anything, from something as small as a pill to something as big as an aeroplane, into a part of the IoT. Connecting up all these different objects and adding sensors to them adds a level of digital intelligence to devices that would be otherwise dumb, enabling them to communicate real-time data without involving a human being. The Internet of Things is making the fabric of the world around us smarter and more responsive, merging the digital and physical universes (Source: https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/).

[8] "Big Data" is a catch phrase that has been bubbling up from the high performance computing niche of the IT market. Increasingly suppliers of processing virtualization and storage virtualization software have begun to flog "Big Data" in their presentations. What, exactly, does this phrase mean? If one sits through the presentations from ten suppliers of technology, fifteen or so different definitions are likely to come forward. Each definition, of course, tends to support the need for that supplier's products and services. Imagine that. In simplest terms, the phrase refers to the tools, processes and procedures allowing an organization to create, manipulate, and manage very large data sets and storage facilities. Does this mean terabytes, petabytes or even larger collections of data? The answer offered by these suppliers is "yes." They would go on to say, "you need our product to manage and make best use of that mass of data." Just thinking about the problems created by the maintenance of huge, dynamic sets of data gives anyone a headache. Large organizations increasingly face the need to maintain large amounts of structured and unstructured data to comply with government regulations. Recent court cases have also lead them to keep large masses of documents, Email messages and other forms of electronic communication that may be required if they face litigation. Like the term virtualization, Big Data is likely to be increasingly part of IT world (Source: https://www.zdnet.com/article/what-is-big-data/).

[9] Artificial intelligence was described, back in the 1950s, by the fathers of the field Minsky and McCarthy, as any task performed by a program or a machine that, if a human carried out the same activity, we would say the human had to apply intelligence to accomplish the task. That obviously is a fairly broad definition, which is why we shall sometimes see arguments over whether something is truly AI or not. AI systems will typically demonstrate at least some of the following behaviours associated with human intelligence: planning, learning, reasoning, problem solving, knowledge representation, perception, motion, and manipulation and, to a lesser extent, social intelligence and creativity. At a very high level artificial intelligence can be split into two broad types: narrow AI and general AI. While narrow AI is what we see all around us in computers today (intelligent systems that have been taught or learned how to carry out specific tasks without being explicitly programmed how to do so), artificial general intelligence is very different, and is the type of adaptable intellect found in humans, a flexible form of intelligence capable of learning how to carry out vastly different tasks, anything from haircutting to building spreadsheets, or to reason about a wide variety of topics based on its accumulated experience (Source: https://www.zdnet.com/article/what-is-ai-everything-you-need-to-know-about-artificial-intelligence/).

[10] https://www.idc.com/getdoc.jsp?containerId=prUS43381817.

[11] https://www.zdnet.com/article/what-is-digital-transformation-everything-you-need-to-know-about-how-technology-is-reshaping/#ftag=CAD-00-10aag7e 14/16.

According to a recent survey conducted by Grant Thornton, more than two-thirds (69%) of CFOs and senior financial executives are planning to increase their investment in technologies that speed business change, and four in ten said they plan an increase of more than 10% in the next 12 months. Just under half said their companies' digital-transformation investments are meant to help them overtake their competition through differentiation.

Yet it's not all good news. Forrester recently reported that digital transformation efforts are running into roadblocks[12] amid confusion, delusion, and resistance to change (and this situation is summarized and clearly depicted bellow, in Figure 1).

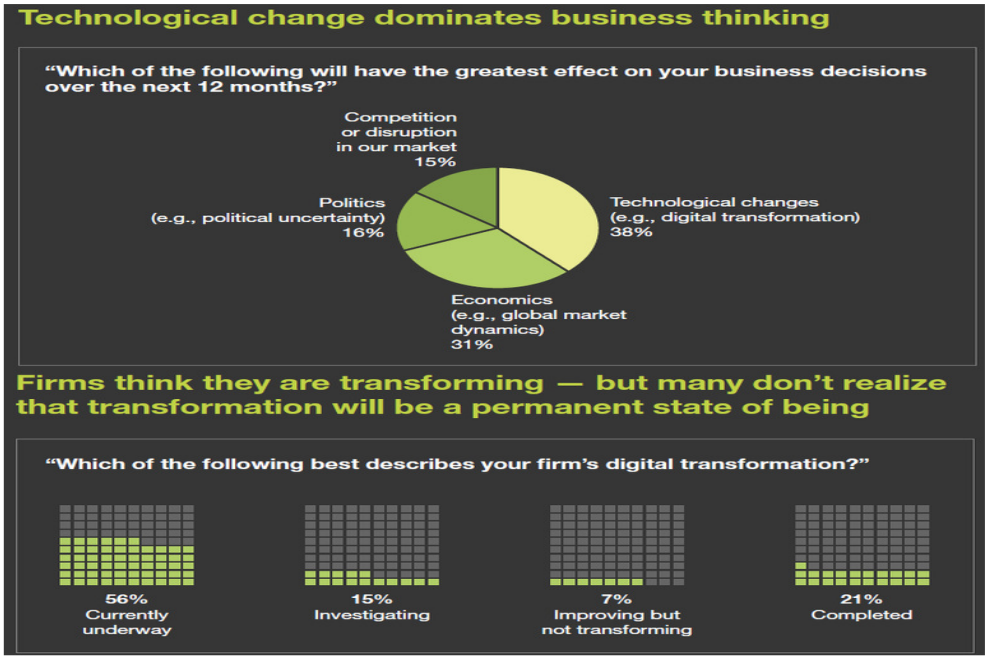

Figure 1: The state of digital transformation
(Source: https://go.forrester.com/blogs/15-12-08-the_state_of_digital_business_2016_to_2020/)

Criticisms of Digital Transformation

To critics, digital transformation simply offers tech vendors another opportunity to rebrand their offerings: it's not uncommon to see systems and services being sold as the answer for digital transformation. This kind of over-selling helps explain why Gartner believes digital transformation is approaching the trough of disillusionment[13].

Tech workers also express cynicism about grand talk of digital. No technology worker spends their working day digitally transforming, rather than coding, programming, and developing. And the phrase can be applied so broadly that it becomes effectively meaningless. Hence, we don't think there's such a thing as digital transformation, but two words that people put together. There is rapid transformation that is driven by technology. Yet all change in society and business these days is impacted by some level of technology.

Why Does Digital Transformation Matter?

Such disillusionment might suggest there is little to be gained by focusing on digital transformation. But beneath the buzzwords there lies a crucial concept: digitalisation is helping smart entrepreneurs and pioneering executives to change the established economic order - and the effects are everywhere.

From Amazon's influence over retailing to Facebook's impact on publishing, traditional firms and sectors are being challenged by nimble, digitally-savvy operators. Yet, while almost three-quarters of business leaders are aware their organisation is under threat from disruption, many are not taking the risk of change seriously.

[12] https://www.zdnet.com/article/digital-transformation-gut-check-sorry-state-or-naturalselection/.
[13] https://www.gartner.com/smarterwithgartner/embrace-the-urgency-of-digital-transformation/.

Only half of enterprises see start-ups as a serious threat, according to research from Dell EMC[14], and almost one in ten do not believe they have any challengers in their market. In fact, 7% of executives say they are not concerned about the threat of digital disruption whatsoever. In these cases, a serious wake-up call is required.

What Does Digital Transformation Look Like?

Technologies from big data to cloud and from the IoT to AI are helping entrepreneurs to develop new business models and disrupt the established way of running operations. These technologies are not just the latest buzzwords, as we see tangible value coming from these technologies in terms of improving product optimisation, increasing production output, and tacking operational efficiency challenges.

So, call it what you want, but digital transformation is very much a thing - and it is something that many executives in traditional firms are still struggling to get their heads around. While start-ups thrive though their new ways of working, their innovative use of data, and their integrated approach to advanced technologies, too many traditional organisations - both in the private and public sectors - are still stuck in legacy mode. These enterprises are fixated on policy and process, rather than information and insight. Such slow-moving firms are getting left behind. Gartner says two-thirds of business leaders believe their companies must pick up the pace of digitalisation to remain competitive.

However, quickening the speed of development is tough. Digital is often viewed as a dark art that only a few experts understand. In too many cases, business leaders fill this knowledge gap with highly-paid consultants[15] who deliver the hype of digital transformation instead of measurable business value. Case studies of projects that deliver true digitalisation are thinner on the ground than the experts have you believe.

What Is Included in A Digital Transformation Project?

A genuine digital transformation project involves fundamentally rethinking business models and processes, rather than tinkering with or enhancing traditional methods. Digitalisation is not, as is commonly suggested, simply the implementation of more technology systems and services. Digital transformation should create something new: that might be an improvement to customer experience (for example by allowing customer self-service), streamlining the supply chain, or using insights from data to offer new products.

This creative requirement remains a tough ask for business leaders. Most organisations do not have a major problem generating new ideas, but many firms fail when it comes to implementing fresh business models[16] or turning good ideas into organisational objectives, according to research from Cass Business School.

This gap between innovation and execution helps explain why digitalisation and disruption are often seen as the preserve of nimble start-ups. But it doesn't have to be this way – there are great examples of digital transformation in the enterprise sector, too.

Digital Transformation Examples

In respect to our current topic, the first example comes from McDermott International. As such, McDermott International is creating a digital twin[17], which is a computer model of the oil and gas platform facilities it provides to clients. The firm envisages a 15% boost to operational margins by using the design-twin approach in key areas like predictive maintenance. Gartner believes half of industrial firms will use digital twins by 2021.

Rolls Royce's R² Data Labs initiative uses machine learning, AI and data analytics to create new services. The R² Data Labs team, which includes 200 data architects, engineers, scientists and specialist mangers, has helped Rolls-Royce deliver more than £250m in value[18] through engine-health monitoring activities in the past 12 months.

[14] https://www.zdnet.com/article/digital-transformation-three-ways-to-get-it-right-in-your-business/.
[15] https://www.zdnet.com/article/tech-careers-its-time-to-pump-up-the-volumeif-you-want-to-succeed/.
[16] https://www.zdnet.com/article/digital-transformation-closing-the-gapbetween-innovation-and-execution/.
[17] https://www.zdnet.com/article/internet-of-thingsprojects-why-your-business-needs-to-build-a-digital-double/.
[18] https://www.zdnet.com/article/successful-iot-deployment-the-rolls-royce-approach/.

Logistics firm UPS is placing analytics and insight at the heart of business operations[19]. The firm is using real-time data, advanced analytics and AI to help employees make better decisions. The firm recently launched the third iteration of its chatbot[20] that uses AI to help customers find rates and tracking information.

In the public sector, NHS Blood and Transplant has spent the past two years pushing a digital transformation agenda[21]. Several interesting trials are currently taking place, including around the use of predictive analytics and the likely waiting time for an organ. The ability to understand organ availability has a huge impact on healthcare.

What does digital transformation mean for legacy systems?

Digital transformation might be where companies want to be, but that doesn't mean IT leaders can afford to forget about their existing infrastructure investments. Gartner says 90% of current applications[22] will still be in use by the year 2023.

This older kit can be an obstacle to change. Almost half (44%) of CIOs believe complex legacy technology is the chief barrier to digital transformation, according to the Logicalis Global CIO Survey[23], with 51% saying they plan to adapt or replace existing infrastructure as a means of accelerating digital transformation.

It is encouraging IT leaders to recognise the replacement of legacy systems with modern, cloud-based systems is not in itself an objective. This process of re-platforming is the foundation for business change, rather than the actual process of digital transformation.

Who is responsible for digital transformation projects?

As the traditional guardians of technology investment, CIOs tend to have a big say in digital change projects. Yet CIOs are far from the only executives with a role in digital transformation management, and the pressure for change has led to the rise of new C-suite specialists, such as chief digital officers[24] (CDOs).

Analyst firms fanned the flames by suggesting the appointment of CDOs could hasten the demise of the traditional IT leadership role.

Gartner originally claimed[25] a quarter of businesses would have a digital chief by 2015, and IDC said[26] 60% of CIOs would be replaced by CDOs by 2020. Right now, those predictions look way off beam. While line-of-business employees are good at buying discrete digital technologies, CIOs have the experience of integrating systems and services. In most cases, appointed CDOs work with their CIO colleagues to exploit advanced technology on behalf of the business.

In fact, CIOs have used their experience to maintain a tight grip of digital transformation. Gartner says more than half (55%) of the 300 top-performing CIOs in global businesses also hold the CDO role. Digital transformation affects the entire business and CIOs help ensure technological elements are understand, bedded down and useful.

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[19] https://www.zdnet.com/article/big-data-case-study-how-ups-is-using-analytics-to-improve-performance/.

[20] Chatbot is a computer program designed to simulate conversation with human users, especially over the internet. Chatbots often treat conversations like they're a game of tennis: talk, reply, talk, reply.

[21] https://www.zdnet.com/article/blockchain-ai-machine-learning-what-do-cios-really-thinkare-the-most-exciting-tech-trends/.

[22] https://www.zdnet.com/article/digital-transformation-why-the-future-is-looking-bright-forcios/.

[23] https://www.prnewswire.com/news-releases/logicalis-global-survey-cios-worldwide-target-legacy-it-in-push-for-digital-transformation-300556078.html.

[24] Definitions of the role of Chief Digital Officer (CDO) focus on the core responsibilities of this new executive role - the transformation of traditional operations using digital processes. CDOs aim to generate new business opportunities, revenue streams and customer services from the adoption of digital technologies. That could take any form from the relatively mundane - replacing paper forms with a digital equivalent - right through to reorganising entire business units. In reality, CDOs are business-facing individuals that often don't have a background in technology, but they're specialists in digital business models. Because the chief digital officer role is so reliant on the use of technology, there is an overlap with the CIO position - and there's some competition as a result. Yet rather than being experts in IT implementation, CDOs are commonly characterised as change agents, because CDOs can be very effective, and can initiate new approaches quickly where they buy cloud services and avoid in-house IT development in a traditional sense. CIOs remain the owners of the technology infrastructure of any company, but CDOs will have a slightly different skill set; while they won't always have the technical detail, they tend to be strong communicators. They talk about the power of disruption and get people to buy into their vision of change, and thus, the role is about more than implementing digital services (Source: https://www.zdnet.com/article/what-is-a-chief-digital-officer-everything-you-need-to-know-about-the-cdo/).

[25] http://www.gartner.com/newsroom/id/2208015.

[26] https://www.zdnet.com/article/idc-has-blind-faith-in-chief-digital-officers/.

1.9. What's the Difference Between Digital Transformation and Business Transformation?

Business transformation is accelerated by and built upon digital technologies[27]. It's a sentiment that says digital, rather than being a thing you do, is a way of working. As such, we think that's the big difference: digital transformation within a business is not about putting in technology that does digital, it's more about the way that you work with those tool sand work across teams.

Digitalisation, therefore, is a way to help the business transform. Such is the potential power of disruption that debates about digital or business transformation are redundant. And thus, there isn't an IT or a business strategy; instead, there's a single digital business strategy.

When does digital transformation stop?

The answer is simple as that: digital transformation doesn't stop. Many people make the mistake of thinking of digital transformation as a discrete project. As Forrester suggests, true transformation is a journey, not a destination[28]. Digital transformation remains a slippery concept that involves the delivery of value to the business and its customers in new - and perhaps unexpected - ways.

Yet while the demand for change will keep on coming, 21% of business and technology decision makers believe their digital transformation efforts are already complete[29]. Such executives are deluded, as almost-constant strategic iteration is the new norm. Digital-led change is likely to go on forever; as such, the word transformation implies there's a beginning and an end - and there isn't. When we have projects that are badged as digital transformation with a shelf life of two-to-three years, this is not long-term sustainability; in fact, we could argue whether any digital system or service offers sustainability.

How is data transformation evolving as a concept?

Just as digital transformation constantly changes, so do its constituent elements. Right now, most business transformation activities involve the innovative use of data, whether that involves analytics, IoT, or machine learning. In many ways, as digital transformation has evolved it has become more about data-led change than anything else.

This transition can be seen in executive job titles, too. As use of the chief digital officer epithet has waned in recent years, so chief data officers[30] have become more common. In this respect, a survey conducted by Research company Econsultancy[31] tracked the use of the chief data officer title on LinkedIn for two years. In April 2016, there were 2,899 people who identified as chief data officers; by February 2018, there were 11,418.

So, the form of digital transformation continues to evolve, meaning the process of defining digitalisation remains complex and contested. The one thing we can be sure of is that transformation - in whatever form it takes - is here to stay, which means CIOs and the rest of the senior team must build a sustainable business strategy. This is the reason why the remaining part of this paper is dedicated to find the right persons that may drive ones cloud and digital transformation leading to boost businesses.

How to find the best talent to drive your cloud and digital transformation

[27] https://www.zdnet.com/article/the-new-rules-of-business-digital-transformation-must-thrive-throughout-yourcompany/.
[28] https://www.zdnet.com/article/the-new-rules-of-business-digital-transformation-must-thrive-throughout-yourcompany/.
[29] https://www.zdnet.com/article/digital-transformation-gut-check-sorry-state-or-natural-selection/.
[30] The Chief Data Officer (CDO) is a senior executive who is responsible for organisation-wide governance, management and exploitation of information. This data management and exploitation takes place through a variety of systems and services, including business intelligence, advanced analytics, data mining, and machine learning, and even artificial intelligence. CDOs should be on the look-out for ways to find opportunities for and through data analytics, whether that's predicting customer trends or finding new revenue-generating opportunities. That data might be customer data, data gathered from IoT sensors, social media, structured, or unstructured data; anything that the organisation gathers itself of buys in from elsewhere. The CDO must ensure the data is secured and maintained, but the role is not simply about deciding the technical aspects, like whether the information should be held in a data warehouse or a data lake or master data management. Instead, the CDO needs to help the business understand the value of this digital asset, enabling it to be mined for insights and competitive advantage. Data might be the crown jewels of a modern enterprise, but many businesses don't necessarily manage their information successfully. That realisation helps explain why CDOs play a key role in helping organisations take care of the information they hold and use (Source: https://www.zdnet.com/article/what-is-a-chief-data-officer-everything-you-need-to-know-about-the-cdo-role/).
[31] https://www.slideshare.net/DavidReilly1/econsultancyguidetolinkedinmarketingsolutions.

While technology and digital transformation are widely seen as critical to the success of virtually every business, in the past, CEOs and tech leaders haven't always seen eye to eye on strategy and tactics. However, success in business today, across several dimensions, is highly correlated to technology competence. Hence, the attitudes of CEOs and tech leaders are remarkably in sync about the importance of technology to enable business strategy; in fact, CEOs even say technology is slightly more important than their CIO counterparts.

This is great news for tech leaders who are shaping their technology functions to deliver significantly more value to their organizations. They have air cover from the highest levels of their companies to do so. This more integrated, strategic approach to technology can have ramifications across the organization. Digital cannot be a standalone initiative but should be embedded in the business strategy. CEOs are signalling that the technology function cannot operate as a siloed entity, struggling to get funding and support, and make a meaningful impact on the business. The invitation to tech leaders is clear: They have a critical role in developing and fostering business strategy, and their readiness to leverage technology is a key competence. The challenge is also very clear: If they don't step up, other leaders within the organization will likely take on these roles, as the role of a technology leader is not to develop a digital strategy or vision, but to embed digital in the business strategy,

As a result, most companies use a combination of talent acquisition techniques to get their digital transformation and cloud work underway. Here's a rundown of effective approaches.

IT-as-a-service (ITaaS)[32] is an operational model where the IT service provider delivers an information technology service to a business. That service could come from internal staff or from outside resources. The key is that this service is so seamless, the customer never really knows where it originates from.

To run IT-as-a-service successfully, you need talent in service and talent in technology. Nowhere is this more apparent than in digital transformation and cloud-based IT, where most companies are making major investments. Unfortunately, the talent isn't always available.

In a 2017 CFO Research Survey[33] of 123 US mid-market company financial executives, almost half (49%) said the inability to attract and retain qualified technology talent was adversely affecting their businesses.

When these executives were asked about the strengths of their internal IT staffs, they said that 40% of their talent challenges were in finding the technical and service skill sets internally to do the projects IT was being asked to do. Another 36% said that their internal IT lacked strategic planning and vision, 34% said that internal IT lacked knowledge of the business, and 33% said that IT was lacking project management skills.

Solving this talent challenge isn't easy. To meet it, CIOs consider a variety of strategies that range from direct hiring, contracting, and renting to sharing talent. The most coveted IT skills are in digital transformation and advanced skills in cloud-based technologies.

The technical skills needed for digital transformation are not necessarily difficult for IT to provide; rather it's the set of soft or interpersonal skills that facilitate digital transformation that IT lacks. Digital transformation projects[34] require significant interactions with users as they learn how to master new digitally based technologies, like document management.

Working in a collaborative and sharing service context doesn't come easy for many IT professionals, either. They may prefer to be engaged in the technical details of their work and might be protective when it comes to sharing their knowledge and skills.

At the same time, a new set of core technical and services skills is emerging in cloud computing. These skills include artificial intelligence, machine learning, and IoT. Resident IT staffs don't always have these skills.

Digital transformation and advanced cloud management techniques are areas that CIOs must address to ensure that their staff can meet technical and service needs. Here's a look at some of the talent acquisition strategies that companies are using.

Hiring

[32] https://web.archive.org/web/20160706002136/http://www.peterhinssen.com/downloads/printmedia/179/08_it_as_a_service.pdf
[33] https://www.cfo.com/it-value/2017/09/dealing-deficit-talent/.
[34] http://jarche.com/2015/04/digital-transformation-skills/.

In a 2016 Harvey Nash and KPMG survey[35] of more than 3,000 IT leaders, 65% reported difficulty hiring IT talent and said it was hurting their businesses. Data science, security, and cloud computing talent were among the most difficult areas to recruit for. All of these skills bases are directly related to digital transformation and cloud technology.

Companies have to offer attractive compensation, positions, and career paths to successfully compete in these tough talent markets. They must also provide pleasant work cultures and working conditions. Many companies use talent management systems[36] that help them forecast their staffing requirements and assist them in determining how they're going to fill talent acquisition and development needs - whether it's through outside hiring or through internal cross-training of personnel - so they can fill new roles.

Some companies also use the 'farm system' approach, where they partner with local colleges and universities. In this approach, companies serve on college and university advisory boards, assisting in the design of IT curriculum. More aggressive companies don't stop there: they provide senior staff to deliver lectures in classrooms on relevant topics and sponsor college-credit company internships for students. By interning students, the company gets to know young grads in advance of deciding whether to hire them. If a company does decide to make an offer, it is making it to a known quantity individual who has already formed professional relationships with staff. This improves the odds of a successful hire and provides a way to get new grads into productive IT roles faster.

Contracting

Contracting is another approach IT takes to solve talent shortfalls in digital transformation and cloud-based work. There are websites where you can seek IT contractors[37], but the best avenue for securing high-calibre tech contractor talent is through word of mouth or by contacting contractors you have already worked with. For one thing, you already know the type and level of work the contractor can provide. A second reason is cultural. The contractor has likely already demonstrated that they work well with your team.

When you employ a contractor, you pay top dollar for services and expect that the individual will be highly self-sufficient, with no learning curves. Accordingly, agreements with contractors should be structured to allow you an easy out at the beginning of an engagement if you discover that they aren't measuring up.

Companies also use the contractor approach when they need to fill an important position, like data scientist, but haven't been able to push it through as a permanent hire in their budgets. In such cases, they might hire a contract data scientist and decide to offer permanent employment later if the contractor's work is excellent and the budget opens up.

Renting

Although the terms 'renting' and 'contracting' are sometimes used interchangeably, they are not the same. When you rent, you are using more of a permanent outsourcing approach than when you contract. Companies rent call centres (and call centre agents). In IT, they might even opt to rent help desk staff who provide service and support for digital transformation.

Renting is more broadly utilized in advanced cloud technology. Software-as-a-service[38] (SaaS), platform-as-a-service[39] (PaaS), and other cloud-based offerings are rented via subscription or per-use prices. The understanding is

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[35] https://www.monster.com/career-advice/article/tech-talent-gap-survey-0816.
[36] https://blog.clearcompany.com/3-ways-to-gain-a-competitive-edge-in-hiring.
[37] https://www.inc.com/drew-hendricks/10-best-freelance-websites-to-find-skilled-contractors.html.
[38] Software-as-a-service (SaaS) is the most common form of cloud computing, where you use a browser and an internet link to access a service provider's application, which is hosted and managed on its servers. You pay for the service according to how much you use it or by subscription, rather than by buying a licence and paying for maintenance, as you would with software run on premise. When people talk about on-demand software and hosted apps, they're usually talking about SaaS. SaaS has been around for years, but some view the launch of Salesforce.com's customer relationship management service in 1999 as a big moment that marked SaaS's move into the mainstream. The principle of remotely using software located on someone else's hardware goes back to the earliest days of commercial computing in the 1950s and 1960s, with the bureau and time-sharing services at LEO and IBM (Source: https://www.zdnet.com/article/software-as-a-service-saas-cheat-sheet/).
[39] Platform-as-a-Service (PaaS) is an integrated set of data management, analytics, and insight application development and management components, offered as a platform the enterprise does not own or control, may sound scary, or cryptic. Cloud computing can be broken down into three cloud computing models, where Infrastructure-as-a-Service (IaaS) refers to the fundamental building blocks of computing that can be rented (physical or virtual servers, storage and networking). PaaS is the next layer up - as well as the underlying storage, networking, and virtual servers this will also include the tools and software that

that you will be using the cloud resource for the long term.

One of the most popular cloud-based rental services for IT is in application development and testing because the cloud-based vendor furnishes the hardware and systems and you don't have to buy them.

Anyhow, we must emphasize that SaaS has had an enormous impact on the way companies consume services. As soon as internet connectivity became widely available at reasonable speed, and offered low enough latency, service providers of various kinds began offering scalable, on-demand products that were delivered over those connections.

For many observers, the modern cloud computing era dates from the launch of the first business-class software-as-a-service (SaaS) application, Salesforce.com, in 1999. But of course, there were precursors, including application service providers (ASPs) and, before that, utility computing via timesharing on mainframes. There are now thousands of SaaS applications, available from internet giants to start-ups, along with services from rather fewer providers of the other two key pillars of cloud computing: platform-as-a-service (PaaS) and infrastructure-as-a-service (IaaS).With SaaS, service consumers control their data, but everything else in the IT stack is managed by the service provider. With PaaS, the application layer comes into play, while IaaS consumers control everything from the OS layer upwards.

The contrast with traditional on-premises (or private cloud) IT is very clear: the capital costs associated with equipping and maintaining data centres full of physical and virtual servers, networking and storage are someone else's problem—and large service providers (such as Amazon, Microsoft and Google) can solve that problem far easier than the average business can. As a customer, you just pay for what you use.

The fundamental benefits of the *'as-a-service'* model are well known, and include: a shift from capital to operational expenditure (CAPEX to OPEX), often leading to lower total cost of ownership (TCO); access for businesses of all sizes to up-to-date technology, maintained by service providers that can leverage economies of scale; scalability according to business requirements; fast implementation times for new applications and business processes; freeing up staff and resources for other projects and priorities.

Sharing

Resource sharing is another approach to talent acquisition that can be used effectively in both digital transformation and the cloud. It's most often used by smaller companies, especially in the not-for-profit sector.

Here's how it works in the credit union world: Four small credit unions can't afford their own IT departments and specialists, so they band together to fund an IT budget and hire the ITers they need. They fund cost and resource-share data centre and personnel expenses, which are facilitated because they all use the same systems. IT becomes a service centre, as it now has four 'customers' whose needs it must serve. The challenge for the CIOs is to make sure that the individuals assigned to the cloud service have service and support skills that can match their technical skills. Sometimes this is easier said than done.

Final Remarks

No single talent acquisition strategy fits all companies, and most companies today use a combination of talent acquisition techniques to get their digital transformation and cloud work done. That isn't likely to change soon.

Thus, the modern workforce – and the companies that employ them - have increasingly embraced the concept of remote work over the traditional office. The benefits are well documented, including stress reduction, increased productivity, a wider talent pool, and better employee retention rates. Even so, it's important to establish ground rules to keep the remote work program effective and manageable.

Defining a clear vision of what you expect your workers to do - and a vision of where they can go and grow - helps enormously, whether they are permanent employees, contractors, or rental vendors. So does showing them that you care about their welfare/partnership, that you are committed to service in your culture, and that you appreciate the efforts they make for your company.

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developers need to build applications on top of: that could include middleware, database management, operating systems, and development tools. And finally, the upper layer: Software-as-a-Service (SaaS) is the delivery of applications-as-a-service, probably the version of cloud computing that most people are used to on a day-to-day basis. The underlying hardware and operating system is irrelevant to the end user, who will access the service via a web browser or app; it is often bought on a per-seat or per-user basis (Source: https://www.zdnet.com/article/what-is-cloud-computing-everything-you-need-to-know-about-the-cloud/).

Conclusions

In this complicated year 2020, COVID-19 made what was once optional into a mandatory part of business strategy, and 2021 will only move the needle further to the digital side. In respect to digital business in 2021, big changes will be seen coming as the post-pandemic era continues to rapidly transform the business landscape. Thus, what many considered optional became imperative overnight speaking of digital business as the majority of businesses will invest in having a full-fledged digital presence.

As a result, digital business will be based on five key points, as follows:

- *Businesses worldwide will create digital divisions.* Digital engagement will become the number one driver of customer value in 2021, and many global organizations will join large organizations in launching data, artificial intelligence, and software-driven divisions.
- *Cloud-first strategies will dominate digital growth.* Every new digital division will embrace innovation through ecosystems, and further 50% of enterprises are expected to make cloud-centric transformation a priority, moving business-critical operational apps and all experience apps into the cloud.
- *"Buy" buttons will be everywhere.* 2021 will be a year in which businesses will toss a variety of sales channels at the wall to see which ones stick. It will be about experimenting with all these channels to build new types of direct customer relationships.
- *DOP will further replace ERP, leading to more platform innovation.* Digital operations platforms (DOP), which combine back-office business tools into a single product, were hot in 2020, and they'll continue to grow as a replacement for legacy enterprise resource planning (ERP) software. Greater DOP adoption will push vendors to differentiate their products, which is a good thing for their clients.
- *Outcomes-based pricing will grow for digital transformation services.* Businesses looking to embrace digital business strategies will be looking to lots of outside vendors, and 50% of new transformation services contracts will include a pay structure based on meeting particular outcomes.

Finally, we must add that coping with all these digital issues involves that buyers of transformation services will expect providers to bring alliances, end-to-end expertise, and software and data assets to accelerate time-to-value. Hence, consultants, tech service providers, and other agencies will need to be aware of this potential and plan budgets accordingly. While most IT and business executives believe a digital business model is critical for success, we argue that it is very important for an organization to implement a digital business model. However, businesses must make good on their commitments to embrace a digital model in order to stay relevant and competitive in today's market, as well as to provide better employee and customer experiences.

As 2020 comes to its end, the complete impact of COVID-19 is not fully known. But it’s clear that the pandemic has significantly increased business dependency on digital technologies and accelerated the timeline for technology adoption and business digitization, presenting tech leaders with an unprecedented opportunity to help shape the future of their organization. On the technology leader’s journey, the board and other C-suite executives will be critical partners.

Following the path tread by executives in tech vanguard organizations, tech-savvy business leaders should engage, enable, and support their change-driving technology leaders. Like financial literacy, tech savviness has become a key competency for all business leaders. The onus is on technology leaders to help ensure that their business counterparts are on board for the journey and that leadership teams are appropriately tech savvy.

Organizations in all sectors and geographies are entering a new volatile era, and they likely will need leaders with the vision and tenacity to drive meaningful change amid historic uncertainty. They can’t control the wind, but they can adjust the sails – but probably not by incrementally fine - tuning their strategies and technology capabilities. Faster, game-changing breakthroughs can help organizations meet the challenges of the moment - and those of the future - and technology leaders can help them make the leap from incremental to transformational.

But topics related to why CIOs must step up to lead digital transformation efforts, why the CIO is essential to digital transformation, the business executives’ commitment to digital transformation, and IT's new role (that is to build a digital society worthy of our descendants) shall be largely addressed in our future papers.

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Mathematical Modelling of Processes to Handle Public Tasks in The Electronic Platform Environment

Jaroslaw WILK
SoftwareONE / Military University of Technology, Warsaw, Poland
jaroslaw.wilk@softwareone.com

Boleslaw SZAFRANSKI
Military University of Technology, Warsaw, Poland
boleslaw.szafranski@wat.edu.pl

Abstract

Electronic platform environments are increasingly used as a mechanism for sharing and integrating digital services delivered to a recipient. One of the main areas where given platforms are used is public administration and implementation of processes for handling public tasks. The authors in their previous publications have shown that the previously available security models are not sufficient and the mechanisms implemented in existing environments are not supported by a formal model that would clearly allow to determine the state of safety of the environment with the possibility to dynamically integrate the services provided. Based on previously developed models, formal descriptions and research conducted by the authors, a new approach built on the mathematical lattice model was developed. In this work, the authors modelled the process to handle public tasks together with a mathematical protection model in such platforms. Then, using the lattice model, the authors proposed a safety control solution in the integration processes of electronic platforms.

Keywords: Mathematical Modelling, Electronic Platforms, Information Systems, Lattice Model, Security, Public Administration, Public Tasks.

Introduction

The authors' experience, both in research and development tasks (numerous previous publications) and in design and implementation tasks, clearly shows a lack of methodical use of the results of system analysis and mathematical modelling in designing IT systems (solutions).

The harmfulness of the lack of the above-mentioned coherence is definitely growing in the case of designing mechanisms which have a particular impact on the users' confidence in using IT solutions, i.e. solutions where the critical problem is to provide effective, user-acceptable security mechanisms. This applies to the greatest extent to processes implemented in a dispersed IT environment, such as the implementation of electronic services with the use of disciplinary and trans-disciplinary (integration) electronic platforms. The lack of security mechanisms with formally confirmed properties may lead to illegal breaches of data confidentiality, to loss of trust and, consequently, to collapse of many projects.

The use of mathematical modelling, principles of enterprise architecture and object-oriented modelling enables the development of a design method, the application of which in the design process will ensure the creation of security mechanisms with formally and unambiguously confirmed properties. The use of mechanisms, designed in accordance with the developed method, in the processes to handle public tasks by electronic disciplinary and trans-disciplinary (integration) services and platforms will contribute to the automation and the increase of security of the electronic handling of public tasks. This is feasible provided that the integration requirements expressed first in the language of the mathematical correlations are correctly reflected in the object-oriented modelling language (architectural framework) and thus taken into account in the ongoing design efforts.

In this paper the authors conducted theoretical considerations on the process to handle public tasks (Chapter 2), then modelled the processes mathematically (Chapter 3) together with the selection of a security model for the verification of the correctness of the handling process (Chapter 4). Next, in Chapter 5, the authors presented

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mathematical modelling of security processes in the electronic platforms together with the security control lattice model used in the integration processes of the electronic platforms (Chapter 6). Chapter 7 summarizes the considerations and presents the usefulness of mathematical modelling, including lattice modelling, in constructing integrated electronic platforms.

Preface on the process to handle public tasks

The theoretical considerations concerning the security of the handling public tasks in the electronic service platform environment will be carried out within a certain abstract model of the electronic platform. This has been determined by: firstly, the possibility of precise, transparent formulation of problems concerning the security of the handling of public tasks and secondly, the possibility to keep the independence of considerations from detailed technical aspects of electronic platforms, which are almost continuously subject to both conceptual and technological changes.

In order to facilitate the understanding of the further development of our considerations, the formal modelling will be preceded by a short description explaining the general assumptions adopted and the subsequent steps of the public task handling, which take into consideration the above-mentioned assumptions. First of all, it should be stressed that the user (hereinafter referred to in the model as the entity) must use a dedicated electronic platform created and functioning according to the one-stop-shop principle in order to process a case, he/she is interested in, by electronic means. In general, it must be an integrative trans-disciplinary platform, as the resources needed to process any case may come from many different disciplinary platforms under the responsibility of many different administrators. Each case that can be handled electronically is assigned a single, specific public task in the platform's directory, the successful handling of which will lead to its successful processing. In practice, the user, after making sure that the case, he is interested in, can be processed via electronic means, should search the platform's catalogue for a public task identifier appropriate to the case he is processing electronically. This part of the user's interaction with the platform is usually supported, according to the one-stop-shop principle, by a special layer of the electronic platform, which makes it easier for the user to link the case to the relevant public task. Modelling and then designing such a user-friendly support layer is a very difficult, and at the same time significantly affecting the usability of the platform, undertaking.

Nevertheless, due to the specificity of its problems existing in this layer, it will not be considered further. Therefore, we will assume that the user has made proper use of this layer and, as a result, has correctly triggered a public task "responsible" for the processing of a case he/she is interested in. Each public task in the platform directory is associated with a scheme describing the process of handling this task. In other words, the above scheme is a recipe that is sufficient for the successful conducting and completion of the handling process of the public task in question, provided that the security requirements are met. We will further assume that the handling of a public task will be expressed, from the point of view of the possibility of security assessment, in the form of a process of the handling of a given public task by a given trans-disciplinary integration platform by means of a sequence of extortion, the implementation of which affects the security status of this process. As a result, the handling process is a sequence of extortions occurring alternately and the resulting security status of the handling process. Thus, if a collection of correct extortions is extracted from the collection of possible extortions, then in general (other, more practical cases will be considered in the chapter on formal modelling) it will be possible to verify the correctness of the handling process in terms of the extortions occurring in it and the achieved security status on the basis of the security rules required in a given platform.

In order to ensure safe handling of public tasks carried out by electronic means, it is necessary to build mechanisms to control a given process. These mechanisms must be placed in electronic platforms (disciplinary and integration platforms).

A disciplinary platform for electronic services - in general this is an environment for service delivery and their protection. It is limited to a single disciplinary entity (legal one, organizational one and/or public one). It has electronic services (simple ones and complex ones) and data units. In the following part of the paper, it is not important whether the services are simple or complex, they will be considered as electronic services (or even shorter services). It also defines the possible data operations, a collection of entities and security control model. Extortions that triggers electronic services from the disciplinary platform require correctness check from a security point of view.

Within the framework of electronic services on the electronic platform, a distinction can be made between disciplinary and trans-disciplinary services.

- Disciplinary service - that is an electronic service which can be provided by services from one disciplinary platform only.
- Trans-disciplinary service - that is an electronic service which requires the execution of at least one or more electronic services available in another disciplinary platform.
- Electronic integration platform - it is an electronic information system that enables cooperation of disciplinary electronic platforms.

Electronic platforms, which are considered in a given paper, are designed and built in such a way that they have functionality useful to assist a defined group of users in processing their cases within a defined scope. Such a group of users of electronic platforms have been called entities. They form the collection P:

$$P = \{p_1, p_2, ..., p_i, ..., p_I\} \tag{1}$$

The individual entities benefit from the support of electronic platforms in processing various administrative cases. They decide themselves to what extent they will use the case support within the possibilities of the electronic platform used. Making a choice - as already said - is not the subject of modelling in this paper.

The framework of possibilities to support the processing of cases in a given platform is defined by a collection of public tasks handled in a given electronic platform. Hence, the entity selects a public task that is useful for processing a given case from the collection of public tasks Z:

$$Z = \{z_1, z_2, ..., z_j, ..., z_J\} \tag{2}$$

Handling public tasks in electronic platforms

The functionality of the electronic platform includes the possibility to handle public tasks according to handling schemes appropriate for particular public tasks. These schemes form the collection S:

$$S = \{s_1, s_2, ..., s_k, ..., s_K\} \tag{3}$$

The individual handling diagrams are clearly assigned to the individual public tasks with the function π:

$$\pi : Z \rightarrow S \tag{4}$$

For further consideration it is necessary to define the electronic service, the operation and the data unit.

The electronic service is an executable resource that processes data from data units when performing operations. Electronic services form the collection E.

$$E = \{e_1, e_2, ..., e_l, ..., e_L\} \tag{5}$$

where:

E - the collection of electronic services,

e_l - l-th electronic service.

At this stage of consideration, electronic services are not considered from the perspective of simple and complex services.

The operation is an elementary executable resource that processes data from data units. They form the collection R:

$$R = \{r_1, r_2, ..., r_n, ..., r_N\} \tag{6}$$

where:

R - the collection of operations,

r_n- the n-th operation.

A data unit is an information resource for storing data. They form the collection D:

$$D = \{d_1, d_2, ..., d_m, ..., d_M\} \tag{7}$$

where:

D - the collection of data units,

d_m - the n-th data unit.

The public task handling diagram defines a sequence of extortions. Extortions, which may occur in a given electronic platform, forms the collection W:

$$W = \{w_1, w_2, ..., w_n, ..., w_N\} \tag{8}$$

The sequence of extortions, defined by the public task handling scheme, s_k defines the handling process unambiguously:

$$w_1^k, w_2^k, ..., w_n^k, ..., w_{N_k}^k \tag{9}$$

Verification of the correctness of the process to handle a public task from the point of view of security consists in checking whether all the elements of the sequence of extortion, created for a given handling process, are correct.

The correctness of extortions depends on the rules applicable in the platform in relation to individual entities. The permissions of individual entities are determined by function u:

$$u : P \rightarrow 2^W \tag{10}$$

The form of extortion depends on the model adopted to describe the process to handle public tasks in an electronic platform. Verification consists of checking whether all extortions w_n^k occurring within the sequence defined by the scheme for handling the public task, s_k which such scheme is associated with the public task pointed by the entity, are consistent with its permissions.

Selecting a security model for verification of the correctness of the handling process

It is assumed that correct extortions will carry out the public task handling process to a safe state (assuming that the initial state is safe). Therefore, it is sufficient to verify only extortions within the handling process.

Extortions may take different forms (depending on the security scheme) but for further consideration only the most complex one was selected – “electronic services, operations and data units”. In this case a sequence of extortions is

presented in the form of a sequence of triplets - data units processed within the public task handling process, operations on data units and electronic services.

Before the authors proposed their own security approach for selected scenario they performed deep analysis of available models with set of criteria based on mathematical model for distributed environment of electronic services platforms. Some available mechanisms were partially integrated as useful but not fully fitting to analysed e-services solution:

- Harrisona-Ruzzo-Ullman model – based on Lampson access control matrix,
- BLB, Biba and Dion models – data flow control,
- Denning, Sandhu and Szafranski models – lattice security models.

Mathematical modelling of protection processes in electronic platforms

The mechanism to control information security (SM) for disciplinary platforms consists of two elements:

- the data security control model (DP data protection), i.e. data access control and data flow control,
- the service execution security control model (services protection SP).

$$SM = \langle DP, SP \rangle \tag{11}$$

Data units from the D collection are assigned confidentiality classes from the collection Q, e.g. unclassified, confidential, secret, top secret. The operations from the collection R have the scopes of operations assigned to them in the collection T, e.g. reading, writing, deleting. Electronic services E are assigned categories of permissions from the B collection, e.g. common, specialized, reserved. Each entity p_i in the collection P has been assigned attributes that define its level of authority:

- the confidentiality class in the collection Q (to which the entity has access),
- the scope of operations from the collection T (acceptable for a given entity),
- the category of permissions from the collection B (indirect launch of services by the entity).

Depending on the security protection model in the given platform, the form of granting these permissions may vary.

The graphical representation of the relationship between the model elements is shown in the Fig. 1 below. Some of the terms referred to in this scheme are explained in more detail later in this chapter.

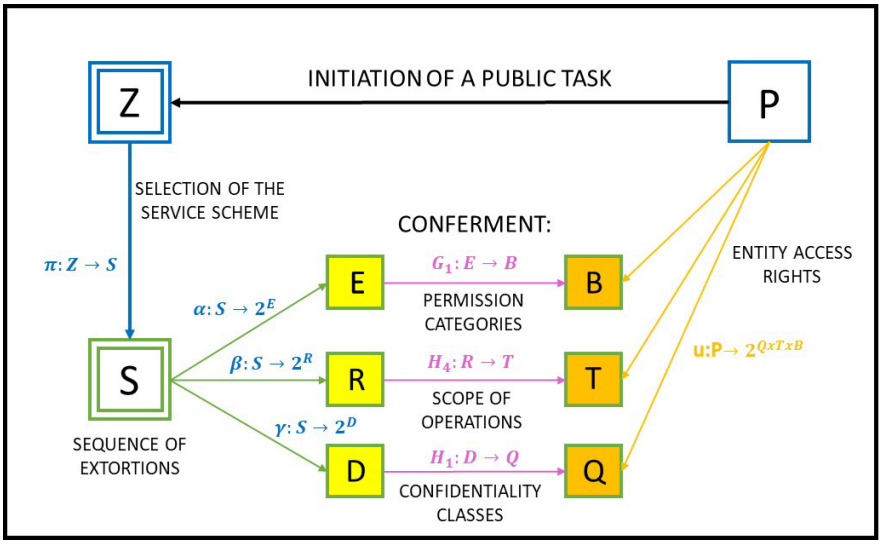

Fig. 1: The scheme of links between objects of the models.

The scheme above shows the links between the objects of the security protection model in the platform, that determine the requirements necessary to be met during the implementation of this protection.

The need to implement a public task is reported by one of the entities forming the collection P, by initiating the task selected by him. The public task is clearly assigned a scheme for handling this task belonging to the collection S. The scheme defines a sequence of extortions, which, according to the selected security model for verification of the correctness of the handling process, can be seen as a sequence of triplets - processed data units, operations on data units and electronic services (i.e. elements of the collections D, R and E respectively). This assignment of extortions to the S-collection scheme is shown as a function of α, β and γ respectively.

In the security layer in the electronic platform, it is not the specific data units, operations and services (D, R and E) that are relevant, but confidentiality classes assigned to them, scopes of operations and permissions categories (Q, T and B). Thus, the scheme illustrates these relationships by placing the symbols of the functions H_1, H_4 and G_1, which are defined further in this chapter.

And further on, as a consequence, the permissions of entities (in the model form of the u function) were indicated, referring them to confidentiality classes (Q), scope of operations (T) and categories of permissions (B), as this is the nature of granting permissions to individual entities.

Data Security Control

The DP model specifies the allowed-for-an-entity access to data units of a certain confidentiality class, the operations allowed with a certain scope and the data flows allowed between data units.

$$DP = \langle P, D, Q, R, T, \rho, \tau, HF \rangle \tag{12}$$

where:

- P - collection of entities $P = \{p_1, p_2, ..., p_i, ..., p_I\}$,
- D - collection of data units $D = \{d_1, d_2, ..., d_m, ..., d_M\}$,
- Q - collection of confidentiality classes $Q = \{q_1, q_2, ..., q_h, ..., q_H\}$,
- R - collection of operations $R = \{r_1, r_2, ..., r_n, ..., r_N\}$,

- T - collection of scopes of operations $T = \{t_1, t_2, ..., t_g, ..., t_G\}$,
- ρ - flow relationship,
- τ - operation relationship,
- HF - the functions of the model, data security model limitation generator.

The flow relationship is built on pairs of confidentiality classes: $\rho \subset Q \times Q$. The operation relationship is built on pairs of scopes of operations: $\tau \subset T \times T$

The functions of the data security control model:

$$HF = \langle H_1, H_2, H_3, H_4, H_5 \rangle \tag{13}$$

H_1- function assigning confidentiality classes to data units

$$H_1 : D \to Q \tag{14}$$

H_2 - a function determining whether an access to data unit d_m is admissible with the permissions of the entity defined by the scope of the operation q_h

$$H_2 : D \to \{0,1\}$$

$$\forall_{d_m \in D} \forall_{q_h \in Q} H_2(d_m) = \begin{cases} 1 - gdy(H_1(d_m), q_h) \in \rho \\ 0 - gdy(H_1(d_m), q_h) \notin \rho \end{cases} \tag{15}$$

H_3 - a function checking whether a flow request from the data unit d_{m_1} to the data unit d_{m_2} is acceptable

$$H_3 : D \times D \to \{0,1\}$$

$$\forall_{d_{m_1}, d_{m_2} \in D} H_3(d_{m_1}, d_{m_2}) = \begin{cases} 1 - gdy(H_1(d_{m_1}), H_1(d_{m_2})) \in \rho \\ 0 - gdy(H_1(d_{m_1}), H_1(d_{m_2})) \notin \rho \end{cases} \tag{16}$$

Access to the data is subject to appropriate permissions and the flow is allowed as in Denning model if the confidentiality class of the source object is not higher than the confidentiality class of the target object.

H_4 - a function defining for operations their scope

$$H_4 : R \to T \tag{17}$$

H_5 - a function determining whether a request to execute an operation r_n is admissible with the permissions of the entity defined by the scope of the operation t_g

$$H_5 : R \rightarrow \{0,1\}$$

$$\forall_{r_n \in R} \forall_{t_g \in T} H_5(r_n) = \begin{cases} 1 - gdy\left(H_4(r_n), t_g\right) \in \tau \\ 0 - gdy\left(H_4(r_n), t_g\right) \notin \tau \end{cases} \tag{18}$$

5.2 Service security control

The SP model controls the process of what extortion of services are allowed, i.e. what services can be used to handle the task triggered by the entity.

$$SP = \langle P, E, B, \delta, BF \rangle \tag{19}$$

where:

- P - the collection of entities $P = \{p_1, p_2, ..., p_i, ..., p_I\}$,
- E - the collection of services $E = \{e_1, e_2, ..., e_l, ..., e_L\}$,
- B - the collection of categories of permissions $B = \{b_1, b_2, ..., b_f, ..., b_F\}$,
- δ - service launch relationship,
- BF - the functions of the model.

The service launch relationship is defined in the pairs of categories of permissions: $\delta \subset B \times B$.

The functions of the service(s) security control model:

$$BF = \langle G_1, G_2 \rangle \tag{20}$$

G_1 - function assigning categories of permissions to electronic services

$$G_1 : E \rightarrow B \tag{21}$$

G_2 - the function determining whether the use of the service e_l in the process of handling a task triggered by an entity is allowed with its permissions defined by the category of permissions b_f

$$G_2 : E \rightarrow \{0,1\}$$

$$\forall_{e_l \in E} \forall_{b_f \in Q} G_2(e_l) = \begin{cases} 1 - gdy\left(G_1(e_l), b_f\right) \in \delta \\ 0 - gdy\left(G_1(e_l), b_f\right) \notin \delta \end{cases} \tag{22}$$

It is permissible to use a given electronic service in the process of handling a public task triggered by an entity when the category of permission of that entity is greater than or equal to the category of service.

5.3 Security control in disciplinary platforms

The security control model for disciplinary platforms (SM) consists of data and service security control models with HF and BF functions.

$$SM = \langle P, D, Q, R, T, E, B, \rho, \tau, \delta, VF \rangle \tag{23}$$

where:

- P - the collection of entities $P = \{p_1, p_2, ..., p_i, ..., p_I\}$,
- D - the collection of data units $D = \{d_1, d_2, ..., d_m, ..., d_M\}$,
- Q - the collection of confidentiality classes $Q = \{q_1, q_2, ..., q_h, ..., q_H\}$,
- R - the collection of operations $R = \{r_1, r_2, ..., r_n, ..., r_N\}$,
- T - collection of scopes of operations $T = \{t_1, t_2, ..., t_g, ..., t_G\}$,
- E - the collection of services $E = \{e_1, e_2, ..., e_l, ..., e_L\}$,
- B - the collection of categories of permissions $B = \{b_1, b_2, ..., b_f, ..., b_F\}$,
- ρ - flow relationship,
- τ - operation relationship,
- δ - service launch relationship,
- VF - the functions of the model.

$$VF = \langle HF, BF \rangle \tag{24}$$

5.4 Implementation of lattice mechanisms to control data and service security

When analysing the flow relationships ρ, operation relationships τ and the service launch relationship δ, it should be noted that if the condition of partial arrangement of the collection of protection classes Q, the collection of operations scope T and the collection of categories of permissions B is met, it is possible to use the lattice theory. This significantly improves the process of security verification and allows for the integration of objects data within integration platforms. The class of cases for which the above conditions are met is so large that such a case only will be considered further.

Flow relationship ρ (feedback-based, transitory and asymmetric) creates the lattice for the flow QL by partial arrangement of the collection Q. There is the supremum and the infimum for each pair of protection classes from the collection Q

The flow lattice QL is defined in the following way:

$$QL = (Q, \rho, \oplus^{Q}, \otimes_{Q}) \tag{25}$$

where:

- Q is the partially arranged collection,
- $Q = \{q_1, q_2, ..., q_h, ..., q_H\}$,
- ρ is the relationship of the partial arrangement,
- $\oplus^Q$ the operator to set the supremum of its arguments,
- $\otimes_Q$ the operator to set the infimum of its arguments,

As in the Sandhu model, it is possible to extend the partially arranged collection by a maximum element (e.g. "syshigh" in the Sandhu model) or a minimal element (e.g. "K0: uncategorized") to meet the lattice conditions.

Operation relationship τ (feedback-based, transitory and asymmetric) creates the lattice for the operation TL by partial arrangement of the collection T. There is an upper and a lower limit for each pair of operation scopes from the collection T.

Operation lattice TL is defined in the following way:

$$TL = (T, \tau, \oplus^T, \otimes_T) \tag{26}$$

where:

- T is the partially arranged collection,
- $T = \{t_1, t_2, ..., t_g, ..., t_G\}$,
- τ is the relationship of the partial arrangement,
- $\oplus^T$ the operator to set the supremum of its arguments,
- $\otimes_T$ the operator to set the infimum of its arguments,

The operation is allowed, as in the Szafranski model, if the scope of operation that is being performed is not higher than the scope of operation owned by the user.

The service launch relationship δ (feedback-based, transitory and asymmetric) creates the lattice for the launch of BL services by partial arrangement of the collection B. There is the supremum and the infimum for each pair of the categories of permissions from the B collection.

The lattice of the BL service launch category is defined as follows:

$$BL = (B, \delta, \oplus^B, \otimes_B) \tag{27}$$

where:

- B is the partially arranged collection,
- $B = \{b_1, b_2, ..., b_f, ..., b_F\}$,
- δ is the relationship of the partial arrangement,
- $\oplus^B$ the operator to set the supremum of its arguments,
- $\otimes_B$ the operator to set the infimum of its arguments,

The full model of data and service security control would consist of three lattices for the concept described here:

The flow lattice: $QL = \left(Q, \rho, \oplus^{Q}, \otimes_{Q}\right)$ [relates to data]

The operation: $TL = \left(T, \tau, \oplus^{T}, \otimes_{T}\right)$ [relates to operation]

The categories of permissions: $BL = \left(B, \delta, \oplus^{B}, \otimes_{B}\right)$ [relates to services]

Such mathematical models in the form of lattices could have been constructed both for individual disciplinary platforms and for integrated platforms - and would then be called super-lattices. These super-lattices would cover separately the three security aspects of the integrated platform.

Lattice model of security control used in processes of integration of electronic platforms

In the processes of platform integration, two different approaches are possible, which have been named (in reference to the nomenclature related to IT system design):

- diagnostic approach,
- prognostic approach.

The application of one of the two approaches has of course resulted in positive and negative effects. The selection must therefore be made on the basis of specific conditions. In general, it can be concluded that in the situation of advanced implementations of disciplinary platforms, indications are for a diagnostic approach. For initial situations, a prognostic approach should be considered.

The process of construction of the super-lattice of the integrated platform is considered below by using the diagnostic approach in the first variant and the prognostic approach in the second variant. The application of the diagnostic approach leads to a dominant definition of local area platform lattices and, as a result, to such features of the super-lattice that the constructed super-lattice can be considered as "poorly" integrated. The prognostic approach puts more importance on the requirements that are formulated before the construction of a super-lattice, and which such requirements result from the desired institutional and organizational rules. This way it is possible to obtain a structure that can be considered as "strongly" integrated.

The construction of a super-lattice with a diagnostic approach is described, in a developed scope, in the previously mentioned papers, especially in the paper by B. Szafranski.

It is assumed that the initial state of the super-lattice construction in the diagnostic approach are defined models for a specific collection of disciplinary platforms in one of two forms for a single platform:

- Two separate models, one for data security control and one for service security control.
- A single security control model for the disciplinary platform (covering both aspects of security protection).

On the basis of models for disciplinary platforms, it is possible to construct a super-lattice starting from constructing local lattices for particular security aspects (flow, operation and service launch) for disciplinary systems.

The next step is to apply the method of folding local lattices to the integrated platform super-lattice described in detail in the paper by B. Szafranski (not discussed in this paper).

By applying the prognostic approach in the platform integration process the lattice models of the domain platforms are also used and their characteristics is taken into account. But the prognostic approach is primarily to ensure that the features of the integrated platform super-lattice are those that arise primarily from the user needs defined in the institutional and organizational rules of security protection.

The process of constructing the integrated platform super-lattice is therefore as follows:

1. The formulation of requirements in the security layer resulting from the applicable institutional and organizational rules. One of the sources of identification of these requirements are possible lattice models of disciplinary platforms. But it's not the only source. The principles resulting from the institutional and organizational rules of security protection on electronic platforms being subject to integration are considered to be the main sources for the prognostic approach.
2. Construction of a super-lattices of the platform integrated in three aspects of security:
   a. the flow QL ,
   b. the operation TL ,
   c. the service(s) launch BL .

   Defining the individual elements of these lattices must take into account the requirements identified in the previous step of the process of constructing a super-lattice.

3. Construction of a super-lattice of a platform integrated in the full scope of a platform security. This chapter of the work deals with this stage of the process, as it is at this stage that there are the greatest differences from the diagnostic approach.
4. Possible construction of lattices of disciplinary platform by reducing super-lattice, in the meaning of the process described (according to work B. Szafranski, but taking into account the rule that the relations of order in the prognostic approach are to be the same in the local lattices). The implementation of this stage of the process reveals that in the prognostic approach there is a kind of reversal of the order of actions compared to the diagnostic approach. This is the concept of integrating disciplinary platforms from identified security needs and the resulting design of the super-lattice is an interpretation of the requirements that must also be included in the lattices of the disciplinary platforms.

The prognostic approach accepts the existing condition less than the diagnostic approach. The prognostic approach is more clearly based on the requirements resulting from the target intentions.

From the security point of view, the essence of the organizational system of an electronic platform (whether disciplinary platform or integrated platform) is to verify the correctness of the use of the platform's functionality by entities (from P). The rules to grant permissions to entities, resulting from the requirements of an institutional and organizational nature, determine in a very important way the effectiveness of security protection on the platform. It is only in this context that the process of verifying the correctness of the usage of the permissions granted should be considered, including the usage of lattice models. It should be noted that when applying the prognostic approach, even in the first step, rules for granting permissions to entities should be developed and they should have an impact on the design of the super-lattice. A number of policy options for the procedure for granting permissions to entities are indicated below.

The permissions (in classical variant) of the entities are granted independently for each aspect of security protection:

- (q_{h*}) - as an acceptable confidentiality class,
- (t_{g*}) - as an acceptable scope of operation,
- (b_{f*}) - as an acceptable category of permissions.

The graphical interpretation in the three-dimensional space of the above-described "extortion cubes" is the cuboid/perpendicular beginning from (q_1, t_1, b_1) and ending in (q_{h*}, t_{g*}, b_{f*}) .

Summary

The proposed security model ensures that public tasks are kept safe regardless of their complex nature and trans-disciplinary form. The security model includes mechanisms to control access to electronic services and data. Other security issues (such as managing the integrity of transactions that modify data, managing accountability, availability or system reliability) have not been included in the paper, but will be further considered by the authors.

This model may be used for service-oriented systems, in particular integration platforms, which have been designed and constructed in accordance with the architectural framework of electronic platforms described in previous publications. The proposed model is a formal representation of integration platforms of public administration in Poland, but a very similar or even identical architecture applies to integration platforms of business environments (financial, educational and insurance platforms).

The model does not force design assumptions for electronic services that do not affect security issues, but may affect the correct implementation of the service by the IT system. Such additional design restrictions may be imposed by electronic service designers in order to adequately handle acceptable (from a security point of view) cases.

The presented model covers only the area of security in the scope of authorization, i.e. verification of the permissions of entities to call up electronic services provided in integration platforms.

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Integration of Mathematical and Object-Oriented Modelling in Management of Security Mechanism Designing for IT Systems

Jaroslaw WILK
SoftwareONE / Military University of Technology, Warsaw, Poland
jaroslaw.wilk@softwareone.com

Boleslaw SZAFRANSKI
Military University of Technology, Warsaw, Poland
boleslaw.szafranski@wat.edu.pl

Abstract

Mathematical modelling is widely used by many researches to describe different mechanisms for IT systems. It was also used by authors in their previous publications to define the management model for integration platforms which support implementation of public tasks. Unfortunately, mathematical modelling is often not integrated with any real-life designing processes, so in effect it cannot be easily used to create or manage any real-life security mechanisms. In this article, the authors have decided to integrate mathematical modelling with object-oriented modelling. One of the most common object modelling languages was used – UML version 2.5.1. The authors conducted a research to select only suitable categories of diagrams to make it a more universal approach also for any new mathematical models that can be integrated into real-life scenarios.

Keywords: UML, mathematical modelling, security management, information security.

Introduction

The service and object-oriented approach is currently the most commonly used when designing or implementing new mechanisms for IT systems. UML and other object-oriented modelling languages are used to describe the whole process from system design, through security, to the build and management. It is easily understood and can be implemented into real-life systems without any significant problems.

Mathematical modelling is still used for a more formal approach when a detailed model is required. It is often used by researchers to address new requirements and it was used by the authors in the previous publication to define the management model for integration platforms which support implementation of public tasks. Still, this model requires a different presentation to make it useful for real-life scenarios.

This integration of the theoretical academic world of mathematical modelling with the practical world of object and service-oriented modelling is a common challenge. The aim of this paper is to show how to integrate a mathematical model into the UML approach and also to propose a standard approach (selected diagrams) on how to easily proceed with this kind of integration in the future.

The paper is organized as follows: first it reminds the reader the main components of the authors' mathematical model (section 2). Section 3 introduces UML modelling with criteria and the authors' choice of which diagram categories are the best to be used. It also presents approach proposed by other researchers. Sections 4-6 present the integration of the previously defined mathematical model into selected UML diagrams (static and dynamic). In section 7, the conclusions of the paper are presented.

Mathematical Model Summary

The mathematical model designed by the authors was explained in detail in previous publications, but still it is necessary to remind the reader the main concept that will be used in this paper.

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The main element is the Security Management (SM) model for integration platforms which consists of (the model presented is a simplified version of the model from):

$$SM = \langle P, D, K, T, E, B, \rho, \tau, \delta, VF \rangle \tag{1}$$

where:

- P – a set of entities,
- D – a set of data units,
- K – a set of protection classes,
- T – a set of operations,
- E – a set of electronic services,
- B – a set of categories of an authorized execution,
- ρ – an access relation,
- τ – a scope of operations relation,
- δ – a relation of an authorized service execution,
- VF – a set of restriction functions (restriction generator for the security management model).

In the simplified version, complex services were removed as a separate model element and were replaced with just electronic services.

For the purpose of this paper, the authors only consider public tasks that can be delivered electronically by public administration. A user (defined as P – entity) can start the implementation of those public tasks (z) by selecting one of them from the public task set:

$$Z = \{z_1, z_2, \dots, z_j, \dots, z_i\} \tag{2}$$

For every public task, there is an implementation schema which describes how it is delivered (consisting of enforcements which change the security state of an electronic service platform or system).

The public tasks schema set with function connecting public tasks with the execution schema:

$$S = \{s_1, s_2, \dots, s_j, \dots, s_I\} \tag{3}$$

$$\pi: Z \rightarrow S \tag{4}$$

Based on an execution schema, an execution sequence is created with enforcements which start an electronic services execution and change security states.

When a security mechanism is designed for such a system, there are two options:

a) mechanism can check the correctness of every security state (almost impossible in the real-life scenario),
b) mechanism can check the correctness of an enforcement (if correct, it will change a secure state to another correct state from the security perspective).

Option b. was selected by the authors (based on enforcements and previously presented security model) so different security controls can be verified, such as:

- whether an entity is allowed to access selected data units,
- whether an entity has enough privileges to execute an operation (such as read, modify) on data units,
- whether an entity is allowed to provide an electronic service.

Another key element of this model is the process of designing new electronic services which are coming from different domain systems and are combined and delivered from an integration platform. In this case the security integration is extremely important to create a new security access level to data (with their operations) and services (with their functions), still keeping full compliance with domain systems security rules and limitations.

Those mechanisms were described in previously prepared mathematical model.

Object-Oriented Modelling – Diagram Category Selection

There are already many publications about security integration into UML that were reviewed and verified by the authors. Very interesting survey was published by ETH Zürich where most important conclusions are:

- UML stereotypes were selected as the most usable for security specification.
- UML behaviour diagrams were selected as most usable for security requirements specification and aspect design.
- The most common way to integrate security into modelling was by extending UML meta-language however the new meta-language should be then an appropriate alternative.

According to the authors and many other researchers the best solution was provided in UMLsec specification where security requirements were implemented into UML (using existing elements and extensions like new stereotypes). Additionally the analysis of usability of UML diagrams was conducted with below conclusions:

- Activity diagram: secure control flow, coordination.
- Class diagram: exchange of data preserves security levels.
- Sequence diagram: security-critical interaction.
- State chart diagram: security preserved within object.
- Deployment diagram: physical security requirements.
- Package: holistic view on security.

The approach presented in UMLsec and in other UML security integration models is mostly focused on a transformation from security requirements or pseudo-language into UML diagrams or simply focuses on specific security areas like:

- approach limited to access control policies,
- SecureUML which focuses only on specifying RBAC model,
- AuthUML which focuses on incorporating access control policies into use case diagrams.

According to the authors still there is no overall approach presented that is focused on the mathematical model transformation into UML security modelling and that is the reason for publishing current paper.

There are several aspects that need to be considered when integrating a mathematical model into UML diagrams:

- system elements and their reference to a mathematical description,
- system access scenarios (in this case, public task access and, as a result – verification of enforcements and security states),
- system development scenarios (in this case, the process of designing new secure electronic services which are in fact the execution of public administration tasks).

Another very import aspect is to select proper UML diagrams that are useful in the process of security mechanisms designing and allow the integration of mathematical modelling. To achieve this it is required to perform a review of categories of UML diagrams with classification and justification whether and why they can be used to translate mathematical modelling into graphical representation. Main criteria selected by authors include:

- whether it is possible to present main model elements and relationships between them,
- whether it is possible to present information on how components react to one another to reflect functions,
- whether it is possible to present information on how system state (in our case a security state) is being changed in time after specific actions.

In the UML generally we have 3 basic categories of diagrams:

- structure diagrams,
- behavioural diagrams,
- interaction diagrams.

Starting with the first category of structure diagrams which "show the static structure of the objects in a system. That is, they depict those elements in a specification that are irrespective of time. The elements in a structure diagram represent the meaningful concepts of an application, and may include abstract, real-world and

implementation concepts." In table 1 below, the most common structure diagrams (some auxiliary and not formally defined in UML 2.5 diagrams were skipped) have been presented with a short justification whether they fit the proposed criteria:

Table 1: Structure diagrams – verification

Diagram name	Short description	Justification
Package diagram	Shows packages and relationships between them.	Not fitting to any criteria. High level overview for developers.
Class diagram	Shows structure of the designed system, subsystem or component.	Basic diagram required before any action can be presented (selected).
Deployment diagram	Shows architecture of the system from deployment perspective.	Not fitting to any criteria. High level overview for software deployment.
Objects diagram	Shows instance specifications of classes and interfaces.	Not fitting to any criteria. Class diagrams are enough from the mathematical modelling perspective.
Model diagram	Shows abstraction or specific view of a system – for example architecture.	Although it does not exactly fit to presented criteria it was selected by authors as a main diagram required from the system architecture perspective.
Internal structure diagram	Shows internal structure of a classifier.	Not fitting to any criteria. Detailed decomposition into properties, parts and relationships is not required in described transformation.
Collaboration use diagram	Shows objects of the system collaborating to produce some system actions.	Specified diagram fits together with class diagram to first criteria. From mathematical modelling it is treated by authors as a complementary diagram and that is why it was not selected.
Component diagram	Shows components and dependencies.	Not fitting to any criteria. Used to create the Service-Oriented Architecture design.

This category of diagrams can be useful to present the general view of the system and place objects defined in the mathematical model there. A mathematical model is not focused usually on technical aspects of the system such as a web portal, database, backend system but rather on lower level objects (entities, data units, etc.) used in action and aligned to each other with functions. For that reason, a model diagram can be used for the high level system design but most of relationships between components from mathematical modelling can be presented in action on dynamic diagrams.

The second category are behaviour diagrams which "show the dynamic behaviour of the objects in a system, including their methods, collaborations, activities and state histories."

In table 2 below, most common behaviour diagrams have been presented with a short justification whether they fit the proposed criteria:

Table 2: Behaviour diagrams - verification

diagram name	Short description	Justification
Activity diagram	Shows sequence and conditions to coordinate the behaviour of system elements	Selected diagram as it fits the proposed criteria – it presents element activities, which collates to functions in the mathematical model.
Use case diagram	Shows set of actions of users with the system.	Selected diagram as it fits the proposed criteria – actions are created based on mathematical functions where a user (entity) is involved.
State diagram	Shows system or object states transition.	Selected diagram as it fits the proposed criteria – it is necessary to present a system and object state changes (from the security perspective).
Information flow diagram	Shows information exchange between system elements (from a high level perspective).	Diagram not selected – as detailed information flow was also not covered in mathematical modelling.
Additional state machine diagrams (behavioural, protocol, interaction)	Show discrete behaviour through state transitions.	Diagrams not selected – as base state diagram is enough from the criteria perspective.

Selected behaviour diagram can cover all three requirements defined by authors. On activity and state diagrams we can integrate component states, how and when they change, which can reflect functions. Use case diagrams can show us exactly when and how which functions and mathematical formulas should be used in system access and development scenarios.

Last category is interaction diagrams (sometimes showed as part of behaviour diagrams but we can treat them as a separate category for the purpose of this paper) which are focused on the communication and sequencing of system components over time.

In table 3 below, most common interaction diagrams have been presented with a short justification whether they fit the proposed criteria:

Table 3: Interaction diagrams - verification

diagram name	Short description	Justification
Sequence diagram	Shows message communication between objects	Although time perspective and messages are not fully covered in mathematical model it is selected to present relationships between objects from the communication sequence perspective.
Timing diagram	Shows interaction between objects with time perspective.	Time perspective was not proposed in criteria so this diagram is not selected.
Communication / collaboration diagram	Shows interaction between objects with message passing perspective.	Communication between objects is not directly covered in the mathematical model. It does not fit the proposed criteria.
Interaction overview diagram	Shows interactions through a variant of activity diagrams.	Interaction between objects from the mathematical model perspective is covered by the activity diagram. This diagram is not selected.

Most of relationships between components can be presented with behavioural diagrams but we could use for example sequence diagrams to describe in detail the process of element collaboration (placed in time). The

mathematical model proposed by the authors does not present the time perspective and that is why most of those diagrams are not selected in this paper. Based on the authors' experience, a deep dive into sequencing was not required in the mathematical model definition – although enforcements and further actions connected to them (for example an electronic service execution and access to data sets) are treated as a mathematical sequence. Detailed scenarios of how electronic services are really cooperating with each other in time is not crucial from the security perspective.

To sum up this section, the best choice for integration of mathematical modelling into UML would be behavioural diagrams. Still, some structure diagrams can be used to present a high level view and interaction diagrams when moving from only security to the full system implementation. Although behavioural diagrams were selected as best for integration process, we should always start with a general system overview and main elements definition. The same approach is used in the mathematical modelling where static elements are defined before they can be used in the dynamic approach – equations.

Integration of object oriented and mathematical modelling

This section presents how mathematical modelling can be integrated into object-oriented modelling. As we have the mathematical model prepared and UML diagrams category selected, the next steps defined by the authors are:

- based on a general process description, elaborate selected UML diagrams,
- fit mathematical equations into created UML diagrams,
- verify whether all elements from mathematical modelling have been fitted into object-oriented diagrams and whether there are no areas where they are contradicted.

This approach will be presented on the authors' mathematical model designed for management of security mechanisms for electronic service platforms. If the mathematical model cannot be fitted into the diagrams created, it means that the diagrams provided do not present proper system behaviours described by the mathematical description. This is why it constitutes a perfect verification of whether and how the theoretical approach created can be implemented into real life scenarios.

The approach presented is an example can be used by other researchers to combine two complementing approaches – mathematical (theoretical) and object-oriented (practical). This step is a direct way to create a real life implementation by building the designed system and translating mathematical equations into algorithms in any programming language (integrated into specific objects such as programmable classes and functions).

Static Diagram Integration

As it was explained in section 3 – static diagrams are the required base to define main elements before they can be used in behaviour and interaction diagrams. Every object from the mathematical model has to be defined as an object class, for example: entity, data unit, electronic service etc. In this case, a sample entity class diagram is presented below (Fig. 1) with a list of protection classes and operation levels associated with data units and execution levels associated with corresponding electronic services.

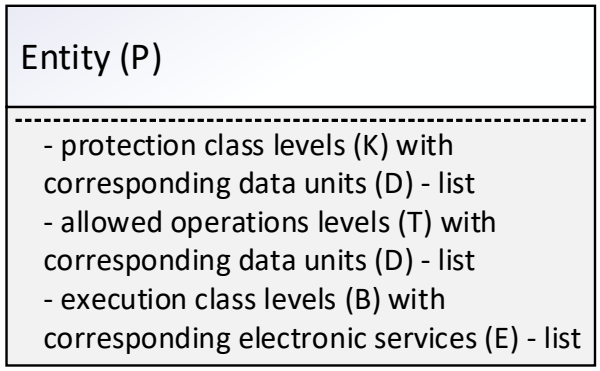

Fig. 1: Class diagram - an entity (P)

The general model diagram of the whole system (for real-life system implementation) should be also provided (Fig. 2) after class diagrams have been created. It is not connected to theoretical mathematical modelling but is necessary for a static view of the system:

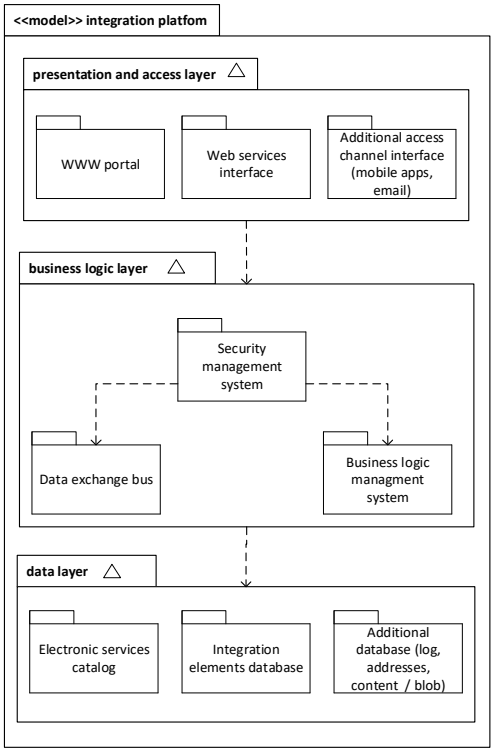

Fig. 2: Integration platform model – architectural model diagram

As static structure architectural diagrams are not the most important ones from the point of view of this paper, they will not be discussed in more details (although they are necessary when building a real-life system).

Dynamic Diagram Integration

This section presents dynamic diagrams integrated with mathematical model recalled in section 2. First of all, use case diagrams are presented with high-level definitions of main actions that are allowed in the system from the perspective of an entity (P). They are then followed with detailed activity diagrams in which both design and execution of electronic services is presented with references to the mathematical model. All models are designed from the security management perspective, so some areas of real-life implementation are not covered in this paper – still presenting the approach how to move from a theoretical mathematical view to a more technical object modelling view.

First and most important activity of the entity (P) is to execute public tasks available on electronic integration platforms (Fig. 3).

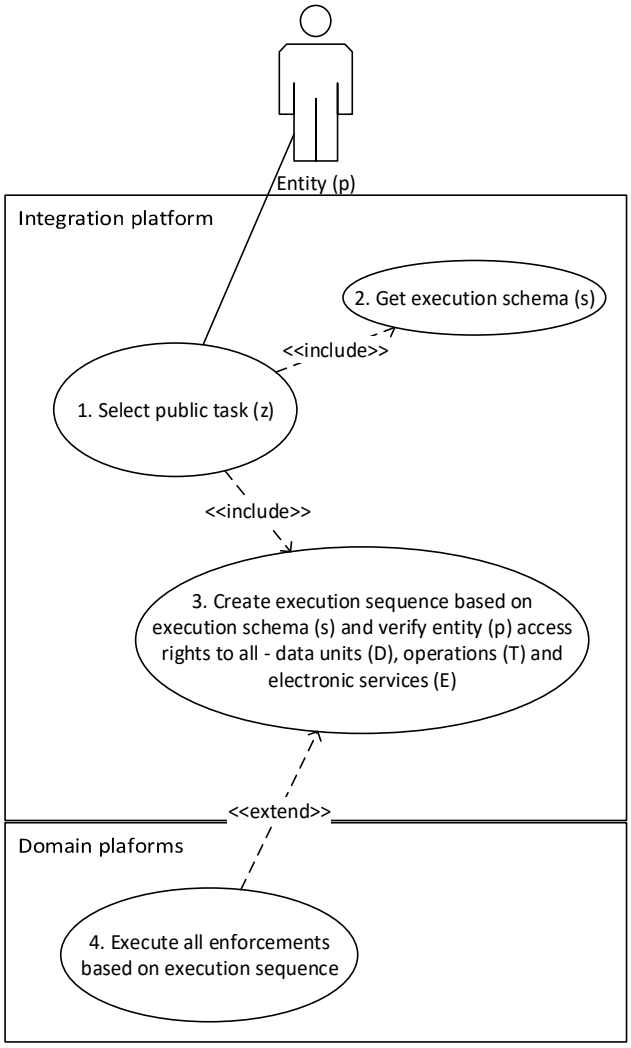

Fig. 3: Public task execution (with support of electronic services platforms) – use case diagram

Static mathematical model elements were directly integrated into the model so that they can be easily created in real-life system as class objects taking part in the execution of use case actions. Dynamic operations such as – (2) getting an execution schema constitutes direct implementation of mathematical functions – in this case function π - equation No 4 from section 2. Enforcements are then transformed to low-level actions of operations (T) on data units (D) and access to high-level electronic services (E). They are verified by the security management system and if a system state is kept as safe, those enforcements are executed on domain platforms (action 4 from Fig. 3).

Next Fig. 4 presents an activity diagram for public task execution with support of electronic integration platforms:

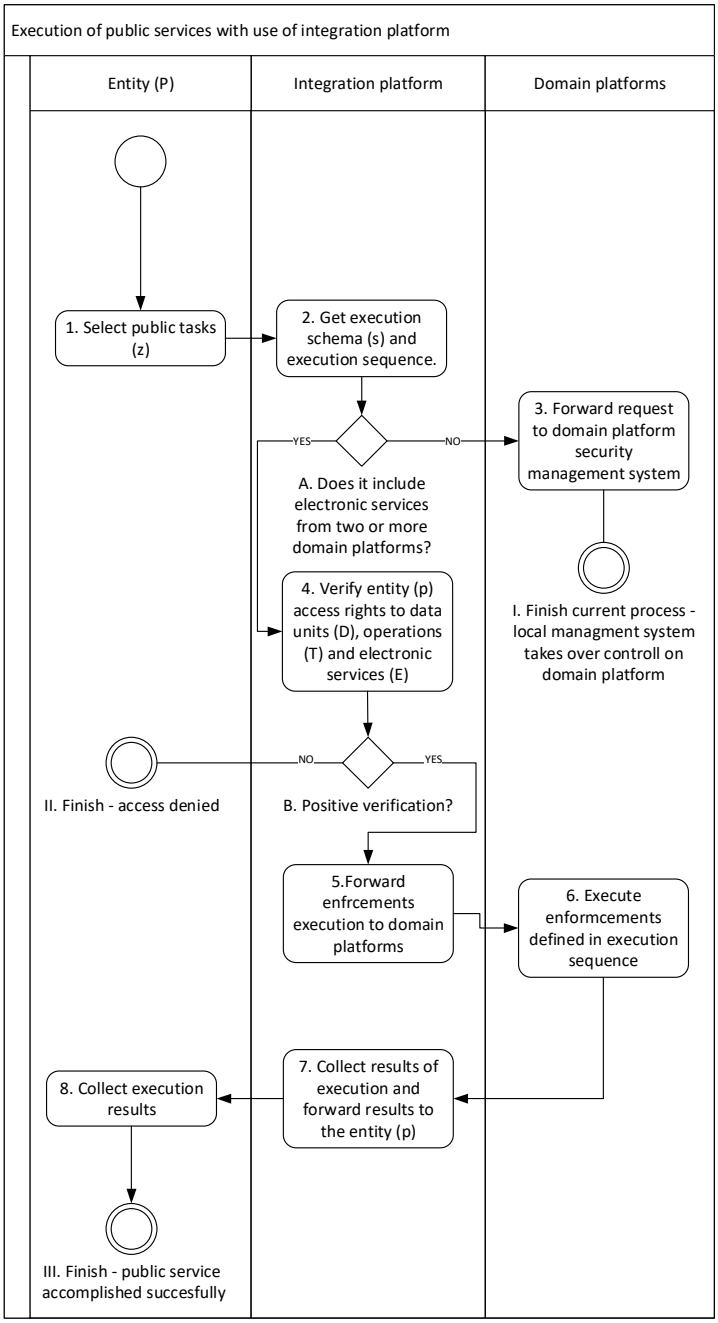

Fig. 4: Public task execution (with support of electronic service platforms) – activity diagram

The above diagram constitutes a graphical presentation of a process described in the mathematical model mentioned in section 2 and described in detail in previous papers. Mathematical elements mentioned in this paper have been integrated into the above diagram (like data units, entities etc.) Additional elements, such as enforcements or some mathematical functions, have not been placed there as they have not been specifically introduced in the same article. Nevertheless every action element corresponds to a mathematical function – for example:

- action 2 is the transformation of a public task (z) into an execution schema (s) mathematically described by equation 4 from section 2,
- action 4 is a core verification set of functions checked by the security mechanism of the integration platform.

Next diagram Fig. 5 presents security states of electronic service integration platform (named as the system in the diagram). As described in section 2 and in the full mathematical model, the whole process starts with a secure state and every enforcement can move it to next secure state or unsecure state which means that the system was compromised and cannot be used anymore (final state). Security mechanisms are checking whether enforcements are correct or incorrect from the point of view of security (this verification is presented on different diagrams – activity and sequence).

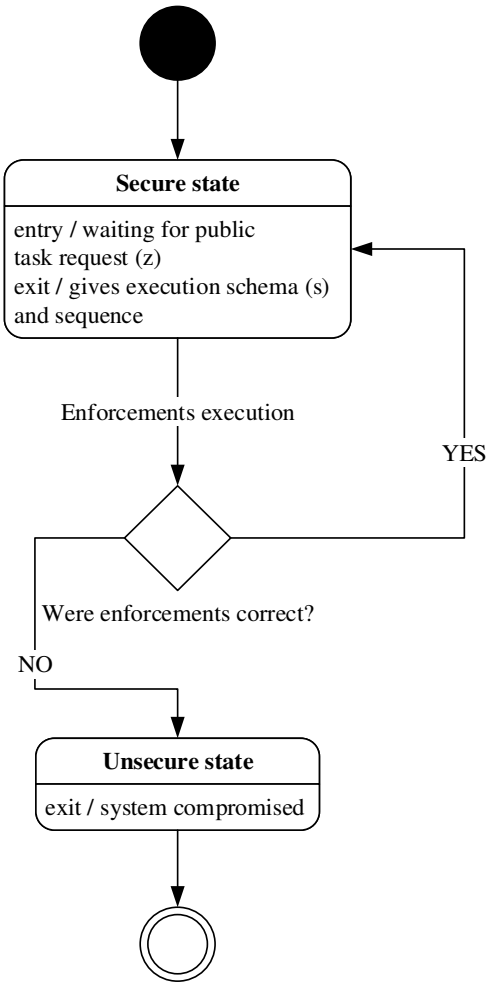

Fig. 5: Electronic service integration platform – state diagram from the point of view of security

Next diagram Fig. 6. presents relationships between main objects from the communication perspective during execution of a public task. Although it can also cover time perspective, it will not be considered in this paper – based on an assumption that the order and time of execution of electronic services are not important from the point of view of security. Of course, it can be added later to the model – for example by allowing execution only in a specific order at a specific time of a day or week, but as it is not currently used for the real-life public administration integration platforms analysed, it is not part of this paper.

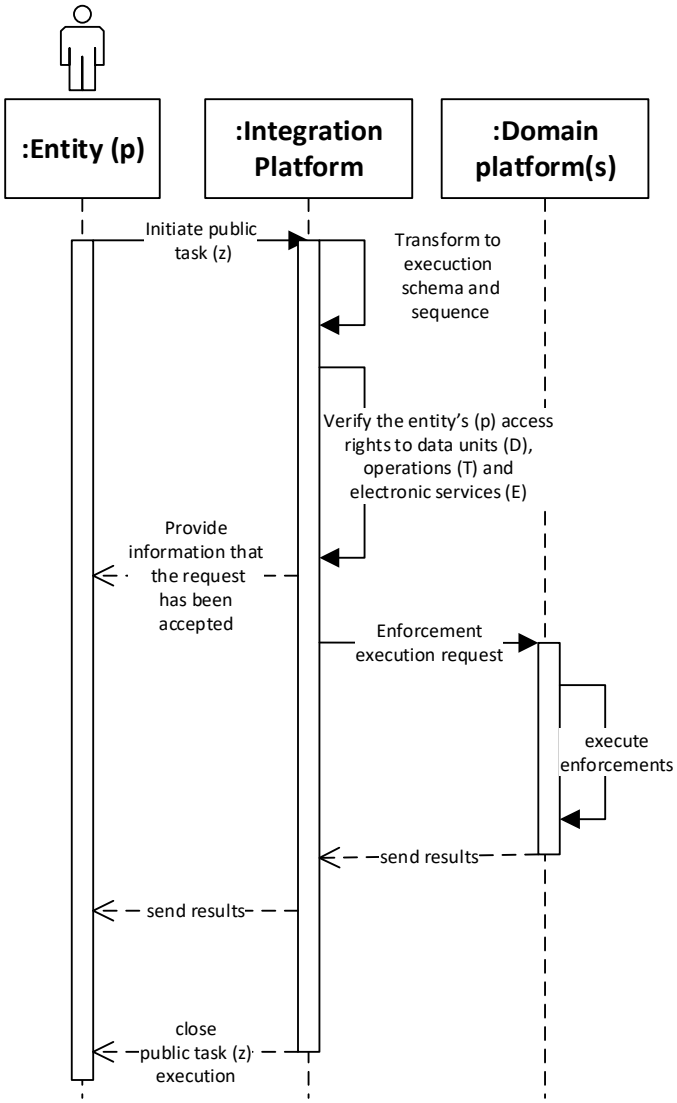

Fig. 6: Public task execution (with support of electronic services platforms) – sequence diagram

The above diagram constitutes a simplified presentation of communication between an entity, electronic service integration platform which coordinates security management and domain platform (or platforms – for diagram simplicity presented on one domain platform example). Static model elements, such as a public task or data units have been integrated into the UML diagram. Dynamic actions both from the integration and domain platforms have also been also included. Designed security mechanism and it's functions are part of integration platform security verification, sequence of enforcements is starting electronic services with data operation actions on domain platforms.

Conclusions

In the paper authors presented an approach to start with a formally verified mathematical model and then continue with a practical approach to finally allow real-life system creation. The mathematical model can be integrated into specified UML diagrams allowing not only the designing of a security mechanism but of the entire system – in this case, the integration platform environment. This approach guarantees a strong basis which is provided by the mathematical modelling and the UML representation clear to developers. Unfortunately, many newly designed systems and security mechanism are created the other way round. First, high-level architects create system diagrams and then, in some cases only, some elements are formally verified, which can result in many mistakes. When focusing on such crucial elements as security, formal mistakes can lead to a system being easily compromised -

which happens often these days. The approach presented and diagrams selected can constitute a guide for architects and researchers on how to start the integration of formal models with UML diagrams before real-life system implementations. It is not the full approach that covers all security aspects so it should be used together with other corresponding frameworks. The authors recommendation would be UMLsec but most of them finally end up with similar conclusions (for example selection of behaviour diagrams) and should be applied based on their specific focus.

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Impact of The Pandemic on The Logistics of Dairy Products

Valentina SHARAPOVA
Doctor of Economics, Professor, Ural State Economic University, Yekaterinburg, Russia,
E-mail: agroprom3@sky.ru,

Natalia SHARAPOVA
Doctor of Economics, Associate Professor, Ural State Economic University, Yekaterinburg, Russia,
E-mail: sharapov.66@mail.ru,

Yuri SHARAPOV
PhD in Economics, Associate Professor, Ural State University of Economics, Yekaterinburg, Russia,
E-mail: iura.sharapov@list.ru

Abstract

The most important food security industry is dairy. Recently, there has been an increase in the production of dairy products due to an increase in milk yield per cow. Despite the growth in production, the indicators approved in the Food Security Doctrine have not yet been achieved. Milk and dairy products produced by Russian agricultural producers are not enough to meet the needs of the population. To reduce the surplus, the state purchases dairy products from foreign countries, despite the high level of costs associated with logistics and product sales. Logistics costs can be reduced by optimizing milk delivery costs and reducing customs duties. Due to the decrease in the purchasing power of the population, the demand for dairy products is also decreasing. Despite the negative impact of the pandemic on the economic performance of the dairy industry due to the difficult situation of small businesses, the industry remains attractive for investors. The methodological basis was the works of both domestic and foreign scientists in the field of food security, logistics of dairy products and government regulation of the industry. The information base was the data of state statistics.
Use the word "Abstract" as the title for the abstract section. The abstract should be no more than 250 words. It should capture research motivation, research Design/methodology, and main findings and implications. The abstract should provide an excellent summary of the paper.

Keywords: Dairy industry, logistics, import of raw milk, food security.

Introduction

The dairy industry is the most important strategic area that ensures the food security of the country's population.

In Russia, the indicators of the Doctrine of Food Security for milk and dairy products are still not achieved. To meet the needs of the population in dairy products, measures are needed to support domestic agricultural milk producers, develop the logistics and marketing infrastructure of dairy products, and form the industry's competitive advantages. Today the dairy industry shows a steady growth in production, which indicates the possibility of choosing a strategy of behavior in the market [6].

Main Part

Various factors influence the achievement of the Food Security Doctrine indicators. First of all, there has been a decrease in the number of cows over the past decades (Figure 1).

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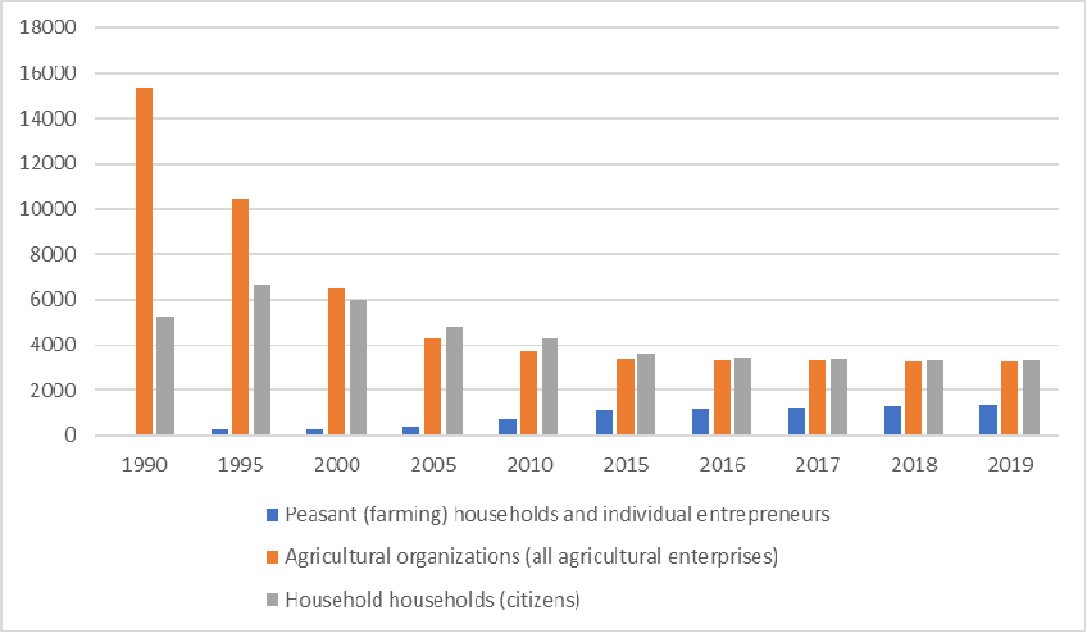

Fig. 1: The number of cows in farms of all categories in the Russian Federation. 1990-2019

A decrease in the number of livestock in the period under review is observed both in the country as a whole and in all constituent entities of the Russian Federation. The main reason for the decline in the number of cows is the low economic efficiency of the dairy industry. During this period, the reduction in livestock was 2.6 times for farms of all categories [2]. So the greatest reduction in livestock is observed in agricultural organizations 78.6%. At the same time, there is an increase in the number of livestock in peasant (farm) households. Despite the reduction in the number of cows, there is an increase in milk production (Figure 2).

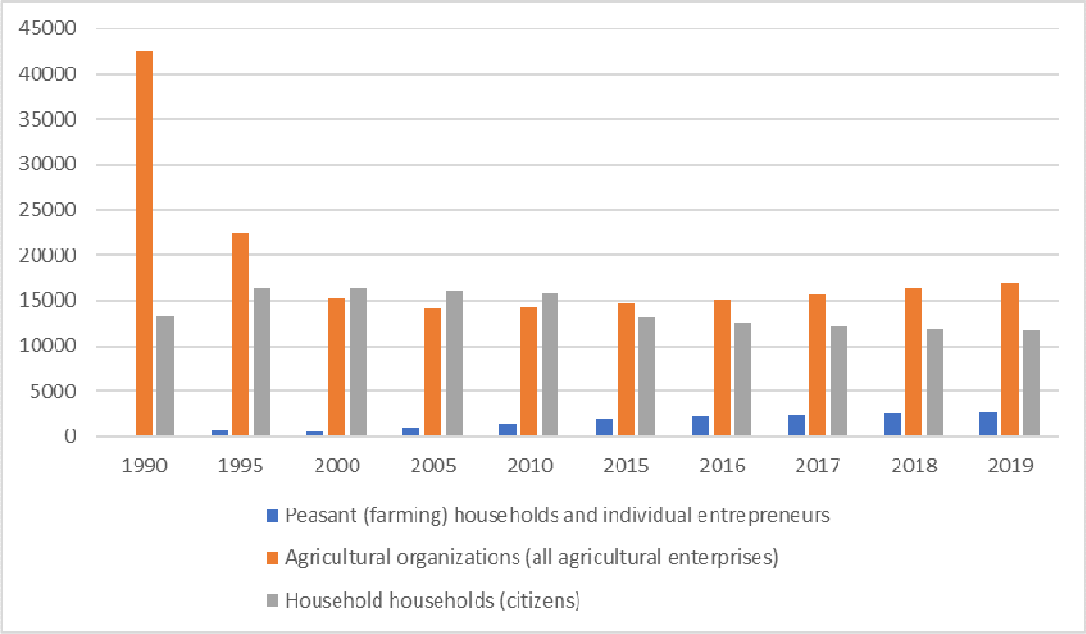

Fig. 1: Milk production in farms of all categories in the Russian Federation, 1990-2019

A sharp decline in milk production continued until 2005. As of 2019, the level of milk production has not reached the level of 1990. The structure of producers has also changed, so, if in 1990 agricultural organizations and households were engaged in milk production, the ratio was 76% to 24%, then in 2019 milk production was carried out by peasant (farm) households - 8.53% of the total production; agricultural organizations - 54.10%; household farms - 37.37%. The production of milk K (F) X over the past five years has increased by 40%, and agricultural organizations - by 18%. In recent years, there has been a steady upward trend in milk production both by agricultural organizations and peasant (farmer) households. A negative trend is also observed when analyzing the number of producers, as the number of milk producers decreased in Russia from 2017 to 2019. by more than 2900 units [4;5].

In the past five years, there has been not only an increase in milk production, but also an increase in the level of its consumption (Figure 3).

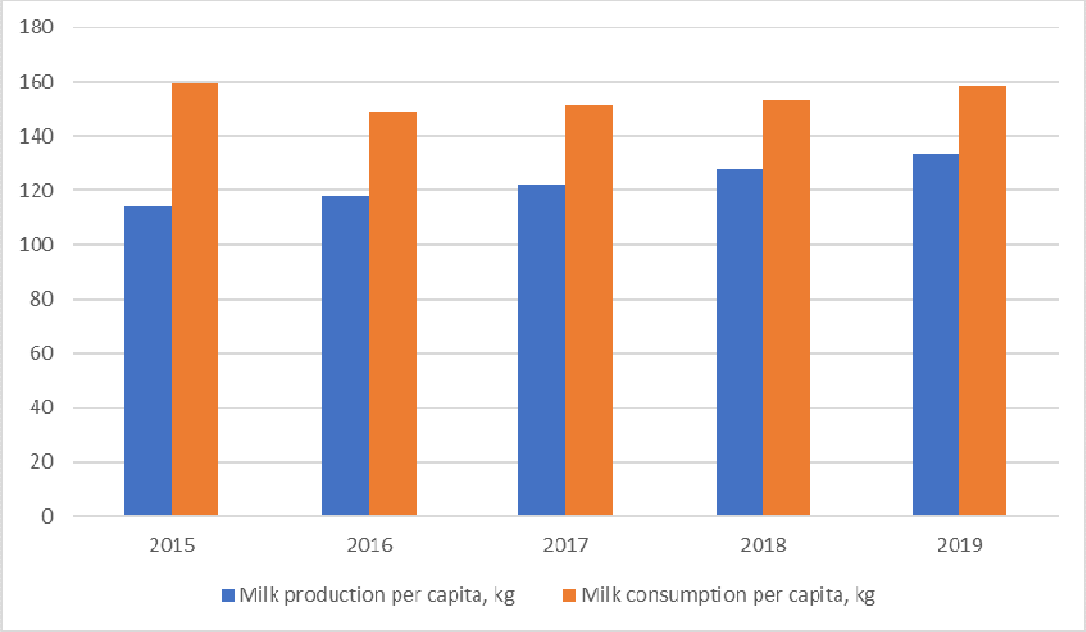

Fig. 1: Production and consumption of milk per capita in the Russian Federation, 2015-2019

On the territory of the Sverdlovsk region, there is also an increase in milk production in farms of all categories. Actual production amounted to 767 thousand tons (38.85% growth compared to 2010). According to the results of 2019, the Sverdlovsk Region entered the TOP-25 subjects in terms of gross milk production in 2019, taking the 10th ranking position.

In terms of the absolute increase in milk productivity in agricultural organizations, the TOP-10 regions are headed by the city of Moscow, an increase of +1685 kg, and the productivity was 7950 kg, But there are regions that showed a decrease in milk productivity in agricultural organizations, the largest decrease in the Chukotka Autonomous Okrug is 2582 kg, with a productivity of only 1883 kg per cow in January - September 2020.

The Russian milk market is finding optimal ways and adapting to the current situation, which is associated with the impact of COVID-19. Due to the decline in demand for dairy products, small and medium-sized enterprises in the industry will have to live in difficult economic conditions in the coming months. The pandemic has adjusted the forecasts made earlier by analytical centers based on an increase in demand for dairy products in Russia, due to the fact that in March 2020, retail chains noted a large increase in demand for shelf-stable products, including dairy products, due to the introduction of a self-isolation regime, which is typical during crises and epidemics around the world.

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Receiving serious government support, the dairy industry remains attractive to investors. Rosselkhozbank alone, according to the chairman of the bank's board Boris Listov, took part in the implementation of over two thousand projects for the dairy industry, investing more than 420 billion rubles aimed at increasing milk production. Recently, the share of imports in the dairy market of the Russian Federation has decreased from 22% to 19%, approaching the indicators indicated in the Food Security Doctrine (no more than 10%). So, in 2020, subsidies to agricultural producers are provided within the framework of "stimulating" and "compensating" subsidies in the amount of 10.6 billion rubles, which exceeds the level of the previous year by 2.6 billion rubles. Funds in the amount of 3.3 billion rubles are also provided for the issuance of short-term loans as part of the implementation of the mechanism of concessional lending to agricultural producers, as well as funds for investment lending in the amount of 10.6 billion rubles.

It should be noted that in Russia, the per capita consumption of dairy products lags behind the EU countries. So, butter is consumed per year 2.8 kg per person, against 4 kg in the EU; cheese consumption is 6.4 kg, which is 3.1 times lower (in the EU - 20.2 kg). “According to OECD-FAO analysts, the consumption of cheese in the Russian Federation will increase by an average of 2% per year, butter - by 1%,” noted at a joint meeting of the Ministry of Agriculture of Russia with the National Union of Milk Producers, which was held on topical issues of dairy development. branches emerging in the milk and dairy products market, which is one of the most promising and interesting in the structure of the RF agro-industrial complex.

The forecast of the Ministry of Agriculture of the Russian Federation to increase milk production to 32 million tons in 2020, which is 1.9% higher (31.4 million tons) than in 2019.

The surplus of raw milk according to Rosstat in 2019 amounted to more than 3646 tons.

Insufficient production of milk and dairy products is compensated by imports. The share of imports of dairy products was 17% of the total consumption by the population.

Most often, raw milk is imported from the following countries: Lithuania, Poland, Denmark, Italy, Spain, France, Latvia and other countries.

To import milk, two main documents are required: an import permit and a veterinary certificate. At the same time, a veterinary certificate may not be required if the product contains less than 50% of animal fats, or the product is not a by-product of processing, or the product contains less than 20% milk powder.

Also, for customs clearance, a certificate or declaration of conformity, an agreement with a specialized warehouse and a customs cargo declaration are required. Also, depending on the exporting country, other documents may be required.

When importing dairy products, you must pay customs duty at a rate of 15%, as well as VAT at a rate of 10%. In Russia, a pilot project for labeling finished dairy products has been developed, which started on July 15, 2019, the project was supposed to be completed on February 29 and implemented on June 1 of this year, but the experiment period was repeatedly extended. At the end of March 2020, the Russian government, due to the threat of a coronavirus pandemic, postponed the introduction of mandatory labeling of dairy products. The marking must contain the following information: date and country of manufacture; composition; information about the manufacturer and importer; brand; product features. Since the labeling of dairy products is an expensive project, the Ministry of Agriculture proposed to partially reimburse the direct costs of labeling milk and provide producers with preferential loans.

Due to the fact that dairy products have a short shelf life, logistics costs may increase when choosing a carrier. At the same time, the transportation time is reduced from 15 to 1 day. The cost of air transportation is from 3.1 to 5.7 US dollars per kilogram of dairy products.

A large number of factors can influence the cost of milk imports. For example, the territorial location of customs, the list of the imported assortment group (the larger the list, the higher the price); packaging; conditions of transportation, including temperature conditions and others.

Despite the high level of costs for the import of dairy products, imports increased in three months of 2020 by 19.2% in physical terms and by 25.5% in value terms. The largest share of imported products is covered by Belarus, Kazakhstan, Argentina, New Zealand, Uruguay (25 countries in total).

Conclusion

The COVID-19 situation shows that a new reality is taking shape, both in trade and logistics, and in manufacturing. There is a rapid growth in the share of online sales, success awaits those companies that are ready to adapt to the new reality, build partnerships, reduce production costs and work out a development strategy.

New economic realities for milk producers around the world are causing problems due to reduced business profitability. To remain competitive, dairy companies need to organize conditions for the growth of production volumes; promote the expansion of product diversification in order to further develop the dairy subcomplex, diversify the sales channels for dairy products [3].

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Analysis of Vacancies in Agricultural Specialties in The Labor Market of The Ural Federal District

Valentina SHARAPOVA
Doctor of Economics, Professor, Ural State Economic University, Yekaterinburg, Russia, E-mail: agroprom3@sky.ru,

Natalia SHARAPOVA
Doctor of Economics, Associate Professor, Ural State Economic University, Yekaterinburg, Russia, E-mail: sharapov.66@mail.ru,

Yuri SHARAPOV
PhD in Economics, Associate Professor, Ural State University of Economics, Yekaterinburg, Russia, E-mail: iura.sharapov@list.ru

Ivan BORISOV
Senior Lecturer, Ural State University of Economics, Yekaterinburg, Russia, E-mail: borisovivan2006@yandex.ru

Abstract

The article deals with the topical issues of supply and demand for the labor of agricultural specialists. The study was based on the two most in-demand specialties: agricultural and tractor driver. The research was carried out on the basis of data from the official websites for job search, as well as data presented on the websites of the Labor and Employment Departments of the Ural Federal District. The purpose of the study is to analyze vacancies in agricultural specialties in the context of the introduction of professional standards. In the course of the research, the following methods were used: monographic research, analysis, synthesis, comparison, generalization.

Keywords: supply and demand in the labor market, vacancies, wages, agronomist, tractor driver, professional standard.

Introduction

Various factors influence the development and state of social and labor relations. On the one hand, social and labor relations are influenced by the normative legal acts of various levels, which regulate the relationship "employee-employer". An active state policy is aimed at changing and transforming the structure of the labor market. That is, the development of the labor market is impossible without active government intervention. One of the most important areas is the assessment of labor market indicators in terms of changes in the number of resumes and vacancies, both in general and by industry.

Many Russian and foreign researchers and economists dealt with the questions formation and development of the labor market. Thus, in the fundamental works of J.M. Keynes, D. Ricardo, A. Smith, J.B. Say outlines the theoretical concepts of regulating the employment of the population. In the works of Russian economists, internal, national and international problems of “the formation and development of the labor market”[1,7] are considered. In the works of foreign scientists, various job search mechanisms are considered, with the use of the Internet being the leading tool.

Significant changes have occurred in the dynamics and structure of unemployment in the last year, which is associated with the negative epidemiological situation in the region. So during the pandemic (from April 2020), “the number of unemployed registered with the employment”[4] services in the Ural Federal District has increased more than 4 times. According to the monitoring data, the results of which are presented on the official website of the Plenipotentiary Representative of the President of Russia in the Urals Federal District, as of October 6, the number of registered unemployed people left 305.3 thousand people.

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At the same time, the demand for agricultural specialists is not increasing. The share of open positions for young specialists in the agricultural sector is also insignificant.

Today, there are professional standards for both professions. For the profession "Agronomist" there is a professional standard approved in 2018. The main goal of professional activity is “the organization of the technological process of growing crop products”[9]. The professional standard provides for three generalized labor functions: performance of work within “the framework of developed technologies for the cultivation”[5,6] of agricultural crops (skill level - 5); organization of products crop production (skill level - 6); management of products crop production (skill level - 7).

The main indicators, as well as directions for achieving qualification levels, indicating the names of positions, will be presented in the form of a fragment of the industry qualifications framework (Table 1).

Table 1 - Fragment of the sectoral qualifications framework for the profession "Agronomist"

Of qualifica-tions level	Name of the Generalized Labor Function	Requirements for the level of education and practical work experience	Job titles
5	“Performance of work within the framework of the developed technologies for the cultivation of agricultural crops”[9]	“Secondary vocational education - training programs for mid-level specialists”[2,8]. Additional professional education is recommended - advanced training programs at least once every five years.	- agronomist; - plant protection agronomist (intermediate qualification)
6	Organization of products crop production	Higher education - bachelor's degree; “secondary vocational education - training programs for mid-level specialists”[2,8]. At least three years of work as an agronomist with secondary vocational education No requirements for practical work experience with higher education. Additional professional education is recommended - advanced training programs at least once every five years	-agronomist - plant protection agronomist - agronomist for testing and protection of breeding achievements
7	management of products crop production	Higher education - master's degree or specialty. Additional professional education is recommended - advanced training programs at least once every five years	Chief agronomist

The information presented in Table 1 on the position of “Agronomist” is not complete in accordance with the approved professional standard and the current Federal State Educational Standard.

Table 2 : Fragment of the sectoral framework of qualifications for the profession "Tractor driver"

Of qualifica-tions level	Name of the Generalized Labor Function	Requirements for the level of education and practical work experience	Job titles
3	Performing mechanized work in agricultural production while maintaining the technical condition of mechanization equipment	Secondary vocational education - training programs for skilled workers (employees) for at least ten months. Passing mandatory preliminary (upon admission to work) and periodic medical examinations (examinations), as well as extraordinary medical examinations (examinations) in accordance with the procedure established by the legislation of the Russian Federation Availability of a tractor driver's license of categories "B", "C", "D", "E", "F"	Tractor driver of agricultural production

In the labor market, the demand for specialists of this profile is high. However, agricultural organizations still lack young specialists.

In the course of the study, the data of the sites for the selection of personnel and the data presented on the sites of the employment services of the Ural Federal District were studied for the most popular professions - an agronomist and a tractor driver.

The amounts offered of wages in the studied professions is shown in Figures 1 and 2.

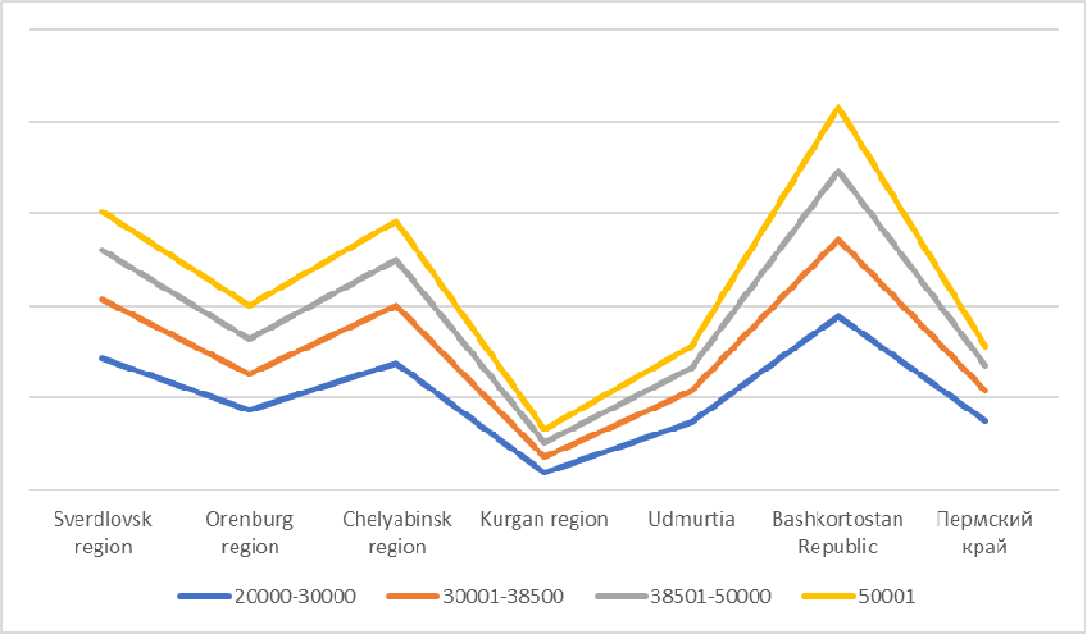

Fig. 1: Salaries offered by employers of the Ural Federal District in the profession «Tractor driver»

The highest wages level are offered by employers in the Republic of Bashkortostan and the Sverdlovsk Oblast; the lowest level is in the Kurgan region.

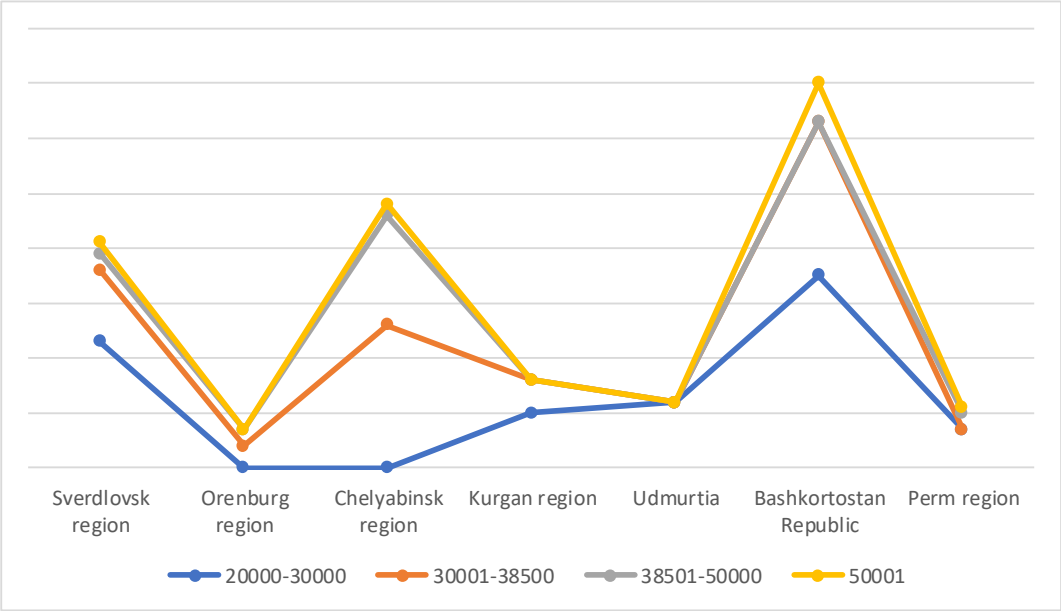

Fig. 2: Salaries offered by employers of the Ural Federal District in the profession "Agronomist"

The level of remuneration for the profession of "Agronomist" differs significantly in the Ural Federal District. The highest level is offered by employers of the Republic of Bashkortostan, the lowest - by employers of the Orenburg and Chelyabinsk regions.

Thus, the average salary offered by employers for these positions is 10-42% lower than the average Russian level (Figure 3).

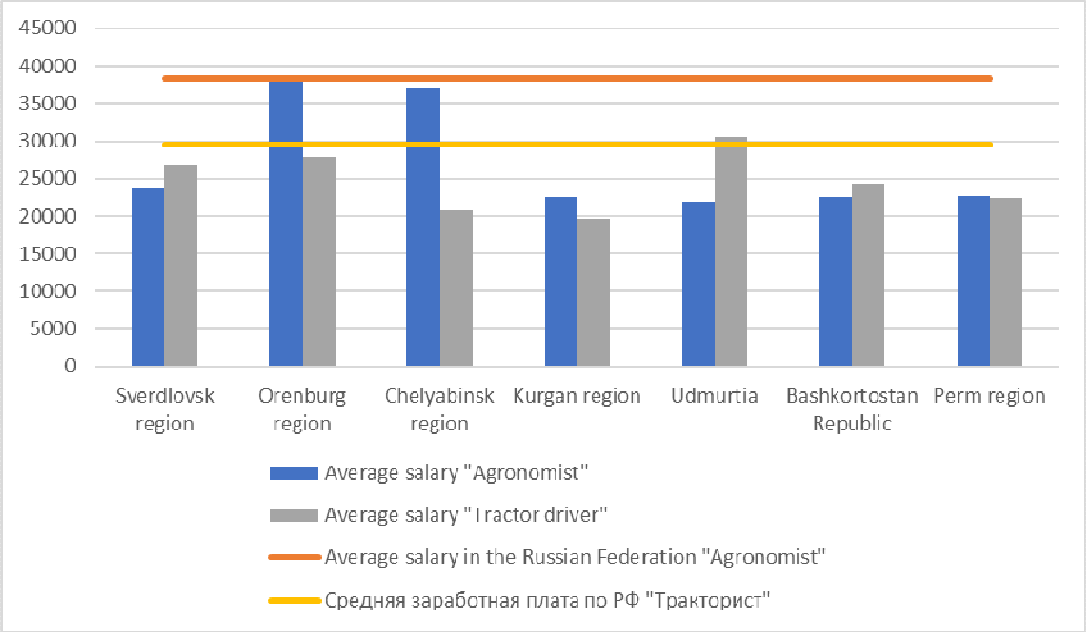

Fig. 3: The ratio of the average wages in the constituent entities of the Russian Federation and in Russia as a whole for 4 months of 2020.

The exception is the salaries offered by employers in the Orenburg and Chelyabinsk regions,

The requirements of employers in various subjects of the Ural Federal District to work experience and the level of education of applicants also differ (Figure 4).

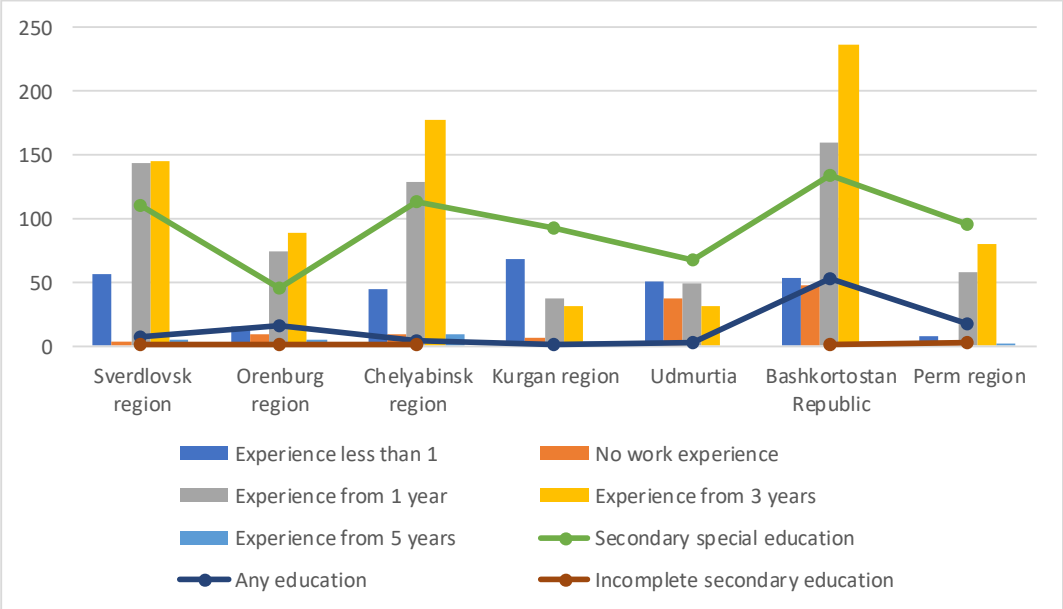

Fig. 4: Analysis of the requirements for the level of education and work experience in the position of "Agronomist" on the territory of the Ural Federal District

No signs of discrimination were found in the analysis of these job search sites. Basically, the announcements contain requirements for the level of education, requirements for qualifications and competencies. Additionally, employers indicate the possibility of training and advanced training by candidates for the position, as well as the presence / absence of social and relocation packages.

After analyzing "the supply and demand in the labor market"[6] of the Ural Federal District, the authors came to the conclusion that there is a high level of demand for agricultural specialists. Despite the sufficient number of vacancies posted on the official job search sites, young specialists are in no hurry to find a job based on these offers. The main reasons for the unattractiveness of the industry are, first of all, the low level of wages compared to vacancies in urban areas, the lack of a developed infrastructure in rural areas and the lack of a decent level of housing amenities.

To attract young agricultural professionals to the countryside, it is necessary to implement socially significant projects at the municipal level to increase the attractiveness of rural areas. For example, such projects include the acquisition of real estate in rural areas on a preferential mortgage; provision of state support to young farmers.

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Relationships of Corporate Social Responsibility with Organizational Resilience: A Literature Review

Joanna A. JOŃCZYK
Bialystok University of Technology, Faculty of Engineering Management, Białystok, Poland
j.jonczyk@pb.edu.pl

Wioletta S. WEREDA
Military University of Technology, Institute of Organization and Management, Poland;
wioletta.wereda@wat.edu.pl

Abstract

The purpose of this article is to enrich existing knowledge regarding the links between corporate social responsibility practices and their organizational resilience, and to determine perspectives and directions for further research. Corporate social responsibility is defined as all voluntary organizational activities taking into account social interests, environmental aspects or relationships with various groups of stakeholders, in particular employees. In turn, organizational resilience is the company's hidden ability to sense and correct improper adaptation tendencies and to cope positively in unexpected situations. For the analysis of the above content, scientific articles selected from the Scopus and Web of Science databases were selected, which presented practices showing the relationships between corporate social responsibility and the resistance of these organizations. The results of these investigations confirm the relationships between these constructs and their analysis has identified a research gap that can be filled by subsequent scientific interventions.

Keywords: Corporate Social Responsibility, Organizational Resilience, Sustainability, Social Resilience.

Introduction

The turbulent changes in today's business environment, caused by the economic crisis resulting from the globally prevailing coronavirus pandemic, as well as aspects such as the dynamically changing market, changing consumer needs, non-traditional competition and regulatory shocks - are increasingly forcing enterprises to pay attention to the problem of organizational resilience (Hamel and Välikangas 2003). There are different definitions of organizational resilience (OR) in existing literature. According to Gunderson and Pritchard (Gunderson and Pritchard 2002), this is the latent ability of the system to survive despite adversity, as well as to recover and maintain the existing structure after the crisis. In turn, according to Ortiz-de-Mandojana and Bansal (2015), organizational resilience is the ability of an organization to predict and respond positively to changes in the environment. They define OR as a latent structure, measured by its results. Teixeira and Werther (2013) define OR as the ability of enterprises to effectively deal with the impact of environmental changes on their purchasing power, and then implement their long-term survival and development. One of the factors that has a significant impact on building organizational resilience is the enterprise's application of practices related to corporate social responsibility (CSR) (Pal et al. 2014). CSR activities are primarily voluntary organizational actions not required by law (McWilliams and Siegel 2001), aimed at improving social and environmental conditions (Mackey et al 2007). One of the most powerful ways to make an organization stand out is by engaging stakeholders through CSR activities, thus bringing them many social benefits and values (McWilliams and Siegel 2001). The result of building an OR through CSR activities is to strengthen the profitability and financial stability of enterprises, as well as to establish significant relationships with stakeholders who, through their involvement in the enterprise, will help him avoid the negative effects of external shocks (Zahller et al. 2015).

The purpose of this article is to enrich existing knowledge regarding the links between corporate social responsibility practices and their organizational resilience, and to determine perspectives and directions for further research.

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The article reviews available literature selected from the Scopus and Web of Science databases, and then analyses the content of 4 selected publications. The main problem identified in the work concerned the ways in which organizations studied by scientists engage in CSR activities and the impact of these activities on building OR. At the same time, methods of measuring OR enterprises and the benefits of possessing this skill for enterprises during external crises and shocks were analysed and evaluated.

An important motivation to take up the above topic are not only the scientific interests of the author, but also the current crisis caused by the global pandemic of the COVID-19 virus, which aroused the need for organizations to review their ability to handle difficult situations. In this context, the rank of organizational resilience (OR) increases, which seems to be important not only in times of crisis, but also in times of greater stability. It is about drawing organizations' attention to the fact that they need to build internal resilience, which, combined with the CSR philosophy, can bring real added value to building a relatively sustainable balance in an ever-changing environment.

Material and Method

Criteria and search procedure

In order to find published literature on the impact of CSR on organizational resilience of enterprises, the Scopus database was searched in July 2020. Searching for literature related to OR issues began with entering the term 'organizational resilience' in the search engine of database. 528 articles were found among the publications available in the Scopus database. To locate the most relevant articles, the number of search results was limited by using appropriate search criteria, referring only to English-language articles from 2010-2020, which are in the area of business and psychology research. In this way, 150 articles were searched that addressed the issue of OR. To compare the results, articles were searched for "resilient organization". 127 articles were found in the Scopus database about a resilient organization. Then, the availability of scientific publications on corporate social responsibility was examined. The search term "CSR" was entered in the Scopus database search engine, resulting in 274039 publications. As in the case of OR articles, results filtering was used. The following criteria were used: English-language articles from 2010-2020, remaining in the research area related to business, social sciences and psychology. A summary of 7621 publications was finally obtained. The above study of literature availability in the Scopus database shows that issues related to corporate social responsibility (CSR) are very popular in available literature. At the same time, there are few publications on the issue of organizational resilience of enterprises, which may indicate that this is a relatively new research area among scientists. The last step in examining the published literature on both CSR activities and organizational resilience of enterprises was to search the articles database using a combination of "organizational resilience" and "CSR". As a result, only 4 scientific articles were compiled. To compare the results, the same search was carried out in the Web of Science database. A list of 3 articles was received, which are also in a list from the Scopus database. Finally, 4 articles found in the Scopus database were selected to analyse the content of publications dealing with CSR issues and its importance for organizational resilience. The list of selected publications is presented in Table 1. To supplement the substantive content, scientific publications on corporate social responsibility and organizational resilience, found through the Google Scholar database and manual bibliography review, on the basis of which the analysed articles were created, were additionally used.

Table 1: Summary of articles on CSR and organizational resilience

No.	Title	Author	Year	Source
	Using CSR disclosure quality to develop social resilience to exogenous shocks: A test of investor perceptions [8].	Zahller, K.A., Arnold, V., Roberts, R.W.	2015	Behavioral Research in Accounting 27(2), pp. 155-177
2.	The long-term benefits of organizational resilience through sustainable business practices [3].	Ortiz-de-Mandojana, N., Bansal, P.	2015	Strategic Management Journal 37(8), pp. 1615-1631

3.	What dimension of CSR matters to organizational resilience? Evidence from China [9].	Lv, W., Wei, Y., Li, X., Lin, L.	2019	Sustainability (Switzerland) 11(6),1561
4.	CEO Greed, Corporate Social Responsibility, and Organizational Resilience to Systemic Shocks [10].	Sajko, M., Boone, C., Buyl, T.	2020	Journal of Management Vol. XX No. X, Month XXXX 1 –36

Analysis of the content of the literature

The first article analysed concerns the disclosure of high-quality information under CSR to develop social resilience to exogenous shocks (Zahller et al. 2015). The authors of the promote and test the theory of social resistance to exogenic shocks. They assume that by disclosing high-quality information on corporate social responsibility (CSR), it is possible to achieve favourable organizational legitimacy, which in turn contributes to the emergence of social resilience to external shocks that are beyond the control of management. Perceived organizational legitimacy represents the perception by internal and external stakeholders of the company's goals and values as well as organizational activities, such as responsible use of limited resources, ethical treatment of employees and fair treatment of clients (Ayers 2014). Zahller, Arnold and Roberts (2015) define social resilience as: "the ability of human communities to cope with external shocks of social infrastructure, such as environmental variability or social, economic and political shocks" (Adger 2000).

Blacconier and Patten (1994) and Jonsson et al. (2009) also examined organizational resilience in a community context. They developed and tested the theory of social resilience using an online experiment involving 100 experienced, non-professional investors. The study manipulates two components of the quality of CSR information disclosed: accuracy and completeness. This study aims to answer the question of how high-quality voluntary disclosure of information about CSR by an enterprise can lead to economic benefits for the enterprise that discloses it.

Before designating the target research group, the researchers conducted a detailed study of 623 potential investors. The candidates had to solve the initial test and answer the control question. After this stage, 186 potential participants were rejected. In the next stage, three more difficult control questions were asked. As 322 investors did not answer at least one question, their participation in the study was abandoned. For the remaining 115 potential participants, the time in which they answered the control questions was analysed in order to examine their involvement in the task. 14 participants whose time was the shortest were excluded. One answer was rejected randomly, leaving a sample of 100 experienced, unprofessional investors who were divided into 4 groups.

The experiment consisted of two parts. In the first, participants were informed that they inherited 10,000 shares in a large company, Dryad Forestry, dealing mainly in the production of wood. The company was listed on the New York Stock Exchange. Participants received basic information about the company and economic and financial statements, as well as an excerpt from the Dryad Sustainable Development Report, which included manipulation of accuracy and completeness. After reading the entire documentation, the participants were asked to provide their assessment on the quality of investment in the company and the reliability of the report on sustainable development. At the same time, participants were instructed to assess the stability and comfort of investment as well as the integrity of the management. In the second part of the experiment, investors learned that six months had passed, during which the industry scandal that caused the shock. The company was not directly involved in the scandal, but it affected the economic results of the entire industry. Participants had the option of transferring any portion of their shares in Dryad to an indexed investment fund linked to S&P 500. Investors were asked to reassess the quality of their investments following the crisis and to estimate the time needed for Dryad's partial and full recovery of net lost income after the external crisis, as well as the maximum time that would be needed for a partial and full recovery.

The manipulated variables that scientists use to test the quality of voluntarily disclosed CSR information are the accuracy and completeness of that information. Measurement variables are two hidden structures: perceived organizational legitimacy and social resilience. Organizational legitimacy is reflected in the credibility and transparency of information disclosed by investors, as well as perceived organizational stability. All elements are

measured on a Likert scale from 1 to 7. Social resilience is examined by investors perceiving whether the company will survive an external shock and will continue to be a good investment in the future. Measured with descriptive questions on a Likert scale from 1 to 7. Divestment is measured using a position asking for the percentage of shares that a participant would transfer to a market indexed investment fund after an industry crisis. This measure aims to capture immediate volatility and perceived risk.

The results indicate that the quality of disclosed information on CSR affects the perceived organizational legitimacy, while obtaining a higher organizational legitimacy promotes the emergence of social resilience, which helps to prevent or minimize the decline in the market value of the organization in the event of an external shock. The path factor between the structure of legitimacy and the structure of social resilience was significant and positive (path factor. 865, $p = 0.002$). Drawing conclusions from the study, the authors suggest that the disclosure of high-quality information about CSR signals the respect of enterprises for social norms and stakeholders. Enterprises gain the trust and loyalty of stakeholders by showing the beneficial intentions of management and accurate and complete reports on CSR activities. Disclosures regarding CSR focus on reports on the organisation's goals and processes as well as results in terms of their impact on the environment and social well-being. Reporting focuses on outcomes and non-economic goals that are often indirectly related to financial performance through their impact on other factors such as reputation, perceived resourcefulness and credibility. Thanks to this, in the event of a decrease in the company's financial results, stakeholders are able to accept unfavourable information and support the company's operations. The quality of disclosed information on CSR indicates whether the organization is aware of its responsibility towards the environment and society. Detailed reporting and disclosure of a wider range of activities, in particular those that produce less desirable results, favours the perception of a higher quality of CSR activities. Accuracy means the verifiability and integrity of reporting, which is reflected in both the correctness and completeness of the information disclosed. Completeness covers a number of areas related to non-financial results, including environmental performance, employee health and safety, diversity, relationships with local communities, and product quality. Researchers indicate that more resilient organizations should better cope with investors withdrawing from financing their operations and recover from their pre-crisis condition faster.

Other researchers, Ortiz-de-Mandojana and Bansal (2015) in their publication entitled “The long-term benefits of organizational resilience through sustainable business practices” escribe social and environmental practices (SEP) as organizational activities that have a positive impact on society by improving the company's impact on the social and natural environment. SEP activities may include community relationships, diversity, employee relationships, human rights, product quality and safety, and environmental and corporate governance practices. SEP practices can be treated as corporate social responsibility (CSR) activities. In this article, Ortiz-de-Mandojana and Bansal (2015) assume that social and environmental practices (SAPs) help companies identify and seize long-term opportunities, as well as mitigate threats, which contributes to their resilience. The authors examine the relationship between social and environmental practices and OR hypothesize that SAP practices result in lower financial volatility, stronger economic growth and better survival rates in the long run. Ortiz-de-Mandojana and Bansal (2015) also analyse whether social and environmental (SEP) practices related to sustainable business development contribute to both short-term results and also OR. They define organizational resilience as "the company's ability to sense and correct inappropriate adaptation tendencies and to cope positively in unexpected situations." The analyses carried out in the article show that enterprises with strong SEP compared to those with low SEP show greater stability, because they can better predict threats and, if necessary, avoid those threats that will harm their financial results. According to the authors, SEPs stimulate the growth of enterprises through the ability to capture information from the environment that is crucial for their development (Nicholls-Nixon, 2005). Resilient organizations are better at acquiring and maintaining important resources needed for development, e.g. employees. Ortiz-de-Mandojana and Bansal (2015) believe that SEPs form a set of flexible resources through which organizational resilience is supported. Such resources include, but are not limited to, employees, suppliers and the company's reputation. Loyal employees who feel that the company invests in them and appreciate them will be able to adapt their working hours or remuneration to the emerging needs of the organization, especially during the crisis (MacDuffie 1995). In addition, employees of thriving companies are usually highly motivated and involved in organizational changes needed for development (Shin et al. 2012; Branco and Rodrigues 2006). Ortiz-de-Mandojana and Bansal (2015) are of the opinion that SEPs improve survival by buffering interference and reducing its vulnerability to the negative effects of the crisis. Also, thanks to social and environmental practices, enterprises become more flexible, which means that they can adapt their activities to changes in the environment much faster and at lower costs than competitors.

The authors also ask in the publication whether a compromise can be made between short-term gains and long-term resilience. They indicate the need to invest in projects and technologies that may initially generate higher costs, negatively affecting short-term profitability, but are conducive to increasing flexibility and the ability to respond to

changes in the environment, which contributes to building OR in the long term. Close monitoring of operations and disclosure of information (Gelb and Strawser 2001), employee training, achieving high quality products and investing in security (Darnall and Edwards Jr 2006) can be included in such projects.

Ortiz-de-Mandojana and Bansal (2015) show that enterprises that use responsible social and environmental practices, compared to a carefully selected control group, have lower financial volatility, higher sales growth and a better chance of survival over a period of 15 years. The authors say that the short-term approach to SEP differs from the resistance-based approach. Social resilience is not about reacting to a one-off crisis, but about continuous anticipation and adaptation (Hamel and Välikangas 2003). Scientists put 4 hypotheses in their article, which they then test in their study. Hypotheses 1,2 and 3 refer to a long period. They assume that Companies with high SEP rates experience less financial volatility (1), experience higher growth (2), have higher long-term survival rates (3), and have lower profitability in the short term compared to their peers. The authors argue that SEP practices build organizational resilience, which contributes to less volatility, strong organizational growth, greater chances of survival in the long run, and lower profitability in the short run. Researchers are testing support for hypotheses using t-tests, ANOVA and survival analysis. In order to select the research sample, the researchers used the Social Index KLD 400 and financial information from the Compustat North America database of the company, which in 1991-1993 used social and environmental practices. Enterprises were selected from the sectors represented by at least 10 companies, obtaining a sample of 195 companies. Then, from a database of 1,782 companies that are part of individual sectors, those with a high probability of being included in KLD and having the company's headquarters in the United States were selected to match them as controls for the sample with high SEP. After identifying all the data about the company needed for the study, 121 matched pairs (242 companies) were finally identified, the results of which were examined over 15 years in the years 1994–2008. Ortiz-de-Mandojana and Bansal (2015) identified several variables, using, the impact of social and environmental practices on organizational resilience in the long run was analyzed. They used rate of return on shares to measure financial volatility, covering 180 months from January 1994 to December 2008. Market data for 22 pairs was not available, which is why these analyzes were carried out only for 99 pairs (198 companies). Long-term growth was measured as the accumulation of net sales growth in 1994-2008. The authors generated a variable 0-1, indicating whether an adverse event such as a merger, acquisition, liquidation or bankruptcy occurred in business operations (1 if it occurred, 0 if it did not). All these events are associated with a lack of immunity, because they represent a significant change in the basic function and structure of the company. The time variable shows the number of business survival years from the starting point t0 = 1994 to the final observation period t15 = 2008. A scale of 0-1 was also used to identify companies in pair, a value of 1 was for companies with a high SEP, while a value of 0 corresponded to their control companies. Short-term profitability is measured by the variable ROA between two consecutive years. At the same time, the authors examined that the practices that led to building OR, including SEP activities, resulted in less financial volatility for companies using SEP compared to their counterparts. DesJardine, Bansal and Yang (2015) also stated that US companies that have invested in strategic social and environmental practices have experienced less shock and recovered faster than their peers after the 2008 crisis. In addition, the study showed that enterprises that use social and environmental practices are developing faster in the long run than enterprises that are less sensitive to issues related to SEP. Analysis of SEP in comparison with the value of net sales indicates that companies with a high SEP ratio are able to attract more customers than their peers and therefore ensure a proportionally greater market share, which also affects OR building. The authors did not find support for the hypothesis that enterprises with a strong SEP would have lower short-term results than control groups. They considered that this result is due to the short-term benefits that SEP also creates, e.g. a reduction in resource use, which improves short-term profitability. Lack of support for H4 is consistent with previous empirical studies, for example Margolis and others (2009).

Another of the selected articles focuses attention not only on the general stakeholder group as previously described work, but also includes the analysis of individual stakeholder groups. The authors Lv, Wei, Li and Lin (2019) assessed the impact of CSR on the company's results in the long term and examined how CSR associated with individual groups of stakeholders affects the organizational resilience of the company. As the definition of organizational resilience, Lv, Wei, Li and Lin (2019) accept: "the company's ability to cope positively with environmental and operational turmoil through long-term, better sales growth and financial instability". In the article, the authors present CSR activities in six dimensions, namely general CSR, shareholder, employee, business, society and the environment, and then separately examine their impact on the organization's resilience. Lv, Wei, Li and Lin (2019) analyse the impact of CSR on organizational resilience on the basis of a large sample of non-financial enterprises from China, active in 2010 - 2017. The authors obtained information on the CSR activities of Chinese enterprises mainly from the Kinder, Lydenberg and Domini databases (KLD), which provides international

assessments of the results of socially sensitive enterprises that Chinese listed companies have been required to publish. Researchers selected a group of companies from China for the study, because the Chinese market is characterized by unstable regulatory conditions, unstable industrial structure and intense competition, appearing along with the rapid development of the economy. These factors mean that Chinese enterprises are struggling with greater uncertainty in their environment and are more sensitive to changes, which is why they must particularly take care of their organizational resilience.

In the first stage of the study, scientists studied the literature published so far on the concept of organizational resilience, which contributes to high growth and low variability of the company's results over time. Then they formulated hypotheses regarding the impact of six dimensions of CSR on organizational resilience and tested them based on reports from Chinese companies.

Scientists conclude that interaction with stakeholders based on good relationships resulting from CSR activities is necessary to build OR. The core of the relationship between a resilient organization and its external environment lies in trust and reciprocity. Thanks to this, enterprises will be able to identify changes in the environment more effectively and obtain the necessary resources and support during the crisis. The important role of CSR in building organizational resilience is manifested in two aspects, namely mechanisms for increasing efficiency and securing results. The authors put forward 12 hypotheses related to six dimensions of CSR in the context of their impact on long-term growth and stability of financial results.

To confirm the hypotheses, the authors measured dependent variables, which are long-term growth and financial volatility. These variables characterize the organizational resilience of the enterprise. Long-term growth is measured by the accumulation of net sales growth over 3 years. Financial volatility is measured by the variability of return on shares. Independent variables that are characteristic of the six analysed CSR dimensions were also introduced into the study model. The variable values came from the Hexun CSR database. In addition, the authors introduced several control variables. They evaluated the ratio of the market price to the book value affecting the company's long-term results (Feltham and Ohlson 1995). They also used the Herfindahl-Hirschman index (HHI) to take into account the concentration of industry. The indicator aims to show whether the company is not a monopolist on the market, thanks to which they can maintain stable results (Ahmed at al 2014). To identify secured financial resources for possible turmoil in the environment, the authors checked sales and administrative costs, leverage and cash flow (Andersen 2012). The last control variable was the assessment of the political nature of the enterprise.

Research results indicate that involvement in CSR activities can improve the company's long-term growth and reduce its financial volatility. CSR activities help the company build its reputation and deepen social foundations. Thanks to this, companies can obtain appropriate resources and support from their stakeholders, which allows to mitigate the negative effects of system shocks, crises and threats (Ortas et al. 2014) and create opportunities for business initiatives (Ortiz-de-Mandojana and Bansal 2015). In addition, the good reputation provided by CSR contributes to increasing customer satisfaction (Singh 2016; Wand et al. 2015), which in turn affects the perceived organizational legitimacy that Zahller et al. (2015) mentioned. The authors find support in the thesis of Pal at al. (2014) that "a deep social foundation along with goodwill, brand awareness, network relationships can act as a mask that protects an organization against sudden negative events and provides its necessary time to absorb shocks and take appropriate action". Researchers say that an enterprise that engages its shareholders through CSR activities will show greater innovation. Innovation is widely recognized in the existing literature as a necessary way to achieve organizational resilience, because they can absorb and even take advantage of environmental changes by developing new opportunities (Sabatino 2016). Shareholder CSR can significantly reduce financial instability by acting as a shock absorber during a crisis and by gaining access to additional financial resources to support business operations (Gunasekaran 2011), however the research shows that this activity has relatively little impact on long-term growth.

The study indicated that CSR activities related to employees are very important in building organizational resilience. These activities include ensuring a safe and comfortable work environment, a high level of investment in remuneration and employee benefits, education and care for emotional involvement, so as to equip employees with the competences necessary to deal with environmental changes (Demmer et al. 2011; Lengnick-Hall et al. 2011). Employee CSR can bring positive and pro-innovative behaviour at work, which ultimately contributes to increased productivity (Shen, and Benson 2016). In addition, the authors note that resilient organizations involve their employees in an emotional way, thanks to which they can encourage employees to respond flexibly to environmental changes and help them identify threats faster (Wisse et al. 2018). Instead of striking or giving up work, employees in resilient organizations can demonstrate collectively commitment and cooperation, and be motivated to generate new ideas and implement various ideas that will strengthen the company's results during a

crisis. Thanks to CSR activities related to employees, organizations can strengthen long-term development and reduce financial instability caused by external shock.

The authors noticed a particularly positive impact of CSR activities on organizational resilience in the context of the business environment. Research indicates that establishing relationships with business partners, customers and suppliers, and even competitors contributes to the creation of a network in which an enterprise can obtain information, knowledge and resources from the market, and thus effectively identify and meet changing environmental needs (Wisse et al. 2018; Zhang et al. 2016). This information resource has a beneficial effect on long-term development and maintaining financial stability. Research results confirm the hypothesis presented in the article that CSR activities related to the business environment have a significant, positive impact on organizational resilience.

CSR practices related to the natural environment are actions taken by the organization to improve the environmental impact of its business activities. Reduction of dependence on natural resources, reduction of carbon dioxide emissions and pro-ecological activities makes enterprises more flexible and competitive. Companies can build a "green image" and then win public favour. Investing in CSR related to the natural environment increases investor confidence, which has a significant impact on organizational resilience.

The role of CSR related to society in building OR consists mainly of creating social reputation arising as a result of the company's charitable activities. Charity can significantly increase a company's value, strengthen its development, and gain the trust of customers (Shan et al. 2017). Positive emotions displayed by the society towards the company may contribute to alleviating the negative effects of external events. However, studies conducted by the authors show that CSR connected with society does not have a significant impact on the long-term growth of the company, which may be due to social awareness not educated in China.

Lv, Wei, Li and Lin (2019) created a publication that comprehensively shows the impact of corporate social responsibility in the context of various stakeholders on building organizational resilience. The authors argue that relationships with employees and close business environment (customers, suppliers) have the greatest impact on building OR.

Sajko and Boone (2020) in their publication investigates how the greed of CEOs affects companies' position on CSR before the global financial crisis (GFC) of 2008 and how these actions determine the organizational resilience of enterprises to systemic shocks and economic crises. The definition of greed is the "pursuit of excessive or extraordinary material wealth" (Haynes et al. 2017). Researchers are investigating whether companies with greedy CEOs and limited investment in CSR are also less resistant to environmental disturbances and how these pre-shock activities contribute to the stability and flexibility of the company in the post-shock period and thus play an important role in creating resilient organization. Scientists theorize that investments in CSR contribute to increasing the organisation's resilience in two ways. First of all, CSR helps to build stability, creating interdependencies and relationships between the company and its stakeholders, thanks to which it is possible to absorb shocks faster. Secondly, corporate social responsibility activities increase flexibility because companies with broad stakeholder involvement gain access to diverse and distinctive viewpoints, thereby increasing the set of possible adjustments to external change (DesJardine 2019).

To examine the organizational resilience of enterprises, the authors compiled selected CEOs of US public corporations listed in the S&P 1500 index before the start of the global financial crisis (GFC) in 2008. Then they combined data collected from all sources, such as KLD, Compustat, Execucomp, BoardEx, CRSP and Thomson-Reuters Institutional Holdings, and then excluded observations with missing variables and enterprises from sectors with a high level of legal regulations (e.g. from the financial and public sectors). The key factor was the approval of the CEOs for a three-year observation in 2006-2008). The list of all sample search criteria for the study was distinguished by 301 CEOs covered by the study. Scientists assume that greedy CEOs will be more likely to neglect the needs of shareholders to maximize short-term profits (Haynes et al. 2015). The researchers also expect that the low investments of greedy directors in CSR will contribute to greater losses in the short term and are associated with longer recovery times after the financial crisis. The authors make several hypotheses, which they examine in three research stages.

Table 2: Research hypotheses put forward by the authors regarding the impact of CEO greed and CSR on organizational resilience

Part I of the study	
H1	ed of the CEO will have a negative impact on the company's CSR.
H2	The relationship between the company's greed and the company's CSR will be more negative if the greater part of the president's salary is an annual bonus.
H2b	The relationship between the president's greed and CSR will be less negative if the majority of the president's remuneration had a limited share in the shares.
Part II of the study	
H3a	The greater the company's social responsibility in the period before the shock, the smaller the fall in the share price after the shock.
H3b	The greater the general manager's greed in the period before the shock, the greater the fall in the company's share price after the shock.
Part III of the study	
H4a	The greater the company's social responsibility in the period before the shock, the shorter the recovery time and the smaller the shock.
H4b	The greater the general manager's greed in the period before the shock, the longer the time.

Sajko and Boone (2020) conducted a 3-stage study to check the validity of the hypotheses. The first stage aimed to investigate how the greed of CEOs affected CSR in the pre-shock period. The research period covered the years from 2003 to the rise of the financial crisis in 2008. This section covered 301 CEOs. The study was conducted by comparing the dependent variable, which is data from the KLD database, on such issues as community, diversity, employee relations, the environment, human rights and product quality with an independent variable, which is the model of the CEO greed measure and CSR measure developed by the authors. In the next stage, the authors examined how the greed of the CEO and CSR before the financial crisis affected the company's ability to absorb exogenous shocks. The observation lasted at the turn of 2018 and 2019. This part also covered the 301 CEO survey. The study was conducted by measuring the decrease in the company's share price as an absolute percentage change between the closing price just before the start of GFC in 2008 and the lowest closing price that the shares achieved over a period of 12 months. Then, the authors compared the results with the previously developed model of greed CEO and CSR. The final stage of the study was to analyze how CEO and CSR pre-shock greed affected companies' ability to build. The third part of the study was attended by 269 CEOs and they were followed in 2009-2011. The decrease in the number of CEOs surveyed resulted from a change in their position or the collapse of the company after the GFC crisis. The authors adopted the risk indicator as the dependent variable, representing the probability that the company would regain balance during t. The observation time was 36 months.

In the first part of the study, the authors showed that greedy CEOs are less concerned about the welfare of their company's stakeholders and tend to give up long-term investments that require short-term financial sacrifices, which confirms hypothesis 1. The results also confirm hypothesis 2a, saying that greedy CEOs are more likely to neglect stakeholder concerns when their remuneration is highly dependent on annual bonuses. At the same time, the study did not indicate that the relationship between the president's greed and CSR was less negative if the majority of the president's remuneration had a limited share in shares (H2b).

In the second part of the study, it has not been confirmed that the greed of the CEO or CSR affects the fall in share prices immediately after the crisis, which is the reason for rejecting hypotheses 3a and 3b. However, when assessing the impact of the dimension of individual stakeholders on company stability, the authors noticed that companies with strong diversification practices are associated with smaller decreases. This result partly overlaps with studies (DesJardine et al. 2019), which indicated that the impact of strategic CSR has a positive effect on the company's ability to absorb shocks. The inaccuracy of analysis and results may be caused by too few samples or independent factors, such as a decrease in customer purchasing power and the supply chain after the crisis.

In the third part of the study, the results showed that companies with greater involvement in CSR before shocks have a much greater chance of recovering faster. Stock prices of companies with strong relations with stakeholders

and CSR activities were associated with higher rates of economic recovery after the 2008 GFC, while companies led by greedy CEOs were less likely to rebound from economic shock. The authors emphasize that investing in CSR contributes to increasing organizational flexibility due to its positive impact on stakeholder motivation and greater interdependence between the company and its natural and social environment. The authors find support for hypotheses 4a and 4b.

Discussion and Conclusions

Main Conclusions

Analysis of the content found in the Scopus database of literature allowed to see the directions of research on the impact of CSR activities of enterprises on shaping their OR. Based on a study by Zahller, Arnold and Roberts (2015), it can be seen that even the way companies provide information about their corporate social responsibility activities can help build OR. The accuracy and completeness of CSR reporting generates the level of perceived legitimacy of enterprises. This means that the stakeholders, based on the quality of the shared report, generate trust and favour in the company's operations. Sharing both positive and negative company results gives stakeholders a feeling that the company is honest and committed to building positive relationships with the business environment. Thanks to this, stakeholders are able to respond in a less negative way to the negative effects of external crises and shocks affecting their related enterprises, as well as to share their resources, knowledge and information to help enterprises rebuild their position after the crisis.

In turn, Ortiz-de-Mandojana and Bansal (2015) indicate that social and environmental practices, which are part of CSR activities, can generate both short-term benefits and build long-term organizational resilience. SEP practices include community relationships, diversity, employee relationships, human rights, product quality and safety, and environmental and corporate governance practices. Research conducted on American enterprises shows that enterprises that have higher rates of SEP practices are willing to increase their economic development, reduce financial instability, and have better survival rates in times of crisis. SEPs should have a particularly strong impact on employees, suppliers and customers, building the company's reputation. SEP practices related to employees have a particularly strong impact on organizational resilience. Committed and motivated employees are able to respond faster and more efficiently to changes, and are also highly flexible, thanks to which they are able to adapt their working time and remuneration to emerging changes and dangers in the company's environment. Through activities for the benefit of the community and the environment, the company gains the trust and loyalty of customers, which contributes to strengthening financial stability.

Lv, Wei, Li, and Lin (2019) examined how CSR associated with specific groups of stakeholders affects the organizational resilience of Chinese enterprises. Similarly to the study of the Ortiz-de-Mandojana and Bansal (2016) way, CSR activities related to workshops and the business environment turned out to be the most significant. CSR activities related to shareholders, society and the environment also affect the achievement of organizational resilience by enterprises, but to a lesser extent than other groups of stakeholders. Researchers indicate that building good relationships with individual stakeholder groups, resulting from CSR activities, is necessary to generate OR. Like previous researchers, the authors assess organizational resilience in terms of its long-term development and financial results. Thanks to CSR activities for individual groups of stakeholders, enterprises are able to gather resources and information on market changes from various sources. This means that each group of stakeholders is able to support the company's operations in its own way during external shocks and increase organizational resilience. The authors approach the study of stakeholder influence in a more comprehensive manner than other scientists.

In the last of the selected articles, Sajko, Boone and Buyl (2020) present a special focus on the greed of the organization's management and its CEOs. They investigate how the greed of CEOs influenced companies' position on CSR before the global financial crisis (GFC) of 2008 and how these activities determine organizational resilience of enterprises to systemic shocks and economic crises. Greedy directors are characterized by their pursuit of excessive or extraordinary material wealth, usually over a short period of time. Studies show that the CEO's greed has a negative impact on CSR activities and on building organizational resilience. The authors emphasize that the essence of building OR is investing in technologies that will negatively affect the company's profitability in the short term, but in the long run will contribute to better response to system shocks and better identification of threats. Scientists recognize that greedy directors attach less importance to taking care of relations with stakeholders

through CSR activities. These relationships are key to achieving OR because they generate access to information and other resources that may be strategic when trying to overcome the crisis.

Limitations and further research directions

In order to select articles for analysis that address the issues of both CSR activities and organizational resilience, we have deliberately narrowed the search criteria for articles in the Scopus database, resulting in 4 articles. This limitation was intended to thoroughly penetrate the issues raised due to the existing gap in the research on the relationship between CSR and the resilience of organizations and to show the actual activities of enterprises in this area. Detailed reviews of selected articles confirm the importance of the organization's resilience in the context of CSR, especially in the sphere of responsibility for results and financial stability. In addition to the Chinese company survey, other articles referred to the general stakeholder group without differentiating between the different types of stakeholders. Although research has shown evidence showing the impact of CSR activities on specific aspects of business operations, it has not been indicated how to conduct these activities. Researchers raise the benefits of corporate social responsibility in the context of organizational resilience, but do not instruct on how to achieve these benefits. In future research, it is worth considering the operationalization of ways to build organizational resilience using CSR, including all groups of stakeholders, going beyond financial issues. It is worth analysing the internal relations in the enterprise, because they have a strategic impact on building OR. It seems reasonable to examine the role of organizational culture and HRM as potential moderators in shaping relevant organizational values and engaging employees and other stakeholders in order to better prepare them to absorb external shocks. No less important is the extension of CSR practices in the context of greater attention to individual mental and physical resistance of employees. From a medical point of view, immunity means the body's ability to actively and passively protect the body against harmful external factors. We care about the body's resistance from the inside, using a proper diet and supporting ourselves with supplements and vitamins. From the organization's point of view, building its resilience should start from the inside of the company, which also includes the internal life of employees. Medical vitamins and supplements mean relationships with stakeholders as well as important resources and information from outside the organization. Therefore, enterprises should constantly strengthen organizational resilience to avoid external crises as far as possible or to pass through them in the shortest possible time, with minimal losses. It is also worth seriously to examine the organization's activities, including in the field of CSR, which could strengthen the individual physical and mental resistance of employees. Given the current time of the coronavirus pandemic, building organizational resilience of enterprises with the help of CSR seems to be not only an urgent need, but an obligation that is difficult to downplay in the context not only of the current but above all the future condition of enterprises struggling with the global crisis. In connection with the above, the author has already started work on the preparation of the project regarding the development of the concept of social organizational resilience.

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The Influence of Organizational Changes on Technology Strategy Development: Case Study of Global Corporations[1]

Olga SHVETSOVA*
School of Industrial Management, Korea University of Technology and Education, South Korea
*Corresponding author: shvetsova@koreatech.ac.kr

Mokom BRENDA
School of Industrial Management, Korea University of Technology and Education, South Korea
mokomanyim@yahoo.com

Introduction

The major objective of any business is to satisfy its customers so when customers are changing, a company must learn to adapt. Change comes the opportunity to learn and prepare your work team adequately for new growths. Employers must assess the skills and tools their employees already have and look for gaps. Organizational change management is an event or program that an enterprise plans to initiate, which will cause significant disruption to their daily activities. The key challenge is reducing possible friction and resistance to change by making sure all employees understand the importance of change to the company's forthcoming growth. And, ignoring the need for change can be far more threatening to your business than the change itself.

Nowadays, new trends and technology evolve so quickly that if you don`t update, you will slip behind. So, customers' needs will continually change. Communication is faster and businesses that can't deliver quickly will lose out. To enhance organizational change management by person, group and the corporation as a whole, Wu (1984) offered practical techniques using several interventions for promoting needed changes. Three models of organizational change have been proposed by Lewin (1951): unfreezing, changeover and unfreezing again. If the change must be done, the first job is to "unfreezing", gradually softening and resolving rooted concepts; next, using them to be the basis of new approaches that you can proceed to "changeover" by these new approaches. Lippit, Watson and Wesley (1958) had ever expanded Levin's organizational change Models and classified to four sections:

1. Necessary requirements for change;
2. A certain relationship of change;
3. Strict Implementation measures of change;
4. The maintenance of steady change and
5. End of aid relationship.

The reasons for resistance are demand for security, habits and misunderstanding, which are big obstacle to change. Therefore, it is necessary to think how to reduce obstacles by: encouraging employees' participation and views, recognition and support for employees, more training courses, mutual communication and mental incentives to reduce obstacles. Lewin (1964) proposed five major interactive constructs for change, respectively, organization-wide change, transformational change, personnel change, unplanned change and remedial change.

Literature Survey

Types of Organizational Changes

With organizational change strategies, companies can avoid stagnation while minimizing disruption. However, one can't prepare without knowing what type of change is occurring. The first step is to understand what change management model exist and then figuring out what best suits your company or team.

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Organization-Wide Change: Organization-wide change is a large-scale transformation that affects the whole company. This could include restructuring leadership, adding a new policy, or introducing a new enterprise technology. Achieving a successful organization-wide change demands comprehensive planning and communication throughout the organization.

Transformational Change: This specifically targets a company's organizational strategy. Companies that are best suited to withstand rapid change in their industry are quick, flexible, and prepared to transform their game plans when the need arises (Kritsonis, Alicia 2004-2005).

Personnel Change: This happens when a company experiences hyper-growth or layoffs. It is important to display genuine compassion and motivate employees to continue working hard through difficult times.

Unplanned Change: It is typically defined as necessary action following unexpected events. By setting basic change strategies in place for these situations, organizations can minimize these unplanned risks and emerge as more adaptable and resilient.

Remedial Change: Leaders implement remedial changes when they identify a need to address deficiencies or poor company performance.

Factors affecting business strategy development

From literature analysis, 11 major implementation factors were identified: strategy development, environmental uncertainty, organizational structure, organizational culture, leadership, operational planning, resource allocation, communication, people, control and outcome. Kazmi (2008) grouped these factors into three activities: activating strategy, managing change and achieving effectiveness. Further, Alamsjah (2011), Jiang and Carpenter (2013) listed the following factors as important dimensions in technology strategy development: degree of uncertainty, clarity of strategy, organizational structure, corporate culture, CEO and top management involvement, people's competencies and commitment, knowledge management, managing change, performance management, communication and development plan. The focus of this research is on the internal factors of organization changes strategy development.

What is technology strategy?

Technology Strategy is that aspect of strategy which is concerned with exploiting, developing and maintaining the sum total of the company's knowledge and abilities. It centers on the knowledge and abilities that affirm that the core of a company is what it knows and what it can do, rather than the products that it has or the markets it serves (William L. Shanklin and John R. Ryans 2015). Developing a strategy will force a company to step back from analysis of its market position and the things it sells. Getting firms to focus on technological strategy requires complementary action from the demand and supply sides. For global corporation, the pressure to improve technological strategy has to be increased through greater trade liberalization and relaxation of internal regulatory constraints to competition.

Research

Hypothesis, Background and Research Questions

Technological strategy is likely to be consistent with organizational changes, so it is expected that technology strategy will be acceptable for global corporations that focus on different strategies (Neally et al., 2001).

Hypothesis 1: The organizational changes in a global corporation will affect the technological strategy in the global corporation.

Conversely, in technology strategies where integration and simplification between functions are required, there is a possibility that low performance will have a negative adjustment effect on technological strategy (Fredrickson, 1986).

Hypothesis 2: The relationship between the technology strategy and organizational changes will be adjusted according to low performance of the corporation.

In terms of organizational changes and innovation convergence, organizations seeking innovation with new missions will have a positive adjustment on technology strategy (Burns and Stalker, 1961).

Hypothesis 3: The relationship between organization changes and technology strategy will be adjusted according to the new mission of the corporation.

Organizations tend to focus on familiar and repetitive processes, making them relatively stable, and requiring more satisfaction. High levels of satisfaction are likely to reduce the negative impact of changes on technology strategy (Nealie et al., 2001).

Hypothesis 4: The relationship between organization changes and technology strategy will be adjusted according to the level of satisfaction of the corporation.

In addition, considering the existing argument that technology strategy is a leadership activity for an entity's business areas and processes (Baines et al., 2009; Garcia & Calantone, 2002; new leadership will positively support technology strategy.

Hypothesis 5: The relationship between organization changes and technology strategy will be adjusted according to the new leadership of the corporation.

Conflicts are considered to be an inevitable part of an organizational change. It is suggested that the potential functional consequences of conflicts can work as a driving force and facilitator during the change process (Chenhal et al., 2011).

Hypothesis 6: The relationship between organization changes and technology strategy will be adjusted according to the conflicts in the corporation.

Do internal organizational changes influence the technology strategy in a global corporation?
What organizational change challenges and barriers are faced by global corporations (figure 1)?

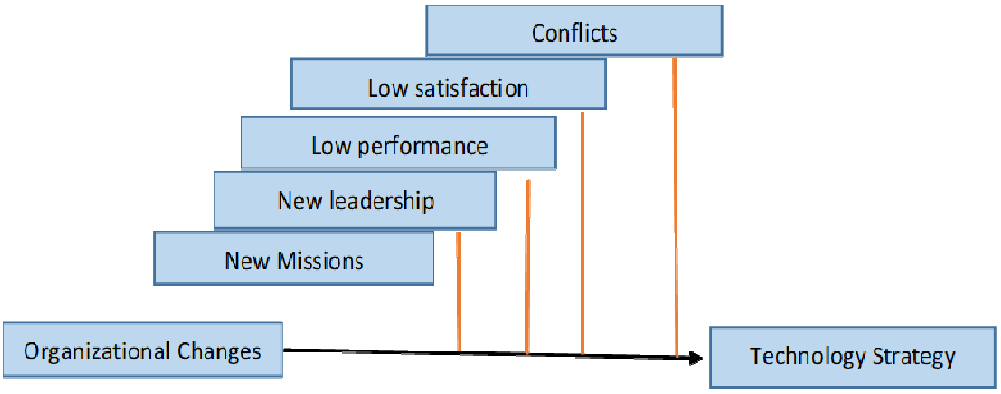

Fig. 1: The moderating effect of Internal Organizational Changes
Source: made by authors

Case study and Statistical Data

These days, the automobile corporations' sector has become an increasingly competitive one. The environment is more dynamic, uncertain and continuously changing. These circumstances forced automobile companies like Hyundai Motors (a Korean based corporation) and Innoson Vehicle Manufacturing (a Nigerian based corporation). Although the later produces copies of original products to be launched at patent expiration, both corporations adopt more effective, unique and innovative strategies to maintain and improve their performance and to gain a larger portion of the world market share.

Methodology and Data Application

In this study, the dependent variable is "Technology Strategy", and the variance in the dependent variable is explained by the independent variable; organizational changes.

To investigation the influence of organizational changes on technology strategy development, the data is collected via an internet survey. With the use the structural Equation Model and the Change Management Model, this thesis examines the moderating impact of the internal forces of organizational changes on technology strategy development. It suggests that internal forces have a significant influence on the relationship between organizational changes and technology strategy development and that new missions and new leadership have a significant positive impact on the relationship between organizational changes and technology strategy.

Results

Under technology strategy, high levels of satisfaction and low level of conflicts has a significantly negative impact on Technology strategy. These results can reduce the flexibility and agility of organizational changes when it places too much emphasis on procedures and norms under technology strategy. The further results are going to be discussed.

Conclusion and discussion

Firstly, Technology strategy development is characterized by bureaucratic regulations in global corporations. Bureaucratic regulations consist of strict orders, contractual arrangements and the manipulation of the employee's autonomy. In this top-to-down hierarchical managing system, new vision was not well communicated or explained to the employees and little attention was paid to creating a suitable climate.

Secondly, duress and manipulation were used too much in the change process and the intrinsic values and emotions of the employees were neglected. The strategy for reducing resistance was simply pressure (Alt et al., 2003).

Thirdly, the employees were not properly empowered and involved in the change. During the planning stage, managers rarely involve employees in deciding how to handle changes. Moreover, no effective incentive system was created for those afraid of the future after the change to help them maintain confidence (Lang et al., 2006).
In order to support corporate success better, corporate communication should be closely linked to a company's overall strategy (Argenti, 2003)

Given that this study simultaneously examines the five organizational changes, further empirical work should be done to provide clear evidence for each change.

In the future, a study can be conducted among new leadership in organizations undergoing changes. The questions can focus on how leaders' function during the change process and the outcome of their efforts. It will be helpful to ask them to clarify whether their efforts are successful or not in implementing the changes, and to explain the reasons behind the success or lack of success. Besides, their evaluations of their work in the process of technology strategy development and their own opinions on how to improve and what to improve and how contribute in facilitating organizational changes.

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How to Strengthen Accounting Transparency For? Small and Medium - Sized Enterprises[1]

Olga SHVETSOVA*
School of Industrial Management, Korea University of Technology and Education, South Korea
*Corresponding author: shvetsova@koreatech.ac.kr

Yun Beom CHOI
School of Industrial Management, Korea University of Technology and Education, South Korea
choiyb96@koreatech.ac.kr

Abstract

This study seeks to find ways to reduce accounting transparency among unlisted small and medium-sized enterprises (SMEs) and strengthen them. Korean accounting transparency increases internationality at the mid- to low-income level every year after year. Transparency in accounting will affect the information environment and capital costs of companies, ultimately serving as an important factor in Korea discount, and furthermore, it is an important issue directly related to Korea's international credibility. Research is needed to solve these problems, but the preceding study mainly developed the accounting transparency index or provided policy guidelines to improve it on the premise that the accounting transparency of our country is low.

In order to enhance the overall level of accounting transparency in Korea, it is necessary to grasp the actual state of accounting transparency of not only listed companies but also unlisted small and medium-sized enterprises and devise measures to improve them. Therefore, the purpose of this study is to identify the factors that impede the accounting transparency of small and medium-sized enterprises in Korea and to suggest measures to enhance their accounting transparency

Keywords: accounting transparency, SME, South Korea, strengthen methods and recommendations.

Introduction

This study seeks to find ways to reduce accounting transparency among unlisted small and medium-sized enterprises and strengthen them in Korea. Korean accounting transparency is international at the mid- to low-income level every year. Transparency in accounting affects the information environment and capital costs of companies, ultimately serving as an important factor in Korea discount, and furthermore, it is an important issue directly related to Korea's international credibility. Research is needed to solve these problems, but the preceding study mainly developed around the accounting transparency index or policy guidelines to improve it on the premise that the accounting transparency level of Korea is low. Non-public enterprises have a relatively small number of external stakeholders, which means less confidence in their management performance, and it is managed by practical owners rather than professional managers, which is likely to lead to more arbitrary intervention in accounting policy decisions.

In addition, major corporate decisions are concentrated on one owner, making little effort to ensure transparency in corporate accounting information, and the level of supervision and regulation by policy authorities is relatively low for them. For this reason, it is highly likely that unlisted companies will be left in a blind spot for accounting transparency as they are more widely adjusted to protect their owners' private interests than listed companies.

According to the 2019 status index, small and medium-sized enterprises account for 99.9 percent of the total number of companies and 90.2 percent of the total number of corporate workers in Korea, making up not only a large portion of the nation's national economy, but also increasing the importance of small and medium-sized

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enterprises by participating in various areas to restore market functions and increase income distribution and jobs. Given the importance of these small and medium-sized enterprises, so far, most of the research on accounting transparency has been biased toward listed companies. In order to enhance the overall level of accounting transparency in Korea, it is necessary to grasp the actual state of accounting transparency of not only listed companies but also unlisted small and medium-sized enterprises and devise measures to improve them.

Therefore, the purpose of this study is to identify the factors that impede the accounting transparency of small and medium-sized enterprises in Korea and to suggest measures to enhance their accounting transparency.

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Literature Review: Status of Small And Medium Enterprises

The Role and Importance of Small and Medium Enterprises

The Framework Act on Small and Medium Enterprises (since 2016) stipulates basic matters of initiatives to foster small and medium enterprises. Subject to this support project are small and medium-sized enterprises, which are called small businesses. Small and medium enterprises refer to enterprises prescribed by statutes for protection and fostering, and the scope standards for small and medium enterprises are prescribed in detail in Article 2 of the Framework Act on Small and Medium Enterprises and Article 3 of the Enforcement Decree of the same Act (since 2017).

According to the general standard of small and medium enterprises, the total number of industrial enterprises in Korea are presented in Table 1.

As shown in table 1, there are 3.6 million companies in 2019. Among them, 3.6 million SMEs account for 99.9 percent of the total number of businesses and 15.12 million workers, accounting for 90.2 percent of the total number of workers.

Table 1: Status of Small and Medium Enterprises (2019)

Division	All	SME	Major Company	Importance	
				SME	Major Company
Number of Businesses	3,604,773	3,600,882	3,891	99.9%	0.1%
Number of Employees	16,774,948	15,127,047	1,647,901	90.2%	9.8%

Source: The Organisation for Economic Co-operation and Development (OECD), 2020

These days, the business environment of small and medium-sized enterprises is in a difficult situation due to sluggish domestic demand, rising unemployment, foreign trade issues and several U.S. interest rate hikes. The internal environment is also noisy due to measures to resolve polarization between large and small companies and the minimum wage and welfare of workers. The minimum wage for 2018 was set to rise 10.9 percent from 7,530 won per hour to 8,350 won per hour by 2019. Under these circumstances, small and medium-sized business managers are finding it difficult to do business due to the burden of labor costs, and unemployed people are paying full attention to policies to create jobs and expand employment. However, the economy lives only when small and medium-sized enterprises live. In other words, it is also small and medium-sized enterprises that are reviving our economy.

Small and medium-sized enterprises are formed around manufacturing industries, so they do not have sufficient capital power according to Damanpour, F. (1992). Since it is established mainly in provincial areas rather than large cities due to its poor size and facilities, it plays a big role in the development of local communities and maintains relationships with large companies and suppliers by processing and delivering parts of products produced by large companies. Small and medium-sized enterprises play a key role in further developing win-win relationships by linking products produced by new research and development with large companies through relatively low costs and rapid decision-making.

Concept of Accounting Transparency

The financial and foreign exchange crisis represented by the 1997 IMF economic crisis prompted Korea to re-recognize the international community's demand for transparency in accounting information and accounting standards. Since Korea's small and medium-sized enterprises account for a very high proportion of the domestic economy, their credibility will be lost if accounting transparency is not guaranteed, making them unable to hope for stable corporate growth. It will also receive negative reviews from the international community on its accounting transparency, raising the cost of raising corporate capital. Accounting transparency reduces information asymmetry between an entity's internal managers and external stakeholders, thereby helping stakeholders make economic decisions and contributing to the efficient allocation of economic resources.

Transparency is maintained when information is pre-examined, objective and easy to understand, without concealing suitable and reliable information in relation to the recording and disclosure and predictability of information.

The IMF (Segev, 1998) defined transparency as a process that makes information accessible, visible, and understandable about existing conditions, decisions and behaviors, and said that factors such as timeliness, completeness, continuity, risk management, audit and control should be included.

Factors affecting an entity's accounting transparency can be classified into four categories (Wells, 2005). First, accounting information transparency is divided into information contents, information disclosure, and information use aspects, and second, accounting system transparency is divided into internal control systems, information systems, accounting organizations and audit systems. Third, managerial transparency is divided into corporate governance and corporate management fairness, and finally, transparency of management consciousness is divided into management philosophy and corporate culture, social responsibility performance, resource allocation decision criteria, and stakeholder respect.

Lee Sang-Wook and Chang, W. (2016) defined accounting transparency as a condition that makes the accounting process and accounting information unquestionable by fully disclosing the accounting process and accounting information when delivering accounting information to users of accounting information. In order to achieve accounting transparency, not only the contents of accounting information but also the process of accounting must be disclosed to the extent that it is unquestionable.

Kang Dong-Kwan and Jung, J. (2016) summarized the economic losses caused by accounting opacity in three ways: First, opacity deprives foreign capital of its chances of attracting domestic capital by undermining the nation's credibility, and secondly, distorts tax flows by preventing corruption such as bribery, and thirdly raises capital costs. Therefore, accounting transparency is the most important part of corporate transparency.

Lowering Factor of Accounting Transparency

We know that internal and external confidence in corporate accounting is low, but we have a long-standing practice. The efforts to set new standards run into the interests of vested interests, making it difficult to ensure success, but it is very important to instill faith in the success of the reform in those who think that change is necessary for accounting reform to succeed.

The revision of the Act on External Audit (2018) introduced groundbreaking systems such as the designation system for regular auditors, the external audit system for internal accounting management, and the registration system for auditors for listed companies, and these new systems must be operated according to their original purpose in the field to gain confidence in reform. To this end, we should also take a closer look at whether there are any problems with supervision, external audit behavior, and the way the company's governance structure works with a broader and longer perspective Sinnett W.M. and de Mesa Graziano C. (2006).

According to Lee Sang-Wook (2009), the Office PriceWaterhouse Coopers (PWC) selected five factors of corruption, legal system, economic policy, accounting and regulation that could affect the overall opacity of the country in January 2001 and calculated the opacity index for each sector, and then averaged these indices to publish the overall opacity index of each country. The opacity index consists of five sub-indexes, which are simple averages of the opacity index. As for the double accounting sector, the survey was conducted by dividing it into factors related to the opacity of accounting standards, the opacity associated with compliance with accounting standards,

and the uncertainty associated with the accessibility of financial information, and Korea ranked 31st out of 35 countries included in the survey, especially in accounting.

According to the Financial Supervisory Service, as of 2016, 89 or 66 percent of 133 companies subject to supervision were caught for accounting violations, including accounting fraud (figure 1). The share of companies caught in accounting fraud in the total supervision companies rose from 48.1% in 2011 to 66% in 2016 (Jose Daily, 2018)

Fig. 1: Companies sanctioned for accounting fraud, 2012-2016
Source: Financial Supervisory Service Annual Report, 2017

The capital procurement routes of small and medium-sized enterprises can be divided into indirect financing and direct financing, indirect capital procurement routes are divided into bank loans, guarantee agencies and government policy funding, and direct capital procurement routes are divided into issues of stocks and corporate bonds. More specifically, the typical method is to provide loans based on the guarantee letter from the guarantee agency and loans from financial institutions based on the company's collateral or credit, general investors and creditors through the issuance of policy funds and stocks and corporate bonds supported by the government. Bank loans (65.9%) are the highest in each funding path, followed by policy funds (26.5%), loans to secondary financial institutions (3.4%), and overseas borrowing (1.6%). They argued that the higher the credit rating and the larger the size, or the greater the growth after the start-up, the higher the proportion of bank loans, and that small and medium-sized enterprises with lower credit ratings or smaller credit ratings use secondary financial loans and private loans (Shin Sang-Chul 2012).

As shown in Figure 2, the biggest difficulties in financing through financial institutions were high loan rates (44.2%), followed by demanding loan screening (31.8%), excessive demand for real estate collateral (19.4%), credit guarantee-oriented loans (16.3%), and lack of loan limits (15.5%). In addition, sales slump was the highest at 62.7 percent, followed by increases in raw and subsidiary materials (54.7 percent) and delays in collecting sales proceeds (30.7 percent).

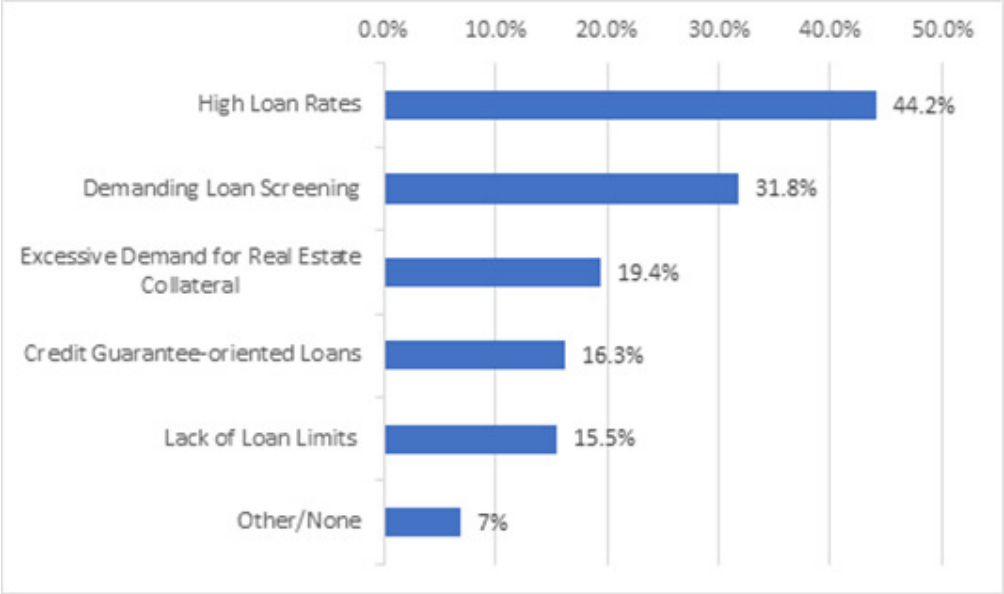

Fig. 2: Difficulties in Financing through Financial Institutions

Source: http://www.fss.or.kr/fss/kr

Methodology: measures to strengthen accounting transparency

Improvement of Internal and External Environment

In the case of small and medium-sized enterprises, the smaller the size, the stronger the governance structure of the managers (Lee Sang-Wook, 2009), and as a result, the more influential the managers are in making decisions, such as exercising full authority, so the will of the managers is most important than anything else to strengthen accounting transparency. Poor awareness of managers is a factor that hinders efficient operation in the process of growing companies, and it is necessary to provide education to managers on management improvement.

According to Lee Sang-Wook (2009), among the many reasons why the preparation of false financial statements by managers, despite being responsible for making financial statements transparent, is that punishment for accounting fraud has been too lenient and there has been a lack of control over managers' discretion. It was also argued that small and medium-sized enterprises are still accounting to benefit from the extension of loans by financial institutions, increase of interest on loans, and decrease of interest on borrowing, and that many small and medium-sized enterprises are still not separated from ownership and management, and that small businesses are more likely to commit accounting fraud if they are immoral, so managers should take the lead in enhancing transparency of corporate accounting through proper judgment.

In order to instill in managers a willingness that securing accounting transparency can be beneficial, not loss, to the company, incentives such as granting additional points when participating in government-funded projects and financing through the financial sector are needed. In addition, when exporting overseas, foreign countries consider corporate accounting transparency important, and it is believed that government-level support should be expanded to attract many overseas investments by emphasizing this part.

Lack of Personnel and Strengthening the Internal Management System

Small and medium-sized enterprises have a small number of accounting staff and are doing other tasks at the same time, so a support system for manpower reinforcement should be established. As such, smaller companies in the internal environment use corporate expenses for the purpose of individual needs, and efforts to enhance corporate transparency are needed. For example, the entity's own efforts should be made to break away from past practices through accounting education, such as withdrawing personal expenses spent on family events from corporate bank accounts, handling non-work-related overseas airfare, hotel expenses, and personal donations.

Other ways for corporate managers to enhance transparency are to have an internal accounting management system that sets the division of duties of accounting-related executives and employees. Compared to large companies, small and medium-sized companies have relatively insufficient manpower and resources and value the performance of their operations rather than internal management, so the possibility of accounting irregularities such as embezzlement of executives and employees still exists, and the size of the company is not large, which affects the existence of the company.

Therefore, if you look at the main checkpoints that the management of small and medium-sized enterprises will check for internal control in order to prevent accounting fraud on cash and deposits, the first thing is that the fund manager and the accounting manager must separate them and control them internally through the division of duties. Second, due diligence on cash and checking the balance of bank accounts are also required without prior notice. Third, unused accounts, such as dormant accounts, are easily omitted from internal management and can be used for cheating, so they are immediately terminated. Fourth, when making cash withdrawals, control the transfer of accounts after obtaining approval from the manager. Fifth, keep separate bankbook, corporate card, seal, securities, etc. Sixth, change the work so that it is not responsible for the same task for a long time. Finally, the company will use external audits as an opportunity to check its financial status.

The introduction of the internal accounting management and control system by unlisted or non-externalized small and medium-sized enterprises will also help increase tax revenues due to transparency in accounting and tax sources. Therefore, the government needs benefits such as subsidies or tax deductions for preferential treatment for those selected for tax audits and consulting expenses spent on establishing an internal accounting management system.

In addition, the development of a company is based on the basics of human resources and the company's system from a small scale.

Based on this, the company's size and internal pool of documents grow together. The size of the company grows because if the internal workforce or system is not supported, it will hinder its efficient operation in the future.

Improvement of Consignment Work Outside

The reality is that small and medium-sized entrepreneurs with no accounting knowledge or low interest lack a deep understanding of their financial statements as they are committed to management activities for survival. For this reason, there are many hidden roles in the job of the audit agent, such as presenting reference materials and reminding them when the accounting managers of the company are weak and lack of their accounting knowledge, and maintaining transparency in accounting by explaining and persuading business owners and executives who do not understand. However, it is no exaggeration to say that most small and medium-sized enterprises are entrusted with accounting books, which hold the key to accounting transparency, and that some tax accountants and accountants prepare financial statements to meet the client's needs rather than transparent ones due to intensifying competition in accounting transparency.

Kim Ki-Young (Professor at Myongji University, South Korea) is also an external auditor and a company's request to prepare financial statements on behalf of the company.

An environment for harsh advice should be created, and auditors in practice cannot point out proper problems such as the company's request for proxy preparation of financial statements, he added, "Because of the nature of the current free-standing system, the auditor cannot make bitter remarks to the company that is a customer," adding, "If these problems are fundamentally improved, the company's financial statement preparation capacity will naturally improve." (Jose Daily, 2017).

Heo Kwang-Bok (2012) says, "For example, a system that grants certain responsibilities to accounting experts who are entrusted with accounting work and prepares a system that allows them to expand their work by selecting agents for bad bookkeeping and selecting representatives for sincere books when they are found to be responsible for accounting. “

Improving Small and Medium-sized Enterprises' Capital Procurement

To address difficulties in financing small and medium-sized companies, credit guarantee agencies operate promissory note guarantees and promissory note insurance systems in line with the promissory note system. The

promissory note insurance system was introduced by the Korea Credit Guarantee Fund in 1997 and is a system in which small and medium-sized companies pay insurance money when bills are processed by signing up for a bill that they provide goods, etc., and such a system serves to prevent small and medium-sized companies from falling into bankruptcy due to the occurrence of a bill default.

The bill system had many problems (for example, not accurate transactions), but from April 6, 2014, not only existing companies subject to external audit but also corporate operators with assets of 1 billion won or more at the end of the previous business year were required to issue electronic bills only when issuing promissory notes, so paper bills were not allowed to be issued. As a result, the number of people who are required to issue electronic bills has increased compared to past paper bills.

However, if a company provides collateral or guarantees of debt for others by company assets or promissory notes, sometimes external audit inmates are required to record future contingent liabilities in their audit reports as annotations, but small and medium-sized companies that are not subject to external audits do not have any special sanctions, which may cause concerns over their accounting transparency.

On the other hand, when a company becomes underfunded due to a sudden bankruptcy, from the perspective of a business executive, the promissory note guarantees and trade receivable insurance schemes are not the solution. Due to problems with trade receivables insurance, the effect is limited to some entities, and the effect is limited to some entities, and insurance policies are screened for high-value notes that are difficult to cover due to concerns or anxiety over the occurrence of outstanding bills, but sometimes due to misjudgment, there is no default on insurance bills, and even when the bill is uninsured, there is no default on the draft insurance policy.

In addition, the current promissory note insurance system, in which the premium rate is calculated according to the credit rating of the promissory note issuer, is burdened with high insurance fees.

Refer to table 2 and since the amount of promissory note exchanges decreased by 43.6% in 2017 compared to 2011, the current promissory note system, which includes many problems, should be improved and activated, or the policy authorities should study the substitute bill in various ways to prevent fraudulent accounting to facilitate loans through temporary financial pressure, such as reducing the bill system and preparing guarantee products.

Kang Man-Soo and Bae Jin-Sung (2017) should first implement the abolition and reduction of the bill system as a way to improve financial practices for small and medium-sized enterprises, and although the bill has various net functions through the method of corporate financing, there are also adverse effects such as one-sided promissory note practices by large companies or delayed payment between consignment and business transactions.

It is necessary to contribute to the liquidity of small and medium enterprises by transferring technology to the private sector after the establishment of a specialized institution for liquidating small and medium enterprises' financial expansion system and success case. In the short term, it is necessary to maintain the current promissory note system, and to develop a bill substitution system such as the stipulation of the expiration of the bill and the improvement of interest payment arrangements, and to successfully lead it, it is deemed necessary to absorb the bill into the products related to the credit guarantee agency (Kang Man-Soo, 2017).

Table 2: Bill Default Rate and Number of Bankrupt Companies

Division	2011	2012	2013	2014	2015	2016	2017
Bill Exchange (Billion)	5,301,061	4,341,082	3,771,402	3,178,251	2,774,317	2,513,820	2,311,919
Bill Default (Billion)	5,688	5,169	5,238	6,023	4,636	2,66	3,431
Bill Default Rate (%)	0.1	0.1	0.1	0.2	0.2	0.1	0.2
Number of Bankrupt Companies	1,359	1,228	1,001	841	720	555	494

Source: Kang Man-Soo, 2017

41.2% of the respondents requested real estate security as a source of difficulty in financing through financial institutions. Therefore, financial and guarantee institutions will make fraudulent accounting to facilitate borrowing from financial institutions in order to improve property collateral or sales-oriented backward lending practices, so financial institutions will need to make efforts by financial authorities to evaluate related financial performance and introduce index for mutual growth in the financial sector as a means of improvement, and to resolve difficulties by providing temporary factors such as loan and discount of bills and loans are temporary factors.

In the United States, Lee Jae-Yeon (2014) considers the adequacy of the business's cash flows and the nature of its managers as the most important factors in reviewing loans to small and medium-sized enterprises. The same happens in Korea. First of all, a loan is made when the size of the cash flow is sufficient to repay the principal and interest of the loan and, given the nature of the management, the willingness to repay is strong. These financial institutions are also demanding as much collateral as possible, but not 100 percent of the principal amount of the loan, so it is not absolute in deciding whether to borrow, and the types of collateral vary from account receivables to inventory assets. In the future, domestic financial institutions also need to establish credit rating models for blue-chip small and medium-sized enterprises and individuals by first evaluating borrowers' ability to repay their debts and supplement their credit risk using collateral or guarantees, considering that collateral or guarantee-oriented lending practices may negatively affect not only themselves but also the borrower and the domestic economy. In addition, for small and medium-sized enterprises and the working class who lack public information such as financial statements, there will be difficulties in applying the credit rating model, so the ability to evaluate repayment ability through rigorous business feasibility assessment and the ability to evaluate repayment will have to be enhanced considering various qualitative information such as the nature of the borrower.

As such, it was argued that the review of loans taking into account business feasibility and follow-up management aimed at collecting loans through business success would prevent borrowers from borrowing recklessly and increase the likelihood of business success rather than raising the lending threshold of financial institutions, thereby providing an important competitive edge in protecting borrowers small and medium-sized enterprises and the working class and ensuring the soundness and profitability of financial institutions in the long term (Lee Jae-Yeon, 2014).

Conclusion

As of 2019, small and medium-sized enterprises account for 99.9 percent of the total 3 640 industrial businesses in Korea, and the number of workers in small and medium-sized enterprises accounts for 90.2 percent of the total number of workers, which not only accounts for a very high proportion of the national economy, but also has a very large job creation effect. As a result, the growth of small and medium-sized enterprises will soon raise the status of the nation and be directly linked to national income. In order to foster small and medium-sized enterprises as healthy enterprises like this, we need to work together to strengthen accounting transparency and grow into sound enterprises.

The lack of eradication of SMEs' failure to properly reflect information to report their management performance to outside agencies is largely attributable to the uncertainty in accounting, which has so far become a practice. For this reason, small and medium-sized enterprises of a certain size or smaller have fewer stakeholders in financial information and relatively lower accounting reports and disclosure obligations than large companies, resulting in insufficient voluntary efforts to enhance accounting and managerial transparency.

In addition, the lack of the accounting capacity of the small and medium enterprise itself prevents it from being accounted for by the entity itself and makes it difficult for the financial institution to question its reliability, which in turn leads to distrust in the financial statements and adversely affects the measurement of the entity's creditworthiness. We looked at ways to enhance the accounting transparency of small and medium-sized enterprises by improving the problems of the bill system, the alternative bill system and the lending practices of financial institutions.

As a way to strengthen accounting transparency in this regard, first of all, small and medium-sized enterprises have a strong governance structure due to their high share ownership, and due to this phenomenon, managers exercise full power in decision-making, so it is important to secure transparency will of managers. It is necessary to expand government-level support such as granting additional points to government-backed projects or granting benefits to small and medium-sized companies when they export overseas as incentives to do so.

Second, the managers of small and medium-sized enterprises are interested in self-esteem through employee education and focus on their tasks without parallel to other tasks, which leads to long-term work, which in turn leads to the growth of the company's professional workforce. Therefore, the burden of labor costs for small and medium-sized enterprises is reduced through policies for the promotion of employment support or employment promotion support, not short-term, and the introduction of the internal accounting management system requires the provision of benefits such as subsidies or tax deductions for consulting expenses spent on the establishment of the internal accounting management system.

Third, most small and medium-sized enterprises entrust the tax agency with reporting and acting for the ledger, sometimes failing to reject the company's unreasonable demands for the evasion of the law, and the opposite phenomenon may cause the captain's agent to encourage the evasion of the law. Thus, accountants and tax accountants hold an important key to accounting transparency, and some tax accountants and accountants need policy government measures in the reality of preparing financial statements in accordance with the client's needs rather than transparent ledgers as competition in the accounting work intensifies. For example, a system that grants certain responsibilities to accountants or tax accountants who are entrusted with accounting tasks on their behalf will ensure efforts by outside accounting experts to ensure transparency.

Fourth, if small and medium-sized enterprises receive voluntary external audits, they can be given tax exemption benefits as preferential measures, reduced external audit costs such as tax credits, or directly supported measures such as tax credits, and the government pays part of the audit costs in a price-subsidized manner similar to the project to support consulting for small and medium-sized enterprises, and, as another alternative, interlinked with the existing tax investigation system so that external audits can take charge of preliminary tax audits.

Fifth, in the past, businesses disappeared countless times. However, it is now more resistant to bankruptcy protection, and it is easier to track the source of funds or the whereabouts of money than in the past due to the computerization of financial institutions and companies. It is believable that this was effective due to the introduction of the real-name system. Authors agree that the nature of the bill is the same as the past or present, and that there are many difficulties in solving the problem of the bill. However, related agencies should take the lead in resolving the capital procurement problem of small and medium-sized enterprises by improving the problematic bill system or activating the bill stand system.

Sixth, it is not easy for small and medium-sized companies to secure funds due to complicated documents and demands for collateral from companies with weak collateral when applying for loans to financial institutions to raise capital. It is necessary to supplement credit risk by using collateral or guarantee after first assessing the borrower's repayment ability by establishing a credit rating model for blue-chip small and medium-sized enterprises and individuals by breaking away from mortgage or guarantee-oriented lending practices.

Some of the limitations of this study are as follows: First, the discussions of this study are limited to unlisted small and medium-sized enterprises subject to external audit and non-external audit, and it is too much to generalize for listed corporations exceeding this category. Second, in order to enhance the practical contribution of the results of this study, further analysis of the computational system will have to be made because it cannot be addressed in this study even though it has a very significant effect on accounting transparency research. This study was conducted on the basis of statistical data and open data resources developed in various disciplines, and we hope to continue multi-pronged and continuous research on unlisted small and medium enterprises in the enterprise in the future.

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The Female Entrepreneur
Case Study: Start-Up in Romania

Cristina Elena BIGIOI

Politehnica University of Bucharest, Bucharest, Romania
cristina.dumitru@upb.ro

Maria Nicoleta CRISTEA

Politehnica University of Bucharest, Bucharest, Romania
maria.cristea@upb.ro

Abstract

Entrepreneurs are an important part of the economy. They allow the development of goods and services. Lately, more and more people are trying to develop a personal business, giving up the job they had, or at the same time with the job that ensures a stable income.Entrepreneurship has also developed among women internationally. The position of women is becoming more and more important, the need for her involvement in public life and in the management of organizations being necessary and undisputed.The present study follows the evolution of the winning companies of a competition regarding the granted subsidies, companies that have as associate a woman. The study shows that very few of the 21 companies have managed to achieve performance in the 5 years since they received a small financing in the form of non-reimbursable funds.

Keywords: Female Entrepreneurs, Performance, Non-Reimbursable Funds

Introduction

The presence of entrepreneurs in the economy has the effect of creating and offering goods and services and creating jobs. The activity carried out involves various taxes and duties that represent revenues for the state. Being an entrepreneur is not easy. It is much easier to be employed.

Women's motivations to join business life ranged from opportunity to necessity, the first including the desire to turn a hobby into a business, to exploit a market opportunity, while the latter referred to the lack of market flexibility. work or inability to adequately fulfill both roles - of mothers and employees. For men, being an entrepreneur is a business strategy. For women, it's a life strategy (Noble, 1986).

Because of their many obligations and roles, many women give up their ideas and do not want to try to enter the business independently. In addition, there are many other factors that influence female entrepreneurship: the influence of national wealth, social status and perception, institutional factors, family life, economic and property inequality, age, employment status, education, and personal income.

In Romania at present the presence of women in the structure of associates represents approximately one third. Thus, women are associates / shareholders within legal entities, respectively carry out economic activity in the form of Authorized person (PFA) or as a member in an Individual enterprise (II) or Family business (IF). The distribution by gender of the associates / shareholders of active legal entities and of the holders / members of PFA / II / IF is shown below (Fig. 1). The companies registered in the Trade Register that have not declared their suspension of activity and are not in any of the states that can lead to the loss of legal personality are considered active, from a legal point of view.

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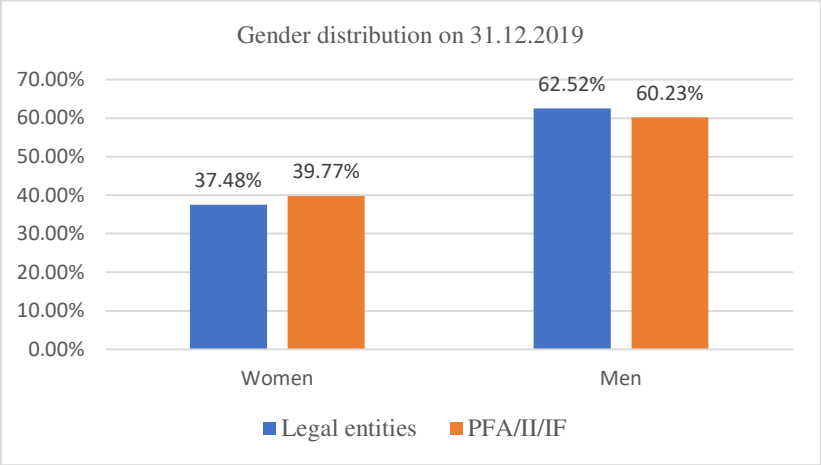

Fig. 1 : Gender distribution on 31.12.2019

Source: Own processing of the data extracted from ONRC.ro

On 30.09.2020 the share of women in the total number of associates is approximately equal to that registered at the end of last year (Fig. 2)

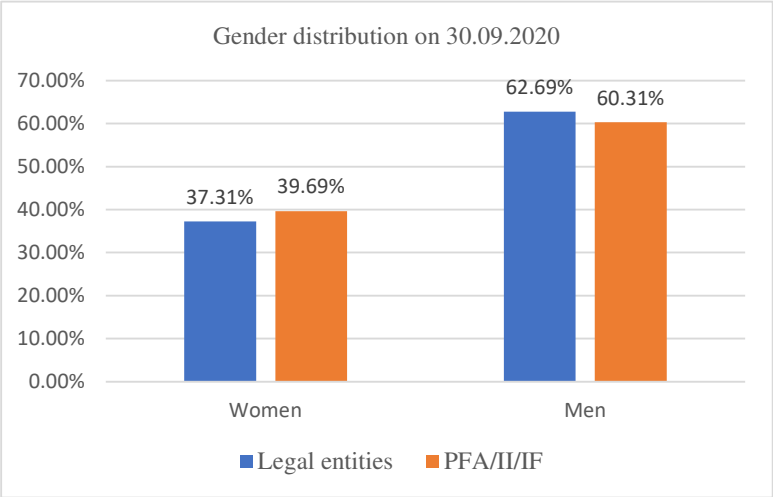

Fig. 2 : Gender distribution on 30.09.2020

Source: Own processing of the data extracted from ONRC.ro

Unilever conducted a study in 2018 on gender equality in startups. 61% of women in startups do not think there are enough female role models, crucial at the ideas stage before a startup is even founded. Funding was one of the most challenging barriers when starting up. Gender discrimination is the main factor causing investors to finance women-led start-ups. Women complain about marginalization during dating and inappropriate treatment when they question inequality between women and men.

A study done by TinyPulse in 2017 found that startups with female founders tended to grow faster, possibly because more diverse workforces are consistently found to lead to better results.

The present study follows the evolution of some companies founded by women in Romania who benefited from non-reimbursable funds through the Female Entrepreneur program, by winning the competition launched in 2015.

Literature Review

In recent decades, the number of companies created or driven by women throughout the world has experienced significant growth.

Brush (1992) has reviewed 57 articles presenting empirical research on women business owners. The discussion concluded that women business owners are similar to males across some basic demographic factors, problems, and business characteristics, but they differ widely from male business owners across individual dimensions related to education, work experience, skills, approach to venture creation/acquisition, business goals, problems, and performance. It is suggested that the major reason for these differences is that women conceive of their businesses differently than men which in turn leads to different approaches and outcomes for performance. When a woman starts or acquires a business, the set of business relationships are "integrated" into her life.

Vasile (2014) observes that over time women have demonstrated leadership skills based mainly on communication, encouraging expression and orientation towards people, which differentiates them from men who are more task-oriented, delegated and leadership companies with three or more women in top management positions performed better than companies without women in such positions in the case of 9 criteria of excellence: leadership, vision, responsibility, coordination and control, innovation, external orientation, capacity, motivation, work environment and values.

Ahmet et all (2019) analyzed the woman as an entrepreneur in Turkey and find that having an entrepreneur(s) in the immediate family was a powerful coping strategy. Entrepreneurship was almost perceived as a family legacy for some women. Women use this class anxiety to break away from patriarchal family roles, adopting various tactics in realizing their strategy.

Cuevas si Gutierrez (2008) have observed that the differences in the characteristics and qualities of women entrepreneurs compared with men affect the behavior adopted by the former. This has been related to the different perception of every gender on the obstacles and opportunities for the development of business activity, as well as their business motivations. Women face difficulties in accessing financial resources. They adopt a business management style that is based on cultural and social values different from those of men. While women generally prefer a “transformational leadership” style, oriented towards people, and based on interpersonal relationships, men develop a leadership style oriented towards task and structures, which is supported by hierarchical and commanding relationships. Businesswomen measure the success of the business by criteria other than the strictly economic ones that are related to the reasons that determined them to create a business.

Verheul, Van Sten and Thurik (2004) find that female and male entrepreneurship are largely influenced by the same factors in the same direction. A remarkable exception is life satisfaction for which they find a positive impact on female entrepreneurship and no impact on male entrepreneurship. Another striking result of their study is the positive effect of life satisfaction on the number of female entrepreneurs, which is contrary to what is argued in the ‘social legitimation’ perspective. Hence, life satisfaction may be an important policy issue for governments aiming to stimulate female entrepreneurship.

Pandey and all (2013) studied the women entrepreneurs from developed and developing countries and they concluded that women entrepreneurs all over the world practice conventional entrepreneurship. Women more often tend to choose business due to flexibility of time and financial security. In developed countries in particular women see business as an opportunity, not a means to fulfill the basic necessities of life. Women world over do not have easy access to top management position.

Through a study conducted in 7 countries, Ifempower (2018) identified the most common and typical challenges that women entrepreneurs face when setting up and running their companies:

- ✓ employee status did not offer sufficient career prospects
- ✓ the need to be bold enough to start a business
- ✓ loss of job
- ✓ the purpose of some female entrepreneurs is to provide a solution to a problem they have personally encountered, to fill a gap
- ✓ to make real changes in society instead of working for a larger organization,
- ✓ flexibility and improving work-life balance
- ✓ appreciating individual freedom and independence
- ✓ lack of capacity to reintegrate on the labor market after maternity leave.

Gogus and all (2015) analyzed the annual 'Turkey's Woman Entrepreneur Competition' and suggested that, contrary to its overt objective of empowering women entrepreneurs, the competition can be considered to subjugate women, and reaffirm and naturalize the dominant, masculine entrepreneurship discourse.

Ramadani (2015) believes that it is necessary to implement programmes that will directly aim to improve the financial environment and provide a variety of financial instruments and impetuses that will assist women in running their businesses, because investors and banks are often reluctant to finance start-up businesses run by women, since they involve a certain degree of risk. Lack of financial support is a major problem faced by women entrepreneurs. Management capabilities that women entrepreneurs in Albania possess are related to the abilities to achieve solid communication with individuals, to generate and realize ideas and formulate goals, plans and policies, followed by their successful implementation.

Bigioi and Bigioi (2017) analyzed the diversity of management in Romania and found that the companies selected respect partially the principle of diversity. The presence of women on boards is only 25% of all members. There are some companies with a board composed exclusively of men, but no one company has only women. Regardless of the origin of the share capital, women have the same low representation.

Research Methodology

Romanian women entrepreneurs in the small and medium enterprises sector had the opportunity to win through competition non-reimbursable funds for the financial support of the businesses in which they were shareholders / associates. We will analyze the companies that won the Women Manager competition, launched in 2015.

The conditions to participate in the competition were:

- the company must have at most 3 years from the registration in the Trade Register at the date of opening the online registration application;

- at least one of the partners must be a woman and hold at least 50% of the shares of the company in the case of applicant micro-enterprises, or

- the representative of the authorized natural person (PFA) / individual enterprise (II) that carries out economic activities, to be a woman.

19 applications were submitted. The budget allocated to this program was low. Each winner could benefit from a maximum of 50,000 lei, representing 90% of the value of the investment that the beneficiary company had to make, the remaining 10% of the investment had to be covered by the beneficiary.

21 companies were declared winners of the competition.

The list of winners is available on the fonduri-structurale.ro website, which mentions DIMMMAT as a source. In this list are mentioned 2 companies out of the 19, which had not yet signed the contract at the date of publication (DIMMAT is the Department for small and medium enterprises, business and tourism)

We considered financial information for 5 years, from 2015-2019. The data were collected from the website www.mfinante.ro, data that are included in the financial statements submitted by the company according to the legislative requirements.

Of the 21 companies, for one we did not find financial information for any year (most likely the company's financial statements were not submitted); for 1 company a declaration of inactivity was submitted, and another did not have financial data available for the last year. Thus, we subjected 19 entities to the analysis.

Each entity is denoted Si, where i € {1, 19}.

The research was conducted in the following stages:
- the data was selected
- the data was been grouped according to specific objectives
- the data was processed

- the results were centralized
- the results were analyzed and interpreted
- the conclusions were drawn.

The methods by which this analysis was performed, were: investigation, identification and interpretation.

Results of the study

We analyzed for companies the indicators: turnover, profit, ROA, ROE, degree of indebtedness.
The evolution of **the turnover** is represented in figure 3.

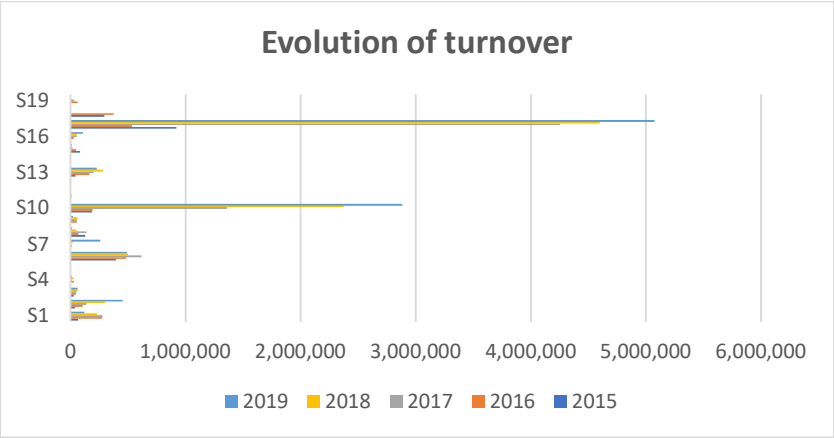

Fig. 3: Evolution of turnover

Source: Own processing of the data extracted from www.mfinante.ro

Regarding the turnover, it is observed that there are 3 companies that did not make any sales during the 5 years.

There are companies S10 and S17 that managed to obtain a significant profit compared to other entities. Moreover, they managed to achieve higher sales from year to year, S10 has a turnover in year 5 15 times higher than that obtained in the first year.

Considering **the profit** obtained, the 19 companies had the following evolution (Fig. 4):

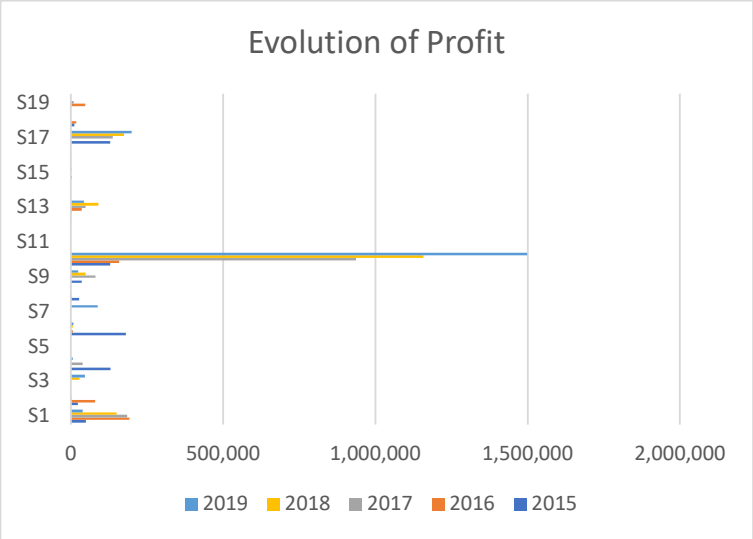

Fig. 4: Evolution of profit

Source: Own processing of the data extracted from www.mfinante.ro

There are 3 companies that fail to make a profit in any of the 5 years.

Considering this indicator, the same company stands out, S10 which not only has the highest turnover and growing, but also manages to cover its total costs based on sales. This way you get the highest profits. S10 manages to make a profit from year to year, the last year records a profit 11 times higher than in the first year. S17, the company with a very high turnover, is in second place in terms of profit evolution. In the last 2 years analyzed, S17 has the highest profit, after S10, but in 2019 S10's profit is only 13% of S17's profit.

As activities, the company S10 carries out Other support services activities for enterprises and the company S17 carries out Wholesale of fruits and vegetables.

Return on equity (ROE) is a measure of financial performance calculated by dividing net income by shareholders' equity. ROE is considered a measure of how effectively management is using a company's assets to create profits.

ROE= Net income/ Shareholders'equity.

Most investment books recommend an ROE of at least 15%.

We calculated ROE for the last analyzed year, 2019, as the 5th year from the date of winning the competition (Fig 5).

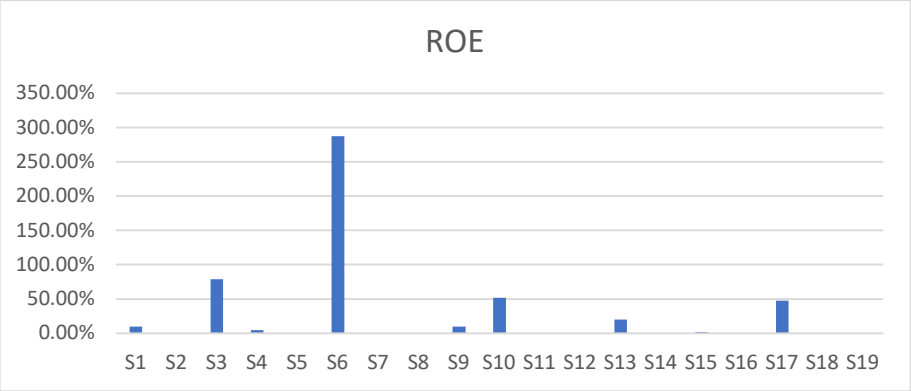

Fig. 5: Value of ROE for the winners of the competition

Source: Own processing of the data extracted from www.mfinante.ro

9 out of 19 companies have a positive ROE, 5 of them have an ROE of over 15% (ie 26% of the companies surveyed). The S6 company stands out from the point of view of this financial performance, but it achieves this indicator due to the losses of the previous years, a situation that makes the net profit to be higher than the own capitals. The S10 company has an ROE of about 52%.

Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings. The ROA figure gives investors an idea of how effective the company is in converting the money it invests into net income. The higher the ROA number, the better, because the company is earning more money on less investment.

ROA= Net income/ Total assets

Values for ROA are mentioned in figure 6

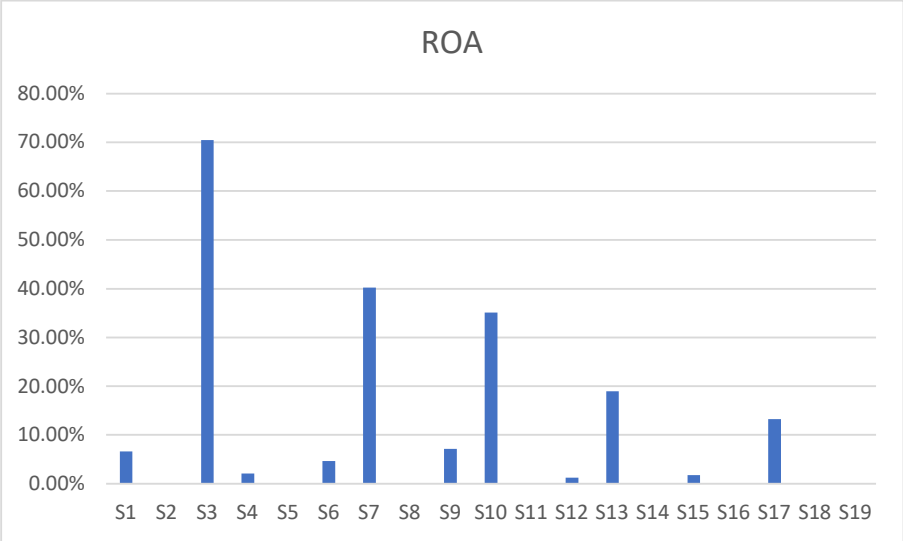

Fig. 6: Value of ROA for the winners of the competition

Source: Own processing of the data extracted from www.mfinante.ro

From the point of view of the ROA indicator, 11 companies have a positive ROA. The S3 company has the highest value in 2019. The S10 company ranks third with 35% ROA.

The total debt ratio divides the total liabilities with the total assets. It shows the proportion of the assets that are financed with debt (Fig 7).

Total debt ratio =Total liabilities/ Total assets.

It is generally considered that a degree of indebtedness of less than 60% is very good and reflects a long-term balance between internal and external sources of financing.

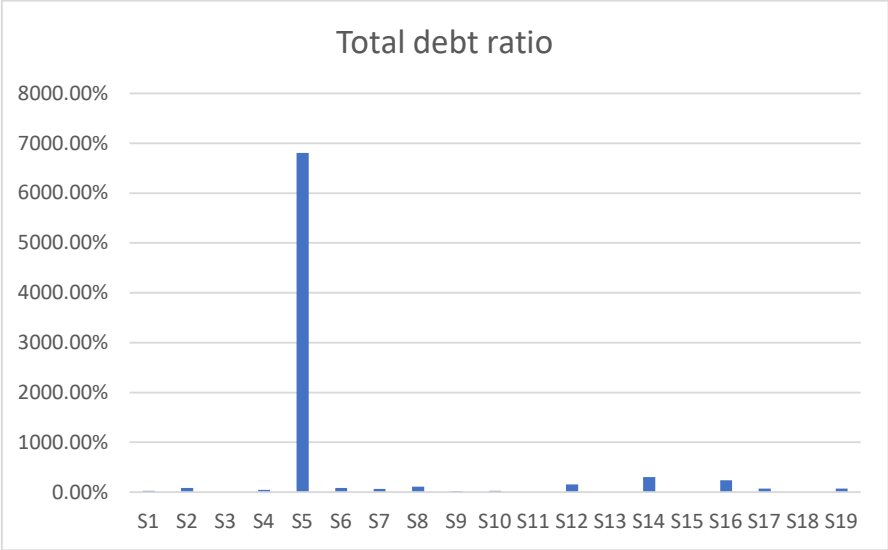

Fig. 7: Value of total debt ratio for the winners of the competition

Source: Own processing of the data extracted from www.mfinante.ro

The S5 company has a very high degree of indebtedness, due to extremely low value assets. The S10 company has a 31% degree of indebtedness. 7 companies have a degree of indebtedness below 60% and 5 companies have values over 100%.

We defined the **function P(i),** P(i)= pi1+pi2+pi3+pi4+pi5, i={1;19}

pi1=1 if the turnover increases in 2019 comparated to 2018

pi2=1 if the the company i makes a profit in 2019

pi3=1 if ROA in 2019 >20%

pi4=1 if ROE in 2019 >15%

pi5=1 if total ratio debt is <60% and >0

The values of this function for each companies are shown in figure 8.

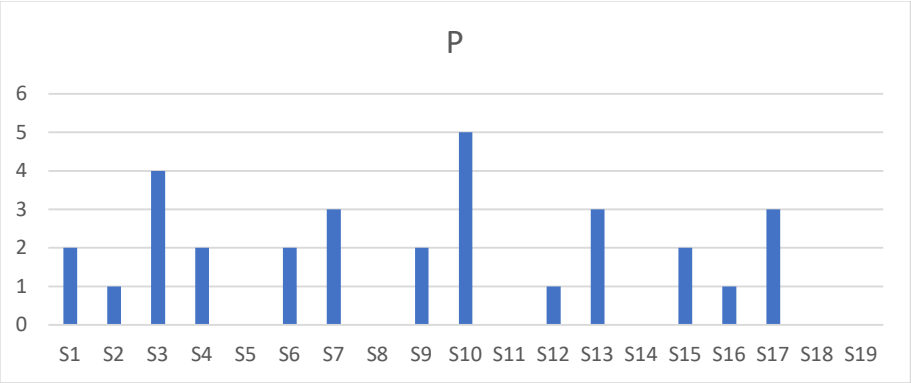

Fig. 8: Value of function P for the winners of the competition

Source: Own processing of the data extracted from www.mfinante.ro

The average value of the function P is 1.63. Each score was obtained as follows (table 1):

Table 1: Score obtained for function P

Score	Number of companies
0	6
1	3
2	5
3	3
4	1
5	1

The S10 company is the only one that gets the maximum score. 31.57% of companies do not meet any criteria, so they get 0 points. 42% of companies meet one or two criteria.

Conclusions

Being an entrepreneur is not easy. In a male-dominated environment, being a woman entrepreneur is even harder. It would be much better if they were encouraged by the entrepreneurial environment. Some start this experience out of necessity, others out of passion. What is certain is that some even manage to develop a profitable business. Women work in the interest of people, based on interpersonal relationships.

Their access to finance is difficult because they are women.

In Romania, the woman is an associate / shareholder / member or holder for approximately one third of the active legal companies, respectively other forms of organizing the economic activity.

One of the possible sources of financing is the non-reimbursable funds, as were those granted in Romania through the Women Manager competition in 2015, which took place in the following years under the name of Women Entrepreneur.

It is true that the amount financed is modest, but helpful for carrying out the activity.

Of the 19 companies that won the competition to finance their business, very few managed to achieve performance.

There are 3 companies that did not make any sales during the 5 years.

Only 5 companies have a financial performance measured by ROE above the minimum value. Another 5 companies have a very high degree of indebtedness.

Among the analyzed companies there is a company that managed to obtain profit every year, to increase the annual profit, to have financial performance measured by ROE and ROA, and a normal degree of indebtedness.

The financing obtained can be useful for a company to support its activity or to develop its activity. The same amount received by 19 companies generated different results. It all depends on the management and the target that each company pursues.

Acknowledgments

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Occupational Noise Management in A Romanian Tires Manufacturing

Ionelia ROȘCA(CIOCAN)
The National Research and Development Institute of Occupational Safety "Alexandru Darabont", Bucharest, Romania, ioneliaciocan10@gmail.com

Ionuț-Cornel CIOCAN
University Politehnica of Bucharest, Faculty of Industrial Engineering and Robotics, Bucharest, Romania, ciocanionutcornel@yahoo.com

Gheorghe SOLOMON
University Politehnica of Bucharest, Faculty of Industrial Engineering and Robotics, Bucharest, Romania, ghe.solomon@gmail.com

Abstract

Hearing loss problems caused by noise are one of the 10 most common occupational diseases encountered in the European Union, and in Romania it is in the top 5. Hypoacusis (hearing loss) or deafness caused by damaging noise is one of the diseases which are identified on the European list of occupational diseases. As well as the hearing loss for those workers already affected, general noise presents additional accident risks at the workplace, as a result of communication difficulties arising from the activity itself. Also, in addition to hearing loss problems, noise causes psychosocial problems, such as stress and anxiety. Each employer is responsible for the safety and health at work within his company and for taking appropriate measures to ensure safe and healthy working conditions. In this case, the main purpose is to eliminate the risk of occurrence of occupational deafness due to exposure to noise and to maintain the productivity of the company. Safety and health at work must be an integral part of a managerial approach and this logic because it is productivity, quality and safety at work are intrinsically linked issues. The case study in this paper presents the noise risk assessment procedure, identifies workplaces where there are noise problems, workers exposed to noise and noise reduction methods where exceedances of the maximum permissible values are found.

Keywords: noise management, risk assessment, reduction methods.

Introduction

Safety and health at work are some of the biggest issues and it is completely the responsibility of the company's management to ensure that their employees are working in safe environment or not.
Some activities in the tire manufacturing can produce high levels of noise. Exposure to high levels of noise for extended periods of time can cause permanent hearing loss for employees.
Despite the fact that it is a well-known danger, noise is still a risk for workers. According to the study "Occupational morbidity in Romania in 2019" of the National Institute for Public Health, occupational deafness ranks 3rd.

The risk is not so obvious as deafness generally develops slowly and even the workers who are most at risk are reluctant to change their habits. That's the reason why it is important to reiterate the dangers of noise exposure in the workplace to managers as well as workers affected as recommended by the non-binding guide to good practice for the application of Directive 2003/10/EC.

Reducing cases of hearing loss due to noise is an essential objective for company management. Employers have a legal obligation to protect the safety and health of workers against all workplace noise risks, according to the Government Decision no. 493/2006, a decision that took over the provisions of Directive 2003/10/EC.

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Noise risk assessment procedure in the tyre manufacturing

Figure 1 presents the diagram showing noise assessment procedure steps applied in a Romanian tire manufacturing as recommended by the non-binding guide to good practice for the application of Directive 2003/10/EC

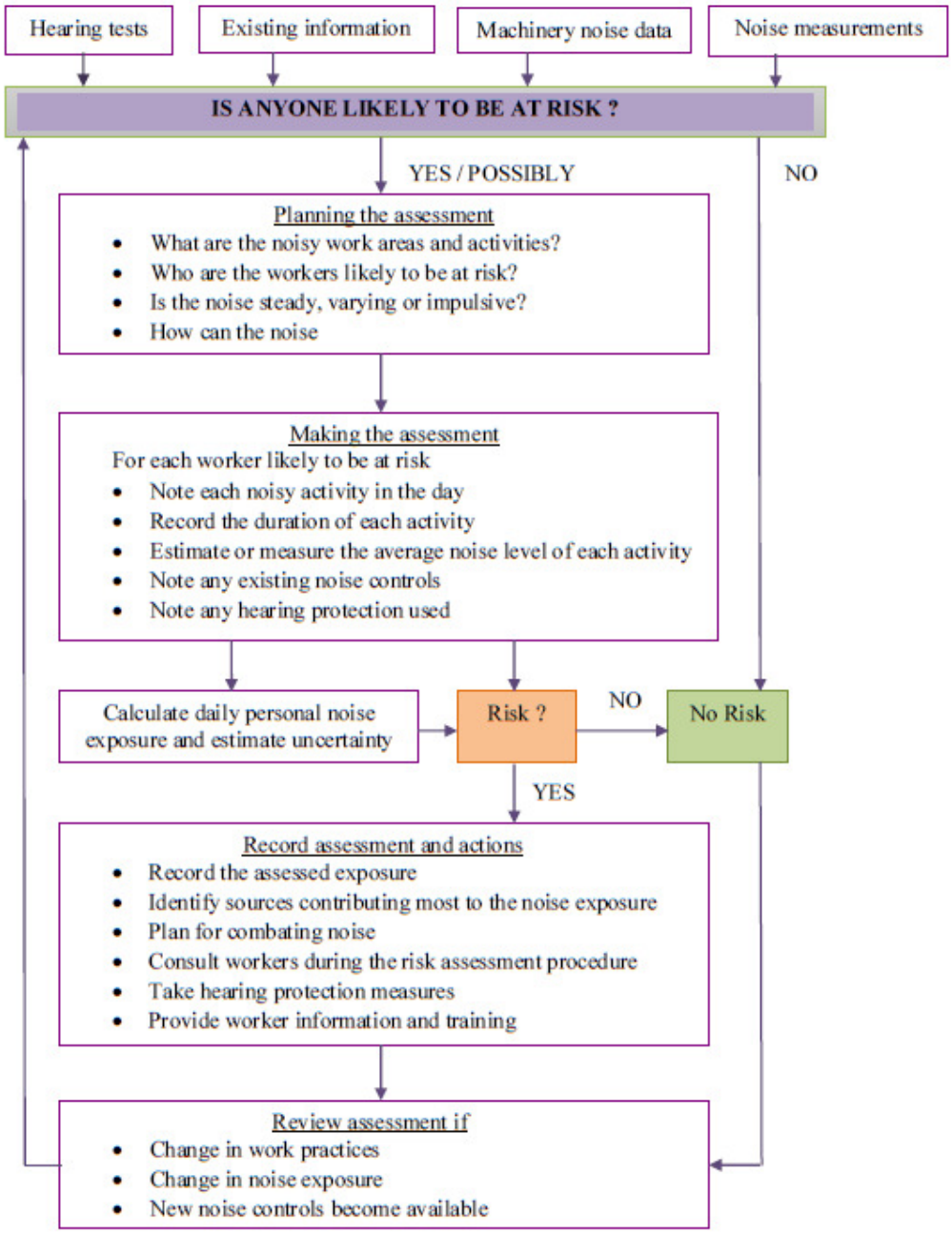

Fig. 1 Noise assessment procedure steps

Performing a noise risk assessment is essential because it is the most important part of a workplace hearing and noise control program.
Article 8 of GD no. 493/2006 requires the employer to assess and, if necessary, to measure the noise levels to which the workers are exposed.

Risk assessment is fundamental for the protection of workers from risks to their health and safety arising or likely to arise from exposure to noise risk. Risk assessment shall identify workers exposed to risk from noise and determine their level of noise exposure. Risk assessment is not an end in itself; its purpose is to identify actions required when exposure action values are reached or exceeded.

Measurements and calculation of daily noise exposure in the tire manufacturing

Noise measurements were performed according to the SR EN ISO 9612:2009 Acoustics. Determination of occupational noise exposure. Engineering method.
The selection of an appropriate measurement strategy is influenced by several factors such as the purpose of the measurements, complexity of the work situation, number of workers involved, effective duration of the working day, time available for measurement and analysis.

In this case, the measurement job-based strategy was chosen from SR EN ISO 9612:2009. The principle of this noise measurement strategy is to measure random noise samples, and for better sampling, HENGs were used (HENG = homogeneous exposure noise groups) HENGs are groups of workers, composed of 1 or more workers, who have the same tasks and expected to have similar noise levels during work shifts.

The determination of the daily noise exposure levels for workers belonging to a specific HENG has to be made by means of the following next steps:

- *Evaluation of the A-weighted equivalent continuous sound pressure:*

$$L_{p,\mathrm{A,eq}T_e} = 10\lg\left(\frac{1}{N}\sum_{n=1}^{N}10^{0,1\times L_{p,\mathrm{A,eq}T,n}}\right)\ \mathrm{dB} \qquad (1)$$

where:
$L_{p,\mathrm{A,eq}T,n}$ is the A-weighted equivalent continuous sound pressure of the sample n;
n is the job sample number;
N is the total number of job samples.

- *Calculation of the A-weighted noise exposure level* of the workers belonging to a specific HENG is given by the following equation:

$$L_{\mathrm{EX,8h}} = L_{p,\mathrm{A,eq}T_e} + 10\lg\left(\frac{T_\mathrm{e}}{T_0}\right)\ \mathrm{dB} \qquad (2)$$

where:
$L_{p,\mathrm{A,eq}T_\mathrm{e}}$ is the *A-weighted equivalent continuous sound pressure* for the effective duration of the working day;
T_e is the effective duration of the working day;
T_0 is the reference duration of the working day, T_0 = 8 h.

The measurements for determining the noise exposure for tire manufacturing workers are made using the following types of equipment: dosimeters Brüel & Kjaer type 4442 and 4448; sound level meter Brüel & Kjaer type 2250. The dosimeters can be used for measurements in all types of work situations. This is the preferred method when making long-term measurements for a mobile worker, engaged in complex or unpredictable tasks or performing a large number of discrete tasks. Before each series of measurement a field calibration must be performed. In this case, the equipment used was calibrated with the Bruel & Kjaer acoustic calibrator type 4231.

The INCDPM guide to occupational safety and health regarding workers exposure to noise (2013) recommends that noise exposure assessment (measurement, determination, analysis, interpretation and reporting of results) should be performed by laboratories with competences in the field of prevention and control noise at work.

Results and discussions

Table 1 shows the results obtained for HENGs subject to evaluation whose values exceed the 80 dB (A) limit.

Table 1: Results obtained for HENGs in tire manufacturing

Homogenous exposure noise groups (HENGs)	Workers number from HENG	Daily noise exposure value calculated for HENG, $L_{EX,8h}$ dB(A)	Max. value measured, Lpeak dB(C)
Bambury 1, 2, 3 / Self-sealing 1 Operators	36	**90**	134
Grinder Operators	20	**90**	127
PTSM 1, 2 / Self-sealing 2 Operators	13	**88**	132
Bambury 15, 16 Operators – Height 0	24	**88**	134
Samples Atelier	44	**88**	143
Vulcanization A.B,C,D,E,F,G,K Operators	66	**87**	136
Tyres Uniformity Operators	48	**87**	131
Tyres Vulcanization Operators	32	**87**	137
Transporters	16	**87**	127
Bambury 8, 9, 10, 15, 16 Operators – Height 7	20	**86**	133
Calandra Operators	20	**86**	137
Transport Operators +Boiacca Transport	59	**86**	133
Tyres Classification + Online Control + Triming Operators	60	**86**	130
Duplex 1 Operators	12	**86**	131
X-Ray Operators	8	**86**	129
Tyres Uniformity Operators	88	**86**	131
ZF Operators	24	**85**	127
Therme Power Plant, Compresor Station, GSM Operators	18	**85**	132
Q-plex 1, 2 Operators	32	**85**	136
Vulcanization Efficiency Atelier	20	**85**	136
Bambury 4, 5, 6, 7, 8, 9, 10 Operators –Height 0	28	**85**	131
Bambury 4, 5, 6, 7 Operators – Height 7	16	**85**	127
Scerografie	4	**85**	123
Carbon Black Operators	6	**84**	125
Mechanical Atelier	30	**84**	129
Comerio Operators	12	**84**	136
TTM 3, TTS 3, TTM 3, TTS 4 Operators	16	**84**	135
Confection Efficiency Atelier + Maintenance	46	**84**	132
Tyres Repairing Operators	8	**84**	131
Bambury 1, 2, 3 Operators – Height 7	12	**83**	125
First and Second Control Operators	88	**83**	123
Bartell, Calemard Operators	16	**83**	132
Triplex, Duplex, SRH Operators	60	**83**	132
TTM, TTS, TTO Operators	28	**82**	137
Flexi Faza 1+2 Operators	104	**82**	132
Filler, Capiatrice, Bartell Operators	124	**82**	134
Bandina Operators	8	**82**	127
Modulo Plus Operators	96	**81**	133
Fire Safety Operators	10	**81**	128
EVO Operators	96	**81**	137
Flexi Operators	176	**80**	136

These are the results of the research "Study of occupational noise and vibration exposure in tire manufacturing of Pirelli" that we made in 2017. More than half of the workers in all the production workplaces of the tire manufacturing were evaluated during the research.

According to the Government Decision no. 493/2006 on the minimum safety and health requirements regarding the exposure of workers to the risks generated by noise, the exposure limit values and the exposure values from which the employer's action on safety and health protection of workers in relation to daily noise exposure levels and the peak sound pressures are fixed as follows:

(a) exposure limit values: $L_{EX,8h}$ = 87 dB(A) and ρ_{peak} = 200 Pa* respectively;
(b) upper exposure action values: $L_{EX,8h}$ = 85 dB(A) and ρ_{peak} = 140 Pa** respectively;
(c) lower exposure action values: $L_{EX,8h}$ = 80 dB(A) and ρ_{peak} = 112 Pa***respectively.
*140 dB (C) in relation to 20 μPa.
**137 dB (C) in relation to 20 μPa.
***135 dB (C) in relation to 20 μPa.
p_{Cpeak} C = weighted peak sound pressure (Pa)
$L_{p,Cpeak}$C = weighted peak sound pressure level (dB)

If the exposure level is between $L_{EX,8h}$ = 80 and 85 dB(A) and ρ_{peak} = 112 and 140 Pa, the employer shall ensure that:

- workers who are exposed to noise at work receive information and training relating to risks resulting from exposure to noise;
- individual hearing protectors shall be made available to workers;
- a preventive audiometric test is offered to those workers identified as being at risk.

If the upper exposure action values is exceeded $L_{EX,8h} \geq$ 85 dB(A) and $\rho_{peak} \geq$ 140 Pa, the employer must to:

- establish and implement a programme of technical and/or organizational measures intended to reduce exposure to noise;
- mark, with appropriate signs, workplaces where workers are likely to be exposed to noise exceeding the upper exposure action values;
- provide for workers' entitlement to receive hearing checks by doctors or by another suitably qualified person under the responsibility of a doctor, in accordance with national law and/ or practice
-

The workers shall use individual hearing protectors, where noise exposure matches or exceeds the upper exposure action values.

Under no circumstances shall the exposure of the worker exceed the exposure limit values of 87 dB(A). If exposures above the exposure limit values are detected, the employer shall to:

- take immediate action to reduce the exposure to below the exposure limit values;
- identify the reasons why overexposure has occurred;
- amend the protection and prevention measures in order to avoid any recurrence.

Technical And Organisational Measures To Reduce The Noise Exposure

On the basis of the risk assessment, if the upper exposure action values are exceeded, the employer shall establish and implement a programme of technical and/or organizational measures intended to reduce the exposure to noise.

Article 17 of GD no. 493/2006 and article 5 paragraph 1 of Directive 2003/10/EC requires that the risks arising from exposure to noise shall be eliminated at their source or reduced to a minimum, taking into account technical progress and the measures available to control the risk at source.

The legislation in force (GD no. 493/2006 and Directive 2003/10/EC) suggests some examples of noise reduction in general.

In the paper "Managing noise exposure and prevention of the hearing loss risk in tyre manufacturing" by Platon, Badea and Ciocan (2017) are presented technical and organizational measures to reduce noise that can be applied in the tire manufacturing in particular.

Noise reduction by technical means:

- reducing airborne noise, e.g. by shields, enclosures, sound-absorbent coverings; (Sound-absorbend shielding of the grinder and tires uniformity equipment, vacuum pumps from vulcanization area, bambury engine; acoustic enclosures around PTSM; placing the acoustic barriers between the bambury working areas);
- reducing structure-borne noise, e.g. by damping or isolation; (vibration insulation of equipment is ensured by flexible mountings; mounting the noise dampers on the level of fan suction located in the roof ceiling).

Organisational measures of noise control:

- selection of low-noise equipment (use of silent tools: compressed air blowers, screw drivers, etc. and silent machines: compressors, motors, fans, etc.);
- noise can be reduced by "limitation of the duration and intensity of the exposure to noise"(Taking into account a 50 % reduction in working time only leads to a reduction of 3 dB(A));
- also, noise can be reduced by "appropriate work schedules with adequate rest periods";
- appropriate maintenance programmes for work equipments;
- workplaces where workers are likely to be exposed to noise exceeding the upper exposure action values shall be marked with appropriate signs;
- adequate information and training to instruct workers to use work equipment correctly in order to reduce their exposure to noise to a minimum.

Conclusions

Managing the occupational safety in the tire manufacturing in general and noise in particular is very important for the employer. It helps company management to achieve and maintain safe and healthy working conditions and to provide employee safety workplaces, focuses on the main noise induced hazards and indicates what needs to be done to ensure the risks of excessive noise exposure are properly controlled.

Acknowledgement

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IT Security Management in Education Sector - Process Approach

Adam KOSTULAK

Institute of Informatics, University of Gdansk, Gdansk, Poland
adam.kostulak@ug.edu.pl

Abstract

The article presents a new way of managing the security of an organization's information systems. Presented Reference Model of Security Processes (RMSP) is pointed to the possibility of its use in educational organizations, as a tool for standardization based on the standards ISO 2700x family.

Keywords: IT security, Business process modeling, Process reference model, ISO 27001, Deming Cycle

Introduction

Information systems security has been a challenge in the field of scientific research for many years. There are few publications in the field of process management of the security of information systems of universities. In turn, ISO certification of university information systems is an innovative topic.

The close connection of this issue with technology means that the approach that takes into account the aspects of systems management to a very narrow extent is often dominant here. The problem of adapting security methods to the properties of the enterprise information system is so complex that it requires advanced management methods. It seems advisable to try to apply the process approach, which is currently more and more often chosen as a management method. Taking into account the direction of changes in the development of the organization, the choice of such an approach seems to be optimal, if only due to the specificity of information systems security processes in companies.

Currently, one of the key properties of information systems is data security. The intensity of intrusions to obtain information for its further use as part of economic espionage as well as simple data destruction has become a serious problem. Losses resulting from the loss of privacy of information are very painful to enterprises and often become the cause of their bankruptcy. Therefore, there is a need to create effective methods of data security management, which will take into account both the dynamics of technological progress and the development of the organization itself.

The dangers to which information is exposed essentially come down to three types of activity. It is sniffing, spoofing, and blocking access to information. These three threats occur at every level of the communication model and constitute a universal approach to building security methods. The technological model comes down to ISO / OSI standardization and concerns the hardware aspects of the IT system network solutions. It is possible to extend this model with application layers, appropriate for individual areas of information management in the company, which, taking into account the organizational structure and dependencies between individual organizational units, would give a complete model for the analysis of information processes.

Educational institutions have been developing dynamically in recent years. This entails the necessity to change the organizational structures and, consequently, to modify the approach to information systems management. The security of these organizations - mostly non-profit (public schools) - is becoming one of the most important challenges for university managers. Information security management in these organizations is a multidimensional problem and is an interesting area for scientific research. The choice of universities as a research object is also dictated by the unique properties of the structure and functioning of these organizations, unlike commercial enterprises. Moreover, nowadays public universities - whose purpose is not to generate added value - adapt quickly to the rules of the free market and require, like companies, commercially effective management methods.

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Information Systems Security Management Models

There are many models for managing the security of information systems. They describe the following areas:

- dependencies between safety elements,
- dependencies in risk management,
- process safety management information systems.

The article focuses on typical normative solutions consisting in the implementation of the principle of continuous improvement, i.e. the implementation of the Deming cycle , i.e. PDCA (Plan-Do-Check-Act), which corresponds to the actual course of normative activities in the recent period, contained in ISO 9001:2000, ISO / IEC 27002:2012 and ISO / IEC 27001 standards.

The ISO / IEC 27001 standard uses the "Plan - Do - Check - Act" (PDCA) model which is applied to the entire process structure (ISMS[1]). The PDCA model takes information security requirements and stakeholder expectations as an input, and through the necessary activities and processes, provides information security outputs that meet these requirements and expectations (Table 1). An example of a requirement may be such information management that breaching its security will not lead to financial losses in the organization. On the other hand, expectation is, for example, properly trained employees who, in the event of a crisis situation, will limit its negative impact on the institution.

The proper establishment and management of an ISMS requires a cyclical approach to ensure that the procedures adopted in a given organization are documented, implemented and, if necessary, improved.

The adoption of the PDCA model also reflects the principles set out in the OECD Recommendations on which the security of information systems and networks is based. This standard provides a complete model for the implementation of the principles outlined in the recommendations on which risk assessment, safety design, safety implementation, safety management and reassessment are based. The requirements described in this standard are general and intended to be used in all organizations, regardless of the type, size and nature of the business.

Table 1: Processes of the PDCA model

Plan (establishment of the ISMS)	Establish an ISMS policy, objectives, processes and procedures relevant to risk management and information security enhancement to obtain outcomes consistent with the organisation's overall policies and objectives
Do (ISMS implementation and operation)	Implementation and operation of ISMS policies, security, processes and procedures
Check (ISMS monitoring and review)	Estimate and measure process performance in relation to ISMS policy, objectives and practical experience, and deliver the report to management for review.
Act (maintenance and improvement of ISMS)	Take corrective and preventive actions based on the results of internal ISMS audit and management review or other relevant information to ensure continuous improvement of the ISMS

Reference models in business terms are primarily used to create the foundations on which the methodology is based and the model of the modeled complexity of the reality of a given company. They represent organizational knowledge, modeling standard and define in the form of models all organizational structures of the examined economic entity. The reference model is actually an abstract structure that facilitates the creation of a solution by focusing the developer on the relevant relationships and aspects in a given organizational structure.

Minor relationships are either separated for later modification or even partially organized through such a pattern. Such a solution contains the smallest set of uniform concepts, ideas and is independent of specific technologies, standards or other implementations. The primary goal of developing a reference architecture model for the main IS security processes is to conceptualize security management in the form of related processes with a high degree of aggregation. The choice of the aggregation level is a key stage in the modeling which balances the overall simplicity and ease of

[1] ISMS – Information Security Management System

navigation within the model and the ability to reflect the major relationships between processes. The low number of top-level processes of the model allows you to easily and quickly understand the main elements of safety management.

Reference Model of Security Processes

The Reference Model of Security Processes (RMSP) described in the article is designed to assist management in the development and implementation of an effective information systems security management system. Based on an interview with the management staff of the studied universities, the functionality and impact of using the model to implement the process method of information systems management were assessed.

The model includes 6 groups of processes composed of multi-threaded processes.

Process Group A - Ensuring physical and environmental security

Process Group B - Systems and networks management

Process Group C - Information access control

Process Group D - Information systems development and maintenance

Process Group E - Information security incident management

Process Group F - Business Continuity Management

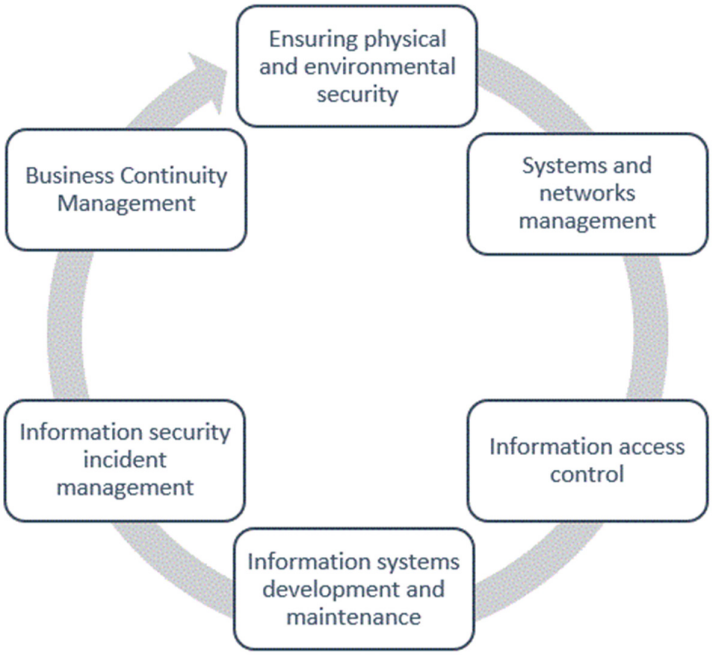

Fig. 1: Information systems security management processes

The implementation of six groups of processes takes place in a cycle (Fig. 1). This approach enables the handling of process input streams in a comprehensive manner and can guarantee the safety quality of the output streams. The process cycle schedule should be adapted to the functional properties of the facility (organization) and constitute an element of the university's information security strategy. It must be determined in accordance with the Deming cycle mechanism (Fig. 2), so that the individual stages of planning, implementing, checking and correcting the safety rules supported by the relevant processes can meet the requirements of ISO / OSI 27001.

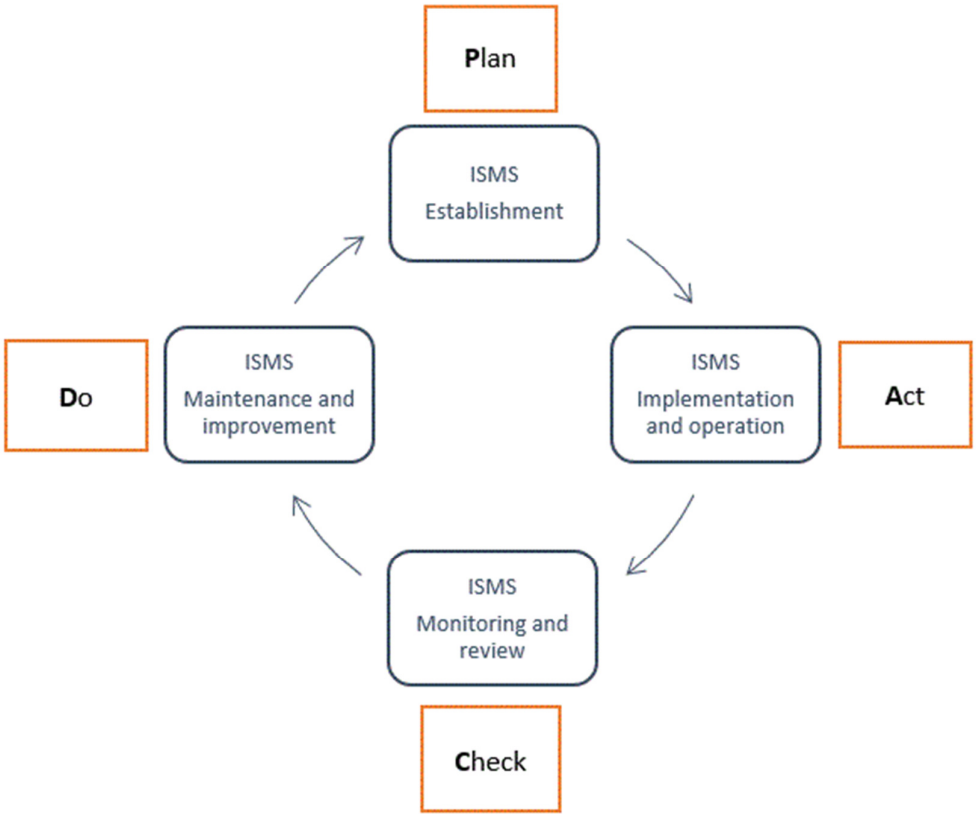

Fig. 2: Deming Cycle - PDCA model used in the processes of information security management system ISMS according to ISO / IEC 27001

Process Group A - *Ensuring physical and environmental security.* These are processes related to the need to provide the organization with appropriate protection against unauthorized physical access and any external damage and disruptions. We distinguish between two processes and 7 activities.

Process Group B - *Systems and networks management.* These are processes that allow you to control activities related to the maintenance, operation and development of information processing infrastructure. There are 10 processes and 31 activities.

Process Group C - *Information access control* . It is a group of processes that determine the system users' rights to use information resources. We distinguish 6 processes and 25 activities.

Process Group D - *Acquisition, development and maintenance of the IT system.* It is a group of processes that define the principles of maintaining efficiency as well as extending and modernizing the system. It consists of 6 processes and 16 activities.

Process Group E - *Information security incident management.* These are processes responsible for the control and management of incidents related to threats to the security of the IT system. It consists of 2 Level 1 processes and 5 Level 2 activities.

Process Group F - *Business Continuity Management* - these are processes that implement mechanisms related to ensuring failure-free and efficient operation of the system. It consists of 1 process and 5 activities.

Conclusions

The primary activity that can direct information systems security management towards process management must be the identification and organization of security processes. Using the model of processes presented in the article, it will be possible to quickly classify security processes and prepare the organization for the implementation of ISMS. However, the implementation of the ISMS itself is not the main and obligatory purpose of the RMSP application**.** This goal is to achieve process management of the organization's information systems security area. While the ISMS is based on the process concept of the PDCA model, this is only a half-measure and can at best be a step on the way to mature process management. It should be noted that the implementation of ISMS may facilitate the path to process management, but is not a necessary step to achieve it.

The changes to be expected after the implementation of the RMSP will have several stages. The first is primarily a modification of the way of thinking about the security of information systems in the organization. Only obtaining appropriate awareness of the management staff may enable further changes towards process management. The next step will depend on the choice of an action strategy to transform the existing management into process management.

The implementation of the process management of the information systems security area of a university using the RMSP model can also take place without the need to change the structure of the entire organization into a process one. As in the case of an ISMS implementation, it can be a preparatory stage for a later transition towards a process organization.

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COVID19 and Management
Impact of Covid-19 on Education Management in Lebanon

Chirine Khalil NASSAR

Ph.D. Candidate, Faculty of Business Administration, The Bucharest University of Economic Studies, Bucharest, Romania, nassar.chirine@gmail.com

Abstract

By the advent of Covid-19, education management have raised eyebrows as schools and universities were the first one to shift on computer aided learning (CAT) technologies with the vision that learning must never stop. ICT based learning methods have been widely applicable to this date. The study has been conducted to investigate the level of technologies used by instructors, assessment criteria for teachers in distance learning environment, challenges faced by instructors in integration of teaching technology and lastly challenges faced by students in distance learning programs in Lebanon. In order to investigate these specific objectives a study has been conducted where primary data has been gathered using questionnaire distributed electronically amongst the sample of n=90 students and n=90 teachers using random sampling methods with adequate ethical consent. Data gathered from questionnaires has been analyzed using descriptive statistics and frequency distribution using Ms Excel. Findings of the study suggests that students in Lebanon are facing numerous issues during their transition from conventional learning to e-learning includes accessibility to Internet, Computer, Learning Resources (e.g. Books and Curriculum), Electricity (e.g. Load shedding), Seating Arrangements at Home (e.g. chair, desk, table) and noise distraction at home (e.g. dog barking, child crying). Furthermore, findings suggests that challenges faced by teachers includes communicating with school management, electricity disruption, noise disruption challenge, children's participation in online classes , confusing when accessing student performance, difficulties using, ICT based technology, frequent communication with parents, attention distraction and lack of personalized attention. Findings of this study poses significant implications for ministry and school authorities to overcome these issues.

Keywords: Covid19, Corona, E-learning, Management, Education, Impact, Technology, Lebanon.

Introduction

The outspread of COVID-19 has also created panic, depression, and different anxiety among people across the globe (NCIRD 2020). The increase of COVID-19 has sent repercussions across the world. The public health calamities, unparalleled in our lifespans, has produced acute human suffering and deaths. The drastic increase in diseased victims and the substantial outcomes of critical patients of the infection have stunned hospitals and physicians and put remarkable stress on the health division. As governments handled with the increase of the infection by shutting down entire economic divisions and formidable extensive limitations on mobility, the healthy calamity developed into a major financial disaster which is predictable to burden civilizations for future time (Duraku & Hoxham, 2020). In response to this crisis there are numerous preventive measures taken by the countries around the world to contain the spread of COVID-19. Especially, to save future generation schools, colleges and universities have been closed which have affected more than 575 million students in 188 countries who have been directly affected by the closure of schools and universities. (UNESCO, 2020).

For specific categories of people entangled in education system is a disaster as they are unable to peruse their education in a traditional system of classroom environment. In addition to the situations caused by self-isolation at homes and other individual aspects have made parents' worried about their children future and distinctive educational requirements (UNESCO 2020). However, revival of schools and universities through opening of education institutes brings undisputable welfares to students and the broader economy but nevertheless, should be wisely evaluated against the health hazards and the requisite to alleviate the peal of the epidemic. (Schleicher, 2020).

The lockdowns in reaction to COVID-19 have interrupted standard schooling with countrywide school shutdowns in most of the MENA region countries as majority of countries. While the educational community have made coordinated efforts to keep up learning progression during this phase, children and students have had to depend more on their own means to carry on with learning privately through the Internet, television or radio. Teachers also had to adjust to new educational ideas and methods of provision of teaching, for which they may not have been educated. Specifically, learners in the most demoted groups, who don't have access to digital knowledge means or nonexistence

of the elasticity and commitment to seek knowledge on their own, are at danger of tumbling backwards (Schleicher, 2020).

Due to quarantine, the utilization of mechanization in the form of online learning has been considered the most relevant substitute to remain educational process as it is being practiced in many areas of the globe during this time. Despite the challenges in execution of online education the current need of pandemic have successfully transformed into distant or online education with drastic development in the discipline of computerized education, which, in other situations, would take a very long time (Lurvnik 2020). Evidence from Yokozeki (2020) suggests that transfer to distant learning style has also been evaluated as a better option for teachers and students to become more powerful, more productive, and improved during the time of self-isolation. On contrary, the current pandemic have raised numerous concerns amongst teachers involved in teaching procedures have been reported low-level utilization of classroom mechanization earlier to the existing situations (UNESCO, 2020). Additionally, desires for moving teaching to online style have also been announced to raise the amount of tension and depression amongst teachers in many parts of the world (Duraku & Hoxham, 2020). The COVID-19 disease has also had an acute effect on higher education as universities shut down their locations and states shut their boundaries in reaction to lockdown precautions. Though colleges and universities were quick to replace face-to-face lectures with online learning, these closures affected learning and examinations as well as the safety and legal status of international students in their entertaining state. Possibly most significantly, the calamity advances questions about the price recommended by a university education that includes interacting and social prospects along with educational content.

Relevancy of Study to Lebanon

World Health Organization (WHO) on 30th January 2020 declared the Covid-19 outbreak a public health emergency which subsequently effected delivery of education systems worldwide. In Lebanon, government on 2nd March 2020 declared a state of emergency by issuance of order of closure of education system within the country to contain the spread of virus. Both formal and non-formal education sectors were ordered to close to ensure the health and safety of future generation which effecting more than 1.2 million children's enrolled in formal, non-formal and UNRWA schools. The closure of educational institutes witnessed no trend of coming to normal, as a result Ministry of Higher Education Lebanon, launched a distance learning program for schools by giving three point agenda. First part of the agenda was promoting (a) Use of Electronic Media where national television and other private media outlets were utilized to generate awareness and provide psychosocial support for learners, parents and caretakers. Second agenda was (b) Use of internet based online platforms where technologies like Microsoft Teams was integrated with public school system. On contrary some private schools are using their own platforms. In addition, schools in Lebanon were asked to use online platforms like WhatsApp and Telegram which provided access of learning material to student. Thirdly, (c) Non-ICT methods were utilized which focusing mainly on paper-based materials. (IAC, 2020) On contrary, IAC, (2020) states that MEHE also issued instructions for teachers and academic communication on guidelines for disseminating lessons and following up with students.

Despite courageous efforts made by MOHE, in response the pandemic, the concept of distant learning is still evolving in Lebanon as the major challenges faced by distance learning includes closure of electricity across Lebanon, readiness of teachers and students to adapt to new ways of remote learning. Thirdly, restriction in movement possess pressure on students to get access to learning resources including stationary and learning utensils.

Significance of the Study

Findings of the study poses significant implications for Lebanon which is currently facing many social issues erupting from civil war, low public expenditure on education and influx of refugees. Despite all these challenges education have emerged as a major national priority for the country. Understanding of the learning management in event of pandemic will assist government in particular ministry of higher education in implementation of RACE II plan which emphasizes on inclusive education as part of their commitment towards sustainable development goals. Despite commendable efforts from MEHE by providing three-point agenda to continue education during pandemic

Research Question

- What is the level of technologies used by instructors in Lebanon?
- What are the assessment criteria for teachers in distance learning environment in Lebanon?
- What are the challenges faced by instructors in integration of teaching technology in Lebanon?
- What are the challenges faced by students in distance learning programs in Lebanon?

Methodology

The research philosophy starts with the belief which provides guidelines for the collection of data prerequisite for sourcing ideas and thoughts for the development of reliable knowledge. Research philosophy refers to the belief which provides insight on how data shall be collected, analyzed and used to achieve research outcomes. Within the scope of current research, research philosophy can be categorized into four different types which includes (a) pragmatism, (b) positivism, (c) realism and (d) interpretivism. The researcher intends to make a choice between positivism and interpretivism which are traditionally represented using quantitative and qualitative research methods. The study uses positivism research philosophy where high structured data will be gathered from participants which incorporates large sample respondents. The study uses quantitative research design which aims to explore the respondent's perspective of challenges being faced by the distance education system which is essential from education management perspective. (Saunders et al., 2009)

Backed by the positivist research philosophy, the research design provides blueprint for the collection, measurement and analysis of data. The study intends to use descriptive research design which is based upon the statistical research which describes phenomenon as it exists. (Akhtar, 2016) The descriptive research design aims to measure who, when and how the phenomenon occurs by investigating the challenges faced by distance learning and education industry as a whole. The study aims to investigate the perspective of both teacher, academics and learners where primary data has been gathered from learners engaged in distance learning and teachers involved in curriculum management and curriculum delivery using internet based technologies. It is noteworthy to examine the phenomenon in detail by describing the concerns of relevant stakeholders which includes teachers and learners who are engaged in remote and online learning caused by social isolation.

Primary data will be gathered using questionnaires as author intends to distribute two separate questionnaires, where one for teachers which aims to cover key areas like (a) level of technology used by instructors in Lebanon in post covid-19 times, (b) method of online learning, (c) assessment of student performance in remote learning and (d) challenges faced by teachers in implementation of remote learning. Similarly, another set of questionnaires will be distributed amongst students to investigate the (a) possession of adequate technological equipment and (b) challenges faced by learners. (Al-Jammal & Ghamrawi, 2013) Questionnaire will be used as an instrument where questionnaire items for each category of respondents will be developed using a close ended instrument using Thurston scale. Questionnaire items on challenges faced by students have been adapted from the previous studies of Senthilkumar & Kumari, (2020). Lastly, questionnaire items on challenges faced by the teachers have been adapted from the previous studies of Duraku & Hoxha, (2020).

The scope of the study revolves around the school students who were the first who implemented distant learning programs in Lebanon as per MEHE guidelines. Population comprises of school students which according to CERD, (2020) have number of 942 thousand students who are currently enrolled in private schools, public schools and private free schools. There are 497,530 students registered in public schools in Lebanon and there are 285339 students who are currently enrolled in private schools in Lebanon. Remaining 159462 students are enrolled in private free schools. The total sample size of n=90 students will be targeted by the author using cluster based sampling method where equal amount of respondents will be targeted from the cluster of public, private and private free schools across Lebanon. The scope of the study requires author to incorporate the opinion of teachers. According to World Bank, (2020) there are more than 80 thousand people who are associated with teaching profession in Lebanon. The study aims to target n=90 teachers working in public, private and private free schools across Lebanon using cluster based sampling technique.

Data collected from questionnaires will be analyzed using descriptive statistics and frequency distribution where pie charts will be used based upon the distribution of responses across frequency providing rationale for the analysis and discussion.

Findings

Demographics of Students

Students from different parts of Lebanon which Halba, Baalbek, Beirut, Zahlé, Baabda, Nabatieh, Tripoli and Sidon were targeted in the survey. Out of total sample of 90 respondents, 41.1% (37) respondents were male whereas remaining 58.9% (53) respondents were female as showed in graph below.

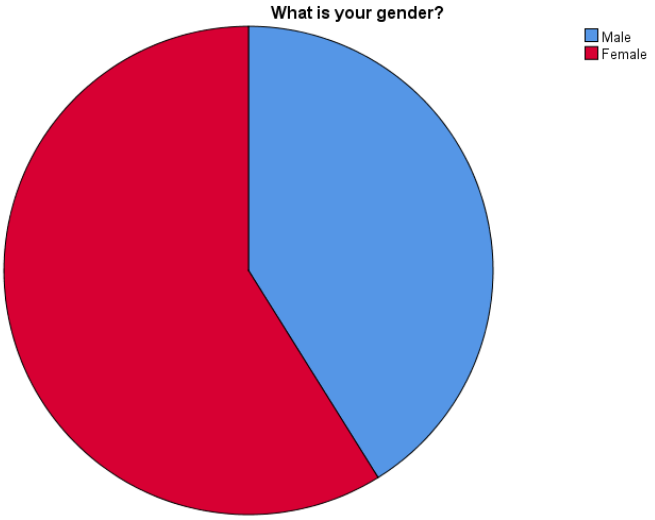

Figure 1: Gender of Respondents

Students from different family background were targeted in the survey, 48.9% (44) respondents reported having 1 to 3 family members, 34.4% (31) respondents reported having 4- family members and remaining 16.7% (15) respondents reported having more than 6 family members as showed in figure below.

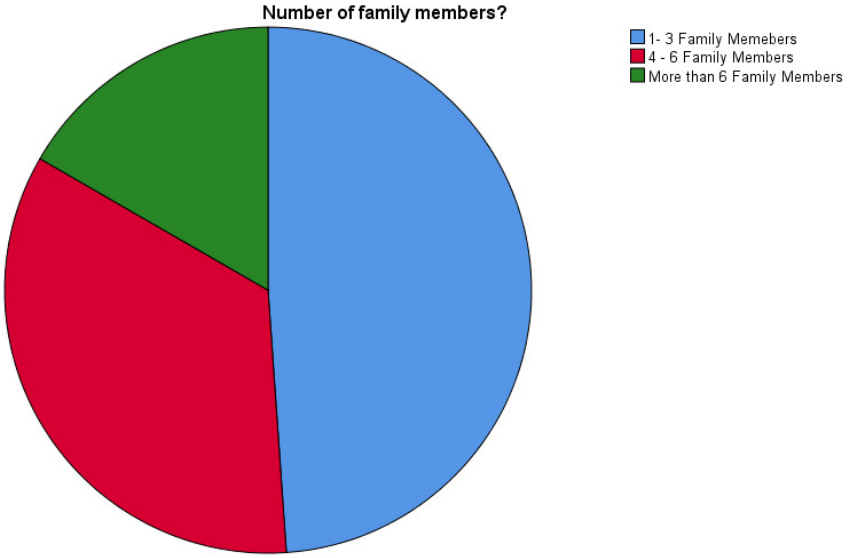

Figure 2: No of Family Members

Respondents from different categories of schools were targeted in the survey by the author. 33.3% (30) participants belonged from the public school system in Lebanon, 33% (30) of respondents belonged from the private school system in Lebanon and remaining 33.3% (30) respondents belonged from the private free school system in Lebanon as showed in figure below.

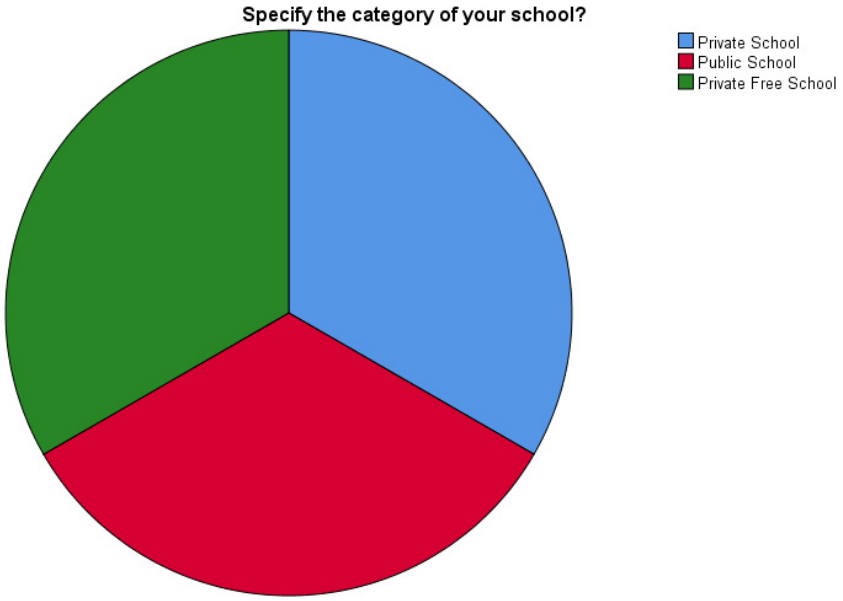

Figure 3: Category of School

Students enrolled in different public, private and free private schools were asked whether they enjoy distance learning programs being started by the institutes. 68.2% (62) respondents reported that they enjoy learning from home, 8.9% (8) respondents reported that they don't enjoy learning from home. Lastly, 22% (20) respondents reported that they are not sure whether they enjoy learning from home using distance learning technologies during period of lockdown and restrictive movement.

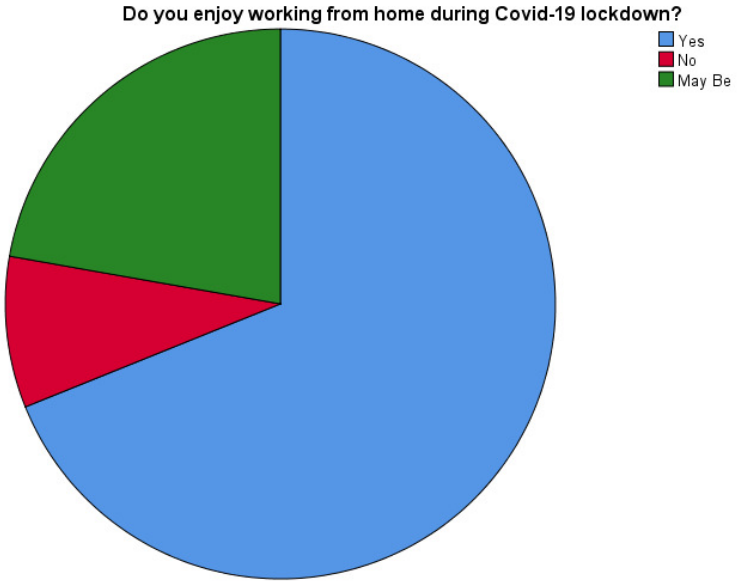

Figure 4: Enjoy Learning at Home

Respondents of the study were enquired about the technology being used by the school for online education. Majority of the respondents which includes 61.1% (55) of respondents reported that they use Google Classroom for attending their daily classes during the lock down period in Lebanon, 21.1% (19) of respondents reported that they use Zoom for attending their classes. 14.4% of respondents reported that they use Microsoft teams. Lastly 3.3% of respondents reported that they use other software applications to access classroom and learning resources.

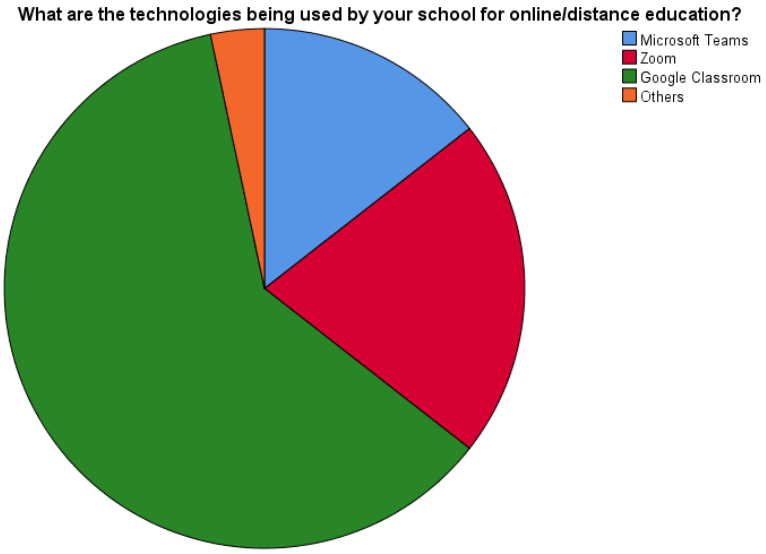

Figure 5: Technologies used by Schools

Respondents of the study were asked about the technology being used by school administration to share the curriculum related information. 50% (45) of respondents reported that majority of the schools used e-learning system which can be accessed using student credentials, 32% (29) respondents reported that their school used WhatsApp to share the curriculum related information. 8.9% (8) respondents reported that curriculum related information is shared on email with parents and remaining 8.9% respondents reported using other mediums for sharing curriculum related information.

Challenges Faced by Students

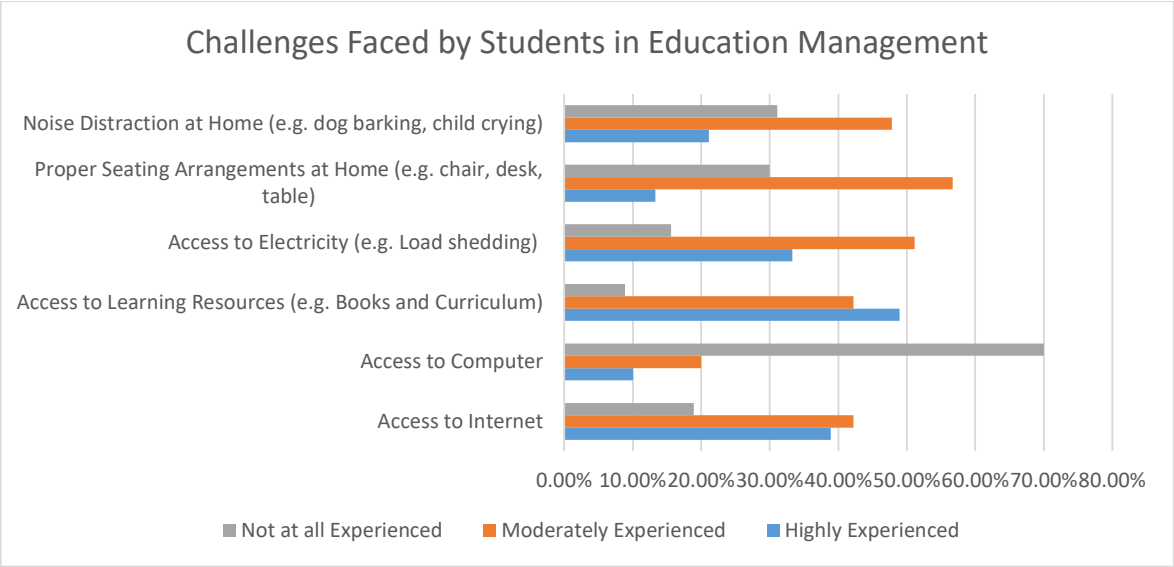

Figure 6: Challenges Faced by Students

Respondents were asked about the challenges faced by students during distance learning. 42.2% reported noise distraction i.e. (dog barking and children crying) moderately experienced during online learning at home. 56.7% of participants reported having moderately experienced issues of proper learning environment at home which includes having adequate furniture and desk during their online learning sessions. 51% of respondents reported having reported moderately experienced issues of access to electricity which disrupts their learning experience at home causing internet disruption. 48% of respondents reported high experienced issue of access to learning resources at home. Majority of the respondents which includes 70% of students have not at all experienced issues related to accessibility

of personal computers, tablets, phones and laptops. Lastly, 42% reported moderately experienced issues of internet disruption in some part of Lebanon.

Challenges Faced by Teachers

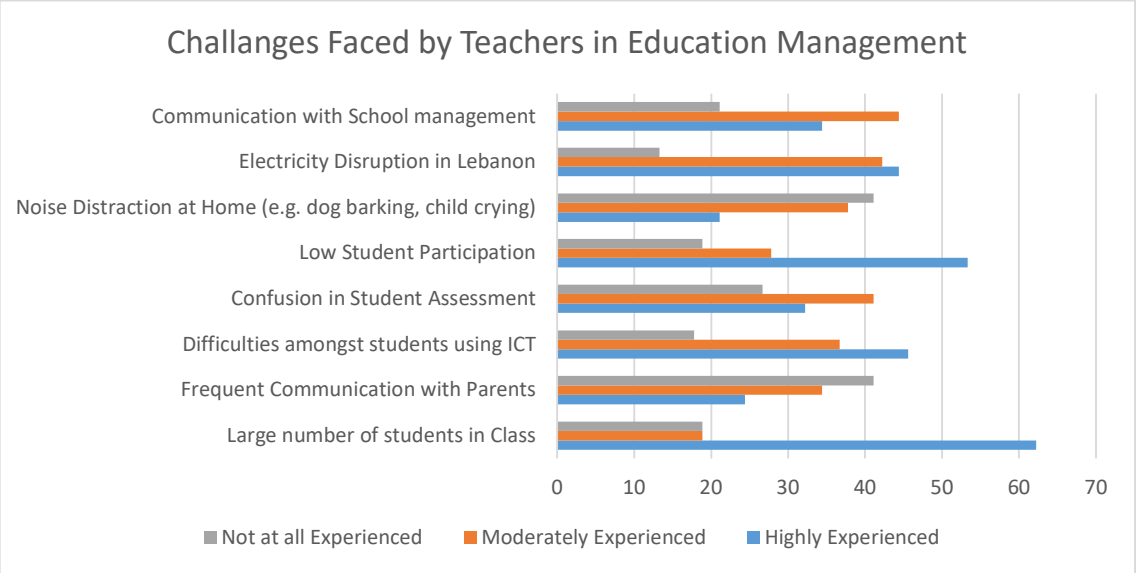

Figure 7: Challenges Faced by Teachers in Education Management

Respondents of the study which characterized of teachers working in different private, public and private free schools across Lebanon. Respondents were targeted with the key questions. Majority of the teachers which includes 44.2% of respondents reported that they have moderately experienced issues in communicating with school management during the tenure of working at home during lockdown. Respondents of the study were asked about the electricity disruption as a challenge to distance learning opportunities in Lebanon, 44.4% of teachers reported that they have highly experienced load shedding and power shortages which have disrupted distance learning experience caused by connectivity issues. Teachers were enquired about the noise disruption challenge faced by them, where majority of respondents which includes 41.1% of respondents reported that they have not at all experienced such issues during the distance learning implementation at home. Teachers were asked about the challenges related to children's participation in online classes where 53.3% reported that they have highly experienced issues of children participation which results in absenteeism amongst students attending online education at home. 41.1% of the teachers reported that they have moderately experienced issues like confusing when accessing student performance. 45.6% of respondents reported that they believe that many students face difficulties using ICT based technology. 41.1% of respondents reported that they have not at all experienced issues of frequent communication with parents. Lastly, 62.2% of the teachers reported having large number of students in an online classes which poses challenges such as attention distraction and lack of personalized attention to each student caused by large size of a class.

Discussion

This study aimed to examine the impact of the COVID-19 outbreak on education management and evaluate significant challenges for online learning in Lebanon situation where e-learning courses are uncommon. Thus, this study reveals both the research and practice about which elements to pay special attention to when designing online learning in this situation.

Findings of the study suggests that there are numerous challenges faced by students in Lebanon amongst which the most commonly occurred challenges occurred during the transition from conventional learning to e-learning includes accessibility to Internet, Computer, Learning Resources (e.g. Books and Curriculum), Electricity (e.g. Load shedding), Seating Arrangements at Home (e.g. chair, desk, table) and noise distraction at home (e.g. dog barking, child crying). Empirical evidence from Aboagye, (2020) shows a similar trend who investigated the challenges faced by tertiary institutions in an era of lockdown. The findings of the study suggest that one of the most common issues faced by institutes includes social issues, accessibility issues, motivation, and academic issues. Findings validate previous study conducted by Raju, (2020) findings which suggest that internet accessibility is amongst the major issue faced by students as many of the students don't have good connectivity of 4G in a rural part of the country which creates problems like buffering and laagering during live streaming of lectures. Furthermore, Raju, (2020) findings show that access to resources like books is the biggest issue as many students had to leave hostels and PGs immediately after the lockdown and could no longer carry textbooks and course material. Andersson, (2020) adapted

a holistic approach by categorization challenges that have categorized challenges into numerous types which include student, technology, institution, teachers, and support. The findings of the Andersson, (2020) studies show that the most commonly incurred challenges faced by students during the Covid-19 lockdown include motivation, conflicting priorities, confidence, learning styles, and accessibility. Sarvestani et al., (2020) findings show that infrastructure issues are one of the most significant challenges faced by students during Covid-19 amongst which the most commonly incurred challenges include internet connectivity issues, scarcity of physical space to peruse virtual education, Lack of access to school resources, lack of facilities and disconnectivity issues.

For the facilitators, it is very hard to understand the online learning attitudes since it meant coping with some flaws. E-learning is a good option in an unrealistic optimistic situation (like COVID-19), but it does not seem to be 'as good as' conventional face-to-face learning (Andersson, 2008). The physical classroom environment and face to face interaction between the students and teachers give satisfactory learning outcomes. Students work in a group, helping one another to accomplish assignments and semester projects. Moreover, during lectures looking at the professor's facial gestures and ways of describing a specific point play an important role to ease the learning. But during online classes these things are negligible (Aboagye, Yawson, & Appiah, 2020). However, developing the e-learning system helps the excellence of the educational system. E-learning is the second-best option for education institutes, as during the current pandemic situation students' learning process proceeded and students are continuing their semester without wasting their learning period. Thus, comprehending the difficulties and barriers of establishing e-learning in higher education institutions and offering practical solutions for them (Sarvestani, Mohammadi, Afshin, & Raeisy, 2019) is the current need to cope with the pandemic situation. During the COVID-19 lockdowns, virtual platforms not only served the education facilities for students but also offering many short-term certificate courses. As well as many institutes, offered different development courses to the teaching staff too (Raju, 2020).

Conclusion

It is important to address all the challenges before the pandemic situation and this effort signifies to engage the students in learning activities and keep them active and busy with studies. For example, the combined approach ought to have guided students to e-learning before you make any changes to complete the e-learning system. For students especially for school-going students, e-learning is a completely new concept and that's why in the pandemic situation they faced many issues to learn from the virtual platform. Also, most of the university students preferred to put on hold their current semester till further notice. Thus, it is necessary to consider all these problems before the implementation of e-learning in higher education establishments in Lebanon.

Future Research Agenda

Future studies should analyse these factors in-depth. Future research should investigate the student's e-learning experience after the COVID-19 lockdown. Future studies should examine the consequences of e-learning. Future studies should examine the impact of a pandemic on education in an underdeveloped nation.

Survey for Students

This questionnaire asks for your preferences about distant learning during covid-19 lockdown in Lebanon. The questionnaires aim to investigate (a) level of technology used by students and (b) challenges faced by students. Your participation in the survey is completely voluntarily and your response will benefits researcher and authorities in improving distance learning experience.

What is your gender?

Male ☐ Female ☐

Number of family members?

1-3 ☐ 4-6 ☐ More than 6 ☐

Specify the category of your school?

Private School ☐ Public School ☐ Private Free School ☐

Do you enjoy working from home during Covid-19 lockdown?

Yes ☐ No ☐ Maybe ☐

What are the technologies being used by your school for online/distance education?

Microsoft Teams ☐ Zoom ☐ Google Classroom ☐ others ☐

What are the technologies used by school's administration to share curriculum related information?

E-Learning System ☐ WhatsApp ☐ Email ☐ others ☐

Rate Challenges Faced in Access to School Distance Learning Programs

Challenges	**Highly Experienced**	**Moderately Experienced**	**Not at all Experienced**
Access to Internet			
Access to Computer			
Access to Learning Resources (e.g. Books and Curriculum)			
Access to Electricity (e.g. Load shedding)			
Proper Seating Arrangements at Home (e.g. chair, desk, table)			

Survey for Teachers

This questionnaire asks for your preferences about distant learning during covid-19 lockdown in Lebanon. The questionnaires aims to investigate (a) level of technology used by students and (b) challenges faced by students. Your participation in the survey is completely voluntarily and your response will benefits researcher and authorities in improving distance learning experience.

What is your gender?

Male ☐ Female ☐

Specify the category of your school?

Private School ☐ Public School ☐ Private Free School ☐

What is your level of education?

Associate Degree ☐ Bachelor's Degree ☐ Master's Degree ☐

Average number of students in an online class?

10-15 ☐ 16-20 ☐ 21-25 ☐ More than 25 ☐

What are the technologies being used by your school for online/distance education?

Microsoft Teams ☐ Zoom ☐ Google Classroom ☐ others ☐

What are the technologies used by schools administration to share curriculum related information?

E-Learning System ☐ WhatsApp ☐ Email ☐ others ☐

Rate Challenges Faced in Access to School Distance Learning Programs

Challenges	Highly Experienced	Moderately Experienced	Not at all Experienced
Large number of students in Class			
Frequent Communication with Parents			
Difficulties amongst students using ICT			
Confusion in Student Assessment			
Low Student Participation			
Noise Distraction at Home (e.g. dog barking, child crying)			
Electricity Disruption in Lebanon			
Communication with School management			
Noise Distraction at Home (e.g. dog barking, child crying)			

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The Conditions Affecting the Functioning of The Mass Media and Social Media Based on Empirical Research Conducted in Ukraine

Aneta ALEKSANDER
Silesian University of Technology, Gliwice, Poland
aneta.aleksander@polsl.pl

Dariusz KRAWCZYK
University of Silesia, Katowice, Poland
d.krawczyk@olpress.pl

Aleksandra KUZIOR
Silesian University of Technology, Gliwice, Poland
aleksandra.kuzior@polsl.pl

Aleksy KWILINSKI
London Academy of Science and Business, London, UK
a.kwilinski@london-asb.co.uk

Abstract

The paper presents research aimed at establishing the opinion about journalists and journalism in the country covered by the so-called hybrid war waged with the Russian Federation after the illegal annexation of Crimea in 2014. An important element of the conflict is the use of disinformation. Such activities are also disseminated through the mass media and the social media. Hence, an important research goal was to establish the respondents' views on the scope and nature of fake news, as well as the impact of their distribution on the working conditions of journalists and the social perception of the profession. The study was conducted with the use of survey method in the town of Sumy, located in eastern Ukraine near the border with Russia, several days before the introduction of restrictions related to reducing the spread of the SARS-CoV-2 virus in March 2020. The main results prove that the practice of distributing fake news in Ukraine is widespread, there is a low social prestige of the profession of journalist and therefore there is a need to introduce restrictions on access to the profession.

Keywords: social communication, journalism, mass media, social media, journalistic ethics

Introduction

The research project carried out from 24 February to 6 March 2020 among 700 students of Sumy State University in Ukraine was aimed at establishing the perception of changes taking place in the system of social communication. The subject of the research was to reveal opinions on the conditions affecting the functioning of the mass media and social media. Within this aspect, it was necessary to verify the degree of approval for the activity of mass media, expressed, among others, in the authority of the journalists' profession. Beside the level of appreciation for the social role of the mass media professional, an essential task was to assess journalistic professionalism, which determines the content of media messages.

The formal authority of journalists and the perception of their professional competence were related to the issue of open access to the profession. Elements of corporative approach may contribute to the improvement of knowledge, skills and professional preparation of people willing to deal with the distribution of news in the structures of tabloidization1ed media market entities. Moreover, they may also pose a threat to the freedom of presenting views and expressing opinions, limiting the freedom of speech. The functions assigned to the independent press may be obstructed by various processes such as progressive convergence, structural concentration or tabloidization. The effects of ownership supervision, however, in many cases make it impossible to perform the control function. The local government press is an example of this phenomenon. Students expressed their opinion on the principles of activity of local administration on the media market.

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One of the barriers impeding the distribution of reliable, credible and proven information is the spread of so-called fake news. Distorted, manipulated or even untrue content is not only a side-effect of the interaction of media activity with persuasive activity, the entertainment industry or achieving political goals. They also affect the main stream of the mass media. Next aim of the study was therefore to identify the perception of scale, type and social range of disinformation. Respondents shared their feelings about the segmentation of manipulated broadcasters. Ukrainian students also commented on the potential consequences of confronting traditional activities of media entities with the distribution of fabrications, misleading information and defamation, which can be both an opportunity and a threat to the mass media.

In open-ended questions asked on the day before the implementation of restrictions related to the prevention of the SARC-CoV-2 coronavirus pandemic, the students expressed their observations on the threats to modern journalism. They also presented their thoughts on combating disinformation. Sumy is a town in the northeastern part of Ukraine near the border with Russia. At the end of March 2020, 13.7 thousand students attended the Sumy State University there.

(Among the students — besides Ukrainians — there were also citizens of the following countries: Afghanistan (3), Angola (2), Anguilla - overseas territory of Great Britain (5), Azerbaijan (12), Bangladesh (4), Brazil (1), Democratic Republic of Congo (2), Egypt (25), Ecuador (3), Ethiopia (1), Finland (1), Ghana (59), India (640), Iran (1), Iraq (8), Ireland (1), Israel (1), Yemen (1), Jordan (191), Kenya (23), Congo (1), Lebanon (9), Libya (8), Mongolia (1), Morocco (15), Nigeria (238), Pakistan (4), Rwanda (2), South Africa (2), Gaza Strip (71), Sudan (1), Sweden (4), Syrian Arab Republic (3), Tanzania (38), Tunisia (6), Turkey (142), Turkmenistan (14), Uganda (1), United States of America (1), Uzbekistan (42), Zambia (10), Zimbabwe (19).

The impact of the Internet on the development of social communication

In recent years, significant transformations in social communication processes can be observed, caused primarily by computerisation in its broadest sense. Information and telecommunication technologies are nowadays one of the most important factors shaping the way knowledge and information is diffused. Phases of information technology development, starting from databases, through closed networks to open networks (Internet) are characterised predominantly by qualitative changes, which have significantly influenced the way information is distributed and access to all information resources. The Internet is undoubtedly a medium that not only has changed the world, but certainly has changed the way this world is evolving (Badzińska, 2013). Today's journalists need a wide range of knowledge, technical and digital skills. In this context, the concept of digital journalism appears here (Kawamoto, 2003). Communication online is very different from traditional communication. First and foremost, it is based almost exclusively on verbal communication, which under typical conditions only serves to convey content. The non-verbal aspect used to establish relationships and convey attitudes is limited to a minimum (Pease, 2001). Internet interactions have their own laws resulting from their asynchronous nature, anonymity and immaterialness of this form of communication, introducing interpersonal contacts into new areas where classical theories developed based on social sciences are not applicable (Juszczyk, 2011).

As Badzińska (2013) writes, "the interpenetration and unification of the virtual and real worlds is occurring today to an unprecedented extent, and hypermedia communication has become the hallmark of fundamental social and economic changes on an international scale. This is reflected both in the media and the potential for their use, in the customer and employee behaviour, in the changing approach to commercial transactions, as well as in the ways of searching for information". The concept of information society, i.e. society for which information, knowledge and all ICT techniques play crucial role, appears in scientific considerations in this context (Badzińska, 2013). As Juszczyk writes (2011), the rise and expansion of the Internet allowed to broaden the scope of freedom of speech in the world, giving the possibility to speak to those who were previously deprived of such an opportunity. The Internet exceeds national borders, competes with traditional cultural media (i.e. press, radio and television) and even absorbs them in the process of convergence, and broadens the scope of debate in countries with unstable democratic systems. Still, according to Juszczyk, it is difficult to talk about "global freedom of speech" or freedom of speech in the global dimension, because there are serious barriers on the way. Firstly, the popularisation of the Internet has aroused interest of big businesses, which create or intercept profitable (and thus popular) websites or Internet profiles, incorporating them into the market competition machine and progressive concentration on media markets. Secondly, enormous disproportions in access to the latest communication technologies, as well as in the level of education and in the development of social capital, contribute to the widening of the gap in information and knowledge resources, and thus to the social exclusion of many people in the world. This phenomenon called "digital divide" is an obstacle to the development of the idea of "global public sphere". Thirdly, the public sphere cannot exist in a global dimension, as in many countries of the world authoritarian governments are becoming various ways of limiting freedom of expression on the Internet. Fourthly, although the Internet has become a symbol of the globalisation of

communication, countries still play a significant role in shaping the so-called media order in various corners of the world, especially in the so-called cross-border network (Juszczyk, 2011).

New technologies have a huge impact on modern journalism, especially on the way journalists convey news to the world (Powell III, 2003).

The Internet has quickly redefined the way in which recipients consume messages. This activity was previously limited to reading a newspaper, listening to news bulletins on the radio or watching the news on TV. Nowadays, however, recipients can get "instant help" in the form of the latest news (literally seconds, minutes or hours ago) on the Internet or receive updates on their smartphones, emails or social networking sites (Stassen, 2010; Hoey, 2017).

The role of social media in communication processes

The origins of social media can be traced back to 1979, when Tom Truscott and Jim Ellis created Usenet, a system that allows Internet users to discuss the Internet through public news by combining the idea of Web 2.0 and user-created content (Kaplan, Haenlein, 2010). Among the first websites that can be regarded as early-stage social media are Six Degrees and Friendster. In the case of Six Degrees, the name of this site comes from the "six degrees of separation", a theory according to which each of us is only six contacts from any person on earth. The site was active from 1997 to 2001, with peaks of registered users reaching around 3.5 million. Friendster was founded in 2002 as a competitor of Six Degrees and in just a few months after its official launch it managed to attract 3 million users. Over the years, the number of users reached more than 100 million, although the reorganisation in 2011 did not allow Fiendster to compete with the new services and finally stopped offering its services in 2015 and was officially discontinued on 1 January 2019 (Kaplan, Haenlein, 2010). "I've seen on Facebook..." is a phrase often heard in today's conversations. This social medium and others similar to it were originally developed to help a person connect with friends and like-minded people. Since then they have evolved into powerful communication tools that are used by information media to interact with the audience (Stassen, 2010).

Social media can be divided in many ways depending on the specific features we are looking for. The following division comes from the user connections that exist on the websites concerned (Polańska, 2011):

- Social media (NK.pl, Facebook.com, Myspace.pl, Moja Generacja.pl, Grono.pl);
- Professional (np. GoldenLine.pl, iProfesor.pl, Profeo.pl);
- Publication (np. Fotka.pl, YouTube.com, Demotywatory.pl, Spryciarze.pl);
- Consumeristic (e.g. connected with group purchases Gruper.pl, Groupon.pl, GoDealla.pl, Kumulator.pl, MyGroup.pl, Znizkomania. pl, CityDeal.pl.)

Social media can also be divided according to their function (Networkeddigital, 2010):

- Social media for the publication of opinions and views (blogs, wiki-type websites, Citizen, Journalism) — the most basic category, its main task is to enable all interested parties to express their opinions or views.
- Social media for sharing content (Youtube, Flickr, Slideshare) - the classification is explicitly based on the idea of Web 2.0, all content that is shared by users on this type of media is available from web servers.
- Social media focused on co-creation or cooperation (Google, Docs, MMOs) — the main role is to achieve a predefined goal in the form of a result of cooperation between participants. This social media category is characterised by the formation of ad hoc communities, usually short-term, with a closed character.
- Social media focused on building and maintaining relations (Social networking, Virtual Worlds) — mainly include social networking services, consisting of building and maintaining human contacts.
- Social media focused on communication and discussion - instant messaging (Instagram, Messenger, Twitter, forums, chat) — media heavily focused on discussion and debate, one of the oldest types of networks, in the modern day Internet is often integrated with other types of social media.
- Social media focused on current events and referring to the news (microblogs, civic announcements, livecast, livestream) — reports and reactions relating to current events, focus on current events, have the form of both official alerts and private blogs or livecasts.

Over the last few years, social media have influenced various aspects of life both for individuals and society as a whole (Khang et. al., 2012).

They have led to a significant shift in mass communication towards interactive digital communication. Together with the emergence of the possibility of presenting various activities and events from private life in the media and social networks, the so-called "peer-journalism" has emerged, in which "we become self-journalists, presenting and

reporting on the experiences from our own lives, providing our own information channels for the publications we subscribe to" (Merrin, 2009). In fact, before the rise of blogs and commentaries on the Internet, the mainstream media retained their role as a guardian, belittling or ignoring stories considered unsuitable for public distribution (Farhi, 2010). The current media have developed significantly. Bloggers are playing an active role in presenting different points of view, including a large part in spreading rumours and influencing opinions about problems, events, or public people. In the process of communication, the power of persuasion has gradually shifted from media institutions to active, participatory audiences called prosumers or producers (Hermes, 2009).

With the increasing importance of social media, and more specifically the Internet in creating public opinion, a number of questions arise about the journalistic credibility, the role and significance of the journalistic profession in the modern world, as well as the truthfulness and reliability of news appearing in the mass media (Kiyan, Torenli, 2017). In the era of the digital society, where we regularly reach for information and knowledge on the Internet, and not always verifying the reliability of the sources we use, the dilemma of Internet self-efficacy arises (Rains, 2008) and the place of professional journalism in a modern world.

Journalistic ethics in the Digital Media Age

Journalism is a field of knowledge about communication among people. There are different models of journalism, however, it can be assumed that it is constructing images of reality and proposing these images to the audience, according to their needs, in the form of messages, while preserving objectivity of content and based on the competence of the authors (Furman, 2006). Journalism is also a specific profession, involved in a variety of relationships that often make it challenging to accomplish the assumed missions in this special and quite closed professional circle. Every journalist should ensure impartiality in presenting facts, moderation in expressing judgments, but also be loyal to the organisation they come from. Objectivity and balance have always been included in the principles of journalistic work. In order to achieve them, it is necessary to have autonomy, a certain lifestyle, a code of ethics, as well as an awareness of a separate identity. But the autonomy of journalistic work differs not only according to the types of media, but also their levels (local, regional, national) (Nowakowski, 2017). Journalism is considered to be a profession of public trust, so the representatives of journalism are required to have an appropriate ethical attitude and high quality services. Trust of recipients (listeners, spectators, readers) is a value that is hard to gain, but very easy to lose - the loss of credibility is a consequence of unethical behaviour (Nowakowski, 2017). As Nowakowski (2017) writes, journalism and the public relations industry are not subject to professional certification, so these are open professions, which has its consequences, for instance, related to the selection of staff, which is crucial for the quality of the profession. A great threat posed to modern journalism is therefore the presence of many non-professionals in the sector, as well as the involvement of both the media and journalists in unethical professional practices, mainly related to corruption (Nowakowski, 2017), but also to misinformation or spreading fake news (Rommer et.al., 2020; Sheares et.al., 2020; Popescu Ljungholm and Olah, 2020; Mircica, 2020; Clark, 2020; Dobson-Lohman and Potcovaru, 2020).

As Mrozowski (2001) observes, trust in journalists depends "more on how they present themselves than on what they represent. Being unable to check their reliability and honesty (truthfulness), viewers must rely on the impression they make on them, and a good impression is made when they are on-site and trying to reach different sources of information, when they get emotionally involved and can make contact with the recipient when they speak in a convincing way and have their own style. In short, the recipient believes the journalists and their relationship when they attract recipient's attention and appear to them to be an interesting personality, i.e. when the journalists create the right image of themselves". As Laskowska writes (2011), the contemporary status of the journalist's profession probably derives from the phenomenon — called by Krzysztofek (2006) — as "de-journalism" or as "disintermediation of the message". It means that due to new technologies a "living" intermediary has become unnecessary. This means that instead of a communication model: sender-medium- recipient is rather a server-customer model, which is not without significance for journalism.

Modern journalism is marked by the dynamic development of modern ICT technologies, as well as mobile devices that enable instant communication from almost anywhere in the world.

There are no other technological innovations that would have a more two-way (or even contradictory) impact on journalistic practice than the Internet. On the one hand, this medium has enabled journalistic practice, offering new opportunities for practitioners. On the other hand, it is perceived as a journalistic nightmare, resulting in a multitude of ethical pitfalls related to its ability to "instantly spread searchable information without space constraints…" (Chari, 2019). The widespread use of the Internet causes such ethical dilemmas as violating someone's privacy, displaying images of violence, spreading rumours, or trolling (Laskowska, 2011). The issue of ethics of modern journalism is also raised by Sztyber (2020). The author asks whether there is any place for journalistic ethics in modern media. As she observes, "when entrusting their attention to the media, the recipients expect the journalistic message to be truthful, and also prepared according to the rules of the journalistic craft. However, this is determined by a number of

factors — apart from legal restrictions and obligations towards one's employer — this can also be determined by the sense of duty to act in accordance with professional ethics. Reliable journalism competes today with other, mainly material values — all information is a commodity that generates income".

Perception of journalists and journalism – research results

Occupational Prestige

The students asked to assess the social reputation of the journalist profession most often considered it to be average (58.4%). The next group of respondents were those who were convinced of the high authority of mass media employees (35.1%). The rest (6.7%) believed that the reputation of journalists among the citizens is low.

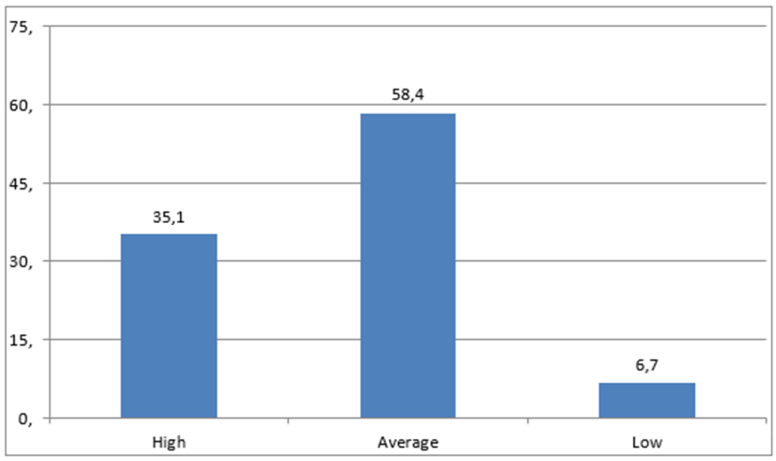

Fig. 1: Opinions on the professional prestige of journalists (%).

The Trend of Prestige Change

In contrast, students who analysed the trend of prestige change were convinced of its growth (42.1%). Much fewer respondents supported a decrease in social recognition (26.7%). Every third student did not have a clear opinion on the subject (31.2%).

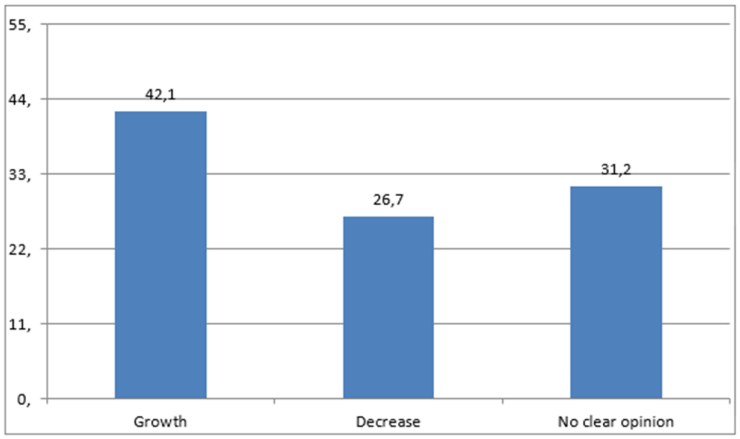

Fig. 2: Evaluation of the direction of social transformation of the prestige of the journalist profession (%).

Journalist Professionalism

Among the students presenting opinions on the professionalism of the journalistic environment, the majority of those who considered mass media employees to be professionally prepared for work (62%). The second place was taken

by those who could not determine the level of qualifications of journalists (23.1%). The fewest respondents indicated a lack of competence to properly perform journalistic duties (14.8%).

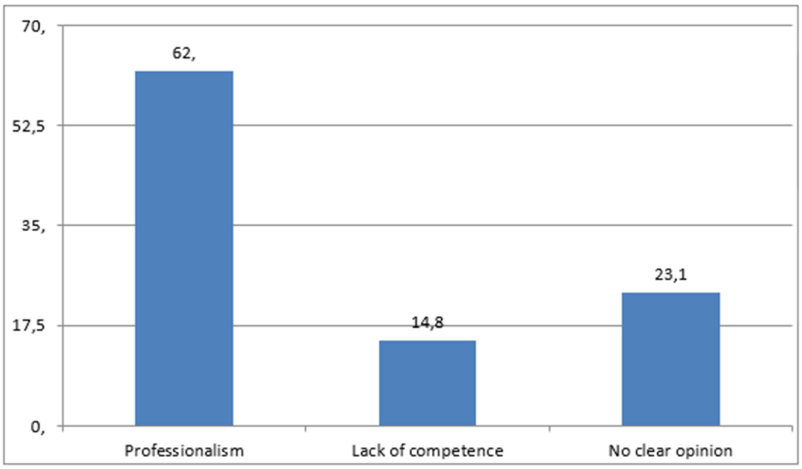

Fig. 3: Evaluation of the professionalism of mass media employees (%).

Access restrictions to the profession

The opinions on the legitimacy of introducing corporate restrictions on access to the profession of journalist were extremely polarised. The majority of students (75.5%) emphasised that they were necessary, even if in their basic form (e.g., the need to have a degree, membership in an organisation or professional self-government, no criminal record, etc.). Much fewer respondents (12.2%) were in favour of free access to the possibility of practicing the profession, and at the same time the harmfulness of creating any barriers. The rest of the respondents chose the answer "I do not know".

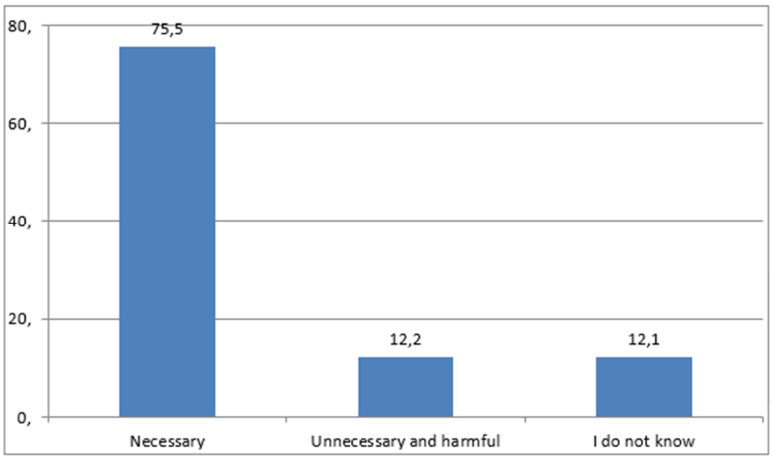

Fig. 4: Students' opinions on the legitimacy of introducing corporate restrictions on access to the profession (%).

Local government press

The press published by local government entities in the current legal status in Poland cannot reliably and impartially review the proceedings of the local administration, as the controlled entity cannot also be a controlling entity. Hence, since 1990 there has been a public debate devoted to local government media, but so far no uniform rules for the presence of local governments on the media market have been developed. That is why, the question to Ukrainian students is whether the municipal authorities should have their own mass media (local government television, radio, press, internet portals, social media, etc.)? The vast majority of respondents considered such activity to be legitimate (65.5%). The opposite opinion that deny municipal structures the right to operate in the media market, was expressed by fewer students (23.4%). The rest of them had no clear opinion on the functioning of the local government press.

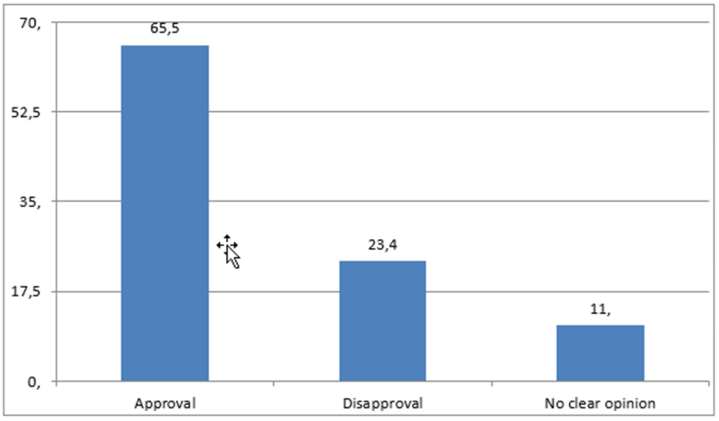

Fig. 5: The respondents' opinion on the activity of municipal authorities in the media market (%).

Opinions on the nature and social range of disinformation

Disinformation Range

According to the vast majority of research project participants, the spread of "fake news" is now a common phenomenon (87%). However, its incidence was reported by only one in ten respondents (9.1 percent). In response to the question about the social range of the manipulation of the news in the media, the lowest number of people who did not have a clear view on the subject was reported (3.8%).

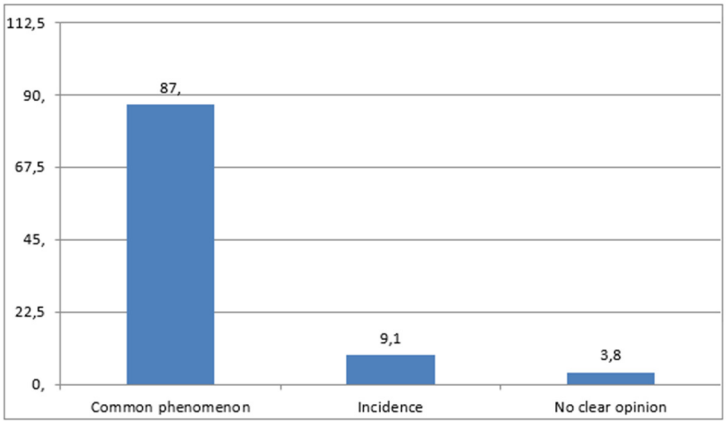

Fig. 6: Opinions on the escalation of disinformation spread in the media (%).

Sender Segmentation

When examining the media that are most often used to distribute manipulated messages, the respondents pointed to social media (67.2%). The second largest group of respondents were convinced that "fake news" appear more often in institutional media (press, radio, television, and editorial offices operating in cyberspace) than in social media (24.2%). The others did not know how to accurately identify the facts.

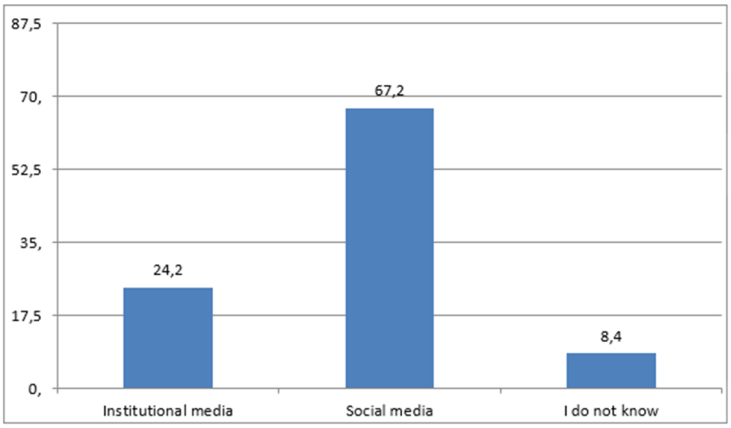

Fig. 7: Characteristics of the most common disinformation sources in the opinion of the respondents (%).

The Impact Of Disinformation On Journalism

The participants of the research project also commented on the ramifications of the distribution of manipulated news for editorial offices that function according to the ethical principles of traditional journalism. Nearly half of the respondents saw the influx of "fake news" as an opportunity for professional and reliable editorial offices to gain recipients expecting reliable and impartial information (46.2%). The contrary opinion was expressed by the second group of respondents, who considered manipulations to be a threat to editorial offices that comply with ethical standards, since, among others, disinformation devalues objective journalism replaced by entertainment (27.1%). The rest of the respondents did not consider themselves competent to express an opinion on the subject (26.5%).

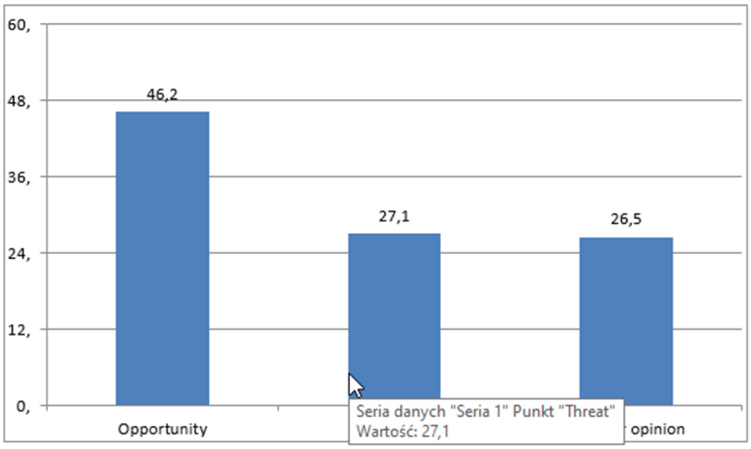

Fig. 8: Respondents' opinions on the implications of spreading disinformation for editors seeking to maintain high ethical standards (%).

Summary. Opinions on threats to journalism

Dangerous Disinformation

Ukrainian students' perception of the most important threats to modern journalism was determined by answering an open-ended question about the factors posing the greatest threat to the sense of journalism and the functioning model of the media market. Most students emphasised the disinformation in its various forms. The opinions of nearly 50% of the respondents could be classified as an indication of fake news or manipulation. According to the respondents, there are many reasons why the distribution of fake news is a common phenomenon, there are many motives, methods and tools for spreading them, but the final effect on the media system always remains negative.

The statements about the "untrue information", "false information" (47 indications), "false messages" (44), "manipulation" (35), "fake news" (31), "unverified, unconfirmed, distorted or inaccurate information" (23) or "fakes" (17) were mentioned many times as the source of the crisis of journalism. This set of threats also includes: "distribution of false messages", "plagiarism", and "spreading rumours".

A Serious Fight Against Disinformation

Respondents also mentioned the Ukrainian draft law on combating disinformation among the threats to journalism. It is worth highlighting that the survey was carried out at a time when Ukraine was debating draft legislation to counteract "fake news", but which could also be detrimental to freedom of speech. Apart from the hybrid war waged by Russia (after the annexation of Crimea and the war in the east of Ukraine) and massive disinformational activities, one of the reasons for this decision was the lack of media competence of the recipients. "Volodymyr Borodinsky — Ukrainian Minister of Culture, Youth and Sports — said that more than 90% of Ukrainians cannot tell the difference between false and true information", and therefore, "President Volodymyr Zelenski instructed the government to prepare draft laws to regulate media activities in Ukraine by the end of December 2019" (Rzeczpospolita, 2019). The draft law presented on January 20, 2020 by the Minister of Culture, Youth and Sports stipulated, among other things, granting certificates of trust to the media, creating the status of professional journalists or appointing a government proxy with the right to refute false or inaccurate information and able to verify what is disinformation. "The proxy will be able to arbitrarily judge what they believe to be disinformation and issue warnings to editors who will do so. The proxy will also be able to impose financial penalties amounting to one thousand average Ukrainian salaries, i.e. currently 5 million hryvnia (about PLN 800,000)" (Andrusieczko & Kokot, 2020). The prepared solutions have met with criticism from the journalistic circles. As the participants of the 4th Polish-Ukrainian Forum of Journalists stated, discussions were held in Ukraine "on the proposal of the Ministry of Culture that wants to push through the law on combating disinformation. The idea is right, but in the opinion of journalists, the proposed solutions may significantly affect their independence. We understand the need to fight against disinformation, but this should be done by honestly joining the forces of journalists and the state, and not before a top-down regulation that may lead to the elimination of inconvenient journalists. The new Ukrainian authorities have a lot of pressure to regulate the media, they want to control it through a single institution" (4th Polish-Ukrainian Journalists Forum, 2020). The participants of the debate finally "turned to the Ukrainian authorities to refrain from adopting laws that could threaten the freedom of speech and the independence of journalists" (Karolonek, 2020).

Senders

Students participating in the research project placed the remaining threats to journalism according to a simple scheme of mass communication involving the separation of the sender, the message and the media audience.
The risk factors assigned by the respondents to the first stage of the communication process, i.e. the senders (broadcasters), can be divided into elements characteristic for journalists and media market entities. Journalists are considered both as a community (professional group) and individually as people professionally involved in the preparation and distribution of press materials. On the other hand, media enterprises are not only editorial offices, but also their ownership supervision structures.

Media Entities

In the respondents' opinion, media owners pose a threat, putting business or political goals ahead of the goal of providing the recipients with impartial, reliable and objective information. One of the reasons identified by respondents may be the conditions on the media market, including "bureaucracy of media concerns" and "dependence of media on owners" or even worse, "dependence on authorities or sponsors". Moreover, influences are a source of danger: "large corporations on news in the media" and "public relations agencies on the credibility of news" and the belief that "business people control the media".

The respondents even pointed to "mafia influence on the selection of information and concealment of inconvenient information", "manipulation caused by officials and oligarchs", "interference by magnates" and "corruption of capitalist media corporations and unethical journalists".

The stigma on journalism is also imprinted by "too much competition among the media", shaping "the desire to be the fastest in the transmission of information at all costs", which means that "journalists have to compete for the fastest access to attractive information". Yet, the main measure is "clickability rate". According to the respondents, "too many mass media also pose a threat".

The mass media in Ukraine, according to the respondents, have their own limitations: "practicing government propaganda", "hiding news that is unpopular to decision-makers", "interfering in the activities of the media of

influential people" or submitting to "government pressure". In this way, the mass media "create a framework beyond which the journalist cannot go. They build a model of "journalism based on political influence". Not only does this result in a "loss of motivation to pursue the profession" but it also poses a real danger to those pursuing the profession. This is a category defined as: "a threat to journalists due to the distribution... of truthful information".

Unethical Journalists

Over a dozen times (15 indications) the respondents explicitly mentioned "corruption" or "corruption of journalists" as a dangerous thing for the future of journalism. They described it in words: "Corruption, moral decadence, lack of rules" and "fabricating news in exchange for bribery". The threat is posed by media professionals who are characterised by "lack of ethical principles". They are distinguished by their "obliquity", "the pursuit of business and susceptibility to bribery", which results in the "transmission of false or manipulative messages upon request" or "being prepared to distribute any information, even false information". It is therefore possible to risk saying that "the greatest threat to journalism is ... journalists themselves". The outcome is an increasingly visible "lack of honest journalists" and, as a result, a "decline in the reputation of the profession", which leads to a "lack of respect among the recipients". At the same time, "the official media are becoming more and more unattractive to the audience, and the profession of journalist is becoming less and less prestigious. "The loss of credibility" resulting from "the fact that news in the media can be purchased" is accompanied by "a low level of journalism". The result is "corporate journalism", the creation of "tailor-made information" and "insufficient control in the official media to counteract false messages". The tools include "pressure on journalists from publishers (e.g. TV stations)" or "private organisations that purchase the right news. It was also mentioned that the "openness of the profession" that makes a "large number of non-professional journalists" with a lack of professional competence is dangerous ("ignorance", "poor knowledge of the mother tongue", or even "basic lack of vocabulary". Such journalists are not "objective", but "subjective", "ready to defame others through the media" and thereby lead to the "collapse of the professional image of journalism". Apart from "dishonesty of journalists" and "buying journalists", the reason why "the media and journalists lie", "falsify the reality" and "disinform" is an "unstable situation in Ukraine".

Messages (content)

The products of journalists' work, i.e. the content of the mass media, are also a threat to journalism. In this regard, the respondents mentioned "the propagation of counterfeit and manipulative information, which destroy the prestige of the journalist's profession", "an increase in the number of false information", "disclosure of unconfirmed information, manipulation", " provision of false information", "spread of false information" etc. Along with the frequently raised "lack of verification of information", there have also been allegations of submission to the convention of the "yellow press", i.e., tabloidisation, as well as the publication of "manipulations that try to control people's minds through social engineering practices".

The level of trust in journalism is also reduced by "false websites containing manipulated information", "the spread of social networks through which false information is distributed", "content spreading hatred based on nationality".

Recipients

Respondents placed some of the revealed threats to journalism on the side of the media audience. Several times "lack of trust" or "distrust of the audience" was mentioned. This category also includes the "risk of losing public trust".
The respondents explained that "people are becoming more and more educated and confidence in the media that manipulate information is decreasing", "a large number of young people are convinced that the information given to us is neither objective, nor reliable or accurate" and "if the media provide false information, people stop trusting them". As a result, "too many people no longer believe in what journalists write, and this undermines the prestige of the profession from the bottom up".

Another stage may be "aversion to the media because of their compromising activities", "dissatisfaction of the recipients", "citizens' resentment towards the media", "recipients' anger at the media for spreading false information" or "people's defiance against lies in the media". According to the respondents, there is a real "threat that people will start attacking journalists because of false information". Hence, "the threat to people in the media is the nation" and "ordinary people — because of the large number of false information spread".

Another areas of risk are the consequences of technological development. This causes that a "journalist is an outdated profession" replaced by "blogs and bloggers", often also "haters", but above all "social media" (21 indications) and "social networks that develop without the need of journalists". In this way, "traditional media are becoming a secondary focus" and "the further technological development of the Internet" makes it "common to spread news through social networks outside the official media". Therefore, traditionally perceived recipients become co-authors

of redistributed content owing to the social media, which enables "full disclosure of classified information" and "distribution of information on social networks without the participation of journalists".

The authorities' Influence

The functioning of media market entities, as well as the behaviour of recipients is affected by the political and economic environment. Therefore, another commonly mentioned threats to journalism are: "political influence", "politics", "government", "government influence" (42 indications). It is not only "a lack of interest by the government in publishing true information" or "a lack of legal protection for journalists".

The essence of the problem lies in "pressure on the journalist from the state", "restrictions on freedom of speech", "restrictions on publication rights", political manipulation", "control of the media by some influential people", "manipulation of the news or the giving of real news, but only those that have been approved by the government" or "a growing amount of information that cannot be published in the official media". The collection of these opinions is further supplemented by convictions of "political persecution" and "government pressure on journalists".

The underlying idea is that politicians and economic power centres are seeking to introduce "censorship" and "media control". This is manifested by "increasing the influence of the authorities on the activities of journalists", "blackmail and manipulation of journalists", "intimidation by the government", "distortion of information by the government" and distribution of "fake news". The consequences of these practices for journalists are "bribery or murder", "health hazard", "threat posed to honest journalists", "physical risk to journalists", "intimidation by the government" and "cruelty to truthful journalists". Examples of "punishment for telling the truth" are "falsification of cases against journalists by the public prosecutor's office", "turning indignant journalists into criminal offenders" or "prison sentences".

The claim of "limiting the freedom of the media and even threatening the lives of journalists" was repeated several times (14 indications). The following were also mentioned: "physical attack on journalists", "threat to people close to the journalist", "risk of loss of job or life", "physical violence and threats". Besides such drastic forms of violence as those described in statements such as: "if journalists tell the truth and do not accept the lies of the politicians they are supposed to describe, it can endanger their lives" or "journalists look for the truth about someone or something and then suffer from people who did not want it," the respondents mentioned other reasons why "journalism becomes a dangerous profession". Such reasons include working conditions: "There is a problem with employment for journalists", "journalists have low salaries", "a small number of jobs in the media sector", "there are many journalists now and there is a danger that there will be no jobs for them". The economic context also means that "journalists are not allowed to tell the truth, they are forced to remain silent or prepare false information". This gives rise to a "feeling of insecurity".

The external factors of negative changes in the media market identified by the respondents were also: "war and terrorism", "poor relations between countries in conflict", "introduction of states of emergency or martial law", "martial law in Ukraine", "military situation in Ukraine" and "the effects of the coronavirus pandemic, including restrictions imposed by the state authorities".

Conclusions

The aim of the research was to identify factors affecting the perception of journalism by students in Ukraine. The majority of respondents (87%) believed that in a country waging the so-called hybrid war with Russia, the practice of distributing fake news is widespread. It concerns, however, mainly social media (67%), which nearly half of the respondents interpreted as an opportunity for reliable mass media to strengthen their position. Nonetheless, the majority of respondents (75%) stated that restrictions on access to the journalist profession are necessary. The authority of a journalist in Ukraine was described by the largest group of respondents as average (58%), but with a tendency to increase social prestige.

A similar study was completed in March 2020 also among the "Polish group", which included students from the University of Silesia in Katowice as well as the "African group" composed of students from Ghana Baptist University College in Kumasi (Ghana) and Bingham University in New Karu (Nigeria).

The results obtained among respondents from Ukraine showed the highest level of disapproval towards the official mass media. They were indicated by as many as 24% of respondents as a carrier of disinformation, compared to 9% in West Africa and 4% in Poland. In Ukraine, the highest number of responses was also noted, suggesting the need to introduce restrictions on access to the profession of journalist, and responses proving the low social prestige of this profession. At the same time, Ukraine was the only research area where opinions were noted about a physical threat

to the life and health and repressions towards people wishing to perform journalistic duties in an objective and raliable manner.

Acknowledgment

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Accounting (MFCA) on Health Service Industry toward Operation Sustainability

Dianwicaksih ARIEFTIARA
Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia, and dianwicaksih@upnvj.ac.id

Ria Maria THERESA
Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia, and ria.maria@upnvj.ac.id

Retna SARI
Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia, and retnasari@upnvj.ac.id

Abstract

This research intends to analyze the level of efficiency at the hospital to increase the efficiency of productivity and industrial competitiveness, and to help realize the government's commitment to support the SDGs program. This research performed a productivity analysis following Material Flow of Cost Accounting (MFCA) which is divided into several stages, namely the planning stage (Plan), the second stage of implementation (Do), the third stage of evaluation (Check), and the last is the follow-up stage (Act). The research was conducted on financial and operational reporting data for three months and showed that the current efficiency level of Hospital X was 68.54%, indicating a high level of efficiency of the hospital. However, with the conventional method, the hospital does not know the level of inefficiency related to the environment or pollution caused by the hospital's operational activities. The implementation of MFCA resulted that the hospital's operational activities for three months resulted in a negative product of 9% of the total material input or Rp. 12,516,456 which previously was not detected by conventional methods. The results of the analysis of material flow tracing using this MFCA have the main benefit of minimizing waste thereby saving the environment from damage, thus realizing the sustainable operation of hospital X. This means that if this MFCA is applied continuously, hospital X will not only save expenses but could achieve eco-efficiency and could realize continues improvement so that in the long-term operation sustainability could be achieved.

Keywords: Material Flow Cost of Accounting; productivity efficiency; material loss, hospital.

Introduction

Indonesia as a member of the G20 is committed to supporting and achieving the SDGs, which are the global development agenda for the period of year 2016-2030. In line with Indonesia's commitment to the SDGs, Material Flow Cost Accounting (MFCA) is a technique to calculate material loss or "waste". In the current production process, generally, companies only focus on output that was produced, the output that will be transferred to the next processing processor to consumers. Waste/material loss at MFCA is all material (input) that is wasted and does not enter the output of a production process (both goods and services). The productivity improvement program through MFCA is still relatively new and has not been widely or generally known by business people and institutions in various regions in Indonesia, especially in the health service industry.

Several previous research regarding MFCA applications were generally carried out in processing (manufacturing) companies both in Indonesia and around the world, such as Western, Asia-Pacific Countries (Christ & Burritt, 2016; Darkamin & Barmaki, 2019; Tajelawi & Gharbarran, 2015; Ichimura & Takakuwa, 2013). , It was found that

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MFCA is a useful indicator of the company's potential growth and environmental impact. Many companies that implement MFCA could recognize losses (waste) that were previously not realized. Some of the research evidence suggests that MFCAs could improve decision-making procedures and increase profitably. The MFCA method is differ from traditional manufacturing cost of production system that allows company to trace their inventory efficiency by controlling material waste. There is still very limited research on eco-efficiency, especially in the health service industry, so it is necessary to conduct research analysis using MFCA considering the benefits it will have towards improvement to the health services (hospitals).

Hospitals as service providers in the health sector., In their business processes, a lot of material are needed as input and consume various resources to support health services. The hospital has allocated a large source of funds in investing in medical equipment, buildings, and providing other supporting facilities. These various tools, buildings, and facilities require resources to be used such as electricity, water, other supporting materials complete with certain specifications (medical supplies such as gloves, masks, syringes, alcohol, bandages, gauze, etc.), in addition to it also requires large maintenance costs as well as operational costs. Most of the operational costs are fixed costs, while hospital income is a variable, variable component, the amount of which could not be determined with certainty each month. For the purpose of going concerned, the large operational costs of a hospital make medical expenses both outpatient and inpatient expensive. In addition, if it is seen that the capacity of hospital facilities is not used optimally, hospital waste on medical supplies and water and electricity resources could have an impact on the high burden borne by the hospital, both monetary and non-monetary (negative impact on environmental sustainability). There is an urgent need to find solutions for hospitals efficiency practices/procedures/strategies, in order to help reduce operational costs so that in the end help realize the SDGs, namely health and welfare; life on land and under the sea; sustainability of the city, environment, and surrounding communities.

This research focuses on solving inefficiency problems in hospitals, analyzing the current level of efficiency of Hospital X, and identifying efforts to increase production efficiency through eco-efficient decisions using Material Flow Cost Accounting (MFCA) to improve economic, environmental performance and achieve sustainable development goals. (SDGs). This research is expected to contribute in three ways, first, this research is expected to have the benefit of helping deepen the understanding of current MFCA. This research provides a literature review regarding the application of MFCA in the service sector, namely hospitals, where as far as the researchers know, there is no literature on this matter before. This research is expected to be a literature review regarding alternative accounting methods in calculating environmental costs. Besides, this research is expected to provide empirical evidence of the benefits of MFCA in supporting environmental sustainability and increasing efficiency, productivity, and company performance. Second, as input and evaluation of the ongoing production process, to be able to identify, reduce, and manage waste/material loss to increase the efficiency and productivity of the company. The results of this research are expected to help management understand how MFCA works or mechanisms. Third, help expand the reach of the Indonesian government's program in realizing the commitment of Sustainable Development Goals (SDGs) in general, as well as the Ministry of Manpower's program in particular, namely as an increase in productivity. Finally, the results of this research are expected to contribute to the reduction in costs that must be borne by the community to enjoy health facilities. With MFCA, it is hoped that it could reduce costs and increase efficiency and productivity, so that companies no longer impose waste or material loss on end consumers, thus the price set to consumers becomes lower and more affordable. This is empirical evidence of how MFCA is applied to industry, especially industry. Health services, namely hospitals, considering that MFCA is a new method and has a very limited implementation in Indonesia.

Literature Review

Resource-Based Theory and Environmental Management Accounting

In the literature on management accounting, theory regarding company strategy, namely the Resource-Based View (RBV), argues that ownership and identification of key resources under its control could create a sustainable competitive advantage for companies, namely through the development and distribution of products or services that have distinctive characteristics to consumers (Barney, 1991; Clulow et. Al., 2007). Several studies on RBV aim to find empirical evidence of how consumers perceive the company's key resources (Clulow et. Al., 2007). Based on RBV theory, the management of corporate’s main resources is crucial. Environmental management accounting

(EMA) is a manager's tool for calculating and managing as well as providing information in order to make decisions and accommodate company interests for concerns about the social and environmental impacts resulting from their business processes (Burritt et al., 2008), and the theory focusses on both the short and long term (Christ and Burritt, 2015). Several research focuses on environmental issues have begun to emerge in the field of environmental management accounting research since 1988, although they are still small in number compared to other accounting fields (Qian et al., 2010; Madein and Sholihin, 2014)

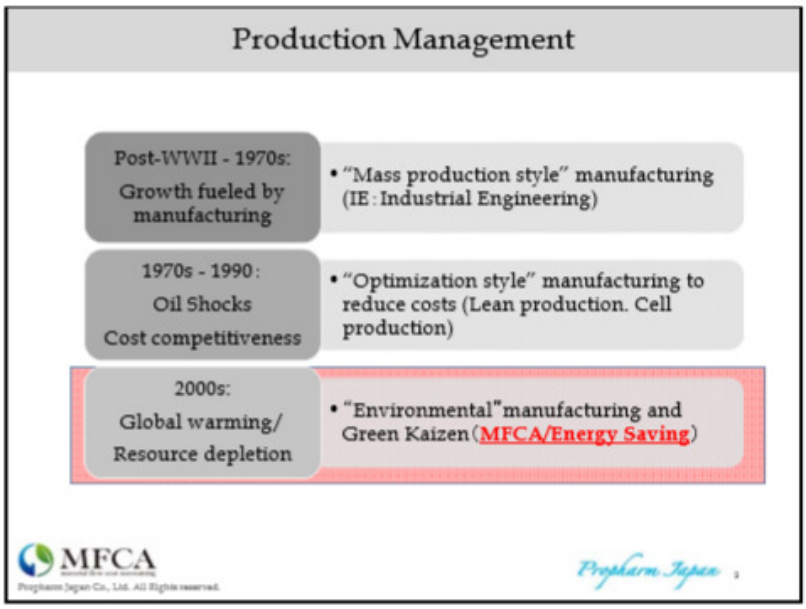

Source: Tachikawa (2015)

Fig. 1: Development of Production Management Practices in the World

Material Flow Cost Accounting

Material Flow Cost Accounting (MFCA) is an accounting technique that calculates the amount of material loss or waste in detail in each cycle involving input, process, and output (Tachikawa, 2015; Christ and Burritt, 2015; Ministry of Manpower, 2015). This MFCA allows companies to obtain more output with minimal waste or loss of input material so that it has a significant impact on cost reduction and quality improvement (Kemenaker, 2015; Tachikawa, 2015).

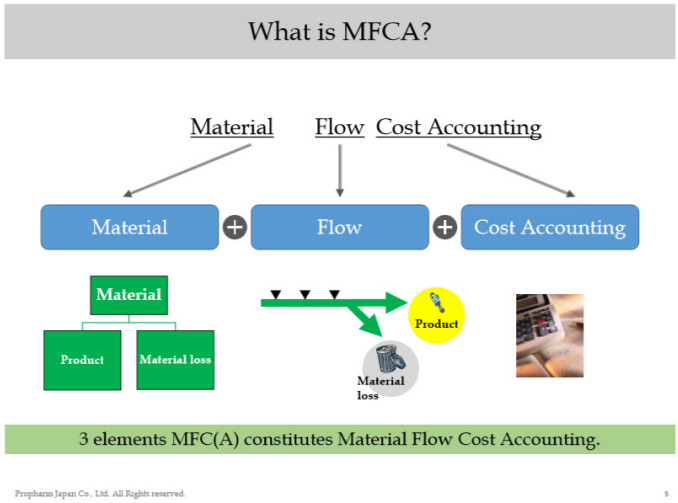

Source: Tachikawa (2015)

Fig. 2: Material Flow Cost Accounting

Tachikawa (2015) explains that MFCA has advantages because its application is not limited to certain types of industry and company size, but could be applied to any industrial scope and field. Through MFCA, companies will get three benefits, namely: (1) reduced costs because MFCA is able to reduce material loss/waste; (2) increase energy efficiency, to reduce CO2 levels which are very beneficial for the environment; (3) increase material efficiency, because MFCA is able to identify the production process per-flow of material to output (Tachikawa, 2015). Christ and Burritt (2015) examined the role of scientific research in helping deepen understanding of current MFCA developments.

Methodology

Research Approach

This research uses mixed method approaches to solving research problems. A qualitative approach is used because this research was carry out focused and in-depth research on a single object of research in collecting data, this method is also called the case research method. Quantitative analysis is also used in this research to prove that the implementation of MFCA brings productivity changes for the hospital compared to before the implementation of MFCA.

Types of Data and Data Collection Techniques

This research uses primary and secondary data types. This research is divided into two stages, which shown in research design in Figure 3

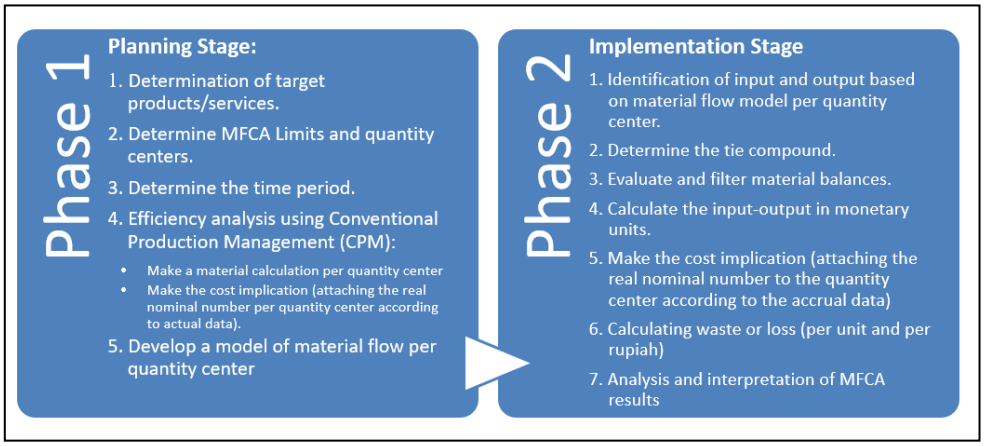

Fig. 3: Research Design

Description of Research Object

This research was conducted at a private hospital located in Depok, West Java. According to the agreement with the hospital management, for the purposes of this research, the hospital's identity is kept secret. Hospital X is a relatively new hospital and is open to the public and serves various groups including Indonesian Insurance and Social Security (known as BPJS-in Indonesian terms) participants. The hospital stands on a land of +/- 2000 square meters and consists of 4 floors. The hospital's services and facilities are very complete, consisting of medical facilities in the form of dialysis; Emergency Room (IGD); Intensive Care Unit (ICU); Neonatal Intensive Care Unit (NICU); Pediatric Intensive Care Unit (PICU); Radiology; Delivery room; inpatient and outpatient rooms; Polyclinic; Pharmacy; Hemodialysis and Laboratory. This hospital was chosen because as a newly established hospital it is still looking for an effective and efficient form or design of services which in the end could calculate the price of services per patient more precisely

Finding and Result

This research was conducted in the midst of the Covid-19 Pandemic, so the data collection process was carried out online in the context of physical distancing. In accordance with the agreement with the hospital management, the scope of this research is limited as follows:

A. Operational scope: Dental Poly

B. Time: The Period of three months (in June, July, and August 2020)

C. Data: - Part of the Income Statements and Dental Poly operational Process Report

Hospital management provided data and research time to the research team for only 3 months, from June until August 2020.

Dental Poly Operational Process

The research was conducted on dental poly, where the operational process of dental poly consists of 4 main processes, namely:

A. Patient registration.

B. Patient examination.

C. Payment.

D. Pharmacy

The operational process for dental poly services could be seen in the following flow chart (Appendix 1):

-Insert flowchart here-

Hospital Operational Efficiency Level

To answer the formulation of the first problem in this research, namely the analysis of the operational efficiency of the hospital, the following data were collected regarding operational efficiency for 3 months:

Table 1: Summary of Financial Data

Financial Data Hospital X in Depok
Division - Dental Polyclinic
From June to August 2020

Information		Amount
Dental Poly Income June August		Rp 195,410,169
Cost :		
The purchase price of drugs, June to August	Rp 1,862,072	
Dental Poly Vendor Bill June to August	Rp 2,825,000	
dentist nurse salary	Rp 16,473,723	
Doctor's salary	Rp 71,793,215	
Doctor consumption	Rp 370,807	
Depreciation of Tools at Dental Clinic	Rp 8,578,231	
Depreciation of Panoramic Tools	Rp 32,031,250	
The number of costs		Rp 133,934,299
		-
Profit or Loss Dental Polyclinic June to August		Rp 61,475,870

Source: internal hospital X in Depok.

From this data, the level of operational efficiency will be calculated using the formula:

$$\text{Efficiency} = \frac{Total\ Input}{Total\ Output}$$

If this efficiency value is getting closer to 1, the hospital could be said to have carried out its operational activities effectively.

Planning Stage

This stage is the first stage in an eco-efficient analysis using Material Flow Cost of Accounting (MFCA). This planning stage consists of:

a. Determination of product or service targets.

In accordance with the results of discussions with the management of Hospital X in Depok, the planning stage begins with determining the target product/service which is the scope of research. In this research, the target of services to be analyzed using MFCA is outpatient services at the dental polyclinic. The choice of this dental polyclinic was intended because the procedures and operational scope were simpler than other services.

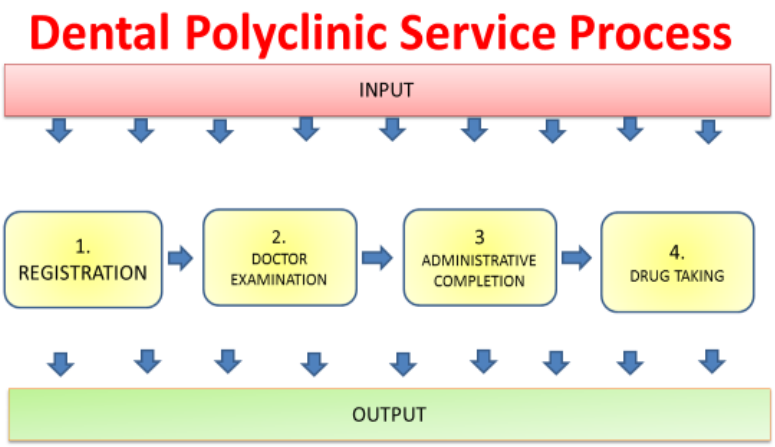

Fig. 4: Service Target MFCA of Hospital X

Source: Internal Hospital X in Depok

b. Determine MFCA Limits and quantity centers.

In accordance with the MFCA concept, it is necessary to determine the quantity center in implementing a good MFCA. Quantity Center is a unit within the organization which involves input, process, and output, output in one quantity center could consist of a successful product (positive product) and the rest of the material/waste (negative product/waste). If described briefly the scope of the service target in relation to input - process - output, then the dental poly service process is as shown on Figure 4.

c. Specifies the time period

Based on the agreement with the management of hospital X, it was agreed that the focus of this research was the operational process of hospital X for three months, from June to August 2020.

d. Efficiency analysis using Conventional Production Management (CPM)

The efficiency analysis of RS X Depok with conventional methods is as follows:

$$\text{Efficiency} = \frac{\textit{Total input}}{\textit{Total output}}$$

$$\text{Efficiency} = \frac{\text{Rp } 133{,}934{,}299}{\text{Rp } 195{,}410{,}169}$$

$$= 68{,}54\%$$

e. Develop a model of material flow percenter quantity

If in the previous section the quantity center that is the focus of research has been determined, at this stage it is to compile a material flow per quantity model. This stage of the research begins by identifying the activities that occur at each quantity center. Here are the details of the activities in each quantity center:

1. Quantity Center's Registration.
   Quantity Center (QC) registration is the beginning of service activities at the dental polyclinic of hospital X Depok. The activity carried out is for patients (either new or old patients) to register for service that day at the registration counter by bringing their medical card (old patient) or KTP / personal data (new patient) and insurance card (if any).
2. Quantity Center's Doctor Examination.
   The doctor's examination is the second QC in the dental polyclinic, this activity starts from the patient re-registering or reporting to the nurse on duty for the dental polyclinic to record complaints or the purpose of coming for treatment. The nurse records the patient's temperature and records the answers to patient complaints. Then the patient is waiting to be called into the doctor's examination room. After the patient has a turn to enter the examination room, the activity that occurs is that the doctor conducts interviews, asks for complaints and records in a medical record book, and performs an examination. When examining the need for drugs and medical equipment to be used, it depends on the patient's case. After the examination, the doctor will provide an introduction to supporting services (only if needed) such as laboratories, radiology (photo panoramic), and so on, if needed. The doctor after the examination will write down the examination note that day in the medical record book, provide a prescription note (if any), and write down all examination actions and drugs or treatment carried out on the treatment form as a basis for charging medical expenses or financial administration settlement by the patient. The doctor also provides a paper schedule for further control (if needed).
3. Quantity Center's Administrative Completion.
   Further activities are at QC completion of administration, starting from the patient queuing at the cashier with documents and making payments. As per the queue, the cashier serves the patient when it is their turn. The patient shows the documents such as a completed medical treatment form, drug prescription, etc. Then the cashier checks the information system, then gives the rate and calculates it. The patient then pays according to the cashier's bill, both cash, and debit then receives proof of payment and proof of payment for the purchase of the drug and drug prescription from the cashier for taking the drug at the pharmacy.
4. Quantity Center's Drug Taking.
   The activities that occur in QC for drug taking are as follows: (1) the patient goes to the pharmacy unit with evidence of drug settlement and a prescription from the doctor; (2) pharmacy officers process drug-taking; (3) verification of patient data and drugs submitted. Furthermore, after the patient receives the medicine, the dental clinic service process is completed and the patient goes home.
   The activities of each QC if described are as follows:

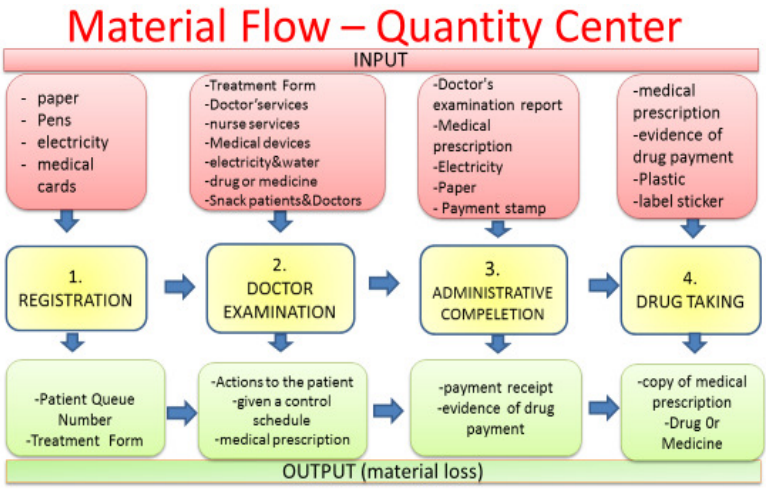

Fig. 5: Quantity Center MFCA of Hospital X

Source: Internal Hospital X Depok

The next step, after identifying the activities of each QC, identifies the material flow (material flow). This will be presented in the next section.

Implementation Stage:

Following are the inputs and outputs based on the material flow model per quantity center:

1. Quantity Center's Registration.
   Inputs needed in QC are paper (form) registration (for new patients), ballpoint for writing registration, electricity for application system resources on the computer, and blank medical card form to print new patient identities. The output on the registration QC is the queue number and the patient treatment form.
2. Quantity Center's Doctor Examination.
   Inputs needed in this activity are medical treatment forms, doctor services, nursing services, medical devices, electricity, water, equipment (medicine, etc.), doctor snacks, and patient snacks. The output produced in this activity is actions to patients, control schedules, drug prescriptions, and doctor's examination reports/treatment forms that contain details of the doctor's actions (bills).
3. Quantity Center's Administrative Completion.
   Inputs needed in this activity are the doctor's examination report, drug prescription, electricity, medical treatment receipt paper, payment stamp. The output produced in this activity is a receipt for payment of examination fees and proof of drug settlement and drug prescription.
4. Quantity Center's Drug Taking.
   Inputs required in this activity are drug prescriptions, proof of payment of drug payments, plastic to wrap drugs, label stickers to record drug information. The output produced in this activity is a copy of the drug prescription and the drug that was submitted.

b. Determine the tie compound.
   This stage of the research analyzes the ties in the MFCA or tie compound as a cycle of the relationship between input-process-output, described as Fig 6.

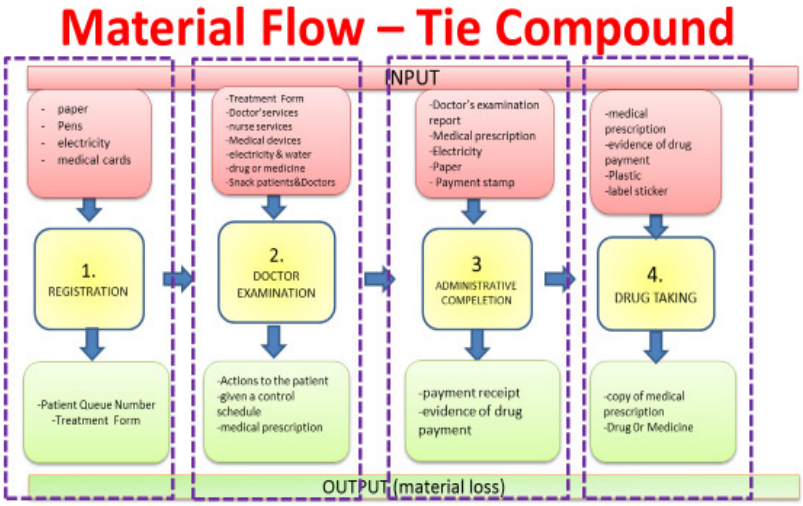

Sumber: Internal RS X Depok

Fig. 6: Tie Compound of Hospital X

In Figure 6 above, the tie compound at hospital X in Depok which is the object of the research consists of 4 tie - compounds, namely:

1. Tie- Compound Registration.
2. Tie – Compound Doctor Examination.
3. Tie – Compound Administrative Completion.

4. Tie – Compound Drug Taking.

These four tie-compounds form the basis of MFCA analysis.

c. Evaluates and filters material balances and calculates the input-output in monetary units.
   The next two steps in this research are presented in one section. Evaluation and filtering of material balances are carried out by the finance department by collecting supporting data for financial statements, namely a list of material balances. This research was conducted from June 2020, so that the material balance needed is the balance at the end of May 2020. Furthermore, the research is continued by calculating the input-output that is included in the quantity center in the monetary unit.
d. Making the cost implication (attaching the real nominal amount to the quantity center according to the accrual data)
   This step is carried out by identifying the positive and negative products of each quantity center. A positive product is the number of resources that are consumed into service components produced or enjoyed by dental clinic patients. Negative products are tracing resources that are actually wasted or waste, where these resources are not consumed in real terms to produce services. Some resource components are not available with accurate data because they are at the hospital level (not at the Poli), but from the explanation of the hospital's financial staff, a logical assumption is made.
e. Calculating waste or loss (per unit and per rupiah).
   Waste or loss is identified from the search results for each quantity center and an explanation from the hospital financial staff. Waste or loss in the manufacturing industry could be easily identified even using conventional cost calculation methods. However, this is not the case with the service industry, waste or loss could not be identified if the company uses conventional cost calculations.

The results of data collection and identification of inputs, outputs (positive products and negative products) both in quantity units and monetary units in each Hospital X quantity center are as Table 2.

f. Analysis and interpretation of MFCA results
   The implementation of MFCA in dental polyclinic Hospital X in Depok produces Material Flow data which is presented in Table 2. The operational process in dental polyclinic is simpler than other polyclinics. The efficiency level of dental polyclinic at hospital X is 68.54%, this means that the resources consumed by the dentist in 3 months are 68.54% contributing to the formation of income.

Table 2: Material Flow in monetary units

Flow No.	Process	Input	Input quantity		Input Cost (IDR)	(+) products	Persentage (+) products	Cost (+) products (IDR)	(-) products	Persentage (-) products	Cost (-) products (IDR)
1	Registration	Paper	15	rim	675,000	Registration proof	93%	627,750	Scrap kertas	7%	47,250
		Ballpoint	5	box	130,000	registration form	100%	130,000	-	0%	-
		Energy	2,920	kwh	4,218,750	Energy	80%	3,375,000	listrik terbuang	20%	843,750
		Medical Card	220	Patien	5,225,418	Medical card	95%	5,225,418	kartu salah isi	5%	261,271
2	Doctor's examination	Doctor's fee	209	Patien	19,895,000	Doctor's fee	100%	19,895,000	-	0%	-
		Nurse's fee	209	Patien	16,473,723	Nurse's fee	100%	16,473,723	-	0%	-
		Medical tools	59	Uses	8,578,231	Medical tools	94%	8,578,231	Medical tools waste	6%	536,139
		Energy	2,920	kwh	4,218,750	Energy	75%	3,164,063	listrik terbuang	25%	1,054,688
		Water	500	m3	6,500,000	-	0%	-	Limbah air	100%	6,500,000
		Supplies (medcines,etc)	242	pcs	1,862,072	Supplies (medcines,etc)	90%	1,862,072	Scrap Perlengkapan (obat dll)	10%	186,207
		Doctor's dan patien's snack	3,420	pcs	5,780,200	Doctor's dan patien's snack	98%	5,780,200	Snack terbuang	2%	115,604
		Panoramic	24	uses	32,031,250	Foto panoramic	100%	32,031,250	-	0%	-
3	Administration	Medical record	209	patien t	9,770,508	Medical record	100%	9,770,508	-	-	-
		Medicine prescription	168	sheet	1,108,800	Medicine prescription payment receipt	100%	1,108,800	Medicine prescription payment receipt	0%	-
		Energy	2,920	kwh	4,218,750	Energy	80%	3,375,000	listrik terbuang	20%	843,750
		Paper	9	rim	405,000	Payment Receipt	95%	384,750	scrap payment receipt	5%	20,250
		Paid Stamp	209	uses	1,045,000	Paid Stamp	100%	1,045,000	Paid Stamp	-	-
4	Pharmacy	Medicine prescription	168	sheet	1,108,800	Copy Medicine prescription	100%	1,108,800	-	-	-
		Medicine payment receipt	168	sheet	504,000	Medicine payment receipt	100%	504,000	-	-	-
		Plastic	450	pcs	4,500,000	Medicine Packaging	95%	4,275,000	Plastic scrap	5%	225,000
		Label Sticker	450	pcs	450,000	Label Sticker	95%	427,500	Label Sticker Scrap	5%	22,500
		Energy	2,920	kwh	4,218,750	listrik	80%	3,375,000	Scrap listrik	20%	843,750
		Water	78.18	m3	1,016,297	-	0%	-	Water waste	100%	1,016,297
	TOTAL				**133,934,299.6**			**122,517,065.0**			**12,516,456.2**

Source: processed data

The eco-efficient analysis is carried out as a company effort to pay attention to the impact of operational activities on environmental sustainability. Kondo & Nakamura (2005) explain that waste management and recycling procedures are companies' efforts to achieve eco-efficiency by comparing input-outputs in the operational process. Table 2. shows that the operational or service process in dental poly by tracing material flow (MFCA). From the identification process per quantity center, in a period of 3 months (June to August 2020), negative products were obtained which had never been detected by hospital X.

From the analysis of input and output, especially the identification of positive and negative products, as in Table 2 shows that the input used by the hospital for 3 months, namely Rp. 133,934,299, did not entirely produce positive products, but there was a few percent that became waste / lost/damaged, according to the MFCA concept. this is called a negative product (loss). A total of Rp. 122,517,065 was a positive product or was actually consumed contributing to services to patients during the months of June to August 2020. The number of positive products if the percentage is calculated is 91% of the total input or resources or materials consumed by the dental clinic. in the production process of its services. The research results show that Rp. 12,516,456 is a material that becomes a negative product, or in this MFCA concept, it is called waste / lost/damaged / waste/loss. If calculated, the percentage of waste/loss is 9% (see Table 2) of the total material that goes into the production process of RS X dental services for 3 months, which was previously not detected by the management of X Hospital. Even though only 9% of the total material/resources consumed are lost to waste / waste/loss, but this amount is very material if we relate it to the cumulative impact of environmental damage that may be caused, especially the waste generated by the health service industry requires more careful attention and handling.

Table 3: Comparison of Input Material Efficiency using Conventional and MFCA

	INPUT (IDR)	OUTPUT (IDR)	
		PRODUCT	MATERIAL LOSS
Before MFCA	133,934,299	133,934,299	-
	100%	100%	0%
After MFCA	133,934,299	122,517,065	12,516,456
	100%	91%	9%

Source: internal data processed

The analysis during this 3-month period is a small illustration that by tracing the flow of material as in the MFCA concept, hospital X is able to reduce resource consumption which has an impact not only on saving hospital expenses but reducing material costs from IDR 133,934,299 to 122,517. 065 (save 9%), but the expected benefit is that in the long run, it is the achievement of eco-efficiency so that it could realize the operation sustainability of the hospital. Eco-efficient is an increase in efficiency due to efforts to minimize the level of pollution to the environment.

The results of this research are consistent with Christ & Burritt (2015); Tajelawi & Garbharran (2015) by using Material Flow Cost Accounting (MFCA) so that it could help companies/organizations to create eco-efficiency conditions. This is because MFCA is indeed a tool created to encourage the achievement of eco-efficiency in organizations that allows organizations to focus on reducing material use and focus on efforts to improve the company's economic performance. MFCA improves transparency material flows and energy consumption in companies that can be a helpful tool for management (Dierkes & Siepelmeyer, 2019; Huang et.al., 2019). MFCA is the best solution where financial performance and economic performance could be synergized for continuous improvement.

Conclusion

This research intends to analyze the efficiency level of Hospital X's operation using conventional method and Material Flow of Cost Accounting (MFCA). The research was conducted for three months and showed that the current hospital efficiency level was 68.54%, meaning that the hospital efficiency level was quite high. However, with the conventional method, hospital does not know how much inefficiency is related to the environment or pollution caused by the hospital's operational activities.

The implementation of MFCA resulted that the hospital's operational activities for three months resulted in a negative product of 9% of the total material input or Rp. 12,516,456 which previously was not detected by conventional methods. Compares to manufacturing industry sector, the efficiency level on health care service industry is lower, because MFCA concept are more suitable in material waste reduction and more applicable in manufacturing sector. However, the results of the analysis of material flow tracing using this MFCA have the main benefit of minimizing waste and energy consumption, thereby saving the environment from damage, thus realizing the sustainable operation of RS X. This means that if MFCA is applied continuously, hospital X will not only save expenses but could achieve eco-efficiency and could realizes continues improvement so that in the long-term operation sustainability could be achieved.

Limitation and Suggestion

This research has several limitations, namely: data access. The research was conducted during the Covid 19 pandemic, which caused the research team could not be able to directly visit the research object so that communication and coordination with hospital management were carried out online with limited intensity and some limited data that could be accessed by researchers. Another limitation is the amount of data obtained, the hospital management limits the data to only three months and only on the dental unit or clinic, this causes some data related to operational costs at the central level that could not be traced in detail. This makes assumptions used in data analysis and discussion. The limited theoretical and empirical literature on the application of MFCA in the service sector limits the analysis of the results.

Suggestions that could be submitted for further research are to use public hospital data sources (financial reports are available) and use proxy measures with secondary data. Future research could further explore MFCA in manufacturing sector companies because the characteristics of the sector are more relevant concerning the flow of material which is the focus of MFCA. Thus it could be seen in more detail to what extent MFCA could encourage eco-efficiency.

Acknowledgment

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Appendix 1. Flowchart of Dental Polyclinic Services Hospital X Depok

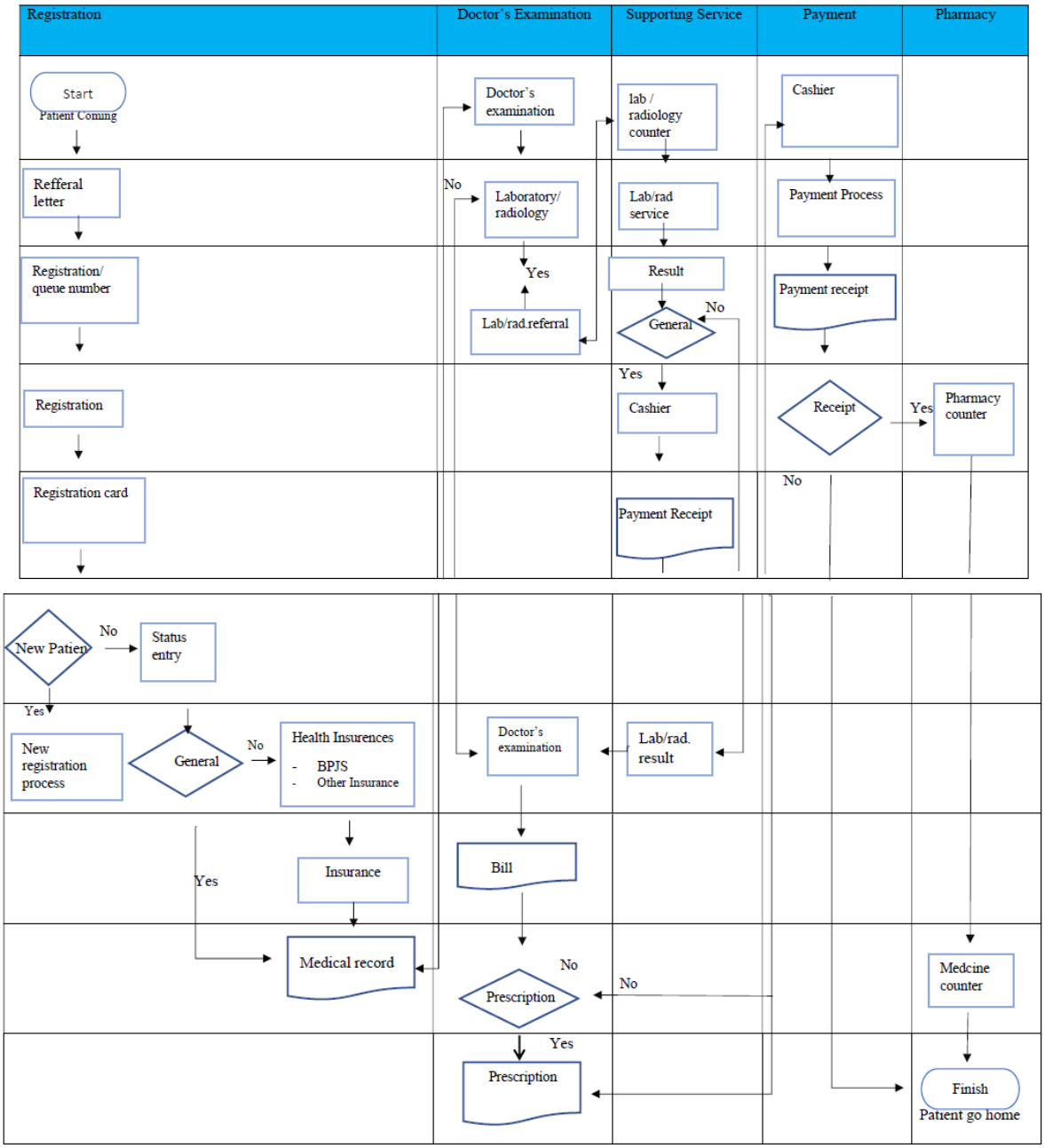

Awareness and Attitudes of Students to The Prospect of a Secure Old Age

Yulia FINOGENOVA
Professor, Plekhanov Russian University of Economics, Moscow, Russia
E-mail: Finogenova.YY@rea.ru

Gulnara KAIGORODOVA
Associate Professor, Kazan Federal University, Kazan, Russia
E-mail: golsuorsi1@mail.ru

Maria PŁONKA
Professor, Cracow University of Economics, Cracow, Poland
E-mail: plonkam@uek.krakow.pl

Tomasz JEDYNAK
Associate Professor, Cracow University of Economics, Cracow, Poland
E-mail: jedynakt@uek.krakow.pl

Tatiana POHARCHENKO
Senior Lecturer, Kyiv National University of Trade and Economics, Kyiv, Ukraine
E-mail: t.pogarchenko@knute.edu.ua

Iryna ZELENITSA
Senior Lecturer, Kyiv National University of Trade and Economics, Kyiv, Ukraine
E-mail: zelenitsa@ukr.net

Abstract

The paper aims to identify students' attitudes to and awareness of the retirement age and social protection, as well as their expectations with regard to educational activities in this area, the propensity for voluntary forms of savings for future retirement, trust in financial institutions. The research was carried out in 2019, using an anonymous PAPI type interview on a non-random sample of economics students (N = 382 people) who were either full-time or part-time students. This pilot study focused on theoretical questions about aging and retirement, which included personal, work, non-work, and retirement contextual factors as predictors of expected retirement age. The main questions of the study are the levels of knowledge of elementary issues about social security, young people's attitudes towards saving and investing, future retirement, care for the elderly and healthcare, health insurance. The authors also identified the level of attractiveness of studying issues related to social security for students. Studies have shown that, despite the lack of an expressive attitude to social insurance, respondents are interested in deepening knowledge in this area.

Keywords: Financial Education, Social Security, Investment, Retirement Policies, Public and Private Pensions
JEL Classification: H55, H75, J32, G2, I25, E21.

Introduction

Population aging is an inevitable prospect stemming from research on demographic change around the world. In this process, an important problem is to ensure the aging of an increasingly numerous social group, which, in the current pension system, will not provide a satisfactory replacement rate and is a threat to the stability of the public finance system, which is reported in publications. Against this background, a change in the mentality of society becomes obvious, in which the main burden of ensuring a decent retirement lies with the individual voluntary protection of retirement. A change in attitudes and awareness in this area must be done already at the stage of the younger generation, which implies the need for proper education of school and "academic" youth.

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Old age as a phenomenon of human life is necessarily represented by two qualitatively different aspects of its existence and scientific analysis: biological, which is expressed in a progressive decrease in the functional capabilities of various morphophysiological systems of the organs of the human body with age, and social, which is associated with natural changes in the social status of a person caused by phenomena biological aging and the necessary adaptation of the personality to these phenomena (Molevich, 2001, p. 61).
It is important to note that in modern society the very meaning of the definition of "old age" has changed (Klymeniuk, 2010, p. 56). If earlier the criterion of old age was incapacity for work, now it is a transition through the legally formalized age threshold, after which a person has the right to a pension or pension insurance payments.

For the average European pensioner, old age looks like traveling, dining out in restaurants, playing poker with friends. However, most begin to think about old age at a young age. That is why it was decided to find out what the students of Russian universities think about this.

Literature Review

The United Nations uses 60 years to refer to older people. This line, which divides younger and older cohorts of a population, is also used by demographers. However, in many developed countries, the age of 65 is used as a reference point for older persons as this is often the age at which persons become eligible for old-age social security benefits. So, there is no exact definition of “old” as this concept has different meanings in different societies. Defining “old” is further challenged by the changing average lifespan of human beings. Around 1900, average life expectancy was between 45 and 50 years in the developed countries of that time. Now, life expectancy in developed countries reaches 80 years. There are other definitions of “old” that go beyond chronological age. Old age as a social construct is often associated with a change of social roles and activities, for example, becoming a grandparent or a pensioner (Unfp, 2012, p. 20).

It's hard to disagree with Naudé, O’Driscoll & Kalliath (2009, p.11) given the trend of global aging, understanding why people decide to retire is a key issue in the 21st century for organizations, individual well-being and society. It is worth noting that, Fisher, Chaffee & Sonnega (2016, p. 230) define retirement timing as the age or relative point at which workers exit from their position or career path (e.g., early, on time, and later).

A critical question for social security policy is how program incentives affect retirement behavior (Coile & Gruber, 2007, p. 234). The importance of family values is mentioned Osborne (2012, p. 56), worldviews, and relationships can be recognized and strengthened prior to beginning retirement because this will also transfer to retirement

The thinking about pensions and more broadly about old age income security has moved in parallel with the development of the social risk management framework, especially in ensuring sustainable development. This framework provides the conceptual underpinnings for dealing with the diverse risks to which individuals or households are exposed in a world (Buzko et al., 2019, p. 9, Holzmann & Hinz, 2005, p. 37). Social risk should be understood as a legally defined probability of material insecurity as a result of a loss of earnings or labour income for an objective, socially significant reasons, as well as the need for additional costs. A situation of social risk can arise not only due to the loss of the ability to work (as a result of illness, accident, childbirth and care, old age, etc.), but also the lack of demand for work (unemployment) (Dluhopolskyi et al., 2019).

Marketing research has shown that contradictions arising at the micro and macro levels are revealed, which explains the effect of the “migration trap”; the low efficiency of using foreign labour in the Russian economy has been proved, as evidenced by the insignificant share of GDP produced by migrants and significant leaks of a part of GDP from the country’s economy through the transfer of funds to donor countries; an imbalance between the needs of the national economy for additional labour by industries and the actual use of foreign labour entering the Russian market is shown; the weak influence of the state on the national labour market and the lack of systemic regulation of the quality of training and the scope of migrant labour are revealed (Yakovleva, et. al., 2019, p.30). All this has a huge impact on the level of pension provision in the country.

From a systems perspective, the pension system is complementary to the financial system for the following reasons: pension system of any country is the channel of the cash flows of the population (savings), or “Long money”; pension system institutions play a central role in corporate governance (notably in pension funds, aimed at increasing of the shareholders’ welfare); this system encourages employees to invest in the capital of any industry (Kuznetsova & Pisarenko, 2016, p. 97).

The development of a private pension insurance system depends on life insurance companies, whose financial system must ensure the realization of financial interests, goals and objectives with sufficient financial resources through the balance and quality of financial instruments and promote capitalization (Achkasova, 2019, p. 181; Tsvetkova et al.,

2019). After all, as Achkasova (2017, p. 71) notes, the preferred indicator for assessing the financial security of the insurance market is its market capitalization. The importance of the insurance institution for the development of the economy, the social sphere of the country and its individual regions cannot be overestimated (Kuznetsova, et. al., 2019, p. 492). Insurance increases the financial protection of all its participants by reducing losses due to possible implementation of various risks and contributes to economic development by providing jobs.

Aims and Methods

The paper aims to identify students' attitudes to and awareness of the retirement age and social protection, as well as their expectations concerning educational activities in this area, the propensity for voluntary forms of savings for future retirement, trust in financial institutions.

The researched group consisted of students studying in Russia. The research was conducted in the latter half of 2019 among the non-arbitrary group of economics and administration, law and tourism full-time and part-time students in Moscow (Plekhanov Russian University of Economics) & Kazan (Kazan Federal University) within the framework of the international research project «Youth relations with the prospect of secure old age and social protection of the population» among universities in Poland, Russia, Ukraine and Lithuania.

The research was conducted using the standardized questionnaire, and the PAPI method (Paper & Pen Personal Interview), which is the form of the direct interview with a respondent, enabled us to directly explain any queries or doubts to respondents and ensured that the questionnaires would be returned. The questionnaire form included questions identifying respondents and nine specific research questions utilizing the semantic differential technique. The respondents' task was to indicate to what extent they identify with the statements located on a bipolar scale constructed on the grounds of opposing statements.

The five-point Likert scale was used for ascertaining the degree of identification, which allowed us to collect answers concerning the degree of acceptance of a given statement or opinion ranked from the complete acceptance of the first extreme statement to the complete acceptance of the second extreme statement. It is significant that the results presented in this work are based on the part of broader research and cover only the answers given to a part of the questions included in the questionnaire (Płonka, 2019; Cycoń, Jedynak, & Płonka, 2020; Płonka, Jedynak, & Trynchuk, 2020).

In the article, the authors formulated specific research dilemmas: own savings in the accounts of financial institutions, voluntary or compulsory participation in the pension system, private or public organization of the pension system, individualism or solidarity in the pension system, lower or higher basic national insurance contributions rate for the retirement insurance, the pension system different for individual social and vocational groups or uniform for everyone, the Pay-As-You-Go or the capital model of financing participation in the pension system, informal or formal education in developing the pension awareness, the pension system insignificant or crucial in the hierarchy of problems' importance, the old-age security the responsibility of the state or the family.

Data Analysis and Results

For a person to afford a decent and secure old age upon retirement, many countries use a funded pension system, when a person monthly deducts a certain amount of money from his salary, which is accumulated in his account. But the money is not just transferred to the account, but the funds that manage these assets, invest them in government securities, bonds, stocks, etc.

The current development of market relations in Russia requires a reform of the pension system, which would provide reliable social protection for the population and adequate pension coverage. The state of the pension system can be considered a crisis: retirement does not protect against poverty; the system is socially unfair; the pension fund is subsidized. To restructure the pension system, it is necessary to reform the solidarity system, create and accumulate, and promote the development of voluntary pension savings (Kozlov et al., 2017a; 2017b; Pukala et al., 2020).

About 6.4 million pensioners in Russia receive social supplements (federal and regional), which are intended to bring the level of material security to the subsistence level. This follows from the data of Rosstat, which refers to the Russian Pension Fund. And the number of such pensioners who receive additional payments is growing. From 2012 to 2019, it grew by about 20%, and the number of all pensioners in the country increased over the same period by only 10%, according to Rosstat. On average, the living wage of a pensioner was about 8.8 thousand rubles in 2019. per month in Russia. This is the threshold at which an elderly person, from the point of view of the authorities, ceases to be poor. Thanks to surcharges in Russia, poverty among pensioners has been formally completely eradicated (Ng, 2019).

Research results confirm that the key problems of the pension system are an aging nation and a huge permanent deficit of the pension fund. This is why the political decision is mature to speed up the pension reform to reduce it. Rosstat for the first time took into account the increase in the retirement age in Russia in the forecast of the demographic load until 2035. According to the average version of the forecast of Rosstat, by 2035 there will be 622 disabled people for every 1,000 able-bodied Russians, of which 391 are pensioners. Rosstat has published a demographic forecast until 2035. According to the median forecast, the population will decline from 146 million to 142.9 million (Kommersant, 2019).

To understand the future of the pension system, it is worth considering what young people think about their future pensions. It is commonly said that young people have a short planning horizon and do not think about retirement. In fact, this is not the case. In a 2008 Flash Eurobarometer survey, respondents were asked, "When you think about retirement, are you thinking about saving money or being financially dependent?". In general, the propensity to save varies from country to country, but the numbers are quite high in all countries. Interestingly, in the vast majority of countries, young people are more aware of the importance of saving than people in all other age groups.

To determine the attitude of young people to the prospect of prosperous old age and social protection of the population, a pilot survey was conducted among Russian students in November-December 2019. In the course of the research, students in the specialities of management, finance, economics, tourism, service were interviewed, among them: women - 67%, men - 33%; at the bachelor's level - 80.8%, master's - 17%, postgraduate - 2.2; full-time education - 86.8%, correspondence - 8.2 and mixed - 5%.

Many young people noted that they strive for financial well-being through saving and investing free funds. The basic principle of saving money is to learn how to save money. However, understanding is one thing, and real saving is another.

The survey results show that young people are aware of the need to save and understand their importance since 72% of respondents have their own savings. 58.2% of students' own life insurance policies, 43.4% use bank deposits, 41.2% use voluntary medical insurance policies, and 14.3% use an account with NPFs (Fig. 1).

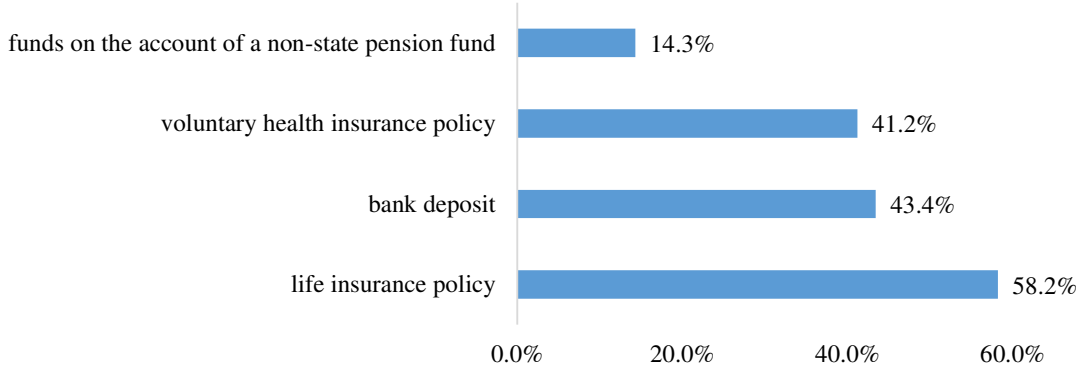

Figure 1: Availability of insurance policies and own savings in the accounts of financial institutions

The state pension for a comfortable old age is unlikely to be enough, the respondents perfectly understand this. Only 52.2% of respondents are counting on a state pension in the future. Perhaps this is due to an increase in the retirement age, an increase in life expectancy, as well as receiving remuneration for work in envelopes and the understanding that they will be left without a pension or will receive small social assistance from the state. Besides, the World Health Organization is officially revising age standards. And now young people are considered up to 44 years old, middle-age - 44-60, elderly - 60-75; old age - 75-90, and after 90 - long-livers (Segodnya, 2015).

The authors found that 94.5% of students use the services of banks, insurance companies - 40.7%, investment companies - 11%, pawnshops - 10.4%, non-state pension funds - 6%, asset management companies - 3.3% leasing companies - 2.7% and only 0.5% of respondents use the services of construction financing funds (Fig. 2).

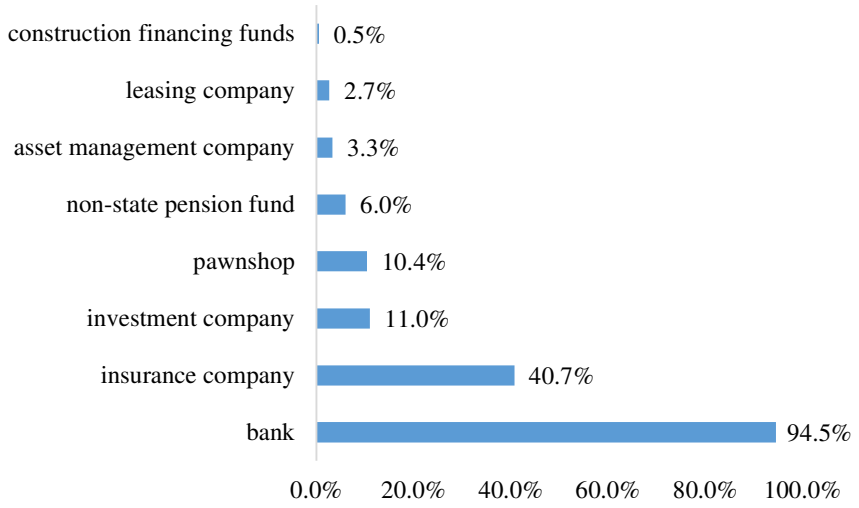

Figure: 2. List of institutions whose financial services students use

The changes taking place in the pension system cannot be called a full-fledged reform, so there is always a risk. Pension and tax legislation will change in the future and more than once, but the state must offer tools for accumulation and increase public confidence in them.

Although each instrument has disadvantages, the potential outcome is individual and depends on their financial knowledge (ability to use investment instruments) and motivation (Rotova & Trynchuk, 2004; Lutsyshyn et al., 2019; Komarova et al., 2019; Cwynar et al., 2019).

It's hard to disagree with Alikperova & Yarasheva (2015), Khovrak & Petchenko (2015), that the factor of citizens' trust in financial institutions is decisive in the development of the financial sector of the state, which determines the success of these institutions, as well as the level of economic knowledge of citizens (Cwynar et al., 2018; Bialowolski et al., 2020; Cwynar et al., 2020), and as a consequence, the manifestation of interest in their increase (Polinkevych & Kamiński, 2018), Suchánek et al., 2019; Vnukova et al., 2020).

Banks are perceived with the greatest confidence among all types of financial organizations - 62%, in second place are investment companies - 18.1%, mutual funds based on investment companies - 7.6%, insurance companies - 7.1%. Students trust non-state pension funds least of all - 2.7%. Do not trust anyone - 2% of respondents.

Young people are ready to invest personal funds in corporate securities - 47.3%, in foreign currency - 20.9%, alternative investments - 16.5%, government securities - 8.8%, in real estate - 4.7%, in themselves, in their education, in children - 0.5%, in precious metals - 0.5%, in the index fund - 0.5%.

Do you have a voluntary health insurance policy (VHI)? 45.1% of students answered this question in an affirmative way. Of these, the question «Who pays the cost of the VHI policy?» 55% of respondents answered that parents, 22.5% - independently, 22.5% - an employer.

The costs of purchasing a voluntary health insurance policy for working citizens should be covered (the choice of several answers) by the employer - 61.5% of the respondents think so, the state - 40.1%, the employee - 22.5%.

The authors found that 22.5% of students firmly believe that pension contributions should be voluntary, in part, another 12.3% of respondents agree (Table 1). The idea of accumulating contributions exclusively by state institutions is supported by 23.6% of respondents, another 17.6% partially agree with this opinion. There should be a systemic decision at the state level regarding the payment of pension contributions, according to 17.6% of students, and another 18.7% partially support this position. Young people, namely 16.5%, are aware that pension insurance contributions should be greater than just the contribution to the Pension Fund, and another 15.4% partially agree with this. At the same time, the vast majority of respondents 38.5% believe that pension insurance contributions should be flexible and set for certain professions, partially supported by another 16.5% of students. It should also be noted that for the majority of respondents, pension insurance contributions are an important issue, as 14.3% of students believe, and another 23.1% partially agree with this thesis.

Table 1
Respondents' attitudes to future retirement – distribution of answers (N=382)
In my opinion, pension premiums should be..., %

	agree		hard to say whether I agree or disagree	agree		
	completely	partly		partly	completely	
absolutely voluntary	22,5	12,6	41,2	10,4	13,3	absolutely mandatory
arranged only by commercial institutions	3,3	6,0	49,5	17,6	23,6	arranged by the state
dependent on citizens' discretionary decisions	22,5	11,5	29,7	18,7	17,6	be based on a system
lower than presently	8,8	13,2	46,2	15,4	16,5	higher than presently
flexibly set for particular professions	38,5	16,5	22,0	10,4	12,6	the same for all citizens
personally, I am not interested	13,2	12,6	36,8	23,1	14,3	this matter is of key significance for me

The main responsibility for caring for the elderly should fall on the state, according to 19.8% of respondents and partially supported by another 20.9% (Table 2); 15.4% (partially - 20.9%) of students are firmly convinced of this to be based on the developed savings programs; should become a subject of study at school or university, 19.8% (partially - 28%) of respondents strongly supported this idea.

Table 2
Respondents' attitudes to old age and its protection, and to intergenerational solidarity – distribution of answers (*N* = 382)
The main responsibility for care of the elderly should..., %

	agree		hard to say whether I agree or disagree	agree		
	completely	partly		partly	completely	
be assumed by children and families	5,5	8,2	45,6	20,9	19,8	be assumed by the state
be based on intergenerational solidarity and social sensitivity	8,2	9,3	46,2	20,9	15,4	be based on individual contributions and savings
be discussed within a family	4,9	12,1	35,2	28,0	19,8	be taught as a school or university subject

Under the state healthcare system, 20.3% of students admit the possibility of compulsory, but not very high, additional payments for various types of assistance, 17% partially agree with this. At the same time, 22.1% of respondents believe that medical care should be free, even if there are queues to see a doctor, 11.5% partially agree with this, and for 29.1% it was difficult to answer.

Table 3 presents the results of the perception of social insurance as an academic discipline. This discipline is necessary, 22.5% (partially 19.2%) of the respondents fully agree with this; it is not outdated, 13.2% fully agree with this (partially 24.2%); important, 15.9% fully agree with this (partially 31.9%); promising 23.1% fully agree with this (partially 22.5%); non-spectacular 17.6% fully agree with this (partially 21.4%); connected with practice, 23.6% fully agree with this (partially 26.4%); uninteresting for me, 9.9% (partially 23.6%) completely agree with this.

Table 3
Perception of social insurance as a subject of teaching – distribution of answers (N=382)
Social insurance as a subject of teaching is..., %

	agree		hard to say whether I agree or disagree	agree		
	completely	partly		partly	completely	
necessary	22,5	19,2	37,9	11,0	9,3	unnecessary
innovative	13,2	24,2	37,4	14,8	10,4	obsolete
important	15,9	31,9	32,4	13,7	6,0	waste of time
having a long-term dimension	23,1	22,5	32,4	16,5	5,5	non-developmental
attractive	9,9	13,7	37,4	21,4	17,6	unattractive
practical	23,6	26,4	32,4	9,3	8,2	theoretical
for me, interesting	9,9	23,6	39,0	13,7	13,7	for me, boring

Students believe that the subject «Social insurance» should be a necessary element of universal knowledge (Table 4); should not be taught at the secondary school level, but at the university level; for all specialities; to be more practical both in the form of seminars and practical classes.

Table 4
Respondents' expectations with regard to social insurance education – distribution of answers (N = 382) Social Insurance as a subject should .., %

	agree		hard to say whether I agree or disagree	agree		
	completely	partly		partly	completely	
be treated as an element of universal knowledge	12,6	23,1	40,7	12,1	11,5	be treated as an element of specialised knowledge
be taught in secondary schools	13,2	20,3	32,4	17,6	16,5	unnecessary at this level
be taught at a university level	15,9	25,3	33,0	13,2	12,6	trainings and postdiploma programmes are sufficient
be developed	9,3	13,2	32,4	27,5	17,6	no, it is taught to an excessive degree
be mandatory for all university courses	15,4	22,0	36,3	17,6	8,8	be mandatory only for insurance courses
be an elective subject for all university courses	19,2	21,4	34,1	14,8	10,4	be an elective subject for some university majors
be more practical	25,3	25,3	34,6	9,3	5,5	be more theoretical
be taught in the form of lectures	6,0	6,6	39,6	29,7	18,1	be taught in the form of classes

It is pleasant to note that the majority (68.7%) of Russian students are interested in deepening their knowledge of social security (Table 5), but for Polish students, this indicator is 74% (Plonka, 2019, p. 367).

Table 5
Respondents' commitment to broadening social insurance knowledge (N=382)
Respondent structure

Respondent opinions and declarations	Structure of responses [%]
I am willing to broaden my knowledge about social insurance	68,7
I am not willing to broaden my knowledge about social insurance	31,3

The results presented in the table indicate that the issue of future pension for students seems to be significant. This is confirmed by the generally accepted opinion about the importance and necessity of social insurance as a necessary component of universal knowledge for teaching, at least as a subject of study at a university for different specialities in the form of seminars and practical classes.

Discussion

Individuals face an increasing variety of financial risks (Merlo et al., 2013; Pyrkova et al., 2018; Tsintsadze et al., 2019), including those linked to their retirement. At the same time, public funding has been reduced or is strictly limited in most countries. Private insurance and pensions products, therefore, play an essential role in social and financial protection (OECD, 2008b, p. 160; Levchenko, 2015; Baranovskyi et al., 2015). Yet the public might have a low level of awareness of the risks they are exposed to and lack literacy, knowledge and skills in insurance and private pensions questions and products. This thesis is confirmed by the data shown in Fig. 1 about the students' insurance policies and their own savings in the accounts of financial institutions.

Individuals develop lifetime savings plans (Jedynak, 2019) to ensure that they will have the desired level of income in retirement. These plans are based on individuals' current knowledge and their level of understanding of financial markets (Clark et al., 2003, p. 27; Arkhipov et al., 2017; Kaigorodova et al., 2018; Horyslavets et al., 2018). In this regard, the quality of educational services should be the focus of contemporary university education (Trunina & Khovrak 2019, 401). And the role of universities in the formation of a financial culture (Trynchuk, 2011; 2017; Bucovețchi et al., 2019), a culture of green public procurement (Baranovsky et al., 2020) and the dissemination of the practice of social responsibility of financial institutions (Khoma et al., 2018; Dankiewicz et al., 2019; Glonti et al., 2020).

Financial literacy is deemed an important life competence nowadays (Cwynar et al., 2019, p.40; Mustafina et al., 2020). The need for financial education is increasingly being recognized in relation to all financial products (OECDa, 2008, p. 2). Quality education, the development of financial consumer protection, and access to financial services should be the three key drivers of financial empowerment for college students today and in retirement and will contribute to the overall stability of the financial system, underlined by three sets of high-level principles endorsed by G20 leaders (OECD, 2008a; 2008b; 2016, p. .3).

For example, the institution of financial ombudsman has been functioning in Poland for 25 years, whose mission is to take measures to protect clients of financial market participants, to represent their interests when applying the provisions of legal acts in accordance with the principles of social coexistence (Zelenitsa et al., 2018, p. 269). Particular attention in the field of insurance is focused on compliance with the rules for the sale of life insurance products and providing increased protection for consumers of the investment market for life insurance (Ostrowska-Dankiewicz, 2019, p. 168). In Russia, the institution of a financial ombudsman was created only in 2018, which carries out its activities on the basis of the Federal Law "On the Commissioner for Consumers of Financial Services" (Legislation of Russia, 2018). The financial ombudsman is independent of the authorities and carries out a free pre-trial settlement of disputes between financial institutions and their clients - individuals, thus avoiding going to court. The formation of this institution should certainly have a positive effect on the growth of trust in financial institutions and their services among not only students but the entire population.

Conclusions

With the aging population, the issue of pension insurance in many countries around the world is gaining importance. Despite the fact that the pension perspective for student youth is seen as distant, and so uncertain, it leads to a lack of proper understanding of the pension itself and pension insurance. The study shows that young people still approve of the issue of old age and consider it quite important. The vast majority of respondents, 68.7%, consider it necessary to deepen their knowledge of social security and pension protection against the risk of old age. The formation of financial culture, including insurance and pension culture, will inevitably be the key to building a secure old age because students are interested in deepening their knowledge of social insurance. This circumstance indicates the need to improve curricula, use innovative teaching methods, increase the level of practical orientation of courses.

The majority of young people (72%) strive for financial well-being through savings and are aware of the need and importance of investing in the policies of life insurance companies (58.2%), bank deposits (43.4%), private pension funds (14.3%). Students trust banks the most among all types of financial institutions. Regarding pension insurance, some respondents understand that the amount of contribution to the Pension Fund should be larger than the current one, flexible and set for certain professions.

The authors proved that the level of material well-being of student youth, changes in public attitudes and life priorities affect the vision of the prospects of their well-being. Therefore, 40.7% of students believe that the main responsibility for caring for the elderly should fall on the state, not the family.

The lack of trust in the state as the organizer of the pension system not necessarily translates to the lack of the pension awareness related with the necessity of securing the old-age in the uncertain and inefficient public finances system.

Under the educational goal, the indicated shortcomings in the pension awareness of young people should constitute the foundation for the discussion concerning planning future retirement and the values preferred in terms of pension security. Under the implementable goal, this research may be a useful instrument indicating the objectives and areas for prospective systemic changes for the benefit of developing the constructs of modern pension programmes which may, in time, transform into legislative initiatives.

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Implications of Talent Definitions for Talent Management Practice

Agnieszka SKUZA, Ph.D.
Department of Product Marketing, Institute of Marketing
Poznan University of Economics and Business, Poznań, Poland
agnieszka.skuza@ue.poznan.pl

Habte G. WOLDU, Ph.D.
Naveen Jindal School of Management,
Department of Organizations, Strategy and International Management
The University of Texas at Dallas, Richardson, TX, USA
wolduh@utdallas.edu

Shawn ALBORZ, Ph.D.
Naveen Jindal School of Management,
Department of Operations Management
The University of Texas at Dallas, Richardson, TX, USA
salborz@utdallas.edu

Abstract

In recent years, talent management has experienced increased attention from both scholars and practitioners. Globalization, technological developments, demographic changes, and the current pandemic influenced fierce competition for talents who will secure organizational development in a turbulent business environment. While organizations increasingly consider talent management central to the competitive advantage, only a small percentage of companies consider their talent management effective. One of the challenges is the lack of agreement both among academics and organizations on who the talent is. This paper contributes to the theoretical literature on talent management by presenting the implications of different talent definitions for talent management practice. Understanding these implications enables organizations to use talent management practices more effectively.

Keywords: Talent Management, Human Capital, Human Resource Management.

Introduction

Throughout the last two decades, organizations increasingly use talent management programs to attract, retain, and develop their talents. However, while talents are recognized as strategic resources central to the organization's competitive advantage, there is a lack of consistency in the operationalization of talent in the organization (Gallardo-Gallardo, Thunnissen, and Scullion, 2020). Also, there is a lack of sufficient empirical evidence of the effectiveness of talent identification practices (Ready and Conger, 2014; McDonnell and Skuza, 2021). Indeed, the Charted Institute of Personnel and Development (2013) study shows that only about 6% of companies consider these practices as effective. Such a belief is attributed to the lack of a conceptual consensus on who talent is in the organizational settings. Theoretical foundations for talent identification and talent definition seem to be absent in academic research, which increases conceptual confusion and limits the advancement of talent management theory. This article contributes to the theoretical literature on talent management by presenting the implications of talent definitions on talent management practice.

Approaches to Talent Definition and Their Implications for Talent Management

Although defining talent depends mostly on the organization's context, and the only correct definition of talent does not exist, adopting a specific approach to talent determines the entire talent management process. The literature review on talent management identifies three key dilemmas in defining talent. The first dilemma concerns whether talent refers to a selected group of employees (elite approach) or all employees (egalitarian approach). The second dilemma is related to understanding talent through innate abilities that K. Heller (1932) defines as higher-order abilities or

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acquired competencies. The third dilemma concerns whether talent should be identified through current performance or through the potential to achieve high results in the future. These dilemmas and their implications for the concept of talent management are summarized below.

For Everyone or the Few - Egalitarian or Elite Approach?

The first question in defining talent is whether the organization should differentiate between talents and "non-talents." On the one hand, it is often assumed that every employee has talent, and organizations should develop this talent (egalitarian approach). Undoubtedly, creating development opportunities for all employees is beneficial from the perspective of motivation and involvement of a broad group of people employed in the organization. Additionally, this approach reduces the risk of identifying the wrong people. On the other hand, however, such an approach is considered ineffective and too costly (Gelens, Dries, Hofmans, Pepermans, 2013). Moreover, it calls into question the legitimacy of talent management, which becomes a new name for human resources management practice. The foundation of talent management is employee diversification, dictated by greater productivity and disproportionately greater added value provided by people with specific skills and abilities (Boudreau and Ramstad, 2005). The approach focused on a narrow group of talents (elite) dominates in talent management literature, although the authors have different interpretations of which employees should be in this group. Chuai, Preece, and Iles (2008) emphasize the need to focus on valuable and unique employees. In this case, value is understood as the potential to develop key organizational competencies, while uniqueness is expressed in the difficulty of replacing a given employee. Collings and Mellahi (2009) promote an approach focused on identifying key positions in the company that contribute to a competitive advantage and identifying people with above-average results and high potential who will be developed to take these positions in the future. Festing and Schafer (2014) recognize talents as people with above-average abilities, skills, knowledge, experience, intelligence, and development potential that significantly impact their organization's performance. Silzer and Church (2010), on the other hand, indicate the necessity to distinguish various groups of talents and individualize them according to their needs, scope, and type of development activities.

Despite the dominance (both in practice and theory) of the approach focused on selected employees or groups of employees, the elite approach raises many doubts about the cost of a potential decrease of motivation and commitment of people not recognized as talents. Those employees constitute the majority of employees in an organization. However, a review of the talent management literature shows a lack of empirical research that could confirm the negative impact of talent management programs on employees not included in these programs. Moreover, studies by Sonnenberg, Zijderveld, and Brinks (2014) and Bjorkman, Ehrnrooth, Makela, Smale, and Sumelius (2013) indicate that talent management programs significantly increase talents' motivation, commitment, willingness to learn, and intent to stay in the company, which translates into the positive financial outcomes. The authors also argue that the strategies of not informing talents about their participation in the program (some companies do not officially inform employees about talent management program) introduce much ambiguity and undermine these programs' role, mainly in terms of increasing commitment and retention of talented employees.

As already mentioned, talent management literature does not provide empirical evidence about talent management's negative effect on the motivation of non-talents. Theoretical considerations in this regard mainly use Adams's theory of justice (1965), pointing to the conditions necessary to minimize negative feelings of employees not covered by the program and suggest that this theory may become a starting point for further empirical research (Gelens, Dries, Hofmans, and Pepermans, 2013). The theory of justice assumes that an important factor of employee motivation is the employee's assessment of the ratio of his inputs and received outcomes to outcomes achieved by other employees for similar inputs. The theory of justice distinguishes between the subjective perception of justice about the distribution and allocation of resources (rewards, bonuses) in the company (distributive justice), procedures used in the distribution of these resources (procedural justice), the way organization communicates potential inequalities (informational justice) and relations between employees and supervisors expressed in openness, trust and respect (interpersonal justice). Minimizing the negative consequences of talent management programs may include the efforts to reduce the sense of injustice by increasing transparency and objectivity of talent identification and providing reliable information about the reasons for not including an employee in the talent group (and about the conditions that must be met in order to be included in the future). It is also emphasized that the perception of injustice is influenced by opened, trusted, and respectful relations with the direct manager (Lind and Tyler, 1988). A positive relationship with the manager and understanding the reasons for lack of inclusion in the talent pool are considered the most important factors that minimize talent management's adverse effects.

While the focus on a purely inclusive or exclusive approach is reported in the talent management literature, it is believed that most companies are increasingly looking for intermediate solutions. The inclusive approach might not only be impractical but often is only declarative (Kaczmarska and Sienkiewicz, 2005). On the other hand, focusing on a narrow group of talented employees (3-5%) may lead to a decrease of the motivation of employees not recognized

as talents. It is also risky to invest substantial resources in a small group of people who may quickly be lured away by the competitors. Therefore, there is an increasing interest in expanding the talent pool to other groups of employees, such as experts or young graduates. Within each group, organizations use a separate set of tools for talent identification and individualized development. Including more employees in the talent management program increases the use of the job as a primary source of development (i.e., new responsibilities, projects, rotation) and relationship-based development tools (mentoring, coaching), as they are less costly and bring tangible benefits to the organization (Garavan, Carbery, and Rock, 2012). However, including more employees in talent management programs increases managers' role in the identification and development of talents, which requires additional tools for developing and assessing managers' skills and their commitment to talent management (Gelens, Dries, Hofmans, and Pepermans, 2013).

Talent as Innate Abilities or Acquired Competencies?

Another dilemma in the talent identification process is the choice between defining talent through innate qualities or through learned competencies (knowledge, skills, and experience). The first approach concerns the definition of talent as a set of internal attributes (intellectual potential, personality traits, motivation) that undergo slight changes over time, indicating the elitism and limited availability of the talent. The second defines talent as an above-average level of competencies and the ambition and potential to develop these competencies.

The choice of either approach significantly influences the talent management practice. When the first approach is used, there is a need to pay much more attention to talent identification and selection, and to use a multi-stage process consisting of various psychological tests, identification of intellectual potential, cognitive abilities, or personality (Pocztowski and Miś, 2008; Meyers, van Woerkom, Dries, 2013). Because inborn talent is a rare commodity, the talent pool is small. The literature review shows that this approach implies assigning talents to the highest positions, and their development is mostly based on formal leadership training and intensive interactions with senior management.

The consequence of assuming that talent is a set of personality, and intellectual predispositions significantly reduce the number of people considered talents. It is assumed that investing more funds in a few talented employees will bring the company disproportionately greater financial benefits and help retain the best employees (Becker, Huselid, Beatty, 2009). However, such an approach is quite risky due to the changing pattern of behaviors of the new generations, which is reflected in their lower loyalty and increased requirements for self-development. While two generations (Millennials and Generation Z) represent an increasing ratio of the working population, a decline in their loyalty can entail a greater risk of talent loss and high financial loss due to allocating significant financial resources to developing a small group of people. On the other hand, identifying talent through innate abilities does not give employees who are not recognized as talents a chance to join the talent group in the future (regardless of their commitment and willingness to learn), which may contribute to decreased motivation and commitment of these employees.

In the second approach (talent in the perspective of competencies), identification, although not devoid of personality elements, largely consists of the diagnosis of above-average competencies - knowledge, skills, and experience that bring special value to the company's operations (Meyers, van Woerkom, Dries, 2013). Since talent is an acquired competence, talent identification criteria also include the candidate's ambitions, ability, and motivation to learn. The evaluation process includes detailed, evidence-based assessment, supported by many examples, multi-directional feedback about the candidate (360-degree assessment), and calibration meetings at various levels of the organization, aimed at in-depth evaluation discussions about candidates. This approach also increases the complexity of talent development activities, which depart from formal training and focus mainly on on-the-job learning, such as project participation, additional responsibilities and tasks, meetings with top-level management, rotation, mentoring, coaching, and facilitation sessions. The competency-based approach's main challenge is managers' increased role in talent identification, which might leave some space for subjective and incorrect choices. Silzer and Church (2010) identified the manager's lack of skills to identify talent as a key weakness of talent management programs, stressing that implementing these programs should be preceded by developing managers' abilities in two areas. The first area concerns the ability to assess employee behavior in the following aspects: (1) what to observe; (2) how to categorize these observations; and (3) how to recognize own cognitive limitations and preferences that affect the categorization process. The second area is related to the managers' understanding of the talent management role and their importance in identifying and developing talents. While the HR department plays a vital role in increasing managers' competencies in talent management, one tool that seems particularly beneficial is calibration meetings held at different hierarchical levels. Calibration meetings allow managers to compare different candidates and discuss the legitimacy of their appointments. They also contribute to the standardization of assessment standards throughout the organization.

The competency-based approach to talent has many benefits for organizations. First, it does not block people who are not recognized as talents from being nominated in the future. Secondly, talents are required to take responsibility for their development, to be more involved in their current duties, new tasks, projects, and strategic team; they are encouraged to take the initiative and participate in the decision-making process. Such engagement brings higher financial benefits than the cost involved in talent development and also reduces the costs associated with the risk of losing talents (Gelens, Dries, Hofmans, and Pepermans, 2013).

What to Measure - Past Results or Potential

Another talent identification dilemma concerns the extent to which talent is identified through an employee's past performance or the potential to achieve high results in the future. While the dominant belief is that the results of a given employee do not guarantee excellent results in the future, especially in new roles (Martin and Schmidt, 2010), in practice, companies treat results as the leading talent identification criteria (Dries and Pepermans, 2008; McDonnell and Skuza, 2021). The prevailing reason is that performance is more objective and easier to justify. Indeed, past performance becomes a more effective assessment criterion when the target position and the related requirements are known. In the early talent management understanding, which mainly mirrored succession management, such an approach was justified. However, in the current talent management practice, identifying talent mainly through the past results is questioned. Talent is increasingly identified through his/her potential to contribute to an organization's key competencies. The assessment of this potential is not related to a specific position, role (i.g. potential to move up two roles in five years) or specific future responsibilities, which are focused on individual career success (Sears, 2003; Skuza, 2018). Academic reviews claim that talent should be rather identified through the potential to become a key driver of organizational performance (Chamorro-Premuzic, Adler, and Kaiser, 2017).

There are few challenges with the identification of talents through potential. First, it requires the identification of a list of components of potential for different talent groups. Up to date, there is, however, a lack of consensus around the components of high potential in the published studies (Dries and Pepermans, 2012; Lombardo and Eichinger, 2000; Silzer and Church, 2009; Player, Randsley de Moura, Leite, Abrams, Tresh, 2019). Further, some potential components may depend on external factors (i.g., learning and motivation depend on the work conditions created by the superior), which significantly complicates potential assessment. Hence, giving candidates to the talent pool opportunity to participate in initiatives and projects outside the department and including more managers in assessing candidates' potential (through 360-degree assessment) allows for more effective identification of talents throughout the organization.

Another challenge in identifying potential comes from a lack of a common understanding of the definition of potential among the organization's managers and their inability to assess potential. Overcoming this challenge requires the centralization of the identification process, in which the direct supervisor's recommendations are only a preliminary stage, followed by multiple calibration meetings. Such meetings, as mentioned above, help establish a common understanding of the potential.

In reviewing the literature about talent potential, both academic and applied, few other questions and ambiguities emerge which call for future research: whether potential components differ by industry, culture, gender, or functional division of the organization?; which components of potential should be tested at different stages of an employee's career?; to what extent the organizational context affects the observable predictors of potential (e.g., determination and enthusiasm, willingness to take risk); to what extent potential can be developed?; to what extent a specific set of potential variables affects the effectiveness of talent management programs?

Conclusion and Implications

Talent management has been proved to increase the organization's competitive advantage, but the lack of conceptual developments of talent definition limits talent management effectiveness. Many organizations spend time and resources developing their own definitions or using studies proposed by consulting companies. The normative nature of the current publications does not explain many emerging dilemmas about talent identification. Academic publications on talent management do not specify how they understand the concept of talent (McDonnell and Skuza, 2021), and the lack of empirical studies on talent identification forces organizations to make intuitive assumptions and test different definitions of talent. Academic publications also fail to provide empirical data on the relationship between the approach to talent definition and the effectiveness of talent management.

While there is no one best approach to defining talents, organizations need to choose a talent definition that best fits their strategies and ensure that the chosen definition is clear and transparent to ensure consistency between the

theoretical assumptions and practice (Dries, 2013). Different approaches to talent have their own merits and drawbacks, and they influence talent management practices differently. For example, the focus on the small group of talents (3-5% of employees) will have different consequences for talent management than focus on a broader group of talents. In the first case, identifying talents is more centralized and usually involves the HR department and top-level managers. In this case, talent development is largely focused on leadership development training and initiatives involving top-level management. The inclusion of more talents in the program requires the involvement of managers from all organizational levels. This entails the need to improve managers' ability to identify and develop talents. Such an approach also requires changes in the broader intra-organizational environment (e.g., organizational culture).

Similar consequences may also occur when organizations define talent through innate abilities versus learned competencies. Each approach to talent definition induces different criteria of talent identification and different assessment methods. For example, competency-based assessment increases the assessment's complexity, the number of tools used to assess talent, and the number of people involved in the evaluation process. Also, while innate giftedness can be identified with relatively objective tools, knowledge, and skills are assessed mainly by observation. Furthermore, the focus on innate abilities may prevent people not recognized as talents from joining the talent pool in the future, which may significantly influence organizational efforts to reduce the sense of injustice by increasing transparency and objectivity of talent identification.

Another dilemma relates to the role of high potential in talent definitions, which requires managers' greater involvement in the identification process. Identification of high potential is particularly susceptible to subjectivity, and studies show that managers tend to follow their interpretation and intuition when evaluating candidates (Silzer and Church, 2009). Therefore, there is a growing need to include calibration meetings in the talent identification process, which helps standardize high potential understanding throughout the organization.

Further, when organizations prioritize performance criteria in their talent identification process, talent management is similar to succession management and includes identifying and developing managers for specific positions. Contrary, programs focused on identifying potential usually do not define the candidate's target position. During two to five years, organizations develop talented employees by engaging them in tasks beyond their skills, and they intensify feedback and support through mentorship, coaching, or sponsoring (Roi, 2012). Further, talent's career path is modified based on continuous tracking of talent's contribution to organizational objectives and the comparison of high potential indicators to the initial assessment (made during the program's talent entry).

In conclusion, talent management theory development depends on a better understanding of who the talent is and how to best identify talent in organizations. The variety of approaches and criteria for defining and identifying talent, and limited empirical evidence of their contribution to talent management effectiveness, leaves organizations with high uncertainty about talent management outcomes. Moreover, there is a growing challenge of identifying the right competencies, for the right roles, for the continuously changing organizational environment. Therefore, to move the talent management theory forward, it is critical to understand the definition of talent in specific organizational settings (Gallardo-Gallardo, Thunnissen, and Scullion, 2020). While the contextual dynamics of talent management explain the variety of approaches used to define talent, each approach's effectiveness is largely silent in academic literature. Thus, further studies should empirically investigate the approaches to talent definition and their consequences in a particular organizational context, which is central to the future development of talent management theory and practice.

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A Managerial Perspective on Learning Organization – The Case of Poland

Agnieszka SKUZA, Ph.D.
Department of Product Marketing, Institute of Marketing
Poznan University of Economics and Business, Poznań, Poland
agnieszka.skuza@ue.poznan.pl

Habte G. WOLDU, Ph.D.
Naveen Jindal School of Management,
Department of Organizations, Strategy and International Management
The University of Texas at Dallas, Richardson, TX, USA
wolduh@utdallas.edu

Shawn ALBORZ, Ph.D.
Naveen Jindal School of Management,
Department of Operations Management
The University of Texas at Dallas, Richardson, TX, USA
salborz@utdallas.edu

Abstract
This article aims to uncover the key elements of learning organizations. This goal was achieved through an exploratory study conducted across 79 organizations located in Poland, Central and Eastern Europe's biggest economy. The study used a multi-step approach involving in-depth focus groups and a ranking list sent to participants by e-mail. By identifying four individual-level and five organizational-level categories, the study's outcome offers important insights on how managers perceive learning organizations. The in-depth field study is particularly important due to the recent conceptual confusion about the learning organization concept. This study contributes to academic discussions on learning organizations and offers recommendations that can be applied by companies seeking to expand their operations to Poland and other Central and Eastern European countries.

Keywords: organizational learning, learning organization, knowledge sharing.

Introduction

The topic of learning in organizations has received a great deal of attention in recent years. Growing recognition of organizational learning has emerged as a consequence of what Drucker calls the shift to "third period of change" characterized by structures based on information and knowledge (Drucker, 1988). There are many interrelated reasons behind this shift, including globalization and the technological revolution that accelerated the rate of changes in the workplace. Another reason is attributed to changes in the individual perception of the workplace. Nowadays, employees "bring more of themselves (their ideas, their feelings) to their work" (Argyris, 1991) and expect more autonomy, responsibility, flexibility, and self-development opportunities (D'Amato and Herzfeldt, 2008; Rupčić, 2019). Learning organizations are seen as a solution to those challenges, and some researchers are even more radical, stating that only learning organizations can succeed and be competitive (Senge, 1994; Huysman, 2000; Garvin et al., 2008).

The literature on learning organizations portrays the organization as a dynamic entity that gains competitive advantage from its relative ability to learn (McIntyre et al., 2012; Basten and Haamann, 2018). Despite its popularity and a proliferation of academic works that have extensively studied the learning organization mechanisms (Saka-Helmhout, 2010), the concept of a learning organization is a subject of confusion, and there is still no generally accepted operationalization of this phenomenon (Davis and Daley, 2008; Wu and Chen, 2014; Pedler and Burgoyne, 2017). Authors focus on recognizing conditions of organizational learning (Song and Chermack, 2008; Starbuck and Hedberg, 2001), identifying agents of organizational learning (Sadler, 2001), analyzing organizational learning processes (Vera and Crossan, 2007; Huysman, 2000; Jensen, 2005), or exploring learning organization outcomes

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(Pérez et al., 2005; Jiménez-Jiménez and Sanz-Valle, 2011; Cheng et al., 2014; Bhaskar and Mishra, 2017; Kim et al., 2017). Although much has been written on learning organizations, there is still no instrumental and comprehensive guidance for successful learning organization implementation (Basten et al., 2015).

Notably, whereas many researchers focus on explaining what a learning organization is and how learning appears, there is a shortage of empirical research that looks simultaneously at organizational and individual-level elements that build a learning organization. Organizational learning is a process that does not happen in an individual mind but is rather developed by social interactions. Many researchers agree that organizational learning is deeply rooted in individual minds (Argyris and Schon, 1978; Senge, et al. 2012; Hoon et al., 2018, Rupčić, 2019) although for an organization to be learning-oriented, the relational and social aspects are of equal importance (Hosking and Bouwen, 2000). Research analyzing individual characteristics within the context of learning organizations is overwhelmed by studies where an organization instead of an individual is the unit of analysis. Moreover, it is difficult to find research examples that would empirically uncover employees' opinions and observations rather than reflect an a-priori reality. There is also a particular dearth of research on learning organizations in a different cultural context. For example, while scholars have increasingly investigated the learning organization concept in Western markets, there is a lack of research on learning organizations in the emerging economies of Central and Eastern Europe (CEE). The rapid political, economic, and social transformation of CEE countries such as Poland results in organizations facing different organizational learning challenges that might not follow the dominant Anglo-Saxon models (Skuza, 2018).

This article aims to uncover how managers identify the key elements of learning organizations, and we chose to focus on Poland, the biggest economy of Central and Eastern Europe. This goal was achieved through an exploratory study conducted across 79 organizations located in various Polish regions. The study uses a multi-step approach involving in-depth focus groups and a ranking list sent to participants by e-mail.

Organizational Learning

Organizational learning has been discussed for over 40 years, although it was not until the 1980s that we noted the radical growth of interest in this phenomenon (Easterby-Smith et al., 2000; Crossan et al., 1999; Crossan and Guatto, 1996). Still, however, little consensus exists on what is meant by the term of a learning organization, and still, there is no generally accepted way to research the concept (Davis and Daley, 2008; Rupčić, 2019). The definition that received a great deal of attention and that constitutes a dominant approach to learning organization was provided by Argyris and Schön, who defined a learning organization as an organization in which "members act as learning agents for the organization by detecting and correcting errors in organizational theory-in-use and embed the results of their inquiry in private images and shared maps of the organization" (Argyris and Schön, 1978, p.29). Their approach was both an inspiration and a subject of criticism. The criticism came from three different streams of research that pointed to the importance of organizational processes and context. The first one treats organizational learning as a dynamic process based on constant knowledge renewal (Crossan et al., 1995) and the spiral of knowledge creation (Nonaka, 1998; Hoegl and Schulze, 2005). The second approach stresses organizational rules, procedures, systems, or culture as critical elements of a learning organization, stating that individuals are important in the concept, but as they operate in certain organizational contexts, their behavior is conditional on a specific context (Basten and Haamann, 2018). The importance of organizational context in creating a learning organization may also derive from the assumption that different people placed in the same structures produce qualitatively similar results (Senge, 1993). The third stream of research represents a relational constructionism approach which states that knowledge exists only in relation (is not a separate product or thing) and that organizational learning might be only interpreted within social interdependencies and co-dependencies (Hoskin and Bouwen, 2000; Gergen, 1985; Reason, 1994; Bouwen and Hoskin, 2000).

The theorists of organizational learning often treat individuals and organizations as separate entities, stating that learning starts and ends in individual minds or that it is located in the organizational routines, systems, and structures (Bouwen and Hoskin, 2000; Davis and Daley, 2008; Garvin, et al., 2008). We would like to contribute to those discussions by integrating these two approaches. First, while we believe that individuals are fundamental to the development of a learning organization, we acknowledge that a learning organization's emergence is conditioned on shared learning that must result in organizational change (see Sambrook and Stewart, 2000, Yang et al., 2004). Second, a learning organization analysis must be carried within an organizational context, which strongly influences individuals' behaviors and assumptions. Such a context includes learning practices and managerial commitment, which emerge as key stimulants of any learning organization.

In this article, we understand learning organization as the one which facilitates the learning of all its members, where people cooperatively expand their capacities and challenge their patterns of thinking and collective assumptions to continuously transform their organization (Gravin, 1993; Senge, 1990; Yang et al., 2004).

Research Method

The main purpose of this study is to examine which factors contribute to the learning organization's development. Learning organization was explained to participants as an organization that 1) actively supports knowledge sharing and creativity; and 2) encourages employees to change obsolete or ineffective practices and processes to leverage organizational responsiveness to changing market trends.

Empirical studies on organizational learning are mostly designed as hypothesis testing with questionnaires that are based on theory and empirical research of other authors. As they often built on the literature from the early 2000s, they may not relate to the views and experiences that might have changed for the last two decades due to the rapid changes in the marketplace. While this is particularly true for the rapidly transforming Central and Eastern European countries like Poland, the qualitative study was designed to identify which elements are believed to contribute to the emergence of a learning organization. The study was primarily qualitative in nature since its main purpose was to uncover opinions and observations rather than reflect an a-priori reality objectively. We tried to understand a learning organization phenomenon from the managers' perspective and the meanings that managers give to their experiences in this area.

We based our research on eight focus group sessions with no more than 10 participants attending each focus group. Overall, 79 managers participated in all sessions, each lasting from 90 to 120 minutes. Focus group sessions were carried out in Poznan, although participants operated in several Polish cities (Poznan, Warsaw, Wroclaw, Gdansk, Katowice). Each participant represented a different company that employed more than 49 people.

During focus group sessions, some attempts were made to increase the reliability of responses, including asking for examples that supported participants' opinions (Suutari, 1998). Transcriptions were analyzed using content analysis by two researchers who independently coded each focus group session findings. All findings were coded in four individual-level and five organizational-level themes. Five weeks after focus group sessions, participants were contacted again, and they were asked to rank each variable according to the level of importance for the learning organization. Each participant created two rankings based on the individual and organization-level variables.

Before the focus group sessions started, respondents were familiarized with a “working definition” of a learning organization. They were also asked about factors that enhance or inhibit competitive advantage in their industries. Further, the interview was organized into two phases. First, managers were asked to identify the skills employees should possess and attitudes they should demonstrate to contribute to a learning organization development. Then, managers were asked to identify organizational practices crucial for developing such an organization. All responses were aggregated, and they were further grouped into nine themes based on the proximity in meaning. The detailed results of the study are presented in the following sections.

Results

Individual Characteristics Needed to develop a learning organization

The first part of each focus group discussion was focused on identifying the employees’ skills and attitudes needed to transform the company into learning organizations. The following question was asked: “What are the skills or competencies that employees should possess and attitudes they should demonstrate in order to contribute to the transformation of your company into the learning organization?”

The responses were coded in first-order concepts and then regrouped into four second-order themes (Table 1). Following Krippendorff’s (2018) framework for qualitative content, the analysis was applied to identify categories that were aligned with the existing literature, thus fitting theoretical considerations.

Table 1: Individual Characteristics Needed to Build a Learning Organization

First Order Concepts	Second Order Themes
Employees should: • Take a risk on new ideas to find out what works. • Invest the time in new experiments. • Take the initiative to pursue action-learning projects. • Continuously search for new ideas and solutions.	Innovativeness and Creativity

Employees should: • Actively search for information from different internal and external sources to make changes and develop skills. • Understand the value of constant learning and take responsibility for their development. • Use inter-departmental meetings as the opportunity to develop their knowledge. • Look for opportunities (new tasks, challenges) to develop skills and competencies. • Actively participate in training and development initiatives. • Actively participate in projects and different working groups to develop their knowledge. • Undertake new responsibilities to develop their skills.	Commitment to Self-Development
Employees should: • Be open to alternative solutions. • Be open to new ideas. • Not be afraid to admit the lack of knowledge. • Challenge organizational assumptions and continuously search for more effective solutions. • Discuss the weaknesses and strengths of their practices and solutions. • Be open to critical feedback and actively search for feedback.	Open-Mindedness
Employees should: • Openly communicate and share knowledge with employees from other departments. • Use social media, forums, blogs to share knowledge. • Share individual insights and knowledge openly with their coworkers. • Actively take the role of internal experts.	Commitment to Knowledge Sharing

Ranked positions of the individual variables are shown in Table 2.

Table 2: Rank Position of Individual-Level Variables

	Respondents Ranking of Individual Characteristics				**Weighted Tank**		
Individual Characteristics	No. 1	No. 2	No. 3	No. 4	Scores	Percent	Rank
Commitment to self-development	28	25	13	13	226	28.61	1
Commitment to knowledge sharing	22	28	21	8	222	28.10	2
Innovativeness and creativity	24	12	30	13	205	25.95	3
Open-mindedness	5	14	15	45	137	17.34	4
Total					790	100.00	

The first identified theme refers to a commitment to self-development, which was the most important attitude that employees should demonstrate in order to contribute to the transformation of their companies into learning organizations. Participants often mentioned that individuals should be responsible for their development and organizational learning depends on their motivation and commitment to improve skills and develop new competencies. Such observations were also noted in earlier studies (Simmering et al., 2003; Rasdi et al., 2011; Garavan et al., 2011). Managers in this study also pointed that employees should: "*look for opportunities to develop new skills and knowledge*"; "*like challenging and difficult assignments that teach new capabilities*"; "*like to work on things that require a lot of skill and ability";* or "*see learning and developing skills as important*."

The second identified theme refers to a commitment to knowledge sharing. Previous studies noted that organizational learning is not a simple sum of what individuals learn but is rather developed by social interactions (Easterby-Smith et al., 2000). In this study, participants frequently mentioned that leveraging learning orientation means encouraging individuals to interaction and dialogue. Through knowledge sharing, employees convey meaning, exchange different points of view, confront stereotypes, perceptions, and mental models. The interviewees often mentioned the need to: "*openly share information and knowledge with employees from different departments*"; "*actively search for information from different internal and external sources to make changes and learn*"; or "*participate in informal or formal initiatives to improve present or create new practices, routines, products*."

The next identified theme referred to innovativeness and creativity. According to the interviewees, a learning organization requires a constant search for new, more effective solutions and practices. Competing in dynamically changing local and global markets requires leveraging human capital's innovative potential. Innovation and entrepreneurship understood as encouraging employees to think independently and competitively are among the basic principles of the "excellent companies" (Peters and Waterman, 2004). Hamlet and Prahalad state that success requires "the capacity to bring about a revolution" that will start from organizations' middle or bottom (Hamlet and Prahalad, 1994). In this study, participants often claimed that in the learning organization, employees should: "*Take a risk on new ideas to find out what works"*; "*Be willing to invest their time in new experiments"*; or "*Continuously search for new ideas and perceptions*."

The last identified theme refers to open-mindedness, which comes from overcoming defensive behaviors, often cited by the interviewees. There are two aspects of defensive behaviors that might block the employee's learning orientation. First, people can be afraid to expose their opinions as they try to protect themselves from the embarrassment that they experience while exposing their reasoning (Argyris, 1985). The pressure to have the "right answer" as a sign of competence can block employees from exposing their way of thinking and from explaining the thought behind their opinions. On the other hand, defensive behaviors insulate people's mental models from examination (Senge, 1990), which prevents them from accepting new insights. Mental models are a perception of the reality, assumptions, and generalizations that influence how people understand the world and how they take action (Senge, 1990). During focus group discussions, managers underlined that to leverage learning orientation employees should be aware of the problem of defensiveness and understand a need for questioning mental models. They also mentioned that open-mindedness needs self-disclosure, constant inquiry, and willingness to question individual and group assumptions.

Organizational Practices That Support a Learning Organization

The second part of each focus group discussion aimed to diagnose organizational practices crucial for developing a learning organization. Therefore the following questions were asked: "What kind of practices are crucial for developing learning organizations?" and "How the organization should support individuals so they can contribute to the transformation of the company to the learning organization?"

The participants' responses for both questions overlapped. They were coded into first-order concepts and then regrouped into five second-order themes (Table 3).

Table 3: Organizational Practices That Support a Learning Organization

First Order Concepts	Second Order Themes
Managers should: • Support innovativeness by being open-minded to ideas and new solutions. • Commit to employees' development. • Create an open and trustful work environment. • See their primary task as facilitating experimentation and learning instead of controlling and knowing what needs to be done. • Understand their own limits and be open to alternative solutions. • Carefully listen to employees and respect different points of view.	Supervisor's support

Organizations should: • Encourage cross-functional teams to work on new challenges or solve existing problems. • Encourage employees to work interdependently in formal and informal teams to solve work problems and undertake new initiatives. • Encourage employees to share their ideas and exchange new knowledge. • Encourage employees to use creativity and share the outcomes of their experiments. • Systematically review successes and failures, assess them, and make the results accessible to employees. • Create and organize access to knowledge databases or/and experiences of other departments, projects, customers, competitors. • Encourage cross-functional (interdepartmental) meetings with the purpose of reviewing and discussing organizational decisions and potential areas for improvement. • Be a facilitator for knowledge acquisition from external entities.	Knowledge Creation, Internalization and Transfer
Top managers should: • Encourage open communication, creativity, entrepreneurship. • Actively support learning initiatives. • Provide vision and superordinate goals. • Create a learning culture with constant learning constituting the most important value.	Top Management Commitment to Learning
• Teams should be rewarded for innovativeness and idea-sharing. • Individuals should be rewarded for innovativeness, knowledge sharing, and taking new initiatives. • Motivational and performance evaluation systems should rely on individual development. • Failures in the application of new knowledge/new initiatives do not influence individual evaluation negatively.	Motivational system supporting learning
Organizations should: • Teach employees creativity skills and data analysis methods. • Develop employees' self-confidence, self-esteem, and self-efficacy, which are necessary for open-mindedness. • Help employees to understand defensive mechanisms and their influence on effectiveness. • Create different learning opportunities – projects, new initiatives, special tasks. • Encourage to question organizational assumptions and ineffective practices constantly.	Development of Learning Skills
Organization should: • Train employees on how to use creative techniques, data analysis methods, trend forecasting. • Develop employees' competencies that are the basis for self-confidence and self-efficacy needed for open-mindedness and inquiry-oriented behavior. • Provide workshops on internal and external issues (such as market trends, competitors' activities).	Learning Skills Development

The ranked positions of the organizational practices are presented in Table 4.

Table 4: Rank Position of Organizational Conditions

	Respondents Ranking of Organizational Conditions					**Weighted Rank**		
Organizational Conditions	**No. 1**	**No. 2**	**No. 3**	**No. 4**	**No. 5**	**Scores**	**Percent**	**Rank**
Supervisor's support	25	35	18	1	0	321	27.09	1
Knowledge creation, internalization, and transfer	19	19	32	8	1	284	23.97	2

Top management commitment to learning	19	23	17	18	2	276	23.29	3
Development of learning skills	9	2	12	31	25	176	14.85	4
Motivational system supporting learning	7	0	0	21	51	128	10.80	5
Total						1185	100.00	

According to the respondents of this study, one of the key conditions for developing a learning organization is the supervisor's support. Focus group participants agreed that the major role in fostering individual learning comes from middle or lower-level managers, who directly impact employees (Osagie et al., 2020). The issues addressed by respondents and assigned to this category portrayed managers as ones that facilitate followers' experimentation, create an open and trustful work environment, involve employees in decision-making processes, and encourage employees to inquire into the nature of complex issues and to analyze problems critically.

The next important theme refers to creation, internalization, and transfer of knowledge. This group's practices involve cross-functional teams, online knowledge sharing tools or creating networks to effectively exchange knowledge and information. Organizations should encourage their employees to be creative, experiment with new ideas, and undertake individual and team initiatives to exchange knowledge and learn from others. Other studies also supported the importance of experimentation (Birkinshaw, 1997; Lankester, 2013) and individual and group initiatives in learning and knowledge transfer (Wu and Chen, 2014). Wang and Wei (2005) believe that exploration is the source for emergent changes as it creates new knowledge that can be transformed into new solutions. Calvert and his colleagues (Calvert et al., 1994) stress that learning organizations learn faster and smarter than their competitors because they encourage risk-taking and the pursue of knowledge-sharing initiatives.

Knowledge creation involves modifying existing knowledge and present practices and leads to better decision choices (March, 1991). The benefits of knowledge creation are demonstrated in the refinement of existing knowledge and learning, which results in lower transaction costs and better decision choices. Respondents highlighted the importance of reviewing past successes, failures, and organizational decisions to improve future actions. They also emphasized the necessity for easy access to knowledge databases where employees can use and build on the experiences of other departments, projects, and various organizational stakeholders. Other studies also included knowledge creation and acquisition in their learning organization concepts stressing the importance of reflecting on past projects (DiBella et al., 1996) and assimilating knowledge from other entities (Huysman, 2000). In this study, participants also mentioned the need to: "*systematically review own successes and failures, assess them and make the results accessible to employees," "develop lessons learned repositories," and "assimilate knowledge from other organizations – suppliers, clients, business partners, and research institution."*

An equally important theme in this category was top management support for learning. The majority of respondents underlined the importance of senior managers' highest commitment to promoting open communication, creativity, entrepreneurship, knowledge flow, and shared vision. Senior managers' support was also found to be an important imperative for the learning environment in other studies (Calvert, 1994; Leitch et al., 1996; Özsomer and Genctürk, 2003; Baker and Sinkula, 2005). Authors discuss the top management role in energizing organizational learning, guiding for integrated efforts, and creating a commonality of purpose, which were also identified as important in this study.

The next important theme referred to the development of learning skills. Training and development are claimed to be a core dimension of a learning organization in a number of studies (Griego et al., 2000; Chiva-Gómez, 2004; Marquardt, 2011). Participants of this study often underlie the importance of supporting employees with the development of "learning skills." This label was adapted from the work of Tjepkema and Scheerens (1997) and Kolb and Kolb (2005). Participants stated that skill-development programs focused on expanding learning competencies and abilities help employees act proactively and evaluate experiments more effectively. In a learning organization, employees should also be taught competencies and skills that help them reflect on and articulate personal vision, understand interdependencies, and balance advocacy and inquiry (Downe et al. 2012). Participants often underlined that these competencies should be developed not only on a personal level but also practiced collectively. They also stated that the development of learning competencies are the basis for self-confidence and self-efficacy needed for open-mindedness and inquiry-oriented behavior, crucial for a learning organization.

Managers participating in this study also believed that a learning organization needs a motivational system that supports employees' learning-behavior, an observation often found in the earlier studies (Garvin, 1993; Remedios and Boreham, 2004; Chiva-Gómez, 2004; Marquardt, 2011). Interviewees stated that organizations should support reward systems that favor knowledge sharing, new initiatives, innovativeness, and entrepreneurial behaviors. They also stressed that "*failures in applying new knowledge or initiative should not influence individual evaluation negatively*," which was a common challenge in their organizations.

Overall, our study identifies four individual-level and five organizational-level themes. While they are believed to influence a learning organization development, organizational practices influence the learning organization directly and indirectly through stimulating individual skills (innovativeness and creativity, and open-mindedness) and attitudes (commitment to self-development, and commitment to knowledge sharing).

Conclusion and Implications

The primary determinant of a firm's performance is its ability to quickly respond to market changes. Post-modern organizations rely heavily on information and knowledge and their application in the decision making process. They frequently transform to be responsive and to quickly detect market changes. This naturally brings much more attention to employees, their knowledge, abilities, and motivation to continually question their assumptions and practices to search for better alternatives. It is believed that market responsiveness and organizational ability to transform knowledge into valuable products and services can be leveraged if the organization is capable of creating a learning environment (Huysman, 2000; Senge, et al., 2012; Basten and Haamann, 2018). In this study, a learning organization is defined as an organization that supports knowledge sharing and creativity and encourages employees to change obsolete or ineffective practices and processes to leverage organizational responsiveness to changing market demands. Such an organization quickly detects market changes and reacts to them faster than competitors.

This study's main purpose was to examine which factors contribute to the development of a learning organization. Our framework based on in-depth focus group discussions with 79 managers stresses the importance of individual-level qualities (open-mindedness, innovativeness and creativity, commitment to self-development, and commitment to knowledge sharing) and organization-level practices that might leverage individual learning orientation. The learning organization is an organization that continuously and intentionally reflects on those practices and investigates their influence on employees' attitudes and behaviors.

The outcome of the study is undoubtedly beneficial for practitioners that want to increase organizational responsiveness. An effective way of stimulating employees to be committed to changes, entrepreneurial behaviors, and knowledge sharing enables the transformation of knowledge into valuable products and services, which is critical for competitiveness.

This study also adds new insights to the current literature. It empirically uncovers opinions and observations about a learning organization. As little empirical studies have been published in this field in Central and Eastern Europe, the study results can be particularly valuable for researchers seeking to expand their research studies to the emerging economies of Central and Eastern Europe.

The study's limitation lies in a relatively small number of respondents that might not be representative of companies located in Poland. Further, since the focus groups were conducted only within companies operating in Poland, the results might not be applicable to organizations located in different, especially culturally distant countries. Many studies posed a series of questions about the applicability of a learning organization paradigm in various countries (Lien et al., 2007; Jamali and Sadini, 2008). Further studies would therefore be needed to ascertain whether the Polish work environment has lent a certain degree of bias to the study. Replicating the study in other cultural settings would be necessary to ensure the validity of findings.

Nevertheless, the findings of this study can be further used to create a learning organization measurement instrument. The available literature on learning organization is abstract and confusing (Pedler and Burgoyne, 2017) and pays more attention to defining and describing than measurement (Jamali and Sidani, 2008). We hope this study provides insights on which subsequent studies can be built and that it can contribute to the future development of the learning organization practice.

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Impact of Social Support, Emotional Intelligence on Work Turnover Intention: A Cross-Sectional Study among Employees

Heera ALKETBI
School of Business Administration,The British University in Dubai,Block 11, Dubai International Academic City (DIAC); Dubai; United Arab Emirates (UAE); Email: heera.alkitbi@gmail.com

Professor Bader Yousef OBEIDAT
School of Business Administration, The British University in Dubai, Block 11, Dubai International Academic City (DIAC); Dubai; United Arab Emirates (UAE); Email: Bader.obeidat@buid.ac.ae

Abstract:

Social support in the working environment could be considered as one of the significant elements influencing laborers in different aspects of their work, such as work fulfillment, efficiency, and prosperity. As the literature indicates, social support in an organization comes from supervisors or colleagues. Another finding of the research is that emotional intelligence has an impact on employees' attitude, level of commitment, and on several job outcomes. The expected result is a significant negative association between supervisor support, co-worker support, emotional intelligence and turnover intentions. This study will contribute to the existing body of knowledge in the UAE and would be crucial in exploring social support and emotional intelligence related to turnover intention among employees of governmental and private universities.

Keywords*:* Turnover intention; Supervisor; co-worker; Emotional intelligence; UAE.

Introduction

In a growing economy, employee turnover is said to be an invisible enemy. It has now become a new challenge to UAE businesses, where the mobility rate of a skilled employee is notably high (Haak-Saheem and Brewster, 2017; (Ewers, 2017). It also results in a considerable loss of resources for organizations and causes great harm to their competitive positions (Ayodele et al., 2019).). The average number of years for which employees stay with organizations is 6 years; this indicates that there is a high turnover rate among the workers (Ibrahim and Perez, 2014). In another study conducted in the UAE, the impact of different factors (performance, satisfaction and job trust) on turnover intention was examined in public and private organizations. The study found that public sector workers have lower turnover intentions as compared to private sector workers (Zeffane and Bani Melhem, 2017). Similarly, a study by Al-Ali et al. (2019) on oil and gas organizations in the UAE found that turnover intention was directly and negatively associated with job satisfaction (Al-Ali et al., 2019).

Understanding the process of turnover may help companies take suitable action in order to eventually reduce the level of turnover, which will in turn lead to a reduction in costs, an improved work outcome and a high productive capacity (Hausknecht and Holwerda, 2013). The issue of voluntary turnover has been thoroughly examined during recent years. For example, experimental studies have demonstrated that a high rate of voluntary turnover is expensive for organizations since it negatively influences authoritative viability and achievement (Rahman et al., 2013). Losing a valuable worker can adversely impact an organization's competitive advantage, bringing down the morale of the rest of the staff (Agarwal et al., 2010), which in turn decreases profitability and work quality (Holtom and Burch, 2016). If a worker perceives a negative overall impression of an organization and its policies, their intention to leave an organization will increase. This, in turn, may give more impetus to search stable and secure employment.

A few factors have been associated with workers' turnover: correspondence at the workplace, work conditions, the tasks they receive, compensation/salaries and benefits (Stamolampros et al., 2019; (Hantoft and Boman, 2017; (Hsiao and Lin, 2018). Nevertheless, the social contributors of turnover received markedly less attention in academic research. Some ongoing investigations found three social components: interpersonal support, supervisory help, employee commitment, and workers' retention (Bedarkar and Pandita, 2014). Additionally, some external factors such as the key attributes of the organization, financial concerns, individual conflicts, or the chance to have more

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advanced professions might push employees to leave the existing organization (Arnoux-Nicolas et al., 2016). Social support in the work environment can be considered one of the most significant elements influencing laborers in several aspects, including work fulfillment, efficiency and prosperity (Rehman, 2018; (French et al., 2018). Research has likewise recognized social factors as significant supporters of representative turnover (Brassard and Méthot, 2006).

The present study discusses three aspects and their separate integration in relation to the turnover intention. Studies by Scott et al. (2014) and Chadwick et al. (2015) reported the negative influence of co-workers' and supervisors' support on employees' intentions to leave an organization. It can be stated as an inference of the literature search that the social support, such as supervisor's and other co-workers' support, play a crucial role in an employee's intention to leave an organization (Wongboonsin et al., 2018). This notion is also consistent with Maslow's hierarchy of needs (McLeod, 2007). According to Maslow's pyramid, the need for love and belonging comes after the basic physiological and safety needs. This implies that even if a person's basic needs are being fulfilled, if their psychological needs are not met, they most likely will not be content. Therefore, in order to realize or fulfill one's talents and potentialities in a workplace, supervisors' and co-workers' support become instrumental. Since the majority of recent research has been conducted in the western world (French et al., 2018; (Scott et al., 2014; (Chadwick et al., 2015; (Lambert et al., 2016), there is a need to identify the factors that lead to employee turnover or turnover intention in the UAE, especially among high skilled professionals.

Emotions and their management have been found to have a notable influence on employees' attitudes and behaviors; therefore, they have now received increasing attention in organizational management and psychology research (Ashkanasy and Humphrey, 2011). Emotionally intelligent workers know how to perceive and use their emotions to regulate complex relationships in the workplace (Siegling et al., 2014). Thus, emotional intelligence has an impact on employees' attitude, their level of commitment, and on several job outcomes (Amjad, 2018). Furthermore, employees' physical, mental and professional development also depends on it (Luthans et al., 2014).

The role of the above components has not been previously explored in a UAE setting. Also, it is not clear how these elements interact with each other and with turnover intention, and this is the fundamental focal point of this piece of research. Exploring the idea of such relationship and whether these elements have a pivotal role in UAE would greatly help in developing proof-based management strategies that result in a decrease in workers' turnover among local workers in universities. This study will examine the individual effects of supervisor and co-worker support as well as emotional intelligence on the turnover intention process. The subjects of the study will be employees of both governmental and private universities. In the end, the findings of the study will be presented along with a comprehensive conclusion with recommendations.

Literature Review And Hypothesis Development

A. Supervisor support and turnover intentions

Lambert et al. (2016) highlighted in their study that if the management of the workplace monitors the work overload on the employee and the relationship between supervisor and their assistants, this can lead to increased employee work satisfaction and commitment to the workplace (Lambert et al., 2016). Empathy and encouragement from supervisors, or lack thereof, are often cited as the most influential factors in a person's decision to stay at or quit their workplace (Wongboonsin et al., 2018). If an employee feels that they are actively encouraged and that their supervisor openly expresses their support, they are less likely to leave their current workplace (Malik et al., 2020). Another study reported that social support such as that of a supervisor's plays a crucial role in an employee's intention to leave an organization (Chadwick et al., 2015; (Alkhateri et al., 2018). In another recent study (Alén et al., 2017), researchers asserted that social support (managers or supervisors) acts as a motivator for employees; they get intrinsic enthusiasm towards their work that helps in reducing employee intention to quit. On a similar note, Mathieu at el. asserts that a supervisor's person-oriented attitude has a negative impact on the employee's intention to leave an organization as compared to their task-oriented or leadership attitude (Mathieu et al., 2016). Based on above literature review, the first proposed hypotheis of the study is the following:

Hypothesis 1: Supervisor support has significant negative effect on employee turnover.

B. Co-worker support and turnover intentions

Beehr and McGrath (1992) described that caring, co-workers' willingness to help each other, empathy, appreciation, respect and support are beneficial in fulfilling daily activities in the workplace, and can also alleviate troublesome circumstances. Therefore, co-worker support is considered to be the most important factor that affects employees in various aspects. It is defined as colleagues' willingness to support and assist each other while performing their routine tasks, thereby reducing work stress (Beehr et al., 1992). Similarly, if one finds social companionship with the people

working alongside them, it creates a more relaxed and encouraging work environment. This in turn establishes a more personalized connection between a person and the organization, and such people are less likely to leave (Karatepe and Olugbade, 2017; (Lavy et al., 2017). (Scott et al., 2014) reported the negative influence of co-worker on employees' intentions to leave an organization.

Hypothesis 2: Co-worker support has a significant negative effect on employee turnover.

C. Emotional Intelligence and turnover intentions

Emotional intelligence (EI) is an individual's capacity to adapt to the workplace, which includes several elements like self-regulation, self-awareness, self-motivation, sympathy, and communication (Khanifar et al., 2012). It has been an area of interest for many researchers of both management and psychology. The research on this topic has evolved back in 1990 when EI's first paper was published by Salovey and Mayer, 1990. Researchers of management studies stated that EI is a predictor of workplace outcomes (Jordan and Troth, 2011). Another researcher reported that emotions are an essential part of organizations, but only a few studies have focused on their role in the workplace (Bande et al., 2015). One previously published research paper showed negative association of EI and turnover (Firth et al., 2004; (Akhtar et al., 2017). Similarly, it was also posited that the higher the emotional intelligence, the lower the workers' turnover intention (Wong and Law, 2002). Higher levels of EI are significantly associated with low stress levels, anxiety, burnout and turnover (Karimi et al., 2014). Mayer (1997) Mayer (1997) postulated that workers with higher levels of EI showed high performance and therefore they had low turnover intentions. Similarly, a study that explores the relationship between emotional intelligence and turnover intentions among nurses found emotional intelligence to have a negative influence on turnover intentions (Trivellas et al., 2013).

Hypothesis 3: Emotional intelligence has a significant negative effect on employee's turnover intention.

Employee Turnover Intention

By definition, worker turnover is the movement of employees around the labor market, in between companies and among the states of employment, unemployment and inactivity (Burgess, 1998). Employees' intention to leave an organization or turnover intention is a measurement of an organization's work plan to quit their present position (Curtis, 2019). Workers leave their jobs for many reasons, including better pay, relocation of one's spouse, unfavorable behavior exhibited by colleagues or supervisors, low job satisfaction, or in some cases, they are simply fired (Horning et al., 2019; (Goler et al., 2018).

There are two types of employee turnover mostly found in the literature: voluntary and involuntary (Memon et al., 2016). However, some authors further categorize these types into four classifications (Heneman et al., 2003; (Morrell et al., 2001) which are functional, avoidable, downsizing and discharge. Voluntary turnover is initiated by the workers themselves (Udechukwu, 2009). It is further broken down into four more categories on the basis of functionality (Dalton et al., 1982; (Abdali, 2011) and avoidability (Abelson, 1987; (Curran, 2012). Dysfunctional turnover is the resignation of a skilled employee or high performer, who is difficult to replace, which might be harmful to the company. Thus, the organization is usually focused on and concerned with retaining such employees (Allen et al., 2010; (Dalton et al., 1982; (Heneman, 2009). Functional turnover is the exit of poorly performing employees, who are not difficult to replace. This is somewhat troublesome but not harmful and could be, in a sense, beneficial to an organization (Allen et al., 2010; (Heneman, 2009). Avoidable turnover could be potentially prevented by certain actions taken by the employer, like increasing salaries, or by giving new favorable job assignments (Allen et al., 2010). Unavoidable turnover occurs in unavoidable circumstances, such as the death of the employee or the relocation of an employee's spouse (Burgess, 1998).

Involuntary turnover is initiated by the employer or organization, independent of the affected worker(s) (Morrell et al., 2001; (Curran, 2012). It is further divided into two more categories. Firstly, discharge turnover is the dismissal of an individual employee for their job problems, performance and/or discipline. It also referred to the termination of dishonest workers from the organization (Rubenstein et al., 2019). Secondly, downsizing turnover is done to improve a company's effectiveness and the growth of shareholder value. The company initiates cost-reduction or restructures the program (Holtom and Burch, 2016).

This differentiation is important for an organization to make strategies for the reduction of turnover, especially voluntary dysfunctional and avoidable turnover, as these workers are those on whom the companies invest and, therefore, want to retain (Parker and Gerbasi, 2016). There is a common misconception that all turnover is the same and that it is always negative. However, the reality is that there are different forms of it, the cost varies across the different types (Parker and Gerbasi, 2016).

Turnover intention or turnover plan is a behavioral tendency of a worker to attempt to quit their workplace. Turnover intention is one of the strongest predictors of voluntary turnover. Unlike actual voluntary turnover, it is not definite (Sousa-Poza and Henneberger, 2004). In the same way, Cho et al. described turnover intention as an employee's voluntary decision to quit their present organization (Cho et al., 2009). Extensive literature has been found in the fields of psychology and economics on the analysis of turnover intention (Sousa-Poza and Henneberger, 2004; (Cohen, 2000; (Mobley, 1977). Such intention to quit is a direct precursor and is good at predicting actual turnover (Mobley, 1977; (Steel and Ovalle, 1984). Thirapatsakun et al. (2014) divided workers' intention to leave an organization into three cognitive mechanisms: thinking of leaving the job, having the intention of looking for another job, and, lastly, having the intention of leaving the job. Thus, turnover intention directly affects the actual turnover decision, and this decision leads to various unwanted consequences, both for the company and worker.

Conceptual Framework And Theoretical Backgroud

Based on the above debates in the literature, a somewhat inconclusive relationship was found between social support (supervisor and co-worker), emotional intelligence and turnover intention. To date, very little is known about the interplay of the dimensions of workplace supervisor and co-workers support and emotional intelligence as predictors of employee turnover intentions, and there is a lack of theoretical framework. Therefore, the researcher intends to develop a conceptual model that links social support, emotional intelligence to turnover intentions to present a tool for measuring the causality between these, as shown in figure 1. On the basis of performing a thorough investigation of the recently available published literature and theories that represent social support, EI and turnover intentions, the researcher utilized the social exchange theory for social support and the Hybrid model for EI to develop this link.

The social exchange theory works on grounds of reciprocal (give and take) relationship centred on word of honour and responsibilities. The central link between public and private employee and organization is an optimistic employment association, from the perspective of an employee, which comprises of three social exchange theory concepts; organizational support, psychological contract and job security (Latorre et al., 2016; (Ertürk, 2014). In a similar way, Goleman Hybrid model emphasizes the importance of emotional intelligence and its active role in high work performance of employees and subsequent satisfaction and retention (Goleman, 1996). The implementation of such theories in both private and public sectors universities would enhance employees' performance towards their responsibilities and their pledge to the organization and will inspire them to devote their energy and determination into given task.

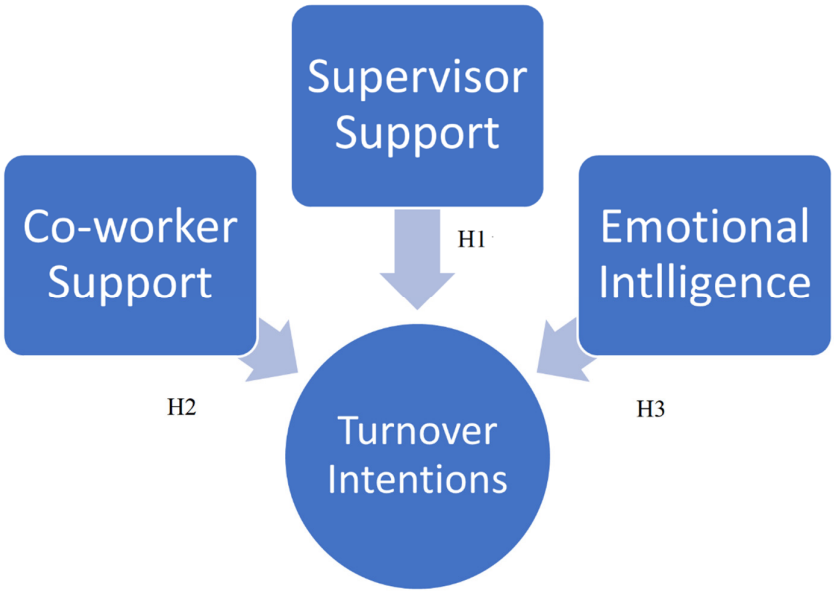

Figure 1 : Initial Conceptual Model for measuring the impact of component of research thesis.

Research Methodology

This will be a cross-sectional study with the purpose of investigating the effects of social support and emotional intelligence on employees' turnover intention in a UAE setting. The employees will be assessed for their turnover intention and its predictors or determinants such as supervisor support, co-workers' support, and emotional intelligence. The study will be conducted at a number of universities, including private and public universities, across the seven Emirates of the UAE. The public universities will consist of the Higher Colleges of Technology, UAE; Zayed University; and United Arab Emirates University (UAEU). Similarly, the three private universities will be the American University of Sharjah, the American University in Dubai, and Abu Dhabi University.

Approximately, more than 5000 employees are working in six universities in the UAE; therefore, when taking this number into consideration and using an OR of 0.70, it was found that a minimum of 537 employees will be required to conduct this study at a 5% level of significance or a 95% level of confidence, keeping a power of 80%. Since an online questionnaire will be sent to the employees, the anticipated response rate is 60%. Therefore, the sample size was overestimated based on the assumed response rate. Thus, after considering a response rate of 60%, the sample size was inflated to 752 in order to achieve the actual sample size of 537 employees. A multistage sampling method will be used to select the employees from the existing databases of various departments.

Expected Results and Implications

The expected result is a significant association between supervisor and co-worker support, and turnover intention. Additionally, emotional intelligence is expected to have negative effects on turnover intention behaviour. The results would support the research question, all the hypotheses, and the proposed framework for this research.

Conclusion And Future Work

In conclusion, this study would not only aim to explore the role of supervisors' and co-workers' support and emotional intelligence in employees' turnover intention but the analysis of this report will also provide a clearer picture of the turnover intention rate in UAE as well as the impact of the study's variables on the turnover intention of employees. This will be very important on a national level as most studies set in the UAE have only attempted to explore the role of job satisfaction and personal factors over the turnover intention. In order to reduce the turnover, it is crucial to explore social support and emotional intelligence, and their impact on turnover intention. Hence, it is important to apply social and emotional intelligence theories to a local setting to gain a better understanding of the underlying sociological, psychological and religious needs and aspirations of the local workforce, as these influence their intentions and decisions to search for opportunities elsewhere. Thus, this study would be crucial in exploring social support and emotional intelligence's relationship to turnover intention among the employees of governmental and private universities.

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Blockchain Technology Adoption: A Conceptual Framework Integrating Consumer Behavior, Technological, Organizational and Environmental Factors

Diana-Cezara TOADER[1], Corina RĂDULESCU[2], Graţiela BOCA[3],Rita TOADER[4]
Florina HAHN[5], Cezar TOADER[6] and Diana IGIAN[7]

[1,2,3,4,5,6] Technical University of Cluj Napoca, Romania
[1] diana.cezara@gmail.com, [2]corinam.radulescu@gmail.com, [3] bocagratiela@yahoo.com,
[4] rita.toader@gmail.com [5]ffloorina@yahoo.com, [6] cezar.toader@gmail.com and dianaighian@yahoo.com

Abstract

Considered to be one of the most disruptive innovations paving the way for the development of new business models, the blockchain technology is heavily ingrained in the strategic thinking of companies that are exploring ways to unleash its power in a variety of realms. However, the adoption of blockchain technology requires an overarching approach above and beyond its technological component. Drawing on the extant management and marketing literature on blockchain technology, this paper proposes a conceptual framework for its adoption which integrates the relationships between technological, organizational, environmental factors, while also adding the consumer behavior as a standalone factor that influences the adoption of this technology. The authors took a holistic approach by incorporating both intrinsic and extrinsic factors as well as the associated complexities that ultimately influence the adoption decision-making process. The proposed framework can be used by organizations as a starting point in their journey to embracing this disrupting technology as well as by scholars willing to refine and further expand the research on the adoption of blockchain technology.

Keywords: Blockchain technology, Distributed ledger, Adoption, Consumer behavior.

Introduction and literature review on blockchain technology

The last two decades have been marked by an exponential increase in disruptive technologies and innovations including artificial intelligence, cloud computing, big data, blockchain technology. We are currently experiencing the fourth industrial revolution (Industry 4.0) that is clearly changing the way people live, think, work and relate to each other (Capgemini, 2018). The blockchain technology is considered one of the most important technological innovations and perceived as the hallmark of Industry 4.0 (Kimani et al., 2020).

In its most fundamental form, a blockchain is a decentralized database of records distributed across computational nodes and structured as a linked list of blocks, each of them including details connected in chronological order (Angelis & da Silva, 2019; Crosby et al., 2016; Lopez et al., 2020; Oh & Shong, 2017). Each block in the chain comprises transaction information which is cryptographically hashed (Rajnak & Puschmann, 2020). This technology has high capabilities and can secure the reliability and the integrity of the transaction records by having all the participants in the Peer-to-Peer network develop, record, store and verify information via a consensus mechanism (Kher et al., 2020; Oh & Shong, 2017; Rhasideh, 2020).

While the literature on blockchain technology is still in an emergent state, it is clear from early research that a broader and more holistic view is needed for organizational adoption. As with most disruptive technologies, it is vital for organizations to assess and understand the determining factors for the adoption of blockchain, together with the potential challenges and complexities associated with the exploitation of this disruptive technology. Therefore, we place our research in the context of digitalization of business models that are fundamentally changing the interaction between companies and their customers. This new competitive reality requires organizations to be agile in their quest to becoming intelligent, as their service interface will become a technology-dominant one (Toader et al, 2019). This paper is structured as follows: the first section provides an overview of the blockchain

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technology, the main characteristics and areas of applications. Next, we describe our research approach and provide a literature review on blockchain technology adoption where we outline the determinant factors and complexities associated with its implementation. In the following section, we present our conceptual framework for a holistic decision-making process for blockchain technology's adoption. We conclude the paper with a series of conclusions, followed by limitations and directions for future research.

Sultan et al. (2018) formalized the characteristics of blockchain into four core dimensions: immutability, decentralization, consensus-driven approach and transparency. First of all, the blockchain is temper-proof as it contains a permanent record of transactions and whenever a new block is added to the chain, it cannot be altered. This is particularly important for building trust in the distributed ledger and its records. Decentralization implies that the information can be accessed and copied by any participant in the network. Therefore, blockchain is permissionless as each party gave up control of their data and power was dispersed away from a central authority. In addition, blockchain is leveraging a consensus model which provides clear rules for verifying the validity of transactions and how information has been created by the majority of participants. Hence, blockchain allows for going beyond a simple database custodianship and focus on the usage and data manipulation as well as on how value can be best extracted from it (Corsby et al, 2016; Jannsen et al., 2020; Upadhyay, 2020). Also, since transactions are verified by a distributed network, the blockchain is perceived as being free of human errors, while also eliminating the third-party intermediaries. Lastly, transparency allows for access to a full transaction history that can be accessed by any party. Given that, trust and transparency are considered to be at the heart of its revolutionary benefits (Frizzo-Barker et al., 2020).

Since the fundamental objective of blockchain technology is to ensure transparency and substantiate accuracy of information across the digital ecosystem, its capabilities can be translated in practical applications in every industry (Sultan et al., 2018). According to Swan (2015), its benefits are more than just economic ones as they also expand into the social, humanitarian, political and scientific domains. There are three main areas that organizations can leverage when adopting this technology: currency (e-payments systems, currency remittance and transfer) with Bitcoin being the most famous illustration of how blockchain can be used for digital payment systems, smart contracts (financial markets) and social applications beyond currency and financial services. The latter can also target endless fields and industries, ranging from the legal field (notary), government applications (voting, electronic IDs), supply chain management, retail, insurance to healthcare industry (health records) (Angelis & da Silva, 2019; Crosby et al., 2016).

The blockchain technology enables new organizational forms and business models, while also facilitating the transition from hierarchical organizations to self-organizing economies. Blockchain creates a myriad of opportunities for how value can be transferred between participants in a trusted and convenient manner (Capgemini, 2018). Its advocates perceive this technology as the underpinning element for trust-free transactions (Upadhyay, 2020), while Swan (2015) advocates for its inclusion as an economic overlay to the seamlessly connected world.

Factors affecting adoption of blockchain technology

The blockchain technology has been the subject of a rapidly growing body of research in the past years. Most of the current literature focuses on the main characteristics of the distributed ledger technology, advantages and disadvantages, areas of applicability as well as the technical difficulties associated with the adoption of this innovative technology. In order to develop the conceptual framework, the authors reviewed the extant management literature and identified the main determinants of the blockchain technology's adoption. Our literature review revealed a number of diverse endogenous and exogenous factors as well as their interdependence that organizations need to consider when adoption a disruptive technology as blockchain.

We categorized these factors based on the TOE framework which was developed by Tornatzky and Fleischer (1990). This framework emphasizes the technological innovation decision-making that it is impacted by 3 determining factors: technological, organizational and environmental. The technological context relates to all the relevant technologies to the companies, both the ones that are already implemented within the organization and the new technologies that are available on the market. This factor is particularly important in the decision-making process as it establishes a limit on the scope, breadth and the pace of technological innovation that a company is able to undertake. The organizational context refers to the internal characteristics of the firm and to the amount of available resources that can be committed for technological innovation purposes (Baker, 2011). The last determining factor, the environmental one, analyzes the structure of the industry, the regulatory environment and the presence of technological service providers, and is considered a very important element in analyzing disruptive technologies (Chen et al., 2020). Besides the technological, organizational and environmental factors, we decided to further enhance this research with an element that is essential in the adoption decision-making process, namely the consumer behavior.

Technological Factors

The blockchain technology can be leveraged to solve a variety of problems across different industries by providing increased transparency, trust and reliability of data processing. Nevertheless, the complicated engineering aspects of the decentralized networks can introduce several important adoption challenges to the organizations.

a) Scalability

The blockchain technology is still considered to be in its infancy, although it has experienced a quick development in the past years. Questions over the technical scalability of the network have been raised given that this will play a critical role for high volume transactions like in the case of listed securities (ESMA, 2017). The current standard of the technology remains some way behind the levels required to support adoption in capital markets and this can put a serious strain on the further adoption of blockchain technology, especially for public distributed ledgers. The legacy transaction networks such as Visa are capable of processing thousands of transactions per second, while the two largest blockchain networks, Bitcoin and Ethereum, register way lower transaction speeds (the first seven transactions per second, while the latter can handle approximately 20 transactions every second) (Oliver Wyman, 2016; Batubara et al., 2018; Finextra, 2020). Nevertheless, according to the latest Global Blockchain Survey conducted by Deloitte (2020), 88% of the surveyed executives believe that the blockchain technology is scalable and will eventually become mainstream.

b) Standardization

Across all industries where blockchain applications proved their feasibility, many organizations have engaged in the development of standalone blockchain platforms that rely on different coding languages, protocols and consensus mechanisms. The presence of a large number of blockchain networks leads to a lack interoperability that defeats the purpose of distributed ledgers, as firms cannot exploit the network effects (Finextra, 2020). As a consequence of this lack of standardization, the stored data is not in line with the market standards and takes away consistency from basic processes like security, making mainstream adoption an almost unachievable endeavor (Finextra, 2020). The adoption of blockchain technology will require harmonized technology standards in order for the industry players to be able to focus on developing value-added services for their customers by leveraging a well-developed and secured infrastructure (Swan, 2015; Janssen et al., 2020).

c) Cost of adoption

Even if blockchain applications are expected to bring a lot of economic benefits, the initial investment may be considerable, particularly in the case of companies with massive back-office operation and complex legacy systems that would need to be replaced. This can create a lot of challenges for the current operations of those organizations besides the implied higher costs (Crosby et al., 2015; Deloitte, 2016).

Integration with legacy systems

Another potential challenge to the adoption of blockchain technology refers to the integration of the distributed ledger with the legacy systems, which are usually deeply embedded in the enterprise. This makes them critical for the everyday operations and the potential requirement to be completely restructured is definitely not an easy decision for the executives. Moreover, there is a high probability of information loss and data corruption which is discouraging more companies from transitioning to blockchain technology (Finextra 2020).

d) Security concerns

The successful adoption of this disruptive technology depends on the efficiency of the risk management associated with distributed ledgers, which is particularly important as the blockchain is part of the companies' core infrastructure. Even though the distributed ledgers are resilient, the business processes built on them may still be vulnerable to technological failures as well as cyberattacks (Deloitte, 2018). Also, since the blockchain technology is still considered to be in its infancy, the networks can still be subject to technological failures. There is a 1.5-5 percent probability of errors for each 1000 lines of code (Janssen et al., 2020).

Organizational Factors

a) Understanding of the blockchain technology and its applicability

One of the main challenges associated with the blockchain's adoption by firms, especially the small and medium ones in sectors other than financial services, is a widespread lack of understanding of how it works and how it can

be leveraged to benefit those firms (Deloitte, 2016). This fact was reiterated in a survey conducted on C-level corporate executives by the Risk Assistance Network Exchange (2020). They found that 40% of the senior managers who had not adopted this innovative technology yet do not have a clear understanding of blockchain or its benefits. This is significantly hindering a more widespread adoption of this disruptive technology.

b) New business models

Batubara et al. (2018) argued for another two main barriers to blockchain's adoption from an organizational point of view: acceptability and the need for new governance models. Indeed, the reconfigurations of the current business models might be complicated and cumbersome (Swan, 2015) and there are companies that are reluctant to the blockchain's disruptive character, since it involves approximately 80% business process transformation and a loss of control due to its decentralized network. This can be perceived as unsettling by many organizations, since it represents a massive shift away from their traditional ways of conducting business activities (Finextra, 2020).

c) Strategic orientation of the management

Clearly, the strategic orientation of the management in deciding the appropriate technology adoption path for their company is another decisive factor for the adoption of blockchain (Angelis & da Silva, 2019). Nurryev et al. (2019) argued that the strategic orientation of the management has a significant effect on the behavioral intention to adopt the blockchain technology for transactions. Moreover, Kamble et al. (2018) found that the practioner's adoption behavior gets influenced depending on how other important people to them have reacted to the usefulness of the blockchain technology. Also, Deloitte (2020) found that the blockhain sentiment among executives is following an improvement pattern, as a growing number of leaders are seeing it among the top five strategic priorities for their companies. This facilitates investment, confidence as well as the advancement of initiatives with transformational potential at the firm level.

d) Scarcity of qualified talent

Lastly, another challenge faced by the organizations is the limited pool of qualified talent required to adopt the blockchain technology. Currently, there is a shortage of adequately trained and skilled workforce who can develop and further manage the complexity imposed by the blockchain technology. According to IBM (2020), the demand for blockchain skills significantly increased by almost 2,000% in the past three years.

Consumer Behavior

Knowledge and understanding of the blockchain technology

Customers play a vital role in the blockchain technology adoption and organizations need to develop a clear understanding of its societal impact and of how this disruptive technology can benefit their customers. Some of the challenges associated with its adoption are rooted in consumers themselves. Recent studies show that there is a limited knowledge and understanding of blockchain technology among customers. When looking at the potential benefits from the consumers' perspective, the blockchain technology has the potential to ensure a high level of transparency in their purchases, reduce the transaction costs, improve their privacy as well as refine social interactions. These advantages potentially power-up consumers in their transactional encounters. Nevertheless, not many customers are aware and actively engage in the use of Blockchain-based applications (Knauer & Mann, 2020).

A survey conducted by HSBC in 2015 showed that 59% of the respondents have never heard of the blockchain technology, while 80% of those who heard of it do not really understand what this technology entails. Another report released by Bank of Canada (Schuch & Shy, 2015) shows that even though many customers had heard of crypto currency, they were unfamiliar with the basic mechanics of the underlying blockchain technology. Kumpajaya and Dhewanto (2015) empirically demonstrated that customers' knowledge of the technology is a relevant acceptance predictor. Hence, increasing the level of awareness can be critical for further adoption.

a) Resistance to change

Crosby et al (2016) argue that the adoption of blockchain technology depends on how successfully it overcomes the cultural resistance of the customers. The decentralized and distributed ledger eliminates the tangibility of the transactions through third parties, hence consumers need to gain trust in this disruptive technology. The greater freedom provided by blockchain applications comes with a higher degree of responsibility that would require a behavioral change on the customer's side. On that note, Woods et al. (2017) presented an important barrier to

blockchain's adoption, namely the security concerns. Although the blockchain technology seems to be difficult to be hacked, its decentralized nature implies that the individual nodes on the network cannot be fully secured and therefore, they are prone to be subject to malicious activity.

b) Social Influence

Social influence, reflected by the extent to which an individual places importance on the views of others, represents an important antecedent of the technology adoption behavior and on the behavioral intention to use it (Nuryyev et al., 2020). Due to the fact that blockchain is still perceived as being linked to the crypto world in the mind of many customers can be considered a reputational challenge, as the crypto world is often perceived as a venue for illicit activity (Finextra, 2020, Swan, 2015).

Environmental Factors

a) Industry structure

The blockchain technology will most likely disrupt the current industry structures due to its potential to become the new open-standard protocol for transactions, contracts and records. According to McKinsey (2018), sectors like financial services, healthcare and government are the ones capturing the greatest value from the decentralized ledger technology as their industries' functions are innately more suited to blockchain solutions.

In case the current incumbents have already adjusted their business models to enable themselves to derive value from blockchain applications and further improve their consumers' experience, then the barriers to entry for other players will be high (McKinsey, 2018). According to Varma (2019), the organizations willing to adopt this disruptive technology need to set the seal on the commercial viability of their blockchain applications in order to successfully face the competition from incumbent players who besides being powerful and rich, they are also well-ingrained in the current legal and regulatory landscape. Also, it is obvious that companies engaging in the development of blockchain solutions by themselves will face serious implementation challenges in terms of scalability and internal buy-in, as blockchain's benefits are best exploited from network effects when players are jointly creating a shared platform (PwC, 2018). Companies will be able to capture the most value from this technology by tailoring their blockchain strategy to their market position, while also taking into account the already established standards, the shape of the ecosystem as well as the legal and regulatory environment (McKinsey, 2018).

b) Legislation and Regulation

Given that the blockchain technology has assumed an increasingly prominent role in the society, its adoption across various industries and fields has caused tension, especially in the areas traditionally subject to extensive regulation, such as financial services sector (money transmission, capital raising). It is clear that the assumptions crafted in the regulations decades ago are now being challenged by the disruptive nature of blockchain technology. Even though numerous federal and state agencies recently started to regulate some of the blockchain applications, there is still a disparate approach across countries and sectors that lead to confusion on the companies' side (Dewey, 2019). Moreover, regulations around cryptocurrencies have gained widespread attention, whereas other blockchain applications are yet to be reviewed by regulators (Janssen et al., 2020). Hence, the uncertainty around the regulatory regimes and jurisdictions companies will be subject to will play a key role on the adoption of blockchain technology (Desphande et al., 2017).

In order to ensure a widespread adoption of the blockchain technology across different industries, while also protecting consumers and preventing malicious activities, a pro-innovation approach to legislation and regulation is needed (Dewey, 2019). Furthermore, regulators need to further enhance their knowledge of the distributed ledgers to be able to understand the blockchain technology, its impact on businesses and end-users as well to identify potential risks associated with its implementation (Deloitte, 2016). Lastly, Harwood-Jones (2016) argues that a wide implementation would be facilitated by tailoring and rewriting laws by considering the nature of blockchain technology as well as data security issues.

c) Governance

The blockchain technology has the potential to redesign participants' interactions in business, politics, and society due to the disintermediation at large scale, which in turn might rapidly change the underpinning tenets of existing governance models (Atzori, 2015). Currently, organizations are facing a lack of clarity on how the distributed

ledger is governed. According to a discussion paper published by the European Securities and Markets Authority (ESMA, 2016), the efficient adoption of blockchain technology relies on the development of a governance framework that addresses the liabilities of the network participants in case of error or fraud, responsibilities for the activities of the network related to regulators and customers, rules to identify authorized participants, correction mechanisms as well as penalties when rules are violated. Also, given that individual participants will most likely interact with the ledger via private keys, a governance framework needs to establish clear guidelines for the management of keys as well as protocols for loss or theft in order to avoid additional vulnerabilities of the ledger (Jannsen et al., 2017).

A proper governance framework can also ensure fair competition and orderly markets by establishing adequate levels of privacy. In the absence of proper safeguards, some participants can easily get access to information and engage in its undue exploitation that can eventually lead to market manipulation or unfair competitive practices (ESMA, 2016).

To sum up, legislation and regulation focus on procedures to be followed and the means to enforce them, while governance relates to stewardship and incentives to act on common interests. Besides creating a proper regulatory environment for the adoption of blockchain technology, governments should also play a collaborative peer role in a bottom-up governance ecosystem (Yeoh, 2017). Also, in order to realize the societal benefits imposed by the blockchain technology, clear rules, procedures and mechanisms for their implementation are needed so that the law enforcement agencies can monitor and impose penalties to participants engaging in fraudulent activities (Crosby et al., 2016).

Development of the conceptual framework

The potential of blockchain technology for creating new foundations for the economic and social systems is currently receiving significant attention from both management and marketing scholars as well as practitioners.

The emphasis of the research so far has been on blockchain technology itself and its use cases rather than on the issues around selection and successful adoption. There is a current need for a holistic understanding of the determining factors, their interaction and the challenges associated with the widespread adoption of blockchain technology.

The TOCE framework proposed in Figure 1 represents one of the first conceptual frameworks that takes a comprehensive approach by including both endogenous and exogenous factors and their relationships when considering the adoption of blockchain.

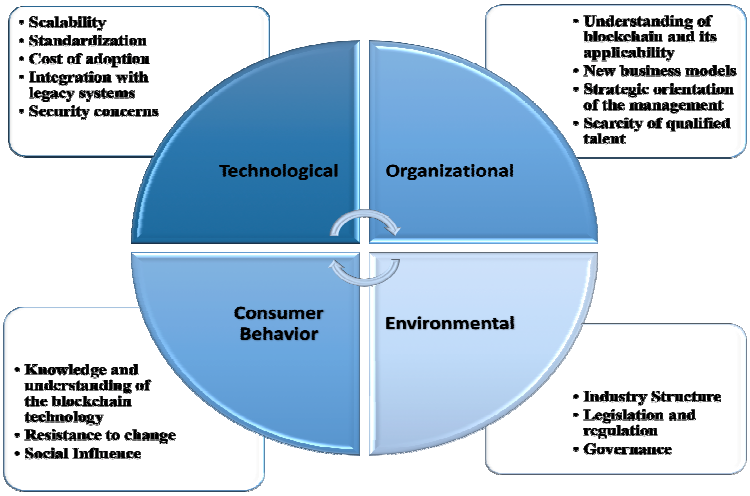

Fig. 1: The TOCE framework

The technological context encompasses the unique engineering aspects of the distributed ledger technology and the potential challenges that might delay a widespread adoption, such as: scalability, standardization, cost of adoption and the integration of the distributed ledger with the legacy systems. We also touched on the importance of an efficient risk management to address the security concerns that are raised by decentralized networks. In terms of the organizational factors, we highlighted the importance of a clear understanding of the blockchain technology, its

benefits and use cases by organizations who are willing to engage in technological innovation. However, the adoption of blockchain technology might require the redefinition of the current business models, hence the strategic orientation of the management in choosing the innovation path is essential in order to ensure the acceptability of this technology. Moreover, we also raised the issue related to the scarcity of qualified talent needed to develop and implement blockchain applications. Regarding the environmental factors, we focused on the industry structure that requires a harmonized infrastructure to ensure the interoperability of blockchain technologies. We also highlighted the need for consistent legal, regulatory and governance frameworks, that are still considered to be a serious impediment to the widespread adoption of blockchain technology.

As it relates to the research design, we have adapted the TOE framework by introducing a new theoretical perspective relevant for the study of blockchain's adoption. Therefore, the novelty of our proposed framework stands from the addition of the consumer behavior as a standalone factor that influences the adoption of blockchain technology by the organizations. Consumers are more powerful because of the blockchain technology that allow them to make more informed decisions and thus, organizations need to further streamline their customer experience to efficiently respond to their empowered customers. There are several general factors that influence customers when deciding whether to engage in activities that leverage blockchain technology that are essential for companies to understand, such as: their current state of knowledge and understanding of this disruptive technology, their reluctance to change as well as the social influence from other people in their networks.

This conceptual framework can be used by companies willing to implement the blockchain technology in order to avoid rushing headlong into a decision without gaining a proper understanding of the endogenous and exogenous factors as well as the challenges associated with its adoption. This framework draws the attention on the need to comprehend the technological and organizational aspects which significantly shape the way in which blockchain applications are implemented and how they can disrupt the current organizational processes. Companies need to conduct a strategic assessment of their business model, legacy systems and their current needs in order to ensure that blockchain is the proper change agent needed to create added-value. Given that blockchain has the potential to disrupt the current industry structures, companies need to understand how to best leverage this technology in order to successfully strive in this new competitive reality. Lastly, organizations need to gain a deep understanding of their consumers' behavior and the challenges associated with their blockchain's acceptance to be able to deliver superior value to customers through blockchain applications.

Conclusions

The journey of blockchain technology has already made the transition from theory into practice as more and more executives recognize it as a true agent of change capable of reshaping the existing business models and redefining the way in which value is transferred between different parties. Organizations are now considering it as a top strategic priority capable of streamlining a wide array of functions and organizational processes.

What management needs to consider in the adoption decision-making process is how to best position their companies to capture the greatest value from the increasing degree of service innovation through blockchain applications. This requires a comprehensive assessment and a deep understanding of the determining factors, their interdependence as well as the associated challenges with the adoption of blockchain technology.

We conducted an extensive review of the management and marketing literature on the adoption of blockchain technology from 2015-2020, which revealed that the primary focus of most research papers so far was on the technological elements. Our paper filled the current gap in the literature by providing a holistic view of the endogenous and exogenous factors that impact the organizational adoption.

The TOCE framework was adapted from the theoretical framework proposed by Tornatzky and Fleisher (1990) which analyzes the technological, organization and environmental contexts, to which we added another decisive dimension for blockchain's adoption, namely the consumer behavior. Our comprehensive conceptual framework identifies 15 determining factors that are interacting and mutually influencing each other, which organizations need to consider when deciding to implement the blockchain technology.

This study has several limitations that researchers can address in the future. First, we proposed a conceptual framework which synthetizes four main dimensions (technological, organizational, consumer behavior and environmental), that authors considered to be essential in the adoption of blockchain technology. Given the diversity of the previously described influencing factors, a more comprehensive inter-disciplinary effort is needed in order to delve deeper in the dependencies between each of the proposed dimensions. Additionally, the conceptual framework proposed has not been empirically tested, hence future research is needed to gain practical evidence across different industries.

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Human Capital Management on the Example of an Amusement Park

Romuald SZOPA
Academy of Physical Education in Katowice, Faculty of Management,
corresponding author: romuald.szopa@gmail.com

Michał KOT
Czestochowa University of Technology, The Management Faculty, ul. Armii Krajowej 19B, 42-201 Częstochowa, Poland, e-mail: office@gjem.press

Abstract

The main aim of the work is to analyze the human capital management of an amusement park, and the care for human capital by the park management. The present study also draws conclusions from the opinions obtained from employees, and thanks to which the park managers will be able to improve certain processes. The research methods used of the work include critical analysis of source materials and questionnaire. The research tool used in work is a questionnaire. The study examines the activities undertaken by the amusement park related to human capital management. The survey has been conducted among seasonal park employees who work at least one season. The following hypotheses are posed in the work: internal training in an amusement park is helpful in performing daily duties at work and allows employees to develop personally, long working hours drastically affects the quality of work performed by employees, which may affect customer service, as well as an amusement park is the right place to gain experience and improve the personal customer service experience.

Keywords: Human Capital Management, Human Resources Management, Entertainment, Amusement Parks.

Introduction

An organization employs the employees by carrying out a complicated recruitment process that acquires the human capital necessary for its functioning. It is essential because it should be remembered that it is not enough to hire employees who perfectly match the profile of a given position with their skills, knowledge and experience as the market situation can change dramatically. It is understood from the current situation that the recently hired employees may be worthless because they have not raised their qualifications by this time, and they have not checked whether there are any novelties on the market, so the organization may also be left behind in terms of competition. The employer needs to provide appropriate working conditions for employees so that they can use their potential and help in gaining a competitive advantage on the market, but this is only part of the tasks that the employer needs to fulfill. The employer needs to implement a system of attitudes in the organization for employees and provides the ways of engaging employees in the life of the organization. The purpose of such activities is to take care of the good name of the organization through the employees, as well as to use the full potential of the employees. The basic assumption of human capital management is the development of employees; it is a precious value for every organization and should be one of the investment priorities. The market forces the organizations to develop, so it is worth providing the most essential resource in the organization with the best possible development. The organizations should prepare development plan for employees that plan should give a chance to develop and achieve the goals of employees, it also allows to lay the foundations for the human potential expected by the organization. The proposed plan will be considered to implement as the strategy. While creating a development plan, it is worth creating a career path for the employees in specific positions, and to create such a plan, the following steps can be considered:

- create a description of the organizational structure
- create a frame of time spent by an employee in a given position or specialization
- creating a promotion system
- the employee should be able to acquire experience in working in his position
- making the possibility of participating in training for employees, and providing the opportunity to make them involved
- developing a career path

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The creation of a plan is designed to improve employee evaluation and improvement, but the most important element is the ability to move employees between positions. An employee who is promoted or transferred to another position in the organization is already familiar with the features of the organization and work culture. Furthermore, he/she has also acquired the skills, knowledge and experience in this organization and has already completed some training. All the factors mentioned above make it much easier for an employee to adapt to a new job and achieve better results than a person who would come from the outside and need some time to implement in the organization.

Literature Review

Human capital theory, as originally developed by Becker (Becker, 1960, Becker and Tomes, 1986, Becker et al., 1990) and more recently by the Unified Growth Theory (Galor and Weil, 1996, Galor, 2005, Galor, 2012), has emphasized the importance of human capital in explaining the demographic transition and economic growth. Many definitions can be found in the literature in connection to human capital. One of the fundamental views of human capital is the one presented by Haque and Oino (2019). They have defined human capital as knowledge and skills. These two main components are created, maintained, and, most importantly applied by the employees while performing their work tasks. Human capital management is the process of creating value in a company or organization through appropriate steps (Ingham: 2007; Ślusarczyk and Grondys, 2019; Kozicka et al. 2019). The concept of human capital reaches deep origins. According to Cadil, Petkovova and Blatna (2014), the concept of human capital is developed from a growth theory, and the relationships between the concepts and the economic growth have been analyzed for several decades. Studies completed by such researchers as Chaiprasit et al., 2020, Gorzeń-Mitka et al., 2017, Schutz (1972) and Mincer (1996) are considered as one of the most important in the context of human capital conceptualization process. Schultz (1972) relates man economic value with the concept of human capital and highlights the importance of investments in this area. Human capital (HC) is an asset for the organization or a well known intangible organizational value. Intellectual capital in the organization represents individual knowledge, skill, experiences, abilities and self-motivation (Baron A, Armstrong M 2007). Meanwhile, human capital can reflect organizational value (Wziątek-Staśko, 2014). Kaplan and Norton state that individual ideas, knowledge, innovation and how they make the decision making in working activities consider as human capital (Kaplan and Norton 2004). According to Kluþka, an enterprise is a social system that emphasizes economics and the social dimension of the enterprise -- the interests and preference human factor. Employees are the pillar of an organization. An organization cannot survive if there are no employees (Kluþka, 2011). Human capital is defined as the stock of skills and knowledge, and employees of expertise further play an integral role in increasing the productivity of the organization. These efforts have evident positive impact on the business performance being aimed at the development of professional skills of employees, including entrepreneurial ones (Stacho et al., 2019; Zainol et al., 2018). Every organization invests part of its money and resources in training its employees. Employees in turn work hard, upgrade their existing knowledge and contribute in their way to increase the productivity of their organization. This trend has risen the potential qualified staff (Tokarþíková, 2013) Consequently, it becomes one of the core reasons of current compensations and benefits programs in enterprise human capital management (Bilan et al., 2020). Human capital is the most crucial constituent of the intellectual capital of a company, as people are the ones who have the knowledge to interact with the surrounding environment. This motivates, supports and create a value for a company. Human capital plays an important role, and it deserves special attention in each of the models (Ross, Ross, Dragonetti, 1997).

Research Methodology

The research methods used in work include critical analysis of source materials and questionnaire. The questionnaire based survey has been used as a research tool in the present study. The purpose of the survey is to examine the opinions of employees about the activities undertaken by the amusement park related to human capital management. The survey questionnaire consists of thirteen main questions and five metric questions. The questionnaire has been circulated among the seasonal park employees who work at least one season. The survey was conducted to check the opinions of seasonal workers about the activities of management in terms of human capital management in an amusement park. The questionnaire has included questions related to the recruitment of employees and training courses offered by organizations. The respondents were also asked for their opinions on the remuneration and bonus system, as well as for the support of their superiors during problems encountered at work. The last questions mainly concern the opinions of employees about personal development while working in the amusement park and their opinion whether it is worth joining the employee team of the amusement park. Due to the epidemiological situation in the world, the study was conducted using an electronic questionnaire. The survey questionnaire was distributed through employee groups of the amusement park and contact on social networks with former employees of the amusement park, also due to the pandemic and the suspension of the amusement park during the survey period, it was addressed mainly to employees who worked under a civil law contract in the last three years in the amusement park. The study was conducted from July 4-11, 2020.

Research Results

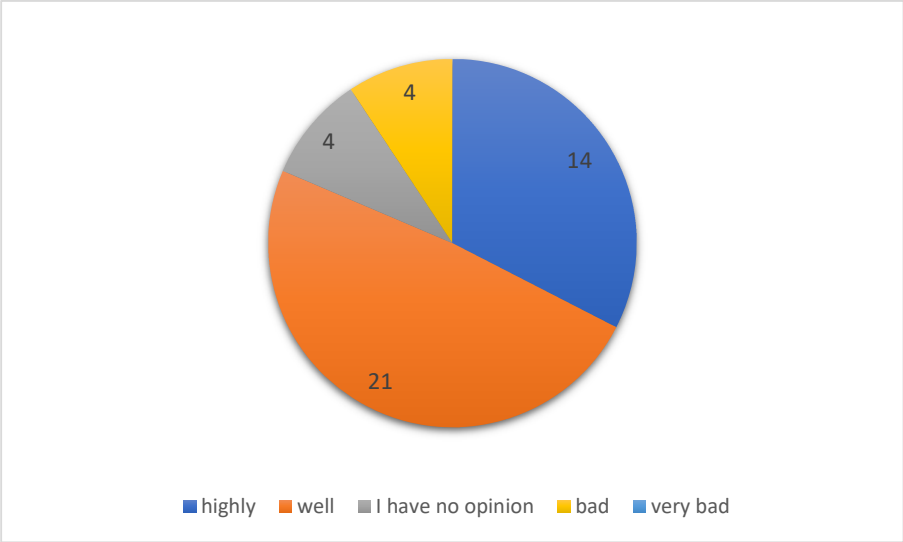

Fig. 1: The ratings of the recruitment of amusement park

The first survey question is related to the first impressions of the employee regarding the organization, the employee recruitment process was assessed. While analyzing the results, it can be concluded that most employees are satisfied with the recruitment process because 48.8% of employees reveal the process as good, whereas 32.6% of employees consider it as a very good process, while only 9.3% of employees do not express positive or negative opinions on recruitment. Also, only 9.3% of employees have expressed a bad opinion about the recruitment process. The results clearly show that employees are satisfied with the approach of the amusement park to the recruitment process.

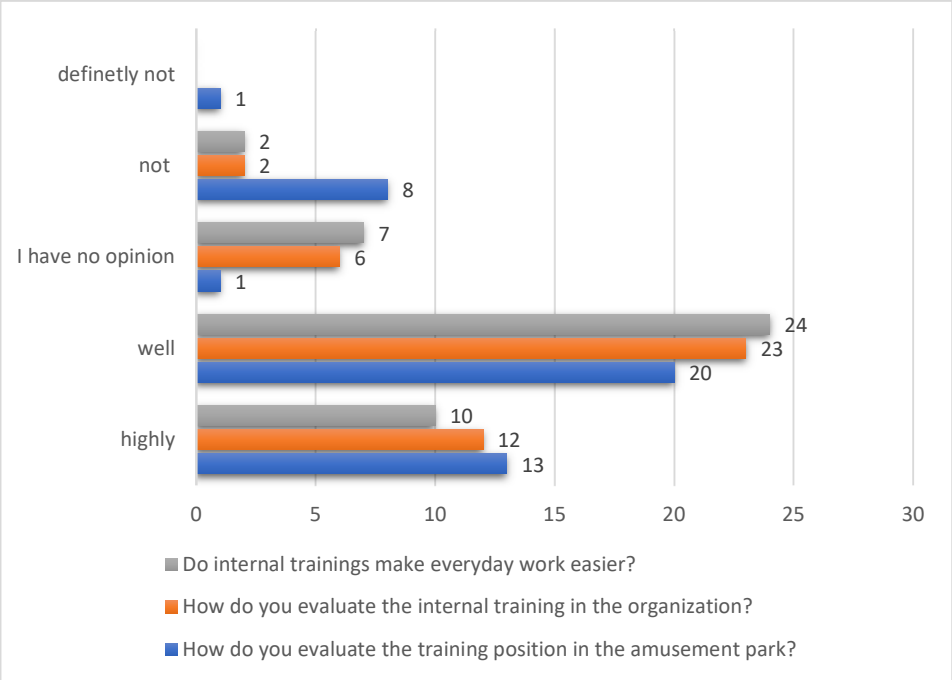

Fig. 2: The opinions of training and internal training and its impact on everyday work of employees in the amusement park

The second question is related to on-the-job training that takes place during the first hours of new employees in the amusement park. In the case of this question, the satisfaction of employees on the way of training and preparation for the position is carried out. 46.5% of employees consider on-the-job training as good, while 30.2% of employees believe it is very good, 18.6% of employees believe that it is poorly conducted and some aspects need to be improved, whereas 2.3% consider it as very bad, and the same percentage have not expressed their opinions on on-the-job

training. The next question is concerned about internal training organized by the amusement park. In the case of this question, most people are satisfied with the training offered by the amusement park, 27.9% of employees consider the training as very good, and 53.5% of employees consider it as good, and 14 % of employees have no opinion. In contrast, 4.7% of employees believe that the training does not bring anything new to them. A positive opinion about internal training among employees indicates that during the training it is possible to acquire new experience, skills and knowledge, and also proves the care of the amusement park in terms of the competences of the employees they hired. The fourth question is a continuation of the internal training survey. In this case, the employees were responded how internal training helped them in their daily work. In this regard, the opinions of employees on the training were assessed. 23.3% of employees stated the training as very helpful at work, 55.8% of employees believe that the training helped them at work. 16.3% did not have an opinion about making work easier after completing the training. In contrast, 4.7% of employees replied that the training did not help them at work. Positive results indicate that the training system offers a wide range of competences to support novice employees in performing their duties efficiently.

Fig. 3: The ratings of bonus system in the amusement park

The opinions of employees related to the bonus system in the amusement park were analyzed based on the question. This analysis gives a variety of ways, but in this question, there is a visible advantage of people who are not satisfied with the bonus system. 27.9% of employees answered that the system has good and bad, 23, 3% of employees do not have an opinion on this subject. In contrast, 16.3% of employees have a very negative opinion of the bonus system that operates in the amusement park, and 4.7% of employees are very satisfied. It can be concluded that, in the case of the bonus system, it is difficult to please each employee. Hence the results are very diverse, but there is a noticeable tendency of negative assessment, which may cause a decrease in motivation and commitment of employees while performing their duties, which may fail to achieve goals.

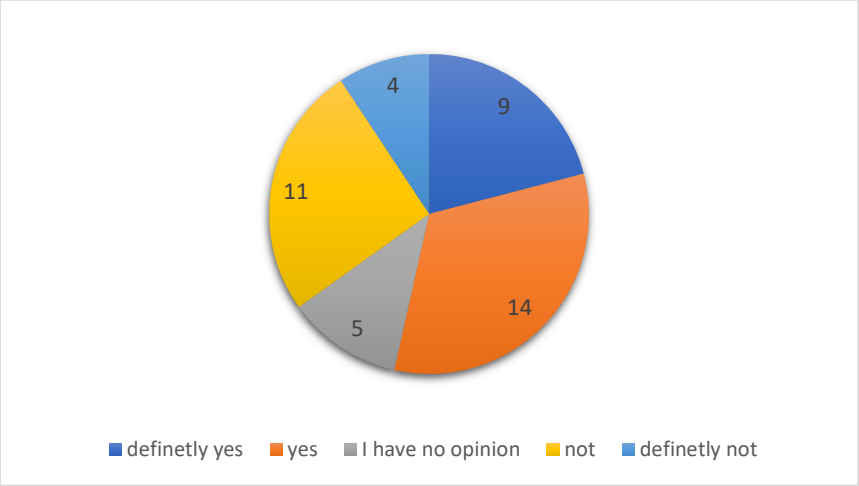

Fig. 4: The opinions of rotation between departments

The rotation of employees is a common element in an amusement park, so it is appropriate to ask for feedback. Most believe that this is a good idea and will allow for better use of the potential employees. Among the surveyed employees, 32.6% considered it as a good solution, 20.9% believed even a very good solution, while 25.6% believed that it is not the best idea and stated as may be problematic, and 11.6% did not express of their opinion on this. In contrast, 9.3% are entirely against rotation between departments.

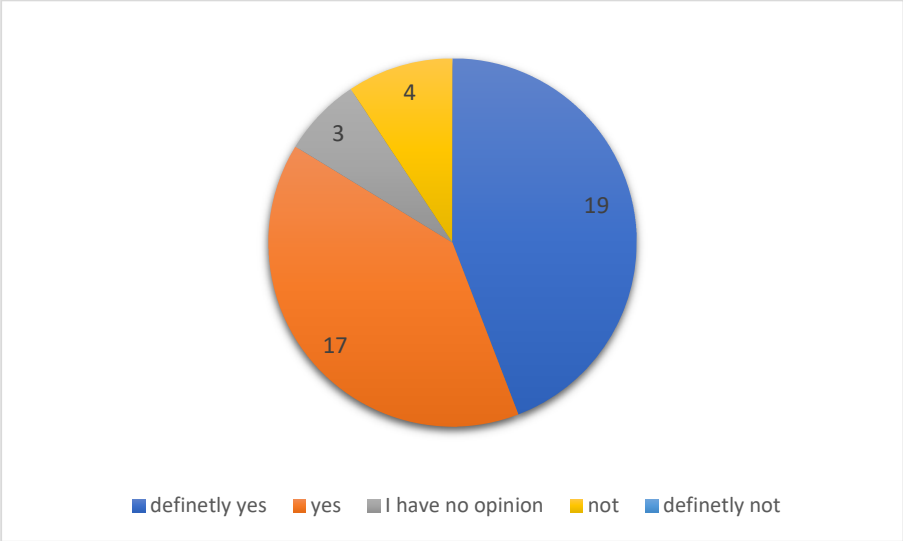

Fig. 5: The opinions of long working hours and attending a large number of clients

The next question raises a significant issue that has already been raised at work, the long hours of working and attending a large number of customers that each employee can handle during the day can affect the quality of work. According to the survey among the employees, 44.2% of employees believe that it can definitely affect their work, 39.5% of employees also believe that it has an impact on quality, while 9.3% of employees believe that it does not have a negative impact on the work performed, and 7% of employees did not express their opinion. The vast number of employees believe that the long hours spent at work and the number of clients served may affect the quality of customer service. These two things will undoubtedly be influenced by increasing fatigue, this is a place that should be considered by the park management and can work with employees to find a mutually satisfactory solution.

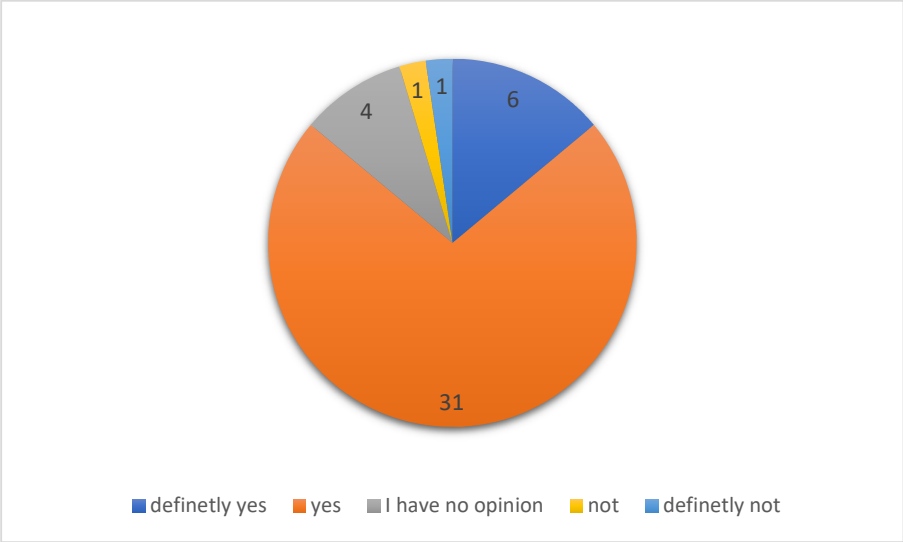

Fig. 6: The opinions regarding the support of supervisors during a problem at work

Support from the supervisor during work is a very important issue that makes the employee feel more confident, being sure that in the event of a problem he can count on his help. In the case of amusement park employees, based on the research results, it can be concluded that the superiors definitely help with any problems encountered. Most of the surveyed employees, 86.1% answered that their superiors help, only 4.7% of the employees responded negatively

that they had not received help from their superiors, and 9.3% did not express their opinion. The results clearly show that the employees' superiors take an active part in the work and help with any problems that park employees encounter.

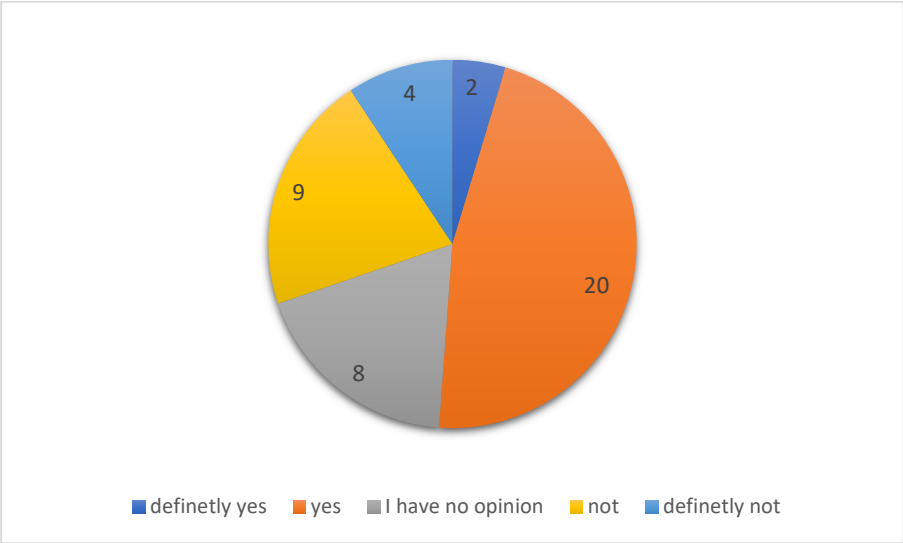

Fig. 7: The opinions regarding the salary of employees for their work

The ninth question is related to the correctness of the remuneration received by park employees. Almost half of the employees, 46.5% believe that the remuneration received is adequate, 20.9% believe that the employer could offer a slightly higher salary. In comparison, 18.6% of employees have no opinion on salaries, only 9.3% of employees believe that their work should be paid much higher, and 4.7% believe that they definitely receive the correct salary.

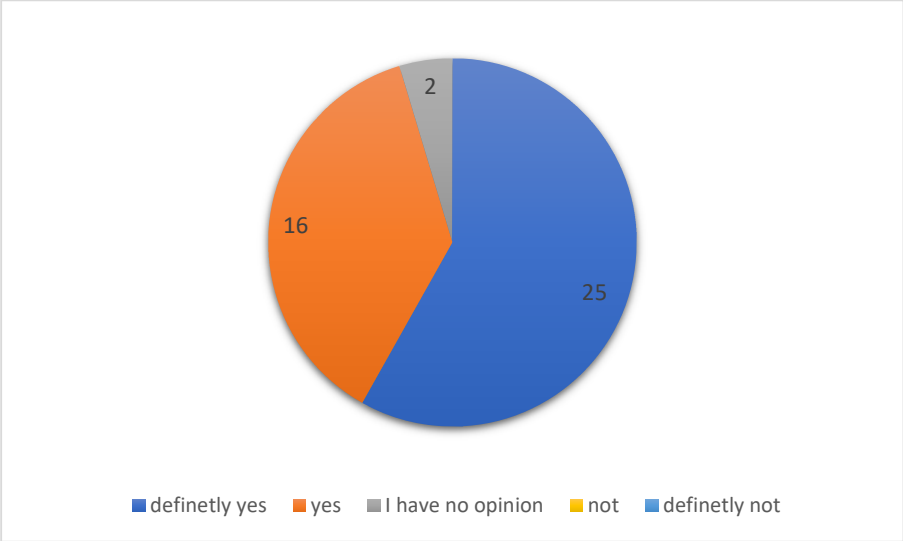

Fig. 8: The opinions of employees concerning their job satisfaction

The tenth question is the first of three questions related to the assessment of personal development opportunities while working in an amusement park. When asked if working in an amusement park is a good place to gain experience in customer service, the employees clearly answered that it is the perfect place to do so. More than half of employees, 58.1% believe that it is a very good place to gain experience in customer service, 37.2% consider an amusement park a good place, and 4.7% of employees do not have an opinion.

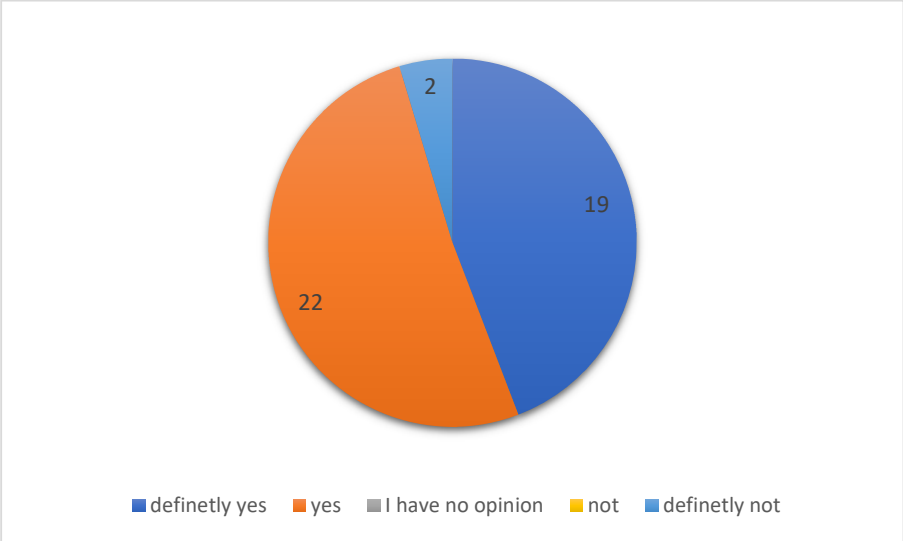

Fig. 9: The opinions of employees related to the acquisition of new skills in the present work

Another question concerns the development and the learning of new skills of employees. In this case, almost all surveyed employees believe that they have developed while working in an amusement park, 51.2% believe that their work has developed them, 44.2% believe that they have developed a lot while working in the park, while 4.7% of employees believe that they learned nothing while working in the park.

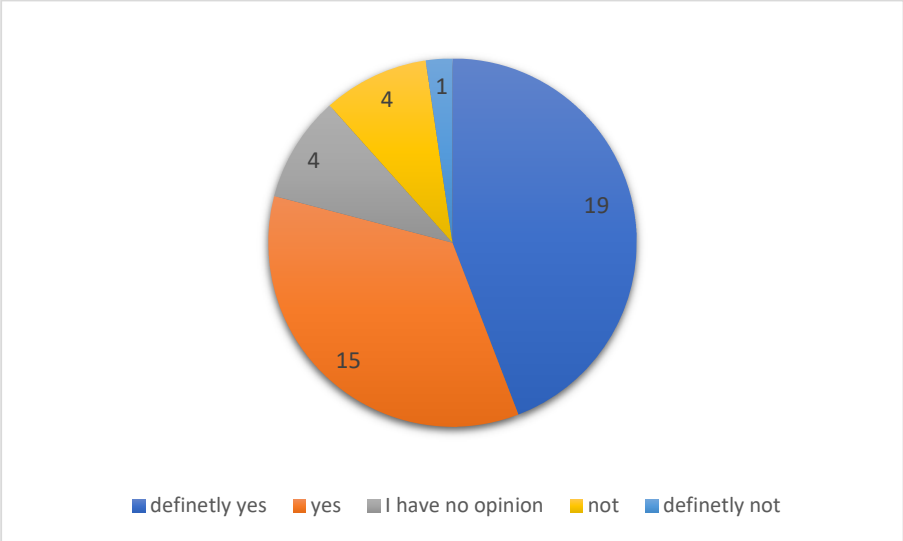

Fig. 10: The opinions of employees related to the recommendation of their job to young jobseekers

The penultimate question is related to the opinion of employees, whether it is worth recommending work in an amusement park for young people who are looking for a job. The majority of employees believe that they would recommend a job in an amusement park. 44.2% of employees would definitely recommend young people to try work in an amusement park, 34.9% of employees believe that they could recommend working in the park to a young person, 9.3% of employees do not have an opinion, the same number of people would not recommend working, and 2.3% of employees even advise against working in an amusement park.

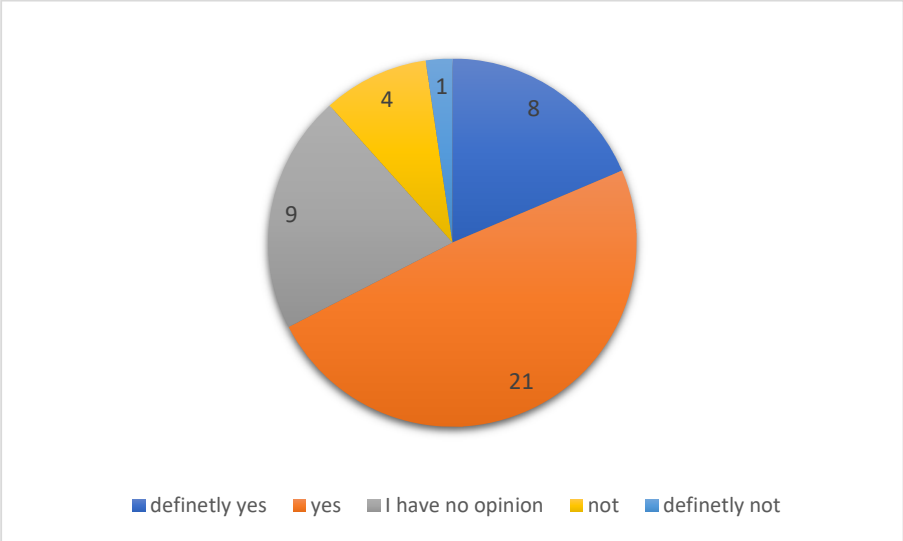

Fig. 11: The opinions of employees related to the management of amusement park

The last question concerned the evaluation of the amusement park. It turned out that 48.8% of employees believe that the amusement park is well managed and caring for employees, 18.6% of employees believe that the park is very well managed. However, as many as 20.9% do not have an opinion on this subject. In the case of employees with negative opinions, only 9.3% of employees believe that the park is poorly managed, and 2.3% are very dissatisfied with the way the park is managed. The results show that most of the employees are satisfied with their amusement park work and care activities of management.

Conclusion

From the results of the research, it can be concluded that most of the employees of the amusement park mainly gain experience at work, have recently graduated from high school and do their education at universities. For the park, it may be a benefit because they acquire employees who are not yet educated and park managers have the opportunity education of employees according to their own standards. However, it can be concluded from the results of the research and the number of people employed at this age that the park management has no problem with it and this is the main direction of the recruitment team. Most of the park's employees work only for the season, which is, unfortunately, a negative situation for the amusement park, because they lose a large part of the employees trained by them after the season ends. This forces the park to create new job offers with the new season and spend money on the next recruitment of employees. The management of the amusement park is positively assessed by its employees. The results confirm that employees are covered by a good training package by the amusement park and are satisfied with it, because the acquired knowledge and skills during the training directly affect the results of their work, and also facilitate its performance. Employees are also very pleased with the opportunity to work in the park and self-development while on the job, this is definitely an essential aspect for most young people who are taking their first steps in the labor market. So, it is a huge advantage for an amusement park that most existing employees believe a place for great development. Widespread customer service during the working days is also an advantage as each employee learns to establish a relationship with the customer. The recommendation by employees to work in an amusement park is also a big advantage for the management, as the research results show that seasonal employees positively perceive most activities related to human capital management. Wages and bonuses will always be factors that do not satisfy everyone, but most of the employees are satisfied with the remuneration they receive. It can be concluded that the number of hours combined with the hourly rate and other legal aspects make employees satisfied with the wages they receive. In contrast, in the case of the work bonus system, employees have mixed feelings, but with a slight predominance of negative ones, taking into account the employees' responses, the bonus system is an issue that the park management can improve. By far the biggest disadvantage indicated by employees of the park is long working hours during the day and the influence of this factor on the quality of the work performed. Fatigue after working twelve hours or more plus working several days in a row, can cause problems for employees. Of course, employees gain a salary, while an organization can lose a lot on the quality of work and customer service, so it is worthwhile for an amusement park to think about modifying the working time of its employees to optimize working time to the quality of customer service. The research results show that the amusement park takes good care of its human capital, and employees are satisfied with their work and development opportunities.

Summary

Human capital management in the case of an amusement park is a difficult task, because the specificity of the activity requires the employment of a large number of employees in several departments, which usually need to be trained and implemented in the organization. Employees who have already been hired play a large role in introducing new employees, because they know the job positions the most, having many hours worked in previous seasons, which in most cases do not have employees at the highest management level. Training of seasonal workers is a significant factor, because they are mainly the representatives of the amusement park and they are the most common people associated with the park by customers, a lot depends on their work, approach and ability to build a relationship with the client. If seasonal workers are not involved in the work, are not properly prepared and trained to work, they may have a negative impact on the reception of the amusement park. The consequence of this may be the loss of customers, which may lead to the loss of funds necessary to maintain the park's attractions in good condition, survive the winter period, or may lead to a hole in the budget needed to prepare the park for the next season. The question was asked at work whether internal training is helpful in everyday work situations, according to employees. In the case of an organization that relies heavily on seasonal workers, it is a crucial aspect to implement employees in the life of the entire organization. They can also be used in other workplaces in the future. This is another positive aspect showing that in the case of training, the employees of the amusement park have to deal with the appropriate approach and development of human capital. In the study conducted by the author of the work, the employees confirmed that the training influences their personal development. The above work may be used by the director and managers of the park who have been observed in it. The research carried out by the author of the work shows the strengths and weaknesses of the amusement park. Conclusions resulting from the research may be necessary data for an organization in terms of human capital management. Work can also be used by sports organizations and other enterprises, because the human capital of the organization is the most important resource of any organization, and the activities undertaken in the amusement park related to the development of employees and their competencies are largely very positively received by the employees who took part in them. In summary, employees working in the amusement park are satisfied with taking up a job in this place and with the training and activities that are offered by the management in the park. They believe that the time spent as a park employee was a good experience and allowed them to acquire the necessary knowledge and competencies that they will be able to use in the further path of their professional career.

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Defeating Inference Threat with Scoring Metrics

Olga DZIEGIELEWSKA

Military University of Technology, Warszawa, Poland
olga.dziegielewska@wat.edu.pl

Abstract

One of the most widely used and most dynamically evolving model which intends to tackle statistical disclosure is differential privacy. The method described in this paper, based on the differential privacy principles, pro-poses adaptive metrics that together state an effective mechanism of pre-venting privacy violations by inference attacks. The method remains effective for the dynamic the information-based systems in which data volume increases and characteristics fluctuates significantly overtime and can be applied for the newly developed systems as well as already well-established systems as an additional software component.

Keywords: Differential Privacy, Information score, Risk-accuracy, Scoring Metrics, SDC Method.

Introduction

One of the most widely used and most dynamically evolving model which intends to tackle statistical disclosure is differential privacy. Published first in 2006, the differential privacy concept was introduced as a system for measuring the theoretical maximum privacy loss that an individual can experience when their private information is used to create a statistical data product (Dwork, C., 2006). The premises of the differential privacy model base on providing plausible deniability to participants by guaranteeing that the outcome of a database does not change significantly whether or not he participates.

The application of differential privacy involves several techniques, including the injection of mathematical noise in the collect data, data hashing, subsampling and randomized data injection. Finding an appropriate tradeoff between the data accuracy and anonymity while adding a noise to the data remains a challenge as datasets users need precise data to work on and the data owners need to comply with the data privacy regulations (Dzięgielewska, O., 2017).

The method described in this paper, based on the differential privacy principles, proposes adaptive metrics that together state an effective mechanism of preventing privacy violations by inference attacks. The method remains effective for the dynamic the information-based systems in which data volume increases and characteristics fluctuates significantly overtime and can be applied for the newly developed systems as well as already well-established systems as an additional software component.

Information Score Metric

Information score metric intends to determine whether the privacy of an active query *q0* made to the database *D* at time *t1* could be biased by historic queries denoted here as *Q0* for which the database transactions terminated before *t1*. The final result of the information score metric is later used as an input for the risk-accuracy metric which is used to establish a baseline for the noise added into the result of the statistical query.

Association Database Model

The idea of the algorithm of the information score metric is based on the association rule learning premises, i.e., it exploits the mechanisms of measuring the quality of the correlation between the unlabeled data – in this case the correlation will be measured based on the parameters of queries users are submitting to the database.

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Definitions

The purpose of the association rule mining is to identify strong rules discovered in databases using some measures of interestingness. The measures that are going to be used for the purpose of the information score matric are:

- ***support***: *sup(X)* of an item set *X* is defined as the proportion of transactions in the data set which contain the item set, what translates to the frequency of the item set in the dataset: $supp(X)=|t \in T;\ X \subseteq t|/|T|$ (Hahsler, M., 2005),
- ***confidence***: the confidence of a rule is defined $conf(X \Rightarrow Y) = supp(X \cup Y)/supp(X)$, what translates into an indication of a positive connotation of the rule (Hahsler, M., 2005),
- ***lift***: the lift of a rule is defined as $lift(X \Rightarrow Y) = supp(X \cup Y)/(supp(X)supp(Y))$, and can be interpreted as the deviation of the support of the whole rule from the support expected. Greater lift values indicate stronger associations (Hahsler, M., 2005).

Let *P* denote the set of all the parameters that appear in the scope of the database *D*. The parameters are identified here as items. The tables T that are defined within the database *D* can be interpreted as item sets.

Let query $Q \in T$ be an item set, and *S* be a sensitivity characteristic determining the sensitivity level of the data. The query *Q* satisfies *S* if $Q \Rightarrow S$. The support of the *S* can be defined as the probability $supp(S)=Pr_{(Q \in T)}\ [Q \Rightarrow S]$.

The information score metric mechanism analyzes the potential inference between the active query itself $(q1 \in Q)$ and the active and historical queries $(q1 \cup Q0 \in Q)$. The queries $q1,\ q1 \cup Q0$ satisfy *S* if: $q1 \Rightarrow S,\ q1 \cup Q0 \Rightarrow S$.

The process

The information score metric algorithm takes an associations database as an input (AR_DB). The generic association rules creation process, that would be used to generate such a database can be described by the procedure AR_DB population, but it must be noted that the detailed AR_DB population algorithm is beyond the scope of this paper.

AR_DB POPULATION

```
1 Obtaining a raw dataset
2 Transforming the raw dataset into a numeric format
3 Computing frequent item sets with the limit set by the minimal support characteristic
4 Computing association rules from frequent item sets with the limit set by minimal confidence
5 Determining the risk profile of the associations
```

A raw data set for the researched case is the set *P* and each of the $p \in P$ has to be translated into the frequency model so that the sensitivity of each element can be determined. For the purpose of the information score metric definition, it is assumed that for steps 4 and 5 a certain threshold is set. It also must be assumed that the frequent item sets list is prepopulated by the database query parameter mappings that could be used to conduct a successful inference attack. The sensitivity of the queries should be measured as a gradient, where the associations with the high level of support characteristic, the confidence close to 1 and the lift value higher than 1, should be marked as critical risk, and the associations with low level of support, confidence close to 0 and the lift value below 1 should be at the end of the spectrum marked as low or no risk.

The AR_DB is a dynamic structure that would be repopulated at each structural change of the database itself, meaning that at every deletion or addition of the data source, the sensitivity of the associations will be recalculated. It must be noted that the detailed AR_DB population algorithm is beyond the scope of this paper.

Algorithm Description

The information score metric derivation algorithm returns a value of the information score metric (*ism*) which is used in the risk-accuracy metric as one of the inputs. The proposed algorithm in its base form analyzes only the critical correlations, but it can be adapted to consider all the sensitivity levels, therefore an optional sensitivity input in the line *i3* has been explicitly shown, however it is assumed that the default value been used in the proposed base design of the algorithm for the critical correlations. Using the sensitivity setup would require modifying accordingly the ism in case algorithm would be used without the criticality constraint.

Additional step that is not covered in the information score metric is the verification check that would intend to cover a structural change of the statistical database protected by the designed SDC method. If the structure of the database changes, then the AR_DB changes and it must be determined if after the structural change the HIST_DB (a database with previously asked queries) should be repopulated or kept as-is. Using the risk-based approach it must be established whether the changes has modified AR_DB beyond an acceptable change ratio, and therefore leading to creating a new instance of HIST_DB. The detailed method of determining the HIST_DB approach in case of the structural change is not covered in this research.

INFORMATION SCORE METRIC DERIVATION

```
        Prerequisites:
p1      AR_DB
p2      HIST_DB
                Input:
i1      P (a set of parameters of the submitted query)
i2      C (asked statistical characteristic)
i3      S (optional, default=1)
                Algorithm:
a1      if (query was asked before)
a2              return ism=ism_hist
a3      else
a4              while (AR_DB has next)
a5                      if (P and C in AR_DB_i)
a6                              add {P,C,ism=1·S} into HIST_DB
a7                              return ism=1·S
a8                      else
a9                              while (HIST_DB has next)
a10                                     if (P_hist_i,C_hist_i,C,P in AR_DB_i)
a11                                             add {P_hist_i,C_hist_i,P,C,ism=1·S} to HIST_DB
a12                                             return ism=1·S
a13                                     else
a14                                             add {P,C,ism=0} into HIST_DB
a15                                             return ism=0
```

Risk-Accuracy Metric

Risk-accuracy metric determines the ratio of the statistical noise added to the result of the statistical database query. The baseline of the noise distribution and the characteristic of the noise addition model is taken from the classical approach of the differential privacy model. The method of calibrating the randomized noise is modified by the following components:

- ***risk*** – a variable component dependent on the preset selected by the database owner characterizing the risk profile of the database. This component is strictly corelated with the information score metric, as the preset can be influenced by this metric to reflect the actual risk, calculated in an adaptive manner. The preset risk value is assigned in a numeric format within the range [0;1] where 0 renders to ignored risk and 1 to the critical risk profile of the query. The preset value is selected at the database level for each of the access roles and the value is modified at a query level after calculating the *ism* value.
- ***accuracy*** – a static component dependent on the preset selected by the database owner characterizing required accuracy level of the retrieved results. The preset accuracy value is assigned in a numeric format within the range [0;1] where 0 renders to low accuracy profile and 1 to the critical accuracy profile of the query. The preset value is selected at the database level for each of the access roles and is not modified during the database transactions.

The metric allows for better control over the risk at a query level what intents to improve the overall accuracy of the results by targeting only the queries with higher risk profile. The queries that are profiled as low-risk at the moment of the invoking the database transaction, will not be as affected by the risk component as the ones with the high-risk profile. It must be noted however, that the perfect accuracy would be only achievable if the risk factor is ignored by the database owner and the accuracy level is set to reflect actual statistics retrieved by the query. Allowing such setup would contradict the purpose of the original differential privacy model, therefore is excluded from the analyses.

Algorithm Description

The algorithm of deriving risk-accuracy metric (*ram*) should work in such a way that its effect would determine to what extent the original noise defined by the base of the differential privacy model should be changed, i.e., we

assume that the noise added in the original version determines the preset *accuracy* component at the level equal to the maximum accuracy required for the database. If the importance is transferred to the privacy of the data, the noise added to the output is modified accordingly by the *risk* component. The maximum value of the *risk* component is equivalent to specifying the *accuracy* component at the minimum level required for the database. The modification of the *risk* component may not exceed the minimum level of accuracy required for a given database. The derived values of *ram* are independent from each other in a sense that they might have the same values for different queries, but they are not dependent on the previous values returned from the algorithm.

```
RISK-ACCURACY METRIC DERIVATION
                Prerequisites:
p1      r_preset(preset of the risk component of the database)
p2      a_preset(preset of the accuracy component of the database)
                Input:
i1      P (a set of parameters of the submitted query)
i2      C (asked statistical characteristic)
                Algorithm:
a1      calculate ism for {P,C}
a2      risk=r_preset*ism
a3      if risk=0
a4              ram=a_preset-1
a5      else
a6              ram=a_preset*risk+risk
```

Applying the Metric into The Differential Privacy Model

As it was mentioned before, the differential privacy model assumes implementation of the mechanism that adds symmetric exponential noise to each coordinate of $f(X)$, where f is the query function and X is the database. The worst-case error is applied to each of the queries asked to the database. Using the proposed modified approach, the distribution of the noise added into each query would be enhanced according to the results of the risk-accuracy metric. This way, both the accuracy and the privacy of the results should be improved as the risk-accuracy factor could be calibrated accordingly per each database query.

Let's assume $D(d_q)$ is a base distribution that is used as a randomized statistical noise generation function defined as the differential privacy model noise generator, where the d_q is the base error rate. If q_n is an *nth* query asked to the database, then the distribution used to generate the noise for the q_n is denoted as $D(d_{qn})$. The method of enhancing the $D(d_{qn})$ would need to assume that for the queries with risk over accuracy weigh, the $D(d_{qn})$ is modified by introducing more noise (denoted as η) into the result ($D(d_{qn}+\eta)$) and decreasing the η otherwise ($D(d_{qn}-\eta)$).

```
ENHANCING DISTRIBUITION
                Prerequisites:
p1      D(d_q)
                Input:
i1      q
                Algorithm:
a1      calculate ram for q
a2      if ram≤0
a3              use D(d_q-ram·n)
a4      else
a5              use D(d_q+ram·n)
```

Applying the Model in A Transactional Database

The perturbative statistical disclosure control methods may either work at the data collection time, where the raw data is modified and the database stores already noisy data or as a part of the statistical derivation interface of the database, where the raw data is stored in the database without any noise added to them before the derivations. The developed method falls into the second scenario and assumes that neither the data collection method must apply any statistical control, nor the data model of the database must satisfy the statistical security-by-design measures.

The opposite approach, called local differential privacy (Kasiviswanathan, S., et al., 2008), assumes perturbing data locally before sending them into the database. The main drawback of the local differential privacy is that this approach can be applied only in cases where the data is not yet collected, therefore making it practical for new solutions. Following the approach of post-processing the raw makes the method application more universal as it can be easily applied not only into the databases that are yet to be implemented, but more importantly, it can be incorporated as an additional end-user interface for existing databases. The need of retrofitting the applications increases therefore creating a statistical disclosure control method that would work for already existing and working environments has more business impact in the current environment than designing a bullet-proof approach that

would work for future databases only. However, the main drawback of external non-custom-fitted design is increased processing time of the queries made into the database, but it's the cost that must be made as a compensation of the privacy of the statistical output.

Assumptions

Before effectively implementing the proposed SDC method into the working environment certain conditions must be met for proper application. Without following the proposed conditions below, the results retrieved from the database might be affected – in best case, only the accuracy of the data would be decreased, in worst case, the SDC method will not work and create a security breach.

The conditions that are necessary for maintain the accuracy of the results are:

- **The data** in the statistical database is stored in non-perturbed manner, i.e. the database that will apply the SDC is an effect of raw data collection. Applying said method over already perturbed data would miss the mark on the statistical accuracy, however still the results would be retrieved.

- The database has **different statistical access roles**, that have different sensitivity levels assigned to them. This way the information score metric may be used to its full potential, as the sensitivity level for a regular analyst might be different than a sensitivity level for a researcher or a data owner. Adhering the sensitivity to the business need would impact the accuracy of the retrieved output, as the sensitivity modifies accordingly the information score metric what in the end affects the error rate of the added noise.

The condition that falls into the mandatory group is **preprocessing of the association database and historical database implementation**. If the aforementioned supporting databases are not created, the proposed SDC method will not work. Whereas the historical database creation falls into the technical task only, creating the association database might be a challenging task to perform, especially for the large-scale databases. The quality of the results and the overall privacy will be affected if the association database is created without due diligence, however it must be noted that even if the associations are not created properly, the noise will still be added to the results, but the purpose of the metrics will not be fulfilled to its potential.

Process

The proposed SDC method works at the statistical derivation interface level. After a user submits a query into the database engine, the noise generation function is triggered.

In the first step the database verifies the preset for a particular database access role of a user. The preset must contain:

- *The sensitivity level* used in the information score derivation algorithm; in the base approach only the association rules will be analyzed, however by adding additional input parameter, the whole spectrum of associations could be potentially analyzed.
- *The risk level* – a component used in the risk-accuracy metric derivation algorithm to assign a base risk profile at the database level. This component is strictly corelated with the information score metric, as the preset can be influenced by this metric to reflect the actual risk, calculated in an adaptive manner.
- *The accuracy level* - a component used in the risk-accuracy metric derivation algorithm to assign a base accuracy profile at the database level.

After assigning a preset that will be used during the whole session between the user and the database, the query itself is verified in the historical database, as the information score metric algorithm recalculates the ism for the new queries only. If the query has not been found in the historical database, the associations are verified to determine the risk profile of the query. After that the ism is calculated and the query is added into the historical database along with the ism. In case the query has been made previously, the ism is gathered as an output of the historical database verification.

After the ism calculation step, the risk-accuracy metric is calculated and passed to the noise generation function as one of the inputs. After the error rate has been determined and the noise generation function has been applied over the raw output, the perturbed output is returned to the user.

The user will not receive any result from the database until the SDC process is not terminated. In case of an error occurred before the output retrieval, all the transactions made into the supporting databases that could affect future results must be rolled back, i.e., any data that has been added into the historical database must be deleted.

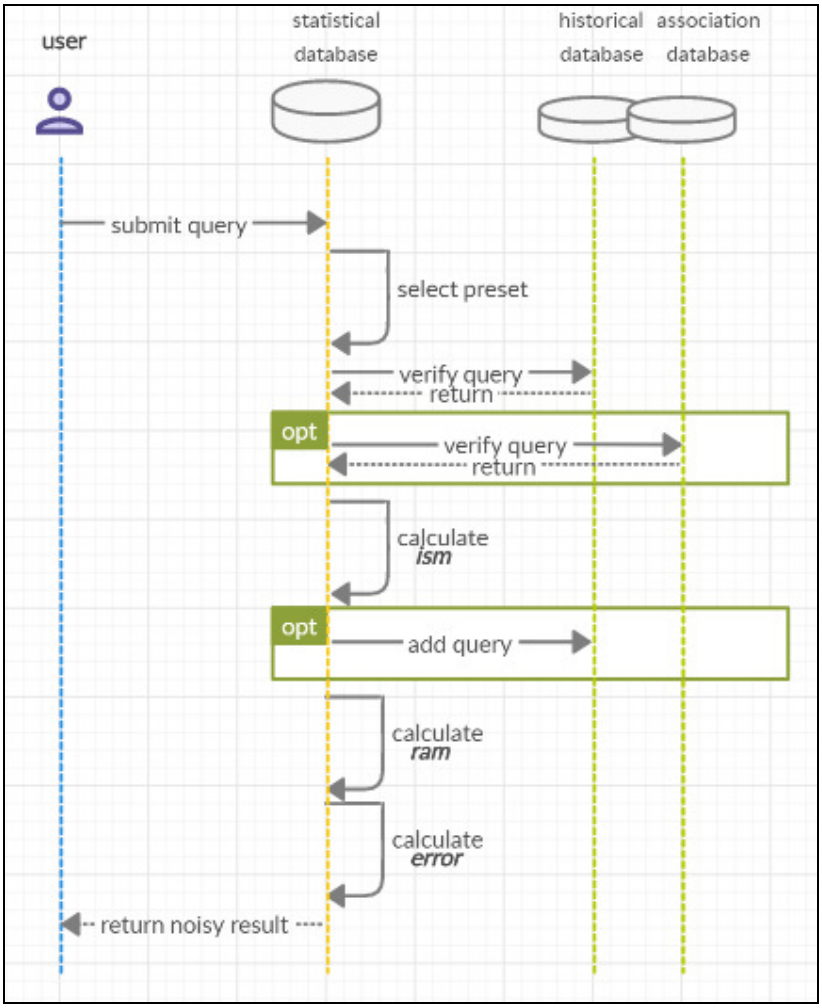

Fig. 1: Transaction scheme

Security features of the proposed method

Mitigation of inference attacks is the key feature of the proposed method. The main purpose of designing an adaptive SDC method was to target dynamic databases and dynamic environment, but as the differential privacy by definition is a perturbative method of the statistical protection, the coverage of the robustness to the attacks is much bigger.

Quantification of privacy loss is a desirable characteristic defined by the author mentioned in her initial idea (Dwork, C., Roth, A., 2014), however the definition is very vague, as the author stresses that the differential privacy is not a binary concept as the privacy loss of the data needs to be consumed at case-by-case basis. However, allowing the calibration of the risk and accuracy in the proposed method most definitely allows for data owners to manage the magnitude of the privacy loss and enhance the metrics accordingly to their needs.

Independent secrecy is a feature that is characteristic to the extended model and can be defined as a feature that indicates robustness against post-processing attacks. In the extended model, despite the fact that the historical data are used to derive information score metric, the outputs generated per each query are independent from each other in terms of added noise. The noise is generated specifically for each query and collecting the data from a set of queries should not reveal any statistical characteristic that could be used to leverage a successful inference attack.

Group privacy is a feature that allows to control the privacy loss incurred by groups (Dwork, C., Roth, A., 2014). This feature renders to extending the base model of the ε-differential privacy, which is bounded by $exp(\varepsilon)$: $Pr[K(D_1)\in S]\leq exp(\varepsilon)\times Pr[K(D_2)\in S]$ to $Pr[K(D_1)\in S]\leq exp(\varepsilon c)\times Pr[K(D_2)\in S]$, bounded by $exp(\varepsilon c)$, where c means a change of c items instead of one item in the original scenario. The proposed extension of the model with metrics still satisfies this feature, as the distribution function will not be affected beyond an acceptable rate.

Other Security Considerations

The technical components security is a separate area that is not covered in the scope of this paper but still states a significant part of the overall security of the proposed SDC method. The most common approach of defining security requirements for the applications is to follow one of the commonly used standards. One of them is OWASP Application Security Verification Standard, which thoroughly covers all the phases of the Software Development Lifecycle with controls to apply in certain areas of the developed solution.

There are two aspects that are critical in terms of satisfying the security of the proposed SDC at the software level: the environment and the implementation security. It must be assumed that the database environment is secured accordingly and follows best security practices, to prevent any side-channel data leakage, which would lead to releasing sensitive data, in particular:

- the statistical database, historical database and association database are properly secured at access level,
- the communication between the database users and the database is properly secured, especially important during the data acquisition process,
- the properties stored in the database that are used in the metrics derivation function and the noise generation function are protected.

It also must be assumed that the implementation of the proposed model is free from errors that would affect the security of the solution, e.g., business logic errors that would affect the processing of the data, backdoors that would intend to bypass the security mechanisms or other application-level errors mentioned in the ASVS framework.

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Stakeholder Analysis on the Adoption of Innovation Strategies

Izabela RUS
Tehnical University of Cluj-Napoca, Baia Mare, Romania, iza.ormenisan@gmail.com

Corina M. RADULESCU
Tehnical University of Cluj-Napoca, Baia Mare, Romania, corina.radulescu@cunbm.utcluj.ro

Rita TOADER
Tehnical University of Cluj-Napoca, Baia Mare, Romania, rita.toader@gmail.com

Florina HAHN
Tehnical University of Cluj-Napoca, Baia Mare, Romania, fflloorina@yahoo.com

Constantin CUCOSEL
Tehnical University of Cluj-Napoca, Baia Mare, Romania, constantin.cucosel @ cunbm.utcluj.ro

Alina Natalia POP
Tehnical University of Cluj-Napoca, Baia Mare, Romania, alinanataliapop@gmail.com

Abstract

This article aims to highlight the importance of vision in companies that want to adopt innovation strategies, influenced by stakeholders but also the relevance of research, finding a way to analyze and classify these factors, determining the development of a company, ensuring its performance, of a high level of economic sustainability.

Innovation strategies are aimed at companies that have an orientation towards competitiveness and economic sustainability.
This article presents classifying stakeholders based on their influence and power and then understanding their motivations so that you can prioritize your efforts and resources accordingly to achieve the desired.

The article includes methods for identifying stakeholders as well as understanding the choices. It is also presented how to achieve the matrices, where our objectives are highlighted, in this way we must establish the parameters for achieving the table in order to have the real score depending on the strategy we need to adopt within the company. This score will help to implement and pursue strategic objectives.

It is very important understanding their motivations and stakeholder analysis for reveals how to adopt strategies through stakeholder analysis.
The basic objective of these companies is to focus on the most appropriate innovation strategies, influenced by key stakeholders, in relation to market needs and customer expectations but also with positive regulations, through strategic balancing.

Combining innovative strategies and their role, with understanding the factors that contribute to increasing economic sustainability, the company becomes more competitive, achieving long-term desired performance.

Keywords: Economic Sustainability, Innovation Strategies, Stakeholders.

Introduction

The innovation capacities within a company are important for the development of economic sustainability and for ensuring its long-term growth. The involvement of innovation strategies, technological development, increasingly complex market requirements but also the involvement of stakeholders in the processes of change, improvement of

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a company, have now become a determining factor in the management of that company, which wants to create economic sustainability, long-term.
In order to achieve this goal, regarding the increase of competitiveness and economic sustainability, it is important to analyze the influence of stakeholders, in all that means innovation strategies and how these well-defined strategies can be implemented within the company.

In the literature, stakeholders are defined "as an interested party, as any group of persons or a person, who may affect or is affected by the fulfillment of the purpose of the corporation" Fletcher, A., Guthrie, J., Steane, P. and al. (2003).

This includes individuals, organizations and professional bodies. Stakeholders may have a positive or negative effect on the project or vice- versa, the project may have a beneficial or detrimental effect on stakeholders. They can be part of the organization working on the project, the client organization or outside these organizations, for example government, regulatory body, trades, etc.

There are different types of stakeholders. Some have a higher degree of power and can decide the course of action, approve or not decisions on a project. Another set of stakeholders can help, with their expert opinion, so consult them. Several other stakeholders need to know the progress of the work as their work begins when this work is completed. There are also stakeholders who want to know when the project will be completed. These stakeholders may be interested as a result of this project, as they can help them in their work. Not all stakeholders are equally involved or affected in the project.

All stakeholders are not equally involved or impacted in the project, the manager needs to know how to engage these different types of stakeholders. This is the main reason why it is important to have a stakeholder analysis.

Stakeholder analysis is an extremely useful technique for identifying, understanding, and prioritizing all stakeholders who can influence the business or project.

Stakeholder Analysis

The analysis of stakeholders will reveal who they are, what their needs and expectations may be, and what issues matter to them and to what degree. This analysis will tell their true level of interest and influence over project.

A thorough analysis will ensure that all affected parties are duly considered. Having access to this knowledge can greatly improve the outcomes of conflict resolution.

Stakeholder analysis will identify who exactly should be engaging, to participate during the project's execution phase - and to what extent. This valuable information can serve as the foundation for choose stakeholder and strategy.

When performed on an ongoing basis, stakeholder analysis will help to choose key stakeholder groups are changing over time - in terms of who they are, how their needs or expectations may be evolving, and how the relationship with them has improved or deteriorated.

The classifying stakeholders is so important, because it is based on their influence and power and then understanding their motivations so that you can prioritize the efforts and resources accordingly to achieve the desired outcomes.

In order to identify the problem, the planned action or the plan to be applied, it is established:

- the main stakeholders, which are those people, due to which, continuous participation, is absolutely necessary for the survival of the company; are those directly affected either positively or negatively by the actions of an organization;
- secondary stakeholders, are indirectly affected, are the intermediaries involved in the delivery process or persons involved in the implementation, start of actions, monitoring of the project, plan, etc…
- tertiary stakeholders: those who will be least affected
- key stakeholders: those with significant influence or importance within an organization; may also belong to other groups.

Stakeholder analysis helps to identify:

• Stakeholders' interests
• Potential risks and misunderstandings
• Mechanisms for positively influencing other stakeholders
• Key people who need to be informed about the project during the execution phase
• Negative stakeholders, as well as their negative effects on the project.

The differents methods to identified stakeholders

1. Team brainstorming: The idea is to come up with the longest possible list whit stakeholder and reserve judgment for the select stakeholder for the end .

2. Team members' experience: If the team has built up valuable knowledge over time, use they for the the best choice.

3. Historical data: The organization may have accumulated of data from previous projects, uses this information to train your stakeholder to efficiency and building on experience.

4. Comparable: Whenever possible, look for similar projects and identify stakeholders who may have played a key role. Maybe the same types of stakeholders will impact or be impacted by current project.

It's important to analyze stakeholders in the early stages of the project. This will allow to proactively develop a stakeholder engagement strategy, which generally produces better outcomes.

There are a number of models that can be used to analyze stakeholders, each with their own strengths and weaknesses. The most appropriate model will probably depend on the nature of your project and available resources.

Is recommended to using a combination of models to gain a more thorough understanding of key stakeholder groups and potential impact on the project.

All stakeholders have their own reasons for their individual opinions and actions. Stakeholder analysis tries to identify and interpret these motivations so that they can be adequately addressed.

Understanding your stakeholders 'motivations will help inform the type of engagement, communications and even arguments that may sway stakeholders to your side.

Stakeholder analysis helps to delimit and involve them actively, continuously, in the innovation process; their roles can be assessed according to their influence, the factors that can generate conflicts or opportunities for success, methods and tools, they can facilitate the systematic involvement, in order to obtain a sustainable improvement in the development of the innovation strategy Kimmich, C., Janetschek, H., Meyer-Ohlendorf, L. and al. (2012).

By analyzing stakeholders, the company has the opportunity to understand who are the key stakeholders, what can be the information about their contribution to the development and innovation process.

Stakeholder involvement must bring value to the company. It is essential that the people, methods and tools used, contribute with a positive, constructive and correct attitude, motivating the people involved (Fig 1. Stakeholder analysis).

Fig. 1: Stakeholder analysis (adaptation after Kimmich, C., Janetschek, H., Meyer-Ohlendorf, L. and al. (2012))

The possibles motivating a stakeholder's stance (Fig 2. Interest matrix of stakeholder)

- Financial interests: will make or lose money because of the project
- Moral and ethical values: believe the project deserves social acceptance

- Rights: the legal rights such as occupational health & safety may
- Religious beliefs: are religious beliefs shaping opinion
- Political opinions: could political opinions be triggering support or opposition to the project
- Business interests: stakeholder expectations the project to boost or shrink business revenue
- Knowledge: How knowledgeable is about the project
- Demographics: things like age, median income and access to employment opportunities can greatly affect opinions of stakeholder.
- Environmental stewardship: environmental sustainability project
- Value of ownership: does the stakeholder stand to gain or lose something of value such as their farm or the propriety
- Communication preferences: the method to communicating with stakeholders (online communications, or value face-to-face meetings).

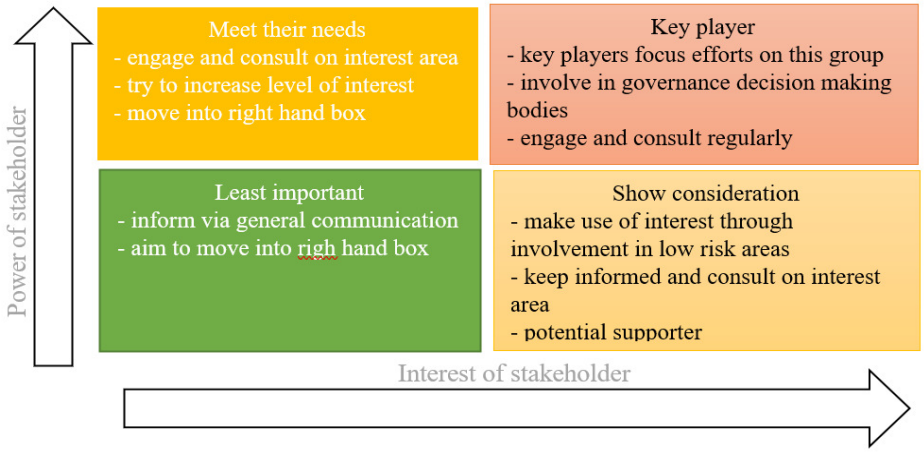

Fig. 2: Interest matrix of stakeholder (adaptation after Coble, Yank, Coussens, Christine, Quinn, and Kathleen(2009))

Making Matrices

In the literature are presented several ways to build this tool. We will not stop at the elements of form but we insist on the elements of content.

This type of tool is widely used in the field of projects with social impact. The main objective is to standardize the presentation of the project so that similar projects carried out at different times can be compared.

Another equally important goal is to present the entire project in a single form so that team members do not have to periodically search for the necessary information, facilitate the transparency of teamwork and increase overall efficiency.

For each action alternative, a matrix is made that presents in a standardized form what needs to be done.

By drawing up a matrix, the action strategies are designed and the best strategy related to the purpose and objective of the project is chosen. First, the purpose and objective of the project are defined, all the strategic alternatives for them are elaborated, and then all the alternatives are evaluated using analyzes such as PEST, cause-effect diagram, etc.… (Fig 3. Power matrix of stakeholder (adaptation after Botten, N. (2006))

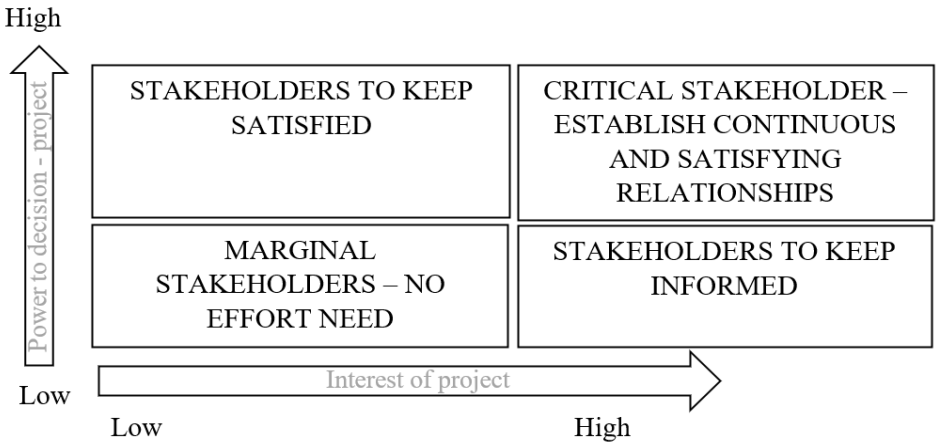

Fig. 3: Power matrix of stakeholder (adaptation after Botten, N. (2006))

In the stakeholder analysis phase, we can build a classification matrix to ensure that truly important people (key stakeholders) receive the attention they deserve from us.

The first step is to make the list of stakeholders and compile the questions that help to correctly identify the key people and understand the motivations:

1. Who is involved in the project?
2. Who can be affected by this project?
3. Who can influence this project?
4. How will the implementation, implementation or even location of stakeholders affect the implementation of this project?
5. Will there be reasons that may involve a career?
6. What are your reasons for supporting or blocking the project?

etc ...

The list is extended according to the additional information regarding the level of INTEREST and INFLUENCE that the stakeholders have in the project, and their prioritization.
We will give a score between 1 and 10 for each of these two criteria (1-lowest weight, 10 - highest weight). To point to the INTEREST column, you can be guided by the answers to the possible questions above (Tabel 1: Matrix stakeholders)

Turning to the INFLUENCE section, we can consider here the level of people within the organization, its level of authority in making decisions regarding the budget, time and resources of the project, if there are friendly relations with other key stakeholders.

The stakeholders with a maximum degree of influence and extremely interested in the project (stakeholder score 11-10), must create and maintain close collaborative relationships, must be actively involved in the analysis phase (ensuring that the project meets their needs), and informed quickly. Much of the energy and attention of the project manager in the management activities of the "stakeholders" will be directed to this group (Tabel 2: Stakeholders analysis with Action Plans).

Stakeholder with an almost maximum degree of influence or impact (stakeholder score 9-8), a high level of satisfaction must be maintained throughout the project; due to the strong influence they have in the project, we want their support to be preserved.

Stakeholders with little power in influencing the evolution of the project (stakeholder score 7-4), but extremely interested in its status and impact will have to be informed periodically; also consulting them on various problems can be beneficial in solving them.

As a last note, it is worth mentioning that the management activities of the people interested in the project represent a continuous process, which extends from the initiation phase to the closing phase.

Tabel 1: Matrix stakeholders

Number	Stakeholder	Their role in carrying out the activity	The influence of the activity on stakeholders	The influence of stakeholders on the activity
1	Actionary A 55%	Financial and technological support	10	10
2	Actionary B 35%	Financial and technological support	10	10
3	Management	Planning, organization, coordination and control	10	10
4	Administrative	Decisions, publications issued by the company, evidence of signed documentation	10	10
5	Manager IT	Technological support	9	9
6	Accountant	Financial support	9	9
7	Employees	Implementation	9	9
8	Customers	Benefits	9	10
9	Suppliers	Ensuring the necessary for services and products	8	10

Tabel 2: Stakeholders analysis with Action Plans

Stakeholder	Project impact on stakeholder	Stakeholder - level of influence on succes of project	Stakeholder´s current attitude toward project	Stakeholder Score - H=5, M=3, L=1, +=1, O=2, -=3	Action plan for stakeholder
Actionary A 55%	High (H)	H	+	11	Invite into project team at analyze phase
Actionary B 35%	H	H	+	11	Invite into project team at analyze phase
Management	H	H	+	11	Invite into project team at analyze phase
Administrative	H	H	0	10	Invite into project team at analyze phase
Manager IT	Medium (M)	Low (L)	0	4	Continue involvement on project team
Accountant	H	M	0	8	Invite at analyze phase
Employees	H	H	+	11	Invite into project team at analyze phase
Customers	H	H	+	11	Invite into project team at analyze phase
Suppliers	M	M	+	7	Continue involvement on project team

Conclusion

Effective stakeholder management is important because without stakeholders, an organization would not exist.

Therefore, it is imperative that organizations have a good relationship with both primary stakeholders - shareholders, investors, employees, customers - and the public - government and local communities - and secondary - the rest of the people directly or indirectly affected by the actions. the organization concerned.

Stakeholders are critical to the success or failure of a project. That is why stakeholder analysis is a critical part of project management as well. Stakeholder analysis will help to determine stakeholders of a project.

Stakeholder analysis is the identification and classification of stakeholders in the project. This helps project managers to prioritize stakeholders and plan for their engagement. Stakeholder Analysis also helps in understanding the communication needs in the project.

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Infrastructure 2 Pedestrian System to Increase Human Life and Health Safety

Krzysztof MASLANKA

Faculty of Electronics, Military University of Technology, Warsaw, Poland
krzysztof.maslanka@wat.edu.pl

Pawel SKOKOWSKI

Faculty of Electronics, Military University of Technology, Warsaw, Poland
pawel.skokowski@wat.edu.pl

Abstract

This paper presents an Infrastructure to Pedestrian (I2P) system to increase human life and health safety. After introducing the reader to the subject of the issue, the authors motivate their research area to increase pedestrian safety on the roads. Then, the concept of the proposed method is presented. Next technical solutions for the prepared I2P system are defined and explained. Moreover, an estimation of the potential profits from the implementation of the proposed concept is shown. The article summarizes brief conclusions.

Keywords: pedestrian safety, infrastructure to pedestrian, accidents, localization.

Introduction

Every day, road users are killed or injured on the roads of the whole world. More than 1/5 of people who die on roads do not use a car, motorcycle, or bicycle - they are pedestrians (WHO, 2013). The current technical and technological possibilities related to the automotive industry and wireless communication systems create an opportunity to use them to increase pedestrians' safety as road users. The most popular ones are those responsible for communication of Vehicle to Pedestrian - V2P, Infrastructure to Vehicle – I2V, Pedestrian to Vehicle - P2V. The authors would like to present an I2P system to increase human life and health safety. The original proposal concerns a novel I2P approach to increase human life and health safety, presented in (Skokowski and Maslanka, 2020). The proposed solution may be an element of system implementations to increase pedestrian safety and allow for significant profits to secure human health and life and the consequences resulting from their loss.

Situation of pedestrian safety

People die on roads worldwide - over 270,000 are pedestrians, which accounts for over 20% of all road fatalities. Apart from deaths, over a million pedestrians are injured each year due to accidents. Based on many studies, it is possible to indicate the causes of accidents and the methods of preventing them or minimizing the probability of their occurrence (WHO, 2013; Zegeer and Bushell, 2010; Job, 2012; Peden et al., 2004; Stigson et al., 2008; Mooren et al., 2011). The most critical factors influencing pedestrians' safety are vehicles' speed, alcohol consumed by drivers and pedestrians, deficiencies in infrastructure solutions, and inadequate, insufficient visibility of pedestrians on the road. While in some cases, social campaigns and promoting road safety can make a difference, good pedestrian visibility and supplementing the infrastructure with appropriate solutions will certainly improve pedestrians' safety on the road.

The concept of the author's solution is shown in fig. 1. The proposed system is based on the communication of road infrastructure elements with pedestrian mobile devices to prevent dangerous road incidents involving them. The basic assumption is to equip the existing or newly emerging road infrastructure with devices enabling communication between pedestrians and infrastructure elements. Mobile devices equipped with appropriate wireless technologies, such as Bluetooth, 5G, or technologies developed in the future (Skokowski et al., 2017; Malon et al., 2017, Malon et al., 2018), can communicate with the infrastructure.

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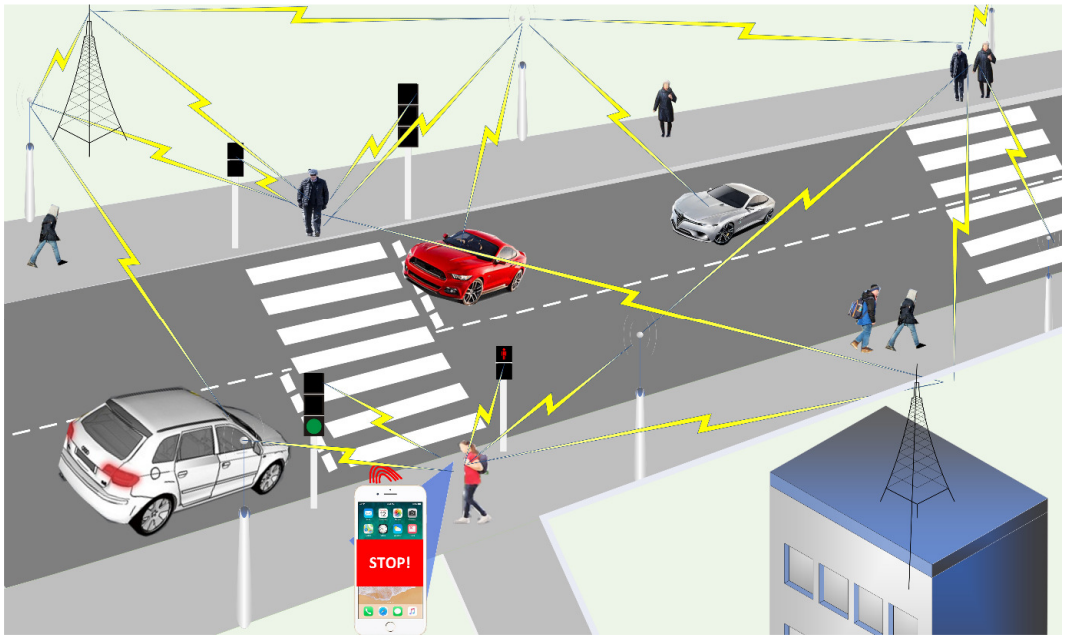

Fig. 1: Proposed a novel Infrastructure 2 Pedestrian (I2P) approach for increasing human's life and health safety

In (Skokowski and Maslanka, 2020), the authors estimated the social costs in the year 2018 in Poland (Jaździk-Osmólska and Korneć, 2018; Symon, 2019), because of the accidents with pedestrians. The total cost for the three basic causes of pedestrian accidents is valued at over 600 million EUR. Considering the authors' solution, investments made in the appropriate road infrastructure can allow for huge savings. The forecasts of road accidents' costs until 2023 will amount to a total of 10 billion EUR. The proposed I2P approach has an immense application potential and can directly contribute to increasing pedestrian safety and significant social benefits. Simultaneously, it should not generate enormous investment costs and, more importantly, not for the end-users of this system - pedestrians.

Table 1: Potential profits in Poland using the I2P solution

PROFITS in million EUR / efficiency of the solution	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
Careless entering the road	414.1	372.7	331.3	289.9	248.5	207.1	165.7	124.2	82.8	41.4
Crossing the road in an illegal place	106.7	96.0	85.3	74.67	64.0	53.3	42.67	32.0	21.3	10.7
Entering the road at the red light	81.8	73.6	65.4	57.2	49.1	40.9	32.7	24.5	16.7	8.2
Total	602.6	542.3	482.1	421.8	361.5	301.3	241.0	180.8	120.5	60.3

The potential public profits using the proposed I2P solution in a million EUR for different values of its' effectiveness are shown in Table 1. It can be noticed that even for very low efficiency, the profits achieved can be huge, and the saved resources can be used for other purposes.

Technical solution for a proposed approach

Modern wireless communication systems might be used for many applications. The basis for the effective operation of I2P for increasing pedestrian safety is the pedestrian's precise location in the vicinity of the road infrastructure. The solutions currently used to determine the mobile device's position, such as GNSS signals and 4G cellular systems, are too imprecise. The new standardization solutions that are just being introduced to the market, such as Bluetooth 5.1 (Woolley, 2019), or the planned solutions in 5G systems, enable the device to be located with high

accuracy.

Positioning performance requirements have been sharpened further in 3GPP Release-17, which targets higher accuracy positioning requirements. For the Industrial Internet of Things (IIoT) use cases, the positioning error is in the range of 10 cm to 1 meter (Patel, 2020). For general commercial use cases, it is in sub-meter level position accuracy (Qualcomm, 2019). The target latency requirement is less than 100ms, and for some IoT use cases, latency in the order of 10 ms is desired. The quick work of the system determining the node's location is also significant from the point of view of the I2P solution (might be used during running or cycling).

Currently, the most accurate results from existing location systems are provided by Bluetooth. Hence, one of the basics of building the I2P system may be equipping road infrastructure elements with Bluetooth communication devices. The prepared infrastructure supported by location services using the 5G system and the I2P system could be launched as one network function. It means that it shouldn't be costly to establish such a solution (Khan et al., 2020; Zhang, 2019).

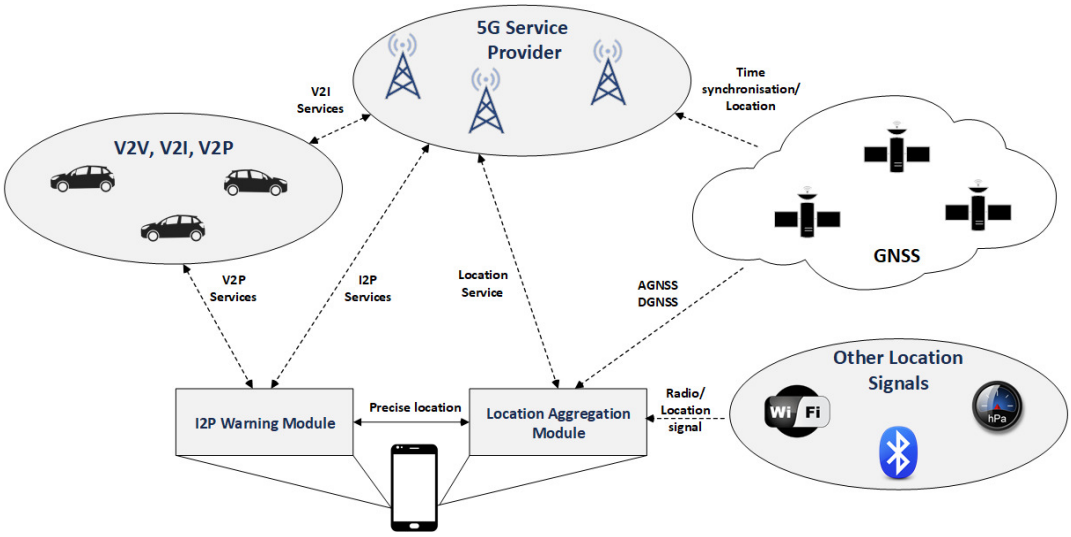

Fig.2: Proposed technical solution for Infrastructure 2 Pedestrian (I2P) system to increase human life and health safety

The pedestrian using the system has an application running on his device, which, using the location services offered by the user's end device, monitors the place where the user is, the direction in which he is moving, and the speed at which he is moving (fig. 2). At the same time, information about the road infrastructure, road, or intersection structure is downloaded. They allow us to determine whether a pedestrian is approaching the edge of the road, about the traffic lights' status at the corner, and, if possible, about any approaching vehicles. This information may come to the user's terminal from communication devices located in the road infrastructure elements or from central servers operated by the road manager in a given city or country. The data collected in this way will allow the use of intelligent computing algorithms, which will warn him, using the mechanisms available on his end device depending on the user's behavior.

The proposed I2P solution could indicate pedestrians' presence on the road through communication between their devices and the road. The infrastructure could then use communication via I2V and I2P to transmit information to connected cars. The vehicle driver would be notified with an appropriate message about a pedestrian's presence on the road despite the lack of visibility. In this case, the infrastructure can also inform a pedestrian about the situation.

Conclusions

The year-to-year social costs of each country related to the loss of life or damage to pedestrians' health connected with road accidents are huge. Nowadays, there is a need to build road infrastructure that would increase pedestrian safety. The I2P concept can prevent road accidents involving pedestrians by equipping the infrastructure with appropriate technology. The proposed I2P solution seems easy to implement, using already existing technologies. Building the system in the phase before the launch of precise 5G systems location services will require financial costs for equipping road infrastructure elements (traffic lights, lanterns, crossroads, etc.) with communication

devices and enabling location pedestrians using the I2P system. During the construction of the 5G system, it should be considered whether not to include in the tenders for frequency bands transferred to operators also the provision of new I2P services proposed by the authors. The presented estimation of potential savings shows the profits by implementing the proposed solution. The expected costs of implementing the I2P system will be much lower than the costs incurred yearly due to pedestrians' accidents, and most importantly, they will not be the same large each year. Over time, an I2P system's investment will decline and may start to generate profits in a brief period.

The novel I2P system to increase human life and health safety should be considered by relevant state authorities and institutions when developing solutions to improve pedestrian safety. Therefore I2P solution should be considered by automotive industry organizations like New Car Assessment Programme (NCAP) or car manufacturers while developing new technologies, i.e., connected cars.

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Breaking Voice Authentication – Security Testing Approach

Olga DZIEGIELEWSKA

Military University of Technology, Warsaw, Poland
olga.dziegielewska@wat.edu.pl

Abstract

A couple of years ago, along with raising popularity of smart devices that promote voice authentication mechanisms, voice recognition became a buzz topic again. Not only voice patterns recognition algorithms significantly improved their quality, but also with a rapid growth in the development of sound editing tools and an outburst of the deep-fake concepts, the attack surface of voice authenticators significantly expanded. This paper describes the approach for penetration testing of the voice recognition solutions and tackles common misconceptions of voice patterns characteristics.

Keywords: Voice Biometrics Testing, Voice Biometrics Threat Modelling

Introduction

In the recent years voice authentication systems are on the raise. Along with raising popularity of smart devices voice unlock functionality, other industries started looking deeper into the possibility of voice authentication implementation for their needs as a single or a part of a multi-factor authentication, e.g. in IVR systems. As an effect the threat landscape changed.

So far there are no standardized documents explaining the approach to testing of the voice authenticators, therefore security researchers try to apply and adapt different techniques and processes when assessing the security of such mechanisms. This paper presents a proposition of an approach to security testing of the voice authentication systems starting with the threat modeling, proposing test scenarios and concluding with the risk evaluation for the identified issues.

Voice Authentication Systems

To better understand the threat landscape a security researcher or assessor must first understand the basic breakdown of the voice authentication systems and their characteristics as it provides better understanding of the potential threats.

Online systems are understood as systems, which are evaluating the samples using online database that is updated in a concurrent manner, e.g. online IVR systems.

Offline systems are understood as systems, which are evaluating the samples using offline database that is frequently physically stored on the input device, e.g. smart devices.

Active authentication or ***non-adaptive authentication*** is understood as a process in which a user is aware of the voice authentication process as he is asked to provide a voice sample during the process (Gajo, A., 2020).

Passive authentication or ***adaptive authentication*** is understood as a process in which a user may not be aware of the voice authentication process as he is not asked to provide a voice sample during the process, but the system analyzes the voice that is gathered through a different process, e.g. during a conversation with an online banking assistant (Gajo, A., 2020).

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Playback detection or ***fingerprinting detection*** is feature of the authentication system that allows to detect the same voice sample being replayed into the input device during two independent and separate authentication processes.

Recording detection is feature of the authentication system that allows to detect the recording of a voice sample being provided into the input device. This type of feature frequently provides further breakdown portraying its accuracy when using ***collaborative*** and ***non-collaborative*** recordings. Collaborative recordings are understood as high quality recordings of a user saying his authentication quote directly to the recorder, while non-collaborative recordings are understood as low quality recordings that were grabbed without user's knowledge.

Understanding Voice Dynamics

To properly assess security of voice authentication systems it is important to understand the physical properties of the voice dynamics, including: the linguistic properties of languages the authentication system is designed for, acoustic conditions during the sampling process and the genetic properties.

The linguistic properties that need to be taken into account as a minimum are phonemes, inflexion and intonation of the covered languages. Those three characteristics help to differentiate not only the languages, but the nationalities of the sample suppliers as non-native speakers tend to mirror the inflexion and intonation of their native languages when they speak in a different language (Crystal, D., 2008).

One characteristic that is partially a linguistic and partially genetic property is the tempo, as both of the factors influence the tempo of one's speech. Another important genetic property is the genetic similarity, which can be understood as the degree to which voice of different people is similar. This is especially important for considering the corner cases in the threat modelling process as people who are related tend to have close proximity when it comes to the genetic voice characteristics.

The acoustic conditions also play a huge role in voice sampling as the background noise or the echo that is present during different phases of the voice authentication can later influence the overall security of the system.

Threat Modelling

The threat modelling process for voice authentication systems testing follows typical steps for such activities, i.e., at first the scope of the test must be determined, then the documentation analysis should be performed and, as a last step, the test scenarios are created.

Determining the scope is a crucial part of each test, but in case of the biometrics testing it is especially important to establish the project limitations as there are no standardized systematic approaches to tackle each and every aspect of the biometrics mechanisms security testing, e.g., similar to the OWASP ASVS. The main question to ask is what the purpose of the test is, as different scenarios would be developed accordingly dependent on the purpose. In case of the voice biometrics the key aspect is the validation the biometrics engine's susceptibility to attacks performed from a perspective of an external attacker. The important factor here is to determine what kind of attackers pose the most threat to the tested environment and to understand this the characteristics of the tested solution required.

What naturally follows is determining what kind of testing can be performed, i.e., white-box, grey-box or black-box. When performing testing for the biometrics product owners, the white-box approach is a feasible option, however in most cases the tester will not have access to the source code of the solution, therefore grey-box and black-box are more common.

Regardless of the selected testing approach it must be confirmed at early stages of the threat modelling which biometrics engine is used and what are its features. Getting to know what kind of the engine is in use allows to craft tool-specific scenarios.

What also helps in developing dedicated test cases is the documentation of the system, understood not only as the technical specification of the product itself, but also the actual implementation and post-implementation documentation, the risk analyses and procedural guides. The relevant supporting documentation should be identified as one of the first steps of this part of the assignment as any gaps in the received material may impact the outcome of the test, therefore should be addressed before actual testing phase. In case of the full black-box testing approach, it is most likely that there will not be any kind of documentation provided beforehand, therefore the threat modelling and the scenarios development must be based on previous experiences of this sort as no systematic standard for testing voice-based biometric authentication are formally developed yet.

The key elements to look for in the system's documentation are:

- What kind of features provides the system?
- What is the type of accepted input and the type of the provided output?
- How is the voice pattern stored in the database? How is the integrity of the pattern over time measured?
- Where is the pattern stored (product owner's side, integrator's side or the client's side)?
- Does the tool provide:
    - playback detection, also described as fingerprinting,
    - recording detection and if so, how its effectiveness differs for collaborative and non-collaborative recording types,
    - genetic similarity detection?
- If the engine can be used in the telephony systems:
    - What are the accepted telephony protocols?
    - Does the engine provide the same level of resilience against attacks using different kind of telephony protocols?
- How the supporting infrastructure architecture looks like and what kind of security protection mechanism are in use?

The last question is especially important as in the voice biometrics systems, there are usually three key elements that need to be somehow connected: the voice samples recording system, the biometric engine and the database. The interesting case are the telephony systems which use the telephony devices with conjunction of the telephony protocols as their recording system, therefore introducing more threat vectors to the initial assessment.

Except from the technical layer, the procedural layer may be also assessed as a part of the assignment. Nonetheless, it must be noted, that the procedural part may help in understanding the business need of biometrics use cases for the authentication system and also to properly assign the risk levels after a gap or vulnerability is identified but should not state a sole subject of the biometrics systems' testing. The key elements to look for at the procedural level are:

- What kind of business processes are protected by the biometric authentication?
- How does the decision tree for the processes look like?
- What are the stages of biometric pattern registration?
- What are the stages of the biometric authentication?
- Have any risk analyses been performed for the process and the selected tool? What are the results? What elements have been analyzed?

The important factor that needs to be mentioned here is establishing the relation between the product owner, i.e. the biometric engine legal owner and the entity that requested the test of the engine. If the product owner requested the test, the case is pretty transparent.

If the requestor is a different legal entity, then it is worth confirming with the client that the third-party provider is notified that the test activities will take place and that the agreement between the client and the third-party allows for such activities. It is also important to confirm the legal aspects, as in case of a gap or vulnerability identified in the solution itself, the risk mitigation falls onto the product owner and the requestor loses the control over the mitigation process, what must be taken into account.

Depending on the project scope established in the previous steps and information gathered during the documentation analysis, the threat models and the test scenarios strictly related with them can be designed.

Test Scenarios

In case of biometrics mechanisms testing, potential attack scenarios prepared and agreed with the test requestor help in understanding the real threat related with used solution. In contrast with standard approach of vulnerabilities testing it's based rather on story-telling than automatic-scans-like vulnerabilities detection.

As the previously mentioned, the fundamental division of the scope areas in case of voice biometrics testing are:
- Supporting infrastructure tests,
- Biometrics engine tests.

Additionally, the perspective of an attacker must be considered, e.g.:

- External attacked with limited resources,
- External attacker with unlimited resources,
- Internal attacker with limited privileges,
- Internal attacker with unlimited privileges.

The following pages present the general outline of the test, focused on the specific areas and more detailed baseline for the biometrics engine test.

From the requestor's risk perspective, the key part of the engagement is usually the biometric engine test scenarios covering the perspective of an external attacker.

A. Threat agent: internal or external with internal access

The table below presents base scenarios for the threat agent describes as an internal attacker or an external attacker who gained access to the internal system.

Scenario name	**Description**
Algorithm-level abuse	Targeted area: biometric engine Action: Analysing used algorithms in terms of effectiveness against the voice recognition attacks.
Source-code level errors	Targeted area: biometric engine Action: Analysing the source code of the biometric engine, including its configurations, to verify the effectiveness and security of the implementation of the algorithms and the system as a whole.
Voice pattern integrity abuse	Targeted area: infrastructure Action: Verification of the database server and the database security by analysing its configuration and performing exploitation of the attacks identified in the infrastructure that could affect the database integrity. Attempts to replace the patterns from the perspective of different roles in the system (e.g. administrator, regular internal user, external user).
Voice pattern capture	Targeted area: infrastructure Action: Traffic analysis between the system's elements. Measuring the probability of capturing the voice pattern by tapping the user's phone.
Voice pattern leakage	Targeted area: infrastructure Action: Traffic and configuration analysis covering the system's elements.
Man-in-the-Middle for registration or validation	Targeted area: infrastructure Action: Attempts to proxy the voice traffic between the user and the analysed system.

B. Threat agent: external attacker

The table below presents base scenarios for the threat agent describes as an external attacker who has only access to the input interface of the system. All of the scenarios mentioned below target the biometric engine.

Scenario name	Description
Voice pattern registration process abuse	Attempts to register a biometric pattern under various acoustic conditions (e.g., different characteristics of background noise) and technical condition (e.g., registration of samples from recordings) to verify how such cases affect the authentication mechanism.
Voice pattern reregistration	Attempts to use or bypass alternative authentication methods available in the system to modify (or overwrite) the already registered biometric pattern. Attempts to invoke parallel pattern registration for the same user ID and verifying how such action affects the authentication mechanism.
Brute-force attack	Verification of the engine tolerance when modulating / fuzzing the created pattern.
Replay attack	Performing replay attacks by recreating a previously captured pattern, including attempting to adapt the system tolerance to the patterns used (i.e. obtaining the effect of increased tolerance).
Deep-fake voice simulation	Attempts to create an AI voice avatar from voice recordings and using simulated voice in the authentication process.

The test scenarios mentioned in above can be treated as a base for the voice biometrics system testing with the focus put on the biometric engine. It must be noted that there are other aspects not covered explicitly here, e.g., hardware security, network security or database security, but the scenarios targeting the infrastructure elements are partially tackling those areas. The weight was put on the biometrics aspects testing, as those are characteristic only for such solutions and other aspects can be treated as somehow supporting elements, whose security must be assessed and comply with the standards but are not the subject of this paper.

Biometric Engine Test Scenarios Implementation

Each of the scenarios targeting the biometric engine depending on the test environment can be completed using different approaches and tools. In the sections below, a workplan's steps and tooling are proposed along with appropriate commentary regarding the implementation of the scenarios in the test environment.

The first two scenarios assume that an attacker is a person with an internal access to the environment, i.e. indicating white-box or grey-box testing (depending on the scenario). The other five assume that an attacker has only access to the input interface and has no other knowledge regarding the system.

A. Algorithm level abuse

Algorithm level abuse intents to find security gaps at the algorithmic level of the voice biometrics engine. This scenario covers analyzing used mechanisms against the current state of the voice recognition algorithmic designs and verifying the concept and the design of the algorithms, including allowed setup and use-cases.

There are no particular ready-to-use tools for this activity, as the review is performed based on the research and understanding of the current trends. The review checklists can be used to make the assessment more systematic, but the detailed steps will depend on the latest developments in the area, therefore rather cannot be standardized.

B. Source-code level errors

Source-code level errors detection aims at identification of the gaps in the implementation of the algorithms that were analysed as a part of the *algorithm level abuse* activity. It is important to note that even if an algorithm is proven to be secure, the improper implementation can introduce security vulnerabilities.

This activity focuses on the code review of the biometric algorithms however the code should be analysed as a whole, as the overall integration of the key algorithms with the system is also an important element where the security vulnerabilities may be introduced.

Another element of this activity is the biometrics engine configuration analysis. It must be understood that the implementation of the engine and its supporting system is a separate element to the configuration of the solution. In most cases the configuration of the biometric authentication system lies in the competencies of the product user, i.e. the systems can be configured differently depending on the product user's needs. A product user is understood as a party who implements the solution into its infrastructure.

The configuration review must be performed bearing in mind that the system must not only be secure but also usable, therefore setting all the parameters to provide the smallest level of the verification errors may not be a feasible option. A proper trade-off between the usability and the security must be determined based on the characteristic of the reviewed system and most likely this activity will almost always have to be done manually.

The source code review on the other hand provide a variety of tooling for static, dynamic and interactive analyses. Vast majority of them are automatic or semi-automatic tools that may miss the mark on the key aspect which is the implementation of the biometric algorithms. The algorithms implementation review should be done manually with support of the code review tools. Just as in the previous scenario, the review checklists can be used to make the assessment more systematic, but the business logic issues are impossible to be standardized in such form.

C. Voice pattern registration process abuse

Voice pattern registration process abuse targets the initiation of the biometric authentication mechanism for a particular end-user. This scenario covers:

- Registration of the voice patterns in different acoustic conditions, e.g.:
  - artificially generated or reduced background noise with varying amplitude and volume,
  - artificially generated or reduced echo,
- Registration of the voice patterns in various technical conditions:
  - pattern registration from recordings,
  - for the telephony systems: pattern registration using different parameters of telephone connection (e.g. 3G, LTE, VOIP).

There should be no direct relationship between various acoustic and technical conditions during the registration process and security of the authentication process identified, i.e., the identified authentication issues occur regardless of how the pattern was registered to pass this scenario. However, some functional errors may be identified that do not have a direct impact on system security.

To effectively execute this scenario, the tester would need access to audio devices, serving as an input (recorders) and output (speakers) and an audio editor. In case of the telephony systems testing, additionally a telephony devices and virtual audio devices allowing for coupling the audio inputs and outputs should be also used.

D. Voice pattern reregistration

Voice pattern reregistration attempts to find gaps in the processes responsible for changing the registered biometric patterns.

This scenario can cover attempts to invoke registration mechanism for a user with already registered biometric pattern and parallel voice pattern registration for the same end-user abusing the race condition on different devices.

Such behavior can be a result of the misconfiguration of the biometric engine or introduction of vulnerabilities at the source code level, therefore when testing this scenario from a perspective of an external attacker some of the conditions in which the existing vulnerability would be exploitable may remain stealth.

In general, the system should not allow for reregistration or parallel voice pattern registration. In case the parallel voice registration is not blocked, then the authentication should be possible using only one pattern – the one that has been registered as the first pattern. In such case it's also worth testing how technical errors, such as closing the connection before the pattern has been successfully registered affects the authentication process.

E. Brute-force attack

Brute-force attack verifies the engine tolerance when modulating or fuzzing the created authentication pattern. The aim of the attack is to verify how the sound distortions can affect the authentication process. There should be no direct relationship between various acoustic distortions and security of the authentication process identified, i.e. the identified authentication issues occur regardless of the distortions present to pass this scenario.

The scenario-related activities would include:

- Adding noise and sound distortion with different characteristics to the attempts to authenticate with natural voice and recordings.
- Attempts to authenticate by other people for the registered tester pattern.
- Attempts to authenticate by other people, genetically similar, e.g. twin, siblings, family members, for the registered tester pattern.

With regards to the genetic similarity recognition, it must be noted that the legal factor must be taken into account when deciding to perform such activity. It should be agreed with the test requestor whether this kind of scenario should be pushed during the testing, due to the liability reasons, in case of using voice samples that are originating from the tester's relatives which are not a party in the agreement between the test's requestor and the tester.

To effectively execute this scenario, the tester would need access to audio devices, serving as an input (recorders) and output (speakers) and an audio editor. In case of the telephony systems testing, additionally a telephony devices and virtual audio devices allowing for coupling the audio inputs and outputs should be also used.

F. Replay attack

Replay attacks are performed by recreating previously captured voice pattern of a user, including attempting to adapt the system tolerance to the patterns used (i.e. obtaining the effect of increased tolerance).

To understand the importance of this scenario it must be noted that available voice recognition tools classify their resistance against such attack in different manners. Some of them would consider the "replay" attack as reusing the identical perfect recording of a voice sample, in some cases this kind of behavior is referred as sample fingerprinting or playback resilience. Other tools would define the replay attacks as the recording detection. It is important to note the difference at the definition level, as this changes the understanding of the risk factors characteristic for the tested solution.

Another important factor to consider is the adaptivity of the authentication process. Some of the solutions, provide the adaptive mechanism that dynamically analyze the end-user's voice and other ones provide the only static phrases verification and they can be differentiated as follows:

- When there is no adaptive mechanism – static constant phrases are the key
- When the mechanism is designed as passive adaptive mechanisms, the dynamically changing phrases are used as keys
- When the voice recognition happens as the background task, i.e. during regular activities unrelated with the authentication process – an active adaptive mechanism is used.

The scenarios for the replay attack are based on the prerecorded phrases. Depending on the adaptivity of the system, the testing scenarios vary. For the non-adaptive system, the risks related with reusing prerecorded phrase is the highest among the mentioned ones, as capturing a valid pattern sample is higher.

Before performing the scenarios, sample recordings must be crafted. The voice recognition systems usually divide the recording to the collaborative and non-collaborative ones. The first type is the kind of recording when an attacker records the samples with close proximity to the victim in perfect acoustic conditions. The second type is the kind of recording captured in bad acoustic conditions, without the close access to the victim.

To test the system's actual resilience in both cases, continuous and composite recordings can be used. Continuous recordings are understood as recordings of the complete phrase at the appropriate tempo of spoken words (approx. 2.5 words per second) and intonation for declarative, interrogative or imperative sentences of the used language. Composite recordings are understood as phrases composed of different statements of the person being recorded, from recordings of different sound quality, which did not meet the standards of the tempo of speech and intonation for declarative, interrogative or imperative sentences of the used language. This kind of differentiation is needed to fully test the effectiveness of the voice authentication mechanisms in the tested solution.

As it was mentioned above, depending on the adaptivity of the system, the test scenarios vary. The table below shows a summary of the test cases for specific systems.

Test case	**System characteristic**
Attempts to authenticate with other phrases, similar in the phonetic context and using a different set of phonemes, to verify whether the biometric engine based on the user's voice characteristics will correctly recognize it	non-adaptive
Attempts to authenticate with prerecorded continuous phrases.	Non-adaptive, passive adaptive
Attempts to authenticate with prerecorded composite phrases.	Non-adaptive, passive adaptive
Attempts to use voice simulator	Active adaptive

To effectively execute this scenario, the tester would need access to audio devices, serving as an input (recorders) and output (speakers) and an audio editor. In case of the telephony systems testing, additionally a telephony devices and virtual audio devices allowing for coupling the audio inputs and outputs should be also used.

It is also recommended to modify the recordings so that the volume of the spoken phrase exceeded the volume of background noise, what can be achieved naturally in the case of recordings from close range (collaborative recordings), or by appropriate editing (non-collaborative recordings).

In some cases, recordings are detected based on the differences of the background noise before, during and after replaying the phase, therefore a special attention must be put into those aspects in the testing phase, as the proper timing of the replay may play a key role as well.

G. Deep-fake voice simulation

Deep-fake voice simulation is based on creating an AI voice avatar which simulates the natural voice of the tester. It must be noted that dependent on the languages supported by the voice recognition system, appropriate generator must be used to properly reflect the targeted phonetics. Currently available non-commercial solutions support only selected languages, therefore the risk for those languages related with attempting this attack scenario is higher.

To effectively execute this scenario, the tester would need access to the voice simulator of the appropriate phonetics, audio devices, serving as an input (recorders) and output (speakers) and an audio editor. In case of the telephony systems testing, additionally a telephony devices and virtual audio devices allowing for coupling the audio inputs and outputs should be also used.

Biometric engine test scenarios implementation

The test environment setup is a crucial part of performing tests effectively and most likely will be common for the internal threat scenarios (i.e., scenarios A-B) and the external threat scenarios (i.e. scenarios C-G).

For the testes focused on the algorithmic and the source code level, the key element is the conceptual work, therefore, no particular configuration will be required. In detecting the source-code level error, automatic tools can be used to facilitate identification of the threats that can affect the overall security of the system and the environment should be appropriately prepared to serve the needs of used tools. Except form the infrastructure part, it also must be noted that different source-code review tools require different formats of the input data, e.g., compilable source code, compiled version of the solution, or only packed sources.

For the tests targeting the external threat the setup is more complex. First of all, a set of audio recording and playing tools must be determined. Ideally, more than one device should be used to mitigate the risk of false negative cases for the device-sensitive scenarios, e.g., replay attacks. A useful tool especially for the telephony systems verification are virtual audio devices that allow to redirect the audio device’s output into the audio device’s input (e.g., VB-cable virtual audio device). This kind of behavior allows to obtain the same method of compression for the recordings used in the replay attacks what proves to be more effective solution than using external devices.

When testing telephony systems, the tester must also have access to tools or devices that are able to connect to the system using different protocols (e.g., 3G, LTE, VOIP).

It is also important to select appropriate audio editor that provides the mechanisms to introduce sound distortions, modulate the background noise levels, combine multiple recordings into one and modify their acoustic characteristics, so that they are nearly identical. Additionally, for the deep-fakes voice simulation a voice avatar generator is required. One of the most popular ones currently available for the wide public is Lyrebird, however at the current stage of the development it supports only English phonetics.

Apart for the tester's environment, it must be noted that the test requestor must set up his environment for the testing activities accordingly as well. The details should be addressed at the planning phase of the engagement however, the key part is that the environment available for testing should reflect the production setup that is under the test.

Risk Evaluation and Mitigation Steps

As it was mentioned before, the risk evaluation for the biometric authentication mechanisms strongly depend on the procedural part. Even if a seemingly high-risk vulnerability is detected when testing the biometric engine itself, the actual risk for the organization must be evaluated taking into account the business risks related with this issue. The methodology that results most useful for that kind of activities is OWASP RRM which introduces the adaptable tradeoff between the technical and the business impacts.

Proposing the mitigation steps for the identified gaps and vulnerabilities in case of the biometric engine testing can be affected by the fact that the test requestor may not be the tested product's owner. It must be established what is the relation between the test requestor, the system's configuration owner, the system's owner and the product owner. Without this, the proposed mitigation techniques can not be feasible to introduce by the test's requestor.

Conclusions

This paper proposes an approach that can be followed during the security assessments of the voice authentication systems. It should be treated as a guide during the process of determining the scope of the assessment, deploying test scenarios and estimating the risks of the identified issues. However, it must be stressed that due to the fast-evolving area which biometrics authentication, the proposed approach should be reviewed and reevaluated on a regular basis to ensure the quality of the security assessment.

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Green Economy as a Part of Corporate Social Responsibility Management by using Sustainable Business Model Canvas

Małgorzata RUTKOWSKA and Anna Maria KAMIŃSKA

Department of Management and Organisation, Faculty of Computer Science and Management,

Wroclaw University of Science and Technology, Wroclaw, Poland
E-mail addresses: malgorzata.rutkowska@pwr.edu.pl, anna.maria.kaminska@pwr.edu.pl

Abstract

The article is devoted to concepts of green economy on the background of Corporate Social Responsibility (CSR). The purpose of this paper to evaluate the relationship between the green economy as a part of corporate social responsibility in management with the use of a business model. In this article, Osterwalder's business model canvas is treated as a tool that supports green economy and CSR. The article uses the descriptive method as a preliminary tool. It consisted in distinguishing and describing a specific phenomenon, which is green economy and CSR. Complementary to the inductive approach, a reduction approach was used, allowing for the verification of the obtained generalizations.

Keywords: CSR, Green Economy, Sustainable Business Model Canvas

Introduction

In recent years, the concept of a green economy has gained international importance, especially as a part of CSR. In general CSR itself (and their links with environmental effects) are currently one of the key economic problems. However, it should be emphasized that promising approaches to CSR and green economy are subject to distrust, resulting, among others, from the lack of awareness and understanding.

In Europe, Corporate Social Responsibility has gained popularity thanks to the *European Union Green Paper* titled *"Supporting a European framework for corporate social responsibility"* published in 2001. In 2002, the U.S. National Policy Association found that Europe had surpassed the United States in terms of voluntary CSR activities. In general, this is the result of a more consistent integration of CSR measures with the Corporate Sustainability approach (Schaltegger, 2020).

Increasingly, in discussions regarding social responsibility and green economy, the need for a different view of the role of the economy, or even- entrepreneurship, in social development is emphasized. Thus, the combination of Green Economy and Corporate Social Responsibility is a responsible action in dynamically developing markets. These are good business practices, the activities of which, their strategy and models are directed towards sustainable development, i.e. the implementation of economic, social and environmental goals in economic activity. Currently, in the changing economic, political and social situation, it is important for entrepreneurs to develop new procedures of conduct in which the treatment of health and the environment will be important, or even priority.

The aim of the study is to indicate the idea of a green economy within CSR. The effect of these considerations is the analysis of activities using the Sustainable Business Model Canvas inspired by the idea of corporate social responsibility in accordance with the principles of green economy.

The goal formulated in this way is determining the adopted research method, consisting in a critical analysis of the literature on the subject and participant observation.

Green Economy

There are many different definitions of a green economy in the literature. The term *green economy* was first coined in a pioneering 1989 report for the Government of the United Kingdom prepared by a group of leading environmental economists, entitled Blueprint for a Green Economy (Pearce, Markandya and Barbier, 1989). It was a consensus definition to the term "sustainable development" and the implications of sustainable development for the measurement of economic progress and the appraisal of projects and policies.

The doctrine of economics, assuming the possibility of satisfying the needs felt by the present generation at the level allowed by available civilizational development, without reducing the chances for them to be met by future generations. This definition refers to the report of the World Commission for Environment and Development, under the direction of G.H. Brundtland, in which the main focus is on intergenerational justice.

In the Agenda 21 - sustainable development objectives are included in four basic categories (Keating, 1993; Borew, 1997):

- economic goals: e.g. change in consumption patterns, international cooperation for sustainable development,
- social goals: e.g. combating poverty, protecting cultural diversity,
- environmental goals: e.g. protection of biodiversity, sustainable farming and waste management,
- institutional goals: e.g. integration of environmental policy with economic and social policy, development of scientific research for sustainable development, strengthening the role of the most important social groups in decision-making processes (Zalega 2015, pp. 5-6).

In 2008, the term was revived in the context of discussions on the policy response to multiple global crises. In the context of the financial crisis and concerns of a global recession, United Nations Environment Programme (UNEP) championed the idea of "green stimulus packages" and identified specific areas where large-scale public investment could kick-start a "green economy" (Atkisson, 2012).

The flagship Green Economy Report released by UNEP in November 2011 under its Green Economy Initiative provides a working definition of "green economy" which has since been cited in numerous other publications.

UNEP has defined the green economy as "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is low carbon, resource efficient, and socially inclusive" (UNEP, 2011).

Another definition for green economy offered by the Green Economy Coalition (GEC; a group of NGOs, trade union groups and others doing grassroots work on a green economy) succinctly defines green economy as "a resilient economy that provides a better quality of life for all within the ecological limits of the planet." (GEC, 2020).

The key question arises: Why the colour green for an economy? The colour green is symbolic of the environment and emblematic of sustainable development, hence the green economy is an economy of the environment. A Green Economy system holds a Triple Bottom Line approach that emphasizes the interdependency between “people, planet and profit”.

As defined by the European Environment Agency, “the green economy can be understood as one in which environmental, economic and social policies and innovation enable society to use resources efficiently, improving people's well-being in an inclusive way, while preserving the natural systems that sustain us” [European Commission, 2020]. Figure 1 shows the relationships between sustainable development concepts within the triune concept has been presented.

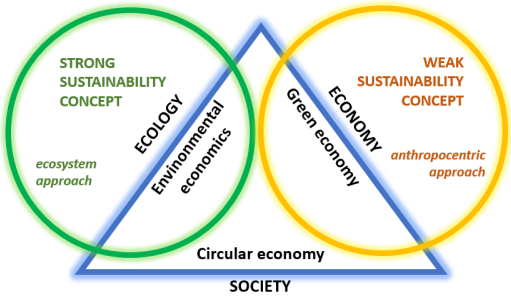

Figure 1: Relationships between sustainable development concepts within the triune concept.
Sources: own study by https://www.mdpi.com/2071-1050/12/14/5582/htm, access: 05.11.2020.

The concept of sustainable development is created through ecology, society and economy. In turn, the green economy has an impact on the circular economy which means that there is increased control over the supply of natural resources

based on renewable resources. Green economy takes due account of environmental and social externalities. The green economy focuses primarily on resource efficiency and ecosystems as the building blocks of the economy and not on inclusive GDP growth as the ultimate economic goal. Moreover, environmental degradation undermines long-term economic growth and human development [Ponomarenko et. Al., 2020].

Figure 2: Inclusive Green Economy [Own study by https://www.switchtogreen.eu/?p=147, access:5.11.2020]

The Inclusive Green Economy (Fig. 2) as an economic model differs from traditional economies in that it includes a combination of three elements: environmental, social and economic. An inclusive green economy (IGE) has evolved from the green economy. IGE is a low carbon economy, efficient and clean to produce, but it also encompasses consumption and results, based on sharing, circular, collaboration, solidarity, resilience, opportunity and interdependence. According to the IGE, it is believed that there are many different pathways to environmental sustainability [UNEP 2, 2020] The transition to an inclusive green economy requires promoting and supporting sustainable lifestyles, increasing sustainable consumption and production (SCP) and encouraging the development of eco-innovation and resource efficiency [Switch to Green, 2020]**.** Such a green approach to the economy and the indication that CSR is a part of it indicates multiple benefits, such as: economic, health, safety, social and environmental benefits. Green economy as a part of CSR is a challenge to create conditions for the growth of prosperity and the growth of social equality in the management of the economy.

Bringing the green economy to an organization that already exists is not an easy task. A suitable tool can be managing the business model so as to weave the foundations of green management to increase Corporate Social Responsibility.

Business Model Management

Business model management started in the mid-90s of the last century. The concept of the business model has been described in many different ways using different definitions and interpretations. For the purposes of this article, it was assumed that "a business model describes the rationale of how an organization creates, delivers, and captures economic, social, and other forms of values" (Osterwalder A and Pigneur Y., 2010).

There are many business models in the literature. Therefore, it will be most appropriate to indicate not what kind of models these are, but what are the criteria for their division.

In 2011, the research team, Ch. Zott, R. Amit and L. Massa analysed 103 publications on business models and distinguished 3 main perspectives of business models (Zott et. Al., 2011):

- e-business, information systems and the use of the Internet in organizations (in relation to Internet enterprises)
- innovation and technology management (technological enterprises).
- strategic- related to value creation, competitive advantage and results of enterprises (all enterprises)

When we would like to describe a business model, it is possible to differentiate components of business model definition to strategic dimensions and basic key words like (Shafer, Smith and Linder, 2005):

- strategic choices: clients, value proposition, skills, revenues, competitors, offer, strategy, branding, diversification, mission,
- value creation: resources and assets, processes and activities,
- acquisition of value: costs, profits, financial aspects,
- value network: suppliers, customer information, customer relations, flows information, products and services).

Business model, can also be defined using four questions: who is the company's customer (who?), what the company sells (what?), how does it produce products and services (how?), why its activity it is profitable (why?) The above questions create the so-called magic triangle business model that includes three key model components business, i.e. value proposition, revenue model and value chain (Gassmann et. All., 2013) (Fig. 3).

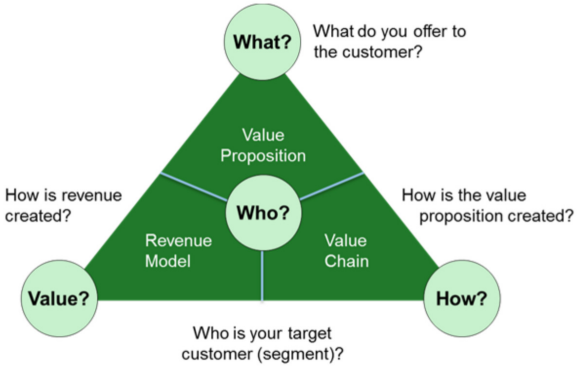

Figure 3: The magic triangle of business model; Source: (Gassmann et. All., 2013)

Based on the information above we can have business model like: open source, pay – per - use, license, freemium, crowd-funding, cross-selling, etc.

The decision which business model is applicable and how to manage it is not so easy, especially when taking into account application of green economy in an organization. Authors of this paper are proposing to use Business Model Canvas created by Alex Osterwalder. Business Model Canvas is a plain sheet with 9 fields that define 9 essential points of the business (Fig. 4).

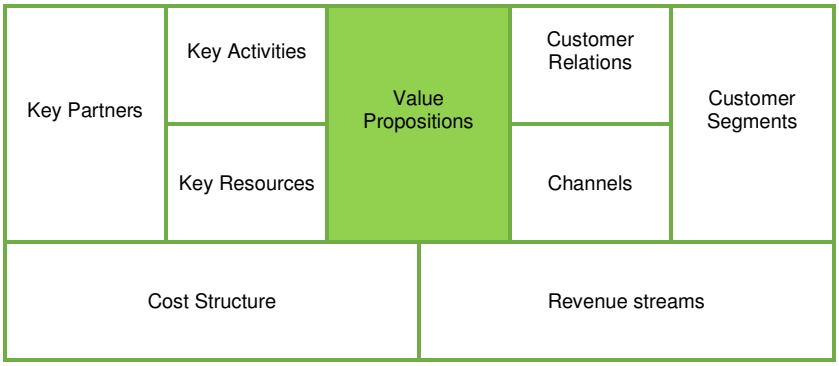

Figure 4: Business Model Canvas [Osterwalder, 2010]

Business model canvas can be used not only to plan and create a new organization, but also to modify the activities of an already existing organization. When creating a business model canvas, it is therefore crucial to properly specify the area of value propositions so that it reflects all the values, including green economy and social responsibility. When we properly define the unique value proposition, “filling up” the remaining fields becomes simple, because we know what resources we need, the climate is our client and how to reach him, with whom we will cooperate and on what terms, as well as what our cost centres and sources of income will be.

Corporate Social Responsibility

In the literature on the subject, corporate social responsibility is understood as: "(…) a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders" [United Nation Industrial Development Organization, https://www.unido.org/our-focus/advancing-economic-competitiveness/competitive-trade-capacities-and-corporate-responsibility/corporate-social-responsibility-market-integration/what-csr, access: 01.12.2020]. Authors of this paper suggests to consider CSR management by simple, but effective tools, like Business Model Canvas or "magic triangle of business model" as mentioned before. This kind of approach would allow to understand honestly the basics of social responsibility. The following categories CSR are distinguished, i.e.: [https://www.businessnewsdaily.com/4679-corporate-social-responsibility.html, access: 01.12.2020]:

- Environmental efforts: One primary focus of CSR is the environment. Businesses, regardless of size, have large carbon footprints. Any steps a company can take to reduce its footprint is considered good for both the company and society.
- Philanthropy: Businesses can practice social responsibility by donating money, products or services to social causes and nonprofits.
- Ethical labor practices: By treating employees fairly and ethically, companies can demonstrate CSR.
- Volunteering: Participating in local causes or volunteering your time (and your staff's time) in community events says a lot about a company's sincerity.

The basis for the concept of social responsibility is the belief that it should contribute to the growth of the company's value by creating a shared value. Corporate social responsibility is treated as a concept that proposes a modern way of thinking and acting. This approach to the issue has the potential to bring benefits to business, society and the environment. In environmental dimension of CSR most important are so called green jobs and activities which lead to decrease of negative impact of business entities on natural environment (Popławski. et al., 2017).

Social responsibility of business has become a main trend in the world economy in the 90's of the 20th century, although it was born in the 30's. Then, Howard R. Bowen described corporate social responsibility as: "manager`s duty to conduct such a policy, make such decisions and determining such directions of business activities that will be consistent with the goals and values of society" (Rabiański, 2013). Corporate social responsibility is not clearly defined either in the subject literature or in practical activity. Moreover, different interpretations of CSR are adopted in various fields of interest, and a clear evolution of the interpretation of this concept is noticed (Demków, Sulich, 2017).

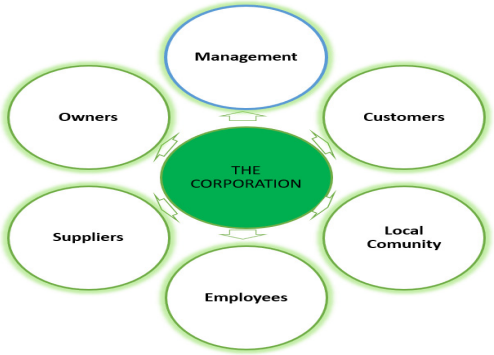

Figure 5: An enterprise model based on the stakeholder concept

Source: author's own elaboration based on Freeman E. (1984).

The CSR brings to some business entities a competitive advantage, especially to these, which are able to build transparent, long-term and lasting relationships with many stakeholders. Business should also create networks with their key stakeholders, including suppliers, legislative authorities and the wider community. Such relations with stakeholders are valuable sources of information for each organization. Most of the successful companies are companies that offer good working conditions throughout the supply chain (Camilleri M.A., 2017; Paliwoda-Matoliańska A., 2014).

Recently economic development has come at the expense of the natural environment. Environmental protection and rational management of natural resources are of key importance in relation to activities undertaken as part of corporate social responsibility. Sustainability requires a change in attitudes to business, and even far-reaching political decisions (e.g. introducing environmental taxes, or public investment in bicycle paths or renewable energy). CSR coexists with "unbalanced" behaviour that eventually outgrows it. An example here are companies that sell "green", ecological products, or simply have extensive charitable programs for local? communities, and at the same time their factories are big polluters or use ineffective technology (Moj-Ogrodnik.pl).

Sustainable Business Model Canvas

Using a Business Model Canvas to for CSR gives a Sustainable Business Model Canvas, that is in general a visual presentation of an ecological and social consequences of the activity in canvas area. The aim of this specific Canvas is to reduce negative and increase positive impact on society and nature [CASE,2018].

In case of green economy, the general aim is to reduce environmental threats and ecological shortages. So the goal for Sustainable Business Model Canvas would be development of the organization without environmental degradation. The management strategy, as for a green innovation, should then include following steps in the block-areas of Business Model Canvas:

- any adjustments should be done by small and progressive modifications,
- important changes done by re-designing,
- use ecological substitutes,
- if possible- apply innovative solutions.

The result of this process would be a Sustainable Business Model Innovation Canvas with a great potential, that would lead to effective change opportunities that would result in green growth [Henriksen, 2012]. The action of reverting traditional approach to business should be coordinated in every area of Business Model Canvas, however even a small change (two, three areas) would be a great success.

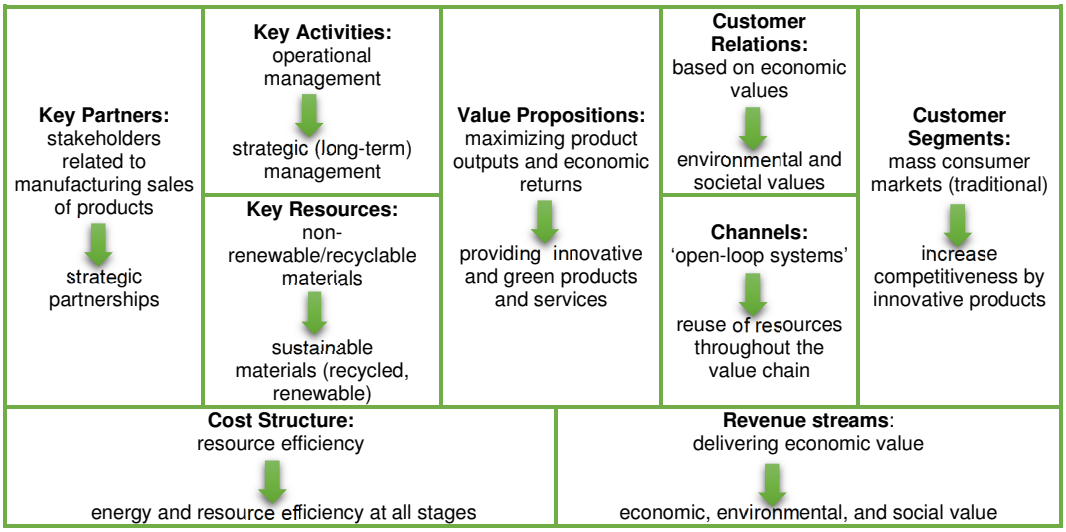

Figure 6: Transformation Business Model Canvas to Sustainable Business Model Canvas

Source: author's own elaboration based on[Beers, D. Van, Grossi F., 2015]

Sustainable Business Model Canvas (Figure 6.) would be a model that supports environment by replacing for example:

- in area of value proposition: traditional shipping by transportation with less co2 emissions,
- in area of customer segments: Asia-Europe trade customers by companies with green profile (less focus on fast transport), etc.
- in area of key activities: production by retrofitting (no waste), etc.

Those changes would radically differentiate business model form the conventional operations to significantly important environmental sustainability of business. Analysing the literature, it might seem that Business Model Canvas is a simple model, which is mainly used in the case of start-ups or newly emerging organizations that must demonstrate an innovative approach to creating an organization. However, applying it to sustainable development can prove to be the key to the success of an environmental-friendly green organization.

Conclusions

By meeting the foregoing, the following conclusions shall be presented:

- Nowadays, companies are increasingly expected to conduct their business responsibly on the one hand and engage in the life of the community and the environment in which it operates, on the other hand.
- Although in the literature you can find links between green economy and CSR, it is difficult to find advice on how to implement them in the organization. The theories presented are very general.
- Green economy and CSR are the criteria for a certain, in this case ecological, action of enterprise development. The positive correlation between CSR and environmental proactivity indicates separate business models.
- Business Model Canvas transformation into Sustainable Business Model Canvas is not easy, but possible in little steps, that can be very profitable for environmental sustainability.

The use of the Sustainable Business Model Canvas business model in order to implement green economy as part of the CSR will help to meet both social and environmental challenges.

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CIM/SMGS Consignment Note as A Necessary Document in The New Legal Regime for Cross-Border Rail Freight Transport – Trends on The External Border of The European Union

Jakub DONSKI-LESIUK

Department of Logistics and Innovations, Faculty of Economics and Sociology,
University of Lodz, Poland, E-mail: jakub.donski@uni.lodz.pl

Agnieszka BUKOWSKA-PIESTRZYNSKA

Department of Logistics and Innovations, Faculty of Economics and Sociology,
University of Lodz, Poland, E-mail: agnieszka.bukowska@uni.lodz.pl

Abstract

The aim of the article is to present the origins of the CIM/SMGS consignment note and to analyze the changes in its use. It presents the latest transport data (2016-2020), showing the dynamics of using this solution across the external border of the EU in forwarding for Russia and Ukraine. It also indicates possible reasons for the dynamics of changes in its popularity. Article refers to the use of one of the functional unification tools in the field of freight transport between the European Union and third countries. Consignment note CIM/SMGS combines the required two different legal orders into one single transport document that may be used for wagonload services and for combined transport. It avoid reissuing of transport documents on EU external border and by doing so to simplify customs clearance – the authorities from the *European Free Trade Association* customs area officially recognized it for use as transit declaration. The CIM/SMGS consignment note is significant for reducing delays in cross-border rail transport. The article uses the analysis of statistical data, applies the theoretical and empirical perspective.

Keywords: cross-border freight, international exchange of goods, railways interoperability, transport law harmonization.

Introduction

The transportation system of any country's is not a whole, neither separate nor self-sufficient. It stays in direct connection with the transport systems of other countries (usually neighboring, but also constituting a component of meta- or macroeconomic systems, i.e. cross-border logistics chains). Together, they constitute regional transport networks, which reduces them to a peculiar system of "connected vessels". Consequently, in the economic activity of transport, the legal provisions regulating transport between two or more countries are of particular importance. The solution to the need to regulate this sphere are international conventions and agreements, which are part of the international law system (Szanciło, 2013). Documents relate to both civil law relations and administrative-law issues. Therefore, in international terms, they regulate not only property relations between entrepreneurs and recipients of their services (clients), but also technical requirements, the formula of customs clearance and the organization of state borders crossing.

The preparation of the transport process means the necessity to organize and regulate a number of legal, organizational, technical and commercial issues. Their importance increases in the case of a process involving the international environment. In addition, it often comes down to regulating very specific issues, related, inter alia, to with the geographical aspect and the possible diversity of local transport subsystems. In such cases, the entire spectrum of divergent issues cannot, as a rule, be regulated by a single source of law. Nowadays, the legal systematization of the international transport process requires the involvement of international organizations, whose tasks boil down to ensuring a platform for cooperation between states and the rationalization of transport relations. This means the necessity to develop and implement normative documents.

In Eurasian East-West freight routes, there are two legal systems on the basis of which rail freight is carried out in international communication. The foundation of international rail law, applicable to goods in trans-Eurasian transport, is based on two legal acts: the *Agreement on International Rail Freight Transport* (SMGS), adopted at the conference of representatives of railway authorities of the signatory states in December 1950 and the *Convention concerning*

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International Carriage by Rail Convention of 9th May 1980 (COTIF) in the version of the Protocol of Modification of 3rd June 1999. The carriage of freight between Europe and Asia is governed by two different legal regimes: the *CIM Uniform Rules* (CIM) and the SMGS. At the interface between these two legal regimes, shipments have to be reconsigned and a new consignment note has to be made out. The aim of the article is to present the origins of the CIM/SMGS consignment note and to analyze the changes in its use. It presents the latest transport data (2016-2020), showing the dynamics of using this solution across the external border of the EU in forwarding for Russia and Ukraine. In addition, possible reasons for reducing the popularity of the use of the document have been identified.

Unification and harmonization of solutions for freight shipments on railways

Harmonization, as a process of making practices compatible by reducing differences in order to achieve a level of similarity between systems, takes into account the fact that some differences between systems may remain (Paise and Paise, 2013). The issue of unification of the transport law relating to cargo handling emerged in October 2003. Then, during the international transport law conference in Kiev, the program entitled *Transport and legal interoperability of CIM and SMGS* was adopted, the aim of which was the harmonization of transport documents. Its implementation envisaged two phases. First, to development of a unified CIM/SMGS consignment note, which would meet the requirements of both transport contracts without infringing the scope of their mutual responsibility (document should become a customs and banking document). Second, agreeing on a unified complaint handling procedure with regard to shipments, sent on the basis of each transport contract and relevant documents.

The project was carried out jointly by experts from the International Rail Transport Committee (CIT) and the Organization for Cooperation of Railways (OSJD). First dedicated agreement, guaranteeing the balance of interests of railways and carriers using the SMGS and the COTIF, was signed on March 30, 2006. Its purpose was to develop a joint consignment note that would enable the transport of goods between railways applying different legal systems, without the need to change documents transport at the stations where they meet (e.g. in Poland, Slovakia and Hungary), i.e. countries bordering the railway infrastructure with a track gauge of 1520 mm.

A pilot train transporting goods transported with the use of the joint CIM/SMGS consignment note was launched on 21st July 2006 from Donetsk and Nizhnedneprovsk to recipients in Germany. On 1st September 2006, the CIM/SMGS document entered circulation as a formal shipping and customs document. In 2010, the common consignment note was used for trains running on 50 routes. At the same time, more than half of the transports carried out with crossing the border of the COTIF and OSJD were made using the above-mentioned of the letter, two thirds of them were transported in containers. The rate of application of this document in Ukraine in 2010 reached 63%, and in Slovakia 30%.

The above decision coincided with the introduction of a common consignment note in all relations on the territory of Russia, then Mongolia and Moldova (2011), and in terms of transit and import also in Kazakhstan (2012). In October and November 2012, pilot container trains were organized using the CIM/ SMGS document on the route China – Kazakhstan/Mongolia – Russia – Belarus – Poland – Germany.

Years of activity in the field of harmonization of transport law has a practical economic dimension. Instead of other transport documents currently provided for under international treaties, parties to the International Convention on the Harmonization of Frontier Controls of Goods may use the CIM/SMGS consignment note as a customs document. Its use is optional, i.e. it depends on the will of rail carriers and their customers (senders and / or recipients of goods). As a rule, the SMGS consignment note cannot be used as a transit declaration in the EU. Similarly to the transit procedure, the simplification in rail transport cannot be applied in this document when there is only one railway undertaking on the EU side. Then such a letter is treated in customs matters as a typical SMGS consignment note. The use of the CIM/SMGS common document as simplification is based on the same legal basis as for the CIM consignment note. The railway undertaking that applied for the simplification in the circulation of goods becomes a person entitled to use the transit procedure along the entire route of transport of goods, to the destination railway station in another country. This means that, e.g. for a transit operation on the CIM consignment note opened in Poland or Slovakia, the railway carrier will be a person authorized to use the transit procedure until the end of the transport, e.g. to a railway station in any EU country. In 2013, already 70% of international container transport and 18% of international wagon transport in the area of operation of the CIM and SMGS regulations was performed using the joint CIM/SMGS consignment note (Committe OSJD, 2014). Figure 1 shows the geographic scope of application of regulations as of May 1, 2019.

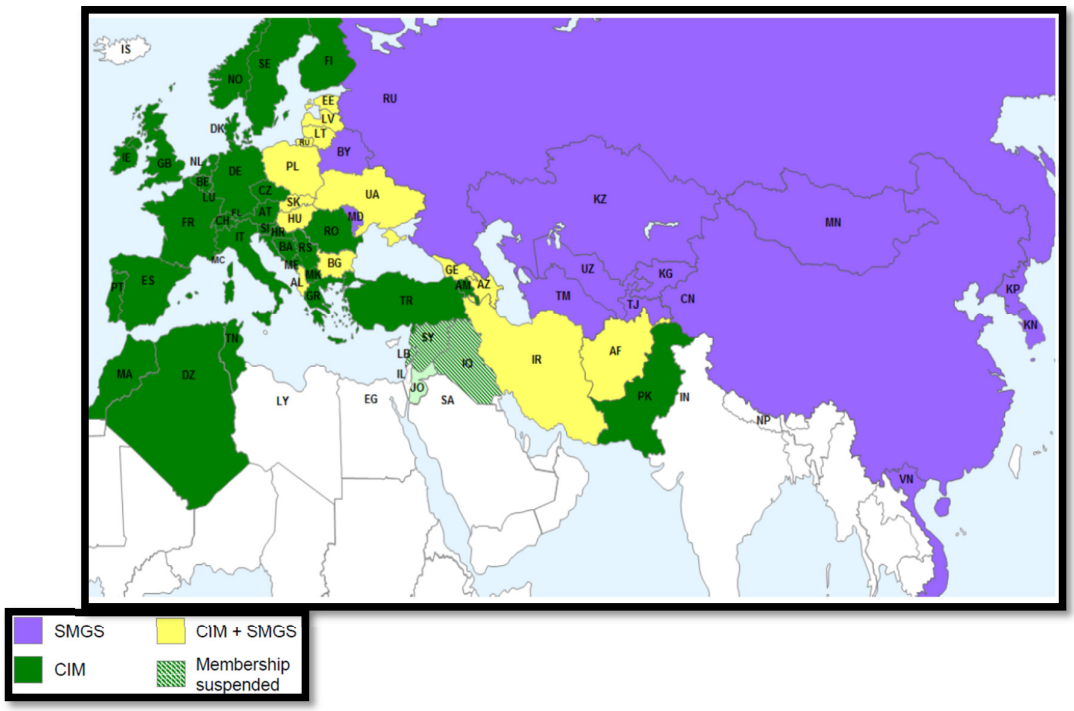

Figure 1: Geographical scope of the application of the CIM and the SMGS

Source: https://www.cit-rail.org/media/files/documentation/freight/scopes/scope_of_application_ of_cim-smgs_2019-05-01.pdf?cid=223805 [Retrieved November 2, 2020].

In 2015, as a result of activities aimed at improving the implementation of trans-Eurasian transport, e.g. the introduction of electronic exchange of customs declarations by railway carriers operating on neighboring national infrastructures, the time necessary to implement customs procedures has been reduced. Currently, the maximum time of customs clearance of goods at individual border stations is as follows: Dostyk (KZ) – 5 hours, Ileck (RU) – 4 hours, Brest (BY) – 5 hours, Małaszewicze (PL) – 10 hours (OSJD Bulletin, 2016). In 2016, the technological service time for container trains at the hub was also shortened. Brest (BY) – up to 9 hours for reloading and up to 6 hours without reloading (OSJD Bulletin, 2017)**.**

New phase of the OSJD and CIT cooperate under the *Memorandum on Cooperation between the OSJD and CIT* signed in Ulan-Bator on 4 June 2015 leads to the unification of procedures and simplification of the exchange of goods. Cooperative efforts and information exchange were continued to design measures facilitating border crossing in international carriage by rail in Eurasia; to draft new or improve existing regulations governing international carriage of passengers and freight by rail; to step up multimodal carriage; to organize combined transport operations and high-capacity container carriage between Europe and Asia; to encourage transport of postal items in containers and transport of general freight under the CIM/SMGS consignment note. An important topic of cooperation under this project in 2019 was the transition to transport operations relying on the use of the electronic CIM/SMGS consignment note and more general paperless technologies. Joint work continues to address information exchange with customs authorities, including the scope of such information, as well as legal aspects of using electronic accompanying documents, such as resolving claims electronically based on an electronic loss-and-damage statement. Attendees of the meetings of the CIM/SMGS Working Group and the CIM/SMGS Steering Group discussed the feasibility of pilot transport operations under the CIM/SMGS consignment note that would be based on contracts of carriage under the electronic consignment note to be entered by the CIM and SMGS carriers. The project is characterized by innovative use of technology to improve efficiency and reduction of bureaucratic burdens on transport.

CIM/SMGS trends across the EU external border – cooperation with Russian Federation and Ukraine

Euro-Asian trade was largely transported by sea, according to container statistics from organizations such as UNCTAD, Eurostat, IATA, UIC and Boeing Corporation. More than 95% of the volume (in metric tonnes) and nearly 70% of the value of cargo (in USD) was transported by maritime routes. Air cargo between Europe and Asia was less than 2% by volume, but over 30% by value. Railways carried 1% of volume and more than 2% of the value (UNECE,

2020). Generally, the land transport cannot and probably will not be able to compete with the sea route in the future as the potential capacity of the land canals is limited to about 2% (physical volumes in metric tons) of the maritime transport infrastructure capacity. Nevertheless, rail connections between China and Europe are of increasing interest as they offer competitive services under certain conditions, especially in terms of cyclicality and lead times independent of weather factors. Rail transport can definitely complement the commercial offer of sea shipping and can serve to increase the reliability of production (including in the automotive and computer industries), based on Eurasian logistics chains. However, the common consignment note is important not only in trans-Asian transport (mainly China-Europe). It is also an important element of simplification in intra-European transport, between the countries included in the Common Market (EFTA) and its closest neighbors, e.g. with Russia and Ukraine.

Data collected in the study, particularly the number of CIM/SMGS consignment notes used in 2009-2019 handling freights (Figure 2) and, additionally, the number of containers transported on the basis of this document (Figure 3) clearly show a change in the tendency in the use of this tool to simplify the exchange of goods. While in the initial period (until 2015) it was popular among importers of shipments, since 2016 the share of export shipments sent by entities in Russia to the European Union has been increasing.

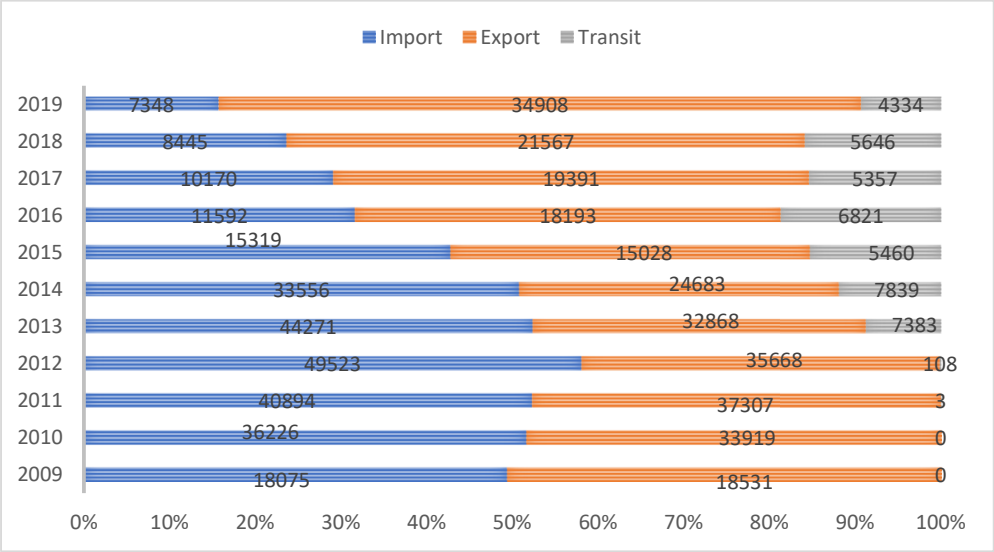

Figure 2: Number of CIM/SMGS consignment notes used for shipments handled by Russian Railways (RZD) in 2009-2019

Source: Own compilation based on RZD data

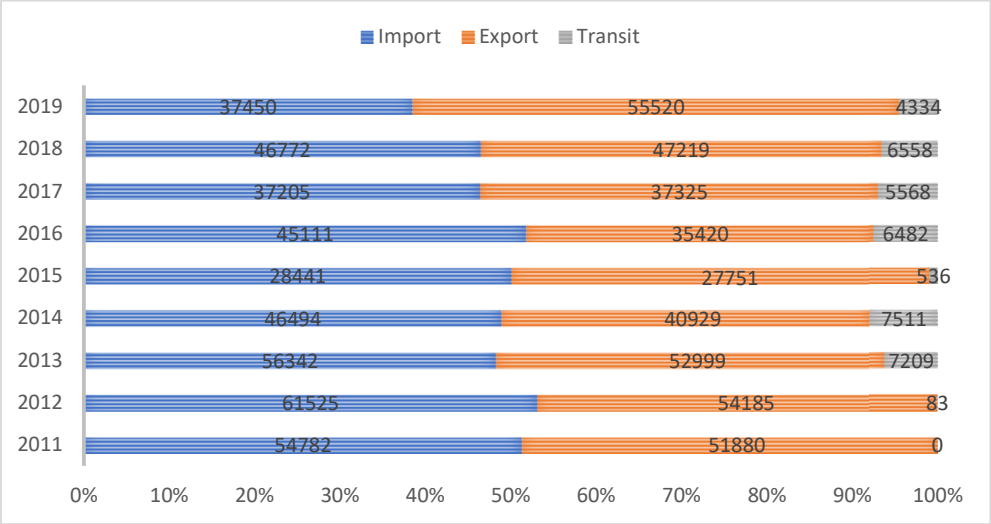

Figure 3: The number of containers handled in 2009-2019 by Russian Railways (RZD) on the CIM/SMGS consignment note

Source: Own compilation based on RZD data

When analyzing the latest data from January-July 2020 (Table 1), it is noticeable that the use of the CIM/SMGS consignment note has increased in popularity in transit relations through the territory of the Russian Federation, i.e. from the European Union to China (both directions). This is happening with a further decrease in the import of cargo to Russia based on CIM/SMGS common document.

Table 1: Changes in EU-Russia freight transport on the CIM/SMGS consignment note in 2018-2020

	2018			2019			7 months of 2020 (January-July)		
	Number of shipments	*Number of containers*	*Dynamics compared to the previous year (%)*	*Number of shipments*	*Number of containers*	*Dynamics compared to the previous year (%)*	*Number of shipments*	*Number of containers*	*Dynamics compared to the analogous*
Export	21.567	47.219	+26,5	34.908	55.520	+61,9	24.603	24.603	-23,67
Import	8.445	46.772	+25,7	7.348	37.450	+17,6	1.649	14.875	-69,62
Transit	5.646	6.558	-17,8	3.301	4.334	-12,9	5.552	6.441	+279,11
TOTAL	35.658	100.549	+2,1	45.288	97.304	-3,23	24.754	49.345	-11,87

Source: Own compilation based on RZD data for OSJD

The dynamics of changes in the use of the acquis of a joint document is slightly different in relation to another direction, which is the international rail freight exchange between Slovakia and Ukraine. Data relating to 2016 and 2019 regarding the application of the CIM/SMGS consignment note are included in Table 2 and Table 3.

Table 2: Changes in the freight transport on the CIM/SMGS consignment note handled by Ukrainian Railways (UZ) in 2016-2019

	2016			2018			2019			2019 compared to the 2018 (%)		
	Number of shipments note	*Number of containers*	*Number of wagons*	*Number of shipments note*	*Number of containers*	*Number of wagons*	*Number of shipments note*	*Number of containers*	*Number of wagons*	*Number of shipments*	*Number of containers*	*Number of wagons*
Export	58.009	20	55.089	36.100	10	36.090	21.708	88	21.620	60,1	880,0	59,9
Import	1.212	0	1.212	3.041	0	3.041	13.144	33	13.081	432,2	-/-	430,2
Transit	28.946	12.143	16.803	13.840	5.392	8.448	12.845	6.489	6.356	75,2	120,3	75,2
TOTAL	85.267	12.163	73.104	52.981	5.402	47.579	47.697	6.610	41.057	90,0	122,4	86,3

Source: UZ data presented for CIT

Table 3: Changes in the freight transport on the CIM/SMGS consignment note handled by Slovakian Railways (ZSSK Cargo) in 2016-2019

	2016		2018			2019			2019 compared to the 2018 (%)		
	Number of shipments	*Number of wagons*	*Number of shipments*	*Number of containers*	*Number of wagons*	*Number of shipments*	*Number of container*	*Number of wagons*	*Number of shipments*	*Number of containers*	*Number of wagons*
Export	*Out of date*	5.064	1.020	1.275	658	112	190	140	-89	-85	-79
Import		6.981	1.252	744	973	658	0	658	-47	-/-	-32
Transit		668	217	9	493	299	17	701	+26	+89	+42
TOTAL	3.229	12.713	2.059	2.028	2.125	1.069	207	1.499	-57	-90	-29

Source: ZSSK Cargo data presented for CIT

The data presented in both tables shows a clear decrease in the number of shipments using the CIM/SMGS consignment note in Slovakia and Ukraine. In 2019, *Ukrzaliznytsia* – the national railway carrier of Ukraine recorded a total of 55.9% of the number of CIM/SMGS documents issued in 2016. Although at the same time, the popularity of the document with regard to import shipments increased more than 10 times. In the work of *ZSSK Cargo* – a Slovak carrier, in 2019 the number of CIM/SMGS documents was reduced by 66.9%, and the transport based on it clearly decreased both in terms of containers and wagon consignments.

The data relating to the exchange of goods by rail between Slovakia and Ukraine shows a decline in the popularity of the use of the CIM/SMGS consignment note in freight transport as well as in the transport to/from Russia. The aim of the study was to identify possible causes of this condition.

Political sphere as a determinant of shaping logistic channels supported with the use of CIM/SMGS solution

The trends that emerge from the data presented in the previous section cannot be left without explanation. It is obvious that the sphere of logistics services depends both on the institutional environment and market needs. However, due to its cross-border dimension, it remains the resultant of political influences active on both sides of the border. Attempts to evaluate economic content while ignoring its political value can only lead to an impoverished, misconceived in its foundation and misleading in its conclusions (Medeiros, 2018). Therefore, this part presents

selected issues from mutual relations between the EU and Russia, which over the past few years have influenced the shape of the current political relations, which have an obvious impact on economic relations.

The decrease in the number of shipments using the CIM/SMGS consignment note between the EU and Russia is, in part, the result of cooling mutual relations is a consequence of political events affecting the economy and changing international economic relations. The nature of the bond depends not only on the political and systemic conditions, but also on the advancement of integration processes. At the same time, the forms of institutional ties may change over time and space as a result of the development of political and economic factors. These, in turn, are often the result of current events and decisions. This is perfectly confirmed by numerous phenomena and their consequences in political relations between Russia and other countries, for example:

- between Ukraine and Russia during the so-called Maidan (November 2013 – February 2014), the subsequent annexation of Crimea and military operations in Donetsk and Lugansk,
- between the Netherlands and Russia in 2013[1)] and their aggravation after the shooting down in July 2014 of a Malaysian passenger plane, operating on the Amsterdam - Kuala Lumpur flight, with 193 Dutch citizens on board,
- between Great Britain and Russia in connection with the case of Sergei Skripal[2)].

The events that took place after 2013 radically changed Russia's position on the international arena, as evidenced by, among others:

- suspension of Russia-EU summits and other regular bilateral meetings (the last summit took place on 28th January 2014),
- suspension of talks with Russia on visas and negotiations on a new partnership agreement,
- suspension of negotiations on Russia's accession to the Organization for Economic Co-operation and Development and the International Energy Agency,
- Russia's exclusion from the G8 group,
- visa sanctions and asset freezing of entities that materially or financially supported actions destabilizing the territorial integrity of Ukraine,
- economic sanctions, for example in the form of a ban on imports of goods from Crimea and Sevastopol.

The above events are not a closed list. However, collectively they are an example of the clear influence of the political sphere as a determinant of shaping the environment in which the international trade of goods takes place and the logistics sphere functions.

As a result of political events, in August 2014, the federal government in Moscow introduced an embargo on the transport and transit of many product groups through the territory of the Russian Federation, including plant and animal origin from the European Union countries, but also from the United States, Canada and Australia. This could not be unaffected by the logistics services for the Eurasian space and resulted in the need to reconfigure the supply chains.

Economic sanctions or restrictions are often seen as especially powerful tools. They provide a tool that is used much less frequently than differentiated integration – a legal instrument that European governments use regularly to overcome deadlock (Schimmelfennig and Winzen, 2020). Currently, the scope for political influence remains of concern and the case related to the use of the “Novichok” substance against Alexei Navalny in August 2020 will, certainly, not improve political relations between Russia and the EU. For the Russian Federation the lifting of the sanctions and the normalization of relations is conditioned upon the lifting of the EU sanctions (Franco, 2018). Foreign-policy experts on both sides broadly share the view that a rapid normalization of relations is unlikely. In last two years, Russia has been sending contradictory messages regarding its future ties with the EU and the West. Similarly, the EU is also sending contradictory messages (Racz and Rai, 2018). Ukraine remains a key obstacle where no quick progress is to be expected.

Characteristically, political relations between Russia and Ukraine are also a significant factor in the decrease in transport between the EU and Ukraine, carried out using the CIM/SMGS consignment note. It should be remembered that the tense relations between Kiev and Moscow affect rail transport. In the context of the use of the CIM/SMGS consignment note, it should be noted that the cargo posted by an entrepreneur located in Slovakia to, for example, Kazakhstan or China, may – theoretically – be transported bypassing Ukraine, i.e. via Poland, Belarus and Russia. It can also be delivered along the Black Sea-Caspian southern route, which, however, will significantly reduce the transit-time due to the need to use the ferry twice between the ports of Ukraine and Georgia as well as Azerbaijan and Kazakhstan.

However, a significant decrease in shipments based on the CIM/SMGS document may be the result of the general economic situation in Ukraine. From the moment of the problems of destabilization of its situation at the turn of 2013 and 2014, this country has not reached the 2013 GDP level (per capita USD 4,030). Regarding to World Bank data, the its critical level (USD 2,125) was recorded in 2015, and then it is gradually increasing. In 2019, GDP per capita reached USD 3,659, now it is still lower even than the value from before the 2008 crisis.

Conclusion

Although the influence of the political situation on the dimension of economic exchange is difficult to overestimate, the harmonization of legal and organizational solutions, such as the CIM/SMGS consignment note, is of significant importance in handling international flows. And these exist and will be implemented to a greater or lesser extent. Tests showed the use of CIM/SMGS consignment note could reduce the standing time of rolling stock at borders from three days to 1,5 hours. This considerably would increase the competitiveness of rail freight transportation. Interest of the number of countries to create a common legal regime for rail traffic across Asia and Europe (including the countries of Armenia, Iran, Pakistan, Serbia, Uzbekistan or Turkey), increasing coverage of the CIM/SMGS consignment note on Trans-Eurasian Logistics Chains.

It can be assumed that the solution in the form of a unified transport document effectively implemented to the legal system, which is a tool to provide a quick logistic service in any relationship between the parties recognizing it, will increase the effectiveness of international exchange also in the future even despite the political obstacles. This stays in line with the expectations of the parties to international transactions and logistics operators, focused on service optimization.

Footnotes:

1) The incursion of the Dutch police on 5th October 2013 into the apartment of the counselor of the Russian Embassy in The Hague and his detention for several hours on charges of mistreating his own children sparked a sharp diplomatic conflict. Moscow reacted at the highest level – on 8th October 2013, President V. Putin demanded an apology, explanations and punishment of the guilty, while Minister of Foreign Affairs S. Lavrov suggested that Russia's relations with the Netherlands would depend on the reaction of the Dutch authorities. The Russian Ministry of Foreign Affairs found the official apologies of the Dutch minister of foreign affairs insufficient. Moscow did not consider the case exhausted. On October 9, the Russian phytosanitary inspection office *(RosSielchozNadzor)* suggested the possibility of suspending the import of Dutch flowers (worth 0.9 billion USD), and two days later announced a reduction in the list of Dutch plants authorized to export dairy products to Russia. The background of the diplomatic conflict is the dispute between the Netherlands and Russia over the interpretation and legal assessment of the actions of Greenpeace activists who on 18th September 2013, attacked the Gazprom oil rig on Barents Sea, in the Russian economic zone. Russian authorities made arrests along with the ship on the charge of piracy. The Netherlands called for the release of the ship and the mitigation of the charges, and on 4th October, after the Russian refusal, brought the case to international maritime arbitration. The Greenpeace action is therefore seen as a deliberate attack on Russia's critical interests, which requires a sharp reaction to deter any imitators.

2) On 12th March 2018, British Prime Minister T. May, in an ultimate form, demanded explanations from the Russian authorities in connection with the application of March 4th on the UK territory a combat paralyzing "Novichok" against a British citizen (former GRU officer, convicted in Russia for cooperation with British intelligence), Sergei Skripal and his daughter Julia. As Moscow ignored the British ultimatum, a series of British retaliatory measures was announced on 14th March 2018. London decided to expel from the UK Britain has 23 Russian diplomats accused of espionage, the suspension of official bilateral contacts with Russia at a higher level and a boycott by members of the government and royal family of the FIFA World Cup in Russia, as well as covert activities in the field of security. In addition, it was announced: the adoption of the British version of the so-called the Magnitsky law imposing sanctions against Russian officials; stricter legislation to combat hostile activity against the UK Britain, including tightening border controls and checks on foreigners' financial assets. British demands for an explanation from Russia were supported by the North Atlantic Council and the German Chancellor A. Merkel. The Russian authorities firmly rejected the British accusations, describing them as "a political provocation". The Russian Ministry of Foreign Affairs refused to provide any explanations until the Russian side was provided with samples of the substance used against Skripal and the British government formally initiated explanatory procedures based on the Chemical Weapons Convention. At the same time, Russian diplomacy announced that Russia would respond to possible British sanctions.

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The Analysis of the Intra EU-28 Agri – Food Trade in the Context of the EU Internal Policies

Oksana KIFORENKO
National Academy for Public Administration under the President of Ukraine, Kyiv, Ukraine,
ok.kiforenko@gmail.com

Nataliia VASYLIEVA
National Academy for Public Administration under the President of Ukraine, Kyiv, Ukraine,
vasilyeva.nadu@gmail.com

Sergii PRYLIPKO
National University of Life and Environmental Sciences of Ukraine Kyiv, Ukraine,
agroadvice@ukr.net

Oleksandra VASYLIEVA
National Academy for Public Administration under the President of Ukraine, Kyiv, Ukraine,
sandra_nadu@ukr.net

Abstract

The agri - food industries are of particular strategic interest for many governments. Policy changes in this area have direct implications for consumers, landscapes and the environment. The aim of the article is to analyse the intra EU-28 agri – food trade in the context of the EU internal policies. The dynamics of the intra EU-28 agri – food trade was analysed in terms of the changeability and differences if compared to the previous periods. The general trend line was built using the appropriate function (choosing from the exponential, linear, logarithmic, polynomial, and power functions) taking into consideration the value of the R^2 coefficient. With the help of one of the functions mentioned above, the projection of the intra EU-28 agri – food trade amount for the following two periods was made. The comparative structural analysis of the intra EU-28 agri - food imports and exports structure in 2019 showed, that the imports structure doesn't differ a lot from that of the exports one. The analysis of the intra EU-28 agri – food trade and its projections made for the following two years point to the successful implementation of the EU internal policies in general and the European Single Market and European Monetary Union in particular. It is also thanks to the worldwide reputation of EU products as being safe, sustainably produced, nutritious and of high quality. The data analysed in the article were taken from the Eurostat official web page. The time frame under research is 15 years – from 2005 to 2019 included.

Keywords: Intra EU-28, agri – food trade, EU internal policies.

Introduction

One of the most important insights from international economics is that there are gains from trade. This is why countries trade with each other; trade simply provide both ends with mutual benefits (Krugman, P. R., & Obstfeld, M., 2003). In practice, individual countries or groups of countries are to some extent integrated, i.e. their activities are carried out more intensively among themselves than with others. A substantial part of economic integration is trade integration (Fojtikova L., Vahalik B., Stanickova M., 2016). European integration has had liberalizing effects on the flows of goods and productive factors between participating economies. Integration involves an intensification of economic relationships, particularly trade relationships, in those countries which have decided to reduce or eliminate trade barriers (Mora, C.D., 2001). To continue the research in the context of the EU internal policies, it would be useful to remind, that the EU was created from the customs union founded in 1968, through a common market to an economic and monetary union, although not all member states of the EU participate in it in the same way. The growing level of economic integration in the EU enables its member states to get economies of scale effects and thus more benefits from their different economic structure. (Fojtikova L., Vahalik B., Stanickova M., 2016). Still, many economists have back and forth argued about the gains that arise from a free trade area and

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further on how a common currency area would be another source of continuous growth in the economy. There have also been many debates of pro's and con's with EU membership as well as what the effect has been on trade. This discussion has been further extended with the introduction of a common currency in the European Union (Buhre L. & Söderström J., 2008). That means, that the implementation of the common European currency and the European Monetary Union (EMU) is considered to be one of the most successful and influential either internal or external EU policies. The European Union's main purpose is to promote trade among its members and the introduction of the EMU aims to further integrate and facilitate trade among the member countries. By becoming a member of the customs union, trade is favoured within the custom-free area and the union's strive to eliminate all trade barriers will promote trade affinities. This in turn has led to a continuous positive trend in trade flows and has promoted the "four freedoms" which are the fundamental idea of the European Union (Buhre, L. & Söderström, J., 2008).

Recently, there has been an intense policy debate on the Euro effects on trade flows. The Euro is found to promote EU integration by eliminating exchange rate-related uncertainties. An obvious policy implication is that countries considering to join the Euro would benefit from the ongoing process of integration, but should also be wary of regarding promises of an imminent acceleration of intra-EU trade. It is generally acknowledged that the Euro-area economies become more integrated by adopting the Euro. Increased trade is one of the few undisputed gains from a currency union by eliminating exchange rate volatility and reducing the transactions costs of trade within the member countries (Serlenga, L. & Shin, Y., 2013). The extent to which member countries will benefit from EMU will be dependent on the countries' openness to trade. The more open to trade the countries are, the lower transaction costs and exchange rate uncertainty will be (Aristotelous, A., 2006).

The building process of the European Union involved the reinforcement of the common European market and the opening of a new period towards an economic and social union that would ensure a high level of employment and income, social protection and equality between all European citizens. European support policies have been a boost to the member states to reduce the existing gap between the central and northern European countries (Bolea L. et al, 2016). Lively discussions are also taking place about the effectiveness and influence of the European Single Market as a kind of either economic or trade and financial policy of the EU. In line with that, it should be said, that the European Single Market, launched in 1992 is an extension of the Common Market concept which aims at eliminating remaining obstacles to trade (physical barriers like frontier inspections, technical barriers of all sorts, fiscal barriers such as differences in indirect taxes and excise duties and national biases in public procurement) among member states of the European Union. The ultimate objective of the initiative was and continues to be the boost of economic growth by spurring competition, exploiting economies of scale and forcing companies to step up innovation and productivity. (AIER et al, 2016). Whether the EU policies and measures had practical applications, proved to be effective in case of the intra EU-28 agri – food trade, if yes – then to what extent, what trends and projections of the different aspects of the agri – food trade mentioned above are, what the possible outcomes of the said policies can be and how to make the EU a better agri – food trader – these are the questions tried to be answered in this paper.

Material and Methods

Trade has been as one of the main determinants of economic growth, given its capacity to drive production and to promote economic specialization and competitiveness of countries and the pattern of trade has notably changed over time (Bolea L. et al, 2016). Trade statistics - both detailed and general results - have proved their worth. They are an instrument of prime importance for both public and private users. For instance, they enable Community authorities to prepare for multilateral and bilateral negotiations on common trade policy, they help European businesses carry out market surveys and thus improve their competitiveness and they are an essential source of information for statistics on the balance of payments, the national accounts and short-term economic studies. This non-exhaustive list highlights the variety of users and their requirements (AEI, 1998).

The aim of the article is to analyse the intra EU-28 agri – food trade in the context of the EU internal policies. The said analysis included also the dynamics one and the general trend line building. The dynamics of the intra EU-28 agri – food trade was analysed in terms of its changeability and differences if compared to the previous periods. The general trend line was built using the appropriate function (choosing from the exponential, linear, logarithmic, polynomial, and power functions) taking into consideration the value of R^2 coefficient. With the help of one of the functions mentioned above, the projection of the intra EU-28 agri – food trade amount for the following two periods was made. Only two periods were taken to make the projection of the amount of the trade turnover mentioned above because of the uncertainty of the present situation as well as a great number of challenges the whole world is facing nowadays.

The data analysed in the article were taken from the Eurostat official web page. The time frame under research is 15 years – from the year 2005 to 2019 included.

Results and Discussion

Trade has recently showed its worth as a stabilizing source of global growth. For the European economy it is also the catalyst for the continuous process of restructuring and innovation that enables EU business and citizens to tap into the opportunities offered by an ever changing global market place (European Commission, 2015 (1)). An effective trade policy should, furthermore, dovetail with the EU's development and broader foreign policies, as well as the external objectives of EU internal policies, so that they mutually reinforce each other. The impact of trade policy has significant repercussions on the geopolitical landscape — and vice versa. Furthermore, trade policy, combined with development cooperation, is a powerful engine of growth in developing countries. The EU will continue its longstanding commitment to sustainable development in its trade policies, contributing to the newly agreed global sustainable development goals (SDGs) under the 2030 Agenda for Sustainable Development. Finally, trade policy reinforces the functioning of the EU Internal Market linking its rules with the global trade system (European Commission, 2015) (2)). To see how effective the EU policies mentioned above are and further develop the research, let's follow the intra EU-28 total agri - food trade turnover in Figure 1.

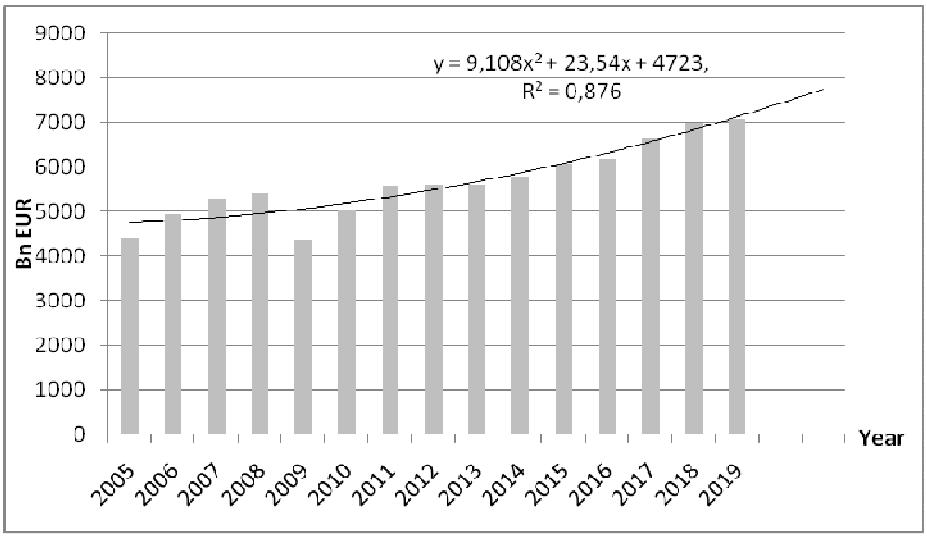

Figure 1: Intra EU-28 Total Agri - Food Trade Turnover, bn EUR

Source: author's own elaboration on the basis of the data from (Eurostat, 2020).

Having observed the data presented in Figure 1, we see, that the intra EU-28 total agri - trade trade turnover increased from the beginning of the time frame under analysis, that is from the year 2005, till 2008 included. But in 2009 we observe a decrease in the amount of the total agri - food trade turnover of 1042.8 bn EUR, which could be caused by the influence of the global financial crisis of 2008 as every sphere of activity felt the impact of the said crisis and the trade of agricultural products was not an exception. Any trade is interrelated with finance and one can't exist without the other, even the so-called barter trade, as finance is the intermadiary link between two types of goods traded. The single decrease of the amount of trade mentioned above didn't become the beginning of the downward period and we see the next increase of the agri - food trade amount of 682.4 bn EUR in the next year. Actually, in 2010 the next upward trend in the dynamics of the total agri - food trade turnover can be observed, the one that continued till the end of the time frame under analysis. As in 2009 the only decrease in the amount of the intra EU-28 total agri - food trade turnover can be observed, we'll pay attention at the biggest and the smallest increase of the said amount. We can see the biggest one in the year 2010 and the smallest one - in 2013. Taking into consideration everything mentioned above, the dynamics of the intra EU-28 total agri - food trade turnover can be roughly divided into two periods – the first one from the year 2005 till 2008 included (the upward one) and the second one – from the year 2010 till the end of the time frame under research, that is till the year 2019 included (another upward one).

The trend line built for the dynamics of the intra EU-28 total agri - food trade turnover is upward through the whole time frame under analysis. It also continues its upward direction during the following two periods taken for the

projection, that is for another two years. Only two periods were taken to make the projection of the amount of the trade turnover mentioned above because of the uncertainty of the present situation as well as a great number of challenges the whole world is facing nowadays. The trend line presented in Figure 1 was built using the polynomial function taking into account the value of the R^2 coefficients of those from the exponential, linear, logarithmic, polynomial and power functions.

Exports to the internal market (i.e. among EU Member States) constitute the bulk of EU - 28 agri-food exports (European Commission, 2017). To make our analysis more profound, let's cast a look at Figure 2, in which the dynamics of the intra EU-28 agri - food exports from 2005 till 2019 included is presented.

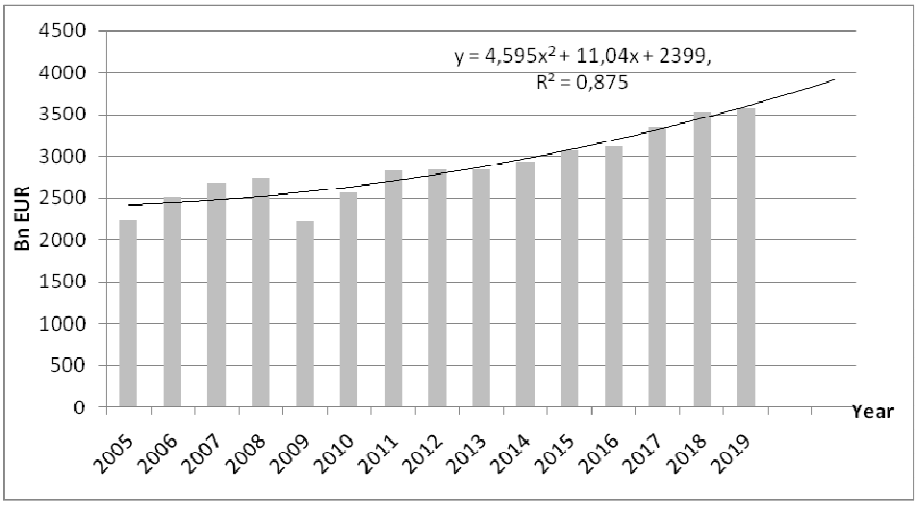

Figure 2: Intra EU-28 Agri - Food Exports, bn EUR

Source: author's own elaboration on the basis of the data from (Eurostat, 2020).

Thanks to the visual presentatioon of the intra EU-28 agri - food exports amount, it can be said, that the general dynamics of the said exports is very much like the one of the total agri - food trade turnover of the countries union under research. If analyzing in a more detailed way, we observe an upward trend of the amount of the agri - food export from the start of the time frame under analysis, that is from the year 2005, to 2008 included. Then we see a sharp fall of 525.6 bn EUR in the following year, being the only decrease of the amount of the intra EU-28 agri - food exports through the whole time frame under analysis. The fall in the amount of the said agri - food exports mentioned in the previous sentence didn't become the beginning of a downward trend as another increase of the agricultural exports amount can be observed in 2010, that is the next upward trend was started then being continued till the end of the time frame under research. The dynamics of the amount of the agri - food exports being analyzed was rather smooth from 2009 til 2011 included, but in 2012 the fast upward move of the agricultural exports amount slowed down and we see the increase of the said epxports amount of only 15.4 bn EUR in the mentioned year (the word "only" was used as an attribute to the said increase as the difference is very small if compared to the differences values from the other years under research). The situation repeated in the following year as well showing even smaller increase in the amount of intra EU-28 agri - food exports, that is 0.2 bn EUR. The following upward move of the exports amount was not that smooth either increasing its positive difference in 2014 and 2015, slowing down in 2016, "moving" faster in 2017 and slowing down the positive increase again in 2018 and 2019. Yet, the year 2009 is the only one with the negative difference in the amount of the intra EU-28 agri - food exports. The smallest increase of the said amount can be seen in 2013 and the biggest one – in 2006. The dynamics of the Intra EU-28 agri - food exports amount can also be divided into two periods – the first one is from the year 2005 til 2008 included and the second one – from 2010 till the end of the time frame under analysis.

The trend line was built for the dynamics of the amount of the intra EU-28 agri - food exports using the polynomial function, having tried the exponential, linear, logarithmic, polynomial and power functions. The polynomial function was given the preference because of the value of the R^2 coefficient. The said trend line is upward not only through the whole time frame under analysis, but continues to be of the kind during the next two periods taken for projection. Only two periods were taken to make the projection of the agri - food exports amount because of the changeability and uncertainty of the nowadays general situation.

The next step of our research is the analysis of the intra EU-28 agri - food imports amount dynamics, which can be ovserved in Figure 3.

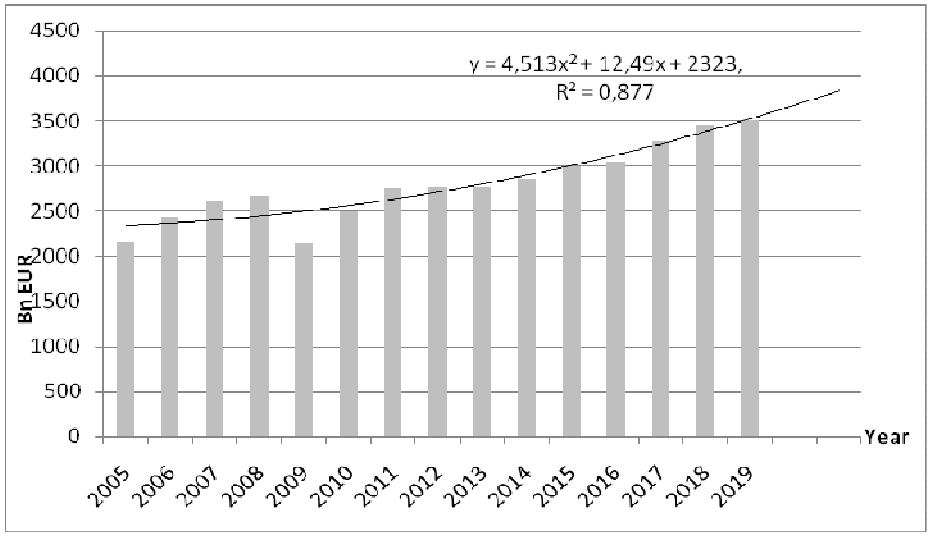

Figure 3: Intra EU-28 Agri - Food Imports, bn EUR

Source: author's own elaboration on the basis of the data from (Eurostat, 2020).

The data presented in Figure 3 allow us state, that the general pattern of the dynamics of the said data is very much like the one of the intra EU-28 agri - food exports, that is - an upward trend from 2005 till 2008 included, the sharp fall of the said amount in 2009 and the following upward trend beginning from the year 2010 till the end of the time frame under research. Another similar thing between intra EU-28 agri - food exports and imports dynamics is the small increase of the imports amount in 2012 (small if compared to the differences between the other time frames) and the smallest one – in 2013. That similarity is an interesting phenomenon needed to be further researched. Another similarity between the amounts mentioned above is that the negative difference of the agri - food imports and exports amount were in the same year, that is in 2009 (imports - 517.2 bn EUR). The smallest increase of the intra EU-28 agri - food imports amount was observed in 2013 and the biggest one – in 2010 and the latter differs from the results of the agricultural exports. If we talk about the periods the intra EU-28 agri - food imports amount dynamics can be divided into, then these are as follows – the first period is from the year 2005 till 2009 included and the second one – from 2010 till the end of the time frame under analysis. Both are upward ones.

The trend line of the intra EU-28 agri - food imports amount dynamics was also built and it is also upward not only through the whole time frame under analysis and continues that way during two following periods taken for the projection, just like in the case with the intra EU-28 agri - food exports case. The trend line was built using the polynomial function having the exponential, linear, logarithmic, polynomial and power functions to choose from. The polynomial function was chosen from the functions mentioned above because of the value of the R^2 coefficient if compared to those of the other functions used for it. Only two periods of time were taken to make projection because of the same reasons mentioned while analyzing the dynamics of the intra EU-28 total agri - food trade turnover and agri - food exports.

To make the analysis more complete, let's analyze the intra EU-28 agri - food trade balance with the help of Figure 4.

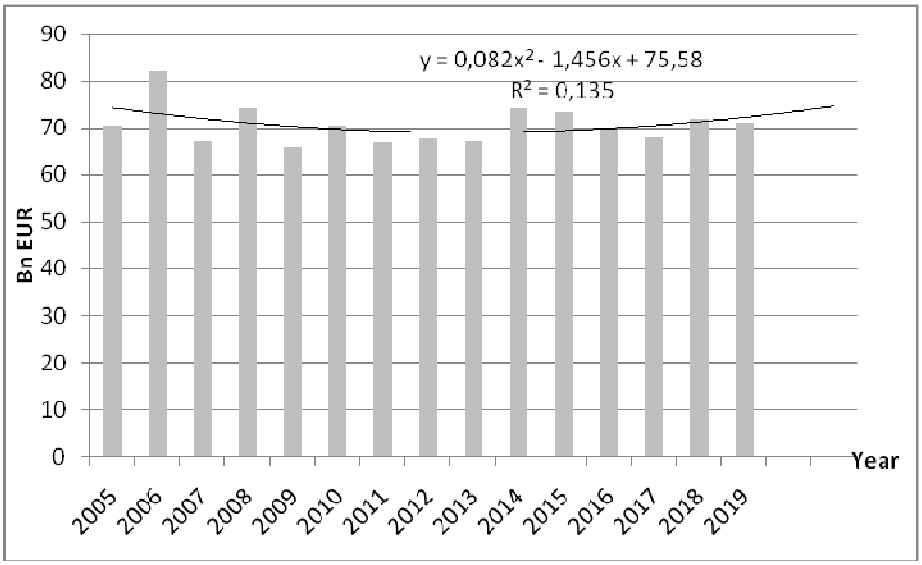

Figure 4: Intra EU-28 Agri - Food Trade Balance, bn EUR

Source: author's own elaboration on the basis of the data from (Eurostat, 2020).

Having cast a look at Figure 4, one can see the extreme changeability of the intra EU-28 agri - food trade balance. Another interesting feature worth paying attention at is that in every even year we observe the increase, that is the positive difference, of the agri - food trade balance, with the only exception in 2016, in which the decrease of the said balance is observed. In every odd year we observe the decrease of the agri - food trade balance, that is the negative difference from the previous period. Such a phenomenon of seasonality of the intra EU-28 agri - food trade balance is also worth a deeper further research. The biggest positive difference, that is the increase if compared to the previous period, of the said balance can be seen in 2006 and the biggest negative difference, that is decrease, can be observed in 2007.

The trend line for the intra EU-28agri - food trade balance was built using the polynomial function, that is quite logical even without having compared the values of the R^2 coefficients of the other functions under consideration judging by the changeability of the data under analysis. But to make the conclusions unbiased, we tried the exponential, linear, logarithmic, polynomial and power functions for the building of the trend line of the intra EU-28agri - food trade balance dynamics. The polynomial one was chosen because of the R^2 coefficient value if compared to those from the other functions used. The trend line mentioned above is slightly downward to approximately the middle part of the data under research, starting being upward in about 2016. It continues its upward direction during two periods taken for the projection, in this case – two years. It means, that the intra EU-28 agri - food exports are projected to have a higher increase than the said imports, judging not only on the projection given in Figure 4 but in Figures 2 and 3 as well.

The last but not the least point of our analysis is the intra EU-28 agri - food exports-to-imports ratio, the dynamics of which can be followed in Figure 5.

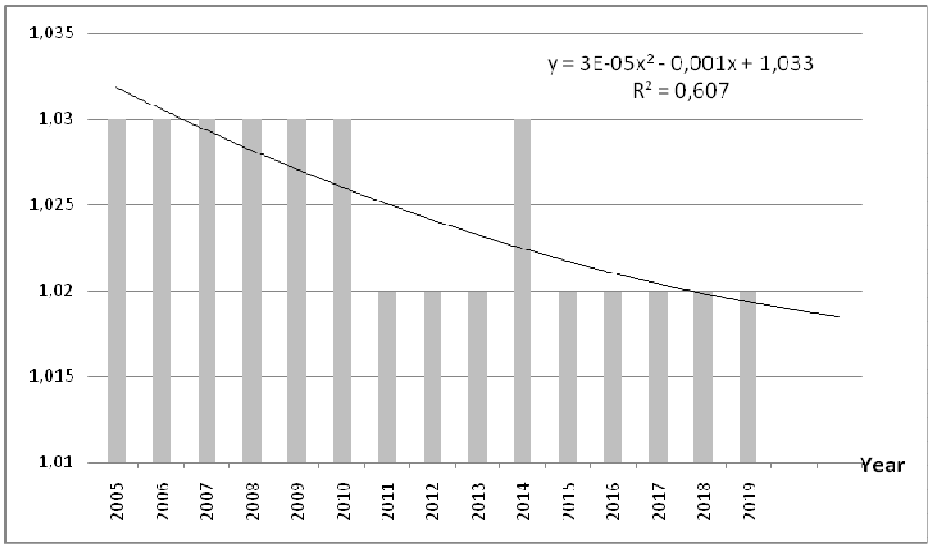

Figure 5: Intra EU-28 Agri - Food Exports-to-Imports Ratio, bn EUR

Source: author's own elaboration on the basis of the data from (Eurostat, 2020).

A very interesting visual presentation of the data under analysis can be observed in Figure 5. From the year 2005 till 2010 included the intra EU-28 agri - food exports-to-imports ratio had the same value – 1.03. In the following year the said value dropped to 1.02 and remained that way through two more years, that is till 2013 included. After that, in 2014 the export-to-imports ratio increases till the value of 1.03 with the next drop in the year 2015. From 2015 and till the end of the time frame under analysis it remained at the level it reached in 2015.

The trend line for the intra EU-28 agri - food exports-to-imports ratio dynamics was built using the polynomial function because of the value of the R^2 coefficient if compared to those of the exponential, linear, logarithmic and power ones. The trend line built for the intra EU-28 agri - food exports-to-imports ratio is downward through the whole time frame under analysis and continues to be of the kind during two more periods taken for the projection making. The explanation of the phenomenon described in the previous sentence could be as follows – the tendency moves to the decrease of the difference between the intra EU-28 agri - food exports and the imports values.

As the last year in the time frame under research is 2019, let's analyze the structure of the intra EU-28agri - food trade in the year mentioned above. We'll start our analysis from the agri - food exports structure, which can be followed in Figure 6.

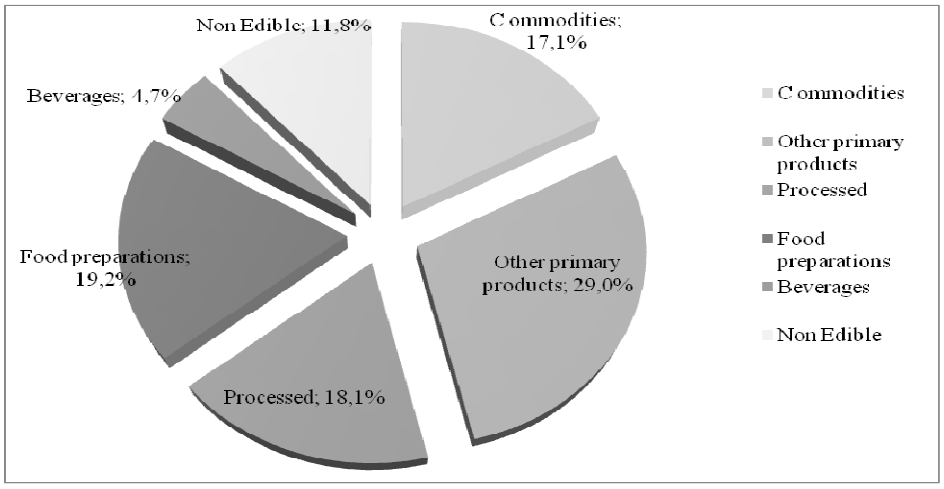

Figure 6: Intra EU-28 Agri - Food Exports Structure in 2019,%

Source: based on the data from (European Commission, 2020).

As a pie chart is considered to be the best tool for any structure analysis, we chose exactly the one for ours. The visual presentation in Figure 6 allows us state, that the biggest share in the intra EU-28 agri - food exports structure in 2019 was taken by "Other primary products", then come "Food preparations" followed by "Processed" agri - food products. The smallest share in the said agri - food exports structure is taken by "Beverages". Such an analysis itself may seem to be not that full at all, but it can be used for the comparison analysis of the intra EU-28 agri - food exports structure with that of the other years or countries. We'll use it for the comparison analysis with that of the intra EU-28 agri - food imports structure in 2019, presented in Figure 7.

The intra EU-28 agri - food imports structure in 2019 doesn't differ a lot from that of the exports one, that is the biggest share in it is taken by the "Other primary products" with the same percentage as in the exports. The second place in the shares of the agri - food imports structure is taken by "Food preparations", just like in the exports structure, and the percentage difference is not that big – 0.3 percentage points. The third place in the agri - food imports is taken by two products groups with the same percentage, that is by "Processed" and "Commodities". The smallest share is observed by "Beverages", just like in agri - food exports.

So, having analyzed the intra EU-28 agri - food exports and imports structure in 2019 presented in Figures 6 and 7, we can state, that the biggest share in either exports or imports is taken by "Other primary products" with the same percentage in both exports and imports. The second place is taken by "Food preparations" in both exports and imports with almost the same percentage. The third place is taken by "Processed" in both exports and imports with the adding of "Commodities" as the product group divided the third place in the imports.

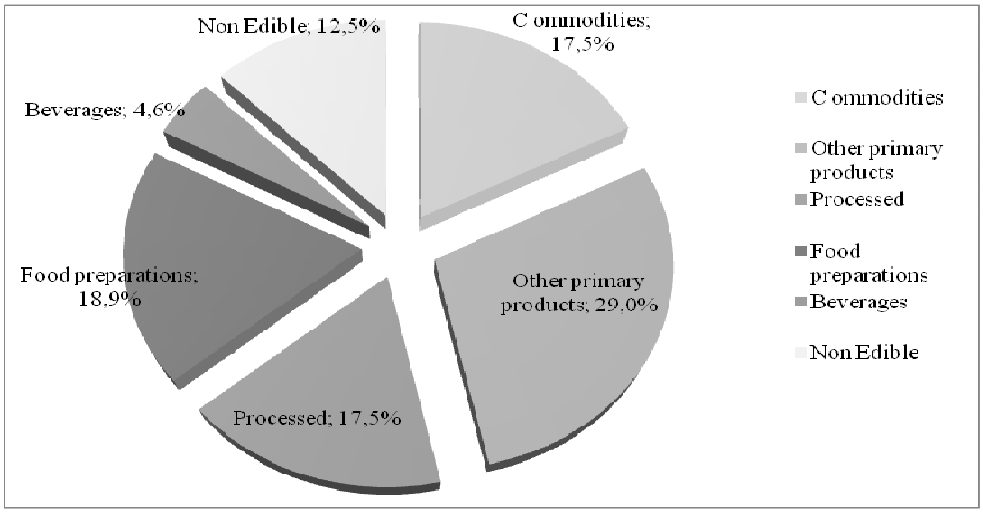

Figure 7: Intra EU-28 Agri - Food Imports Structure in 2019,%

Source: based on the data from (European Commission, 2020).

Conclusions

The agri - food industries are of particular strategic interest for many governments. Policy changes in this area have direct health implications for consumers and for the welfare of farm animals. They affect landscapes and the environment like few other policy measures. The agri - food industries are critical for rural development; they provide jobs and incomes in remote regions and are often a matter of national pride. For these reasons, agriculture and food - related themes have always played relatively large roles in trade negotiations. Be it at multi -, pluri -, or bilateral level, agricultural and food - related concerns play an important role (Bureau J. et al., 2014). For centuries countries have relied on trade in agricultural and food commodities to supplement and complement their domestic production. The uneven distribution of land resources and the influence of climatic zones on the ability to raise plants and animals have led to trade between and within continents (FAO, 2003). The European Union (EU) is characterized by a high level of openness to trade, consequently increasing its member countries' vulnerability to external shocks coming from the rapidly changing global environment. Agriculture still plays a vital role in shaping Europe's future, including in the optics of the resilience of its economy (Civín L. & Smutka L., 2020). The analysis of the practical implementation of the internal EU policies, e.g. the European Single Market and European Monetary Union, allow us draw the following conclusions – the general pattern of the intra EU-28 total agri - food trade turnover, exports and imports dynamics are very much alike and can be roughly divided into two upward

periods - the first one from the year 2005 till 2008 included and the second one – from the year 2010 till the end of the time frame under research, that is till the year 2019 included. The only decrease in the amount of the intra EU-28 total agri - food trade turnover, exports and imports can be observed in 2009, having been the possible result of the global financial crisis of 2008. The trend lines for all the three data sets mentioned above were built using the polynomial functions, taking into consideration the R^2 coefficients of those from the exponential, linear, logarithmic, polynomial and power functions.

The intra EU-28 agri - food trade balance dynamics is extremely changeable. In every even year we observe the increase of the agri - food trade balance, with the only exception in 2016, and in every odd year we observe the decrease of the said trade balance. The trend line for the intra EU-28 agri - food trade balance was built using the polynomial function. The trend line "behaviour" during two projection periods means, that the intra EU-28 agri - food exports are projected to have a higher increase than the said imports.

The intra EU-28 agri - food exports-to-imports ratio had the same value from the year 2005 till 2010 included, with the drop in the following year to the value of 1.02, which remained that way during two more years. The increase in 2014 didn't last longer and the next drop of the said value was observed in the following year continuing till the end of the time frame under analysis. The trend line built for the intra EU-28 agri - food exports-to-imports ratio is downward through the whole time frame under analysis and continues to be of the kind during two more periods taken for the projection making, which, in turn, means, that the difference between the exports and imports mentioned above will lessen.

The comparative structural analysis of the intra EU-28 agri - food imports and exports structure in 2019 showed, that the imports structure doesn't differ a lot from that of the exports one and even the percentage share are the same or have small differences. The exception is the third place in the products groups share – it is taken by the "Processed" agri - food products in the said exports but by "Processed" and "Commodities" in the imports mentioned above.

The analysis of the intra EU-28 agri – food trade and its projections made for the following two years point to the successful implementation of the EU internal policies in general and the European Single Market and European Monetary Union in particular. But it is also thanks to the worldwide reputation of EU products as being safe, sustainably produced, nutritious and of high quality (Hogan P., 2018). Apart from the positive trends and projections of the agri – food trade inside the EU, there remain many threats either in the internal or external markets that could have a negative influence or even harm it. Among the so-called "old" threats one should mention protectionist policy of some countries either the EU member or non-member states. Another factor, that makes the EU market turbulent, is the unfinished Brexit trade talks. Among the so-called "new" threats, that is the ones, which came into our lives not long ago, one should definitely mention the COVID-19 pandemic, that influenced all the spheres of the human activity, changed the pattern of the global as well as internal trade and whose influence is far from being over. Nevertheless, the growing demand for food and increasing world population number are among the positive factors, that make the agri – food production and trade prosper. And the EU is among the ones who will gain from that. The safety, nutrition, production sustainability and high quality of the EU products will add to the EU agri – food products and trade success.

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Changes on the 21st Century Labour Market and The Profile of the "Employee of The Future" In the Opinion of University Students and Graduates – The Representatives of Generation "Z" In Poland

Dr Magdalena RĘKAS

Wroclaw University of Economics and Business, Poland
magdalena.rekas@ue.wroc.pl

Abstract

The 21st century is characterized by the extremely dynamic socio-economic changes which affect the functioning of organizations and entire markets, in particular the labour market. Numerous trends can be observed which radically change the sphere of work and employment, i.e.: work globalization, automation and robotisation, industry 4.0, technological innovations, rapid urbanization, negative demographic changes, the increasing importance of flexible employment forms, the growing scale of self-employment and remote work, the implementation of *Work Life Balance* model, creative work, agile organizations and teams, teal organizations, etc. To a much greater extent, the appropriate human capital becomes the source of competitive advantage and business success. Organizations need motivated and committed employees presenting appropriate and diverse competences, drawing conclusions from the surrounding reality, capable of adapting to changes, creating innovations, developing products and services suitable for the increasingly diverse, demanding and knowledgeable customers. Generation "Z" is entering the labour market in growing numbers, having different characteristics from previous generations and creating further changes in employment models and work organization. The article discusses the results of a pilot study aimed at answering two research questions: What is the approach of university students and graduates representing generation "Z" in Poland to the changes on the 21st century labour market? What is the profile of the "employee of the future" in the opinion of this generation? Based on the analysis of Polish and foreign literature, the article presents a general description of generation "Z" representatives, including their values, needs and motivations as well as their behaviour on the labour market. The research findings describe the profile of the "employee of the future", including the expectations and characteristics of an employee representing generation "Z" university graduate, which should constitute an important element in developing a correct HR policy in an enterprise.

Keywords: labour market, factors of the labour market changes, generation Z, profile of the employee of the future

Introduction

The scientific discourse is increasingly focused on the problem addressing generational differentiation of employees in contemporary organizations. Young people with relatively short work experience or recently entering the labour market – referred to as generation "Z" remain, in many respects, radically different from the more mature, in terms of age, employees (Wiktorowicz, 2016). At the same time, the galloping dynamics of changes can be observed on the 21st century labour market. Many experts wonder whether human work will be totally automated in the near future. Will there still be a place for people on the labour market, and if so, what role they are going to play? The report published by *Infuture Hatalska Foresight Institute* entitled "Employee of the Future" (2019) highlighted that, according to 15% of the respondents, the ongoing technological and economic changes open up new opportunities on the labour market, while 85% of the respondents recognize threats to human labour resulting from work automation as well as the risk related to disappearance of some of the occupations performed today. The approach towards the aforementioned transformations occurring on the 21st century labour market varies significantly depending on the generation active on this market (Weingarten, 2009). It should also be adopted that along with generation "Z" gaining the dominant position on the labour market, the model of work may also change.

Basically, there are four generations functioning on the modern labour market. The source literature provides diverse terminology referring to a given generation as well as different dates regarding their year of birth. E. Hetig (2019), after Lain-Kennedy, identified the following generations: Baby Boomers, generation "X", generation "Y"

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and generation "Z". The representatives of the first group, i.e. people born in 1946-1964 are slowly retiring to be replaced by the next generation - generation "X" (people born in 1964-1985). They, in turn, have to face the challenges of working with the next generations: "Y" (people born in 1985-1995) and "Z" (people born after 1995 to 2010). Since 2010, generation "Alpha" has been identified to constitute the resources of future employees (Thompson Augusto dos Reiss, 2018). Each of these generations has been shaped by various social, economic, political, cultural and technological events, and thus their members differ in many characteristics, including the ones referring to professional life. Therefore, they present different approaches to work, to understanding development, loyalty, dedication of working time and organization. For an employer, a team made up of workers diverse in terms of age, covering representatives of different generations offers access to a wide range of competences and experiences, increases creativity and multiplies methods of solving problems, but it is also a challenge to create an appropriate intergenerational management system. Thus, the "employee of the future" will evolve depending on the scenarios offered by the labour market development and the generations that dominate it at a given moment.

The purpose of the article is to attempt answering the following questions: What is the attitude of students and graduates representing generation "Z" in Poland to the changes on the labour market in the 21st century? What is the profile of the "employee of the future" in the opinion of this generation? Due to different characteristics of this generation, it seems reasonable to find out, already today, the attitudes and expectations of generation "Z", as that will allow businesses and institutions to prepare for the new model of the "employee of the future".

The article has been prepared based on the analysis of Polish and foreign literature and the analysis of research reports, in particular the 2018 research report published by *Infuture Hatalska Foresight Institute* entitled "Employee of the Future" (2019) and the author's own pilot studies. The research consisted of two parts. The first part addresses the research methodology and the description of the target group. The second part presents the results of pilot studies conducted in June 2020 using a survey questionnaire.

Changes on the labour market in the 21st century and generation "Z" in the light of source literature

The research carried out by many authors, including: Kultalathi S. et al. (2015), Lieber L.D. (2010), Luscombe J. et al. (2013), Lyons S.T. (2015), as well as the experiences and opinions of employers indicate that the current situation on the labour market is largely influenced by intergenerational differences and the simultaneous functioning of several generations of employees. The subject of the study is generation "Z", which is also called: "generation V", "generation C", "generation Cox", "internet generation", "homeland generation" or "Google generation", as well as the "mobile generation" or the "selfie generation" (Kapil Y. et al., 2014) living in the Internet and the social media. This generation is aware that their world is a digital environment which affects their features and adaptation to life.

Various studies analysing generation "Z" (Ozkan and Solmez, 2017; Seemillee and Grace, 2016; Merriman, 2015) highlighted several important characteristics of this generation, such as:

- they are digital natives attracted by an immediate reward;
- their attention focus time is 8 seconds comparing to 12 minutes characteristics for generation Y;
- they are more interested in experience and expert knowledge than in general knowledge, they are more flexible;
- they are identified as loyal, compassionate, thoughtful, open-minded, determined;
- they are valued as a competitive, spontaneous, adventurous generation curious about the world;
- the difficulties they perceive include: uncertainty about the future, high individual expectations and concerns;
- they prefer to shop online because of such factors as: the Internet impact, product description, external factors, deals and product identity.

M. Diaconu and A. Dutu (2020), in turn, identified the characteristics of generation "Z" in the context of their approach to the labour market, which should be taken into account by employers when managing a diversified team and developing rules for the functioning of intergenerational teams:

- they intuitively satisfy their continuously changing needs;
- they should be part of the solution as they dislike things being imposed on them;
- they show respect and loyalty before asking for it;

- they accept social learning, learn directly, expect full commitment, prefer learning by acting rather than listening passively, focus on designing their own life journey and career, they are not interested in syllabuses and understanding general knowledge;
- they can manage time in virtual space;
- technology is an extension of their identity, hence they are capable of managing skilfully the increasingly complex tools;
- they are strongly attached to, e.g., a technology manufacturer and are dependent on personal phones;
- they pose a clear challenge for companies in the sense of self-confidence and self-motivation, far from being naive and detecting dishonesty quickly;
- healthy food preferences are important to them;
- they are optimistic about their financial future, use financial advice mostly from their parents and are careful when spending money, often make savings out of caution;
- they are ideal patients of the future due to their openness to stress measurement technology and genetic mapping technology;
- they are in favour of online shopping over the phone as they can easily compare prices and make the right choice; smartphone is a tool which helps them make transactions and take decisions;
- their goal is the career top salary level approximately 3 times higher than the one earned by those currently employed;
- they enjoy travelling and operate effectively in both local and global space, thus they expect employers to provide them with the opportunity of choosing their place of work in the world;
- they inherited scepticism from their parents, but not pessimism, they are the generation which emphasizes happiness and openly expresses their dislikes;
- they have the ability of processing information faster than other generations, provided they find them interesting;
- they rely heavily on social media for social as well as school/university and later professional contacts;
- they prefer online interactions with friends over face-to-face ones; they favour messaging over calling by phone or e-mailing;
- social media are very important to them;
- they are better at multitasking than the preceding generation Y;
- they do not favour starting work as early as possible and are increasingly using the online version of vocational training to the detriment of classical education;
- they earn a living as a result of their own efforts at a young age working under fixed-term contracts;
- they strive to perform work being their passion.

Demographic and generational changes represent one of the factors having impact on the labour market transformation, which has been particularly intense since the turn of the 20th and the 21st centuries. This transformation is present in the economic, technical, social and demographic spheres and has a fundamental impact on the entire national economy as well as the individual components of its structure. Taking the classical approach, the changes on the labour market and also in individual industries are influenced by the following factors: technological, social, environmental, economic and political ones (Samuelson and Nordhaus, 2008). As A. Tomanek (2010) emphasizes, technical progress, globalization processes and negative trends in population changes constitute the essential development challenge for the labour market. B. Stopczyński (2015) indicates that the volatility of the labour market is influenced by the global competition, the development of information and communication technologies, including the Internet and technological development. R. Dylkiewicz (2013) highlights that it is globalization characterised by strong intensity which exerts the greatest impact on the labour market. This is due to the elimination of barriers resulting in a uniform global economy, influencing the supply of labour and its demand. On the other hand, O. Blanchard (2006) argues that the situation on the labour market is the consequence of many factors, often closely related to one another. In the study by M. Rękas (2019) it was indicated that technological, social, environmental, economic and political factors result in the emergence of new challenges regarding the approach to work in the 21st century as well as the characteristics and competences of the "employee of the future".

A different classification of the factors responsible for changes on the labour market in the 21st century was proposed in the study carried out by *Infuture Hatalska Foresight Institute*. It distinguishes 3 groups of factors, depending on their perception by employers, employees and labour market experts, i.e. (Employee of the Future, 2019):

- "Now" factors – this is a group of change factors that are felt and noticed by employees and employers right now and currently have the strongest impact on business, labour market or the desired employee competences. This group includes such factors as, e.g.: rapid technology development, mobile internet,

digitization and automation of work, cloud computing, Big Data, urbanization, consumerism, generational changes in the work environment, flexible working conditions.

- "New" factors – this is a group of change factors which are increasingly felt and noticed, but they are in the initial stage of development. This group includes such factors as, e.g.: growing social inequalities (including the NEET generation), freelancing economy, work life balance, silver economy, increase in life expectancy, minimalism, expanded virtual reality, lifelong learning, women empowerment gender parity, the idea of sustainable development.
- "Next" factors – this group of change factors is made up of trends that are already taken into account, but are sometimes approached as the future ones. The following factors are included here: artificial intelligence and machine learning, monitoring and controlling, cybercrime, climate change, zero waste economy, overpopulation, teal organizations, sharing economy.

The above classification of the factors responsible for changes on the labour market was also used in the author's own pilot study.

Research Methodology and Description of the Group of Respondents

The research was conducted following the below stages:

1. The analysis of the selected source literature and research reports published by Polish and foreign institutions in the defined research area, which allowed systematizing knowledge, identifying the research problems and planning the research.
2. An in-depth debate involving students from the "Economicus" Science Club and the students of Wrocław University of Economics during didactic classes – based on a detailed scenario developed on the basis of experiences and conclusions from the literature and the available research findings – preliminary qualitative studies which allowed formulating questions provided in the survey questionnaire.
3. Conducting questionnaire survey among students and graduates of universities representing generation "Z" – quantitative research.

The performed quantitative research was of pilot nature, and its objective was to provide answers to the following two research questions.

- What is the approach of university students and graduates representing generation "Z" in Poland to the changes on the 21st century labour market?
- What is the profile of the "employee of the future" in the opinion of generation "Z" representatives?

In order to obtain answers to the aforementioned questions a quantitative research tool was used, i.e. a survey questionnaire which allowed collecting information by applying the indirect measurement method. The survey was conducted on-line from 10th till 21st June 2020. It was provided by sending a special generated link to people from a random research sample covering university students and graduates in Poland representing generation "Z" and residing in Poland.

The questionnaire included personal information section and 29 questions divided into 4 areas: value of work, expectations when choosing a job, factors of changes on the labour market and their perception, the attitude of generation "Z" towards changes on the labour market in Poland within the coming 10-15 years. These areas allowed identifying the characteristics of the "employee of the future" in the studied group. Therefore the questionnaire provided questions about job expectations, employee competences, the labour market and its change factors, along with the current situation on the labour market related to SARS-CoV-2 pandemic and the respondents' attitudes towards the changes they anticipate in the future. The respondents were asked about the value of work for them, if they have any professional experience, what their attitude to work is, whether they are attached to the current place of employment, how they imagine the possibility of retraining, what values they follow when choosing a job and what they find important at work. Next they were asked about the factors changing the labour market and their preferences related to choosing an employer. The subsequent section included questions about the characteristics and competences of the employee of the future. The respondents were also asked to provide information about their personal feelings regarding the impact of SARS-CoV-2 pandemic on the labour market. In this section the respondents were also requested to comment on their current or future decisions regarding employment. The personal information part included a question about the respondent's age, which allowed excluding questionnaires filled in by the representatives of a different generation. It was adopted in the study that the research sample covers the representatives of generation "Z" born after 1995, who were between 18 and 25 years of age at the time of the study.

Before conducting the survey, the respondents were informed about its purpose and ensured that the survey was completely anonymous. In the course of the survey no irregularities or technical disturbances occurred. 150 fully completed questionnaire sheets were collected as a result of the conducted pilot studies. The Table below presents the research sample in detail.

Table 1: Detailed research sample

No.	Specification	Possible answers	Number of provided answers	Value in total answers
1.	Gender	**woman**	**86**	**57.3%**
		men	64	42.7%
2.	Age	**18-25 years of age (generation Z)**	**150**	**100%**
3.	Studies	in the course of the first cycle degree programme	40	26.7%
		in the course of the second cycle degree programme	**67**	**44.7%**
		completed studies (graduates)	43	28.7%
4.	Form of studies	**full-time studies**	**95**	**63.3%**
		extramural studies	55	36.7%
5.	Education at the time of completing the survey	primary	0	0%
		vocational	0	0%
		secondary general	23	15.3%
		secondary vocational	18	12%
		bachelor's degree	**61**	**40.7%**
		master's degree	37	24.7%
		engineer's degree	11	7.3%
6.	Place of residence	village	18	12%
		city up to 50 thous. inhabitants	18	12%
		city up to 100 thous. inhabitants	**47**	**31.3%**
		city up to 250 thous. inhabitants	26	17.3%
		city over 250 thous. inhabitants	41	27.3%

Source: Author's compilation

The analysis of the above Table shows that women dominated the research group (57.3%). The distribution of provided answers is almost fifty-fifty, which significantly reduces the probability of collecting erroneous information that could result from the gender factor alone. Students accounted for 71.4% and graduates for 28.7% of all the respondents. The group of students was dominated by the second cycle degree programme students. 63.3% of the respondents represented the students or graduates of full-time studies. 40.7% of the respondents covered by the survey had already obtained the bachelor's degree, thus they were the first cycle degree programme graduates. Based on the place of residence, 31.3% of the respondents resided in cities of up to 100,000 inhabitants and next the inhabitants of cities with the population of over 250 thous., i.e. 27.3%. The research was conducted as a pilot study and will be repeated on a larger research sample after obtaining additional funding within the framework of the research project implemented by Wrocław University of Economics. The research will be extended by quantitative studies covering the representatives of generation "Z", regardless of the level of education, and also by qualitative studies (interview) among the employers currently employing representatives of the surveyed generation. It will allow developing the map of gaps between the expectations and the actual employment conditions on the labour market. In addition, it will help determining the impact of the prolonged SARS-CoV-2 pandemic on the situation and attitudes of both sides of the labour market – employers and employees representing generation "Z" in the perspective of the deteriorating economic conditions and the situation in many industries.

Research Results – generation "Z" and their attitude on the 21st century labour market and also the profile of the "employee of the future"

The conducted survey was focused on seeking answers to two research questions: *What is the approach of university students and graduates representing generation "Z" in Poland to the changes on the 21st century labour*

market? The following research hypothesis was formulated in relation to the defined research problem: Students and graduates representing generation "Z" are open to changes on the labour market and will create a new model of the "employee of the future" presenting a different approach to the value of work than the previous generation.

The second question was: *What is the profile of the "employee of the future" in the opinion of generation "Z" representatives?* regarding which the following research hypothesis was formulated: Among the characteristics of the "employee of the future" representing generation "Z" the most important ones are: work is a passion at the same time, development and no stress at work rather than earnings are crucial, they are familiar with the Internet and digitization since birth, hence remote work is the desirable form of employment for them, they are open to transformations in the world, primarily the ones resulting from technological changes, they remain highly sensitive to ethics and care for the environment.

The results of the author's own research allowed verifying both research hypotheses. The Table below presents the results with the highest indications. The obtained answers allowed creating the "employee of the future" profile representing generation "Z" in relation to the respondents, i.e. university students or graduates.

Table 2: The "employee of the future" profile represented by generation "Z" in the surveyed group

Employee's approach	Generation "Z" employee profile in the light of own research
The attitude of generation "Z" and the value of work	
• Which approach to work does the respondent identify with the most?	• Work should be a passion (49%)
• Has the respondent ever taken up a job in his/her life? If so, for what purpose?	• Yes, to increase income (44%)
• How important is work in life for the respondent? *On the scale from 1 the least important to 5 the most important*	• important for 52% of the respondents (average 3.8)
• How important is the amount of earnings for the respondent on the scale from 1 the least important to 5 the most important?	• important for 46% of the respondents (average 4.3)
• Which of the elements of work is the most important for the respondent in performing work?	• no stress (36%) Additionally: permanence and stability of employment as well as developing skills and qualifications (both elements came second, 22% of the responses each)
• Is job satisfaction more important for the respondent than earnings?	• rather yes (47%) • yes (24%) Positive answers: 71% of the respondents
• Does the respondent think that the current number of hours devoted to work is too high?	• Yes (52%)
The expectations of generation "Z" when choosing a job	
• What is the most important for the respondent when choosing a job? *On the scale from 1 unimportant to 6 the most important*	• Earnings are most important (average 5.14) • Development and improvement (average 5.02)
• What form of employment is the most attractive for the respondent?	• Running one's own business and part-time work (the same results - 31% of responses each)
• Which statement does the respondent identify him/herself the most? a) An employee should adapt to the labour market. b) The labour market should adapt to an employee.	• The labour market should adapt to an employee (64%)
• What is the most important for the respondent in his/her professional career? a) Security and stability of employment	• Security and stability of employment *(flexicurity model)* and performing work which allows career development

b) Performing work which allows for career development (promotion) c) Control over the performed work, duties and working hours d) Earning the highest possible income	(the same results - 43% of responses each)
• What are the crucial factors for the respondent when choosing an employer? a) offered high earnings b) company reputation (only the best are employed) c) company ethics d) independence of the position at work	• Company ethics (50%)
• What does the respondent want to gain from professional work? a) Change the reality b) Be innovative and creative in return for high earnings c) Work at a high position in an attractive organization d) Be proud of work in a socially engaged organization	• High position in an attractive organization (34%)
• How does the respondent see his/her work in the future?	• I am part of an organization that puts people and common good first (32%) • I am part of the continuously developing innovative and international ecosystem using ultramodern technology (31%)
• What should the enterprises of the future do according to the respondent?	• Bring the greatest possible benefits to the environment and reduce negative impacts on the environment (33% of the responses) • Feature high social awareness as the primary goal of business (32% of the responses)
The factors of changes on the labour market as assessed by generation "Z"	
• Does the respondent believe that dynamic changes are taking place on the labour market?	• Yes (86%)
• Which group of factors (technological, social, environmental, economic and political) influencing changes has the greatest impact on the labour market transformations at the time of conducting the research in the opinion of the respondent?	• *Technological factors* (47% of indications)
• Which of the *technological factors*, according to the respondent, have the greatest impact on the changes taking place on the current labour market (indicate 3 answers)	• mobility and digitization (57% of indications) • automation and robotisation, including the development of artificial intelligence (53 % of indications) • fast development of technology (51% of indications)
• Which of the *social factors*, according to the respondent, have the greatest impact on the changes taking place on the current labour market (indicate 3 answers)	• Generational changes on the labour market (48% of indications) • *Work life balance* (45% of indications) • Aging society (44% of indications)
• Which of the *environmental factors*, according to the respondent, have the greatest impact on the changes taking place on the current labour market (indicate 3 answers)	• Climate changes (47% of indications) • Urbanization (42% of indications) • Depleting natural resources (37% of indications)
• Which of the *economic and political factors*, according to the respondent, have the greatest impact on the changes taking place on the	• Powerful corporations (59% of indications) • Social inequalities (52% of indications)

current labour market (indicate 3 answers)	• Immigration crisis (36% of indications)
The attitude of generation "Z" towards changes which according to them will take place on the labour market in Poland in the coming 10-15 years	
• Which of the factors: NOW, NEW, NEXT may have the greatest impact on changes on the labour market model in Poland within the coming decade?	• NEXT (59% of indications) and among them: artificial intelligence, machine learning and climate changes (37% of indications each)
• What does the respondent feel when thinking about the future changes on the labour market related to technological and economic development?	• Believes that he/she can manage the new tasks (41% of indications)
• Which 3 most important competences will the "employee of the future" have to present on the future labour market in Poland?	• Ability to cooperate with others 75% • Ability of active learning 66% • Digital skills 49%
• Which of the new organizational and employment models is the most groundbreaking in the respondent's opinion?	• Remote work (64% of indications)
• Does the respondent feel attached to his/her current place of employment?	• Yes and rather yes (43% of indications)
• Would it be easy for the respondent to take up a new, better job at the expense of retraining?	• Yes and rather yes (67% of indications)
• Does the respondent believe that SARS-CoV-2 initiated another revolution in the labour market?	• Yes and rather yes (86% of indications)
• Does the respondent think that the labour market in Poland has ceased to be the "employee's market" as a result of SARS-CoV-2 epidemic?	• Yes and rather yes (70% of indications)

Source: Author's compilation

The research findings presented in the above Table indicate that the value of work has been redefined. Generation "Z" definitely perceives work as an element related to carrying out their passion and thus bringing satisfaction, which is a completely different approach to the role of work in human life comparing to other generations. Generation BB was dominated by the attitude "I work to survive", generation "X" representatives identified themselves with the statement "I live to work", generation "Y" "I work to live", whereas generation "Z" is the first generation which desires to combine work with passion.

In the question *"What is the most important for the respondent when choosing a job?"* the respondents were asked to evaluate the following elements: earnings, form of employment, mobility, development and improvement, creativity and influencing climate change. The survey covered these characteristics which were considered the most important in the light of the source literature review and the results of foreign research, in particular the Employee of the Future report (2019). According to the respondents, earnings constitute the most important aspect when choosing a job (139 indications), development and improvement were ranked as the second (132 indications), the third position was taken by the form of employment (115 indications), the fourth – creativity (111 indications), with mobility to follow (107 indications). Influencing climate change was listed as last since only 86 people considered it the characteristic which they take into account when choosing a job.

It is worth emphasizing that people from generation "Z" are not particularly eager to work full-time, on the contrary, they perceive running their own business as the most attractive form of employment, which offers an opportunity to decide about the time and amount of work, and if they decide to take up employment they prefer a part-time option. They value freedom in deciding about themselves and their working time. For an employee representing generation "Z" earnings are important when choosing an employer, however, while performing the job the absence of stress at work is the most important value. In turn, their career expectations are focused on job security and stability (the component of the *flexicurity* model), but also on performing work which provides an employee with development and promotion possibilities (they strive for a high position in an attractive organization). The attitude of generation "Z" representatives also confirms their high sense of ethics and appreciation for the ecology oriented operations of the enterprise they work for. People from generation "Z" are attached to such values as flexibility and freedom of work, they find professional development opportunities highly important.

The employee of the future representing generation "Z" expects to be part of an organization that puts people and the common good first, and also a part of the constantly developing, innovative and international ecosystem, using ultra-modern technology – this finding confirms the openness of this generation to the world and, at the same time, the very important role of technology, which they deal with since birth and are aware of its development in the future, hence working with robots is not a scary vision for them. It should be highlighted that they expect to work remotely, as it offers them a specific space to operate, they are also ready to retrain and change the sector. This approach allows for a new definition of work in the 21st century, i.e. work is no longer a place where a person spends 8 hours every day, but a collection of activities performed from anywhere in the world, also from home. For generation "Z" online communication is a normal form of contact and a part of their everyday life. The study identified three most important competences sought on the future labour market that form a coherent entirety in relation to the characteristics of the discussed generation and the results of provided responses about other aspects.

People from generation "Z", as confirmed by the research findings, are aware of the changes on the labour market in the 21st century and, in their opinion, the group of technological factors will have the greatest impact on the labour market transformations in the years to come. The rapidly advancing technological changes do not pose a problem for generation "Z", moreover, the majority of this generation representatives are not afraid of the changes, they even believe in being fully capable of dealing with the new tasks. It is also worth emphasizing that, in their opinion, it is the market that will have to adapt to them and not the other way round, thus a company which will not notice generational changes on the labour market may have a problem with recruiting and retaining employees.

Generation "Z" also confirms that they can quickly analyse information and draw conclusions. In the face of the existing threats – the current SARS-CoV-2 pandemic, generation "Z" perceives risks, and above all notices the change in the nature of the market situation from the employee's market to the employer's market but, nevertheless, detects opportunities for the market and business development in a properly selected model of work organization, i.e. the already mentioned remote work. The obtained findings of the author's own research are largely consistent with the characteristics of generation "Z" presented in the cited source literature, in particular in the article by M. Diacon and A. Dutu (2020) and also in the *Infuture Hatalska Foresight Institute* report entitled "Employee of the Future" (2019).

Conclusion

Beyond any doubt the world is already speeding so fast that the model of the "employee of the future" will continue to evolve. Undoubtedly, generation "Z" will be an important subject of this model and, due to a number of specific and completely different characteristics than in the case of previous generations, will present a specific challenge for employers. Diverse attitudes and values of work, different expectations than the ones already known form the labour market characteristic for generations BB, X and Y cause that employers will have to learn how to recruit, work with, retain and motivate employees representing generation "Z".

It is worth observing that, at the international level, a great deal of research has been carried out in different national contexts to identify the characteristics of generation "Z". Interestingly, the results of these studies are also sometimes different from the ones indicated in the presented study. This variability of findings is directly determined by cultural factors and national context in which each study was conducted. Further research will certainly allow for much better understanding of the characteristics and behaviours typical for generation "Z" representatives, entering the labour market more and more boldly and in greater numbers, and will also determine further changes on the labour market in the 21st century.

The presented research is a pilot study and should be approached within the constraints resulting from a reduced sample of respondents. In the near future the study will be extended to cover a more representative sample size. Further research direction will take the form of a comparative study in intergenerational contexts to allow providing knowledge for the development of human resources policy and managing multigenerational employee teams.

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New Transformations and Challenges for Human Resource Management in the Public Sector

Charbel EL AMMAR
PhD Candidate, Bucharest University of Economic Studies, Romania
charbel.alammar@gmail.com

Abstract

The main idea of public management is that management methods in the private sector are superior to those in the public sector and can be borrowed. The public sector is considered less innovative, overly bureaucratic, rigid, expensive and too centralized. Increasing the performance of human resources in the public sector is still the subject of extensive debate and study. The modernization of the administration must be guided at all times by the need for good management of the money coming from the contributions and efforts of citizens, by increasing the effective accountability of its organizations and by decentralizing services, measures that can contribute to the implementation of modern management, which can encourage the necessary effort to adapt the public sector. This empirical research aims to identify and analyze new transformations and challenges for human resource management in the public sector compared to private organizations. The comparative analysis of human resources in the public and private sectors is based on the thorough analysis of the literature and identifies the differences in organization and management of staff in the two types of organizations.

Keywords: Human Resource Management, Public Organizations, Staff Management, Recruitment.

Introduction

Moving from a stable organizational context, marked by the civil service system, human resources management is now evolving in a hybrid environment, which combines the values and principles of public and private action. The challenges are considerable to move from a simple management of personnel files to a genuine human resources management, focused on the skills and motivations of the staff and enabling the implementation of an integrated and coherent human resources policy, in relation to with the strategic orientations of the organization. Practices inspired by the new public management have a lasting impact on the functioning of public organizations, especially in developed European countries. These practices are carefully constructed as opposed to the classical bureaucratic model, considering the market model as the key to solving public problems. While it is undeniable that the new public management and its various applications have allowed public organizations to make significant progress (Giauque & Emery 2008), they have nevertheless been seriously criticized, especially on the grounds that these methods violate specific public values, the democratic logics that regulate their operation and, finally, they aimed to reduce administrations to simple enterprises dominated by market requirements.

Research Methodology

The main objective of this empirical research is to make an in-depth analysis of the literature in order to identify the main transformations and challenges that have occurred in recent years in human resource management in the public sector compared to private organizations. In this sense, the literature review of the main articles was used, as well as of the main studies and researches that approach the targeted topic. A comparative analysis of the differences and similarities between human resources in public and private sector organizations was included, which incorporates an analysis of recruitment processes, human resources management, retirement and fixed-term employment contracts in

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public and private organizations.

Literature Review

Most analysts believe that it is necessary to rethink public organizations by integrating the best of the two: the traditional administration and the private enterprise. This hybrid view is shared by well-known specialists in administrative sciences (Aucoin, 1997; Pollitt & Bouckaert, 2004) or organizational sciences (Olsen, 2006). Thus, the concept developed by Denhardt and Denhardt (2003) and formulated in response to an exaggerated management, is built around the following guidelines:

- ✓ Serving citizens, not consumers;
- ✓ Pursuing the general interest;
- ✓ Prioritizing the valorization of citizenship and less of entrepreneurship;
- ✓ Thinking strategically and acting democratically;
- ✓ Recognizing that imputing is not an easy task;
- ✓ Serving rather than to leading;
- ✓ Valuing people, not just productivity.

This hybrid institutional model depends, more or less, on the country and the organizations analyzed, on the administrative reality in which public agencies are currently evolving. The many reforms that have affected public administrations have transformed the working environment of employees, projecting them into a new era, known as post-employment service. They are currently facing new employment conditions and new ways of working, which aim to make the public service more efficient. But these changes have a strong impact on their identity and motivations at work. The typical conditions of the civil service, typical of the old civil service statutes, have been largely abandoned in Western countries, starting with the appointment of civil servants for life, as well as by the very name of civil servants, renamed civil servants.

Thus, the hybrid institutional model described above translates into an environment called post-employment, whose main features are:

- ✓ public servants are employed under conditions close to the private sector, but benefit from the guarantees of public law (Demmke, 2004);
- ✓ enthusiasm is provided by an entrepreneurial spirit (Farnham et al., 2016), which respects the values characteristic of the public ethos and the principles of public law (legality of administrative action, equal treatment, proportionality, etc.)
- ✓ orientation, evaluation and reward according to the quality of their services and the performance achieved (Villeneuve, 2006), incorporating the expectations and legitimate requirements of the beneficiaries of public action: citizens-clients.

Post-employment service appears explicitly not only in the literature (Schedler & Proeller, 2000), but also in international public service modernization projects. This hybrid public function, halfway between the pure logic of the market and the classical one, of the public administration, induces new behaviors, based on competencies that more or less successfully combine the qualities of the traditional "bureaucrat" with those of the successful private sector employee.

Public officials are usually required to be "customer-oriented", fully respecting the equal treatment of beneficiaries. Influenced by this new institutional and organizational context, the practices of public human resources management are thus necessarily transformed, which determines the emergence of significant challenges.

The public management of human resources remains determined by the legal bases, statutes and other regulations regarding the personnel, which condition the modalities of action. On the other hand, it must also meet the requirements of the organization, providing concrete solutions to help better fulfill its missions and challenges, trying to make better use of the strategic leverage effect (Emery & Giauque 2003).

Thus, significant difficulties arise, starting from the fact that planning and strategy are often missing or are expressed in general terms, making any operationalization difficult. Added to all this is the fact that many strategic plans are more like public marketing than a real will to strategically steer. From the moment the human resources management passes from the purely administrative stage to a true management of people, it becomes obvious that the role of the hierarchy is central, because it is the one that will select, frame, appreciate, value, develop and promote staff, based tools provided by the human resources service.

Many studies have considered staff quality as a moderating variable essential for human resource management practices to lead to increased performance (Vermeeren et al., 2008). This dimension of public leadership is all the more critical as the evolution due to the new public management is based on an increased delegation of responsibilities and a greater margin of maneuver granted to public managers, although practice shows that this transfer of responsibilities it is less obvious than it seems (Broucker, 2008).

In particular, this delegation can bring about a form of public service explosion, with public officials being treated very differently from one department to another, without these differences always being legitimized by objective elements. In this way, a neosubjectivity in the public service appears, subject to the arbitrary power of a hierarchy that demonstrates an excess of autonomy.

The era of automatisms (salary increases, career development, etc.), a feature of the public service, seems less and less adapted to a rapidly changing world and constantly changing public organizations. Thus, a good human resources management system should highlight the positive behaviors that contribute to the quality of the services provided, the collaboration between staff members and the efficient use of available resources and intervene to improve dysfunctional behaviors (Tataru, 2019). In fact, this means avoiding automatic mechanisms, assigning the same salaries and promotions to everyone. The problem also lies in the fact that the end of automation means moving to a dynamic system, whose criteria must be clearly defined and rigorously applied, without which the public administration risks entering a form of revived internal clientelism. In this respect, the analysis of remuneration practices by performance is particularly illustrative of the difficulties encountered by the public administration.

The access to the public service was based on objective qualifications, attested by official diplomas, necessary to fulfill the different tasks of the positions that compose it. Since the 1980s, this logic of "diploma" has been gradually replaced by that of skills (Boyer, 1998; Horton et al., 2002). It was thus found the emergence of competency benchmarks to stimulate the development of professional development in the public service, in which the isolation between ministries, for example, is classically significant (Rouban, 2007).

The definition of competencies shows that this challenge will not be easy to overcome, the public management of human resources being faced with a very important sophistication of its activities, especially those of involvement, training and professional development. Indeed, if a competence is contextualized by definition, then each environment requires specific competencies, which must be identified and described. The activity of civil servants is not easy to appreciate, due to the complexity of the activities performed and the multiple relationships between functions, but this cannot justify ignoring this central process of this management. Individual and group performance management systems, based on clear objectives and precise indicators, undoubtedly indicate the way forward. This is reflected in the OECD reports on remuneration for performance, which argue that not only can financial rewards have a positive impact on the motivation of civil servants, but also on the process of completing the action to which they are confined and at the end of which each civil servant knows his goals and goals. it can be included in the most general missions pursued by its service (Reichard, 2002; OECD 2005).

A group of authors (Desmarais et al., 2012) note that in recent decades most OECD countries have introduced many changes in the management of their public sector, bringing it closer, from this point of view, to business management. These reforms, more or less radical, based on a critique of bureaucracy, can be largely related to the new management and the new public management. They pursued similar objectives, such as decentralizing decision-making power, improving public sector performance and attractiveness, reducing costs, and so on. In this way, the outline of a new public management of human resources was drawn, built largely as an opponent of the bureaucratic model and characterized by contractual labor relations, flexible remuneration and especially the generalization of remuneration based on performance, emphasis on professionalism of politics. At the same time, this unequivocal vision hides significant differences in the reforms undertaken. Thus, the principle of career civil service is present in many European countries, and with some notable exceptions, the unilateral appointment of civil servants is the rule in many countries.

However, the countries that have committed themselves to extreme reforms are ultimately a minority. The reforms undertaken differ from country to country, so it should be noted that, beyond certain managerial convergences, changes in personnel management in public organizations remain strongly contingent on the institutional conditions, culture and administrative traditions of each country, or even levels of governance.

It is not uncommon for human resource management reforms not to have the desired effects in terms of effectiveness or to remain only formal. But beyond the difficulty of sustainably transforming practices, human resource management reforms also remain the paradoxes and tensions to which civil servants are subjected and have to work (Emery & Giauque, 2007). The analyzes also highlight the flaws of coherence of impulsive and contextual changes. These changes are accused of fueling a crisis of values and public ethos.

The study undertaken by Desmarais et al. (2012) aimed to take stock of the reforms carried out in an international perspective, with emphasis on the dimensions related to the management of public organizations. Specifically, he focused on four empirical researches. The study began with an analysis of the effects of changes in the public sector.

De Chatillon and Desmarais (2010) were interested in the effects of changes related to the new public management on psychosocial risks. If the negative effects of the new public management in terms of workload and pressure on employees have been mentioned in the literature based on qualitative analyzes, this study is innovative by quantitatively analyzing the impact of these changes on suffering at work, especially burnout, in a local French community. The analysis, conducted on a sample of 1118 public employees, highlighted the impact that the new public management had on burnout through its effects on the workload of employees and the climate of psychological violence. The second research focused on managing change in the public sector and, in particular, on the roles and identity construction of intermediary managers in the change process within public authorities.

Fergelot and Alis (2012) highlighted the way in which intermediary managers are at the same time actors and objects of the transformations induced by the reforms that are adopted in public services. This qualitative research, conducted in two French public authorities, describes and models the role of managers in the development of sensemaking and sensegiving, to legitimize, implement and assume change. Following the analysis of these two dimensions of the role of managers in the context and process of change, the text provides avenues for research for exploration.

The third research, conducted by Moreau et al. (2012) analyzes a developing phenomenon, that of the impact that public-private partnerships have on the behaviors and positioning of employees, who become responsible for managing public services in a strictly private and commercial legal framework. The results show that public-private partnerships generate trials: evidence, experiences, which initially result from a strategy to exclude more recalcitrant employees, and then encourage managers to seek a compromise to bring their private business world closer to the specific civic world. public service. Thus, a policy of developing a proximity management can result in a mixture of values, favorable to user satisfaction.

A more recent study, which examines the introduction of a logic of skills in the public sector, was conducted by Ben Hassine et al. (2012). The text proposed an approach aimed at establishing a profile of skills in this sector in Tunisia. The results showed that there was a tension between "bureaucratic" skills, associated with a tendency to verticalize relationships and compliance with administrative procedures, and managerial skills, related to the search for a better exchange of information, with an emphasis on ethics and management skills development, on vision and piloting public policies. Thus, it was observed that the Tunisian government wanted to identify within it the means to reinvent bureaucratic solutions by adapting them to the challenges of the new public management. The study concluded with two texts with reflections related to the remuneration of performance in the public sector.

The second reflection, authored by St-Onge and Buisson (2012), proposed a balance of knowledge about remuneration by merit in the public sector. After describing what happened in the public sector in the United States, the United Kingdom and in terms of remuneration based on individual performance, the article presented a summary of the results of studies that analyzed the impact of remuneration by merit in the public sector. The authors then found that remuneration by merit in the public sector has similar limits to those identified in the private sector, but that, in addition, the public sector offers additional specific constraints. This raises the question of why more states persist in adopting and maintaining it.

To explain this paradox, the authors turn to the perspectives of institutional and conventionalist theories, which show that the adoption of a management practice does not derive only from its supposed or objective "technical" performance. Finally, the study proposes promising research avenues to better understand the issues and challenges of

merit-based pay in the public sector. Current and future changes in human resource management in public organizations make these issues an emerging area of research in the field of management sciences. The study also demonstrates the diversity of issues and challenges posed by these changes. Beyond the analysis of the effects of new practices, the research now focuses on an analysis of the hybridization of human resources management practices, which occurs as a result of juxtaposing bureaucratic and managerial models and to define management models specific to the new public management.

Comparative Analysis of Differences and Similarities between Human Resources in Public and Private Sector Organizations

The main differences in the organization of human resources in the public and private sectors concern the fundamentals of the relationship of subordination, the methods of recruitment methods and the conditions of remuneration. In the private sector, the sources of labor law emerge primarily from the contract. Even if labor law must comply with certain external rules (constitution, ratified treaties, laws, etc.), the essential foundation of labor law is the will of the parties, whether it is expressed in the relationship between employer and employee or through a collective delegation: national interprofessional agreement, national branch convention, enterprise or establishment agreement, etc. The competition, regardless of its modalities (by test, based on the title, internal, external, etc.), is the standard recruitment norm in the public service. This way of recruiting is a way to avoid favoritism.

Devetter (2004) recalls that "before the generalization of competition, recruitment in the public service remained for a long time marked by nepotism and clientelism". This is not the only way, because other systems have been used in the past (or still are), such as elections, drawing lots or co-optation. The competition rule responds, moreover, to the requirements of anonymity, foundations of public office: an official is a person who holds a position, it is recruited based on his skills and abilities and not based on his name, rank, wealth, family his or his system of relationships. Given these criteria, the competition is distinguished as an ideal selection tool, because it is based on the assessment of the candidate's skills.

If private sector recruitment meets a number of requirements, such as non-discrimination, the relevance of the information requested, loyalty to the candidate, the obligation to formalize the recruitment in writing, the employer is free to recruit whenever he wishes. This freedom meets the objectives of the enterprise, which are fundamentally different from those of the public service. The latter is in the service of the general interest, while the company's objective is - in economic terminology - to combine the factors of production to achieve maximum performance (Dima, 2018). The free choice of recruitment is the corollary of the company's raison d'être. Once the terminology problems are overcome, there are many commonalities and many similarities between the public and private sectors, when the structures are of comparable size. If the ways of recruiting in the public and private sectors are different, the similarities become clearer when it comes to managing staff, or giving up.

With regard to staff management, the big difference between the public and private sectors concerns joint administrative commissions, which have the power to issue opinions on the careers of civil servants under the statute and to meet in the disciplinary board in case application of sanctions. The Joint Administrative Commission is consulted on all matters affecting the careers of officials: position (relocation, secondment, making available), career (promotion, promotion through the list of skills, tenure) and sanctions discipline. In practice, this committee has a greater role in decision-making than advisory: its opinions are followed by overwhelmingly overwhelming effects. It should be noted, moreover, that trade union representation is more rigid in the private sector than in the public sector. The rigidity of staff management under the statute is often opposed to the greater freedom that staff managers would have in the private sector, especially when there is a need to stop working with an employee.

Frequently advanced evidence is the growing temptation to use untrained staff in the public service, especially in limited-term or rapidly changing positions. Or the flexibility of the private sector, compared to the public sector, comes more from different cultural contexts, than from a greater ability to give up a collaborator. Whether in the public or private sector, collaboration between an employer and an employee can be concluded in three forms: end of contract, career or resignation.

Retirement, the end of the contract (fixed-term contracts are not the prerogative of the private sector, the public service can use them, and do not hesitate to do so), resignation are significantly comparable situations in terms of personnel

management in both sectors. The difference between the two systems is found more in the licensing procedures. With regard to dismissal for economic reasons, this notion has no equivalent in the public system. The closest thing is the law on the release of cadres, which although it is a simple law, is enough to "dismiss" officials. The comparison between the public and private sectors must be made on the basis of dismissal for personal reasons (labor law) and professional incompetence (civil service status).

The fixed-term contract does not offer human resources managers in the company more flexibility than the one available to the personnel managers under the statute. Both labor law and civil service status distinguish between dismissal for misconduct and dismissal without fault. With regard to the latter, the finding of professional incompetence or the inability to work due to a long illness leads to dismissal, both in the private and public sectors.

In public organizations, the duration of the career is that of the professional life of the civil servant: the time within them coincides with the long period of bureaucracy, accompanied by the stability and continuity of the rules. In the private sector, short time and market responsiveness take precedence, determining the strengthened and continuous link between activity and contract. The time perspective of the official coincides with the duration of his career. This explains the heated nature of the debate on the issue of retirement age in the civil service and in the case of assimilated staff. All this is encouraged, as promotion is largely done according to seniority. This specific relationship with time can be observed and vice versa, in the sanctions that can be applied to an official in case of disciplinary misconduct: removal from the promotion table, demotion from the echelon, temporary exclusion, ex-officio retirement, respectively so many ways that affect career time.

The job guarantee is more applicable to the position than to the person holding it and is a guarantee of independence, neutrality and impartiality. Acting on behalf of the state, serving as such the general interest, the official must be protected from partisan interests. Offering a job for life removes his concerns from the need to find a professional backup solution.

Officials are extremely reluctant in the face of any confrontation, for example in situations where they are brought together to decide on a debate and / or a conflict. This does not mean that they are foreign to the concept of conflict, struggle, influence, observed as much in the public sector as in the private sector, but the expression of conflicts has the vocation to be suppressed, deaf, discreet. Raising one's voice is a mistake, a signal for a career and inadequacy for leadership or senior management positions. This is why public service rituals are poorly adapted to certain ways of meeting people in the private sector, especially those in which the arguments are opposed before a choice can be seen. Joint meetings between staff representatives and management are very illustrative of cultural differences in conflict management. Even if they belong to the public service, employees 'representatives are imbued with a union culture, which results from workers' demands and therefore has a sincere, direct, sometimes abrupt way of expressing themselves.

Compared to them, management representatives use rather codified, allusive language and are often shocked by the turn of joint meetings, even when the positions of staff representatives are, more often than we think, more moderate than their expression. The aversion to confrontation of officials is the corollary of their relationship with time, which is calibrated with their career. Destined to stay in touch with each other for decades, they are unlikely to significantly damage their relationship. Particularity in the public sector is therefore an exacerbated aversion to confrontation, even if the latter remains the most effective way of resolving conflicts. And this time the staff manager under the statute must take into account this dimension: to avoid the frontal solution of the problems in question or the opposition of the people or to engage in a pedagogical activity in order to make the confrontation finally accepted or tolerated.

Conclusion

The fact that there are more similarities than differences in personnel management in the public and private sectors calls for convergence in the training of management staff, managers and directors. One might imagine that the lack of the instrument of financial differentiation in the hands of public sector management underestimates the importance of training in human resource management and management in general. But the opposite is true: this is due to the fact that staff managers under the statute have fewer tools at their disposal and that they should be specially trained in this regard. Persons under the statute have specific motivations, which should not be overlooked. Often, officials have a keen sense of the general interest, of the public service, of the mission in which they compete. As such, they can be

strongly mobilized towards goals, provided that these goals are either relevant to their status and that the forms are met, that their motivation is stimulated. This is why the training of civil servants should be enriched with knowledge and experience from the sociology of organizations, the sociology of professions, and even anthropology. Rituals, codes, professional culture have as much the right to be studied and taught in the public service as in the private sector.

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Green Early-Stage Investments in the EU Member States

Małgorzata RUTKOWSKA and Jolanta PAKULSKA

Department of Management and Organisation, Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Wroclaw, Poland
e-mail addresses: malgorzata.rutkowska@pwr.edu.pl,

Cardinal Stefan Wyszynski University (UKSW) in Warsaw, Faculty of History and Social Sciences,
jolanta.pakulska@gmail.com

Abstract

Nowadays, eco (green) investments have been recognized as a key element in the transformation from a brown to a green economy. Eco-investments can be applied to all sectors of the economy, and all its dimensions: social, economic, and ecologic; Eco-investments are the applicable result of sustainable development actions among European Union countries. This paper presents the role of eco-investments among the EU member states and statistical analysis. This study is based both on qualitative and quantitative research methods. Then, the eco-investments on the European Eco-Innovation Scoreboard tool have been also analyzed, and the results were also presented. Source material for the examination were secondary data. As a result of this research, the leading eco-innovators were identified among factors influencing this type of investment.

Keywords: eco-innovation, green early-stage investments, Eco-IS.

Introduction

In recent years, the term 'eco-innovation' has been increasingly used. The definitions of eco-innovation seem to be quite general and, thus, many kinds of innovation can be defined as eco-innovations. Eco-innovations can contribute to the renovation of the whole innovation system, taking into account social, ecological, and economic aspects. Among the very important are green jobs, which can be seen also as a sustainable development factor (Sulich 2018) and an eco-innovation which contribute to the real economy sphere and protection of the natural environment (Sulich et. al., 2018).

Eco-innovation plays a key role in promoting and implementing green growth because it promotes all forms of innovation that reduce environmental impacts and strengthens resilience to environmental pressures (Park, Bleischwitz, Han, Kyung, and Joo). These pressures caused by human activity are called an anthropopressure, but seen both as a challenge and a set of ideas for the new entrepreneurship in EU countries (Sulich et. al., 2018).

This article reviews the results of eco-innovation in the EU Member States in terms of the total value of green early-stage investments (per capita). They are part of eco-innovation inputs which comprise investments aiming to trigger eco-innovation activities.

The Essence of Eco-Innovation

The definitions of eco-innovation seem to be quite general meaning and are the important issue of further classifying eco-innovations to better understand their specific characteristics. There is no commonly agreed definition of eco-innovation, therefore this article presents only the most important of them. According to the classical definition of eco-innovation, it is a new product that provides value for the customer and business, while significantly reducing the negative impact on the environment (James, 2001). Eco-innovation is most often understood as innovation (that is, changes in technology, organizational structure, and management of the company which is designed to eliminate or at least reduce the negative impact of business on the environment (Witkowski, 2008).

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Eco-innovation refers to all forms of innovation – technological and non-technological – that create business opportunities and benefit the environment by preventing or reducing their impact, or by optimizing the use of resources. Eco-innovation is closely linked to the way we use our natural resources, how we produce and consume, and also to the concepts of eco-efficiency and eco-industries. It encourages a shift among manufacturing firms from "end-of-pipe" solutions to "closed-loop" approaches that minimize material and energy flows by changing products and production methods – bringing a competitive advantage across many businesses and sectors [http://ec.europa.eu/environment/pubs/pdf/factsheets /eco-innovation/en.pd, access: 11.11.2018].

Pro-ecological innovation (eco-innovation) is also any innovation, implemented following applicable law, which brings benefits for the natural environment - in particular in the form of minimizing the consumption of natural resources per unit of manufactured product and minimizing the release of hazardous substances into the environment during the production of the product and its use and afterward. Use (Reid A., Miedziński M., 2008).

This article assumes that eco-innovation is "Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources, including energy" (European Commission, 2007).

Eco-innovation in the EU Member States

The researches on the eco-innovation level in the EU Member States is provided since 2010. The data is collected by the Eco-Innovation Observatory, which is an EU initiative focused on the research of eco-innovations in the European Union. The results of this research are a yearly ranking called the Eco-Innovation Scoreboard (Eco -IS) (Szpor, Śniegocki, 2012).

The Eco-IS is the synthetic index, consisted of the 16 indicators divided into five groups (Eco-innovation inputs, Eco-innovation activities, Eco-innovation outputs, Resource efficiency outcomes, Socio-economic outcomes) [1]. In our analysis, we are interested in the first group (Eco-innovation inputs). The index for this area is calculated based on three indicators: government investments in environmental and energy R&D, green early-stage investments, and total R&D personnel. We analyzed the last indicator and we study the relationship between this one and Eco-innovation inputs and between this one and the Eco-IS.

Thanks to this shape of the index, various aspects of eco-innovation can be presented. The index is important information for each country about an eco-innovation level (Kobryń, Prystrom, 2017). The Eco-IS showed us how the level of eco-innovation distinct from the average for the EU Member Stated because this average is always 100 [2].

Earlier research by one of the authors showed that the level of eco-innovation in the European Union member states is very diverse. This diversification is reduced; it is difficult to say whether it will be a constant tendency. The Eco-IS indicator for individual countries ranged from around 40 to almost 190 (see Figure 1).

In 2018 the most eco-innovative country was Luxembourg, Germany, Sweden, and Finland. These countries have a value of the index is above 120 and are counted among the eco-innovation leaders. On the other hand, there were Hungary, Slovakia, Romania, Malta, Poland, Bulgaria, and Cyprus, whose index is 80 and belong to the countries catching up on the eco-innovation group. In the middle, there is the largest group of countries included in the group of advocates of eco-innovation where the index value ranges from 81 to 119. Over the years, the group of eco-innovation leaders has remained more or less constant. A slight shift is generally recorded with an indicator of around 120. Similarly, the situation is in the other groups. However, some countries have shifted significantly in ranking over the years.

[1] More about this can be read in: Eco-innovation [online]. [cit.2018-01-22]. Available at: https://ec.europa.eu/environment/ecoap/indicators/index_en.

[2] More about the construction of the Eco-IS can be read on Eco-innovation [online]. [cit.2018-01-22]. Available at: https://ec.europa.eu/environment/ecoap/indicators/index_en

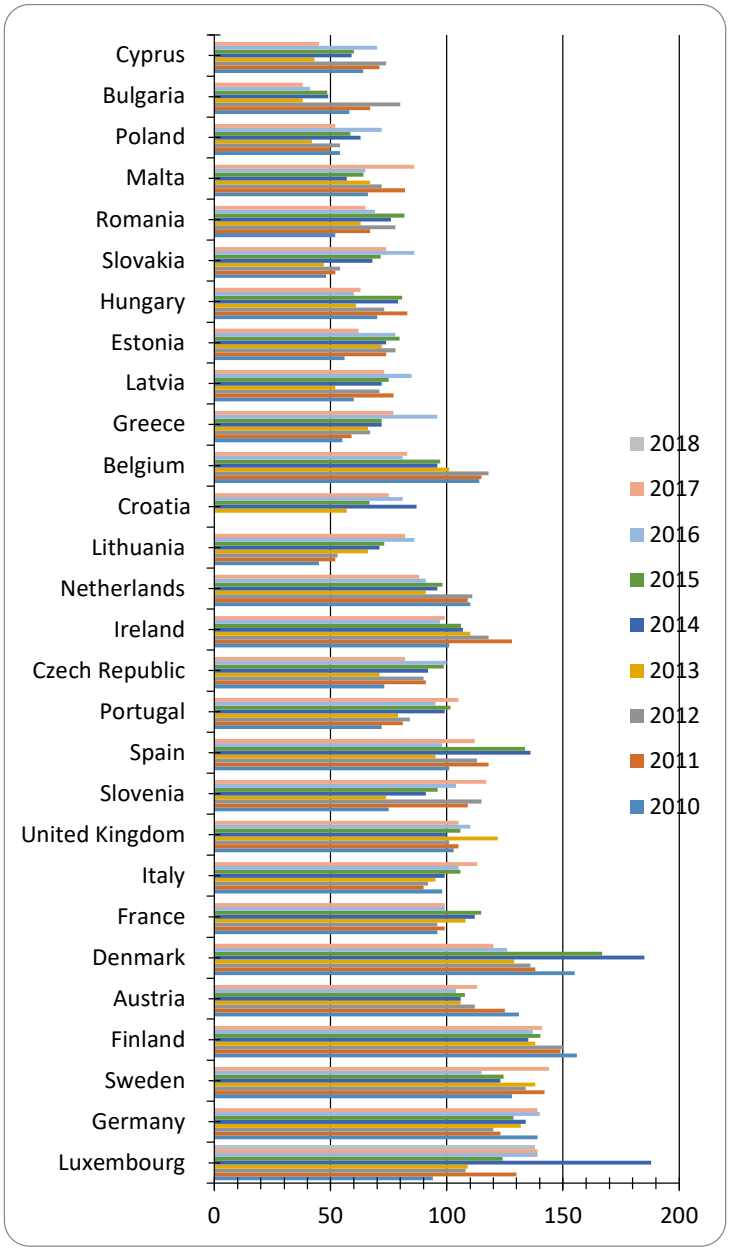

Fig. 1: Eco-innovation Scoreboard 2010-2018

Source: *own calculations based on Ranking Innovation Union Scoreboard, https://ec.europa.eu/environment/ecoap/indicators/index_en (access: 18.05.2020).*

Eco-innovation Inputs

Eco-innovation inputs are one of the five areas included in the Eco-IS construction. It includes investments (financial and human) to trigger eco-innovation activities. Eco-innovation inputs comprise investments (financial resources, human resources, technical resources) that provide an initiative for eco-innovation activities at companies, research organizations, and other institutions. Thus, eco-innovation investments are an important determinant of eco-innovation performance at the level of companies, sectors, and countries. This indicator contains (Giljum, Lieber, Doranova):

1. Governments environmental and energy R&D appropriations and outlays (% of GDP).
2. Total R&D personnel and researchers (% of total employment).
3. The total value of green early-stage investments (USD/capita).

Table 1: Indicator group: Eco-innovation inputs

Name of the indicator	Short description	Unit of measurement
Governments environmental and energy R&D appropriations and outlays	The relative priority is given by governments to invest in research and development in the areas of energy, including renewables, and the environment	Percentage (of GDP)
Total R&D personnel and researchers	Indicator of the knowledge and research capabilities of a country. Since the data for R&D personnel involved in eco-innovation or environmental or cleantech research is not available, the generic indicator is used	Percentage (of total employment)
The total value of green early-stage investments	The value of early-stage investments in cleantech industries	USD/capita

Source: *own collaboration based on Giljum, Lieber, Doranova.*

The eco-innovation rate in the EU Member States is characterized by very large variations (from 0 to 287). In most cases, countries take similar positions in terms of both indicators. Although there are large discrepancies in some cases. The biggest difference was in the case of Estonia, which ranked 21 in terms of Eco-IS overall, while 8 in terms of Eco-innovation inputs. A much smaller difference was recorded for Greece (positions 19 and 9), Luxembourg (positions 1 and 11), and Italy (positions 8 and 17).

Table 2: Comparison of country positions in 2018 according to Eco-IS and Eco-innovation inputs

The EU Member States	The position of the country in terms of Eco-IS overall	Country position in terms of Eco-innovation inputs
Austria	5	10
Belgium	18	13
Bulgaria	27	26
Croatia	17	23
Cyprus	28	28
Czech Republic	13	14
Denmark	6	2
Estonia	21	8
Finland	4	4
France	7	3
Germany	2	1
Greece	19	9
Hungary	22	19
Ireland	14	15
Italy	8	17
Latvia	20	22
Lithuania	16	20
Luxembourg	1	11
Malta	25	27
Netherlands	15	12
Poland	26	21
Portugal	12	18
Romania	24	25
Slovakia	23	24
Slovenia	10	6
Spain	11	16
Sweden	3	5
United Kingdom	9	7

Source: *own collaboration based on Ranking Innovation Union Scoreboard, https://ec.europa.eu/environment/ecoap/indicators/index_en (access: 20.05.2020).*

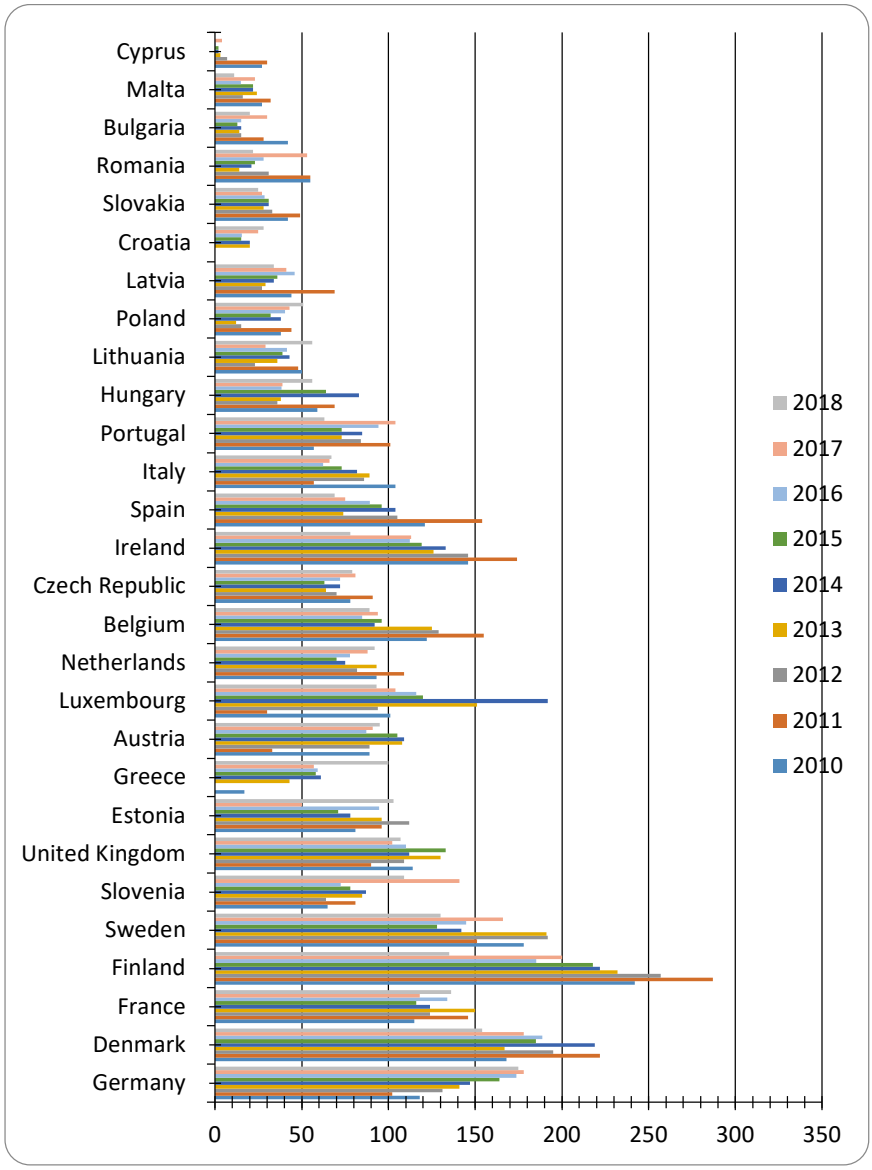

Fig. 2 : Eco-innovation inputs 2010-2018

Source: *own calculations based on Ranking Innovation Union Scoreboard, https://ec.europa.eu/environment/ecoap/indicators/index_en (access: 20.05.2020).*

The total value of green early-stage investments

The total value of green early-stage investment is the indicator that shows the value of early-stage investments in cleantech industries. The total value of a green early-stage investment is very diversified in EU countries (from 1 to almost 400). In many countries (especially in the initial years of the research period) there is no data on the subject under study. At all times, Finland, Ireland, Sweden, United Kingdom, Germany are at the forefront. At the other end of the ranking, Poland, the Czech Republic, and Greece are permanently present. Similarly, as in the case of Eco-IS overall and Eco-innovation inputs, countries rank in the ranking. Fig. 3 shows clearly how large discrepancies are found in this indicator and indicates how much more do the countries at the bottom of the rankings have to do in this respect.

The positional statistical measures were used to present the degree of differentiation of the total value of a green early-stage investment. In this case, we can see that a value deviates significantly from the others we cannot use classic measures because it can create problems of interpretation. Therefore, we used positional measures, to determine which we take into account not all but the selected values. The analysis was based on range and quadrant deviation, which suits the best for this analysis (Pułaska-Turyna, 2011).

The range from the sample is a measure showing the difference between the smallest and the highest value of the indicator being examined. The higher this indicator, the less evenly distributed the level of ecological innovations, and the greater is the dispersion of the values of individual countries' indicators around the average level of eco-innovation. The smallest difference is noted certainly when the range is 0, which in practice does not occur. In the case of the European Union Member States for the total value of the green early-stage investment, it can be concluded that the range is very huge. The highest range was calculated for 2010- 2012 (371), but in 2013 this indicator has decreased, but in the next year the range has risen significantly again. In 2014-2016 this indicator has decreased significantly, but in 2017 – 2018 has risen significantly again.

An indicator that can tell us a bit more is the quadrant deviation which is equal to half the interquartile range and measures the diversity of only a part of units after the rejection of 25% of units with the smallest values and 25% of units with the highest values. Therefore, we receive information on the diversification of the level of eco-innovation, in 50% of the EU Member States at the level closest to the median. The level of diversification is smaller than all EU Member States. In this case, the decline in the diversification has been observed already since 2015, and the trend has not changed in 2017, but in 2018 has risen significantly again.

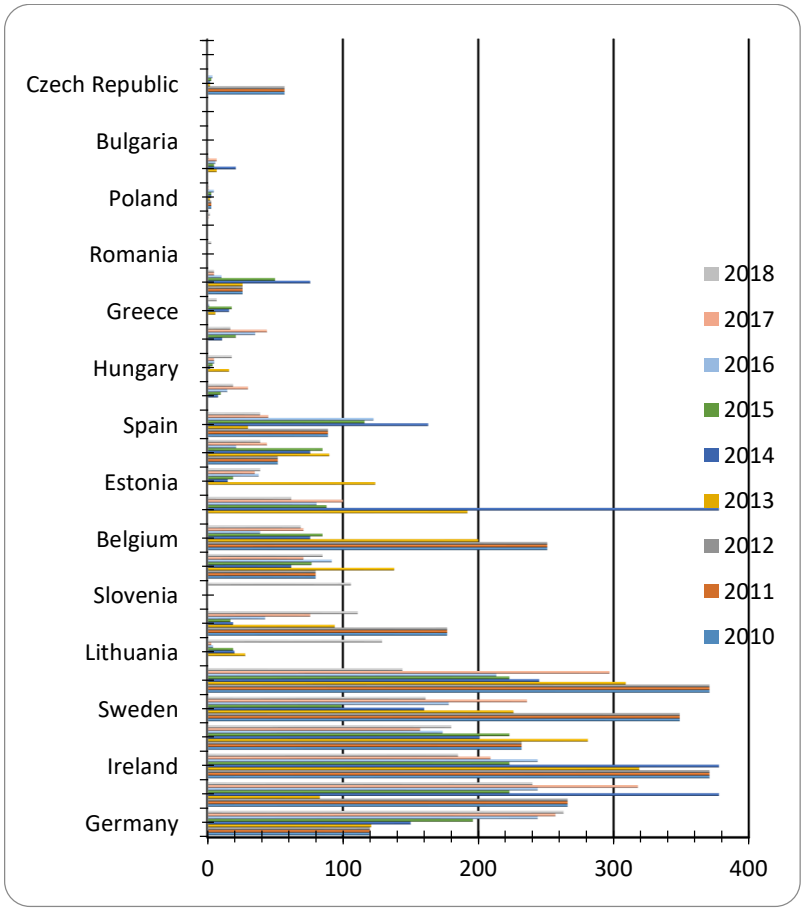

Fig. 3: Eco-innovation Scoreboard 2010-2018

Source: *own calculations based on Ranking Innovation Union Scoreboard, https://ec.europa.eu/environment/ecoap/indicators/index_en, (access: 25.05.2020).*

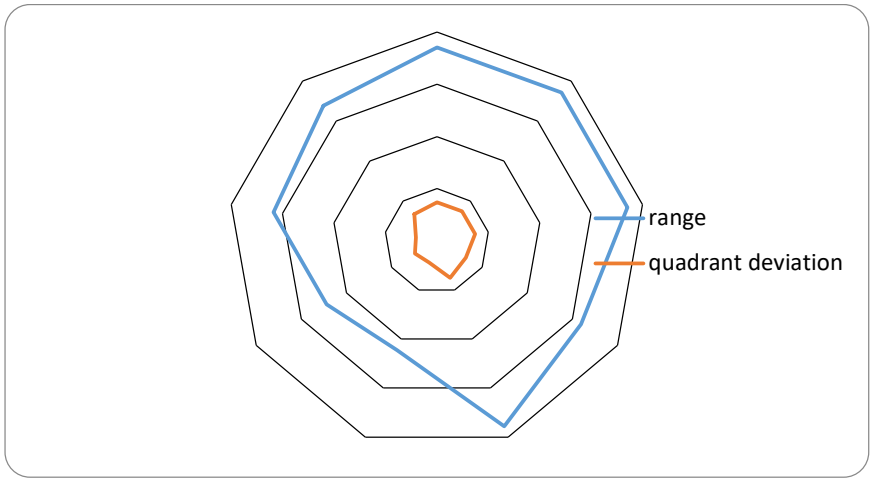

Fig. 4 : Range and Quadrant Deviation

Source: *own calculations based on Ranking Innovation Union Scoreboard, https://ec.europa.eu/environment/ecoap/indicators/index_en (access: 20.02.2020).*

The total value of green early-stage investments (per capita) versus Eco-IS inputs and Eco IS-overall

The Pearson correlation coefficient was used to investigate the relationship between the total value of green early-stage investments and Eco-IS inputs as well as between the total value of green early-stage investments Eco-IS overall. Aside from 2014, there is less correlation between the total value of green early-stage investments and Eco-IS overall than between the total value of green early-stage investments and Eco-IS inputs. In 2014, this correlation is almost the same. In 2018 correlation between the total value of green early-stage investments and Eco-IS inputs is smaller than in prior years, and the correlation between the total value of green early-stage investments Eco-IS overall is much smaller.

The correlation between the total value of green early-stage investments and Eco-IS overall in 2010-2015 is quite strong, as it remains at 0.75-0.84, in recent years the relationship has weakened and reached values below 0.7, which should be interpreted as a moderate relationship. In contrast to the above, the correlation between the total value of green and the Eco-IS inputs is constantly at a fairly strong level (0.82 - 0.88). This means that with the growth of the total value of the green early-stage investment, both Eco-IS overall and Eco-IS inputs should analogically grow.

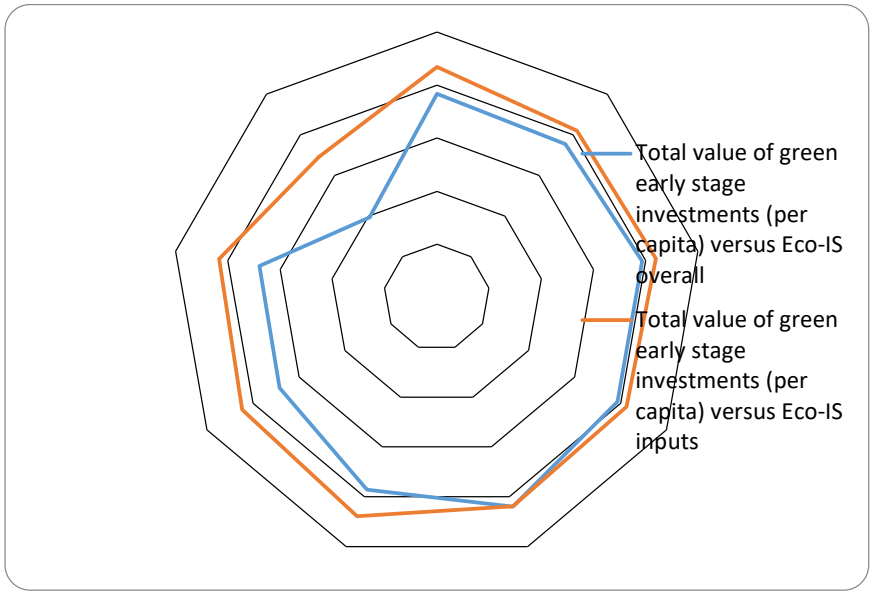

Fig. 5: Pearson correlation between the total value of green early-stage investments and Eco-IS inputs and Eco-IS overall

Source: *own calculations based on Ranking Innovation Union Scoreboard, https://ec.europa.eu/environment/ecoap/indicators/index_en (access: 20.2.2020).*

Conclusions

Based on the above analysis, the following conclusions were adopted:

1. The eco-innovation rate in the EU Member States is characterized by very large variations and the total value of the green early-stage investment is very diversified in EU countries.
2. Most often there is a smaller relationship between Eco-SI and the total value of greenery.

The limitation of this paper is the scale of the eco-innovations which is related to the wealth of each member state but was not indicated in the paper. Although there is a group of well-developed countries, which are leaders in expenditures on eco-investments and eco-innovations, they are also leaders in the transformation towards a green economy. Further research directions for this paper can cover a more detailed area of the economy - the Environmental Goods and Services Sector and can be focused on the direct relations between indicators of eco-development and innovations. Such direction of future research can provoke more managerial implications and recommendations for the policymakers.

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Motivation of Employment Personnel in the Public Services Sector

Charbel EL AMMAR

PhD Candidate, Bucharest University of Economic Studies, Romania
charbel.alammar@gmail.com

Abstract

Motivation at work remains a key concern for any organization, whether public or private. Its presence among employees is likely to increase the performance of the organization, while its absence leads to the opposite. Motivation stimulates effort and the adaptation of effective behaviors to individuals at work. One of the first tasks of any manager is to motivate his employees to provide as much effort as possible, thus motivating all employees in the chain. Employee motivation is a process of stimulation of them by the organization through the management factors for fulfilling the tasks that come from the job description at a level of performance meant to lead to the achievement of the organization's mission. In this context, the article aims to conduct an empirical theoretical research on motivation of personnel in the public organizations. Thus, it conducts an in-depth analysis on main theories related to human resources motivation and presents the concept and dimensions of work motivation in the public services sector.

Keywords: employee motivation, human resources, public organizations, work attitude.

Introduction

The process of training human resources revolves around motivation. This is the psychological factor that determines the activation of performance and efficiency. Motivation in human resources means motivating people in their work. It does not mean, first of all, to reward her money, but to improve the mental/social representations regarding the work, the organization in which it takes place and the products obtained through the respective activity. An individual's motivation for work means the certainty that he will obtain, by performing work under established conditions, elements that will satisfy his own needs. The value system is involved in the motivation, which gives a precise meaning to the consequences of the employees' behavior and influences the degree of individual freedom to adhere to certain values.

In the organizational context, motivation is a conditioned factor of the performance of each component of the organization, the spring that pushes it to act in a certain way, its internal state, which animates and determines its behavior, and motivation is the process by which managers it determines the subordinates to achieve the best possible performances, giving them grounds to act in this respect.

The existence of an efficient and democratic administrative structure is one of the most important criteria that define the modernity of a country. The functioning of a modern, flexible and efficient public administration is an essential condition for the structural transformation of the Romanian society, for the achievement of a profound reform in all fields of socio-economic life, for the increase of the citizen's role in decision making. The public administration must be able to face the challenges it has to face, which is not possible without the help of an honest and well-trained professional apparatus. The very quality of public services depends on the quality of the employed staff's activity. The employed personnel have a special significance, because their activity is nothing but the ensemble of the activities carried out in order to carry out the public services, and in the last instance of the general interest. But in order to carry out quality activities, employees must be motivated. They must satisfy certain needs through the activity they carry out within an organization or within the institution where they work.

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Literature Review

Research in psychology and management in recent decades converges towards consensus supporting the idea that motivation at work results from the interaction of the individual and his environment, according to Lewin's behavioral equation that the behavior of the individual is a function of two variables: his personality (P) and its environment (E). (Bakari et al., 2017) Therefore, motivation is above all an individual phenomenon, each individual is unique thus having different needs, expectations, values, history, attitudes and objectives. (Stepanova et al., 2018) Being an internal process that only the individual can control, motivation is a challenge for managers, they can influence it, for the benefit of the organization, creating a work environment that supports and inspires employees a high level of motivation. The motivation is therefore intrinsic land. (Deci & Ryan, 2010) But external forces bring to trigger the behavior, to orient it, to invigorate it, to maintain it in order to achieve the expected objectives. In public administration, human resources are a particularly important issue, as even the best administrative laws cannot give the expected results if those who apply them, civil servants, do not have adequate training.

Approaches to understanding and explaining motivation are different because many theorists have developed their own opinions and theories about motivation. They approached motivation starting from different points of view, from ideas determined by the socio-economic and political conditions existing at that time. None of the approaches can be considered the most correct and comprehensive. Each contributes to the understanding of human behavior and has its limits. The study of the epistemology of the theories of the organization highlights numerous theories on motivation. Many of these theories can be divided into two broad categories, each with a number of other concepts:

1) **Process theories of motivation focused on explanations of motivation** that emphasize how people are motivated. There are four important theories that describe how and when a person goes through the motivation process:

- Needs - objectives theory of motivation: Theoretically, motivation is triggered by a need that must be transformed, through a series of stimuli, into a behavior aimed at supporting, or accepting, another behavior that aims to meet the goal of satisfying the need.
- Vroom's theory of expectation: This theory is also based on the premise that needs give rise to human behavior. However, Vroom's theory introduces in the motivation process the problem of the force that it has, respectively the desire that a person has to follow a certain behavior (Parijat, & Bagga, 2014).
- Equity theory: J. Stacy Adams, the founder of this theory, found that when employees feel that they have been treated unfairly compared to their colleagues, they will act in a certain way, changing their behavior (Adams, 2005).
- Porter-Lawler's theory of motivation: Describing more fully the motivation process than other theories, Porter and Lawler believe that needs give rise to human behaviors and that the effort to accomplish a task is mainly influenced by the perceived value of the results (Khan, 1993). embracing the behavior and the perceived probability that the behavior will give rise to these results.

2) **Content theories of motivation: human needs.** There are explanations of motivation that emphasize people's inner traits. They focus on knowing people's needs and how these needs can be met. To this end, a series of theories have been devised to help managers better understand these needs:

- Maslow's hierarchy of needs. Maslow's concept of the hierarchy of needs argues that human beings have five basic needs, ranked according to their importance and the order in which people generally strive to meet them: physiological needs, security or safety needs, social needs, needs for consideration and needs for self-improvement.
- Alderfer's theory. Responding to a series of criticisms of Maslow's theory, Alderfer explains human needs and divides them into three basic categories: necessities of existence, needs of association, and needs of development.
- Argyris' theory of the maturity-immaturity spectrum. Also providing information about human needs, this concept focuses on the personal and natural evolution of people to explain human needs. Thus, as people mature, they show increasing needs for sustained activity, have deeper interests, are able to adopt a long-term perspective, are more self-aware, and have better control over their own destiny.
- McClelland's theory of acquired needs. It is a theory that explains human needs and focuses on the desire for achievements, power and association that people manifest as a result of the experiences they live in life. This theory focuses on three of the many needs that arise throughout life: needs for achievement (the desire to do something better or more efficiently), needs for power (to control, influence, or be responsible for others), and association needs (desire to maintain close, friendly personal relationships).

From a management perspective, motivation is one of the four interdependent activities of the influencing function - leadership, motivation, communication and consideration of groups - which are performed by managers to guide the behavior of members of the organization to achieve its objectives.

Work Motivation in the Public Services Sector: Concept and Dimensions

One of the important questions raised by public management is whether individuals behave differently when working for the public or private sector. If it is accepted that a person's behavior depends on his individual characteristics and his environment, then it is a question of knowing, on the one hand, whether the motives, values and needs of civil servants are different from those of employees in the sector. private, and on the other hand, if the environment of public organizations provides a solid institutional framework similar to that of private organizations in order to motivate their employees and therefore to trigger the best performance (Brewer & Brewer Jr., 2011).

Traditional theories of motivation at work have provided important theoretical tools, so-called determinants, most of which are based on neoclassical assumptions that the individual, being rational, systematically seeks to maximize his personal benefits. Following the neoclassical paradigm, rational choice theories or public choice argue that the behavior of individuals at work, both in the bureaucratic system (public) and in the market system (private), is transformed by maximizing their own interest, because individuals are selfish and tend to behave like stowaways (Weibel et al., 2010). These are stereotypes that implicitly suggest that public and private sector employees are identical; they respond directly to the incentives offered to them, as well as to the opportunities and constraints of the organizations in which they work.

This stereotypical view of public organizations has been criticized and rejected by many authors in public management (Hondeghem & Vandenabeele, 2005; Perry et al., 2010; Brewer & Brewer Jr., 2011, etc.). while it is true that public or private employees may respond to incentives that are offered to them, however, depending on the values that predispose an individual to work in a sector, an incentive may be the basis for motivated behavior in a given sector, and not in another sector. For example, private agents can be animated mainly by utilitarian incentives, while civil servants are animated by normative and emotional incentives.

Unlike private organizations that seek to maximize their profit and therefore their own interests, public organizations aim to defend the general interest, to ensure collective well-being. It is therefore normal for public officials to be particularly motivated by community or collective motives. The collective interest must take precedence over the personal interest, although the latter always exists in any official, as is the case with all individuals. As a consequence, theories based on self-interest could not provide reasons to analyze the motivation of employees, in particular public sector employees. (Moynihan & Pandey, 2007)

Scientific papers suggest that work motivation of public sector employees is very different from that of private sector employees (Ciobanu et al., 2019, Cornean, 2020). Research on motivation in the public sector has shown that it results from the interaction between the individual characteristics of the employee and the organizational environment. These two broad categories of behavioral determinants are used as a tool in identifying and understanding the motivating factors of work in public services. Studies show that the individual characteristics of public sector employees and their work environment are different from those of the private sector. (Brewer & Selden, 1998) Therefore, certain sources of motivation of public servants seem to be different from those of private sector employees. From the two categories of determinants of work motivation, **four variables can be retained: employee motivations; work context; job characteristics; attitude towards work.**

These four variables of individual characteristics and organizational environment will be further analyzed in terms of involvement in the motivation of work in the two sectors - public and private - to highlight the differences between them:

a). Employee motivations.

They derive from the individual characteristics of the employees. Research has shown that civil servants' motives are more oriented towards the ethics of good consumption, the spirit of sacrifice and altruism that converge with the state's mission focused on satisfying the general interest and ensuring collective well-being, while the motives of private sector employees are to maximize their own utilities, thus attaching greater importance to financial rewards (Crewson, 1997), which is in line with the goal of private organizations, which is to maximize their profit.

Studies have shown that public sector employees are more motivated by a sense of usefulness to users and the support of their neighbor, a willingness to serve the state and contribute to the defense of the collective interest or

through intrinsic rewards (Perry & Wise, 1990). Unlike their private sector counterparts, public officials they seem to be little motivated by extrinsic monetary rewards.

In support of this assertion, we recall the empirical work of Buelens and Van den Broeck on 3,314 private sector employees and 409 public servants in Belgium (Buelens & Van den Broeck, 2007). In the same vein, Houston's work indicates that civil servants place greater value on intrinsic incentives that provide a sense of self-fulfillment, while private sector employees attach more value to extrinsic elements, such as a high level of income (Houston, 2000).

Other research has shown that public sector employees attach more importance to higher needs (needs for fulfillment, autonomy, self-actualization and development) than their private sector counterparts. Public sector employees are more motivated by content jobs, recognition, interesting work and the opportunity to learn new things. (Jurkiewicz et al., 1998)

It can be noted, as a conclusion of this research, that individuals with a pro-social behavior, wanting to put themselves in the service of the public interest, to support the disadvantaged, to contribute to the well-being of others, are much more likely to integrate into public organizations, while individuals who are motivated primarily by the care of defending their own interest, of maximizing their own utility, are more inclined to integrate into private organizations. Therefore, studies have shown that individuals who place great importance on money seek to integrate into the private system in which they are confident that they will be better paid than in the public sector. In other words, the assertion that people tend to choose organizations that are compatible with their own values or motives and in which they can meet their needs is learned.

b). The work context.

It refers to the characteristics of the organizational environment in which people work. According to Perry and Porter (1982), the work context is limited to issues that are found in both the immediate and the extended environment of the employee. The immediate environment refers to the interpersonal relationships of the employee with colleagues and the hierarchical superior, as well as to the work environment that these relationships create as a friendly atmosphere and the conditions of physical work environment (conditions of sound, thermal, visual, atmospheric hygiene and general condition of the work space, office location, cleanliness, comfort). The extended environment includes elements of job security and stability, the reward system, goal setting, formalization, fairness and procedural justice (the way agents are treated and the way organizational rules are administered).

The work context of public organizations is often perceived as fundamentally different from that of private organizations, due to the fact that their missions and functions are different. Thus, the public sector has the task of fulfilling social missions, promoting collective well-being, protecting the population and providing society with public goods and services that, due to the externalities that cause them, cannot be easily provided on the market. (Wright, 2007)

Instead, private organizations aim to maximize their profits and, by rebound, must be productive and competitive (Dobrin et al., 2015). A number of researches have pointed out that there are more ambiguous objectives in public sector organizations than in private enterprises, making it difficult to mobilize civil servants by providing accurate information on objectives and achievable organizational performance, organizational commitment, as well as reducing the motivation of public officials.

The hierarchical level is also considered as one of the major determinants of the differentiation of motivation in the two sectors. The organizational structure of public organizations is considered to be heavier than that of private organizations. Thus, public organizations have the highest level of formalization, scriptology and centralization (Buelens & Van den Broeck, 2007).

However, civil servants are likely to be motivated to achieve their performance goals because they place more importance on their job, due to the fact that they work for the state, which provides very important public services to society. As a consequence, they are likely to consider the provision of such services to the community as a personal duty. The works of Jurkiewicz and Brown (1998) pointed out that civil servants are more motivated by job security and stability compared to private sector employees, who are much more interested in high incomes.

c). Job characteristics

The activities required by a person's job in an organization are usually summarized in a formal description in the job description - an organizational document that lists the activities to be performed by the person in the job and is also

specified responsibilities and limits of competence. An unclear job description can be confusing to employees and cause them to lose interest in the job. When properly designed, job descriptions communicate to employees what the job is, set performance levels that employees must maintain, and act as a guide that they must follow to help the organization meet its goals (Girneata et al., 2015). Therefore, posts must have certain characteristics capable of creating the conditions that give rise to greater motivation. The most motivated employees work better. This evidence has led various researchers to highlight the motivating factors.

This theory of job characteristics describes the conditions that a certain job must offer to arouse the interest and motivation of the employee. From this point of view, motivation is born from the balance between three psychological dimensions: work must be capitalized; the person must feel responsible for his results; the person must be constantly informed of his results. According to Hackman and Oldham, the more the three dimensions are satisfied, the less the employee will be absent and will have the desire to leave the company, in addition he will be motivated and efficient.

Some studies suggest that civil servants are more likely to feel that their tasks are important and challenging, because public organizations provide employees with the opportunity to address important social issues (Perry et al., 2010). Indeed, public sector employees may be motivated because they have the feeling that the tasks they perform have a considerable impact on improving the living conditions of society, especially the most disadvantaged people, or contribute to ensuring a certain degree of social equity.

In addition, given the multiple functions of the state and given that public bodies often have more influential missions and a greater impact on society than private enterprises, public posts can be challenging and require a variety of skills. And if the mission of the organization is important and in harmony with their own values, the tasks entrusted to them will also be perceived as important.

However, a number of researches have shown that civil servants think that the private sector has a better chance of providing interesting jobs (Buelens & Van den Broeck, 2007). The public sector would, in principle, is characterized by administrative posts that are likely to have more routine activities, while the private sector, through productive posts and those related to the marketing and sales function, involves several challenges.

Other research has not found differences in the characteristics of public and private sector jobs. Thus, for example, the results of the research undertaken by Rainey and Bozeman (2000) reveal that civil servants face the same level of difficulty in some tasks as their counterparts in private enterprises.

Also, in both the public and private sectors, routine tasks with non-precise objectives have a negative effect on motivation, while specific and clear tasks reinforce it. Perry and Wise (1990) suggest that civil servants feel that their tasks are more important and contain more challenges than private sector employees. This feeling results from the perception that they work for organizations that have more functions and provide public services that are very important for the population.

However, these characteristics of the public sector position (variety of skills, importance of the task) that favor motivation sometimes seem to be in contradiction with the work context that is not always favorable (such as through multiple, ambiguous and contradictory objectives, procedural constraints, centralization thus reducing the level of autonomy and identity of tasks in the public sector).

In conclusion, it appears that the differences in job characteristics between the public and private sectors exist mainly due to differences in the employment context of each sector and the importance of tasks (public sector tasks generally have a considerable impact on the functioning of the company).

d). Attitude towards work.

It is one of the variables on which researchers rely to determine whether civil servants behave differently from private sector colleges. The differences found in the motivation of public and private sector employees, as well as in their work context, translate into the adoption of different attitudes and behaviors at work.

In general, job satisfaction analyzed as the main attitude towards work results from the congruence between employees 'expectations from their job (employees' reasons) and what they receive (work environment). Thus, numerous sources of job satisfaction are: salary, promotions, job security, supervision, work group characteristics, participation, organizational structure and organizational climate. In the literature, the comparison of the two sectors - public and private - is at the center of contradictory debates.

Most of the work on attitudes towards work identified a low level of satisfaction with public officials, argued by the cumbersome organizational structure of public organizations, procedural constraints, ambiguous and sometimes contradictory objectives that hinder the factors that could contribute to job satisfaction. civil servants (such as the opportunity to perform altruistic tasks, to contribute to collective well-being. It should be emphasized, however, that studies that found civil servants to have a lower level of job satisfaction used to measure job satisfaction. In general, specific factors of work, such as: promotion perspective, salary level, autonomy in work, however, these facets of work seem to be frustrating in the public sector, especially due to the lack of autonomy in work generated by procedural constraints and political interventions. papers with the same research topic found contrary results, respectively, showed that civil servants are generally more satisfied with their job (DeSantis & Durst, 1996).

Although empirical studies have provided varying results regarding the difference in job satisfaction of civil servants and private agents, they do not suggest a large gap between the two sectors. Related to this aspect, there is the impact of another concept, namely "employment" which is, along with satisfaction, an important attitude in determining the behavior of individuals at work (Ritz, 2009). Numerous empirical researches on the comparison of organizational employment between civil servants and private sector employees has found contradictory results, depending on the context of the economic, social and cultural environment of the organizations included in the samples of research undertaken.

A number of studies have highlighted, through a comparative analysis, that the level of organizational employment of private sector employees is higher than the level of employment of its public sector counterparts. Some research papers have found, among other things, that the employment of public managers is positively related to continuous employment, respectively their desire to remain in the organization, but does not necessarily translate into the decision to make considerable efforts for the benefit of organization (Balfour & Wechsler, 1991).

Other empirical research has led to results according to which civil servants are much more engaged in their work than their private sector counterparts. Such a level of commitment may be due to the fact that civil servants do not have rational reasons as the only source of motivation, but normative and affective reasons. These studies have shown that civil servants are employed in their organization especially under the impact of motivating factors towards work in the public sector.

Conclusions

Knowing the reasons that generated the behavioral actions of employees gives meaning to the managerial activities within any organization. Knowing these reasons can be the generators of increasing the efficiency of actions and can contribute to the prediction and understanding of human behavior, as well as to decipher its moral value. In organizational theory, and later in human resource management, motivation has been related to operational effectiveness in the work of individuals, often being linked to an instrumental logic. Currently, there is a change of perspective: professional success is due to motivation and not just skills proven by the individual.

The motivating factors that could lead to the increase of the subjective value of work, taking into account the particularities of different situations and people, are non-pecuniary factors. Among these can be mentioned: appreciating the success of employees, setting goals that lead to competition, permanent information on the financial situation, informing the stage of achieving objectives, encouraging personal initiative, imprinting a climate of autonomy, freedom, creativity, care for the professional future, acquisition of intelligence.

Motivational theories emphasize either that staff have different needs that must be met and depending on their satisfaction they will be more or less motivated to work hard to achieve goals, or that motivation occurs in the work process, which leads to the conclusion that the work must be designed in such a way as to be as attractive and motivating as possible for the person submitting it. Thus, the public management has an important role, namely to identify the system of needs for each team or for each civil servant, in order to use the most appropriate ways to motivate. Among the ways that can be used in the motivation process can be mentioned: salary as a means of motivation, position as a means of motivation, objectives as a motivating factor, alternative work programs and total quality management.

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The Effects of Company CSR on Generation Z – Example of an Insurance Company

Nevenka POPOVIĆ ŠEVIĆ, Ph.D.
Faculty of Contemporary Arts, Belgrade, Serbia
e-mail: nevenka.popovic.sevic@its.edu.rs

Milica SLIJEPČEVIĆ, Ph.D.
Faculty of Management, Metropolitan University, Belgrade, Serbia
e-mail: milica.slijepcevic@metropolitan.ac.rs

Milena ILIĆ, Ph.D.
Faculty of Contemporary Arts, Belgrade, Serbia
email: milena.ilic@fsu.edu.rs

Abstract

The purpose and the objective of this paper are to examine the essence of the social responsibility concept by way of an example of a respected Serbian company doing business in the insurance industry, with a special focus on the opinions and attitudes of Generation Z. The objective of this paper is to examine the availability of information concerning CSR activities in the local community, as well as the broader one, with a special emphasis on its development, as well as aid in the spheres of culture, science, and education, sports and assistance for the socially disadvantaged. This objective is to be achieved using quantitative research and individual interviews. The road to a proper strategic direction is paved by linking company work with responsible business and adequately communicating with target audiences. This paper underlines the significance of informing the target population factually and in a timely manner, resulting in comprehensive and transparent information about the CSR activities undertaken in the insurance industry.

Keywords: Socially Responsible Business, Organisational Support, Business Competitiveness, Generation Z, Insurance Industry

Introduction

In companies with a modern approach to CSR activities, it is believed that young members of Generation Z should participate in many activities and initiatives, especially those that require digitalisation and complete robotisation of the business process. One of the suggestions being made is the so-called responsible organisation and turquoise management model, which is increasingly being seen as a response to the views of the younger generation (Sobotka, 2019).

Within 'today's modern framework, the so-called responsible and self-aware companies' model is based upon self-aware people employed by the company itself. They are the ones who create their own work environment rather than being mere observers (Ohme, 2018). The development of such a direction is based upon increased care and readiness to act. This type of company is characterised by a low tolerance to every possible aspect of dysfunction in business.

The turquoise management model is based upon three core foundations: self-organisation, integrity and evolution. The self-organisation is formed as a type of negation of the hierarchical model of management where it is given to each employee to manage, whereby each employee takes responsibility equally, as all is based on mutual trust. Integrity presupposes the abolition of boundaries between the 'employees' professional and personal lives, which is believed to achieve the best possible business results, as no form of employee imperfection is covered up. Finally, evolution views the company as a living organism moving in a certain direction. Regardless of the long-term business goals, a company primarily depends on the signals received by its immediate environment and the actions of the company team (Laloux, 2018). Younger generations, among others, the Z one, would fit perfectly within the above-

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mentioned company business models, as they strive for self-fulfilment in a way requiring internal motivation for all CSR activities in the company, as well as active business creation.

Companies that achieve good financial results allocate significant funds and resources to CSR activities in order to improve relations with employees, care for the environment and, generally, when it comes to relations with the immediate and wider community. In the long term, the means allocated can become a significant strategic advantage in achieving a more efficient corporate image and improving relations with shareholders, as well as improving opportunities to attract new employees (Manokaran et al., 2018). Interestingly, the author Friedman (2017) believes that the management of any company only has a single obligation, and that is to maximise the profits of owners and shareholders, and that social issues should be voluntary actions of free-market systems, rather than business issues. According to one study (Lim & Greenwood, 2017), CSR communication developed from one-way to two-way (correlative). In this way, companies and their brands have been allowed to increase the commitment of shareholders to caring for consumer motives and needs. If consumers identify the basic motive of companies as providing services to others, they can develop positive feelings and attitudes to CSR projects undertaken by those companies (Peloza, Ye & Montford, 2015).

It is believed that the increased popularity of CSR activities within the insurance industry is related to the intention of insurance companies to strengthen their business image within their long-term business engagement (Okhrimenko & Hranchenko, 2018). CSR is a modern tool intended to improve the sustainable economy as well as a resultant CSR philosophy of the leading industries of every economy with the aim to provide innovative know-how techniques and practices that lead to economic development (Popovic-Sevic & Bajalski, 2019).

Experts believe that the share of the insurance industry in the GDP sphere may increase to a significant 7% by 2020, with such a share being associated with an increase in net premiums as well as a remarkable increase in the number of companies offering insurance services (Trynchuk et al., 2019). Interestingly, the increased numerical presence in the insurance industry (Sulkowska & Cycon, 2017) does not directly contribute to increasing awareness and insurance culture among insurance users, with most of them viewing CSR activities in the insurance industry exclusively as a trend (Khoma et al., 2018). Unfortunately, this is evidenced by a lack of financial investment in CSR activities of the insurance industry for a long period of time (Makarenko et al., 2018).

When it comes to insurance companies, all three target groups – employees, clients, and potential investors are important for determining CSR activities. In this sense, it is considered that the greater the trust in the insurance company, the more impact it will have on the market value of that company (Szczepanski & Switalska, 2018). This consequently means that CSR activities in insurance are not just a trend, but rather a necessity for insurance companies.

In summary, it is of special importance to identify the impact of CSR communications on Generation Z, as not only are they the second most numerous demographic, but their purchasing power has been said to be the greatest (Fromm, 2018). The main goal of this research is to examine the impact of CSR communications on Generation Z consumers, their purchasing habits, as well as on special connections to brands in the insurance industry.

Generation Z

Modern technologies have caused the younger generations to be continuously exposed to, and under the influence of numerous sociological and technological challenges in their immediate environment, which has resulted in the acquisition of new skills and knowledge necessary for access to most information systems. Full automation of activities, the use of artificial intelligence systems and digitalisation have become omnipresent in all spheres of production and services processes, as well as in the everyday lives of consumers.

Gen Z is the first generation that has never experienced life before the Internet, and its members are defined as a kind of digital nomads (Akcayir et al., 2016). This means that this generation is the first in a series to which information technology is accessible from an early age, which has had revolutionary consequences on the lives of its members – ranging from various social interactions to mental health, as well as behaviour in their private and professional lives (Carbonell et al., 2018). This has the further consequence that Generation Z cannot be technologically dependant, for the simple reason that information technologies have been an integral part of their lives from their very beginning.

Generation Z is also called by other names, such as“postmillennials“", “ the digital generation“, “dotcom generation”, “e-generation”, “switchers”, etc. It is also known as Generation C. The members of this generation are also better versed in the use of various information gadgets. Instead of traditional toys, they prefer the use of electronic gadgets, cosmetics and branded clothes as children (Peszko, 2018). They are a kind of digital immigrants, communicating in a digital language in almost all spheres of their activities. They spend a lot of time in front of the screen (computer, laptop and mobile phone), mostly using chats and various forms of social networks as a means of communication. They prefer the content found on the Internet, spending much time surfing it and watching YouTube videos. They are proponents of the digital way of learning, preferring to use short educational videos and short online workshops (Tick,

2018). The use of computers has become a part of their daily lives, even while at home. Television is completely obsolete to them, replaced by the world of the Internet.

Generation Z is thought to have $29-$143 billion in consumer purchasing power, and its members even control about 93% of the purchasing decisions of their families. Also, they are recognised as the most diverse generation by ethnicity and sexual choices, and is therefore considered to be fairly free-spirited (Grace & Seemiller, 2016).

Compared to previous generations, Generation Z has different conceptions on the topic of relationships, communication and mutual activities. Why is it so important to differentiate between various generations of consumers? Simply put, it is because all generations are intertwined, connected in everyday life through living and working together, communicating with each other. Finally, there are differences in the motivational wheel as the initiator of the communication process, when making important life decisions, but also when it comes to different types of purchases, differences that are obvious in the behaviour of consumers of different age groups (Csobanka, 2016). It is believed that members of each generations are interconnected primarily owing to shared experiences, mainly through customs, various cultural events, economics and politics, popular culture… All experiences in regular and emergency situations make them a unique group, not by age, but in a sociological sense.

It is believed that the development and application of modern technologies will affect many sociological and economic changes and open numerous ethical problems in the future for the following reasons (Mesko et al., 2017): (i) they will occupy all areas of human existence and functioning, allowing access to even the most sensitive personal information of technology users; (ii) robots will most likely replace humans in areas where they were not present until recently (such as activities that require much more mental and creative work). Looking at Generation Z, predominantly users of modern technologies, it is able to offer the following:

- Expeditious feedback with the aim of communicating with other parties – modern technologies provide the ability to see and talk online, along with other global forms of communication;
- Complete independence in terms of access, work and further provision of information – they provide space and 24-hour independent communication in all areas of life and work.
- Increasing the effectiveness of work on online platforms – technical devices will replace humans in many activities, which will automatically mean less work for people;
- Enables further development and expansion of online education – in addition to online studies, the Internet is an excellent platform for independent learning and upgrading specific skills and knowledge.

What else defines and characterises Generation Z? They are highly intelligent, but it is noticeable that this does not transfer to emotional intelligence. They are more inclined to diverse activities compared to previous generations. Despite the fact that they are generally able to perform several activities simultaneously, their concentration drops over time, so long-term memory is a problem. They may live a happy life, but their values are derogated. Their present is completely virtual and strictly controlled – if they are not online, they almost do not exist! In that sense, there is an important paradox – a virtual presence on social networks means that they are not alone, but on the other hand, many members of Generation Z are very lonely.

One study found that this generation feels constant pressure from a variety of sources, be it poverty, school, unequal economic opportunities, war, etc., and that members of this cohort feel that they live extremely stressful lives (Global Millennial Viewpoints Survey, 2019). They are characterised by impatience and egocentrism; they love everything with an immediate nature and outcome (Yuliana, 2018). They start, but also complete many things later than the previous generations, beginning with separation from the immediate family, completion of formal education, finding and retaining a job, forming a marital union, expanding the secondary family, and so on (Bencsik et al., 2019).

Everything in the lives of the Generation Z is consumeristically “fast” – frequently changing partners, places of residence, workplaces and more. In this context, many describe them as an unstable generation living with constant fear, despite their flexibility. They are described as a generation with a heightened degree of depression, isolation and laziness. As a result, they seldom get attached, both to people and things. Another issue with Generation Z is the form of direct communication and acceptance of criticism and suggestion in the workplace, resulting in a reduced loyalty rate and often a lack of basic responsibility for undertaken activities (Ray & Singh, 2018).

Many resent Generation Z for their narcissism and their noticeable lack of empathy compared to previous generations. They do not have strong relations with their primary families, which was not the case with their predecessors. The opinion of their peers is more important to them, often excessively so. In that sense, media channels, as well as their representatives (celebrities and blogger) are the ones exercising a lot of influence on them. In an educational sense, they prefer independent learning styles where reading is cast down to a secondary position (with new reading strategies being present) and with physical activity playing a significant role. As a consequence, they are structured by images, with the text being of secondary importance, reading being done “between the lines”, thus being faster and more efficient. Thus, those belonging to Gen Z are further confirmed to receive text simultaneously – they can process a lot of information at the same time.

Those belonging to Generation Z like various media channels that combine writing, images and videos, all in order to be able to express themselves through them. For members of Generation Z, Facebook is long since obsolete, and almost all of them have left it and are instead widely found on Instagram, Line, Tik-Tok, Snapchat, YouTube, WhatsApp, Jott. They choose social networks that store content only 24 hours a day. To them, writing and sharing texts on social networks is almost unknown – instead, video, photo and audio content are shared.

All these characteristics are extremely important for companies that deal with CSR and want to share their values with their customers, including members of the Generation Z, in a certain manner. Consequently, companies will recognise the necessary method of adapting the news and content of a certain socially beneficial activity, in order to get the attention of these young people. With the rapid changes in IT technologies and communication with their customers, many companies will find it necessary to transform their appeal to their target audiences.

CSR Perception of Generation Z

In the era of high information technologies, young members of Generation Z are changing society, but society is transforming them as well, through a various set of socially responsible activities. The sociological environment is of great importance for members of Generation Z who prefer to work in a team. Since those belonging to this generation are quite confident in themselves, they want some kind of a secure future. They know that work is important in that sense, for the sake of achieving their life ambitions. If not realised, it can make them very unhappy. If they are in any way unhappy or dissatisfied at their workplace, they have no problems leaving it and very quickly starting business activities elsewhere. They are fiercely independent and intolerant of authority of any kind, and they do not have cut out or defined relations with any particular generational group that came before them.

In terms of consumption, Gen Zers want to be actively involved. One study found that as many as 48% of teenagers receive pocket money on a regular basis, which they proceed to spend according to their style and tastes (Olczyk, 2018). Despite the fact that Generation Z is not overly focused on advertisement messages, it cannot be said that they pay no attention to them at all.

According to one research, Generation Z prefers creative approaches to company strategies to regular ones (Stupinska, 2018). Namely, they are more oriented towards companies through which they are given the opportunity to influence the development of certain matters within the company (31% of Gen Zers versus 25% of Gen Yers). Young people value the ability to demonstrate originality and style with every socially beneficial CSR activity, with different opinions being maximally respected – that is definitely the way to gain the full support of Generation Z. The thing that Generation Z certainly has in common with the generation that preceded it is that they strive for education, but also for entrepreneurship. They are not afraid of challenges and are ready to face completely unpredictable situations and work-related tasks, as well as to try finding the best possible solutions in the shortest time frame possible.

Given the experiences of financial institutions, it is certain that the industry is facing intense competition. The financial and even insurance sector is continuously faced with the most diverse technological challenges, which are an important factor in the industry.

Numerous changes in the business environment are forcing financial institutions to innovate with their products, which is to say, their offers, in order to maintain a competitive advantage (Miletic et al., 2018).

It is indisputable that the younger generation would prefer to be informed about all CSR activities performed by a financial institution through a system of various social networks, as that medium is the one they are most receptive to (Dootson et al., 2016). In that sense, it is necessary to regularly update content posted on social networks, all the while increasing interaction with the youngest users.

Gen Zers correspond with institutions in a very analytical and pragmatic manner. Thus, companies communicating their CSR values should modify their communication with Generation Z in three ways (Francis & Hoefel, 2018):

- Access to activities through co-participation, rather than through possession of things or events.
- Clarification of CSR activities through the possibility of preserving the wholeness of each individual.
- Approach to all socially responsible activities through the ethical prism of business.

The thing that Generation Z finds most important when it comes to CSR activities is the accurate and faithful presentation, whether pertaining to the actions of a company or an individual. Insisting on authenticity, but also on preserving the freedom of communication, marks the tendency of the members of generation Z to freely express their opinions and attitudes, with the aim of better understanding others. By using the Internet, Generation Z wants to demonstrate its freedom, but also to express theiropposition to gender divisions, as everything to them. They have an interest in those companies in which state-of-the-art IT technology is at the forefront and where jobs are based on a multitude of projects. They also like to work at, and highly value companies where co-working is an option (Ozkan & Solmaz, 2015).

Companies should focus on some of the special characteristics of Generation Z, which is to say constant and ethical communication, as well as dialogue. This generation does not like confrontation and wishes to express its uniqueness in a pragmatic manner. That is why they are called "identity nomads." However, for the sake of some common interest, they are more than willing to mobilise their own resources and join the majority, which may have a different attitude from their own at a given moment (Francis & Hoefel, 2018). The same study showed that they are ready to boycott companies whose campaigns or any other activities are associated with racist, homophobic and unethical actions.

In accordance with the above, members of Generation Z expect open and clear communication from companies, and should they have certain inquiries or objections to their activities, they will demand their efficient resolution. They presuppose a dialogue with companies that is devoid of all stereotypes and desire pragmatism at all costs. This further means that, when communicating its CSR values, a company should clearly discern the ideas and values of Generation Z, and adapt its messages to its value system. This is especially challenging for large companies that face a number of ethical challenges in doing business, as there is a preconception that big brands are somehow less ethical compared to smaller ones. In that sense, it is of the utmost importance to communicate all activities with Generation Z, without exceptions. Communicating with members of Generation Z, along with everyday technological and other challenges, brings with it numerous new advantages of transforming communication that should be wisely marketed.

Methodology

The research was conducted in order to determine the attitudes of the respondents about their perception of the insurance company (hereinafter the Company) as socially responsible. The company is a leader in the insurance market in Serbia, with about 3,000 employees. It covers the entire insurance market, and its organisational structure consists of the General Directorate and the main insurance branches in 29 of Serbia's largest cities and more than 600 points of sale. The Company was founded 45 years ago, and since its establishment, in addition to its core business, it has invested significant funds in the development of the community, trying to reinforce its brand and the trust of its users and the citizens of Serbia.

In the 15/05 – 23/05 2018, extensive research was conducted with the aim of reviewing the attitudes and experiences of Serbian citizens in the insurance market, as well as the perception of the Company as socially responsible. The research covered different categories of the population according to gender, age, occupation, work status and income. All respondents live and work in the territory of the Republic of Serbia, excluding Kosovo and Metohija. In this paper, the authors will mainly focus on the views of the youngest respondents, most of whom belong to Generation Z (as part of the survey sample), but will not discard the rest of the sample.

The size of the research sample was 1054 respondents, of which 48.8% were male and 51.2% female. By age the sample was structured as follows: 18-29 years old - 18.3% of respondents; 30-44 years old – 24.7%; 45-59 years old – 27.0%; and 60+ 30.0% of respondents. The percentage of respondents who didn't go to school, have not finished primary school, or only finished primary school, as well as those who completed a two-three-year secondary school is 52.1%. Those who have finished a four-year high school, gymnasium and specialisation make up 31.0% of the respondents, and those with a completed university or college make up 16.9%. Of the 1054 respondents included in the survey, 260 belong to the youngest group of respondents, 18-29 years old, which includes Generation Z.

By employment status, 10.8% of respondents are employed in the public sector, 1.3% work in the social or mixed sector, 28.0% in the private sector, 22.4% are unemployed, 25.8% are pensioners and 1.1% are farmers. Pupils and students make up 6.2% of respondents, informally employed (undeclared labour) 2.2%, while a further 2.2% of respondents did not wish to answer the question pertaining to their employment status.

Those who have no income make up 26.0% of the respondents, while 6.9% of them earn up to 15,000 dinars. Those whose income amounts to 15.001 to 29,999 dinars comprise 29.1%, 30,000 to 49,999 16.2%, while those with incomes that are equal to or exceed 50,000 dinars make up 2.9% of respondents. There were also 18.9% of those who did not want to answer this question. By place of residence, 60.8% of respondents live in urban areas, while 39.2% of them belong to the rural population. Regionally, 21.3% live in the Belgrade Region, 28.1% in Vojvodina, 28.9% in Western Serbia and Sumadija, while 21.7% live in Eastern and Southern Serbia.

The method of data collection was PAPI, a quantitative research in the form of personal interviews where well-trained interviewers had a printed questionnaire from which they read the questions to the respondent and filled in the answer. The data entry software used was WARP IT, a professional licenced market research program with a wide range of options when setting up a project. SPSS was the software used for data analysis. In order to control the credibility of the answers and the obtained results, repeated interviews of 20% of respondents were conducted. Poststratification was conducted in order to eliminate non-responses due to refusal of interviews, the variations of poststratification being age and education. The margin of error is 1.3 p.p. for an incidence of 5%.

Categories that did not wish to provide answers were excluded from the analysis when cross-referencing the variables.

When cross-referencing the variables, the "didn't go to school, have not finished primary school, or only finished primary school, as well as those who completed a two-three-year secondary school" represents the "primary school" category. The category "four-year high school, gymnasium and specialisation" was compiled into the "secondary school" category.

In the segment of employment status, the categories employed in the social or mixed sector, farmer, and informally employed (undeclared labour), as well as those that earn upwards of 50,000 dinars are low-frequency categories (<5%) and are observed indicatively when cross-referencing variables. The Chi-square test was used to prove the second hypothesis.

Hypothesis 1: Generation Z lacks information regarding CSR activities in the local and wider communities.

Survey question 1: How familiar are you with the CSR activities of the Company in the local and wider communities?

Survey question 2: Does the Company aid the development of the local and wider communities?

Survey question 3: Does the Company aid the development of culture?

It is believed that managers within the company should know and understand the cultural characteristics of their consumers/users in order to adequately implement their CSR strategies in the long run (Hur & Kim, 2017). In addition to the form of communication through a country's cultural sector, the manner in which a company determines its priorities when it comes to its relations to CSR initiatives in the cultural sector is of the utmost importance. In this context, the importance of the manner in which companies communicate CSR information is particularly emphasised (Ott & Xiao, 2017). It is a common belief that, in a way, it is the responsibility of companies to spread cultural sustainability among their own shareholders, as well as to put forward innovative projects in direct cooperation with the local community (Tamagnini & Baldo, 2019).

Survey question 4: Does the Company support science and education in society?

Survey question 5: Does the Company aid socially disadvantaged people?

Survey question 6: How should the Company aid socially and materially disadvantaged people?

Survey question 7: Does the Company promote sports?

Survey question 8: Which projects should the Company support?

Hypothesis 2: There is no statistically significant difference in the answers of the respondents depending on their education level in relation to the variable: When choosing an insurance company, I take into account whether it cares about the local and wider communities.

Survey question 9: When choosing an insurance company, I take into account whether it cares about the local and wider communities.

Data Analysis and Research Results

Table 1: Social community development by the Company across the regions

Company – social community development	Urban	Rural	Belgrade	Vojvodina	Western Serbia	Eastern and Southern Serbia	No income	Less than 15k	15-29,9k	30-49,9k	Over 50k
Yes, but I am not familiar with the project.	27.6	24.4	29	22	33.1	20.2	24.8	19.2	23.2	32.2	30
Yes, I am familiar with a specific project.	0.2			0.3							3.3
It doesn't help the community.	17.5	25.1	17.4	18.2	28.2	16.2	24.5	26	19.9	19.3	20
I don't know if it helps the community.	54.8	50.5	53.6	59.5	38.7	63.6	50.7	54.8	56.9	48.5	46.7

The largest number of respondents stated that they did not know if the Company was helping the community, almost 50% if respondents in all target groups. The vast majority of respondents living in urban areas (99.2% of them) do not know the names of the projects that contribute to the development of the community and that the Company supports, as opposed to only 0.2% who do. When it comes to respondents whose income is more than 50,000 dinars, the result is somewhat better, so that 3.3% of respondents are familiar with specific projects with which the Company helps the community, but the vast majority, 96.7% are not. Some 32.2% of people who earn between 30,000 and 50,000 dinars say that they do not know the exact names of the projects that the Company supports, aimed at developing the social community, but that they do know the Company helps. In Belgrade, almost 60% of respondents claim that they do not know if the Company helps the community, while the percentage of respondents who claim the same in Eastern and Southern Serbia is 63.6%.

Table 2: Responses across various age groups regarding the Company's projects in local and wider communities

	18-29	**30-44**	**45-59**	**60+**
Yes, but I don't know about a specific project.	24.4	27.7	29.5	23.5
Yes, a specific project cited.	0	0	0.4	0
No	21.9	23.5	18.9	20.3
I don't know.	54.8	48.8	51.2	56

Table 2 shows that those belonging to the youngest group of respondents and Generation Z are 3.3% and 5.1% less aware of whether the Company aids the development of wider and local communities compared to the 30-44 and 45-59 years of age groups, respectively. The youngest group either thinks that the Company does not help, or do not now of it helps to a greater extent than these two mentioned age groups of respondents. From the data provided, it can be seen that 24.4% of respondents aged 18-29 have information that the company Company helps the development of the local and wider communities, while 76,7% either think that the Company does not help, or don't know if the company helps.

Table 3: Responses across various age groups regarding the Company's support for cultural programs

	18-29	**30-44**	**45-59**	**60+**
Yes, but I am not familiar with a specific project.	25.5	25.8	24.9	22.7
Yes, specific project cited.	0	0	0.4	0.6
No.	16.7	16.7	21.1	17
I don't know.	56.4	57.8	53.7	59.6

The attitudes of those belonging to the youngest group of respondents, to which Generation Z belongs, are almost identical to those of the 30-44 age group, so that 25.5% of them say that the Company aids culture, but cannot cite a specific project. There is a significant disparity when it comes to answers of different age groups of respondents when they say that the Company does not help culture. There, 21.1% of the respondents aged 45-59 gave such an answer, which is 4.4% more than respondents of all other age groups, even the youngest, the subject of this paper. This question is also answered negatively by all age groups. Some 16.7% of the respondents aged 18-29, including those belonging to Generation Z, stated that the Company does not help the development of culture, and 56.4% did not know whether the Company helps the development of culture.

Table 4: Responses across various age groups regarding the Company's donations to science and education programs

	18-29	30-44	45-59	60+
Yes, but I am not familiar with a specific project.	24.7	22	23.5	19.4
Yes, specific project cited.	0	0	0.4	0.6
No.	18.6	25.1	23.2	18.4
I don't know.	56.7	52.9	53	61.6

Respondents belonging to the youngest generation, Gen Z, are more aware than other respondents that the Company aids science and education in the community (24.7% of them). However, here too, the negative result is clearly dominant, so that 18.6% of them are explicitly of the opinion that the Company does not help the development of science and education, and as many as 56.7% are do not know whether the Company helps science and education. Respondents aged 30-44 and 45-59 mostly said that they did not know whether the Company helps science and education. The least informed are the respondents over the age of 60, with 61.6% of them saying that they did not know if the Company helped science and education in society.

Table 5: Responses across various age groups regarding the Company's contribution to socially disadvantaged people

	18-29	30-44	45-59	60+
Yes, but I am not familiar with a specific project.	25	22.7	26.3	19.3
Yes, specific project cited.	0	0.4	0	0.6
No.	16.7	23.6	21.8	20.9
I don't know.	58.3	53.5	51.9	59.2

The attached table shows that 58.3% of respondents aged 18-29, including Generation Z, do not know whether the Company helps socially disadvantaged people, while 25% of respondents in that age group are aware that the Company helps, but cannot cite a specific project. That is 2.3% higher than in the next age group (30-44), while results are the worst in the 60+ age group, 5.7% lower than with the youngest respondents.

The Company mainly conducts a CSR project for socially disadvantaged people from the categories listed as answers to the respondents. By far the largest number of respondents, 72%, answered that they did not know how the Company should/could help the socially disadvantaged.

About 4.4% of respondents feel that funds should be allocated to humanitarian actions, while almost 3% believe that the Company should finance soup kitchens and 2.7% who think that it should help single mothers and pregnant women. Other respondents answered as follows: construction of shelters 2.2%, financial assistance to the needy 2.1%, assistance to refugees 1.8%, and the same percentage assistance to the poor. Assistance to the disabled – 1.7%, pensioners – 1.6%, assistance to the Roma – 1.5%. Some 1.1% saw free schooling as an area that could use the Company's help, while the fewest number of respondents saw the Red Cross as being in need of help, only 1 % of them.

Table 6: Responses across various age groups as to whether the Company's is socially responsible

	18-29	30-44	45-59	60+
Yes, but I am not familiar with a specific project.	26.6	26.5	32.6	24.4
Yes, specific project cited.	0	0	0	0.3
No.	17.7	17.7	20.07	21.8
I don't know.	55.7	55.7	46.7	53.5

The youngest respondents here have identical results as the respondents aged 30-44, with 26.5% of them perceiving the Company as socially responsible, but cannot cite a specific project. It is interesting that a greater percentage of respondents aged 45-59 see the Company as socially responsible, by a margin of 6.1%. When it comes to the oldest category, however, 2.1% hold that view when compared to the 30-44 age group. As the table above shows, an identical percentage of respondents aged 18-29 and 30-44 answered "no" and "I don't know", constituting the majority in both categories, with 17.7% of them feeling that it wasn't, and 55.7% not knowing whether the Company was socially responsible.

Table 7: Responses across various age groups as to whether the Company is sports donor

	18-29	**30-44**	**45-59**	**60+**
Yes, but I am not familiar with a specific project.	30.6	25	29.8	23.4
Yes, specific project cited.	1	0.8	1.1	1.9
No.	14	23.1	22.5	17.4
I don't know.	54.4	51.2	46.7	57.3

Table 7 shows that 30.6% of respondents aged 18-29 are aware that the Company helps sports, while 54.4% of respondents of that age are not, while 14% think that it doesn't. For the first time, the youngest generation can name a specific project, 1% of them. The lowest percentage of positive answers about whether the Company helps sports is in the group of the oldest respondents, 23.4% of them. However, the highest percentage of those who could name a specific project, 1.9%, is also within this age group.

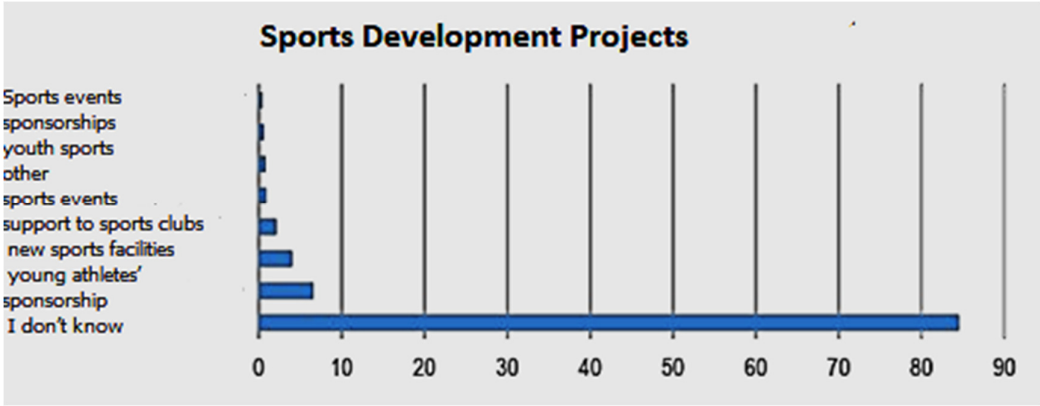

Graph 1: The types of sport projects supported by the Company

Looking at Graph 1, it can be concluded that as many as 84.5% of respondents do not know which sports projects the Company should launch and support in the local and wider communities. The largest percentage of those who commented on specific projects that the Company should support, 6.6% of respondents, thought they should sponsor young athletes/talents, 4% felt they should invest in sports facilities, while 2.1% stated that the Company should support sports clubs. Sports events – 0.9%, other – 0.8%, youth sports – 0.6% and sponsorship of sports events – 0.4%.

The correlation between the level of education under the sample (youngest respondents and Generation Z) and the attitude to the following statements was tested: When choosing an insurance company, I take into account whether it cares about the local and wider communities. Chi-square test was used to test the hypothesis H2: there is no significant statistical difference in the answers of the respondents based on their education level in relation to the variable: When choosing an insurance company, I take into account whether it cares about the local and wider communities.

Table 8: Age group 18-29, education level

	Number
No education, unfinished primary school, primary school, high school 2-3 years	54
4-year high school, gymnasium, specialisation	143
College, university +	63
Total by column	260

Table 9: Data on respondents' attitudes towards the statement

	Yes, but I am not familiar with a specific project	Yes, project cited by name	No	I don't know	*Total by lines*
No education, unfinished primary school, primary school, high school 2-3 years	12	1	16	25	54
4-year high school, gymnasium, specialization	27	1	30	85	143
College, university +	15	1	14	33	63
Total by columns	54	3	60	143	260 (total)

Table 10: Results on the attitudes of the respondents regarding the statement and the relation with education level

	Yes, but I am not familiar with a specific project	Yes, project cited by name	No	I don't know	***Total by lines***
No education, unfinished primary school, primary school, high school 2-3 years	12 (11.22) [0.05]	1 (0.62) [0.23]	16 (12.46) [1.00]	25 (29.70) [0.74]	54
4-year high school, gymnasium, specialization	27 (29.70) [0.25]	1 (1.65) [0.26]	30 (33.00) [0.27]	85 (78.65) [0.51]	143
College, university +	15 (13.08) [0.28]	1 (0.73) [0.10]	14 (14.54) [0.02]	33 (34.65) [0.08]	63
Total by columns	54	3	60	143	260 (total)

At a significance level of 0.5, the following results are obtained: The Chi-square statistic is 3.7998. The P-value is .703743. The result has no significance at $p < .05$., which means that they are independent variables. This confirms H2: There is no statistically significant difference in the answers of the respondents (youngest respondents and Generation Z) depending on their level of education in relation to the variable: When choosing an insurance company, I take into account whether it cares about the local and wider communities. The Chi-square test of independence showed that there is no significant connection between education and the conditionality of the choice of an insurance company by its care about the local and wider communities.

Conclusion

Based on the research results obtained, it can be concluded that the general hypothesis that Generation Z lacks information regarding CSR activities in the local and wider communities is confirmed. The answers of the respondents from Generation Z to the questions asked confirmed that the Company primarily does not have a satisfactory and efficient way of communicating its CSR activities to the public, especially not to members of the youngest generation, which also includes Generation Z. This resulted in the highest percentage of negative answers to all questions asked. The answers to the questions whether the Company helps the local and wider communities, whether it aids science and education, culture, sports and socially disadvantaged people are all mostly negative. Between 14% and 18% of Generation Z believe that the Company does not help the local and wider communities, science and education, culture, sports and socially disadvantaged people. The vast majority of Generation Z, 54% to 58% or more of respondents, do not know whether the Company helps the local and wider communities, science and education, culture, sports and socially disadvantaged people.

The fact that 17.7% of Z generation members do not see the Company as socially responsible and 55.7% of them do not know the answer to the question, indicates that more than 73% of the youngest generation of respondents do not perceive the Company as socially responsible, which is another confirmation the fact that the Company does not adequately communicate the projects it implements, and thus the general hypothesis that Generation Z lacks information in the field of CSR activities in the local and wider communities is confirmed. While the fact remains that the state is obliged to take care of education, pensioners, Roma, poor people, refugees, pregnant women, single mothers, soup kitchens, there is a great lack of funds in the local and wider communities that the Company also recognises and wishes to direct its CSR activities there and contribute, being a part of the solution of the problem. However, the research says that the vast majority of respondents do not know how to determine in which segment of socially vulnerable people they should direct their CSR activities. This also indicates a lack of information in this area.

When asked which projects the company should support in the field of sports, the vast majority of respondents (84.5%) answered that they did not know. This result also indicates that there is a lack of information and that there is no real communication on the topic of sports. The Company is actually present in most sports, and the result is still "I don't know".

The "I don't know" answers are above 50% of all answers in the group of the youngest respondents, to which the Generation Z belongs, is also the dominant result of all survey questions: How familiar are you with the Company's CSR activities in the local and wider community; Does the Company help the development of the local and wider communities; Does the Company help the development of culture; Does the Company help science and education in society; Does the Company help socially disadvantaged people; How should the Company help socially and materially disadvantaged people; Does the Company support sports and which sports projects should the Company support?

Considering the above and the fact that the first hypothesis was confirmed, the conclusion is that communication is a factor of the utmost importance in the CSR strategy of any organisation. It is necessary for every organisation that wants to present itself as socially responsible to inform all participants about its CSR strategy and implementation of specific projects in a transparent, adequate, understandable, honest and timely manner. This holds especially true when it comes to young members of the local and wider communities, with an emphasis on Generation Z.

The limitations of the research are reflected in the impossibility to examine a larger number of respondents at the same time, to repeat this research in an identical manner, but with a larger number of companies, and subsequently compare the results. It is possible that there are certain companies that are more clearly positioned as socially responsible, which would be useful for comparing and once again proving the need for timely and accurate information about CSR activities of the Company to the public through all channels of communication. As Generation Z is demanding, it is necessary to take all measures in a timely manner in order for companies to be perceived as socially responsible for what they do and how they behave, but also for how much attention they pay to transparent, adequate, understandable, truthful and timely informing of the public, which is another important aspect of CSR.

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A Comparative Analysis of Factoring Market in Poland and the EU before and during the Time of COVID-19

Maciej TOKARSKI

WSB University in Torun, Poland
maciej.tokarski@wsb.torun.pl

Abstract

Factoring companies have been supporting Polish entrepreneurs in running their business for over 25 years. They finance their development and provide resources to meet the most urgent needs. They enable the conversion of receivables resulting from issued invoices into cash. This allows you to effectively secure financial liquidity and avoid payment gridlocks. Their services are already used by 22 thousand. companies in Poland. Factoring is the most dynamic section of the Polish financial services market, the volumes of factoring turnover has been steadily increasing since 2008. Unfortunately, the recent lockdown suppressed this dynamic trend and factoring was also affected by the slowdown. The present article is aimed at a comparative analysis of the factoring markets in Poland and UE.

Keywords: business financing, assignment of receivables, factoring market, Poland COVID-19

Introduction

Short term financing is vital for the financial survival of any company, because very often they are facing deficits of cash during their activity. Therefore a company has to identify the optimal solutions in order to cover those (temporary) deficits. A good solution to this problem is the financing with receivables using factoring (Benea, Duma, 2013). A well-organised financial services market providing access to a wide range of range of financial instruments is a prerequisite enabling enterprises to function smoothly and expand. Many SMEs confront problems when attempting to gain access to external funding because of the difficulties faced by financial institutions in producing consistently reliable risk-assessment processes. Particular problems for firms may be experienced in the management of working capital. In an attempt to alleviate such problems many firms have considered alternative forms of finance – factoring - by pledging an important element in their working capital, that of accounts receivable. The incidence of asset based finance – including factoring – has been increasing rapidly over the past decade and factoring is specifically targeted and suitable for smaller businesses.

Factoring is currently considered to be a flexible short-term financing source which also represents an alternative to a bank credit. It is also a safe instrument which allows the entrepreneur to improve or even regain financial liquidity. Factoring is also a very important tool of managing the receivables in a company. In times of recession mostly small and medium enterprises are put at risk of financial liquidity loss due to the lack of payment of a counterparty. A limited access to the traditional current financing in the form of bank credits and a weaker market position of SME, confronting bigger enterprises, decreases the possibilities of obtaining longer payment terms of trade credit. From that point of view, settling the receivables on time and securitization against the default risk of buyers are extremely important and quite often determine the ability of the company's survival in the market.

Factoring market in Poland grows very dynamically. Its strength is its high efficiency in solving the everyday business problems. The safety of trading and, consequently, increasing company's liquidity is crucial point for the development of any business. Factoring meets these needs (Czternasty, Mikołajczak, 2013).

The present article is aimed at a comparative analysis of the factoring markets in Poland and EU. As a result of the analysis, the hypothesis that in the considered period the factoring market in Poland saw a fast growth has been confirmed. Not only did the factoring turnover grow, but also the number of enterprises using the services of factors was on the rise. Research methods include literature and general statistical analysis of financial data (EUF, FCI, PFA and The Polish Central Statistical Office).

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The concept and definition of factoring

There are many definitions of factoring in source literature and business practice. The official definition of factoring created for banking purposes by the Bank of France in 1973 states that it is a business arrangement between the supplier and the factor, under which the supplier assigns its accounts receivable to the factor that undertakes to collect them and pay the supplier, even if the actual debtor is late on payment (Deschanel, J. P., Lemoine, L, 1993). The essence of factoring is best captured by a definition that describes the facility as a purchase by the factor of supplier's short term receivables arising under transactions other than the purchase of services or goods for private consumption or from a hire-purchase arrangement, in order for the supplier to be paid on time or for the risk of debtor's insolvency to be transferred to the factor (Salinger, 1999).

Factoring refers to the phenomenon where a company (the adherent) sells its accounts receivables (the invoices showing the debts owed by its clients) to a financial service company (otherwise called factoring companies or factors) at a discounted rate (a little cheaper than the exact amount stated on the invoice), which will be paid immediately the status and creditworthiness of the debtors are ascertained by the factor. This allows for the uninterrupted running of day to day operations in the company, while passing off the burden of debt collector to the factor (Chirkunova et al., 2016; Dorfleitner et al., 2017; Protopappa-Sieke and Seifert, 2017).

Mian suggested a simple definition of Factoring being company's sale of its accounts receivables to a financial institution other than its captive one (Mian, 1992). Sopranzetti defined Factoring through the eyes of service providers, the Factors, being a financial institution that are in the business of buying and managing other firm's accounts receivables whereas through a typical Factoring contract the Factor bears credit risk and the responsibility to monitor the credit quality of the outstanding accounts receivable (Sopranzetti, 1999).

Soufiani defined Factoring as an economic decision whereby a specialized firm undertakes the responsibility for the administration and control of a company's debtor portfolio enabling the company to sell their accounts receivables at a discount in exchange for cash (Soufiani, 2002) .

Factoring, a form of asset-based finance, is often referred to as current-asset financing (Bakker, Klapper, & Udell, 2004; De Vries & Cameron, 2003). In factoring, funding, usually cash, is extended based on the discounted value of trade debtors. In addition to providing funds, factoring firms usually provide debt chasing and collection services for firms as trade debtors are exchanged for cash (Klapper, 2006).

Factoring is not a loan and there are no additional liabilities on the balance sheet of the company, although it provides financing of working capital. In addition, factoring is often done "without recourse", meaning that the factor that purchases the receivables assumes the credit risk for the buyer's ability to pay. Hence, factoring is a comprehensive financial service that includes credit protection, accounts receivable bookkeeping, collection services and financing (Klapper 2005).

The factor has three main functions such as:

- financing (pay their clients for their invoices as they are issued);
- providing services (collect payment from their customers, provide advice to clients on credit management, pursue late payers);
- protecting the client against bad debts.

Factoring increase working capital of a firm without increasing the liabilities of a firm's balance sheet since factoring isn't a loan. Factoring provides firms with comprehensive financial services which may consists of credit services, receivable bookkeeping, collection services and financing. Factoring firm assess the creditworthiness of the client firms' customers (Klapper, 2006). Factoring is especially important for SMEs since they have difficulty in accessing bank financing due to the weak credit history and inadequate collateral and assessing creditworthiness of their customers (Bradic-Martinovic et al., 2015). Factoring allows SMEs to reach funding faster and less costly way than bank finance.

From the above definitions, it is obvious that:
1) The scope of Factoring is mainly focused on the finance function despite its extended range of services.
2) Factoring is more suitable to SMEs rather than to the large corporates.

Factoring in Poland

The law in Poland does not specify whether factoring is a banking activity. Hence factors in Poland do not need the permission of the National Bank of Poland in order to trade nor do they need to obtain a permit from the Polish Financial

Supervision Authority. This creates ideal conditions for the development of the factoring market, in which Polish entrepreneurs are more and more eager to engage in. Factoring agreements have to be in accordance with the provisions of the Civil Code (the Act of 23 April 1964) or since 2005 article 1: 102 (1) Principles of European Contract Law. There isn't a ban on the assignment of receivables in general, although in practice a ban on the assignment of receivables to commercial contracts is becoming more and more common in Poland. The law governing the assignment of receivables is within the Code of Civil Procedure, and results directly from article 509 §1 of the Civil Code (Stecki, 1996; Kruczalak,1997; Kreczmańska-Gigol, 2006). Internationally, the most important source of law is the Convention on International Factoring adopted by the International Institute for the Unification of Private Law - UNIDROIT in 1988 at the International Diplomatic Conference in Ottawa (Sommer, 1998; Puławski, 2018). The Convention contains 23 articles grouped into four chapters (UNIDROIT Convention on international factoring). In addition to the Convention, the UNCITRAL - Convention on the Assignment of Receivables in International Trade from 2001 is also used as an international source of Law on Factoring. Convention on International Factoring defines the factoring contract as a contract whereby the client transfers to the factor the receivables from the concluded basic sale agreement with the debtor, where the factor performs at least two of the following functions:

1. Financing the client, including loans and advance payments;
2. Keeping accounts related to receivables;
3. Collection of receivables,
4. Provision against the risk of non-payment of receivables.

Poland's factoring market compared to other countries of the EU

The factoring services are used by the enterprises from the developed and developing countries (Klapper, 2006). According to the data of the EU Federation for the Factoring and Commercial Finance Industry, the majority of the EU countries noted an increase in the factoring turnover since 2009. In the majority of countries, factoring is a common financial service. In Poland it was spread by banks in the 90's of the 20th century. Next, then on-bank factoring partnerships started to be created and their factoring services developed dynamically. The factors both on the demand and the supply sides condition the development of factoring services. On the side of the entities offering factoring services one may enumerate: the type of the entities offering factoring services, their number, size, the turnover they generate or the range of services they offer. Legal regulations promoting the development of alternative financing are also important (Keczmańska-Gigol, 2015).

The portfolio of products offered by Polish factors is comprehensive. Both the independent factoring entities and the banks deliver the broad range of 'classic' factoring facilities, as well as tailored ones (Tokarski, 2005; PFA: Polish Factors Association; Czarecki, 2007).

• Domestic factoring

– Non-recourse factoring
– Recourse factoring
– Collection only
– Reverse factoring
– Maturity factoring

All of these services are delivered either as notified or non-notified type. The most common payment terms: 30 to 90 days.

• International factoring export

– Export, non-recourse factoring based on two-factors' system
– Export, recourse factoring based on two-factors' system
– Direct export factoring
– Collection only

The most common payment terms: up to 180 days.

• International factoring import

– Import factoring, backing the co-working export factor (cover and collection)
– Collection only

The table 1 shows detailed information about factoring turnover by country in the 2011-2019 years, together with year on year growth rate, GDP penetration and market share.

Figures collated by the EUF's Economic and Statistic Committee for 2019 show an 8% growth year on year in factoring turnover in EU countries, with the total now exceeding 1,9 trillion euro. It was the 11th consecutive year of growth and the third where the yearly increase was higher than the 6 years' market compound annual growth rate (7%). This figure confirms how factoring is playing an essential role in financing companies' growth, outpacing the progress that might be expected simply from good economic conditions in the EU.

The high level of concentration shown by the EU factoring market in previous years also in 2019 remained unchanged, with the top five countries of France, United Kingdom, Germany, Italy and Spain together representing 75% of the total EU market. And in 2019, for the first time, France overtook the United Kingdom to become the no. 1 country by volume in the EU factoring market.

The table 1 shows detailed information about factoring turnover by country, together with year on year growth rate, GDP penetration and market share. This year's GDP penetration ratio was again higher than last year's (11,3% comparing to 10,9% in 2018), and there were again wide variations between countries. The lowest GDP penetration ratio was in Luxemburg (1%) and the highest in Belgium (18%). The dominant type of factoring was domestic, representing 80% of total turnover, unchanged from the previous year. In 2019 the growth of international factoring was slightly higher than that of domestic.

At the end of 2019, the estimated value of funds advanced by European factors to their clients exceeded 274 bn euro, showing a year on year increase of 14%. These advances were secured by assets valued at 331bn euro (increase by 7% y/y). The ratio between advances granted and security values equals 83%, and it reflects low risk profile of factoring transactions.

In conclusion, statistics collated for 2019 shows that factoring is still developing much faster than the EU economy. It is a source of funding for growing number of companies and also provides them additional benefits – such as popular risk coverage (in case of nonrecourse factoring), accounts receivables portfolio management and a soft collection service.

Table 1: Total factoring volume in EU by country (in Millions of EUR)

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	GDP penetration 2019	Market share 2019
Austria	8,986	10,969	14,110	16,458	18,264	19,621	21,091	24,107	27,220	7.00 %	1.40 %
Belgium	36,871	42,352	47,684	55,374	61,169	62,846	69,641	76,340	84,819	18.00 %	4.40 %
Bulgaria	1,010	1,500	1,700	1,728	1,820	1,947	2,919	3,211	3,532	6.00 %	0.20 %
Croatia	0	0	3,146	2,498	2,885	2,825	1,340	1,094	1,140	2.00 %	0.10 %
Cyprus	3,758	3,250	2,823	2,671	2,414	2,925	2,830	3,585	3,181	14.00 %	0.20 %
Czech Republic	5,132	5,196	5,302	5,912	5,064	4,848	6,121	6,778	7,240	3.00 %	0.40 %
Denmark	9,158	8,800	8,932	10,463	12,606	13,237	14,948	18,637	18,838	7.00 %	1.40 %
Estonia	1,164	1,877	1,899	2,010	2,010	2,495	2,495	3,600	3,900	14.00 %	0.20 %
Finland	13,000	17,000	17,699	20,554	23,095	22,000	24,000	25,800	28,000	12.00 %	1.50 %
France	174,580	186,494	200,459	226,598	248,194	268,160	290,803	320,409	349,714	14.00 %	18.30 %
Germany	157,260	157,424	171,290	189,880	209,001	216,878	232,431	241,814	275,491	8.00 %	14.50 %
Greece	14,732	12,761	12,095	13,017	12,869	12,782	13,151	14,635	15,045	8.00 %	0.80 %
Hungary	2,817	2,676	2,661	2,827	3,779	3,635	5,730	6,911	8,550	6.00 %	0.40 %
Ireland	18,330	19,956	21,206	25,476	25,978	23,952	26,294	26,294	28,424	8.00 %	1.50 %
Italy	175,182	181,878	178,002	183,004	190,488	208,642	228,421	247,430	263,364	15.00 %	13.80 %
Latvia	371	542	592	680	867	867	720	784	805	3.00 %	0.00 %
Lithuania	2,134	2,488	2,763	5,550	3,150	3,100	3,000	3,660	3,400	7.00 %	0.20 %
Luxemburg	180	299	407	339	339	339	339	339	339	1.00 %	0.00 %
Malta	200	240	178	296	275	275	350	554	696	5.00 %	0.00 %
Netherlands	46,000	51,187	52,902	57,378	65,698	82,848	89,713	98,368	112,148	14.00 %	5.90 %
Poland	17,900	24,510	31,588	33,497	35,020	39,756	44,300	56,474	66,141	13.00 %	3.50 %
Portugal	27,879	22,940	22,302	21,404	22,921	24,517	27,008	31,757	33,800	16.00 %	1.80 %
Romania	2,600	2,920	2,713	2,700	3,651	4,016	4,560	5,007	4,854	2.00 %	0.10 %
Slovakia	1,171	1,024	1,068	1,036	1,036	1,646	1,646	2,521	2,032	2.00 %	0.10 %
Slovenia	550	650	626	536	329	1,000	1,200	1,400	2,000	4.00 %	0.10 %
Spain	122,125	124,036	116,546	112,976	115,220	130,656	146,292	166,391	185,559	15.00 %	9.70 %
Sweden	29,259	33,149	30,554	28,290	26,078	20,481	20,094	19,822	20,625	4.00 %	1.10 %
United Kingdom	268,100	291,200	308,096	350,622	376,601	326,878	324,260	320,193	328,966	13.00 %	18.50 %
Total	11,140,449	1,207,318	1,259,343	1,373,774	1,470,821	1,503,172	1,605,697	1,727,915	1,906265		

Source: author's own calculations on the basis of data from the EU Federation for the Factoring and Commercial Finance Industry.

Over the last 10 years Polish factoring has grown fivefold. The average annual growth dynamics reached 20% and this is the dynamics that other countries cannot boast of. Unfortunately, the recent lockdown suppressed this dynamic trend and factoring was also affected by the slowdown. However, the market remained in the black, although to a lesser extent than in the previous years. In the first half of the year the market noted 2.6% growth rate. Europe, which brings together 2/3 of the sector, remains the dominant factor for the development of the global factoring market. Poland takes strong 8th place it enjoys the best growth dynamics among the leaders. The share of factoring turnover in GDP in our country amounts to 13%, while in the entire Old Continent it reaches 11.3%, and in the world it amounts to 4%. There are around 60 factoring institutions at the Polish market, among which the greatest share of the market belongs to institutions, which are members of Polish Factors Association (The Polish Central Statistical Office, 2020). In 2019, 22,083 customers (29.0% more than in the previous year) used factoring services.

Table 2: Total factoring volume in Poland (in Millions of EUR)

Year	Total factoring volume	Number of customers (factorers)
2008	11,486	4432
2009	11,997	5 206
2010	16,210	5 622
2011	17,900	6667
2012	24,510	7688
2013	31,588	8472
2014	33,497	10 242
2015	35,020	12 650
2016	39,756	14 806
2017	44,300	15880
2018	56,474	17917
2019	66,141	22 083
GDP penetration 2019	13.00 %	
Market share 2019	3.50 %	

Source: author's own calculations on the basis of data from the Polish Central Statistical Office and data from the EU Federation for the Factoring and Commercial Finance Industry (https://euf.eu.com/total-factoring-volume-data/poland-20-poland.html)

The service of factoring, thanks to the constant financing of receivables, prevents the creation of payment backlogs enabling the regulation of liabilities on time and, as a result, improves the financial liquidity of economic entities. Itis thanks to these above-mentioned reasons that the use of the service of factoring is larger in Poland than in the other countries of the EU (NBP– National Bank of Poland, 2015).

The market in Poland still enjoys considerable growth potential, if only because there have been over a million business entities operating in the micro, small and medium-sized enterprises segment alone. It is easy to calculate that the factors service less than 1% of enterprises. Hence, it is necessary to develop products tailored specifically to companies from this sector and promote them effectively, especially for those who do not keep full accounting records. The factoring offer which is available on the market might be considered mature. Factors providing it offer a full range of products and the quality of their services meets the requirements of the worldwide standards.

The Polish factoring industry needs more educational and promotional activities to mature, because this facility cannot function properly without informed and knowledgeable entrepreneurs. Entrepreneurs should above all understand that factoring is as much a solution to their cash flow problems as a source of supportive services, which are equally advantageous as the purely financial benefits of factoring. These educational activities should be addressed not only to entrepreneurs as the potential users of factoring, but also to factors and debtors.

The international Covid-19 pandemic is shaking the whole world. This is an unprecedented health crisis that affects all of us. The shock to our economy is tougher than in 2008 and will have devastating economic and social consequences across Europe.

The data collated by the EUF shows that in 2019, factoring and commercial finance volumes in the EU grew overall by 7.9% to reach €1.91 trillion. This rate of growth, which equalled that seen in 2018, again clearly outpaces the increase in GDP in Europe. Funding of €275Bn is supporting around 280,000 European clients, helping them to deliver growth,

employment and business success. With factoring and commercial finance now representing around 11.3% of EU GDP, this is an increasingly powerful and vital contribution to EU economic development. Besides Europe remains the first economic zone in the world for factoring with two-thirds of the global total.

The statistics of European factoring are generally good in the first quarter of 2020. However, with the economy coming to a sudden halt, and in the absence of invoices to finance, they should be expected to decrease sharply from April

Factoring in the time of COVID-19

Data gathered on the European factoring market for H1 2020 has shown, for the first time in 11 years, a decrease in factoring turnover of 6.0% year on year. The total factoring turnover reached €853 billion compared with €911Bn in H1 2019. Information received from country members' organisations indicates that this drop is principally the result of national lockdowns, and in some countries of the impact of government measures to sustain enterprises and especially their treasuries. What is interesting is that the decrease in factoring turnover was almost in line with the reduction in EU GDP of 6.3%. This is why this year's GDP penetration ratio was similar to last year's (11.1% compared with 11.2% in 1H 2019); normally we see factoring growing faster than GDP (EUF Newsletter, Spring 2020).

The trend differs between countries, but 3 of the top 5 European factoring markets received the hardest hit. The biggest falls were observed in (EUF Newsletter, Spring 2020):

- UK, with 14% decrease year on year, significantly greater than its GDP reduction of 7.7%,
- Italy, with a 13% decline, whilst GDP shrunk nearly 11%,
- France, with a 10.2 % fall, compared with a 9.3% reduction in GDP,
- Portugal, (not the one of the largest markets) fell 9%, and GDP was reduced by 7.1%,
- Belgium with a 5% turnover reduction and an 8% decrease in GDP.

The principal causes of these reported falls were:

- decreased client turnover,
- insufficient, poorly targeted or belated government interventions.

Despite this difficult business environment, there were also countries where a yearly increase was reported:

- Netherlands, where turnover grew 4.6%, when GDP decreased by 2.6%,
- Norway, which saw 2.6% of growth, when it experienced an almost 13% decrease in GDP,
- Poland, which grew by 2.4% whilst its GDP fell by 2% (although when we exclude the increase in turnover of one main member, the overall market decreased by 2%, in proportion to the GDP decrease),
- Denmark, 1.7% growth against 2.6% GDP reduction,
- Germany 1.6% growth compared with a 4.2% fall in GDP.

The data from the German and Polish markets indicate that in both countries the support measures taken by their governments have helped to soften the economic impact of lockdown and to minimize its effect on the supply chain.

The leader of the European market is France with almost 18% of the market. Next there is Germany with 15.8%, followed by UK 15.3%, Italy 12.5% and Spain 10.2% respectively. These top 5 countries represent 71.7% of the EU factoring market.

Conclusion

The basic problem preventing the correct development of enterprises is lack of capital. Capital shortage is often a result of the payment gridlock, which emerges as an effect of bad management of trade credit. The tool used to improve cash flow is factoring. Around the world, factoring is a growing source of external financing for corporations and small and medium-size enterprises (SMEs).It is currently considered to be a flexible short-term financing source which also represents an alternative to a bank credit. It is also a safe instrument which allows the entrepreneur to improve or even regain financial liquidity. It is also a very important tool of managing the receivables in a company. It is a financial service providing liquidity to the real economy as it involves the payment of invoices before their final due date. Factoring is widely accepted as an alternative financing source, and used in almost every industry that sells business-to-business or business-to-government. One of the biggest advantage of factoring is the improvement of financial

competitiveness by the increase of liquidity and enhancement of cash-flow patterns of businesses (Milenkovic-Kerkovic, T. & Dencic-Mihajlov, K. 2012).

The Polish factoring market has come a long way from a modest beginning to a very dynamic development which has been observed for many years. Factoring is not only becoming more and more known, but also more and more appreciated as a quick and easy source of financing for the current operations of enterprises

Factoring is the most dynamic section of the Polish financial services market, the volumes of factoring turnover has been steadily increasing since 2008. Polish business had effectively examined factoring as financial instrument. Remembering that Poland is the 6th economy in the Europe and there are over 2 million of businesses entities, the demand for factoring may be very strong. The current number of factoring clients extends 22 k, thus the potential is still large, the number of the clients looking for factoring may amount to 100 000. Such a bound was reported from the factors and fin-techs servicing the micro businesses (The Polish Central Statistical Office, 2020). The increase in factoring popularity is based on clients' demand more than just short -term financing but also a helping hand in decreasing the risk level in day-to-day operations. What should be noted here, factoring market approaches to the matured stage. Polish factors offer a full range of products derived from trade receivables model and the performance of the services' quality correspond to the world standards. Market looks attractive, there is still room for new players and new. Poland remains an exceptional place for doing factoring business.

In July 2020, the European Commission approved the Polish factoring-based support program for enterprises affected by the coronavirus epidemic. Poland is the first European market where the aid for companies will be based on factoring. The value of the support program amounts to EUR 2.6 billion, *i.e*. PLN 11.5 billion. The scheme was approved under the Temporary State Aid Framework. It will provide further support to companies which were severely affected by the effects of the coronavirus pandemic. Factoring is going to be used as the measures which will allow the enterprises to meet their liquidity needs as well as it will help them stay in business during this difficult time. The program, which is implemented by Bank Gospodarstwa Krajowego (BGK), will be available to enterprises of all sizes and it will provide guarantees for both recourse factoring and reverse factoring. BGK will enter into portfolio agreements with factors (banks or factoring companies) and it will grant them guarantee limits. Factors will be able to use these limits and provide BGK guarantees to entrepreneurs for the granted factoring limits. The cooperation between BGK and the factors will ensure liquidity for companies and it will enable the on-going settlements of liabilities (https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1402).

Factoring is a financial service whose application leads to the shortening of the cash conversion cycle thanks to which it is possible to improve the corporate financial liquidity. Due to its complex and multidimensional character it allows for a better trade liability management as well as for the protection against the risk of debtors' default. Factoring will be in high demand during and after this crisis, as banks pull out of credit facilities, especially SMEs and companies looking for new alternative sources of working capital financing. With the significantly increased volatile business environment, companies will look to mitigate the risk of their receivables. When exploring liquidity options during these tumultuous economic times, companies should remember to consider all financing options at their disposal. For companies with accounts receivable, factoring arrangements and other receivables financing structures may provide a much-needed source of liquidity. Factoring ensures solvency to businesses and frees them from problems involved in paying their liabilities, helping them to focus on the core business.

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Tax Risks in The Context of Digitalization of The Economy

Olga SINENKO

Far Eastern Federal University, Vladivostok, Russia
sinenko.olga@gmail.com

Igor MAYBUROV

Ural Federal University, Ekaterinburg, Russia
mayburov.home@gmail.com

Abstract

The use of modern digital technologies in the process of tax administration not only opens up new opportunities, but also creates additional tax risks for the state and taxpayers. The article presents a study of tax risks under the conditions of the digitalization of the economy. The purpose of this study is to identify and systematize tax risks and to work out criteria for tax risk assessment in the context of digitalization. The study used the methods of logical and systems analysis of tax risks under the condition of the digitalization of the economy; content analysis was employed to analyze the available literature; the best practices of tax administration digitalization were summarized; the practice of using digital technologies to minimize tax risks was explored.

Keywords: Tax Risks, Digitalization, Risk-Based Approach, Tax Administration, Tax Risk Management, Digital Technology.

Introduction

A transition to a qualitatively new level of interaction between tax authorities and taxpayers is due to the development of information technologies and their adoption by tax authorities.

As digital technologies are penetrating the life of society and are getting actively employed by tax authorities, new risks are emerging for the state as well as for the taxpayer. A transformation of tax relations is happening under the influence of the challenge of economic digitalization and contemporary fast changing trends in the digital economy. Among the key ones are:

- first, the transformation of traditional industries and companies and ubiquitous use of the internet: business models are evolving as their number grows; growing spread of digital goods and services. As of January 2020, the number of internet users totalled 4.5 billion people globally; 3.8 billion of them were social media users. In Russia, 118 million people, or 81% of the country's population, use the internet; the number of social media users reaches 70 million, which is 48% of the country's population. E-commerce sales in Russia have been growing year-on-year: 487.83 billion roubles in 2013; 616 billion roubles in 2014; 732.67 billion roubles in 2015; 868.67 billion roubles in 2016;– 1,035.8 billion roubles in 2017; 1,285 billion roubles in 2018 (RAEC, 2019).

- second, the development of digital platforms and the use of big data. This drives the transformation of relations in the sphere of taxation and the growth of cross-border transactions that take place on cross-border platforms that are invisible to regulators and tax authorities. In the consumer-to-consumer (C2C) market, users engaged in e-commerce are spread among the following platforms: 65% are based on Avito, 39% on Youla, 22% on Vkontakte, 9% on Instagram, 8% on Irr.ru, 6% on Odnoklassniki, 6% on WhatsApp, 5% on Facebook Messenger; 5% on Auto.ru, 4% on Drom.ru, 2% on Telegram, 2% on Viber. In 2018, the big data market garnered 38 billion dollars globally, growing to 46 billion dollars in 2019.

- third, the development of robotics, M2M (machine-to-machine), artificial intelligence (the Higher School of Economics expects the global robotics market to reach 147 billion dollars by 2025, China accounting for 30% of the

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world's robotics technology market by 2022 (Abdrakhmanova G.I., 2019). According to RLMS, 26.5% of employees in Russia work in jobs with high levels of automation (over 70%) (CMASF,2018).

- fourth, the development of the cryptocurrency market (an increase in the volume of capital flows bypassing the traditional banking system) (shadow online transactions). Today, there are over 1,300 cryptocurrencies (their cumulative market capitalization has been growing year-on-year, reaching the present value of over 597 billion dollars: Bitcoin's current total value is 259.6 billion dollars; Ethereum's value is 72,9 billion dollars; Bitcoin Cash is worth 57.8 billion dollars, Ripple and others are valued at 46 billion dollars.

On the one hand, the digital economy trends described above create new opportunities for taxpayers and the state, but on the other hand, they are a source of new tax risks for all parties involved in tax relations. Tax authorities are trying to embrace the ongoing processes by creating various online services for more convenient communication with taxpayers and are using automated systems that improve the quality of tax control. Taxpayers, too, are looking for ways to reduce their tax charges. For example, the website of the Russian Federal Tax Service had over 145 million unique visitors in 2018 and 160 million in 2019. Between 2015 when automated tax control systems in Russia were launched, and 2019, the number of dummy companies (so-called fly-by-night companies) halved. Today, there are 120,000 of them, which is 3.2% of all businesses. At the start of 2016, there were 1.6 million fly-by-night companies. The number of VAT refund claims filed by high-risk organizations has reduced 15-fold. The factors listed above fuel the reduction of the number of companies engaged in the shadow economy.

The size of the shadow economy and the actual number of self-employed individuals in Russia remains highly debatable. Additionally, blogging and ecommerce social media are gaining in popularity (an Instagram influencer with 150,000 followers whose posts garner an average of 15,000 likes is paid around 15,000 roubles for a promo post).

Methodology

They key research methods are content-analysis, synthesis, and comparative analysis. An analysis was done of tax risks amid the digitalization of the economy. When conducting the research, types of digital tax risks were identified and systematized; areas subject to each type of risk were located through relevant qualifying elements. Criteria for tax risk assessment in the context of digitalization were devised. Content analysis was conducted of the literature on the subject and the best practices of the digitalization of tax administration were summarized. As a result of the analysis, the main components of digital technology application with the goal of tax risk minimization were identified. The analysis utilized data from the websites of the tax authorities in Asia-Pacific countries and academic journals.

Research

1.Tax risks. The majority of researchers agree that tax risks emerge, on the one hand, as a result of what the state does and, on the other hand, as a result of taxpayers' own actions. Tax authorities define tax risk as the risk of illegal actions by taxpayers who look like an attempt to extract unfair tax benefits and go "beyond the execution of their right to determine the tax base and/or calculate the amount of tax to be paid". Approaches to defining the concept of "tax risk" are summarized in Table 1. Tax risks faced by taxpayers are largely due to their desire to minimize their tax liability (Sinenko, O. Mayburov, I., 2017). As an outcome of risk exposure, additional tax charges, fines and penalties might be imposed.

Table 1: Definitions of the concept of "tax risk"

«Tax risk» of the state	«Tax risk» of the taxpayer
Probability of tax revenue loss as a result of tax minimization schemes used by taxpayers thanks to loopholes in tax legislation (Gashenko, Irina V., Zima, Yulia S., 2019)	Probability (threat) of additional tax charges, penalties and fines being imposed as a result of a tax audit following disagreements between taxpayers and tax officers as to how to interpret tax legislation, which could result in bigger tax burden for the organization.
Possibility of failure to meet collection targets for total tax revenue and specific taxes.	Possibility of financial and other losses for the company as a result of tax payment and optimization in monetary terms
Failure to meet tax revenue targets, including as a result of the use by taxpayers of "legal" tax minimization	Possibility of growth of tax liabilities and, consequently, lower financial potential of the taxpayer

schemes (Tkacheva, T., Afanasjeva, L., Goncharenko, L., 2019)	(Gubar, E. A., Zhitkova, E. M., Kumacheva, S. S., & Tomilina, G. A. (2019).

Source: compiled by the authors

Most of the researchers agree that it is impossible to mitigate completely the impact of tax risks even under the conditions of digitalization. The ongoing digital transformations highlight the timeliness of identifying, assessing, monitoring and forecasting tax risks faced by the state as well as by taxpayers. Tax risks in the context of digitalization can, therefore, be defined as risks that occur for the state or the taxpayer under the conditions of the development of the digital economy and/or risks that occur because of the adoption of digital technologies by tax authorities. As part of this study, tax risks were identified that emerge as a result of digital economy trends. The results of the attempt to prove a connection between the influence of digital economy trends and negative outcomes for taxation and tax administration are presented in Table 2.

Table 2: Relationship between digital economy trends and tax risks

Digital economy trends	Tax risks
Ubiquitous use of the internet: evolution of business	Transactions executed via P2P services, social media channels, international job boards are difficult to control, which results in tax evasion (due to the problem of identifying such entrepreneurs and controlling their business operations)
	Tax base is diluted; virtual tax havens emerge; tax revenues decrease as a share of corporate incomes is taken out of the jurisdiction of national tax laws (duty-free import).
Growing spread of digital goods and services	Decrease in tax revenue from sales of traditional goods and services; Tax evasion as sellers of digital goods and services are hard to track down and identify
Use of big data	Tax base can be expanded by means of digital data.
Digital currency and development of cryptocurrencies	Increase in cash flows generated by trade in cryptocurrencies bypass the traditional banking system, — tax administration becomes more complicated.
Use of robots, M2M, artificial intelligence	Tax revenues are reduced thanks to robotization.

Source: compiled by the authors

The analysis enables one to name the following key tax risks for the state that emerge in the context of digital economy: the risk of illicit business operations being conducted over the internet (through social media channels, P2P services etc.); the risk of tax evasion due to the difficulty of identifying online sellers of digital content; the risk of tax base shrinkage due to the cheapness of digital goods and services; the risk of tax evasion by crypto entrepreneurs; the risk of tax revenue reduction as a result of robotization etc (Sinenko, O. Mayburov, I., 2019).

2. Utilization of digital technology in tax risk identification. In the course of tax administration, it is critical for tax authorities to promptly identify and assess the impact and probability of tax risks. Effective tax risk management depends on a combination of methods and activities that make it possible to forecast the occurrence of risk events and take steps to mitigate them. In order to improve the effectiveness of the identification and assessment of tax risks in the course of tax administration, digital technologies are finding ever wider application globally. This study contains a comparative analysis of technologies that are employed in tax administration within the following categories: blockchain, robotic process automation, artificial intelligence, chat bots, biometric identification etc. Table 3 presents the results of the analysis of digital technology application in tax administration in Asia-Pacific countries.

Some countries in the Asia-Pacific have not only automated elements of tax control in order to minimize tax risks, but are also embracing robots and using the benefits of artificial intelligence and biometrics. Communicating with taxpayers and consulting them on tax issues has been delegated to chat bots in many countries.

Table 3: Map of digital technology application in tax administration in the Asia-Pacific in 2016-17

Country	Digital technology application		Blockchain		Robotic process automation		Artificial intelligence		Chat bots		Biometric identification		Others	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Australia	+	+	–	–	I	I	I		+	+	–	–	–	–
Hong Kong	+	+	–	–	P	P	P	P	P	P	–	–	–	–
India	+	+	–	–	+	+	–	–	+	+	–	–	–	–
Indonesia	+	+	–	–	–	–	P	P	P	P	P	P	–	–
Canada	+	+	–	–	–	–	+	+	–	–	–	–	–	–
China	+	+	I	I	–	–	P	P	+	+	+	+	I	I
Colombia	+	+	–	–	–	–	I	I	I	I	–	–	–	–
Korea	+	+	–	–	–	–	P	P	P	P	I	I	–	–
Costa-Rica	–	–	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Malaysia	+	+	–	P	P	I	+	+	P	P	+	+	P	P
Mexico	+	+	–	P	–	I	P	P	P	I	+	+	–	–
New Zealand	+	+	–	–	–	–	P	P	P	P	+	+	–	–
Peru	+	+	P	P	–	–	P	P	+	+	+	+	P	P
Russia	+	+	P	P	+	+	P	P	P	P	P	I	–	–
Singapore	+	+	–	–	I	I	+	+	+	+	P	P	–	–
USA	+	+	P	P	+	+	P	P	+	+	+	+	–	–
Thailand	–	–	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chile	+	+	–	–	–	–	–	–	+	+	+	+	+	+
Japan	+	+	–	–	–	–	P	P	–	–	+	+	–	–

Note: «+» - in use, «□» – not in use, «P» – planned to be used, «I» – in introduction stage, «na» – data not availableнет данных
Source: compiled by the authors on the basis of data from OECD (2017)

Digital communication between tax authorities and taxpayers is developing rapidly and becoming more advanced. To study digital tools and methods of tax control, data from the official websites of the tax services of Asia-Pacific countries were used to produce a summary of the practice of digital technology application by the tax authorities of Asia-Pacific countries (valid for 2019). Fiscal authorities in all countries of the Asia-Pacific region use third-party information, including big data, on the income and transactions by taxpayers to assess tax risks. The pioneers in this field are South Korea, the US, Singapore, and China. Artificial intelligence and big data are starting to be used not only for assessing but also for forecasting tax risks.

Table 4: Application of digital technologies by Asia-Pacific countries (as of 2019)

Digital technology	Country	Methods and practices in use
Digital communication with taxpayers	USA	Mobile application «IRS2Go app», virtual services (video conference calls)
	Singapore	Digital system «CorpPass», «myTaxPortal» website.
	China	«Alipay», «WeChat»
Preliminary calculation of VAT refund	Chile	An application creates a VAT return file on the bases of electronic tax documents
	EEU	Belarus: «EEU Taxpayer (Web)» software, Kazakhstan: via "Taxpayer's Logon" etc.

Electronic document workflow (electronic invoicing)	China	GTS (Golden Tax System)
Artificial intelligence, big data, internet-of-things	USA	IBM's Watson supercomputer – analysis of tax returns
	South Korea	«Tax secretary», AI for forecasting tax risks
	Australia	Alex the chatbot that provides consultations to tax payers
	China	Data from biggest corporations is used to analyze tax risks
Social media monitoring for tax purposes	US, China	Social media monitoring to detect tax evasion, including crypto transactions

Compiled by the authors using data from websites of national tax authorities

Digital technologies enable tax authorities to tackle a wide spectrum of tasks associated with the detection and mitigation of task risks and to transform conceptually the paradigm of tax administration. Despite the fact that Russia does not lead the way in digital development, the Russian government is trying to address the problem of tax risk management amid digitalization. The evolution of the digitalization of tax administration in Russia pursuing the goal of tax risk minimization is presented in Table 5.

Table 5: Evolution of digitalization of tax administration in Russia (1991 -2020)

Year	Changes in the system of tax administration in the context of digitalization
1991	Introduction of individual taxpayer identification numbers (ITIN)
1992	Testing of elements of AIS-Nalog system.
1997	First version of open website of State Tax Service of Russia goes online
1998	Start of mass issuance of individual taxpayer identification numbers to private individuals
2002	– Adoption of digital document management as an operational standard for territorial tax authorities; the option of electronic filing of tax returns become available
2003	–the Unified State Register of Taxpayers can be accessed remotely; – one-stop-shop for company registration.
2010	Tax arrears reminder notices are now sent to taxpayers through their accounts on the tax service's website;
2011	– Nalog-Servis system is launched (provides services of entering tax return data, printing of tax reports etc.); Federal Information Address System.
2012	– Electronic registration service is launched; – Private individuals can create taxpayer accounts on the website of the tax service; – Official online invoice templates are introduced
2013	– Launch of pilot version of VAT-2 automated system
2014	– Launch of automated system Nalog-3; – Launch of taxpayer accounts for businesses on the website of the tax service
2015	– Launch of taxpayer accounts for sole traders on the website of the tax service – Launch of automated system VAT-2.
2016	– Introduction of online cash registers; Introduction of RFID tags; Launch of tax monitoring.
2017	Launch of taxpayer accounts for foreign companies
2018	– Launch of information system "Unified State Register of Taxpayers and Civil Registration"
2019	– Introduction of special taxation regime for self-employed individuals (mobile application "My Tax")
2020	– Launch of State Information Online System of Accounting (Financial) Reports

Compiled by the author using data from the official website of the Federal Tax Service at: https://www.nalog.ru/

It has to be noted that the adoption of digital technologies positively impacts the efficiency of tax authorities. According to the Federal Tax Service of the Russian Federation, the time spent on tax audits has been declining year-on-year, the number of on-site tax audits decreased more than seven-fold between 2011 and 2019, while the number of inconclusive tax audits halved. In 2019, the share of tax audits that were found to be invalid was 0.36% of all tax audits conducted, which is almost half the 2011 number. Between 2011 and 2019, the number of inconclusive on-site tax audits in Russia decreased from 772 to 358. Between 2011 and 2019, the effectiveness of tax audits improved: the share of audits that found irregularities increased from 62.8% of the total number of tax audits in 2011 to 96.9% in 2019 (FTS, 2020).

The introduction of tax monitoring in 2015 enabled the Russian tax authorities to make tax audits 30% less labor intensive. As of January 2020, 95 companies accounting for 30% of the country's tax revenues were engaged in tax monitoring.

Thanks to the implementation of the online cash register project in Russia, average sales per cash register doubled between 2017 and 2019. Online cash registers are used by over 1.5 million taxpayers. As of January 2020, there were over 3.2million online cash registers in use in Russia. Thanks to RFID implementation, excise duty collection has increased 40%; over 10,000 companies and sole traders take part in the tagging system, 24% of them are recently registered entities, which implies that they are out of the shadow market. Since the launch of the project, the number of fur garments registered in the tagging system has increased by 51%, customs duty payments increased 80% - from 38.7 million dollars to 69.6 million dollars.

Demand for mobile phone applications released by the Federal Tax Service is attested, among other things, by the number of downloads in the Google Play Store: Moy Nalog (My Tax) has been downloaded more than 500,000 times; Nalogi FL (Taxes Private Individuals) – over 1.1 million times; Lichnyy Kabinet Predprinimatelya (Business Account) – over 150,000 times; Proverka Kassovogo Cheka (Check Your Receipt) – over 120,000 times etc. Additionally, Russian taxpayers have been actively using services available on the website of the Federal Tax Service, the evidence of which is the number of visits: "Check the accuracy of invoices" – over 5.4 billion hits; "Find out the ITIN of a private individual" – over 393 million hits, "Personal account of a private individual" – over 24.2 million hits; "Transparent Business" – over 5 million hits; "Personal account of a sole trader" – over 1.3 million hits etc. Such efforts help increase the amount of collected tax payments without increasing the tax burden on taxpayers. For example, in 2013-19, VAT revenue increased 140% (Sinenko, O.A., 2020).

For the sake of a systemic approach to tax risk detection, the Federal Tax Service of Russia plans to create a virtual transaction environment – a digital eco-system that would consist of a number of connected elements: the digital environment of the taxpayer, the digital environment of the tax authority, and the tax administration environment. Along with the benefits, the employment of digital technologies by the Russian tax authorities has brought about some negative impacts and new types of tax risks, both for the tax authorities and taxpayers.

3. Classification of tax risks in the context of digitalization. The incorporation of new digital technologies into business processes and the system of tax administration in Russia provides evidence for the considerable potential of tax base expansion and tax revenue growth. On the one hand, there is stronger tax control; on the other hand, new types of risks emerge that are associated with the application of digital technologies in the economy as a whole and by tax authorities in particular.

Risk management effectiveness is largely determined by the precision of tax classification that makes it possible to identify risks and organize risk management efforts. In this study, a classification of task risks in the context of digitalization was built on the basis of criteria that were developed by V. G. Panskov. He systematized tax risks by factor of occurrence and by type of consequences for the state and the taxpayer. Viewed from the perspective of consequences, tax risks can be acceptable, critical and catastrophic. By this criteria, risks for the taxpayer are classified into four groups: risks of an audit by the controlling authority; risk of heavier tax burden; reputational risk, and risk of prosecution. Building upon the principles of tax risk classification by V. G. Panskov, the authors have systematized the identified tax risks for the state (Table 6) and the taxpayer (Table 7) in the context of digitalizsation

It has to be noted that as part of this study, new tax risks for the state caused by internal factors include those risks that are associated with the digital transformation of the tax authorities, the adoption of digital solutions for tax administration. Tax risks for the state caused by external factors include the risks associated with the impacts of digital economy trends on the national tax system. Additionally, the list of tax risks has been expanded with general risks of digitalization that are associated with the introduction of digital technologies in the business processes of the Federal Tax Service of Russia.

Table 6: System and assessment of tax risks for the state in the context of digitalization created in order to optimize the work of the Federal Tax Service of Russia

Risk description	Probability of risk occurrence	Degree of danger of losses
Tax risks caused by internal factors		
Risk of tax evasion by small businesses due to high cost of equipment (online cash registers, RFID tagging, digital workflow)	L	CA
Risk of a fictional tax debt because of fly-by-night companies reporting all business transactions, in order to conceal a tax gap from tax authorities etc.	L	C
Risk of minimization by the taxpayers of their tax liabilities (for example, by registering as a self-employed individual)	L	C
Tax risks caused by external factors		
Risk of illicit activities conducted over the internet (through social media channels, P2P services)	HL	CA
Risk of tax evasion by users of international freelance platforms	L	C
Risk of loss of control over transactions concluded via online cross-border platforms	L	C
Risk of tax evasion due to the difficulty of identifying online sellers of digital content	L	C
Risk of tax base shrinkage due to the cheapness of digital goods and services and elimination of middlemen.	L	C
Risk of tax evasion by crypto entrepreneurs	HL	CA
Risk of reduction of revenues from personal income tax and insurance contributions as a result of robotization and automation	L	CA
General risks of digitalization		
Cyber risks	U	CA
Operational risks (technical failures and breakdowns)	L	A
Risks associated with lack of digital presence of some taxpayers	U	A
Risk associated with lack of internet connection in some parts of Russia	L	A

Note: unlikely (U); likely (L); highly likely (HL); acceptable (A), critical (C) and catastrophic (CA)
Source: compiled by a the authors

The principles of a risk-based approach to taxpayers in Russia were laid down back in 2007 in the Concept of Planning On-Site Tax Audits. The principles were originally applied to VAT payers. Today, the Federal Tax Service of Russia is capable of implementing the risk-based model of tax administration on the basis of big data analysis using data on cashless payments, information retrieved from online cash registers, electronic invoices, RFID tags. As part of this study, an analysis was conducted of tax risks faced by taxpayers in the context of digitalization within the existing legal framework. The identified tax risks are systematized in Table 7.

Table 7: Tax risks for taxpayers in Russia created in order to optimize the work of the Federal Tax Service of Russia

Group of risks	Risks for taxpayers
Risks of audit by controlling agency and of heavier tax burden	Risks stipulated by the Concept of Planning On-Site Tax Audits
	Risks associated with online cash register malfunction
	Risks associated with the adoption of electronic document workflow systems (electronic invoices, electronically submitted VAT returns)
	Risks caused by technical failures and incorrect data in the course of communications between the tax service and other government agencies (the Federal Service for State Registration, Cadastre and Cartography and the traffic police)

	Risks of obtaining unjustified tax benefit
	Risks of tax optimization by splitting up a business
	Risks of crypto transactions (purchase of cryptocurrency, exchanging one cryptocurrency for another or for fiat money, paying for goods and services with cryptocurrency, cryptocurrency mining)
	Risks associated with earning an additional income (selling goods through P2P services, social media channels, doing jobs found on freelance platforms etc.)
Risks of prosecution	Risks associated with mandatory tagging of goods
	Establishment of fly-by-night firms for the purposes of tax evasion
	Major tax fraud by a corporation
Reputational risks	Risks of being blacklisted as a dishonest taxpayer
	Cyber risks due to the threat of data theft/loss and disclosure of confidential tax information

Source: compiled by the authors

When managing tax risks, it is critical to identify which tax payments that are affected by emerging risks. The results of an analysis of the impact of digital risks faced by taxpayers on tax revenues in Russia are presented in Table 8.

Table 8: Impact of digital tax risks for taxpayers on main tax payments in Russia

Risk	VAT	Excise duties	Corporate Income tax	Property taxes	Personal income tax	Land tax	Vehicle tax
Risks of incorrect operation of online cash registers	■	■	■		■		
Risks associated with introduction of electronic document management systems (electronic invoicing)	■	■	■				
Risks caused by technical failures and incorrect data in the course of communications between the tax service and other government agencies				■		■	■
Risks associated with crypto transactions (purchase of cryptocurrency, paying for goods and services with cryptocurrency, cryptocurrency mining)	■		■	■	■		
Risks associated with earning an additional income (selling goods via P2P services, social media etc.)	■		■		■		
Risks associated with mandatory tagging of goods	■	■	■				
Cyber risks due to the threat of data theft/loss and disclosure of confidential tax information	Loss of reputation and competitive edge						

Source: compiled by the authors

Conclusion

To sum up, it should be noted that tax risks associated with the development of the digital economy are caused by the emergence of new business models and ways of earning income, the virtualization of goods-for-money exchanges (creation of digital currencies, digital goods and services), the digitalization of industries and of the system of tax administration (use of robots, artificial intelligence, machine learning). The study of tax risks in the context of digitalization proves the necessity of the transformation of tax administration. This applies to individual procedures addressing specific taxes as well as to the improvement of the entire mechanism of tax administration. We believe that in order to tackle the problem of tax risks it is necessary to constantly monitor emerging digital tax risks. The problem can be solved if digital transformations are accomplished that imply full transparency of economic processes for the state and if a new level of trust between society and the state is reached.

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Scientific Impact on The Fighting Invasive Species in The Ballast Water of Seagoing Vessels

Nataliia TIRON-VOROBIOVA[1], Anatoliy DANYLYAN[2], Valentyn CHYMSHYR[3], Igor MASLOV[4], Andrii NAYDYONOV[5], Olha ROMANOVSKA[6]

[1-6]Danube Institute of National University "Odessa Maritime Academy", Izmail, Ukraine
Corresponding author's e-mail: natasha.vorobyova051982@gmail.com

Abstract

This article deals with an actual question of a significant decrease in fish stocks of the entire World Ocean. In this regard, there is a massive resettlement of invasions and zooplankton, which is the main reason for the decline in fish catch in various parts of the world of fishing. The main method of resettlement of invasive migrants is ballasting and deballasting of sea vessels, where in the ballast waters of the vessel these biological creatures of various sizes begin to fight for their existence, destroying all life on their way in the waters of the new habitat. The damage to the global economy over the past 30 years in the decline in fishing is about $ 5 trillion. Along with financial losses, ballast water contaminated with harmful viruses: cholera, plague, hepatitis, Covid-19 and its modifications can lead to a pandemic on a planetary scale, considering that the Covid-19 virus, according to the latest updated data from scientists from a number of countries, is viable in wastewater for up to 48 hours. One can imagine what consequences could threaten all of humanity. It is no coincidence that for all shipowners of the World Marine Fleet it will is necessary to re-equip ballast systems in accordance with the updated International Standard D-2 until 2024. Currently, more than 70 thousand seagoing vessels should be re-equipped at various shipbuilding and ship repair yards. According to our approximate calculations, the total amount of the re-equipment is about 7 billion dollars. Scientists and engineers of the Danube Institute of National University "Odessa Maritime Academy", including the authors of the article, invented a unique installation for disinfection and purification of ballast water in accordance with the requirements of the updated standard D-2. All the main costs for the production of the presented installation were worked out in detail according to the existing labor standards of the Izmail shipyard. The selling price of the newly manufactured installation is $ 169,000, well below current world prices. The results obtained show that with the help of the above processes in the manufactured installation, practically the entire line of life-threatening viruses are destroyed in ballast wastewater.

Keywords: water resources, Covid-19, invasive species, ballast water, standard D-2, safety of navigation.

Introduction

The world maritime fleet is currently experiencing significant economic difficulties associated with the re-equipment of the ballast system of each seagoing vessel. This new requirement arose due to the huge losses of water resources of all coastal countries of the world ocean, which found its expression in the IMO (International Maritime Organization) normative document [1], which is mandatory for all shipowners.

The damage that has been caused to aquatic flora and fauna on a global scale over the past three decades is estimated at $ 4-5 trillion, which cannot be accurately quantified. Cargo transportation by sea and river fleet from year to year, practically increases in all directions of the sea routes of the World Ocean, with the exception of the period of the global pandemic Covid-19, there is a steady decline. The intensity of cargo transportation by water assumes a significant increase in ballast water discharge and reception in different parts of the World Ocean – this is dictated by the safety of navigation. After unloading cargo in ports, the draft of the vessel is significantly reduced, which leads to a violation of its stability, and in order to restore this stability, the vessel takes outboard water into the ballast tanks, thereby increasing the draft. The frequency of ballasting and deballasting depends on the intensity of the work of the vessel and weather conditions. During this period of ballast operations, the plankton, zooplankton, neoplankton, and phytoplankton, which is the food for many fish and marine animals, move but there is also another side of the danger of its migration in ballast waters. This danger is associated with its survival in an alien habitat, where it mercilessly destroys the flora and fauna, causing irreparable damage to the economy and ecology of many countries of the world.

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In the process of implementing the new requirements for the ballast water of sea vessels, unique installations have appeared to destroy various invasive bioorganisms, harmful viruses, the latter being extremely dangerous for human life and health. Suffice it to recall the dire consequences of the cholera pandemic in the period 70-71 years of the 20th century, raging simultaneously in different parts of the world: Ukraine, Odessa region, the coast of Peru, the islands of Haiti and a number of African countries. *Cholera vibrio* in these countries was in coastal waters for a long time, constantly threatening the population. Undoubtedly, it can be concluded that simultaneous contamination could only occur when ballast water was discharged from sea vessels with a clear violation of the discharge distance from the coastal zone. Detection of the hepatitis virus in sea waters is quite frequent, and modern installations certified by the IMO and international supervisory authorities are capable of destroying them. In this regard, it is appropriate to recall the information received from scientific sources that the Covid-19 virus survives in wastewater for 48 hours and its entry into the body of aquatic fauna, waterfowl is unpredictable in its consequences.

Presentation of The Main Material

The main problem that the authors of the article raise in this work is relevant today in all countries involved in sea transportation. The purity of the water space and the ecological health of the flora and fauna of the World Ocean can be possible only with a sharp decrease in the migration of various invasions in the ballast waters of ships. Statistics and analytics constantly carried out by IMO, speaks of significant volumes of transported ballast water, it is about 5 billion tons per year, and 1 m3 of ballast contains about 50 thousand species of zooplankton, which causes irreparable damage to marine and river fauna, it is more than 200 billion dollars per year. In the Azov-Black Sea basin Russia and Ukraine have reduced the catch of sturgeon and mullet over the past decade by 12 times, completely disappeared: the Black Sea ancheus, chirus, flounder in the Black Sea have become a rarity. Canada during this period, has reduced the catch of sturgeon more than 5 times, the Atlantic from year to year, reduces the catch of valuable fish species, which brought billions of dollars in profits to the leading fishing countries.

Phenomena such as the massive release of whales and dolphins on the shore caused the disruption of the location apparatus of these sea animals, where parasitic worms penetrate and block its work. Colonies of these worms are constantly found in ballast waters when samples are taken on ships by onshore laboratories.

The latest IMO requirements, which regulate the quality of ballast water for ballast water discharge in accordance with International Regulation D-2 with the wording: Ballast Water Treatment System (BWTS), also determine the terms for the conversion of ships until 2024. In this regard, at present, more than 70 thousand sea vessels are subject to complete reconstruction of the ballast system.

According to our calculations, the financial costs in the segments of the world marine fleet are: TAM (Total Addressable Market) – total target market – 4.9 billion dollars; SAM (Served / Serviceable Available Market) – available market size – $ 1.47 billion; SOM (Serviceable and Obtainable market) – realistically achievable market size – $ 0.3 billion [2]. The last meaning determines the real possibilities of the ship repair facilities of Ukraine for the re-equipment of the ballast system of sea vessels. Currently, the shipyards of Ukraine have successfully begun this work, having re-equipped 6 sea vessels of foreign companies, there is a fairly large volume of incoming orders from ship owners in future. This big work in the World Marine Fleet is due to be completed in September 2024.

The scientific and engineering team of the Danube Institute of National University "Odessa Maritime Academy" (DI NU "OMA"), created the installation in accordance with the new requirements of Rule D-2, which was patented and successfully tested in the laboratory of the institute [3].

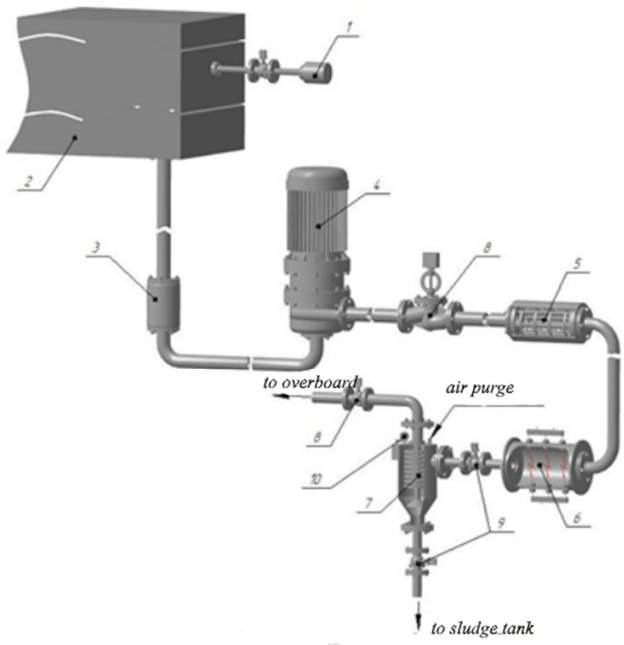

Fig. 1: Installation for purification and disinfection of ballast water, developed in the DI NU "OMA"

1 – dispenser of chemicals; 2 – ballast tank; 3 – coarse filter; 4 – ballast pump; 5 – unit ultraviolet UV radiation; 6 – block of electrohydraulic impact; 7 – self-emptying nanofilter for fine cleaning; 8 – stop valves of the ballast system; 9 – electric gate valve EA-220; 10 – pressure sensor [4]

In Fig. 1. a schematic diagram of the installation of a sea vessel, proposed by the developers of the institute, is shown. On any seagoing vessel, the amount of ballast is up to 30% its deadweight, and the time for complete ballasting of the vessel takes 10-14 hours, which requires, with the installation of new modern systems for cleaning and disinfecting ship ballast, in no way to reduce productivity and not to increase the time for receiving ballast and discharging it. Ballast is received directly from the ballast tanks, where the ballast water is preliminarily treated with special reagents. Now hypochlorite is widely used instead of chlorine, which actively destroys the metal of ballast tanks by corrosion. According to the patent, we proposed to use iron chelate, which is several times superior in its action to hypochlorite, without exceeding it in price. From the ballast tank through a coarse filter with a screening out of large invasive bioorganisms of 300 microns or more, then it passes water through a pump, which creates a pressure in the ballast system of no more than 3 bar, disinfecting water through a cassette set of UV lamps located in the direction of water movement, which then enters the electric hydraulic shock unit where there are constant pulsating electric discharges in the form of lightning, which can destroy most of the living microorganisms in the ballast water. The next stage of processing begins in the nanofilter with automated cleaning of its filter elements by blowing them with compressed air. The created filter is able to purify water by screening out various inclusions up to 2-3 nanometers, without significantly increasing the resistance to water movement. Purified and disinfected water is discharged overboard.

In the process of testing the installation, an ozone generator was additionally introduced, which made it possible not to use the remaining expensive modules: nanofilter and electrohydraulic shock. The developers of the installation proceeded from the concept of sufficiency and cost savings. In this simplified form, the installation reached ballast water treatment rates in full compliance with the new Regulation D-2. This begs the question: "Why were the other two modules designed?" Analyzing the situation with the constant tightening of requirements for the ballast water of ships (every 5 years), and understanding the growing costs of re-equipment of the ballast system, it became obvious to create a universal installation taking into account the growing requirements. The Covid-19 pandemic also made adjustments to the creation of a full-fledged installation. It became known that viruses, dangerous to human life and health, are widely spread in ballast waters. The versatility of the installation is confirmed by its ability to disinfect waste water using the other two modules, which gives a complete guarantee of the destruction of the entire line of viruses. Scaling the size of the installation taking into account its performance, it can be successfully applied at the wastewater treatment plant of any metropolis.

At the beginning of this year, the development team of the installation of the DI NU "OMA" tried their hand at YEP Starter – the International Entrepreneurship Program, putting forward their own project "BWTS" (Ballast Water Treatment System). YEP Starter is a 3-month startup incubation program supported by the United States Agency for International Development. USAID is an independent government organization run directly by the US Secretary of State. The startup was supported by the Ministry of Education and Science of Ukraine, the Ministry of Foreign Affairs of Estonia and the University of Tartu, and the Ministry of Digital Transformation of Ukraine. For 3 months, the institute team diligently performed various tasks, attended lectures and used the acquired knowledge to develop their project. The team successfully passed the YEP Starter incubation program and received a prize in the form of Personal Mentorship, the team was invited to take part in the next stage – the PreAcceleration Program [5].

The Izmail shipyard showed interest in the production of the installation under the patent of the institute developers, providing partial financial assistance in the creation of a laboratory installation, which made it possible to conduct research in a simplified version using two modules (UV and ozone module), this showed the effectiveness of the created laboratory installation in accordance with the new requirements. Due to financial difficulties, the developers of the Danube Institute cannot continue in-depth research using the other two modules. One of them – the module of electrohydroimpulse at present will be replaced by a module of a nanosecond corona multipulse electric discharge, which specialists of the Institute are currently working on. The new module is able to improve the quality of ballast water disinfection until the complete destruction of the entire line of viruses. Tests carried out in one of the laboratories in Ukraine showed the complete destruction of *E. coli* colonies in water. The consumed electricity for disinfection of $1m^3$ of water is reduced by 3 times and amounts to 0.1 kW, which in ship conditions for an average large-tonnage vessel will amount to 2 thousand kW of power of marine diesel generators 1300 kW of electricity savings, which is equal to saving diesel fuel for 1 hour of operation of the new module – 260 liters, or $ 205.

Research and development work on the installation continues, the developers are improving the installation, having received the approval of the management of the Izmail shipyard, which is currently re-equipping sea vessels with foreign-made installations, which are supplied directly by the ship owner. All the installations installed by the factory belong to Wärtsila, they are recognized in the World shipping market as the most reliable and high quality ones. The selling price of this installation is too expensive and not affordable for many shipowners. Today, the scientists and engineers of the institute are faced with the most important task to achieve complete superiority of the domestic installation not only in terms of performance, but also in price, in contrast to foreign analogues. For this purpose, in the first approximation, the price of our installation was calculated for its production at the Izmail shipyard. The new legislation of Ukraine in 2020 on taxation of private industrial enterprises of the category of an existing plant was taken into account, where the list of taxes includes the following items: the rate of income tax – 18%; military tax – 1.5%; tax on dividends – 5%; value added tax (VAT) – 20% of the amount of sold products, but after the goods cross the border, the amount of VAT is refunded to the payer; unified social contribution (USC) – 22% from the wage fund; environmental taxation (ecotax) – 1% of the profit.

Factory calculation of monthly installation production costs [6]:
1. Pipeline and fittings - $ USA 3000
2. Automation equipment - $ USA 6000
3. Installation of an ultrahigh corona electric pulse voltage 50 000 kW. - $ USA 50,000
4. Self-discharging nanofilter - $ USA 35,000
5. Ozone installation - $ USA 25,000
6. Ultraviolet UV disinfectant - $ USA 10,000
7. Chemicals for the trial period - $ USA 2000
8. Materials for electrical installation work - $ USA 8000
9. Indirect costs - $ USA 10,000
10. Creation of design and working technical documentation - $ USA 5000
11. Wage fund for workers in various specialties (10 people) - $ USA 10,000.

Total: $ USA 169,000 price with a full set of installation modules.

The calculation of profit is obtained from the difference in the base price of similar installations on the World market, taking into account the deadweight of the vessel, which can be taken with a certain error as the average market price of $ USA 250,000, then 250,000 - 169,000 = $ USA 81,000. From the profit received, it is necessary to pay general taxes 26% = $ USA 21,060 then the net profit will be 81,000 - 21060 = $ USA 59,940, which is quite consistent with the European level of profitability. In Ukraine, the selling price of manufactured products can be set by the manufacturer, which is often not justified when, in the pursuit of excess profits, a non-marketable price is set and the goods lose their liquidity. It is obvious from the calculations that it is more profitable for the plant to produce our installation in a simplified version without two innovative modules.

In creating their own installation, the developers of the institute analyzed in detail a number of foreign analogues such as: Optimarin (Norway), OBS / OBS, Alfa Laval (Sweden), Pure Ballast 3, TeamTec OceanSaver AS, Ocean Saver, Sunrui (China), Bal Clor, Ecochlor , Inc (USA), Ecochlor, Erma First (Greece), Erma First FIT and others. The result of the analysis showed that many foreign installations are focused on the D-2 standards with no prospect for the next 5 years after 2024 [7-9].

Conclusion

The installation developed and patented by the developers of the DI NU "OMA" based on the results of laboratory studies, has shown its competitiveness in the BWTS market in its simplified version. The installation flexibility allows to use a full set of modules without additional configuration, by automatically connecting and disconnecting them. This installation, with a certain scale of it, is capable of disinfecting and purifying wastewater from city sewage treatment plants. With the use of a corona nanosecond electric pulse discharge, this installation (its module) is able to reduce the energy consumption of ship power plants by three times. The use of an innovative module of an electric pulse discharge will destroy the entire line of harmful viruses that are dangerous to human health and life.

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The Changing Role of Human Resource Management

Daniela MARGARIT(RUSE)
Polytechnic University, Bucharest, Romania
Email:rusedaniela@yahoo.com

Liviu Daniel GHICULESCU,
Polytechnic University, Bucharest, Romania
Email: daniel.ghiculescu@upb.ro

Abstract

Given that resistance to change can play a major role in determining how a company operates, it is necessary for those involved in change management to find solutions to avoid mass resistance when a change occurs. The most important aspect to consider is the communication about the need for change, the impact and the benefits it brings to the organization as a whole.

Keywords: Human Resources Management, Companies, Teleworking, Employers.

Introduction

People are the common and vital resource of all organizations, are the ones who ensure survival and development in a long chain of competition, in all areas. Resistance is a natural reaction of employees when faced with changes.

Change is uncomfortable and requires, every time, new ways of thinking and performing tasks at work, mentioned in "Management.How you can reduce employee resistance to change"

https://www.colorful.hr.

Human resources specialists believe that a good management of change must aim to create a favorable environment and anticipate employees' needs in transit periods. Human resources management encompasses most of the human-oriented activities, with objectives from the conception, design, use, maintenance and socio-human development.

Change generally requires continuous adjustment of life. The process of change is often irreversible, moving the individual from the state of comfort to an aspirational one and realizing a dream. In an organization, things are absolutely the same, the small difference being its size and its ability to adapt to external conditions, from the environment in which people work while maintaining internal stability. You don't have to be a visionary for the change-stability relationship to be balanced, the identity of the organization is important, the flexibility to adapt to advanced technologies and the existence of an employee reward system that equally reflects priorities, organizational values, as well as the needs of individuals that forms the organization.

Human Resources Management in Romania

Human resources management encompasses most human-oriented activities, having objectives derived from the conception, design, use, maintenance and socio-human development. This type of management has evolved substantially, has developed high competence in multiple ways. Most organizations use human resources specialists, by outsourcing this service, which, in the past, was a self-standing department within the entity and directly subordinated to its management.

A number of activities are carried out to ensure long-term and beneficial relationships between the employee and the employer. These activities developed in Romania immediately after opening the borders and with the Romanian market being captivated by multinationals and brands with capital and conduct, allowing management to develop in all aspects. Human resources management existed in Romania, but it was not called so, nor did it have an acute

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need to direct and orient the human resource and is mentioned in the book “Human resources management” written by Păunescu I. (2000).

Human resources management has evolved substantially, has developed high competence in multiple ways. Specialists develop methods of finding and hiring people with the required skills, looking at the organization's future projects and trends, the number of employees needed and the type of skills and competences that any vacancies require. All this work is the definition of human resources management, more precisely, all the activities oriented to the provision, development, motivation and maintenance of human resources within the organization, in order to achieving, with maximum efficiency, its objectives and meeting employees' needs.

Rigorous human resource management requires effectiveness in activities relating to:

- the flow of staff – which involves not only recruitment and selection, but also the pursuit of post adaptation socialization, internal promotion;
- leaving the organization;
- performance evaluation;
- feeds-back, both from the business entity seeking personnel and from the employees, whether personal, team or organizational objectives are achieved or not, rewards and benefits;
- defining posts, organization chart, areas of responsibility, training teams or working groups and training of employees;
- keeping employees engaged and involved in decision-making activities, the development of bottom-up and top-down communication, maintenance of procedural accuracy and organizational ethics, mentioned in “Labor force in Romania. Employment and unemployment in 2019”, National Institute of Statistics, https://insse.ro/cms/ro.

These tasks can only be successfully completed if there is "someone" (a person, team or department) capable of, at least, to:

- identify how organizational objectives can be understood and interpreted in their interdependency to the level of the objectives of each individual employee;
- understand and identify the internal drivers of employees;
- identify the need of knowledge and skills necessary for the staff to achieve the objectives;
- establish the set of measures, to optimize them (understanding the nature of all organization activities and methods of professional development of employees);
- know how to serve all the skills of the employees to the organization and take steps to reduce thosebehaviors that are at odds with the goals of the organization.

The gap between the quality of employees and organizational objectives, between the goals of the employees and those of the organization, it is what human resources management really means.

Most of the time the organization goals change much faster than people's ability to adapt to these changes and is mentioned in the book “Human resources management” written by Păunescu I. (2000). As it grows and develops, any organization faces problems with the need for human resources.

The objectives pursued by human resources management are:

- Increasing efficiency and effectiveness of staff (increase of the productivity);
- Reducing absenteeism, fluctuation and the magnitude and number of striking movements;
- Increase employee work satisfaction;
- Increase the capacity to innovate, solve problems and change the organization.

The statement that human resources management is the only road to success is certainly exaggerated, but it is perfectly true that a just management of human resource allows to obtain competitive advantages that can place the firm in a higher position on the market.

The management of the change

As for any need involving a process of finding problems and identifying solutions and for change, there is a management that has the same feature as research and finding the problem, finding the right solutions, solving and moving from the current state to the desired state. In the situation addressed, the focus is on the broader impact of

change in particular, on people and how they, as individuals and teams move from the current situation to the new one, mentioned in "Management change" 5 principles of organizational strategy, https://www.austral.ro/blog.
The change in question could vary from a simple process change to major changes in the company policy or the change of the required strategy, if the organization wants to reach new limits. In the management of the change, it is important to realize that there will be a response to change and let's think about the reaction in the report with the change, passive - we're waiting to see what's happening or active - we're engaged to achieve the desired goal.

When an organization opposes change, it often means that it agrees to achieve a goal in one way, the one originally proposed or the one the organization is already accustomed to. But the adaptation of an organization to change is influenced by two main aspects: our expectations of a certain situation and what happens in reality. The greater the difference between the two, the harder it is for us to adapt. Organizations capable of adapting will prosper in conditions of uncertainty and chaos. Companies run by leaders with an adaptable attitude will not complain of failures, they will recognize the situation, learn from mistakes and then continue to go further (fig.1).

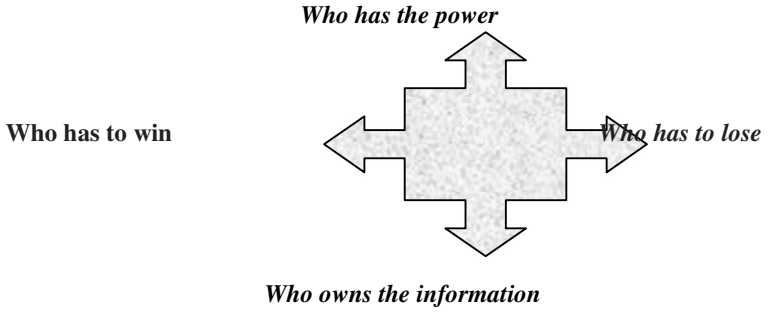

Fig. 1: Categories of interest that control the process of change is mentioned in the article: (2015)" The *role of* human resources management in the context of change" [online] accessed May 2020 http://andrei.clubcisco.ro

Human resources in Romania in the context of the pandemic crisis.

Changes in the structure of society as a whole but also in the way companies operate, have put a mark on work organization (open-ended, full-time and fixed-time employment contracts), which are abandoned in favor of new flexible forms of work that benefit both the employer and the employee.

Although the legislation is constantly amending and supplementing, flexible forms of work such as teleworking or home-work, in the context of the pandemic crisis of COVID 19, have partially resolved the continuity and balance in the economy, mentioned in "Labor force in Romania. Employment and unemployment in 2019", National Institute of Statistics, https://insse.ro/cms/ro

However, the rules to be followed in order to implement these flexible forms of work create numerous problems. Not all employees are ready for such work, cannot adapt and individual employment contracts don't have rigorous clauses in this respect. Flexibility at work has several advantages for employee, the salary package is becoming more complex and more tailored to market needs, negotiation power is transferred from the employer to the employee, costs are more effective and improves employee satisfaction and is mentioned in the book *The New York Talent Management Manual: Recreation Organizational Excellence Handbook*, written by Berger, D et al (2003). In addition, mobility also has benefits in kind with favorable tax treatment: "gift tickets, car usage for personal purposes or holiday vouchers".

Not all areas are ready to adopt this kind of work. Not all employees are ready to work from home. At this time, changes have taken place in every respect worldwide. The imminent threat of an unknown enemy, in this case SARS-type virus, its way of spreading determined long series of decrees to force companies to adopt measures in order to make the employees activity more flexible. But here is how a crisis situation puts a sufficiently high pressure so it can force us to find quick solutions, and this acceleration of what is shown, in many respects, to be progress (the best example is the digitization of some procedures and services), will bring long-term benefits.

It is also true that for very many employers not much will change, not if the legislation does not make the necessary updates and changes. Not all firms will want to invest in more effective measures to protect employees from the risk of contamination, and the likely fines from ITM(Territorial Labour Inspectorate) will not prove viable unless there are clear provisions in the law.

Although we do not like it, in the next few months and even more, social distancing will say its word, we will still have to try to work without exaggerating in terms of socialization and avoiding larger groups of people. Therefore, work at home will be kept high, because there will also be many employees who will request to continue working from home, out of fear of being left without work, or of fear of illness.

Moreover, companies have had the opportunity to test the extent to which employees can do their work from home and also assess the extent to which this change has been cost-effective for the company. Investment in people has proved to have a good effect over time. The employee felt valued and made more effort to develop the company. Valuable individuals understood that they can grow with the business, being motivated in all respects.

Those who did not agree with the company's policy or did not comply with the requirements of the management, were willing to leave, to star over under other conditions and the remaining ones have helped to solve some difficult situations the company faced. This approach, based on investment in current employees, has good long-term effects. Filling vacant positions will be easier because employees will have other roles in the company, some of the more important ones they could only dreamed of and they are now doing it with passion, mentioned in "European Union law", https://eur-lex.europa.eu.

In addition, they have already adapted to the working environment and have already delivered results in a certain area, so they are more likely to manage in a new one. In this way you can prevent problems that may arise when hiring a new employees, like the inappropriate attitude, the lack of flexibility or the lack of focus on results, because you already know them.

More than 51% of the companies made portable devices available to employees, which allows internet connection via telephone networks for business purposes and over 85% use computing techniques, like personal computers, desktops, portable computers, tablets or smartphones and is mentioned in the book *General Community Law*, written by Tancu, D. (2007).

These data relate in particular to enterprises with more than 10 employees, with main activity in manufacturing, construction, trade and services. Thus for those companies which insured the transport of employees or settled travel payments, for those offering a warm meal, or 1-3 hours of disconnection in the gym, for those who paid exorbitant rents for large spaces, ensuring all the comfort to their employees, for them there were certainly cost reductions from the start.

For employees who did not receive such benefits, there was an increase in income, the latter having no longer to pay for the daily transport to and from the place of work, eliminating the daily costs of lunch, the stress of waiting at public transport stations, the daily temptation to buy "something" seen at a colleague or suggested by a tiring ad. This is another factor that will make many employees to take home work into account, even after the end of the state of emergency, and companies should be prepared and open to such proposals.

Large companies have given up large offices, using virtual offices where only one employee takes orders, answer the messages, receive the mail and distribute it diligently. Companies can reinvest the money saved in new technologies that make work at home easier, communication with employees, business partners and even customers. It is already expected to be registered, in the next year, a major increase of people who will still want to work from home and companies wishing to keep their employees will have to accept such requests and remember the recent lesson: only those who adapt quickly are overcoming the crisis.

Many employers have been unconfident about telework or work at home, but this crisis has driven out skepticism for many of them. They had the opportunity to test, see and convince themselves that work from home comes with more benefits and that doesn't mean that those working from home no longer work or are no longer as efficient. On the contrary, in countless situations, and again depending on each field, work at home will be much more efficient for many employees and will bring much better results to the company. It is a time when attempts are being made to preserve business and to invent ways of resisting.

The increasingly common career process, the professional retraining which occurs when we, as people, want a partial or total change in the field of activity which is increasingly taking place at a time of crisis. Reconfiguring the professional road when we believe we have chosen the wrong road, it no longer applies at this time, although we believe that we have potential and ideas for another area, we have no choice now. What is happening in the labor market was a rapid learning process in crisis conditions but a process that will benefit those companies that have understood how much this transformation can help them, or they will hasten the end of the inadaptable ones mentioned in the article *Europe, from one way ticket to migration in a circuit from one state to another*,written by Bechir, M. in Adevărul newspaper.

Many of the companies that were not ready for work from home and they have not even made any efforts to digitize quickly, to ensure that they support their employees in terms of work at home, have seen a drop in labor productivity. Due to the situation created by the pandemic, the closure of some businesses, the rethinking of others, the migrant workforce returned to the country. At this point, the restart of the economy is being considered, so we will have to have a plan with arguments prepared and a speech explaining the benefits of these changes, especially because of the trend of people, generally speaking, to be closed to the new and to resist change and is mentioned in the book *Labor market, restructuring, employment, unemployment*, written by Osoian, C. (2005).

Automation and modern technologies will speak more and more.The flexibility of working hours will no longer be for most of the companies just a way to try mark a trend, somewhere in the distant future, but a concrete reality demanded not only by employees, but also by legislation.

Change - the survival of organizations

It is known or more understood that the survival of an organization depends on change, which can be divided into four levels (fig.2):

- change in knowledge,
- a change in attitude,
- how to change the behavior of individuals
- as well as changes in the behavior of the group or organization.

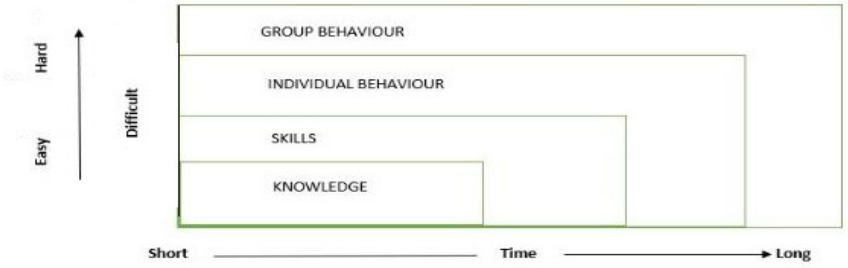

Fig. 2: The relationship "Time - Difficulty" in producing a change is mentioned in the article (2015) "*The role of* human resources management in the context of change" [online] accessed May 2020 http://andrei.clubcisco.ro

The easiest changes to make are with knowledge, followed by changes in attitude. Attitude structure differs from knowledge structure, knowing that they are emotionally positive or negative. As far as behavioral changes are concerned, they are much more difficult and time consuming than the other two mentioned above. Changes in group and organizational performance are probably the most difficult and time consuming. The survival of an organization may therefore depend on the degree to which behavioral sciences are able to resolve conflicts between understanding change and implementing it, mentioned in "Management change" 5 principles of organizational strategy, https://www.austral.ro/blog .

Control of the change process

We seem to tend to believe that organizations are the ones changing but in reality change is always achieved by people, which is why to achieve effective change, the focus is primarily put on people.

William Bridges – who dedicated his career to research into how change affects us – says "changes are not the problem, but the transition. The change is a new laptop. The transition is the attempt to use it."

Change means doing things differently, seeing things in a new way, adapting to surprises and ideas with unexpected results.

Any significant transformation first creates "problems" to the people and then to the organisations in which they work. Jobs are changing, new skills and capabilities need to be developed and employees will find themselves in an uncertain situation. Responding to these problems in a reactive way, on a case-by-case basis, puts the speed, morale and results of a team at risk.

Principles of the basic change

The goal setting helps to establish performance indicators and how to measure the achievement of the goal. This also involves identifying the resources and people who will facilitate the process and support the team's effort. When you establish a solid basis in the process of change, you will have more clarity and ease for successful implementation.

The power of example - the top of the organization

Because change is inherently difficult for people at all levels of an organization, when you are in the process, all eyes will head to the CEO and leadership team for help, support and direction. The leaders themselves must first adopt the new changes to motivate the rest of the team by example.

Planning

Regardless of the size and impact of what is changing, a more or less formal, flexible plan is needed to ensure the operation of the measures. The establishment of human resources is the first step in the plan and the time allocated for implementation is also done at this stage.

Communication

The best decisions are made through communication, an attitude that strengthens the team and helps them understand and implement the new situation. Top-down communications are designed to provide employees with the right information at the right time and request information and feedback.

Monitoring

In the process of change, it is important to make sure that actions happen as planned, or at least that you are informed when things do not work as planned. At this stage, make sure that the budget, the allotted time, and the quality indicators you have set are respected. Also the change brings with it a lot of resistance from people, make sure that they have constant support in going beyond this stage.

Anticipate the unknown

No program of change is exactly in line with your plan, no matter how well it is made and perhaps this unpredictability is precisely the charm of the changes.

Reward the success

The work team will feel appreciated, proud of the effort, will feel that their work has counted and will be much more motivated to deal with future changes in a proactive and enthusiastic way.

Clear Goals, Major Changes

While they are constantly changing, the goals of HR management show that an increasing number of employers have taken significant steps in the process of managing change through specific activities of human resources management. Most of the time, the training process is considered decisive in this effort. The long-term objective is to make all workers aware of the reality of change and the need to work together regardless of the differences between partners.

Attracting the human resource, the potential skilled for each job, provides an increasing number of contemporary employers with the possibility of better control and further reducing operating costs. Keeping specialists for as long as possible so that investment in their training and specialization can be amortized is another important objective.

The potential advantage is to reduce fluctuation and increase efficiency, continuity and productivity. Different schemes of change are being developed, flexible working hours, the traditional time of start and end of the daily 8-hour program may vary, short working week (compressed), distance work (home).

An indicator by which the effect of a positive environment in the organization can be measured is the quality of life of employees and their jobs. Quality of life can be defined as the degree to which employees can meet their needs (self-esteem, sentimental belonging and self-realization) at work. In these circumstances, it is an effective human resources management department that provides the process of motivating workers to induce a desire to achieve performance and provides stability for staff.

Last but not least, the motivation, the establishment of forms of direct, indirect and performance criteria reward is a clear and constantly changing objective. Ensuring the quality of working conditions through participatory and responsible involvement in the work, achieving adequate satisfaction, reducing stress and accidents at work or occupational disease hazards, make that organization a wanted one, making the role of the HR manager much easier.

The human resources policy formulated by the organization's management, guides the work of each employee. This requires the elements of this policy to be detailed and implemented at every level of the hierarchy. The establishment of a fair human resources policy must take into account the importance of human resources, the responsibility of the management and the objectives in this area.

Conclusions

At a time when most companies are facing great problems with human resources and when statistics rank us as the top of the export of skilled personnel, it is important to clarify what is going on and what direction to follow in the area of human resources, mentioned in "Professions, employees and employers face-to-face-to-digitization", https://www.zf.ro.

The world of human resources is extremely dynamic, so it is good not to approach forecasts for long periods. However, the next period will continue to be in a growing shortage of staff, the statistics on
the departure of Romanian workers from the country continue to remain at the same level, so the range of options for employers will remain at most as small.

The importance of human resources and their management will increase as a result of the companies demand, which have reduced their activity and have chosen to resist or develop other lines. The need for people is not simple, it comes to a package with qualifications and motivation.

If the workforce chooses to leave, we will import work from outside the European Union to cover immediate needs, but with fabulous costs for employers.

Small and large firms will approach the motivation technique for ambitious young people who want to feel that they make the difference, that the purpose of the work is respected and due to them. It is true that large organizations do not have concurrent on the motivational chapter, they offer in addition to stability, salaries and benefit packages that are more attractive to a young individual. As always, fair reward for work, recognition and appreciation, investment in training and development, the fact that man is man and can be wrong will be successful.

People are in constant search, are being eaten by the illusion of a higher salary, but they also want a balanced working time, they want conditions, they want respect, they want flexibility and they want to get to work easily. Qualities, and if he approaches, the individual cannot adapt then he has a choice, resists (not much) and does not yield, or goes into a new search.

At the time of this work, the effect of the coronavirus pandemic changes a lot of life at work in some cases forever.

In Romania, however, telework was the common alternative during the pandemic, whereby employees continued their work from home. Many employers have convinced themselves that work from home can be at least as productive as work at office. Of course, it cannot be carried out permanently, but digitization could be, in the future, another approach to avoid human contact in the event of a health emergency. And this could rethink the entire organization chart of companies and institutions.

The current situation has happened unexpectedly and suddenly, tens of millions of people around the world have been finding themselves in the situation of working at home the next day. The companies rushed to adopt fast remote work solutions, consisting mainly of video and conference platforms, alongside the phone, chat, WhatsApp,

email and collaborative solutions such as Google Docs, one Drive or similar. And in general, these platforms, plus some specialized on a case-by-case basis, have proved quick and easy to implement.

Beyond the logistical issue of their adoption and large-scale implementation (licensing purchases, initial user training, phone or laptop purchases or tablets in some cases), the real difficulty of making the transition to this way of working has proved to be different. One of the mindset and psychological adaptation.

We all received what we wanted (work from home) before the pandemic, but after a while it was no longer comfortable because it was not a choice was sudden imposition and without preparation. The human resource has adapted, we have found solutions for anything, simpler or more complex, cheaper or more expensive, but unfortunately not in all areas of the economy and is mentioned in the book *General Community Law*, written by Tancu, D. (2007). Employees will need to adapt to the new context, business travel will be significantly reduced, online meetings and videoconferencing become a normality and also show their efficiency, they may never recover again.

The fact is that in the coming period, companies will show more concern for employees, and so they will appear in the top of the most wanted jobs in the future. It is a quality that you can get very hard and that involves a fairly high cost of time, money and resources. As for the human resource, it has discovered dormant skills and competences, so it will have to adapt even more to evolve.

Acknowledgement

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Development of Approaches to Ensuring Tax Security in The Region

Elena A. MURZINA

Volga state university of technology, Yoshkar-Ola, Russia, elena.murzina@gmail.com

Marina S. SHEMYAKINA

Volga state university of technology, Yoshkar-Ola, Russia, sh.marina.s@gmail.com

Abstract

The article reveals the tasks set before the formation of a tax control system in order to ensure the tax security of the region, the following: ensuring the established amounts of tax revenues to the budget, reducing tax arrears, increasing the effectiveness of tax control, improving the tax culture of taxpayers, implementing the principle of conscientious taxpayers, reducing the number of complaints and appeals of taxpayers. The author of this article considers it strategically important to increase the efficiency of tax control not through the application of tax sanctions, but through preliminary prevention of tax violations, informing taxpayers about potential risks, and building a comfortable business climate. The latter is especially relevant in the current epidemiological situation.

Keywords: Economic Security, Tax Security, Tax Control, Tax Security Risks, Tax Risk Management.

Introduction

Tax control tools ensure the effectiveness of the implemented regional tax policy. The strategic result of its development is an increase in tax revenues going to the budget, as well as the prevention of tax risks and threats. The level of tax security of the regions depends on the efficiency of organizing the implementation of tax control.

The main activity of the tax authorities at present can be designated cameral control, which involves conducting more detailed tax audits. The tax authorities of the constituent entities of the Russian Federation use automated cameral controls. The effectiveness of the on-site inspection depends on the quality of the desk audit, since a plan of the on-site audit is formed based on the results of the desk inspections.

Monitoring, collection of indirect information and its assessment are given an important place during the audit. In particular, on the basis of information obtained from external sources, the directions of actions of the tax authorities are determined.

It is not always possible to bring the taxpayer to justice. With the system of responsibility currently in force, many participants in tax relations, from an economic point of view, it is more profitable to apply the scheme of tax evasion, even if there is a risk of prosecution. In this case, the tax authorities need to analyze tax optimization schemes in order to form and apply measures to prevent and eliminate the identified tax violations.

Review of literature

Considering the current state of research on the selected topic, we note the following. Among Russian scientists, theoretical and practical aspects of state support were considered with varying degrees of completeness in the works of O. Ponomareva (2017), V.I. Boboshko. (2017), Bykovskaya Yu.V., Ivanova L.N., Safokhina E.A. (2018) and a number of others. The named authors focus on certain aspects of the state support mechanism, including its individual measures. The issues of assessing the effectiveness of state support are raised in the works of V. Barinova (2018), E.R. Dadashev. (2020), Baranova S.V. and her co-authors (2020).

Including in the context of a coronavirus pandemic in the work of N.S. Bezugloy. and Shamray I.N. (2020). To a lesser extent, the system of assessing state support for small business has been studied in the work of S.A. Anokhina. (2020). It seems interesting to study the dynamics of indicators of small business activity in the regions of the Russian Federation using neural network modeling of small business entities Yu.V. Kuznetsova. (2017; 2020) and Perova V.I. (2020). Nevertheless, the proposed method can only identify regions with a low level of clustering of small business entities, but not the effectiveness of state support in relation to these entities. It should be noted that some authors made attempts to form a certain integral indicator reflecting the level of formation and dynamics of development of the small business sector (Burov V.Yu., Kaibalina N.B. & Ortykov A.U. (2020)). This is undoubtedly of interest, but it is not comprehensive and does not reflect the effectiveness of government support. An interesting study summarizing government support measures is the Review of international practice of supporting the economy and

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the population in the fight against the coronavirus pandemic, which was prepared by a team of scientists from the Institute for Social Policy of the HSE University (2020).

It can be noted that in Russian studies, it is precisely the integrated approach to the methodological provision of state support that is not sufficiently represented, and many problematic issues still require comprehension and search for new scientific approaches, including the absence of an economic and mathematical justification for the conscientiousness of an entrepreneur's behavior.

Foreign authors in their research focus on efficiency criteria (economic, social, budgetary) (Sternberg R. (2017), Kadirbeyoğlu, Z., Adaman, F., Özkaynak, B., & Paker, H. (2017)). For example, Fuller T., Moran P. (2016) distinguishes such a criterion as the significance of government support measures among its recipients. Speaking about the practical implementation of the results of foreign research, it is especially worth highlighting the PART (Program assessment rating tool) system (USA), aimed at monitoring and assessing the effectiveness of state support. This system is complex in nature, summarizes a significant amount of factor indicators and gives, as a result, a report on the effectiveness of state targeted support programs. Nevertheless, this program allows you to analyze the results as a fait accompli, but not to form preliminary forecast values of the effectiveness of state support.

It is planned to use the technology of distributed ledgers (blockchain) as the main toolkit for the implementation of the project. Blockchain has not received wide, deep coverage in scientific literature, especially the use of this technology in the sphere of the functioning of the system of state support for business entities. The main research in the field of distributed ledgers is focused on several projects, such as: Masterchain (2020), Waves (2020). However, none of them is considering the possibility of using it in the field of state support, methodological approaches to using this technology are also not being studied.

Methodology

Let us formulate the main provisions of the proposed approach to solving the problem.

Provision 1. Measures of state support for small and medium-sized businesses should be differentiated in relation to each region, their volume and content should be assessed from the standpoint of:

1) admissibility in each specific region in the context of ensuring the economic security of the region;

2) sufficiency for each specific business entity (and at the same time not be redundant);

3) the effect of the application should be determined by quantitative indicators.

Provision 2. A necessary condition for the effectiveness of state support should be the absence of abuse by the recipients of funds. The recipients of state support funds should be exclusively conscientious entrepreneurs - subjects of the ecosystem of small and medium enterprises. Accordingly, we propose to introduce, substantiate and quantify the category of “conscientious entrepreneur” for the purpose of obtaining state support. For this purpose it is proposed:

1. Explore the content of the category "conscientious entrepreneur". It should be noted that the term "good faith" also takes place at the legislative level: a) for example, it is found in the Civil Code of the Russian Federation, a number of other regulations), b) in tax legislation, the very concept of "good faith" is taken into account in relation to taxpayers (good faith or unscrupulous taxpayer).

2. Within the framework of our research, the sign of “conscientiousness” is considered not as a qualitative one, but primarily as a quantitative characteristic of an entrepreneur - a representative of small or medium-sized businesses. Accordingly, it is proposed to develop a system of quantitative indicators to assess the "good faith of an entrepreneur" and, as a result, the formation of a passport of a bona fide entrepreneur

3. A quantitative assessment of financial and economic activities and confirmation of the status of a bona fide entrepreneur is the basis for the provision of state support.

Provision 3. Balanced government support for the ecosystem of small and medium-sized enterprises should be built using distributed ledger technology (blockchain), which in relation to the task at hand has the following advantages:

a) the immutability of the entered initial data on potential recipients of state support;

b) a single format for the accumulation, systematization and analysis of data;

c) transparency of the registered information for all interested parties;

d) exclusion of corrupt practices when deciding on the provision of state support;

e) the possibility of registering information on the financial and economic activities of a business entity, coming from all controlling bodies of state power (subject to the gradual deployment of the all-Russian system);

f) the use of smart contracts to automate the procedures for determining recipients

g) the use of smart contracts to track the acceptable and sufficient volumes of government support;

h) the reliability and invariability of the effectiveness of the implemented measures of state support.

Общий план работы и ожидаемые результаты:

Results

Using the proposed methods, the following were obtained:

1. Scientific substantiation of the prospects and economic effect from the deployment of comprehensive balanced state support for the ecosystem of small and medium-sized businesses within the constituent entity of the Russian Federation, the Federal District, Russia. Formation of the methodological base of the study, substantiation of the use of economic and mathematical research methods and analytical tools of a comprehensive system of balanced state support for small and medium-sized enterprises, including the creation of its strategy that ensures sustainable socio-economic development of the region and its municipalities in the search for a balance of the regional ecosystem.

2. Analytical study of the use cases of distributed ledger technology (blockchain) for project tasks. Analysis of existing information and analytical systems used by government authorities for the implementation of distributed ledger technology. Determination of the optimal technological platform for solving the problems of providing balanced state support for the ecosystem of small and medium enterprises. Analysis taking into account the possibility of practical implementation of the use of smart contracts in the Etherium, Masterchain or Waves blockchain.

3. Development of basic principles for the application of a balanced state support system for small and medium-sized enterprises. Building a differentiated model for regulating the processes of state support for small and medium-sized enterprises, taking into account the socio-economic development of regions. Scientific substantiation of a differentiated approach to obtaining government support measures for small and medium-sized businesses, taking into account the entrepreneurial integrity index.

4. Research of the content of the category "conscientious entrepreneur" in order to develop a system of quantitative indicators of "conscientious entrepreneur".

Conclusion

Tax control tools ensure the effectiveness of the implemented regional tax policy. The strategic result of its development is an increase in tax revenues going to the budget, as well as the prevention of tax risks and threats. The level of tax security of the regions depends on the efficiency of organizing the implementation of tax control.

The main activity of the tax authorities at present can be designated cameral control, which involves conducting more detailed tax audits. The tax authorities of the constituent entities of the Russian Federation use automated cameral controls. The effectiveness of the on-site inspection depends on the quality of the desk audit, since a plan of the on-site audit is formed based on the results of the desk inspections.

Monitoring, collection of indirect information and its assessment are given an important place during the audit. In particular, on the basis of information obtained from external sources, the directions of actions of the tax authorities are determined.

Acknowledgments

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Music and Tourism: An Analysis of Music, Being a Part of Cultural Tourism

[1*] Sruthi SAJI

[1*] PhD Research Scholar, Department of English Language and Literature, Amrita Vishwa Vidhyapeetham University, Kochi Campus, Kerala, India. Email: sruthisajis949494@gmail.com

[2*] Dr. Sreelakshmi N.

[2*] Assistant Professor, Department of English Language and Literature, Amrita Vishwa Vidyapeetham University, Kochi Campus, Kerala, India. Email: sree3545@gmail.com

Abstract

Music is an integral part of life, a major mark in representing the culture and tradition of a society. Tourism, being a globalized process bringing out different people together, takes hold of music too in its inter-disciplinary journey, through Music Tourism. Connecting people around the world through the music festivals, help in the sustainable development of the process of globalization. Music therapy, a major way of treatment, dated back to ancient Gods to the modernity, can also be considered as a major part of the cultural tourism. This study focuses on music, rather than being a mere art form, shares its part with tourism promoting equally in the entertainment arena, economic sphere and in the health-induced fields.

Keywords: Music, Music Tourism, Culture, Tradition, Music Therapy.

Introduction

Music, in all its rights has its universal way to mark the cultural expressions. It can be considered as one of the major factors affecting the culture and tradition of a society. It varies according to different cultures, which are cherished for their aesthetic values. Music has been bound basically to rituality and sociality. And so, music was considered as a performance of power, representing a particular group. Especially, while looking onto the cultural side of a group, music can be taken as an order of expressing their emotions in a proper way. Even though, it was given such an emphasis on that sphere, by now, music is seen as a part of our everyday lives, where most of the people are on an urge of being a part of music, via listening, singing, forming groups worldwide. The soothing effects the music produces, creates a relaxing atmosphere and paves the way for seeking pleasure through its performance**.**

While talking about the rituality and sociality of music, it has been a major factor defining the ritual side of a society. Music was used as a major source for ecclesiastical purposes, by the churchmen. And rather than focusing on its importance in the church, it was also used by certain tribal groups to express their emotions through their songs. As a matter of consideration, music for them was a way to celebrate their ritualistic performances, and for the minority groups, music was used as a weapon against the ones who opposes their freedom of rights. So music as a genre, is considered as evolved from culture and a part of culture, itself. Music, having a therapeutic implication, is a major arena where people look into for pleasure seeking, enjoyments, etc. And this ranges from the classical styles of music including the Western classics, Carnatic music and Hindustani music to the punk- rock styles which are being considered as the popular music forms of the time.

Discussion and Results

Music Tourism

Music tourism is a tourist entity where the people/tourists travels to a place to listen to music performed on festivals. This, as an entity has been promoted by many people all around the world, since it is not only considered as an entertainment arena, but also a way for the local authorities of the place at which the musical festival being held, to live through. During early times, music was basically accepted in its classical or traditional forms. But with the arrival of modernity, there happened a great distinction between classical and popular music. The upper class elites

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went to see the musical performances in huge theatres on festivals. And by the time, the middle or lower classes get used to the hallway or street singing. As tourism as an institution started into being, music as a form of cultural art was also used as a medium to entertain people. Even though music had only been a way of entertainment, it was used as a way to make money too. Tours for the foreigners as part of music festivals were for the promotion of music, fan club and in achieving economic prosperity.

Music works as a narrative for the tourists since it shows out different cultures, and helps in a cultural interaction with the inter-disciplinary fields too. Since music passes out the boundaries, it attracts the tourists who come to know of the tradition of a particular place and identity. Music can be considered as a product of tourism, which can also be a tool to study it. World music genres and their importance in the Diaspora communities or Ethnic communities such as African, Caribbean, Indian, etc, should also be focused on, while talking about music tourism. The third world countries are the major ones who focus on the enhancement of this, due to their need of the appraisal of their own culture to the ones who battle against them and also in an urge to earn money. Music tourism can also be taken as a great opportunity for the ones around the world to establish themselves and showcase their talents. It also contributes the local employment of people over a place and in the promotion of their culture and tradition as well. This phase of tourism started out in the West and later on, was carried away by other countries too.

Major groups or music festivals to be mentioned are given below:

Name of Band/ Festival	**Place of origin**	**Year of origin**
Jam band phenomenon	California, US	1960
Summerfest	Milwaukee, US	1968
New Orleans Jazz and Heritage festival	New Orleans, US	1970
Rio Carnival	Brazil	1723
Notting Hill Carnival	London, UK	1966
Love Parade	Germany	1989
Montreal International Jazz Festival	Montreal, Canada	1980

Music tourism was also promoted in many states of India and the major musical festivals taking place annually, are as follows:

Name of Band/ Festival	**Place of origin**	**Year of Origin**
Desert Camping Festival	Thar Desert, Rajasthan	2018
Dhrupad Mela	Varanasi, Banaras	1989
Sunburn Festival	Vagator, Goa	2007
Ziro Festival of Music	Ziro Valley, Arunachal Pradesh	2012

Music Therapy and Cultural Tourism

As the Seventeenth Century playwright, William Congreve has said, 'Music has charms to soothe the savage breast, to soften rocks or bend a knotted oak'. Music therapy works accordingly, where music, as a medium is being used to address the emotional, physical and other needs of an individual or a group. This therapy not only helps in the treatment process of a particular aged people, but also for the people of all ages. A disturbed mind can be treated by making a distraction on it, with the soothing melodies, and that's what the music therapists do. Cultural tourism provides this sort of facilities for the tourists so that the long- travelled tourists could sit back, relax and have a relief on their stress. Also, the people who had to suffer from Stroke, head injuries, Alzheimer's disease, Autism, heart disease, Cancer, Dementia, etc are being treated with music, nowadays. The universal nature of music helps it to transcend the individuals across all background and ages.

The Receptive Music Therapy, which guides the patients to listen to live or recorded music and Active or Expressive Music Therapy, which engages the clients in the act of making music and producing songs ,are both being used in the tourist' sessions, where basically the tourism supports the former one, the most, because it is more time-saving

than the other. In Kerala, Swathithirunal Kalakendram Music Therapy Foundation at Kozhikode district is considered as a centre of music therapy, which beholds twenty years of experience. In the treatments over there, it is an interpersonal process in which therapist uses music and all its elements to help those undergoing pressure to maintain good health. The basic advantage of these kind of places or this particular therapy is that it helps in the reduction of a number of anaesthetics and the decrease in the length of proceedings, number of employees and equipments of high cost, and moreover an effective way for the reduction of stress, strain agitation, etc.

Music therapy is not a matter that has just happened to form, all of a sudden. But it was used as a healing implement for centuries. Apollo, Greek god of music and medicine, connected these two in the curing of diseases, followed by Aesculapius, who cured diseases of the mind by using song and music. And this same method was used in Egyptian temples too. Even in the Bible, David playing harp for King Saul has been mentioned, and then comes Hippocrates who had played music for mental patients. So music therapy is one of the effective ways used by the ancient legends and the ones now, to cure many mentally and physically ailed diseases, which can be more strongly recommended to be taken, a part of the cultural or music tourism, rather than just giving an inferior position.

Conclusion

Music can be one of the major cultural areas that the field of tourism has to rely on, since it is a part of the cultural space existing in the world that defines different societies, different people and different cultures. Tourism, basically an inter-global process, takes the help of music to be a part of the entertainment industry as well as in the promoting an economic prosperity for the third world countries. Music festivals conducted annually, or on a six- months' basis are given much importance by the tourists all around the world, because they find it a greater chance to get to know the other people and their culture. So it helps in an interaction around the globe, or maybe we can call it as an effective process of globalization too. Music therapy in tourism is also an effective way to attract the tiresome tourists, who wants to get a relief. Therapeutic sessions of music are being held nowadays, all around the globe, which also helps in promoting the inter-global relations and in the universal spread of peace and calm with the magical power of music.

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The Problem of Zombie Businesses in The Global Economy

Kirill Kurilov
0000-0003-1540-5388 Togliatti State University, Togliatti, Russian Federation, KY.Kurilov@gmail.com

Anastasia Kurilova
0000-0002-1943-5675, Togliatti State University, Togliatti, Russian Federation, aakurilova@yandex.ru

Abstract

The current situation in the world economy is characterized by instability and lack of progressive movement towards social well-being. A sharp decline in interest rates and concessional government financing of large socially significant enterprises led to the emergence of enterprises that are highly likely to be unable to pay off their debts. The COVID-19 pandemic has led to an increase in the number of zombie businesses and an increase in their debt. It should also be noted the emergence in the world economy of states that are similar in their characteristics to zombie enterprises. The main distinguishing feature of these countries is the inability to pay off their debts through the economic activities of their economies, since the debt of these countries exceeds their annual GDP. At the same time, due to securitization, zombie enterprises and zombie countries issue various financial assets, including bonds, which are bought by solvent and well-known companies such as Apple. In this regard, it is relevant to search for a model for the distribution of zombie assets of economic entities.

Keywords: zombie enterprises, zombie countries, financial instruments, bonds, junk bonds, GDP, infection model

Introduction

The current economic situation is characterized by instability and lack of a stable movement towards general social well-being.

The situation has worsened significantly as the COVID-19 epidemic spreads around the world. Most enterprises around the world have experienced difficulties related to their economic activities. However, the scale of these difficulties is highly industry specific. For example, the majority of IT companies not only did not suffer, but were also able to increase sales volumes, since during the lockdown the consumption of services which can be obtained remotely increased. At the same time, travel service companies and airlines experienced a catastrophic drop in service volumes, and many were on the brink of financial ruin.

The financial crisis has made the problem of zombie companies urgent, which are companies that cannot pay off their existing debt, and the available income is used to pay off interest on loans.

For the first time, the concept of zombie companies appeared in connection with the outbreak of the financial crisis in Japan, when the bubble burst in the financial and real estate markets. Low interest rates gave rise to inefficient companies that, despite their inefficiency, continued to function. Also, Japanese banks, in the absence of highly profitable projects, continued to finance ineffective zombie enterprises. Also, Japanese banks found themselves in a situation where potentially large losses on previously issued loans forced banks to continue financing some of the zombie enterprises. All this led to the fact that in the early 2000s, the total share of zombie enterprises was about 30% of the total number of all Japanese enterprises. Zombie-owned assets accounted for 15% of all assets in the Japanese economy (Hoshi & Kashyap, 2011).

The largest number of zombie enterprises was observed in those sectors of the Japanese economy in which there was no fierce competition from foreign companies. In those industries in which there was significant competition from foreign companies, the number of zombie enterprises was lower.

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At the same time, zombie companies hindered their existence from the development of healthy companies by obtaining affordable financial resources and ensuring at their expense the hiring of qualified personnel with a higher salary. The increase in the number of zombie enterprises in a sector of the economy leads to the fact that viable companies are forced to reduce investment and hiring.

At the same time, the emergence and growth of zombie enterprises negatively affected the productivity of other enterprises. According to Caballero, Ricardo, Hoshi & Kashyap, 2008, the increase in the number of zombie companies in several sectors of the Japanese economy led to a drop in productivity in those sectors. Thus, the lack of market competition and the forces of "creative destruction" defined by Schumpeter led to a prolonged stagnation in the Japanese economy. If the Japanese government had not prevented the bankruptcy of inefficient enterprises, the economic growth, according to Caballero, Ricardo, Hoshi & Kashyap, 2008, would have been higher. For example, the Japanese economy in the 1990s grew by an average of 0.5% per year, while the US economy during this period grew by 2.6% per year. Thus, the Japanese government and banks by supporting economically inefficient enterprises, on the one hand, avoided a possible hard and short recession in the Japanese economy, and on the other hand, generated a new series of problems associated with a long gradual stagnation, a decrease in economic efficiency and a prolonged absence of economic growth for a long period.

Summing up the Japanese experience, we can draw conclusions about the reasons for the emergence of zombie companies.

Firstly, the main reason for the emergence of zombie companies is the low level of interest rates on attracted debt financing, which leads to a significant increase in the ratio of equity and debt capital, which, in the event of a tendency of rising interest rates, turns out to be one of the main reasons for the emergence of financially insolvent companies.

Secondly, an indirect reason for the appearance of zombie companies is the increase in the volume of bad loans in the composition of bank portfolios, while banks, in order to avoid declaring losses, continue to provide financing to insolvent companies in the hope that in the future their financial condition will improve and they will be able to return previously attracted debt financing and interest.

Third, it is the government's desire to avoid significant social and economic upheavals in society by any means. As a result of government actions, some insolvent enterprises receive state support. At the same time, support measures are usually implemented not based on the principle of the future efficiency of the enterprise and the possibility of restoring solvency after receiving financial support but based on the principle of too big to fail.

It should be noted that the problem of zombie enterprises is typical not only for the Japanese economy, but also for the world economy. So in China, the rapid economic growth and government support measures associated with the policy of stimulating production have led to an increase in the number of zombie enterprises, a characteristic feature of which has become excess production capacity in the steel, cement, and aluminum industries.

The main feature of Chinese zombie companies is that they are owned by the state, the activities of zombie companies are carried out in those industries where there is an excess of production, they provide significant employment and a large share of regional GDP, their efficiency is quite low, each of these enterprises has a significant volume corporate debt. A drastic cut in funding for Chinese zombie businesses could lead to production shutdown and collapse (Guangyuan, 2015).

A difficult situation has developed in other world economies as well. A sharp 10-fold decrease in the US Federal Reserve rate from 2.5% (12/19/2018) to 0.25% (03/16/2020), as well as a significant period of low interest rates, in effect from 01/30/2008 to 09/26/2018, brought to life in the United States, see figure 1 for an epidemic of zombie enterprises.

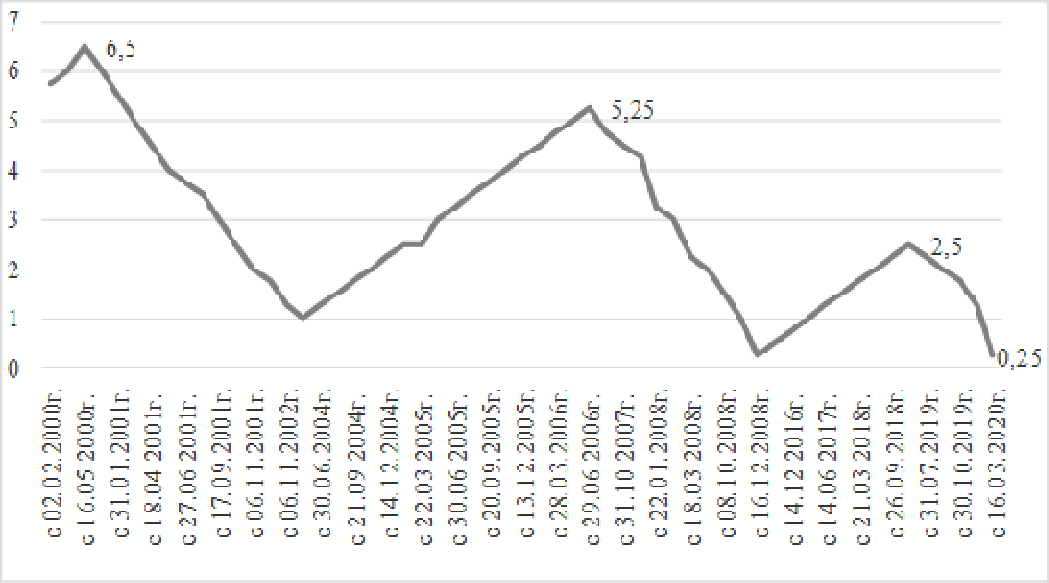

Figure 1: Dynamics of changes in the US FRS rate, in% (prepared on the basis of data from the Federal Reserve System, 2020)

According to Lee & Davis, 2020, with the onset of the COVID-19 pandemic, almost 200 large enterprises and companies in the United States have joined the ranks of zombie enterprises. The total number of zombie enterprises whose shares are included in the Russell 3000 index reaches 527 enterprises, while the total volume of liabilities of these companies has grown from $ 378 billion to $ 1.36 trillion. US dollars.

At the same time, Lee & Davis, 2020 note that at the peak of the financial crisis of the 2000s, the debt burden of zombie enterprises reached only $ 500 billion. Thus, the debt burden of zombie companies has more than tripled. Among the American zombie companies are quite large players such as the aircraft manufacturer Boeing, the travel company Carnival, Delta Air Lines, the oil and gas company ExxonMobil and the largest and oldest retail chain in the United States Macy's.

It should be noted that the United States fits the definition of a zombie enterprise, since the US GDP has been less than the US debt since 2012, see figure 2., and in 2020 the national debt exceeded GDP by 31.01%. The average growth rate of the US debt to GDP ratio from 2000 to 2020 is 3.6% per year. If debt continues to grow at this rate, then by 2030 debt will exceed US GDP by 86.52%. Given the state of the US economy, it should be noted that this debt is unlikely to be repaid soon. At the same time, a decrease in the volume of attracting debt financing from the United States may entail disastrous consequences for the US economy and labor market. Thus, in addition to zombie enterprises in the world economy, one should recognize the existence of zombie countries that cannot exist normally without attracting debt financing and will not be able to significantly reduce the amount of available public debt.

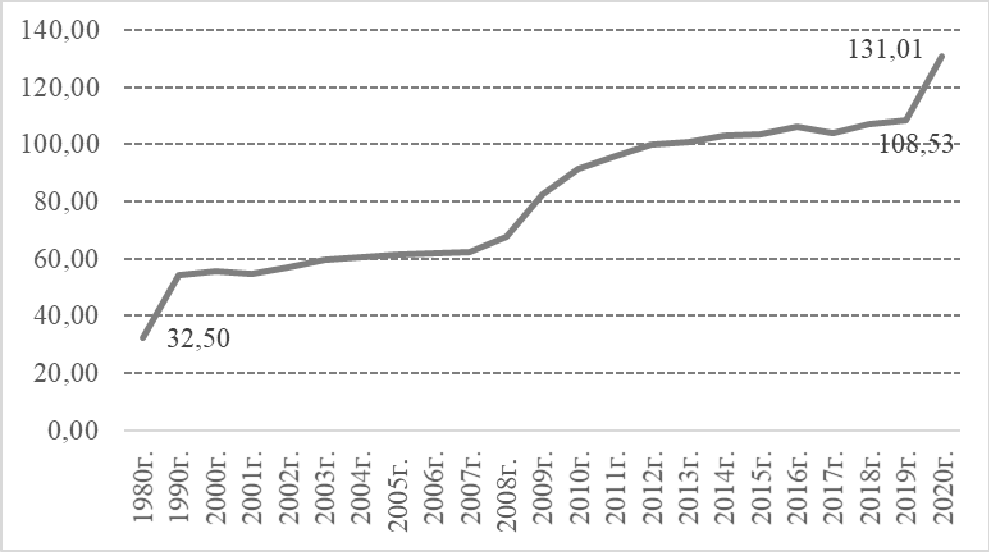

Figure 2: Dynamics of the ratio of the US dollar to US GDP, in%, prepared based on data from the Federal Reserve System, 2020)

At the same time, a significant indicator, more than 100%, of the debt-to-GDP ratio characterizes a fairly large number of countries, including China, Great Britain, Italy, etc. see figure 3.

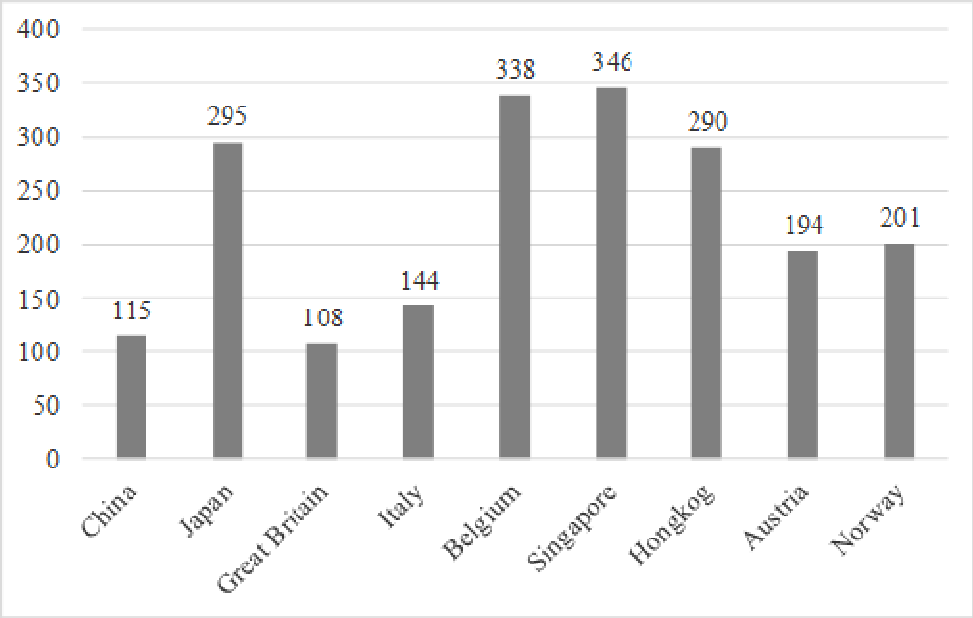

Figure 3: Debt to GDP ratio for countries with a value of more than 100%, in% (prepared based on data from the Federal Reserve System, 2020)

The global ratio of public debt to world GDP is currently 300%. Thus, in order to pay off public debts, the whole world needs to pay three full annual GDP, which in a real situation is hardly possible.

The situation is aggravated by the fact that the debt of zombie enterprises and zombie countries is acquired by other economic actors. For example, large companies such as Apple or Google are actively buying bonds on the US financial market, including high yield bonds, which are characterized by high yield and high risk. In particular, Apple has about $

78.74 billion in corporate bonds, Facebook has $ 10.7 billion, and Google has $ 23.7 billion (Obukhova & Pakhunov, 2020)

Also, many countries are buyers of bonds of other countries, investing part of their reserves in bonds of countries, including the United States, see figure 4.

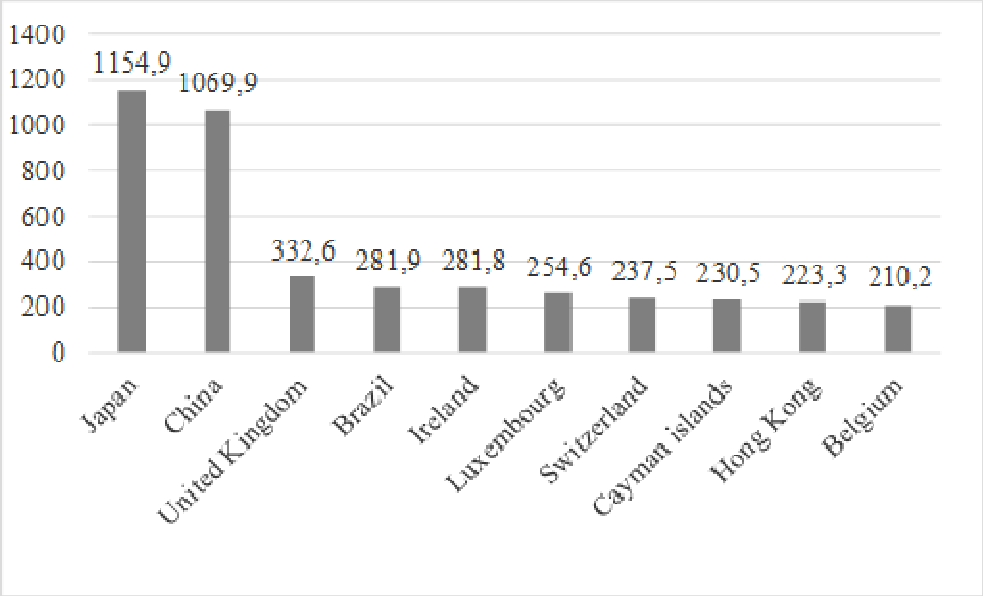

Figure 4 - US Lender Countries, January 2020, $ billion (based on data from the Federal Reserve System, 2020)

Formulation of the problem

Thus, a network of assets is formed, based on bad debts of borrowers, which is unlikely to be repaid in the future. At the same time, a chain of "contaminated" assets is formed whose owners may not even be aware of the existing problems with these assets. Given the potentially wide range of owners of such assets, the problem of bad debts, zombie enterprises and zombie countries are currently quite relevant.

The greatest danger is the gradual infection of economic agents with the assets and derivative assets of zombie enterprises and zombie countries, see figure 5.

The mechanism of this infection is due to the possibility of converting non-market obligations into market ones through securitization by issuing bonds and other financial assets. Financially stable and efficient enterprises by acquiring financial assets of zombie enterprises and zombie countries become risk carriers of issuers of financial assets. In this regard, it is relevant to model the process of contamination of economic entities with other economic entities with bad debts. Analyzing figure 5, we can conclude that this mechanism of infection is similar to infection during an epidemic characteristic of biological subjects.

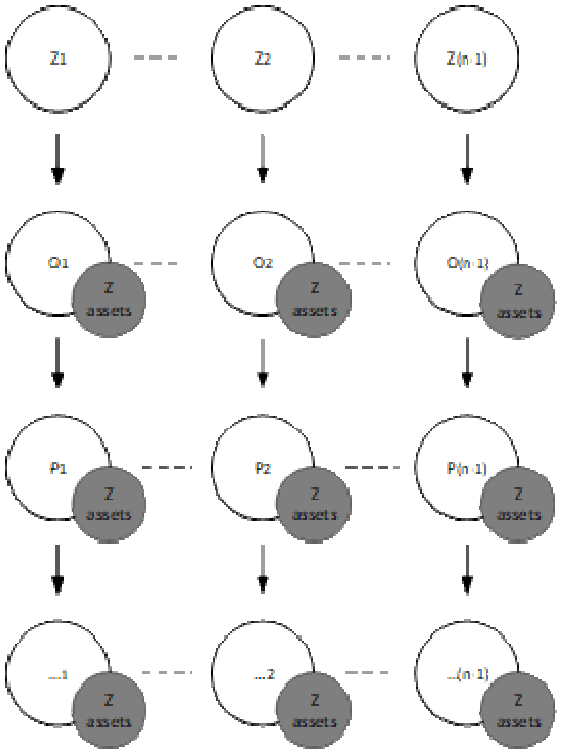

Figure 5: The mechanism of infection of enterprises with assets of zombie enterprises and zombie countries (prepared by the author)

Results

Considering the mechanism of infection like biological organisms, when describing the infection model, one can use the appropriate models of the spread of the epidemic, for example, the classical SIR model proposed by W. Kermak and A. McKendrick in 1927. In accordance with this model, the entire population of biological subjects is divided into three groups.

The first group (Susceptible) is biological subjects susceptible to infection, but not infected, that is, the number of uninfected by the time t, S (t);

The second group (Infected) are biological subjects infected by the time t, I (t);

The third group (Recovered) are biological subjects who have recovered from the disease by the time t, R (t).

The epidemic model is described using the following differential equations:

$$\frac{dS(t)}{dt} = -\frac{\beta S(t)I(t)}{N}; \tag{1}$$

$$\frac{dI(t)}{dt} = \frac{\beta S(t)I(t)}{N} - \gamma I\ (t); \tag{2}$$

$$\frac{dR(t)}{dt} = \gamma I(t); \tag{3}$$

where: β is the frequency of contacts between representatives, $\gamma = 1 / T$, while T is the time of illness.

A similar and other model for assessing the epidemic can be used in assessing the consequences of "infection" of economic entities with primary toxic assets of zombie enterprises, zombie countries, as well as their derivatives.

Conclusions

Summing up the above, we can draw the following conclusion. The turbulence of the global economy, as well as the crisis caused by the COVID-19 pandemic, is leading to the emergence of many zombie enterprises. It should also be noted the emergence of zombie countries whose debt is several times higher than their GDP of these countries and most likely cannot be repaid in the coming years. At the same time, zombie economic entities issue various financial assets that are acquired by other economic entities, including those with high solvency and widely known in the market, such as Google and Apple. Thus, there is a transfer of part of the risks of bankruptcy of zombie economic entities to efficient and solvent enterprises. In turn, economic entities (individuals and enterprises) who buy, for example, Google and Apple stocks and bonds become carriers of the risk of zombie economic entities. This mechanism is like the infection of biological subjects during an epidemic. Therefore, there is a potential for predicting the consequences of the epidemic of the emergence of zombie enterprises and zombie countries for the world economy.

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Approaches to Shaping the Financial Strategy of Zombie Businesses

Kirill Kurilov
0000-0003-1540-5388, Togliatti State University, Togliatti, Russian Federation
KY.Kurilov@gmail.com

Anastasia Kurilova
0000-0002-1943-5675, Togliatti State University, Togliatti, Russian Federation
aakurilova@yandex.ru

Abstract

The debt market is currently characterized by the growth of bad debts of the corporate sector and states. A particularly alarming trend is in the corporate sector, which is seeing a rise in the number of zombie businesses, which are businesses that cannot pay off payables and only pay interest payments on them. The negative point is that these enterprises issue financial assets, including bonds that are bought by well-known and large companies such as Apple, Facebook, Google, etc. Thus, toxic assets are spreading throughout the economy, spreading the risks of insolvent economic actors throughout aggregate. In the context of the growing risks of massive non-payments, the relevance of the formation and use of the financial strategy of the enterprise, adapted for zombie enterprises, increases.

Keywords: zombie businesses, financial strategy, junk bonds, financial investments

Introduction

The debt market is currently characterized by the growth of bad debts of the corporate sector and states. A particularly alarming trend is in the corporate sector, which is seeing a rise in the number of zombie businesses, which are businesses that cannot pay off payables and only pay interest payments on them. So, according to Lee & Davis, since the beginning of the COVID-19 pandemic in February-March 2020, almost 200 large American companies have joined the ranks of zombie companies. The total number of such companies in the Russell 3000 index, which includes 3 thousand of the largest traded American companies, reached 527, and the total volume of their liabilities compared to the end of last year increased from $ 378 billion to $ 1.36 trillion.

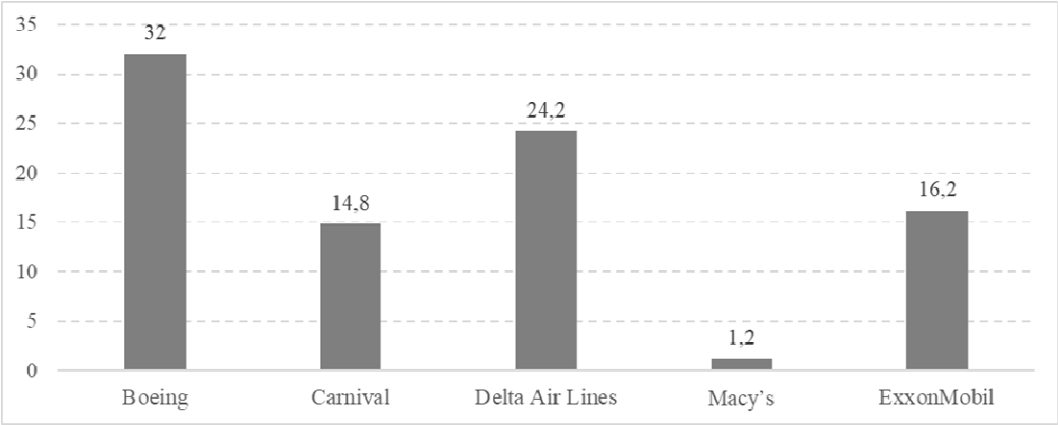

Figure 1: Growth in debt of the largest US zombie enterprise, in billions of US dollars (prepared by the author based on data from Lee & Davis, 2020)

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Among the zombie companies were such major players as the aircraft manufacturer Boeing, the cruise company Carnival, the airline Delta Air Lines, retailer Macy's and the oil and gas corporation ExxonMobil. The concentration of zombie enterprises in various sectors of the economy is shown in figure 2. As you can see from figure2, the largest concentration of zombie enterprises is in the industrial sector.

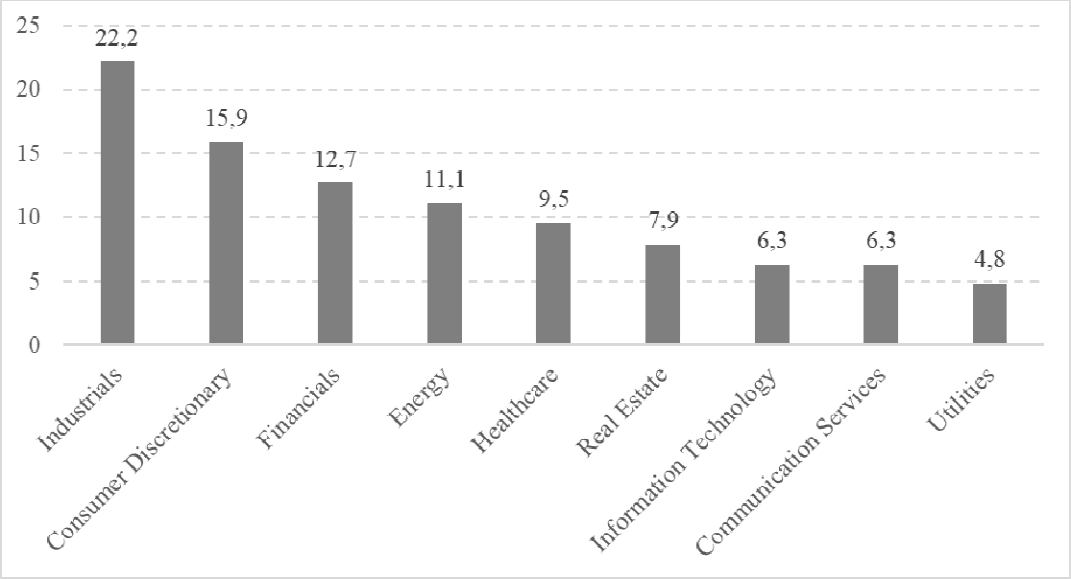

Figure 2: The concentration of zombie enterprises in various sectors of the economy, in% (prepared by the author based on data from Finbox, 2020)

In addition, there are a number of countries that are actively attracting financing from the external market, the volume of debt of which exceeds the annual GDP of this country. At the same time, the debt of these countries continues to grow. Striking examples are Japan, whose external debt is already more than 2 times higher than its annual GDP, as well as the United States, whose external debt is 31% higher than its annual GDP.

On the negative side, the liabilities of these enterprises are bought by well-known and large companies, in particular, Apple has about 78.74 billion USA dollars in corporate bonds, Facebook has 10.7 billion USA dollars, and Google has 23,7 billion USA dollars. In addition, the reserves of these companies are placed in government bonds, including US bonds (Obukhova & Pakhunov, 2020).

Thus, toxic assets are spreading throughout the economic entities, spreading the risks of insolvent economic entities to the entire population.

Formulation of the problem

In the context of the growing risks of massive non-payments, the relevance of the formation and use of the financial strategy of the enterprise increases.

First, the financial strategy of the enterprise is necessary for zombie enterprises, which in the process of its implementation can restore their solvency, profitability and pay off existing debts. Such changes take place in the process of company restructuring, which is the most important mechanism of modern financial strategy.

The restructuring process is due to a certain impact of external and internal factors, which take into account with the help of the necessary set of measures of an organizational, managerial and financial nature, which must be carried out in the company in order to strengthen its market position and implement strategic objectives.

The development of a financial strategy in many companies is associated with the need for restructuring, choosing the form of its implementation, assessing the likelihood of results (forecast and financial analysis) and efficiency.

Results

The financial strategy is developed in accordance with the global objectives of the company's economic strategy. In the process of its development, the main trends in the development of finance are predicted, the concept of use is formed, the principles of financial relations with their partners are outlined.

There are five key elements that are relevant to financial strategy:

the goal is the effective development of the company;

time - long-term benchmarks;

direction - financial activities;

mechanism - financing;

conditions - internal and external environment.

One of the main functional goals of a financial strategy is to maximize the company's market value. The financial strategy solves the problems that ensure the financial stability of the company in the modern market conditions of management. This is a fairly good tool that allows the company to develop in a clearly defined direction and achieve ever better results.

Financial strategy provides:

formation and competent management of financial resources;

identifying the most important areas of activity and focusing efforts on their implementation;

maneuverability in using the reserves of financial management;

compliance of financial activities with the economic condition and material capabilities of the company;

objective accounting of the financial and economic situation and the real financial situation of the company in the year, quarter, month;

considering the financial capabilities of the company and its competitors;

identification of the main threat from competitors, mobilization of forces to eliminate it and choice of directions for financial actions;

identification of the most effective areas of investment and concentration of financial resources in these areas;

creation and preparation of strategic reserves;

ranking and gradual achievement of goals.

The main tasks of the financial strategy include:

identification and specification of ways to successfully use financial opportunities;

formation of promising financial relationships between the company and third parties;

provision of operating and investment activities with financial resources;

analysis of economic and financial capabilities of potential competitors, development and implementation of measures to ensure financial stability.

The development and implementation of a financial strategy, as the basis of a company's financial planning, is based on the use of the following tools:

financial management: financial analysis, budgeting, financial control;

financial services market: securities, factoring, leasing, insurance.

From the standpoint of strategic management, there are usually three main groups of objects of strategic management:

the company as a whole;

strategic economic zone;

strategic business unit.

In the system of this management, there are usually three main types of strategies:

corporate strategy;

functional strategies;

strategies of individual economic units (business units).

The corporate strategy determines the prospects for the development of the company. It is aimed at fulfilling the company's mission and most comprehensively ensures the implementation of the main goal of operation - maximizing the welfare of owners.

At the corporate level, the strategy covers such important issues as the choice of types of economic activities, ways to ensure long-term competitive advantages of the company in the relevant product markets, various forms of conglomerate reorganization (mergers, acquisitions), the principles of allocation of all main types of resources between individual strategic zones of management and strategic economic units. The development of corporate strategy is carried out mainly by the top managers of the company.

Functional strategies are formed, as a rule, for the main types of the company's activities in the context of the most important functional units. The main strategies at this level include financial; marketing; production; innovative.

The strategies of business units (business strategies) of a company are usually aimed at solving two main goals:

ensuring competitive advantages of a specific type of business;

increasing its profitability.

When developing a financial strategy, an enterprise should use the following principles:

considering the company as an open system capable of self-organization;

considering the basic strategies of the company's operating activities;

predominant focus on the entrepreneurial style of strategic financial management;

highlighting the dominant areas of strategic financial development;

ensuring flexibility in the financial strategy;

highlighting the dominant areas of strategic financial development;

providing alternatives to strategic financial choices;

providing the developed financial strategy with an appropriate organizational structure and organizational culture;

focus on the professional staff of financial managers in the process of implementing the financial strategy;

considering the level of financial risk in the process of making strategic financial decisions.

Regarding the formation of the financial strategy of zombie enterprises, it is necessary that the financial strategy of the enterprise be aimed at increasing the solvency and increasing the profitability of the enterprise. To do this, it is

necessary, first, to assess the existing financial strategy to determine the mistakes made in its formation and to form a new financial strategy based on new goals and objectives.

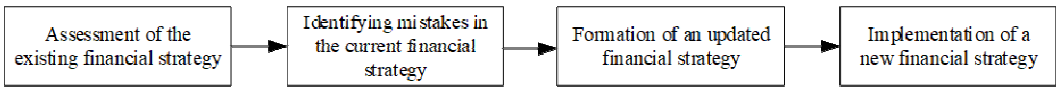

Figure 3 - The process of adjusting the financial strategy of the enterprise (prepared by the author)

After the formation of the financial strategy of the enterprise, it is necessary to assess its effectiveness using the golden rule of economics:

$$Tp > Tr > Ta, \qquad (1)$$

Where:

Tp - profit growth rate;

Tr - the growth rate of sales;

Ta - the growth rate of the advanced capital.

If, as a result of the development of a financial strategy, this ratio does not correspond to that recommended in this model, the strategy or part of it must be changed in order for it to fulfill the main goal - to ensure maximum efficiency of the enterprise.

Conclusions

Summing up the above, we can draw the following conclusions. The number of financially unstable enterprises that can be classified as zombie companies is growing. Along with this, the debt of these companies is growing significantly, which, through securitization, is transformed into financial assets, which are gradually spreading throughout the financial market, transferring risks to other well-known and solvent enterprises. This problem is common all over the world; Japan, China and the USA are experiencing problems with zombie companies. Therefore, it is necessary to transform the economic activities of these companies by transforming the financial strategies of these enterprises in order to increase their efficiency and solvency. The formation of an updated financial strategy for most zombie enterprises is a chance for their transformation into a solvent and profitable enterprise.

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The Tourism Impact on The Residents' Life Quality – Case Study

Pedro LIBERATO *
Polytechnic Institute of Porto, School of Hospitality and Tourism, Vila do Conde, Portugal,
CiTUR research member
pedrolib@esht.ipp.pt

Ana SILVA
Polytechnic Institute of Porto, Porto Accounting and Business School, Porto, Portugal
silva_marg49@hotmail.com

* *Contact author*

Abstract

Tourism is a fast-growing sector at national level, but also at global level. This growth has generated positive externalities, but also some negative ones. This study aims to understand how the (negative) impacts of tourism are perceived by residents of the Sé parish, and how they affect their quality of life.
To achieve the main objective of the study, a face-to-face survey was carried out among the inhabitants of the parish of the Sé. The answers of 234 participants were collected and then analysed in the SPSS statistical software. The results obtained prove that the residents have quality of life, are satisfied with the conditions of their environment, noting also that these two variables are related to each other. However, it was not possible to correlate residents' perceptions regarding the role of tourism activity. Through the results obtained it is expected that tourist entities and bodies evaluate, the growth and maintenance of tourism, but also all the issues that are directly or indirectly related to it.

Keywords: Gentrification, Tourist Pressure, Overtourism, Quality of Life.

Introduction

In recent years, the tourism sector has contributed to the financial balance between imports and exports in Portugal. In 2019, according to INE, more than 29 million guests were registered in hotels, generating a total of 77.8 million overnight stays, which corresponds to an increase of 7.4% and 4.3% respectively, compared to 2018, being responsible for the entry of 4.3 billion euros in the country.

These figures are mainly due to the commitment to diversify the tourist offer of the various destinations, to the emergence and improvement of the support infrastructures and to the commitment to the qualification of the tourist product. From this perspective, the range of countries issuing tourists has diversified and domestic tourism has grown. In 2019, the domestic market contributed with 26.1 million overnight stays, representing an increase of 5.9% over 2018, which corresponds to 33% of the total overnight stays for the year. The city of Porto is no exception. Due to its location, its gastronomy, the Port wine, its natural beauty, its culture, and heritage and also its hospitality, climate, low cost of living in relation to the reality of tourists, as well as the increase in low-cost flights, more tourists choose to visit the city and stay overnight.

However, despite the growth in revenue and the improvement of infrastructure and services in cities, tourism also has a less positive side. One of the biggest problems caused by tourism is the (lack of) quality of life of city dwellers who constitute themselves as tourist destinations. Cities suffer from an excess of tourists, which leads to various problems in terms of infrastructure capacity, the sustainability of the city itself and with the residents themselves and may even lead to a deterioration in the relationship between tourists and residents.

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Doxey (1975), cit. in by Zaidan & Kovacs (2017) published "Irridex", a theory on residents' attitudes towards the presence of tourists and the way they change and move from feelings of acceptance and welcome, to feelings of irritation and boredom, as the number of tourists increases in relation to the local population, to the point where these attitudes would result in antagonism between the two parties. Rosenow & Pulsipher (1979) emphasise that the negative impacts/results of tourism are associated with seasonal tourist pressure, hostile tourist behaviour and environmental impacts.

To make the whole picture worse, regulation of the sector is failing to keep pace with the great growth that has been seen, leading to disparities and conflicts between the parties. Due to the growth in demand from the city of Porto, there are situations of eviction of residents, from their homes, to create tourist accommodation offered on digital platforms.

Being the parish of Sé the cradle of the city of Porto, a crossing point between the city centre and the Ribeira area and due to the landscape, it provides, many tourists are attracted to visit it, which may harm the daily lives of the inhabitants. This is the starting point for this research work, to assess whether tourism and the number of tourists present in this historic area harms its inhabitants and in what way. This will be done by analysing the inhabitants' perception of this sector of activity and how this perception influences their quality of life, seeking to identify the day-to-day activities that will be most affected by tourism.

Literature Review

In the 1970s, several authors warned of the more negative side of the continuing growth in demand for international travel and tourism. All of them state that if tourism demand continued to grow, such growth would require careful planning and management so that the effects of mass tourism on the environment and societies would be minimised. Young (1973) cit. in by Gossling, McCabe, & Chen (2020), predicted several social, environmental, and economic consequences for destinations that did not control growth and did not carry out regional planning and management. Turner and Ash's (1975) cit. in Gossling, et al. (2020), stated that tourism demand would begin to be met also by lower social classes, making demand so high that destinations would be unable to meet it. Many studies point to several negative effects caused by tourism. In this article, 4 of these negative effects will be addressed, gentrification, touristification, tourism pressure and overtourism.

Gentrification and touristification

The concept of gentrification has been much studied and has evolved over time for several years. See that for Glass (1964) cit. in Fernandes, Carvalho, Chamusca, & Pinto (2018), this definition emerges as the process of changing an urban area conducted through the entrance of more residents and/or users of the city. For Rose (1984) cit. in Fernandes, et al. (2018), gentrification is related to chaos, presenting different forms and in different locations. For Benediktsson et al (2015) cit. in Fernandes, et al. (2018), this concept emerges as an idea of segmentation, and finally, for Lees, Shin & Lopéz Morales (2016), gentrification is the process of social recomposition of the population of a given territory resulting from urban transformations and associated with a gradual replacement of poorer residents by groups of higher socio-economic status, which has been becoming more complex. The phenomenon has been spreading, either through its occurrence in territories around the world or through its progressive increase in scale.

One of the causes for the emergence of this process are the new users who long for new services, leading to the disappearance of older shops and restaurants (Burnett, 2016, cit. in Fernandes, et al., 2018), giving rise to new offers influenced by tourism demand, such as souvenir shops, local accommodation, among others.

However, several authors, such as Zuk et al. (2015) cit. in Fernandes, et al. (2018), argue that the whole gentrification process is difficult to evaluate, since it may vary in terms of the time it takes to occur, in its causes and actors involved. But in the end, three conditions will always be met, the existence of empty or undervalued buildings in each area, the preference for urban life, and the existence of (gentrifiers) gentrification agents (Hammett, 2001, cit. in Fernandes, et al., 2018). Other research shows that there are fluctuating movements of these gentrification agents, the most important being tourists and students (Gotham, 2005; Smith, 2005, cit. in Fernandes, et al., 2018). This happens because both tourists and international students, when using certain places of a city during their stay, leave their mark. Although they are in a limited space and time, they will modify them thus leading to gentrification as a process of urban modification.

It can be said that one of the main causes of gentrification in several cities today is tourism and the volume of people it transports every year globally, thus giving rise to the term tourist gentrification. Tourist gentrification can be defined as the process of gentrification accelerated by the tourist activity (Gotham, 2005; Cócola Gant, 2015, cit. por Mendes,

Amílcar, Carreiras, & Guimarães, 2016), since recreation companies and tourist spaces are created and introduced that will transform cities (Gotham, 2005, cit. por Cordeiro, 2018).

Since tourist gentrification is a process of replacing local genesis (residents, commerce, among others) to give way to the economy of tourism, one of its consequences is touristification. Touristification is a current gentrification process that manifests itself in the significant expansion of tourism in a certain area, both on the supply side, with services, equipment and tourist accommodation, and on the demand side, where the city becomes seen and sought after as a tourist destination (Mendes, 2017, cit. in Cordeiro, 2018). It is basically the loss of identity of a certain place to the detriment of the tourism sector and tourists.

From this point of view, the gentrification of tourism and, consequently, the touristification are translated into the appropriation of urban spaces for tourism (Oliveira, 2017), where there is the displacement of the poorest classes to more peripheral areas to give way to housing for tourism purposes, substitution of local commerce to give way to souvenir shops, specialization of city services in the area of tourism, among others, where everything becomes tourism.

Tourist Pressure and Overtourism

Mass tourism is an increasingly recurrent phenomenon, often involving the arrival of large numbers of tourists to small areas, which has a major impact on the area of arrival and leads to increased pollution, waste, water consumption (which adds to the needs of the resident population), putting infrastructure and habitats under great pressure (WWF, 2020).

This mass arrival of tourists can be measured through the Tourist Pressure felt in the destinations. Tourist pressure can be defined as the number of tourists/visitors, existing in a certain place and time, in relation to the number of inhabitants of that same place. Several studies have associated perceptions of tourism with visitor density/agglomeration, stating that tourism pressure is a psychological rather than a measurable construction (Neuts, Nijkamp, & Van Leeuwen, 2012, cit. in Gossling et al., 2020). This is a phenomenon in which the greater the number of tourists, the greater the tourist pressure felt in a defined territory. If tourism pressure increases consecutively, it could be considered as a scenario of over-tourism. To better understand the consequences of Tourist Pressure, and its increase, this new concept, overtourism, will be addressed.

The term Overtourism has been defined as the situation in which part of the local population feels that their daily lives and quality of life are diminishing due to tourism, leading to the emergence of forms of resistance or protest directed at tourism, tourists, legislators, or stakeholders (UNWTO, 2018, cit. in by Gossling, et al., 2020). As the local population will resist tourism, another problem arises linked to overtourism, the degradation of the value of the experience to the tourist. For Pasquinelli, & Trunfio (2020) overtourism is "a multifaceted phenomenon in terms of the increase in visitor numbers and their temporal and spatial concentration, the influence of tourist behaviour on the quality of urban life (such as noise, vandalism, among others), and the physical impact and urban transformation (such as the exploitation of natural resources and tourism)". It is the cause of several problems such as overcrowding of public spaces; the spread of the impacts of visitors' inappropriate behaviour; the physical touristification of the city centre and other frequently visited places; the eviction of residents from their areas of residence to make way for tourist accommodation; the pressure on the local environment (waste, noise pollution, and use of natural resources) (Koens et al, 2018, cit. in Pasquinelli, & Trunfio, 2020), the weakening of socio-cultural cohesion and transformation of the social character of many cities (Peeters, et al., 2018, cit. in Pasquinelli, & Trunfio, 2020).

In short, overtourism is a phenomenon that involves the number and density of tourists in a certain area, the social, cultural, economic and/or environmental changes caused by tourism, and the (positive or negative) sociopsychological responses among residents triggered by these changes (Gossling, et al., 2020).

It can be concluded that overtourism, as well as tourist pressure, are phenomena that can be considered psychological, since their existence depends on the perception and evaluation of tourism and its effects by the local population.

Quality of Life

The theme quality of life has been studied by several authors. It is important, first of all, to stress that the authors of the studies on this subject use "quality of life" and "well-being". For Delibasic, Karlsson, Lorusso, & Rodriguez (2008) cit. in Mathew, & Sreejesh (2017), quality of life is presented as the degree of well-being felt by a person or a group of people. The World Health Organization (WHO) cit. in Mathew, & Sreejesh (2017), also defined quality of

life and presented it as the set of perceptions of individuals about their position in life, according to the cultural context and value system in which they live, in relation to their life goals, expectations, standards and concerns.

Sirgy (2001) cit. in Rivera, Croes, & Lee (2016) defines quality of life as a dynamic connection between material wealth, social conditions and physical well-being (including work, income, social support, health conditions, personal and family life), and a precondition for achieving happiness.

The measurement of quality of life in general or related to a particular area of life, such as social life or family life, is usually performed using objective and subjective indicators (Sirgy, Meadow, & Samli, 1995, cit. in Uysal, et al., 2016). These two indicators are considered to be the two dimensions of quality of life.

The quality of life (or well-being) can thus be divided into two dimensions, the objective dimension and the subjective dimension. The objective dimension is made up of indicators that the individual does not control, i.e. those that are independent of him or her, and may include the individual's income, basic needs, physical health, standard of living and crime (Stiglitz et al., 2009, cit. in Croes, et al., 2018). Regarding the subjective dimension, this is composed of indicators that capture self-reported responses to individual happiness and satisfaction, highlighting a list of capabilities, functionalities and needs (Stiglitz et al., 2009, cit. in Croes, et al., 2018), including satisfaction with family, work, community or life in general (Andrereck, & Jurowski, 2006; Diener, & Suh, 1997, cit. in Uysal, et al., 2016).

However, both dimensions have criticisms and limitations. In the case of the objective dimension, the main limitation is that objective indicators may not accurately reflect people's experience of well-being (Andrews & Withey, 1976, cit. in by Woo, Uysal, & Sirgy, 2018). In relation to the subjective dimension, the main criticism is that feelings and emotions are a mental evaluation of an objective condition, not the condition itself. Since individuals are socially capable of adapting to their situation, after their adaptation they perceive a satisfactory quality of life, eventually affecting their quality of life and the evaluation of it (Croes et al., 2018).

From the moment a city/area becomes a tourist destination, the life of the residents of that city is affected by tourism on an economic, socio-cultural and environmental level (Andereck et al., 2005; Harrill, 2004; Moscardo, 2009; Nunkoo & Smith, 2013; Sharpley, 2014; Sirakaya, Teye, & Sonmez, 2001; Uysal, Woo et al., 2012, cit. in Uysal, et al., 2016). Several studies attempt to understand the relationship between the impacts of tourism and residents' attitudes towards tourism development (Uysal, et al., 2016). Research around this theme has shown that, according to the level of development of the destination, residents' attitudes towards economic, socio-cultural and environmental factors tend to change from positive to negative (Uysal, Woo, et al., 2012, cit. in Uysal, et al., 2016) and, consequently, the different levels of tourism development will affect, in a different way, residents' quality of life (Uysal, et al., 2016). Allen, et al. (1988), cit. in Uysal, et al. (2016), acknowledge that host communities benefit from tourism development in the early stages of the destination's life cycle, but that this benefit diminishes as it moves into more evolved stages.

Objectives, Hypotheses and Methodology

Objectives and Hypotheses

The main objective of this research is to study the influence of the perception of the inhabitants of the region under study, in relation to tourism, on their quality of life incorporating both tangible and intangible items. The specific objectives are: i) to evaluate how tourism activity affects the inhabitants of the Sé; ii) to perceive whether the inhabitants have a good perception of tourism activity; and iii) to evaluate the quality of life of the inhabitants (tangible and intangible).

Based on the specific objectives, the Research Hypotheses were developed:

- Hypothesis 1 - Tourism has a positive impact on the lives of the inhabitants;
- Hypothesis 2 - A better perception of tourism by the inhabitants leads to greater satisfaction;
- Hypothesis 3 - Greater satisfaction is synonymous with better quality of life;
- Hypothesis 4 - The city's inhabitants have a good quality of life.

Methodology

The research used a quantitative approach, where a questionnaire survey was applied and this was based on the questionnaire used in the research "Tourism impact and stakeholders' quality of life" by Woo, E., Uysal, M., & Sirgy, M. (2018). The questionnaire was applied to residents over 18 years of age in the municipality of Sé. The questionnaire was introduced door to door and in total the answers of 234 inhabitants were collected, this sample representing an error of 6.15% for a 95% confidence level.

The normality test was carried out for the three variables that make up the various hypotheses, which made it possible to understand which tests should be carried out to analyse the validity of the research hypotheses. It was concluded that all the variables under study did not follow a normal distribution. The Chi-square (adherence) test for a sample was carried out in order to understand the impact of tourism on the lives of inhabitants and whether they had a good quality of life, the Linear Regression test and the Spearman Correlation Coefficient, in order to verify the correlation between the perceptions of the impacts of tourism on the lives of inhabitants and the inhabitants' satisfaction in relation to the environment, as well as between the inhabitants' satisfaction in relation to the environment and the generalised satisfaction.

Results

Characterisation of the sample

Most respondents were women (71.8%). Most of the sample was older, 39.3% were aged between 55 and 65 and 23.5% were over 65 and with a lower level of schooling, 32.9% of those surveyed were in the 1st cycle only. Regarding the professional situation, 50.9% were employed and had “Other” as sector of activity (53%) with an income of between 500 and 1000 euros (52.1%).

Table 1- Characterization of the sample

Gender	Frequency	%
Female	168	71,8
Male	66	28,2
Total	234	100
Age group	Frequency	%
18 a 24	8	3,4
25 a 34	24	10,3
35 a 44	11	4,7
45 a 54	44	18,8
55 a 65	92	39,3
>65	55	23,5
Total	234	100
Level of schooling	Frequency	%
Can neither read nor write	21	9
1st cycle	77	32,9
2nd cycle	22	9,4
3rd cycle	18	7,7
Secondary education	73	31,2
Higher Education	23	9,8
Total	234	100
Professional situation	Frequency	%
Student	6	2,6
Employee	119	50,9
Self-employed worker	24	10,3
Unemployed	11	4,7
Retired	53	22,5
Other	21	9
Total	234	100
Sector of activity	Frequency	%

Tourism	21	9
Health	3	1,3
Other	124	53
None (retired/unemployed/student)	86	36,7
Total	234	100
Monthly income	Frequency	%
<500€	92	39,3
500€ - 1000€	122	52,1
1000€ - 1500€	10	4,3
Not applicable	10	4,3
Total	234	100

Source: Own elaboration

Analysis of the Hypotheses

For the analysis of hypotheses 1 and 4 the Chi-square (adherence) test for a sample was performed, as well as an analysis of the frequency table obtained with this test. For hypothesis 1 the items in group 2 of the questionnaire "Perception of the impacts of tourism on the lives of inhabitants, in economic and non-economic terms" were analysed and for hypothesis 4 the items in group 4 of the questionnaire "Generalised satisfaction" (quality of life) were analysed. For this test, it was considered that all values have the same probability of occurring.

With the Chi-square (adherence) test for a sample, carried out for the "Perception of tourism impacts", a Chi-square value of 211,607 and p of 0,000 (Table 2), i.e. less than 0.05, was obtained. This means that there is sufficient statistical evidence to reject the null hypothesis, i.e. the data obtained is not consistent with the expected distribution. It has been found that the values that occur most are those below 3, i.e. inhabitants do not perceive tourism as having as many positive impacts on their lives as expected. In short, it was found that hypothesis 1 of the study was not validated.

In relation to "generalized satisfaction" (quality of life), the values obtained by performing the Chi-square (adherence) test for a sample, were for the Chi-square of 235,872 and for p of 0,000 (table 2), again a value below 0.05, which means that there is sufficient statistical evidence to reject the null hypothesis, i.e. the data obtained are not consistent with the expected distribution. As in hypothesis 1, it was also important to analyse the frequency table obtained in the Chi-square test. Observing the frequencies obtained, it can be seen that the values that occur the most are those above 3, with a percentage of about 91% of the responses obtained above 3 points, which means that inhabitants feel that they have a good quality of life. It can be stated that by analysing the values obtained in the Chi-square Test, hypothesis 4 was validated, since most of the respondents and their answers were positive (>3) in relation to the items in this variable.

Table 2: Chi-square Test Results obtained for the exposed variables

	Perceiving the impacts of tourism on life in economic and non-economic terms	**General satisfaction**
Chi-square	211,607	235,872
gl (degrees of freedom)	27	14
Significance Sig.	0,000	0,000

Source: Own elaboration

For the analysis of hypotheses 2 and 3, the Spearman Correlation Coefficient and Linear Regression were used. To analyse hypothesis 2 it was necessary to compare and analyse the items of group 2 of the questionnaire "Perception of the impacts of tourism on the lives of inhabitants, in economic and non-economic terms" with the items of group 3 "Satisfaction of inhabitants with their surroundings". To analyse Hypothesis 3, the items in Group 3 "Satisfaction of inhabitants in relation to the environment" were compared and analysed with the items in Group 4 "Generalized satisfaction".

Regarding hypothesis 2, the Spearman Correlation Coefficient was carried out and a p-value of 0.001 was obtained, which shows a high dependence between the variables, however, the R-value is -0.212, which shows the existence of negative correlation: when the values of one variable increase those of the other decrease - weak, due to its value being higher than -0.300. If the p-value is less than 0.05, this means that there is sufficient statistical evidence to reject the null hypothesis, that is, the variables are not independent.

Table 3: Results obtained for Spearman's Correlation Coefficient between "Perception of the impacts of tourism" and "Satisfaction with the environment

		Perceiving the impacts of tourism on life in economic and non-economic terms	Satisfaction of inhabitants with their surroundings
Perceiving the impacts of tourism on life in economic and non-economic terms	**Correlation Coefficient (R)**	1,000	-0,212
	Sig. (2 ends)		0,001
	N	234	234
Satisfaction of inhabitants with their surroundings	**Correlation Coefficient (R)**	-0,212	1,000
	Sig. (2 ends)	0,001	
	N	234	234

Source: Own elaboration

In order to better understand the relationship between the variables under study, it would be necessary to carry out Linear Regression. However, it was not possible to proceed with the study of Linear Regression, since two of its assumptions were not verified, namely the fact that there is no linear relationship, given the dispersion of the variables, and the fact that the Durbin-Watson test presented a value not comprised between 1.5 and 2.5, as the value obtained was 0.600. It can be seen that there is a correlation between the variables, however, there is no linear relationship. Although there is dependence between the variables, it was found that the existing correlation was negative and what hypothesis 2 studied was a positive correlation. It can be said that hypothesis 2 was not validated.

Finally, for hypothesis 3, the Spearman Correlation Coefficient was also performed and a p-value of 0.000 was obtained, which indicates the existence of a very high dependence between the variables; however, the R-value obtained was 0.264 (<0.300), which shows the existence of weak positive correlation. The obtained p-value is less than 0.05, which means that there is sufficient statistical evidence to reject the null hypothesis, i.e. the variables are not independent.

Table 4: Results obtained for Spearman's Correlation Coefficient between "Environment Satisfaction" and "Generalized Satisfaction"

		Satisfaction of inhabitants in relation to the environment	Generalized satisfaction
Satisfaction of inhabitants in relation to the environment	**Correlation Coefficient ®**	1,000	0,264
	Sig. (2 ends)		0,000
	N	234	234
Generalized satisfaction	**Correlation Coefficient ®**	0,264	1,000
	Sig. (2 ends)	0,000	
	N	234	234

Source: Own elaboration

As in hypothesis 2, Linear Regression could not be carried out because there was no linear relationship and the value of the Durbin-Watson test was not accepted (0.708). Thus, there is a (positive) correlation between the variables, however, there is no linear relationship.

Taking hypothesis 3 into account, it can be said that it has been partially validated, since the variables are dependent on each other (even if little) and there is a direct correlation (positive), that is, when the values of one variable increase the values of the other also increase, a relationship which was intended to be tested in this Hypothesis.

Conclusions

Several limitations and negative impacts have arisen from the growth, for some, of tourism that has been excessive in recent years. One of the parties most affected by this unregulated growth is the inhabitants of tourist destinations and, consequently, their quality of life. While many cities already take the well-being of their inhabitants into account when thinking and planning the development of their tourism sector, others are still in a very early stage.

Following this line of thought, the present work was elaborated with the intention of perceiving how the inhabitants of the tourist destinations, in this case the inhabitants of Sé (Porto), perceive the tourist activity, and to find evidence that confirms the influence of the perceptions of tourism on the quality of life of the inhabitants. The term quality of life in this work was evaluated considering several material and non-material indicators of the life of the inhabitants. Through the analysis of the results obtained it was found that the inhabitants of the area under study do not perceive tourism as the source of positive impacts on their lives, however, it cannot be said that tourism is a source of negative impacts. A more in-depth study in this area would be necessary. It was also found that the relationship between "Perception of the impacts of tourism" and "Satisfaction with the environment", contrary to what was expected, is negative. This negative relationship happens a lot because the results obtained for the variable "Perception of the impacts of tourism" were negative, contrasting with the positive results obtained for "Satisfaction with the environment". Thus, both hypothesis 1 and hypothesis 2 were not validated.

On the other hand, hypotheses 3 and 4 have been validated, because in relation to hypothesis 3 it was found that the variables are positively correlated, i.e. higher satisfaction corresponds to better quality of life, and in relation to hypothesis 4 it was found that the values that occur the most are those above 3, which shows that the inhabitants surveyed have quality of life.

Relating the hypotheses tested to the specific objectives to be achieved in this work, it was found that these were only partially achieved, since it was not possible to clearly perceive the impact of tourism activity on the inhabitants of the area under study, nor was it possible to perceive whether the inhabitants have a good perception of tourism activity. However, it was possible to evaluate the quality of life of the respondents and their satisfaction with the environment, and that a greater satisfaction of the inhabitants leads to a better quality of life. It is possible to state that, in general, the inhabitants surveyed are satisfied with their quality of life, classifying it as being good in most aspects, and with their environment. However, there is still no predominant opinion regarding tourism and its impacts.

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Employee Rotation as A Contemporary Management Problem

Ireneusz MICIUŁA
Department of Sustainable Finance and Capital Markets, Faculty of Economics, Finance and Management,
University of Szczecin
Szczecin, Poland, ireneusz.miciula@usz.edu.pl - corresponding author

Henryk WOJTASZEK
Management Institute, Faculty of Management and Command,
War Studies University
Warsaw, Poland, h.wojtaszek@akademia.mil.pl

Paweł STĘPIEŃ
Department of Sustainable Finance and Capital Markets, Faculty of Economics, Finance and Management,
University of Szczecin
Szczecin, Poland, pawel.stepien@usz.edu.pl

Abstract

This paper indicates changes in movement of employees in a selected organization as a management problem in the 21st century. The rotation in this industry was characterized. A proposal for a tool designed to counteract employee rotation was presented. An analysis of the staff shortage occurring in a commercial bank was carried out using a case study.

Keywords: Rotation, Employee, Present Day, Management, Socio-Economic System.

JEL classification: A11, A13, D31, E24, E32, L26, M12.

Introduction

Proper human resource management results in a synthetic diagnosis of an employee in the light of the overall organizational system. An exemplary contemporary manager, a rational manager with the ability to manage a culturally diverse team should be prepared to adequately respond to the problems of the 21st century (Rubenstein-Montan et al., 2001). One of the significant problems in banking is the growing staff movements, which are an obstacle to the proper functioning of the team inside and outside the organization in terms of the key - quality customer service. The times of crisis and the deteriorating situation of the "bank's customer portfolios" mean that the needs of the bank's employers and the customers themselves are not met. Staff shortages arise, bank employees fail to achieve their sales targets, they quit without taking any action that would be the basis for remedying the current state of affairs. The reasons related to this aspect of the problem may be of various organizational nature. The organization may have team problems with the proper motivation of the employee and frequent sick leave (Kirsch, 1996; Miciuła, 2018). There are banking teams that periodically recruit people for given positions, they are unable to keep a good employee in their current workplace. Staff shortages increase the risk of proper customer service. All activities aimed at assessing the rationalization of the resulting phenomenon and introducing changes to restore the assumed banking structures should be performed (Knights and Willmott, 1999).

Literature Review

Labor movements (fluctuation)

The enterprise should have the required number of people employed, in the event of its absence, it is planned to hire new employees, i.e. recruitment (Zeffane and Morgan, 2003). Recruitment consists in finding suitable candidates with the appropriate qualifications for a specific job position (Snell, 1992). The departure of employees for maternity and paternity leaves and call-up to military service is one of the reasons for employee movements, the

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nature of which is temporary. The employer is obliged to employ an employee in the previously held position. Termination of the employment relationship may take place only for the following reasons: in the event of bankruptcy or liquidation of the workplace, then the employee is entitled to a monthly severance pay, for economic reasons, organizational, production or technological changes, then the employee is also entitled to a monthly severance pay due to the fault of the employee, then the employer has the right to terminate the employment contract without notice.

Professional promotion is the transfer of an employee to a higher position. It is associated with a change of position, an increase in remuneration, but also greater duties and greater responsibility.

An employee's departure from work may be due to a number of reasons:

- inappropriate interpersonal relationships in the enterprise,
-hard working conditions, work harmful to the employee's health,
- change of the employee's place of residence,
- undertaking an independent business activity by the employee,
- the possibility for the employee to obtain better working conditions, the possibility of faster promotion, the possibility of taking full advantage of the employee's professional qualifications.

Demotion is a kind of punishment for an employee, it is a punitive transfer to a lower job position, and thus a reduction in wages and job prestige. Demotion is the opposite of promotion.

The retirement of an employee who meets the retirement requirements. The employee is then entitled to severance pay, which is a gratuity in connection with the end of work. Retirement for a disability or retirement pension is the reason for permanent employee movements.

Dismissal of an employee is also a permanent nature of employee movements. Dismissal is a measure of last resort, used when other measures have not produced the expected result. Termination of the employment relationship may take place: by mutual agreement of the parties, by termination of the employment contract, without termination of the employment contract, disciplinary dismissal. The death of an employee obliges the employer to pay a death benefit to the employee's family. The amount of the death benefit depends on the period of employment of the employee (Stoner and Wankel 1992). Employee turnover at a certain level is a natural process like a business cycle (Baldwin et al., 2003). On the other hand, many factors affect above-average employee migrations.

Rotational fluctuation of banking employees

Frequent changes in the workplace of banking employees are associated with staff changes, moves and negative rotation, i.e. as a result of a progressive threat to the rotation of the 21st century.
The concept of negative rotation was explained as a set of employee activities performed consciously or not, more often at the initiative of an employee, which resulted in the dismissal of a job by moving to another bank with a more attractive spectrum of operation from the employee's perspective.
The concept of rotational fluctuation of banking employees has been characterized as a specific system of mass dismissal of banking employees and the search for a better alternative solution, which is a significant problem threatening efficient management in the 21st century. The effects of this phenomenon are limited staff resources in bank branches, observed more and more often in banking structures (Gray and Vander Wal, 2012). The figure number 1 shows a diagram of the proposed remedies for employee turnover problems.

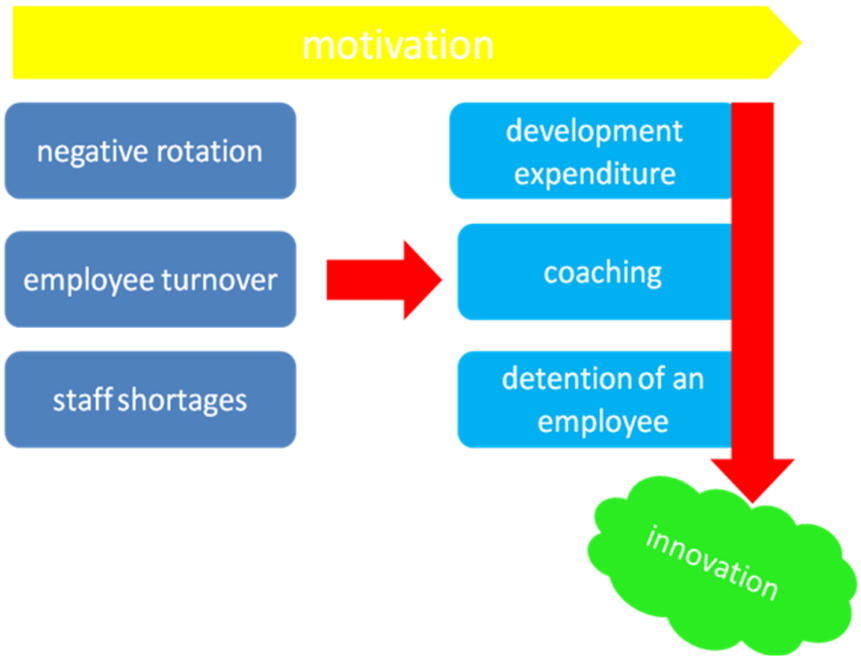

Fig. 1: Scheme of suggestions for fixing the problem of employees

Source: own study

In order to solve the above problem, it was suggested that the Bank's Management Board implement the employee retention plan and coaching. The consequence of this action is that the employee will remain in the workplace and release a sense of usefulness in the position held. Managers forget how important a role is to properly motivate an employee, increase relationship and mutual cooperation. It was recommended to introduce trainings in the field of fluctuation rotation, which would be an activity supporting management and showing the threat to today's banking organization. The awareness of this growing phenomenon should be increased (Gołębiewski, 2001; Wojtaszek and Miciuła, 2019).

The traditional definition of job rotation is the planned change of specific jobs by selected employees or groups of employees. The rotation is indicated by the number of employees who voluntarily left the organization, were made redundant, retired or died in the course of their work. Rotation changes the human and intellectual capital of an organization and affects performance. Turnover has a direct impact on costs, both in terms of reducing wages and greater expenditure on recruiting employees. In colloquial terms, job rotation may be associated with employment fluctuation - staff (staff) rotation understood as the arrival and departure of employees from the place of employment (voluntary or involuntary). Until recently, job rotation was associated only with positive changes, which resulted in promotion, gaining new qualifications and gaining new experience (Nowakowska-Grunt et al., 2020).

The problem of employment liquidity in banking is actual in practice. Banks, despite high unemployment and educated specialists in this field, still have problems with finding suitable employees. Even if the organization finds an employee who will meet its needs, a problem in the long run may arise when such an employee is retained in the organization. The reasons for the rotation may be different, depending on the employer or forced by the market situation. Rotation, i.e. the movement of employees, and more precisely their arrival and leaving work at a certain time (Wojtaszek and Nejman, 2015).

The departure of an employee is considered as:

- voluntary, i.e. caused by his resignation. It is influenced by such factors as: the atmosphere at work, ties between the supervisor and colleagues, and the use of more attractive work.
- voluntary, i.e. independent of the employee himself, resulting from decisions of superiors or unexpected actions of the bank's structures. We include here:
- dismissal of an employee caused, among others, by staff reduction,
- liquidation of a given job,

- expiry of a contract that was signed for a specified period,
- disciplinary dismissal,
- resignation under duress,
- implementation of some project,
- employee aging,
- retirement or disability pension,
- illness or death of an employee.

The most important internal causes, apart from natural reasons related to retirement or special leave, include:

- change of the organizational structure and related reorganization,
- lack of motivation, low salary, bad atmosphere, communication disruptions
- errors in management,
- poor working conditions, insufficient tools necessary for work and protection social,
- lack of clearly defined evaluation criteria,
- low efficiency of employees due to burnout or excessive burnout workload.

The more important external causes include:
- company mergers,
- strong competition,
- modern technologies,
- new labor markets for employees.

Rotation as a negative phenomenon:

- costs incurred by the company in connection with the dismissal of an employee,
- costs incurred by the company in connection with hiring a new employee (e.g. training costs), who may not be suitable for the position,
- the lack of a person employed at a given position contributes, inter alia, to not carry out a project within a specified period,
- routine, habituation and lack of motivation to act due to not moving inside the company,
- a high level of staff mobility rates indicates improper management of the organization.

In practical terms, the analyzed phenomenon shows a rotation resulting from the termination of an employment contract initiated by the employee himself. Banking employees complain on internet portals about high employee turnover in their banking branch. The problem affects more and more banks nowadays. Bankers share their information, exchange views on various job-related portals, thus exchanging information. Too much pressure from the management on the implementation of sales plans while maintaining the highest possible ratio of adapting the offer to the customer's needs often results in failure to meet the sales goals (Pocztowski and Miś, 2000; Pocztowski, 2003).

Results of the Research

Network management of the 21st century solution. Organization map.

An organization map is a tool that, with the help of built-in statistics, shows the roles of employees, the work of departments and the entire company, the flow of resources and places where they are blocked. The map of the organization enables the mapping of the informal structure of the company, i.e. the actual practices of employees, which allows for the proper planning, implementation and monitoring of activities preventing excessive and costly employee rotation (Stabryła, 2006; Kabus and Miciuła, 2019). The most commonly used organization map charts describe how to create and interpret network analysis deployments to help solve common problems in companies and organizations (Gray and Vander, 2012; Hejduk, 2016). These diagrams present an example of modern management through the use and development of employees' knowledge, human resources management by reducing the costs of leaving and replacing employees (Miciuła and Miluniec, 2019). Also this support sales management by increasing cross-selling and extended sales, and developing effective sales channels. The audited banking unit lacks network management that would solve the problem. The network map counteracts the fluctuation problem by suggesting the creation of conditions in which employees have a sense of using their own potential and a satisfactory comfort of work resulting from the proper workload, transparent communication and satisfactory

relations with management and colleagues. An increase or a financial gratification does not necessarily solve the problem of employee rotation (Rokita, 2005).

To sum up, thanks to the mapping of the actual practices present in the company and the possibility of their multi-level interpretation, the organization map is a tool that allows you to reduce employee turnover and significantly reduce its negative consequences, unfortunately it is not used in the analyzed bank (Wojtaszek, 2016; Kadłubek and Miciuła, 2019).

Analysis of staff shortages in a commercial bank - case study

For the purpose of examining this issue, questions were built, which were answered on the basis of participant observation, which served as a tool in the study. The question was posed: what elements significantly affect the emerging problems of staff shortages in the examined commercial bank? The survey was conducted in April 2014, summarizing the last 6 months of work for the commercial bank under study.

A research hypothesis was adopted - informing that the main cause of staff shortages is the lack of couching, motivation and communication disruptions. The results of the study made it possible to attempt to test the hypothesis and indicate possible areas for improvement.

A survey was conducted among bank employees (of the entire operating department). The survey was conducted among 22 people, of which 18 people (81% of the population) are men and 6 people (19% of the population) are women. The respondents were divided into four age groups:

- 20-30 years - 9 people, which is 40.9% of the studied population,
- 31-40 years old - 5 people, which is 22.7% of the studied population,
- 41-50 years old - 6 people, which constitutes 27.3% of the studied population,
- over 50 - 2 people, which constitutes 9.1% of the studied population.

The presented data show that the greatest number of people is 20-30 years old, as much as 40.9% of the surveyed population, and the fewest are employees over 50 years of age.

Higher education is the minimum requirement for employment in the analyzed bank. All respondents have higher education in banking.

The figure number 2 shows the reasons why employees terminated their employment relationship. People who witnessed the above-mentioned event, but were not a party to the dismissal, also answered this question.

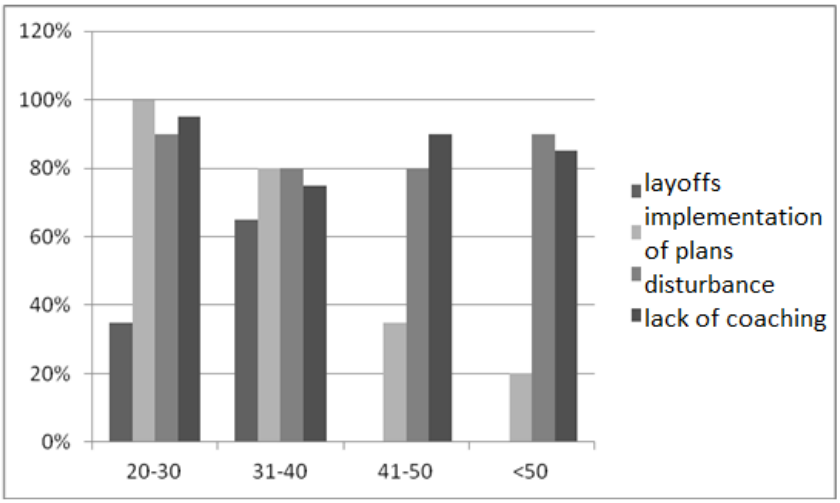

Fig. 2: Reasons for employee rotation by age group.

Source: own study.

The figure 2 shows bank employees by age and their percentage share due to: coaching, disruptions, implementation of plans and layoffs.

The conducted survey allows you to consult employees who are working and those who no longer work. Regardless of the age, the majority of employees claim that there is a lack of coaching and disruptions in the surveyed banking branch. The tendency to implement sales plans with the age of given employees in terms of feasibility becomes lower in implementation. The layoff process is a side of all employees in the age range, both those profitable for the organization and those not profitable. It is likely that employees who did not meet their sales plans have been fired, and employees who have pursued these plans have moved to more attractive jobs. Employees aged 41 and over 50 do not implement sales plans. Another question among the respondents was the information on the reasons for the failure to implement the assumed team plan (figure 3).

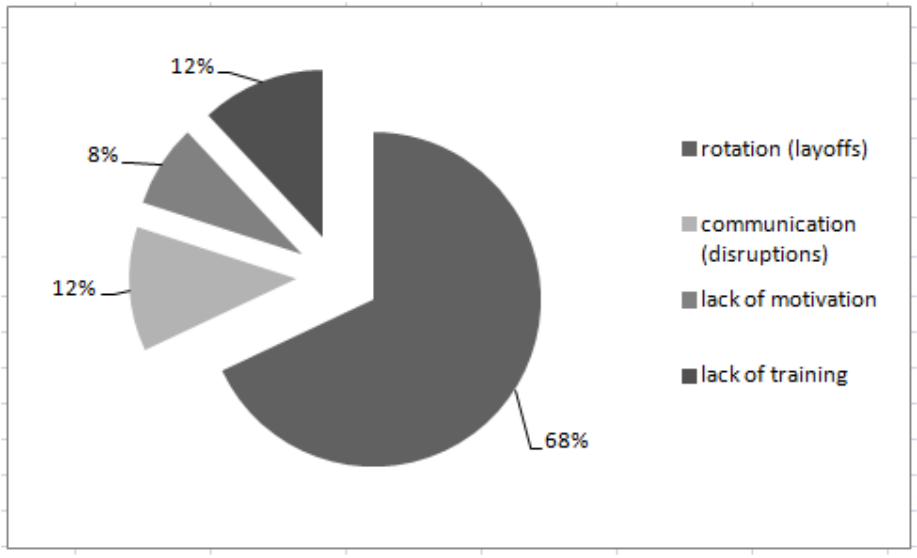

Fig. 3: Reasons for failure to implement the team plan

Source: own study

The main factor independent of team work planning is employee turnover due to layoffs, as many as 68% of respondents were terminated their employment contract. Among the examined factors, the following are parallels: lack of motivation and communication disorders. It was noted that the correction of not only unrealized sales, but also rotation can be disruptions in communication and lack of motivation. Support no meals in only 8 percent of the study population.

Another question among the respondents was the information on the absence of employees (figure number 4). The survey shows people who have an established employment relationship but are not present at work. Most of the respondents showed that this is due to communication disruptions. Communication disruptions may include various factors, such as the lack of information about the bonus, incorrect information about the incentive system, and the inability to rationally plan the holiday. It is natural that, according to the Labor Code, an employee is entitled to a vacation. On the other hand, the practice and the personnel of the branch show other components of these situations. On the other hand, 37% indicated that the reason was a lack of motivation. Among the respondents on sick leave, there is one person who does not significantly affect the resulting problem of employee rotation. It was assumed that the employee who is on sick leave is in fact sick and cannot get to work

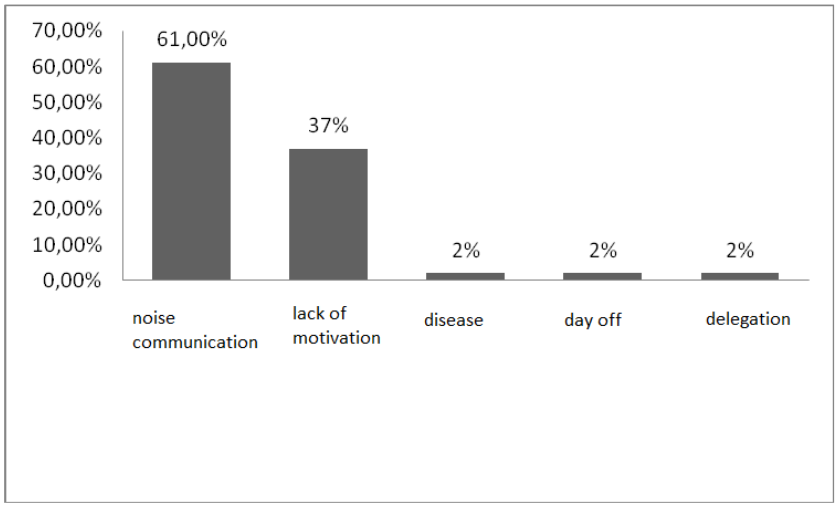

Fig. 4: Reasons for absenteeism of employees at a bank branch

Source: own study.

The most common work disruptions were the lack of coaching, in the audited entity there is no basic fulfilled communication principle, such as a conversation between employees and superiors, and vice versa. This is a factor in which 62% of respondents indicated the main cause of communication disruptions (figure 5). A disturbing element is the extended working time, although it ranked in the 15% position, however, in combination with others, it may become a threat to the entire banking organization.

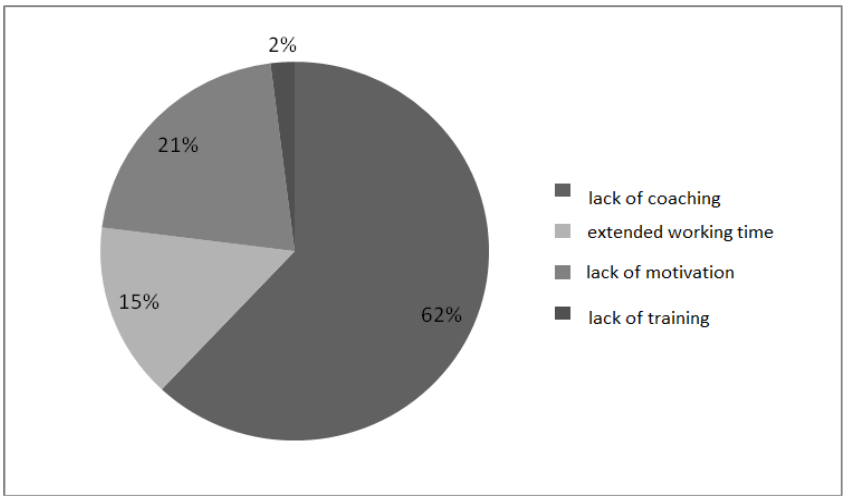

Fig. 5: Types of communication disturbances

Source: own study.

Summary

The hypothesis posed makes it possible to state unequivocally that the main factor causing staff movements or rotation in the examined banking branch are communication disruptions, lack of coaching and lack of motivation. It was noticed that the sales plan is implemented by young people in the age group from 20 to 40 years, as well as these people more often decide to change jobs.

In the aspect of dismissals, age ranges do not matter, it only matters who was a party to the notice. In the study of the parties to the dismissals, the aspect of the subjectivity of the dismissal was not distinguished, but the information was provided resulting from participant observation, which indicates the dismissed persons - those who did not implement their sales plans and those who departed - those who implemented their sales plan. The emerging problem of staff movements in the form of dismissals of employees, regardless of the initiating party, causes serious disturbances in the operation of the banking organization in the 21st century. Until recently, the organization was prepared for positive rotation activities related to promotion, absence of an employee for the duration of training. A

crisis situation, unfavorable quotations of funds, low quality of the client's portfolio, and the lack of his creditworthiness cause the deepening dissatisfaction of both the bank employee and the manager, which results in a staff change involving the termination of the employment contract of one of the parties, usually a profitable employee. The cyclical lack of full staffing of bank employees leads to customer neglect.

There are modern tools of the 21st century supporting counteracting the situation of employee rotation in the form of organizational maps in the field of network management, but they are not applied in the audited bank. The bank's management board should consider the possibility of using the above-mentioned tool.

Employees need coaching, "positive conversations" and, above all, support from the management. All kinds of disturbances should be dealt with on an ongoing basis. The employee should be appreciated, feel about himself as an important entity of the organization. If symptoms of negative rotation or any personnel changes were observed, all actions should be taken to detain the employee. If the banking unit is not able to organize a remedial program to retain the employee, it can use ready-made solutions offered by specialized units dealing with, for example, network management, including an organization map, which significantly contributes to overcoming the research problem.

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Towards Life Cycle Perspective In Activities of Small and Medium Enterprises In Poland

Jolanta BARAN

Silesian University of Technology, Gliwice, Poland
jolanta.baran@polsl.pl

Abstract

The growing needs of enterprises in the integration of environmental life cycle aspects into product development, related to the implementation of new legal regulations, result in the searching the relevant tools to meet these needs. The aim of this study is to present the conditionings for the inclusion of the life cycle perspective in activities undertaken by SMEs, as well as to analyze possible barriers and eco-design procedures in terms of its application by small and medium-sized enterprises.

Keywords: Small And Medium Sized Enterprises, Life Cycle Assessment, Ecodesign, Environmental Aspects

Introduction

In the structure of small and medium-sized enterprises in Poland according to the predominant type of activity, the number of entities that conducted service activities was dominant, constituting 56.4%, especially in the field of trade, repair of motor vehicles - 27.7%. There was also a significant share of entities that declared predominant type of activity related to construction - 12.2%. Industrial activity (mining and quarrying; industrial processing; production and supply of electricity, gas, steam, hot water and air for air conditioning systems and water supply; sewerage, waste management and remediation activities) was conducted by 31.4% of entities (including mainly the companies in the area of industrial processing - 28.1%) (Determinants of the entrepreneurship, 2018).

Small and medium-sized enterprises in their activities deal with issues related to environmental protection. This is reflected in particular in the implementation of actions resulting from legal regulations, to avoid possible penalties, but also in taking non-obligatory initiatives (Jonek-Kowalska, 2014). Activities undertaken in the field of environmental protection and environmental management in response to the negative impact on the environment generated by the enterprise, or resulting from other incentives, include among others (Baran, 2013):

- keeping records and calculating fees for discharging gases or dust into the air, discharging sewage into waters or into the ground, water abstraction and waste storage (beyond the scope of general use),
- payment of fees for the use of the environment (for the introduction of gases or dust into the air and storage of waste) (Ustawa Prawo ochrony środowiska, 2001).
- paying fees for discharging sewage into waters or into the ground and water abstraction (Ustawa Prawo ochrony środowiska, 2001).
- payment of product fees and the recycling fee and keeping records of packaging, introduced electrical and electronic equipment, batteries and accumulators, obligation to organize and provide access to the collection network for end-of-life vehicles, preparation of reports,
- in the field of waste management - keeping waste records, preparing the required statements and information, hazardous waste management programs, developing documentation needed to apply for permits, permits, decisions, implementation of obligations related to the BDO, i.e. the database on products and packaging as well as waste management.
- in the field of water and wastewater management - preparation of water reports, hydrogeological analyses, determination of pollution indicators,
- in the field of air protection - preparation of documentation necessary to apply for permits, as well as to notify installations, preparation of reports on emission management, PRTR (The National Register of Pollutant Release and Transfer) and KOBIZE (The National Centre for Emissions Management) reports, measurements of pollutant emissions and the effectiveness of devices reducing emissions,

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- in the field of protection against noise - noise analyses, measurements of emissions and noise levels,
- in the field of investment planning - preparation of reports on the investment's impact on the environment, development of project information sheets, post-implementation analyses of projects, ecological reviews, projections of the investment's environmental impact, conducting environmental audits,
- in terms of requirements related to Integrated pollution prevention control permits - preparation of documentation necessary to apply for integrated permits, conducting environmental studies, comparing the proposed solutions with the best available techniques BAT, developing adaptation programs,
- in the field of greenhouse gas emission trading system (EU ETS) - preparation of documentation necessary to apply for permits to participate in the greenhouse gas emission trading system, monitoring of emission levels, settlement of emission allowances, preparation of reports,
- implementing and maintaining an environmental management system or an integrated management system,
- applying for financing of pro-ecological projects – for example from National Fund for Environmental Protection and Water Management.

These activities largely cover responsibility for negative environmental impact, enforced in accordance with the "polluter pays" principle. The activities of enterprises and their effects on environmental protection are monitored in the scope, which is mainly related to the manufacturing of products. That is reflected in reporting and payment of fees for using the environment beyond the scope of general use. In many cases, especially from the point of view of small and medium-sized enterprises, this approach has so far been sufficient, as it corresponded to the level of formal requirements. However, environmental protection law, as well as the theory and practice of enterprise management, are evolving towards taking into account environmental aspects not only at the stage of product production, but also at other stages of its life cycle. In recent years, legal acts, both Polish and EU, have been implemented, which define requirements relating to stages of the product life cycle other than manufacturing for some product groups, e.g. packaging, electrical and electronic equipment, batteries and accumulators, motor vehicles.

The use of a product life cycle assessment broadens the perception of a product's environmental impact and enables a relative assessment of the achievement of the Sustainable Development Goals SDGs. Companies and researchers are becoming more and more aware that engineering activities require a sustainable approach in the face of the growing demand for products created within sustainable development (Sarkis, 2001). However, this approach is still not used more widely in enterprises, especially in the sector of small and medium-sized enterprises SMEs. According to the Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations (2013/179/EU) (Commission Recommendation, 2013), most SMEs do not have the knowledge and resources necessary to provide information on environmental performance in life cycle. That is why it is so important to provide support for enterprises in this area. This is due to the complexity of the issue of incorporating environmental aspects into design, as well as because of the still relatively small, though increasing, ability to use this approach in the activities of enterprises.

Compared to large enterprises, SMEs tend to have limited human, knowledge, and financial resources (Michna and Kmieciak, 2020; Ates et al, 2013). On the other hand, they are less formalized and more flexible, thanks to which they have the ability to adapt faster to changes in the environment (Michna et al, 2020).

The aim of this study is to present the reasons for the inclusion of the life cycle perspective in activities undertaken by SMEs, as well as to analyze possible barriers and eco-design procedures in terms of its application by small and medium-sized enterprises.

Rationale for including environmental aspects throughout the life cycle of products in small and medium-sized enterprises

The environmental life cycle of a product is a consecutive approach, with interrelated stages, starting from the research and development phase, acquiring and processing raw materials needed to produce a specific product or provide a service, through the production or service provision phase, product use, up to the disposal of consumer waste.

The first of the important reasons for integrating the life cycle perspective into the activities of small and medium-sized enterprises is the development of legislation in this area. Even if a company only supplies components for the production of a regulated product for another company, the requirements increase along the entire value chain.

Table 1 lists products for which certain environmental protection requirements are present in the legislation in relation to different stages of the life cycle. Three main stages are included - the production stage (the stage of

implementation of technological processes and all auxiliary processes), the use stage (stage related to energy supply, water consumption, maintenance, renovation, regeneration, repair, etc.), post-consumer waste management stage (including e.g. landfill, waste treatment).

Table 1: Life cycle stages of selected product groups for which legal, Polish and / or EU solutions, regulating environmental protection procedures were applied

No	Name of the product or product group	Legal acts obliging to take into account the impact of products on the environment at the stage of use or management of post-consumer waste	Life cycle stages		
			Raw material and material acquisition	Using	Post-consumer waste disposal
1	Packaging: plastic, aluminium, steel, from paper and cardboard, of glass, made of wood, multi-material	Ustawa z dnia 13 czerwca 2013 r. o gospodarce opakowaniami i odpadami opakowaniowymi (Dz.U. 2013 poz. 888) (Ustawa, 2013) Ustawa z dnia 11 maja 2001 r. o obowiązkach przedsiębiorców w zakresie gospodarowania niektórymi odpadami oraz o opłacie produktowej (Dz.U. z 2001 r. Nr 63 poz. 639) (Ustawa o obowiązkach przedsiębiorców, 2001)	X		X
2	Lubricating oils		X		X
3	New pneumatic rubber tires and used pneumatic tires		X		X
4	Equipment operating on the temperature exchange principle (e.g. refrigerators, air conditioning equipment, heat pumps)	Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (ErP directive) (UE L 285 z 31.10.2009, p. 10-35) (Directive, 2009) Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174 z 1.7.2011, str. 88-110) (Directive, 2011) Ustawa z dnia 11 września 2015 r. o zużytym sprzęcie elektrycznym i elektronicznym (Dz.U. z 2015 r. poz. 1688) (Ustawa, 2015)	X	X	X
5	Lighting equipment (e.g. fluorescent lamps, LED)		X	X	X
6	Large and small electrical and electronic equipment (e.g. household appliances, washing machines, dryers; watches, irons)		X	X	X
7	IT and telecommunications equipment (e.g. telephones, printers, personal computers)		X	X	X
8	Consumer equipment and photovoltaic panels (e.g. radio, TV sets)		X	X	X
9	Electric and electronic tools (e.g. drills, saws, sewing machines)		X	X	X
10	Toys, recreational and sports equipment (e.g. consoles, video games)		X	X	X
11	Medical devices (e.g. cardiology equipment, dialysis equipment)		X	X	X
12	Monitoring and control instruments (e.g. smoke detectors, heat regulators, thermostats)		X	X	X
13	Vending machines (e.g. vending machines for dispensing products, money)		X	X	X
14	Industrial and portable batteries and accumulators	Ustawa z dnia 24 kwietnia 2009 r. o bateriach i akumulatorach (Dz.U. z 2009 r. Nr 79, poz. 666) (Ustawa, 2009)	X		X
15	Motor vehicles and three-wheeled mopeds	Ustawa z dnia 20 stycznia 2005 r. o recyklingu pojazdów wycofanych z	X		X

		eksplo23atacji (Dz.U. z 2005 r. Nr 25, poz. 202) (Ustawa, 2005)			
16	Sale of food	Ustawa z dnia 19 lipca 2019 roku o przeciwdziałaniu marnowaniu żywności (Dz. U. 2019 poz. 1680) (Ustawa, 2019)		X	X

The production stage of products is subject to legal regulations aimed at reducing the environmental impact of production processes along the entire supply chain. These regulations apply not only to producers who produce a specific product for which the environmental impact is determined, but also to those involved in the acquisition of energy resources, metal ores, chemical raw materials, precious and semi-precious stones, other resources, processing of these raw materials, the use of secondary raw materials and manufacturing of materials.

As shown in Table 1, there are also more and more solutions aimed at reducing the environmental impact after the end of use of products. This applies, for example, to packaging, tires, electrical and electronic equipment, and motor vehicles. Additionally, solutions are implemented to reduce electricity consumption at the stage of use of energy-related products. This applies to such product groups as refrigeration appliances, washing machines, dishwashers, air conditioners, fans, hot water boilers, TV sets, fluorescent lamps, electric motors, external electric power supplies, water pumps, circulation pumps, the so-called set-top boxes.

Taking into account the list of products presented in Table 1, it can be concluded that the problem of considering environmental aspects at various stages of the life cycle concerns mainly to large enterprises and concerns. Small and medium-sized enterprises are however suppliers of components for the production of products manufactured by large enterprises.

In addition to the applicable legal regulations, a motivating role in carrying out the analysis of the impact of the life cycle on the environment is played by activities in the field of product development and improvement, that is, identifying opportunities to improve the environmental performance of products at various stages of their life cycle (ISO 14044, 2006; ISO/TR 14062, 2002), mainly as part of eco-design.

Supporting decision making in industry, governmental or non-governmental organizations (e.g. in strategic planning, setting priorities, implementing changes taking into account the impact on the environment) is another premise for conducting an environmental analysis of the product life cycle. Applications of life cycle assessment in the area of environmental management systems and tools include, inter alia, environmental management systems and environmental performance assessment, for example, identification of the significant environmental aspects of an organisation's products and services, integrating environmental aspects into product standards, environmental communication (ISO 14044, 2006), and product evaluation under GPP.

The above-mentioned applications of environmental life cycle analysis of products are followed by its use for marketing purposes (ISO 14044, 2006) (e.g. as part of the environmental labelling system, preparation of environmental statements or environmental declarations, as well as CSR (Corporate Social Responsibility) reports).

The system-wide nature of the life cycle perspective means that its inclusion in the procedures used in other methodological approaches to environmental analysis can be a complementary factor in the environmental impact assessment (EIA), the economic side of environmental management (EMA), policy evaluation (recycling models, etc.), Sustainability, Substance and Material Flow Analysis (SFA and MFA), Hazard Assessment and Risk Management of Facilities and Facilities, Product Responsibility, Supply Chain Management, Life Cycle Management (LCM), Project Descriptions, Life Cycle Thinking, Cost Analysis life cycle (LCC) (ISO 14044, 2006).

Moreover in December 2015, the European Commission adopted the EU Circular Economy Action Plan to boost employment, growth and investment, and develop a carbon neutral, resource-efficient and competitive economy. On 4 March 2019, the European Commission Report on the implementation of the Circular Economy Action Plan (COM (2019) 190 final) was presented. It states that the circular economy is now an irreversible global trend on a large scale. However, much effort is still needed to intensify EU and global action, fully close the loop and take advantage of the competitive advantage that the circular economy provides for EU enterprises. In this context, a further challenge is for the circular economy is to be at the heart of the EU's industrial strategy, which will enable a closed loop in new areas and sectors. The product life cycle assessment should become the norm and eco-design rules should be extended as much as possible (COM (2019) 190 final). With this message, a new Circular Economy Action Plan was developed (COM/2020/98 final). It sets out a sustainable product policy framework covering the design of sustainable products, empowering consumers and public buyers, and a closed loop in production processes. Key product value chains have also been identified for electronics and ICT (Information and Communication Technologies), batteries, accumulators and vehicles, packaging, plastics, textiles, construction and

buildings, as well as for food, water and nutrients. Actions are also proposed to reduce the amount of waste, adapt the closed loop to the needs of people, regions and cities, and take into account the global context of the implemented solutions (COM/2020/98 final) (Baran, 2019).

However, the inspirational role of the above-mentioned approaches is often not yet reflected in practice of Polish SMEs, due to both the constant need to overcome barriers that are generally associated with environmental protection measures and the specific problems of carrying out a life cycle assessment.

Barriers of life cycle perspective implementation in SMEs

Introduction a life cycle perspective in SMEs involves the use of analytical methods based on life cycle assessment. It is necessary to determine the impact of specific product and process solutions on the environment.
Barriers to using LCA, affecting the limitations of the inclusion of a life cycle perspective, lead to lost opportunities for improved environmental decisions. Potential concerns that affect the use of LCA methods include the aspects pointed in table 2 with considering possible solutions.

Table 2: Barriers of life cycle approach-based methods implementation

Barriers	Description	Considering possible solutions
Resource requirements	- Required know-how - Time consumption - High costs	- Outsourcing of life cycle approach expertise, acquiring the know-how from outside - Searching for external financing options - Estimation and comparing the costs and benefits of external and internal expert LCA services
Data requirements	- Difficult data collection procedures in practice - The need for internal training to collect good site-specific quality data - Inconsistent data - external and internal - Lack of internal procedures for collecting life cycle data - Data are not available at the needed level (e.g. geographic, process) - The range of LCI databases vary in design, format, and quality - Data not available in the value chain	- Joining in developing databases with data that have been vetted within the industry - Development and implementation of internal procedures and data collection systems adapted to the needs of LCA
Increasing number of methodologies, standards and programs containing methodological recommendations	- The problem with determining the appropriate methodological approach needed in a given situation	- Developing know-how - Trainings
Limited guidance	- Problems with the application of complicated methodological procedures in available programs (e.g. concerning recycled content) - Methodology in continuous dynamic development	- Employees trainings - Developing cooperation with partners in the value chain – especially with suppliers and clients
Uncertainties over implementation of results	The results of an LCA may suggest a change in a company's operations. Dedicated competence groups within an organization are somewhat reluctant to changes and particularly changes that don't evolve from activities within the group itself	- Implementation appropriate knowledge management approach to life cycle-based activities - Stimulating LCA understanding in the Human Resources area

Validity	Power of and value provided by LCA would increase significantly if it were validated – additional costs and requirements	- Analysis of the possibilities of validity and selection of the best solution
Scientific basis	Life-cycle studies that do not follow the steps of a traditional LCA may be criticized as lacking scientific support	- Cooperation with science - Development of internal know-how
Transparency	Existing standards and guidance provide some guidelines, which, if followed, will ensure consistency, but for some issues, the standards are silent or ambiguous, leaving room for the use of an extensive range of methods. Many of these methods lack transparency on core methodological issues, making it difficult to compare them with other methods	- Organization needs initial analysis before conducting LCA-based analysis - Adaptation of the methodology used to the needs
Absence of perceived need	Many companies do not see how lifecycle thinking can be applied to their specific operations - or even the benefits of doing so. Many potential users are unaware of how life-cycle approaches can aid in decision making. Documentation of performance improvements can be tedious and resource intensive, but may be necessary to verify the results of changes resulting from life-cycle thinking.	Options for integrating or at least considering LCA analytical approaches and results in conjunction with other environmental and decision making tools will be needed to show how LCA can contribute to improved decisions.
Organizational structures	Often, life-cycle practitioners are functionally a part of a company's environment, safety, and health division - separated or disconnected from the process design and product development departments. Thus, the knowledge of the life-cycle practitioners is not shared with developers, and the developers may not be aware of how life-cycle thinking can be integrated into design and development.	- Introduction of a new department dealing with sustainable development - Appropriate department empowerment because many internal parties need to work together to implement LCA-related projects providing the required resources for the sustainability initiative including time and educational resources - Participating actively in setting up the strategic sustainability goals of the organization - Communicating explicitly throughout the organization regarding the sustainability aims in an effective and clear manner - Involving actively the employees with regard to ideas and suggestions for the use of life cycle approaches

Source: (Wolniak, 2019; Zarębska and Dzikuć, 2013; Baran, 2019; Baran, 2020; Life-Cycle Thinking, 2007).

Ecodesign as a tool for incorporating a life cycle perspective in small and medium-sized enterprises

Figure 1 shows the general model for integrating environmental aspects into the product design and development process, with guidance for small and medium-sized enterprises. Suggestions to apply solutions in small and medium-sized enterprises result from the need to take into account the realities of running a business in the SME sector.

Typical stages of the product design and development process	Recommendations for small and medium-sized enterprises on integrating environmental aspects into product design and development
Planning	– Initial problem analysis (formulated in relation to a specific goal and requirements) in the context of existing conditions (including time frames, financial constraints, external factors). – Decide whether to carry out the eco-design procedure on your own or consider involving an external expert. – Organization of possible training for staff or sending employees to training.
Design assumptions	
Conceptual design	– Initiating and conducting activities aimed at identifying concept solutions. – Caring for commitment to the search for solutions of a carefully selected, properly motivated team. – Initial analysis of the availability and adequacy of internal resources as part of the potential implementation of individual solutions. – Application of simpler analytical methods - qualitative and semi-quantitative in order to estimate the environmental impact of the considered solutions.
Design concept	
Detailed design	– Development of selected design concepts using the design tools used so far, or considering the purchase of e.g. new software. – Ensuring the creation and maintenance of an internal database for the implementation of a specific solution.
Design solution	
Research/prototype	– Verification of the achievement of the ecodesign goal and ensuring that at this stage there is communication between employees responsible for design and sales.
Prototype	
Production and introducing to the market	– Ensuring that the launch of the product on the market is accompanied by carefully prepared information addressed to customers.
Product	
Product overview	– Periodic reviews of both the product design and development process and its results.

Fig. 1: General model of integrating environmental aspects into the product design and development process with recommendations for implementation in small and medium-sized enterprises.
Source: on the basis (ISO/TR 14062, 2002; Baran, 2013).

It is particularly important for small and medium-sized enterprises to decide whether to carry out the eco-design procedure on their own or with the involvement of an external expert. The first solution is a more demanding approach, the barrier to its application is primarily the need to have specialist knowledge in the field of estimating the impact of the life cycle on the environment, including knowledge of appropriate software and the ability to select appropriate research methods. While large enterprises have organized research and development departments and laboratories, thanks to which the implementation of new solutions is easier, it is much more difficult in enterprises without such departments and experience. In this case, it is worth considering involving an external expert, especially if a life cycle assessment is required. If, on the other hand, ecodesign will be carried out by employees of a given company, then it is necessary to appoint a carefully selected design team composed of people responsible for design, production, financial and marketing aspects. It is also important to involve top management (Baran, 2017).

In small and medium-sized enterprises that implement the ecodesign procedure on their own, special attention at the stage of conceptual design should be paid to initiating and conducting activities aimed at identifying concept solutions (Baran, 2015). It is worth using tools and methods that stimulate creativity, including heuristic methods,

such as brainstorming or unorganized thinking. A less formal approach in contacts between employees in small and medium-sized enterprises as compared to large enterprises seems to be an opportunity to obtain the appropriate results (Jonek-Kowalska, 2019).

Another important issue at this stage for small and medium-sized enterprises is the analysis and assessment of the availability and adequacy of internal resources as part of the potential implementation of individual solutions. This is all the more important as small and medium-sized enterprises usually have less financial resources, which limits the possibilities of implementing some solutions.
At this stage, it is often necessary to carry out a life cycle environmental analysis. Faced with the complexity and high level of difficulty in carrying out a life cycle assessment, small and medium-sized enterprises, if possible, may use simpler analytical methods - qualitative and semi-quantitative, to assess the environmental impact of the solutions considered.

Overall, ecodesign (at all stages of the presented model of the ecodesign process) can be supported as part of the environmental management system and in this respect the recommendations of PN-EN ISO 14006 can be used, which provide guidelines to assist the organization in establishing, documenting, implementing, the maintenance and continual improvement of ecodesign management, which is treated as part of the environmental management system. It is intended for the use by those organizations that have implemented an environmental management system according to PN-EN ISO 14001, but it can also be useful in other management systems. These guidelines are applicable to any organization, regardless of its size or type of business.

Conclusions

Environmental aspects relating to the entire product life cycle in the design and development of products is increasingly becoming a necessity. At the same time, small and medium-sized enterprises are forced to respond to legal requirements regarding the environmental aspects of the products for the production of which they supply components. Large enterprises with R&D departments separate in their structure are able to respond faster and more adequately to the need to meet new legal requirements, while a less formalized or informal, more intuitive approach to product design and development in small and medium-sized enterprises can be perceived as a weakness when it is necessary to use a complex procedure and complicated test methods that may be resistant on first contact. In addition, the use of cost-intensive design solutions as well as the purchase of software supporting the design process is more achievable for large enterprises that have greater access to capital. In small and medium-sized enterprises with fewer employees, there are also fewer opportunities to delegate selected employees who are involved in fulfilling time-consuming duties, to additionally carry out the eco-design procedure. There are also concerns about potential unwanted knowledge transfer in the event of the possible involvement of external experts. These problems, when confronted with the still low ecological awareness of the society and the perception of environmental protection primarily as a cost, require a special approach both in the development of legal solutions that should take into account these difficulties of small and medium-sized enterprises, proposing instruments to facilitate their implementation, as well as in the field of offering small and medium-sized enterprises practical solutions supporting ecodesign.

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Directions for Improving the Efficiency of Technology Transfer Processes in The Russian Economy

Olga PYATAEVA
Russian State Academy of Intellectual Property, Moscow, Russia, opyataeva@gmail.com

Liliya PRIKHODKO
Financial University under the Government of the Russian Federation, Moscow, Russia, Iprikhodko88gmail.com

Vladislav SHALAEV
Industrial University of Tyumen, Nizhnevartovsk, Russia, Shell77.77@mail.ru

Pavel SHULUS
Lomonosov Moscow State University, Moscow, Russia, Shuluspavel@gmail.com

Evgeny PAVLOV
Russian State Academy of Intellectual Property, Moscow, Russia, eo.pavlov@ya.ru

Abstract

Technology transfer is of particular strategic importance, as technology is a catalyst for the socio-economic development of economic actors at home and abroad. Technology consists of a pool of knowledge and know-how, acts as a catalyst for healthy and competitive international trade, and is linked to the commercial needs of industrial enterprises. Sectors of economy, regions and national economies in general need effective planning of research activities and management of production, from the research laboratory to the market of knowledge-based products. The tasks of creating an institutional environment for technology transfer in Russia actualize the need to develop recommendations for improving the efficiency of technology transfer, which is the subject of this article.

Keywords: Innovation, technology transfer, efficiency, technologies, Russian economy.

Introduction

From a legal point of view, technology consists of the set of intellectual property rights and the tangible holders in which it is expressed. From the economists' point of view, technology is an incentive for competitive (e.g. international) trade, linked to the commercial needs of industrial enterprises, Sectors of the economy, regions and national economies in general need effective planning of research activities and management of production, from the research laboratory to the market of knowledge-based products.

Thus, the objects of transfer (transfer) of innovative technologies are, first, the rights to the protected results of intellectual activity and means of individualization (article 1225 of the Civil Code of the Russian Federation) and, second, the material carriers in which they are expressed.

Definition of the category «technology transfer»

Let us further indicate different approaches to the definition of the category «technology transfer». In the most common variant in various scientific and methodical sources, the transfer of technologies is the «process of involving technological innovations in market relations» and is literally translated as «transfer of technologies in the direction of application of knowledge», «the process of transferring technologies from one field of activity to another or from one field of application to another» and is:

- a process of realization of scientific and technological achievements in products and services offered to the market;

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– using of intellectual property developed and tested in some fields (in some enterprises) and in other fields (enterprises).

Development of technology transfer mechanisms in Russia

Considering the emergence and development of technology transfer mechanisms, it is worth noting the key importance for its development of the economic restructuring that took place in Russia in the early 1990s.

In the Soviet economy, the invention (technological development, technology) was, a priori, the property of the State; then, tried and legally secured methods were proposed for bringing the invention into practical activity. At the same time, the economic effect of the use of innovations was not a decisive criterion for its introduction into industrial production (which can be considered in both positive and negative context); instead the term «introduction» was used (technologies, inventions, new technical solutions, etc.), which were carried out within the framework of the existing management system with the assigned formal functions of purpose, planning, control, motivation, etc. Unlike the term «transfer» discussed above, it has an emphasis on «transfer», which can be carried out both within administrative procedures and spontaneously, under the influence of economic interests of spontaneous economic agents.

Mechanisms of technology transfer

The general legal framework for the implementation of technology transfer processes in Russian legislation is regulated by the Decree of the President of the Russian Federation of 1 December 2016 #642 «Strategy of Scientific and Technological Development of the Russian Federation» where the formation of an effective system of communications in the field of science, technology and innovation, etc. the formation of a system of technology transfer, is defined as one of the main directions and measures of implementation of State policy in the field of scientific and technological development.

At the same time, legal and methodological documents such as the Model Regulation «Intellectual Property Policy for Universities and Research Organizations», Recommendations on Management of Intellectual Output Rights in Organizations, Recommendations on Management of Intellectual Output Rights and Tools for Customization in Regions, and «National Standards: Technology transfer. General provisions» (GOST R 57194.1-2016), «Technology transfer. Technological audit» (GOST R 57194.3-2016), «Technology transfer. Results of intellectual activity» (GOST 57194.2-2016) are used.

Legislative and infrastructural framework of technology transfer in Russia

The analysis of the legislative and infrastructural framework of technology transfer processes raises many questions, particularly with regard to mechanisms for diffusion of innovation. The development of the IP market is a key element in the utilization of national scientific capabilities. Despite some transformations in Russian legislation in the field of protection of IP facilities, the legal and regulatory framework still has a number of «shadow parties» requiring further clarification and refinement.

Thus, the existing legal norms define the relationship of the organization with the external environment, covering those spheres of activity which have a connection with commercial secrecy. Such relationships are largely determined by long-standing personal contacts and informal relationships. The introduction of the most flexible IP market regulation still remains a pressing issue: restrictions on the application of antimonopoly legislation in the area of IP regulation should be removed. A balance must be struck between the inadmissibility of unfair competition and the interests of the right holder in the protection of IP objects. Legal uncertainty about IP facilities reduces the intensity of technology transfer.

The issue of VAT taxation of the transfer of rights to IP objects remains unresolved. The position of the Plenum of the Russian Federation (Decision of 30.05.2014) is that, in accordance with paragraph 1 article 146 of Tax Code of the Russian Federation, which defines as the object of the VAT levy the actions on the provision of services, should be taken into account that the concept of «service» presupposes the transfer of patents, licenses, trademarks and other civil-legal obligations. The Tax Code of the Russian Federation does not explain whether VAT should be withheld if the difference between the amount of income received from the assignment of the property right and the cost of the acquisition of the claim is negative or nil (art. 155 of the Tax Code of the Russian Federation). There is no official position on this matter.

It is important to note the lack of sufficient attention by law to the regulation of licensing relationships. The execution of the license agreement is an important stage in the process of transferring rights to the use of IP objects. The efficiency of the transfer of IS objects depends on the proper execution of all the terms of the agreement. According to art.1237 Civil Code of the Russian Federation, control over the execution of the license agreement is entrusted to the licensor on the basis of the licensee's account of the use of the IP objects. The lack of capacity of the right holder to control access to the IP facility leads to litigation.

Support for technology transfer mechanisms

Direct support for applied research and development is currently being used in Russia, but practice shows that this type of support is not very effective and accounts for a small share of total government financial support for commercial innovation in industrialized countries. For this reason, there is a need for a method to encourage investment in research, which will have a significant impact on the quantity of research and development undertaken.

It seems that the innovative system of Russia has been characterized earlier and continues to be characterized by the approach called «repulsion from technology». This implies, first, significant investment in a large number of potential innovation processes; secondly, increased attention at the initial research stage of innovation; thirdly, the fact that the technological process is beginning, In fact, from scratch, it ignores lessons learned in other areas of activity.

In addition, there is currently no body responsible for technology transfer in the Russian Federation; the software-targeted method of technology transfer management is not sufficiently used, etc.

This leads developers, technology implementers, and other transfer participants to the disappointing conclusion that investment in technological solutions can in most cases not be commercially viable, economically efficient. The challenge is to develop a technology transfer mechanism that can be quite successful.

Reasons for technology transfer' ineffectiveness

The number of enterprises from the scientific and practical fields involved in technology transfer to the real economy is not commensurate with their counterparts abroad. Nor is there a clear positive development in the number of such enterprises in Russia. The current situation is largely due to the fact that there are barriers to the effective operation of the DOT in the process of technology transfer, namely:

1. Lack of communication between innovators (universities, academia) and the business sector on the demand for and supply of business-relevant products from the science and education sector. Many universities do not monitor market needs and do not assess research opportunities leading to commercialization of the results of their intellectual activities.
2. Often innovation is not ready for market entry because of the weak economic component, that is, the mechanism of entry of an innovative product into the market is not sufficiently developed (lack of innovation infrastructure supporting the commercialization of innovative products).
3. The low level of developer activity in patenting their inventions, which reduces the benefits of intellectual property results' commercialization, as proprietary these type of results do not become a commercial product and can only be used in the development of technological processes.
4. Lack of initiatives and insufficient training of research teams in decision-making on commercialization of Reeds and their transfer to the real economy.

Ways of improving the efficiency of technology transfer

The following groups have been identified as possible ways of improving the efficiency of technology transfer processes in the Russian economy: legal, organizational and infrastructural, economic and personnel.
1. The legal enforcement of the regulation of IP transfers in the Russian Federation should aim at developing and adopting the necessary standards and norms in accordance with the objectives of the innovative development of the economy.
2. Establish a framework that should methodologically form an ecosystem of innovation for technology transfer.
3. Creation of a map of transfer efficiency criteria for various economic entities, as well as methodological recommendations for the establishment of such enterprises and the legal and organizational organization of their activities; Methodological aspects of performance assessment for investors and technology owners (i.e., actual business models).

4. Development of professional requirements for the competences of technology transfer specialists.
The proposed measures would significantly improve the efficiency of the technology transfer process, create a continuous flow of high-tech developments, reduce transaction costs and improve the overall dynamics of innovation.

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Assessing Innovation Performance Through *Ex-Ante* and *Ex-Post* Patent-Based Measures

Francesca MICHELINO*, Antonello CAMMARANO and Mauro CAPUTO
fmichelino@unisa.it acammarano@unisa.it mcaputo@unisa.it
Department of Industrial Engineering, University of Salerno, Italy
*Corresponding author

Abstract

The paper analyzes the relationships between *ex-ante* and *ex-post* measures for innovation performance based on patent data. Results provide suggestions for innovation managers on the leverages to be operated during the innovation process for obtaining high valuable patented technologies.

Keywords: innovation performance, patent data.

Introduction

Innovation is more and more acknowledged as the only tool for companies to compete in a sustainable way (Michelino et al., 2019). Patents are universally acknowledged as the main output of technological innovation (Patel et al., 1995; Michelino et al., 2015) and are commonly used as a way for proxying both innovation activities and innovation performance. Yet, among the most interesting indicators for measuring innovation performance we find the so called "*ex-post*" measures, which are available years after the application of the patent.

The aim of this paper is to analyze the relationships that *ex-post* indicators have with *ex-ante* ones, which are immediately available when the R&D efforts for producing the patented technology are put in place. Indeed, if such relationships exist, innovation managers and decision makers can select the more adequate *ex-ante* indicators for obtaining high valuable patents also according to *ex-post* ones.

In what follows, first a literature review of patent-based metrics for innovation is presented. After a methodological section, results are presented and discussed. Conclusions close the work.

Literature Review

The use of patent data to measure innovation has multiple advantages: patent data are widely acknowledged by scientific literature (Burhan et al. 2017; Caputo et al., 2019; Grupp, 1992; Johnstone et al., 2012) since they cover decades of innovation activities (Griliches, 1990), are publicly available, allow access to a wide range of objective and standardized information, are continuously updated (Belderbos et al., 2010). Indeed, patent indicators are able to cover many different aspects of innovation (Squicciarini et al., 2013), from technological acknowledgement to scientific content, from knowledge base breadth to market success. Among patent quality indicators, a distinction is made between *ex-ante* and *ex-post* indicators, according to the possibility of determining the measure before or after the date of publication.

Ex-ante measures

Ex-ante indicators are available at the date of application of the patented technology and contain information on its potential value.

The number of claims determines the boundaries of the exclusive right in terms of legal protection and defines the scope of the patent, i.e. its potential uses/products/applications, whereas the breadth of the patented technology can be measured looking at the number of different knowledge domains (Squicciarini et al., 2013).

As to backward citations, from one side, the absence of citations to previous patents defines the originality of the technology since no previous art is found for the technology (Cammarano et al., 2019). On the other side, the

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existence of citations to non-patent literature (NPL) and research papers defines the scientific content of the patent and its complexity (Callaert et al., 2006).

Looking at the technological areas of the patent (Lerner, 1994), the presence of new combination of knowledge domains denotes the capability of creating new architectures and developing architectural innovation (Guan and Yan, 2016; Verhoeven et al., 2016).

All these indicators can be modulated by innovation managers by addressing R&D efforts towards new technological areas, relevant scientific issues and borderline knowledge. Therefore, the main advantage of such measures is that they are directly manageable already during the innovation process. Yet, the information provided by them is mainly related to the potentiality of the technology and not to the actual success it can have.

Ex-Post Measures

Ex-post indicators overcome the problems of *ex-ante* ones, determining the actual impact of the patent in terms of both technological and market success.

Indeed, many authors define the technological acknowledgment of the patent through the number of forward citations received from other patents, which attest the validity of the new technology (Hall et al., 2000; Cammarano et al., 2017a; Ahuja and Lampert, 2001). On the other side, the market success can be defined by the number of patents generated by the applicant after the focal patent and recalling it as a priority, i.e. the numerosity of the patent forward family (Squicciarini et al., 2013; Harhoff et al., 2003).

Obviously, the fact that the applied patent is actually granted by the receiving office is a measure of effectiveness of the innovation process. Yet, even granted patents are sometimes lapsed by the assignees when the benefits deriving from the exclusive right ownership are valued lower that the costs for maintain it: therefore, the payment of renewal fees is a direct measure of the value that the owner of the patent directly attributes to it (Squicciarini et al., 2013; Svensson, 2012).

Even if *ex-post* indicators are capable to provide information on the actual success of the patent, their definition is possible only years after the publication and decision makers are not able to directly modulate them during the innovation process. For this reason, finding statistically significant relationships between such indicators and *ex-ante* measures can provide a guide to managers and decision makers concerning *ex-ante* measures to focus on in order to obtain adequate *ex-post* indicators.

Methodology

Data and sample

The research is performed on patents filed by R&D-intense IT hardware companies from 2000 to 2009 and thereafter granted. The industry was selected since intellectual property plays a central role in this sector: patents are a means of appropriation of innovation (Pavitt, 1984) and can be employed to study innovation practices (Cammarano et al., 2017b). The choice of the years of analysis depends on the need for evaluating *ex-post* patent quality indicators, with 2009 being the latest period for which information is available in the PATSTAT version available for the authors. The firms were selected from *The EU Industrial R&D Investment Scoreboard*, which annually reports the ranking of the worldwide top R&D spending companies. In particular, only those repeatedly included in five subsequent scoreboards were considered, in order to include the firms showing a continuous commitment to innovation.

A total of 1,705 patents applied by 60 companies is found.

Variable definition

Consistently with literature, the following *ex-ante* indicators are included in the work:

- **scope**, defined as the number of claims reported in the application;
- **breadth**, defined as the number of international patent classification (IPC) codes within the patent;
- **originality**, a dummy variable assuming a value of 1 if no patent backward citations is reported in the application, 0 otherwise;
- **scientific value**, calculated as the number of NPL backward citations reported in the application;

- **architectural capability**, a dummy variable assuming a value of 1 if the combination of IPC codes reported in the application is new-to-the-world, 0 otherwise.

Similarly, *ex-post* measures are defined as:

- **technological value**, defined as the number of external forward citations received five years after publication (i.e. self-citations are excluded);
- **market value**, defined as the number of family patents, i.e., the number of patents applied within 5 years from application defining the focal patent as a priority;
- **internal value**, a dummy variable assuming a value of 1 if renewal fees are paid eight years after publications, 0 otherwise.

Statistical analyses

Firstly, in order to find relationships between *ex-ante* and *ex-post* quality measures, Pearson's correlations are performed. Thereafter, regressions of *ex-post* indicators using *ex-ante* ones as predictors are used to find linear dependency relations.

Moreover, by performing Ward cluster analysis using *ex-post* indicators as clustering variables, different clusters of patents are found characterized by different values of such metrics: a one-way ANOVA is therefore performed to find whether significant differences are found among the clusters also as to *ex-ante* indicators.

Finally, principal component analysis is performed to find the latent concepts behind the different performance indicators, trying to summarize the information they contain and finding redundancy among the metrics, i.e. whether different indicators measure similar concepts.

Results

In Table 1 means and correlation coefficients are reported for the variables under investigation.

Technological value is positively associated to breadth and negatively related to originality: patents receiving higher technological acknowledgment are those with a wider knowledge base, but also those relying on an already strong prior art. Indeed, original patents, i.e. patents that do not cite previous patented technologies, may be related to newer and more risky technologies that can turn into failures.

Market value is positively related to breadth and architectural capability and negatively associated to scope: a wider base of knowledge together with the original combination of knowledge areas turn into technologies that can be usefully employed in different contexts, generating future generations of patents from the focal one. On the other side, if a patent is already defined with a wide scope, i.e. if many different claims are reported, the recourse to a wide patent family is not necessary, being the focal patent a multi-purpose technology.

Internal value is positively associated to patent scope and negatively related to originality and scientific value: multi-purpose technologies are highly valued by their owners, as many applications and products can be derived from them. On the other side, the riskiness associated to radical new, science-based technologies makes patents less appealing for companies, especially when short-term results are pursued.

Table 1: descriptive statistics and correlation coefficients

	mean	1.	2.	3.	4.	5.	6.	7.	8.
1. scope	1.32	1							
2. breadth	2.55	-.044	1						
3. originality	0.03	.000	-.013	1					
4. scientific value	0.49	.222**	-.023	.146**	1				
5. architectural cap.	0.55	-.101**	.550**	-.086**	.003	1			
6. technological v.	10.57	-.038	.083**	-.049*	-.022	.034	1		
7. market value	1.93	-.090**	.145**	.004	.028	.158**	.171**	1	
8. internal value	2.33	.187**	-.039	-.165**	-.139**	-.027	.126**	-.107**	1
* correlation is significant at .05 level; ** correlation is significant at .01 level									

Table 2 shows regression results using the three *ex-post* indicators as dependent variables and all ex-ante metrics together with control variables as predictors. Regression results confirm those deriving from correlation analysis, leading to the following equations:

$$technological\ value = 13{,}723 + 3{,}276\ breadth - 2.012\ originality + \varepsilon_1$$

$$market\ value = 13{,}377 - 3{,}507\ scope + 3{,}007\ breadth + 3{,}558\ architectural\ capability + \varepsilon_2$$

$$internal\ value = 25{,}092 + 9{,}361\ scope - 5{,}941\ originality - 7{,}050\ scientific\ value + \varepsilon_3$$

Table 2: linear regression of *ex-post* measures using *ex-ante* indicators as predictors

dependent variable:	**technological value**			**market value**			**internal value**		
model summary:	*adj-R^2*	*F*	*sig.*	*adj-R^2*	*F*	*sig.*	*adj-R^2*	*F*	*sig.*
	,008	3,730	,002	,035	13,331	,000	,087	33,549	,000
predictors:	*b*	*t*	*sig.*	*b*	*t*	*sig.*	*b*	*t*	*sig.*
constant	9,177	13,723	,000	1,391	13,377	,000	2,482	25,092	,000
scope	-,110	-1,432	,152	-,042	-3,507	,000	,106	9,361	,000
breadth	,824	3,276	,001	,118	3,007	,003	-,051	-1,361	,174
originality	-4,315	-2,012	,044	,088	,262	,793	-1,885	-5,941	,000
scientific value	-,050	-,202	,840	,075	1,952	,051	-,258	-7,050	,000
architectural capability	-,756	-,899	,369	,465	3,558	,000	,021	,169	,866

In Table 3 the results of cluster analysis performed using *ex-post* quality indicators as clustering variables are shown, together with one-way ANOVA significance.

Cluster 1 is characterized by the highest internal value, whereas technological value is on average with that of the sample and market value is very low: for this cluster only scope among *ex-ante* indicators is significantly higher than the average value of the sample, confirming the fact that patents considered a good investment for companies are those featured by many claims and representing multi-purpose technologies.

Cluster 2 is characterized by average market values slightly higher than those of the whole sample, while the other two *ex-post* metrics are below average. These patents have higher values of originality and scientific value, i.e. these are the riskiest technologies. If such riskiness turns into failure in most cases, when this does not happen a market development of the new technology can be observed.

Cluster 3 is featured by higher values of all three *ex-post* indicators if compared to the total sample: such highly valuable patents are characterized by a wider knowledge base and the original combination of technological domains. Including different technological areas into the new technology and combining them in a new-to-world way results in high quality patents.

In Table 4 the results of principal component analysis are shown as to the first four factors, whose eigenvalue is greater than or equal to 1. Moreover, the graphical representation of the quality metrics in the first factorial plane is reported in Figure 1.

The first factor is highly associated to breadth and architectural capability (*ex-ante*) and technological and market value (*ex-post*): combining many different knowledge domains within a single patented technology in a novel way is confirmed as the most significant strategy to pursue high technological and market value.

The second factor is positively associated to originality and scientific value (*ex-ante*), but negatively to internal value (*ex-post*), confirming that the high risk associated to new-to-the-world technologies relying on a complex scientific base often turns into patents that are lapsed by the owner after some years.

Table 3: cluster analysis and one-way ANOVA using *ex-post* indicators as clustering variables

	cluster 1	cluster 2	cluster 3	total sample	variance within/between	F	sig.
N	*781*	*762*	*162*	*1,705*			
scope	2.02	0.90	0.00	1.32	0.054	19	0.000
breadth	2.40	2.61	2.96	2.55	0.112	9	0.000
originality	0.00	0.06	0.01	0.03	0.038	26	0.000
scientific value	0.29	0.77	0.12	0.49	0.036	27	0.000
architectural capability	0.52	0.56	0.66	0.55	0.162	6	0.002
technological value	11.03	8.39	18.62	10.57	0.028	36	0.000
market value	0.81	2.22	5.99	1.93	0.002	640	0.000
internal value	4.25	0.00	4.00	2.33	0.000	7,580	0.000

Table 4: principal component analysis of patent quality indicators

component	1	2	3	4
total explained variance	1.699	1.342	1.206	1.086
% explained variance	21%	17%	15%	14%
cumulative %	21%	38%	53%	67%
scope	-.311	-.038	.798	-.032
breadth	.794	.032	.241	-.245
originality	-.119	.627	-.008	.129
scientific value	-.109	.565	.572	.147
architectural capability	.806	.009	.200	-.296
technological value	.251	-.302	.104	.747
market value	.464	.153	-.046	.583
internal value	-.135	-.716	.361	.026

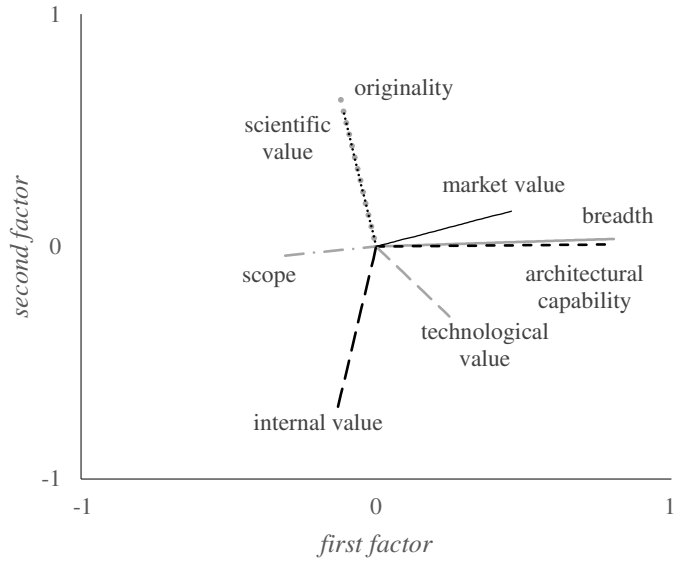

Figure 1: positioning of quality indicators in the first factorial plane

Conclusions

The work provides suggestions on the relationships among *ex-ante* and *ex-post* indicators of innovation performance, the former being immediately available but providing information only on the potential value of the patented technology, the latter being capable of defining its actual value but requiring a long period of time to be calculated. In this way the paper contributes to knowledge advancement in innovation management, providing useful insights to decision makers on what leverages operate *ex-ante* in order to obtain high *ex-post* performances.
Relying on patent data - which are standardized, publicly available and verified by independent third parties - yields objectivity to the work, but also limits it only to the technological dimension of innovation. For this reason, future

developments will be addressed towards the inclusion of non-patent indicators of innovation success, such as percentage of revenues deriving from new products, in order to verify the existence of relationships between innovation outputs and financial outcomes.

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Cost of Quality Calculation in An Innovative Strategic Industry: Evidence from The EU Defence Sector

Jolanta DYBEK
Warsaw University of Technology, Warsaw, Poland, jolanta.dybek.dokt@pw.edu.pl

Wojciech SADKOWSKI
Jagiellonian University, Cracow, Poland, wojciech.sadkowski@uj.edu.pl

Anna SŁAWIK
Jagiellonian University, Cracow, Poland, anna.slawik@uj.edu.pl

Abstract
The research aims to test an original cost of quality (CoQ) calculation in an innovative organisation operating in the European defence industry. Our methodology embraces the identification, classification and estimation of CoQ – based on business process mapping and accounting data exploration – as well as a structure and ratio analysis thereof. The main findings show that CoQ constitutes over 39% of operating costs of the company which is the subject of our study, and they are present in nearly all business processes. We find a very high share of compliance costs (>84% of total CoQ), and only a minor percentage of non-compliance costs (<8%), which is a positive phenomenon. The processes that generate most CoQ are the design and development process and the maintenance process. The presented ready-to-use tool allows for the measurement and management of CoQ, and can contribute to controlling and value-based management solutions. Being the first such case study in the high-tech defence industry, our research paper not only fills the gap in academic literature, but has valuable implications for practitioners as well.

Keywords: Cost of Quality, Cost Calculation, Defence Industry, Innovative Organisations, Management Accounting.

Cost of quality and its calculation

Cost of quality (CoQ) is a term defined by Juran (1951) and means an instrument for measuring quality. New definitions of the term have appeared in secondary sources in the years since. Feigenbaum (1961) – the quality guru – believes that these are costs related to pro-quality activities such as prevention, assessment, control testing, and debugging, whereas Groocock (1974) argues that these are costs incurred for defective production and those that would not have occurred without quality assurance activities.

Crosby (1979) points out that quality does not cost anything, but what is costly is the lack of it – that is, doing the work improperly the first time. Oyrzanowski (1984) defines quality costs from the resource-oriented point of view – as outlays on: obtaining a certain level of quality, analysing costs, and carrying out activities aimed at minimising them, whereas Horngren et al. (1997) define them as costs aimed at preventing low quality and those which result from insufficient quality. Bland et al. (1998), on the other hand, define them as costs that constitute the difference between the actual production cost and the cost that would have arisen if there had been no system failures or employee error. Their definition suggests looking at quality costs in terms of opportunity costs.

Zymonik (2003), in turn, presents a marketing orientation by defining quality costs as the consumption of resources needed to generate value for the customer – expressed in monetary units – that the customer is able to accept. For Wood (2007), CoQ is a cost related to the achievement as well as the lack of the desired level of quality of services and products. From an accounting point of view, CoQ is the sum of all compliance and non-compliance costs, where compliance costs are those incurred for the prevention of poor quality and non-compliance costs are those resulting from a lack of appropriate quality of products and services, Mukherjee (2019).

CoQ forms the basis of the CoQ calculation, which is used to measure, record, monitor, analyse, interpret and manage them, Malik et al. (2016). The aims of that calculation are indicated, among others, by Toruński (2012): assessment of management system efficiency, creation of a basis for quality improvement programmes, the identification of key areas and processes that require improvement, and an increase in goodwill. In addition, the CoQ calculation is used to measure the efficiency of an organisation and also helps to increase profitability and competitiveness, Jafari and Rodchua (2014), Malik et al. (2016).

The CoQ calculation models developed mostly apply to enterprises in the industrial sector; examples of these are studies from the wood, metallurgical, machinery, furniture, automotive and food industries, Harrington (1987), Pole (2003), Chopra and Garg (2012), Malik et al. (2016), Teli et al. (2018), Pristavka and Koloman (2018). These models most often include assumptions, the structure of CoQ, and sources of information on CoQ, as well as bodies responsible for the calculation of CoQ, Sadkowski (2019a). However, to the best of our knowledge, there are no scientific studies that would test the calculation of CoQ in the defence industry. This study therefore contributes to filling this research gap.

It should be stressed that CoQ calculation is a management accounting tool, which means that there are no legal norms that would oblige enterprises to implement it in their accounting systems, nor are there any regulations that shape it. The optional nature of its application means that only a few organisations have decided to implement it. On the other hand, the discretion of its structure provides an opportunity to create original and innovative tools.

The awareness of the existence of CoQ is confirmed by almost every entrepreneur; however, most of them do not want to expose themselves to additional costs and labour outlays related to keeping an account of these costs. This is surprising because, by doing so, organisations deprive themselves of a number of possible benefits, such as gaining a competitive advantage, improving the quality of services and products offered, or increasing the efficiency of processes. The economic balance associated with the implementation of the CoQ calculation clearly shows that the sum of potential benefits far exceeds the costs of its implementation, Jafari and Rodchua (2014), Murumkar et al. (2018), Elsharif (2019).

The role of CoQ and its measurement in innovative organisations

The efficient management of costs and the processes that generate them has a critical impact on the achievement of an enterprise's goals. One of the most important systems in an organisation in particular – a management system that controls processes and the activities that create them – requires the supply of information on costs, to be collected in accounting and controlling subsystems. In innovative enterprises, information on CoQ is all the more important, as these types of costs are generated in almost all business processes of those entities.

The processes of enterprises (especially innovative ones) should therefore be systematically measured on the basis of established efficiency measures. The ISO 9000:2015 standard "Quality management systems – Fundamentals and vocabulary" stresses that the measure of process efficiency is expressed by the degree to which the quality goals they contain (which must be measurable) are achieved, ISO (2015).

CoQ, which is the main element of CoQ calculation, make it possible to assess the degree of achievement of quality goals, Sadkowski (2015). Measuring these costs in innovative enterprises, such as those operating in the high technology sector, is a significant challenge for managers because the costs in question can be hidden in all processes operating in those entities, Yang (2008), Murumkar et al. (2017).

Mukherjee (2019) points out that it is CoQ analysis that determines the assessment of process efficiency. Reliably conducted, it allows one to: determine the amount and structure of CoQ, determine the dynamics of its changes in the studied periods, identify the places where it arises, take corrective actions, optimise costs, increase the efficiency of management systems, and improve the quality of processes as well as products and services provided to customers, Sadkowski (2019b).

In summary, CoQ calculation is a very important tool which supports effective management in innovative enterprises. Its skilful use supports the achievement of competitive advantage, increases the effectiveness and efficiency of processes, and improves the quality of products and services offered, Jafari and Rodchua (2014), Murumkar et al. (2018).

CoQ calculation in an innovative organisation – a case study from the EU defence industry

Subject and context of the research

Aerospace and defence [1] is a high-tech industry that has become a critical part of the global infrastructure, economic growth, international trade, and globalisation, and plays a vital role in national security, Briones-Peñalver et al. (2020). The defence sector itself is actually part of the latter – a larger structure in the security sector of a nation, Chuter (2011). This is why it is directly affected by national security policy and indirectly affected by invisible pressure from social-economic policies and the development of information technology, Wang et al. (2018). From the perspective of the population as a whole, the security sector is the foundation of the state's stability – hence security in daily life

is a precondition for economic and political development and a well-functioning security sector is therefore fundamental to a country's success, Chuter (2011).

At regional level, the defence industry is important to the competitiveness of EU industry as a whole because of factors related to technological and economic policy. After all, the main goals of the European Union's industrial policy include: support for scientific and technical progress, which determines the competitiveness of Community products; support for the development of so-called strategic industries, that is, those which ensure the share of production of new generations of products based on modern technologies on global markets (which are important for defence) as well as prestigious industries such as information technology, biotechnologies, space research and technology, the aerospace industry, and nuclear energy. The competitiveness of the European defence industry is also crucial to the credibility of the Common Security and Defence Policy, Defence Industry (2020). Figures demonstrate that this is an important sector for the economies and societies of the EU Member States – with a turnover of EUR 97.3 billion for 2014, directly employing 500,000 people, and creating 1.2 million indirect jobs, Defence Industry (2020).

The European defence sector is currently facing challenges such as market fragmentation and falling defence spending, Defence Industry (2020). Like other industries, it needs to move towards increasing efficiency in order to provide the best value for money to its customers while protecting the interests of its shareholders. Hence, inasmuch as is the case with enterprises operating in other industries, efficient management, including cost optimisation – especially in critical organisational processes such as quality assurance – is crucial here. Efforts to monitor quality management systems and to ensure product quality are enormous in the defence industry, Thomas (2006). This is due to technological sophistication, the rigours of stringent practices, and control within the supply chain, which all serve to create a significant challenge to quality assurance functions in general, Thomas (2006).

In many respects, the defence sector is a peculiar market that differs substantially from many other industries of the economy, Castellacci & Fevolden (2015). First, defence companies are heterogeneous and produce in several different industry segments, Hall et al. (2010). Second, they invest heavily in R&D and innovation, but the lag between input and output of the innovative process is often very long, González & López (2013). Third, the industry is heavily regulated and protected, and public instruments such as R&D procurement and offset agreements are commonly used to support national interest and domestic firms, Guay & Callum (2002).

The enterprise which is the subject of this study competes in the defence sector and is part of a corporation operating in one of the EU Member States which brings together several dozen industrial plants and research centres of key importance to the national defence industry. It is one of the largest defence solutions providers in Europe. The company's core business is the creation, production and sales of optoelectronic products for the military and, to a limited extent, for the civilian market. It is a large enterprise [2], which is in fact a research and production centre, where all products created and sold are the result of the work of the corporation's own research and development facilities.

Optoelectronics, and more broadly photonic techniques, have been identified as key technologies for the development of many fields of technology, PPTF (2015). The 21st century is expected to be the century of "light". Photonics [3] is currently one of the fastest growing fields of science, and – as a high-tech industry – it is characterised by a high degree of globalisation and rapid diffusion of innovation, www1 (2018).

The analysed enterprise is a highly innovative organisation from a technological point of view, and this is what it builds its competitive advantage on. Technological innovation is a crucial competitive strategy for companies in the defence industry, and public policies that support R&D investments and close cooperation between private firms and public science and technology organisations play a particularly relevant role in this sector, Castellacci & Fevolden (2015). The managers of the enterprise are aware of that, as evidenced, for example, by its organisational structure, human resources management policy, and its relational capital. The company has its own R&D and innovation department, which introduces innovative projects to the company, obtains external funding (both domestic and foreign), and is fully responsible for the overall management of projects commissioned to the company as part of competitions. Approximately 40% of the company's employees carry out tasks in the field of R&D. The company has won numerous competitions within the framework of programmes supporting innovation related to the development of modern technologies, obtaining funding for projects in the field of scientific research or development work for the benefit of national defence and security. Most of these projects are carried out in consortia, consisting of units of the arms industry, universities (mainly technical) and private entities.

The result of extensive cooperation between the enterprise and the academic community is, among other things, the research presented in this article in the area of CoQ and its calculation. It shows that the company not only engages

its resources in product and technological innovations (which is obvious in this industry), but is also open to organisational and management innovations.

The selected enterprise is a case study which is representative of innovative organisations for research into CoQ for at least three reasons: (1) it is an enterprise operating in the high technology sector, which requires numerous product and technological innovations that must be driven by above-average quality; (2) it operates in a strategic industry from the point of view of national defence and, as such, must meet the highest quality standards in order to deliver the expected value for the customer; and (3) it has quality assurance systems (such as the ISO-certified quality management system), suitable organisational structures and competent human resources in the area of quality. For the above reasons, CoQ should be present in almost every process of the enterprise's operations, thus constituting an important component of its economic balance. That balance, on the other hand, is both a result and a factor determining the company's competitive position. As a participant in the international market, the company competes with foreign companies, which often have a decisive advantage in terms of financing (national defence sectors are usually financed by a fixed percentage of a given country's GDP), have a wider market and have greater opportunities for lobbying at the international level. The challenge of Industry 4.0 must be added to these market conditions (as well as the announced Industry 5.0), which poses not only a qualitative challenge, but – above all – a financial/investment (cost) challenge.

Industry 4.0 is seen to represent the transformation of organisations to digitalise their entire manufacturing process and its environment. It is anticipated that advancements in Industry 4.0 will lead to dramatic improvements in the flexibility, efficiency and automation of manufacturing, Bibby & Dehe (2018). They are welcomed by manufacturing organisations who are continually aiming to "eliminate unnecessary production costs; improve manufacturing process and business performance; increase throughput; reduce cycle times and maintain quality" in order to operate in changing manufacturing environments, Cottyn et al. (2011, p. 4397).

Therefore, quality management together with cost management (understood as cost optimisation while maximising the value for the customer) may constitute an important source of competitive advantage for enterprises operating in the European defence sector, an example of which is the company which is the subject of this study.

Research Methodology

Estimating CoQ is a process that requires the following assumptions. The studied enterprise must have a quality management system confirmed by an ISO certificate, maintain comprehensive bookkeeping, and provide access to its sensitive data (i.e. quality book, process map, unpublished financial data, and data from the accounting system). Full cooperation between the studied entity and the person(s) responsible for the implementation of the CoQ calculation is necessary. CoQ arises in processes implemented by innovative enterprises. The adopted cost categories include prevention costs, appraisal costs, internal failure costs, external failure costs, and other CoQ. Prevention costs are the costs related to providing the conditions for meeting quality requirements in the implemented production and service processes (e.g. costs of employee training). Appraisal costs are costs incurred to ensure that the requirements in the processes are met (e.g. audit costs). The costs related to irregularities that occurred before the product was delivered to the customer are the costs of internal failure (e.g. the cost of a defective product), and those detected after the product was delivered to the customer are the costs of external failure (e.g. warranty repairs). Other costs of quality include costs that cannot be assigned to compliance costs (the cost of prevention and appraisal) and non-compliance costs (the costs of failure), e.g. the cost of environmental fees.

The first stage of estimating CoQ is related to the analysis of a map of processes of the studied enterprise. On the basis of the analysis, it will be possible to indicate a potential CoQ that is hidden in the processes under way, and to place them in the identification form presented in Table 1. At this stage, consulting the Quality Management Systems Officer, as well as the accounting department, is recommended.

Table 1: Cost of quality estimation form

Name of the process	Name of the cost	CoQ category	The amount of the cost	Source document	Additional information
process No. 1	Cost No. 1				
	Cost No. 2				
	Cost No. n				
process No. 2	Cost No. 1				
	Cost No. 2				
	Cost No. n				
process No. n	Cost No. 1				
	Cost No. 2				
	Cost No. n				

Note: own elaboration.

The CoQ items identified require actions related to estimating their amount, assigning them to an appropriate cost category, and indicating the source document. Therefore, cooperation with the accounting department of the studied entity is of vital importance. Significant remarks concerning the calculation of the costs in question should be included in the "Additional information" column. The CoQ estimation form prepared in this way constitutes the basis for the implementation of subsequent stages.

The second stage consists of preparing a CoQ matrix and ordering the CoQ identified in a model of their structure. At this point, it is necessary to use the financial data on CoQ drawn from the CoQ estimation form. The CoQ matrix should contain aggregated CoQ for the entire period under consideration. The matrix form is presented in Table 2.

Table 2: Matrix of cost of quality

CoQ	Basic (operational) processes	Management (strategic) processes	Auxiliary processes	Total	CoQ structure analysis
Prevention costs					
Appraisal costs					
Costs of internal failures					
Costs of external failures					
Other CoQ					
Total					
Analysis of the structure of processes generating CoQ					

Note: own elaboration.

The CoQ matrix is a source of information about the amount of costs incurred, their structure, as well as the share of those costs in individual processes of the enterprise: fundamental, management and auxiliary. The information obtained will allow for the identification of the areas of activity that generate the highest CoQ and require optimisation actions.

The last stage of the research consists of carrying out a ratio analysis of CoQ, consisting of 13 measures. They have been collected in Table 3.

Table 3: Ratio analysis of cost of quality

No.	Name of the indicator	Formula
1	Indicator of the share of CoQ in total costs	W_{QC1} = (CoQ/Total costs)*100%
2	Indicator of the share of compliance costs in CoQ	W_{QC2} = [(Prevention costs + Assessment costs) / CoQ]*100%
3	Indicator of the share of non-compliance costs in CoQ	W_{QC3} = [(Costs of internal errors + Costs of external errors) / CoQ]*100%
4	Indicator of the share of prevention costs in CoQ	W_{QC4} = (Prevention costs / CoQ)*100%
5	Indicator of the share of assessment costs in CoQ	W_{QC5} = (Assessment costs / CoQ)*100%
6	Indicator of the share of costs of internal errors in CoQ	W_{QC6} = (Costs of internal errors / CoQ)*100%
7	Indicator of the share of costs of external errors in CoQ	W_{QC7} = (Costs of external errors / CoQ)*100%
8	Indicator of the share of other CoQ in CoQ	W_{QC8} = (Other CoQ / CoQ)*100%
9	Indicator of the share of the number of non-compliance cases in CoQ	W_{QC9} = (Number of non-compliance cases / CoQ)*100%
10	Indicator of the share of CoQ in sales revenue	W_{QC10} = (CoQ/Sales revenue)*100%
11	Indicator of the share of CoQ in net profit	W_{QC11} = (CoQ/Net profit)*100%
12	Indicator of the share of non-compliance costs in net profit	W_{QC12} = [(Costs of internal errors + Costs of external errors) / Net profit]*100%
13	Indicator of the share of CoQ in operating costs	W_{QC13} = (CoQ/Operating costs)*100%

Note: own elaboration.

The result of the ratio analysis of CoQ will be information on the percentage share of particular quality cost categories in the total costs, as well as the relationship between CoQ and particular items of the profit and loss account, i.e. sales revenue, operating costs and net profit. Determining the right conclusions will allow for conducting activities aimed at optimising costs and processes.

The assumptions for the CoQ estimation procedure and CoQ calculation, as presented here, have been used in an attempt to apply them to the defence industry enterprise operating on the territory of the European Union which is the subject of this study, which has made its proprietary data available for research purposes. The results obtained have been collected in the next part of the article.

Results

The identified quality cost items of the studied enterprise have been consulted with the accounting and controlling departments. As a result of this work, a CoQ estimation form has been created and used to prepare the CoQ matrix for 2019 presented in Table 4.

Table 4: Matrix of cost of quality of the organisation for 2019

CoQ [in EUR]	Basic (operational) processes	Management (strategic) processes	Auxiliary processes	Total	The share of CoQ categories in the structure of CoQ [%]
Prevention costs	4,152,979.22	628,634.54	4,857,675.51	9,639,289.27	52.00%
Appraisal costs	2,601,875.26	435,532.45	2,908,925.50	5,946,333.22	32.08%
Costs of internal failures	-	-	160,436.86	160,436.86	0.87%
Costs of external failures	1,021,688.70	-	281,031.62	1,302,720.32	7.03%
Other CoQ	-	1,020,831.75	467,910.84	1,488,742.58	8.03%
Total	7,776,543.18	2,084,998.73	8,675,980.32	18,537,522.24	100.00%

The share of processes in the structure of CoQ [%]	41.95%	11.25%	46.80%	100.00%	x

Note: own elaboration.

The estimated CoQ for 2019 in the enterprise amounted to EUR 18,537,522.24. The largest categories therein are prevention costs (52%) and appraisal costs (32.08%). The share of other categories was as follows: other CoQ 8.03%, costs of external failures 7.03%, costs of internal failures 0.87%.

In order to obtain the full picture of CoQ, in particular the processes of the organisation, the authors have prepared an extension of the CoQ matrix, which is presented in Table 5.

Table 5: Extended matrix of cost of quality of the organisation for 2019

CoQ [in EUR]	**Basic (operational) processes**				**Management (strategic) processes**		
	Commercial process	**Design and development process**	**Business development process**	**Production process**	**Management process**	**Quality management process**	**Economic and financial process**
Prevention costs	1,551,103.95	2,237,636.00	242,174.91	122,064.36	187,205.38	191,997.17	249,431.99
Appraisal costs	-	2,237,636.00	242,174.91	122,064.36	55,677.43	-	379,855.02
Costs of internal failures	-	-	-	-	-	-	-
Costs of external failures	-	-	-	1,021,688.70	-	-	-
Other CoQ	-	-	-	-	1,020,831.75	-	-
Total	1,551,103.95	4,475,272.00	484,349.82	1,265,817.41	1,263,714.56	191,997.17	629,287.01
The share of processes in the structure of CoQ [%]	8.37%	24.14%	2.61%	6.83%	6.82%	1.04%	3.39%
CoQ [in EUR]	**Auxiliary processes**						
	Logistics process	**Personnel management process**	**Maintenance process**	**Internal control system process**	**Quality control process**	**Environmental management process**	**IT systems management process**
Prevention costs	-	244,538.39	4,280,445.89	-	-	-	281,031.62
Appraisal costs	807,599.46	160,436.86	655,824.45	85,046.42	1,200,018.32	-	-
Costs of internal failures	-	160,436.86	-	-	-	-	-
Costs of external failures	-	-	-	-	-	-	281,031.62
Other CoQ	-	454,003.85	-	-	-	13,906.99	-
Total	807,599.46	1,019,415.95	4,936,270.34	85,046.42	1,200,018.32	13,906.99	562,063.23

The share of processes in the structure of CoQ [%]	4.36%	5.50%	26.63%	0.46%	6.47%	0.08%	3.03%

Note: own elaboration.

The processes most burdened with CoQ in the organisation are auxiliary processes – 46.80% (in which maintenance costs dominate, constituting 26.63% of all CoQ) and basic processes – 41.95% (the vast majority concerning the design and development process, constituting 24.14% of CoQ). Only 11.25% of quality-related costs arise in strategic processes, mainly in the management process (6.82%).

The data obtained in the CoQ matrix, as well as information from the financial statements of the enterprise, were the basis for the ratio analysis, the results of which have been collected in Table 6.

Table 6: Ratio analysis of cost of quality of the organisation for 2019

Indicator	Value of the indicator
Indicator of the share of CoQ in total costs	36.79%
Indicator of the share of compliance costs in CoQ	84.08%
Indicator of the share of non-compliance costs in CoQ	7.89%
Indicator of the share of prevention costs in CoQ	52.00%
Indicator of the share of appraisal costs in CoQ	32.08%
Indicator of the share of costs of internal failures in CoQ	0.87%
Indicator of the share of costs of external failures in CoQ	7.03%
Indicator of the share of other CoQ in CoQ	8.03%
Indicator of the share of the number of non-compliance cases in CoQ	0.0004%
Indicator of the share of CoQ in sales revenue	32.38%
Indicator of the share of CoQ in net profit	287.16%
Indicator of the share of non-compliance costs in net profit	22.67%
Indicator of the share of CoQ in operating costs	39.15%

Note: own elaboration.

The most important findings from the ratio analysis of CoQ of the studied defence industry organisation include:

- at least 1/3 of all costs of the studied enterprise are related to quality,
- a very high share (84.08%) of compliance costs in the CoQ structure,
- the small share of non-compliance costs (7.89%) in total CoQ,
- the negligible impact of errors on quality-related costs (0.0004%),
- CoQ have a significant impact on the operational activities of the organisation and its financial performance.

In summary, the high level of involvement in prevention and assessment activities visible in the calculated indicators is a desirable phenomenon and reflects very well on the cost and quality strategy implemented by the enterprise. The

above is also confirmed by the low indicators related to non-compliance cases.

Conclusions and Recommendations

The implementation of the CoQ calculation in the selected defence industry enterprise has made it possible to sort out the problem of costs related to quality in that entity – to highlight their scale and structure, to identify priority areas for the management of this cost group, and perhaps to define new tasks for controlling.

The results of the research confirmed the critical importance of CoQ in innovative enterprises. On the other hand, the implementation of the CoQ calculation developed in the high-tech industry (photonics), in the European defence sector – to the best of our knowledge – is the first scientific examination of its kind, which offers a valuable contribution to scholarship as well as business practice.

As for the latter, the authors recommend that the organisation should take measures aimed at optimising its fundamental and auxiliary processes, in particular the design and development process and the maintenance process, which are the largest sources of CoQ. Moreover, maintaining a high level of prevention and appraisal costs, which effectively prevent the occurrence of non-compliance cases, is recommended. In the case of enterprises marked by a high percentage of CoQ (as is the case with the studied entity) and such diverse types of costs present in various business processes, we strongly recommend that the organisation use IT programmes based on artificial intelligence to identify the CoQ, which will allow the process to be automated, Sadkowski (2020).

Referring to the current economic circumstances, the pandemic-induced crisis seems to have created suitable conditions for the implementation of QC innovations due to the general pursuit of savings and cost optimisation. Our CoQ calculation is such an innovation. An additional justification for its implementation in the studied organisation is the fact that photonic enterprises operate in international markets, while being strongly embedded in global value chains, www1 (2018). This strong dependence of the enterprise's activities on other participants of the supply chain, who are already reporting operational problems (problems with timely delivery), seems to imply a need to take proactive action in logistics and quality control processes in order to ensure business continuity.

CoQ calculation is an innovative tool for measuring CoQ in the processes of high-tech enterprises operating in the defence industry. The skilful use of this tool will allow for the optimisation of the level of these costs and an increase in value for the organisation's stakeholders.

Endnotes

[1] According to Global Industry Classification Standard (GICS). Aerospace & Defence industry comprises manufacturers of civil or military aerospace and defence equipment, parts or products; it includes defence electronics and space equipment, https://www.msci.com/gics.

[2] Net revenue from sales – EUR 57.25 million; ROE – 7.4%; ROA – 5.5%; ROS – 11%; employment – 630 FTE as for 2019.

[3] Optoelectronic devices are introduced to various fields of science and economy as measuring or execution equipment: from geology to agriculture, to medicine, to power generation, to transport, to manufacturing systems, and – more recently – to the entertainment industry

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Beneficiaries' Expectations and Return on Pension Fund Investment in Nigeria

Babatunde A. AGBEYANGI
Department of Accounting,
College of Management and Social Sciences,
Covenant University Ota, Nigeria.
baagassociates@yahoo.com

Rafiu O. SALAWU
Department of Management and Accounting,
Obafemi Awolowo University, Ile-Ife, Nigeria.
osalawu02@yahoo.co.uk

Samuel A. FAKILE
Department of Accounting,
Landmark University Omu-aran, Nigeria.
samuel.fakile@covenantuniversity.edu.ng

Olubukola UWUIGBE
Department of Accounting
College of Management and Social Sciences,
Covenant University Ota, Nigeria.
bukola.uwuigbe@covenantuniversity.edu.ng

Abstract

The study examines beneficiaries' expectation in relation to returns generated from pension fund investment in Nigeria. This study investigates the perceptions of contributors of pension fund from the various investments by Pension fund administrators (PFA). The study adopted survey design method using questionnaire to establish the expectations of pension fund beneficiaries on the returns generated on their contributions. The population of the study consists of active pension contributors, retirees of Federal and State Polytechnics in the South-Western state of Nigeria, PFAs and Pension Fund Custodians staff respectively totaling 13,528. Sample size of 389 was drawn using Taro Yamane method of sample size selection technique on margin of error of 5%, where 98.7% of the entire research instrument was returned. Data collected were analyzed using both descriptive and inferential statistics. The descriptive statistics consists of mean and standard deviation while Kruskal Wallis test, a non-parametric test for mean difference in response approach was used to infer. The study concluded that expectations vary from beneficiary to beneficiary but, with general expectation of reasonable returns on investment of their contributions by pension fund managers. The study therefore, recommend that pension managers should, as a matter of diligence, invest pension funds into portfolio that will make for stable value of pension for contributors at retirement.

Keywords: Beneficiaries' expectation, Pension fund investment, Pension fund administrators, Return on investment.

Introduction

The goal of any efficient pension scheme is to provide succor to retirees at old age. In the case of Nigeria, the new Contributory Pension Scheme (CPS) was established to give retirees a good lease of life after their productive years. S. 86 of Pension Reform Act (PRA) 2014 expressed unequivocally the need to invest pension contributors' fund so as to provide pensioners with pension that will sustain them at pension age. Before now, Nigeria pension system adopted defined benefit plan (DB) until 2007 whereby government employees in the Federal, State and Local government levels were paid a lump sum gratuity and regular monthly pension payment to retired employees in the

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public sector. The private sector employers and employees put contributions in the National Social Insurance Trust Fund (NSITF). Lump sum pension payments were then given to retired employees. From 2004, after the enactment of Pension Reform Act (PRA) 2004, Contributory Pension Scheme was established. The scheme is a fully funded, defined contribution (DC), privately managed and based on individual accounts known as Retirement Savings account (Stewart & Yermo, 2009).

The expectation of pension fund contributors is sacrosanct. They anticipate receipt of their pension as at when due at retirement. They also expect that the value of their pension will also be enhanced by returns generated from the investment of their contributions while they are still in service. Despite generally positive findings linking pension system development and economic growth, there have also been plenty of disappointments. In too many countries, pension fund investments remain highly concentrated in bank deposits and traditional government bonds, contributing little long-term funding for development – as well as delivering disappointing investment returns and therefore pensions (Morales, Fuentes, Searle & Stewart, 2017).

The Act also encourages the contributors to add voluntary savings to the mandatory 8% contribution by them and 10% by their employers (PRA 2014, S. 4(1). To make this happen, the Act stipulated that the funds should not lie fallow in the hands of the administrators to make the expectations of pension contributors achievable. The funds' administrators are mandated by the Act to invest in specified investment outlets (PRA 2014, S. 86 – 90). Such investment is expected to generate further income for the contributors and recorded in their retirement savings account (RSA) and regular information on returns from these investment sent to the contributors every quarter.

Managing and administering pension funds have continued to pose a major challenge to the government of Nigeria. Pension which guarantees employee succour in his or her inactive years is critical to the sustenance of life of the individual at old age (Nkanga, 2005). In the Nigerian society, most workers who contribute to pension scheme suffer from poor management of these pension funds (Akowe, Ocheni & Daniel, 2015). It was also found out from PenCom (2019) report that many state governments defaulted and are still defaulting in the remittance of deducted pension contributions of their employees, as well as in the mandatory employer's contributions. This has been a great challenge for getting these funds into the RSA. It is the funds that are available that will be invested as pension assets on behalf of the contributors.

PRA (2014) section 83(3) provides for monitoring of the investment area to which pension funds should be applied. This is to guarantee that pension funds are well secured and do not reduce in value before the time the contributors become retired to draw fund from their RSA. There is the fear of efficient investment of pension funds by the pension managers. This necessitated the provision of Amended Investment Regulation (2019) by PenCom. The Regulation instructed each PFA to establish an Investment Strategic Committee and a Risk Management Committee in compliance with Section 78 of PRA (2014).

This study therefore looks at the expectations of the pension fund beneficiaries in relation to the returns generated by PFAs on the investment of their pension contributions. The study delve into the expectations of beneficiaries, who are contributors and retired persons, on the benefits derivable from investing their pension fund in the investment portfolio stipulated in S. 86 of PRA (2014), and the transparency that attend to the returns on those investments.

Literature Review

Existing literature were reviewed to assess efforts made by previous studies on what work have been done on the expectations of pension beneficiaries on returns form investment of pension funds. Amao (2008) serialized the Nigerian Pension Reform Act (PRA) 2004 and discussed the likely effect of the Act on Nigerian employees. The paper is exploratory in nature and it identified the inherent challenges for the future successes of the new scheme to include social implications on employees, higher life expectancy and lower fertility, increase in population of pensioners, lower pension compared with higher standard of living among prospects and challenges.

Ahmed and Oyadiran (2013), in their study on the impact of 2004 pension policy on the welfare of Nigerian civil servants in some selected ministries, obtained responses by questionnaire using random sampling modus operandi, discovered that the implementation of the contributory pension scheme (CPS) had significantly improved the welfare of civil servants. Their study furthermore revealed that the CPS has not addressed the problem of sharp practices and inadequate budgetary allocation and as such, the new pension order has not been able to surmount these challenges being experienced by retirees in Nigeria.

According to Egbe, Awogbemi and Osu (2013), there is need to diversify a portfolio before it can be optimized. This is first step in the right direction for plausible investment. The main objective of diversification is the reduction of variability of portfolio returns without necessarily losing the anticipated rate of return. Thus, the main reason for

achieving optimal diversification is knowing the nature of relationship of the portfolio and not component securities in the portfolio. The purpose of allowing these funds and assets to be applied as stated above is to reduce the challenges posed by the time value of money, provide a better welfare to the contributors who are to receive their pension whenever they are due. Where voluntary funds are paid into the Retirement Savings Accounts (RSA), PFA is tasked to invest such funds in profitable investments. The choice of investment windows by the managers poses another challenge in pension fund administration.

Anazodo, Ezenwile, Chidolue and Umetiti (2014) examined the effect of new pension scheme on retirees in Nigeria. Their study employed qualitative and exploratory research design and descriptive analysis to examine the issue of the new Contributory Pension Scheme (CPS) as it relate to how retiree received information on the pension managers operate. The study concluded that most retirees are not privy to how pension managers, to whom their funds were entrusted, operates and that the ecological nature of Nigeria may place a challenge on the instituted regulations to check and safeguard retirees' fund.

Biobele (2015) examined pension fund accounting and pensioners' wellbeing in Nigeria looking at their sustainability and life expectancy. The study adopted the survey design by administering questionnaire to evaluate the perceptions of pensioners on the effect of pension fund accounting to their wellbeing. A sample size of 400 respondents comprising of 135, 132 and 133 respondents from Oyo, Anambra and Kano states respectively, taken from three geo-political zones was collected. Judgemental sampling technique was adopted for selecting respondents from the states. Ordinary Least Square (OLS) was used to analyze the data obtained for the study. The study revealed that accounting for pension fund significantly have effect on pensioners' wellbeing. Collective bargaining between pensioners and pension fund administrators have also been identified as a source of pensioners' sustainability.

Reis, Silveira, Braga and Teixeira (2015) looked at the effect of pensions and retirement on the social welfare of households in Brazil's Minas Gerais State. Their study used a methodological approach hinged on propensity score estimates using p-score and p-smatch2 packages earlier adopted by Becker and Ichino (2002), and micro-data from the National Household sample survey, Pesquisa National por Amostra de Domicilios (PNAD). The study found out that retirement income and pension are vital contributors to beneficiary's household income, specifically for beneficiaries of low-income households. The study concluded that there is a positive effect of social security on the incomes, access to knowledge and conditions of living of households used in the study.

However, Andonov and Rauh (2018) revealed that there is dependence of institutional investors on past performance in setting expectation of future return. The study employed statistical testing on real return versus expected return on pension investments to analyze its data. The study found that asset class around 22% weight of variation in portfolio expected returns, creating a large role for the difference in assertions concerning returns in the different classes of asset. The study also discovered that unfunded liabilities are positively correlated to the portfolio expected returns. This is in line with the assumption that 'fiscally entangled' government is faced with pressure in maintaining greater anticipated rates of return. The study also found that the expected returns in risky asset classes like real assets, public equity, hedge funds and private equity are significantly and positively correlated to the past return.

It was found out that most literature studied (Becker & Ichino (2002); Amao (2008); Ahmed & Oyadiran (2013); Egbe, *et al* (2013); Anazodo, *et al* (2014); Biobele (2015); Reis, *et al* (2015); Andonov & Rauh (2015) were unable to establish the core expectations of pension beneficiaries (contributors and pensioners) to have reasonable returns on the pension funds invested by pension managers on their behalf. This study have therefore examined the expectations of these beneficiaries on the pension fund investment returns as stipulated in S. 86 of PRA (2014) and as contained in the investment guidelines issued by PenCom in Nigeria.

Materials and Methods

This paper adopts survey research design. Quantitative method of data collection and analysis was used to explore the outcome beneficiaries' expectation and return of pension fund investment taking South-West Polytechnics in Nigeria into consideration. The target population consists of 4672 pension fund beneficiaries in five (5) Federal Polytechnics, 7500 in twelve (12) State Polytechnics domiciled in South-Western part of Nigeria, 1,208 of twenty-one (21) Pension Fund Administrators (PFA) and 148 in four (4) Pension fund custodians (PFC) domiciled in Nigeria. Proportional allocation method of the Stratified sampling technique was used to derive a sample size of 389 using Taro Yamane sample size calculator from the combined population of 13,528, where 98.7% of the research instruments was returned. However, PFA and PFC staff were included in the study based on the fact that they are also part of pension fund beneficiaries, thereby justification of inclusion. Summary of the questionnaire distribution to target sample can be evidenced in table 1.

Table 1: Questionnaire Distribution to selected institutions

Strata	Population	Sample Size*	Proportion (%)	
Federal Polytechnics	4672	134	34.45	
State Polytechnics	7500	216	55.53	
PFAs	1208	35	9.00	
PFCs	148	4	1.03	
Total	**13528**	**389**	**100.0**	

**Using the Proportional Allocation technique.*

The data collected through the structured questionnaire was collated using spreadsheet and analyzed making use of descriptive and inferential statistics through Statistical Package for Social Sciences (SPSS). The expectations of the pension fund beneficiaries and returns of pension fund investment in Nigeria as opined by the beneficiaries, PFAs and PFCs was analyzed using weighted average score technique as depicted in the research instrument. The weighted average technique comprises of threshold at which the decision of the selected items of the test instruments lies. The frequencies on variables of expectations was scored by assigning 1 to Strongly Disagree, 2 to Disagree, 3 to Indifferent, 4 to Agree and 5 to Strongly Agree. Reversed questions were coded otherwise.

The weighted averages score was ranged in the following ways;

Strongly Agree (SA) = 4.5 - 5.0; Agree (A) = 3.5 - 4.4; Undecided (U) = 2.5 - 3.4; Disagree (D) = 1.5 - 2.4; Strongly Disagree (SD) = <1.5
The weighted frequency (WF) per items can be expressed in equation (4) as;

$$WF = (1 \times F_1) + (2 \times F_2) + (3 \times F_3) + (4 \times F_4) + (5 \times F_5) \quad (1)$$

$F_1, F_2, \ldots, F_5$ represents individual frequencies attached to the likert scales of SD, D, I, A and SA respectively. Hence, the weighted average (WA) score will then be calculated as;

$$WA = \frac{WF}{n} \quad (2)$$

Where n ≡ total number of responses

The Kruskal Wallis H statistic of mean rank for several groups is given as

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{g} n_i (\bar{R} - \bar{R}_i)^2 \quad \sim \quad \chi^2_{(g-1)} \quad (3)$$

Where;
H is the Kruskal Wallis Test statistic,
N is the total number of samples
g is the number of groups representing the 5 point scales from the research instrument
$\bar{R}$ is the overall mean
$\bar{R}_i$ is the average rank responses per items.

The weighted average score technique coupled with Kruskal Wallis H test for difference in mean response was used to confirm if there exist mean difference in respondents' expectations on the returns generated by PFAs on the investment of their pension fund investments.

Results and Discussion

2: Descriptive Statistics of Beneficiaries Expectations

Item Nos.	Beneficiaries Expectations	Mean	Std. Deviation
1	Contributors' monthly contributions are invested in income-yielding investments as contained in PRA (2014)	4.38	.697
2	Contributors experience increase in the amount in their retirement savings account (RSA) due to investment of their monthly contributions by the PFAs	4.31	.847
3	Retired personnel receive regular payment of their pension amount from their PFAs	3.00	1.276
4	There is diminution in the value of equities invested in, due to market dynamics which have caused retirees to lose part of their RSA balance between the date of retirement and the date of receipt of lump sum/first pension	3.94	.967
5	Retirees' risk appetite is not as high as that of the active contributors going by the general retirement age (60years and above)	3.63	.928
6	There is adequate compliance with the framework and implementation guidelines for RSA Retiree fund whose main objective is to ensure that retirees' pension does not lose value after commencement of monthly pension	3.44	1.118
7	All income earned from investment of pension fund are credited to the individual RSA of beneficiaries as specified by Pension Reform Act (PRA) (2014)	4.00	1.276
8	There is safety and maintenance of fair return on amount invested on behalf of contributors by PFAs	3.38	1.220

Source: Field Survey, 2020.

Descriptive statistics of table 2 indicated beneficiaries' expectation on the pension fund invested. Mean response of 4.38 in item 1 implies that beneficiaries agreed that contributors' monthly contributions are invested in income-yielding investments as contained in the PRA (2014). Mean response of 4.31 in Item 2 showed an agreement that contributors experience increase in the amount in their retirement savings account due to investment of their monthly contributions by the PFAs as they were indifferent (mean response = 3.00) on the opinion that retired personnel receive regular payment of their pension amount from their PFAs.

Taking the value of equities of item 4 into consideration, beneficiaries agreed on the mean response of 3.94 that there is diminution in the value of equities invested in, due to market dynamics which have caused retirees to lose part of their RSA balance between the date of retirement and the date of receipt of lump sum/first pension; as retirees agreed based on the empirical analysis of item 5 that their risk appetite is not as high as that of the active contributors going by the general retirement age of 60 years and above.

In addition, pension fund beneficiaries were indifferent on mean response of 3.44 about the adequacy of compliance with the framework and implementation guidelines for RSA retiree fund as evidenced in item 6, but agreed on mean response of 4.0 in item 7 that all income earned from investment of pension fund are credited to the individual RSA of beneficiaries as specified by Pension Reform Act (PRA) (2014). On the safety and maintenance of fair return on amount invested on behalf of contributors by PFAs in item 8, beneficiaries were indifferent on whether or not there exist safety and maintenance as evidenced from mean response of 3.38.

Table 3: Kruskal Wallis H test for Difference in beneficiaries expectations and Returns of Pension fund Investments

Item Nos.	Safety and maintenance of fair return on amount invested on behalf of contributors by PFAs [b]		N	Mean Rank	Test statistics [a]
1	Contributors' monthly contributions are invested in income-yielding investments as contained in PRA (2014)	Strongly Disagree	24	288.50	237.278 (4) [0.000]
		Disagree	72	88.50	
		Indifferent	120	134.90	
		Agree	72	232.50	
		Strongly Agree	96	288.50	
		Total	**384**		
2	Contributors experience increase in the amount in their retirement savings account (RSA) due to investment of their monthly contributions by the PFAs	Strongly Disagree	24	288.50	261.318 (4) [0.000]
		Disagree	72	176.50	
		Indifferent	120	82.10	

		Agree	72	288.50	
		Strongly Agree	96	246.50	
		Total	**384**		
3	Retired personnel receive regular payment of their pension amount from their PFAs	Strongly Disagree	24	12.50	149.811 (4) [0.000]
		Disagree	72	200.50	
		Indifferent	120	142.10	
		Agree	72	244.50	
		Strongly Agree	96	255.50	
		Total	**384**		
4	There is diminution in the value of equities invested in, due to market dynamics which have caused retirees to lose part of their RSA balance between the date of retirement and the date of receipt of lump sum/first pension	Strongly Disagree	24	180.50	76.972 (4) [0.000]
		Disagree	72	176.50	
		Indifferent	120	180.50	
		Agree	72	136.50	
		Strongly Agree	96	264.50	
		Total	**384**		
5	Retirees' risk appetite is not as high as that of the active contributors going by the general retirement age (60years and above)	Strongly Disagree	24	360.50	108.084 (4) [0.000]
		Disagree	72	240.50	
		Indifferent	120	170.90	
		Agree	72	188.50	
		Strongly Agree	96	144.50	
		Total	**384**		
6	There is adequate compliance with the framework and implementation guidelines for RSA Retiree fund whose main objective is to ensure that retirees' pension does not lose value after commencement of monthly pension	Strongly Disagree	24	348.50	66.085 (4) [0.000]
		Disagree	72	172.50	
		Indifferent	120	163.70	
		Agree	72	216.50	
		Strongly Agree	96	186.50	
		Total	**384**		
7	All income earned from investment of pension fund are credited to the individual RSA of beneficiaries as specified by Pension Reform Act (PRA) (2014)	Strongly Disagree	24	12.50	120.640 (4) [0.000]
		Disagree	72	140.50	
		Indifferent	120	202.10	
		Agree	72	240.50	
		Strongly Agree	96	228.50	
		Total	**384**		

( ) parenthesis represents degree of freedom; [ ] parenthesis represents p-value
a. Kruskal Wallis Test ; b Grouping Variable

Empirical analysis of the Kruskal Wallis H test for difference in beneficiaries expectations and returns of pension fund investments in table 3 indicated a statistically significant difference on the opinion of beneficiaries with respect to how their contributions are invested in income-yielding investments and safety and maintenance of fair return on amount invested on behalf of contributors by PFAs, $\chi^2_{(4)} = 237.278$, $p < 0.05$ with a mean rank of 288.50 for strongly disagree, 88.50 for disagree , 134.90 for indifferent response, 323.50 for agree and 288.50 for strongly agree.

Kruskal Wallis H test also showed a statistically significant difference on increase in the amount in retirement savings account due to monthly contributions by the beneficiaries between the safety and maintenance of fair return on amount invested on behalf of contributors by PFAs, $\chi^2_{(4)} - 261.318$, $p < 0.05$ with a mean rank of 288.50 for strongly disagree, 176.50 for disagree, 82.10 for indifferent response, 288.50 for agree and 246.50 for strongly agree as evidenced from item 2 of table 3.

It was also evident that opinion of respondents on regular payment of pension by beneficiaries was statistically different between the fair returns on the amount invested by PFAs, $\chi^2_{(4)} = 261.318$, $p < 0.05$ with a mean rank

of 12.50 for strongly disagree, 200.50 for disagree, 142.50 for indifferent response, 244.50 for agree and 255.50 for strongly agree as depicted on item 3 of the aforementioned table.

Kruskal Wallis H test result also showed a statistically significant difference in diminution of equities invested between the safety and maintenance of fair return on amount invested on behalf of contributors by PFAs, $\chi^2_{(4)} = 76.972$, $p < 0.05$ with a mean rank of 180.50 for strongly disagree, 176.50 for disagree , 180.50 for indifferent, 136.50 for agree and 264.50 for strongly agree as evident in item 4.

In addition, it cannot be overemphasized that high in retirees risk appetite and the returns on amount invested was statistically significant $\chi^2_{(4)} = 108.084$, $p < 0.05$ with a mean rank of 360.50, 240.50, 170.90, 188.50 and 144.50 for strongly disagree, disagree, indifferent, agree and strongly agree respectively. Hence, retirees risk appetite is as high as that of the active contributors going by the general retirement age of 60 years.

Empirical result of analysis also indicated from the Kruskal Wallis H test on adequate compliance with the framework and implementation guidelines for RSA retirees taking into account the safety and maintenance of fair return on amount invested on behalf of contributors by PFAs was statistically significant based on the $\chi^2_{(4)} = 66.085$, $p < 0.05$ with a mean rank of 348.50 for strongly disagree, 172.50 for disagree , 163.70 for indifferent response, 216.50 for agree and 186.50 for strongly agree.

On the Kruskal Wallis H test of the item 7 of the table, analysis indicated a statistically significant difference on the manners at which income earned from investment of pension fund are credited as specified by the Pension Reform Act (PRA) taking the safety and maintenance of fair return on amount invested on behalf of the contributors by PFAs into consideration, $\chi^2_{(4)} = 120.640$, $p < 0.05$ with a mean rank of 12.50, 140.50, 202.10, 240.50 and 228.50 for strongly disagree, strongly agree, indifferent, agree and strongly agree respectively.

Conclusion and Recommendations

Hence, empirical analysis of the result findings cannot be neglected as beneficiaries expectations are high in the area of the returns received or to be received from their pension fund investments from the respective PFAs attributed to each beneficiary and the pension fund custodians. However, result also showed that expectations vary from beneficiaries to beneficiaries, which depends on how the respective PFAs manage the financial returns of the beneficiaries. This portends that the performance of Pension managers differs. Some are more diligent and calculative as far as risk on investment is concerned. The result of the study is in tandem with Anazodo, Ezenwile, Chidolue and Umetiti (2014). The study recommends that, for pension contributors and retirees to repose confidence in the way their funds are managed, their funds should be invested in safe investments where risks on investments are professionally calculated, reasonable income generated from such investments. It is also expected from the PFAs, transparent accountability posture to the operation of the pension fund management devoid of misappropriation. With these, the expectations of pension beneficiaries will be very close to accomplishment.

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Theoretical Basis For Ensuring Economic Security And Competitiveness of The Region in Foreign Trade Activities

Olga Makarova
PhD in Economics, associate professor in the Graduate School of Industrial Economics, Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg, Russia, makolg@yandex.ru
Yulia Makarova
Graduate student in the Graduate School of Industrial Economics, Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg, Russia, julia.makarova@hotmail.com
Svetlana Gladkova
PhD in Economics, associate professor in the Department of Civil Law and Civil Procedure, St. Petersburg University of the Ministry of Internal Affairs of Russia, Saint-Petersburg, Russia, gladkovas@rambler.ru
Yulia Dubolazova
PhD in Economics, associate professor in the Graduate School of Industrial Economics, Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg, Russia, makolg@yandex.ru

Abstract

The article discusses competitiveness at the present stage. The analysis made it possible to systematize the views of individual domestic and foreign authors on the disclosure of the concept of competitiveness, methods of its assessment. The authors formulated a definition of the competitiveness of enterprises, taking into account the level of offenses in foreign economic activity and highlighted other approaches to the definition of the concept of competitiveness: legal, mathematical, socio-psychological, organizational and managerial, economic and financial. The article considers factors and conditions influencing competitiveness, including the region, through indices of comparative advantages. The Bell Balassa Index, Lafey Index, PCA Index, WEF Competitiveness Index were considered. Global Overview, "Growth Index.

Factors that represent potential threats to Russia's foreign economic security include health and primary education, labor market efficiency, technological readiness, business and macroeconomic environment.

Disclosing ensuring the competitiveness of enterprises taking into account countering violations in foreign trade activities, the classification of violations in foreign trade activities was clarified.

Keywords: Competitiveness, Economic Security, Foreign Trade, Threats, Risks

Introduction

The study of the category "competition" is devoted to a considerable number of studies, however, the essence of which is not unambiguous and a single system of views on its content, forms and types has not yet been developed.

To solve this problem, it is necessary to understand what is meant by competitiveness at the present stage. The analysis carried out as part of the writing of the work made it possible to systematize the views of individual domestic and foreign authors on the disclosure of the concept of competitiveness, the methodology for assessing it.

A number of authors, speaking of competition, imply some kind of rivalry - the independent rivalry of two or more persons Stigler J. (2000).

Later, the authors specified that rivalry arises among buyers, indicating certain conditions for its occurrence. So, A. Smith in the work "Research on the Riches of Peoples" wrote - "competition will now begin among buyers if there is a reduction in supply, which will entail an increase in prices," but when the supply is too high, the price will fall the lower, the more competition between sellers, "or, depending on how quickly it turns out for them to sell this product" (1997).

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Marshall A. connects competition with the struggle for rare economic benefits and, as a way of acquiring them, for consumer money. This conclusion follows from the logic that most of the benefits (goods, services, resources) are rare in the sense that their number is less than the potential need of society. In this regard, the owners of these benefits have the opportunity to distribute them, while pursuing their benefit, setting conditions, for example, the required level of prices, quality, etc. As a result, they have the opportunity to decide who to provide the benefits to, and to whom to refuse it (1993).

In the development of the idea of unity, stability, as well as deterministic equilibrium in conditions of perfect competition, Blaug M. put forward the theory of general equilibrium (1994).

One of the first economists - representatives of the functional approach is J. Schumpeter. As a distinctive criterion of competitive market, its ability to initiate new achievements of scientific and technological progress is highlighted (1982).

Del Bosco, B., Chierici, R., Mazzucchelli says, If to speak about the indicators characterizing the level of economic security of the region and factors, influencing on it some authors note, for assessment of the impact of the external economic safety and assessment of competitiveness of the region, it is possible to estimate influences of separate economic indicators (a gross regional product per capita, direct foreign investments per capita, the average monthly nominal salary of the permanent worker) on export of goods per capita of the region. At the same time the used regression model confirms that all above-mentioned indicators have positive impact on export and trade activity at the regional level of the country. However the level of influence of these indicators on export of goods is per capita various. Results of work show that influence of direct foreign investments on export activity wasn't significant. The gross regional product positively influences this indicator. The average monthly nominal salary of the permanent worker per capita has the smallest impact on export of goods (2019).

Some authors suggest using thresholds of indicators characterizing the level of economic security in their calculations. So, A. Burmisova (2016) and Fadeev Yu.N. (2016) use an approach that consists in comparing threshold values of indicators. At the same time, these values are calculated on the basis of international experience.

The works of S.Yu. Glazyev, A.N. Illarionov, V. Medvedev, E.A. Oleinikova, V.K. Senchagov, A. Orlov and others (2004 , 1997,2005) are devoted to the assessment of economic security of economic systems of various levels.

S.V. Hooke notes that in assessing the system of indicators characterizing economic security, in addition to generally accepted significant parameters, it is necessary to evaluate the areas of the region's economy that are most exposed to threats [(2008), to which, in our opinion, the sphere of foreign economic relations belongs.

Most studies assess the level of national and regional economic security in the following areas: living standards, production, demography, financial sphere, ecology, law and order, scientific and technical potential (2008).

At the same time, as a rule, domestic economists identify the following types of security on the principle of the most vulnerable spheres of life: production, financial, food, demographic, scientific, technical and social security.

Among the components of national economic security V.A. Oleinikov mentioned the following: investment, financial, price, currency, information, scientific and technical, energy security, as well as the security of the stock market, credit and banking system, material spheres of economy, foreign economic activity, etc. (2004)

According to V.E. Manevich, the large size of net exports does not indicate good economic health, but, on the contrary, a narrowing of the domestic market. "Net export is the transfer of the domestic economy to the foreign economy, and net import is the transfer of the external world to the domestic economy." He proposes "to halve energy exports without the slightest harm (and with great benefit) to the economy." (2004)

Model

As a result of studying the opinion of various authors, the author's definition of the competitiveness of enterprises engaged in foreign trade activities was formulated.

By the competitiveness of enterprises engaged in foreign trade activities it should be understood that competitiveness is the result of a well-thought-out, targeted policies that take into account the external and internal factors of the economic entity at the macro and micro levels, which are in constant competition, in which the independent actions of each of them exclude or limit the possibility of each of them unilaterally to affect the general conditions of circulation of goods in the external commodity market in the context of the globalization of the economy and the

strengthening of the role of multinational corporations, and with strict enforcement of the legality of foreign trade activities and respect for the economic security of the State.
Based on the analysis of monographic and other scientific sources on this topic, it is proposed to distinguish other approaches to the definition of the concept of competitiveness: legal, mathematical, socio-psychological, organizational and managerial, economic and financial.

The legal approach describes this concept from the point of view of legal science, emphasizing the exclusion or limitation of the possibility of destructive manifestation.

The mathematical approach considers competitiveness as a model for managing the external and internal factors of an economic subject at macro and micro levels and describes them in terms of lifetime.

The organizational and managerial approach consists in determining the competitiveness in terms of the organizational and legal form of the design under consideration.

Socio-psychological analyses the activities of economic actors in terms of their rational economic behavior, the result of well-thought-out, targeted policies.

The economic and financial approach considers competitiveness as the conquest and expansion of business in the market of goods and services, including in foreign trade activities.

The study of the principle and methods of assessing the comparative advantages of enterprises in foreign trade activities is based on various reasons for the emergence of comparative advantages in certain sectors of the economy: differences in the endowment of production factors, differences in production technologies, different levels of investment in labor, differences in the principles of the economic structure of countries (from the tax system to state programs of support and stimulation of production), political conditions in the country.

Among all known methods of measuring comparative advantages, the concept of identified comparative advantages was most popular, the idea of which is based on the premise that if a country has a comparative advantage in a given industry (for a given product), this will be expressed in the country's foreign trade, export specialization in a given industry.

The authors considered factors and conditions influencing competitiveness, including the region, through indices of comparative advantages. The Bell Balassa Index, Lafey Index, PCA Index, WEF Competitiveness Index were considered. Global Overview, "Growth Index) (1965 < 2002, 1992).

It was noted that economic security also affects the competitiveness of the region and the state as a whole. In turn, economic security indicators will show control (border) points of improvement or deterioration of economic security. Foreign economic security plays an important role in this process.

As part of the study, the authors formulated taking into account the stated direction, the definition of the competitiveness of enterprises, taking into account a separate, but important factor - this is the level of offenses in foreign economic activity.

Results

Potential threats to foreign economic security included:

- Health and primary education (rating - 54). The factors that led to this value of the rating are life expectancy (years), the number of TB diseases, the prevalence of HIV;
- Labour market efficiency (rating - 60). The assessment used factors such as employee-employer cooperation, the cost of excess labor, the impact of taxation on incentives to work, reliance on professional management, the country's ability to retain and attract talent;
- Technological readiness (rating - 57). The following factors influenced the formation - availability of the latest technologies, absorption of technologies at the firm level, foreign direct investment and transfer of technologies, international Internet traffic, traffic volume per user;
- Business (rating - 71). Data on the number of local suppliers, the level of cluster development, the depth of the value chain, the willingness to delegate authority were used;
- Macroeconomic environment (rating - 53). The following factors were used in the calculations - state budget deficit, inflation, sovereign credit rating.

Disclosing ensuring the competitiveness of enterprises in the framework of countering violations in foreign trade activities, the authors clarified the classification of violations in foreign trade activities.

The developed classification of offences in foreign trade activities is presented in Table 1.

Table 1: Classification of offences in foreign trade activities

Criteria	Characteristics
By the sphere of emergence in the sphere of economic activity	against public danger
	against public health and public morals
By severity	of low gravity
	moderate severity
	heavy
	Particularly grave
By the degree of public danger	minor violations
	gross violations
On the object of encroachment	encroaching on the movement of goods
	infringing on the procedure for the registration of goods, their movement under customs procedures and the implementation of customs control measures
	encroaching on the provision and use of benefits
	encroaching on customs charges
	encroaching on the normal operation of customs authorities
By form of wrongful act	action
	inaction
By types of legal liability	administrative responsibility
	criminal liability
By amount of damage	minor damage
	average damage
	major damage
	causing particularly serious damage
По характеру криминализации	Activity permitted by law, with elements of destructive activity
	Activities prohibited by law
	Activities not prohibited by law, with elements of destruction
According to the status of subjects of offenses in the field of foreign trade	Offences committed by foreign trade economic entities in the export of goods, works, services
	Offences committed by foreign trade economic entities in the import of goods, works, services

Note of the Criminal Code of the Russian Federation - Criminal Code of the Russian Federation
Administrative Code of the Russian Federation - Code of Administrative Offenses of the Russian Federation
The developed systematization will make it possible to study violations in foreign economic activity both in general and in individual elements, predict the extent of their spread, and contribute to the neutralization of the determinants and socio-economic consequences of these phenomena.

Conclusion

In the context of increasing globalization processes that contribute to the growth of competitiveness of developed economies, the issues of ensuring Russia's foreign economic security (given its very low competitiveness indicators) remain relevant.

At the same time, taking into account the variety of manifestations of illegal acts in the field of foreign economic activity, their conjugation with other economic offenses, other subjects of investigation, it becomes an important task to determine their destructive influence on the economic security of the State. The developed classification makes it possible to streamline offenses in foreign economic activity by the nature of the impact, which creates the prerequisites for the formation of effective strategies for comprehensive counteracting existing offenses in the foreign trade activities of economic entities.

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Application of Selected Models and Methods of Graph Mining on the Example of the Analysis of Publication Links

Zbigniew TARAPATA
Military University of Technology, Faculty of Cybernetics, Warsaw, Poland
zbigniew.tarapata@wat.edu.pl

Abstract

The paper deals with specific group of methods of graph and network mining related to the so-called community detection (clustering). Presented methods was discussed and divided into four groups: node-centric, group-centric, network-centric, hierarchical-centric. The characteristics and properties of several methods from each group were discussed. In many cases, attention has been drawn to the computational complexity of the methods presented and ways of improving it. An extensive example of the use of selected methods for the analysis of publication cooperation of employees of a research institute is presented.

Keywords: graph mining, community detection methods, link analysis, clustering.

Introduction

Data mining consists of many data analysis techniques. Its primary purpose is to discover hidden and useful relationships between data from a very large collection. Graph mining, which has gained in importance in recent decades, is one of the innovative approaches to explore a structured data set represented by graphs and networks (Rehman et al (2012)). It is used in various fields, such as bioinformatics, chemical reactions, program flow structures, computer networks, social networks, etc. Different methods of data mining are used to extract graph-based data and perform useful analysis of this data. Different approaches to graph and network (weighted graphs) exploration are proposed in the literature (Rehman et al (2012), Tang and Liu (2010)). Each of these approaches is based on classification, clustering, or decision trees. This paper focuses on a specific group of methods of graph and network mining related to the so-called community detection.

The first section presents the taxonomy of community detection methods in graphs. Selected models and methods of community detection are presented. In the next section there is an example of the application of the described methods to evaluate the publication links between the employees of the Institute of Computer and Information Systems of the Faculty of Cybernetics, Military University of Technology, Warsaw, Poland. The paper ends with a summary and conclusions concerning the described models and methods and their applications.

Selected methods of graph and network mining

Discussing selected methods of graph exploration focused primarily on the methods of detecting communities (communities, groups, clusters - these terms will be used interchangeably) with certain properties. Communities are subsets of entities, among which there are relatively strong, direct, intense, frequent, or positive ties Wasserman and Faust (1994)). Networking interaction provides useful information on the relationships between the entities.

Methods of detecting communities (groups, clusters) can be divided into 4 categories (Drif and Boukerram (2014)):

- node-centric (each node (vertex) in a group meets certain properties);
- group-centric (considering connections within a group as a whole; the group must meet certain properties);
- network-centric (take into account the weights of edges and vertices and divide the whole network into detachable subnets);
- hierarchical-centric (creating a hierarchical community structure).

It should be noted that many of the described models and methods have their computer implementations in numerous of packages and environments, such as R, Python, Gephi, Neo4j, etc. (Neo4j (2020), MCL (2020), Modularity (2020), Markov Clustering (2020), MCL2 (2020), Gephi (2020)).

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In further consideration, we will assume that we have a given undirected unigraph $G = (V, E)$, where V – set of nodes (vertices), and $E \subset \{\{u,v\} : u,v \in V\}$ set of edges. Undirected unigraph is a graph where there is at most one edge (undirected link) between each pair of vertices. If there is an edge between a pair of vertices, we say that these vertices are adjacent to each other.

We will also accept the following indications: number of vertices $n = |V|$, number of edges $m = |E|$. In some models we will assume that the vertices or edges of the graph have weights assigned to them. Then, when it is important, we will emphasize it.

Below, the definitions of several terms that will be used in the further part of the study are reminded (they concern the undirected unigraph G).

Subgraph of graph G is the part of the graph that is based on a selected subset V_p of vertices G and all edges between vertices belonging to V_p.
A *full subgraph* (clique) in the G graph is called a graph where there is an edge between each pair of vertices (all vertices are adjacent).

A *connected graph* is a graph in which there is a path (sequence of alternate vertices and incidents edges with them) between each pair of vertices. In other words, we can move between each pair of vertices in the graph.

The *connected component* of graph G is the maximum subgraph of this graph, which is a connected graph.
Edge connectivity $ec(G)$ of graph G, is the minimum number of edges whose removal results in graph disintegration (i.e. the graph ceases to be connected when these edges are removed).

Cut in graph is a set of edges, the removal of which causes the graph to become disconnected.
Min-cut S is a cut with a minimum number of edges. For a non-trivial graph (with more than 1 vertices and edges) there are: $|S|=ec(G)$.

The *degree* of the vertex in graph G is the number of edges incidental to this vertex (in the case of unigraph, it is the number of neighbours of the vertex under consideration).

Node-centric community detection methods

This group of community detection methods is based on some specific properties of the vertices (nodes) in the graph. The most common characteristics of vertices in the graph are degree, radius, closeness, betweenness, clusterization coefficient, hubs and authorities, PageRank (Bartosiak et al (2011)). From the point of view of detecting communities, the characteristics of a subset of vertices are important, based on selected characteristics of vertices.

Methods based on the concepts of *k-core, k-plex, k-brace*

The methods of this group are based on the definitions of the terms: *k-core, k-plex, k-brace*, which are presented below.

k-core (Ugander et al (2012)): subgraph of graph G, in which each vertex connects to at least k vertices of the group (there is a degree of k).
k-plex: for a group with n_s vertices, each vertex should be adjacent to no less than n_s-k vertices in the group.
These two definitions are complementary, i.e. k-core is $(n_s$-$k)$-*plex*.
k-brace (Ugander et al (2012)) is a variety of k-core. Instead of a vertex degree, the definition uses the concept of edge embeddedness. *Embeddedness* $Em(e_{ij})$ of e_{ij} edge connecting two vertices i and j is the number of common neighbors of vertices i and j, i.e.

$$Em(e_{ij})=|V_i \cap V_j| \tag{1}$$

where $V_i = \{j \in V: e_{ij} \in E\}$, and $|x|$ describes cardinality of the set x.
k-brace of graph is a graph created by repeatedly removing all such edges e_{ij}, for which $Em(e_{ij})$ is less then k, and then removing all components connected to vertex. To characterize the final result of the edge-removal process and to better understand the essence of the k-brace, let us assume the following definitions.

Let $H = (W, F)$ be a subgraph of $G = (V, E)$, where $W \subseteq V$ and $F \subseteq E$, and each edge in F has both vertices in W. Then we define the set of subgraphs $B_k(G)$ of graph G: we say that the subggraph H belongs to $B_k(G)$ if (i) each edge of H belongs to at least k different triangles (the triangle in the graph is a 3-element clique) in H, and (ii) each vertex in H is incidental with at least one edge in H. It can be shown that the k-brace is in fact a specific part of $B_k(G)$ (Ugander (2014), Ugander et al (2012)).

You can see that for all graphs, the k-brace is a subgraph (k+1)-core: because every vertex in the k-brace is incidental with at least one edge, and each edge of the e_{ij} has connection $E_m(e_{ij})$ equal to at least k in G, hence all vertices in the k-brace must have a degree equal to at least k+1 in G. The inquisitive reader should have no problem answering the important question whether each edge in the k-brace belongs to at least k triangles in G.

The complexity of k-plex and k-core determination algorithms is $O(m+n)$. The complexity of the algorithm for determining the k-brace is $O(m^2)$. Because the k-brace is a subgraph of (k+1)-core, it is better to determine (k+1)-core first, and then to determine k-braces in them.

Clique Percolation Method (*CPM*)

One of the methods of grouping in graphs is *Clique Percolation Method* (*CPM*) (Palla (2005)). The problem of determining the maximum clique in the graph, or a clique of k size (k is the number of vertices of a clique) is a known problem belonging to the NP class of computational complexity and is used as a subproblem of *CPM*. Therefore, different polynomial approximation algorithms are used to solve the problem of determining the maximum clique or clique of size k (Wu and Hao (2015)).

The idea of the *CPM* algorithm (for a given network and fixed k) is presented below:

1. Find all cliques of k size in the network.
2. Build a cliques' graph. The vertices of the cliques' graph are the cliques determined in the 1 step, and two cliques are adjacent (connected by an edge) if they have k-1 common vertices.
3. Each connected component in the cliques' graph creates a community (group).

Group-centric community detection methods

Group-centric community detection methods are based on the structural properties of the part of the graph G (e.g. subgraph of G). This group of models and methods can include: *quasi-clique* determination methods (Palla (2005)), *Highly Connected Subgraphs* (*HCS*) (Hartuv and Shamir (2000), Huffner et al (2014)), *Markov Clustering* (*MCL*) (Azad et al (2018), van Dongen (2000)).

Quasi-clique determination methods

Subgraph $G_s(V_s,E_s)$ is a quasi-clique if there is a condition:

$$\frac{2|E_s|}{|V_s|(|V_s|-1)} \geq \gamma \tag{1}$$

where γ is the given density of the quasi-clique and the denominator means the maximum number of edges (degrees) in G_s.
A greedy approach can be used to determine quasi-clique (Pattillo et al (2013)):

1. Starting with a vertex with the highest degree, expand it with vertices that can contribute to a larger quasi-clique.
2. Continue until you cannot add more vertices.

Highly Connected Subgraphs (*HCS*) method

In this method, the term *Highly Connected Graph* is used: graph with n>1 vertices is highly connected, if its edge connectivity $ec(G)>n/2$.

Highly Connected Subgraph (*HCS*) is such a subgraph H of graph G, that H is highly connected.
The *HCS* algorithm identifies highly connected subgraphs as clusters. The idea of the algorithm is as follows:

1. Find and delete *min-cut* in G getting a set of subgraphs $\{H_1, \ldots, H_t\}$ relating from the cut removal (cut in graph is a set of specific edges in G (removing these edges we disconnect a graph G)).
2. For each subgraph H_i, $i = 1,\ldots,t$ check if it is strongly connected, i.e. if there is a condition $ec(H_i) > n/2$:
   a. If yes, give a subgraph H_i as cluster;
   b. Otherwise, repeat *HCS* algorithm on the H_i subgraph (recurrence).
3. Repeat steps 1÷2 until there are no more subgraphs.

The calculation time of the *HCS* algorithm is limited by $2Nf(n,m)$, where N - the number of clusters found, $f(n,m)$ - the computational complexity of the algorithm for determining the min-cut in the graph with n vertices and m edges. The quickest deterministic algorithms of finding the min-cut in an unweighted graph require $O(n^2m)$ steps, and for weighted graphs – $O(nm+n^2\log n)$ (Stoer's –Wagner's algorithm (Stoer and Wagner (1994))). Another proposal to solve the min-cut problem is a randomized Karger's algorithm (Karger (1993), Karger and Stein (1996)). It is based on the idea of the so-called *edge contraction*. Edge $e(u,v)$ contraction consists of replacing vertices u, v, which are its ends, with a vertex w, removing all edges between u and v and the "surge" to the vertex w the edge that occurred u, v. The complexity of the Karger's algorithm is $O(n^2m\log n)$, and the probability of not finding the min-cut is equal to: $\left[1-\binom{n}{2}^{-1}\right]^T \le \frac{1}{e^{\ln n}} = \frac{1}{n}$, where $T = \binom{n}{2}\ln n$ is the number of runs of the edge contraction algorithm.

Markov Clustering (*MCL*) method

Markov Clustering (*MCL*) is an algorithm based on the simulation of stochastic flow in graphs (Azad et al (2018), van Dongen (2000)). The algorithm is based on random walks on graph G; visiting a dense cluster, we will not likely leave it until many of its vertices have been visited. The MCL algorithm simulates the flow inside the graph and promotes the flow in the strongly related part of the graph and degrades this flow in the weakly related part of the graph, thus determining the clusters in the graph. The size of the flow is proportional to the weight of the edge, which affects the probability of its selection when walking on the graph (this probability does not depend on how to get to a given vertex, hence the Markov model).

Network-centric community detection methods

Network-centric community detection methods consider edge and vertices weights and divided network into disjoint subnets. Grouping is based on: similarity of vertices (central similarity measures: degree, radius, betweenness, closeness, clusterization coefficient, Hubs-Authorities, PageRank) (Bartosiak et al (2011), Ferrer et al (2009), Tang and Liu (2010), Tarapata (2007)), latent space model (Salter-Townshend and McCormick (2017), Tang and Liu (2010)), block model approximation (Tang and Liu (2010)), cut minimization (Karger (1993), Stoer and Wagner (1994), Tang and Liu (2010), Wu and Hao (2015)), modularity maximization (Blondel et al (2008), De Meo et al (2011), Gach and Hao (2014), Newman (2006), Traag et al (2019)).

k-means method in graphs

The method is based on the *k*-means method known from data mining (Ferrer et al (2009)). In this method the definition of the function of distance (similarity) between grouped objects (in the graph: vertices) is important (e.g. the length of the path in the graph is measured by the number of edges in the path; the length of the path in the network is measured by the sum of weights of the edges occurring in the path; the shortest path is the one whose length is the smallest). The most commonly used distance functions $dist(i,j)$ between two vertices i and j are:

- length d_{ij} of the shortest path in graph (network) between i and j, i.e. $dist(i, j) = d_{ij}$;
- Jaccard's distance (similarity): $dist(i, j) = \frac{|V_i \cap V_j|}{|V_i \cup V_j|}$;
- cosine distance (similarity): $dist(i, j) = \frac{|V_i \cap V_j|}{\sqrt{|V_i| \cdot |V_j|}}$;
- features based on the largest common subgraph, the smallest common supergraph, graph editing distance (Schenker et al (2005)),

where V_i described in **Error! Reference source not found.**.

The idea of *k*-means method in graphs (Schenker et al (2005)) is modification of standard *k*-means method (Ferrer et al (2009)):

1. Select *k* vertices (e.g. randomly) and each of them set as the initial centroid (the central vertex of each *k* cluster);
2. Create / count clusters by assigning vertices to the nearest (in the sense of the $dist(\cdot,\cdot)$) centroid function;
3. Designate new centroids in clusters (designation of a new centroid in a cluster is to determine such a vertex from the cluster, for which the average or the sum from the values of the distance function $dist(\cdot,\cdot)$ to the other cluster vertices is the smallest);
4. Repeat steps 2 and 3 until there are no more changes in the clusters or the assumed number of iterations is reached.

The complexity of the *k*-means algorithm in the graph is equal $O(n^2+nm) + N\left(O(kn)+O\left(k^{-1}n^2\right)\right)$ where N is number of iterations in algorithm.

Louvain modularity method

Louvain modularity method (Blondel et al (2008)) is used to detect groups/clusters/communities. The most important of these are the communities in large networks. This is one of the most popular methods of determining clusters. The essence of the method is to optimize modularity as the algorithm advances. Modularity is a value on a scale from -1 to 1, which measures the density of the edge inside the community to the edge outside communities. Optimization of this value results in the best possible grouping of vertices of a given network, however, going through all possible iterations of vertices in a group is impractical because of time consuming (the problem of determining maximum modularity is NP-hard to calculate), therefore heuristic approaches are used. The idea of the method comes down to two steps:

- small communities are first located by local optimization of modularity at all vertices of the network,
- then each small community is grouped into one vertex (the so-called "community") and the process is repeated.

Greedy algorithm has computational complexity $O(n \log n)$, where n is the number of vertices in the graph.
The Louvain method has a lot of improvements and modifications, which the works treat, among others (De Meo et al (2011), Gach and Hao (2014), Traag et al (2019)).

Hierarchical-centric methods of community detection

The aim of this group of methods is to build a hierarchical community structure based on the network topology. One of the best-known methods of this group, which is based on the so-called edge betweenness, is Girvan's-Newman's method (Girvan and Newman (2002)).

Girvan's-Newman's method

Edge betweenness, used in the method, is based on the number of shortest paths between all pairs of vertices passing through the edge: a given edge is the more important the more the shortest paths pass through it. As a reminder: the measure of betweenness for vertices is based on the thesis that a vertex is more important in the graph, the more the number of shortest paths connecting any two vertices in the graph passes through it.

Girvan-Newman's method uses the observation that the edges between groups usually have a greater value of edge mediation than inside groups.

The idea of the algorithm is as follows:

1. Calculate the edge betweenness of all edges in the network.
2. Delete an edge e_{bet_max} with the highest value of the betweenness measure.
3. Recalculate the edge betweenness for all edges affected by edge removal e_{bet_max}.
4. Repeat steps 2 and 3 until no edges are left.

The Girvan's-Newman's algorithm has a complexity $O(m^2n)$.

Application of models and methods of graph mining for the analysis of publication links

The results presented in this section concern scientific publications (chapters in monographs) between 2015-2018 of the employees of the Institute of Computer and Information Systems (ISI) of the Faculty of Cybernetics, Military University of Technology, Warsaw, Poland (http://isi.wat.edu.pl) (number of chapters: 164).

The data (in BibTex format) was converted to the weighted graph format (network) read by the software Gephi (Gephi (2020)), in which the analyses were made. The analyses were carried out using the Louvain method implemented in Gephi and by determining the value of *k*-core and *k*-brace (Ugander (2014), Ugander et al (2012)) for different values of *k*.

Graph of publication links was constructed in a following way:

- the collection of graph vertices are the authors of the publication (employees) who had at least one publication,
- an edge (*x, y*) is added between such a pair of authors *x* and *y*, who had at least one publication in common,
- the edge (*x, y*) weight is the number of common publications by authors *x* and *y*.

It follows from the way the graph is constructed that if a vertex is isolated (i.e. not connected to any other vertex, i.e. the degree of that vertex is 0), it means that the author either published it himself or with co-authors who were not ISI employees.

Example of exported BibTex records for a chapter in the monograph is presented below:

}
@*incollection*{
author="Wojciech Kulas and Zbigniew Tarapata",
title="An IT Tool to Support Anti-crisis Training in WAZkA System: A Case Study",
pages="158-165",
booktitle="Computer and Information Sciences. 32nd International Symposium, ISCIS 2018 Held at the 24th IFIP Worl Computer Congress, WCC 2018Poznan, Poland, September 20-21, 2018, Proceedings; in series: Communication in Computer and Information Science 935",
publisher="Springer",
address=" New York",
isbn="978-3-030-00840-6",
year="2018",
}

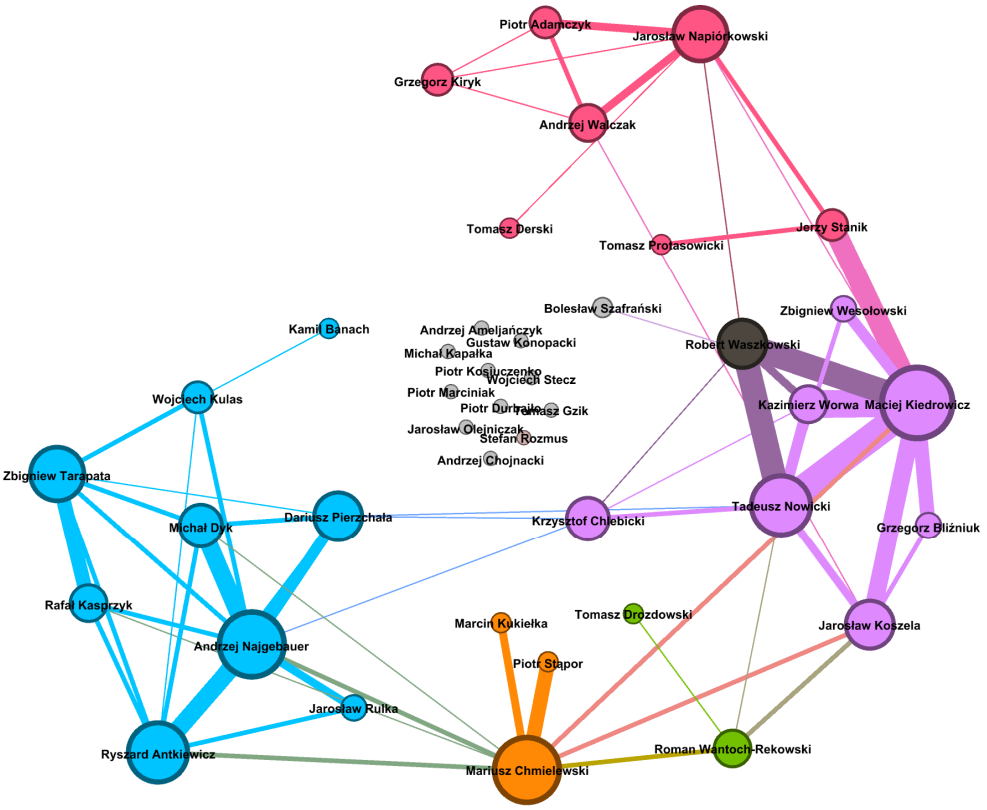

Fig. 1: Graph of publication cooperation between the authors (from ISI) of the chapters in monographs between 2015-2018. Number of vertices *n* = 42, number of edges *m* = 64. The number of clusters is 15, of which 5 are multi- faceted (vertices coloured the same colour belong to the same cluster). The size of the vertex is proportional to its degree, the "thickness" of the edge is proportional to its weight;

Source: own elaboration

Fig. 1 shows the network of links between the authors of the chapters in the monographs between 2015-2018. Number of vertices *n* = 42 (number of employees who had at least one publication as a chapter in the monograph), number of edges *m* = 64 (number of pairs of employees who had at least one joint publication as a chapter). The number of clusters is 15, of which 5 are multi-faceted (vertices colored the same color belong to the same cluster). The size of a vertex is proportional to its degree (i.e. the number of employees with whom a given employee had joint publications), the "thickness" of the edge is proportional to its weight (i.e. the number of joint publications between a pair of employees). The graph analysis shows that the chapters in the monographs were created the vast majority in five groups of co-authors (number of clusters). The most numerous of these groups (blue) has a number of 9 (central vertex: A. Najgebauer), but judging by the "thickness" of the edge in the 8-person group (violet, central vertex: M. Kiedrowicz), there were most publications of this type. These conclusions can also be confronted with the data in Table 1.

Fig. 2 shows the *k*-core of the graph in Fig. 1. According to the interpretation (subsection 2.1), the *k*-core will indicate those authors of the publication who had at least one publication in common with other authors in the *k*-core. For example, the 3-core (Fig. 2c), "filters" the graph of publication links to such a subgroup of authors, in which each of them had at least one common publication, with at least 3 authors of this group: e.g. Dariusz Pierzchała has at least one common publication with 3 authors of this group (these are: Zbigniew Tarapata, Andrzej Najgebauer, Krzysztof Chlebicki, Tadeusz Nowicki). Fig. 2 shows that such connections among the authors of the chapters are strong.

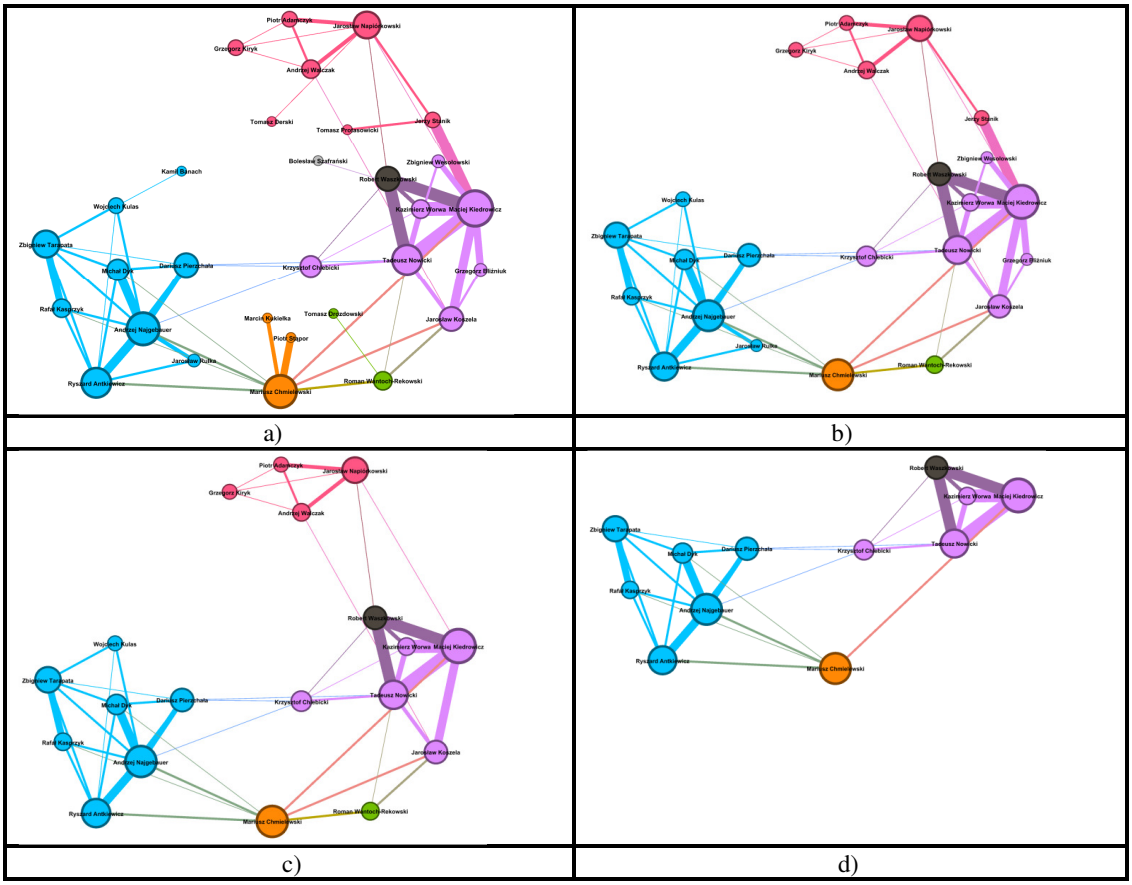

Fig. 2: Graph filtering results from Fig. 1 to *k*-core: (a) 1-core, (b) 2-core, (c) 3-core and (d) 4-core; Source: own elaboration

Fig. 3 shows the *k*-brace of the graph in Fig. 1. In this case we also have interesting interpretations and results. Namely, the *k*-brace "filters" such vertices from the graph that if two employees (authors) had at least one common publication (edge in the graph and the *k*-brace between them), each of them had at least one joint publication, with at least *k* the same authors. For example, in Fig. 3c, Zbigniew Tarapata and Andrzej Najgebauer are in the 3-brace and are connected by an edge (they had at least one common publication). This means that each of them had a common publication with at least three of the same authors (Fig. 1 shows that they were them: Rafał Kasprzyk, Ryszard Antkiewicz, Dariusz Pierzchała, Wojciech Kulas, Michał Dyk). Let us also note that each *k*-brace is a subgraph (*k*+1)-core.

Table 1 shows the values of basic measures of vertex centrality measures in the graph in Fig. 1. While the vertex degree measure is interpreted as the number of authors with whom a given author has published (vertex in the graph), the weighted degree measure is interpreted as the number of all co-authors' publications of a given author (sum of the weights of incidental edges with a given vertex). From the point of view of the betweenness measure, the most important is the vertex (author) that would take part in the "association" of the largest number of pairs of co-authors. Considering the measure of closeness, the most important is the author who is closest (in sense of publications) to all other authors. More about vertex centrality measures in graphs and their interpretation can be read in (Bartosiak et al (2011)).

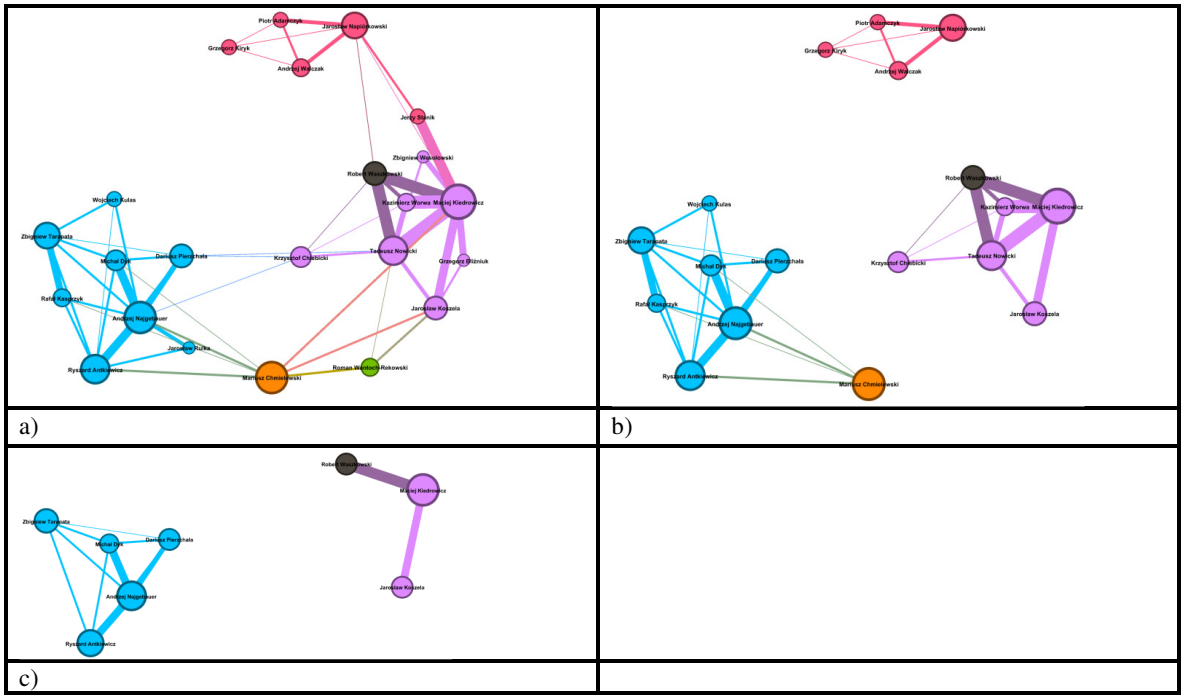

Fig. 3: Graph filtering results from Fig. 1 to *k*-brace: (a) 1- brace, (b) 2- brace, (c) 3- brace;

Source: own elaboration

Table 1: Values of basic vertex centrality measures from Fig. 1. Three vertices (authors of publications in chapters), for which the value of the appropriate measure is the highest, are marked in bold. Zero vertexes, i.e. authors who have not co-authored publications with other ISI employees, are not included; Source: own elaboration

Family Name	Degree	Weighted Degree	Close-ness	Betweenn ess	Autho-rity	Hub	Page Rank
Adamczyk	3	6	0,312	0,000	0,031	0,031	0,026
Antkiewicz	8	19	0,433	0,036	**0,354**	**0,354**	0,052
Banach	1	1	0,261	0,000	0,050	0,050	0,011
Bliźniuk	2	7	0,372	0,000	0,068	0,068	0,017
Chlebicki	5	6	0,439	0,027	0,203	0,203	0,034
Chmielewski	**9**	20	**0,537**	**0,202**	**0,317**	**0,317**	**0,065**
Derski	1	1	0,296	0,000	0,016	0,016	0,012
Drozdowski	1	1	0,302	0,000	0,021	0,021	0,012
Dyk	5	13	0,414	0,009	0,278	0,278	0,033
Kasprzyk	4	10	0,403	0,008	0,228	0,228	0,028
Kiedrowicz	**10**	**52**	**0,537**	**0,181**	0,228	0,228	**0,074**
Kiryk	3	3	0,312	0,000	0,031	0,031	0,026
Koszela	6	16	**0,492**	0,063	0,174	0,174	0,044
Kukiełka	1	3	0,354	0,000	0,053	0,053	0,011
Kulas	3	5	0,326	0,000	0,175	0,175	0,021
Najgebauer	**9**	**28**	0,453	0,061	**0,383**	**0,383**	**0,058**
Napiórkowski	7	12	0,414	**0,086**	0,096	0,096	0,057
Nowicki	8	**30**	0,483	0,059	0,236	0,236	0,055
Pierzchała	6	11	0,426	0,030	0,295	0,295	0,039

Protasowicki	1	2	0,282	0,000	0,010	0,010	0,013
Rulka	2	5	0,319	0,000	0,124	0,124	0,016
Stanik	3	11	0,387	0,036	0,056	0,056	0,029
Stąpor	1	5	0,354	0,000	0,053	0,053	0,011
Szafrański	1	1	0,354	0,000	0,039	0,039	0,011
Tarapata	7	15	0,349	0,039	0,298	0,298	0,048
Walczak	4	7	0,382	0,025	0,056	0,056	0,033
Wantoch-Rekowski	4	6	0,426	0,037	0,126	0,126	0,033
Waszkowski	5	21	0,446	0,025	0,152	0,152	0,036
Wesołowski	2	6	0,387	0,000	0,078	0,078	0,017
Worwa	4	17	0,414	0,002	0,138	0,138	0,029

Summary

The problems of graph mining are of growing importance in the analysis of large data sets, often automatically acquired and processed from electronic sources. Several implementations of methods of solving these problems and description of their practical applications causes that the field of graph exploration is constantly developing. This can be seen in the intensity of scientific publications, scientific conferences held in this or similar areas, especially in the last twenty years.

The paper presents only selected models and methods of graph mining. The reader interested in this subject is referred to the review and application literature (Drif and Boukerram (2014), Kumar aet al (2016), Schenker et al (2005) , Tang and Liu (2010), Wasserman and Faust (1994)).

The analysis of relations between the authors of the publication presented in the study and the designated characteristics of groups of authors or individual authors (e.g. vertices isolated in graphs from subsection 3 do not directly testify to the quality of publication. They reflect the emerging in the institute of the research subgroups that have joint publications, not the quality of their work.

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Application of the FMEA (Failure Mode and Effects Analysis) Method for the Analysis of Effects and Errors in the Transport of Dangerous Goods (a case study)

Ryszard BUDZIK

Opole University of Technology, Opole, Poland.
r.budzik@po.edu.pl

Abstract

In the article, the issue of safety in the transport of dangerous goods by rail has been presented. Based on the example of one of the largest enterprises dealing with rail transport in Poland, the analysis has been conducted on errors arising during the loading, carriage and unloading of dangerous goods.
In order to carry out the analysis, the FMEA (FAILURE Mode and Effects Analysis) method has been applied. The use of the FMEA method has demonstrated the main importance of the human factor for the level of safety in the transport of dangerous goods by rail. The application of the FMEA method for the analysis of safety in the X company in the transport of dangerous goods by rail has enabled the creation of risk tables that have contributed to the introduction of principles on minimizing risks in the transport of dangerous goods.

Keywords: FMEA method, transport of dangerous goods by rail.

Introduction

Transport, in Latin "transport – to carry, to freight", is an activity related to the movement of people, cargo from point A to point B with properly selected means of transport.

Nowadays, when the time is the main factor in transferring goods from place A to place B, road transport has dominated the transport market for carriage of various goods.

At any time, when thousands of tons of different goods are being transported around the world, the problem is safe transport of dangerous goods with an adequate level of safety. From the point of view of carriage of hazardous materials, an alternative for road transport is rail transport.

One of the main factors distinguishing the mode of transport is the range of cargo movement. Taking into account the range, transport can be divided into short- and long-distance transport. Long-distant transport is divided into air transport, water transport, road transport and rail transport.

Rail transport is the oldest mechanized form of transport used primarily for the carriage of bulk cargo. In particular, freight rail transport is profitable for distances starting from several hundred kilometers. Rail transport has a number of advantages:

- high load capacity,
- relatively short delivery time,
- technical reliability of the means of transport,
- from the point of view of safety, a lower risk of an accident, collision,
- lower transport rates per kilometer compared to road transport.

Long-distance rail transport is still being developed, the example of which can be the Moscow-Vladivostok railway with the distance of 9259 km. The major significance of this railway is the transport of goods from China to Europe.

Security in Rail Transport

Securing the cargo plays the major role in transport. It depends on the proper protection whether the goods will be delivered to the indicated place in perfect condition.

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The consequences of inappropriate security are often large material losses. An undesirable effect of inadequate protection during transport is an accident. According to the correct security procedures, various loads are protected with adequate nets, straps, mats, chains and ropes. In rail transport, cargo is secured not only against movement but also against theft.
Dangerous goods carried by the means of transport are classified in terms of physical, chemical and biological properties. Also, goods transported by rail may possibly pose a threat to the health and life of people involved in the transport of dangerous goods, they may also cause significant losses in the material and environmental spheres.

According to RID (in French: Le Règlement concernant le transport international ferroviaire des marchandises dangereuses), it is the regulation for the international carriage of dangerous goods by rail, based on the Directive 2008/68/EC of the European Parliament and the Council of Europe on the inland transport of goods. (Directive 2008/68/EC of the European Parliament on the inland transport of dangerous goods. 2008).

The RID regulations, among others, specify what dangerous goods are not allowed for international transport and which are allowed and under what conditions.

According to RID, there are 9 classes of dangerous goods. These are explosives, gases, flammable liquids, flammable solids, materials susceptible to self-ignition, water reactive materials, oxidizing materials, radioactive materials, corrosive materials, various hazardous materials and objects.

Legal provisions for the transport of dangerous goods

The main principles for the international transport of dangerous goods by rail have been included in the RID regulations, Annex C to the Convention of International Carriage by Rail. The Convention was written in Berlin on 9 May 1980. RID is in force in all European countries. The participants in the transport of dangerous goods by rail are obliged to adapt to and obey the rules dictated by RID.

The general rules dictated by RID in the event of a hazard are presented to all the participants in the transport of dangerous goods and are as follows:

- to apply all possible measures to minimize the effects of the event,
- the obligation to immediately notify relevant emergency service,
- to provide the necessary information for an effective rescue operation.

The analysis of effects and errors in the transport of dangerous goods by rail according to the FMEA analysis (a case study)

The subject to the analysis is the transport of dangerous goods by rail in the X company. The X company carries dangerous loads in the area of Poland, Belarus, Czech Republic, Ukraine and Germany. The X company has their own rolling stock, all the attestations and certificates related to the security of the transport of dangerous goods. The security in the X company is ensured by a range of procedures, instructions aimed at specifying and indicating appropriate operations concerning the secure carriage of dangerous goods; the analysis of types and effects of possible errors has been carried out (Kosiorek D.: Jakość w teorii i praktyce zarządzania organizacjami. “Zarządzanie i finanse” No. 11 Part 1,2013; Rychły – Lipińska A.: FMEA . Analiza rodzajów błędów oraz ich skutków. “Zeszyty Naukowe Wydziału Nauk Ekonomicznych Politechniki Koszalińskiej” No. 11,2007;
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In order to improve the safety of the transport of dangerous goods in the X company, the analysis of the types and effects of possible errors has been carried out according to FMEA.

The FMEA method is to prevent the effects of hazards which may occur during the transport of dangerous goods by rail.

The hazards which the FMEA analysis relates to occur at the stage of:

- loading and unloading of dangerous goods,
- carriage of goods,

Critical threats which may occur are as follows:
- train derailment,

- a collision with another train, a motor vehicle at a crossing, wild game,
- leakage of a tanker or a load unit.

Lesser rank threats include:
- inadequate security,
- inappropriate marking of dangerous goods,
- incorrect connection of loading/unloading devices.

Irregularities that may affect safety are:
- incorrectly written documentation,
- illegible marking,
- human error.

In practice, the application of the FMEA method for the analysis leads to the determinanion of the threat-effect-cause relationship. For each hazard, its cause or effect, the criteria are defined given the value in the range of 1 to 10.

In Tables 1, 2 and 3, the criteria and weights for hazards, hazard effects and frequency of hazard occurrence are presented based on practice.

Table 1: Criteria for the probability of hazard detection (weight, ranking).

No.	Effectiveness of hazard detection	Weight, Ranking
1.	Complete uncertainty	10
2.	Very faint uncertainty	9
3.	Faint uncertainty	8
4.	Very little uncertainty	7
5.	Little uncertainty	6
6.	Average uncertainty	5
7.	Moderate uncertainty	4
8.	High uncertainty	3
9.	Very high uncertainty	2
10.	Highest uncertainty	1

Table 2: Criteria for the probability of hazard detection (weight, ranking).

No.	Effectiveness of hazard detection	Weight, Ranking
1.	Dangerous, with warning	10
2.	Dangerous, no warning	9
3.	Very serious	8
4.	Serious	7
5.	Moderately serious	6
6.	Not very important	5
7.	Unimportant	4
8.	Trivial	3
9.	Very trivial	2
10.	No effects	1

Table 3: Probability and frequency of hazard occurrence (weight, ranking)

Probability of hazard occurrence	Frequency of hazard occurrence	Weight, Ranking
very high – very frequent hazards	once a week once a month	10 9
high – frequent hazards	once a quarter once every six months	8 7
medium – occasional hazards	once every nine months	6

	once a year once every 1.5 year	5 4
low – relatively low hazards	once every 2 years once every 2.5 years	3 2
distant – unlikely hazard	once every 3 years	1

In the X company, as a result of the FEMA analysis, 25 hazards have been identified based on practice:

- incorrectly compiled shipping documents and specifications,
- inadequate selection of personnel,
- lack of a sufficient number of employees responsible for the transport process,
- poor mental and physical condition,
- lack of staff training in OSH
- failure to comply with internal regulations and orders,
- training in the transport of dangerous goods inconsistent with applicable regulations,
- lack of appropriate training in the transport of dangerous goods,
- illegible marking of dangerous goods,
- improper securing of dangerous goods,
- inappropriate selection of the rail car for the transport of dangerous goods,
- collision with wild game,
- collision with another train,
- collision with a motor vehicle at a crossing,
- leakage of a tanker,
- leakage of a load unit,
- damage to train control mechanisms,
- failure of the breaking system,
- damage to the sheathing of a car or a locomotive,
- damage to railway traffic control devices
- poor condition of the railway infrastructure,
- train derailment due to human error,
- train derailment for reasons beyond the carrier,
- natural disasters.

On the basis of the points in the ranking assigned to the occurrence of the specific hazard (Z), effect of hazard occurrence (S) and control of hazard detection (W), the risk has been created which is the product (L) of the above ranking ratings.

$$\mathbf{L = (S) \times (W) \times (Z)}$$

Number L may take values from 1 to 1000. On the basis of long-term observations in the analyzed X company, it has been concluded that number L = 100 is significant for the safety of the rail transport of materials. It has been stated that each determined L value higher than 140 means a critical hazard for the transport of dangerous goods by rail.

The matrix of L risk is presented in Table 4.

Table 4: Risk classes and the risk level

No.	Risk class	"L" risk	Risk level
1.	I	L<100	No risk, or a very low risk of hazard occurrence
2.	II	100<L<140	Steps to eliminate the risk of hazard must be taken
3.	III	L>140	With an increase in the number to more than 140, very high hazard, including the critical one

In order to obtain the specific numbers of risk (L) in the X company, the table has been compiled containing information on what L numbers can be assigned to the specific hazard. Based on the FEMA analysis, the criteria for assessment of the degree of risk have been created. L number higher than 140 amounts to the critical hazard. L number lower than 100 means there is no risk of hazard occurrence. The risk is acceptable.

Typical two examples of hazards out of 25 threats which may occur in the transport of dangerous goods by rail in the X company are presented in Table 5.

Table 5: Exemplary hazards that may occur in the transport of dangerous goods.

No.	Hazard	Possible effects	Control measures (detection)	Z	S	W	Z	Recommended control measures
1.	Poor mental and physical condition	Threat to life and health	Control before and during work by the manager	4	6	7	168	L higher than120. Critical hazard. Controls ought to be introduced
2.	Poor condition of the railway infrastructure	Risk of an accident	Reporting on bad condition to superiors	2	6	7	84	Threat of bad condition, reporting to the infrastructure manager

Summary and conclusions

In the analyzed company, the research results on the application of the FEMA method have been specified. With this method, one may easily determine which hazards should be eliminated first.

Based on the conducted analysis of safety in the transport of dangerous goods by rail in the X company, the following conclusions have been drawn:

- 1. The application of the FMEA method has shown mainly the importance of the human factor for the level of safety in the transport of dangerous goods by rail,
- 2. The transport of dangerous goods by rail is a complex and responsible process and constantly changing regulations, new forms of security, methods of loading and unloading, force companies to continue training in this field,
- 3. The effects that may be due to inappropriate transport may concern every person and also the surrounding environment,
- 4. The application of the FMEA method for the analysis of safety in the X company has resulted in the creation of the risk table and the risk tables have contributed to the introduction of principles for minimizing risks in the transport of dangerous goods by rail in the X company.

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Profitability Ratios and Downside Risk in Asset Pricing

Anna Rutkowska-Ziarko

University of Warmia and Mazury in Olsztyn, Poland

The Faculty of Economics, Department of Finance

E-mail: aniarek@uwm.edu.pl; aniarziarko@gmail.com

ORCID: https://orcid.org/0000-0001-6073-3386

Lesław Markowski

University of Warmia and Mazury in Olsztyn, Poland

The Faculty of Economics, Department of Finance

E-mail: leszekm@uwm.edu.pl

ORCID: https://orcid.org/0000-0001-6238-1724

Abstract

The aim of the study is to verify the pricing of assets in the Polish capital market using CAPM extended version. In the research, in addition to market risk in the form of a beta coefficient, the variables adopted for the model were the fundamental ratios used to analyse profitability, ROA and ROE. Market risk was considered in a variance and downside framework. For calculating the downside risk the Harlow and Rao formula was used. The subject of the research were stocks of the companies with various capitalization and across different industries, belonging to the large, medium and small indexes and equally-weighted portfolios based on these stocks. Two-factor models for quarterly returns were estimated in a two stage procedure in which cross-sectional regression was applied. The regressions give an evidence of existing positive risk premium for market risk both in conventional and downside approach For all samples of companies downside beta is a little better risk measure than the conventional one. The findings of our study indicate also that the ROA and ROE ratios proved to be valid factors in the risk-return relationship. Profitability ratios considerably outperform market beta coefficients as factors explaining average returns on the Warsaw Stock Exchange. Mean returns in the capital market are much more responsive to the financial performance of a company, especially ROE, than to the market index. The highest explanatory power have models for portfolios, large and medium stocks and with downside beta and ROE ratio. The results show that the combination of financial analysis' factors with downside risk measure contributes to a better understanding of capital asset pricing.

Keywords*:* Downside beta, CAPM, ROA, ROE.

JEL Classification*:* G12, G32.

Introduction

The study of share prices in the financial markets is as old as the financial markets themselves. The growing importance of financial markets and financial institutions in the economy means that research on share prices is

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an important area and will continue to be so in the future. Fundamental analysis is the oldest tool for analysing stock prices in financial markets (Ritchie, 1996).

Profitability and cash flow analysis has a special place in the fundamental analysis of the stock market. It is believed that the increase in share prices and dividends paid by the company is related to the ability of enterprises to generate profit and to maintain positive cash flow.

An alternative approach to the pricing of financial assets is highlighted in Markowitz's portfolio theory (Markowitz, 1952; 1959) and the model of valuation of capital assets. This model was developed independently by Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1966).

These models assumed that for a market in equilibrium the average rate of return on shares depends on the risk incurred by the investor. The risk was measured by the variance in returns. For variance, the risk of the investment portfolio can be easily determined based on the correlation between returns on shares. This approach is easy to apply in practice. In the calculus of variance, positive and negative deviations from the average rate of return are treated in the same manner, which is not consistent with the assumption that the investor prefers to own more than less. In response to this, asymmetric risk measures such as semi-variance were developed in the capital market studies (Hogan & Warren, 1974). The downside measure of co-occurrence replacing covariance is the lower partial moment. It is worth emphasizing that when determining variance and covariance, the reference point is always the average or expected rate of return. However, different target points can be chosen for determining the lower partial moments. Many approaches to calculating them have been proposed in the literature (Bawa & Lindenberg, 1977; Harlow & Rao, 1989). Research on the use of downside risk measures and the Downside CAPM (D-CAPM) model includes works (Estrada, 2002; Post & Vliet, 2006; Momcilovic et al., 2017). Barucci and Fontana (2017) put forward that expected returns change over time and a risk premium for downside risk is generated. They offer an explanation for changing risk aversion in time. Investors have low risk aversion after a rise in share prices and high-risk aversion after declining in prices.

Irrespective of the one-factor CAPM with a classical and downside risk approach, the Arbitrage Pricing Theory (APT) was created, which significantly enriches the structure of capital asset pricing. APT indicates the existence of risk factors other than volatility. It is, on the one hand, a competitive theory and on the other a theory expanding CAPM. (Ross, 1976). According to APT, rates of return on shares depend on several factors that are sources of systematic risk, which can be considered as a combination of elements of portfolio and fundamental analysis in the process of capital assets pricing. Fama and French (1992; 1993; 2018) made an important contribution to the development of multi-factor models and APT. Their model is based on a variance as a risk measure added to CAPM other than beta coefficient risk factors such as firm size and book-to-market. Zaremba and Czapkiewicz (2017) found that profitability factors ROA and ROE have a statistically significant impact on rates of return in emerging markets

Considering the market factors and fundamental factors, this paper attempts to specify multifactor models in the classic approach to risk and models based on downside risk measures. As a statement of the financial performance of the company, the profitability ratios ROA and ROE are taken. The two-factor models based on one profitability ratios and alternatively classical and downside beta coefficients are estimated. We assume, that the profitability ratios are one of the most important reasons determining the level of rates of return on the capital market. The aim of the study is to verify the pricing of assets in the Polish capital market using CAPM extended version.

The article is organized as follows. First, the downside risk measures were introduced in Section 2. Section 3 describes the data set, the method of portfolios formation and the results obtained were discussed. We conclude in the last Section.

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Theoretical Background

CAPM is still one of the fundamental theories and tools of risk assessment. However, its standard version is subjected to continuous modification by taking into account additional risk factors. These factors may prove the effectiveness of assets management and, thus, the financial condition of the company.

Florio and Leoni (2017) showed that companies with a good quality of risk management are in good economic condition and their market position is better. Accounting variables are a valuable support to market beta in risk analysis (Amorim, Lima & Murcia, 2012). They analysed the relationship between information from financial statements and systematic risk in the Brazil financial market. In addition, this article gave a wide review of literature and studies on that topic. Nekrasov and Shroff (2009) highlighted the utility of accounting information

as risk factors. The co-movement between the ROE of a firm and the market ROE were considered. Cambell, Polok, and Vuolteenaho (2010) appreciated the role of accounting information in the calculation of the cost of equity and the risk analysis. They study the influence of stock cash flow on returns in the capital market and provide an example of the application of accounting risk measures using the Morningstar stock-rating system. Morningstar Inc. argues that accounting data may better reveal information about the long-run risk and cost of capital than CAPM.

The correlation between market risk and accounting information was also analysed for emerging markets. Er and Kaya (2012) analysed the Istanbul Stock Exchange and found the impact of EBIT divided by net sales on market beta. They did not use ROA or ROE. Toms (2012; 2014) proposed the accounting-based risk (ABR) model as a contrast to CAPM. The ABR model focuses on revenue and cost behaviour and the impact of that on the accounting rate of return.

The role of financial ratios in multi-factor models is still developing. Fama and French (2018) proposed six-factor models with cash profitability and operating profitability**.** Ahsan (2013) showed that a portfolio based on ROE can generate positive abnormal returns, but higher ROE does not guarantee higher returns from a security. He considered NYSE, NASDAQ and AMEX stocks and annual company performance. Zaremba and Czapkiewicz (2017) tested explanatory power of four popular factor pricing models in emerging European markets. They analysed about 100 anomalies documented in the financial literature. Out of wide range of variables they used as well the profitability factors like ROA and ROE. Considering these ratios they found positive differences between means that significantly different from zero under the equal-weighted and capitalization-weighted portfolios.

CAPM is a theory describing the risk-return relationship in the light of the postulate according to which variance is the only accepted measure of risk. For this reason, testing the asset pricing model has been widely criticized as not being sufficient to determine the cost of capital. The downside risk is intuitively based on investor aversion to potential deviations in the form of losses rather than profits. In addition, the return distributions are not usually normal or at least symmetrical. Many CAPM validity tests conducted on developed markets found the advantage of CAPM downside beta coefficient over classic CAPM (Post & Vliet, 2006). Ang, Chen and Xing (2006), using common stock quoted on NYSE, AMEX and NASDAQ, provided strong evidence that investors require a premium for downside risk and verified that assets with high downside betas obtain high average returns. Models with downside betas have higher explanatory power than traditional CAPM for NYSE stocks (Chen et al., 2009). Tsai, Chen and Yang (2014) investigated whether the expected returns depend on CAPM and downside betas. They used a dynamic conditional correlation (DCC) model and, for a sample of developed countries, they revealed that the downside betas explain a substantial part of the volatility of expected asset returns better than CAPM betas. In emerging markets, Estrada (2007) indicated that the Downside-CAPM much more explained the risk-return relationship than the traditional CAPM, particularly in asymmetric return distribution. Estrada proposed a new formula of downside beta and verified its utility in asset pricing. Alles and Murray (2013) concluded that downside co-skewness was a significant measure in cross-sectional regressions in contrast to the downside beta. These results were confirmed in the Korean stock market (Thuy & Kim, 2018). Extensive research in emerging markets such as Slovenian, Croatian and Serbian demonstrated that the downside risk is the variable that statistically significantly explain mean returns (Momcilovic et al., 2017) Significance of downside risk in asset pricing was examined on the Chinese stock market (Ali, 2019). This research showed a positive risk premium for downside variability in the medium and long term. Therefore, we considered risk analysis in two approaches: variance and downside risk. Recent research into accounting-based downside risk and cost of capital was conducted by Konchitchki et. al. (2016). They proposed a measure of downside risk - accounting-based downside risk. The accounting-based downside risk is the proportion of lower and upper variances of ROA. It contrasts the meaning of downside risk compared to our approach. Rutkowska-Ziarko (2015) and Rutkowska-Ziarko and Pyke (2018) identified a positive correlation between the quarterly profitability ratios (ROA, ROE, ROS) and the quarterly average rates of return for companies listed on the Warsaw Stock Exchange.

In the current study, we use the concept of Harlow and Rao (1989) for downside risk. In addition, quarterly information on company performance was used, whereas most studies employed annual data. In this article, we suppose that fundamental variables have better explanatory power of average rates of return for larger and medium firms compared to smaller firms.

Research Methodology

According to the classic CAPM, the main source of risk is the economic situation of the market as a whole, which is reflected in the market portfolio, including all available assets. In practice, stock indices are an approximation of such a portfolio. The main, systematic measure of risk is the beta factor, which expresses the sensitivity of

changes in a given asset to changes in market conditions. The CAPM postulates a linear function between expected returns of assets and the systematic risk expressed by beta coefficients. This relation can be given as follows:

$$E(R_i) = R_f + \beta_i\big(E(R_M) - R_f\big) \quad (i = 1, \dots, N) \tag{1}$$

where $E(R_i)$, $E(R_M)$ are the expected return on asset *i* and the market portfolio, respectively; R_f is risk-free rate; β_i is beta coefficient for asset *I*, which reflects the sensitivity of a given asset to changes in the stock index as a proxy of market portfolio.

In contrast, downside CAPM (D-CAPM), unlike the classic approach, identifies risk only as deviations below the assumed rate of return. Downside risk measures base on semi measures like semi-variance of returns and co-semi-variance or, more generally, lower partial moments (lpm) of degree n (with $n \geq 1$) and defined as:

$$lpm_i{}^n = \frac{1}{T-1}\sum_{t=1}^{T}(lpm_{it})^n\ , \tag{2}$$

where:

$$lpm_{it} = \begin{cases} 0 & for\ R_{it} \geq \tau \\ R_{it} - \tau & for\ R_{it} < \tau \end{cases} \tag{3}$$

and R_{it} – rate of return on asset *i* in period *t*; T - length of the time series.; τ - target rate. An important issue for assessing downside risk measure is the target rate, which means the required rate by the investor. The theory distinguishes many forms of downside beta coefficients, differentiating them from the formula and the target rate. In a case when the required rate τ equals risk-free rate and $n = 2$, the downside beta coefficient can be written as follows (Hogan & Waren, 1974; Bawa & Lindenberg, 1977):

$$\beta_i^{HW} = \beta_i^{BL} = \frac{E\{(R_{it}-R_f)\cdot\min[(R_{Mt}-R_f),0]\}}{E\{\min\,[(R_{Mt}-R_f),0]^2\}} \tag{4}$$

and the special case of above coefficient where the target rate is zero (Li & Galagedera, 2008):

$$\beta_i^{HW}\big(R_f = 0\big) = \frac{E[R_{it}\min(R_{Mt};0)]}{E[\min(R_{Mt};0)]^2} \tag{5}$$

Harlow and Rao (1989) developed the problem of lower partial moment as the *n*th order generalised lpm. They indicate that investors' risk assessment of securities should take into account various acceptable target rates. One such level for determining the downside measure is the average rate of the market portfolio. The downside beta of the Harlow and Rao formula is given by using the covariance between asset *i* and market portfolio:

$$\beta_i^{HR} = \frac{E[(R_{it}-E(R_i))\min(R_{Mt}-E(R_M);0)]}{E[\min(R_{Mt}-E(R_M);0)]^2}\ . \tag{6}$$

In this research, formula described in (6) was employed to calculate the downside betas to study the risk-return relationships.

Research Results

The study sample employs securities listed on the Warsaw Stock Exchange. The dataset consists stocks quoted in the WIG20, mWIG40 and sWIG80 indices. The WIG20 index is based on the value of a portfolio of 20 major and most liquid companies on the WSE, the mWIG40 index comprises 40 medium-sized companies and the sWIG80 index comprises 80 smaller companies listed on the WSE. The selection of companies from such various indices made it possible to consider the impact of company size on the risk-income relationship. The sample time period of quarterly returns starts from January 2010 to December 2017. The full-time series in the analysed period were characterized by 62 stocks: 10 from the WIG20, 21 from the mWIG40 and 31 from the sWIG80 indices. The sample includes a set of stocks mixed in terms of size and across different industries. In the study, we used data for companies from almost all industries, excluding the financial sector.

Besides individual securities, equally-weighted portfolios are also analysed in this study. Portfolios are formed from securities sorted in ascending order by the average return. Each portfolio consists of 5 securities and is formed in a rolling procedure. In that way for the entire sample of 62 securities, 58 portfolios can be created. For two

separate subsamples of 31 large-medium securities and 31 small securities, 27 portfolios are formed in each of them.
The market-wide WIG index is used as the market portfolio approximation. Two well-known profitability ratios (ROA and ROE) from quarterly financial reports are taken. All data were obtained from the EMIS database. EMIS provides access to information on over 145 emerging markets.

The study of relations between risk measures and expected rates of return is carried out in a two-step procedure. In the first stage, based on all observations of the sample, the risk measures and ratios (β_i, β_i^{HR}, $\overline{ROA}_i$, $\overline{ROE}_i$) are estimated using single linear regressions and formula from section 2. In the second stage cross-sectional multiple linear regression model relating mean returns to risk measures is used (Estrada, 2002). Two versions of two-factor CAPM are proposed. Each type of model includes two sets of variables. The first constitutes a classical or downside beta coefficient and the second comprises company characteristics in the form of the average return on assets ratio (ROA) and average return on equity ratio (ROE). The idea of combining financial ratios with downside risk is a new one. The specific combination of proposed risk factors is unique just for this paper. The testing cross-sectional multiple regression equations are as follows (Estrada, 2002):

$$\bar{R}_i = \lambda_0 + \lambda_1\hat{\beta}_i + \lambda_2\overline{ROA}_i + \eta_i; \qquad (i = 1. \dots . N) \tag{7}$$

$$\bar{R}_i = \lambda_0 + \lambda_1\hat{\beta}_i + \lambda_2\overline{ROE}_i + \eta_i; \qquad (i = 1. \dots . N) \tag{8}$$

$$\bar{R}_i = \lambda_0 + \lambda_1\hat{\beta}_i^{HR} + \lambda_2\overline{ROA}_i + \eta_i; \quad (i = 1. \dots . N) \tag{9}$$

$$\bar{R}_i = \lambda_0 + \lambda_1\hat{\beta}_i^{HR} + \lambda_2\overline{ROE}_i + \eta_i; \quad (i = 1. \dots . N) \tag{10}$$

where $\bar{R}_i$- means rates of return for the *i*-th security or portfolio; β_i, β_i^{HR}, $\overline{ROA}_i$, $\overline{ROE}_i$, are the estimates of risk measures for the *i*-th security or portfolio; $\lambda_0, \lambda_1, \lambda_2$ - structural parameters, η_i - random variable term of *i*-th security or portfolio.

From the relationships (7-10), some testable implications can be formulated. The risk premium denoted by parameters of λ_1 and λ_2 associated with all risk measures should assume significant and positive values. Finally, the constant term λ_0 should significantly differ from zero and correspond to the actual risk-free rate.

The estimation of extended CAPM was preceded by the analysis of correlation coefficients between average returns and systematic risk measures and fundamental ratios, separately for individual securities and portfolios. Tables 1-6 show the Pearson correlation coefficients between market betas and profitability ratios.

Tab.1: Correlation coefficient between risk measures for all individual stock companies

	$\bar{R}$	β	β^{HR}	$\overline{ROA}$	$\overline{ROE}$
$\bar{R}$	1	0.248*	0.247*	0.476***	0.525***
β		1	0.949***	0.026	-0.030
β^{HR}			1	-0.039	-0.079
$\overline{ROA}$				1	0.758***
$\overline{ROE}$					1

Source: own research

Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively.

Tab.2: Correlation coefficient between risk measures for equally-weighted portfolios based on all stock companies

	$\bar{R}$	β	β^{HR}	$\overline{ROA}$	$\overline{ROE}$
$\bar{R}$	1	0.384***	0.410***	0.736***	0.775***
β		1	0.967***	-0.029	-0.069
β^{HR}			1	-0.052	-0.082
$\overline{ROA}$				1	0.890***
$\overline{ROE}$					1

Source: own research

Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively.

There is a positive and significant correlation between average rate of returns and the average values of the profitability ratios (ROA and ROE) and betas for the sample of all stock companies under study. The power of correlation is higher for equally-weighted portfolios compare to individual stock companies. In the same time there is no significant correlation between market and accounting risk factors, both for portfolio and individual stock companies.

Tab.3: Correlation coefficient between risk measures for large and medium stock companies

	$\bar{R}$	β	β^{HR}	$\overline{ROA}$	$\overline{ROE}$
$\bar{R}$	1	0.415**	0.397**	0.537***	0.534***
β		1	0.955***	0.216	0.095
β^{HR}			1	0.135	0.033
$\overline{ROA}$				1	0.718***
$\overline{ROE}$					1

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively.*

Tab.4: Correlation coefficient between risk measures for equally-weighted portfolios based on large and medium stock companies

	$\bar{R}$	β	β^{HR}	$\overline{ROA}$	$\overline{ROE}$
$\bar{R}$	1	0.677***	0.718***	0.691***	0.783***
β		1	0.949***	0.496***	0.369*
β^{HR}			1	0.338*	0.311
$\overline{ROA}$				1	0.846***
$\overline{ROE}$					1

Source: own research
*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively.*

Similar results have been obtained for the sample of large and medium stock companies. In this case, all risk factors were significantly correlated with the average rate of returns. The correlation for portfolios was stronger than for individual companies. The classical beta (β) and downside beta (β^{HR}) have not any connection with the average rate of return on the capital market. Whereas the significant correlation between returns for stock companies and average accounting profitability was observed.

Tab.5: Correlation coefficient between risk measures for small stock companies

	$\bar{R}$	β	β^{HR}	$\overline{ROA}$	$\overline{ROE}$
$\bar{R}$	1	0.101	0.105	0.391**	0.517***
β		1	0.952***	-0.185	-0.192
β^{HR}			1	-0.262	-0.256
$\overline{ROA}$				1	0.814***
$\overline{ROE}$					1

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively.*

Tab.6: Correlation coefficient between risk measures for equally-weighted portfolios based on small stock companies

	$\bar{R}$	β	β^{HR}	$\overline{ROA}$	$\overline{ROE}$
$\bar{R}$	1	0.070	0.148	0.519***	0.665***
β		1	0.987***	-0.433**	-0.397**
β^{HR}			1	-0.442**	-0.385**
$\overline{ROA}$				1	0.955***
$\overline{ROE}$					1

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively.*

The correlation analysis exhibits the positive and statistically significant relationships between mean returns and classical and downside beta coefficients both for individual securities and portfolios. The analysis also shows the strong positive correlations between profitability ratios and mean returns and these measures considerably outperform market beta coefficients in the overall samples securities and portfolios. The findings of this study indicate that returns are much more responsive to the level of fundamental data than the market condition. Stronger relationships of this type were observed for portfolios, which was expected. In addition, the results show no relationship between market measures and fundamental measures for individual securities, which generate the possibility of treating the latter as additional information necessary for asset pricing.

The results of multivariate cross-sectional regressions defined in equations (7-10) for all securities and equally-weighted portfolios are given in Tables 7 and 8. The beta coefficient and downside beta of the HR formula are significant variables in explaining mean returns of these investments. Investors are rewarded for classical and downside systematic risk in the shape of a positive risk premium which ranged from 0.0138%-0.0169% per quarter for individual securities and 0.476%-0.0525% per quarter for portfolios. The findings are consistent with the results of Mamoghli and Daboussi (2010) who identified positive and significant premiums for classical and downside betas in cross-section regression analysis when the mean returns of portfolios were regressed over the above-mentioned risk measures. However our results did not confirm the findings obtained by Galagedera (2009) and Thuy and Kim (2018) who found that the beta and downside beta were insignificant and co-skewness outperformed these risk measures in explaining the variation of average returns.

When the tools of fundamental analysis are included together with CAPM and downside betas the average values of ROA and ROE ratios proved to be valid factors illuminating the risk-return relationship. In all regressions, estimates of risk premium for these variables were significantly differ from zero at the 1% level. Correlations

between the ROA and ROE ratios and mean returns testify that these factors are more influential than beta coefficients in explaining of mean stock returns. The risk premiums for portfolio investments are much higher than for individual securities and ranged from 3.4389% to 3.4909% per quarter for ROA and from 1.5970% to 1.6145% per quarter for ROE. For explanatory power two conclusions should be drawn. Firstly, models containing average ROE have more explanatory power than models using ROA ratio. The first models explain about one-third and the second models explain about one-fourth of variability in mean returns of securities. However, models with ROA and ROE for portfolios have the average R-Squared values about 0.79-0.82 and 0.70-0.73, respectively. Secondly, downside CAPM have slightly higher explanatory power than classical CAPM, both for individual securities and for portfolios.

Tab.7: Two-factor cross-sectional regressions of risk factors on the mean returns for all individual stock companies

	Models			
Risk factor	**I**	**II**	**III**	**IV**
Constant	-0.0033 (-0.418)	-0.0040 (-0.543)	-0.0056 (-0.689)	-0.0058 (-0.784)
β	0.0138 (2.132)**	0.0155 (2.503)**	- -	- -
β^{HR}	- -	- -	0.0155 (2.442)**	0.0169 (2.782)***
$\overline{ROA}$	1.4174 (4.261)***	- -	1.4675 (4.458)***	- -
$\overline{ROE}$	- -	0.7081 (5.062)***	- -	0.7278 (5.248)***
Adj. R^2	0.257	0.323	0.274	0.338

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively. Regression t-statistics are in parentheses.*

Tab.8: Two-factor cross-sectional regressions of risk factors on the mean returns for equally-weighted portfolios based on all stock companies

	Models			
Risk factor	**I**	**II**	**III**	**IV**
Constant	-0.0643 (-6.845)***	-0.0623 (-8.166)***	-0.0644 (-7.822)***	-0.0612 (-9.465)***
β	0.0484 (5.567)***	0.0525 (7.183)***	- -	- -
β^{HR}	- -	- -	0.0476 (6.577)***	0.0506 (8.505)***
$\overline{ROA}$	3.4389 (10.240)***	- -	3.4909 (11.110)***	- -

$\overline{ROE}$	- -	1.5970 (13.150)***	- -	1.6145 (14.510)***
Adj. R^2	0.696	0.786	0.734	0.821

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively. Regression t-statistics are in parentheses.*

The two-factor cross-sectional regressions were repeated for a subsample of large and medium stock companies and separately for small stock companies. The results obtained for large and medium stocks included in Table 9 very closely resemble the results received for the whole sample. The impact of risk factors on the expected rates of return was positive and statistically significant at the level of 5% and 1% for the beta and average ROA and ROE ratios respectively. The explanatory power of these models is higher than the results obtained for all securities and it varies from 0.338 to 0.389. Similar to the previous results for all securities the best model for explanatory power was the equation using the downside beta of the HR formula and the average ROE ratio. All estimates for portfolio investments are statistically significant at 1% level (Tab.10). Particularly noteworthy is the downside CAPM with ROE ratio for which the highest level of explanatory power was 0.851. The results show a stronger effect on stock prices caused by changes in return on equity than return on assets. Increasing profits from equity generate higher demand for shares of a given company and thus higher prices of these shares.

Tab.9: Two-factor cross-sectional regressions of risk factors on mean returns for large and medium stock companies

	Models			
Risk factor	**I**	**II**	**III**	**IV**
Constant	-0.0044 (-0.438)	-0.0042 (-0.448)	-0.0075 (-0.710)	-0.0070 (-0.704)
β	0.0185 (2.057)**	0.0217 (2.537)**	- -	- -
β^{HR}	- -	- -	0.0199 (2.231)**	0.0228 (2.660)**
$\overline{ROA}$	1.2838 (3.083)***	- -	1.3474 (3.321)***	- -
$\overline{ROE}$	- -	0.5687 (3.449)***	- -	0.5943 (3.651)***
Adj. R^2	0.338	0.377	0.352	0.389

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively. Regression t-statistics are in parentheses.*

Tab.10: Two-factor cross-sectional regressions of risk factors on the mean returns for equally-weighted portfolios based on large and medium stock companies

	Models			
Risk factor	**I**	**II**	**III**	**IV**
Constant	-0.0368 (-3.126)***	-0.0419 (-4.704)***	-0.0499 (-4.787)***	-0.0505 (-6.727)***
β	0.0467 (3.087)***	0.0473 (4.451)***	- -	- -
β^{HR}	- -	- -	0.0563 (4.967)***	0.0540 (6.582)***
$\overline{ROA}$	1.8211 (3.274)***	- -	1.9591 (4.601)***	- -
$\overline{ROE}$	- -	1.0772 (6.113)***	- -	1.0816 (7.779)***
Adj. R^2	0.595	0.771	0.721	0.851

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively. Regression t-statistics are in* parentheses.

Tab.11: Two-factor cross-sectional regressions of risk factors on mean returns for small stock companies

	Models			
Risk factor	**I**	**II**	**III**	**IV**
Constant	-0.0017 (-0.131)	-0.0071 (-0.581)	-0.0043 (-0.313)	-0.0095 (-0.788)
β	0.0104 (1.035)	0.0121 (1.303)	- -	- -
β^{HR}	- -	- -	0.0125 (1.272)	0.0143 (1.586)
$\overline{ROA}$	1.4674 (2.442)**	- -	1.5543 (2.564)**	- -
$\overline{ROE}$	- -	0.9293 (3.484)***	- -	0.9708 (3.634)***
Adj. R^2	0.125	0.260	0.142	0.280

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively. Regression t-statistics are in parentheses.*

Tab.12: Two-factor cross-sectional regressions of risk factors on the mean returns for equally-weighted portfolios based on small stock companies

	Models			
Risk factor	**I**	**II**	**III**	**IV**
Constant	-0.0524 (-2.154)**	-0.0555 (-3.033)***	-0.0636 (-2.836)***	-0.0621 (-3.809)***
β	0.0381 (2.026)*	0.0417 (2.731)**	- -	- -
β^{HR}	- -	- -	0.0495 (2.771)**	0.0500 (3.541)***
$\overline{ROA}$	3.4242 (3.778)***	- -	3.6800 (4.290)***	- -
$\overline{ROE}$	- -	1.8350 (5.662)***	- -	1.8910 (6.325)***
Adj. R^2	0.324	0.538	0.400	0.603

Source: own research

*Notes: *, **, ***, indicates significance at the 10%, 5% and 1% level respectively. Regression t-statistics are in parentheses.*

As shown in Tables 11 and 12 the significant risk factors for small stock companies turned out to be the ROA and ROE ratios. The values of the risk premium for these factors were higher compared to large and medium companies and ranged from 1.4674% to 1.5543% quarterly for average ROA ratio and from 0.9293% to 0.9708% quarterly for the ROE ratio. For portfolios the values of risk premium were significantly higher than for individual securities and ranged from 3.4242% to 3.68% and from 1.835% to 1.891% quarterly for average ROA and ROE ratios respectively. In contrast to models based on portfolios, the results for individual securities models show that investors are not rewarded for classical and downside betas as the systematic risk measures. Market risk premiums for beta and downside beta of HR formula are positive but not statistically significant. The implication is that average returns of small companies are less sensitive to general market conditions than other-sized companies which may indicate the importance of company size in the assets pricing. Regardless of the size of the company the explanatory power of models with downside beta is higher than in the models with the CAPM beta.

Conclusions

This paper analysed the impact of two sources of systematic risk in capital investment mean returns. The first is the market beta coefficient in the classical and downside approach and the second is fundamental factors in the form of average profitability ratios ROA and ROE. The Harlow-Rao formula was used to determine the downside risk coefficient. These measures were adopted as independent variables in cross-sectional regressions of extended versions of CAPM relative to quarterly mean returns of individual companies and equally-weighted portfolios. The research sample included large, medium and small-sized companies.

There are some important theoretical and practical implications of this study. The study and its results indicate that the beta coefficient in the downside framework is an appropriate measure of risk for explanations of average returns regardless of the size of the company. For small companies, downside beta is an even better risk measure than the conventional counterpart, which was confirmed specifically by estimates for portfolio investments based on these companies. Investors are rewarded by a positive and statistically significant premium for the acceptance of CAPM beta and downside beta. This means that stocks or portfolios with higher classical or downside betas generate higher mean returns. This conclusion is consistent with many recent studies and gives strong evidence for using CAPM with lower partial moments in addition to classical CAPM. Moreover, results show that the mean return as a threshold rate is relevant to make capital investments decision.

Correlation analysis and two-factor models demonstrate the advantage of fundamental factors over market risk coefficients, both in the conventional and the downside approach. The average ROA and ROE ratios were more strongly correlated with mean investment returns than beta coefficients. The estimates of the premium for profitability ratios were statistically significant in models based on securities and portfolios for various sizes of the company. However, the values of these premiums for small companies were relatively higher than for large and medium companies. R-squared values were higher for the sample of large and medium stock companies compared to small companies. It should be emphasized that the two-factor models with ROE ratio had the highest explanatory power of variability of returns exceeding more than 80 percent for portfolio investments. This research, conducted on the Polish capital market gives stronger evidence of the significance of economic analysis in asset pricing. The company's ability to generate profits and the efficiency of managing its assets is important for investors in the capital markets.

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Global Economic Effect of Covid-19 on Unemployment and Quality of life of Young Adults

Otegbayo Bolajoko Elizabeth[1], *Olugu Ezutah Udoncy[2], Siti Norida Wahab[3], Ahmad Bin Ibrahim[4] and Otegbayo Christy Olubunmi[5]

[1]Institute of Graduate Studies, University of Malaya, Kuala Lumpur, Malaysia, hva170021@siswa.um.edu.my

[2]Faculty of Engineering, Technology and Build Environment, UCSI University, 56000, Kuala Lumpur, Malaysia, olugu@ucsiuniversity.edu.my
*corresponding author

[3]Department of Logistics Management, Faculty of Business and Management, UCSI University, 56000, Kuala Lumpur, Malaysia, sitinorida@ucsiuniversity.edu.my

[4]Faculty of Engineering, Technology and Build Environment, UCSI University, 56000, Kuala Lumpur, Malaysia, ahmadibrahim@ucsiuniversity.edu.my

[5]Department of Education, Ibrahim Babangida Badamosi University, Lapai, Niger State,Nigeria, otebumms@gmail.com

Abstract

The global economic crisis as a result of Covid-19 might increase the risk of employment insecurity and poor quality of life among young adults. This study evaluates the influence of the Covid-19 pandemic on employment insecurity and quality of life among young adults. Covid-19 pandemic is negatively affecting the global economy given that majority of business establishments and companies are compelled to temporarily shut down. As a result, some establishments or organizations are unable to meet up with the financial responsibilities of their companies. Therefore, workers are being laid off temporarily or permanently, businesses and companies are downsizing, cost of goods and services is spiking. Consequently, there is a further increase in employment insecurity among young adults. Hence, there is a likelihood of a reduction in the standard of living for the young adult population. A collective effort by the government and major stakeholders is required to ensure rigorous enforcement of Covid-19 precautionary measures. Additionally, adequate social or welfare support should be put in place for individuals who have lost their jobs and low-income earners. This will help minimize the severity of the economic crisis and employment insecurity among young adults globally. The study culminates with directions for further studies.

Keywords: Covid-19, Global Economy, Employment Insecurity, Young Adults, Informal worker, Quality of Life.

Introduction

The Covid-19 outbreak has continued to escalate across the globe, leaving affected countries and her citizens economically, socially, and mentally devastated. In fact, the effect of the Covid-19 pandemic has been reported to reduce global economic growth by 3.0 to 6.0 % in 2020. There is a likelihood of partial recovery of global economic growth in 2021, if there are no records of re-infection otherwise known as a second wave or even a third wave (Jackson et al., 2020). However, the inability to work towards preventing a second wave of the virus might further increase the risk of economic instability and insecurity globally. In as much as every affected country is putting in the effort to curtail the spread of the virus, it is important to note that policymakers and major stakeholders across the globe are confronted with the dilemma of securing the health of the public through enforcing physical distancing, closure of social activities, and certain related business activities. Sequel to these, they are faced with the unintended economic meltdown, which in turn poses a threat to the global economic growth (Ozili, 2020).

Unarguably, the inability to curtail the spread of the infection or virus might worsen economic recession across the globe (Açikgöz and Günay, 2020). Invariably, the human cost in terms of loss of lives is likely to negatively affect

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global economic growth. Furthermore, there are chances of the heightened poverty level, career-derailing, job losses, social unrest, increased cost of goods and services. According to Jackson et al. (2020), the global market might diminish by 18% in developing countries whose economies depend greatly on trade.

Amidst the global unrest and economic crisis caused by the sudden outbreak of Covid-19, more concerns need to be channelled towards young adults (WEF, 2020). The pandemic has no doubt ensued to unexpected disruption of many lives globally, through inflicting of psychological stress arising from imposed physical distancing (Dong and Bouey, 2020). Considering the ripple effect of the pandemic, there are speculations of deepening economic crisis on numerous sectors of the world economy (Walker et al., 2020). Hence, there is a likelihood of increased unemployment rate and implications for incurred debt. These are likely to result in inter-generational issues which may further serve as a threat to the well-being of youths and future generations (see Figure 1). Hence, this study intends to evaluate the global effect of Covid-19 on young adults. Its further sorts to evaluate the consequences of the global economy on the employment rate and quality of life of young adults.

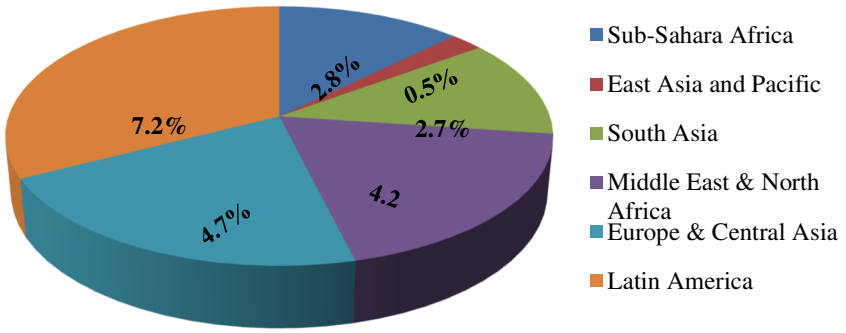

Fig. 1: Predicted Shrink in Economy in Different Regions (by percentage)

Source: WEF, 2020

Literature Review

The incidence of Covid-19 has tremendously transformed from a public health concern to the global economic crisis. According to Kumar (2020), the current pandemic is one of the worse global experiences since World War II. In the quest to flatten the curve of Covid-19 spread, countries were compelled to adapt to stringent measures which required international travel bans, border closures, closures of business establishment and social activities, and enforced quarantines. These adapted measures have created an uproar in the global market and further escalates the risk of massive global recession. Irrespective of the length and severity of the pandemic globally, different regions across the continent are forecasted to experience a shrink in economy.

The economy shrinkage forecasted for different regions across the globe was triggered by the shutdown of the global market. Concurrently, the shutdown enforced in different regions affected the global market and these has led to a massive disruption in the supply chain (Ling and Wahab, 2020). As a consequence, there is a decrease in the Gross Domestic Product (GDP) of most countries across the nation (The World Bank, 2020). Table 1 presents some of the global economic factors of the Covid-19 outbreak in all regions across the globe.

Table 1: Global Economic Factor of Covid-19 Outbreak

Sub-Sahara Africa	Asia and Pacific	Middle East & North Africa	America	Europe
Since March 2020, Crude Oil price has continued to drop GDP downturn Economy recession A massive decline in agricultural productivities Nearly 24.3 million tourism-related jobs are threatened Unemployed has escalated from 6.2% in 2019 to 7.8% in 2020 Expected yearly revenue from oil sales is predicted to decline by 48% monthly	Export services such as international accommodation services, food serving services and tourism are all under heated pressure to lay off staffs A decrease in the export trade of oil services Disrupted labour movement and supply chains Sectors highly reliant on automobiles, pharmaceuticals and electronics supplies are under intense pressure Heightened prices of surgical supplies Unable to resume normal working hours	40% drop in the trade market An expected increase in drop specifically electronics and automobile products Intense disruption and decline in supply and demand chains Heightened risk of job loss A collapse in demand and a decrease in the supply of crude oil Increases risk of GDP decline Expected to lose approximately 42 billion dollars this year.	68.2 million citizens have filed for unemployment insurance 20 million jobs lost Disruptions in supply chain Harsh contraction of financial situations Extremely globalised economies and integrated cross-border supply chains Heightened share of services sector of GDP in advanced economies	EU economy growth shrunk by 8.3% in the 1st wave of Covid-19 outbreak. Predicted to reach 11% during the second wave Shrunk in energy prices Approximately 5.5 million job loss

Source: The World Bank (2020)

Subsequently, millions of individuals have been put out of jobs since the first quarter of Covid-19 outbreak across countries due to the uncontrollable economic meltdown (World Economic Forum (WEF), 2020; International Labour Organization (ILO), 2020). Observably, young adults are considered one of the most vulnerable in terms of jobs lost during this pandemic. Young adults in the context of this study are referred to individuals between the ages of 15-25 years. As at 2015, statistical evidence indicates that young adult between ages 15-24 years makes up to 1.2 billion (17%) of the global population. The data is forecasted to increase to 1.3 billion by 2023 (United Nation (UN), 2020).

The increased rate of unemployment among young adults during the pandemic remains worrisome. The fact that young adults make up 17% (1.2 million) of the world population is a global concern (UN, 2020). Over the years, the young adult unemployment rate in the labour force has been quite low. Furthermore, young workers are expected to experience more difficulty in accessing the labour market in 2021 prior to the pandemic as shown in Table 2.

Table 2: Global Youth Unemployment Prior to Covid-19 Pandemic

Region	Subregion	Youth total (%)			Youth male (%)			Youth female (%)		
		2019	2020	2021	2019	2020	2021	2019	2020	2021
World		13.6	13.7	13.8	14.0	14.0	14.1	13.0	13.1	13.2
Africa	Northern Africa	30.2	29.8	29.6	26.4	25.7	25.3	39.6	39.8	40.3
	Sub-Saharan Africa	8.7	8.7	8.7	8.2	8.3	8.3	9.2	9.2	9.1
Americas	Latin America and the Caribbean	17.9	18.0	18.1	15.2	15.2	15.4	22.0	22.1	22.2
	Northern America	8.8	9.1	9.4	9.9	10.1	10.4	7.6	8.1	8.4
Arab States	Arab States	22.9	23.0	22.9	19.7	19.8	19.6	42.2	42.1	42.5
Asia and the Pacific	Eastern Asia	9.8	10.0	10.2	10.8	11.0	11.1	8.7	8.9	9.0
	South-Eastern Asia and the Pacific	10.5	10.9	11.0	10.3	10.6	10.7	10.8	11.2	11.5
	Southern Asia	18.7	18.8	18.9	18.7	18.9	19.0	18.4	18.5	18.6
Europe and Central Asia	Northern, Southern and Western Europe	14.8	14.8	15.1	15.8	15.6	15.9	13.8	13.9	14.2
	Eastern Europe	14.9	14.4	14.2	14.6	14.1	13.9	15.3	14.8	14.5
	Central and Western Asia	17.8	17.5	17.7	16.6	16.6	17.0	19.7	19.0	18.9

Source: ILO (2020)

Majority of young adults are mostly non-skilled workers, self-employed or unemployed. Figure 2 gives an insight into the labour market involvement and socio-economic status of young adult across different regions of the world (ILO, 2020).

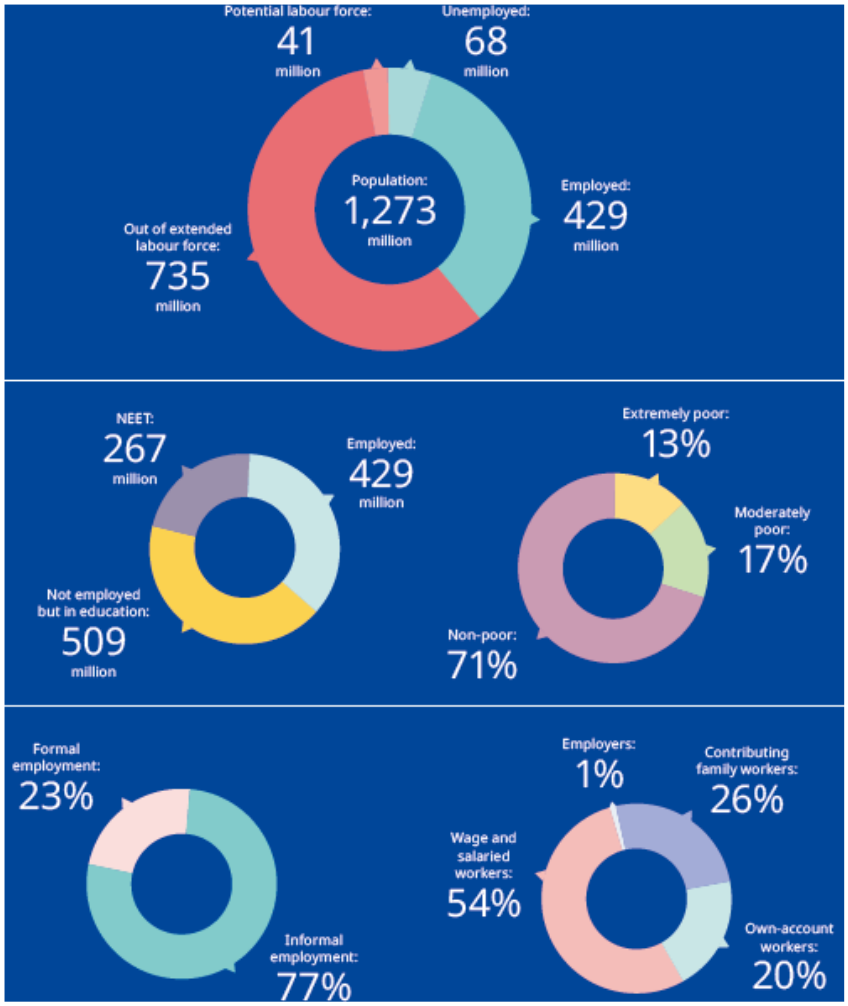

Fig. 2: Global Labour Market of Young Adult, 2019

Source: ILO (2020)

The shutdown of most business sectors worldwide has led to downsizing of companies, laying off staffs and temporary and/or permanent closure of business outlets. As a consequence, there is a further negative economic impact on young adults in 2020 and beyond. Table 3 shows the trend in decline rate of employability to population ratio between young adults (18-25 years) and older adult 25-29 across different regions and sub-regions worldwide from 1999, 2019 and 2023. This was reported prior to the Covid-19 outbreak. The labour market is predicted to remain unfavourable to young adult (18-25 years) through to 2023 (ILO, 2020).

Table 3: Global Illustration of Youth Employment to Population Ratio

Region	Subregion	Youth total (%)			Youth male (%)			Youth female (%)			Adults (%) 25+		
		1999	2019	2023	1999	2019	2023	1999	2019	2023	1999	2019	2023
World		**46.4**	**35.6**	**34.6**	**54.2**	**42.2**	**41.0**	**38.4**	**28.5**	**27.8**	**66.0**	**63.2**	**62.1**
Africa	Northern Africa	25.4	19.2	18.7	36.9	28.1	27.9	13.5	9.8	9.1	47.7	47.1	46.9
	Sub-Saharan Africa	47.9	44.1	43.6	49.8	46.3	45.9	46.0	41.8	41.3	76.4	74.0	73.9
Americas	Latin America and the Caribbean	45.3	40.1	39.3	57.5	49.1	48.1	33.2	30.8	30.2	61.9	64.1	63.5
	Northern America	56.3	47.9	45.9	58.1	47.8	45.8	54.4	48.1	46.1	64.7	62.2	60.9
Arab States	Arab States	27.8	21.4	20.7	44.4	36.7	35.4	10.2	4.8	4.6	53.8	55.8	54.5
Asia and the Pacific	Eastern Asia	62.2	40.8	39.1	62.0	41.5	39.6	62.5	40.0	38.4	75.6	68.5	66.3
	South-Eastern Asia and the Pacific	51.5	42.4	41.2	57.8	48.9	47.7	45.0	35.6	34.4	72.3	71.7	70.9
	Southern Asia	38.1	25.7	24.8	55.2	38.5	37.3	19.5	11.6	11.1	60.8	55.7	55.0
Europe and Central Asia	Northern, Southern and Western Europe	38.9	37.3	36.1	42.3	38.8	37.6	35.4	35.7	34.6	53.1	56.3	55.7
	Eastern Europe	32.2	27.4	25.1	35.6	30.6	28.0	28.7	24.0	22.0	56.7	59.8	58.4
	Central and Western Asia	37.7	35.4	34.3	45.9	43.9	42.3	29.5	26.5	25.9	57.1	57.6	56.5

Source: ILO (2020)

Data generated from ILO (2020) indicated that before the Covid-19 outbreak, young adults were highly employed by the most hit sectors during the Covid-19 outbreak. Four of the most disrupted sectors include accommodation, food and services, wholesale and retail trade, these sectors amongst others are said to have experienced a massive economic output downturn during the outbreak. As a result, young workers employed in any of these business establishments are confronted with either temporary or permanent job loss, reduction in working hours or slash in income. Table 4 shows the informal sectors engaging young workers in the labour market and the severity of Covid-19 outbreak on these sectors in term of the economy globally during the Covid-19 outbreak.

Table 4: A Global estimation of young workers employed by Unskilled Sector Hit by Covid-19

		Baseline employment estimates for 2020 (before COVID-19 crisis)		
Economic sector	Impact of crisis on economic output	Level of employment (millions)	Share in global youth employment (%)	Share of young women in total youth employment (%)
Wholesale and retail trade; repair of motor vehicles and motorcycles	High	74.8	17.5	41.7
Manufacturing	High	59.2	13.8	36.9
Real estate; business and administrative activities	High	16.4	3.8	43.8
Accommodation and food services	High	28.1	6.6	50.8
Transport, storage and communication	Medium-high	21.0	4.9	16.4
Arts, entertainment and recreation, and other services	Medium-high	28.4	6.6	60.3
Mining and quarrying	Medium	2.9	0.7	22.6
Financial and insurance services	Medium	4.6	1.1	54.7
Construction	Medium	33.1	7.7	5.4
Agriculture, forestry and fishing	Low-medium	123.7	28.9	36.0
Utilities	Low	2.0	0.5	21.3
Public administration and defence; compulsory social security	Low	8.6	2.0	33.3
Human health and social work activities	Low	11.8	2.7	74.2
Education	Low	13.2	3.1	69.5

Source: ILO (2020)

A comparison between high, medium and low-risk rate (percentage and number) among young and older adult across different regions and income groups clearly indicated that young adults are highly vulnerable to job loss during Covid-19 outbreak globally (ILO, 2020).

Invariably, since the onset of Covid-19 and given the constant decline in economic output of business establishments, millions of young employees have been thrown out of jobs thereby losing their source of income globally. The severity of the economic impact is highly dependent on region and income groups (see Table 5). Understandably, young workers from low income earning region and sub-region may endure even worse predicaments than young workers from high income earning regions. Besides, gender disparities due to social and cultural barriers may further heighten the risk of job loss for young adults in the Middle East and North African (MENA) regions. Bearing in mind that young adult from MENA region accounts for the highest number of unemployed young workers (51%) (WEF, 2020; ILO, 2020) followed by Sub-Sahara Africa and Central Asia prior to pandemic even complicates their situation during and/or post Covid-19 period.

In view of the current economic turmoil across countries, young adults are likely at the verge of experiencing long term negative consequences from both pre and post Covid-19 outbreak. The implication of decline in revenue from oil sales, manufacturing industries, agricultural farming, import and exports of goods and services, and tourism and travels threatens the employability of young workers in the labour market who have reportedly lost their jobs (The World Bank, 2020). Above-mentioned economic sectors were major generating income source for young employers across all regions and sub-region prior to Covid-19. In other words, most of the highly affected sectors employed a huge population of young adults. Therefore, the contracting economy has made it very difficult for affected sectors to strive given decline in productivity and cash flow. These have led to downsizing of companies resulting in compounding of the unemployment challenge for young adults (employed, self-employed and job seekers) (Ozili, 2020; ILO, 2020).

The fact that young adults are disadvantaged in terms of proper education and formal skills may narrow the opportunity for young workers in the labour market. Consequently, the inability to predict the extent of the severity and duration of the Covid-19 outbreak in aforementioned regions would continue to narrow the opportunities for young adults in the labour force. Hence, young adults from regions and sub-regions of very low to moderate-income groups and low employment rates before the pandemic are even at increased risk of extreme poverty.

Table 5: The global unskilled young workers and Adults in Percentage and Actual Numbers

		Percentages (%)					Absolute numbers (millions)				
		High risk	Medium-high risk	Medium risk	Low-medium risk	Low risk	High risk	Medium-high risk	Medium risk	Low-medium risk	Low risk
World	Youth (15–24)	40	11	11	33	5	131	37	36	108	16
	Adult (25+)	35	11	11	37	7	605	182	192	638	114
By income group											
Low-income	Youth (15–24)	18	11	5	64	2	13	8	3	47	1
	Adult (25+)	20	7	5	65	3	36	13	9	119	5
Lower-middle-income	Youth (15–24)	35	10	13	38	4	52	15	19	57	6
	Adult (25+)	31	11	9	45	4	258	88	75	367	34
Upper-middle-income	Youth (15–24)	59	13	12	10	6	54	12	11	9	6
	Adult (25+)	50	12	17	12	9	312	76	108	74	55
High-income	Youth (15–24)	44	12	10	13	21	6	2	1	2	3
	Adult (25+)	33	14	13	15	25	34	14	13	16	26
By region											
Africa	Youth (15–24)	19	11	5	62	2	19	10	5	60	2
	Adult (25+)	22	8	5	62	3	64	23	14	183	10
Americas	Youth (15–24)	45	18	10	19	8	15	6	3	6	3
	Adult (25+)	39	19	11	18	12	62	30	18	29	20
Specifically for Latin America and the Caribbean	Youth (15–24)	43	18	10	22	6	12	5	3	6	2
	Adult (25+)	38	20	11	22	10	50	26	14	28	13
Arab States	Youth (15–24)	40	12	10	36	2	2	0	0	2	0
	Adult (25+)	34	14	13	34	5	9	4	4	9	1
Asia and the Pacific	Youth (15–24)	46	10	13	26	5	84	18	24	48	9
	Adult (25+)	41	10	14	28	6	482	115	168	330	68
Europe and Central Asia	Youth (15–24)	41	11	10	23	15	5	1	1	3	2
	Adult (25+)	32	12	11	25	21	28	11	9	22	19

Source: ILO (2020)

Methodology

Due to the dearth of study and the importance of the investigated topic, a narrative review method was adopted. A total of 21 articles were selected from 35 articles extracted from PubMed, Science Direct and Springer from September 2020 to October 2020. Irrelevant and duplicated articles were removed after screening. Articles with a focus on the global economic impact of Covid-19 and employment insecurity for adults and young adults were considered for this study. Furthermore, relevant information was extracted from Report paper published by ILO, UN and other global economic forums in the cause of this study. Inclusion criteria were also limited to articles that evaluated the impact of unemployment on young adults with a focus on young adults aged between 15-24 years. Both qualitative and quantitative focused papers were included (Nier et al., 2020; Krishnan and Wahab, 2019). Additionally, papers that evaluated the impact of Covid-19 on the global economy of travel and tourism, food supply and sports were respectively included in the study. Articles not published in English language and articles published before the year 2020 were respectively excluded.

Result and Discussion

Result

Since the outbreak of Covid-19, individuals have been compelled to practice physical distancing and confinement across the continent. These measures are considered the most logical and safest strategy to prevent the continuous spread of the virus (flattening the curve). Quite a number of businesses and productive activities were confronted with economic stagnancy, and are unable to meet up with the financial obligations to staffs and the company as a whole. As a result, there are reports of temporary layoffs, downsizing or closure of companies and businesses, and this further heightens the risk of employment insecurity among young adults. ILO (2020) established an estimated value of 178 million young adult populations across different regions earned their income from adversely affected sectors as a result of the Covid-19 backlash. Sectors such as retail trade, accommodation and food services are experiencing an economic downturn. Nearly, 17.1% of the young adult population across the Middle East and North Africa, Asia and Pacific, Europe, America and Sub-Sahara Africa world have reportedly lost their jobs since the outbreak of Covid-19 (ILO, 2020). An insight on statistical evidence of young workers who have stopped work since the onset of Covid-19 pandemic and those who worked prior to the outbreak is presented in Figure 3. This illustration is based on gender and income groups.

Fig. 3: Global Rate of Young Adult Who Stopped Working since Onset of Covid-19 Outbreak
Source: ILO (2020)

According to ILO (2020), the global working hours of young adult dropped by 7% by each day every month during the first and second wave of the pandemic. After adjustment, the working hours subsequently increased to 14% per day every month. The loss in working hours evaluated covered all outcomes such as part-time, lay-off, reduced working hours, unskilled workers, unemployed worker, and self-employed. Apparently, every lost working hour per day and month translates to a loss of 400 million full-time jobs per 48 hours a week. In essence, all affected region except the Middle East and North Africa (data not present) experienced at least a two-digit loss in daily revenue from labour except for America whose losses were adversely higher compared to other regions (Refer to Fig 4 & Fig 5)

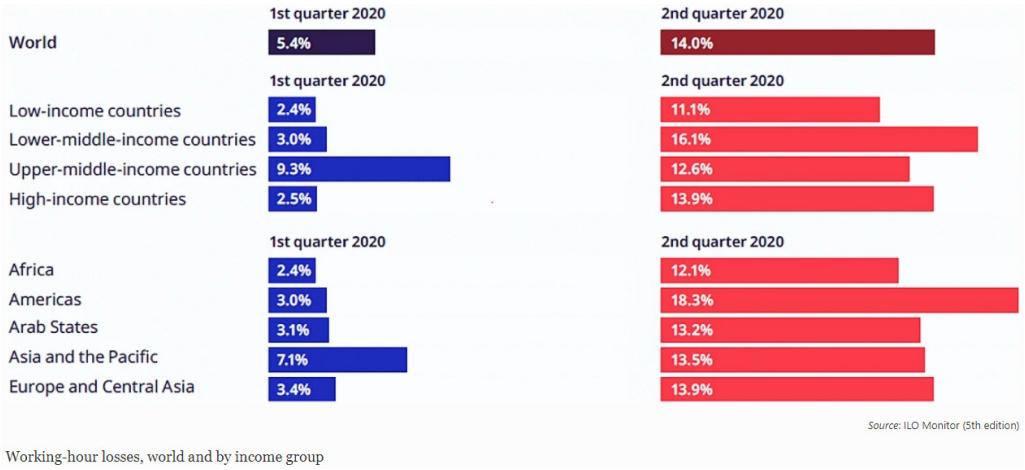

Fig. 4: Labour Market Impact of Covid-19 from a Global Perspective
Source: ILO (2020)

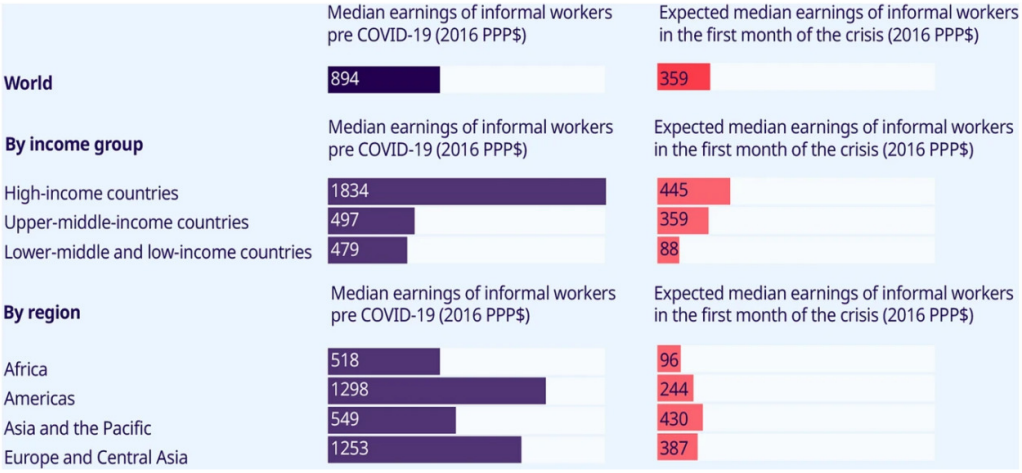

Fig. 5: Labour Market Impact of Covid-19 from a Global Perspective

Source: ILO (2020)

The fact that young workers are highly employed in the sector mostly affected during Covid-19 further exacerbate their vulnerability towards poor income, lack of adequate social and legal job securities. The global economic effect of Covid-19 continues to escalate the unemployment rate of young adults and induce a low quality of life (see Table 6).

Table 6: Global Effect of Covid-19 on Young Adults Employment and Impact on Quality of Life

Source	Global Region	Young adult unemployment during the pandemic	Impact on quality of life
David et al. (2020) WEF (2020)	Sub-Sahara Africa	• Approximately 20 million young workers ages 15-24 years will lose their jobs • The jobless rate reached 7.8% in 2020 from 6.2% in 2019 • Young adult expected to experience low income and lack of social work security • Difficulty to gain access into a new job due to low education • Maybe disadvantaged to more career opportunity and growth • Difficulty to access new job for informal workers due to socio-economic status, ethnicity, gender diversity and location • May endure lower pension	• Increased socio-economic inequality (extreme poverty) • Social unrest • Increase the risk of domestic violence for female
ILO (2020)	Asia and Pacific	• 10-15 million young workers are likely to permanently lose their jobs • 12% of young adult stop working since the awakening of pandemic • Drastic slash income • A continuous decrease in working hour by 6.5 per 48 hours a week which may escalate to 13.5% with prolonged pandemic • Youths informal sectors might shift to informal sectors	Decrease mental well-being due to stress of working hours loss and slash in income.

		• 92% loss in productivity and 91% financial downturn for self-employed young adults • Unfavourable working hours without befitting income	
WEF (2020)	Middle East & North Africa	• Low chance of employment in the labour force, risk of unemployment is five times higher compared to older adult • Tighten opportunity for women in this region to participate in the labour market • Women working in Agricultural and other sector are likely to experience harsh working condition with no social security	• 14.3 million people to fall below the poverty level • 1.9 million people are expected to become malnourished • Risk of mental health concerns • Gender-based violence is likely to exacerbate among young women in this region
Gould and Kassa (2020); Jackson et al. (2020)	America	• The unemployment rate increased from 8.4% to 24.4% from spring 2019 to the first quarter of 2020 during the pandemic • Leisure and Hospitality are the most hit sector with a high proportion of young workers, hence this sector experience 41% job loss • Drop in working hours by 13.1% due to lockdown measures • Difficulty to secure a new job post-Covid-19 pandemic, as newly available jobs may require formal employees	Long term negative impediments which may lead to
Jackson et al. (2020); ILO (2020)	Europe	• The young adult jobless rate reached 17.3% in June 2020 from 7.7% in 2019 • Long term unemployment challenge which may include poor salary earning through-out lifetime. • Less future opportunity in terms of career growth • Securing a new job during a pandemic will negatively influence income power	• Low income earning power result in high dependency on parent which further leads to delayed marriage for affected individuals • It also causes a risk of low fertility in women • Poor mental well-being

Source: ILO (2020)

In order to protect the future of young adult, it is imperative for government and major stakeholders across nations to join forces and establish regionally tailored policies that will aid in cushioning the current and predicted adverse effects of the increased unemployment rate, income loss and extreme poverty level on young adults in and outside the labour market. Table 7 presents the recommended policies peculiar to different regions to aid in minimizing the effect of the global economy on young adults.

Table 7: Regionally Tailored Recommended Policies

Source	Region	Recommended Policies to Cushion Effect
WEF (2020); ILO (2020)	Sub-Sahara Africa	• Government to develop inclusive business models that expedite young people's transition to the formal economy • Young adult empowerment programs in terms of training and provision of financial assistance to set them up at the end of the training. • Policies to protect unskilled workers against exposure to hazardous and unfavourable social security • High-tech enhancement training programs for the young adult to enable them to fit into current working condition induced by Covid-19 on the labour market
Jackson et al. (2020); ILO (2020)	Europe	• Set up skilful programs to aid young workers to escape long term consequences of unemployment • Set up a social scheme to help young adult gain financial assistance during and post-pandemic • Policies to regulate for standard income-earning power for a young adult who get into the labour force at an earlier age
ILO (2020)	Asia and Pacific	• The government should lend financial support to some affected sectors such as healthcare. • Establish policies that will protect unskilled workers from last in first out • Lend support through to enterprises and jobs • Lend financial aid to self-employed young adults • Embark on youth-targeted employment programs to help young adult gain access into the labour force
UN (2020); WEF (2020)	Middle East & North Africa	• Loosen up on cultural and social barrier limiting female gender from employment • Policies to protect unskilled workers especially female gender in this region. • Set up a social scheme to accommodate the inclusion of informal employees back into the labour market, through the provision of training • Provide financial support to vulnerable individuals
Gould and Kassa (2020); Jackson et al. (2020)	America	• Set up policies to accommodate waiver of work history for the affected individual might aid cushion the effect on job seeking young seeking adult • Improve on social welfare scheme to enable both employed and job-seeking individual access to social support

Source: ILO (2020)

Discussion

Unarguably, the measures besought in controlling domestic and international spread of the Covid-19 virus across the world have resulted in global economic crash (Ozili and Arun, 2020; ILO, 2020). The global economy came to a complete standstill during the first wave of the pandemic. Infact, the drop in oil price due to decline in demand and increase in supply was catastrophic for many oil based economy. Little or no demand for tourism due to closure of international and domestic borders both by air, road and sea, disruption in agricultural farming due to interruption of export and import services, reduced manufacturing outputs due to imposed movement restriction orders were the bane of the pandemic (The World Bank, 2020; WEF, 2020; Osman et al., 2020).

Apparently, the disruption in the flow of the global market affected the GDP of major regions such as Sub-Sahara Africa, Asia and Pacific, Middle East and North Africa, Europe and America. Hence these regions are expected to experience a shrink in the economy during and after pandemic (see Figure 1). As a result of the current global economic recession, millions of individuals have been affected through job losses, income loss or slash and cut-down of working hours. However, young adults within the age of 15-24 years are observed to be the most affected population during the pandemic (ILO, 2020).

Young adults have been one of the most marginalized populations in terms of unemployment and socio-economy inequalities over the years prior to the pandemic (see Figure 2). Even-though a large population of a young adult are

employed in the informal sector (see Table 2), majority of them have to endure terrible working condition which exposed them to hazardous and harsh working environment with poor payment (ILO, 2020; David et al, 2020). During this pandemic, young adult population are twice at higher risk of job loss, income loss and loss in working hours than older adult (see Table 2). During the pandemic, an estimate of 17.1% of young workers has been thrown out of jobs (see Figure 3). Meanwhile young workers in the workforce experience daily loss of working hours amounting to increased risk of losing their job permanently globally (see Figure 4 & Figure 5).

Apparently, Covid-19 pandemic poses a long-term threat to the global economy through the lenses of employment insecurity. Amidst the risk of job loss and other chains of a negative effects, comes a decreased standard of living. It is an established fact that, once the source of income of an individual is negatively affected then the standard of living also becomes affected (Belayeth Hussain, 2020; Ali et al., 2020; Buheji et al., 2020; Gössling et al., 2020; Ozili and Arun, 2020). The consequences of unemployment on a standard of living are indicated in Table 6. In nutshell, there is a dare need to put in place mitigating measures to assist young adult globally as shown in Table 5. It is believed that if these measures are properly implemented, it will guarantee a considerable reduction of the impact the pandemic on young adults.

Conclusion and Recommendations

The restraining order of movement control and compulsory or temporary closure of some business outlets and companies have undoubtedly escalated the workers' laying off and job insecurity among young adults. The stringent policy control measures implemented to aid minimize the spread of Covid-19 have led to a massive disruption in the global market. Most affected sectors were the main driving force of the labour market and global economy over the years. Young adults employed by these establishments have been subjected to severe losses in jobs, income and working hours. Young adults have become the most vulnerable due to their unskilful nature and lack of adequate social security in their workplace. Furthermore, young workers who are self-employed started experiencing a decline in productivity and income exposing them to instant loss of income as well. This is a very challenging time for young adults across different regions. Considering young adult prior to Covid-19 experienced difficulty in gaining access into the labour force, Covid-19 pandemic escalated the chains of negative effects on these group. As the current economic shrinkage heightens, the risk of prolonged unemployment among young workers is inevitable hence snowballing the socio-economic inequality and worsening quality of life. In other to alleviate the effect of the global economic shrinkage on young adults, this study has recommended useful regionally tailored policies. Young adults are the future hence there is a dare need to expand the labour market in ways that it will be favourable to young adults. The limited number of empirical studies from different regions and sub-region to give adequate insight into the exact situation of young adults regarding unemployment challenges during the pandemic was a major drawback of the study. Hence, it further narrowed the ability of the study to explore deeper into the economic effect of Covid-19 on young adult unemployment across global regions. Additionally, certain regions like the European Union and the Middle East and North Africa had limited data on young adult current experience during the pandemic. Information for this region was extracted from a general global economic impact of Covid-19. Hence, there is need to further conduct empirical focused study on these subject with respect to these areas highlighted.

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Drones as a Solution to Malaysia Healthcare Supply Chain Disruption during COVID-19 Pandemic

Muhammad Yazid SAHAK[1], Nikram SUBRAMANIAM[2], *Siti Norida WAHAB[3], Ezutah Udoncy OLUGU[4], and Bolajoko Elizabeth OTEGBAYO[5]

[1,2]Health Facility Planning Section, Planning Division, Ministry of Health,
Sungai Buloh, 47000 Selangor Darul Ehsan, Malaysia
[1]nikram@moh.gov.my
[2]yazidsahak@gmail.com

[3]Department of Logistics Management, Faculty of Business and Management,
UCSI University, 56000, Kuala Lumpur, Malaysia
sitinorida@ucsiuniversity.edu.my
*corresponding author

[4]Faculty of Engineering, Technology and Build Environment,
UCSI University, 56000, Kuala Lumpur, Malaysia
olugu@ucsiuniversity.edu.my

[5]Department of Preventive Medicine, Faculty of Medicine,
University of Malaya, 50603 Kuala Lumpur.
lizzyotebs@yahoo.com

Abstract

This paper explores the application of drones in the Malaysian healthcare supply chain during the COVID-19 pandemic and proposes strategies by identifying issues and challenges faced. A detailed literature review was conducted from a leading database to understand in detail the role of drones as a solution to the healthcare supply chain disruption during the COVID-19 pandemic. This study found several challenges such as limited technical capability, strict government regulation, need for a 5G network, high cost, and limited drone capabilities. Therefore, this study proposed strategies to mitigate these challenges which include investment in tertiary education, government legislation improvement, expedite 5G network adoption, collaboration with NGOs to reduce cost burden, and provide drones with multi-functionality. The findings of this study have significant implications and contributions to the body of knowledge relevant to drone technology and the healthcare supply chain. Specifically, the findings uncover challenges faced by the healthcare supply chain industry during the COVID-19 pandemic. Practically, the findings from this study may increase the understanding and awareness about the importance of drones and challenges among the key players (e.g. education, government, private sector, user, and manufacture). The study eneded with recommendations for future studies.

Keywords: Drones, Healthcare Supply Chain Management, COVID-19, Supply Chain Disruption, Sustainability

Introduction

The world is facing one of its toughest challenges in place of the COVID-19 pandemic. The global economy has been severely impacted. The current population has never experienced a pandemic of this magnitude, and recovery of the economy, for now, is uncertain. There are already existing gaps in the supply chain of raw materials and essential medications in which they were unprepared for due to destabilizing factors, pandemics included. The supply chain for healthcare has been severely affected, especially with regards to equipment such as personal protective equipment (PPE) in which there is an imbalance in supply and demand. Governments have set in place lockdowns and travel bans to curb the spread of the virus (Waiho et al., 2020). As expected, this has further disrupted the healthcare supply chain. Similar occurrences have been experienced during disasters such as flooding and earthquakes, in which there is difficulty in delivering medical supplies (Govind et al., 2020).

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A study from the Association for Professionals in Infection Control and Epidemiology, Inc, (APIC) had discovered that in the first few months of the 2009 H1N1 influenza pandemic, there was a 2 to a 3-year backlog of supply of N95 respirators and face masks for the infection preventionists (Rebmann, 2009). This is just one of the many studies that have proven that traditional methods are insufficient in combating natural disasters. There are many advances in technology that have been developed to assist, including the use of drones in the healthcare supply chain. It is important to ensure the accuracy of the material that is shared with all relevant stakeholders in the supply chain (Liu et al., 2018). The drone seems able to provide accurate information with an appropriate integration from one point to another within the supply chain (Floreano & Wood, 2015). It is not only suitable in the area of the healthcare supply chain. It is capable of being applied in every area including environmental monitoring, law enforcement, military applications, and many more (Marris, 2013). With the current pandemic situation, drones are capable of performing a wide range of activities including package delivery, inventory checking, production monitoring, simplifying the administration tasks, provide real-time information, same-day delivery as well as underwater operation (Nier at al., 2020; Olivares et al., 2015).

In the current situation, the drone application in the field of healthcare is relatively low due to some reason. A study by Graham (2016) identified few factors that may influence the drone application which include the organization, economic, political, and legislation. Additionally, relative advantage, perceived benefits, reliability, and perceived risk are other factors that may influence the drone application (Pappot & de Boer, 2015; Olivares & Cordova, 2015). In the Malaysian context, the drone has been used by the police and the military during the COVID-19 pandemic mainly to control public movement and to conduct aerial observation in ensuring the public are following the restrictions particularly in the park and public spaces. However, the issue of cybersecurity still in the grey area with the government still finding a way to ensure that privacy is protected (Bernama, 2020). Furthermore, the control of public movement, food delivery using a drone are also under trial phase in order to encourage the public to stay at home (Ling and Wahab, 2020). On the other hand, to improve the healthcare supply chain during the COVID-19, the Malaysia Ministry of Health is also looking into the methods to deliver medicines to the affected remote areas. Nevertheless, the usefulness of the exercise is still uncertain. Thus, the purpose of this study is to explore drone applications in the healthcare supply chain, its advantages, issues, challenges, and their impact on the healthcare supply chain. Since drone application in the healthcare supply chain is relatively a new concept in Malaysia, this study aims to propose strategies that enable to leverage it applicability particularly in the healthcare supply chain industry.

Drones in the Healthcare Supply Chain Overview

Healthcare has made numerous advances over the years. Technology has always been an avenue to augment the patient experience, treatment, and management. The integration of medical devices with IT is known as the Internet of Medical Things (IoMT). Drones, also known as Unmanned Aerial Vehicles (UAV) have been around for more than a hundred years. These vehicles without a pilot have been used by the military ever since World War I (Custers, 2016). Since then, it has gained popularity in many other fields, including agriculture, commercial, logistics, and even healthcare. The use of drones is for augmenting and increase the efficiency of healthcare.

While there are no official requirements for drones that are operating in healthcare settings, there are several recommendations based on generic drone technology that is being used in various humanitarian missions. A study by Tatham et al. (2017a) highlighted that a flight endurance of 8 - 12 hours which covers most of the daylight, could allow drones to operate with a much higher amount of time on task. The endurance is important to assist the answer in a remote and unreachable location, compared to situations where the location is nearer to the supplies. The feature of long flight hours is a high plus point in the drone industry and has always been the center focus of the manufacturer as an area to improve (Carlsson & Song, 2017). Additionally, the night-flying capability would be immensely useful especially in cases where a location might have daylight that is relatively short as this would allow transporting goods to occur during dark hours and the organization could also be benefited from data maximization due to longer flights. Hugely depending on the design of the drones, a night-flying feature would also require the use of infrared cameras that could, for example, help identify groups of people or individuals in an area based on their personal thermal signature or if there are the presence of campfires. The requirement for such endurance capacity as mentioned in the above points implies that the drones would need a more complex controlling system and must be able to maneuver beyond visual sight, and this requires the system to have a payload that can connect with satellite and advance network such as 5G for control purposes (Murray & Chu, 2015; Wahab & Khong, 2019). Alike, a camera with a function of infrared still and video to support the process of assessing needs whenever one arises. The extra function could also help in providing additional data for researchers. Thus, the ability to quickly and efficiently transmit the data generated from the camera and other sensors from the drone can be achieved. Undoubtedly, drones have been used in many countries to curb the COVID-19 spread. Some of the drones that are used for this purpose include multipurpose drones, thermal imaging drones, announcement drones, disinfectant drones, surveillance drones, and medical drones (Chamola, 2020).

India has developed its very own Corona Combat Drone (CCD), which is an agricultural drone that has been remodelled for sanitation (Ulmer & Thomas, 2018). This multipurpose drone is not only able to spray disinfectant but also able to do thermal imaging, carry COVID-19 test kits, make announcements on a speaker, and also has geofencing technology (Urban Air Mobility News, 2020). On the other hand, Malaysia has used drones for crowd surveillance and also to make announcements in three different languages of Malay, Chinese, and Tamil to inform the public to stay at home (Bullock, 2020). Additionally, a study on long-endurance remotely piloted aircraft systems (LE-RPAS) for the use of humanitarian response in areas affected by disasters such as earthquakes, floods, or cyclones has been implemented under the humanitarian logistics operations. There is difficulty in understanding the extent of the damage to buildings and the access routes available. This makes planning a movement for relief goods or other support extremely challenging. With the use of LE-PRAS, it will provide photographic information to the National Disaster Management Organisation (NDMO) (Tatham et al., 2017b).

Drones as a Solution for Healthcare Supply Chain

There are many uses for drones in the healthcare industry. One of the contemporary applications is as a solution to disruption of the healthcare supply chain during this COVID-19 pandemic. There are many areas in which drones have proven to improve the healthcare supply chain. Drone usage is very important and acts as a solution for the healthcare supply chain. A study by Tucker (2017) highlighted that drones are capable of delivering more effective healthcare services to patients from a distance. Drones are capable of transporting blood and other medical suppliers to patients and hospitals with less hassles. The two prominent company and institution who are actively studying the practicability of the drone application during the COVID-19 pandemic includes Zipline and DrOTS.

Zipline's medical delivery drones

Rwanda is a country in Africa with challenging terrain and poor infrastructure. A company known as Zipline has been using drones to supply blood products to over 25 hospitals and clinics across Rwanda every day. As shown in Figure 1, the technicians will store the blood in the cargo bay of the drone and run through checklists of preflight prep before the aircraft is launched. An electric catapult is used to launch the drone at a speed up to 100 kilometers per hour. These drones can make this delivery in a relatively short time. It is ideal for products that have a short shelf life and strict storage requirements. The drone cruises at an altitude of 120 meters, and they usually make around 20 to 30 trips a day (Ackerman, 2019).

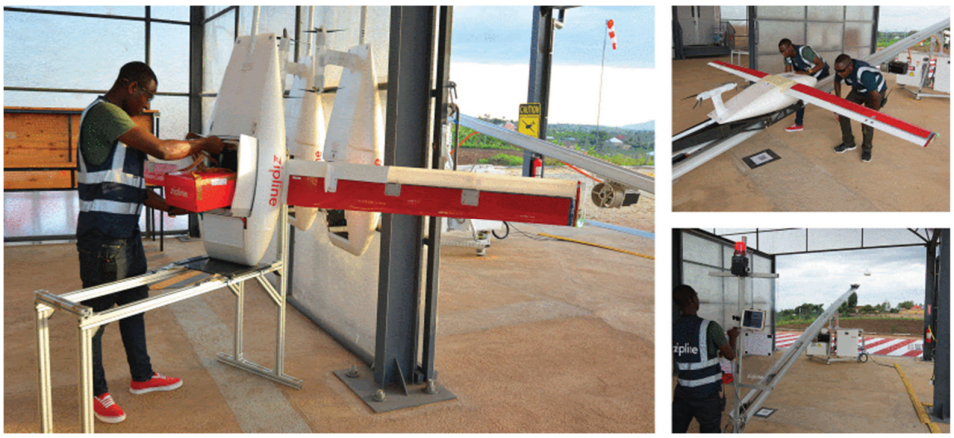

Fig. 1: Drones for blood supply in Rwanda, Africa
Source (Ackerman, 2019)

Drones observed therapy system (DrOTS)

From 2016-2018, Stony Brook University (New York, USA) and the Pasteur Institute of Madagascar implemented a proof of concept (POC) for bi-directional drones to transport healthcare provisions known as Drones Observed Therapy System (DrOTS). The POC was in Malawi, Senegal, and Madagascar. The drones were able to carry sputum samples for TB & HIV, medications, blood, and injectable oxytocin for up to 120km journeys. Even though the POC used dummy samples, the POC was considered a success, and the respective countries are keen to adopt this technology. It was concluded that drones are worth future investments due to their compelling prospects (Knoblauch, 2019).

Research Objectives and Methodology

The purpose of this paper is to report on a detailed assessment of the use of drone technology in the healthcare supply chain and to develop effective mitigation strategies. Therefore, these research objectives are to analyse the issues and challenges of drone technology in the healthcare supply chain. Data collection methods include an extensive review of past literature. The literature gathered for initial data collection comes from various sources, such as JStor, Emerald, Reaxys, Scopus ScienceDirect, Online Library, and SpringerLink Journal, which fit or are linked to keywords such as Drones, Drones Technology, Healthcare, Supply Chain Disruption, COVID-19 Disruption. The review of literature generated 29 useful works of literature from journal articles, conference papers, master thesis, books, trade magazines, and newspapers. Other resources such as reliable news publications and blogs were taken to include views from industry leaders. This study was limited publications in English language. All the literature was then reviewed and categorized by inclusion or exclusion of Malaysia as the country being reviewed. All the information gathered was then used to develop the mitigation strategies in this study. The methodology that was adopted in this study is presented in Figure 2.

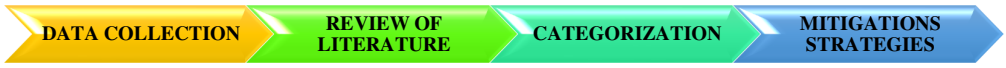

Fig. 2: Methodology used in this study

Issues and Challenges of Drones in the Healthcare Supply Chain

Despite many benefits drones can offer in response to health issues such as the COVID-19 pandemic, several constraints and challenges are inherent in drones implementation. The next section will further discuss the issues by dividing it into device-related and non-device-related challenges.

Device-related challenges

Vulnerability in drone operations

Exposure to hacking, such as GPS-jamming and radio control bypass has made drones an easy target and attractive prospect for hackers. Drones can be stolen, disabled, and used to carry out cyberterrorism and other illegal activities. Recently, several agencies including government-related have voiced concerns about the safety risks that drones pose (Rodday, 2016). The risks comprise system architecture and security vulnerability. In terms of system architecture, the 2.4Ghz radio frequency and telemetry (for further than 100m range) used in remote controlling drones could easily be hacked and controlled by other parties, making it very dangerous if the medical supplies failed to reach the necessary location or the supplies are of controlled pharmaceutical products. On the other hand, security vulnerability concerns on the system connectivity. Some drones have Wi-Fi connectivity, and this can pose a security threat to the devices and platforms that are connected to the network. Access points used in most drones are wired equivalent privacy (WEP) as encryption, and this technique can easily be cracked. The attacker can reach the drones' network and could control devices on the other end (Custers, 2016).

Drones technical limitations

Drones are currently facing some limitations in terms of battery life and loading capacity, which inhibit their ability to cover far and long distances and perform more than one delivery at a time. There is also concern about durability and justification for investment into the system. Most, if not all non-military drones are incapable of recognizing and avoiding other airborne objects such as other aircraft and birds (Wang & Sheu, 2019).

The need for 5G network technology

5G refers to the fifth generation of wireless communication technology that supports mobile networks through global connectivity. Among the benefits of 5G are low latency, high speed, increase in availability, wide range, and high reliability. Complementary technologies such as IoT and AI which benefited from the 5G network, could change the healthcare sector and affect many other industries that are related to it. The advancement in 5G technology, for example in China, has already proven to be beneficial in its response mechanism to the COVID-19 pandemic. The country was able to provide better assistance to the healthcare staff and frontlines with the help of a 5G network (Osman et al., 2020). In addition to that, the 5G network has been very helpful in setting up virus tracking, patient monitoring, data collection, and analysis (Govind et al., 2020).

With the use of smart wearables, drones, and mobile apps that improve the flexibility of the telemedicine market, 5G network technology is essential for the realization of such functionality. 4G networks are lacking in bandwidth and speed of data transfer, thus are unable to support high-quality, real-time long-range drone maneuvering. However, 4G LTE networks also obstruct the attachment of the Internet of Medical Things (IoMT) devices to cloud services, rendering them unreliable (ATT Business Editorial Team, 2020). 5G with its innovations such as ultra-low latency and high-speed data transfer would allow mobile networks in addressing these issues. However, as the 5G network is still in its infancy, and most countries don't have access to the technology, practitioners can only make use of the existing 4G network and bear with its limitation for now (see Figure 2).

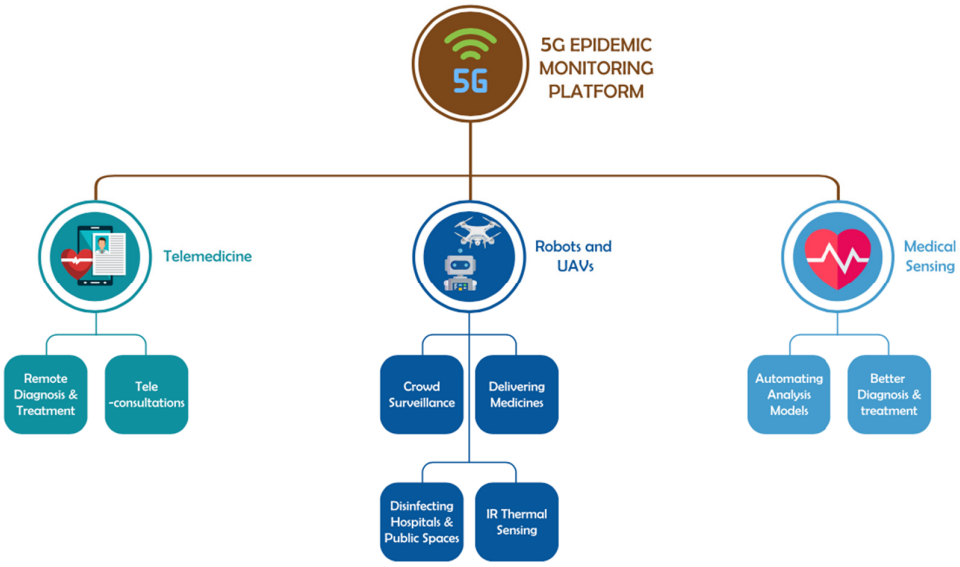

Fig. 2: 5G epidemic monitoring platform

Source: Chamola (2020)

Lack of reliable weather data to help flight planning

One of the external factors that are crucial in drones' flight planning is the weather forecast. Weather plays important roles in determining the route, height, distance, weight, and schedule of drones' operations. Without reliable weather data, it is difficult and even dangerous, not to mention costly, to be operational. In bad weather, a drone could crash and hurt people or damage things on land, lost in flight, and effectively disrupt the supplies to vital healthcare centers (Sandvik, 2014).

Non-device-related challenges

Government regulation

In many countries, the incorporation of drones into the COVID-19 impact response system is bounded by the inconsistency of government regulatory policies (Chamola, 2020). As the pandemic shocked the world, many things are affected, and the government needs to prioritize life-affecting regulations before anything else. Thus, it is understandable that the regulations for drones are not being updated since COVID-19. However, certain policies are not clear even before the pandemic started. For example, the Federal Aviation Administration (FAA) in the US, requires commercial drones to go through the same safety and economic reviews, known as Part 135, as a 12-passenger private jet. Not only are both vehicles in a different class, but some of the requirements are also irrelevant to drones. Figure 3 details the differences between private jet and drone. In Malaysia, the Civil Aviation Authority of Malaysia (CAAM) is the national agency charged with the responsibility of managing aircraft-related matters. There are a few essential regulations required in order to operate a drone in Malaysia. One of the rules is the limitation on drone flights to daylight hours and requirements for commercial users to keep their aircraft within their visual sight (Osman et al., 2020). The limitation will hinder most drones' flight for supplies of healthcare products as the drop off locations would be further than visual distance.

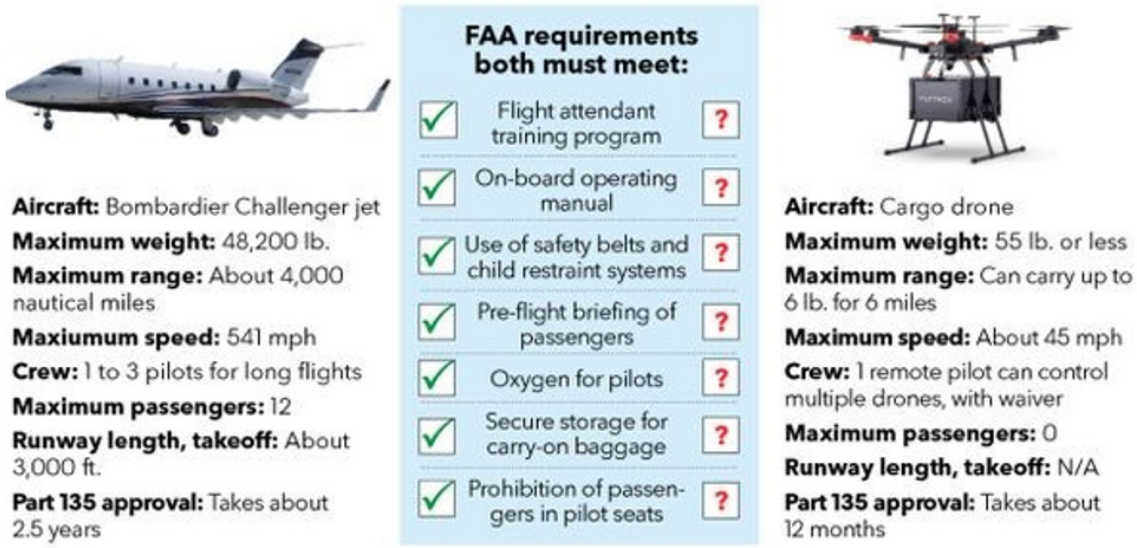

Fig. 3: FAA requirements for commercial planes vs. drones

Source: Descant (2020)

Beyond Visible Line of Sight (BVLOS)

Although considerable advances in drone technology have been made recently, drone operations Beyond Visible Line of Sight (BVLOS) remain somewhat unsafe. While it's a known regulation, more importantly, it is why it is being ruled as such. There is a lack of evidence that BVLOS is as safe as manoeuvring drones within sight. Operational guidelines and technical assistance are increasingly needed to guarantee the security and safety of the operation of drones. From a practical perspective, most drones, especially non-commercial ones, are designed to be operated on a visual sightline basis (Marris, 2013). The controller must always have direct visuals of the drones and the surrounding area including the terrain and treelines in which it operates. This would mean there is a limit of 1.5 km radius between the operator and the drones, although the actual field of operating flight area can be extended by following the drones using a car or a boat while maintaining the rule of a maximum 1.5 km distance. However, some companies and organizations are lobbying the authorities for approval to undertake beyond visual line of sight where the drones pilot can rely on one or more remote observers to keep the unmanned aircraft always in sight. These observers then transmit any flight information to the controller via radio, thereby helping to maintain a safe separation from other aircraft (Tatham et al., 2017b).

Limited technical capability

From a supply chain management perspective, the drone's reliability is dependent on the availability of trained personnel who operates and maintains the drone and its system. From a more strategic perspective, in order to handle the drones efficiently and applying lean management strategy to the system, warehouses and distribution centers need to match supplies as demanded by customers (Pappot & de Boer, 2015). Given the current push-based approach to PPE campaigns with long lead times, this requires a shift in the supply chain strategy to ensure that local requirements can be met in real-time. Otherwise, this strategy will only lead to an inefficient distribution of inventories and, ultimately, defeat the propose of drones' usage in managing the supply chain in a pandemic (Comes, 2018).

Adaptability

The introduction of new logistic methods like drones will certainly require certain degrees of adaptability by the whole supply chain. A new system and requirements, either manual or automatic, needs to be created in order to adopt drones into the supply chain. Limitations of drones such as weight per trip, temperature control, and are new conditions that need to be considered in the new system (Ulmer & Thomas, 2018). There is also a concern for a new learning curve for existing workers in the supply chain, which will be a challenge, especially during a critical time where systems are required to run efficiently. The indicators for the healthcare supply chain that are using drones as their mode of logistics are like conventional logistic vehicles. However, the measurements are slightly different. Some of the indicators for the healthcare system performance include health facilities, patients reached, and health outcomes. Meanwhile, the indicators for supply chain management induces turn-around times, no of samples,

stock-outs, commodity or sample types, quantity, weight, volume/size, quality, no of successful deliveries made, and payload damage or loss (Olivares et al., 2015).

Cost

As noted by Mailey (2013), there is no standardized way of generating "cost/flight hour" or a similar metric. Nevertheless, Figure 5 shows drones' technical specifications and their cost to allow a better perspective on the feasibility of adopting a drone system. Evidently, the financial benefits of utilizing drones to serve healthcare supply chain needs can only be seen when the system runs at maximum capacity and the marginal cost of each flight would be reduced to a minimum. In order to reduce costs and increase efficiency, companies could outsource a drone service provider, or, a group of agencies within a regional interagency network could share the cost to develop their own system and use it alternately. A collaboration would help minimize risk and help to ensure a shared return for all the parties involved in their investments (Tatham et al., 2017a).

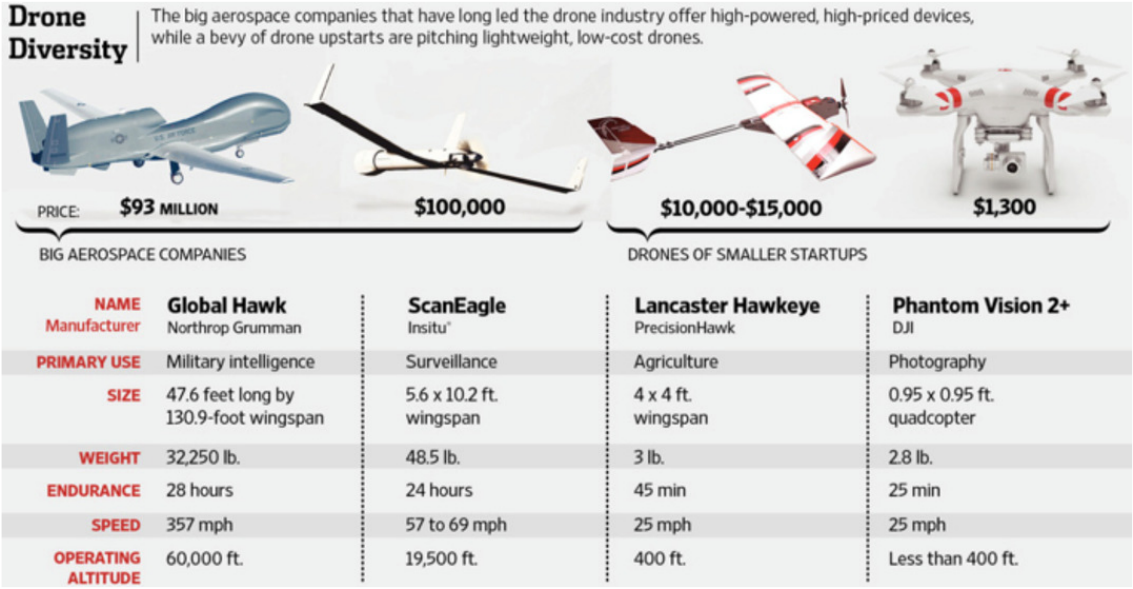

NAME Manufacturer	Global Hawk Northrop Grumman	ScanEagle Insitu	Lancaster Hawkeye PrecisionHawk	Phantom Vision 2+ DJI
PRIMARY USE	Military intelligence	Surveillance	Agriculture	Photography
SIZE	47.6 feet long by 130.9-foot wingspan	5.6 x 10.2 ft. wingspan	4 x 4 ft. wingspan	0.95 x 0.95 ft. quadcopter
WEIGHT	32,250 lb.	48.5 lb.	3 lb.	2.8 lb.
ENDURANCE	28 hours	24 hours	45 min	25 min
SPEED	357 mph	57 to 69 mph	25 mph	25 mph
OPERATING ALTITUDE	60,000 ft.	19,500 ft.	400 ft.	Less than 400 ft.

Fig. 5: Drones technical specification and its cost
Source: Mailey (2013)

Drones Issues and its Impact on Healthcare Supply Chain

Challenges faced in onboarding drones as part of the healthcare supply chain would be crucial to be addressed as the dominos' effect could further cause disruption in the whole chain, especially the end-users. Some of the prominent challenges include supplier disruption. Having supply disruption would be counter-productive in adopting drones for healthcare supply chains. Supplies could be interrupted due to poor supplies flow, inefficient route planning, weather-caused rescheduling, drones' breakdown, and bottleneck from untrained personnel in adopting the new system (Liu et al., 2018). Furthermore, the patient backlog is another challenge faced by the industry. The end-users, like hospitals and clinics, would probably need less adoption of change with the use of drones in the healthcare supply chain but will be majorly affected if things do not go as planned. Medical personnel cannot perform efficiently if there is a bottleneck in the supply chain. Ineffective usage of drones to send specimens such as COVID-19 throat swabs to the central laboratory could potentially cause late diagnosis and eventually causing a higher spread of disease where it should be contained (Knoblauch et al., 2019). In addition, unavailability of drones to assist in supporting the delivery of healthcare supplies, logistic workers are required to have a higher frequency of close contact with high-risk groups like healthcare workers which might expose logistic workers to greater risk (Graham, 2016). Undoubtedly, the inefficiency of the supply chain cannot be achieved without a drone application. The routes planning, inventory, and order would need more real-time collaborations. While this allows for better efficiency, it could also cause more delays if there is even a part of the system that is not adopting and onboarding effectively. Wastage in terms of higher waiting time, over or under orders, and extra processing could reflect drones' adoption as just a fancy gimmick (Nier et al., 2020; Giones & Brem, 2017). However, the cost is always the main issue for the organization to adopt drone technology. Including drones as part of the healthcare supply chain is already going to cost a lot of money. Without effective and efficient adoption of it, there will be not only a higher monetary cost but also related costs such as higher mortality and morbidity of patients (Rajendran et

al., 2018). As highlighted by Tariq (2019), it is time for Malaysia to update the drone laws and provide more trainings to ensure the personnel are upto date in drone management.

Recommendations

There are certain aspects of the Malaysian healthcare supply chain that could benefit from the adoption of drones. There are certain rural areas, especially in places with no good access roads. This study found that drones could be used to complement the supply chain of these areas in tackling COVID-19 more efficiently. Firstly, a nationwide 5G network would be an ideal environment for the movement of drones around the country. According to Malaysia's former Prime Minister, the country will commercially launch 5G technology by the third quarter of 2020. If Malaysia can fast track that technology, it would greatly benefit the healthcare sector. For instance, Telekom Malaysia is developing Langkawi Island as the first 5G standalone network in Malaysia. The pilot project or proof of concept for our drone technology could be used in Langkawi Island to interlink the Langkawi Hospital and its surrounding clinics. Pilot projects are ideal in a smaller region or smaller sample size as there will be problems anticipated, and they can be rectified before nationwide implementation.

Furthermore, it is important to improve the legislation for drones that operate in healthcare services. Two policies that have heavily affected the drones' operations, particularly in healthcare services are daylight hours flight and beyond visible line of sight (VLOS). Currently, drones are only allowed to fly during daylight with visible sight, where medical supports are not bounded by time or location, and services are always required to be operational. Most importantly, to reach further from visible sight (~1.5km). While it is understood that this legislation is implemented for safety reasons, more research should be done to ensure that the limitations are not bounded by unempirical reasons. The potentials are huge for drones' adoption in the healthcare supply chain, especially in disrupted conventional healthcare supply chain events like COVID-19.

Meanwhile, the government should expedite the accreditation of certifications offered by educational institutions for commercial drone operation. While there are a few academics and institutions like Drone Academy Asia, Aviation Management College, Asia Drone and IoT technology that offer programs like Certified Drone Operation Proficient, Certified Drone Aerial Mapping And Surveying Proficient, Certified Drone Inspection Proficient, Certified Drone Maintenance And Repair Proficient, none of the courses are accredited by Malaysian Qualification Agency (MQA) while at the same time, are being accredited by international bodies. Accreditation is the rank or recognition of an MQA standard assessment. It also offers a framework for certain actors to accept the system for several reasons. For example, this accreditation status will be used by the Public Service Department (PSD) to recognize qualifications for public service employment. Academic bodies can use the accreditation of accredited graduates for registration as academic engineers.

On the other hand, the cost could probably be one of the biggest reasons that hinder organizations from considering drones in their supply chain line up. Thus, collaboration with NGOs and businesses to share the cost of drone usage in the healthcare supply chain is essential. Other than the new learning curve and creation of new SOPs and regulations in their existing system, the cost would only add up to more hesitations. Drones are very likely to change the landscape of the supply chain, including in the healthcare sector and investment made today will pay off in the future when the system stabilizes, and cost/benefit reduces as supplies sliding from conventional ways to drones. A small and medium organization should start collaborating and sharing the cost of implementation as part of their value supply chain. Operating drones involves multiple aspects such as pilots, maintenance, insurance, system development, and others not to mention the cost of owning the drones themselves. By sharing the cost or creative collaboration, more organizations can reap the benefits of integrating drones into their supply chain ecosystem.

In the current situation, there is a nationwide lack of PPE supply due to the increased usage and requirement in hospitals and clinics. There have been donations of PPE from NGO's that are being consolidated by organizations such as myPPEhub. Currently, the donated PPE is being manually transported to hospitals or clinics that are in dire need. A collaboration with myPPEhub in the distribution of PPE would make the supply more efficient. Drones could be deployed immediately after a PPE is collected and transported to facilities within a 100km radius. There are very strict guidelines according to the World Health Organization (WHO) on the collection, storage, packaging, and transport of COVID-19 swab specimens. These guidelines are in place to protect the specimens and the staff handling them. Specimens that can be delivered promptly to the laboratory can be stored and shipped at 2-8°C. When there is a tendency for the specimens to be a delay in reaching the laboratory, it is strongly recommended to use the viral transport medium. Whereas specimens may be frozen to - 20°C or ideally -70°C and shipped on dry ice if more time is required to reach the laboratory (WHO, 2020). Drones would be a much safer option in the transportation of specimens to laboratories. This could be proposed to the Ministry of Health or private clinics with a large sample size.

Conclusion

While the world is experiencing sudden and devastating changes from the COVID-19 pandemic, the emergence of various technologies, such as drones and 5G, are facilitating the impact mitigation effort. Keeping that as the foundation of this work, this study offered some of the latest insights into the COVID-19 pandemic and how the use of drones can help to minimize disruptions in the healthcare supply chain. This paper started with a general review of drones and their recent application in the healthcare and health supply chain. In order to relate to the impact of COVID-19, this study also dived into the functionality of drones in the previous pandemic crisis and the implementation challenges. This study identified drone technology interventions in the direction of COVID-19 impact management in the healthcare supply chain. From the intensive literature review and field observation, it is believed that the 5G network shall equip drones to offer higher versatility in functions and bigger areas of services. Regulations on drones are also encouraged to be revised based on the latest development in the industry. To ensure enough manpower in drone operation, education institutions should strive to get accreditation for their certifications. While it is noted that a few challenges are limiting the rapid adoption of drone technology, the immense potential that it holds in regard to supporting the healthcare supply chain cannot be overlooked. Government bodies and authorities should lead the collection and data assessment in local drones projects and invest more in drones research and development as the trend and adoption of this vehicle into the healthcare industry will only go one way up. Being among a few studies to investigate drone technology application in the Malaysian healthcare supply chain, the main limitation of this study is the extremely subjective nature of the findings. The emphasized issues, challenges, and mitigation strategies were based on literature search and current drone practice observation in the healthcare industry. Hence, future research should adopt a quantitative research approach. This would generate more more substantiated and significant outcomes. Furthermore, as the healthcare supply chain industry continuously advances, the proposition from this study particularly on the mitigation strategies should be considered as a guideline with emphasis on the continuous evolution of the industry in the future. Thus, future research should focus on empirical and structured studies. It is also suggested that future studies may engage focus groups to achieve more valuable insights towards the overall drone technology application in the healthcare industry particularly in Malaysia and other countries in general.

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Staging in The Cultural and Educational Activities of a Museum

Spesivtseva Nadezhda
Mary State University, Yoshkar-Ola, Russia, snv.marsu2015@yandex.ru

Mamontova Marina
Mary State University, Yoshkar-Ola, Russia, mamontova-ms@mail.ru

Viaznikova Victoria
Mary State University, Yoshkar-Ola, Russia, vikvit-007@mail.ru

Abstract

The article examines the problem of integration of theatrical and museum techniques in the museum space, reveals the directions of staging in museums, gives examples of staging in the cultural and educational activities of museums.

Keywords: Museum, Staging, Theater in A Museum, Cultural and Educational Activities of A Museum.

Introduction

Staging is more often used in the practice of a modern museumwhich expands museum activities, emphasizes the readiness of museums to put new activities into practice and gain new experience. Staging in a museum is a kind of communication according to the laws of drama, when a certain interpretation of a museum object takes place in an exposition, museum program, event for visitors with the use of theater language and attributes (script, stage direction, roles, etc.). The issue of staging in a museum is studied by E.L. Krasnova, V.S. Maleev, A.L. Timofeeva, I.A. Shchepetkova and others.

The process of "staging in a museum" began in the 70s of the 20th century which was caused by a new communicative concept of museums. Today the process of staging occurs in a new format. According to V.S. Maleev (2018), there are two reasons for this – the need to preserve the intangible cultural heritage and the perception of the museum as a place not only for gaining knowledge, but also for leisure and getting new emotions and impressions. This can be achieved through staging, the use of the laws of drama.

I.A. Shchepetkova (2006) believes that staging in the museum has three directions:

1. Plot construction of the exposition, i.e. "staging of museum expositions (historical events, scientific discoveries, biographies of famous people, plots and heroes of mythology, etc.).
2. The use of sounds, music, tactile effects, game elements, etc. in the exhibition to enhance the influence on memory, perception, imagination, impression, to activate entertainment and create new opportunities for cognitive and entertaining work with visitors.
3. Presentation of museum and theatrical performances, art actions, immersive performances. They can be independent or part of another event (opening of an exhibition, anniversary of a poet or composer, City Day celebration, etc.).

According to M.V. Korotkova (2018), the use of staging in the museumrequires the fulfillment of a number of conditions: compliance with the main direction of the museum and the theme of the exposition; the use of the most striking, characteristic of the given era real exhibits in staging; organic integration of theatrical elements into the usual rhythm of life of the exposition, as well as the solution to personnel and financial problems, etc.

The purpose of our research was to study the experience of staging in the museum as part of its cultural and educational activities while working with visitors.

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Results

The year of 2019 was declared the Year of Theater in Russia.As a result, a special attention was paid to this issue. The Theater Institute and the V. Potanin Charitable Foundation held the THEATRUM 2019 festival. One of the goals of the festival was to update and draw attention to stage practices in the museum. The festival program included such museum and theater projects as “UralmashGO!” (the Museum of the History of Ekaterinburg), “Uprising” (the Tomsk Regional Museum of Local History named after M.B. Shatilov and the Tomsk Regional Theater for Young Spectators), etc. So, the performance “UralmashGO” is based on the interview with workersfrom the largest plant in the Urals made by employees of the Museum of the History of Ekaterinburg. In the play, personal memories are intertwined with the history of the plant and the city.

A large project “Museum + Theater” is being implemented at the Anna Akhmatova Museum, where visitors can see small performances about the personality and work of Anna Akhmatova and other famous literary figures of the 20th century, as well as performances for the whole family based on the works of world children’s classics in whichnot only actors but also the audience take part. Bright puppets, shadow theater techniques, animation and light effects are used in staging. The performances of the project are laureates of numerous festivals. In addition, the museum has been hosting the Golden Chain theater festival since 2013. There is similar experience in many other literary museums where theater is a way to get closer to the writer and his characters.

The performance-excursion "Don Stefano" about the sculptor Stepan Erzia (Nefedov) (play by S. Senichev) is another example of successful cooperation of a museum with professional actors. The performance-excursion was presented by a group of young actors from the studio theater in the exhibition hall of the Mordovian Republican Museum of Fine Artsnamed after Erzia where the sculptures of the great master areexhibited. According to the creators of the project, this kind of performance will increase the audience’s interest in the artist and his works, as well as in the museum exhibitions.

Such public holidays as Christmas, Maslenitsa, Easter, Low Sunday, Trinitycan become a subject for staging in the museum. Museum visitors get acquainted with the holidays through the folk theater where traditions, rituals and things associated with them come to life. During the presentation, visitors get involved in the action, play, sing, craft, etc. For example, the Museum of the History of Yoshkar-Ola and the folk association “Tsarev Gorod” have been implementing the project of the children’s folklore studio “Teremok” for children over 1 year old for many years. It is based on a folk game as a unique means for communication with children. The program of classes also includes folk theater (folklore scenes, fairy tales). The same team have staged the play “It was in Petrovka”. The performance is based on folklore and ethnographic material.

Theatrical excursions have become more popular with the audience. At the Serpukhov Museum, employees conduct a theatrical excursion “Alive Pictures”, during which the heroes of the pictures give monologues, communicate with each other and with the audience. The “alive picture” based on the work by K.E. Makovsky “Down the aisle” can be a good example of it. It recreates the everyday life of boyars, introduces old-time folklore. “Alive pictures”are bright decoration of festive events and actions, such as Night at the Museum, Night of the Arts, etc. Moreover, depending on the theme of the event, various works of art are taken as the basis for staging. The second example from the practice of this museum is a walking city tour “Along Kaluzhskaya Street”. The excursion is conducted by several museum specialists, each of whom appears to the audience as a historical person who once lived in the city.

Theatrical excursions are held at the National Museum of the Republic of Mari El named after T. Evseev. On New Year and Christmas holidays, the excursion “Merry holiday Shorykyol” is conducted about the halls of the museum by fairy tale characters and accompanied by competitions, games, dances.“Traditional culture of the Mari people of the late XIX - early XX century”is a theatrical excursion with folk games, fortune telling, a master class in folk dances, etc. The museum program “Grandmother’s Chest” is also held with the participation of the actorsfrom the Mari National Drama Theater named after M. Shketan.

Museums also use shadow theater in the work with the audience that provides many opportunities for cultural, educational and recreational activities of the museum – interactivity, dynamics, entertainment, magic, immersion in the plot, perception of a museum object and immersion in history. Shadow theater is not widely used in the practice of museums and is more often targetedat a children’s audience as part of an excursion program or workshop in a museum, let us consider some examples.

An interactive tour “Shadow Theater” of the exposition “Theatrical life of Simbirsk-Ulyanovsk” for children in the Museum House-Studio of the Architect F.O. Livchak immerses the child in the magical world of theater, talks about the types of theater art and museum objects associated with it: ballet shoes, wigs, costumes, theater binoculars, posters and performance programs, portraits of actors and actresses. At the end of the excursion, children and adults take part in the theatrical shadow action, they make figures and decorations for the performance and move them according to the script of the play “Kolobok”.

The Museum of the Silver Age, a branch of the State Museum of the History of the Russian Literature named after V.I. Dahl, held a guided tour of the exhibition “Moomins: From Hat to Tip of Tail” based on the books by the

Finnish writer Tove Janssonas part of The Night of the Arts event. During the excursion, children from 5 to 9 years old and their parents visited a lighthouse on a desert island, measured the length of the Moomin's tail, guessed the heroes from the books, read their favorite books and then took partin a shadow theater. Figures of familiar heroes appeared on a white screen in the light of a lantern. Children took part in making the performance - they inventeda story, made figures of characters, brought them to life and showed the performance. The script was based on a story about Moomin and his friends.

During the research, we set an additional task – to develop a scheme for conducting a workshop for museum visitors, with the code name "Bright Shadows". The purpose of the workshop is not only to teach the technologies of shadow theater, but also to connect the storyline of the performance with the museum collection through the museum objects, pieces, museum environment. We believe that workshops and shadow theater can become the initial form of introducing shadow theater technologies into the practice of museums.

In conclusion, it is necessary to note that museums are introducing staging into their activities very successfully, striving to enhance the semantic and emotional impact on visitors, first of all, this concerns the cultural and educational activities of the museum. The museums hold independent theatrical performances, more often in cooperation with the theaters of the region, theatrical excursions and programs, puppet theater performances, shadow theater, folk holidays and events, museum classes and many other events which are popular with visitors, where staging acts as an element, component, tool, means. Thus, staging performs the functions of communication, education, upbringing. However, there are still issues related to the identification and description of successful experience, development of methodological foundations of staging in the museum space.

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Exploring the Mediating Effects of Inspirational Motivation And Intellectual Stimulation on Creativity: A Case Study of Romanian Employees

Cristian – Liviu VELE

Technical University of Cluj Napoca,
North University Center in Baia Mare, Romania
Department of Economics
cristian.liviu.vele@gmail.com

Abstract

This article focuses on the implications that two dimensions of transformational leadership, more specifically inspirational motivation and intellectual stimulation, have on employee creativity in the context of the present global pandemic. These two variables were selected due to their direct influence in employee motivation and active implication in organizational long-term sustainability. We consider that the effects of the pandemic and the necessity to work from home in the case of a large number of employees have led to problems regarding adaptability and work efficiency, and for these reasons the study wishes to provide a better understanding of employee behavior and of what it takes to support individuals in terms of creativity and innovation. For this article, a quantitative research was conducted using a questionnaire based on the Multifactor Leadership Questionnaire (MLQ) which was applied to employees that work in companies located in the northern part of Romania. The answers of 60 respondents were analyzed and the findings led to the conclusion that inspirational motivation and intellectual motivation are strong influencers of employee creativity. At the same time we noticed that creativity is necessary in the majority of respondents and as a consequence they consider their work as productive for the organization.

Keywords: Transformational Leadership, Employee Creativity.

Introduction and literature Review

Creativity is seen as an ability to produce innovative solutions to organizational problems. Thus, creativity is a key factor in increasing organizational performance by using humans' cognitive abilities to solve problems. At the same time creativity is used as a basis for creating successful new business models based on innovation (Huang, Krasikova & Liu, 2016; Kark, Van Dijk, & Vashdi, 2018). There are different models and views regarding what it takes to support and lead creativity within organizations (Mumford, Scott, Gaddis, & Strange, 2002; Shalley & Gilson, 2004; Shalley, Zhou, & Oldham, 2004), one of the most used frameworks for supporting creative thoughts consist of eight core processing activities (Mumford *et al.,* 1991): problem definition, information gathering, concept selection, conceptual combination, idea generation, idea evaluation, implementation planning and monitoring. Given the fact that creativity is aimed at solving organizational problems in an innovative manner with the purpose of increasing performance we must ask ourselves how can organizations support employee creativity and increase the success off creative thinking and creative outcomes.

Studies have shown that transformational leadership can foster employee creativity (Amabile, 1988; Hughes et al., 2018; Koh, Lee, & Joshi, 2019), by motivating, inspiring and supporting employees in order to increase their participation in creative behavior. Transformational leadership can also be used to ensure the success of organizational change when adopting a climate designed at supporting innovation. Transformational leadership supports creativity and innovation by modeling the way in which people behave, by inspiring a shared vision and challenging the traditional processes of conducting different activities and by enabling others to take action in following their ideas. The main goal of transformational leadership is to build a vision for the future and to provide the appropriate model of behavior by setting high performance expectation and providing support for individuals in order to reach the expected performance and also by ensuring intellectual stimulation which is imperative in developing creativity (Avolio *et al.*, 1999; Gong et al., 2009; X. H. Wang, Kim, & Lee, 2016). In an organization in which transformational leadership is efficient the employees will put the needs of the organization before their personal needs (Gumusluoglu & Islev, 2009; Bass, 1996).

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Transformational leadership consists of four dimensions aimed at fostering employee creativity. These dimensions are (Avolio & Bass, 1985): idealized influence, individual consideration, inspirational motivation and intellectual stimulation. Through idealized influence a leader works on encouraging employees to invest their efforts in achieving the organization's mission. Individual consideration is focused on increasing the degree of communication between the leader and the employees, thus trying to best understand the individual needs of every employees. By using inspirational motivation a leader creates a shared vision for the organization and effectively communicates that vision to everyone in order to make sure that individuals invest their efforts, knowledge and abilities in reaching the vision. And finally, through intellectual stimulation a leader works on developing and encouraging critical thinking. As said before, creativity is aimed at finding novel innovative solutions to organizational problems. For this to happen within organizations leaders need to inspire individuals to think outside the box and to constantly stimulate them intellectually in order to ensure the development of innovative solutions.

The recent transformations that have occurred worldwide, during the present pandemic, have made creativity crucial for organizations, in order to grow and develop sustainable competitive advantages. Thus, factors that influence employee creativity such as in their motivation, personal control and uncertainty avoidance orientation (Shafi et al., 2020; Tse et al., 2018; Wang, 2020) need to be taken into consideration by leaders. At the same time, leaders need to be aware of the fact that having employees that are learning goal orientation is an important factor that influences creativity within the organization (Bakker *et. al*, 2020; Huang & Luthans, 2015). Learning goal orientated employees focus their efforts into constantly enhancing their own competencies and on developing new abilities and skills that can be put in the service of the organization in which they work. They tried to gain as much knowledge as they can and also share that knowledge with the intent of overcoming challenges and achieving their goals and those of the organization through creativity and innovation (Huang & Luthans, 2015).

Studies have shown that organizations which fail to develop a working environment based on creativity and innovation do not obtain high levels of productivity and sustainability due to the fact that these organizations are not able to adapt fast enough to changes in the business environment (Pitta, 2009). For this reason organizations need to promote an environment which positively influences both creativity and innovation (Cummings and Oldham, 1997; Oldham and Cummings, 1996; Krause (2004) , evidence suggesting that an organizational climate that supports creativity is an important contributor to individual and team creativity (Hunter et al. ,2007; Hsu and Fan, 2010; Gumusluoglu and Ilsev, 2009).

Therefore, the present study takes into consideration two of the dimensions of transformational leadership namely inspirational motivation and intellectual stimulation as influencers of employee creativity based on the fact that the present pandemic has forced organizations to adapt into allowing their employees to work from home and to give them an increase degree of freedom and responsibility.

Motivation is a crucial element in any model regarding human performance and a key factor for ensuring a business's long term development and sustainability (Pinder, 2014). Having a large percent of employees working from home has lead to new problems. For organizations the necessity of ensuring proper motivation has increased, in order to ensure active participation of employees in achieving organizational goals. In this context we consider inspirational motivation as being extremely important in ensuring superior level of motivation within the working force of an organization and also in creating an environment that encourages creativity and innovation.

At the same time we need to take into consideration the fact that creativity cannot be obtained in the lack of intellectual stimulation of those responsible for obtaining creative results and innovation. Through intellectual stimulation leaders encourage their followers to think in new ways and to develop their problem solving skills and the use of reasoning before taking a decision or an action. In addition, followers are encouraged not to accept the current situation and to question everything specially old assumptions, to reformulates problems and to unleash their imagination with the intent of finding new creative ways of doing things or solving problems (Bass, 1985; Hater & Bass, 1988; Kark & Van Dijk, 2003).

Methodology and Research

The present research focuses on the correlations between two dimensions of transformational leadership, namely *inspirational motivation* and *intellectual stimulation*, and employee creativity in the context of a pandemic situation that forced a large number of employees worldwide to work exclusively from home. The data was gathered using a multi-item scale questionnaire, based on the Multifactor Leadership Questionnaire (MLQ) (Avolio & Balls, 2005) and on the Kumar and Holman (1997) Creativity Styles Questionnaire. All items were measured on a five point Likert-type scale where (0) strongly disagree to (4) strongly agree.

The variables defined in our study are measured by three individual factors, using a number of three question for each factor regarding transformational leadership and four questions regarding creativity. The answers were loaded as a sum of responses into the variables, which were then processed using IBM SPSS 20. For the purpose of this research, we chose to use only the items regarding inspirational motivation and intellectual stimulation from the MLQ. A total of 60 valid questionnaires were gathered form the subjects that took part in our study. The participants in our study are working in companies located in the northern part of Romania, in fields such as sales, logistics, production or marketing, occupying both operational positions and also management positions.

In order to achieve the main objective of the research, namely a better understanding and explanation of the correlations between inspirational motivation and intellectual stimulation and employee creativity, a series of questions were asked to which we tried to provide with appropriate answers.

Q1: Does inspirational motivation has a positive influence on employee creativity?

Q2: Does intellectual stimulation has a positive influence on employee creativity?

To answer the above questions, first an analyze of the internal consistency of the scale used in the research questionnaire was performed, using a Cronbach's Alpha reliability test, and the results obtained let us to conclude that the internal consistency is good and we can proceed with analyzing the correlations between the defined variables within our study. As it can be seen below all the answers given in our study were taken into consideration.

Table 1: Cronbach Alpha coefficient

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.749	.799	3

(Source: own processing in SPSS)

Case Processing Summary

		N	%
Cases	Valid	60	100.0
	Excluded[a]	0	.0
	Total	60	100.0

a. Listwise deletion based on all variables in the procedure.

(Source: own processing in SPSS)

Findings

Of the participants in our study 75% are female and 25% are male with the majority of them being situated in the 20 to 30 years of age interval (56.7%). 30% of the participants have declared that the complexity of their work has increased during the time of the pandemic, while 56.7% have stated that the complexity of the work has remained the same, only 13.3% have declared that the complexity of their work has decreased as a result of the pandemic.
51.7% of the respondents have declared that they need to use their creativity on a daily basis (16.7% - frequently and 35% - fairly often), 33.3% of the respondents declared that they only need to use their creativity sometimes in their work, and only 3.3% of the respondents said that they never use creativity in their daily work.

Table 2: Descriptive statistics

Statistics

		Inspirational motivation	Intellectual stimulation	Creativity
N	Valid	60	60	60
	Missing	0	0	0
Mean		8.5833	8.2000	9.7500
Median		9.0000	8.0000	10.5000
Mode		8.00	9.00	12.00
Std. Deviation		2.01933	2.05682	3.42783
Variance		4.078	4.231	11.750
Skewness		-.962	-.363	-.545
Std. Error of Skewness		.309	.309	.309
Kurtosis		2.354	-.152	.141
Std. Error of Kurtosis		.608	.608	.608
Range		11.00	9.00	15.00
Minimum		1.00	3.00	1.00
Maximum		12.00	12.00	16.00
Sum		515.00	492.00	585.00
Percentiles	25	8.0000	7.0000	8.0000
	50	9.0000	8.0000	10.5000
	75	10.0000	9.7500	12.0000

(Source: own processing in SPSS)

The means of the two variable that were considered in our study as influencers of employee creativity have values below 9 while creativity has a mean value of almost 10. These values may lead us to the conclusion that inspiration motivation and intellectual stimulation may not influence creativity as much as we thought, further analysis needed to be conducted. Median values in inspirational motivation (9.00) intellectual stimulation (8.00) are relatively high meaning that the participants in our study are actively contributing to the formation of vision within the organization and share that vision to other members and at the same time try to convince others too think outside the box and stimulate them at an intellectual level. We can see that the median value of creativity is also relatively high (10.50), meaning that employees our creative in their daily work and need to use their creativity in solving different problems.

We can see some differences in the mode of the data set, the value that appears most often, in relation with the median values of the variables, which may suggest that there are some major differences in the answers that were provided in the research and furthermore, if we take into consideration also the values of the variances, especially in the case of creativity we can see that there are certain areas of expertise in which creativity is required and perhaps even a necessity while there are other fields in which creativity is not a requirement and individuals do not necessarily have to be creative.

Table 3: Variable correlations

Correlations				
		Inspirational motivation	Intellectual stimulation	Creativity
Inspirational motivation	Pearson Correlation	1	.677**	.516**
	Sig. (2-tailed)		.000	.000
	N	60	60	60
Intellectual stimulation	Pearson Correlation		1	.514**
	Sig. (2-tailed)			.000
	N		60	60
Creativity	Pearson Correlation			1
	Sig. (2-tailed)			
	N			60
**. Correlation is significant at the 0.01 level (2-tailed).				

(Source: own processing in SPSS)

As it can be seen above the value of the significance coefficient allows us to conclude that that the variables defined in our study have a positive influence on employee creativity and if you take into consideration the value of the Persons linear correlation coefficient we can see that inspirational motivation is a strong predictor of employee creativity (0.516) and also intellectual stimulation strongly influences employee creativity (0.514). Through inspirational motivation an environment characterized by high expectations within the organization is created, environment that has at its core a shared vision and every member of the organization is inspired to meet the high expectations set by that vision. It is extremely important for leaders and also for employees to clearly illustrate the future vision, to strengthen their commitment and encourage everyone to overcome any problem into achieving that vision.

The positive correlation between inspirational motivation and intellectual stimulation can also be noticed in the figures below, which show the link between the two independent variables and creativity, as the dependent variable of the study.

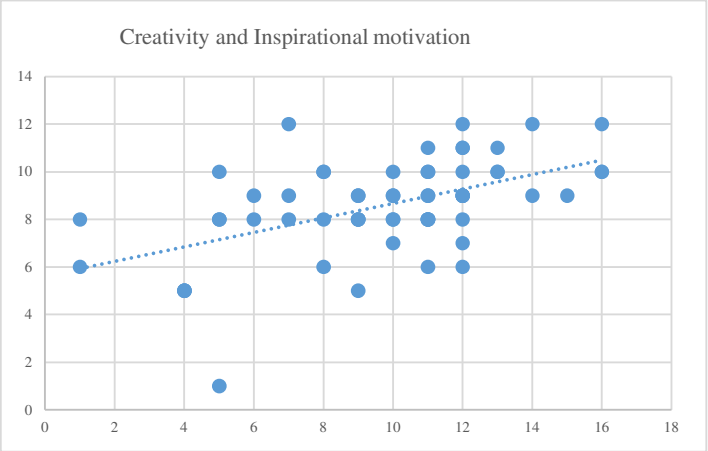

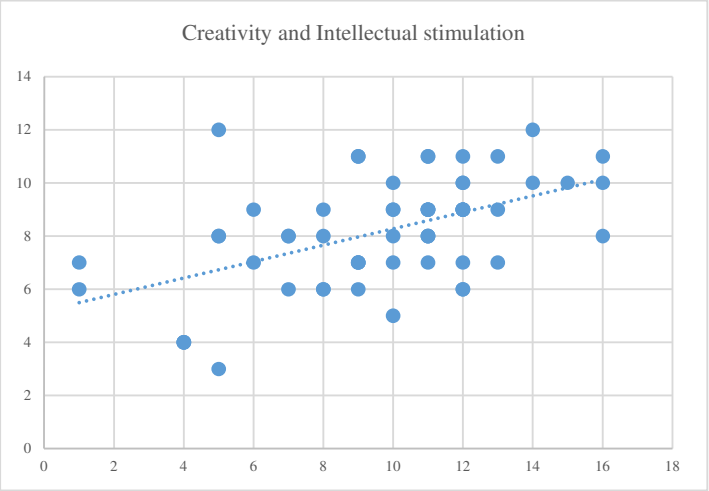

Intellectual stimulation comes and supports inspirational motivation by encouraging individuals to look at problems from different angles and the question traditional assumptions and traditional approaches to problem solving. By doing this, employees are somehow ignoring the traditional ways of doing things around the organization and focus on an innovative manner to identifying and implementing solutions to everyday problems.

Conclusion and Discussion

Creativity and innovation have become increasingly important especially in these times of global pandemic where organizations have been put into the situation in which their employees had to work from home. Even more, changes in the global business environment have led to new problems especially related to logistics production and sales problems that forced organizations to become more flexible and to adapt to these new changes. In this context, encouraging and supporting employee creativity has become paramount in assuring organizational survival and sustainable development.

We focused on this study exclusively on 2 dimensions of transformational leadership namely inspirational motivation and intellectual stimulation as predictors of employee creativity in the context of a global pandemic. We consider these two factors as extremely important in ensuring a high level of intrinsic motivation for individuals, which is necessary in order to keep them working towards meeting the organizational goals in times of great insecurity. At the same time intellectual stimulation plays a defining role in supporting employee adaptability to the new working context and in increasing the level of work productivity.

The respondents in our study work in companies located in the northern part of Romania and the statistical analysis of their responses revealed relatively high scores both in inspirational motivation and intellectual stimulation. Also, relatively strong correlations were obtained between these two independent variables and employee creativity, suggesting that organizations characterized by an environment in which a shared vision is promoted and individuals are intellectually stimulated also have the most creative employees.

The findings of this study provide a better understanding of the necessary actions needed to be taken by organizations in order to encourage and foster employee creativity, with the intent of obtaining superior performance and long term development. The fact that creativity is strongly influenced by inspirational motivation and intellectual stimulation provides organizations that have employees working from home with the necessary instruments for better motivate individuals and to actively implicate them in the overall organizational success.

Of course, the present research has certain limitations, due to the fact that it would be advisable to extend the range of the study and to include a higher statistical population. At the same time , it would be useful to extend the study on a longer period of time in order to better understand the effects of the global pandemic on the activity of the organizations and on the work of its members and to better identify what it takes to increase the degree of adaptability.

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Are Randomness of Behavior and Information Flow Important to Opinion Forming in Organization?

Agnieszka KOWALSKA-STYCZEN,
Faculty of Organization and Management, Silesian University of Technology,
Zabrze, Poland, E-mail: agnieszka.kowalska@polsl.pl

Krzysztof Malarz
AGH University of Science and Technology, Faculty of Physics and Applied Computer Science,
Kraków, Poland, E-mail: malarz@agh.edu.pl

Abstract

We examine how the randomness of behavior and the flow of information between agents affect the formation of opinions. Our main research involves the process of opinion evolution, opinion clusters formation and studying the probability of sustaining opinion. The results show that opinion formation (clustering of opinion) is influenced by both flow of information between agents (interactions outside the closest neighbors) and randomness in adopting opinions.

Keywords: Opinion Dynamics, Social Modelling, Organization, Social Complex System, Agent-Based Model,

Introduction

Understanding what factors influence the formation of opinion in society is very important for many aspects of an organization's activities, including organizational behavior, organizational knowledge transfer, leadership and many more. The basis of the proposed approach in this paper is to look at the organization as a complex social system. This direction of research is more and more often seen as an important element of management science (Kowalska-Styczeń, 2018). To explain the specifications of social systems (including organization) such as self-organization, order, chaos, complexity, the evolution of mathematical theories must be extended (Ehsani et al., 2010). Such an extension of the theory is the usage of computer modeling, simulation, in particular agent-based modeling (Kowalska-Styczeń, 2020). As emphasized by Acemoglu and Ozdaglar (2011), we acquire our beliefs and opinions through various types of experiences, in particular through the process of 'social learning'. As part of this process, people communicate with other people, they obtain information and they update their beliefs and opinions. The communication takes place with a subgroup of society consisting of friends, colleagues and peers, co-workers and distant and close family members. Information obtained by a person from a particular partner on a social network is transferred to other members of that network. Depending on the communication (information flow) in the social network, this information transfer may have a smaller or larger reach, the information may amount to more or less people. It should also be noted that in the formation of opinions, we often deal with unpredictability, as well as with irrational processing of information (Sobkowicz, 2018; Stadelmann and Torgler, 2013).

The purpose of this article is to study the formation of clusters of opinions (i.e. groups of people with the same opinion). In a social network, individual opinions and interpersonal relationships always interact and evolve, leading to self-organization of clusters of opinions across the network (Zhang et al., 2013). Because it is very difficult to study social systems in terms of their complexity, researchers increasingly use computer simulations. Therefore, in this article, we propose simulations carried out for a model based on Latané (1981) theory of social impact, which takes into account both the different flow of information between community members and the randomness of their behavior (noise). The basic assumption of Latané's social impact theory is that people are members of a community and within that community they interact with each other. Social influence are all interactions between people (persuasion, joke, showing emotions, feelings, etc.). The theory of social influence is based on three principles: social power, psychosocial law, and multiplication or division.

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Model Description

The computer model used here has been formally described in the work by Bańcerowski and Malarz (2019). The model was also tested by Kowalska-Styczeń and Malarz (2020) for two and three opinions available in the system and initially randomly distributed among agents. The formation of opinions in the community as a result of the flow of information and randomness of agents behavior was investigated, and several phases in the behavior of the system (community) due to these parameters were detected. In this paper, we focused on the relationship between the spatial distribution of opinions and the probability of sustaining opinion by agents in opinion clusters.
It should be noted that, the essence of social influence is not only exerting social influence, but also succumbing to it. In the used model, this fact was taken into account by introducing the following parameters: intensity of persuasion and intensity of support. These parameters determine the effectiveness of which an individual may interact with or influence other individuals by changing or confirming their opinions. These parameters are interpreted as follows:

- **intensity of persuasion**: the larger $0 \leq p_i \leq 1$ the agent is more convincing agents with other opinions from his neighborhood to accept his/her opinion,
- **intensity of support**: the larger $0 \leq s_i \leq 1$ the agent convinces more strongly with other agents from his neighborhood, so that they do not change their opinion if this opinion is identical with the opinion of agent i.

In the simulations presented in the next section, random values of p_i and s_i for each agent were assumed.
As in previous works, we take into account two parameters of the model: information flow in the community and random behavior (noise). The varied flow of information in the community was expressed in the model using the parameter α (this parameter talks about the influence of close and distant neighbors in the community). Small values (e.g. $\alpha = 1$ or 2) mean good communication between agents and good access to information (an exchange of information with a large number of agents in the network takes place). The larger values of α, the weaker the communication between the groups of agents (the exchange of information takes place only in the closest neighborhood, e.g. $\alpha = 6$).

The randomness of agents' behavior is expressed by the parameter T (social temperature). If T = 0, then a lack of randomness is observed, and the agent adopts an opinion that has the most influence on him/her. As T increases, more and more often opinions that do not have the greatest impact on agents are chosen.

To sum up, in the used computer model:

- The society is represented by agents occupying the nodes of the square lattice. Each network node corresponds to one person.
- Every agent i has one among K available opinions and, moreover, it is characterized by two parameters: intensity of persuasion (p_i) and intensity of support (s_i). We assume random values of these parameters for all agents.
- Each agent is influenced by all other agents. The strength of this influence decreases with increasing distance between them. Additionally, in order to reduce the impact of distant neighbors, the parameter α was introduced, which appears as a constant in the distance scaling function.
- The randomness of human behavior is reflected by T parameter, which characterize the entire system.

The simulations are carried out on square lattice of linear size L = 41 with open boundary conditions.

Results

Spatial distribution of opinions. Let us start presentation of the results by showing the spatial distribution of opinions for K = 2 (two possible opinion), for α = 2, 3, 6 (various levels of flow of information) and for T = 0, 1, 3, 5 (various levels of noise, i.e. various levels of randomness in the opinion adopting). As can be seen in Figure 1, both α and social temperature T have influence on opinion formation and polarization in the groups (self-organization of opinion clusters).

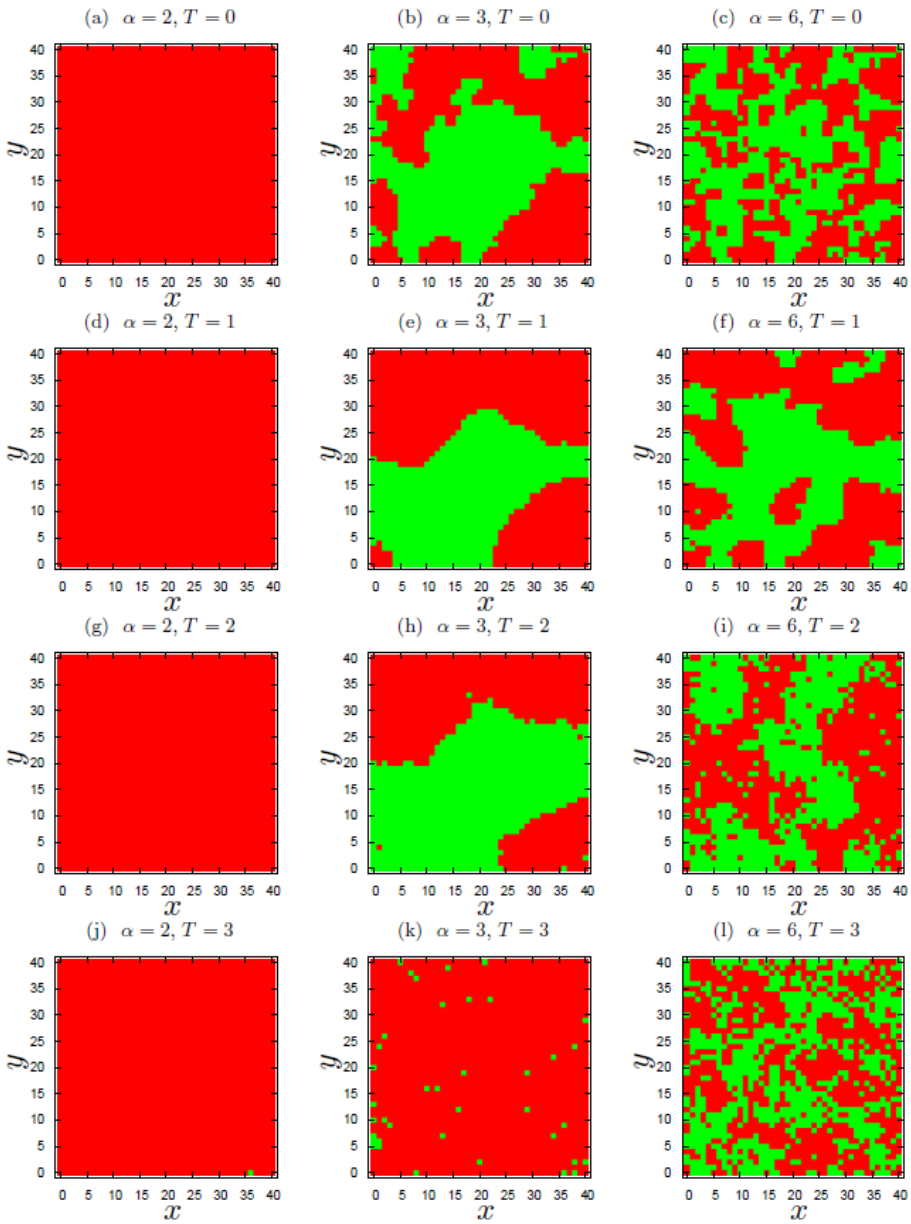

Fig. 1: Spatial distribution of opinions for K = 2 opinions for various α and various social temperatures (T) after t = 100 time steps of the system evolution (red and green mean different opinions)

For α = 2 (and α = 1) the consensus takes place (all agents accept one of two opinions), except of single cases for large T values. The higher α, the less interactions unit has outside the closest neighbors group, which leads to lower polarization of opinions (there are more and more clusters, i.e. groups of agents with the same opinions). In addition, small clusters are able to survive, although they are surrounded by large clusters of agents with different opinion. An analogous situation occurs when the T parameter is increased. With larger T , there is more heterogeneity in the areas where actors with opposite opinions occur and the division into clusters is less pronounced (less polarization of opinions in the groups). An increase of the social temperature T often results in the emergence of small clusters of agents with a minority of opinion. In general, the increase of T and causes that more clusters are formed, and the polarization of opinions in groups is weaker.

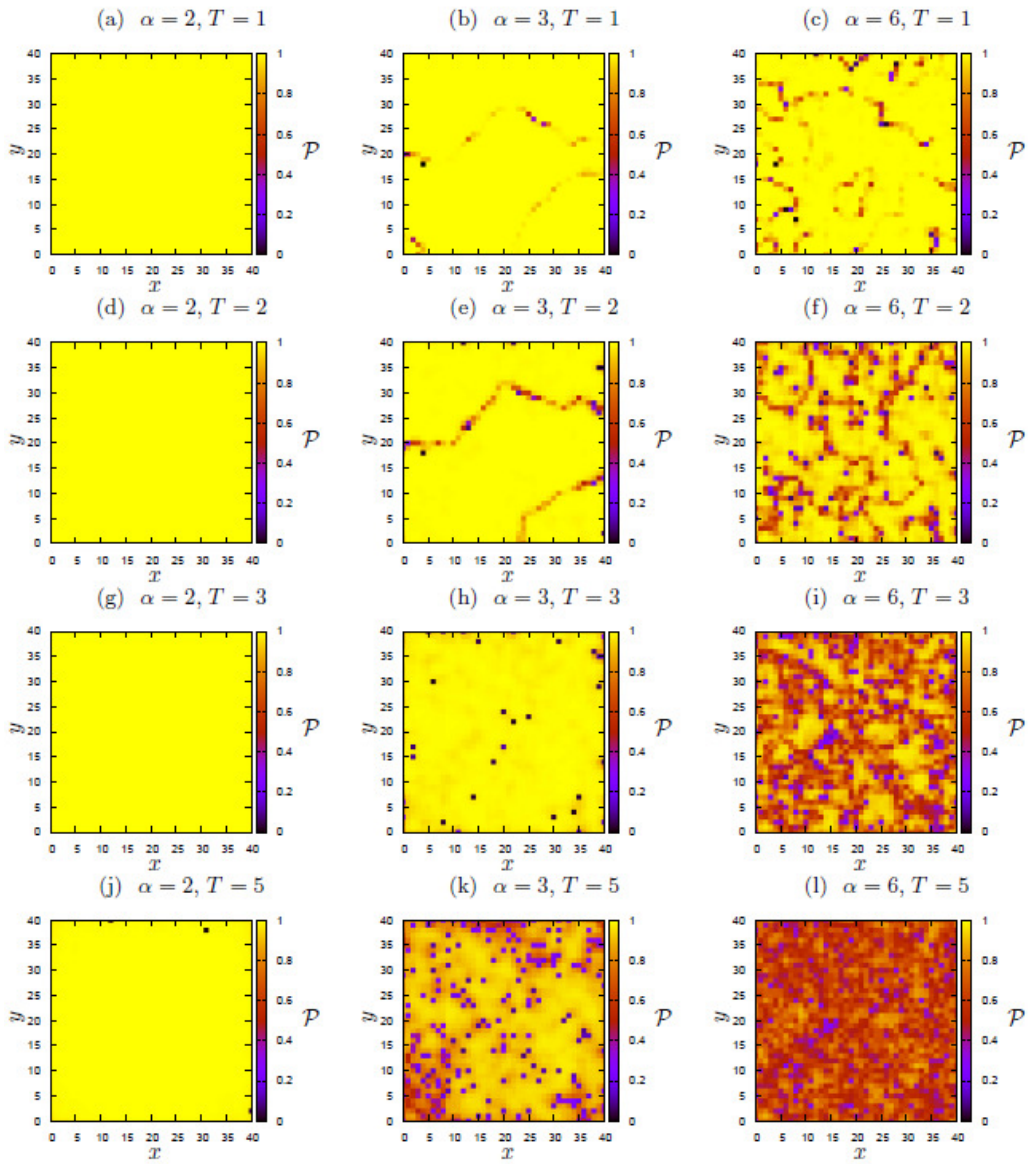

Fig. 2: Spatial distribution of probabilities of sustaining opinion for K = 2 opinions, social temperature T and for various values of after t = 100 time steps of the system evolution.

Probability of sustaining opinion. For Figure 1 discussed in the previous Section, corresponding heat-maps have been created (see Figure 2). Each agent is assigned to one point in the network with a certain color. This color depends on the probability that agent will sustain his/her opinion. The colors change from yellow (high probability of sustaining opinion) to black (low probability of sustaining opinion). We do not show heat-maps for T = 0, because the probability of sustaining the opinion has then only two values: either 0—the agent will change his/her opinions or 1—the agent will sustain his/her opinion. The smallest probability of sustaining the opinion occurs for agents on the outskirts of clusters—compare Figure 2 to Figure 1. In addition, this probability is higher in large clusters than in small ones. This likelihood also decreases with the increase of T (more and more darker colors in the agents' network). This probability is of course affected by T and α. The higher T , the less probability of sustaining the opinion (less yellow), which is especially visible for α = 6 in the Figure 2i and Figure 2l. The chances of sustaining the current opinion of agents also decrease with the rise of α (there is more and more darker color). To sum up, the greater the randomness of behavior and the smaller the flow of information (i.e. greater α), the less yellow color in the heat-maps is observed (a lower probability of sustaining opinion in the entire lattice of agents), which is particularly evident in Figure 2i (T = 3) and Figures 2k and 2l (T = 5).

Clustering of opinions. Analyzing the results in the previous Section, the clustering of opinions is influenced by both the level of randomness in agents' decisions (T) and the influence coming from close or distant neighbors (α). For clusters detection, the Hoshen and Kopelman (1976) algorithm has been applied. In Hoshen–Kopelman algorithm each agent is labelled in such way, that agent with the same opinions and in the same cluster have identical labels. The algorithm in this paper was used for a square lattice with von Neumann neighborhoods (with the nearest neighbors interactions).

In Table 1, the relative size S_{max}/L^2 of the largest cluster after t = 1000 simulations time steps for different values of T and for K = 2 has been shown. These results coincide with Figure 1. In all cases, for α = 1, the largest cluster fills the entire lattice in 100% (i.e. there is a consensus in opinion). It should be noted that this is a situation in which most agents in the lattice influence the opinion of the selected agent (the flow of information between agents is very good). For α = 2, the influence of other agents in the lattice is still greater than the influence of the closest neighborhood. The size of the maximum cluster then fluctuates around 100% of the network size (i.e. one large cluster with one opinion). In general, for any size of T , the size of the largest cluster of opinions decreases with the increase of α.

Table 1: The relative size of the largest cluster S_{max}/L^2 for L = 41.

T	α = 1	α = 2	α = 3	α = 6
0	100%	94%	54%	34,0%
1	100%	100%	83%	57%
2	100%	99%	92%	62%
3	100%	99%	92%	24%
4	100%	99%	90%	15%
5	100%	100%	85%	12%

In order to get a better look at the clustering of opinions, the average number of small and large clusters after thousand time steps for hundred simulations was also studied (see Figure 3). We assumed that small clusters contain no more than five agents sharing the same opinion (S ≤ 5). The randomness in accepting opinions (T) often results in the formation of small clusters of opposing opinions (as can be seen in the Figure 1). The number of clusters increases with an increase of α, i.e. the smaller the influence of all agents in the network on the selected agent, the more difficult is appearing the opinions clustering. In general, the number of clusters increases with T , but for α = 3 and α = 6 and for T = 1, the number of clusters is lower than for T = 0. First of all, the probability of a new cluster forming (with opposite opinion) inside another cluster is still very small. Secondly, the probability of changing opinions is greater at the clusters borders than inside the cluster. If the adjacent clusters have different sizes, then the probability of changing the agent's opinion in a smaller cluster is greater than in the larger one. This situation leads to the disappearance of small clusters, or in general to a reduction in number of clusters. We can see similar phenomena in terms of the number of small clusters (see Figure 3). The number of small clusters increases with T (of course, apart from low T values and for α > 1).

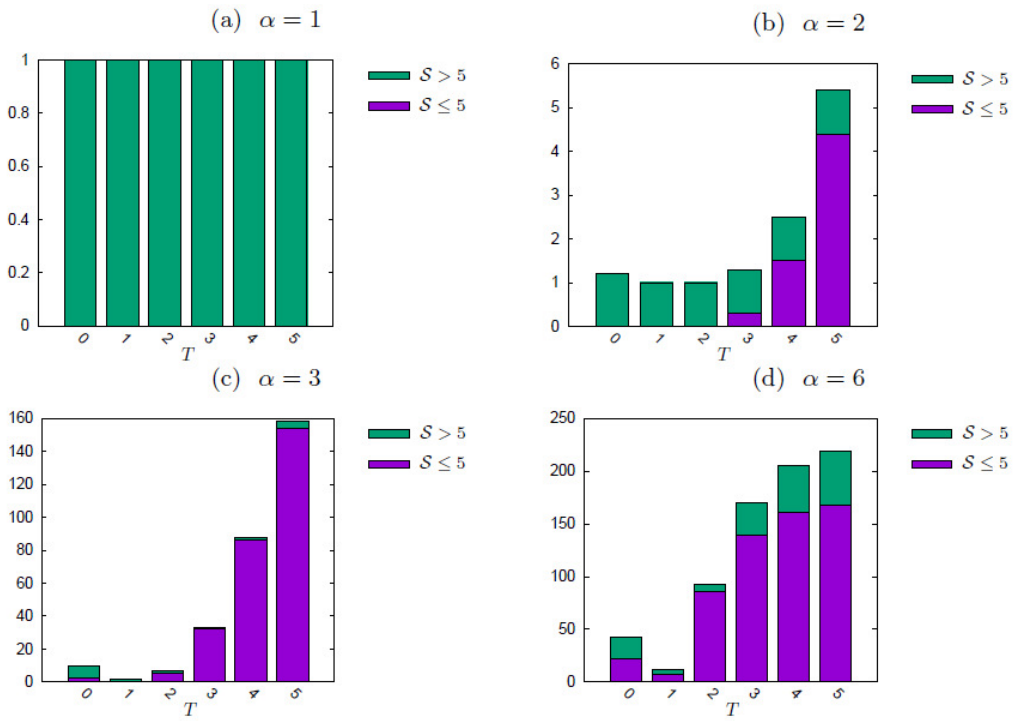

Fig. 4: Histogram of cluster sizes S for various values of temperature T and exponent α

Summary and Conclusions

In this article, we used a cellular automaton model in which the theories of Latané's social influence were implemented. We studied how the social temperature (randomness of human behavior) and the flow of information in society influenced the clustering of opinion. To achieve this goal, the spatial distribution of opinions, probability of sustaining opinion and the number of clusters were studied.

First, the spatial distribution of opinions after 100 steps of simulation was analyzed. The simulations showed how clusters of opinion are formed depending on the flow of information in the agents' network, as well as after considering the randomness in forming the opinion. Consensus (one large cluster) was possible for K = 2 (two opinions) for low values α (α = 1, 2), when agents formed their opinions also contacting more distant agents (that is, when the flow of information was good in the whole community).

Taking into the account the randomness in forming opinions in the case of consensus did not really matter.

Generally, the greater the α and T , the more clusters, i.e. groups of agents with the same opinions (less polarization of opinions in the groups). Of course, it should be noted that the appearance of noise in the system (T = 1) slightly orders the system in relation to the situation when T = 0 (lack of randomness). This is in accordance with other studies (Ren et al., 2007; Biondo et al., 2013; Shirado and Christakis, 2017; Kowalska-Styczeń and Malarz, 2020), in which a low noise level has brought order to the system. With the formation of opinion clusters, the probability of sustaining opinion is closely related. This probability is greater within the clusters than at their borders and it is larger in the larger clusters (Figure 2). This leads to the disappearance of small clusters, and thus to reduction of the number of clusters.

The formulation of opinions is also described by the number and size of clusters of opinion. The clustering of opinions is influenced by both the level of randomness in agents' decisions and the influence coming from neighbors. Generally, the size of the largest cluster of opinions decreases with the increase of α. This, of course, corresponds with the spatial distribution of opinions (see Figure 1). Furthermore, the number of clusters increases with α, i.e. the smaller the influence of all agents in the network on the selected agent, the more difficult it is for forming clusters of opinions. An interesting phenomenon occurs in the case of analysis of the impact of T (for T > 0). The probability of a new cluster forming (with different opinion) inside another cluster is then small and the probability of changing opinions is greater at the border between two clusters than inside them. Additionally, the

probability of changing the agent's opinion in a smaller cluster is greater than in the larger one, which leads to the disappearance of small clusters, or in general to a reduction in the number of clusters. In summary, the simulations showed that opinion formation and spread is influenced by both flow of information between agents (interactions outside the closest neighbors) and randomness (irrationality) in adopting opinions (what is shown in Table 2).

Table 2: The impact of both T and α on the formation and spread of opinions

Impact on	For T > 0	α
Spatial distribution of opinions	The greater the T, there are more and more clusters	The greater the α , there are more and more clusters
Probability of sustaining opinion	The higher T, the less probability of sustaining the opinion	The higher α, the chances of sustaining the current opinion of agents decrease
Clustering of opinions	The number of clusters increases with T	The number of clusters increases with α. The size of the largest cluster decreases with the increase of α
Summary	Generally randomness (irrationality) hinders polarization of opinions in groups	The better the flow of information in the community, the easier it is to form and spread opinions, also get a consensus

Better information flow, i.e. contacts with more agents in the network representing the community facilitates the formation of opinion and its spread. In the case of small values of α (when information flow is very good), the result of the simulation is a consensus, as in most sociophysical models of social dynamics (Castellano et al., 2009). For large values of α (when opinions are consulted only in the close neighborhood), the polarization of opinions is weak and there are many small groups of agents with the same opinion. In addition, the presence of many small clusters causes a lower probability of sustaining opinion for individual agents, i.e. they change their opinions more often.

As mentioned earlier, the better the flow of information in the community, the better the opinion spreads and the more often there is consensus and polarization of opinions. Also, Björkman et al. (2004) and Tsai (2002) emphasize that good communication and wide interaction channels favor the exchange of knowledge and information. In organization, good spread of opinions and information is particularly important in the case of organizational change, organizational culture and knowledge transfer. Managers should therefore ensure good information flow between members of the organization by creating both formal information flow channels and informal communication networks. Moreover, they should make sure that the number of members in the organization who act in a random and unpredictable manner is small, because the more randomness in the organizational behavior, the less chance of polarization of opinions and consensus appearing.

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Detecting Financial Fraud in South Africa: A Comparison of Logistic Model Tree and Gradient Boosting Decision Tree

Katleho MAKATJANE[1]; Ntebogang MOROKE[2] and Bokang NCUBE[3]

North West University; Mafikeng Campus; South Africa[1,2]
North West University; Vaal Campus; South Africa[3]

katleho.makatjane@yahoo.com[1];ntebo.moroke@nwu.ac.za[2]; bokang.ncube@nwu.ac.za[3]

Abstract

For years, fraudsters have been using debit and credit card numbers that they have printed them on a blank plastic card so that they can use them in brick and mortar stores. For the past five years, banks had introduced Europay MasterCard and Visa (EMV) chip card technology, which made it possible for merchants to twitch demanding a PIN (here reference as personal identity number) for each transaction made. As frequency of transactions is increasing, number of fraudulent transactions is rapidly increasing. Hence the objective of this study to determine the effectiveness of logistic model tree (LMT) and gradient boosting decision tree (GBDT) to detect the amount of fraudulent transactions in South Africa (SA). A daily data for the period of 01 Mach 2020 to 10 July 2020, was obtained by, web-scrapping credit and debit card fraud from SA. The LMT and GBDT were constructed using training data on the 17 financial conditioning factors identified by the LogitBoost algorithm. We applied these models and validated them using receiver operating characteristics (ROC), and predictive accuracy (ACC). Overall, the two models exhibit reasonably a good performance; the LMT exhibits the highest predictive capability as compared to GBDT model. Our results indicated a success rate of 99.95% and a prediction rate of 99.9% when using the logistic model tree. This is a promising technique for online fraud susceptibility detection. The results of this study are useful for decision makers and SA financial sector for future use and planning in credit and debit prone areas.

Keywords: Classification, Detection Algorithms, Machine Learning, Multiple Anomalies.

Introduction

In recent years, fraud detection for online systems has become the most up-to-date topic. Efficient and complicated fraud detection systems must be owned by banking systems, electronic systems such as PayPal and fraud investigators among others in order to prevent fraud activities that change rapidly. The percentage of fraud loss order channel in online stores is currently at 74% and 49% in mobile channels. Grounded on these statistics, the moral is to govern incongruities across forms of fraud deeds that have endured transformation comparative to the past. A decent fraud detection system ought to be able to classify fraud transaction accurately and must make the detection possible in real time transactions. Fraud detection according to Seyedhossein andAshemi (2010) has two distinct groups namely (1) the anomaly detection and (2) misuse detection. Across different industries and organisation worldwide, financial fraud has been a huge concern because it brings large desolations to businesses. As indicated by Budhram (2012), the financial losses in South Africa because of credit cards fraud increased by 53% between 2010 and 2011. Furthermore, in these years; South African Banking Risk Intelligence Centre (SABRIC) had shown that two things have happened in the South African (SA) financial sector. (1) In the year 2011, a total loss of R403.15 million was recorded from the sector. This was an increase of R263.8 million from that of 2010. (2) High rate of card fraud perpetrated should thus be a major concern for establishment of accepting credit cards, the banking industry, and especially for individual users. Due to intensification and hastening of E-

[1]Corresponding Author.

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Commerce, there has been an incredible use of debit and credit cards for online shopping which led to high volume of frauds related to both debit and credit cards. In the era of digitalisation, the need to identify both debit and credit card frauds is essential. Fraud detection involves monitoring and evaluation of the behaviour for innumerable users in order to detect or avoid unwanted behaviour. In order to categorise financial fraud detection effectively, various technologies, algorithms in detecting frauds must be understandable. Algorithms can differentiate transactions which are fraudulent and non-fraudulent. To effectively find fraud, they need to be passed to a dataset and knowledge of fraudulent transaction. They analyse the dataset and classify all transactions (Albshrawi and Lowell 2016). Fraud detection tools have been brought to scenic in order to address this problem and to provide reliable solutions to business. It is normally discovered through outlier detection process which in accordance with Jayakumar and Thomas (2013), it is enabled by data mining techniques, that are able to identify valuable information by revealing hidden trends, relationships and patterns found in a large database (Hassani et al. 2010).

Machine learning algorithms are employed to analyse all authorised transactions and report suspicious ones. These reports are investigated by professionals who contact the cardholders to confirm if the transaction was genuine or fraudulent. The investigators provide a feedback to the automated system which is used to train and update the algorithm to eventually improve the fraud detection performance over time. To our knowledge, this traditional way of detecting debit or credit card fraud is tedious and takes quite a time as some cards are stolen; lost or user threatened (i.e. the card holder is threatened to release card PIN). Hence this study contributes to the existing methods by building Google Flutter system and Chrome extension for android that flags" Fraud"/suspicious transaction that will help both banks and card holders about the knowledge of fraudulent transactions made. This is a new system that card holders will be able to install the Google Flutter application in their smart phones and have an opportunity to trace the whereabouts of their cards if stolen or lost and be able to stop the usage of the cards with the use of their cell phones. Even though detecting financial fraud is considered as a high priority for many organisations, recent literature lacks updated and comprehensive in-depth review that can help organisations with their decisions for selecting an appropriate data mining procedures. In the past, some scholars such as Pumsiriat and Liu (2018) and Ngai et al. (2013) have indicated that neural networks were introduced to detect credit card frauds. Therefore, in this study, our focus is based on deep learning which is a sub-field of machine learning (ML) to detect and classify the financial fraud in South Africa. Deep learning algorithms are used to extract knowledge about the processing of image or quantitative data. Furthermore, deep learning in neural networks has many algorithms for use in fraud detection, but in this paper, we selected the logistic model tree (LMT) and gradient boosting decision tree (GBDT) to detect whether a normal transaction of datasets qualified as a novel fraud. To accurately label the transactions as fraudulent and non-fraudulent, we build the Google Flutter platform for crowd-sourcing ratings instead of team labels. This lead us to supervised learning alone not unsupervised learning. See an example of the proposed Google Flutter in Figure 1. This will be build using the following link https://flutter.dev.

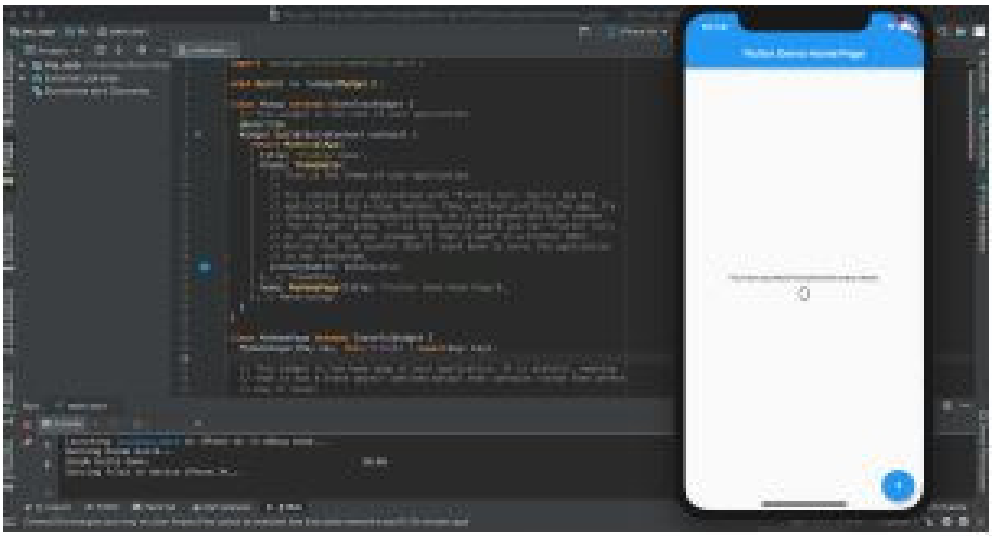

Figure 1: Flutter in Android Studio

Methods and Procedures

As already mentioned, the main goal of this study is to use deep learning algorithms to detect and classify financial fraud in South Africa., We use both the logistic model tree and gradient boosting decision tree classifiers to achieve this objective. As indicated by Tsangaratos and Ilia (2016), these classifiers are complicated regarding the developed models and the size of the training data that is to be used.[2]. These two features are somehow allied and the assortment of which make available an ideal recital for the established model Tsangaratos and Ilia (2016) and Costanzo et al. (2012).

Logistic Model Tree

The logistic model tree is a classification model, which combines decision tree learning methods and logistic regression (LR) Bui et al. (2016). Following Chen et al. (2017), we make use of Algorithm 1 in Appendix A to produce a LR model at every node in the tree, and the tree is pruned using a classification and regression tree (CART) algorithm of Breiman et al. (1984). The LMT uses cross-validation to find several LogitBoost iterations to prevent over-fitting of training data and use additive least-squares fits of the logistic regression for each $M_i$as follows

$$L_M(X) = \sum_{i=1}^{n} \beta_0 \beta_i X_i, \tag{1}$$

where β_i is the coefficient of the ith component of vector x, whereas n is the number of factors (Doetsch et al. 2009). Furthermore, just as in Chen et al. (2017)'s work, a linear logistic regression is estimated in order to compute posterior probabilities of leaf nodes in the LMT. According to Agresti (2018) and Stokes et al. (2012), the posteriors are calculated by

$$\mathrm{P}\ (\mathrm{M}\ |\mathrm{X}) = \frac{\exp(\mathrm{L_M}(\mathrm{X}))}{\sum_{\mathrm{M}\prime=1}^{\mathrm{D}} \exp(\mathrm{L_{M\prime}}(\mathrm{X}))}, \tag{2}$$

where D is the number of classes. For more readings on LogitBoost Algorithm, see for instance (Pham and Prakash (2019), Pourghasemi et al. (2018) and Kamarudin et al. (2017)) respectively. The LogitBoost algorithm is given in Algorithm 1.

Gradient Boosting Decision Tree

Boosting algorithms were originally introduced by machine learning community for classification problems. The main approach is to combine iteratively, several simple models; called 'weak learners', to obtain a 'strong learner' with improved prediction accuracy (Touzani et al. 2018). Boosting is an iterative algorithm that combines simple classification rules with 'mediocre' performance in terms of misclassification error rate to produce a highly accurate classification rule. Stochastic gradient boosting provides an enhancement which incorporates a random mechanism at each boosting step showing improvement in performance and speed while at the same time generating the ensemble Culp et al. (2016).

As declared by Son et al. (2015), gradient boosting algorithm utilises decision stumps or regression trees as weak classifiers. The weak learners measure the observed error in each node, and split the node using the following test function $k: \mathbb{R}^n \to \mathbb{R}$ with a threshold τ and return values η^{ι} and η^{r} respectively.In order to minimise the error after split, we identify the following triplet $(\eta^{\iota}, \eta^{r}, \tau)$and this make us to obtain an optimal split given by

$$\varepsilon(\tau) = \sum_{\mathrm{i:k(x_i)<\tau}} \omega_{\mathrm{i}}^{\mathrm{j}} \left(\mathrm{r}_{\mathrm{i}}^{\mathrm{j}} - \eta^{\iota}\right)^2 + \sum_{\mathrm{i:k(x_i)\geq\tau}} \omega_{\mathrm{i}}^{\mathrm{j}} \left(\mathrm{r}_{\mathrm{i}}^{\mathrm{j}} - \eta^{\mathrm{r}}\right)^2 \tag{3}$$

where ω_i^j and $r_i^j$are the weights and responses of $x_i$for the jth iteration. We, therefore, proceed by minimising the error in equation (3) so that we obtain an optimal tripled as (η^*, η^*, τ^*) over all possible $\tau's$at each node. Note

[2]Note that the complexity of these models is due to (1) the number of variables used to build the model. (2) The size of the training data which is more critical for the learning process.

that$\tau(\eta^{\iota}, \eta^{r})$ can be found simply by computing the weighted average of r_i^j's over training data that fall on the corresponding side of the split. The training procedure of gradient boosting decision tree is presented in Algorithm 2.[3]

$$\varepsilon_{t+1}\left(\tau_{(t+1,\rho)}\right) = \sum_{i=1}^{N_{\rho+1}} \omega_{t+1,i}\left(r^i - \eta_{t+1,\rho}\right)^2. \quad (4)$$

We firstly optimise $\eta_{t+1,\rho}$ because it assumed that $\tau_{(t+1,\rho)}$ is currently known and in an online learning,$\{(\omega_{t+1,i}, r_i)\}_{i=1,\cdots,N_\rho}$ is unavailable. For this reason, Touzani et al. (2018) declared that it is therefore impossible to minimise the error directly by adjusting $\tau_{t+1,\rho}$and also by computing the weighted average of r_i^j's as in the off-line learning. Consequently, Son et al. (2015) updated a weak classifier based on the new classifier as well as the limited information of the present classifier.

Representing the right-hand side of equation (3) by; $\Delta\eta$ we obtain

$$\varepsilon_{t+1}\left(\tau_{(t+1,\rho)}\right) = \sum_{i=1}^{N_{\rho+1}} \left\{\omega_{t+1,i}\left(r_i - \eta_{t,\rho}\right)^2 + \omega_{t+1,i}\left(-2\left(r_i - \eta_{t,\rho}\right)\Delta\eta + (\Delta\eta)^2\right)\right\} \quad (5)$$

which helped us to minimise the above quadratic function with respect to $\Delta\eta$ and obtain the solution in equation (6) as in Son et al. (2015)

$$\Delta\eta\left(\tau_{t+1,\rho}\right) = \begin{cases} \Delta\eta^{\iota}\left(\tau_{t+1,\rho}\right), & if K_\rho(x_i) < t + 1, \rho \\ \Delta\eta^{r}\left(\tau_{t+1,\rho}\right), & \text{otherwise} \end{cases} \quad (6)$$

where, $\Delta\eta^{\iota}\left(\tau_{t+1,\rho}\right) = \frac{\sum_{i:K_{\rho(x_i)\geq\tau_{t+1,\rho}}}^{N_{\rho+1}} \omega_{t+1,i} r_i}{\sum_{i:K_{\rho(x_i)\geq\tau_{t+1,\rho}}}^{N_{\rho+1}} \omega_{t+1,i,}} - \eta_{t,\rho}^{\iota}$

and

$\Delta\eta^{r}\left(\tau_{t+1,\rho}\right) = \frac{\sum_{i:K_{\rho(x_i)\geq\tau_{t+1,\rho}}}^{N_{\rho+1}} \omega_{t+1,i} r_i}{\sum_{i:K_{\rho(x_i)\geq\tau_{t+1,\rho}}}^{N_{\rho+1}} \omega_{t+1,i,}} - \eta_{t,\rho}^{r}.$

Employing recursive procedure to find η, Son et al. (2015) obtained these two equations

$$\Delta\eta^{\iota}\left(\tau_{t+1,\rho}\right) = \alpha\left(\omega_{t+1,i} N_\rho + 1 r N_{\rho+1} - \eta_{t,\rho}^{\iota}\right) \quad (7)$$

$$\Delta\eta^{r}\left(\tau_{t+1,\rho}\right) = \alpha\left(\omega_{t+1,i} N_\rho + 1 r N_{\rho+1} - \eta_{t,\rho}^{r}\right). \quad (8)$$

Here, αdenotes a learning rate. Intuitively, the return value $\eta$is updated with proportion to the amount of a difference between the weighted response of a new example and a previous return value. For readings on gradient boosting algorithm see for instance Touzani et al. (2018), Culp et al. (2016) and Son et al. (2015).

Model Assessment

The receiver operating characteristic (ROC) curve is a useful tool to assess performance of the proposed classifiers. The ROC curve is constructed using sensitivity as the Y-axis against 1-specificity as the X-axis with various cut-off thresholds Chen et al. (2017). The area under the ROC curve (AUC) represents the capability of a model to predict fraud. According to Bui et al. (2016), the value of 1 under AUC indicates that the estimated classifier is perfect otherwise; the value of 0 indicates a non-informative classifier. Khattak (2017) and Hussin et al. (2016) had emphasised that a correlation of predictive capacity and AUC could be quantified as follows: excellent (0.9-1), very good (0.8-0.9), good (0.7-0.8), average (0.6-0.7), and poor (0.5-0.6). In this study, the standard error of AUC values is used; and a smaller standard error indicates a better classifier.

Furthermore, the predictive accuracy (ACC) has also been widely used to assess the predictive capability of the models. The ACC is the proportion of fraud and non-fraud that the classifiers had correctly classified. In this study, ACC together with AUC are used to evaluate the performance of the two models. According to Ahmed (2018), Chen et al. (2017) and Pranckevicius and Marcinkevicius (2017) the prediction accuracy is computed by

$$\text{Accuracy} = \frac{\text{TP} + \text{TN}}{\text{TP} + \text{FP} + \text{TN} + \text{FN}} \quad (9)$$

[3]$\nu$is a shrinkage factor to training data and to the classifier.

where TP (true positive) and TN (true negative) are the number of frauds that are correctly classified, and FP (false positive) and FN (false negative) are the numbers of fraud incorrectly classified Hussin et al. (2016). It is possible to obtain the AUC of a ROC curve using the following formula where $\Phi\odot$ denotes the cumulative standard normal distribution. The classification accuracy is calculated by actual labels that are equal to predicted label divided by total corpus size in test data.

$$\text{AUC} = \Phi\left(\frac{\alpha}{\sqrt{1+b^2}}\right) \tag{10}$$

Empirical Analysis

This section provides and discusses the empirical analysis of the data sets. We propose to use crowd-labelled, web-scraped credit and debit cards in South Africa to train a model to rate the 'reliability' of online transaction content. We therefore obtain a data set which is highly skewed, consisting of 592 frauds in a total of 376807 observations. This resulted in only 0.472% fraud cases. This skewed set is justified by low number of fraudulent transactions. Between the years 2018 and 2019, credit and debit card fraud has increased by 20.5% due to online transactions. As per the report of the SABRIC, the weak state of the country's economy has provided criminals with the impetus, and opportunity to commit financial crime. The group's data shows that digital banking incidents has increased by 20% in 2019, a number that is set to rise in the future, as criminals continue to use social engineering tactics to extract personal and confidential information from victims; and this enable them to transact on victims' accounts without authority. But, with cybercrime; a gross fraud loss on South African issued cards has increased by 20.5%. See for instance Figure 2.

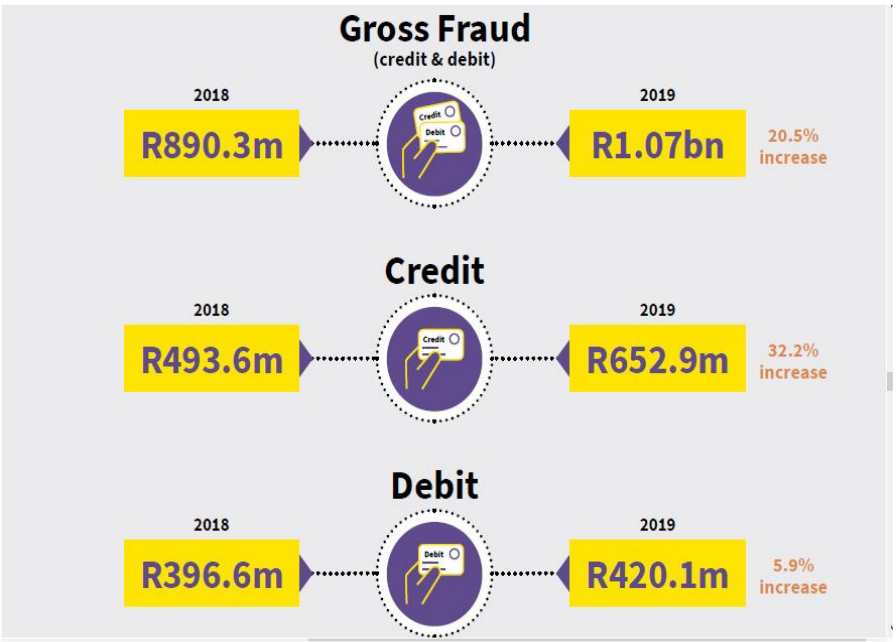

Figure 2: Gross Fraud (Credit and Debit) Source: https://www.sabric.co.za

Preparation of Training and Validation Datasets

For confidentiality purpose with the obtained dataset, we perform a principal component analysis and we finally have 35 variables with 31 principal components. However, Mori et al. (2016) defined principal component analysis (PCA) as a commonly used descriptive multivariate method for handling quantitative data and can be extended to deal with mixed measurement level data. Table 1 present exploratory data analysis for both identified number fraudulent and valid transactions. The reported mean for fraudulent transaction indicates South African's are losing at around 122 Rands daily on made online transaction.

Table 1: Exploratory Data Analysis

	Total No	Mean	Std
Valid Transactions	376215	88.29	250.10
Fraud Transactions	592	122.21	256.68

Financial Conditioning Factors selection and Model Prediction

To begin our analysis, we first train a logistic model tree to establish a benchmark. We train this model with the ratio of 80%:20% training and test data. The assumption we made is that every transaction made is valid and 95% to 99% of the time our algorithm would be correct and cost the debit and credit cards holders in South Africa over 211.3 million Rands from the sample period of the study otherwise, the classifiers would not be useful. Using the LMT, we only obtain 17 principal components as important predictors of financial fraud in South Africa. Logistic regression model tree is used for classifying the probability of a class of fraudulent transaction or non-fraudulent transaction across both credit and debit cards. See Table 6. As Recommend by Bui et al. (2016), we removed all the conditioning factors with null predictive values.

Evaluation of the Classification Experiment

The values of the financial susceptibility index (FSI) have been calculated by the use of the LMT model. This model can cope with binary and multi-magnificence target variables, numeric and nominal attributes, and missing values (Chen et al. 2017). Using the training data, we were able to establish the LMT model. To lessen variability, we further use a cross-validation approach of ten-fold. This approach partitions training data into ten subsets and averages validation effects over ten rounds. The ten-fold cross-validation method was also used for the gradient boosting machine tree model in this study. The calculated FSI values were in the range of 0.01 to 0.988. The financial susceptibility map was reclassified into five classes inclusive of very low (0.001-0.09), low (0.10-0.30), moderate (0.31-0.49), high (0.50-0.64), and high (0.65-0.988) using the natural break method. Note that this same method has been proposed by Chen et al. (2017). In data mining and machine learning modelling, it is essential to assess and check the qualities of the ensuing models Moreover, Using a training data, Table 2 presents the results of the predictive accuracy (ACC) and AUC; while Figure 3, presents the sensitivity and specificity of the two models and Figure 4 and Figure 5 are the ROC curves of the models. The LMT model has the highest overall performance in terms of ACC and AUC, with values of 0.9995 and 0.9875, respectively. The GBDT model exhibited barely decreased ACC and AUC values than the LMT.

Table 2: Performance on Training Data

Parameters	LMT	GBDT
ACC	0.9995	0.9692
AUC	0.9875	0.9552

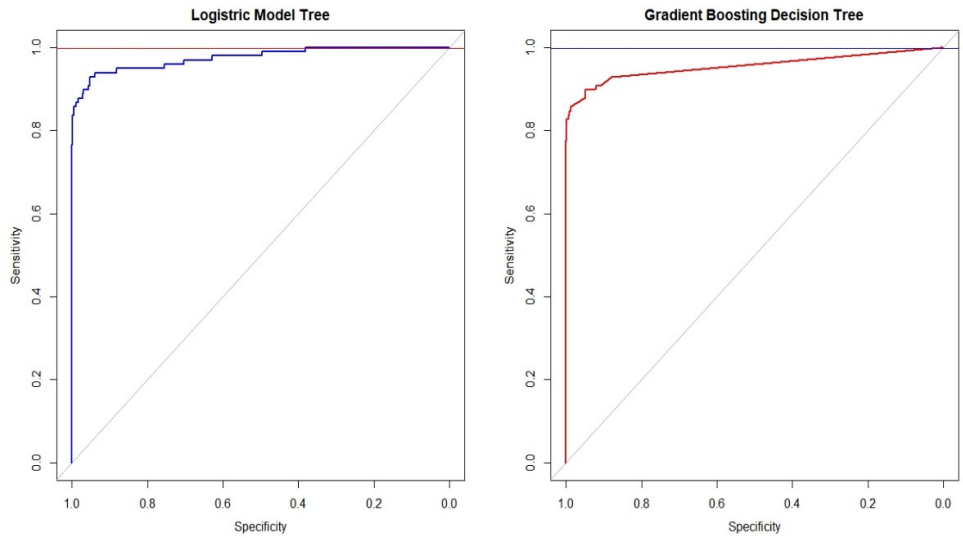

Figure 3: Sensitivity and Specificity Curves

The prediction capabilities of the two models were further evaluated using validation data, and results are shown in Table 3. LMT has good prediction capabilities with the highest ACC value of 0.999 and AUC value of 0.9885.

Table 3: Performance on Validation Data

Parameters	LMT	GBDT
ACC	0.9990	0.9892
AUC	0.9885	0.9776

Finally, to compare statistically significant differences between the two models, a pair-wise comparison was conducted using Wilcoxon signed-rank and model power test procedures on validation data. The former was used in the research that was carried by Chen et al. (2017) and Bui et al. (2016) while the latter was carried in the empirical analysis of Makatjane and Moroke (2016). The null hypothesis for this method is that there is no significant difference between the estimated fraud detection models at the 95% significance level. The z and p-values are used to evaluatesignificant differences between financial fraud detection models. Furthermore, the mean difference of the models was used to determine the actual power of the two models. When z values exceed criticalvalues of $(\pm 1{:}96)$ and p-values are smaller than the significant level (0:05), the null hypothesis willbe rejected and therefore the performances of these models are notably different. The results of the Wilcoxon signed rank and power tests are shown in Table 4. The LMT and GBDT models' performances are significantly different since$(\mathrm{p-value} = 0.0001, \mathrm{z\,value} = 6.53)$. In general performance, the LMT outperformed the GBDT as both the AUC and ACC are higher in the LMT hence we conclude that the LMT has accurately predicted the financial fraud in South Africa. This is also confirmed by the power test as the LMT has the actual power of92.41% giving LMT more prediction power of 1.43% than the GBDT.

Table 4: Pair-wise Comparison and Power Test

Wilcoxon Signed-Rank Test		Model Power Test		
Parameters	LMT vs GBDT	Model	Mean Difference	Actual Power
z-value	6.53	LMT	-0.0194	0.9241
p-value	0.0001	GBDT	0.07168	0.9098

Sensitivity and Detection Rate Analysis

Looking at the output in Table 5, we can see that we have the high accuracy of 99.9% as we expected. If we look at our confusion matrix in Table 7, we can see that, using our model, we only got 500 predictions wrong; this figure of 500 is made up of 353 false positive and 147 false negatives. Going from 259 wrong to 500 wrongs is quite an improvement on performance, but we must consider the importance of sensitivity and specificity when it comes to the real-world application which the results are reported in Table 5. Are the implications of a false negative significant than the implications of a false positive? Ultimately, there is no way lenders could function if they classified every transaction as fraud and investigated it thoroughly before deciding whether to approve it, the costs of doing that would be so high that it would not be feasible.

Table 5: Sensitivity Performance

Parameters	LMT
Accuracy	0.999
Sensitivity	0.9990
Specificity	0.8628
Prevalence	0.9967
Detection Rate	0.9936
Detection Prevalence	0.9959
Balanced Accuracy	0.9056

Discussion and Conclusion

Fraud detection is a complex issue that requires a substantial amount of planning before throwing machine learning algorithms at it. Nonetheless, it is also an application of data science and machine learning for the good, which makes sure that the customer's money is safe and not easily tampered with. However, mitigation financial hazard and management planning plays a critical role in financial society and economic world. The statistical input of this work lies in employing a logistic model tree as a benchmark to select the important predictors of the financial fraud in South Africa using the LogitBoost algorithm. We then further employed the gradient boosting decision tree to detect the gross financial fraud from online transaction made by the debit and credit cards of South Africans. There are few studies that aim to effectively detect financial fraud in South Africa to our knowledge, this is the first use of such algorithms to produce a map characterising fraudulent financial behaviour across financial sector in South Africa. Seventeen financial conditioning factors were extracted for the study including slope. To select these factors, we used the LMT method using LogitBoost algorithm, and all conditioning factors were used according based on assessing the results. Finally, model performances were evaluated and compared using ACC values, ROC curves, AUC values, Std. error, CI at 95%, and significance level. According to this case study, the two models exhibit reasonably good performances; the LMT model has the highest predictive capability compared with the GBDT model; with the success rate of 99.95% and a prediction rate of 99.9%. This is a promising technique for online fraud susceptibility detection. Finally, these study results may be useful for decision makers and South African financial sector for future use and planning in credit and debit prone areas. In the future, we recommend updating the established Google Flutter for android and build Chrome extension that flags "fraud or suspicious transaction" while purchasing goods and services online. While the flutter will help the card users to trace their lost or stolen cards and be able to stop any transaction immediately without going to the bank or card issuer. All these recommended procedures will also automatically notify the banks on the suspicious transactions and automatically train the system without confronting the card holder if the transaction was fraudulent or not. The main problem that we will encounter is when the card has been taken from the holder and is been threaten by the perpetrators. However, we ought to solve the problem by modifying how the ATM (reference here as automatic teller machine) on how they would request the PIN. Maybe, there should be some personal questions, or some OPT numbers to be sent to the card holders prior finalising the transaction. In the future, we recommend updating the established Google Flutter for android and build Chrome extension that flags "fraud or suspicious transaction" while purchasing goods and services online.

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Appendix A

Algorithm 1: LogitBoost (*J* classes)

---

1. Start with weights $\omega_{ij} = \frac{1}{n}, i = 1, \cdots, n, j = 1, \cdots J, F_j(x) = 0$

and $p_j(x) = 1/j \; \forall_j$

2. Repeat for $m = 1, \ldots, M$:

a) Repeat for $j = 1, \ldots, J$:

i. Compute working responses and weights in the jth class

$$z_{ij} = \frac{y_{ij}^* - p_{j(x_j)}}{p_{j(x_j)}\left(1 - p_{j(x_j)}\right)}$$

$$\omega_{ij} = p_{j(x_j)}\left(1 - p_{j(x_j)}\right)$$

ii. Fit the function $f_{mj}(x)$ by a weighted least-squares regression of z_{ij} to X_i with weights ω_{ij}.

b) Set $f_{mj}(x) \leftarrow \frac{J-1}{J}\left(f_{mj}(x) - \frac{1}{J}\sum_{k=1}^{J} f_{mj}(x)\right), F_j(x) \leftarrow F_j(x) + F_j(x)$

c) Update $p_j(x) = \frac{expF_j(x)}{\sum_{k=1}^{J} \exp F_k(x)}$

3. Output the classifier $F_j(x)$

Algorithm 2: Gradient Boosting Decision Tree

Initialize: $\boldsymbol{f_0(X)} = \mathbf{0}, \eta, d_0 = 0$

for $j = 1; \cdots; M$ do

$\omega_i = exp\left(-y_i f_{j-1}(x_i)\right), \mathrm{i} = 1, \cdots, \mathrm{N}$

$r_i = -y, \mathrm{i} = 1, \cdots, \mathrm{N}$

$S = \{(x_i, \omega_i, r_i)\}_{1,\cdots,\mathrm{N}}$ and $\nu = \{x \mid x \in \mathbb{R}\}$

$\mathbf{R} = \mathrm{GROWTREE}(S, \nu, \eta_0, d_0)$

$f_j(x) = f_{j-1}(x) - \nu \cdot \sum_{k=1}^{|R|} \eta_k \delta(x \in \mathfrak{R}_k),$

where $\mathfrak{R}_k, \eta_k \in \mathbf{R}$

end

Procedure SPLITLEARNING(S)

$(\eta^{l*}, \eta^{r*}, \tau^*) = argmin_{\eta^l, \eta^r, \tau}\, \varepsilon(\tau)$ in equation 3

Return$(\eta^{l*}, \eta^{r*}, \tau^*)$

Table 6: Logistic Model Tree Estimates

	Estimate	Std. Error	z value	Pr (>|z |)
Intercept	-11.59297	0.56359	-20.570	***
P2	0.97034	0.16135	6.014	***
P4	2.5051	0.26667	9.394	***
P5	1.17946	0.14110	8.359	***
P7	1.09164	0.13649	7.998	***
P8	-0.39848	0.04979	-8.003	***
P9	2.28317	0.34641	6.591	***
P10	-2.15369	0.23206	-9.281	***
P12	1.30902	0.30054	4.356	***
P13	-0.61980	0.18975	-3.266	**
P15	0.80611	0.19968	4.037	***
P16	-2.34563	0.36838	-6.367	***
P17	-1.36377	0.22136	-6.161	***
P18	1.99701	0.35711	5.592	***
P19	-1.17852	0.26091	-4.517	***
P20	-0.39459	0.18683	-2.112	*
P22	-0.88614	0.32182	-2.754	**
P26	1.60504	0.57022	2.815	**

Signif.codes: *0 '***' 0.001,'**' 0.01 ,*' 0.05'.' ,0.1 ,' ' 1*

Table 7: Confusion Matrix

		Reference	
		0	1
Prediction	0	153508	147
	1	353	592

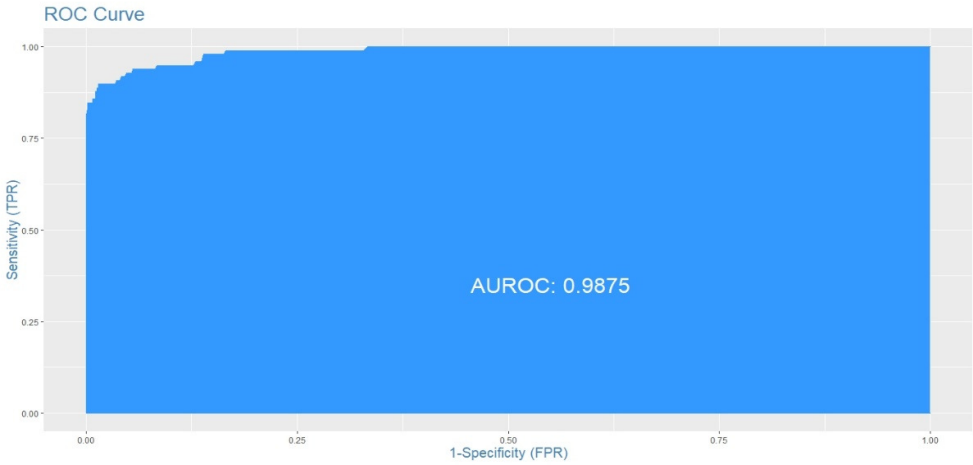

Figure 4: ROC Curve for Logistic Model Tree

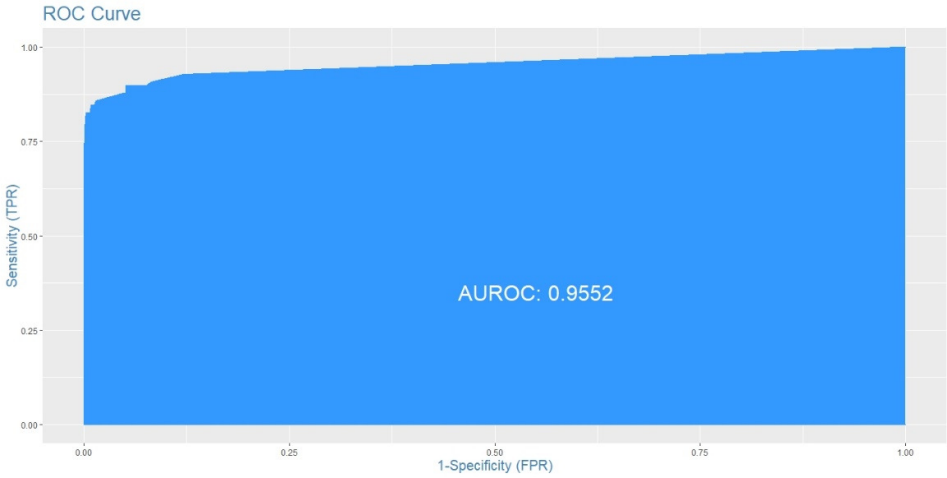

Figure 5: ROC Curve for Gradient Boosting Decision Tree

Emigration: Potentiating Factor of Social Tolerance in Romania

Andreea MURARU

PhD., The Bucharest University of Economic Studies, Bucharest, Romania
Email: andreea.muraru@ie.ase.ro

Abstract

In this article, I investigated whether higher social tolerance levels in Romania can also be attributed to emigration through its system of social remittances. In investigating this hypothesis, I used two waves of survey data from the World Value Survey for building a social tolerance index and analyzing it in relation to country specific questions on migration (specifically having or not friends or relatives who live abroad and the frequency of communicating with them). The results from multinomial logistic regressions show that there is an increased probability of having a higher tolerance level for persons who have friends or relatives abroad with whom they talk, the reverse being also valid – higher chances of being less tolerant for individuals who do not have friends or relatives who have emigrated. The impact of the communication frequency is not that clear cut, as high frequency communication does not seem to be significant in the multinomial logistic regression. However, average communication frequency has a direct impact on tolerance while rare communication increases the probability of lower tolerance levels. Association analysis confirms the results of the logistic regression.

Keywords: Migration, Social Tolerance, Multinomial Logistic Regression, Association Analysis.

Introduction and Literature Review

In the last two decades, Romania faced massive emigration flows. According to an OECD report (OECD, 2019), Romania has the 5th largest emigrant population in all OECD countries, registering an increase in emigration by more than 200 percent in the past 15 years, adding up to 3.4 million Romanians who reside abroad. According to the same OECD report, 75 percent in the decrease of Romania's population in the period 2000-2018 can be attributable to migration.

Migrants usually remain connected to their native countries through remittances, communication and life plans (Sandu, 2010). In the dedicated literature the flows from the Diasporas most referred to are financial remittances, which is not surprising as the sums at global level are notable: $689 billion USD in 2018 (according to World Bank data). But there are also other types of flows that come from migrants towards their home countries together with economic remittances: the social remittances. Peggy Levitt in 1998 defined the concept of social remittances as representing "ideas, behaviors, identities, and social capital that flow from receiving- to sending-country communities" (Levitt, 1998). The scholarship on social migration focuses either on the phenomenon in general (e.g Levitt, 2001, Levitt and Lamba-Nieves, 2011, Levitt and Merry, 2009, for Romania see for e.g. Anghel and Coșciug, 2017, Anghel, 2009, Horváth, 2009) or on different sides of it – political remittances (e.g. Chauvet and Mercier 2014), gender roles (Vlase, 2013), human rights and so on. There are also studies that show that there is a strong connection between economic and social remittances (for e.g., Vari-Lavoisier, 2016).

This study is subsumed to the literature on social remittances. The starting hypothesis is that migrants in recipient countries change or enrich their value system by the exposure to a different culture, language, learn about openness and alterity from the position of the foreigner and through their transnational connections transpose to a certain extent their enriched set of values on the aspirations of the staying population. Starting from a finding of White (2016), I would say that especially in the Eastern European former communist block, remittances in their social form, might also shape the way towards "normality" – a feature that for the former communist countries was only to be found in the foreign western countries –, in terms of values, tolerance and openness.

Even though the literature on the socioeconomic impact of migration in Romania is relatively abundant from an anthropological and sociological point of view (see for e.g. Anghel and Coșciug (2017), Horvat (2009), Anglet et al. (2016), Sandu (2010)), there is a very limited number of papers that use a quantitative approach to social remittances in Romania.

One quantitative study is that of Nikolova et al. (2015), in which the authors investigate if civic engagement of the staying population of Bulgaria and Romania is different whether they have or not relatives and friends living

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abroad. They use Gallup World Poll data and through regression analysis, logit and propensity score matching find that having family and friends abroad is positively associated with pro-social behavior (donating, volunteering, and helping strangers). Another study is that mentioned in Sandu (2010), who uses data from a survey on temporary migration taken in 2006 and also tests for the change in tolerance towards ethnic and religious minorities.

Nevertheless, the picture of Romanian migration changed drastically in the last decade and this study by using a different survey-based quantitative approach comes to enrich the picture on the social (tolerance) remittances in Romania. In this article, I investigated the importance of migration and preserving migration connection in promoting social tolerance in the staying population. As part of the democratic values, I consider that tolerance can also be one of the values transferred or enhanced through the system of social remittances. Nevertheless, there is a challenge in identifying this influence as cosmopolitanism and globalization also act as important factors that enhance the transmission of modern society values; therefore, I used two waves of survey to see whether the influence of migration changed in time. In addition, in the models I used, I tried to illustrate the impact of migration beyond that of specific demographic variables.

Furthermore, this study centers on social tolerance as an indicator built from the World Value Survey. Building social tolerance from this kind of data can also be found in Kirchner et al. (2011) and Dunn et al. (2009). In these two studies, the authors define tolerance as: "non-negative orientation toward groups outside of one's own" (Dunn et al. 2009) and "the willingness to tolerate or accept persons or certain groups as well as their underlying values and behavior by means of co-existence (even if they are completely different from one's own)" (Kirchner et al. 2011). Nevertheless, there are also studies who argue that this kind of approach, because of the way in which the questions in the survey are formulated, include prejudice in the definition of tolerance (Hjerm et al., 2019).

The paper is structured as follows: the next section describes the data and the methodological approach, section 3 presents the main findings and the last section concludes.

Data Sources and Methodology

The data sources for this article are the last two waves of the World Values Survey (WVS-7 which is still ongoing at world level, but which was completed in Romania in 2018, and WVS- 6, which was applied in Romania in 2012). For Romania, the Research Institute for Quality of Life organizes the survey and the Romanian Group for The Study of Social Values makes the results public on their website.

The main questionnaire of The World Value Survey includes a question, common for all countries, referring to social tolerance: "On this list are various groups of people. Could you please mention any that you would not like to have as neighbors?". The groups mentioned are: drug addicts, people of a different race, people who have AIDS, immigrants/foreign workers, homosexuals, people of different religion, heavy drinkers, unmarried couples living together, people who speak a different language. Following Kirchner et al. (2011) I have built the social tolerance index for Romania as an additive index on only 7 of the 9 categories as drug addicts and heavy drinkers are generally less tolerated groups and would have affected the results.

Besides this section of the WVS, I also used the country specific items referring to migration, specifically whether the respondent has relatives or friends living abroad ("Among the friends and relatives with whom you talk, are there persons who live or have lived abroad for at least one month?") and also the section referring to how frequently people communicate with their acquaintances from abroad ("How often do you get in contact with friends/relatives from that country? 1. Daily; 2. Weekly; 3. 2-3 times a month; 4. Monthly; 5. 2-3 times a month; 6. 1-2 times a year; 7. Even rarer). To my knowledge, the World Value Survey is a unique source for this kind of migration data for Romania.

For studying the influence of migration on tolerance levels, I used multinomial regression analysis and association analysis. The choice of these methods is justified not only by their suitability for categorical variables but also because the influence of migration connections on the tolerance level of the staying population might also be formulated as a classification or association problem, which can be effectively solved by applying these techniques.

For applying these methods, I had to recode both the social tolerance variable and the communication frequency variable. I have transformed them in 3-level variables for the ease of interpretation. For the social tolerance the three levels are:

(i) *low degree of tolerance*, people who had a maximum score of 2 from the total of 7 tolerance elements,

(ii) *medium tolerance* - a score between 3 and 5, and

(iii) *high tolerance* - individuals with a score of 6 and 7 on the social tolerance scale.

For some analyses, I also needed a binary form of the tolerance variable, therefore I have recoded it in *more likely to be more tolerant* (values 5, 6 and 7 form the social tolerance index), and *more likely to be less tolerant* (values 0,1,2,3 and 4 form the social tolerance index).

As concerns the communication frequency variable, the three levels that I have built are:

(i) *frequently* – for the persons who discussed at least 2-3 times per month;

(ii) *average* – for the persons who communicate on a monthly basis or at least once at 2-3 months, and

(iii) *rarely* – for individuals who only communicate once or twice a year or even less.

In the last category I also included the persons who did not have friends or relatives living abroad so as not to loose their impact on the low tolerance level.

Multinomial logistic regression is an extension of the binary logistic regression for a multiclass dependent variable. Given K classes of the Y variable, the multinomial logistic regression can be written as K-1 logits of the form:

$$\log\left(\frac{P(Y_i = 1|x_{i1}, x_{i2}, \dots, x_{im})}{P(Y_i = K|x_{i1}, x_{i2}, \dots, x_{im})}\right) = a_{10} + a_{11}x_{i1} + \cdots + a_{1m}x_{im} = a_1^{'}X_i$$

$$\log\left(\frac{P(Y_i = 2|x_{i1}, x_{i2}, \dots, x_{im})}{P(Y_i = K|x_{i1}, x_{i2}, \dots, x_{im})}\right) = a_{20} + a_{21}x_{i1} + \cdots + a_{2m}x_{im} = a_2^{'}X_i$$

…

$$\log\left(\frac{P(Y_i = i|x_{i1}, x_{i2}, \dots, x_{im})}{P(Y_i = K|x_{i1}, x_{i2}, \dots, x_{im})}\right) = a_{i0} + a_{i1}x_{i1} + \cdots + a_{im}x_{im} = a_i^{'}X_i$$

…

$$\log\left(\frac{P(Y_i = K-1|x_{i1}, x_{i2}, \dots, x_{im})}{P(Y_i = K|x_{i1}, x_{i2}, \dots, x_{im})}\right) = a_{20} + a_{21}x_{i1} + \cdots + a_{2m}x_{im} = a_{K-1}^{'}X_i$$

Coefficients a_{ij} can be interpreted as: an increase by one unit in x_{il}, keeping all other variables fixed leads to an increase in $\log\left(\frac{P(Y_i = i|x_{i1}, x_{i2}, \dots, x_{im})}{P(Y_i = K|x_{i1}, x_{i2}, \dots, x_{im})}\right)$ by a_{ij}. Probabilities can be derived by calculating the exponential. Coefficients are estimated through an extension of maximum-likelihood.

Association analysis is a data mining technique that identifies and validates associations between item sets with the goal of making predictions regarding the appearance of an event when another one happens (a rule of the type { X → Y }) . It is usually used in market basket analysis in recognizing items often bought together. In identifying associations, it uses the support measure (the number of transactions in which a set of items appears, or its frequency $S(\mathrm{X} \rightarrow \mathrm{Y}) = \frac{\sigma(X \cup Y)}{T}$, T=the total number of transactions), the confidence which is a ratio between the item set support and the support of the left-hand side item (its formula is $c(\mathrm{X} \rightarrow \mathrm{Y}) = \frac{\sigma(X \cup Y)}{\sigma(X)}$) and also the interest factor or the lift which calculates the ratio between the item set support and its support under the hypothesis of independence ($I(\mathrm{X} \rightarrow \mathrm{Y}) = \frac{S(\mathrm{X,Y})}{S(X)S(Y)}$). Values of the lift higher than 1 suggest a direct relation between categories, whereas a value lower than 1 suggests a reverse relation between them. When the interest factor equals 1, the items in the set are independent as the support for the set is equal to the product of the individual supports (Tan et al., 2019).

Results

The importance of variables for classification

In order to establish a ranking of variables in terms of their relevance in classifying a person as rather more tolerant than intolerant, I used decision trees, a tool highly versatile in classification analysis and perfectly fit for categorical and ordered variables.

In order to perform this analysis, I used the binary recoded social tolerance variable presented in the data section above (with value "yes" for tolerance index higher or equal to 5, out of the maximum 7, and value "no" for tolerance below or equal to 4) and then tested the importance of traditional demographic variables (education, age and gender) together with the migration variables in classifying individuals as rather more tolerant or rather more intolerant. Therefore, I estimated two models, one with the binary migration variable – having or not friends or relatives abroad – and one with the three-level communication frequency variable (built as specified in the data section).

As can be seen below, the importance of the gender variable was very low (Table 1 and Table 2), not being a very relevant variable in discriminating between the two classes of tolerance, therefore its inclusion in the multinomial logistic regression as explanatory variable would be unnecessary.

Table 1: Variable importance – model 1

Education	Age	Has friends/Relatives who emigrated	Gender
36.9	19.4	8.4	4.03

Table 2: Variable importance – model 2

Education	Age	Communication frequency	Gender
36.09	20.13	10	3.89

The decision tree for the second model can be seen in Fig. 1 below. In interpreting the tree, following the left branch means the *yes* answer to the category mentioned in the node, while the right is the *no* answer (e.g. if education is not primary, take right and reach the blue node corresponding to tolerance=yes, meaning more likely to be tolerant than intolerant; 78% of cases are in this node, with a probability of being assigned to this class of 0.76).

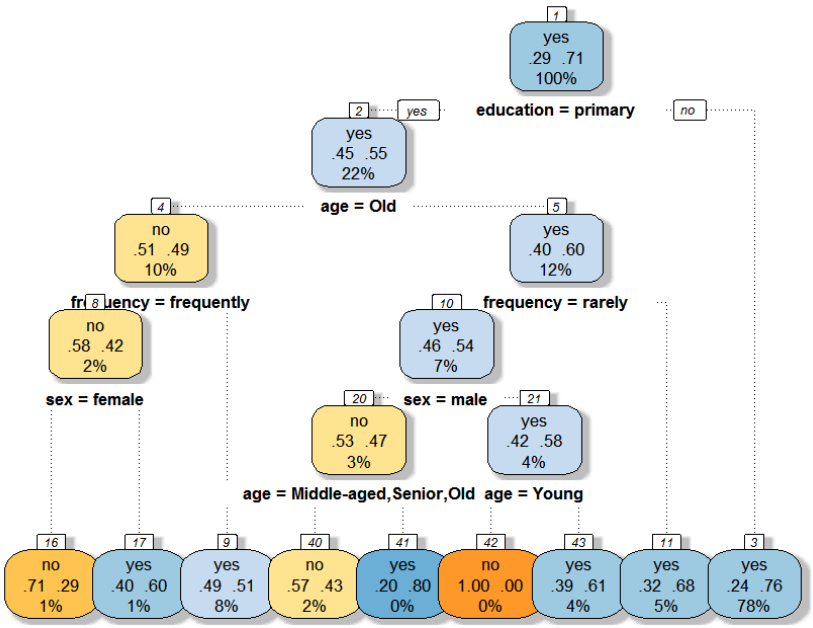

Fig.1: Decision tree

The most important variables among the selected demographic characteristics are, as expected, education and age, young and above average educated individuals being usually associated with a higher openness, tolerance and trust in democratic values.

Results form the multinomial logistic regression

The next step was to build a multinomial logistic regression model, in which the dependent variable was the three-level scale social tolerance index (*low degree of tolerance*, people with minimum score of 2 out of the 7 tolerance elements, *medium tolerance*, people with a score between 3 and 5, and *high tolerance* - individuals with a score of 6 and 7).

I estimated the multinomial logistic regression model on both waves of the survey 2012 and 2018 to compare results. As explanatory variables I used: education, age and alternatively the two variables for identifying the potential impact of migration (the binary variable showing whether the individual has or not a friend or relative living abroad and the three-level variable, quantifying the frequency of contact, built as shown in the data section).

Table 3: Results from multinomial logistic regression – model 1

2012	Intercept	Has friend/relatives emigrants=yes	Age	Education
Low tolerance	0.32	-0.35*	0.006	-0.14*
Medium tolerance	0.97*	-0.38*	-0.0009	-0.15*
2018				
Low tolerance	-1.15*	-0.48*	0.02*	-0.17*
Medium tolerance	-0.28	-0.17	0.08**	-0.08*

**=statistical significance at 0.05; **=statistical significance at 0.10*

The multinomial logit from the table above can be written as:

$$ln\left(\frac{P(tolerance = low)}{P(tolerance = high)}\right) = a_{10} + a_{11}(\text{Has friends/relatives emigrants} = \text{yes}\ ) + a_{12}\text{Age} + a_{13}\text{Education} + \varepsilon$$

$$ln\left(\frac{P(tolerance = medium)}{P(tolerance = high)}\right) a_{20} + a_{21}(\text{Has friends/relatives emigrants} = \text{yes}\ ) + a_{22}\text{Age} + a_{23}\text{Education} + \varepsilon$$

The coefficients show the contribution of the variables to the log-probabilities, or log-odds for having low tolerance vs. high tolerance.

Therefore, as can be seen from Table 3 above, in 2012, the coefficient $a_{11} = -0.35$ means that switching from the pivot category (the one not mentioned in the table) *has friends/relatives emigrants=no* to category *has friends/relatives emigrants=yes* (the category mentioned in the table) decreases the log-odds of having low tolerance versus high tolerance by 0.35 (increasing therefore the probability for the high tolerance group).

At the same time, when looking at the second logit, for the category *tolerance=medium*, the coefficient $a_{21} = -0.38$ shows that when switching from not having relatives or fiends living abroad to having, the log odds of being moderately tolerant vs. highly tolerant decreases by 0.38. The age coefficient isn't statistically significant, showing that an increase by one year in the age of the respondent doesn't necessarily modify its level of social tolerance. As age is significant in terms of classification, I would say the explanation for this is that the impact of age, at least for this survey year, might be seeable from the perspective of age groups (young vs. middle-aged vs. senior).

In 2018, there is a change in the magnitude of coefficients. The log-odds of having a low tolerance level vs. high tolerance when switching between the group of people who do not have friends or relatives who live abroad to the group that has, decreases to 0.48. Nevertheless, the log-odds of having medium tolerance vs. high tolerance when moving between the two categories of the binary migration variable becomes insignificant. Moreover, age becomes significant, showing maybe that the young generation in the six years between the two surveys, is more likely to be highly tolerant as a result of globalization and cosmopolitanism.

The education coefficient is at all times negative, showing that the higher the education level the most likely it is for the respondent to have higher tolerance (an increase by one in the education level, reduces the log-odds of belonging to a less tolerant group vs. the highest tolerant group).

The figures below graphically synthesize the results of the multinomial logistic regression in two instances: the impact of having or not friends and relatives living abroad relative to education (when holding age equal to its sample average) and relative to age (when holding education equal to its sample average).

As can be seen from Fig. 2, having friends or relatives who emigrated increases the probability of being highly tolerant by about 10 percentage points, while not having these kind of acquaintances increases the odds of being less tolerant (by about 5 percent in 2012, and decreasing from 5 to about 2.5 percent for the low tolerance class in 2018). Therefore, the direction of the impact is similar in both 2012 and 2018, but there are some differences regarding the level of probability associated to low and medium tolerance classes, which could show that during the 6 years between the two surveys there was a natural change towards higher tolerance.

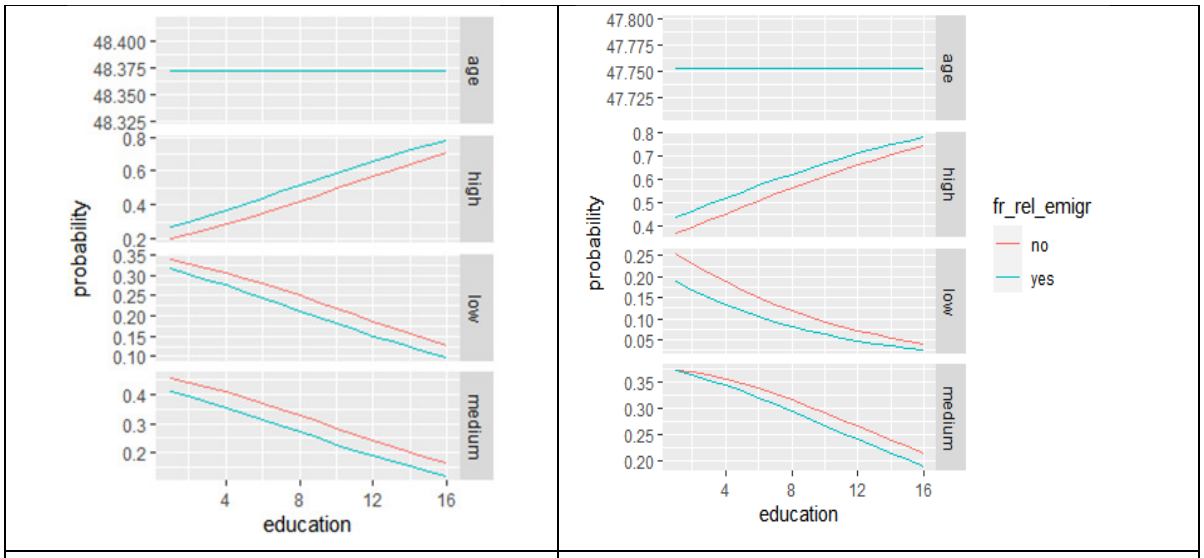

2012	2018

Fig. 2: Impact of binary migration variable relative to education

Similar conclusion regarding the impact of having or not friends and relatives living abroad can be drawn from Fig 3 below. We can see from the graph that there is a higher likelihood of being highly tolerant for individuals who have acquaintances abroad and increased chances of being more intolerant if these connections with emigrants are absent. As in the graph before, there are also some differences between the two survey years, more pronounced on the age reference graph because, as it was seen from the analysis of the logit coefficients, age was not statistically significant in 2012.

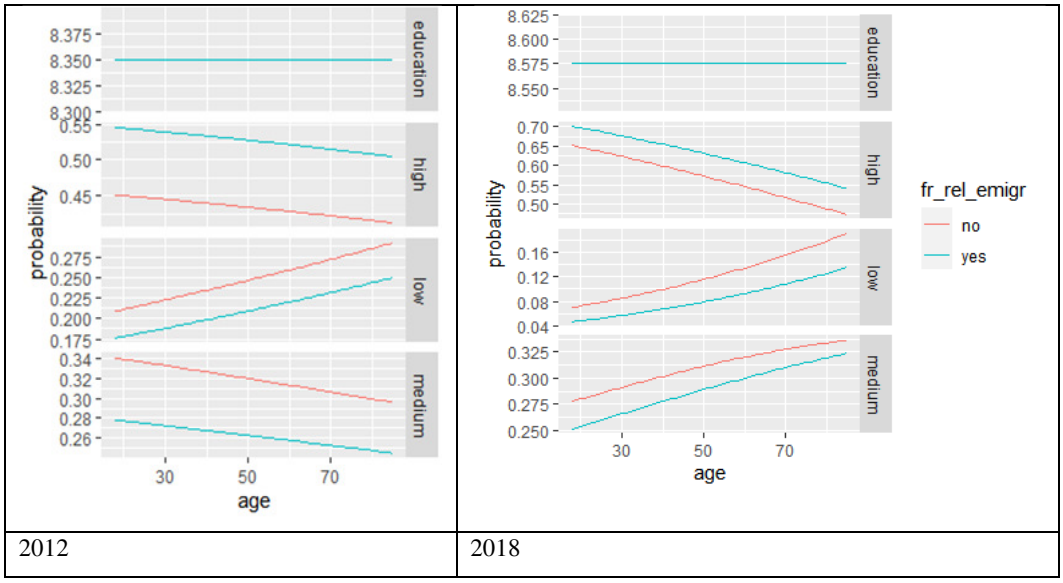

2012	2018

Fig. 3: Impact of binary migration variable relative to age

The second model I investigated used the three-scale variable for communication frequency. The results of the model can be seen in Table 4 below.

Table 4: Results from multinomial logistic regression – model 2

2012	Intercept	Communication frequency =frequently	Communication frequency =rarely	Age	Education
Low	-0.17	0.10	0.5*	0.006	-0.15*
Medium	0.42	0.32	0.42*	0.00001	-0.15*

2018					
Low	-2.16*	0.64	0.87*	0.02*	-0.17*
Medium	-0.73*	0.43	0.26	0.08*	-0.08*

The logit models can be written as:

$$ln\left(\frac{P(tolerance = low)}{P(tolerance = high)}\right) = a_{10} + a_{11}(\text{communication frequency} = \text{frequent}) + a_{12}(\text{communication frequency} = \text{rarely}) + a_{14}\text{Age} + a_{14}\text{Education} + \varepsilon$$

$$ln\left(\frac{P(tolerance = medium)}{P(tolerance = high)}\right) = a_{10} + a_{11}(\text{communication frequency} = \text{frequent}) + a_{12}(\text{communication frequency} = \text{rarely}) + a_{14}\text{Age} + a_{14}\text{Education} + \varepsilon$$

Analyzing the coefficients in Table 4 above, we can see that the ones for *communication frequency=frequent* are not statistically significant in neither of the two years. But, the coefficients for *communication frequency=rarely* show that when passing from average contact frequency (the pivot category not mentioned in the table) to rare contact, there is an increase in the log-probability of having a low level of tolerance relative to high tolerance. The same is valid for the log-probability of belonging to the medium tolerance class relative to high when moving from average contact to rare contact. In 2018 this coefficient is no longer significant. Like in the previous specification frame, age is not statistically significant in 2012 and becomes significant in 2018, showing an increase in log-probability of belonging to the lesser tolerant groups relative to the high tolerance ones when age increases by one year, and education is significant at all times showing a direct connection between education and tolerance.

Graphically, we can see that the contact of average frequency with friends and relatives living abroad leads to an increase in the probability of being highly tolerant while a rare contact increases the odds of having a medium and low tolerance level. The influence of frequent contact in those graphs must be interpreted with caution, as the variable proved not to be statistically significant.

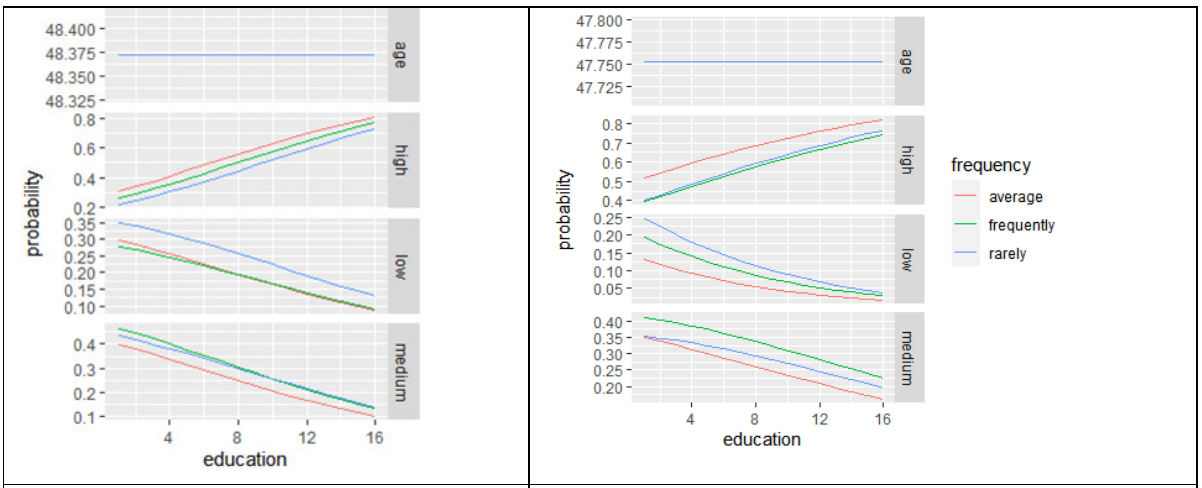

2012 | 2018

Fig. 4: Impact of *communication frequency* relative to education

The same conclusions can be drown from the figure below, which shows the impact of the frequency of contact with the friends and relatives who live abroad while holding education to its average level. As in the previous case, the average frequency contact increases the probability of belonging to the high tolerance group and decreases the odds for the medium and low tolerance groups.

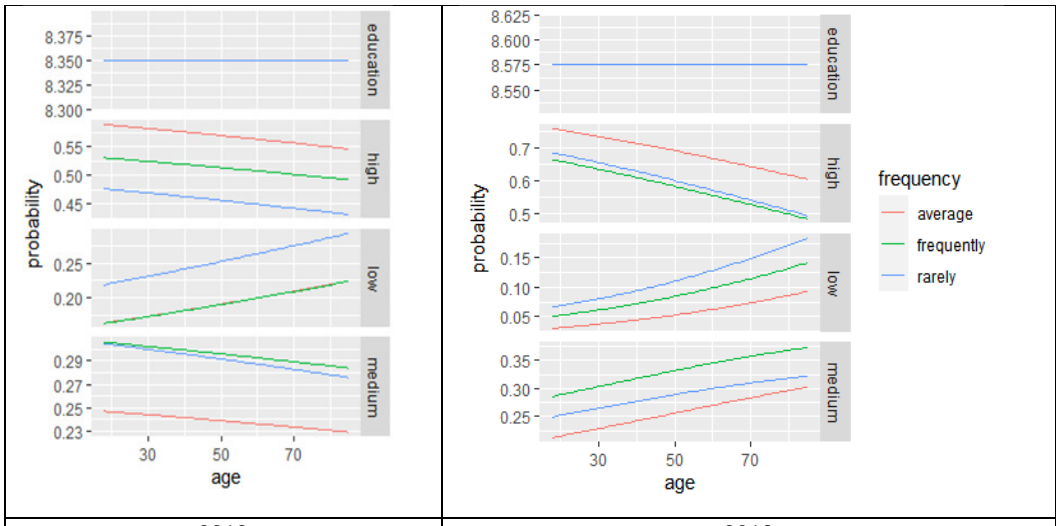

2012 | 2018

Fig. 5: Impact of *communication frequency* relative to age

Results form Association analysis

For building association rules I used the social tolerance index in binary form (coded as *Yes* for more likely to be tolerant, and the value *No* for less likely to be tolerant, as described in the data section).

In investigating the association between having or not friends and relatives who live abroad and being more or less tolerant, I extracted all the 4 *yes-yes*, *yes-no*, *no-yes* and *no-no* rules. The analysis of the association rules offers similar results for both survey waves.

As can be seen from Table 5 below, the *yes-yes*, and *no-no* rules have a positive level for the lift, showing a direct association between the categories: individuals who have friends and relative living abroad usually are more tolerant (a confidence level of 0.72, showing that 72 percent of the persons who have emigrants as acquaintances have an above average tolerance level). In the no-no case, the confidence level is much lower but it is compensated by a much larger lift, showing a somewhat more important direct connection between the two. In the case of no-yes, yes-no rules, the lift is smaller than unit, showing that there is an important inverse connection between the categories.

Table 5: Association rules between binary migration variable and tolerance

Association rule	Support	Confidence	Lift
2012			
{Friends/relatives living abroad=Yes → Tolerance=Yes}	0.47	0.72	1.08
{Friends/relatives living abroad=Yes → Tolerance=No}	0.17	0.28	0.84
{Friends/relatives living abroad=No → Tolerance=No}	0.16	0.41	1.26
{Friends/relatives living abroad=No → Tolerance=Yes}	0.22	0.59	0.87
2018			
{Friends/relatives living abroad=Yes → Tolerance=Yes}	0.43	0.80	1.04
{Friends/relatives living abroad=Yes → Tolerance=No}	0.11	0.2	0.87
{Friends/relatives living abroad=No → Tolerance=No}	0.12	0.27	1.16
{Friends/relatives living abroad=No → Tolerance=Yes}	0.33	0.73	0.95

When looking at the association rules between the communication frequency and the binary tolerance index (Table 6 below), we can see that the rules between average communication frequency and *tolerance=yes* as well as between frequent communication and *tolerance=yes* have high confidence levels (above 0,7 in all cases) and lift values higher than one which confirms in almost all cases the positive relation between the two (with exception of

the lift very close to 1 in 2018 for the association rule {Frequency=frequently → Tolerance=Yes}, sign of independence). Also, the association between the rare frequency of communication and the below average level of tolerance is sustained by a 1,2/1,1 lift level in 2012/2018. As its confidence value was low, I also investigated the association rule between {Frequency=rarely → Tolerance=Yes }and as can be seen from the table below, even though its confidence level is high, the lift is below unit showing a reverse relation between the two.

Table 6: Association rules between communication frequency and tolerance

Association rule	Support	Confidence	Lift
2012			
{Frequency=rarely → Tolerance=No }	0.21	0.39	1.20
{Frequency=average → Tolerance=Yes}	0.12	0.76	1.12
{Frequency=frequently → Tolerance=Yes }	0.23	0.74	1.10
{ Frequency=rarely → Tolerance=Yes }	0.32	0.61	0.90
2018			
{Frequency=rarely → Tolerance=No }	0.14	0.26	1.11
{Frequency=average → Tolerance=Yes}	0.09	0.87	1.13
{Frequency=frequently → Tolerance=Yes }	0.25	0.78	1.02
{ Frequency=rarely → Tolerance=Yes }	0.43	0.74	0.97

Conclusions

In this study, I tried to investigate whether we can say that social tolerance in the staying population (the origin population of migrants) can be enhanced by the connections maintained between the people remaining in the country and the ones who have emigrated. In doing this, I used survey data form two waves of the World Value Survey for Romania and applied quantitative analysis techniques.

Even though migration is not one of the main determinants of tolerance, hypothesis that cannot even be taken into consideration, it still is a variable that, as the analyses showed, contributes to increasing the level of tolerance. The multinomial logistic regression illustrated that there is an important increase in the probability of being highly socially tolerant for persons who have friends and relatives who live or have lived abroad for at least one month and with whom they speak, and also that the lack of such connections leads to an increases the probability of being less tolerant, beyond the influence of education and age – important factors influencing tolerance.

The frequency of communication proves to be an important factor only when it comes to average vs. rare communication (average communication leading to higher chances of being highly tolerant), while the coefficient for frequently communicating in the multinomial logistic regression framework, did not prove to be significant. Results from the association analysis confirm the existence of a direct connection between migration and tolerance, persons who know and are in contact with emigrants being associated with a higher level of tolerance.

This study can be enhanced by adding supplementary variables regarding the recipient countries for the migrants, as it can influence their value system, and through a regional analysis on the social tolerance level for the staying population as well as.

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Sensor and User Interaction-Based Evaluation of Clinical Trials Implemented in A Form of a Mobile System Assisting Parkinson's Disease Treatment

Tomasz GUTOWSKI
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland
tomasz.gutowski@wat.edu.pl

Mariusz CHMIELEWSKI
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland
mariusz.chmielewski@wat.edu.pl

Abstract

The paper introduces a novel system for pharmaceuticals companies or medical facilities that support or conduct clinical trials. The system consists of two applications, the CT (clinical trials) management portal accessible only to the supervisor of the trials and a mobile application concentrated on collecting data from the patient. The paper proposes a novel solution which allows to organize and accurately track the efficiency of clinical trials using sensor-based examinations, daily surveying, medicine intake reporting and user interaction tests. This set of activities makes the process of evaluation of the treatment easier and less prone to inaccuracies and subjectivity. The paper focuses on the usage of the system in clinical trials regarding the Parkinson's disease, testing new medicines and new approaches to the therapy. The paper presents synthetic view of requirements and conceptual and testing phase of a deployed IQPharma Clinical Trials Assistant system. The original findings concern correlating aspects (methods) of pharmaceutical therapy evaluation for Parkinson's Disease including: Patient subjective health state evaluation - using answers provided in the surveys, Detection of motor symptoms and evaluation of their intensity using signals of inertial and biomedical sensors – aggregated features of actigraphy and electromyography. Reflex and mental perception assessment using user interaction exercises to evaluate the reaction time, accuracy of movement and providing complemental assessment of patient.

Keywords: Parkinson's Disease, mobile system, clinical trials, patient state evaluation.

Introduction

Parkinson's disease is an uncurable brain disorder that touches mostly people over 50 years old (Gelb et al. (1999)). Due to its long-term character and constant progression it is essential to discover and test new therapies that will minimize the influence of symptoms in treated patients to allow them to live without unpleasant limitations. All of the newly proposed therapies and medications must undergo the process of clinical trials in order to verify the positive influence of that treatment and to discover potential side effects. The treatment is compared with results from previously used therapies and placebo. At the time of the trials it is essential to strictly follow the schedule of medicine intakes and to monitor the state of the patient as frequently as possible. Usually the patient reports the daily effects and his health condition at the end of the day what leads to many errors and inaccuracies. Furthermore most of the evaluation is carried out by the patient, what may lead to subjectivity of submitted results.

This paper presents a complete system created to supervise clinical trials, focusing mostly on trials regarding Parkinson's disease, minimizing the involvement of the doctor or the supervisor. The presented solution consists of a mobile application which is provided on a mobile device for every patient and a web application dedicated for clinical trials management. Through the web application the supervisor can schedule all medicine intakes as well as state evaluation activities such as completion of the questionnaire (e. g. the MDS-UPDRS), which can be completed individually by the patient, but also with the presence of the examiner to increase accuracy. To decrease the subjectivity of state evaluation a number of tests have been designed to access the current condition of the patient, onboard sensors and sensor bands such as Thalmic Labs MYO are used to measure the tremor and rigidity the patient is experiencing.

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The described system can be used for any type of clinical trials, its goal is to support the treatment providing the doctor all the acquired and analysed patient data with the discussed system in order to make appropriate decisions that will lead to greater comfort of the participating patients (Friedman et al. (2015)). Depending on the defined questionaries, provided symptoms recognition device and defined activities, the system can accordingly be dedicated to support the treatment of various types of diseases with expected scope. Designed methods for state evaluation of the patient have been created based on observations, medical consultations and discovery of symptoms that can be measured using wearable devices.

Research Background

Parkinson's disease is the degeneration of brain structures of unknown cause. The essence of Parkinson's disease is the atrophy of dopaminergic cells in the brain, what causes symptoms such as motor slowing down, muscle stiffness, resting tremor, gait and posture disorders, it usually as an asymmetric onset mentioned by Gelb et al. (1999). The definition of PD is also formulated as: a progressive disease of the extrapyramidal system consisting of the disappearance of substantia nigra cells producing dopamine and the presence of Lewy bodies on histopathological examination as mentioned by Poewe et al. (2017). It is a spontaneous, slowly progressive degenerative disease of the central nervous system.

Parkinson's disease is progressive, which means that the treatment needs to be adjusted over time to maintain the efficiency. In the first period, which lasts about 5 years, the response to dopamine treatment is very good. As the disease progresses the damage spreads to other areas of the brain and it becomes more difficult the keep the dopamine at the sufficient level. To make matters worse, after taking the medication, the symptoms do not go away quickly (patients sometimes think that it is the medication that harms them, because they have taken the pill and for 0.5-1 hours nothing improves). As the doses get larger the chance of the dopamine level exceeding the expected also increase. This may lead to additional movement disorders such as dyskinesias.

Levodopa is the main drug used in the pharmacotherapy of PD. It is an amino acid that can pass from blood to the brain and be converted into dopamine in the brain. Levodopa is rapidly degraded in the peripheral tissues before it reaches the brain; on the other hand, it is not possible to administer higher doses of the drug as this causes increased side effects what has been mentioned by Contin et al. (2010). The solution is to give a combined administration of the peripheral enzyme dopa-decarboxylase inhibitor levodopa, for example carbidopa or benserazide. The main complications of the use of levodopa are the so-called on-off syndromes characterized by the occurrence of significant hypokinesis when the drug concentration in the blood decreases, interspersed with hyperkinesis (involuntary movements) at the top of the dose (Direnfeld et al. (1978)). Another complication is the occurrence of mental disorders when using high doses of the drug.

To monitor the progression and evaluate the severity of the disease several rating scales have been proposed by Goetz et al. (2008). One of the most commonly used is a revision of UPDRS known as MDS-UPDRS. It is based on a completion of a questionnaire. The survey consists of four parts: Part I - Exceptional aspects of everyday activities skills), Part II - Movement aspects of everyday activities, Part III - Movement symptoms and Part IV – movement complications. The survey is designed to be completed by the patient as well as the examiner. Parts IA, III and IV are to be completed by the examiner in the presence of the patient (they provide instructions for the examiner and the patient) and sections IB and II can be completed individually by the patient. All of the parts require the severity evaluation of certain symptoms in the scale of 0 – Normal to 4 – Severe. These evaluations make up 56 scores of the survey, there are also 5 yes/no type questions. The survey is designed to be completed within 30 minutes and based on the provided answers the total score is calculated.

Architecture and technology stack

The system is built up of two application, the mobile application - IQPharma Clinical Trials Assistance and the web application – IQPharma Clinical Trials Server. They communicate and exchange data through the secure HTTP protocol (the REST API served by the web application).

The mobile application is developed for the mobile devices that use Android 4.4 or higher in Java 1.8. For data exchange with the web application the device must provide an Internet connection. To use external sensor platforms the device should support a specified communication standard such as Bluetooth or USB, depending on the device. The mobile application is the only access point to the system available to the patient participating in the trials. It include 9 main modules:

- Sensor examination module responsible for performing the patient state examinations using built in and external sensors connect via USB or Bluetooth,

- Questionnaire module, which manages the completion of the survey by the patient and the question flow,
- Communication module in charge of the communication with the web application, it manages sending patient data - completed examinations, surveys, exercises and other events from the application, it also gets data from the server such as clinical trials schedules, updates, information from the supervisor,
- Notification module organizing the push notifications and alerts sent from the application to inform the user about the need to complete a certain activity, it also consumes the push notifications received from Google Firebase Messaging,
- User interaction module which coordinates the interaction-based exercises the patient is obliged to complete during the trials for state evaluation,
- Medicine intake module, managing the reminders about necessary intakes of medicine,
- Administration module, available for the supervisor to specify settings and permissions for clinical trials and the application,
- Analysis and statistics module providing the basic analysis view based on registered signals, surveys and other patient activities as well as statistics regarding the patient's involvement in the trials,
- Settings module allowing the patient to define person related setting and update his profile.

The application uses Realm database to store local data and received schedules from the server. All of the activities do not require constant Internet connection, they are saved in the local database and once the Internet connection is established, they are persisted to the global database for the information and analysis performed by the clinical trials supervisor using the management portal.

The IQPharma CTA Trials Management Portal is an application built of two parts: frontend SPA (Single Page Application) built with Angular framework and the backend in Java developed using Spring Boot framework. The management portal is accessible only to medical supervisors to oversee the clinical trials. The application uses a PostgreSQL database and static files for storing sensor signals, the Google Firebase Messaging is used to instantly send notifications to the mobile app about changes in the schedule and other crucial messages. The application consists of the following modules:

- Schedule management module which allows for definition of new schedules for medicine intakes, surveys, exercises and other activities to be performed by the user. The created schedules can be modified using the module other activities can also be defined.
- Communication module responsible for the communication with mobile apps through Google Firebase Messaging,
- Analysis and statistics module which presents advanced analysis of the clinical trials and the results for every participating patient,
- Patient data module allowing to access and modify patient data,
- Messaging module organizing the communication between the patients and assigned supervisor,
- Data access module providing an interface to access and to modify data in the database and static files.

The relations between modules and communication between applications is presented on Fig. **1**.

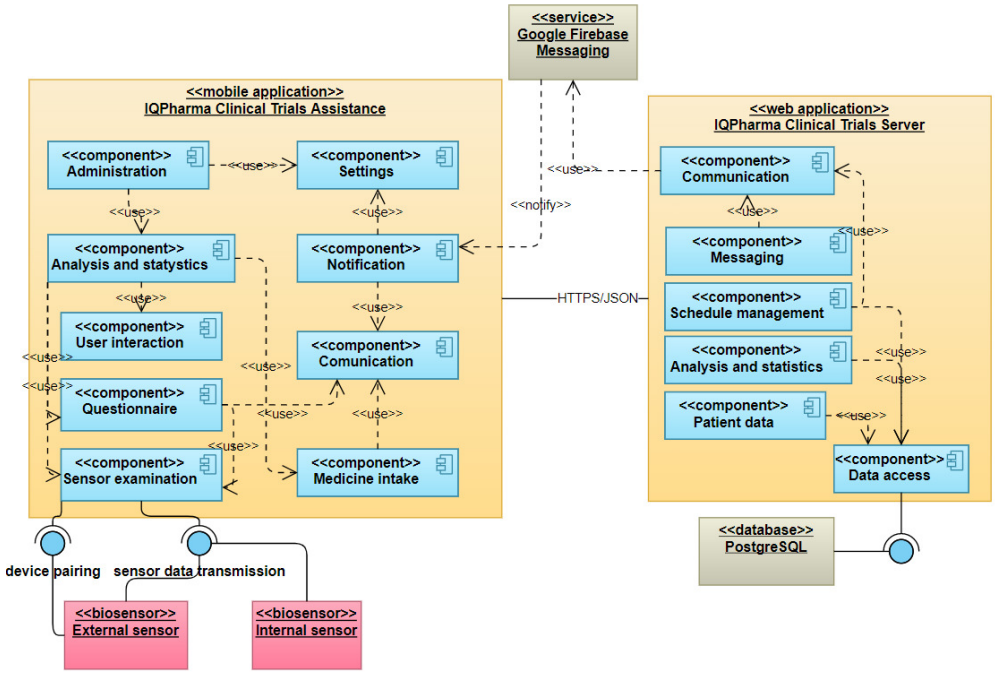

Fig. 1: The architecture of IQPharma CTA system presenting two subsystem - IQPharma-CTA and IQPharma-CTS

Clinical trials assistance and tool composition

The assistance in clinical trials is provided by the system on multiply levels. First of all, it supports fast communication between the patient and the supervisor, allowing the patient to report any noticed problems instantly. The supervisor can assign a medicine intake schedule for every patient, at each intake time the patient is notified through the mobile device. It is also possible to schedule other events for the patient such as survey completion, which allows to keep track of the current condition. To keep track of the intensity of motor symptoms of the disease, sensor-based examinations and interaction tests have been defined, these enable the objective evaluation of the symptoms ignoring the subjective impression of the patient. The activities scheduled for the patient are time-constrained, they all must be completed at specified time and the patient is reminded of them by notifications shown on Fig 2.

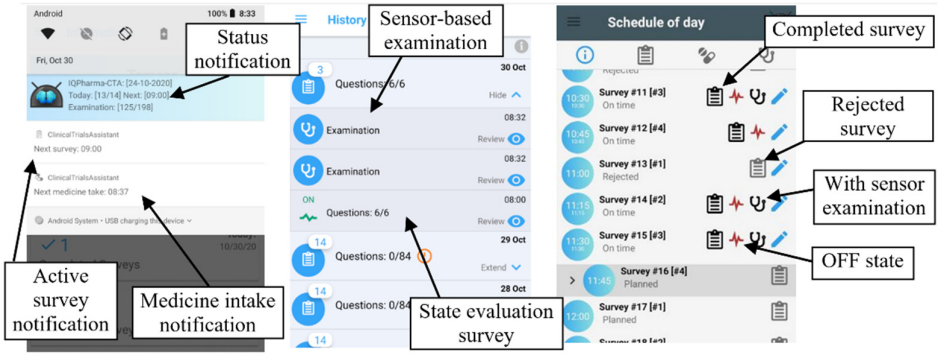

Fig 2: The view of notifications generated by the application (left), the history of completed activities (middle) and the daily schedule of activities (right).

Medicine Intake Tracking

Building the schedule of medicine intakes requires to provide the dose size and specific times at which the intake should take place or the number of intakes during the day and the time of the first and last dose (the other dosages

will be planned during the day with equal time intervals). Provided this information the schedule is built and sent to mobile devices of the desired patient group. Once the medical trials start, every time the user is obliged to take the medication, he will be notified with a push notification and if the appropriate permission are provided also a remainder is displayed on the whole screen and an alert sound is played until the user performs one of the desired actions: confirms that the medicine has been taken, delays the reminder by 5 minutes or dismisses it, the remainder has been presented on Fig 3. In case of dismission or no reaction within 10 minutes the supervisor is instantly informed in order to apply adequate measures. The times of the reminder and the actual intake are sent to the web application for further analysis.

Daily questionnaires for well-being and symptoms evaluation

The system has an extensive support for questionnaires. It supports multiply answering formats: Yes/No, single choice, multiply choice, number and text answers. All of the questions should be defined through the management portal where they can be assigned to created clinical trials or specific patients. Just like in case of medicine intake the time of the survey can be defined in two ways. At the time of survey, a reminder is displayed which allows the user to complete it immediately or to delay it by 5 minutes. The number of questions and their order might change depending on the provided answers, the question flow is defined by the supervisor. The user can move between questions and return to a completed survey in order to correct the answers. Depending on the configuration the application may record the signals from selected sensors at the time of answering the questions. It might provide information about the state of the patient without his awareness.

For Parkinson's disease two different surveys have been implemented: short survey consisting of questions regarding the current state of the patient and the dyskinesis and the MDS-UPDRS survey which has proven to give a good evaluation of the disease progression collecting the data regarding the last week. The MDS-UPDRS survey has been implemented in two modes one of them requires the presence of the examiner, who answers the questions based on the responses of the patient and a version to be completed just by the patient (example questions are provided on Fig 4. and Fig 5). Every completed survey is sent to the management portal where the supervisor can view the overall score, the answers and sensor signal analysis, if the data is collected.

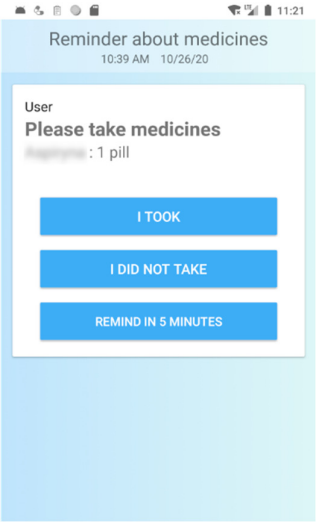

Fig 3. Medicine intake reminder in IQPharma-CTA

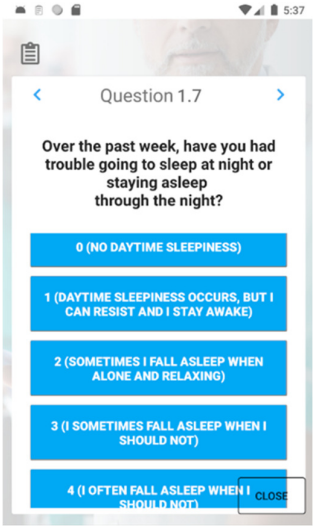

Fig 4. Question 1.7 from the MDS-UPDRS survey displayed in IQPharma-CTA

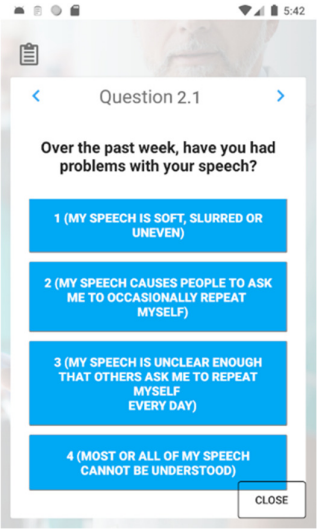

Fig 5. Question 2.1 from the MDS-UPDRS survey displayed in IQPharma-CTA

Sensor Examinations

In order to objectively evaluate the state of patients, especially their motor symptoms, a set of sensors built into the mobile device have been selected to register the signal (LeMoyne et al. (2014)). If the user is equipped with an external sensor device with Bluetooth connectivity, such as MYO armband, it can be used to register the signals too. The sensors selected for motor symptoms of Parkinson's disease include: accelerometer, gyroscope, magnetometer and electromyograph (Rigas et al. (2012)). Each of the signal component presented in Table 1 plus the calculated magnitude are collected at a constant frequency, saved and sent to the server for analysis.

Table 1: The sensors available on different platforms with their signal components and sampling frequencies

	Accelerometer (50 Hz)	Gyroscope (50 Hz)	Magnetometer (50 Hz)	Electromyograph (200 Hz)
Mobile device	3 channels - X,Y,Z	3 channels - X,Y,Z	3 channels - X,Y,Z	n/a
MYO arm band	3 channels - X,Y,Z	3 channels - X,Y,Z	n/a	8 channels - E1, E2, E3, E4, E5, E6, E7, E8

The examination using the sensors is performed at times specified by the supervisor through the management portal. The supervisor can specify the duration of the examination, used sensors and also the limb used for the examination. At the specified time the patient is notified and asked to complete the examination. Once the examination is complete, the sensor signals undergo processing using low-pass and high-pass filters in order to remove the noise and gravity (accelerometer signal) components. The filtered signal is then used to calculate time and frequency domain parameters that give an overview of the signal characteristics. The list of used parameters is described by Gutowski et al. (2020). The signal analysis results can be viewed in the management portal as well as in the mobile application in administrator view what is presented on Fig. **6**. and Fig. **7**.

Fig. 6: Sensor signal visualisation in the management portal for electromyograph and accelerometer

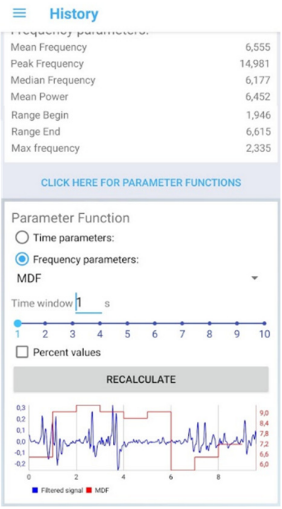

Fig. 7: Sensor signal analysis visible in the administrator mode of the mobile application for accelerometer

Evaluation of motor skills and reflexes using user interaction tests

The user interaction test is designed to measure the reflex, reaction time of the patient and their mental condition, it corresponds directly to the third part of the MDS-UPDRS survey. Every time the patient agrees to taking the test, he is provided with a set of six exercises to complete. The first two exercises focus on gaining as many points as possible, the third and fourth need to be completed in minimum time, the last two exercises measure the precision of movement. Throughout the whole test, the remaining time, number of points and mean reaction time are displayed.

The first exercise requires the patient to perform as many clicks as possible within the restricted area in 30 seconds. For every click the number of points is increased and timespan between clicks is registered. The second exercise is presented on Fig 8., the screen is split into 25 squares and every time an area is highlighted the patient must click it as quickly as possible. After each correct click another square is highlighted (within 250 ms) until the end of time. To complete the third and fourth exercise the user must click on the squares too, but each of the squares has a number displayed in the middle, the goal is to click them in ascending order. In exercise 3 all of the correctly picked squares are highlighted, in the fourth exercise only the last correctly clicked is, it is more difficult to find the next number. For every attempt with exercise 5 a drawing with a path is displayed, Fig **9**. presents an example. The user must follow the path while touching the screen. The distance for every crucial point is calculated between the original and the path drawn by the patient. The last exercise focuses on analysing the handwriting, the patient must write 6 words (3 consisting of 3 letters and 3 consisting of 4 letters) using block lettering on the screen, what is presented on Fig 10. The writing is then recognized and based on the number of recognized letters the score is calculated.

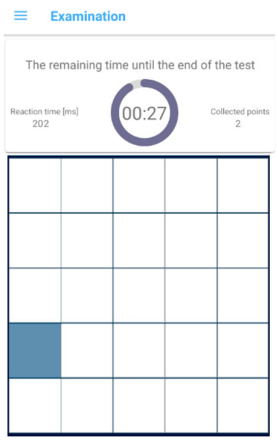

Fig 8. Second exercise with a highlighted square.

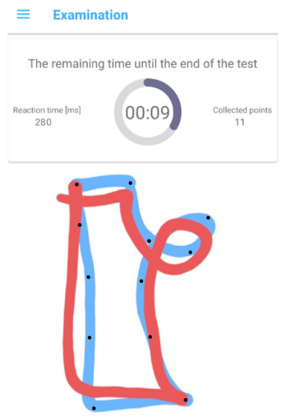

Fig 9. Fifth exercise presenting the pattern path (blue) along with the path drawn by the user (red).

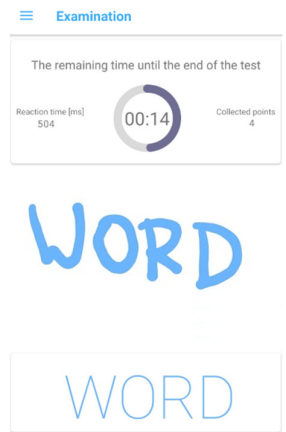

Fig 10. Sixth exercise presenting the recognition of handwritten words.

The total number of points is calculated with the following equation:

$$P = \left(\frac{220 - p_{e1}}{n_{e1}} + \frac{75 - p_{e2}}{n_{e2}} + \frac{t_{e3} - 15}{n_{e3}} - \frac{t_{e4} - 20}{n_{e4}} + \frac{\sum_{i=0}^{n_{e5}} d_i}{6n_{e5}} + \frac{21 - p_{e6}}{n_{e6}}\right) \cdot 100 \qquad (1)$$

Where n_{e1}, n_{e2}, n_{e3}, n_{e4}, n_{e6} are the normalization factors with the following default values: $n_{e1} = 1320$, $n_{e2} = 450$, $n_{e3} = 450$, $n_{e4} = 420$, $n_{e6} = 126$.

Table 2: The definition of symbols used in the equation and the ranges of their values

Symbol	Definition	Value range
P	total number of points	[0,100]
p_{e1}	number of performed click (collected points) during the first exercise	[0,250]
p_{e2}	number of correctly clicked squares (collected points) during the second exercise	[0,75]
t_{e3}	time in seconds required to sort the squares with maximum time of 90 seconds (third exercise)	[0,75]
t_{e4}	time in seconds required to sort the squares with maximum time of 90 seconds (fourth exercise)	[0,70]
d_i	normalized value of distance between the i-th crucial point in the pattern path and the i-th crucial point in the pattern drawn by the patient (fifth exercise)	[0,1]
n_{e5}	number of crucial points for the path (fifth exercise)	[1,20]
p_{e6}	number of letters correctly recognized in the words written by the patient (sixth exercise)	[0,21]

Each of the values presented in Table 2 has an assigned value range, if the value acquired from the exercise exceeds the maximum value, it is rounded to the maximum value. The higher the total number of points (P) the more severe the motor symptoms are for the patient. The provided scale does not allow to diagnose the patient with Parkinson's disease, users without any disorders might still receive a significant score. The goal of the exercises is to evaluate the current condition of the patient in reference to other patients and his previous condition to keep track of the progression of the disease and to verify medication effects. Example score values received by a healthy patient are presented below, they provide the total score of 19.1:

$p_{e1} = 197$, $p_{e2} = 56$, $t_{e3} = 37$, $t_{e4} = 41$, $\sum_{i=0}^{n_{e5}} d_i = 1.8$, $n_{e5} = 12$, $p_{e6} = 20$.

Tool Application Methodology

The process of tool application starts at the management portal where the supervisor defines the clinical trials providing the basic information including the name, aim, description, assigned supervisors, doctors, start and end date. The next two steps include assigning patients to the trials, and definition of activities that the patients will be required to perform to allow evaluation of their state. Assigning patients to the clinical trials can be performed in marked groups not visible to the patients (e.g. patients taking levodopa and patients taking placebo). They are two ways of assigning the patient to the trials: If the patient already has an account he just needs to be signed up for the trials, otherwise an account must be created either through the mobile application by the patient or through the management portal by the administrator.

The supervisor can create custom sensor measurements selecting the sensors, their sampling frequency (not higher than the maximum supported by the sensor), parameters that will be calculated based on the signal, the duration of every examination. A user guide for every examination type can also be defined. As described before, a custom survey can be defined with a formulae to calculate the points, exercises for the users and also medicine intake reminders. The created schedule is time-constrained, every activity is assigned to indicated time and every activity completion, delay or dismissal is saved and known to the supervisor. The schedule defined at the level of clinical trials can be overridden at the level of chosen group or patient. Once the schedules and the patients are assigned, the system awaits for the starting time of the trials, then the supervisors and the patients receive a reminder. During the trials the patients are requested to complete specific activities and report their state at defined times, the supervisor is informed about the progress of the trials and at any time of the trials can view the data that has already been collected and conduct analysis.

CTA supported clinical trials evaluation tests

In order to evaluate the capability of supporting clinical trials by the system several tests have been conducted. The first test was to check the approachability and the speed of survey completion in reference to the traditional manual approach presented on Fig. **11**. The test proved the completion of survey using the application was faster and simpler, however the limited area on the screen made it impossible to view all the instructions and answers at once using a font visible for older people with presbyopia, what is not the case when using the printed copy. The completion of the survey in conventional form requires the presence of the patient and the supervisor at the same time whereas the application allows for individual questionnaire completion by the patient and the supervisor, providing the possibility of more frequent surveying.

Another test included the detection of tremor in Parkinson's disease using the internal sensors as well as MYO Armband in reference to the Leap Motion controller which uses infrared cameras to track the movement of palms shown on Fig. **12**. The Leap Motion controller has proven to provide more precise values regarding the tremor than sensors in the mobile device and in the armband, unfortunately the controller was prone to losing the detected position of hands, in case of intensive tremor, this was not the case for the armband and mobile device. The parameter values registered with the mobile device were more representative than the ones from the armband, the reason for this is the fact that the palm experiences a higher amplitude tremor than forearms, where the band was placed.

Fig. 11: Manual completion of the MDS-UPDRS survey by the supervisor

Fig. 12: Sensor based examination using Leap Motion controller as an alternative tremor recognition sensor

Conclusions

Providing objective methods for clinical trials is a crucial and demanding task that needs to be conducted in order to achieve objective assessment of pharmaceutical treatment tailored to the needs of the patient. The management over the trials is time and resource consuming it also requires taking additional precautions to make sure the results are objective and accurate. The tool provides a solution for continuous monitoring of trials and objective evaluation of patient's condition during composed clinically sound treatment. IQPharma CTA is based on time-constrained activities performed by the patient, at the time and frequency planned and requested by the trials' supervisor. The application keeps track of any medical events, occurring inconveniences supplemented with possible patient's actions delays while monitoring the trials progress. Constructed application is dedicated for effective, remote, autonomous monitoring neurological disorders and in particular Parkinson's disease providing methods of symptom intensity evaluation. The novelty of the tool comes from the composition of surveying supplemented by biomedical monitoring as well as human interaction testing, providing new means of identifying tremor, bradykinesias, rigidness and other movement related symptoms of neurological disorders. The discussed solution has been tested against traditional surveying method of state evaluation and has proven to require less time for configuration, remote management and execution of CTs as well as to provide more frequent and accurate state evaluation but most of all delivering quantitative algorithms for symptoms intensity evaluation therefore ON/OFF state recognition. This directly leads to higher reliability and accuracy of medical trials evaluation and in the end better quality of the process.

Acknowledgment

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The Statement of Comprehensive Income – A New Disclosure Concept

Prof. Marzena REMLEIN, Ph.D.
Poznan University of Economics and Business, Poland
marzena.remlein@ue.poznan.pl

Prof. Małgorzata RÓWIŃSKA-KRÁĽ, Ph.D.
University of Economics in Katowice, Poland
malgorzata.rowinska@ue.katowice.pl

Abstract

The goal of the paper is to critically assess the current solutions in the field of disclosure of components of comprehensive income in financial statements and to develop a proposal for the structure of the statement of comprehensive income that will improve its usefulness.
Based on the literature studies and the results of previous empirical research on comprehensive income reporting, the authors of the paper formulated the following thesis: The principles of disclosing comprehensive income in accordance with the law do not provide optimal information about the financial effects of the entity's operations.
The paper is structured as follows. Section 1 presents the outline the concepts of comprehensive income reporting. In Section 2 we describe our idea of disclosure of comprehensive income. Section 3 includes our empirical research and application of a new concept of the statement of comprehensive income in practice. The last section contains final comments on the use of the new concept of the statement of CI in assessing the company's profitability. Our proposal will contribute to the increased transparency of the statement of comprehensive income and will help the users of financial statements in proper understanding of the significance of comprehensive income and other comprehensive income. The proposed structure of the statement of comprehensive income is also intended to assist users in interpreting the ratios calculated on its basis.

Keywords: Comprehensive Income, Net Income

Introduction

Profit (or loss) is one of the most important economic categories used to assess the financial position of an entity and its management. The rules for its presentation in the financial statements are set out in accounting standards which have been subject to quite large changes in recent years. Since 2009, the companies listed on regulated markets in the European Union have been required to present total comprehensive income (CI) and its components in the comprehensive income statement prepared under International Financial Reporting Standards (IFRS). It is the result of a joint agreement between the International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB) to take into account the information needs of investors and other capital 'providers'. This statement is also the result of adopting a new concept of presenting information on the overall result - comprehensive income, not only profit and loss.

This solution has good points, but there are also negative effects, particularly concerned with difficult interpretation of dates about the other comprehensive income in respect of profitability.

The goal of the paper is to:

- critically assess the current solutions in the field of disclosure of components of comprehensive income in financial statements,
- develop a proposal for the structure of the statement of comprehensive income that will improve its usefulness.

The paper has been based on literature review, analysis and interpretation of International Accounting Standard 1 (IAS 1), and a review of financial statements. We used the financial statements of a selected company listed on the Warsaw Stock Exchange prepared for 2019 according to IFRS. We applied the method of content analysis, synthesis and deductive inference.

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The paper is structured as follows. Section 1 presents the outline the concepts of comprehensive income reporting. In Section 2 we describe our idea of disclosure of comprehensive income. Section 3 includes our empirical research and application of a new concept of the statement of comprehensive income in practice. The last section contains final comments on the use of the new concept of the statement of CI in assessing the company's profitability.

Outline of the concepts of comprehensive income reporting

The concept of comprehensive income (CI) involves the necessity to include in the financial result of the entity also events that were previously recognized in equity. This results directly from the definition of comprehensive income in IAS 1, according to which total comprehensive income is the change in equity during a period resulting from transactions and other events, other than those changes resulting from transactions with owners in their capacity as owners (IAS 1.7). According to IFRS total comprehensive income is a new measure for assessing an entity's performance in the reporting period. It includes components such as:

- profit and loss as the entity's financial result calculated in the traditional profit and loss account,
- other comprehensive income so far disclosed in equity.

The comprehensive income formula is as following:

$$CI = I_n + OCI_n$$

CI – comprehensive income,
I_n - net income (profit/loss),
OCI_n - other comprehensive income.

Other comprehensive income includes income and expense that other IFRS specifically exclude from profit and loss account. The financial result established in the profit and loss account and its structure indicate the profitability realized in a given period. Other comprehensive income provides information on potential profits or losses which the unit will realize in subsequent periods and which have already caused changes in the revaluation reserve for the current period. For this reason, when evaluating the financial condition of an economic entity, it is necessary to take into consideration also the increase in equity capital understood as the „global" result of the entity.

The issue of reporting of comprehensive income is still the subject of many discussions, studies and researches by both Polish and foreign scientists (eg. Szychta, 2010, s. 117-141; Walińska, 2009, s.335 - 348; Gierusz, Gawrońska, 2012, s. 29-46; Mechelli , Cimini, 2014; Poniatowska, Rówińska, 2018; Dehning & Ratliff 2004; Chambers et al., 2007;
As far as the benefits resulting from applying the concept of comprehensive income are concerned, it is the most frequently indicated that it provides a better insight into the ability of an entity to generate profits in the future (Kanagaretman et al., 2009); it constitutes a better evaluation of the value creation process and helps to forecast a company's ability to generate cash and its equivalents (Marchini & D'Este, 2015); it also minimizes the negative effects in connection with the phenomenon of active shaping of profits by managements resulting from transferring expenses (Chambers et al., 2007).

According to the concept of comprehensive income, the effects of the balance sheet valuation shape the effect of the entity's activity. However, there is a doubt as to whether disclosing them in the financial statements, they can be added to the result of real transactions?

Based on the literature studies and the results of previous empirical research on comprehensive income reporting, the authors of the paper formulated the following thesis: The principles of disclosing comprehensive income in accordance with the law do not provide optimal information about the financial effects of the entity's operations.
It is not our intention to discuss the advisability of disclosing comprehensive income. We can find some papers about it (Mironiuca, Huiana 2016, s.498; Du, Stevens, McEnroe, 2015; Gazzola, Amelio, 2014; Pascan, 2014; Luty, 2010; Szychta, 2011; Hodgson Russell, 2014; Kuzior, Rówińska, 2017). We would like to show that by presenting the structure of comprehensive income in a different way, stakeholders in financial statements get more useful information.

IAS 1 requires that all the items of income and expense be recognized in a period, i.e. the items comprising CI, be presented either:

- in a single statement of CI (hereinafter referred to as combined statement of CI), or
- in two statements: a statement displaying components of profit or loss (separate income statement) and a second statement beginning with profit or loss and displaying components of OCI (statement of CI) - hereinafter referred to as separate statement of CI.

According to IAS 1, an entity is free to choose the way of presenting costs and information on other comprehensive income. As a minimum, the statement of comprehensive income shall include line items that present the following amounts for the period (IAS 1. 82):

- revenue;
- finance costs;
- share of the profit or loss of associates and joint ventures accounted for using the equity method;
- tax expense;
- a single amount comprising the total of:
  - the post-tax profit or loss of discontinued operations and
  - the post-tax gain or loss recognized on the measurement to fair value less costs to sell or on the disposal of the assets or disposal group(s) constituting the discontinued operation;
- profit or loss;
- each component of other comprehensive income classified by nature;
- share of the other comprehensive income of associates and joint ventures accounted for using the equity method; and
- total comprehensive income.

New disclosure concept of comprehensive income

There should be noted that the total income is shaped by:

- the effects of completed transactions,
- effects of the valuation made as at the balance sheet date.

The methods and ways of valuation result from the accounting policy and the profit management policy adopted by the entity. The financial consequences of the performed balance sheet valuation only mean the potential profits or losses (revenues, costs) identified (but not yet realized) at the balance sheet date. We can call them virtual profits or losses because we don't know if and in what amount they will appear in the future. We call the effects of balance sheet valuation as unrealized profits or losses.

Our suggestion is to look at comprehensive income as the sum of the results of realized trades and unrealized profits or losses:

$$CI = ICT_n + IUT_n$$

ICT_n is the net income on completed transactions (realized profits or losses), IUT_n is the net income on unrealized transactions (unrealized profits or losses).

$$IUT_n = IUT_{nP/L} + IUT_{nE}$$

$IUT_{nP/L}$ are the effects of the valuation through profit or loss, IUT_{nE} are the effects of the valuation through equity.

$$CI = ICT_n + IUT_{nP/L} + IUT_{nE}$$

Comprehensive income is determined by the net values (after income tax). Profit or loss on completed transactions is the gross profit (or loss) less current income tax. While unrealized profits and losses are adjusted for deferred income tax.

$$CI = GP_{bT} \times (1 - TR_c) + (IUT_{P/L} + IUT_E) \times (1 - TR_d)$$

GP_{bT} is the gross profit (before income tax), $IUT_{P/L}$ are the effects of the valuation through profit or loss (gross value), IUT_E are the effects of the valuation through equity (gross value), TR_c is the current income tax rate, TR_d is the deferred income tax rate.

Following the presented formulas, we propose a change in the structure of the statement of comprehensive income:

A. Net profit (or loss) on completed transactions

Revenue (completed)
- Costs (completed)

- Tax expense

B. Net profit on unrealized transactions

Unrealized profits and losses through profit or loss
+ Unrealized profits and losses through equity
– Deferred income tax

Comprehensive income (A+B)

The consequence of the new disclosure concept of comprehensive income should be a change in the way of disclosing the financial results in the statement of financial position. We can notice some inconsistency in disclosures in the financial statements:

- the statement of comprehensive income discloses comprehensive income (net), including the net profit (or loss) and other comprehensive income (net),
- the statement of financial position (as part of equity) discloses net profit (or loss), while other comprehensive income is often disclosed as retained earnings.

Therefore, we propose to change the way of disclosing equity and liabilities in the statement of financial position to the following:

1. Equity including net profit (or loss) on completed transactions.
2. The effects of the valuation through:
    a. profit or loss,
    b. equity.
3. Liabilities[1].

The use of the proposed structure of the statement of comprehensive income and statement of financial position provides more clear and unambiguous information for stakeholders. It clearly shows the coherence of these two elements of the financial statement.

Research and Discussion

We examine the statement of comprehensive income of Mercator Medical S.A. covers the year 2019. The goal of the empirical research is to present the differences in the scope of disclosure of reporting information published by the Mercator Medical S.A. (in accordance with IAS 1) and our proposal. Thus, we will indicate the scope of their use by stakeholders.

Table 1 presents the elements shaping the comprehensive income of the examined company.

Tab. 1 : The structure of the statement of comprehensive income of the Mercator Medical S.A.

Specification	**Value (PLN thousand)**
Sales revenue of products and services	3 147
Sales revenue of goods and materials	271 237
Other operating revenue	1 303
Operating revenue	**275 687**
Operating costs	(40 937)
Value of sold goods and materials	(234 390)

[1] The statement of financial position is not the subject of this paper. More on the proposed structure of equity and liabilities in: Remlein M., Rówińska-Král' M. (2020), *Nowa perspektywa bilansu. Wartość poznawcza i analityczna – studium przypadku*, w: Zeszyty Teoretyczne Rachunkowości, nr 108 (164), pp. 151-166.

Other operating costs	(1 465)
Operating costs	**(276 792)**
Operating profit (or loss)	**(1 105)**
Financial revenur	7 776
Financial costs	(7 387)
Profit (or loss) before taxes	**(716)**
Current income tax	(1 039)
Deferred income tax	(98)
Net profit (or loss)	**(1 853)**
Other comprehensive income	(46)
Comprehensive income	**(1 899)**

Source: Mercator Medical S.A.

First of all, we used the content analysis of the notes to identify revenues and costs which are the effects of the valuation made as at the balance sheet date and which are unrealized profit or loss. Table 2 presents the results of our analysis.

Tab 2 : Financial effects of the valuation disclosed in the statement of comprehensive income of the Mercator Medical S.A.

Occurrences	Item of the statement of comprehensive income	Value (PLN thousand)
Reversal of the write-down of receivables	Other operating revenue	11
Reversal of inventories write-down	Other operating revenue	37
Write-down of receivables	Other operating costs	(88)
Inventories write-off	Other operating costs	(75)
Updating investment value	Financial costs	(3 650)
Valuation of financial instruments	Financial costs	(318)
Unrealized profits and losses through profit or loss		**(4 083)**
Exchange differences	Other comprehensive income	(46)
Unrealized profits and losses through equity		**(46)**

Source: authors' own elaboration on based Mercator Medical S.A.

The next step, we entered the above information to the form of the statement of comprehensive income we proposed (tab.3).

Tab. 3 : New concept of the statement of comprehensive income

Specification	Value (PLN thousand)
A. Net profit (or loss) on completed transactions	**2 328**
Sales revenue of products, goods and materials	274 384
Other revenues of completed transactions	9 031*
Costs of sold products, goods and materials	**(275 327)**
Other costs of completed transactions	(4 721)*
Current income tax	**(1 039)**

B. Net profit (or loss) on unrealized transactions	**(4 227)**
Unrealized profits and losses through profit or loss	**(4 083)**
Unrealized profits and losses through equity	(46)
Deferred income tax	(98)
Comprehensive income (A+B)	**(1 899)**

Source: authors' own elaboration on based Mercator Medical S.A.

The new concept of the statement of comprehensive income presents net profit on completed transactions. There is a positive situation for the company. In the statement of comprehensive income report according to IAS 1, the company had an operating loss. The final negative comprehensive income of the Mercator Medical S.A. is a consequence of the negative adjustments made in connection with the balance sheet valuation.

Usefulness of the new concept of the statement of CI in assessing the company's profitability

The separation of comprehensive income into completed and unrealized transactions is of great importance for investors as they can assess the real situation of the company. The use of the proposed structure of the statement of CI also makes it possible to enrich the financial analysis with indicators that do not appear in the "traditional" scope of the analysis, and provide relevant information for the stakeholders. We propose the following ratios to realistically assess the company's financial situation:

- share of unrealized profit (or loss) in comprehensive income (**IUT_n / CI**),
- share of realized profit (or loss) in comprehensive income (**ICT_n / CI**),
- share of unrealized profit (or loss) in equity (**IUT_n / E**),
- share of realized profit (or loss) in equity (**ICT_n / E**),
- ratio of unrealized profit (or loss) (**IUT_n / L**),
- ratio of realized profit (or loss) (**ICT_n / L**),
- share of realized profit (or loss) in unrealized profit (or loss) (**ICT_n / IUT_n**).

The first two ratios allow to assess the actual, real value of the income achieved in a period. Share of unrealized profit (or loss) in comprehensive income shows the portion of income for a period that may or may not become future income. The next two ratios show the relation of profit or loss (realized and unrealized) in relation to equity. The good financial standing of the company is evidenced by the high share of realized profit in equity. In the next step we relate realized and unrealized profit (or loss) to liabilities. In our opinion the most important is the last one "share of realized profit (or loss) in unrealized profit (or loss)" which should be as high as possible.

The presented ratios provide additional information for the stakeholders, which in our opinion is extremely important information. They indicate the role and significance of the realized profit (or loss) and present also the influence of the applied principles of balance sheet valuation on the value of comprehensive income and equity.

The above-mentioned possibilities offered by the proposed concept of the structure of the statement of comprehensive income make it more useful and clear for each group of stakeholders. It also allows for a more detailed approach to profitability research (assets, equity, sales).

The concept of comprehensive income contained in IFRS and the possibility of "controlling" the financial result (through balance sheet valuation) introduced chaos to the profitability analysis. We ask questions:

1) should the benchmark in assessing profitability be comprehensive income or (traditionally) net profit (or loss)?
2) And if the net profit (or loss), do the results of the balance sheet valuation (depending on the adopted accounting policy) describe company's profitability?

In our opinion, for the purposes of profitability analysis, information about profit (or loss) on completed transactions should be used. It is especially important when, using profitability ratios, we want to compare the financial situation of various entities using different balance sheet valuation models.

Analysing the statement of comprehensive income of Mercator Medical S.A. we can see that the examined company has net loss and negative value of comprehensive income (Table 1). Seemingly, it indicates the company's deficit. Using the proposed structure of the statement of comprehensive income (Table 3), we clearly find out a net profit on completed transactions, which proves the company's profitability. A loss on unrealized transactions should not be viewed negatively. It may indicate the application of the earnings management policy (accounting policy) which uses to a large extent the prudence principle. The loss on unrealized transactions, shown in the financial statements, is only a "virtual" loss, not yet incurred, which will not necessarily be incurred in the future. In our opinion information about the profit or loss on unrealized transactions should not be considered when assessing the Company's profitability.

Conclusions

There is no conceptual basis for when an item should be included in other comprehensive income and when in profit and loss account. Vast majority of companies presents profit and loss account and other comprehensive income as separate statements. The reason is that other comprehensive income is still mostly ignored by investors and other users outside accounting and financial reporting. Companies are afraid that presenting profit or loss and other comprehensive income in one report would make a net profit a subtotal in arriving at the total comprehensive income.

It should be noted that the great freedom afforded by IAS 1 and the lack of a uniform template for the statement of comprehensive income encourage the search for ready-made solutions. It is visible that this document is prepared according to the templates published by recognized audit and consulting companies. We notice this gap and undertake to fill it with a proposal for a new concept of comprehensive income report. The most important is the separate disclosure of completed transactions (realized profits or losses) and unrealized transactions (unrealized profits or losses).

This division is of great importance for investors as they can assess the real situation of the company. Thus, our concept is relevant to both accounting theory and economic practice.

We hope our proposal will contribute to the increased transparency of the statement of comprehensive income and will help the users of financial statements in proper understanding of the significance of comprehensive income and other comprehensive income. The proposed structure of the statement of comprehensive income is also intended to assist users in interpreting the ratios calculated on its basis. The proposed structure of the statement of comprehensive income is also intended to assist users in interpreting the ratios calculated on its basis. Those issues will be the subject of authors' future empirical research.

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Défi De Laboratoire Médicale : Un Problème D'acheminement Et D'allocation Pour La Collecte De Prélèvements Sanguins Et Urinaires A Domicile (Cas Maroc)

Haitam ETTAZI
Faculty of Sciences University Ibn Tofail, Kenitra, Morocco, ettazi.haitam@gmail.com

Najat RAFALIA
Faculty of Sciences University Ibn Tofail, Kenitra, Morocco, arafalia@yahoo.com

Jaafar ABOUCHABAKA
Faculty of Sciences University Ibn Tofail, Kenitra, Morocco, abouchabaka3@yahoo.fr

Abstract

Ce papier a pour but de résoudre le problème de prélèvement et de collectes de tubes sanguins et/ou urinaires des personnes malades à domicile via un staff médical (infirmier/aide-soignant) depuis le laboratoire d'une façon optimale. Pour assurer une bonne gestion, plusieurs contraintes doivent être prises en compte à savoir : horaires du staff, préférences des patients, la durée maximale de retard d'un prélèvement sanguin… Ce problème s'intègre sous le problème de tournée de véhicule avec fenêtre de temps, préférence et priorité selon les cas urgents. Nous avons proposé tous d'abord une formulation mathématique du problème considérées en utilisant les méthodes de programmation linéaires variables à nombres entiers (MILP) ainsi que différents méta-heuristiques. Pour les résultats, nous avons appliqués une instance réelle d'un laboratoire au Maroc (Témara) nommée Laboratoire **BioGuich** afin de sélectionner la méthode donnant les résultats les plus optimales.

Mot clés : Méta-heuristiques, Problème de tournée de véhicules, Allocation et Planification, Soins à domicile.

Introduction

Depuis une vingtaine d'année, la population du Maroc a grimpé d'une dizaine de millions de personnes selon le recensement de 2014 estimant une hausse considérable du taux du vieillissement impliquant une hausse de nombres de malades de maladies chroniques nécessitants des traitement et des prélèvements périodiques afin d'assurer le suivi médicale adéquat. Cela à changer la philosophie de faire les choses incitant les structures médicales (hôpitaux, laboratoires…) à diversifier leurs services et ainsi à se déplacer d'eux-mêmes afin d'assurer les soins et prélèvements nécessaires pour les patients.

Cet article traite plus spécifiquement le problème d'acheminement et de routage des véhicules et des équipes de soins à domicile où les prélèvements sont faits durant un intervalle de temps bien précis et chaque type de prélèvements doit être effectués par un soignant qualifié.

Etat de l'art

Dans le cadre des services de prélèvements médicale à domiciles, l'enjeu de la logistique touchent plusieurs points à savoir le problème d'allocation et de planification ainsi que le problème de ramassage et de livraison.

Dans le travail de Fahle (2001), Begur et al (1997) et Akjiratikarl et al (2007), les auteurs ont considérés la planification et l'acheminement des soignants (infirmiers(ères)) à domicile et ont développés un système d'aide à la décision spatiale. Pour cela, une heuristique a été réalisée pour construire des routes pour chaque infirmier(ère) en se limitant à la contrainte d'indisponibilité du personnels et aide soignants. Un autre aspect du problème a été introduit par Rousseau et al (2013) qui a proposé une variante du problème Dial-a-Ride où une équipe de soignant est envoyés au parallèle au malade afin de réaliser un service requis avant le service principale (soins/prélèvements sanguins…) tel que le lavage complet du malade, changement d'habit, mesure de tension artérielle, prises de

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pilules…Cela nécessite une coordination entre les différents acteurs (soignants, infirmiers(ères)…) pour réaliser ces services d'une façon optimale. Ce même auteur a souligné sur l'importance des contraintes de synchronisations qui permettent de mettre le trait sur l'aspect prioritaires des visites.

Liu et al (2013) ont abordé un problème d'ordonnancement des véhicules rencontré dans la logistique des soins à domicile. Il s'agit de fournir aux patients des dispositifs médicaux de la pharmacie et des médicaments de l'entreprise de soins à domicile, de livrer des médicaments spéciaux d'un hôpital aux patients et de collecter des échantillons biologiques et des médicaments non utilisés et des dispositifs médicaux pour les patients. Le problème peut être vu comme un problème particulier d'acheminement des véhicules avec des livraisons simultanées, de ramassage et de fenêtre de temps, avec quatre types d'exigences: livraison depuis le dépôt vers le patient, livraison depuis un hôpital vers le patient, ramassage depuis l'emplacement du patient vers le dépôt et ramassage depuis l'emplacement d'un patient vers un laboratoire médical. Dans le cas où le patient a besoin de médicaments fournis par l'hôpital, le véhicule doit d'abord visiter ce dernier. Deux modèles de programmation mixtes ont été proposés avec un algorithme génétique (GA) et une méthode de recherche taboue (TS). L'algorithme génétique est basé sur un chromosome de permutation, une procédure de division et d'une recherche locale. Les attributs d'attribution de routes pour les patients constituent l'élément de base de la méthode de recherche taboue. Ces approches sont testées sur des cas de test à partir de benchmarks VRPTW existants.

Présentation Du Problème

Le problème traité sous cet article entre dans le cas du problème de tournée de véhicules avec les contraintes de fenêtres de temps, synchronisation et priorité.

Supposons V l'ensemble de services demandés et V1 le sous-ensemble des demandes à horaires fixes et V2 le sous-ensemble des demandes à horaires variables. Chaque demande i est caractérisée par une location (domicile du patient) et une plage horaire [ai, bi] où chaque soignant (travailleur) est contraint de prélever et/ou collecter l'échantillon (tube sanguins/urinaires…).

Soit ei l'estimation du temps d'exécution requis pour la collecte d'échantillons. Au cas où un service requis a été réalisé par une entité externe, un cout ci considéré. Pour des tests spécifiques où il est impérative de prélever/collecter un échantillon, sa durée ne doit pas dépasser une durée maximale entre la collecte et la réalisation du test au sein du laboratoire et est affilié un variable Dmaxi, quoi que ce soit le test devient inutile. En générale, quand les prélèvements sont réalisés, il est nécessaire que les tubes arrivent dans un délai ne dépassant pas 90 minutes au laboratoire, quant à la collecte, ils sont assurées par des véhicules gérés par le laboratoire lui-même qui roulent en continus afin de ramasser les tubes à travers le champs géographique où le laboratoire réalise ses services. Ces échantillons critiques sont estimés à 30% des tests globales réalisés par le laboratoire en question, c'est pour cela que le laboratoire à déléguer cette tâche à une équipe spécialement conçus pour cela et qui se déplace que pour ce genre de cas. Le laboratoire en question a plusieurs points de collecte qui ont été mis en disposition où les infirmier(ères) après avoir réalisés un prélèvement peuvent déposer leur échantillonnages pour se libérer à d'autres patients attendant de recevoir un service similaire soit de prélèvements ou de collectes et qui aura pour but de gagner du temps afin de minimiser le cout de déplacement(aller/retour) du laboratoire vers les domiciles des patients et vice-versa.

Pour généraliser et simplifier le problème, nous avons considérés un planning de travail journalier.

Dans cet article, le but principale est de trouver un ensemble de routes possibles pour acheminer les tubes sanguins/urinaires depuis le laboratoire ver les domiciles des patients (demandeurs de services) et vice-versa d'une façon optimale. Pour cela, on va suivre un plan comme suit :

- Proposer une formulation mathématique du problème considéré.
- Utiliser un solveur linéaire CPLEX afin de trouver un résultat exact du problème.
- Appliquer 2 algorithmes méta-heuristiques afin de trouver une solution approchée du problème.
- Appliquer ces techniques sur une instance réelle de laboratoire BioGuich pour un intervalle maximale d'une journée de travail.
- Comparer les différents résultats obtenus par les techniques appliquées.

Formulation Mathématiques

Plusieurs formulations mathématiques ont été proposées afin de modaliser ce type de problème. Dans cette section, on présentera une formulation connue pour sa simplicité qui a été introduit au début par Fisher et Jaikumar (1981). Notre modèle est défini par un graphe orientée $G = (V, E)$ où $V = N \cup D \cup C$ où N est l'ensemble des demandes de

prélèvement, D représente le point de départ et le point d'arrivé de chaque infirmière et finalement C dénote la combinaison laboratoire/point de collecte chacune spécifié par son temps de collecte en concordance avec son planning de transport. Le nœud 0 représente le laboratoire et chaque nœud $i \in V\{0\}$ représente un patient qui a besoin d'être prélever. Chaque arcs $(i,j) \epsilon E$ possede un poids d_{ij} qui représente la durée de déplacement des véhicules du laboratoire au domicile du patient. Le durée requis pour charger un point de collecte en entier est notée $partd_i$. Un ensemble M des infirmières est disponible pour asservir toutes les demandes. Les infirmières sont dénotées par l'index k tel quek $\in$ M, et sont caractérisées par un planning de travail (STa_k pour l'heure de début et End_k pour la fin), un point de départ H_k généralement le laboratoire et un point final B_k soit un point de collecte ou le laboratoire. On introduit aussi le paramètre SV qui représente un nombre réel et un indicateur LT_i pour chaque demande i qui prend la valeur booléenne 1 si le test est critique et 0 sinon. Dans le cas du laboratoire dont l'étude est concernée, le laboratoire ne possède qu'un seul point de collecte. Ce modèle nécessites des variables de décisions binaires n^2K soit x_{ijk} et des variables nK soit y_{ik} tel que :

$$\boldsymbol{Min}\ \left(\sum_{i\in N_1} C_i\left(1-\sum_{k\in M}\ \sum_{j\in V/i\neq j} x_{jik}\right)+\left(\sum_{k\in M}\ \sum_{i\in V}\ \sum_{j\in V/i\neq j} d_{ij}.x_{ijk}\right)\right) \quad \textbf{(1)}$$

Subject to:

$$\forall i \in N : \sum_{k\in M}\ \sum_{j\in V/i\neq j} x_{jik} = \sum_{j\in V/i\neq j} x_{ijk} \quad \textbf{(2)}$$

$$\forall i \in V/D\ , \forall k \in M: \sum_{j\in V/i\neq j} x_{jik} = \sum_{j\in V/i\neq j} x_{ijk} \quad \textbf{(3)}$$

$$\forall k,k' \in M\ /\ k \neq k' : \sum_{i\in V/i\neq B_k} x_{iB_k k} = 1\ ;\ \sum_{i\in V/i\neq B_{k'}} x_{iB_{k'}k} = 0 \quad \textbf{(4)}$$

$$\forall k,k' \in M\ /\ k \neq k' : \sum_{i\in V/i\neq H_k} x_{H_k ik} = 1\ ;\ \sum_{i\in V/i\neq H_{k'}} x_{H_{k'}ik} = 0 \quad \textbf{(5)}$$

$$\forall k \in M : \sum_{i\in C} x_{H_k ik} = 0 \quad \textbf{(6)}$$

$$\forall i \in N, \forall k \in M\backslash b_i : \sum_{j\in V/i\neq j} x_{\mathrm{ijk}} = 0 \quad \textbf{(7)}$$

$$t_i + e_i + d_{ij} \leq t_j + \mathrm{SV}.(1-\sum_{k\epsilon M} x_{\mathrm{ijk}}) \quad \textbf{(8)}$$

$$\forall i \in N, \forall j \in C, \forall k \in M \quad t_i + e_i + d_{ij} \leq t_{jk} + \mathrm{SV}.(1-x_{\mathrm{ijk}}) \quad \textbf{(9)}$$

$$\forall i \in C, \forall j \in N, \forall k \in M,\ \ t_{ik} + td_i + d_{ij} \leq t_j + \mathrm{SV}.(1-x_{\mathrm{ijk}}) \quad \textbf{(10)}$$

$$\forall i \in N, \forall k \in M, \qquad x_{\mathrm{H_k}ik}.(ST a_{\mathrm{k}} + d_{\mathrm{H_k}i}) \leq t_i \quad \textbf{(11)}$$

$$\forall i \in N, \forall k \in M,$$

$$t_i + e_i + d_{i\mathrm{B_k}} \leq End_k + Ret_k + \mathrm{SV}.(1 - x_{\mathrm{ijk}}) \quad \textbf{(12)}$$

$$\forall i \in C, \forall k \in M, \quad t_{ik} + td_i + d_{i\mathrm{B_k}} \leq End_k + Ret_k + \mathrm{SV}.(1 - x_{\mathrm{ijk}}) \quad \textbf{(13)}$$

$$\forall k \in M, \qquad Ret_k \leq Max_{Ret_k} \quad \textbf{(14)}$$

$$\forall i \in N: a_i.\sum_{k\in M} \sum_{j\in V/i\neq j} x_{jik} \leq t_i \leq b_i + Lateness_i \quad \textbf{(15)}$$

$$\forall i \in N: t_i \leq \left(b_i + Max_{Lateness_i}\right).\sum_{k\in M} \sum_{j\in V/i\neq j} x_{jik} \quad \textbf{(16)}$$

$$\forall i \in N/LT_i = 1, \forall j \in C, \forall k \in M, \quad PT_j.drp_{ijk} - t_i \leq DMax_i \quad \textbf{(17)}$$

$$\forall i \in N/LT_i = 1, \forall j \in C, \forall k \in M, \quad t_{jk} \leq PT_j + SV(1 - drp_{ijk}) \quad \textbf{(18)}$$

$$\forall i, j \in V, \forall k \in M, \quad \mathrm{x}_{ijk} \in \left\{\begin{matrix} 1, si\ \mathrm{l'}infirmièrek\ traverse\ du\ noeud\ i\ au\ noeud\ j \\ 0\ sinon \end{matrix}\right\} \quad \textbf{(19)}$$

$\forall i \in N = \mathrm{N_1} \cup \mathrm{N_2}: \mathrm{t}_i$: *Heure d'arrivée au domicile du patient* **(20)**

$\forall i \in C, \forall k \in M: \mathrm{t}_{ik}$ *: Heure d'arrivée de l'infirmière k au point de collecte avec temps de collecte égale à* PT_j **(21)**

$$\forall i \in N/LT_i = 1, \forall j \in C, \forall k \in M: drp_{ijk} \in \left\{\begin{matrix} 1, si\ \mathrm{l'}infirmière\ est\ transportée\ au\ laboratoire \\ 0, sinon \end{matrix}\right\} \quad \textbf{(22)}$$

$\forall k \in M$:Ret_k *: Retard de l'infirmière k(Travail supplémentaires)* **(23)**

$\forall i \in N$:$Lateness_i$: *Retard de la demande i* **(24)**

La fonction objective(1) est de minimiser les retards tout en respectant les fenêtres de temps des patients et le planning horaires des infirmières charger de prélever et de collecter les tubes sanguins/urinaires ainsi que de minimiser la somme totales des distances parcourues. La contrainte(2) indique que chaque nœud ne peut être visité qu'une et une seule fois. La contrainte(3) assure la continuité des routes. Les contraintes(4), (5) et (6) sont mises en place pour définir les points de départ et arrivée de chacune des routes. La contrainte (7) spécifie les possibles préférences et exigences de certaines infirmières pour un patient. Les contraintes(8), (9) et (10) représentent la durée d'un voyage entre deux points. Le planning de travail est assuré par les contraintes(11), (12) et (13) tandis que les contraintes(14) et (15) définissent les fenêtres de temps de chaque demande établie par un patient. La contrainte(16) est spécialement élaborée afin de permettre les retards à condition qu'ils soient délimités. Pour finir, les contraintes(17) et (18) servent à démontrer que la durée écoulée entre la collecte d'un test critique et l'instant où il est testé dans le laboratoire ne doit pas dépasser une limite de tempsDMax_i. Les contraintes(19), (20), (21), (22), (23) et (24) définissent la nature des variables de décision.

Approche de résolution

Notre approche s'appuie sur la décomposition du problème en un problème de routage journalier. Dans un premier lieu, on va déterminer les routes pour chaque infirmière pour une journée de travail. Au début, on a considéré le planning pour une période vaste allant d'une semaine jusqu'à un moins, mais après une reconsidération et large réflexion on a trouvé que cette idée et non attractive et que ça complique le problème de planification vue le nombre de contraintes à considérer est grand. Pour remédier à cela, on a trouvé que la meilleure solution est de planifier les visites des infirmières en concordance avec les demandes des patients jour par jour et en faisant cela, on réussira à réaliser un équilibrage de charge.

Les expériences dont nous avons réalisées en utilisant le solveur linéaires CPLEX ont démontré une limitation et que nous ne pouvant arriver à des bon résultats que pour de petites instances. Le fait que le problème étudié dans ce papier sera appliqué sur une instance réelle et donc un cas pratique, les demandes ne feront qu'augmenter et pour cela que nous sommes dans l'obligation de trouver une autre approche qui satisfera les demandes des patients pour ainsi mieux gérer les déplacements des infirmières au patients concernés, ce qui nous amènent à trouver une approche plus persistante et plus adéquate tel que les méthodes approchées à savoir dans note cas les méta-heuristiques dont nous utiliserons deux méthodes ; l'algorithme de recherche taboue et l'algorithme de recherche à voisinage variable. Afin d'utiliser et d'appliquer ces deux algorithmes, nous devons tous d'abord définir la notion d'opérateurs de voisinage qui sont la base d'utilisation et sans ces opérateurs on sera dans l'incapacité de développer une solution à partir de ces deux méta-heuristiques.

Opérateurs de voisinages

Les algorithmes de recherche taboue et de recherche à voisinage variable sont basés sur deux types d'opérateurs de voisinages. Le premier type est l'opérateur d'insertion qui possède trois mouvement possible: - Une demande dont elle appartient déjà à une route peut être insérer dans une autre route, une demande sous-traité par une entité externe peut être insérer dans une route et finalement une demande appartenant à une route peut être enlevée d'une route et ajouter à l'ensemble des demandes sous sous-traitance.

Le deuxième type d'opérateur de voisinage est l'opérateur de permutation. Cet opérateur possède deux types de mouvement. Une demande appartenant à l'ensemble des demandes sous-traitées peut être échangé avec une demande appartenant à une route, le deuxième mouvement est qu'une demande appartenant au préalable à une route peut être échangées avec une autre demande appartenant à la même route ou à une différente route.

Algorithmes

Solutions Initiales

La première étape à considérer avant l'utilisation de chacune des deux méthodes introduit est de générées une première solution couramment appelé solution initiale. Cette solution est construites par insérer les demandes des patients dans les routes une par une au sein de la meilleur position possible, en prenant compte de leur priorité. Dans notre cas, la priorité est accordée aux demandes à horaires fixes en considérant les tailles des fenêtres de temps par ordre décroissant pour chaque visite d'un patient, tandis que les demandes à horaires variables, ils sont traitées par les nombres des jours restants jusqu'à la fin de leur fenêtre de temps spécifié. Si une demande n'est pas insérer, l'ensemble de ces demandes seront placées dans une liste des demandes reportées. Pour les demandes critiques, un point de collecte est inséré.

L'algorithme de Recherche Taboue

Cet algorithme suit une structure classique : à partir d'une solution initiale, l'algorithme se déplace de la solution courante à une autre solution on explorant le voisinage tout en évitant ceux qui sont actuellement taboues jusqu'à rencontrer la condition d'arrêt. Dans ce cas, on a opté d'utiliser le type d'opérateur d'insertion. L'algorithme en question utilise une liste taboue des demandes récemment déplacer. La condition d'arrêt utilisé dans ce cas est le nombre max d'itérations correspondant à la taille de la liste taboue.

L'algorithme de Recherche à voisinage variables :

VNS

Début
- $Sol_{mei} \longleftarrow$ Génération de solution initiale
- k $\longleftarrow$ 1
- Tant qu'un nombre prédéfini d'itération sans amélioration :
  - Répéter
    - S' $\longleftarrow$ Secouer en utilisant l'operateur kth et commencer depuis Sol_{mei}
    - S'' $\longleftarrow$ VNS^2 en commençant par S'
    - Si f(S'') < f (Sol_{mei}) alors
      - $Sol_{mei} \longleftarrow$ S''
      - k $\longleftarrow$ 1
    - Sinon
      - k $\longleftarrow$ k+1

Résultats Numériques :

Le laboratoire dont on va appliquer les algorithmes et méthodes décrits en dessus nous a fournis des instances réelles d'une semaine de travail à savoir une semaine de travail commencent le lundi et finis le vendredi dont la plage horaire de travail pour chaque jours d'étale de 8h00 à 18h00. Pour la généralisation du problème étudié, les temps de repos du personnel n'a pas été pris en compte et peut être l'objet d'un prochain travail comme perspective. On a générés deux groupes d'instances, le premier groupe est un ensemble relativement petit et simple composé de 10, 15 et 20 demandes, avec respectivement 6, 9 et 12 demandes à horaires fixes. Le nombre d'infirmières allouées pour ces demandes est généralement de 1 ou 2, et pas de point de collecte pour ce groupe d'instance (Pas de test critique). Cette petite instance est pratiquement ficelé pour la méthode exacte (MILP) afin d'obtenir une solution optimale pour pouvoir la comparer avec les résultats obtenues par les algorithmes heuristiques. Le deuxième groupes d'instances est obtenues par le laboratoire BioGuich pour des demandes réelles en cours d'une semaine de travail, le nombre de demande pour chaque journée varies généralement de 150 jusqu'à 200 dans la majorité des cas avec respectivement des demandes à horaires fixes de 90 jusqu'à 120. Nous avons optés à appliquer nos algorithmes pour les nombres de demandes de 150, 175 et 200 avec respectivement des demandes à horaires fixes de 90, 105 et 120. Pour les tests critiques, le pourcentage est environ de 20% (5 points de collectes) qui sera asservie et dépendra de la distance depuis le laboratoire, si le domicile du patient dont le prélèvement est considéré critique et jugé comme loin, l'infirmière dépose le test au point de collecte qui se charge de livrer le test au laboratoire dans un délai ne dépassant pas 90 minutes maximum, sinon l'infirmière elle-même se charge de déposer le test au laboratoire.

Les tests des méthodes étudiées dans ce papier ont été réalisées sur une machine 2.4 GHz Intel Core (TM) i7-5500 CPU avec 8GB de RAM, fonctionnant sous Windows 10 Home. Les codes ont été programmés en CPLEX Studio version 12.10 pour la formulation mathématique, et Python 3.8 pour les algorithmes heuristiques.

Table 1 : Résultats pour les petites instances

Instances			MILP	Heuristiques	
Patient	**Infirmière**	**Point de Collecte**	**% Optimale**	**Recherche Taboue (%)**	**Recherche à Voisinage Variables (%)**
10	1	0	100	100	80
15	1	0	100	80	60
15	2	0	100	60	40
20	1	0	100	70	50
20	2	0	100	20	30
10	1	1	100	80	90
15	1	1	50	90	70
15	2	1	20	80	20
20	1	1	0	90	90
20	2	1	0	100	100

Afin de mieux comprendre la Table I, chaque ligne représente un ensemble de 10 instances. Les trois premières colonnes représentent la taille de chaque instance et est composée du nombre de patients, le nombre d'infirmières et le point de collecte. La colonne MILP représente le pourcentage d'instances où le solveur linéaire CPLEX a trouvé une solution optimale. La durée maximale d'exécution a été limitée à une heure maximum. Dans le cas où CPLEX n'a pas trouvé de solution optimale, on utilise la meilleure solution trouvée après une heure d'exécution pour la comparer avec les résultats des algorithmes heuristiques. Les deux colonnes restantes indique la proportion d'instances où chaque algorithme à trouver une solution meilleur que celle trouvé par le solveur linéaires CPLEX. Comme il est clair, le solveur linéaires trouvent toujours des résultats optimales que celle des heuristiques à condition où le point de collecte n'est pas utilisé, mais lorsqu'un point de collecte entre en vigueur, les heuristiques arrivent à converger vers une solution meilleur que celle du solveur linéaire. Malgré la puissance des algorithmes heuristiques par rapport au solveur linéaire, cela ne prouvent pas que ces derniers ont pu trouver des solutions optimales.

En ce qui concerne la rapidité des algorithmes proposées, il est évident que l'algorithme de recherche taboué est clairement rapide que les autres, malgré cela la qualité des solutions produites par ce dernier sont inférieures.

Après avoir conduit plusieurs tests sur des petites instances, il a été déduit que les paramètres des valeurs stratégiques des algorithmes heuristiques sont comme suit : la taille de la liste taboue est fixée à 65% du total des nombres de demandes, et le nombre d'itération sans amélioration tout en respectant les meilleurs solutions a été fixé à 1000. Pour l'algorithme de recherche à voisinage variable, le nombre d'itérations maximales a été fixé à 500. Ces valeurs ont été choisies afin de pouvoir obtenir des résultats pour des instances réelles du problème étudiées dans un temps raisonnables.

Table II. Résultats

Instances			Recherche Taboue		Recherche à voisinage variable	
Patient	**Infirmière**	**Point de collectes**	**% du meilleur**	**CPU(ms)**	**% du meilleur**	**CPU(ms)**
150	10	5	0	1105	60	59562
150	15	5	40	2560	20	71056
150	20	5	70	3050	10	75487
175	10	5	0	1080	50	68154
175	15	5	0	1700	40	66213
175	20	5	50	4520	30	94054
200	10	5	0	2065	20	78456
200	15	5	20	2310	60	112289
200	20	5	30	7200	20	125394

La Table II montre les résultats obtenus par le groupe d'instances numéro 2, d'une semaine de travail dans le laboratoire BioGuich. Chaque ligne représente un ensemble de 10 instances. Les trois premières colonnes indiquent le nombre de patients, le nombre d'infirmières et le nombre de point de collecte. La colonne 4 et 6 démontre le pourcentage totale des instances pour lesquelles on trouve des solutions efficaces ce qui peut nous donner une idée sur quelle méthodes a donné les meilleurs résultats. Les colonnes 5 et 7 indiquent le temps d'exécution de chaque solution pour les deux algorithmes qui précisent que l'algorithme de recherche à voisinage variables est plus rapide que l'algorithme de recherche taboue tandis que pour la qualité des résultats obtenus, l'algorithme de recherche taboue donne des résultats meilleur que l'algorithme de recherche à voisinage variables.

Table III. Données du laboratoire d'une semaine de travail

	Lundi	**Mardi**	**Mercredi**	**Jeudi**	**Vendredi**
Nombres de demandes	164	145	158	128	106
Nombres de demandes à horaires fixes	128	85	108	94	72
Nombres de demandes critiques	36	24	30	26	18
Nombres d'infirmières	8	8	8	8	8

La Table III propose des détails sur une semaine de travail (Fin Septembre 2020) dans le laboratoire BioGuich avec un totale de 801 demandes exécutées par 8 infirmières au cours de la semaine.

Table IV : Résultat Recherche Taboue

Instances			**Recherche Taboue**			
Patient	**Infirmière**	**Point de collectes**	**Nombres de demandes sous-traitées**	**Nombres de demandes reportées**	**Total des retards**	**Distance totale parcourue**
150	10	5	8	49.3	308.5	1,389.4
150	15	5	4.2	5.8	208.4	2,178.9
150	20	5	2.9	1.2	23.5	1,487.6
175	10	5	18.5	61.6	352.8	1,356.2
175	15	5	3.2	23.8	315.4	2,487.9
175	20	5	4	2.9	81.6	2,154.3
200	10	5	28.4	74.1	295.7	1,348.4
200	15	5	5.2	42.6	367.1	2,259.1
200	20	5	3.5	6.2	236.9	2,478

Les Tables IV et V mettent en évidence les valeurs Objectives de chaque critère des algorithmes heuristiques étudiées dans ce papier.

Table V : Résultat Recherche à Voisinage Variable

Instances			**Recherche à Voisinage Variable**			
Patient	**Infirmière**	**Point de collectes**	**Nombres de demandes sous-traitées**	**Nombres de demandes reportées**	**Total des retards**	**Distance totale parcourue**
150	10	5	6.4	44.3	306.6	1,176.5
150	15	5	3.2	6.2	216.2	2,126.4
150	20	5	2.9	1.5	26.4	1,619.1
175	10	5	15.3	57.8	364.1	1,247.6
175	15	5	2.5	20.7	302.3	2,392.3
175	20	5	2.8	3.1	85.9	2,276
200	10	5	22.7	72.6	312.2	1,218.8
200	15	5	5.1	38.4	371	2,142.7
200	20	5	3.4	6.9	208.5	2,431.2

Conclusion et perspectives

Dans ce papier, nous avons étudiés un cas spécifique du problème de tournée de véhicules pour les prélèvements et la collecte d'échantillon sanguins/urinaires dans la ville de Témara situé au Maroc. Dans le cadre de cette études, le laboratoire BioGuich pour les analyses médicales depuis le début du confinement en mars 2020 due au COVID-19 au Maroc a ajouté le service de se déplacer vers les patients à leur domicile afin d'effectuer les prélèvements et collecte requis pour limiter les déplacements des patients. Pour cela, il s'est avérer nécessaires pour le laboratoire de mettre au point un système de logistique visant à optimiser les ressources pour une bonne gestion de ce service. Le fruit obtenues par cette études est le développement de deux méta-heuristiques pour optimiser et planifier du mieux possible les déplacements des infirmières afin d'asservir les demandes des patients qui ne cessent d'augmenter jour en jour. Cette études a pu faire gagner au laboratoire un temps considérable ainsi d'augmenter la traçabilité des échantillons collectés ce qui améliore la qualité des tests réalisés. Pour de futur travaux, il est nécessaires d'ajouter les contraintes humaines telle que les pauses des infirmières, instaurer un système de pénalité pour les tests en retard, affiner les routes disponibles afin de minimiser de plus en plus la durée des trajets.

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Impact of Mathematical Courses in Grade of a Student in Engineering Degree Program

M.Anwar.[1]and Rashmi Rani[2]

[1, 2]College of Engineering and Computing, Al Ghurair university, Academic city, Dubai. 37374
E-mail: anwar@agu.ac.ae1, Rashmi@agu.ac.ae2* ,

Abstract

The educational research is effectively benefitting from the statistical techniques such as multiple regression which is a multivariate technique used to determine the correlation that may exist between a dependent variable and a combination of multiple predictor variables. This paper presents a multiple linear regression model to analyze the students' final grades in four mathematics courses and their correlation with the response variable, the CGPA. The outcome shows that students' performance in mathematics courses may affect their overall performance in a university degree program. Finally, the study recommends that universities and faculty are required to work hard towards adopting effective teaching methodologies for improving students' performance in mathematics.

Keywords*:* Multiple regression, CGPA, R-Square,

Introduction

Mathematics and Basic Science are an integral part of any engineering degree program. Mathematical technique models and reasoning are integral to most areas of engineering and the discipline depends on mathematics for many of its fundamental underpinnings [ACM (IEEE) CE2016]. Science provides us about the laws of the natural world and Mathematics helps us to establish relationships among different components [1]. Mathematics is used in Physics comprehensively, in graphics structurally and in engineering practically. Mathematical courses play a key role in the understanding and applications of engineering program. Enhancing student's academic enactment via Mathematical courses is one of the prime services for the academic community of higher education. Mathematical courses can develop intellectual maturity. Engineers are using Mathematics as a tool for solving numerous boundary value problems and optimization problems. According to the information by United States National Research Council (1989), simple skills of Mathematics and geometry are essential for almost all occupations. Tobias (1978) emphasized the importance of basic high school mathematics knowledge in the examinations required for recruitment in the public and private sectors.

Mathematics provides a language for working with ideas relevant to computer engineering, specific tools for analysis and verification, and a theoretical framework for understanding important ideas [ACM (IEEE) CE2016]. Mathematics and science courses considered as creating an overall style or ethos for a specific computer engineering degree program. [ACM (IEEE) CE2016]

The article presents a multiple linear regression model to analyses the student's final grade (CGPA) based on his/her grade in four Mathematical courses namely Calculus I, Calculus II, Linear algebra and Differential equations, in Engineering degree program. In the first level of Calculus, students are getting knowledge about limits, continuity, derivative and integration with application. In second level of Calculus, concept of Improper integral, functions of several variables, Multiple Integral, Polar curves, Sequence and Series has given to the students. In the course Linear Algebra students are learning Matrices and Determinant with applications, Eigenvalues and Eigen vectors, Analytic functions etc. The calculus and differential equations are required to support engineering material as communications theory, signals and systems, and analog electronics. The analysis of continuous functions is fundamental to all engineering programs [ACM IEEE CE2016]. Linear algebra is required for solving networks of equations describing voltage/current relationships in basic circuits and is used in engineering application areas such as computer graphics and robotics [ACM IEEE CE2016].

In this paper multiple regression analysis has been used as a technique to visualize the influence of Mathematical courses to the final grade of an engineering student. Multiple Regression is a set of techniques used to analyze the relationship between two or more independent variables and a dependent variable. Multiple linear regression is

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defined as a multivariate technique for determining the correlation between a response variable Y and some combination of two or more predictor variables, X , [Montgomery and Peck (1982)], [Draper and Smith (1998)], [Tamhane and Dunlop (2000)], and [McClave and Sincich (2006)]. It can be used to analyze data from causal-comparative, correlational, or experimental research.

Multiple linear regression is one of the most widely used statistical techniques in educational research. It is regarded as the "Mother of All Statistical Techniques." Many colleges and universities develop regression models for predicting the GPA of incoming freshmen. The predicted GPA can then be used to make admission decisions. In addition, many researchers have studied the use of multiple linear regression in the field of educational research. The use of multiple linear regression has been studied by Shepard (1979) to determine the predictive validity of the California Entry Level Test (ELT). In [Draper and Smith (1998)], the use of multiple linear regression is illustrated in a prediction study of the candidate's aggregate performance in the G. C. E. examination.

A multiple linear regression model based on a number of independent (or predictor) variables X, X_1,.., X_k can be obtained by the method of least squares, and is given by the equation

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \varepsilon,$$

where Y = response variable, X =predictor variables, β_k = the population regression coefficients, and ε = a random error, Mendenhall, et al (1993), Draper and Smith (1998). Multiple linear regression allows for the simultaneous use of several independent (or predictor) variables, X, to explain the variation in the response variable Y. The fitted equation is given by

$$\hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \ldots + \hat{\beta}_k X_k$$

where $\hat{Y}$ = predicted or fitted value and $\hat{\beta}$ = estimates of the population regression coefficients. The sum of squares of deviations (residuals) of the observed value of Y from its predicted or fitted value is given by

Multiple standard error of estimate measures the error in the predicted value of the dependent variable.

$$SE = \sqrt{\frac{\sum(Y-\hat{Y})^2}{n-(k+1)}}$$

Where:

Y is the observation.
$\hat{Y}$ is the value estimated from the regression equation.
n is the number of observations in the sample.
k is the number of independent variables.
SE is the standard error of estimate.

Methodology

In this resourceful experimental study, we observed the inference of Mathematical courses over the CGPA of a student in an engineering degree program. In this study marks obtained by 36 students' in four different mathematical courses and their CGPA has been analyzed via multiple regression method. Table 1 displays the marks obtained by 36 students in 4 Mathematical courses along with their CGPA.

Table 1: Marks and CGPA of students

N	$(X_1)^a$	$(X_2)^b$	$(X_3)^c$	$(X_4)^d$	CGPA (Y)
1	65	61	69	71	2.72
2	85	71	73	69	2.95
3	62	56	52	51	2.39
4	74	88	82	86	3.23
5	97	97	93	96	3.8
6	80	87	86	83	3.31
7	73	91	93	88	3.75

8	94	92	95	93	3.89
9	90	90	88	93	3.59
10	85	88	92	86	3.28
11	74	85	85	81	3.34
12	82	87	91	82	3.76
13	98	98	96	95	4
14	85	91	86	81	3.34
15	90	93	94	87	3.78
16	96	96	98	95	4
17	91	92	92	94	3.76
18	90	97	97	91	3.97
19	88	88	92	91	3.9
20	76	85	88	91	3.71
21	85	92	95	88	3.85
22	63	65	77	76	3.14
23	93	93	91	83	3.89
24	95	91	92	94	3.84
25	90	93	88	86	3.73
26	81	83	77	87	3.29
27	50	69	63	64	2.32
28	63	69	63	64	2.32
29	82	88	86	87	3.73
30	70	70	68	55	2.82
31	90	89	94	86	3.14
32	63	60	71	76	3.26
33	92	98	91	93	3.41
34	61	61	50	66	2.47
35	91	85	94	75	3.68
36	62	68	75	76	2.4

[a]: Calculus I
[b]: Calculus II
[c]: Linear Algebra
[d]: Differential Equations

The objective of this study was to develop an appropriate multiple linear regression model to relate the student's CGPA (considered as the dependent or response variable Y) to the student's scores in four Mathematical courses (considered as the independent or predictor variables X). It examined how well the scores in mathematical courses could be used to predict the student's GPA.

This study investigated the feasibility of the use of the four constraints namely X_1, X_2, X_3 and X_4 for 36 undergraduate students enrolled in engineering degree program in 4 mathematical courses. The multiple regression method is used to analyze the result. The following model was developed to find the expected CGPA.

$$\text{CGPA} = \left.\begin{array}{c} 0.033721493 + \\ (0.011278972 * X_1) + \\ (-0.004118305 * X_2) + \\ (0.022707756 * X_3) + \\ (0.010690464 * X_4) \end{array}\right\} \quad (1)$$

Table 2 shows the Regression statistics obtained from the data and Table 3 shows the standard error (SE) and regression coefficients.

Table 2: Regression Statistics

Regression Statistics	
Multiple R	0.913386647
R Square	0.834275167
Adjusted R Square	0.812891317
Standard Error	0.227941938
Observations	36

Table 3: Statistical Data

	Coefficients	*SE*	*t Stat*	*p*
X_1	0.01127897	0.00622	1.8148	0.079
X_2	-0.0041183	0.00882	-0.467	0.644
X_3	0.02270776	0.0083	2.7346	0.01
X_4	0.01069046	0.00715	1.4948	0.145

Table 4: Analysis of Variance

	df	*SS*	*MS*	*F*	*p*
Regression	4	8.108	2.027	39.014	1.1E-11
Residual	31	1.611	0.052		
Total	35	9.719			

Interpretation of the Results

a) From the Analysis of Variance table, we observe that the p-value is very small 1.1E-11. This implies that that the model estimated by the regression procedure is significant at an α -level of 0.05. Thus at least one of the regression coefficients is different from zero.

b) The p-values for the estimated coefficients of X_1 and X_3 are respectively 0.079 and 0.01, indicating that they are significantly related to Y. The p-value for X_2 is 0.644, indicating that it is probably not related to Y and the p-value for X_4 is 0.0145 indicating that it is less related to Y at an α -level of 0.05.

c) The R^2 value in the regression output indicates that only 83.4 % of the total variation of the Y values about their mean can be explained by the predictor variables used in the model. The adjusted R^2 value indicates that 81.3% of the total variation of the Y values about their mean can be explained 1 2 by the *k* predictor variables used in the model., As the values of R^2 and adjusted R^2 are not very different, it shows that at least one of the predictor variables contributes information for the prediction of Y.

d) The variance about the regression σ^2 of the dependent variables for any given set of the independent variables is estimated by the residual mean square (s^2) which is equal to ss(residual) divided by appropriate number of degrees of freedom. For our problem, we have, $s^2 = 0.051968$ and $s = 0.22796$
Since the 's' value is very small, it indicates thar the prediction is meticulous.

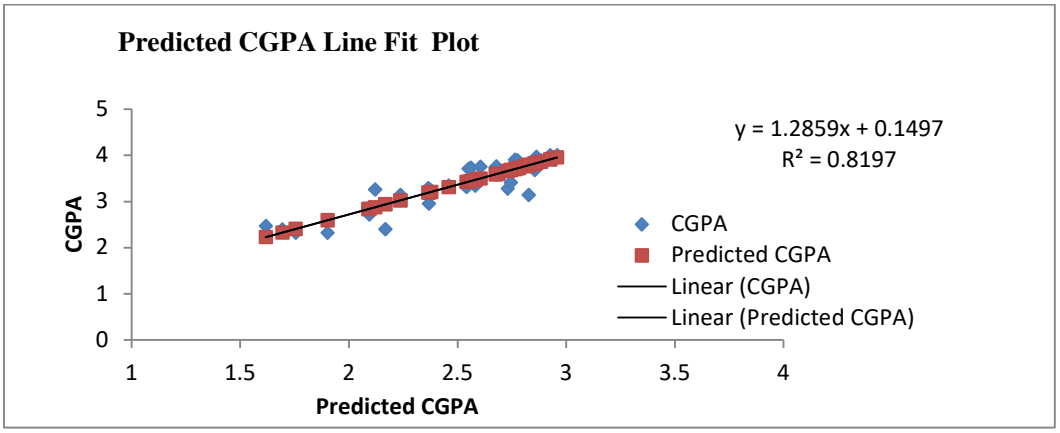

Figure 1

Figure 1 shows the regression plot of CGPA verses predicted CGPA. R value for this plot is 0.905387 which indicates the CGPA and Predicted CGPA are strongly related. R^2 value in this plot is 0.8197 which shows that the regression predictions fit the decisively.

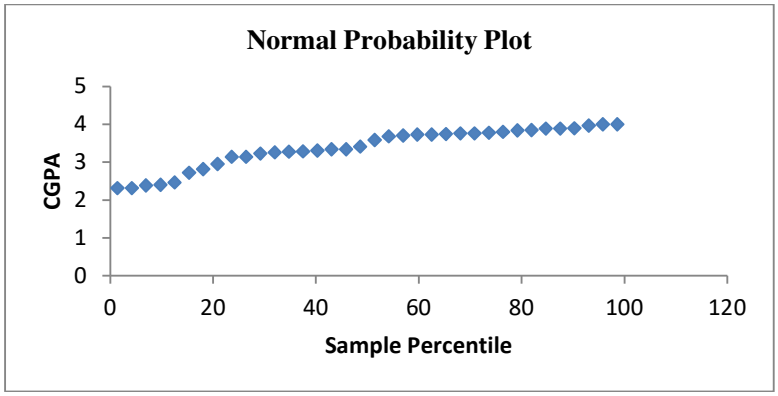

Figure 2

Figure 2 shows the Normal probability plot. From the plot, we observe that there exists an approximately linear pattern. This indicates the consistency of the data with a normal distribution.

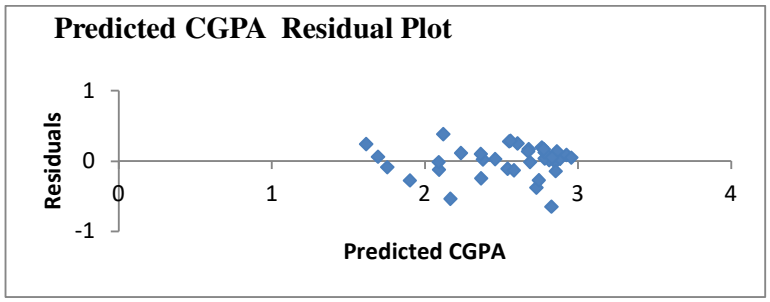

Figure 3

Figure 3 provides the predicted CGPA residual plot.

A residual plot **is** a graph that shows the residuals on the vertical axis and the independent variable on the horizontal axis. If the points in a residual plot are randomly dispersed around the horizontal axis, a linear regression model is appropriate for the data; otherwise, a non-linear model is more suitable [2]. This plot shows random pattern which is good fit for linear model

Conclusion

From the above analysis, it appears that our multiple regression model for predicting the student's CGPA is useful and adequate. The s value in the given study is very small which implies that at least one of the predictor variables contributes to the prediction of CGPA.

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Extracting Knowledge from an Image: An Example of VAD Stroke Volume Calculation

Krzysztof MURAWSKI

Cybernetics Faculty, Military University of Technology, Warsaw, Poland
krzysztof.murawski@wat.edu.pl

Abstract

The paper presents the method of calculation of the blood stroke volume of Ventricular Assist Device (VAD). The method was developed for a pneumatic extracorporeal myocardial support pump, which was equipped with a miniature camera during the research. The aim of the publication is to show the method of "extraction of knowledge" from a 2D image showing the view from above of a multilayer flaccid diaphragm. The knowledge is being "extracted" during image processing and analysis, as well as during 3D modeling of the diaphragm shape. The result of the calculation is a three-dimensional view of the diaphragm and the value of the VAD stroke volume. The developed technique calculates the three-dimensional shape of the diaphragm and the blood stroke volume on the basis of only one image. This enables the stroke volume to be measured at any diaphragm position and at any time, and the frequency of the results is not less than 30 Hz. Basically it depends only on the time of image acquisition of a camera used. Experiments, during which the developed method was tested, have shown that image processing and analysis allows to "extract knowledge", from which it is possible to obtain a hitherto unknown stroke volume with an average measurement error not exceeding ±2 ml.

Keywords: Knowledge Acquisition, Stroke Volume, Image Processing.

Introduction

The problem of determining the shape of diaphragm assembly (multilayer flaccid diaphragm), Fig. 1, of the pneumatic extracorporeal Ventricular Assist Device (VAD), Fig. 2, was noticed by the author due to the research conducted by the Optoelectronics Department of the Silesian University of Technology within the "*Polish Artificial Heart*" program: Czak et al (2013), Gibinski et al (2011), Konieczny et al (2011), Kustosz et al (2013), Konieczny et al (2012), Opilski et al (2011), Konieczny et al (2013), Sobotnicki et al (2013), Pustelny et al (2013). After the completion of the program, the author conducted his own research works at the Military University of Technology, within which he attempted to calculate the blood stroke volume, using image processing and analysis. The result is a visual method of distance measurement Murawski (2014), Murawski (2015), Murawski et al (2016), which was used in the method of calculation of the shape of a multilayer flaccid diaphragm of the pneumatic extracorporeal Ventricular Assist Device, Murawski et al (2015), Murawski and Sulej (2018), Murawski et al (2018), Sulej, W. and Grad and Murawski (2017), Sulej and Murawski (2017), Sulej and Murawski (2018), Murawski et al (2018), Sulej et al (2017), Sulej and Murawski (2017), Sulej and Murawski (2018), Sulej et al (2018) and in the method of calculation of the stroke volume (*SV*), Murawski et al (2016), Sulej and Murawski (2017), Murawski et al (2018), Sulej et al (2018), Grad et al (2016), Grad et al (2017), Grad et al (2018) presented in Murawski et al (2015). The method included in Murawski et al (2015) is the subject of the patent application No. P.414104 of 09.22.2015 and is entitled: "The system and the method of calculation of a shape of the diaphragm assembly of a pneumatic extracorporeal Ventricular Assist Device." It has been implemented by the author and embedded in an embedded computer system. The software has unique features of the distance measurement proprietary method presented in detail in Murawski (2014), Murawski (2015), Murawski et al (2016). These features include: 1) measuring the distance to the object on the basis of one photo only; 2) simultaneous multi-point measurement of the distances to all objects in the camera's field of view; 3) measuring the distances to an object outside the focus range of the camera objective; 4) measurement of the distance by a fixed camera equipped with an objective with a fixed focus, unchanged during the measurement. The method of calculation of the stroke volume has been tested by the author under laboratory conditions Murawski (2014), Murawski (2015), Murawski et al

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a) b)

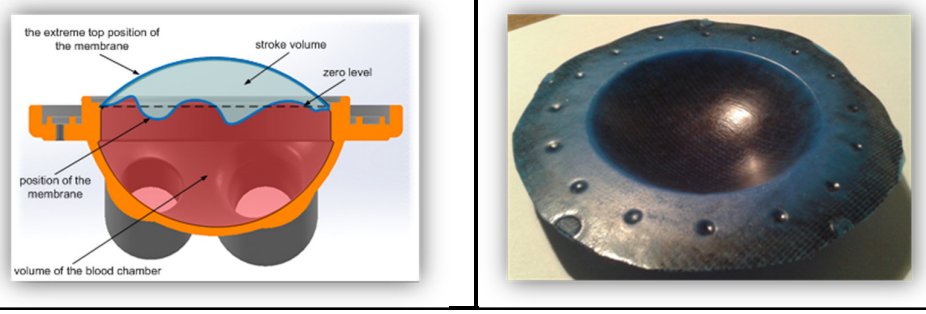

Fig. 1: Location of the flaccid diaphragm in the pump (a), view of the diaphragm (b)

(2016) and Murawski et al (2018). The measuring stand consists of the following elements:

1) the model of the pneumatic extracorporeal Ventricular Assist Device (VAD), Fig. 2;
2) the shadowless illuminator using the phenomenon of electroluminescence, Fig. 3a;
3) the peristaltic pump, Fig. 9;
4) the microprocessor controller of peristaltic pump, Fig. 9;
5) a computer system made by using the IBM PC platform;
6) the Ximea MQ013RG-E2 industrial camera with the camera objective, Fig. 4;
7) hydraulic system, Fig. 9.

The shape of the flaccid membrane and the stroke volume of the pneumatic extracorporeal VAD were calculated at a frequency of 30 Hz (without visualization) and at a frequency of 15 Hz with the diaphragm's software graphic visualization enabled.

a) b)

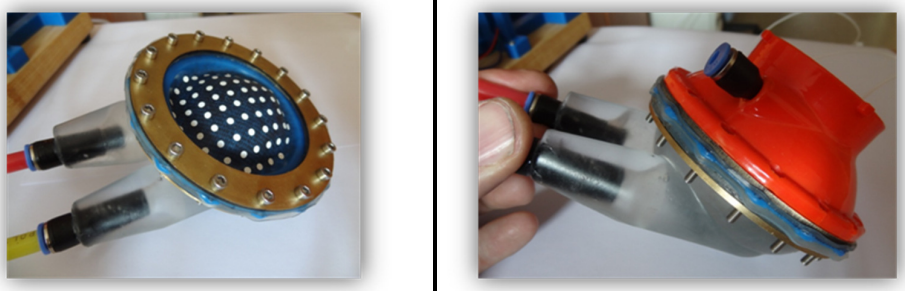

Fig. 2: Blood ventricle of the model of ventricular assist device (a) with air ventricle mounted (b)

a) b)

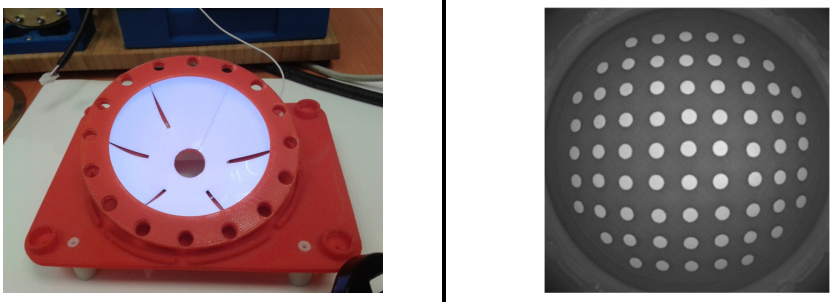

Fig. 3: View of an: electroluminescent light (a), image of the reference diaphragm - flat (b)

a) b)

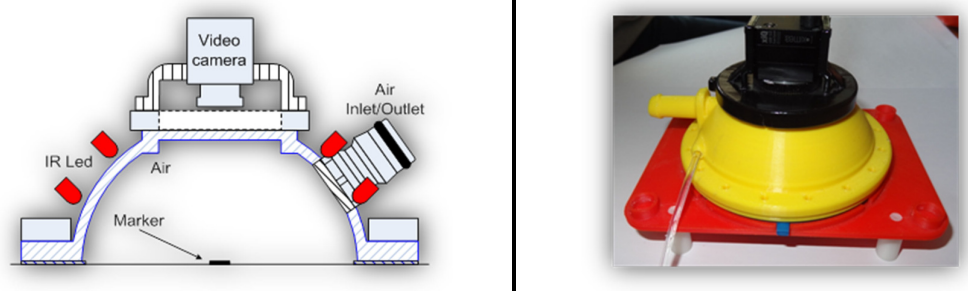

Fig. 4: Calibration system of the camera optical track: sketch (a), view (b)

Measurement of a momentary stroke volume

The subject of this presentation is a method using image analysis and processing to calculate the stroke volume of the VAD, Fig. 2. The method requires the use of a non-moving camera equipped with a standard non-stereoscopic objective with a fixed aperture and focus, unchanged during measurement. The camera, Fig. 4, is placed above the diaphragm assembly, whose main element is a multilayer flaccid diaphragm shown in Fig. 1 and Fig. 2a. The camera enables simultaneous observation of the entire membrane surface, Fig. 3b and Fig. 5. Diaphragm shape calculation is based on the analysis of the view of the diaphragm e.g. of the view shown in Fig. 5a or Fig. 5c. When we know the current view of the diaphragm, e.g. Fig. 5c, and have the image of a flat diaphragm stored in the memory of the reference system, Fig. 5b, the method enables us to determine the shape of the diaphragm represented in 3D space Grad et al (2017) and to determine the blood stroke volume Sulej et al (2017).

a) b) c)

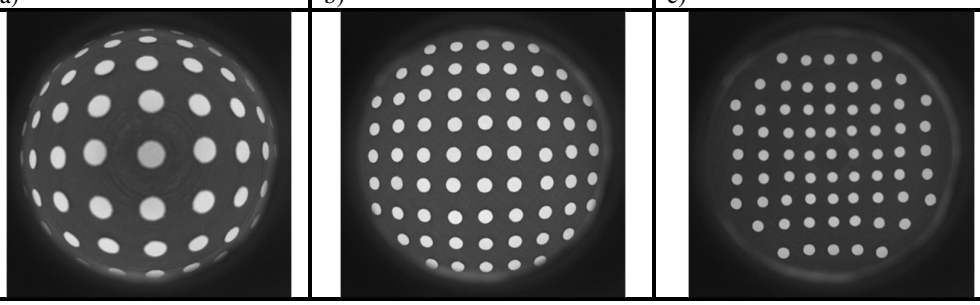

Fig. 5. Diaphragm view: convex (a), flat – reference (b), concave (c)

a) b) c)

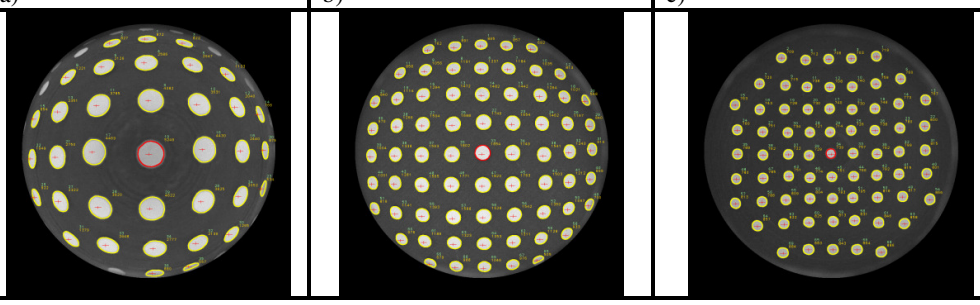

Fig. 6 The result of segmentations of the diaphragms' images shown in Fig. 5

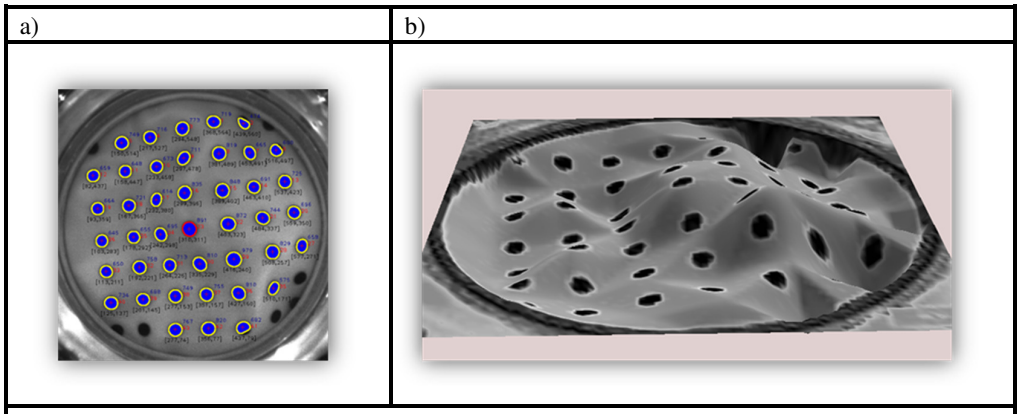

Fig. 7 : Photo of the membrane taken with the camera (a), calculated diaphragm shape (b)

Diaphragm shape calculation technique (Murawski, Pustelny and Murawska (2015))

The shape of the flaccid diaphragm is determined in three phases. The first phase (configuration of the video measurement system) consists in: a) setting the sensitivity of the camera; b) setting the operating parameters of the illuminator Murawski et al (2018), Fig. 3a, which illuminates the flaccid membrane with passive measurement markers, Fig. 2a; c) setting the aperture and the focus for the central marker located in the center of the diaphragm, in the resting position, halfway between the extreme positions of the diaphragm deflection, Fig. 4a; d) segmentation of the membrane image Murawski at al (2015) and calculation of z_0 area of the central marker, Fig. 4a; e) calculating the outline of the membrane; e) transformation of the membrane outline into M of virtual markers $\{(x_m, y_m, z_0)\}$ where m = 1…M, x_m - coordinate x of the center of gravity of the virtual marker, y_m - coordinate y of the center of gravity of the virtual marker, z_0 - area of the central marker. The first phase is carried out only once, before the surface shape of the flaccid membrane is calculated. The second phase consists in: a) taking a picture of the membrane, e.g. Fig. 5a, Fig. 8; b) carrying out segmentation of the picture, e.g. Fig. 6, Fig. 7a; c) calculating the position N of the measurement markers and calculating their centers of gravity $\{(x_i, y_i)\}$ and determining for them the area of the marker z_i where i = 1…N. The results of the second phase are the positions of measurement markers

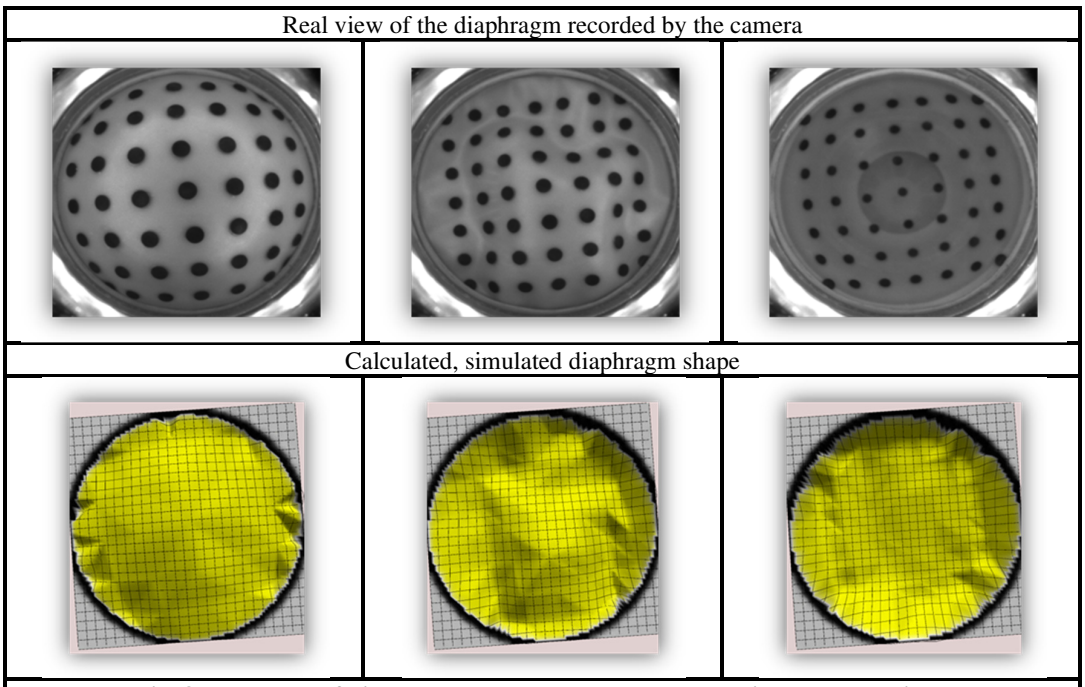

Fig. 8: Examples of diaphragm shapes calculated by the discussed technique

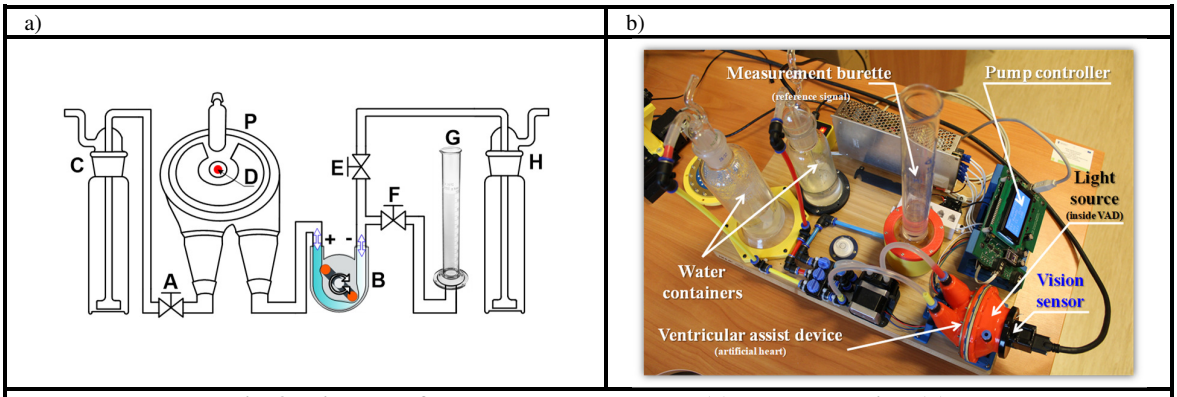

Fig. 9: Diagram of the measurement system (a), the system view (b)

$\{(x_i, y_i, z_i)\}$, where i = 1…N, determined in 3D space. The third phase consists in: a) creating, with the step k, a regular two-dimensional grid of K^2 points and placing M virtual markers on the created grid $\{(x_m, y_m, z_0)\}$, where m = 1…M, according to their positions resulting from the designated outline of the membrane; b) placing N measurement markers on the created grid $\{(x_i, y_i, z_i)\}$, where i=1…N; c) calculating areas for z_j where j = 1…$K^2 - (M + N)$ points of the grid, by using interpolation in three-dimensional space, e.g. Cubic type. The result of the calculations are nodal points of the desired shape of the diaphragm, whose example view is shown in Fig. 7b. Other calculated membrane shapes are shown in Fig. 8. The presented method of calculating the shape of the diaphragm of a VAD has many advantages. It has been confirmed that the determination of the shape of the diaphragm can be done at the rate of the incoming camera images, e.g. 30 images per second. Thus, it is possible for the system controlling the pump supporting the heart muscle to react quickly to changes in the pump's operating conditions. The method also allows to determine the shape of the diaphragm in pneumatic pumps where opaque materials have been used, mainly to minimize the risk of clotting. The advantage of the described method is also the use of only passive markers, as shown in Fig. 8.

Measurement System

The correctness of the technique presented in item "*Diaphragm shape calculation technique*" is shown in the system shown in Fig. 9. In the study, the model of the VAD, as shown in Fig. 2b, was used. The only difference is in the material, of which the blood ventricle was made. The model used in the study has had the printed blood ventricle. Currently, for technological reasons, only blood ventricles cast in glass-epoxy resin or polyurethane are used in the research. The cast ventricle variant eliminates the problems caused by insufficiently tight of the 3D print layers. The laboratory system shown in Fig. 9 consists of elements conventionally marked *A* to *H* and of the pump *P*. The element marked *C* is a 500 ml Dreschl washer. During start-up, it is used to flood the measuring system,

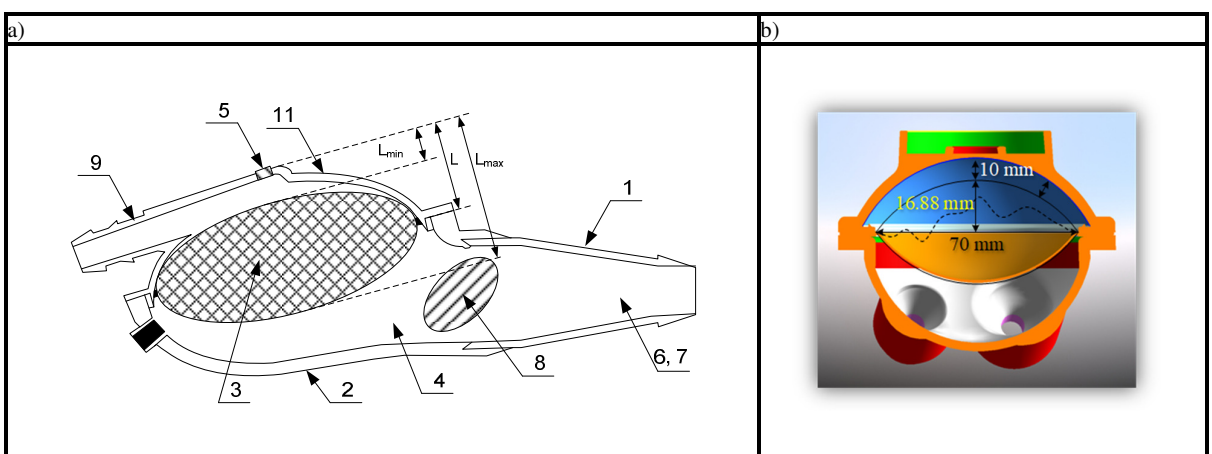

Figure 10. The sketch of a pump supporting the work of the heart (a) and the model of the heart assist pump.

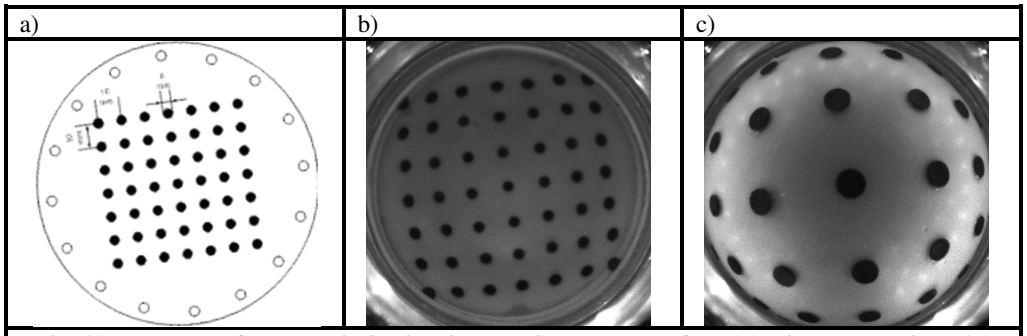

Fig. 11: Example of markers' distribution on diaphragm surface (a), diaphragm views (b) and (c)

including the pump *P* under test, with liquid, e.g. water or glycerin solution. The 250 ml Dreschl *H* flush absorbs excess liquid from the system. Pump *B* is started with valves *A* and *E* open and valve *F* closed. Under these conditions, the shaft of peristaltic pump *B*, turning counterclockwise ("+"→"-"), draws in liquid from washer *C* and, through open valve *E*, discharges the gas pushed out by the liquid from the blood ventricle of pump *P* into washer *H*. The appearance of liquid in washer *H* means that the hydraulic system is vented off completely. Thus, the blood ventricle of the tested VAD *P* is fully filled with liquid, which results in pushing the membrane assembly upwards. Next, pump *B* continues operation with valve *E* closed and valve *F* open. The flowing liquid then vents the connection of pump *P* to the burette *G*. After the measurement system is completely vented, the pump is switched off and valve *A* is closed. Under these conditions, burette *G* enables precise measurement of the volume of the liquid pushed/sucked from/to the blood ventricle of pump *P*. It thus shows the actual value of the stroke volume. The stroke volume value read during the verification of the developed method is considered as a reference value. A 100 ml burette was installed in the system. It enables to measure the stroke volume with an accuracy of ±0.5 ml.

The figure also shows the intake manifold of the operating gas Fig. 10a-9 and the camera position, Fig. 10a-5. In the system shown in Fig. 9a, the pneumatic ventricle was left unconnected. In the study, the shape of the diaphragm was changed by a peristaltic pump *B*, which operated with valves *A* and *E* closed and valve *F* open. As the peristaltic pump shaft rotated clockwise, pump *B* drew liquid from the measurement burette *G* and pressed it into the VAD, which results in an upward movement of the diaphragm. When shaft of the pump *B* rotates counterclockwise, the pump *B* sucks in (takes away) the liquid from the blood ventricle of the pump *P* and the diaphragm moves downwards. The liquid being sucked in is directed through the open valve *F* to the inside of the measurement burette *G*. This enables the reading of the stroke volume values and thus the evaluation of the performance of the developed method for calculating the stroke volume, by using image analysis and processing.

3D reconstruction of the diaphragm shape - example

Let us assume that during the experiment a photograph of the membrane, Fig. 11b, was taken, on which markers were placed according to the pattern presented in Fig. 11a. For her, in the configuration shown in Fig. 4a, a photograph of the central marker was taken and the marker's surface was calculated. Let the surface area of the central marker be z_0 = 780 px. In the same system, the outline of the membrane, which consisted of 1501 points, was calculated. These points have been transformed into M = 1501 of virtual markers. Virtual markers are saved in the format $\{(x_m, y_m, z_0)\}$ where m = 1…1501. The obtained values of x^T_m and y^T_m were as follows:

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xTm = [33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,33,
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118,118,118,118,119,119,120,120,120,121,121,122,122,122,123,123,124,124,124,124,125,
125,126,126,126,126,127,127,128,128,128,128,129,129,130,130,130,130,131,131,132,132,
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142,143,144,144,145,145,146,149,149,150,150,152,153,153,154,156,156,157,157,159,159,
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173,175,175,176,176,177,177,178,178,179,179,180,180,181,181,182,182,183,183,184,184,
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598,598,598,598,598,598,598,598,598,598,598,598,598,598,598]

y^T_m =[287,289,291,293,295,297,299,301,303,305,307,309,311,313,315,317,319,321,323,325,327,329,331,
333,335,337,339,341,343,345,347,349,280,282,284,288,290,292,294,296,298,
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364,266,268,270,274,276,278,359,361,363,364,366,368,370,262,264,266,267,269,271,365,
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92,591,45,592,43,44,591,44,592,593,43,592,44,593,42,43,592,43,593,594,42,593,43,594,41,42,593,42,
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5,83,553,83,553,85,551,85,551,87,549,87,549,89,89,546,90,546,90,543,93,
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115,116,520,117,519,520,117,118,518,119,517,518,119,120,516,121,515,516,121,122,514,
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145,146,490,491,147,488,489,147,149,150,150,152,484,485,153,153,155,481,482,156,156,
157,158,159,477,478,160,160,162,474,475,163,163,165,471,472,166,469,470,166,168,169,
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182,454,455,183,184,452,453,185,186,450,451,188,189,447,448,190,191,445,446,192,194,
443,444,195,196,440,442,197,198,438,439,199,200,436,437,201,202,434,435,203,204,432,
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218,219,417,418,220,222,414,416,223,225,411,413,226,228,408,410,229,231,405,407,232,
234,402,404,235,237,398,401,238,239,241,395,238,240,244,391,393,394,396,243,245,246,
248,387,389,390,392,245,247,249,250,252,384,388,249,251,255,257,379,381,385,254,256,
258,259,261,374,376,380,382,258,260,264,266,369,371,375,377,263,265,269,271,273,363,
365,367,368,370,372,268,270,272,274,275,277,279,356,358,360,364,366,368,276,278,282,
284,286,288,348,350,352,354,355,357,359,361,281,283,285,287,289,290,292,294,296,298,
300,302,304,306,308,310,312,314,316,318,320,322,324,326,328,330,332,334,336,338,340,
342,344,346,347,349,351,353,355,289,291,293,295,297,299,301,303,305,307,309,311,313,
315,317,319,321,323,325,327,329,331,333,335,337,339,341,343,345,347]

The value z_0 of all virtual markers was calculated on the basis of the central marker area calculated during calibration. In this example, the area was 780 px. On the analyzed picture of the diaphragm, $N = 45$ measurement markers with coordinates $\{(x_i, y_i, z_i)\}$ where i = 1…45, were identified. These values were:

x^T_i = [86,96,103,115,125,151,158,166,176,188,197,204,219,229,237,246,258,270,276,294,
300,309,318,329,338,346,361,372,382,391,399,408,419,432,445,451,461,472,479,
492,512,521,529,538,549]

y^T_i = [432,359,284,213,143,511,441,364,293,224,152,80,520,450,375,301,231,163,88,529,
459,384,315,242,173,99,536,467,393,322,254,184,108,549,480,404,333,265,191,123,
487,413,343,275,204]

z^T_i = [636,598,597,651,690,662,565,538,555,628,626,695,622,536,562,581,613,669,678,
630,601,519,546,603,611,655,605,588,575,572,585,608,673,600,570,588,562,571,634,
634,635,616,599,601,671]

a) b)

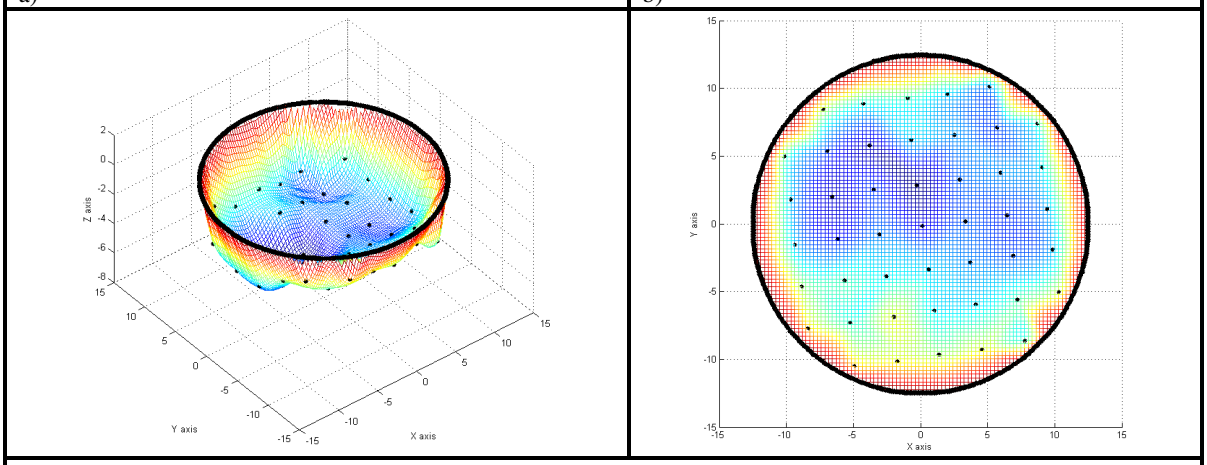

Fig. 12: Designated and scaled view of the concave diaphragm (a), distribution of virtual and measurement markers (black points) in the 2D plane (b)

a) b)

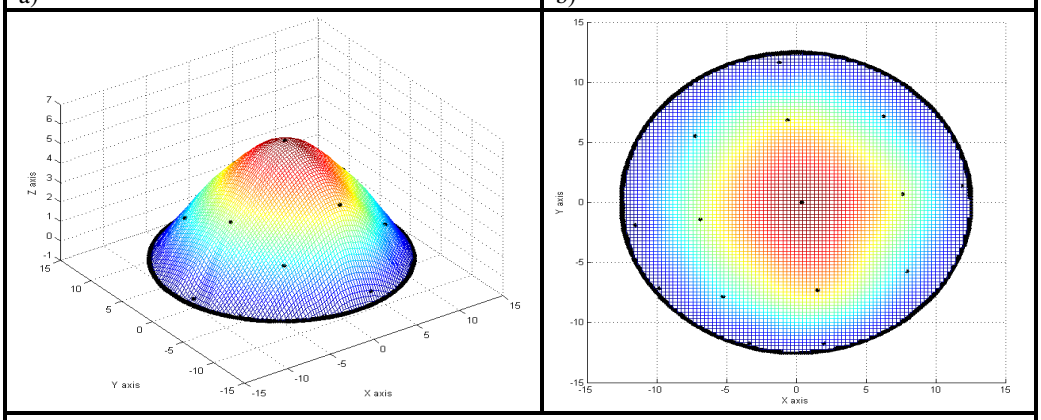

Fig. 13: Designated and scaled view of the convex diaphragm (a), distribution of virtual and measurement markers (black points) in the 2D plane (b)

a) b)

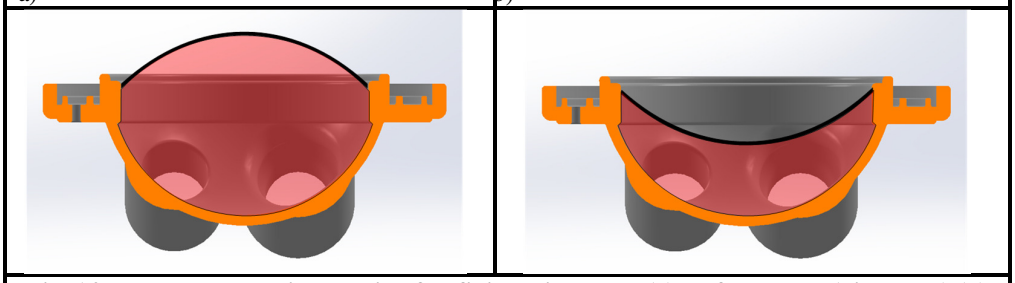

Fig. 14: Pump cross-section: during full filling with blood (a), at full stroke (discharge) (b)

According to the method shown in item "*Diaphragm shape calculation technique*", a two-dimensional point grid was created. The resolution of the grid in the X and Y axes is assumed to be $K = 30$ points, whose coordinates in the X and Y axes are evenly distributed between the maximum and minimum values of the interpolated variables. The determined values of grid steps were $k_x = (\max(x^T_m) - \min(x^T_m))/(K\text{-}1)$, $k_y = (\max(y^T_m) - \min(y^T_m))/(K\text{-}1)$. The result is the grid with a size

a) b)

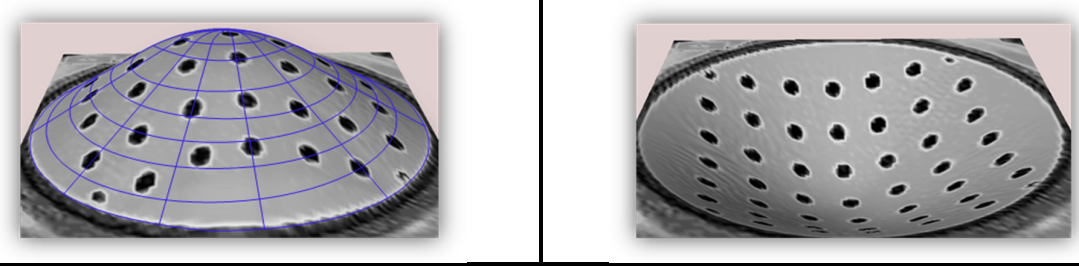

Fig. 15: Diaphragm shape calculated: when the pump is fully flooded (a), when fully pushed out (full stroke) (b)

of $K^2 = 900$ points. Scaled coordinates of measurement and virtual markers have been inserted into the point grid. For the created grid of the markers, Z-axis values were determined by using "Cubic" interpolation in 3D space. The result of the calculation, Fig. 12a, represents the desired diaphragm shape. The position of virtual markers and measurement markers on the 2D plane after scaling to the grid size is shown in Fig. 12b. The calculations were also checked for other measurement data. Let's assume that we determined, during another measurement, the position of $N = 15$ markers with coordinates $\{(x_i, y_i, z_i)\}$ where i = 1…15, such that:

```
xTi = [288,457,302,152,584,488,325,160,55,495,350,94,197,360,240]
yTi = [582,480,474,444,350,334,318,286,276,189,153,156,141,53,53]
zTi = [798,1412,2106,1519,798,2006,3006,1969,798,1427,2294,798,1545,959,798]
```

By repeating the calculations for the new input data, the shape of the diaphragm shown in Fig. 13 was obtained.

Measurement of stroke volume

The stroke volume of the pump is proposed to be calculated on the basis of the determined shape of the flaccid diaphragm separating the pneumatic ventricle from the blood ventricle. The difficulty to determine the stroke volume of a ventricular assist device equipped with a flaccid membrane, Fig. 1a, lies in the fact that there are only two diaphragm states that are well defined mathematically. The first state occurs when the pump is fully filled with blood (liquid), Fig. 14a. Then the flaccid membrane is pushed upwards and the volume of blood accumulated in the pump is much greater than 70 ml. The second state, well defined mathematically, occurs during a full blood pump stroke (about 70 ml for an adult). In this case, the flaccid membrane is fully pushed towards the blood ventricle, Fig. 14b. Between the indicated two membrane positions there is an infinite number of its states (shapes), which must be calculated and which have no known mathematical description. For this reason, the techniques presented in sections (*Diaphragm shape calculation technique*) and (*3D reconstruction of the diaphragm shape - example*) were used to calculate the stroke volume. The proposed method can be used in two implementations: a) measurement of the stroke volume of the VAD, implemented in the virtual world; b) measurement of the stroke volume of the VAD, implemented in the real world; Measurement of the stroke volume of the VAD, implemented in the virtual world, requires a one

a) b)

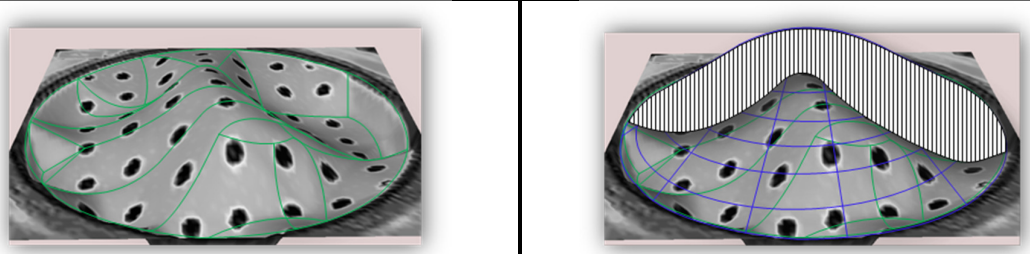

Fig. 16. Measurement of the stroke volume in the virtual world: the calculated shape of the diaphragm (a), the idea of calculating the stroke volume (b)

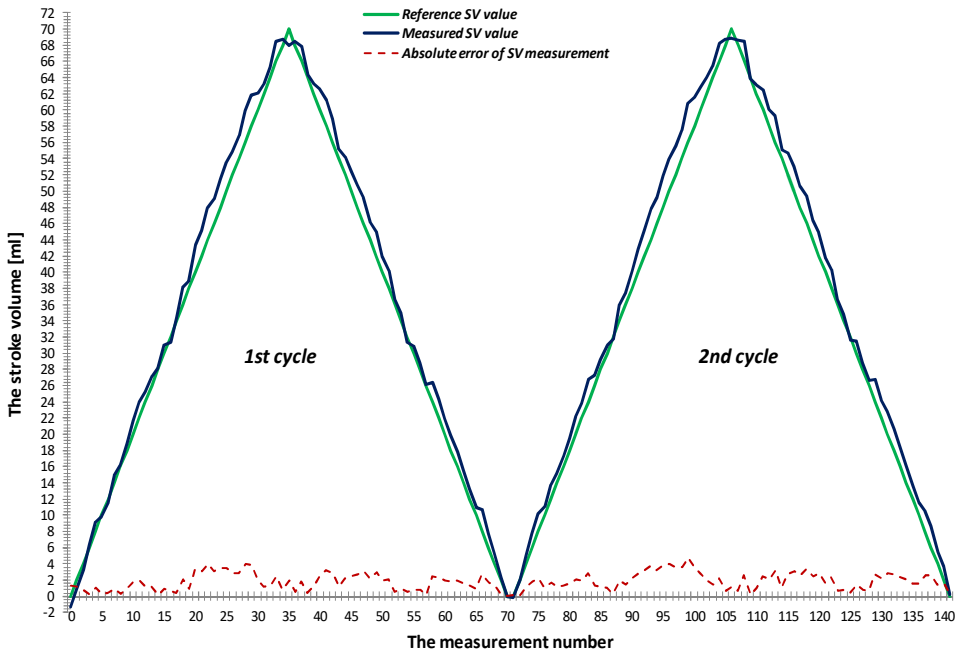

Fig. 17. Chart of measurement results of the stroke volume obtained in two measurement cycles, Sulej (2018)

times sensor calibration. Calibration consists in determining the grid of points (matrix) describing the shape of the flaccid membrane for its two extreme positions, Fig. 15a and Fig. 15b. Then, when we know the sum of the distances calculated between the corresponding grid points, and the projected pump stroke volume determined by the two extreme positions of the diaphragm, we can calculate the measurement constant for the stroke volume φ. The determination of a constant φ completes the calibration phase. Measurement of the stroke volume of the pump implemented in the virtual world consists in: calculation of the grid describing the shape of the diaphragm, e.g. shown in Fig. 16a; calculation of, shown in Fig. 16b, the sum of distances D between the corresponding points of the grid of the diaphragms: observed one, Fig. 16a, and convex one, Fig. 16b, obtained during maximum pushing the diaphragm into the pneumatic ventricle. The desired stroke volume is then determined from the formula $V = V_{MAX}-D\varphi$. However, the measurement method shown may be relatively easily disturbed by the expansion of the diaphragm, which may be due to natural aging/wear of the material. As an alternative to the above, the measurement is carried out in the real world. This measurement also requires a single sensor calibration. During calibration, the values of the parameters necessary for the correction of errors in the image resulting from the influence of optical distortion are calculated (the angle of view of the camera objective is about 130°). The calculation of the parameters' values completes the calibration phase. The measurement of the stroke volume carried out in the real world consists in determining the points of the grid describing the shape of the observed diaphragm, whose coordinates are specified in [mm] and calculating the stroke volume V of the pump as a result of numerical integration. These calculations can be performed by using, for example, the Simpson method or using the definition of the Riemann marked integral. This variant of calculating the stroke volume has been studied in depth under item Sulej (2018). It was confirmed there that the volume of liquid in the pump model used, contained between the upper and lower diaphragm positions is approximately 70 ml. Due to numerical integration the calculated volume was 69.9988 ml. Elimination of optical distortion has also significantly improved the shape of the obtained grids Sulej et al (2017). The most characteristic ones of them are shown in Fig. 18. The improved shape calculation of the diaphragms has had a positive impact on the accuracy of the calculation of the stroke volume. The graph showing two complete cycles of pump operation, during which the stroke volume was calculated and measured at the same time is shown in Fig. 17. For the results obtained there, the following error values were calculated: average relative error (≈1.5%), average absolute error (<1.83 ml), max. absolute error (<5 ml), Sulej (2018).

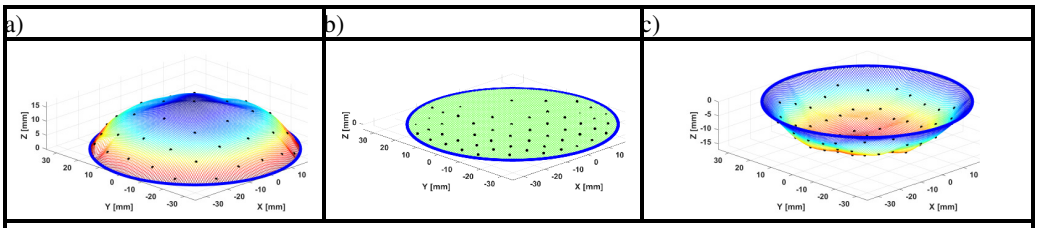

Fig. 18: Visualization of the grids calculated for the diaphragms: convex (a), flat (b) and concave (c), Sulej (2018).

Conclusion

The publication presents in a comprehensive and compact way the method of calculating the stroke volume of the pulse, extracorporeal and pneumatic Ventricular Assist Device. The measurement of the stroke volume was possible due to the knowledge gained during the processing and analysis of images and during the interpolation of the determined nodal point positions of the diaphragm. The conducted research works proved the validity of the stroke volume measurement theory developed by the author and included in Murawski, Pustelny and Murawska (2015). This statement is also confirmed by the graph shown in Fig. 17, discussed in detail in the work Sulej (2018). The measurement results are very encouraging. The average absolute error was ultimately below 1.83 ml and the average relative error did not exceed 1.5 %. These values are small and fully acceptable, also by the medical community. More information about the presented solution can be found in the literature pointed out in the References.

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Risk Related Project Classifications for the Purpose of Project Management

Ewa MARCHWICKA
Wroclaw University of Science and Technology, Wroclaw, Poland, ewa.marchwicka@pwr.edu.pl

Barbara GŁADYSZ
Wroclaw University of Science and Technology, Wroclaw, Poland, barbara.gladysz@pwr.edu.pl

Dorota KUCHTA
Wroclaw University of Science and Technology, Wroclaw, Poland, dorora.kuchta@pwr.edu.pl

Abstract

We apply modified K-means and decision trees classification methods to classify projects in two ways: according to industry, organization size, project duration and project management type, in order to find out which risks are most common for each class, and additionally according to risk types identified in the risk identification process, in order to determine which risk types indicate that the customer expectations with respect to project outcome may turn out to be substantially different at the end of the project than they were at its beginning. Results of a questionnaire with 350 respondents are used for calculations. The conclusions may improve the project management process: they will help to prioritize risk classes and to decide when to put more weight on project scope and requirements management.

Keywords: Clustering, Classification Trees, Risk, Requirements Management, Project Management.

Introduction

It is common knowledge that risk is an inherent part of projects and that its proper management consumes huge amounts or resources, but omission of spending these resources may result in project total or partial failure. It has also been known for years (Mirai, 2020) that in many cases we deal with customers who do not really know or do not really realize what they actually expect and are not aware of their ignorance. Obviously, each project manager should be able to identify which risks they should put emphasis on in each given situation and when the customer needs special attention with respect to project requirements management.

The objective of the research is thus twofold:

- O1: to analyze the dependencies between company type, project management type and project type dominant in the company on one hand and risks that may appear in their projects on the other hand;
- O2: to analyze the dependencies between risks identified in the project risk identification process on one hand and the magnitude of differences between the customer expectations expressed at the beginning and those articulated at the end on the other hand.

The goal of both analyses is to provide indications with respect to project management. The first analysis will results in advice as to how to prioritize risk in the project risk management process for a given project in a given organization. The second one will lead to the identification of situations when special emphasis should be put on project requirements management and communication with the customer and end users of the project product.

The research was conducted in the following steps: data collection, data cleaning and transformation, data labeling, data classification.

The research methods that were used are: questionnaire (used in data collection), in-depth analysis (manual process that was used for data labeling), a modified version of K-means classification method and decision tree classification algorithms. We also used very fundamental statistics methods.

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Literature Review

In this article we use a set of risk categories, into which we classify the risks that were listed in the respondents' answers. To have a representative risk classification, we conducted a literature analysis. The following search terms (for article titles) were used: {"software project risk", "construction project risk", "project management risk"} AND {"classification", "types", "typology", "checklist", "register", "identification", "factors", "dimensions"}. The analysis is summarized in Table 1.

Table 1: Project risks typology

PROJECTS IN GENERAL	
(Khallaf et al., 2018)	Operational, Political, Financial (macro), Technology, Contracts, Financing (market), Business cultural differences, Market potential, Contracts and legal issues, Resources, Design, Quality, Financing (project), Construction and cultural issues, Other.
(Zhang et al, 2018)	Organizational environment, Client, Complexity, Contract, Execution, Vendor.
(Yu et al 2017)	(Top 15) Legal, Cooperation, Tariff, Financing, Political, Technology, Corruption, Administrative procedures, Currency, Demand and revenue, Credit, Worker, Construction, Operation, Force majeure.
(Sanchez-Cazorla et al., 2016)	Design, Operation and maintenance, Demand, Market, Social profitability, Construction, Labor, Environmental, Financial, Economic, Legal and/or political, Contractual, Impact on local groups, Reputational, Force majeure.
(Asan et al., 2014)	Operational, Business and market, Engineering and design, Organizational, Financial and economic, Procurement and contractual, Political and legal, Environmental, Social and safety.
(Gandhi et al., 2012)	Schedule, Technical, Financial, Vendor, Culture, Reputation, Intellectual property, Flexibility, Compliance, Quality.
(Hillson, 2003)	Corporate, Customer and stakeholder, Natural environment, Cultural, Economic, Requirements, Performance, Application.
(Marcinek, 2001)	Macroeconomic, Industry, Regional, Technical, Marketing, Financial, Management.
CONSTRUCTION PROJECTS	
(Baba, 2019)	Economic, Land acquisition, Design, Financial, Construction, Force majeure.
(Chatterjee et al., 2018)	Political instability, Economic, Social, Technological, Work quality, Time and cost, Resource, Documents and information, stakeholder`s.
(Sohrabinejad, Rahimi, 2015)	Enviromental and social, Legal factors, Economic factors, Political, Design, Execution, Project management, Planning and scheduling, Human resources, Res. and Equipment, Partners.
(Valipour et al., 2015)	Financial, Legal, Political, Market, Operation, Organization and coordination, Force majeure.
(Burcar et al., 2013)	Legal, Political, Economic, Social, Nature, Management, Technical, Human factor, Procurement, Contractual.
(Rezakhani, 2012)	External, Operational, Project-Management, Engineering, Financial.
SOFTWARE PROJECTS	
(Hoodat, 2009)	Requirement, Cost, Scheduling, Quality, Business.
(Wallace et al., 2004)	Team, Organizational environment, Requirements, Planning and control risk, User risk, Complexity.
(Ropponen and Lyytinen, 2000)	Scheduling and timing, System functionality, Subcontracting, Requirement management, resource usage and performance, personnel management.

Based on the literature analysis, we decided to use eight classes of risks for the purpose of further analysis: random events (force majeur), market risks, law risks, technical risks, people risks, financial risks, time risks, quality risks.

The query "risk" AND "project" AND "type", whose objective was to identify literature items referring to the dependencies between project or organization or project management type on one hand and project risk types on the other (Objective O1), led only to one relevant output (Perrenoud et al., 2014) which treats the impact of project type

on risk timing and frequency in construction projects. The query "risk" AND "project" AND {"requirement" OR "customer"), whose objective was to identify literature items referring to the dependencies between risks identified in the risk identification stage and the problems with customer expectations or requirements (Objective O2), returned no relevant results.

Method

Data collection

The dataset was collected by means of a questionnaire (21 closed questions and two open questions in five sections). Data from 350 different Polish companies were gathered in January 2020, using the CATI method. It describes the companies in a few dimensions, i.e.: company industry (a simplified form of NACE categories (Eurostat, 2008)), company size (micro – less than 10 employees, small – between 10 and 49, medium – between 50 and 249, big – over 250), project management type which dominates in the organization (traditional, Agile, mixed), predominant project duration and project risks which are usually identified. The respondents (project managers) were also asked to provide information on the last project they managed, among other on the differences between the customer expectations expressed at the beginning of the project and those expressed at the end. They were supposed to use the Likert scale: 1 – almost none differences, 2 – very small, 3 – small, 4 – middle, 5 – big, 6 – very big, 7 – fundamental differences.

Selected statistical information about the sample and the answers given is presented in Table 2 and Table 3.

Table 2: Frequencies of individual risk types

risk	random	market	law	technical	people	financial	time	quality	none
frequency	20%	30%	9%	10%	23%	34%	24%	16%	2%

Table 3: Dominant risk categories in selected company types

Group of respondents	Dominating risk categories
construction companies	financial (35%), market (30%)
IT companies	financial (30%), time (30%)
Agile management dominant	technical (36%), people (36%), finance (36%), quality (36%)
traditional management dominant	market (40%), finance (37%)

On top of that in 20% of cases it was indicated that the differences between initial and final customer expectation were small, medium, big, very or fundamental, thus not negligible.

Data Cleaning and Transformation

The data cleaning process is a very important part of data analysis. Many articles show that a good quality of data has a great influence on the results quality (Gudivada et al., 2017). The data cleaning process was performed in a few steps. Firstly, we excluded the companies that did not give any risk information or any information on the differences in the customer expectations at the beginning and at the end. This reduced our dataset to 253 companies. In the second step we analyzed the company types represented among the respondents and decided to analyze only two most frequently represented company industries and ignore the rest. The most frequently represented industries were Civil engineering (referred to as "construction" in the following) and IT&Communication (abbreviated as "IT" in the following). This step reduced our dataset to 185 companies. In the last step we decided to exclude four more companies for answer quality reasons. The final dataset was composed of 181 companies in total for the K-means classification (objective O1) and 177 for decision tree classification (objective O2).

In the step of data transformation, we distinguished two subsets of questionnaire questions: one set that was related to company basic characteristics and the second related to the last project managed by the respondents. When building basic characteristics, we considered only those data attributes which were easy to be transformed into numerical values. Thus we selected four company attributes: industry, company size, average project duration, predominant project management type. The further data transformation process was evident. The only less trivial transformation was extracting the information about the project management predominant in the organization and was based on selecting the management type with the highest weight assigned by the respondent.

Data Labeling

The initial dataset had the answers about risks written in free text, which made it difficult for quantitative data analysis. For this purpose, we decided to use manual labeling that allowed us to assign risk classes to each of the answers. For labeling we asked the opinion of two independent experts, which allowed us to eliminate mistakes. In case of the answers for which the opinion of both experts did not match, we used a further in-depth discussion about how to classify the risks. Based on the literature presented in Table 1 we distinguished eight risk classes: random events (like weather conditions or various accidents), market risks (risk that are connected with changing market conditions and market competition), law risks (connected to official and legal procedures that influence the company's business), technical risks (connected with quick technology change or technology problems), risks referring to people (connected with human relations, human conflicts, job change, etc.), financial risks (connected with costs), time risks (connected with time estimations and exceeding the tasks execution time), quality risks (connected with product quality or guarantee issues or customer requirements expectations in general).

K-means based data clustering (Objective O1)

Our final dataset for objective O1 included 181 companies and was represented by the following attributes: industry, company size, average project duration, project management type, risk attributes (eight binary attributes with eight types of risks assigned). We decided to cluster non-risks attributes using the K-means method, which is a classical clustering approach (Likas et al, 2011), but we used a modified quality measure adjusted to the needs of multiple class classification. For the purpose of K-means clustering we used the implementation and normalization techniques described in (McCaffrey, 2013). The implementation was adjusted in the normalization part, so that also the data attributes for which the standard deviation equals 0 are correctly handled and does not produce any division by zero cases. There are several advantages and disadvantages of using K-means clustering (Likas et al, 2011). One of the most discussed drawbacks of the method is that the number of clusters (parameter *K)* is not given and it needs to be selected experimentally. Thus we analyzed different cluster numbers, from four to twelve, and observed the risk distributions. We selected the cluster number for which the risk distribution maximized the quality measure. As a quality measure we selected the average percentage of records covered with most representative risk combinations. This quality measure shows how well the risk subsets match the clusters (which were obtained on the basis of the four company attributes described above). We assumed that a combination should be counted as a matching one even if more risks (than listed in the combination) appear. This allows to achieve a higher value of records that match, which suits the case of small datasets. This also means that shorter combinations will have higher scores and it reflects the hierarchy of the most common risk combinations that are expected to appear – starting from the shorter ones and ending with the longer. What is more, because the dataset is small, we considered only the two-level hierarchies, i.e. combinations of length one or two.

There are several methods that can be used to measure the quality of clustering. The methods are usually based on pair counting (Pfitzner et al., 2009). The problem in the case that is described in this article is that we should expect clusterings to have multiple classes of risks. That is why we also use pair counting, but we select only those classes whose match measure exceeds a given threshold *T*. This approach is a modification of the Dice asymmetric index (Pfitzner et al., 2009). The modification is summarized in formulae (1) and (2), which define the clustering quality measure $Q(S)$ (*S* is a given clustering, symbol |*X*| denotes the cardinality of set *X*).

$$Q(S) = \frac{1}{N}\sum_{i=1}^{N}\sum_{k=1}^{2}\frac{1}{|R(T,k,i)|}\sum_{C\in R(T,k,i)} M\big(C,S(i)\big) \qquad (1)$$

where *N* is the number of clusters in the clustering *S*, $S(i)$ is the *i*-th cluster in the clustering, $R(T,k,i)$ stands for the set of possible *k* elements risk combinations *C* whose risk match measure $M\big(C,S(i)\big)$ (defined in (2)) exceeds threshold *T*.

$$M\big(C,S(i)\big) = \left|E\big(C,S(i)\big)\right| \Big/ |S(i)| \qquad (2)$$

where $E\big(C,S(i)\big)$ stands for the set of all entries in $S(i)$ with combination *C*. An entry counts also if it contains additional risks than the elements of *C*.

Decision trees-based classification (Objective O2)

The final dataset for objective O2 was composed of 177 companies, where both the information on risk classes identified in the organizations and on the differences between the customer expectations in the beginning and in the end of the recently managed project were available. We used classification decision trees based algorithm CRT (Classification and Regression Tee) (Rokach and Maimon, 2008), (Larouse, 2005).

Results

First we present the results regarding objective O1. The risk threshold value *T* for the match measure (2) was arbitrary set to 0.3. This means that we analyzed only the risks combinations that were represented in the given cluster in more than 30% of possible occurrences. In other words, we analyzed the risks that should appear in at least 30% of the companies from a given cluster. Based on different possible clusterings, we first identified the clustering with the highest quality measure. After selecting the best cluster, we tried to analyze in more depth the given clustering and risks. In Table 4 we present the results for different number of clusters.

Table 4: K-means clustering quality results

Clusters count	3	4	5	6	7	8	9	10	11	12
Quality	0.39	0.40	0.41	0.43	0.32	0.30	0.36	0.30	0.41	0.35

The highest results quality was obtained for 6 clusters. The detailed results for 6-class clustering with respect to the most common risk types are shown in Table 5.

Table 5: Best K(=6) for K-means clustering – detailed results

No.	Cluster centroid (industry, size, project duration, management type)	Most common risks (match)
1	civil engineering, small, years, unknown-traditional	market (0.43)
2	any, small-middle, quarter-half of year, mixed	time (0.47)
3	civil engineering, middle, unknown, unknown-traditional	random events (0.44)
4	civil engineering, micro-small, quarter-half of year, unknown-traditional	financial (0.34)
5	any, micro-small, days-months, unknown-traditional	financial (0.34)
6	IT, micro-small, days-months, agile-mixed	financial (0.67), market & financial (0.50)

The words “unknown” in Table 4 mean that in the respective organizations both project management types are used, pairs of answers connected with a hyphen represent the case when two answers were present in the data cluster. Expressions similar to “days-months” refer to the best unit(s) in which average project duration in the corresponding company should be counted (according to the respondent). Let us now analyze the results for objective O2 (Table 6).

Table 6: Probabilities of having the given level of differences between customer expectations for companies which declared the given risk type

Cust. exp.	All projects	Risk								
		random	market	law	technical	people	financial	time	quality	none
almost none	0.51	0.66	0.56	0.60	0.65	0.44	0.55	0.36	0.31	0.50
very small	0.29	0.26	0.25	0.20	0.18	0.32	0.27	0.45	0.35	0.00
at least small	0.20	0.08	0.19	0.20	0.17	0.24	0.18	0.19	0.34	0.50

For example, the probability of having at least small differences among the initial and final customer expectations for all the projects is equal to 0.20, and for projects where risk of “people” type is identified - to 0.24.

The tree classification algorithms were used to identify homogenous classes, defined by individual risk types, with respect to the differences in the customer expectations. They generated nine homogenous classes, out of which two correspond to cases in which the probability of having small, medium, big, very big or fundamental differences between the customer expectations at the beginning and at the end of the project are over 35% :

- included market and people risk, excluded time and quality risk: 37% of probability of having at least small differences in the customer expectations;
- included quality risk, time risk excluded: 35% of probability of having at least small differences in the customer expectations.

Discussion and Conclusions

With respect to objective O1, which was to analyze the dependencies between company and their project (management) types and project risks, we state that we did not obtain any clusters centered around Agile, which may show that Agile approach was not popular for the companies that were analyzed. In fact, we had only 11 company datasets (among 181) classified as Agile. We also did not obtain any clusters centered around company size "big", probably for the same reason: there were only 14 such entries.

The results of the clustering show that for micro and small organizations (clusters 4, 5, 6 in Table 5) the most common risk type are financial risks. This shows that the risk of exceeding project budget is very dangerous for small companies and should be handled with special care. In case of micro (or small) IT companies this kind of risk was identified in 67% of the cases, which seems to be a significant result.

For civil engineering companies that are of middle size (cluster 3, Table 5) the riskiest are random events (force majeur). This classification includes the risk of bad weather or human accidents or human sickness.

For small civil engineering companies (cluster 1, Table 5) the risks that are most likely are market conditions, which include risks connected with market competition or the risks that are generated by the subcontractors who do not fulfil their commitments.

For both civil engineering and IT companies that realize projects with duration under half a year (cluster 2, Table 4) the most common risk type that was identified is time risk (almost half of the cases).

As far as objective O2 is concerned, it was found out the identification of people and market risk with the exclusion of time and quality risk or the identification of quality risk with the exclusion of time risk may indicate a high probability (over 35%) of having significant differences between the customer expectations expressed at the beginning of the project and those expressed in the end. Also, it was proven that in about 20% of projects, independently of the risk identified, those differences are at least small. This means a high probability of customer dissatisfaction, which may be equivalent to project failure and/or missed new project opportunities.

The conclusions presented above are important for the risk management process. We identified priority risks for different company types (described by industry, company size, project duration and project management type). This prioritization helps to determine in each case if a given risk group is worth further analysis. In particular, the prioritization can be used in designing risk response strategies (PMI, 2017), based on company type, and indicates which risks should be treated more carefully in the risk management process. Also, we pointed out situations when the identification of some risks may be equivalent to a high probability of the occurrence of a risk event which in many cases may be crucial for project success: the ultimate lack of customer satisfaction. In such cases special attention has to be paid to requirements management and communication with the customer.

As part of the future research we plan to narrow the investigation to the selected companies type that was most often represented in our data (i.e: civil engineering companies) and try to collect more data. We also plan to check the different quality measures on the data collected and compare the results, as well as to re-apply tree classification algorithms to the extended data and examine more profoundly the influence of risk identified in projects on the fundamental problem of achieving ultimate customer satisfaction.

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Quality Management Systems and Models as A Tool for Small and Medium Enterprieses Development and Competitiveness Increase

ZANE DRIŅĶE

Faculty of business administration, Turiba University, Graudu Street 68, LV-1058, Riga, Latvia; zane.drinke@turiba.lv

ROSITA ZVIRGZDINA

Faculty of business administration, Turiba University, Graudu Street 68, LV-1058, Riga, Latvia

rosita@turiba.lv

Abstract

The theme "Quality management system and models as a tool for small and medium enterprieses development and competitiveness increase" is determined by the basic concepts included in the topic - small and medium enterprises (hereinafter referred to as "SMEs"); competitiveness and quality management system (hereinafter referred to as "QMS"). Small and medium-sized enterprises are interested in producing products in which potential buyers can see the qualitative features they need to meet their needs. Thus, the merchant, the quality requirements and competitiveness of the product produced by him coalesce into one system whose function is closely related to the goal of the product buyer to more fully meet their needs. Today, the European Economic System employs more than 23 million small and medium-sized enterprises, which produce goods and services worth more than 4 billion Euros. These companies employ over 90 million economically active people from different European countries (Eurostat, 2018). Object and object of the research: the following object of the research is determined: competitiveness of small and medium enterprises and the subject of this research: improvement of the competitiveness of small and medium enterprises by applying the conformity requirements defined by the quality management system.
The purpose and tasks of the research: to reveal the positive effects of the implementation of the quality management system on increasing the competitiveness of small and medium enterprises, as well as to identify the most important barriers to the restructuring of production in accordance with the requirements of the quality management system for small and medium enterprises in the local economy.
The following main tasks are identified for achieving the goal:

- explain the most important concepts of the work theme;
- create a model for interconversion and interaction between customers' quality requirements and production conformity requirements.

Research Hypothesis: elements of the quality management system applied to increase the competitiveness of SMEs can lead to a competitive advantage in the market.
Research methodology and methods: the study uses analysis and synthesis methods, deductions and induction methods as well as logical approach methods. However, appropriate quantitative methods are used to process the data obtained.

Result of the research: in the course of the research a model is developed and recommendations for implementation of the quality management system in enterprises are worked out.

Keywords: small and medium-sized enterprises, competitiveness, quality management system, management, competition, national economy

Introduction

In today's world, with the rapid expansion of SMEs in the EU and in other parts of the world, their competitiveness and economic significance are consistently increasing. At present, the proportion of SMEs in the EU has reached 99.8% of the total number of enterprises, and in the different sectors of the national economy (hereinafter "TS"),

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they account for not more than 68% of all economically active population, producing over 42% of GDP in these enterprises (Eurostat, 2018).) Large Chinese exports account for 60% of SMEs, while Thailand 46%. In many countries of the world, in practice, it has been demonstrated that micro and small enterprises are more capable of responding more flexibly to economic crises and other external threats (OECD, 2017). In the practice of small and medium-sized enterprises, it has been shown that companies in this group compete successfully with large companies in several performance indicators. Convincingly, the following scientific research findings about the positive effects of SME activity in different parts of the world are highlighted:

- In individual sectors of the economy, the global competitiveness of SMEs is 2-3 times higher than the competitiveness of large enterprises in local and foreign markets (OECD, 2018);
- SMEs are more competitive than large companies in creating new products and offering additional jobs (Sargeant, 2011);
- Thanks to the successful implementation of SME development policy in Japan, over several decades, unemployment rates in the country are close to the natural rate of unemployment and are several times lower compared to the unemployment rate in the USA and the EU (Meti, 2017);
- The results of SME Performance Surveys in Japan show that 10% of industrial small businesses have higher productivity compared to large companies, while in service industries this figure is up to 30%;
- Small and medium-sized enterprises are generally more satisfied with work and working conditions than large companies, mainly due to their higher standing and trust from employers (Kok, J. et al. 2011);

The above-mentioned research findings on the global prevalence of SMEs, their impact on the country's economic development and the competitiveness of SMEs in different markets clearly demonstrate the need to focus on small and medium-sized enterprise development problems and solutions. Competition and competitiveness are the main categories of market economy that have undergone dramatic changes with the transformation of the market economy itself. Therefore, the concept of "competitiveness" is given a great deal of attention in various academic and other types of publications. Famous scientists P. Krugman, M.Porters, P.Samulens, M.Spens, J.Stiglicks, J.Tirol and many others have devoted much attention to the study of competition and competitiveness, the revelation of their content.

The results of the study indicate that quality is a much broader concept than competitiveness. This concept is widely used on a daily basis in each of the economic groups - households, enterprises, state and local government institutions, as well as in public organizations, but possibly with different content. In practice, it has proven that everyone knows what quality is, but only a few can explain it. The content of the concept of quality is widely discussed in the academic environment, starting with the beginning of the XX century. Well-known researchers in the field of quality are such as J. Juran (1989), E. Deming (Deming, 2000), R. Dorfman and P. Sheaterer (Dorfman, Steiner, 1954), Lefler (1982), G. Kanji and M. Ascher (1996), G.Knovless (Knowles, 2011), who have focused on studying the quality of different products in relation to customer quality requirements, their constant changes in the goods and services market.

Transform customer quality requirements into compliance requirements

Taking into account the wide range of studies on quality and the lessons from their critical evaluation, Quality is defined as "quality" - a set of characteristics defined by the entity that is used to assess the suitability of a particular tangible or intangible item to meet his or her needs. This concept can be shortened in the following form: quality - a set of characteristics defined by the entity. In the work, the term "quality" is related to the concept of "relevance", which in essence is inextricably linked in any field of human activity. Conformity concept work explains the following: compliance - a set of characteristics defined by an individual, a company or another organization, used to measure the usefulness of the product and / or service processes and / or the value of the value of the product produced. Abridged Explanation of Conformity A set of features defined by the entity or organization.

Small and medium-sized enterprises, which have taken a decision to increase the competitiveness by using the potential competitiveness advantages included in the Quality Management Standard, it is important to understand how the transformation of quality requirements into conformity requirements occurs. The model developed in the framework of the study on the requirements for the transformation of quality requirements into compliance requirements is included in Figure 1.

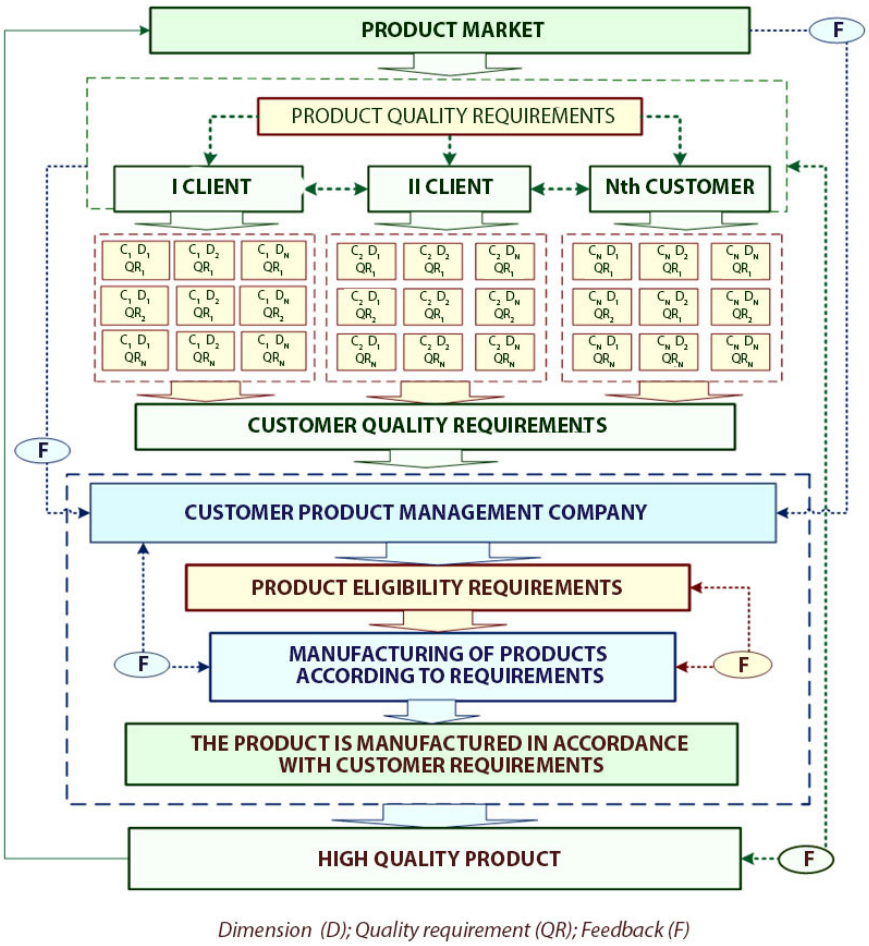

Abbreviations used in the picture: ***D*** *- Dimension;* ***QR*** *- quality requirement;* ***F*** *– feedback*

Fig. 1: Transformation of customer qualification requirements into compliance requirements and model of production of the corresponding product

Source: authors own study

The model shows that one product meets several quality requirements, the content of which is determined by the buyers, creating a set of qualitative requirements ΣCnDn, which consists of a social, technical, economic and management dimension. The picture shows that the war for the client and each of these dimensions has several qualitative features, for example: - C1D1QR1 - the first quality of the first dimension of the first customer I, etc. Thus, SMEs get an idea of customer quality requirements.

At this point, the decisive moment in the development of competitiveness begins - from the customer's quality requirements identified in the market research, it is necessary to select the requirements to be included in the product being produced, which are referred to as qualitative features of the work and their time remains unchanged. The model shows that the quality requirements identified in the market research reach the manager of the company, which decides on the quality requirements to be set in the product, the production of which comes as compliance requirements. In order for SMEs to maintain their competitiveness in the target market or to increase it, it is important for him to include in his product the most qualitative requirements that are most relevant to the customer, but increasing these quality features makes the product manufactured more expensive and more expensive for the buyer.

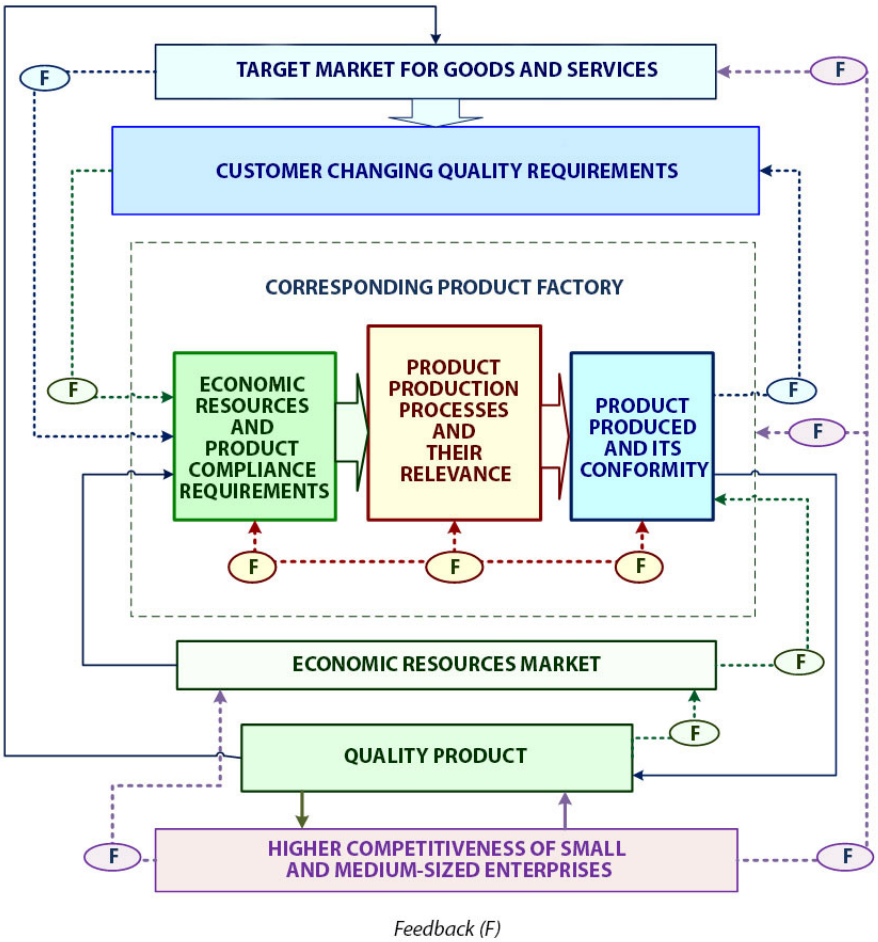

Abbreviations used in the picture: ***F*** *– feedback*

Fig. 2: Manufacturing Compliance System Model for Better Execution of Customers' Requirements and Increased Competitiveness

Source: authors own study

To obtain a more complete picture of the production of appropriate products for increasing the competitiveness of SMEs, a production conformity system model is presented in Figure 2, which adds elements of the production conformity model of Figure 1 and reveals their relevance to the product market and customer satisfaction requirements.

The model shows that the signs of conformity of the identified manufactured product come to the company in the green field. The economic resources that meet and define the requirements of SMEs come into production and start the process of their coupling, or the second important stage in the production of the corresponding product. Using elements included in the production conformity system, the validation of the result of the work performed is carried out throughout the production process in order to verify the appropriateness of the presence at each stage of production and at each workplace.

The product produced comes into the warehouse of the company and the last job of creating the corresponding product starts. The feedback generated within the production conformity system is one of the key elements in creating the positive effect of producing a product that creates the necessary prerequisites for all production process units to operate in accordance with the defined characteristics of the product's compliance. As soon as the product goes through the SME gate and goes to the market, it transforms the corresponding product produced by the company into a quality product from the buyer.

Significant Elements of The Quality Management System and Their Relevance to Increasing the Competitiveness of The Company

The introduction of quality management systems (hereinafter referred to as QMS) is a strategic decision, which requires good knowledge and understanding of the key elements of the QMS and their interconnectedness in the implementation and successful implementation. The most significant of these elements is the company itself, which has a production conformity system. This system model is shown in Figure 2 and follows a brief explanation of system operation. It is important for managers to be aware that the production conformity system is oriented towards the market and the dominant client. This means that the production conformity system must consistently meet customer changing quality requirements. Many researchers have pointed out that the internal environment of the business, the dominant threats and opportunities, is the most significant aspect of business formation and development. The next element of the QMS is management, its quantitative and qualitative composition. Exactly the management determines the goals and objectives of the activity, mission and vision, in which the most important place is allocated to the client and his quality requirements. These issues are continually being widely discussed in the academic environment, where the opponents express bold ideas about various issues of raising the effectiveness of corporate governance (Maxwell, 2013; Mezzei, 2006). In these and many other scientific studies a large attention is paid to the issues of compliance of the managers themselves, the dimensions of their competence level and competency. It is important for drivers to know the driver's compliance law, which specifies the need for compliance of the characteristics of the management entity with the characteristics of the control object, the objectives and tasks of its operation.

The next QMS element - the employed staff - is closely linked to management. The employees of the company are the most significant of the resources at their disposal, which is the largest opportunity and, in some cases, the greatest threat to the company's pursuit of the goal. R. Tricker is one of the many scholars who have turned to the staff of the company. He has come to the conclusion that the greatest benefit of the involvement of employees is the human feeling of being responsible for their performance (Triker, 2014). L. Dale and G.Ouens-Brogers, in turn, have shown a scientific interest in staff compliance issues and their training as a sufficiently effective means of maintaining the required compliance level (Triker, 2017). It is important to recognize that the relevance of the staff begins at the moment when interviews with potential employees take place. In this respect, not only formal signs of compliance are important, but also the possible synergy effect and the desired positive synergy effect for the company.

The fourth element of the QMS is the processes. Despite the fact that each of us is a witness to many processes and has managed to engage in a number of processes during the day, in practice, it can be verified that many managers are struggling to create processes, their mutual commitment and the disclosure of interactions. In essence, this is the first sign of discrepancy, but not always with such a conclusion is enough to solve the problem. To a large extent this is due to the inadequacy of the concept of "process" in the QMS - as any action requiring resources and not in accordance with observations in practice, where the process emerges as a set of targeted, interoperable and complementary activities with its own goal. But the requirement of resource requirements included in the Standard is an unnecessary and unnecessary interruption, because nothing happens without resources. But it is important for the company to provide each of the production conformity system processes with the necessary, interoperable and complementary resources whose quantitative and qualitative composition is determined by the product being produced. D. Besterfield, and other scientists, devoted a great deal of research to the production conformity system. In these scientific studies, managers and process researchers can get useful insights on the process set-up efficiency. This means that it is impossible and not necessary for an enterprise to create efficient processes - this is an integral part of every process. But there must be sufficiently efficient processes that form a unified process system that fits organically into the production conformity system. These processes will work with the effectiveness that a manager of the company has created with his management decisions, the content and relevance of which in all cases determines managerial knowledge and understanding of the management object.

Systemic thinking and production conformity system is the fifth key element of QMS. Its significance relates to the production conformity system and as a system incorporating the manufacturing conformity subsystem. Despite the fact that many scholars have devoted their work to research into various socio-economic systems and their constituent elements, systemic thinking for many managers seems to be something new and unusual, often too complicated. It is important to note that in this context lies one of the most important aspects of enhancing competitiveness - the manager must be able to think systematically and well-positioned in the company as a special and unique socio-economic, technical and management system. Systemic thinking is closely linked to compliance in general and the production conformity system in particular. An unwritten rule for each driver is to establish a system of adequately functioning production compliance that is able to continuously offer products that meet customer quality requirements and continually follow these changes. The inefficiently functioning production conformity system at best increases the cost of production and reduces the company's profitability, but in the worst case, the product's compliance with the much higher negative consequences for competitiveness increase.

The systemic approach is closely related to the next element of QMS - the continuous improvement of the product produced. In essence, product placement is one of the processes that is closely related to the customer's quality requirements. The issue has been given a great deal of attention by the founders of the quality management system, Demings, Juran and others. It's important for management to know what should be improved and in which direction they should go. Although the answer to these questions is not complicated, it is more difficult to decide on making improvements and providing them with the resources that are difficult for many companies to overcome barriers. In practice, it has been observed that there is a passive and active phase in the development of the product as well as in the production processes. In the passive phase, minor improvements are made, which is sufficient for the company not to lose the achieved level of production efficiency and / or to reduce the sale of products manufactured at a reasonable price to the merchant. In this phase, management decisions about product and / or product development are taken primarily based on customer complaints and novelty elements in alternative products.

On the other hand, in the active phase, radical and rapid improvement measures of the product and production system are being implemented, aimed at switching to the production of a new product that could more fully meet customer quality requirements.

The last element of the QMS included in the work is mutually beneficial cooperation partnerships. In an effort to build this QMS and manufacturing compliance element, it's important for managers to be aware of what are the key partners and have mutually beneficial relationships. Ready-to-use, and in all cases, useful answers to these questions is not a question of experience and intuition. But the manager should understand that his company is isolated from others - potential co-operation partners are not able and will not be able to produce products that will meet the customer's quality requirements. The above theoretical aspects of QMS, production conformity systems and customer quality requirements are used for continuation of theoretical and applied research in relation to the compliance of manufactured products with customer quality requirements and the continuous improvement of the product produced.

Conclusion

The European Economic System employs more than 23 million small and medium-sized enterprises, or 99.8% of the total number of companies, with a value of over 4 billion Euro, employing more than 90 million economically active population, making SMEs the most significant aspect of socio-economic development. SMEs operating in different countries of the world have shown a relatively high level of competitiveness and have surpassed the performance of large companies in certain sectors of the economy. SMEs are more flexible in responding to changes in the goods and services market, they are overwhelming in creating new jobs, therefore, in many countries of the world, much attention is being paid to the competitiveness of SMEs

Drivers and / or owners should take into system that any recommendations made in the external environment do not give rise to production conformity systems and the production of quality products, and can’t give a positive result until the manager and / or owner himself / herself is aware of the uniqueness of its business, its competitive advantages and disadvantages by taking internal and / threats and opportunities prevailing in the external environment

It is important for the SMEs managers to take into account the fact that its operation is based on several elements of the quality management system, the most important of which are the management and personnel of the company, their interdependence; the internal environment of the company and the threats and opportunities prevailing therein; business processes, their interdependence and complementarity; systemic thinking in management decision making; feedback and their effective operation; mutually beneficial cooperation partners.

Within the framework of the study, a model is developed that reveals the transformation of quality requirements into compliance requirements, demonstrating that in one product several quality requirements are matched, the content of which is determined by the purchasers, creating a set of qualitative requirements.

The customer quality requirements identified in the market research are used to select the requirements for the product to be manufactured, or the fixed quality features that remain unchanged for some time. The model shows that the SMEs manager decides on the quality requirements to be recorded in the product to be manufactured, which are presented as conformance requirements.

To enable SMEs to maintain its competitiveness in the target market or increase it, it is important for him to include in his product the most qualitative requirements that are most relevant to the customer, but increasing these quality characteristics makes the product manufactured more expensive and more difficult for the buyer.

The developed production conformity system model complements the quality requirements transformation model, revealing how the production of the appropriate product and the monitoring of compliance requirements in all production processes lead to the product being transformed into the quality product required by the buyer when it

comes to the market.

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Talent Management for Industrial Engineering in German Language

Laura TRIFAN
University Politehnica of Bucharest, ROMANIA, laura.trifan@upb.ro

Cristian MUSTATA
University Politehnica of Bucharest, ROMANIA, cristianmustata@yahoo.com

Ioana GUICA
University Politehnica of Bucharest, ROMANIA, guicaioana@yahoo.com

Tania BREZEANU
University Politehnica of Bucharest, ROMANIA, taniabrezeanu@yahoo.com

Abstract

The paper presents relevant figures and a general macroeconomic picture of an emerging economy like Romania as well as the main aspects that determine and influence the employment decision of graduates, with emphasis on the engineering in foreign languages, especially the German language, as well as the roles of the actors in the talent management process. Informed persons take their decisions rationally, fully aware of the situation and their options. Bachelor and master graduates face the challenge to understand the local, regional, and global economic situation as good as possible, identify the opportunities, make the best choice for their career, and find the path in their specialization to the best suitable job consistent to their talents and to a work-life balance. Based on data acquisition about the graduates of the German stream of the Faculty of Engineering in Foreign Languages, the paper enumerates some examples of job titles they hold.

Keywords: engineering in foreign languages, higher education, employment, talent management, Romania, emerging economy

Towards the Knowledge-Based Economy

The present paper exemplifies how talent management and recruitment of persons with academic degree, especially the graduates who studied industrial engineering in German language is covered in Romania, the more so as it is a niche study program, being the only one in the country, with this specialization. Compared to the past, the awareness is higher for the graduates, because of the new type of profile companies are seeking for, with a high demand of specialization and soft skills.

Towards the knowledge-based economy, the simple human resources develop to human capital, i.e. to the value of the workers´ knowledge and the added value they provide through knowledge. Therefore, managing people turned into a high demanding activity, an integrative endeavor of universities, employers, and recruiters, accompanying the various stages of the employee life cycle, optimizing the human capital, and transforming it into talent management. This is a mutual adaptation of the human to the new situations arising with the digitalization and the new technology, which gets ubiquitous.

A responsible data gathering about the alumni, allowed the faculty to follow their employment rate and their career path quite after graduating.

Economic situation – way to Industry 4.0 and knowledge-based economy

The trend in the knowledge-based economy, where the developed countries belong, is based on intellectual capital and on one of its subsets, the human capital as the main business asset. The emerging economies, as Romania was reclassified by FTSE Russell (1) are defined as economies, that have experienced economic growth that is much higher than that of high-income countries for an extended time range, as stated in the book by Tsunekawa and Todo (2019), which move away from the traditional economies that have relied on exports of raw materials and agriculture, through innovation and technological dynamism in a fast economic catch-up, as partners of the developed countries,

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as in the book Globalization and the Emerging State: Past Advance and Future Challenges by Tsunekawa, cited by Medel D. (2019) in his essay on emerging markets. Beside the higher investability, the emerging economies build sustainable value chains as parts of the global value chains. Domestic industries in both industrialized and developing countries have become intertwined through complex business networks created through foreign direct investment and global information and finance sourcing, occupying specialized niches within global value chains, according to Gereffi and Sturgeon (2013) in Global value chains and industrial policy: The role of emerging economies, cited by Gereffi (2015) in the Working Paper.

The process of startup and SME-development goes parallel with the privatization of the key sectors of economies and needs qualified and specialized workforce and skilled labor with high economic value. There is a paradigm shift, a new way of identifying value and capitalizing the intangible assets of companies. Contrary to the fears of Keynes (1930), who warned in his essay about "technological unemployment", a change of the nature of work is perceived, with systemic transformations, which increasingly require a specialized workforce. Beside the fast digitization of companies, the digitalization takes over and provides new opportunities and business models, according to the Gartner glossary, in a strong human-computer interaction. The perceiving and understanding of the human-computer interaction (HCI) have evolved since this concept has been coined in the 1970s. The HCI is like an "arms race" between human and Artificial Intelligence (AI), machine learning, big data, 3D and 4D printers, 5G, Virtual Reality, Blockchain, Augmented Reality and the Internet of Things (IoT), only that the main result must be the co-existence between technology and society and assure that it remains human-centered. As Schwab considered in the book The Fourth Industrial Revolution (2016), "technology is not an exogenous force over which we have no control".

Human values need an adaptation in relation to the computing innovation and possibly will become more critical as researchers come up with ever more ingenious and potentially intrusive ways of sensing, monitoring, collecting, and sharing digital information, as anticipated in the book Being Human. Human-Computer Interaction in the Year 2020, edited by Harper, Rodden, Rogers and Sellen (2008). This is the only path for companies to resist on the market, develop and make profit.

Adaptability is demanded from employers or employees, as individuals, from the companies, as organizations and from the digital technology, in a process of Digital Darwinism, which was defined as "an era where technology and society are evolving faster than businesses can naturally adapt" as Schwartz (1999) stated in his book about Digital Darwinism and where businesses must keep up with a high demand for technology, information systems, and responsiveness (to data, communication, and customers´/stakeholders´ expectations).

At this moment, there are two types of signals coming from the market, proving the same trend. The market-listed companies show a rather reluctant conjunctural behavior as Weisenhaus (2020) states in his article, with the pandemic effects already priced in, according to dts New York (2020), and the stock exchanges are recovering, inching up with higher investments predominantly on technology titles. On the other hand, in the EU, one in 10 SMEs in Europe could be expected to file for bankruptcy within the next six months, according to Dimson, Mladenov, Sharma, and Tadjeddine (2020), in their article COVID-19 and European small and medium-size enterprises: How they are weathering the storm.

A recent report of the World Economic Forum (2020) about the Future of Jobs, predicts by 2025 a disruption of about 85 million jobs and that 97 million new jobs may emerge "that are more adapted to the new division of labor between humans, machines and algorithms", whereas 40% of the workforce will be able to re-skill.

1. 2 Romania, Balkan country. Some figures

With a population of 19.52 million inhabitants, the workforce distribution on the economic sectors is as follows: 47.55% services, 30% industry and 22.45% agriculture. Approximately 3.4 million Romanians live abroad. The EU-accession was in 2007, together with Bulgaria, when the second wave of Eastern Extension took place.

There are financial problems in the educational system, e.g. schools and high-schools are underfinanced and there are still some disparities between the development of the urban and rural areas, although the rural and poor areas have improved over the last two decades, at least in economic terms (in 2018, the five poorest areas – rural areas in Romania – had 18.3% to 25.4% of the average GDP per capita in the EU). In the time 2000-2018, Romania achieved an 80% increase of relative improvements in the urban area (with a real income convergence), compared to the EU-average, but the disparities between urban and rural areas persist (equipment and facilities, internet connection, the number of teachers), as presented in the study of Eurostat (2018), Methodological manual on territorial typologies.

Romania has a mean download speed of 61.08 Mbps and is ranked no. 26 worldwide. An index showing a high digitalization potential is that of the private households with internet access (83% in 2019) as a statistic of Eurostat

(2018) showed. A further Eurostat (2019) statistic states that round 23% of the enterprises have ERP solutions, compared to about 37% in the EU-27.
According to an annual report (2019) of the National Bank of Romania, the foreign investments in Romania decreased with 68%, from 4,364 bn Euro, in the first eight months of 2019, to 1,395 bn Euro in the first eight months of 2020. Traditionally, the main investors are Germany, Italy and Netherlands.

Positioning Romania in the economic picture

Between brain drain, start-ups and getting employed in a big company, there is a force field that gives the great potential of the economy, despite the inherent difficulties. After presenting some figures and options on the labor market, some opportunities are detailed, and some conclusions are drawn.

Labor Market – domestic and foreign – temptation to go working abroad, skilled migration

Romania has been admitted for 13 years in the EU, during this time a broad reform and adaptation to the European higher education area has taken place, which includes the fact that curricula are adjusted to the needs of the EU labor market and graduates get interdisciplinary technical, economic and management skills, in the pursuit of a high employability and a quality employment.

According to a report of the National Statistics Institute, the Labour Force in Romania. Employment and Unemployment (2019), the highest level of employment rate for working age persons was registered among graduates of superior level of education (89.2%). As the level of education decreases, the employment rate also decreases.

Complementary, according to Eurostat Regional Yearbook (2020), edited by the European Union, about 38% of the Romanian specialists worked in science and technology, with the highest number in Bucharest (50.8% of the labor force) in 2018. This is only one of the figures that demonstrate the monocentric pattern of development in Romania, with a concentrated activity in and around the capital.

Romania recorded very low old-age dependency ratios (which is positive aspect) and the commuter zones surrounding Bucharest were relatively small, accounting for less than 15 % of the total population in their functional urban areas. The figures show the tendency of concentration of big and small companies in the capital and in the important cities, with effects on the renting prices and the household burden for living several years during academic studies and after graduation. The highest activity rate (90.6%) was registered for persons aged 15-64 years with higher education level (university of short and long term, including master's, doctoral, postdoctoral and postgraduate).

Table 1: share of students in tertiary education institutions in Romania (academic year 2019-2020)

Tertiary Institution	Percentage
Business, administration, law	24.1%
Engineering, construction, manufacturing	20.4%
Health and welfare	13.9%
Social sciences, journalism, and information	9.0%
Arts and humanities	8.9%
ICT	7.2%
Agriculture, forestry, fisheries, veterinary sciences	4.5%
Natural sciences, mathematics, statistics	4.4%
Services	4.1%
Education	3.5%

The share of students in tertiary education institutions in Romania in the academic year 2019-2020, by field of study shows that the “engineering, manufacturing and construction” branch is among the highest in demand, on the second place with 20.4% (among the highest share in EU), after “business, administration and law”.

The student-academic staff ratio in tertiary education is 19.4 (number of students per member of academic staff), compared to the EU-28 average of 15.4, according to a Eurostat (2017) statistic regarding the tertiary education, which is a rather good number.

The skilled migration drove Romania to the top countries with the highest international migration rates worldwide: 7.3% p.a., second placed after Syria, as in the International Migration Report 2015: Highlights. In a report for the

World Bank by Dospinescu and Russo (2018), figures show that between 1990 – 2017, Romania registered the highest rise in the migration stock among all EU states: 287%, producing a loss of human capital represented by highly skilled workforce, with negative impact on the key sectors of the economy (health, informational technology, civil constructions, education, and physics) and capitalization of investments in the educational system by the destination countries, but on the other hand with positive effects like high remittances to countries of origin and decrease of unemployment rate.

The EU-integration brought a significant change in the Romanian migrant profile: "the mobility for labor of professionals in the context of the economic-financial crisis seems to set up the foundations of the skilled and highly-skilled personnel migration for labor", as stated by Iacob (2018), in the Romanian Journal of Communication and Public Relations.

As in a statistic of Eurostat (2019), research shows that in 2019, Romania had the lowest share (25.8%) of people aged 30-34 with tertiary education in the European Union.

The motives invoked by the migrated workforce are categorized as follows:

- economic factors: economic instability, unsatisfying salary level in Romania, lack of work position corresponding to the professional skills in Romania, infrastructure
- socio-political factors: political and legislative instability, corruption, status of the education system, status of the sanitary system, reunification with family already established abroad, social pressure, Romanian lifestyle
- organizational factors: limited number of career opportunities, leadership at the workplace in Romania, the interaction with co-workers in Romania

The Path to Entrepreneurship

A statistic from Eurostat (2020) regarding Structural Business Statistics. Business Demography Statistics shows that in 2018, in Romania, 135,532 new businesses were registered, while 80,181 deregistered, cited by Păunescu and Molnar (2020) in the article Country's Entrepreneurial Environment Predictors for Starting a New Venture—Evidence for Romania, while in 2020, statistics from the Romanian National Trade Register Office present a decrease of the average number of incorporations of natural and legal persons, in 2020, compared with 2019, with about -27.76%, depending on the 41 counties, the least decrease was in Bucharest and Ilfov county (-2%) and the highest in Arges county (-44.5%). The branches with the most SME incorporations are: Professional scientific and technical activities, trade and repair centers, construction, Information Technology and Communications.

As in the statistics of the National Trade Register regarding the student registrations in 2020, among the companies founded by students, from 19,880, only 9,196 are still functioning, the other were closed after a period of 3 years.

Financing Innovative Start-ups with potential

According to the Global Innovation Index (2020), the current crisis influenced the innovation at a time of flourishing. In 2018, research and development (R&D) spending grew by 5.2%, after recovering from the financial crisis of 2008-2009. Venture capital (VC) and the use of intellectual property (IP) were at an all-time high and policies provide a strong fostering of innovation, including in developing countries, in a promising trend.
Basically, figures show that:

- the pandemic has not changed the potential for breakthrough technologies and innovation
- top companies and R&D spenders will continue their respective activities of R&D, IP, and innovation for competitivity
- top R&D firms in the information technology sector, will push to digitalization and foster innovation
- pharmaceuticals and biotechnology sector will experience R&D growth because of the new focus on health R&D
- transport will migrate to "clean energy"
- innovation catalysis in traditional sectors (tourism, education, retail) but also on organizational level

This innovative potential requires government support as well as collaborative models and continued private sector investment in innovation.

On global level, the crisis has modified the financing scheme of VC deals that had started before the pandemic. Rather than financing novel, small, and diverse start-ups, venture capitalists began focusing on so-called "mega-deals",

boosting a number of large firms rather than giving money to a broader base of start-ups. Less early-stage VCs, by R&D-intensive start-ups with longer-term research interests in fields such as life sciences, and by ventures outside of the top VC hotspots. Current VC investments are concentrated in a few hot spots in the world (Israel, Hong Kong, Luxembourg, the USA, the UK), and only a few in emerging economies (China, India, Singapore), mainly towards health, online education, big data, e-commerce, and robotics.

According to Romania Insider (2019), Romanian venture capital fund GapMinder launches new selection round for startups and the article of Purice, Polish entrepreneurs launch in Romania Mill Games, the first accelerator to invest in independent gaming studios, main VC funds in Romania are: Catalyst (the first private equity fund designed for Romania), GapMinder (targeting IT Software and Services start-ups in Romania and Central Eastern Europe), Mill Game (Polish investment accelerator for game developers), Early Game Ventures (an early-stage venture capital firm in Romania investing in startups that create new industries in Europe's emerging markets), ROCA X (investment fund focused on early-stage tech startups), Cleverage Venture Capital, Founders Bridge, SeedBlink (crowdfunding platform) (medical service providers selling preventive medical packages to firms), Gradient Ventures, Techstars Ventures, Next Capital (for telemedicine), Sparking Capital (for circular economy, waste recycling).

Furthermore, there are some Business angels and private investors for tech start-ups like job recruitment platform through gamification, park-sharing application, software robots to provide companies with a faster way to automate processes etc.

Eliciting the fact that consumers spend more and more time online, some innovations in e-commerce are: omnichannel retail and industrial services (e.g. in real-estate), a marketplace for software applications.

The article of Cristea on Business Review (2020) states that foreign investments continued in Romania despite pandemic: expanding the production operations, greenfield investment, IT investment (mobile and embedded devices, software), R&D investment, a regional hub investment, scaling up investment.

Although there are first steps of financing tech start-ups by VC and business angels, the percentage is still small. Despite the high interest for entrepreneurial education and the wide range of courses and trainings about how to start a business, the step into entrepreneurship is strongly connected to the personal decision of young persons to take risks and responsibilities and choose the entrepreneurial pathway instead of the status of an employee of a big company or look for a job abroad.

Slower innovativeness on local level

Most of the Central and Eastern European countries have a moderate degree of innovativeness, Romania is an exception, being classified as a modest innovator, positioned below the EU-average, shows the report European Innovation Scoreboard (2019).

One essential cause of the slower innovativeness is the fact that some of the companies perceive barriers to digitalization. Some of them are:

- falsely perceived high cost
- difficulty in integrating a new software
- wrong mindset of not perceiving the time pressure and missing the opportunities
- lack of digital skills
- resistance to change.

Yet, the internet is a major driver for economic growth and over time more and more companies are coming to this conclusion. Big challenges occurred in the educational system. Higher education as a driving force is continuously adapting to this process.

Higher Education and the digitalization

Due to the pandemic, the academic field is exposed to a fast change of the teaching-learning process, which migrated from presence courses to online learning.

Universities are in charge with harmonizing the profiles of the graduates the labor market require, with the digitalization process and the job offer mutations (new job names, new job descriptions and requirements), meaning that the applicants´ profiles are changing towards digital literacy. That means that the future of university is more than ever entangled with the business field.

Talent Management

Talent management is expected to shift towards digitalization, as well as current psychological counseling.

The ideal situation is when every person finds a job according to their skills and talents, there is a motivational saying about this perfect matching, if you do the things you like, you will never need to work.

The upcoming trend has been lately to make more and more interviews online, saving time, costs and providing environment sustainability, so the pandemic acted as a catalyzer.

There are three categories of students: Those who just want to graduate, those who are outstanding in the theoretical part, they get good marks but have no experience, and those who are not focused on marks, but on internships or voluntary activities.

At present, some companies restrain their activity and cut the costs, because of the pandemic and are not in the situation to pay for the career reorientation of the employees, but the need for skilled workforce remains.

The selection can be made on two levels: the recruiters, as vendors, try to select persons according to their declared skills and competencies in the CV, but the company representative is interested in every detail which reveals the real level of competency and takes the final decision in “hiring and firing”. The importance of the managers is tremendous because they employ the candidates, although they not always know better who is fit for a certain job. In this case, recruiters and employers are allies in the recruitment process.

On the other side, the graduates, as candidates have the essential role of understanding their environment, gathering relevant information, make a rational choice and be able to highlight the strengths and convince the employer of their qualification.

In the sustainability circle, there is one more important actor: the university. The expectation of the recruiters towards universities is to enrich the curricula and adapt them for the new market challenges. Only a self-regulating circuit allows the divergent university curricula to be permanently adjusted and thus be corrected and adapted to the labor market requests.

The permanent strive of the higher education is to continuously modernize the curricula and keep it balanced and fill the gap between the CV and the effective competence.

The digitalization is a tremendous activator of rearranging the existing values and creating new dimensions, which induce a collaboration among the three parties, assisted and supported by the university and provides accuracy in solving the crisis and sustainability of the process.

The Innovative Perspective of the Recruitment Companies

Generally, the main challenge of the recruitment companies is matching the best applicant with a certain job offer. Therefore, assessments need accuracy, to satisfy both the objective and subjective expectations of the employers. According to a study conducted in 2016 by LinkedIn Talent Solutions (2019) that surveyed 1,297 hiring managers in 6 most important job markets in the world, the "potential means slightly different things to different companies".

Equally important is the personalized approach to the questions asked in the interview, for revealing the true potential of a candidate and highlighting it. It is not so relevant and conclusive to apply a set of closed and classic questions that restrict their true personality and sometimes push candidates to come up with pre-prepared answers. The most important qualities for a candidate are his soft skills. According to the study, there are six very important skills, namely Adaptability, Culture add, Collaboration, Leadership, Growth potential and Prioritization. These soft skills are closely followed by some key questions, which are not so predictable by candidates. The answers to these questions are not categorized as "good" or "bad", but as important for creating the candidate's profile as a whole. These answers follow the candidate's thinking and behavior in certain unexpected or unforeseen situations.

Traditionally, companies resort to recruitment companies and rely on them for hiring and training of the employees. Either a company has its own department, which supervises the career plan of each employee, or makes outsourcing to a specialized recruitment company, in case of SMEs. The innovation in human resources implies the entire interaction between organizations and its people and includes methods for talent assessment and management, as well as new innovative metrics to emphasize the important aspects of talent seeking, employment and management.

The pandemic forced the large-scale shift to remote working, creating a marketplace for remote or hybrid work. The report Labour Force in Romania. Employment and Unemployment (2019) evidenced by both strong demand from jobseekers (2) as well as an increasing demand from employers for jobs that are based remotely (3). These circumstances forced new concepts for doing business and continue the working activities. Among the new concepts there are variable staffing models, like a blended team. That implies high adaptability and flexibility and a mindset for unexpected tasks and uncertainty. That makes teamwork crucial for the successful solving of the tasks. Notions like core team (4) or team alignment get a new weighting. Just as it is very important to take soft skills into account in digital recruitment, it is just as important to test the candidate according to the theories of personality types and thus gather and facilitate analysis of information about teams or specific groups of people, based on the result of interactions in terms of preferences, interests, reactions, values, motivations, and skills. This characterization can very effectively determine a candidate's personality and adaptability and his inclusion in a core team.

The recruitment has three perspectives: of the employer, of the recruiter and of the job seekers; each one´s needs are important. The employer demands graduates with solid knowledge and some practical experience, at reasonable costs. The recruiter (which is a vendor) is the intermediating part (first has to understand exactly the needs of the employer, then seeks suitable candidates) and the candidate (searches for the best workplace, with reasonable pay and perks).
As consultants from recruiting companies state, the tendency is that students and graduates usually don´t ask for specialized counseling and a career development plan, sometimes not even when this action is financed through a project and the candidate would get consultancy for free. Instead, it is usual to rather ask friends or relatives for advice.

The advantages of a specialized coaching for finding the most adequate job are undeniable. The assessment elicits general essential features of the person, for a higher awareness on the job seeking, or specific features of the person towards a specific job profile and an assessment based on psychological aptitude tests reduces the seeking area to the most adequate jobs according to the strengths of the person.

If the competencies and skills lack from the candidate´s profile, training and re-skill are recommended. Sometimes qualified and specialized workforce is hard to find, so the burden of additional training falls on the employer.

The Role of the University as an Agent for Talent Management

In the Talent Management Handbook, Second Edition: Creating a Sustainable Competitive Advantage by Selecting, Developing, and Promoting the Best People, Berger and Berger (2010) conclude that Universities assist companies in their objectives related to talent management: to discover and promote new talent, to train, inspire and coach future leaders, to retain and reward the best people and thus implement a culture of organizational excellence. Universities have the first chance to identify, acquire and promote new talents, while building up new competencies on their way to graduation. Additionally, in the book Strengths-Based Recruitment and Development: A Practical Guide to Transforming Talent Management Strategy for Business Results, Bibb (2016) finds that “afterwards companies should find which of these talents are naturally fit for the jobs they need, as this approach promises more success compared to only find the people who can do the job”.

With an international experience of almost 30 years, the Faculty for Engineering in Foreign Languages has excellent connections to many of the companies with foreign investors, supporting companies in finding proper workforce for their open positions in engineering and management.

Instrumental Skills and the Market Value of a Graduate

A decisive task of the university teachers is to focus on core competencies, abilities, aptitudes, and instrumental skills beside the economic and technic skills, essential to be induced to the students, for getting them well equipped for the future. Instrumental skills are mainly instrumental values, which optimize the problem-solving capacity, keeping the balance at the workplace (calm, happiness, contentment, patience, active listening, leader vs. manager).

The Market Value of a graduate is illustrated in the rapidity of finding a job after applying and fitting perfect to the job according to the person´s qualification and specialization and to the total satisfaction of the employer. The whole process should lead to the win-win situation where both parts are content with their choice.

By understanding its role, universities contribute to a better adaptation to the workforce (5) sustainability through its specific instruments.

A Higher Responsibility within the Experiential Learning Cycle

The Experiential Learning Cycle undergoes a transformation to a quality Learning Cycle which includes the selection of the best suitable information from the flood and redundance of the information. In the author´s opinion, a rigorous selection of the courses the person enrolls in occurs, and thus Kolb´s model gets a new stage (see Fig 1), when students actively decide and choose the most adequate courses which bring them the most significant information and help them get the skills and competencies they need for employment. This is a feature we induce in our faculty by all the curricula, teaching the students who to learn, through giving them the choice and offering them the instruments to make rational decisions in what they need for their specialization, but they also like to learn, according to their preferences and talents. The active selection provides optimal information, and the student is at the right place and chooses the optimal combination of disciplines, so he/she will never have the impression that information is redundant or irrelevant.

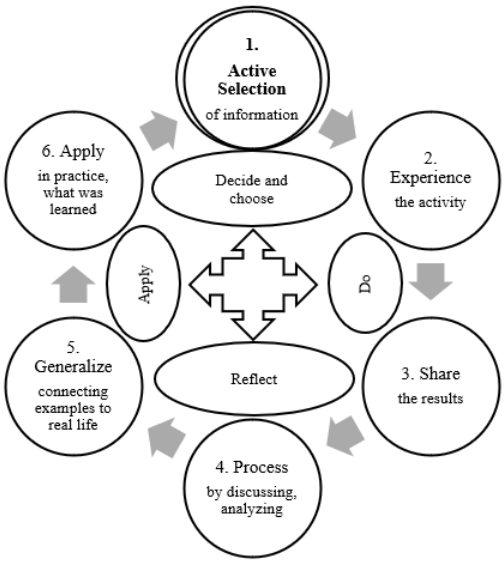

Fig. 1: The Revised Model of the Experiential Learning Cycle (own representation)

A student that internalizes this learning methodology activates a high degree of selectivity and optimizes the learning process. Online courses require and induce a higher responsibility to the students, they get aware of the essential aspects that they need for a job that fits to their profile and build a career. On one side, the student learns to make rational options, on the other side, the faculty tries to permanently improve and optimize the curricula.

The entire perspective of the economic climate is eclectic and demanding for the young graduates and creates an interplay between the temptation to work abroad, start-up a business or get employed.

An example for the involvement of the German Stream from the Faculty of Engineering in Foreign Languages in the Talent Management

The German stream of the Faculty of Engineering in Foreign Languages is not so numerous, so it might be considered a niche. The interest of the German companies is high because the faculty it is a pool of German speaking graduates. The Job offers are generally sent to us, teachers, as one of the important recruitment channels for the companies. On the shortest way, teachers forward these job requests to the students or even to the graduates, over the Alumni Network.

Center for Counseling and Career Orientation

The University Politehnica of Bucharest (UPB) takes the agent function for talent management very serious, through its Center for Counseling and Career Orientation, students may get counseling and workshops on various topics, from writing a CV, time management, identification of the personal values, to sessions about discovering entrepreneurial skills.

A survey among the students and graduates of the German Stream at the Faculty of Engineering in Foreign Languages (N=56 after sampling) showed that 26.9% knew about the activities of the center and got information about:

- jobs in Romania (80.8%)
- jobs abroad (57.7%)
- study opportunities abroad (30.8%)
- study continuation opportunities (34.6%)
- techniques of job hunting (65.4%)
- self-awareness (53.8%)
- career planning strategies (73.1%)

Only 3.8% were counseled by a HR company, 57.5% got counseling within an EU-project and only 3.8% got counseling within specialized courses (Social Competencies, Personal Competencies). A first conclusion is that there is improvement potential in the communication among the center and the students, for a targeted information.

Initiatives on Faculty level

Many initiatives support the students and graduates in job seeking and in practical trainings:

- simulation of a job interview with representatives from companies or the Romanian-German Chamber of Commerce and Industry (AHK Romania)
- participation at POLIFEST (the annual career expo of UPB, which presents the educational offer, the industry-university partnerships and offers study taster days for high-school students)
- specialized courses and seminars on topics like: Leadership, Business communication, Social competencies
- stressing out entrepreneurial skills through gamification and within the Entrepreneurial Hub
- assisting the student organization of the German stream for preparing talent management events
- collaboration with recruitment companies and pointing out their role in the career planning of the students

The yearly survey carried out by the UPB highlights the fact that the graduates of the German stream record a 100% employability after their bachelor´s degree, some of them work part-time even during studies. This sheds a light on the employability profile of the graduates. The fact that our graduates have a very high employment rate demonstrates that their market value is high as well.

Analyzing the responses to the surveys made every 5 years (0-5-15 years) by our faculty, some of the job titles our graduates hold, are: Head of Sales Operations, Senior Buyer, Managing Director, Marketing Director, Technology Consultant, Credit and Risk Manager, Product Manager, Cost Manager, Salesforce Technology Analyst, International Key Account Manager, Brand Manager, International Purchasing Director. Few of them (three graduates, meaning 1%) are freelancers or founded their own small company in the last 5 years.

In the last decade, opportunities for studying abroad increased very much, thus students could gain a lot of management and technical experience on international level and practice the language among German speaking natives.

Conclusions

As an emerging economy, Romania has a great potential for foreign investments and the development of the innovative SME sector, and a rather good digital infrastructure, in terms of internet speed and ERP solutions. Nevertheless, there is a high demand for sustainable investments, to absorb the well qualified workforce. On one side, the attraction of the jobs abroad is high, on the other side, there are good opportunities for graduates to get employed in an innovative company or to start-up a business in an innovative field.

The paper presents some facts and figures about Romania, regarding the status of the higher education graduates and their perspectives to develop a career in the country and as a case study, the perspectives of a niche: the German speaking graduates with industrial engineering specialization.

The Faculty of Engineering in Foreign Languages understands its role of an education agent, which actively helps intermediating graduates for best fitting jobs, according to their knowledge, skills and aptitudes, through optimized curricula, continuous improvement and through the networks and university-company partnerships, which give graduates the opportunity to find their career path.

Our faculty is very active in keeping up the contact to its graduates in a network which means knowing about each other and providing information about practical stages or jobs for the students. Through its international experience and the know-how, curricula on technical and managerial knowledge, with a strong entrepreneurial focus is permanently adapted and kept up to date to the requirements of the labor market.

The actual research focused on the extent on which the information provided on university level reaches the students from our faculties. The figures show that there is space for improvement in communication and that the direct connection between the faculty and the companies, assure a good information flow, regarding the job opportunities for students and graduates.

Although on macroeconomic level, the tendency is to export workforce in other countries, when the performance characteristics and the qualifications meet the labor market needs, then the labor market value is high (100% employability), and our graduates find adequate jobs in Romania or (to a lesser extent, because of the economic risks) get financed for innovative start-ups and develop their career (as an alternative to the IT-branch, which definitely is a success story).

Acknowledgment

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Endnotes

(1) Starting from September 2020, Romania was reclassified by FTSE Russell (the trading name of FTSE, wholly owned subsidiary of London Stock Exchange Group (LSEG) and is a unit of the Information Services Division) from Frontier to Secondary Emerging market status within the market benchmark and will be included in the FTSE Global Equity Index Series (GEIS) from March 2021). This is a step forward for the foreign direct investments from the point of view of investability and stock-exchange presence.
(2) Jobseekers searching for roles on the LinkedIn platform using built-in remote job filters, normalized against changes to all job searches.
(3) The share of job postings, which use number of keywords (i.e. 'remote work', 'work from home', home office') in 10 different languages, as well as built-in remote job filters.
(4) The theory of psychological type introduced by Carl G. Jung in 1920. This theory outlines a characterization of the person in depending on the types later developed in the form of a correspondence table with 16 personality types by Isabel Briggs Myers in 1940 based on the initial study.
(5) Workforce refers both to employment and self-employment.

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Forecasting Time Series: Trend Function with Wavelet

Monika HADAS-DYDUCH

University of Economics in Katowice, Department of Statistical and Mathematical Methods in Economics,
40-287 Katowice, ul. 1 Maja 50, Poland
Email: monika.dyduch@uekat.pl

Abstract

The aim of this article is to present the author's combination of the creeping trend method with wavelet analysis. The purpose of merging the above-mentioned methods are short-term prediction of time series - several elements, even though as a rule wavelets are used for series consisting of at least several dozen observations. The applied creeping trend method has been modified in several essential stages. The proposed model is mainly used to predict macroeconomic indicators.

Keywords: wavelets, macroeconomic indicators, prediction, creeping trend.

Introduction

Forecasting is a technique that uses historical data as inputs to make informed estimates that are predictive in determining the direction of future trends. Businesses utilize forecasting to determine how to allocate their budgets or plan for anticipated expenses for an upcoming period of time. This is typically based on the projected demand for the goods and services offered.

In the other words, forecasting is a technique of predicting the future based on the results of previous data. It involves a detailed analysis of past and present trends or events to predict future events. It uses statistical tools and techniques. Therefore, it is also called as Statistical analysis. In other words, we can say that forecasting act as a planning tool that helps enterprises to get ready for the uncertainty that can occur in the future. Forecasting actually begins with management's experience and knowledge sharing. To obtain the most numerous advantage from forecasts, organizations must know the finer details of the different types of forecasting methods, understand what an appropriate forecasting method type can and cannot do, and know what forecast type is best suited to a specific need. Lets list down some major benefits of Forecasting:

- Better utilization of resources
- Formulating business plans
- Enhance the quality of management
- Helps in establishing a new business model
- Helps in taking best managerial decisions

Accurate forecasting is essential for every manufacturer, retailer, the distributor in the industries. The critical benefits are –

- Increased customer satisfaction.
- Efficient optimization of inventory.
- Better planning to reduce stock out and to overstock.
- Efficient Production Scheduling.
- Reduce the safety stock requirement.
- Lowering the cost of near expiry products.
- Improvement in pricing and promotion management.

The appropriate forecasting methods depend largely on what data are available. If there are no data available, or if the data available are not relevant to the forecasts, then qualitative forecasting methods must be used. These

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methods are not purely guesswork—there are well-developed structured approaches to obtaining good forecasts without using historical data. Quantitative forecasting can be applied when two conditions are satisfied: numerical information about the past is available; it is reasonable to assume that some aspects of the past patterns will continue into the future.

Prediction can be performed with various methods and models. These can be mechanical methods based on series analysis, trend models, econometric models of cause and effect, analog methods, methods based on artificial neural networks, wavelets, etc. The article uses wavelet and two adaptive models to predict time series, i.e. the creeping trend method and the method of exponential smoothing. However, the key role in the proposed proprietary model is played by wavelets.

The aim of the article is to present the author's combination of the creeping trend method with the wavelet analysis based on the Daubechies wavelet, the structure of which is a direct one because it does not require a thorough knowledge of the wavelet theory. It allows you to easily calculate the approximate values of the scaling function and the wavelet. This construction begins with certain numerical values that follow directly from the general theory.

The proposed model can be applied to various social and economic problems (see: Hadaś-Dyduch, Koutsky, Meluzinova, Balcerzak and Pietrzak, 2019; Hadaś-Dyduch, Balcerzak, Pietrzak 2016) . Each problem has its own importance (see for example: Balcerzak, 2015, 2016, 2017, 2020; Balcerzak & Pietrzak, 2017; Cheba & Szopik-Depczyńska, 2017; Dmytrów & Bieszk-Stolorz, 2019; Simionescu et al., 2017; Gavurova et al., 2017; Hadaś-Dyduch et al., 2017; Hadaś-Dyduch, 2018a, b, 2019a, b)

Wavelets

A wavelet is a waveform of effectively limited duration that has an average value of zero and nonzero norm. Many signals and images of interest exhibit piecewise smooth behavior punctuated by transients. Speech signals are characterized by short bursts encoding consonants followed by steady-state oscillations indicative of vowels. Natural images have edges. Financial time series exhibit transient behavior, which characterize rapid upturns and downturns in economic conditions. Unlike the Fourier basis, wavelet bases are adept at sparsely representing piecewise regular signals and images, which include transient behavior.

Wavelets as the Fourier transform decomposes a signal into a family of complex sinusoids, the wavelet transform decomposes a signal into a family of wavelets. Unlike sinusoids, which are symmetric, smooth, and regular, wavelets can be either symmetric or asymmetric, sharp or smooth, regular or irregular.

For different types of signals, you can select different types of wavelets that best match the features of the signal you want to analyze. Therefore, you can perform wavelet signal processing and generate reliable results about the underlying information of a signal.

The family of wavelets contains the dilated and translated versions of a prototype function. Traditionally, the prototype function is called a mother wavelet. The scale and shift of wavelets determine how the mother wavelet dilates and translates along the time or space axis. A scale factor greater than one corresponds to a dilation of the mother wavelet along the horizontal axis, and a positive shift corresponds to a translation to the right of the scaled wavelet along the horizontal axis. The following figure shows the db02 mother wavelet and the associated dilated and translated wavelets with different scale factors and shift values.

The Daubechies wavelet was applied to the research in the article, the basic properties of which were widely described in (Hadaś-Dyduch 2015, 2015c, 2016a,2019d, 2019e). The Daubechies wavelets, based on the work of Ingrid Daubechies, are a family of orthogonal wavelets defining a discrete wavelet transform and characterized by a maximal number of vanishing moments for some given support. With each wavelet type of this class, there is a scaling function (called the father wavelet) which generates an orthogonal multiresolution analysis.

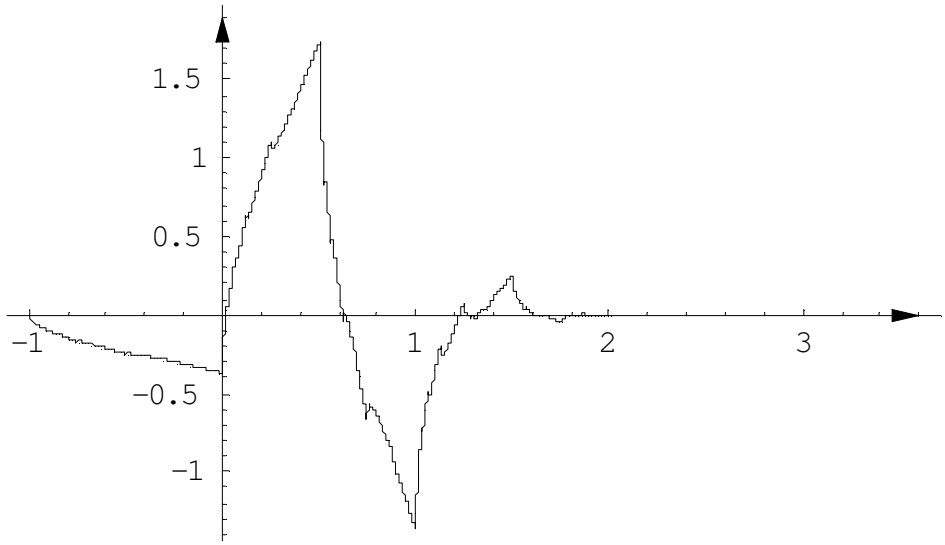

Fig. 1: Daubechies wavelet

For Daubechies scaling functions, the connection coefficients contained in the matrix (Beylkin 1992, Ziółko 2000):

$$F = \begin{pmatrix} 0 & 2 & 0 & 2 & 0 & 2 & 0 & \cdots \\ & 0 & 2 & 0 & 2 & 0 & 2 & \cdots \\ & & 0 & 2 & 0 & 2 & 0 & \cdots \\ & & & 0 & 2 & 0 & 2 & \cdots \\ & & & & 0 & 2 & 0 & \cdots \\ & & & & & 0 & 2 & \cdots \\ & & & & & & 0 & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \end{pmatrix}$$

meet the rule:

$$f_{m,n}^{j} = 2^{-2j} \int_{-\infty}^{\infty} \varphi\left(2^{-j} x - m\right) \frac{d\varphi\left(2^{-j} x - n\right)}{dx} dx = 2^{-j} f_{m-n}$$

where:

$$f_n = \begin{cases} 0 & gdy \quad n = 0 \text{ lub } n \geq 2M - 1 \\ \int_0^{\infty} \varphi(x-n) \frac{d\varphi}{dx} dx & gdy \quad 1 \leq n \leq 2M - 2 \end{cases}$$

$$\varphi_{m,n}(x) = 2^{\frac{m}{2}} \varphi\left(2^m x - n\right), m \in Z,\ n \in \aleph,$$

$$\aleph = \left\{ n \in Z : \sup p\varphi_{m,n} \cap (0,1) \neq \varnothing \right\}.$$

$$f_{-n} = -f_n.$$

Algorithm

Proposed algorithm for prediction of time series with the use of wavelet Daubechies is a proprietary algorithm, later referred to as the M-2 model. The proprietary model is intended for prediction based on a one-dimensional time series. It is intended for short-term prediction. We introduce a time series into the model at the input, which is a one-dimensional, n-element series:

$$y_1,\ y_2,\ y_3,\ \ldots,\ y_n,$$

Then we follow the diagram shown in Fig. 2, as well as in Fig. 3 and Fig. 4.

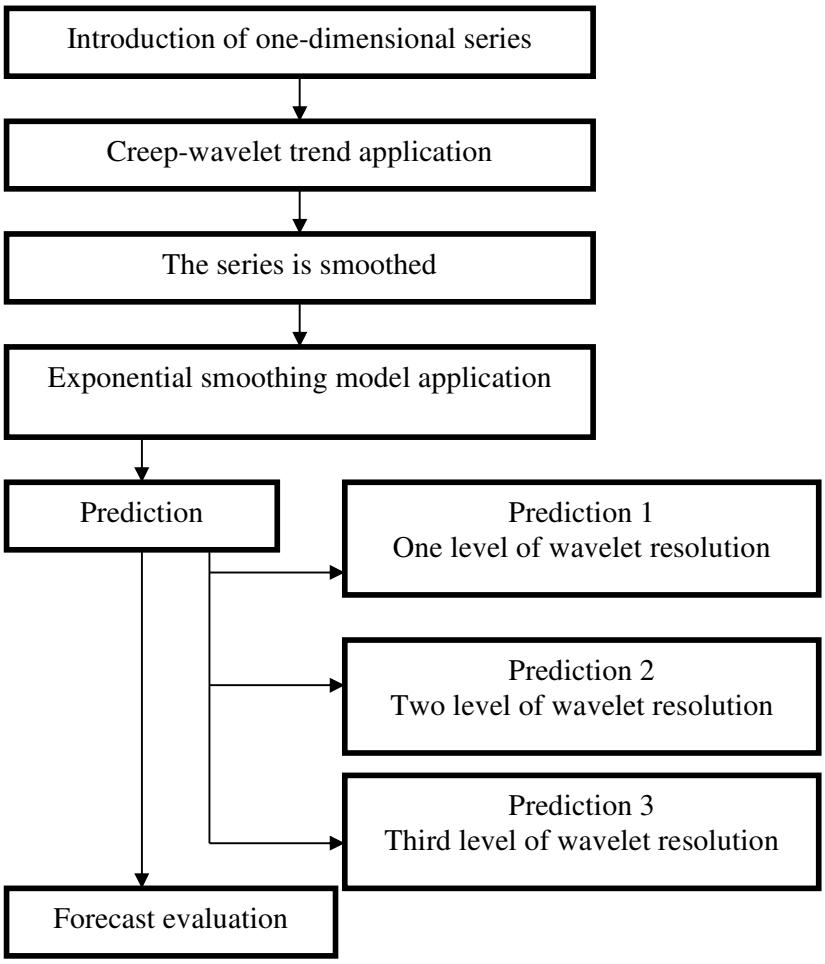

Fig. 2: Graf – one of the step of algorithm

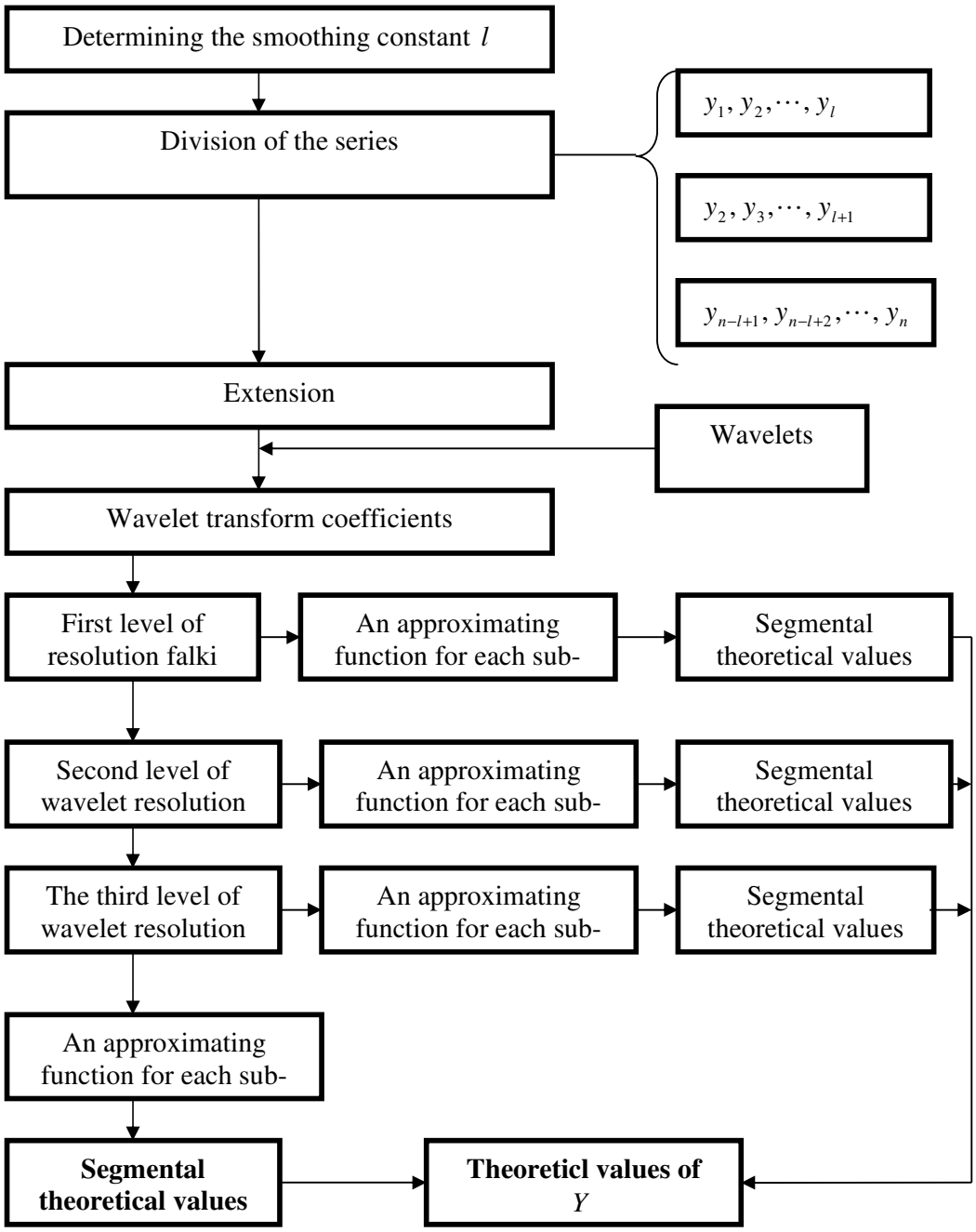

Fig. 3: Graf – one of the step of algorithm

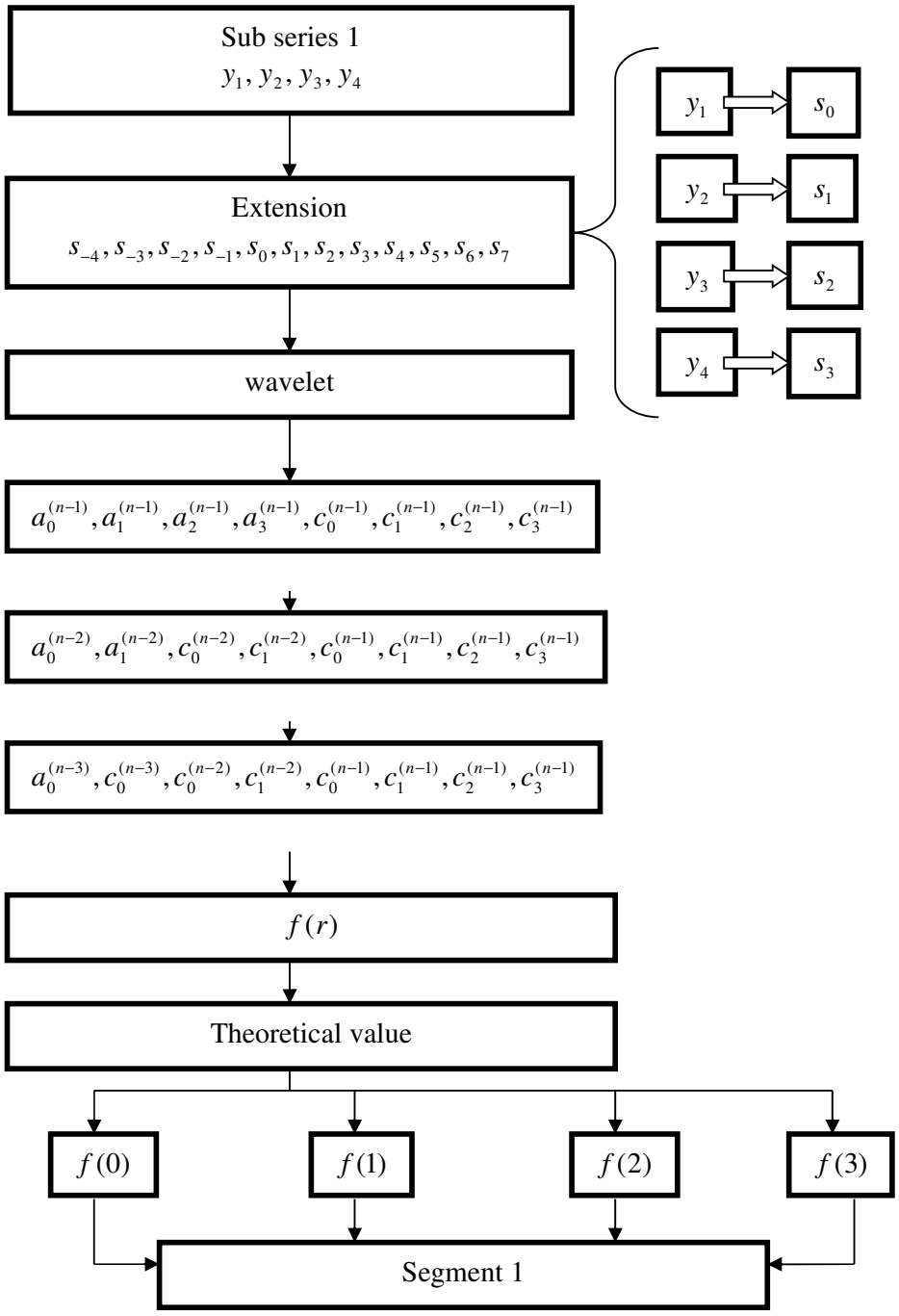

Fig. 4: Graf – one of the step of algorithm

Algorithm Application

This part of the work presents the implementation of the M-2 model. The purpose of implementation is to predict macroeconomic indicators of the euro area countries. A detailed description of the implementation of the M-2 model is presented for the number of unemployed people in the euro area. Data on the number of unemployed in the euro area used to implement the M-2 model were taken from the Eurostat database. For clarity, the description of the implementation is presented in several key steps.

Series

As mentioned above, the implementation of the M-2 model was carried out for the time series presenting unemployment in euro area countries (series). The series included in the study covers the period 1997-2014 ((EA11-2000, EA12-2006, EA13-2007, EA15-2008, EA16-2010, EA17-2013, EA18-2014, EA19), annual average, 1000 people). However, the model was implemented for 2003-2019 data. 2019 was left as the test year.

Sub-series

A subjectively smoothing constant equal to 4 was adopted in the study. Thus, the series representing unemployment is divided into four-element sub-series. We get the following 14 sub-series:

SUB SERIES 1:

$$y_1,\ y_2,\ y_3,\ y_4$$

SUB SERIES 2:

$$y_2,\ y_3,\ y_4,\ y_5$$

SUB SERIES 3:

$$y_3,\ y_4,\ y_5,\ y_6$$

……

SUB SERIES 13:

$$y_{13},\ y_{14},\ y_{15},\ y_{16}$$

SUB SERIES 14:

$$y_{14},\ y_{15},\ y_{16},\ y_{17}$$

Extension of the sub-series

We can extend the obtained sub-ranks by various methods. The article adopts two trivial methods that give the worst results in the wavelet transform, i.e. the method by adding zeros and the symmetric method. The extension matrices in both methods for the analyzed example are as follows:

$$R_{M_1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 14122 & 13503 & 12428 & 11262 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 13503 & 12428 & 11262 & 11004 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 12428 & 11262 & 11004 & 11706 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 11262 & 11004 & 11706 & 12604 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 11004 & 11706 & 12604 & 13084 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 11706 & 12604 & 13084 & 13179 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 12604 & 13084 & 13179 & 12336 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 13084 & 13179 & 12336 & 11238 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 13179 & 12336 & 11238 & 11482 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 12336 & 11238 & 11482 & 14736 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 11238 & 11482 & 14736 & 15565 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 11482 & 14736 & 15565 & 15776 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 14736 & 15565 & 15776 & 17835 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 15565 & 15776 & 17935 & 18928 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$R_{M2} = \begin{pmatrix} 11262 & 12428 & 13503 & 14122 & 14122 & 13503 & 12428 & 11262 & 11262 & \ddots \\ 11004 & 11262 & 12428 & 13503 & 13503 & 12428 & 11262 & 11004 & 11004 & \ddots \\ 11706 & 11004 & 11262 & 12428 & 12428 & 11262 & 11004 & 11706 & 11706 & \ddots \\ 12604 & 11706 & 11004 & 11262 & 11262 & 11004 & 11706 & 12604 & 12604 & \ddots \\ 13084 & 12604 & 11706 & 11004 & 11004 & 11706 & 12604 & 13084 & 13084 & \ddots \\ 13179 & 13084 & 12604 & 11706 & 11706 & 12604 & 13084 & 13179 & 13179 & \ddots \\ 12336 & 13179 & 13084 & 12604 & 12604 & 13084 & 13179 & 12336 & 12336 & \ddots \\ 11238 & 12336 & 13179 & 13084 & 13084 & 13179 & 12336 & 11238 & 11238 & \ddots \\ 11482 & 11238 & 12336 & 13179 & 13179 & 12336 & 11238 & 11482 & 11482 & \ddots \\ 14736 & 11482 & 11238 & 12336 & 12336 & 11238 & 11482 & 14736 & 14736 & \ddots \\ 15565 & 14736 & 11482 & 11238 & 11238 & 11482 & 14736 & 15565 & 15565 & \ddots \\ 15776 & 15565 & 14736 & 11482 & 11482 & 14736 & 15565 & 15776 & 15776 & \ddots \\ 17835 & 15776 & 15565 & 14736 & 14736 & 15565 & 15776 & 17835 & 17835 & \ddots \\ 18928 & 17935 & 15776 & 15565 & 15565 & 15776 & 17935 & 18928 & 18928 & \ddots \end{pmatrix}$$

Wavelet Coefficients

Following the algorithm of the wavelet transform for the Daubechies wavelet, we determine for each sub-series the wavelet coefficients (for the first resolution level), i.e. the coefficients:

$$a_0^{(n-1)}, a_1^{(n-1)}, a_2^{(n-1)}, a_3^{(n-1)}, c_0^{(n-1)}, c_1^{(n-1)}, c_2^{(n-1)}, c_3^{(n-1)}$$

For example, for the first sub-series from the calculation we get the following coefficients:

- extanding sub-series with method 1:

$$a_0^{(n-1)} = 14787{,}72 \qquad a_1^{(n-1)} = 10947{,}66$$
$$a_2^{(n-1)} = 1026{,}21 \qquad a_3^{(n-1)} = 14787{,}72$$
$$c_0^{(n-1)} = 5790{,}82 \qquad c_1^{(n-1)} = -1407{,}75$$
$$c_2^{(n-1)} = 3829{,}86 \qquad c_3^{(n-1)} = 5790{,}8212$$

- extanding sub-series with method 2:

$$a_0^{(n-1)} = 13142{,}89 \qquad a_1^{(n-1)} = 10947{,}66$$
$$a_2^{(n-1)} = 12989{,}17 \qquad a_3^{(n-1)} = 12142{,}89$$
$$c_0^{(n-1)} = -347{,}77 \qquad c_1^{(n-1)} = -163{,}35$$
$$c_2^{(n-1)} = 624{,}40 \qquad c_3^{(n-1)} = -347{,}77$$

Segmental Model

For the first level of wavelet resolution, we obtain 14 segment models. For each model, we determine the function values:

$$\tilde{f}(r) = \sum_{k=0}^{2^n-1} a_k^{(n-1)} \cdot \varphi([r/2]-k) + \sum_{k=0}^{2^n-1} c_k^{(n-1)} \cdot \psi([r/2-1]-k)$$

For $\mathrm{r} = 0, 1, 2, 3, 4$ (where ψ - wavelet Daubechies).

Model

Theoretical value:

$$\hat{y}_1,\ \hat{y}_2,\ \hat{y}_3,\ \ldots,\ \hat{y}_t\ \ \hat{y}_{t+1}$$

we need to calculate

$$m_2,\ m_3,\ \ m_4,\ \ldots, m_t$$

Basing on :

$$m_t = \alpha \cdot \hat{y}_t + (1-\alpha) \cdot y_{t-1},$$
$$t = 2,3,\ldots,n,n+1 \quad \alpha \in \langle 0,1 \rangle$$

Forecast and Forecast Error

Based on the formula (1) and the estimated value, we forecast the number of unemployed euro area countries for the next period. The obtained values do not match one hundred percent with the real value, they are burdened with some errors, which are listed in the table. From the two methods of sample extension proposed in the M-2 model during the wavelet transform, Method 1 gives more accurate prediction results.

Table 1: Errors in predicting the number of unemployed people in the euro area depending on the method of sub-series extension

Method	Error		
	AE	**PE**	**APE**
Method 1	46,3393	-0,2512%	0,2512%
Method 2	118,6669	-0,6433%	0,6433%

Source: Own

Summary

The article presents a combination of the creeping trend method with wavelet analysis and forecasting using the exponential smoothing method. The obtained results of the presented prediction method are relatively low compared to the results obtained with other adaptive methods. For example, the APE error for alpha minimizing the error of expired forecasts in the classical method of exponential smoothing is 8.5267%, while in the classical method of the crawling trend with the prediction method of harmonic weights it is 8.3336%.

The proposed in this article model can be applied to various social and economic problems. Each problem has its own importance. One of the increasing trends in the world for at least a quarter of a century is the progressing socio-economic diversification and cracking the world into two separate blocks - the world of poverty and the world of wealth (see: Cheba, 2015; Hadaś-Dyduch, 2015a, b, 2016, 2016b,c, 2017, 2019c, 2020; Pietrzak & Ziemkiewicz, 2018b, 2019). The social structure is changing (see: Horáková, 2015; Jankiewicz, 2018a, 2018b, 2018c, Jankiewicz & Pietrzak, 2020).

The distances between individual market segments and those remaining outside this market are growing. The benefits of economic growth are not evenly distributed. The richest are quickly escaping and at the same time the area of relative poverty of both the unemployed and some of the employed is growing, even in the conditions of favorable macroeconomic indicators and good economic condition of companies (see Balcerzak, 2015, 2016, 2017, 2020; Balcerzak & Pietrzak 2017; Goryakin & Yevgeniy, 2015; Potrafke, 2015; Kuc, 2017a, 2017b; Pietrzak et al., 2017b; Kuc-Czarnecka et al., 2020; Potrafke, 2015; Sánchez-López, Aceytuno, & De Paz-Bañez, 2019)

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Problems of Commercializing Innovations in The Aspect of Interests Coordination for The Subjects of The Intellectual Product Market

Irina TRUBINA
Orel State University named after I.S. Turgenev, Orel, Russia
E-mail: i-j-i@yandex.ru

Olga RUDAKOVA
Orel State Institute of Culture, Orel, Russia
E-mail: rudakova71@yandex.ru

Elena SEMYONOVA
Orel State University named after I.S. Turgenev, Orel, Russia
E-mail: EM_Semenova@mail.ru

Aleksander ZAKHAROV
Orel State University named after I.S. Turgenev, Orel, Russia
E-mail: zakharovalex78@gmail.com

Lyudmila KUZNETSOVA
Orel State University of Economics and Trade, Orel, Russia
E-mail: gambeeva-1969@mail.ru

Abstract

The article is devoted to the research of processes for commercializing innovations taking into account interests coordination for the subjects of an innovation cycle. The purpose of the research is to characterize the current problems of the market for intellectual products, within which the commercialization of innovations is carried out. Based on the analysis of official statistical information, trends in the development of the Russian innovation market were identified. It is noted that the demand in the domestic market for intellectual property resulting from private businesses is relatively low. It is revealed that the activity of the private sector for investing in the innovation sphere is inferior to the state. The article suggests systematic marketing research of consumers ' requests for innovative products, the formation of a new mechanism for synchronizing financing at the stages of the innovation cycle, expanding the practice of concluding license agreements, developing innovation infrastructure, stimulating investment in science and training innovative personnel.

Keywords: Innovation, Innovation Activity, Innovation Management, Intellectual Resource.

Introduction

To characterize the modern economy, the definition of "knowledge economy" is often used, which emphasizes the importance of intellectual resources as a decisive factor in the efficiency of economic activity. In the knowledge economy, the process of labour-intensive production, based on the mass use of physical labour, takes a back seat. Traditional enterprises, which differ in their traditional capital structure and production organization, are being replaced by new intellectual organizations. The added value of the products in such organizations increases due to the use of knowledge and creative approaches, and the efficiency of production is evaluated by intellectual potential and innovation activity.

Innovation processes that commercialize innovations in specific production structures become a significant argument for structural transformations in the economy (Mashegov, P.N., 2004). The end result of novelties is innovation. In fact, innovation is a useful effect of accumulating intellectual capital, the result of the development, creation and distribution of new types of products and technologies in the production sector. The process of commercializing innovations involves the implementation of new knowledge in a specific product, technology, organizational and methodological approaches. This is the creation of a specific use value and the implementation of a value assessment

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for the results of intellectual activity.

The fundamental essence of the concept forthe commercialization of innovations is to obtain an economic effect from the implementation of scientific and technological development. A simplified scheme for commercializing innovations looks like this: an interested customer or consumer invests in research and development or buys ready-made results of intellectual activity, and long-awaited funding comes to science. At the same time, successful commercialization of innovations requires a balance of interests among all stakeholders in the market of intellectual products, including developers, investors and end users. This study is devoted to the problem of matching the interests among the subjects of the innovation cycle in the process of commercializing innovations.

Literature Review

Research in the field of creating and commercializing the results of intellectual activity is of considerable interest to both domestic and foreign scientists. The relevance of the problems to form an effective system for mutually beneficial commercialization of intellectual property is due not only to the theoretical interest in the laws of development of innovation processes, but also to the practical significance of building effective models for commercializing innovations based on achieving a balance of interests among direct developers, investors, consumers and the state.

Such scientists as F. Khaek, J. Schumpeter, P. Drucker, A. Hosking, M. Peters, P. Senge, K. Vesper, etc. are interested in the problems of innovation management.

Questions of creation and commercialization of intellectual property objects are reflected in the research of I. A. Bliznets, V. A. Bobryshev, G. V. Bromberg, Yu.I. Vorobyov, A. A. Dynkin, R. Kelly, N. M. Korshunov, A. N. Kozyrev, A.D. Korchagin, K. B. Leontiev, V. A. Logachev, V. N. Lopatin, V. L. Makarov, S. V. Morozov, A. P. Sergeev, S. V. Usoltseva, M. Yu. Chelyshev and others etc.

Theoretical and methodological aspects to form an effective algorithm for commercialization of innovations were studied in the works of A. Brett, M.A. Pivovarova, Peter F. Boer, M. Porter, E.A. Kozlovskaya, Yu.V. Radionova, and others. However, the development of models for the commercialization of innovations based on the coordination of the interests between the seller and buyer of intellectual property objects in terms of paying the cost remains a very relevant area for further research.

To find out the best ways to improve the efficiency of commercializing innovations, it is necessary to create scientifically based methods for analyzing the market potential of innovations, forecasting demand and assessing risks at the early stages and in the process of conducting research.

Research Problem

Historical and modern experience of the society development shows that the need for science, scientific achievements, their usefulness, including for individuals, is constantly increasing, that is, the need for knowledge, spiritual and intellectual goods and values should be attributed to unsaturated. At the same time, it should be noted that the demand for innovation results from the industrial and social sectors lags behind the capabilities of the scientific and technical potential. To some extent, this can be explained by the fact that certain economic laws and regularities can be interpreted quite specifically in relation to the products of intellectual activity.

Among the essential features of science and its products, as a specific product resulting from the use of intellectual capital, the following items can be distinguished: uncertainty of costs, terms and results of research and development, "non-digestibility", "non-alienability", non-consumability in consumption, unpredictability and non-obviousness of scientific discoveries and inventions, non-linearity of the world around us. Features of the use value for scientific work are that they do not "wear out"in the process of consumption or "wear out" in a specific way. When transferring this product, it remains with the transmitting (selling) it. Once created, it either does not require new costs to be reused, or they are significantly lower than the cost of creating it. The main characteristics of the use value (cost) of an intellectual product in science at any stage are novelty, originality,uniqueness, as well as timeliness, potential or real profitability (Volkova, T.I., 2004).

The innovation process consists of obtaining and commercializing inventions, new technologies, products, and solutions in the field of production organization. The promotion of an innovative project from one stage to another requires mandatory feedback between the intermediate results of R &d and the market, because it is possible to implement a scientific result or technology only when it is able to strengthen someone's competitive advantage, to bring or to increase profits. Successful development of the innovation process requires multi-stage decision-making

and a variety of connections.

The result of commercializing innovations is the transformation of intellectual property products into a specific product that is sold on the innovation market in order to generate income (Kovazhenkov, M.A. and Bgantseva, Ya.V., 2009). Under the process of commercialization, innovations receive a market assessment of their use value (depending on the quality and novelty of the intellectual product), and their cost is specified (including the basis of evaluating the resources involved in the development and replication of the innovative product).

The process of commercializing innovations is actually determined by the duration of the stages in the innovation process itself, since at the stage of creating an innovation and its industrial development, two factors acquire a special influence: the risk level of investment losses and the level of investment costs. This is due to the fact that the return from scientific and technical activities can only be predicted taking into account the possible risks and the results obtained may not be commercialized. The risk level of investment losses decreases as positive results of scientific, technical, technological and commercial results related to a specific innovative project are obtained.

The following indicators can serve as criteria for selecting an innovative idea that involves subsequent commercialization:

- probability of technical success;
- patent purity;
- availability of scientific and technical prerequisites for transformation into a business idea;
- scientific and technical potential;
- the market potential of products created on the basis of innovation, the capacity of the future sales market;
- estimated production costs and sales price;
- availability and nature of competition;
- features of allocation channels;
- financial and economic indicators of investment efficiency.

The current state of the innovation market in the Russian Federation allows us to evaluate different indicators of innovative development (table 1).

Table 1: Target indicators of innovative development in the Russian Federation (Official website of the State statistics Committee, 2020)

Indicator name	Measureunit	2017	2018	2019
Share of organizations that implement technological innovations in the total number of organizations	percent	20.8	19.8	21.6
Domestic research and development expenditures, as a percentage of gross domestic product	percent	1.11	1.0	1.03
Internal research and development costs by funding source:	percent			
budgetary funds		63.8	64.3	64.4
extra budgetary funds		36.2	35.7	35.6
The share of costs for technological innovations in the total production costs of goods shipped, works performed, and services provided by industrial production organizations	percent	1.7	1.5	1.6
Share of innovative goods, works, and services in the total volume of goods shipped, works performed, and services provided by industrial production organizations	percent	6.7	6.0	6.1
Share of innovative goods (works, services) new to the world market in the total volume of goods shipped, works performed, and services provided by industrial production organizations	percent	0.2	0.2	0.3

Indicator name	Measureunit	2017	2018	2019
Share of innovative goods, works, and services in the total volume of exports of goods, works, and services of industrial production organizations	percent	7.1	6.6	5.2
Balance of export-import for technologies	mln. USA$	-2124,0	-1659,3	-1316,7

Analysis of the data presented in the table allows us to conclude that the domestic innovation market is quite stable. According to comparative estimates of specialists at the Higher School of Economics, who compared the indicators of innovative development of Russia and the EU countries, our country is in the top ten in terms of the intensity to spend on technological innovations. At the same time, it should be recognized that a significant share of the above costs falls on the modernization of the production apparatus (32.6%) (HSE University, 2020). A positive aspect is the reduction of the negative gap in the balance between export and import of technologies. However, Russian investors are not yet ready psychologically and financially to invest in innovative development. The structure of internal research and development expenditures is dominated by budget funds, which indicates an insufficient level of funding from private investors.

Market realities are such that the volume of effective demand is relatively limited, in other words, limiting (this is primarily relevant for the domestic market of the country), so a change in the paradigm of economic relations in the "science – production – consumption" cycle is necessary. And this process is gradually unfolding in Russia.

The stability of the innovation system, the ability to maintain its parameters under conditions of disturbing external influence is achieved with absolute efficiency of communication between the subjects of innovation-direct developers of intellectual products, investors, consumers and the state.

If we take into account that the appearance of the final product of innovation in the sphere of consumption involves the relationship of ten or several hundredseconomic entities, we can imagine the scale of their interaction and the number of economic ties that permeate the economic system.

Rational interweaving of economic relations leads to mutual consistency of the entire system of general, private and individual proportions of production and economic interests, i.e. the balance of the economic system. The alignment of interests is always relative and implies the possibility of deviations from the balance. Specific features of the innovation market create certain problems to coordinate the interests of innovation sector entities.

First, the specifics and transfer of ownership rights to intellectual products have a direct impact on pricing in the process of commercializing innovations. Transactions are mostly private, individual in nature, and there is a possibility of selling the same product and (or) its rights to several persons. The development level of modern information technologies makes it possible for unauthorized replication and use of intellectual property products.

Stratification of property rights, legal and normative regulation of relations between stakeholders significantly increases the protection of copyright. Regulation of transactions on the transfer of ownership, disposal and use of intellectual property objects reduces the number of conflicts and contradictions in the commercialization of innovations.

Second, the innovation market has pronounced features of an imperfect competition market. This is a market for differentiated products with low product interchangeability where a relatively small number of sellers and buyers interact. The asymmetry of the information field also contributes to the reduction of competitiveness. Imperfect information about prices, demand and competitiveness of an intellectual product negatively affects the balance of interests for innovation market participants.

Third, the innovation market is highly influenced by non-market factors implementing these products. These include the influence of subjective factors on price formation, the growth of transaction costs (the costs of specification and protection of property rights, the costs of opportunistic behavior), institutional and financial conditions that differ from the traditional market and are determined by state policy.

The main problems of commercializing innovations in Russia include:

– shortcomings in the tax legislation that is not focused on stimulating the innovative activity of enterprises and the cooperation of all participants in the innovation cycle;
– underdeveloped infrastructure of the innovation market;
– low efficiency of the state scientific and technical policy aimed at preserving, rather than expanding the

reproduction of the country's scientific and technical potential;

– underdevelopment of the small business system and state mechanisms that encourage support for the advanced development of such structures in intellectual production;

– lack of training in innovative professions, both from a quantitative and qualitative point of view;

– capitalization of science mainly at the level of individuals;

– the gap between science and education and, as a result, scientific results are not capitalized in the field of education, and young specialists are not involved in scientific research;

– the risk to degenerate domestic science resulting from external leakage of the best scientific personnel;

– low efficiency of innovation activity, which is due to the underdevelopment of existing institutions, rules, laws regulating economic relations in the innovation sphere;

– low efficiency of the system to protect intellectual property rights, poorly developed law enforcement practice protecting the legal rights forthe owners of industrial property;

– the long-term nature of the necessary research work in the short-term state policy and at the same time the demand for innovation from companies is mostly situational in the absence of long term systemic demand for innovation;

– the impact of supply on demand in the field of innovation at this stage is very weak, which is due to the technological backwardness of most companies, and the "operational gap" between the number of inventions created and the number of inventions actually implemented on a commercial basis in Russian companies is growing.

To find out the best ways to improve the efficiency of commercializing innovations, it is necessary to create scientifically based methods for analyzing the market potential of innovations, forecasting demand and assessing risks at the early stages and in the process of conducting research.

The modern innovation strategy is formed in accordance with the requirements of the new stage in post-industrial society development. The fourth industrial revolution, based on the priority in the development of digital technologies, dictates the need to choose areas of innovation in such spheres as development and implementation of end-to-end technologies thus ensuring the "digitalization" of economic processes. Key areas of support for digital initiatives were identified within the framework of the national program "Digital economy of the Russian Federation" adopted in 2017. These areas are presented as roadmaps to implement new technologies in business processes. Among the most significant are the following: artificial intelligence technologies, robotics, big data and IoT technologies, virtual and augmented reality technologies, and digital innovations in the field of production technologies (Komkov, N.I., Eroshkin, S.Yu. and Kravchenko M.V., 2005).

The implementation of the national program has its aim not only to overcome the delay of the Russian economy behind the technological leaders, including Singapore, Finland, Sweden, Norway, the United States of America, the Netherlands, Switzerland, Great Britain, Luxembourg and Japan, but also to create its own competitive technologies that correspond to the new technological order.

Accomplishment of digital innovations involves mixed financing of projects, since the introduction of digital technologies meets the interests of both the state and the business environment. The financial plan for state support of domestic developments in the field of end-to-end digital technologies involves the use of such tools as the grants allocation, subsidizing the interest rate on the loan, and direct financing of the activities by innovative leaders. Innovative programs are implemented with the help of the Ministry of Communications and Digital Development, the Ministry of Industry and Trade, as well as organizations such as the Russian Venture Company, the SKOLKOVO Foundation, the Innovation Promotion Fund, the Russian Information Technology Development Fund, and others.

The choice of priorities for innovative development also determines the construction of a modern algorithm to commercialize innovations. In our opinion, it is possible to achieve a relative alignment of the interests between subjects involved in the creation and implementation for technological products only if we change the model of economic relations in the "science-production-consumption" cycle. The relationship between these objects of the innovation process is often presented as a sequential (or parallel-sequential) linear relationship between its main links (the so-called "technological push" model). It considers research and development as the source and the only driving force. As a rule, an investor is actively involved in the commercialization process of an innovation at the stage of its introduction to the market. The consumer receives the finished product and adapts it while using it. It is obvious that such a model may have limited application in modern market conditions.

The new economic conditions are more consistent with the nature of communication, focused on the consumption and the consumer. The consumer forms a request for an innovative product, he/she is ready to accept and implement new ideas and technologies. It is at the stage of analyzing a consumer request when an association between an investor and a developer arises. The process of co-financing is carried out in the form of research grants, creation of spin-off companies or strategic alliances.

This structural and logical model implies close cooperation within the agreement relations, including the division of responsibility and risk between science, production and consumption. Creating an intelligent product in the form of new ideas and scientific concepts at the research stage involves timely adjustment for the characteristics of the intelligent product, taking into account consumer requests (Pivovarova, M.A., 2004)

Thus, according to E. A. Kozlovskaya and Yu. V. Rodionova, the developers and consumers' integration in the process of production and development of an innovative product provides a significant economic effect and accelerates the process of introducing this product to the market (Kozlovskaya, E.A. and Rodionova, Yu.V., 2014).

This approach reduces the risk of entrepreneurs ' investments bringing the product to the stage of commercial use, and reduces the cost of consumers to finish and adapt the intellectual product to its needs and requirements. In addition, the consumer will have sufficient information, which creates obstacles for an unscrupulous seller (selling an outdated product, inflating its price, etc.). Close structural and functional interaction will reduce the risk of shadow relations associated, among other things, with the institution of mediation, which is widespread in the intellectual sphere, including the sphere of science (Pivovarova, M.A., 2004).

The principle of state regulation at all stages of the intellectual product movement has a consistent impact on all processes of production and reproduction for an intellectual product. The inclusion of state power and management structures in the model provides legal protection for the developer and the manufacturer, the necessary support of the parties, and external conditions for the normal flow of the innovation process as a whole.

Of course, at the stage of fundamental research, ideas about the production (commercial) consumption of an intellectual product are usually general in nature. It is obvious that it is advisable to emphasize state support on this particular area of research. The implementation of state programs aimed at the development of domestic science can be carried out through co-financing and management, creation of a developed infrastructure for innovation, its scientific-based economic and legal support, compliance with certain proportions in the science – production cycle, etc.

Discussion and Results

Achieving a relative alignment of the interests among the subjects involved in the innovations creation is possible, first of all, by changing the model of economic relations in the cycle "science-production – consumption". Therefore, the concept of effective organization for the innovation processis of great importance. This includes a full cycle of creating innovative developments from the birth of a scientific concept to the creation of high-tech products and its further use to meet the needs of society and the state.

When making decisions about investments in research and determining their economic feasibility, it is necessary to use various methodological approaches to economic calculations that take into account the expected economic, technical, production and other types of effect, the profitability of innovation, and so on.

There is no doubt that to ensure the interdependence and interaction of the subjects in the innovation cycle, systematic marketing research is necessary, including identifying and taking into account consumer requests, evaluating the commercial potential of innovative products and products produced on their basis, the potential market, stimulating demand and promoting products from the manufacturer to the consumer, etc. There is also a need for a new mechanism for connecting science, investors, production, and consumers, which contributes to the commercial potential of innovations.

In recent decades, Russia has lagged behind the economies of developed countries in many areas. This state of affairs is largely due to both external and internal reasons. External reasons are the lack of demand for innovations and new technologies, the lack of state support for science and innovation, and the low attractiveness of science for young people. Internal reasons for the decline in the attractiveness of science are a decrease in the number of researchers, the amount of funding, which is manifested by a decrease in its effectiveness, a smaller number of patents, new technologies being created, and publications in leading journals (Komkov, N.I., Eroshkin, S.Yu. and Kravchenko M.V., 2005).

The problem of implementing research results remains significant for the Russian economy. It is necessary to create a new mechanism for making coordinated decisions, fully synchronizing funding from justification to development of innovative projects and development of their results in the future. The development of such a mechanism based on the strengthening of horizontal relationships between the subjects of the innovation cycle contributes to the coordination of their interests in the process of commercializing innovations.

Today, the country's leadership clearly understands that radical changes in the structure of ownership, production and employment are needed. The need to transit to an innovative economy, long understood and implemented on a large scale by developed countries, is gradually being recognized in Russia, both at the state level and at the level of private business.

The next direction of increasing the efficiency of commercialization is the possibility of attracting advanced foreign production and organizational and management technologies. Without this, it is impossible not only to effectively commercialize innovative developments that correspond to the era of the "knowledge economy" and the intellectualization of production, but also to solve such problems as updating the material and technical base, organizing new high-tech industries, and introducing modern management and marketing methods.

It is necessary to expand the practice of concluding license agreements that can actually save foreign exchange costs and allow the seller to get know-how assistance in improving the licensed product, as well as its commercialization and implementation in foreign markets.

To ensure the large-scale flow of innovation processes in Russia, a well-developed innovation infrastructure is necessary. Also, professionally trained specialists in the field of innovation and technology transfer are needed, since the volume of capital investments in successful enterprises into intangible assets that form the knowledge base is often equal to or even higher than investments in physical equipment (Pivovarova, M.A., 2004). In the modern world economy, under the conditions of high competition in the industrial sphere, it is the efficiency of mastering and improving the mechanisms for commercialization of research and development results that ensures the stability of the innovation process by attracting investors who are always at the emergence of new promising economic sectors.

All the above-mentioned processes should be accompanied by serious investments in science, because it opens up new directions of social-economic and technical-technological development of society. Since R &d often has a long time lag and a degree of risk, and scientists and businessmen sometimes do not get on well, the state should take such a responsibility as being a long-term strategic investor.

Overcoming the scientific and technological gap, switching to an innovative development path, and increasing the efficiency of innovation commercialization requires developing a long-term strategy for Russia's participation in the formation of the global economic, scientific and technological space. This strategy should become an integral part of the national socio-economic development strategy. This provides for the rational use of promising areas of Russia's international specialization, taking into account its competitive advantages. Such a strategy would allow Russian companies to get initial guidelines for forming business plans designed mainly for the future to enter foreign markets, acquire foreign assets, and develop cooperation with partners from other countries.

Only the transition to an innovative development scenario, targeting the widespread use of intellectual capital products, and improving the efficiency of innovation commercialization that meets the interests of all participants in the innovation process, opens the way to modernizing the Russian economy, increasing the pace and efficiency of its development based on the intensive use of domestic intellectual potential and the development of advanced technologies.

In conclusion, ii should be said that the effective functioning of the economic system requires the interaction of all its agents. Investors, manufacturers, scientists, the population and public authorities, despite the difference in motivation, should have a common understanding and a goal – "Development is for the sake of the country's future, not for short–term personal gain". In this connection, it is impossible not to recall the well-known thesis of J. Grata "innovation is, first of all, a state of mind". Unfortunately, as the history of world development shows, it takes tens or even hundreds of years to form a unified public consciousness.

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Smart Home Systems Threats and Security Evaluation

Marian ION[1], George CARUTASU[1, 2] and Alina Camelia PAVEN[1]

[1] Doctoral School, University Politehnica of Timisoara, 2 Piata Victoriei, 300006 Timisoara, Romania, ionmarian@gmail.com, carutasu.george@profesor.rau.ro, camelia.paven@student.upt.ro.

[2] Department of Informatics, Statistics and Mathematics, Romanian-American University, Expozitiei 1B, 012101 Bucharest, Romania.

Abstract

Smart devices and systems are increasingly getting into our lives and our homes. As technology advanced, and more and more devices got "smart", or "smarter", the number, complexity and impact of their addressed threats increased proportionally. As smart devices have reduced capabilities and performances, compared to classic ICT equipment, reduced attack surface and increased cybersecurity level may be expected. Still, the reality differs and, at present time, smart devices and systems bring new threats and increase the risks for ICT infrastructures. Due to their nature, errors, attacks, hacking on smart devices and systems have physical consequences, impacting safety and security of humans and their properties, safety and security of communities, and even nations.

Keywords: Smart Device, Smart System, Cybersecurity, Risk Assessment.

Introduction

While the first prototype of the first known automated house, ECHO IV, became operational in April 1966 as Computer History Museum (2016) published in a curatorial insight, the idea was not new, being prospected by inventors from the industrial revolution when, at the beginning of the previous century, electric home appliances were first introduced to market. As those were not smart devices, 60 more years were necessary to evolve into ECHO IV to control rooms temperature and start and stop some home appliances. In the next 20 years ECHO IV was followed by many other attempts to automate house processes and activities, from the 1969's Honeywell Kitchen Computer as Computer History Museum published (2016), to the more complex systems of the 1990's designed to help elders handle common tasks. Despite the fact that a major progress was made with the invention of micro-controllers and miniaturization, the "smart" revolution took the giant leap in the last 20 years, following the market development in computers, networking, multimedia and, of course, smart mobile terminals. Still, some areas like cybersecurity for smart devices and systems fell behind the market, and advance slower.

A smart home system refers to a system containing appliances, devices and software applications that work together to automatically or manually control the installed appliances from a local data network or Internet (remotely), using a mobile application or device. Securing complex technological environments, containing ICT and IoT technologies is currently a challenging task for professionals, and an almost impossible one for common consumers, as we are also showing in the present paper.

Considerations on Smart Devices Security

All "smart" equipment, device or system is based on 3 main pillars: computing power, programmable capabilities, and inter-connectivity (networking). Combined, they provide a sufficiently large attack surface for any person with some hacking knowledge, proper tools and an interest in getting into someone else data, or privacy.

As part of the larger technological revolution of IoT, smart devices continuously increase their presence in our day to day lives, starting from industrial automation, environmental sensors, or automated public services, to building management, home automation, or support to elders, persons with disabilities or ill people. Smart devices are basically specialised devices performing one or few simple and clear tasks, and contain a processing unit, memory unit, are programmable in certain aspects, and are capable to communicate with other devices using standardised data exchange protocols. Smart devices are products with reduced processing and networking capabilities built,

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usually, for long term usage in various conditions and environments, with low to nonexistent change rate. Considering these, one might think smart devices provide a smaller attack surface for cybersecurity incidents. In comparison computers, tablets, or smartphones are general usage computing equipment used for lots and lots of tasks and activities, with tens of thousands of running application, services and processes, lots of input/output ports, tens of data exchange protocols, and dozens of programming languages used to create software applications. General use computing equipment provide a very large attack surface and are more prone to vulnerabilities, threats and cybersecurity incidents. Still, general use computing equipment, namely computers, servers, tablets, or smartphones use several protection means to prevent cybersecurity exposure and vulnerabilities exploiting, without relevant impact on performance, storage, or user experience. In smart devices, instead, there is a number of several cumulative factors contributing to increased risks, such as:

a) Outdating technologies, due to fast technological advancements;
b) Reduced performance due to constraints like smaller dimensions, low energy consumption, etc;
c) Smaller memory space, due to low cost and low energy constraints;
d) Limited protection means, due to reduced performance, reduced resources, and low energy constraints;
e) Permanent exposure into the network or Internet, due to the nature and purpose of the device;
f) Low to nonexistent update rate due to cost constraints, and fast technological advancements, etc.

Generally speaking, smart devices face a number of physical threats, several human related risks, and a large number of logical threats. The physical threats are mainly related to theft, physical destruction, and damage due to environmental conditions. Theft related risks may be mitigated making smart devices difficult for physical access using hard enclosures, concealed installations, and controlled or monitored environments. We should emphasise the fact that installation of sensors in remote, not monitored, or not guarded areas, may expose them to theft risks or as well may protect them, depending on every particular situation – parking sensors in a locality, versus environmental sensors in a forest.

When analyzing threats related to human users or operators, we should mostly consider those leading to loss of personal or sensitive information, especially consisting of images or sounds from the inside of buildings, or of people, data regarding presence inside the building, schedules, habits, etc. Misusing smart devices may result in leaks of such information to the Internet, with unpredictable consequences. Such incidents might be caused, as example, by accidental touches of an intelligent remote control pad leading to streams of multimedia data published on the Internet. Weak credentials to authenticate to the system, or to WiFi are, as well, important risks related to human use.

Logical threats, or cybersecurity risks, are much more difficult to predict, prevent, identify, and mitigate. In less than 10 years, cybersecurity transformed from an important ICT aspect, into a critical one, following the market explosion of mobile technologies, cloud computing, social media, or IoT, all summing up to previously known security aspects of classical computing. To fight cybersecurity risks, governments around the globe use a responsible approach on cybersecurity in their national legislation and institutions, with deeper focus on critical infrastructures, critical data, and service continuity for the society. As we exemplified in a previous paper, Ion M., Carutasu G. (2020), in the last 10 years the European Union had one of the most concentrated approach by issuing and renewing dozens of regulatory acts on subjects related to cybersecurity, critical infrastructures and IoT in general enforced at both, community and Member States' national levels, by establishing responsible institutional relationships at community level, and by strongly supporting market development in cybersecurity and critical systems.

An important aspect of smart devices and systems is that despite the fact that they use different technologies and different protocols for technological and historical reasons, in the end they can be regarded as following an architecture very similar to ICT, structured to the ISO/OSI model (physical, data link, network, transport, session, presentation and application layers) as published by the International Standardisation Organisation (1984), as well as its common TCP/IP implementation (physical, data link, network, transport and application layers). This situation may lead to similarities in attack patterns between the two (IoT and ICT), still considering the particularities related to specific technologies that were used, and the purpose of the device. As examples, consider a network of TCP/IP environmental sensors connected to the Internet to transmit pollution data in a busy city, or a network of LoraWAN public parking sensors, or Bluetooth bracelets taking the pulse and blood pressure of elders or chronic disease people. They mark some technological differences (analog or digital signal, gateway or cloud, communication protocols, etc) and some similarities (processing, storage, and transmission of data, standardised and common data protocols and architecture, Internet usage, etc), and they all behave similar, having the same usage cycle: they collect data, eventually they store some data, transmit data to a central system or cloud infrastructure over a standardised protocol, eventually receive some commands, process data, and perform some other tasks, such as alert

people in case of life threatening situations (pulse variations, blood pressure drops, etc). Smart devices are, usually, meant to function continuously, as long as they are powered, in recurrent usage cycles, as described above:

- Data collection stage: handles the collection of physical parameters from the environment or a target system in analogic or digital form. Transformation from analogic to digital is possible to occure at this stage, as sensors may be analogic or digital, and processing systems are commonly digital.
- Data storage stage: handles collected data storage on the device, considering the storage size available. As smart devices face constraints related to storage size, keeping data on device is only on temporary basis. Some data transformation may occur at this stage, considering the standardised formats implemented through programming.
- Data transmission stage: deals with the transmission of collected or stored data to a central processing system, or a cloud computing infrastructure, using standardised data transmission protocols. Data transformation occur in this stage, in order to encapsulate data in the proper data units according to the used transmission protocol.
- Data processing stage: is handled by a central processing system, an ICT system with specialised software applications, depending on the destination of the entire system. Data processing may be performed automatically, or based on human interaction.
- Commands stage: deals with commands received from the central processing system, and meant to determine some actions to be performed at logical level (inside the smart device), or at the physical layer (on the environment, or the target system). This stage is not always present (ex: passive sensors), and requires already programmed data processing at device level, in order to perform the commanded tasks.

This entire usage cycle is repeated over and over again in a repeated feedback loop, until the smart device is damaged, losses its electric power, or receives a stop command. The usage cycle stages of a smart device correspond to one or more layers in the classical computing OSI architecture making it easier to switch from classic computing systems hacking, to IoT hacking. Moreover, increased usage of TCP/IP, WiFi, and other general data communication protocols increases the exposure of smart devices to cybersecurity risks.

The above cycle is based, as may easily be seen, on a structural approach of a smart system. While some authors focus on similar, structural approaches regarding IoT architectures – Hu F. (2016) –, we tend to consider the ISO/OSI model quickly becoming more suitable, due to the increasing technological similarities between ICS and IoT retaining, still, the particularities related to IoT devices' usage purposes. This means, as already mentioned, that cybersecurity incidents may replicate reasonably easy, and in large aspects from the ICT world to the IoT one. Because IoT is, by its nature, connected with the physical world, consequences of cybersecurity incidents will have a more complex result and threatening impact on actual safety and security of people and society than ICT cybersecurity incidents. In this prospect, we observe that merging ICT and IoT technologies removes barriers, increases the complexity of cybersecurity incidents, and makes them dangerous in both physical and virtual worlds.

At present time defence means for complex cybersecurity incidents involving ICT infrastructures and smart devices or systems are difficult to access, or even understand for common users, and organisations. Regarding consumer level IoT systems, they are almost nonexistent. As result, despite a reduced exposed attack surface, smart devices may be vulnerable on their entire usage cycle, and a mitigation policy should address it entirely in order to ensure a safe usage, considering all their limitations, as already mentioned. In this perspective, we may conclude that, generally speaking, smart devices have a significantly lower level of cybersecurity compared to computers, smartphones, or tablets. Still, there are several ways one can take to increase the security of smart devices and, in particular, smart home devices, and that includes measures like:

a) Use strong credentials in all systems;
b) Keep smart devices in isolated network segments;
c) Use updated routers and firewalls;
d) Keep smart devices out of the Internet, unless necessary;
e) Update the firmware/software to latest stable version;
f) Replace old, not updated smart technologies, etc.

A particular category of technological threats has been brought in the recent years by artificial intelligence. As AI technologies develop, they are increasingly introduced, integrated into smart systems, and improved continuously with real life data collected, in purpose or error, without users' consent and sent over the Internet, as several cybersecurity and personal data breaches showed in the last years, such as: Alexa's 2018 privacy breach incident – Zhou Y. (2018), Amazon's 2018 personal data breach incident – Murnane K. (2018) –, Google Assistant's 2019 privacy breach – Barbaschow A. (2019) –, etc (the enumeration is not exhaustive, but only an exemplification).

Thus, despite the continuous development, reaching new heights in specialised domains, with regard to privacy and interaction with human environment improvements are still necessary – AI is still far from discerning between things to listen and process, and things private, or perilous to human safety or even human life. An appropriate approach that needs to be further investigated in the following years must focus on bringing the subject open on the table and promote building smart systems with "ethics by design" principles in mind, as evidentiated by Stefan R., Carutasu G. (2020).

Smart home systems – technological integration risks and mitigation

A smart home system represent a sum of IoT and ICT hardware and software technologies, with the purpose to manage and automate processes, tasks, and activities inside the house, in order to improve life conditions of the inhabitants. Smart systems are used, practically, in all areas of our present lives: in residential, professional, and critical infrastructure environments. We carry and use every day smart devices, parts of smart systems, being smartphones, smart watches, smart bracelets, smart sensors, smart actuators, smart tags, smart cars, remote controls, smart apps, etc. Considering the buildings application, the IoT components of smart systems fall into 2 structural categories, and comprise mainly in sensoring and actuating devices, as follows:

a) Building related: environmental sensors (light, temperature, humidity are the most common), safety sensors (electrical energy, gas, water, fire), as well as actuators elements such as: environmental actuators (windows, aerators, air conditioning, lights, etc), access actuators (gates, doors, windows), etc.
b) Inhabitants related: presence sensors, health related sensors (pulse and blood pressure are the most common), emergency button, etc.

From an ICT perspective, a smart building system (residential or professional application) falls into one of the 3 following variants:

a) An independent system: data processing is performed on devices, the system has limited functionalities manageable at device level;
b) With local ICT infrastructure: the central processing system is present on location and is, probably, directly connected to the IoT component; access to Internet may be required for mobile management applications;
c) On cloud computing infrastructure: the central processing system is running in cloud; Internet access is required; smart devices may connect directly to the system in cloud, or using a central gateway.

As smart systems used in home or professional building applications contain a large number of IoT and ICT technologies, each with its own vulnerabilities and threats, it is important to manage them as a whole, taking into account all their components and characteristics. Considering the diversity and fast development in technology, and also the continuously increasing merging between ICT and IoT technologies, cybersecurity in smart systems is a real challenge for everyone, especially for common users of smart building systems, in home or professional applications. A common user of smart technologies usually doesn't possess the necessary knowledge to properly secure them and trustfully relies heavily on the protection the device or system provides by itself. An older smart system usually rises much more cybersecurity challenges to its owner, compared to a new system. Even older components included in newer smart systems, will rise more cybersecurity concerns, from this perspective. A good example of mixed threat and complex attack based on merging technologies is the 2018 hacking of a fish tank to steal data from a casino – Wei W. (2018) –, clearly showing the impact of a not secured IoT device on secured ICT systems.

Considering the increasingly interconnection of different devices, the fast development in IoT and cybersecurity industries, and the fact that the people manifest a high latency towards money spending on technology adoption or technology update, smart systems face an increasing number of cybersecurity threats on all technological layers of their IoT and ICT components. Also, an important aspect caused by the same increased interconnection between technologies we daily use – computers, smartphones, smart TVs, smart watches, smart home devices, e-mail, file server, cloud storage, online payment, telework, etc –, is the fact that a cybersecurity breach may provoke much more damage than, maybe, previously estimated. Losses or modification of data, publication of personal data on the Internet, multimedia streaming, exfiltration of credentials, patterns and behaviors of inhabitants, modifications in smart home systems, malware installation, are all possible consequences of cybersecurity incidents involving ICT and IoT infrastructures in residential or professional environments.

To try to diminish the kind of above mentioned threats and risks, tasks related to cybersecurity would be better handled by technology providers and professionals in this area, capable to evaluate risks, take relevant corrective

actions and implement prevention measures. From this point of view, cloud based solutions will become the most secure for common users, as many technological activities are handled by technologies provider (hardware maintenance, software maintenance, networking, ICT cybersecurity, etc), even if human error may still appear. As well, IoT smart devices and systems may connect to specialised update services and automatically updating their software to eliminate vulnerabilities and limit risks. Cybersecurity devices to protect local smart environments (e.g. building environments for home or professional use) are still to penetrate the markets.

Still, every user of smart systems implemented in residential and professional environments can take few measures to increase the protection of informational and automated systems, such as:

a) Use strong credentials
b) Apply producers' recommended measures
c) Have data network segmented and use firewall technology
d) Keep important, and personal data away from IoT
e) Keep data private, especially credentials
f) Use anti-malware technologies
g) Update and upgrade technologies to their latest stable variants, and patches
h) Apply best practices, preferably issued by professionals
i) Periodically evaluate systems security, preferably by professionals
j) Apply professionals' recommended measures
k) Contact professionals on each hacking suspicions, etc.

Cybersecurity Risk Assessment for Smart Systems

The first step in cybersecurity of smart systems, especially in residential environments, is acknowledging and understanding the threat, and the risk. This may be hard for some consumers, as technology gets more and more complex and difficult to understand.

The second step is risk assessment, a realistic as possible evaluation of what might happen, and the possible consequences. Smart systems are complex systems that integrate multiple technologies: electric, electronic, data communication, and information technology, with particularities specific to each domain. Considering the diversity of purposes, technologies, and implementations, as well as the merging between ICT and IoT, it is difficult to asses risks from all perspective without in-depth knowledge in all or most of these areas.

A cybersecurity risk assessment framework represents a set of rules, standards, and activities performed in order to evaluate the risk level of computing infrastructures. It represents the foundation of all future measures regarding cybersecurity, and it is important to identify and apply a properly tailored risk assessment framework to the computing infrastructure, its purpose, and implementation. As well, cybersecurity risk assessment frameworks may target quantitative or qualitative aspects in different proportions, or both, in order to fit various purposes and applications. As a result, taking also into consideration the large variety of technologies, increased level of integration and multidisciplinarity of smart systems, development of several risk assessment frameworks and methodologies, each tailored to specific applications, became necessary. Currently, several organisations proposed some risk assessment frameworks to help evaluate the cybersecurity of smart systems, such as NIST (National Institute of Standards and Technologyh – NIST Cybersecurity for IoT Program), IoT Security Foundation (IoT Security compliance framework, by IoT Security Foundation (2020)), ISO/IEC (International Organisation for Standardisation / International Electrotechnical Commission), Intel (Threat Agent Risk Assessment methodology), etc. Considering all above, there is no general framework that can be applied as is to all smart systems in residential, professional, or critical infrastructures, and therefore, professionals will need to develop skills considering these criteria, and specialise on sectorial applications instead of generic ones. Due to constraints given by the available space, the paper will only analyse the 2 approaches we consider the most representative for the IoT cybersecurity market: the NIST program, and the ISO/IEC standardisation framework.

In their effort to support cybersecurity in IoT, NIST developed a Cybersecurity for IoT Program to support the "development and application of standards, guidelines, and related tools to improve the cybersecurity of connected devices and the environments in which they are deployed. By collaborating with stakeholders across government, industry, international bodies, and academia, the program aims to cultivate trust and foster an environment that enables innovation on a global scale.", NIST (2016). The Program takes into consideration the multidisciplinarity of smart systems and uses previously developments, building upon them, including IoT devices, data communication protocols for IT and IoT, hardware and software infrastructure, cloud computing, data management, IT

cybersecurity. NIST's Program has a wide profile, concentrating more on qualitative and disaster management aspects of cybersecurity of IoT systems.

ISO/IEC approach focuses, instead, on standardisation and common methodology to asses risk, being complementary, in this aspect, to NIST Cybersecurity for IoT Program. ISO concentrates on voluntary conformity to published standards elaborated by large open communities of experts. The general framework of ISO/IEC for cybersecurity is represented by the ISO/IEC 27000 serie containing dozens of standards on the application of cybersecurity in organisations, as well as other relevant standards. Among them ISO/IEC 27030 – Guidelines for security and privacy in IoT, still in continuous development, concentrates explicitly on cybersecurity of IoT systems, while the rest have a more general approach to cybersecurity, targeting IT systems, data communication, incident management, privacy, etc. Other ISO/IEC standards outside the 270000 series targeting security on IoT platforms, are: ISO/IEC 20924 – IoT definition and vocabulary, ISO/IEC 29161 – Unique identification for IoT, ISO/IEC 30141 – IoT Reference architecture, ISO/IEC 30147 – Methodology for Trustworthiness of IoT system/service, or ISO/IEC 30149 – IoT Trustworthiness framework. ISO/IEC standardisation approach of technologies and methodologies is complementary with any other risk assessment framework. Standardisation and mutual recognition, interoperability of concepts, technologies, methodologies are critical for general progress, market development, and intelligent use of resources, but need enforcement of compliance in critical aspects, or critical areas (e.g. critical infrastructures, important data protection, etc). Still, ISO/IEC standardisation approach is compliant and complementary to all other approaches concentrating on the actual evaluation process of cybersecurity. Other organisations involved in the process of standardisation with impact in cybersecurity area for IoT are ITU (International Telecommunication Union) and IEEE (Institute for Electrical and Electronics Engineers).

It is important to mention that other organisations and companies are deeply involved in IoT security and offer support in risk assessments through standards, guidance, best practices, tools and frameworks for evaluation or autoevaluation of risk exposure. As already mentioned, a integrative approach is necessary to cover all relevant aspects, the multidisciplinarity of IoT and the large diversity of technologies, and applications.

Conclusions

IoT technologies will accelerate their development and market penetration. IoT already becomes common presence in our lives, without us even really noticing. Due to cost constraints, users will continue to adopt technologies with a perceptible latency. As complexity and interconnection increases, cybersecurity become more difficult to be applied by normal users. As well, with technological accelerated progress common users cannot keep up with all the information will need to be remembered, all the tasks will need to be performed for a safe and secure IoT environment. Choosing between standards, frameworks, methodologies and tools to evaluate risk in own IoT environments is, already, overcoming to normal users, and will get increasingly difficult. Therefore, cybersecurity will need to evolve into automated processes and tools, performing more and more without human intervention. Where still needed, professionals should to be involved in resolving more complex cybersecurity incidents. Cost constraints, on the other hand, may lead to important raising in cybersecurity incidents caused by, on involving IoT devices and systems. Considering all these, IoT cybersecurity need to be addressed in simpler ways for the customer, keeping technological activities at technological level while maintaining the optimum performance in resolving incidents and keeping users, their data and their systems safe and secure.

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The Impact of Entrepreneurial Behavior and Attitudes in Economic Growth of European Countries

Sofia GOMES[1], Pedro FERREIRA[2] and Tiago TRANCOSO[3]

[1] Research on Economics, Management and Information Technologies (REMIT), University Portucalense, 4200-072 Porto, Portugal; sofiag@upt.pt

[2] Research on Economics, Management and Information Technologies (REMIT), University Portucalense, 4200-072 Porto, Portugal; pferreira@upt.pt

[3] Instituto Politécnico de Viana do Castelo (IPVC), 4900-347 Viana do Castelo, Portugal; tiagotrancoso@estg.ipvc.pt

Abstract

This article analyzes the impact of entrepreneurial behavior and attitudes on the economic growth of 21 European countries. The objective is through a set of entrepreneurship indicators collected by the Global Entrepreneurship Monitor (GEM) that measure entrepreneurial behaviors and attitudes such as Perceived Opportunities, Perceived Capabilities, Total Early-Stage, Entrepreneurial Activity, Established Business Ownership, Entrepreneurial Employee Activity and Innovation, assess the impact of these indicators of entrepreneurial activity on the economic growth of these countries. The empirical study uses a data panel covering 21 European countries and a period from 2001 to 2019. A statistical analysis of the dependent and independent variables, a correlation analysis, and a multiple linear regression model was estimated. The results suggest that entrepreneurial activity driven by opportunity, innovation, stable business owners and the involvement of employees in promoting entrepreneurial activity has a positive impact on Gross Domestic Product per capita and, as such, stimulates countries' economic growth. Europeans considered in this sample. However, entrepreneurial activity at an early stage and the skills and knowledge to start a new business have a negative impact on the economic growth of these countries. This study complements the existing literature that analyzes the impact of entrepreneurship on economic growth, but using a sample of European countries (there are few empirical studies with this purpose on European countries), and it is innovative since it uses the indicators for the first time. classified as entrepreneurial behaviors and attitudes collected by GEM to assess their impact on countries' economic growth.

Keywords: Entrepreneurial Behavior, Entrepreneurial Attitude, Entrepreneurship, Economic Growth.

Introduction

In recent years, the role of entrepreneurship as a driver of economic growth in countries and regions has been emphasized, arousing the growing interest of several authors. The first difficulties that are imposed on the study of entrepreneurship are to define the concepts of entrepreneurship and the entrepreneur and to find a reliable, robust, comprehensive and comparable measure of the entrepreneurial activity of the countries (Pittaway, 2005; Wennekers et al., 2005).

Taking into account the definitions of entrepreneurship and entrepreneur that bring together the greatest theoretical consensus among the authors, we can define entrepreneurship as an activity of innovating through a process of creative destruction (Schumpeter, 1911), the discovery of information that allows the detection of business opportunities (Kirzner, 1973) in environments of uncertainty and risk (Knight, 1921). Thus, in general terms, we can define entrepreneurship as the intention and / or action to create value through new businesses, products and / or methods and the entrepreneur the individual who develops the entrepreneurial activity, bearing risks, uncertainties and business opportunities.
If capturing the dimension of entrepreneurship and entrepreneurship in a single definition is difficult, it is even more challenging to find a measure, in empirical terms, of entrepreneurship that is robust and efficient and that allows countries to be compared in terms of entrepreneurial activity since, there are numerous definitions of

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entrepreneurship, several international databases that collect different measures and dimensions of entrepreneurial activity, making comparison difficult.

Over time, several empirical studies have been carried out that demonstrate that entrepreneurship has an impact on the economic growth of countries (Ács, 2006; Ács & Naudé, 2011; Amorós, Fernández, & Tapia, 2012; Audretsch, 2007; Baumol & Strom, 2007; Carlsson et al., 2009; Hessels & Van Stel, 2011; Kourilsky et al, 2007; Minniti & Lévesque, 2010; Olaison & Meier Sørensen, 2014; Stam & Van Stel, 2011; Van Praag & Versloot, 2007; Van Stel et al., 2005; Wennekers and Thurik, 1999). However, there is no consensus among authors on the results of this impact, which may vary according to the macroeconomic condition of the countries (usually expressed by the Gross Domestic Product per capita) and the variables used to measure entrepreneurial activity. In this context, our study aims to measure the impact of entrepreneurial activity measured through entrepreneurial behavior and attitudes variables collected by GEM on the economic growth of 21 European countries (Belgium, Croatia, Denmark Finland, France, Hungary, Germany, Greece, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom), from 2001 to 2019, with European countries being selected according to data availability.

This article contributes to the study of the impact of entrepreneurship on the economic growth of countries in two ways: (1) there are few studies that use a sample of European countries (Stoica & Roman, 2020) and (2) they are, for the first time, measures of entrepreneurial behavior and attitudes were used as measures of entrepreneurship to assess their impact on the economic growth of the European countries considered.

This article is organized as follows: in section II there is a brief review of the literature on the relationship between entrepreneurship and economic growth; in section III, data, variables and methodology used are presented; in section IV the results of the statistical and econometric analyzes performed are presented and the results are discussed and in the final section, the conclusions and recommendations for future studies.

Literature Review on Entrepreneurship and Economic Growth

Over time, entrepreneurship has been measured in quantitative terms, through the self-employment rate (Carree & Thurik, 2008; Mojica, Gebremedhin & Schaeffer, 2009; Carree et al., 2002) or by the percentage of own businesses (except for the agricultural sector) as a function of the total labor force (Audrestch & Fritsch, 2002; Carree et al., 2007; Parker & Robson, 2003; Li et al., 2009; Nzaku & Bukenya, 2005; Deller, 2007) and the number of new companies created, the latter measure being widely used by several authors as the main measure of entrepreneurial activity (Ács & Szerb, 2010; Audrestch & Fritsch, 2002; Fritsch & Muller, 2002; Baptista, Escárcia & Madruga, 2004; Fritsch, 2004; Carree & Thurik, 2008; Gries & Naudé, 2010; Hartog, Parker, Van Stel & Thurik, 2010; Bosma, Stam & Schutjens, 2006; Bosma, Erik & Schutjens, 2006; Callejon & Segarra , 1999; Ács & Armington, 2004; Audretsch & Fritsch, 2002; Hessels & Van Stel, 2011; Mariet Ocasio & Mariet Occasion, 2016).

However, several criticisms have arisen since, reducing entrepreneurial activity to the creation of new companies does not include, for example, innovation, the identified opportunity, entrepreneurial capacities, motivations and motivational appetite to undertake, being limited only to results of the entrepreneurial activity and not to the causes that motivated the action to undertake. This measure of entrepreneurship has proved to be very reductive (Baliamoune-Lutz, 2015) because for entrepreneurial activity it is not mandatory to have to create a new company since, entrepreneurship can occur within existing companies (without the need for new companies are created) as a result of a new idea or business opportunity.

According to Wong et al. (2005), the use of a quantitative measure of entrepreneurship such as the rate of creation of new companies results from the difficulty of obtaining better measures that can be tested econometrically to assess the impact of entrepreneurship on economic growth, which in turn is measured, for example, through the Gross Domestic Product per capita (GDP per capita).

In order to overcome the limitations of business creation as a quantitative measure of entrepreneurship and its impact on economic growth, GEM measured business creation through four indicators widely used by several authors (Ács & Szerb, 2010; Van Stel, Carree & Thurik, 2005; Wong et al., 2005; Stam et al., 2007; Martin & Picazo, 2008; Wennekers et al, 2005; Ács, 2006; Amoros, 2007; Koellinger & Thurik, 2009; Thurik, 2009; Audrestsch & Thurik, 2001; Audrestsch, 2007; Naudé, 2008):

(i) *Total Entrepreneurial Activity (TEA) Index* - Percentage of people involved in the creation of a new business or ownership / management of an existing youth business up to 3.5 years in relation to the adult population (18-64 years), that is, have been paying wages, salaries and other payments for more than 3 months, but for less than 3.5 years (includes self-employed or self-employed workers).

(ii) *Nascent Entrepreneurial Activity Index* - Percentage of people involved in creating a business in relation to the adult population (18-64 years old) up to 3 months, that is, people actively involved in starting a business as owners or co-owners (this business does not yet pay salaries, wages and other payments).

(iii) *Young Firm Entrepreneurial Activity Index* - Percentage of people involved in the ownership / management of a new business that has existed for more than 3 months, but less than 3.5 years in relation to the adult population (18-64 years), that is, the ownership and management of a business that have been paying salaries, wages and other payments for more than 3 months and less than 3.5 years.

(iv) *Established Businesses Activity Index* - Percentage of people involved in the ownership / management of an existing business for more than 3.5 years in relation to the adult population (18-64 years) who pay salaries, wages and other payments.

Even though there is consensus among the authors that entrepreneurship has an impact on the economic growth of countries (Ács, 2006; Ács & Naudé, 2011; Amorós, Fernández, & Tapia, 2012; Audretsch, 2007; Baumol & Strom, 2007; Carlsson et al. , 2009; Hessels & Van Stel, 2011; Doran et al. (2018); Walstad, & Thomas, 2007; Minniti and Lévesque, 2010; Olaison & Meier Sørensen, 2014; Stam & Van Stel, 2011; Van Praag and Versloot, 2007; Van Stel et al., 2005; Wennekers and Thurik, 1999), although the effect is not consensual. This impact depends on the growth stage of the economy under analysis (Bosma et al., 2009; Ferreira et al., 2017; Gries & Naudé, 2010; Sternberg & Wennekers, 2005; Wennekers et al., 2005), the same measures being possible entrepreneurs have different economic results, whether they are developed or developing countries (Sternberg & Wennekers, 2005; Valliere & Peterson, 2009).

In general, entrepreneurship can drive economic growth in countries by diversifying the offer of products and / or services, increasing competition (opening up to new markets and increasing efficiency) with positive externalities for families, of knowledge spillowers , job creation, increased innovation and productivity, increased company efficiency, stimulating creative destruction, with the replacement of less competitive and innovative companies, among others (Audretsch & Keilbach, 2004; Ács, 2006; Van Praag & Versloot, 2007; Van Stel et al., 2005; Wong et al., 2005; Fritsch, 2008).

However, the results are not consensual: studies have concluded that entrepreneurial activity has a positive and greater impact in developed countries than in developing countries (Stam, et al, 2011; Van Stel et al., 2005) but for other authors, entrepreneurship does not have a significant impact in high-income countries but has a positive impact in poorer countries (Stam, et al, 2011; Sternberg & Wennekers, 2005; Van Stel et al., 2005).

Thus, considering that entrepreneurship affects countries' economic growth in different ways depending on their stage of development, several authors have analyzed this relationship by distinguishing developed economies from developing economies (Bosma et al., 2009; Ferreira et al., 2017; Gries & Naudé, 2010; Sternberg & Wennekers, 2005; Wennekers et al., 2005; Avnimelech, Zelekha, & Sharabi, 2014; Hashi & Krasniqi, 2011; Marcotte, 2014; Van Stel et al., 2005; Wong et al., 2005), instead of using a single country data panel, regardless of their stage of development.

Although these studies make the connection between entrepreneurship and economic growth, some authors (Audretsch, 2007 and Audretsch & Keilbach, 2004) pointed out omissions in the neoclassical model of economic growth that was based on the factors of production - the connection of labor and capital to product, including, with a positive impact, the concept of entrepreneurial capital in economic growth models. Entrepreneurial capital included the number of start-ups per capita, initial activity in an information and communication technology company, that is, entrepreneurial capital encompassed all factors that facilitated the start of new businesses and positively influenced the economic environment. Other authors, such as Ács & Vargas (2005), have empirically tested the impact of Research and Development and human capital and concluded that they have a positive impact on economic growth; also Hessels & Van Stel (2011) showed that companies with export guidance have a positive impact on entrepreneurship and are an additional contribution to economic growth.

But even with the use of more quantitative measures, they are still not enough to measure the impact of entrepreneurship on economic growth, with GEM recognizing this limitation (Bosma, 2013), and revising its model. In this review, the concept of entrepreneurship was reformulated, having introduced three essential components (Bosma et al., 2009), which the GEM also started to collect:

- Attitudes / behaviors related to general attitudes and behaviors towards entrepreneurship in a country or group of countries;

- Activities that contemplates the creation of new initiatives and not the reducing vision of creation of new companies and,

- Entrepreneurial aspirations related to business innovation, growth and prosperity.

The three components can affect the economic impact of entrepreneurial activities, and introduced important changes in the concept of entrepreneurship, and, according to Ács & Szerb (2010), entrepreneurship came to be defined as a dynamic, multifaceted interaction of attitudes, activities and aspirations, allowing a new approach to the study of the impact of entrepreneurship on the economic growth of countries.

Galindo and Méndez (2014) explored the link between entrepreneurship, economic growth and innovation and concluded that there is a positive relationship between these three factors, since entrepreneurship and innovative activities contribute to the increase of the economic product and this, in turn , promotes entrepreneurial initiatives and entrepreneurship. Bosma et al. (2018) concluded through an empirical analysis that the quality of the institutional environment, such as financial stability, the size of government and the perceived skills for creating a new business, stimulates entrepreneurship and, as such, economic growth. Some authors (Marfatia, 2014; Marfatia, 2015; Hüning, 2017; Hüning, 2019) concluded that the levels of risk and uncertainty about the countries' economy, that is, a country's monetary policy influences the motivation of entrepreneurs, with consequences at the product level in macroeconomic terms. A more recent study by Doran et al. (2018) showed that entrepreneurial attitudes have a positive and significant effect on GDP per capita in developed countries, while entrepreneurial activity has a negative impact in low and middle income countries. Bohlmann et al. (2017) concluded through an empirical study that the perception of opportunities by entrepreneurs is positively related to entrepreneurial activity because individuals who perceive opportunities define more challenging goals and, ultimately, apply higher standards to assess the achievement of your goals.

In this way, increasing opportunity recognition, in turn, can increase entrepreneurial behavior and, as such, economic growth. On the other hand, the impact of entrepreneurs' perceived opportunities on entrepreneurship is not consensual since entrepreneurial capacity does not only include cognitive skills on how to start a new business, but requires the ability to recognize and explore opportunities, persistence to overcome potential obstacles and leadership skills in contexts of uncertainty. In this way, entrepreneurs' perceived opportunities are negatively with age due to certain age-related cognitive and physical declines (younger adults may be biased towards their own perceived skills and abilities for entrepreneurship) but positively related to entrepreneurial activity since the perceptions of capabilities by entrepreneurs are the basis for achieving the defined objective (Bohlmann et al., 2017; Ackerman et al., 2002).

The studies analyzed indicate that, in general, there is a positive effect of entrepreneurial activity on economic growth, but the extent of this impact is not consensual depending on the measures used to capture entrepreneurial activity. On the other hand, most studies use quantitative measures of entrepreneurial activity, especially the creation of new businesses, not incorporating the review of the concept of entrepreneurship carried out by GEM that covers entrepreneurial attitudes, behaviors and aspirations. In this way, our study complements the existing literature on entrepreneurship and economic growth, adding a new perspective that measures entrepreneurial activity through the attitudes and behaviors of entrepreneurs using a sample of European countries (according to the review carried out, there are few studies using samples with European countries), the ultimate objective being to assess the impact of entrepreneurs 'attitudes and behaviors on countries' economic growth.

Data and Methods

For the analysis of the impact of entrepreneurial attitudes and behaviors on the countries' economic growth, we consider a sample of 21 European countries (Belgium, Croatia, Denmark Finland, France, Hungary, Germany, Greece, Ireland, Italy, Latvia, Netherlands, Norway, Poland , Portugal, Russia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom). These countries were chosen according to the availability of data in GEM, which is one of the most important databases of entrepreneurship.

For each country, measures of economic growth and entrepreneurial attitudes and behavior were considered. In this way, the dependent variable is the Gross Domestic Product per capita (GDP per capita) collected in the World Bank's World Development Indicators as a measure of the countries economic growth and the independent variables are the entrepreneurial attitudes and behaviors collected in the GEM. GEM data are collected from the adult population, for a sample of at least 2,000 respondents per country, and the basic research questions are the same for each participating country, which ensures comparable measures and allows relevant analyzes to be carried out between countries. Thus, the independent entrepreneurship variables used and their definitions are specified in table 1:

Table 1: Independent variables

ENTREPRENEURIAL BEHAVIOUR AND ATTITUDES INDICATOR (Abbreviation)	DEFINITION BY GEM
Perceived opportunities (PO)	Percentage of 18-64 population who see good opportunities to start a firm in the area where they live
Perceived capabilities (PC)	Percentage of 18-64 population who believe they have the required skills and knowledge to start a business
Total early-stage Entrepreneurial Activity (TEA)	Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business
Established Business Ownership (EBO)	Percentage of 18-64 population who are currently an owner-manager of an established business, i.e., owning and managing a running business that has paid salaries, wages, or any other payments to the owners for more than 42 months
Entrepreneurial Employee Activity (EEA)	Rate of involvement of employees in entrepreneurial activities, such as developing or launching new goods or services, or setting up a new business unit, a new establishment or subsidiary
Innovation (INOV)	Percentage of those involved in TEA who indicate that their product or service is new to at least some customers and that few/no businesses offer the same product

Source: Own elaboration based on GEM definitions

The main objective of our study is to assess the impact of entrepreneurial attitudes and behaviors on economic growth measured through the GDP per capita of 21 European countries, previously mentioned, for the period from 2001 to 2019. The main hypotheses are:

- Hypothesis 1 (H1): The entrepreneurial activity measured by TEA, EBO and EEA have a positive impact on economic growth, as they are indicators of the level of entrepreneurial activity.

- Hypothesis 2 (H2): High levels of perception of capacities and opportunities (PO and PC) by entrepreneurs are positively related to countries' per capita GDP.

- Hypotheses 3 (H3): Countries with higher levels of innovation (INOV) will have higher rates of economic growth.

These hypotheses were tested using a multiple linear regression model, by the method of ordinary least squares (OLS) using a dynamic data panel since the sample collected has transversal and temporal data. As the sample considered in this econometric analysis is a dynamic observation panel, there may be some temporal correlations between the variables, and dynamic panel data estimation techniques should be used. In this way, we start from the basic model of dynamic panel data specified as follows:

$y_{it} = \eta_i + \alpha y_{i,t-1} + x_{it}'\beta + v_{it}$, being that, $v_{it} \sim iidN(0,\sigma_v^2)$

In these models, the problems are concentrated on the question of accidental parameters when fixed effects are omitted and on issues of simultaneity and endogeneity when the nature of these effects is random. Anderson and Hsiao (1981) suggested including the first differences in the dynamic model to overcome these problems:

$$\Delta y_{it} = \delta \Delta y_{i,t-1} + \Delta x_{it}'\beta + \Delta\varepsilon_{it}$$

where: *i* represents the country and *t* is the time; $\Delta \ln Y_{it}$: first differentiated logarithm of GDP per capita; $\Delta \ln X_{it}$: first logarithm of the dependent variables shown in table 1; εit: the error term. Thus, all the variables used (dependent and independent) were used in the model estimated in logarithm.

The collected sample was subject to a descriptive statistical analysis, a correlation analysis and, finally, the estimation of the regression model.

Results and Discussion

Table 2 shows the descriptive statistics for the variables (dependent and independent). The number of observations is 115 observations during the period from 2001 to 2019. In terms of GDP per capita, the maximum value $ 97,019.18, recorded by Norway in 2014 and the minimum value is $ 8,704.9 recorded by Russia in 2002 Regarding the independent variables related to entrepreneurial attitudes and behaviors, the maximum and minimum values recorded vary between countries (for example: TEA has a minimum value of 3.65% in 2011 in Slovenia and a maximum value of 14.16% in 2016 in Latvia; the PO has a maximum rate of 81.56% in Sweden in 2018 and a minimum rate of 10.87% in 2011 in Greece; the PC has a maximum rate of 60.22% in 2016 in Poland and a minimum rate of 27.46% in 2018 in Russia), thus suggesting that the independent variables have different impacts on the countries' economic growth, having been confirmed that there are no lagged effects.

Table 2: Descriptive statistics

	GDP_PC	TEA	EBO	EEA	PC	PO	INOV
Mean	36442.55	7.239826	6.801652	4.952870	42.34722	36.27757	28.23200
Median	35518.42	6.820000	6.470000	4.760000	43.40000	34.13000	27.09000
Maximum	97019.18	14.19000	15.79000	16.18000	60.22000	81.56000	54.13000
Minimum	8704.898	3.650000	2.000000	0.510000	27.46000	10.87000	5.400000
Std. Dev.	20608.02	2.164793	2.741321	2.814487	7.073246	16.18849	8.324955
Skewness	0.748328	0.985814	0.864244	1.084012	-0.156790	0.808259	0.269542
Kurtosis	3.021265	4.096952	3.500638	5.498152	2.280721	3.286128	3.579369
Jarque-Bera	10.73541	24.39255	15.51689	52.42605	2.950202	12.91353	3.000922
Probability	0.004665	0.000005	0.000427	0.000000	0.228756	0.001570	0.223027
Sum	4190894.	832.5800	782.1900	569.5800	4869.930	4171.920	3246.680
Sum Sq. Dev.	4.84E+10	534.2416	856.6918	903.0324	5703.512	29875.68	7900.755
Observations	115	115	115	115	115	115	115

Note: in the estimated model, all the variables used were logorithimized as suggested by Anderson and Hsiao, 1981 for this type of models. Source: authors own calculations.

Table 3 presents a correlation test between the variables, showing the existence of multicollinearity between the variables, since the test reveals a high correlation between some independent variables such as ASD and CP, which reveal a very positive correlation (0,52, $\rho = 0$) and EEA with INOV (0.42, $\rho = 0$) and with PO (0.59, $\rho = 0$). There are also some independent variables present a significant negative correlation, such as EBO and INOV (-0.15, $\rho = 0$).

Table 3: Correlation matrix of dependent and independent variables

Correlation	GDP_PC	TEA	EEA	EBO	PC	PO	INOV
GDP_PC	1.000000						
TEA	-0.127855	1.000000					
EEA	0.552630	0.064504	1.000000				
EBO	0.117028	0.229634	-0.124532	1.000000			
PC	-0.335661	0.520485	-0.050182	0.276980	1.000000		
PO	0.615026	0.074431	0.585197	0.024364	-0.245638	1.000000	
INOV	0.374378	-0.044879	0.425719	-0.154884	0.051732	0.113418	1.000000

Source: authors' own calculations.

Table 4: Regression Analysis

Log(GDP_pc)	Model
Log(TEA)	(0,421752)***
	(0,137512)
Log(EBO)	0,488407***
	(0,083615)
Log(EEA)	0,263002***
	(0,0066986)
Log(PC)	(1,118054)***

	(0,2481080)
Log(PO)	0,433912***
	(0,0093984)
Log(INOV)	0,630915***
	(0,109710)
R-square	0,718688
Adjusted R-square	0,7030059
F-statistic	45,98578***
Observações	115

*Note: *** p < 0.01; standard errors are shown in parentheses. Source: authors' own calculations.*

The model is statistically significant according to the F statistics data. The adjusted R squared value is greater than 70%, that is, more than 70% of the variation of economic growth in the European countries in the sample measured by GDP per capita is explained by the independent variables of entrepreneurship.

The TEA that corresponds to the percentage of the population aged 18 to 64 who is a nascent entrepreneur or owner-manager of a new business has a negative impact on the economic growth of the countries, which can be explained by the fact that the countries are not divided by their stage of development economic - developed and developing countries and, corroborating, the conclusions of several authors in which TEA can have different economic results (Bosma et al., 2009 and 2012; Ferreira et al., 2017; Gries & Naudé, 2010; Sternberg & Wennekers, 2005; Wennekers et al., 2005; (Sternberg & Wennekers, 2005; Valliere & Peterson, 2009). The EBO that measures the percentage of the 18- to 64-year-old population who is currently the managing owner of an established company, that is, it owns and manages a functioning company that has paid salaries, wages or any other payments to owners for more than 42 months, has a positive impact on economic growth, explaining 49% of the variations. s in the GDP per capita of the European countries considered. The EEA as measured by the rate of employee involvement in business activities, such as the development or launch of new goods or services, or the creation of a new business unit, a new establishment or subsidiary also has a positive impact on economic growth, explaining 26 % of changes in GDP per capita of the European countries considered. The impacts of EBO and EEA on economic growth are also not consensual among authors, and may have different impacts depending on the level of economic development in countries (Bosma et al., 2009 and 2012), based on the premise that the greater the number owners of their own business and the more involved employees are in the entrepreneurial activities of companies, the higher the rate of business activity and, as such, the greater the economic growth.

Thus, hypothesis 1 is confirmed with respect to the variables EBO and EEA that have a positive impact on economic growth, since they are indicators of the level of entrepreneurial activity. With regard to the negative impact of TEA on GDP per capita, it is proved once again that its impact on countries' economic growth depends on their stage of development.

The PO measured by the percentage of the population aged 18 to 64 who sees good opportunities to open a business in the area of residence, has a positive impact on economic growth, that is, 43% of the changes in GDP per capita are explained by this variable, as found by Bohlmann et (2017) in his empirical study.

CP measured by the percentage of the population aged 18 to 64 who believes they have the skills and knowledge necessary to start a business, has a negative impact on GDP per capita. This result, according to studies by Bohlmann et al., 2017 and Ackerman et al., 2002, may result from the fact that the population included in the sample is older, that is, older adults have cognitive and physical declines related to age in as such, less perceived opportunities, having a negative impact on entrepreneurial activity and, consequently, on economic growth.
Hypothesis 2 that high levels of OP and CP are positively related to countries' per capita GDP is only partially confirmed. There would have to be greater discrimination of the sample separating the population from the countries considered by age.

INOV measured by the percentage of those involved in TEA who indicate that their product or service is new to at least some customers and that few / no companies offer the same product, has a positive impact on GDP per capita

and explains 63% of variations in the economic growth of the countries considered, as argued by several authors (Audretsch & Keilbach, 2004; Ács, 2006; Van Praag & Versloot, 2007; Van Stel et al., 2005; Wong et al., 2005; Fritsch, 2008; Galindo and Méndez, 2014). Thus, hypothesis 3 is confirmed that countries with higher levels of innovation will have higher rates of economic growth.

Thus, in the European countries considered, the level of economic growth depends on the level of entrepreneurial activity measured by the variables TEA, EBO and EEA, the capabilities of entrepreneurs (PO and PC) and the degree of innovation in the country (INOV), being mostly your positive impact.

Conclusions

Starting from the relationship already studied, in empirical terms, by various authors, between entrepreneurship and economic growth, we elaborated a new model in which the entrepreneurship variables are attitudes and behaviors of entrepreneurs collected by GEM. We conclude, for a group of 21 European countries that, in general terms, there is a positive impact of entrepreneurial attitudes and behaviors on the countries' economic growth, as measured by GDP per capita.

For this group of countries, entrepreneurial activity as measured by the entrepreneurial activity of stable business owners (EBO), that is, existing for more than 42 months and by the involvement of employees in promoting entrepreneurial activity (EEA) positively influence economic growth. However, entrepreneurial activity measured through early-stage entrepreneurial activity (ASE) in the group of countries considered has a negative impact on economic growth, since differences in the countries' stage of development have not been considered (classification of countries into countries developed and developing according to the value of GDP per capita).

The entrepreneurial activity captured by the ability to perceive that there is a good opportunity (PO) to start a new business in the area of residence has a positive and expressive impact on economic growth. However, the perception of entrepreneurs who have the skills and knowledge to start a new business (PC) has a negative impact on economic growth, which can be explained by the fact that the age of entrepreneurs has a negative effect on PC. On the other hand, this variable is negatively related to the fear of failure of entrepreneurs. Finally, entrepreneurial activity is positively influenced by innovation (INOV) existing in entrepreneurial activity at an early stage and, as such, has a positive impact on economic growth.

In general, this study suggests that entrepreneurship driven by opportunity, innovation, stable business owners and the involvement of employees in promoting entrepreneurial activity are key factors in stimulating the economic growth of European countries considered in this sample.

In terms of limitations, this study uses a relatively small sample (21 European countries and a maximum time period of 2001-2019), as a result of the availability of data. In future studies, we will try to use a larger sample of countries, divide countries by their stage of development (developed and developing countries) and include new variables that capture the attitudes and behaviors of entrepreneurs such as, for example, the intention entrepreneurship, the motivation index of entrepreneurs, fear of failure and entrepreneurship as a good career choice, measuring its impact on countries economic growth.

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Knowledge Management and Stupidity Management as New Competences of a Manager in the 21st Century - A Research Perspective

Anna CHWIŁKOWSKA-KUBALA
Poznań University of Economics and Business, Poznań, Poland, anna.chwilkowska-kubala@ue.poznan.pl

Jan M. JANISZEWSKI
Warsaw School of Economics, Warsaw, Poland
jan.janiszewski@sgh.waw.pl

Marek KRASIŃSKI
Wrocław University of Economics and Business, Wrocław, Poland
marek.krasinski@ue.wroc.pl

Abstract

Among the different categories of challenges that modern managers are faced with, one should consider the dangers that effective and efficient knowledge management must tackle. The critical meaning of knowledge is underscored in both the practice and theory of organizational management. In recent years, an increasing interest in the issue of stupidity in the context of organizational management has been observed. The purpose of the research is to present a diagnosis of the practical application of knowledge management systems, stupidity management and employee suggestion schemes. The initial research conducted permits to draw the conclusion that organizational stupidity management is a valid and important issue since it constitutes an integral element of knowledge management and employee suggestion schemes.

Keywords: Knowledge Management, Stupidity Management, Kaizen Management, Suggestion Schemes.

Introduction

Knowledge management has become one of the fundamental directions of research on how the competitive advantage of a business is shaped (Lee and Choi, 2003), on the sources of productivity and on the micro foundations of the broadly defined organizational success. It is often said in management literature that broadly understood organizational knowledge is an essential area of management research. One of the charges raised against the concept of knowledge management is the assumption that the members of an organization are oriented onto activities aimed at the acquisition, transfer, allocation and reallocation of knowledge, or the sharing of redundant knowledge (Davenport, et al., 1998).

When considering the imperfections of the knowledge management concept Alvesson and Spicer (2016) note that 'quick feet and hands combined with a friendly smile matter more for the economy than the intellect of a relatively small group of elite knowledge workers' (Alvesson and Spicer, 2016, pp. 6-7). These scholars have coined the notion of functional stupidity defined as 'organizationally-supported lack of reflexivity, substantive reasoning, and justification. It entails a refusal to use intellectual resources outside a narrow and 'safe' terrain. It can provide a sense of certainty that allows organizations to function smoothly' (Alvesson and Spicer, 2012, p. 1196).

Organizational stupidity management is a relatively new notion and not yet comprehensively studied in the area of management and quality studies. For this reason, the authors decided to conduct initial empirical research to determine whether the problem of organizational stupidity is raised in economic practice.

Based on the direction for research on stupidity in the context of the knowledge management pyramid proposed by Chwiłkowska-Kubala, Krasiński and Janiszewski (2020), the paper presents the results of initial research on the

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significance of knowledge management systems, stupidity management and employee suggestion schemes in economic practice.

The fundamental objective of the empirical research was to evaluate the legitimacy of research on stupidity management. The main purpose of the research was operationalized to three detailed research questions:

1) To what degree do contemporary organizations apply knowledge management, stupidity management and employee suggestion schemes?
2) What is the importance of knowledge management, stupidity management and employee suggestion scheme metrics in contemporary organizations?
3) How is organizational stupidity manifested in contemporary organizations?

Theoretical background

Knowledge Management

Knowledge management may be analysed from many different perspectives, namely human resources management, strategic management, IT systems management or with the adoption of an approach integrating many management functions. Table 1 shows selected definitions demonstrating the different approaches to knowledge management and research perspectives. From an interdisciplinary perspective, knowledge management can be defined as: 'effective learning processes associated with exploration, exploitation and sharing of human knowledge (tacit and explicit) that use appropriate technology and cultural environments to enhance an organization's intellectual capital and performance' (Jashapara, 2011).

Table 1: Selected knowledge management definitions

Authors	Definition
Dhar, et. al. (1997)	'Effective knowledge management systems allow people to learn from past decisions, both good and bad, and to apply the lessons learned to complex choices and future decisions.'
Tiwana (2001)	'Knowledge management is not knowledge engineering. Knowledge engineering has been a vital part of computer science but is barely even related to knowledge management. Knowledge management is a business problem and falls in the domain of information systems and management, not in computer science. Knowledge management needs to meld information systems and people in ways that knowledge engineering has never been able to.'
Davenport, et al. (1998)	'Knowledge management draws from existing resources that your organisation may already have in place – good information systems management, organizational change management, and human resources management practices.'
Swan, et al. (1999)	'… any process or practice of creating, acquiring, capturing, sharing, and using knowledge, wherever it resides, to enhance learning and performance in organizations.'
Skyrme (1999)	'The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organising, diffusion, use and exploitation, in pursuit of organisational objectives.'
Mertins, et al. (2000)	'… all methods, instruments and tools that in a holistic approach contribute to the promotion of core knowledge processes.'
uit Beijerse (2000)	'The achievement of the organization's goals by making the factor knowledge productive.'
Newell, et al. (2009)	'… improving the ways in which firms facing highly turbulent environments can mobilise their knowledge base (or leverage their knowledge 'assets') in order to ensure continuous innovation.'
Bergeron (2003)	'Knowledge Management (KM) is a deliberate, systematic business optimization strategy that selects, distils, stores, organizes, packages, and communicates information essential to the business of a company in a manner that improves employee performance and corporate competitiveness.'

The definitions presented in Table 1 by Bergeron and Dhar refer in part to the issue of continuous improvement of processes and the culture of learning via solving problems. These definitions are essential with respect to organizational stupidity and the kaizen system that will be discussed further on in the paper.

When referring to knowledge management one must discuss the issue of knowledge sharing. Knowledge sharing is of paramount importance and it is a characteristic of organizations that ground their operations on the premise of continuous improvement of their processes. Table 2 shows the most crucial impediments that organizations are faced with while sharing knowledge. Knowledge management systems in organizations ought to focus on removing these impediments, while 'knowledge managers' must be aware of their existence and should not deny them.

Table 2: Sharing Knowledge: Reasons and Impediments

Enablers	Impediments
High levels of trust	Fear and suspicion
Rewards for sharing	Unintentionally rewarded for hoarding
Team-based collaborative work	Individual effort without recognition and reward
Aligned mission, vision and values, and strategy	Individual accountability and reward
Joint team-wide accountability and rewards	Functional focus
Group accountability and rewards	Employee-owner interest conflicts.
Process focus	Lack of alignment
Focus on customer satisfaction	Not-invented-here syndrome
Open to outside ideas	Too busy to share
Eye on competition	Internal competition
Collaborative and cross-functional work	Incompatible IT
Need to share	Compartmentalization of functional groups
Localized decision making	Centralized top-down decision making

Source: Tiwana (2000, p. 80).

Among the greatest obstacles that the implementation of a knowledge management policy within a business is faced with is selling ideas to senior management and to end users. Knowledge management is often an expensive proposition as it does not only entail the expense of the technology infrastructure used to enable but also the expense in implementing corporate culture changes and revitalizing employee reward structures. Incorrect planning of a knowledge management strategy will not always produce immediate visible results, which could give rise to scepticism among upper management that controls the budget (Tiwana, 2000). The impediments listed in Table 2 related to knowledge sharing contribute to the development of stupidity in organizations, which will be discussed further on.

DIKW Hierarchy

DIKW is data (D), information (D), knowledge (K), wisdom (W): a four-layer hierarchy, where each layer adds certain attributes over and above the previous one (Fig. 1). Data is the most basic level; Information adds context; Knowledge adds how to use it; Wisdom adds when and why to use it. Despite being at the top of the DIKW hierarchy, wisdom is a neglected concept in knowledge management (Jifa, 2013; Rowley, 2007).

Fig 1. DIKW Hierarchy (Knowledge Management Pyramid)
Source: Rowley (2006, p. 164)

Data

All organizations need data, and some industries are heavily dependent on it. Data in contemporary organizations is usually stored in various technology systems where it is entered into by different departments e.g. finance, accounting, and marketing.

Information

Peter Drucker said that information is 'data endowed with relevance and purpose' which, of course, suggests that data by itself has little relevance or purpose. (Davenport, et al., 1998) Information is 'systematised data' (Meadows, 2001). Information shapes data and affects the vision of reality. Ackoff (1989) finds that although more and more information is being made available to managers this does not necessarily translate into better functioning of an organization. This would be possible in the event of no conflict between managers. Unfortunately, managerial conflicts in organizations tend to be more frequent than conflicts between competing businesses.

Knowledge

Knowledge and knowledge management are lofty concepts – debated by academics and managers and even doubted by some analysts – that only a few businesses have mastered.

In a practical sense, knowledge could be considered as 'actionable information'. 'Actionable information' allows us to make better decisions and provide an effective input to dialogue and creativity in organizations. Knowledge allows us to act more effectively than information or data and equips us with a greater ability to predict future outcomes (Tiwana, 2000).

Knowledge is the key resource in intelligent decision-making, forecasting, design, planning, diagnosis, analysis, evaluation, and intuitive judgment. Knowledge formed in and shared between individual and collective minds is not the product of databases but it evolves with experience, successes, failures, and learning over time. Tiwana's golden rule concludes: 'People first, then technology'. Davenport and Prusak's definition of knowledge highlights the characteristics that make knowledge valuable and those – often the same ones – that make it difficult to manage well: 'Knowledge is a fluid mix of framed experience, values, contextual information, expert insight and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms.' (Davenport, et al., 1998).

Wisdom

As arises from Figure 1 wisdom is at the top of the hierarchy. Wisdom is the ability to adopt reasonable and correct actions. All humans absorb information in the same way, yet they are not all equally apt at transforming the information they learn into knowledge, nor in putting the knowledge into use. In a class taught by the same

teachers, some students will score better than others in exams despite having been provided with exactly the same amount and the same quality of knowledge. This may result from facts such as motivation or experience, but there obviously also exist personal differences in learning ability (Meadows, 2001).

Wisdom includes (Jifa, 2013):

- understanding knowledge related to self;
- enlightening others as to knowledge;
- applying knowledge concerning with when, where to use;
- creating and inventing knowledge means obtaining new knowledge.

Employee suggestion system

Management of knowledge must encompass and improve business processes. Without a way of capturing and integrating past knowledge, any development process can quickly dissolve into chaos. Given this, it is crucial that organizations are managed in compliance with the kaizen concept via constant improvement through small changes and innovations.

The Japanese view of management this boils down to one precept: maintain and improve standards. Kaizen is a Japanese term and was initially used and spread by Masaaki Imai. Imai (2012) acknowledges that in the context of kaizen, management has two major functions: maintenance and improvement. Maintenance refers to activities directed toward maintaining current managerial, technological, and operating standards and upholding standards through discipline and training. It is very important for managers that everybody can follow standard operating procedures. Improvement refers to activities directed toward elevating current standards.

Kaizen is process-oriented, processes must be improved before results, as opposed to result-orientation where outcomes are all that counts. (Berger 1997.)

Improvements are initiated by individuals and most commonly organized in some form of a suggestion scheme. A suggestion scheme can be described as a formalized mechanism which encourages employees to contribute constructive ideas for improving processes in organization. Implemented ideas are rewarded by a monetary award or some other form of recognition usually proportionate to the benefits generated. (Milner, et. Al) 1995.

Organizational stupidity management

It may be concluded from an analysis of source literature that the discussion of knowledge and broadly defined organizational competence is dominated by categories proposed by scholars such as incompetence (Argyris and Business, 1986), organizational incompetence, or stupidity (Ott and Shafritz, 1994). In the context of stupidity, one notion worth noting is myopia of learning coined by Cohen and Levinthal (Levinthal and March, 1993) which is manifested in economic practice as having no holistic approach, focusing on current activities without considering the importance of the long-term perspective and underestimating the significance of potential failures.

M. Alvesson and A. Spicer (Alvesson and Spicer, 2017) state that we can encounter numerous instances of stupidity in economic practice. They have introduced the notion of functional stupidity defined as ‘organizationally-supported lack of reflexivity, substantive reasoning, and justification. It entails a refusal to use intellectual resources outside a narrow and ‘safe’ terrain. It can provide a sense of certainty that allows organizations to function smoothly’ (Alvesson and Spicer, 2012, p. 1196).

Ott and Shafritz (1994) point out that stupidity may be studied as per three different approaches: epistemological, socio-cultural and moral. At the epistemological level stupidity is failure to gather and use information. This may be exemplified by a situation where the information policy of a given organization forces decision-makers to make bad decisions. Ott and Shafritz (1994) found that even a good manager overwhelmed with an excessive amount of data that he or she is required to process will be unable to make the right decisions at the right time. From the socio-cultural and moral perspectives, as Ott and Shrafitz (1994) note, people are likely to do stupid things out of the need to adhere to rules applicable in a given society (or organization). Moreover, these researchers found that stupid conduct may also be the result of a drive to maintain good relations. What is more, Ott and Shafritz suggest that stupidity may actually be reinforced and promoted by culture, including organizational culture.

Alvesson and Einola (Alvesson and Einola, 2018) listed three aspects of functional stupidity:

- lack of reflectiveness manifested by taking one's assumptions as a given;
- not asking why one does something (justification);
- not considering the consequences or wider meaning of one's actions (lack of substantive reasoning).

Researchers have found that the members of an organization when taking various actions display a tendency to comply with organizational routine, procedures or guidelines. This results on one hand from the fact that they take certain principles as a given and on the other, from their passivity in asking questions and reflecting over the legitimacy of the actions they take (Alvesson and Einola, 2018).

According to Alvesson and Spicer (2017), there exist a number of ways for managers to encourage functional stupidity the purpose of which is to discourage employees from asking questions and reflecting on the tasks assigned or to curb such reflection. Among these methodologies Alvesson and Spicer name authority, seduction, naturalisation and opportunism.

Authority consists in taking advantage of the respect for a manager and the conviction that a manager 'knows best' and that it is up to the manager to determine the ways in which assignments must be completed. The authority technique is applied primarily in highly hierarchical structures oriented onto maximizing the efficiency of work assignments. Ott and Shafritz (1994) reached similar conclusions that hierarchical structures support the consolidation of stupidity.

The next three techniques of enhancing stupidity according to Alvesson and Spicer (2017) are similar to the socio-cultural and moral aspects of the perception of stupidity put forth by Ott and Shafritz (1994). Seduction refers to the 'charming' of subordinates by a manager through his or her impressive speeches, eloquence or great appearance. Managers who use the seduction technique are able to convey amazing visions and convince subordinates that their ideas are visionary and worth implementing. In line with the naturalisation methodology, the members of an organization are made to believe that a given solution is always implemented in the given company or is a successful industry standard. Arguments regarding alleged lack of alternative solutions is another component of naturalisation. According to Alvesson and Spicer, opportunism is a methodology often practiced in businesses rendering professional services. Opportunism is reinforced by a system of incentives and benefits that the persons completing an assigned task may expect to obtain. One manifestation of opportunism is doing tasks that produce measurable benefits without questioning their significance even if they are considered stupid by a consultant.

Functional stupidity may bring benefits from the perspective of an organization. It reinforces the feeling of certainty that one is doing the right thing and making the right decisions (Falkheimer et al., 2016). At the same time, it can contribute to reinforcing negative patterns of thinking both from the perspective of the individual and the entire organization.

As found by Alvesson and Einola (2018), the functional stupidity concept coined by Alvesson and Spicer (2012, 2017) is not tantamount to pure stupidity or a low intelligence quotient. To be considered functionally stupid, one needs to be intelligent and competent within a given area (via following the rules of a certain job, mastering recipes for success, being likely to take a subordinate position, etc.) (Alvesson and Einola, 2018). In reference to the concept put forth by Alvesson and Spicer (2012), Falkheimer et al. (2016) suggest that managers have a tendency to focus on linear decision models. The scholars found that this tendency may be paired with an orientation onto controlling processes and a strive at interpreting phenomena in the surroundings. This, in turn, makes stupidity management easier.

Table 3 presents a comparison of the differences in the various approaches: the concept of a knowledge-based organization and the concept of functional stupidity. The individual pairs of characteristics are not opposites per se but extreme attitudes/behaviour models.

Table 3: Knowledge-based organization vs functional stupidity

In line with the concept of a knowledge-based organization:	Concept of functional stupidity assumes that:
Employees are encouraged to delve into problems	It is easier to make decisions when people do not ask too many questions
Growth in productivity and efficiency owing to delving into problems	Reflecting and posing questions shorten the time to execute ongoing assignments
Creating new knowledge based on experience; concentration on shaping learning skills	Concentration on following the assumed career path by attaining set goals
Organizational culture strengthening openness to experiments and sharing experience, 'culture of different opinions'; readiness to accept mistakes	Caring about a good image within a group hinders willingness to propose non-standard solutions or comments regarding the set goals
Orientation onto the long-term perspective from the point of view of the resource base	Concentration on the short-term perspective – completion of assignments

Source: (Chwiłkowska-Kubala et al., 2020, p. 139).

Methods

The study was conducted using the CAWI (Computer-Assisted Web Interview) methodology in a targeted sample of graduates of post-graduate studies in Lean Management, Six Sigma and Management for Engineers. The assumption of the research was that a targeted sample would allow us to guarantee the right level of subject-matter knowledge of respondents since the syllabuses of these post-graduate courses covered issues related to knowledge management, continuous improvement, innovations, etc. The questionnaire research was conducted with the use of the Google Formular tool. Analysis of collected data was conducted based on descriptive statistics.

We received 44 replies in our initial study. Most respondents represented organizations operating on the market for over 16 years (56.8%), another 22.7% of replies came from businesses with 11 to 15 years of presence on the market, and 11.4% of replies came from those present on the market for 6 to 10 years, while the smallest percentage of replies i.e. 9.1% came from businesses with a market presence of 1 to 5 years. Bearing in mind the fact that 52.3% of replies were provided by representatives of large organizations (over 250 employees) it should be assumed that procedures and management processes are formalised in the organizations studied. All respondents hold managerial positions in their respective organizations.

The first part of the questionnaire pertained to the identification of whether knowledge management systems, stupidity management systems and employee suggestion schemes exist in the organizations studied and if so, whether any metrics are used to manage the systems.

Results and Discussion

The distribution of answers is shown in Table 4. Based on an analysis of the results obtained we can reach the conclusion than none of the three management systems exists in more than 50% of the organizations studied. The most common is the employee suggestion scheme management system (45.5%), which is only an introduction or a component of the knowledge management system (40.9%). In the times of knowledge-based society and knowledge-based economy these results are hardly optimistic. The situation is even worse when it comes to management of such systems since only half of employee suggestion schemes are measured and as regards knowledge management systems, only 44.4% of them are. Bearing in mind the well-known saying by Peter Drucker 'you can't manage what you can't measure' we are faced with the question what the knowledge management systems and employee suggestion schemes are used for in over half of the companies we studied.

Table 4: Management systems in organizations studied

Existence of a management system:	Knowledge		Stupidity		Employee suggestions	
	Yes	40.9%	Yes	6.8%	Yes	45.5%
	No	59.1%	No	93.2%	No	54.5%
Measurement of a management system:	Knowledge		Stupidity		Employee suggestions	
	Yes	44.4%	Yes	66.7%	Yes	50.0%
	No	55.6%	No	33.3%	No	50.0%

Source: Own materials based on the results of the empirical study conducted.

The research conducted was also aimed at providing the authors with answers to the question whether the issue of stupidity management is worth taking up in the future. In the light of the assumptions of the stupidity concept discussed earlier on in the paper, we have found that the issue is significant from the theoretical perspective. In practice, however, only 6.8% of the organizations studied declared that a stupidity management system is in place at their workplace but – interestingly – in 2/3 cases the system is actually measured. This may mean that the problem is still relatively new and as such not popular, but those businesses that made attempts to implement it have also decided to apply metrics to measure the system.

The second part of the questionnaire was aimed at answering the question whether there exist manifestations of organizational stupidity in the organizations studied. Since there are no stupidity management systems in place, perhaps no such manifestations have been observed in the first place? The results of this part of the study are shown in Table 5.

Table 5: Manifestations of stupidity and knowledge in the organizations studied

Please specify which statement best describes the reality in your organization											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Employees are encouraged to delve into problems	11%	5%	18%	9%	7%	14%	9%	11%	11%	5%	It is easier to make decisions when people do not ask too many questions
Growth in productivity and efficiency owing to delving into problems	11%	7%	9%	16%	11%	11%	11%	14%	7%	2%	Reflecting and posing questions shorten the time to execute ongoing assignments
Creating new knowledge based on experience; concentration on shaping learning skills	9%	7%	11%	16%	14%	16%	16%	5%	2%	5%	Concentration on following the assumed career path by attaining set goals
Organizational culture strengthening openness to experiments and sharing experience, 'culture of different opinions'; readiness to accept mistakes	11%	7%	11%	7%	11%	11%	16%	14%	2%	9%	Caring about a good image within a group hinders willingness to propose non-standard solutions or comments regarding the set goals
Orientation onto the long-term perspective from the point of view of the resource base	11%	5%	16%	2%	11%	0%	7%	23%	5%	20%	Concentration on the short-term perspective – completion of assignments

Source: Own materials based on the results of the empirical study conducted.

The attitudes and organizational behaviour presented in the left-had side of the table are characteristic of organizations oriented onto knowledge management, while the right-hand side shows manifestations of

organizational stupidity. Respondents were asked to mark the statement that best exemplifies the situation at their workplace and a 10-point scale was adopted. The distribution of answers to the first pair of statements demonstrates that – if we treat them as bipolar opposites – there is a perfect equilibrium – each received 50% of all answers. However, there are considerably more (11% for answer 1) cases where knowledge management issues prevailed over stupidity-related issues (5% for answer 10). The second and third pairs of statements demonstrate a slight advantage of knowledge management (55% to 45% in the second pair and 57% to 43% in the third pair), while the two last pairs tend to incline towards manifestations of stupidity (52% to 48% in the fourth pair and 55% to 45% in the fifth pair). The analysis of overall results but also detailed results for the individual values in the table allows for the finding that manifestations of organizational stupidity are common in the organizations studied. Therefore, we should pay more attention to this problem so that not only knowledge but also stupidity could be effectively managed.

The third part of the questionnaire featured questions the purpose of which was to formulate a diagnosis of the manifestations of organizational stupidity and knowledge management and employee suggestion schemes with regard to the individual levels of the knowledge management hierarchy discussed earlier on in this article.

Out of the total of organizations studied, 34.1% of them are not undertaking any actions aimed at ensuring the right quality of data supplied to them. It is a standard procedure to assure data quality at 31.8% of the organizations and 34.1% of them sometimes do it. At the same time, only 45.5% of the organizations studied do not allow their employees to use data obtained randomly. This means that in the organizations studied the existence of organizational stupidity has solid foundations and it could be transmitted onto the higher levels of the DIKW hierarchy. A decision-making process grounded on unverified data may lead to reaching wrong decisions, which could be detrimental to the entire business.

Unfortunately, at a higher level of the knowledge management hierarchy the issue of quality assurance – in this case of information – looks even worse. There are no information quality assurance systems in place in 70.5% of the organizations studied, and 52.3% of employees are not trained or instructed on the correct use and generation of information in any way. Such training is available to all employees in just 29.5% of businesses studied and in 18.2% of organizations only selected persons undergo such training. It arises from these results that at the level of information, in the organizations studied there exist even more manifestations of organizational stupidity than was the case at the level of data.

The next level of the knowledge management hierarchy studied was knowledge itself. Only 52.3% respondents said that there exist knowledge bases or banks in their businesses and similarly, just over one half (54.5%) of organizations studied hold meetings during which employees are given the opportunity to share their knowledge about the projects they are working on. The fact that knowledge is not codified and is predominantly hidden, the weak foundations of knowledge management and the high chances for spreading organizational stupidity at the base of the knowledge management hierarchy translate into a situation where decisions in organizations are made in considerable number of cases without a substantive justification, as claimed by 61.4% respondents. Only 22.7% of respondents demonstrated a converse opinion, while 15.9% could not provide any answer to this question.

The initial research conducted allows for the conclusion that the problem of organizational stupidity management, as an integral component of knowledge management and employee suggestion scheme management, is valid and significant. There is a widespread debate on the issue of knowledge management, a lot is being written on the topic and many trainings are being organized in this field of study. However, little attention is paid to a specific threat that this approach must tackle. Organizational stupidity exists. It may often be covert but it still exists. It might be worth introducing a formal stupidity management system so as to minimise its impact on the added value generated in organizations, while in advanced stupidity management systems one could also try to generate some added value of stupidity itself.

Future Research Perspectives

The results of the research allow for the conclusion that the issue of stupidity deserves the attention of researchers. In our opinion, it would be worthwhile to conduct research on a larger sample where the criteria could include the size of the organization or the sector of the economy a given organization operates in to identify correlations between sectors, company size and stupidity and knowledge.

Among the directions for future research on the topic are studies on conditions favourable to the emergence of organizational stupidity, as well as research on the impact of stupidity on the productivity of contemporary organizations.

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Analysis of Factors Influencing the Level of Digital Competence of Children and Youth in Poland

Agnieszka BUDZIEWICZ-GUŹLECKA

University of Szczecin, Szczecin, Poland
agnieszka.budziewicz-guzlecka@usz.edu.pl

Anna DRAB-KUROWSKA

University of Szczecin, Szczecin, Poland
anna.drab-kurowska@usz.edu.pl

Abstract

The principal features of contemporary reality are fluency and rationality in the use of modern digital technologies. It is essential that children and young people develop the digital competences of the future. This article discusses the trends in future labour markets and the characteristics of digital competences. The aim of the article is to verify areas and factors influencing the development of digital competence in the context of future labour market requirements. The student's contemporary environment should be examined to answer the research question: are modern students provided with suitable conditions for acquiring basic and advanced digital competences? This examination will allow the identification of the components of the future digital competence indicator. Therefore, on the basis of research conducted among experts, the authors have proposed factors affecting the components of the future digital competence indicator, which may be proposed in the context of assessing the level of competence of students prepared for the future labour market. The following research methods were adopted during the research process: critical analysis of literature, heuristic method, selected quantitative methods, analysis of digital competence level.
The authors conducted primary research among: experts in digital competences and among primary school students (children and youth).

Keywords: Digital Competence, Education, Information and Communication Technologies

Introduction

The key features of contemporary reality are fluency and rationality in the use of modern digital technologies. It is essential that children and young people develop digital competences of the future.

It is expected that the most crucial competences will include fluency and rationality in exploiting the potential offered by information and communication technologies while recognising and consciously avoiding emerging risks. It is essential in this respect to develop, among other things, digital competences, the possession of which has been recognised as a prerequisite for functioning in a digitised environment and achieving success in life (2018/C 189/01) (2018/C 189/01).

The aim of the article is to verify areas and factors influencing the development of digital competence in the context of the future labour market requirements.

The student's contemporary environment should be examined to answer the research question: are modern students provided with suitable conditions for acquiring basic and advanced digital competences? The aim of this examination is to identify the components of the future digital competence indicator. Therefore, on the basis of research conducted among experts, the authors have proposed factors affecting the indicator of future digital competences, which may be proposed in the context of assessing students who are being prepared for the future labour market.

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The following research methods were used during the research process:

- critical analysis of the literature;
- the heuristic method;
- the selected quantitative methods;
- analysis of the level of digital competence.

The authors conducted primary research among: experts in digital competences and among primary school students (children and youth).

Trends in future labour markets

The primary megatrends (Jeliński, 2016, Vukanović, 2018), which will emerge as a result of technological progress and ubiquitous transmission of information, include:

- industry 4.0 – the fourth industrial revolution is the term used to describe the technologies and rules of economic organisations operation (Ustundag, Cevikcan, 2017) which systemically use:
  - (a) cyber-physical systems and modelling;
  - (b) Internet of things and services;
  - (c) cloud computing capabilities;
  - (d) Internet of Everything;
- economics of sharing (Budziewicz-Guźlecka, 2017);
- artificial intelligence, automation and robotics.

All these trends will affect future employees (currently still students). Typically social megatrends, i.e. the lifestyle resulting from the interpenetration of the real world with the digital world, will also be instrumental.

In the face of the dynamically developing service sector, demographic trends will render it necessary to make the current, traditional forms of employment more flexible, allowing for more teleworking, more informal, self-organising project teams, making greater use of the knowledge of freelancers. They will also result in a more extensive use of robotisation, machine learning and automation of repetitive business processes, thus releasing valuable human resources that will creatively undertake new activities to foster sustainable development and social inclusion that guarantee an improved quality of life.

Changes in the principles of work organisation might include:

1. The concept of working time will cease to exist over the years – the concept of daily or annual work, as well as the concept of the workplace itself, will undergo a significant transformation. Communication technologies offer the ability to make working time more flexible – the convenience of not having to meet rigid schedules cannot be overestimated. Discussions conducted in certain countries about work and family responsibilities are a sign of a trend that is emerging and difficult to stop (A. Mas-Colell).
2. The role of self-employment will increase concurrently with the transformation of traditional businesses, which will blur the differences between traditional employment contracts and service contracts. In the future, on the one hand, there will primarily be civil servants (employed in the traditional form under a contract of employment), and on the other hand, independent employees who will form a dense network of contacts.
3. The work will become more interesting as repetitive, routine duties will be automated. However, despite the possibility of shortening the working day resulting from the ever cheaper automation, this situation will not prevail. At the same time, the motivation to get promoted or achieve success will still be very strong, prompting efforts and spending time at work.

As Drab-Kurowska claims, digitisation of the economy, and in particular the development of the on-demand economy will cause changes in the labour market and is forcing and will force new forms of employment. Due to digitisation, the work will be much less related to time and place and more to independence, autonomy which entails monitoring of results.

It should be stressed that Revolution 4.0 is changing the nature of present work. Some of the current professions will be replaced by new specialisations. However, as with any innovation, this is inevitable. Technical and technological progress initially leads to lower demand for labour, however subsequently causes the creation of new jobs. Companies should be aware that they need to react quickly to market changes and adapt to the needs of new customers. As Budziewicz-Guźlecka claims, this results in the search for employees who have digital competences

in addition to the ability to function in a very rapidly changing environment. In particular, the tasks of low and medium-skilled workers performing repetitive and uncomplicated activities are likely to be automated.

On the other hand, e-competence (digital skills and competences) (Redecker, 2017, Vuorikari at, 2016), entrepreneurship, change management skills and creativity will be most sought-after by employers.

The characteristics of digital competence as the foundation of the future labour market

Digital competence should be understood as a set of skills, knowledge and attitudes that enable effective use of digital technologies. Digital competence is defined as a set of information literacy skills which includes the ability to retrieve information, to understand it, and to assess its reliability and usefulness, as well as digital competence which includes the ability to use computers and other electronic devices, to use the Internet and to run applications and software of all kinds, and to create digital content. Additionally, digital competence involves the ability to use the opportunities offered by digital media creatively, to communicate and to develop relationships through electronic media, using the Internet safely. Digital competence is a broad set of skills (Stopar, Bartol, 2019, Periáñez-Cañadillas, 2019, De Vito, 2017) which determine the efficient and deliberate use of new technologies (Budziewicz-Guźlecka, Drab-Kurowska, 2009) and active participation in society.

Digital competence consists of skills, attitudes and knowledge necessary to understand and be able to use the main functions of ICT. Computer skills include skills that are related to the following activities on telecommunication devices: proper operation of the equipment, i.e. basic computer functionality, i.e. using a mouse, keyboard or touch screen, connecting a monitor, using a printer; using software, i.e. skills that allow the use of programs such as text, graphics editors etc.; using applications, i.e. effective use of specialised software.

Information literacy, on the other hand, is the ability to use information and communication technologies to find, evaluate, create and communicate information, requiring cognitive and technical competence (American Library). The scope of information literacy should include the skills that allow us to (Jasiewicz, Filiciak , Mierzecka, et al):

- determine the type and scope of the searched information;
- find and secure effective access to a variety of information sources;
- analyse and critically evaluate information and verify the metadata;
- integrate information found with one's knowledge and value system;
- use the information in a manner conducive to the achievement of a specific objective;
- understand the social, economic and legal aspects of access to and use of information.

Information literacy is a prerequisite for being an active citizen of the information society, who will meet the requirements of the future labour market.

Functional competence, on the other hand, is the combination of IT and information competence with different areas of life. According to the "Framework Directory of Digital Skills", 8 key areas are defined for functional competences. They include:

- work and professional development;
- relations with relatives;
- pursuit of interests;
- health;
- finances;
- religion and spiritual needs;
- day-to-day activities;
- civic engagement.

To sum up, functional competence (Lloyd) is based on digital competences and information literacy which allow taking specific actions and achieving goals using digital technologies. Digital competence is the basis for information literacy which enables the development of functional competence.

Digital competence responds to the challenges related to greater communication opportunities, easier access to information and progress in technology. The challenges of the future will be related to the development of artificial intelligence, 5G, big data, virtual reality, such as augmented reality.

Broadly defined digital competences additionally include so-called computational thinking (Swanson, Anton, Bain, et al.) which is the ability to find solutions to complex, open problems, generally using digital technologies and data analysis.

These relationships are presented in Figure 1.

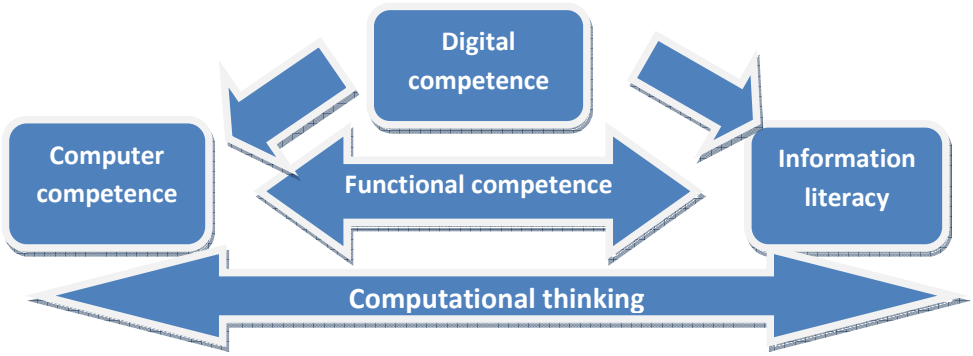

Fig. 1: Relationships between competencies

Source: own work

Functioning in the digital reality requires the development of computational thinking skills that enable us to solve problems in different fields. Digital competence is a certain kind of compilation that is not only based on a combination of awareness, knowledge and skills, but also on attitudes and behaviours.

Analysis of factors influencing the structure of the future digital competence indicator

For the purpose of this study, it is necessary to identify factors influencing the future digital competence indicator in the context of ongoing processes of development of information transmission techniques and technologies and the requirements of future labour markets. The identification of this indicator requires a broad analysis of the competences of current students who will enter the labour market in a few years.

The starting point is the use of multidimensional benchmarking to identify the factors influencing the future digital competence indicator among students. It should be stressed that the selection of diagnostic features in the multidimensional benchmarking method is crucial. Out of many variables, it is necessary to select those that have the greatest impact on the analysed phenomenon and provide key information. This is a fundamental problem of a substantive as well as statistical nature. In principle, the selection of the features should not be subjective, but based on a specific procedure. The procedure is as follows: – determining the initial set of features (variables) on the basis of substantive criteria, – conducting formal and statistical analysis on the set, – selecting the optimal set of explanatory variables on the basis of results. The application of formal and statistical criteria allows the elimination of those variables which do not meet the required criteria. However, this does not mean that the others must be included in the study. From the received set, an optimal set, meeting specific criteria, should be selected.
The components affecting the indicator include:

- infrastructure area;
- area of basic competence;
- area of advanced competence.

This indicator may be illustrated as follows:

$$\mathbf{I_{fdc} = (0{,}3*i_1+0{,}2*i_2+0{,}3*i_3+0{,}2*i_4) + (0{,}25*p_1 +0{,}25*p_2+0{,}25*p_3+0{,}25*p_4) + (0{,}4* z_1+0{,}3*z_2+0{,}3*z_3)}$$

Source: own work

To determine the weight of the individual indicators, this study uses expert evaluation[1]. The adopted method involved the collection of experts' evaluations which allowed the determination of the significance of individual

[1] The study involved a team of 65 specialists in the field of digital competences and education of children and youth. These included teachers, university representatives and employers. The experts have knowledge and experience in the subject matter of the study.

indicators that affect the future digital competence indicator, i.e. I_{fdc} – and confirmed the validity of the adopted criteria.

Table 1 demonstrates the variables (diagnostic features) that are included in the components of the future digital competence indicator – in the area of infrastructure.

Table 1: Variables (diagnostic features) included future digital competence indicator I_{fdc} – in the area of infrastructure.

No.		Variable name	Assigned weight	Scoring criterion (0.1)
1.	i_1	Broadband network availability	0.3	0 – lacking 1 – existing
2.	i_2	Computerisation of schools	0.2	0 – lacking 1 – access
3.	i_3	Computers and interactive whiteboards software	0.3	0 – lacking 1 – existing
4.	i_4	Use of infrastructure by teachers	0.2	0 – not used 1 – used

Source: own work

Table 2 demonstrates the variables (diagnostic features) that are included in the components of the future digital competence indicator – in the area of basic competence.

Table 2: Variables (diagnostic features) included in the future digital competence indicator I_{fdc} – in the area of basic competence.

No.		Variable name	Assigned weight	Scoring criterion (0.1)
1.	p_1	Students' digital awareness	0.25	0 – lacking 1 – existing
2.	p_2	Digital awareness of the environment (teachers, parents, institutions)	0.25	0 – lacking 1 – existing
3.	p_3	Practical testing of students' skills	0.25	0 – lacking 1 – existing
4.	p_4	Support for exceptionally talented students aimed at developing advanced competences	0.25	0 – lacking 1 – existing

Source: own work

Table 3 demonstrates the variables (diagnostic features) that are included in the components of the future digital competence indicator – in the area of advanced competence.

Table 3: Variables (diagnostic features) included in the future digital competence indicator I_{fdc} – in the area of advanced competence.

No.		Variable name	Assigned weight	Scoring criterion (0.1)
1.	z_1	Analysis of large datasets	0.4	0 – lacking 1 – existing
2.	z_2	Construction of software robots	0.3	0 – lacking 1 – existing
3.	z_3	Use of AI mechanisms	0.3	0 – not used 1 – used

Source: own work

The study uses an element of the Delphi method, i.e. expert evaluation. The method adopted in the conducted study involved the collection of experts' evaluations which allowed the determination of factors affecting the digital competences of the future.

These variables allow the determination of the level of future digital competences, depending on the needs and purpose of research. This indicator may be used for research in the following frames of reference:

- spatial (regional differentiation);
- demographic (age of respondents);
- educational (different levels of education, school profiles).

The indicator will provide a recommendation for decision-makers at various levels which will allow the development of instruments to improve the digital competences of the future for children and youth.

ICT-enabled infrastructure for children and youth in schools

The starting point for acquiring digital competences in schools is the application of modern technologies using the Internet (Herout, 2016). However, many schools in Poland currently lack an adequate number of computers and a fixed broadband connection.

This problem has been identified and, as a result, the National Education Network Programme (*OSE – Ogólnopolska Sieć Edukacyjna*) is currently being implemented in Poland. Its main objectives are to provide all schools with safe, fast and, above all, free internet. The aim of OSE is to:

- create an infrastructure to enable schools to connect to the broadband Internet;
- equalise educational opportunities for students, especially from small schools;
- develop students' digital competences;
- assist in the development of education using on-line resources.

OSE aims to provide common and equal access to very fast, safe and free Internet for schools to enable a civilisational change in the manner students are educated, by supporting analogue education with digital education. As regards the development of digital competences, it is particularly crucial that the Internet provided by OSE is fully safe, both for the school and its students. In order to use the potential of the OSE programme, it is necessary to integrate its existing network infrastructure with the programme network (https://www.szkolawchmurze.pl/ose/). The main benefits of the integration of the school network with the OSE network include: cost reduction – network integration will allow the resignation from fees for the services of existing Internet provides, guarantee of safety of students using the Internet throughout the school, stable and efficient school computer network, monitoring the condition of devices in the school network around the clock using dedicated software, maintenance of the entire solution.

OSE provides a unique opportunity to make a qualitative change aimed at creating a digital learning environment at school, shared by students and teachers (Gudmundsdottir, Hatlevik, 2018).

School equipment is important in developing students' digital competences, however, it is not crucial and should not be a starting point and a reason to take interest in this issue. The mere development of technology at school, without a specific teaching strategy, will not lead to any changes. A smartly designed digital classroom does not have to be based on a perfectly equipped computer lab. Not every teacher who will be provided with modern technological solutions will be able to use them effectively (Pettersson, 2018, Napal Fraile, Peñalva-Vélez, Mendióroz Lacambra, 2018, Instefjord, Munthe, 2017). Conversely, a teacher with passion, eager to discover new methods of working with a student, may perfectly cope with the equipment deficiency. Unfortunately, Polish education is usually focused on the passive acquisition and reproduction of knowledge. The models that activate students, requiring them to be more creative and to seek solutions to problems on their own are considerably more effective. For students, however, the principal aspect is how the Internet is used in their everyday classes.

Infrastructure plays the primary role, and it is followed by its skilful use. The results of research related to infrastructure in schools and its use by teachers will be presented in another study.

Digital competence in education process – basic area

Digital awareness, understood as the actual intellectual state that has been obtained based on the level of knowledge, understanding and reasonable valuation of information that takes place in the surrounding world. This ability involves acquiring, analysing and managing information as well as using technology. In addition, when analysing the concept of digital competence awareness, it is necessary to recognise how important it is for an individual (student) to be aware of the need for “digital” knowledge. However, it is only the ability to analyse the

information obtained and to apply it to specific situations in everyday life that enables potentially optimal and generally the most complete participation of an individual in society and the future labour market.

The student's digital awareness is developed by the environment, i.e. teachers, parents and institutions.

Parents with digital awareness should become mentors for their children and encourage wise use of on-line resources. Parents often do not know how to protect their children responsibly from possible dangers. This is confirmed by the results of the research (the research was conducted among parents of children attending primary schools) conducted by the authors (Budziewicz-Guźlecka, Drab-Kurowska, 2018).

To a considerable extent, the responsibility for digital competence lies with teachers and principals who had attended traditional schools and are often unwilling to treat the Internet as a potential educational environment and who more often than not lack the necessary teaching and digital competence to use ICT effectively as a teaching aid and content resource. A school should be the primary place for students to acquire digital competences.

From an institutional point of view, the introduction of practical methods of developing digital competences must not be limited to modifying the core curriculum or issuing top-down recommendations, but requires significant professional support for teachers and reorganisation of the operation of the Polish school.

Digital competence or network security skills should be tested in practice. They should be verified practically through computer tests as a part of which the student would be required to demonstrate a given skill.

Students with extraordinary digital skills should have an opportunity to broaden these skills through the support in the development of advanced digital competence.

To analyse the use of the Internet by students, the authors conducted a study. The study was carried out among 252 students[2] aged 7-14 who attend primary schools. For the purpose of this article, the main conclusions of the study will be presented. Teenagers use the network on their own since the age of seven. The following correlation may be observed: the younger the generation, the earlier this contact occurs. This is due to the dynamic development of information transmission technology and its prevalence and availability. The time spent on-line is increasing due to the general availability of smartphones. The Internet provides teenagers mainly with entertainment, but also with access to culture (music, films, etc.).

Nearly 40% of students expressed the opinion that school education does not prepare them for life in a world based on modern technologies.

The vast majority of the respondents (81%) do not have the opportunity to create educational resources on their own during classes. Only 20% of the students had such an opportunity. Most often during classes students had the opportunity to create multimedia presentations on their own. More than 7% of the respondents had the opportunity to do so, and this was the highest percentage score in terms of the type of multimedia resources created during classes. During classes, students more frequently use ready-made multimedia aids rather than prepare them independently. If there is an opportunity to create educational resources on one's own, these usually include simple reference materials, increasing the attractiveness of the message rather than its effectiveness and involvement of other participants. Graphic materials, digital texts and multimedia materials come second (about 4% of responses). E-books, digital textbooks and mobile applications were the least frequently created (2% of students indicated this possibility).

The study reveals that students are aware of the risks they may face on-line. For example, after the students were made aware of what Internet violence is, it proved that only half of the respondents (51%) have not directly experienced Internet violence. Most often, teenagers were the victims of name-calling, ridicule and humiliation. Nearly one in three affected students does not take any action, does not even inform relatives or other people who could provide support in this situation.

Most families do not introduce rules to limit time spent on-line or select the content available to teenagers. This entails the risk of strong smartphone addiction which, when accompanied by increasing Internet usage, may forecast the escalation of the problem. Children and youth may be protected against Internet threats through access restriction rather than other safeguards. It should be concluded that parents lack knowledge about safeguards and thus need to increase their digital awareness.

[2] Students participating in the study took part in the project: "Young e-leader" POWER 2014 – 2020, III. Higher education for economy and development. The study was conducted from November 2019 to February 2020.

Younger students of primary schools were much more likely to admit that parents, regardless of their declaration, check what they actually do on-line, as well as set time limits for its use, i.e. they establish rules restricting access to selected types of content.

Digital competence in education process – advanced area

Advanced digital competences foster creativity, entrepreneurship and innovation; they help build social, intellectual and economic capital. Moreover, it should be stressed that the development of digital competences serves to reduce social disparities and the lack of these competences gives rise to new forms of social exclusion.

In social and economic activities various technologies and information systems are used. They range from simple information systems (information portals) through complex management information systems (for businesses, banks, offices, etc.) which automatically carry out complex calculation procedures, to the development of artificial intelligence. The indicated examples of systems and their scope of application are characterised by different functional capabilities which depend on the type of system and its area of operation. As a result of these transformations, a common tendency is becoming increasingly clear, which is defined by experts as the virtualisation of social life.

Appropriate competences of students who will enter the labour market are a necessary condition for the development of institutions, companies and organisations; allowing the increase of effectiveness of operation, create new forms of cooperation, involvement and communication or use of digital technologies fostering the economic potential of a country. According to Budziewicz-Guźlecka and Drab-Kurowska (2012, 2017), digital competences are necessary for the development of e-government services and intelligent cities. Moreover, digital competence opens up new vistas for meeting life's needs – it enables fuller personal development as well as active participation in social and cultural life.

The advanced competencies include mainly data set analysis, construction of software robots and use of artificial intelligence mechanisms. The results of the study related to advanced competences will be presented by the authors in another article.

Conclusions

The mechanism of raising digital awareness involves the realisation of the objective, which is to increase the effectiveness of actions taken to enhance digital education. Effectiveness is interpreted as the compliance of the decision made with the educational goal (at basic or advanced level).

Modern technologies are and will be a permanent element of the modern network society. Great digital competences will allow children and youth to navigate successfully through the future labour market. It is necessary to verify whether the modern user is prepared to exploit the potential of the digital economy. To measure digital competence, the presented digital competence indicator may be applied. The indicator enables the calculation of the competence level in different aspects (spatial, educational, age, etc.).

The future digital competence indicator proposed by the authors will render the measurement of the level of digital competences more realistic and will allow better identification of different factors which need to be developed in order to increase the level of digital competences of children and youth.

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Leveraging on Social Inclusion Theory in Explicating the Link Between Women Empowerment and Environmental Performance of Farms in Nigeria

Ayoyimika A. OMOLADE (corresponding author)
ayoyimika.omoladepgs@stu.cu.edu.ng
Department of Business Management
Covenant University, Ota, Ogun State, Nigeria.

Olaleke O. OGUNNAIKE
olaleke.ogunnaike@covenanatuniversity.edu.ng
Department of Business Management
Covenant University, Ota, Ogun State, Nigeria.

Ebe E. IGBINOBA
ebe.igbinoba@covenantuniversity.edu.ng
Department of Business Management
Covenant University, Ota, Ogun State, Nigeria.

Mary E. EZEMA
mary.ezema@stu.cu.edu.ng
Department of Business Management
Covenant University, Ota, Ogun State, Nigeria.

Abstract

Pollution or environmental degradation due to agriculture is a major problem in Nigeria. This threatens the capacity for future agricultural production to meet the rising world population expected to grow to almost 10 billion by 2050 (UNDESA, 2019). This paper explores empowerment of female Nigerian farmers as a strategy for drastic reduction in pollution or environmental degradation. Agriculture creates employment opportunities to 70% -75% of the Nigerian working population and contributes about 20.9% of Nigeria's total gross domestic product. Globally, agricultural practices degrade and pollute the environment and threaten its capacity for future agricultural production. Meanwhile, everyday, women who provide most agricultural labour under the broad sector use, manage or conserve natural resources when carrying out their roles as consumers or educators. In addition, their production and consumption patterns tend to be more resource-efficient and they make more sustainable decisions for their households and businesses (OECD, 2007). Women also have smaller ecological footprint than men. However, this has not translated to reduced pollution or environmental degradation due to agriculture. This paper using a desk review method discusses the key role women play in ensuring environmental performance of farms and various ways they can be empowered to do more. This paper concludes with recommendations.

Keywords*:* Environmental Performance, Female Farmers, Women Empowerment, Sustainable Development Goals

Introduction

In the past half-century, agricultural intensification was achieved through increased use of land, fertilizers, pesticides, irrigation water and agricultural machinery without considering the impact of business activities on the environment. Lampridi, Sørensen, & Bochtis (2019) mentioned that environmental impact of agriculture is

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devastating; clearing of half of the global forest, erosion of biodiversity and air pollution by greenhouse gases released during burning.

This is contrary to sustainable development which encourages continuous use of resources to improve the quality of life of citizens without depriving future generation from meeting their needs (Gberevbie, Joshua, Excellence - Oluye, & Oyeyemi, 2017). Therefore, things must change in order to meet the growing demand for agricultural produce fueled by the rising world population which is expected to grow to almost 10 billion by 2050 (UNDESA, 2019). As a consequence of these developments, countries are moving towards environmentally friendly or sustainable agriculture using innovative systems that protect and enhance the natural resource base, while increasing productivity.

Finding ways to promote environmental performance needs to focus on women in the agriculture sector. This is because women play a key role in global and Sub Saharan Africa's agricultural production. Logeswari & Thiruchenduran (2016); Njobe & Kaaria (2015) confirm that women are the backbone of the sector because they represent 52% of the total population in the sector and are responsible for approximately 50% of the agricultural labour on farms in Sub-Saharan Africa. Njobe & Kaaria (2015) also confirmed that women produce 60% to 80% of the Africa's food.

Women also use, manage or conserve natural resources when carrying out their roles as consumers or educators. OECD (2007) also confirmed that the female production and consumption patterns tend to be more resource-efficient and they make more sustainable decisions for their households and businesses. Sachs, Barbercheck, Braiser, Kiernan, & Terman, (2016) also stated that women care more about environmental problems than men. However, a research study by Njobe & Kaaria (2015) revealed that African and Nigerian women remain an untapped opportunity in agriculture and environmental performance. Women's level and quality of participation does not meet the sustainable socio-economic development benefits. Women involved in agriculture either as workers, farmers, processors, livestock owners or entrepreneurs consistently experience limited access to productive resources, compared to their male counterparts.

Similarly, despite representing more than half of Africa's population women only contribute 39% of Africa's GDP. Oedl-Wieser (2020) opined it is due to the peculiarity of the agricultural sector which is gendered. The major players(women) are not the ones that determine how to run the farm. That is not all. A research study by Abdulai & Hazell (1995) cited in Nwachukwu (2016) stated that the incorrect use of modern inputs like fertilizer, pesticides, irrigation water often result in destruction of beneficial species because of water logging, chemical contamination of water, and pesticide poisoning. All these deteriorate land, reduce yields and productivity (Nwachukwu, 2016). Which are among the greatest agricultural problems Africa is facing.

Women who want to promote environmentally friendly farming need access to land, suitable technologies, environmental education, and training. The ability of female farmers to deliver is affected by empowerment. According to FAO, the underperformance of agriculture in developing countries is attributable to women's limited access to productive resources and inability to take advantage of opportunities in the sector. Limited access in this regard, is experienced more by women than their male counterparts, demonstrating a clear "gender gap".

According to AfDB, (2015) women empowerment and eradication of gender inequality can lead to Africa's development because it has the potential of increasing productivity of about one billion inhabitants. Women empowerment and gender equality are also imperative to achieving the 2030 Agenda for Sustainable Development. It is also a channel for achieving other goals like promoting full and productive employment and decent work for all, ending poverty, food security, reducing inequalities. This implies that women empowerment and environmental performance are synonymous; one cannot promote environmental performance without starting with women empowerment.

In this paper, we bring to the fore the areas female farmers can be empowerment particularly in relation to environmental performance. The paper is structured as follows: section 1 consists of introduction, objectives, and methodology. While review of literatures covering the concept of women empowerment and environmental performance, theoretical underpinning of the paper can be found in section 2.Conclusion and recommendations are contained in section 3.

Objectives of the Paper

The major objective of this paper is to propose a model of enhancing environmental performance through empowerment of female farmers.

In achieving this objective, the following research questions, which reflect areas of concern in this paper, will be answered.

1. What is women empowerment?
2. What is environmental performance?
3. What are the factors affecting environmental performance of female farmers?
4. In what ways can be environmental performance of female farmers be enhanced?

Methodology

This paper uses a desk review approach. Desk research involves gathering of data from available materials like the press, statistical, empirical, and analytical reports, internet, and academic journal. After that, the materials are cross referenced and collated (Juneja, 2018). It is useful and usually carried out at the beginning of a study to get necessary information which can be used as a standard during the study (Pitan 2016).

Existing conceptual and empirical literatures on women empowerment, sustainable development, environmental performance, and agriculture globally and in Nigeria was reviewed.

Literature Review

Women Empowerment

Women's empowerment is a socio-political concept made up of psychological, cognitive, economic and political dimensions (Logeswari & Thiruchenduran, 2016). According to Moses, (2009) women empowerment entails giving women power to function at their utmost capacity. Women empowerment also refers to the way women get the ability to make strategic life choices in areas they were formerly denied this choice (Kabeer, 1999). He stressed that resources, agency, and achievements dictate the ability to make individual choices.

Resources here mean human, material, social expectations and allocations while agency is the ability to determine one's goals, take steps towards achieving these goals, and choose their strategic life outcomes. Achievements can be in different forms like better welfare, having equal number of women and men in political positions.

O'Neil, Domingo, & Valters, 2014 mentioned that empowerment can be economic, psychological, social, and political. While Moses (2009) state that empowerment can be channeled towards education, finance, training, decision making power, and economic status of women to promote their active participation in development process.

Countries have developed several strategies to empower women. They have reviewed laws on status of women and encouraged women to participate in politics and the cash economy, improved women's access to education. For example, in 2000, the Federal Government of Nigeria started introduced the national policy on women. This was expected to help increase the percentage of women in the legislature and executive to 35 percent. Also, the Nigerian Government established the National Women Development Centre under the Federal Ministry of Women Affairs (WomenAid Collective, 2008). A look into women's role in agricultural production shows that their productivity and environmental performance can be enhanced through empowerment. Some of the forms of empowerment are

a. Environmental Education and Training:

Education is very important in promoting farmers adoption of environmentally sustainable farming techniques. It helps them identify and abandon harmful practices. Zahra (2018) opines that farmers can only change their mindset and practice environment-friendly agriculture when they have knowledge about sustainable farming.

However, women cannot practice sustainable farming due to lack of environmental education. There are low numbers of women compared to men in informal training. According to the Nigerian National Bureau of Statistics and World Bank (2019), from the age of 20, literacy rates for males are considerably higher than those of females, particularly in the 65 and over age group, where 61.8 percent of males report being literate, while for females that number is only 27.5 percent. This is due to some social and cultural factors that see modern education or informal

training of women as waste of time and resources because females end up as mere housewives. This is responsible for the increased rates of teenage pregnancies in secondary school and early marriage of girls.

Also, most training programmes are not designed with gender in mind. Many a times women are time constrained and cannot attend because they lack money to pay for this training. Access to quality education and the acquisition of knowledge on environmental sustenance could reduce environmental degradation and create opportunities for women.

In addition, Swanson (2008) revealed that women have not received enough attention from extension workers considering the key role they play in agriculture. Hamisu, Ardo, Makinta, Garba & Musa (2017) stated that this extension workers act as technician, agents of change, consultant. They also assist farmers to identify and find suitable solution to their problems. They also serve as middleman between agricultural research institutions and farmer. Lack of access to all these services hinders their performance. Also, some agricultural agents are men with a mindset that there are things women can do or not do. According to Anunobi & Anunobi (2018) ; Nigerian National Bureau of Statistics and World Bank (2019) this makes women miss extension services like training, advisory services and information to enhance their sustainable agricultural practices in the farm.

The contribution of female farmers to environmental performance is affected because knowledge of new and better agricultural practices, changing climate allows them to make good decisions, like adopting sustainable agricultural machinery and other adaptative measures (Anunobi & Anunobi, 2018, Solomon and Edet, 2018).

b. Decision Making Power:

Women represent almost half of humanity but their contribution to leadership and management is much less. Female participation and representation in decision-making processes that pertains to them and their families' environmental well-being are often restricted. According to Moses (2009) only a small number of women hold leadership positions and have equally contribution like men in decision making. It is not different environmentally.

Women are missing in key decision-making forums that decide how economic and financial resources and opportunities are assigned (UN, 2009). This also means women's knowledge about the environment and agriculture is mostly not acknowledged by agricultural development agencies and other personnel. Whereas, it may be this knowledge that will birth methods of achieving agricultural practices that are environmentally friendly and preserve natural resources.

According to Sachs et. al. (1997) women care more about environmental problems than men and women have been assisting in finding solutions to these problems. However, women are excluded from or have low representation in groups established to encourage better management of natural resources, due to discriminatory rules and social norms. Women are not also involved in development and planning of environmental policies and programs meant for them. These have often made the programs counterproductive, because they fail to meet purpose of increasing women's control over natural resources (Green & Thropp, 1998).

c. Access to Land

Access to land is the right to use or control land and its resources. Women's ownership and control of land means women will determine what is planted and how it is planted, how the proceeds from the farm are used (Agri, Kennedy, Bonmwa, & Acha, 2018). Presently, access to land is limited as less than 13 percent of agricultural landowners are women (UN Women, 2018). Also, numerous Nigeria women are marginalized regarding ownership and access to land (Ajala, 2017; George, Olokoyo, Osabuohien, Efobi & Beecroft, 2015). Land is still largely consolidated in male hands.

Tiondi (2000) asserts that access to land, property and water in agriculture determines how people handle natural resources. The existing common ownership of land is also a challenge because each user maximize their own self-interest, not minding the impact of their actions on other users.

Environmental performance

Environmental performance focuses on the commitment of organizations to preserving and protecting their natural environment like maintaining air, water, soil quality (Gallego-Álvarez, Vicente-Galindo, Galindo-Villardón, & Rodríguez-Rosa, 2014). Environmental performance also refers to the impact of business activities and products on the natural environment, like the amount of resource they consume, quantity of waste generated, and emissions (Epstein, 1996) cited in (Gallego-Álvarez et.al. 2014). Environmental performance finds its root in sustainable agriculture which looks for ways of meeting the objectives of a healthy environment, economic profitability, and social and economic equity. These three pillars are informally referred to as people, planet and profits.

A report by FAO (2018) stated that wrong application and poor management of fertilizers for agricultural use can alert the quality of the environment. Similarly, in most countries, the way water is taken from rivers and underground beds is beyond the environmentally sustainable level leaving a negative impact on rivers and underground beds. They also confirmed that pesticides are important inputs for plants and animals in modern agriculture, but if not well managed they can cause harm to people's health or to the environment.

Titilola (2008) mentioned other factors leading to resource deterioration as clearing of land for agriculture or other economic purposes, collection of word for cooking without planting trees, unsustainable housing and feeding of animals, the time land is left uncultivated is now shorter. All this are fueled by the high demand for agricultural products.

Theoretical Framework

The theoretical framework of this paper is predicated on the Social Inclusion Theory propounded by Weber. According to the World Bank "it is the process of improving the terms for individuals and groups who are disadvantaged to take part in society, by increasing their access to resources, opportunities, ensuring their voice is heard and respect for rights". Social Inclusion Theory is relevant to this study because it explains the importance of women as social agents that must be empowered for environmental performance.

Proposed Model: Figure1 show the relationship between environmental education, access to land, decision making power as empowerment female farmers need to promote environmental performance

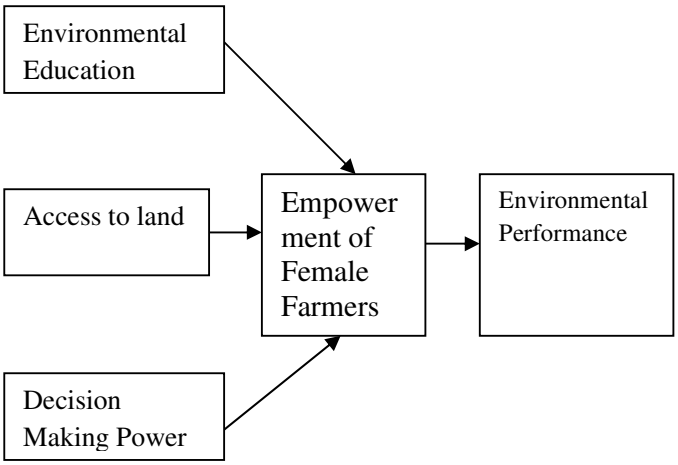

Fig. 1: Female Farmers Empowerment and Environmental Performance

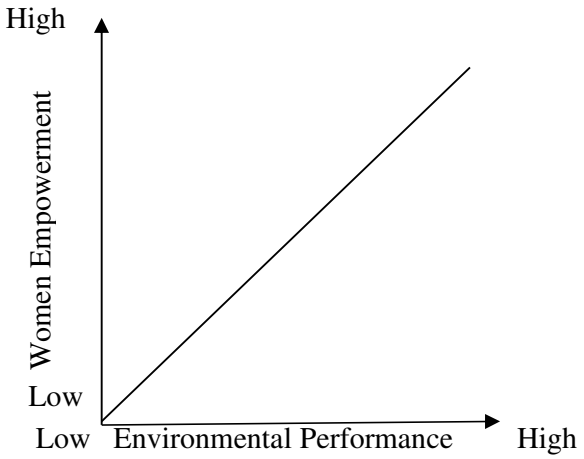

Fig. 2: Relationship between Women Empowerment and Environmental Performance

If female farmers are empowered, they will engage in more environmentally friendly activities and practices which increase their environmental performance. When empowerment of female farmers increases, their environmental performance increases and vice versa.

Conclusion and Recommendations

For women farmers to fully contribute to environmental performance, they need access to and control over productive resources. They also must be better educated on environmental issues and the implication of their activities on the environment. Better education can also increase women's level of participation in decision making at all levels of government and the farm. Training must be planned and carried out with women in mind. Greater efforts must be made to increase the number of female extension worker. This can be done by encouraging or giving scholarship to females taking STEM courses. Generally, it will go a long way in achieving SDG 4 – quality education.

Women as key players must be actively involved in making decisions on the farm, at the state, local or national level. Design and implementation of sustainable development programmes should be done with the mind that most participants are women. More importantly, their suggestions or contributions on policies about the environment, conservation, and degradation, should be acknowledged and considered. To achieve this and the SDG 5 - gender equality, the participation and representation of women in politics especially in the legislature is required.

Better land reforms and financial empowerment like credit that women can use to acquire land will go a long way in increasing their access to land. Reduced and less costly legal requirement for land processing for women can also increase access to land. This enhances achievement of SDG 16 which aims to promote of peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels.

Also, infrastructures need to be provided as lack of infrastructures puts pressure on the earth, for example collection of firewood and smoke from burning has negative environmental and health impact. Provision of infrastructure will also help in providing modern access to energy - SDG 7 and safe and clean water -SDG 6.

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Management Through Individualisation. How Can Artificial Intelligence Help Us Manage Effectively and Increase Employees' Efficiency?

Ewa JOCHHEIM

Czestochowa University of Technology (Poland) Faculty of Management, Czestochowa, Poland
ewa@aiaconcept.com

Abstract

The objective of the article is to present management through individualisation, which supports effective attainment of business objectives. The created tool supports people who analyse internal needs of employees and teams, as well as helps translate this knowledge into effective management. The tool combines knowledge from various fields such as artificial intelligence (AI), management psychology and psychology of needs. The application is scientifically founded. It analyses employees' needs and gives managers tips on how to manage individuals and teams. Consequently, it helps organisations to quickly and effectively attain their business objectives by applying an individual approach and new information techniques.

Keywords: Needs Analysis, Management Through Individualisation, Artificial Intelligence.

Introduction

Management through individualisation is a novel approach to managing employees and employee teams. A literature overview gives an insight into research on an individual attitude towards employees, but there are no articles answering the question of how to actually apply an individual approach and our knowledge about it.

There are few studies on the benefits of individualised management. Some researchers believe, however, that motivation to work is to a large extent a reflection of individual differences in character traits, such as scrupulousness (e.g. Barrick and Mount, 1991). The individualisation process was researched in many contexts, such as an active formation of one's professional career (Beck, 1992). The approach applied so far which considers money to be the best motivator (Taylor, 1996) has been criticised by researchers who stress the role of other factors in the motivational process, such as the attitude to work, type of work and team work. Maslow (1963) described in his theory five basic needs, and additional needs of some people. The role of individual needs in shaping behaviours can also be found in the Two Factor Theory of motivation by Herzberg (1968, 2003), in which internal factors, so called motivators, increase satisfaction from work, which boosts employees' productivity. That is why organisations which want to be effective in the attainment of business objectives should be designed in a way which helps satisfy individual, internal desires of employees. J. W. Atkinson (1974b) also paid attention to the fact that individual traits can have an impact on motivation to work, and some of them are genetical (Skinner, 1988). These and many other ideas (Malinowski, 1958; Maslow, 1963; Obuchowski, 1983) have been reflected in the theory developed by S. Reiss (2012), which underlines special role of an individualised approach to the employee, helping increase effectiveness and improve management. The theories presented above show that individual needs are the basis for human behaviour and motivate to perform certain activities. Therefore, getting to know the needs and their in-depth analysis should be the starting point for creating tools for effective employees' management.

The gist of management through individualisation

If an organisation cannot rise to its challenges, looking for the source of the problem should start at the management level. In one study, 359 managers were asked why organisations do not achieve their objectives and various reasons for failure were named (Longenecker, Simonetti & Sharkey, 1999). Managers from 30 different companies were asked to assess the impact of 25 factors on their ability to achieve expected results. The main reasons for failure were internal competition, lack of cooperation between employees and between the manager and employees. Another problem was ineffective communication between managers and lower level employees, as well as contradictory objectives. But the factors that prevent them from achieving their business objectives show not only mistakes committed by managers, but also lack of company's support for the management staff (Toor & Ogunlana, 2009). On top of that, individual differences between employees have a significant impact on the effectiveness of

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both individuals and objectives achieved by teams. Cognitive, emotional and social individual differences between employees have an impact on group processes and the functioning of the team as a whole. What is more, individual differences influence the way in which people behave in various situations and have a significant impact on their behaviour (Robertson & Callinan, 1998; Larsson, 1989). In studies applying the Big Five model (Costa & McCrae, 1992; McCrae & Costa, 1990) as well as the results of two metanalyses (Barrick & Mount, 1991; Tett, Jackson, & Rothstein, 1991), it was found that typical traits of a given individual have an impact on their results at work.

Given the above conclusions, the problems that organisations are not dealing with stem not only from underestimating the importance of individual differences and needs in terms of the results of individuals and teams, but also from lack of support for the management staff. The tool that we have been developing takes into account these factors and uses them to support managers in managing individual employees and teams. According to the Gallup report, 52% of employees in the USA are not engaged, which means that they are not emotionally engaged in their work, they do not invest in it enough energy and passion, which, consequently, leads to simply fulfilling orders (Gallup, 2020). Management through individualisation aims to engage employees more, which will generate more positive emotions and translate into more effective and creative work (Harter, Schmidt & Keyes, 2003).

Researching Needs – Contemporary Measurement Methods

Social sciences focus on defining and finding a perfect method of measuring a given phenomenon. Psychometric tools that are available on the market are very often expensive and difficult to interpret. Plus, tools in social sciences have recently been often undermined. There are no transparent and reliable methods which would allow to collect the necessary content, interpret it quickly and draw conclusions (Flake & Fried, 2019). Barry and co-workers (2014) have shown in their research that 40-93 % of measurement methods used in studies published in scientific magazines did not have the accuracy of their tool confirmed. And Weidmann and co-workers (2017) have proved that out of 365 measurement methods, 69% were used without reference to any earlier studies or did not describe the scale validation process. The tool described here is a remedy to the above problems and the figure 1 below shows how the prepared tool called AIA works. The AIA application is easy to interpret, highly accurate and reliable. During the design process, a set of questions and needs were defined. During the validation and tests, the number of needs was reduced to 32. The mobile application conducts online studies, and artificial intelligence prepares an individual a profile of a given person. AI establishes the profile on the basis of answers, taking into account all parameters fed into the application. AI looks for correlations in the calculations. The application hones the model all the time, by feeding itself with new studies and downloaded data after the following confirmation/negation from the user.

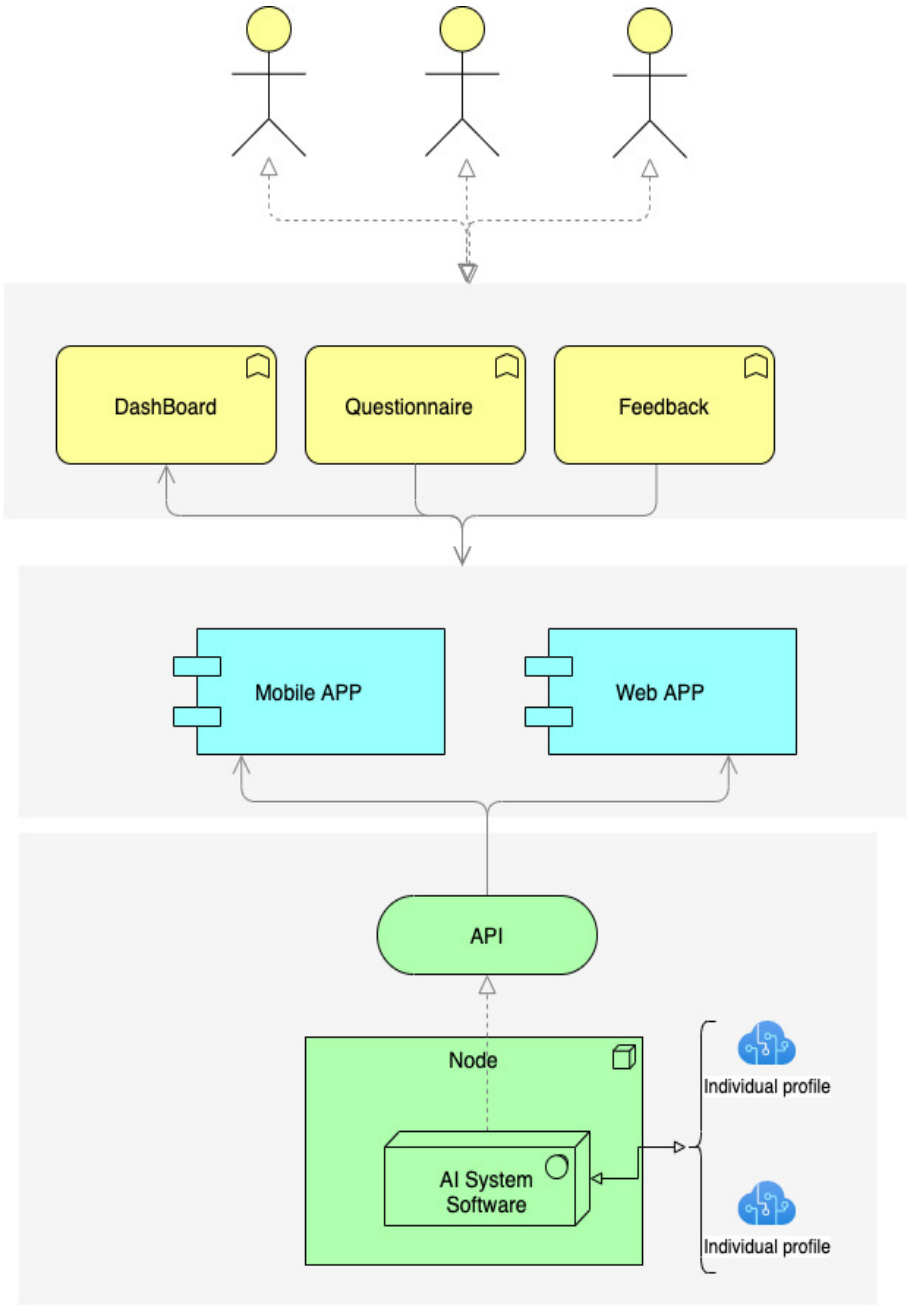

Fig 1. Description of the AIA system based on artificial intelligence Source: Own work.

Methodology and tool description

The starting point for the tool (AIA) is an analysis of individual needs of the employee. Based on research on needs, the number of needs was established at 32.

Table 1 shows the name of the need and describes typical personality traits of a person who has a high (80% in comparison to the whole population) intensity of the need.

Table 1. 32 Individual needs studied by AIA

	Need	Personality traits typical of the need
1	Influence exertion	Strong will, efficiency, ambition, power
2	Fulfilling tasks	Fulfilling tasks, acting for others, people-oriented
3	Autonomy in action	Independence, pride, individuality
4	Team work	Dependence, humbleness, building bonds, closeness, relations
5	Intellectuality	Thinking, searching for truth, insightful approach
6	Practical actions	Practicality, resourcefulness, creation, acquiring experience
7	Sensitivity to criticism	Low self-esteem, acceptance, recognition, approval
8	Confidence	High self-esteem, assertiveness, emotional strength
9	Structure and organisation	Process orientation, method, routine, punctuality, perfection
10	Openness to changes	Flexibility and creativity in action, spontaneity
11	Collecting	Collecting objects, gathering, ownership
12	Generousness	Magnanimousness, tendency to lose things, sharing
13	Responsibility	Sticking to principles, rightness, honesty, diligence
14	Opportunism	Goals orientation, calculation, self-interested
15	Social engagement	Humanitarianism, altruism, idealism
16	Social pragmatism	Realism, self-orientation, apolitical
17	Sociability	Extravert, openness to others, many contacts
18	Privacy	Introvert, reserve in contact with others
19	Taking care for your family	Bringing up and taking care of children, self-sacrifice, homebody, family oriented
20	Partnership in family	Independence of children and family
21	Prestige	Social position, importance, elitism, status, hierarchy
22	Modesty	Egalitarianism, equality, naturality, restraint
23	Competition	Comparing oneself, competition, rebelliousness, inclination to compete
24	Harmony	Compromises, arbitrariness
25	Sensuality	Romanticism, aestheticism, beauty
26	Ascetism	Practicality, utilitarianism, reserve, simplicity
27	Enjoy taste	Gourmet, food enthusiast
28	Quenching hunger	Eating as survival need
29	Movement and physical activity	Physical activity, energetic
30	Physical restraint	Sedentary, comfortable life style
31	Security	Stability, predictability, conservative position, unwillingness to changes
32	Courage	Risk, insecurity, spontaneity, adventure

Source: own work

Each person has all the above mentioned needs, but to a varying extent. First, to define the intensity on the scale from 0% to 100%, you fill in an AIA questionnaire.

Next, once the value of the need has been established, AI develops tips for the manager. The app gives hints what actions should be taken towards the employee to improve their effectiveness. The supervisor simply follows the tips from the system and gives feedback whether the recommended tip was useful or not. Thanks to the system of active cooperation between the manager and the application, the AIA application learns on an ongoing basis from the human and their tips become more and more accurate. The system is based on AI and deep learning.

Up until now, managers not only had to observe employees to analyse their individual needs, but also draw conclusions with regard to how to manage them and the whole team. Developing an individual management strategy was not only tiring and time-consuming, but also prone to many potential errors.

An analysis of individual needs conducted by the AIA system is a starting point for creating a tool, the functioning of which boils down to three basic steps:

1. Analysis of individual needs of the manager, employee and team.
2. Analysis with development tips that the manager should apply to improve effectiveness of the employee/team.
3. Feedback from the manager, on the basis of which the system learns how to effectively analyse needs and create a development strategy, it hones the algorithm and develops tips for effective management.

The AIA application gives ready-made tips for the manager in a virtual talk on how to work with the employee. It helps answer the following questions:

- What individual objectives should be set for the employee?
- How to individually communicate with the employee?
- What individual work conditions should be provided for the employee?
- How to individually show recognition to the employee?

The tool is a universal one, which means that the needs analysis can be conducted in many contexts, not only in management through individualisation, but also for example in professional sports, checking the compatibility of needs in relations or studying the probability of committing a crime. The questionnaire should be filled in the same way, the only differences are in the report that is generated and tips from the system. The interdisciplinary character of the method was of crucial importance in the process of effective development of the application: AI achievements are combined with those from social sciences on the reasons for human behaviour.

Research problems that may arise in the future will most likely be related to the analysis of the application's effectiveness. The application uses artificial intelligence together with a deep learning system - the needs analysis and recommendation system, is a constantly learning and changing system. When analyzing the effectiveness, determinants will be analyzed, the value of which loses validity over time. This means that they could have been replaced with other, more accurate values defined by artificial intelligence, which makes those analyzed in the research obsolete. Another research challenge will be to clearly define the effectiveness of the application presented here. As it examines the individual needs of a person and prepares individual recommendations, the increase in the effectiveness of a manager, employee or team will also be very individual and difficult to clearly define. An additional question is whether the list of needs proposed here is complete? In the future, it makes sense to verify it and adapt it to the changing working and living conditions and environment, and to human life on the Internet.

Conclusions

AIA will help managers by improving employees' efficiency and effective attainment of business objectives. From the very beginning of the application development, it is tested on an ongoing basis by managers managing teams. Their task is to check the functionality of the application as well as assess the usefulness of the tips that are provided to them. In addition, from autumn 2020, the tool is tested by managers and sales teams, which will allow to determine whether the sales effectiveness of sellers has been increased thanks to the use of the tool. The priority is not only to support managers in effective and precise management through individualisation, but increasing engagement and motivation, and hence effectiveness of employees. The tool can become a binder between the manager and the employee and will use specific tips to develop the strategy for successful management of both the individual and the whole team.

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Conceptualization of Intuitive Planning in Commercial Services

Elzbieta SKAPSKA

Bialystok University of Technology, Bialystok, Poland
e.skapska@pb.edu.pl

Abstract

Contemporary conditions on a service market require dynamic planning to create new quality and value in products and services. The use of an *intuitive planning* concept may prove to be an effective tool. The aim of the study was to fill a gap in research on the subject of services in a theoretical way as well as in a reviewing and cognitive framework. In order to reach the goal, creative and empirical research has been performed in which the most important role is played by intuitive reasoning that is supported by rational reasoning. For the purposes of the article, several distinct components of the process of providing market services were analyzed and conceptualized on the basis of perception and intuition that are at the heart of this sort of planning. The following research questions were formulated: can *intuitive planning* be applied to service-oriented business activity and does its introduction make sense in the process of service provision? Are there visible differences in production planning and service provision processes? The result of scientific deliberations constitutes a set of recommendations for service providers with regard to planning service-oriented activities in economic practice in the context of their profitability and aptitude for bringing prosperity. Based on the trial of 247 students, the results have shown that the most indications are assigned to the 'forecast of the optimal achievement of a goal' and the fewest – 'taking risks, but with the chance of significant rewards'.

Keywords: planning, intuition, rationality, commercial services, service provision process.

Introduction

One of the most significant characteristics of today's market economy is a growing significance of commercial (market) services associated with an access to a wide range of the ICT sector which has brought new opportunities to educate consumers, facilitate access to the market, support decision-making processes and engage consumers in the service provision process. A change in consumer behavior resulting from the application of digital technologies requires service providers to re-design their market relations. Apart from "hard" components of the purchase-sale process on the market, in terms of consumer-salesman relations, also its "soft" business-related elements gain in significance. This is associated with the need to complement traditional planning (based on measurable factors) with planning based on perception and intuition, i.e. intuitive planning.

Paweł Harasim (2009) is considered the Polish promoter of intuitive/sensual planning. Intuitive planning is a relatively new notion, poorly propagated and rarely undertaken by authors. It constitutes – as has been mentioned – a part of complementary planning with regard to traditional planning and additionally entails other elements, e.g.: the human factor, working atmosphere, interpersonal relations, personality types of employees. Despite the fact that researchers have noticed an economic value of "soft" elements of planning, they take on this issue rather unwillingly, which may result from the immeasurability feature of factors that accompany this process, particularly in case of the service provision process.

D. Kahneman puts an emphasis on intuition in business activity. In his view, it suffices that such activity is characterized by logical consistency, not necessarily reason (Kahneman, 2002). Cognition takes place through a sequence of logical experiences, a total of insights and a reception of stimuli through two types of personality: analytical and intuitive.

Hence, necessary cognitive structures in the process of planning may be divided into: a) the ones connected with imagination; understood as expectations and needs that are engaged by subconscious; b) structures associated with intelligence which corrects experiences that are recorded in imagination. Intuition is a general ability to adapt to new conditions and perform new tasks by means of various models of intuitive, rational, irrational and emotional thinking. The thinking that is, to varying degree, dependant on the context. With regard to new value of enterprises with their results and benefits, an immensely significant role is ascribed to intellectual capital, intuition and cognitive processes

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so that the information included in memory could reflect the semantic, episodic and context connections (Salvi et al., 2020; Popov et al., 2020). Information processing, that occurs in the nerve system, consists in the reception of information from the environment, storing and transforming it, and finally, introducing it, again, into the environment in a form of reaction, i.e. behavior (In psychology there is the law of effect that associates the experience of satisfaction with particular behavior in a given situation. If the experience repeats in the future the probability of repeating this specific behavior increases - Thorndike, 1898). A relation with a client is one of the key indicators of service provider's profitability, e.g. banks. The attention that is drawn to effective initiative in communication with a client results in obtaining the knowledge on various strategic decisions which are, or will be, realized and contribute to the understanding of developmental directions. In the literature, there is a confirmation of a positive relation between communication in practice and a level of satisfaction (Parajuli, 2020). Orientation towards entrepreneurship in services constitutes the grounds for internationalization and innovation. At the same time, it makes contribution to the creation of entrepreneurship culture (Vuorio et al., 2020). In services, it is crucial to evince trust in an individual as well as the trust at the level of a whole organization. Organizational trust has a direct connection with a broad range of organizational variables which affect success and effectiveness while achieving goals (Sado et al., 2020).

Idea of intuitive planning

In general terms, planning refers to the management function and is based on the analysis of figures, forecasts or other measurable factors, and thus enables the planning of effective and preventive measures. Intuitive planning is used especially in operational planning, and more specifically in short-term planning (up to three months), i.e. in the case of a supply chain it will concern production and purchase planning at a factory level (Harasim, 2009). The use of perception and intuition in planning allows the entrepreneur to predict the emergence of crisis situations by gaining a holistic view of the planning process, also in service businesses. It is noteworthy that the application of traditional and intuitive planning to business activities requires the fulfillment of appropriate conditions (Table 1).

Table 1: Conditions necessary to use intuitive planning in enterprise (Source: own elaboration based on: (Harasim, 2009)).

Conditions	Traditional planning	Intuitive planning
intellectual potential		+
knowledge of organization/company		+
knowledge of people (behavior, personality, interpersonal relations)		+
knowledge of environment (surroundings)	+	+
reliable data and information	+	+
knowledge	+	+
knowledge of planning processes and methods	+	+
experience	+	+

As mentioned above, the main components of sensual intuitive planning are: the human factor, working atmosphere, interpersonal relations, personality types of employees. The research (Skąpska, 2020) confirms situations, in which these factors concern the exploration of perception and intuition for planning pro-development activities in the company. The survey shows that the most frequent and at the same time most desirable feature of relations between co-workers is relationship based on cooperation. Such an answer was provided by 40% of respondents. This relationship refers to a situation where the manager respects a subordinate and values their opinion. Among significant, but not the most important relations, respondents indicated a relation motivating to change (46.4% of responses) as well as a relation based on tolerance (34.4%) and friendliness (45.6%). The achieved result can be explained by the fact that employees are willing to innovate, but need encouragement, and a friendly attitude to another person promotes efficiency and effectiveness achieved in an organization's team. In this regard, respondents also pay attention to respect for differences in character, views and appearance. Still, they attach the least importance to the compassion and motivating-for-effort relation as well as a claim-type relation, which can be a manifestation of the fact that, in the workplace, employees are disciplined and want to focus on their tasks.

Entrepreneurs/employers are obliged to ensure adequate working conditions, i.e. those based on ethical, moral and human rights principles, but this is not always the case. Depending on the preferred forms of respect, employees' personalities can be divided into two groups. The first of these is represented by a philosopher, a friend, an expert and a seeker. These are persons who value most contact and information flow. This means that soft values are an expression of meeting their higher-level needs, i.e. self-development, respect and recognition. The second group is composed of: a star, a builder, a creator and a free spirit, who, more than soft components, rely on hard motivation,

e.g. in the form of publicity, higher wages, better working conditions or enriched workplace equipment (Skąpska, 2020).

Any theories need to be confirmed in economic practice or, in other words, facts need to be described. On the basis of observations and literature review, it is possible to compare opportunities and threats that are associated with the implementation of intuitive planning into an organization (Table 2).

Table 2: Opportunities and threats of application of intuitive planning concept by enterprise (Source: own elaboration based on: (Harasim, 2009)).

Opportunities	Threats
allows for preventive activity	entails a high risk
helps to predict "black scenarios"	*requires a great emotional effort from the management to be put into the production or service provision process, which may result in a lack of focus on the task
comprehensive analysis that takes into account many more factors than traditional planning	**causes increased labor costs, e.g. salaries (prizes, motivation systems, training)
fosters a holistic view of the crisis situation and enables to find a solution	***increases the transfer of *know-how* (outflow of employees involved into the project/mission of the company)

; **; * - author's elements of the table.*

In considering two versions of planning: traditional and intuitive, it is noteworthy to draw attention to differences in the components of their potential (Figure 1).

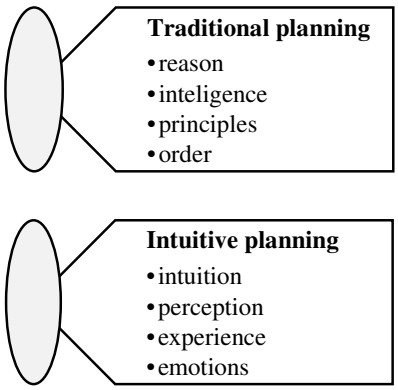

Figure 1: Elements of traditional and intuitive planning potential
(Source: own elaboration).

In traditional planning, the most important are those factors that relate to the establishment/order, and intuitive planning – those relating to spontaneity/marketing. Reason and order constitute planes for repeated activities, for established norms. Feeling/reception, reactions to stimuli (perception) and premonition (intuition), on the other hand, are rooted in natural order, unforced instructions, but require management of emotions.

The basis for a service provider's perception, in a positive and negative sense, is the quality of services and expectations of these services. Additionally, perceptual behavior of the recipient of services is related both to knowledge contained in books, media, images, sound, magnetic and optical discs, and hidden knowledge created by skills, experiences and reflections (Skąpska, 2019).

Commercial services as the subject of planning

Planning forms a part of management which, in turn, means a process that involves social responsibility for economic and effective planning and regulates the company's activities in pursuit of specific objectives (Junega, 2018). Similarly to controlling, it should be considered as a tool to improve management functions of an enterprise (Akhmetshin et al., 2019). Lack of an internal control system in a company leads not only to inappropriate management of human resources and other business processes, but also increases the likelihood of negative

consequences for the company, such as: loss of important commercial information, allocation of market share to competitors, increased risk of fraud (Rahim et al., 2017; more about risk, see: Jibril et al., 2019).

Key decisions made by a service provider and a recipient are different, therefore the service provider decides on a service by looking for answers to the questions: what, in what quantities, for whom. The recipient of the service, in turn, decides about a self-service rather than a service and answers the questions: what, in what quantities, for how much, from whom. In pursuit of their different goals, it becomes desirable to find a way to reach a compromise. The service provider is primarily interested in economic (hard) management, which refers to traditional planning. However, due to his pro-consumer attitude they have to take into account (soft) management, which can undoubtedly refer to intuitive planning. Economic management, or economization, is connected with the commercial approach of an entrepreneur to conducting business, e.g. with making profit and strengthening the market position. Hence, the commercialization of activity means that it is based on market principles. The market forces the division of services into commercial and non-commercial ones and their assumption of respective characteristics (Table 3).

Table 3: Features of commercial and non-commercial services
(Source: own elaboration)

Commercial services	Non-Commercial services
are of a market/private nature	are of a state/public nature
tradable	intended for general social use
paid	unpaid
material and non-material	mostly non-material
their launch must be profitable (related to generating revenue, profit)	their introduction to the public sector must serve the general public (accessible to all)
provided by private sector operators	provided by private and non-profit sector operators

Economic management should be considered in relation to the place of service provision, i.e. 'economization in services', and management – to its object, i.e. to services, hence: 'service management'. Apart from the criterion of remuneration, according to which services are divided into commercial and non-commercial ones, another division of services deserves to be mentioned in the market context. M. Katouzjan (1970) made a distinction between old (not requiring high qualifications, whose importance decreases with economic growth) and new services. With regard to such a manner of division, 'freeing up services' within the framework of transforming the system of a centrally controlled economy to a market economy system (commercial service) was considered a breakthrough moment as it became a condition for the new functioning of service providers (Table 4).

Table 4: Examples of commercial traditional and modern services
Source: (Skąpska, 2019)

Traditional services	Modern services
Housekeeping (cleaning, ironing and cooking services)	Digital services (teleconferences, intranet systems)
Intermediate services (street sales)	Modern business services (consulting, database handling, marketing)
Repair services (shoemaking, tailoring)	Business services (tax consultancy, controlling, asset management, development and implementation of promotional programs, property protection)
Commercial services (sale of low-tech items)	High-tech services (information technology services, biotechnology, licenses and patents)
Professional services (market research, traditional photography services)	Electronic banking services
Repair of motor vehicles and household appliances	Tele-medicine
Wholesale and retail trade	Information-based services (web portal services)
Hotels and restaurants	Consumer services (travel)
Transport	Services related to industry (legal, accounting, banking, financial, insurance, logistic services)
Storage and communication services	Directory services combined with self-service (databases in operating systems and applications, e.g. Red Hat, Fedora, IBM Tivoli)

When considering services in the light of new economic and market trends, services of a contemporary nature i.e. consumer, business, highly informative and self-service, seem to be particularly interesting (Skąpska, 2019).

With regard to the above mentioned concept, the idea of planning in services is based not so much on expectations as on desires, especially that the process of service provision is not easy to plan in the traditional way due to the negligible possibility of recreating each of its stages. Any potential consumer can make planning more difficult by having a different idea of the service. The specificity of this activity consists in adapting existing services to the needs of specific users and launching innovative activity, which is a manifestation of innovative business (Skąpska, 2019). In the area of services a great stress is put on a service provider because of their ability to play different roles (owner, manager, agent, client, innovator, contractor) in the course of their economic activity. An entity performing work gives meaning to the service-oriented activity by means of using awareness to stimulate growth at every level of 'advancement', i.e. maturity of activities. A service provider is an entity running a business activity of a service nature which results in services focused both on people and facilities, falling in the 'market' category. Categories of services, together their changing characteristics, will be determined according to the stage (the above mentioned level). It should be remembered, however, that social processes are not only dominated by reason, which still remains an asset, but also extra-national motives and interests. Rationalization of the social process means seeking to control forces opposing reason and solving conflicting interests of individuals and social groups in order to protect humanity from extinction (Bochenek, 1999). Everyone is responsible for the fate of the entire humankind, regardless of their functions, profession, etc. (Hall, 1990).

In order to be able to design the desired course of the process of providing travel services, planning should be based on key elements. Management teams are forced to start with three projects: firstly, they should map the travels of their clients. An important idea is to map these travels and obtain answers to the questions: what happens in the presence of the client and what has to happen behind the scenes to ensure this 'on stage' impression. Secondly, they should assess themselves (and their competitors) with regard to basic elements of customer experience and technical excellence. Thirdly, they should identify critical interactions with customers. These distinctive moments that determine an organization's identity and strategy are of great significance to customers (Leavy, 2017).

Intuitive planning of services in the market context

The market is an important platform for creating relations and a place of social bonds. In the liberal thought, trade is analyzed as a means of serving rational individuals. By signaling prices and volumes of trade, it provides information that allows each social actor to freely adjust his or her behavior ensuring self-regulation of the economy and society (Bremond, 2007, p. 107). On every market, including services, there is a phenomenon of satisfying needs and raising awareness of them. Their satisfaction, as T. Veblen (2008) stresses, does not result from rational choice, but is conditioned by already existing social institutions and infrastructure. Institutionalism indicates that economics is a psychological science when it refers to the behavior of people in the economization process.

J. B. Say claimed that producing means creating usefulness. Production, in turn, means readiness to provide services. Provision is division and exchange, and consumption is an intake associated with satisfying needs (Say, 1967). Thus, the use value of goods consists of a number of distinct useful characteristics which may be present in goods at different intensity. These features are usually easily understood by the recipient (Table 5).

Table 5: Useful features of goods and services – differences (Source: own elaboration based on: (Ładoński, 1994)).

Goods	Services*
product functionality	high quality
operational reliability	imagined outcome of an activity
durability	satisfaction with consumption
efficiency	adequacy to expectations
life span	willingness to re-consume
reparability	possibility of co-creation
modernity	complexity, i.e. additional services
safe use of the product	trust, belief in the expected effect

** author's elements of the table concerning useful features of services*

An important principle for the survival and development of a company on the market is an imperative of being competitive in striving for balance between organizational culture and service design. 'Great culture' manifests itself in the ability of managers/planners to work in a relationship with customers and staff and meet the expectations of both groups. This is particularly important in a service organization. A person planning a service process should decide whether traditional planning is sufficient to achieve the desired effect, or whether the process should be extended by adding new stages, i.e. implement intuitive planning (Figure 2). The length of the process certainly depends on the characteristics of services.

The following features constitute the specificity of services and their distinctness with regard to material goods: a) intangibility – the service as a product for sale is dominated by intangible elements: the service cannot be touched, felt, tasted in the same way as tangible goods; b) indivisibility – refers to the simultaneity of the service provided by the service provider and its consumption by the customer, i.e. to the inseparability of the person providing the service with the product, the customer's participation as a co-creator of the service, and the role that can be played by the other customers in this process, (c) diversity – means the difficulty of maintaining homogeneous quality standards and the difference in the level of concluded transactions and provided services; (d) impermanence – by rule services may not be stored and maintained, so it is not possible to produce them in stock to, for example, sell them at the time of increased demand.

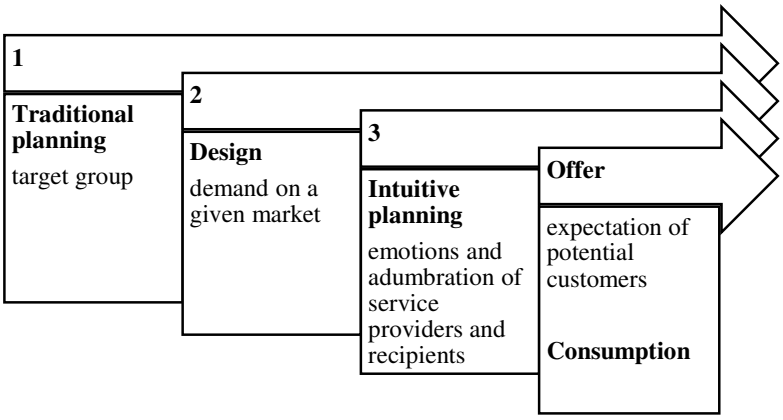

Figure 2: Planning stages in services

(Source: own elaboration).

In a deliberate selection of activities, a market participant has the opportunity to assess which activities lead to better and which to worse results. In the provision of services, what counts are the structural components of the person's type of character and trust as a relationship value. This gives the reasoning of individuals certain specificity. In services, the components of the provision process are factors that hinder repeatability, such as emotions, dominance of the human factor together with its level of maturity, professional experience, personality, qualifications, etc. People's economic behavior depends on their subjective perception of reality, knowledge and standards. The set of rules of behavior of individuals and organizations reduces uncertainty, ensures regularity of behavior/activities. When, as a result of the provision process, the service meets or exceeds the expectations of the recipient, the cycle can be repeated to some extent, i.e. a new process can be planned. Planning initiates the reproduction process and a new cycle of the service provision process after the first cycle has been completed and there occurs a desire to resume it (Figure 3).

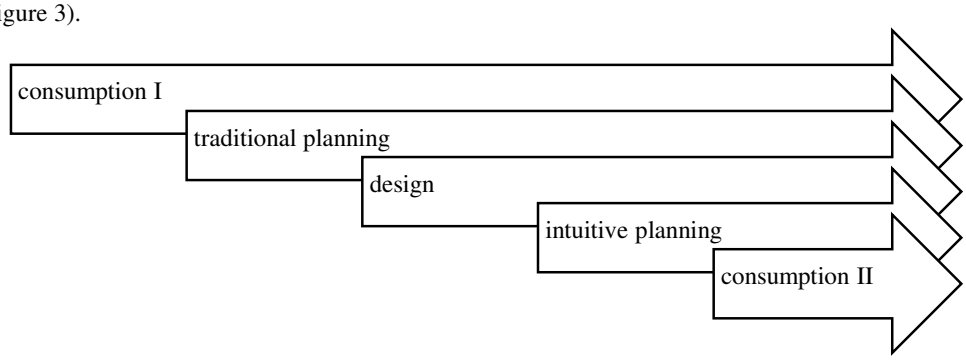

Figure 3: Stages of resuming the planning process in services

(Source: own elaboration).

In a more developed form of organization of the economization process, also in the service sector, the market emerges as a network of economic institutions, the division of labor and knowledge, and the problem of benefits resulting from the use of individual skills, qualifications as well as knowledge, place and time (Hayek, 1945). Appropriate application of the logic of thinking translates into rational activity, allowing to reduce losses in human resources. In this respect, service providers can take advantage of the opportunities offered by an economic order that fosters greater rationality. It is not perceived as a form of specific directives, but as an ethos, not as a logical category, but as a psycho-sociological one. A service provider solves problems based on intuition, imagination, insight and emotions. Taking into account the influence of these factors on economic choices, it is possible to divide planning paths into two parts (Figure 4): a path leading to benefits and a path that brings costs, expenses, but not always losses. In the long run, costs (capital expenditure) can be transferred into benefits.

Figure 4: Effects of selecting the planning path

(Source: own elaboration).

Planning results in projections of the decision consequences which include costs or benefits. In services, one of the prediction methods entails basing the thinking and acting on intuition, imagining the process as well as acting on the perception of individual activities that may lead to positive acceptance of the effect of the process, i.e. service consumption.

Intuitive planning and rationality vision in economic management

Planning assumes the ability to imagine things. In service relations and in a process of service provision, intuition, or in other words, creative imagination rests on a unique set of abilities of a person as well as on favorable opportunities and means that enable intellectual potential to show (Garden, 2008). The set includes:

- verbal-linguistic intelligence (highly developed verbal skills and sensitivity to meaning and word rhythms);
- logical-mathematical intelligence (ability to think about concepts and abstract ideas as well as to differentiate logical and numerical patterns);
- spatial-visual intelligence (ability to associate and remember things graphically as well as to visualize abstract concepts);
- kinesthetic intelligence (ability to control the movement of the body and to operate certain objects);
- musical intelligence (ability to appreciate the rhythm);
- interpersonal intelligence (ability to properly detect and properly respond to other people's moods, motivations and desires);
- intrapersonal intelligence (ability to be aware of internal feelings and to conform to them as well as one's values, beliefs and thought processes);
- naturalistic intelligence (ability to recognize and categorize plants, animals and other objects in nature);
- existential intelligence (sensitivity and ability to search for answers to deep questions with regard to human existence – What is the sense of life? How did we get here?).

Using the perception and intuition for thinking about actions, i.e. planning, consists in a basis for a reasonable production process, especially the process of service provision. The perception, in this context, should be understood as an interpretative processes. The intuition, however, based on intelligence, constitutes the ability to predict. The points of view on how to administer and manage rationally derive from the image of the world, the image of a human and from the origin of performing the science [Stacewicz, 2003]. A new paradigm of rationality is connected with the name of H. A. Simon (1955). New quality in economics has been introduced by researchers of the institutional economics. According to them, a human is a being who seeks for satisfaction and not the optimum. Rational behavior of people is formed by the structure of a task and calculating capabilities of a human. They must formulate judgments based on strongly filtrated data. The rationality in respect to services was first defined by E. Skąpska [2019]. According to her 'rationality is a trait of a reasoned economic action with regard to logical cohesion and human mind. Such action in services may hardly be replaced by artificial mind (e.g. computer)'. Simultaneously, the ability to predict events requires an additional skill of proper perception of reality which is connected with the following notions [Gardenfors, 2006]:

1) internal world – it is necessary for a skill of instant planning;
2) definitions of various emotions – at this level, an individual is capable of observing and understanding that someone is, for instance, suffering. It is sympathy. Even though one understands someone else's emotions, it does not mean they know what somebody believes in or desires;
3) focalization – it is being able to understand what someone focuses on or pays attention to. This skill does not assume the existence of any concept of an internal world;
4) intention – it is the ability to, above all, understand that there might be a specific purpose behind someone else's particular behavior. This form of everyday reasoning is especially interesting;
5) mind – the skill behind the concept of mind has been previously defined as possessing symbols or concepts on the subject of what individuals believe in or desire;
6) self-insight – at this level one needs symbols and concept of their internal world. The example may be their own beliefs or desires. To be more precise, it means the ability to meditate on them. A special case constitutes the ability to pre-plan, which assumes that one is capable of defining their needs.

The above 1 – 6 levels form a series of layers in the cognitive development of humans and lead to self-awareness.

Construction of the problem

Each attempt to create a concept of rationality poses, by definition, an attempt to improve the functioning of an individual enterprise. It needs to be stressed that, if its postulations are not in accordance with the reality, there is a danger of creating an utopia. Rational actions are a basis of economic activities and they become rational, thus correct, if they are congruent with the rule of economy, which has been present in the literature since the half of the 18th century. Acting (administering or managing) is considered to be rational when an entity that realizes a preferable goal chooses, based on their knowledge, the most effective means.

Ignoring the validity of aims and morality of means undermines the sense of rationality and reason. Although business activity is generally rational, there is no sole rationality. Objectivistic rationality, subjectivism rationality and rationality of actions are not identical to rationality of thinking. One should accept the fact that there are always more rational projects, plans and economic actions.

Methods

247 students of economics from Polish economic universities (Warsaw, Wrocław, Kraków, Poznań and Katowice) and 111 entrepreneurs (exhibitors at international fairs in Polish cities) took part in the study conducted by the author. In the first case, a questionnaire was used, which was distributed to students. And in the second one, a direct interview was conducted.

Results

Intuitive planning usually refers to irrationality and a quick decision. Rational thinking is opposed to emotional activity, a lack of analysis, complete information and thoughtful phases of operation. These issues were resolved during the research (Figure 5. and Figure 6).

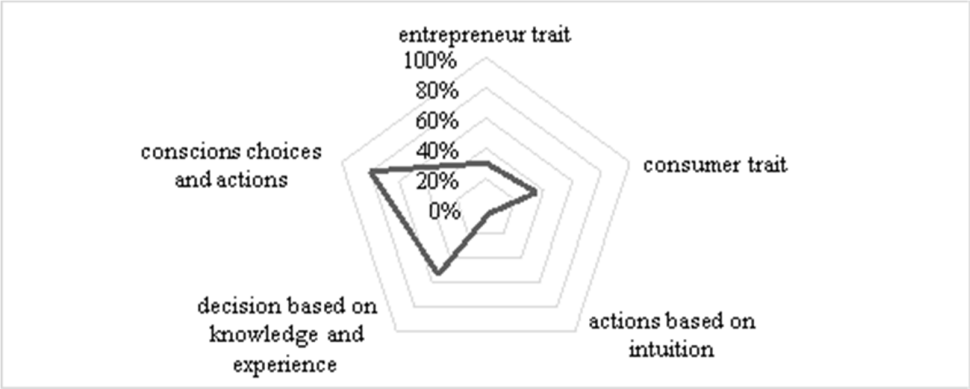

Figure 5: Importance of rationality in opinion of economic students
(Source: own elaboration based on authors research).

The largest number of responses, as much as 68.4%, concerned the understanding of rationality of the entrepreneur as a forecast of the optimal achievement of the goal. The fewest votes were given to the approach of taking risk, but with a chance for significant benefits. This is only 6% of indications (Table 6).

Table 6: Entrepreneur rationality
(Source: own elaboration based on authors research).

No.	Respondent answers	Indication proportion
1	taking risks, but with chance of significant rewards	6%
2	security, certainty, complete information	47%
3	ability to reduce costs	8%
4	forecast of optimal achievement of goal	68%
5	maximum effects and minimum expenditure	25%
6	minimization of inputs, minimization of waste	22%

The most indications were assigned to the 'forecast of the optimal achievement of the goal' (68%), and the fewest – 'taking risks, but with the chance of significant rewards' (6%). Such proportion might mean that rationality is perceived as a trait associated with effectiveness that is led to by a proper plan based on a vision of achieving benefits.

Other goals by the service entrepreneurs included: experience, amenities, technology, optimization, reduction of costs, increase of earnings, a plan, a strategy for actions. On the other hand, the production entrepreneurs valued high quality of production.

Conclusions

Based on the undertaken considerations, it appears that traditional planning without emotional involvement and knowledge of economic psychology, or emotional or social intelligence, may be considered incomplete. However, complementing this form of planning with intuitive planning involves additional risks and costs which may turn out to be both a successful and unsuccessful investment. Planning with a positive effect can give an entrepreneur a holistic view of an organization, where people are the greatest capital. Then, the culture of the organization, based on open discussions that foster innovation and increase work efficiency, will be associated with the profit. The possibility of obtaining many benefits, for both service sellers and service buyers and resulting from the implementation of intuitive planning into services, allows to conclude that there is a need for further, this time empirical, research on the subject.

The traditional planning, under rational thinking and acting in order to achieve a goal, is based on an analysis, numbers, risk and cost estimation, minimization of risk. The risk, within the reason, is controlled. Everything is precisely calculated – each step investigated. This element of the process may prove itself in the production process, but in the service provision it is not entirely predictable. One cannot repeat many stages in the next activity cycle of a service provider and a service receiver. The process itself, obviously, needs to be deliberate and thought over. However, the process of service provision is affected by emotional state, real time prediction and instant decisions that are made based on participant's experiences and promises. Therefore, those specific features of services make it necessary to complement the traditional planning with the emotion-based planning, i.e. intuitive planning which is sensitive to individuals participating in the service provision process.

In the context of use value of services, i.e. consumer's satisfaction of needs, one needs to pay a particular attention to meeting service personnel's expectations, their desires and ideas with regard to services.

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Rationality is Service Provider's Trait

Elzbieta SKAPSKA

Bialystok University of Technology, Bialystok, Poland
e.skapska@pb.edu.pl

Abstract

Specificity of services requires separate, special treatment as they face the issue associated with rationality. It significantly connects with various factors which are often ascribed only to people. Those factors regard relations and interactions. They constitute a part of organizational potential, but they do not shape any substantive or financial matters. The aim of the article is to explain the notion of rationality and form an attempt to ascribe it to a service provider. Achieving the assigned goal is based on the results of survey research and interviews. Those results concern a cardinal conclusion that rationality, in economic sense and with regard to services, is about conscious acting that brings benefits and, in comparison with production, is far more attached to human reason and market-environment relations. This means that rationality should be a trait of an every economic entity. However, as for a trait of a service provider, it might be understood as a unique skill that a person uses in order to repeat a successful and effective process of service provision based on employer's involvement in accurate (in accordance with expectations) satisfaction of service consumer needs.

Keywords: Services, Business Activity, Rationality

Introduction

Rationality regards a human in the context of economic management and the evolution of conditions for their activity. The traditional perception of rationality is evolving. The source of this process is rationality in the classic view. New alternative views are emerging all the time, which testifies to the need for adjusting to the current progressive changes. Service may only be provided by a human equipped with competence, qualifications, experience, personality, i.e. human capital. Accepting this fundamental assumption leads to a conclusion that human labor is a basic generative factor in services. J. B. Say (1967) claimed that productivity meant creating usefulness, and the production constitutes readiness to provide services.

In the 60s, there was a turnaround towards the belief in human's rationality. Contemporary psychologists believe that humans, in their everyday lives, apply the rule of deduction that does not diverge from the rules of logic or statistics and they perceive the world in a way that hardly differs from the scientific perspective (Szewczak, 2013, p.73). At this point, one may summon up rationality in a macro scale, which was taken by O. Lange with a measurable goal, i.e. the increase of national income. Thus, if we relate the EU countries, we may talk about rationality that refers to common goals instead of universal rationality. It is worth stressing that the basis and the reason for the economic activity is composed of, firstly, unlimited human needs and desires, and secondly, resources that are necessary to satisfy them. However, the later ones are limited at a given place and time. This requires making economic decisions. Global communication generates the same or very similar needs for all the people, but only some of them may satisfy their desires.

The concept of economic rationality was enriched by J. Bentham, who was a representative of utilitarianism in the 17th century. He introduced the model of a calculating unit/individual which originated from the principle of utility. According to him, each person calculates the utility that comes from the actions. Even insane or mentally ill people constantly calculate their actions. 'The principle of utility uses the rule that either approves of or rebukes any activity that expands or reduces one's happiness associated with their desired goals – even if it is only a tendency to do so. Friedman (1953), in connection to the theory of the rational choice, claimed that it had been invented as a mathematical simplification that enabled creation of a set of results which reflect analytical power. People, even though they possess neither formal tools nor cognitive resources in order to calculate the optimum, behave like bicycle riders – they keep the balance in spite of being unaware of equations behind the dynamics of movement. Simon (1978) notices that exercising the rationality requires an effort, but its consequences are pervasive, especially with respect to an organization or an institution. Baumol (1979), however, discovered a different point of view as for a satisfactory criterion that guides economic entities. Simon's criterion covered the establishing the first decision which passes the acceptance test. The different point of view on maximization concerns the comparison of all the

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available alternatives. In the second half of the 20th century, it was concluded that human behavior systematically diverged from the assumptions of the rational choice theory depending on various circumstances, for instance, making a decision under different risk factors (Tversky and Kahneman, 1979).

Subsequent generations of researchers, inspired by Simon's works, introduced new models into the notion of limited rationality, for example, the reductionistic interpretation was dominating among neoclassical economists (Gigerenzer, 2004, p. 389-409). According to this interpretation, the limited rationality is nothing close to the subversive theory. It may be easily utilized for modeling full optimal procedures with regard to costs, time capital, financial resources, resource limitations (Arrow, 2004, p. 47-55). In turn, Ariely (2009) draws attention to the departures from the traditional theory of a rational choice which are characteristic of people. These are automatic and intuitive errors rather than controlled and analytical ones like aversion to a loss, control illusion or an error in a group.

One of the first attempts to explain rationality in the context of services was made by E. Skąpska (2019) who defined the rationality of economic management in services as a feature of deliberate economic activity that is grounded on logical coherence and human mind – the mind that may be replaced by artificial mind to only a limited extent. The deliberations that are included in E. Skąpska's book have become prerogatives for further research on the subject of rationality in services and some of them are presented in this article.

Rationality Essence

Rationality is a polysemic notion which is difficult to fathom. However, each and every attempt to explore the issue seems to be necessary as it is a key term in the economics. The activity of an entity that takes up economic challenges might be regarded with respect to the assumed definition of rational economic activity. A rational entity chooses an action which is the most beneficial with regard to the profit loss balance. Therefore, it leads to the state of the utmost utility for the unit or an individual. In reality, there are many types of departures from the rational calculation, but at least some of them, to some extent, might be controlled by an entity that makes the decision. This approach by D. Kahneman and A. Tversky (1973) is considered to be a turning point. In the period of behaviorism domination (the 50s of 20th c.), it was mostly emphasized that emotions affected the perception processes and logical deduction in a disruptive manner (e.g. attribution errors), which, obviously, denied the rationality of an individual or a unit.

Comparing the characteristic of a service enterprise and a production enterprise shows certain differences which are significant while determining the rationality of actions. One may use specific criteria to discern the distinction. Considering the subject of activity, in a service enterprise it is service, and in a production unit there is a material product. As for the activity goals, there is service provision in a service enterprise, which requires consideration for individual expectations and client's character. And, there is a serial production in accordance with the type of a consumer and their previously determined needs. The result of service provider's activity is individual services, and producer's – mass products. Challenges that are associated with the rationality and a service provider consequently regard the definition of a service product for the sake of service provision and the verification of knowledge in real life as well as full information on a client (Rogoziński, 2000, p. 35). Service receivers, before making a decision, possess knowledge about service providers and their offered products/services. During the selection, receivers gain information from the Internet, discuss the subject with their friends and have conversations or conduct negotiations. Therefore, current service providers are forced to maintain communication channels in order to keep coherence as for expectations and synergy (Mortimer & Pressey, 2013, p.55). However, one should highlight the fact that consumers, who represent various cultures, pay attention to different factors while assessing services, and thus they see their quality in various manners. People from the eastern Asia have strong bonds with other people from their group and they stress keeping the harmony among the people they identify with. On the other hand, people from the western countries make decisions on their purchases regardless of the norms and expectations of other people (Lin et al., 2013, p. 500-510).

Service provider as entity of economic activity

A service provider is an entity that runs business activity with regard to services as well as a person who provides service. Services may be divided in an economic sense into the following categories: a) trade services (transportation, foreign travel, mail and telecommunication, finance, construction, IT industry, advisory, exhibitions, fairs); b) non-trade services (copyrights, medical services, maintenance of non-governmental enterprises); c) governmental services (maintenance of representative agencies, intergovernmental organizations).

Personality of an individual has, among others, two interplaying components: wisdom and intelligence. In that sense, wisdom builds strategic grounds which support human's behavior, and intelligence regulates efficiency of thought processes.

Thus, rationality is a trait of conscious human activity which plays various roles, including the economic role. It constitutes an ability that is available to everyone in all situations. It consists in proper demeanor which an expression of economic reason (Bochenek, 1999). Rationality is also entity's knowledge, their access to information and the ability to process it (Kotarbiński, 1973, p. 306).

This may also relate to demand for reaching greatest benefits at the lowest costs which is an expression of the so-called principle of rational economic management (i.e. an assumption about maximizing character of human activity). The rule might be considered as, firstly, a principle of the biggest effect at a given level of effort which brings a maximal level of the aim realization and, secondly, a principle of minimal expenditure when a given goal is realized at minimal effort. (Milewski, 1998). However, proper understanding of rationality, according to J. Stecewicz, meets contemporary requirements and it needs consulting extra-economic dimensions of managing: ecology, philosophy, psychology.

Rationality in services requires a significant amount of effort from a decision maker. They must take into account psycho-social factors that cover cultural diversity, religion, social capital or trust. Egoism and reluctance to knowledge do not favor rationality. Any labor that cooperates with creation of utility (value), such as doctor's work, lawyer's or scientist's work, is productive work. Those people produce intangible goods. Each of entities that participate in the creation of social relations must use tools and systems which provide them with the current access to information from various fields of activity, incl. sales, organization, finance. Rules (traditions) assist a person in understanding the character of the rational world view. Any defined parameters, functions, principles are temporary and transitional. A rule may help to make a decision because majority of people accept it as reliable and based on an interpersonal agreement (Nozick, 1993, p. 80). B. Spinoza and G. W. F. Hegel see coupling between rational activity, morality and the values within them. Thanks to rationality one may achieve, according to the authors, higher values. Hence, the rationality itself becomes a value. It plays a role of an ethical pattern for human activity and it paves the way to rich knowledge and a better world (Bochenek, 1999, p.60).

An economic approach does not approve of the existence of irrational decisions. However, it does not enable clear predictions as for human behavior patterns. It only has the ability to explain already made decisions *ex post* which is based, most frequently, on a far ambiguous and very flexible category of 'psychological costs'. Consequently, in an economic reality, there are various types of human attitudes and behavior patterns (Stacewicz, 1991, p.92): instinctive patterns which originate from a biological character; rational (sane) patterns that come from the intellect; emotional patterns connected with positive and negative moods.

Moreover, the author also finds principles that describe the potential of human behavior: 1. Pleasure principle – one's own satisfaction without weighing someone else's opinions; 2. Reality principle – optimizing one's own benefits with regard to limitations, incl. simultaneous activity of other people; 3. Development principle – unselfish provision of help to others or renouncement of one's own benefits to the favor of others. Concepts of rationality in economic activity are associated with the vision of a human as an economically managing entity. Those include (Stacewicz, 1991, p.90-91):

A. 'Economic human' concept – it connects with economic rationality in the most traditional sense, i.e. microeconomic rationality which is success oriented rationality in terms of finance. An economic human is reduced in their economic activity to narrow economic motives of egoistic features;
B. 'Social human' concept – leads to rationality that has political features. It may, depending on conditions, take a shape of macroeconomic rationality that focuses on the increase of development pace or techno-economic rationality that maximizes productivity of creative factors. A social human is an idealized, hypothetical entity that is driven by a collective interest.
C. 'Multidimensional human' concept – leads to administrative rationality that focuses on the quality of life that is humanistic rationality. A complete, 'multidimensional' human acts based on different economic and social motives. The evolutionary view on business activity is the one that sees a gradual transition from cunning activities to reasonable activities and finally to wise activities.

Mindful conduction of service activity in practice and the economic theory include two standpoints. The microeconomic standpoint (researched in this article) comes down to establishing human's traits in economic activity, i.e. human nature, especially answering the questions about motives and the rationality of their behavior, which enables the author to determine the rules for functioning of economic entities. In the macroeconomic standpoint, however, it is analyzed how the administration/managing works in the scale of societies (countries), that

is in a national economy (Bartkowiak, 2013, p.11). In this respect, researchers pay attention to specialization and division. The issue of production, as economists claim, is solved. It seems that economics faces the problem of the division in the field of services. Few economists notice the significance of extra-mathematical elements of economic managing which are particularly specific to services. Therefore, there is a poorly recognized problem of a new approach towards the rationality of this type of management.

Methodology

Proprietary research on the subject of rationality by service providers has been divided into 2 stages. First of all, the online surveys reached 100 Polish managers of service companies. Diversified service activity regards rational collection of resources, disposal, i.e. reducing the loss and maximizing the effects.

The structure of the service companies included the following types:

- 28% educational companies (professional training, courses).
- 14% construction companies (incl. design offices).
- 13% trade (incl. bookstores).
- 10% advertising (advertising in private media, incl. reporting photography).
- 10% consulting (tax advisory, accounting, judicial assessment).
- 9% medical (specialist private offices, incl. stomatology).
- 8% information and IT (incl. logistics).
- 3% financial (loans, insurances).
- 2% service.
- 1% production.
- 1% tourist (customer service center).
- 1% trade-extractive company.

The following research stage regarded the in-depth interview. The questions were directed at exhibitors at an international job fair in Polish cities: Warsaw, Wrocław, Szczecin, Poznań. The responding companies included various activities (production and services) and the interview took on a form of a questionnaire. The research sample amounted to 80% of all the exhibitors and it constituted, in this case, N=109 observations, incl. 17 production companies and 92 service providers. The original sample had been N=110 observations, but a company that conducted business, both in the production and in the services, was removed. One of the other companies changed the category from 'business advisory' into 'business advisory/services'.

Results

In order to distinguish the relationships that were statistically important among the researched variables, the chi-square test of independence was performed. The assumed confidence level was 0.95. As a measure of relationship's strength, V- Cramer measure was adopted. The following data presents only statistically significant relations.

Table 1: Enterprise profile against management method (in %)
(Source: own elaboration based on research).

Enterprise profile	Management method (democratic style, transactional style etc.)				
	1	2	3	4	5
educational	0.0	13.0	34.8	30.4	21.7
consulting	0.0	22.2	44.4	33.3	0.0
construction	0.0	14.3	50.0	28.6	7.1
advertising	22.2	22.2	11.1	44.4	0.0
information and IT	14.3	0.0	14.3	57.1	14.3
other	57.1	14.3	14.3	14.3	0.0
trade	33.3	16.7	25.0	8.3	16.7
financial	33.3	0.0	33.3	33.3	0.0
medical	12.5	0.0	12.5	12.5	62.5

A relationship between the enterprise profile and the management method was observed - Question 1. from Part I: '*What factors do you take into account while assessing the effectiveness of service provision?*'. The V-Cramer measure valued at 0.379 indicates an average relationship between the variables. The analysis of results in Table 2. indicates that the method of management had greater significance for educational companies, consulting, construction, advertising and information/IT companies than for trade, financial, medical and other companies.

Table 2: Enterprise profile against staff competence and skills (Source: own elaboration).

Enterprise profile	High competence and skills of staff				
	1	2	3	4	5
educational	0.0%	0.0%	0.0%	3.6%	96.4%
consulting	0.0%	0.0%	0.0%	11.1%	88.9%
construction	0.0%	0.0%	21.4%	21.4%	57.1%
advertising	0.0%	11.1%	0.0%	33.3%	55.6%
information and IT	0.0%	0.0%	0.0%	12.5%	87.5%
other	0.0%	0.0%	0.0%	25.0%	75.0%
trade	0.0%	0.0%	0.0%	16.7%	83.3%
financial	0.0%	0.0%	0.0%	0.0%	100.0%
medical	0.0%	0.0%	0.0%	0.0%	100.0%

The variable of *Activity profile* affected significantly the two factors from Question 2, Part 1: '*Which factors, according to you, have positive influence on the effectiveness of service provision?*'. This variable affected the evaluation of the next factor: *High competence and skills of staff* (V-Cramer 0.36) and *Client-oriented staff* (V-Cramer 0.35). The *High competence and skills of staff* factor has the biggest influence on the effectiveness of the provided services primarily for medical companies, financial companies, trade companies, information/IT companies, as well as for educational and consulting companies. Its significance is lesser for construction and also, which is surprising, for advertising companies (Table 3.).

Table 3: Enterprise profile against client-oriented staff (Source: own elaboration).

Enterprise profile	Client-oriented staff (with proper personality, empathy)				
	1	2	3	4	5
educational	0.0%	3.7%	7.4%	14.8%	74.1%
consulting	0.0%	11.1%	33.3%	55.6%	0.0%
construction	0.0%	14.3%	35.7%	14.3%	35.7%
advertising	0.0%	0.0%	33.3%	33.3%	33.3%
information and IT	0.0%	0.0%	12.5%	25.0%	62.5%
other	0.0%	0.0%	37.5%	12.5%	50.0%
trade	0.0%	0.0%	8.3%	16.7%	75.0%
financial	0.0%	0.0%	0.0%	66.7%	33.3%
medical	0.0%	0.0%	0.0%	22.2%	77.8%

The variable of *Client-oriented staff* has the greatest influence on the effectiveness of provided services primarily for medical companies, financial and trade companies – grades 4 and 5. However, if one goes up the table, it may be noticed, that the significance of this factor is decreasing. Thus, it is the least important to construction companies as well as consulting (see Table 4.).

Table 4: Enterprise profile against knowledge sharing (Source: own elaboration).

Enterprise profile	Knowledge sharing				
	1	2	3	4	5
educational	0.0%	0.0%	0.0%	14.8%	85.2%
consulting	0.0%	0.0%	0.0%	66.7%	33.3%
construction	0.0%	0.0%	21.4%	42.9%	35.7%
advertising	0.0%	0.0%	44.4%	33.3%	22.2%
information and IT	0.0%	0.0%	25.0%	37.5%	37.5%
other	0.0%	0.0%	50.0%	25.0%	25.0%
trade	0.0%	0.0%	50.0%	8.3%	41.7%
financial	0.0%	0.0%	0.0%	66.7%	33.3%
medical	0.0%	0.0%	0.0%	33.3%	66.7%

A statistically significant relation was also detected between the question from the metric about *Activity profile*, and Question 4 from Part II of the survey: *What staff competences contribute to the development of the services you provide?*'. That relationship regarded two factors from this question: *Knowledge sharing* (V-Cramer measure 0.47) and *Staff engagement* (V-Cramer measure 0.44).

Table 5: Enterprise profile against staff engagement (Source: own elaboration based on research).

Enterprise profile	Staff engagement				
	1	2	3	4	5
educational	0.0%	0.0%	0.0%	3.7%	96.3%
consulting	0.0%	0.0%	0.0%	33.3%	66.7%
construction	0.0%	0.0%	0.0%	28.6%	71.4%
advertising	0.0%	0.0%	0.0%	33.3%	66.7%
information and IT	0.0%	0.0%	0.0%	25.0%	75.0%
other	0.0%	0.0%	25.0%	50.0%	25.0%
trade	0.0%	0.0%	0.0%	8.3%	91.7%
financial	0.0%	0.0%	0.0%	0.0%	100.0%
medical	0.0%	0.0%	0.0%	22.2%	77.8%

The most important measure of rationality in business activity was the one that indicated the ratio of regular clients to the number of commissions (Table 6). It means that it is the value that should guide the service provider who act rationally and they are obliged to maintain bonds with a client in order to obtain their loyalty.

Table 6: Indicators for activity rationality depending on effect advantage over expenditure (Source: own elaboration based on research).

Detailed list	Effect advantage over expenditure [%]				
	No $n = 47$	Yes $n = 62$	Avg. profile $N = 109$	$\chi^2(1)$	p
material consumption costs/daily takings	19.1	11.3	14.7	1.32	0.251
no. of provided services/time (day, month, year)	40.4	53.2	47.7	1.76	0.185
no. of clients/physical effort plus material consumption	21.3	25.8	23.9	0.30	0.583
service sales volume/ no. of clients daily	34	29	31.2	0.31	0.576
no. of pieces of advice /number of receivers	6.4	16.1	11.9	2.42	0.120
sales volume/daily takings	14.9	8.1	11.0	1.27	0.259
regular client number/commissions	29.8*	51.6*	42.2	5.22	0.022
other measure	23.4	17.7	20.2	0.53	0.466

It was also worth noticing that there was correlation between the assessment of effect advantage over expenditure and the assessment of the measure for the number of regular clients/commissions. The companies with the advantage of the effects over expenditure more often pointed out the significance of this measure with regard to the rationality of this activity.

The next step consisted in performing the analysis of correlation between the type of business (production vs. services) and the assessment of the effect advantage over expenditure (Table 7.). In order to do that, the chi-square test of independence was performed. Because the result of the test was statistically insignificant [$\chi^2(1) = 1.54$; $p = 0.119$], one should write that the variables had not been correlated.

Table 7: Effect to expenditure ratio depending on business type (Source: own elaboration based on research).

Effect advantage over expenditure	Production	Services	Total
no	5 (29.4%)	42 (45.7%)	47 (43.1%)
yes	12 (70.6%)	50 (54.3%)	62 (56.9%)
total	17 (100%)	92 (100%)	109 (100%)

The further stage included the analysis of correlations between the type of business and the assessment of the net profit to revenue ratio (Table 8.). The statistically insignificant test result of the chi-square [$\chi^2(2) = 0.02$; $p = 0.990$] made one conclude there were no correlations between the variables.

Table 8: Net profit to sales revenue ratio depending on business type (Source: own elaboration based on research).

Net profit to revenue ratio	Production	Services	Total
high profitability	10 (58.8%)	53 (57.6%)	63 (57.8%)
low / below expectations	1 (5.9%)	5 (5.4%)	6 (5.5%)
meets expectations	6 (35.3%)	34 (37.0%)	40 (36.7%)
total	17 (100%)	92 (100%)	109 (100%)

The last stage of analysis used the chi-square test to examine the correlation between the assessment of the net profit to sales revenue ratio and the assessment of the effect advantage over expenditure (Table 9). The test result was not statistically significant [$\chi^2(2) = 4.47$; $p = 0.107$] which means there were no enough grounds to confirm the statement that the variables had been correlated.

Table 9: Net profit to revenue ratio depending on effect assessment (Source: own elaboration based on research).

Net profit to revenue ratio	Effect advantage over expenditure		
	No	Yes	Total
high profitability	27 (57.4%)	36 (58.1%)	63 (57.8%)
low / below expectations	5 (10.6%)	1 (1.6%)	6 (5.5%)
according to expectations	15 (31.9%)	25 (40.3%)	40 (36.7%)
total	47 (100%)	62 (100%)	109 (100%)

Therefore, we may say that the enterprises were concordant as for the profitability and reasonableness of their business activity.

Seeing the research results that concern the rationality, one should observe the differences in economic activities, both, in production and in services. Despite the fact that the respondents were dominated by the representatives of service enterprises (84.5%), the ability to choose more than one answer enabled the researchers to make comparisons with regard the respondents' answers (Figure 1.).

Figure 1: Understanding rationality of economic activity by service and production enterprise representatives (in %) (Source: own elaboration based on research).

The answers concerning the definition of rationality in economic management differed depending on the presented types of business activity. The service representatives accepted that it might be defined as something more than only the ability to use the opportunity to lower costs. Almost 50% of respondents agreed with that statement. Other aspects of rationality included the ability to achieve assigned goals (not only financial ones) and to adjust to the needs of both parties based on complete documented information, sense of security and minimalization of risk (only controlled risk is possible). In trade, rationality means attitude towards the enhancement of further stages, i.e. rationalization (e.g. material segregation, systems for managing goods, minimizing wastage). In activity connected

with customer service, rationality is about conducting a thorough interview with a client and getting to know their expectations, and then taking such actions so that the both parties are fully satisfied by the transaction. Being rational is also doing profitable activities with respect to the value and the mission of the company, which also requires recognition of its possibilities and resources. In construction, it is an ability to establish proportions between the performance and the number of work hours; the price and the investments in real assets (machines, fixed assets).

Entrepreneurs relate the rationality of actions to a certain situation (Figure 2.) where there is room for safety and complete information, including the ability to reduce costs and take risk, but with the prospect to gain considerable benefits. Some of the researched people saw the rationality differently. According to them, rational activity is the one that brings a person to intended effects. It is also taking the most profitable actions with regard to the value, culture and the company's mission along with the possibilities and company resources. Moreover, rationality is logical and it is mainly about performing tasks which lead to the realization of goals, fulfillment of company entrusted commissions, most frequently in accordance with the needs of a client, and the benefits.

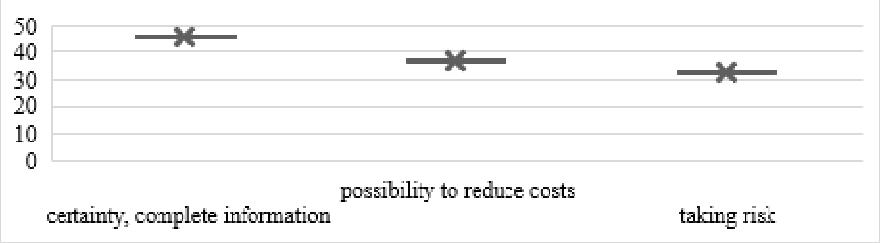

Figure 2: Perception of rationality term by entrepreneurs (in %)
(Source: own elaboration based on research).

In confrontation, the theory distinguishes rationality, effectiveness, efficiency, but in the practice people often equate them with one another.

Rational activity is, according to entrepreneurs, justified acts that are not taken without a need and in accordance with a project. They are planned, but with a possibility to modify them in case it is necessary. They are conscious and have a distinct division of responsibilities. Those responsibilities are defined according to particular standards and norms. What is more, rational actions are verifiable, based on facts and experience, i.e. their consequences are known. Rationality is also maintaining the balance and taking measured actions ('Look before you leap'). It is a hierarchy of tasks and using tools that enhance one's assessment (many representatives stressed this). It is 'fast, cheap and with no mistakes'. Rational activity is prospective and developmental activity that conforms to market's trends (nonpersonal). It is not always economical or accurate (proportional to duties directed at achieving a goal). Some opinions claim its aim is 'to quickly achieve your aim, but adequately to the situation and possibilities'. It takes care of a balanced progress through recycling, voluntary service and an internal audit to verify cleanliness. The respondents highlighted that rational actions must make sense, i.e. bring effects and added value. Thus, they should be coordinated, controlled and directed so that they allow optimal realization of the goal. Finally, they must be in accordance with the laws, agreements and they should seek the balance and the lack of impulsivity.

The entrepreneurs most frequently present rationality of actions by using the following indicators (Figure 3.):

- number of provided services/time (day, month, quarter, year) – 23.43%;
- number of regular clients/commissions – 20.73%;
- sales volume/number of clients– 15.32%;
- number of clients/physical effort plus material consumption – 11.72%;
- material consumption cost/daily takings – 7.21%;
- number of pieces of advice/number of clients – 5.86%.

Non-statistical measures (mentioned in some cases) turned out to be the following items: sales volume/number of employees; production volume/ realization time; margin/sales volume; expenditures/commissions (contract volume); commission value/number of working days; staff input/results; friends' recommendation/number of commissions; project/result expressed in financial means as well as yearly revenue/income.

The rationality of a producer/service provider has an impact on the following factors (Figure 3.) in the descending order: knowledge resources, labor resources, real capital and financial capital (27.34%), work organization and working conditions (19.05%), the management method (partner, autocratic) (18.79%), intellect (mental abilities) (16.71%) and 8.94% of the researched people mentioned time (work hours). 'Natural conditions (raw materials, weather)' factor received the same percentage of the answers. 0.26% of the researched group answered 'other'.

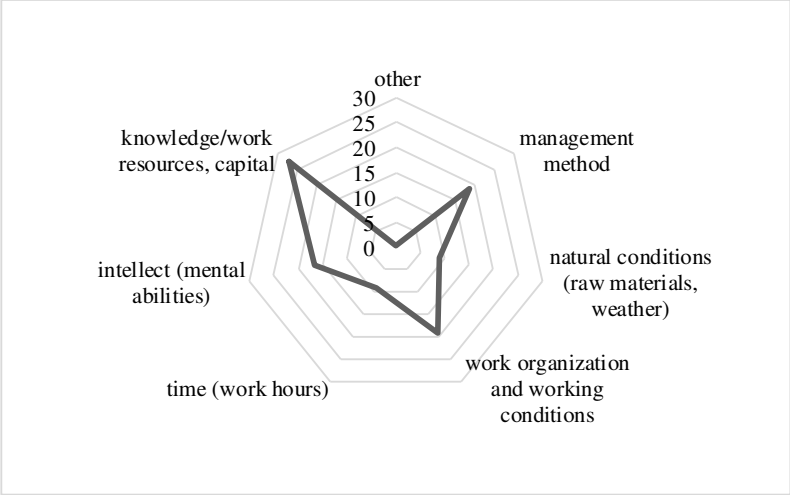

Figure 3: Activity rationality factors for producer/service provider (in %) (Source: own elaboration based on research).

The data clearly shows that classic production factors (work, capital), but fortified with proper resource of knowledge, have the greatest influence on service provider's rationality.

Conclusion

The discussion about rationality leads to a main conclusion that the most rational activity in services is the one that may be repeated. It means that a service provider needs some necessary guidelines and instructions which will let them create a proper framework, rules for specific behavior as well as suitable and proper to the character of the service expression of flexibility. One should also mind the fact that the kind of business activity (i.e. production and service enterprises) does not differentiate significantly the concept of rationality – the answers in production and service companies were very similar. Needs of the service market are much more customized and realized on a client's commission compared with the production. Therefore, the condition for correct (rational) proceeding of a service provider is information that constitutes the basis for the whole process of service provision, from inspiration (the idea) to a final effect – a final product. It is often the thing that cannot be counted (intuition, context, emotions and spirituality), which is significant for the service provision process. This provision (a service economic management process), definitely and more frequently, sees the victory of intuition over the reason. A service provider, depending on the kind of provision, engages a service receiver into the process of provision which makes them (the receiver) partially play the role of the provider. According to practitioners of economic life, the rationality of a service provider is expressed in specific proportions. Essentially, it concerns a number of provided services in relation to a given time – daily, monthly, yearly (23.43%) and a number of regular clients with respect to the commission rate (20.73% of the answers).

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Construction of A Portfolio with A Price to Earnings Ratio as An Additional Criterion

Paweł KLIBER
Poznań University of Economics and Business
Al. Niepodleglosci 10, 60-725 Poznan, Poland
e-mail: p.kliber@ue.poznan.pl

Anna RUTKOWSKA-ZIARKO
University of Warmia and Mazury in Olsztyn
ul. Michała Oczapowskiego 2, 10-719 Olsztyn, Poland
e-mail: aniarziarko@gmail.com

Abstract

The classical models for construction of investment portfolio do not take into account fundamental values of companies in which one invests. In our approach we extend the portfolio choice by adding this dimension to the classical criteria of profitability and risk. It is assumed that an investor selects stocks according to their attractiveness, measured by some fundamental values of companies. In this approach portfolios are assessed according to three criteria: their profitability, risk (measured by variance of returns) and their fundamental value (measured by some indicators of financial standing of companies). In this article we consider earnings to price ratio as the measure of the fundamental value of a company. In the paper we consider an algorithm for constructing portfolios with fundamental criterion based on analytical solutions for appropriate optimization problems. In the optimization problem we consider minimizing variance with constrains on expected return and attractiveness of investment, measured with some indicators of fundamental values of companies in a portfolio. We also present empirical examples of calculating effective portfolios of stocks listed on the Warsaw Stock Exchange.

Keywords: Portfolio Analysis, Fundamental Value, Multicriterial Choice, Fundamental Analysis.

JEL Classification: C61, C63, G11

Introduction

Classical methods for selecting portfolio of investments, developed by Markowitz (1952, 1959) and Sharpe (1963), take into account only market performance of companies measured by their returns. In the classical model potential portfolios of investment are evaluated according to two criteria: profitability and risk. The first criterion is measured with expected rate of return and the second one with variance or standard deviation of return. In other words, this approach takes into account only the information that are reflected in the market prices of companies. One does not consider any other criteria, which can give some additional information about the future prospects of the company or its financial and competitive situation.

However in the recent years there was a growing interest in the methods of portfolio analysis in which one considers alternative ways of constructing portfolio. The article of Kolm, Tütüncü and Fabozzi (2014) contains a survey of major developments in portfolio theory since the beginning of its existence, and the book of Doumpos and Zopounidis (2014) lay the attention on multicritera methods used in this field. Most of innovations depends on using some criteria of risk other than variance or standard deviation of returns, as for example semivariance or conditional value at risk (CVaR). The article of Fabozzi, Focardi and Jonas (2007) presents the variety of risk measures that are currently used in practice of portfolio investments. In some other approaches some characteristics of distributions of returns are assets are used as additional criteria for evaluating portfolio performance. Examples of such characteristics can be skewness or kurtosis. Such extended portfolio analysis is presented in (Briec, Kerstens and Jokund, 2007) or (Rodríguez, Luque and González, 2011).

There are several research in which one considers criteria that are not based on assets' returns. There is a branch of the literature which takes into account ethical, social or environmental criteria in portfolio construction. The so-called socially responsible investments approach was described for example in (Steuer, Qi and Hirschberger 2007). The articles (Ballestero et al. 2012) and (Bilbao-Terol et al. 2013) are another examples of this approach.

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Lo, Petrov and Wierzbicki (2003) considered liquidity of stocks as an additional criterion in the portfolio construction process. There are only a few papers which considers also fundamental values of companies. Xidonas, Mavrotas and Psarras (2010) considered the amount of dividends paid by companies. Jacobs and Levy (2013) in their paper take into account the risk associated with leverage. The utility function of an investor includes the costs of margin calls, which can force borrowers to liquidate securities at adverse prices due to illiquidity, losses exceeding the capital invested, and the possibility of bankruptcy.

Tarczyński (2002) applied a synthetically developed measurement to evaluate the economic and financial standing of a company and used this measure as an additional criterion for evaluation possible portfolios. He called this measure the taxonomic measure of attractiveness of investment (TMAI). The portfolio constructed with the use of this measure was called fundamental portfolio. In recent years this model was modified for example by substituting variance as a measure of risk by semi-variance (Rutkowska-Ziarko and Garsztka 2014). In (Rutkowska-Ziarko 2013) the Mahalanobis distance was used to determine the TMAI, due to a possible correlation between diagnostic financial variables.

In this paper we propose an approach in which one uses price-earnings ratio as a measure of fundamental value of companies in a portfolio. We present a simple algorithm for constructing a fundamental portfolio with price-earnings fraction as an additional criterion for evaluating portfolios. The algorithm is based on analytical solutions of optimization problems. In the empirical part we verify this method computing fundamental portfolios of the stocks traded on the Warsaw Stock Exchange. The article is organized as follows. After this introduction, in the section 2 we present our proposition of extending classical portfolio theory for additional, fundamental criterion. Section 3 provides analytical solutions to the problems connected with computing fundamental portfolios and algorithm for constructing such portfolios. Section 4 contains empirical examples from the Warsaw Stock Exchange and section 5 concludes.

Portfolio problem with criterion on price-earnings ratio

In the article we use a generalization of classical Markowitz model of portfolio optimization, see (Markowitz 1952) and (Markowitz 1959). We consider an investor who tries to determine optimal composition of his portfolio. Assume that there are n risky assets with random rates of returns $R_1, \ldots, R_n$. Let μ_i be an expected return of asset i: $\mu_i = E[R_i]$. By cov_{ij} we denote covariance between the asset i and j, $cov_{ij} = \mathrm{cov}(R_i, R_j)$. By x_i we denote the proportion of wealth invested in the asset i. As in the classical Markowitz model an investor evaluates a portfolio according to criteria of expected rate of return and risk. The expected return equals

$$\mu_P = \sum_{i=1}^{n} x_i \mu_i \tag{1}$$

and the risk is measured by the variance of return from portfolio, which equals

$$\sigma_P^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} x_i x_j cov_{ij} \ . \tag{2}$$

The expected return and variance of return of portfolio's components are estimated on the basis of historical returns of the shares of companies. The problem of portfolio selection thus relies entirely on the past market data. In our approach we combine this classical approach to estimating future market performance with the fundamental analysis. It augments Markowitz model with a third criterion which describe financial and economic standing of companies which shares are in a portfolio.

Market multiples are financial indicators that compere given accounting values per share with the market price of this share. Loughran and Wellman (2011) analysed a broad sample of not financial firms from NYSE, AMEX, NASDAQ. They found that companies with low levels of market multiples appeared to have higher stock returns than companies with high levels of market multiples.

Price to earnings ratio (P/E) is one of the most popular market multiples Price to earnings ratio (P/E) relates earnings per one ordinary share to its market price:

$$\mathrm{P/E} = \frac{market\ price\ of\ a\ share}{net\ profit\ per\ share}.$$

It is considered that the P/E ratio can give valuable information about the future profitability of investments. The research on the pricing anomalies connected with the price to earnings ratio dates back to the work of Breen (1968). He considered US companies from S&P 500 in the period 1953-1966. He discovered that portfolios of companies with the lowest P/E ratio were more profitable for investors. This phenomenon was called earnings effects. Similar results were obtained for NYSE by Basu (1977, 1983).

Price to earnings ratio anomaly is still the topic of interest in the field of finance. Chaya and Nigam (2015) analysed 500 the most liquid companies listed on Bombay Stock Exchange (BSE). They found that it is possible to get abnormal returns on capital markets for investing in companies with low value of price to earnings ratio. They termed this phenomenon as value premium. The term value premium relates to others market multiples as well. Troung (2009) discovered that low P/E stocks outperform high P/E stocks in New Zealand. Ikoku, Hosseini and Okany (2010) examined the information value of price-earnings (P/E) ratios in the Nigerian stock exchange prediction of stock prices.

Since the of P/E has a role in predicting future stock prices, this ratio can be used in the portfolio selection problem. Richie (1992) proposed the strategy of buying stocks of companies with low value of P/E ratio, e.g. out of three or four first deciles. This strategy however ignores the risk analysis and portfolio diversification. In our work we combined the fundamental strategy based on the P/E ratio with risk analysis in the context of Markowitz portfolio theory. Instead of price to earnings ratio the reciprocal of this ratio was used in the portfolio chose model. We used earnings to price ratio (EP), calculated as in equation below:

$$\mathrm{EP} = \frac{net\ profit\ per\ share}{market\ price\ of\ a\ share}.$$

We used E/P ratio in multicriteria portfolio selection problem. We assume that it is beneficial for investors to buy the stocks of companies with a high level of net income per share compared to its market price. The EP as an additive measure. It can be shown that the ratio of earnings of all companies in a portfolio (proportional to number of shares in the portfolio) divided by the value of the portfolio is a weighted average of earnings to price ratios of all companies in this portfolio. In other words earnings to profit ratio of any portfolio (EP_P) is given by

$$EP_P = \sum_{i=1}^{n} x_i EP_i, \tag{3}$$

where $EP_1, \ldots, EP_n$ are earnings to profit ratios of single companies.

With the introduction of EP_P we have three criteria for assessing an investment: profitability, risk and fundamental value. The formulas for calculating these criteria are given in Eqs. 1-2 and Eq. 7. One of the methods for obtaining a portfolio which is efficient with respect to all three criteria is to solve a problem of minimizing variance of a portfolio with constrains on the two other criteria. This leads to the following optimization problem:

$$minimize \sum_{i=1}^{n} \sum_{j=1}^{n} x_i x_j cov_{ij} \tag{4}$$

with respect to

$$\sum_{i=1}^{n} x_i \mu_i \geq \gamma \tag{5}$$

and

$$\sum_{i=1}^{n} x_i EP_i \geq EP_\gamma, \tag{6}$$

where γ is the target rate of return and EP_γ is the fundamental value of portfolio required by the investor. Of course, there is an additional condition that $\sum_{i=1}^{n} x_i = 1$.

The analytical solution of the portfolio problem

Let Σ be a covariance matrix of returns, i.e.

$$\Sigma = \begin{bmatrix} cov_{11} & \cdots & cov_{1n} \\ \vdots & \ddots & \vdots \\ cov_{1n} & \cdots & cov_{nn} \end{bmatrix}.$$

Define the following vectors: $\mu = (\mu_1, \ldots, \mu_n)^T$, $z = (EP_1, \ldots, EP_n)^T$ and let e be a column vector of length n: $e = (1, \ldots, 1)^T$. Using the vector notation, the optimization problem (4)-(6) can be formulated as follows:

$$minimize\ \frac{1}{2} x^T \Sigma x \tag{7}$$

with respect to

$$x^T e = 1, \tag{8}$$

$$x^T \mu \geq \gamma \tag{9}$$

and

$$x^T z \geq EP_\gamma. \tag{10}$$

The Kuhn-Tucker conditions for the problem (7)-(9) are as follows

$$\Sigma x = \lambda_1 e + \lambda_2 \mu + \lambda_3 z, \tag{11}$$

where $\lambda_2, \lambda_3 \geq 0$, with the complementary conditions

$$\lambda_2 (x^T \mu - \gamma) = 0, \tag{12}$$

$$\lambda_3 \left(x^T z - EP_\gamma\right) = 0. \tag{13}$$

Assuming that covariance matrix is nondegenerate (as it is in practical usages), it follows from eqn. (11) that the solution has the following form:

$$x = \lambda_1 \Sigma^{-1} e + \lambda_2 \Sigma^{-1} \mu + \lambda_3 \Sigma^{-1} z. \tag{14}$$

We have to consider several cases. To simplify the notation, we define the following symbols. Let

$$g_{11} = e^T v^1, g_{12} = e^T v^2, g_{13} = e^T v^3, g_{22} = \mu^T v^2, \tag{15}$$
$$g_{23} = \mu^T v^3, g_{33} = z^T v^3,$$

Where

$$v^1 = \Sigma^{-1} e, \quad v^2 = \Sigma^{-1} \mu, \quad v^3 = \Sigma^{-1} z. \tag{16}$$

Firstly, assume that $\lambda_2 = \lambda_3 = 0$. From complimentary condition (12) and (13) it turns out that only condition (8) must be satisfy as equality. Putting the solution (11) with $\lambda_2 = \lambda_3 = 0$ into (8) we obtain the solution

$$\tilde{x}^1 = \frac{1}{g_{11}} \Sigma^{-1} e. \tag{17}$$

The minimal variance in this case equals

$$\sigma_1^2 = \frac{1}{g_{11}^2}. \tag{18}$$

In the case when $\lambda_2 > 0, \lambda_3 = 0$, in the optimal solution condition (8) is fulfilled and condition (9) holds as an equation, which gives a system of equations

$$\lambda_1 g_{11} + \lambda_2 g_{12} = 1, \tag{19}$$

$$\lambda_1 g_{12} + \lambda_2 g_{22} = \gamma. \tag{20}$$

After some manipulations one can write the solution of this system as

$$\tilde{x}^{12} = (1 - \alpha_{12})\, \tilde{x}^1 + \alpha_{12} \frac{v^2}{g_{12}}, \tag{21}$$

where

$$\alpha_{12} = \frac{g_{12}(\gamma g_{11} - g_{12})}{g_{11} g_{22} - g_{12}^2}. \tag{22}$$

The variance of the portfolio in this solution equals $\sigma_{12}^2 = \sigma_1^2 + \Delta\sigma_{12}^2$, where

$$\Delta\sigma_{12}^2 = \frac{(\gamma g_{11} - g_{12})^2}{g_{11}}. \tag{23}$$

The case $\lambda_2 = 0, \lambda_3 > 0$, is analogic to the last one. The optimal solution satisfies conditions (8) and (10) as equations. The solution can be expressed as

$$\tilde{x}^{13} = (1 - \alpha_{13})\, \tilde{x}^1 + \alpha_{13} \frac{v^3}{g_{13}}, \tag{24}$$

where

$$\alpha_{13} = \frac{g_{13}(EP_\gamma g_{11} - g_{13})}{g_{11} g_{33} - g_{13}^2}. \tag{25}$$

The growth of variance when switching from $\tilde{x}^1$ to $\tilde{x}^{13}$ equals

$$\Delta\sigma_{13}^2 = \frac{\left(EP_\gamma g_{11} - g_{13}\right)^2}{g_{11}}. \tag{26}$$

In the last remaining case is when $\lambda_2 > 0, \lambda_3 > 0$. In this case all conditions (8)-(10) must be fulfilled as equalities, which brings us to the following system of equations

$$\lambda G = a, \tag{27}$$

where λ is the vector of multipliers $\lambda = (\lambda_1, \lambda_2, \lambda_3)^T$, $a = \left(1, \gamma, EP_\gamma\right)^T$ and the matrix G is

$$G = \begin{bmatrix} g_{11} & g_{12} & g_{13} \\ g_{12} & g_{22} & g_{23} \\ g_{13} & g_{23} & g_{33} \end{bmatrix}.$$

The optimal solution to the problem (4)-(7) with all conditions fulfilled as equation can be thus formulated as follows:

$$\tilde{x}^{123} = \lambda_1 v^1 + \lambda_2 v^2 + \lambda_3 v^3, \tag{28}$$

where $\lambda = G^{-1}a$.

These derivations lead to the following algorithm for finding the optimal solution of the problem (4)-(6):

1. Compute the vector $\tilde{x}^1$ and check if it fulfills the conditions (5) and (6). If so, it is the optimal solution.
2. Otherwise, calculate $\Delta\sigma_{12}^2$ and $\Delta\sigma_{13}^2$. Choose the smaller value: let it be $\Delta\sigma_{1k}^2$.

Compute the vector $\tilde{x}^{1k}$ and check if it fulfills the conditions (5) and (6). If so, it is the optimal solution. Otherwise the optimal solution is the vector $\tilde{x}^{123}$.

Empirical results

In the empirical part we analyze 20 largest and most liquid companies quoted on the Warsaw Stock Exchange. The sample includes all companies form WIG20. The computations are based on quarterly returns calculated on daily closing prices in the period starting from the beginning of 2014 and ending at 5 March 2019. Returns are computed as relative increases of prices according to the formula:

$$r_{it} = \frac{P_{it+s} - P_{it}}{P_{it}} \cdot 100\% ,$$

where r_{it} is the rate of return on security i at time t, s is the length of investment horizon (in our case one quarter) expressed in days and P_{it} is the quoted price of security i at time t.

Financial indicators for each company were calculated based on annual financial reports for 2018. For each company in the sample we computed earnings to price ratio. Mean return and standard deviations were calculated based on time series of returns. Table 1 contains information concerning profitability, risk and price to earnings ratio for all companies.

Table 1: Profitability, risk, price-earnings ratios (P/E) and earning-price ratios (EP)

Company	Mean (%)	Standard deviation (%)	P/E	EP
ACP	0.21	0.01	5.92	0.169
ALR	0.29	8.94	10.02	0.100
BZW	0.51	16.05	14.63	0.068
CCC	0.24	10.64	29.57	0.034
CPS	5.62	14.43	17.34	0.058
ENA	1.49	8.88	3.95	0.253
ENG	-1.06	13.04	5.40	0.185
EUR	-1.06	17.66	-116.71	-0.009
KGH	-2.11	14.67	12.27	0.081
LPP	1.21	19.89	30.98	0.032
LTS	1.37	16.14	6.12	0.163
MBK	3.79	16.73	16.57	0.060
OPL	-0.04	11.62	-105.40	-0.009
PEO	-2.59	12.36	12.38	0.081
PGE	-1.84	8.92	7.32	0.137
PGN	-2.24	12.39	12.36	0.081
PKN	2.34	13.89	5.35	0.187

PKO	5.98	14.75	16.80	0.060
PZU	0.69	11.19	8.76	0.114
TPE	-3.75	24.88	2.97	0.336

Source: own calculations

During the period under research, there were only two companies with negative earnings: EUR and OPL. For companies with positive earnings the P/E ratio was the lowest for TPE. At the same time, this was a company with the highest risk and its expected return was negative. The lowest standard deviation was for the ACP and the P/E ratio for this company was positive and quite low. The EP ratio of companies was negatively correlated with the mean returns (correlation coefficient -0.254) and there was no correlation between standard deviation of return and EP ratio (correlation coefficient 0.033). There was also no correlation between mean return and risk measured with variance (correlation coefficient -0.035).

The problem of portfolio choice in this situation can be considered as a trade-off between risk and two other criteria. We seek for a portfolio which minimizes risk. However low-risk portfolios tend to have lower expected return. On the other hand, if we assume higher requirements on mean return of a portfolio, the solution will have lower EP. Figure 1 depicts the efficient frontier for the three-criteria portfolio choice. Each point on the graph represents a solution for the problem (4)-(6) for different combination of required mean return and required level of EP.

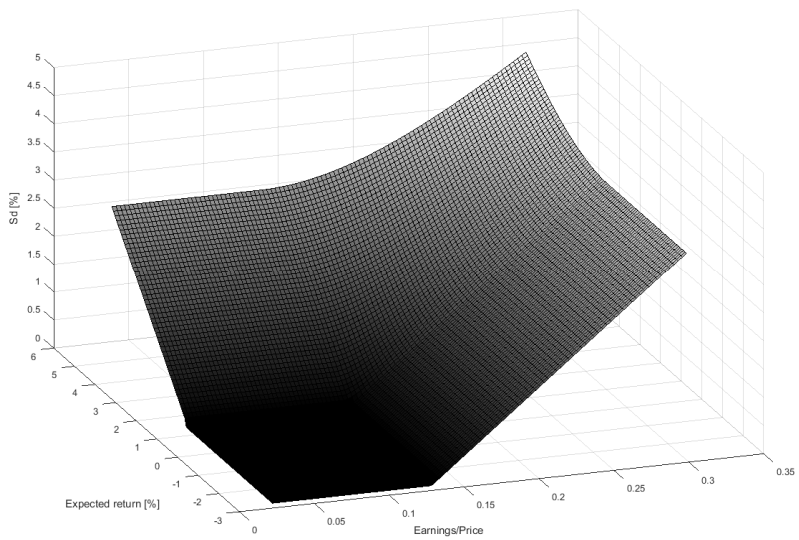

Fig. 1: Effective frontier for the portfolio problem with three criteria

To analyze the impact of fundamental values of companies in which one is willing to invest on the trade-off between profitability and risk, we determined the shape of efficient frontiers for various values of the required EP ratio. We calculated, using algorithm proposed in section 3, effective portfolios for EP_γ at the levels of 0.06, 0.18 and 0.27. The results are depicted at Figure 2. As one can see, the higher levels of required earnings-price ratio moves the effective frontier upwards. For low levels of required EP ratio, as the required profitability of expected return grows, the restriction connected with EP ratio (given by eqn. 6) is less important and for the highest levels of expected rate of return it is not binding. This phenomenon is expressed on the figure by the convergence of effective frontiers on the right side of the plot. However, when required EP ratio is high enough, the restriction on EP becomes binding for any value of expected return, which moves classical efficient frontier much upwards. This shift of efficient frontier illustrates the trade-off between assessment of a portfolio measures by market measures and its fundamental value.

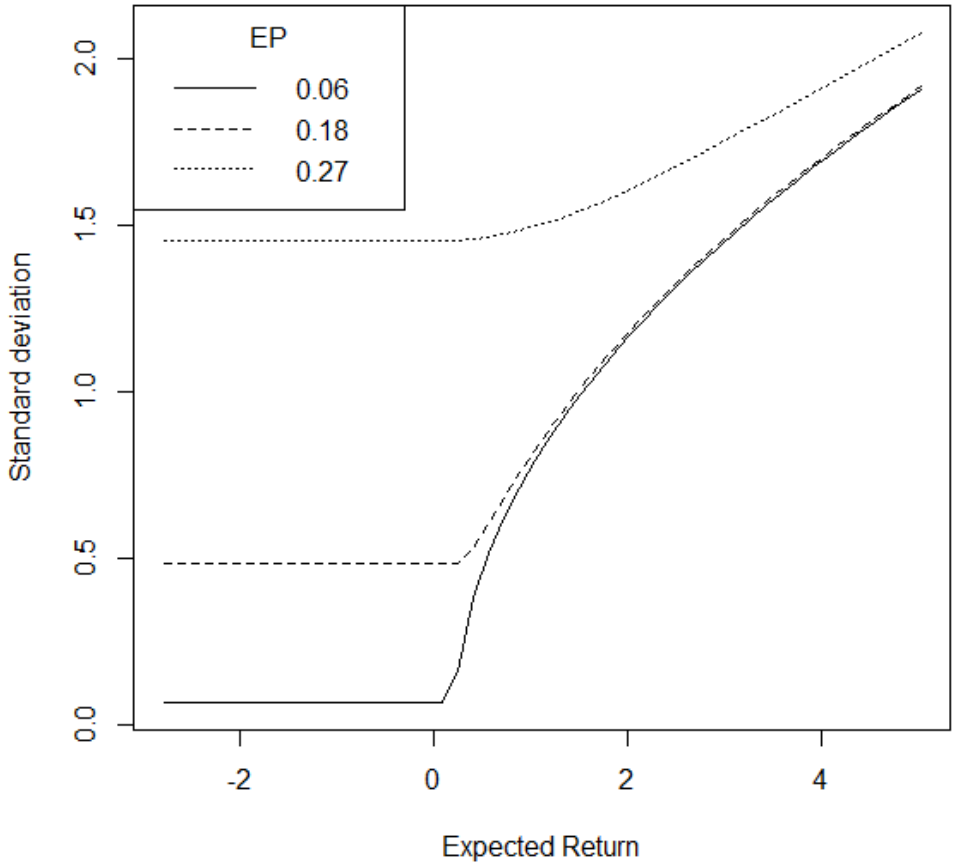

Fig. 2: Effective frontiers for different values of earnings-price ratio

Conclusions

In the paper we propose an algorithm for constructing a portfolio of assets for which three criteria are considered: profitability (measured with expected return), risk (measured with variance of returns) and a fundamental value of companies in the portfolio (measured with price to earnings ratio). The algorithm for finding effective portfolios with respect to all three criteria is based on the analytical solutions of the suitable optimization problem. We have shown that the algorithm is effective and allows one to construct efficient portfolios with minimal computational effort.

The proposed algorithm allows us to determine the effective frontier (i.e. the tradeoff between profitability and risk) for several level of requirements concerning fundamental values of companies which stocks are in the portfolio. The results from empirical research for the major companies traded on the Warsaw Stock Exchange reveals that if an investor requires high expected return from his portfolio, then the constrain on fundamental value is not binding.

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Study on Agile Digital Transformation in Relation To Organizational Innovation

Teodora E. FOGOROS
The Bucharest University of Economic Studies, Bucharest, Romania, teodora.elena@icloud.com

Stelian M. OLARU
The Bucharest University of Economic Studies, Bucharest, Romania, olaru_stelian@yahoo.com

Bianca I. TRIFAN
The Bucharest University of Economic Studies, Bucharest, Romania, bianca.dumitr@gmail.com

Dorin MAIER
Technical University of Cluj - Napoca, Romania, dorin.maier@gmail.com

Abstract

Uncertainty, fast change, volatility, market competition and technology advancement are the keywords of the last decade. This paper highlights the main elements of a doctoral research regarding the relationship between organizational innovation processes and the agile methodology. Organizations are faced with continuous change and are challenged to adapt innovatively to evolving requirements in order to survive in the market. As digitalization completely changed the performance scenarios of organizations, by introducing Internet of Things (IoT) technologies, big data and cyber security concepts, simply aligning with the technology usage may not be enough; the transition to organizational innovation requires a cultural change, focused on employees and customers, emphasizing the need for flexibility and agility. It is the employees themselves who can have the most impact on process acceleration and management facilitation, as they are involved directly in the process delivery. Hence, organizations are trying nowadays to build agile innovation based on processes, by linking the terms agility and innovation. The aim of this study is to develop a framework for future studies on the relationship between agile methodology, agile innovation, organizational innovation processes and digitalization. Based on a total of 100 publications, including recognized publishers and data sets at European level, in this study we strive to provide a holistic overview on past accomplishments and future agreements on the terms above.

Keywords: Agile Innovation, Business Agility, Organizational Innovation, Digitalization

Introduction

It is widely accepted that organizations face new challenges in the current context, marked by the fourth industrial revolution (Industry 4.0), which leads to the digitalization of industries by focusing on smart technical solutions, increasingly relying on the Internet of Things (IoT) technologies, automatization and optimization of processes to improve productivity and profits (Parida et al., 2019). Forced to quickly adapt to the increasingly rapid environment changes, the principles of agility seem to be the answer for organizations, in order to develop innovation opportunities. However, as Parida et al. (2019) observed in their study, simply using technological applications is not enough: the organization's business models, and the methodologies used must align with the standards of innovation. By using IoT, business processes become agile and connected. In their research, Akhtar et al. (2018) highlighted that a better competitive advantage can be obtained by organizations by combining the IoTs and dynamic data and information processing capabilities. The main reason is that in this way agility is deeply implemented in their processes, at its turn a consequence of the IT infrastructure development. Based on Vodafone's 2019 IoT Barometer, 34% of worldwide businesses are now using IoT in daily operations, up from 29% in 2018, with 95% of IoT adopters already observing measurable benefits; 81% of IoT adopters say their reliance on IoT has grown, and 76% of adopters say IoT is mission-critical to them; 58% are using analytics platforms to get more insights from their IoT data to improve decision making (Forbes, 2019). Also, on the Vodafone IoT Barometer (Forbes, 2019), where they investigated eight fields of activity (finance, retail, automotive, healthcare, transport, energy, manufacturing or all of it), it was depicted a comparison between the main benefits considered to be brought by IoT enterprises. The adopters are seeing a wide range of benefits, based on Forbes (2019), such as: reduced operating costs (53%), better collection of accurate data/insights (48%), improved employee productivity (47%), increased existing revenue streams (42%), reduced fixed costs (41%), improved asset utilisation or uptime (41%), enhances customer experience/loyalty (39%), improved brand

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differentiation (37%), streamlined compliance with regulation (35%), reduced waste (35%) and created new revenue streams (33%).

Despite these statistics, based on Akhtar et al. (2018), the correlations between IoT, dynamic data and information processing capabilities (DDIPCs) and operational agility are still at an infancy state. An enterprise which has embedded operational agility means that it can provide quick responses, cost-efficiency and adapted actions. Also, it supposes assistance in improving operational changes and flexibility in daily actions (Langer and Alting, 2000).

Quick reaction to changes in the business environment supported by a balance between the need for stability and the adequate level of flexibility represents the agility of the organization (Ciric et al., 2019).

However, in the Lean methodology, the Value is defined as the critical factor of success in implementing agility in daily processes. It is often considered that an activity that does not add Value for the company or for the customer is a waste (Poppendieck, 2011). Value is often interpreted in a traditional way, as profit generation. But, as described by Khurum et al. in 2013, it is a much more complex concept: besides the Customer Value and the Financial Value, there are also some internal Value Aspects (Value degradation of assets and legacy within the development company). However, the definition of Value within the organization will always suggest the maximization of it for a given investment (Alahyari et al., 2017). In order to do this, it is mandatory to understand the exact meaning of 'Value' for each organization and thus derive what strategy should be applied in order to achieve Value creation. Even though numerous articles were published about how organizations may create Value, they are focused only on aspects such as quality (de Azevedo Santos et al., 2011; Conboy, 2009), simplicity (Conboy, 2009), economy (Conboy, 2009) and frequent releases (Hoda et al., 2011; Petersen and Wohlin, 2010).

Also, by mixing the Lean Six Sigma methodology with innovation management, the focus is on the principles of quality management, which helps in the analysis of the innovation impact on organizations' processes (Ifrim et al., 2020). In the current international environment, where globalization affects most market segments and consumer expectations, an organization which includes in its processes strategic agility will be better equipped to compete in the continuously changing market. Multiple definitions were developed in recent years for the concept of strategic agility: Weber & Tarba (2014) defined it as 'the ability to remain flexible in facing new developments and to develop innovative ways to create value', while Junni et al. (2015) suggests that indeed, an organization must be able to 'renew itself and stay flexible without sacrificing efficiency'. Thus, as observed by Shams et al., 2020 in their study, strategic agility enables organizations to stay flexible and create value with a set of activities, such as: variations in specific processes, power of diversity, dedication of resources which are able to maintain the level of flexibility.

It is important to understand that adopting an agile development doesn't imply the existence of perfectly defined and validated requirements, as specified by Shim and Lee (2019) in their study. An agile development emphasizes the idea that an organization is not perfectly resisting change but embracing it. As Ghezzi & Cavallo (2020) mentioned in their study, (based on Beck et al.' Agile Manifesto Principles, http://agilemanifesto.org/principles.html, accessed in 18th October 2020), one of the main agile principles is 'Delivering the highest value to customer quickly'. Meeting customers' expectations is the centre of a successfully developed organization.

In 2015, Campanelli & Parreiras observed in their study that there is a similarity between the Lean methodology and Agile methodology, related to the main values in both: individuals and interaction, working software, customer collaboration and responding to change.

Research Methodology

This study in the result of an early PHD research on agile methodology, digitalization and innovation. Whereas the research is in an early stage, by analysing an extensive review of 100 data sets of existing academic literature from recognized publishers, we managed to obtain a broad view on the subject of interest. In this light, this paper aims to establish how an agile approach of an organization may have an influence on the organization innovation processes and the relationship between them.

Theoretical Framework

A Literature Review of the Agile Approach

Taking into consideration the complexity and the continuous changes brought about by innovation, the business world is required to quickly adapt their strategies. The Agile methodologies, such as Scrum, Kanban or Extreme

Programming have as main focus to provide an adapted process model to develop products, in order to achieve users' needs and customer expectations (Schon et al., 2017).

In a research study by Teich and Faddoul (2013), using an agile approach means emphasize with continuous process improvement, the purpose being to minimise waste while maximise customer value. Though, it is important to understand the difference between a traditional approach of management and the agile approach. By traditional management, in the speciality literature, the term "waterfall" is often encountered. Basically, this means clarifying the objectives, developing a structured plan, establishing various timelines and deliverables and it can take several years, as observed by McMakin and Hefferman in their study (2020). By introducing the agile approach, the projects are divided into "sprints" and it comes with a rapid delivery of different evolutions that can be tested in collaboration with the developer and the customer. In terms of failure, agility means failing fast, but at a small scale. Based on recent studies, different authors consider that organizations which are adopting agile as methodology should embrace its both parts: technical aspect and social aspect (Danese et al.,2018; Shah and Ward, 2007).

In their research, Takeuchi et. al (1986) declared that a subsequent phased approach for product development does not provide enough flexibility. After this statement, other process models have been developed: RUP - Rational Unified Process (Kruchten, P.,1998; Kruchten, P., 2004), Scrum (Schwaber, K., 1997; Schwaber, K., 2004), XP - Extreme Programming (Beck, K., 2000), Kanban or Feature-Driven Development (Palmer, S.R. et al., 2001). Later in 2001, many leaders of these streams managed to create together the Manifesto for Agile Software Development, with all values and principles included (Beck et al., 2001). In the Agile Manifesto we can find four main values (Schon et al., 2017):

- individuals and intercommunication instead of processes and tools;
- leaving documentation and procedures behind and introducing working software;
- renunciation of contract negotiation and using customer collaboration;
- avoid following a plan and instead adapt and respond in a positive way to change.

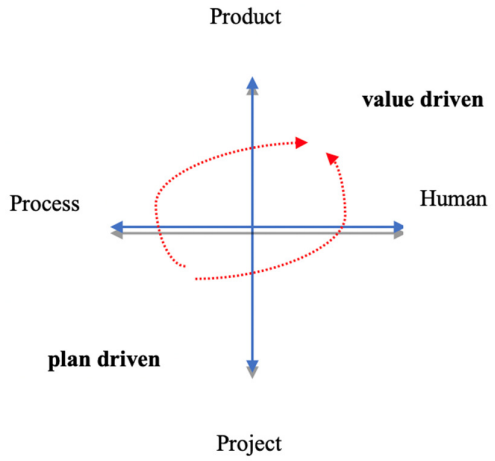

Fig. 2: Outcomes vs. human needs in agile approach

Source: elaborated by the authors, based on the research of Schon et al. (2017)

As we can observe in Figure 2, since the creation of Agile approach, software development focuses more on value-driven process models, instead of plan-driven ones. In the plan driven domains, people tend to negotiate the price, the project plans, etc., contrary to people in value-driven domains, that focus on experiences and employees' values. In the end, the agile methodology has as centre point the human being.

Traditional Collaboration versus Agile Approach

There are multiple key-parts in the projects and organizations based on agile methodology (Hoeren & Pinelli, 2018): developers are always connected to the business teams, they are working in sprints (small development units delivered in order to be tested), they have a product owner (customer's voice) and a scrum master.

Adopting the Agile methodology means accepting the fact that in every step taken the progress cannot be predicted and many changes and risks from the client or from other process parts may interfere in developing different models or products. The logic of agility offers a flexible approach, followed by a learning from failure.

To offer a better view on traditional approach and the approach proposed by agile methodology, in Table 1 we will examine it in contrast.

Table 1: Traditional approach vs. Agile approach

Traditional approach (Waterfall model)	**Agile approach (Scrum-method)**
Long delivery and development cycles	Sprint method – small delivery and development units
Constant delivery of software solutions	Constant delivery of small and independent software parts
Long-term phases: design, programming, tests	Short-term sprints
Very procedural and fixed flow chart	Flexible workflow
Old and traditional roles: client and contractor	New roles: product owner, business analyst, development team, agile master
The client predefines the targets	Constant interaction and continuous adjustment
The progress is determined related to targets	The progress measuring units must be determined first

Source: adjusted by the authors, based on the research of Hoeren & Pinelli, 2018

Working in sprints helps organizations to better prioritize the tasks in the product backlog. If the deadline agreed for one sprint is not respected, the unfinished developments must be reassessed and reprioritized. Historically, organizations have continuously tried to improve the speed and efficiency of processes and information, as well as for materials used in service delivery chain, in order to face the dynamic business environments (Khoghlahn & Ardabili, 2016); hence, they were unable to achieve constant performance. But the agile approach is dynamic due to the fact that the client is in continuous communication with the development team, which at it's turn is open to changes in areas that can be identified, no matter the moment.

The Relationship Between Organizational Innovation Processes and Agile methodology

The need for agility and innovation is most often encountered in Multinational Enterprises (MNEs), as they operate in different host countries (Shams et al., 2020). The performance is based on the ability of the organization to adapt to all the cultural specificities and to develop associated dynamic capabilities (Junni et al., 2015). One of the crucial factors that are influencing the performance improvement, the functional communication and geographical boundaries is represented by the information technologies (IT). Based on recent research, big data analytics and analogous capabilities improve decision-making processes, and by adding knowledge management skills it leads to the association with performance (Rialti et al., 2019; Ferraris et al., 2019). In his research, Maier, D. (2018) observed that there are multiple types of innovation: innovation of technology flow, of the manufacturing processes and the less need of knowledge. Numerous studies were elaborated on the connexion between information technology capability of an organization and agility. In 2011, Lu and Ramamurthy (2011) confirmed in their research that information technology improves organizational agility, by offering both market capitalizing opportunities and increased operational agility. Later in 2014, Chen et al. (2014) proved in their study that an IT-based capability has a positive impact, due to its flexibility and quickly reactive operations and processes.

Digitalization and Digital Technologies: between opportunity and challenge

Trying to define the terms ‘digitalization’ and ‘digital technologies’ is still a challenge for researchers. Hess (2016) in his article considers that the automation of daily tasks with the aid of information technology describes the meaning of digital transformation. Clearly, nowadays, the digital transformations are visible in multiple sectors: political decision-making, supply chain and the general public daily lives. Social media, IoT, Big Data and Cloud are the main factors of influence in processes, services and business models, by connecting machines, people and things and encouraging new ways of collaboration (Legner et al., 2017). Taking the example of Uber, that leads taxi-drivers to protest over the world or AirBnb, which managed to compete with the hotel industry and transformed almost every home into an accommodation, we observe the platform-based business model and the multi-sided marketplace

business model (Fogoros et. al, 2020). Though, digital transformation represents a global phenomenon with influence on worldwide organization business processes (Grab et al., 2019). Moreover, the usage of IT gradually evolved: if in the past, IT started to be used for automation of internal business processes, nowadays it's more and more present in everyday external products and services: smart houses, smart and electric cars and cloud-connected toys for our children (Legner et al., 2017). The progress made by companies in all these areas, brought on by digital transformation, is also starting to incorporate much-needed sustainability principles as well (Dumitrescu and Buzatu, 2020). For an organization, from the point of view of Legner et al. (2017), there are three key fields of action for digitalization which can be observed in Figure 3.

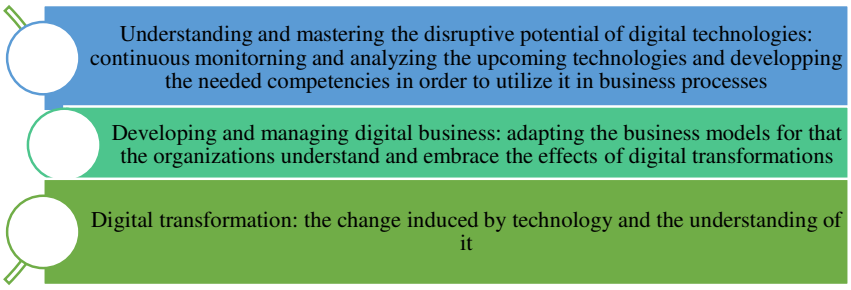

Fig. 3. Key fields of action for organizations' digitalization

Source: elaborated by the authors, based on the research of Legner et al. (2017)

Based on the research of Marquardt et al. (2018), the main obstacles aligned with the digitalization in business processes are the following: the lack of IT skills of employees, lack of specialists' availability, the legal concerns in terms of security and the difficulties in the conversion of existing IT systems and processes.

Research Contribution

The aim of this study is to propose a research agenda to advance academic discussion on how an agile approach can provide opportunities for an organization, having as main focus the innovation of processes. As the literature review shows, there are some key factors supporting in enabling organizational innovation processes, such as: information technology, the agile approach, monitoring upcoming technologies, adapting the business models, embracing the change introduced by digitization, providing the necessary resources capable to manage technology, etc. Adopting an agile approach having as main goal the digitalization of an organization represents indeed an opportunity for growth. Hence, there are multiple challenges that must be handled by organizations in the current business context.

Current state of innovation in Europe

The European Innovation Scoreboard (EIS) tool used to measure innovation results is developed by the European Commission. This tool provides a comparative analysis of innovation state in EU countries, displaying 2019 data. It is important to specify that in the context of the Covid-19 health crisis and its consequences, the data may not be less relevant for the short-term, current context.

Following the score for 27 separate indicators, such as innovation activities in organizations, investment in research and innovation, human resources and employment elements, there are four categories of performance groups (European Commission, 2020): innovation leaders, strong innovators, moderate innovators and modest innovators (Bulgaria and Romania are below 50% of the EU average). Based on the scoreboard provided by the European Commission (2020), we noted the following countries for any category of performance group:

- modest innovators: Romania and Bulgaria;
- moderate innovators: Croatia, Poland, Latvia, Hungary, Slovakia, Greece, Lithuania, Italy, Malta, Czechia, Slovenia, Spain, Cyprus;
- strong innovators: Portugal, Estonia, France, Ireland, Austria, Germany, Belgium;
- innovation leaders: Luxembourg, Netherlands, Denmark, Finland, Sweden.

Some countries performed exceptionally well on certain individual dimensions: Luxembourg has attractive research systems and researchers are very well connected at international level, Portugal and Finland have high shares of SMEs with innovative products and processes, Austria has a high versatile innovation capability, Sweden invests in human resources and Denmark is known for its innovation-friendly environment.

Challenges introduced by the Agile Innovation

Continuous performance, framework conditions, investments, innovation activities and good ideas are the building blocks for achieving an innovative culture within an organization. However, due to the advancement of technology, organizations must be able to provide a quick response through new projects, developing new products and services, etc., to stay competitive. This is the moment where agility must interfere, by introducing the idea of value added to all processes, by freeing resources and integrating them in the innovation process (Guell, F., retrieved on: https://www.fguell.com/en/agile-innovation/). The fusion between innovation and agility leads to the agile innovation concept, which supposes flexibility, reactivity and responsiveness.

In Table 2 we extracted some of the most encountered challenges faced by organizations with regards to the traditional approach and where the agile approach contributes with new and useful insights.

Table 2: Summary of challenges of traditional and agile approach

No.	Source of research	Researchers' opinion	Authors' opinion
		Challenges of the traditional approach	**Agility Innovation approach**
1.	Bjarnason et al., 2011	Communication issues	Continuous interaction with the customer, the business analyst, the developer and the teams. Recurrent meetings are taking place in order to erase communication gaps.
2.	Bjarnason et al., 2011	Over scoping	There is a list of evolutions sent to the developers which is constantly updated and prioritized depending on the customer's requirements. In this way, repeated allocation in projects is rarely encountered.
3.	Carlson & Matuzic, 2010	Evolutions prioritisation	The client's voice is always listened: the evolutions list is always reprioritised, and less important requirements are put on hold. Before fully developing an evolution, the customers receive blueprints to be tested and validated before passing to the production environment.
4.	Bjarnason et al., 2011	Long procedures and documentation requirements	The agile methodology supposes working with user stories and with product backlogs, which are precise, and which avoid large and useless procedures.
5.	Guell, F., 2020	Financial resources	The contract is negotiated each year, when the cost and potential value of projects is established.

Source: Authors' own research.

In Figure 5 we elaborated the Agile Project Management Methodology framework, often used in organizations for its short development cycles of a product or service.

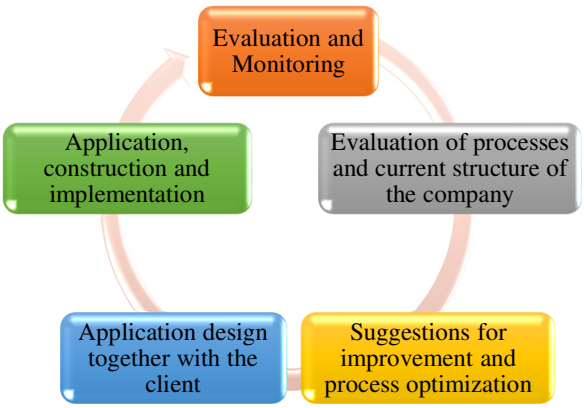

Fig. 5: Agile Project Management Methodology framework

Source: elaborated by the authors, based on the research of Reddy, S. (2019). Retrieved on: https://medium.com/@sudarhtc/agile-project-management-methodology-manifesto-frameworks-and-process-f4c332ddb779, accessed 24 October 2020

As in every project, there are as well some risks involved while using the agile approach, such as: the scope creep, the timeline issues and the budget issues. If an organization decides to use Agile as methodology, it must pay attention to properly defining the scope from the beginning, with all the features included (requirements specifications, acceptance criteria, actual and future evolutions). Also, based on the number of resources available, the deadlines should be well established, compared to the amount of effort required. Last, but not least, regarding the financial aspects, there are some factors to take into consideration, such as quality and value. Exceeding agreed budgets may show overcharging on the customer's side or overlooking items that should have been specified from the beginning.

Conclusion

The authors of this paper attempted to develop a framework for future studies on the relationship between agile methodology, agile innovation, organizational innovation processes and digitalization.

As the digital transformations are now part of both business processes and everyday life, it is important to adapt to technology-induced changes in order to stay competitive.

Regarding our analysis, we first elaborated a solid literature review on the following concepts: the agile approach, the differences between the traditional and agile approaches, the relationship between organizational innovation processes and agile methodology and finally we analysed the digital technologies in terms of opportunities and challenges.

We also considered crucial to observe the current state of innovation in European countries, based on several indicators. Moreover, analysing the challenges introduced by innovation and agility represents a base for future studies.

There are still many parts in the agile approach usage by organizations to be improved, starting with the financial aspects, the relationship between departments, the culture of organization and so on. Nevertheless, it is the individual who remains the centre of all the automation, standardisation and digitalization of business processes. The companies should first focus on preparing their employees with the aid of a solid knowledge base for the digitalization of their current jobs and after that, offering them the chance to be part of the automation process.

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Analysis of Investment Plans Supporting Industry 4.0 Among Small and Medium-Sized Enterprises in Poland

Alina RYDZEWSKA

Silesian University of Technology, Faculty of Organization and Management
Poland, (email: Alina.Rydzewska@polsl.pl)

Abstract

The aim of this study is to analyse investment plans supporting Industry 4.0 among small and medium-sized enterprises in the industrial sector in Poland.
The research carried out allowed to conclude that the majority of enterprises do not have specific plans for investments supporting Industry 4.0. However, in the case of responses that were definite, the largest part was "probably yes". Considering the investment plans of enterprises from the point of view of the size criterion, micro enterprises (turnover up to or equal to EUR 2 million) constitute a group characterised by less definite investment plans. Taking into account the duration of operation (number of years), the statistical analysis did not indicate a group of enterprises that differs from the others. In turn, the results of the analysis concerning the investment plans of enterprises from various provinces are not clear. The initial analysis showed the following provinces: Pomeranian, Podlaskie, Łódź, Greater Poland, of which companies generally declared plans to increase investment outlays. However, the statistical analysis did not show any differences. The PKD (Polish Classification of Business Activities) section, in which most respondents intend to make investments related to Industry 4.0 is the production of finished metal products.

Keywords: Industry 4.0, investment plans, small and medium-sized enterprises, statistical analysis

Introduction

Each era brings new challenges that create opportunities and threats. An entity that wants to develop must adapt to new conditions and then anticipate changes, so that it can act on them in advance. The success of business entities largely depends on innovation and the ability to implement new solutions that respond to new environmental conditions.

The contemporary challenges facing enterprises are changes related to Industry 4.0. After the third industrial revolution, which was associated with the automation of individual processes, the fourth one came. The essence of the fourth revolution is connecting the virtual world with the real one by combining organisation and work systems, as well as creating networks and integrating people with digitally controlled machines, that extensively use the Internet and information technology (Bauernhansl et al., 2014). According to K. Schwab, the scope of this revolution is more extensive than the previous one, and its most important stimulants are: universal and global access to the Internet, significant reduction of data storage costs, device mobility, intelligent sensors, renewable energy sources and artificial intelligence (Schwab, 2016). Hence, the observed changes are not assessed as a revolution, but as a stage of evolution of existing solutions (Alcácer et al., 2016).

In view of the presented conditions of operation, enterprises can take advantage of the opportunities offered by Industry 4.0. The measurable effects of the changes introduced in connection with the fourth revolution are higher revenues and a jump in efficiency (Kiel et al.. 2017, Götz, 2018). It should be noted, that the possibilities of the modern environment are not only limited to large, strong economic entities. Industry 4.0 is also an opportunity for smaller business entities, that are able to flexibly adapt to the needs of their customers. Moreover, conditions of the Polish economy, such as: short logistic paths to Western Europe, membership in the European Union, large internal market and access to production staff, provide opportunities for the development of economic entities operating in it.

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In this study, the aim was to verify investment plans for Industry 4.0 among small and medium-sized enterprises in the industrial sector in Poland.

Therefore, the following research questions were formulated:

1) Are small and medium-sized enterprises in Poland planning to increase investments in Industry 4.0 solutions within 5 years?
2) Do the investment plans related to Industry 4.0 differ in the groups of small and medium-sized enterprises, according to their:

a) size,
b) duration of operation,
c) location,
d) PKD sector.
The following research methods were used for the study: histogram and analysis of structure indices, as well as statistical analysis of the significance of differences – Kruskal-Wallis ANOVA tests and post-hoc tests. In order to carry out the presented analyses, this study uses a part of a comprehensive research on Industry 4.0 among small and medium-sized enterprises in the industrial sector in Poland. The research was carried out in the form of a questionnaire and was conducted in the first quarter of 2020

Investments supporting Industry 4.0 and related benefits

An economic entity wishing to develop must make investments. Investments are understood as financial outlays [...] which are to bring benefits in the future (Mayo, 2019). These outlays may be related to the increase and/or reorganisation of tangible, human, financial or intangible resources. Companies that do not invest strategically lose their position in the market. According to P. F. Drücker, "a minimal amount of growth may simply be necessary for survival. And you always need it when the market grows or when the structure of the industry changes [...] if the market grows, you need to grow with it – dropping to the margin means disappearing" (Drücker, 1995).

Enterprises operating in the conditions created by Industry 4.0, therefore, also take actions that should translate into higher economic results in the future (Müller, 2019). These activities cover three main areas: tangible, organisational and procedural, as well as personnel. The tangible (physical) area is related to investments in advanced robots, software, Internet connections, data security systems, data collection and production monitoring equipment, as well as remote production control and communication (*Information and Communications Technology* – ICT). The organisational and process area refers to activities aimed at creating a virtual organisation, cyber-physical solutions, along with decentralisation and personalisation of production, development of the architecture of remote production control processes, along with pre-sale and after-sales activities. However, the personnel area includes activities related to the regrouping of job positions, flexible organisation of work, task systems, training allowing employees to acquire new competences and ways of functioning in the virtual world (Kujawińska et al., 2016).

As a result of the investments carried out, enterprises undergo a thorough digital transformation. They reconstruct individual functions of the internal (vertical) value chain and – with the participation of external partners – the horizontal value chain (Khan, Turkowski, 2016). By taking advantage of the opportunities offered by data analytics and new technologies (including intelligent sensors, communication devices), companies expand their offer by introducing innovative services and products tailored to the needs of customers. Using mobile connectivity for data transmission, they connect devices with each other via the Internet of Things (IoT) (Kagermann, 2013). Thanks to the automation of production and the dissemination of robots, they outsource the implementation of production tasks to machines that are able to run production systems independently, without human participation. They also create new business model solutions to optimise customer relationships and offer comprehensive solutions within the digital ecosystem. The implementation of the presented elements has a different scope and pace. It depends, among others, on the specifics of the industry, the financial resources necessary to carry out investments, the attitude of managers to the challenges of Industry 4.0, access to new employees related to the implementation of projects in connection with the fourth revolution, the attitude of employees to changes in their qualifications.

Research carried out by PWC shows that companies, on a global scale, plan to increase investment outlays related to Industry 4.0 solutions by 2 percentage points within 5 years, which will translate into expenditures of over PLN 100 billion per year. These entities are convinced that, thanks to these activities, they will achieve a jump in efficiency improvement and reduce costs. 27% of the surveyed companies, that are the leaders in changes, expect an increase in revenues and a reduction in operating costs by approximately 30% within 5 years. Among the surveyed enterprises, that have not yet undergone the fourth industrial revolution, such results were expected by 10% of the

respondents. The average drop in operating costs expected by economic operators is 3.6% annually, which varies for individual economic sectors (e.g. the metallurgical industry, as well as transport and logistics forecast a cost reduction of 3.2%, and the paper industry 1%) (Błasiak et al., 2017).

Investing in digital transformation is costly. However, despite the need to incur additional costs, enterprises implementing Industry 4.0 solutions are convinced that the revenues generated will significantly exceed the costs incurred, and the period of return on investment will be quite short. 83% of respondents believe they will get a return on their investment in a maximum of five years. They also point out that the key success factor is not technology, but people who can use it effectively (Veile et al., 2019, Horváth, Szabó, 2019). However, the largest beneficiary of the investments carried out will be the customer who, in the era of digitisation, turns into a digital customer with new, specific requirements for the enterprise (Szwajca, 2019).

Research Methodology

In this elaboration, in order to verify investment plans for Industry 4.0 among small- and medium-sized enterprises, a fragment of a comprehensive study was used. This study was commissioned by the Faculty of Organization and Management, Silesian University of Technology. The contractor was a professional research company. The subject of the study was the issue of Industry 4.0 among small- and medium-sized enterprises in Poland.

The research was conducted among enterprises from the industrial sector, included in section C of the Polish Classification of Activities (PKD), and covered 23 PKD divisions of industrial processing. The choice of production enterprises was based on the fact, that Industry 4.0 solutions are primarily used in production processes (Mariani et al., 2019).

For the research, a questionnaire was used, which concerned enterprises employing from 10 to 249 people, whose annual turnover did not exceed EUR 50 million, or whose balance sheet total did not exceed EUR 43 million. The survey was conducted using an anonymous questionnaire. The link to the questionnaire was sent to the participating enterprises via e-mail. The respondents were top managers, as they have the most extensive information about the enterprise.

The research was carried out from December 2019 to April 2020. The scope covered 900 enterprises, 613 of which responded to the questionnaire. The selection of enterprises for the sample was random. In order to confirm the statistical representativeness of the sample, power analyses were performed. Both the power analysis for the entire group of enterprises (one mean, t-test) and for groups (multiple means, one-way ANOVA) were equal to 1.0 or close to one (0.9986 for groups, based on the duration of functioning).

The survey questions analysed in this study were closed questions, and the Likert scale was used for answers (1 – No, 2 – Probably not, 3 – Hard to say, 4 – Probably yes, 5 – Yes).

The following research methodology was adopted in the study:

1) Are small and medium-sized enterprises in Poland planning to increase investments in Industry 4.0 solutions within 5 years?
In order to answer the presented research question, a histogram with a fitted normal curve was used, as well as the analysis of absolute values and structure indices.

2) Do the investment plans related to Industry 4.0 differ in particular groups of small and medium-sized enterprises?
To verify the presented research question, tests of significance of differences were used, namely the Kruskal-Wallis ANOVA test and post hoc tests. These tests are valid for more than 2 samples for the ordinal dependent variable. It should be noted that the system of survey responses is ordinal (Likert scale).
In order to conduct the tests, we formulated the following statistical hypotheses (null)

$H_{0\ (1)}$ In the group of enterprises, according to the size, there are no differences in the investment plans of enterprises from the SME sector

The division of enterprises into four groups was based on the turnover: the smallest (micro) entities – up to EUR 2 million, small – from EUR 2 million to EUR 10 million, medium – from EUR 10 million to EUR 50 million, and large – over EUR 50 million. This criterion was considered important, because – among the studies conducted so far – the availability of financial resources was mentioned as a limitation to investing in Industry 4.0 solutions (Ates

et al., 2013).Therefore, it can be concluded that the smaller the enterprise, the lower the financial resources, and so the limited investment plans (Rydzewska, 2019).

H0 (2) In the group of enterprises, according to the length of operation, there are no differences in the investment plans of enterprises from the SME sector

According to the criterion of the length of operation of the enterprise, five groups of enterprises were distinguished: the youngest entities operating up to 5 years (formation), (early) growth from 6 to 10 years, late growth from 11 to 15 years, mature 16-20 years and stabilised – over 20 years (Dodge and Robbins, 1992). From the theoretical point of view, investment activities are most often undertaken by enterprises in the period of (early and late) growth phases. These entities, after the first years of activities related to staying on the market, focus on rapid growth and development. As part of early maturity, they focus on systematic development, while in the late growth phase – on permanent changes related to the expansion of their resource potential.

H0 (3) In the group of enterprises, according to the location (province), there are no differences in the investment plans of enterprises from the SME sector

The criterion of location, i.e. the province, in which the enterprise operates, was considered important. Provinces in Poland are characterised by a different degree of industrialisation. There is a division into regions of western Poland, where the degree of industrialisation (calculated as Manufacturing Value Added per capita) is high; regions: Lower Silesia, Greater Poland, Silesian, Lubusz (over EUR 2,500 million per capita, as the national average); Central Poland regions: Pomeranian, Łódź, Masovian, Opole, Kuyavian-Pomeranian (at the level of the national average of about EUR 2,500 million per capita), and eastern regions: Subcarpathian, Lesser Poland, Warmian-Masurian, Holy Cross, Podlaskie, Lublin – with the exception of West Pomeranian (less than EUR 2,500 million per capita) (Bukowski, M. et al., 2017). Therefore, it can be concluded that, in western regions, the surveyed enterprises will be more willing to invest in Industry 4.0 than in other regions, especially eastern Poland.

H0 (4) In the group of enterprises, according to the sector (PKD division, section C) there are no differences in the investment plans of enterprises from the SME sector

The last criterion was the sector, namely the PKD division of section C, Industrial processing. Within this classification, 23 activities have been distinguished. The theoretical basis and the research carried out allow to conclude that the scope and type of investments related to Industry 4.0 is determined by the specificity of the activity, including technology. Therefore, it is possible to distinguish sectors that will show wider investment plans, e.g. the electronics industry (according to PWC research, companies in the sector in question plan to invest at the level of 7% of total expenditure) and at a lower level (according to PWC, companies from the paper and metallurgical sectors will invest the least) (Błasiak et al., 2017).

Findings

Considering the results of the research conducted among all enterprises, when asked about plans to increase investments related to Industry 4.0 within the next 5 years, the presented histogram (Figure 1) shows that the largest part of respondents (31%) answered “Hard to say” (number 3 on the Likert scale). Also, the analysis of the fitted normal distribution indicates that most responses fell within the range of answer number 3. However, the second group of responses, in terms of numbers, is answer number 4 in the Likert scale. “Probably yes” was indicated by 27% of the surveyed enterprises. Definite “Yes” and “No” answers were given by comparable size groups, which constituted 16% of the respondents. The smallest group of enterprises (11%) indicated the answer 2 – “Probably not”

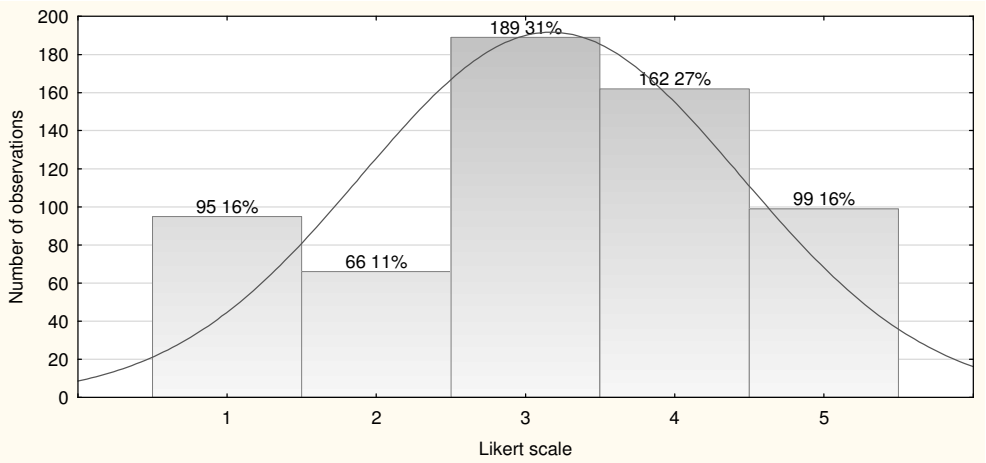

Fig. 1: Histogram with numbers and structure of responses based on the Likert scale

To sum up, the largest part of the surveyed enterprises, when asked about their plans to increase investments in Industry 4.0 solutions in the next 5 years, answered "Hard to say". However, among companies with specific investment plans, they were mostly positive ("Probably yes").

Initially considering the investment plans for Industry 4.0 among enterprises of various sizes (measured by the turnover), on the basis of the box and whisker plot analysis (Figure 2), it can be noticed, that the enterprise group that differs from the others is the group of micro enterprises (with a turnover lower or equal to EUR 2 million). The median of responses for these companies is number 3 ("Hard to say"), while the median of responses by enterprises of other sizes is number 4 ("Probably yes").

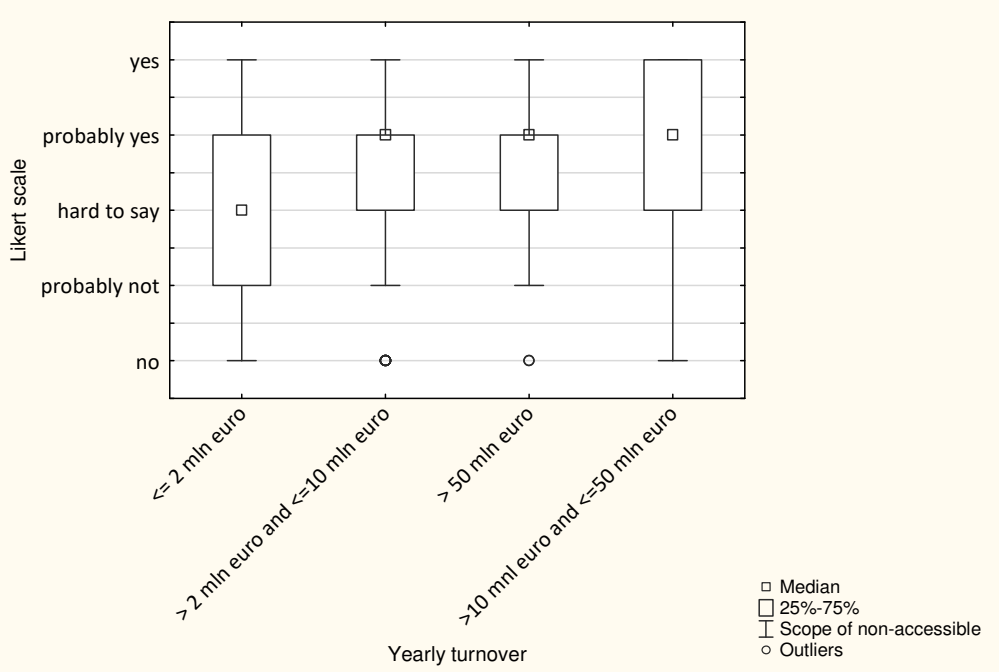

Fig. 2: A box and whisker plot concerning investment plans in Industry 4.0 solutions for groups according to the size (annual turnover)

The presented initial conclusions were statistically confirmed. The performed test concerning the significance of differences – the Kruskal-Wallis test ($p = 0$) indicated, with the adopted significance level ($\alpha = 0.05$), the rejection of the verified null hypothesis (Appendix 1). This means that there is at least one group among enterprises, which differs from others according to their size. In turn, further post-hoc tests (Appendix 2) show that significant differences exist between the group of micro-enterprises (with a turnover of less than EUR 2 million) and small (with a turnover of EUR 2 to 10 million) and medium (with a turnover of EUR 10 to 50 million) enterprise groups.

These results are consistent with the theoretical assumptions that smaller enterprises have lower resource potential and, therefore, their investment plans may be limited (Sommer, 2015). Hence, micro-companies, with a turnover of up to or equal to EUR 2 million, mainly indicated responses in which they were not determined whether they want to increase expenditure on investments in Industry 4.0.

Initially analysing the responses of enterprises from the SME sector regarding investment plans supporting Industry 4.0, on the basis of box and whisker plot (Figure 3), the group is not visible according to the length of its operation, which differs from the others. The median response of all groups (operating: 0 to 5 years, 5 to 10 years, 11 to 15 years, 15 to 20 years and over 20 years) is the same, and it is number 3 on the Likert scale, namely "Hard to say".

The initial conclusions are confirmed by the statistical analysis of the significance of the differences. The results of the Kruskal-Wallis test ($p = 0.2961$), with the adopted significance level ($\alpha = 0.05$), indicate no grounds for rejecting the verified null hypothesis (Appendix 3). This means that, within the studied groups of enterprises, there is not a single statistically different group.

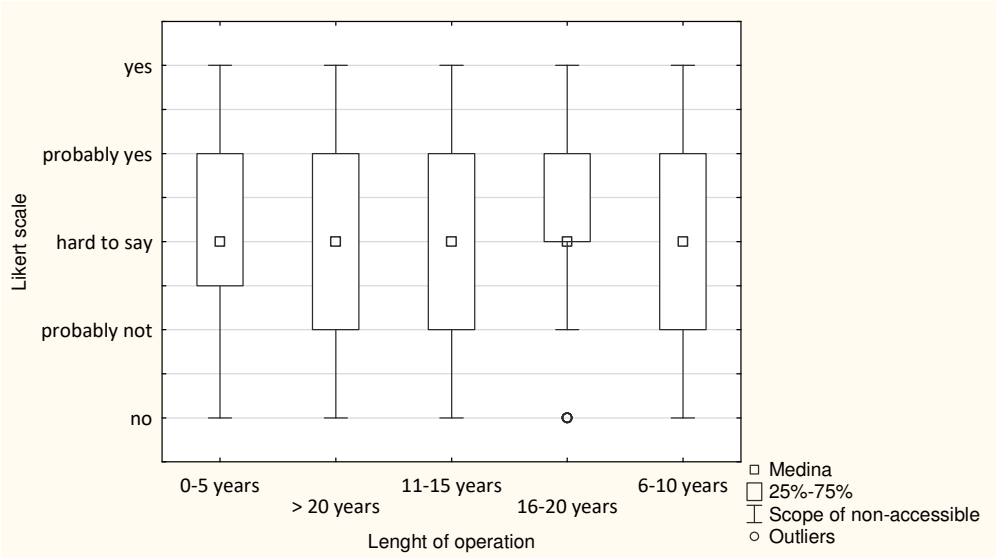

Fig. 3: A box and whisker plot concerning investment plans in Industry 4.0 solutions for groups according to the length of operation (number of years)

Thus, the statistical research is not in line with the theoretical assumptions. Theoretical considerations suggest that enterprises in the early and late growth phase (operating from 6 to 10 years and from 11 to 15 years) are most willing to undertake investment activities. However, this is not confirmed by Polish enterprises in relation to investments in Industry 4.0.

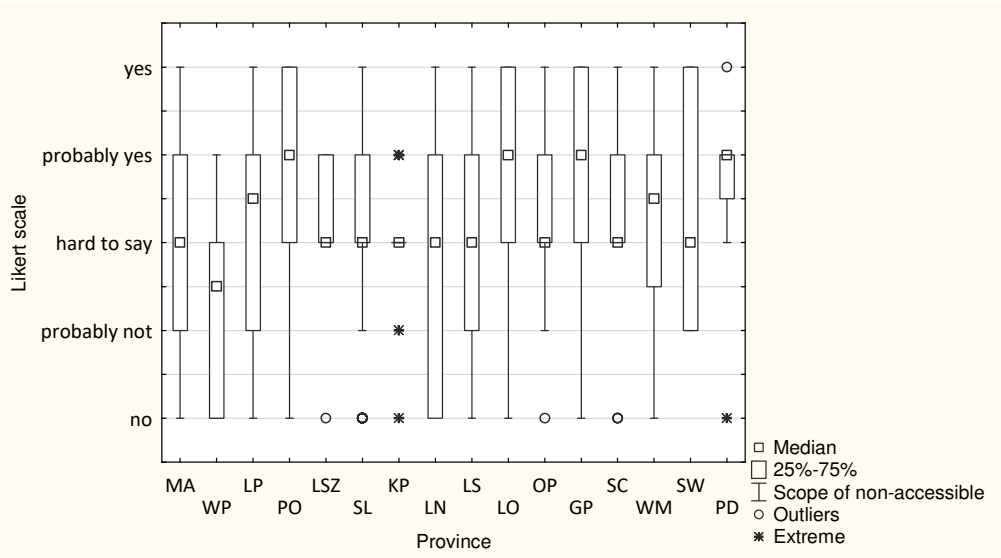

Fig. 4: A box and whisker plot concerning investment plans in Industry 4.0 solutions for groups according to location (province)

However, when conducting statistical research, the results of the Kruskal-Wallis test ($p = 0.1619$) with the adopted significance level ($\alpha = 0.05$) indicate that there are no grounds for rejecting the verified null hypothesis (Appendix 4). Therefore, within the groups of enterprises from individual provinces, there is not a single statistically different group.

The presented research contradicts theoretical considerations, which indicated that, in the regions of western Poland (with a higher degree of industrialisation), they would be willing to invest to a greater degree than enterprises from eastern Poland (with a lower degree of industrialisation). The results of the analysis of differences indicate no statistically significant differences between the investment plans related to Industry of 4.0 enterprises from individual provinces. However, the box and whisker plot analysis shows that there are groups of enterprises whose median response is 4 ("Probably yes"). They showed a higher tendency to invest in Industry 4.0. However, these are companies from the provinces of central Poland and the Podlaskie province (eastern Poland). However, enterprises from western Poland (West Pomerania province) indicated responses between "Hard to say" and "Probably not".

Empirical research may, therefore, lead to initial conclusions that the solutions of Industry 4.0 and, therefore, also investments, are not related to the level of industrialisation of the environment. Industry 4.0 relies on the extensive use of the Internet and information technology, which is independent of location.

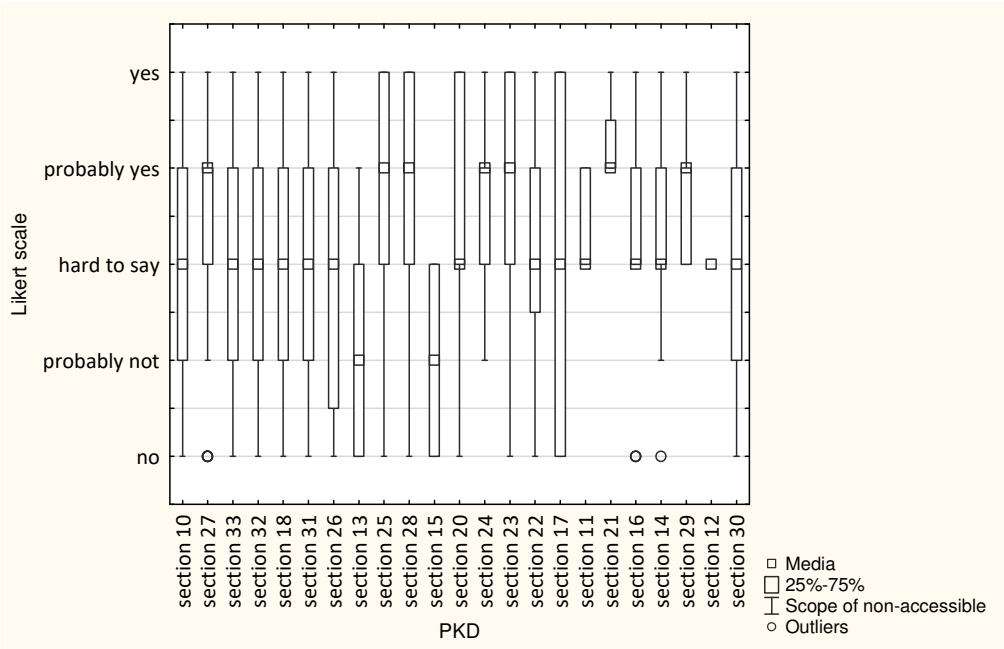

Fig. 5. A box and whisker plot for investment plans in Industry 4.0 solutions for groups according to the sector (section C, Industrial processing)

On the other hand, initially considering the responses to investment plans supporting Industry 4.0 among enterprises of particular PKD divisions (under section C, Industrial processing), on the basis of the box and whisker plot analysis (Figure 5), it can be noticed that groups of enterprises differ from the others. Median responses of 4 on the Likert scale ("Probably yes") occur in the case of divisions 27 (manufacture of electrical equipment), division 25 (manufacture of finished metal products – excluding machinery and equipment), division 28 (manufacture of machinery and equipment), division 24 (manufacture of metal), division 23 (manufacture from other non-metallic mineral products), division 29 (manufacture of motor vehicles). However, divisions 13 (manufacture of textiles) and 15 (manufacture of leather and related products) have a median response of 2 ("Probably not"). The remaining divisions have a median response of 3 ("Hard to say").

However, the statistical analysis of the significance of the differences – the Kruskal-Wallis test ($p = 0.003$), with the adopted significance level ($\alpha = 0.05$), indicates the rejection of the verified null hypothesis (Appendix 6). This means that there is at least one sector that differs statistically from the others, due to the responses to investment plans in Industry 4.0 solutions. Post-hoc analysis (Appendix 7) gives grounds for the conclusion that the statistically significant sector is division 25 (manufacture of finished metal products – excluding machinery and equipment) with respect to divisions 32 (other manufacturing) and 33 (repair, maintenance and installation of machinery and equipment). The other sectors do not show statistically significant differences.

The presented research is consistent with the theoretical assumptions that the sectors may differ in their investment plans supporting Industry 4.0. On the basis of the initial box and whisker plot analysis, divisions characterised by a higher investment initiative were distinguished (mainly these are: production of electrical appliances, machinery and equipment, metal products, motor vehicles). However, statistical analysis indicated sector 25 (production of finished metal products – excluding machinery and equipment) that differed statistically in terms of responses to investments in Industry 4.0 solutions.

Summary

In this study, the aim was to verify investment plans for Industry 4.0 among small and medium-sized enterprises in the industrial sector in Poland. Therefore:

1) the structure of responses regarding investment plans of enterprises in general was analysed,
2) an analysis of differences was performed, in order to identify groups of enterprises differing in investment plans according to their: size, length of operation, location and PKD sector.

The conducted research and their analysis allowed to identify initial investment plans under Industry 4.0 within the next 5 years among small and medium-sized enterprises operating in Poland. And so, the greatest number of respondents indicated the answer "Hard to say" (number 3 on the Likert scale). However, in the case of responses that were definite, the largest part was answer number 4 on the Likert scale ("Probably yes").
Considering the results of the responses of enterprises of various sizes, the statistical analysis indicated micro enterprises (turnover up to EUR 2 million) as a group of enterprises characterised by less definite plans to invest in Industry 4.0 solutions. These results are consistent with the theoretical considerations that the smaller enterprises, due to the lower financial resources, are characterised by more limited investment plans.

When analysing the results of research on enterprises according to the length of their operation, the statistical research did not indicate a group of enterprises that differed from the others. These results are not in line with the theoretical assumptions, according to which companies in the period of (early and late) growth invest the most. A possible explanation of these results is that these companies have already made investment steps towards solutions to the fourth revolution and their plans for the next 5 years are not comparable to those of the other groups.

Considering the results of research on enterprise investment plans related to Industry 4.0 according to location, they are not conclusive. The results of the test of significance of difference indicate no statistically significant differences between the plans of enterprises from individual provinces. However, the box and whisker plot analysis shows that there are groups of enterprises with a higher tendency to invest in Industry 4.0. However, these are mainly companies from the provinces of central Poland. Thus, the investment plans of the small and medium-sized sector in Poland do not correspond to the level of industrialisation of the regions, which may be associated with the fact that some solutions of the fourth revolution (such as computerisation and digitisation) are independent of location. Therefore, they may constitute an opportunity for the development of companies from less industrialised provinces.

The last criterion used to study investment plans of enterprises related to Industry 4.0 within groups is the type of activity (PKD division under section C, Industrial processing). The results of statistical surveys indicated the following sectors: production of finished metal products, production of electrical appliances, machinery and equipment, metal products, motor vehicles, which enterprises generally declared to increase their investment outlays within 5 years. However, the PKD divisions, within which enterprises did not generally declare their willingness to invest in Industry 4.0, were: manufacture of textiles and manufacture of leather and related products. Thus, enterprises operating within individual economic divisions and sectors show investment plans at various levels. Development intentions related to the fourth revolution are determined by the specificity of the activity.

The presented studies need to be continued. Their further conduct should take into account the verification of individual investment intentions under Industry 4.0 and the benefits associated with them in terms of economic results (increase in revenues, reduction of costs, increase in efficiency).

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Appendix 1. The results of the Kruskal-Wallis ANOVA test for groups of enterprises according to turnover (size)

	Kruskal-Wallis ANOVA test by ranks; Likert scale (Sheet3) Independent (grouping) variable: Yearly turnover Kruskal-Wallis test: H (3, N= 597) =23.74296 p =.0000			
Dependent: Likert scale	Code	N (valid)	Sum (Rank)	Average (Rank)
<= EUR 2 million	1	449	126,043.50	280.72
> EUR 2 million and <= EUR 10 million	2	93	32,238.50	346.65
> EUR 10 million and <= EUR 50 million	3	32	12,541.00	391.91
> EUR 50 million	4	23	7,680.00	333.91

Appendix 2. Post-hoc analysis for enterprise groups according to turnover (size)

	P-value for multiple (two-tailed) comparisons; Likert scale Independent (grouping) variable: Yearly turnover Kruskal-Wallis test: H (3, N= 597) =23.74296 p =.0000			
Dependent: Likert scale	<= EUR 2 million (R:280.72)	> EUR 2 million and <= EUR 10 million (R:346.65)	> EUR 10 million and <= EUR 50 million (R:391.91)	> EUR 50 million (R:333.91)
<= EUR 2 million		**0.0048**	**0.0026**	0.8949
> EUR 2 million and <= EUR 10 million	**0.0048**		1.0000	1.0000
> EUR 10 million and <= EUR 50 million	**0.0026**	1.0000		1.0000
> EUR 50 million	0.8949	1.0000	1.0000	

Source: own work

Appendix 3: The results of the Kruskal-Wallis ANOVA test for groups of enterprises according to length of operation

Dependent: Likert scale	Kruskal-Wallis ANOVA test by ranks; Likert scale (Sheet3) Independent (grouping) variable: Length of operation Kruskal-Wallis test: H (4, N= 566) =4.915783 p =.2961			
	Code	N (valid)	Sum (Rank)	Average (Rank)
0-5 years	1	160	46,518.50	290.74
6-10 years	2	81	21,747.50	268.49
11-15 years	3	78	19,844.50	254.42
16-20 years	4	63	19,117.50	303.45
> 20 years	5	184	53,233.00	289.31

Appendix 4: The results of the Kruskal-Wallis ANOVA test for groups of enterprises according to location (province)

Dependent: Likert scale	Kruskal-Wallis test by ranks; Likert scale (Sheet2) Independent (grouping) variable: Province Kruskal-Wallis test: H (15, N= 596) =20.26819 p =.1619			
	Code	N (valid)	Sum (Rank)	Average (Rank)
LS	1	50	14,454.00	289.08
KP	2	13	3,447.50	265.19
LN	3	15	3,854.50	256.97
LSZ	4	6	1,644.50	274.08
LO	5	14	4,946.50	353.32
LP	6	28	8,659.50	309.27
MA	7	246	68,949.50	280.28
OP	8	10	2,820.50	282.05
SC	9	20	6,452.50	322.63
PD	10	8	2,956.50	369.56
PO	11	22	8,142.00	370.09
SL	12	96	30,275.00	315.36
SW	13	13	4,419.00	339.92
WM	14	12	3,758.00	313.17
GP	15	33	11,213.50	339.80
WP	16	10	1,913.00	191.30

Appendix 5. Symbols and names of provinces in Poland

Symbols	**Province name**
LS	Lower Silesia
KP	Kuyavian-Pomeranian
LO	Łódź
LN	Lublin
LSZ	Lubusz
LP	Lesser Poland
MA	Masovian
SC	Subcarpathian
PO	Pomeranian
SL	Silesian

WM	Warmian-Masurian
GP	Greater Poland
WP	West Pomerania
PD	Podlaskie
SW	Holy Cross
OP	Opole

Appendix 6. The results of the Kruskal-Wallis ANOVA test for groups of enterprises of PKD sectors

Dependent: Likert scale	Kruskal-Wallis ANOVA test by ranks; Likert scale (Sheet3) Independent (grouping) variable: PKD Kruskal-Wallis test: H (22, N= 585) =44.56555 p =.0030			
	Code	N (valid)	Sum (Rank)	Average (Rank)
section 14	0	13	4,075.50	313.50
section 10	1	26	7,253.50	278.98
section 11	2	7	2,050.00	292.86
section 12	3	1	245.00	245.00
section 13	4	7	1,119.50	159.93
section 15	5	3	414.50	138.17
section 16	6	16	4,286.50	267.91
section 17	7	7	2,069.50	295.64
section 18	8	30	8,179.00	272.63
section 20	10	9	2,851.50	316.83
section 21	11	4	1,774.50	443.63
section 22	12	16	4,700.50	293.78
section 23	13	9	3,342.00	371.33
section 24	14	7	2,387.50	341.07
section 25	15	50	19,141.00	382.82
section 26	16	20	5,669.00	283.45
section 27	17	29	9,491.50	327.29
section 28	18	52	17,726.00	340.88
section 29	19	7	2,509.50	358.50
section 30	20	5	1,364.00	272.80
section 31	21	24	6,357.00	264.88
section 32	22	108	28,366.00	262.65
section 33	23	135	36,032.00	266.90

Appendix 7. Results of post-hoc analysis for groups of enterprises of PKD sectors

Dependent: Likert scale	P-value for multiple (two-tailed) comparisons; Likert scale (Sheet3) Independent (grouping) variable: PKD Kruskal-Wallis test: H (22, N= 585) =44.56555 p =.0030																						
	section 14 (R:313.50)	section 10 (R:278.98)	section 11 (R:292.86)	section 12 (R:245.00)	section 13 (R:159.93)	section 15 (R:138.17)	section 16 (R:267.91)	section 17 (R:295.64)	section 18 (R:272.63)	section 20 (R:316.83)	section 21 (R:443.63)	section 22 (R:293.78)	section 23 (R:371.33)	section 24 (R:341.07)	section 25 (R:382.82)	section 26 (R:283.45)	section 27 (R:327.29)	section 28 (R:340.88)	section 29 (R:358.50)	section 30 (R:272.80)	section 31 (R:264.88)	section 32 (R:262.65)	section 33 (R:266.90)
section 14		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

section 30	section 29	section 28	section 27	section 26	section 25	section 24	section 23	section 22	section 21	section 20	section 18	section 17	section 16	section 15	section 13	section 12	section 11	section 10
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	0.2742	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.2742	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	**0.0082**	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	**0.0087**	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

section 31	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000	1.0000
section 32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	**0.0082**	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		1.0000
section 33	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	**0.0087**	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	

Appendix 8: Divisions of sector C, Industrial processing

Division 10 – Manufacture of Food Products
Division 11 – Manufacture of Beverages
Division 12 – Manufacture of Tobacco Products
Division 13 – Manufacture of Textiles
Division 14 – Manufacture of Clothing
Division 15 – Manufacture of Leather and Related Products
Division 16 – Manufacture of Wood and Products of Wood and Cork, Except Furniture; Manufacture of Articles of Straw and Plaiting Materials
Division 17 – Manufacture of Paper and Paper Products
Division 18 – Printing and Reproduction of Recorded Media
Division 19 – Manufacture and Processing of Coke and Refined Petroleum Products
Division 20 – Manufacture of Chemicals and Chemical Products
Division 21 – Manufacture of Basic Pharmaceutical Products and Medicines, as well as Pharmaceutical Preparations
Division 22 – Manufacture of Rubber and Plastic Products
Division 23 – Manufacture of Other Non-metallic Mineral Products
Division 24 – Manufacture of Metals
Division 25 – Manufacture of Fabricated Metal Products, Except Machinery and Equipment
Division 26 – Manufacture of Computer, Electronic and Optical Products
Division 27 – Manufacture of Electrical Equipment
Division 28 – Manufacture of Machinery and Equipment, n.e.c.
Division 29 – Manufacture of Motor Vehicles, Trailers and Semi-Trailers, Except Motorcycles
Division 30 – Manufacture of Other Transport Equipment
Division 31 – Manufacture of Furniture
Division 32 – Other Manufacturing
Division 33 – Repair, Maintenance and Installation of Machinery and Equipment

Cybersecurity of Children and Youth in Poland

Piotr ŁADNY

University of Szczecin, Szczecin, Poland
piotr.ladny@usz.edu.pl

Abstract

The development of the Internet and modern technologies irreversibly changes the modern world and affects the functioning of almost all spheres of life. Cyberspace is becoming a natural environment for functioning for many people, especially for representatives of the young generation. The growing activity in the use of information and communication technologies, however, creates a number of new threats to which children and young people are particularly exposed.

The purpose of the article is to attempt to define the most important dangers associated with the use of the Internet by minors and to critically analyse solutions and proposals aimed at raising the level of cybersecurity in Poland by limiting access to pornographic material.

Based on the collected data on threats related to the access of minors to dangerous content, in particular pornographic materials and actions taken to limit their accessibility, the basic elements on which the IT security model of children and adolescents should be based have been indicated.

The research method adopted by the author is secondary research, based on analysis of the literature, research results and legal regulations regarding cybersecurity.

Keywords: cybersecurity, children, Internet, Poland

Introduction

Growing range, popularity and possibilities caused that the Internet revolutionized not only ways of communication but had a huge impact on almost all aspects of functioning of the modern world. By creating new opportunities and influencing the acceleration of innovative processes, the Internet becomes a catalyst for positive social and economic changes, which increases the quality of life. However, it is also an environment in which various unfavourable or dangerous phenomena appear and develop.

The growing number of incidents and new threats that appear in the digital space from year to year, with the simultaneous increase in social and economic costs associated with the liquidation of their effects, make the problem of cybersecurity a challenge for companies, institutions, individual users of the Internet and for state authorities and international organizations. The result is more and more intense activities including developing modern hardware and programming solutions in the area of IT security, creating recommendations and guidelines for companies and organizations, developing new strategies and legal regulations, establishing agencies at national and international level responsible for the protection of electronic communications networks as well as creating educational programmes aimed at preventing, effective response and reduction of the effects of attacks and incidents in cyberspace.

Creating conditions for safe and hygienic use of the network and its resources by minors is becoming particularly important area related to cyber security. Children and adolescents are very active and engaged users of information and communication technologies, but due to the lack of knowledge, experience and assertiveness, and the natural curiosity of the world, they do not have sufficient defines mechanisms, which is why they are much more exposed to the risks associated with the use of adults than adults' networks, its resources and capabilities and thus require special protection.

Internet activity of Polish children and youth in the light of research

Research on the use of digital technologies by children and young people in Poland indicates that, like in other countries, the Internet is for the young generation a natural growth environment and a place for the implementation

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of a growing number of activities, and a smartphone, tablet, smartwatch or computer connected to the network are everyday tools.

The „Nastolatki wobec Internetu 3.0" [Teenagers towards the Internet 3.0] report, prepared by NASK in 2017, shows that almost all young people use the Internet and the percentage of people declaring that they do not use the network is only 0.7% (Kamieniecki, Bochenek, Tanaś, Wrońska, Lange , Fila, Loba, Konopczyński, 2017, p. 7). Young people most often use the Internet at home (80%), at school (39.2%), at friends (32.4%) or in public places where Wi-Fi is available (29.7%) while indicating that they treat and perceive modern communication technologies as an integral part of their home, school and community everyday life.

Research conducted by the CBOS Public Opinion Research Centre (Skierka, 2018, pp. 1-3) shows that 87% of young people between 6 and 19 years old use Internet resources, and in the last fifteen years this percentage has increased by as much as 29%. From the declarations of guardians, it can be concluded that the majority of children and young people using the Internet are in the 13-15 age group (94%), slightly less (91%) - in the age group from 16 to 19 years old, and the youngest group from 6 up to 12 years old, they constitute 86%, which means that also primary school students from primary schools eagerly use the network.

Research indicates that as internet is becoming more widespread, the age of internet initiation is decreasing, and internet use is increasing. The data collected by NASK shows that the average age of internet initiation among teenagers in 2017 was 9 years and 7 months (median = 10 years), while the data presented in the next edition of the report (Bochenek, Lange, 2019, p. 6) indicate that teens use the net on their own from the age of seven. It is emphasized that the younger the generation, the earlier the contact with digital technologies.
Analysing the changes taking place in many researchers (Orange Polska, 2016; Eurostat Statistics Explained, 2017; Lange, Bochenek, Wrońska, 2018), it is believed that during the last few years the age has shifted when children start their adventure with the network from an average age of 9-10 to 6-7, and less.

Using the web has become a natural element of behaviour for teenagers. Thanks to mobile technology, young people have permanent access to the Internet, which affects, among others, an increase in the average number of hours spent online. From 2017 (i.e. for 2 years), this value has increased by as much as 32 minutes and is now 4 hours and 12 minutes. Compared to research conducted in 2010, the time spent every day on the Internet increased by as much as 30% (EU Kids Online 2020, p. 22).

The research results confirm that the Internet has permanently entered the everyday life of Polish teenagers. Nearly 96% of respondents declared using the network every day. Occasional use of the Internet ("several times a week" or "several times a month") was declared by less than 4% of respondents. Almost every teenager in Poland is online every day, regardless of age, type of school or gender.

Along with the increase in the use of IT technologies, however, the risk of children and young people being exposed to various threats related directly or indirectly to the use of the Internet and digital services increases.

Characteristics of cyber threats to children and teenagers

Cybersecurity is a heterogeneous, complex area covering many aspects (including technical, legal, organizational, social, psychological), and due to the evolution of existing threats and the emergence of new, quite difficult to be characterized and systematized. This also applies to threats and methods of protecting children and teenagers using information and communication technologies. The threats among minors that may be found in cyberspace (Aftab, 2003, p. 84), e.g.

- Access to information that is inappropriate for them (pornography, hatred, intolerance, bigotry, violence, fraud, gambling, false information, manipulated or exaggerated information);
- Access to dangerous information (instructions on how to obtain and use services and dangerous goods - chemical and explosive materials, poisons, drugs and weapons);
- The possibility of child grooming or disturbance by other network users, including minors (vulgar or offensive comments, threats, blackmail, distribution of malware or hacking into network devices and services);
- The possibility of phishing private information (via phishing, forms, competitions) by traders using unfair marketing techniques;
- The risk of fraud and disclosure of confidential financial information (payment card numbers, passwords, pins), such as credit card numbers, pin numbers and passwords) during online purchases;
- The risk of contact with cyber-attackers and, consequently, meetings in the real world.

The issue of threats resulting from uncontrolled use of the Internet can also be referred to the basic spheres of human functioning by indicating (Biała, 2006, p. 105), among others:

- Physical hazards: eyes strain, stain fatigue, which stays in the same, bad for the body position for a long time, headache, wrist pain, fatigue;
- Psychological threats, consisting of addiction to the network to such an extent that a young person gains confidence and security only in front of a computer, and in relation to relatives gains a growing stranger and distance;
- Moral threats: they result from using these sites, which are an incentive for early sexual intercourse, performing sex, and easy access to pornography;
- Social threats: anonymity can be a source of using profanity and the use of psychological techniques that threaten proper social communication;
- Intellectual threats: a lack of distance to the propagated content reduces criticism and creative thinking in a child who recognizes that information obtained from the Internet as true.

One of the most common hazard classifications in the literature on the subject in relation to children and teenagers is the division into 3 basic groups, whose sources are:

- Exposure to content present and available on the Internet, and inappropriate to the child's level of development (emotional, social, intellectual) and to the system of values adopted in a given culture;
- Behaviours of other Internet users, e.g. hate, grooming, phishing, malicious software;
- Internet user's own behaviour, e.g. publishing his or her data and photos, contacts with people he or she met on the Internet, internet abuse, downloading and sharing copyrighted content, gambling.

Although the typology presented is one of the most frequently indicated and used in scientific research (Pyżalski, 2012; Włodarczyk, 2013), it seems that it does not cover threats that have appeared in recent years, which result from technological development and the dissemination of technology cloud computing, the use of algorithms that use machine learning and artificial intelligence, the Internet of things, and wearables.

The examples of recent years indicate that online threats to which children and young people are exposed may have their source in factors other than those listed in the above classification and relate not only to content, contacts and behaviour but also to the technologies themselves used by children or their guardians. Although it is assumed that information technologies should be treated as neutral and they do not pose a threat by themselves, errors or neglect of equipment manufacturers or developers creating programs and applications may, in practice, cause that certain solutions or products using information technologies may be dangerous for users . One of such areas are solutions related to the collection and processing of large data sets, which in the absence of appropriate rules for acquisition and analysis or in the event of leaks may violate the privacy of the data subjects. An example could be interactive toys designed for the youngest (e.g. Cayla Doll or i-Que robot) that were highlighted in the 2017 Joint Research Centre (JRC) developed and published by the European Commission on the order of the European Commission on online toys (Chaudron et al., 2017, pp. 8-9). The report emphasized that toys connected to the Internet, having built-in microphones and speakers, and using speech recognition technology and learning algorithms for interactive communication "give the child new and important opportunities for play and learning and provide him or her with educational support, but at the same time carry a risk to children's safety, may violate their right to privacy and a sense of trust (...) ".

Webcams used for remote supervision of small children (electronic nannies) have become another example of the risks associated with the growing popularity of IOTs. Due to security holes in the software of these devices or as a result of users leaving default passwords, such devices may allow unauthorized persons to access photos and video recordings as well as personal data of users. Information about such events has appeared in the media many times and in relation to various manufacturers (Sekurak 2018). A similar risk is associated with the use of network devices (routers, access points), which due to software vulnerabilities, lack of support from manufacturers or failure to install updates by users may be a weak point in the security of the home network and all connected devices (computers, televisions, game consoles, monitoring cameras, digital assistants).

An area of potential threats is also the increase in popularity of wearable electronics (wearables) in the form of smartwatches, sports bands or locators used for remote supervision of children. As in the case of IOT, these devices often do not have adequate security mechanisms, which means that their users are exposed to the acquisition of confidential data on activity, location or even remote eavesdropping. In 2019, it was revealed that one of the manufacturers of smartwatches intended for children did not implement sufficient security on servers collecting data from watches, which made it possible to obtain remote access to virtually any user account (over 5,000) and location information, related telephone number with watch, photos, call recordings. The published information (Morgenstern, 2019) showed that a large number of devices to which remote access was possible was in Poland.

The examples cited above cannot be attributed to any of the three groups mentioned earlier, and with the development of new technologies, it can be expected that the risks associated with the lack of adequate security or the negligence of manufacturers will be a growing cybersecurity problem. For this reason, it seems reasonable to indicate the 4th area that can be defined as a technological environment related to the security of service and application equipment.

The appearance of the phenomenon of sharenting on the network, which determines the behaviour of parents or guardians consisting in displaying the image of children and reporting their lives on the Internet, mainly in social media, has created a new area of digital threats. The word sharenting arose from the combination of two English words: share and parenting. To emphasize the different degree of potential harmfulness of such activities, sharenting differs from oversharenting, which means extreme activity of parents in this area, and troll parenting, which means sharing content that compromises children or shows difficult moments for them. Research conducted in 2010 by AVG Technologies covering 2,200 mothers of children under 2 years of age from the USA, selected EU countries, Australia, New Zealand and Japan showed that 81% of children under 2 years of age have a digital profile or trace in the form of a photo left on the Internet by their parents (in the US this percentage was the highest, i.e. 92%, and the average for EU countries participating in the survey is 73%). Research conducted among Polish parents of children aged 0-18 (Nogała, 2019) shows that up to 3 million Polish children already have their photos online, and the percentage of parents who publish them is about 40%. Posting photos, videos, embarrassing information or location data cannot only expose your child to jeering and ridicule but also create potentially dangerous situations related to the use of photos by paedophile-prone people and expose them to the risk of unwanted contacts in the real world (e.g. at school or place of residence). Dangerous behaviour of parents towards children may result from low digital competences and the related lack of awareness of potential threats, but may also be undertaken for commercial purposes, and may be based on the desire to monetize the image of the child or family.

Although it should be assumed that the intention of the vast majority of parents is not to expose children to any risk, such behaviours can be described as the next, fifth group of threats, defining it as the activity of parents and guardians towards children.

Quantitative research conducted on representative samples shows, among the various threats that young people may encounter on the Internet, that one of the most common is contact with dangerous content. According to the results of the latest edition of the EU Kids Online study (Pyżalski, Zdrodowska, Tomczyk, 2019, p. 82), only 28% of Polish 9-17-year-olds declared that they had no contact with dangerous content. As many as 43% had to deal with violent images, and 37% with content showing how to commit suicide. Every third Polish teenager encountered hate speech during the year preceding the test. In turn, the research carried out by Dajemy Dzieciom Siłę foundation shows that on average 43% of children aged 11-17 have contact with pornography on the Internet (Makaruk, Włodarczyk, Michalski, 2017, p. 10).

Pornographic materials are easily and widely available on the Internet and the lack of any warnings causes that contact with such materials may occur not only as a result of intentional action but also unintentionally, as a result of clicking on a random advertisement or a link sent in email spam.

Research on the impact of viewing pornographic material by children and teenagers indicates a number of negative effects that pornography may have on emotional, personality and social development. It is noted (Behun, Owens, 2019) that pornographic content can shape unrealistic expectations of sex life and false relationship patterns, and viewing them can be a source of complexes regarding appearance or physical characteristics. The relationship between compulsive viewing of pornography and the occurrence of mental problems and less satisfaction with life is also emphasized, and that girls who have contact with the sexualizing material presented in the media are more likely to experience depression.

In the light of the data indicating the growing scale of threats to which children and young people using the Internet are exposed, the need to introduce systemic solutions aimed at increasing the level of cybersecurity of children and young people is increasingly pointed out.

One of the more frequently indicated problems that should be solved is the elimination or limitation of children and young people's access to dangerous content, including pornographic material.

The possibilities to limit access to pornographic content

Although the discussion about the possibility of restricting access to pornography has been conducted for a long time, in practice in no country, except for those where the Internet is subject to strict state control (e.g. China or Turkey), it has not been possible to introduce effective mechanisms to protect children and young people against such content.

The first and only European country where work began to solve this problem was Great Britain, where in 2013 actions were taken to limit the availability of pornography on the Internet. The introduced solutions were initially based on self-regulatory activities under which the largest Internet providers serving a total of about 90% of customers used filters blocking access to websites classified as containing pornographic content, gambling or extremist materials. Unfortunately, the implemented solutions have not only blocked pages containing undesirable content but also many others that have been incorrectly classified (e.g. pages about sex education and even politicians' websites). As a result of the reported problems, Internet providers have introduced the option to opt out of blocking assuming that filters will be applied to all people who do not want to opt out. After two years, the British office controlling and supervising the media and telecommunications market (Ofcom) conducted research, which showed that only a few to a dozen or so percent of customers use filters imposed on the Internet supplied by means of wired technologies. Due to the low effectiveness of the actions taken, an agreement was concluded under which the same self-regulation mechanisms were used by cellular operators. The actions taken did not, however, lead to the solution of the problem because, as it turned out, the effectiveness of the filters used was not 100% (additionally other sites were blocked than assumed) and the mechanism itself proved to be easy to be circumvented.

Because self-regulation and blockades used by network providers proved to be ineffective, work began in 2016 to introduce a legal requirement to verify the age of Internet users who want to access pornographic content. Adopted in 2017, the Digital Economy Act, 2017 contained provisions that obliged adult content providers to verify the age of users to confirm their age of majority. The Act did not specify the mechanisms on which this verification was to be based, indicating only that they were to be effective. A regulator, which was the organization dealing with the awarding of age marks to films distributed in Great Britain (British Board of Film Classification), was appointed to verify the effectiveness of these mechanisms. The Act also introduced financial penalties imposed on content providers who, when directing messages in the territory of Great Britain, will not use age verification tools and the option of blocking access to a website whose provider will not comply with the introduced provisions, and also gave the regulator the opportunity to apply to payment organizations (Visa , MasterCard, PayPal) with a request to block payments for access to sites that distribute pornographic content without using age verification tools. The initially adopted provisions had to come into effect in 2018, however, concerns about the security and confidentiality of data collected for the needs of the age verification system and votes indicating the possibility of violations of the privacy of persons using such a system caused that after further postponements, in October 2019 it was announced that age verification provisions will not be introduced.

Due to the importance of the problem of strengthening the protection of minors against access to pornographic content on the Internet, the European Union has decided to take legal action. As a result, on November 14, 2018, the European Parliament adopted a new directive (2018/1808), amending the so-called the Audiovisual Media Services Directive, which as one of the assumptions adopted the extension of the protection of minors against harmful content. The European Commission has obliged Member States to ensure that, under their responsibility, providers of video-sharing platforms apply - preferably through co-regulation - appropriate measures to protect minors from harmful content.

The directive states that "Member States shall take appropriate measures to ensure that audiovisual media services provided by media service providers under their jurisdiction, which may harm the physical, mental or moral development of minors, are only made available in such a way as to that underage circumstances may not be listened to or viewed by minors. These measures may include selection of broadcasting hours, age verification tools or other technical solutions." At the same time, it was pointed out that the most harmful content, such as unreasonable violence and pornography, should be subjected to the strictest remedies.

In the context of the introduced regulations, it should be noted that the regulations do not specify definitely what measures are to be applied by the member states in order to limit access to harmful content. Although an age verification mechanism was indicated, unspecified "other technical solutions" were also allowed. In addition, the regulations apply only to entities that are based in one of the member states. Poland - like other EU member states - is required to implement the directive in its legal order by 19 September 2020.

It seems that reports indicating the growing problem of the availability of pornography on the Internet, and the legislative initiative of the European Commission may have inspired the authors of the Polish draft regulation restricting access to pornographic content (STS, 2019), which was presented in December 2019 by Twoja Sprawa association.

As indicated in Article 1 of the draft, its purpose is to define the obligations of "entities providing qualified pornographic content on the Internet and other entities providing electronic services, entities providing payment services and telecommunication undertakings, in order to protect minors against access to such content."

According to the presented proposal, the basic mechanism used to protect minors is to be age verification - "The entity providing qualified pornographic content is required to use effective tools to verify the age of the recipient in order to prevent minors from accessing such content." The National Broadcasting Council is to be responsible for implementing the provisions of the Act, which, together with the co-regulator appointed (it is assumed that this body will operate as a foundation), will monitor compliance with the obligation to verify age and block access to websites offering pornographic content.

The project also envisages the creation of a register of Internet domains and accounts through which pornographic materials are distributed without the use of effective age verification tools. Information about the providers of content entered in the register is to be provided to telecommunications operators and payment service providers in order to block access to their websites and block any payments for access to content covered by the Act.

Despite the lack of detailed information on what the most important element of the proposed regulations should look like in practice, i.e. the age verification mechanism, and thus its effectiveness, the level of security of collected data and the cost of implementation, the Ministry of Family, Labour and Social Policy together with the Prime Minister of the Polish government announced that the presented draft will become the basis for legislative works, which are to begin in the first half of 2020.

It should be emphasized that, apart from the doubts indicated above regarding the mechanism of age verification that would be used, the project included other questionable entries, such as the statement that "Tools to verify the age of the recipient are considered effective, even if it is possible to circumvent them by minors, if this requires the use of extraordinary measures and actions by such minors that cannot be expected from the average recipient."- which provokes the question whether installing a browser plug-in or an alternative browser using block bypass mechanisms can be considered extraordinary measures and actions? Another questionable provision of the project is to regulate only some of the entities (those for which sharing pornographic content is part of the basic sphere of activity) excluding those services and services on which pornographic materials are e.g. exchanged between users (Instagram, TikTok, Twitter or Reddit) or shared among other harmless content (e.g. Google or Youtube), however, also easily accessible.

Another doubt raises the statutory provisions not only of providers of pornographic content but also of all providers of telecommunications and payment services. The regulations also apply to content providers operating outside of Poland. It is hard to imagine a willingness to cooperate with such suppliers and voluntarily adapting to Polish regulations, when, for example, one of the largest pornographic content providers, Pornhub announced the creation of its website in the anonymous TOR network, which enables, among others, bypassing locks and guaranteeing access from any network. The difficulty in forcing creators of adult websites is also indicated by the fact that, despite the provisions of the Penal Code (Article 202 § 1) in Poland, which penalizes the public presentation of pornographic content, or adopted in June 2014 on the basis of self-regulation by Employers The Internet Industry "Code of Good Practice on the Detailed Rules for the Protection of Minors in Audiovisual Media Services on Demand" (IAB, 2014), none of the pornographic services located on Polish servers or registered by a Polish company or organization has used effective safeguards verifying the age of users (KRRiT , 2015).

The project also lacks information indicating what mechanism should be used to block those sites whose owners do not meet the obligations imposed on them. This means that, as in the case of age verification, it is impossible to assess what costs will be necessary to create it, and because the blockades are to be implemented by telecommunications operators, what costs will be borne by these entities. The authors do not indicate exactly how to block websites that will be entered in the domain register, but the record indicating "removal from telecommunication systems of telecommunications entrepreneurs, used to change domain names to IP addresses" suggests one of the simplest solutions involving the use of operators' DNS servers. However, this solution is very easy to be bypassed, because it only requires changing the operator's DNS server address to a non-operator address in the device configuration (computer, smartphone).

In the light of British experience, the biggest weaknesses and obstacles to successful implementation are the above-mentioned doubts regarding the age verification mechanism that would guarantee that access to pornographic content is obtained only for adults.

An important problem that has not yet been solved anywhere is the creation of such an age verification system that will be reliable and at the same time ensure anonymity and privacy for the verified persons. This condition is not met by systems used in some countries based on payment cards or using e.g. electronic identities because they combine information about the use of websites offering specific pornographic content with a specific person. It should be noted that there is a serious contradiction here because, on the one hand, such a system cannot be anonymous as confirmation of age must occur for a specific person and, on the other hand, it cannot combine information about a specific person

with information about which services it uses because it could lead to the disclosure of information, e.g. unusual sexual preferences of such a person.

The statements of the representatives of the Ministry of Digitization (Słomski, 2020) appearing in the media, which is involved in the work on the project, show that one of the ways can be cooperation with the creators of browsers and embedding mechanisms of age verification and blocking access for those who will not be positively verified. However, such an idea seems completely unreal considering the number of web browsers available on the market (there are over 200 in the Google Play store only), the fact that none of the largest browsers is being developed in Poland.

Obstacles to the implementation of the proposed solutions, particularly with regard to blocking certain content and websites, are the doubts raised as to the legality of such solutions under European law. It is pointed out that imposing a legal general obligation to filter and block pornographic content on telecommunications providers could be considered incompatible with Article 15 of the Electronic Commerce Directive (Directive 2000/31/EC). The Court of Justice of the European Union also stated this in its judgment of November 24, 2011 in case C-70/10 Scarlet v SABAM11. The Court has ruled that EU law does not allow an internet provider to be ordered to implement a system to filter all electronic connections transmitted through its services, applicable to all its customers, at its sole expense and without a time limit.

The above reservations indicate that the bill prepared by Twoja Sprawa Association and approved by the government administration indicates a real problem, however, its general nature, lack of relevant information, lack of market realism, records indicating ignorance of technical problems and even doubts as to compliance with EU regulations cannot be in its present shape, considered to be a regulation that has real chances for implementation and effective prevention of addressed threats.

Summary

Despite the prevailing consensus on the harmfulness of the phenomenon and the broad public support for the fight against the scourge of pornography among minors, there are currently no countries that have systemic and effective solutions in the field of limiting access to pornography for minors (while maintaining the principles of open Internet). The lack of solutions that could be indicated as exemplary and the failure of the 5-year attempt to build such a system in Great Britain indicate that the solution to this problem is extremely complicated and multidimensional. Certainly it is not possible to introduce effective solutions based solely on technological solutions, because their level of advancement and rapid development gives the possibility of identifying and blocking dangerous content (e.g. using artificial intelligence algorithms) but at the same time enables the creation of simple and easily accessible tools for bypassing blockades and restrictions effectively.

It should be emphasized that the introduction of specific technical solutions must be preceded by an analysis of their capabilities and effectiveness, which will indicate at what level (end devices, local/home/school networks, internet service providers or content providers) their application will be the most effective and rational. There are currently no such analyses. The implementation of solutions that will allow any restrictions on access to dangerous content (including pornography) on the Internet must also be preceded by a discussion and a decision whether the principles and regulatory framework in this area should be defined in hard law (at national or EU level), in the form of or co-regulation, or probably European Commission guidelines encouraging member states to take specific actions would be sufficient?

It also seems that the construction of a cybersecurity system for children and teenagers cannot be limited to selected problems (dangerous content or digital violence) but should take into account a wide spectrum of threats.

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Risks of Migration Crime Under the Conditions of The Pandemic Crisis: Theoretical and Prognostic Study

Margarita URDA
Southwest State University, Kursk, Russia, urda.ru@rambler.ru

Anton BAUMSTEIN
Southwest State University, Kursk, Russia, 5068896@list.ru

Nickolay PARSHIN
Belgorod Law Institute of the Ministry of Internal Affairs of Russia, Belgorod, Russia, n.m.parshin@yandex.ru

Abstract

The study defines the conceptual foundations of the migration crime risks, it also identifies the development trends of the phenomenon under study. The paper assesses the migration crime risks in the context of the crisis caused by the coronavirus pandemic COVID-19. The stated research is relevant and timely since there is a need to ensure an effective migration policy that is subject to the effects of the pandemic crisis. The purpose of this study is a theoretical insight of a new concept of "migration crime risks" as a necessary prerequisite for a prognostic study that identifies the development trends of the phenomenon under study in relation to the external factors. Based on the results of the study, the authors define the concepts of "migration crime" and "migration crime risks"; the factors affecting the development of migration crime are identified and the most probable risks of migration crime are predicted in atypical conditions of a pandemic crisis.

Keywords: Migration Crime, Illegal Migration, Criminality Of Migration Processes, Migration Policy, Pandemic Crisis, Migration Regime.

Introduction.

The year 2020 will become a world history as a year of critical rethinking of global problems caused by geopolitical, economic and environmental crises in the unique conditions of pandemic coronavirus infection COVID-19, announced on the 11th of March, 2020 by the World Health Organization. The pandemic has complicated the already controversial migration situation on a global scale.

The experts agree that the coronavirus will worsen the impending global economic crisis. The signs of a recession can be observed now. There is a sharp decline in commodity circulation and capital flows globally. The exchange of labor resources was interrupted due to the complete or partial international border closure. Because of the measures taken to counter the spread of coronavirus infection, many migrants were stranded in the host country and are in a formally involuntary violation of the migration regime's regulations. The prospects for their return to their homeland are not clear. Due to the development of unemployment, access to the labor market is significantly limited. There is an acute threat of new flows of refugees from economically depressed states to centers of attraction for migration. Provoking social tension, these factors have got the criminogenic potential. So, there is a need for a prognostic assessment of the migration crime risks through the prism of "social reflexivity". W. Beck (2000) defines it as risk reduction and prevention of negative consequences.

The results of such an assessment can serve as a basis for optimizing migration policy at the state and interstate levels, aimed at minimizing the risks of migration crime.

Methods

The starting point of this research is the theoretical development of a conceptual framework for the migration crime risks. This new perspective direction of scientific research allows us to predict the development of the studied phenomenon through the prism of the external influence on it. The use of the general scientific cognition methods that is: legal and dogmatic, comparative, analysis and synthesis allowed us to formulate the concept of migration

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crime and identify the relationship of this phenomenon with illegal migration, which is one of the main factors in the formation of migration crime risks.

The dialectical method made it possible to predict the development of migration crime in relation to the external factors caused or amplified by the pandemic crisis.

The main methods of obtaining criminologically significant information about the determinants of migration crime that affect the formation of its risks are statistical, comparative, sociological methods, observation, expert assessment and questionnaire survey. The survey involved 280 people living in the cities of Moscow and Kursk, three categories: indigenous residents (citizens of the Russian Federation), foreign citizens, and law enforcement officers.

The theoretical and prognostic components of the present study complement each other and form the basis for the formation of a methodology for the preventive impact on migration crime in order to minimize its risks in general and in situations of crisis in particular.

Results and Discussion

Based on the results of the research, the author formulated the definition of migration crime, which means a socially dangerous illegal phenomenon of social reality, which includes three groups of crimes: 1) committed by foreign citizens (stateless persons); 2) in relation to the specified category of persons; 3) against the migration regime (entry procedure, stay (residence) of foreign citizens and stateless persons).

Migration crime risks are understood as qualitative and quantitative characteristics of destructive manifestations of migration processes that affect the criminogenic well-being of the population. They create the social tension and increase the level of conflict between citizens of the host state and migrants. In the context of the pandemic crisis, their negative impact will gradually increase. In the medium term, this will lead to an increase in real migration crime.

One of the main factors in the formation of migration crime risks is illegal migration. The relationship of these comparable, but quite independent phenomena is more significant than is commonly believed. Awareness of the importance of illegal migration in determining migration crime affects the rethinking of the public danger of this type of crime and should be taken into account when optimizing migration policy, as well as national security strategies.

During the pandemic crisis, formally forced violation of the migration regime of socially unprotected illegal migrants will inevitably provoke an increase in migration crime. If the restrictions that create obstacles to legal migration are strengthened, then after removing the barriers caused by the need to prevent the spread of COVID-19, illegal migration and the scale of human smuggling will increase.

The specific features of the pandemic crisis allowed us to identify the most likely risks of migration crime. These include an increased violent and mercenary crime and ethnic clashes, the criminalization of economic relations involving migrants and corruption in the migration sphere, and the smuggling and exploitation of migrants.

Discussion

To date, we have accumulated an extensive experience in studying various aspects of migration. The problem of counteracting migratory crime is among them. There are lots of disputes around it regarding its definition, essence, and correlation with related concepts.

In the scientific literature two main points of view have been formed regarding the content of the concept of "migration crime". Supporters of a narrow approach, such as Sobolnikov (2011), interpret it as a set of crimes committed by migrants (foreign citizens and stateless persons). Adherents of a broader approach, such as Lopashenko (2017) and Markova, Koshelev and Sukhodonlov (2018), in addition to this component, include in the scope of definition a set of crimes where migrants are victims.

Criminal violations of the entry and stay of foreign nationals and stateless persons in the territory of the host State, which constitute special rules for the management of migration processes, are also a component of the content of migration crime. These offences are not fully covered by any of the above categories. They do not have a victim; they can be committed by any person with the consent and (or) in the interests of migrants.

The concept of "risks of migration crime" has relatively recently been introduced into a scientific circulation by sociologists. The risks of migration crime, as stated by Yudina and Bormotova (2019) are "a measure of possible

danger caused by migration processes that directly affect the stability and criminogenic well-being of people living in a certain territory". The main risks of migration crime include an increase in interethnic conflicts, terrorism, extremism, cross-border crime, an increase in drug use of society, corruption, criminalization of economic relations, general social tension, etc.

In doctrinal sources, such as Kovalenko, Shuraeva and Zhukov (2018), Sychenkova (2009) and Borishpolets (2007), the term "migration risks" is often used to characterize the category under consideration. It seems that in volume it is broader than the risks of migration crime. Unlike the concept of the migration crime risks, it does not always have a negative meaning.

Migration as a phenomenon creates risks and is simultaneously caused by them, regardless of whether it is legal or illegal, at all stages of the migration cycle and at all levels: domestic, community, regional, national and global. Migration, as Williams and Baláž (2012) conclude, is also a reference source concerned a risk or uncertainty that affects behavior choices.

The term "risks of criminality of migration processes", as Lopashenko (2017) notes, is as close as possible to understanding the risks of migration crime. To characterize the category in question, it is preferable to use "migration crime risks" for two reasons. First, the attention of the observer is focused on the negative social phenomenon. Migration unlike migration crime is a complex phenomenon that combines positive and negative principles. Migration is a natural process based on the inalienable human right to freedom of movement. This right is enshrined in international acts, in particular: the Universal Declaration of Human Rights of 10 December 1948, International Covenant on Civil and Political Rights of 16 December 1996 et al. It is guaranteed by all democratic states. Secondly, the risks of migratory crime include criminal components directly related to the crimes, and not only those that generate them.

With regard to the risks of migration crime, the measure of possible danger refers to the qualitative and quantitative characteristics of the destructive manifestations of migration processes.

The assessment of these parameters is significantly complicated in view of the fact that the real migration crime has the features of uncertainty, unpredictability and the absence of, as named by Sobolnikov (2011), "conditions for its sufficient criminal diagnosis" and it is characterized by a high level of latency. This specificity is due to the fact that the attributive sign of real migration crime is illegal in form and uncontrolled in content migration, which is almost impossible to count. The importance of illegal migration in determining migration crime has not been fully studied. This explains the contradictory assessment of the impact of migration on the crime rate in host countries, in particular European countries and the USA, as stated by Ousey and Kubrin (2018), Crocitti (2014), Nunziata (2015). The scientific literature, such as Ousey and Kubrin (2018), notes that the existing counting methods do not take into account unobserved factors that significantly influence the correlation between migration and crime. The main one is illegal migration. However, the studies such as Nunziata (2015), have pointed out that the level of migration crime decreases if migration is properly controlled.

In the Russian Federation, the evaluation method of migration crime does not also take into account the relationship of this phenomenon with illegal migration. In the absence of profile statistics with a high migration susceptibility migration crime is extremely low (Russia takes the fourth place after the USA, Germany and Saudi Arabia in terms of the number of international migrants with an indicator of 11.6 million people, as noted by United Nations (2019); about the same number of illegal migrants stay in its territory every year according to reports by Markova, Koshelev and Sukhodolov (2018).

In the total share of recorded crime, the number of crimes committed by a foreign contingent is approximately 2%; only 3 per cent of those convicted persons are foreign nationals and stateless persons.

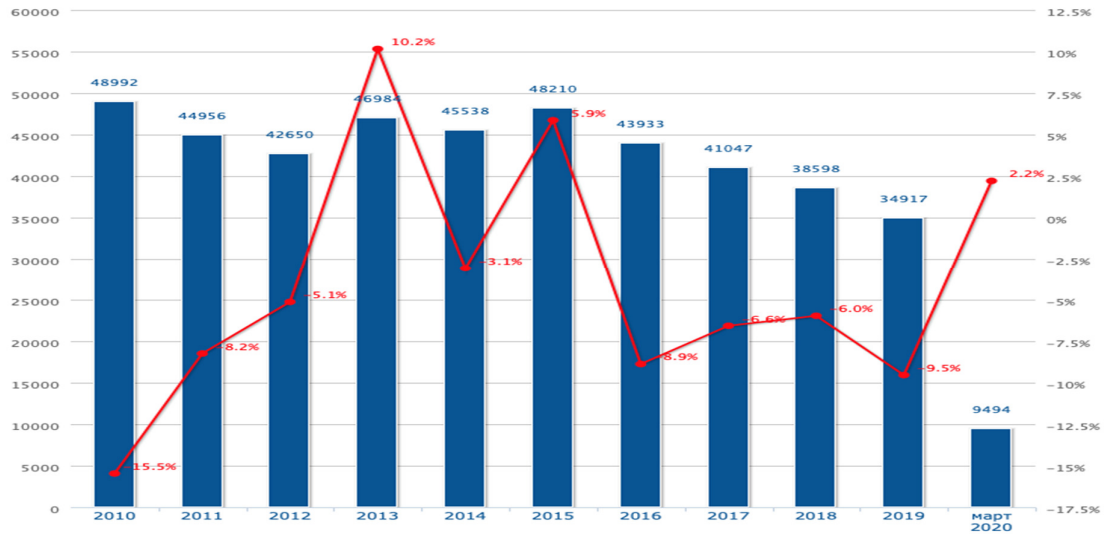

Fig. 1. Number of crimes committed by foreign nationals and stateless persons

The underestimation of the importance of illegal migration when determining migration crime is confirmed by the official data: by a comparison of the number of crimes committed by foreign citizens and stateless persons (Fig. 1) and the number of detected foreign citizens and stateless persons who have committed crimes (Fig.2).

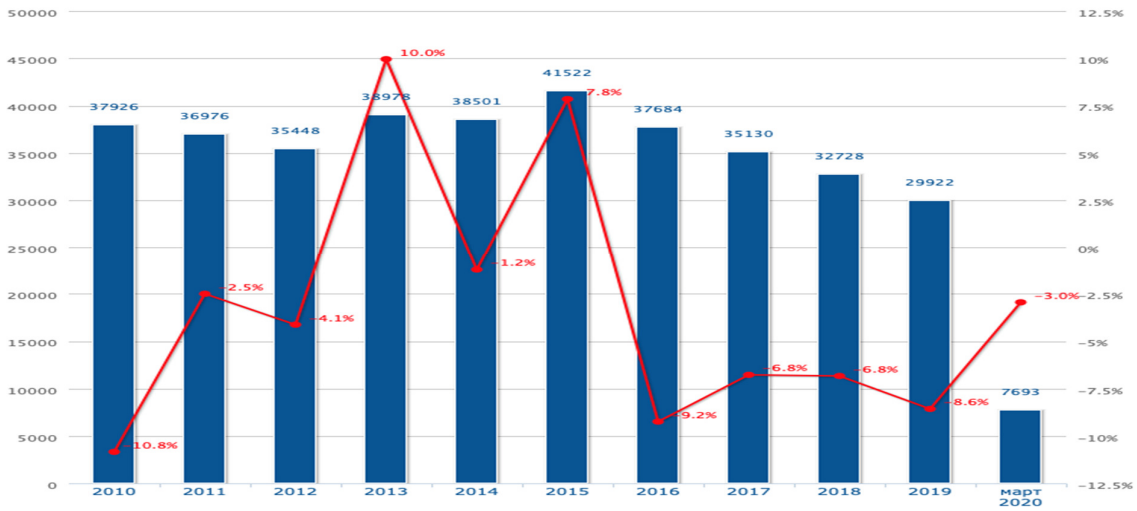

Fig.2. Number of foreign nationals and stateless persons identified as having committed crimes

The comparison of these data groups is almost identical. Meanwhile, hidden from observation, highly latent migration crime, determined by the illegal status of the subjects of crimes or victims, is the most dangerous because of its lack of visibility and scale.

In the meantime, hidden from surveillance highly latent migration crime, determined by the illegal situation of the perpetrators or victims, poses the greatest danger in view of its non-obviousness and dimension.

Among the factors that determine migration crime 18% of respondents mentioned illegal migration. It is the third most popular response, after ineffective migration policy (27%) and corruption in the migration sphere (25%).

Low official indicators of criminal activity of migrants in 2020 (Fig.1 and Fig.2) are explained not only by the unregistered part of migration crime due to the illegal status of foreign citizens (stateless persons), but also by the fact that the burden on law enforcement agencies has increased in the context of the pandemic crisis. They were reoriented to provide restrictive measures to prevent the spread of coronavirus infection and deliberately did not take measures to detect and suppress offenses in order to prevent the potential spread of COVID-19 in detention facilities and special

institutions for foreign citizens who are waiting for a forcible return to their homeland. This trend has been observed by Phillips (2020) in many countries.

Therefore, the official data and skeptic characterizations by Varshaver (2020), in reference to the growth of migration crime, more likely are concerned with the short-term development of this phenomenon. They do not take into consideration the specific features of the pandemic crisis that the economists do, that is: the market conditions have sharply worsened, a pandemic has layered on it, a sharp drop in oil prices, international sanctions and border closures with the suspension of economic activity. The shadow sector of the economy is expected to grow, where the competitive advantage of foreign workers will be lower social demands compared to the indigenous population.

Among the respondents surveyed, 76% are predicting an increase in migration crime after the removal of the restrictive measures to counter coronavirus infection. The main risks of migration crime in the context of the pandemic were identified by respondents as an increase in violent and mercenary crime (31%), ethnic clashes (18%), criminalization of economic relations involving migrants (18%), corruption (17%), and terrorist attacks (10%).

The experts suppose that the reasons for the increase in migration crime are the more difficult situation of migrants compared to the indigenous population: the loss of work without any guarantees, the inability to go home due to the closed borders, the lack of money, housing rent, overcrowded accommodation without the opportunity to isolate increases the risk of COVID-19 infection, difficulty in accessing medical care.

82% of respondents answered in the affirmative when answering the question: "Will the tightening migration policy after the abolition of restrictive measures to counter the spread of coronavirus infection lead to an increase in migration crime?". 62% of respondents attributed the smuggling and exploitation of migrants to the possible risks of increasing restrictions on the migration regime.

An important component of the pandemic crisis is the social anxiety of the population caused by the already observed negative socio-economic consequences caused by the pandemic crisis. In the medium term, it is expected that xenophobia increases as a reaction to the illegal behavior of migrants, and as a result, there will be a crime wave committed against them.

It is no coincidence that in the first recession year of 2013, the number of crimes committed by migrants increased by 10%, with a slight crime wave committed against them. In 2014 there has been a sharp increase in the number of assaults by 30%, where migrants became crime victims (see Fig. 1, 2, 3).

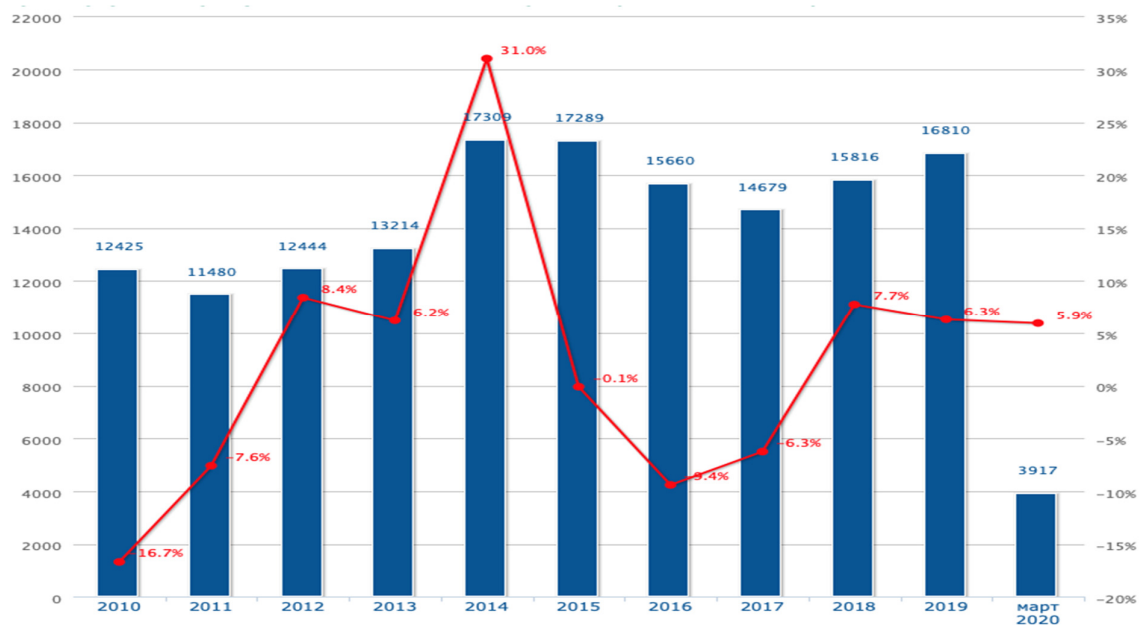

Fig. 3. Registered crimes against foreign citizens and stateless persons

Conclusion

Given the uncertainty of the pandemic crisis, it is difficult to make accurate assessment of the trends in migration crime and its risks. But it is already possible to predict an increase in migration crime with a high degree of probability. Taking into account the specifics of the pandemic crisis in the medium term, it is expected that officially recorded indicators of migration crime will increase in size exceeding the corresponding indicators of the last crisis of 2013-2014: at the beginning there will be a crime wave committed by migrants (over 10% in 2020), then after some time it will be against them (more than 30% in 2021).

The main factor affecting the increase in the risks of migration crime is illegal migration, the scale of which will increase if the migration policy is tightened and additional restrictions are imposed on the migration regime.

The most likely risks contributing to the growth of migration crime will be an increase in inter-ethnic conflicts and general social tension, a growth of the violent and mercenary crimes, a criminalization of economic relations involving migrants and an increased corruption in the migration sphere. The risk of terrorist attacks will remain.

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Insurance Fraud as An International Problem: A Comparative Legal Analysis of Russian and Foreign Legislation

Valery NOVICHKOV
Southwest State University, Kursk, Russia, valery.novichkov@yandex.ru

Andrey BAYBARIN
Southwest State University, Kursk, Russia, andrewbaybarin@gmail.com

Alexander GREBENKOV
Southwest State University, Kursk, Russia, grebenkov@gmail.com

Elena SHATANKOVA
Southwest State University, Kursk, Russia, shatankova.elena@mail.ru

Natalia PETRISHCHEVA
Southwest State University, Kursk, Russia, petrishceva_nc@mail.ru

Abstract

In this article, the authors focus on the disclosure of the concept of fraud in the insurance sector in domestic legal science and abroad. The article highlights the practical aspects of the criminal activities of a fraudulent insurer based on international experience in the insurance industry. The authors consider various forms of such fraud, both by policyholders and by insurers. Analysis of foreign experience in combating insurance fraud allows, on their basis, to formulate recommendations for the regulation of the Russian insurance market in order to counter insurance fraud. The authors cite statistical data from international organizations whose activities are aimed at countering the negative phenomenon under consideration, which allow us to summarize that such an appeal for experience to foreign countries is useful and expedient for Russian society. The authors came to the conclusion that due to the urgency of the problem of criminalizing fraud in the insurance industry, which in Russia is given a less significant place at the legislative level than in foreign countries, an important direction in the activities of the domestic legislator is the appeal to international experience in the fight against insurance fraud. This can provide an excellent basis for improving insurance fraud legislation.

Keywords: Insurance Fraud, Crime, Measures To Combat Insurance Fraud, Insurance, Fraudster, Domestic Legislation, Foreign Experience, Criminal Law.

Introduction

The relevance of the chosen research topic is determined by the conducted research on the state of crime in the economic sphere at the global level. Thus, according to the data obtained by the international network of companies PwC (PricewaterhouseCoopers), the issue of the criminal situation in the field of payments, finance and insurance at the global level remains very relevant and is characterized by further criminalization of economic relations. And, according to Craig (2018), statistical indicators indicate an increase in the number of crimes in the economic sphere.

It is important to note that one of the significant economic indicators is the prevalence of fraud. This negative phenomenon firmly occupies one of the leading places in the system of financial crimes. Their disclosure is directly related to a number of difficulties, which necessitates a high level of legal qualifications.

We will pay more detailed attention in the article to fraud in the insurance industry, due to the fact that today the problem of insurance fraud remains the most urgent and widespread in the insurance industry.

The epidemiological situation with the spread of COVID-19, which led to a crisis in the economy, as a result of which, according to experts, a sharp rise in insurance fraud should be expected, also gives topicality to the study. According to the chairman of the committee for combating insurance fraud of the All-Russian Union of Insurers Sergei Ivanovich

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Efremov, on the basis of the existing Russian practice of the crisis years, it can be concluded that there is a stable growth of fraud by 5-10% in "difficult times for Russia." Metelitsa (2015) cites as an example the period of the crisis of the Russian economy from 1998 to 2008.

A similar point of view is shared by Farhutdinova and Suslyakova (2020), who claim that the pandemic will result in an increase in insurance rates for our state for all policyholders, since they will include additional risks from fraudsters.

Methods

In this study, a specific scientific methodology is applied using such general scientific methods as analysis and synthesis, which allowed the authors to compare and contrast different approaches to the subject of study, as well as to consider its individual elements, which together gives the result of the most effective study of the topic under consideration.

Particular scientific methods were also used: comparative legal and formal legal. They allowed, through their toolkit, to analyze domestic and foreign legislative regulation of such a crime as insurance fraud.

The methodological basis of the research is also made up of the provisions of dialectics, taken in unity with general and particular scientific methods, which made it possible to study the problem under consideration in an indissoluble unity with other legal phenomena.

As sources, the authors used the regulatory legal acts of Russia, as well as of a number of foreign countries, along with the scientific works of such authors as T.A. Filippova, N.V. Bykova, D. Kruger, Kelly E. Riddle and a number of other authors who have authority in this area.

Results and Discussion

The development of insurance fraud is closely related to the development of the insurance itself and the insurance market as a whole, as well as to the spread and differentiation of various types of insurance. These include car insurance, including compulsory motor third party liability insurance (OSAGO), health insurance, life insurance, etc.

In the global industry, most of the crimes in the economic sphere are precisely in insurance fraud. According to Bykova (2009), statistical data indicate the largest percentage of such frauds in this area. In particular, fraud is most prevalent in health insurance, and the largest losses from fraud are in auto insurance. Undoubtedly, for a particular state, these indicators may fluctuate depending on the national characteristics of the development of the insurance market, which have a significant impact on the level of fraud. As a rule, in economically developed countries, financial, insurance and credit crimes are developed no worse, which is confirmed by Avakyan (2011) citing specific practical cases and statistical data from their practice.

For example, American family insurers lose about $ 1000 each year due to fraud, while British ones lose about £ 700. Note also the fact that according to the National Bureau of Insurance Crimes in the United States, insurance fraud is the second most common economic crime in the United States.

In Holland, fraudsters are paid about $ 0.5 billion. According to experts, Canadian society loses about $ 1.5 billion annually from this phenomenon. It is believed by Europol (2020) that about a third of each dollar of premium goes towards insurance claims initiated by fraudsters.

The German state is characterized by losses due to insurance fraud in the amount of almost 10% of the total payments. However, as some experts note, in reality the figures are significantly higher than in official sources. At the same time, in Germany, as well as in other European countries, the predominant direction in fraudulent activities is car insurance. In most cases, according to Nets Group (2019), fraudsters manage to gain about 500 €.

In France, losses caused by illegal acts of insurers are estimated at about $ 3 billion. Some statistical indicators indicate that only the share of solved crimes in terms of fraud is already 10% of the paid insurance compensation. However, despite this, the prevailing opinion by Europol (2020) is that it is France that is the leader in Europe in terms of the effectiveness of organizing the fight against insurance crime.

In general, the European Insurance Committee estimates losses due to this kind of crime in Europe at almost 10 billion €, which is 2% of all insurance premiums in the European Union, and at least 10% of all payments were received by fraudsters, as stated by European Commission (2020).

Considering the situation in the Russian state, we note that just 10-15 years ago, citizens did not suspect about such a “rock of society” as insurance fraud, but now, according to Bykova (2009), it has become so large-scale that it has a negative impact on all participants in the insurance industry without exception. Thus, according to the statistical data of the Federal Insurance Supervision Service, as provided by Bank of Russia (2020), every year Russian citizens-insurers lose up to 15 billion rubles due to illegal acts of both clients and employees of insurance companies.

At the same time, similar to the experience of foreign countries, almost 70% of all cases of insurance fraud are in the field of auto insurance. According to Bank of Russia (2020), each car owner paid on average about 0.5 million rubles for payments to scammers. Some large companies claim that payments to fraudsters account for up to 10% of auto insurance premiums.

According to the Russian Union of Auto Insurers, payments of insurers in court in 2018 increased by 1.5 times. According to the estimates of the Committee of the All-Russian Union of Insurers for Combating Insurance Fraud, the statistics of disclosure balances at a fairly low level - about 10%. In general, the damage from fraud in OSAGO RSA is estimated by TASS (2018) at almost 60 billion rubles annually, a third of which are losses due to illegal actions of intermediaries, almost 20% from fraud by the insurers themselves, 25% from the distribution of fake OSAGO policies and about 20% due to transport management without CTP policy.

Let's move on to consider the very essence of such a phenomenon as insurance fraud. Until recently, when this concept was not introduced by the legislator, the prevailing point of view, as stated by Mitrohin (1995), was that insurance fraud was understood as a form of unlawful behavior of individual subjects of an insurance contract, the purpose of which was illegal and gratuitous recourse of insurance compensation payments through deception, or abuse of confidence, or making a smaller insurance premium, or hiding important information when concluding an insurance contract, as well as refusal of the insurer to pay insurance compensation without legal grounds. Roughly speaking, this interpretation also meant that all types of illegal actions in the field of insurance can be attributed to the objective side of insurance fraud, regardless of their subjects, the presence of a criminal structure, etc.

However, this point of view was later criticized by Zhilkina (2005), referring to the fact that not all of the named legal facts contain elements of the crime of fraud, focusing on the fact that if we integrate into one concept acts both committed against the insurer and those committed by the insurer or a person, posing as his representative, this will lead to unfoundedness both from a legal and economic point of view. In addition, such an association does not emphasize the differences between fraud as criminal offenses from, for example, violations of civil (insurance) legislation.

That is why, up to a certain point, an intermediate position has arisen in the Russian literature, according to which insurance fraud is understood as all fraud related to insurance. That is, in this case, crimes committed by fictitious insurance organizations (branches, representative offices), insurance intermediaries that have no legal rights, etc. are also taken into account by Larichev and Galaguza (1999).

In connection with such an ambiguous legal practice in relation to a unified approach to determining the legal essence of insurance fraud, Sharapova (2018) notes that there is a need to reform the Russian criminal legislation. Undoubtedly, an important step in this direction was the Federal Law of November 29, 2012 No. 207-FZ "On Amendments to the Criminal Code of the Russian Federation and Certain Legislative Acts of the Russian Federation". This novel supplemented the Criminal Law of the Russian Federation with six articles at once, providing for liability for special types of fraud, including in the field of insurance. From now on, a precise definition of the term under study was given at the legislative level. So, fraud in the field of insurance means theft of someone else's property through deception regarding the occurrence of an insured event, or the amount of insurance compensation that is payable in accordance with the law or contract to the policyholder or another person.

Obviously, for a more detailed study of the concept of "insurance fraud", one should refer to the experience of foreign countries, where the indicated criminal act is not as "young" as in Russian society, as a result of which foreign experience has considerable experience in determining its legal essence, qualifications, methods identifying and dealing with it.

So, Kryuger (2018) interprets the concept under study as follows: this is a deliberate crime committed by the insured (beneficiary), the purpose of which is unfair enrichment at the expense of the insurer by deceiving the insurance company, distorting information about the insurance object, as well as taking actions aimed at the occurrence of an insured event or increasing insurance compensation.

If we analyze the above definitions, we can identify the difference between their interpretations: in foreign experience, giving an interpretation of fraudulent actions, only one subject is mentioned - the insured (beneficiary), while in the

Russian interpretation there is an alternative to subjects: from the side of the insured (beneficiary), so and by the insurer. In our opinion, the domestic understanding of insurance fraud is closer to reality, since we cannot completely exclude the possibility of an insurer's dishonest behavior.

Let's move on to the very issue of comparative legal analysis of qualifications in Russian and foreign legislation. Let's start with an examination of the domestic corpus delicti.

So, under the crime under Art. 159.5 of the Criminal Code of the Russian Federation "Fraud in the field of insurance", which is included in section 8 of the Criminal Code of the Russian Federation "Crimes in the field of economy", means all crimes that infringe on property relations and economic rights of citizens, legal entities, municipal and state formations.

According to Sharapova (2018), the objective side of insurance fraud includes a number of characteristics and features, thanks to which we can correctly qualify this act. These include, firstly, the very content of the crime, which consists in the theft of someone else's property (in particular, money), i.e., gratuitous seizure, illegal movement and circulation in their favor or in favor of other persons. In this case, the act can be expressed both in an active form (action - for example, staging a car theft, deliberate communication of information that does not correspond to reality, etc.), and in passive (inaction - for example, failure to provide assistance to the insured person, etc.).

Second, it is worth mentioning the ways in which insurance fraud is committed. Such can be, for example, deception - the communication of deliberately false information or even the omission of true facts. At the same time, deception is a mandatory sign of fraud and can be expressed in various forms, for example, oral, written, etc.

Thirdly, the fact that the subject of the crime violates the norm of the criminal law, speaks of the unlawfulness of his act.

Fourth, the presence of a socially dangerous result (consequences). These include, in most cases, causing property damage to the insurance company, its owners, participants, or other customers, whose money supply goes to illegal payments to fraudsters.

And the last sign of a crime, fraud in the insurance industry is its causal relationship between the act and the socially dangerous consequences that have occurred. In this case, a prerequisite is the real possibility of causing property damage and its occurrence as a result of a criminal act.

We will pay special attention to the subjective characteristics of the composition of insurance fraud. So, as stated by Prometov (2008), most often the subjective side is expressed in the form of direct intent, due to the fact that a person realizes the social danger of his actions (inaction) and foresees the possibility or inevitability of the onset of socially dangerous consequences, and also wants their occurrence. However, in the science of criminal law, it is allowed to commit fraud in the field of insurance with indirect intent with complicity, i.e., the person realizes the social danger of his actions (inaction), foresees the possibility of the onset of criminal consequences, but does not want them to occur, as he is indifferent to them.

In contrast to this point of view, some legal scholars argue that insurance fraud is always committed with direct intent, due to the fact that in order to achieve the desired result, the fraudster in relation to the victim commits many active actions that require intellectual and analytical activity from him. Thus, according to Sharapova (2018), for a successful outcome of the case, a fraudster must develop a certain action plan in order to achieve the desired result. In this case, the fraudster remembers the selfish purpose for which he commits fraud.

It should be borne in mind that often the criminal orientation and social danger of insurance fraud do not seem to the fraudsters to be something significant and illegal. For example, as stated by Kuznecov (2016), a survey was conducted among insurers in Germany and America, according to which about 93% of them do not see anything criminal in getting a little more from the insurance company than they should.

So, we smoothly moved on to consider the experience of criminalization of insurance fraud by foreign countries. First of all, we note that only in a number of foreign countries this type of crime is determined by the usual norms of criminal law, which provides for liability for fraud in general. That is, there is a single, "maternal" norm for fraud in different spheres of human life. Until recently, as we found out, Russia was one of such countries. However, since 2012, according to Filippova (2012), Russia, like most foreign countries (for example, Sweden, Austria, Germany, Bulgaria, Poland, etc.), includes fraudulent actions related to insurance in the criminal legislation as an independent, separate corpus delicti.

For example, Austrian criminal law (§151) includes insurance fraud under offenses against other people's property. The objective part of this act includes a number of alternative acts, such as destroying, damaging or hiding insurance items; as well as causing or attempting to cause harm to oneself or to third parties in order to thereby generate property benefits directly or indirectly related to insurance. The sanction for such an act provides for imprisonment up to six months or a fine.

Dutch Criminal Law (327bis) as the subject of a crime brings a person who, through a “clever trick”, misleads the insurer with regard to data related to the insurance contract, thus forcing him to agree to conditions that are not legal and lawful. The punishment in this case is imprisonment for no more than one year or a fine.

In the Polish Criminal Code (Art. 298), the main object of insurance fraud is the country's economic turnover. And the legislator refers to the objective side only those actions, the purpose of which is the unfair acquisition of insurance compensation due to a premeditated incident that is the basis for obtaining monetary compensation. The sanction of the article provides for punishment in the form of imprisonment for a term of 3 months to 5 years.

In the United States, the problems of criminalizing insurance fraud are given a significant place at the legislative level, due to the fact that insurance is mandatory in many areas of every American's life. Thus, 47 states (representing 94% of the total number of states) qualify this act as a crime, while 37 states qualify insurance fraud as “felony”, which means the most serious of criminal acts.

At the federal level, there is the National Insurance Crime Bureau, which is responsible for detecting and investigating insurance fraud. And in 42 states - there is a specialized Bureau for combating insurance fraud ("insurance fraud bureaus"), which operate under the State Insurance Department. And the anti-fraud units in the states of South Carolina, Nevada and Pennsylvania, according to Bykova (2009), are generally part of the department of General Attorney (that is, they are real "law enforcement" agencies).

In addition, 26 states have separate criminal laws that govern certain types of insurance fraud. Most often this applies to the field of auto insurance, medical, as well as insurance of employees against accidents and a number of other types.

It is important to note that the main US criminal law - the Model Criminal Code - sets out the main points related to the qualification of insurance fraud in several sections. So, in Chapter 2, space is allocated for the interpretation of this type of crime, according to which it is understood as an intentional act committed by any person, which is aimed at depriving third parties of profits. At the same time, fraud is recognized as a deception by an insurance company, reporting false data when concluding an insurance contract, when submitting an application for insurance compensation, etc. As we can see, this definition includes a variety of the objective side of the fraudster. And Chapter 4 of the Model Law already provides for the differentiation of the sanctions applied to the violator. The criterion for choosing a particular punishment, as stated by Riddle (2013), is the nature and severity of the act committed.

Given the law enforcement and legislative features of the American federal state, it is natural that the definitions and sanctions of insurance fraud vary from state to state, due to the fact that they may have their own definition, which will differ from the interpretation of the US Model Law. As, for example, it was with the legislation of the state of Arizona. So Arizona Fraud Statutes of April 29, 1997. In §20-463, it defines that insurance fraud is a felony of rank 6, which indicates a high level of public danger, as a result of which the legislator provides for punishment of up to 10 years in prison, as well as a fine of up to $ 150 thousand.

As we can see from the above analysis, foreign states are characterized by a fairly strict system of sanctions, which provides not only significant amounts of fines, but even deprivation for more than 10 years (Criminal Code of the PRC). Fraud cases are carefully monitored, widely publicized and, for the most part, severely suppressed. This situation is explained by Bykova (2009) by the fact that foreign legislators subject all aspects of insurance to a thorough criminal law and criminal procedure.

In order to “keep up”, Russia, as already noted, to effectively combat insurance fraud, clearly differentiated the criminal sphere of fraud at the legislative level, thereby consolidating the concept of “insurance fraud” in the law, as well as providing specific types of punishment for it. It should be noted that domestic repressive measures are not inferior in severity to foreign sanctions. So, the minimum punishment for this crime is to pay a fine of up to 120 thousand rubles or in the amount of the convict's salary or other income for a period of up to one year, while the maximum provides for imprisonment up to 10 years with a fine of up to 1 million rubles or in the amount of wages or other income for a period of up to 3 years (or without it) or with restriction of freedom for up to 2 years (or without it), which indicates the cumulative nature of the sanction.

We will also pay attention to the issues of regulating the legal framework for the bodies involved in the fight against fraud in the insurance industry. Thus, the activities of the above American bodies (the National Bureau of Insurance Fraud, the specialized Bureau of Insurance Fraud, the State Insurance Department, the anti-fraud units in some states, etc.) are mainly regulated by special state laws. For example, Florida is governed by §1880 Fraud bureau, Utah is §31 Fraud bureau, etc. However, many of these laws are based on the Model Fraud Bureau Act, which is considered the governing law for all states. It defines the competence of the authorities, fixes their legal status, describes the procedure for conducting an investigation and a number of other legal aspects.

The Canadian state is characterized by the activities of a special committee at the Insurance Bureau of Canada (IBC). It performs the function of detecting and disclosing insurance fraud cases, while actively working with the Canadian police to investigate insurance fraud. At the same time, their police even have a special "Anti-Fraud Protocol", which defines the content of insurance fraud, declares the main provisions for its disclosure and prevention. Assistance to the Insurance Bureau of Canada and insurance organizations in the performance of these functions is provided by a variety of separate investigation bureaus that deal only with insurance issues, having a special license for this.

France is also not inferior in the organization of law enforcement measures to combat and counter insurance fraud. Thus, the investigation of such acts is carried out by external organizations, which are mostly composed of police officers. After the investigation procedure, all cases are sent to court. At the same time, the insurance company does not pay insurance compensation in the pre-trial period. An interesting fact is that all insurance companies in France, without exception, keep a special record of persons who have committed crimes in the field of insurance, so as not to “make mistakes” again. In addition, according to Sitnikova (2010), on the basis of these reports, they develop methods for specialists on the occurrence and further regulation of insurance losses due to fraud, as well as on the procedure for checking cases for fraud.

As we have already noted, the problem of combating fraud abroad is one of the most urgent, which is determined both by the scale of development of the insurance itself, and the degree of organization of the fight against this type of crime. At the same time, as stated by Filippova (2012), this negative phenomenon is being fought both in the companies themselves and at the state and global levels.

Thus, the main mechanisms that make up the system of collective security against fraud in this area, in international practice, include the consolidation of efforts of all insurance companies in the fight against fraud, as well as their interaction with law enforcement agencies of the state apparatus; protection of corporate capital from fraud by fraudsters; as well as strict observance of all recommendations and rules of conduct that are provided by the legislator to prevent cases of fraud.

It is important to note that international experience can become the basis for the formation of the foundations for combating fraud in the Russian insurance sector, since the world community, according to statistics and experts' opinions, has very effective mechanisms in its arsenal. For example, the international community has long begun to take measures to combat insurance fraud. An important step in countering this negative phenomenon was the formation in 2006 of the Insurance Fraud Bureau (IFB). This non-profit organization was founded in the insurance industry precisely with the aim of detecting and combating organized fraud.

According to her data for May 2018, international insurance organizations, by joint efforts, focusing on combating fraud, managed to reduce the number of claims related to this crime by the industry by almost a third compared to 2015. And also this kind of consolidation led to a drop in the volume of fraud in Europe to almost £ 1.5 million, according to Association of British Insurers (2020).

In addition, the Bureau of Insurance Fraud, based on data that was sent anonymously via the hotline, she developed a strategy for 2015-2019, which consisted in an in-depth study of fraudulent schemes in all types of insurance, as stated in The Insurance Fraud Bureau (2020).

Let us also note some states that, with the global goal of the global fight against insurance fraud, have reformed their legislative framework to restructure the consciousness of economic entities in the insurance market and increase attention to insurance crimes, as mentioned in Petuhova (2018). For example, in the UK, the following legislative change initiatives have been proposed relatively recently. Firstly, the consolidation at the legislative level of the foundations of the anti-fraud mechanism, including in the field of insurance. Secondly, the use of accounting systems, which was mentioned earlier, with information about former fraudulent clients with a special penalty coefficient. Thirdly, the introduction of an additional term for insurance companies to verify customer information (based on the same accounting systems). Fourth, a limited number of warning messages about fraudulent attempts. Fifth, as stated by Voronin (2017), the establishment of a number of specific grounds for refusals to provide insurance services due to the identification of N-th number of fraud attempts.

In general, the result of the fight against insurance fraud in the UK was reflected in the increased attention of business entities to this problem, which led to an increase in investments in the Insurance Fraud Bureau, which led to an expansion of the controlled and supervised scope of activities, as well as to the restructuring of the target group.

It will also note the fact that holding various scientific and practical conferences, forums and round tables will also be useful for application in Russian practice. For example, 3 years ago, Austria hosted the II international conference on combating fraud, which was attended by representatives of major Russian insurance companies and organizations. At this conference, the methods and measures to combat unscrupulous insurers were discussed, which, undoubtedly, can serve as a support for the development of further long-term policies to combat insurance fraud in the Russian insurers market. Thus, such measures of international exchange of experience will most favorably influence the activities to combat insurance fraud.

Let us emphasize that as the Russian insurance market develops into the practice of domestic companies, it is advisable to gradually introduce some of the methods of combating fraud used abroad. Not all of them can be automatically adapted to Russian soil, regardless of national characteristics. For example, the publicity of fraud, which is typical for a number of European countries, i.e., the disclosure of disclosed facts of fraud and punishment of criminals) in Russia will have, according to Sitnikova (2010), two types of consequences.

On the one hand, a positive effect, since the educational effect will work (i.e., citizens see that a crime is solved, and criminals are punished). However, on the other hand, in Russia, such information may, on the contrary, serve as a prerequisite for some persons to commit an illegal act, since they, knowing little about insurance, thus learn from information channels about such opportunities for illegal enrichment at the expense of insurers or insurance companies. As a result, when using this toolkit (if necessary), it is important to be careful about its use by means of partial "dosage" of information, without a detailed description of the model of the crime, focusing on the exposure and application of sanctions to the offender.

Conclusion

Summing up the comparative legal analysis of fraud in the field of insurance on the example of Russia and a number of foreign countries, we came to the conclusion that this problem remains one of the most urgent and widespread for the world community today. Foreign interpretation of the term insurance fraud is in many ways similar to the Russian concept enshrined in the Criminal Law. The only significant difference is the person performing the objective side. In our opinion, as noted, Russian terminology is more accurate and consistent with reality.

Let us emphasize that over the past decade, Russia has made great strides in regulating the institution of insurance fraud. Most recently, the Russians did not know anything about such a problem, and now the legislator has singled out an independent article 159.5 of the Criminal Code of the Russian Federation, which fixes the structure of this crime, reveals its content and features.

Based on the study, we also found out that the system of sanctions providing for liability for “insurance fraud” is almost equally strict both in foreign countries and in the domestic criminal system. However, in some countries, for example, the USA and Canada, the problems of criminalizing insurance fraud are still given a more significant place at the legislative level than in Russia.

In addition, as we have already noted, the problem of combating fraud abroad is one of the most urgent, which is determined both by the scale of development of the insurance itself and the degree of organization of the fight against this type of crime. In this area, international experience can serve as a foundation for improving legislation on insurance fraud.

Summarizing the above, without a doubt, it can be argued that the Russian legislator has already taken the first step towards effectively combating the studied negative phenomenon - he has formed at the federal level a unified approach to the concept of insurance fraud by introducing it into the Criminal Law, differentiating at the same time the sanctions for committing these crimes. The next important step, in our opinion, should be the introduction of international experience of the collective security system in insurance. This can be expressed in the form of the consolidation of efforts of all insurance companies in the fight against fraud, the creation of associations of various insurance companies with the support of the central bank, the legislative empowerment of security officers of insurance companies with special powers, the creation of special bodies to investigate and conduct operational-search measures in cases of insurance fraud, etc.

Thus, the use of international experience in the fight against insurance fraud can become really effective and useful in Russian practice, therefore, the domestic legislator must necessarily turn to the world community for valuable experience in combating fraudsters in insurance and other sectors of the financial market

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Criminological Characteristic of a Modern Cyber Offender in the Russian Federation

Andrey BAYBARIN
Southwest State University, Kursk, Russia, andrewbaybarin@gmail.com

Alexander GREBENKOV
Southwest State University, Kursk, Russia, grebenkov@gmail.com

Vladimir TARYKIN
Southwest State University, Kursk, Russia, email: tarykin.vladimir@yandex.ru

Gennady PLOHIH
Southwest State University, Kursk, Russia, email: sader100zent@mail.ru

Anton BAUMSTEIN
Southwest State University, Kursk, Russia, 5068896@list.ru

Abstract

The article is devoted to the study of the quantitative and qualitative characteristics of computer crime in the Russian Federation, which, together with a detailed analysis of the criminological parameters of a cybercriminal's personality, made it possible to substantiate the main trends that have formed over the past 5 years in this area. Particular attention is focused on the analysis of statistical indicators presented by the Judicial Department at the Supreme Court of the Russian Federation for the period 2015-2019, which made it possible to draw up a typical criminological portrait of the personality of a Russian computer criminal.

Keywords: computer crime, cybercrime, criminological characterization, information and communication technologies, typology, computer offender.

Introduction

The widespread use of information systems in various areas of the life of society, along with the intensive improvement of the means and methods of using information and telecommunications technologies for illegal purposes, creates new threats to the security of Russia. This complicates not only the structure of computer crime, but also increases the professional skills of those who encroach on information technologies.

Confirmation of this trend in the field of computer crime are the indicators reflected in the statistical compendium of the Prosecutor General's Office of the Russian Federation, which indicate that in January-December 2019: law enforcement agencies of the Russian Federation registered 294,409 crimes committed using information and telecommunications technologies or in the field of computer information. A study of the dynamics of this type of crime allows us to state its twenty-sixtieth growth over the past seven years (in 2013, 11 thousand cybercrimes were recorded).

In addition, possessing a high level of latency, computer crime is of particular interest in the context of the study of its structure and dynamics, and in particular the personality of a cybercrime with specific knowledge in the field of computer technology. At the same time, the establishment of criminal law, socio-demographic, moral and psychological signs, as well as his «professional skills» becomes important when conducting a structural analysis of the identity of a computer offender.

Methods

General and special scientific methods, traditional for theoretical and applied legal research, were used, such as formal-legal, system-structural, content analysis of various publications, comparative legal method.

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Results and Discussion

Crime, existing in virtual space or using the achievements and opportunities of information and communication technologies, is a new, poorly studied negative cyber-social phenomenon for Russian society. Thus, in the context of the dichotomy of digital renewal of the criminal legal sphere, a new type of crime has formed - computer crime, which should be understood as a set of crimes that encroach on information and communication infrastructure.

Computer crime as a hyperlatent and super-changing social and negative phenomenon leads to the emergence of new categories of criminals, the identification of whose personal characteristics contributes to actively countering crimes committed using information and communication technologies. In this regard, modern studies of Russian and foreign scientists are devoted to the analysis and classification of computer criminals on various grounds (for example, on social status, sex age, motives, etc.), while focusing on the typology of persons who commit crimes in the field of computer information.

In the most simplified form, the typology of computer criminals is given by A.E. Pobegailo (2018), who identifies only three types of the corresponding category of persons:

1) persons who are characterized by a combination of professionalism in the field of computer technology and programming with elements of a kind of fanaticism and ingenuity ("ideological" criminals);

2) persons who suffer from various mental illnesses that make communication difficult in the real world and force them to focus on a virtual world in which it is easier to communicate and assert themselves;

3) professional computer criminals.

The typology presented by the author is generalizing in nature, as it reflects the most extensive groups of computer criminals.

Of particular interest within the stated topic of graduation qualification work is the typology of professional computer criminals.

Thus, E.T. Khaliullina (2018), senior researcher at the Research Institute of the University of the Prosecutor's Office of the Russian Federation, identifies the following types of professional computer criminals:

- Hackers who have a high level of computer technology knowledge and spend a lot of time at the computer in search of computer system vulnerabilities;

- hacktivist. This term is used to refer to the new phenomenon of social protest, which is a kind of synthesis of social activity, aimed at protesting against something, and hacking;

- cybercriminals. Unlike hackers themselves, such persons gain access to data in ways that are not directly related to the hacking of protection systems, but through deception, abuse of trust or official authority;

- persons engaged in industrial espionage;

- cyberterrorists - persons who use the Internet as a tool for real harm.

In turn, T. M. Lopatina (2007) believes that "the development of computer technologies contributes to new trends in the development of the computer underground. There is a peculiar evolution of hackers, more dangerous varieties of them appear:

- information brokers - order the theft of information to professional hackers, and then resell it to commercial competitors or other interested persons;

- metahackers - parasitize the activities of professional hackers, tracking their work and remaining unnoticed, and then use the results for their own purposes;

- darksiders - reject the principles of classical hacking, putting commercial profit and enrichment at the head of their activities ".

Professor A.L. Osipenko (2004), depending on the available programming skills and the means used in committing a criminal attack, identifies the following groups of hackers:

- «script kiddies» - a large group of novice hackers, consisting of people who are poorly versed in the basics of programming and use ready-made software to carry out attacks, often not even understanding the principles of their action;

- The main group of hackers, consisting of persons with good programming skills, capable of creating their own hacking software, better understanding the fundamentals of the functioning of computing systems attacked, and including a number of subgroups: «crackers» - entities specializing in destroying the security of networks or computer systems in order to illegally use their resources; "phreakers"

- Persons entering telephone networks and other secure telecommunication systems;

- «coders» - individuals who hack software and distribute stolen material free of charge through specialized sites;

- hackers of the «old guard» (oldguard hackers) - persons with high professional training in the absence of direct criminal intentions. Such persons with some superiority relate to the requirements of the law, believing that they are allowed almost everything in the networks [6].

If A.L. Osipenko considers «crackers» as a subgroup of hackers, then M.E. Flenov (2012) distinguishes between "hackers" and "crackers" as creators and destroyers, and believes that the «crackers» include:

- «virus descriptors - persons who use their knowledge to develop a destructive program;

- vandals - persons seeking to destroy the system, delete all files or disrupt the server;

- computer/server hackers - persons who commit "burglary" for the purpose of profit, often fulfilling someone's orders to obtain information.

- program hackers - individuals who remove protection from the software and provide it for universal use. Such people cause damage to software firms and the state.

At the same time, as I.P. Rodivilin (2017) notes, «the circle of persons who commit crimes in the field of computer information is not limited only to" hackers, "in connection with which the term" information thieves "should be applied to these persons, since their goal is to steal an important resource in the modern world – information». Such an interpretation makes it possible to refer to computer criminals any person who, due to either certain or independent circumstances, influences information. Therefore, the introduction of the term in question seems inappropriate.

Let us turn to the position of foreign scientists considering typologies of computer criminals. So, for example, the Canadian psychologist M.K. Rogers (2002), identified groups of computer criminals depending on the level of their technical readiness: beginners, cyber punks, their own - employees of victim organizations, encoders, hackers of the old guard, professional criminals, cyberterrorists. The typology presented fully correlates with the position of the foreign legislator regarding the regulation of liability for criminal attacks committed using information and communication technologies.

The constant improvement of information and communication technologies has a direct impact on the transformation of not only computer crime, but also the personality of a cybercrime in modern Russia. The corresponding changes are reflected in the criminological characteristic of the computer offender, which, along with existing typologies, allows you to form a holistic idea of persons who commit crimes in the field of computer information.

Criminologically significant information about the identity of a computer offender in Russia was obtained as a result of a study of statistical indicators published on the official website of the Judicial Department at the Supreme Court of the Russian Federation, for 2015-2019.

Consider the socio-demographic signs of a cybercrime - gender, age, citizenship, place of residence, level of education, social status.

Among computer criminals, men predominate, accounting for 92.4 per cent of the total number of convicts in the period under review (847 out of 917). Accordingly, the proportion of female convicts is 7.6% (70 of 917), of which 5.7% (4 of 70) committed a criminal assault while pregnant, and 2.9% (2 of 70) had children under the age of 3.

According to the above data, the proportion of persons between the ages of 18 and 24 is 34.4 per cent of the total number of convicted persons; from 25 to 29 years old - 26.8%, from 30 to 49 years old - 34.2%, from 50 years and older - 3.1%.

When considering the age limits of convicted computer criminals, close attention should be paid to the criminal activities of minors. For this purpose, reference is made to the statistical data reflected in the report of the Judicial Department of the Supreme Court of the Russian Federation on convicted persons who have committed crimes under the age of minor.

The number of minors convicted of crimes in the field of computer information for 2015-2019. is 14 people (1.5% of the total number of convicts under c.28 of the Criminal Code of the Russian Federation). At the same time, in 2017, the maximum number of convicted persons aged 14 to 17 years is 6 people, of which 2 are sentenced to imprisonment for a term of one to two years, 1 is from three to five years.

The availability of data on convicted minors in statistical indicators indicates that, as stated by Rudik and Toporov (2016), «at the age of 14, a person has sufficient skills and technical capabilities to carry out illegal activities, as well as that computer crimes committed by minors are a new feature of modern crime, which requires new forms and methods of counteracting». One solution to this negative situation is to lower the age of criminal responsibility for certain types of computer crimes. In this regard, attention should be drawn to article 12 of the Criminal Code of the Republic of Belarus, which provides for a lower age limit for criminal liability for theft through the use of computer equipment of 14 years.

Continuing the analysis of the socio-demographic features of a cybercrime, we turn to the question of the citizenship of convicted persons: for example, more than 98% of all persons convicted of crimes under chapter 28 of the Criminal Code of the Russian Federation are citizens of the Russian Federation; about 1.7% are citizens of the CIS states; 0.3% - citizens of other states. At the same time, the proportion of stateless persons in relation to the total number of convicts is zero.

About 93.5 per cent of convicts are permanent residents of the area, i.e. they have permanent residence; 6.5% are residents of a different area. The proportion of homeless persons and refugees and internally displaced persons is zero.

As noted earlier, the basic criterion for identifying various typologies of computer criminals is the level of their technical and organizational skills in working with information and communication technologies, which directly or indirectly depends on the level of education of such persons. therefore, such a criterion is of paramount importance in compiling a criminological portrait of a modern criminal.

Most computer criminals had higher education - 35.3% of the total number of convicts; secondary vocational education - 31.5 per cent; secondary general education - 25.8 per cent; basic general, primary or no education - 7.3%.

After analyzing the socio-demographic characteristics of convicts, we draw up an intermediate criminological portrait of a modern Russian cybercrime: this is a man aged 18 to 49 years, a citizen of the Russian Federation who has a permanent place of residence, as well as higher or secondary vocational education, who is socially able-bodied person without a permanent source of income or a worker.

Consider the criminal evidence of a computer offender - the place where the crime was committed, the presence/absence of complicity, unsubstantiated or outstanding convictions at the time of trial, etc.

About 61.8 per cent of persons committed a computer crime in the administrative centres of the constituent entities of the Russian Federation, 4.8 per cent in rural areas, respectively, 33.4 per cent in another territory within the Russian Federation.

In complicity in the group, 98 convicts committed criminal attacks in the field of computer information, which is 10.7% of their total number, of which 31.6% were members of an organized group.

Conclusion

Having analyzed the criminal legal characteristics of the convicts, we highlight the following features of the computer offender: in the past, he had no criminal record and was not prosecuted; prefers to commit criminal acts alone in the administrative centers of the constituent entities of the Russian Federation.

In addition to the analysis of the socio-demographic and criminal-legal characteristics of the cybercrime, we highlight the main trends that have developed over the past 5 years in the area under consideration.

Firstly, in 2019 there was a decrease in the number of convicted persons according to the composition of criminal attacks provided for in chapter 28 of the Criminal Code of the Russian Federation, by about 30% (in 2015 - 235, in 2019 - 165). The resulting trend is mainly due to the sign of the virtuality of computer crime, since, providing anonymity and physical distance from the immediate victim, virtual space acts as a significant advantage and at the same time a powerful determinant of the commission of criminal assault, and, as a result, the level of latency of the group of crimes in question increases significantly. At the same time, the lack of tactical and methodological recommendations for the investigation and disclosure of criminal attacks in the field of computer information significantly complicates the collection of information relevant to the criminal case.

Secondly, there is a qualitative change in the composition of convicts: the proportion of women prosecuted for computer crimes increased by 10%, respectively, the proportion of male convicts decreased by a similar indicator.

Thirdly, if previously computer criminals were characterized by the presence of secondary vocational education (in 2015 - 37.4%, in 2019 - 29.1%), now higher education is considered as a priority level of education (in 2015 - 29.8%, in 2019 - 37.6%). At approximately the same level, the proportion of convicted cybercriminals with secondary general education remains.

Fourthly, the proportion of criminal attacks committed in the group has increased - over the past 5 years, this figure has increased from 6.0% to 21.2%, of which in an organized group - decreased from 50% to 40%.

Considering the data obtained, it can be concluded that the typical criminological portrait of the personality of a Russian computer offender is currently as follows: this is a man aged 18 to 49 years, a citizen of the Russian Federation who has a permanent residence, as well as a higher or secondary vocational education, who is socially able-bodied person without a permanent source of income or a worker. In the past, he had no criminal record and was not prosecuted. He prefers to commit criminal acts alone in the administrative centers of the constituent entities of the Russian Federation.

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Prerequisites of Russia-China Bilateral Counterterrorism Cooperation

Irina V. MINAKOVA
Southwest State University, Kursk, Russia, irene19752000@mail.ru

Tatyana N. BUKREEVA
Southwest State University, Kursk, Russia, tnbinchina@yandex.ru

Anastasia V. POPOVA
Moscow City University, Moscow, Russia, anystap@gmail.com

Dmitry N. NECHAEV
Voronezh Branch of RUE named after G.V. Plekhanov, Voronezh, Russia
nechaevpolitia@rambler.ru

Abstract

Russia and China face the problem of international terrorism and ethnic separatism; various manifestations of violence cover different regions in both countries, but geographically are tied to the main centers of instability: the North Caucasus region in Russia and Xinjiang in China. Both countries have considerable experience of counterterrorism cooperation at the global and regional levels. However, bilateral cooperation is becoming one of the main conditions for an effective fight against terrorism. Analysing the features of the North Caucasus region and Xinjiang, the authors study the main prerequisites for the relevance of Russia-China interaction on countering international terrorism, distinguishing such factors as a common border between two countries, foreign trade relations, geopolitical position of the states, analogous problems in terms of countering international terrorist organizations and Islamic extremist groups, as well as experience in countering political terrorism and separatism. Thus, the development of national counterterrorism policy requires a multifactorial analysis and multi-directional state control over key factors and their dynamics, and the bilateral Russia-China counterterrorism cooperation must rely on geographical proximity and common interests, serving a stable platform for further interaction in fighting terrorism at the regional level.

Keywords: Terrorism, Separatism, Counterterrorism, Bilateral Cooperation, Russia, China.

Introduction

International terrorism as a destructive phenomenon is spread on all continents and in all regions of the world. In Russia, the majority of terrorist attacks took place in the 1990s and the first half of the 2000s, China for the first time faced this problem in the early 2010s. The North Caucasus in Russia and the Xinjiang Uyghur Autonomous Region of China, the regions with intertwined cultures, customs, and confessions, are the places most affecting by terrorism and separatism in both countries. The acts of manifestations of international terrorism have general patterns and features caused by many factors. The additional motives of terrorist threat in these regions are their geopolitical and geo-economic position and the intention of some actors in the world economy and politics to use the factor of instability caused by relevant activities for achieving their interests. In this regard, it is of interest to study the prerequisites that determine the relevance of bilateral counterterrorism cooperation between Russia and China.

Research Material and Methods

The purpose of the study is to analyse the prerequisites of bilateral Russia-China cooperation in terms of countering terrorism.

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The research works of the following Chinese and Russian scholars cover the issues of Russia-China security cooperation: E Lizhi (2016), Jin Huixin (2011), and Vasiliev L.V. (2014). The features of the terrorism in the North Caucasus are studied in the papers of Shitova N.A. and Chihichin V.V. (2014), Yaroshenko G.V. (2016), Baranov A.V. (2017), and Ivanov S.M. (2019). Scientific works of Buyarov D.V. (2015), Clarke, M. (2018), and Wang Zhengxun (2014) are devoted to socio-economic and ethnopolitical prerequisites for the manifestation of international terrorism in China.
During the research process, there were used the following research methods for studying complex social objects: analysis, synthesis, comparison, analogy.

Research Results

Today terrorism has assumed the global character and become one of the major global threats to the national security of most countries. The internationalization of terrorism, an extensive network of international terrorist organizations, and the mobility of terrorist forces require from the world community a collective approach and regular interaction in countering terrorism. International cooperation has already become one of the effective forms of interaction between states in responding to terrorism.

The main prerequisites for the relevance of Russia-China interaction on countering international terrorism are

- bordering countries and foreign trade relations
- geopolitical position of the states
- similar problems in terms of countering international terrorist organizations and Islamic extremist groups
- experience in countering political terrorism and separatism.

In China, Xinjiang and Tibet are the main hotbeds of instability, where ethnic separatism embraced terrorist tactics have got widespread.

In Russia, the North Caucasus is a region with complicated political, social and economic situation. Counter-terrorism and homeland security are the main directions of national policy in this region. Terrorist attacks have been committed in the North Caucasus for over 25 years (Baranov, 2017). It should be noted that the Russian legal system focuses attention only on two macro-regions; it emphasizes their special position, the North Caucasus and the Far East. Moreover, the North Caucasian region of Russia is marked by a significant number of violent incidents caused by terrorist organizations, most of which have international roots.

The same situation happens in Xinjiang. According to the Chinese authorities, today there are several separatist groups in Xinjiang associated with the global Islamic terrorist network actively helping to fuel conflicts in China. It is known that many Uyghur are fighting in Syria on the side of terrorist groups (Minakova, Bukreeva, Golovin, and Bykovskaya, 2019).

In the North Caucasus, terrorism has strong connection with the geopolitical and geo-economic position of the region. The territory of the region has become an area of interests (national, economic, etc.) of such actors in world politics and economy as the United States, Turkey, China, and Iran. The North Caucasus is also included in the Virtual Caliphate (a quasi-state supposed to be created by certain terrorist movements). According to a popular, widespread 'the Three Seas Initiative', the South Caucasus (closely connected with the North Caucasian region of Russia) is a part of a wider region, which stretches forth the Mediterranean Sea inclusively (moreover, this increases the importance of the geopolitical and geo-economic position of the South Caucasus) (Ivanov, 2019).

In China, the Uyghur problem escalated after the collapse of the Soviet Union, when the Central Asian republics gained independence, it arouse the envy of the Uyghur minority population in Xinjiang: newly formed countries with a kindred Turkic culture turned out to be right next door to them. In those years, Afghanistan and Central Asia were tormented by Islamic extremists, and the Chinese Muslim population also conceived the idea of an armed religious struggle. The utopian dream of creating an independent state (East Turkestan or Uyghuristan) began to gain particular popularity due to the fact that economic development of Xinjiang was far behind Eastern China. The radical Islamists, as in Afghanistan, ideologically cultivated the illiterate population (Shanin, 2020).

The actors in world politics can confront each other using different means, even involving terrorist and separatist organizations. This moment is facilitated by the geographical location of the regions, some of which are border areas; it makes the state borders of China and Russia 'relatively transparent'.

In addition, the process of countering manifestations of international terrorism in the North Caucasus and Xinjiang is complicated by significant imbalances in the socio-economic development of the regions.

Yaroshenko (2016) identifies the main economic reasons conducive to the spread of terrorist ideology among different groups of the population, they are social and economic crises, decline in production, unemployment, deterioration of economic prospects for a significant part of the population.

According to Rosstat data (2018), personal consumption expenditures per capita in many territorial entities of the North Caucasian Federal District is significantly lower than the all-Russian value (Russia – 26,780 rubles, Ingushetia – 9360 rubles, Karachay-Cherkess Republic – 11,121 rubles). Undoubtedly, the revealed imbalances are not final and require additional research, which is carried out by some scientists. Shitova and Chihichin (2014) note the significant intraregional differences in the socio-economic development of the territorial entities of the North Caucasian Federal District (the situation will be different in urban and rural areas, in cities and towns, in suburban and peripheral villages).
A similar situation is observed in Xinjiang (see fig. 1). According to the rank, Xinjiang with an average personal consumption expenditure of 7,591 RMB is in 23rd place, the autonomous region is not only behind the developed eastern provinces of China (Zhejiang – 15,029 RMB, Guangdong – 13,113 RMB, Jiansu – 12,215 RMB, Fujian – 12,038 RMB, etc.), but also behind other autonomous regions (Inner Mongolia – 8,798 RMB, and Ningxia – 7,857 RMB).

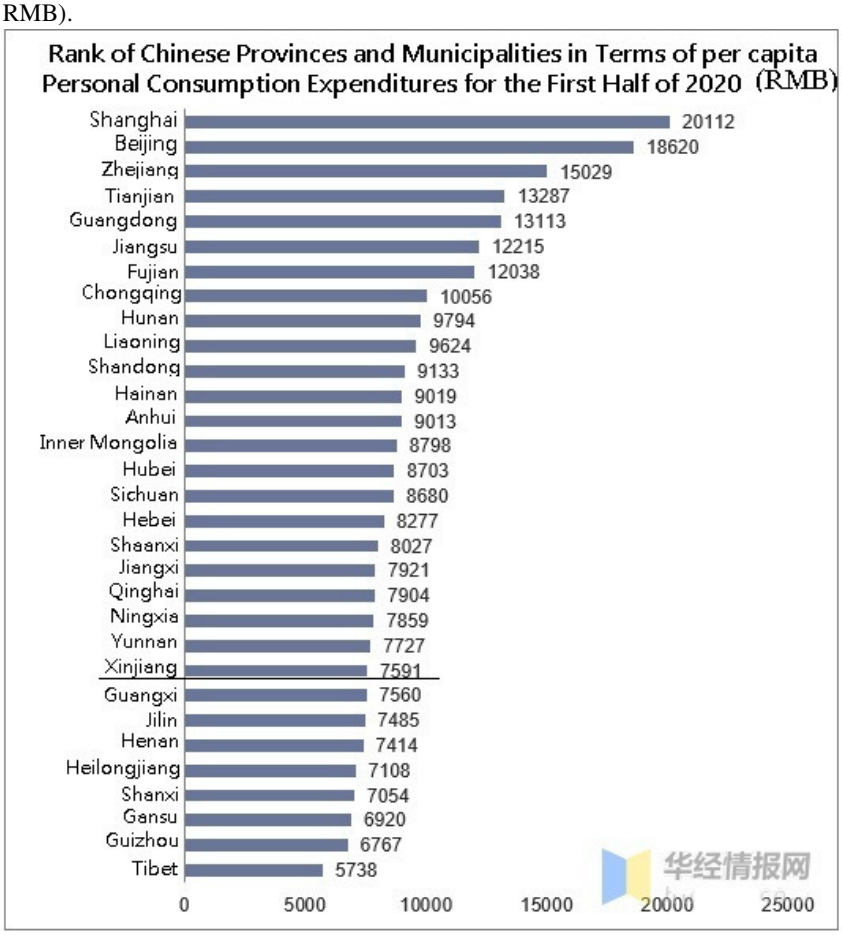

Fig. 1: Rank of Chinese provinces and municipalities in terms of per capita personal consumption expenditures for the first half of 2020, RMB (Chen, 2020)

Both regions, the North Caucasus in Russia and Xinjiang in China, are developing regions, where multiconfessional and multiethnic component often leads to political and armed conflicts, used by international terrorist organizations for achieving their goals (directly or indirectly giving them a religious, political or ethnic overtones, and often camouflaging high priority economic goals).

As a result, the memories about settled conflicts are often passed down through several generations, and some conflicts become simmering or hidden. Ultimately, in case of relaxation of the political, economic and military influence of the central government in the region, terrorist and separatist movements intend to use these historical controversial situations.

Similar problems and prerequisites for manifestations of terrorism in Russia and China make international cooperation a necessary condition to ensure the national security of the countries. The priority area of bilateral cooperation between China and Russia is to conduct regular military exercises, which serve as a demonstration of a well-functioning mechanism of joint interaction and advanced level of professional performance in responding to terrorist threats. Counterterrorism exercises are held within the framework of the SCO events with the participation of all member countries of the organization, and separately between the armed forces of Russia and China.

The first large-scale international counterterrorism exercises 'Coopertion-2003' were held in August 2003 within the SCO in the territory of Kazakhstan and China (Xinjiang Uyghur Autonomous Region) with the participation of 5 member states of the organization, including China and Russia.

Since 2005, the bilateral Russian-Chinese military exercises 'Peace Mission' have been held annually. In 2012, Russia and China began to conduct the Maritime Interaction maneuvers. For the years of the existence of this naval interaction, bilateral exercises were staged in the Seas of Japan and Okhotsk (Russia) and in waters of the Yellow Sea, the East and South China Seas (China). In 2015, for the first time the naval exercises were conducted in 2 stages: the first stage took place in the Mediterranean Sea, the second one – in Primorye (Russia). In September 2019, the forces of the eight SCO member states conducted military exercise 'Center-2019'. This multilateral exercise demonstrated the readiness of Russia and the Central Asian states to protect national interests. Strengthening the military interaction became an important component of the objectives of the exercises (Bukreeva, 2020). The international counterterrorism exercises of the SCO member states 'Peace Mission-2020', originally scheduled for August 2020, have been postponed to 2021 due to the global spread of the coronavirus.

Conclusion

The spread of international terrorism and separatism in the North Caucasus (Russia) and Xinjiang (China) is determined by both general prerequisites (similar or suitable for certain regions of the world) and regional features, including a large number of particular factors. The development of counterterrorism policy, strategy or plan requires a multifactorial analysis and multi-directional state control over key factors and their dynamics. Developing bilateral counterterrorism cooperation, Russia and China must rely on such factors as geographical proximity and common interests, serving a stable platform for further interaction in fighting terrorism at the regional level.

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Video Microteaching as an Innovation in Pre-Service Teacher Training

Silvia BARNOVA
DTI University, Dubnica nad Vahom, Slovakia, barnova@dti.sk

Slavka KRASNA
DTI University, Dubnica nad Vahom, Slovakia, krasna@dti.sk

Gabriela GABRHELOVA
DTI University, Dubnica nad Vahom, Slovakia, gabrhelova@dti.sk

Dasa PORUBCANOVA
DTI University, Dubnica nad Vahom, Slovakia, porubcanova@dti.sk

Abstract

Recently, a lot of attention has been paid to the necessity to increase the quality of pre-gradual teacher training programmes at universities in Slovakia and to adapt their content to the current needs and requirements of students, the society and the labour market. DTI University in Dubnica nad Váhom, Slovakia, has implemented a new project focusing on the application of video microteaching as an innovation in teacher trainees' compulsory teaching practice, which can be realized both in the classroom and online. The purpose of the proposed paper is to draw attention to the benefits of video microteaching from the point of view of increasing the quality of teacher training and from the aspect of the organization of teaching practice which is getting more and more difficult. In the paper, the authors briefly introduce the above project under realization and point out the innovation in the content, as well as in the functional and conceptual focus of teacher trainees' compulsory teaching practice. Based on recently gained experiences and available research in this field, it can be stated that video microteaching appears to be a suitable, effective and attractive alternative to traditional classroom based observations and provides opportunities for recording and analysing lessons conducted by teacher trainees as well. Microteaching is also interesting from the aspect of the current pandemic, which highlighted the necessity to promote university education in the virtual environment.

Keywords: Video Microteaching, Teacher Trainees, Teaching Practice, Innovation.

Introduction

As it is generally accepted, in the context of education, teachers, their competencies (Gabrhelová, 2018), personality traits (Bilčík and Krištofiaková, 2019), and their preparedness for performing their job have an important role to play. Teacher training is focused on preparing future teachers (in our case vocational school teachers) for dealing with demanding tasks and requirements placed on them in the modern society and the needs of the labour market. Well-prepared teachers are able to respond to the needs of students and become important factors in the process of their students' personality development, throughout which their individuality, diversity, special needs, disabilities, but also talents must be taken into account.

Unfortunately, current experiences show that large groups of teacher trainees are unlikely to work as teachers in the future (Čepelová, 2019), which can represent a serious issue for the educational system. It is a clear signal that some measures must be taken and the attractiveness of the teaching profession must be increased. One of the possible pathways leading to increasing the teacher trainees' interest in becoming a vocational school teacher is providing them with positive teaching practice experiences, which have the potential to become a source of motivation for educating youth in schools. It is undeniable that positive experiences during pre-gradual studies increase teacher candidates' willingness to teach in the future despite the mental demands of this profession and teachers' low financial remuneration.

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The current situation in the field of ensuring pre-service teachers' compulsory teaching practice in Slovakia

In the context of teacher trainees' compulsory teaching practice, two trends can be observed. One is related to the focus of teaching practice and the other one to the conditions of its realization.

Recently, it has come to certain changes as for the content and focus of teacher trainees' teaching practice in Slovakia. While in the past, it was focused on practicing certain pedagogical tasks (Spilková, 2003; Hlásna et al., 2005); recently, self-reflection, as well as creating a link between theory and practice are more accentuated (Geršicová, 2008; Geršicová and Tóthová, 2008; Geršicová and Adamík-Šimegová, 2012; Bizová et al., 2016). It can be considered a positive shift but, unfortunately, some barriers to the realization of teacher trainees' teaching practice in vocational schools have occurred both on the side of schools and on the side of teacher trainees.

Some universities providing teacher training have signed contracts with schools where teacher trainees can carry out their teaching practice but it must be pointed out that finding a school open to cooperation is more and more difficult. Although these schools welcome teacher trainees, their teachers are not able to devote them as much time as expected because of several reasons:

- There is a lack of well-qualified and experienced teachers willing to take part in the realization of teacher trainees' teaching practice.
- Teachers are not sufficiently financially motivated as, in their contract, the maximum amount of working hours is specified.
- Teachers' busy timetables and other duties do not allow them to spend enough time with teacher trainees.
- The management of teacher trainees' teaching practice is demanding.
- There is a lack of a clear guidance regarding the realization of teacher trainees' teaching practice in schools.

There is still a large group of teacher trainees who want to or must find a school where they can undergo their compulsory teaching practice by themselves. In many cases, it shows to be a demanding task and teacher trainees must deal with several problems, including teachers' unwillingness to work with teacher trainees, locality of available schools, problems with distance and costs (commuting), time, and their inability to synchronize their other duties with the realization of teaching practice.

The issues of teaching practice have been dealt with by a number of experts in Slovakia (e.g. Spilková, 2003; Geršicová and Gubricová, 2014; Danek, 2019) in two contexts: the teaching practice of teacher trainees and of practicing teachers. The theoretical and application level of teacher trainees' teaching practice has currently been dealt with by e.g. Matúšová, Prusáková, and Slaboňová (2018), who focused on vocational didactic modules in teaching practice, while Sirotová (2018) paid attention to student portfolios and their role during a university student's – a future teacher's – teaching practice. Lobotková (2018) described teaching practice as a motivation factor for teachers-to-be; and also other authors – e.g. Sirotová and Michvocíková (2019); Michvocíková (2019); Severini, Kostrub, and Yuzyk (2019); Danek (2019) – dealt with the issues of teacher trainees' teaching practice. In their work, Kancír and Madziková (2018) focused on teaching practice from the point of view of the development of practicing teachers' key competencies and introducing innovative trends in field didactics; and Szíjjártóová and Kramáreková (2019) consider it a tool for increasing the quality of teachers' education. From the aspect of the presented topic, an important finding is that virtual platforms are not much used in the context of teacher trainees' teaching practice in Slovakia (Geršicová and Gubricová, 2014).

Microteaching

Microteaching is a teaching method applied in teacher training, a part of which is formed by video records of teaching (lessons and teaching units) with the aim to gain a constructive feedback from another student, a mentor, a teacher, or a group of students about things that worked well and opportunities for improvement in the field of didactic skills. Microteaching as such is nothing new, in the mid-60s, this didactic method was introduced by D. W. Allen at Stanford University and, subsequently, it found its application in all forms of teacher training. Watching a video record of teaching and getting feedback from practicing teachers and students, provides a teacher (or teacher trainees during their teaching practice) with a good picture of the lesson and enables carrying out a detailed analysis of intentionally selected lessons, teaching units, their sequences, but also vocational school students' vocational training and so, to optimize teacher trainees' experiences with the realization of the educational process (Barnová and Krásna, 2019c). Moreover, the results of a survey on microteaching (Hattie's survey within the Visible Learning project) – showed that microteaching ranked 6th among the most effective didactic methods contributing to the improvement of students' skills (Waack, n.d.).

Video microteaching in teacher trainees' teaching practice

With introducing video microteaching into teacher training, innovation stands on two pillars – using media and transformation (changing from student to teacher).

Application of digital technologies in modern schools is a must nowadays (Barnová and Krásna, 2018a,b,c; Barnová and Krásna, 2019a,b,c; Krásna and Barnová, 2018a,b; Krásna and Barnová, 2019, Rybičková and Hasajová, 2007) and, undoubtedly, videos help create a link between university courses focusing on the didactic and methodical aspects of vocational school and practical training teachers' pre-gradual training (Pasternáková and Lajčin, 2012) with the everyday practice in vocational schools. The basic requirement when creating videos with the aim to innovate the concept of university courses, is focusing on the didactic and methodic aspects and ensuring compliance with the national curriculum policy, as well as the everyday educational practice in vocational schools.

In the process of transformation of a student into a teacher, video records of teaching units with experienced teachers of vocational subjects and with experienced teachers of practical training, as well as records of their own teaching practice can serve as a motivation factor and also provide students with opportunities for self-reflection and self-evaluation.

The advantages of introducing video microteaching as one of the alternative forms of teacher trainees' teaching practice are as follows:

- Video records can help university students understand how they can create a link between the theoretical knowledge gained during their studies and the reality of educational practice in schools.
- In vocational schools where teaching practice is carried out, practicing teachers are given the opportunity to build professional relationships with their future colleagues.
- Teachers taking part in teacher trainees' teaching practice are "forced" to keep pace with up-to-date knowledge from field didactics.
- Teachers get useful feedback from external students currently employed as teachers of practical training in other schools, which they can use for their own development and they are also provided with an opportunity to exchange experiences.

From the aspect of increasing the quality of teaching practice, implementation of microteaching brings several benefits. If compared to traditional classroom observations, video records or their selected sequences can be viewed and analysed several times by several individuals from various places and at any time. When microteaching is used, special attention can be paid to every detail, every step, word, and the procedures applied by the teacher in the context of achieving the teaching unit's goals. The essence of microteaching lies in discussing the procedures, methods, and the organization of teaching. Video records of lessons conducted by teacher trainees and their detailed analysis form an important part of their teaching practice, too, as they enable them to reveal their weaknesses, to evaluate the efficiency of the selected procedures, to suggest suitable methods, and, also space for role plays is created. Another proof of the efficiency of microteaching is that in the process of analysis, student assessment, pedagogical diagnostics, the teacher's non-verbal communication, the changing atmosphere during the lesson, etc. can be focused on.

Project on introducing video microteaching as a part of teacher training programme

In accordance with its mission, the aim of DTI University in Dubnica nad Váhom, Slovakia – being a private educational institution – is to permanently increase the quality of services provided to its students, to implement modern, effective and innovative forms and methods of education, and to make its study programmes more accessible to everyone. Therefore, the University's intention is to provide its students with alternatives in the form of distance learning opportunities. In this context, DTI University has decided to realize a project focusing on the implementation of video microteaching into teacher trainees' compulsory teaching practice. The project is focused on the innovation of classroom observations by students in the Bachelor's and Master's study programmes in the field of Teaching vocational subjects and practical training by means of the application of video records, (self)reflection and portfolios. It is targeted on the development of DTI University students' professional, practical and application skills, which are needed in the process analysing videos recorded in the classroom – especially during vocational subject lessons, but also during practical training in vocational schools. The outputs of the project can be used as a source of help for mentors during teaching practice and the creators of the University's concept of teaching practice, where classroom observations form a part of teaching practice.

At the stage of project preparation, an analysis of university students' needs and their experiences with classroom observations during their teaching practice was realized. The findings were compared with the findings of the analysis carried out at the Faculty Education of Trnava University (Bizová, Geršicová et al., 2015), where also video records

of lessons were applied. The results show that using video records for the purposes of classroom observations can be considered a suitable, innovative, attractive, rational, and effective solution for teacher trainees, including DTI University students.

Based on the results of the analysis of classroom observations within students' teaching practice, the following objectives of the project were formulated:

- To work out a concept of basic thematic units for university courses, which require reflection on teaching situations in order to create a link between theoretical knowledge and the educational practice;
- To create the content of the set of lessons, teaching units, and educational situations corresponding with the educational goals, explain how it can be used for the development of students' critical thinking, (self)reflection, and make video records in collaboration with selected vocational schools.
- To process the video records for the purposes of instructional courses and make them available online.
- To design methodical materials with video records of lessons, teaching units, and educational situations for instructional courses and to make them available online.
- To work out a portfolio containing the results of future teachers' and practicing teachers' (self)reflection activities as one of the possible approaches to the innovation of students' teaching practice.

Creating a series and a database of video records representing typical teaching situations modelling problem aspects of teaching can significantly help in the organization and realization of teacher trainees' teaching practice and increase the quality of their reflective ability for analysing lessons and pedagogical situations. By means of video records, university students' analytic and divergent thinking processes can be developed. They can analyse the basic methods, forms and principles of teaching, the content of the lesson, problem situations and suggest possible solutions. Video records also contribute to the development of students' (self)reflective thinking (Schön, 1987) and, by means of them, a link between theoretical knowledge and the educational reality is created.

The outputs of the project under realization will contain the following:

- a set of lessons, teaching units, and educational situations representing the educational goals and developing students' (self)reflective thinking,
- video records of lessons, teaching units, and educational situations in collaboration with vocational school teachers,
- video records processed for the purposes of instructional courses,
- methodical materials for basic instructional courses,
- framework of criteria for self-evaluation as a means of quality of education.

Video records have the potential to increase interactivity in pre-gradual teacher training, as well as its accessibility due to the flexibility and effectiveness of their application and the fact that they enable highly personalized, individualized and own-paced learning based on the needs of every student.

Video microteaching in the context of school closures

One of the mail goals of DTI University is to make education provided at this institution more flexible, individualized, personalized, accessible and affordable to its current and potential students. Implementation of video microteaching helps the University achieve this goal as recorded lessons or pedagogical situation can be well analysed online, where there are no restrictions as for teacher trainees' location or time.

The benefits of microteaching for both students and universities could be clearly observed when it came to massive school closures during the COVID-19 pandemics in spring 2020, when teacher trainees neither had opportunities to observe lessons nor to teach in classrooms. In that situation, video records and their analysis represented the only way of completing the compulsory course of teaching practice. The results of this unexpected and unintended experiment showed that under specific circumstances, video microteaching has the potential to replace teaching practice in schools to a certain extent.

Conclusion

Video microteaching – despite its undeniable benefits – is not frequently used for the purposes of teacher training in Slovakia. DTI University in Dubnica nad Váhom – as a reaction to the changing needs and requirements of teacher trainees, schools, the Slovak educational system and the whole society – has made the decision to realize a project within which video microteaching is applied for the purposes of teacher trainees' teaching practice. Taking into account the current trends in education and the rapid development of digital technologies, introduction of innovations

is a must. It not only increases the quality of pre-gradual teacher training but highly individualized and personalized forms of learning increase the teacher trainees' motivation to continuously develop their skills and to opt for the teaching profession in the future. It must be also noted that sufficiently developed didactic competencies during teacher trainees' teaching practice can be a source of teacher trainees confidence in the direct educational practice. For the above reasons, it can be assumed that the project under realization has the potential to broaden knowledge in the presented field and provides an opportunity for the implementation of its outputs into pre-gradual teacher training programmes.

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Coping Strategies in Business from The Viewpoint of Education and Gender

Tatiana PETHO
Faculty of Management, Prešov University in Prešov, Konštantinova 16, 080 01, Prešov, Slovakia,
tatiana.petho@unipo.sk

Róbert ŠTEFKO
Faculty of Management, Prešov University in Prešov, Konštantinova 16, 080 01, Prešov, Slovakia,
robert.stefko@unipo.sk

Jaroslava GBUROVÁ
Faculty of Management, Prešov University in Prešov, Konštantinova 16, 080 01, Prešov, Slovakia,
jaroslava.gburova@unipo.sk

Abstract

The aim of the research study is to compare traders in the level of coping strategies from the viewpoint of type of education (humanistic and economic university education) and age of traders (traders younger than 40,99 years and traders older than 41 years). Research sample consisted of 143 participants aged from 18 to 65 years (average age was 35.235 with standard deviation of 2.432). Czech version of the German Stress coping style questionnaire SVF 78 (Janke, Erdmann 2003, Janke & Erdmann, 2002) was used for measuring coping strategies. T- test for two independent samples did not find statistically significant differences between traders with humanistic university education and traders with economic university education. The comparison of means of differences found statistically significant differences in the level of substitutional satisfaction (p=0.025). Statistically significant differences were found in the level of guilt rejection in the context of age.

Keywords: coping, coping strategies, business, trader

Introduction

The research study deals with the issue of coping strategies from the viewpoint of education and age of traders. Coping is defined as „constantly changing cognitive and behavioral effort to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person“ (Lazarus, Folkman 1984 p .141)

Coping and coping strategies

Coping is defined by Křivohlavý (1994) as an effort to minimize, tolerate, manage or reduce unusually hign, buredsome or strenuous requirements of the internal or external environment, as well as various conflicts between the given requirements. Lazarus and Folkman (1984) and Compas et al. (2001) definitions of coping highlight the role of coping as a process of responding to stress. Further, both definitions emphasize coping as a controlled, effortful process; that is, responses that require conscious, purposeful, and intentional thoughts and behaviors (Compas et al., 2017). Lazarus distinguished between two general types of coping. The first, termed problem-focused coping, is defined as problem solving or doing something to alter the source of the stress. The second, termed emotion-focused coping, is aimed at reducing or managing the emotional distress that is associated with the situation. These responses are different from each other, and they may have very different implications for a person's success in coping (Carver, Weintraub, Scheier, 1989).

Bartuňková (2010) divides coping techniques into active and passive. Active coping techniques include sublimation, aggression, compensation, identification and behavioral attention. Passive techniques include

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reggresion, denial, isolation, escape to solitude, secpae to illness or daliy dreaming. The choice of individual coping strategies depends on several factors, and as Scheier and Carver (1985) point out, positive coping strategies can have consequences for how traders cope with work stress that is a part of their daily functioning (Lazarus, Kanner, Folkman, 1980; Reker, Wong, 1985). Theoretical postulates provide us with a basis for the formulation of hypotheses and subsequently for interpretation of research findings.

Research Methodology

The main goal of the research study is to compare traders in the level of coping strategies from the viewpoint of type of education (humanistic and economic university education) and age of traders (traders younger than 40,99 years and traders older than 41 years).

We assume the existence of statistically significant differences between traders with humanistic university education and traders with economic university education in the level of coping strategies.

We assume the existence of statistically significant differences between traders younger than 40,99 years and traders older than 41 years in the level of coping strategies.

We assume the existence of statistically significant differences between employees with humanistic university education and economic university education in the level of coping strategies in the context age.

Research Sample

Research sample consisted of 143 participants aged from 18 to 65 years (average age was 35.235 with standard deviation of 2.432). Research sample consisted of traders younger than 40,99 years (75 participants) and traders older than 40,99 years (68 participants). The proportionality of genders was uneven- the sample contained 86 women and 57 men. The research sample consisted of traders with humanistic university education (47 respondents) and traders with economic university education (53 respondents). 43 respondents disposed with technical and science university education employees with secondary education (84 participants) and employees with university education (56 participants). The research instrument administered in print form to traders working in private sector in Prešov and Košice County during March 2019. Employees completed questionnaire during work break. It took approximately 20 minutes to complete the questionnaire.

Research Methods

Czech version of the German Stress coping style questionnaire SVF 78 (Janke, Erdmann 2003) used for measuring coping strategies. Stress coping style questionnaire contains 78 statements about dealing with stress and using coping strategies. The respondent evaluates each item using a 5-points Likert scale, ranging from “Not at all” to “Very likely”. The 78 items are divided into 13 subscales, each represent a particular way of reacting to a stressful event: Underestimation, Guilt rejection, Tilt, Substitutional satisfaction, Control of situation, Control of reaction, Positive self-instruction, Need for social support, Active avoidance, Flight tendency, Rumination, Resignation, Self-blaming. Internal reliabilities for the 13 subscales range from $\alpha = 0.77 - 0.94$

Research Results

The comparison of differences in the level of coping styles in the context of type of education and age of traders were assessed by using statistical method t-test for two independent samples and processed in statistical program IBM SPSS 20.00 Statistics. Table 1 shows comparison of means in the level of coping styles in the context of type of education.

Table 1: Comparison of statistically significant differences in the level of coping style of traders in the context of type of education

	Type of university education	n	Mean	Standard deviation	t	Degree of freedom	p
Self-blaming	Humanistic	47	3.184	0.751	-1.162	98	0.248
	Economic	53	3.010	0.751			
Resignation	Humanistic	47	3.445	0.685	-0.849	98	0.398
	Economic	53	3.330	0.686			
Rumination	Humanistic	47	2.801	0.892	-1.297	98	0.198
	Economic	53	2.585	0.777			
Active avoidance	Humanistic	47	2.266	0.788	-1.140	98	0.257
	Economic	53	2.100	0.689			
Flight tendency	Humanistic	47	2.978	0.765	-1.103	98	0.273
	Economic	53	2.811	0.751			
Social support	Humanistic	47	2.457	0.799	-1.267	98	0.208
	Economic	53	2.270	0.676			
Positive self-instrument	Humanistic	47	2.294	0.744	-1.365	98	0.175
	Economic	53	2.107	0.628			
Control of reaction	Humanistic	47	2.344	0.681	-1.160	98	0.249
	Economic	53	2.201	0.547			
Control of situation	Humanistic	47	2.230	0.620	-1.063	98	0.291
	Economic	53	2.103	0.572			
Substitutional satisfaction	Humanistic	47	3.040	0.837	-1.840	98	0.069
	Economic	53	2.729	0.840			
Tilt	Humanistic	47	2.678	0.741	-1.391	83.888	0.168
	Economic	53	2.491	0.547			
Guilt rejection	Humanistic	47	2.865	0.730	-0.418	98	0.67
	Economic	53	2.808	0.635			
Underestimation	Humanistic	47	3.011	0.655	-2.578	98	0.11
	Economic	53	2.638	0.774			

Source: (own proceeding)

The comparison of means is not statistically significant. T- test for two independent samples did not find statistically significant differences between traders with humanistic university education and traders with economic university education. Table 2 shows comparison of means in the level of coping styles in the context of age of traders.

Table 2: Comparison of statistically significant differences in the level of coping style of traders in the context of type of age

	Age	n	Mean	Standard deviation	t	Degree of freedom	p
Self-blaming	Under 40.99	75	3.033	0.841	-1.287	141	0.200
	More than 41	68	3.203	0.729			
Resignation	Under 40.99	75	3.330	0.707	-0.735	141	0.464
	More than 41	68	3.417	0.721			
Rumination	Under 40.99	75	2.680	0.905	-0.195	141	0.845
	More than 41	68	2.708	0.820			
Active avoidance	Under 40.99	75	2.246	0.727	0.710	141	0.479
	More than 41	68	2.159	0.743			

Flight tendency	Under 40.99	75	2.944	0.794	-0.226	141	0.822
	More than 41	68	2.973	0.711			
Social support	Under 40.99	75	2.400	0.798	-0.545	141	0.587
	More than 41	68	2.471	0.744			
Positive self-instrument	Under 40.99	75	2.187	0.676	-0.109	141	0.913
	More than 41	68	2.198	0.617			
Control of reaction	Under 40.99	75	2.278	0.542	0.407	141	0.684
	More than 41	68	2.237	0.631			
Control of situation	Under 40.99	75	2.284	0.653	1.311	141	0.192
	More than 41	68	2.142	0.642			
Substitutional satisfaction	Under 40.99	75	2.773	0.868	-2.262	141	0.025
	More than 41	68	3.100	0.859			
Tilt	Under 40.99	75	2.562	0.634	-0.426	141	0.671
	More than 41	68	2.611	0.646			
Guilt rejection	Under 40.99	75	2.947	0.627	2.530	141	0.013
	More than 41	68	2.674	0.662			
Underestimation	Under 40.99	75	2.691	0.791	-1.574	141	0.118
	More than 41	68	2.880	0.623			

Source: (own proceeding)

The comparison of means of differences is statistically significant in two cases. Statistically significant were found in the level of substitutional satisfaction (p=0.025). Traders older than 41 years dispose with higher level of substitutional satisfaction than traders younger than 40.99 years. Statistically significant differences were found in the level of guilt rejection in the context of age. Traders younger than 40.99 years dispose with higher level of guilt rejection than traders older than 41 years. T- test for two independent samples did not find statistically significant differences in other coping strategies.

Discussion and Conclusion

Research found statistically significant differences in the level of substitutional satisfaction. Traders older than 41 years dispose with higher level of substitutional satisfaction than traders younger than 40.99 years. Previous research by Aldwin (1991) showed that older adults are less likely to perceive stressful episodes as controllable, they should also be less likely to use instrumental action and more likely to use palliative or avoidant coping strategies. Substitutional satisfaction is considered as avoidant coping strategy and our findings that older traders dispose with higher level of subsitutional satisfaction are consisted with previous research by Aldwin (1991). Frankovský and Ištvániková (2008) poit out the fact that managers and traders get into problematic situations on a daily basis and in solving they need to mobilize all their forces, sometimes with less success in managing them and there are also cases where they fail in these situations and in this case, they choose negative ways of coping.

Statistically significant differences were found in the level of guilt rejection in the context of age. Traders younger than 40.99 years dispose with higher level of guilt rejection than traders older than 41 years. T- test for two independent samples did not find statistically significant differences in other coping strategies. For example, the Vaillant (1977) study mentioned earlier found that middle-aged men in the Grant study used fewer neurotic and immature defense mechanisms and more mature strategies, in contrast with their youthful selves (Aldwin, 1991). Our findings are in line with previous research by Vaillant (1977), because guilt rejection is consider as a less mature coping strategy.

Limitation of research study is occasional selection of participants and the research sample is not representative. The research results can be considered as the preliminary findings. Coping strategies are a prerequisite for coping with work- related stress placed on traders in their work. The research confirmed statistically significant differences in the level of two coping strategies in the context of age.

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Neuromarketing And Product Policy from The Perspective of the Slovak Consumer

Tatiana Tatiana PETHÖ
Prešov University, Faculty of Management, 16 Konštantínova Street, 080 01 Prešov, Slovakia,
E-mail: tatiana.petho@unipo.sk

Róbert ŠTEFKO
Prešov University, Faculty of Management, 16 Konštantínova Street, 080 01 Prešov, Slovakia, e-mail: robert.stefko@unipo.sk

Jaroslava GBUROVÁ
Prešov University, Faculty of Management, 16 Konštantínova Street, 080 01 Prešov, Slovakia, e-mail: jarkagburova@gmail.com

Abstract

Not only functionality and price, but also the overall design (material and method of packaging) affect the customer and his experience with the product as a whole. The application of the principles of neuromarketing can provide an excellent insight about the final design of products and its emotional effects on the customer. The motive for buying products may also be that the product evokes a certain idea of consumer prestige, is associated with a certain symbol with which the consumer wants to identify. The result of neuromarketing is effective marketing communication, set according to real brain reactions and optimization of the product itself as a whole. If we buy a product, we are interested as a whole - brand, material, packaging, price, location, promotion. The product as a whole evokes emotions in us. The aim of the paper is a theoretical summary of product policy and neuromarketing, as well as identifying differences in the perception of quality and selected forms of promotion, which significantly affect the shopping behavior of Slovak consumers.

Keywords: Product Policy, Neuromarketing, Consumer, Business Behavior.

Introduction

Marketing is an important tool for achieving business goals. It takes place in market economy conditions, where market demand and supply meet. Many companies, large and small, began to realize the need and importance of marketing and therefore decided to adapt their business philosophy to marketing, respectively. gradually change your corporate philosophy to marketing. It is characteristic of the current rapid pace of market development that companies are waging a competitive struggle in which they are fighting for customers. There are currently a number of definitions, wordings and versions of the term marketing. One common feature for all these definitions is the customer and the satisfaction of his needs (Rajan, 2005).

Neuromarketing is a combination of neuroscience, psychology, and economics, involving the practical application of neuroscientific knowledge and techniques (often derived from consumer neuroscience) to obtain company-specific marketing information (Hubert and Kenning, 2008; Camerer and Yoon, 2015; Shaw and Bagozzi, 2017; Nuñez-Gomez et al., 2020), and to measure the impact of commercial communication (Madan, 2010; Mañas-Viniegra et al., 2020). Neuromarketing helps researchers to overcome the limitations encountered in studying decision-making processes when consumers respond to brands. It also helps us to understand the processes that inform perceptions of advertising (Baron et al., 2017).

Literature Review

Blythe and Zimmerman (2005) define a product as an offer of a company that satisfies the needs of customers. Customers look for benefits when buying and are willing to say goodbye to valuable things, including money and their time, in exchange for gaining these satisfaction. This includes the basic product and benefits, the value that the customer actually buys, and product attributes that include the brand name, design, country of origin, price and packaging as well as support services such as delivery, installation and warranty.

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The product is evaluated from two sides, from the point of view of the buyer, where it is such a performance or object that is able to satisfy one wish or one need. The other side is the manufacturer and what it can offer on the market. These are usually services, goods or solvable problems (Štefko et al., 2012; Nastišin, 2018). The product in its unaltered form cannot be successfully offered on the market indefinitely. The reason is the constantly changing marketing environment of each company (changes in customer requirements, changing possibilities of the company, the arrival of new competitors, the emergence of new technologies, etc.). Take timely measures in the area of product policy (eg. the need to improve existing products, withdraw products from sale, development of new products, etc.), but also in the area of other tools of the marketing mix allows the company to monitor the product life cycle (Srpová et al., 2010 ; Wijonarko et al., 2019).

According to Machkovej (2015) the mark can take various forms and can be represented graphically, verbally or spatially. A mark is a complex symbol that can be expressed by different symbols at different levels of meaning. The brand identifies the manufacturer of the products and brings a number of benefits not only to the consumer but also to the owner of the brand. The value created for the customer is enhanced by the style and design of the product. Design is an important marketing element and represents a broader concept than style. The style is more related to the appearance of the product and the design has a much deeper core, which relates to the very basic function of the product. The design of the product helps to the functionality, usability and operation of the product, as well as its appearance. It can give the manufacturer a strong competitive advantage in the target market and is considered a good marketing tool for building a brand, as it helps consumers to distinguish often similar products. Only a very small number of managers can distinguish between design and value (Kotler et al., 2007).

The packaging is an important part of the implementation phase of the marketing algorithm and should reflect the ideas of the manufacturer and is a visual and physical proof of the product. The significance of packaging lies in the fact that it transmits a message about its own product, brand, in which category it is included, addresses a typical customer or promotes the benefits of the product (content). The public and consumers should be made aware of the product, its uses and benefits. Businesses are aware of the power of good packaging in creating instant knowledge of the brand and business to consumers. High-quality and correctly innovated packaging brings a competitive advantage. On the other hand, improperly designed packaging reduces the company's sales and worries consumers. For this reason, it follows that poor communication through packaging leads to bankruptcy (Šalgovičová, 2001).

Through neuromarketing research, we can obtain information on two areas: polarity and activation. Emotional polarity indicates both positive and negative fluctuations from zero, ie the extent to which the respondent likes the shot or not. The activation curve indicates the ability of the stimulus to arouse a stronger, less variable emotion, ie interest in the product. Thus, the research agency thus obtains information on the extent to which the spot can influence purchasing decisions. The course of neuro curves must be examined and compared with the results of in-depth interviews and focus mainly on those areas where different data are measured (Tahal et al., 2017).

Neuromarketing is a combination of Neuroscience, Psychology and Economics (Madan, 2010). Despite being an emerging field that appeared in 2002, it has rapidly gained credibility in recent years (Morin, 2011). Neuromarketing has expanded its scope beyond measuring the effectiveness of brand advertising campaigns and the psychology of consumer behaviour (Lee et al., 2007; Plassmann et al., 2012). Hence, some authors consider that the most appropriate term is Neurocommunication (Cuesta-Cambra et al., 2017; Manas-Viniegra, Nunez-Gomez, Tur-Vines, 2020).

The main advantage of neuromarketing is the ability to test the impact of communication on an individual's emotions. Unlike other methods, depending on the extent to which and what respondents are willing to reveal about themselves, neuromarketing measures the actual survival of a given activity by individuals at the moment of contact with the stimulus tested. As already mentioned, neuromarketing is used in combination with interview, and it is with this traditional method of market research that it is most effective. This is also because it can elucidate many reasons for behavior (Tahal et al., 2017). Among the announced disadvantages of neuromarketing is the fact that it is inappropriate and problematic to apply in the preparatory phase of research, where the emotional response is much lower. Neuromarketing research is very expensive. This is due to the technological equipment needed for this research, but also to the prices of the services of neuromarketing agencies. According to Bennett (2011), it is first necessary to determine the price of neuromarketing research in order for a firm to consider whether such research is worthwhile. The costs are usually very high and therefore only large companies can afford this research. It is important to compare what results we get from this research and what we can get from alternative forms of research. The biggest negative of the use of neuromarketing is the weak regulation in the field of ethics. The magnetic resonance method allows you to monitor the activity of the whole brain without the possibility of privacy. A lie detector is easier to deceive than modern imaging devices. This means that one has no right to any privacy, one cannot hide any thoughts. Of course, research is always attended by volunteers who are fully aware of the risk associated with the experiment (Fronková, 2016).

Methods and Methodology

The aim of the research was to identify differences in the perception of quality and selected forms of promotion, which significantly affect the shopping behavior of Slovak consumers. The object of the research was consumers living in the region of eastern Slovakia. The selection of the survey sample was carried out by random selection in the form of a questionnaire. The obtained primary data were subsequently processed in the statistical program Statistica.

To determine the goal of the research, we set the following hypotheses:

H_1: We assume that there are statistically significant differences in the perception of satisfaction with the quality of purchased products in the Slovak Republic depending on the gender of the surveyed respondents.

H_2: We assume that there are statistically significant differences in the impact of selected forms of product promotion on consumer shopping behavior depending on the gender of the surveyed respondents.

Survey Results

The research sample consisted of a total of 166 respondents. Based on the processed results, we can state that the largest share in the research has respondents aged 18 to 30 years, 77 (46.39%), followed by respondents aged 41 to 50 years in the number of 35 (21.08%), from 31 to 40 years with the number of 29 (17.47%) and from 51 years and above 25 (15.06%).

As far as completed education is concerned, of the respondents, most respondents have completed tertiary education I. level 58 with a share of 34.94%, secondary education with a high school diploma of 52 and a share of 31.33%, higher education II. and III. degree 30 with a share of 18.07%, secondary school without a GCSE 22 with a share of 13.25% and basic education 4 with a share of 2.41%. The research involved 89 interviewed women and 77 interviewed men. Women formed a larger group with a share of 53.61% and men 46.39%.

In the questionnaire, we asked the respondents how they search and buy products on the market. Respondents could choose from 4 closed answers or from the opportunity to express their own opinion. Out of 166 respondents, up to 97 (58.43%) respondents search for and buy products of this company in the retail chain, 39 (23.5%) in retail, over the Internet 20 (12.05%), from the known 10 (6.02%) and none of the respondents used the other option.

Price is one of the psychological factors that influences the shopping behavior and shopping decisions of consumers, so the next question we wanted to find out whether the respondents prefer quality over price. Respondents chose from a five-point Likert scale, from the option definitely yes - 5, rather yes - 4, I don't know - 3, rather no - 2 and definitely no - 1. Within the above question, up to 63 (37.95%) respondents marked the answer earlier not. This means that when buying products, respondents watch their prices rather than quality. Of the 166 respondents, 47 (28.32%) respondents, on the other hand, prefer quality over price. Answers were definitely not marked by 24 (14.46%) respondents, definitely by yes 18 (10.84%) and I do not know the answer by 14 (8.43%) respondents.

The aim of our research hypothesis H_1 was to determine whether there are statistically significant differences in the perception of satisfaction with the quality of purchased products in the Slovak Republic depending on the gender of the surveyed respondents. The results are processed in the tables below.

Table 1: Contingency table - gender of respondents versus quality of services

			Are you satisfied with the quality of the products provided?					Total
Likert scale			5	4	3	2	1	
Gender of respondents	Man 1	n	25	37	9	5	1	77
		%	15,06 %	22,29 %	5,42 %	3,01 %	0,6 %	46,39 %
	Woman 2	n	18	50	13	8	0	89
		%	10,84 %	30,12 %	7,83 %	4,82 %	0 %	53,61 %

Total	n	43	87	22	13	1	166
	%	25,90 %	52,41 %	13,25 %	7,83 %	0,6 %	100 %

Source: Own elaboration

Based on the results processed in Table 1, the answers of the respondents (men and women) to the question related to satisfaction with the two services provided are given. Respondents had the opportunity to choose from a five-point Likert scale, from the options definitely yes - 5, rather yes - 4, I do not know - 3, rather no - 2 and definitely no - 1. Number of important groups of women number 89 and men 77. Possibility to decide yes chose 25 men and 18 women, rather yes 37 men and 50 women, I do not know 9 men and 13 women, rather not 5 men and 8 women and the last option definitely marked only 1 man.

Table 2 : Chi-square test - gender of respondents versus quality of services

Likert scale			**5**	**4**	**3**	**2**	**1**	**Total**
Gender of respondents	**Man**		19,94578	40,35542	10,20482	6,03012	0,463855	77
	Woman		23,05422	46,64458	11,79518	6,96988	0,536145	89
Total			43,00000	87,00000	22,00000	13,00000	1,000000	166

Source: Own elaboration

Table 3: Summary table: Expected numbers

Pearson's chi-quadrant	4,65852
Sv	4
P	0, 324163

Source: Own elaboration

The value of the probability captured by Table 3 is p = 0.324163. The level of significance at which we verified the hypothesis, t. j. α = 0.05 is less than the probability value, so the relationship found is not statistically significant. We reject Hypothesis 1 and we can state that there are no statistically significant differences in the perception of satisfaction with the quality of purchased products in the Slovak Republic depending on the gender of the surveyed respondents.

The main task of marketing and marketing communication is to know the customer, reveal his needs and wishes, communicate with him and important for the company itself is feedback. The aim of the company is to offer its consumers the greatest possible value. With a suitable marketing strategy, the company builds its competitive position in the market. An organization that currently wants to succeed in the market must monitor and evaluate competition, adapt its product or service offering to market changes, and be able to reach a large number of users.

Promotion is one of the tools that influences consumers' shopping behavior and shopping decisions. For this reason, in the second research hypothesis H_2, we focused on finding out whether there are statistically significant differences in the impact of selected forms of product promotion on consumer shopping behavior depending on the gender of respondents. Respondents could choose one of the options in the questionnaire, which were selected forms of promotion, namely: 1 - Sales promotion, 2 - Advertising, 3 - Personal sales, 4 - Internet, 5 - Social networks, 6 - Direct marketing, 7 - New trends in marketing communication. We used Pearson's Chi-square test of independence for verification.

Table 4: Contingency table - gender of respondents versus choice of form of promotion

			Which of the following forms of promotion do you consider to be the most effective?							Total
Selected forms of promotion			**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Gender of respondents	**Man 1**	N	23	13	12	11	3	10	5	77
		%	13,86%	7,83%	7,23%	6,63%	1,8%	6,02%	3,01%	46,39%
	Woman 2	N	38	13	12	7	4	8	7	89
		%	22,89%	7,83%	7,23%	4,22%	2,4%	4,82%	4,22%	53,61 %
Total		N	61	26	24	18	7	18	12	166
		%	36,75 %	15,66%	14,46%	10,84%	4,22%	10,84%	7,23%	100 %

Source: Own elaboration

In Table 4, we capture how men and women answered the question asked. Respondents chose from 7 options offered. The larger group consisted of women 89 and men 77. Of the 166 respondents 61 (36.75%) of respondents, the answer was sales support, 23 men and 38 women. The same number of women and men 26 and the Internet 12. marked answer was social networks with a share of 4.22%

Table 5: Chi-square test - gender of respondents versus choice of form of promotion

Selected forms of promotion		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
Gender of responden	**Man**	28,295	12,060	11,132	8,349	3,246	8,349	5,566	77
	Woman	32,704	13,939	12,867	9,650	3,753	9,650	6,433	89
Total		61,000	26,000	24,000	18,000	7,000	18,00	12,00	166

Source: Own elaboration

Table 6: Summary table: Expected numbers

Pearson's chi-quadrant	0,43151
Sv	6
P	0,618492

Source: Own elaboration

The value of the probability captured by Table 6 is p = 0.618492. The level of significance at which we verified the hypothesis, t. j. $\alpha = 0.05$ is less than the probability value, so the relationship found is not statistically significant. We reject the hypothesis and can conclude that there are no statistically significant differences in the impact of selected forms of product promotion on consumer shopping behavior depending on the gender of the respondents.

Conclusion

Every day, companies are fighting for the favor of customers, and therefore in order for a company to function, it must use all possible ways to gain a competitive advantage. The basic element of business is the product and it is no longer enough just to produce and wait for who to buy the product, but it is necessary to know which products suit the customer. The product strategy is important in terms of long-term, comprehensive and effective operation in the global and global market. Product policy is part of the marketing mix and its task is to analyze, plan, implement and control product decisions. There is a very diverse competitive environment in the market in which products are lost

and indistinguishable. The organization's priority is to create and find its place in the market and gain the favor of consumers. The result of a good product strategy is customer satisfaction as well as organization.

Neuromarketing can confirm, reconfigure, or improve the conventional theories of marketing theory. The classical methodology of market research that we are already familiar with is incomplete because it can only probe the consumer's consciousness, but not his subconscious. Some might say that such studies are also made in the forms of classic marketing, but the tools used in neuromarketing are brain scanners that use magnetic resonance imaging. All this is done in order to determine the exact reactions of the potential consumers (Gurgu, Gurgu, Tonis, 2020).

Neuromarketing combines marketing, neurology, psychology or sociology. Marketing is basically anything that helps to get a product / service to the attention of customers, remember it / it and ultimately sell it. Neuromarketing incorporates knowledge from human behavior research into this process - which products / services and why customers perceive them more attractive than others.

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The Security of Personal Data during Cross-Border Transmission in the Integrated Information System of the EAEU in the Context of the Digitalization of the Economy

Natalia E. DERKACH
Southwest State University, Kursk, Russia, tavag5@yandex.ru

Olga I. SOLODUKHINA
Southwest State University, Kursk, Russia, kuznecova_olja@mail.ru

Svetlana A. STARYKH
Southwest State University, Kursk, Russia, cvetlana.staryx.87@mail.ru

Alexey N. BOROZDIN
Southwest State University, Kursk, Russia,e-mail: l-boro@yandex.ru

Mariia A. GOLOLOBOVA
Southwest State University, Kursk, Russia,e-mail: masha.gololobova68@gmail.com

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Abstract

The current stage of development of society is characterized by an increasing role in the field of information. Currently, technical means allow for the collection and processing of significant amounts of socially significant data necessary for the effective functioning of state mechanisms, the flow of public processes, and the implementation of human rights. Increasing the vulnerability of people's private lives and creating threats to illicit trafficking in personal data is facilitated by the intensive development of automated technologies in the field of information processing and transmission, their introduction into all social spheres of society. Proper legal regulation of this process should maintain a balance of interests of participants in information turnover and to some extent compensate for the increase in the effectiveness of modern technologies used in cross-border transfer of personal data.

For both Russian and foreign legislation and legal doctrine, the task of legal protection of personal information becomes particularly relevant in the context of active development of open information systems that significantly simplify the leakage and other forms of illegal use of personal data.

In this article, we consider the legislation on personal data of the member States of the Eurasian economic Union in terms of personal data security during cross-border transmission in the integrated information system of the EAEU. Problems related to the comprehensive state approach of the EAEU member States in the field of protection of the rights of personal data subjects are identified.

Keywords: personal data, EAEU, cross-border transmission, integrated information system, cryptographic security of information

Introduction

In the legislation on personal data (hereinafter PD) of Russia and the Republic of Armenia, the categories "personal data" are similar and represent any information or information related directly or indirectly to a specific or identifiable individual. The legislation on personal data of the Republic of Kazakhstan and the Kyrgyz Republic

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additionally includes in the concept of "personal data" information and information about the subject of personal data recorded on a tangible medium (paper, electronic or other). In the Republic of Belarus, there is no basic law on personal data, but a draft law "on personal data" has been developed, which treats "personal data" by analogy with the legislation on personal data of Russia and the Republic of Armenia.

PD is information of limited distribution (confidential information) and is not subject to transmittal and distribution to third parties without the consent of the PD subject, except in cases established by the legislation of the EAEU member States, as well as when the PD subject independently or personally considered it necessary to place the PD In the public space.

It should be noted that among other types of confidential information, PD Is the most sensitive, since it directly affects the rights and freedoms of a person and citizen and includes many identification features: direct and indirect, which can be used to determine the subject of PD. In this connection, the measures to ensure the security of PD differ in their content and composition from the measures taken to ensure the security of other types of confidential information, although there are similar points.

The measures taken to ensure the security of PD may differ significantly in different countries, depending on the category of PD, the established levels of security of PD information systems, the adopted standards for information security and, in general, on the state approach to protecting this type of processed information.

The purpose of the study is to analyze the legislation on personal data of the member States of the Eurasian economic Union in terms of personal data security during cross-border transmission in the integrated information system of the EAEU.

The object of the research is the system of public relations in the field of personal data. The subject of the research is the norms of domestic and international law regulating the use and protection of personal data in cross-border transmission in the integrated information system of the EAEU.

Material and Methods

The validity of the proposed provisions, conclusions and recommendations is confirmed by the choice of the subject and object of research, the completeness of use and critical analysis of literary sources, and the application of a systematic approach to research. The main scientific provisions set forth in the work correspond to the set goal and objectives of the research. The reliability of the results obtained is ensured by:

- using modern scientific research methodology;
- using a set of methods of scientific knowledge: comparative and system analysis, synthesis;
- using reliable information (analytical data and reviews, monographic research materials, periodicals, Internet resources) and adequate methods of its processing (methods of comparative analysis, induction and deduction);
– justification of theoretical conclusions, using a variety of bibliographic databases.

Results and Discussion

PD security is a state of personal data security characterized by the ability of users, technical means and information technologies to ensure the confidentiality, integrity and availability of PD when processing Them in PD information systems [14].

Cross-border transfer of PD means the transfer or provision of personal data to other States. Cross-border transfer of personal Data in electronic form between the EAEU member States is carried out through the integrated information system of the Eurasian economic Union (hereinafter-the EEU IIS).

The EEU is an organizational set of geographically distributed state information resources and information systems of authorized bodies, information resources and information systems of the Eurasian economic Commission (hereinafter referred to as the Commission, the EEC), United by national segments of the member States and the integration segment of the Commission [2]. National segment of the member state, integration segment of the Commission - information systems that provide information interaction of information systems of authorized bodies and information systems of the Commission within the framework of the information system [2].

Within the framework of the EAEU, the IIS is intended to solve the following tasks: interstate exchange of data and electronic documents, creation and maintenance of a unified system of normative and reference information,

creation of common information resources, creation and operation of a common infrastructure for documenting information in electronic form, etc.

The IIS is a continuation of the integrated information system for foreign and mutual trade, which was established in accordance with the Agreement Of the governments of the Customs Union member States "on the creation, operation and development of the integrated information system for foreign and mutual trade of the Customs Union" on September 21, 2010 and was implemented in 2011-2014.

In the case of cross-border interaction between the customs authorities of the EAEU member States in the implementation of common processes, information is exchanged, including personal data of individuals: last name, first name, patronymic, information about the identity document of an individual, a unique identifier of an individual, and others [3]. In addition, the competent authorities of the EAEU member States exchange information in the field of labor migration and social security.

In accordance with article 361 Of the Customs Code of the EAEU, customs authorities have the right to collect information about persons engaged in foreign economic activities related to the movement of goods across the customs border of the Union, or other activities in relation to goods under customs control, including information about individuals: personal data (surname, first name, patronymic), date and place of birth, gender, address of residence, details of an identity document, including the personal (individual identification) number of an individual (if available), taxpayer identification (registration, registration) number (if available)) and the frequency of movement of goods by these persons across the customs border of the Union. At the same time, information is collected by customs authorities when performing customs operations and by receiving it from other state bodies of the member States [1].

On December 19, 2005, Russia ratified the Council of Europe Convention on the protection of individuals in the automated processing of personal data of January 28, 1981 (hereinafter referred to as the 1981 Convention), assuming obligations to comply with the domestic legislation of this Convention. On July 27, 2006, Russia adopted Federal Act No. 152-FA "on personal data". Articles 12 of this law define the following:

- item 1- " cross-Border transfer of PD On the territory of foreign States that are parties to the 1981 Convention, as well as other foreign States that provide adequate protection of the rights of PD subjects, is carried out in accordance with this Federal law…»;
- item 2- " the Authorized body for the protection of the rights of PD subjects approves the list of foreign States that are not parties to the 1981 Convention and provide adequate protection of the rights of PD subjects. A state that is not a party to the 1981 Convention may be included in the list of foreign States that provide adequate protection of the rights of PD subjects, provided that the provisions of the 1981 Convention comply with the legal norms in force in the relevant state and the security measures applied for PD»;
- item 3- " cross-Border transfer of PD on the territory of foreign States that do not provide adequate protection of the rights of PD subjects may be carried out in the following cases:... provided for by international treaties of the Russian Federation... " [9].

The 1981 Convention was ratified by two EEU member countries-Russia and the Republic of Armenia. In accordance with the order of Roskomnadzor dated 15.03.2013 N 274 (ed.from 15.06.2017) "on approval of the list of foreign States that are not parties to the Council of Europe Convention on the protection of individuals with automated processing of personal data and ensuring adequate protection of the rights of personal data subjects", the Republic of Kazakhstan provides adequate protection of the rights of PD subjects. Thus, the EEU member States-the Republic of Belarus and the Kyrgyz Republic, in the opinion of the Russian side, cannot properly ensure the security of PD during their cross-border transfer. However, if the cross-border transfer of PD is provided for by international treaties of the Russian Federation, it is possible.

The current legislation of the Russian Federation does not provide for criteria that determine the adequacy of protection of the rights of PD subjects on the territory of a foreign state [18].

In the Republic of Armenia, the procedure and conditions for processing personal data are Regulated by the Law of the Republic of Armenia No. LR-49 "on personal data protection" dated June 13, 2015. Article 27 of this law provides for the transfer of personal data to other States. Article 27, paragraph 2, States: "Personal data may be transferred to another state without the permission of the authorized body, if this state provides a satisfactory level of personal data protection. A satisfactory level of personal data protection is considered to be provided if: 1) personal data is transferred in accordance with international agreements; 2) personal data is transferred to a country included in the list officially published by the authorized body." Paragraph 6 of article 27 States: "personal data held

by state bodies may be transferred to the authorities of foreign States only within the framework of interstate agreements, and to non-state bodies – in accordance with the norms of this article" [10].

The provisions of the provisions of the articles on cross-border transfer of PD in the national legislation of the Republic of Armenia and Russia are similar, which is due to the intention of these countries to comply with the principles of the 1981 Convention.
In the Kyrgyz Republic, the legal regulation of working with PD is carried out in accordance with The law of the Kyrgyz Republic dated April 14, 2008 No. 58 (ed.from 20 07.2017) "On personal information". Cross-border transfer of PD is provided for in article 25. According to paragraph 1 of this article: "The cross-border transfer of personal data the holder (owner) of the array of personal data under the jurisdiction of the Kyrgyz Republic, transmitting the data comes from an international agreement between the parties under which the receiving party ensures an adequate level of protection of the rights and freedoms of subjects of personal data and the protection of personal data established in the Kyrgyz Republic" [11].

In the Republic of Kazakhstan, public relations in the field of personal Data are regulated by the Law of the Republic of Kazakhstan dated may 21, 2013 N 94-V (ed. from 28.12.2017) "on personal data and their protection". Article 16 of this law provides for cross-border transfer of PD. In particular, it is determined that the cross-border transfer of PD to the territory of foreign States is carried out only if these States ensure the protection of PD, otherwise it can be carried out in cases stipulated by international treaties ratified by the Republic of Kazakhstan [12].

In the Republic of Belarus, the cross-border transfer of personal Data is defined in the law "on personal data". Paragraph 1 of article 10 of the bill provides for the following: "cross-border transfer of PD is prohibited if an appropriate level of protection is not provided in another state, except in cases when: collection, processing, distribution, provision of PD is carried out within the framework of an international Treaty of the Republic of Belarus" [13].

Conclusions

As a result of the analysis of the national legislation on personal Data of the EAEU member States, the following conclusions are formulated:

1. ensuring the safety of personal Data during their processing is achieved through a set of measures: legal, organizational and technical. The application of these measures is the responsibility of the operator for personal data processing. These measures depend on the information security regulations and technical standards adopted within States.
2. the Security of cross-border transfer of PD is characterized by a greater degree of technical aspect of their protection, in particular the use of cryptographic means of information protection. These tools are used to neutralize those threats to the security of PD That can be closed using such tools. So, using encryption of information containing PD, the requirements for ensuring their confidentiality and integrity are met. Threats associated with unauthorized access to information are minimal.
Article 19, paragraph 2, of The law no. LR-49"on personal data" of the Republic of Armenia explicitly States: "When processing personal data, the operator is obliged to use encryption tools to ensure the protection of information systems containing personal data ...", while there is no direct rule in the legislation of the Republic of Kazakhstan and the Republic of Belarus. In Russia and the Kyrgyz Republic, the use of cryptographic information security tools depends on the established requirements for the protection of personal Data, the implementation of which ensures the levels of personal Data security established by the Government of the Russian Federation and the government of the Kyrgyz Republic. Thus, there is no unified approach to the organization of ensuring the security of PD transmission using cryptographic means of protecting information containing PD in the EAEU member States.

In the EAEU member States, cryptographic protection is based on the development of their own cryptographic algorithms taken as a basis as national standards.

Thus, in accordance with the decision of the Council of the Eurasian economic Commission of 18.09.2014 N 73 "on the Concept of using services and legally binding electronic documents in interstate information interaction" – "member States use national standards for cryptographic algorithms for creating and verifying EDS. The methods used by the state authorities of the member States to implement cryptographic algorithms are incompatible with each other, which is due to different approaches to ensuring information security." These provisions are currently relevant.

The decision of the Council of the Eurasian economic Commission of 18.09.2014 N 73 says: "If, in accordance with the legislation or the relevant agreement of the member States, it is required to ensure the confidentiality of the document, the information contained in the electronic document can be encrypted (converted using cryptographic information protection tools). The procedure for using cryptographic information security tools in such cases is established by international agreements within the Union." This provision implies that confidential information does not have to be encrypted, it can be encrypted, which contradicts the very essence of the concept of confidentiality of information, that is, restrictions on its access.

3. it is clear from the national legislation of the EAEU member States that PD is confidential information and currently PD is transferred to the AIS between countries for customs purposes. However, as for the international agreements of the EAEU member States on the cross-border transfer of PD And their protection within the framework of joint integration, which would define all agreed and unified necessary measures for the safe processing of PD with a sufficient level of security, they are absent.

In the law of the EAEU, there is an international agreement that declares General requirements for the protection of restricted access information, including cryptographic protection of information circulating in the components of the information system. Thus, information protection in the EAEU is carried out in accordance with the terms of reference for the creation of the EEU IC, approved by Decision No. 137 of the Board of the Eurasian economic Commission "on approval of the terms of reference for the creation of an integrated information system of the Eurasian economic Union" (hereinafter the Terms of reference). The terms of Reference indicate that information protection in the information security system should be provided in accordance with the requirements for the creation, development and functioning of a cross-border space of trust, developed by the Commission in cooperation with authorized bodies and approved by it.In addition, protection against unauthorized access to information in the information security system must be provided in accordance with the requirements of the terms of Reference and taking into account the provisions of technical, technological, methodological and organizational documents, approved by the Commission for the purpose of ensuring the unification of applied organizational and technical solutions in the creation, operation and development of an integrated system and maintaining an appropriate level of information security.

In addition, international agreements have been signed that provide for the use of international recommendations and standards taken as a basis for the exchange of electronic documents in cross-border interaction. This is the" X. 509 Standard "- the ITU-T X. 509 standard " Information technology. Open systems interconnection. Reference: public key and attribute certificate Structures"; "XAdES Standard" - XML AdvancedElectronicSignature standard that describes the extended format of an electronic digital signature (e-signature) in XML format; "XMLDSig standard" - a standard for syntax and processing of an electronic digital signature (e-signature) in XML format, as well as the applied public key infrastructure (PublicKeyInfrastructure) in accordance with the recommendations of X. 509 PublicKeyInfrastructure. In this case, the agreed cryptographic standards of the EDS and the agreed cryptographic standards of the hashing function, approved by the Commission, should be used [5].

Taking into account that the national legislation of the EAEU member States should use cryptographic information protection tools and cryptographic algorithms implemented by them to encrypt and create electronic signatures of their own domestic development, therefore, cryptographic standards in the EAEU should be unified within the framework of international agreements. But, as stated in The decision of the Council of the Eurasian economic Commission of 18.09.2014 N 73 "on the Concept of using services and legally binding electronic documents in interstate information interaction» – "The use of unified cryptographic means of EDS in cross-border electronic data exchange between public authorities of the member States is currently impossible, since in accordance with the regulatory framework of the member States, only cryptographic means certified according to national standards are allowed to be used in the member States." Therefore, the problem of creating unified cryptographic means of protecting information in information interaction in the EAEU is relevant, and the use of cryptographic means of protecting information from manufacturers of countries outside the EAEU increases national security risks.

The Protocol on amendments to the European Convention of 1981 (hereinafter referred to as the Protocol) was signed in Strasbourg on October 10, 2018. Russia, along with 19 member States of the Council of Europe, supported the updated version of the Treaty. The changes relate to obligations to strengthen control over the circulation of PD, processing of "special" types of data, such as biometrics or genetic data, as well as regulation of cross-border exchange and international cooperation [19].

The new version of the 1981 Convention provides for uniform rules for refusal in the cross-border transfer of PD, if the state is obliged to comply with the agreed protection rules established by a regional international organization [20]. The question arises: how is it possible to cross-border transfer of PD within the framework of information interaction in the EAEU on the basis of international agreements drawn up between the EAEU member States,

while the new rules of the 1981 Convention require countries that have joined the updated Convention to comply with the norms established by it? The answer is not long in coming, the EAEU member States that are not parties to the 1981 Convention will need to sign and ratify the new rules of the 1981 Convention. Moreover, to bring their legislation in the field of protection of personal Data in line with the norms of the updated Convention.

Taking into account that the entry into force of the modernized Convention of 1981 is expected within five years, it is advisable for this period to develop common requirements and measures for ensuring the security of Pdnp for cross-border transmission within the framework of information interaction in the information system.

4.in the EAEU member States, in General, a small role is assigned to the protection of the rights of PD subjects, in particular in the cross-border transfer of PD to the AIS. This is due to a number of identified reasons. This is the "lag" of national legislation from generally recognized international norms of law in the field of respect for human rights and fundamental freedoms. The lack of a unified developed policy for the safe processing of PD circulating in the AIS and the relegation of this problem to the level of national legislation. Lack of common criteria that determine the adequacy of protection of the rights of PD subjects on the territory of States that are not members of the EEU. So, in the European Union these criteria are established and reflected in Regulations N 2016/679 European Parliament and of the Council of the European Union "On the protection of individuals when processing personal data and free circulation of such data, and repealing Directive 95/46/EC (General Regulation on the protection of personal data)" (Adopted in Brussels on 27.04.2016). At the same time, none of the EAEU member States meets the criteria for assessing the adequacy of the country and is not considered, from the point of view of the European Union legislation on PD, as a country that provides an adequate level of protection of PD, despite the fact that Russia and the Republic of Armenia have ratified the 1981 Convention. All this causes certain difficulties in the free exchange of personal data And their protection both within the framework of close integration processes of the EEU, and in interaction with the countries of the European Union for one reason or another.

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On Application of Digital Monetary Instruments as a Priority Vector of Innovative Economy Development in the Aspect of the Country's Economic Security

Svetlana A. STARYKH
Southwest State University, Kursk, Russia, cvetlana.staryx.87@mail.ru

Natalia E. DERKACH
Southwest State University, Kursk, Russia, tavag5@yandex.ru

Olga I. SOLODUKHINA
Southwest State University, Kursk, Russia, kuznecova_olja@mail.ru

Daniel I. RASPOPIN
Southwest State University, Kursk, Russia, soldaten046@rambler.ru

Sergey K. SOLOVYEV
Southwest State University, Kursk, Russia, sergey999997@mail.ru.

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Abstract

In modern realities the development of economy and socio-economic, information and technical systems depends on full-scale formation of digital environment and infrastructure (industry). The structured model of digital economy positively influences both the activity of economic entities and the mechanism of functioning of its constituent elements: it allows attracting instruments of investment from outside, to develop and modernize electronic commerce and platforms, taking into account application of new software and digital products.
The article analyzes the comparison of the essence of crypt currency and digital money. The classification of digital money and payment systems is considered. The correlation of the terms and e-money, their similarity and difference, as well as their main features are studied, problem aspects and perspective directions of development are revealed.

Keywords: Digital Money, Virtual Currency, Crypt Currency, Bitcoin, Blockchain, Payment System.

Introduction

In the current state of innovative economy development, a range of new requirements and standards for telecommunications, computing hardware and software products, automated information systems are naturally emerging.

Considering the process of formation and development of this sphere in the Russian Federation, it should be noted that the main requirements and recommendations are based on the legal framework.

In particular, the legal support of the digital economy in the Russian Federation is introduced by the Russian Government Decree of 02.03.2019 № 234 "On the system of management of the national program "Digital Economy of the Russian Federation" (including "Regulations on the system of management of the national program "Digital Economy of the Russian Federation") [15].

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Studying international trends in the development of economies and economic processes, virtual currency (also known as digital money) has acquired a special role in the integrated world economy [9, 11].
For example, the essence of large-scale effect from the creation and introduction of digital currencies and monetary instruments is studied by many specialists and scientists in various fields: economic, social, legal, macroeconomic, political [10].

References Review

Methodological approaches to assessing the quality of financial statements are based on the works of Benish M., Deshow P., Richardson S. A., Sloan R. and others. Criticism of the results obtained by foreign researchers is formed by using the heritage and modern developments of members of the Russian statistical school: D. Zhuravsky, V. Glinsky, I. Eliseeva, N. Kablukova, V. Nemchinova, V. S. Suslova, A. Chuprova, and Yanson U.E.

Explanations of the financial market functioning mechanism were offered by the following authors: Black F., Fama E. F. and others. The study of the evolutionary component of economic development is present in the works of Lo A., Nelson R., Niederhoffer W., Winter S. J. Among the few publications that focus on the study of the instability of the financial system in the context of information flows are the works of Vercelli A., Minsk H. R., Sordi S.

Methodology of Research

The methodological basis of the research is determined by the following fundamental methods and principles: analysis, synthesis, analogy, abstraction, descriptive, mathematical and mathematical-statistical methods.

Practical significance and implementation results, results of expert studies

Having performed a comprehensive analysis of digital money, the following classification of currencies (instruments) was identified, which can be divided into three components:

1. Traditional funds (paper money, bank and commercial deposits, securities).
2. Electronic funds (bank and credit cards, Internet money system; various payment systems - Yandex.Money, Pay Pal, Apple Pay, Google Pay, Samsung Pay, Web Money; smart cards (electronic wallet).
3. Digital means (digital money, cryptocurrency) [5].

Having studied the main provisions and regulations of the European Directive on the development and use of electronic money, it should be noted that electronic money is an electronic (including magnetic) stored monetary value, represented by the requirement to the issuer, which is issued when the issuer receives money to make payments and is accepted as a means of payment by institutions other than the issuer of electronic money. That is, the various payment systems presented above allow to carry out transactions, commercial and other operations with a greater degree of efficiency and optimality, which in turn has a favorable impact on the information and economic processes of the involved parties. These operations include:

- Paying for goods and services on the Internet regardless of the country and location;
- Making money transfers to debit and credit cards;
- Conducting and completing e-currency purchases and exchange transactions through stand-alone devices and secure communication channels;
- Applying settlement accounts using e-mail, a technological software product or a device.

Almost the entire flow of transactions with electronic money is made with a special electronic wallet, which is a unique identifier consisting of a set of structured elements (numbers and letters). You can open one or more electronic wallets on the official website of the payment system, having previously registered on this platform.

Virtual (digital) money is a type of unregulated digital money, which is issued and, most commonly, regulated and controlled by its developers, accepted and used among members of a certain virtual community, in some cases, created with the initiative of a state market segment [6].

Electronic and digital money are based on a single principle of non-material payment methods, but at the same time have a number of essential features that distinguish their individual characteristics. The main difference between digital money is that it is not directly connected with the state currency system, but is created directly through software systems and electronic platforms that are not elements of a single network. In turn, traditional money to be

converted into electronic format must be deposited in cash equivalents. These criteria and basic requirements are met by cryptocurrencies.

Cryptocurrency is a digital currency based on cryptographic encryption and protection methods. This type of currency is created virtually and contains information and data encrypted by mathematical methods, protected from possibility of forgery and copying. Known and frequently used cryptographic currencies are: Bitcoin, BitcoinCard, Ethereum, Dash and Ripple. The active cryptovalut is formed on the basis of the Bitcoin technology - it is a centralized database, which consists of information blocks and contains records on the crediting, transfer and withdrawal of funds, that is, all transactions [3].

An important aspect is the fact that the implementation of this chain is based on the impossibility of changing these records of information blocks, which can only be supplemented. Each transaction is protected by an electronic signature of the user, who performs operations with digital monetary instruments. Comparison and analysis of cryptocurrency and electronic money is presented in Table 1.

Table 1: Relationships between the characteristics of digital monetary instruments

Characteristic	Cryptocurrency	Digital Money
Cost of a constituent element	Confidence in the payment system, optimal ratio of supply and demand	Reasonable equivalent to the quantity of fiduciary money, converted into an electronic form
Emission method	Forging, Mining, (rally), ICO (Initial coin offering) based on mathematical model of system generation	Predominantly electronic depending on the value of fiduciary money in the current period
Availability	Access to the Internet and digital sites	Access to various elements of the Internet, electronic devices, client bases and communication systems
Customer Identification	Ability to use digital units anonymously	Identification by performed operations, taking into account the database, registration and protection of servers
Connection to inflation	Not exposed to inflation, not available at this period	There is a direct correlation
Regulation	- are legalized and taxed, have integrational value (Japan, USA, Canada, Germany, etc.) - restricted circulation of cryptocurrency for banks, allowed for individuals (China) - prohibited (Bangladesh, Bolivia, Vietnam)	The process of regulation in the corresponding country is carried out by the Central Bank of the state
Security, risks (on the example of the Russian Federation)	- threat of viral attacks - data password loss - virtual theft - lack of full legal regulation in this sphere	- inflation - threat of theft, fraud, illegal operations - Longer term of money transfer
Issuer	Decentralized	Centralized

Based on the data from Table 1, it can be concluded that digital money and cryptocurrency have priority values in themselves, depending on the individual characteristics of each. The choice of application of one of them is based

on the bases of functioning of a specific system of operations and commercial transactions, depending on the form and methods of financial and cash flows. However, in the modern reality, cryptocurrencies have a number of significant advantages, which is confirmed by the society, since the use of this digital money instrument has gained considerable popularity and profitability in recent years [12, 14]. Hence, the following privileged categories can be distinguished:

- transaction speed;
- minimum commissions for transactions;
- security of financial flows;
- convenience of storage and accumulation;
- possibility of complete confidentiality;
- long-term actualization.

It should be noted that the cryptocurrency is not widespread in everyday life as a means of payment. However, according to estimates of leading scientists and specialists of the world, if the current dynamics of the use and creation of digital currencies will be preserved, by 2030 the number of users of block wallets will reach the level of 200 million, and in the future the cryptocurrency will replace cash at all [1].

In order to reach a new consumer level and achieve the desired maximum, it is necessary to solve the main problem aspects within the application of cryptocurrency, namely:

1) The cost of the leading cryptocurrencies used for settlement operations should be stable. It is necessary to carry out their legal transition to a legitimate status, based on the established legal and regulatory framework in this area.
2) Implementation of the process of cryptocurrency integration by the leading companies in the field of payments. Through mobile devices and applications (ApplePay, GooglePay), among Visa and Mastercard card providers, retailers Amazon and Ozon.
3) The financial system must be prepared and configured for power outages and cyberattacks, as well as the availability of modern scientific, technical, software, computer and computing facilities [6].

Conclusions

Cryptocurrencies require legal recognition and a unified system of control and regulation. With the advent of regulation, it will be necessary to abandon the principles that were originally embedded in the technology of the Blockchains. That is why it is of primary importance to find the point of balance between freedom and control, so that investors will be willing to invest in a promising project to create a Unified Automated System of Digital Cash.

Discussion of Results

The development of the modern global economy is an obvious consequence of the progress of the digital market and turnover [7,8].

Moreover, users are waiting for substantial guarantees to ensure the protection of digital operations against viruses, hacking, confidentiality of informational and financial flows and personal data. A full interconnection between the public sector and private, commercial entities will allow developing an optimal mechanism to create a Unified system of digital money application, which will entail a new turn in economic development in the current state of digitalization and globalization in general. In Russia, this issue has been sufficiently studied, which made it possible to form and apply an integral concept aimed at the development of the electronic money market within the framework of the national program "Digital Economy of the Russian Federation".

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The Mechanism of Selecting Priority Investment Facilities on the Basis of Integral Indicators of Competitiveness

Natalia E. DERKACH
Southwest State University, Kursk, Russia, tavag5@yandex.ru
Olga I. SOLODUKHINA
Southwest State University, Kursk, Russia, kuznecova_olja@mail.ru
Svetlana A. STARYKH
Southwest State University, Kursk, Russia, cvetlana.staryx.87@mail.ru
Daniel I. RASPOPIN
Southwest State University, Kursk, Russia, soldaten046@rambler.ru

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Abstract

The paper proposes an algorithm for selecting priority investment facilities on the basis of a competitiveness assessment technique through the effects of investees on micro-, mini -, meso - and macro-levels. Levels of competitiveness are considered. Theoretical formulas for the measurement of competitiveness are proposed.

Keywords: competition, competitiveness, competitiveness assessment techniques.

Introduction

The Russian government is actively seeking the ways of overcoming the country's economic crisis. Achieving this goal is fraught with many difficulties, including the problems of creating a competitive environment. Competition policy is still at an early stage of development and has no support based on the understanding of the importance of competition. Many economic executives associate competition with poorly organized transition to open international trade or with destructive competition based on negative (and sometimes adverse) forms and manifestations. Within this framework, there mainly appear such theoretical ideas as the formation of a competitive economy by supporting the strongest economic sectors and groups of enterprises.

Material and Methods

When describing the problems of analysis and assessment of competitiveness, Professor N. A. Faminskiy notes a few specific features. The multivariance of factors and conditions of competitiveness, the relativity of this category leads to the complexity of its definition [1]. Professor P. S. Zavyalov notes [2] that "there is no single and universal concept of competitiveness", therefore, it is necessary to study and apply a set of methods of quantitative analysis and evaluation of competitiveness taking into account its properties of "multulayerness". The main factors that determine the possibility of multiple interpretations of this concept are the various initial positions of economists regarding the fact what should we see as a manufacturer: only individual enterprise, a separate industry or the whole economy.

Depending on the object of competition all the variety of competitive relations arising in the economic sphere, can be divided into four levels: micro (the competitiveness of products (goods, services)); mini (the competitiveness of enterprises), meso- (industry competitiveness) and macro level (the competitiveness of the region (country)).

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In this case, the problem of competitiveness evaluation can be represented in the form of a pyramid (Fig. 1) in which each subsequent level is based on the lower one. In addition, it has its own elements, characteristics and serves as the basis for the higher level.

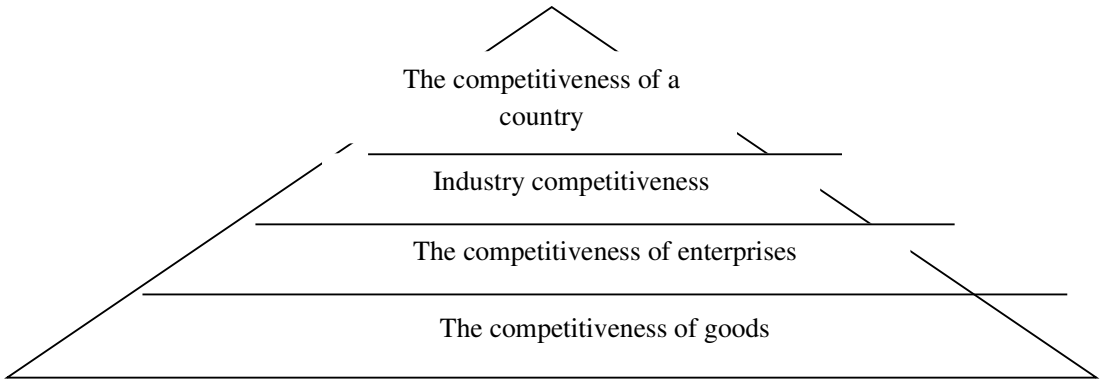

Fig. 1: Competitiveness pyramid

At the base of the pyramid is competitiveness, which is determined by the following elements:
• price competitiveness of products – the ratio of the price level with the prices of similar products of main competitors; the effectiveness of price differentiation system depending on the supply-and-demand situation and the policies of competitors; the attractiveness of discounts for consumers;
• quality of products – technical and functional characteristics of the product (functionality, reliability, safety, ease of use; food, energy, physiological value, harmlessness, storageability, etc.),status of products;
• competitiveness of marketing, advertising and maintenance systems.

The next level of competitiveness of a business entity – enterprises - can be represented as a total of two sets:
- many parameters characterizing a business entity on mini level. For example, the efficiency of company production, financial position of a company, the efficiency of marketing and market promotion of goods, etc.;
- a variety of competitive goods and services provided by a business entity. In other words, each competitive item of goods of a business entity becomes a structural element of its competitiveness, i.e. its competitive advantage[6].
In a formalized form, the index of competitiveness of commodity producers can be represented as follows:

$$КС_{т/произ.i} = F(x_i) + КС_{тов.i}\,,\ i = \overline{1,I} \qquad (1)$$

где $F(x_i)$ – the economic parameters characterizing a business entity (*i*) at the micro level; $КС_{тов.i}$ - the index of goods competitiveness provided by a business entity (*i*).
At the meso-level there can be surveyed the competitiveness of industries, business combinations and the association of various enterprises (holdings, etc.). The competitiveness of a business entity at the meso-level can be defined in the form of the following two sets:
- many parameters characterizing the state of meso-entity (industry). They can be the following ones: the level of integration, specialization and cooperation in industry, the level of unification
and standardization of industry products, etc.;
- many competitive mini-entities (enterprises and organizations), as well as a subset of competitive goods and services of meso-entity.
In a formalized manner and by analogy with the micro level, the competitiveness of meso-entities is represented as:

$$КС_{мезосуб.s} = F(y_s) + КС_{т/произ.i_s} \qquad (2)$$

where $F(y_s)$ – the economic parameters characterizing a business entity at the meso-level, $КС_{т/произ.i}$ - the index of competitiveness of mini-entities *(i)* (commodity producers, companies, etc.) determined by a certain meso-entity *(s)*.
The next level of competitiveness – macro level. It analyses the competitiveness of national economic systems, institutional systems of countries, regions, etc. The components of macro-entities' competitiveness are divided by analogy with mini and meso-levels into the parameters which characterize a macro-level, such as climatic and geographical conditions, level of education of the population etc., and the competitiveness of those meso and mini-entities, which in turn, form the structure of a macro-entity.

Regarding the competitiveness of countries, Adrianov V. [3] says that "the synthetic index which combines the competitiveness of goods, commodity producers, industries, and describes the country's position in the global market, is the country competitiveness. In general terms it can be defined as the capacity of a country under the conditions of free fair competition to produce goods and services that meet the requirements of the world market and improve welfare of the people of this country and its citizens.

The components of macro-entity's competitiveness are divided into the following two sets and two subsets:

- a variety of parameters and factors characterizing the state of a macro-entity;
- a set of competitive meso-entities, and, in its turn, the subsets of competitive mini - and micro-entities.

Similarly, in a formalized manner the competitiveness of macro-entities is represented as follows:

$$КС_{макросуб.n} = F(h_n) + КС_{мезосуб.sn},\ n = \overline{1,N},\ s_n = \overline{1,S_n} \quad (3)$$

where $F(h_n)$ – the economic parameters characterizing a business entity at the macro level, $КС_{мезосуб.sn}$ - the indicator of competitiveness of meso-entitities (industries) *(s)* determined by macro-entity (*n)*.

Business entities, whether they are enterprises, industries, or countries, are the active elements of the economic system, and the objects of commodity level, as such, are passive elements. Moreover, in our opinion the goods and services as the final product of any entity determine the need for a separate analysis and estimation of competitiveness of business facilities and entities. Therefore the structure of competitiveness of business facilities and entities can be represented as a set of economic activities parameters of a macro-entity, including meso - and micro-entities, as well as many of objects of commodity level as a consequence of end result of micro- meso - and macro-entities' activity.

Based on the aforesaid, formally the competitiveness of a macro-entity can be represented in the form of an integrated index of competitiveness [4]:

$$КС_{макросуб.n} = F(П_{nsi}) + КС_{микро.n},\ n = \overline{1,N},\ s = \overline{1,S},\ i = \overline{1,I}, \quad (4)$$

where N – the number of macro-entities; S – the number of meso-entities of a macro-entity *(n)*; I – the number of micro-entities of a meso-entity *(s)*; $КС_{макросуб.n}$ - the integrated index of competitiveness of a macro-entity *(n)*; $F(П_{nsi})$ - a great number of economic parameters of micro-entities *(i)* and meso-entities *(s)* of a macro-entity *(n)*; $КС_{микро.n}$ - the integrated index of competitiveness of all goods and services provided by a macro-entity *(n)*.

Results and Discussion

Thus, the assessment of entities' competitiveness of each level should be based on the structural decomposition of objects and entities of competitiveness. It must not be a formal addition of the parameters of lower levels. It must also take into account the specific features of the studied level of competitiveness.

For example, the competitiveness of the industry complex will be characterized by two integral parameters: 1) directly by the competitiveness of the industry complex in conjunction with similar objects (for example, the sugar complex of the Kursk region, the sugar complex of the Orel region, etc.); 2) by the competitiveness of its constituent enterprises (in case of sugar complex – sugar factories). In its turn, each integrated indicator is composed of several groups of specific indicators. The competitiveness of the industry complex: suppliers, providing processing with raw materials, manufacturing, export-import balance. Competitiveness of an enterprise: the competitiveness of products; financial condition; marketing activities; the effectiveness of production management; the business cooperation with suppliers[7,10].

The process of competitiveness assessment can be represented in the form of a diagram (Fig. 2).

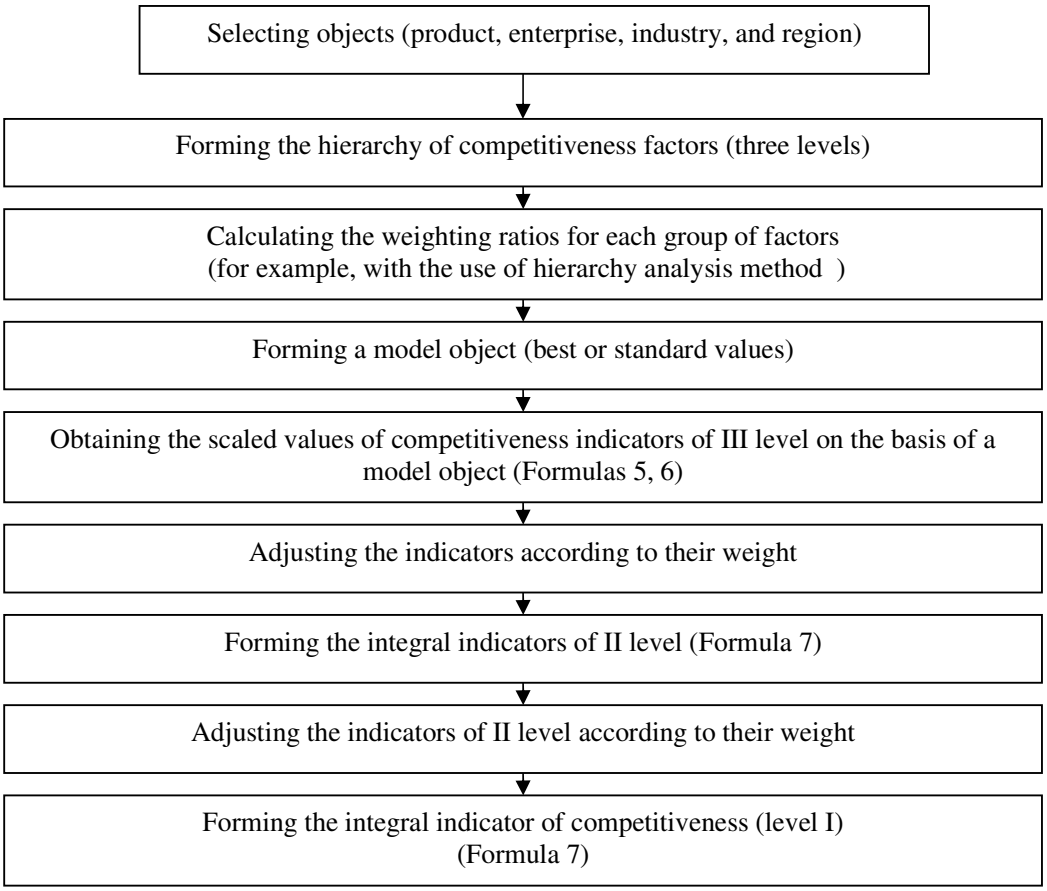

Fig. 2: Scheme for competitiveness assessment

All specific indicators of the third level have different dimensions; therefore, it is necessary to assess the criteria on a unified scale in order to include them adequately in the analysis process and the construction of an integral indicator. It should be noted that the factors of competitiveness could play a stimulating role (stimulants) and disincentive (disincentives). The example of the first ones is the yield of sugar beet, the example of the second ones is the losses of sugar in production[8]. Taking into account this factor we propose to use the formulas (5-6) for scaling by analogy with the calculation of Human Development Index used by the UN:

$$Xmij = \frac{Xij - X\min j}{X\max j - X\min j} \text{ – for stimulants} \quad (5)$$

$$Xmij = \frac{X\max j - Xij}{X\max j - X\min j} \text{ – for disincentives} \quad (6)$$

where X mij – the scaled value of an indicator *(j)* for a region *(i)* in a year *(n)*; Xij - the actual value of an indicator *(j)* for a region *(i)* in a year *(n)*; Xminj – the minimum value of an indicator *(j)* for the number of years *(n)* across regions *(i)*; Xmaxj – the maximum value of an indicator for the number of years *(n)* across regions *(i)*.

In the function of $X\max j$ and $X\min j$ there can be respectively offered the maximum and the minimum value of the criterion *(j)* based on the values of this index for the number of years *(n)* for the analyzed objects, i.e., $X\max j$ = max (Xij for the number of years *n*), $X\min j$ = min(Xij for the number of years *n*).

For the formation of integral indicator, the degree of closeness of the actual sample to the model sample is calculated with the help of a formula [5, p. 127]:

$$Yi = 1 - \frac{dio}{Co}, \tag{7}$$

где $dio = \left[\sum_{j=1}^{n} (xij - xoj)^2 \right]^{\frac{1}{2}}$, $Co = x'' + 2Sd$

$x'' = \frac{1}{t} \sum_{i=1}^{t} dio$, $Sd = \left[\frac{1}{t} \sum_{i=1}^{t} (dio - x'')^2 \right]^{\frac{1}{2}}$

xij – the implementation of property *(j)* in the object *(i)*;

xoj – the implementation of property *(j)* in model sample.

Conclusions

After evaluating competitiveness, it is necessary to choose the most priority investment project due to the limited investment funds. With the help of cluster analysis, we propose to divide industrial complexes and enterprises into three groups depending on the obtained integral indicators: high competitiveness, medium competitiveness, low competitiveness. The following algorithm is supposed to be used (Fig. 3)

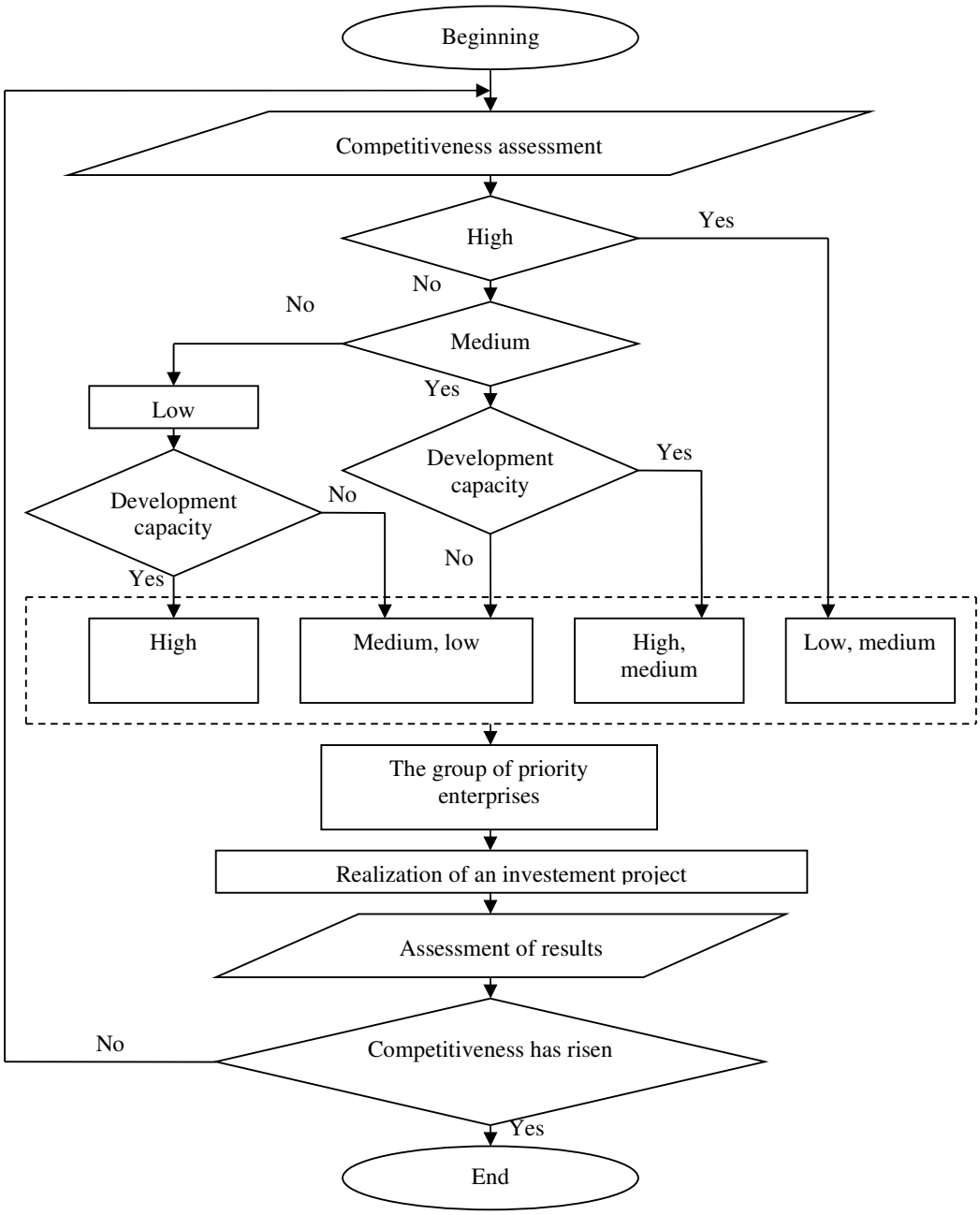

Fig.3: The algorithm for selection of priority investment facilities

If the competitiveness of a particular industry is high, then priority investment facilities are companies with low and medium competitiveness in order to prevent monopolization of the market and competition development. The allocation of investment funds among enterprises is determined by their size and their objectives. If their quantity is limited, then the targets of investment are selected from the best companies in the group. If the competitiveness of a particular industry is medium and has potential for development, priority is given to the enterprises with high and medium marketability in order to achieve a leading position[11]. If there is no potential for development, i.e., further increase of competitiveness is limited, for example, due to geographical features, priority is given to investment facilities with medium and low competitive ability, similarly, as in the case of high competitiveness of the industry complex[8,9]. In a situation where the competitiveness of a particular industry is low and there is potential for development, priority investment facilities are companies with high competitiveness in order to withdraw the industry from crisis and establish themselves as a leader.

The proposed algorithm for the selection of priority investment facilities enables to develop a comprehensive mechanism of improving and maintaining the sustainability of competitive positions. The specific approach will make it possible to consider the features of internal and external environment of the studied systems. Besides, to assess the implementation of an investment project one can use the change of integral index of competitiveness as the most meaningful criterion. Its peculiarity consists in the reflection of a significant number of factors that characterize different aspects of the main structural components of the studied object.

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Prediction of Missing Persons' Disappearance Reason Using Machine Learning Methods

Ryszard ANTKIEWICZ
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, ryszard.antkiewicz@wat.edu.pl

Przemyslaw CZUBA
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, przemyslaw.czuba@wat.edu.pl

Tomasz GUTOWSKI
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, tomasz.gutowski@wat.edu.pl

Dariusz PIERZCHALA
Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, dariusz.pierzchala@wat.edu.pl

Abstract

This paper presents the concept of using ML methods to infer the reason of the people missing. The issue of determining the reason of disappearing of persons is extremely important and orientates police action as well as has huge impact on the effectiveness of the search. In consideration of the amount and diversity of information collected in the process of searching for missing persons, the police services should rely on templates that are both readable to humans and have a structured form for the purposes of computer support methods. The formal model, we propose for description of a missing person, ensures consistency and completeness of data. Based on historical cases, an aggregated model of disappearances was built. Six ML methods were selected and calibrated on the basis of historical cases, and then their quality was compared. Due to the relatively small set of real cases available in the system, 40 000 synthetic cases were generated. In order to identify the best method of classification, several selected methods were studied: Bayesian networks, naive Bayesian classifier, decision trees and random forests, and multilayer perceptron.

Keywords: Machine Learning, Missing Person, Prediction of Reasons of Disappearance.

Introduction

The importance of the issue of searching for missing persons results from the number of events involving the disappearance of persons occurring in subsequent years. Figures Fig.1 and Fig.2 present numbers concerning Poland from 1997 to 2017.

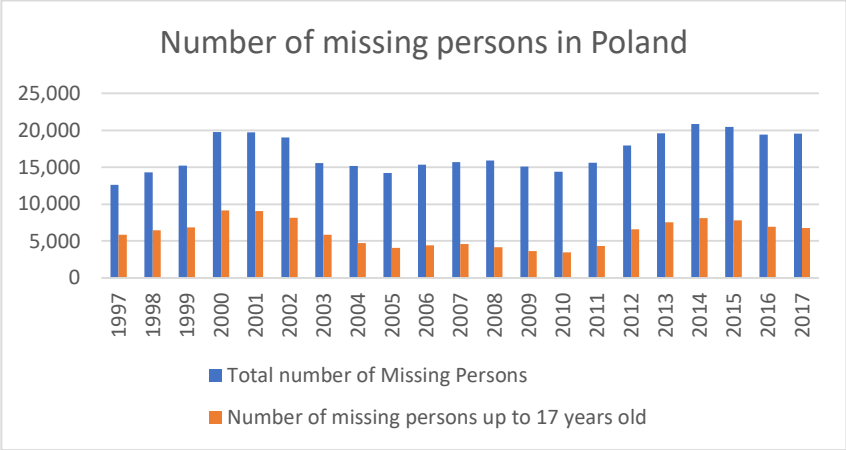

Fig.1: Number of missing persons in Poland in the years 1997 – 2017

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Source: https://statystyka.policja.pl/st/wybrane-statystyki/zaginieni/50885,Zaginieni.html

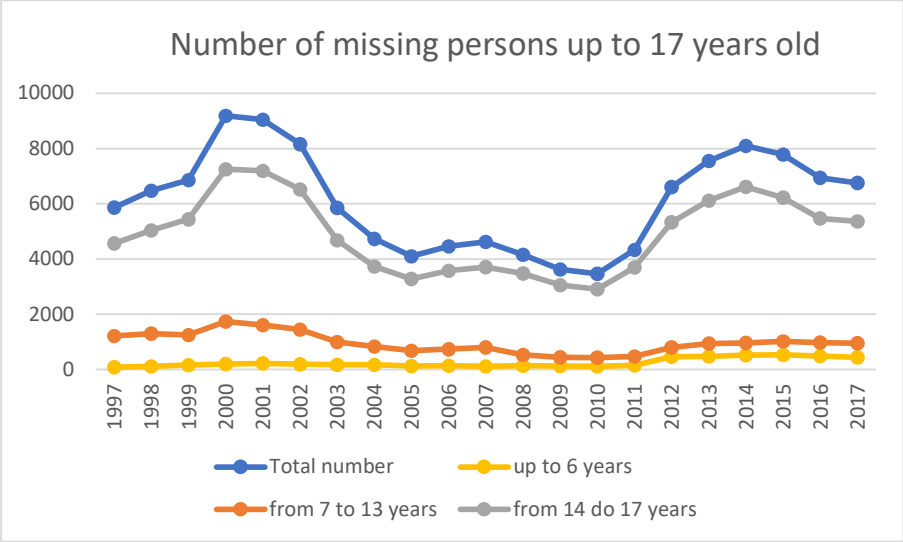

Fig.2: Number of missing persons up to 17 years old in Poland in the years 1997 – 2017

Source: https://statystyka.policja.pl/st/wybrane-statystyki/zaginieni/50885,Zaginieni.html

It can be seen that these are significant numbers, many of them concerning children and youth. The search activities of the Police often require decisions to be made with highly incomplete information under time constraints. Wrong decisions may result in a threat to the health or life of missing persons, especially children. In this context, it seems necessary to use modern IT methods of data collection and processing to facilitate decision making and improve the quality of these decisions. The literature contains a number of descriptions of applications of Machine Learning methods (ML) Blackmore K. (2002, 2003a,2003b,2005) methods of image recognition Chackravarthy, S. (2018), methods based on GIS systems Anderson P. et al. (2013)., Koester, R. J. (2008), supporting police work in the execution of search tasks.

In Poland, a project called "Developing a database and tools for semantic information and knowledge management in the area of disappearances and searches for people", financed by the National Center for Research and Development is coming to an end. The result of the project will be an IT system enabling, among other things, collection of data on both completed and currently ongoing searches. Historical cases will be the basis for calibration of ML methods used, among other things, to draw conclusions about: the level of searches, typing the cause of the disappearance, building behavioral models of different types of missing persons, developing standard operating procedures for the police, indicating normative documents and searching from the database, documents related to the disappearance cases, similar to the currently implemented ones. A separate functionality is a GIS module supporting the field search process.

The subject of this article is the use of ML methods to select the cause of disappearance based on the data collected during the search process. By analyzing historical cases of disappearances, they can be classified according to the cause of disappearance. Determining the cause of the disappearance may facilitate taking appropriate action in the search process. It may indicate the places of search, appropriate operational activities, predict the behavior of the missing person. It can therefore be assumed that on the basis of classified disappearances where the cause of the disappearance is known, a method of classification can be developed which will assign the new disappearance to one of the known classes. Thus, the problem of selecting the cause of disappearance will be considered as a problem of classification. ML methods are calibrated on the basis of records registered in the database describing historical cases of disappearances.

The rest of the work was divided into five parts. In the "Related work" section there will be an overview of missing persons' search methods, ML methods and GIS systems. The "Data description" section contains the definition of the data model describing the disappearances and the aggregated model and relations between the models. Aggregate model is used directly in ML methods. The method of generating synthetic data is also described. The real data available for the time being covers less than 600 cases. Therefore, in order to verify the ability of ML methods to predict the cause of disappearances, a method of generating synthetic data was developed, based on the previously developed model of disappearances in the form of Bayesian Network. The section "Classification methods" reviews the ML methods that have been used to infer the cause of the disappearance. The "Multiclass methods validation"

section discusses methods of quality assessment of classification methods when objects are classified into more than two classes. At the end, a chapter presenting the results of a computational experiment performed on data containing a large number of records of disappearances is presented.

Related Work

Works devoted to the issue of searching for missing persons can be divided into three categories, due to their subject matter:

a) general studies;
b) "Search and rescue - SAR" issues;
c) the use of ML methods to search for missing persons.

The group a) includes publications that generally describe the problems of missing persons. The report NCA (2017) as declared by the authors, “provides key statistical data regarding missing people.“ . The statistics included in the study cover the fiscal years 2012/2013 to 2015/2016 and include the following: the number of missing persons in the administrative division of the United Kingdom, data broken down by gender and age of missing persons, broken down by reasons for the disappearance, duration of the search. Factors that can be used to assess the risk to the missing person are indicated. In particular, statistical data were provided on: the distance between the point of disappearance and the place of finding, the duration of the search from the moment of reporting the disappearance to finding. The main types of causes of disappearance are classified. The report Newiss G. (2011) contains an analysis of 280 disappearances ending with the death of missing persons. It analyses the circumstances of the disappearance, the duration of the search and the time from disappearance to death, the vulnerability of the missing persons to the crime, the identified threat factors and methods of assessing the risk of disappearance. The works and reports discussed above contain primarily sets of statistics and observations on the behaviour of missing persons of different categories. These data are of course helpful in planning the search for missing persons, but they do not explicitly describe the tools that could speed up and improve the quality of the search conducted by the police. A very comprehensive set of publications includes the work Morewitz, S. and Sturdy Colls, C. (2016),. The Handbook contains articles of such character as described above. However, the Handbook does not include works on the use of IT systems, including artificial intelligence methods, ML or GIS.

An extensive group of publications includes group b), devoted to the search for missing persons, especially in the extra-urban area. These issues are called "Search and rescue - SAR". The name was taken from the military action of searching for missing ships or pilots of planes shot down or landed as a result of an accident in an unknown area. A classic position in the field of modeling and evaluation of the effectiveness of the search for these objects is the work Koopman B.O. (1946) The way of using Koopman's theory in the field of searching for missing persons in an out-of-town (undeveloped) area is presented, among others, in the works: Frost J.R (2000), Frost J.R (2001), Cooper D. (2000), Cooper, D., et al. (2003). Issues related to search process optimization are presented in the works Stone, L. D., (2016) Stone, L. D. (1977). The most extensive and frequently quoted study is the book Koester, R. J. (2008), It contains~~, first of all,~~ defined many types of disappearances, elements of behavioral models of persons missing in the field, rules of planning field searches, schedules and sets of actions to be performed during the execution of the search. Based on theoretical studies, a number of practical guides for planning and conducting the search have been developed. A good example of such a guide is the work Anderson P. et al. (2013).

The most interesting, from the point of view of the subject of this article, is the group c) of works, devoted to the application of artificial intelligence (AI) methods, including ML methods in the search for missing persons. The issue of using AI and ML methods for detecting criminal offences has a relatively broad literature. The book McCue C. (2006), and a number of scientific articles can be mentioned here. The paper Nath, S., V. (2006) presents the use of clustering methods to identify patterns of crime with regard to the spatial location of crimes. The article Chackravarthy, S. (2018), presents the use of deep learning algorithms to analyze recordings from city cameras to automatically detect criminal activity. The article Prabakaran, S. and Mitra, S. (2018), provides an overview of the use of data mining algorithms to detect and analyse many different types of crime, such as fraud, robbery, murder, rape, traffic crime, cybercrime. The paper McClendon, L. and Meghanathan, N. (2015), presents the use of regression algorithms to detect and compare crime patterns identified in two different crime data sets. The work Wang, T. et al. (2013),] describes a tool for automatic detection of crime patterns.

However, the above mentioned works do not address the issue of missing persons. The use of AI and ML in the search for missing persons is not widely available in the literature. Interesting works Blackmore K. (2002, 2003a,2003b,2005) can be pointed out here. They contain a precise description of research aimed at building an

inquiry system to support police work in searching for missing persons. It was assumed that only cases of disappearances involving the greatest threat to the lives of missing persons, murder, victims of criminal crimes and runaway will be considered. Of the many data, 357 cases were selected, which were used to calibrate the selected classification method. It has been assumed that the most appropriate method of classification will be the classification rules. It was assumed that the rules will be the method best supporting the intuition of the police officers carrying out the search process. The results of the research are presented in detail in (Blackmore K. (2002, 2005). The results obtained were not very satisfactory. The average Accuracy was 71%. However, the analysis of the error matrix showed that the quality of the classification for the different causes of disappearance was definitely different. The algorithm classified correctly 84% of runaway and only 39% of homicides and 47% of cases of victims of criminal crimes. The works Blackmore K. (2003a, 2003b) describe the use of artificial neural network (ANN) methods to classify cases of disappearances. The use of ANN has significantly increased the accuracy of the classification of disappearances to 99%. However, in order to obtain a set of classification rules, methods combining the ANN method and genetic algorithm to extract a set of rules from the neural network were used. Thus, obtained a set of rules, obtained a classification accuracy of 86%.

The problem considered in this paper is formulated similarly to that in the papers Blackmore K. (2002, 2005). However, it has been assumed that methods will be developed to conclude all identified causes of disappearance, which also include the causes considered in the paper Blackmore K. (2002, 2005). The data being the basis for the analysis came from the archives of the Polish Police. In order to identify the best method of classification, several selected methods were studied: Bayesian networks, naive Bayesian classifier, decision trees and random forests, and multilayer perceptron. Due to the fact that the number of real disappearances currently available in the computer database was relatively small, in the order of 500 cases, a synthetic case generator was built. It allowed to effectively increase the available research material and to compare the quality of the methods used and to indicate those that are most promising for further research.

Data Description

The information collected on the missing person and its surroundings (including the circumstances of the disappearance, weather conditions, relations to other persons) we shortly describe in a formal model. On the basis of the model, there will be defined the methods dedicated to generation of synthetic data and aggregation of the features. Hence, we will further assume that:

- S – a set of "missing persons" cases;
- F^1 – non-empty and finite set of possible "detailed" features describing the case (first-order features). This is information collected in the course of the investigation;
- L^1 – number of features in set F^1;
- F^2 – non-empty and finite set of possible "aggregated" features describing the case. This is "the secondary" information, determined on the basis of the values of the features in set F^1;
- L^2 – the number of attributes in the set F^2;
- $F=F^1 \cup F^2$ – non-empty and finite set of all possible "aggregated" attributes describing the case;
- $f \in F$ – feature *f*, defined by the ordered pair $<id_f, D_f>$, where:
    - id_f – identifier of feature *f*,
    - D_f – domain of values for feature *f*;
- $D = \bigcup_{f \in F} D_f$ – domain of values for features describing the case.

Each case $s \in S$ is described by a feature vector consisting of two subvectors $s=<S^1, S^2>$, where:

- the vector of "detailed" features:
    - $S^1 = <s^1_1,\ldots, s^1_i, \ldots, s^1_{L1}>$, $s^1_i \in F^1$, $i=1..L^1$;
- vector of "aggregate" features:
    - $S^2 = <s^2_1,\ldots, s^2_i, \ldots, s^2_{L2}>$, $s^2_i \in F^2$, $i=1..L^2$.

The value of each feature of vector S^1 in the case *s* at the moment *t* – this is the so-called "information on the case" established at the moment *t*:

- $v: S \times F^1 \times T \rightarrow D$,
- $v(s,f,t) \in D_f$, $f \in F^1$, $s \in S$.

If the information is not time-dependent, a fixed value may be assumed:

- $V: S \times F^1 \rightarrow D$,
- $V(s,f) \in D_f$, $f \in F^1$, $s \in S$.

A value of feature *f* defined by the domain D_f might be nominal, ordinal or numerical.

The following are selected features from F^1 collection, constituting "information on the case":

- s^1_1: Gender of the missing person:
  - id_{s11} = "sex"
  - D_{s11} = { 0: "male, "1: "female" }
- s^1_2: Previous suicide attempts:
  - id_{s12} = "suicide_attempts"
  - D_{s12} = { 0: "Unknown",1: "Not registered ",2: "Simulated", 3: "Real"}
- s^1_3: Somatic illnesses:
  - id_{s13} = "somatic_illness"
  - D_{s13} = { 0: "hypertension", 1: "chronic coronary artery disease", 2: "cancer", 3: "chronic respiratory diseases", 4: "diabetes", 5: "life-threatening", 6: "non-life-threatening" }
- s^1_4: Traumatic events/experience:
  - id_{s14} = "traumatic_events"
  - D_{s14} = { 0: "abandonment by someone", 1: "death of a relative", 2: "unforeseen situations difficult to handle", 3: "rape of a person", 4: "violence against a person", 5: "formal/legal problems", 6: "change of marital status", 7: "birth of a child", 8: "a disappointment to sb./sth." }

The data constituting "case information" are collected during the investigation of missing persons at different stages and therefore at different moments in time. This means that at a given point in time *t* not all of the features of the S^1 vector in case *s* have to be fixed - can be considered to be non-existent. In the proposed model we use a complete set of features with the length L^1 (vector S^1).

Aggregated Data Model

The number of features in the set of F^1 contains more than 30 "detailed" features describing the case ($L^1 \approx 30$), with different levels of detail - they represent qualitatively different values. Most methods of data analysis require sets with a large amount of data - assuming that L^1 is the largest possible number of different "detailed" features, the number of all potential combinations of features can be determined as "2^{L1}-1". The "curse of dimensionality" has a negative impact on the quality of prediction, exceeds the requirements for computing power, worsens the response times of the implemented methods. In order to reduce the length of the features' vector, it is possible to (1) select significant features and discard excessive ones, and (2) apply aggregation of detailed features into generalised ones. The first step is the selection of traits - in the proposed model we have selected a subset of mandatory features from set F^1, ensuring the consistency and completeness of the information collected in the case. The next step is to aggregate the "detailed" characteristics into "aggregated" characteristics. For this purpose, we specify a set of functions corresponding to methods, which for each case $s=<S^1, S^2>$, $s \in S$ determine the values of attributes in the S^2 vector (of length $L^2 < L^1$) on the basis of values of attributes in the S^1 vector:

- $X = \{X_i: (F^1)^{L1} \rightarrow F^2, i=1..L^1\}$

The idea of aggregation can be illustrated as follows:

$$S^1 = <s^1_1,\ldots, \mathbf{s^1_3},\ldots, \mathbf{s^1_{14}}, \mathbf{s^1_{15}}, \ldots, s^1_i, \ldots, \mathbf{s^1_{20}}, \ldots, s^1_{L1}>, s^1_i \in F^1, i=1..L^1$$

$$\mathbf{X_3}$$

$$S^2 = <s^2_1 ,\ldots, \mathbf{s^2_3},\ldots, \mathbf{s^2_8},\ldots, s^2_i, \ldots, s^2_{L2}>, s^2_i \in F^2, i=1..L^2, L^2 < L^1$$

The aggregation function for characteristic s^1_3 ("Somatic diseases") is presented below:

- X_3: $(F^1)^{L1} \rightarrow F^2$;
- $X_3(s^1_1,\ldots, s^1_i, \ldots, s^1_{L1}) = \begin{cases} 0, & when\ s_3^1 = 0 \text{ v } s_3^1 = 2 \text{ v } s_3^1 = 4 \text{ v } s_3^1 = 5 \\ 1, & when\ s_3^1 = 1 \text{ v } s_3^1 = 3 \text{ v } s_3^1 = 6 \end{cases}$.

Other aggregation functions concern the following characteristics are as follows: age, ability_impl, life_threat, adjustment, suicides, medication, health_condition, temporary_hardness, relations_with_other_people, traumatic_events, higher_mood, negative_self, negative_others, behaviour_change, leave_preparation, weather, terrain.

Synthetic Data Generation

Synthetic data are all data that describe a specific phenomenon or condition and that have not been obtained by direct observation, but have been produced on the basis of a model of the phenomenon (e.g. simulation). They are generated when: (1) there is not sufficient real data, (2) in order to obtain specific data that are infrequent in nature, (3) if real data cannot be used due to privacy concerns (i.e. protection of the privacy of the individuals represented in the real data). Synthetic data allows methods and algorithms to be analysed across a wider range of scenarios and under very different conditions. In this paper, the synthetic data set (in contrast to the imbalanced dataset with real data, provided for research) is expected to contain samples for all causes of disappearance.

Generation of synthetic data is widely used in scientific research in various fields, e.g.: pattern recognition in a research study by Varga and Bunke (2003), data mining in a study by Liu et al (2011). There are a lot of different tools with functions to generate synthetic data. In the presented method we used GeNIe software which is an environment for building graphical Bayesian network models. GeNIe was developed at the University of Pittsburgh and further BayesFusion, LLC – as one can read in the book by BayesFusion (2020). With support of GeNIE/SMILE, we have implemented model of belief networks as Bayesian network to generate the values both of detailed and aggregated features. Since we are predominantly interested in proving the legitimacy of the synthetic data cases, and considering that no complete and comprehensive data exists in the available databases, a particular focus was required on developing an adequate network model. Bayesian networks are acyclic directed graphs where nodes represent random variables and arcs represent direct probabilistic dependences between them. The selection of variables for the model and the definition of links were accomplished with the help of several independent field experts. Further, to parameterise the model (in tables of conditional probabilities), values estimated on the basis of statistics from real case databases were used. In this way, both high compliance of the model with reality and the fact that the "causes" are approximately equally represented was ensured.

Synthetic data generation is a "inverse problem" to Bayesian network modelling. Having an evaluated model, in the first step, values for each root node are sampled from their unconditional distribution. Random values are generated in the nodes (without parents) according to estimated distributions and parameters. In the next step, the "child nodes" resulting from relationships with the "parent nodes" and the random values generated there are updated. That cycle is repeated iteratively until values have been sampled for all nodes in the model. Further, given the distributions, we generated several data files to teach and test the algorithms for prediction of reason for disappearance. Each individual record of the generated file contains values of the features randomly generated from the joint distribution modelled by set of nodes in the network. In order to balance the causes of disappearances we have used the function "Bias samples by existing evidence". It resulted in data related to the posterior joint probability distribution (i.e., biased by the observations) rather than from the original distribution.

The Table 1 shows examples of values of several features that were generated using the Bayesian network model within the GeNIe package.

Table 1: Examples of the generated random values of chosen features

sex	*suicides attempts*	*somatic illnesses*	*traumatic events/experience*	*relations to other persons*
male	real	no	abuse against a person	threat from a criminal group
male	no	cancer	difficult situations	no
male	simulated	no	abandonment by somebody	conflict at school

female	no	diabetes mellitus	no	unknown
female	no	hypertension	unknown	conflict in the relatives

Case Study

In the project supporting the process of searching for missing persons, the following methods were chosen to solve the problem of selecting the cause of the disappearance:

- Bayesian network;
- Decision trees;
- Random forests;
- Multilayer perceptron;
- SVM.

The application of many methods for the study resulted from the need to verify the quality of these methods in real life and to select the best one based on the quality of the classification of the causes of disappearance.

Bayesian networks were chosen as a method of selecting the cause of disappearance for two reasons. It can be used relatively easily to build a classification model based on expert knowledge. This is particularly important in the absence of real data to teach (calibrate) the model. Secondly, Bayesian Network could be used as a synthetic data generator to test other classification methods and other functionalities of the designed IT system. The rules of generating synthetic data using Bayesian networks are described in the previous section.

The structure of the Bayesian Network developed for the project is shown in Fig. 3. The indicated probability values correspond to the case of disappearance caused by a suicide.

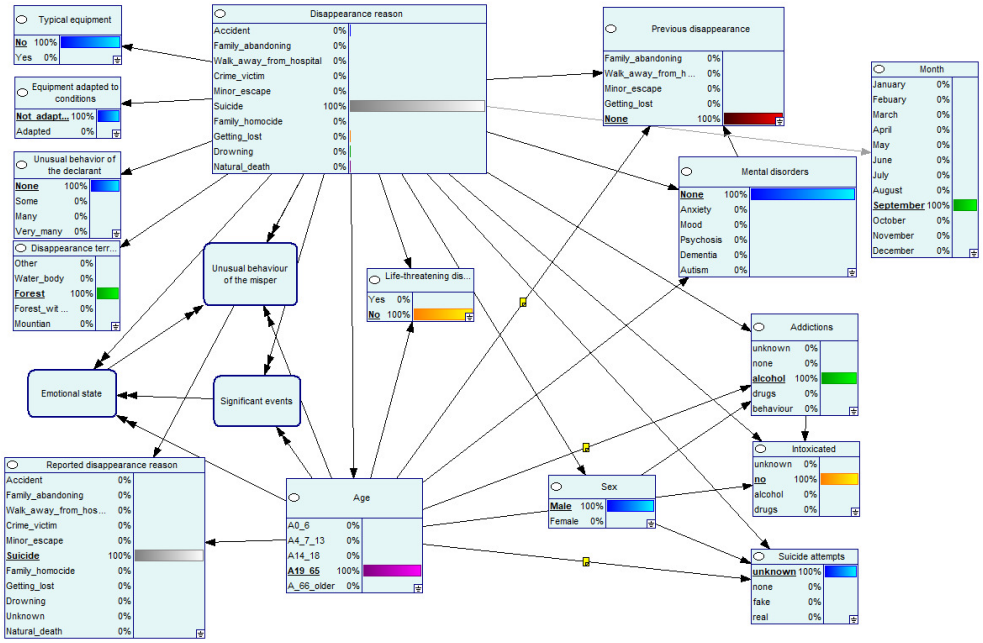

Fig.3: The structure of the Bayesian Network and the result of the inference in the node "Disappearance reason", with specified values of other network nodes.

The Accuracy Index, defined as follows, was used to evaluate the classification methods:

$$Accuracy = \frac{properly\ classified\ cases}{all\ cases}$$

To verify the relevance of the selected methods of classification to the cause of disappearance identification, a computational experiment was conducted. For this purpose, two sets of data were used:

- Set 1: 617 real and 40000 synthetic cases,
- Set 2: 617 real cases.

The first dataset is a complete one, which means that it contains all cases. The latter is a subset of the previous one. It does not contain cases that occurred in the following months: January, April, July, and October. The second set of data allowed us to assess how much a reduction in the size of the training set can reduce the quality of classification. Table 2 shows the abbreviation of disappearance causes for the simplicity of the tables presented in this section.

Table 2: Contribution of each disappearance reason in the whole dataset.

Disappearance reason	Abbr.	Number of cases in Set 1 (%)	Number of cases in Set 2 (%)
Accident	AC	4146 (10,2%)	52 (8,4%)
Family abandoning	FA	3966 (9,8%)	59 (9,6%)
Walk away from hospital	WA	1891 (4,7%)	53 (8,6%)
Crime victim	CV	4057 (10%)	21 (3,4%)
Minor escape	ME	7995 (19,7%)	89 (14,2%)
Suicide	SU	7887 (19,4%)	80 (13%)
Family homicide	FH	2068 (5,1%)	43 (7%)
Getting lost	GL	8332 (20,5%)	116 (18,9%)
Drowning	DR	47 (0,1%)	11 (1,8%)
Natural death	ND	201 (0,5%)	93 (15,1%)

The main dataset is imbalanced meaning, that there is an unequal distribution of classes within it. Table 2 shows the distribution of classes in the main dataset with their percentage share. Table 3 shows the results we got after training several machine learning algorithms on the main and “real” datasets.

Table 3: Quality of classification for various methods and two datasets

Method	Accuracy (Set 1)	Accuracy (Set 2)
Multi-layer Perceptron	0.85	0.33
Decision Trees	0.70	0.44
Random Forests	0.78	0.46
Bayes Network	0.88	0.48
Support Vector Machines	0.52	0.29

The first set was divided into training and test data (respectively 75% and 25% of the datasets) using a 4-fold stratified cross-validation technique. The learning process was conducted 4 times for each method using different parts of the data. For the second set the synthetic cases were used as training data and the methods were tested using real cases. To train the Neural Network model, we performed feature scaling for the whole dataset using Min-Max Scaling. To find best suited NN hyper-parameters we used the Grid Search method. Best results were achieved for the model with two hidden layers with 23 and 57 neurons respectively with ReLU activation function across the network.

The best performing methods on real data set are Bayes Network and Random Forest. In the case of synthetic data test, Bayes Network and Neural Network respectively. Data that was used for the learning and the testing purposes of this paper was generated via the Bayes Network method. That can be the reason for good results in the case of Set 1. Low results of the second set are due to poor data quality (many records had missing features and output class) and a small number of examples. Despite that, Random Forest altogether with Decision Trees and Bayes Network show promising results. Table 4 and Table 5 show confusion matrices for the best-performing methods. Table 6 and Table 7 presents the outcomes of testing on a real dataset.

Table 4: Confusion matrix for Random Forest

		Assigned Class									
		AC	FA	WA	CV	ME	SU	FH	GL	DR	ND
Actual Class	AC	2309	213	57	153	332	249	1	825	2	5
	FA	279	2899	2	158	0	338	96	192	0	2
	WA	38	7	1479	94	101	40	1	116	6	9
	CV	215	162	20	2552	527	152	5	412	2	4
	ME	100	2	0	89	7029	510	65	190	1	9
	SU	9	245	2	45	673	6595	81	236	0	1
	FH	28	58	5	36	81	98	1669	90	1	2
	GL	517	112	110	192	211	282	10	6890	2	6
	DR	3	3	1	1	10	5	0	17	7	0
	ND	35	2	3	5	3	6	15	53	2	77

Table 5: Confusion matrix for Bayes Network

		Assigned Class									
		AC	FA	WA	CV	ME	SU	FH	GL	DR	ND
Actual Class	AC	3172	154	37	129	123	32	10	488	1	0
	FA	115	3517	3	132	0	93	45	56	0	5
	WA	33	11	1718	31	28	3	3	63	0	1
	CV	121	145	26	3271	220	28	12	234	0	0
	ME	97	3	13	122	7518	177	20	44	0	1
	SU	22	154	0	26	364	7287	15	18	0	1
	FH	11	57	4	25	31	17	1916	5	0	2
	GL	391	88	57	191	72	45	2	7478	3	5
	DR	13	1	1	2	3	0	0	4	23	0
	ND	22	16	5	7	1	3	3	43	0	101

Table 6: Confusion matrix for Neural Network tested on real data

		Assigned Class									
		AC	FA	WA	CV	ME	SU	FH	GL	DR	ND
Actual Class	AC	2	20	1	0	11	13	3	1	0	1
	FA	0	39	4	0	0	10	0	6	0	0
	WA	20	2	5	1	3	10	5	7	0	3
	CV	0	9	0	1	5	5	0	0	0	1
	ME	2	4	0	1	64	12	2	4	0	0
	SU	0	13	0	0	6	55	4	2	0	0
	FH	1	5	0	0	4	11	20	0	0	2
	GL	3	8	2	0	21	56	8	17	0	1
	DR	1	2	0	0	4	1	0	2	0	1
	ND	13	19	8	6	0	1	9	31	0	6

Table 7: Confusion matrix for Support Vector Machines tested on real data

		Assigned Class									
		AC	FA	WA	CV	ME	SU	FH	GL	DR	ND
Actual Class	AC	35	0	1	0	1	5	2	8	0	0
	FA	30	4	2	0	3	10	0	10	0	0
	WA	20	2	5	0	3	10	5	7	0	0
	CV	11	1	0	1	1	4	1	2	0	0
	ME	34	0	0	1	26	6	1	22	0	0
	SU	34	0	2	0	5	24	0	15	0	0
	FH	6	0	0	0	1	0	34	2	0	0
	GL	48	0	2	0	4	14	1	47	0	0
	DR	7	0	0	0	1	1	0	2	0	0
	ND	19	0	2	1	1	10	8	51	0	1

Making use of synthetic data allowed us to check whether ML methods work in the discussed setting. Although results for real data are not great, we strongly believe that after more real data will be gathered the methods will give real-world results.

Conclusion

Statistical data indicate a significant size of the phenomenon of missing persons in Poland. In that problem, the time from the moment of disappearance to the moment of making a decision should be as short as possible. Equally, decisions taken by the police, with limited knowledge, should be appropriate to the situation, reason and possible threats. Currently, the Police do not have any IT tools to facilitate the gathering and processing of data on historical cases. The purpose of such processing would be to use the experience of historical cases to increase the efficiency and effectiveness of searches in new cases of disappearances.

The formal model for the description of collected information about the missing person and its surroundings (including the circumstances of the disappearance, weather conditions, relations with other people) ensures data consistency and completeness in decision support, especially regarding a reason of disappearance.

This paper presents the concept of using ML methods to infer the cause of the people missing. Based on historical cases, an aggregated model of disappearances was built. Six ML methods were selected and calibrated on the basis of historical cases, and then their quality was compared. Due to the relatively small set of real cases available in the system, 40 000 synthetic cases were generated. The model of disappearances in the form of the Bayesian Network was used to generate synthetic cases.

ML methods are sensitive to the size of data sets, therefore dimensional reduction is a key issue which determines the quality of classification results. In the proposed solution, the reduction of data volume was achieved by selecting features and aggregating retail features to generalised ones. This has reduced the complexity of the classification tasks, including the space of possible vectors of feature value combinations.

The numerical example shows that the random forest method shows the highest quality of classification. A good matching of the Bayesian Network is probably due to the fact that it was used to generate synthetic data. Further research to compare the usefulness of ML methods for identifying the cause of missing persons will be carried out using an appropriate amount of data from real sources. Studies are also planned to investigate the impact of changes in data structure on the need to recalibrate classification models.

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Long-Term Assessment of Engineering Enterprise Product Technological Competitiveness

Iryna KREIDYCH
Doctor of Economics, Professor
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine
ORCID ID:0000-0002-4594-2160
e-mail: kreidichin@gmail.com

Inna MILKO
PhD in Economics, Associate Professor
Simon Kuznets Kharkiv National University of Economics, Kharkiv, Ukraine
ORCID ID: 0000-0002-5962-0082
e-mail: milkoinna@gmail.com

Oksana KAZAK
PhD in Economics
Borys Grinchenko Kyiv University, Kyiv, Ukraine
ORCID ID: 0000-0003-2088-9022
e-mail: kazakoksana1974@gmail.com

Maryna YANCHUK
Doctor of Economics
National Aviation University, Kyiv, Ukraine
ORCID ID: 0000-0002-6614-3691
marina_y2006@ukr.net

Abstract

This article is devoted to the development of a method of long-term assessment of technological competitiveness of enterprises taking into account the indicators of absolute and specific technological value of mechanical engineering products by areas of manifestation and using a scenario approach. Technological competition that exists at the macro, meso and micro levels of the economic system improves the solution of economic and organizational development problems and strengthens the market position of machine-building enterprises. Economic-mathematical modelling is carried out by combining asynchronous elements of situational modelling and features of Seidel's method as the most effective way of modelling technological competitiveness of products, companies and clusters in the national system of competitiveness as a complex system. The outlined combination makes it possible to obtain combinational equations at all stages of the iteration, as well as to form alternative calculations that describe the state of the finite elements of the state in cases of statistical and other disruptions and changes during the implementation of a particular scenario. This allows us to identify critical elements of the effect of increasing technological competitiveness. The results of the research will allow machine-building enterprises to assess the prospects of technological competitiveness of products based on absolute technological cost and specific technological cost in the areas of its manifestation.

Keywords: High-Tech Products, Export, Clustering of High-Tech Products, Mechanical Engineering Enterprises.

Introduction

The ability to create, to effectively attract, and to use technological innovation contributes to enterprise competitiveness, which is a significant advantage in the highly competitive environment. Technological competition, which exists at the macro-, meso- and micro-levels of the economic system, improves solving economic and organizational development problems and strengthens the market position of engineering enterprises. In this context, the need for assessment of mechanical engineering enterprise technological competitiveness is relevant.

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Literature Review

In research (Measures and programs …, 1996: 92), it is proposed to determine the competitiveness of products under static conditions adjusted for the share of the *i*-th product in sales volume over the studied period, the importance rate of the *j*-th market in which the product is presented and the competitiveness of the *i*-th product in the *j*-th market. The disadvantage of the differential approach is its inability to determine the impact of parameters on consumer preferences. The combined method enables to express the ability of the product to compete under certain market conditions through comprehensive quantitative rate - competitiveness indicator (Safronov, 1998: 237). For a diversified enterprise that produces a variety of products, competitiveness indicator of the mass of commodities can be calculated as an average weighted of competitiveness indicators of each product using a formula (Measures and programs …, 1996: 68-173). The paper of Shkardun V.D., Akhtiamova T.M. (2000) (Shkardun, Akhtiamova, 2000: 49-51) considers a method of enterprise competitiveness assessment, which is represented as the ratio of properties of products to the amount of claims to them; the technology of a product is determined according to its characteristics: economic, technical, environmental, socio-psychological and legal ones. The competitiveness is defined as the average geometrical of the competitiveness indicators of each factor group. Other researchers define the problem of enterprise competitiveness assessment the way that Shmulevich T.V. (1999) stated it: to determine the values of competitiveness indicators, one should identify the numbers of most similar ones relative to the reference enterprises (Shmulevich, 1999: 115). Competitiveness indicators mentioned were as follows: return on assets, on investments, on fixed assets, on production; capital productivity; turnover ratio of current assets, autonomy, flexibility and absolute liquidity. Some researchers suggest to use a model approach for integrated competitiveness indicators determination, the essence of which is to develop economic and mathematical model of the competition object, for example, such as the problem of the effect of the acquisition and use of the optimization of a product, the maximizing of the market share which is occupied by this or another manufacturer and comparison of the model (forecasting) indicators of economic development or state. According to Chernyshevskii, L.M. (Chernyshevskii, 2008), the application of an individual indicator system is objectively stipulated by the complexity and ambiguity of this level, and he proposes to combine technical indicators with a scientific approach and, as a result, to consider the scientific and technological level of production.

The purpose of the article

is developing a long-term assessment of mechanical engineering enterprise technological competitiveness method on the basis of indicators of absolute and specific technological cost of mechanical engineering enterprise products according to areas of manifestation and with the use of scenario approach.

The main results of the research

Technological competitiveness of products, enterprises and clusters in the national competitiveness system is a complex system, because it consists of a significant number of interacting components; consequently, it acquires some qualitatively new features which are not typical for each of its constituents considered in isolation from others. This statement is confirmed by research.

Determining the competitiveness of a technological product.

O. Andreeva gives a more complete definition of product competitiveness: “competitiveness is a characteristic of the product-competitor depending on compliance with competitive public needs and with cost to meet it” (Andreeva, 1997:118-125). Besides, the measure of product compliance with public needs for various markets is different, which is not included in the definition. These shortcomings are eliminated in the following definition (Grosheva, 1991: 72): “competitiveness is nothing else than demonstration of product quality in the market relations; it is defined by the ability of products to be sold in a particular market to the maximum possible extent and without losses for the manufacturer.” A systemic definition of product competitiveness is provided by Faskhiev, K.A., Kostin, I.M.: “Competitiveness of a product is estimated by the ability to outperform, at some time, without losses, in terms of quality and price, the characteristics of the counterparts in a particular segment of the market” (Faskhiev, Kostin, 2001). From our point of view, the most comprehensive description of competitiveness is its definition as a market product feature, which represents its demand in the market, the ability to bring profit (Antoniuk, 2005: 275). Competitiveness is the ability to stay ahead of competitors in the market and to ensure the efficiency of enterprises activity through technological innovations, scientific and innovative potential management, technical level of production, technological capabilities, information activities. It is closely related to financial and organizational competencies, whereby technological product competitiveness is a set of competitive advantages of technological, technical, qualitative nature, corresponding to its functionality and customer value.

Determinants implementation of situational modeling of technological competitiveness

During modelling technological competitiveness of products, enterprises and clusters, it is reasonable to be guided by the following determinants: 1) all material intensity indicators define the cost value according to the type of technological construction of products; 2) a work package to reduce the labour-intensity and technological cost of products in use includes the application of design solutions that help reduce the cost of training and make-ready, technical control, transportation of products; reduce resource consumption, replace components of the product while maintaining its quality; enhance harmonization and standardization of the product components; facilitate and simplify conditions for maintenance and repair in order to limit the requirements for personnel qualification; 3) technological production cost is determined in monetary terms as the sum of all expenditure and used when the cost parameters are essential for the enterprise or cluster to improve its technological competitiveness; or it is determined as a percentage of the total production cost; 4) along with the absolute technological cost, the technology specific cost is applied for the area of its manifestation. Therefore, we propose to carry out mechanical engineering enterprise product technology competitiveness modelling in order to assess the competitiveness potential of the entity and its possible changing after taking a number of strategic measures.

During the implementation of situational modelling technological competitiveness of products, companies and clusters with asynchronous nature, one includes in the scheme functional (logical) elements, and their individual components in their integrated form (as a multitude) in the outputs of the scheme, are designated as $x_1, x_2, ..., x_n$. Thus, $e_1, e_2, ..., e_k$ are characteristics of the system. For example, technological competitiveness of certain products in the system of national competitiveness (as a simple multitude of elements) can form a scheme with a single output pole that characterizes its value during certain change, where *e* will respectively have two values: 0 (constant value) and 1 (variable value) at the output. To characterize the technological competitiveness of enterprises and clusters, we can form a scheme with four poles, which characterizes 16 states ($e_1, e_2 ... e_{16}$); thus, each element of the scheme has to perform a certain function of the current multitude $f_1, f_2, ..., f_k$. The function is understood as a system of logical equations from the description of a single parameter of enterprise or cluster technological competitiveness.

Scenario approach to modeling the increase of technological competitiveness

Let us carry out modelling the material intensity and the technological competitiveness of ACURA PJSC "Stakhanov Wagon Works" remote starting devices with the conditions given in Figure 1.

We presented the input data for modelling the material intensity and the overall technological design of ACURA devices in Table 1.

Table 1: The input data for modelling the material intensity and the overall technological design of ACURA devices

e_2	Value	e_3	Value	e_4	Value
R_p	0,09	E_p	0,1	M_p	0,06
R_t	0,10	E_t	0,09	M_t	0,06
R_r	0,08	E_r	0,05	M_r	0,01
$\boldsymbol{R_{total}}$	**0,27**	$\boldsymbol{E_{total}}$	**0,24**	$\boldsymbol{M_{total}}$	**0,13**

(compiled by the author)

Based on the results of modelling the material intensity and the overall technological design of ACURA remote starting devices (for scenario 1), we can conclude that only 2.4% reduction of the planned technological chip design cost reduction in the retail price per ACURA unit sales can be achieved. Thus, enterprise will not achieve the planned increase of technological competitiveness of ACURA remote starting devices in the national market, although some positive effect of these activities will be observed.

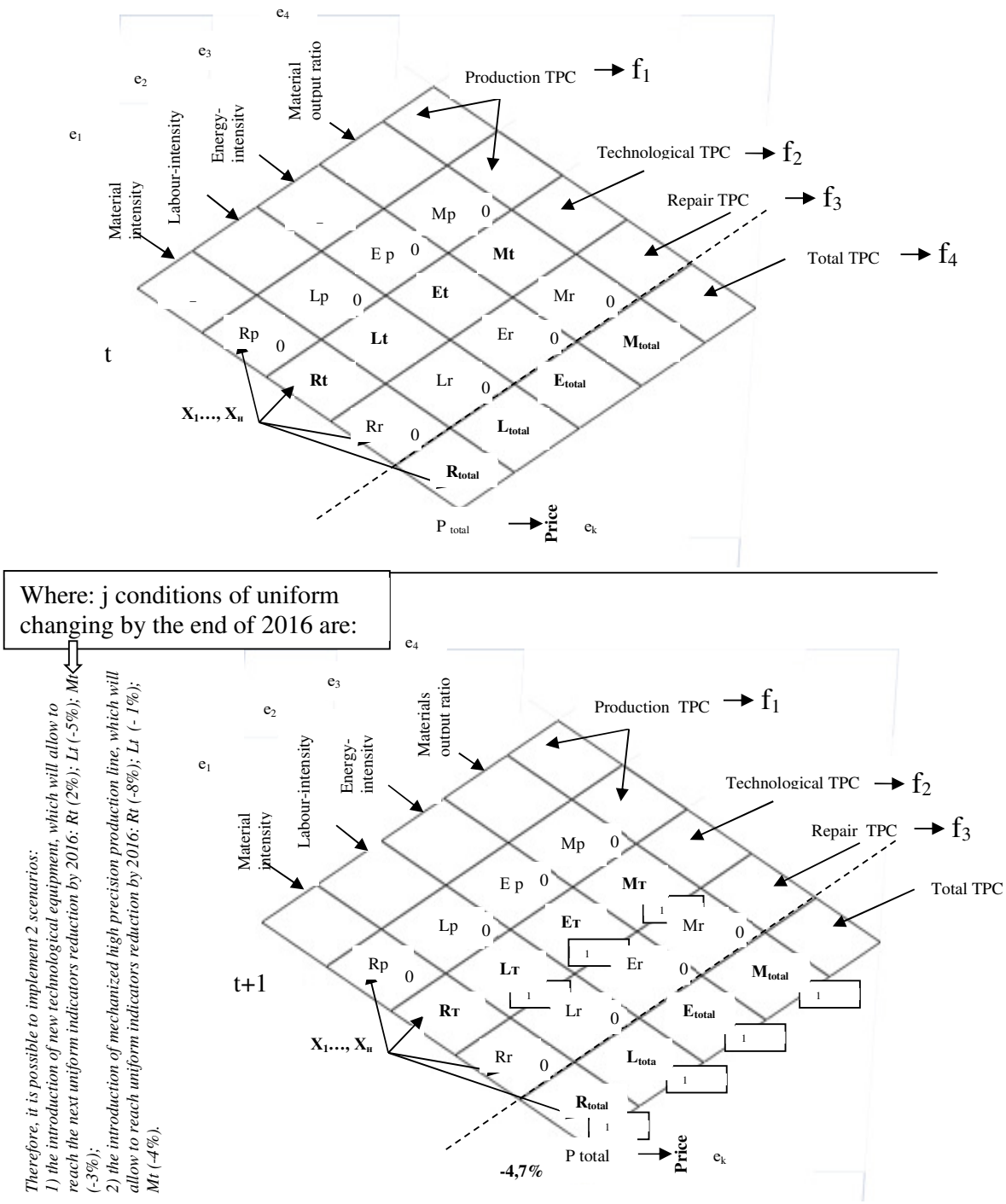

Figure 1: Scheme of the material intensity and TPC of ACURA devices modelling
(*adapted by the author on the basis of Matviichuk, 2009*)

Let us work out a mathematical equations system, which evaluates the changing of state factors for the 1-st scenario (Figure 2).

Changing of e	Changing of R_{total}	Changing of e_k total per unit.	period
		Base 10,15	t
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,1- (0,1*0,004)+0,09-(0,09*0,001)+0,06-(0,06*0,006) = 0,1*1+0,09*1+0,06*1 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,6376 →	10,13 →	t+1
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0996-(0,996*0,004)+ 0,089-(0,089*0,001)+0,059-(0,059*0,006) = 0,1- (0,1*0,004)+0,09-(0,09*0,001)+0,06-(0,06*0,006) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,6367 →	10,12 →	t+2
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0992-(0,0992*0,004)+0,0889-(0,0889*0,001)+0,0586-(0,0586*0,006)= 0,0996-(0,996*0,004)+ 0,089-(0,089*0,001)+0,059-(0,059*0,006) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,6358 →	9,93 →	t+3
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0988-(0,0988*0,004)+0,0888-(0,0888-0,001)+0,0582-(0,0582*0,006)= 0,0992-(0,0992*0,004)+0,0889-(0,0889*0,001)+0,0586-(0,0586*0,006)	0,6346 →	9,92 →	t+4
0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1 0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0984-(0,0984*0,004)+0,0887-(0,0887*0,001)+0,0578-(0,0578*0,006)= 0,0988-(0,0988*0,004)+0,0888-(0,0888-0,001)+0,0582-(0,0582*0,006) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,6335 →	9,91 →	t+5

Figure 2: The mathematical equations system which evaluates the changing of state factors for the scenario 1*.

*Note: * Changing of $e_1..e_n$ is uniform over 5 years*
(compiled by the author)

On the basis of the results, let us work out a mathematical equation system which evaluates the changing factors of state for the 2-nd scenario.

From the results of modelling the material intensity and of the general technological design of ACURA remote starting devices (for scenario 2, see Figure 3), we can conclude that, from the planned reduction of chips technology design cost (in case of mechanized production precision lines acquisition), the planned reduction in retail prices (4.7%) per ACURA unit sales can be achieved. Thus, the enterprise will reach the planned increase of ACURA remote starting device technological competitiveness in the national market.

The modelling results show the scheme elements state changing process, but the function changing at the input – approximately, as there are interim results, and, therefore, there exists a statistical risk of failure within the iteration. Therefore, in the process of enterprise and cluster technological competitiveness modelling, it is reasonable to use methods of simultaneous nature (for example, economic researchers used Seidel method (Strategy 2010, 2009)). According to this modelling method, it is appropriate to use the mathematical equations shown in Figure 4.

Changing of e	Changing R_{total}	Changing of e_k total per unit	Period
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,1- (0,1*0,016)+0,09-(0,09*0,0002)+0,06-(0,06*0,008) = 0,1*1+0,09*1+0,06*1 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,638	10,15 10,02	t t+1
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0984 – (0,0984*-0,016)+ 0,0899-(0,0899-0,0002)+0,0595-(0,0595-0,008) = 0,1- (0,1*0,016)+0,09-(0,09*0,0002)+0,06-(0,06*0,008) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,635	9,92	t+2
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0968-(0,0968*0,016)+ 0,0898-(0,0898*0,0002)+0,059-(0,059*0,008) = 0,0984 – (0,0984*-0,016)+ 0,0899-(0,0899-0,0002)+0,0595-(0,0595-0,008) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,633	9,83	t+3
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0952-(0,0952*0,016)+0,0897-(0,0897-0,0002)+0,0585-(0,0585-0,008) = 0,0968-(0,0968*0,016)+ 0,0898-(0,0898*0,0002)+0,059-(0,059*0,008) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,631	9,75	t+4
0,09*1+0,1*1+0,06*1= 0,09*1+0,1*1+0,06*1 0,0936 –(0,0936-0,0-16)+0,0896-(0,0896-0,0002)+0,058-(0,058*0,008)= 0,0952-(0,0952*0,016)+0,0897-(0,0897-0,0002)+0,0585-(0,0585-0,008) 0,08*1+0,05*1+0,01*1=0,08*1+0,05*1+0,01*1	0,628	9,67	t+5

Figure 3. The mathematical equations system which evaluates the changing of state factors for the scenario 2*.

Note: * Changing of $e_1..e_n$ is uniform over 5 years
(compiled by the author)

Topological numbering of input for the equation variables is based on rank assigning. If the variable will affect the output element (e_k), it can be assigned rank 1; if value has the probability of changing (which can affect e_k), it is assigned rank 2. Thus, we receive several equations systems for the same sequence of input data sets. However, one of them will use the simple iteration method (asynchronous modelling), and the other one will provide alternative calculations that characterize the state e_k in cases of statistical and other disruptions and changes within the iteration.

To the left, the value of state element at the time t is substituted, according to the topological numbering scheme

$$
\begin{aligned}
e1(t) &= f1(x1(t), \dots, xn(t), e1(t-1));\\
e2(t) &= f2(x1(t), \dots, xn(t), e1(t), e2(t-1));\\
&\quad \dots = \dots\\
ek(t) &= fk(x1(t), \dots, xn(t), e1(t), \dots, ek-1(t),\\
&\quad ek(t-1)).
\end{aligned}
$$

To the right, the input values of state elements obtained in the same iteration and only for the element that is calculated are substituted

Figure 4: The mathematical equations system of the determining of state of elements which characterize elements during iteration t*

*Note. * To get the most accurate state of the scheme before the modelling, it is reasonable to arrange the equation, namely to record the exact order of its valuation because the state of i-th element can be calculated only if all states of the elements, which are included into the equation and can affect the value of this element, will be estimated.*
(compiled by the author)

However, in the process of the synchronous modelling, in one iteration, combinational equations (which show the final result) can be obtained. This, inevitably, leads to the impossibility of intermediate states of element and its impact on e_k researching (although it reduces the amount of calculations). In this regard, it is appropriate to add the asynchronous modelling to each iteration phase through alternative calculations, which describe the e_k state in cases of the statistical failures within iteration. For example, on the basis of data calculations for scenario 2 (Fig. 3), we assume that at the 3rd stage, there is a possibility of statistical and other disruptions and changes; due to this, the cost can be additionally reduced by reducing the labour-intensity of the repair TPC by 7% and at the 5-th stage by 3%. Thus, the system of mathematical equations that calculate the state factors changing for scenario 2 and the possibility of statistical failures are shown in Fig. 5.

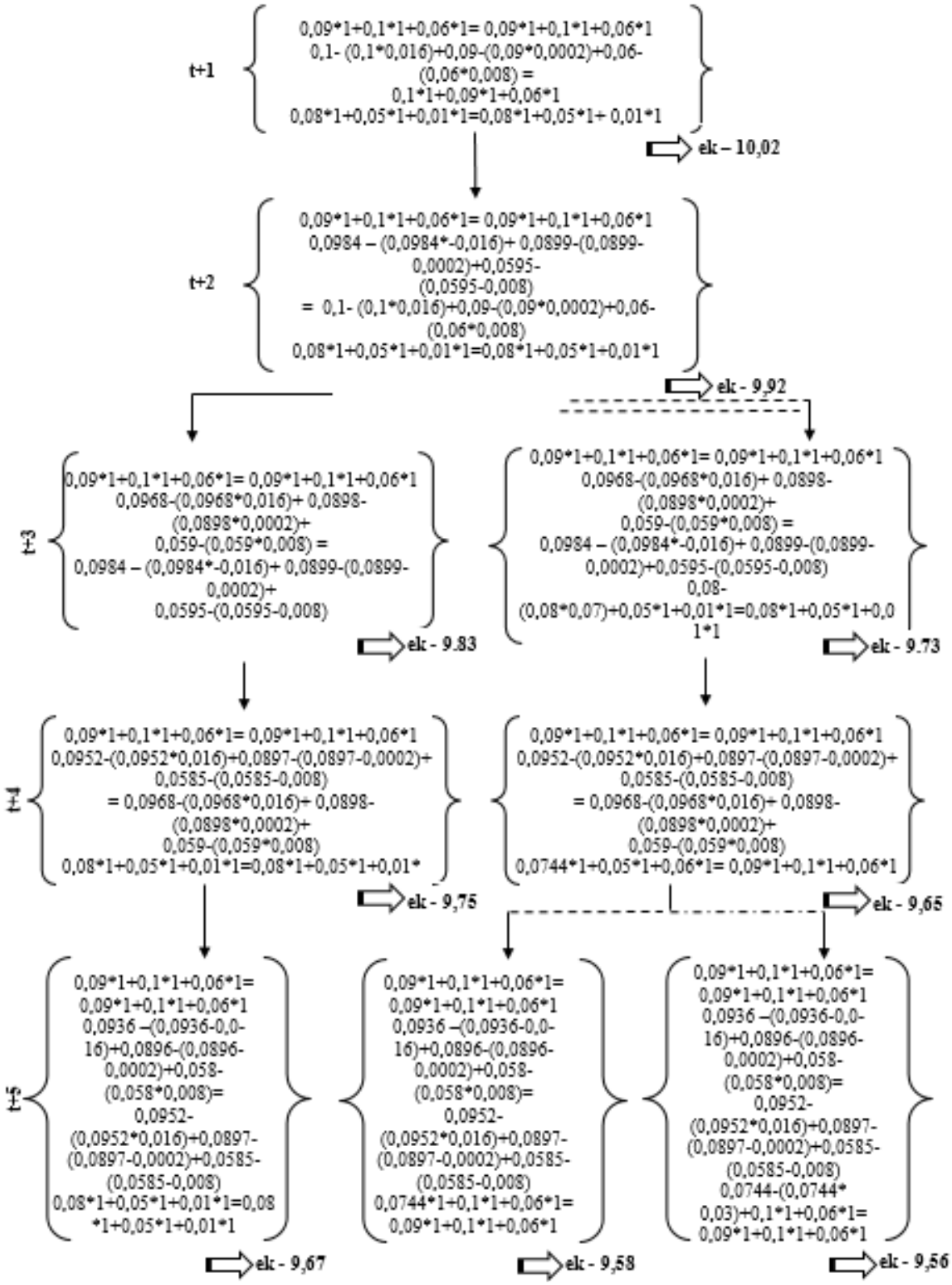

Fig. 5: The system of mathematical equations that calculate state factors changing for scenario 2 and the possibility of statistical failures

(compiled by the author)

As a result of the modelling, it was found that the implementation of the scenario 2, in case of failures due to which there is a possibility of additional cost reducing by reducing the labour-intensity of the repair TPC at the 3-rd stage (by 7%) and the 5-th stage (by 3%), the enterprise can get additional opportunity to reduce retail prices by 5.8%.

Thus, the proposed combination of situational asynchronous modelling elements and Seidel method features (used in modelling of a synchronous nature) is the most effective way for modelling the technological competitiveness of products, companies and clusters in the national competitiveness system as a complex system. Due to the outlined combination, combinational equations at all stages of iteration could be obtained, and the alternative calculations that describe the state of finite elements of state in cases of statistical and other disruptions and changes during the implementation of a specific scenario could be formed.

Conclusion

The long-term assessment of enterprise technological competitiveness method is based on the synthesis of indicators of specific and absolute technology product cost according to the areas of manifestation and involves using a scenario approach, combining situational and asynchronous modelling elements with Seidel method features (Milko, 2014). Modelling the material intensity and the technological competitiveness of ACURA remote starting devices made it possible to determine that, under scenario 1, only 2.4% reduction of the planned technological chip design cost reduction in the retail price per ACURA unit sales can be achieved, and under scenario 2, the planned technological chip design cost reduction in retail prices (4.7%) per ACURA unit sales (in case of mechanized precision production lines acquisition) can be achieved. As a result of the modelling, it was found that, in case of Scenario 2 implementation, there is probability of failures, which can result in possible additional cost reduction with the labour-intensity of the repair TPC reducing at the 3-rd stage (by 7%) and the 5-th stage (by 3%) - the enterprise can get an additional opportunity to reduce retail prices by 5.8%. Assessment of mechanical engineering enterprise technological competitiveness prospects should be based on the following determinants: cost according to type of technological competitiveness of products based on material intensity including all expenditure; along with absolute technological cost, it is advisable to use the specific technological cost according to areas of its manifestation.

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On Heuristic Linear Decomposition of Symmetric Index Generation Functions

Tomasz MAZURKIEWICZ

Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, tomasz.mazurkiewicz@wat.edu.pl, ORCID: 0000-0001-7305-2379

Abstract

Decomposition methods of index generation functions gained a lot of interest lately due to their impact on memory size in hardware realizations. In this paper, we focus on a special class of those functions, i.e. symmetric index generation functions. We analyze the properties of this class, and how they influence on searching for a linear decomposition of index generation functions. In particular, we focus on a heuristic algorithm that uses discernibility sets, which efficiently reduces index generation functions. We present experimental results to prove the efficiency of this algorithm. Furthermore, we prove that the properties of symmetric index generation functions lead to better time efficiency of this algorithm, due to significant variables reduction.

Keywords: lndex generation functions, Logic synthesis, Linear decomposition, Symmetric functions, Variables reduction

Introduction

Memory-based logic synthesis of index generation functions (IGF) gained a lot of interest due to the applications of those functions (Sasao (2011, 2017, 2020)) in realizing pattern matching circuits. In the literature, there are many examples of using those functions in Internet of Things for devices such as virtual routers and malicious data detection systems. What is more, the concept of hardware implementation of index generation functions has been reported by Sasao (2020) as ”the key device in the network hardware”.

Index generation function maps unique integer value $\{1,2, \dots, K\}$ to elements of a set that consists of K different binary vectors, whose length equals N. Other assignments are left unspecified. The important property of those functions is that they are not fully defined, i.e. $K \ll 2^N$. Thus, they can be efficiently minimized and implemented using fewer variables than N.

In the literature, techniques such as variables reduction (Borowik and Łuba (2014)) and functional decomposition (Mazurkiewicz (2020a,2020b)) are used to minimize memory usage. However, linear decomposition has been identified as being the most efficient (Łuba et al. (2016), Mazurkiewicz and Łuba (2019), Sasao (2017)). Interestingly, those methods can be easily transferred and adapted to the field of knowledge discovery and data mining (Borowik (2014), Borowik and Łuba (2014)), i.e. to minimize the number of attributes and remove redundant decision rules.

Using the linear decomposition, an index generation function is implemented as a composition of a linear transformation L (using EXOR gates) and a general function G that is implemented using memory. Linear transformation, i.e. a composition of several linear functions, reduces the number of variables from N to P. Thus, $2^P Q$-bit memory is required to implement function G.

In this paper, we analyze the application of existing heuristic linear decomposition algorithm by Mazurkiewicz and Łuba (2019) in the minimization of a special class of index generation functions. Symmetric index generation functions are functions such that any permutation of input variables does not change the function. We prove that existing heuristic methods can be easily applied to minimize those classes of functions. What is more, properties of symmetric index generation functions simplify the computations, i.e. the number of variables can be efficiently reduced. According to our best knowledge, other studies (Nagayama et al. (2020)) addressed only optimum algorithms. The proposed approach was presented in Fig. 1.

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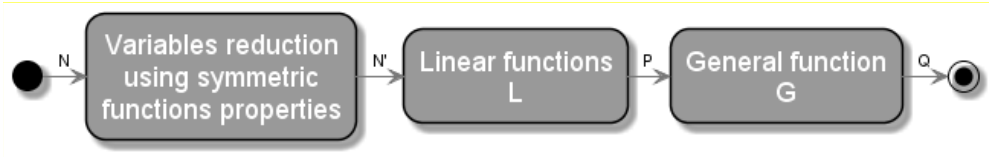

Fig. 1: Proposed approach.

The rest of this paper is organized as follows: the second section defines symmetric index generation functions and compound degree. The linear decomposition algorithm using discernibility sets is described in the next section. In Section 4, we analyze the properties of symmetric index generation functions and the influence on the number of variables. The experimental results using experimental software are presented in Section 5. The efficiency of the linear decomposition algorithm after variables reduction is investigated in that section. The last section concludes the paper.

Preliminaries

An **index generation function** represents the following mapping:

$$F: D^N \rightarrow \{1,2,\dots,K\} \tag{1}$$

where D^N is a set of different binary vectors, called registered vectors, i.e. $D^N \subseteq \{0,1\}^N$. The important property of this function is that $|D^N| = K \ll 2^N$. Function F assigns the corresponding index (unique integer value from 1 to K) for every vector $v \in D^N$.

A **characteristic function** χ of an index generation function is

$$\chi : \{0,1\}^N \rightarrow \{0,1\} \tag{2}$$

where

$$\chi(v) = \begin{cases} 1 & \Leftrightarrow \quad v \in D^N \\ 0 & \Leftrightarrow \quad otherwise \end{cases} \tag{3}$$

In this paper, we focus on **symmetric index generation functions**, i.e. index generation functions whose characteristic function is symmetric.

M-out-of-N coders are often used as standard benchmark functions of linear decomposition algorithms. They consist of $K = \binom{N}{M}$ binary vectors, whose length is N and Hamming weight is M. Such functions represent symmetric index generation functions and are denoted S_M^N. An example of such function was presented in Table 1.

Table 1: Symmetric function S_1^6.

x_1	x_2	x_3	x_4	x_5	x_6	$F(X)$
1	0	0	0	0	0	1
0	1	0	0	0	0	2
0	0	1	0	0	0	3
0	0	0	1	0	0	4
0	0	0	0	1	0	5
0	0	0	0	0	1	6

To minimize such functions, linear decomposition can be used. In that case, an input function *F(X)* is realized using a general function *G(Y)* and *P* linear functions. Consider a linear function $y = \bigoplus_{i=1}^{N} x_i c_i$, where $x_i \in X$, $c_i \in \{0,1\}$. The compound degree of such function is $\delta = \sum_{i=1}^{N} c_i$. Therefore, the compound degree of the function *G(Y)* is equal to $\max_{i=1,2,\dots,P} \delta$.

Linear Decomposition

To find a linear decomposition of an index generation function a discernibility set might be used. In this section, we shortly present an iterative algorithm using such sets. For a detailed description please refer to the original paper by Mazurkiewicz and Łuba (2019). Efficiency of this algorithm for general index generation functions was already proven.

A discernibility set, denoted as C_{pq} is defined as follows:

$$C_{pq} = \{x \in X, p \neq q: x(p) \neq x(q)\} \tag{4}$$

p and q are indexes of registered vectors. Each vector $v \in D^N$ has index p iff $F(v) = p$.

The collection of all C_{pq} sets, i.e. for $p, q \in \{1,2, \dots, K\}$ and $p < q$, will be denoted as RC_{pq} and it's complement as $COM(RC_{pq})$. Additionally, the complement limited to sets with cardinality r will be denoted as $COM(RC_{pq}^r), r \leq N$.

To find decomposition of a function into several linear functions, the simple test can be used (Łuba et al. (2016), Mazurkiewicz and Łuba (2019)). Function $x_i \oplus x_j$ $(x_i, x_j \in X)$ is a decomposition function of F iff $\{x_i, x_j\} \notin RC_{pq}$. In that case, $\{x_i, x_j\} \in COM(RC_{pq})$. This simple test can be generalized. For example, pair of two linear functions: $x_i \oplus x_j$ and $x_j \oplus x_k$ $(x_k \in X)$ are decomposition functions of F iff $\{x_i, x_j, x_k\} \in COM(RC_{pq})$.

The discernibility matrix can be used to represent RC_{pq}. To improve the time efficiency of the algorithm, the repeating values are removed from this matrix.

To illustrate the idea of discernibility sets, all C_{pq} sets generated for S_1^6 function, i.e. RC_{pq}, were presented in Table 2. Additionally, the discernibility matrix was presented in Table 3. In each row, $x_i = 1$ iff $x_i \in C_{pq}$. Notice that each row can be generated using EXOR operation on p-th and q-th vectors from the truth table.

Table 2: RC_{pq} for symmetric function S_1^6.

p, q	C_{pq}	p, q	C_{pq}	p, q	C_{pq}
1,2	$\{x_1, x_2\}$	2,3	$\{x_2, x_3\}$	3,5	$\{x_3, x_5\}$
1,3	$\{x_1, x_3\}$	2,4	$\{x_2, x_4\}$	3,6	$\{x_3, x_6\}$
1,4	$\{x_1, x_4\}$	2,5	$\{x_2, x_5\}$	4,5	$\{x_4, x_5\}$
1,5	$\{x_1, x_5\}$	2,6	$\{x_2, x_6\}$	4,6	$\{x_4, x_6\}$
1,6	$\{x_1, x_6\}$	3,4	$\{x_3, x_4\}$	5,6	$\{x_5, x_6\}$

Table 3: The discernibility matrix for symmetric function S_1^6.

x_1	x_2	x_3	x_4	x_5	x_6	p, q
1	1	0	0	0	0	1,2
1	0	1	0	0	0	1,3
1	0	0	1	0	0	1,4
1	0	0	0	1	0	1,5
1	0	0	0	0	1	1,6
0	1	1	0	0	0	2,3
0	1	0	1	0	0	2,4
0	1	0	0	1	0	2,5
0	1	0	0	0	1	2,6
0	0	1	1	0	0	3,4
0	0	1	0	1	0	3,5
0	0	1	0	0	1	3,6
0	0	0	1	1	0	4,5
0	0	0	1	0	1	4,6
0	0	0	0	1	1	5,6

To find linear functions that decompose an index generation function, an iterative approach was proposed Mazurkiewicz and Łuba (2019). In this paper, we assume that the input function is not preprocessed using argument reduction procedure. For symmetric functions S_M^N, this procedure leads to a single row of all zeroes, which heavily affects the properties of analyzed functions.

The mentioned algorithm works as follows. Firstly, the algorithm searches for a decomposition function of F using discernibility sets. Next, the discernibility matrix is regenerated based on a linear transformation that was found. As long as $COM(RC_{pq}) \neq \emptyset$, another decomposition functions can be found. Thus, the algorithm iteratively finds a decomposition function and regenerates the discernibility matrix.

The key element of the algorithm is the proper selection of a decomposition function. The most time-efficient approach, called First-Fit or simply FF, chooses the first (in the lexicographic order) decomposition that was found. Unfortunately, the solution provided by this method is not always optimal, i.e. for *M-out-of-N* coders. Thus, another approach called MinR was proposed. It uses the number R of distinct row vectors in a truth table of a function limited to a subset of input variables $X \backslash d$, where d denotes variables used in a linear function and $|d| = r$. For example, if $y = x_1 \oplus x_2$, then $d = \{x_1, x_2\}$ and $X \backslash d = \{x_3, x_4, \dots, x_N\}$. The function that provides the minimum value of R is chosen as a decomposition function. If two or more subsets have the same value of R, then the first function found is chosen. Thus, in this place we proceed similarly to the FF method.

Due to the additional calculations in a decomposition selection procedure, the MinR approach is more time-consuming than the FF approach. However, the results presented in the literature proves that it provides better results for *M-out-of-N* coders.

What is important, in both approaches in each iteration the algorithm searches for a decomposition function with as small compound degree as possible. Thus, firstly $COM(RC_{pq}^2)$ is analyzed, then $COM(RC_{pq}^3)$, and so on.

Properties of Symmetric Functions

In this section, we analyze the properties of symmetric functions. We determine how they can be used for reducing the number of variables. Due to the space limitation, we focus on symmetric index generation functions with $M = 1$, i.e. S_1^N.

Basic Minimization

Let $M = 1$ and $N \geq 3$. In that case, $K = N$. In a symmetric index generation function S_1^N variable $x_i = 1$ ($x_i \in X$) in each registered vector $v \in D^N$ iff $i = F(v)$. Recall that Table 1 illustrates this property. In that case, any C_{pq} set contains only two variables: x_p and x_q since registered vectors with indexes p and q will always differ on those two variables. Therefore, the generation of RC_{pq} leads to a discernibility matrix that contains all possible vectors, whose length is N and Hamming weight is two. Any variable $x_i = 1$ iff $i = p \vee i = q$. Thus, $COM(RC_{pq}^2) = \emptyset$ and no function with compound degree two can be used as a decomposition function.

On the other hand, RC_{pq} does not contain any set with cardinality bigger than two. Therefore, since $\{x_1, x_2, x_3\} \in COM(RC_{pq})$ the algorithm chooses a pair of functions: $y_1 = x_1 \oplus x_2$ and $y_2 = x_2 \oplus x_3$ as decomposition functions in the FF approach. Recall that the MinR approach requires additional computations. However, the discernibility matrix of the analyzed symmetric index generation function can be also treated as a symmetric function. Thus, the value of R will be the same for all possible subsets d. This leads to the conclusion that the same pair of functions is chosen also in the MinR approach.

Notice that a pair of functions will be used as decomposition functions for any symmetric index generation function S_1^N. What is important, that the pair is known in advance without any computations whatsoever. The number of variables is reduced from N to $N' = N - 1$.

Consider now the function after first iteration of the algorithm if $N \geq 6$, i.e. $F(X) = G(x_4, x_5, \dots, x_N, y_1, y_2)$. Notice that first and third vectors are vectors, whose Hamming weight equals one. On the other hand, the second vector has 1 on both y_1 and y_2 variables. Thus, the truth table of a function still contains all possible vectors with Hamming weight one. The length of those vectors equals $N' = N - 1$. Therefore, $COM(RC_{pq}^2) = \emptyset$ one more time.

Decomposed function S_1^6 and all C_{pq} sets with cardinality two were presented in Tables 4 and 5 accordingly to illustrate described theoretical considerations.

Table 4: Decomposition of symmetric function S_1^6.

(a) Function after first iteration. (b) Function after second iteration.

x_4	x_5	x_6	y_1	y_2	$G(X')$		y_1	y_2	y_3	y_4	$G(X'')$
0	0	0	1	0	1		1	0	0	0	1
0	0	0	1	1	2		1	1	0	0	2
0	0	0	0	1	3		0	1	0	0	3
1	0	0	0	0	4		0	0	1	0	4
0	1	0	0	0	5		0	0	1	1	5
0	0	1	0	0	6		0	0	0	1	6

Table 5: C_{pq}^2 sets in the second iteration.

p,q	C_{pq}^2	p,q	C_{pq}^2
1,3	$\{y_1, y_2\}$	3,5	$\{y_2, x_5\}$
1,4	$\{y_1, x_4\}$	3,6	$\{y_2, x_6\}$
1,5	$\{y_1, x_5\}$	4,5	$\{x_4, x_5\}$
1,6	$\{y_1, x_6\}$	4,6	$\{x_4, x_6\}$
3,4	$\{y_2, x_4\}$	5,6	$\{x_5, x_6\}$

Using the FF approach we proceed similarly as previously. This leads to choosing a pair of functions $y_3 = x_4 \oplus x_5$ and $y_4 = x_5 \oplus x_6$ as decomposition functions. Notice that for the FF approach the described procedure will be used iteratively $\zeta = \left\lfloor \frac{N}{3} \right\rfloor$ times. Thus, the number of variables can be reduced to $N' = N - \zeta$ without any computations. In the next subsection, we investigate if some additional improvement can be achieved.

On the other hand, for the MinR approach, we have to proceed differently after finding the first pair of decomposition functions. Notice that if subset d contains only variables x_i, then all rows in a truth table are distinct. Thus, $R = K$. Recall that in the MinR approach, we look for a subset d that minimizes the value of R. If $y_1 \in d$, then second and third row are the same, i.e. all variables x_i are zeroes and $y_2 = 1$. Other rows are distinct. Thus, $R = K - 1$ and pair of functions: $x_4 \oplus x_5$ and $x_5 \oplus y_1$ is chosen as decomposition functions. In the end, the number of variables is reduced by two without any computations.

Further Minimization

From this point, we analyze only the FF approach. Let $N = 3 \cdot n$, $n \in \mathbb{N}$ and $F(X) = G(y_1, y_2, \dots, y_P)$. If $n = 2$, then $COM(RC_{pq}) \neq \emptyset$ and no further minimization is possible. If $n > 2$, then the vectors from the truth table of a function can be represented as a composition of the following two matrices:

$$A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \\ 0 & 1 \end{bmatrix}_{3\times 2} \quad B = \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}_{3\times 2} \tag{5}$$

In the result, we get the following matrix:

$$M = \begin{bmatrix} A & B & \cdots & B \\ B & A & \cdots & B \\ \vdots & \vdots & \ddots & \vdots \\ B & B & \cdots & A \end{bmatrix}_{n\times(2\cdot n)} \tag{6}$$

Notice that matrix B contains only zeroes. Matrix A contains two rows with Hamming weight equal to one and one with Hamming weight equal to two. What is more, this matrix contains all possible vectors, whose length is two, and Hamming weight is one. In the matrix M, every row and every column contain only one matrix A. Thus, the matrix M contains all possible vectors, whose length is $2 \cdot n$, and Hamming weight is one. In that case, $COM(RC_{pq}^2) = \emptyset$ and no function with compound degree two can be used as a decomposition function.

Since matrix A contains a row of all ones, it is not possible to find a pair of decomposition functions $y_i \oplus y_j$ and $y_j \oplus y_k$ such that $j - i = 1 \vee k - j = 1$. Thus, the following pair is chosen: $y_1 \oplus y_3$ and $y_3 \oplus y_5$. In that case, the number of variables was reduced to $N' = \frac{2}{3}N - 1$ without any computations.

On the other hand, if $N \neq 3 \cdot n$ $(N \geq 7)$, then we have $F(X) = G(x_N, y_1, y_2, \dots, y_{P-1})$ or $F(X) = G(x_{N-1}, x_N, y_1, y_2, \dots, y_{P-2})$. In that case, instead of the matrix M we get one of the following matrices accordingly:

$$M_1 = \begin{bmatrix} 0 & M \\ 1 & 0 \end{bmatrix}_{(n+1)\times(2\cdot n+1)} \tag{7}$$

$$M_2 = \begin{bmatrix} 0 & 0 & M \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}_{(n+2)\times(2\cdot n+2)} \tag{8}$$

Recall that the matrix M contains all possible rows with Hamming weight equal one, whose length is $2 \cdot n$. Thus, both M_1 and M_2 matrices contain all possible $2 \cdot n + 1$ and $2 \cdot n$+2-bit length vectors accordingly. Therefore, again $COM(RC_{pq}^2) = \emptyset$.

Notice that the M_1 matrix contains a row such that only y_1 and y_2 are one. Thus, $\{x_N, y_1, y_2\} \in RC_{pq}$ and a pair of functions $x_N \oplus y_1$ and $y_1 \oplus y_2$ cannot be used as decomposition functions. On the other hand, $\{x_N, y_1, y_3\} \in COM(RC_{pq})$ and one more variable is reduced without computations. Similarly, the M_2 matrix contains a row such that only y_1 is one. Thus, $\{x_{N-1}, x_N, y_1\} \in RC_{pq}$ and $\{x_{N-1}, x_N, y_2\} \in COM(RC_{pq})$.

As a result, for both matrices, we obtain a reduction of variables by $\left\lfloor \frac{N}{3} \right\rfloor - 1$ without any computations whatsoever.

Evaluation

To evaluate the efficiency of the described approach, we analyze some basic symmetric index generation functions. The same functions were used by other authors (Nagayama et al. (2020)) to analyze the optimum algorithm. Table 6 shows obtained results, i.e. the reduction of the number of variables (from N to N'), using the described properties of symmetric functions and the FF approach. In that table, *S. 4a* denotes results obtained using the approach described in Section 4a of this paper. Column *S. 4b* shows the results after applying further minimization. Notice that the number of variables was significantly reduced without any computations. The linear decomposition algorithms can be applied to further reduce that number. Since the time efficiency of all heuristic linear decomposition algorithms depends on the number of input variables, reducing it leads to better efficiency.

Table 6: Obtained results using the properties of symmetric functions and the FF approach.

Funcion	N	*S. 4a*	*S. 4b*
S_1^{10}	10	7	6
S_1^{20}	20	14	13
S_1^{30}	30	20	19
S_1^{40}	40	27	26
S_1^{50}	50	34	33
S_1^{60}	60	40	39
S_1^{70}	70	47	46
S_1^{80}	80	54	53

Table 7 shows the obtained results after minimizing symmetric functions using original heuristic algorithms by Mazurkiewicz and Łuba (2019). The column denoted *Opt* shows results obtained using the optimum method by Nagayama et al. (2020). However, this method searches only for solutions with a compound degree less or equal to five. Thus, it is possible to find a decomposition with fewer input variables than *Opt*. The column denoted κ presents the optimum theoretical solution calculated using the following formula

$$\kappa = \lceil \log_2 K \rceil \tag{9}$$

Table 7: Results obtained using heuristic algorithms.

Function	*Opt*	κ	FF	MinR
S_1^{10}	4	4	4	4
S_1^{20}	7	5	6	5
S_1^{30}	10	5	6	5
S_1^{40}	13	6	7	6
S_1^{50}	17	6	7	6
S_1^{60}	20	6	7	6
S_1^{70}	23	7	8	7
S_1^{80}	27	7	8	7

Table 8 shows the compound degree for results obtained using FF and MinR methods. The most remarkable result to emerge from the data is that the application of heuristic methods leads to better results in terms of the number of input variables. Results obtained using FF approach are close to κ, while the MinR method leads to results equal κ for all analyzed functions. However, the obtained compound degrees are generally high. It is worth mentioning that both methods, FF and MinR, were not designed to minimize the compound degree of a decomposed function.

Using the approach described in this paper, we obtain result worse by one variable for S_1^{60} function using the FF method. The main reason for this is that the argument reduction procedure is not applied. Thus, an input function is slightly different. For other analyzed symmetric functions we get the same number of the variables P after linear decomposition.

Table 8: Compound degree.

Method	S_1^{10}	S_1^{20}	S_1^{30}	S_1^{40}	S_1^{50}	S_1^{60}	S_1^{70}	S_1^{80}
FF	4	9	15	22	29	29	38	36
MinR	5	10	16	20	32	32	26	40

Figure 2 shows computation time (in seconds) of heuristic decomposition of symmetric index generation functions S_1^N. The experiments were conducted using experimental software implemented in Python (using NumPy), and run on the following computer environment: CPU: Intel Xeon E5-2650v2 2.6Hz, memory: 64 GB, OS: Windows 7, interpreter: Python 3.8. Computation time using original algorithms was presented. Additionally, the computation time after reducing the number of variables using the approach proposed in this paper was presented to evaluate its efficiency. It was denoted FF_p and $MinR_p$ accordingly.

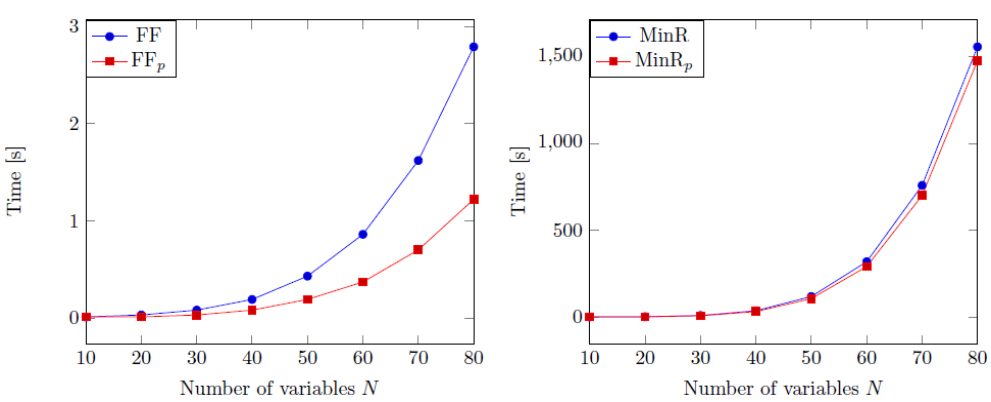

(a) The FF method. (b) The MinR method.

Fig. 2: Computation time (in seconds) for symmetric functions.

The FF method is much faster than the optimum method by Nagayama et al. (2020) implemented in the C language and leads to quite good results. For example, it finds the solution for S_1^{80} function that is worse than the theoretical optimum by only one variable in 1.2 seconds. On the other hand, the time efficiency of the MinR method is much

worse. Notice that the reduction of the number of variables leads to better time efficiency of both algorithms. Time FF_p is up to 2.3 times shorter than the computation time of the original method. On the other hand, the MinR method has been accelerated only by 5%.

Conclusion

In this paper, the properties of symmetric index generation functions were analyzed. Additionally, we proved that those properties can be used to efficiently reduce the number of variables. This leads to a lower computation time of the heuristic linear decomposition algorithms. In particular, the FF method was accelerated by 2.3 times. What is more, we proved that heuristic algorithms can provide better results than the optimum algorithm in terms of the number of variables. However, the compound degrees are much higher.

In this paper, we focused on symmetric functions with $M = 1$. Therefore, our future work includes analysis of properties of functions with $M \geq 2$ and their influence on heuristic linear decomposition algorithms.

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Flexible Methodologies as Tools for Implementing Dynamic Changes in The Management System

[1] Inna LEVYTSKA
National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine
ilevytska@nubip.edu.ua, inna_levytska@ukr.net

[2] Alona KLYMCHUK
State University Zhytomyr Polytechnic, Zhytomyr, Ukraine
alena_klumchyk@ukr.net

[3] Olena KOVALENKO
Vinnytsia National Technical University, Vinnytsia, Ukraine
kovalenka88@gmail.com

[4] Nataliia BRYTANSKA
Private higher education institution «Vinnytsia Institute of designing of clothes and entrepreneurship», Vinnytsia, Ukraine
brita_nat@ukr.net

[5] Oleksandr MAZUR
Kyiv University of Market Relations, Kyiv, Ukraine
mazur3103@ukr.net

Abstract

Dynamic changes in the control system are due to changes in the external and / or internal environment. The risks of negative results after the introduction of changes are significantly reduced by using systemic training methodologies. Such methodologies are flexible management methodologies based on the Agile Manifesto. The authors propose the adaptation of known approaches to the introduction of flexible management methodologies together with the principles of change management. This uses a synergistic combination of the principles of the Agile Manifesto and the rules for implementing Cotter's changes. Among them: creating a sense of urgency; support groups, the vision of change, informing, removing obstacles, creating short-term victories, consolidating improvements, fixing changes. The authors consider a practical example of using the proposed method of implementing changes in the universities of Ukraine in the restructuring of the educational process in a pandemic. This adaptation takes into account the peculiarities of educational management. The introduction of changes concerned the translation of the educational process into a full distance format. Educational management has its own characteristics. The quarantine experience of VNTU and NUBIP universities testifies to positive changes based on already existing distance and blended learning portals. But the full remote format revealed problems of the unwillingness of a group of teachers and students to work completely remotely, insufficient server power, vulnerabilities of the testing module. To solve such problems, special training of teachers was organized, for students in rural areas - the use of various information channels, changes in the testing system. In addition, it was important to introduce changes for active teacher-student communication; teacher-teacher (at the suggestion of users); to introduce the electronic dean's office module at all faculties, to start using the procedures of forming the electronic archive and to implement the procedures of free choice of disciplines by students. It was also necessary to use security tools. Comparative tables of the introduction results of dynamic project groups of improvement of management systems of training and procedures of processes realization of training online testify to the efficiency of using flexible methodologies taking into account theories and practices of the introduction of changes. This approach allows you to create a dynamic management system of the organization, which quickly perceives and implements change.

Keywords: Management System, Change Management, Sound Management Methodologies, Agile, Educational Management, Quarantine Period (Pandemic).

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Introduction

The urgency of introducing dynamic changes in the management system is confirmed by the needs of entrepreneurs and managers who offers to the market a variety of products and services for a variety of target audiences in a competitive market. Such methodologies are actively used for IT projects and IT products. But the tendency to use them in other areas and in everyday life is increasing day by day [Sutherland].

The introduction of changes in the management system also has its scientific and applied basis. For example, 8 Cotter's rules show that changes cannot be made randomly without preparation.

Steps such as creating a sense of urgency, forming a support group, creating a vision of change, informing, removing obstacles, creating short-term victories, consolidating improvements, fixing change - can be quite stable and dynamic and each can be implemented using flexible management methodologies [Cotter].

Materials and Methods

Methods of analysis of known approaches to flexible management and implementation of changes; synthesis of synergetic rules for the introduction of dynamic changes based on flexible methodologies; an experiment in the real educational process of the university; summarizing the results of changes.

The purpose of the research

Modern management actively uses flexible methodologies and adapts them to their needs [Ralph von Rusmalen, Management 3.0.]. The purpose of the study is to identify the features of flexible methodologies and their implementation for the formation of a dynamic management system of the organization. Approbation of the recommendations was performed on the example of the introduction of changes in the management of the university during the transition to distance learning during the pandemic.

Results and Discussion

The Agile Manifesto contains four basic principles [3].

- Engage People and their Interactions
- Improve the System
- Delight all clients
- Manage the system, not the people
- Co-create work

These principles support the priority orientation of personnel and their needs, the creation of values for customers and an environment where all participants in the production and management system can express themselves in the best way. The manifesto can be implemented using the Scrum methodology. This is the most popular implementation that can be used for university, business and student education [Tronin].

Let's analyze the principles of the Agile Manifesto, a flexible methodology according to Cotter's steps.

Creating a sense of urgency is the basis for change in motivation of employees in time and in the importance of the decision. There are also external signals of a sense of urgency. For example, the pandemic and the announcement of quarantine have made changes necessary for remote work, the introduction of distance learning, online negotiations, changes in the distribution of services and goods. Flexible methodology involves the active use of functional iterations and step-by-step work with constant monitoring and improvement, which corresponds to effective and dynamic time management.

Creating a support group or a project team is a good idea. Even better, when creative groups are already in the units and in general as strategic management groups. Each department should feel identified in the draft changes and be able to make suggestions and participate in the discussion. To do this, flexible methodologies use short daily discussions and mandatory analysis of iterative results, visualization of processes using special boards.

Creating a vision of changes is formed through clear texts and visualizations to achieve the goals in a timely manner. They become specific through special orders, decrees, statutes, regulations, or amendments to existing

documents. The ideal case is the only electronic environment where each employee has access to documents and visualization of the vision at the moment.

The next step - informing - resonates with previous and active dynamic support of information processes through daily and iterative meetings and discussions, visualization of processes, making changes to documents and their publication.

Removing obstacles is, first and foremost, work with the staff who resists the changes. This is a targeted training of staff, taking into account their suggestions, motivation and belief in the feasibility of changes. Flexible methodologies include dynamic training of staff, updating their skills and competencies, active work in pairs an in teams.

Creating short-term victories. Each iteration has specific results that are demonstrated and analyzed by all departments. Only positive results are followed by employee motivation. Therefore, negative results should be carefully analyzed for further improvements.

Consolidation of improvements. Psychologically, change is a slow process. That is why iteration after iteration adds positive changes, reduces the risks of negative results. It is important to consolidate all the positive achievements in the selected project area that were received before the implementation of changes and a specific project.

Fixing changes. In the electronic space, a special environment of dynamic electronic documents, a blog for implementing changes, task boards, new standards and regulations are being formed. Consolidation of such changes forms a new corporate culture, new concepts of the organization, and regular evaluations and discussions help to consolidate changes.

Educational management has its own characteristics. On the one hand, there are sustainable institutions and educational processes, on the other - the development of modern learning technologies forces school leaders to use new management methods and flexible technologies. One example of the introduction of rapid change has been and is the need to transfer learning processes to a completely remote mode. The implementation of distance learning was carried out most successfully in those universities, colleges and schools where learning management systems have already been introduced, teams have been formed to introduce innovative technologies, and so on. But the introduction of flexible methodologies and their adapted principles allow more effective projects to use distance format for quality learning during a pandemic in such conditions.

Flexible responses to mines in the environment are often intuitive. But this approach involves a lot of risk, duplication and leads to negative results. Let’s consider the example of the introduction of an iterative Agile approach in the process of implementing full distance learning during a pandemic in higher education. It should be noted that this approach was used at the university, which had already sufficient experience in the use of electronic resources in a mixed format. For example, scientific and practical developments of specialists of VNTU and NUBIP universities allowed to form special educational portals with access for applicants for higher education to electronic resources, use of tests, forums, etc. But the full distance learning format, introduced in a limited time, was a new and rather crisis process, taking into account that it was necessary to transfer all students and teachers of the university to this format. Online teaching required new approaches and concepts using the existing experience of blended learning and crisis education management [Kuzminskaya, Bisikalo, crisis].

Figure 1 shows the portals for blended and distance learning of NUBIP and VNTU, which demonstrate the high level of readiness of universities to use digital technologies. Each of the universities has its own approaches to building electronic services and using technology. But the main principle - the formation of quality content by discipline, creating an environment for effective communication between the administration, students and teachers is implemented in both environments.

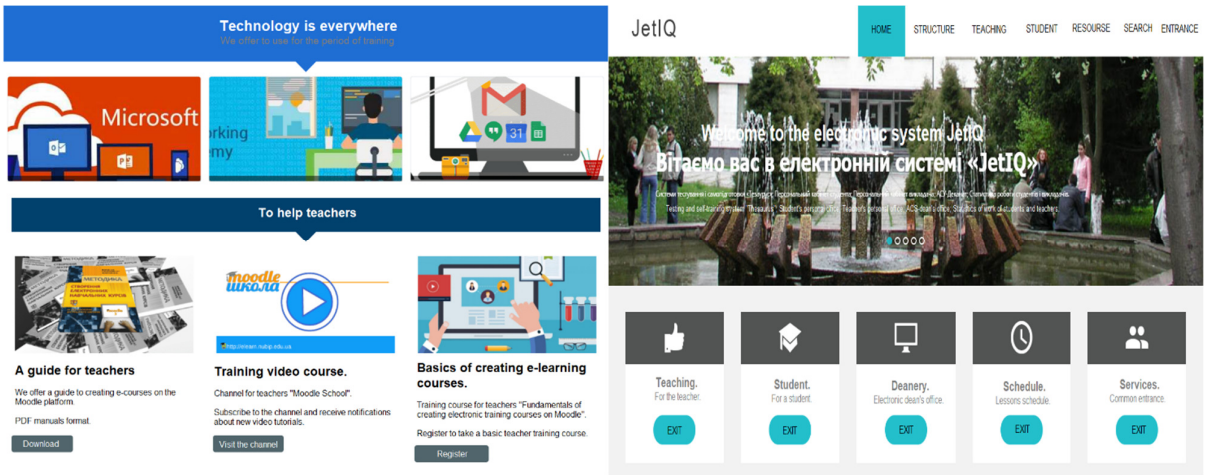

Figure 1: Main pages of learning management system portals universities

Access to electronic resources, communication tools, and university repositories is organized on the main pages of educational portals. There are information pages on the implementation of changes in the educational process and communications.

But the full distance learning format introduced in a limited time was a new and rather crisis process, given that all students and faculty of the university had to be transferred to such a format.

Online teaching required new approaches and concepts using the existing experience of blended learning and crisis education management.

For example, on the first day of the introduction of quarantine teachers received instructions on the use of existing electronic resources and video communication, dynamic orders, and change orders that have been generated educational processes.

Consider the introduction of a flexible methodology for implementing change and adherence to Agile principles on the example of changes in educational processes services and other activities in the Vinnytsia National Technical University at the beginning of quarantine.

1. The group of senior management of the university in the center of change, respectively problems posed the interests of people - students and teachers, and also a priority area of activity that needed the largest changes - the provision of educational services. The first principle of the Agile Manifesto, which prioritizes people and collaboration rather than processes and tools.
2. The analysis of existing electronic resources, server architecture and other tools for distance learning. 2 The principle of the Agile Manifesto is the importance of working products, not documents.
But integration is also important for educational processes existing products and the introduction of new or previously passive one's tools.
In this case, it is the use of video communication with Google Meet and other student support channels, especially in rural areas.
3. Formed a support group for teachers and students that consists of representatives of each faculty, center distance learning, computer center, technical specialists working with electronic learning systems on each faculty.
Such a group develops and maintains readiness for change users of the learning management system, advises, helps, solves problem situations. Support channels have been formed for this purpose in social networks, special training sessions for teachers and students.
Cooperation with students and has been actively introduced to teachers.
The customer of educational services are students, readiness for changes are supported by dynamic discussions and changes in current documents.
4. Procedures for approving changes in documents have not changed and carried out according to previous plans. But dynamic orders of the administrative group allow making changes for the situation.
5. Monitoring the implementation of changes in accordance with the situation also has its own features.
5.1. A special notification system has been introduced for scheduled classes.
5.2. An electronic scheduling system with permanent links to online classes has been developed and implemented.

5.3. The basic learning management system contains instructions for working in the system in the form of Wikipedia, as well as a blog for technical and content changes in the system.
As the quarantine experience has shown, during this period there were detected the following problems:
1. Unwillingness of a group of teachers and students to work completely remotely. Solution: training; motivation; for students in rural areas - the use of various information channels.
2. Insufficient capacity of university servers. Decision: introduction of new capacities and formation of a special technical group.
3. Vulnerability of the testing module for the following reasons:
multifunctionality and the need for special knowledge (execution of instructions) when creating test tasks, the interest of hacker groups in access to answers to questions and failure of final control; large simultaneous server load.

Table 1: Dynamic results of certain modules of electronic information educational environment of VNTU

Modules	Up to quarantine	During quarantine	Changes	Usage statistics
Personal repository	Repository of personal methodical and scientific resources of the teacher		Activation of syllabus publication; electronic communi-cation between repositories	Downloaded materials from personal repositories - 1366483 times
Navigator of educational resources	Discipline resource navigator for students		Navigators for all actual disciplines and disciplines of free choice have been created	Created navigators of educational resources: 3873
Electronic magazine	Service formation of documentatio n of flow line and final control .	Service the formation of documenta-ti on is connected with the electronic archive.	Added blocks for forming course work archives.	All students and teachers of the university are covered
Test-IQ	Student knowledge testing service.		Modules work with increased security, google services and e-mail are partially separated	Answers to the questions of electronic tests TestIQ: 2880640 were received
Communications	Messaging service, corporate mail, file exchange	Google communi-cations services are built.		All students and teachers of the university are covered

In addition to the testing module, during the quarantine changes were made in the module of file communications teacher-student; teacher-teacher (at the suggestion of users); the electronic dean's office was introduced at all faculties, the use of procedures for the formation of the electronic archive and the implementation of procedures for the free choice of disciplines by students began; built-in corporate mail and video services. Also, security measures have been implemented, the consequences of hacker attacks have been eliminated, and G Suite for Education services have been partially separated. Table 1 presents the results of the stress testing of the electronic information educational environment of Vinnytsia National Technical University.

Based on the performed research and experience of implementing changes, the following recommendations were formed.

1. Agile approach should be used for projects and management situations, limited in time, in crises, and insufficiently defined situations, with limited resources and the need for consistent rapid change.
2. Management decisions are based on the results of analysis and forecast of the impact of actions on people and their cooperation.
3. Adapter's Cotter methodology involves the use of iterations and follows all steps of the change cycle with a repeat cycle to achieve the desired results.

The proposed methods can be used in the educational process as training of flexible management methodologies using practical cases and change boards. Such training can be conducted both online and offline. During the training, students work in teams and gain skills of teamwork, creating iterations, a daily brief discussion of changes, and their rapid implementation of situations.

Conclusions

The results of research indicate that the developed flexible methodologies for IT cannot be used directly in the general and project management of other areas. But Agilemanifest and the chosen methodologies must be adapted to the specific organization, projects and staff teams. The proposed recommendations for implementing changes using the tools of flexible methodologies allow you to form your own dynamic management system of the organization, which quickly perceives and implements changes in management in accordance with external market signals and changes in the internal environment.

We thank IT specialists and distance education centers of universities - Vinnytsia National Technical University and the National University of Life and Environmental Sciences of Ukraine for the opportunity to analyze the features of electronic resources and the experience of implementing dynamic changes in educational formats during the pandemic.

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The Link Between the Development of Road Transport Infrastructure in Poland And the Changes in Transport Accessibility at Regional Scale

Tomasz KWARCIŃSKI

Chair of Transport Management, Institute of Management, University of Szczecin, Szczecin, Poland
tomasz.kwarcinski@usz.edu.pl

Abstract

Transport infrastructure affects the level of transport accessibility. The impact can be direct or indirect. The development of transport infrastructure directly affects the spatial and temporal accessibility of transport, shortening the distance and travel time. The indirect impact of transport infrastructure on transport accessibility manifests itself in improving the competitive position of the region and individual companies. The article aims at presenting the impact of the development of road transport infrastructure on changes in the level of regional transport accessibility in Poland. Separate attention is paid to the changes in the spatial layout of transport availability. The evaluation considered the most recent data from the Central Statistical Office, and the scope of the analysis looks at 2008 to 2018. In the context of improving transport accessibility, an assessment of the investment consisting in the construction of the S3 expressway was also presented.

Keywords: Road transport infrastructure, transport accessibility, Poland.

Introduction

Transport infrastructure is recognized as the biggest determinant of the proper functioning of a given area. It results from the functions performed by transport in the economy and in society. Transport infrastructure with good qualitative and quantitative parameters betters the quality of life, including the mobility of citizens. Beyond the social aspect, transport infrastructure is also important for all activities of economic operators. First and foremost, it has a positive impact on their competitive capacities. The quality of transport infrastructure also has an impact on the environment.

Transport infrastructure is the result of the economic activity of previous and current generations, which will be reflected in the asset intensity and capital intensity ratios. It is assumed that about 10% of the national assets are in the form of infrastructure, including transport infrastructure. At the same time, after assessing the capital intensity of transport infrastructure, it should be noted that it is characterized by high production and maintenance costs. The cost of building and maintaining infrastructure increases with its quantitative level, reflected in the road category.

The role of transport infrastructure in socio-economic development - literature review

Transport infrastructure is an important factor, which contributes to socio-economic development. Such views are common in the literature. In domestic literature, especially since the 1960s, this subject has been brought up by many researchers (W. Grzywacz, 1982, K. Wojewódzka-Król, R. Rolbiecki 2008, M. Ciesielski 1992, M. Ratajczak, 1999, Z. Dziembowski 1995).This perspective includes general assumptions regarding transport infrastructure (social and economic characteristics, functions and classification) and attempts to identify the effects of economic, social and environmental development (P. Rosik, B. Szuster, 2008). On the other hand, foreign literature deals with the impact of transport infrastructure on socio-economic development, which is related to the primary and secondary impact (D. Banister, J. Berechman, 2000) [i], as well as direct and indirect effects, and demand and supply (J.G. Heggie, 1978) [ii].

Research connected with the impact of transport infrastructure on socio-economic development concerns:

a) time of travel - quantitative growth and qualitative development of transport infrastructure reduce travel time;
b) costs of transport – the development of infrastructure improves the investment attractiveness of a given area, capital productivity, it contributes to technical progress;

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c) efficiency of the transport process - the transport infrastructure impacts on the progress of the transport process, and directly affects the efficiency of manufacturing companies and household budgets (e.g. lower operating costs of passenger cars).

The development of transport infrastructure is particularly relevant in the less-developed regions. This thesis is confirmed by assigning different weights to transport infrastructure as a factor shaping the competitiveness of the region[iii]. Of value are reports presented by the IMD – *International Institute for Management Development* and the WEF – *World Economic Forum*, where transport infrastructure is among the basic requirements that shapes the competitiveness of a given area, K. Schwab, 2019 (most often a country). The approach of W. Grzywacz coincides with this; it distinguishes three groups of countries (low, medium and highly developed) and postulates different shaping of outlays on social and economic transport infrastructure.

E. Załoga (2006) points out that transport infrastructure is a determinant of the competitiveness of countries and economic groups. He stresses the increasing role of transport infrastructure as a driver of supporting the group's competitiveness in the global economy. In the EU countries, transport infrastructure is considered an extremely important strategic factor used to achieve development goals, including the group's competitiveness, the efficiency of the use of resources and climate neutrality. An important position in these programs is occupied by the T-TEN trans-European transport network.

In the social dimension, the role of transport infrastructure stems from its function as a determinant of social mobility. Thanks to ensuring spatial connections, the transport infrastructure enables access to jobs, science, health care and culture. On the wider stage, transport infrastructure positively impacts the leveling of social disproportions in regional terms. As K. Wojewódzka-Król and R. Rolbiecki (2018) notes, the development of transport infrastructure may also contribute to mitigating the implications of unemployment.

In the spatial aspect, the transport infrastructure influences, inter alia, the mobility of inhabitants as well as the market of goods and services. Its improvement allows the inhabitants (at the same time) to cover a greater distance. On the other hand, for market entities it means the possibility of reaching more customers. Owing to better transport infrastructure, producers can offer their products in a wider area.

In environmental terms, attention is drawn to the role of transport infrastructure in reducing external costs of transport. Improving transport infrastructure could contribute to constraints related to the reduction of pollutant emissions and noise.

Despite the generally expressed opinion about the positive impact of transport infrastructure on the socio-economic development, this impact has not been explicitly identified in terms of quantity and quality. Based on statistical analyses, it is only possible to confirm the relationship between the quality of infrastructure and the level of safety, speed of transport, production efficiency and travel time.

The link between the development of transport infrastructure and transport accessibility

The literature lists several approaches to transport accessibility, which etymologically derives from the words access and ability and is related to the ability of achieving a goal using transport infrastructure (linear and nodal) and transport services (A.M. El-Geneidy, D.M. Levinson, 2006).

Many researchers point to the important role of transport infrastructure in shaping transport accessibility. M.Q. Dalvi and K.M. Martin (1974) find that it provides the opportunity to achieve specific goals and locations. On the other hand, K. Spikermann and J. Neubauer (2002) believe that transport accessibility is the core product of the transport system in a given area, which presents the advantages of the location of a given area (region, city or route) in relation to other areas. P. Rosik (2008) refers transport accessibility to indicators based on transport infrastructure. He distinguishes between simple and composite indicators. Simple indicators related to the network density in a given area (network length per 100 km2, per 1,000 inhabitants or a weighted average indicator taking into account both the area and the number of inhabitants). Composite indicators consider access to a given area from the outside (e.g. interregional or national connections). I. Tarski (1973) states that transport infrastructure has an impact on the formation of transport accessibility, while M. Madeyski has a broader approach to the issue of transport accessibility, referring it to transport infrastructure and transport services. According to Madeyski (1976), accessibility is a parameter that allows to determine the degree of transport development of a given area. It is conditioned by the density of transport points and the frequency of connections between them.

The linear infrastructure of transport itself falls short of the demand for accessibility, as transport customers can use it only through transport points (communication stops). This reservation does not apply to the users of individual transport whose transport needs are attended to as a result of access to the linear infrastructure.

Amongst the types of transport accessibility (economic, spatial, temporal and informational), transport infrastructure has a particularly close interaction with spatial and temporal accessibility. Spatial accessibility is related to the ease of achieving the assumed objective using the transport network. It depends on the transport policies (equipment with nodal and linear transport infrastructure) of a given area (region, state). Time availability means the actual time needed to travel between specified points using the means of transport P. Śleszyński (2014). As P. Śleszyński notes, time accessibility is one of the easiest ways to identify spatial accessibility. It results from universality and comparability allowing the analysis of various transport systems. The conditions for such a defined time transport accessibility are created by the density of the transport network.

Improving transport accessibility requires continuous activity of the state and local governments, inter alia, in the field of development of transport infrastructure. This will be confirmed by R.S. Tolley and B.J. Turton (2014), who state that the development of the transport system makes for improved transport accessibility by reducing the time and cost needed to travel a given distance, for example between the place of residence and the destination.

Besides the density of the network of transport infrastructure, the quality of it affects the ease of reaching the travel destinations. The network of infrastructure connections is characterized by a radial design, which means that larger units (e.g. cities) have a greater number of possible directions of transport connections with the environment, which increases their spatial availability. That said, such organization of transport implies automatically that the inhabitants of smaller centers have limited transport accessibility, which in practice means that they can only travel in one direction. The inhabitants of towns located on the communication routes connecting larger towns are in a more favorable position.

Transport infrastructure, in the context of transport accessibility, has a positive impact on territorial cohesion. The issue concerns in particular areas located on the periphery of the country, region (peripheral) that is socially or economically backward. This thesis is confirmed by K. Spiekermann and M. Wegner (2004), according to whom the transport infrastructure enables spatial interaction, improving social cohesion. The role of accessibility also stems from its importance to overall economic growth, which additionally influences social development. In this aspect, accessibility of transport remains an important factor in providing people with access goods and services; and in more general terms it has a positive impact on the quality of life of inhabitants in the region.

The link between the development of transport infrastructure and the level of transport accessibility of regions in Poland

The empirical analysis presents an assessment of the impact of the development of transport infrastructure in Poland on transport accessibility in the regional dimension (in each voivodeship). In the analysis of the level of transport accessibility at the regional level in Poland, two indicators were taken into account (Table 1):

– spatial density of the road network as the quotient of the length of hard surface roads[iv] to area (of the country and voivodships),
– demographic density of the transport network as the quotient of the length of hard surface roads to the number of population (of the country and voivodships).

Table 1: Transport accessibility of regions in Poland in 2018 – spatial aspect

Specification	Length of hard surface roads (in thousand km).	Surface (in thousand km2)	Number of people (thousand)	Spatial density (in km/100km2)	Demographic density (in km/thousand inhabitants)	Weighted average road network density index
Polska	307,7	312,6	38 300	98,21	8,02	88,72
dolnośląskie	20,5	19,9	2 900	103,02	7,32	86,85
kujawsko-pomorskie	19,1	17,9	2 001	106,70	9,55	100,95
lubelskie	22,8	25,1	2 100	90,84	10,86	99,31

lubuskie	9,0	13,9	1 000	64,75	9,00	76,34
łódzkie	21,0	18,2	2 400	115,38	8,75	100,48
małopolskie	26,2	15,1	3 400	173,51	7,71	115,63
mazowieckie	23,9	35,5	5 004	112,11	7,37	90,90
opolskie	8,4	9,4	900	89,36	9,33	91,33
podkarpackie	17,3	17,8	2 001	97,19	8,24	89,48
podlaskie	13,7	20,1	1 100	68,16	12,45	92,14
pomorskie	14,5	18,3	2 300	79,23	6,30	70,68
śląskie	22,0	12,3	4 500	181,30	4,96	94,79
świętokrzyskie	14,7	11,7	1 200	125,64	12,25	124,06
warminsko-mazurskie	14,0	24,1	1 300	58,09	10,00	76,22
wielkopolskie	30,2	29,8	3 400	101,34	8,88	94,88
zachodniopomorskie	13,9	22,8	1 600	60,96	8,69	72,78

Source: prepared by the author based on Transport wyniki działalności 2018; GUS Warszawa 2019, Rocznik demograficzny 2020, GUS Warszawa 2020.

The presented calculations provide grounds for drawing the following general conclusions regarding the availability of road transport infrastructure in Polish regions:

1. Taking into account the area, as a criterion for assessing transport accessibility one could identify several voivodeships with a higher spatial density index than the national average (approx. 100 km/100 km2). This group includes regions located in the southern part of Poland (Małopolskie, Świętokrzyskie and Śląskie). On the other hand, the area of northern and north-western Poland (Zachodniopomorskie, Pomorskie, Warmińsko-Mazurskie and Lubuskie) are characterized by lower spatial density indicators of the road network.
2. Given the population as a criterion for assessing transport accessibility, it can be noted that the voivodeships characterized by higher road demographic density indicators than the national average (8 km/thousand inhabitants) are Podlaskie, Zachodniopomorskie, Kujawsko-Pomorskie, Warmińsko-Mazurskie and Lubuskie, while lower indicators concern Małopolskie, Podkarpacie, Śląskie and Pomorskie.
3. Indicators of demographic density of the road network and spatial density of the road network can be used for comparative assessment of one quality. To distinguish regions with better and worse transport accessibility, one can use the balanced indicator of road network density[v], which reflects the degree of development of the transport network, taking into account the area and population. Considering this indicator, it can be concluded that prime availability of road transport infrastructure is in the Świętokrzyskie, Małopolskie, Kujawsko-Pomorskie and Łódzkie Voivodships. Pomorskie, Zachodniopomorskie and Lubuskie showed a worse result.

The increase in the level of transport accessibility in regions depends on the development of transport infrastructure. Table 2 and Figure 1 present the development of the sustainable road network indicator in 2008, 2013 and 2018 as a result of the development of the length of transport infrastructure in Poland.

Table 2: Changes in transport accessibility in Poland in 2008–2018 - road infrastructure

Specification	Weighted average road network density index (2008)	Weighted average road network density index (2013)	Weighted average road network density index (2018)	Change in 2018: 2008 (in %)
Polska	79,14	85,88	88,72	12
Dolnośląskie	80,78	85,60	86,85	8
Kujawsko-pomorskie	80,66	95,26	100,95	25
Lubelskie	81,05	95,09	99,31	23
Lubuskie	60,37	69,69	76,34	26
Łódzkie	93,24	107,04	100,48	8
Małopolskie	103,31	110,47	115,63	12
Mazowieckie	79,84	92,03	90,90	14
Opolskie	79,49	86,43	91,33	15

Podkarpackie	67,98	73,90	89,48	32
Podlaskie	79,33	98,14	92,14	16
Pomorskie	59,13	63,64	70,68	20
Śląskie	96,00	93,77	94,79	-1
Świętokrzyskie	104,17	121,74	124,06	19
Warmińsko-mazurskie	66,43	74,70	76,22	15
Wielkopolskie	84,70	90,34	94,88	12
Zachodniopomorskie	69,27	73,99	72,78	5

Source: prepared by the author based on Transport wyniki działalności 2018; GUS Warszawa 2019, Rocznik demograficzny 2020, GUS Warszawa 2020.

2008 *2018*

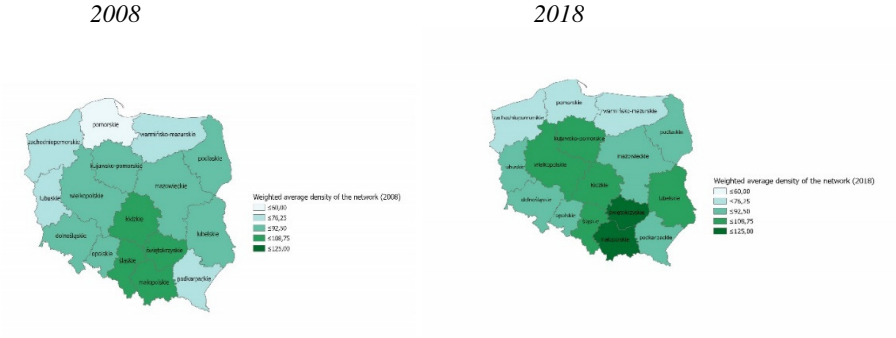

Fig. 1: Weighted average road network density index in Poland (2008-2018)

Source: prepared by the author using ArcGIS software.

Changes in the length of road infrastructure seen in Poland in 2008–2018 positively influenced the improvement of the level of spatial accessibility in Poland and in particular regions. An exception consists in one voivodeship (Śląskie) where the indicator of the level of transport accessibility expressed by the balanced road network density indicator has decreased. A high growth rate of the weighted average road network density indicator was recorded in the following voivodeships: Kujawsko-Pomorskie, Lubelskie, Podlaskie and Podkarpackie.

Taking into account the indicator of the density of balanced road network, the situation in this respect is more favorable in southern Poland (especially in the Małopolskie and Świętokrzyskie Voivodeships). That said, this indicator is lower in the northern Poland voivodeships (Zachodniopomorskie, Pomorskie and Warmińsko-Mazurskie Voivodships).

The positive effect of improving transport accessibility in the regions of eastern Poland could be related to a special program implemented from the European Union funds, taking into account the development of transport infrastructure (OP Development of Eastern Poland). The improvement is also related to the decline in population numbers in some regions. In the analyzed period, such a situation took place in the following voivodeships: Lubelskie, where there were 40,000 inhabitants less, and also: Łódzkie (-81,000), Opolskie (-48,000), Podlaskie (-9,000), Śląskie (-109,000), and Świętokrzyskie (-27,000). On the other hand, in the remaining regions, there was an increase in the number of people, and the largest was seen in the following voivodships: Małopolskie (+111,000), Mazowieckie (+192,000), Pomorskie (+113,000) and Wielkopolskie (+102,000). The migration of inhabitants is related to the choice, especially of younger people, of places offering better conditions for the development of education and later work opportunities. Undoubtedly, large urban centers and suburban areas located in close proximity are places that offer such conditions. Weaker improvement in spatial accessibility can be noticed in the Łódzkie and Zachodniopomorskie Voivodeships.

The impact of the development of transport infrastructure on the level of regional transport accessibility can also be analyzed taking into account road categories. In Poland, roads are divided into: national (including motorways, express roads), voivodeship, district and commune roads. Roads of a higher category are important for the accessibility of interregional transport, while roads of a lower category (district, commune) are relevant for intra-regional mobility. Changes in road length in 2008-2018 are shown in Table 3.

Table 3: Changes in road length in Poland in 2008-2018

Specification	National roads		Voivodeship roads		District roads		Commune roads	
	2018 (in km)	2018: 2008 (in %)	2018 (in km)	2018: 2008 (in %)	2018 (in km)	2018: 2008 (in %)	2018 (in km)	2018: 2008 (in %)
POLSKA	**19 402,8**	**5**	**28 883,7**	**1**	**114 874,2**	**0**	**140 796,2**	**41**
Dolnośląskie	1 419,7	6	2 170,8	-10	8 071,2	-4	8 561,5	41
Kujawsko-pomorskie	1 207,1	13	1 744,5	0	6 720,9	2	8 912,0	72
Lubelskie	1 041,4	-3	2 298,6	4	9 314,8	2	10 861,8	71
Lubuskie	908,5	11	1 592,3	0	3 485,7	0	2 976,0	32
Łódzkie	1 485,9	10	1 363,4	16	7 445,6	0	10 510,9	45
Małopolskie	1 097,9	7	1 414,2	0	6 533,2	1%	16 799,5	23
Mazowieckie	2 437,1	3	3 007,1	1	14 033,8	5	19 190,8	56
Opolskie	779,5	0	995,5	1	3 692,2	-2	3 065,8	6
Podkarpackie	927,1	20	1 721,6	3	6 464,5	0	7 973,8	42
Podlaskie	994,7	1	1 334,5	8	6 700,8	2	4 409,7	70
Pomorskie	914,2	1	1 833,8	1	5 250,1	-2	6 285,3	69
Śląskie	1 228,3	10	1 486,1	4	6 068,4	-1	12 959,1	11
Świętokrzyskie	755,0	0	1 075,5	0	5 842,4	3	6 959,6	39
Warmińsko-mazurskie	1 333,6	1	1 917,5	0	6 950,5	-1	3 641,4	72
Wielkopolskie	1 736,0	0	2 789,6	4	11 258,9	-1	13 986,5	34
Zachodniopomorskie	1 136,8	0	2 138,7	1	7 041,2	-2	3 702,5	35

Source: prepared by the author based on Transport wyniki działalności 2018, GUS, Warszawa 2020, Transport wyniki działalności 2008, GUS Warszawa 2009.

In 2008-2018, the length of almost all road categories increased, and only the length of district roads remained unchanged. That said, when analyzing this process, one should take into account the possibility of transferring roads to new road operators, which changes their status. In addition, in accordance with the applicable regulations, the commissioning of a new national road (motorway, expressway) meant that the old route, pursuant to the Public Roads Act, passed under the management of Municipal Executive Boards. This resulted in numerous protests from communes, which could not provide appropriate financing for maintenance of the transferred roads. After the change in regulations, national roads are handed over to provincial local governments, which is a better option.

In the period 2008-2018, among all road categories in Poland, the roads with the highest categories (motorways, expressways) underwent the greatest development. Such an extraordinary growth dynamics (114% motorways, 360% expressways) is partly due to the short length of the roads that had been built in Poland until 2008. The problem was the financing of road transport infrastructure, in particular roads of the highest category. Financing provided from the budget of the European Union proved helpful; co-financing from EU funds amounted to 75% of the value of investment. Generally, the length of motorways in the years 2008-2018 has increased from 765 km to 1636 km and the length of expressways has increased from 451 km to 2077 km. Currently, there is no region in Poland without a motorway or expressway.

The basic network in the regional perspective consists of district and commune roads. Especially in the latter category, a high growth dynamic was recorded in Poland (increase in commune roads by 41%). Most of them were recorded in the following voivodships: Kujawsko-Pomorskie, Lubelskie, Podlaskie and Warmińsko-Mazurskie, so in the area of Eastern Poland.

To conclude, the development of road transport infrastructure in Poland has improved the spatial accessibility of regions. The increased transport accessibility in interregional terms is positively influenced by the expansion of the network of higher-category roads, i.e. motorways and expressways. These roads are beneficial in faster and safer

movement of passengers and cargo between regions. More widely, a modern road network of international importance has a positive effect on international traffic, increasing the competitiveness of economic entities and thus positively influencing the competitiveness of regions and the country. Improving accessibility in the intra-regional area is also important. This is enabled through the expansion of district and commune roads, in which case the provincial local government and the state are actively involved in their financing.

The link between the development of transport infrastructure and transport accessibility as seen in the case of the S-3 expressway (section from Szczecin (Płonia) to Gorzów Wielkopolski)

The S-3 expressway connecting Szczecin (Klucz) with Gorzów Wielkopolski was put into use at the end of 2010. The total length of the new road was 81 km. In the coming years, the road was extended towards Świnoujście (north) and Lubawka (south). Until commissioning of the new S-3 road, car traffic took place on National Road No. 3 (currently district road no. 119) Szczecin (Płonia) - Gorzów Wielkopolski.

After a decade of commissioning the S-3 road, a number of positive social, economic, spatial and environmental benefits can be noticed, including:

1. **Improving safety in the carriage of passengers and cargo.** The section of National Road No. 3 Szczecin (Płonia) - Gorzów Wielkopolski was considered very dangerous in the Zachodniopomorskie Voivodeship. Many tragic traffic incidents took place there. In 2010, there were 15 accidents on National Road No. 3 on this section, while in 2019 there were 7. At the same time, no road accident occurred in 2019 on the new S-3 road.[vi]
2. **Improving traffic flow, shortening the travel time between cities.** National Road No. 3 (currently voivodeship road no. 119) in the section Szczecin – Gorzów Wielkopolski is a single carriageway running through towns and rural settlements. Until commissioning of the new road, the S 3 road was one of the most trafficked roads in the voivodeship. Its task was to handle international and regional traffic, and especially in cities through which the local traffic ran. In the years 2000-2010, the average daily traffic of vehicles on this road increased by 20%. The increase concerned both passenger cars and trucks. The most difficult situation occurred in the city of Pyrzyce, where the average daily traffic in vehicles exceeded 18,000 in 2010. This resulted in many kilometers of congestion, long travel times through the city, and was also burdensome for the inhabitants in everyday life.
Research conducted in 2015, already on the new S-3 road, confirmed further development of the average daily traffic on the section Szczecin (Klucz) - Gorzów Wielkopolski. In 2015 traffic amounted to 14.5 thousand vehicles, including 11 thousand passenger cars and about 2.2 thousand trucks.[vii]

Execution of the investment resulted in a major reduction in travel time between the cities in the south of the voivodeship (and also Gorzów Wielkopolski) and the northern part of the voivodeship (including Szczecin).
According to data supplied by Google Maps, the travel time between Szczecin (city center) and Gorzów Wielkopolski (city center) is currently about 1 hour (distance 110 km). The same route, but using district road 119 (old National Road No. 3) takes about 1.45 hours (distance 102 km). However, it is to be remembered that currently, traffic on Route 119 is smooth. Before road S 3 was commissioned, it took from 2.5 to 3 hours to travel between Szczecin and Gorzów Wielkopolski.

3. **The positive impact of investments on the labor, goods and services market.** The commissioning of a new road had a positive impact on the possibility of accessing better paid jobs in the area of the Szczecin agglomeration. This also applies to the possibility of satisfying other needs related to science, health centers or cultural institutions. It is also important in handling cargo for the ports of Szczecin and further in Świnoujście and in handling tourist traffic
4. **Improving the living conditions for the locals.** The increasing traffic of road vehicles made it particularly difficult for the inhabitants of the villages along National Road No. 3, i.e. Szczecin Płonia, Żabowo, Pyrzyce, Mielęcin, Mielęcinek, Lipiany, Renice and Gorzów Wielkopolski. The commissioning of road S – 3 improved the living conditions of the inhabitants, including their safety, and limited exhaust and noise emissions.
5. **Improved comfort of the travel.** The construction of Passenger Service Areas with service and recreational functions has improved the comfort of the journey and the possibility of rest during travel. The new expressway is adapted to the load-bearing capacity requirements, which was not ensured by the old National Road No. 3. This resulted in the formation of ruts on the old road, which created an additional hazard for travelers. Taking into account the current parameters of the S-3 road, it is possible to use it for loads of abnormal weights oraz sizes.
6. **Strengthening the position of the region as a cross-border transport and logistics center.** Taking advantage of the location of the Zachodniopomorskie Voivodeship at the north-south junction, connecting southern Scandinavia through Świnoujście, Szczecin, the Oder River Trail, the Czech Republic, Austria with the ports of the Mediterranean Sea requires the construction and maintenance of high-quality transport infrastructure. Undoubtedly,

the S-3 road helps to strengthen this position. Just as important as this is the development of the railway line ("Nadodrzanka") and the Oder River Waterway.

7. **Reducing the adverse impact of road construction and operation on the natural environment.** The conducive factors include specially built bridges (25) ensuring the continuity of wildlife migration routes (overground and underground wildlife crossings).

Conclusion

The development of transport infrastructure has a positive impact on the mobility of passengers and goods. It also contributes to the safety and comfort of travel, and the reduction of transport costs, including external costs (air pollution, accidents, congestion), and it positively affects the employment rate (directly and indirectly).

The development of transport infrastructure has a positive effect on the level of transport accessibility. It undeniably contributes to the improvement of transport accessibility in terms of space and time. In this aspect, it facilitates the achievement of goals and reduces the time associated with it. The advancement of transport infrastructure, in the context of transport accessibility, has a positive effect on the social and economic cohesion of the region.

The presented analysis of the impact of development of transport infrastructure on the level of transport accessibility confirmed the betterment of transport accessibility index in spatial terms. The advancement in this indicator primarily resulted from the development of hard surface roads in Poland. Importantly, it concerned virtually all road categories. The development of expressways and motorways streamlined transport accessibility in the interregional perspective, while the development of commune roads contributed to a better situation in the intraregional perspective.

The construction of the S-3 road had a positive impact on the social, economic and spatial cohesion of the Zachodniopomorskie Voivodeship and improved the quality of life of the locals. In the context of transport accessibility, beside improving cohesion, the time aspect of the investment's implementation proved important, as it allowed to shorten the travel time between cities and through the voivodeship. In any case it has, however, to be noted that the planned completion of the entire investment will take place in 2024. Only then will it be possible to assess the full effects of the investment. The new S-3 road has improved transport accessibility (especially interregional) and reduced external costs of transport, but the question is whether it has not limited the development of cities and rural areas through which the National Road No. 3 (currently voivodeship road no. 119) ran.

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[i]Primary impact can be defined as a current one, while a secondary impact occurs over time. In a short period of time one can observe changes as a result of traffic, benefits from lower vehicle operation costs, a reduction in travel time, improved traffic flow, and in the long term, there are shifts related to the location of settlement and production.

[ii]Demand effects are related to the direct benefits achieved from implementation of the investment (the use of materials for construction or demand for labor). Supply effects are related to implementation of the infrastructure investment and its impact on the environment.

[iii] That said, the impact on competitiveness depends on the stage of development of a given country - higher in relatively underdeveloped countries, and lower in highly developed countries. The segmentation criterion is most often based on the purchasing power of an individual citizen, expressed in USD. It is true that the measure used by the World Economic Forum (GDP per capita) has come in for a lot of criticism. There are calls for taking into account more elements in measuring the level of development of countries. A good example is the HDI measure, which takes into account not only GDP per capita, but also life expectancy and school education.

[iv] Unpaved roads, used by farmers and foresters to access fields, were omitted.

[v] The weighted average density index takes into account spatial and demographic density. It is a quotient of the length of network (e.g. road network) and the square root of the product of the area and the population of the studied area.

[vi] For more information on this subject see www.obserwatoriumbrd.pl

[vii] The decrease in the number of trucks is most likely due to the fact that the use of expressway S3 by them is paid. Some of the vehicles use the old national road S-3, which is free for passenger cars. This status can be confirmed by research conducted on national and district roads that is carried out in 2020, and whose results will be known at the end of 2021.

The Relevance of the Local Touristic Actors for the Destination Communication: The Case of Terras de Trás-os-Montes

Madalena MARINHO
Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal email: madalenacrmarinho@gmail.com

Ricardo Fontes CORREIA
Associate Professor – Instituto Politécnico de Bragança; UNIAG-Applied Management Research Unit, Campus de Santa Apolónia, 5300-253, Bragança, Portugal email: ricardocorreia@ipb.pt

Elisabete Paulo MORAIS
Coordinator Professor – Instituto Politécnico de Bragança; UNIAG-Applied Management Research Unit, Campus de Santa Apolónia, 5300-253, Bragança, Portugal email: beta@ipb.pt

Abstract

The destination communication is carried out by a diversity of actors, from the local community, to the tourists, the public and the private sector The local community has taken on an increasingly active role with regard the communication of a destination, since it is in direct contact with the tourist, assuming a informal role of the destination promoters. This communication is progressively generated through information and communication technologies (ICT), namely social networks. In this article the communication contribution of the tourist entities of the Trás-os-Montes lands (a region in the northeast part of Portugal) is analyzed. For that an evaluation was carried out on their online presence and its way of communicating the region. The findings offer relevant insights for the destination managers and policy makers.

Keywords: Local community, tourist entities, communication, destination, information and communication technologies (ICT).

Introduction

The local community of a territory is one of the most important elements in the construction of the territorial offer, since it is at the same time producer and consumer of such offer (Hankison, 2007, Correia &Brito 2020). From this community the touristic actors connected to the hospitality industry have the capacity to promote the destination individually by their actions and promotional tools. If they are aware, involved, and identified with their region desired image, these local actors tend to act as true promoters of the region by conveying, in contact with other audiences, messages consistent and appropriate to the characteristics of the offer (García et al., 2012). However when they are not aligned with the destination vision or simply are not aware of it, their communication may generate an unclear image for the tourist.

Although the relevance and potential of these local tourist actors in promoting a destination are undeniable, Aitken and Campelo (2011) mention that residents and the local community are often left out of the brand creation process, and therefore do not participate in the implementation of the territorial marketing strategy (Kavaratzis & Ashworth, 2008), nor, in turn, are aligned with the communication of the brand / destination.

Depending on the characteristics of the territory, local community can vary in size, diversity, dispersion, as well as interests. This heterogeneity makes the alignment of the local community with the values and territorial vision a complex driving force.

The relevance of the local tourist actors was amplified with the technological promotional tools that are now available both for companies and individuals. In fact if, since the 1980s, Information and Communication Technologies (ICT) began to transform tourism (Buhalis & Law, 2008), they are currently essential in tourist organizations (Drosos, Chalikias, Skordoulis, Kalantonis, & Papagrigoriou, 2017). ICTs are crucial not only as internal sales tools (Martins et al 2017) but also for interaction, dialogue and connectivity with customers. These

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technologies have made available to tourist actors, even if small, instruments to communicate directly and interactively with their audiences, influencing not only their image but also that of the region where they are located.

The main objective of this article is to understand the online presence of tourist entities and how they communicate the destination where they are inserted. The destination chosen for this analysis comprises the 9 municipalities ascribed to the Lands of Trás-os-Montes (a region in the northeast part of Portugal). In a first stage, it was important to understand the presence of various local tourist entities, on social networks and how they make use of their website. Then, we analyze whether they communicate the destination and whether they do so effectively.

The article is structured as follows. Section 2 offers a comprehensive overview of the theoretical background where the role of the local community in the communication of a destination and the importance of online communication is highlighted. Section 3 presents the methodology used, and after in section 4 the results are discuss. Finally section 5 summarizes the main contributions of the paper and concludes with limitations and suggestions for further research.

Conceptual Background

The role of the local community in promoting a destination

Everything that happens territorially (e.g. local production, local brands, security, economic performance and climate change), or carried out by entity's related to the territory (such as politicians and public figures) daily communicates the characteristics of the territorial offer, thus having the potential to influence its image and attractiveness (Correia, 2014, Correia & Brito 2020). At the same time, some of these entities themselves actively communicate messages about the territory. Hotels communicate characteristics of the territory to which they are related, just as food and landscape. The restaurants are also attached to the local characteristics and may communicate them while promoting their services, the same happens with other actors related to the touristic industry.

The way, in which the locals interact with tourists, even the menus in the restaurants or the shops windows are important sources of communications that should be as much as possible influenced by the vision and territorial brand. Considering the number of the local actors (that can vary from less than one hundred to many thousands) it will be difficult to align them all in a unified territorial vision and to control (or at least influence) their promotional messages.

Given the diversity the offer elements, one of the most common problems of territorial marketing is the transmission of messages with many appeals, becoming easily confusing and/or inconsistent. Territories should not pretend to be everything, but turn out to be experts in some particular features. Thus, the message/promise associated with the territorial brand should be clear and differentiating. The associated positioning of the territorial brand should serve as a unifying framework by which the territory intends to be recognized while acting as a territorial promise – that is, the brand is an element that fosters the identity of the place (Sousa, Casais & Pina, 2017). As mentioned above, it is essential that this positioning will be identified with the local community, as its realization depends greatly on its behaviour.

As Sousa and Rocha (2019, p. 189) state, "territorial marketing is a fundamental tool in the promotion of places, one that must be present in the strategies of local government representatives, helping and promoting a sustainable economic and social development of the regions". Only by being aware of how the territory intends to communicate externally and the image that it intends to build, can local territorial agents behave in a manner that coincides with that intended image (García et al., 2012). Thus, one of the most important measures of territorial image construction involves communication with territorial agents in order to influence their behavior.

The importance of online communication

The evolution of the ICT has been notable and the effects of this evolution applied to tourism are clearly visible. ICT allows tourists to access accurate and reliable information about the place they want to visit. They also allow reservations to be made more quickly, with easy comparison of costs and in a much more convenient physical and temporal way. In general, ICTs contribute to a higher quality of service and to a higher overall satisfaction of guests (Buhalis, 1998).

ICTs enable local people to become more involved in the dissemination of the destination brand, and they do so, in a more accessible way (Kavaratzis, Braun & Zenker, 2013). They facilitate the creation of contacts that help in the development of companies, in the acquisition of more capable and cheaper suppliers and even in the dissemination and delivery of products (Buhalis, 2000; Manente & Minghetti, 2006).

The technologies now available allow the development of solutions to enhance the consumer experience and increase their involvement with the touristic players and the destination. Social networks with the extremely easy way how they alllow the acess and share of information are now one the main sources of promotional messages. Social networks have been an increasingly regular practice for the dissemination of the image that entities want to create around a destination brand. In addition, these networks are one of the most pivotal points in the online aspect of marketing management, helping to reach and interact with the target audience (Xiang & Gretzel, 2010; Kotler et al. 2011). The use of various digital platforms by stakeholders is extremely used and efficient, making "(...) network communication one of the main communication strategies" (Navío-Marco, Ruiz-Gómez & Sevilla-Sevilla, 2018, p.463).

All of this highlights the importance of the ICTs in the ability to arouse the interest and desire of tourists in the face of a destination brand. In the same order, this offers a greater notoriety to the territory. Finally, ICTs are a breaking point in the financial and notoriety gap between tourism agents, facilitating contact with the market and providing higher quality of service to smaller companies. Through this greater competitiveness, the region ends up gaining more financial and social capacity (Buhalis, 2000).

Adapting this information to the Portuguese territory, the northern region of Portugal has the lowest internet penetration (69%), and the most purchased services online are accommodation (57%), transport tickets (44%) and entertainment tickets (37%) (ACEPI, 2019). Taking these tourist services into account, it is important that the different tourist entities are present online and communicate the destination in order to attract tourists.

Methodology

To analyze the online presence of tourist entities and their communication of the destination, quantitative and qualitative approaches were used. In a first stage, the presence of tourism agents on social networks was verified and they had a website. Regarding the quantitative analysis, it was ascertained how many followers and publications they had in each network. The social networks analyzed were Facebook, Instagram and Youtube, as they are the most used by Internet users (Marktest, 2019).

In a second phase, which corresponds to the qualitative approach, the objective was to understand if the entities communicated their destiny. In the case of communicating, an analysis was made that consisted in finding out on which platform they communicate, how they communicate, and which are the target themes of communication. The analysis comprises the periodic interval from January 1, 2020 to May 31, 2020.

Sample Selection Criteria

For the selection of the sample was considered the territorial unit NUT III, which corresponds to the Lands of Trás-os-Montes. This region in the north of Portugal is composed of nine municipalities: Alfândega da Fé, Bragança, Macedo de Cavaleiros, Miranda do Douro, Mirandela, Mogadouro, Vila Flor, Vimioso and Vinhais. The tourist entities of these counties were selected based on three categories: accommodation, catering, and activities. The accommodation and restaurants were taken from the book Boa Cama, Boa Mesa 2020 (Expresso, 2020). This book contemplates several criteria for the selection of the spaces awarded with the reference, such as: considered ambassadors of the region's gastronomy; users and promoters of local products; recognized in the region for their active role. This book is also known to contain the best accommodation and restaurants in each region of Portugal. As far as tourist activities are concerned, these were chosen based on the website of each City Hall under analysis and the Tripadvisor platform

Sample

In total, 29 entities from the 9 municipalities were analyzed: 10 accommodations; 9 restaurants and 10 entities with tourist activities.

Table 1 shows the nine municipalities that correspond to the Lands of Trás-os-Montes, the data on the arrival of guests in 2018 (INE, 2018), the tourist entities analyzed and the due designation of abbreviations in legend for better interpretation of the data. It is possible to observe that the municipality of Bragança presents a larger number

of entities for analysis. This is justified because it is the capital of the district and the target of the demand for more tourists.

Table 1: Sample of tourist entities analyzed.

Counties	Guest arrivals (2018)	Tourist entities	Denomination
Alfândega da Fé	7822	Bela Vista Silo Housing	A1
Bragança	65243	Pousada de Bragança	A2
		Bétula Studios	A3
		Quinta da Rica Fé	A4
		Restaurante G	R1
		D. Roberto	R2
		O Abel	R3
		O Geadas	R4
		Tasca Zé Tuga	R5
		Anda D'I	ATV1
		Nordeste Park	ATV2
		Montesinho Aventura	ATV3
Macedo de Cavaleiros	6411	Solar do Morgado Oliveira	A5
		Brasa	R6
Miranda do Douro	25587	Casa dos Edras	A6
		Casa Belharino	A7
		Douro Pula Canhada	ATV4
Mirandela	22936	Dona Fina Guest House	A8
		Flor de Sal	R7
		Maria Rita	R8
		Naturthoughts	ATV5
		Anitudes	ATV6
Mogadouro	1975	Casa das Quintas	A9
		A Lareira	R9
Vila Flor	3136	Quinta Barracão da Vilariça	A10
Vimioso	1366	P.I.N.T.A	ATV8
		Coordenadas de aventura	ATV9
Vinhais	6712	Parque Biológico de Vinhais	ATV10

Results

In a first phase, the analysis consisted in knowing the online presence of the selected tourist entities, and out of 29, only 2 do not have any online presence (2 restaurants). Regarding the most used platform, Facebook stands out (26 entities), 17 entities are present in Instagram and have a website (graph 1).

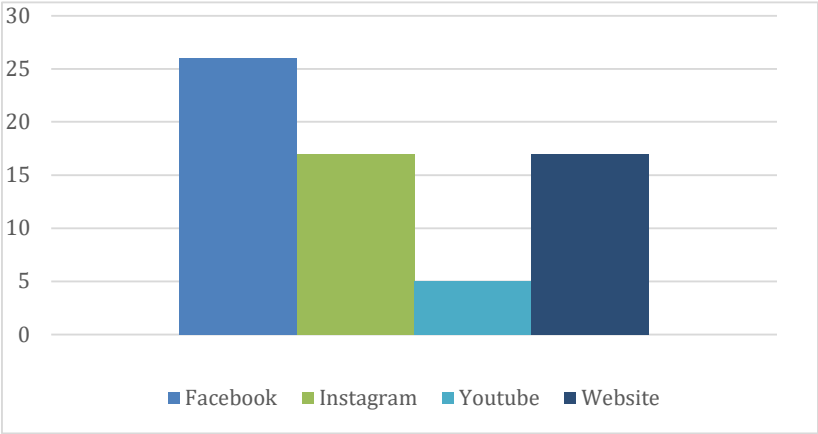

Graph 1: Online presence of tourist entities.

Although most of the entities are present on the platforms presented, many of them, during the analysis period, did not interact with their followers. We can also withdraw that 8 entities placed between 0 and 5 posts (in five months) on the Facebook social network, this being an extremely low number compared to other entities.

The followers of the two most used social networks (Facebook and Instagram) were also studied to know their impact on these same networks (graph 2). The entities with more followers on Facebook correspond to restaurants (6 have more than 3000 followers) and activities (2 have more than 3000 followers).

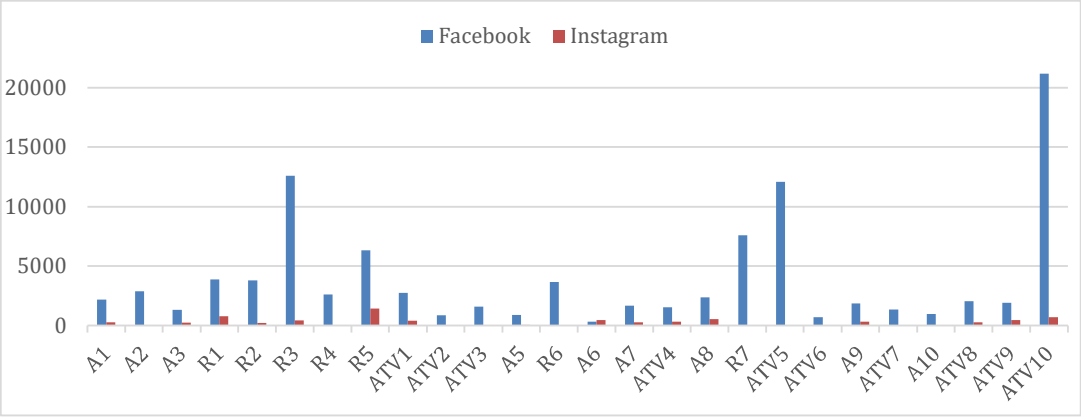

Graph 2: Followers of social networks of tourism entities.

The analysis proceeded with the objective to find which of the 29 entities communicate the destination. In a first stage, the existence or not of some type of content on the platforms that portrayed the destination was verified. Of the 29 entities analyzed only 18 communicate the destination. The results obtained show that the most used platform to communicate is Facebook, and of the 18 that communicate, 15 use this social network (graph 3). It can also be seen that 10 entities have information about the destination on the website, information that corresponds to static pages.

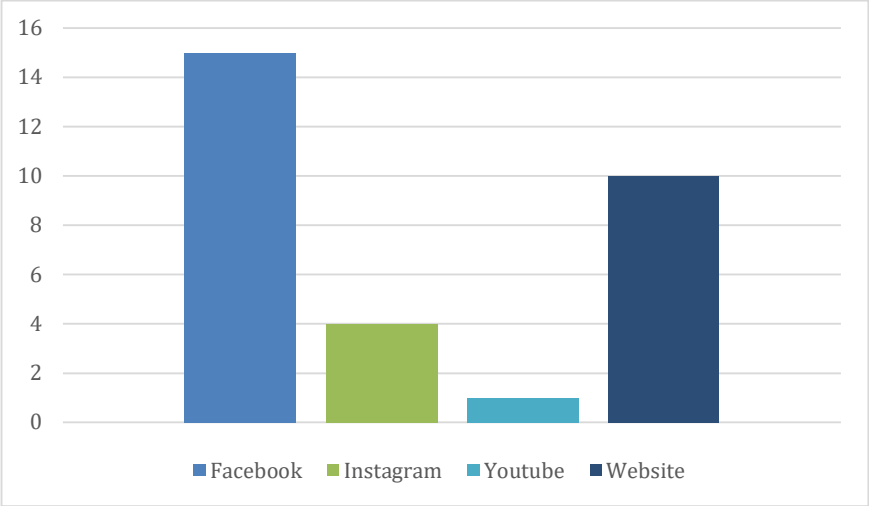

Graph 3: Platforms where tourist entities communicate the destination.

Should also be mentioned what form of sharing was chosen by the entities to communicate the destination. Four categories were considered: photos, sharing, text and videos. As for sharing, it is important to inform for consideration that these consist of shared content from other people, blogs, or news. Graph 4 shows that the most used way to communicate the destination are the photos. This represents the identity of a destination and can trigger emotions and desires to visit a destination (Pérez-García, 2020). Many of the photographs used are accompanied by explanatory text about the content that is the target of the communication.

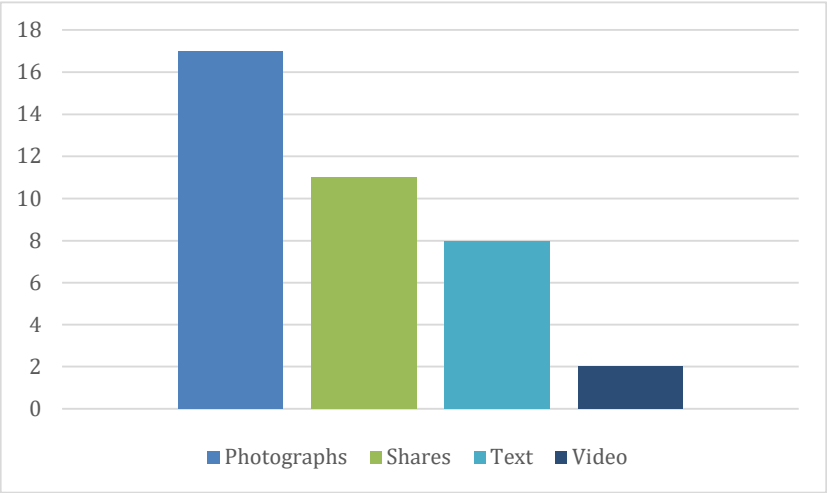

Graph 4: Ways used by tourist entities to communicate the destination.

Regarding the themes addressed by the entities, these were categorized based on the nine dimensions/attributes of image perception of destiny, proposed by Beerli and Martín (2004). The categories are the following: natural resources; general infrastructure; tourist infrastructure; leisure and recreational tourism; culture, history, and heritage; natural environment; social environment; atmosphere of the place; political and economic factors. Despite the existence of 9 dimensions, for the following analysis only 4 categories were considered, since they are those related to the data under study.

- Natural resources: time, beaches, flora and fauna, parks, and natural reserves.
- Tourist infrastructures: hotels, restaurants, bars, discotheques, tourist office, etc.
- Leisure and recreational tourism: entertainment and sports activities.
- Culture, history, and art: museums, monuments, gastronomy, religion, customs, etc.

Therefore, of the communicated themes, the majority comprises the category natural resources, namely the theme Natural Park of Douro International. Soon after, the category corresponding to culture, history and art stands out, being the events of the region and local gastronomy the most communicated

The Facebook platform was chosen for a more detailed analysis, as it is the most used by entities. The purpose of this analysis is to know the activity of the entities in this social network and the frequency of their communication of destination. The quantification of this frequency was made based on the total of publications in the period stipulated for analysis. From this we conclude that only 15 tourist entities communicate through this social network (graph 5).

Although many entities communicate the destination, it is important to understand the number of posts registered during a period of five months and how many of these correspond to the communication of the destination.

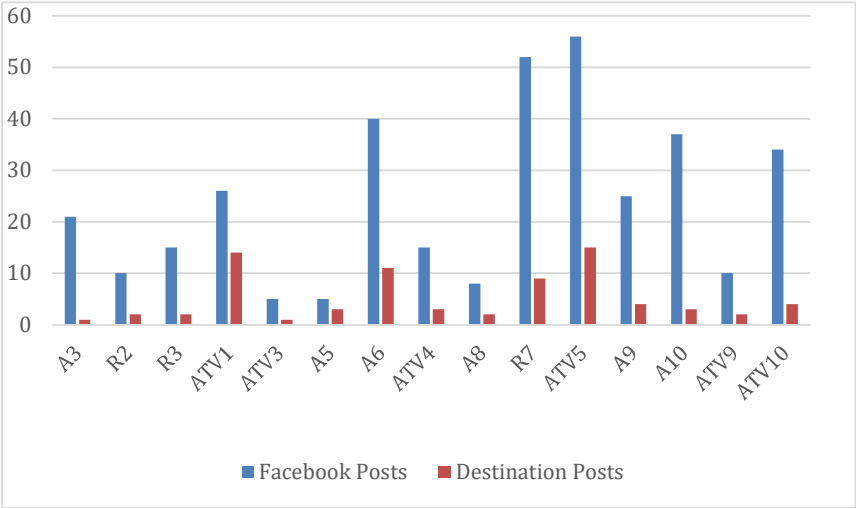

Graph 5: Comparison between the total of facebook posts and the posts that communicate the destination

This importance is related to the idea that an entity that makes several posts but only communicates the destination once, is in a situation substantially different from another that communicates the territory weekly, which is here the intended objective to improve the capacity and notoriety of the destination brand. For graph 5, only tourist entities that communicate the destination were considered.

The most active entities on the Facebook platform are respectively a restaurant and a tourist entertainment company in the municipality of Mirandela. It is also these two entities that most communicate the destination, followed by ATV1 and A6.

The analysis made shows that about 62% (18) of the tourist entities analyzed communicate the destination, but although this number represents more than half of the total sample we must take into account that 16.6% (3) of these entities communicate through a website, where the information is on a static page, not contributing so effectively. The remaining entities communicate through the Facebook and Instagram platform, but during the five months analyzed only 4 entities communicated more than five times the destination.

Final Considerations

We must stress that, based on some studies (Correia & Brito, 2017; Kavaratzis, Braun, & Zenker, 2013), we can conclude that uncontrolled sources, where tourist entities are included, are more significant and effective in communicating a destination. This is because the less controlled the information, the more credibility and influence it will have on the creation of the image of the destination, with consumers (tourists). As Correia and Brito (2017,

p.819) states "(...) the territorial offer is co-produced by a multiplicity of entities, each one of them will be able to function through their behaviors and activities as a communication element of the territory".

The use of technologies has allowed the various entities a lower dependence on intermediary companies for the distribution and communication of their products (Buhalis, 2000), allowing a better interaction between the various tourism agents and an integral marketing communication.

The study made it possible to verify the complexity that involves the communication of a destination by local entities. We concluded then that it is not enough to sporadically communicate a destination to attract tourists' attention; the message communicated must be constant, clear, and attractive. However, most tourist entities in Trás-os-Montes do not communicate the destination regularly.

Most tourist entities are small and micro enterprises, a number that is even more intensified in the region under study. This type of entity suffers from a greater difficulty in accessing social capital and technological investments. However, according to Lee and Hallak (2020) small and micro enterprises have the capacity to become competitive through the appropriate use of online platforms and the support of destination governments and tourism associations in connecting all these enterprises.

This article presents some limitations, particularly regarding the selected sample. Not all the entities chosen matched the top demand in terms of tourism.

Another limitation in this study relates to the method of analysis - observation. This method when applied by different researchers may eventually generate different collected data, since different points of view may lead to the consideration of different types of posts as a form of communication. However, it should be made clear that there has been an effort for the analysis to be totally impartial and built from the position of the tourist. For example, some posts were not considered "communication" because the photographs were not visually perceptible.

For a future line of research, it would be interesting to consider a larger sample of tourist entities in order to draw more assertive conclusions. It would also be interesting to cover other types of tourist entities such as: museums, regional product shops, bars, tourist services etc as well to analyze the alignment between the messages conveyed by the touristic actors and the position and vision of the destination brand.

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The Possibility of Developing and Management of Direct Sales In The Conditions Of Electronic Economy

Ewa KORELESKA

UTP University of Science and Technologie in Bydgoszcz, Bydgoszcz, Poland

ewa.koreleska@utp.edu.pl

Abstract

The aim of this study is to present development possibilities of direct sales of food products under the conditions of electronic economy. Secondary data was obtained from - CEBOS reports from the years 2002 to 2020, as well as from the Central Statistical Office and primary data were obtained from three interviews with the Internet users for better interpretation of the secondary data. A case study method was also employed which involved analyzing Rural e-box' project (2020). For this purpose, secondary and primary data obtained from an interview with the project manager were. It was found that a vast number of the Polish Internet users (85%) do used the Internet for shopping. However, as compared to other countries, Poles use this form of sale much more rarely (19 position among 29 European countries in 2020). Purchasing food via the Internet is not yet very popular among the Internet users (7% of Internet users), though it is worth noting that for the last year it has gained in importance. In the opinion of the Internet users it was caused by a wider assortment of products offered by online stores and manufactures and better equipment and access to the Internet and the pandemic. It seems that the concepts of the type of *Rural e-box* which are of regional character with the use of modern internet, informatic technologies, modern management methods reduce the concerns about the food quality and its delivery time, are very likely to find followers in Poland.

Keywords: Internet, management, direct sales, distribution, electronic economy, food, organic food, online shopping,

Introduction

The role of the Internet is getting more and more important. The newest data of the Central Statistical Office shows that in 2020 as many as 90.4% of Polish households have access to the Internet. Considering the place of residence, the percentage of households with the access to the Internet is higher in towns than in rural areas (Społeczeństwo informacyjne … 2020). At the same time the role of the Internet has been undergoing changes as from the source of information it has also become a communication channel as well as a distribution channel for goods and services.

Goal, material and research methods

The aim of this study is to present development possibilities of direct sales of food products under the conditions of electronic economy. In the beginning, literature publications were reviewed (e.g. based on the Web of Science). The major concepts were defined, including a definition of direct sales, their form and management of the process of distribution. In Poland online shopping is less popular European countries and the popularity of online food product shopping is smaller as compared to other categories of products. Secondary data was obtained from - CEBEOS reports from the years 2002 to 2020, as well as from the Central Statistical Office and primary data were obtained from three interviews with the Internet users for better interpretation of the secondary data. Three scenarios were prepared to be used as measurement tools. At the end of the research, a case study method was employed which involved analyzing 'Rural e-box' project. For this purpose, secondary and primary data obtained from an interview with the project manager were used (measurement instrument – interview questionnaire was employed). The survey was conducted in 2020. Then, the collected data was analyzed.

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Shopping via the Internet

Shopping via the Internet in Poland as compared to other European countries

There are differences regarding shopping via the Internet between the European countries. This form of shopping is most frequently used by the Danish, whereas it is least frequently used by the Romanians. Poland occupies the 19th position in this respect (fig.1).

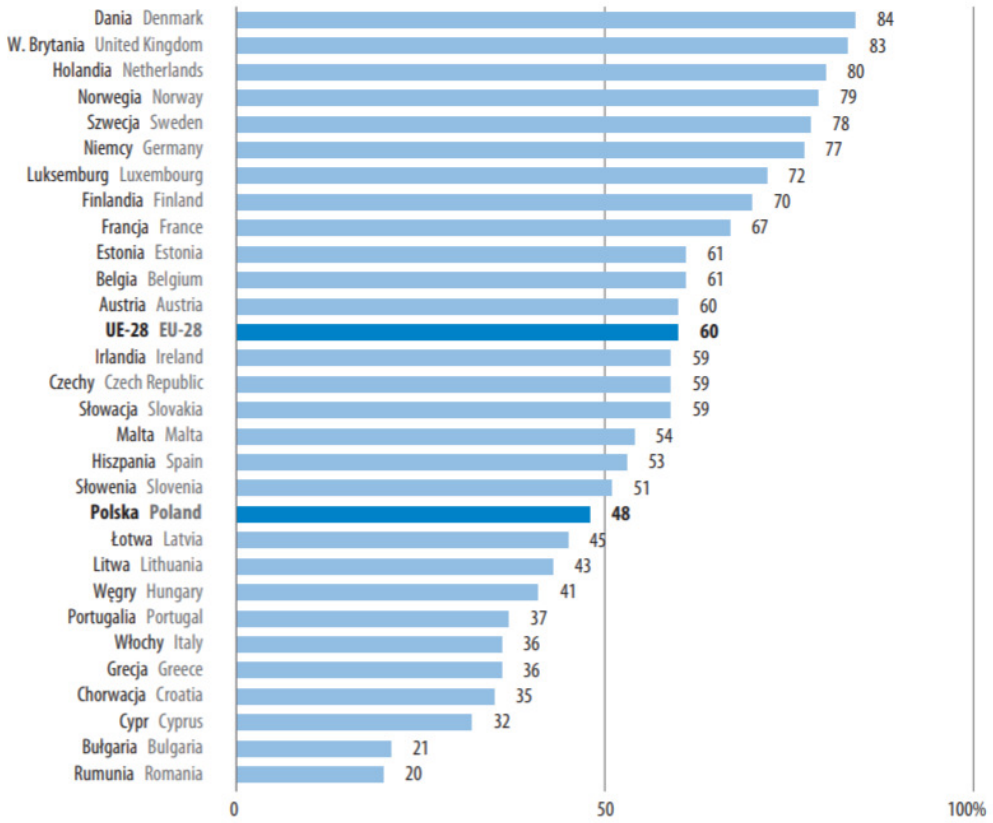

Fig. 1: Source: Społeczeństwo informacyjne w Polsce. Wyniki badań statystycznych z lat 2015-2019, GUS, US w Szczecinie, Warszawa, Szczecin, 2019.

Online shopping in Poland – according to the product category

According to the Center of Public Opinion Research in 2002 shopping on the Internet was not very popular in Poland. Only less than 0.5% of the whole population declared that they had bought something via the Internet in the month preceding the survey. In the following years the number of online shoppers was still small, though it was fast growing. Thus, in 2004, 3% of all Poles (that is 13% of the Internet users) declared that during the previous three months they had bought something online. In turn in 2005, 4% of Poles (14% of Internet users) declared that during the previous month they had bought something on the Internet. In 2008 the percentage of people doing online shopping was higher and it doubled as compared to 2005. A systematic increase was recorded in the following years. In 2020 this percentage has risen up to 57% (that is 85% of Internet users) (tab. 1).

Table 1: Shopping via the Internet in Poland

Specification	2002	2004	2005	2006	2007	2008 *	2009	2010	2011	2012	2013	2014	2015	2016	1017	2018	2019	2020
Percentage of Poles declaring having done online shopping at least one time																		
Internet users	-	-	-	-	-	57	67	67	66	72	75	74	80	81	81	81	83	85
All adults	-	-	-	-	-	23	32	34	37	40	45	47	51	53	54	51	57	57
Percentage of Poles declaring having done online shopping in the previous month																		
Internet users	2	13	14	23	24	35	33	33	32	37	42	36	46	45	46	51	52	65
All adults	0	3	4	7	9	15	16	17	18	21	25	23	29	29	31	32	36	44

**since 2008 the research was extended and the share of adult Poles and Internet users who bought something on the Internet at least one time was determined*

Source: *Korzystanie z Internetu. Komunikat z badań, nr 85/2020, CBOS, Warszawa, 2020; Korzystanie z Internetu. Komunikat z badań, nr 95/2019, CEBOS, Warszawa, 2019; Korzystanie z Internetu. Komunikat z badań, nr 49/2017, CEBOS, Warszawa, 2017; Korzystanie z Internetu. Komunikat z badań, nr 92/2016, CEBOS, Warszawa, 2016; Internauci. Komunikat z badań, nr 90/2015, Warszawa, 2015; Internauci 2014. Komunikat z badań, nr 82/2014, CBOS, Warszawa 2014; Internauci 2013. Komunikat z badań, nr BS/75/2013, CBOS, Warszawa 2013; Korzystanie z Internetu. Komunikat z badań, nr BS/81/2012, CBOS, Warszawa 2012; Korzystanie z Internetu. Komunikat z badań, nr BS/99/2011, CBOS, Warszawa 2011; Korzystanie z Internetu i komputerów. Komunikat z badań, nr BS/79/2010, CBOS, Warszawa 2010; Korzystanie z Internetu i komputerów. Komunikat z badań, nr BS/96/2009, CBOS, Warszawa 2009; Polacy w sieci. Komunikat z badań, Bs/58/2008, CBOS, Warszawa 2008; Korzystanie z Internetu i komputerów. Komunikat z badań, nr BS/59/2007, CBOS, Warszawa 2007; Internet i komputery: wyposażenie gospodarstw domowych, sposoby i cele korzystania. Komunikat z badań, CEBOS, nr BS/58/2006, Warszawa 2006; Internet i komputery: wyposażenie gospodarstw domowych, korzystanie, perspektywy rozwoju. Komunikat z badań, CEBOS, nr BS/68/2005, Warszawa 2005; Internet i komputery w gospodarstwach domowych. Komunikat z badań, Warszawa 2004; Komputery, internet, telefony komórkowe: wyposażenie gospodarstw domowych i użytkownicy w niektórych krajach Europy środkowej i wschodniej. Komunikat z badań, CEBOS, BS/82/2002, Warszawa 2002.*

It was found that in the month preceding the study, clothes and shoes were the most commonly purchased products. It is worth noticing that during the whole considered period, that is, from 2007 to 2020, this category of products enjoyed the biggest interest of the Internet users (tab.2). Moreover, it was observed that the dynamics of growth in the percentage of people who buy clothes and shoes online was the highest. Their number has increased four times so that in 2020 they accounted for more than one third of all the Internet users.

Electronic equipment was found to be on the second position in terms of the number of its online buyers. The share of people who bought this kind of equipment was, however, twice lower that the number of those who purchased clothes and shoes. It needs to be noted that the dynamics of growth, being only 45%. was not so rapid as in comparison with 2007.

The next position was occupied by cosmetics. As compared to 2007 the share of people who bought cosmetics on the Interned was doubled.

The number of the Internet users who are interested in a purchase of books maintained at a similar level in 2007 and 2020. A drop down to 6% was reported only in 2014.

In the considered period, the interest in a purchase of toys and other products for children as well as motorization articles has increased three times.

Sports equipment, food, medicines, and access to services and content are found to be less frequently purchased. Although the use of paid online content, such as, e.g. newspaper archives, photographs, is not very popular it has been slowly gaining popularity.

As for medicines, despite of intensive advertising they do not attract a vast number of buyers. In 2020 their sale has increased by 6%. It is probably due to that fact that unknown suppliers are less trustworthy and some medicines are available on prescription.
Percentage of online food buyers in the years 2009-2019 ranged at a very low level from 1% do 3%. No sooner than in 2020 a purchase of food became more popular among the Internet users and increased by 1,3 times as compared to the previous year (7% Internet users).

The least interest of the Internet users was found for multimedia (programs, computer games music, movies) as well as bus, train or plane tickets, whereas plane tickets have been less popular in 2020 as compared to the previous years, due to the pandemic. The number of people buying plane tickets has decreased more than half as compared to 2019, which results from a drop in the number of travels in the times of the epidemic.

Some respondents listed other types of products to be bought on the Internet which are not included in the list, e.g. house or apartment interior equipment, construction materials and tools, machines and devices, garden tools, animal accessories, cleaning and hygienic agents.

It should be noted that definitely more people than last year – which, as it seems, should be attributed to the situation of the pandemic – have been using the Internet to buy shoes and clothes, electronic equipment, cosmetics or even food products.

Table 2: Online shopping reported in 2004-2020 (within a month from the time of the study) %

Specification	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	1017	2018	2019	2020
Cloths, shoes	7	14	15	15	14	16	17	18	23	20	21	23	25	34
Electronic equipment	11	13	12	11	10	9	10	10	11	11	11	10	10	16
Cosmetics	b.d.	b.d.	b.d.	b.d.	b.d.	7	9	6	9	10	9	10	10	,15
Books, e-books, audiobooks	11	11	7	7	9	8	8	6	11	11	9	9	11	12
Toys, children articles	3	5	7	9	10	8	9	9	12	12	12	10	10	12
Motorization articles	2	4	9	10	10	8	12	9	9	9	11	7	6	8
Spports equimpent	b.d	2	b.d.	b.d.	b.d.	7	7	5	6	7	8	6	4	7
Food products	b.d.	bd	2	1	2	1	2	1	3	3	3	2	3	7
Medicines	b.d.	b.d.	2	1	2	2	2	3	4	4	4	3	5	6
Access to services and content	b.d	b.d.			3	4	4	2	4	3	4	3	3	5
Programs, computer games	b.d	5	4	3	3	4	4	3	4	2	3	2	3	4
Plane, train and bus tickets	2	3	4	3	6	4	4	6	7	7	7	4	7	3
Music, films	3	b.d	4	2	4	3	4	2	3	3	5	2	2	3
Records	b.d	5	3	4	1	b.d	b.d	b.d	b.d	b.d	b.d	b.d	b.d	b.d
Others	9	8	12	11	10	10	10	8	10	11	13	8	9	14

Source: Korzystanie z Internetu. Komunikat z badań, nr 85/2020, CBOS, Warszawa, 2020; Korzystanie z Internetu. Komunikat z badań, nr 95/2019, CEBOS, Warszawa, 2019; Korzystanie z Internetu. Komunikat z badań, nr 49/2017, CEBOS, Warszawa, 2017; Korzystanie z Internetu. Komunikat z badań, nr 92/2016, CEBOS, Warszawa, 2016; Internauci. Komunikat z badań, nr 90/2015,

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Analysis of results of the Internet Shopping in the opinion of the Internet Users – own study

To enable better interpretation of the results the Internet users were interviewed. Asked to indicate advantages of electronic commerce they listed the following benefits: convenience, lower price, shorter time, wider assortment, better availability of products, free delivery. They expressed the following comments: ‘ I am not in a hurry, I do shopping at 22:00, when I have some leisure time’. When it comes to disadvantages they most frequently mentioned delivery problems and damage of the package content. It needs to be noted, though, that recently the Internet users have noticed improvement in this field. Suppliers take care of their shipments to be delivered as they believe that ‘one negative comment can make people be more cautious which can decrease their profits”.

The Internet users are not surprised at an increased interest in online shopping of clothes and shoes. They think that this kind of shopping is more convenient. The respondents are not afraid that the size may not be right as there is a possibility of using an esize.me scanner, which provides a precise 3D model of feet in merely 5 seconds. This model includes all dimensions needed to correctly match the shoes including width, instep height and circumference. The scan is performed only once and the service is free. It can be performed in the shop (200 shops) CCC or by a smartphone application. However, when the size is not correct the customers know that they can use a free return of the order with time, as they claim, long enough to do it.

Besides, some Internet users said that they had gone to the store to try on a given model and then they bought it online thus, saving as much as 150 PLN.

Internet users explained a relatively stable level of interest in electronic equipment by preferences for shopping in stationary stores. Respondents indicate that these products are of specialist character that requires counseling, turning on and off, checking and configuration.

A similar situation associated with a purchase of books was interpreted by a drop in the interest in reading and the fact that people are still not used to online shopping.

High dynamics of a growth in purchasing children products was explained by introduction of social programs including (Rodzina) Family 500 plus.

A purchase of motorization products, as has already been mentioned, increased by four times. The Internet users were of the opinion that it was caused by an increase in the number of motor vehicles in Poland including second hand cars which require more repairs and replacement of parts. According to the newest data of CSO , the index of motorization (number of passenger cars falling on 1000 people) in 2017 was 586, whereas the majority of the registered passenger cars (90.1%) were 6 years old and more [CSO].

Moreover, the respondents indicated that the waiting time for the parts to be ordered online and those bought in a conventional store is similar whereas a their price is at a similar level.

A drop in the interest in online programs, computer games results from a huge technological progress. In 2008 the number of free games available online was smaller. There was no play store. Nowadays people use free games.

In turn, CD records are getting out of use. The Internet users take advantage of free VoD services. Sometimes they use pirated VoD services, which are losing popularity in Poland. A wider access to legal sources and an increase in expectations concerning the quality of services have a definite impact on this phenomenon.

A small interest in an online purchase of food products was explained by a concern about the product freshness.

Besides, it was found that the delivery was sometimes too long while 'I need the product right now' 'I prefer to go to the store and have it right now than wait'. According to the respondents, a interest in food online shopping was the effect of a limited food offer. Only selected stores offered such an option. However, the time of the pandemic slightly changed the attitude of the Internet users which is reflected by an increase in the share of online food buyers. In the opinion of the Internet users, it was caused by a wider assortment offered by online stores and producers, better 'equipment – tablets, computers, smartphones', to be used by consumers and spread of the coronavirus pandemic.

The Internet users believe that in the time of the pandemic, the significance of online sales will keep growing and once people get used to online shopping it will have even a bigger share in the market.

Concept, advantages and disadvantages and direct sales management - theoretical approach

According to the Polish legal regulations, the supply of food from the manufacturer to the consumer can be carried out with the use of a direct sales formula or agricultural retail trading. So understood direct sales apply exclusively to unprocessed products of animal origin. They are supplied in the form of direct deliveries to end consumers or to local retail companies supplying products directly to end consumers and on the territory of the household. The second formula , that is, agricultural retail trading applies to each type of food, that is, food of animal origin and nonanimal origin, unprocessed and delivered directly to end consumers, e.g. to a farm and to a market (Rozporządznie 2015, Śmigielski 2019).

The literature provides three models of direct sale (Waszczyk, Radacki 2005, Brzeziński, Bogusz, Kania 2014):

- classical direct model which involves a direct contact between the seller and the customer,
- classical shipping model (by means of post office),
- non classical shipping model (by means of the Internet), in the case of the two latter models there is no contact between the seller and the customer.

Direct sales is one of the best forms of distribution channel between a food manufacturer and a customer. Direct contact provides measurable benefits for both sides of the chain, it is favorable for increasing the quality of the offered products and making the customers aware of the properties of products (Koreleska 2008, 2017, Nowak, Tanska-Hus, Minta 2011, Bogusz 2018; Wojcieszak-Zbierska, Bogusz 2020).

Selling in short distribution channels is the subject of scientific studies around the world (especially in the context of a pandemic). (Al-Adwan, Kokash 2019; Atkociuniene, Vaznoniene, Kiausiene, Pakeltiene 2019; Corsi, Mazzocchi 2019; Jablonski, Sullins, McFadden 2019; Bareja-Wawryszuk 2020; Jovanovic, Vujadinovic, ,Mitreva, Fragassa, Vujovic 2020; Jurado, Moral, Viruel, Ucles 2020; Kumar, R ., Kumar, N., Bishnoi, Malik, Kumar, P. 2020; Rover, Pugas, De Gennaro, Vittori, Roselli 2020; Thilmany, Canales, Low, Boys 2020).

Sales management includes determination of tactical sales purposes, creation and monitoring of the current operation plan, planning and management of resources to be used for current sales support (Tracy, Scheelen 2000).

Regular management process involves, among others:

- monitoring of sales and settlement of all financial transactions,
- determination of prices and payment methods, management of rebates and credit programs, implementation of special programs for regular customers,
- assessment of the dynamic of sales, identification of leaders and sales outsiders,
- control of the state of mutual settlements between the company and the customer,
- management of customer relations (system CRM),
- management of the sales process in separate channels (Grzybek 2015).

Project 'Rural e-box' an example of a direct sale

The project Rural e-box' was created in order to shorten the delivery chains of food coming from agricultural farms. The core of the project is the concept of collective action.
The project assumes implementation of innovative sales models of food manufactured by farmers and small enterprises:

1. Farm shop.

2. Sales platform.
3. Purchase groups.

Rural e-box includes local food manufacturers from the Kujawsko -Pomorskie province, among others, farmers who are involved in Agricultural Retail Trade (ART), Marginal Local Activity (MLA), organic and apiarian farms (Farmers (13 including: ART, organic farms, direct sale, apiarian farms) Enterprises (4 including 3 MLA*)
The assortment offer includes: meat, diary, herbal products, fruits and vegetables. Kujawsko-Pomorski Center for Agricultural Counseling in Minikowo is the initiator and leader of the created operational group. In the beginning, the workers of the Center considered taking up such an initiative only for regional manufacturers and sellers of cheese. However, only three out of 30 willing farmers remained in the group of regional entrepreneurs. Therefore, to take advantage of financial support from 'Cooperation' as part of Rural Area Development Program for the years 2014-2020, it was necessary to additionally convince farmers or entrepreneurs who were involved in production or selling of other food products. Eventually, the Agency for Restructuring and Modernization of Agriculture acceptance of financial support in the amount of (Funding 726 682 PLN) was obtained. The total value of the project was 1 110 512.55 PLN (Rozporządzenie 2016).

In order to test different sales models of food manufactured by farmers, the Center and the University of Science and Technology have created a consortium on the basis of the 'Cooperation' initiative.

The project has been implemented since December 2019. Thanks to it an Internet platform will be created as well as farm shops, and a potential customer will have the possibility to choose a convenient form of shopping.
The project consists of three stages:

1. Investment stage in which farmers could buy equipment necessary for small scale processing, e.g. cheese caldron, the purchase was financed in 50% from the project, however, at the moment of a purchase the farmers had to pay the whole sum.
2. Construction of a quality system, creation of an internal control system which.
3. Active sale, launch of a sales platform.

It is assumed that transport of food to a group of customers will be carried out once a week. Orders will be placed through a sales platform from Sunday to Wednesday. A car and a sales platform will be purchased partly from the project funds. In the beginning, the enterprise will be a part of the project. Then, the costs connected with a distribution of products will be borne by the manufacturers proportionally to the sales volume. Therefore, an association was created in 2020 which will continue common distribution, when the project funds get exhausted.
The goal of this association is to support, promote and develop the idea of short food delivery through (Stowarzyszenie…2020):

1. Supporting Kujawsko-Pomorskie farmers who are involved in food manufacturing as part of: agricultural retail trade, marginal, local limited operation, direct sales, direct deliveries as well as micro and small agricultural -food companies from the Kujawsko Pomorskie voivodeship (referred to as local food manufacturers) as well as economic entities and persons that plan to take up such economic activity.
2. Development of a cooperation net between farmers, producers, processors and local leaders for purpose of common sale and product promotion.
3. Extension of the cooperation net through engaging in actions aiming at increasing the number of food manufacturers.
4. Supporting a development of entrepreneurship, agriculture and traditional and organic processing.
5. Encouraging exchange of experiences and opinions on the subject of sustainable development of trade and production.
6. Support for alternative forms of contact between individual customers and small manufacturers.
7. Organization, creation and promotion of places, processing and trade of traditional and organic products.
8. Attention to high quality of products, maintenance of high sanitary-veterinary standards.
9. Implementation of new technologies in the field of food production while maintaining the Polish tradition.
10. Development of the consumer awareness of high quality of food produced by local manufacturers in favor of consumer patriotism development.

A number of promotion actions have already been taken as part of the project such as creation of a website including address data to be used for information purposes. There is a possibility to order products and collect them on the farm or in the company. Products can also be purchased at fairs. There are action taken PR, including meeting in the Marshal's Office in Toruń**, or** in the Province Governor's Office in Bydgoszcz (April 2020). Organizers participated in a conference on analyses, chances and threats to rural areas on the territory of Kujawsko-Pomorskie Province. A presentation was prepared for the conference participants.

The project 'Rural e-box' differs significantly from other projects of this type, eg. farmers come from the whole province which generates problems of logistic nature due to the distance and scatter of the suppliers. There are also problems connected with different requirements concerning transport conditions of so diversified products. It seems that systematic analyses of costs, analysis of the net geography, and analysis of the role of particular manufacturers in the delivery chain will make optimization of the operation easier. The interviews with the Internet users indicate that there is a demand for such a distribution of agricultural products.

Conclusions

It was found that a vast number of the Polish Internet users (85%) and Poles (acc. to different studies 53%, 48%) do used the Internet for shopping. However, as compared to other countries, Poles use this form of sale much more rarely (19 position among 29 European countries in 2020). The dynamics of changes in the period from 2002 to 2020 has been high which suggests that its further development can be expected in the next few years with particular growth in the interest in such products as clothes, shoes (almost four times). Purchasing food via the Internet is not yet very popular among the Internet users (7% of Internet users), though it is worth noting that for the last year it has gained in importance (in 2020 in relation to 2019 1,3 times). In the opinion of the Internet users it was caused by a wider assortment of products offered by online stores and manufactures and better equipment and access to the Internet and the pandemic. It seems that the concepts of the type of *Rural e-box* which are of regional character with the use of modern internet, informatic technologies, modern management methods reduce the concerns about the food quality and its delivery time, are very likely to find followers in Poland**.**

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Do Consumers' Attitude and Intention to Use Contactless Payment Matter? An Empirical Perspective amidst COVID 19 Pandemic

Lennora PUTIT
Department of Entrepreneurship and Marketing Studies, Faculty of Business and Management, Universiti Teknologi MARA, Kampus Puncak Alam, 42300 Kuala Selangor, Selangor Malaysia
lennora633@uitm.edu.my

Norsiah AHMAD
Department of Entrepreneurship and Marketing Studies, Faculty of Business and Management, Universiti Teknologi MARA, Kampus Puncak Alam, 42300 Kuala Selangor, Selangor Malaysia
a_norsiah@uitm.edu.my

Nor Fazalina SALLEH
Department of Entrepreneurship and Marketing Studies, Faculty of Business and Management, Universiti Teknologi MARA, Kampus Puncak Alam, 42300 Kuala Selangor, Selangor Malaysia
nor_fazalina@uitm.edu.my

Nini Hartini ASNAWI
Department of Entrepreneurship and Marketing Studies, Faculty of Business and Management, Universiti Teknologi MARA, Kampus Puncak Alam, 42300 Kuala Selangor, Selangor Malaysia
niniha3000@uitm.edu.my

Mohamad Fariz ABDULLAH
Department of Entrepreneurship and Marketing Studies, Faculty of Business and Management, Universiti Teknologi MARA, Kampus Puncak Alam, 42300 Kuala Selangor, Selangor
farizabdullah@uitm.edu.my

Amirah AHMAD SUKI
Kuliyyah of Economics and Management Sciences,
International Islamic University Malaysia, Malaysia
amirahahmadsuki@iium.edu.my

Abstract

Studies have shown that human nature is continuously evolving and it generally affects consumers when adopting a new set of consumption behaviour. In the recent event of a global coronavirus pandemic (termed COVID 19), consumers are forced to depend on new technological methods of payment in pursuit of a safer method to purchase goods and services. Following this concern, this study was conducted to investigate the extent to which perceived usefulness, perceived ease of use, social influence, trust, convenience, and fear affect consumers' attitude towards the use of contactless payment. It also aims to examine whether attitude influences consumers' intention towards the use of contactless transactions. Using a non-probability sampling technique, data were collected from 200 respondents via online questionnaire survey distribution. A total of 185 usable data were analysed using Smart PLS 3.0 statistical software package. Several findings were established and discussed further.

Keywords: Contactless e wallet payment, Intention, Attitude, Technology Acceptance Model, Trust, Fear, COVID 19 pandemic

Introduction

Past studies have shown that an evolution of human behaviour occurs over a period of time. The need to adopt a particular set of planned behaviour arises as a result of the propensity to fulfil psychological and social needs (Ajzen and Fishbein, 2000). In a technological system's adoption, Davis (1989) stated that perceived usefulness, perceived ease of use may affect one's intention. This study attempts to investigate the extent to which socio-psychological related factors affect consumers' attitude and intention to use contactless payment transactions of goods and services amidst the current global pandemic.

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Contactless payments have proven to provide benefits to both businesses and consumers alike, in terms of higher levels of control and convenience for consumers, and higher return on investment (ROI) for business merchants (Brett, 2017). Essentially, it is an act of financial transactions for goods and services without any physical need to exchange cash, write a cheque or enter a Personal Identification Number or PIN (Brett 2017; Joifin, 2018). The contactless payment's existence comes in many forms, most commonly as credit and debit cards, key fobs, smart cards and other similar devices that allow secure payment by near field communication (NFC). Nagashree, Rao and Aswini, (2014) stated that NFC has evolved from a combination of radio-frequency identification (RFID) to other non-contact inter-connection technologies. The relative simplicity of NFC combined with its compatibility, with existing Bluetooth and Wi-Fi standards, presents an advantageous solution for facilitating any contactless transactions (Balachandran, 2015).

From a consumer's perspective, this latest technology allows for fast, easy and secure payments for purchases and has increased convenience for consumers when making everyday transactions such as transportation tolls, parking facilities, food shopping and petrol stations (Mokhtar, 2019). Perhaps, the potential increased acceptance of contactless payments is also due to fear of the ongoing global disease outbreak, namely corona virus or COVID 19 (The Star Online, 2020). Although there seems to be a decline in corona virus infection rates and plans are in place to begin easing lockdown measures in some parts of the developed world, it has provided a hint of hope after weeks of unrelenting gloom (Mohamad, 2020).

Nevertheless, it is not the case for many developing countries (Mohamed, 2020) who cautioned that the crisis may barely have begun, and the human toll of a major COVID-19 outbreak would be much larger than in any advanced economy. In addition to fear of any microbial infections (Lee, Mathis, Jobe & Pappalardo, 2020), many consumers fear shopping physically and to adhere instead, towards practicing extreme social distancing and other relevant hygienic measures in ensuring transfer avoidance of such infections. There is also a potential opportunity to explore alternative forms of shopping and payment mechanisms in light the rising concern of COVID 19 pandemic (Star Online, 2020; Chin, 2020). In view of the above, this study examines the socio-psychological related factors that may affect consumers' attitude and intention to fully adopt contactless payment transactions of goods and services during the current global pandemic situation.

Literature Review

Drawing from the Technological Acceptance Model (TAM) (Davis, 1989) and Protection Motivation Theory (Rogers, 1975), other earlier seminal works and relevant constructs from literature are also justifiably warranted to further understand intention and actual behavioural adoption. Theory of Planned Behaviour, for one, proposes that intention is a proximal predictor to actual behaviour (Ajzen, 1991) while Theory of Reasoned Action by Fishbein & Ajzen (1975) further explain that intentions and behaviour are considered to be strongly related when they are measured at an equal level of specificity. Following these concerns, several predicting factors are further explored in this study. These factors may determine the extent to which there will likely be a subtle shift in consumers' propensity to use contactless payment transactions in light of COVID19 pandemic situation.

Behavioural Intention

In understanding the mechanics of adoption, any usage of product and services can be explained in terms of its execution, habit, application, or fulfilment (Liu & Gong, 2008). Many researchers found that actual adoption is difficult to be measured accurately on its own (Schuitema, Anable, Skippon, & Kinnear, 2013). Most of the studies related to the technology or innovation have investigated behavioural intention as a predictor of adoption (Irani, Gunsegaran & Dwivedi, 2010). It is considered as an indicator of actual behaviour; and actual behaviour is found to be directly and closely affected by behavioural intention (Fishbein & Ajzen, 1975).

According to Ajzen (1991), intention is likely to play a crucial role in controlling the motivational factors that will be contributing to the actual behaviour. If the intention to deal with behaviour is stronger, there will be a higher possibility that an actual behaviour will be performed. Putit, Nurhani, Suki, Afiqah, Nurul & Nurul Amirah (2020) and Putit & Muhammad (2015) for example, focused on the need to investigate the web-based travel transaction intention and loyalty behaviour while Mutahar, Norzaidi, Ramayah, & Putit (2017) used intention to study on the mobile banking adoption amongst consumers in Yemen. These studies found that intentions play significant roles in the actual adoption of technology-related behaviours. Jusoh & Teng (2019) further found that an intention to adopt e-payment has a strong positive effect on the actual usage of e-payment. In view of the above, intention is looked into as a measure to examine potential acceptance and usage of such contactless payment transactions.

Attitude

Attitude towards usage has been recognized as a factor that guides future behaviour. In TAM, attitude towards usage is referred to as an evaluative impact of an individual's positive or negative sentiment when displaying a specific

behaviour (Ajzen & Fishbein, 2000). Singh, Sinha & Liébana-Cabanillas (2020) found that a user's positive attitude towards e-wallet will improve behavioural intention. This study has the comparative outcomes to which attitude towards behaviour influences intention to use SakuKu, a form of e-wallet contactless payment amongst Generation Y consumers in Indonesia (Jerry & Maulana, 2017). On the other hand, Shroff, Deneen & Ng (2011) found that attitude and behavioural intention has a non-significant relationship.

Teoh, Hoo & Lee (2020) however, found that Malaysians have positive attitudes and are ready to use mobile cashless payment transaction services, given that this strategy improves payment speed just as it is simpler to utilize. Nonetheless, the study was not generalizable since it only specified certain sampled population of interest that were not representative. The Technology Acceptance Model by Venkatesh and Davis (1996) stated that both perceived usefulness and perceived ease of use were found to impact behavioural intention, but at the same time, highlighting the need to develop an attitudinal construct. As mentioned by Nidhi et al (2020), positive attitude may influence intention to adopt e wallet payment transactions. In view of these contentions, it is postulated that attitude can influence the adoption of contactless payment.

Perceived usefulness and perceived ease of use

Perceived usefulness (PU) reflects the degree to which an individual regards a specific framework to support their activity performance (Mathwick, 2001). Perceived ease of use (PEOU) is referred to as the degree to which a particular conversion is considered straightforward (Davis 1989). As stated by Venkatesh and Davis (2000), attitude towards information system is affected by both of these variables. Alaeddin, Altounjy, Zainudin & Kamarudin (2018) supported the contention, to which PEOU and PU significantly affect attitude towards technology usage. Further to that, Wijayanthi (2019) asserted that perceived helpfulness also impacted attitude toward technology utilization, and was supported by Jin, Seong & Khin (2020). Isrososiawan, Hurriyati, & Dirgantari (2019) also found that PEOU has a positive and significant impact on the use of mobile payment.

Nevertheless, prior research considers perceived ease of use as a basic requirement for system design and should not have an influence on attitude in the later stages of adoption (e.g. Agarwal and Prasad, 1998; Chau and Hu, 2002; Davis et al., 1989). This is further supported by Ajibade (2018) who stated that the association between attitude towards using innovation and genuine use can also be influenced by factors that are not controllable by the likely users such as other facilitating conditions involving knowledge, money, time and effort. In this study, PU and PEOU are still worthy of investigation on its potential influence on attitude, which is posited to also influence consumers' intention to adopt contactless payment.

Trust

Trust is an outcome of both social and financial collaborative significance, to which vulnerability is available (Pavlou, 2003). Social influence and trust were referenced in TAM2 and TAM3 individually. Past research by Jin et al., (2020) have shown that there is significant positive relationship between social and behavioural influences to accept mobile wallets. Lai (2017) has inferred that TAM2 and TAM3 were not positively significant in determining innovation of a single-stage e-payment System. Aslam, Ahmad, Akhtar & Maqbool (2017) indicated that consumers are not confident enough to use cashless payments. Nonetheless, Jerry & Maulana (2017) suggested that trust be explored in determining its influence on cashless payment usage. In view of this, it is postulated that trust influences customers' attitude towards technological usage of cashless payments in their business transactions.

Convenience

Convenience refers to an individual's assessment of service encounters that provide easy access to products and services (Hsu & Chang, 2013). A study on English learning through PDAs by Chang, Mokhtar, Majid, Luyt & Theng (2012) revealed significant impact of perceived convenience on attitude toward using PDAs. Hsu & Chang, (2013) also demonstrated that perceived convenience clearly influences attitude toward using Moodle. Moreover, Cristobal, Flavián & Guinalíu (2018) found that mobile payment application is convenient to use and both genders concurred about the convenience of using the mobile phones for making payment. Lee & Jun (2007) contended that TAM should consider investigating factors influencing selection goals in addition to convenience and usefulness. In any case, Lai & Zainal (2015) mentioned that convenience is useful in determining the use of a single-stage e-payment system. In fact, convenience was an extension of TAM for the novel innovation of a single-stage e-payment system (Lai, 2017). In this study, it postulates that convenience affects customers' attitude to use contactless payment in their business transactions.

Fear

Fear has been long recognized as a powerful motivator that educates humans on how to react towards dangerous situations as a matter of survival. It is viewed as an extrinsic motivator considering that fear is created by environmental incentives; specifically, threat. In most psychology studies, this phenomenon is explicated through the Protection Motivation Theory (PMT) developed by Rogers (1975). The PMT model attempts to explain people's motivation for a particular behaviour based on the perceived threat encountered. Drawing from this assumption, both businesses and consumers alike may find that their anxiety towards microbial infections are effective motivators for them to be proactively involved in hygienic practices in their daily activities. These activities include self-grooming, eating, socializing, travelling, and interestingly, making payments in the retail setting.

Despite the fact that Covid19 pandemic has affected global economy through social clampdowns and business closures, essential services including the retail marketing sector are very much active in terms of the number of visits by consuming patrons (Bernama, 2020). Apart from wearing face mask, a customer could still be infected through contact with contaminated surfaces that include card terminals and banknotes during the check-out process. Hence, customers who are fearful of the risk of infection, and highly cognizant of this threat during COVID 19 pandemic (Lee, Jobe & Mathis, 2020; Lee et al, 2020), are motivated to consider contactless form of payment that prevent physical exposure to these contact surfaces (The Star Online, 2020).

Following the above review of extant literature, several hypotheses are developed for this study.

H1 - Perceived usefulness affects attitude towards contactless payment transactions

H2 - Perceived ease of use affects attitude towards contactless payment transactions

H3 – Social Influences affect attitude towards contactless payment transactions

H4 - Trust affects attitude towards contactless payment transactions

H5 - Convenience affects attitude towards contactless payment transactions

H6 – Fear affects attitude towards contactless payment transactions

H7 – Attitude influences intention to adopt contactless payment transactions

Figure 1.0 – Conceptual Framework

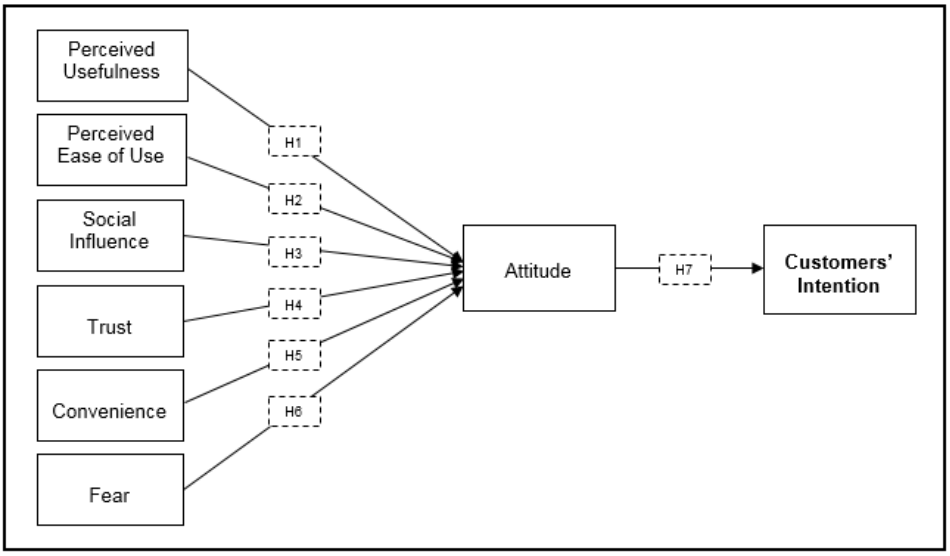

Methodology

The targeted population of this study were generally retail customers who carried out transactions of goods and services via offline and online retail outlets. Hair et al., (2010) stated that sample sizes that are within the range of 100 and 200 would be fitting and adequate. Consequently, the target population size in this study was 200 respondents, but only 185 usable feedbacks were used for further data analyses. This study adopted quota sampling from a non-probability sampling technique, to which a population is segmented into fundamentally unrelated sub-groups dependent on a specified proportion (Brick, 2011). In this study, the sample is obtained by segregating the respondents as per diverse ethnicities into identified sampled size ratio. The research instruments used to measure all items are adopted from previous researches and adapted to this study. Data analyses were carried out using both SPSS Version 26.0 and Smart PLS version 3.0 software respectively.

Finding and Discussion

Descriptive Statistics

From the 200 survey distribution, only 185 usable data were collected and analysed to determine the demographic characteristics of targeted respondents and their usage patterns of contactless payment transactions. Table 1 shows the demographic profile of the respondents who had participated in this study. For gender, the highest percentage was female at 68.1% (n=126) and male respondents made up 31.9% (n= 59). Therefore, the highest number respondents of the study are female compared to male. The age group ranged from below 18 years old until 41 years old and above age group. The highest age range for this study was those between 18 to 25 years old at 71.9% (n=133). The analysis is based on 185 online respondents as shown in Table 1 below

Table 1: Demographic Profile

Profile	Descriptive Profile	Percent	Frequency (n=185)
Gender	**Female**	**68.1**	**126**
	Male	31.9	59
Age	Below 18 years old	2.2	4
	18 - 25 years old	**71.9**	**133**
	26 – 30 years old	13	24
	31 – 35 years old	4.3	8
	36 – 40 years old	5.4	10
	Above 41 years old	3.2	6
Education	Postgraduate Degree	1.1	2
	Bachelor Degree	**60.5**	**112**
	STPM/Matriculation/Diploma	20.5	38
	SPM	17.8	33
Ethnicity	**Malay**	**26.5**	**49**
	Chinese	24.9	46
	India	24.3	45
	Others	24.3	45
Employment	Executive	1.1	2
	Non-executive	2.7	5
	Manager	5.9	11
	Others	**90.3**	**167**
Income	**No Income**	**44.3**	**82**

	Below RM 1,000	18.4	34
	RM 1,001 - RM 2,000	24.3	45
	RM 2,001 - RM 3,000	11.9	22
	RM 3,001 - RM 4,000	0.5	1
	RM 4,001 and above	0.5	1
State	**Johor**	**49.7**	**92**
	Melaka	2.2	4
	Negeri Sembilan	1.1	2
	Selangor	13	24
	Perak	1.1	2
	Penang	1.6	3
	Kelantan	1.6	3
	Terengganu	0.5	1
	Pahang	4.9	9
	Sabah	5.9	11
	Sarawak	11.4	21
	W.P. Kuala Lumpur & W.P. Labuan	7.0	13

Table 2 shows the target respondents' general usage characteristics of contactless payment. Generally, all respondents were aware of the contactless e-wallet payment application system. In terms of usage, majority have experienced using it at 78.9% (n=146) as compared to the non-users at 21.1% (n=39). In terms of the types of contactless payment cards, most respondents were using Touch n GO e- wallet system at 48.6% (n=90), followed by Maybank QR Pay system at 16.8% (n=31) and others at 5% (n=1). However, 20% (n=37) were still not using the e wallet payment system. Most respondents have used the e-wallet payment system for less than 1 year at 61.6% (n=114), while 17.8% (n= 33) have used it for nearly 2 to 3 years, and 5% have used it for more than 5 years. 20 %(n=37) of the respondents have not used this system before.

Table 2: Usage Characteristics of Contactless e-Wallet Payment

Profile	Descriptive Profile	Percent	Frequency (n=185)
Awareness	**Yes**	**100**	**185**
	No	0	0
Usage	**Yes**	**78.9**	**146**
	No	21.1	39
Types	**Touch n Go**	**48.6**	**90**
	Boost	11.9	22
	Grab Pay	2.2	4
	Maybank QR Pay	16.8	31
	Others	0.5	1
	Not using	20	37
Duration	**Less than 1 year**	**61.6**	**114**
	2 – 3 year	17.8	33
	More than 5 years	0.5	1
	Not Using	20	37

Inferential Statistics

Partial Least Square – Structural Equation Modelling

By using the partial least square–structural equation modelling techniques, the convergent validity and discriminant validity testing were subsequently used in measuring the model. Convergent validity of the measurement are usually ascertained by reviewing the loadings, average variance extracted (AVE) and composite reliability (CR). The results in this study showed all loadings to be above 0.7; CR were all higher than 0.7, and the AVE were also greater than 0.5 as shown in Table 3 below.

Table 3: Convergent Validity

Construct	Item	Loadings	CR	AVE
Perceived Usefulness	PU1	0.910	0.922	0.822
	PU3	0.908		
	PU5	0.903		
Perceived Ease of Use	PEOU1	0.914	0.931	0.819
	PEOU2	0.887		
	PEOU5	0.914		
Social Influence	SI1	0.925	0.922	0.855
	SI3	0.924		
Trust	T1	0.913	0.949	0.824
	T3	0.903		
	T4	0.924		
	T5	0.890		
Convenience	C2	0.930	0.932	0.872
	C4	0.938		
Fear	F1	0.793	0.859	0.605
	F2	0.730		
	F3	0.803		
	F5	0.783		
Attitude	AT1	0.899	0.951	0.794
	AT2	0.890		
	AT3	0.890		
	AT4	0.899		
	AT5	0.876		
Intention	CI2	0.905	0.928	0.810
	CI3	0.895		
	CI4	0.900		

Note: *Item C5, C15, F4 were deleted due to low loadings, meanwhile item C1, C3, CI1, PEOU3, PEOU4, PU2, PU4, SI1, SI2, SI4 and T2 were deleted due to cross loadings.*

Using Fornell and Larcker (1981), discriminant validity of the measurement criteria was used in comparing the correlations between constructs and the average variance extracted (AVE) from that construct. Table 4 below shows that all values of the square root of AVE were greater, thus indicating that the measures were discriminant.

Table 4: Discriminant Validity

	CV	ATT	INTN	FEAR	PEOU	PU	SI	TRUST
CV	**0.934**							
ATT	0.886	**0.891**						
INTN	0.808	0.896	**0.900**					
FEAR	0.713	0.770	0.768	**0.778**				
PEOU	0.877	0.869	0.811	0.654	**0.905**			
PU	0.860	0.877	0.826	0.670	0.904	**0.907**		
SI	0.748	0.731	0.670	0.601	0.732	0.756	**0.925**	
TRUST	0.878	0.876	0.807	0.717	0.893	0.890	0.736	**0.907**

Note: Values on the diagonal (bolded) are square root of the AVE while the off-diagonals are correlations

Further data analyses were then undertaken to test the relationship between independent, mediator and dependent variables. The result revealed that four out of seven tested hypotheses were accepted. H1, H5, H6, and H7 were accepted, to which convenience served as the strongest predictor ($\beta = 0.279$, $p< 0.05$), followed by perceived usefulness ($\beta = 0.526$, $p< 0.05$) and fear ($\beta = 0.222$, $p< 0.05$) indicating a significant relationship with consumer attitude towards intention. The R^2 values of 0.869 (or 80% variance in attitude) were above the 0.26 value as suggested by Cohen (1988) indicating a solid model.

Next, the predictive construct of attitude towards intention was further analysed. The results indicated that attitude ($\beta = 0.896$, $p< 0.05$) had a significant relationship with customer intention. The R^2 values explained 80 % of the variance in customer intention. Table 5 illustrates the overall hypothesis testing of the said relationships.

Table 5: Hypothesis Testing

Hypothesis	Relationship	Std Beta(β)	t-value*	R^2	f2	Decision
H1	Perceived Usefulness > Attitude	0.241	3.196		0.061	Accepted
H2	Perceived Ease of Use > Attitude	0.154	1.636		0.024	Rejected
H3	Social Influence > Attitude	0.013	0.214	0.869	0.000	Rejected
H4	Trust > Attitude	0.111	1.151		0.013	Rejected
H5	Convenience > Attitude	0.279	3.394		0.098	Accepted
H6	Fear > Attitude	0.222	4.718		0.169	Accepted
H7	Attitude > Customer Intention	0.896	37.175	0.803	4.080	Accepted

*$p< 0.05$

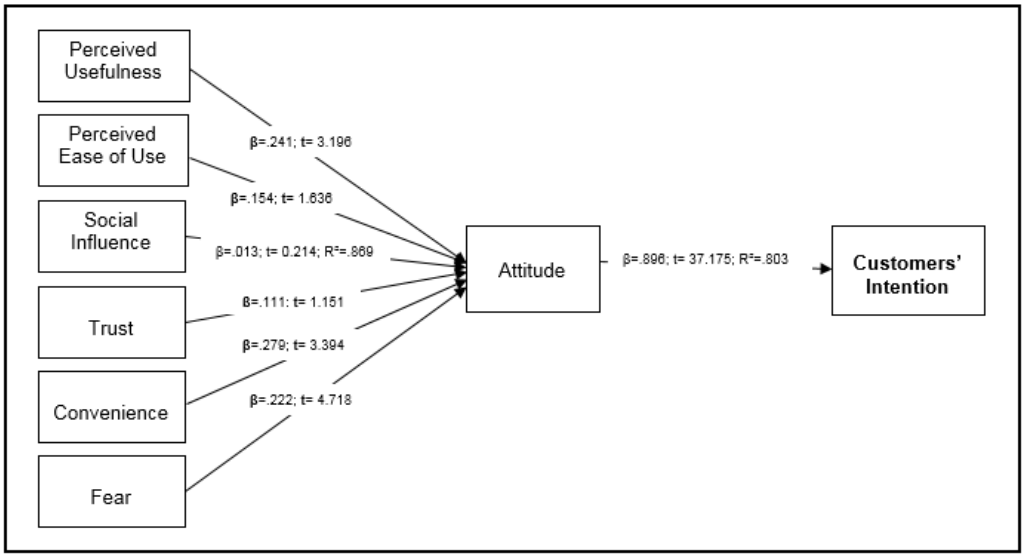

Figure 2.0: Inferential Findings

From the above analyses and findings, several discussions were generated. Firstly, the effect of perceived usefulness on customer attitude was significant in this study, hence accepting H1. This is concurrent with Wijayanthi (2019) who found the significant influence of perceived usefulness on attitude toward using e-wallets as a payment method for services. For instance, Touch n Go e-wallet payment permits the users to utilize them at anytime and anywhere. In this study, it was revealed that many respondents liked to use the Touch n Go's e-wallet payment applications at Tealive Sdn. Bhd. retail outlet because they can get special discounted rates on any beverage purchases.

Secondly, perceived ease of use was found to have an insignificant effect on customer attitude towards contactless payment usage, thus rejecting H2. This finding confirms prior research that considers perceived ease of use as a basic requirement for system design and should not have an influence on attitude in the later stages of adoption (Agarwal and Prasad, 1998; Chau and Hu, 2002; Davis et al., 1989). It further supports Ajibabe's (2018) contention that perceived ease of use's impact on attitude towards using technology is weak because other facilitating factors beyond user's control could also influence attitude. Another plausible explanation for this finding could be due to respondents' familiarity with Internet and mobile phone usage that may increase their expectancies of service usefulness rather than influencing their attitudes toward the service. (Agarwal and Prasad, 1999; Liaw, 2002).

Thirdly, social influence and trust were also found to have no significant influence on customer attitude towards the use of contactless payment. Hence, H3 and H4 are rejected. This study aligns with Lai (2017) who stated that TAM2 and TAM3 were not worthy of investigation in relation to the innovation of single-stage e-payment systems. Being seasoned Internet users, the need for trusted and reliable business merchants and other social influences on this contactless payment usage is minimal since experience has played a major part in reducing trust and risk issues and social references (Lai, 2017; Pavlov, 2003.).

Further to that, convenience was found to have a significant effect on attitude towards the use of contactless payment, hence H5 is supported. This finding supports past research by (e.g. Lai & Zainal, 2015), who stated that convenience is crucial in determining the use of single-stage e-payment system. E-wallet gives convenience to the customers because the customers do not have to queue at the bank or any automated teller machines (ATM) kiosks. With an e-wallet usage, customers simply need to display the scanner tag given from the e-wallet system application in making a payment offline or via online.

Fear was further revealed to significantly affect attitude towards the use of contactless e-wallet payment during the COVID-19 pandemic, thus accepting H6. The findings support past research (e.g. Lee, et al, 2020; Lee et al, 2020) showing significant effects of fear and anxiety on attitude across different age, gender, and racial groups. With an increased number of COVID 19 medical cases, many individuals fear of going to crowded places to avoid potential infection of such disease, and in turn, such fear may influence their attitude towards use of contactless payment systems for consumption transaction activities (The Star Online, 2020).

Finally, the relationship between customer's attitude and customer's intention towards the use of e-wallet payment was also found to have a significant effect ($\beta = 0.881$, $t = 25.218$, sig. = 0.000). Hence, H7 is accepted. This finding was consistent with Nidhi et al., (2020) who stated that a user's positive attitude towards e-wallet will improve their behavioural intention. This study demonstrated that customers' attitudes can influence their intention towards the use of e-wallet payment particularly during the recent development of the COVID-19 pandemic. Customer attitude fundamentally contain beliefs, emotions, and goals towards certain objects.

Conclusion

In essence, the study has warranted continuous attention towards examining consumers' behaviour in relation to adopting and using contactless payment solutions, particularly during the current global COVID 19 pandemic outbreak. Most of the hypotheses were tested; perceived usefulness, convenience and fear were found to have significant effects on attitude. In turn, a favourable attitude towards such payment solutions has a significant influence on consumers' intention to undertake contactless payment transaction activities. The findings have managerial implications. It can assist the business practitioners to develop better marketing strategies in order to create more awareness, and also highlight potential benefits of using these alternative payment solutions within the B2B and B2C markets. Several limitations were observed. In terms of sampling design, only younger sampled population were targeted as compared to other older age group. Also, a qualitative research method approach could be undertaken for future research in an attempt to potentially generate richer data with regards to the study.

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The Benefits of Business Continuity Management System based on the International Standards in a Pandemic Situation

Dorin MAIER
Technical University of Cluj - Napoca, Romania, dorin.maier@gmail.com

Stelian Mircea OLARU
Bucharest University of Economic Studies, Romania, olaru_stelian@yahoo.com

Gabriela Elena BIŢAN
Bucharest University of Economic Studies, Romania, gabriela_bitan@yahoo.com

Teodora Elena FOGOROŞ
Bucharest University of Economic Studies, Romania, teodora.elena@icloud.com

Abstract

The current social and economic context is characterized by totally new challenges and difficult to foresee changes. The evolution of the international epidemiological situation caused by the pandemic situation significantly affects most businesses and subjects them to increasing disruption. Therefore, organizations need a proactive approach equipped with framework to protect themselves against the outcomes of disruptive events. In this context, the purpose of this research paper is to explore the benefits of business continuity management and to highlight the organization's gains by applying the provisions of subject matter international standards. The analysis of the main benefits of business continuity management indicate that by implementing the business continuity management system the organizations can minimize the disruptions of the business activities and maintain their performance level.

Keywords*:* business continuity, business continuity management, benefits of business continuity.

Introduction

The current socio-economic context created by pandemic situation highlights the vital need for business continuity in many fields of activity. The rapid evolution of the pandemic and associated governmental response measures led to fast and unexpected occurrences that surprised many organizations, mostly the Small and Medium Enterprises (SMEs). The efficient management of unexpected occurrences requires companies to thoroughly and continuously analyze their internal resources and capabilities to maximize the rendered output.

The most influential international organizations and national governments advise businesses to develop and maintain specific capabilities in order to detect, prepare and respond to crises situations (Filipović et al., 2018).

If we analyze the exposure of the organizations to risk, we can observe that this may disrupt operations, disaffect customers and compromise business credibility and revenue streams. The management of risks supposes a large range of defined and performed activities, which helps with the identification and the analyze of risks, as well as with the definition of measures needed to manage its possible effects, such as elimination, reduction, etc. (Bitan et al., 2020). Risks could arise in the form of disruptions, both from external (such as disaster, crisis, malware, etc.) and internal threats (such as human error, utility disruptions, etc.) (Fani and Subriadi, 2019).

In order for organizations to become more successful in responding to a complex, uncertain and full of risks and threats business environment, they are progressively considering developing and maintain a business continuity management (BCM) plan (Maier et al., 2014). The primary goal of the business continuity management discipline is to attempt to discern risks that would provide catastrophic for the organization and require it to put an end to

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operations and thereafter prepare proactive risk mitigation plans and reactive risk response plans while focusing also on likely steps necessary for business recovery once the impact of the threat has stopped (Ionescu et al., 2019).

Business Continuity Management (BCM) principles are commonly known as one of the most effective programs to use in relation to crisis, (incidents, disasters, etc.) specifically for organizations to continue or resume their operations. Over time, the concept has gained popularity and has developed into one of the pillars of a resilience plan (Charoenthammachoke et al., 2020). Business continuity management is defined as the advanced planning and preparation of an organization to maintain business functions and/or quickly resume activity after a disaster has occurred. It also involves defining potential risks including fire, flood or cyber-attacks (Dobran, 2019).

The main goal of this paper is to explore and analyze the main benefits of business continuity management by reviewing the studies published in global crisis periods. The paper is structured in three main parts, a first part to briefly define the concept of BCM, a second part for presenting the international standard of business continuity management and a third part for the benefits of the business continuity management system. The paper ends with the conclusions sections where we highlighted the main findings of our research.

The concept of business continuity management

The constantly changing threats in the business environment led to the emergence of business continuity management in many industries as a systematic process to foresee, prepare for and counter the effects of crises and interruptions, although its potential to play a more strategic role is still largely under-used (Maier, 2018). The concept of business continuity management has appeared in the scientific literature rather recently as an evolution of the disaster recovery approach in an organization.

It seems that the roots of business continuity management are connected to the Information Systems protection activities (Supriadi and Sui Pheng, 2018) but the concept developed and gained more importance since then. The concept of business continuity management evolved from a technical focus to a more boarder strategic requirement (Elliott et al. 2010).

The terrorist attack from September 11 2001 at World Trade Centers in New York City, USA was identified as the main trigger point for developing more thorough business continuity plans (Foster and Dye, 2005). Soon after these tragic events, many organizations realized that the business environment is full of many unknown threats and, in order to answer to these threats, the business continuity plans must play a more important role than in the past. If we add to that point the current pandemic situation, it is clear that threats are not only related to fire, natural disasters or some infrastructure breakdown, but rather they have a large degree of unknown and uncertainties therefore, the business continuity planning should be in the priority efforts of the business recovery.

Business continuity management is not only about recovery from a disaster. It should also be a driven business process that unifies a large spectrum of management disciplines (Smith & Fischbacher, 2009). The main disciplines that are integrated in the BCM are the Business Continuity (organizational/operational relocation), Emergency Response, Disaster Recovery (technology continuity) and Crisis Management.

Developing an integrated business continuity management plan to facilitate the perpetuation and resumption of activities in safe conditions, both for people and the environment, by integrating management system models defined by international standards is an approach that can be applied in any organization, but the priorities may be different, depending on the field in which the organization operates. (Bițan et al., 2020). Also, organizations should focus on some security aspects. Investing in security related to the usage of technology and Internet might be less expensive than the payment of charges due to malfunctions of the IT department (Ionescu et al., 2020).

In this context, researchers worldwide tried to show and emphasize the importance of the concept. The willingness of organizations to respond to unsystematic and crisis situations depends on the management involvement in and commitment to business continuity planning. Business continuity planning refers to the identification and protection of critical business processes and compulsory resources in order to maintain the anticipated level of performance by preparing processes that enable survival in times of business disturbances (Sui et al., 2010).

From a different angle, we can stress out that the main purpose of business continuity planning is to keep an organization running even if a high impact risk occurs. To achieve this, a plan must be created so that it addresses the recovery of key business functions in case of an incident or a disaster. Thus, the business continuity plan allows an organization to resume operations as soon as possible, without further consequences. The business continuity planning process includes risk identification, risk assessment, risk ranking and risk management (Gilbert and Gips, 2000).

The importance of the BCM is highlighted also by a series of nonprofit organizations that dedicate their time to popularize and flourish the concept among practitioners. One organization is The Business Continuity Institute (The business continuity institute, 2005) which defines business continuity management as ”an act of anticipating incidents that will affect mission-critical functions and processes for the organization, and ensuring that it responds to any incident in a planned and rehearsed manner” (The Business Continuity Institute, 2005) .

Other nonprofit organization, the Disaster Recovery Institute International (DRII), define the concept of BCM in their Internationally Glossary for Resiliency as: ”Holistic management process that is able to identify potential threats to an organization and their impact on the business operations which also provides a framework for building organizational resilience with the capability of an effective response that safeguards the interests of its key stakeholders, reputation, brand and value-creating activities” (DRII, 2018).

Considering the above approaches, we can observe that the business continuity management is a tool that can be used to provide greater confidence so the organization can deliver its products or services even if a certain risk occurs (Gibb and Buchanan, 2006). Business management activities deliver a framework for the decision-making and actions to avoid, confront and recover from a disruptive crisis consistent with strategic intent (Shaw and Harrald, 2003. Business continuity strategy characteristics are high-value and high-maintenance. Business continuity includes different technologies, from older to newer, from physical to computerized, from singular to cohesive ones (Maitra et al., 2013).

At some point, any company could suffer an outage or face a crisis, because there is no way to control the entire operating environment (Smith, 2012). Managing business continuity is the act of predicting adverse situations which will distress critical functions and processes in the organization and ensure that the reaction to any adverse situation is planned and well-rehearsed. Clearly, innovation may help companies in managing business continuity. A few years ago, innovation was only at a discovery stage. Though, today technology passed to the next step, meaning implementation, practice and improvement (Fogoros et al., 2020). In order to maintain its market position, an organization should adopt an innovative strategy, by digitalizing its management strategies and its business models.

Managing business continuity is not just about recovering from disasters such as fire, flood or information system failure, but also about problems regarding crucial suppliers or customers, frauds, unethical operations and organizational reputation (Gallagher, 2003).

The business continuity management system based on the international standards

Even if the concept of business continuity management is relatively recent in literature, its importance for organizations is highlighted by the development of international standards that provide a systematic approach to setting up internal processes for ensuring business continuity. Thus, the International Organization for Standardization (ISO), through Working Group ISO / TC 292, has developed a wide range of standards on Security and Resilience, of which 9 standards are for Business Continuity (6 of them are already published and 3 standards are under development) (www.iso.org). Following these standards can help mitigate the negative effects of a global crisis. Business continuity management system supports the preparation of organizations for better management of crisis situations or to cope with the negative effects of a crisis (Bițan et al., 2020).

To support the global effort of the organizations in combating the actual pandemic crisis, ISO has made available, free of charge, several medical and business standards, including the standards for Business Continuity (ISO, 2020).

One of the most important standards of this series is ISO 22301:2019 Security and resilience – Business continuity management systems – Requirements that provide guidance to organizations regarding how to ensure the continuing operation of their essential functions during and after a disaster or crisis.

The standard is written by leading experts in business continuity management and it provides a framework for a better management of the business continuity on the organization level (Kosutic, 2020).

This standard has been issued for the first time in 2012. In 2019 ISO published a revision of the standard, the content of which being in accordance with the "High-Level Structure" HLS, promoted by ISO. According to HLS, all the management systems standards (for quality, environment, food safety, occupational health and safety, information security, anti-bribery, energy, etc.) are structured in the same way. Having the same structure, when using another management system standard for the first time, users who are familiar with a management system standard will immediately feel at ease with the new one (Bițan et al., 2020).

If we analyze the ISO 22301 standard, we can identify that its implementation in an organization will highlight the importance of understanding continuity needs, it shows that is important to implement and operate the measures to control the continuity risk on the organization level. Another important aspect underlined by the ISO 22301 is that managers have the possibility to monitor and evaluate the effectiveness and performances of the system of business continuity management. Lastly, the managers can have a base for continual improvement formed on objective measurements.

A business continuity management system developed according to the ISO 22301 standard helps the organization understand how it can fight and protect against disruptive incidents, recover from hazardous disruptions when they arise and to reduce the likelihood of their occurrence. The purpose of ISO 22301 standard is to give insurance that business will continue to deliver products and services in case of disruptive events. The main ways how the standard responds to these requirements is: by making a business impact analysis and in this way it can identify the business continuity priorities; by taking risk assessment that will offer data regarding the potential disruptive events that can affect the business operations; by defining the action plans to prevent such events from happening or to reduce their impact on operations. Covering all of this aspects the provisions from the standard can indicate how to recover in the shortest time possible (Kosutic, 2020).

The strategies and solutions that are to be implemented are usually in the form of policies, procedures, and technical/physical implementation. In most cases, organizations do not have all the facilities, hardware, and software in place, therefore, ISO 22301 implementation will involve not only to set organizational processes but also to develop plans and to allocate technical and other resources to make the continuity and recovery of business activities possible. Business continuity is part of overall risk management in a company, with areas that overlap with information security management and IT management (Figure 1).

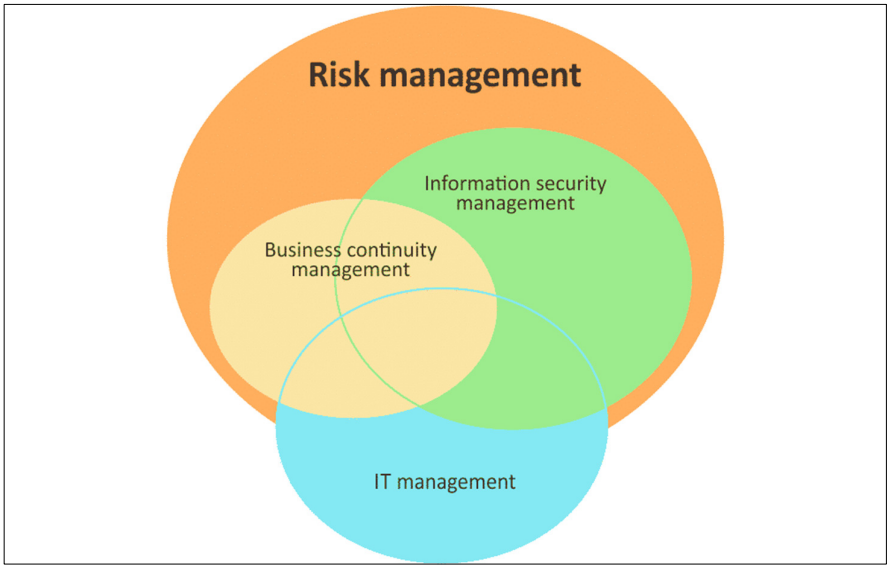

Fig. 1. The integration of business continuity management in the overall corporate management
Source: Kosutic, D., (2020) The basics of ISO 22301. Available at: https://advisera.com/27001academy/what-is-iso-22301/

The benefits of Business Continuity Management

The changes faced by the global business environment, translated into stronger competition, emphasis on knowledge and materialization of business threats exert a great pressure on organizations and force them to establish key directions of action and essential activities to be performed. In this context we want to highlight the main benefits of the business continuity management as found in the literature.

Possible serious disruptions, as natural disasters (floods or earthquakes), blackouts and fires, disruptions and damage to the infrastructure, social and political upheavals (unrest and political upheavals), local and global health issues (epidemics or pandemics), personnel or material losses due to attacks or accidents, can have the effect of business interruption. In order to reduce the risks of any kind of business interruption and to take the best possible precautions in the event of serious disruptions, ISO 22301 should be used (Lampe et al., 2020).

Table 1: Advantages of the business continuity management in a Pandemic situation

No. Crt.	Advantages of the business continuity management
1.	Development of a clear action plan, well-structured and interlinked for a good response to disruptive events
2.	Ensuring that all vital and key processes are available as a result of a proactive management system
3.	Prioritization of necessary activities and clear specification of areas used for the recovery process this permit that the main activities of the organization can be maintained
4.	An approach of the business continuity management processes in a systematic and concept-based manner
5.	Possibility to be prepared to face severe situations by identification of risk areas and possible impacts
6.	Getting the management support for the all the business continuity activities
7.	Clear allocation of tasks and responsibilities in a crisis, detailed documentation of emergency management
8.	Respecting the requirements of an international regulatory and audit
9.	In case when interruptions occur in business some financial losses can be avoided
10.	Performance targeted to the clients can bring business benefits

Source: Authors' own research based on the literature review.

If we consider the specification of the ISO 22301 standard, we can observe in Figure 2 four essential business benefits for organizations arising from implementing the standard (Kosutic, 2020).

A first benefit is the **compliance with legal requirements.** There are more and more countries defining laws and regulations requiring business continuity compliance. And beyond government interests, private businesses are also requiring their suppliers and partners to implement business continuity solutions.

The second benefit is related to the **achievement of marketing advantage.** The marketing advantage is in the customer perception of the certified organizations that offers credibility in the continuity of their operations, and the delivery of their products and services. Additionally, such certification can help the organization get new customers, by making it easier to demonstrate that they are among the best in the industry, leading to increased market share and higher profits.

The third benefit is the **reduce dependence on individuals.** In many cases a lot of organization rely their critical actives on a small group of people and a painful situation is when some of these peoples need to leave. In the same time managers, who are aware of this phenomenon, can use the practices of business continuity management to find ways of becoming less dependent on a certain person. In this way managers can avoid many unpleased situations when someone leaves the organization.

The fourth benefit is **preventing large-scale damage.** In a world of real-time services and transactions, every minute of down service has significant financial and reputational consequences. By implementing business continuity practices, the organization will have a sort of insurance policy and thus, the company will save money.

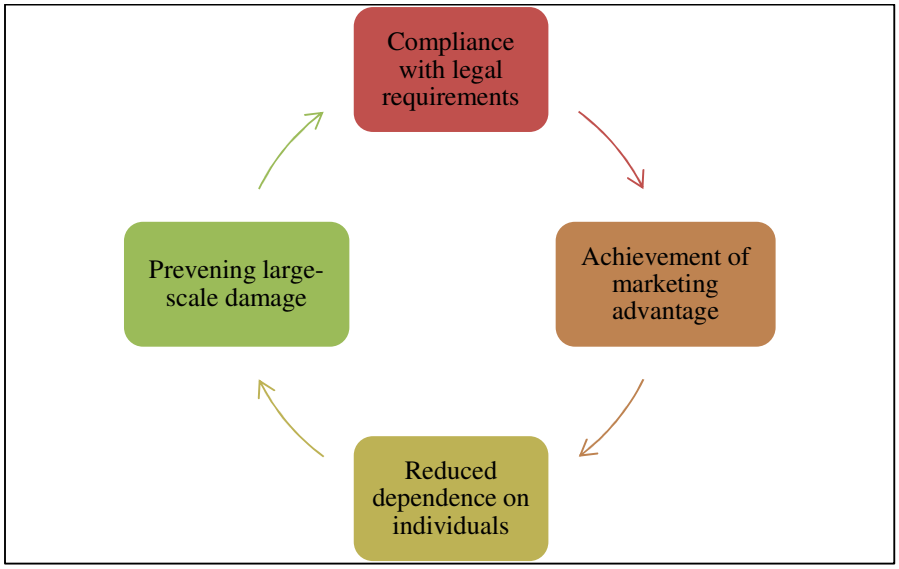

Fig. 2. Standard implementation's essential business benefits
Source: Kosutic, D. (2020) The basics of ISO 22301. Available at: https://advisera.com/27001academy/what-is-iso-22301/

As any other management system, Business Continuity Management System can be certified by a Certification Body. The main benefits of ISO 22301 certification of an organization identified by ***P**rofessional **E**valuation and **C**ertification **B**oard* (PECB) (Professional Evaluation and Certification Board, 2020) are referring to expand the organization's knowledge on how a Business Continuity Management System will help meet business objectives, strengthen the reputation management and protecting the brand, reduce the risks of business interruption by identifying risks and minimize the impact, greater resilience against disruptions, quicker recovery from interruption and overall the organization can achieve international recognition.

The PECB (Professional Evaluation and Certification Board, 2020) highlights the main reasons why implementing the ISO 22301 standard is a necessity for organization. In crisis context, many businesses are affected and some of the small one is closing, that why PECB consider that assurance of the continued service is the most important reason to implement a Business Continuity Management System, followed by reducing risk of business interruption. The level of benefits gained, however, may differ from organization to organization (Sharp, 2009).

The companies tend to use the business continuity management only for reducing the effects of interruptions or crises and don't take in consideration that the potential and its strategic role is far greater and is still largely unexplored (Maier, 2014).

It is obvious that BCM can offer a lot of benefits to organizations, but we need to consider also that there are a series of counterarguments related to these concepts. In their work, the researchers Urbanec and Urbancová (Urbanec and Urbancová, 2015) argue that in order to implement BCM standards, organizations need to take into account higher costs and also that it is a time-consuming process. Other aspects refer to the fact that BCM has higher requirements from specialists in a certain field and stricter demands for local rules change implementation. In the case of employees, they need to be informed in advance about the implementation of BCM, and they also need to be informed about the main threats of the organization and how to be eliminated or limited. All of these can mean that only those employees who can understand the reasons why implementing BCM is a good thing may accept it (Urbanec and Urbancová, 2015).

Conclusions

Now, in the pandemic situation, more than ever, the international business environment is facing tremendous threats, numerous unknowns and uncertainties. In this context it becomes more and more important the development of business continuity plans as well as proactive management and readiness to handle incidents of any kind. The whole process starts with a good understanding of the organization, followed by determination of the business continuity management strategy, development and implementation of the BCM response, exercise, preservation and review of the BCM arrangements, and concluding with embedding the BCM in the organization's culture. Business impact analysis is the most relevant element in understanding how an organization functions, together with risk assessment. Business continuity management is key to ensuring that an enterprise can protect

itself against the risks which are inherent in its environment. Enterprises are increasingly reliant on the availability of information in order to provide services to customers.

The purpose of this paper was to increase awareness of the BCM benefits for organization. When implementing a Business Continuity Management System, a company can have better financial stability, can improve the organizational climate, can develop new business segments and can improve the crisis management. The employees' awareness of risks, the strengthening of a competitive advantage and the enhancement of the organization's prestige are some other benefits of conducting a business based on a Business Continuity Management System.

Also, we wanted to highlight that, when dealing with a crisis the role of a business tool is not to improve the organization performance, but rather to minimize the performance drop. As the first step in business continuity planning is to predict the crisis situation we can observe that active enterprises predict and prevent the crisis situations, while, in passive ones, establishment of business continuity management model is mediated by the intensity of crisis situation recurrence. In this case, the business continuity management develops, when the likelihood of crisis recurrence comes to a critical level. The benefits of the BCM are felt also at the employees' level. They become more aware of its impact and in the improvement of their crisis management. Considering all the benefits of the BCM there is a need for future research to explore the concept of business continuity for building resilient organizations.

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Evidence That Romanian Entrepreneurs Are Opportunity-Driven, Rather Than Necessity-Driven: A Macroeconomic Spatial Analysis

Horia TIGAU
Bucharest University of Economic Studies, Bucharest, Romania
tigauh@gmail.com

Mihai ANTONIA
Bucharest University of Economic Studies, Bucharest, Romania
mihai.antonia@gmail.com

Abstract

The purpose of our study is to investigate the macroeconomic factors influencing new firm formation in Romania, using a spatial panel framework. Entrepreneurship and macroeconomic factors influence each other in various ways, as there are many determinants of regional entrepreneurship dynamics in contemporary Romania. The main hypothesis of this paper tries to indicate whether the Romanian Entrepreneur is opportunity-driven or necessity-driven. Several other papers have shown that the entrepreneurial attitude differs by country, due to the business framework or to cultural aspects. The other tested hypothesis is whether there exist spatial spillover effects between Romanian counties with respect to the ratio of new businesses to active business population. The paper develops a holistic conceptualization of the spatial variation of start-ups in Romania and empirically investigates determinants of the birth of new firms, using data over the period 2008-2018 at the NUTS 3 level. The results suggest that the unemployment rate, the resource utilization rate and the number of active firms per thousand inhabitants have a significant influence on the proportion of newly created firms in the total number of active firms. Returning to the hypotheses, the authors conclude that Romanian entrepreneurs in the aforementioned period have been more opportunity-driven, while spatial spillover effects have shown to be significant.

Keywords: Entrepreneurship, Unemployment Rate, Spatial Panel, Macroeconomic Factors.

Introduction

Entrepreneurship has a decisive contribution to employment and economic growth, in any country on the globe, at any level of economic development (Carree & Thurik, 2003). In the globalization context, politicians, economists and researchers consider entrepreneurship dynamics as an important contribution to sustainable economic development. Failing start-ups lead to increases in innovation due to entrepreneurs' will to further explore the creative process (Nanda & Rhodes-Kropf, 2017). Therefore, the Europe 2020 Strategy considers entrepreneurship as a main tool in reaching the EU's agenda for growth and jobs for the 2010 - 2020 decade. The European Commission sees entrepreneurship as acting upon opportunities and ideas and transforming them into value for others, which can be financial, cultural, or social. EU created an environment where entrepreneurs can flourish and grow and, as a citizen of EU, starting a business is quite easy. You can set up your own business (even as a sole trader) in any EU country, Iceland, Norway or Liechtenstein, with less than 100 Euro in just 3 days.

Entrepreneurship is still in its early stages in Romania, but in a continuous expansion. The political factors see the opportunity in entrepreneurship development and therefore, consistent with the EU's agenda, Romanian's Government developed in 2014 the Government Strategy for Developing SMEs and improving the business environment in Romania – "Orizont 2020" (H.G. 859/2014). A series of measures have been proposed for the development of entrepreneurship in Romania, so that to reach 35 SMEs per thousand inhabitants with an increase of 3 million employees. Romania launched in 2017 a governmental program named Start-Up Nation (OUG-3, 2017) inspired by the successful program Israel Start-Up Nation. The program has brought credits of up to 200,000 RON (almost 40,000 Euros) to 8,600 new firms. The budget for the second year of implementation, 2018, had shrank and only 4.684 new businesses received funding.

Even stimulated by the political measures, in the end, the final decision of starting a business is still a personal choice. The literature's position in human capital theory is that people invest in themselves through education, training and experiences, expecting higher earnings. Investments in human capital have a positive impact over labour productivity,

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which transferred to the entrepreneurial field promotes start-up success. Early studies found a strong positive correlation between human capital and new business formation (Armington & Acs, 2002).

In this study we focus our attention on how does the birth rate of new firms depend on several regional macroeconomic factors in Romania. Our main hypothesis suggests that Romanian entrepreneurs are rather opportunity-driven, than necessity-driven (Ross et al., 2015). The innovation in this paper is given by the use of a spatial panel regression model with data available at the NUTS3 level for Romanian counties; the model's dependent variable, the ratio between the number of new firms formed in the specific year and the number of total active firms in that year, is also lagged one year forward to the explanatory variables – this strategy was employed to reduce the endogeneity in the data, as well as to portray new firm creation as a response to regional macroeconomics characteristics. Our study presents a framework for other researchers that wish to analyse how unemployment affect entrepreneurship, either in the case of Romania, taking into account other explanatory variables as well, or in the case of their chosen country. Different results might be obtained, depending on the entrepreneurial culture defined in specific cases or on geographical properties of the respective countries.

Literature Review

Entrepreneurship and the birth of new firms are substantial elements in economic growth because they influence the composition of firm dynamics, which is an important predictor of growth and performance between regions (Audretsch & Feldman, 2004). It is clear from the previous studies that macroeconomic factors influence the entrepreneurial activity. The regional variation of start-ups is explained by the differences between regions in: population growth, economic growth, wages, unemployment and entrepreneurial density (Keeble & Walker, 1994 ; Audretsch & Fritsch, 1994 ; Armington & Acs, 2002 ; Tamasy, 2006).

Another effect on economic development of new firm formation is that thet may displace incumbents (Aghion, Howitt, & Mayer-Foulkes, 2005). On the other hand, incumbents may also benefit from the knowledge spillovers and creativity of the newcommers (Fritsch & Changoluisa, 2017). Inovative start-ups can exert considerable competitive pressure, Changoluisa & Fritsch (2019) investigate the relationship between new business formation and the level of competitive pressure that is perceived by manufacturing incumbent establishments. Competitiveness has a positive impact because it leads to better and cheaper products in the market. A positive impact of new business formation on incumbent performance is improved productivity (Fritsch & Changoluisa, 2017).

Entrepreneurship aroused interest of few romanian reasearchers: Păunescu, Popescu, & Duennweber (2018) studied the desirability of entrepreneurship and how different factors affect the desire to become an entrepreneur and found that social stability and feasibility are the most important factors. Pop (2018) was intrested in evolution of the Romanian SMEs after Romania's integration in the European Union. Tigau (2019) measured the impact of FDI and other macroeconomic factors on new firms survival rate and results discovered that FDI has a significant positive effect on the survival of startups. Goschin (2020) explored the impact of actual economic crisis on the surviving rate and the results suggests that entrepreneurship resilience is influenced by FDI per capita and the agglomeration of active firms.

Although few studies exist on new business formation in Romania, the conceptual framework adopted in this study is inspired from other spatial studies (Audretsch & Fritsch, 1992 ; Audretsch & Fritsch, 1994 ; Keeble & Walker, 1994 ; Tamasy & Le Heron, 2008 ; Gaygisiz & Koksal, 2003 ; Ross, 2011 ; Ross et al., 2015 ; Ghani, Kerr, & O'Connell, 2014). In previous studies, a variety of country-level measures of entrepreneurial activity and new firm formation was developed. In a study over the geography of firm birth in Germany, the birth rates were measured in two different ways: the *ecological approach,* that standardizes the number of entrants relative to the number of active firms and the *labour market approach*, that standardizes the number of new firms with respect to the size of the workforce (Audretsch & Fritsch, 1992 ; Keeble & Walker, 1994 ; Armington & Acs, 2002,). In other studies the following variables were used: *new business density,* defined as new registrations per thousand inhabitants between ages 15-64 (Khader, Rajan, & Sen, 2014); *nascent entrepreneur* - the exact number of start-up activities (Tamasy, C., 2006); *VAT Registrations* (data from the Value Added Tax register in Scotland) per thousand of working age population (Ross, A., 2011; Ross, A. et.al, 2015). Ultimately, since people and not establishments start businesses, for our study we have chosen the *ecological approach* that standardizes the number of entrants relative to the number of active firms.

It is valuable to understand the macroeconomic conditions in the economy because they also affect the survival and profitability of companies. Numerous factors drive the creation of new businesses or start-ups in the economy. Entrepreneurship and *macroeconomic factors* influence each other in various ways. Literature in this field is rich, but

studies investigating the determinants of new firm formation seem to have contradictory results depending on the period being examined and, in some cases, geographical factors might play a role as well.

The most commonly used determinant of start-ups in studies is economic growth. Higher firm birth rates are associated with higher subsequent growth rates within regions of the United States (Reynolds & Maki, Regional Characteristics Affecting Business Growth: Assessing Strategies for Promoting Regional Economic Well-Being, 1991), explained by the fact that new economic activity tends to locate in those regions where production convexities yield the greatest returns to that activity. However, an early study for West Germany suggests the contrary (Audretsch & Fritsch, 1992). In 1994, same authors David B. Audretsch and Michael Fritsch suggested that birth rates tend to be higher in regions where gross value added per person is greater. Few years later, a positive relation between GDP per capita and entrepreneurship was found in several studies (Audretsch D. , 2007 ; Baumol & Strom, 2007). In low GDP level countries, starting a business provides a path to avoid unemployment and is often seen as an effective poverty escape route. Studies have shown negative empirical evidence between entrepreneurship and GDP per capita for poor countries and positive relations or less significant for rich countries (Amoros & Bosma, 2014). There are also studies, which state that GPD per capita is statistically insignificant in new firm formation (Keeble & Walker, 1994).

Spatial variation of average wage is likely to influence the demand of goods, which means an increase in personal income may positively influence the creation of new firm formation (Reynolds et al., 1994). Wage growth, which also acts as a proxy for demand, was not found to influence entrepreneurial activity in the study conducted by Andrew Ross in 2011. The coefficient was negative and not statistically significant (Ross, A., 2011). The same author, in 2015, discovers a positive relationship between wages and entrepreneurial activity: income levels proxied by regional wage rates were significant at the Scottish level and within urban regions, highlighting that increasing disposable incomes imply increased purchasing power, generating growth opportunities for existing businesses (Ross et.al, 2015). Another positive dependence was found on a paper that presented the results of an empirical investigation into regional differences in the formation of new firms in West Germany. High wage level, associated with high level of skills, seems to stimulate the creation of start-ups - analyses strongly indicate that founders of new businesses tend to have a high skill level and it is well known that such persons normally face a relatively low danger of being unemployed (Fritsch M. , 1992). Variations in the firm birth rates are substantially explained by regional differences in population growth and income growth, which in this case is the average annual rate of increase in personal income (Armington & Acs, 2002).

Employment in small businesses tend to have a positive impact in new firm formation. (Fritsch, 1992). Small firms may be considered as 'incubators' for new firm founders (Keeble & Walker, 1994). To test that hypothesis in Romania's case we want to determine if there is any correlation between new firm birth rates and average number of employees per economic establishment.

Krugman's theory (Krugman, 1991a ; Krugman, 1991b) can be adapted to link firm births to the degree to which three types of spillovers occur within a region. Krugman's model points to the importance of agglomerations in generating convexities in production within a spatial unit and it can be considered the pioneering theory of spatial variation of entrepreneurship. After that there is a growing literature identifying the determinants of new businesses on a regional basis (Audretsch & Fritsch, 1992 ; Audretsch & Fritsch, 1994; Reynolds & Storey, 1992 ; Fritsch, M., 1992). Later on, even after studies concluded that the subject of regional entrepreneurship turned to be more complex and a significant number of independent variables as well as dependent variables interact, influencing the entrepreneurial processes, this theory still stands (Malecki, 2009) (Audretsch & Link, 2017) (Iftikhar, Ahmad, & Audretsch, 2020; Sunny & Shu, 2019). Location chosen for start-up activity is influenced by the presence of agglomeration economies, especially in cities where people and firms' density can influence the search costs for workforce and suppliers (Reynolds et al., 1994).

It is well known that starting a new business requires capital, and usually, in Romania's situation, it may come from own funds, debt or European funds. In a study about optimism and entrepreneurship (Meza & Southey, 1996) we found an interesting observation about the relationship between entrepreneurial ability and debt – when financed with debt, entrepreneurs make safer choices. Lending rates are the interest rates banks provide to the private sector for loans, and it was hypothesized that high rates lead to low ease of business because of unwillingness to take out loans. In Romania's case, a survey-based study named "Barometer of start-ups from Romania 2019" indicated that in 79% of the cases, own funds are the primary source of financing for a new business. Deposit interest rates are more likely to stimulate savings in detriment of entrepreneurship and start-ups, especially when future profits tend to be lower. Following resource-based theory, which says that an entrepreneur will start a business when he has enough capital to do so (Braunerhjelm, 2007), we want to put this to test and find if there is any relation between new firm birth rate and deposit interest rate.

Higher rate of unemployment could lead to new firm formation, due to difficulty in finding a job.

Many studies investigating the unemployment and its relationship with new business formation seem to be contradictory and dependent on the time period or geographical factor. For instance, the unemployment rate was found to be strongly negative and statistically significant at the Scottish level and in rural regions indicating that continuing entrepreneurial activity in Scotland is opportunity- driven and the effect of a given business cycle is greater than any unemployment push effect (Ross et al . 2015). A prevision study in Romania confirms the existence of a strong relationship between unemployment and entrepreneurship (Sipos-Gug & Badulescu, 2015). On short term the relationship is negative - an increase of unemployment predicts, for instance, a decrease of entrepreneurial activity in the following months, explained by difficulties at the level of the nation economy and social aid for the unemployed. On the long term, the relationship is positive, an increase in unemployment predicting an increase in entrepreneurial activity, which may be explained by "push effect". Higher rates of unemployment could lead to new firm formation and a negative change in labour market conditions and the limited availability of waged employment may push individuals into entrepreneurial activity.

Macroeconomic factors are not the only determinants of new firm formation - social trust also plays an important role in the birth of new firms. In a study across nine EU countries Corradini (2020) suggests that social trust may facilitate the flow of information and knowledge exchange across spatially embedded institutions, firms and people, thereby fostering entrepreneurial processes. Social trust turns to be a more important factor in countries with lower level of economic development and diminishes in countries or regions with higher GDP and stronger quality of governance (Audretsch, Seitz, & Rouch, 2018).

Methodology

Our study is intended to reveal how several macroeconomic indicators (which were reviewed in the previous section) can influence the birth rate of new firms in a spatial panel framework. In particular, we wish to verify the following two main hypotheses:

H1: A developed entrepreneurial culture (variable encapsulated in the ratio of new firms to active firms) is significantly related to a low unemployment rate.

H2: There is a significant spatial dependence between regions in the dependent variable.

The model chosen to verify these hypotheses is a spatial panel regression model with data from the 41 Romanian counties and the municipality of Bucharest (NUTS 3 level) in the period 2008-2018. The following table offers a description of the variables used in the model. The fourth variable acts as a dependent variable, while all the subsequent ones are explanatory.

Table 1: Variables used in the model

No.	Name	Description	Source
1	*Number of new firms**	The total number of firms registered only during the specified year.	National Trade Register Office
2	*Number of active firms**	The total number of firms active during the specified year.	Romanian National Statistics Institute
3	*Number of employees**	The total number of persons hired with a labor contract or service report, on a determined or undetermined period, whose contract/report was not suspended in the specified year.	Romanian National Statistics Institute
4	*New firms to active firms ratio*	Ratio between the number of new firms and the number of active firms.	Authors' own computation
5	*Average number of employees per firm*	Ratio between the number of employees and the number of active firms.	Authors' own computation
6	*Unemployment rate*	Ratio between the number of unemployed persons (registered at employment agencies) and the active civilian population.	Romanian National Statistics Institute

7	*Average net salary*	The monthly average salary gain, computed by dividing the net sum payed by economic agents to their employees to the number of employees.	Romanian National Statistics Institute
8	*Resource utilization rate*	The ratio between the active civilian population and the work resources (which includes persons in the age group that is fit to work and persons which fall outside of this category, which are active).	Romanian National Statistics Institute
9	*Active firm density*	Ratio between the number of active firms and the population (measured at 1st of January) multiplied by 1000.	Authors' own computation
10	*GDP growth rate*	Ratio between specified year's GDP and previous year's GDP.	Romanian National Statistics Institute
11	*Interest rate*	Interest rate for new term deposits of households; initial maturity between 1 and 2 years.	Romanian National Bank

**N.B. : These variables are not used in the model, but are used to compute variables that are present in the model.*

When performing a spatial analysis, a frequent issue that appears is that of endogeneity. A solution for this issue is using valid instrumental variables (Barros et al., 2020). However, finding such variables represents a challenging task, as most economic indicators are extremely correlated to each other. To avoid simultaneity, several other papers have adopted a common approach to reduce endogeneity: using one year lagged data for the dependent variable (Baccini & Urpelainen, 2014 ; Steinerg & Malhotra, 2014 ; Memili, et al., 2015 ; Goschin, Druica, & Valsan, 2020). We have also adopted this method. The lagged data model offered much more significant results than the usual model that uses simultaneous variables, hence indicating the presence of endogeneity in the initial data. When testing for multicollinearity, no correlation between two explanatory values was higher (in absolute value) than 0.65. According to the literature, variables that show correlations higher than 0.8 should be removed from the model (Berry WD, 1985). Therefore, we did not eliminate any variables based on this standard procedure in literature.

As it is the case with spatial analysis, we have used a spatial weight matrix to describe the proximity of counties. Several measures are used in the literature (Elhorst, 2014). We have chosen to represent the matrix based on binary contiguity, i.e. if $\boldsymbol{W} = (w_{ij}) \in \mathbb{R}^{n\times n}$ is the weight matrix, with n being the number of counties (42, in our case), then $w_{ij} = 1$ if the region i shares a border with region j , and $w_{ij} = 0$ otherwise. This matrix, with zeros on its main diagonal is then row standardized, such that each obtained number represents a spatial weight in the regression. The work that follows is done by using the statistical software R.

In order to determine the appropriate form of the regression equation, several statistical tests were employed. The SLM1 marginal test (Baltagi, Song, & Koh, 2003) pointed towards using random effects (p-value < 0.001), instead of fixed effects, result which was strengthened by the Hausman test (p-value = 0.999) (Pace & LeSage, 2008). When using the spatial dependence Lagrange multiplier test (Anselin, Bera, Florax, & J., 1996), results indicate the presence of spatial lag dependence (p-value = 0.003) and spatial error dependence (p-value = 0.012). The model is described by the following equations:

$$\boldsymbol{y} = \lambda(I_T \otimes W)\boldsymbol{y} + X\boldsymbol{\beta} + \boldsymbol{u} \qquad (\mathbf{1})$$
$$\boldsymbol{u} = \rho(I_T \otimes W)\boldsymbol{u} + \boldsymbol{\varepsilon} \qquad (\mathbf{2})$$
$$\boldsymbol{\varepsilon} = (\boldsymbol{\iota_T} \otimes I_N)\mu + \boldsymbol{\nu} \qquad (\mathbf{3})$$

, where **y** is the NT×1 vector of observations for the dependent variable, $I_T$is the T×T identity matrix, W is the spatial weight matrix illustrated before, λ is the spatial dependence parameter, X is the NT×k matrix of explanatory variables, **u** is the disturbance term, composed of an autoregressive error part whose effects are described by ρ, and an error part $\boldsymbol{\varepsilon}$**,** which is also split in a specific effects part $\boldsymbol{\mu}$ with $\mu_i \sim IID(0, \sigma_\mu^2)$ related to each region and a novelty part $\boldsymbol{\nu}$ with $\nu_{it} \sim IID(0, \sigma_\nu^2)$ that accounts for both changes in time and regions; $\boldsymbol{\iota_T}$ is a vector of T ones. In this study, N=42, T=10 and k is 7. For the dependent variable **y**, the observed period is 2009-2018, while for the explanatory variables the observed period is 2008-2017.

The direct (equation 4) and indirect (equation 5) impacts of every variable in each region are estimated as follows:

$$S_k(W)_{ii} = \frac{\partial y_i}{\partial x_{ki}} \qquad (4)$$

$$S_k(W)_{ij} = \frac{\partial y_i}{\partial x_{kj}} \qquad (5)$$

Averaging these impacts across all regions will yield the mean direct and indirect impacts for each explanatory variable (LeSage & Pace, 2009).

Results and Discussions

Based on the methodology described above, the following regression parameters have been estimated, together with their level of significance:

Table 2: Regression results

Name	Model 1 (Full Model)
Intercept	0.772 (<0.001) ***
Average number of employees per firm	0.013 (0.269)
Unemployment rate	-0.019 (<0.001) ***
Average net salary	4×10^{-5} (0.528)
Resource utilization rate	-0.003 (0.018) *
Active firm density	-0.006 (0.034) *
GDP growth rate	-0.039 (0.532)
Interest rate	0.002 (0.658)
λ	-0.615 (<0.001) ***
ρ	0.671 (<0.001) ***
ϕ	2.236 (<0.001) ***

N.B. : p-values are in parentheses. The ϕ parameter is equal to $\sigma_\mu^2/\sigma_\varepsilon^2$. If ϕ=0 at a significant level, then we can reject the hypothesis that random effects describe the data better than fixed effects.

Based on the results described above, we can confirm the hypotheses: the unemployment rate significantly influences the new firms birth rate and there is a significant spatial dependence in the dependent variable.

Recalling that the dependent variable is delayed by a period of 1 year, we can interpret that more new firms are created in response to a lower unemployment rate, which might mean that people start a business due to opportunity-driven reasons, instead of necessity-driven reasons (Albulescu & Tamasila, 2014). This result was also observed in previous literature, for the case of Scotland (Ross et al., 2015). Another interpretation of this relationship's sign could be given by a decrease in entrepreneurship due to situational, period-specific characteristics of the economy that also result in a high unemployment rate (Sipos-Gug & Badulescu, 2015). Due to the difficulty of providing robust instrumental variables to test this hypothesis, it is hard to tell if this was indeed the case in our study. We also observed that two more variables present a significant influence on the dependent variable: the resource utilization rate and the active firm density. The negative signs for these two variables can also be explained as an entrepreneurial response to low-performance economic indicators. By creating new jobs, entrepreneurs offer more available spots for the workforce to occupy. A lower active firm density means that entrepreneurs have smaller barriers to enter the market, as competition (represented by a higher firm density) is lower, hence more new firms are created. This result is somehow contradictory to what the literature says, in which birth rate is higher in agglomerations (Reynolds et al., 1994), due to the availability of suppliers, workforce and a well-defined market. Moreover, this result further strengthens the

point that the Romanian Entrepreneur is opportunity-driven, as more new firms appear in regions where there is a lack of existing firms. Regarding the second hypothesis, the result shows that the spatial model was appropriate for our analysis, and that spatial spillover effects exist, as we have already enconuntered in the literature (Krugman P. , 1991a ; Krugman, 1991b).

Contrary to what was discovered in the literature, average net salary, interest rate and the GDP growth rate did not show a significative influence on the dependent variable.

The following table shows the mean impacts for each explanatory variable:

Table 3: Direct, indirect and total impacts of the explanatory variables

Name	Direct impact	Indirect impact	Total impact
Average number of employees per firm	0.014 (0.261)	-0.006 (0.305)	0.008 (0.273) ***
Unemployment rate	-0.020 (<0.001) ***	0.008 (0.024) *	-0.011 (0.001) ***
Average net salary	4×10^{-5} (0.443)	2×10^{-5} (0.437)	2×10^{-5} (0.471)
Resource utilization rate	-0.003 (0.020) *	0.001 (0.060) .	-0.002 (0.030) *
Active firm density	-0.006 (0.017) *	0.002 (0.060) .	-0.003 (0.021) *
GDP growth rate	-0.042 (0.542)	-0.018 (0.580)	-0.024 (0.556)
Interest rate	0.002 (0.684)	-0.001 (0.693)	0.001 (0.689)

N.B. : p-values are in parentheses.

The table above shows significant impacts for the same three explanatory variables discussed earlier. Direct impacts are similar to the regression coefficients and offer similar explanations. The indirect impacts, which are significant (at a 0.06 level), show a positive sign, meaning that an increase in unemployment rate, resource utilization rate or active firm density in one county can lead to an increase of new firm formation in neighbouring counties. This result might suggest that unemployed persons might seek a job in the region, outside her own county or competition in the county might influence the entrepreneur to start her enterprise somewhere else in the region. The magnitude of indirect impacts, being smaller than that of the direct ones might suggest that there is a decay due to distance.

Conclusion

The present study's goal was to analyse how do macroeconomic indicators influence the birth rate of new firms (standardized to the total number of active enterprises) in a spatial setting. We have discovered that three of our chosen explanatory variables present a significant influence to the dependent one. The unemployment rate presents a negative relation, suggesting that entrepreneurship in Romania in the observed period might be more opportunity-driven than necessity-driven. The resource utilisation rate also negatively influences the new firm birth rate, as entrepreneurs seek to create new jobs, while the low active firm density means less competitions and smaller barriers to entry for new firms. From the spatial point of view, there was significant evidence that there exist spillover effects across the 42 regions.

There are however some limitations to the study: first of all, choosing the one year lagged dependent variable to reduce endogeneity is a "quick fix" solution, which might not offer the most accurate results – better ways to deal with endogeneity are to employ a dynamic spatial panel model, in which time lags are introduced, or using strong instrumental variables; secondly, entrepreneurial success and innovation are heavily linked to the entrepreneur's own skills, attitudes and behaviours, characteristics which were not present in this study.

As for further research, we recommend the use of better instrumental variables, as well as a dynamic regression model, together with questionnaire-generated data, similar to data available from the Global Entrepreneurship

Monitor (Amoros & Bosma, 2014). We encourage other researchers to replicate our study in the case of their countries of choice, as well as for the Romanian case, using other explanatory variables which better fit the model.

To conclude, the present study has confirmed what the authors have proposed as hypothesis: the Romanian entrepreneur tends to be opportunity-driven. This attitude towards entrepreneurship suggests that Romania's development level is behind that of Western states, which are frequently pointed out as reference points for Eastern economies. It is optimistic that Romanians see this gap as an opportunity to develop new businesses, offer jobs, invest in innovation and create value. We hope that this study offers good insights to why this attitude of Romanian entrepreneurs is beneficial and that it should continue. For our own future research, we want to study several years from now if that gap had gotten smaller and that entrepreneurship had played an important role in the result.

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Do the Poor Choose Financial Inclusion? A Special Case Study of Simeulue Regency

ALIASUDDIN
Faculty of Economics and Business, Universitas Syiah Kuala. Indonesia
aliasuddin@unsyiah.ac.id
https://orcid.org/0000-0003-2656-873X

Taufiq C. DAWOOD
Faculty of Economics and Business, Universitas Syiah Kuala. Indonesia
taufiq.dawood@unsyiah.ac.id
https://orcid.org/0000-0002-8216-4468

Nanda RAHMI
Faculty of Economics and Business, Universitas Syiah Kuala. Indonesia
nanda_rahmi84@unsyiah.ac.id
https://orcid.org/0000-0002-3770-4621

Abstract

This study analyzes the factors that determine financial inclusion in Simeulue Regency, Aceh Province, using household survey data with a sample of 383 households. There are two methods of analysis used in this study, namely factor analysis and cross-tabulation. The estimation results show that the variables that influence financial inclusion are gender, education level, and employment status. Meanwhile, employment status, poor status, and education level have a significant effect on financial inclusion. Furthermore, women have more influence than men. Financial institutions and banks need to take advantage of women's influence in increasing financial inclusion in this area.

Keywords: Financial Inclusion, Factor Analysis, Socio-Economic Variables, Simeulue, Aceh

JEL: G4, G5, I3, R2

Introduction

Simeulue Island is a remote area located in the Indian Ocean with the closest distance from Sumatra Island to 86 miles (Figure 1). This island consists of 147 large and small islands. The island can be accessed by sea and air routes. Because this area is far from Sumatra Island, the economy of this area is relatively very limited. The poor population in Simeulue Regency was 19.78 percent in 2018 of 89,059 people (BPS Simeulue, 2019).

The high number of poor people impacts financial and banking access, so it is feared that the penetration of inclusive finance will be relatively low compared to other regions. The results of empirical studies prove that the poor have somewhat limited access to financial inclusion (Lyons, Grable, & Joo, 2018). However, this empirical evidence is mostly done in other countries with different Simeulue Regency conditions, so it is necessary to study the factors that determine financial inclusion in this area.

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Figure 1: Map of Aceh Province and Simeulue Regency

Source: UNEP (2007).

Table 1 shows some of the socio-economic indicators of Simuelue Regency and Aceh Province. The poverty rate in Simeulue Regency is still substantial and above the poverty rate of Aceh Province. This data confirms that economic development in Simeulue Regency is still not optimal. Another indicator, the per capita income of Simuelue Regency is still far below Aceh Province. The income per capita in Simeulue Regency is only USD 1,147, and per capita income in Aceh Province USD 1,639.

Meanwhile, public spending in Simeulue Regency is only USD 445.13 and Aceh Province USD 597.13. This expenditure is deficient and cannot be separated from low income because the poverty rate is still very high. Even though the income and expenditure per capita are low, the economic growth of Simeulue Regency (4.75 percent) is higher than that of Aceh Province (4.15 percent). High economic growth has not provided more significant benefits for the community because there are still many poor people. The last indicator is the Simeulue Regency of Human Development Index (HDI) 64.41, far below Aceh Province's 70.60.

Table 1: Socio-economic Indicators of Simeulue Regency and Aceh Province, 2019

Indicators	Simeulue Regency	Aceh Province
Poverty (%)	18.99	15.32
The income per capita (USD)	1,147	1,639
Expenditure (USD)	445.13	597.13
Human Development Index	64.41	70.60

Source: BPS Aceh (2020).

Based on several socio-economic indicators, the remote location of Simeulue Regency has resulted in the low economic achievement of Simeulue Regency. Although some hands are soft, there is hope for profitable economic growth. This economic growth is expected to affect financial inclusion. Kim, Yu, & Hassan (2018) found that economic development involves developing financial inclusion, and financial inclusion affects economic growth. The result of inclusive finance cannot be separated from digital banking development (Ozili, 2018). Given the geographic location of Simeulue Regencysome socio-economic indicators that are still below the Aceh Province average, determining financial inclusion in Simeulue Regency is one of the empirical studies that can add empirical evidence in the field. Financial inclusion because there are no studies about this in Simeulue Regency.

This research is fundamental because empirical evidence shows that financial inclusion affects reducing poverty in several countries. Li (2018) found that financial inclusion has a positive and significant effect on lowering the poor population. Boukhatem (2016) documents evidence that economic progress has a considerable impact on reducing the poor. Another

study shows that financial inclusion significantly affected the poor population in Aceh Province (Aliasuddin, Dawood, & Rahmi, 2020).

Literature Review

Financial and banking advances have affected financial inclusion in both developed and developing countries. This progress is supported by developments in information technology and the internet so that banking services are not only in conventional forms but transform digital banking. Mushtaq & Bruneau (2019) found that the role of information technology (ICT) is enormous in increasing financial inclusion in 62 countries. The progress of this financial inclusion is inseparable from the technological aspect, but in this study, the technical factor is not included in the analysis model.

Apart from technological factors, other factors influence the development of this financial inclusion. A study conducted by Kabakova & Plaksenkov (2018), for example, find that several socio-demographic variables affect financial inclusion in 43 countries using the fuzzy-set qualitative comparative analysis approach. Meanwhile, Li (2018) household survey data in China find that income is an essential factor for poor households' financial inclusion. Grohmann, Klühs, & Menkhoff (2018) document that the factors that play a significant role in financial inclusion are economic infrastructure and financial literacy.

Ayllón & Fusco (2017) find that households with low incomes tend not to use banking services or low financial inclusion. Meanwhile, Zins & Weill (2016) conducted a study on the determinants of financial inclusion in 37 countries in Africa using a probit model. They find that males, wealthier, more educated, older were essential factors that determined financial inclusion.

Iqbal & Sami (2017) examine financial inclusion in India using a multiple regression model and found that financial institutions influence financial inclusion. Tchamyou, Erreygers, & Cassimon (2019) use the generalized method of moments in analyzing ICT on inequality through economic development in 48 African countries. They found that financial depth affects reducing poverty in 48 African countries.

Swamy (2014) analyzes gender roles on financial inclusion panels least squares and generalized moments with a sample of poor people in India. This study indicates that the part of women is greater than that of men in financial inclusion in India. This study forms the basis that gender has a significant effect on financial inclusion.

Lyons, Grable, & Joo (2018) find that older people have a subordinate role in financial inclusion and get the most significant financial inclusion effect. Furthermore, they found that low education and low income had the most significant vulnerability in financial inclusion.

Research Method

Sampling Method

This research was conducted on household respondents in Simeulue Regency and especially the East Simeulue Subdistrict. The number of households in the East Simeulue Subdistrict was 6,987 households (BPS Simeulue, 2019). Determination of the number of samples is conducted using the formula (Tejada & Punzola, 2012):

$$n = \frac{N}{1+Ne^2} \tag{1}$$

N is the population (6,987 households), *e* is the error, and *n* are samples. According to Tejada & Punzola (2012), equation (1) is valid if *e* must be 5 percent to meet large sample properties' requirements. Based on these considerations, the number of samples in this study was at least 378 households. Fortunately, the number of samples in this study was 383, so it was eligible for large sample properties. Sampling from households was done by simple random sampling. All households had the same opportunity to be selected as samples.

Model Analysis

There are two main models and approaches to data set analysis. First, a data set that has a distribution from a randomly drawn population and tries to study the data set. This approach is known as the statistical model approach. The second model is a geometric form approach model from the data set with a deterministic model. This second model can be in the form of subspace, manifold, and topology. This second approach model is known as the geometric model (Vidal, Ma, & Sastry, 2016: 4).

The model used in this study is the second approach model, namely the geometric model. Although in the geometric model, it is stated that the number of samples used is not sufficient and the population distribution is unknown, in this study, the geometric model is used because the model is suitable for this analysis. This geometric model approach uses a classical principal component analysis (PCA) to analyze the topological model (Vidal, Ma, & Sastry, 2016: 5). The most suitable nonparametric research is to use the factor analysis approach to identify the essential variables that affect a variable.

Based on these considerations, the model used in this study is stated (Vidal, Ma, & Sastry, 2016: 5):

$$x_j = y_1\mu_1 + y_2\mu_2 + \cdots + y_{dj}\mu_d + \varepsilon_j \qquad \forall x_j \in x \qquad (2)$$

Where $d < D$, $y_{ij} \epsilon R$ with $i = 1, \ldots, d$ and $\mu_1, \mu_2, \ldots, \mu_d \epsilon R$ are unknown model parameters that need to be determined. Furthermore, $\varepsilon_j \epsilon R^D$ is the error term between sample *j*th in the model.

Findings and Discussion

Household choice of financial inclusion is determined by selecting eight variables that are considered necessary. There are economic variables, and there are also demographic variables and banking service system variables. The variables used in determining this financial inclusion are income per capita, working status, educational level, banking services, ATM card holding, number of bank accounts, and gender. The discussion on determining the selection of financial inclusion was analyzed by assessing the estimates' robustness.

Robustness of the Estimates

Analysis of the selection of factors that determine financial inclusion is carried out using a factor analysis approach. In theory, a factor value greater than 1 is a dominant factor in determining financial inclusion selection. For this analysis to be more valid, it is necessary to carry out repeated estimates four times to obtain the robustness of the research results. The extraction method used in estimating this coefficient is the principal component, alpha factoring, generalized least square, and maximum likelihood.

The estimation results using these four extraction approaches can show no change in the eigenvalues coefficient of the variables used in determining the selection of this financial inclusion. Figure 2 shows the extraction results in deciding the eigenvalues coefficient of the variables used in this study, which consists of four panels (a), (b), (c), and (d).

The estimates for all extraction models gave the same eigenvalues coefficients. Only the positions of each variable were different. Figure 2 panel (a) is the extraction result using the principle component approach where the educational level variable's place is other than the panel (b), which results from extraction using the alpha factoring method. The same results are also shown by the panel (c) of the extraction results using the generalized least squares method and panel (d) of the maximum likelihood method's extraction results.

Table 2: The goodness of fit Test

Extraction Method	Chi-squares	df	Significant
Generalized Least Squares	52,651	7	0.000
Maximum Likelihood	39,634	7	0.000

Source: Estimated Results, 2020.

Panel (a) to the panel (d) also shows the position of each different variable according to other extraction methods. Confirmation that this model is very valid is also demonstrated by the goodness of fit test of the last two approaches, namely generalized least squares and maximum likelihood.

The statistical results of these two extractions have a probability value smaller than zero, with each chi-squares statistic shown in Table 2. Table 2 shows that the two extraction approaches have very significant chi-squares values indicating that the model is perfect to use as material for analysis. Based on these results, the factor analysis method is the most appropriate in this study, and the consequences of this study are valid.

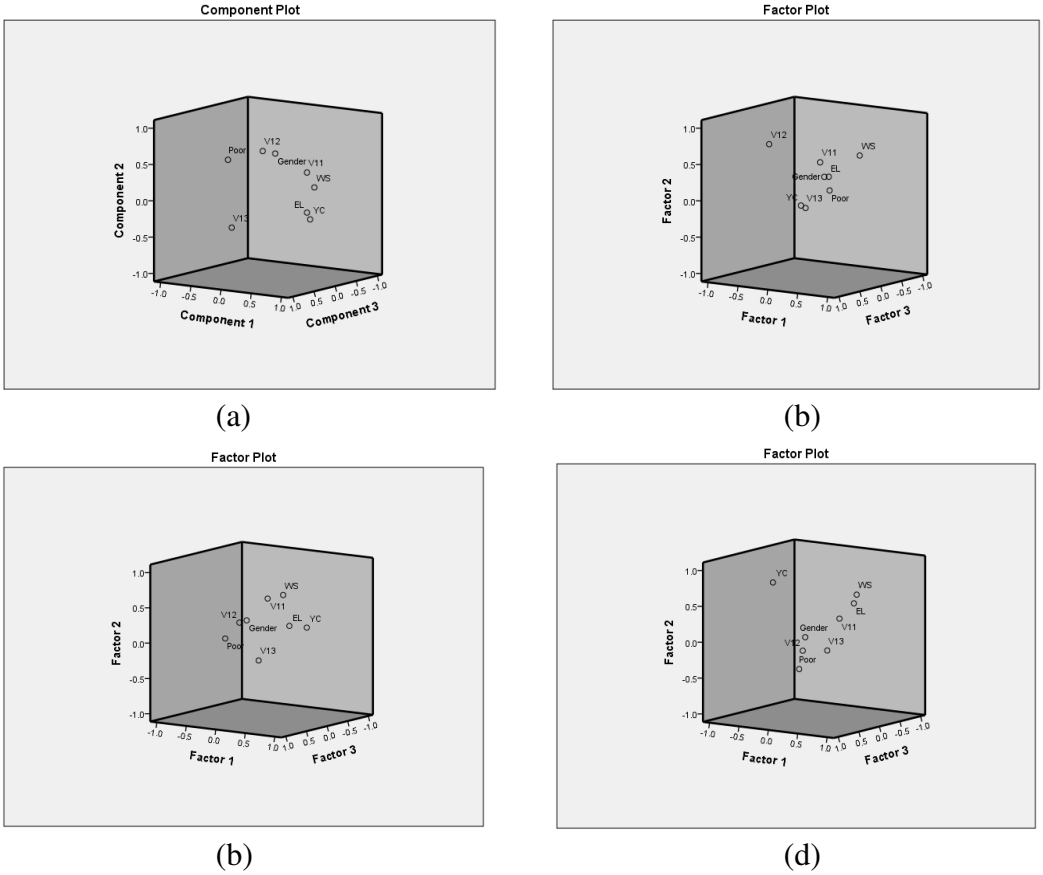

(a) (b)

(b) (d)

Figure 2: Extraction Results of Estimates

Determinants of Selection of Financial Inclusion

Testing the analysis model in the previous section shows that the method used in this study is excellent. The analysis can be carried out to determine financial inclusion selection by including economic and demographic variables. Table 3 shows that of the eight variables used to determine financial inclusion, three main variables play a significant role in determining financial inclusion.

The first variable that determines financial inclusion is gender, with an eigenvalue coefficient of 2.155 and the variance of this variable of 26.94 percent. These results indicate that gender is a very dominant determinant in choosing financial inclusion. The results of field data show that the number of female respondents in this study is 78 people and the male respondents are 199 from the total respondents are 277 people. Although the number of male respondents is more than female, female respondents' role in determining the selection of financial inclusion is relatively good. This result proves that the role of women in developing financial inclusion is critical. This study's results are in line with research conducted by Swamy (2014) and Zins & Weill (2016), who find that gender plays a role in the development of financial inclusion.

The second variable that determines financial inclusion is the educational level with an eigenvalue coefficient of 1.435 and the variance of this variable of 17.93 percent. This academic level variable is significant in determining the selection of respondents' financial inclusion in this study even though many respondents are of low education. The data of this study indicate that the number of respondents from low education is 211 households (55.1 percent) and higher education is 172 (44.9 percent). Even though household respondents have low education, they understand that financial inclusion is an important variable in supporting productive activities and smooth daily household transactions. However, this study's results are different from research conducted by Lyons, Grable, & Joo (2018) that low education has a greater risk of vulnerability in financial inclusion. The government should place greater emphasis on social support for financial inclusion.

Working status is the third variable that plays a crucial role in choosing financial inclusion in this study. This variable has an eigenvalue essential and variance of 14,654 percent. There is a working status that is a long-term working contract, and there is a non-contract working status with 187 households (48 percent) and 196 (51.2 percent), respectively. This data shows that the respondents in this study were mostly workers without a contract. These results indicate that employment status from work without a contract also has financial inclusion. According to Lyons, Grable, & Joo (2018), this working status is included in the social factors, should receive greater attention in financial inclusion because non-contract workers face a greater risk of losing their income so that access to financial inclusion is lower.

Table 3: Eigenvalues of Principle Components

Component	Eigenvalues Extraction		
	Total	**Percent Variance**	**Cumulative**
Gender	2.155	26.940	26.940
Educational Level	1.435	17.933	44.873
Working Status	1.172	14.654	59.527
Poor Status	0.965	12.058	71.585
Income Per Capita	0.911	11.387	82.972
Banking Services	0.613	7.662	90.634
Holding ATM Card	0.477	6.343	96.977
Number of Bank Account	0.272	3.023	100.000

Source: Estimated Results, 2020.

Table 3 shows that five other variables do not affect determining the choice of financial inclusion. The variables are poor status, income per capita, banking services, holding ATM cards, and several bank accounts. The income per capita does not affect the selection of financial inclusion. This result illustrates that even low income will still be interested in having access to banking services (financial inclusion). The research results by Ayllón & Fusco (2017) found that low income tends to have an intense desire for financial inclusion. But this result is different from a study conducted by Li (2018), which documents that income influences the development of financial inclusion in China.

Effects of Socio-economic Variables

The subsequent analysis is the influence of socio-economic variables on financial inclusion in this area, with the control variable being gender. Gender selection is significant to see the effect of gender on financial inclusion. The determination of the socio-economic influence of this variable was carried out using cross-tabulation. There are three variables selected

to analyze the effect of these socio-economic variables on financial inclusion. These variables are working status, poor status, and educational level.

Working status is very influential on financial inclusion. Only lazy people have a very significant effect with a statistical value of 30,967 and a p-value of 0,000, while the female statistic is 3,825 with a p-value for 2-sided of 0.067 and 1-sided of 0.039 (Table 4). These results indicate that men who work will choose financial inclusion, while women do not necessarily. This is very rational because most of the financial transactions in this area are mostly carried out by males compared to females.

Table 4: The Effect of Working Status on Financial Inclusion

Gender	Chi-square	df	2-sided	1-sided
Female	3.825	1	0.067	0.039
Male	30.967	1	0.000	0.000
Total	37.369	1	0.000	0.000

Source: Estimated Results, 2020.

There are two working statuses: working with long-term contracts and without contracts, which have two different conditions. Working with a contract has guaranteed long-term employment, whereas, without a contract, there is no guarantee whatsoever. The estimation results show no difference in influence between workers with long-term contracts and workers without contracts, both for males and females. The estimation results in Table 5 show that women's effect is relatively more significant than that of men because the female statistical value is greater and more significant than that of men. Overall, male and female influence is very substantial, which illustrates that job status has no difference with financial inclusion. Workers with contracts and workers without contracts share a desire for financial inclusion.

Table 5: The Effect of Poor Status on Financial Inclusion

Gender	Chi-square	df	2-sided	1-sided
Female	5.791	1	0.025	0.021
Male	4.563	1	0.043	0.028
Total	6.961	1	0.013	0.008

Source: Estimated Results, 2020.

The effect of female education is greater than that of males on financial inclusion. Statistics for females and males were 29,028 and 13,635, respectively, and significant at the 1 percent level (Table 6). This estimation result shows that women are more concerned about financial inclusion than men. The results of this estimate can serve as a reference for financial institutions and banks in increasing banking market penetration in the community. Approach to female will have a more significant effect than male.

Table 6: The Effect of Educational Level on Financial Inclusion

Gender	Chi-square	df	2-sided	1-sided
Female	29.028	1	0.000	0.000
Male	13.635	1	0.000	0.000
Total	37.313	1	0.000	0.000

Source: Estimated Results, 2020.

Conclusion

Several conclusions can be summarized from the estimation results and the discussion in the previous section. First, three variables significantly influence the choice of financial inclusion, namely gender, educational level, and working status. The variable of gender has a more significant effect on financial selection in this study, whereas the academic class

variable has the second more significant magnitude coefficient. The third bigger coefficient is the variable of working status.

Other results show that the socio-economic variables on financial inclusion are significant by using cross-tabulation extractions. The variables of working status, poor status, and educational level significantly affect financial inclusion. The influence of women is more significant than that of men. These results indicate that the role of women is enormous in society in this research area.

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Geographical Distribution of Sustainable Tourism Development of The Countries of The European Union Using the Machine Learning Method

Josef BOTLÍK
Silesian University in Opava, School of Business Administration in Karvina, Czechia botlik@opf.slu.cz

Milena BOTLÍKOVÁ
Silesian University in Opava, Faculty of Philosophy and Science in Opava, Czechia, milena.botlikova@fpf.slu.cz

Petr JANÍK
Silesian University in Opava, Faculty of Philosophy and Science in Opava, Czechia,
petr.janik@fpf.slu.cz

Jana STUCHLÍKOVÁ
Silesian University in Opava, Faculty of Philosophy and Science in Opava, Czechia,
jana.stuchlikova@fpf.slu.cz

Abstract

On the one hand, the long-term growth of tourism leads to the development of the environment. The mass nature of tourism in recent years has created negative pressures on the social and natural environment. For these reasons, development needs to be geared towards sustainability. Creating an environment in which social, economic and environmental areas are consistent. Measuring the sustainability of tourism in the EU is based on the methodology of European indicators for assessing sustainable development. The article deals with the comparison of sustainable tourism of EU countries on the basis of selected indicators from individual areas of sustainability year-on-year comparison of 2012 and 2017 through machine learning methods and comparative analysis. The results show that there are countries that are still lagging behind in achieving sustainability goals in terms of renewables or waste production.

Keywords: Sustainable, tourism, environment, European Union.

Introduction

Liberalization of the tourism market, shortening of distances, digitization of supply, this is only a small list of factors that have caused the dynamic growth of tourism in recent decades. The tourism industry has been and still is considered an efficient pole of development. Many authors agree that tourism is a rapidly developing sector, there is a link between economic development and the development of tourism and it is also a sector with a positive impact on employment, to reduce poverty (Oh, 2005). For example, Manzoor (2018) demonstrated a positive relationship between tourism growth, economic development and employment using bivariate regression. The dynamic development of tourism, also due to the "aggressive" targeted marketing strategy of the destination (DMOs), which is intended to attract as many tourism clients as possible, has become unbearable in many cases. The excessive influx of tourists itself has all the negative effects, such as rising inflation, rising prices for residential housing, rising harmful emissions (Oklevik, 2019) and non-planned tourism growth brings with it the degradation, fragmentation of natural, social and economic environments (Davenport, 2006). Many authors deal with the issue of sustainable tourism, there are many definitions of sustainable tourism. According to Pásková, (2014), it is such tourism, *"when the services provided to visitors and the visitors' own activities affect the natural and anthropogenic environment, the local community and the biosphere as a whole only to such an extent and quality that environment, the local community and the biosphere as a whole, thus not restricting the possibility of using tourism and other anthropogenic use of the destination in the future"*. According to UNEP (2005), it is defined sustainable tourism as *"… tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, industry, the environment and host communities"*. Although there is no uniform definition of sustainable tourism, uniform elements can be found in them. A uniform feature of sustainable tourism is the preservation of cultural heritage for future generations and the definition of some of the areas of interest (pillars). Butler (2006)

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defines the development of tourism with the intentions of maintaining the community and the environment, Richards (2000) as the integration of accommodation facilities into the environment. Great part of the literature identifies three basic pillars of sustainability: economic, social and environmental (Cantu- Martinez, 2018). In order to create sustainable space, the pillars must be integrated with each other. According to Šimková (2013), however, there are more dimensions. It considers it positive to extend the area of sustainability to include a political, institutional and technological pillar. The technological pillar is associated with the use of technological progress, the implementation of the 4 Industrial Revolution, which is an essential part of the development of each sector. Similarly, Fernandez and Rivero (2009) define the scope of the pillars. These authors define the pillars of sustainability as economic, social, natural sustainability and extend the pillars to include the political and regulatory environment and the travel and tourism industries. The political pillar represents the interaction between residents and public administration. As far as psychological sustainability is concerned, the author is inclined to define the satisfaction of local communities and visitors to the destination, but the question is whether this issue is no longer part of the socio-cultural indicators. The need for the concept of sustainable tourism is based on the argument that, like any development, the development of tourism has certain social and biophysical limits.

Tourism Sustainability Assessment Methodology

The individual pillars are characterized by a set of criteria. Exist a number of benchmarks that determine the sustainability of tourism. In the past, the selection of indicators was carried out mainly on an ad hoc basis, without a specific theoretical or conceptual framework for the system in place. The development of tourism was comparation in connection with quantitative indicators of tourist movement, for example, the research Kostková (2017) or Vorontsova (2016) who which dealt with the issue of incoming and outgoing tourism in Russia. Many authors have argued that ad hoc approaches lead to a number of dangers in the selection of indicators (eg Bossel, 1999). Other authors discuss about appropriate roles of science, policy and the public in the indicator selection process (McCool and Stankey, 2004). At present, there is a methodology on the basis of which the sustainability of tourism in a destination or region EU, the so-called European system of indicators (ETIS, MRD, 2013) in the field of tourism, is assessed. Based on a set of 34 indicators, it describes developments in the three pillars of sustainable development. The WTO Key Indicators for Sustainable Development (ETIS) are an example of a top-down approach that Twining-Ward and Butler (2002) consider a "useful starting point", but further point out that this approach is too narrowly focused and ignores the specific conditions of destination. However, Tudorache (2017) considers the ETIS system to be a sustainable tourist destination management system based on a number of indicators, which offers an innovative approach to tourism planning. The individual indicators defined in ETIS copy the Global Sustainable Development Goals (Department of Economic and Social Affairs Sustainable Development, 2020) and are part of many other indices (TTCI index, Beynod GDP method). In general, sustainable tourism one of the global goals SDGs (Goal 8.9), an indicator of this goal is the share of tourism in GDP and the contribution to employment in the economy. Summary indicators of sustainable development of the region were issued by UNWTO (Publications Office of the EU, 2014), it is a set of 17 goals of sustainable development of the region in general, it is not defined by sector, it is a targeting from the whole-society perspective, on which the sustainability of tourism is based ((more details of sustainability indicators on the website www.

Database and Methods

This paper analyses the economic-socio-environmental diversity of regions EU27. For the sustainability analysis, we chose a selection of factors (see Table 1). This contribution presents the geographical distribution of sustainable tourism in the regions of the European Union the year-on-year dynamics of the development of the years 2012 and 2017 based on selected sustainability indicators. The comparison of the two periods makes it possible to objectively assess the efforts that individual regions make in sustainability policy. Individual studies consist of analyses and evaluations based on selected indicators of sustainable tourism development. The paper is based on a search of professional literature and databases of Eurostat, UNWTO or the Czech Statistical Office. Map visualizations were performed in MS Excel. Comparative analysis and clustering method using machine reading were used to analyze the development of the dynamics of selected indicators. Data were evaluated by cluster analysis using machine learning. Machine learning is a specific sub-area of artificial intelligence, which contains algorithms to learn from the data provided. Machine learning is currently one of the fastest growing areas of computer science, and it is difficult to find an industry or research field, including tourism, in which machine learning methods are not applied. In most cases, the methods of comparison, the method of multi-criteria decision-making are used in the analysis of tourism flows, the development trends of tourism are in most cases solved at the level of regression analysis or development of time series. Methods based on machine learning algorithms and text data are relatively rare in tourism, this method used by Feng (2019) or Zou (2019), who used data from Google and predicted trends and flows in tourism based on the Radon Forest (RF) model.

Table 1: Indicator sustainable tourism (UNEP 2005, CSU 2020)

Pillar	Group	Indicator
Economic	C1	Number of tourist/100 inhabitants
	C2	Number of commercial establishments/100 inhabitants
	C3	The share of women and men in employment in tourism (%)
Social	B1	Number of tourist nights
	B2	Average length of stay
	B3	Share of tourism employment in total employment (year 15 - 64)
Environmental	D1	Share of the use of renewable resources (%)
	D2	Recycling of municipal waste in EU countries (%)
	D3	Waste volume per capita (in thousands of tonnes)

The machine reading method enables the application of cluster analysis, which is a commonly used method in regional analyses. Used cluster analysis (K-Means algorithm) is a non-teacher learning method. It is used to classify objects, and the goal is to find subsets or clusters of objects in a given set of objects, and objects can contain multiple different unrelated data. It tries to find objects in a cluster that are more similar to each other and yet sufficiently different from objects outside the cluster. The K-means algorithm uses the Euclidean distance as the main criterion for the classification of points into clusters, where μj is the arithmetic mean of the points in the cluster (middle value in the class; (1)) - the standard. In the K-means algorithm it is necessary to specify the required number of clusters K: C_1, C_2, C_3, ..., C_k.

The method is advantageous due to its speed and simplicity, it can also work with a large number of input data in a finite number of iterations. The disadvantage is the need to determine a predetermined number of clusters. K-means is negatively affected by the existence of isolated and distant objects (affecting the average). Different initial locations of cluster centroids can lead to different results. The method is unit-sensitive, if the input indicators are different or s In our case, it is not necessary to perform data standardization (all values are in%) trongly variable, it is better to perform standardization, for example z-score. (Kelbel and Šilhán, 2019).

Development of selected economic pillar indicators

Economy Pillar

The density of tourists is expressed as a ratio of the number of tourists, both domestic and incoming tourism. The indicator we use is calculated as the number of tourists staying in collective accommodation establishments and subsequently related to one hundred inhabitants living in the given territory on 1st of January of the given year. High tourist density is a generator of both positive and negative impacts on the destination. On the one hand, intensive attendance brings the economic and social development of the population in the form of increasing employment, GDP growth, etc. On the other hand, mass tourism, so-called "over tourism", entails clashes with local people, suppression of local cultures and ecological damage to the landscape. The factor "density of tourists" is used and recommended by several authors, e.g. Zou (2019), who uses the machine learning method in analyzes just like us. None of the EU regions has seen a decline in tourist density, suggesting the continuous development of tourism. The highest year-on-year increase in 2012/2017 was recorded in Portugal (dynamics 171.47 %), Latvia (164.31 %), the dynamic increase was supported by a decline in the population. Another region is Romania (161.15 %), the main reason for the increase in Romanian tourism was a 1.5-fold increase in attendance and a minority decrease in population. Croatia (155.24 %) and Lithuania (153.29 %) also rank among the most dynamic five. The lowest increases occurred in Luxembourg (100.5 %), Ireland (101.56 %), Finland (106.35 %), but also in France, which is among the top 10 regions in attendance (109.51 %), where it was growth was dampened mainly by the increase in the number of residents. The Czech Republic is just above the EU average and median (EU average 131.25 %; median EU 129.67 %; Czech Republic 131.55 %). In 2017, more than 50 % of regions were below average, in 2012 it was 13 of the total.

Sustainability Indicator of Tourism Development “Density of commercial facilities” or else “Equipment density” represents the amount of land occupied by tourism infrastructure per 100 inhabitants. This indicator is statistically reported by the Czech Statistical Office (CSO, 2012), but in world research it is used in various forms (for example,

in research into the impact of floods on infrastructure in Venice or Miami (Molinaroli, 2019)), or in assessing the importance of construction in protected areas (Clements, 2018). Expansion of tourism infrastructure (construction of hotels, water parks, golf courses, etc.) leads to land seizure, ecosystem damage, reduction of ecological stability of the territory, etc. This indicator is not one of the ETIS indicators, it belongs to the set of CZSO indicators. The ratio of the number of facilities to the number of inhabitants is suitable for territorial comparison. Portugal was the most active in building accommodation between 2012 and 2017 (dynamic 2017/2012 250 %), followed by Lithuania, Latvia and Belgium (dynamics 2017/2012 200 %) The decrease in accommodation facilities showed in the year-on-year comparison in the Czech Republic (dynamics 90 %), Germany (85.71 %), Luxembourg (77.78 %) and Ireland (38.89 %).

There are many research studies to explore the trend towards gender equality in the tourism sector, especially in China or the Arab countries (generally in countries with unequal status of women). The results show that women do not have a favourable view of tourism's economic impacts and that several barriers exist to their employment in the tourism sector (Alrwajfah, 2020). Nevertheless, women make up a significant proportion of those involved in tourism (employed or otherwise involved). Gender balance is expressed by the ratio of women and men employed in tourism. In general, there is a trend in developed and democratic countries, that in the tourism sector, the majority of the female population is represented. According to statistics, it is clear that in most EU regions (24) the share of women in tourism employment is over 50 %. The highest share of women in 2017 was in Latvia (74.2%), Lithuania (73.7%) and Estonia (72.8%). A higher proportion of men in the tourism sector is in Greece, Cyprus and Malta. The higher proportion of men working in Malta is also a reflection of the higher proportion of men in the total population. In the EU-15 regions, the proportion of women employed in the tourism sector has been reduced, suggesting a growing interest of men in the tourism sector. The year-on-year increase (2017/2012) of the share of men employed in tourism in regions with a relatively high proportion of women in 2017 occurred in Sweden (dynamics 91.61 %), Estonia (dynamics 91.8 %) and Latvia (dynamics 92.94 %), followed by Cyprus (94.27 %). The share of women employed in tourism increased in Malta, where men were predominantly employed in 2012 (dynamics 113.52 %, women's share in tourism employment 37.50 %). In Croatia, despite a relatively high proportion of women in 2012 (52.20 %), there was a further increase in the proportion of women and a deepening of the feminization of the sector. Gender imbalances can be observed in Luxembourg, where there has been an increase in women, in 2012 there was a predominance of men (46.60 % of women), and in 2017, women already prevail (54.7 %).

Social Pillar

The number of overnight stays is given as overnight stays in all accommodation facilities. The following two factors, "Average number of overnight stays" and "Average length of stay (overnight stays)" are among the frequently used factors. For example, according to Matijova (2019), these factors are one of the important indicators of tourism capacity and performance on the socio-economic development of the national economy quantified by the registered unemployment rate. Many studies show a link between these factors and the average price of accommodation, Matijova, (2019) argues that as the average price of an overnight stay increases, the unemployment rate decreases. Our research shows that this fact must be supported by lucrativeness and a specific environment (for example, the sea - Portugal, Spain, etc.). Other studies also emphasize that there is a significant correlation between GDP and physical volume of activity expressed in nights spent (Petcu, 2019).

The most dynamically developed tourism in the number of overnight was in Portugal (dynamics 2017/2012 153.98 %). In Romania, Latvia and Greece, the year-on-year growth in 2017/2012 was in the range of 138-140 %. The lowest increases were recorded in Ireland (107.69 %), Finland (107.86 %), France (108.12 %) and Italy (110, 49 %). Of the total of 27 EU regions analysed, compared to 2017 and 2012, 18 regions recorded a decrease in the average number of days spent. This trend is generally a global trend, decreasing the length of stay, increasing the number of trips. In general, people go more often to shorter periods of time. The average length of nights increased dynamically in Greece (131. 20 % (from 7.55 to 9.91 nights), 126.75 % in Sweden from 4.12 nights to 5.22 nights, and in Croatia from 5.11 nights to 6.42 (dynamics 2017/2012 125.56 %) The most noticeable decrease in the length of stay was recorded in the year 2017/2002 in Slovakia (dynamics 75.46 %). Also, guests in Estonia shortened the length of their stay year-on-year (dynamics 82.86 % 2017: 3.31 nights, 2012: 4 nights). The popular Malta recorded a decrease between 2017 and 2012 (dynamics 85.84 %, 5.76 nights to 4.94 nights in 2017.

Tourism is a catalyst for economic prosperity, for valorization and protection of the environment, for equity and social cohesion. Its contribution has now reached 10.4% of GDP at the world level, which gives it an important role in the EU's sustainable development strategy (Petcu, 2019). From this point of view, "Direct employment in tourism" is also a very important factor. In 2017, the share of tourism employment increased the most in Croatia (with 122.06 %), Estonia (133.36 %) and Greece (136.93 %). Luxembourg had the largest decline (77 % dynamics).

Environmental Pillar

The indicator "Share of energy from renewable sources" was selected as an indicator of progress towards the objectives of the EU Sustainable Development Strategy (SDGs) and thus of sustainable tourism. Hungary was the only region among the 27 EU countries where in 2017 (compared to 2012) the share of the use of renewable energy sources decreased (dynamics 85.87 %). Malta (245.08 %) recorded a high increase in the use of renewable energy sources, using 2.82 % in 2012 and 7.17 % in 2017. and Luxembourg (dynamics 203.18 %, 2012 3.42 %, 2017 6.38 %). Thus, a high increase was recorded in those regions with otherwise low share of OEZ. Ireland also had a dynamic year-on-year growth rate (of 150.10 %). Climate change, increasing dependence on fossil fuels and rising energy prices are the cause of the increasing need for renewable energy. Renewable energy sources are based on domestic sources, their use contributes to alleviating dependence on external sources. With regard to EU renewable energy sources, it set targets for the use of OEZ at 17.5% by 2017 and at 20 % by 2020 and at 32 % by 2030. EU targets are not set uniformly for all regions, each EU country sets its own targets, which they are always obliged to revise in EU reports (**Error! Reference source not found.**). In 2017, 11 of the 27 countries already reached the 2020 targets. Portugal can be expected to meet the 2020 targets, while Lithuania, Cyprus and Greece reached the 2020 targets in 2018.

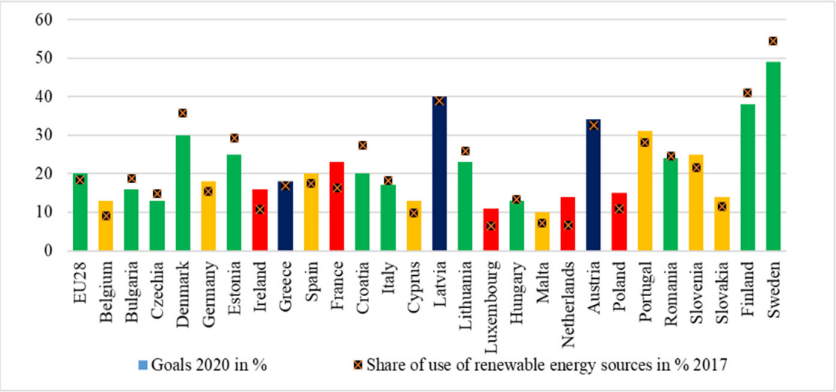

Fig. 1: Goals 2020 and status 2017 share of renewable energy sources in EU, Eurostat (2020)

Studies of factors influencing the amount of waste generated in tourist destinations are relatively common. Tourism contributes significantly to the production of municipal waste. Factors influencing the amount of waste generated in tourist destinations are the number of tourists and excursionists, GDP per capita, population (Iuras, 2020). Regions such as Poland (dynamics 281.67 %), Slovakia (224.06 %) or Lithuania (204.68 %) recorded a large increase between 2017 and 2012. On the other hand, a considerable decrease of municipal waste recycling occurred in Malta (65.98 %), Romania (93.92 %) and Sweden (98.94 %). Austria is stagnating between 2017 and 2012. Other EU countries showed growth in recycling. In the 13 EU countries out of the 27 analysed, the amount of waste generated per head decreased, namely Belgium (92 % dynamics), Luxembourg (93.10 % dynamics) and the Netherlands (93.44 % dynamics). The growth of waste generation per capita was reflected in Estonia (139.29 %), Latvia (135.60 %) and Slovenia (130.11 %), which are among the leading representatives of recycling.

Evaluation Using Machine Learning

The K-Means method with the ScikitLearn function library (Machine Learning in Python, https://scikit-learn.org/) implemented in Python was used for clustering itself. The metric in function was the Euclidean distance, the number of iterations of 300, and the required number of clusters of four. The analysis of the programming language - clustering method led to the grouping of the region into four clusters on the basis of selected indicators. A graphical heuristics, called the Elbow method, is used to estimate the optimal number of clusters. This method is based on the graphical assessment and search for “break, elbow” **Error! Reference source not found.**. It can be seen from **Error! Reference source not found.** the correlation heat map shows the relationships between the individual characteristics (Principal Component Analysis (PCA) was used to reduce the number of characteristics prior to data Classification.

Value	Corellation matrix								
	C1	C2	C3	B1	B2	B3	D1	D2	D3
C1	1,00	0,71	-0,11	0,93	0,13	0,19	-0,40	0,37	0,44
C2	0,71	1,00	-0,02	0,68	0,08	0,12	-0,31	0,26	0,21
C3	-0,11	-0,02	1,00	0,03	0,08	-0,29	0,67	-0,24	-0,14
B1	0,93	0,68	0,03	1,00	0,18	0,11	-0,29	0,32	0,30
B2	0,13	0,08	0,08	0,18	1,00	0,21	-0,18	-0,06	-0,17
B3	0,19	0,12	-0,29	0,11	0,21	1,00	-0,41	-0,01	0,22
D1	-0,40	-0,31	0,67	-0,29	-0,18	-0,41	1,00	-0,43	-0,24
D2	0,37	0,26	-0,24	0,32	-0,06	-0,01	-0,43	1,00	0,30
D3	0,44	0,21	-0,14	0,30	-0,17	0,22	-0,24	0,30	1,00

r= -1 -0,80 -0,60 -0,40 -0,20 0 0,20 0,40 0,60 0,80 1

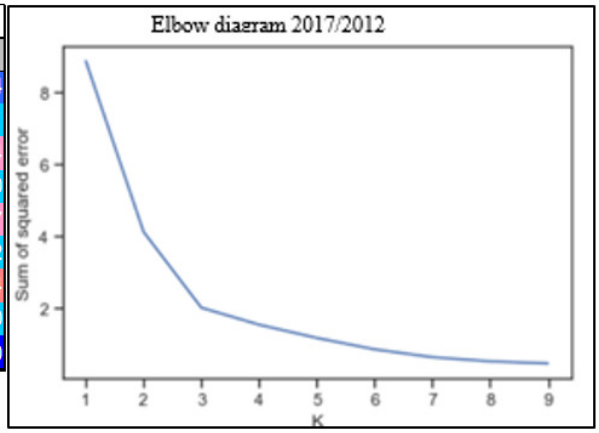

Fig. 2*:* Correlation heat map for 2012/2017 and Elbow diagrams for 2017/2012

The individual clusters are divided according to the colour key, see the picture (
Fig. **3**). The first cluster (orange) represents the regions that implement steps to growth in the individual pillars (for more details see comparisons). Cluster 2 (red) recorded a high increase in the use of renewable resources, on the contrary with a low dynamics of waste recycling. The decline in the share of tourism in the employment of men in tourism, as well as the low dynamics of commercial facilities. According to Figure 3, it is clear that the land in cluster 3 (green colour) excels in dynamics in the recycling of municipal waste, with a relatively high increase in the density of tourists. The fourth cluster (purple) represents regions with a relatively high dynamics of tourist density, a dynamic increase in accommodation facilities relative to the population and a relatively high number of overnight stays (for more details, see the distribution of average values).

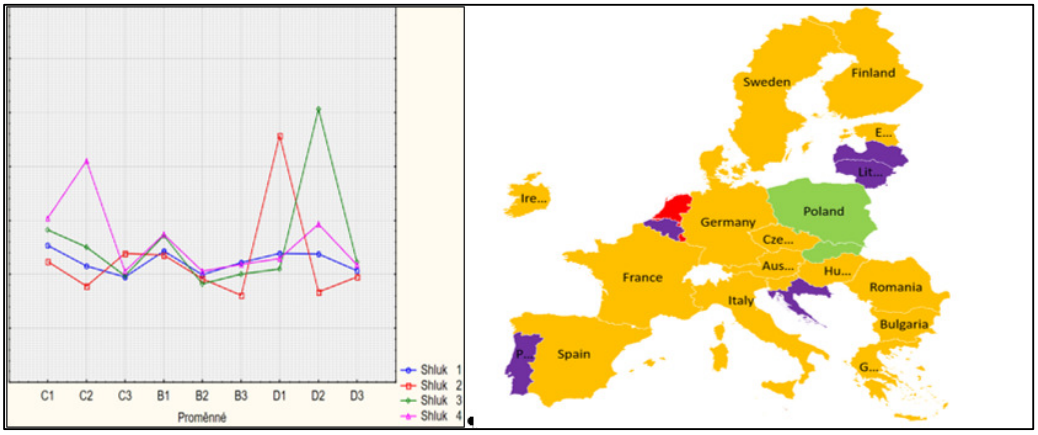

Fig. 3: Resulting cluster (shluk) by country in 2017/2012 (proměnné: value, shluk: cluster)

Conclusion

World research shows that Tourism is an important tool in the international strategy for sustainable development. Nevertheless, it is pointed out that the main goals of the sustainable development of tourism are: increasing the number of jobs in tourist destinations; providing safe and comfortable tourism; respect for the historical heritage, culture, traditions of nations; conservation of the natural landscape and biodiversity; minimizing the use of non-renewable resources in the development of tourism; development of "green" tourism; and the transformation of ecological tourism to the dominant one in the future (Kotlyarov, 2017), the results of our work demonstrate the need to monitor other factors, such as gender factors in connection with the change in employment in the tourism segment, furthermore, our analyzes demonstrate the importance of research into the environmental aspects and impacts of environmental pollution through waste produced by the tourism segment.

Forecasts of further development of tourism outline a scenario based on mutual satisfaction of needs and wishes "*Do you want to come? So, in return, help us with something*". A similar project is already being implemented in Norway. All regions are environmentally friendly. It seeks to meet the goals of renewables. From the point of view of environmental indicators, regions such as Sweden, Romania and Malta should in the future focus on the share of municipal waste recycling, and Hungary should also focus on the share of renewable resources. Slovakia and Slovenia

generation waste, which is growing year-on-year 2017/2012. From the social indicators, there is a decrease in the share of women and employees in tourism, declining feminization may be a reflection of the attractiveness of work in the sector. In the case of Malta, this phenomenon is not a negative phenomenon (see above). In general, there is a trend of shorter stays, but the higher frequency causes a carbon footprint due to the increase in traffic flows. The intensity (density) of tourism is increasing in all EU regions.

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Harmony – The Traditional Chinese Concept or International Competence?

Katarzyna MAZUR-KAJTA

Opole University of Technology, Faculty of Economics and Management, Department of Enterprise Management, E-business and Electronic Economy, Opole, Poland, k.mazur-kajta@po.edu.pl

Bogdan RUSZCZAK

Opole University of Technology, Faculty of Electrical Engineering Automatic Control and Informatics Department of Informatics, Opole, Poland, b.ruszczak@po.edu.pl

Abstract

The aim of this article is to discuss contemporary perceptions of international aspects of harmony from the Chinese, Malaysian, Belarusian, Polish and Portuguese perspectives, as well as to define the relationship between pro-harmoniousness and economic sciences.

The objective of this study was to answer the following questions: How does the international community perceive the concept of harmony? Is harmony important in interpersonal communication? What values favour harmony and what factors disrupt harmonious relations? What areas of economic sciences are related to harmony? Can pro-harmoniousness be considered an international competence or is it rather a traditional Chinese concept? The results provide the definition of harmony as balance and cooperation, as well as identify pro-harmoniousness as an important element of interpersonal communication among international competencies.

Keywords: Harmony, Sustainability, Competence, International Competence

Introduction

Harmony is considered to be an "obvious" concept which is commonly well understood. However, its definition may range broadly from the realm of music to a feature of a mature person, inner peace, even distribution of forces/elements, interpersonal relationships, compatibility, balance, order, or a peaceful attitude towards others and/or the natural environment. The idea of harmony permeates the entirety of human life, including its professional aspects. Harmonious relationships in a workspace translate into professional effectiveness and thus may be considered as a professional competence. Therefore, they show the human ability to effectively integrate with the environment (Sternal E., 2014) leading to great professional performance in line with a company's strategic goals (Sienkiewicz Ł. et.al., 2013). Pro-harmoniousness may be identified as one of the 'soft skills', which are acquired along with experience and are explicitly related to the personality and the attitude of a particular employee. Even though as such pro-harmony is not considered a soft competence, it may be associated with the most common soft competencies, such as: high personal culture, kindness, honesty, communicativeness, positive attitude towards others, the ability to work in a team, solving conflicts, empathy, care for a good atmosphere, or patience. Although researchers have outlined the theoretical background for it, pro-harmoniousness has not been examined in the context of national culture. Therefore, an attempt was made to investigate the concept of harmony/pro-harmoniousness in the light of international culture. The aim of this research was to answer the following questions:

Q1: How does the international community (the research included representatives of China, Malaysia, Belarus, Poland, and Portugal) perceive the concept of harmony, what terms are associated with it, and how is harmony defined?
Q2: Is harmony important in terms of interpersonal communication?
Q3: What values seem to favour harmony and what factors disrupt harmonious relations?
Q4: What areas of the economic sciences are related to harmony?
Q5: Can pro-harmoniousness be considered an international competence or rather a traditional Chinese concept?

The research results of this study may be useful not only in promoting the importance of sustainability and economic culture in a business environment but also in developing the 'One Belt One Road Initiative'. Since countries selected

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in this study are spread along the line of this project, the research may support the improvement of intercultural communication and as a result, improve business communication along this route.

Material and Methods

The research consists of two parts: the literature review of the subject and the questionnaire which refers to the perception of harmony in general – interpersonally, as well as regarding the economic environment.

Review of recent literature on the subject and existing research

The literature review was based on an examination of several scientific articles and research reports on harmony available in Polish, English, and Chinese. This part of the research revealed a significant imbalance between the number of studies specifically discussing the role of harmony in Chinese culture and the studies of harmony in other cultures selected for this research. Therefore, this study also includes information published online in journal articles.

For this reason, the following study is not final and requires more extensive investigation in the future. The results of the literature review were used to develop the questionnaire. They are discussed further in subsection 2.3. of this paper.

Survey

The survey was conducted between the years 2017 and 2019, among 867 representatives of young people from China, Malaysia, Belarus, Poland, and Portugal. The research was conducted at universities among: 197 Chinese students, who studied at the University of International Business and Economics in Beijing, 220 Malaysian students, who represented the Universiti Teknologi Mara, 150 Belarusian students from Vitebsk State Technological University, 150 Polish students, who represented the Opole University of Technology and 150 Portuguese students, who studied at Instituto Politécnico de Tomar. The research group was defined based on the following features:

1. Selected countries:

– Are located along the route of the One Belt One Road Initiative introduced in 2013, therefore, the results of the research may become useful in maintaining business relationships under this initiative;
– Are not neighbouring countries and are located in various regions of Asia and Europe;
– Represent a diverse level of economic development;
– Can be classified under diverse national cultures. They are characterized by various religions/philosophical trends, historical traditions, political systems, and other cultural manifestations that have shaped current attitudes and patterns of civil behaviour, norms, values, symbolism, and language, which strengthen a sense of connection and belonging. According to Table 1 which presents the classification of cultures represented by the research group based on the typology suggested by Geert Hoefstede, Richard R. Gesteland, and Richard Lewis, it becomes evident that these countries represent different dimensions of culture.

Table 1: Typology of cultures

	Country				
Typology of cultures	China	Malaysia	Belarus	Poland	Portugal
G. Hoefstede					
Power distance	80	100	95	68	63
Individualism	20	26	25	60	27
Masculinity	66	50	20	64	31
Uncertainty avoidance	30	36	95	93	99
Long term orientation	87	41	81	38	28
Indulgence	24	57	15	29	33

R. R. Gesteland *					
Monochrome / polychrome	moderate monochrome	polychrome	polychrome	polychrome	differentiated approach to time
Expresive/ reserved	reserved	reserved	low expressive	low expressive	expressive
Formal/ informal	formal	formal	formal	formal	formal
Relationship focused/ Deal-focus	relationship focused	relationship focused	moderate relationship-focused	moderate relationship-focused	moderate deal-focused
R.D. Lewis **					
Multi-active/ linear-active/ re-active	re-active	moderate reactive	multi-active	moderate linear-active, moderate multi-active	multi-active

*Notes: * Belarus has been classified in the group of countries with similar cultural characteristics as: Russia, Poland and Romania. Portugal, on the other hand, was classified into the same cultural group as: France, Belgium, Italy, Spain and Hungary.; ** Belarus has been classified in the group of countries with similar cultural characteristics as: Russia, Slovakia, Croatia and Romania.*

Source: own elaboration based on: Hofstede Insights, www.hofstede-insights.com/product/compare-countries/ , Access: 04.11.2020; Hofstede G., Kultury i organizacje, Polskie Wydawnictwo Ekonomiczne, Warszawa 2000; Gesteland R.R., Różnice kulturowe a zachowania w biznesie, Wydawnictwo Naukowe PWN, Warszawa 2000; Lewis R.D., When Cultures Collide. Leading across Culture, Nicholas Brealey International, Boston, London 2006.

2. Age group:
– Students represent the young generation of citizens, who constitute a group of potential future managers, therefore, their opinions may indicate future behaviours of the management staff.

In each of the above-mentioned countries, the survey was carried out once and in direct contact with respondents, in Chinese, English, Russian, Polish, and Portuguese, respectively. Despite the survey itself, it was also possible to collect additional comments and answers to questions in Chinese, English, German, or Polish. The study was conducted in each of the countries among the same number of respondents. Unfortunately, not all returned questionnaires were of full research value. This affected the number of questionnaires qualified for the analysis.

The results of this part of the research are presented further in this article.

Research and Discussion

Review of recent literature on the subject and existing research

The review of recent literature on the subject and existing research allowed to compile information about the concept of harmony in selected countries. As a result, the following was concluded:

– there is a large discrepancy in the number of publications on harmony between China and the other countries selected for this study;

– the existence of the concept of harmony in the following areas: philosophy/religious trends, aesthetics, nature, health, cuisine, architecture, tourism, symbolism, the broadly understood economic sciences, politics, implemented projects, and music;

– common areas, i.e. areas in which harmony slogans exist in all five surveyed countries: aesthetics, architecture, nature, and terminology of launched projects;

– topics related to harmony and economic sciences were mainly related to China, Malaysia, and Poland.

Details of the analysis are presented in Table 2.

Table 2: Areas in which harmony occurs.

	Country				
Aspect of harmony	**China**	**Malaysia**	**Belarus**	**Poland**	**Portugal**
Philosophy / religious movements	- Taoism - Confucianism - Buddhism	- religious harmony			
Aesthetics	- *Fengshui* - experiencing music, painting, and calligraphy	- sacral housing	- paintings of Sergej Shemet - the exhibition ***Harmony of Contrasts*** **hold by the members** of the creative association ***Artel***	- proposals - an exhibition of photographs	- natural landscape
Nature	- sustainable development - farming calendar - *Fengshui*	- coexistence of indigenous peoples of Cameron Highlands with the natural environment - sustainable development	- development of energy sources - linen sheets	- sustainable development - natural environment	- vineyards - forests of cork oaks - olive groves - fields sown with grain
Health	- Chinese medicine - *taijiquan* - *qigong*			- human internal environment	
Cuisine	- 5 elements cuisine - tea infusion	- a variety of flavours of Arab, Chinese and Indian cuisine			- fortified wines – Porto
Architecture	- *Fengshui* (geomancy) - temple architecture - architecture of imperial buildings - park architecture	- architecture of religious buildings (mosques, Chinese and Hindu temples) - between traditional (sacred) and modern buildings - the buildings of the city of Kuala Lumpur	- streets in the city of Minsk	- name of the urban estate	- buildings of the city of Lisbon - development of religious buildings
Tourism		-street of Harmony in the city of Malacca - *Street of Harmony* in the city of Georgetown - names of travel agencies - names of apartments and hotels	- the richness of fauna and flora - names of apartments, hotels, and manors		
Symbolism	- Chinese signs - *ying-yang* - crane - crab	- Petronas Towers which in cross-section resemble eight-pointed stars, referring to: *unity, harmony, stability,* and *rationality*		- Greek mythology	- country flag, white/silver coat of arms, referring to balance and peace
Economic sciences	- sustainable development - conflict resolution in the workspace	- multiculturalism of co-workers - teamwork - disproportion in earnings between:	Projects: - construction of the countryside of the future - *Water Harmony*	- sustainable development - the law of harmonisation - work-life balance Projects:	Projects: - Erasmus +, harmonisation of comprehensive internationalisation strategies in the

	- book titles on business management issues Projects: - innovative, "green" solutions - One Belt One Road Initiative	inhabitants of the eastern and western parts of the country, inhabitants of towns and villages, women and men, people of various ethnic origins Projects: - implementation of development programs, which counteract the marginalization and ethnic imbalances in the economic environment		- Erasmus +, harmonisation of comprehensive internationalisation strategies in the EU higher education - promotion strategy of Opole city for 2017-2022 - research grant for financing research projects	EU higher education
Politics	- the concept of a harmonious society - the value of a socialist society - social posters - statements by politicians (among others: Jiang Zenmin, Hu Jintao, Wen Jiabao, Xi Jinping - so*ft power*	- ethnically diverse society (including Malaysians, Chinese, Hindus, indigenous people) - Swedish World Peace Prize for Teo Choo Guan	- the need to move towards achieving peace and social harmony - the protest "races of harmony" regarding the disputed presidential elections - denominational policy – development of inter-ethnic and inter-religious relationships		
Other	- *China Railways Harmony* - Sun Tzu "The Art of War" - music		- music (including ritual songs, language melody) - a musical instrument - name of the band and choir - meditation poetry by Jan Czykwin - borderland culture	- music - a musical instrument - harmonious development of the child - the cause of happiness - harmony within the family	- combination of modernity and tradition, the past and the present

Source: own elaboration.

Survey

Based on the review of the literature the following list of synonyms for harmony was compiled: *order, orderliness, mathematics, symmetry, aesthetics, change, complementation, music, nature, non-conflict, fairness/justice, cooperation/collaboration, balance, opposition,* and *subordination*. Respondents were asked to select three words from this list, which, in their opinion, best defined the meaning of harmony. The words selected in a majority of surveyed countries included: *balance* (in 4 out of 5 countries) and *collaboration/cooperation* (in 3 out of 5 countries). However, the results differed among individual national groups. According to the Chinese participants, the main synonyms of harmony were: *balance* (63% of responses), *collaboration/cooperation* (58%), and *order* (50%). Malaysian respondents indicated: *non-conflict* (81% of responses), *nature* (50%) and *collaboration/cooperation* (40%). The Belarusian group selected: *balance* (58%) and *complementation* (41%). Members of the Polish group chose: *balance* (58%), *orderliness* (56%), and *order* (51%) whereas representatives of the Portuguese group selected: *balance* (96%), *cooperation/collaboration* (46%), and *fairness* (41%). Details are presented in Figure 1.

Figure 1: Defining harmony [%].

Source: own elaboration.

According to representatives of all groups, harmony is an important element of interpersonal communication. This has been reflected in the number of provided affirmative responses "definitely yes" and "yes". The majority of participants, who agreed with this statement were from Malaysia (94% of answers). Participants who agreed with this statement the least were from Poland (79%). Details are shown in Figure 2.

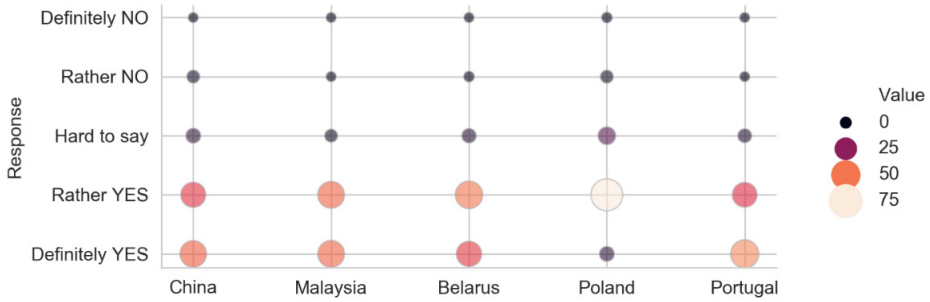

Figure 2: Perception of harmony as an important value in interpersonal communication [%].
Source: own elaboration.

According to the respondents, behaviours that promote harmony include: *courtesy/kindness, establishing group rules and rules of conduct, fairness, showing respect to people with more experience and knowledge*, and *knowing one's place in the social hierarchy*. Over 80% of participants indicated *kindness/friendliness* as the behaviour which favours harmony the most. According to 88% of Chinese responders, *collective rules and principles of conduct* are essential in enhancing harmony. Among Malaysian respondents, the concept of *fairness* was also rated highly (83%). According to respondents from Belarus, harmony may be synonymous with *showing respect to people with more knowledge and experience* (87%). Participants from Poland associated harmony with *establishing rules and principles of conduct* (88% of responses) and *knowing one's place in the social hierarchy* (86%). Portuguese respondents believed that *kindness/friendliness* is equally important as *respect to people with more knowledge and experience* (91% of responses). Nevertheless, most often, they defined harmony as a synonym for *establishing group rules and principles of conduct* (94%).

Based on the selected categories (which favour harmony) it may be concluded that:

– *courtesy/friendliness* was most often selected by the respondents from Belarus (99% of responses), and the least by the Chinese participants (86%);
– *establishing group rules* and *rules of conduct* was most often selected by the Chinese and Polish respondents (88% each), and it was the least selected value among Belarusian participants (76%);
– *fairness/justice* was most often indicated by Polish respondents (85%) and the least by the Chinese participants (73%);
– *showing respect to people with more experience and knowledge* was most often selected by the Portuguese participants (91%), and the least by Polish students (72%);
– *knowing one's place in the social hierarchy* was most often chosen by respondents from Poland (86%) and least by respondents from Malaysia (60%).

Details are shown in Figure 3.

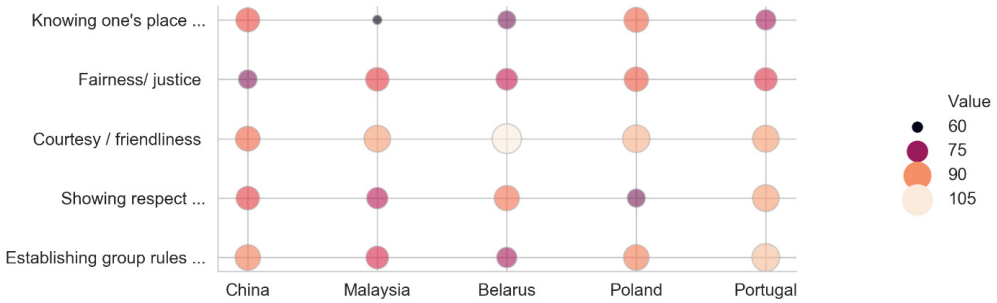

Figure 3: Factors favourable to harmonious interpersonal relationships [%].

Source: own elaboration.

Among the behaviours unfavourable to harmonious interpersonal relationships, the following categories were selected: *disrespecting the elderly, deliberate misinformation, expressing opinions different from the opinion set by a group to which one belongs, and strong standing out from a group*. According to the respondents' harmonious interpersonal relations are most often undermined by *disrespecting the elderly*. This was indicated by respectively: 77% of Chinese respondents, 89% of Malaysian responders, 82% of Belarusian respondents, 83% of Polish respondents, and 88% of Portuguese respondents. According to the Chinese participants, harmonious interpersonal relations may also be undermined by: a *strong standing out from a group* (73% of responses) and *deliberate misinformation* (53%). According to Malaysian and Belarusian participants, these factors were: a *strong standing out from a group* (56% and 51% respectively).

In terms of factors which undermine the pursuit of harmonious interpersonal relationships:

– *disrespecting the elderly*, was essential for Malaysian respondents (89%), and the least important for Chinese students (77%);
– *deliberate misinformation* was essential for the Chinese participants (54%), and the least significant for the Polish respondents (29%);
– *expressing opinions different from the opinion set by a group to which one belongs* was most significant among Malaysian participants (44%) and the least important among the Chinese respondents (42%);
– *a strong standing out from a group* (both in a positive and negative sense) was most often selected by the Chinese respondents (73%), and least often by the Portuguese participants (40%). Details are shown in Figure 4.

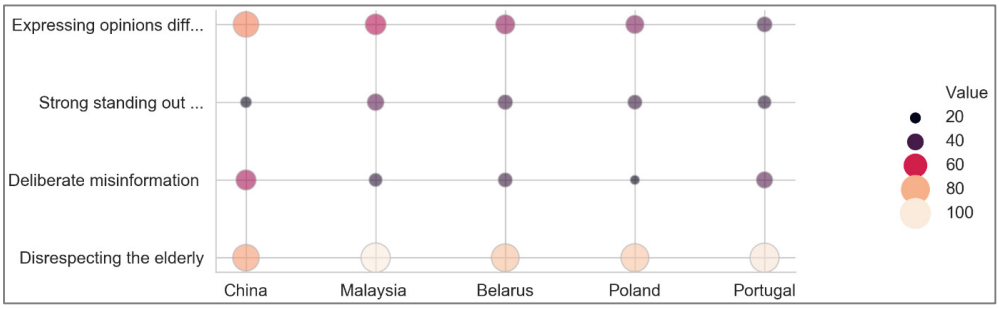

Figure 4: Factors unfavourable to harmonious interpersonal relationships [%].

Source: own elaboration.

Discussion - the importance of harmony in China and the world

The issues of harmony in the international perspective have been addressed mainly by researchers who represent the social sciences (the study has not included articles about harmony in art). The above-mentioned issues have been discussed in: psychology, sociology, religious studies, political science, pedagogy, economics, and administration and management. The categories related to harmony include: internal harmony, interpersonal harmony, family harmony, harmonious communication, social harmony, work-life balance, sustainable enterprise management, and industrial harmony. They were explored by: Romuald Jaworski (2004), Anselm Grün (2008), Max Lüscher (1987), Melvyn Kinder (1997), Rohit Dhankar (2020), Julian W. Korab-Karpowicz (2017), Keith Davis and Robert L. Blomstrong (1975), Archie B. Caroll (1993), Chinonye C. Wobodo (2019), John Child and Malcolm Warner (2003), Katarzyna Mazur-Kajta (2018; 2019). They were also discussed in Green Paper: Promoting a European framework for Corporate Social Responsibility (2001).

The way in which researchers define harmony depends on the discipline they represent, their perception of the world, and the key aspects they take into account. However, the literature review has shown that a majority of papers about harmony are mainly related to Asia, most often China, or provide a comparative analysis.

In the economic sciences, these references can be found in research conducted by: Xue Yang (2016), Robert J. Taormina (2003), Ip Po-Keung (2014), Kylie Heffernan and John Crawford (2001), Monoj Khakhlary (2019), Imtiyaz Yusuf (2018), Sylvia Xiaohua Chen et.al. (2009), Siddappa Naragatti et. al. (2019), Shukui Tan et.al. (2014), Kalpathy Ramaiyer Subramanian et.al. (2015), Sara Bigazzi et.al. (2019), Matthew Adekunle Abioro et.al. (2019), Joshua N. Hook et.al. (2009), Linus Hagstrom and Astrid H.M. Nordin (2019), Virginia S.Y. Kwan et. al. (1997), Katarzyna Mazur-Kajta and Paula Lipińska (2018) as well as Kwok Leung et. al. (2002). This indicates the importance of the international aspect of harmony not only in China but also worldwide. The connection between harmony, the natural environment, and the economic sciences implies sustainable development. This has been confirmed by the results of the author's research. Surprisingly, topics related to harmony and the economic sciences were not discussed with the same incidence in the surveyed countries but appeared mainly in articles about/from China, Malaysia, and Poland. This does not mean that in other countries the issue of harmony or striving for it in the business environment is not discussed, however, such articles are not easily accessible. Furthermore, it becomes evident that media attention has also been focused on harmony. It is reflected in the fact that this concept has been used to name various projects, including those in tourism (naming hotels and apartments). Although projects which indirectly use harmony "in the background" are quite diverse, all of them refer to sustainable development and offer pro-ecological "green" solutions which counteract marginalization and create a modern environment for human life by improving the living conditions of present and future generations, the internationalization of education and financing of scientific research.

This survey also showed that the concept of harmony was highly valued by all surveyed groups of respondents. This not only suggests that the concept of harmony is important in terms of interpersonal communication but also indicate similar categories of values which favour or disrupt harmonious relationships.

Conclusion

The results of the conducted research provided answers to the research questions which referred to the selected research group:

Q1: Among Portuguese, Chinese, Belarusian, and Polish respondents, harmony was most often described as balance, whereas Malaysian participants defined it as non-conflict. Despite slight percentage differences in defining synonyms of harmony, it can be concluded that in the examined international environment, harmony was mainly associated with balance and cooperation.

Q2: Harmony has been recognized as an important factor of interpersonal communication. Q3.1: The values which favour harmony include: courtesy/kindness, establishing group rules and rules of conduct, fairness, showing respect to people with more experience and knowledge, and knowing one's place in the social hierarchy.

Q3.2: The values which disrupt harmonious relationships include: not showing respect to the elderly, deliberate misinformation, expressing opinions different from the opinion set by a group to which one belongs and a strong standing out from a group (both in a positive and negative sense).

Q4: With regard to issues which refer to the economic sciences and are related to the concept of harmony the following may be concluded:

– In management: Literature on business management, conflict resolution in a workspace, cooperation in a multicultural environment, teamwork, preventing unjustified differences in earnings and other inequalities in the economic environment, developing solutions which enhance work-life balance and developing urban strategy;
– In economics: Assumptions of the One Belt One Road Initiative, the essence of the law of harmonisation and sustainable development – pro-ecological projects and modern solutions, financing research projects and projects which enable internationalization.

Q5: Despite the large disproportion in the number of Chinese and non-Chinese articles about harmony, pro-harmoniousness may be regarded as an international competence, and thus, it is not related only to Chinese culture.

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Assessment of the Effectiveness of Technology Transfer Entities

Olga PYATAEVA
Russian State Academy of Intellectual Property, Moscow, Russia, opyataeva@gmail.com

Alexander ANISIMOV
PhD, associates professor, Moscow, Russia, anisimov_au@mail.ru

Artyom GAVRILYUK
Lomonosov Moscow State University, Moscow, Russia, Gavriliuk@spa.msu.ru

Elena BORISOVA
Russian State Academy of Intellectual Property, Moscow, Russia, e.v.borisova@bk.ru

Oleg SKRYABIN
Russian State Academy of Intellectual Property, Moscow, Russia, 88-88@mail.ru

Abstract

In the context of the analysis of the various methodical approaches to the assessment of the subjects of technology transfer, it can be stated that there is no uniform methodology for assessing such effectiveness. The global scientific community recognizes that it is necessary to establish common methodological standards for the analysis of technology transfer processes in order to understand current trends and development potentials in the areas of technology transfer, but this has not yet been achieved. For Russia, this means that, in the absence of a single standard, the Russian innovation community can develop its national standards for evaluating the effectiveness of the technology transfer process, taking into account the national specificities of the process of commercializing innovation. The authors of this paper hold the view that the efficiency of the innovation process is determined by the efficiency of the technology transfer as its main instrument.

Keywords: Innovation, technology transfer, efficiency, technologies, Russian economy, economic efficiency, technology transfer entities, TT.

Introduction

It is obvious that the aim of the technological policy of the company is the realization of such projects which prove their efficiency from the financial, technological and strategic points of view. A system of indicators is used to measure it, which generally consists of five structural blocks: basic and portfolio financial, technological, project and government indicators. Depending on the specificity of the technology strategy, the composition of the indicators used varies.

In this regard, two important points need to be emphasized. First, an important feature of a technology transfer is the difficulty of valuation because there is no direct relationship between the cost of innovation development and the costs of its transfer, deployment and absorption. Unlike the value of an ordinary commodity (whose price may vary as a result of market conditions), the cost of technology is difficult to predict and depends on the expectations of scientific and technological actors.

Relevance of the subject area

In order to determine the possible impact of the introduction of innovative technology, it is important to objectively perform an assessment of the usefulness of the technology, which consists in identifying the degree of novelty, which is determined by a set of characteristics which substantially differ from the previous technology, the evaluation of its characteristics as an asset of a company to understand the options and the amount of profit and

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includes a) marketing studies, b) evaluation of the patent and legal situation, c) analysis of the technology and intellectual property market.

Second, the cost-effectiveness of technology transfer is demonstrated over a sufficiently long period of time when products produced under the technology are marketed; In this regard, technology transfer can be considered as an investment project with the possibility of using an appropriate assessment and analysis methodology.

The main indicator of the efficiency of the transfer as an investment project should be the positive value of the net present value of all transactions. Since net present value is an additive criterion (the developer and user in technology transfer process have their own economic objectives) and the positive outcome of the investment is important for each party, net present value should be achieved for both parties participating in technology transfer.

In the technology transfer relationship system, the efficiency of the investment can be significantly increased for both parties involved as a result of the effect of a technological lever resulting from the intensive use of the technology being the subject of the transfer.

Technological level as a main idea

The concept of a technological lever has been developed by a number of Russian and foreign researchers to establish a link between technological efficiency and the efficiency of the operational and financial activities of the enterprise. The technology lever can be defined as a measure of an enterprise's ability to diffuse the advanced knowledge and technology acquired through primary innovation to multiple end-user products.

The total effect (power) of a technological lever (TL) is considered to be a function of the effect of three components: the technological lever (TL), whose value on the basis of the formula is greater than or equal to one; the price lever (PL) arising from the fact that: that the developer can set higher prices for its products at the first stage and thus obtain higher margin margins; the developer lever (DL) arising from the knowledge gained from the development of the BIT, can be used in the manufacture of improved or derived «resulting technologies».

Since there can be substantial savings in R&D costs, the value of the developer's leverage is always positive. The developer has the most significant last component of the technological lever.

Due to the action of the developer lever, the second element of the formula will be reduced at each new TT operation, which will be reflected in the increase of operating profit.

A user can also derive additional benefits from the action of a technological lever from TT if, on the basis of the acquired technology, he can and intends to develop several modifications of the final product. In this case, the cost of acquiring the technology can be considered as a one-time thing, and the cost of implementing it will be reduced with more intensive use of the technology and the growth of the resulting end products.
In such a situation, all three components of the technological lever are possible.

Components of the technological lever

The technology lever approach provides greater justification for the competitiveness and market value effects of TT, as it asserts that, when technology is used intensively, the profit and value of the net assets of the participants increases. In addition, participants may obtain competitive advantages by imposing monopoly prices for both the technology itself and the products it generates for a period of time.

In general, the following provisions are proposed for use by all participants in the TT process:

1. The net discounted value method is the main method for technology assessment in the TT phases.
2. The return-on-investment method is used as an additional method to quickly assess the suitability of the project to participants.
3. In order to take into account the strategic value of the project, it is advisable to use the method of estimation of real options, which, with well-organized interaction of the parties involved, allows to «highlight» and assess the synergistic effect of investment in innovative technologies.
4. In enterprises where new management technologies have already been introduced, additional or alternative use of economic value added and a balanced scorecard may be made.

Key Performance Indicators for technology transfer entities

Indicators for assessing the performance of technology transfer entities (e.g. the technoparks, technopoles, business incubators, etc.) should be

1. Patent/innovation activity indicators:

- The number of inventions submitted by inventors to the technology transfer office to assess whether a security result has been obtained;
- Number of agreements on transfer of innovative technologies;
- Number of innovative companies established;
- Number of commercialized IS facilities;
- Number of patent applications;
- Number of patents obtained;
- Number of jobs created on the basis of the constituent entity;
- Number of jobs in the real economy created through the TTC on the basis of transferred, introduced and mastered technologies
- Number of trained staff/students in the fundamentals of commercialization (protection of intellectual property, etc. Number of students);
- Consultancy services provided to developers (hours or number of people);
- Number of valid licences;
- Number of licences sold to local companies;
- Number of new licences, options or other agreements;
- Amount of R&D done for local companies;
- Number of partnerships established (which include cooperation and joint projects);
- Number of international contracts;
- Number of new spin-off companies established;
- Number of new Iips created;
- Number of innovative projects brought to the final stage of implementation with the support of the Centre;
- Number of projects identified; number of business plans prepared, etc.

2. Aggregate values of innovation:

- International transfer of innovative technologies (volume of exports/imports);
- Output and sales of finished products created on the basis of transfer of innovative technology;
- The amount of tax revenue to the budget from technology transfer, deployment and absorption;
- Income from commercialization (by type of income);
- Net profit from commercialization;
- Volume of investment attracted for high-tech projects;

3. Innovation performance ratios:

- Profitability of investment in innovation;
- Revenue from commercialization per unit of technology development costs;
- Profitability of investment in research and development: the value of income derived from different types of commercialization in relation to the research budget;
- Ratio of own, debt and leveraged financing, etc.

4. Additional indicators:

- Quantitative indicators of environmental improvement through transfer, introduction and mastery of innovative development.

A complete set of evaluation criteria for the various actors involved in the transfer is planned for the next stages of the implementation of the IND. This will allow not only to determine the current status of the transfer, but also to monitor structural.

Thus Key Performance Indicators is a tool for monitoring a company's technological performance, allowing for the targeted selection of projects, the evaluation of their progress and the analysis of the results achieved. An integrated approach to the development of such a system should aim not only at the immediate objective of improving the technological portfolio of the organization, but also at achieving the ultimate objectives of its activities - enhancing competitiveness, profitability, market stability and, in some cases, development of the national industry as a whole.

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International Business after Brexit: The Impact on Taxes

Ernesto Marco BAGAROTTO
Dipartimento di Management
Università Ca' Foscari, Venice, Italy
E-mail: ernesto.bagarotto@unive.it

Francesca DAL MAS
Lincoln International Business School
University of Lincoln, Lincoln, UK
E-mail: fdalmas@lincoln.ac.uk

Abstract

The Brexit is the exit of the United Kingdom from the Europen Union. After a transitional period, as of January 1st, 2021, a new set of rules will apply. Still, there are several open issues which need to be addressed. The present paper analyses the impact of the Brexit on taxes, which is going to affect the international business for organizations operating both in the European Union territory and in the United Kingdom.

Keywords: Brexit, European Union, International Business, Taxes.

The Brexit is the withdrawal of the United Kingdom (UK) from the European Union (EU). The Brexit happened with the referendum of June, 23rd, 2016, in which 52% of voters were in favour of the UK leaving the EU. Since then, long debates happened to study and forecast the changes affecting the relations between the UK and the EU members, with huge impacts on workers, travellers, and businesses. This paper aims at identifying the main consequences that the Brexit is going to produce for economic operators, from a tax perspective.

The political earthquake following the summer of 2016 referendum saw the resignation of the premier Cameron, opposed to Brexit, and the appointment of May as premier. After a complex internal process passed for the parliamentary vote, on March, 29th, 2017, the process provided by art. 50 of the Treaty on European Union (TEU) started.

Subsequently - after the Tory leadership passed to Johnson, who was appointed as the new UK premier - the Withdrawal Agreement was reached, ratified by the UK on January, 23rd, and by the EU on January, 30th, and entered into force on February, 1st 2020 (from now on, "Agreement").

The signed Agreement, however, is not decisive. The Agreement has started a transition period, which will end on December, 31st, 2020. During the period ending by 2020, the UK remains subject to the EU law and remains part of the EU customs union and market. The other EU countries, for their part, must interpret their legislation as if the UK was still a member of the EU. By contrast, the UK is no longer part of the EU's political bodies or institutions during the transitional period.

For the economic operators, therefore, in the transitional period, nothing substantially changes for the purposes of income taxes, VAT, and customs duties.

Until December, 31st, 2020, the following rules apply:

- for income tax purposes, the UK is considered an EU member by the other EU countries;
- for VAT purposes, transactions with the UK are still considered as intra-EU transactions;

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- for customs duties purposes, the UK is part of the customs union. Transactions between the UK and EU countries cannot, therefore, be subject to customs duties and the UK is required to apply EU customs legislation in operations with non-EU countries.

The transitional period was provided to allow the parties (the EU and the UK) to the Agreement to negotiate their future relations, subsequent to the conclusion of the transitional period.

The Agreement, in fact, despite being very massive, leaves many options open, first of all, that of the No Deal. There are many open issues: fishing, competition, access to databases, the role of the Court of Justice, just to mention a few.

The debate is still open. Herewith, we try to forecast what will happen from a fiscal perspective at the end of the transitional period.

With regard to income taxes, unless specific agreements, it must first be considered that, although the UK will no longer be part of the EU, the UK will continue:

- to be linked to other countries of the EU by double taxation treaties;
- to be bounded by the previously signed international treaties, such as those on the exchange of information (the 1988 Strasbourg Convention and the Isle of Man, Guersney and Jersey TIEAs);
- to be part of the OECD (Freedman, 2017).

On the income tax side, the main impacts will be on multinationals and groups that include UK subsidiaries or parent company (Müller and Berens, 2018).

First of all, the applicability of the advantageous provisions contained in the parent/subsidiaries directive (Directive July, 23rd, 1990, no. 435) and interest/royalties directive (Directive June, 3rd, 2003, no. 2003/49 / EC) will no longer apply.

In particular, it will not be possible to obtain the exemption form the outgoing withholding taxes on dividends paid by UK companies to EU companies and vice versa; on interests paid by UK companies to EU companies and reverse; on royalties paid by UK companies to EU companies and conversely.

Nevertheless, the provisions stated by the double taxation treaties agreed by the UK will still apply to the payments of dividends, interests, and royalties between UK companies and EU companies and reverse.

However, the double taxation treaties do not systematically establish the exemption form withholding taxes but provide maximum thresholds for withholdings applicable in the country of the payer.

Another negative aspect resulting from the Brexit is represented by no longer benefiting from the tax neutrality regimes established for extraordinary transnational transactions, as by Directive October, 26th, 2005, no. 2005/56 / EC.

Again, in the case of transfer of the headquarters of an EU company to the UK, it will no longer be possible to invoke the application of the tax breaks introduced by various EU countries. The tax breaks consist in the possibility of suspending the payment or paying in tranches, in implementation of the jurisprudence of the EU Court of Justice to protect the freedom of establishment (judgment November, 29th, 2011, C-371/10, National Grid Indus BV).

More generally, as a result of the Brexit, EU subjects wishing to carry out business activities in the UK will no longer be able to invoke the freedom of establishment protected by the Treaty on the Functioning of the European Union (TFEU).

These are only a few of the main consequences that international businesses will need to face, as the 2021 approaches.

As mentioned, the UK may try to become more attractive from a fiscal point of view (Cape, 2019). For example, the UK could consider issuing rulings in favour of multinational companies that have their headquarters in its

territory. To date, in fact, from an EU perspective, the main obstacles to the granting of rulings is that of the ban on state aid, established by the TFEU. With the exit of the UK from the EU, the ban on state aid provided by the TUFE will disappear (Kotsonis, 2019; Segura, Olafsson and Clayton, 2019; Nicolaides, 2020).

However, the UK will suffer more significant risks of being considered a tax haven by the laws of EU countries. This, in particular, could result in the subjecting to unfavourable regulations of dividends from UK companies and capital gains realized through the sale of shares in UK companies. As evidenced by Freedman (2017) “Brexit offers some opportunities but also dangers.”

As for VAT and customs duties, the question may look simple. The UK will go from being an EU country to being a non-EU country. Therefore, supplies of goods between the UK and the EU will be treated as imports and exports and no longer as intra-EU transactions (Cape and Schofield, 2018). Consequently, the transactions relating to goods from the EU to the UK will be non-taxable export sales, while the supplies from the UK to the EU will be imports, subject to the payment of VAT and duties, when due.

Other changes will occur concerning the impossibility of applying specific preferential regimes, such as that on consignment stock, remote sales to individuals, and triangular transactions.

Some issues may arise in the period around December 31st, 2020. However, art. 51 has provided for "transitional" rules for the abandonment of the transitional period.

In particular:

- paragraph 1 states the application of VAT rules “in respect of goods dispatched or transported from the territory of the United Kingdom to the territory of a Member State, and vice versa, provided that the dispatch or transport started before the end of the transition period and ended thereafter”;
- paragraph 2 states the application of VAT rules “until 5 years after the end of the transition period with regard to the taxable person's rights and obligations in relation to transactions with a cross-border element between the United Kingdom and a Member State that took place before the end of the transition period and with regard to transactions covered by paragraph 1”;
- paragraph 3 states “refund applications that relate to VAT which was paid in a Member State by a taxable person established in the United Kingdom, or which was paid in the United Kingdom by a taxable person established in a Member State, shall be submitted under the conditions of that Directive at the latest on 31 March 2021>”.

The thorniest issue that has implications for VAT and duties concerns the great land border between the UK and the EU, namely the physical border between Ireland and Northern Ireland. Strictly speaking, in fact, it would be necessary to establish a fence and a customs between the two countries and consider the operations to and from Northern Ireland as imports and exports (Morchid and O’Mahony, 2019).

The creation of a physical border, however, stands as a very delicate aspect from a political point of view. It would indeed challenge one of the cornerstones of the peace agreements that put an end to the conflict between Catholic and Protestant groups (so-called Good Friday agreements of 1998), namely the creation of an open and easy to cross border.

Now, in the Agreement, there is a special protocol dedicated to Northern Ireland, which states that one of the objectives to be pursued is to avoid a physical border, thus protecting the 1998 agreement in all its dimensions. The idea is, therefore, to create a so-called backstop, and continue to apply the EU internal VAT and customs legislation to Northern Ireland, with a system that should, in fact, move the border between the EU and the UK for VAT and customs purposes in the channel between the UK and Ireland. This should mean that goods entering Northern Ireland from the rest of the UK should be checked and verified to ensure compliance with EU sanitary and phytosanitary measures. Customs duties under EU law should be applied to goods entering the territory of Northern Ireland only where there is a risk that such goods will enter the EU. On the other hand, no customs duties would be levied on goods arriving in Northern Ireland from the rest of the UK, where there is no risk of them entering the EU single market.

Beyond the technical difficulty of putting in place such controls, it remains understood that the customs formalities and procedures of the European Union will apply to goods brought into Northern Ireland from outside the EU or exported from Northern Ireland beyond outside the EU. This is a result that is not shared by UK Brexit supporters, as it would lead to the violation of the UK's unity and sovereignty over Northern Ireland.

The question is, therefore, still uncertain. What is certain, on the other hand, is that for operators in EU countries, relations with UK-based companies will be more complicated. For multinationals divided between EU countries and the UK, less favourable tax rules will apply.

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El Uso De La Web En La Difusión De La Misión Y Visión De Las Facultades De Derecho De Universidades Latinoamericanas

The Use Of The Web In The Diffusion Of Mission And Vision Of Law Faculties From Latin American Universities

Hugo GONZÁLEZ[1]

Universidad Autónoma del Perú, Lima, Perú

hugo_augencio@hotmail.com

Resumen

El presente estudio analiza el uso de las páginas web en la difusión de la misión y visión de las facultades de derecho de las universidades latinoamericanas, según el ranquin Scimago (2019). De las 25 universidades, 10 han difundido la misión y 7 la visión a través de su portal y enfatizan en el desarrollo de la formación profesional, la proyección social, creación de conocimiento, el liderazgo (académico), las alianzas, y el uso específico de las TIC. La mayoría de universidades utiliza las redes de Facebook y Twitter, pero tienen reducida interacción y las actividades que difunden son diversas: diplomados, seminarios, publicaciones científicas.

Palabras clave: Web, misión, visión, red social, derecho, Scimago, ranquin.

Summary

The present study analyzes the use of the web pages in the diffusion of the mission and vision of Latin American law faculties according to ranquin Scimago (2019). From 25 faculties, 10 have disseminated the mission and 7 have disseminated the vision throughout the website and emphasize the development of the professional training, social projection, creation of knowledge, academic leadership, alliances, and the use of specific use of IT. Most universities use the social media from Facebook and Twitter, but they have reduced the interaction and activities which they disseminate are diverse: graduate degrees, seminaries, scientific publications.

Keywords: Web, misión, visión, red social, derecho, Scimago, ranquin.

Introducción

El presente estudio analiza el uso de la web para difundir la misión y la visión de las facultades de derecho de Latinoamérica[1]. Se seleccionó a las universidades que hayan explicitado su misión y visión a través de su página web. La misión de las facultades de derecho está centrada en la creación de conocimiento, formación, alianzas, liderazgo académico, proyección social, resolución de problemas, enfoque interdisciplinar y uso de TIC. La visión, en cambio se centra en liderazgo, calidad de la investigación, también en alianzas, contribución a la diversidad, proyección social, formación profesional y reconocimiento.

Asimismo, se analizó el uso de las redes sociales en la difusión de la información de las facultades, entre las más representativas se encuentran Facebook y Twitter por medio de las cuales se difunden una diversidad de temas: foros, diplomados, publicaciones científicas, etc. Dentro de este contexto las TIC están consideradas como herramientas que permiten desarrollar la comunicación del conocimiento, la información y la integración (Salas-Rueda et al., 2019), de las instituciones. Estas plataformas son herramientas fundamentales para el desarrollo y difusión de las actividades educativas dentro de un contexto de hipermediación (Sabich, 2017), en la que no solo predomina el texto, también la imagen y sonido.

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[1] Docente y abogado, doctor en Psicología Educacional y Tutorial, magíster en Docencia Universitaria. Docente investigador adscrito a la Dirección de Investigación y a la Escuela de Derecho de la Universidad Autónoma del Perú. Código orcid: https://orcid.org/0000-0001-7050-5774, correo: hugo_augencio@hotmail.com, Perú. El presente trabajo forma parte de la línea de investigación: enfoque interdisciplinario de la ciencia jurídica de la Universidad Autónoma del Perú.

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Estudios Previos

Algunos estudios previos sobre la misión y visión de las universidades resaltan la adecuada utilización de los planes estratégicos, el plan de la comunicación estratégica (Ciancio, 2018; Yusof, Awang, Valdez y Yaacob, 2018); en función de la calidad de la planeación estratégica se logra la misión y visión institucional (Soares y Setyohady, 2017).

Otros estudios enfatizan en que el logro de los planes estratégicos permite la internacionalización de las instituciones y al acceso al conocimiento (Popescu, 2017; Grieves, 2018). Pero la planificación no puede estar aislada de la tecnología ya que debe utilizarla como un medio para difundirse y llegar de manera efectiva al beneficiario o beneficiarios.

Las redes sociales tienen diversos usos en las disciplinas, por ejemplo, se está estudiando en el campo médico a través de las redes sociales, aunque todavía reducido, para obtener información de manera rápida a través de WhatsApp, Facebook, Twitter para la elaboración de trabajos científicos (Araújo, et al., 2019); en el campo de la Documentación específicamente en el análisis de la co-citación y co-palabras en una base de 383 publicaciones científicas (Gálvez, 2018); en el ámbito de la producción científica en la universidad (Corchuelo, 2018) donde se ha estudiado la visibilidad de las publicaciones científicas a través de la web o internet, pero se ha encontrado que existe una participación reducida de los investigadores; en el ámbito jurídico como acceso al uso de redes para expresar su derecho a la libertad de expresión, caso específico a los criminales sexuales a quienes se prohibió o se restringió el uso de las redes sociales (Herrán, 2018); asimismo, De La Hoz, Acevedo y Torres (2015) estudiaron el uso de las redes sociales por estudiantes y docentes, concluyeron que su uso es aceptable pero debe existir una tendencia creciente y generar política institucional en el desarrollo de estas.

De los estudios previos se colige que las TIC, específicamente, a través de las redes sociales son transversales, debido a sus diversos usos en las actividades humanas: médica, educativa, investigativa, etc. que permiten una mejor comunicación, comprensión y por consiguiente optimizar las condiciones de vida.

Fundamentación

La misión y la visión institucional forman parte de la gestión o planificación estratégica que implica una serie de procesos, entre ellos su aseguramiento inicial, antes de que se implemente y luego se controle. Para ello requiere contar con recurso humano, diseño de estrategias (Abesada y Almuiñas, 2016) para desarrollarlo de manera eficiente y efectiva.

El cumplimiento de la misión y visión depende la organización de la institución universitaria, pero también del contexto, teniendo en cuenta que muchas veces este es determinante, sobre todo cuanto existen crisis económicas, financieras, conflictos sociales que imposibilitan a las instituciones a cumplir sus objetivos y por ende su misión y visión.

Lo previo se concatena con la web o los portales que son medios o plataformas que permiten una mayor y mejor comunicación entre los miembros de las organizaciones, en este caso específico entre los miembros de las comunidades universitarias. En este proceso se difunden una serie de informaciones que brindan las instituciones de educación superior desde su misión, visión, objetivos, servicios educativos que brindan (desde pregrado hasta postgrado), actividades de investigación, proyección a la comunidad, etc.

Las TIC son herramientas que permiten centralizar el proceso formativo y el centro de aprendizaje del estudiante (García y González, 2017), también sirven de instrumento para que las universidades difundan sus funciones, su organización y de manera concreta que lo realicen a través de su misión y visión; es decir qué son y qué aspiran lograr dentro del corto, mediano o largo plazo.

En este sentido la misión de la universidad es dar a conocer su estructura, su organización, su esencia; pero también su proyección, sus aspiraciones en función de la formación de sus profesionales y de su impacto en la sociedad, que son algunos criterios del ranquin Scimago, incluyendo la investigación, para la jerarquización de universidades y de facultades de las universidades en el mundo.

En este sentido las universidades para comunicarse con sus miembros o con la sociedad recurren a la web, a internet, específicamente a través de las redes sociales (Linkedln, You Tube, Twitter, Facebook) y académicas (Google Scholar, Medeley, Academia.edu, ResearhGate), para desarrollar o difundir la ciencia de la universidad (Corchuelo, 2018), pero también las primeras (redes sociales) sirven para difundir los propósitos o los objetivos de las universidades.

Las redes sociales poseen un gran impacto en la formación universitaria a través del uso de las redes sociales (Hermann-Acosta, Apolo Molano-Camargo, 2019) que se han generado como espacios que permiten una constante comunicación o interrelación, reduciendo el lugar y sobre todo el tiempo. Estas están siendo utilizadas por las universidades para dar a conocer los programas o servicios que ofrece a sus estudiantes o potenciales estudiantes.

En este proceso, existen una serie de beneficios de las instituciones que utilizan la web, como la comunicación efectiva entre las universidades, creación de espacios flexibles de trabajo, aprendizaje, adquisición y difusión del conocimiento, mejorar la organización o estructura de las universidades (Orgaz-Agüera, Moral-Cuadra y Domínguez, 2018) y dar a conocer por este medio sus funciones, su misión, visión y otras actividades que realizan.
La Unesco, a través de Valencia-Molina et al. (2016), ha establecido ciertos parámetros para la adquisición y la aplicación de ciertas competencias de las TIC que también son utilizadas por las universidades. En el nivel de apropiación se tiene conocimiento sobre esta y su uso; en la de integración se presentan los contenidos, la comunicación y la transmisión de información; en el nivel de reorientación se aplica la tecnología que involucra la participación activa de sus miembros o participantes.

A pesar de que existe una diversidad de herramientas tecnológicas, sin embargo, la web o los portales resultan ineficientes porque les falta estructurar, organizar eficientemente los recursos de las plataformas virtuales (Sabich, 2015).

Método

El presente estudio es de carácter cualitativo. Se base en análisis de contenido, en base a las páginas web por medio de las cuales las Facultades de Derecho de las Universidades de Latinoamérica han difundido su misión y visión, según el ranquin de Scimago de 2019.

Las Facultades de Derecho que están en el ranquin Scimago (2019) son 25, pero de estas 10 han explicitado su misión y 7 su visión en su portal o web: La Pontificia Universidad Católica de Chile (primer lugar, solo ha explicitado su misión), La Universidad Nacional Autónoma de México (tercer lugar), La Universidad de Chile (quinto lugar), Universidad los Andes de Colombia (sexto lugar), Pontificia Universidad Católica de Valparaíso (octavo lugar), Pontificia Universidad Católica del Perú (noveno lugar), Universidad de Rosario (décimo tercer lugar), Universidad Diego Portales de Chile (décimo cuarto lugar, ha difundido solo su misión), Universidad de Antioquía (décimo noveno lugar, solo ha expresado misión) y Universidad los Andes de Chile (vigésimo lugar).

El análisis se ha realizado por categorías, tanto de la misión y visión: la formación profesional, proyección social, las alianzas, el liderazgo académico, enfoque interdisciplinar, proyección, etc.

Respecto al uso de las redes sociales: presentación de la misión-visión, el tipo de redes sociales, las temáticas que difunden en las redes y la cantidad de usuarios e interacciones.

Resultados

La misión de las facultades de derecho

Tabla 1: La misión de las facultades de derecho

Nro.	Categorías	Universidades
1	Formación profesional	Pontificia U. Católica de Chile, Pontificia Universidad Católica de Valparaíso, Pontificia Universidad Católica del Perú, Universidad de Chile, U. Diego Portales de Chile, Universidad los Andes de Chile, U. los Andes de Colombia, Universidad N. Autónoma de México.
2	Proyección o servicio social	Pontificia U. Católica de Chile, Pontificia Universidad Católica de Valparaíso, Universidad de Antioquía, Universidad del Rosario, Universidad los Andes de Chile, U. los Andes de Colombia, U. los Andes de Colombia, Universidad N. Autónoma de México.
3	Creación de conocimiento	Pontificia U. Católica de Chile, Pontificia Universidad Católica de Valparaíso, Universidad de Antioquía, U. Diego Portales de Chile, Universidad los Andes de Chile, U. los Andes de Colombia.
4	Liderazgo (académico)	Pontificia U. Católica de Chile, Universidad de Chile, Universidad del Rosario.
5	Resolución de problemas	Universidad de Antioquía.
6	Enfoque interdisciplinar	Universidad de Antioquía, Universidad de Chile, U. los Andes de Colombia, U. los Andes de Colombia, Universidad N. Autónoma de México.
7	Alianzas	U. los Andes de Colombia.
8	Uso de TIC	Universidad N. Autónoma de México.

Nota: Elaborado por el autor en base a los datos difundidos por las universidades

De las categorías, las que tienen mayor énfasis se enfocan en la formación profesional que están referidas a la integridad, ética (la explicitan 8 universidades), sobre la proyección o servicio social el cual implica que la universidad se involucra con su entorno (también lo han expresado 8 universidades), respecto a la creación del conocimiento que es la esencia o una de las principales funciones de la universidad (la han difundido 6 facultades), en liderazgo académico (han explicitado 3 universidades), sobre resolución de problemas (ha explicitado la Universidad de Antioquía), en el desarrollo del el enfoque interdisciplinar que implica la integración de varias disciplinas lo han difundido 5 universidades, sobre alianzas una universidad y el uso de TIC solamente la Universidad Nacional Autónoma del México.

La visión de las facultades de derecho

Tabla 2: La visión de las facultades de derecho

Nro.	Categorías	Universidades
1	Formación profesional	Pontificia Universidad Católica de Valparaíso, Universidad de Chile.
2	Proyección o servicio social	Pontificia Universidad Católica de Valparaíso, Universidad de Chile, Universidad los Andes de Chile.
3	Reconocimiento (internacional)	Pontificia Universidad Católica de Valparaíso, Pontificia Universidad Católica del Perú, Universidad los Andes de Colombia, Universidad N. Autónoma de México.
4	Contribución a la diversidad	Pontificia Universidad Católica de Valparaíso, Universidad los Andes de Chile.
5	Calidad de la investigación	Universidad del Rosario.
6	Alianzas	Universidad de Chile, Universidad los Andes de Chile, Universidad los Andes de Colombia.
7	Liderazgo	Universidad los Andes de Colombia, Universidad N. Autónoma de México.

Nota: Elaborado por el autor en base a los datos difundidos por las universidades

En la visión también se han explicitado una serie de categorías: la formación profesional 2 universidades, la proyección social 3 instituciones, el reconocimiento internacional 4, contribución a la diversidad que implica respetar los derechos, opiniones de los demás lo han explicitado 2 facultades, sobre las alianzas 3 facultades y respecto a liderazgo 2, respectivamente, según el ranquin de 2019.

El uso de redes sociales de las facultades de derecho de las universidades

Tabla 3: El uso de las redes sociales

Universidad	Tipos de redes
Pontificia Universidad Católica de Chile	Twitter, Facebook, Linkedin, Flickr, YouTube.
Universidad del Rosario	Twitter, YouTube, Instagram, Linkedin, Facebook
Universidad Nacional Autónoma de México	Facebook
Universidad Diego Portales de Chile	Facebook, Twitter, Instagram
Pontificia Universidad Católica del Perú	Facebook, Twitter
Pontificia Universidad Católica de Valparaíso	Twitter
Universidad de Antioquía	Facebook, Linkedin, Twitter, YouTube.
Universidad de Chile	Facebook, Twitter

Nota: Elaborado con base a los datos de las universidades que han publicado en su web

Las redes sociales están insertadas o agregadas en la página web donde se difunde la misión y visión de las facultades de derecho y por tanto esta información se puede difundir a través de las redes que se especifican en la tabla precedente. Las redes más usadas corresponden a Facebook y Twitter. Las instituciones que usan más cantidad de estas: la Universidad del Rosario, la Pontificia Universidad Católica de Chile y la Universidad de Antioquía.

En la difusión de la misión y visión de las universidades, se evidencia predominio de texto sobre la imagen.

Uso de las redes sociales: Facebook

Tabla 4: Facebook: gustos, seguidores y visitas

Universidad	Gustos	Seguidores	Visitas
Diego Portales	5 655	5 815	182
Católica de Valparaíso	5 279	5 376	192
Pontificia Universidad Católica de Chile	10 938	11 118	1 959
Pontificia Universidad Católica del Perú	674		5 073
Universidad Nacional Autónoma de México	123 954	126 634	
Universidad los Andes de Colombia	16 466	17 848	283
Universidad de Chile	3 568	3 668	
Universidad de Antioquía	20 160	20 661	496
Universidad los Andes de Chile	1 486	1 515	30

Nota: Obtenido de las redes de las universidades consultadas (entre enero y febrero de 2019)

La UNAM cuenta con más personas a quienes les gusta la página: 123 954, seguido de la Universidad de Antioquía con 20 160, la Universidad los Andes de Colombia con 16 466, la Pontificia U. Católica de Chile con 10 938, las demás oscilan entre 674 (Católica del Perú) a 5 655 (Diego Portales); la misma jerarquía se mantiene para los que siguen la página de Facebook.

Los temas que se difunden a través de Facebook son diversos: democracia universitaria, Diplomado en Derecho Empresarial (UNAM), Cambio de Constitución, convocatorias, seminarios, foros.

Uso de las redes sociales: Facebook: cantidad de comentarios

Tabla 5: Comentarios en Facebook

Universidad	Comentario	Compartido
Universidad de Antioquía	1	34
Universidad Nacional Autónoma de México	1	8
Universidad los Andes de Colombia	1	3
Pontificia Universidad Católica del Perú		
Universidad de Chile		4
Diego Portales	2	3
Pontificia Universidad Católica de Chile		1
Universidad los Andes de Chile		
Católica de Valparaíso	2	1

Nota: Obtenido de las redes de las universidades consultadas (entre enero y febrero de 2019)

Las redes sociales, por su naturaleza, generan mayor interacción, sin embargo, en las páginas o publicaciones se evidencia que no existe tal interacción en Facebook. Algunas publicaciones no cuentan con comentarios (U. de Chile, U. los Andes de Chile, Pontificia Católica de Chile, Católica del Perú) y otras solo uno (UNAM, U. los Andes de Colombia) o dos (Pontificia U. Católica de Valparaíso, Diego Portales). Se evidencia que existe reducida interacción en Facebook.

Uso de las redes sociales: estadística de Twitter

Tabla 6: El uso de Twitter

Universidad	Siguiendo	Seguidores
Pontificia Universidad Católica de Chile	822	11 600
Universidad Nacional Autónoma de México	526	41 000
Universidad del Rosario	1 121	66 100
Universidad de Chile	1 387	20 000
Diego Portales	91	6 394
Católica de Valparaíso	156	1 295
Pontificia Universidad Católica del Perú	295	3 716

Nota: Obtenido de las redes de las universidades consultadas (entre enero y febrero de 2019)

Se evidencia que existe una diversidad de seguidores en la red de Twitter con más prevalencia, respecto a los seguidores, en las universidades del Rosario, Autónoma de México, Universidad de Chile.

Las temáticas que se difunden en Twitter son diversas y en algunos casos coinciden con los mismos tópicos expresados en Facebook: diplomados, publicaciones, foros, seminarios, etc.

Respecto a los comentarios en Twitter, de las universidades seleccionadas, no se han realizado en esta red, esto demuestra que la participación es menor que en Facebook.

Discusión

Respecto a los resultados obtenidos, sobre la misión y visión, se basan en las categorías principales relacionadas con la formación profesional, la creación del conocimiento científico, la proyección social, el liderazgo, el enfoque interdisciplinar, las alianzas, el reconocimiento internacional, están concatenados con la planificación estratégica (Ciancio, 2018; Yusof, Awang, Valdez y Yaacob, 2018), también con los planteamientos de Soares y Setyohady (2017) porque la realización de la planificación conlleva al logro de la misión y visión institucional. Asimismo, están relacionados con la internacionalización de las instituciones y el acceso al conocimiento que propone Popescu (2017) y Grieves (2018).

Sin embargo, en la propuesta sobre el desarrollo de las TIC, en la misión y visión de las facultades de derecho, solo lo explicita la UNAM, aspecto que no se especifican en las demás facultades. No obstante, las universidades analizadas, sí usan redes sociales: Facebook y Twitter con más frecuencia con relación a las demás redes, como se verifica en su mismo portal.

En el portal de las facultades predomina el uso de texto, en vez de imagen o video; asimismo, sobre el uso de las redes sociales por las facultades de derecho de las universidades, en la red de Facebook, Twitter, se evidencia que no han ordenado adecuadamente los símbolos e imágenes, aspecto que coindice con el planteamiento de Sabich (2015) quien considera que las webs son ineficaces porque no se ha estructurado adecuadamente los recursos de las plataformas virtuales.

Sobre la interacción o participación, tanto en Facebook como en Twitter, no se evidencia que exista una participación activa entre la universidad y los usuarios, como lo establece Valencia-Molina et al (2016) en el nivel de reorientación que implica la participación activa entre los miembros o participantes; se puede apreciar que los comentarios en las redes sociales analizadas de las facultades son escasas por parte de los usuarios.

Conclusiones

La misión y la visión de las facultades de derecho de las universidades de Latinoamérica enfatizan en la formación profesional íntegra, la proyección o servicio social, creación de conocimiento, liderazgo y reconocimiento internacional.

Existe predominio de texto frente a imagen en los portales de las facultades de derecho donde han expresado su misión y visión.

El uso de las TIC en la misión y visión de las facultades de derecho es escaza, solo la UNAM la ha difundido en su misión.

El uso de las redes sociales no evidencia participación activa entre las facultades de derecho y los estudiantes o usuarios.

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Algunas Tendencias Sobre El Proceso De Enseñanza-Aprendizaje En Derecho Some Trends On The Teaching-Learning Process In Law[1]

Hugo GONZÁLEZ
Universidad Autónoma del Perú, Lima, Perú
hugo_augencio@hotmail.com

Aracelly RUBIO
Universidad César Vallejo, Lima Norte
aerupa@hotmail.com

Resumen

El presente estudio analiza algunas tendencias sobre el proceso de enseñanza-aprendizaje del derecho en artículos de revistas indizadas en Scopus y Web of Science. Se realizó un estudio documental en una muestra cualitativa homogénea de 46 manuscritos. Los artículos estudian el enfoque por competencias relacionados con la formación integral del estudiante. Las estrategias metodológicas están referidas a la resolución de problemas, aspectos lúdicos, la conferencia trascendente, la investigación como estrategia de aprendizaje, el trabajo colaborativo. El rol del docente es de orientador, planificador; y del estudiante de protagonista respecto a su proceso de aprendizaje.

Palabras clave: Enseñanza-aprendizaje; paradigma; currículo; evaluación; docente; estudiante.

Abstract

This study analyzes some trends on the teaching-learning process of law in articles of journals indexed in Scopus and Web of Science. A desk study was performed in a homogeneous and qualitative sample of 46 manuscripts. The articles study the competency-based approach in relation to the comprehensive education of the student. The methodological strategies refer to problem solving, playful aspects, transcendent conference, research as a learning strategy, collaborative work. The role of the teacher is to be an advisor and planner; and the student is the protagonist in terms of his/her learning process.

Keywords: Teaching-learning; paradigm; curriculum; evaluation; teacher; student.

Introducción

El presente artículo analiza los aportes de algunas investigaciones jurídicas de revistas indizadas en Scopus y Web of Science (2014-2018) en la formación de los estudiantes del ámbito jurídico.

Permite comprender el sistema de aprendizaje del estudiante, quien se ha convertido en protagonista principal del proceso formativo que responde al enfoque por competencias (Ramírez-García, González-Fernández y Salcines-Talledo, 2018; Sanroman y Morales, 2016). Exige enseñar, aprender, diseñar estrategias metodológicas, planificar la formación integral del profesional que responda a las exigencias actuales. Este proceso requiere una actuación interdisciplinar como una necesidad para responder a la realidad compleja desde un abordaje de varias disciplinas (Llano, Gutiérrez, Stable, Núñez, Masó y Rojas, 2016).

El trabajo se ha establecido en los siguientes apartados: estudios previos, fundamentación, análisis de los artículos por categorías, discusión, conclusiones, referencias y apéndice (donde se registra la relación de artículos que se han analizado con Atlas ti). Las categorías están relacionadas con paradigma, currículo, estrategias metodológicas, estudiante, docente, relación estudiante-docente-comunidad y sistema de evaluación.

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1 El presente trabajo forma parte de la línea de investigación: enfoque interdisciplinario de la ciencia jurídica de la Universidad Autónoma del Perú.

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Estudios previos, congresos y revistas

La didáctica estudia el proceso de enseñanza-aprendizaje, equilibra el enseñar y el aprender (Abreu, Rhea, Arciniegas y Rosero, 2018; Mora y Pujal, 2017; Abreu, Gallegos, Jácome y Martínez, 2017), a través de un enfoque interdisciplinario que integra el derecho y la didáctica. Desarrolla el cómo y el qué; es decir qué estrategias, formas y medios se deben emplear en la formación de los profesionales del derecho.

Aparte de las investigaciones sobre didáctica, son relevantes los aportes de la Universidad Nacional Autónoma de México (Cáceres, 2016)2, sobre la enseñanza del derecho a través del "Congreso Internacional sobre Investigación en Pedagogía y Didáctica del Derecho", difundidos virtualmente. Sus temáticas son diversas: el papel de la psicología en el fortalecimiento de la actividad del docente, las competencias blandas, la solución de problemas, el desarrollo de competencias, nuevos enfoques en la enseñanza, la enseñanza creativa y constructiva, la neurociencia en relación con la enseñanza del derecho, el método dialéctico, la enseñanza centrada en juicios orales, la investigación en la enseñanza del derecho, los diseños curriculares en postgrado, el enfoque intercultural, la clínica jurídica, aprendizaje por módulos, el paradigma de la complejidad, el cine en el derecho, estudios interdisciplinarios (poesía y derecho), evaluación jurídica, etc.

Otras fuentes especializadas, sobre la enseñanza del derecho, son las revistas científicas. En Latinoamérica la "Revista Pedagogía Universitaria y Didáctica del Derecho"3, que se encuentra indizada en las principales bases de datos: Web of Science y últimamente en Scopus, difunde publicaciones sobre la enseñanza y la investigación en derecho. Se puede acceder a sus textos electrónicamente desde las publicaciones del 2014. Investiga diversos temas, entre los más relevantes: estrategias colaborativas, formación por competencias, la investigación jurídica, aprendizaje colaborativo o cooperativo, cambio curricular, experiencias didácticas, la literatura en la investigación y la enseñanza, el aspecto lúdico, el cine, estrategias metacognitivas, el método de casos, el aprendizaje basado en problemas, las TIC en la enseñanza, el sistema de evaluación, proyecto pedagógico, etc.

La revista "Academia. Revista sobre Enseñanza del Derecho"4, una de las primeras revistas en Latinoamérica, también investiga sobre la enseñanza del derecho. Difunde sus publicaciones en línea desde el 2003, cuyas temáticas más relevantes, en los tres últimos años (2016, 2017 y 2018), se enfocan en innovación didáctica, planificación de la enseñanza, enfoque por competencias, planes de estudios jurídicos, estrategias para aprender textos en inglés, maneras de enseñar o aprender Derecho Administrativo, la enseñanza del lenguaje jurídico, etc.

En esta línea, la "Revista de Educación y Derecho"5 de la Universidad de Barcelona estudia aspectos relacionados con la enseñanza del derecho desde el 2009 hasta el presente (2019). Las temáticas más representativas están referidas a los desafíos de la enseñanza del derecho en Europa; estrategias y metodologías en la formación de jueces y magistrados; pedagogía, cine, literatura y derecho; las clínicas jurídicas; la evaluación de la docencia superior.

Los eventos y/o publicaciones (congresos y revistas especializadas) permiten fundamentar y orientar los procesos formativos de los futuros abogados tomando en cuenta el diseño del currículo, las estrategias metodológicas, la inclusión de las TIC, la interacción con otras disciplinas como la literatura, la inserción de la investigación, la mejora de los sistemas de evaluación.

Fundamentación

Las tendencias, el contexto actual y los paradigmas

El contexto actual, de la educación superior, específicamente la universitaria, está orientada a la internacionalización (Tünnermann, 2018; Unesco, 2009) basada en la integración solidaria, la interculturalidad, el respeto a la identidad de los países, de los espacios académicos universitarios; el aumento de la enseñanza superior, los cambios en la investigación.

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[2] CÁCERES, Enrique (2016). "Pasos hacia una revolución en la enseñanza del derecho en el sistema romano-germánico". Tomo I, II, II. México: Universidad Nacional Autónoma de México. Disponible en https://metodologiadelainvestigacionyensenanzadelderecho.wordpress.com/2019/06/24/memorias-del-cimied/.

[3] Revista Pedagogía Universitaria y Didáctica del Derecho. Disponible en https://pedagogiaderecho.uchile.cl/index.php/RPUD/issue/view/5145.

[4] Academia. Revista sobre Enseñanza del Derecho. Disponible en http://www.derecho.uba.ar/publicaciones/rev_academia/.

[5] Revista de Educación y Derecho. Disponible en http://revistes.ub.edu/index.php/RED/index.

Otra tendencia es la masificación (Guzmán-Valenzuela, 2017) que ha ampliado la oferta educativa y ha permitido que más personas tengan acceso a la educación superior de manera efectiva y permanente (Ramos y López, 2018). Esta transformación exige que el estudiante aprenda a aprender, aprenda a hacer, aprenda a convivir y aprenda a ser (Delors, 1994); aprenda a desaprender, aprenda la comprensión humana (Morin, 1999); aprenda a liberarse (Freire, 2005), a desarrollar su pensamiento crítico y creativo en la formación de abogados (Camilloni, 2019) para transformar su entorno, el uso de las TIC (Espinosa-Munguía, 2018)

La formación profesional debe estar relacionada o ser coherente con el desempeño laboral o empresarial (Bartual y Turmo, 2016). Las universidades deben establecer sus currículos donde precisen las competencias generales y específicas que respondan a las exigencias de las empresas o las instituciones donde se desempeñarán los futuros abogados.

Las tendencias se relacionan con los paradigmas que imperan en la enseñanza actual. Desde el ámbito de la pedagogía, se habla de un paradigma centrado en la innovación a través del uso de la tecnología que se desarrolla en los procesos educativos a través de la interacción entre docentes y estudiantes (Aguiar, Velásquez y Aguiar, 2019), estos últimos participan de manera comunicativa y creativa en el proceso formativo (Roa, 2017).

Otra dimensión de los paradigmas está orientada a indagar y resolver problemas que se encuentran pendientes en la ciencia (Bravo, 2018), en este caso los problemas están centrados aún en el protagonismo principal del docente, con menor actuación del estudiante; otro problema es el aislamiento de la formación universitaria frente a los problemas sociales; todavía la universidad se encuentra desvinculada de la sociedad, de la empresa, del mundo laboral.

Los paradigmas tienen una implicancia con la responsabilidad ética y moral (Ortega y Romero, 2018), en este sentido se pretende mejorar no solo el aprendizaje de los estudiantes, sino conocer los problemas sociales para resolverlos y mejorar las condiciones de vida de la población, por eso se requiere la formación de profesionales que transformen su realidad o contexto desde su área o especialidad, acercar los conocimientos jurídicos para que las personas conozcan sus derechos y los ejerzan. El derecho no puede ser una ciencia que se divorcie de la sociedad, sino que debe integrarse con el desarrollo de esta.

Otras posturas establecen el paradigma emergente centrado en un rol transformador que valora el saber, al mismo nivel que el ser con su comprensión multidimensional y su carácter transformador (Rodríguez, Trujillo, Vargas, Corredor y Gallego, 2018) que no es ajeno al proceso formativo del derecho.

La enseñanza del derecho, en este marco, no es ajena ya que ha sufrido cambios desde la concepción romanista (Witker, 1985) hasta el enfoque interdisciplinar, que se nutre de otras ciencias: económicas, históricas, sociológicas y el enfoque por competencias. Lamentablemente, como lo menciona Witker (1985), existe un paradigma "parroquial" que imposibilita la apertura, la polémica en la que predomina una enseñanza libresca, normativa, con mayor protagonismo del docente.

Frente a este problema, desde la década del 70 se inicia lo que Witker (1985) denomina una concepción dinámica del derecho orientada a la producción de conocimientos, para desarrollar el espíritu crítico y creativo de los estudiantes, como protagonistas de su aprendizaje donde impere el diálogo, la controversia. En este contexto, el docente es un guía, un instructor; y el estudiante un ente activo que logra aprendizajes significativos (Sanromán y Morales, 2016).

El currículo, pedagogogía y didáctica

Orienta la formación del ser humano, la educación, el proceso de aprendizaje. Ha ido cambiando desde el tradicional, hasta el currículo por competencias y el socioformativo que resuelve problemas reales, del contexto, en equipo (Tobón, 2017).

El currículo tiene una base filosófica que permite fundamentar qué se va a enseñar, cómo y por qué (Gil, 2018); responde al contenido, a los procesos metodológicos o estrategias y a un propósito. En el derecho se deben aprender contenidos actualizados y relevantes, que respondan a los intereses de los estudiantes y sociales con el fin de resolver problemas y tener una sociedad más justa, equitativa.

En los últimos años ha sido impulsado y consolidado el currículo por competencias a través de varias instituciones, desde la Unesco a través de Delors (1994) quien propone que las competencias deben estar orientadas al conocer, hacer, ser y convivir. Otros autores establecen que permite la formación integral del estudiante, consolida los procesos de aprendizaje, gestiona adecuadamente recursos, metodologías, trabaja en base a problemas y proyectos, etc. (Moreno, Casanova, Martell, Álvarez y Tabares, 2019).

El currículo, como planificación de experiencias, propone objetivos orientados a la formación del estudiante; es el punto de encuentro entre la pedagogía y la didáctica, está entre la frontera de estas dos disciplinas (Ortiz, 2014). Es una construcción social, que organiza todos los medios, instrumentos para formar integralmente al estudiante, teniendo en cuenta su contexto, realidad y pensamiento complejo. Se relaciona con los procesos jurídicos ya que responde a realidades complejas y diversas que requieren la interacción con otras disciplinas.

La pedagogía se encarga del proceso formativo como una categoría mayor en el ámbito educativo que integra todas las acciones educativas o institucionales tomando en cuenta el contexto en cuyo seno se desarrolla el proceso de enseñanza-aprendizaje y otros procesos que permiten la formación del estudiante (Ramos, Rhea, Pla y Abreu, 2017). En ese sentido, la pedagogía tiene un propósito formativo, institucional, cristaliza el proceso formativo o educativo en función de los propósitos de la institución, integrando a la comunidad y a la familia, funciona como un eje articulador de estos; planifica cómo debe desarrollarse la organización educativa.

El propósito de la pedagogía se orienta al desarrollo cognitivo e intelectivo para la formación íntegra de los educandos como un proceso de humanización que tiende a su transformación individual y colectiva (Pallarès y Traver, 2017). En este sentido estudia y comprende el proceso educativo o formativo de la persona para que tenga una sociedad más equitativa, más justa, que permita interactuar al sujeto con su contexto para comprenderlo, pero también para transformarlo. Coadyuva a las transformaciones sociales que son trascendentes para los aprendices (Pallarès, Unda, Traver y Lozano, 2018). Por ello, desarrolla experiencias de aprendizajes significativos que se apliquen a la práctica real y concreta.

La didáctica estudia el proceso de enseñanza-aprendizaje (Abreu, Gallegos, Jácome y Martínez, 2017; Ramos, Rhea, Pla y Abreu, 2017). En su desarrollo histórico ha variado su objeto de estudio: desde la enseñanza hasta la concepción curricular y su alcance que va más allá de la didáctica (Abreu, Rhea, Arciniegas y Rosero, 2018).

Existen coincidencias con otros autores, al establecer que la didáctica requiere de estrategias óptimas para que el estudiante cumpla con los propósitos planteados en el currículo. Por ello estudia la relación del docente con el estudiante para que interactúen y logren los aprendizajes planificados. En este contexto esta disciplina con la pedagogía y el currículo se interrelacionan e intervienen en la planificación y la consolidación o construcción del conocimiento del estudiante (Rodríguez-Pérez, 2019). Los resultados permiten una formación competente del discente para que se desempeñe de manera eficiente en la sociedad.

Sin embargo, no se puede hablar de didáctica en términos generales, requiere precisarla según el contexto y pertinencia; en este caso se trata de una didáctica universitaria (Zabalza, 2011) que permita a los docentes universitarios demostrar sus competencias en la formación de los estudiantes de manera eficiente, eficaz, etc.

La didáctica comprende el siguiente procedimiento: planteamiento del problema, logro del objetivo, despertar la motivación, presentar el contenido, actuación del estudiante, construcción de la actividad o producto y evaluación (Ortiz, 2014). Este proceso permite una participación activa del estudiante para reconstruir el conocimiento y luego pueda aplicarlo para simular o resolver algún problema. Se relaciona con otras propuestas o procesos: interrogación, desarrollo, consolidación (Fabres, 2016); permiten que el estudiante participe activamente tomando decisiones e interactuando con el docente o sus compañeros, demostrando sus competencias. También es pertinente que en este proceso se incluyan el uso de las TIC, de las redes sociales como medio didáctico, el uso de la investigación como recurso para aprender mejor, la relación o actuación del estudiante con su entorno para que conozca de manera directa la realidad, los problemas y luego proponga soluciones.

El enfoque por competencias debe complementarse con el paradigma socioformativo (Tobón, 2017, 2018), que propone un currículo contextualizado según la realidad, en la que el estudiante y el docente tienen mayor interacción; utiliza estrategias metodológicas que promueven la participación del estudiante, a través de una didáctica centrada en la persona donde el estudiante es atendido de manera individual, según el caso (Mora y Pujal, 2017); el sistema de evaluación se realiza a través de rúbricas con criterios específicos y definidos. El estudiante participa activamente no solo en el aula, sino en actividades académicas y otras que generan vínculo de la universidad con las demás instituciones nacionales o internacionales.

En consecuencia, debe existir una lógica y coherencia, según el paradigma, desde el currículo hasta la evaluación; si se ha optado por un enfoque por competencias se debe evaluar los desempeños del estudiante a través de evidencias, resultados concretos.

En suma, el proceso de enseñanza-aprendizaje requiere de una serie de componentes para su realización como el enfoque o paradigma en el que se fundamenta, la concepción curricular, el uso específico de estrategias metodológicas o recursos didácticos, los tipos de saberes o conocimientos que debe desarrollar el estudiante y el

sistema de evaluación que se utiliza o aplica para evidenciar o comprobar los aprendizajes; asimismo, tener en cuenta el contexto o la realidad donde se desarrolla la actividad pedagógica o didáctica en interacción con su medio local con proyección a nivel internacional; en interacción permanente con otras disciplinas científicas.

Método

Se seleccionaron 46 manuscritos sobre la enseñanza del derecho de revistas indizadas en las bases de Scopus y Web of Science publicados entre el 2014 y el 2018.

El propósito no es cuantificar, sino interpretar o reflexionar, en torno al contenido de los documentos (Díaz Herrera, 2018), en este caso sobre los artículos seleccionados en los que se han identificado las categorías que responden al proceso formativo del estudiante. Se ha considerado como criterios de inclusión: artículos publicados en las bases de Scopus y Web of Science y que traten sobre la enseñanza jurídica.

Se ha considerado una muestra cualitativa homogénea (Hernández-Sampieri y Mendoza, 2018) ya que se trata de documentos que comparten una temática central: la enseñanza del derecho, con diversas formas o enfoques. La búsqueda se realizó en las bases de datos y en las revistas de acceso abierto, a través de palabras clave: enseñanza, derecho, enseñanza del derecho.

Las estrategias que se utilizaron para la búsqueda en Scopus en castellano fueron: TITLE-ABS-KEY ((enseñanza AND derecho AND universidad)); y en inglés: TITLE-ABS-KEY ((teaching AND law AND university) next).

Sobre el análisis se ha realizado por categorías: paradigma, currículo, estrategias metodológicas, estudiante, docente, relación estudiante-docente-comunidad, sistema de evaluación a través del programa Atlas ti.

Tabla 1: Artículos por año y bases de datos

Año	Cantidad	Scopus	Web of Science	Scopus y Web of Science
2014	8	0	6	2
2015	8	1	7	0
2016	13	1	12	0
2017	5	1	4	0
2018	12	4	5	3

Nota: Elaborado en base a las revistas indizadas en Scopus y Web of Science

Análisis por categorías

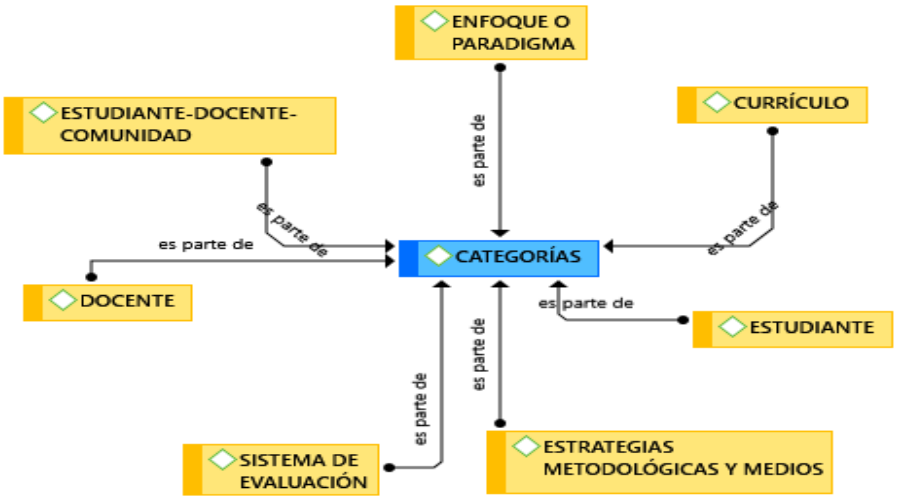

Figura 1: Categorías según artículos de Scopus y Web of Science 2014-2018

Nota: Elaborada por lo autores con base a los artículos analizados

En la figura 1 se precisan las categorías principales que tratan los artículos científicos, con mayor predominio en estrategias metodológicas. En el proceso formativo del estudiante de derecho intervienen varios aspectos: la concepción de paradigma, el tipo de currículo, el sistema pedagógico y didáctico; de manera específica las estrategias, los medios o materiales, los sistemas de evaluación, las relaciones o convenios de las universidades con otras instituciones que generen espacios o escenarios donde complemente su formación el futuro profesional y relacione la teoría con la práctica.

El tratamiento de los paradigmas según los artículos analizados

La concepción de paradigma tiene diversos tratamientos que se establecen a parir de los artículos científicos (figura 2), que se han especificado en los documentos procesados en el programa Atlas ti

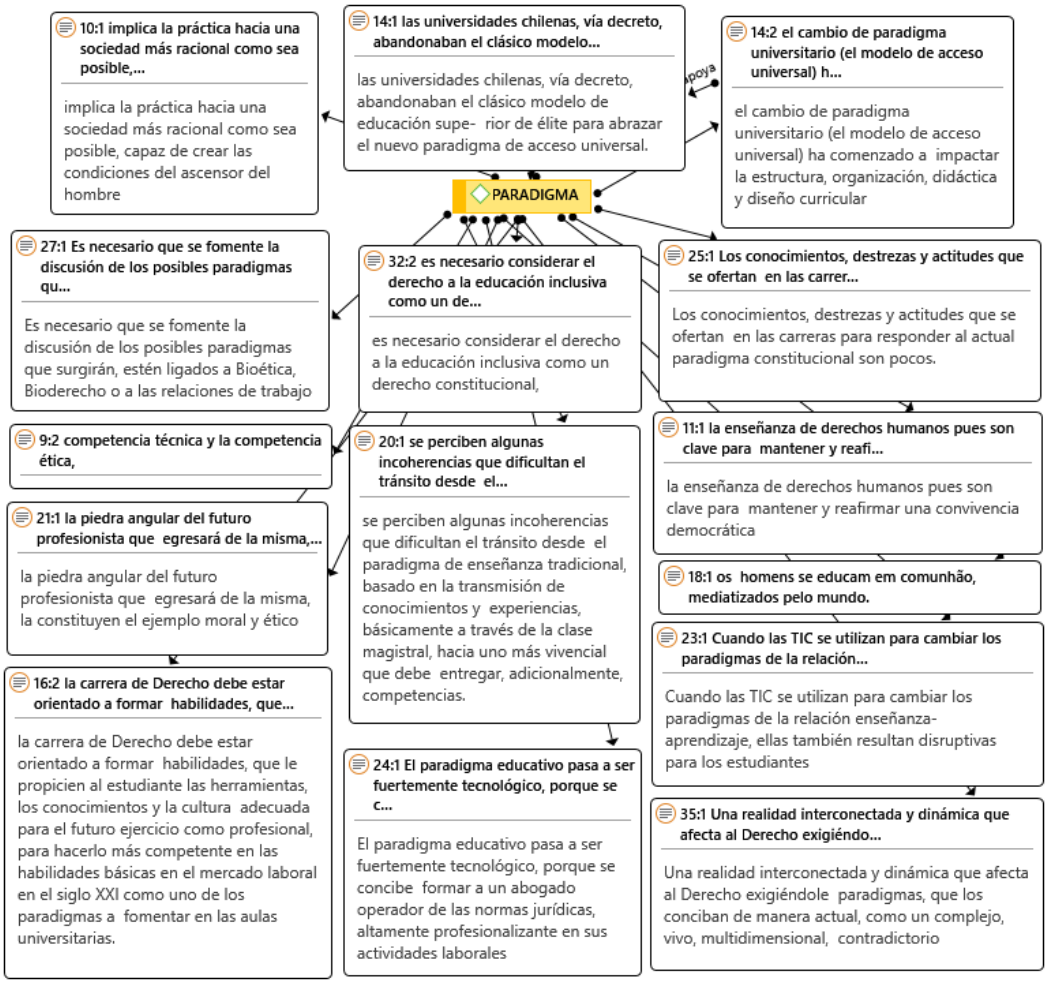

Figura 2: La concepción de paradigma según artículos de Scopus y Web of Science 2014-2018
Nota: Elaborada por lo autores con base a los artículos analizados

El paradigma se conceptualiza como una realidad científica que permite el estudio de los problemas y la formulación de su solución (Khun, 2004); en el ámbito jurídico responde a cómo entendemos el derecho y cómo lo desarrollamos a través de la enseñanza o la educación jurídica que no debe ser elitista, sino de acceso universal, un derecho con carácter práctico, que promueva la crítica, el desarrollo de competencias teniendo como base la ética y el uso de las TIC que coadyuven a su eficacia.

El paradigma de acceso universal a la educación universitaria (Benfeld, 2017) ha permitido la mayor inclusión de estudiantes al sistema universitario, ha generado el cambio del currículo y los procesos didácticos; es valorado positivamente por los actores educativos sobre la diversidad social que se ha creado. Este acceso permite al futuro profesional tener un ascenso social, en base a los derechos humanos (Verdan Rangel, 2016), y permiten la

construcción de una convivencia democrática (Ronconi, 2017), la práctica de una educación inclusiva (Vasconcelos Silva, 2016). Concatenante con la propuesta freireana que los hombres se educan en comunión (Swensson, 2016).

El paradigma constitucional (Pazos y Fabara, 2018) promueve el desarrollo de la actitud crítica y habilidades en la formación de los estudiantes, opuesto al sistema tradicional que es acrítico, pasivo. Se concatena con el enfoque por competencias porque este promueve la actividad práctica del estudiante y no se limita solamente a lo cognitivo, opuesto al paradigma tradicional donde impera la clase expositiva (Pérez, 2014).

El paradigma actual está infuenciado por lo tecnológico que permite una alta cualificación del abogado en la realización de sus actividades profesionales (Álvarez, 2014), por ello dota al estudiante de herramientas para que se desempeñe eficientemente y le permita cooperar y movilizarse en un contexto tecnológico para cumplir los retos que exige el ámbito laboral (Antúnez, 2018), que ha permitido cambiar el pardigma tradicional, el rol del estudiante: de oyente a un rol creativo (Cicero, 2018).

El paradigma también debe estar ligado a la Bioética o Bioderecho (Catellanelli, 2015) desde un estudio interdisciplinar ya que el derecho no está aislado de otras disciplinas. Este proceso no solo debe implicar su enseñanza en el derecho sino a través de otras disciplinas que formen íntegramente al futuro abogado para que se desenvuelva de manera responsable en la solución de problemas sociales. Requiere de competencias técnicas y éticas (Silva Mariosa y Dos Santos, 2015), que le permitan ser un modelo moral y ético (Prado-Carrera, 2016).

El tratamiento del currículo en los artículos analizados

El proceso formativo implica una serie de aspectos, como el enfoque o paradigma, también un plan u orientación curricular (figura 3)

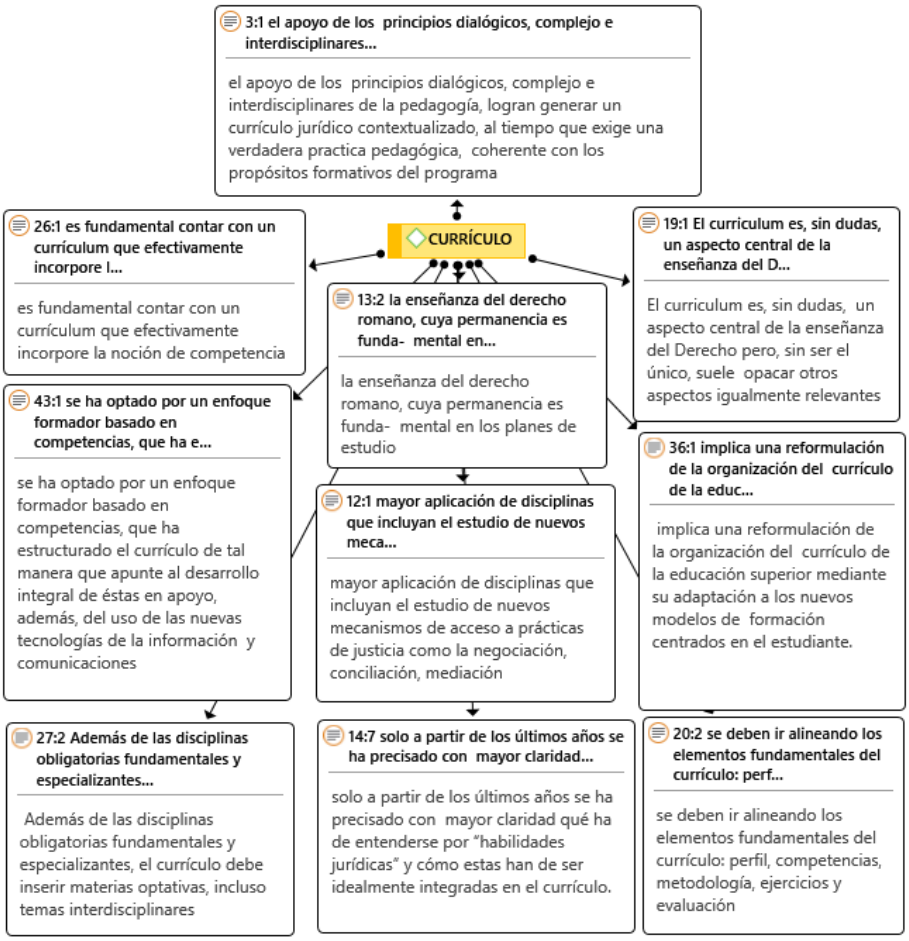

Figura 3: El currículo según artículos de Scopus y Web of Science 2014-2018

Nota: Elaborada por lo autores con base a los artículos analizados

Se propone un currículo relacionado con la realidad, pertinente y adecuado al contexto; que tome en cuenta la complejidad y lo interdisciplinar (Silvera, Garcés y Pineda, 2018; Castellanelli, 2015). Incluye la realidad compleja, que es estudiada en interrelación con las demás ciencias como la medicina, contabilidad, economía, ecología, porque el derecho no solo estudia o aplica normas o jurispudencia, sino que su acción la realiza en interacción con otras ciencias.

El currículo es el núcleo de la enseñanza-aprendizaje de la disciplina jurídica y su importancia en la comunidad académica de la universidad (Pezzetta, 2017). Desarrolla las competencias que están centradas en el estudiante, por eso precisa y selecciona los contenidos, metodologías, la planificación del tiempo, sistema de evaluación y el uso de las TIC (Gregorio y Casas, 2014; Aedo, 2014; Becerra y Salas, 2015).

Se propone un currículo sistemático que integre aspectos metodológicos, práticas, evaluaciones, la inclusión de estrategias o habilidades jurídicas o pragmáticas (Benfeld, 2017). También se incluye a las TIC como apoyo al desarrollo de competencias que permitan la formación integral y eficiente de los estudiantes (Becerra y Salas, 2015; Aedo, 2014).

Asimismo, se propone un currículo en la que se incluyan cursos básicos o clásicos que han cimentado la base del derecho: la enseñanza del derecho romano (Oyarce, 2018); también asignaturas que permiten la solución de problemas actuales de manera rápida, sin recurrir a la justicia tradicional: negociación, conciliación, etc. (Bonett Y Meyer-Pflug, 2016).

El tratamiento de las estrategias en los artículos analizados

En este proceso formativo, también juegan un papel fundamental las estrategias (figura 4).

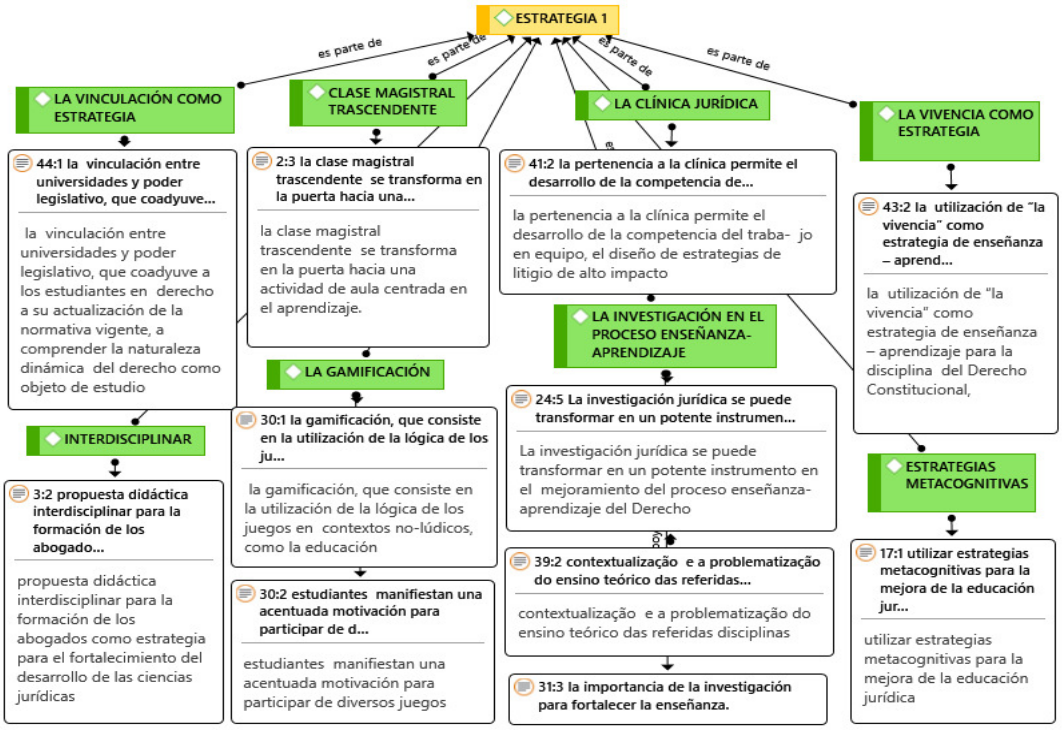

Figura 4: Estrategias metodológicas (1) según artículos de Scopus y Web of Science 2014-2018
Nota: Elaborado por los autores con base a los artículos analizados

Los artículos analizados estudian con mayor énfasis las estrategias metodológicas. Entre estas, se analiza a la vinculación como proceso o estrategia que establece una relación entre las instituciones de formación profesional y el poder legislativo que involucra al estudiante con la entidad y comprenda su funcionamiento, las normas o actividades que se desarrollan (Díaz, 2015). Se concatena con la clínica jurídica que desarrolla el trabajo en equipo y la litigación como actividades fundamentales del abogado en el ejercicio de la profesión (Londoño-Toro y Torres-Villarreal, 2018).

La estrategia de la clase magistral trascendente promueve el aprendizaje del estudiante y le permite reflexionar, crear; no es la clase tradicional que mantiene al estudiante en un estado pasivo (Elgueta y Palma, 2014). Se complementa con las estrategias metacognitivas que desarrollan la formación jurídica autónoma, crítica (Massimino y Colombo, 2016).

La investigación como estrategia consolida el proceso de enseñanza-aprendizaje jurídico (Álvarez, 2014). En este caso la investigación es importante porque promueve la enseñanza (Piazza y Volpato, 2016). Por ello, se requiere de un proceso de aprendizaje que contextualice y problematice los cursos jurídicos (Lázaro Castro De Lima, 2015) que se imparten en la universidad.

Se proponen otras estrategias, como la gamificación que permite el desarrollo del aprendizaje a través del juego (Morales, 2016) que genenera mayor motivación en los estudiantes y por consiguiente repercute en su aprendizaje.

También, la propuesta didáctica interdisciplinar que implica el mejoramiento de la formación en las ciencias jurídicas (Silvera, Garcés, Pineda, 2018). Con ello se deja la concepción clásica monodisciplinar; el derecho no puede aislarse de otras ciencias para resolver los problemas complejos.

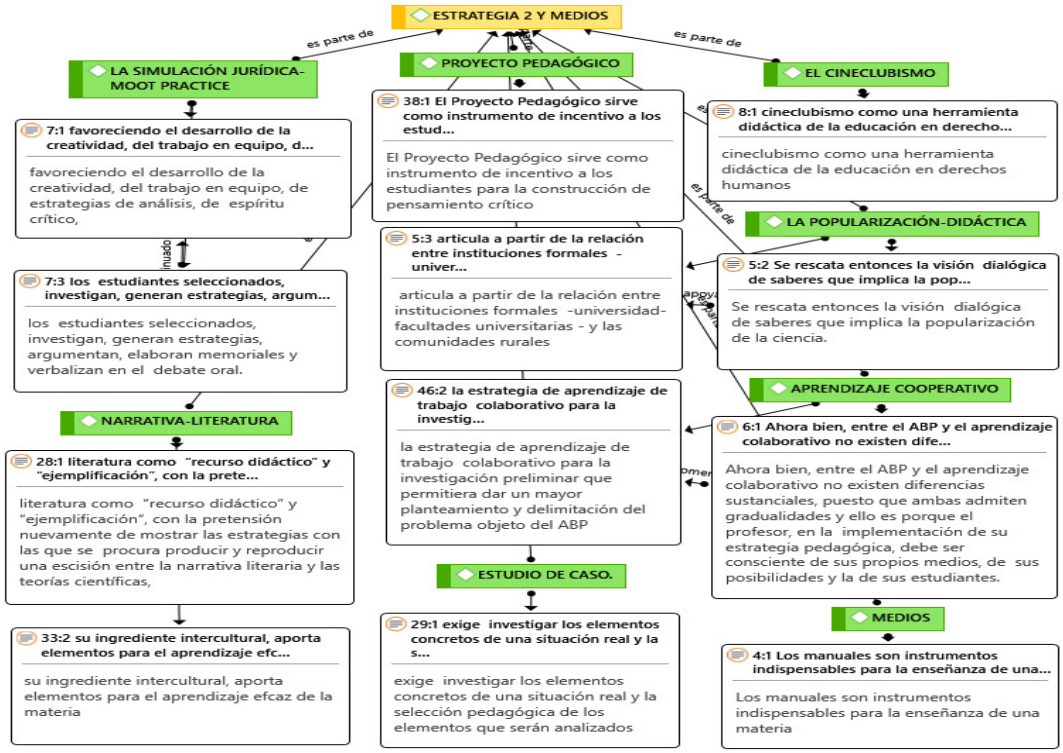

Figura 5. Estrategias metodológicas (2) según artículos de Scopus y Web of Science 2014-2018

Nota: Elaborado por los autores con base a los artículos analizados

La simulación jurídica fomenta el aprendizaje en equipo, la crítica, la creatividad (Consolo, 2015); el proyecto pedagógico permite desarrollar la actitud crítica del estudiante y esto compromete a los docentes y a la institución (Klotz, 2018). Ambas propuestas desarrollan en pensamiento crítico del estudiante, además de generar la integración. Se complementa con el aprendizaje cooperativo que está orientado a desarrollar la responsabilidad individual, la interacción directa que permite trabajar en forma efectiva a través de pequeños grupos (Pinto, 2014).
Otro aspecto relevante es la relación del arte (cine, literatura) con el derecho. El cineclubismo se ha utlizado como un instrumento didáctico en el desarrollo de la educación de los derechos humanos a través de la proyección de películas que desarrollan el debate o la controversia (Marchiori y Vaz, 2016); la literatura como estrategia mejora el aprendizaje de la ciencia jurídica (Cardinaux, 2014), asimismo, el conocimiento y la relación con otras culturas (Muñoz, 2018); permite el desarrollo de la ciencia interdisciplinar.

La popularización del derecho como propuesta didáctica permite el diálogo con la comunidad acercando el lenguaje jurídico a las demás personas que no tienen cultura jurídica, se establece una relación entre la universidad y la

comunidad rural (Duque, Quintero, Duque, 2016). Se concatena con el estudio de caso que toma en cuenta situaciones de la realidad para ser analizados en las actividades académicas (Sanchez, Capella y De Castro, 2016). Las estrategias, no están ailadas, sino en interrelación con otros elementos didácticos, como los medios y materiales; en uno de los artículos analizados se enfatiza en el uso del manual como herramienta necesaria para la enseñanza constitucional (Murillo de la Cueva, 2018).

El tratamiento de la concepción de estudiante en los artículos analizados

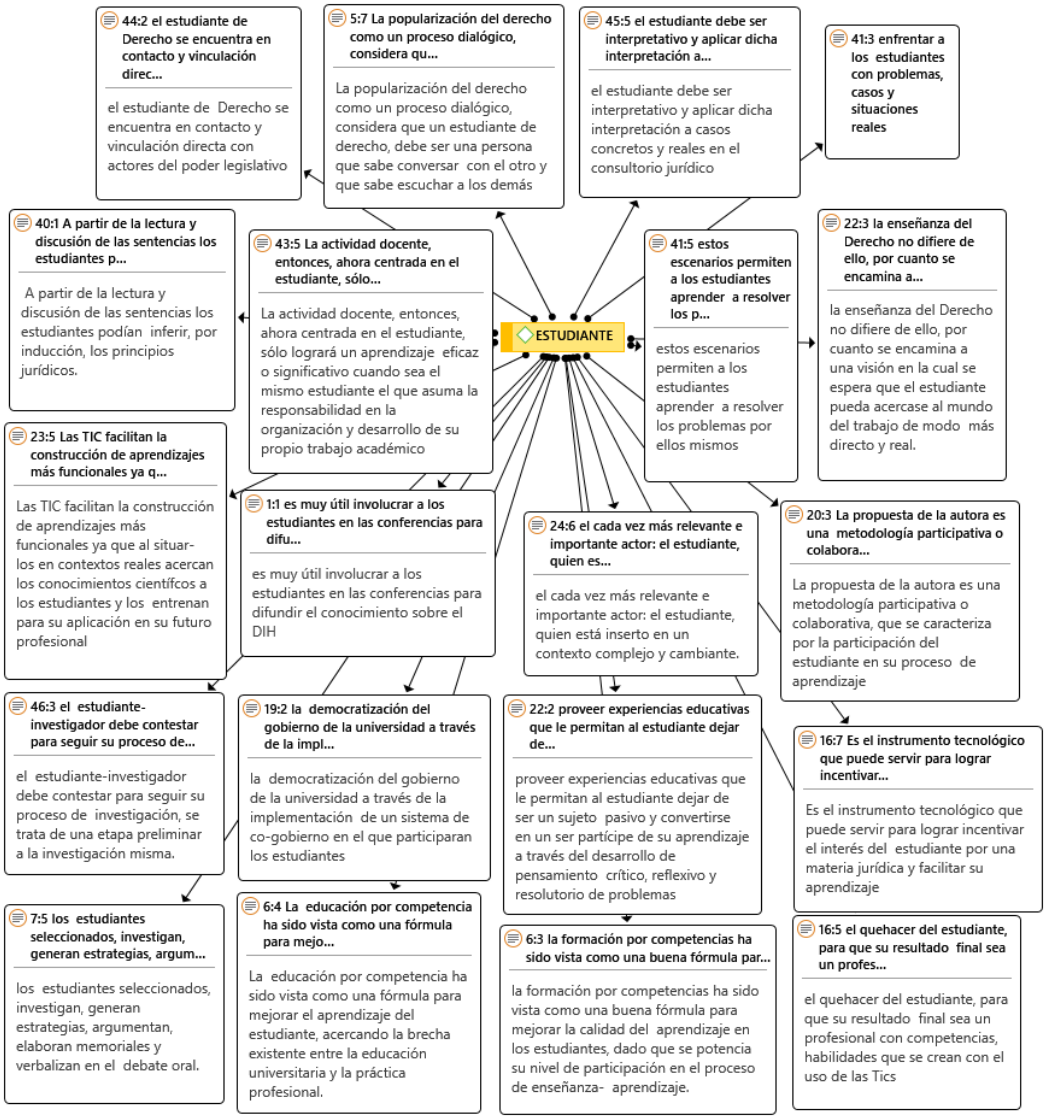

Figura 6: La concepción del estudiante según artículos de Scopus y Web of Science 2014-2018
Nota: Elaborado por los autores con base a los artículos analizados

Con las nuevas concepciones o paradigmas educativos, el rol del estudiante se empodera. Dialoga, transmite el derecho y sabe comprender a los demás, genera que el conocimiento jurídico traspase las aulas, asumiendo una actitud crítica, reflexiva (Duque, Quintero, Duque, 2016; Baraona, Cádiz, Villanueva, 2015); cumple un rol activo en la interpretación y aplicación del derecho que permita una transformación de su entorno (Illera, 2017); el estudiante identifica y resuelve problemas, casos concretos que tienen trascendencia social, política, desde el ámbito local y regional (en caso de Latinoamérica) a través de la clínica jurídica (Londoño-Toro y Torres-Villarreal, 2018); como actor del proceso de aprendizaje se enfrenta a un mundo complejo (Álvarez, 2014); su actuación se funda en el modelo por competencias que le permite acercar la formación universirsitaria a la actividad práctica, al mundo laboral concreto (Pinto, 2014; Baraona, Cádiz y Villanueva, 2015)

El estudiante se responsabiliza de su propio aprendizaje o de su formación académica, consolidando un aprendizaje perdurable, innovador (Becerra y Salas, 2015; Pérez, 2014; Cicero, 2018); esta actuación se complementa con el uso de la tecnología que permite o promueve su aprendizaje (Antúnez, 2018).

El protagonismo del estudiante no solo implica partipación activa en las aulas o en su entorno, sino también en la universidad actuando en el cogobierno de esta (Pezzetta, 2017) porque en la mayoría de ocasiones no es considerado en el gobierno de las instituciones superiores; también es relevante su actividad como investigador porque mejora su actuación en actividades jurídicas, en intervenciones orales que le permiten una actuación en el poder judicial que está directamente relacionado con su carrera (Cázares, 2017; Consolo, 2015; Díaz, 2015). En este sentido, también se debe involucrar en actividades académicas, específicamente en las conferencias sobre el Derecho Internacional Humanitario (Bashiriva, Mammadov y Ibragimov, 2018).

El tratamiento de la concepción del docente en los artículos analizados

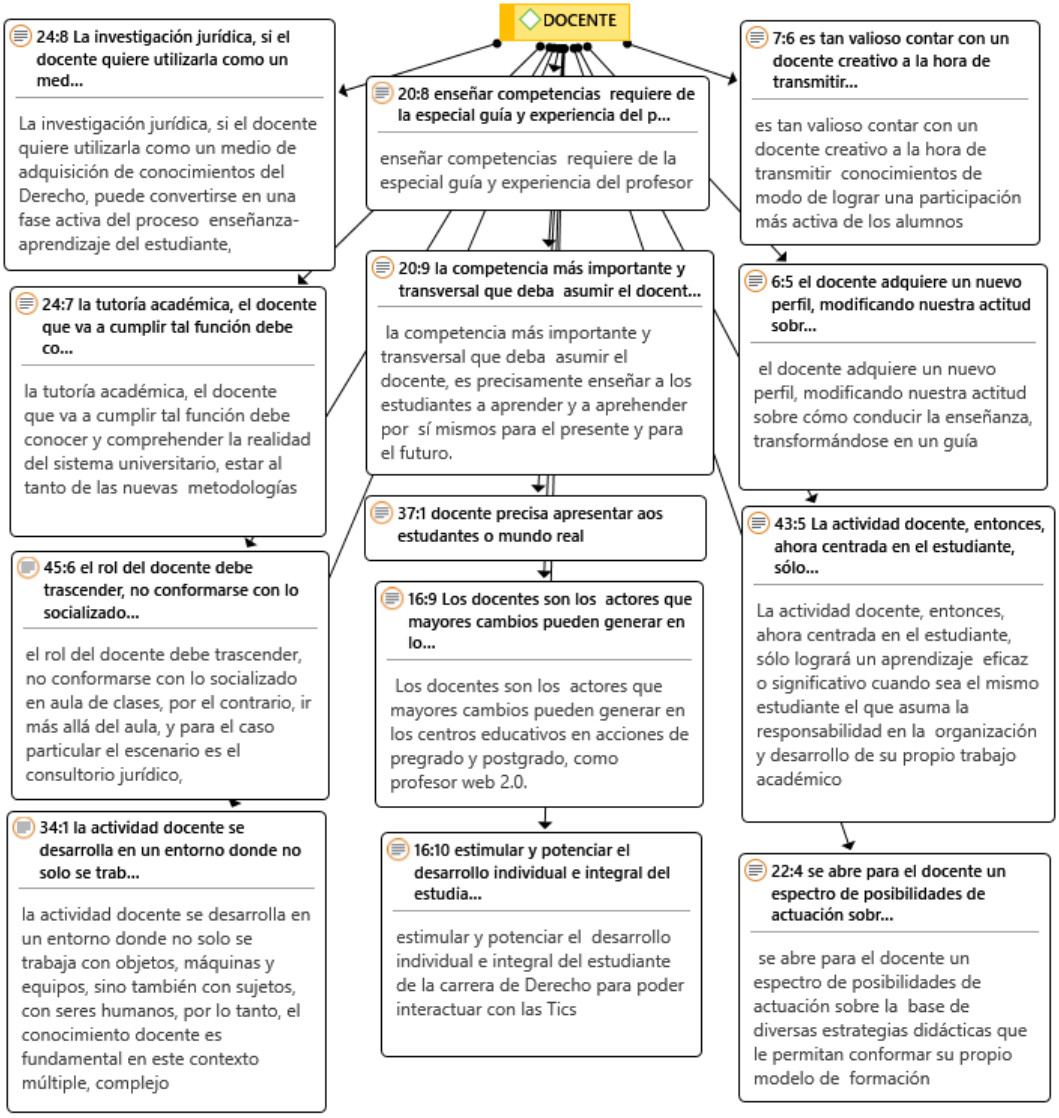

Figura 7: La concepción del docente según artículos de Scopus y Web of Science 2014-2018
Nota: Elaborado por los autores con base a los artículos analizados

En la figura 7, se evidencia que la responsabilidad del docente es orientar al estudiante para que aprenda por sí mismo, perdure en el tiempo y logre un aprendizaje efectivo (Pérez, 2014; Becerra y Salas, 2015); debe impatir su clase con actitud creativa para lograr la participación de los estudiantes, convertirse en un guía (Consolo, 2015; Pinto, 2014).

Debe aplicar una serie de estrategias metodológicas que le permitan formar con efectividad, también dominar pertinentemente las TIC o web 2.0 (Baraona, Cádiz y Villanueva, 2015; Antúnez, 2018); la actividad docente debe responder a un contexto diverso y complejo, que permita al estudiante acercarlo a su mundo real, más allá de las aulas universitarias (Ribero y Buzzi, 2018; Torres, 2016; Illera, 2017); también, recurrir a la investigación para desarrollar un aprendizaje acivo en el estudiante (Álvarez, 2014).

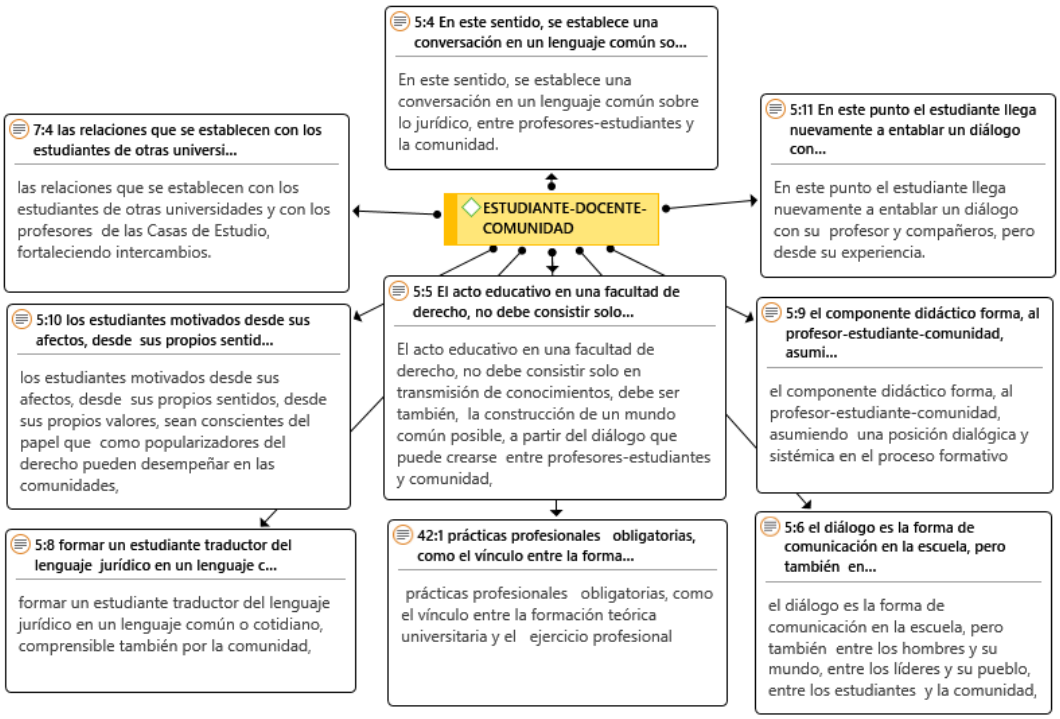

El tratamiento de la relación estudiante-docente-comunidad en los artículos analizados

Figura 8: La concepción estudiante-docente-comunidad según artículos de Scopus y Web of Science 2014-2018

Nota: Elaborado por los investigadores con base a los artículos analizados

Existe una interrelación entre estudiante-docente-comunidad o contexto a través del diálogo para integrar y compartir el lenguaje jurídico; nutrirse o enriquecer su formación desde la experiencia del docente (Duque, Quintero y Duque, 2016); asimismo, es relevante la relación con estudiantes de otras universidades con el fin de fortalecer las relaciones interinstitucionales (Consolo, 2015), así como también permita optimizar los nexos con sus futuros centros laborales.

Otra relación relevante es el vínculo entre la teoría que se imparte en las aulas y la práctica jurídica (Pérez Hurtado, 2018); resuelve el problema o el divorcio de la universidad con el ejercicio de la profesión, el contexto; aunque en los últimos años, la universidad sigue desvinculada de la empresa, del mundo laboral, por eso existe una serie de profesionales sin empleo.

El tratamiento de la concepción de evaluación en los artículos analizados

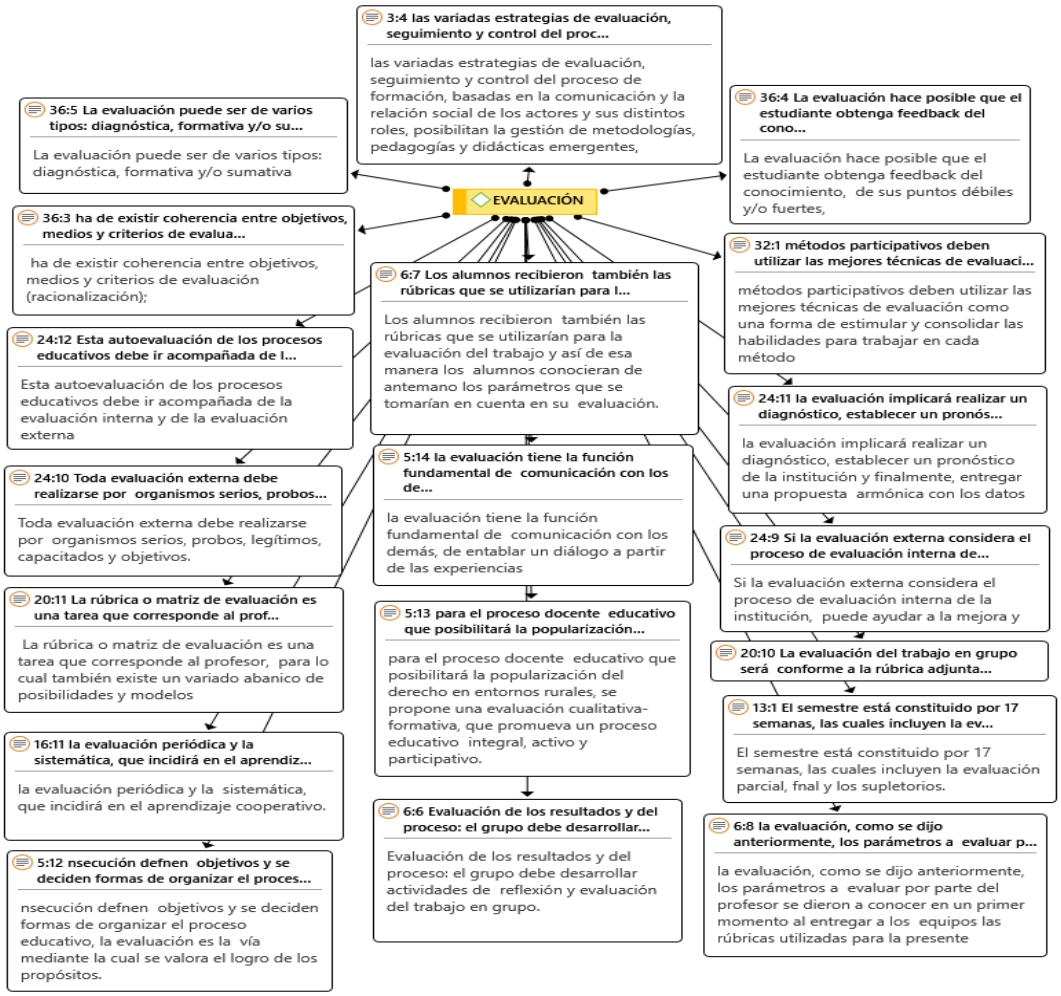

Figura 9: La concepción del sistema de evaluación en artículos de Scopus y WOS 2014-2018
Nota: Elaborado por los autres con base a los artículos analizados

La evaluación se enfoca como un sistema que establece una adecuada gestión y optimización en la formación del abogado (Silvera, Garcés y Pineda, 2018); se utiliza como un medio para realimentar o reforzar los aspectos que aún no ha comprendido el estudiante y que se debe establecer en base a criterios y objetivos a valorar (Gregorio Y Casas, 2014). La evaluación debe responder o concordar con cada tipo de estrategia o metodología (Vasconcelos, 2016).

Se propone una evaluación externa realizada por organismos confiables, preparados; otros sistemas de avaluación integral comprenden varios aspectos: la autoevaluación, la interna y externa con el propósito de mejorar la formación jurídica (Álvarez, 2014). También existen ciertas modalidades de la evaluación (por rúbricas) que no solamente analizan los resultados individuales, sino de grupo que valoran el aprendizaje colaborativo (Pérez, 2014; Antúnez, 2018); asi mismo, implica una reflexión grupal sobre la evaluación de proceso y de resultados (Pinto, 2014).

En el caso de la popularización del derecho se propone una evaluación cualitativa-formativa que promueve una formación jurídica íntegra, no solo se encarga de medir o valorar resultados sino de una interacción o diálogo de saberes, de experiencias (Duque, Quintero y Duque, 2016).

Discusión

Sobre Paradigmas

La temática, desarrollada en los artículos analizados, tiene correspondencia con otros planteamientos teórico-científicos; por ejemplo, Benfeld (2017) refiere el paradigma del acceso universal a la educación universitaria, se relaciona con los planteamientos de Guzmán-Valenzuela (2017), Ramos y López (2018) quienes establecen que la masificación ha ampliado la oferta, el acceso a la eduación superior. Se trata de una oportunidad que tienen las personas para educarse y mejorar sus condiciones de vida y de su entorno.

Otros resultados, que resaltan la importancia de las TIC en la educación jurídica (Álvarez, 2014; Cicero, 2018; Antúnez, 2018), se concatenan con las investigaciones de Espinosa-Munguía (2018), Aguiar, Velásquez y Aguiar (2019) al considerar que estas forman parte del desarrollo global centrado en la innovación, pero no solamente ello, sino que sirve de instrumento para realizar eficazmente procesos formativos y de investigación, por ejemplo, los programas para procesar datos científicos.

El paradigma sobre el desarrollo de las competencias propuesta por Pérez (2014), en el ámbito jurídico, tiene su correlato con el trabajo de Mesa (2018) quien estudia las competencias y su impacto internacional; es una tendencia global que implica aprender para hacer y demostrar a través de evidencias o resultados.

Sobre la concepción ética, en el ámbito jurídico, planteada por Catellanelli (2015), coincide con estudios recientes de Ortega y Romero (2018) quienes establecen no solo la ética, sino la responsabilidad ética y moral enfocada a resolver los problemas y mejorar las condiciones de vida.

Sobre currículo

Los resultados sobre el currículo, de los artículos analizados, estudian la pertinencia de este con la realidad, el logro de las competencias, el aporte de otras disciplinas, incluye en el proceso formativo a las TIC (Silvera, Garcés y Pineda, 2018; Gregorio y Casas, 2014; Benfeld, 2017; Castellanelli, 2015; Becerra y Salas, 2015; Aedo, 2014). Concuerdan con los estudios de Tobón (2017) quien argumenta que el currículo dede solucionar problemas concretos del entorno; los alcances de Delors (1994) quien considera que las competencias se orientan a saber hacer; los aportes de Llano, Gutiérrez, Stable, Núñez, Masó y Rojas (2016) que proponen la interdisciplinariedad para el estudio de una realidad compleja.

Sobre estrategias

Los resultados se correlacionan con los estudios o investigaciones desarrolladas en el "Congreso Internacional sobre Investigación en Pedagogía y Didáctica de Derecho" de la Universidad Nacional Autónoma de México, específicamente lo relacionado con la enseñanza creativa y constructiva que se concatena con la propuesta de Elgueta y Palma (2014) quienes proponen una clase magistral innovadora, creativa; en otros artículos del Congreso se enfatiza en la clínica jurídica que también ha sido desarrollada por Londoño-Toro y Torres-Villarreal (2018); otros estudios del Congreso enfatizan en la investigación en la enseñanza del derecho, propuesta que ha sido fundamentada por Álvarez (2014); las estrategias metacognitivas que permiten un aprendizaje reflexivo en el estudiante, también han sido desarrollados en investigaciones del Congreso y que tienen su correlato o parangón con el estudio de Massimino y Colombo (2016).

Otros resultados, se relacionan con los estudios publicados en la revista "Academia. Revista sobre Enseñanza del Derecho" y la "Revista de Educación y Derecho" donde se enfatiza en la enseñanza del derecho, por ejemplo, a través la literatura, el cine desde una perspectiva interdisciplinaria que tienen correlato con las propuestas desarrolladas por Marchiori y Vaz (2016) a través de su propuesta de cineclubismo; la propuesta de Cardinaux (2014) propone la lieratura como estrategia de enseñanza del derecho.

Sobre la concepión del estudiante, docente y su relación con el contexo

En el proceso de aprendizaje el estudiante tiene un rol preponderante con la orientación del docente. El estudiante debe aprender a aprender, aprender hacer, a convivir y a ser (Delors, 1996), aprender a resolver problemas de su entorno o contexto, el cual tiene correlato con los resultados o propuestas fundadas por Illera (2017) quien sostiene que el estudiante cumple un rol activo en la aplicación del derecho para transformar su entorno. También resuleve problemas (Londoño-Toro y Torres-Villarreal, 2018); se debe responsabilizar de su aprendizaje que sea perdurable

e innovador (Becerra y Salas, 2015; Pérez, 2014; Cicero, 2018); debe tener una actuación en el poder judicial (Cázares, 2017; Consolo, 2015; Díaz, 2015). Para que el estudiante logre un apredizaje efectivo, el docente debe responsabilizarse en la orientación del estudiante que aprenda por sí mismo (Pérez, 2014; Becerra y Salas, 2015).

Sobre la concepción de la evaluación

La evaluación es un sistema de verificación de los logros del estudiante, las evidencias de lo que conoce y de lo que aplica. En los estudios previos se ha estudiado la evaluación jurídica (en los documentos del "Congreso de la UNAM"), el sistema de evaluación desarrollada en manuscritos de la "Revista Pedagogía Universitaria y Didáctica del Derecho"; asimismo, la "Revista de Educación y Derecho" que ha difundido manuscritos referentes a la evalaución de la docencia superior. Estos alcances se concatenan con los resultados de los artículos analizados (Silvera, Garcés y Pineda, 2018) quienes establecen que la evaluación requiere una adecuada gestión y optimización en la formación del profesional en derecho. También se utiliza como un sistema para realiementar sobre lo que aún no ha compredido el estudiante (Gregorio y Casas, 2014). La evaluación no solo verifica el aprendizaje, sino que también permite hacer mejoras en el el proceso formativo (Álvarez, 2014) que involucre el diálogo, las experiencias (Duque, Quintero y Duque, 2016).

Conclusiones

Los artículos analizados enfatizan en el enfoque por competencias relacionado con la formación práctica del futuro profesional en derecho Las estrategias metodológicas, que más predominan en los artículos científicos, están referidas a la resolución de problemas, aspectos lúdicos, la conferencia trascendente, la investigación como estrategia de aprendizaje, el trabajo cooperativo o colaborativo.

El rol del docente está centrado en la planificación, orientación; el del estudiante, en mayor actividad o protagonismo y en permanente actividad o relación entre la teoría y la práctica que le permita comprender y transformar la realidad compleja.

El rol del docente es la de orientar al estudiante para que aprenda por sí mismo; en cambio, el estudiante debe tener un rol activo en su formación profesional para generar cambios o transformaciones en su entorno a través de la resolución de problemas.

El sistema de evaluación no solo valora o mejora el aprendizaje de los estudiantes, sino que optimiza su proceso formativo.

Los artículos analizados aportan desde la formación por competencias, la aplicación de estrategias activas, la actividad planificadora del docente, el protagonismo del estudiante, hasta la evaluación de los resultados de los estudiantes de derecho.

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Anexos

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La Capacité D'absorption: Sa Relation Avec L'ambidextrie Des Connaissances Et Ses Facteurs De Génération Dans Le Contexte De La Communauté Du Savoir

Souad NEFZI

Doctorante à la Faculté des Sciences Économiques et de Gestion de Tunis, Université de Tunis el Manar, Tunisie
Post-doctorante à l'Université du Québec à Montréal, Montréal, Canada
souad_nefzi@ymail.com

Samia KAROUI ZOUAOUI

Professeur de Management, Université de Tunis el Manar, Tunisie
Samia8860@gmail.com

Daniel TOMIUK

Département d'AOTI - École des Sciences de la Gestion
Université du Québec à Montréal, Montréal, Canada
tomiuk.daniel@uqam.ca

Abstract

L'absorption des connaissances permet aux organisations à balancer l'exploitation de connaissances existantes et l'exploration de nouvelles connaissances. Cette capacité organisationnelle est appelée l'ambidextrie dans la littérature. L'objet de cette étude est d'expliquer le rôle que l'absorption des connaissances joue dans le développement de l'ambidextrie. Pour ceci, nous distinguons entre la capacité d'absorption potentielle (CAP) et la capacité d'absorption réalisée (CAR). Les participants à notre étude sont des acteurs travaillant pour des compagnies d'assurances. Un questionnaire fût développé. Notre échantillon s'est élevé à n=288 répondants. Des analyses ont été effectuées à l'aide du logiciel SPSS. Les résultats confirment l'existence de communautés de connaissances dans le domaine de l'assurance. L'étude identifie aussi des facteurs qui favorisent la relation entre la capacité d'absorption et l'ambidextrie. Finalement, nos analyses révèlent que la CAP a un effet modérateur sur la relation positive entre la CAR et l'ambidextrie. Ceci est suivi d'une discussion des résultats.

Mots clés: Connaissances; Communauté de connaissance; Capacité d'absorption; Ambidextrie.

Introduction

Aujourd'hui, l'avantage concurrentielle et la survie d'une entreprise dépend des compétences et du savoir des acteurs qui y travaillent, de leur capacité à produire des connaissances individuelles, de leur collaboration dans la co-création de nouvelles connaissances et de l'exploitation de ces connaissances par l'intermédiaire d'un processus efficace de diffusion et de partage (Lu & Ramamurthy, 2011; Wilden, Gudergan, Nielsen & Lings, 2013; Mikalef & Pateli, 2017). En effet, le savoir-faire des acteurs travaillant dans l'entreprise permet de développer simultanément le processus de la capacité d'absorption. L'absorption des connaissances est la capacité organisationnelle à transférer, intégrer et utiliser de nouvelles connaissances (David, Keupp & Mermoud, 2020). L'absorption des connaissances améliore l'ambidextrie organisationnelle. Le terme 'ambidextrie' décrit le pouvoir d'utiliser les deux mains de façon efficace. Dans un contexte organisationnel, cela représente l'habilité d'une organisation à balancer deux capacités apparemment opposées; l'exploitation et l'exploration des connaissances (van Sandwijk, 2018). L'ambidextrie des connaissances est soutenue par la stratégie des entreprises qui sont toujours à la recherche de moyens à combattre la concurrence (Sambamurthy, Bharadwaj & Grover, 2003; Mikalef et al., 2016).

Nous choisissons la *communauté de connaissance* comme un contexte favorable au développement de la connaissance de type exploratoire et à la connaissance basée sur l'exploitation. Les travaux récents distinguent deux formes de

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communautés de connaissance; (a) les communautés de pratique et (b) les communautés épistémiques. Chacune de ces formes de communauté se mobilise suivant le processus de la capacité d'absorption; capacité d'absorption potentielle et capacité d'absorption réalisée. Celles-ci favorisent l'ambidextrie basée sur l'exploitation des connaissances existantes et sur l'exploration de nouvelles solutions. L'objet de cette recherche est de déterminer les facteurs qui génèrent la capacité d'absorption et d'expliquer le rôle que cette dernière joue dans le développement de l'ambidextrie (exploration/exploitation) dans les communautés de connaissance et ce à travers la réalité du domaine des assurances. La question principale soulevée dans cette étude est la suivante :

Quels sont les facteurs qui favorisent la relation entre la capacité d'absorption et l'ambidextrie dans les communautés des connaissances?

Pour répondre à cette question, nous allons:

- Analyser et décrire les phases de la capacité d'absorption que nous conceptualisons comme une trajectoire dynamique qui réunit un ensemble hétérogène de deux composantes; les connaissances d'exploration et les connaissances d'exploitation générées au sein de chaque type de communauté, et…
- Déterminer les facteurs d'influence qui favorisent la relation entre la capacité d'absorption et l'ambidextrie.

Communautés des Connaissances, Logique de la Capacité d'Absorption, et Ambidextrie: Une Dualité Cognitive entre l'Exploration et l'Exploitation des Connaissances

Dans une économie basée sur la connaissance, il est nécessaire de penser à de nouvelles formes de coordination des connaissances dispersées (Cohendet, 2014; Cohendet et Llerena, 1998). Selon Diani (2002), la forme de coordination appelée *communauté de connaissance* est considérée comme un mécanisme de coordination des connaissances dispersées qui permet leur transformation en connaissances partagées et échangées entre les individus de l'organisation (Cohendet et al. 2002). C'est de la communauté qu'émerge la connaissance et où sont développés de nouvelles informations.

En effet, Cohendet et al.(2006, p.22) définissent les communautés de connaissances comme « *des lieux d'apprentissage actif et délibéré »*. Ceci les distinguent des *« groupes fonctionnels* (qui) *sont essentiellement des lieux d'apprentissage passif, favorisant par exemple, l'apprentissage par l'usage et le 'learning by doing'»*. L'émergence de la communauté de connaissances se fonde sur *« la volonté des individus d'interagir pour transmettre, améliorer et/ou créer de nouvelles connaissances, et l'apprentissage qui constitue le fondement de ces modes d'interactions sociales»* (Merindool, 2007, p5).

Il existe deux formes des communautés des connaissances; (a) les communautés épistémiques et (b) les communautés de pratique. Selon Cohendet et al. (2006, p 36) *« (l)es communautés épistémiques sont des groupes d'agents partageant à la fois un but de création de connaissances et un cadre commun permettant l'appréhension collective de cette activité »*. En s'inspirant de travaux de Lave et Wenger (1991, p.98), Davel et Tremblay (1991), Goury et Spalanzani (2010) définissent les communautés de pratique comme *« un système d'activité sur lequel les participants partagent des compréhensions sur ce qu'ils font et sur ce que cela signifie dans leur vie et pour leur communauté. Ainsi, ils sont unis dans l'action et dans la signification que cette action a, aussi bien pour eux-mêmes que pour une collectivité plus large »*.

La contribution des communautés de connaissance à l'ambidextrie des connaissances

Selon Adler et Heckscher (2011), les communautés de connaissance apparaissent comme un mécanisme de coordination et de collaboration entre personnes désireuses de s'engager ensemble dans la réalisation d'un objectif cognitif spécifique par le biais de conventions pour un meilleur partage de connaissances. L'analyse de deux principales formes de communautés autonomes et séparés a pour fonction principale l'exploration et l'exploitation des connaissances. Ainsi, la façon de gérer simultanément l'exploitation et l'exploration au sein de l'entreprise renvoie à la notion d'ambidextrie organisationnelle (O'Reilly & Tushman, 2013; Boumgarden et al., 2012; Junni et al., 2013; Birkinshaw & Gupta, 2013; Blindenbach-Driessen & Ende, 2014; Popadic, Cerne & Milohnic, 2015).

Dans le champ de la gestion des connaissances, les deux pratiques d'exploration et d'exploitation sont liées à la génération de la connaissance. Elles sont considérées comme deux activités typiques de recherche de la connaissance où l'exploitation réfère au meilleur usage de connaissances existantes alors que l'exploration renvoie à l'acquisition de nouvelles connaissances (Li et al,. 2006). L'exploitation représente l'innovation qui est liée aux actifs déjà existants

de l'organisation et se concentre principalement sur l'amélioration et l'efficience de processus existants. L'exploitation des connaissances est menée pour mieux répondre aux besoins des clients et des marchés actuels et cherche à améliorer les produits et services existants. L'exploration, quant à elle, est un type d'innovation qui demande à l'organisation d'examiner de nouvelles manières de faire les choses, de nouveaux marchés, nouveaux produits et des nouveaux modèles d'affaires qui ne lui sont pas familiers. D'un point de vue gestion, l'exploration représente un plus grand défi car ce type d'innovation oblige les gestionnaires à s'aventurer sur un territoire qui lui est largement inconnu). L'exploration inclue le développement et l'acquisition de nouvelles technologies et ressources et vise à générer de la variation. Elle requière de la recherche, de la prise de risques, de l'expérimentation et de la flexibilité organisationnelle (O'Reilly & Tushman, 2013; Gonzalez & Massaroli de Melo, 2018).

L'ambidextrie des connaissances fait référence au fait que les organisations doivent être capable de combiner ces deux types d'apprentissage organisationnel. Ceci est un défi car l'exploration et l'exploitation nécessitent des structures et cultures organisationnelles différentes. L'exploration requiert de l'improvisation et de l'adaptation et est donc associée à une structure plus organique et des systèmes qui ne sont pas rigides. Comparativement, l'exploitation est plus souvent associée à des structures mécaniques, à de la routine, au contrôle et à de la bureaucratie (Gonzalez & Massaroli de Melo, 2018).

Le recours aux communautés de pratique et épistémiques en tant qu'espèces d'action collective enrichit la réflexion sur l'intérêt apporté par ces dernières en matière de transfert des connaissances par le mécanisme de la capacité d'absorption qui se situe au cœur de l'activité collective, ainsi que celui apporté par la capacité d'absorption en matière d'ambidextrie. De ce fait, l'accent est mis sur le rôle de la capacité d'absorption comme un mécanisme essentiel de coordination dans les communautés de connaissance qui favorise l'ambidextrie des connaissances à travers un processus de transfert des connaissances.

La capacité d'absorption : un processus à la base de l'exploitation et de l'exploration des connaissances

La définition de Zahra et George (2002) ouvre une voie intéressante sur ce qu'est la capacité d'absorption. Ces derniers reformulent le modèle d'origine de Cohen et Levinthal (1989) et définissent la capacité d'absorption comme « the ability of a firm to recognise the value of new external information, assimilate it, and apply it to capabilities » (p. 128).

Selon Van Den Bosch et al. (2005), la capacité d'absorption d'une organisation est constituée de trois composantes; (a) son aptitude à reconnaître la valeur de la connaissance externe, (b) son aptitude à l'assimiler, et (c) son aptitude à capitaliser sur ces connaissances pour des fins commerciales. Zahra et George (2002) proposent une re-conceptualisation de la capacité d'absorption selon un modèle dynamique à travers lequel les entreprises acquièrent, assimilent, transforment et appliquent les connaissances (Camisón et Forés 2010). Ils proposent une conceptualisation de la capacité d'absorption en distinguant la capacité d'absorption potentielle (CAP) et la capacité d'absorption réalisée (CAR).

La capacité d'absorption potentielle (CAP) regroupe les dimensions de l'acquisition de connaissances telles que la capacité à valoriser les connaissances (comme le soulignent Cohen et Levinthal, 1990) et la capacité d'acquérir et d'assimiler des connaissances. La capacité d'absorption réalisée (CAR), quant à elle, consiste en la transformation et l'application des nouvelles connaissances avec des connaissances déjà existantes (Andrawina et al., 2008; Camisón & Forés, 2010; Koubaa & Amamou, 2010)).

Selon Cohendet et al. (2006), le processus de la capacité d'absorption est produit de manière croissante dans les communautés des connaissances à travers la génération, l'accumulation et la distribution des connaissances. « L'ensemble des communautés du savoir peut être ainsi vu comme des sources d'unités d'absorption diverses qui forment la base de la capacité d'absorption de la firme et permettent à cette dernière d'exploiter et de bénéficier de la diversité des connaissances ». Il convient de souligner que le processus de la capacité d'absorption par ses différentes étapes d'acquisition, d'assimilation, d'exploitation, et d'exploitation favorise les connaissances à travers l'exploration et l'exploitation des connaissances (Cohendet et al., 2006, p.163).

CA potentielle et exploration des connaissances

Pour Zahra et George (2002), la capacité d'absorption potentielle renvoie à l'acquisition et l'assimilation. Ce processus de la capacité d'absorption, selon Lane et al. (2006) se réfère spécifiquement à l'exploration des connaissances. Cette dernière consiste en la recherche d'un nouvel ensemble d'activités et va essentiellement conduire au développement de nouvelles compétences qui n'existaient pas précédemment dans l'organisation (Daghfous,

2004). Pour ce faire, en partant des travaux d'Arbussa et Coenders (2007), l'exploration des connaissances dans le cadre de la capacité d'absorption potentielle comprend deux étapes essentielles: reconnaître les connaissances externes et les assimiler.
Szulanski (1996) donne importance à la connaissance antérieure et déjà existante. Cette dernière est nécessaire pour créer des nouvelles connaissances. En effet, les organisations ont préalablement besoin des deux composantes de la connaissance : les connaissances acquises pour une application particulière et les connaissances technologiques pour reconnaître les sources des connaissances externes et les assimiler (Zahra & George, 2002; Lavie et al., 2010; Narasimhan et al., 2006).

Cassiman et Veugelers (2006), soulignent que l'exploration des connaissances par l'acquisition de la connaissance externe nécessite moins de ressources. Ainsi, la recherche des nouvelles connaissances externes d'après Lichtenthaler (2009) et Gupta et al. (2006), réduit la rareté des ressources internes et facilite l'analyse des contraintes imposées.

CA réalisée un processus d'exploitation des connaissances

La capacité d'absorption réalisée se réfère au processus de transformation et d'exploitation de connaissances (Zahra & George, 2002). En partant de l'idée de March (1991), la conception de l'exploitation repose sur l'utilisation continuelle des connaissances et des compétences existantes dans des processus de production existants. Ainsi, la connaissance doit être transformée, maintenue et réactivée entre les membres puis intériorisée à nouveau par leurs expériences pour être exploitée par la suite (March & Stock, 2006; Lichtenthaler, 2009). En somme, le processus de transformation de la capacité d'absorption renvoie à deux étapes essentielles. Il s'agit, à la fois, de maintenir les connaissances assimilées et de réactiver ces connaissances par la pratique (Lane et al., 2006; March & Stock, 2006). La connaissance par exploitation consiste à transformer et à mettre en pratique des connaissances assimilées qui peuvent être maintenue pendant des années jusqu'à ce qu'elle soit finalement appliquée de nouveau (March, 1991; Lane et al., 2006; Todorova & Durisin, 2007).

La Relation de la Capacité d'Absorption avec l'Ambidextrie et ses Facteurs de Génération dans les Communautés du Savoir

La capacité d'absorption et l'ambidextrie des connaissances

Il existe une relation directe et significative entre la capacité d'absorption et l'ambidextrie des connaissances (Jansen, 2005; Huany, 2008; Datta, 2009; 2010). Jansen (2005) explique que la capacité d'absorption affecte l'ambidextrie car c'est un moyen qui favorisant l'équilibre entre l'exploration et l'exploitation. Il décrit la capacité d'absorption selon deux dimensions : (a) la capacité d'absorption potentielle et (b) la capacité d'absorption réalisée. Les entreprises qui se concentrent sur l'acquisition et l'assimilation de nouvelles connaissances provenant de l'externe (*c.-à-d.*, la capacité d'absorption potentielle) sont capables de renouveler leur stock de connaissances. Malheureusement, ceci engendre souvent des coûts d'acquisition (Zahra & George, 2002) ce qui peut décourager certaines entreprises à s'y investir significativement. En revanche, les entreprises qui se concentrent principalement sur la transformation et l'exploitation des connaissances déjà acquises (*c.-à-d.*, la capacité d'absorption réalisée) peuvent souvent réaliser des profits à court terme grâce à une exploitation plus efficace des connaissances acquises mais ces entreprises risquent de tomber dans un piège car elles ne développent pas suffisamment de nouvelles compétences pour répondre aux changements environnementaux lorsque ceux-ci se présentent (Ahuja & Lampert, 2001).

La capacité d'absorption réalisée joue un rôle important pour favoriser l'interaction de l'ambidextrie au niveau de l'exploration et de l'exploitation (Jansen, 2005; Jansen et al, 2005; Todorova & Durisin, 2007; Zahra & George, 2002). En effet, la capacité d'absorption réalisée est susceptible d'influencer la performance grâce à l'innovation. Todorova et Durisin (2007) ont montré que la transformation des connaissances existantes, facilite la combinaison de connaissances et le développement de nouveaux schémas de perception et des propositions de changements à des connaissances existantes, aux processus, et même aux technologies (voir aussi Van den Bosch et al, 1999). L'exploitation est alors à la base de la capacité d'absorption réalisée et celle-ci sert à améliorer les connaissances existantes (Van den Bosch et al, 1999; Jansen, 2005; Jansen et al, 2005; Todorova & Durisin, 2007; Datta, 2009; 2010). La capacité d'absorption réalisée est essentielle dans le processus d'innovation. De plus, la transformation et l'exploitation des connaissances peuvent approfondir les connaissances et les compétences existantes, et améliorer l'efficacité de l'exploitation à l'avenir (Datta, 2009; Lane & Lubatkin, 1998; Jansen, 2005).

Zahra et George (2002) démontre que la capacité d'absorption réalisée permet de filtrer à travers les connaissances existantes et ainsi diminuer les coûts qui leurs sont associés (voir aussi Jansen, 2005; Jansen, et al, 2005). La capacité

d'absorption réalisée peut aussi aider à développer et traiter plus efficacement les connaissances acquises nouvellement de l'extérieure, permetant ainsi à l'organisation de poursuivre l'exploration. Dans cette optique, Datta (2009; 2010) démontre que l'exploration est améliorée par une combinaison d'une meilleure interprétation des connaissances existantes et ainsi que des connaissances acquises nouvellement de l'extérieur.

La capacité d'absorption réalisée est associée positivement à l'équilibre entre l'exploration et l'exploitation. D'où l'hypothèse H1 suivante :

H1 : La capacité d'absorption réalisée agit positivement sur l'ambidextrie des connaissances.

Un parcours de la littérature de Levinthal et March (1993) permet d'affirmer que le déroulement de l'exploitation des connaissances nécessite de la recherche et le développement des nouvelles connaissances. L'acquisition et l'assimilation des connaissances externes est un attribut de la capacité d'absorption potentielle se basant sur des connaissances existantes (Datta, 2009).

La capacité d'absorption potentielle est essentielle pour renouveler les stocks de connaissances d'une entreprise, ainsi que pour développer des résultats novateurs qui diffèrent sensiblement de connaissances existantes (Van den Bosch, et al, 1999; Jansen, 2005; Jansen et al, 2005; Todorova & Durisin, 2007). L'exploration qui provient de l'externe nécessite l'acquisition et l'assimilation des connaissances externes (Jansen, 2005; Jansen et al. 2005). Ces dernières, à leur tour, contribuent à une nouvelle capacité pour poursuivre l'exploration des connaissances (Datta, 2009; 2010). En revanche, Jansen et al, (2005), Van den Bosch et al, (1999) et Zahra et George (2002) soulignent tous que les entreprises qui ne sont pas en mesure de poursuivre avec succès l'exploration sont celles qui ont une difficulté à acquérir et à absorber de nouvelles connaissances externes (Datta, 2009; 2010).

De cette littérature, on peut retenir que la capacité d'absorption potentielle modère positivement l'impact de la capacité d'absorption réalisée sur l'ambidextrie (Datta, 2009). Bien que, la capacité d'absorption potentielle augmente les connaissances acquises, l'exploitation reste basée sur les connaissances actuelles. Par conséquent, il y a un approfondissement et élargissement des connaissances et des compétences qui se réalisent (Van den Bosch et al., 1999; Zahra & George, 2002; Jansen, 2005; Jansen et al., 2005).

D'un point de vue intra-organisationnel, le développement de la capacité d'absorption potentielle est susceptible de borner la transformation et l'exploitation des connaissances (Datta, 2009; 2010). Les travaux de Jansen (2005), Jansen et al. (2005), Van den Bosch et al. (1999) ainsi que de Zahra et George (2002) démontrent l'importance des différents aspects de la capacité de coordination, le système et la capacité de socialisation (la capacité combinatoire). Ces derniers permettent d'augmenter la capacité d'absorption potentielle, contrairement à la capacité d'absorption réalisée. C'est pourquoi, les organisations ont besoin d'une faible formalisation et de divers réseaux avec une certaine centralité modérée pour augmenter la capacité d'absorption potentielle. Alors que, pour la capacité d'absorption réalisée, les organisations ont besoin de divers réseaux avec une formalisation et une centralisation élevée (Datta, 2009; 2010).

L'acquisition et l'assimilation de nouvelles connaissances nécessitent la recherche des nouvelles ressources (Jansen, 2005; Jansen et al., 2005). Ces ressources sont différentes des ressources mobilisées pour l'exploitation où l'on a besoin de ressources pour améliorer des produits, des services et des technologies. Ainsi, pour accroître leur capacité d'absorption potentielle, les entreprises sont susceptibles d'entraver des tâches ou des opérations dans l'organisation pour développer efficacement l'exploitation.

Par conséquent, la capacité d'absorption potentielle modère négativement la relation entre la capacité d'absorption réalisée et l'ambidextrie (Datta, 2009; 2010). D'où la combinaison de l'effet de modération de la capacité d'absorption potentielle sur l'effet de la capacité d'absorption réalisé (Datta, 2009; 2010) dans l'exploration et l'exploitation. On obtient ainsi l'hypothèse H2 suivante :

H2 : La capacité d'absorption potentielle modère la relation entre la capacité d'absorption réalisée et l'ambidextrie des connaissances.

Facteurs de générations de la capacité d'absorption dans les communautés du savoir

Nous cernons le concept de la capacité d'absorption dans un contexte communautaire. Sur la base de la littérature, nous avons déterminé les facteurs qui favorisent le processus de la capacité d'absorption dans les communautés du savoir pour développer l'ambidextrie. Conformément à la littérature, nous avons trouvé deux facteurs principaux.

Ces deux facteurs nous ont permis de décrire et d'expliquer la manière dont les communautés du savoir explorent, absorbent et exploitent les connaissances à travers la confiance relationnelle et l'interaction sociale. Ces deux facteurs peuvent aider au développement de la capacité d'absorption. Nous explorons ces facettes dans les sections suivantes.

La Confiance Relationnelle

La confiance a été un sujet de débat et d'intérêt dans la philosophie et les sciences sociales. Fukuyama (1995), dans son *bestseller* intitulé *« Trust : The Social Virtues and the Creation of Prosperity »*, affirme que « la confiance représente les attentes qui se constituent, au sein d'une communauté régie par un comportement régulier, honnête et coopératif, fondé sur des normes habituellement partagées, de la part des autres membres de cette communauté. » (p. 26).

Gubbins et Mac Curtain (2008) soulignent le débat existant quant à la définition du rôle de la confiance dans le capital social. Celle-ci semble être un élément principal pour la coopération et un mode principal de coordination des relations. Sans confiance, la coopération est limitée aux activités qui sont faciles à surveiller simultanément. En outre, les gens qui travaillent ensemble, se font plus facilement confiance et vont plus facilement échanger avec les autres (Gubbins et MacCurtain, 2008).

De nombreuses études (Luo, 2008; Liu 2012) fournissent des conceptualisations de la confiance et ses conséquences sur l'échange en tant que mécanisme puissant pour toute relation interne et externe de l'organisation. Pour Certains auteurs la confiance est définie comme l'ensemble des croyances que le collaborateur d'échange possède au sujet de la crédibilité et de la bienveillance des autres collaborateurs (Cavusgil et al., 2004). L'accent est mis sur l'aspect de la crédibilité de la confiance et de la bienveillance en tant que deux dimensions importantes. Des résultats empiriques dévoilent les avantages de la perception de la bienveillance lors des échanges commerciaux (Kong et al., 2014). Conséquemment, la confiance facilite les collaborations efficaces dans les relations entre les parties concernées pour créer une ambiance favorable d'apprentissage (Dyer et Singh, 1998; Dodgson, 1993). En effet, la création d'un climat de confiance favorable, améliore l'efficacité organisationnelle interne et facilite la poursuite de bonnes relations inter-organisationnelles. Les niveaux et la nature des relations de confiance entre les membres orientent ainsi l'attention sur la collaboration, l'échange d'informations entre les membres, l'acquisition des connaissances nouvelles et l'exploitation des connaissances existantes (Dodgson, 1993). La confiance favorise donc le développement des transactions entre les parties et encourage la collaboration ouverte. Elle facilite l'interaction entre les membres pour une meilleure accumulation et partage des connaissances ainsi que l'apprentissage inter- et intra-organisationnel à travers l'instauration d'un climat d'échange social favorable. Ceci améliore le rendement collectif et réduit la dépendance des organisations envers des ressources externes dans lesquels l'organisation a possiblement moins confiance (Luo, 2008).

Nahapiet et Ghoshal (1998) font valoir que la confiance intragroupe est un facteur important dans l'échange et la combinaison d'informations. Ces mêmes auteurs affirment que la confiance crée l'anticipation de la valeur par l'interaction sociale avec les autres, et donc, motive les personnes à approfondir leurs relations par la poursuite d'interactions (Moran, 2005). Lorsque les niveaux de confiance sont élevés, les gens sont généralement plus susceptibles de s'engager dans l'échange social et l'interaction coopérative (Nielsen, 2002; 2007). La confiance augmente la coopération, améliore la flexibilité, réduit le coût de la coordination des activités et fait augmenter le niveau de transfert des connaissances, stimulant ainsi l'échange et l'apprentissage (Nielsen, 2007).

Nielsen (2002; 2007) souligne que c'est à cause de l'importance des relations de confiance personnelles que, les idées partagées et les expériences continuent à jouer un rôle important dans la collaboration. Dans le cas d'apprentissage relationnel collectif, il est également possible que la confiance soit une condition préalable nécessaire pour le partage de connaissances. Elle influe le processus de partage des connaissances en faisant augmenter le transfert de connaissances du fait que les membres sont prêts à partager les informations avec seulement ceux en qui ils font confiance et qu'ils utilisent les informations d'une manière digne de confiance (Gubbins & MacCurtain, 2008; Li, 2005).

Par conséquent, la confiance facilite le développement des relations sociales qui réduisent, par conséquent, l'incertitude lors de nouvelles transactions. En tant que telle, la confiance augmente l'accès de l'entreprise à la connaissance externe et renforce sa capacité à la collaboration avec son réseau de partenaires pour créer de nouvelles connaissances et combiner ces capacités avec les ressources existantes (Gubbins & MacCurtain, 2008).

Des interactions fréquentes intra- et inter-organisationnelles aident également l'organisation à augmenter leur capacité d'absorption en promouvant la création et le transfert de connaissances tacites. De plus, la confiance relationnelle est

considérée comme ayant un effet important et efficace à faire augmenter l'impact de la capacité d'absorption sur l'ambidextrie, car elle renforce la relation pour la création de nouvelles connaissances et l'exploitation des connaissances existantes (Liu 2012; Luo, 2008; Gubbins & MacCurtain, 2008; Nielsen, 2007; Li, 2005; Nahapiet & Ghoshal, 1998). Ainsi, nous émettons les deux hypothèses H3a et H3b suivantes **:**

H3a: La confiance relationnelle agit positivement sur la capacité d'absorption potentielle pour favoriser l'ambidextrie.

H3b: La confiance relationnelle agit positivement sur la capacité d'absorption réalisée pour favoriser l'ambidextrie.

L'interaction Sociale

Selon Tsai et Ghoshal (1998), les interactions sociales ou les liens sociaux sont des canaux pour obtenir des flux d'information et échanger des ressources. Grâce aux interactions sociales, un acteur peut avoir l'accès aux ressources d'autres acteurs. Pour Wei, Zheng et Zhang (2011), les liens d'interaction sociale représentent la force des relations, la quantité de temps passé, et la fréquence de communication entre les membres. L'interaction sociale joue un rôle essentiel dans la définition des objectifs communs et de valeurs et aussi dans le partage de ces objectifs et des valeurs entre les membres d'une organisation (Chang & Chuang, 2011). La littérature sur la socialisation organisationnelle de Tsai et Ghoshal (1998) souligne l'importance de l'interaction sociale informelle pour aider les individus à apprendre les valeurs de l'organisation. Grâce au processus de l'interaction sociale, les acteurs se rendent compte et adoptent les langues, les codes, les valeurs et les pratiques de leurs organisations. Dans ces acteurs socialisés peuvent également créer de nouveaux ensembles de valeurs ou de nouvelles visions sur la base de leurs intérêts communs et la compréhension mutuelle.

L'intensification de l'interaction sociale entre les membres en interne ou externe de l'organisation fait accroître les connaissances acquises en renforçant la capacité de l'entreprise à reconnaître, acquérir et évaluer les connaissances pertinentes (Lane & Lubatkin, 1998; Sui-Hua, 2013), et par extension, les transformer, les échanger et les absorber tout au long du processus de transfert des connaissances (Renko et al., 2001).

L'approche basée sur la connaissance considère les organisations comme des communautés sociales spécialisées dans la création et le transfert de connaissances. La cohésion sociale autour d'une relation a une influence sur la volonté et la motivation des individus à investir du temps, de l'énergie et de l'effort dans le partage des connaissances avec les autres. En effet, l'apprentissage et la capacité d'absorption sont fréquemment cités comme des explications effectives de transfert de connaissances, tout en mettant l'emphase sur le rôle de la connaissance commune, et le rapprochement relationnel, et soulignant l'importance de la force des liens (Reagans & McEvily, 2003). Par l'interaction sociale, une connaissance commune facilite le transfert des connaissances dans le processus de capacité d'absorption. Les individus apprennent de nouvelles idées, et les associent avec celles déjà acquises. Les origines de la connaissance et de l'expérience commune peuvent ainsi varier. Les individus trouvent plus facile d'absorber de nouvelles idées dans les domaines où ils ont une certaine expertise, et ont plus de difficultés d'absorber de nouvelles idées en dehors de leur zone de compétences immédiates. Par conséquent, la connaissance est plus susceptible d'être transférée entre les personnes ayant des caractéristiques similaires de formation (Reagans & McEvily, 2003).

Chang et Chuang (2011) notent que les interactions sociales émergent, évoluent, se développent et se débouclent au fil du temps. En outre, les relations sociales fournissent des canaux de communications qui permettent de réduire le temps et les efforts nécessaires pour recueillir des informations. Le partage des connaissances est relativement facile à atteindre et à maintenir lorsque les réseaux ont des liens solides et directs entre leurs membres (Chang & Chuang, 2011; Suseno et al., 2006). L'interaction sociale lie les membres d'une communauté et fournit un moyen rentable de partage de connaissances (Chang & Chuang, 2011). Plus les interactions sociales se construisent et se développent, plus l'intensité, la fréquence et l'étendue des connaissances échangées va se développer.

La connaissance observable ou explicite est relativement facile à obtenir par des efforts passifs tel que, l'apprentissage interactif qui permet à une entreprise de s'approcher suffisamment de la source pour acquérir les composantes les plus profondes des connaissances (Lane & Lubatkin, 1998). En substance, l'interaction sociale facilite l'acquisition de connaissances et l'apprentissage relationnel par la création intense, et l'interaction répétée. Elle renforce la capacité des individus à reconnaître et à évaluer les connaissances externes pertinentes, pour les transformer et les exploiter (Yli-Renko et al, 2001). Plus l'interaction sociale est développée, plus elle offre un terrain propice basée sur des systèmes de technologie spécialisés, des résultats en matière d'information spécialisée, et du savoir-faire (Lane et Lubatkin, 1998).

En intensifiant la fréquence, l'étendue et la profondeur de l'échange d'informations, l'interaction sociale augmente la relation spécifique de la connaissance commune. La connaissance commune, à son tour, augmente la capacité d'absorption parce que la capacité d'une entreprise à acquérir de nouvelles connaissances dépend de la possession préalable de connaissances liées (Cohen & Levinthal, 1998). Ainsi, la capacité de chaque membre à absorber les connaissances apprises et communiquées est renforcée par l'interaction sociale répétée. Cette dernière fournit un meilleur accès et une meilleure compréhension des activités et offre des moyens plus efficaces de communication. Les individus sont relativement plus motivés à investir dans le partage des connaissances incarnées dans des routines. Ainsi, en amplifiant les activités de partage des connaissances, l'interaction sociale sert à augmenter la capacité relative des connaissances externes et l'efficacité de l'individu pour apprendre et absorber ces connaissances externes de manière efficace (Reagans & McEvily, 2003; Yli-Renko et al., 2001; Lane & Lubatkin, 1998).

À la lumière de cette analyse nous émettons les hypothèses H4a et H4b suivantes :

> H4a: L'interaction sociale agit positivement sur la capacité d'absorption potentielle pour favoriser l'ambidextrie.
>
> H4b: L'interaction sociale agit positivement sur la capacité d'absorption réalisée pour favoriser l'ambidextrie.

Le modèle de recherche proposé (voir Fig 1) illustre nos hypothèses. Il montre que l'impact de la capacité d'absorption des connaissances sur la capacité d'absorption réalisée est modéré par l'activation de la capacité d'absorption potentielle. Ainsi, des facteurs de génération de la capacité d'absorption peuvent favoriser le développement de transfert des connaissances au sein des communautés (voir annexe).

Méthode de Recherche

Notre travail se situe dans un paradigme positiviste selon une logique hypothético-déductive. Il a pour objet l'explication du fonctionnement des capacités d'absorption en tant que mécanisme de coordination et de collaboration basé sur le transfert des connaissances qui favorise l'ambidextrie au niveau de l'exploration et d'exploitation des connaissances dans les communautés du savoir.

Nous avons développé un questionnaire qui est l'outil le plus fréquemment utilisé pour la collecte des données dans la recherche en sciences de la gestion. Les items sont tous de type Likert (Usunier et al., 2000). Nous avons choisi les compagnies d'assurance comme terrain d'investigation. Ce choix est justifié par des résultats découlant d'une première étude exploratoire effectuée en 2014. Cette étude exploratoire avait démontré l'existence réelle de communautés de connaissances dans le domaine de l'assurance. Nos répondants sont des acteurs qui travaillent dans les compagnies d'assurances offrant des protections contre les dommages. La taille de l'échantillon s'est ainsi élevée à n=288 membres.

Mesure des variables et validation des échelles de mesure (AFE, AFC)

Pour valider notre modèle de recherche, nous avons utilisé en premier lieu des instruments de mesure qui ont été construits et préalablement validés par d'autres chercheurs. Après la détermination de la définition opérationnelle et des items de mesure, une purification des données collectées par l'analyse factorielle exploratoire (AFE) a été exécutée et une analyse de la fiabilité a été réalisée grâce au logiciel SPSS.

Par la suite, une analyse factorielle confirmatoire (AFC) est nécessaire pour compléter l'analyse factorielle exploratoire (AFE). Cette étape est nécessaire pour l'ajustement du modèle complet et la vérification des hypothèses par la méthode des équations structurelles. Les résultats de l'AFC seront présentés en cohérence avec nos deux niveaux d'analyse correspondant chacune à un sous-modèle. Le premier sous-modèle **(M1)** regroupe les relations causales entre les facteurs de génération de la capacité d'absorption potentielle et réalisée au sein des communautés du savoir. Il s'agit de la confiance relationnelle et l'interaction sociale. Pour les analyses, plusieurs indices d'ajustement ont été utilisés. Les valeurs présentées dans la table 1 (en annexe) montrent que la qualité d'ajustement du sous-modèle M1 est satisfaisante.

Le sous-modèle **(M2)** regroupe l'ensemble des relations directes et indirectes entre la capacité d'absorption réalisée et l'ambidextrie des connaissances, modéré de la capacité d'absorption potentielle. Les valeurs présentées dans la table 2 (en annexe) montrent que la qualité d'ajustement du sous-modèle M2 est satisfaisante.

Fiabilité et validité des échelles de mesure des sous-modèles (M1) et (M2)

Tous les coefficients du sous-modèle (M1 et M2) sont positivement corrélés à la variable latente à laquelle ils contribuent et aucune valeur relative aux variances des erreurs de mesure des items n'est négative ou supérieure à 0,8. Une analyse factorielle confirmatoire de second-ordre (AFC) est lancée sur les items relatifs à toutes les variables qui composent notre modèle de recherche. Par ailleurs, le calcul de la valeur du Rhô de Jöreskog et celle du Rhô de validité convergente (Rhô de vc aussi appelé *Average Variance Extracted* ou *AVE* en anglais) indique que cette échelle présente une forte fiabilité (voir table 3). De plus, la validité discriminante est établie car les valeurs des Rhô de validité convergente (Rhô de vc) sont presque toutes supérieures à 0,5.

Tests des hypothèses de recherche

Test des effets des facteurs de génération de la capacité d'absorption (M1)

Les résultats de l'analyse de données empiriques (table 4) montrent un effet positif de la confiance relationnelle sur la capacité d'absorption (potentielle et réalisée). La valeur-t supérieur à 1,96 démontre que la relation est significative.

Au terme de cette présentation des résultats des tests des hypothèses relatives au premier sous-modèle (M1), il apparait que les hypothèses **H3a, H3b, H4a et H4b** de l'effet des deux facteurs (confiance relationnelle et interaction sociale) sur la capacité d'absorption potentielle et réalisée sont totalement confirmées.

Test de l'effet direct de la CAR sur l'ambidextrie des connaissances et rôle modérateur de la CAP (M2)

Il existe un effet direct positif de la capacité d'absorption réalisée sur l'ambidextrie des connaissances (table 5). D'où la confirmation de l'hypothèse **H1**.

L'hypothèse H2 indique que la relation causale entre la capacité d'absorption réalisée (CAR) et l'ambidextrie des connaissances change en fonction de la variable de modération (CAP). En somme, la capacité d'absorption potentielle (CAP) affecte la force de la relation entre la CAR et ambidextrie.

Le coefficient de régression de l'ambidextrie des connaissances ($R^2 = 0,55$) a augmenté par rapport à l'effet direct de capacité d'absorption réalisée sur l'ambidextrie des connaissances ($R^2 = 0,36$) suite à l'intervention de la capacité d'absorption potentielle. Ce qui démontre le pouvoir explicatif de la modération par la capacité d'absorption potentielle de la relation entre la capacité d'absorption réalisée et l'ambidextrie des connaissances. Nous pouvons ainsi avancer que lorsque la CAP augmente (diminue), l'effet positif de la CAR sur l'ambidextrie des connaissances lui aussi augmente (diminue) de manière proportionnelle (table 6). À la lumière de ces résultats, nous pouvons conclure que la capacité d'absorption potentielle modère la relation entre la capacité d'absorption réalisée et l'ambidextrie des connaissances. D'où la confirmation de l'hypothèse **H2.**

Discussion des Principaux Résultats de la Recherche

Comme le stipule la littérature, nous présentons également les rôles des principaux facteurs dans la réalité du domaine des assurances. La confiance, une caractéristique relationnelle des processus cognitifs sociaux, est à la base du développement des communautés de connaissances dans le domaine des assurances. La présence de liens de confiance entre les membres améliore la qualité du climat de travail au sein de l'industrie des assurances. Ce climat explique la présence d'un dialogue culturel, qui a un effet positif sur le renforcement de la confiance relationnelle, il permet aux individus de s'exprimer à travers l'échange, de développer leurs interrelations pour accroître leurs connaissances. Il permet un rapprochement entre les membres, favorise la créativité, l'initiative personnelle et l'esprit d'équipe.

D'après les recommandations de plusieurs auteurs (par ex., Liu, 2012; Luo, 2008; Gubbins & MacCurtain, 2008; Nielsen, 2007; Li, 2005; Nahapiet & Ghoshal. 1998), le travail en équipe au sein des assurances favorise l'entente entre les individus. Le travail en équipe augmente le degré de confiance qui représente un repère collectif pour mettre des lois nouvellement créées pour les adapter et les appliquer à la vie quotidienne des parties concernées. Avoir confiance entre les membres dans les assurances c'est pouvoir se réunir ensemble, partager volontairement ses acquis

et travailler avec sincérité et transparence pour favoriser le transfert des connaissances. Cela rend le climat agréable au sein des groupes communautaire pour propose des lois et des règles et discute avec le siège.

Le facteur confiance relationnelle apparait comme déterminant et est considéré comme étant relié à l'ouverture d'esprit des individus. Les résultats empiriques convergent avec les travaux de Liu (2012) pour laquelle la confiance est un mode principal de coordination des relations. Elle est nécessaire pour gérer efficacement le transfert des connaissances et rendre les communautés au sein des assurances plus performantes en stimulant le processus de la capacité d'absorption.

Un manque de confiance amène à l'absence d'un dialogue culturel et un blocage d'échanger les connaissances entre les membres cela peut détruire la relation car la confiance est la base des relations humaines fortes. Sans confiance, il n'y a pas d'interaction ni de regroupement. Les relations par le biais d'intra personnelles font partie de la vie quotidienne de toutes les assurances, la confiance caractérise les relations entre les individus, aucun membre du groupe ne peut créer une loi non institutionnalisée d'autrui, cela permet de faciliter la communication et favoriser l'efficacité.

L'analyse du deuxième facteur d'influence fait ressortir le fait que l'interaction sociale affecte positivement la capacité d'absorption potentielle et réalisée. Ce résultat rejoint les analyses de Chang et Chuang (2011), Sui-Hua (2013) et Wei, Zheng et Zhang (2011). Ces chercheurs ont constaté que l'intégration de l'interaction sociale dans le processus de transfert de connaissances, joue un rôle primordial dans le développement et le maintien de la capacité d'absorption potentielle et réalisée.

La confiance est à la base des interactions sociales. Le développement des interactions sociales est dépendant de la volonté des acteurs de s'impliquer dans un processus de socialisation par le biais des interactions inter personnelles. L'interaction est une opportunité pertinente pour communiquer entre les membres, échanger leurs connaissances et exploiter celles créées par les autres membres de la communauté.

L'existence de la communauté des connaissances au sein des assurances prouve l'existence des interactions sociales à travers lesquels elles vont s'influencer les unes avec les autres pour améliorer des relations interpersonnelles et favoriser le développement cognitif lors de transfert des connaissances. D'après les témoignages avancés, l'interaction est une forte cohésion sociale qui permet à ses membres au sein des assurances de collaborer pour accroître les connaissances acquises en renforçant la capacité de l'entreprise . à reconnaître, acquérir et évaluer les connaissances pertinentes. La qualité des connaissances crées dépend de la variété des expériences individuelles mises en interaction (Cohendet et al, 2006).

Les résultats empiriques sont consistants avec les recommandations de Reagans et McEvily (2003), Renko et al. (2001) et Lane et Lubatkin (1998). L'interaction et la collaboration entre les membres au sein des assurances représentent une source de création des connaissances nouvelles et l'exploitation des connaissances déjà existantes. L'atteinte d'un objectif commun ou spécifique est plus susceptible de se produire lorsque les membres sont bien réunis ensemble. Les membres au sein des assurances mettent l'accent sur l'importance de développer leur vision. Ils fournissent un effort pour changer les valeurs et les croyances qui marquent leur contexte en cherchant potentiellement à s'engager mutuellement, plutôt que de chercher l'intérêt personnel.

Dans le domaine des assurances, l'accent est mis sur l'importance de partage qui est basé sur des interactions et des échanges fréquents entre les membres, ce qui facilite le travail collectif. Ce dernier permet d'améliorer le processus de collecte des connaissances et de développer la capacité d'acquérir, d'assimiler, de transformer et d'exploiter la connaissance chez chaque employé afin d'en tirer profit dans le cadre d'une collaboration communautaire bien organisée.

L'effet direct de la capacité d'absorption réalisée sur l'ambidextrie des connaissances

À la lumière des résultats empiriques obtenus, nous rejoingnons les travaux de Jansen (2005), Huany (2008), Datta (2009; 2010) et Lavie et al. (2010) quant à l'effet positif de la capacité d'absorption réalisée sur l'ambidextrie des connaissances. En effet, les résultats obtenus montrent que la réalité des compagnies d'assurance coïncide avec le point de vue de ces auteurs. Ces derniers montrent que les connaissances qui proviennent de l'extérieur se transforment par les membres, en facilitant la combinaison des connaissances et le développement de nouvelles idées et des propositions de changements des connaissances déjà existantes.

L'effet modérateur de la capacité d'absorption potentielle sur la relation directe entre la capacité d'absorption réalisée et l'ambidextrie des connaissances

Après vérification de la validité du lien directe entre la capacité d'absorption réalisée (CAR) et l'ambidextrie des connaissances, les résultats empiriques obtenus concordent avec les travaux des plusieurs auteurs (par ex., Jansen, 2005; Huany, 2008; Datta, 2009; 2010 et Lavie et al., 2010). La capacité d'absorption potentielle (CAP) joue un rôle modérateur. Elle renforce/affaiblit la relation directe entre la capacité d'absorption réalisée (CAR) et l'ambidextrie des connaissances (AC). Lorsque la capacité d'absorption réalisée agit sur l'ambidextrie de connaissances, en privilégiant l'exploration, la capacité d'absorption potentielle renforce cette relation. L'acquisition et l'assimilation des connaissances externes (qui sont des attributs de la capacité d'absorption potentielle) jouent le rôle du renforçateur et s'intègrent pour améliorer les connaissances existantes (CAR) en créant des connaissances nouvelles. Dans le cas où la capacité d'absorption réalisée agit sur l'ambidextrie des connaissances en privilégiant l'exploitation, la capacité d'absorption potentielle affaiblie la relation. En effet, l'exploitation des connaissances absorbe des connaissances déjà existantes, quand la CAP s'intègre, elle affaiblie la relation, car l'ambidextrie des connaissances dans l'exploitation absorbe directement les connaissances qui sont nouvellement créées.

Conclusion

L'objet de la présente recherche consistait à analyser le processus de la capacité d'absorption à travers lequel deux formes de communautés de connaissances favorisent différemment l'ambidextrie des connaissances en mettant l'accent sur la logique d'exploitation et d'exploration. À travers une revue de la littérature, nous avons envisagé que la capacité d'absorption réalisée (CAR) favorise le développement de la connaissance d'exploitation destiné à générer de simples améliorations dans l'offre existante et que la capacité d'absorption potentielle, par le développement de la connaissance exploratoire, conduisent à l'exploration de nouvelles solutions. Nous avons aussi expliqué que le développement de la capacité d'absorption dans les communautés du savoir est associé à la confiance relationnelle adoptée par l'entreprise, et le degré de développement des interactions sociales. L'analyse de la réalité dans le domaine des assurances nous a permis de retenir les quatre hypothèses théoriques préalablement élaborées**.**

Les caractéristiques dégagées sont les suivantes : à travers la confiance relationnelle et l'interaction sociale, la capacité d'absorption est jugée cruciale pour développer l'ambidextrie des connaissances selon deux logiques. L'exploitation et l'exploration conduisent nécessairement à l'exploration de nouvelles offres et certainement à l'amélioration de l'existant.

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Annexe

Élaboration du modèle conceptuel :

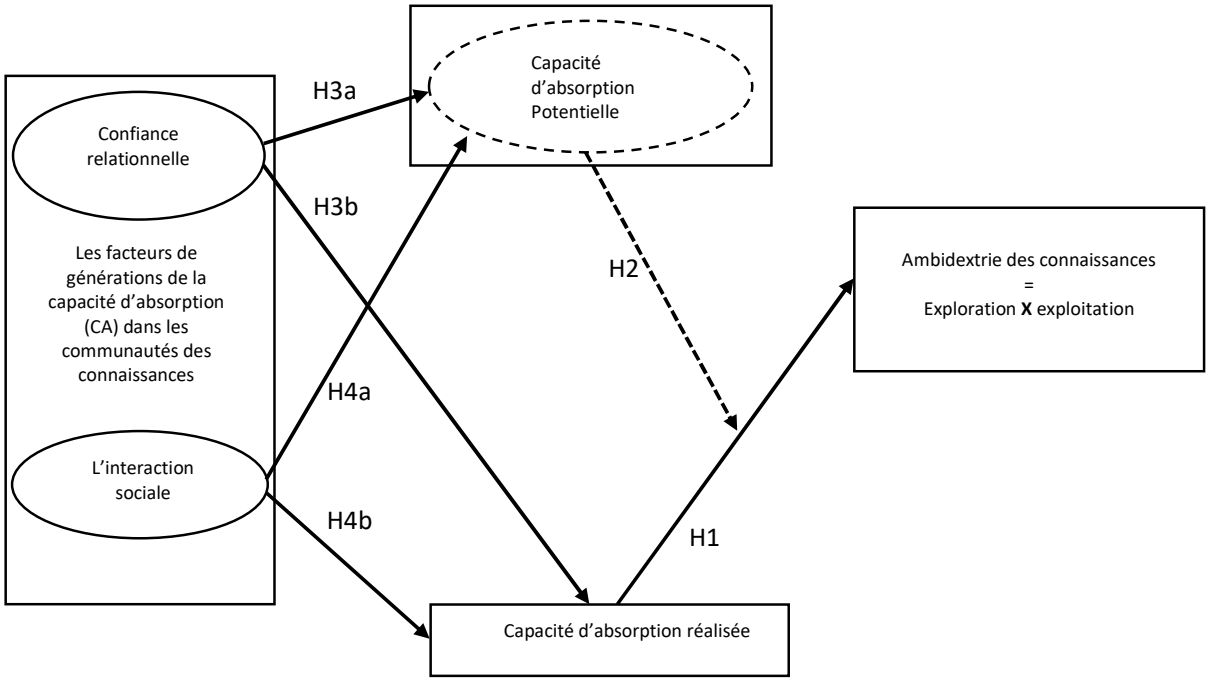

Fig. 1 : La capacité d'absorption: Sa relation avec l'ambidextrie des connaissances et ses facteurs de génération dans le contexte de la communauté des connaissances

Table 1: Les indices d'ajustement relatifs au sous-modèle M1 de validation

Indices d'ajustement	*GFI*	*AGFI*	*RMSEA*	*NFI*	*CFI*	*χ^2 normé*
Acceptation si indice…	*Proche de 1*	*Proche de 1*	*<0,08*	*> 0,9*	*> 0,9*	*<5*
Valeurs des indices d'ajustement pour M1	*0,93*	*0,89*	*0,041*	*0,95*	*0,96*	*1,38*

Table 2 : Les indices d'ajustement relatifs au sous-modèle M2 de validation

Indices d'ajustement	*GFI*	*AGFI*	*RMSEA*	*NFI*	*CFI*	*χ^2 normé*
Acceptation si indice…	*Proche de 1*	*Proche de 1*	*<0,08*	*> 0,9*	*> 0,9*	*<5*
Valeurs des indices d'ajustement M1	*0,92*	*0,89*	*0,072*	*0,89*	*0,87*	*2.50*

Table 3 : Fiabilité et validité du modèle des variables des facteurs de génération de la capacité d'absorption et la relation de cette dernière avec l'ambidextrie des connaissances

Variable	*Valeur de Rhô de Jöreskog (ou Rhô de ksi)*	*Rhô de validité convergente (Rhô de vc)*
Confiance relationnelle	*0,760*	*0,454*
Interaction sociale	*0,847*	*0,491*
Acquisition	*0,818*	*0,550*
Assimilation	*0,895*	*0,595*
Transformation	*0,864*	*0,685*
Exploitation	*0,929*	*0,816*
Ambidextrie des connaissances	*0,957*	*0,691*

Table 4 : Test des effets des facteurs de génération de la capacité d'absorption (M1)

Hypothèses	*Indices d'ajustement*	*Coefficient de régression (CR)*	*Valeur-t significative si >1,96*	*R^2*
H3a: La confiance relationnelle agit positivement sur la CAP pour favoriser l'ambidextrie	*GFI= 0,93 AGFI= 0,89 RMSEA= 0,041 NFI=0,95 CFI= 0,96 X²/df=1,38*	*0.74*	*7.236*	
H3b: La confiance relationnelle agit positivement sur la CAR pour favoriser l'ambidextrie		*0.68*	*8.387*	
H4a: L'interaction sociale agit positivement sur la CAP pour favoriser l'ambidextrie		*0.62*	*4.543*	
H4b: L'interaction sociale agit positivement sur la CAR pour favoriser l'ambidextrie		*0.51*	*6.366*	
Capacité d'absorption potentielle (CAP)				*0.39*
Capacité d'absorption réalisée (CAR)				*0.64*

Table 5 : Test de l'hypothèse de l'effet direct de la CAR sur l'ambidextrie des connaissances

Hypothèses	*Indices d'ajustement*	*Coefficient de régression (CR)*	*Valeur-t significative si >1,96*
H1 : La capacité d'absorption réalisée agit positivement sur l'ambidextrie des connaissances.	*GFI=0,92 AGFI=0,89 RMSEA=0,072 NFI=0,89 CFI=0,87 X²/df =2,50*	*0,31*	*2,463*
L'ambidextrie des connaissances		*0,36*	

Table 6 : Test de l'effet de modération de la CAP sur la relation entre CAR et l'ambidextrie

Condition 1 : CR= 0,33 significatif car valeur-t = 8,41 est supérieur à 1,96
Condition 2 : CR= 0,46 significatif car valeur-t = 9,11 est supérieur à 1,96
Condition 3 : La modération est pure car l'effet de la capacité d'absorption potentielle sur l'ambidextrie des connaissances CR= 0,04 est non significatif car valeur-t = 0,32 inférieur à 1,96
R2 : 0,55 pour l'ambidextrie des connaissances

Content Marketing in The Context of Brand Building

Lubica GAJANOVA

University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Department of Economics, Univerzitna 1, Zilina, Slovakia, lubica.gajanova@uniza.sk

Abstract

The development of technologies and the Web 2.0 environment have influenced the behavior of content producers and consumers as well and made it necessary to change marketing concepts. Content marketing is a current trend that brings benefits to companies and their clients, moving in a digital world flooded with redundant information. It does not force products or praise the seller, but focuses on the needs and interests of (potential) customers. Content marketing can be a useful tool for a brand building or strengthening. The aim of the paper is to focus on the concept of content marketing and examining its link to the brand building process. The paper presents a summary and analysis of various secondary data of scientific as well as practical nature. The results of the analysis clearly show that a well-designed brand-driven content strategy achieves the goals set naturally and so we can consider the use of content marketing in the context of brand building as justified.

Keywords: Content Marketing, Brand Building, Brand-Driven Content Strategy.

Introduction

The theme of content marketing is very topical nowadays. However, it is important to realize that this is not a completely new thing, on the contrary, this concept goes back a long way. The famous phrase "content is the king", spoken by Bill Gates in 1998, is familiar to almost every marketer who is interested in this field. The goal of content marketing is to create valuable and relevant content for customers, thus increasing their loyalty and trust (Valaskova and Krizanova, 2008). In general, content marketing is used to achieve marketing goals through unsaleable content, which is based on a strategy stem from detailed definition of the target audience. In today's risky world (Buc et al, 2013; Olah et al., 2019), characterized by digitization and new technologies (Mihăilă et al., 2018), this concept is taking on new dimensions and there are more and more opportunities to use it effectively to educate customers, build relationships and trust, and increase brand authority.

Brand-driven Content Strategy

Bloomstein (2012) presents a simple Venn diagram as the starting point for the concept of a brand-driven content strategy. This contrasts “Brand Values” on the one hand and “Audience Needs” on the other. The interface forms the “added value” and at the same time describes the communication goals of a brand-driven content strategy.

While brand values can easily be defined from an inside-out perspective, the situation is different with target group needs. Bloomstein (2012) thinks that these could be based on baseline user (customer) research. From the author's point of view, this kind of research is not an option in this context, but rather a critical success factor. Furthermore, these user research should go fundamentally beyond baseline and provide detailed information about the points at which so-called "moments of truth" occur within a customer journey. Kalbach (2017) describes it latter aptly: They are critical, emotionally charged interactions, and usually occur when someone has invested a high degree of energy in a desired outcome. Moments of truth either make or break a relationship.

Simmons et al. (2007) very similarly identified four pillars of Brand-driven Content Strategy: (1) understanding customers; (2) marketing communications; (3) customer interactions; (4) valuable content.

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Understanding customers as the first pillar can be identify with personalization and adaptation to their needs. Marketing communication is a desirable element for strengthening the brand's position in the market. In this concept, it deviates from one-sided communication and prefers dialogue (interaction) with customers. However, when creating brand equity, Simmons et al. (2007) emphasize the last of the four pillars and argue that valuable and relevant content can help companies build a strong brand, develop unique positioning, and maintain relationships based on trust and loyalty.

Brand-driven Content Strategy Framework

A brand-driven content strategy helps increase brand equity with the help of communication content and defines the framework for the communicative management of a brand. It also has the task of bringing together the content needs of the user (outside-in) and the interests of the brand (inside-out) so that relevant business goals (such as increasing brand equity) can be achieved. The model developed by Sommer (2017) defines the scope of a brand-driven content strategy, building on the one hand on existing theories of leading brand experts such as Keller (2013), Simmons et al. (2007) and on the other hand on the existing model from Bloomstein (2012). This approach should make it possible to better combine the two disciplines of brand management and content strategy and to create a mutual understanding of the existing interactions.

The model is based on the two terms "Points of Difference" and "Points of Parity" established in scientific brand literature (Keller et al., 2011; Kotler, 2009; de Chernatony, 2011) and links them to Bloomstein's Venn diagram (Bloomstein, 2012). Points of parity embody the expectations of the economically relevant target group (right-hand circle segment without the "added value"). Points of Difference (overlapping area of brand characteristics and target group needs), on the other hand, represent relevant, beneficial differentiating features of a brand. These are benefits of a brand, which go beyond the expectations of the target group and must be reflected in the core and in the communication of the brand. “Added Value” (points of difference) arises where brand characteristics and target group needs overlap. This goes beyond the expectations of the target group (points of parity) and is divided into functional and emotional benefits. At the same time, the added value also forms the basis for the communication goals (successful communication of differentiating features) of a brand-driven content strategy and marks the area in which people and brands can resonate with one another and where a “Shared Mental Model” can develop (de Chernatony, 2010; Champniss and Vila, 2011).

In order to systematically integrate the added value presented in the brand-driven content strategy framework into the communicative management of a brand, the tools of various brand and content strategy experts can be applied and combined. In the following, the most useful tools of implementing a brand-driven content strategy are described that can create and maintain a state of resonance between people and brands and thereby contribute to relevant corporate goals.

Tools of implementing a brand-driven content strategy

To strengthen market positioning, the goal of every marketer should be to combine brand perception with a strong and compelling story. Storytelling can express brand positioning in a way that can engage customers in person and arouse emotions in them (Samuel, 2015). This method can be applied across all content marketing tools and its use is preceded by a process of understanding and defining of the target audience (Zak, 2014).

Content on a blog is one of the most effective content marketing tactics in building customer loyalty and trust and strengthening brand positioning. It can include articles, surveys, interviews, reviews, case studies or even graphic, video or other interactive content. A study by Impact Branding & Design states that for almost 50% of marketers, content on a blog is a key content tool. At the same time, it states, blogs are among the five most trusted sources of online information for users. However, for a successful blog, it is important to know your customers (Sukhraj, 2017). Similar conclusions are drawn from the HubSpot study, which emphasizes the following: (1) a blog increases website traffic if it is properly optimized for search engines; (2) a blog contributes to the transformation of website visitors into potential customers if it satisfies their needs; (3) a blog builds a company's authority and credibility (Wainwright, 2018). Another study talks about the importance of linking the blog with other content marketing tactics, especially video. It argues that placing video in blog articles will make posts more dynamic and involve more people (Gotter, 2017).

Thanks to the video, it is easier for consumers to remember the brand and remember it even after a long time. The study concludes that videos strengthen brand positioning and allow repeatability and continuity (eg in the form of podcasts). They also increase web traffic and work well on all personal devices (Bowman, 2017). The importance of video as a content marketing tool is growing. According to a HubSpot study (2020), a video will account for 80% of all web traffic in two years. Adding a video to a newsletter or blog article will increase your click-through rate by

up to 300%. The 90% of consumers say that demo videos of products have helped them with their purchasing decisions. According to the Ascend2 study (2015), up to 51% of marketers rated testimony and tutorials as the most effective for building a brand. The mentioned demo videos are also considered highly effective (49%) (Griwert, 2015).

Social networks can be considered a distribution channel for content marketing. The second view emphasizes the possibility of understanding specially adapted content on social networks as one of the possible tactics of content marketing. The conclusions of the Content Marketing Institute (2020) study, according to which social networks are one of the most used content marketing tools to build brand awareness, also correspond to this concept. The effectiveness of content on the social networks within a brand building was examined by Gunelius (2011). He found that it is a more economical way of marketing than traditional marketing. It enables direct communication, audience involvement and effectively builds brand awareness. According to him, most marketers use the golden 80/20 rule when creating content on social networks, where about 80% of the content has a non-sales character, while offering additional value for the customer. Additionally, another study shows that user-generated content on social networks causes 6.9 times more involvement than corporate content (Gottbrecht, 2017).

Unlike social networks, email newsletters serve as a support tool for other content tactics and their distribution. According to a CMI study, an email newsletter can build an audience, gaining and deepening better customer engagement and long-term brand loyalty (Harris, 2016).

The goal of infographics that relates to product or service is both the education of readers and the transmission of useful information or building brand awareness on multiple platforms (CMEX, 2014). Researches have shown that visual data is absorbed faster than an ordinary text data and that is why infographic has 45% effectiveness as a content marketing tactic (Lasquite, 2015).

Conclusion

The aim of the paper was to examine the connection between content marketing and the brand building process. The paper presents a summary and analysis of various scientific sources that have demonstrated content marketing as a strategic marketing activity based on the creation of valuable relevant non-sales content for a well-defined audience. At the same time, the Brand-driven Content Strategy Framework was emphasized, explaining the combination of brand management and content strategy, which represents a mutual understanding of the existing interactions. The paper also devoted space to the description of secondary data of practical nature, which presents the most useful tools of implementing a brand-driven content strategy, which can create and maintain a state of resonance between people and brands and thereby contribute to relevant corporate goals. Therefore, in the brand building process, content is considered an important component of the whole process. Valuable and relevant content can help companies create a strong brand through stories, develop and strengthen unique positioning, and maintain relationships based on trust and loyalty. An important condition for effective brand building with the help of content marketing is a compelling story built around the brand and consistency in the content created, which is based on this story.

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Concept Design of Strategic Management for Non – Profit Organization in Slovakia

Eva KICOVA,
University of Zilina, Department of Economics, FPEDAS, Univerzitna 8215/1, 010 26 Zilina, Slovakia,
Eva.Kicova@fpedas.uniza.sk,

Olga PONISCIAKOVA,
University of Zilina, Department of Economics, FPEDAS, Univerzitna 8215/1, 010 26 Zilina, Slovakia,
Olga.Ponisciakova@fpedas.uniza.sk

Abstract

Society in one country consists of three sectors - private, public and non-profit coexist and influence and complement each other. We include in the private sector all companies and various companies established for the purpose of making a profit. The non-profit sector is usually referred to as the third sector. It represents the part of the company that controls the activities not offered or insufficiently prepares the first two sectors. The tertiary sector has an irreplaceable function in every state. The very functioning of non-profit organizations that operate in the market will be long-term. Only in this way can they fulfil their purpose in society. For this reason, we focused on the strategic management of these companies, in order to create a conceptual proposal for strategic management for non-profit organizations. We used the methods of analysis, synthesis and interrogation for the chosen goal. We consider the most important benefit of the proposed concept of strategic management for non-profit organizations to be a real opportunity to put their strategy into practice and thus support their successful fulfilment of their mission and vision.

Keywords: Management, Strategic Management, Non-Profit Organization.

Introduction

The mission of non–profit sector is fulfilling tangible and intangible needs of society, that state and business sector is not able to, or cannot fulfil. It points out problems in society, which are important for society-wide changes. The mission of tertiary sector is perceived from multiple views. Economists perceive tertiary sector as an institutional solution to deficiencies in state and market, political scientists rather emphasize the mediatorial function of tertiary sector between state and market and neo-corporatist theories perceive tertiary sector as a border between state and society that relieves tension and political conflicts. Tertiary sector has an irreplaceable function in every state. The actual functioning of non-profit organisations suggests that their function in market will be long-lasting. Only then can they fulfil their purpose in society. For this very reason, we focused our efforts on strategic management of these companies and based on interviews with managers of selected non-profit organisations, we have devised a concept design of strategic management for non-profit organisations.

Specifics of strategic management in non-profit organisations in Slovak Republic

According to Gavurova, we differentiate five basic functions in non-profit organisations. The first is advocacy function that formulates and interpret political requests of citizens, which enforces and defends rights and interests of citizens and individual interest groups (Gavurová, B. 2011). Expressive function of non-profit organisations points out, defends and strengthens cultural, ethnical, religious and linguistic differences of individual interest groups. The community building function provides an opportunity for individuals to participate in social life and thus build the natural responsibility of citizens for life in village, neighbourhood or city. Non-profit organisations provide services and public goods that are not provided by state. These are mainly social, educational, humanitarian and legal services. In Slovakia, about one third of all organisations perform this function, within the EU, it is about two thirds. We refer to this as a service function. The innovative function of non-profit organisations is very

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important. The third sector is an environment in which social innovations and social experiments, that there is no place in state and business environment for, are conducted. From them, the state can then choose the ones it considers to be the most promising. From the state's point of view, the opinion forming function is very important. Non-profit organisations are usually a great source of thoughts, new procedures and ideas. They offer new, more flexible ways of solving social problems, but they also create moral or ideological visions that prevent new social changes. Non-profit organisations also fulfil the function of political socialisation, because they are a kind of training field in which people learn democratic principles, learn to motivate, lead people, discuss and train in the roles of "homo politicus". They encourage the creation of a new legislative environment adds 3 more functions to these basic functions. He attributes to non-profit organisations the role of so-called "watch-dogs", which together with the media and political parties oversee compliance with democratic rules and thus assigns them the so-called control function. Non-profit organisations provide feedback and make it possible to correct mistakes in society (Mason, D. et al., 2018). They resolve conflicts and fulfil the function of prevention, especially in ethnic and racial areas. They also contribute to conflict prevention trough international programs focused on cooperation and understanding. The last function of non-profit sector is the reproduction of social wealth (Ansoff, 1976). Therefore the non-profit organisations are necessary for the government of each state.

However, strategic management is closely related to the concept of management. Strategic management is the process of specifying the goals of the organisation, developing policies and plans to achieve these goals and allocating resources to implement the plans. It provides the overall direction of the whole enterprise. Good strategy and strategic management should integrate goals, policies and sequences of the organisation into a coherent unit. (Akingbora, 2006).

Every non-profit organisation must define its goals, where the company wants to be in the future. Each company must objectively evaluate its current position as must the company decide how to get, where it wants, considering the possibilities, alternatives, available resources and necessary changes. This process is called strategic management. (Alvarez-González, l. i., et. al., 2017)

According to Beard, strategic management is a process of creation and implementation of long-term plans, which is of fundamental importance and its implementation will give the company a comparative advantage. Efficiency strategies are dominant in management (Beard, F. D. 2015).

Strategic management is a complex process that aims to develop and maintain consistency between the goals and resources of the company on the one hand and changing market conditions on the other. Strategic management includes the identification of opportunities and subsequent strategic decisions regarding the redistribution of resources and ways to use them. The strategic management process also helps the company identify and maintain a competitive advantage (Agostino, D., Arnaboldi, M. 2012).

Management generally follows standard process and procedure. However, the modern world is constantly changing. Every day, new opportunities and problems appear. Any traditional management policy cannot cope with new situations and cannot solve new problems. In order to cope with new situations, a company can use new tools and methods that help in specifying goals, vision, strategy and the like (Gajanova, L., Nadanyiova, M. and Moravcikova, D., 2019)

The foundation of every success of a non-profit organisation is the correct definition of vision, mission, goals, appropriate choice of strategy and effective and correct management. Strategic management has long-term consequences for the non-profit organisations and has a broad-spectrum focus that will affect the entire company, and therefore falls within the competencies of the top management of the non-profit organisation (Ližbetinová, L., Hitka, M. 2016.)

We tried to find out in our survey directly focused on non-profit organisations in Slovakia, how do they use or do not use various methods and procedures of strategic management. The survey period was from March to June of 2020. However, this period was marked by the Covid-19 pandemic, which changed the "normal" functioning of a huge number of companies. Help-focused non-profit organisations did much more work during this period than in the past. In addition, our survey from 2019 was confirmed. In this survey, we found out that the tools of the marketing mix, so necessary for the development of work in the online environment, are in non-profit organisations in the Slovak Republic only at an average level.

During this period, more than 300 online questionnaires were sent out, but none returned. We managed to directly address 50 non-profit organisations with which an interview was conducted on the topic of strategic management of a non-profit organisation. However, for the purposes of this post, we had to exclude all the answers that were

realised with the volunteers. After this selection, we were left with 50% of interviews, which served as the foundation for creating a concept of strategic management for non-profit organisations in the Slovak Republic.

Concept design of strategic management for non – profit organization in Slovakia

In addressing the issue of streamlining the strategic management of bus companies using the BSC concept, we propose to create an effective strategy management system. This system consists of 6 phases that run in a constant cycle:

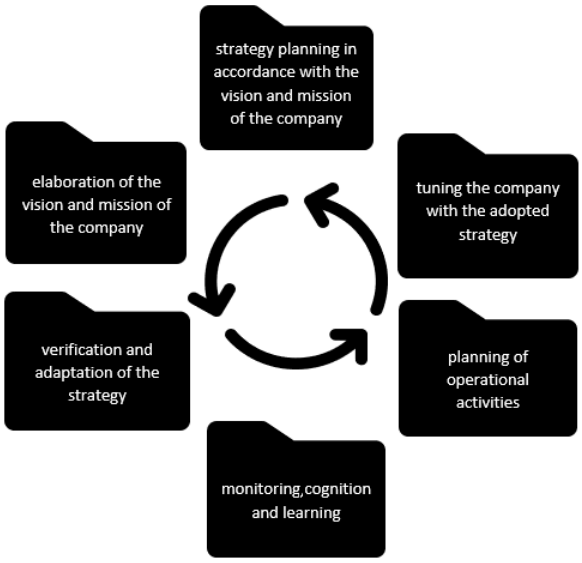

Fig. 1 Concept design of strategic management for non–profit organization in

Slovak Republic, source: own design

We consider the first phase to be the phase of elaboration of the vision and mission of the non-profit organisation. Based on interviews with managers of non-profit organisations, we found out that almost 50% of non-profit organisations do not have a clearly defined and formulated vision and mission, and up to 70% of them could not answer the question of what their mission and vision is. It is necessary to realise that even the non-profit organisations must have their basic goals clearly defined and then plan the way to achieve them in the form of attainable strategy. Such process is demanding and is the responsibility of top management. It is necessary to pay increased attention to it. The next phase of strategy management consists of transforming plans into specific objectives, measuring instruments, their target values and strategic actions. Internal fine-tuning of organisation and subsequent planning of operational activities is the next step of great importance. An essential tool used in these phases is the strategic map, which represents a logical and comprehensive architecture for displaying a specific strategy.

Kaplan and Norton claim that for a non-profit organisation to improve its activities, processes and results, it must be able to measure them. For this reason, it is necessary to assign appropriate indicators, their target values and the actions leading to the fulfilment of set objectives (Kaplan, R., Norton, D. 2001). For each strategic objective shown in the strategy map, it is necessary to determine at least one measuring instrument that will allow you to measure and evaluate the success of the selected strategy. However, it should be borne in mind that these are not only financial measuring instruments, but also non-financial, which are often difficult to quantify, so the selection of appropriate measuring instruments requires due attention.

Target values are the values of selected indicators, the real achievement of which is expected in the future in order to fulfil the intended mission of the company. When identifying them, we consider the current state of selected indicators and the complexity of set goals.

After the successful identification of strategic goals, measuring instruments and their target values, it is necessary to determine the activities, by which the non-profit organisation will get on the right path to implement its strategy and fulfil its mission. These strategic actions determine the way in which the company wants to achieve the set values of the strategic objectives. In order to ensure the implementation and reassessment of the identified strategic actions, a person responsible for its progress is allocated to each strategic action.

In the next step, the strategy management system is harmonised with individual organisational units and individual employees, which is critical for the successful implementation of the strategy. In the process of harmonising individual employees with the company's strategy, their awareness is of key importance. Unless all employees know and understand the company´s strategy, the success of implementation is very unlikely. A suitable mean of communication to help achieve this requirement is organisation of meetings.

According to Agostino by formulating the strategy and elaborating the plan of operational activities, the non-profit organisation is embarking on the path of implementing a strategy that should lead it to fulfil its vision and mission in the coming years. However, a well-formulated strategy and its perfect implementation may not guarantee the achievement of the desired mission of the company (Agostino, D., Arnaboldi, M. 2012). The reason is the dynamic development in the macroeconomic, competitive and technological environment of the company, which may be the cause of an outdated or even unrealisable strategy. The final phase of the strategy management system is therefore its verification and adaptation. It is also a phase followed by the initial phase of strategy implementation, because in case of undesired direction of the company or significant changes in the company´s environment, the strategic analysis is re-implemented and new strategy is formulated.

Model of strategic map for non-profit organisations in Slovak republic

To create a strategic map for non-profit organisations, it is necessary to define four basic perspectives, namely financial perspective, customer perspective, perspective of internal processes and the perspective of learning and growth.

In the case of non-profit organisations, after consultation with the managers of non-profit organisations, a slight modification is needed, which depends on the specific conditions in the non-profit organisation as follows:

- The strategic map will reflect 4 perspectives
- The mission of the organisation is heading to the top of the model, while the strategy is still at the core
- The customer perspective determines the term “customer”- someone who is the recipient of the aid, and how the organisation can produce value for these “customers”; the customer perspective is located at the top of the strategic map behind the mission of the company and is divided into 2 groups – persons who contribute (donors, taxpayers, etc.) and persons who receive a service or goods (beneficiaries)
- The financial perspective is slightly changed to the perspective of financial sustainability, the aim is not to maximise profits, but to find an answer to the question of how to add value for “customers” while controlling costs and thus ensure long-term sustainability
- Perspectives for internal business processes are focused on satisfying the beneficiaries in compliance with the budget
- On the other hand, the emphasis on the learning and growth perspective is shifted to ensure the organisation´s ability to improve, grow and change

We based our assumptions on interviews with managers of non-profit organisations in the Žilina Region. The following figure also considers the factors that, according to the managers of the non-profit organisations, are of the utmost importance in individual perspectives.

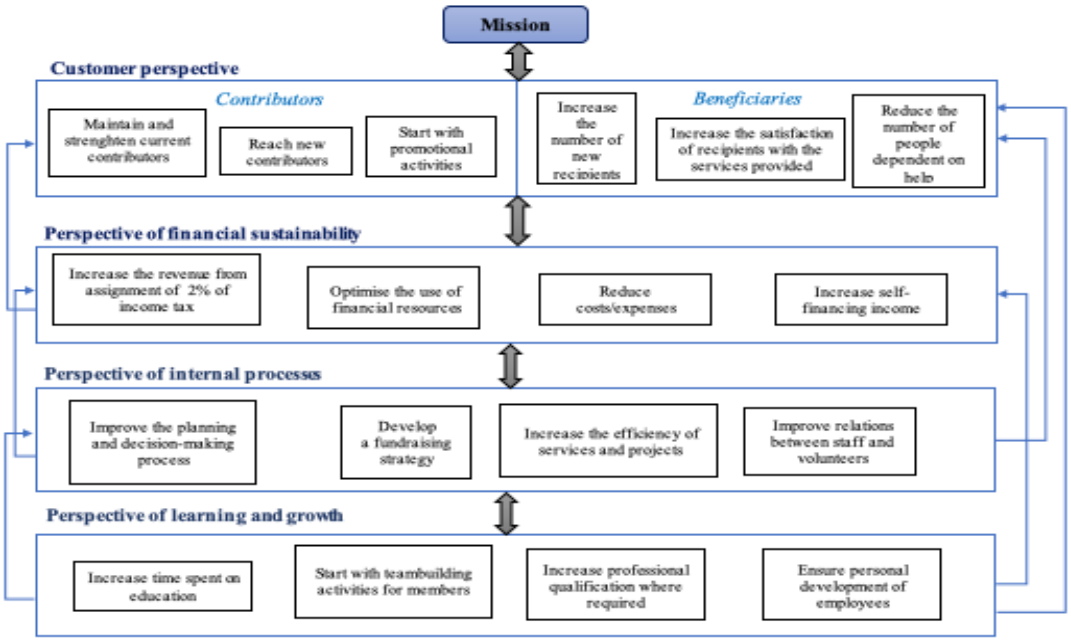

Fig. 2: Model of a strategic map for non-profit organisation in Slovak Republic, Source: own design

Conclusion

Every change made in a non-profit organisation is expected to have a positive impact on its current performance. For the implemented measures to bring the desired effect to the non-profit organisation, it is necessary to improve them regularly and adjust according to the changing needs of the environment and the company itself. The key benefit of our proposed concept of strategic management for non-profit organisations is the real possibility of enforcing their strategy in practice and with the help of appropriately selected strategic goals, measuring instruments and actions, the successful fulfilment of the mission and vision of non-profit companies. Thanks to this concept, the non-profit organisation will achieve success in financial and non-financial indicators. However, the concept of strategic management is also associated with certain risks that may hinder its effective use. The biggest risks include incorrectly set measuring instruments, the monitoring of which may not signal the fulfilling of strategic goals. The non-profit organisation will then focus on the wrong activities that are not in compliance with its mission and vision. The concept proposed by us may be a suitable foundation for the strategic management of non-profit organisations, but its benefits and risks will ultimately be in the "hands" if the managers and their decisions.

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Application of The Green Marketing in Automotive Industry: Case Study of Slovak Republic

Margareta NADANYIOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 8215/1, 010 26 Zilina, Slovak Republic, margareta.nadanyiova@fpedas.uniza.sk

Lubica GAJANOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 8215/1, 010 26 Zilina, Slovak Republic, lubica.gajanova@fpedas.uniza.sk

Jana MAJEROVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 8215/1, 010 26 Zilina, Slovak Republic, jana.majerova@fpedas.uniza.sk

Abstract

Recently, societal and global interest as well as the need and necessity of solving environmental problems are also reflected in marketing, namely by a gradual transition to the application of green marketing. If a company wants to be successful, competitive and ultimately popular with customers, it has to adapt to this trend. In this reason, many business managers in various industries see green marketing as a significant competitive advantage, investing in the future, or building a good image in the eyes of customers. Based on this, the article is aimed on the analysis of the green marketing in the automotive industry and its application in Slovak conditions. This includes providing the theoretical background and analysis of the green marketing from the viewpoint of Slovak and foreign authors. The important source for secondary data was scientific researches, annual company reports, statistical databases, published professional publications. Based on the analysis results, benefits of the green marketing are highlighted such as gaining competitive advantage, improving company's image, increasing customer's loyalty and brand value.

Keywords: Green Marketing, Automotive Industry, Corporate Social Responsibility, Sustainability.

Introduction

Nowadays, the social and environmental consequences of rapid economic growth are becoming increasingly apparent (Hardingham et al., 2018). More industrial greenhouse gases, the enlargement of the ozone hole, climate change, the destruction of forests, the disappearance of animal species and ecosystems are all a manifestation of the rapidly deteriorating environmental situation on our planet. Thus, environmental problems and their growing intensity force people to seek new and rational ways of producing, consuming and disposing of products. Governments and various institutions are examining the negative effects of the functioning of society and, based on research conducted, are issuing regulations and recommendations that global corporations and companies should orientate (Poliak et al., 20104). Respect for the environment is a very current social phenomenon today. Companies have begun to take global threats seriously (Valaskova & Kramarova, 2015). Socially responsible behaviour towards the environment is becoming not only a modern business concept, but also an important factor in the competitiveness of companies. Social responsibility is becoming an integral part of corporate strategies. Consumer preferences are also changing, and interest in environmentally friendly products is growing (Krizanova et al., 2014; Majerova, 2015). More and more consumers want to know if the products are really environmentally friendly, not been tested on animals and if it was not produced by children and adults in a poor working environment. People are beginning to realize the environmental impact of their actions.

In this reason, the main goal of the paper is to analyse the green marketing in the automotive industry in the case of Slovak conditions. Based on the analysis results, benefits of the green marketing are highlighted such as gaining competitive advantage, improving company's image, increasing customer's loyalty and brand value.

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Literature Review

Green marketing is a relatively new issue; it only appeared at the end of the 20th century. It can be understood not only as the promotion or advertising of products with environmental characteristics, it is a much broader marketing concept, which also includes product modifications, changes in the production process, and packaging and advertising modifications. Green marketing contributes to environmental protection by trying to minimize the harmful impact of products on the environment (Polonsky, 1994).

The first experts to define green marketing include Henion and Kinnear, who emphasize that green marketing deals with all activities that provide support in the emergence of environmental problems, as well as their subsequent elimination (Henion & Kinnear, 1976). This definition of green marketing also had a few opponents. For example, Polonsky consider it necessary to extend the definition to a wider range of activities that fall under the concept of green marketing. On this basis, he claims, that green marketing consists of all activities designed to create and facilitate any exchanges designed to meet human needs or desires, in order when meet those needs and desires to minimize adverse effects on the natural environment (Polonsky, 1994).

Lieskovská (2010) defines green marketing as a tool for promoting ecological trends in the sets of activities of individual companies, organizations but also individuals. The range of green marketing processes is quite extensive, from responsible behaviour to the environment, through the production of products that include eco-dimension and eco-requirements, to the consumption of individual products, where their environmentally responsible life cycle also affects the quality of everyday life and health of society.

Green marketing is often referred to as modern marketing. Thanks to its environmental orientation, it represents a part of environmental management. Green marketing is enriched with the so-called the green dimension, which offers the opportunity to create a competitive advantage. The environment where it can be applied varies depending on customer demand, regulations and the opportunity to gain a credibility advantage. Companies face positive pressure to achieve environmental efficiency, which contributes to their higher profitability, but also to their overall economic stability. Many companies are implementing green marketing, especially for reasons of opportunity, social and environmental responsibility, pressure from government and competition, and cost reduction (Moravcikova et al., 2017).

According to Krizanova et al. (2013), the primary goal of green marketing is to make the consumer aware of its impact on the environment through purchasing decisions including the possibilities of nature protection and at the same time build a long-term relationship through socially responsible communication. Green marketing was thus based on the principles of corporate social responsibility, which defines green marketing as marketing promoting environmentally responsible products.

Also, consumer's behaviour underwent a significant change in the last decade (Lizbetinova & Weberova, 2016). The environment is becoming one of their priorities, and they are therefore considering the environmental aspect in their purchasing decisions. Consumers are also increasingly interested in the environment when it comes to thinking about future generations. This trend has supported the emergence of environmental initiatives in various areas such as green energy consumption, zero packaging waste or environmentally sound usability (Amberg & Fogarassy, 2019).

Nowadays, there is no universal definition of green marketing. McDaniel and Rylander (1993) use this term for consumer and environmental marketing strategies. Baker (2003) defines green marketing as a holistic management process responsible for identifying, anticipating and meeting the needs of consumers and society in an efficient and sustainable way. According to Juraskova et al. (2012), green marketing focuses on all activities aimed at satisfying human needs or desires, but with minimal impact on the natural environment.

The American Marketing Association defines green marketing in several ways (White et al., 2011; American Marketing Association):

- Sales definition – sales of products that are environmentally friendly.
- Socio-marketing definition – development of products that have a minimal negative impact on the environment or improve its quality.
- Environmental definition – production promotion and packaging of products in a way that respects environmental protection and responds to environmental issues.

Grant (2007) points out that the responsibility for environmental protection lies not only with the government, large corporations and nongovernmental organizations, but with the responsibility of the whole society and seeks to incorporate green behaviour into the normal life of every consumer. He characterizes green marketing as a set of five features called "5 I", including (Grant, 2007):

1. Intuitive – changing the perception of green products. It is very difficult for most people to change their normal activities, such as work, travel or shopping, to sustainable ones. The task of green marketing is to facilitate the adoption of environmentally friendly products so that consumers buy these products intuitively.
2. Integrative – improving the quality of life of current and future generations through a combination of economic, social and environmental developments.
3. Innovative – creating new environmental products and new lifestyle.
4. Inviting – green products are often better, more durable, healthier and more effective. Therefore, new, fun concepts should be created for them that can be easily incorporated into culture.
5. Informed – the ordinary brand is chosen by those consumers who do not pay enough attention to individual products and have little orientation in the particular industry. Green products are little associated with a guaranteed brand, but their choice is strongly linked to consumer education.

Methodology

The main aim of the article is to analyse the green marketing in the automotive industry and its application in Slovak conditions. This includes providing the theoretical background and analysis of the green marketing from the viewpoint of Slovak and foreign authors. Based on the analysis results, benefits of the green marketing are highlighted such as gaining competitive advantage, improving company's image, increasing customer's loyalty and brand value.

The important source for secondary data was scientific researches, annual company reports, statistical databases, published professional publications.

General scientific methods were applied for the processing of the data, such as data collection, excerption, description, comparative analysis, deduction, induction, analysis and synthesis.

Results and Discussion

Recently, we have seen relatively significant changes in the quality of life in Slovakia. This was largely conditioned by a change in the lifestyle of people and quality of their life. People's quality of life is the result of the interaction of the social, health, economic and environmental conditions that affect human and social development. The topic of environmental protection has become more important in the value ranking of society, where it is increasingly becoming part of the public debate and even the political agenda (Gal et al., 2003).

Regarding environmental situation, in Slovakia it can be seen positive changes in recent times. Before 1989, Slovakia still as a part of Czechoslovakia, was considered a country where one of the largest pollutants was achieved on a global scale. Unfortunately, the next decade, which represented an improvement in the environmental protection, was not due to sensible measures and effective action. A reduction in the quality of the environment has been considered to be a reduction in industrial and agricultural production. It was not until the transition to the new millennium that successful steps to protect the environment were recorded for the first time. In the mentioned change, the technological progress is very important, such as increase of the share of cleaner and more efficient technologies as well as successful changes in environmental legislation.

Currently, we can observe positive trends in environmental protection. One example is the fulfillment of the goal set by the European Union to reduce greenhouse gas emissions by 20% by 2020 compared to 1990. This goal was already met in 2017, when the value of emissions was lower by 21%. The current pandemic around the COVID-19, which has seen a huge slowdown in the economy, will also play a significant role in reducing emissions. Slovakia achieved very successful values when it managed to reduce the volume of produced emissions by almost 41%, which represents in absolute terms the value of 43.5 tons of produced emissions. In this respect, Slovakia has the fifth position in the European Union Member State in terms of the number of reduced emissions. Even when looking at the ratio of emissions per capita, Slovakia is on a relatively successful eleventh position in the European Union, where it has managed to overtake countries such as Germany, Czech Republic, Denmark and others (Drapakova & Geist, 2019).

Unfortunately, Slovak forests did not help to reduce these emissions due to the excessive logging as well as natural disasters. In Slovakia, there is logging more wood due to the total area of forests, with greater intensity and lower added value than in other OECD countries as well as in comparison with other Visegrad countries (Palus et al., 20104).

Except the fact, that reducing emissions have a positive impact on our environment, the positive effect was also reflected in the reduction of the costs of air pollution and thus in reduced costs of health care, which arose due to poor air quality (Jurkovic et al., 2019; Krizanova, 2008).

The COVID-19 pandemic has caused a huge slowdown in the global economy, which will most likely border on the economic crisis. Many companies have to cut excess costs in order to be able to operate with the highest degree of efficiency. In some companies, it may include costs of green marketing activities. At a time when people are suffering from uncertainty, whether from a pandemic or an economic crisis, their shopping behaviour is greatly affected by the price and not as well by environmental aspects of the product (Massey et al., 2018).

Application of the green marketing in automotive industry is analysed in the case of the Kia Motors Slovakia. Kia Motors Slovakia is a production plant based in Zilina and belonging to the European division of Kia Motors Europe. It is the most modern production plant in Europe, which will cover up to 54% of European demand with its production. In 2003, sales of Kia in Europe covered only 35% of the market segment. At present, demand has grown and up to 80% of sales will take place on the European market.

Kia Motors Slovakia is aware of the green marketing importance and therefore strives to be involved in environmental protection. The company has participated on the 2020 strategy, which consists of three main pillars:

- environmental awareness, management and cooperation,
- saving energy and reducing emissions,
- waste as a resource.

Another tool used to protect the environment is the ISO 14 001 certificate, the purpose of which is to effectively manage and meet requirements and to constantly improve environmental protection. With such a large plant, efficient energy use is also required. Therefore, regular monitoring and evaluation of the efficiency of energy consumption, media and materials, as well as the amount of waste, wastewater and emissions per vehicle included, was included in the system.

Kia Motors Slovakia is focused not only on the gentle production of the vehicles, but also on their lifecycle. For this reason, it manufactures models based on the certificate according to ISO 14 040 and also according to the ISO 14 062 certificate by integrating environmental aspects into product design and development.

Kia Motors Slovakia has five main goals for the future:

- reduction of emissions and risk of environmental damage,
- reducing the amount of waste produced and increasing the rate of its recycling and recovery,
- reducing the number of raw materials, energy and chemicals per vehicle and engine produced,
- increasing the level of emergency preparedness,
- development of Chemicals Management and raising awareness among employees.

Kia Motors Slovakia considers waste as the raw material and energy of the future. Therefore, it has shifted its priority from trying to get rid of waste to trying to find ways to reuse waste, whether through recycling or other energy recovery. At the same time, the circular economy was supported, the main purpose of which was to minimize waste by preserving the value of products and materials for as long as possible.

Environmental protection also takes place during the development of vehicles. In addition to the traditional ways of developing new technologies, it is also necessary to set certain limits that must be observed in the automotive industry. One of the ways to move production more towards environmental responsibility is to comment on the planned legislation. Kia Motors Slovakia can also use this option due to the fact that it is located in several supranational and international environmental groups, such as the legislative commission of the Association of the Automotive Industry of the Slovak Republic and others.

Kia Motors Slovakia is also active in philanthropy. Despite the fact, that this activity falls under the social pillar of the corporate social responsibility, it represents the way to maintain good relations with the surroundings where Kia Motors Slovakia is based as well as support the protection and cleanliness of the environment through specific projects. To support the Zilina self-governing region, the Kia Motors Slovakia Foundation implemented a total of 157 projects in 2019, to which it provided financial support in the final amount of 1.3 million euro. At the same time, the foundation has established new partnerships with the aim of becoming a responsible partner in the Zilina region in terms of social responsibility as well as environmental responsibility. The primary areas that received support were education, sports, reconstruction of medical facilities, as well as the development of bicycle transport in the region and the revitalization of urban greenery.

A significant part of corporate philanthropy at Kia Motors Slovakia is also made up of volunteering in more than 70 non-profit organizations. A significant part of the activities of non-profit organizations is the cleaning of public areas. This also includes the revitalization of greenery or the planting of trees.

Green marketing activities of Kia Motors Slovakia also includes a project called BikeKia. It is a modern bike sharing system, which aims to increase mobility around the city. It is one of the more ecological options for relocation and at the same time the health support. Overall, the project has been very popular, even by the end of the first month since its launch, and a European record has been set in the number of borrowings of one bicycle per day, namely 25 times. The BikeKie project includes not only public bicycle rental, but also the construction of cycle paths. The Kia Motors Slovakia Foundation contribute a significant amount to their construction.

In 2009, Kia Motors launched its own brand ECO Dynamics, which was to represent a public commitment to zero emissions. In 2012, Kia Motors made progress and launched the new brand ECO Green, which included vehicles with a futuristic design and an ecological image. With the dynamic changes in market demand, Kia's focus is also changing. Its goal is to take the place of the market leader in eco-friendly cars of the new generation. Kia Motors currently offers some types of eco-friendly vehicles, such as hybrid vehicle (e.g. Kia Niro Hybrid 1.6 GDI), electric vehicle (e.g. Kia Soul EV), Plug-in hybrid model (e.g. Kia Optima Plug-in Hybrid 2.0 GDI).

In 2014, Kia Motors ranked 35th in the list of green brands. Currently, there are only two carmakers in the list of TOP 100 green brands - Tesla (ranked 74th) and Toyota Motor Corporation (ranked 92nd).

Conclusion

Based on the above mentioned, we can claim, that the green marketing is gradually implemented by every successful company even in Slovakia. This includes companies in automotive industry, which are trying to compensate the negative effects caused by emissions from manufactured vehicles. By changing the production portfolio, they responded flexibly to the change in requirements and launched the first hybrid vehicles and later also electric cars. It is also worth mentioning the effective optimization of production, where in recent years the analysed car plants have significantly reduced the consumption of energy and waste produced. In addition to the classic production, the carmakers are also implementing other projects aimed at protecting the environment, which can attract new customers.

In these reasons, the analysis results show that Kia Motors Slovakia can definitely be considered environmentally responsible. It has made huge strides in optimizing production, which has been reflected in lower emissions as well as lower energy consumption. The company also operates according to strict environmental management standards.

The efficient application of the green marketing in automotive industry (not only) in the case of Kia Motors Slovakia has many benefits such as gaining competitive advantage, improving company's image, increasing customer's loyalty and brand value.

It follows from the above, the issue of green marketing in automotive industry not only in Slovak conditions has the great potential for the further research in deeper qualitative and quantitative level. It would be appropriate to do comparative analysis of green marketing in automotive industry between Slovakia and other European countries. The next investigation could be also aimed at improving knowledge of the perception of green marketing in automotive industry by consumers. Another possibility includes determination of how the green marketing in automotive industry affects the brand loyalty.

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Commercialization as a Factor Influencing Economic Science

Jan KOMOROWSKI
Warsaw School of Economics, Warsaw, Poland
jkomoro@sgh,waw,pl

Abstract

Commercialization as a factor influencing the economic science
When searching for threats to research at the interface between theory and practice in the modern world, we may not overlook commercialization. Research commercialization is part of the current surveys devoted to the conditions of the evolution of modern science. Typically, commercialization is seen positively, as a main factor, which improves economic growth. Market mechanism is believed to have the power to boost research development by adapting it to market needs and opportunities, better use of research benefits and gains, mobilizing investment, etc. The impact of market mechanism is also used to provide adequate valuation and allocation of resources. We must bear in mind that the impact of commercialization on research is much deeper and multilateral and it produces much more complex consequences to research and economy.

Keywords: Commercialization of research, evaluation of intellectual value, utility gap, privatization of scientific knowledge.

Introduction

One can easily notice the impact of commercialization on research. As a process, commercialization turns various forms of human activity into market products and places them within the competition framework. Usually commercialization is perceived as something positive. It is believed that by adding on dynamics to diverse areas of human activity it brings concrete economic benefits which are sources of wealth. This way the market-theory-based mechanism of commercialization impacts business practice, shapes relationships and institutional arrangements that are brought together into an economic system. As a result, commercialization becomes the key to explain the world around; it impacts people thinking and determines advances in economics. Yet, what is good for the economy is not always good for knowledge, which is why we need to take a closer look on how commercialization impacts research.

Commercialization of university-based research, and especially its impact on the stock of economic knowledge, boils down to the assessment of how market mechanism influences research and what are the effects of the process. It is assumed that the market mechanism helps to correctly estimate the value of resources and contributes to rational allocation thereof. Against this background, we can ask if commercial aspects should decide on the choice of scientific interests, distribution of funds for research, sharing of benefits, using research results, etc. In fact, the impact of commercialization on research is deeper and more complex. All of the above mentioned aspects make commercialization one of the most interesting occurrences that influence modern research, change its functions, lead to the emergence of a new sector of modern economy but also generate some threats.

The substance of commercialization of research

Commercialization is the sign of times that embodies the impact of market economy on diverse forms of human activity. Market value and sales have become almost the only measures, against which goods are assessed. Market rules have dominated human thinking so much that we cannot stop seeing public goods as products, we attribute behavior guided by market principles to independent subjects, build interpersonal relations on competition, etc. Also, typically of the market economy, laws of supply and demand have broadly invaded the sector of public services and commercialized education, healthcare, culture, arts, information media, security systems and other areas, which until recently had been excluded from the impact of market mechanisms because of the functions they perform in society.

Nowadays, commercialization is also present in university research so intensely that one cannot possibly draw a line between research activities and aspects of trade and competition. Market mechanism promotes original solutions and mobilizes cognitive capabilities; it is result-oriented, improves research infrastructure and accelerates the implementation of research achievements, etc. To some commercialization of research proceeds too slowly, to others it goes too fast but ultimately the process is seen as inevitable.

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Such approach to the world of science and research is the most visible in economics, the field of science which explains how business is run. The conviction has got reinforced due to strong correlation between economic growth and commercial applications of scientific knowledge. It is a two-way relationship meaning commercialization of research fuels the economy while strong economy stimulates research. Dilemmas, problems and threats stemming from the application of market mechanism to research are realized much less frequently.

Colloquially, commercialization means seeing research as a commercial product. Its substance consists in treating effects of science and research as **commodities** at a disposal of individual entrepreneurs. Instead of performing the cognitive function, commercialized research is organized around the vision of benefits and gains that it can produce at the marketplace. These benefits are not limited to the repayment of resources invested in research but they include gains from trade, speculation, intermediary services, processing, appropriation (theft) of patents, utility designs, and inventions. It means that similarly to other commercial industries, scientific knowledge subjected to the market mechanism is brought into the area of **private business activity,** while benefits from research are appropriated by market players.

Trade in knowledge-based products stirs up competition, business strategies, and conflicting interests. Inventions, discoveries, patents, and scientific publications can be turned into profit. New forms of business activity emerge while research and knowledge become increasingly more dependent on marketing, promotion and sales. Taking over innovative businesses, acquisition of patents, know-how, brain drain, intelligence and previously unknown forms of intellectual property crimes are deployed to achieve business goals. Against this background, it seems little realistic to put aside potential benefits of research and assuming that scientific effort is motivated by altruistic reasons is naïve.

Universities and R&D centers, so far financed from public coffers, may be an attractive and highly profitable investment targets, which is why we may expect that sooner or later research and knowledge will cease being universally accessible **public goods** expected to meet general social objectives. Actions aimed to enhance the efficiency of scientific institutions will fuel the interest of capital holders in research. It is not by chance that the richest multinational companies take over innovative businesses, buy the most promising patents, inventions, technological solutions, and utility designs, establish *start-ups*, etc.

By unleashing commercial motivation we distort the **autonomy of research;** approach to scientific problems, the choice of direction of research, etc. are mainly dictated by economic criteria. If we consider benefits and conflicts of interest, the market is far from transparent. Attention should be paid to the relative nature of the value of research, which depends on economic advancement, openness of the economy, freedom of trade, control over the carriers of knowledge, etc. **Valuation of intellectual property**, asset productivity - including the specificity of estimating the value of goodwill - generate a number of difficulties. The same can be said about the **protection of goods that contain intellectual property.** All of the above obscure the course of acquisition, transaction, and exploitation of effects.

This specific market should be seen from the viewpoint of interests of individual entities and in the context of general economic policy of a respective country. Already at the first glance we can see that when market becomes a fetish, in the environment filled with competitive pressure and correctness, research is faced with hard tests. The market of goods produced by research is far from being transparent. The vision of benefits encourages to compromise on ethics and scientific methodology. Striving for profit, domination, violence, injustice means research becomes instrumental, which leads to the misappropriation of truth and social mission and, consequently, to the loss of trust in those who manage it.

Also in Poland commercialization has pervaded the scientific community. Universities, their attractiveness and courses they offer are judged based on rankings, which also decide about funds allocated to research or the promotion of researchers. Reforms, expectations vis-à-vis research and the teaching content do not provide simple definitions of goals and values. The Ministry of Higher Education is obsessed with international rankings, Journal Citation Reports and other gadgets of the science market just like a housewife with the thought of having a one-million-dollar handbag being unable to grasp a wider context of the phenomenon or give it any critical consideration. The “Shanghai ranking” (Academic Ranking of World Universities) is very much appreciated although the “Bologna system” introduces identical unified teaching standards at all universities.

The impact of commercialization can be observed in research policy. Funding research through competitive biddings, tenders and participation in business projects as well as teaching students skills currently needed at corporations are popular ways of pumping funds into research driven by commercial considerations which signal the absence of any long-term vision of how university research and its ties with the economy should develop. We forget about the mission universities have vis-à-vis their graduates, which in simple words can be expressed as teaching them how to manage their self-development and be able to use knowledge throughout their professional lives until they retire. These contradictions resonate in the debate over the reform of education and restoration of trust in economics as a field of science.

Commercialization manifests itself in the cost of research. Trends that can be observed suggest that science and research should be cheap. In a growth-oriented country, researchers’ salaries remain below national average and are

lower than the remuneration of most professionals. Independently of long-term effects for the quality of education, universities reduce the number of classes and seminars, cut funds for students most of whom work instead of studying. Pauperization among young researchers is especially dramatic as it drives down market attractiveness of this profession. Apparently, we are not fully aware of the consequences of making research market-driven and shaping it based on foreign patterns.

Commercialized research as a sector of modern economy

Commercialization of research has got far-reaching economic consequences. At empirical level, we can see that by commercializing research we exert a significant impact on the economy and society, enrich economic activities with academic knowledge, foster entrepreneurship, etc. Major effects of commercialization include:

1. stimulating business demand for university knowledge;
2. focusing research on market and competition;
3. transmitting competition from market to research;
4. transforming scientific accomplishments into tradable economic assets;
5. research driven by economic interests;
6. approaching research as a modern branch of market economy.

Commercialization of research and university curricula leads to privatization. From this point on the problem of funding, use of knowledge resources, exchange of storage devices, dissemination of results, division of benefits, development of research staff, education, infrastructure, etc. make part of business relations. Whether they should be developed is judged by the outlays and effects judged against investment effectiveness measures. Expected outcomes of staff training, patent protection, trade in *know-how,* scientific publications, promotion of research, etc. are seen through business models, identification of competitors, building strategic alliances and making money.

It is generally believed that countries which privatized their research centers at earlier stages, engaged capital, attracted investments, offered financial incentives for researchers, recruited specialists, commercialized inventions, etc. grow faster because they have developed a separate industry referred to as the ***research industry.*** The role of this new industry in the economy consists in acting as leverage for growth, building the competitive advantage and an instrument of economic expansion.

Utility, as a feature that generates financial gains, links research with the economy. We may expect that commercialization helps research develop faster. The inflow of private capital mobilizes R&D centers, fuels investment, dictates directions of research, stimulates exploitation of outcomes, impacts researchers' salaries, determines the creation of new jobs, etc. By introducing knowledge from research into the economic bloodstream we may successfully solve the problem of funding, division of resources for research, dissemination of results, and maximization of effects in commercialized world.

Economic benefits make scientific knowledge similar to capital and drag research into the business cycle, stir up investor interest, obscure ties between knowledge generation and commercialization, decouple trade in knowledge from researchers and scientists, and as a result globalize research. Commercialization weakens the power of scientific arguments and intensifies the impact of business. In the long-term perspective, giving up autonomy in order to attract the interest of business deprives of the power to decide about the future of research and about civilization changes induced by research in the times when making money and striving for being rich is becoming central to any transformation in modern economy and culture. From this point on, the development of scientific knowledge has been dictated not so much by the importance of new discoveries but by the vision of economic gains. This is why scientific circles are thrilled about the potential graphene applications while other achievements of human intellect remain unnoticed.

Effects of the commercialization of research are similar to the impact of market mechanism on education, culture, media, healthcare and other social services. They result from turning the above mentioned areas into business activities driven by market mechanism and competitive struggle. Aided by commercialism, the new content injected into the economic bloodstream creates new entities. The vision of benefits shaped by fashion, rankings and models to be followed not necessarily serves the advancement of knowledge or helps in resolving civilization problems.

The impact of commercialized knowledge on economy can be best portrayed using numerical relationships. Cost-effectiveness criterion is connected with financial engagement and risk assessment. Higher level of commercialization helps reap additional benefits because at this stage projects which do not offer return on investment have already been eliminated. We can observe it in practice in more developed countries where interest is focused on the implementation stage and on the exploitation of benefits rather than on conducting basic research, where businesses want to acquire inventions rather than develop ideas or recruit specialists working for competitors rather than spend time on educating their own staff. Commercialization of research is guided by benefits, while the interest shown by capital helps develop

business relations. At lower levels possibilities to raise funds for research and capitalize its results are limited. For the same reason it is believed that humanistic disciplines more often experience financial hardships because people think they produce losses.

Bearing in mind difficulties in objective evaluation of the effects of research on economy, it is assumed that they are proportional to outlays meaning the higher the outlays the higher the expected effects. Hence, direct expenditure on research in individual countries is the basic measure of economic effects. Despite simplifications of such approach, the value of research outlays is huge. According to American researchers, the total value of the global research market exceeds USD 2 trillion a year and is higher than any other cost item including military ones.[1]

The scale of global research expenditure offers exorbitant possibilities, yet it not necessarily brings us closer to the resolution of major problems. The lack of adequate progress suggests that financial resources are used in an inefficient manner. The material structure of R&D expenditure is very telling. Better use of funds allocated to research is inhibited mainly by the diversity of goals and preferences, the need to maintain massive administrative infrastructure and the dispersion of research funds. The list of countries - top global R&D spenders for years includes the United States, China and Russia. The vision of unilateral investor benefits is the main reason behind the lack of will to make joint efforts and assist the weakest economies. Commercialization reduces the readiness to cooperate and fosters rivalry amongst the main centers even when they work towards the same goals.

The share of R&D expenditure in the GDP is a relative measure informing about funds allocated to research. It adopts the highest values in the most advanced economies (e.g., Norway, Israel – 3.4%). Contrary to popular belief, high R&D outlays and the expansion of the research sector in most Western countries do not directly translate into higher GDP. The relationship is also blurred by business relationships, transfers of profits, tax evasion, etc. At international scale these relationships are very diverse due to differences in the income, economic imbalances or underdevelopment in particular when the cost of debt servicing is higher than research-related expenditure.

The pattern of R&D expenditure broken down by industry is much more interesting as it informs about what research is used for, what goals it pursues in a longer-term perspective, how competitive advantage and dominance are built. Similarly to universities and R&D centers, fixed costs consume the biggest portion of R&D funds, which is why it is hard to estimate the value of "research goods" that have been produced. Information about direct R&D outlays could better show the **research potential** of a given country. In the absence of such data, reliable calculation of expenditure efficiency is rather difficult.

According to UNESCO statistics, Poland allocates as little as ca. 1% GDP (2015) on R&D. Considering low GDP of the country and a low share of outlays on research in it, Poland ranks at the bottom of EU rankings. Paradoxically, despite low R&D expenditure, GDP growth rate in Poland has for many years been amongst the highest in the EU economies. This phenomenon challenges the significance of the correlation between R&D outlays and GDP dynamics and, at the same time, reveals the imperfectness of this very measure. Undoubtedly, expenditure does matter for the prestige and working conditions ensured to the research community, their remuneration, mobility, including being able to attract top people from the country or from abroad but it does not correctly reflect the outcomes of research and their effect on GDP in a given year. With diverse scale of income in mind, the number of researchers and the share of population with higher education would possibly be much better indicators of R&D impact on the economy. For some reasons R&D expenditure accumulates in countries like China and India where salaries are low and R&D results quickly get globalized.

Thus the impact of research on economy could be better expressed in the number of scientific and R&D workers and as a share of this professional group in total employment. Such data better illustrate scientific potential of individual countries than allocated funds. The fact that effects in the field of research depend on the number of scientists and researchers rather than on expenditure encourages reflecting on how, by pursuing the right carrier development policy in the knowledge and R&D sector aimed to improve researchers' productivity, we could intensify economic effects of research.

In the case of the Polish "research industry" a number of simple improvements could be put in place. Mobility and concentration of researchers in top R&D centers are a derivative of salaries offered in the research sector. Low salaries do not encourage employees to move from one scientific institution to another within the same country but certainly make young researchers seek more attractive jobs in other industries or abroad. It implies huge losses in staff and "brain drain" as international corporations and R&D centers continue recruiting specialists from different countries. The impact of big migration flows, which since the early 1990s have drained several millions of engineers, IT specialists, medical doctors and other young specialists, is difficult to estimate. Astonishingly, in Poland where outlays on science are relatively low (0.74% GDP) similarly to researchers' salaries and migration index among young

[1] "Global Investments in R&D" (2020), Fact Sheet No 59, UNESCO Institute for Statistics. Published in June 2020, http://uis.unesco.org/sites/default/files/documents/fs59-global-investments-rd-2020-en.pdf

well educated people is high, the share of population with higher education is also high (5.1% above the EU average). Yet, well educated society is not enough to build an innovative economy.[2]

Comparative analysis might be helpful in finding out to what extent scientific development is favored by increases in expenditure as well as by the cooperation amongst R&D centers, concentration and coordination of research, etc. High positions in innovation rankings of the biggest corporations from a couple of industries testify to links between innovation and opportunities of financial accumulation. It means that in individual institutions, scientific knowledge produces effects relative to the possibilities of investment merging, R&D outlays and increased organizational and technological innovation. Speaking of commercialization, attention should be paid to proportions in which R&D expenditure is shared among the public sector, research establishments, and private companies. Concentration of expenditure on research may also mean active involvement of the government, which decides on goals to be accomplished in the research sector and on "how much research there is in research." We need to bear in mind that innovation in business covers not only own accomplishments but also progress achieved through trade in intellectual property goods, acquiring patents and inventions, taking over companies, etc., which explains a lot when it comes to the creative use of scientific knowledge.

According to *Forbes* magazine, ca. 44% of the total expenditure of private companies goes to R&D. The remaining part is financed by the central budget and R&D institutions. In fact, the impact of private operators on research is much bigger as it encompasses supervision over the use of a substantial portion of budget expenditure, projects carried out within the framework of public and private partnerships and spending made by universities, which in Western countries are mostly private. Estimates show **that the private sector controls on average around 70%** of all R&D outlays while its own capital involvement is much smaller.[3]

Problems and threats of commercialization of research

Looking at how research develops one may not overlook the threats of commercialization. Imperfections of the market mechanism leave visible traces. The point is that if we take market efficiency for granted, we get an ideal model that does not fit the reality. Trade in knowledge is usually hindered by regulated access to market, control of market flows, inadequate valuation, and other limitations that undermine the functioning of market forces. All of the above distort market balance and conclusions that flow from it for research. Premises of short-term balance provide little solid ground for the identification of fields of research, in which resources should be invested. Problems and threats in the research market can be boiled down to the following issues:

-- social conflict between the ethos of university research and consequences of its commercialization,

- adequacy of market valuation of carriers of scientific knowledge,

- impact of profitability on directions of resource allocation,

- making research development dependent on the interest exhibited by the capital market.

When it comes to effects of commercialization, it is worth noting that the *modus operandi* of the world of university research is far from the principles of perfect competition and of an efficient market. On the contrary, distorted transparency of the market mechanism hinders the adequacy of the structure of prices, costs and funds allocation. Monopoly in the field of knowledge carriers and concentration of funding activate factors from outside of the economic realm. Moreover, being a stakeholder, the government may restrict its control and coordination functions, as a result of which tasks that research is supposed to accomplish become the resultant of a combination of diverse external factors.

Deficit and information asymmetry are symptoms of monopolistic nature of trade in research achievements. Under such circumstances, owners of scientific knowledge use the advantage they get to maximize benefits, dominate and achieve other goals, which usually leads to **inflated prices and restricted access** to the most advanced research. The resulting low adequacy of prices translates into the shortcomings of the value chain. Starting from the research idea up to the distribution of benefits, these relationships are **infinitesimal by nature** and increase to a certain limit meaning we cannot reach high level of innovations without increasing the outlays on capital intensive projects and higher salaries. Then, the market mechanism triggers the spiral of costs and capital engagement, which considerably

[2] Author's compilation of the Polish State Statistics GUS) "Global Investments in R&D" (2020), Fact Sheet No 59, UNESCO Institute for Statistics. Published in June 2020, http://uis.unesco.org/sites/default/files/documents/fs59-global-investments-rd-2020-en.pdf

[3] Muszyński M., (2015) „Coraz więcej wydajemy na naukę, ale ciągle mało", Published on May 3, 2015, https://www.forbes.pl/technologie/naklady-na-badania-i-rozwoj-wydajemy-coraz-wiecej-ale-malo/tnt8h17

increases the valuation of effects. That is reflected in almost prohibitive prices of new inventions in the most commercialized sectors, such as, e.g., electronics or pharmacology.

Long-term effects of market-orientation in research are equally clear. Since benefits expressed in concrete sums have become the key driver of growth and allocation of research funds is dictated by the size of potential profits, university research has been losing its **elitist mission** of altruistic knowledge development, the perspective of scientific interests has changed while research has been emerging as the most profitable sector of economy. Research cannot develop outside of the economic context, which is why politicians' appeals are ineffective as long as business operators, especially those with substantial capital resources, exhibit little interest.

An active **research development policy** needs to be oriented at placing innovative products in the market and consists in the concentration of investment aimed to change the proportions between innovative and traditional sectors of economy. A knowledge-based economy translates into higher R&D outlays in enterprises and their higher international competitiveness. That is why it is worth taking care of enterprises which need knowledge and R&D efforts as much as we are trying to avoid investment projects that are too capital-intensive.

Stimulating research concurs with the country's competitiveness policy. The latter does not depend on the positions of the country's universities in international rankings, but directly derives from the achievements that enhance market **attractiveness of products.** Investment in research should not be dispersed. In leading economies outlays impact the structure of exports because economy is a self-regulating system. It is not accidental that research fuels the exports in industries, such as defense, aircraft, pharmaceutical, telecommunication, electronics, etc. This is how demand for knowledge and research generated by the fastest developing industries becomes the driving force of the economy

Research produces benefits, improves attractiveness of the economy, modernizes technology, creates new jobs, mobilizes public resources for research, etc., which is why **it requires cooperation between public authorities and business,** including international corporations, geared towards supporting knowledge-intensive modern industries and international expansion. Public expenditure on research is commercialized when advanced technologies are implemented. One can easily realize that the private sector is the biggest beneficiary of such commercialization.[4]

Observations confirm that countries whose policy promotes international economic expansion and the fostering of the market position are in favor of giving active support to economic operators capable of exploiting commercialized research. This is because the **"pull" strategy** which engages research in the development of expansive sectors of economy, **is more effective than the "*push*" strategy,** which motivates research institutions to make bigger efforts, which at a later stage get exposed to the penetration of foreign capital.

Difficulties with adequate valuation of carriers of scientific knowledge

At the heart of the problems arising from commercialization of research lies adequate valuation of the carriers of research value because we are dealing with goods protected by intellectual property laws which contain a substantial portion of original solutions. There are many indications that carriers of scientific knowledge are **sources of exceptional gains,** because their market valuation differs a lot from real expenses. Inadequate valuation **calls into question the assumption of market efficiency,** which questions the deployment of market mechanism to research outcomes. Exceptional gains are boosted by two parallel tendencies:

a) – overpricing of knowledge-based goods,

b) – restricting the utility of research by its owners.

High prices of products-carriers of scientific knowledge are caused by several factors connected with legal and patent protection of intellectual property, which gives intellectual property owners control over its trade. As a result, the adequacy with which the market value of research goods reflects their utility depends on monopolistic position of their owners. High prices of research-intensive products are also caused by some objective reasons, such as, e.g., total outlays made over a long period of funding the research, development, and implementation phases, remuneration paid to outstanding specialists, long time of return on investment, the risk of failure, etc. On top of that, advanced specialization ensures advantage over one's competitors and gives certain freedom to impose higher prices for exclusive knowledge obtained from research.

Secondly, we can easily realize that in the absence of close substitutes, prices of such products are based on the **cost formula** and cover not only justified costs but also all other costs which a monopolistic operator wishes to include. Low price elasticity of such products additionally encourages high margins. High **costs of research** reduce the population of those who wish to conduct it while, on the other hand, return on investment higher than the average attracts capital. It means that goods which carry scientific knowledge ensure above-average profitability, while the

[4] Błoński M., (2018), „Chiny prześcignęły USA w liczbie publikacji naukowych, Retrieved on January18, 2018, www.fleshbay.pl.

propensity to overestimate costs and apply high margins on goods which do not have close substitutes provide foundations of the pricing strategy.

For the same reasons, unlike for other goods in the market, when calculating return on investment on research-based products we consider all costs of research although they are not always fully justified. Monopolistic advantage secured by the research component allows using the cost formula that sometimes takes unit prices of products to unimaginable levels. Companies which carry out research willingly overestimate expenses and margins. That is confirmed by outrageously high prices of products that require multiple certifications to confirm that they are based on top notch technologies, contain components of advanced material engineering, pharmaceuticals, military and optical equipment, products for the aircraft industry, space sector and other special use products. It is not a secret that products for the military, telecommunication, mining, air transport, and other special use industries are even ten times more expensive than the same products in a regular market exchange.

It is worth noting that hand in hand with imposing high prices on such products goes a tendency to restrict access to knowledge, which in terms of market mechanism categories means **decreasing its social utility.** The phenomenon consists in rationing the use of knowledge and research by their owners. That is a reflection of supply restricting strategy aimed at maximizing gains of knowledge and research owners who exercise their monopolistic control. The use of privately owned knowledge is restricted in many ways. Privatization of intellectual property ensures legal protection to the most valuable components, control of trade and the scope of use. High unit prices and restricted access may produce exceptional gains.

We may conclude that exceptional gains, which have become a rule in the research market, also reveal the dysfunction in valuation and low market efficiency in this product category. Privately owned scientific knowledge boosts individual gains and reduces potential economic and social effects. The above described effect of commercialization, i.e., overestimating of costs and charging high unit prices in this category of goods, on the one hand delays the use and, on the other hand, restricts the group of beneficiaries of scientific achievements. This occurrence may be referred to as a **social utility gap of scientific knowledge**.

Growing discrepancy between increasing unit prices and decreasing utility makes adequate valuation even more difficult. The gap provides a wide framework within which market value of research goods oscillates at circumstances of controlled supply. As a result, **the efficient market hypothesis is challenged** for goods-carriers of scientific knowledge, the most attractive and modern products that bring exceptional profits and guarantee above-average financial gains to their manufacturers. It means that in the market economy commercialization of research offers the possibility to obtain exceptional gains from trade in goods, whose value is enhanced by the research and innovation component.

Looking at the valuation of research we may also observe that high outlays on research not always translate into productivity. Decreasing utility may signal the risk of capital invested in research being wasted when outlays cannot be recovered in the market. Ultimately, market mechanism in this area is far from perfect while research directly generates costs. International corporations teach us how we can benefit from knowledge and research. They are particularly interested in inventions that are covered with patent protection already at early stages of development as in their case further outlays on development and implementation works offer possibilities to leverage future gains. This is why top-notch photovoltaic and laser technologies, Internet apps, autonomous vehicles or graphene have relatively quickly got under the control of corporations.

Global corporations want their products to contain as much intellectual capital as possible. The point is not to reduce costs or offer cheaper products but to diversify and individualize them to achieve the longest possible advantage and monopolistic position, which bring **exceptional gains.** This is the operating pattern of the largest corporations, such as Google, Apple, Uber, Microsoft, etc. This approach finds empirical confirmation in high valuation of brands, trademarks, copyrights, inventions and other intellectual property carriers.

Commercialization of scientific knowledge in combination with limited public control triggers threats of **globalization.** The concentration of intellectual property in the hands of the most powerful corporations may expose mid-sized economies to painful effects of foreign capital penetration, drain the market from intellectual potential, and induce the transfer of intellectual property abroad while on the other hand it encourages monopolistic control over prices of knowledge-based goods, which limits the purchasing power of local communities. Weaknesses of "exceptional gains strategy" pursued by global corporations have been noticed and exploited by companies from the Far East, which opt for multi-stage expansion, mass production, cost reduction, and global distribution.

Commercialization and utilitarianism of scientific knowledge

Commercial funding increasingly more often decides on the choice of research interests and the allocation of funds for research. Profitability argument delineates goals and strategies in the field of research. It is expressed in the shifting of research interest from basic research to applications oriented at discounting benefits and highlighting factors leading to commercial applications of scientific knowledge in individual sectors of economy. A particularly sensitive area within this strategy is the one of development investment.

Above-average returns boost the **attractiveness of investment, yet they do not translate into the increase of social capital generated by research.** High-budget programs attract private capital seeking exceptional financial gains. There is a belief that investing in research unlocks growth dynamics and testifies to the modernity and innovation of economy. By treating research as a source of financial benefits we generate a powerful pressure on being successful. Examples can be found in the earlier mentioned industries, in which research programs are worth tens or even hundreds of millions of dollars. Protected by the government, their investment quickly translates into enhanced market value and high dividends. Irrespectively of whether financial engagement of the private sector is driven by the wish to participate in gains or by the control of access to scientific knowledge, such research projects pose the risk of reduced social utility of research outlays and turn into a financial pyramid. Although effects of the impact of science are well examined it is surprising that for over a decade the growth of countries with big capital resources, which are considered the richest, the most modern and innovative has been very low, especially when compared to economic growth leaders.

By making gains a priority, we naturally eliminate projects, which are interesting knowledge-wise but economically ineffective. Risk may be posed by central administration's impact on the allocation of public resources. The proportion, in which public funds are allocated in accordance with the needs declared by research community and to what extent they cater to commercial projects of private market players is crucial. From this point of view, giving support to private initiatives seems the most effective although such preferences are not always relevant for research.

Research whose results cannot be easily exploited is less interesting, which is why business actively uses marketing to create the vision of benefits irrespective of the value of knowledge. For instance, commercials that promote pharmaceuticals or financial products use attractive presentation formats, contexts, emotions, etc. to highlight the attractiveness of these products, suggest benefits intended to radically transform the life of those who buy them even though artificially generated fascination usually leads to disappointment. As a result, research projects carried out on a commercial basis do not always produce effects meeting high methodological and ethical standards. Final market valuation dictated by the scale of economic benefits differs from the real value of scientific knowledge. Business-oriented research leads to **instrumental treatment** of issues that it addresses. We may expect that creative marketing goes beyond conventional solutions deployed in advertising of certain goods and takes the target audiences outside of boarders of risk acceptable in a given market, by which it infringes rules of business ethics.

When the success of business projects is decided in a competitive struggle, the so called scientific arguments can be used rather freely. Instrumental approach to research that consists in the subordination of scientific argumentation to business rules gives **priority** to gains over the development of scientific knowledge and is a sign of **utilitarianism**, which undermines trust in research, truth and teaching, its originality and novelty.

Instrumental approach to research sends the **research community into the arms of conformism.** The phenomenon is rather widely present in the world of knowledge and research. We can speak of information conformism, which consists in manipulating information and communicating imprecise content. More dangerous consequences can be caused by cases of **normative conformism** that infringes the standards of conclusion drawing methodology and disseminates views that have not been properly validated. It produces schematic thinking, uncritical deduction and sometimes dogmatizing. Normative conformism **erodes the credibility** of research entities, media and research community. As an example we can give the belief in market balance and efficiency, adequacy of market price and value, etc. Thinking of the relevance and reasons behind such approach we may conclude that its presence in science is indicative of ties between the assumptions of scientific theories, i.e., paradigms of science, with ideology.

The loss of credibility combined with instrumental approach may suggest we are at odds with ethical requirements expected of researchers. In research the phenomenon is manifested by **ethical relativism,** which ignores moral norms and poses threats to the economy and civilization that are difficult to predict; the better perspective for gains, the higher the risk of negative effects of commercialization. Under a powerful impact of business, politics and ideology, ethical relativism in research may lead to manipulation, injustice, and destruction. Research gets engaged into ideological and commercial issues. Remarkably, market theory is dismissive of public goods and responsibilities of the state while it highlights the interest of private corporations. State aid granted to banks which triggered the crisis was justified at scientific grounds along the same lines while the victims of crisis, including Polish shipyards, were refused any support.

Conformism and utilitarianism in research may help us explain low growth dynamics in countries whose knowledge-related expenditure is relatively high and which we see as innovative, pursuing knowledge-based growth with modern economic infrastructure, rich in capital resources, making high research outlays, etc. For many years in this group of countries we have been observing stagnation, indebtedness, and other reflections of economic imbalances. To certain extent, utilitarian and conformist approach to knowledge and research triggers the concentration of wealth leaving civilization problems of underdevelopment, ecology, demography, and poverty unresolved. It means that by turning knowledge into a market asset we privatize gains and restrict social function of commercialized research. Thus,

despite huge research outlays at a global scale, there is no progress in solving the most acute economic problems and securing sustainable growth.[5]

Conclusions

We should be concerned about commercialization, as it turns knowledge and research against their substance, makes them market assets and treats effects of research as goods. Privatization of scientific knowledge leads to its instrumental treatment, sees resolving social and research problems in the light of gains, and stirs up competitive struggle that produces deep divisions. Priorities of scientific cognition are replaced with economic goals and change the relationships in the world of research. A new industry has emerged, in which research interests are subordinated to the availability of funds and accountability for effects. Knowledge, which gives control over the use and multiplication of effects through marketing activities, is considered the top scientific achievement.

By subjecting research to economic interests we make directions of research directly dependent on capital engagement. This is why the conviction that scientific knowledge is a form of capital and a source of wealth while economic performance depends on market domination and competitive advantage has become so common. Considering the substance of commercialization of knowledge, it is easy to note that economic efficiency depends also on the skillfulness with which we use market and business cycle mechanisms. At the same time expectations that problems depending on the progress in science will get resolved are ungrounded unless they produce commercial benefits.

Considering knowledge as a form of capital is the source of numerous misunderstandings. In fact, such approach boils down to seeing research as commodity and reduces the relevance of creative thinking, a factor critical for the creative potential of knowledge and research, which capital does not have. Perhaps this is why in highly developed economies unlimited access to capital and huge research outlays do not produce satisfactory growth. Apparently, achieving effects that derive from scientific knowledge depends on something more than capital. Research as an area of human intellectual activity merits more attention than investment outlays and competitive efforts.

Thus mechanisms of research differ from the mechanisms of trade in goods or services. Researchers may not be blamed for tasks they may not accomplish within commercialized knowledge and research. The efficiency of market mechanism and privatization of gains arise some concerns. Attention should be paid to these arguments when we evaluate research outlays and the distribution of economic effects since unilateral benefits may lead to unfavorable use of funds for research and unfair sharing of its effects based on the market mechanism.

Once again we should take a closer look at the mechanism that shapes the price and utility of knowledge when gains from it are privatized. In this area attention should be paid to the distortions of market mechanism. They inform about above-average returns on investment in research and downwards trend of the social utility of research outcomes. These occurrences confirm that a concrete owner in control of research-based products may shift demand and supply curves by inducing market mechanism to change the economic equilibrium price. Such a shifting to the new equilibrium sends false information to the market. As a result, owners of scientific knowledge may unduly increase prices and reap extraordinary benefits.

The possibility to achieve above-average return on investment consists in securing monopolistic position for knowledge-based products. By protecting intellectual property, through patents or other methods, one may take control over the supply and prices. Monopolistic position allows taking market valuation of knowledge carriers to higher levels; the same happens to anything that in commercials is presented as original, attractive, and desired. Above-average gains in this category of products are also achievable as a result of overestimated costs and distorted market transparency and transaction equivalence. Monopolistic position of a market leader comes as a result of mergers and acquisitions, trade in patents, as well as unlawful use of intellectual property. Being aware of obvious economic benefits of trade in carriers of intellectual property we may not remain uncritical about commercialization as a process that concurs with research development. These occurrences call for the awareness and responsible agency of researchers.

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Some Remarks to Behavioral Aspects of Brand Management from the Perspective of Foreign Market

Jana MAJEROVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic, jana.majerova@fpedas.uniza.sk

Margareta NADANYIOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic, margareta.nadanyiova@fpedas.uniza.sk

Lubica GAJANOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic, lubica.gajanova@fpedas.uniza.sk

Abstract

Aspects related to the country of origin of the brand are traditionally identified with cultural identity, political climate, language, history, landscape relief, economic and technical development, as well as religiosity and population. Based on these elements, the country's image can also be understood as an essential element of a marketing strategy forming a dynamic holistic system, a complex of penetration of business and consumer expectations as well as a holistic attitude construct. Thus, the aim of our paper is to provide a contextually wide introduction into further own research of the phenomenon "national branding" and its incorporation into managerial theory and practice. The paper is divided into two parts. The first part deals with the theoretical background of the topic. Subsequently, in the second part of the paper, own analysis of secondary data is provided. The outcomes of the research and subsequently formulated conclusions provide the understanding of overall complexity of national brand and its incorporation into management processes.

Keywords: Brand, Branding, National Brand, National Branding, Country of Origin, Simon Anholt.

Introduction

The professional literature currently identifies several levels of further development of brand management, depending on which of the fundamental attributes of its value will be emphasized. At the same time, it maintains a sectoral approach to modifications of brand management concepts as a possible way to eliminate the shortcomings of uniformly conceived theoretical models of building and managing brand value (Valaskova & Krizanova, 2008; Palus et al., 2014; Kunter, 2016). Thus, in accordance with the latest knowledge in the researched area, the following sources of brand value come into consideration: 1) the social influence of the brand, its status dimension and the symbolism of belonging to an aspiration group (Krizanova et al., 2014); 2) the qualitative dimension of branded production, innovation and technological leadership (Girard et al., 2017); 3) socially responsible brand management and an emphasis on sustainable development (Butt et al., 2017; Lin et al., 2017) and 4) the contribution of the brand to the national economy and the convergence of its identity with the national brand identity of the country of origin (Garrett et al., 2017; Kim et al., 2017). It is the latter view of the issue of sources of brand value that has significant competitive potential on a global scale. Despite its growing regional fragmentation, the global market is a constant economic reality, and abstraction from international economic interdependence is not possible. The need for goal-oriented brand management thus even shifts from the B2C level to the B2B levels to the B2G level. At the same time, the brand acquires the character of an essential geopolitical stabilizer of social events. Its international implications are a balanced mechanism for balancing regional economic disparities (dislocation of production to regions with higher availability of production factors) to a facilitator of security policy (see the impact of the "Olympic Games" on events in the Korean Peninsula region). The regional origin of production became economic as early as 1887, when the British government, in an effort to restrict the sale of non-English products to English consumers, passed a law requiring the labelling of products made outside England with their country of origin (Oberecker et al., 2008). However, the psychological dimension of the country of origin effect (COE) began to be discussed only in the 1970s (Krizanova et al., 2013). Traditionally, a CEO is defined as a psychological effect describing how consumers' attitudes, product perceptions, and resulting consumer behaviour frameworks are affected

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by the product's place of origin (Herz & Diamantopoulos, 2013). The term "origin of the brand" was defined by Thakor and Kohli (1996) as the place, region or country in relation to which the brand is perceived by its consumers. Lampert and Jaffe (1998) later stated that a country's image could be considered an asset in this context if it had a positive connotation, while it represented a societal commitment to the brand if there were negative associations.

Literature Review

Aspects related to the country of origin of the brand Kaynak et al. (2000) identified with cultural identity, political climate, language, history, landscape relief, economic and technical development, as well as religiosity and population. Based on these elements, the country's image can also be understood as an essential element of a marketing strategy forming a dynamic holistic system, a complex of penetration of business and consumer expectations as well as a holistic attitude construct (Parobek et al., 2016b). Consumer sensitivity to the country of origin aspect has been shown to vary by product category - strongest for consumer durables and luxury goods brands (Bitzios et al., 2017) and weakest for low consumer engagement product brands such as shampoos, candies, light bulbs, toilet paper and sports shoes (Aichner, 2014). In other times, in addition to the indication of the country of origin of the brand, the indication of the country of production of the product also comes to the fore in terms of terminology. However, research to date suggests that this aspect does not have a significant impact on consumer behaviour (Nguyen & Nguyen, 2017).

From the point of view of the company's decision-making on the development of its activities on foreign markets, consumer affinity, resp. animosity in relation to the brand's country of origin. The extent of consumers' tendency to prefer brands depending on the country of origin varies depending on the degree of individualism, resp. collectivism, which characterizes the socio-cultural profile of the consumer country. It is true that countries with a higher degree of collectivism are more ethnocentric in consumption, i.e. they prefer domestic brands to foreign ones and, conversely, countries with a higher degree of individualism are more open to foreign brands. With the mean value of this dimension in the Hofsted model, Slovakia belongs to the so-called indifferent countries. One of the biggest challenges in this area is faced by Asian brands, which subconscious consumers generally associate with low quality, even life- and health-threatening externalities of their consumption and use. Exceptions are brands from the electronics and automotive industries (which, however, are also very cautious in declaring their country of origin if they are not countries with explicitly positive associations - such as Samsung and Daewoo brands, which are active in declaring their origin up to in the context of the country's economic development). On the contrary, strong positive associations are associated with brands of wine from France, cars from Germany, electrical engineering from Japan, coffee from Colombia, fashion from Italy and chocolate from Switzerland. Some brands have even gone so far as to base their competitive advantage on creating the illusion of nationality (for example, the American ice cream brand Häagen-Dazs has thus created the impression of Scandinavian origin to convey an aura of old world traditions and crafts) (Moravcikova & Krizanova, 2016; Yang et al., 2018; Hussein & Fraser, 2018).

A properly communicated type of link between the country of origin and the product category of the brand is thus demonstrably a source of competitive advantage, which, however, is not sufficiently used in practice. An example is Turkey, which has a strong tradition in carpet production but is not presented externally in the context of international trade, so that the term "Turkish carpet" becomes a brand added value and not just an indication of the standard quality of this product category (Morgan et al., 2004). In connection with the term 'country of origin branding', in our view, given its importance for the development of the market on an international scale, two other related terms need to be defined terminologically, namely 'national brand' and 'national producer brand'. With a certain degree of abstraction, a national brand can be described as synonymous with the brand of the country of origin (macro-dimension). The national manufacturer's brand then represents a specific product brand managed in such a way as to maximize the synergetic effect resulting from the value of the national brand (micro-dimension) in building and managing its value. The relationship between these two dimensions of the brand is synalagmatic. This means that not only the national brand has the potential to positively affect the consumer-perceived value of the brand of the national producer, but also vice versa - a valuable brand of the national producer has the potential to positively affect the value of the national brand and accelerate foreign direct investment, respectively development of tourism in the country. In the context of the national manufacturer's brand management from the point of view of corporate governance, the key phase is its positioning in accordance with the existing value of the national brand. Brand positioning is traditionally defined as the act of designing a product's product and communication policy so that the brand occupies a distinct place in the mind of the consumer (Krizanova, 2008).

Through this process, brand management offers added value to the consumer based on the creation of their own competitive uniqueness. Already Dib et al. (Cristea et al., 2015), however, stated in 1997 that positioning, the essence of which is the perception of the brand by consumers, is not completely under the control of the company, but it is also influenced by environmental factors. The resulting positioning of the national manufacturer's brand may therefore differ in practice from the original intention of its management (Blankson, 2004). The explanatory variables of this

phenomenon are the personality characteristics of the consumer, his value system, established patterns of consumer behaviour and his own past experience (Schiffman & Kanuk, 2007).

In addition, in the context of corporate marketing management in the international market, brand positioning is exposed to new challenges related to the effects of consumer subjectively perceived national brand value, which can cause significant oscillation of product brand value (Baack et al., 2013). Parobek et al. (2016a) state that when entering a foreign market, it is necessary to pay primary attention to the creation of the so-called consumer familiarity with the brand. The affective dimension of brand positioning in foreign markets is given by the consumer's need to express themselves (Munteanu & Pagalea, 2014). Such a self-expressing potential is also available to the brand of the national producer, which on the outside reflects the value orientation of the consumer, his (anti) globalization attitudes, lifestyle, etc. The normative level of positioning is manifested by different degrees of preference, respectively. rejection of the brand of the national producer caused by consumer ethnocentrism, resp. national disidentification, which were profiled on the basis of the personal characteristics of the consumer with regard to his past experience with the country of origin as such, resp. with competing brands of national producers. Jimenez and San Martin (2010) defined consumer ethnocentrism as a way of seeing processes and phenomena characterized by egocentrism and scaling of the attributes of their surroundings depending on the degree of their conformity with their own perception of social and moral norms.

This creates a precondition for optimal positioning of domestic brands as well as brands of national products of countries with a convergent socio-cultural profile (Josiassen et al., 2011). National disintegration, on the other hand, represents an animated attitude towards national product brands due to their connection with national brands, thus creating space on the domestic market for favourable acceptance of foreign brands from countries with a divergent socio-cultural profile. The level of ethnocentrism and national disidentification in the target markets is a relevant segmentation variable and it is necessary for the company to take it into account when creating a reference framework for positioning in its strategic management. The tool for detecting convergences and divergences of national brand profiles is the so-called The National Brand Index (NBI) compiled by the GfK consulting group in cooperation with S. Anholt and the so-called The Good Country Index (GCI), in the development of which S. Anholt also participated.
The National Brand Index is based on six basic parameters, which are:

- export - the influence of the country's image on the commercial success of its exported production,
- model of government - perception of the capabilities and possibilities of the form of government and the current political situation to ensure sustainable development and respect for human rights,
- culture - presentation of the landscape in the artistic sphere and its success and knowledge in sports, literature, music, cinematography, architecture, etc.,
- population - friendliness and hospitality in relation to tourists as well as the degree of friendship formation at the international level,
- tourism - the attractiveness of the country in terms of its natural beauty, history and social life,
- immigration and investment - attractiveness for talents and capital in terms of interest in studying, working and living as well as in the development of business activities.

The most valuable national brands according to this index in 2019 are Germany, France, Great Britain, Canada, Japan, USA, Italy, Switzerland, Australia and Sweden. The Slovak Republic is not evaluated in this ranking. Within the region of Central and Eastern Europe, only the Czech Republic, Hungary, Poland, Russia, Turkey and Ukraine are considered. Within the Good Country Index, the benefits of countries in seven basic dimensions are assessed in terms of selected criteria. However, the disadvantage of this model related to its global dimension is that it does not take into account the country's commitments to its own citizens, but only the country's contribution to societal sustainable development, which slightly limits its usability for brand management in terms of corporate governance in foreign markets.

Results and Discussion

The profiles of national brands of OECD countries according to S. Anholt are found in Table 1, where: 1) S&T is a science and technology; 2) C is a culture; 3) IP&S is international peace & security; 4) WO is a world order; 5) P&C is a planet & climate; 6) P&E is prosperity and equality and 7) H&W is health & wellbeing.

Table 1: Profiles of national brands of OECD countries

OECD countries	Dimensions						
	S&T	C	IP&S	WO	P&C	P&E	H&W
Australia	20	48	54	6	50	102	13
Austria	20	48	54	6	50	102	13
Belgium	9	1	109	13	22	7	16
Canada	29	25	41	11	39	27	8
Czech Republic	2	9	98	48	60	98	47
Chile	74	51	19	26	43	73	91
Denmark	4	6	64	9	14	2	3
Estonia	36	3	93	72	57	37	27
Finland	7	13	52	8	6	9	12
France	24	14	53	16	3	17	23
Germany	21	15	37	2	18	14	7
Great Britain	5	11	48	12	11	35	4
Greece	27	47	115	31	15	50	29
Hungary	3	19	17	43	32	23	33
Iceland	15	37	77	42	1	105	41
Ireland	32	8	50	21	10	1	2
Israel	34	63	123	84	25	99	51
Italy	41	26	55	14	7	36	24
Japan	61	45	18	47	33	47	21
Korea	44	34	35	33	98	65	19
Latvia	13	17	104	70	42	80	70
Luxembourg	37	10	100	20	30	56	11
Mexico	95	64	85	99	90	108	45
Netherlands	8	2	27	3	19	4	9
New Zealand	12	35	33	19	27	69	17
Norway	49	22	51	7	5	8	5
Poland	23	21	107	24	34	46	79
Portugal	39	12	133	28	23	21	39
Slovakia	42	20	113	52	24	142	52
Slovenia	10	16	160	18	12	77	57
Spain	40	30	71	15	9	34	22
Switzerland	104	112	156	125	47	55	117
Sweden	17	5	67	4	26	3	1
Turkey	55	75	78	39	51	40	44
USA	38	67	72	29	35	62	10

Source: Authors' own processing according to https://goodcountry.org/

The scores of countries acquired in individual dimensions are quantified as a ratio indicator of their individual contribution to the global dimension of a given dimension, while the result also takes into account the level of GDP of a given country. Based on the values of individual dimensions, it is also possible to determine the total value of IGC (it is true that the lower the value of the score, the more valuable the national brand is perceived as valuable within the dimension). However, this data has a lower usability in terms of marketing implications than knowledge of the values acquired within the individual dimensions. The reason is that the mutual similarity of countries in terms of their attributes involved in the perception of the value of the national brand is an essential factor in the decision on the positioning of the national manufacturer's brand in the context of identified consumer ethnocentrism, respectively national disintegration. OECD countries are thus grouped as follows, based on the similarity of their national brand profiles, as follows:

- Cluster 1: Australia, Chile, Japan, Korea, Austria, Turkey, USA,
- Cluster 2: Denmark, Finland, France, the Netherlands, Ireland, Hungary, Canada, New Zealand, Germany, Norway, Spain, Sweden, Italy, United Kingdom,
- Cluster 3: Mexico, Switzerland,
- Cluster 4: Belgium, Luxembourg, Poland, Portugal, Slovenia,

- Cluster 5: Czech Republic, Estonia, Greece, Iceland, Israel, Latvia, Slovak Republic.

The cluster analysis consists of following steps 1) selection of input database; 2) selection of parameters; 3) name of the object; 4) choice of clustering technique; 5) choice of using distance; 6) placing in clusters; 7) choice of distances in Dendrogram; 8) selection of appropriate techniques for creation of Dendrogram; 9) an explanation of the best Dendrogram similarities of objects and variables. Input for clustering in terms of data analysis is data matrix. Data matrix contains variables (in our case the attributes of the socio-cultural profile) in m columns and n rows (in our case OECD countries) on which these characters are measured. Every object it means the row of data matrix, that is, $x_{iT} = (x_{i,1}, ...x_{i,j},... x_{i,m})$ is characterized by its characteristics. The performed cluster analysis showed that clusters 4 (Belgium, Luxembourg, Poland, Portugal, Slovenia) and 5 (Czech Republic, Estonia, Greece, Iceland, Israel, Latvia, Slovak Republic) are the most similar, while the largest degree of differences was found between these clusters and cluster 2 (Denmark, Finland, France, the Netherlands, Ireland, Hungary, Canada, New Zealand, Germany, Norway, Spain, Sweden, Italy, the United Kingdom). It is in cluster 2 that the most brands among the TOP 10 most valuable according to the NBI index for 2019 (France, Canada, Germany, Sweden, Italy, Great Britain) are grouped. Other of these brands are in cluster 1 (Australia, Japan, USA) and 3 (Switzerland). The position of the Slovak Republic in cluster 5, together with knowledge of the value of the "masculinity" dimension in Hofstede's model of socio-cultural profiles, indicates the consumer ethnocentrism of its population, characterized by the importance of innovation as a possible source of weakening the value of national producers' brands in favour of foreign producers (Kliestikova & Janoskova, 2017). In the sense of the above, it should be true that in the context of brands of national producers, their national brand is an advantage in the conditions of the Slovak Republic only if they come from clusters 4, respectively. 5 (case, from clusters 1-3, assuming their innovativeness). However, this is a presumption concerning consumer decision - making in conditions of the same price level - i. e. that in this way the Slovak consumer will make a choice when choosing between brands without taking into account the criteria of their price. Consumer ethnocentrism in this case is also caused by the existence of a stereotype of distrust in relation to the real quality of foreign brands of consumer products on the Slovak market. This fact is given not only by historical experience, but also by current cases questioning the quality of branded production allocated on our market (ad case of dual quality of food on the Slovak and Austrian market from 2019). The importance of the national brand in the context of building the competitive advantage of national manufacturers' brands also follows from Table 2, which shows the representation of the countries of origin of the world's most valuable brands in 2019 according to Interbrand.

Table 2: Countries of origin of the most valuable brands according to Interbrand 2019

Country	Brands in the Interbrand 2019 ranking	Number of brands
Canada	Thomson Reuters	1
China	Huawei, Lenovo	2
Denmark	Lego	1
France	Louis Vuitton, Hermes Paris, AXA, L´Oreal, Danone, Cartier, Dior, Moet & Chandon	8
Germany	Mercedes, BMW, SAP, Audi, Porsche, Allianz, Siemens, Adidas, Volkswagen	9
Great Britain	HSBC, Land Rover, Burberry, Mini, Johnnie Walker, Smirnoff	6
Italy	Gucci, Ferrari, Prada	3
Japan	Toyota, Honda, Nissan, Canon, Sony, Panasonic	6
Korea	Samsung, Hyundai, Kia	3
Mexico	Corona Extra	1
Netherlands	Philips, Heineken, Shell	3
Spain	Santander, ZARA	2
Switzerland	Nescafé, Nestlé	2
Sweden	H&M, IKEA	2
USA	Apple, Google, Microsoft, Coca Cola, amazon, facebook, IBM, GE, McDonald´s, Disney, intel, CISCO, ORACLE, NIKE, pepsi, Gillette, American Express, Pampers, ups, J.P.Morgan, Budweiser, Goldman Sachs, citi, hp, Adobe, Hewlett Packard, 3M, Starbucks, Colgate, Morgan Stanley, VISA, mastercard, Harley&Daidson FedEx, NETFLIX, Johnson&Johnson, DHL, Discovery, PayPal, Tiffany&Co., Jack Daniel´s, KFC, salesforce, CATERPILLAR, Sprite, John Deere, Tesla	51

Source: Authors' own processing according to http://interbrand.com/

Table 3 shows the most valuable brands in the Slovak Republic according to the SuperBrands 2019 evaluation as well as their countries of origin (more than 64% of these brands come from countries grouped in clusters 4 and 5).

Table 3: Countries of origin of the most valuable according to SuperBrands 2019

Country	Brands in Superbrands 2019 ranking	Number of brands
Austria	Baumit, Zepter	2
Canada	Jamieson, McCain	2
Czech Republic	Eiffel optic, FOTOLAB, mall.sk, Mountfield, Pilsner Urquell	5
France	Yves Rocher	1
Germany	dm drogerie markt, Kaufland, Rajo, Viessmann	4
Great Britain	Bubbleology	1
Poland	CCC	1
Slovakia	BORY MALL, COOP Jednota, DEMA, Dormeo, EXIsport, GECO, HYZA, mecom, NAY, Považský cukor, SATUR, SWAN, SUPERZOO, topreality.sk, zlavadna.sk	15
Switzerland	Victorinox	1
USA	MARY KAY	1

Source: Authors' own processing according to https://slovaksuperbrands.com/

An example of systematic managerial work with knowledge of consumer ethnocentrism and its specifics in the conditions of the Slovak Republic is the Rajo brand, which, despite belonging to the German concern Meggle AG since 2003, does not communicate this fact externally in its marketing activities and continues to identify its identity with consumers of perceived Slovak origin. From the previous text of this chapter, in accordance with the results of the cluster analysis, it could appear that in the Slovak market, consumers in the absence of Slovak, resp. Czech brands prefer brands from Estonia, Greece, Iceland, Israel, Latvia, Belgium, Luxembourg, Poland, Portugal and Slovenia. However, reality proves that this assumption is wrong. The cluster arrangement of OECD countries must be perceived on two basic levels, which are equivalent to each other. One of them is the already mentioned level of brand perception on the Slovak market, which is characterized by shopping ethnocentrism and a tendency to innovation.

Conclusion

The aim of our paper was to provide a contextually wide introduction into further own research of the phenomenon "national branding" and its incorporation into managerial theory and practice. The aim of the paper has been accomplished by analysing the evolution of relevant publications in reputable databases as well as by providing brief own analysis of secondary data which are publically available. The outcomes of the research and subsequently formulated conclusions provide the understanding of overall complexity of national brand and its incorporation into management processes. These findings have already been partially outlined by various authors, but no clear and uniform statement has been formulated so far. However, it is important to highlight the fact that presented research outcomes form platform for erudite managerial decision making when entering either operating on foreign market.

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Unification of The Law of Carriage of Passengers in The European Union - Myth or Reality?

Dorota AMBROZUK

ORCID 0000-0003-2828-2049

University of Szczecin, Szczecin, Poland, dorota.ambrozuk@usz.edu.pl

Abstract

Under a common transport policy and consumer policy, beginning in the 1990s, European Union's bodies have been issuing regulations governing the subject-matter of the carriage of passengers. Their aim was to uniform the rules applicable in this scope in European Union Member States, and at the same time to raise the level of passenger protection with regard to regulations already included in international carriage conventions and domestic laws in individual Member States (cf. Gospodarek, 2011, pp. 55-68; see also Kersten, 2007, pp. 117-136). Solutions that were more favourable to passengers compared to the existing ones have been introduced. Issues not previously legislated have been regulated. The Union's legislator maintained at that (modelled on international carriage conventions) the branch-like nature of these regulations (cf. Ambrożuk, 2014, pp. 11-24).

Even though provisions of individual carriage regulations address an array of issues, they still do not comprehensively regulate problems that a passenger may face while travelling. Certain issues are still not standardised and Member States were left with considerable freedom when it comes to other matters.

In this state of facts, it is reasonable to ask whether unification of the law of carriage of passengers has indeed been achieved.

The aim of this paper is to provide an answer to this question. The author presents issues which need to be regulated at the Union level to bring about full, or at least further reaching, unification.

The author analyses legislation and judicial decisions, including those of the CJEU, and reviews the literature.

Keywords: European Union law, carriage of passengers, unification of regulation

Introduction

The process of unification of the law of carriage of passengers in the European Union initiated in 1990s has certainly contributed to the reinforcement of protection of passengers as the weaker party to the contract for the carriage of passengers. The level of this protection could not be raised quickly in the pan-national scale by introducing changes to existing international carriage conventions relating to individual branches of transport due to the length of processes of negotiation and renegotiation of international agreements. Such processes often take a good few years (see Ambrożuk, Dąbrowski, Wesołowski, 2019, pp. 15-52). This is caused by discrepancies in the interests of individual countries, differences in legal systems (the common law system, the continental system) and the related conceptual grid and established tradition. Moreover, even if changes in individual conventions that would be favourable to passengers were brought about relatively quickly, there still would be no guarantee that all states-parties to the convention would adopt these amendments in the current shape, which is seen in the example of the so-called PAL 2002 Protocol to the 1974 Athens convention relating the carriage of passengers and their luggage by sea. As a result, they could lead to the emergence of problems greater than the existing ones. A passenger wanting to pursue his claims under a contract for international carriage by a given means of transport would have to establish not only whether a carriage convention applies to the given carriage (that is establish the scope of application of the convention) but also the version that should be applied (original or as amended; and if there have been multiple amendments, which amendments). Moreover, successful changes at the level of international law (international conventions) does not solve the issue of introducing relevant changes in domestic laws of individual Member States. This is why the EU legislator resorted to the furthest-reaching unification measure under EU secondary legislation, that is a regulation. Regulations are in force and applied in Member States directly which means they do not require any activity on the side of Member States, they do need implementing rules.

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This concerns the following regulations:

1) Regulation (EC) No 2027/97 on air carrier liability in the event of accidents, amended by Regulation (EC) No 889/2002 of the European Parliament and of the Council of 13 May 2002,
2) Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing Regulation (EEC) No 295/91, (the so-called air regulation),
3) Regulation (EC) No 1107/2006 of the European Parliament and of the Council of 5 July 2006 concerning the rights of disabled persons and persons with reduced mobility when travelling by air,
4) Regulation (EC) No 1371/2007 of the European Parliament and of the Council of 23 October 2007 on rail passengers' rights and obligations, (the so-called rail regulation) (see Stec, 2010, pp. 969-985),
5) Regulation (EC) No 392/2009 of the European Parliament and of the Council of 23 April 2009 on the liability of carriers of passengers by sea in the event of accidents, (the so-called sea regulation),
6) Regulation (EU) No 1177/2010 of the European Parliament and of the Council of 24 November 2010 concerning the rights of passengers when travelling by sea and inland waterway and amending Regulation (EC) No 2006/2004, (the so-called waterways regulation),
7) Regulation (EU) No 181/2011 of the European Parliament and of the Council of 16 February 2011 concerning the rights of passengers in bus and coach transport and amending Regulation (EC) No 2006/2004, (the so-called bus regulation), (see Stec, 2012, pp. 433-450).

The EU legislator has built within the European Union framework a system of legal norms concerning the carriage of persons maintaining separation of individual branches of transport. In each of the individual branches of transport (transport by air, sea, inland waterways, rail and road), under one or more regulations, it has regulated similar issues such as:

- liability for the life and health of passengers and for their luggage;

- liability for preventing access to a means of transport, its cancellation, delay, loss of connection, including also the issue of due flat-rate compensation in such cases,

- the issue of carriage of disabled passengers or passengers with reduced mobility, including non-discrimination of such passengers when using transport services and as part of it: granting these passengers, as a rule, the right to transport, with exceptions dictated mainly by safety principles and taking into account technical possibilities of a given carrier, enabling these passengers to travel with assistance (sometimes they are transported gratuitously) or a certified guide dog, granting the right to gratuitous assistance of employees of the entity managing ports, airports, railway stations, terminal, etc., or assistance of the carrier's staff, providing gratuitous transport of a limited amount of equipment necessary for mobility and principles of carriers' liability for such equipment;

- obligation to provide necessary information to passengers;

- obligation for carriers to have third party insurance;

- obligation to establish in each Member State a body or bodies responsible for enforcing provisions of these regulations and granting passengers the right to file complaints to such bodies for violation of provisions of these regulations.

Taking into account the adopted method, i.e. EU regulations, the system looks uniform at first glance, but in reality it is still far from full unification.

Causes and effects of lack of full unification

There are at least a few reasons for the lack of full unification of the law of the carriage of passengers at the EU level.

The first of them results mainly from the scope of rules and exclusions adopted in individual regulations. Regulations do not apply to each carriage of persons performed in the territory of the European Union (or under domestic or international transport). It is an effect of numerous exclusions of application stipulated in regulations, i.a. due to the size of the means of transport or the number of crew (e.g. inland waterways regulation no. 1177/2010), irregularity of transport or route length (e.g. bus regulation no.181/2011) or no payment for transport (e.g. air regulation no. 261/2004). In such cases provisions of international carriage conventions will apply to international carriage, and domestic provisions of a given Member State to domestic carriage, or even to international carriage when a given problem cannot be solved on the basis of an international convention.

Secondly, some of the regulations grant European Union Member States the possibility to exclude application of certain provisions for a given period of time or stipulate the right to grant temporary exemptions from applying

them (rail regulation no. 1371/2007, and also bus regulation no. 181/2011). This period of time may be extended. It is primarily dictated by taking into account the difficulties that entrepreneurs dealing with transport, including also transport infrastructure, may encounter when applying all provisions of these regulations. This refers mainly to entrepreneurs from less well-off countries of the European Union.

The third reason for the absence of full unification is the lack of standardisation in the regulations - with the exception of carriage by rail and by sea - of the issue, highly important to passengers, of the statute of limitations for their claims. Limitation periods fall under procedural rules which rest with the Member States under the principle of procedural autonomy of these countries, understood as Member States' competence to regulate jurisdiction of courts and court procedures which serve to examine claims based on the Union law (see ECJ judgements of 16 December 1976 in C-33/76 *Rewe* and C-45/76 *Comet*; Resolution of the Polish Supreme Court of 17 March 2017, III CZP 111/16). However, a breach of this rule is being observed due to the need to comply with the principle of equivalence and the principle of efficiency (Wróbel, 2005, pp. 41-42; see ECJ judgement of 25 July 1991 in C-208/90 *Emmott*). According to the principle of equivalence, national procedural rules cannot be less favourable to claims based on the Union's law than similar claims based on a domestic law, while according to the principle of efficiency domestic procedural rules cannot make it impossible to exercise in practice rights based on the Union's law (Wróbel, 2005, p. 44).

The absence of the said regulation causes European Union Member States to apply different limitation periods in reference to the same claims resulting from EU carriage regulations, depending on whether a given claim has a basis both in the convention law and EU regulations (e.g. claim for compensation of the death of a passenger) or solely in the Union's regulations (e.g. claim for flat-rate compensation for flight cancellation or delay). In the first case, the absence of standardisation of the limitation period in the Regulation is an obstacle in the application of the limitation period resulting from an international carriage convention (CJEU in its judgement of 22 October 2009 in C-301/08 *Bogiatzi* against the air regulation no. 2027/97 (889/2002)). In the second case the limitation period resulting from the convention should not be applied and it is appropriate to apply the limitation period resulting from a domestic law (CJEU judgement of 22 November 2012 in C-139/11 *Moré* against air regulation no. 261/2004). Limitation periods resulting from a domestic law may be different, e.g. in the majority of European countries they are three years, but e.g. in Spain and Greece - five years. In Poland regulation of the limitation period of passenger claims is not uniform, but as a rule these period allow for one or two years. Earlier, for claims resulting from air carriage pursued on the basis of Regulation no. 261/2004, Polish courts applied a one-year, a two-year or even a ten-year limitation period, which did not foster certainty of law. The case was resolved by the Supreme Court in its judgement of 17 march 2017, III CZP 111/16 (more on this subject in Stec, 2017, pp. 591-598; Kasprzyk, Konert, 2017, pp. 55-72; Ambrożuk, Wesołowski, 2018, pp. 91-101). Currently this issue is already regulated in the Polish Aviation law (one-year limitation period).

As has been pointed out above, carriage by rail and by sea is an exception here. Rail regulation no. 1371/2007 and sea regulation no. 392/2009 do include limitation periods. This is because the EU legislator has appended extensive excerpts from international carriage conventions to them. The rail regulation was supplemented with an excerpt from the so-called CIV convention, that is Uniform Rules concerning the Contract for International Carriage of Passengers and Luggage by Rail, which is appendix A to the Convention concerning International Carriage by Rail (COTIF), done on 9 May 1980, amended by the Vilnius Protocol of 3 June 1999. The sea regulation was appended with an excerpt from the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea, PAL 2002. Both of these conventions standardise limitation periods.

This is why, not going into legal complexities relating to appropriate application of provisions covered in appendices to the said regulations, it may be assumed that in the case of international carriage by rail performed in the territory of the European Union, claims of passengers resulting from rail regulation no. 1371/2007, where at the same time this carriage falls under application of the CIV Convention, are subject to a three-year, two-year or a one-year limitation period. It depends on what the claim concerns and on whether the carrier may be accused of actions or failure to act intended to cause damage, or if he acted or failed to act in a negligible way and was aware of the likelihood of damage. The same limitation periods are applied as a rule to passenger claims resulting from EU rail transport which is at the same time domestic transport, but only in reference to compensation claims for the death or injury of the passenger and compensation claims for damage to luggage, because the limitation period stipulated for in the appendix refers to such claims only. Other claims resulting from the above-mentioned regulation are subject to limitation periods stipulated in a domestic law (Ambrożuk, 2018a, pp. 41-48; see also Stec, 2017, pp. 600-602).

The question of establishing limitation periods seems slightly simpler in the case of the sea regulation no. 392/2009. It covers claims that are also subject to regulation in the Athens Convention PAL 2002, to which a two-year limitation period applies (Ambrożuk, 2018b, p. 136).

The above-mentioned solutions applied in the road regulation no. 1371/2007 points out that even where the limitation period has been regulated, not directly in the regulation but in its appendix, one cannot talk about a full unification of law in this scope in reference to rail carriage performed in the Union's territory.

The fourth reason for the absence of full unification involves giving Member States full discretion in terms of exercising obligations imposed by the regulations. An example here is the obligation, present in almost all regulations, for a Member State to appoint a body or bodies responsible for enforcing provisions of the regulations to which passengers may bring complaints for violations. The number of such bodies and conditions for filing complaints with them as well as the procedure of examining the complaints were left to the discretion of Member States, recommending only under European Commission's interpretative guidelines (see Interpretative Guidelines on Regulation (EC) No 261/2004 and on Regulation (EC) No 2027/97 (889/2002) and Interpretative Guidelines on Regulation (EC) No 1371/2007) that bringing in a claim to the said body should be preceded by filing the claim with the carrier itself. Hence the possible far-reaching discrepancies here in individual Member States.

The efficiency of such complaints may be different in individual Member States, too. E.g. in Poland until recently an administrative body appointed to enforce the provisions of the air regulation no. 261/2004 had not only exercised administrative supervision (as is the case now), but also adjudicated passengers' individual financial claims (flat-rate compensation), which caused severe problems in practice and judicial decisions (Ambrożuk, 2017, pp. 48–60). At the same time, in the Netherlands the complaints only had an effect in the sphere of administrative law and did not determine the passenger's individual claim, which the CJEU considered sufficient (see CJEU judgement of 17 March 2016 in joint cases C-145/15 *Ruijssenaars and Others* and C-146/15 *Dees-Erf*).

Moreover, difficulties in unification may result from a multiplicity of languages in which the regulations are issued or a diversity of legal cultures of individual Member States, thus from typical problems which emerge also on the ground of the convention law and other Union regulations. Differences in this regard may cause different interpretations of the same legal measures that are present in the regulations when the law is applied by entities coming from different Member States of the Union. The interpretative guidelines prepared by the European Commission and primarily by the CJEU case-law may prevent such different interpretations.

Summary

Regulations issued by authorised bodies of the European Union which govern the matters of carriage of passengers in individual branches of transport have contributed to far-reaching unification of the rules in place. Yet still, this does not mean full unification, which might never be achieved. Undoubtedly, full unification would benefit from systematization of limitation periods resulting from regulations for claims that passengers have the right to, by standardising them directly in the regulations. This would require breaking the procedural autonomy of Member States.

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Resurrection of Securitisation – Has the EU Found the Right Solution?

Przemyslaw KATNER

University of Szczecin, Szczecin, Poland
ORCID 0000-0003-4059-5216

Abstract

Before the 2007 financial crisis, securitisation as an economic and legal construct had been developing dynamically in developed and developing countries, gaining significant impact on financial markets. The crisis, however, led to a breakdown in this sphere. Using data made available by the European Bank Authority and the Association for Financial Markets in Europe the scale of these measures was presented as well as the later image of securitisation in the USA and Europe. The paper then presents reasons which caused certain securitisation products irrespective of the pre-crisis rating level (even those rated 'AAA') to perform poorly during the crisis and reasons that hinder the development of securitisation in the post-crisis environment, especially in Europe, and which affected the relatively quick increase of US securitisation issuances and outstandings. This led to the need to look at attempts to revive securitisation in the European Union by relevant changes in the law, which would lead in particular to lowering the risk borne by investors and which would increase trust in securitisation, thus positively affecting its attractiveness. This is why the author analyses solutions adopted in Regulation 2017/24 (in force since January 1, 2019 and followed by other acts and documents related to securitisation) which introduces a general framework for securitisation and unified rules for simple, transparent and standardised (STS) securitisation as a high-quality securitisation, which is an opposite to complex, opaque and risky securitisation products available on the market. Particular attention is paid to due-diligence, risk-retention, transparency, simplicity and standardisation requirements that are imposed by the regulation.

Keywords: securitisation, securitization, Regulation 2017/2402, STS

Introduction

Securitisation is an economic and legal construct with a non-uniform character and often rather complicated structure. It is quite often assumed that it is a necessary element of properly functioning financial markets. Nevertheless, after the financial crisis which started in 2007, both securitisation issuances and outstandings in Europe have dropped drastically compared with the previous situation and remain quite low. What were (are) the reasons for it and has the European Union found a solution to this problem?

Securitisation is defined in various ways (e.g. Lipson 2012, p. 1233; Delivorias 2016, p. 1; in Polish literature e.g. Zombirt 2003, pp. 29–30; Baczyk 2015, pp. 748–749; Katner 2016, pp. 12-13). For example, Schwarcz (2012, p. 1298) defines it as "a financial transaction in which (1) a special purpose entity issues securities to investors and, directly or indirectly, uses the proceeds to purchase rights to, or expectations of, payment, and (2) collections on the rights or expectations so purchased constitute the primary source of repayment of those securities". Whereas Regulation 2017/2402 laying down a general framework for securitisation and creating a specific framework for simple, transparent and standardised securitisation (hereinafter Regulation 2017/2402) in recital 1 provides that "securitisation involves transactions that enable a lender or a creditor – typically a credit institution or a corporation – to refinance a set of loans, exposures or receivables, such as residential loans, auto loans or leases, consumer loans, credit cards or trade receivables, by transforming them into tradable securities. The lender pools and repackages a portfolio of its loans, and organises them into different risk categories for different investors, thus giving investors access to investments in loans and other exposures to which they normally would not have direct access. Returns to investors are generated from the cash flows of the underlying loans".

Development and downfall of securitisation

Securitisation is a relatively new economic and legal phenomenon. Its roots may be sought in the 18th century (Frehen, Goetzmann, Rouwenhorst, 2014, p. 287 *et seq.*), but usually it is assumed that modern securitisation was initiated in 1970 in the USA when the Government National Mortgage Association (GNMA, Ginnie Mae) began

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publicly trading mortgage-backed securities (MBS), which gave investors the title to revenues obtained as a result of paying off these mortgages (in particular the principal and interest) (Deku, Kara 2017, p. 57 *et seq.*; Schwarcz, Markell, Broome 2004, pp. 1-3; Lipson 2012, p. 1247). In mid 1980s it appeared in Western Europe and then spread throughout almost the entire world (Salter, Utz 2001, p. 45; Mancuso 1997, pp. 59-60; Katner 2015, pp. 212-218; Lee 2002, p. 101 *et seq.*). The issued and transferred securities were gradually secured against assets other than mortgage receivables and which are a source of revenue, especially against receivables (also future receivables) resulting from e.g. consumer credit, credit card use, leasing agreements, contracts for the sale of goods, contracts for the provision of ICT services, medicine deliveries, etc. (Schwarcz, Markell, Broome 2004, p. 3; De Sear 2006, pp. 50-52). In the 1990s the so-called synthetic securitisation evolved, which is a securitisation model departing from the traditional one (Bell, Dawson 2002, p. 542 et *seq.*).

The securitisation market developed very dynamically (LoPucki 1996, p. 24). It is hard to give the exact numbers as there are varied sources and selection methodologies that are used to determine the securitisation issuance. However, the European Securitisation Forum (ESF) reported that in 1996 the European securitisation issuance amounted to less than EUR 40 billion in issues placed, in 1997 – almost EUR 50 billion, in 1999, after a drop in 1998, it was over EUR 70 billion (ESF Report 2001, p. 2). In 2002 the issuance in Europe rose to EUR 157.7 billion, in 2004 – EUR 243.5 billion and in 2006 – EUR 481 billion (ESF Report 2010, p. 3). In the USA, in 2000 the issuance was at the level of EUR 1,088 billion, it peaked in 2003 (EUR 2,914.5 billion) and in 2006 it was EUR 2,455.8 billion (ESF Report 2010, p. 3). If we take into account the outstanding balances, in 2004 securitisation was a USD 6 trillion industry (Schwarcz, Markell, Broome 2004, p. 1), and in 2007 – USD 8.9 trillion (Cheng, Dhaliwal, Neamtiu 2011, p. 541 *et seq.*).

Development of securitisation resulted from varied functions it performed. They include i.a. obtaining and diversifying sources of funding for the operation, diversification and transferring credit risk, freeing up regulatory capital and economic (internal) capital, improvement of return of assets and return on equity indexes and also increasing investment opportunities (Stopyra 2013, p. 310; EBA 2015, pp. 46-47).

Nevertheless, the financial crisis which started in 2007 has led to a regression in the development of securitisation. In 2007 the US securitisation issuance (taking into account asset-backed securities (ABS) and MBS, both public and private placements, excluding any retained volumes) amounted to EUR 1,164 billion and in Europe it was EUR 333.3 billion (ESF Report 2008, p. 20). In 2008 it was EUR 211.3 billion and EUR 45.8 billion, respectively, in 2009 - EUR 326.2 billion, EUR 18.5 billion and in 2010 – EUR 486.4 billion and EUR 72.5 billion (AFME/ESF 2009, p. 21 and AFME/ESF 2010, p. 21). Within the 'AAA'-rated securitisation products, rated by Standard & Poor's, Moody's Investor Services and Fitch Ratings, the US residential mortgage-backed security (RMBS) subprime products and US collateralised debt obligations (CDOs) default rates between 2007 and 2009 reached approximately 16% at the highest point. Within the 'BBB'- rated securitisation products the situation was much worse and the US RMBS subprime products default rates reached approximately 60% and 45% for non-subprime products while US commercial mortgage-backed securities (CMBS) and US CDO products had default rates of approximately 20% in 2007 and 2009 respectively (EBA 2015, pp. 11-12). Until 2006, virtually all primary issuance in Europe was placed with end-investors and other banks. However, in 2007 around one third of securitisation issuance and from 2008 until the first quarter of 2014 the vast majority of issued transactions were retained by issuers themselves. The amount outstanding peaked in Europe in years 2008-2009 at over EUR 2 trillion, to fall in 2013 to EUR 1.5 trillion (EBA 2015, pp. 10-11).

Situation after the crisis

There are opinions in the literature which claim that securitisation itself has contributed to the financial crisis, i.a. by leading to the sharp deterioration in lending standards (e.g. Engel, McCoy 2007, p. 2039 *et seq.*; Eggert 2009, p. 1259 *et seq.*; McCoy, Pavlov, Wachter 2009, p. 495 *et seq.*; Peterson 2007, p. 2186 *et seq.*). While investigating the situation it was found out that certain securitisation products, irrespective of their pre-crisis rating level, performed poorly during the crisis i.a. due to factors like (i) misalignment of interest between originators and investors that led to quite loose underwriting criteria of underlying loans in securitisation transactions; (ii) erroneous modelling assumptions from rating agencies and investors; (iii) the complexity of transactions; (iv) the lack of sufficient transparency towards investors and investor's due diligence. There was also a lack of sufficient state regulations. The specific elements in securitisation transactions that ran into difficulties during the crisis were "originate to distribute" securitisation model (where underlying assets were originated by financial institutions in order to distribute them to various third parties), excessive leverage and embedded maturity transformation (as securitisations relying on refinancing within a narrow window of time are vulnerable to market liquidity risks and present specific credit risks difficult to quantify) (EBA 2015, pp. 47-49, US Senate Hearing 2011).

It should be noted that most EU securitisation products before, during and after the crisis performed well with almost zero losses (EBA 2015, pp. 12-14, 47). In spite of that, after the crisis the balances outstanding in European securitisation were still relatively low - at the end of the first quarter of 2019 they were only EUR 990.9 billion (1,120.9 billion, if we include collateralised loan obligations (CLOs) and CDOs) (EBA 2020, p. 16) - and so was the case with the level of new securitisation transactions. Reasons for this were sought i.a. in the post-crisis stigma attached by investors to the whole securitisation market, in the macro-economic environment that unfolded since the financial crisis, in the tightening of the main credit rating agencies' rating methodologies and rating policies, affecting the securitisation asset class following the negative experience of securitisation ratings during the years of the crisis, in the change of investor base and the lack of secondary market liquidity, in a uniform approach of existing regulations to varied securitisations (regardless of how they are conducted, collateralised and of the degree of complexity) and in the potential regulatory uncertainty among issuers and investors as a result of the numerous regulatory initiatives (EBA 2015, pp. 7, 24, Delivorias 2016, p. 17; Katner 2018, p. 814).

Surprisingly, at the same time the US securitisation market was recovering much faster despite the fact that the US securitisation instruments during the crisis had reached much higher default rates than the ones originated in the EU. For instance, in the last quarter of 2016 US outstandings reached approximately EUR 8.8 trillion. And throughout 2016 the US issuance of securitisation products amounted to EUR 1,860.4 billion (AFME 2017, pp. 7, 11). However, securitisation markets in the USA have different characteristics to those in the EU and their recovery is at least in part due to the public sponsorship as vast majority of securitisation instruments in the US (in 2016 it was EUR 1,416 billion in agency MBS as to US issuance and EUR 6.2 trillion as to outstandings) benefit from public guarantees from the US Government Sponsored Enterprises (e.g. Fannie Mae). Banks investing in these products also benefit from lower capital charges under the US regulatory regime (AFME 2017, pp. 7, 11).

In order to change the situation and taking into account the importance of soundly structured securitisation for the market, the works of the Basel Committee on Banking Supervision (BCBS) and the International Organisation of Securities Commissions (IOSCO), the European Union initially implemented a legislative framework to address the risks inherent in securitisation (see e.g. EBA 2015, pp. 17-21 which shows a wide scope of regulatory reforms related to securitisation since 2009) and then it started works on rules adapted to better differentiate simple, transparent and standardised (STS) products from complex, opaque and risky ones. The works resulted in the aforementioned Regulation 2017/2402 that entered into force on January 18, 2018 and has been applied since January 1, 2019. Simultaneously, Regulation 2017/2401 on prudential requirements for credit institutions and investment firms was adopted and amended former provisions with respect to rules concerning securitisation. This type of a legislative act (regulation, not a directive) resulted from a pursuit to ensure uniform solutions on securitisation on the territory of the entire European Union. Next, the given legal acts were followed by other acts and documents relating to securitisation and STS securitisation (see e.g. a list of them in AFME 2020, pp. 5-8), the aim of which is to ensure uniform interpretation of the adopted provisions and manner of their application (e.g. Commission delegated regulation (EU) 2019/1851 of 28 May 2019 supplementing Regulation (EU) 2017/2402 of the European Parliament and of the Council with regard to regulatory technical standards on the homogeneity of the underlying exposures in securitisation).

Regulation 2017/2402

General framework for securitisation

As has been previously mentioned, Regulation 2017/2402 differentiates between STS securitisation and other types of securitisation. Article 2 includes definitions of all terms key to securitisation (and STS securitisation), like securitisation itself, standard and synthetic securitisation, resecuritisation, securitisation position, originator, original lender, securitisation special purpose entity (SSPE), sponsor, (institutional) investor, servicer, asset-backed commercial paper programme/transaction (ABCP programme/transaction), first loss tranche, etc.

With reference to all types of securitisation, Regulation 2017/2402 lays down a general framework within which it establishes due-diligence, risk-retention and transparency requirements for parties involved in securitisations, criteria for credit granting, requirements for selling securitisations to retail clients, a general ban on resecuritisation, requirements for SSPEs as well as conditions and procedures for securitisation repositories. It is worth pointing out in this respect that i.a. originators, sponsors and original lenders should - as a rule - apply to exposures to be securitised the same sound and well-defined criteria for credit-granting which they apply to non-securitised exposures. The due-diligence requirement is addressed to institutional investors who are obliged to verify varied information related to securitisation and take steps in order to ensure that they properly assess the risks arising from securitisation, to the benefit of end investors. In order to be able to do so, the originator, sponsor and SSPE should make at least certain information and documents available – as a rule by means of a securitisation repository – to potential investors as well as to holders of a securitisation position and to the competent authorities (transparency requirement). In Poland

such an authority is the Polish Financial Supervision Authority. The repositories are legal persons authorised and supervised by the European Supervisory Authority (European Securities and Markets Authority, ESMA) that centrally collect and maintain the records of securitisations and are supposed to provide the investors with a single and supervised source of the data necessary for performing their due diligence. Finally, the risk-retention requirement is intended to ensure that the interests of originators, sponsors, original lenders and investors are aligned. Regulation 2017/2402 tries to achieve it by imposing an obligation on the originator, sponsor or original lender to retain on an ongoing basis a material net economic interest (defined in Article 6(3) of the Regulation) in the securitisation of no less than 5% so that they retain a material net economic exposure to the underlying risks in question (with certain exceptions). The originators are also forbidden from selecting assets to be transferred to the SSPE with the aim of rendering losses on the assets transferred to the SSPE higher than the losses over the same period on comparable assets held on the balance sheet of the originator.

STS Securitisation

For STS securitisation - as one which is to ensure special protection to investors - apart from the indicated requirements resulting from general rules for securitisation, it is necessary to meet additional criteria. Most of all, the originator, sponsor and SSPE involved in a securitisation considered STS must be established in the European Union. Moreover, Regulation 2017/2402 provides criteria for a simple, transparent and standardised character of STS securitisation.

As to the simplicity requirement, i.a., the title to the underlying exposures must be acquired by the SSPE by means of a true sale or assignment or transfer with the same legal effect in a manner that is enforceable against the seller or any other third party. That excludes synthetic securitisation at the moment, but on July 24, 2020 the European Commission presented a proposal of a new regulation that would introduce STS balance-sheet synthetic securitisation (see also EBA, 2020). The transfer or assignment of the underlying exposures to the SSPE (and to the seller, if he is not the original lender) as a rule cannot be subject to clawback provisions in the event of the seller's insolvency. The underlying exposures must have specific features like e.g. meet predetermined, clear and documented eligibility criteria which do not allow for active portfolio management of those exposures on a discretionary basis, not include certain transferable securities and – without exceptions – any securitisation positions. Securitisation (ABCP transaction) should be backed by a pool of underlying exposures that are homogeneous in terms of asset type (e.g. pools of residential loans, auto loans or leases) which contain obligations that are contractually binding and enforceable. To prevent creation of 'originate to distribute' models the underlying exposures in particular should be originated in the ordinary course of the originator's or original lender's business pursuant to underwriting standards that are no less stringent than those that the originator or original lender applied at the time of origination to similar exposures that are not securitised and the originator or original lender should have expertise in originating exposures of a similar nature to those securitised.

STS securitisation also requires a wider scope of transparency than the one provided within the general framework for securitisation. And with respect to the standardisation requirement, STS securitisation assumes certain standardisation of practices and documentation. To this extent, among others, the interest-rate and currency risks arising from securitisation should be appropriately mitigated and any measures taken to that effect should be disclosed. As a rule, the SSPE should not enter into derivative contracts and should ensure that the pool of underlying exposures does not include derivatives.

The fulfilment of the above-mentioned requirements does not automatically make securitisation to be STS securitisation. To achieve this, it is necessary to notify ESMA of that fact and the securitisation must be included in the list of all notified STS securitisations maintained on ESMA official website.

Conclusion

At the moment it is difficult to tell clearly whether the route adopted by the EU to return securitisation's role in EU financial markets proves right. On the one hand this is caused by a relatively short period of applicability of new solutions, on the other by a current bad economic situation associated with the COVID-19 pandemic. One may only demonstrate that in 2019 the STS securitisation issuance reached EUR 67.6 billion (out of EUR 216.8 billion in total) and the cumulative number of STS notifications as of Q2 2020 was 330 (AFME 2020, p. 11, 14). An example of a successful STS securitisation on the Polish ground was securitisation carried out in 2019 by PKO Leasing S.A. – owned by PKO Bank Polski S.A., a major Polish bank – that involved the sale of a portfolio of high-quality leasing receivables with a total value of PLN 2.5 billion (approximately EUR 560 million).

Without a doubt, the adopted solutions lead to ordering the market and impose obligations on actors who take part in securitisation, which - if enforced - should ensure increased security of trading and thus encourage investment.

Uniform regulation of STS securitisation as high-quality securitisation seems to be especially important, and so does bringing about a certain correlation of interests of parties to securitisation in reference to the quality of securitised assets and the resecuritisation ban.

At the end, we should not directly compare the size of securitisation in the EU with US securitisation, where in 2019 outstandings reached EUR 9.8 trillion and placed issuance amounted to EUR 1,906 billion (AFME 2020, pp. 12, 16). Apart from the aforementioned role of agency MBS in these numbers, it must be noticed that in 2019 over 90% of outstandings in Europe were A- to AAA-rated (over 50% were AAA- rated) compared to only around 53% in the USA, while over 32% of US outstandings were CCC-rated or lower.

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The Concept of Piercing the Corporate Veil in The Polish Capital Companies Law

Zbigniew KUNIEWICZ

University of Szczecin, Szczecin, Poland, zbigniew.kuniewicz@usz.edu.pl
ORCID 0000-0003-0793-9937

Abstract

The issue in question which is the subject of the research analysis in this paper is not regulated in the Polish legal system. The consequence of the organizational structure adopted by the legislator involves a clear separation of the company from its shareholders. This separation is demonstrated in the personal, organizational and material sphere. From the point of view of the main theme of these reflections, the most important aspect of separate personhood of a capital company is to adopt the principle of non-liability of shareholders for the company's obligations. Company's debts are its own debts for which it is fully liable. For shareholders the company's debts are debts of a third party. Shareholders are obliged to make contributions to the company and only to this extend do they bear the economic risk of participation in the company which involves the likelihood of losing the contributed resources.

Even though the principle of shareholders' non-liability for the capital company's obligations results from the company's separate personhood, the legislator decided to express it directly in legal provisions. It is worth adding at that that shareholders' non-liability for the company's obligations is treated as a fundamental principle inscribed in the construction of capital companies. The above-mentioned comments trigger a question of whether the principle of shareholders' non-liability for obligations of a capital company is absolute or whether it may be lifted in certain circumstances. There are increasingly frequent opinions coming from legal scholars and the judicature, inspired mainly by the views of the Western legal commentary which questions the absolute nature of the discussed principle. It is therefore pointed out that in certain cases it is necessary to disregard the company's separate personhood and impose liability for its obligations on its shareholders. These situations are treated as exceptions and boil down to cases where the form of the company's legal personality was used to circumvent statutory bans or to achieve benefits contrary to principles of community life.

The method of interpretation of applicable laws in an apragmatic approach was employed in preparing this paper. Conclusions that derive from the analysis have the nature of postulates. They express a need for a normative regulation of the concept of the so-called piercing of the corporate veil in capital companies since the existing legal regulations provide a doubtful basis for applying this structure.

Keywords: capital companies, shareholders' liability for company's obligations.

Introduction

The aim of this paper is to present the concept for which trade law scholarship uses various terms, such as "piercing the corporate veil", "lifting the corporate veil" or disregarding separate legal personhood of a capital company (Sołtysiński 2013, p. 15). Therefore, the subject of the analysis will cover a limited liability company, a joint-stock company and also a simple joint-stock company which has already been regulated and will enter into force on March 1, 2021.

The concept of piercing the corporate veil presented in the title of the study refers to shareholders of a commercial company and its essence is that it is the shareholders, apart from the company itself, who would be liable for the company's obligations. The use of the conditional mood expressed by the term "would" is justified by the fact that the enumerated entities - as a rule - are excluded from liability for obligations of the company in which they are shareholders. The form of legal personality of a capital company provides a certain protective umbrella which in legal literature is called a corporate veil. The problem which is the platform for these reflections boils down to explaining whether the principle of shareholders' non-liability for a capital company's obligations can be lifted in the Polish companies law. Despite quite a significant degree of complexity of the research problem, these reflections will be conducted at such a level so as to be comprehensible also to those readers who do not have specialist legal or trade knowledge.

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Company's separate legal personhood

When proceeding to substantive reflections, first one needs to remember a few basic principles on which the legal construction and functioning of capital companies are based. Most of all they are companies which require relevant capital to be established, which comes from contributions brought by shareholders. Upon entering the company in the entrepreneurs' register it acquires legal personality (Article 12 of the Polish Commercial Companies Code, hereinafter: CCC). The fact that the company has legal personality has certain legal consequences among which emphasis needs to be placed on the existence of the company's personal, organizational and material separateness from its shareholders.

The existence of personal separateness of capital companies means that these companies act as autonomous entities towards their shareholders. The consequence of being a shareholder involves a bonds between the enumerated entities and the company, which is called a corporate relationship. This relationship has a civil law nature, which means that it outlines relations between autonomous entitles guided by the principle of their equality (Opalski 2012, pp. 10-11). The content of a corporate relationship includes shareholders' obligations towards the company and company's obligations towards the shareholders resulting from legislation or articles of association or statutes. In particular, the company is entitled to a claim against the shareholders for full coverage of shares, whereas the shareholders may demand that the company pay the approved dividend.

The principle of debtor's liability for their debt

Civil law features a fundamental principle that governs financial liability, which stipulates that each debtor bears liability for their debt (Stelmachowski 1984, p. 309; Kubiak-Cyrul 2019, p. 94). Therefore, the existence of financial separation between the company and its shareholders means that each of the named entities is liable for their own obligations. It is unlimited liability because it covers the entire debt and its scope covers the debtor's entire property. As an example we can quote a situation where a capital company - as the buyer - executes a contract for the sale of real estate, and thus becomes liable for the performance of this contract, especially for paying the price. The expression of this obvious thesis is a consequence of applicability of the afore-mentioned principle of debtor's unlimited liability for his obligations. However, at this stage of reflections it is still an open question whether apart form the company (who is the debtor) there is another actor, shareholders in particular, who will be liable for the performance of the obligation arising from the contract executed by the company.

Provisions of the civil code, which is a basic legal act governing private law relationships, fail to stipulate for a legal norm which would directly state whether each debtor is liable for their behaviours. Legal literature treats applicability of this general rule as so obvious that it does not require specific normative reasoning (Radwański, Olejniczak 2010, p. 22). Nevertheless, the civil code has regulations that assign liability for debts of a specific debtor to other entities. Article 33^1 § 2 of the Polish Civil Code (hereinafter: CC) is an example of such a regulation. Pursuant to this provision, subsidiary liability for the obligations of an organizational unit which is not a legal person but has legal capacity is borne by its members. Subsidiary nature of this liability means that it arises when the given organizational unit becomes insolvent. The category of organizational units stipulated for in the said Article 33^1 § 2 CC includes partnerships, that is registered partnerships, professional partnerships, limited partnerships and joint-stock limited partnerships. Partners in these partnerships, apart from the shareholder in the joint-stock limited partnership, are liable for the companies' obligations.

Shareholders' non-liability for the company's obligations

Capital companies have a different legal status than partnerships. It is because they are organizational units equipped not only with legal capacity which is a determinant of them having rights and obligations, but they also have the attribute of legal personality. This property is afforded by statute in a sense that the legislator expressly confers legal personality upon companies, pointing to the moment a company obtains this personality (Article 12 CCC). The most significant consequence of legal personality of a capital company - at least from the point of view of the subject-matter of these reflections - is shareholders' non-liability for the company's obligations. Capital companies' having legal personality entails the principle of shareholders' non-liability for the company's obligations. Applicability of this principle may be derived from previous comments, emphasizing, on the one hand, the fact of a capital company having legal personality, and on the other by pointing out an absence of a legal norm which would burden shareholders with liability for the company's operation. However, in the case of capital companies, the legislator declared *expressis verbis* the principle of shareholders' non-liability for the company's obligations (Articles 151 § 4, 300^1 § 4, 301 § 5 CCC). Therefore, if we say that shareholders are liable in a limited way (up to the value of contributions made) for the obligations of the capital company, then such a statement is not true and is only a mental shortcut. In reality, it means that a company, as a legal person, is liable independently for its own debts, while shareholders are not liable for the company's obligations but only bear the economic risk of losing the contributions made to the company. This

risk surfaces when the company is dissolved and its assets prove insufficient to return the contributions to all shareholders (Kidyba 2015, p. 652; Szumański 2014, p. 636).

The form of legal personality that capital companies are equipped with is therefore a certain protective umbrella which shields shareholders against liability for the company's obligations towards its creditors. In certain, few, cases stipulated for in law, shareholders may be liable to the company. An example here is liability to the company for returning any undue performances received from the company, e.g. dividend (Article 198 and 350 CCC). However, it must be clearly stressed that shareholders are liable to the company, not to the creditors. Polish regulations of the commercial companies' law do not have a legal norm that would be a basis justifying the lifting of the principle of non-liability of shareholders for a capital company's obligations. Actions taken by bodies of a capital company are - pursuant to Article 38 CC - actions of the company itself for which it is fully liable. Legal scholarship emphasises that shareholders cannot be liable for the company's obligations since it is the basic principle of capital companies' law (Szumański 2012, p. 168; Kidyba 2017, pp. 358-359).

The principle of shareholders' non-liability for the company's obligations also refers to companies functioning as a holding company. It is characteristic to a holding company to comprise a parent company and a subsidiary or subsidiaries. Emergence of the parent-subsidiary relation between companies is a consequence of the parent company's holding an adequate stake in the subsidiary (Article 4 § 1(4) CCC). By having the status of a shareholder in a subsidiary, the parent company may influence the operation of this subsidiary. Possibilities of this influence depend on two factors. On the one hand, the number of shares held determine the "voting power" of the parent company at the general meeting or general assembly of the subsidiary. On the other hand, the discussed scope of influence of the parent company on the subsidiary is determined by the competences afforded to the general meeting and the general assembly of the subsidiary. Because the subsidiary is a separate entity from the parent company, a principle of capital companies law is applicable here, according to which the parent company is not liable for the subsidiary's obligations (Szumański 2012, p. 172).

The so-called corporate veil may only be pierced when a holding company agreement is made between the parent company and the subsidiary. Article 7 CCC expressly stipulates for admissibility of concluding such a contract. This provision lays down that an agreement for the management of the subsidiary or a transfer of profits by such company to the parent company may specify the scope of liability of the parent company for damage caused to the subsidiary and the scope of liability of the parent company for obligations of the subsidiary towards creditors. The analysis of Article 7 CCC shows clearly that provisions of the holding company agreement concerning liability of the parent company both towards the subsidiary and its creditors are not obligatory elements of the content of such an agreement. The holding company agreement may, therefore, not regulate the issue of liability of the parent company at all. Whereas the fact itself that such a provision may be placed in a holding company agreement is confirmation of the thesis consistently upheld here that on the ground of Polish companies law there is no regulation that would justify the so-called "piercing of the corporate veil".

Views of legal scholars and commentators and judicature

Polish legal scholars and commentators emphasize that normative regulations do not introduce instruments that would allow general relativisation of separate personhood of capital companies and thus assignment of liability for the company's obligations to shareholders. At the same time, they point out that a measure of "abusing the company's legal form" may at times be used by shareholders in order to circumvent statutory bans or to act in breach of principles of community life to the detriment of third parties. In the above circumstances, court intervention may be justified which would deprive shareholders of their privilege of non-liability for the company's obligations.

However, there is a theoretical and practical problem here involving indication of a legal basis that allows bypassing the company's separate personhood. Two regulations are considered in this regard, that is Article 5 CC and Article 58 § 1 CC. The former regulates abuses of an individual right by introducing a ban on using one's own right in a manner contradictory to its social and economic purpose or principles of community life. However, legal scholarship takes up significant reservations against application of Article 5 CC to achieve a result of circumventing separate personhood. They point out that the clause of abusing an individual right may be used as an instrument of protection of a defendant, not as a basis to bring in a claim (Sołtysiński 2013, p. 16). Article 58 § 1 CC in turn, declares invalid legal activities that are designed to circumvent the law. This provision also raises serious doubts as to whether the use of a legal from of a company may be deemed as circumvention of the law with effect of invalidity of the legal act of forming the company. It needs to be emphasized that Article 21 CCC, which is a special provision towards 58 § 1 CC, stipulates for a different effect than invalidity for defective performance of a legal act of forming a company. Pursuant to Article 21 CCC, the register court may adjudicate the dissolution of a commercial company registered in the register due to defects that have not been remedied within the time period defined by the registry court (Opalski 2012, pp. 14-15).

The presented doubts, associated with the application of the measure of circumventing the company's separate personhood are also present in Polish judicature. One needs to emphasize at that that the established line of judicial decisions of the Supreme Court assumes that the principle of separate personhood and of capital company's liability is an undisputed principle in the current legal status. Searching for justification for assigning shareholders with liability for the company's obligations, the Supreme Court cites examples of facts presented in the German literature as circumstances that allow the application of the concept of the so-called piercing of the corporate veil. It involves situations in which the property of various entities (e.g. shareholder and company) was mixed in such a way that a third party is not able to tell what is whose. Such a mixing may also have a personal scope and concern the activity of members of bodies of legal persons - in situations where these same natural persons serve in the bodies of different legal persons. Doubts may arise then as to on whose behalf they act. The Supreme Court is very cautious in reaching for the construct of law circumvention which is expressed in Article 58 § 1 CC (cf. judgement of the Polish Supreme Court of 2 November 2013, judgement of the Polish Supreme Court of 8 September 2014). At the same time the Supreme Court clearly emphasizes that invoking the concept of circumvention of the law in order to achieve an effect in which shareholders of a capital company are assigned with liability is exceptional in nature, limited to a specific example and justified by its circumstances.

The presented reflections have shown that sometimes there is a need to lift the principle of shareholders' non-liability for capital companies' obligations. However, existing regulations do not provide a clear legal basis that would allow for this objective to be implemented. Therefore, regulation of the premises and mode of application of the so-called piercing of the corporate veil in the Polish companies law is a justified *de lege ferenda* postulate.

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Selected Issues of Incorporation and Implementation of Norms of Private International Law into National and EU Law (Based on Transport Agreement Regulations)

Krzysztof Wesolowski

University of Szczecin, Szczecin, Poland, krzysztof.wesolowski@usz.edu.pl

ORCID 0000-0002-4427-317X

Abstract

In some areas of private law a certain convergence of regulations applicable in different systems (bodies) of law can be observed. One of such domains is the transport law where, for many years now, a process of interpenetration of legal concepts and entire regulations has been noticed. It can take the form of, i.a., incorporation and implementation of regulations drawn from a different system of law. Each of these two methods has its strengths and weaknesses. The issue of incorporation and implementation of norms set out in international transport conventions into the EU law is particularly interesting. It is connected with regulations issued by the EU institutions with the aim to improve the legal status of passengers using various modes of transportation. The regulations were designed to supplement and modify the norms resulting from international conventions in order to enhance and protect passenger' rights. However, conventions are transposed into the EU law using different methods, different from the ones applied in national law. This gives rise to specific problems. The aim of the paper is to identify the problems and also the benefits and drawbacks of the solutions adopted. The research method used by the author include analysis of legal acts, case law and secondary literature.

Keywords: International Uniform Private Law, Incorporation, Implementation, Transport Law

Introduction

The existence of separate systems (bodies) of laws is an age-old phenomenon. In principle, these systems maintain their autonomy and integrity, specific axiology and rules of interpretation. A common problem arising from the coexistence in one domain of norms drawn from different systems of law is the issue of their hierarchy and, in consequence, precedence. The debate over that is endless. Essentially, the answers lie within the sphere of the constitutional law of individual states. This problem, however, does not exhaust the issue of coexistence and co-application of norms drawn from different systems of law.

In recent years, a new challenge has emerged in the form of multicentricity (polycentricity) of legal systems. It is a situation in which law applicable in a given state is laid down, applied and interpreted by many autonomous, though affecting one another, decision centers located within the state, and outside its structures (Łętowska, 2005, p. 5 et seq.). Such situation is contrasted with the traditional monocentric system rooted in legal positivism and normativism, in which law is understood as a hierarchical, autonomous and ordered system created by the state, with legal norms complying with a higher standard, thus acquiring a pyramidal shape, with the highest norm at its top (the famous Kelsen pyramid of standards with the so-called basic norm, *Grundnorm* at the top) (Kalisz, 2007, p. 35 et seq.). Multicentricity of a legal system can be observed mainly in the European Union member states. It is the result of obligatory co-application of national norms and the EU norms. Such situation leads to a number of problems which cannot be narrowed down to the issue of precedence only.

Multicentricity is reflected in the private law in the way norms drawn from one body of law penetrate to another body of law. The concept of multicentricity embraces the influence of norms of one legal system on the content of norms of another system, implementation of norms of one system into another system (mostly, from international or EU law to national law), and the incorporation of norms. The latter is particularly prominent in regulations regarding the transport agreement. This arises from the fact that this agreement – among very few – has been regulated at a supranational level and is governed by international conventions. In fact, in each branch of transportation there are several conventions that regulate transport agreements. These are as follows:

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- the Convention for the unification of certain rules relating to international carriage by air signed in Warsaw on 12 October 1929, as amended by the protocol done at the Hague on 28 September 1955; the Convention, supplementary to the Warsaw Convention, for the unification of certain rules relating to international carriage by air performed by a person other than the contracting carrier, signed at Guadalajara on 18 September 1961,
- the Convention for unification of certain rules for international carriage by air signed at Montreal on 28 May 1999,
- the Convention on international carriage by rail (COTIF) signed at Berne on 9 May 1980, as amended by the Vilnius Protocol of 3 June 1999,
- the Athens Convention relating to the carriage of passengers and their luggage by sea, signed at Athens on 13 December 1974, amended by the Protocol of 19 November 1976 and Protocol of 2002 (PAL).

As country borders become more permeable, and thus – there is less justification for maintaining separate regulations for domestic and international transport – many countries decide to regulate the transport agreement in a given branch of transport by reference to relevant international convention (examples of such solutions in various systems of law are provided in the academic papers by Wesołowski and Dąbrowski (2017, pp. 542-544) and Ambrożuk, Dąbrowski and Wesołowski (2018, pp. 154-157). In result, convention norms are incorporated into national law.

The processes of implementation and incorporation of international convention norms, containing uniform private law norms and pertaining mostly to the problems of passenger transportation, can also be observed in the case of the EU law. However, these processes are different from transposition typical for normal national legislation, which leads to specific problems. The aim of this paper is to identify these problems, and also, the benefits and drawbacks of the solutions adopted.

Incorporation and implementation of an international convention as a measure of convergence of solutions adopted in different legal systems

For the purposes of this paper, the concept of incorporation of an international convention is understood as extension of its provisions onto situations which are not covered by its application of its own, inherent force (*ex prioprio vigore*). This extension occurs by reference included in the provisions of the legal system to convention norms. In result, the convention extends its scope of application, but still maintains distinctiveness from the incorporating law. It continues to be a specific micro-system, autonomous from other systems, including the incorporating system of law. Such incorporation has consequences pertaining to, i.a., the interpretation of convention regulations (cf. Gebauer, 2000, pp. 683–705; Czepelak, 2008, p. 395; Ambrożuk, Dąbrowski, Wesołowski, 2019, pp. 153–155) or gap filling (Dąbrowski, 2018, pp. 89–99).

Many different ways of reference to international conventions can be noted in internal law. One may come across references to a convention that governs a specific subject matter, however, references may be obscure and vague, disabling proper identification, with the reservation that it is a convention binding the state and by the law of the state, reference to such convention is made (e.g. art. 208 of the Polish act of 3 July 2002 – Aviation Law). The good point here is automatic incorporation of all amendments and supplements to the convention into internal law as applicable as on the date of entry into force of the referring provision. It also extends to a new international convention if the referring state becomes a party to the convention. The second option is reference to an international convention with an annotation that the reference also includes further amendments and supplements to the convention which entered into force after the referring provision entered into force, properly promulgated (e.g. art. 41 § 1, art. 97, art. 272, art. 279 of the Polish Maritime Code). Such incorporation method enables automatic incorporation into internal law of subsequent protocols and conventions amending or supplementary to the convention identified in the referring provision. However, in case of ratification of a new convention covering the same issues, to incorporate it, an amendment of the referring provision needs to be made. The third option is to refer to a given convention without referring to its subsequent amendments and supplements which may enter into force after the referring provision becomes effective (art. 181 § 1 Polish Maritime Code). This option necessitates amending of the referring provision whenever the convention is amended. Lack of such amendment may cause duality in the legal status – the convention as amended or supplemented will be applied in international relations subject to its scope, whereas internal relations will be governed by the convention in the unamended form, as indicated in the referring provision.

In turn, implementation of an international convention consists in enacting provisions in national law that fully adhere to and reflect regulations set out in the convention. The procedure may be forced or voluntary. Such provisions are related to the convention only in substance, i.e. it is only the content that is tied to the convention. Norms imposed by these regulations become an integral part of the domestic legal system in which they are issued, sharing its axiological system and rules of interpretation. If implementation is forced (which does not happen with

regard to transport relationships), interpretation of regulations implemented forcibly must take into account the key purpose, which is the unification of internal law at a supranational level.

Voluntary implementation may include convention regulations in their entirety or in part. In fact, such implementation resembles a situation common in private law when the legislator models the new regulations on solutions adopted in another legal system. However, implementation takes place only if the "transposition" of convention regulations into national legislation is not reduced to selected regulations, but at minimum, includes a significant part of convention regulations. Another important point is that the implemented provisions are not substantively changed. However, the question of distinguishing between the two legislative techniques during voluntary implementation has no major significance.

Norms arising from international transport conventions as a component of the EU law

The EU regulations on selected issues of passenger transport agreement in individual branches of transportation are applicable all across the European Union. At present, the EU system of passenger protection relies mostly on the following regulations (in order relevant to the branch of transportation):

1) Council Regulation (EC) No 2027/97 of 9 October 1997 on air carrier liability in the event of accidents, amended by Regulation (EC) No 889/2002 of the European Parliament and of the Council of 13 May 2002,
2) Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules of compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing Regulation (EEC) No 295/91,
3) Regulation (EC) No 1107/2006 of the European Parliament and of the Council of 5 July 2006 concerning the rights of disabled persons and persons with reduced mobility when traveling by air,
4) Regulation (EC) No 1371/2007 of the European Parliament and of the Council of 23 October 2007 on rail passengers' rights and obligations,
5) Regulation (EC) No 392/2009 of the European Parliament and of the Council of 23 April 2009 on the liability of carriers of passengers by sea in the event of accidents,
6) Regulation (EU) No 1177/2010 of the European Parliament and of the Council of 24 November 2010 concerning the rights of passengers when travelling by sea and inland waterway and amending Regulation (EC) No 2006/2004,
7) Regulation (EU) No 181/2011 of the European Parliament and of the Council of 16 February 2011 concerning the rights of passengers in bus and coach transport and amending Regulation (EC) No 20006/2004.

However, these regulations do not provide a full regulation of passenger transport agreement. They only amend and supplement regulations arising from international transport conventions. It was assumed that to viably improve the legal status of passengers, it is necessary to pass directly applicable regulations as the process of amending international law takes too much time. Thanks to that solution, an EU system of passenger protection came into being (Ambrożuk, 2014, p. 11 et seq.; Gospodarek, 2011, p. 56 et seq.; Stec, 2012, p. 433 et seq.; Stec, 2007, p. 247 et seq.; Stec, 2010b, p. 4 et seq.; Stec, 2010a, p. 969 et seq.; Koziński, 2010, p. 19 et seq.; Szymajda, Polkowska, 2002, p. 55 et seq.; Pavliha, 2013, p. 226 et seq.; Ambrozuk, Dąbrowski, Wesołowski, 2019, pp. 135–137).

The European Union joined the international transport conventions regarding passenger transport, in result of which they became part of the EU legal order. Pursuant to art. 216 (2) of the Treaty on the Functioning of the European Union, agreements concluded by the EU are binding for both the EU institutions and EU member states. This means that in the EU relationships, which also encompass domestic transport in the EU member states, both the convention regulations (regardless of whether the member state is a party to it) and other EU regulations that amend and supplement them, are applicable. However, the lack of accession of a member state to an international convention the EU is a party to, creates a complicated, dualistic legal situation in that state (cf. Koziński, 2010, p. 31 and Dragun-Gertner, Popławska-Dąbrowska, 2017, p. 92).

The EU legislator has thus treated the norms resulting from international transport conventions on passenger transports as a basis for the EU system of passenger protection. Nevertheless, relations between regulations arising from international conventions and EU regulations are not identical in all branches of transportation since different modes of reference to convention provisions were applied. However, the reasons for such a situation, including historical factors, have little significance for the subject matter of this paper.

As it comes to the EU Aviation Law, the EU legislator sort of incorporated conventions on aviation (first, the Warsaw Convention, then the Montreal Convention) by expressly referring to them in the content of the regulations. Yet, a typical referring provision is lacking. Therefore, the application of convention norms results rather from the

entirety of the regulation contained in individual regulations. Unquestionably, the fact of adopting the Montreal Convention by the EU is important.

In contrast, the situation is different in case of regulations applicable to sea and rail transport. However, the convention regulated these two branches of transportation in a different way. The Athens Convention concerning transport by sea was, in its original shape, criticized for favoring the interests of carriers. For years efforts were made on the international forum to change the convention. They resulted in the Protocol of 1 November 2002 (PAL 2002). The Protocol, despite the fact that it significantly improved the legal status of passengers, at first was not really applauded by states with a merchant fleet. It entered into force much later, i.e. on 23 June 2014, after it was ratified by 10 states (Belize, Bulgaria, Croatia, Denmark, Greece, Latvia, Malta, the Netherlands, Norway, Palau, Panama, Saint Kitts and Nevis, Serbia, Syria, Great Britain). The PAL 2002 ratification process would have been even slower had it not been for the stand taken by the European Union. On 23 April 2009 the EU adopted the Regulation No 392/2009 on the liability of carriers of passengers by sea in the event of accidents, which was a sort of transposition into the EU law of the Athens Convention, as amended by PAL 2002 pertaining to international and national carriers by category A and B ships. This happened through inclusion of Annex I, Provisions of the Athens Convention relating to the carriage of passengers and their luggage by sea of 1974, consolidated text, and the Protocol of 2002 to this Convention. The order and numeration of provisions was retained, and the provisions left out were highlighted. Moreover, in a similar way the International Maritime Organization reservation and guidelines, non-binding in their nature, for implementation of the Athens Convention, adopted by the IMO Legal Committee on 19 October 2006 (IMO guidelines), which constitute Annex II to the Regulation No 392/2009, were transposed to the EU law. Through this measure, they became binding. However, the Regulation itself contains a number of "supplementary" regulations which aim at enhancing the legal status of passengers in relation to the regulation of the Convention.

Such transposition into the EU law of the provisions of the Athens Convention seems, at first glance, no different from incorporation. The name of the convention, its structure and numeration of provisions were retained in the Annex. However, this method is closer to implementation than incorporation, since the Regulation contains in the Annex a text equivalent to the original Convention text (exempt some provisions). Nevertheless, it constitutes a distinct legal act governed by principles of the EU law. It was drawn up in all official EU languages (and not in English and French, the two texts of a single original of the Athens Convention being equally authentic). Thus, the Regulation is subject to the axiology and rules of interpretation of the EU law. The same holds true for gap filling.

Regardless of that, the European Union accessed the Athens Convention as amended by Protocol of 2002, based on two decisions of the Council of Europe of 12 December 2011.

Such situation, however, creates a problem of order of precedence that should be followed to govern the EU relationships – the Athens Convention or the Regulation (with Annexes). It constitutes not only a theoretical, but also practical conflict. Even if the differences between the content of the Convention and of Annex I to the Regulation are disregarded, the issues of interpretation and authenticity of languages on which interpretation is based, of gap filling and possible future amendments to the acts, remain unsolved. When transposing the provisions of the Athens Convention into the European Union law, the EU legislator did not determine the order of precedence of the regulations. The rule has it that international agreements concluded by the EU should take precedence over secondary legislation passed by the EU organs (cf. opinion of the Court of Justice of the European Union expressed in item 42. Judgment C-308/06 of June3, 2008, *Intertanko*). This would mean that in case of international transport carried out within the EU territory, precedence should be given to the Athens Convention. On the other hand, the logic dictates a reverse order of precedence of regulations, as pointed out in secondary literature (Koziński, 2010, p. 31). Yet, it does not solve doubts about the correctness of the solution adopted.

The situation is similar in case of rail transport. Provisions of the Appendix CIV to COTIF Convention were also transposed into the EU law (Regulation 1371/2007). It must be admitted, though, that the rail convention did not raise so many objections as the Athens Convention. The EU accessed COTIF, thus the CIV which relates to the transport of passengers as amended by the Vilnius Protocol of 3 June 1999. The changes introduced by this Protocol were, to a large degree, the effect of significant liberalization of the rail transport sector carried out by the European Union, in particular separation of infrastructure management and transport activity (cf. Freise, 2009, pp. 1237-1238). The Regulation tackled various aspects of rail passenger transport, and most importantly, strengthened passenger rights, and granted passengers the right to submit a complaint to any carrier's subcontractor or railway undertaking involved, based on joint and several liability of the carrier who entered into the transport agreement. Significant part of CIV was implemented by Regulation No 1371/2007, and specifically, by containing an excerpt from the Uniform Rules CIV in Annex No I. However, as it was the case with IMO, it was not transposed in its entirety. Some provisions, i.a. regarding jurisdiction, were left out in the belief that such issues fall under the exclusive competence of the EU.

Hence, also in this case, there is a legal act which is new – in relation to the convention – and governed by rules specific to the EU law. The mode of implementation is, in essence, the same as in the case of sea carriers. The Annex I is headed: Extract from Uniform Rules concerning the contract of international carriage of passengers by rail (CIV), Appendix A to the Convention concerning international carriage by rail (COTIF) of 9 May 1980, as modified by the Protocol for modification of the Convention concerning international carriage by rail of 3 June 1999. The structure (division into chapters and articles) and numeration have been retained in the same form as in CIV. Despite that, for reasons indicated above with regard to the Athens Convention, also this Regulation should be recognized as a new act of the EU law with all consequences thereof.

However, in the case of rail law, the issue of precedence between acts has been successfully regulated. As the implied by the provisions of the Agreement between the EU and the Intergovernmental Organization for International Carriage by Rail (OTIF) on the accession of the European Union to the Convention concerning International Carriage by Rail (COTIF) of 9 May 1980, as amended by the Vilnius Protocol of 3 June 1999, if international transport is carried out between the EU member states, Regulation 1371/2007 takes precedence over the CIV, and the uniform rules of CIV may be applied to it only subsidiarily (Freise, 2009, pp. 1237-1238). Art. 2 of this Agreement provides as follows: "Without prejudice to the object and the purpose of the Convention to promote, improve and facilitate international traffic by rail and without prejudice to its full application with respect to other Parties to the Convention, in their mutual relations, Parties to the Convention which are Member States of the Union shall apply Union rules and shall therefore not apply the rules arising from that Convention except in so far there is no Union rule governing the particular subject concerned." This rule also arises from recitals 7 and 8 of the preamble to the aforementioned Agreement ("Member States of the Union cannot invoke and apply the rights and obligations deriving from the Convention directly among themselves"; "the Convention applies fully between the Union and its Member States on the one hand, and the other Parties to the Convention, on the other hand"). However, if carriage is conducted between states being parties to the Uniform Rules CIV of which only one is an EU member state, then the legal relationship between the parties is primarily subject to the Uniform Rules CIV, and the Regulation shall be applied to it only as supplementary, based on the reference made in art. 8 § 2 COTIF, provided that the EU law is the governing law of the agreement, even if both parties come from the EU member state or member states. The important issue here is to identify the point of entry or point of destination in a state which is not a member of the European Union.

Strengths and weaknesses of the adopted method of regulation

The method of incorporation of international convention provisions has many benefits. It allows to directly apply the provisions with regard to relationships which fall outside the scope of *ex prioprio vigore* application of the provisions, with all the „weight" they gained being applied internationally (academic commentaries, reference literature, foreign case law) (Wesołowski, Dąbrowski, 2017, p. 547). Incorporation enables full compliance of internal legislation with international regulations and prevents misrepresentation of convention norms that may occur in translation of original, authentic convention texts into national languages (Młynarczyk, 2002, p. 29). When an international convention is incorporated into domestic law by a general reference to the convention, without being specific about it, adoption of a new convention or amending protocol will automatically trigger changes in the incorporating legal system. However, the downside is that incorporation may maintain some discrepancies in meaning that occur between equally authentic languages of a multilingual convention if no language is deemed prevailing.

However, essentially, the EU legislator did not apply the above method (only to some extent in the case of Aviation Law). The method of transposition of convention law to the EU law used in case of COTIF and Maritime Law raises some doubts. The creation of a new legal act, though its content may be largely consistent with the provisions of relevant international convention, does not allow for the use of the benefits of incorporation. In the case of the EU law which is by principle available in all official EU languages treated as equal and authentic, the problem of discrepancies between the language versions of regulations remains unsolved. This equal authenticity of the EU language versions gives rise to the issue of order of precedence of provisions, an issue that is not always solved *expressis verbis*. In the future, to avoid duality in legal status, it might be necessary to modify the regulations whenever any changes to the convention law are made. Another issue is the leaving out of some convention provisions from the annexes. Insofar as the non-inclusion of provisions concerning jurisdiction is understandable, the dropping of some other provisions is questionable. For example, provisions of Annex I to the Regulation 1371/2007 (rail), Title VI, contains provisions of art. 60 (1-3) CIF which define the prescription time-bar on claims. However, Annex I does not include provisions of art. 60 (4-5) CIF pertaining to suspension of time-bar periods with respect to claims filed with the carrier and provisions banning enforcement of time-barred claims. In this way a cohesive solution – ensuring that short time-bar periods on claims arising from rail transport agreements were counteracted by suspension of time-bar periods - became fragmented.

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Synergy, Logic-Language for The Modeling of Software Requirements in Students of Systems Engineering and Informatics

Erick G. FLORES
Santiago Antúnez de Mayolo National University, Huaraz, Perú
efloresc@unasam.edu

Yvett N. GONZALES
Santiago Antúnez de Mayolo National University, Huaraz, Perú
ygonzaleso@unasam.edu

Esmelin N. ALAYO
Santiago Antúnez de Mayolo National University, Huaraz, Perú
eniquin@unasam.edu

Alex PACHECO
Cañete National University, Cañete, Perú
apacheco@undc.edu.pe

Edwin ROQUE
Cañete National University, Cañete, Perú
eroque@undc.edu.pe

Abstract

In the manufacture of software, specifically in the activity of system analysis, the student of Systems Engineering and Informatics must know and systematically develop capacities for their performance in the treatment of system requirements, since the capacities executed in their mental space, are developed in their natural language at a common level without a guideline and theoretical basis of applied grammatical structure. Which leads to a subjective perception, identification and description of software requirements. Given these empirical facts, a guiding and guiding concept is proposed for the development of capacities that help the student in the sensitive identification, description, relationship and diagramming; based on the synergy between; a structure - intermediaries (based on the logic and logic of use cases) linked to language (semantic expression of meanings) to arrive at a conscious reason (thought) that helps and accompanies the modeling of software requirements. This research is of a quantitative approach, experimental type, explanatory level, pre-experimental design and deductive method, carried out to students of the Systems Engineering and Computer Science career of the university, to whom the Instrument "Components of the modeling of software requirements". In addition, a favorable student performance of 36% was obtained and the research hypothesis was corroborated. Ha = The logic-language synergy improves the modeling of software requirements in Peruvian students of Systems Engineering and Informatics.

Keywords: software requirements, logic-language, use case modeling.

Introduction

In software manufacture, throughout the software process (Pressman, 2010), specifically in the systems analysis activity, the systems and informatics engineer must have a sensory sensitivity to the context of the problem to identify, describe, organize, relate and synthesize the software requirements within their mental space in a complex and often deeply abstract way; managing to obtain, with strenuous efforts, software in terms of requirements, which are inputs for the next system design activity.

The capacities executed in the mental space are developed in their natural language at a level of colloquial and / or common use, without a theoretical base of applied sentence structure and with a confusing logic of the application of use cases (only to knowledge graphic icons and symbols); situation that leads to an analysis of software requirements

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in a mental space of abstract empiricism with subjective features, causing enormous complications in the modeling of software requirements based on use cases.

For Aristotle, logic and language are closely related (Ruiz, 2015). If language is made up of signs with which we express (in a spoken or written way) our thinking, logic allows us to analyze certain uses of that language, specifically those related to the creation and transmission of knowledge. This problem, the aforementioned philosophical basis and the pertinent knowledge have made it possible to establish a synergistic relationship between the sentence structure of the Spanish language and the logic of use cases for the identification and description of software requirements as a pedagogical strategy to facilitate the management of the abstraction in requirements modeling through use cases

Materials and Methods

This research is of a quantitative approach, experimental type, explanatory level and pre-experimental design, carried out on a group of 28 students of the Systems Engineering and Informatics career, to whom the Document Measurement Instrument "Components of the modeling software requirements", which consists of 11 items, which systematically relate logic and language in the framework of modeling software requirements. Where the independent variable is studied: logical-language synergy of the ordinal polytomous type and the dependent variable, modeling of nominal dichotomous software requirements. The Document Measurement Instrument was applied in a pilot to 10 students of the Systems Engineering and Informatics career to later verify the reliability of the aforementioned with Cronbach's Alpha. Subsequently, it was submitted to the Judgment of three experts and the Kendall Coefficient was applied to measure the degree of agreement between several judges.

For the normality analysis, the Shapiro-Wilk Normality test was applied for the study variables, where P-value in each of the cases is $P > \alpha$ (0.05 - the null hypothesis is not rejected), so that observations are normally distributed. Regarding the general objective of the research, it was obtained as a result that the P-value in the ANOVA table is less than 0.05, so there is a statistically significant relationship between the modeling of software requirements (Proposed methodology) and the modeling of software requirements (previous methodology), with a confidence level of 95%. Likewise, when performing the homocedasticity test in the comparison of means, it was obtained that the calculated P-value is less than 0.05, therefore, the null hypothesis is rejected in favor of the alternative hypothesis, thereby corroborating the general hypothesis of the investigation. Ha = The logic-language synergy improves the modeling of software requirements in Peruvian students of Systems Engineering and Informatics. All these analyzes have been carried out with the support of the statistical software IBM SPSS statistics 25.

In addition, for the analysis of the research, the deductive method has been used whose research strategy was the synergistic review of the theoretical bases based on Aristotelian Thought, Chomsky's linguistic creativity and the Maturanian Language Theory.

Research Motivation

In software manufacture, throughout the Software Process (in our case Life Cycle), specifically in the System Analysis activity, the Systems Engineering and Informatics student must identify, describe, organize, relate and synthesize the system requirements within your mental space in a complex and often deeply abstract way; managing to obtain, with strenuous efforts, a software in terms of requirements, which are inputs for the next activity of System Design as another fundamental activity of the Software Process within the framework of Software Engineering.

The capacities executed in the mental space of the student, many times of deep abstraction, are developed in the Spanish language at a level of colloquial and / or common use without a guideline and theoretical basis of applied grammatical structure. Which leads to a subjective perception, identification and description of software requirements, causing enormous complications in the modeling of software requirements and future activities of the software process.

Synergy, logic-language for thought

For the analysis of the research, the deductive method has been used, whose research strategy was the synergistic review of the theoretical bases based on Aristotelian Thought, Chomsky's linguistic creativity and the Maturanian Language Theory.

In the first instance (Ruiz, 2015) states: there is the relationship between language, logic and thought, which is one of the great findings of Aristotle, the same one who maintains that from the senses that experience recovers, as a source of certain data, logic and language are going to be fundamental. Logic studies the form that a certain type of argument must have, those that try to prove or prove something; it shows what paths thought follows when it acts; Likewise, he observes that the basic element is language through words, with which we refer to realities through sentences to express or think combinations between these realities.

For his part, Chomsky points out that the fact that people are able to communicate means that there is something in our minds that allows us to do so. One way to define this position is to call it "rationalist", that is, to attribute a primary role to reason in our relations with experience. Giving primacy to reason over experience is like saying that experience and the world provide us with the data, but that we do not get to them without intermediaries, but rather through a structure that determines the way we perceive, or in which our mind processes that data; and it is this structure that we must verify and discover (Versace, 2016)

Likewise, the Maturanian Theory of Language establishes that acquiring awareness of something implies reflecting objective reality through generalized meanings that have been objectified in the word. The link between thought and language, therefore, is intimate and necessary, since the semantic expression of meanings of thought is given in language (Ortiz, 2016)

From these statements, a guiding concept is proposed, which is the basis for the approach, presentation and development of capacities that help the student in the sensitive identification, description, relationship and diagramming of components for the modeling of software requirements. The concept proposed in this research tells us: that the experiences of reality are perceived by the senses, through information, data and that in the synergistic link between; a structure - intermediaries (being the logic and logic of use cases, for example) and the language (semantic expression of meanings) a conscious reason (thought) is reached that contributes to the modeling of software requirements.

Abstraction methodology for modeling

For the generation of knowledge, based on the proposed guiding concept, and making it operational, 3 stages are proposed:

a. Initial moment. It is the writing of the business process, perceived by the senses and the knowledge generated in the mental space of the student, which must be processed in a logical way, with the conception of statements and written under the structure of the sentence. First, a framework description of the business process is made and then sentences are detailed as the subjects appear, in the environment of the main actions that they carry out called Thematic sentence (Tavera, 2016) and later the secondary or extension actions called Development sentences (Tavera, 2016), which are the details of the topic sentence, a description that is shown in Fig 1.

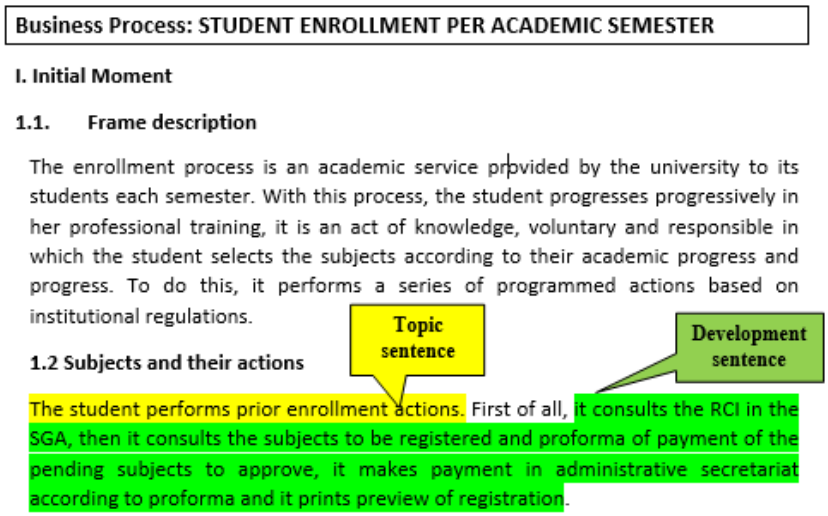

Fig. 1: Initial moment

b. Intermediate moment. Starting from the products of the initial moment, thematic sentences and development sentences and relying on the Matrix of thematic sentences and development sentences, the subjects, main actions and detailed actions are structured correspondingly, as shown in Table 1.

Table 1: Sentence matrix - moment in between

Tematic Sentence (TS)		Development Sentence (DS)
Student	Carry out previous registration actions	Consult Comprehensive Curriculum Record (RCI)
		Check license plate preview
		Make electronic payment
		Print license plate preview
Administrative secretary	Prepare and deliver payment receipt	
Student	Register no debit of goods	Start procedure
		Request format "No debit of goods"
		Complete the form of "No debit of goods"
Systems Engineering School	Formalize enrollment	Analyze student case
		Validate enrollment in Academic Management System (SGA)
		Print and endorse "Registration form"
		Register delivery of "Registration form"

c. Final moment. Using the results of the Matrix of topic sentences and development sentences and considering the following relationship between the elements of the sentence (language) and the symbols of the use case diagram of the UML modeling language, as shown in Table 2.

Table 2: Relationship between language and UML

Language	UML	Symbol
Subject	Actor	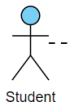
Tematic sentence	Case of use	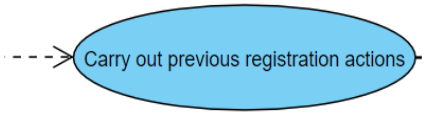
Development sentence	Case of use - Extend	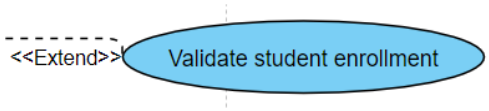
	Case of use - Include	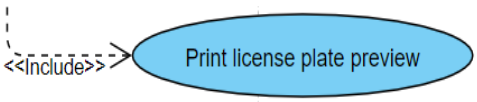

We proceed to develop the diagram of use cases, resulting in the following diagram for the case of the Student actor, as can be seen in Fig. 2

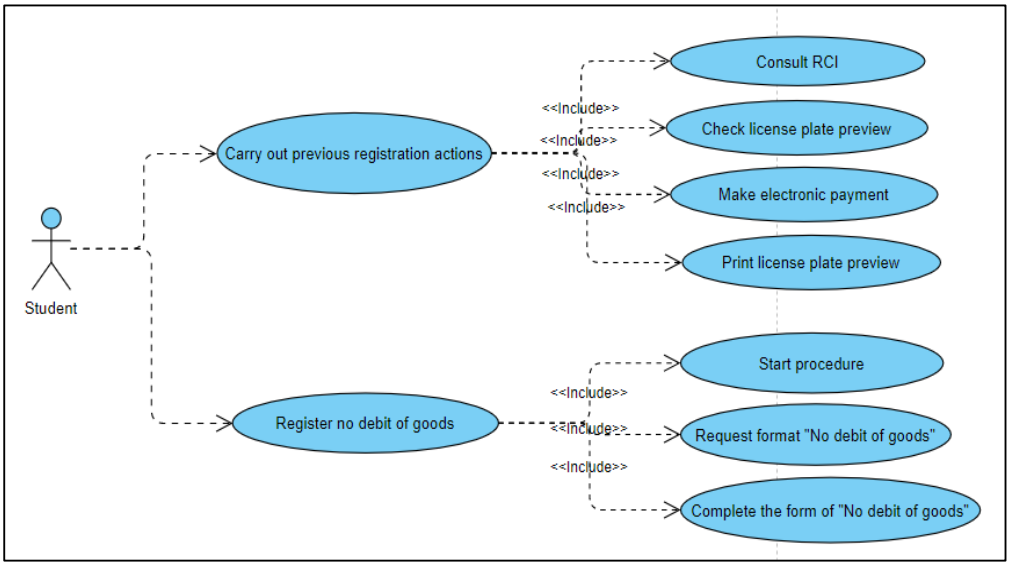

Figure 2: Resulting use case diagram

This is the product that the student would obtain in the modeling of the software requirements.

Discussion of Results

(Vargas, 2015) proposes in his doctoral thesis "Model for the specification of initial software requirements from the syntactic and semantic relationship between objectives and problems", a model for the specification, formalization and relationship of organizational objectives, problems of the domain and objectives of the system in the phase of software requirements reduction, allowing to generate traceability and consistency. A set of syntactic and semantic rules is structured that facilitate an association relationship of common domain terms.

The proposal of this research proposes a guiding concept, which is the basis for the approach, presentation and development of capacities that help the student in the sensitive identification, description, relationship and diagram of components for the modeling of software requirements. The concept proposed in this research tells us. That the experiences of reality are perceived by the senses, through information, data and that in the synergistic link between; a structure - intermediaries (being logic and logic of use cases, for example) and language (semantic expression of meanings) a conscious reason (thought) is reached that contributes to the modeling of software requirements, by means of a value chain consisting of three moments.

a. Initial moment. It is the writing of the business process, perceived by the senses and the knowledge generated in the student's mental space, which must be processed in a logical way, with the conception of statements and written under the structure of the sentence.

b. Intermediate moment. Starting from the products of the initial moment, thematic sentences and development sentences and relying on the Matrix of thematic sentences and development sentences, the subjects, main actions and detailed actions are structured correspondingly.

c. Final moment. Based on the results of the Matrix of topic sentences and development sentences and considering the following relationship between the elements of the sentence (language) and the symbols of the use case diagram of the UML modeling language.

Regarding the general objective of the research, it was obtained as a result that the P-value in the ANOVA table is less than 0.05, so there is a statistically significant relationship between the modeling of software requirements (Proposed methodology) and the modeling of software requirements (previous methodology), with a confidence level of 95%. Likewise, when performing the homocedasticity test in the comparison of means, it was obtained that the calculated P-value is less than 0.05, therefore, the null hypothesis is rejected in favor of the alternative hypothesis, thereby corroborating the general hypothesis of the investigation. Ha = The logic-language synergy improves the modeling of software requirements in Peruvian students of Systems Engineering and Informatics

By applying the logic-language synergy, the modeling of software requirements improves in Peruvian students of Systems Engineering and Informatics, in the 2019-1 semester, where it can be seen that the average of the students' evaluations was 14.3214, improving Regarding the 2018-1 semester grades, since the average of the students' evaluations was 10.1622, where the logical-language synergy was not applied. These results can be seen in the Fig 3.

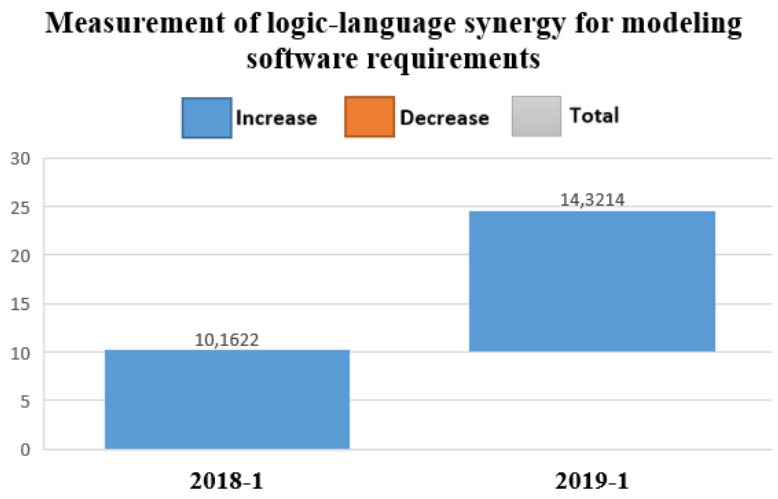

Fig. 3: Result of the improvement of the logic-language synergy

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Horizontal Dimension of Subsidiarity In the Activity of Polish Local Government

Daniel WACINKIEWICZ

University of Szczecin, Institute of Legal Studies, Szczecin, Poland
daniel.wacinkiewicz@usz.edu.pl
ORCID 0000-0002-5048-9866

Abstract

This paper addresses the idea and principle of subsidiarity, which undoubtedly may be called one of the modern foundations of European democracies. They have been and still are playing an important role in shaping the European social, political and legal thought. Currently, next to classical aspects of the principle of subsidiarity (making up the so-called vertical subsidiarity), another aspect, horizontal subsidiarity, is being observed. This horizontal dimension of subsidiarity, playing an increasingly important role in the functioning of contemporary democratic societies, is an implication of the principle of civil society in connection with the principle of public dialogue. This paper characterises how the principle of horizontal subsidiarity is understood now on the ground of Polish regulations and presents an example of implementation in the local government practice of a project corresponding to its characteristics.

Keywords: horizontal subsidiarity, territorial self-government, satisfaction of residents' needs, urban prototyping

Introduction

The idea of subsidiarity may undoubtedly be called one of the foundations of modern European democracies.

Shaped in the 1930s in opposition to socialism (in its two mainstreams - communism and social democracy) and liberalism, it was an attempt to revitalise the social order. It has been and still is playing an important role in shaping the social, political and legal thought bringing answers to fundamental questions such as: what is authority for? What objectives should it serve and what role should it play? (Millon-Delsol, 1995, pp. 6-7), and also what is the scope of independence and self-sufficiency of a citizen, social groups, smaller and larger communities in different spheres of the operation of the state? (Dolnicki, 2012, p. 23).

Currently, next to classical aspects of subsidiarity (making up the so-called vertical subsidiarity), another aspect, horizontal subsidiarity, may be observed. This, in turn, involves ensuring such a way of performing public tasks so that they are to the greatest possible extent implemented by civil society institutions.

The adopted research goal in this paper is to characterise how the principle of horizontal subsidiarity is understood on the ground of Polish regulations, and then, by means of a case study, how it applies to the activity of Polish territorial self-government. One of the projects carried out in Szczecin (one of Poland's largest cities) will serve as an illustration of the issue in question.

Sources of The Idea of Subsidiarity

The sources of the idea of subsidiarity - a philosophical thought and reflection which has shaped contemporary understanding of subsidiarity - may be sought in different stages of development of the European culture. It already appears in Aristotle's ancient philosophy as an important elaboration of his philosophy of politics, thus being an implication of criticism of Plato's' communism (Finnis, 2001, p. 177). It then emerges in medieval scholarship of St. Thomas Aquinas and in enlightened concepts of John Locke and Jean-Jacques Rousseau. However, an undoubted breakthrough in the shaping of the contemporary concept of subsidiarity occurred when its assumptions were expressed in the scholarship of the Catholic Church. It needs to be remembered that it was first expressed (though still not directly named) in the 1891 Encyclical Rerum novarum. It believed that the state's obligation to provide aid to a family that have found themselves in a difficult situation that they cannot overcome themselves constitutes valid

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and substantiated care. Such state activity was not treated as taking away civil rights but as their appropriate protection (Wacinkiewicz, 2016, p. 289-290).

Subsidiarity rules were clearly named and formulated in the 1931 Encyclical Quadragesimo anno (Pius XI, 1946). Its essence is expressed fullest by the thought that what an individual can accomplish by their own initiative and industry cannot be taken from them for the benefit of the community. It is similar in the case of lesser organizations and small associations. Taking tasks from them which they are able to accomplish is treated on the ground of Quadragesimo anno as "injustice and a grave evil". Each intervention in public life due to its purpose and nature must have a subsidiary character - it is supposed to help social organizations, not absorb them (Pius XI, 1946, p. 58).

The question of proportionality of state action was also referred to by John Paul II in the Encyclical Letter Centesimus annus, published on the centenary of publication of Rerum novarum. Pointing out that expanding the range of state intervention (the concept of "welfare state", "social assistance state") which was bases on "respond(ing) better to many needs and demands", which results in remedying "poverty and deprivation unworthy of the human person", led to "excesses and abuses". "Malfunctions and defects in the Social Assistance State are the result of an inadequate understanding of the tasks proper to the State. Here again the principle of subsidiarity must be respected: a community of a higher order should not interfere in the internal life of a community of a lower order, depriving the latter of its functions, but rather should support it in case of need and help to coordinate its activity with the activities of the rest of society, always with a view to the common good". Consequences of erroneous understanding of the role (tasks) of the state are too obvious and negative at the same time. As concluded by John Paul II, "(b)y intervening directly and depriving society of its responsibility, the Social Assistance State leads to a loss of human energies and an inordinate increase of public agencies (...). In fact, it would appear that needs are best understood and satisfied by people who are closest to them and who act as neighbours to those in need. It should be added that certain kinds of demands often call for a response which is not simply material but which is capable of perceiving the deeper human need" (Jan Paweł II, 1996, p. 517-518).

The Essence of Contemporary Understanding of Subsidiarity

Inherent human dignity is central and key to the principle of subsidiarity stemming from the assumptions of the personalistic concept of man (Izdebski, 2015, p. 171). Irrespective of its sources, manifestations and nature, human dignity is an ethical and legal expression of the need for autonomy, respect, deference and self-actualisation, whereas a call for dignified treatment is one of the needs inherent in each individual (Wacinkiewicz, 2016, p. 494).

It is respect for human dignity, key to implementation of subsidiarity, that the following finding stems from: free persons responsible for their own actions are at the same time, and primarily, responsible themselves for meeting their own needs. They may use all of their rights, resources and capabilities for this purpose and what they choose to apply is the choice (free will) of the individual.

In turn, inability to meet one's necessary needs by their own resources opens an opportunity for supporting the person in need "from the outside", that is from the side of the community, associations and institutions of a civil society. The order of intervention is determined by a certain proximity of the supporting entity towards the person in need. Therefore, help first comes from the closest community, that is family. Then, taking into account the fact that we live in an organized society (which is made up of a number of levels of organization), room for interference from the institutions of civil society (in particular non-governmental organizations) opens

Only the inability to meet one's own needs associated with insurmountable difficulties, both as part of individual (independent) and collective (community) actions, provides a basis for public authority to act. This is when a public task occurs (Izdebski, 2011, p. 147). Its essence is to aid persons in need in overcoming life problems, insurmountable by means of one's own powers, resources and capabilities, and to remove reasons of such a state of affairs and to restore a person to normal social functioning. Thus, public tasks serve to enable life in conditions suitable to human dignity. Reasons for public authority intervention understood in this way still require one express supplementation: public authorities must act only for the purpose and within limits of necessary assistance. It is then that public authorities are obliged to bring help to persons in need. This does not entail at all freedom of the range of activities from the side of public authorities or, all the more so, consenting to an excessively broad range of intervention.

Subsidiarity in the Polish legal and administrative system

The principle of subsidiarity, along with values such as democracy, respect for the rights of the individual, cooperation of authorities and social dialogue, is also one of the foundations for the establishment, first, of the European Communities and then of the European Union. This, and the fact that it is reflected in normative acts adopted under

the auspices of organizations such as the Council of Europe (here in particular in the European Charter of Local Self-Government) and in constitutions of European countries (Constitution of the Italian Republic), and also at the same time the fact that it is not a widespread principle outside our continent caused it to be called "very European" (Izdebski, 2015, pp. 170-171) in the literature.

The principle of subsidiarity may also be called one of the prime principles of the political system of the Republic of Poland. It is all the more reasonable since the Polish Constitution sees the source of all rights and freedoms of an individual (citizen) in his inherent and unalienable dignity. It was expressed *explicite* in the preamble to the Constitution of the Republic of Poland in the following phrase: "the basic law for the State, based on (...) the principle of subsidiarity in the strengthening of the powers of citizens and their communities". All public authorities may be considered addressees of this regulation because it is their duty to strengthen (i.a. in their activity) the "powers of citizens and their communities".

Even though the content of the principle of subsidiarity was not elaborated in the provisions of the Polish Constitution, there is no doubt that it may be reconstructed also on the ground of its other provisions, in particular in those referring to territorial self-government. They demonstrate i.a that a local government participates in the exercise of public power and the substantial part of public duties which local government is empowered to discharge by statute is done in its own name and under its own responsibility (Article 16(2)). What is especially important, it is this local government that performs public tasks which were not reserved by the law (Constitution or statutes) to the organs of other public authorities (Article 163). Among these tasks the most important role is played by those which meet the needs of a self-governing community. The Constitution stipulates that they are performed by a local government unit as its own tasks (Article 166(1)). The Constitution also points out that the commune is the basic unit of local government (Article 164(1), which is especially important from the point of view of the principle of subsidiarity, and forms the first, "closest to the citizens", level of the self-government structure.

Let us look closer at this last issue. Now, in the Polish system of public administration the principle of subsidiarity outlines the need to implement public tasks at the lowest level of administrative structures. This specified, according to the said constitutional regulation, the basic role of territorial self-government, and within it - of the commune (as a basic local government unit) in the organization and operation of the public administration system.

The literature points in particular to two (essential from the political point of view) aspects where the principle of subsidiarity plays a crucial role. This involves first of all, specifying the essence of public tasks (solving individual and collective problems which are unresolvable under a civil society); second of all - dividing public tasks between different levels of public authorities (that is a vertical division of public tasks between individual authorities). Both aspects are traditionally classified into the category of the so-called vertical subsidiarity. Next to them, however, one can notice today another, third aspect of subsidiarity, that is horizontal subsidiarity. This, in turn, involves ensuring such a way of performing public tasks so that they are carried out to the greatest possible extent by civil society institutions. (Izdebski, 2015, pp. 172-173). This is how achieving the common good is to be done.

The literature defines horizontal subsidiarity "as a delegation of aspects of public policy making to non-state actors, such as business, NGO's and other interested participants of civil society" (Colombo, p. 39). It is also noticed that the horizontal dimension of subsidiarity enables perceiving society "as a conglomerate of different domains: the market, the state and civil society" along with its specific features and "unique coordination mechanisms" (van de Donk, 2019, p. 47). In such horizontal systems of coordination, there is more emphasis on the diverse nature of social arrangements explicitly avoiding any particular ranking that is a reflection of size, power or status (Mulé, Walzenbach, 2019, p. 141). The path leading to this emphasizes interactions of various stakeholders, while elements such as active participation, engagement or networking collaboration of actors from various fields (administration, business, civil society) are important themselves.
One may cautiously notice the complexity of the principle of subsidiarity in this horizontal angle, expressed both in a negative aspect (boiling down to public authority refraining from the performance of tasks which can be carried out by the individual, social groups, communities or civil society institutions), as well as in a positive aspect (entailing public authorities' duty to provide assistance to the named entities, which involves stimulating, inspiring, maintaining and supplementing the efforts of these entities) (Millon-Delsol, 1995, pp. 8-9).

Practical implementation of assumptions of horizontal subsidiarity - the example of the city of Szczecin

Szczecin is the third largest city in Poland in terms of the area and seventh in terms of population. It is the capital of the West Pomerania Province and at the same time the centre of the Szczecin metropolitan area. Its specific nature is manifested in a number of endemic features (including environmental ones - 60% of the area is covered by greenery

and waters). Szczecin is located right at the border with Germany (12 km) and is the only Polish metropolitan area with a cross-border nature. What is interesting, the capital of Poland, Warsaw, comes only fourth among European capitals in terms of its distance from Szczecin (550 km). Berlin, Copenhagen and Prague are all closer to Szczecin (125 km, 280 km and 505 km, respectively). The city of Szczecin, like many other European cities, faces quite characteristic developmental problems: suburbanization, demographical problems, or, from a more detailed perspective, too great a share of individual car transport in the city's transport structure.

An example of a project that is in line with the characteristics of the principles of horizontal subsidiarity is a model of urban changes for the old town implemented in the city - a project which combined potentials of activities of the administration, business and civil sector.

In 2019 an urban prototyping project was carried out in the city for one of the most significant public spaces of the old town. This complex participatory-research-design project was limited space-wise in its original assumptions to only one city square. Its aim was to develop a concept for transforming this area into a multifunctional living urban structure by working jointly, bottom-up and with various users of this space (Wacinkiewicz, 2020, pp. 10234-10240).

It needs to be stressed that from the start this project was conducted according to the assumptions of horizontal subsidiarity: municipal self-government authorities decided to refrain from deciding independently about the direction of transformations of this public space in favour of developing it in a joint effort of various stakeholders (users of this space). In this project task representatives of self-government authorities of the city along with non-governmental organizations, entrepreneurs, residents, students and also representatives of the academic circles, cultural institutions, artistic and general schools created solutions to improve the aesthetic and functional values of this place. At the same time, transport-related research commissioned by the city's authorities was carried out on the practice of use of the square's space by different users (i.a. its intensity, availability of transport, use of parking places, necessary changes in traffic organization).

As early as a few weeks into implementation, it became obvious to all those involved in the project (self-government authorities, social activists, residents) that activities that restore the space of the square to all its users and related problems that got revealed cannot be solved within the square itself. This is why residents, NGO representatives and entrepreneurs formulated a clear expectation not only towards creating a plan for the square alone, but also towards a comprehensive concept for the entire city. The city's authorities approved this proposal for extending the project, noticing in this socialized decision-making process a chance for creating a city centre area that is well-designed from the point of view of its users (residents, entrepreneurs, tourists, etc.) and that has a central role of the old town.

An expectation regarding a broad, holistic look at this fragment of the city's space resulted in the research, consultation and design process concerning the square being combined with arrangements made for the entire old town and its relation with the very centre of the city. Thus, not only did the spatial scope of the project expand, but primarily a need for a comprehensive analysis of many new elements in a much greater scale emerged.

The consultation-design process included issues such as protection of historical monuments and buildings in this area, guidelines on planned infrastructural investments in the area of the old town (rebuilding public squares, removing some parts of the road layout), shaping and protection of greenery or transport-related matters (introduction of hierarchy of roads, pedestrianizing some roads, or changes in a parking policy). These solutions were developed in cooperation with relevant public institutions and public authority bodies (e.g. historical monuments protection services, the Police, the fire brigade), entrepreneurs (who carry out economic activity in this and surrounding area), NGOs (those which operate in this area and those whose activity focuses on revitalisation, mobility, protection of historical monuments and buildings or social inclusion), residents, tourists and other users of this space (e.g. students of a nearby arts academy, students of a music secondary school and general schools in the area).

In effect, the concept of final changes was publically presented at the end of 2019. It was included in the framework of the most important planning documents (Study of conditions and directions of spatial planning) and strategic documents (Strategy for City's Development) and outlined an action plan for 2020-2026 which was approved for implementation by the city's self-government authorities (and which has been implemented since the spring of 2020). Its guidelines concern investment activities (including protection of historical monuments and buildings), principles for valorisation of green areas, transport changes associated with restricting traffic and many others - which were influenced in the most part by various stakeholders.

From the point of view of the principles of horizontal subsidiarity, the project resulted in effective networking of the collaboration of various actors and in making the decision-making process public. The drawing up of a comprehensive action plan enabled development of cooperation of various project's stakeholders and activation of non-governmental organizations. Measurable effects that should be observed already at an early stage of the project included i.a.

enhancing residents' involvement in the project expressed in high turnout and activity during consultation and design meetings; energising social activists and non-governmental organizations resulting in many initiatives (cultural, social, educational and environmental) implemented by means of i.a. participatory financial instruments (participatory budgeting); entrepreneurs' readiness (especially the catering industry) to coordinate their development plans with the drawn-up comprehensive action plan; reducing a social conflict associated with transport changes (a plan for construction of garage facilities in connection with current reduction of parking places and increased parking fees) and many others. Moreover, as early as one year into implementation of the comprehensive action plan it was established that its certain elements and tasks (performed previously by self-government authorities) will be performed by non-governmental organizations (subsequent stages of urban prototyping, public opinion surveys and social consultation, engagement-related activities). It also needs to be added that experience gained in this way proved invaluably useful in the face of the lockdown and restrictions triggered by the COVID-19 pandemic. A certain spin-off of the discussed project involved activities on the basis of which i.a. the city's authorities, in agreement with entrepreneurs and non-governmental organizations, agreed on temporary road closures or traffic restrictions in certain streets - in order to make it possible to carry out commercial and social projects there (e.g. catering services, artistic displays, environmental activities), while observing suitable social distance and safety rules.

Conclusion

Dignity of every person is a central value for the principle of subsidiarity stemming from the personalistic concept of the individual. It is observance of this principle that demonstrates that free people are responsible for meeting their own needs. Only inability to meet them on one's own and inability to meet them under a civil society makes public authorities authorised or even obliged to step in. From the perspective of the principle of subsidiarity understood in such a way, public authority does not exist to relieve (replace) individuals (communities) from the task of meeting their needs, but to support them and provide assistance where they are not capable of meeting their needs by means of their own capacities and resources.

Subsidiarity does not only mean that competences and tasks are passed the closest onto the smallest communities (including self-governing communities) but also that higher groups are obliged to aid lower groups when problems with correct implementation of tasks vested in them occur.

Currently, the horizontal dimension of subsidiarity has an increasing importance. It is an implication of the principle of civil society in connection to the principle of social dialogue and involves ensuring such implementation of public tasks so that they are performed to the greatest possible degree by civil society institutions.

The project and the comprehensive action plan created on its basis presented as an example of practical implementation of horizontal subsidiarity show the potential of projects designed with an overwhelming participation of civil society. The valuable experience and empirically verified models for action stemming from it are encouragement to develop projects that facilitate interactions and networking of collaboration of stakeholders from various fields (administration, business, civil society).

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The Influence of Chosen HRM Solutions for Knowledge Workers on Their Job Performance Through Work Motivation and Work Engagement – Result of Initial Empirical Research

Agnieszka BIENKOWSKA
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Poland, Wyb. Wyspianskiego 27, 50-370 Wroclaw, agnieszka.bienkowska@pwr.edu.pl.

Beata IGNACEK-KUZNICKA
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Poland, Wyb. Wyspianskiego 27, 50-370 Wroclaw, bignacek@gmail.com.

Anna KOSZELA*
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Poland, Wyb. Wyspianskiego 27, 50-370 Wroclaw, anna.koszela@pwr.edu.pl, Corresponding author.

Abstract

The aim of this article was the issue of specific solutions for the evaluation of KWs and their remuneration was analyzed to make their job performance as maximized as possible. First of all, the analysis focused on one specific group of employees who are KWs. The empirical studies were conducted using questionnaires among employees of organizations operating in Poland – 185 employees took part in the research. Methods of statistical description and estimation were used, including Spearman correlation analysis and regression analysis with mediator. The presented results of empirical research allowed for the construction of a mediating model demonstrating the impact of the shape of solutions of HRM on motivation, engagement, and job performance of KWs. The presented results of research are therefore supported by the authors' initial research, which proved the positive impact of KWs absorption on the relationship between work motivation and job performance.

Keywords: Management, Knowledge Worker, Motivation, Engagement, Job Performance

Introduction

Knowledge workers (KWs) are specifically aware of how to allocate knowledge to use it effectively (Drucker, 1994). They are direct participants of the process of searching, creating, practical use and distribution of this strategic resource of the organization (Drucker, 2011; Jashapara, 2014; Klincewicz, 2012; Koźmiński, 2012; Oleksyn, 2014; Wellin, 2013). Their organizational commitment is based on needs and fulfilled personal goals through the organization (Meyer and Allen, 1997). KWs are characterized consequently by specific characteristics, i.e. autonomy, innovation, intellectualism, professionalism, reputation and cooperation (Bieńkowska and Ignacek-Kuźnicka, 2017). That characteristics imply the need to shape a unique combination of solutions in the area of human resources management conducting a positive impact on their attitudes and behaviors (Trzcieliński et al., 2013; Von Krogh et al., 2001). In this context it can be concluded that creating an atmosphere of motivation and engagement among KWs so that they can effectively perform their tasks and achieve the goals set for them is of fundamental meaning especially in knowledge-based organizations.

Nowadays, there is still a gap regarding the knowledge of the KWs' individual of the organization and the need to shape human resources management solutions dedicated to KWs in terms of their engagement, motivation, and job performance (Bieńkowska and Ignacek-Kuźnicka, 2017; Juchnowicz, 2012; Tabaszewska, 2011). The management scientists are confronted with a real problem, which can only intensify over the years. Manual skills are becoming increasingly insignificant, as more and more creativity, expertise, experience and skills are required from employees today (Jashapara, 2014; Davenport, 2007). Knowledge-based organizations are becoming dominant and are required to learn how to effectively manage KWs to stimulate their work engagement, work motivation and improve the employees' job performance. Many researchers confirm that, for example, adequate organization of training programs for KWs increases their involvement in work, which has also a positive impact on the results (Šikýř, 2013; Likert, 2016; Juhnovich, 2012). The literature findings concerning the close relationship between work motivation and work

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engagement and also job performance, suggests that also the relevant shape of HRM solutions can positively stimulate work motivation (Salanova et al., 2015). It should not be omitted that an organization that focuses on a high level of work motivation, work engagement, which will result in high job performance, will ensure high performance of the whole organization (Bieńkowska and Tworek, 2019; Bieńkowska and Ignacek-Kuźnicka, 2019).

However, the trying to indicate appropriate and complex solutions raises problems that require scientific research. This explains the importance of making research to clarify the empirical correctness of the issue. Therefore, the main aim of this article will be to verify the influence of chosen solution of HRM on work motivation, work engagement and job performance of KWs.

Literature review and hypotheses development

Knowledge workers in an organization

Who are a knowledge workers? Before the "IT age", the answer was that it is a doctor, lawyer, teacher, preacher, or architect (Kowalski, 2011; Drucker, 2011; Wellin, 2013; Jashapara, 2014). What did these professions have in common? They were free professions, practiced by highly educated erudite professionals who, through their expert knowledge and high standards of behavior towards clients, created professional values (Murgia et al., 2016; Chong et al., 2017; Harlow, 2018). Drucker (2011) has significantly extended this traditional definition, mainly by creating the closed catalogue of professions, because he has managed to find KWs in public administration and business. According to him, they are excellent professionals with specialized knowledge, who operate and communicate routinely, beyond formal competence structures, using their autonomy in the decision-making process. Their natural environment is the culture of individuality (Jashapara, 2014), which allows for the self-fulfillment of individual interests in conditions of cooperation.

Armstrong and Taylor (2016) describe this culture as open because of the opportunity to share ideas and knowledge within a community of activities. Creating unique knowledge in an open culture is an attribute of power, one who possesses it is quintessential of the KWs (Armstrong and Taylor, 2016). Such an employee has a high value for the organization, at the stake of expected success (Griffin, 2017). For KWs, on the other hand, the value is the reputation and professional value that inspires him to continue to improve his expert skills (Griffin, 2017).

The theoretical considerations are complemented on the definition of the KWs by empirical research on some of its components:

- on innovative and self-fulfilment (Lewis and William, 2003; Fischer et al., 2019);
- the need for autonomy (Steinmann and Schreyogg, 2007; Fowler, 2014; Biesok and Wyród-Wróbel, 2018; Harlow, 2018; Pluta, 2018);
- over professional value (Evans, 2005; Hwang et al., 2015; Pluta, 2018);
- on professionalism (Evans, 2005; Fowler, 2014; Bieńkowska and Ignacek-Kuźnicka, 2017 and 2018);
- on intellectualism (Evans, 2005; Parmenter, 2015; Bieńkowska and Ignacek-Kuźnicka, 2017 and 2018;);
- on the creative process (Parmenter, 2015; Fischer et al., 2019);
- on cooperation and knowledge sharing (Parmenter, 2015);
- on passion (Evans, 2005; Fowler, 2014);
- on reputation and sense of responsibility (Maciariello, 2016; Biesok and Wyród-Wróbel, 2018).

The authors have explored and developed their own set of the characteristic of KWs, which determine it. The fundamental elements of this collection are autonomy, professional ethos, innovation, intellectualism, professionalism, reputation and cooperation (Bieńkowska and Ignacek-Kuźnicka, 2017). About the individual elements of this collection from the perspective of KWs' characteristics also wrote the other researchers: (Janz et al., 1997; Jungert et al., 2013) on freedom; (Evans, 2005; Steinmann and Schreyogg, 2007; Tidd and Bessant, 2013; Murgia et al., 2016; Chong et al., 2017; Griffin, 2017) on ethics related to professional ethos; (Tidd and Bessant, 2013; Fischer et al., 2019) discussed on innovation; (Hwang et al., 2015) described on the intellect; (Frick, 2010; Tidd and Bessant, 2013; Owen, 2013) on the role of the professionalism; (Frick, 2010; Hwang et al., 2015; Bhatnagar et al., 2017) about the reputation; (Davenport, 2007; Tidd and Bessant, 2013; Jashapara, 2014) about cooperation. The content of the concept includes significant object's characteristics, which use to create it. The above *differentia specifica* is the intention of the KWs concept (Grobler, 2006). The intention is a certain idealization, it is a sequence of conceptual states. In the set of characteristics describing a given concept, some characteristics are perceived as more typical, others as less typical. Such a lack of precision is caused by the difficulty in establishing a clear line, where it begins and where it ends, in our case - KWs.

Generally, the identification of an object using description is not the same as the ostensive indication of an object (Piłat, 2007). It is also the case with the KWs description. In this case, it is necessary to define the level of absorption of differentia specifica KWs as a continuum, in which particular places there is a certain intensity of the characteristics of the KWs.

This intensity is urgent in the context of HRM, especially in the development of solutions fitted to KWs (Teo and Noyes, 2008). In turn, the adopted shape of HRM solutions, e.g. in terms of evaluation of KWs or their remuneration, is critical in the context of KWs job performance (Raczek, 2016). Therefore, it is necessary to consider possible links between these contexts (Truss et al., 2013; Zelles, 2015). As a consequence, the empirical insight will be critical because sheds new light on this issue. To explain the relation, the empirical research will use the following intermediaries: KWs' work motivation and KWs' work engagement (Meyer and Allen, 1997; Truss et al., 2013; Armstrong and Taylor, 2016; Griffin, 2017).

Work motivation and work engagement of KWs and their job performance

In the literature, motivation is defined as the internal energy that makes people act (Griffin, 2017). Sources of motivation, types, and even more its level, according to research, have a significant impact on the organization (Steinman et al., 2001; Owen, 2003; Flower, 2015). The literature not only defines motivation but also work motivation, which Hackman and Oldham (1974, 1975) defined as the degree to which an employee is motivated to do his work effectively. Work motivation is shaped by three factors: work valuable, responsibility for the task, and feedback (Hackman and Oldham, 1975; Frick, 2010; Griffin, 2017; Jureczka, 2018; Sadeghi et al., 2019). It is considered that the nature of work is of great importance in terms of shaping certain employees' behaviors. Employees should respond positively to the four basic job characteristics: variety, task identity, autonomy, and feedback (Hackman and Oldham, 1976). These considerations of work motivation have resulted in the creation of the Job Characteristics Model, which states that internal motivation, which in the age of the knowledge-based economy, becomes more and more important, is determined by three psychological states that occur when a job has certain characteristics: diversity of the skills used to perform the task, the degree of ability to perform the task from start to finish, the autonomy of the job, the meaning and impact of the task on others, and the feedback about the task performed (Kovach, 1980; Steinmann and Schreyogg, 2001; Parmenter, 2015; Ding et al., 2019; Pak et al., 2019). This is based on the natural need for human development (Flower, 2015). There are some specific factors among KWs that determine their work motivation. Particularly important here is the high autonomy of work in performing tasks, the diversification of tasks, and the appropriate encouragement to further improve their skills (Janz et al., 1997; Saraswathi, 2011). Work autonomy is a source of strengthening work motivation and respect for independence is reflected in the sense of internal motivation (Steinmann and Schreyogg, 2001; Flower, 2015). The freedom to work and plan one's work, to adapt physical and cognitive elements within the limits of work according to Horwitz and colleagues (2003) is also important in shaping work motivation (Baron and Hanna, 2002; Thompson and Heron, 2002; Horwitz et al., 2003). Giving individuals and teams of the KWs, the autonomy to define their work, designing jobs, and providing appropriate support from senior management in knowledge management (McKenzie et al., 2001) is key to ensuring a high level of motivation among KWs.

This factor often proves to be critical because of their work characteristics, since KWs are creative workers who take responsibility for their work and are able to control themselves perfectly when performing tasks, which is why they are so motivated by their independence (Owen, 2003; Davenport, 2007; Frick, 2010; Tidd et al., 2013; Maciariello, 2016). The literature, therefore, confirms that the main driving force behind the work motivation of KWs is therefore autonomy, a sense of purpose of a higher level, aspiration for perfection (Flower, 2015; Bhatnagar et al., 2017). In contrast, internal motivation is largely supported by KWs' characteristics: creativity and innovation (Fischer et al., 2019). Moreover, the literature shows that the level of motivation is 48% higher among KWs' best employees than among the average (Hunter et al., 1990). Additionally, it was observed that properly designed working conditions for KWs, will provide an ideal background for additional actions known from HRM practices, such as adequate remuneration, recruitment, and selection based on P-O fit or employee development, which will then more effectively strengthen work motivation (Hackman and Oldham, 1980; Osterloh and Frey, 2000). Moreover, the research made by Bieńkowska and Ignacek-Kuźnicka (2019) confirmed that among KWs, work motivation is higher than among workers who do not have high KWs levels. Therefore, the results of these initial studies inspired the authors to continue searching for the characteristics and behaviors characteristic of KWs that determine employee's effectiveness in the organization (Bieńkowska and Ignacek-Kuźnicka, 2019). On this basis, it can be expected that it is natural that KWs have high work motivation.

As mentioned, due to the fact, as a natural consequence of the hypothesis that KWs have a higher level of work motivation, is the assumption that the work engagement of KWs will also be higher. Just as in the case of work motivation, there are many definitions in the literature for work engagement. Alarcon and Lyons (2011) described employees' work engagement as a multidimensional concept that is based on positive emotions related to the level of

engagement (Alarcon and Lyons, 2011). Other researchers understand work engagement by the employees' positive identification with the organization's mission, goals, and values (Simon, 2011). In general, work engagement is considered to be a mental state that corresponds to the positive affectivity of the employee (Bakker and Leiter, 2010). However, most often, the literature for measuring and defining work engagement adopts the Utrecht Work Engagement Scale (UWES), which presents engagement in three aspects: vigor, dedication, and absorption (Schaufeli et al., 2002). Thus, it is observed that employees engaged in work are characterized by such characteristics as perseverance and determination to dedicate their time and energy to work despite the existing conditions (vigor); a sense of motivation, and importance of the goal, which actively engages the employee in the work, even if it goes beyond the standards (sacrifice); and a deep concentration of employees on their tasks (absorption) (Schaufeli et al., 2002).

Similarly, the engagement of KWs is considered in three dimensions. Their relationship with the organization is considered in relation to how well employees understand their responsibilities, how much energy they bring to work, and how motivated they are to perform their tasks (Figurska, 2015). The care of work engagement among KWs is therefore important because one of the most important factors determining the contribution of KWs to the organization is their engagement. Employees who are engaged in work have high competencies, are more active, full of energy, are much more independent, and all this results in higher job satisfaction (Harter et al., 2002; Saks, 2006; Schaufeli et al., 2008; Bakker, 2009). Work engagement affects employees' job performance, improves their effectiveness, thus increasing the effectiveness of the organization and improving its results (Tidd and Bessant, 2013; Wellin, 2013). It is not without reason that employee work engagement may be a key factor of both business and organizational success (Albrecht, 2012; Tate, 2015; Tate et al., 2019). On the other hand, in the context of KWs, knowledge, and skills, as well as their attitudes and behaviors are becoming increasingly important in determining the success or failure of an organization (Figurska, 2015).

The proper management of KWs, due to its natural characteristics, i.e., the fact that it is located, acquired, developed, shared, used, and preserved by people, will contribute to raising the level of commitment to work (Morello and Caldwell, 2001; Staples et al., 2001; Morawski, 2003 and 2009; Davenport, 2007; Czubasiewicz, 2009; Figurska, 2010, 2012 and 2015). The literature is considered that work engagement is also directly related to internal employees' work motivation (Hallberg and Schaufeli, 2006; Schaufeli, 2013). This can be especially visible in the case of KWs, for whom the provision of certain specific characteristics of work results in increased motivation to work and, according to theory, will result in work engagement. Taking the above considerations into account, it seems natural to say that KWs also have high level of engagement to work.

The economic measure of effectiveness consists of the behavior presented as a result of mental and physical effort (input) and the effects of these behaviors (results) – together referred to as job performance (Brumbach, 1988; Griffin, 2017). Behaviors and actions determined by the organization's goals are, according to Campbell (1990), job performance. Motowidlo and colleagues (1997) studied the multidimensionality of this concept and stated that it is the total value of the behaviors required from employees. Borman and Motowidlo (1997) distinguished performance concerning a formal job description as something contextual, related to a task, as a voluntary contribution, apart from formal duties. Task-based performance indicators are according to Campbell (1990; 1997): leadership and administrative skills, ability to perform job-specific and non-specific tasks, and communication proficiency. According to Borman and Motowidlo (2008), there are 5 indicators of the assessment of contextual effectiveness: working for an organization apart from the formal duties of the job description, performing key tasks on time and with enthusiasm, being ready to support colleagues, being compliance with the rules in difficult circumstances, being compliant with the organization's policy to defend its goals (Szara et al., 2017).

Characteristics that identify KWs: intuitiveness and creativity are both important elements of individual behavior in the workplace and they directly or indirectly affect the efficiency of the organization. They belong to the whole set of productive behaviors that are expected from a member of the organization. According to Griffin (2017), dysfunctional behaviors are harmful to the organization's performance, and therefore KWs' characteristics contribute to performance. It was found that for these people the boundary between professional and personal life is blurred, they work more like volunteers than full-time employees (Evans, 2005). Welch (2005) claims that the attributes that an individual brings to the organization, the fact that he/she is passionate, is fundamental to measuring effectiveness (Parmenter, 2016). Attitude, individual abilities, and character traits are components that build the effects of work of KWs, but their efficiency determines the success of the organization (Davenport, 2007; Griffin, 2017; Pluta, 2018). The characteristics of KWs which affect the progression and decide about the results are the following: idealism, cooperativeness, innovativeness, autonomy, flexibility, high qualifications, interdisciplinarity, openness, illogical development paths, finding sense. These are examples of characteristics that lead to outstanding performance that exceeds standard expectations (Davenport, 2007; Tidd et al., 2013; Flower, 2015; Amstrong et al., 2016; Maciariello, 2016). It was established that autonomy and cooperation significantly and positively affect the effectiveness of KWs (Janz et al., 1997; Davenport, 2007; Jungert et al., 2013). Managers are aware that the natural environment for KWs

is to guarantee a high degree of work autonomy. This provides them with independence in decision-making (Jashapara, 2014), as well as the constant opportunity to improve their competence by performing various tasks, to which they are often mobilized by the opportunity to share their expert knowledge (Griffin, 2017). These common characteristics allow us to treat KWs as a cohesive group in the context of increasing job performance, because the factors determining the performance of KWs are identical, regardless of the profession (Davenport, 2007). KWs tends to identify more with their specialty, and they do it so much that they define performance in terms of representatives of their specialization (Griffin, 2017).

Therefore, achieving the best results at work requires a synthesis of three elements: knowledge, skills, and will – and this combination undoubtedly characterizes KWs (Evens, 2005). Organizations achieve better results by employing creative, cooperative employees with excellent skills who derive job satisfaction (Parmenter, 2016). It is therefore understandable that a higher level of contextual efficiency was found among KWs who identified themselves with the mission and long-term goals of the organization (Szara et al., 2017).

Moreover, numerous studies have proved the relationship between job performance and personal characteristics of KWs (Fitzpatrick et al., 1999, Buljac-Samardzic et al., 2010., Al-Makhaita et al., 2014; Bieńkowska and Ignacek-Kuźnicka, 2019) and it has also been proved that those workers who share their knowledge achieve better results than others (Cummings, 2004).

Therefore, based on the above considerations, as well as on the results of research already conducted by the authors (Bieńkowska and Ignacek-Kuźnicka, 2019), which proved the moderating effect of KWs absorption levels on the relationship between work motivation and job performance, extending the set of work-related characteristics by work engagement, the following hypothesis can be formulated:

H1: *The level of absorption of a KWs' characteristics positively affects the level of work motivation* (**H1a_1**)*, work engagement* (**H1a_2**) *and job performance* (**H1b**).

HRM solutions influence on KWs' job performance

Relation between HRM solutions and job performance of KWs

Over the years, many HRM strategies have developed which successfully can apply for different types of organizations (Becker and Huselid, 1999). However, it should not forget that HRM refers first of all to people - employees of the organization and because they are the key resource of the organization, the HRM strategy should select in such a way as to maximize the effectiveness of employees (Giauque et al., 2010). As mentioned above, KWs are a specific but increasingly fundamental group of employees whose maximization of results brings incredible benefits to the organization making it competitive in the global marketplace (Lee and Maurer, 1997; Horibe, 1999; Alvesson, 2000 and 2004; Amar, 2002; Benson and Brown, 2007). It is, therefore, necessary to focus on the choice of the shape of managing human resources in such a way that the employee of knowledge, feeling most comfortable in the organization, shows great effectiveness (Tabiu and Nura, 2013).

There is no doubt that many significant differences can be found between specific groups of employees (Pfeffer and Baron, 1988; Benson and Brown, 2007), as this causes different perceptions and responses to management strategies in the organization (Benson and Brown, 2007). Therefore, the verification of the HRM solutions' shape fit to the knowledge employees to increase their performance seems to be an essential aspect, given that some studies confirm the impact of HRM practices and processes on employees' behaviors and attitudes (Arthur 1994, Huselid, 1995; Giauque, 2010). The HRM strategy concentrated on employee engagement is bringing results in developing the productivity and efficiency of an organization. This strategy focuses primarily on evaluating employee development focused on the results that the employee achieves and on fair and competitive remuneration appropriate to the employees' results (Whitener, 2001). Such an approach seems to be critical in the context of managing KWs even for how KWs perceive of remuneration aspects. The structure and level of remuneration is the identification of KWs with their specific employee profile, i.e. a highly educated, knowledgeable, elite employee with strong added value for the organization (Thompson and Heron, 2005; Dickinson, 2006; Giauque et al., 2010).

Fulfilling the KWs' expectations about the specificity of remuneration - i.e. allocation of remuneration based on the difficulty of work performed - will result in a positive perception of the remuneration system, and thus HRM strategy as a whole, which will contribute to an increase in the employee's job performance (Thompson and Heron, 2005; Williams et al., 2007). Moreover, such an HRM strategy will allow for a sense of organizational support to root in the employee, which is greater the more the organization appreciates the employees for their contribution (Eisenberger et al., 1986; Giauque et al., 2010). This sense of organizational support increases the employee's sense of duty and willingness to fulfill his or her obligations to the employer (Eisenberger et al., 1990 and 2001; Shore and

Tetrick, 1991; Shore and Wayne, 1993; Hutchison, 1997). Based on those considerations, the following hypotheses can be formulated:

H2a. *For KWs there is a relation between the shape of HRM solution (employees assessment orientation on results of work rather than on actions and attitudes* (**H2a_1**)*, and remuneration of employees' orientation on difficulty of work rather than results of work* (**H2a_2**)*) and job performance.*

Relation between HRM solutions and work motivation, work engagement of KWs

As with the search for HRM solutions relevant to stimulate the job performance of KWs, the focus should also be on finding the right typologies of HRM solutions that will effectively strengthen their work engagement and work motivation. The research in this area (Hertzenberg et al., 2000; Horwitz et al., 2003) presents many factors as effectively shaping work motivation and the work engagement of KWs. Among them, special attention should focus on the assignment of challenging work, which brings better results and allows the employees to present their skills in difficult conditions (Hertzenberg et al., 2000).

Two of HRM's solutions, employee's assessment and employee's remuneration, are therefore especially highlighted (Keegan, 1998; Hansen et al., 1999; Swan et al., 1999; Robertson and Hammersley, 2000; Horwitz et al., 2003). In the context of employees' assessment, Drucker (1985) focuses on the need for managers to stay in regular contact with KWs to consult on the various options that will allow KWs to maximize its results (Drucker, 1985; Vora, 2004; Carleton, 2011). Therefore, KWs expect the work to be an intellectual challenge for them that will deliver the results the employer expects to add value to the organization (Jamrog, 2004; Carleton, 2011). It can therefore be concluded that the lifeblood behind KWs' motivation and engagement is its ability to achieve its goals and solve its problems - to face challenges and, moreover, this form of work provides KWs with great satisfaction (Sekaran, 1989; Mortimer and Lorence, 1989; Chen, 2008; Narang and Dwivedi, 2010; Bieńkowska et al., 2020).

That is why it is so important to shape the remuneration for KWs, as it turns out that the amount of remuneration itself is a secondary priority for KWs. It is much more significant that the employer should show KWs recognition for its contribution to the organization by praising its efforts (Pobst, 2014). If managers provide appropriate working conditions for KWs, they will ensure that they are highly motivated and committed to work that will result in high job performance in the long term (Drucker, 1985; Vora, 2004; Carleton, 2011).

H2b. *For KWs there is a relation between the shape of HRM solution (employees assessment orientation on results of work rather than on actions and attitudes and remuneration of employees orientation on difficulty of work rather than results of work) and work motivation* (**H2b_1_1, H2b_2_1**) *as well as (***H2b_1_2, H2b_2_2***) work engagement.*

Relation between work motivation, work engagement and job performance of KWs

Since a certain HRM solutions are effective in strengthening both work motivation, work engagement and job performance, it seems natural that in this relation it is job performance that will be the resultant variable. It seems natural, therefore, that the result variable will be even more effectively stimulated by work motivation and work engagement, which will be strengthened by appropriately selected solutions for KWs HRM.

Many literature references are confirming the positive relationship between work motivation and job performance (Bieńkowska and Tworek, 2019; Bieńkowska and Ignacek-Kuźnicka, 2019). The truthfulness of the relation results from the very perception and definition of work motivation. According to Bessell and colleagues (2002), it is the motivation that is one of the most important factors that make employees achieve effective and efficient job performance, i.e. make employees highly effective (Bessell et al., 2002; Azar and Shafighi, 2013).

In addition to work motivation, it is a work engagement that is often indicated as a positive influence on job performance. Employees with a high level of work engagement are also highly concentrated, energetic and enthusiastic about their tasks (May et al., 2004). Such feelings associated with the employees' working time translate into a higher level of job performance, which has confirmed in the literature (Salanova et al., 2005; Xanthopoulou et al., 2009; Bakker and Bal, 2010; Yongxing et al., 2019). Although there are not many studies that verify the relation between work motivation and job performance or work engagement and job performance among KWs, it seems logical to assume that for KWs, in particular, these relations will be strong. According to the concept of the Job Characteristics Model (Hackman and Oldham, 1976). Potential Employee Motivation is highest when the tasks performed are characterized by a high level of autonomy. It has been proven that both autonomy and cooperation are effective and, more importantly, positive for the job performance of KWs (Janz et al., 1997; Davenport, 2007; Jungert et al., 2013; Bieńkowska and Ignacek-Kuźnicka, 2019).

However, in the context of work engagement, there is evidence that direct work engagement of KWs affect the organization's performance (Davenport, 2007). Managers have particular difficulty in verifying the work engagement among KWs based only on observations because KWs' work tool is the mind and the processes taking place in the human mind are not visible. Therefore, to evaluate the level of work engagement, managers should observe the results of the work. It can conclude that the more so among KWs, researchers should investigate the relationship between work engagement and job performance (Figurska, 2015).

H2c. *For KWs there is a relation between work motivation* (**H2c_1**) *as well as work engagement* (**H2c_2**) *and job performance.*

In the context of the relations described above, it seems that there is a need to analyze for KWs the impact of the shape of HRM solutions (in the context of the employees' assessment system and remuneration) on job performance while analyzing the mediating role of work motivation and work engagement. It will allow us to verify and more comprehensively explain the mechanism of the shape of HRM solutions' influence on the job performance of KWs. Therefore, a hypothetical model of HRM solutions impact on KWs' job performance will be assumed, considering the mediating role of their work motivation and engagement, which is clearly connected to both of them. Therefore, in light of the above, the main hypothesis should be formulated:

H3: *For KWs the shape of HRM solutions (employees assessment orientation on results of work rather than on actions and attitudes and remuneration of employees orientation on difficulty of work rather than results of work) influence on their job performance (indirect effect) through the work motivation* (**H3_1_1, H3_2_1**) *and work engagement* (**H3_1_2, H3_2_2**) *(intermediary variable).*

The diagram illustrating all adopted research hypotheses is presented in Figure 1.

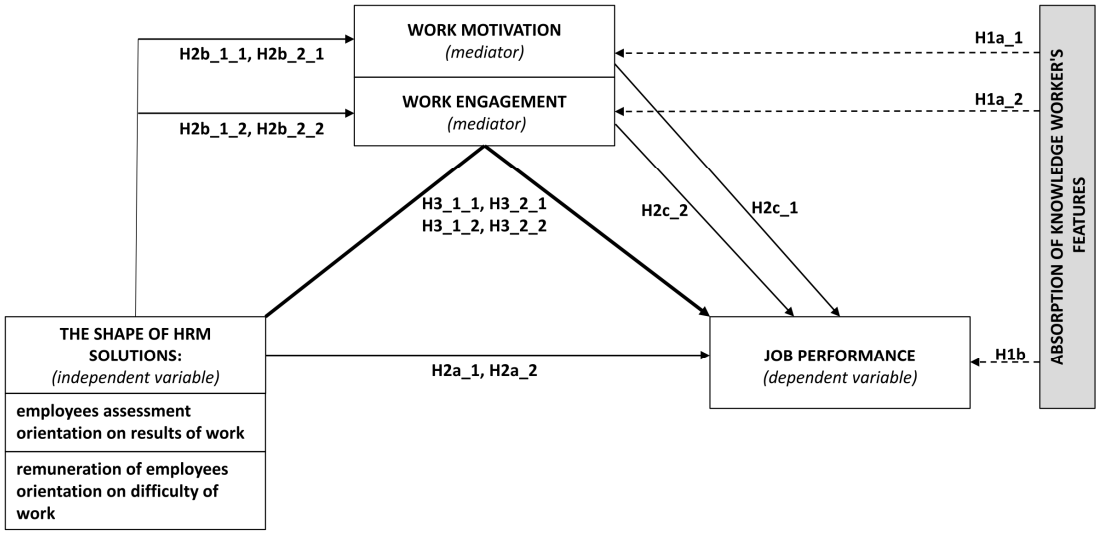

Figure 1: HRM solutions influence on KWs' job performance through work motivation and engagement
Source: own work

Research methodology and results

The research described in the article was conducted to verify the formulated hypotheses concerning the confirmation of the presented HRM solutions influence on KWs' job performance through work motivation and engagement.

The research was attended by 185 respondents, representatives of organizations operating in Poland, the members of the KWs group. The research only takes into account those observations for which the absorption of KWs' characteristics was equal to 3.0. It has been established that such a group of employees will be distinguished by an appropriate level of characteristics appropriate to KWs. The research was conducted using a questionnaire formulated specifically for the purpose of telephone surveys.

Variables Measurement

To examine the proposed hypotheses, key variables were defined: *work motivation*, *work engagement, job performance* and *absorption of KWs' characteristics,* and of course the shape of HRM solutions (*employees assessment orientation on results of work rather than on activities and behaviors and remuneration of employees*

orientation on the difficulty of work rather than results of work). Respondents evaluated all variables based on the list of factors and using a 7-point Likert scale (the scale from I strongly agree to I strongly disagree with a middle point: I do not have an opinion).

Work motivation was measured based on the concept of Hackman and Oldham (1974, 1975). The scale contains 1 item (based on a single question) referring directly to the previously presented definition of work motivation: "I am full of energy and enthusiasm to work in my work position, I am fully committed to the tasks entrusted to me by my organization."

Work engagement was measured according to the definition presented by Schaufeli and colleagues (2002). The scale was adapted from the Utrecht Work Engagement Scale (UWES) 9 scale and contains 9 items (Schaufeli et al., 2002):

- At my work, I feel bursting with energy.
- At my job, I feel strong and vigorous.
- I am enthusiastic about my job.
- My job inspires me.
- When I get up in the morning, I feel like going to work.
- I feel happy when I am working intensely.
- I am proud of the work that I do.
- I am immersed in my job.
- I get carried away when I am working.

Job performance was measured according to the definition presented by (Campbell, 1990; Motowidlo, Borman and Schmit, 1997; Szara et al., 2017). The measurement scale consists of 4 items relating to the quality of performed work, bringing satisfaction to the organization, timeliness of the tasks assigned to the employee, efficiency of the tasks performed understood in the context of the goals set by the organization and the effectiveness of the employee in the workplace.

Finally, the ***absorption of KW's characteristics*** is based on the concept developed by the authors: own study based on (Bieńkowska and Ignacek-Kuźnicka, 2017). The scale consists of 6 items:

- In my profession I use unique knowledge, which is why I am independent as an expert and at the same time I have great responsibility.
- I am open to interdisciplinary cooperation and sharing my specialist knowledge.
- I do my job in a flexible mode, without any strict supervision, and in the sphere of knowledge I have neither subordinates nor superiors, I have only partners.
- I am an intellectual and I constantly use my knowledge in my organization
- I create original solutions to the problems that I face,
and my original ideas are innovative.
- Because of my reputation, position, scope of competence and responsibility, I am an employee who influences the success of my organization.

Employees assessment orientation on results of work rather than on actions and attitudes was measured on a Likert scale. In order to focus on the differences between the examined phenomena (orientation of employee assessment on tasks vs. orientation on actions and attitudes), the variable was changed to a dichotomous one, but the observations for which the assessment was 3 were eliminated. Thus employee assessment orientation on results of work rather than on actions and attitudes was assessed: 1 - assessment oriented on results of work; 2 - assessment oriented on actions and attitudes.

Remuneration of employees' orientation on difficulty of work rather than results of work was measured on a Likert scale. In order to focus on the differences between the examined phenomena (difficulty of work vs. results of work orientation), the variable was changed to dichotomous to eliminate the observations for which the evaluation was 3. Thus, remuneration of employees' orientation on difficulty of work rather than results of work assessed: 1 - remuneration orientated on difficulty of work; 2 - remuneration orientated on results of work.

Descriptive statistics and reliability analysis of scales

As a first step in a research process, the reliability of scales of each variable was verified. The results of the analysis of the reliability of the measurement scales are presented in tab. 1. Cronbach's α indicates an internal reliability of the scales and measurements. In table 2. the frequencies for dichotomous variables are presented.

Table 1: Defined variables along with the descriptive statistics values and results of the reliability analysis of scales (N=186).

No.	Variable	No. of items	Cronbach's α	Factor analysis	Mean	Standard deviation
1	Work motivation	1	--	--	4,2270	0,7887
2	Work engagement	9	0,820	43,11%	3,8710	0,6309
3	Job performance	4	0,823	65,92%	4,3844	0,5435
4	Absorption of KW's characteristics	6	0,712	41,95%	4,2213	0,5154

Source: own work

Table 2: Frequencies of dichotomous variables.

Variable	**assessment oriented on results of work**	**assessment oriented on actions and behavior**
Employees assessment orientation on results of work rather than on actions and behavior	27	92
Variable	**remuneration orientated on difficulty of work**	**remuneration orientated on results of work**
Remuneration of employees' orientation on difficulty of work rather than results of work	53	74

Source: own work

Relations between work motivation and work engagement of KWs and their job performance – research results

In order to verify hypothesis H1 **(H1a_1, H1a_2, H1b),** the correlation between *the level of absorption of a KWs' characteristics and work motivation, work engagement and job performance of KWs* was calculated as the first part of the study. The correlation was analyzed with the use of Spearman correlation. The results are presented in table 3.

Table 3: Correlation analysis between the work motivation, work engagement, job performance and absorption of KWs' characteristics.

Correlation	**Work motivation**	**Work engagement**	**Job performance**
Absorption of KW's characteristics	rho(185)=0,423**, p<0.001	rho(186)=0,602**, p<0.001	rho(186)= 0,526**, p<0.001
	**. ** Significant correlation at 0.01 (two-sided)		

Source: own work

Based on the above research results, it can conclude that the absorption of KWs' characteristics is correlated with work motivation and job performance. More specifically, the level of correlation is statistically significant, so the research results are considered valid. Therefore, even though the correlation does not indicate a cause-and-effect relationship, it allows us to adopt **H1a_1, H1a_2, H1b** hypotheses. Logic suggests only one right direction of interaction, i.e., the influence of the level of knowledge absorption on work motivation and job performance, which is also illustrated by the literature. There is no possibility that the level of work motivation, engagement, or job performance will determine the level of knowledge absorption. As a result, it turns out that KWs have a higher level of work motivation, engagement, and job performance than employees who do not have this status.

Mediation Model – Research Results

Determining the correctness of the mediation model consists of three stages: checking the relations of independent variables to the mediator, checking the relations of dependent variables to the mediator, analysis of relations between independent and dependent variables. The first stage, i.e., verification of relations between independent variables and the mediator was performed using the Student's t-test for independent tests and verified the correctness of **H2b_1_1** and **H2b_2_1** and **H2b_1_2** and **H2b_2_2** hypotheses. A comparison was made:

- the average level of work motivation and engagement of the observed group of employees with results-oriented evaluation system with the average level of work motivation and engagement of the observations' group of employees with activities and attitudes-oriented evaluation system (**H2b_1_1** and **H2b_1_2**) (Table 4.);
- the average level of work motivation and engagement of the observations' group of employees with remuneration oriented on difficulties at work with the average level of work motivation and engagement of employees with remuneration oriented on work results (**H2b_2_1** and **H2b_2_2_2** (Table 5.)).

Table 4: Periodic evaluation orientation a work motivation and work engagement of employees.

	employee's assessment orientation	***N***	***M***	***SD***	***t***	***dt***	***p***
work motivation	on results of work	92	4,3187	0,69728	-2,109	116	0,035
	on activities and attitudes	27	3,9630	0,97985			
work engagement	on results of work	92	4,0159	0,61824	-4,104	117	<0,001
	on activities and attitudes	27	3,4280	0,76776			

Source: own work

Table 5: Remuneration orientation, a work motivation and work engagement of employees

	employee's remuneration orientation	***N***	***M***	***SD***	***t***	***dt***	***p***
work motivation	on difficulty of work	73	4,2877	0,77243	-0,982	124	0,328
	on results of work	53	4,1509	0,76952			
work engagement	on difficulty of work	74	3,9715	0,69937	-1,695	125	0,093
	on results of work	53	3,7652	0,64224			

Source: own work

The obtained results, which are presented in Table 4., show that there is a statistically significant difference between the average level of work motivation, work engagement related to the observations' group with a results-oriented employee evaluation system with the average level of work motivation and work engagement related to observation group with actions and attitudes-oriented employee evaluation system. It allows for the acceptance of hypotheses **H2b_1_1** and H**2b_1_2.**

At the same time obtained results, which are presented in Table 5, show that there is not a statistically significant difference between the average level of work motivation and work engagement referring to the observations' group with the difficulty of work with average work motivation and work engagement related to the observations' group with remuneration oriented on difficulties at work with the average level of work motivation and work engagement referring to observations with remuneration oriented on work results. Hypotheses **H2b_2_1** and **H2b_2_2** should be rejected.

In the second step, was to analyze the relationship of variables dependent on the mediator. To verify **H2c_1** and **H2c_2** hypotheses (Table 6, Table 7), r-Pearson correlation analysis was performed.

Table 6: Correlation analysis between analyzed variables for observations with dichotomous variable. Employees assessment orientation on results of work rather than on actions and attitudes.

		Work motivation	**Work engagement**
Job performance	r	0,418	0,401
	Sig.	<0,001	<0,001
	N	118	119

Source: own work

Table 7: Correlation analysis between analyzed variables for observations with dichotomous variable. Remuneration of employees' orientation on difficulty of work rather than results of work.

		Work motivation	Work engagement
Job performance	r	0,461	0,397
	Sig.	<0,001	<0,001
	N	126	127

Source: own work

The results presented in tables 6-7 clearly show that there is a statistically significant relations between work motivation, work engagement and job performance for both analyzed groups. Therefore, it allows to accept all verified analytical hypotheses in this part of research.

In the third step, the relationship between the independent variables and dependent variables should be analyzed. Thus, the analysis was performed with the Student's t-test for independent samples. The mean of job performance related to the observations' group with the orientation of employees' remuneration focus on the difficulty of work was compared with the mean of job performance related to the observations' group with the orientation of employees' remuneration focus on results of work **H2a_1** (Table 8), as well as the mean of job performance related to the observations' group with the orientation of employees' remuneration focus on the difficulty of work with the mean of job performance related to the observations' group with the orientation of employees' remuneration focus on results of work **H2a_2** (Table 9).

Tab.8. Periodic evaluation orientation and job performance of employees

	employee's assessment orientation	***N***	***M***	***SD***	***t***	***dt***	***p***
job performance	on results of work	92	4,4484	0,52615	-1,276	117	0,205
	on actions and attitudes	27	4,3056	0,45644			

Source: own work

Tab.9. Remuneration orientation and job performance of employees

	employee's remuneration orientation	***N***	***M***	***SD***	***t***	***dt***	***p***
job performance	on difficulty of work	74	4,4189	0,52360	-1,623	123	0,107
	on results of work	53	4,2689	0,49964			

Source: own work

Obtained results show that there is not a statistically significant difference between the average level of job performance related to both the different orientations of the periodic evaluation and the remuneration. Hypotheses **H2a_1** and **H2a_2** should be rejected.

In consideration of the above results, it should be stated that the mediation model can only be built for solutions in the context of employee periodic evaluations. It is not possible to build such a model for remuneration solutions, due to the lack of statistically significant relations between the orientation of these solutions and the level of work motivation and work engagement (rejection of H2b_2_1 and H2b_2_2_2 hypotheses). Therefore, it is not possible to adopt H3_2_1, H3_2_2_2 hypotheses.

Therefore, such a conclusion enables the next step and verify the mediating model of job performance. To do that, a mediation model was built for employees' assessment orientation on results of work rather than on actions and attitudes as an independent variable, and job performance as a dependent variable. The work motivation and work engagement will be tested as the mediators in the models (the following hypotheses H3_1_1 and H3_1_2). The obtained regression model should be statistically significant, and the total effect should be higher than the direct effect calculated for given variables (direct effect given the results described above is statistically not significant). The results of the analysis are included in Table 10 and Table 11.

Table 10: Work motivation as the mediator of the relation between employee's assessment orientation on results of work rather than on actions and *attitudes* and job performance.

Mediator	Direct effect value	Indirect effect value	Boot LLCI	Boot ULCI	R2
Work motivation	0,0116	0,0242	-0,0024	0,0524	0,1765

Source: own work

The obtained regression model with mediator is statistically significant (F (2,117) =12,5356 and corrected R2=0,1765). Moreover, work motivation is a statistically significant mediator of the model (p<0,001, coeff. = 0,2726, se = 0,0567). But the mediating effect is not statistically significant, as can be observed in table 5 (BootLLCI = -0,0024 and BootULCI = 0,0524). The obtained model shows that there is no reason to accept, that work motivation is a mediator of the relation between *employee's assessment orientation on results of work rather than on actions and attitudes* and job performance. Therefore, there is no reason to accept the hypothesis **H3_1_1.**

Table 11: Work engagement as the mediator of the relation between employee's assessment orientation on results of work rather than on actions and *attitudes* and job performance.

Mediator	Direct effect value	Indirect effect value	Boot LLCI	Boot ULCI	R2
Work engagement	-0,0088	0,0448	0,0188	0,0754	0,1614

Source: own work

The obtained regression model with mediator is statistically significant (F (2,118) =11,3585 and corrected R2=0,1614). Moreover, work engagement is a statistically significant mediator of the model (p<0,001, coeff. = 0,3048, se = 0,0668). The mediating effect is also statistically significant, as can be observed in table 5, based on which it can be concluded that indirect effect is higher than the direct one, and also significant (BootLLCI = 0,0188 and BootULCI = 0,0462 and they are both above the value of 0). The obtained model shows that work engagement is indeed a mediator of the relation between employees' assessment orientation on results of work rather than on actions and *attitudes* and job performance. Therefore, it allows for accepting hypothesis **H3_1_2**.
The obtained results are presented on in Figure 2.

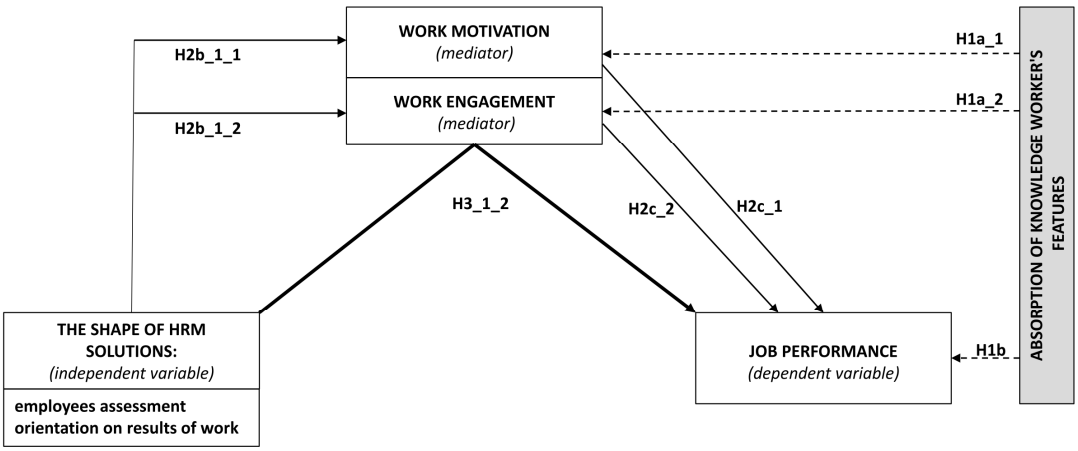

Figure 2: HRM solutions influence on KWs' job performance through work motivation and engagement – verified.

Discussion

The article was aimed at verifying how to manage a specific group of employees, who are KWs. The first part of the research verified the influence of absorption of KWs on work engagement, work motivation and job performance. The examined group of KWs was characterized by the level of absorption of KWs above 3. Concentrating on the level of absorption of KWs' characteristics allowed to prove that if the realization of assigned tasks requires the use

of intuition and creativity (i.e. if the level of absorption of KWs is significant), the level of work engagement, work motivation and job performance will be higher than in the case of workers characterized by lack of KWs' absorption. The confirmation of this relationship allowed us to reach the main goal of the research, which is to verify the impact of HRM solutions on KWs' job performance, as well as the impact of work motivation and work engagement on this relation. The research focused on such shapes of HRM solutions as employees' assessment orientation to work results and employees' remuneration orientation to work difficulties.

The research did not confirm that the shape of HRM solutions: employee assessment and remuneration used in the research has an impact on KWs' job performance. It may result directly from the lack of consistency of the KWs, especially that although the direct relationship was not confirmed, indirect relationships can find. For one of the researched shapes of HRM solutions, a mediation model was built and verified, which shows that for KWs, the results-oriented employees' assessment influences the employee's engagement, and that engagement influences the job performance.

Such a finding, thus, provides organizations in which KWs are employed, a piece of partial information on how to manage human resources in the context of employees' assessment, to effectively strengthen their work engagement and thus provide the organization with high employees' job performance (Whitener, 2001, Bieńkowska et al., 2020). This is in line with the common opinions on employees' assessment system, which state that the main goal of employees' assessment is to provide information on the results and progress made by employees. Lack of such feedback contributes to the disruption of an employee's sense of self-fulfillment, and this contributes to the disruption of employees' work engagement (Amabile and Kramer, 2013). Moreover, it is observed that such a employees' assessment solution will also strengthen the work motivation. However, there are no reasons to accept that work motivation shaping by the employees' assessment orientation on the result will strengthen job performance. However, in the context of employees in an organization, it is important to take care of the level of their work motivation, because it brings many measurable benefits. Employees' assessment orientation on their results is an effective method to create a fair remuneration system for employees. It is recognized that among employees whose remuneration is fair, there is a significant increase in job satisfaction, which also significantly contributes to the job performance (Saks, 2006; Vosloo et al., 2014, Naji, 2014; Agustiningsih et al., 2016).

Unfortunately, the expectations of strengthening work engagement, work motivation and job performance through the employees' remuneration orientated on the difficulty of work, were not confirmed. Perhaps an adequate explanation for the results obtained from the conducted research is the fact that remuneration is not one of the most important motivating element of human resources management. In daily work, KWs experience complex problems and each of their tasks are unpredictable and unique (Jayasingam et al., 2016). To solve each task, they have to use their mental abilities and therefore, perhaps, more than on remuneration, they want to develop their skills and broaden their knowledge (Pobst, 2014; Bussin and Brigman, 2019). There is an opinion among researchers that the constant updating of salary structures and increasing salaries for KWs may not bring the result expected by the organization (Bryant and Allen, 2013). It can be expected that if the competitors offer richer opportunities for development, the KWs will decide to leave the job because they are more interested in development than the instability of work and job security (Pobst, 2014; Bussin and Brigman, 2019). Therefore, it is necessary to expand the research with further elements of HRM solutions to get a full picture of HRM strategies fitted to KWs' needs to positively strengthen work motivation and work engagement. Perhaps instead of focusing only on job performance, to verify also other components that may affect job performance and organization performance, such as employees' job satisfaction or organizational commitment. Although not all the intended results of the research have achieved, the presented results indicate that a certain shape of HRM solutions may have an impact on strengthening work motivation, work engagement and, consequently, KWs' job performance. It is important to recognize, from an organizational perspective, which HRM solutions will have a positive impact on KWs. Over the years, it is KWs that have become the dominant group in organizations, and this trend is continuing (Juhnovich, 2012; Šikýř, 2013; Liker, 2016). That is why it is the task of managers to stimulate KWs appropriately by shaping an effective style of human resources management (Salanova et al., 2015; Bieńkowska and Tworek, 2019; Bieńkowska, Tworek, Zabłocka-Kluczka; 2020).

Conclusions

The article raises upon a very important topic of appropriate shaping of HRM solutions to stimulate the job performance of KWs. The relationship between job performance and HRM solutions, which can be mediated by work engagement and work motivation among KWs, was partially explained by research. The results of the study confirmed that the level of absorption of KWs influences the level of work motivation and work engagement. However, most importantly, it was confirmed that there is a mediation model, which confirms the impact of results-oriented employees' evaluation on work engagement, which in consequence affects a higher level of job performance among KWs. Additionally, it was confirmed that this form of shaping the employees' evaluation also strengthens work motivation. From the organization's perspective, all the above conclusions are important because they provide

the organization with information on the appropriate way to shape the employees' evaluation to strengthen work motivation, work engagement and thus implicitly job performance among KWs. Therefore, it can be concluded that the identified research gap has been partly enriched by the research.

However, it is recommended to fill it with further empirical data. Unfortunately, the research done has some limitations. First of all, the constructs of work motivation were build using one item. Besides, a group of employees took part in the research, representatives of Polish companies only. The main limitation, however, was the fact that only a fragment of the phenomenon was examined. It should be remembered that the study included only two HRM solutions, i.e. employee evaluation and remuneration. The other HRM solutions, like HR planning, staff recruitment and selection, employees' development, etc., were not taken into account. Similarly, all constructions commonly perceived as strengthening job performance, e.g. job satisfaction, were not included in the study. It does, however, provide the opportunity to further explore the topic and conduct further research in this area. Therefore, the results only allow an initial verification of the topic, which also does not allow for any binding theories on the strengthening of job performance by HRM solutions among KWs.

Despite numerous research limitations, the indicated aim of the article was partially achieved by the authors. It has been confirmed that the specific shape of HRM solutions indirectly influences the job performance of KWs. Therefore, the topic seems to be very interesting for further investigation, especially as KWs are becoming an increasingly critical group of employees in organizations. Therefore, providing all the information on how to strengthen their engagement, motivation and, consequently, job performance, which will contribute to strengthening the position of an organization, will be extremely valuable for managers.

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Assistive Robot Model to Care for Patients with Covid-19

Jesús D. OCAÑA
Universidad Nacional Santiago Antúnez de Mayolo, Huaraz, Perú, jocanav@unasam.edu.pe

Erick G. FLORES
Universidad Nacional Santiago Antúnez de Mayolo, Huaraz, Perú, efloresc@unasam.edu.pe

Víctor A. ANCAJIMA
Universidad Católica Los Ángeles de Chimbote, Chimbote, Perú, vancajimam@uladech.edu.pe

Alex PACHECO
Universidad Nacional de Cañete, Lima, Perú, apacheco@undc.edu.pe

Abstract

This research project consists of the design of a robot model, equipped with artificial intelligence, with the ability to deliver drugs to patients with COVID-19 during their hospitalization; in this way, health personnel are not exposed to the risk of contagion of this disease. The humanoid-looking assistance robot is programmed in such a way that the assistance personnel indicate by means of the numerical keyboard to which bed to go, the robot moves and locates the number of the patient's bed through pattern recognition, facilitating the medication and conclude with care. The sensor system detects the objects around it, capturing this information to transmit it to the neural networks, which tells the robot which way to move. Neural networks and computer vision are recorded on an Arduino microcontroller. The mathematical models were processed in the Matlab software and the results obtained from the simulations showed the operation of the robot with the learning response time of the neural networks, for the displacement and recognition of the patient's bed number. All these systematized actions are developed with the concurrent design methodology that contains five stages, conceptual design, kinematic analysis, dynamic analysis, mechanical design and simulation. The assistance robot was designed, with neural networks and artificial vision, adding sensors, actuators and peripherals.

Keywords: Assistive robot, artificial neural networks, artificial vision.

Introduction

The World Health Organization (WHO) defines COVID-19 as: "the most recently discovered infectious disease caused by the coronavirus. Both the new virus and the disease were unknown before the outbreak broke out in Wuhan (China) in December 2019". It is a virus that causes respiratory diseases that is killing many people in the world (WHO, 2019). On the first front of the battle against COVID-19, are the doctors, nurses and technical personnel who risk being infected to save our lives. In the case of medical personnel, it is believed that the main reason for death is not age, but overexposure to the virus. (Villoria, 2020).

The specialty medical robot industry is booming, and researchers from one of China's leading universities have designed a specific one that they say could help save lives on the front lines of the battle against COVID-19 (Ranchal, 2020). For this research, the mobile robot was taken into account, which can recognize and identify objects, with a system based on Machine Learning methods, by means of a LIDAR sensor (Aponte and Llanos, 2018).
Currently most robots can acquire information about the environment, estimate the position and track the movement of the robot. Additionally, techniques or methodologies can be included for the positioning of the robot with odometry (Caldato, Achilles and Castanho, 2017) and (Cheng et al, 2017).

The use of neural networks is considered a technique of great contribution in the analysis of internal parameters of the motors (León, et al., 2020). Through the use of the Artificial Neural Networks platform of the Matlab software, different configurations were carried out to obtain a generalization of the network with a minimum error (Contreras, et al., 2019).

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As a precedent, Baeza (2018) published his thesis entitled “Implementation of an artificial neural network in an 8-bit microcontroller for direction control of a mobile robot ', he concluded that the experimental results have shown that the Networks Artificial Neural B-Spline is able to achieve the direction control of the mobile robot. The neural network was implemented in an 8-bit microcontroller with which it was shown that recursive functions allow complex calculations to be carried out with the least processing power.

Valencia et al (2020) who carried out the research work called "Detection of infractions and license plates in motorcycles, by means of artificial vision, applied to Intelligent Transport Systems", reached the following conclusion, through the tests carried out, we confirmed the hypothesis Initial: using a mobile application, we were able to recognize motorcycle license plates, and using the Hough circular transform in Matlab, the limitations found in the developed prototype occur when there is excess sunlight, in which case the motorcycle license plates are overexposed in photos.

This project is justified because it is necessary that health personnel, who fight against COVID-19, do not expose themselves directly with patients, therefore, the protection of workers is key to guarantee the functioning of the health system and of society. The objective of this research work is to model an assistive robot to care for patients with covid-19. The robot's structure was designed with galvanized material, which is coated with a layer of zinc. It was simulated with ultrasonic sensors to detect obstacles, the number recognition operation was verified, because the hospital beds of each patient are numbered, and for the displacement control, the Arduino microcontroller was used. In conclusion, the proposed design and the viability of the simulations were achieved, verifying the response time of the entire system and subjected to failures for its verification, giving an expected functional result, for a future implementation.

Materials & Methods

The type of research is non-experimental with a descriptive purposeful level, since it is desired to inform, describe and design a medical assistance robot to care for patients with covid-19. The research design is of a transectional type, because the collection of data will be carried out in a single moment.

The methodology used is the concurrent design (Sabater and Verdú, 2012), which contains five stages:

Conceptual design, in this first stage the functional characteristics and technical specifications were developed, the requirements were identified, such as the structure and dimensions of the medical assistance robot, types of movement, trajectories, operating time, load capacity and precision.
Kinematic analysis, in this stage the analysis of the movement of the robot was carried out, for this the differential type robot was established and odometry was used to measure the position of the robot. The positions, velocity and acceleration of the robot in question were also calculated.
Dynamic analysis, in this stage the dynamic study was developed that allowed the selection of the motors, design of control strategies, implementation of ANN, artificial vision tests and simulation of the system.
Mechanical design, in this stage the kinematics and dynamics were integrated and the different stages that make up the methodology were listed, based on the creation of projects and elaboration of electronic circuits.
Simulation tests were developed with computer tools for verification and simulation of neural networks, the number recognition tests were used by the Matlab program and the part of electronic circuits, the Proteus 8.10 Professional program was used.

Proposed model and motivation

The following block diagram was proposed, which is shown in figure 1, it has a system of sensors to perceive the environment based on neural networks, determining the displacement and location of the robot, it also has a Camera to take images of the numbers of the hospital beds and process this data with pattern recognition. The listening block is for the robot to send audio signals, and a user interface to interact with healthcare employees.

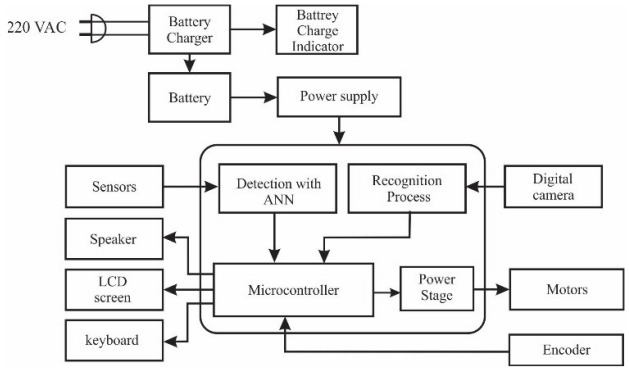

Fig. 1: Block diagram of the assistance robot

Structure of the assistance robot.

The physical structure of the robot is made of materials whose characteristics respond to factors such as: resistance, compression, flexibility, impact, corrosion. The material to be used for the structure of the robot will be galvanized sheet, which is coated with a layer of zinc, which acts as an anti-corrosion agent, prolonging the useful life of the robot under wet or rainy conditions. The design of the physical structure of the robot is shown in figure 2, with a height of 1.6 m.

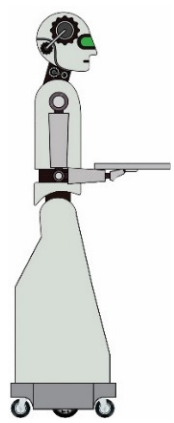

Fig. 2: Physical form of the assistance robot

Robot position

Figure 3 shows us the position of the robot, which is the general way to locate the robot, the equation of the robot in a linear combination of the X and Y axis. The total speed (VT) is the average of the tire speeds left (VL) and right tire speed (VR). To find the velocity in Vx and Vy, by Pythagoras we must know the angle φ, which is the angle that the robot moves. L comes to do the distance of the wheels.

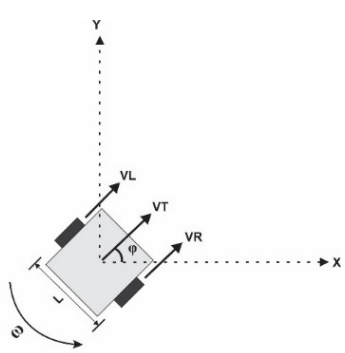

Fig. 3: Robot position

Odontometric Equations

It is a system of equations that describe the velocity in x, the velocity in y, the angular velocity ω, with respect to the speeds of the robot's rim and the angle φ is the direction in which the robot is moving.

$$Vx = Vt\cos\varphi \tag{1}$$
$$Vy = Vt\sin\varphi \tag{2}$$
$$Vx = \left(\frac{VR+VL}{2}\right)cos\varphi \tag{3}$$
$$Vy = \left(\frac{VR+VL}{2}\right)sin\varphi \tag{4}$$
$$\omega = \frac{VR-VL}{L} \tag{5}$$

To find the robot's velocity at position (x, y), we relate the tires with respect to the robot's positions. The velocity Vx is what is called the first derivative of the position $\dot{x}$, the velocity Vy is the change in position at $\dot{y}$, the change in position $\dot{\varphi}$ is the velocity ω. These equations are called the state space system, it is a well-known system in control systems (Urquijo, et al., 2017).

$$\dot{x} = \left(\frac{VR+VL}{2}\right)cos\varphi \tag{6}$$
$$\dot{y} = \left(\frac{VR+VL}{2}\right)sin\varphi \tag{7}$$
$$\omega = \dot{\varphi} \tag{8}$$

Sampling Time

Using an encoder, the speed of the driving wheels is measured, thus determining the effective relationship between the speed indicated by the encoders and the actual speed at the wheels.

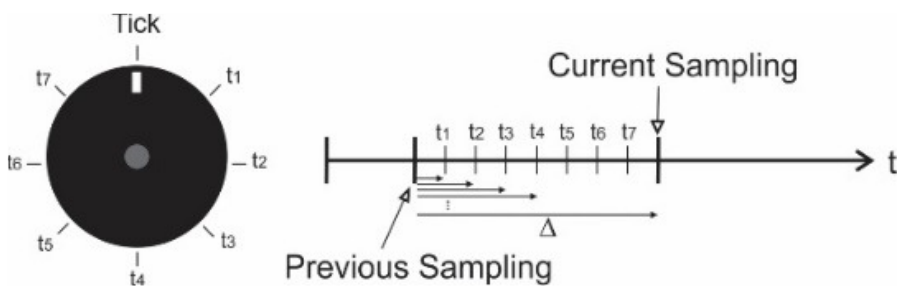

Fig. 4: Sampling time with the encoder

In this case, 2 encoders will be used, with a slot called Tick, this means that the entire turn of the encoder represents one turn of the motor. The times are sampled and since the speed is constant, we can determine how long the motor turns in one revolution? With this we can estimate the distance traveled at constant speed.

Delta = currentSampling - previousSampling

Distance

$$D = 2\pi R\frac{\Delta Tick}{N} \tag{9}$$

Where:
N is the number of encoder slots; in our case it will be 1.
R is the radius of the rim

Frequency

$$f = \frac{1}{Delta} \tag{10}$$

Angular Velocity

$$\omega = \frac{\frac{2\pi}{N}}{Delta} \tag{11}$$
$$\omega = f * \frac{2\pi}{N} \tag{12}$$

Linear velocity

$$V = \omega * R \tag{13}$$

Movement flow of the robot with Artificial Neural Network

A multilayer perceptron neural network was created, the input data of which are the ultrasonic sensors, the outputs of the neurons, are connected to the control Arduino for displacement.

The robot has 4 ultrasonic sensors installed, to detect the walls of the area and can recognize the entire environment, for this a multilayer perceptron was implemented, whose inputs are the sensors S1, S2, S3 and S4, and 2 output neurons O1 and O2, each output neuron has 2 states 1 or 0. This Neural Network was developed with the Matlab program and implemented in an Arduino microcontroller (Ocaña, et al., 2020).

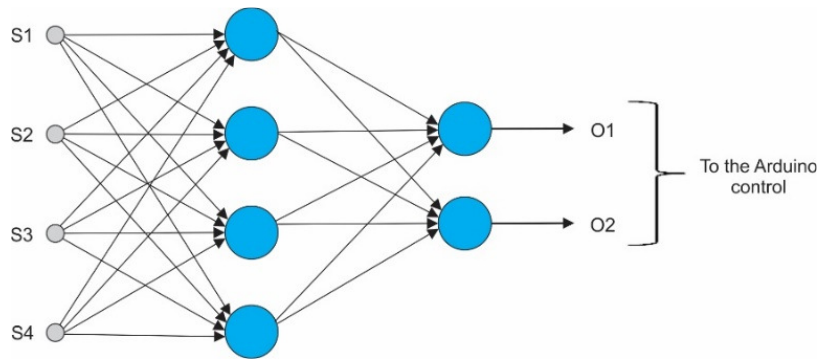

Fig. 5: Multiplayer perceptron with 2 output neurons

Hospital bed number recognition process

PreProcessed

In this pre-processing stage of the image, the quality of the images was improved for their easy interpretation, for this the discrete Fourier transform (DFT) was applied, entered in the Matlab program (Krötzsch and Gómez, 2017).

$$X[k_1,k_2] = \sum_{m=0}^{N-1}\sum_{n=0}^{N-1} x[m,n]\, e^{-j\frac{2\pi}{N}(k_1 m + k_2 n)} \tag{14}$$

Inverse transform:

$$x[m,n] = \frac{1}{N^2}\sum_{k_1=0}^{N-1}\sum_{k_2=0}^{N-1} X[k_1,k_2] e^{-j\frac{2\pi}{N}(k_1 m + k_2 n)} \tag{15}$$

DFT was applied in image filtering, in the implementation of fast algorithms and in image analysis problems.
The Magnitude of the transform is given by:

$$X_M(k_1,k_2) = \sqrt{X_R(k_1,k_2)^2 + X_I(k_1,k_2)^2} \tag{16}$$

The phase of the transform is expressed as:

$$\emptyset(k_1,k_2) = \tan^{-1}\left(\frac{X_I(k_1,k_2)}{X_R(k_1,k_2)}\right) \tag{17}$$

In the DFT-2D applied to the image, represented as a matrix, the variable in the two axes is space. This implies that the frequency variable is associated with the spatial periodicities that appear in the image. The spatial frequency has units of (1/m)

Image reduction:
It is an operation that allows reducing the dimensions of the matrix (image), in order to reduce the number of iterations and to reduce the response time.

Grayscale
The representation of a grayscale image is the simplification of the image in a two-dimensional matrix that only contains relevant information on the luminance component of the YIQ color model, presenting intensity levels between 0-255, 0 being for the color black. and 255 for white.

Image complement:
The complement of the image is determined by subtracting from 255 the intensity value of each pixel belonging to the image

Control Circuit

In this stage 3 Arduinos are used, one controls all the ultrasonic sensors with neural networks, the other Arduino controls the motors for movement, the third Arduino is programmed through the keyboard to which bed it will attend, it also processes the image of the number hospital bed, it also detects people through body temperature and controls the motor to move the robot's head. The OV7670 camera is located on the robot head. The 4 ultrasonic sensors are located on the 4 sides of the robot, sensor 1 (S1) is connected to the front, left (S2), right (S3) and back (S4), these sensors are programmed to detect any obstacle at 50 cm. In figure 6 the total circuit of the robot is shown.

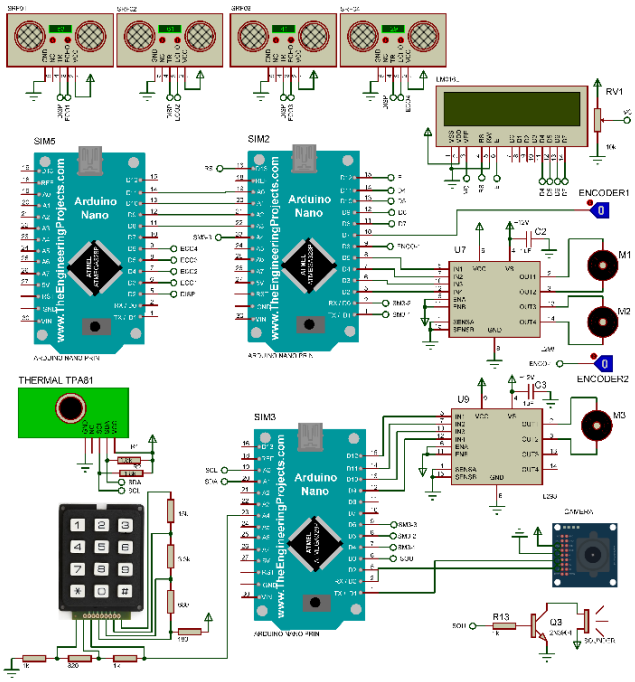

Fig. 6: Control circuit

Simulation Results

Robot simulation with neuronal networks

The Neural Network was simulated with the Matlab program, as shown in figure 7, the input corresponds to the 4 ultrasonic sensors, in the hidden layer there are 4 neurons with their respective weights (w) and polarization (b), in the output layer there are 2 neurons, with their respective weights (w) and polarization (b) and in the output we obtain 2 binary states.

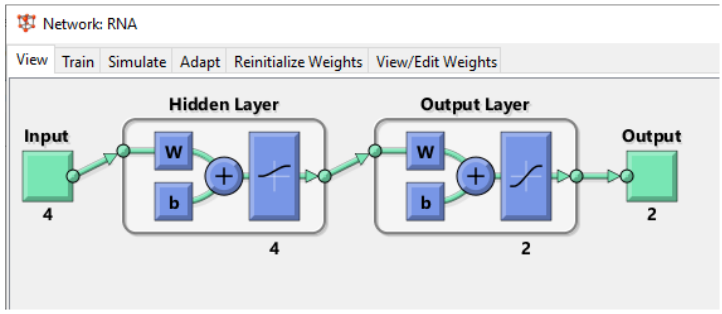

Fig. 7: ANN Simulation in Matlab

In figure 8, the verifications carried out in Matlab are shown, each time a sensor detects an obstacle at 50 cm, it sends a pulse "1" and if there is no obstacle it sends "0" to the Neural Network. In the first upper left, the 4 sensors show 0, 1, 1, 0, which indicates that S1 is ahead there is no obstacle, in the left S2 and right S3, there is an obstacle, and behind S4 there is no obstacle, the exit it shows us 1 and 0, which means that the robot moves forward. In the second upper right, the 4 sensors show 1, 1, 0, 1, which indicates that S1 is ahead and S2 on the left is an obstacle, in the right S3, there is no obstacle, and behind S4 there is an obstacle, the output shows 0 and 0, which means the robot goes to the right. In the third lower left, the 4 sensors show 1, 0, 0, 1, which indicates that S1 is ahead there is an obstacle, S2 is left and S3 is right, there is no obstacle, and behind S4 there is an obstacle, the output shows us 1 and 1, which means that the robot goes to the left. In the lower right fourth, the 4 sensors show 1, 0, 0, 0, which indicates that S1 there is an obstacle, S2, S3 and S4 there is no obstacle, the output shows us 0 and 1, which means that the robot is going to back.

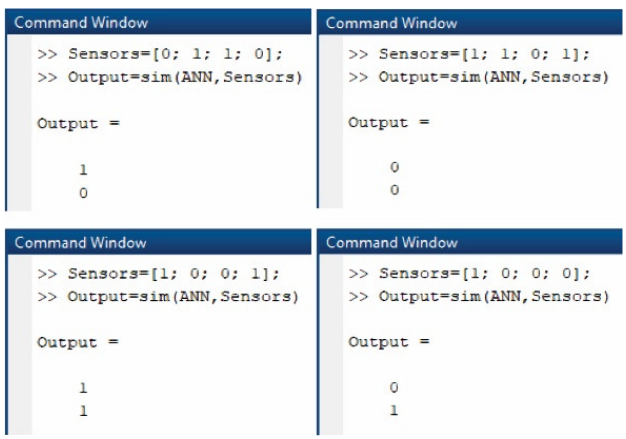

Fig. 8: ANN verification

Table 1 shows the result of the simulation tests of the Neural Networks, according to the data from the sensors, we will have a binary value in the output of the Artificial Neural Network. These values obtained from the neural network are sent to the control stage for its movement of the robot, when the four sensors detect 0 1 1 0, at the output of the neural network 1 and 0 are obtained, this data is sent to the control stage, ordering the robot to advance. In the second row we denote that the sensors detect 0 1 1 0, at the output of the neural network we obtain 0 and 0, this data is sent to the control stage ordering the robot to go to the right. In the third row we denote that the sensors detect 1 0 0 1, at the output of the neural network 1 and 1 are obtained, this data is sent to the control stage, ordering the robot to go to the left. In the fourth row we denote that the sensors detect 1 0 0 0, in the output of the neural network we obtain 0 and 1, this data is sent to the control stage ordering the robot to go back.

Table 1: Result of ANN simulation tests

Sensors	ANN Output	To move
0 1 1 0	1 0	Get moving
1 1 0 1	0 0	Right
1 0 0 1	1 1	Left
1 0 0 0	0 1	Back off
0 1 1 1	1 0	Get moving

Simulation of robot displacement with ANN

The simulation tests carried out on the control circuit showed the desired behavior, verifying the displacement in all directions. Figure 9 shows the simulation where the data from the Arduino with Neural Networks, due to the detection of the sensors, we can see that S1 and S4 are a long distance, S2 and S3 are obstacles, the output of the Arduino with Neural Networks is 1 and 0, sending this data to the second Arduino, to control the motors, according to this data received by this Arduino, the robot will advance, therefore motor 1 (M1) and motor 2 (M2) rotate clockwise , resulting in the robot moving forward and the robot movement can also be displayed on the LCD screen.

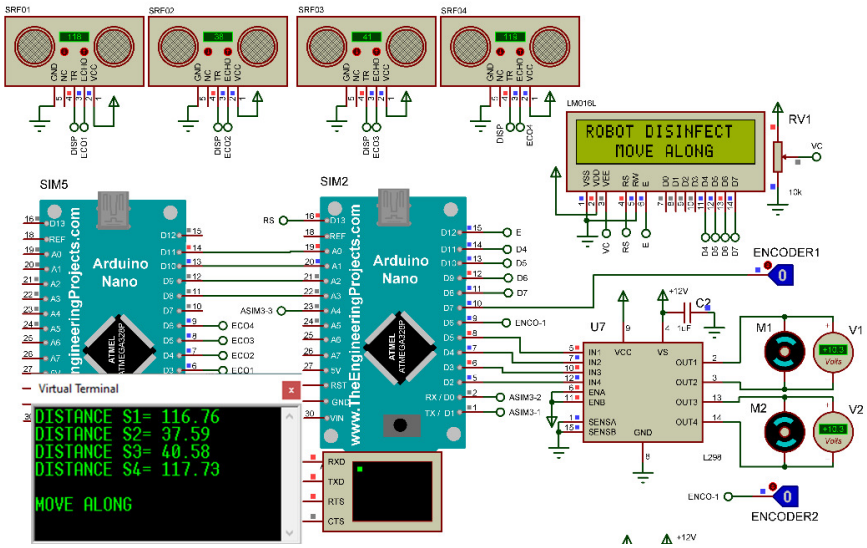

Fig. 9: Control circuit simulation

To evaluate the effective operation of the assistance robot, all movement tests were carried out, in addition the operation of the 2 encoders was simulated, resulting in efficient movement. To calculate the distance traveled by the robot, wheels whose diameter is 9 cm were used, as 1 turn of the encoder is equal to one turn of the wheel, therefore, one turn of the wheel equals 28.2 cm, when the wheel is turned 20 laps, the robot has traveled 5.6 meters. Head turning was also simulated to detect the hospital bed number.

Recognition Process

During the recognition process, there is a pattern of numbers for you to compare with the data captured by the camera. Each hospital bed has a number pasted on the wall at the top, these numbers are extracted and converted into black and white characters represented by binarization. To obtain more accurate binarization results, various local threshold values are used.

Although the values were taken properly, several points appear in the binarized image that produce a noisy image, Figure 10 (a). There are several methods that allow you to reduce this type of noise, such as Gaussian, low-pass and medium filters, etc. To maintain the shapes of the symbols by removing only noise, the labeling method is used. The elimination of noise resulting from the number taken, the labeling method shown in figure 10 (b) is used, where it is shown that the black points of the background and the white points within the characters have been eliminated

(a) (b)

Fig. 10: (a) Character plates after the binarization process (b) Character plates after the binarization and denoising processes.

After eliminating the noises, these characters are coded and entered into the recognition process, to carry out the identification of the hospital bed number.

Figure 11 shows the behavior of number recognition, each number has a representative graph, this graph is stored in the database as patterns, what is going to be compared are not numbers, but the graphs are compared. In figure 11 (a) it is observed that the number taken is 145, we can notice that this number has a characteristic graph that is stored as a pattern; the number of the hospital bed was taken by means of the camera as shown in figure 11 (b), and as a result of the recognition process it gives us a graph almost identical to the graph stored as a pattern, therefore, the result of this recognition process is number 145.

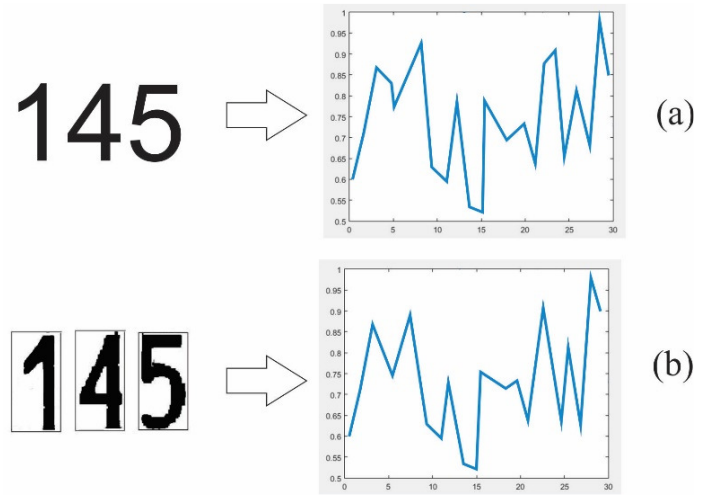

Fig. 11: (a) Representative graph of the number 145, (b) Image captured with its graph

Discusión

The results obtained in table 1 show that the ultrasonic sensors detect obstacles when the robot moves, these data taken from the sensors are collected and stored in the Neural Network. At the output of the neural network, the binary values are obtained that are sent to the control circuit for the movement of the assistance robot. These results are related to what Baeza (2018) maintains in the research called "Implementation of an artificial neural network in an 8-bit microcontroller for direction control of a mobile robot", who points out that the experimental results have shown that the Networks Artificial Neurals, is capable of achieving the direction control of the mobile robot, being implemented in a microcontroller, as in this investigation, the ANN training with ultrasonic sensors could be carried out on an Arduino NANO, and the robot's displacement could be verified with these networks. neuronal, resulting in efficient robot movement.

In the process of visual recognition, the numbers are extracted and converted into black and white characters represented by binarization, then the labeling method was used where the black points of the background and the white points within the characters have been eliminated, then this image is converted into a characteristic graph of this number taken. As a result of the recognition process, it gives us a graph almost similar to the representative graph stored as a pattern, thus detecting the number of the hospital bed. These results are corroborated with the study by Valencia et al (2020) who in their research entitled "Detection of infractions and license plates on motorcycles, using artificial vision, applied to Intelligent Transport Systems", reached the following conclusion, which was developed a platform in Matlab that can recognize the characters on the motorcycle plates regardless of the position in which it is in front of the camera, in some experiments there were problems in the character recognition stage, what happens is that on some occasions the matrix of some character has noise, giving better results the plates with a white background and black letters. Taking the results of the research by Valencia et al, it was possible to verify through the recognition of patterns the images must be converted to black and white represented by binarization and the plate must have a white background with black numbers, obtaining recognition efficient.

Conclusions

The model of an Assistive Robot was made to attend to patients with covid-19, a multilayer perceptron neural network was created, training with the Matlab program and recorded on the Arduino NANO board, where the sensors detect obstacles and the robot can move without any problem. The displacement operation was simulated and verified resulting in a functional assistance robot.

Visual recognition was checked, with the numbers extracted and converted into black and white characters represented by binarization, and this image was transformed into a characteristic graph of this taken number. As a result of the recognition process, it gives us a graph almost similar to the representative graph stored as a pattern, thus detecting the number of the hospital bed.

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Recommendation Algorithm Based on Recommendation Sessions

Michał MALINOWSKI

Military University of Technology / Faculty of Cybernetics / Institute of Computer and Information Systems
Warsaw, Poland, michal.malinowski@wat.edu.pl

Abstract

The enormous development of the Internet, both in the geographical scale and in the area of using its possibilities in everyday life, determines the creation and collection of huge amounts of data. Due to the scale, it is not possible to analyse them using traditional methods, therefore it makes a necessary to use modern methods and techniques. Such methods are provided, among others, by the area of recommendations.

The aim of this study is to present a new algorithm in the area of recommendation systems, the algorithm based on data from various sets of information, both static (categories of objects, features of objects) and dynamic (user behaviour).

Keywords: Recommendation System and Algorithm, Graphs and Networks, E-Commerce.

Introduction

Recommendation Systems (RS) are currently ubiquitous in many areas of life. They become indispensable tools to help users to search for appropriate information in the huge amount of data that surrounds them. Such systems influence the decisions not only of decision-makers, but also of ordinary citizens in their daily lives. It is estimated that in 2020 the level of about 40 trillion gigabytes of data stored in social media databases, electronic mail systems (e-mails) and indexed websites will be reached.

Outline of algorithms of recommendation systems

The currently existing recommendation systems could be divided into three main techniques:

- **Content Based** (methods of filtering based on content) – such systems are constructed on the assumption that objects with similar features will receive similar ratings from the same user;
- **Collaborative Filtering - CF** (methods of filtering based on neighbourhood) - such systems are based on the idea, that if two users have made similar decisions in the past, their preferences will also converge in the future. This method can be divided into the following:
    - **Model Based;**
    - **Memory Based:**
        - **User Based;**
        - **Item Based.**
    - **Hybrid Collaborative Filtering.**
- **Hybrid Filtering** (hybrid algorithms) – systems using the rules of the two previous techniques.

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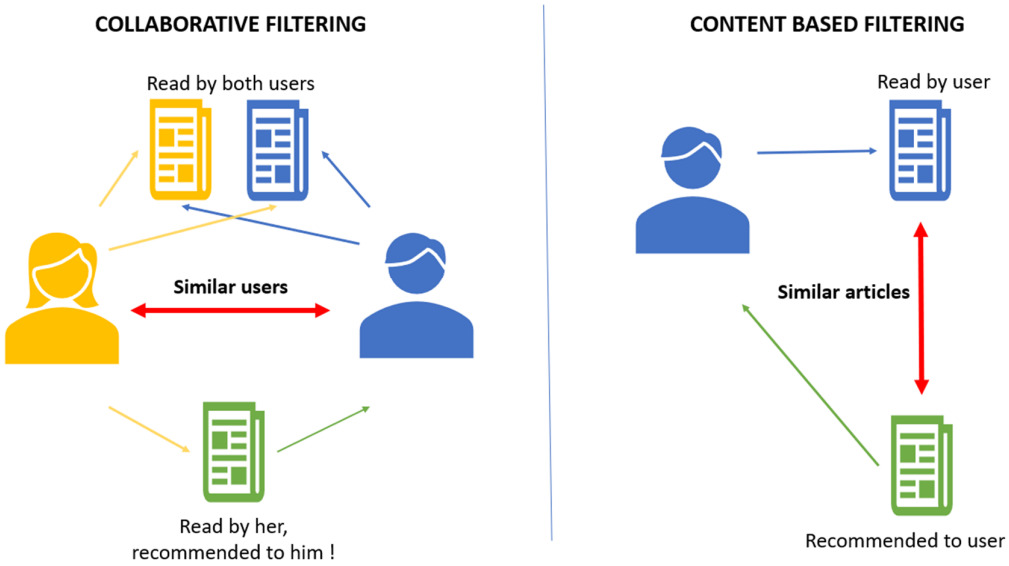

Fig. 1: The idea of operation of the systems based on Content Based Filtering and Collaborative Filtering Methods.

Table 1. provides an overview, advantages and disadvantages of the algorithms used within the above mentioned types of methods [4].

Table 1: Comparison of recommendation techniques

Technique	Content Based	
Algorithms	Content Based algorithm using Hidden Markov Model	
Advantages		Disadvantages
No scarcity and cold start problem It ensures privacy		Requires rich description of items Requires organized user profile Content overspecialization is problem
Technique	Collaborative Filtering (Memory Based)	
Algorithms	User Based CF Item Based CF	
Advantages		Disadvantages
Easy to implement Data addition is simple Need not consider content Good scalability		Depends on explicit feedback Cold start problem Sparsity problem Limited scalability for large dataset
Technique	Collaborative Filtering (Model Based)	
Algorithms	Slope-one CF Matrix factorization	
Advantages		Disadvantages
Improving prediction performance Improving scalability and sparsity problem		Model is expensive Loss of information in matrix factorization
Technique	Hybrid Collaborative Filtering	
Algorithms	Combination Model Based and Memory Based	

Advantages	Disadvantages
Overcoming limitations of sparsity Improving prediction performance	Increased complexity Complicated for implementation
Technique	Hybrid Filtering
Algorithms	Combination Content Based and Collaborative Filtering
Advantages	Disadvantages
Collaborative and content based methods are complementary in their strengths and weaknesses Overcoming scarcity and cold start problem	Difficult for implementation

In algorithms of recommender techniques based on Content Based Filtering, user profiles include features and items chosen by the user in the past. Consequently, those algorithms have two main weaknesses: they only recommend items similar to those chosen in the past, and also, the system must extract meaningful and useful features from the description of items.

Collaborative Filtering's recommendation systems are based on the received information from users who shared similar interests and preferences in the past. In this method, algorithms use the feedbacks received from other similar users to give recommendations. The main advantage of this method over the previous one is that, in this technique, the community of users gives opinions about certain items, and also provide feedbacks and ratings. As a result, there is a chance for quite new items to be recommended to the user.

Considering the nature of this method, it provides the system will return weak and non-transparent predictions, when the number of users will be too low (Cold Start)

The algorithm described in the study can be classified as the hybrid algorithm type, because it can make recommendations based on both the similarity of objects' features (Content Based) and the similarity of users' behaviours (Collaborative Filtering - CF). Precise classification can be made only on the basis of the input data provided in the form of the graph **G,** which is described below.

The concept of a recommendation session may be reflected, for example, by the relationship between purchased orders and order items or between a product category and products. In the area of mathematical apparatus it is based on graph and network theory, and can be described on the basis of a bipartite directed graph **G** called the graph of the recommendation session such that:

$G =< N, E >$ (1)

where:

$N = J \cup O$ – the collection of nodes

$E \subset J \times O$ – the collection of edges (directed edges)

O – the collection of objects

The object ($o \in O$) may be:

- products in an Internet shop;
- a video in a video-on-demand service;
- an employee in an employment-related service;
- press article in the news service;
- a person on a social network application.

J – collection of kernels

The kernel ($j \in J$) may be:

- a products' category – one of the sub-collections of products having common features;
- the purchase order – the result of the customer's actions in the shop, which is finalised with the purchase;
- a wish list – a sub-collection of the shop's products related to the customer, which such sub-collection results from the customer's future shopping preferences;
- an expert – a sub-collection of products indicated by the discipline specialist;
- a website visit ID – a unique key assigned to a user's visits to the website. A visit consists of a sequence of viewed/visited pages of an online store;

- a person – IT structure identifying and describing the user in the IT system.

Due to the adopted and further discussed interpretation of the model and its components, the following limitations are assumed to be met:

$J \cap O = \emptyset$ – no kernel shall be a facility and no facility shall be a kernel

$(\forall j \in J)(\exists e \in E)(e = (j, o))$ – each kernel must be associated with at least one object

$(\forall o \in O)(\exists e \in E)(e = (j, o))$ – each object must be associated with at least one kernel.

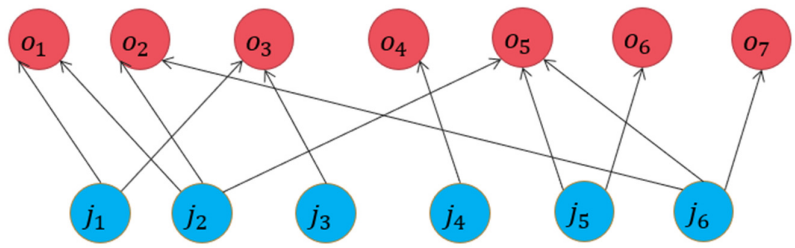

Fig. 2. The recommendation session's graph

A single session **S** can be presented as a sub-graph of the graph **G** such that:

$S =< N', E' >$ (2)

where:

$N' = j \cup O'$ – a collection of session's nodes

$E' \subset E$ – collection of session edges

$O' \subset O$ – a collection of session's objects (related to a kernel)

$j \in J$ – a session's kernel

$(\forall o \in O')(\exists e \in E)(e = (j, o))$ – each object of a session is associated with a kernel

$(\nexists o \in O \backslash O')(\exists e \in E)(e = (j, o))$ – there is no kernel-related object that is not a part of the session.

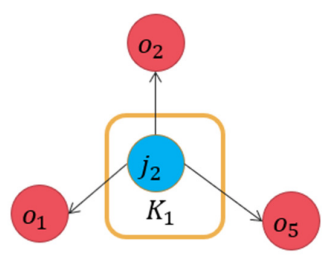

Fig. 3. Single recommendation session model

The session is made up of one kernel only and of all edges and objects related to the kernel.

The sessions (*S*) may be:

- the products' category and the products themselves;
- the purchase order and the order's items;
- the customer's wish list with the elements;
- an expert with his/her assessments;
- an identifier (ID) of the website visited, along with the pages visited;
- a person with his/her colleagues.

In addition, due to its physical properties and similarities, the session's kernels can be grouped into classes **K.** The kernels of the same type are grouped into the classes, e.g.: products' categories, purchase orders, etc.

Where:

$K \subset J$- the class is the sub-collection of the kernels' collection

The class ($K \subset J$) of the session's kernels may be:

- the categories of the products;
- the purchase orders;

- the customers' wish lists;
- experts;
- identifiers (IDs) of the website visits;
- persons.

In addition:

$(\forall i \neq j)(K_i \cap K_j = \emptyset)$ – no kernel is present in two or more classes

$\bigcup_{i=1}^{|K|} K_i = J$ – each kernel belongs to a class

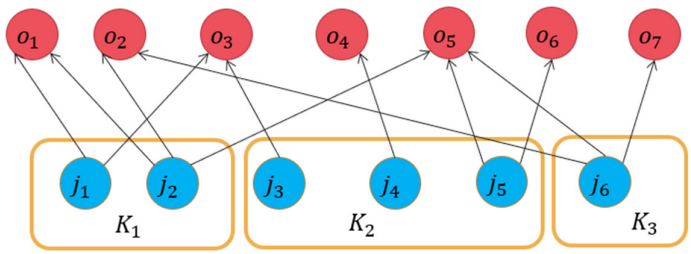

Fig. 4. The classes of the kernels

Algorithm of the Recommendation Session

Let $\boldsymbol{C}$ be a collection of users using the recommendation system and $\boldsymbol{O}$ a collection of all possible objects that can be recommended.

In addition, let $\boldsymbol{u}$ be a utility function measuring the utility of object $\boldsymbol{o} \in \boldsymbol{O}$ for user $\boldsymbol{c} \in \boldsymbol{C}$. This is $\boldsymbol{u}: \boldsymbol{CxO} \rightarrow \boldsymbol{W}$, where $\boldsymbol{W}$ is an ordered collection (e.g. non-negative integers)

Then, for each user $\boldsymbol{c}$ belonging to $\boldsymbol{C}$, a sub-collection $\boldsymbol{R_c}$ belonging to $\boldsymbol{O}$ is selected, which maximises the usability for the user. This means that for the arranged $\boldsymbol{c} \in \boldsymbol{C}$ we determine the collection of the recommended objects as follows:

$$R_c = \{r \in O: u(c,r) = \max_{o \in O} u(c,o)\} \qquad (3)$$

In a general case, the task of the recommendation algorithms is to find a sub-collection $\boldsymbol{R_c}$ called the collection of recommended objects for user **c**.

In a specific case, a recommendation is made to the selected object $\boldsymbol{m}$ without directly considering the user $\boldsymbol{c}$, for whom the recommendation is made. Therefore, condition (3), taking into account a change in the function of the recommendation such that $\boldsymbol{u}: \boldsymbol{OxO} \rightarrow \boldsymbol{W}$, can be presented as follows:

– firstly, the collection of recommendations for user $\boldsymbol{R_c}$ is replaced by $\boldsymbol{R_m}$, i.e. the collection of recommendations for the object;

– secondly, for the arranged $\boldsymbol{m} \in \boldsymbol{O}$, we determine the collection of recommended objects as follows:

$$R_m = \{r \in O: u(m,r) = \max_{o \in O} u(m,o)\} \qquad (4)$$

Considering user $\boldsymbol{c}$ consists in the fact that it is him who, consciously directing his behaviour, selects an object $\boldsymbol{m}$ from the $\boldsymbol{O}$ collection, against which recommendation $\boldsymbol{R_m}$ shall be built up.

ARS (Algorithm of the Recommendation Sessions) based on this particular case.

Fig. 5: Architecture of the Algorithm of the Recommendations Session (ARS)

<u>Input data:</u>

G – the session graph

m – object (graph node) to which the recommendations are to be linked

Output data:

R_m – vector of recommendation for the object **m** (the lower the position in the vector, the better the recommendation for the object **m**)

Steps:

K01: Presentation of input data

Example:

G $=< N, E >$

m = o_3

where:

$N = J \cup O$

$O = \{o_n : n = \overline{1,9}\}$

$J = \{j_n : n = \overline{1,6}\}$

$E = \{< j_1, o_1 >, < j_1, o_2 >, < j_1, o_5 >, < j_2, o_2 >, < j_2, o_3 >, < j_2, o_4 >, \dots, < j_6, o_1 >, < j_6, o_6 >\}$

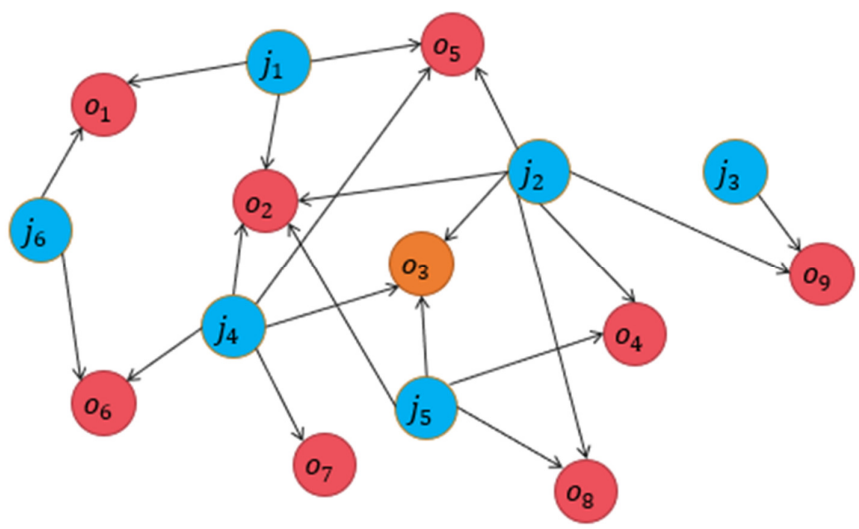

Fig. 6: The graph of the input session G with the input object (node) marked m

K02: The design of the sub-graph **G'$_m$** of the graph **G** consisting of node **m** and nodes adjacent to the node **m** and edges between them and node **m.**

Example:

G'$_m$ $=< N', E' >$

m = o_3

where:

$N' = O' \cup J'$

$O' = \{o_3\}$

$J' = \{j_2, j_4, j_5\}$

$E' = \{< j_2, o_1 >, < j_4, o_1 >, < j_5, o_1 >\}$

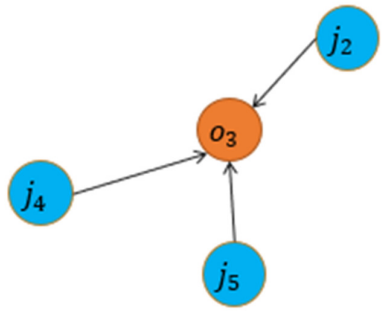

Fig. 7: The designed sub-graph G'$_m$ of the graph G

K03: The construction of the sub-graph **G''$_m$** of the graph **G** composed of the graph **G'$_m$** and the nodes adjacent to the nodes of the graph **G'$_m$** and edges between them and the nodes of the graph **G'$_m$**

Example:

G''$_m$ $=< N'', E'' >$

m $= o_3$

where:

$N'' = O'' \cup J''$

$O'' = \{o_3, o_2, o_4, o_5, o_6, o_7, o_8, o_9\}$

$J'' = \{j_2, j_4, j_5\}$

$E'' = \{< j_2, o_1 >, < j_4, o_1 >, < j_5, o_1 >, < j_2, o_4 >, < j_2, o_5 >, < j_2, o_9 >, < j_4, o_2 >, < j_4, o_6 >, < j_4, o_7 >, < j_5, o_2 >, < j_5, o_8 >\}$

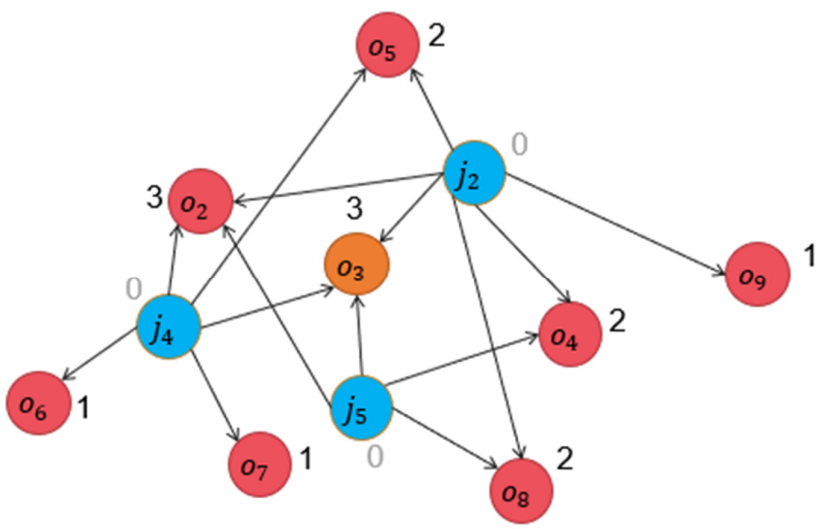

Fig. 8: The constructed sub-graph G''$_m$ of the graph G with estimated incoming steps of the nodes

K04: Estimation of the incoming steps for each node that is the object of sub-graph **G''$_m$**

Example:

$deg_{in}(o_3) = 3$

$deg_{in}(o_2) = 3$

$deg_{in}(o_4) = 2$

$deg_{in}(o_5) = 2$

$deg_{in}(o_6) = 1$
$deg_{in}(o_7) = 1$
$deg_{in}(o_8) = 2$
$deg_{in}(o_9) = 1$

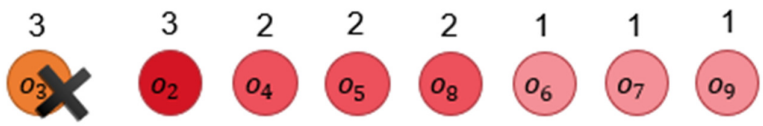

Fig. 9: Sorted objects (nodes) with the removed object m

Application of the algorithm

The algorithm, as the part of the scientific research, was used to build recommendations for a real existing e-commerce solution based on real data. The precise data were downloaded from the relational database (MySQL) of the online store's IT system AM76 (https://am76.pl) for the time period from the 15th to the 20th of December 2019.

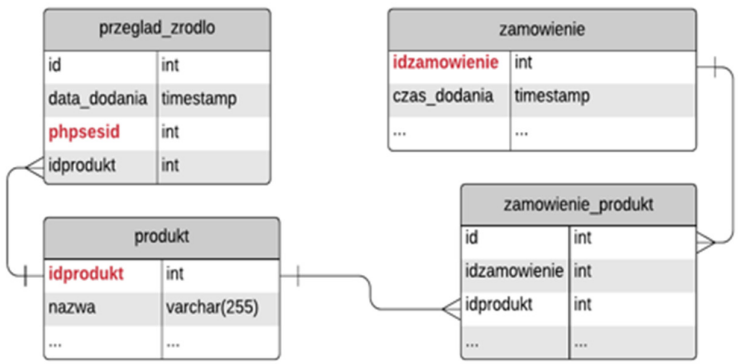

Fig. 10: Data structure in the form of an ERD diagram of the database of the IT system AM76.pl

The data used to build graph G was information such as:

O – a collection of objects being products with unique identifiers: idproduct (*produkt.id*)

$J = K_1 \cup K_2$ – collection of kernels made up of two classes:

K_1 - visiting a shop with unique identifiers: phpsesid (view_source.phpsesid)

K_2 - the purchase orders with unique identifiers: purchaseorderid (*purchaseorder.id*)

$E = E_1 \cup E_2$ – a collection of edges composed of:

E_1 - visiting the products: phpsesid –> idprodukt

E_2 - the items of the purchase orders: purchaseorderid –> productid

K_1

J

phpsesid	data
1624844680	2019-12-15
1601766927	2019-12-15
1372428021	2019-12-15
1630107088	2019-12-15
1539705806	2019-12-15

E

phpsesid	idprodukt
1000180571	3454
1000180571	3492
1000852593	4314
1000852593	4050
1000896693	3046

K_2

idzamowienie	data
89031	2019-12-15
89032	2019-12-15
89033	2019-12-15
89037	2019-12-15
89048	2019-12-15

idzamowienie	idprodukt
89031	4750
89031	4503
89031	5496
89031	4946
89032	3689

O

idprodukt	nazwa
2	Abalone Classic
3	Abalone Travel (edycja polska)
5	Agricola
7	Agricola: Torfowisko
8	Alhambra (edycja polska)

Fig. 11: Examples of data for individual elements of the graph G

The data described above have been exported to the graphs' database Neo4j. This database allowed to present the data contained in the MySQL relational database in the form of the Graph **G**.

OpenSource software called Cytoscape was used for the research. Cytoscape is a software environment for integrated models of biomolecular interaction networks. The basic version of the above mentioned software has been enriched with a plugin called CypherQueries, which allows for direct connection to the Neo4j database. Neo4j is a native graph database, built from the ground up to leverage not only data but also data relationships.

Within the research, individual steps (K01–K06) of the "ARS" algorithm were executed.

K01

The incoming graph **G** containing:

- 1733 nodes (red) in the collection O;
- 2056 nodes (blue) in the collection K_1;
- 314 nodes (green) in the collection K_2;
- 7459 edges in the collection E_1;
- 964 edges in the collection E_2.

Moreover, the object **m** was an object (node) with the identifier (idproduct) 4537 having the name "Teotihuacan: City of the Gods".

K02

The sub-graph **G'm** of the graph **G** has been constructed. The sub-graph consisted of the node **m** and nodes adjacent to it and edges linking them. The adjacent nodes were the kernels of the sessions, in which the node **m** occurred.

Fig. 12: The constructed sub-graph G'$_m$ of the graph G

K03

The sub-graph **G''m** of the graph **G** was built. Nodes that are objects related to the kernels of the sessions being in the graph have been added to the subgraph **G'm**.

Fig. 13: The constructed sub-graph G''m of the graph G

K04 and K05

Using the Cytoscape software's analytical module, the incoming steps for each node of the sub-graph **G'm** were estimated, and then the steps were sorted in descending order.

Table Panel

Indegree	idprodukt	nazwa	_neo4j_labels
8	4537	Teotihuacan: Miasto Bogów	[obiekt_O]
3	4503	Na Skrzydłach	[obiekt_O]
3	4879	Root (edycja polska)	[obiekt_O]
3	4554	Architekci Zachodniego K...	[obiekt_O]
2	4043	Decrypto	[obiekt_O]
2	196	Story Cubes	[obiekt_O]
2	4050	Azul (edycja polska)	[obiekt_O]
2	5496	Epoka Kamienia: W Piękn...	[obiekt_O]
2	2561	Takenoko: Chibis	[obiekt_O]
2	3572	Gejsze	[obiekt_O]
2	4590	Azul: Witraże Sintry	[obiekt_O]
2	4101	Sagrada (edycja polska)	[obiekt_O]
2	4789	Reef (edycja polska)	[obiekt_O]
2	263	Cyklady (edycja polska)	[obiekt_O]
2	4393	Gizmos	[obiekt_O]
2	5448	Rzuć na Tacę	[obiekt_O]
2	5443	Tapestry (edycja polska)	[obiekt_O]
1	784	Tzolkin: Kalendarz Majów	[obiekt_O]
1	4784	Fabryka Czekolady	[obiekt_O]
1	305	CATAN, OSADNICY Z CA...	[obiekt_O]
1	4117	INIS	[obiekt_O]
1	4555	Paladyni Zachodniego Kr...	[obiekt_O]
1	5486	Minerały (edycja polska) ...	[obiekt_O]
1	4729	Seikatsu	[obiekt_O]
1	4098	SteamRollers: Maszyny P...	[obiekt_O]

Fig. 14: The result of sorting the incoming steps of the graph G''$_m$

K06

Eventually, the result of the sorting was saved in the CSV file, omitting the m node with the identifier (idproduct) 4537. This file was a physical representation of the resultant vector $\mathbf{R_m}$.

Evaluation of the algorithm

In order to assess the effectiveness of the algorithm against other recommendation algorithms it is proposed to:

- implement the tested n-algorithms in a real e-commerce system;
- present the results of recommendations to clients based on a random algorithm with a 1/n probability (where n is the number of tested algorithms);
- register the actions taken by users as a collection $D = \{d_1, d_2, d_3, d_4, d_5, d_6, \dots\}$ in which the action in the n-th step would be represented by the vector
  $d_n =< d_n(1), d_n(2), d_n(3), d_n(4) >$
  where the vector positions mean:
  $d_n(1)$ – the recommendation algorithm used
  $d_n(2)$ – the object, for which the recommendation was made
  $d_n(3)$ – the resulting vector of the recommended objects;
  $d_n(4)$ – the object selected by the client

On the basis of the collected results, a measure of effectiveness for the tested algorithms should be calculated in the form of

$$\boldsymbol{E(a')} = \frac{\sum_{n=1}^{|D|}[d_n(1)=a' \; AND \; (4)\in d_n(3)]}{\sum_{n=1}^{|D|}[d_n(1)=a']} \qquad (5)$$

where:

a' – algorithm for which efficiency is calculated;

$[i]$ – Inverson's operator.

$$[i] = \begin{cases} 1 & gdy\ i\ jest\ prawdziwe \\ 0 & gdy\ i\ jest\ fałszywe \end{cases}$$

$d_n(i)$ – returns the value of vector d_n at the position $n = 1{\cdot}4$

Modifications and development

The base form of the Recommendations Session Algorithm can be developed in various directions, among other such as:

Adding a third layer of session nodes

It consists in adding consecutive layer of nodes (kernels and objects), creating the sub-graph $\mathbf{G''_m}$, adjacent to the nodes of the sub-graph $\mathbf{G''_m}$.

In addition, further algorithm steps such as:

- calculating the outgoing steps of all nodes;
- deletion of the step 1 nodes (sessions with one object);
- calculating the incoming steps of nodes;

In this way, the resulting vector of recommendation $\mathbf{R_m}$, for object **m,** shall have higher values of parameters indicating the position of the recommendation, i.e. the incoming steps, without the need to expand graph **G**.

The additional cost that will then be incurred will be linked to additional calculations.

Adding weights to edges

At the stage of preparation of the graph **G**, the weights' values should be related to the individual classes of the session's kernels. Then assign these weights to the edges coming out of them. As a result, the incoming steps of objects shall be the sum of the weights of the incoming edges.

Thanks to this procedure the property shall be given that some session classes, such as expert recommendations, are more valuable than random visits by an anonymous user.

Pathway of a user

In order to eliminate the algorithm's historic agnosticism, an auxiliary variable should be implemented in the form of the vector **M**, in which information about "viewed" objects shall be stored. The first element of this table would be the node **m**, which after a change would be called $\mathbf{m_1}$. For the subsequent elements of the table **M**, indexes would be the number of steps in which the user would "visit" subsequent nodes. The steps of the algorithm would then depend not on a single node **m**, but on the vector of nodes **M**.

Pathway of recommendation

As an impulse for the development of the next path of the algorithm, one may consider the willingness to receive as a result not only a proposal for the next step (recommendation vector $\mathbf{R_m}$), but the whole path of recommended products ending with a satisfactory state, for example, a purchase. For this purpose, the theory related to the Semi-markowski processes of the CD class (continuous over time, discrete in their states) can be used. In this case, the modifications would be much larger and, above all, would involve different conversion of the source data and construction of the Graph **G**.

Conclusions

The presented algorithm that is the member of the group of recommendation algorithms is relatively simple. The biggest difficulty is to prepare the input data for this algorithm in the form of Graph **G**. This difficulty is especially visible in the aspect of extraction and export of real data from functioning systems (mostly relational databases) to the graph-network structure (Graph **G**).

The algorithm, in its basic form, is historically agnostic in relation to users' actions. For the algorithm, the current history of user actions is irrelevant.

Furthermore, the characteristics of the users of the algorithm are irrelevant for the algorithm. This may be both a disadvantage (lack of personalization) and an advantage (meeting the GDPR requirements). The algorithm gives the same results in each call for various users. The only variables affecting the algorithm are the selected object for which a recommendation is made and the Graph **G**.

The practical usefulness of the results of the algorithm may give rise to discussions due to the very similar values of the parameter indicating the position of the recommendation, i.e. the incoming steps. However, this feature is very much dependent on the size of the Graph **G**, and precisely on the number of edges in the graph. The bigger is the number of the edges, the higher the degree of nodes in the graph.

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Conducting an IT Strategic Alignment for Moroccan SMES Using A Redefined Lightweight Framework Based on COBIT5

Yacoute ZENJALI
PhD student in Management Sciences, Faculty of Law, Economics and Social Sciences, Cadi Ayyad Marrakech, Morocco
Research Laboratory: (L-QUALIMAT)-GRTE-DROIT-SOCIÉTÉ,
zyacoutt@gmail.com

Najib BELKHAYAT
University Professor, Cadi Ayyad University
Marrakech, Morocco
Research Laboratory : L2IS–Laboratoire d'ingénierie informatique et systèmes
najib.belkhayat@uca.ac.ma

Abstract

IT strategic alignment is a subject that is constantly surfacing these last years. To keep up with a market in rapid evolution, companies must keep there IS (Information System) in perfect alignment with their strategic objectives. In this context, several frameworks have been developed to propose scientific approaches for IT strategic alignment and IS governance and management. Indeed, large renown companies all over the world based their IS management and governance processes on reputed frameworks in this domain such as COBIT5, ITIL, TOGAF, ZACKMAN.. Unfortunately, these frameworks are not adapted to SME (Small and Medium Enterprises) mainly in developing countries.
The main aim of this paper is to propose a novel approach that can be used by Moroccan SMEs to engage their IS strategic alignment. This approach is based on COBIT5 and relies on two phases distinguishing between external stakeholders' needs and internal ones. Our approach has been tested in a Moroccan SME and leaded to tangible results presented in this paper.

Keywords: IT Strategic alignment, COBIT 5, IS governance framework, Moroccan SMEs

Introduction : General Review

Seeking for digital solutions is becoming a major reality for companies nowadays; it enables to identify the efficiency of an operation via customer feedback and statistical data. Efficiency of processes is more and more depending on its digitalization level. Actually, information is considered as the most important asset of the company. This fact makes companies stakeholders aware of the importance of the quality and security of their information system. Thus, IS strategic alignment is becoming a hot topic in governance and management high standards.

Information system strategic alignment is a managerial practice that aims to better understand, create, and reinforce the IT convergence and synchronization with the purposes, trajectories, and rhythms of the enterprise.

In this context, two approaches are used. Downstream, a strategic alignment approach can start from the business strategy and deduce the involved processes and the corresponding IS which leads to an IS projects portfolio elaboration. Upstream, the alignment of the information system strategy with the business lines and the support functions can benefit from IT innovations impact on companies' strategies and governance approaches. Thus, the steering elements are determined by a combination of the strategy, governance, alignment and urbanization of the information system and IT innovations. (Lufman, 2000)

Strategic alignment relies heavily on the shared will and commitment of the stakeholders. The information system department (ISD) must be able to promote and implement the strategic alignment of the information system and

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seek for the support and the commitment of all the stakeholders. CIO (Chief IS Officer) can be helped by different frameworks developed as best practices for IS strategic alignment and IS governance and management. The question is: **Are these frameworks adapted to SME in developing countries?**
In this paper, we will present a review of few main IT management and governance frameworks. In a second part, we will present the problematic and related work of these frameworks for SMEs in developing countries. Finally, we will present our proposed approach and its application in a Moroccan SME case.

IS Strategic Alignment Frameworks

Several reasons justify the importance of IT Strategic Alignment, foremost the information system creates value and is a source of competitive advantage. It is also possible to demonstrate links between the information system uses and the company's performance.

The most profitable and important investment is to model the information system and justify its adequacy with the strategy development. The major challenge of strategic alignment thereby is to make the information system an asset at the service of the enterprise's strategy (Henderson, 1999).

Strategic alignment should be seen as an iterative process. It can occur at all levels and it should ideally be an approach affecting the entire enterprise and its information.

Several frameworks have treated this subject notably Zackman, TOGAF, Henderson and Venkatram Model, ITIL and more recently COBIT5. In the literature review, we will briefly present and discuss the effectiveness of these frameworks.

Strategic alignment implies a partnership approach. It must be a profitable relationship and cannot be carried out without the commitment of all the stakeholders. (Arthur A. Thompson, 2001) It requires an effort, to explain and use common tools. To communicate and work together, the various stakeholders must use methods and tools that are understandable by everyone but even thought, the strategic alignment is not synonymous of uniformity. (Morton, 2007)

Venkatraman and Henderson Model

Aligning the information system with the main enterprise goals and strategy is the major business challenge today. (Venktraman and Henderson, 1999)

IT Strategic alignment is the main pillar among five pillars of information systems governance which comprise: Value creation, resource management, risk management and performance measurement.
Venkatraman and Henderson (1999) define four interaction perspectives between IT and Business activities at the strategic level.

Henderson and Venkatraman present four forms of the IT Strategic Alignment:

a) Operational execution of the strategy

In this first type, the general management and the business departments are at the origin of the strategy.
In this case, the ISD adapts to the existing processes and its task comes down to trying to satisfy, in particular, the need for availability, speed, costs and deadlines.

b) Information System as a vector of technological transformation

The general management defines a new strategy that will trigger a redefinition of the ISD strategy. Information System Direction is called upon to implement an innovation expressed by the top management. Once the ISD strategy is redefined, it is necessary to think about the infrastructures and the technological processes necessary for its implementation. The ISD is evaluated in this case by its ability to provide a technological innovation adapted to enterprise needs and delivery deadlines.

c) Information System Direction as the origin of the strategy and source of competitive advantage

This type of IT strategic alignment is a mode that prevails in sectors dominated by technology such as the telecommunications sector and the automotive industry.
The strategy of the Information System Direction in this case defines the overall strategy of the firm. ISD is adopting major technological innovations to provide the enterprise with a competitive advantage. ISD is then required to translate new technology trends into products and services based on the business's strategy.

d) Information System as an Operational Service Provider

In this type, the focus is on the relationship between ISD and the business management. The IT service is developing infrastructure and processes to provide an excellent level of service. The enterprise's processes are then called to optimize performance (Service quality, user satisfaction…). The same enterprise may have to follow different modes of alignment depending on the activity and the desired positioning. (Morton S. a., 2008)
The most widespread situation for industrial SMEs is the first form 'operational execution of the strategy' because usually the strategy stems from top management but, regardless of its role, every IT activity, project, or service must play a part in creating business value.

Generally, we conduct a strategic alignment assessment, to identify improvement tracks by linking them to the business strategy, and define where the enterprise can benefit from IT to achieve its strategic objectives.

Several governance frameworks have dealt with this area, notably ITIL, and COBIT5. It is therefore essential to compare these frameworks in order to choose the framework that can be adapted to Moroccan SMEs.

Both ITIL and COBIT5 have value to offer to the firms. Picking the right controls in each of these frameworks or standards may help SMEs to increase their productivity and efficiency.

The Open Group Architecture framework (TOGAF)

Developed in the mid-1990s, TOGAF is one of the pioneers in this domain; it is today recognized as an industry standard. The framework seeks to develop cartography of the company's organization, so that the technical and business teams can share different views of a single element according to their skills and roles in the project. TOGAF recommends a joint work between IT and business from the organization analysis, to the information system architecture urbanization. It seeks to maintain the project alignment with the business objectives. (CIGREF, 2007) The collaboration between the technical and business teams allows an acceleration of new processes deployment. TOGAF brings together a set of best practices for businesses of all sizes, but does not allow the development of the implementation process. (TOGAF , 2013)

ITIL (Information Technology Infrastructure Library)

Developed from best practices related to IT management in organizations, ITIL aims to help organizations better understand the processes directly related to information system management.

ITIL takes a Lifecycle approach to provide best practice guidance for IT Service Management. There are five stages in the ITIL Service Lifecycle: Strategy, Design, Transition, Operation, and Continual Service Improvement. (ITIL V3, 2014)

ITIL approach is based on the process notion and is divided into six basic modules focused on IT management; User support; internal cost management and ISD service levels; software asset management; management of technological infrastructures; management of the development cycle of application software solutions; and security management. Yet ITIL is more focused on IT management and does separate clearly governance and management.

COBIT5 (Control Objectives for Information and Technology)

The framework was developed by the ISACA (Information System Audit and Control Association) in order to control and prevent IT risks that could harm the company financially.

Its four main IT domains are: IT planning and organization, acquisition and implementation, delivery and support, surveillance. COBIT provides an implementable set of controls over information technology and organizes them around a logical IT framework.

COBIT5 tried to integrate a single framework that deals with the alignment and the implementation phases simultaneously while separating management and governance.
The framework targets the top-level needs of an enterprise as depicted in the **Figure 1**, the framework seeks to improve overall business orientation via IT controls starting by stakeholders needs and business strategy definition.

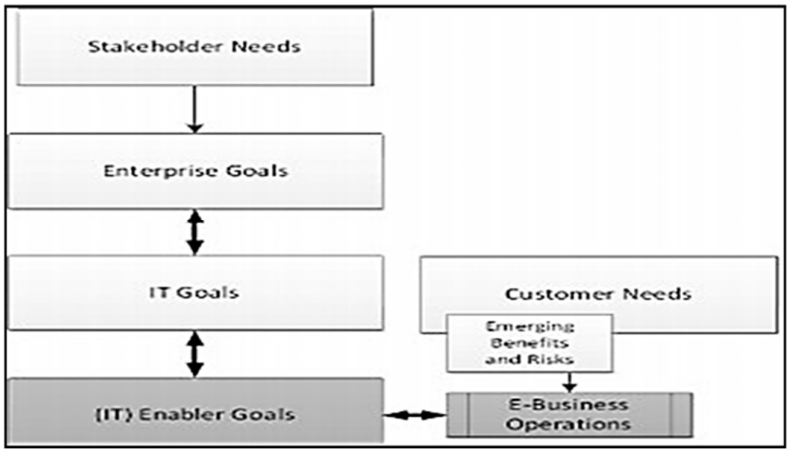

Figure 1 : Bottom-up requirements depiction COBIT5 (ISACA, 2012)

COBIT5 represents a process-oriented approach that encompasses 5 domains (planning, construction, execution and metrology) and 37 distinct processes that comprise 210 activities. It can be adapted to all business types, industry, technological environment, geographic location and entrepreneurial culture.

After our benchmark in this field, we can deduce that TOGAF and Venkatraman & Henderson models are classic frameworks that focus primarily on the enterprise architecture and do not consider the implementation process in a detailed way.

Concerning ITIL, the framework enables IT services to be managed across their lifecycle, whereas COBIT aids enterprise IT Governance to generate the maximum added value via IT investments.

COBIT5 provides a theoretical framework to define goals and objectives but also to measure the company's adaptation and alignment degree. The framework covers the business end to end, which is beneficial for Moroccan SMEs. Thus, in the second part, we will focus on COBIT5 as a global framework for IT strategic alignment. But is COBIT 5 as a global framework adapted for SMEs IS strategic alignment?

COBIT-was developed in 1994 (and published in 1996) by the Information Systems Audit and Control Association (ISACA). ISACA was created in 1967 and has been represented in France since 1982 by AFAI (French Association of Computer Audit and Consulting). It is a control framework that aims to help the management of risks (security, reliability, compliance) and investments. Cobit5 is a toolbox that achieves objectives by implementing effective governance and IT management. (Fabrice Garnier de Labareyre, Dominique Moisand, 2011).The fifth version Of COBIT focuses on the value that the governance of IT can bring to the Business particularly.

Understanding and managing the risks associated with ICT is an integral part of the COBIT5 theoretical framework. It seeks to mitigate risk in order to meet ICT governance needs and ensure the integration of communication and information systems.

COBIT5's principles and processes

COBIT5 framework is based on five principles of corporate governance and IT administration.

a) Meeting stakeholders needs

COBIT5 provides all the processes required to support the creation of added value through the use of ICT. This principle is related to the concept of strategic alignment. However, a constant challenge for each enterprise is how they will succeed in implementing their strategic alignment. COBIT5 offers organizations, the opportunity to begin by analyzing their business and IT strategic alignment by defining the main strategies. (ISACA, IS Audit and Assurance Guideline Assertions and best practices, 2012)

b) Covering the enterprise End-to-End

COBIT5 is able to perform all the functions and processes within a company. The framework does not focus only on the function of ICT but also considers information and technology as assets that should be treated like all other assets. A focus on covering the enterprise end-to-end requires a crucial shift in the minds of business and IT management; it implies a move from managing IT as a cost, to managing IT as an asset.

c) Applying a single integrated framework

Compared to previous versions, COBIT 5 includes a greater and more comprehensive definition of business management related to governance and ICT management

d) Enabling a holistic approach

The implementation of effective GEIT (Getting Started with Governance of Enterprise IT) requires a holistic approach that will take into account the interaction between processes and various structures notably: organizational structures, processes, culture and behavior, information, infrastructures, and people skills.

e) Separating governance and management

COBIT makes an important distinction between governance and management. This separation remains essential for the responsibilities breakdown in SMEs. COBIT5 makes a difference between ICT governance and ICT process management, as they both include different types of activities.

Governance ensures that the needs, conditions and options of interested parties are assessed to determine objectives that can be achieved by the business; to set an orientation in the context of the priorities and decisions; and to control performance and compliance. (COBIT5, 2012)

It ensures that stakeholders needs, conditions and options are ***evaluated*** to determine balanced, agreed-on enterprise objectives to be achieved, setting ***direction*** through prioritization and decision making, and ***monitoring*** performance and compliance against agreed-on direction and objectives. (EDM) (ISACA, 2012)

Management covers the planning, design, production and management activities in line with the management set up by the governance team in order to achieve the company's objectives.

Although COBIT5 is a global framework that guides the deployment process, the question that really arises is: can this framework be applied to Moroccan SMEs?

To meet this question, we will start by defining the Moroccan SME, and try to decipher the possibility of conducting a strategic alignment based on COBIT5.

COBIT5 Framework for Moroccan SMEs

Moroccan SMEs (Small and medium sized enterprises) play an essential economic and social role. Before 2005, most of the organization based the definition of SMEs on the number of employees. Actually, the workforce is considered as the closest variable to assess the contribution of the SMEs to GDP of the country. Nevertheless, this criterion does not determine an official definition of SME. For this reason, a second quantitative criterion is retained in Morocco which is the turnover. (OECD, 2005) In what follows we will state the limits and problems of Moroccan SMEs, as well as the related works in the case of COBIT5 application within SMEs in wider sense, since its application remains very minimal in Moroccan SMEs.

SME cases: organization and management specificities

Although COBIT5 is a general framework and includes all the necessary aspects to conduct strategic alignment, the framework still remains very large for Moroccan SMEs, because corporate governance (CG) may sound worrying to some small and medium sized enterprises (SMEs), where the owner generally assumes the role of manager as well.

In SMEs, there is often an absence or a lack of formal strategy documents. Another problem that usually comes up in SMEs is the absence of middle management with the ambition to step forward and assume responsibility for communication with employees. In a small and medium-sized enterprise, there is generally financial and human resources lacking which drive the owner to play the role of manager and to be directly connected to the executors, and it usually creates communication problems within the company. And last but certainly not least the paradox, 'if it works, we do not seek to improve or modify the existing' and if it does not work, investments are stopped and SMEs fear to face financial issues due to changes.

The question then is: How can we adapt an existing framework to increase its adequacy for SMEs in developing countries?

Related work: CoBit5 for SME

Erik Guldentops 2012 addressed the case of IT governance in SMEs based on COBIT5 framework in a wide sense. (Guldentops, 2012) His main contributions remain very theoretical, the IS researcher argues that COBIT5 offers an overview of the overall IS function, by linking it to audit and governance. Thereby, there are some drawbacks when focusing on SMEs.

When SMEs adopt IT, they will be confronted to the same challenges as IT alignment, IT failures, IT business orientation, and basing on COBIT5 to IT Governance.

As an IT practitioner E.Guldentops relies on the fact that SMEs have limited resources and cannot be compared to large organizations. Within SMEs, the CEO often assumes the role of owner and manager. But even with all these weak points, the author still believes that there is no framework that encompasses IT, information, and their functions in organizations, better than COBIT, even for SMEs.

If we analyze (Guldentops, 2012) the author's hypothesis, the fifth principle of COBIT5 and which in our opinion remains the most important in driving an IT strategic alignment 'Separating governance from management' is not often applied in SMEs where usually the CEO is the owner. Thus, although COBIT5 is an performing framework in terms of strategic alignment assessment, and it manages alignment and implementation phases while covering the end-to-end enterprise based on a single framework. COBIT5 remains very large for an SME, and difficult to adapt to an environment where the resources are very resistant to change and in a country where the application of COBIT is not widespread yet.

COBIT5 relies in particular, on a very functional approach to the organization. In this framework, the Information System operates in parallel with the actual organization - and in some way disconnected from it - because it is based on the nominal arrangement of functions.

In this context, the alignment of the information system consists on reconciling, often on an ad hoc basis, the reality of operations with an idealized vision of the organization (ISACA, 2012)

IS strategic alignment for Moroccan SME conceptual framework (ISSA- Moroccan SME): Towards a new approach based on Cobit5

Moroccan SMEs are characterized by some unique specificities as defined in the previous chapter which make COBIT5 difficult to apply. To meet SMEs limits and weak points, we suggest a new approach based on COBIT5 as an IT governance framework.

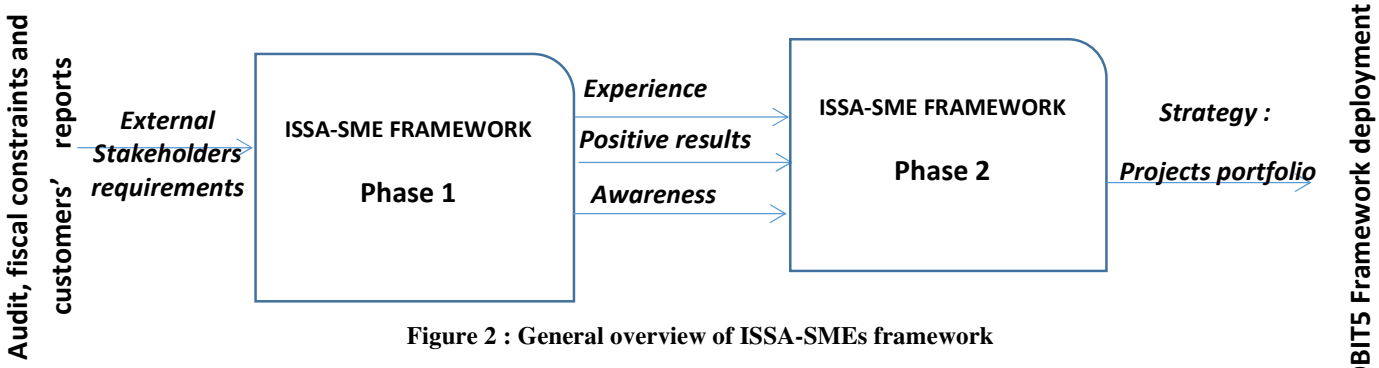

Figure 2 : General overview of ISSA-SMEs framework

ISSA Framework can be described in two phases as depicted in **Figure 2**: the first one represents a prototype driven by the external stakeholders needs. The positive results of the first phase notably employees awareness and motivation lead to the second phase, which consists of using the basic framework which is COBIT5 by considering the internal and external stakeholders needs and business strategies as drivers. The second phase depends largely on the first phase success within Moroccan SMEs.

Stating the IS projects portfolio based on Cobit5 focusing on financial risks

Table 1: Stakeholders needs priorities assessment according to Moroccan SMEs Leaders

	Stakeholders needs	
Perception of the priority degree of stakeholders needs by Moroccan SMEs leaders :	External stakeholders:	Internal stakeholders:
	HIGH	MEDIUM
Trigging event:	Customers, communities, suppliers requirements (Audit, fiscal control...) Government laws and policies	Business and support functions needs Business strategy and objectives

In Moroccan SMEs, generally the strategy is not predefined. The company is often obliged to respond to its external environment requirements firstly: fiscal audit or simple audits imposed by its external stakeholders (Customers, parent company, banks…)

The deployment of ISSA-Moroccan SME framework can be depicted as follows:

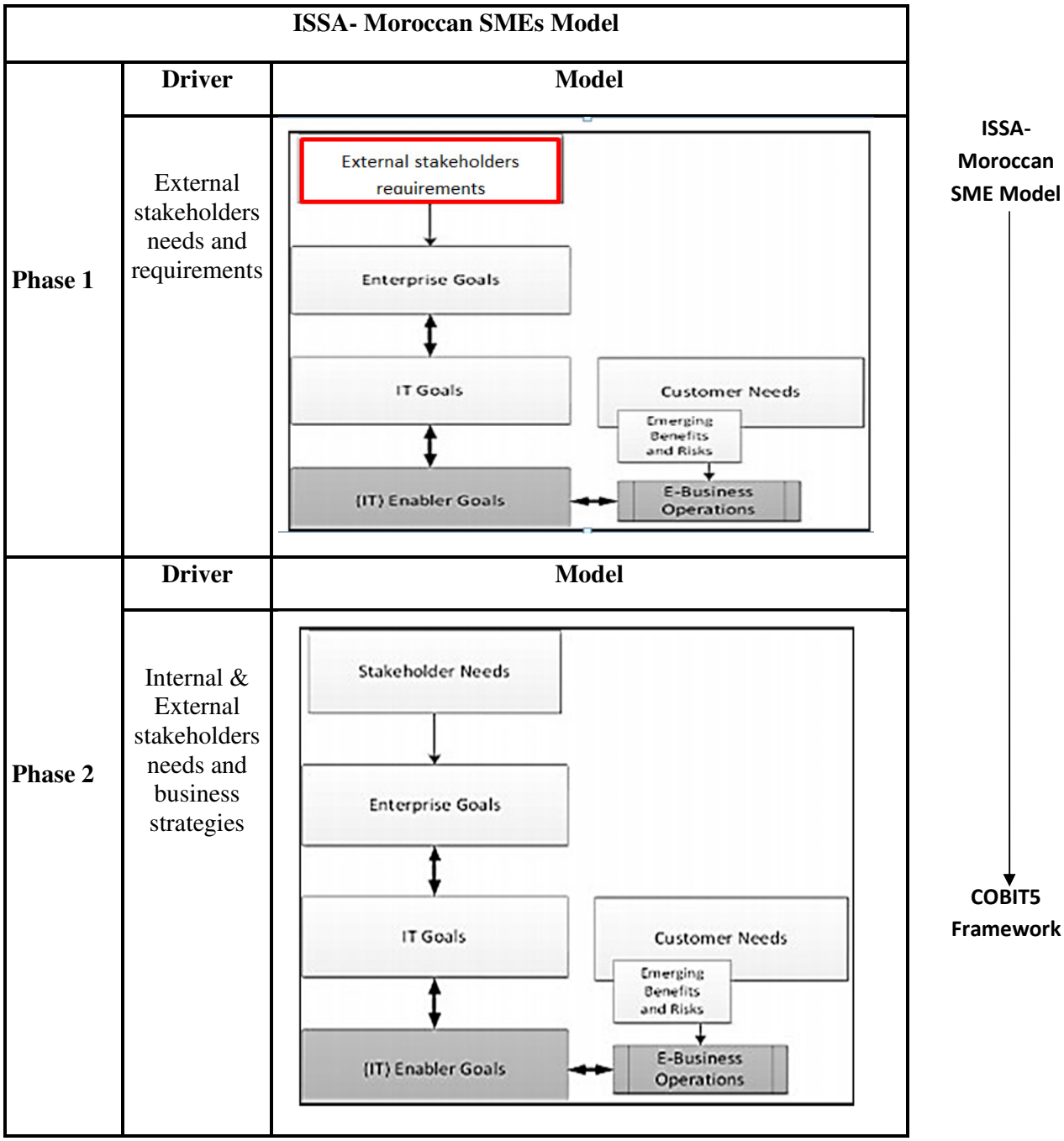

Figure 3 : ISSA-Moroccan SME framework

To better understand ISSA-Moroccan SME framework, we will detail each predefined phase in the subsequent.

Overview of ISSA framework deployment

II.2.1. *The first phase of ISSA-Moroccan SME framework*

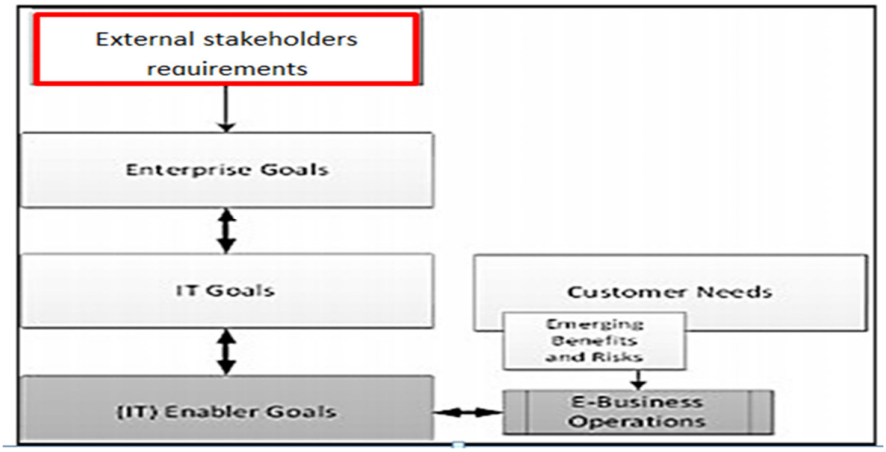

Figure 4 : First phase of ISSA-Moroccan SME framework

The driver of strategic alignment is no longer the business strategy but the external stakeholders' requirements in the first phase of ISSA-Moroccan SME Framework as depicted in **Figure 4**.

Even in SMEs, IT function must always be in perfect alignment with the needs of the company which in ISSA framework are the external stakeholders' needs. To meet external environment requirements implicitly implies a change in the strategies and objectives of the business and IT function; usually these changes affect the business actual procedures and processes. The transition to the ISSA-Moroccan SME second phase depends on the first phase success. This will make SME leaders react and be conscious of strategies formality importance and will drive them to consider both internal and external stakeholders needs, as well as the separation between governance and management.

II.2.2. The second phase of ISSA-Moroccan SME framework

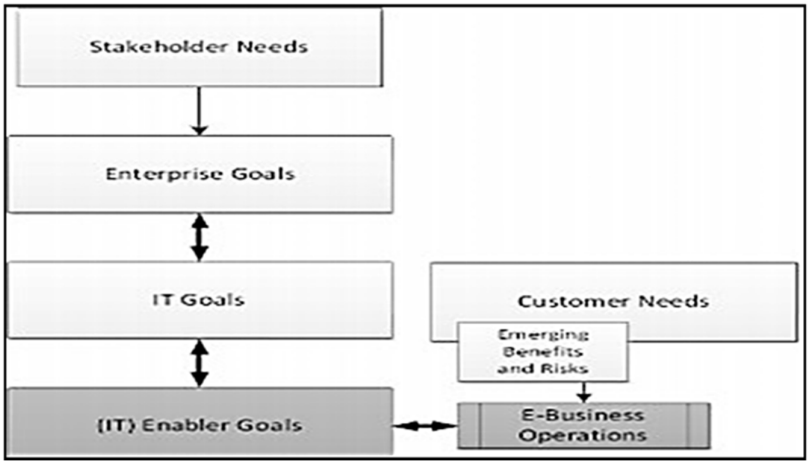

Figure 5 : Second phase of ISSA-Moroccan SME framework

Once the first phase is well successful; Moroccan SMEs leaders will see results that highlight the importance of strategic alignment within their organization, they will be more conscious of the business strategies definition importance and will thereby consider internal and external stakeholders needs for optimal processes that generate concrete results.
Thus, in this second phase, we will use the basic framework which is COBIT5 by relying on its first principle 'Meeting stakeholders needs' in wider sense as depicted in **Figure 5**.

ISSA-SME Application

II.3. Context

To better understand IT strategic alignment process; we decided to deal with the case of a Moroccan industrial SME based on ISSA framework by introducing the human factor and thereby change management in this process.
Information system strategic alignment involves two conditions, firstly understanding the company's strategy by the ISD. And secondly taking into consideration IT constraints and opportunities.
As advanced, generally in Moroccan SMEs, there is no formal strategy. So instead of starting by the business strategy identification, we will start by determining the external stakeholders requirements. The implementation of ISSA-Moroccan SME framework will be done in two phases.

II.4. ISSA-Moroccan SME Framework application

The second COBIT5 principle 'Covering the enterprise End-to-End' allows us to focus on all the areas affected by the business external environment which represents the driver of ISSA-SMEs framework**.**

The first phase of ISSA-Moroccan SME Framework

The first phase of ISSA-Moroccan SME framework aims to firstly consider external stakeholders requirements. In this context, asset preservation is the main objective of the company. It was a recommendation among others reported by an auditors group and a part of the strategy to improve Moroccan units to be in perfect alignment with the parent company.

Preserve the real estate of the company	- Preserve the know-how - Preserve the brand identity - Preserve the company's goodwill	- Manage security and continuity - Manage confidentiality / Right of access - Manage risks	Aligned
	- Preserve the company's assets	-	Not aligned

Figure 6 : First phase of ISSA-Moroccan SME implementation

For assets preservation, our project consisted mainly on two axes. Firstly: an asset management procedures manual implementation, and secondly: setting up asset management software. A project that remains crucial for an industrial company which holds several assets and seeks to expand its portfolio.

The main outputs of this phase are stakeholders' awareness of the strategic alignment importance, as well the experience and motivation generated by the positive results. All these factors led the company to define its strategic objectives and have a clear vision of its future projects. Downstream, a strategic alignment approach can start from the business strategy and deduce the involved processes and the corresponding IS which leads to build an IS projects portfolio.

The second phase of ISSA-Moroccan SME framework

Once the project has been implemented, SME leaders have noticed positive results that have improved the business profitability by reducing the assets costs. And thereby leaders and employees have recognized the importance of an IS strategic alignment. This led them to formalize their strategies and implement the remaining portfolio projects.

The industrial Moroccan SME has been able to change its basic structure, its functioning and employees habits in order to be in strategic alignment with its strategy which henceforth consider both internal and external stakeholders needs which is the first basic driver in COBIT5 framework. Our change management plan was well successful, as the first phase made employees more conscious of change management and continuous improvement importance. This awareness guides them today to be in strategic alignment internally and with their external environment constantly.

Firms should align their IS with their business strategy and their external environment requirements. In our case, before embarking in the strategic alignment analysis, we were able to identify some improvements tracks without

relying on a specific IT Strategic alignment framework. But with a well-founded alignment analysis we were able to make a project portfolio for the enterprise and above all a prioritization assessment for our potential projects. The Bottom-up approach while using ISSA-SMEs framework allowed us to cover the whole company but also to be more than just opportunistic, and try to bring the most concrete added value to our perimeter by focusing on the highest priority projects.

Conclusion

In Morocco, leaders start to realize the importance of strategic alignment. Whatever the enterprise's size or turnover, it must set goals in alignment with its strategy to ensure its market positioning. Good practices, like those presented in COBIT 5, must be understood and applied properly. Whether it is applied for a small or large company, we can always adjust COBIT 5 to the company's external drivers and needs for better IT governance and management.

Before starting any process, it is crucial to use an approach. In our case, despite the existence of several frameworks dealing with our subject, Moroccan SMEs specificities have meant that only COBIT5 can be applied, under the condition of going through a pre-phase that consists on focusing firstly on the external stakeholders needs. This first phase will generate the interest of giving more importance to a strategic alignment with the internal company needs. Moroccan SMEs would need a flexible organization with stronger cooperation from employees, which cannot be done in an environment of insecurity. Change management is a major challenge for Moroccan SMEs; but this field of information systems is probably no more exceptional or problematic than any other perimeter. Aligning IT is no longer a choice but an obligation for all the SMEs that want to keep their positioning in a highly competitive market and avoid unnecessary expenses.

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Current Use of Uber Brand Marketing Strategy

David Vrtana[1,a,] and Jana Majerova[2,b,]

[1,2,]University of Zilina, Faculty of Operation and Economics of Transport and Communication Department of Economics, Univerzitna 8215/1, 010 26 Zilina, Slovak Republic

[a]david.vrtana@fpedas.uniza.sk, [b]jana.kliestikova@fpedas.uniza.sk,

**Corresponding author*

Abstract

There are various factors behind the success of global brands. These factors may include brand strength, competitive advantage, customer loyalty or the proper application of your marketing strategy. In many cases, it must respect the development of current trends. Today's world is characterized by speed, which is largely reflected in the marketing field. People are increasingly demanding on the products and services offered. Their demands on the quality of transport, simplicity, but also on the perception of price differentiation are increasing. The aim of the article is to find out the principles of success of the strategy applied in the company on the basis of relevant information from the given issue. In this article, we focus on the successful use of the marketing strategy of the UBER brand, which was able to change the quality of low-cost travel through a mobile application. We divided the article into three basic parts. In the first part, we analyze the description of the situation that led to the emergence of the service, communication and customer strategy of the brand. We use analysis and synthesis in which we identify different views of authors from various studies focused on the success of marketing strategy. Based on the obtained data, we describe the differentiation strategy and its successful use.

Keywords: UBER, Marketing Strategy, Diferentiation Strategy, Marketing Communication

Introduction

The marketing strategy is defined by a number of authors as a whole, which is focused on different areas. El-Ansary (2006, pp. 266-293) argues that in its formulation it is necessary to understand customer behavior, analyze the market in detail, segment it, focus on those segments that have the potential for high and regular demand, then transform their requirements for technical specification of the product and differentiate it so that the market is covered as much as possible. The above definition implies a comprehensive view of the author on marketing strategy. Another view of the perception of marketing strategy is provided by Krizanova et. al. The authors claim that the CRM area (2018, pp. 2567) is a key area in shaping a company's marketing strategy. According to the authors, it contains key activities aimed at acquiring and maintaining the value of products and services provided to customers. In this context, the authors Poliak et al. Stated that the distribution policy should be an essential part of the applied marketing strategy. According to the authors, a suitably chosen form of distribution route can contribute to the overall satisfaction of the customer with the product or service (2014, pp. 153 - 161). The authors' views on the perception of marketing strategy are different. None of the authors emphasize marketing communication. The importance of marketing communication in marketing strategy is emphasized by Navas and Lu. The authors argue that the right marketing strategy should also take into account the marketing communication of the product or service (2020, pp. 839 - 851). Based on the above, it is possible to express that when creating a marketing strategy of a company, it is necessary to focus on various forms of marketing communication and thus get the customer's awareness. Zauskova and Reznickova argue that with a properly applied and enforceable marketing strategy, a brand can create strong competitive stability in a global market environment. (2019, pp. 133-150) By creating a stable competitive advantage, the company can ensure higher customer loyalty and thus maximize profits.

There are already several models in place to create and properly apply a marketing strategy. One of them is Porter's Generic Strategies model, which compares the benefits provided to customers and the size of the analyzed market. When creating this model, it is necessary to focus on managing customer segmentation. According to Gajanova et al. it is necessary to take into account the psychographic factors that determine the correct definition of the customer segment. (2019, pp. 65-84). Krylov (2019, pp. 12-25) also agrees with this opinion. After the correct definition of the customer, it is possible to identify individual strategies in the models, which companies can use in order to strengthen

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market presence. In the second part of the article, we also describe the selected strategy that is currently used by the UBER brand.

Our research is focused on the analysis of the current situation of the UBER brand in the market environment. Using Porter's generic model, we identify those areas that will identify the current UBER brand interface in relation to updating and creating a new marketing strategy.

The initial situation of UBER brand

In development, the process of providing a service in the classic taxi service was lengthy and less comfortable. To call a taxi, it was necessary to go to the street and wave at it, or call the dispatching center and order it. The disadvantage was the long wait, the impossibility of tracking his current location, tracking whether the taxi will arrive on time or not. The disadvantage was also the price, which was unknown in advance and its amount depended on various factors (eg the amount of fuel consuption, the length of the route, etc.). We are currently seeing a trend of evolving technologies that many brands must respect. One of them is UBER. The brand was established in 2009 in San Francisco in the form of a startup with the priority goal of differentiating itself from the classic taxi service. At the time of the brand's creation, there was no direct competition on the market with the possibility of ordering a taxi via the online application. At the beginning of the brand, the main activity was to provide luxury car transport.

The current position of the UBER brand is strong worldwide and its services cover more than 120 countries around the world.1 From the above, it can be argued that it is a stable brand with a global presence. At present, the company's activity is to provide customers with a simple and transparent form of transport from point A to point B. The added value is the use of an online platform, on which the marketing concept is based. The condition for using the application is registration. Communication with the customer is also built on the online platform. This takes place through a mobile application available for all existing platforms. The user has an online overview of where the car ordered by him is located and at what time and from where it will pick it up. If the customer cannot determine his exact, just use the GPS integrated in the mobile and the Uber service responds to the customer's location via the application by sending a driver to the GPS location.2

Difference from the classic taxi service

The difference compared to the classic taxi service is in all elements of the application. The basic difference is the price differentiation and methods of payment, it is also the method of communication between the carrier and the customer. In addition to the above, the differentiation lies in the safety and quality of the service provided and also in its variability.

Also agrees with the opinion at Hollowell. (2019, p. 13-18)

Uber offers several service options according to the type of car, number of seats, luxury and affordability to cover the requirements and preferences of the customer segment as much as possible. These are Uber X, TAXI, BLACK, SUV and LUX. Uber X and Uber TAXI is designed for people who are looking for a cost-effective solution, Uber BLACK is designed for those who like to travel in a black car (sedan) and want to have their personal driver, Uber SUV for people who need more space and Uber LUX for those who need luxury during the move from point A to point B. The variability of the services provided brings customers significant added value in the form of a travel experience. For customer segments, we have defined that the priority of UBERU is to provide value. This can be seen in the variability of services. However, the disadvantage of variability is its geographical availability because the variability of the service depends on registered drivers.3

Using the service from the UBER brand is significantly more affordable than when using the services of the classic taxi service. Setting the price below the price level of the taxi service is caused by the service settings. In contrast, Uber does not have costs associated with the classic taxi service (own taxis, their depreciation, costs for the purchase and installation of taximeters, etc.), so it can afford to set a lower tariff for transportation. This tariff is specific to each region. Customers also have the opportunity to calculate the price of the route they have chosen in the application environment. In the case of several passengers who have the same direction, these passengers do not have to deal with the issue of the distribution of fares or owe each other. All they have to do is choose the fare splitting option in the Uber application and the same amount will be automatically withdrawn from each passenger's account

[1] UBER company profile: https://www.uber.com/global/en/cities/

[2] Marketing of UBER. Generation Y: https://www.podnikajte.sk/zahranicne-pribehy/uber-taxi-generacie-y

[3] Difference between an UberX, Uber Black and Uber Taxi: https://www.quora.com/What-is-the-difference-between-an-UberX-Uber-Black-and-Uber-Taxi

Another difference compared to the classic taxi service is the integration of regular drivers. Uber drivers differ significantly from the competition in their specific specifications. This means that they are ordinary drivers on the road who are unemployed or interested in earning a living in addition to their work. In order for drivers to be able to carry out this activity, they need to register with the company via the website, download the application and can start providing their services for which they are paid (80% of the transport price, 20% profit for Uber). The basic conditions that drivers must meet include a minimum age of 21 years, a driver's license valid in the country or verified in a foreign country in which he wants to provide the service, integrity, active driving for at least 3 years. Compared to a taxi service, they do not have to have a license for taxi drivers if they provide the service only occasionally.

Uber cares about the safety of its customers and employees, so it builds the Global Safety & Security Team, a team that helps drivers integrated into the service and customers move safely around the city. The team includes, for example, former Boston Police Commissioner and former vice president of trust and security on eBay.[4]

Only drivers who prove their integrity on the basis of an extract from the criminal record, as well as an extract from the driver's registration card and information on the technical condition of the vehicle may register for the Uber service. The vehicle must not be older than 10 years and must pass a technical and emission inspection. Uber also relies on feedback from the driver as well as the passenger, thus trying to ensure the quality of service. Rides are also monitored and stored in the system, so in the event of customer or driver dissatisfaction, Uber can respond quickly to the problem.

Customer Segmentation

In the previous chapter, we described the deifferentiation of the brand from the classic taxi service. In the individual difference points, we were able to identify value for the customer. Therefore, value creation through service is an important part of UBERU's strategy. The customer does not have to wait and be unsure which car and which driver will arrive when his pick-up is at the given address, the customer will receive a text message that the pick-up is in place. Value is also provided for each customer individually. In connection with the expansion of the company, the customer segment of the brand was gradually formed. At the beginning of the brand's development, a typical customer was a rich young man who needed to get from point A to point B in a luxury car and are willing to pay extra for transportation. Currently, the target segment of the brand is a person who does not have their own car. A typical customer also has his own behavioral characteristics. These characteristics can be, for example: he likes to travel in style, he requires VIP style, I want to be more socialized, I want a luxurious but cost-effective and safe ride and so on. In many cities, the brand (UberX) offers its customers 30% better price rates than the classic taxi service. The key factor in customer satisfaction is value. This is provided in the form of a holistic approach by providing an alternative transaction flow. The basic model applied by the brand to customers consists of the following steps: search (exclusive ride - VIP, which is cost-effective), book (availability on request from customers), payment (applied non-cash transaction - card, internet banking, mobile phone or watch), control (feedback and satisfaction with the driver and traffic). [5]

Based on the key steps, it can be argued that the current value that the brand provides to all customer segments is reliability. Another key factor proving the success of the brand is to meet the customer's request within 10 minutes of placing the order. In this context, it is also possible to talk about an effectively applied logistics strategy of the brand. The authors' statements at the beginning of the article declared the distribution policy as an integral part of the marketing strategy. Based on the analysis of the UBER brand, it can be argued that, in addition to distribution, the brand's logistics operations related to the service provided are also important.

Competitive position and marketing communication of the brand

In addition to the customer segment, it is important to perceive the competitive position of the brand. At the beginning of the chapter, we claimed that in the beginning, the brand had no competition. It can be argued that it had a monopoly global position. However, the brand currently has a number of global competitors. There are various services on the market that offer the main product of passenger transport as well as Uber. The difference in competition can be perceived in who performs this service. BlaBlaCar, for example, can be seen as competition. Like UBER, BlaBlaCar is built on an online platform, but the difference can be seen in the connection of ordinary drivers with free space in the car. Other competitors include brands such as Easy Taxi, Gett, Flywheel, Software, Hailo, LeCab, whose primary

[4] Announcing Uber's U.S. Safety Advisory Board: https://www.uber.com/newsroom/safetyadvisoryboard

[5] Uber Business Model Canvas: Know what led to Uber's success: https://jungleworks.com/uber-business-model-canvas-what-led-to-uber-success/

goal is to simplify the process of calling, tracking and paying for a taxi, limousine or licensed driver. Other online platforms differ in their geographical location or the possibilities they offer to their customers (for example, Ola, Taxi Mobility, Lyft, Haxi, Taxicode, Sidecar, Bolt and others). Another competitor is ZoomCar, which differs from Uber in that the customer can rent the entire car for a certain period of time. The same principle is to work on an online platform. The basic difference between the UBER brand and competing brands is the price for transport and their geographical effect. When defining the resulting strategy, it is necessary to take into account all these findings, as the resulting strategy is also based on price differentiation.

When formulating the brand's marketing strategy, it is necessary to take into account the use of marketing communication. The UBER brand chooses an unconventional way of communication, which tries to attract customers. One of the non-traditional marketing events was "#OMGUBERICECREAM", the aim of which was to include "request ice cream delivery here" options in the online application and subsequent ordering of ice cream. Customers could thus order ice cream online, where they could set the place where the ice cream car should be displayed and then select the option of ice cream delivery right here. In a similar way, customers could order Christmas trees or roses for Valentine's Day from the comfort of home. The campaign was designed for the US market. A similar marketing event was the "#UberKITTENS" event, in which customers could adopt a kitten brought to them by the driver.[6] In addition to non-traditional events and promotions, the brand also cooperates with well-known organizations. One of them is Red, who has been helping to fight AIDS for a long time. In this marketing event, UBER provided customers with the opportunity to support the organization just after the end of the ride in the amount of $ 5. A marketing campaign to support homeless war veterans took place in a similar way. The brand does not use traditional forms of marketing communication. Instead of mass communication in the form of billboards or the use of advertising space on television or in the print media, it uses another non-traditional form. The brand strives to combine the value provided to customers in the form of its service with a marketing communication tool. When entering a new market, it offers customers the opportunity to try the online service for free. Here, the effect is combined for free with the communication tool word of mouth. In this way, the brand will save money on mass communication and, in the form of an effect, will allow customers to use the services for free. Tanwar claims that, according to the brand's experience, it is an average cost advantage of 48%. (2013, pp. 11-17) The mentioned event is limited by the number of days and rides when customers can use the service free of charge. The traditional and cost-effective tool is the use of communication with customers in the form of social networks. Numbers are also a success of this form of communication. The brand has 22 million fans on the social network Facebook, it has 1 million fans on the social network Twitter and 1.4 million fans on Instagram.

Strategic Brand Management

At the beginning of the chapter, we provided a theoretical view of the perception of marketing strategy by various authors. The authors identified in several factors that need to be followed in formulating and implementing the strategy. We described these in the first chapter of the article. Based on the theoretical evaluation and the initial situation of the UBER brand, we came to the conclusion that the principle of operation of the company is based on the strategy of differentiation. According to the author Tanwar, the differentiation strategy is focused on the uniqueness of a product or service that offers exceptional features for customers. (2013, pp. 11-17) With the opinion of the author, it is possible to identify the UBER brand, whose main idea is based on the assumption of a unique service for the general public.

The long-term goal that UBER wants to achieve is to create value-added potential for the customer and provide him with such benefits that they do not need to own a car. The aim is to achieve cost-effectiveness, practicality in using the service and better comfort than when using your own car. In this context, it is possible to take into account the environmental aspect, which can lead to an overall reduction in emissions, but also the total number of cars on the streets. The company strives to achieve these goals through various activities in areas that point to the main differences from the classic taxi service. Focusing on these areas ensures and strengthens the brand's competitive advantage.

In the following subchapters, we identify individual areas that are a key factor in formulating the resulting brand strategy.

Factors proving success

In the first chapter, we identified areas through which the brand provides added value to the customer, we identified areas of variability compared to the classic taxi service and we defined the competitive position. In order to strengthen

[6] Marketing campaigns of UBER: http://newsroom.uber.com/2012/07/omgubericecream/

the importance of our chosen strategy for the UBER brand, it is necessary to identify the facts proving the success of this brand.

As already mentioned in the introduction to the article, UBER in 2015 developed into the position of the most valuable "startup" in the world. This year, the company's value reached approximately $ 51 billion. In 2018, the company became one of the second most popular companies in the world.

Proof of success is the ever-growing trend of UBERU users. In Year 207 there were about 3 million of them, in 2018 this number rose to 5.21 million, in 2019 it rose to 6.90 million. Compared to 2017 - 2019, in the first quarter the number of users recorded 5% more than 1 Q from previous years. Similar to the number of users, the number of market shares is evolving in 2018, reaching a market share of 71%, in 2019 it was 70%. The highest market share was achieved in the month of January in 2016, when the brand's market share reached 87%. Despite various factors (increased competition, new customer requirements), the brand's market share is still high at present.

The company's success is also due to annual revenues, which reached USD 19 billion in 2016 and have been growing steadily since that year. In 2017, businesses had revenue of $ 34 billion, in 2018 it was $ 50 billion, and in 2019, revenue was $ 65 billion. Similar to the exponential growth of annual revenues, it is also possible to record a quarterly increase in brand revenues. The company's net income of $ 0.4 billion since 2014 was $ 14.1 billion in 2019, an increase of approximately 3,525%.

Proof of success is also the confidence of investors willing to invest considerable funds in Uber. Uber uses the raised capital to expand into new cities and improve its services. Investors include, for example, the Chinese company Baidu, which invested $ 600 million in Uber in December 2014, and Google Ventures, which invested approximately $ 258 million. Investments continue today and are also showing a growing trend.

The success of Uber is also evidenced by the number of new companies that are trying to apply its successful strategy to their industries and thus achieve similar business success. Examples include applications such as Swifto (Uber for dog walking), HomeHero (Uber for nursing seniors), Saucey (Uber for alcohol) or Eaze (Uber for medical marijuana).

These numbers and facts prove the success of the company and on this basis it is possible to confirm the identified differentiation strategy. Despite the diversity of services offered to the general public, the brand is globally stable, competitive with a high market share.

Discusion

In the second chapter, we identified the currently used UBER brand strategy. We argued that UBER uses a differentiation strategy, where it tries to adapt individual services to the requirements and needs of the general public. We are currently witnessing the use of the same strategy in several cases. An interesting example is Apple, which has changed the world of computing. It managed to differentiate itself from the competition through design-different products, which also contained high added value for the customer. The company has created a certain type of culture that provides them with loyal customers and constantly returning customers with strong competitive stability in a global market environment. At present, the company's products also represent a certain social-status symbol, which is why there is such great interest in them. The importance of the status symbol is also emphasized by Nadanyiova, who argues that in order to be competitive, it is necessary to differentiate the product. However, it is important to then analyze the process of perception by the customer. (2017, pp. 90-94) Another example for comparison can be the Booking service, where the customer can book accommodation from more than 800,000 hotels worldwide via the website. The service allows customers to search for hotels in one place, compare them, find out their occupancy or prices, thus making their work easier and saving time. Again, we can say that it is a matter of creating a certain customer culture that uses this platform.

We are of the opinion that the differentiation strategy will be applied more and more often in various areas, depending on the development of current trends. At a time when the customer can choose from a large number of products with similar properties, the task, respectively. the goal for each company is to bring a specific product that is partially different from the competition. According to Hollowell et al. such an approach can lead to building customer loyalty and loyalty to the brand (2019, pp. 13-18). The company can thus bring a product with added value for the customer (eg vegan products) or a product with a different use. However, the use of this form will become more and more demanding because the strategy of differentiation is not only about an innovative product, but also about the high loyalty of customers, who will become more and more demanding. Gajanova et al. (2020, pp. 1 - 18). With increasing customer loyalty, we can also see the growing strength of the brand. The connection is expressed by Chankoson and Thabhiranrak, who argue that the stability and strengthening of the brand is related to meeting customer requirements, which may ultimately reflect their level of loyalty (2019, pp. 129-138). Nadanyiova et. Also agrees with this opinion. al, which also considers the satisfaction of customer requirements to be an important factor. (2020, pp. 90 - 108) In view of these facts, its use in some already oversaturated market segments will be questionable. We see great potential in the use of a differentiation strategy in services, where individual providers can take advantage of the expansion of

information technology or cashless payments. It can also lead to the transfer of a certain part of the business to entities that are dedicated to the area and can do it more efficiently.

As the differentiation strategy is that the product differs from other competing products and is perceived as exceptional, there is a risk that the product will not be captured in the target market. Gregova et al. (2020, pp. 150-160). The risk may arise due to the excessive conservatism of the target market, which does not need a product that is different. To be successful in the market, a company must adapt its products to evolving market conditions. Insufficient innovation policies can result in the loss of customers to the detriment of competitors. Tuffnell et al. Also report on this factor, who consider it to be significant (2019, pp. 58-63). On the other hand, exaggerated innovation will disrupt the core of the product, leading to an outflow of customers.

In connection with the identification of the strategy, there are also threats that may adversely affect the company in the future. One of them is the pressure from investors. The company obtains funds for its growth from its investors. This form of financing allows start-ups to significantly accelerate their growth rate. Investors expect the invested funds to be valued as soon as possible and can therefore intervene intensively in the management of the company. They may also exert undue pressure on business management. However, the pressure to maximize profits can also have the opposite effect and put a start-up in trouble.

Conclusion

In the article, we analyzed the initial situation of a successful and stable UBER brand. Based on the analysis, we identified the main elements of the strategy, which are based on the differentiation from the classic taxi service and provided to the general public. These elements included price differentiation and method of payment, the method of providing the service and communication, services, the integration of ordinary drivers into the service and the safety and quality of the service provided. Elements focused on differentiation from the competition are characteristic of the differentiation strategy, which we theoretically discussed in the introductory part of the article. The contribution of our article was to find out what is the basis of the company's success with the use of the current marketing strategy. We found that the brand is based on the originality of a startup applied to the market at the right time, in the right place and offered to the right customers. Uber correctly identified market requirements, thus ensuring customer satisfaction by transforming their requirements into service specifications in the form of added value. The company offers a variable, affordable, secure and quality service that it can sell with the right choice and appropriately applicable marketing communication.

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The Innovative Potential of The Regional System: Research, Evaluation and Management

Yu.N. STEPANOVA
Voronezh State University of Forestry and Technologies named after G.F. Morozov, Voronezh, Russia, E-mail: julia_vrn@inbox.ru

S.S. MORKOVINA
Voronezh State University of Forestry and Technologies named after G.F. Morozov, Voronezh, Russia, E-mail: tc-sveta@mail.ru

D.S. PETROV
Voronezh State University, Voronezh, Russia, E-mail: den_petrov@rambler.ru

A.V. IVANOVA
Voronezh State University of Forestry and Technologies named after G.F. Morozov, Voronezh, Russia, E-mail: anna_iv_1989@mail.RU

S.A. KUZNETSOV
Voronezh State University of Forestry and Technologies named after G.F. Morozov, Voronezh, Russia, E-mail: 89204339020@mail.ru

Correspondence: ***Yu.N. Stepanova*** *Federal State Budget Educational Institution of Higher Education «Voronezh State University of Forestry and Technologies named after G.F. Morozov», 394087, Voronezh, Timiryazeva Street, 8, E-mail: julia_vrn@inbox.ru*

Abstract

The article deals with the problem of innovative development of the regional system with an emphasis on the study of the innovative potential of economic entities, assessment of their innovative component and further management using the optimal strategy of innovative development. Using the method of assessing the innovative potential based on the process approach, representatives of various industries and economic entities were interviewed on the example of the Voronezh Region, which is part of the Central Federal District. The resulting assessment made it possible to identify the innovative potential of each economic entity using the matrix of opportunities and track its dynamics over three years. Practical conclusions of the research of innovative potential allowed to identify its key components in the regional system of assessment of innovative potential, allowed to determine the criteria of innovative susceptibility of economic entities, and management perspectives allowed to algorithmize the process of developing an innovative development strategy. The proposed methodology for assessing the innovative potential of economic entities evaluates it from the position of two components: the index of economic and technological development and the index of ability to innovate, which allows a comprehensive approach to the study of activities and the optimal development of innovative development strategies. A comprehensive assessment of the innovation potential, which forms the right management impact, leads to an increase in innovation activity and an increase in the innovation potential of economic entities of the regional system.

Keywords: Innovative Potential, Regional System, Innovative Activity, Assessment Of Innovative Potential, Strategy Of Innovative Development.

Introduction

The modern world does not stand still, it is constantly evolving. Today, it is difficult for humanity to imagine its life without a telephone, computer, car, household appliances, namely, without innovations that have become familiar to us. Innovation is the main driving force behind economic and social development today. Innovative activity has led the world community to a new, higher stage of development. Innovation processes originate in individual branches of science, and end in the field of production, causing progressive changes in it. In our time, innovation is not a whim,

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but a necessity for survival, competitiveness and continued prosperity. The need for innovative development of society is a new era of the new century, predetermining the modern development of the economy, which shifts the priorities of values from material goods to ideas. Implementation of innovative development is possible only if business entities have a new resource for growth - innovation potential.

In order to correctly assess the degree of influence of the innovative potential on the development of an economic entity in a regional cut, it must be studied, firstly, from the concept of essence (as a measure of the form of movement), and secondly, from the concept of composition (as a measure of the transition of matter from one form to another). Since 1980, the process of researching innovative potential was launched into scientific circulation by Christopher Freeman. From this point on, there are endless discussions about the components and approaches to the formation of innovative potential.

Freeman (1980), Zhits (1999), Chukhrai (2002), Ankh-Erdene (2014), investigated the innovative potential only from the standpoint of the resource approach, which allows assessing only the current situation of the development of the innovation process.This approach is not complete, since under different conditions resources can be used in different ways, and ultimately they do not serve as a guarantee of the same economic results, and therefore do not serve as a comparable characteristic of innovative development.

Porshnev (2009), Barancheev (2015) clarified the resource approach by proving that it is the presence of open and hidden resource opportunities that leads to the achievement of the ultimate goals of an economic entity. However, the authors named their approach to researching innovative potential as targeted. Here, the innovative potential is revealed through the analysis of the "output" of innovation and is a reflection of the final result of the implementation of existing opportunities (in the form of a new product obtained during the implementation of the innovation process). At the same time, this approach does not take into account the presence and balance (complexity) of the structure of the components of innovative potential and the sufficiency of the level of development of potential for the formation of innovative activity of an economic entity.

Drucker (1985), Lisin (2002), Titova (2010) attempted to comprehensively combine the totality of resources and the results of their practical use in order to implement innovative activities by an economic entity in the regional context. Thus, a resource-targeted approach has been formed, which makes it possible to assess not only the current state of the available resources, but also the effectiveness of their use.

The application of the above approaches led to the fact that in the classical literature two concepts of innovation potential were formed in the "narrow" and "wide" sense. Innovation potential in the "narrow sense" is a set of innovations, innovations confirmed by patents, licenses and other documents confirming the intellectual property right to innovations. In the “broad sense”, innovation potential is an organized set of interrelated conditions and resources (material, financial, personnel, information, intellectual and others) that ensure the production and reproduction of scientific, technical and technological innovations and the possibility of innovation.

In the context of the "broad sense" it is interesting to study the resource component of the innovative potential of economic entities of the regional system.

In order to clearly understand how to manage innovation potential, it is necessary to know how resources - a source of potential to be translated into the form of a result, what action needs to be taken, how to generate energy in order to launch a systemic innovation process. For these purposes, you need to use all the functionality of the resources: capabilities, abilities and readiness. Opportunity, as a function of resources, will reflect their stage of movement when they exist only in the form of prerequisites or trends, but act as the forthcoming. Ability, as a function of resources, will show the conditions for their successful application in innovation. Readiness, as a function of resources, will determine their state when everything has already been done in order to begin the process of creating innovations.

Accordingly, this article is aimed primarily at identifying the relationship of innovation potential with the stages of the life cycle of economic entities of the regional system. Firstly, to determine the strength characteristics of the innovative nursery, capable of creating new opportunities at the stage of the life cycle. Secondly, to assess the innovative potential of economic entities in order to identify their innovative susceptibility. Thirdly, we need to develop a strategy for the balanced and dynamic development of economic entities of the regional system in an innovative economy.

The rest of the article is organized as follows: Section 2 briefly discusses the determinants of growth that underlie innovation potential and analyzes the relevant literature, Section 3 presents a methodology for assessing innovation

potential, Section 4 analyzes our assessment results by methodology and their impact on the regional cut. Section 5 describes the results of our research. Finally, the last section provides concluding conclusions and further research proposals.

Theoretical, Informational, Empirical, and Methodological Grounds of the Research

It is well known that a fairly wide circle of scientists has studied the resource component of the innovation potential, which is the basis for its formation. Thus, using various theoretical and methodological approaches, these studies focused on a different set of factors for the growth of innovative potential, but did not trace the connection with the life cycle of an economic entity. In this paper, exploring the innovative potential, we consider growth factors, complementing their vector with a factor, and also highlight the connection with the life cycle of an economic entity of the regional system in order to form management impact in the form of an innovative development strategy. Kokurin (2001) characterizes material resources most fully, defining them as the material basis of innovation potential, containing a technical and technological base, which will subsequently influence the scale and pace of innovation activities of an economic entity of the regional system. The importance of material resources is that they are formed in industries that manufacture means of production, which, through the use of new technologies, lay in them potential opportunities that are realized or unrealized later. With the development of society and the intensification of the use of knowledge, the influence of the information resource on the innovation potential does not decrease, but, on the contrary, increases. Kalitich (2002) in his studies proved that this resource is not independent and in itself has only potential value, only by combining with other resources - experience, labor, qualifications, technology, technology, energy, raw materials; it appears in "kinetics" as the driving force of innovation potential. Nevertheless, an information resource (such its active forms as knowledge bases, models, algorithms, programs, projects, etc.), like an enzyme, transfer material factors from a latent state to an active one. This type of resources, unlike others, is practically inexhaustible. Financial resources are part of the innovative potential as an organic unity of available resources and unused opportunities for their alternative investment. Thus, they are characterized by a set of sources and reserves of financial capabilities that are available and can be used to achieve specific goals and objectives. The amount of financial resources reflects the financial strength, the ability of the system to participate in the creation of wealth and the provision of services. Dobrov (1999) argues that in addition to the providing function, financial resources also perform an insurance function, directly duplicating, and also measuring in monetary units material, information, intellectual resources that are part of the innovative potential. The importance of an intellectual resource in the formation of innovative potential can be reflected from three positions: economic, managerial and social. The economic aspect was considered by Smith (2007) in the doctrine of human capital. Mill (1980) wrote about the quantity and quality of human ability to work. Nelson and Winter (2002), argued that the evolutionary theory of economic growth is impossible without man. Schumpeter (1982) concluded that innovation processes are a factor in economic growth. Social aspects explored in their theories by Hayek (1965), Habermas (2002) and proved that the basis of the generator of the intellectual resource of people lies in the social interaction between them. Management aspects were reviewed by Mintzberg (2000), Prahalad and Hamel (2002) laying the foundations of the theory of strategic management. Thus, undoubtedly, the quality of intellectual resources and the degree of their involvement in social production directly affect the rate of economic growth. The dominant role of intellectual resources makes a person the main producer and consumer of innovations, that is, the process of developing new ideas is launched in conditions of a clear presentation of one's capabilities and desires, thus adaptation to new economic realities takes place. Intellect enables a person to generate new ideas from the moment they start and, with the help of new technologies, bring them to a finished product. Thus, the intellectual resource is, as it were, a vector resource for the remaining components of the innovative potential, allowing to reveal their additional capabilities and increase the effectiveness of their contribution at all stages. innovation production process. Proceeding from the fact that each phase of the life cycle of an economic entity has its own temporal characteristic, it is important to determine and assess the innovative potential at each stage using precise quantitative and qualitative criteria. Afonichkin and Ignatiev (2012) identified the relationship of potential with the life cycle through various growth trends and identified the following areas: development, uniform development, outstripping growth, stagnation and decline. Simonova (2013), considering this area, formed a mechanism to prevent the influence of negative factors on the development of crisis phenomena that lead to a loss of competitiveness of an economic entity. This made it possible to destroy ineffective and ineffective links within the economic entity, respectively, the innovative potential, passing through the crisis stages, contributes to the formation of new - effective links and in large quantities. Based on the foregoing, we note that an economic entity, being at the stage of formation, forming its goals and looking for like-minded people, already has a synergistic effect from the resource component of the innovative potential and here it is important to correctly assess the susceptibility of the components of the potential to further growth and development. At the stage of growth or development, the potential in the form of a force vector accumulates all available resources, including their hidden capabilities to achieve the set goals. The stage of maturity or growth stabilization is associated with the implementation of the existing potential, which is sufficient to maintain the present effective state of management. As a result, the period of slowdown in growth leads them to the stage of decline, as a contradiction between the initially available potential and the environment. There is a gap in the mechanism of formation of potential resources.

This particular section is devoted to answering the following question: "What is the trend in the development of innovative potential in Russia?" The answer to this question can be given by comparing the statistics. Analysis of reporting of international statistics developed by the International Business School INSEAD and the World Intellectual Property Organization (WIPO) expressed in the form The Global Innovation Index (GII), reflects the most complete set of indicators of innovative development in different countries of the world and indicates the following. In general, for the period 2013–2019. Russia has significantly increased its innovative potential against the background of the world level, improving its position in GII from 62nd to 46th place (+16 points in 7 years). Data presented for 129 countries and ranking by the level of innovative development/ The picture that we get in Figure 1 characterizes the GII index, which in its structure includes two sub-indices: the first is the resources of innovation, the second is the results of scientific, technical and innovative activities. According to the results of the report presented at the final conference in New Delhi in 2019, there was a steady improvement in the situation in the first sub-index, it gives an improvement (+11 points), but a worsening of the situation in terms of the impact of the second sub-index on the economy and society (-10). Among European countries, Russia ranks 31st out of 39 possible. According to the index of GDP per capita, 6th place.

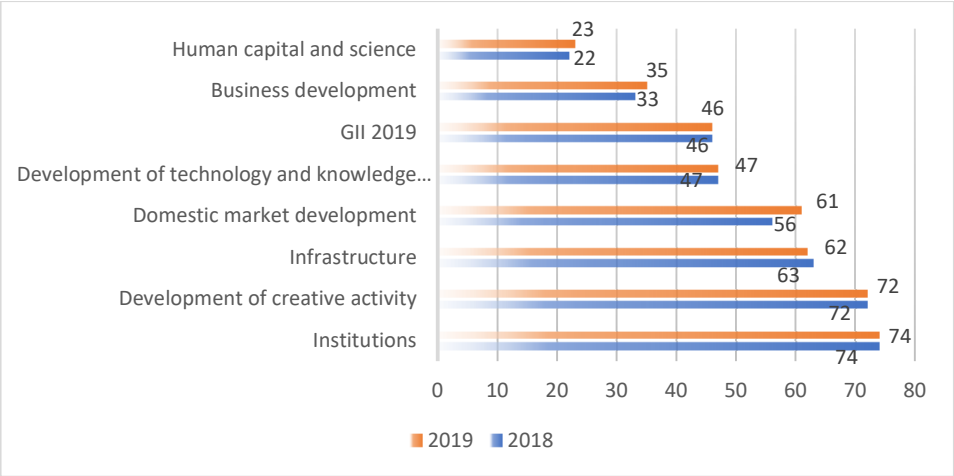

Fig. 1: Global innovation index of Russia and its elemental components

It is clear that three positions stand out as Russia's GII advantages: human capital and science, the position is characterized by indicators of the scale of higher education and the presence of graduates of scientific and engineering specialties; the level of business development, the position is characterized by the indicators of workers employed in the field of knowledge-intensive services; the development of technologies and the knowledge economy, the position is characterized by indicators of the results of innovative activity: the number of patent applications for inventions and utility models, the quality of scientific publications.

Two positions are noted as a negative impact on the overall efficiency of innovation activity in Russia: legislative and legal, affecting the loan portfolio of microfinance institutions and transactions using venture capital, as well as infrastructure.

The following figure 2 shows the dynamics of Russia by Development Indices: GII, HDI, KEI, GCI, IQ in the period from 2012 to 2019.

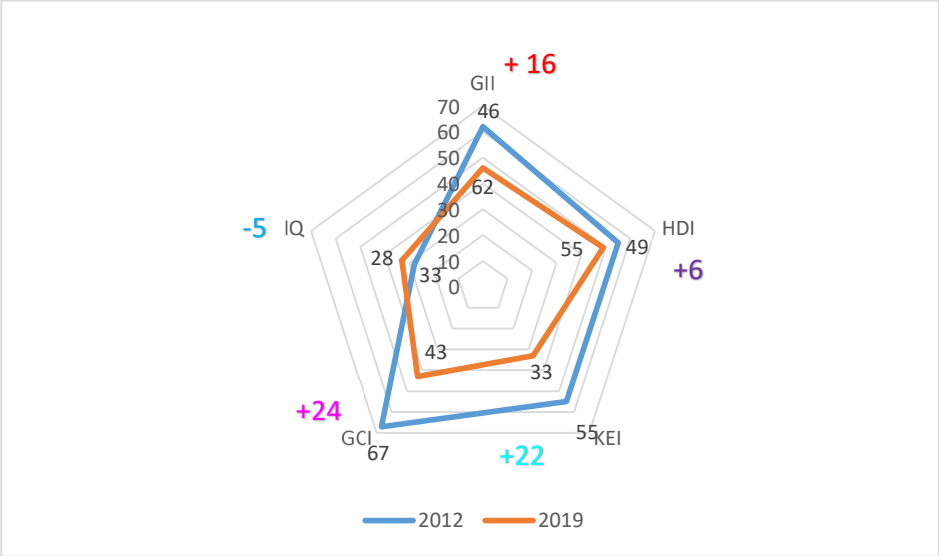

Fig. 2: Russia's position on development indices: GII, HDI, KEI, GCI, IQ

The Human Development Index (HDI) is a combined indicator calculated annually by experts from the United Nations Development Program together with a group of independent international experts. In 2019, the index shows an increase of 6 points. In particular, there is an improvement in its structural components of indicators of the duration of education, life expectancy of the population and indicators of gross national income (GDP) per capita.

The Knowledge Economy Index (KEI), characterizes the level of innovative development, calculated according to the method of the World Bank. The index is an indicator of science and measures the achievements of a country in terms of the achieved level of education of its population in two main indicators: the adult literacy index (2/3 weight) and the index of the cumulative share of students receiving primary, secondary and higher education (1/3 weight) ... It is generally accepted that in developed countries the minimum indicator of the index should correspond to 0.8, with the level of education being the determining factor. The value of this index for Russia is 0.832, an increase of 22 points.

The Global Competitiveness Index (GCI) is calculated according to the World Economic Forum methodology, based on a combination of publicly available statistics. It characterizes the overall competitiveness of the country and the competitiveness of business (Business Competitiveness Index, BCI). At the end of 2019, Russia's position corresponds to 43rd place, an increase in the index compared to 2013 (+24 points).

At the end of 2019, Russia ranks 33rd in the (IQ) rating of countries and loses 5 points compared to 2012. The (IQ) index characterizes three indicators: the average IQ of the population, school performance and the number of Nobel laureates. Russia entered the top 25 countries by only one indicator - the presence of Nobel laureates.

It is obvious that Russia is moving in the right direction and only innovation, research and development can lead the country to potentially new economic realities. Yes, of course, today it is inferior to the leading countries, but it already has a certain experience of innovative development and potential in the form of human resources and science development, which is proved by international indices. Thus, the given vector of innovative development of the economy becomes predetermined for economic entities of the regional system, whose innovative potential should be developed, analyzed and evaluated, turning it into a systematic innovation activity.

All existing methodological and conceptual directions of researchers in assessing the innovative potential can be combined into three approaches: resource, resource-market, and cost.

The resource-based approach inherently reflects the assessment of the impact of production, technical, human, financial, resources on the innovative potential. Here, the assessment of the innovative potential consists in the sequential calculation of particular indicators and the general total indicator for each type of resource (Sidorova, 2018). Also, based on the express method, an assessment is carried out by resource groups: end-to-end and specific, the second is considered dominant (Belousov, 2017). The assessment of innovative potential using the index of only financial and economic indicators (Somenkova, 2017), or the effectiveness of the results of individual activity (RIA) (Kalachikhin, 2013) is one-sided as it covers only one area of activity. The complexity of the assessment is important here. If an economic entity has high innovative capabilities, but cannot disclose and apply them, the combined nature of the assessment (Terebova, 2017) makes it possible to identify reserves for increasing the efficiency of using

potential. But an assessment based on the calculation of a single integral indicator, including resource, performance and management components, cannot be adequately accurate, since a large number of criteria are concentrated in one indicator and weight is lost from significance.

The resource-market approach evaluates the resource impact of the innovative potential on the functioning of an economic entity in a market environment. Here, the assessment of innovative potential forms the basis for the mechanisms of strategic and innovative management (Kulabukhov, 2006). A comprehensive assessment methodology is based on calculating an integral indicator in two directions (Derevyankin, 2013) of the potential and efficiency of innovation activities. Assessment (Kagan, 2012), the readiness of an economic entity and its ability to innovate, is expressed in the form of successful commercialization, which leads to increasing competitiveness and increasing business value. The value approach assesses the innovation potential based on the economic value added of an economic entity, taking into account the factors that affect the determination of value growth (Yakovleva, 2018). This approach to assessing the innovative potential has not found mass application in practice. The methodology is based on the assumption that the innovative potential should reflect the capabilities of an economic entity in terms of resource provision and strengthening of competitive positions and ensure economic growth and development, reflecting the ability to obtain maximum results with minimal costs, that is, create additional value. The estimation algorithm consists in calculating a complex indicator using the distance method to compare the calculated indicators with the standard.

We believe that it is impossible to carry out a comprehensive assessment of the innovative potential in terms of achieving the goals of innovative development using the above proposed approaches. All these approaches do not consider the innovative potential, with a process component, since the estimates obtained are abstracted from the goals of innovative development and the indicators used are focused only on the resource approach. Our special direction of research is to consider the innovative potential, on the one hand, as a product, and on the other hand, as a component of the result of an activity, that is, as a process.

The methodology for assessing innovative potential is based on two subjective and objective approaches. An objective approach is associated with the perception of innovation as a result (product), where innovation is measured directly, it is the unit of analysis. The subjective approach of assessment characterizes innovation as an activity (process), and the unit of analysis here is innovation. We argue that the assessment should be based on resources. -product approach and rating method. The methodology of innovative potential should be based on an assessment of the degree of readiness of an economic entity of the regional system to introduce innovations. Our methodology will be expanded by calculating a complex indicator consisting of 2 partial assessments: characterizing economic and technological activity (Iet) and innovation susceptibility (Iir). The main tools of the assessment methodology are indices, criteria, indicators and the square matrix of innovation potential presented in Figure 3. The red "low" zone contains indices of innovation potential from 0 to 4 points. Yellow "middle" zone - from 5 to 7 points. Green "high" zone - from 8 to 10 points.

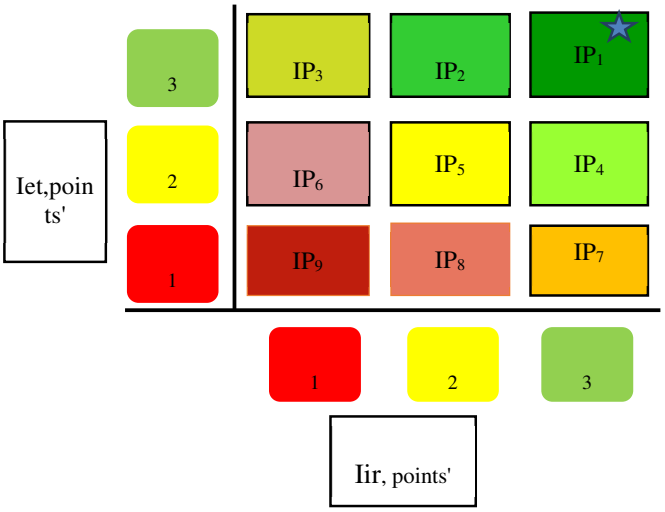

Fig. 3: Innovation potential matrix

Each index is decomposed into ten (10) criteria reflecting personnel, scientific and technical, production and technological and organizational and managerial potential, ability and willingness to innovate. The evaluation of the criteria in the composition of the indices is based on the determination of growth rates by comparing the corresponding value for the reporting year and the value for the year preceding the reporting year. Positive dynamics of the criterion is estimated at 1 point, negative or zero dynamics are estimated at 0 points. Thus, summing up the total number of points, the value of the indices (Iet) and (Iir) is determined. As an information base for analyzing the innovative potential of an economic entity, the data contained in the reporting under IFRS (Balance Sheet; Statement of Financial Results) and Rosstat data - "Information on the organization's innovative activities" are used. The positioning of the innovative potential of an economic entity according to the assessment results is presented in Table 1. Based on the assessment results, we understand the state of economic and technological activity and innovation susceptibility

Table 1: Positioning innovation potential based on evaluation indices

The value of the indices (Iet) / (Iir) in points	Identifier of innovative potential for innovation potential matrix
8-10 / 8-10	IP_1 - The absolute leader in innovation
8-10 / 5-7	IP_2 - Successful Traditionalist - Moderate Innovator
8-10 / 0-4	IP_3 - Successful Traditionalist - Modest Innovator
5-7 / 8-10	IP_4 - Moderate Traditionalist - Leader of Innovation
5-7 / 5-7	IP_5 - Moderate traditionalist - Moderate innovator
5-7 / 0-4	IP_6 - Moderate Traditionalist - Modest Innovator
0-4 / 8-10	IP_7 - The humble traditionalist is the innovation leader
0-4 / 5-7	IP_8 - Modest Traditionalist - Moderate Innovator
0-4 / 0-4	IP_9 - The humble traditionalist innovator

Results

Figure 4 summarizes the results of assessing the innovative potential of ten innovatively active economic entities of the regional system of the Voronezh region, which is part of the Central Federal District (CFD) of the Russian Federation. The research period was divided into three phases, lasting one year (2015/2016; 2016/2017; 2017/2018). It has been established that the innovation leader is FPC Cosmos-Oil-Gas LLC. The high level of development of innovation activity is evidenced by the line of movement of its innovative potential from the square "Moderate traditionalist - Moderate innovator (IP_5 - 5) (2015/2016) to the square "The absolute leader in innovation" (IP_1 -1) (2018/2019). The benchmark for the development of innovative activities - the green zone belongs to JSC NVP "Protek", whose innovative potential is identified as "Moderate traditionalist - Leader of innovations". In the group with an average level of resource endowment and susceptibility to innovation are LLC "BH" and LLC "BMK" - (IP_6 -6) (2018/2019), while in the red zone with a low level of resource endowment with unstable susceptibility the remaining six subjects are in innovation.

More than half of the subjects during the analyzed period increased their innovative potential, which corresponds to the positive dynamics of movement in the matrix. At the same time, 40% lost their innovative potential over the analyzed period. The results obtained are quite satisfactory and allow us to draw a number of conclusions.

Figure 5 shows the dynamics of the number of economic entities with a positive value of the criteria that form (Iet) and (Iir) and their changes. The growth of innovative potential is largely due to growth (Iet), primarily the growth of capital productivity and the turnover of current assets. Thus, 40% of the index criteria (Iet) have a positive trend in 60% of subjects.

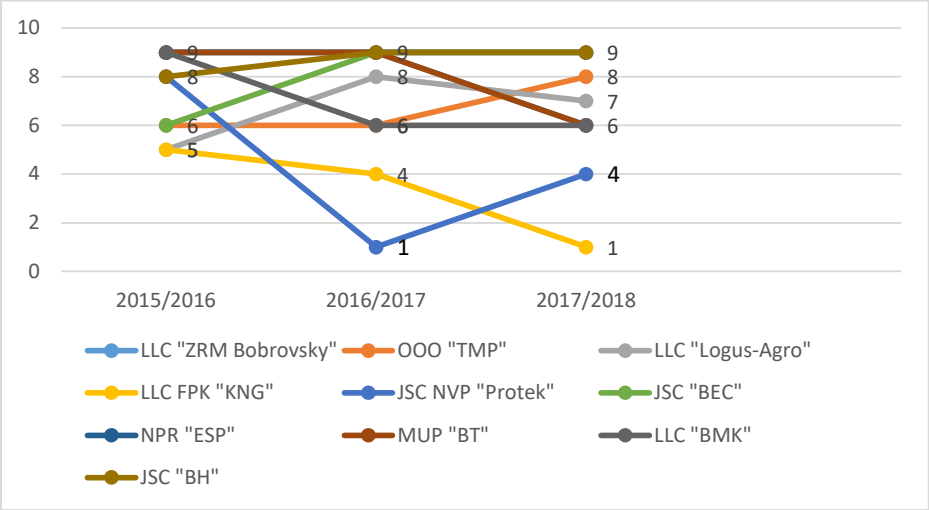

Fig. 4: Development of the innovative potential of economic entities of the Voronezh region according to the matrix of opportunities

The contribution (Iir) to the formation and development of innovative potential is not high. Let's note the criteria: the level of specialized higher education of workers (Iir 3) - positive dynamics in terms of growth rate in 7 subjects; the share of personnel training costs in the total costs of technological innovation (Iir) 4 and the share of R&D costs performed in-house in the total costs (Iir) of 5-6 entities. A detailed analysis of the criteria for assessing innovative potential made it possible to establish that the most problematic area is the commercialization of innovations, characterized by such criteria as the share of costs for the production and sale of innovative products (goods, works, services) in the structure of total costs for the production and sale of products (goods, works, services) and the share of innovative products (goods, works, services) in the total volume of manufactured products (goods, works, services). A decrease in these criteria in dynamics predetermines a slowdown in the growth rate of innovative potential, to a greater extent than the rest of the analyzed criteria. The results obtained for 10 leading economic entities determined the cause-and-effect relationship between the state of their innovation potential and the level of innovation activity of the regional system. In confirmation of the data of our study, the Russian Regional Innovation Index (RIII) of the Voronezh Region at the end of 2019 is 0.409 and +3 points compared to 2018. Figure 6 shows the distribution of the five sub-indices of the forming RII. The subindex of socio-economic conditions for innovative activity (SEA) contains three groups of indicators: basic macroeconomic indicators; educational potential of the population; digitalization potential -13th place in the rating of 85 regions of the Russian Federation.

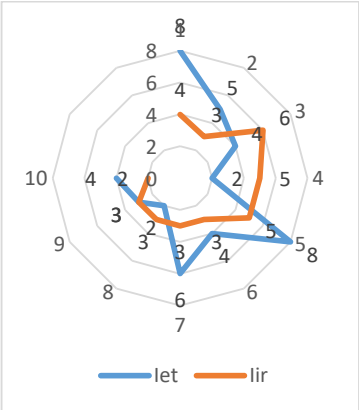

Fig 5. Criteria for the development of innovative potential in the composition of indices (Iet) and (Iir)

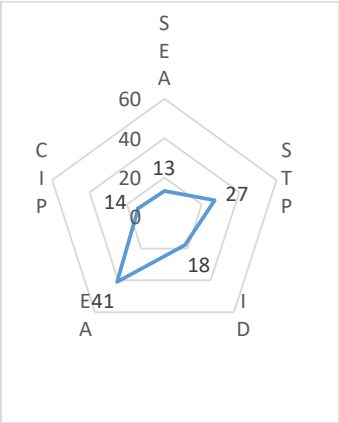

Fig 6. RRII subindices of the Voronezh region for 2019

Scientific and technical potential (STP) consists of indicators of funding for research and development; the provision of scientific personnel and the effectiveness of scientific research and development - 27th place. The lack of financial support for research and development at the level of large and medium-sized enterprises of the regional system is a factor limiting its scientific and technical potential. Evaluation of innovative activity (ID) is formed according to indicators of the volume of production of innovative products and its profitability - 18th place. Assessment of the quality of innovation policy (CIP) - 14th place.

Conclusions and Recommendations

As a result of the study, the innovation potential was considered as a set of private potentials, their interconnection and active influence on each other were proved. The technical and economic conditions and conditions for innovative susceptibility were determined, capable of bringing the innovative potential of an economic entity into action. In the course of the study, a universal methodology for assessing the innovative potential of economic entities of the regional system engaged in any type of activity, without industry reference, was presented. Thus, our results of assessing the innovative potential of economic entities of the regional system made it possible to identify indicators on the basis of which proposals for the development of innovative activities are formed, which are of a strategic nature. In general, our results have proved the importance of innovation potential as a resource component of the regional system. It is he who should determine the strategic vector of the formation and development of the mechanism for managing the regional system. As a recommendation, we note that the management impact should be formed in two directions. First, it is a process one, since this component of the innovation potential presupposes its constant maintenance at a competitive level, renewal and growth. The second, product (productive), as the component assesses the effectiveness and efficiency of its use by the subjects of innovation in the region.

As part of the strategy for managing innovative potential, it is necessary to develop a system of differentiated organizational and economic measures for the development of innovative activities of an economic entity in accordance with the status of its innovative potential, calculated using the matrix of opportunities, which will generally increase the strategic competitiveness of the regional system.

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Fascization Trends in Modern Society as A Response to Global Contradictions

Irina V. MINAKOVA
Southwest State University, Kursk, Russia, irene19752000@mail.ru

Tatyana N. BUKREEVA
Southwest State University, Kursk, Russia, tnbinchina@yandex.ru

Tatyana S. LOPATKINA
Moscow City University, Moscow, Russia, tatyanalopatkina@yandex.ru.

Daniil I. RASPOPIN
Southwest State University, Kursk, Russia, tdime-swsu@mail.ru

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Abstract

Global contradictions and world economic crises heighten social inequality and population's distrust towards the existing authorities. Fascist ideology and technologies are used as means and tools for overcoming crisis situations. The purpose of the research is to study and analyse the factors and conditions for the rise of fascism in modern society. The authors have found that fascism has numerous country variations. Fascist trends are extremely active not only across the world, but also within individual civilizations. At the same time, the ideological connection between fascism and liberalism was detected. The new anti-fascist movement must not only combat fascism itself but also end the conditions that lead to the rise of fascism.

Keywords: Liberalism, Fascism, Modern Social Relations, Global Contradictions, Anti-Fascist Movement.

Introduction

Global contradictions and world economic crises heighten social inequality and population's distrust towards the existing authorities. The expansion of migration processes leads to an increase in national tension. Economic crises have changed for the worse the situation of the global middle class population. Global and internal problems, overlapping each other, significantly affect the consciousness of citizens, cause increased anxiety and economic insecurity, provoke massive aggressive sentiments, a negative attitude towards the ruling political elite and political institutions, sometimes taking radical forms. Fascist ideology and technologies are used as means and tools for overcoming crisis situations.

The economic and social spaces of European countries are fertile ground for fascist sentiments to grow. Historical and political analysis shows that the fascist ideology is in demand in societies affected by the ideological crisis, where population professes political nihilism.

Fascism is not a challenge, a splash in a particular era or culture. The challenges of fascism are fundamental and immanent in human history. After the collapse of the Soviet Union, the trends of fascism became more and more evident. In 1974, the world homicide rate was 2.85 per 100,000 people. At the same time, the trend was downward. The trend has changed upward since the early 1980s. By 1993, the homicide rate had risen to 3.85. In 2011, 6.9 homicides were recorded per 100,000 people (Bagdasaryan and Sulakshin, 2017).

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Research Material and Methods

The study is based on the theoretical works on fascist ideology and practice of Russian and foreign scholars: A. Bauerkemper (2006), B.N. Bessonov (1995), S.G. Kara-Murza (2008), A. Fenner A. and E.D. Weitz (2004), St. Breuer (2005), A.J. Gregor (2006), etc.

The purpose of the research is to study and analyze the factors and conditions for the rise of fascism in modern society.

During the research process, there were used general scientific research methods: analysis, synthesis, comparison, analogy.

Research Results

History knows the names of great conquerors who dreamed of world domination: Alexander the Great, Genghis Khan, Tamerlane, etc. The desire for glory received various ideological justifications. In the ancient world, the ideas about the superiority of free men over slaves prevailed. In the Middle Ages, the concept of 'the chosen' was widespread. The development of capitalist relations has led to understand chosen people as the most successful in the competitive struggle. The existence of mankind began to be interpreted as a field of global competition. The one who managed to win rivals was considered successful. The fascist experience of the 20th century became a new form of the ideology of anthropological superiority.

In 1945, fascism was stopped. The existence of the USSR and a Soviet alternative based on the ideology of human equality made it possible. The idea of human equality pushed out the idea of superiority. Seven decades have passed. The USSR, bearer of an alternative ideology had collapsed, and fascism started to rise again.

Fascism is an ideology of organization of a state and social relations based on the right of superiority (Bagdasaryan and Sulakshin, 2017) and the right of violence (Bauerkemper. 2006) over other people (Bagdasaryan and Sulakshin, 2017).

A fundamental mistake is to identify the phenomenon of fascism with communism. Today this point of view is becoming dominant in the world political science discourse (Luks, 2008) (Hayek, 2005). As a result, the accusations against fascism are transferred to communism (Laqueur, 1991).

However, analysis shows that communism and fascism are at opposite poles of the ideological classification. Communism – fundamental equality, liberalism – equal rights, fascism – anthropological inequality. Communism – a man as a social being, liberalism – a man as an individual, fascism – a man as a 'wolf', a superman. Communism – solidarity, liberalism – competition, fascism – war. Communism – collective property, liberalism – private property, fascism – corporate property. Communism – internationalism, liberalism – bourgeois nationalism, fascism – racism. Communism – labor income, liberalism – surplus product (profit), fascism – direct exploitation. Communism – freedom from exploitation, liberalism – freedom from social burdens, fascism – freedom as a supremacy the free over the unfree. Communism – world brotherhood, liberalism – world market, fascism – world domination. Communism – integrity, liberalism – morality, fascism – morality of power. Communism – responsibility for the weak, liberalism – the strong overcomes the weak, fascism –repression of the weak.

Thus, liberalism is obviously closer to fascism than communism, while there is no ideological connection between communism and fascism. In other words, the USSR is quite confidently the opposite of Nazi Germany. It is no coincidence that with the collapse of the USSR, fascism began to come back again.

In 1929, the world was hit by an unprecedented economic crisis. The status of majority population has deteriorated. The situation in Europe was exacerbated by an influx of immigrants and refugees. The migration flows were caused by the collapse of the former traditional empires: the Russian Empire, the Ottoman Empire and the Austro-Hungarian Empire. There were many Jews among the refugees and migrants. In the wake of the economic and social downturn, the Europeans' hatred of strangers was rising. Of all xenophobic movements, anti-Semitism came to the fore, and fascist and Nazi parties swept to power.

Today the scenario has been repeated. The financial and economic crisis has an extremely negative impact on the majority European population. The aftermath of revolutions across the Middle East is a massive resettlement of migrants and refugees to Europe. A series of terrorist attacks perpetrated by migrants from the Middle East is generating xenophobia. Anti-Semitism of the 1930s is replaced by Islamophobia. The popularity of far-right parties has been rising. They push out the parties of the political center incapable to respond to new challenges.

As fascism of the 1920s-1940s, there is a huge amount of research. Fascism existed not only in Germany and Italy, as is traditionally believed. Many countries turned out to be fascist to one degree or another. Here are just some examples.

Austria. Engelbert Dollfuss, chancellor of Austria, built a model of the state based on Mussolini's fascist Italy. The monopoly political position in the country belonged to the fascist party 'The Fatherland Front' (Pauley, 1981).

Albania. The fascist regime in Albania was established after occupation in 1939 by Italy and led to wide-spread fascism in society. The fascist state in Albania was attached to Fascist Italy. The Albanian Fascist Party held power in the state.

The United Kingdom. Fascism in the mid-1930s had a prospect of success in Britain. The British Union of Fascists was founded in 1932 by the English aristocrat Oswald Mosley. Two years later, the organization was renamed the British Union of Fascists and National Socialists, reflecting the intention to unite the ideas of Mussolini and Hitler. Dozens of branches of the British Union of Fascists were opened throughout the country. With the outbreak of war in 1940 the British Union of Fascists was banned by Winston Churchill (Benewick, 1972) (Cross, 1961).

Fascist parties existed in Greece, Denmark, Ireland, Spain, the Netherlands, Latvia, Lithuania, Poland, Norway, Romania, etc.

Currently, three forms of fascism can be distinguished.

Postmodern Fascism. Neoliberalism today has a strong fascist nature. It affirms the hard power of a minority. For the sake of the power of a minority, a majority must be suppressed at national and global levels. Legalizing same-sex marriage in the US became a fundamental milestone in the fascism of neoliberalism.

Clerical Fascism. Today clerical fascism mostly has an Islamic face.

Classical Fascism. The Islamisation of Europe and terrorist attacks have become a catalyst for Neo-Nazism. This form of fascism is based on the growing migrant phobia of the European population.

The modern world is a system with a center and a periphery. The disparity between living standards in the center and the periphery is constantly growing. The center systematically conducts military operations in peripheral countries, and as the experience of recent years shows, the quality of life in the periphery is falling. It proves that violence-based traditional for fascism policy still exists.

One of the conditions for fascism is a rise of xenophobia. At the same time, the mass media act as a tool for managing xenophobia. Nowadays, the management capabilities of the media mass have grown up to the global level.

However, the largest media companies are mainly located in developed Western European countries and the US. It means the actual dominance of certain states in selecting and interpreting information.

The word-frequency analysis data show that the terms 'Muslims', 'Islam', 'migrants', 'migration' and 'the Russians' have become the words of high-frequency (Bagdasaryan and Sulakshin, 2017).

Thus, The New York Times used the word 'the Russians' 199 times in 2004, 212 times in 2008, and 472 times in 2014. As for the terms 'Muslims' and 'Islam', these terms were used 150 times in 2008, 184 times in 2010, 245 times in 2012, and 318 times in 2014. The words 'migrants' and 'migration' were used in the texts 35 times in 2008, 43 times in 2010, 55 times in 2012, and 84 times in 2014.

It demonstrates that the images of internal enemy (Muslim immigrants) and external enemy (the Russians) are the part of today's propaganda. The informational promotion of the topic of xenophobia is taking place again. Xenophobia has become a popular media topic again.

The rise of xenophobia inevitably leads to pogroms, war, and military escalation. Since the Western media actively point out 'a half-ring of hostile encirclement' for Europe ('hostile Muslims' are in the south and southeast, and 'hostile Russians are in the east), the United States appears to be the only partner for Europe in this situation.

Artificially created hostility determines two fundamental consequences for Europe: the expansion of the American military presence and Europe's economic dependence on the US economy (Minakova, 2018).

Nationalist ideology is on the rise in modern Ukraine. To spread nationalism there, the following tasks were solved:

1) destruct the previous civilizational identity; 2) compose the historical justification of a new nation; 3) cultivate the image of the enemy. Naturally, Russia was declared this enemy.

After the 2014 Coup in Ukraine, in which nationalist militants (Right Sector, football ultras) played one of the decisive roles, Nazification took on particularly radical manifestations.

The nationalist militants of The Right Sector movement and football ultras played one of the decisive roles in the 2014 Coup in Ukraine, after this the process of Nazification of public life became more radical.

In 2008, Stepan Bandera and Roman Shukhevych were listed among the 12 greatest Ukrainians. During the Great Patriotic War 1941-1945, the followers of Bandera brutally tortured more than 5 million civilians of the Western Ukraine, and more than 5 million Ukrainians were sent to Nazi Germany for forced labor, half of them did not return to Ukraine.

In 1943-1944, detachments of the Ukrainian Insurgent Army of Shukhevych exterminated over 100,000 Poles. And it is far from making the full list of their crimes committed during the Great Patriotic War.

Monuments to these Nazi criminals have been erected in modern Ukraine. At the same time, the memorials to Anti-Fascists have been demolished and desecrated. The West chooses not to pay any attention to modern Ukrainian nationalists; the obvious parallels with 1941 are ignored by Europe.

The main factor opposing the fascist scenario is the Russian idea. It is not an exaggeration to assert that the Russia civilization has anti-fascism nature (Berdyaev, 1946).

We dwell on the differences between fascism and the Russian idea.

Firstly, the difference in social equality, i.e. the issue of equality and human dignity. Fascism asserts the fundamental nature of human inequality. According to fascist ideology, inequality is not only social, but also anthropological phenomenon. The Russian idea, on the contrary, is based on the dream of the fundamental equality of mankind.

Secondly, the differences in the proposed models of inter-ethnic relations. Fascism is based on the idea of national superiority and the destruction of other nations. The Russian model, on the contrary, supports the protection of ethnic groups. It was developed a unique system of ethnic coexistence within the framework of the Russian model. The Russian history knows ethnic conflicts, but they are isolated incident.

Thirdly, the difference in understanding the interpersonal relations. For fascism, struggle is the basis of this relationship: in the 'struggle for existence' the strong survive, and the weak die out. Instead of struggle the Russian Idea proposes following the path of altruism and solidarity.

Fourthly, the difference in understanding the ultimate goals and the historical mission. The goal of fascism is world domination. The master-slave relationship is a key system for fascism. The Russian idea presupposes the salvation of the world from those who sought to dominate over it.

Finally, the difference in understanding the human nature. In fascism, a superman is an ideal person. For the Russian idea, a social individual (a brother) is a human being.

Thus, the fascist model is absolutely different from the Russian model, these two models are hostile.

Conclusion

As a part of the study, it was revealed the ideological connection between fascism and liberalism. The liberal principle of competition, and as a result dividing people into successful and unsuccessful was legitimized institutionally and ideologically by fascism.

Fascism has numerous country variations. Fascist trends are very active not only in the world, but also within individual civilizations. As in the era of Hitler and Mussolini, the development of a world anti-fascist movement is an urgent step for the global community. Currently, despite the widespread use of anti-fascist idea, there is no

genuine large-scale anti-fascist movement. To build it, it is necessary to focus on the positive and negative experience of anti-fascism in the 1930-1940s.

Despite the visible success of the anti-fascist policy in the post-war years, after a certain period of time, the fascist movements again attract supporters. The victory over fascism in 1945 delegitimized it, but did not eradicate the reasons that gave rise to their historical reproduction. Thus, the new anti-fascist movement must not only combat fascism itself, and also end the conditions that lead to the success of fascist ideology.

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Conceptual Model of Ethics Assessment for Artificial Intelligence Systems Based on Tabular Data

Radu STEFAN

Doctoral School, University Politehnica of Timișoara, Piața Victoriei 2, 300006 Timișoara, Romania; radu.stefan3@student.upt.ro, radu.stefan@live.de

George CARUTASU

Department of Informatics, Statistics and Mathematics, Romanian-American University, 1B Expoziției Blvd., 1st district, 012101 Bucharest, Romania; carutasu.george@profesor.rau.ro,
Doctoral School, University Politehnica of Timișoara, Piața Victoriei 2, 300006 Timișoara, Romania

Abstract

The exponential growth of Artificial Intelligence applications in the last decade, led to a debate in the science, business, political and activist communities about the ethical implications such systems. The dispute about ethics in AI is not new, already 60 years ago in the birth hour of Artificial Intelligence, the discussion on unwanted moral and technical consequences of automation has begun (Samuel, 1960). In the last decade, research on ethical aspects of Artificial Intelligence has increased tremendously. With ethics as a vast domain on one side and Artificial Intelligence with its broad and growing complexity on the other, the factorization of these areas cannot be approached in the entire spectrum. In this article we would like to introduce a conceptual model of ethics assessment for Artificial Intelligence systems based on tabular data.

At first, we present and reevaluate a model of ethical dimensions after which we will analyze contextual differences and risk levels of Artificial Intelligence systems. Based on the context and the risk level we derive an ethical assessment to be applied at every stage of the development lifecycle of an Artificial Intelligent system based on tabular data.

Keywords: Ethical Artificial Intelligence, Development Lifecycle Artificial Intelligence, Ethical Assessment, Ethical Dimensions.

Introduction

More and more modern applications and software components make use of some form of Artificial Intelligence (AI), such as: Supervised Learning, Unsupervised Learning or Reinforcement Learning. Thus, we call such applications Artificial Intelligence systems. The most used technology to implement AI is some form of Machine Learning (ML), by implementing one of the various types of models, e.g., regression analysis, decision trees, support vector machines, deep neuronal networks, etc. The model used is highly dependent of the problem to be tackled. In Artificial Intelligence systems based on tabular data, where typically supervised or unsupervised learning is applied, problems are defined to belong to one of the four clusters depicted below, depending on the nature of the data, if discrete or continuous.

Independent of data and the model used, the machine learning algorithms employed in an Artificial Intelligence system all operate with a probabilistic outcome. The models used are often called *black-box systems*, due to the lack of transparency on how the outcomes are *produced*, based on a specific input.

While the design and production of AI based software is mostly dominated by data scientist, engineers, developers; the operation and the interaction with such systems is widely spread in the society, not seldom in high stake environments (e.g., health, financial, traffic, general business). Thus, the development of such systems is in need of ethical consideration when society and humans rely upon them to make decisions.

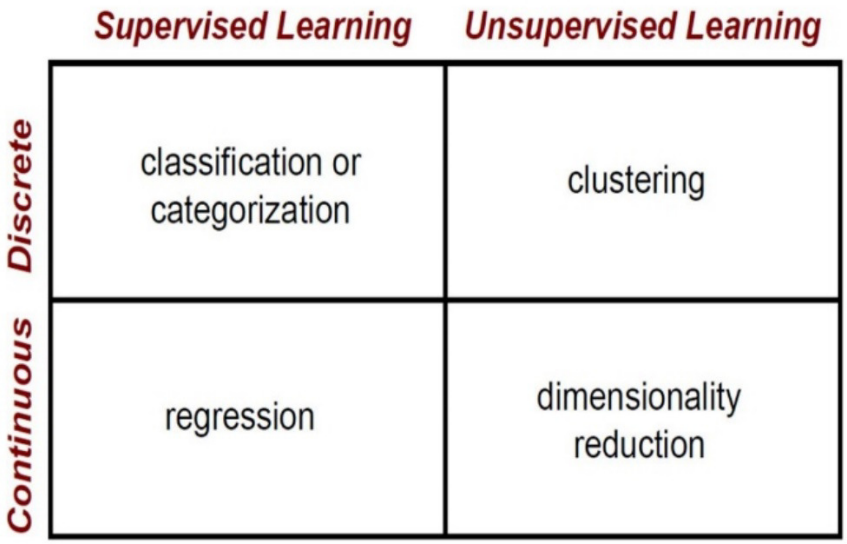

Fig. 1: AI problem areas depending on data type

In the recent years, many political and scientific bodies have published guidelines *for ethical Artificial Intelligence*. The European Commission published last year the *Ethics Guidelines for Trustworthy AI* (European Commisision, 2018) next to many other regulatory aspects as summarized by (Ion and Carutasu, 2020). In the United Kingdom, the government in partnership with the Alan Turing institute has produced "a guide for the responsible design and implementation of AI systems in the public sector" (Leslie, 2019). The United States of America government has published an *Artificial Intelligence Ethics Framework* (United States Intelligence Community, 2020) in June 2020, which has been already adopted by many US agencies. Also, many agencies, communities and non-government organization have published their own guidance. Just to name a few: the highly regarded Future of Life organization has published the so-called 23 Asilomar AI Principles (signed by 1677 AI/Robotics researchers and 3662 others, 2017), that are endorsed by hundreds of researchers in the field of AI and robotics. The OECD also adopted in May 2019 the recommendation of the council on Artificial Intelligence (Yeung, 2020).

Compiling an exhaustive list of all publications, legal materials and other mentions, would be beyond the scope of this paper, however a good overview on the global Artificial Intelligence ethics guidelines is given by Jobin et. al (Jobin, Ienca and Vayena, 2019). The authors claim after analyzing 84 documents that *"… further thematic analysis reveals significant semantic and conceptual divergences in both how the elven ethical principles are interpreted, and the specific recommendations or areas of concern derived from each …"*. Therefore, we claim the need for a conceptual model of ethical assessment that can be understood applied by engineers, data scientists, developers, program and product managers, testers, etc. that are directly involved in the planning, creation, development, deployment, and monitoring of Artificial Intelligence systems based on tabular data.

Guiding Ethical Principles

In prior work (Stefan and Carutasu, 2020), we have defined a framework for ethical dimensions in intelligent decision support systems based on Artificial Intelligence with an approach for ethical issue mitigation. The resulting six ethical dimensions are *(order is random)*:

Fairness,

Reliability & Safety,

Privacy & Security,

Inclusiveness,

Transparency,

Accountability.

In this paper we would like at first to analyze the ethical dimensions and extend and adjust the framework (if needed) based on the work done by Jobin et. al. (Jobin, Ienca and Vayena, 2019), considering this a more complete analysis of the recent published AI ethical guidelines. The ethical dimensions from Jobin are ordered based on the frequency of appearance in the number of documents analyzed, we keep this order in the comparison table below:

Table 1: Comparison of ethical dimension models

Ethical Dimensions based on	
Article from Jobin (Jobin, Ienca and Vayena, 2019)	**Initial model** (Stefan and Carutasu, 2020)
1. Transparency	1. Transparency
2. Justice and Fairness	2. Fairness
3. Non-Maleficence	3. Reliability and Safety
4. Responsibility	4. Accountability
5. Privacy	5. Privacy and Security
6. Beneficence	6. Inclusiveness
7. Freedom and autonomy	
8. Trust	
9. Sustainability	
10. Dignity	
11. Solidarity	

The comparison above confirms, that our initial model already captured the most relevant (by frequency of appearance in literature) six ethical dimension. Thus, we analyze the dimensions 7. – 11. from the table above in more details, considering the extension of our initial model.

Discussion on addition ethical dimensions

Freedom and autonomy refer on one hand to positive (granting) freedom, such as empowerment or freedom to withdraw consent, on the other hand the term refers to negative (inhibit) freedom, such as manipulation or surveillance. We believe that aspects of freedom, in the sense mentioned above, positive as well as negative, are covered especially throughout the dimensions of transparency, privacy and security, as well as others.

Trust we believe, is not necessarily an ethical dimension. Trust or Trustworthy we regard as a natural consequence of the ethical dimension model, where all six dimensions contribute, but most significantly the dimension of transparency. Having transparent systems, leads to understanding the system and only things understood humans can and will trust.

Sustainability, Dignity and Solidarity are rather values of humanity that shall be strongly considered in scenarios aiming towards Artificial General Intelligence (AGI), defined as the Artificial Intelligence on par with Human Intelligence. AGI is beyond the scope of this paper.

In conclusion, the initial six ethical dimensions are appropriate for an ethical assessment of an Artificial Intelligence System.

Applied ethics to AI

Applying an ethical framework to any *Artificial Intelligence* systems has many facets. In an attempt to prove towards stakeholders, authorities, auditors, users and beneficiaries of the system that an ethical framework was build-in and operates as desired, it is mandatory to aim towards explicability of the system, that in turn generates the necessary trust for acceptance. Also, we claim that ethical values should be always applied and build in with a contextual awareness.

Context Aware Ethical Framework

The importance of the ethical principles mentioned above is dependent on several factors as well as on the context in which the application shall be later used. An Artificial Intelligence based system used in the medical sector to diagnose human diseases is far more sensitive to ethics compared to a recommender system, used by an online shop to suggest additional products for purchase. An often-discussed bias of Artificial Intelligence systems is the so-

called gender bias. The gender bias can result from an inadequate but rationally correct data set. A typical and recent example was the Amazon AI recruiting tool that showed biased against womeni. The bias arose as the model was trained observing patterns on applicants over a period of 10 years back. Most came from men, a reflection of male dominance across the tech industry. While this example highlights best the gender bias and many have appealed for gender neutral Artificial Intelligence, we need to be aware and treat that matter context dependent. A counter example would be the system, mentioned above, used to diagnose human diseases. In such a context the gender property is a crucial factor, at least for some human diseases, that have a diverse incidence rate or may have different symptoms for female compared to male.

In conclusion, any ethical assessment needs to be applied within the constraints given by the context in which the Artificial Intelligence system will be used. In the following chapters we will discuss how to assess the context as a level of risk and the recommended ethical dimensions to be considered at every level.

Explainability of Artificial Intelligence Systems

The other influential factor to ethics in Artificial Intelligence systems is contained it the explainability of the system, the way it operates and how it produces the outcome. As mentioned in the introduction, many Artificial Intelligence systems nowadays are regarded as a “black-box”, which contributes negatively to the usage and trust of AI systems in the wide society.

Explaining and understanding how an Artificial Intelligent System operates, depends on the level of expertise available with the receiver. For example, a data scientist may understand the system in terms of which machine learning model was chosen for the system and how the data has been prepared and used for training. While on the other hand, an applicant for a loan at the bank would like to understand the particular outcome of his scoring, after this was processed by an Artificial Intelligence System.

A more complete research on explainability of interpretability of machine learning systems, where most Artificial Intelligence Systems are based on machine learning, is given by (Doshi-Velez and Kim, 2018). The authors claim that the below list is non-exhaustive, however it should suffice to highlight the various factors that contribute towards explainability of an Artificial Intelligence system:

Global vs. Local Interpretability – Global Interpretability implies understanding the system as whole, the data, the design and training of the model, etc. Typically, it requires a certain level of expertise in the field of machine learning. The local interpretability implies solely the reasoning for a particular outcome, which should not require any expertise.

Area, Severity of Incompleteness – Especial in very complex domains interpretability becomes a challenge. For example, looking at self-driving cars as the system of Artificial Intelligence, there is a large spectrum of interpretability

Time Constraints – It should not be neglected that any user can afford a limited time to understand the explanation. The time available varies depending on the context.

Nature of User Expertise – The level of expertise of the user affects all the other three factors mentioned above. It also affects the level of sophistication that can be part of the explanation.

Conceptual model of ethics assessment for Artificial Intelligence Systems

Assessment of context

The ethical assessment needs to start early in the planning phase of any Artificial Intelligence System. At first during the goal definition stage, the product owner needs to define the impact of the system to be build. According to Bostrom et. al. (Bostrom and Yudkowsky, 2014) it is widely agreed that current Artificial Intelligence Systems have no moral status. However, the Artificial Intelligence Systems must be designed considering the human moral status, which is roughly defined by two criteria:

Sentience: the capacity for phenomenal experience or qualia, such as the capacity to feel pain and suffer

Sapience: a set of capacities associated with higher intelligence, such as self- awareness and being a reason-responsive agent

Thus, at first the Artificial Intelligence System to be designed, needs to assess for the above. As an example, in the medical field an Artificial Intelligence System that helps diagnosing humans and implicitly recommends medical treatment, can cause extreme pain, suffer or even premature death if not operating correctly. In contrast, another Artificial Intelligence System optimizing advertisements to be placed on a specific website is highly unlikely to cause pain or suffer, neither physical nor morally to any human.

In a recent published withe paper on Artificial Intelligence (Commission, 2020) the European Union, suggest a binary distinction for a risk-based approach in AI applications. Among all Artificial Intelligence Systems, some should be considered high-risk AI application when two cumulative criteria are met:

- First the Artificial Intelligence system is employed in a specific sector, considered sensitive, such as: healthcare, transport, energy, and parts of public sector
- Second, the Artificial Intelligence system is used in such a manner that significant risks are likely to arise. The assessment of the level of risk of a given use could be based on the impact on the affected parties, where significant effects are produced.

While definitions of context in which an Artificial Intelligence System can be more or less risky, are still vaguely formulated in both, legislation and scientific literature, we recommend classification of context at four levels: high-risk, medium-risk, low-risk, no-risk.

Matching the level of risks ethical dimensions result in the following matrix representing mandatory and recommended dimensions to be considered:

Table 2 : Comparison of ethical dimension models

Level of risk: *Example:*	No risk *Ads optimizer*	Low risk *Product recommendations*	Medium risk *Loan application*	High risk *Human medical diagnosis*
Ethical dimensions:				
Transparency				
Fairness				
Reliability and Safety				
Accountability				
Privacy and Security				
Inclusiveness				

We expect in near future, a legislative format, that would classify Artificial Intelligence Systems more accurately in risk categories. Therefore, we recommend considering all ethical dimensions in every AI System. Beyond the legislation, a well implemented ethical assessment, increases the quality and the adoption of every Artificial Intelligence System, as it becomes more trustworthy.

Applied Ethics at every stage of the development lifecycle

While many, intentionally or not, associate the development of Artificial Intelligent systems based on tabular data, with traditional software development, in reality the development stages are significantly different. The abstract SDLC model can be applied to both, traditional software development and Artificial Intelligence systems, however the phases differ substantially. Most Artificial Intelligence implementations rely upon Machine Learning techniques, thus the specific term found in the literature is *Machine Learning Lifecycle (MDLC)* or *MLOps*. In his paper (Qian *et al.*, 2020) the author exemplifies five phases of ML lifecycle:

1. Specification
2. Design
3. Development
4. Deployment
5. Audit

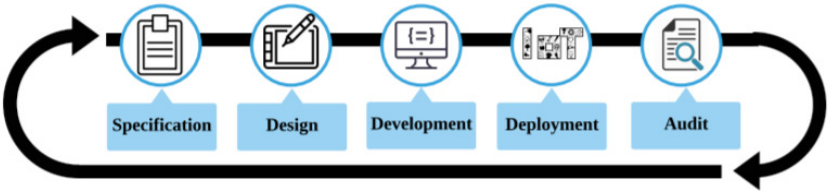

Fig 2: Development stages defined by (Qian *et al.*, 2020)

Another way to look at modern, cloud-based Machine Learning lifecycle is described by (Hummer *et al.*, 2019). The author also compares the classical application lifecycle to AI Application lifecycle and highlights key differences in the table below.

Table 3: Comparison of Application Lifecycle Classical vs AI by (Hummer *et al.*, 2019)

Classical Application Lifecycle	AI Application Lifecycle
Requires dev / ops skills	Involves more diverse skill sets
Relatively short running	Long-running, resource intensive
Human speed (low change frequency)	Continuous (re-)training
Few versions of software artifacts	Huge number of models
Linear evolution of artifacts	Specialized models coexist
Configurations applied at runtime	Parameters tuned at training time
Codebase changes trigger new builds	Data/code changes trigger new builds (re-training)
Deterministic testing	Statistical/probabilistic testing
Monitoring of application performance and KPIs	Monitoring of model accuracy, drift, and KPIs

There are many other suggested frameworks in the literature. Also, the international enterprises, such as Microsoft, Google, IBM, etc. that do have solutions around machine learning and necessary tools, define their own frameworks, typically limited on the solution portfolio they offer.

Therefore, we would like to define a more generic framework for Artificial Intelligence systems, based on tabular data. The framework consists of four distinct stages:

1. Planning,
2. Data,
3. Model,
4. Deployment

Each stage is separated in several phases:

Table 4: Generic Development Lifecycle of an Artificial Intelligence System

Planning	Data	Model	Deployment
• Ideation • Scope • Requirements • Ownership	• Framing the problem • Data exploration • Data collection • Data preparation	• Choosing the model • Training the model • Testing the model • Optimizing the model	Deploy Application Monitor Performance Continuous Testing User Adoption

The ethical assessment needs to span all stages of development, and every role that participates in the creation and usage of the Artificial Intelligence System, needs to be aware of its own contribution towards the ethical framework and the assessment.

In *Table 5 : Ethical Dimension at every stage of the development* lifecycle we have grouped the ethical assessment for every stage of the development lifecycle of an Artificial intelligence system. Further we would like to detail the ethical dimensions at every stage of the development lifecycle. In doing so, we assume that the Planning stage is governed by the product owner, as well as sponsors and executives. The product owner is expected to oversee the whole lifecycle including the adoption of the Artificial Intelligence System by the users. In the *Data and Model stages* mostly Data Scientists and Data Engineers (sometimes also called Machine Learning engineers) are the roles

to work extensively on the system. Lastly, in the *Deployment stage*, data and infrastructure engineers make the system available to the end-users. In addition, application testers and user adoption experts should be involved at this stage.

Table 5 : Ethical Dimension at every stage of the development lifecycle

Ethical dimension vs Development lifecycle	Plan	Data	Model	Deploy
Transparency	Who are the users and the stakeholders of the Artificial Intelligences System and who needs to audit / understand the system? Plan for explainability towards any interested stakeholder, agency, operator, user or other third party	Data collection, preparation, mining, and other data operations, need to be documented and exposed to anybody (as defined in the planning phase)	Model selection should consider the transparency dimension, in a way that results can be interpreted by anybody (as defined in the planning phase). Implement global explainability wherever possible	Whenever possible add local explainability to every particular outcome. Available Frameworks: • LIME • SHAP
Fairness	Assess in the context of the AI System, the individuals and particular groups that may treated unequally (advantaged or disadvantaged)	Assess the data as well as how the model produces results based on: • Race • Sex • Gender identity • Ability status • Socio-economic status • Education level • Religion • Country of origin		Use available toolkits to assess fairness, such as: AIF360 (IBM) Microsoft
Reliability and Safety	Enforce documentation of sources of errors along the whole lifecycle. Ensure traceability and auditability of decisions performed by the system.	Dataset is representative and sufficient to produce predictable results.	Confusion Matrix (Precision and Recall) of the model should match the risk context highlighted in the section above	Third-party auditors and other agencies maybe interested in global explanations of the model, that can be achieved with tool like: GLMR or BRCG
Accountability	Who is responsible for the output of the system? How is the responsible party liable?	Who has authority over the data used? For personal data, is consent available?	Accountable entity needs to understand the performance of the model	Users of the system are informed about the accountability and responsibility of the system
Privacy and Security	Ensure data sources are protected. Ensure model cannot be attacked	Data sources must be protected at any time: at rest and during data manipulation. Consider also who has access to sensitive		Data sources and model should not be exposed.
Inclusiveness	Enable anyone use / interact with the system (people with disabilities, different cultures / languages, etc.) Ensure the system is well intended towards humans and societies	Is the data inclusive of minorities, other cultures, etc.?	Is the model trained for minorities, different cultures, etc.?	The system interface should be inclusive of everyone who is supposed to use the system.

Ethical Assessment by dimension at every development stage

In the planning stage all ethical dimensions need to be covered in depth. Some of the dimensions need contextual estimations while other should offer guidelines for stages to follow. Last but not least, the product owner, or an ethical expert if existent, needs to keep an overarching overview on the ethical considerations during all stages of development.

Transparency. This ethical dimension is one of the most relevant to generate trust and finally adoption for the users of the system. Transparency could be possibly also important for auditors or regulatory bodies, especially if the Artificial Intelligence System is classified as a high-risk application.

At the planning stage, in order to achieve transparency, the requirements need to include a degree of explainability or interpretability of the outcome produced by the system. This can be achievement with several toolkits, depending on the method targeted.

The data scientist, in the data stage of the development need to assess what data features will contribute significantly to the outcome and make all the knowledge available at the model stage.

When developing the model for an Artificial Intelligence system, one of the most important decision is the accuracy versus the interpretability of the model.

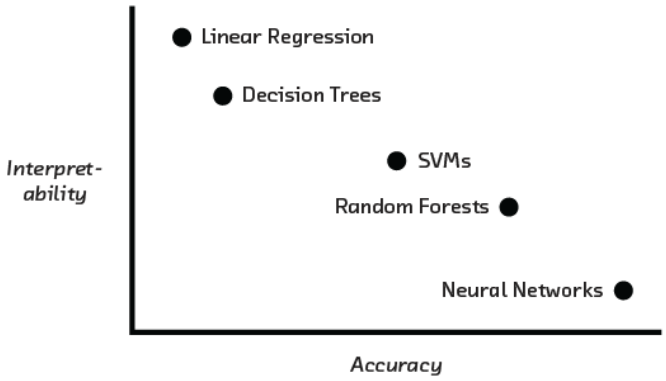

Fig. 3: Interpretability vs. Accuracy of Machine Learning Models[ii]

Last but not least, at the deployment stage explanations (typically local interpretability) need to be made available in relevant form for end-users of the Artificial Intelligence system.

Fairness. In recent years, the fairness and with that the elimination of bias has become a crucial element for any Artificial Intelligence System, especially those dealing with personal data and the classification of humans in categories, being it for loan application, CV pre-selection or medical diagnosis. Every Artificial Intelligence System needs a method of treating individuals and groups equally. Most biases that lead to unfairness, origin in the available data set (e.g. underrepresentation of a particular race or gender), or in biases after data manipulation. Another source of unfairness is the model itself, that might user correlation features that do not represent a causality. Ensuring fairness is probably a challenging task, however the following attributes should be avoided to the extend possible: *Race, Sex, Gender identity, Ability status, Socio-economic status, Education level, Religion,*

Country of origin.

At planning phase, depending on the context (e.g. medical diagnosis requires gender and probably also sometimes race for a correct diagnosis) the restriction on these features need to be part of the requirement for the developing team.

For the fairness ethical dimension, the data and model stages need to work hand in hand based on the requirements from planning and the context of the Artificial Intelligence system. All sensitive attributes mentioned above, should not be used as long as those are not mandatory due to the context. For this particular case, an explanation should be provided via the transparency dimensions.

At the deployment stage the fairness of the Artificial Intelligence system can be tested using several toolkits available. Those have risen in the last couple of years, becoming more complex, more specific and more powerful. Some of them are:

AI Fairness 360 - https://aif360.mybluemix.net/

Fairlearn - https://fairlearn.github.io/

Reliability and Safety. This ethical dimension requires a great performance in accuracy of the model. It also connects back to the explainablity of the model, the so-called global explanation, which is explaining results on the model implementation, in contrast to local explanation that would provide reason for a specific outcome. The degree of explainability for a particular model is highly dependent on the model selection. Typically, the more performant a model, the less explainable how it delivers results.

At the planning stage the product owner, together with other stakeholders or even with an ethical committee if available, should not leave this task solely to the data scientist as it needs to be considered already in the planning phase.

At the data stage, the data scientists need to make sure that the dataset is representative and sufficient to produce predictable results.

For the model, it is of crucial importance that the model does not produce erroneous results, thus a special attention should be given to the confusion matrix, including the precision and recall. Naturally, all that in the context of the Artificial Intelligence system.

At the deploy stage, attention should be paid not only to end-users but also to third-party auditors that might need to assess the system for reliability and safety. Thus we suggest to use models for globlal explainability such as:

Skater - https://github.com/oracle/Skater, or

ELI5 - https://github.com/TeamHG-Memex/eli5

Accountability. Probably the single ethical dimension that does not necessarily require a technical implementation. Nevertheless, it requires the product owner to define accountability of the Artificial Intelligence system. In common business scenarios, the accountability towards third-parties is with the company developing the system. In some scenarios, where multiple parties contribute towards a single system, accountability can become challenging and needs to be agreed (possibly contractually) early on. For example, an AI company may develop an Artificial Intelligence system (the model), based on a dataset (data) provided by a supplier, after which the system gets licensed to the final beneficiary company (deploy) that uses it with its end-customer. When an end-customer files a complain that he/she was treated unfairly by the system, who takes responsibility. The unfair treatment can happen because of the original data, the model or the deployment. Who is accountable? This example should highlight how important this aspect is, however, in most cases it can be treated similar to traditional software development.

At plan stage, the product owner together with all other stakeholders, need to ensure which entity is responsible for the output of the Artificial Intelligence System and implicitly how is the responsible party liable.

At data stage, scientists should also be aware about the dataset used. It should be also documented who was authority over the data, and especially when personal data is used, consent for the usage of data need to be available.

For the model stage, it is relevant to provide information towards the stakeholders on how the model will operate, in such a manner that responsibility and liability can be adjusted.

At the deploy stage, end-users of the system need to be made aware about who has accountability and how is this party liable.

Privacy and Security. This particular ethical dimension is to be treated similarly to privacy and security in traditional software, especially when privacy is concerned with having the user consent to use data or protection of data towards externals. However, there is a major difference in Artificial Intelligence Systems, as the data scientist and engineers need to have full access to data during the data and model stage. Access to data sources at rest and during manipulation of data needs to be strictly regulated and governed.

During the plan stage, product owners need to ensure that data sources are protected and that the models are not only protected but also robust to manipulation. For data privacy and security, existent models, such as privacy-by-design (Cavoukian, 2009) can be used. Model robustness in Artificial Intelligence systems based on tabular data does not require the complexity of such used in image classification.

At data and model stage, data scientist and data engineers are required to protect the datasets at rest and during manipulation. An important consideration is also who has access to sensitive data, such as medical records.

Inclusiveness. Everyone using the system should be able to interact with it and draw the same level of benefits from it. The system should be designed in a way that it is beneficent to any human, despite culture, race, disabilities, etc. Often the inclusiveness is misunderstood as limited to the interface. For example, early facial recognition systems

had difficulties to be used by other races than Caucasians. Therefore, inclusiveness needs to be addressed at every stage of development.

At plan stage, the product owner should assess inclusiveness based on the people who are planned to interact with the system. Especially those Artificial Intelligence systems that are meant for the wide society (consumer) this dimension need to cover, all races, all cultures, people with disabilities, etc.

For and inclusive system, the dataset needs to be inclusive and representative of all features that the Artificial Intelligence system needs to cover later.

Also, the model, needs to be trained on all the features that include minorities, different cultures and other relevant features.

For the deployment, a special attention should be given to the user interface, which needs to made available to everyone who is supposed to use the system, including minorities, people with disabilities, different cultures and languages.

Conclusion

In this paper we have presented a complete ethical assessment for Artificial Intelligence systems based on tabular data. Initially we have analyzed a minimum set of ethical dimensions that need to be considered, comparing our initial research work with other models published. We have argued why the six dimensions of the ethical model suffice to ethically assess an Artificial Intelligence system.

We claim that any ethical assessment needs to be performed in a contextual aware framework, that allows for risk level assessment first. Once the risk level is defined within the context ethical dimensions can be evaluated and applied at every stage of the development lifecycle.

In building Ethical Artificial Intelligence systems, all six ethical dimensions must be applied for every of the four stages at the development lifecycle. This method creates a robust assessment that is presented in this paper as a conceptual model, that needs further refinement and detailing in respect to the context in which the system will be used. However, the above ethical assessment and recommendations build a solid ground to design, develop and deploy Artificial Intelligence systems that fulfil the ethical standards based on current guidelines published and research literature available.

Ethics of Artificial Intelligence systems is currently in rapid and continuous development, that brings the ethics more and more into the field of engineering. This overarching discipline area is expected to grow towards an interdisciplinary field of research, to adapt ethics for the distinct types of Artificial Intelligence implementations across many application domains.

If you can't explain it simply, you don't understand it well enough. — Albert Einstein

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Support of Electronic Commercial Entities In the Conditions of Deepening Global Corona Crisis: Tax Aspect

Yuliia KOVALENKO
D. Sc (Economics), Professor
University of the State Fiscal Service of Ukraine (Irpin), Professor of the Department of Financial Markets, Ukraine, orcid.org/0000-0002-5678-3185
kovalenko0202@ukr.net
+380676865098

Nataliia BOREIKO
PhD (Economics),Senior Researcher
University of the State Fiscal Service of Ukraine (Irpin), Senior Research of Institute of Fiscal Policy (Ukraine)
orcid.org/0000-0001-5808-4823
boreyko.nat@gmail.com
+380984749415

Tetyana SKOROMTSOVA
PhD (Economics), Associate Professor
University of the State Fiscal Service of Ukraine (Irpin), Associate Professor of the Department of Tax Policy (Ukraine) https://orcid.org/0000-0002-2564-7025
Askanij@ukr.net
+380985051441

Iuliia PANURA
PhD (Economics), Associate Professor
University of the State Fiscal Service of Ukraine (Irpin), Associate Professor of the Department of Tax Policy Ukraine, orcid.org/0000-0003-3571-3513
panurajulija@ukr.net
+380672817258

Oleksandr BOREIKO
Master of Finance, banking and insurance, University of the State Fiscal Service of Ukraine (Irpin, Ukraine)
orcid.org/0000-0001-9971-684X
o.iy.boreiko@gmail.com
+380936898222

Abstract

The article reveals topical issues of improving the taxation of e-commerce entities in the global economic crisis caused by the spread of corona virus infection COVID-19. The purpose of the article is to study the current state of e-commerce in Ukraine and identify possible ways of improving taxation of activity subjects in the situation of deepening corona crisis. The article is based on general scientific methods of cognition: abstract-logical, dialectical and system analysis, induction and deduction, analogy and extrapolation, as well as logical generalization. E-commerce is a promising activity that has been showing steady growth for many years. The ability to do business online allows many businesses to adapt to new business conditions, including quarantine restrictions imposed by the spread of corona virus COVID-19. E-commerce is one of the types of economic activity, which is developing and at the same time it is also a reliable source of budget, despite the crisis. However, the economic crisis has faced with businesses in this area, so these ones need state support. The potential of e-commerce is significant. It allows its subjects to reorient its activity depending on the needs of the business environment. We should take into account this feature when we develop measures to support this area and provide conditions for its sustainable growth. The proposed measures will increase the number of online stores, turnover from operations in this area and sales of goods via the Internet, the number of taxpayers and tax revenues to the state budget, as well as reduce the amount of concealment of income from transactions.

Keywords: E-Commerce, COVID-19, Corona Crisis, Business Entities, Taxation.

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Introduction

Considering extraterritorial nature of e-commerce operations, as well as the global scale of corona crisis, many business participants have been negatively affected by pandemics and quarantines. In most cases, the risks are associated with the lack of payments under the agreements, the refusal of customers to purchase planned goods (works, services), the difficulty of establishing the supply of physical goods.

According to the Global Innovation Index 2019, in recent years Ukraine is on the list of countries with per capita income below the average and in 2019 it had second place among the 26 countries included in the sample by this criterion (out of 130 countries covered research) [3]). After all, according to experts of the International Monetary Fund, countries with low per capita incomes and developing countries will be with the highest risk zone during the current crisis [6].

During recent years, there has been seen a steady growth of the e-commerce market in Ukraine and in the world. However, the outbreak of the COVID-19 corona virus pandemic has caused a global economic crisis. And it has also affected e-commerce activities.

For most countries of the world, the problem of choosing the mechanism of e-commerce taxation to ensure the filling of the state budget is relevant. Taking into attention fact that each country has different tax regimes, respectively, and tax rates, entrepreneurs have the opportunity to produce, exchange and place their goods and services based on their value in different parts of the world (usually in more attractive tax jurisdictions) [11]. Sometimes this is contrary to the interests of the state where the entrepreneur is registered as a taxpayer and, as a result, that causes tax competition.

Therefore, in the current situation, support for e-commerce at the state level is crucial. In the absence of effective measures, supporting the domestic segment of e-commerce and the IT industry may cause increasing of shadowing of this area and outflow of highly qualified professionals abroad. This will negatively affect the filling of the state budget.

In our work, we will focus on highlighting the current state of e-commerce in Ukraine and identifying possible ways of improving taxation of the subjects of this activity in the situation of corona crisis deepening.

The Main Part

Today, e-commerce taxation issues are being discussed and tried to be properly addressed by statesmen, politicians and scientists, as the World Wide Web is perceived as a kind of interstate and international information environment. Thanking this network, completely new markets have been formed and are dynamically developing, forming an independent segment of the world economy [16]. The latest includes e-commerce, so the authors believe that improving the mechanism of tax regulation of e-commerce with maximum consideration of its specific features is an important scientific task.

The formation of the idea of e-commerce, its subjects, ways and methods of its implementation was influenced by the works of such famous scientists as A. Summer, D. Strauss, W. Tanzi, E. Winston, W. Dick, G. Duncan, W. Zwass, I. Evod, R. Kalakota, D. Kozie. Problems of e-commerce pay attention in their scientific publications A. Koren [7; 8], A. Nellen [10], M. Papis-Almansa [11], E. Redih [13], L. Tymchenko, P. Melnyk, L. Tarangul [14], G. Yurchuk [16] and others. However, the issue of improving the taxation of e-commerce and supporting its subjects in the context of the corona crisis requires additional study. This is due to the fact that doing business on the Internet and excessive tax burden in most countries, including Ukraine, encourages its subjects to apply schemes to minimize tax liabilities, as well as to transfer economic activity to countries with a favorable tax climate.

At the beginning of 2020, before the outbreak of the pandemic, e-commerce in Ukraine accounted about 4% of the total retail market. According to the results of 2019 in Ukraine, the volume of the e-commerce market amounted more than 97 billion UAH, among them physical goods and services were sold worth more than 76 billion UAH, which is 17% more than in 2018. According to experts, in 2020 it is expected to increase volumes of purchasing and selling goods on the Internet up to over 87 billion UAH (or 15%). It is worth noting that globally, e-commerce market in 2019 amounted more than 3.3 trillion US dollars, which is 531 billion US dollars more than in 2018. According to market analysts, in 2020 sales are expected to exceed to 3.8 trillion USA dollars [12].

Of all the e-commerce sectors in Ukraine, the most common type is B2C – Business-to-Consumer, which is represented mainly by online stores and marketplaces, where goods are sold to the final consumer. The level of trust in making purchases on the Internet has strengthened and every third Internet user buys goods online [6]. With the

outbreak of the pandemic and the introduction of quarantine measures, a significant number of consumers switched to buying goods (works, services) online. Therefore, e-commerce, unlike other areas of economic activity, was able to balance and survive in a crisis, but with some losses.

The government has taken a number of urgent measures to support domestic businesses, including a partial easing of fiscal pressures (through the introduction of tax breaks and tax exemptions for supply of goods where it is necessary to implement pandemic measures, a moratorium on tax audits). etc. [2]. However, taking into account that it is difficult to estimate the magnitude of businesses and state losses due to the corona crisis, experts emphasize the need for government support for business at least for the coming years.

According to the analysis of the works of L. Tymchenko, P. Melnyk, L. Taranguland others (2008), the introduction of new taxes as an additional source of filling the budget, in particular taxes in the field of e-commerce, is quite justified.

However, this can lead to the manifestation of not only stimulating but also disincentive function of taxes [8]. An effective push for the development of e-commerce at the initial stage may be the introduction of a moratorium on the introduction of new taxes for several years (following the example of the United States), as well as non-interference of the state in the face of relevant regulatory authorities. However, it does not preclude the introduction of special tax regimes or tax benefits for businesses in the field of commerce to stimulate activity and increase tax revenues to the state budget.

The most acceptable direction for the implementation of transformations in the field of e-commerce taxation may be making some amendments to the legislation of Ukraine, taking into account foreign experience and recommendations of international organizations. This conclusion coincides with the position of the Organization for Economic Co-operation and Development, which in its document "E-Commerce: Framework for Taxation" (OECD, 1998) determines that the basic principles of taxation applied to traditional trade should be guided by e-commerce taxation. Of course, we should take into account these principles when the improvement of its taxation is carried out. However, e-commerce is a specific activity, so it requires the development of special measures with maximum consideration of its features.

Research Methodology

In the process of the research it was established that the modern system of taxation of e-commerce entities in Ukraine is based on the application to them of generally established norms and rules of taxation (Fig. 1).

However, the mechanism of taxation of e-commerce entities does not take into account a number of specific features of this type of activity, which encourages businesses to hide a significant amount of financial resources and reduce the tax base. In modern tax legislation, there are not enough effective methods of tax control, which allow to identify e-commerce entities that underestimate the amount of actual income [2]. M. Papis-Almansa (2019) notes that in practice it is difficult to ensure effective control of e-commerce, because most transactions of purchase (sale) are carried out on the Internet, and each batch of goods is almost impossible to verify [11].

In order to alleviate the negative impact of the pandemic crisis, as well as to find ways to expand the tax base and de-shadow business in the field of e-commerce, it is advisable to consider tax breaks (cancellation or deferral of VAT payments until the end of 2020), preferential lending and state support for the financing of the IT industry (in particular, through government procurement for the development and provision of digital services). An effective means of support may be the introduction of tax holidays for newly created e-commerce entities (for 2 years), which will stimulate new work place creation and , will help reduce the number of unemployed in the country. As a result, in the future it will have a positive impact on filling the state budget.

It will be essential to consider measures to intensify activities in the field of e-commerce and its taxation more carefully.

A reduction of VAT rate on certain activities in the field of IT technologies, which are currently the most popular (for example, the development of software for online services (online education, on-line medicine, on-line employment, etc.)) may be a significant reduction in the impact of the crisis on e-commerce entities. State support may be an increasing (up to 50%) share of advance payments for e-commerce entities involved in ensuring the supply of goods (works, services) for state needs for the period of overcoming consequences of a pandemic.

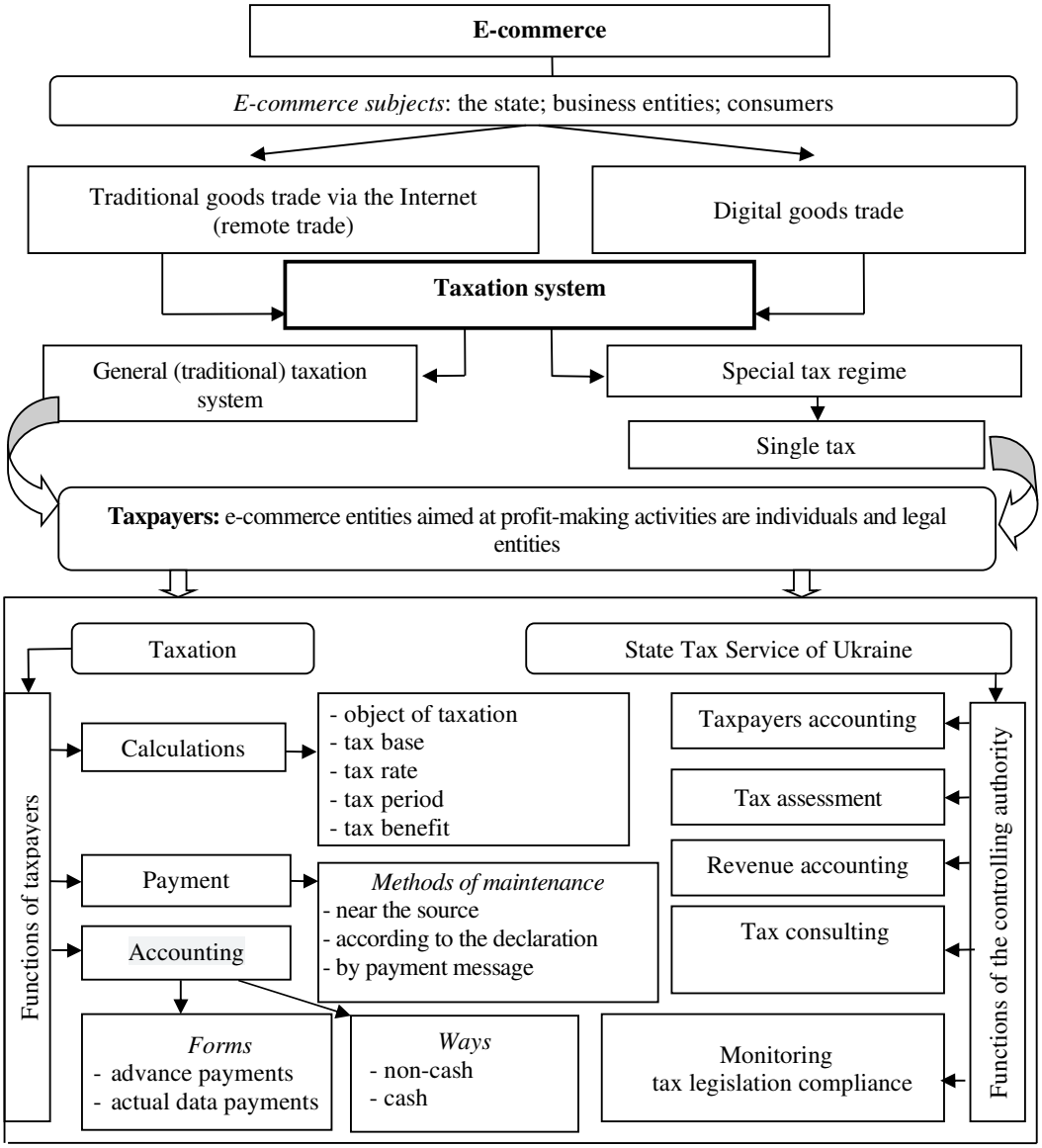

Fig. 1: The main elements of taxation the system of e-commerce entities

The development and implementation of an online system of early bankruptcy prevention (such system is successfully used in the European Union) can be a resisting way of the shadowing of e-commerce and other areas of activity.

In the future, the best option for e-commerce taxation in Ukraine could be using of alternative tax systems. The essence of this approach is to form a methodology for calculating tax base, namely the introduction of fixed indicators that will allow tax authorities to control e-commerce entities, tax revenues, and which activities will lead to filling the state budget [8].

Alternative taxes in the world are applied to those activities where there is a significant turnover of funds that are difficult to control and tax. In particular, in such countries as Turkey, Tunisia, Morocco, they are used instead of VAT on small businesses, and in Pakistan they are used instead of excise tax [1]. The application of alternative taxes prevents the relocation of significant turnovers to the shadow segment of the economy. Taking into account the specific features of e-commerce and the tendency of its subjects to conceal or underestimate the tax base, and other violations of tax legislation, this experience can be really relevant for Ukraine.

One of the alternative forms is the income tax. This tax is applied to the taxation not of the actually received income, but of the estimated (conditional) one. That means, when using this approach, the average possible (or

projected) income is taxed. Using of such tax provides assignment of each payer to a particular type of activity for whom the average rate of return is set separately. Considering Ukrainian realities, such approach is promising.

The creation of a special regime may lead to the fact that the provided tax benefits will be used as a mechanism of minimizing tax liabilities. However, the Internet itself is a driving force for the economies in many countries; therefore, the provision of such benefits can be seen as a preference from the state for rapidly developing e-commerce.

On the other hand, the introduction of new taxes for the taxation of e-commerce entities will be irrational and burdensome, as reforming the current tax system in Ukraine is aimed at reducing the number of taxes and fees. However, domestic tax legislation contains the concept of a single tax, which allows not essential changes and additions to the Tax Code of Ukraine. This will take into account the specific features of the research area, namely the development of indicators of basic profitability and fixed physical indicators of its entities. Considering the virtual nature of e-commerce, the application of this approach will verify the correctness of the calculation of the tax base of business entities; minimize their opportunities in terms of understatement of the tax base. As a result this will attract more participants having been taxed.

In addition, it will contribute to: 1) expanding the tax base, in particular, by reducing tax evasion in this area; 2) reduction of administrative costs in the implementation of control and verification measures; 3) taxation fairness. After all, such approach does not create incentives for understatement of income by economic entities but promotes taxation of income, which in other conditions may be escaped from taxation [2].

State tax policy and practical aspects of e-commerce taxation should exist as symbiotic areas and should be considered analogically. After all, improving the mechanism of e-commerce taxation is impossible without a proper understanding of the necessary methodological framework, and the last one may lead to the impossibility of implementing innovations in practice.

Results of the Research

Nowadays the Tax Code of Ukraine does not define the physical fixed indicators of business entities in the field of e-commerce and the amount of basic income that they have. But the peculiarities of the domestic tax system will allow creating an effective tool for modern taxation of such entities on the basis of the above mentioned approach. This approach has two important advantages: 1) minimal costs of tax control; 2) the impossibility of distorting the tax base by the taxpayer.

It is useful to adapt the studied approach to Ukrainian realities by introducing a special tax regime for e-commerce entities on the basis of a simplified taxation system, namely, assigning these entities to a separate (additional) group of single taxpayers with annual income with transition period: 2021 - 10 million UAH; 2022 – 15 million UAH; 2023 – UAH 20 million UAH. On the one hand, the introduction of an additional group of taxpayers in the Tax Code of Ukraine will ensure the legalization and reduction of the shadow segment of e-commerce, and, on the other hand, it will not require significant financial costs to improve taxation.

According to the proposed approach, the subject of taxation is a business entity that receives income from business activities on the Internet. Respectively, the object of taxation is the established income received by a legal entity or individual from the sale of goods (works, services) through using of information and communication systems. And at the same time, the tax base is the amount of the established income.

Therefore, it is proposed to apply a special tax regime with the following variables for payers of the additional group of the single tax, in particular, business entities in the field of e-commerce. The single tax base (TB) is proposed to be calculated as the difference between the amount of basic income, expenses and social tax benefit by the formula (1):

$$TB = I_B - Ex - B_{soc}\ , \qquad (1)$$

I_B – basic income adjusted for inflation per taxable entity; Ex – expenses; B_{soc} – social tax benefit.

I_B can be calculated by the following formula (2):

$$I_B = \frac{I}{1 + I_{Ac} - I_B}\ , \qquad (2)$$

where I is estimated fixed income, that is an income in value terms per one taxable entity; I_{Ac} is the actual inflation index; I_B is an index of inflation laid down in the budget.

Reducing basic income, in the case when actual inflation exceeds budget forecast, will allow the entrepreneur to compensate for the losses from this by reducing tax base. That is, using of formula (2) is aimed at supporting the entrepreneur, not the budget, but, paradoxically, in the future it will strengthen the country's economy.

Expenses (Ex) are calculated by applying two coefficients K_I and $K_{e\text{-}com}$ to the amount of received basic income I_B by the formula (3):

$$Ex = I_B \times K_I \times K_{e\text{-}com}, \quad (3)$$

K_I is reducing the basic income ratio ($K_I = 0{,}8$);
$K_{e\text{-}com}$ is corrective preferential coefficient of basic income of e-commerce, which is determined by the peculiarities of economic activity of e-commerce product groups and takes into account traditional goods trade (works, services) (remote trade) and digital goods trade (works, services).

The social tax benefit (STB) is calculated as following: the monthly social tax benefit is 100% of the minimum salary on January 1st of the reporting period (on January 1st, 2020 it was 4,723 UAH). If the minimum wage does not change during the year, the STB = 4 723 × 12 UAH, and if it changes, the social tax benefit will be calculated by the formula (4):

$$B_{soc} = \sum_{th}^{n} S_{th} \times n_{th}, \quad (4)$$

S_{th} is the minimum salary for n_{th} months.

It is proposed to apply a transition period for the single tax rates for a separate group of taxpayers, in particular, business entities in the field of e-commerce: 2021 - 20%; 2022 - 18%; 2023 - 15%. On the one hand, the proposed reduction of the single tax rate to 15% of the potential income of e-commerce entities will reduce the level of tax evasion and reduce the shadow segment of the economy; on the other hand, it will ensure the economic efficiency of this tax. After all, excessive tax pressure encourages businesses to look for gaps in tax legislation and use various schemes of tax evasion, reduce or stop business activity [2].

The single social contribution is calculated on the same tax base as the single tax for single tax rates for a separate group of taxpayers.

Basing on research by Russian scientists L. Frolova (2009) and A. Koren (2007; 2011), it can be argued that the analysis of e-commerce indicators is quite difficult because there are problems with collecting data on the enterprises' activities, their income, quantity and type of products etc. This is often due to the fact that e-commerce is a relatively new activity and is used by most companies as an additional way to market or promote products. The latest ones do not carry out separate accounting of transactions occurring on the Internet, which makes it difficult to obtain reliable data.

In general, the application of the proposed measures to support e-commerce in the context of the economic crisis will contribute to the further development of this area, increase the number of online stores in Ukraine, turnover from operations in this area and sales of goods via the Internet, increase the number of taxpayers and tax revenues to the state budget, as well as reduce the amount of concealment of transactions' income.

Conclusion

During recent years there can be seen a steady growth of the e-commerce market in Ukraine and in the world. However, the outbreak of the COVID-19 corona virus pandemic has caused a global economic crisis. And it has also affected e-commerce businesses.

In the context of the above mentioned the formation of an effective system of e-commerce taxation, which would take into account the specific features of economic activity on the Internet, is one of the urgent issues closely related to increasing revenues to the state budget and Ukrainian development. The developed measures should be aimed at filling the state budget, because the socio-economic situation of the country's citizens depends on the timely tax payments. Introduction of tax holidays, preferential crediting of the industry, increasing (up to 50%) share of advance payments for e-commerce entities involved in the supply of goods (works, services) for the state,

government orders for the supply of goods (works, services) by entities e-commerce, in particular the IT industry for the period of overcoming the effects of the pandemic, will be a stimulus for work place creation, and thus contribute to reducing the number of unemployed in Ukraine, which in turn will have a positive impact on filling the state budget.

In the case of stabilization of the crisis related to the COVID-19 pandemic, it is worth considering the possibility of introducing an alternative tax system for e-commerce entities, which, according to the analysis of the scientific literature, are successfully applied to those activities where there are significant turnover difficult to control and tax.

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Multiagent Search for Extremes on A Defined Infrastructure as A Tool for Regional Sustainability Analyzes

Josef BOTLÍK
Silesian University in Opava, School of Business Administration in Karvina, Czechia botlik@opf.slu.cz

Milena BOTLÍKOVÁ
Silesian University in Opava, Faculty of Philosophy and Science in Opava, Czechia, milena.botlikova@fpf.slu.cz

Abstract

Current trends in regional analyzes require highly demanding mathematical and statistical calculations. This fact is due to significant amount of data and classification of economic systems as „soft systems“. Due to the fact that in these systems there are a number of factors, the structure of which is not precisely defined, the data are vague and incomplete, it is necessary to look for more effective analytical tools. At present, the characteristic feature of regional analyzes is the prediction of sustainability (sustainable region, sustainable processes). One of the dominant sectors influencing sustainability is tourism, which significantly affects the values of economic, social or environmental factors. These effects are due to increased movements of subjects in space and the subsequent action of subjects in preferred destinations. Transfers to these destinations are conditioned by the values of the significance criteria, autonomous entities choose the destination according to preferences, i.e. the entities try to maximize the values of their preferences, especially the quality of life. (Xu, et al., 2020; McGrath, 2020). Grouping of subjects in destinations leads to a change of environment. Changes in the values of preference factors may occur. Autonomous entities will define new criteria for maximizing the values of their preferences, therefore it can be assumed that there will be a change in the significance of destinations and the transfer of entities to other destinations. As a progressive tool for mapping infrastructure and finding local extremes, which quantify the requirements of entities and serve to identify the movement of autonomous entities, at present, characterized by a high degree of use of ICT (Industry 4), artificial intelligence and autonomous systems based on a multiagent environment appear. According to (Reis, 2020), artificial intelligence (AI) is at the heart of academic and public debate and an important progressive tool. The authors conducted an extensive literature search and examined the impact of AI on European Union (EU) policy. Multiagent approaches to the analysis of sustainable development are presented, for example, by studies (Pons-Pons, et al., 2012), the authors present a georeferenced agent-based model.

Keywords: Tourism, Artificial intelligence, Multiagent systems

Introduction

Within socio-economic structures, the individual is confronted with a set of factors on the basis of which he decides in his behavior. The goal of an individual's behavior is usually to change his location with respect to the values of preferred socio-economic variables, such as job availability, safety, air quality etc. On the contrary, the individual's position in the environment will affect the values of socio-economic variables. The change of location is performed by the individual by changing the position along the selected trajectory, while from the point of view of the time horizon between the change of location it is possible to choose trajectory along physical infrastructure (roads, regional borders etc.) or virtual infrastructure (minimum distances, region significance, etc.). In the case of virtual infrastructure, different criteria are placed on the availability of trajectory points than in the case of physical infrastructure. Virtual infrastructure expresses connections between elements of infrastructure independent of the physical interconnection of elements, such as the inclination of municipalities to the superior state unit (for example using the European classification NUTS or LAU nomenclature), change of position is related to a longer time horizon.

The behavior of individuals in this environment is the behavior of autonomous systems that make decisions based on the environment in which they are (state of the environment), relationships with the environment and environmental parameters (state of the environment) depending on the states in which autonomous individuals are located (state of autonomous system). The state of the environment and the state of the environment can be affected

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by the state of other autonomous elements. As part of meeting the needs of entities, there is a regrouping of entities in elements using different infrastructures, which again changes the values of socio-economic factors. These findings are confirmed in almost 10 years of research (Aksay et al., 2020ú where bird flows are investigated using AI based on spatial distribution and environmental needs. From the above, it is possible to specify the basic requirements for creating a model for monitoring and predicting the behavior of autonomous systems on a selected infrastructure.

For example, a study (Olsavszky, et al., 2020) states that standard time series analyzes cannot be performed for analyzes at NUTS2 level due to the complexity of basic techniques and is a machine learning method for these complex data regional analyzes. It is obvious that it is necessary to define the infrastructure as an independent environment that uses selected factors to modify its structure and parameters, used by autonomous systems. This can be achieved by defining infrastructure elements, without defining links. Links in the environment are variables that are defined as a pair of neighboring nodes based on belonging to a selected factor, in other words a combination of factors, respectively. In this case, autonomous systems can be implemented using multi-agent systems, where the set of agent states, the set of available stimuli, the set of available actions that the agent can perform, but also the set of system states and the system environment are decisive for the agent's behavior.

The use of significant regional information better reveals an identifiable area of the image and contributes to the recognition of human behavior (Tan, 2020). The priority action of an agent is to move around the selected infrastructure in the direction of a positive change in the value of a certain factor in order to maximize profits depending on the competition of other agents and the current state of the system. Maximization of the profit from the selected factor is indicated by the trajectory to the local or global extreme of the quantity. This section should follow keywords. This section should provide background of the study and highlight research motivation.

Methodology

For processing a similar type of task, it can be further assumed that there is a large set of subjects who have target behavior dependent on states, environment and stimuli, and there is an environment of these subjects in which they are embedded and which also change their state. For this type simulations can be used. Simulation is used in cases where accurate mathematical quantification of reality is very difficult, or is almost impossible or even excluded. Creating models and simulating the operation of modeled systems are a basic approach to the analysis of multiagent systems. The monitored system is examined by means of a model, its reactions to input stimuli are determined and an analysis of its behavior is performed. The simulation is used as a tool in regional analyzes of sustainable environment by a large number of authors, for example, the study (Jia, et al., 2018) uses simulation for analyzes of spatial and temporal changes in land use based on conventional natural and socio-economic indicators.

The combination of simulation, modeling and multi-agent approach can effectively predict flows, which is confirmed by a study (Han, Huang, 2020), in which the authors literally state that existing methods of predicting traffic flows cannot fully reflect the real-time situation, therefore in this study based on in-depth learning. A simulation is an imitation of an objective reality, state, or process. Simulation generally means displaying selected key features or monitoring the behavior of selected systems, in order to analyze knowledge about their operation, in other words to optimize performance or maximize profits. In a given objective reality, only a certain part of the reality formed by a bounded system (infrastructure of the state, region, etc.) is essential, which will enable the defined system to be simplified and appropriately represented.

The model, which is an abstraction of the system or reality, can then be described using available, distinguishable elements and connections, or elements and states. In the analytical phase, a discrete system is assumed, the number of autonomous objects is integer, also the values of attributes of infrastructure elements change stepwise (if they are described by a continuous function, the values on the time discrete axis are identified). In the case of the movement of autonomous systems on the selected infrastructure, the defined problem is the identification and reachability of the extreme in the infrastructure by the autonomous individual (optimization of the profit from the selected quantity for the subject).

The problem is defined as finding a path on a selected infrastructure with a non-decreasing value of the selected attribute on the next infrastructure node. The simulation model must include infrastructure generation and quantification using data series, determination of logic for the behavior of the subject when passing through the infrastructure and in competition with other entities. Back-validation of the simulation can be performed on historical macroeconomic data. Changes in the simulated system can be expressed by a change in the state of the autonomous entity (including a change in position), a change in infrastructure parameters (a change in an attribute or an attribute value) in a time series. Timed passes are performed sequentially, yet multiple events and agents can

be identified at the same time. However, there is a problem of synchronization and ensuring the correct sequence of events.

Due to the complexity of macroeconomic simulations, samples of available objective realities (scenarios) are generated for the model, it is not possible to enumerate all possible states. If a model is to be created and to simulate system based on agents, especially a multiagent system, it is necessary to use the agent as an element of the modeled system. However, this may conflict with the definition of the environment as a system in which autonomous elements move independently. Therefore, it is appropriate to distinguish between the subsystem of autonomously moving entities, that is, elements that change their internal state and performing actions according to their own decisions, aimed at meeting one of the objectives and the environment subsystem, as data carriers for autonomous elements.

Agent theory

A an agent can be defined as an entity designed to continuously and autonomously fulfill goals in an environment that affects the conditions leading to the fulfillment of goals and causing the agent to change from the current to the target state. Thus, the agent is determined by the environment in which he operates, as well as by the mission and the resulting target behavior, to meet the goals he can have a certain amount of intelligence that is used to solve problems. Multiagent systems (MAS) are those systems where more than one agent moves in the environment, they can be described as a group of discrete, loosely interconnected autonomous systems (agents) that cooperate or compete to achieve a common goal. Multiagent issues are related to social behavior, such as the ability to form groups based on common interests. The MAS is therefore characterized by the cooperation of agents, conditioned by mutual interactivity, based on mutual communication. It is necessary to define and create means for this communication. The agent can be more generally understood as a hardware or software system that is autonomous, social, reactive, proactive, while autonomy we understand the ability of the agent to work without human intervention, the ability to control his reactions and communication and modify the internal state on this principle. Social adaptability is the ability of an agent to interact with other agents using a language designed to communicate with agents. The ability of social behavior is given by the ability of agents to form social bonds in order to achieve common goals, to maintain information about other agents and to form judgments about them, to form coalitions and teams from which they expect mutual benefit. A necessary condition is the ability to adjust the view of the surrounding world in the model, based on changing interrelationships. The agent also behaves rationally, which is action aimed at achieving his goals, not to disappoint. An agent works in a certain environment, an environment we call everything that an agent comes into contact with, including other agents.

A standard system approach applies to the definition and identification of an environment, so the environment can be fully or partially observable, depending on whether the agent can monitor and recognize its complete state. Furthermore, the environment can be static or dynamic, with the static environment changing only through the actions of the agent. A static environment can be understood as an environment with a fixed structure, even if the attributes of the elements of the structure change in the environment. The environment can be further understood from the point of view of states and actions, we distinguish between deterministic environments, resp. nondeterministic, while in a deterministic environment the state is given only by the previous state and the action performed. The environment in which the agent operates is given by the Agent system. The result of the agent's activity is the change of the agent system from the current to the target state, caused mainly by examining the system, searching for internal laws, gaining new knowledge and subsequent gradual transformation to the desired state.

An environment in which several agents operate is called a Multiagent system, it can be described as a group of loosely interconnected autonomous systems (agents) cooperating in order to achieve a common goal. The communicating agent can use strategies in the system that select actions from the action database and determine which action will be performed in response to the current state of the environment. It is obvious that the strategic approach is an extension of parallel processes with the possibility of choosing the dominant strategy, ie the strategy that is best for the agent, independently of the chosen strategies of other agents. In most cases, agents make decisions based on their knowledge. Then we talk about the so-called rational agent. A rational agent always chooses a dominant strategy. Thus, agents can influence each other's behavior within strategies, perform their actions in harmony with others, act against others, or be neutral and not interfere with the activities of others.

Tools for working with infrastructure

In the first phase, it is always necessary to determine the environment for the functioning and interaction of subjects. If a fixed infrastructure is defined in the system (eg roads in the road network, etc.), these "corridors" can be used for the movement of the subject. Depending on the level of differentiation, movement within the corridor

can also be understood as movement in the sub-infrastructure. To minimize the effects of system composition and decomposition, or changes in the resolution level of the system, it can be generalized that the infrastructure indicates the existence of a link of the appropriate type between two nodes, allowing movement between system elements. Binary incidence and relational matrices can be successfully used as a tool for indicating links in the system.

This shifts the recording of the environment system to two levels. In the first level, the selection of available elements of the environment is made, which will form the infrastructure nodes and which will set the basic resolution level. Nodes are recorded in a relational node-node matrix. The environment is further characterized by a set of factors belonging to individual nodes. The factor values are assigned to each node as a set of vectors. Based on the selected relevant factor, the relevant physical or virtual infrastructure is generated in the second level, due to the possible scope of the system, the infrastructure is unrated and can be recorded by a binary matrix. If the links between nodes are known at the level of individual factors, the relevant type of infrastructure is determined (existence of a road, existence of a railway, geographical proximity of municipalities, affiliation to a superior node or geographical location using GPS). The set of generated bonds is then stored in layers in incidence and relational matrices or by weight combinations for combinations of factors. Simple agents can be used to generate the infrastructure, with the logic {"does the current node have bindings?", "Does the number of bindings correspond to the required structure density", "is another node available?", "Does the new edge match the conditions", "was the edge already registered", "Edge enable", "edge rejection", "edge shift"}.

If the infrastructure created exists, a precedent-setting phase will occur. Precedence's are recorded in a binary precedence matrix and record the increase or decrease in the value of the relevant factor (or a combination of the values of several factors) in places with existing infrastructure of the relevant type. The values are compared in the immediately adjacent nodes (with the first precedent). The independence of the environment and agents makes it possible to calculate multiple precedence's based on the identified first precedents, enabling agents to "see around the corner", i.e. to identify the direction of increase of the value of the relevant factor between more distant nodes. There are agents in the environment who select the available infrastructure based on their priorities. The goal of the behavior is to move to a node with a higher value in the desired factor or combination of factors. These nodes can be local extremes, and agents begin to cluster in these extremes.

Based on clustering in nodes, it can happen that the agent is rejected by the node and moved to another node than the defined local extreme. In this way, the agents find and occupy even more distant extremes. At certain time intervals or at the initiative of the node (for example, after a certain number of rejected agents, etc.), new values of factors in the nodes are calculated, based on the demand of the agents and their interest in the node. Subsequently, based on the new values of factors, new precedents and regrouping of extremes will be calculated, which leads to a new movement of agents. Recalculations in nodes take place on the basis of the lucrativeness of socio-economic parameters, for example, with a high number of agents, the value of "safety" factors decreases or the value of the "labor availability" parameter increases, etc.

Theoretical design of agents' work

The standard search algorithms are designed to explore search spaces systematically. This systematicity is achieved by keeping one or more paths in memory and by recording which alternatives have been explored at each point along the path. When a goal is found, the path to that goal also constitutes a solution to the problem. In many problems, however, the path to the goal is irrelevant. When identifying critical points, the path to the destination does not matter, another class of algorithms can be considered that do not care about the paths at all.

Local search algorithms operate using a single current node (rather than multiple paths) and generally move only to neighbors of that node. Typically, the paths followed by the search are not retained. These local search algorithms are not systematic, however, are less demanding processing and usually identify acceptable solutions in large or infinite (continuous) state spaces, characteristic of the infrastructure. Local search algorithms explore analyzed landscape. A complete local search algorithm always finds a goal if one exists; an optimal algorithm always finds a global minimum/maximum.

The modified "hill-climbing" search algorithm (direction-ascent version) was used for search. It is a loop that continually moves in the direction of increasing value. It terminates when it reaches a "peak" where no neighbor has a higher value. The algorithm does not maintain a search tree, so the data structure for the current node need only record the state and the value of the objective function. Hill climbing does not look ahead beyond the immediate neighbors of the current state.
The modification of the algorithm is as follows. If there are multiple paths from a node, the path to the node that has precedence in the higher power matrix is selected. If there is a match for multiple nodes, the path leading from the

selected node to the node with the highest multiple precedence is selected. In case of a match, the selection is random.

Figure 1 shows the analyzed theoretical regional infrastructure. Graph nodes are regional entities that are characterized by the values of the factors on the basis of which agents increase their benefit (they maximize the benefit by searching for the entity with the highest value of the factor that is of interest to the agent). In the figure, the maximization factor values for nodes 2 and 5 are 100 and 120. It is clear that the benefit maximizing agent will try to reach node 5. To simplify the analysis, agents do not use absolute values when making decisions, but use ratio assessment (binary logic), where the agent proceeds through the individual nodes in the direction of increasing the value of the maximization factor. The increments are stored in a precedent matrix, where for a given row element the value "1" is stored in the column if the row element (node) has a lower value of the maximization factor than the column element. In Figure 1, the growth directions are indicated by the oriented edge.

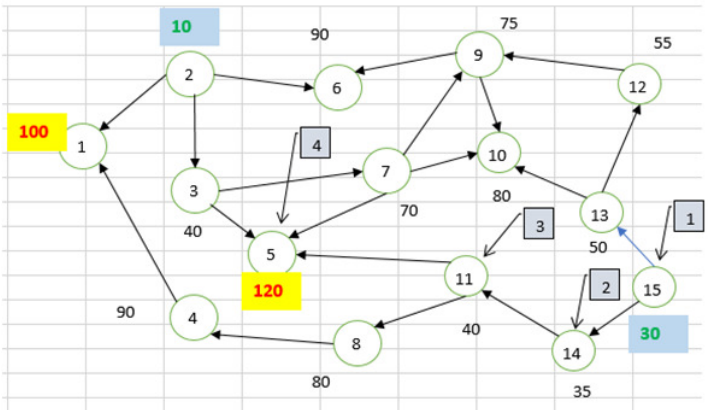

Fig 1. Regional infrastructure as a network graph

The example shows that the agent is unable to recognize the global maximum and identifies local maxima as pseudoglobal maxima. In Figure 1, the agent would not distinguish the significance of nodes 2 and 5 and would not identify the exchange of maxima when swapping factor values (100 <-> 120). For better agent orientation, multiple precedents are calculated, (powers of the precedence matrix) identifying paths equal to the power of the respective precedence matrix. These matrices (Figure 2), when inserted into the agent's memory, allow the identification of reaching the global (or one of the pseudoglobal maxima) if it reaches any local maximum (the agent compares the path length to the reached local maximum and the pseudoglobal maximum).

The example shows the passage of an agent coming from node 15. In the case of a simulation, the autonomous agent will pass through the nodes in the order: node 15, node 14, node 11, node 5. Through this pass, the agent reaches the local maximum. The logic of the passes is shown in Figures 2 and 3. In the first step, the agent decides between the path to node 13 and 14. (Figure 2, single (first) precedence's matrix). In the first logic, the agent looks for a node to which there is a longer (arbitrary) path. There is a path of length "1" from node 15 (red bounded line) to both nodes, there is no longer path (dashed areas in all matrices do not contain the value "1"). Because the first logic did not determine the direction of motion, the agent follows the second logic. The agent searches for the longest path from nodes 13 and 14 (green bounded line). The higher value is in line 14, where there is precedence in the quadruple precedence's matrix. The agent therefore chooses a path to node 14. From node 14, the only path leads to node 11, the agent does not use logic.

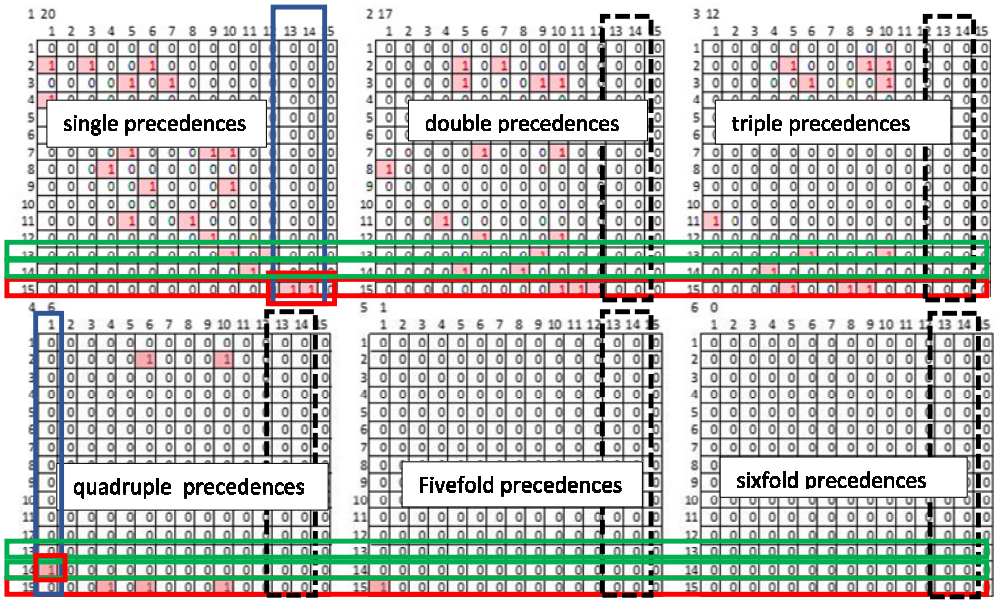

Fig 2. The first logic of an agent in precedent matrices

At node 11, the agent decides between the path to node 5 and node 8 (Figure 3). The agent indicates that the longest path of length 3 (triple precedence matrix, figure 3) leads to node 5. A path of length 3 also leads to node 8, but is part of the path on which the agent is located. The agent chooses the path to node 5. There is no path from the node, the agent found a local maximum, if we take into account the reachability of local extremes, then he found a pseudo-global maximum.

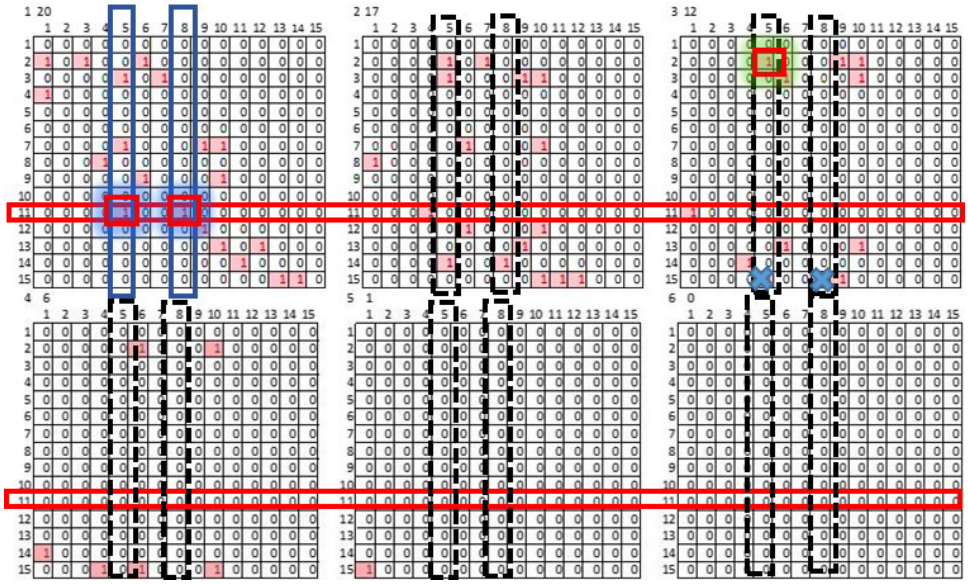

Fig 3. The second logic of the agent in precedent matrices

Conclusion

The paper outlined the principles of possible creation of a multi-agent system, which would serve to simulate the behavior of the human population in real space with a variable infrastructure that provides various links in the system. From the point of view of system creation, it is a set of structures recorded using a universal tool, incidence and relational matrices. For the movement of agents across the infrastructure, the links between nodes are

transferred to sessions, the direction of growth of the analyzed variables in the system is determined based on the availability in the generated infrastructure. For work with an oriented system, a matrix apparatus is again used, incidence and relational matrices of precedence are used, so-called precedent matrices. A group of agents whose goal is to maximize profit based on a selected factor, resp. groups of factors. Agents that map (create) infrastructure can also be involved in the system to prefer areas of greater importance. The system is in the stage of theoretical design, in no case is it a final design and it cannot be ruled out that some of the mentioned procedures and proposals will not be feasible or are a "blind way".

Some authors (Malik, et al. 2020) see multiagent systems and artificial intelligence as powerful tools, which, however, need to be supplemented by other tools in the future, for example through Fuzzy logic. Despite the fact that environmental factors are important factors influencing the competitiveness of a destination and are positively linked to the economic performance of developed destinations, the link between environmental competitiveness and tourism growth in less developed destinations appears weak and insignificant adaptations (Zhu, et al. 2020). It is therefore necessary to prioritize the identification of essential infrastructure as an important parameter of the intensification of structural regional analyzes. Despite these facts, analyzes of sustainable tourism must also be based on scattered multilevel interactions and feedbacks, leading to organizational processes that improve the identity of entities, regions and competitiveness, in particular through effective multilevel coevolutionary adaptations (Zhu, et al. 2020) based primarily on determinants. intentions, experience, systemic approach and social responsibility.

The presented methods of identification of local extremes were used in the project as a starting point for identifying the creation of critically exposed places that may negatively affect the sustainability of the region and the sustainability of tourism. At present, it is a concept that significantly intensifies research procedures and which can be used to identify and simulate the negative and positive effects of entities involved in tourism in the region.

The multiagent approach based on binary precedent identification currently shows weaknesses, when in some cases it cannot identify real global extremes, it identifies pseudoglobal extremes based on global identification with respect to the environment. Previous studies have also shown that multiple precedents need to be interpreted in relation to local minima and to determine the longest paths to local maxima for these minima (length of the path already traversed). When identifying multiple precedents related to local maxima (length of the longest, still existing path from a selected location to available local maxima), it can lead to misinterpretation of autonomous movement conditions because it replaces the maximum benefit criterion for the criterion of the frequency of occurrence of the maximum benefit value.

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Social Potential in The Conditions of Digitalization of Economy and Society: Evaluation and Opportunities for Development

KNIAZ SVIATOSLAV
Lviv Polytechnic National University, Lviv, Ukraine, 79013
E-mail: svkniaz@ukr.net

STARUKH ANNA
Ivan Franko National University of Lviv, Lviv, Ukraine, 79000
E-mail: a_starukh@lnu.edu.ua

SHEVCHUK IRYNA
Ivan Franko National University of Lviv, Lviv, Ukraine, 79000
E-mail: i_shevchuk@lnu.edu.ua

SKUPEIKO VASYL
Lviv University of Business and Law, Lviv, Ukraine, 79021
E-mail: vasyl.skupeiko@ukr.net

HALAZ LINA
Lviv Polytechnic National University, Lviv, Ukraine, 79013
E-mail: halaz.l@gmail.com

KRAMAR RUSLANA
Lviv University of Business and Law, Lviv, Ukraine, 79021
E-mail: ruslana.kramar@ukr.net

MOSKVYAK YAROSLAVA
Lviv Polytechnic National University, Lviv, Ukraine, 79013
E-mail: slavakohanec1201@gmail.com

OGIRKO IGOR
Ukrainian Academy of Printing, Lviv, Ukraine, 79020
E-mail: ogirko@gmail.com

SMIRNOVA KATERYNA
Odessa State Environmental University Odesa, Ukraine, 65016
e-mail - katerynavs80@gmail.com

RUSYN-HRYNYK ROMAN
Lviv Polytechnic National University, Lviv, Ukraine, 79013
forvardroman@ukr.net

KOZAKEVYCH OLHA
Ivan Franko National University of Lviv, Lviv, Ukraine, 79000
olgakozakewycz@gmail.com

Abstract

The article is a study of social potential in the context of digitalization of the economy and society and a consideration of its opportunities for development. The study establish that the economy digitalization is one of the most widely discussed aspects of the global socio-economic process, which has numerous, multifaceted and diverse manifestations. The fact, that the growth of digital technologies entails an exponential increase of quantitative and qualitative integration changes in the society communication system is noted. It is stated that American scientist N.

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Negroponte proposed the term “digital economy” in 1995. The article clarifies that researchers identify five areas of digital technologies impact on economic activity and indicate their areas of implementation: the Internet of Things, Big Data, innovative 3D printers, the economy of sharing. It is stressed that the global trends of digitalization of national economic systems are the development of technologies for microelectromechanical systems (MEMS), cognitive robotics, computer-aided design (CAD), mechatronics, high-precision instruments, supersensitive sensors, signal preprocessing, cloud data, Internet. The article considers that the areas of digitalization of the economy impact on social potential are as follows: the labor market, online educational services, cybercrime and business. Digital technologies and products currently considered innovative trends in the modern socio-economic environment as the most promising for the development of social society potential are presented. The process of digitalization of goods and services production has not only technological advantages, such as a new industrialization on a digital basis, increasing the competitiveness of economic entities, etc. Despite the importance of digitalization of the national economy, public authorities should not forget that the main vector of its development is the socialization of the economy, its fulfillment, first, the social functions to ensure the welfare of households and the whole society through effective use of digital information technologies. That is why the development of various legal acts, that will implement digital technologies in public life and at the same time protect the rights of citizens, deserves special attention.

Keywords: Digitalization, Digital Economy, Society, Social Potential.

The topicality of the research problem

Currently, the digitalization of the economy is one of the most widely discussed aspects of the global socio-economic process, which has numerous, multifaceted and diverse manifestations. The base of it is the deep penetration of digital technologies, i.e. the use of hardware and software for the collection, processing and transmission of digital information in all areas of economic activity and social relations [8, p. 951]. Estimates of the economy digitalization phenomenon are ambiguous, but researchers agree that its study is essential and only scientific understanding can achieve a harmonious combination of technical and technological progress and socio-economic life. That is why the study of social potential of the economy and society digitalization is extremely relevant.

Analysis of recent studies and publications

The digital economy as a new socio-economic system based on a new technological opportunities is the subject of many works of futurists and philosophers. A significant number of works ensuing the specific goal to reveal the causes and repeat the success of companies that use new business models are devoted to this problem. Among the foreign authors dealing these problems are H. R. Varian (1992), T. Pearson (1994), A. Goldfarb (2013), S. M. Greenstein (2013), C. E. Tucker (1998), K. Schwab (2017) and others. A large amount of research is conducted under the auspices of international organizations (e.g., OECD), national research institutions of different countries and initiative groups (e.g., MIT Initiative on the Digital Economy, IDE). Ukrainian economists are also actively involved in creating the conceptual apparatus of the institutional palette of systems research in the digital economy. Among them are V. Groysman, V. Heitz, N. Heorhiadi, A. Hrytsenko, Y. Zaitseva, S. Kniaz, S. Kubiv, O. Moskalenko, R. Skrynkovskyy, T. Yefimenko, V. Yuzevych and others [1–28]. However, at the same time, a significant number of problems regarding the vision of the digital development of the economy and society concept remain insufficiently solved.

The aim of the study is to analyze the social potential in the context of digitalization of the economy and society and to identify opportunities for its development.

The object of the research is the social potential in the conditions of economy and society digitalization.

The subject of the research is the digitalization of the economy and society.

The principal material statement

Digitalization is, first, a procedural phenomenon. Today, the exponential growth of digital technologies entails an exponential growth in the quantity and quality of integration changes in the society communication system. The emergence of technical means such as the Internet and mobile devices allowed members of society to be in constant communication with each other is the first step in digitalization as well as a harbinger of global modifications of social institutions and the total vector of society development [16, p. 37].

The term “digital economy” was proposed in 1995 by American scientist N. Negroponte (1995) [17, p. 44], but, despite more than two decades of its widest popularity, the meaning of the concept remains indefinite.

The digital economy, also known as the Internet economy, the new economy, or the web economy, refers to the one that is mainly based on digital technologies include digital communications networks, computers, software, and other related information technologies. In other words, the term “digital economy” refers to the convergence of computing and communication technologies over the Internet and, therefore, to the flow of information and technologies that stimulate e-commerce and huge organizational changes [15, p. 138].

There are two approaches to the concept of “digital economy”. The first one interprets it as a set of industries focused on the production of electronic goods and services based on digital technologies. Examples are distance learning, creation and implementation of media content, etc. This approach considers, in fact, a new group of products produced based on a certain technology and designed to meet both existing and new needs, formed in a noteworthy as the realization of the opportunities provided by technology. The second approach considers the digital economy as a new format of the economic environment formed under the influence of scientific and technological progress in the field of digital technologies and realizes the opportunities provided by them in all areas of socio-economic activity [20].

The development of the digital economy in the broadest sense of the word extends to the following main areas:

- financial, where digital technologies cover a fairly high share of all financial services;
- production, where its main share falls on the high-tech sector;
- trade, where Internet commerce is currently not so common;
- social, for example, health care, education, provision of other social services [12, p. 9].

The global trends of digitalization of national economic systems are, first, the development of technologies for microelectromechanical systems (MEMS), cognitive robotics, computer-aided design (CAD), mechatronics, high-precision instruments, supersensitive sensors, pre-processing of signals, Internet and cloud data, etc. These technologies provide the digitalization embodiment of production processes [10, p. 68].

Researchers identify five areas of digital technologies impact on economic activity: 1) data collection and analysis; 2) personalization and setup; 3) experiments and continuous development; 4) innovation in contracts; 5) communications and communication tools.

Implementation realms of the above areas are:

1. Internet of Things. This concept of a physical objects computer network equipped with embedded technologies allow them to interact with each other and/or with the external environment, implies that the organization of such networks can restructure economic and social processes, eliminating the need for human participation in actions and operations, more advanced concept of the Internet of Everything. Internet of Everything is the integration of people, processes, data, and things into a network leads to the development of procedures to process the vast amounts of data generated by connected objects. The basis of the Comprehensive Internet is things, data, people, and processes.
2. Big Data. This is a socio-economic phenomenon associated with the emergence of technological capabilities for the analysis of huge data sets and the transformational consequences that follow from this. The defining characteristics of "big data" are represented by the 3 V formula; the components the formula are physical volume, velocity of growth and processing, and variety of structured and semi-structured data types.
3. Innovative 3D printers. These are devices for layer-by-layer creation of physical objects based on digital three-dimensional models, which use reduces the time and effort of creating and replicating many objects, but requires a wide range of new materials.
4. Sharing economy, where people and companies organize business through digital platforms [1, p. 91].

Under the influence of digital technologies, management mechanisms and market business models are changing, value-added models are being transformed, the importance of intermediary activity in the economy is decreasing, and the possibilities of an individual approach to the creation of goods and services are increasing. The transition to the intensive use of digital technologies can have far-reaching political implications for macroeconomics.

In developed and a number of developing countries, with a rapidly growing economy, the so-called “knowledge economy” is being formed as a new economic system, as well as a new market structure, in particular, the labor market.

The knowledge economy is characterized by the following features: accelerating the aging trend of highly educated population with a median age of forty-five years, tertiary education (share – 60%), the highest integrated indicator – the human development index, average GDP per capita – 52 thousand dollars, developed digital economy, almost full coverage of the Internet – 85% of the population [3, p. 1973].

According to the framework proposed by J. Rasmussen, there are three categories of people employed in the economy: "Skill", "Rule" and "Knowledge". The classification of these categories is based on the length of the training period required to perform the relevant tasks, as well as the nature and degree of autonomy of work. Examples of occupations that fall into the category of "Skills" are operators, salespeople, drivers, security guards, support workers. To perform the labor functions of the category "Rule" requires specialized, applied training, which is typical for locksmiths, accountants, nurses, office administrators. The category "Knowledge" includes such professions as: teachers, doctors, physicists, chemists, engineers, managers, scientists [6, p. 663].

In this regard, it is important to stimulate the emergence of new segments of the economy and the development of high-tech jobs, already created in our country (only 17% of jobs belonging to the category of "Knowledge"); they would focus on knowledge, which, in turn, will stimulate the demand for professionals who meet the latest requirements of digitalization:

- possession of cognitive skills (excellent memorization of information, good skills to find, process, and transform information, the ability to draw conclusions, model and build hypotheses, apply the knowledge in practice);
- possession of social and behavioral skills (ability to interact in a team on the base of positive communication, adequately respond to stressful situations managing the emotions and emotional state, to conduct adequate self-assessment and evaluation of others, the ability to solve problems);
- possession of digital skills, i.e. the development and application of digital intelligence based on digital citizenship, in particular, for the future development of digital entrepreneurship).

Despite many discussions both on foreign and domestic scientific and technological platforms, there is no commonly accepted vision of the labor market future. There is also no consensus on the key factors that will affect future jobs and wages. Currently, most scientists emphasize that the labor market is under the impact of the Fourth Industrial Revolution focus on technological developments in robotics, neuromorphic engineering, and the creation of artificial intelligence. Some experts view the future of materialized labor in five dimensions: the future of jobs; quality of jobs; increasing inequality in wages and incomes; formation of a "new" social protection system (for example, developed countries are already conducting experiments on the "introduction" into practice so-called "unconditional income"); conducting social dialogue in a system prone to the transformation of industrial relations [14].

The development of the digital economy has a great impact on the labor market: the structure of employment is changing, there are new requirements for professional competencies, and the demand for ICT professionals is growing. Citizens employed in almost all sectors of the economy must master digital skills in work with information using modern means of telecommunications and software [4, p. 52].

With the digitalization of economic relations, new specialties and professions are emerging. There is a rethinking of the very concept of "high qualification", as the criteria for skilled work in the traditional definition is the presence of higher or specialized education and the manifestation of professional experience, skills and abilities. Nevertheless, in a digital economy, the ability to permanent adaptation to acquire new knowledge, skills and abilities is of particular importance. At first glance, these trends do not carry any negative burden, if you ignore the specific feature of the fourth industrial revolution in the labor sphere. Its essence is that it does not create many jobs in new industries. For example, in the United States, only 0.5% of employees are busy in new industries that did not exist in the twentieth century. Moreover, about 47% of jobs in the United States may become automated in the next two decades, and as a result, the relevant professions will disappear [2, p. 10]. The labor market will have a tendency to increase polarization, the essence of which is that the intensification of employment will be inherent to highly profitable cognitive and creative professions, as well as low-income manual labor and its weakening for medium-income standard professions.

According to research The Future of Jobs, published by the World Economic Forum, by 2020 the world labor market will add 2 million jobs, but 7.1 million will disappear. Jobs will appear in the intellectual and high-tech spheres, and will reduced in the real sector of the economy and administrative work [19].

In addition, an "economy on demand" model of doing business will seriously affect the labor market; this model assumes that at any time anywhere in the world the consumer can get what he wants. This model is projected on the

labor sphere. As a result, there may be a proliferation of unregulated virtual labor, and the class of workers who earn from order to order and disenfranchised will increase.

Such changes in the labor market are at odds with the existing human resources and education system and raise questions: what to do with people who have not found a place in the digital economy, as they do not have creative potential, special social and communication skills, and cannot work in conditions of uncertainty and rapid change? At the same time, in some industries the situation is changing slowly (higher education, mining and processing industry, construction); others are faster (health, transport, consumer goods, public sector, engineering, energy), but some are very fast (banking, insurance, high technology, telecommunications, media, retail, sports and entertainment). Thus, there is a kind of "digital labor trap", which will result in the emergence of so-called "digital marginals" (the people who are unable for a number of reasons to adapt to digital social and working conditions) [13, p. 16].

New jobs are being created at least in the field of IT and robot maintenance. Their number is less than the number of potentially lost jobs due to the introduction of robots in all industries. However, today there are new areas of economic activity related to digital technology and mass dissemination of information. For example, photo and video blogging, which, in fact, is not direct, but the sale of individuality, the sale of information, which, according to Pierre Levi, is synonymous with "knowledge". Moreover, ubiquitous automation, increasing productivity, leads to cheaper goods. At the same time, the purchasing power of people who lost their jobs due to the introduction of robots and failed to retrain into IT specialist or video blogger will tend to zero. This means that the goods will simply remain unpurchased and the manufacturer will suffer losses. The consequences of this economic paradox can be observed today; in developed countries, the question of the providing and receiving unconditional basic income for some members of society arise more and more often.

Another important area of digital economy development, which covers a huge number of people, is widespread free online courses. However, for a long time, distance education was only a supplement to traditional university education. The organization of online training first helps those who received education without leaving work. Modern online courses have a number of fundamental differences. The main one is that online educational platforms are focused on students. Anyone who has access to the Internet can attend such courses. The second difference is that such an educational product is not limited by the services of university courses. The main idea of such projects is that anyone can learn any necessary skill [5, p. 76].

In the context of digitalization, cybercrime is actively developing, and it poses the most serious danger to the financial sector, as mobile devices and financial mobile applications have already become part of the remote banking infrastructure. The threat is posed by smart contracts in organizations and companies that do not interact directly with money (like banks), but are close by and through them large amounts can be accessed. Thus, despite all the advantages of digital technology in the financial sphere, the threats are quite high. For fraudulent purposes, a digital resource of cryptocurrency is used; it has the properties of transactions anonymity, uncontrollability of any regulators, the lack of any collateral, and the impossibility of canceling the transaction. With the help of cryptocurrency, usually, bitcoins, conduct illegal transactions, evade taxes, and launder money obtained by criminal means. Cryptocurrency can also be used to finance international terrorism [11].

The digital age is changing the approach to making business, as well as the requirements for information technology used: 1) marketing management systems, sales and service; 2) telephony and messengers; 3) document management and personnel management systems; 4) accounting systems and many other enterprise applications. Thus, digitalization closely penetrates into most spheres of public life. Digital technologies and products that are currently considered innovative trends in the modern socio-economic environment and are the most promising for the development of social potential of society are presented in Table 1.

Table 1: The most promising for the development of society social potential digital technologies and products

Digital Technology Type	Overview of Digital Technology
BioTech	The consumption of living organisms and biological processes in production, agriculture and medicine with the use of high technologies
RetailTech	Technologies developed by startup for use in trade. These technologies include: 3D body scanning, consumer tracking by AI-enabled assistants to help retailers and consumers
LegalTech	Digital technologies in the legal field of business, specializing in information technology services for professional legal activities, and since the late 2000s also in the provision of legal services to consumers using information technology

InsurTech	The field of the latest insurance technologies to give existing insurance products a digital form, as well as to change radically the product or the process of concluding a contract for its provision in order to improve the quality of customer service
GovTech	All IT products, solutions, developments, services that help to solve public sector problems
Digital marketing	Internet marketing has evolved into digital marketing with use of comprehensive methods of on-line strategy, website development and mobile applications, creative and copywriting, contextual advertising and SMM, as well as other interactive products. The most popular forms of digital channels are search promotion; contextual and teaser advertising; media and banner advertising; promotion on social media and blogs; creation of mobile applications for smartphones, tablets and other media; viral advertising
CRM&BPM	CRM is a sales system, ready-made processes for managing all types of transactions. Bpm'online CRM combines the capabilities of a customer relationship management (CRM) system and a business process management system (BPM).
Digital insurance	Digital insurance allows insurance companies to reduce costs, increase customer service speed, provide standardization and improve the responses and services quality, establish a close relationship between the insurance company and the customer. The use of cloud platforms reduces the likelihood of errors, and the process itself becomes open and allows you to track the status of claims settlement.
ePrescription	ePrescription (electronic prescription) is carried out on the basis of 3 procedures: eCapture provides formation of an electronic prescription by a doctor of a medical institution; eTransfer is a confidential transfer of an electronic prescription to a pharmacy; eDispensation means data transfer from the pharmacy back to the medical institution, confirmation.
TeleHealth	"Digital" technologies to provide remote medical services and support the work of doctors

Source: [7] improved by the authors based on [21–29]

Thus, we can identify the basic characteristics of the digital phase of society:

- a strong trend of steady and unhindered development of technologies and expansion of the constantly updated technological innovations. Moreover, the growth of computing capacity significantly exceeds the cognitive abilities of person;
- absence of geographically determined barriers to the dissemination of digital technologies and knowledge, increasing availability of information for all members of society;
- the tendency to "mobilize" and individualize the input and output devices of information transmission, which, in turn, leads to the blurring of boundaries between the biological nature of man and artificial technological products;
- the presumed unlimited amount of information transmitted through communication channels, which are constantly expanding;
- growing demand for subjectivity and constant reorganization of skills that are dominant in the economic relations of a digitalized society;
- evolution of social institutions and historically formed communication systems under the condition the corresponding institutional and technological base;
- the set of functional possibilities of human labor replacement by automated work that extensively replaces physical work of people with work of robots expands [9, p. 224]. Moreover, the first three industrial revolutions mechanized human labor, that is, facilitated human labor, but person still remained involved in the process of material production, the fourth industrial revolution displaces person from the realm of physical labor and fully automates it. Such automation in the end no longer facilitates human labor, but directly replaces human labor and may lead to negative socio-economic consequences in the future [18, p. 49].

Conclusions

The study [1–29] found that the digitalization of the economy is one of the most widely discussed aspects of the global socio-economic process, which has numerous, multifaceted and diverse manifestations. The growth of digital technologies entails an exponential increase in the number and quality of integration changes in the communication system in society. Researchers identify five areas of impact of digital technologies on economic activity and indicate their areas of implementation. The main directions of the economy digitalization impact on the social potential are the labor market, online educational services, cybercrime and business. Digital technologies and products are presented that are currently considered innovative trends in the modern socio-economic environment and are the most promising for the development of society social potential. The process of digitalization of goods and services production has not only technological advantages, such as a new industrialization on a digital basis, increasing the competitiveness of economic entities, etc. According to the author's opinion, despite the importance of digitalization of the national economy, public authorities should not forget that the main vector of its development is the socialization of the economy, its fulfillment, first, the social functions to ensure the welfare of households and the whole society through effective use of digital information technologies. That is why the development of various legal acts, that will implement digital technologies in public life and at the same time protect the rights of citizens, deserves special attention. Further research, in our opinion, should be aimed at studying the world experience of digitalization of socially significant spheres and the implementation of the best ideas in our country.

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Design and Execution of a Manipulator With 6 Degrees of Freedom Controlled by A Smartphone

Rafal FENC
Wroclaw University of Technology, Faculty of Mechanical Engineering, Department of Machine Tools and Mechanical Technology, Wroclaw, Poland, rafal.fenc@pwr.edu.pl

Marek STEMBALSKI
Wroclaw University of Technology, Faculty of Mechanical Engineering, Department of Machine Tools and Mechanical Technology, Wroclaw, Poland, marek.stembalski@pwr.edu.pl

Abstract

The article presents the methodology of proceeding while designing a manipulator with 6 degrees of freedom. The main goal of the project was to produce as many elements as possible using a 3D printer and to ensure maximum load capacity of 0.5 kg in the position of the greatest tilt of its arms. In the project described above, a manipulator was made in which nearly 90% of the elements were obtained in 3D printing technology. A smartphone with dedicated software written in C ++ was used to provide communication of the robot with the user. The STM32 microcontroller was used as a source of communication and computational element in the robot. The designed manipulator is modelled on Autodesk Inventor 3D graphics software. The culmination of the work was the preparation of a physical model and verification of its correct functioning.

Keywords: Robot, Manipulator, 3D Printing, Mechanical Engineer.

Introduction

In order to illustrate the intensive development of robotization in the world (Dekle R., 2000) the data on the increase in the number of robots used in the industry on the Japanese market are presented and the economic effects of this development are presented.

There are more and more manipulators and robots in the world around us that are designed to make our lives easier by helping us with various tedious and dangerous physical and mental work. It has been noticed that the continuous development of this technology allows for new possibilities of using them in everyday life. Autonomous mobile robots (Karunarathne D.Morales Y.Kanda T. and Ishiguro H., 2017), (Morales Y. Kanda T. and Hagita N., 2014), (Ferrer G. Zulueta A.G. Cotarelo F.H. and Sanfeliu A., 2017), (Truong X.T. and Ngo T.D., 2017) are often used for this purpose, which allow, for example, to move luggage, guard buildings or give instructions. The item (Sekiguchi S. Yorozu A. Kuno K. Okada M. Watanabe Y. and Takahashi M., 2020) describes an innovative way of controlling such a robot, which follows a human without knowing their direction. Another group are humanoid robots created by inspiration from human abilities or appearance. A comprehensive literature review of these robots and the latest technological achievements are presented in (Kahraman C. Deveci M. Boltürk E. and Türk S., 2020). The item (Alontseva D.L. Ghassemieh E. Krasavin A.L. and Kadyroldina A.T., brak daty) describes an intelligent robot used in the implant treatment process. In this process, in addition to a number of important parameters, the most important are the distance of the plasma spray and the speed of the plasma stream. It would be impossible for humans to directly provide these parameters.

A wide range of robots are those which help to recover from various accidents by assisting in rehabilitation - the so-called rehabilitation manipulators (Chu C.Y. and Patterson R.M., 2018). The item (Wang D. Wang Y. Zi B. Cao Z. and Ding H., 2020) presents the development of a robot for rehabilitation of fingers using active and passive training. In (Hussain I. Salvietti G. Spagnoletti G. Malvezzi M. Cioncoloni D. Rossi S. nad Prattichizzo D., 2017), (Zhang L. Li J. Cui Y. Dong M. Fang B. and Zhang P., 2020), (Akdoğan E. Aktana M.E. Korua A.T. Arslana M.S. Atlıhana M. and Kuranb B., 2018), robots used for rehabilitation of upper limbs were described. In turn, items (Lewis C.L. and Ferris D.P., 2011), (Shi D. Zhang W. Zhang W. and Ding X., 2020), (Weiqun W. Zeng-Guang H.

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Lina T. Feng Z. Yixiong Ch. and Min T., 2014), (Guzmána C.H. Blanco A. Brizuelac J.A. and Gómez F.A., brak daty) show examples of robots and ways of controlling them used for rehabilitation of lower limbs.

Thanks to the use of manipulators and robots, it is possible to perform activities in places that are difficult to access, dangerous or unfriendly to humans, e.g. exploration of oceans (Kadiyam J. nad Mohan S., 2019), (Vigneshwaran S. and Yuvaraj K., 2020) or space (Wanga X. Shib L. and Katupitiyaa J., 2020), (Jackson L. Saaj Ch.M. Seddaoui A. Whiting C. Eckersley S. and Hadfield S., 2020), (Xu R. Luo J. nad Wang M., 2020), (Wu Y. He M. Yu Z. Hua B. and Chen Z., 2020). The article (Zereika E. Bibuli M. Miškovic N. Ridaoc P. and Pascoal A., 2018) broadly presents the directions of development of marine robotics.

It should be noted that the interest in robots is greater than in manipulators, but the manipulator is to a certain extent the basis of the robot and therefore the focus has been placed on it in this work.

It has been decided to design and manufacture a manipulator with as many components as possible using 3D printing technology (Zeng L. Li P. Yao Y. Niu B. Niu S. and Xu B., 2020), (Balogun H.A. Sulaiman R. Marzouk S.S. Giwa A. and Hasan S.W., 2019).

3D printing is an additional method of producing elements, which is increasingly popular in the world around us. It owes its popularity mainly to the affordable price of printers, simplicity of use and the ability to produce complex shapes. Treating the same shapes with traditional methods would be very expensive and sometimes even impossible. Based on forecasts (Piątek Z., 2019) the use of additive technology in each field will approximately double, and Asia is considered to be the region with the fastest development of this technology.

The next assumption in the described project was to obtain appropriate torques in the kinematic nodes, allowing for proper operation of the manipulator with a maximum load capacity of 0.5 kg. In addition, communication between the manipulator and the user should be carried out using a smartphone.

The use of the manipulator control by means of a telephone (Jiang Ch. Fahad M. Guo Y. and Chen Y., 2018), (Grazioli C. Faura G. Dossi N. Toniolo R. Abate M. Terzi F. and Bontempelli G., 2020) enables accessibility for the general public, and not only for one employee at the workstation by means of a programming device (teaching panel) or a PC. Nowadays, the telephone is increasingly used to control various devices (Grazioli C. Faura G. Dossi N. Toniolo R. Abate M. Terzi F. and Bontempelli G., 2020). E.g. modern intelligent home systems (Lin Y. Wang S. Yang Ch. Shen V.R.L. Juang T.T. and Hung W., 2020), (Phangberthaa L.N. Fitria A. Purnamasaria I. and Muliono Y., 2019) allow you to control various devices to save energy and increase comfort. The way of controlling the keypad by means of a telephone (Azeta J. Bolu C.A. Hinvi D. Abioye A.A. Boyo H. Anakhu P. and Onwordi P., 2019), (Gunawan A.S. Hartanto B. Mili A. Budiharto W. Salman A.G. and Chandra N., 2017) also allows for controlling its operation away from the workstation. The main operating systems for mobile devices are: Android, iOS from Apple, Windows Phone and BlackBerry. 81.5% of the smartphone software market belongs to Android, 14.8% works with Apple's iOS software, 3.3% - Windows Phone and 0.4% belongs to BlackBerry OS in the book by (Płonkowski M., 2018).

Selection of the kinematic structure

The first stage in designing the manipulator was the selection of its cinematic structure. It is usually determined by the intended use of the machine to carry out the previously assumed activities (tasks). A stationary serial kinematic structure (with an open kinematic chain) was selected to perform the functions assumed in the project described above. This structure allows the manipulator to operate freely in any direction and its application can be varied. In addition, the serial structure takes up less space than the parallel structure, which is significant for using the manipulator in a small area.

In order to obtain 6 degrees of freedom in relation to the base, 6 independent rotary actuators were used and their arrangement is shown in Fig. 1.

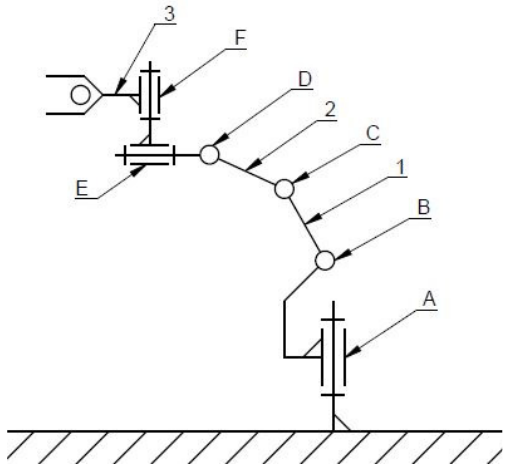

Fig. 1: Kinematic diagram of the manipulator, A-F - manipulator drives, 1-3 parts of the manipulator.

The described spatially arranged rotary pairs are class V. On this basis, the number of degrees of freedom is checked below using formula (1).

$$w = 6 \times n - \sum_{i=1}^{n} i \times p_i \tag{1}$$

Calculations according to the above algorithm confirmed the selected number of 6 degrees of freedom in relation to the ground using 6 drives.

Assuming a working space of 500 x 900mm, it is assumed that the parts marked in Fig. 1 with numbers 1, 2 and 3 are respectively: 200, 150 and 90mm (counting from the manipulator flange. The sum of the lengths of these three significant parts is 440mm, which is almost half of the longest side of the table, i.e. assuming that the manipulator is located in the middle of the assumed work area, its workspace occupies almost the entire area. For this reason, the above assumption has been met. At this stage of design, the acceleration of the drives equal to 1 m/s^2 was assumed.

Selection of Manipulator Drives

The design assumes a load capacity of 0.5 kg at full reach of the manipulator, which affects the required drive system. It has been assumed that the drives used will be electric motors due to their compact design and the lack of the need for additional medium such as liquid or compressed air. The dimensions of the manipulator and the planned lifting capacity support the use of stepper motors or micro-servomotors.

Knowing the dimensions of the key parts and the maximum load capacity, the necessary torque has been calculated, which must be reached by the drives when moving with an acceleration of 1 m/s^2.

The torque calculations were made for the most difficult position, which is for the straightened arm in the horizontal direction. In this position, the maximum load of 0.5 kg, the mass of the parts, the mass of the drive units, including their centres of gravity, is taken into account. Taking into account all these parameters, the motors were selected starting from the manipulator gripper (assuming that the centre of gravity of the lifting capacity is located in the axis of the manipulator's parts) to its turntable. The diagram used for the calculation is shown in Figure 3.

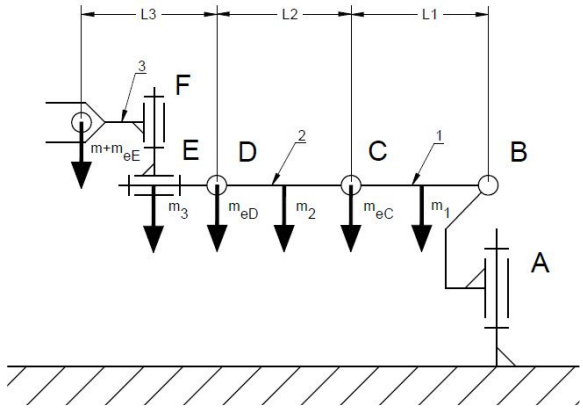

Fig. 2: Diagram of the manipulator system at the maximum horizontal tilt A - F - manipulator drives, m1 - m3 - equivalent masses of the robot elements, meC , meD , meE - masses of individual drives, m - mass 0.5 kg

The drive torques have been calculated for the worst case, when the manipulator is affected by the greatest torques (the system shown in Fig. 2). Suggesting the obtained high torque (holding) and the possibility of step control, a stepper motor with a gear was used. The exception is the "F" motor, where a servo is used due to the low torque. More important parameters of the selected drives are presented in Tab. 1.

Table 1: parameters of the selected drives

Motor	Model	Current [A]	Voltage [V]	Torque [Nm]	Gear ratio	Weight [kg]
A	JK42HS34-0404	0.4	12	0.25	2	0.22
B	JK42HS40-0504	0.5	12	0.43	10	0.28
C	JK42HS40-0504	0.5	12	0.43	4.4	0.28
D	JK42HW34-0334	0.33	12	0.22	2.6	0.2
E	JK35HY26-0284	0.6	7.4	0.064	None	0.13
F	Redox S90–micro	0.5	4.8 - 6.0	0.21	None	0.009

Motors with the same voltage (12V) were selected. Unfortunately, due to the reduction of weight, one of the motors had lower voltage (7.4V), which resulted in the possibility of higher temperature of this motor during power supply than the others.

Planetary gears with helical teeth were used to execute the ratio aimed at increasing the torque. It was selected because of the possibility of obtaining large gear ratios with small dimensions and the possibility of distributing the pressure over a larger number of teeth (orbitals). On the other hand, the use of helical teeth was dictated by the increase in the number of buttresses, i.e. the distribution of pressure over several pairs of interlocking teeth and the reduction of vibrations and noise. Additionally, using 3D printing technology, any gear can be made, eliminating the need to purchase a planetary gear. It can be designed according to its structural requirements (size, shape, gearing).

It was decided that a planetary gear with a fixed rim will be used, and the outer gear (sun) will be placed on the motor shaft.

The gear ratio $i_A = 2$ is impossible to be achieved with planetary gears and a classic external gear unit is used. Drive "A" is the drive of the manipulator's turntable located at its base. For this reason, efforts have been made to select the right size of gears to ensure adequate rigidity at the base and a secure bearing to prevent the gear wheel from changing its position other than in its own axis. The larger pitch circle diameter was adopted: 85mm, while the smaller one of 42.5mm and the module 2.0.

The gear ratio $i_B = 10$ realized by a single-stage planetary gear would require large dimensions of this gear, so it was decided that a two-stage planetary gear will be designed.

Due to the design of the gears using the 3D printing method and their strength, the smallest number of $z_1 = 20$ teeth was assumed. The number of rim teeth (z_3) should not be less than 80. In addition, this number depends on the size of the orbitals between the sun and the rim because their number of teeth cannot be too small either. The number of teeth of orbital gears has been calculated from the correlation of the sum of pitch diameters.

$$d_{pBrim} = d_{pBsun} + 2 \times d_{pBorbitals} \tag{2}$$

$$z_2 = \frac{z_3 - z_1}{2} \tag{3}$$

It was noted that for the minimum number of $z_3 = 80$ teeth, number of $z_2 = 30$ teeth is sufficient. In order to protect against unforeseen loads on the manipulator parts, it was decided to use the number of $z_3 = 88$ teeth on the rim, the number of orbitals teeth being $z_2 = 34$.

Knowing the final number of gear teeth, the gear ratio was calculated and compared with the assumed ratio when selecting the drive.

$$i_B = 2 \times \frac{z_1 + z_3}{z_1} \tag{4}$$

The calculated ratio $i_B = 10.8$ is greater than the assumed ratio of 10. According to the calculations, it was assumed that the calculated gear ratio meets the assumed requirements of the selected drive.

Another important parameter influencing the strength and correctness of teeth made with the 3D printing method is the height of the tooth h, which should not be less than 2mm.

The height of the tooth is:

$$h \leq 2 \times y \times m_B + c \tag{5}$$

where: y- tooth height factor ($y = 1$); m - tooth module; c - tip clearance ($c = 0.1 \times m$).

$$m_B \geq 0.95 \tag{6}$$

On the basis of the calculated value (11) the tooth module $\mathrm{m_B} = 1.125$ was adopted.

The number of teeth for other gears in other planetary gears was calculated analogously and the results are presented in Tab. 2.

Table 2: planetary gear data

Gear	z_1	z_2	z_3	Assumed ratio	Calculated ratio	Module
B	20	34	88	10	10.8	1.125
C	12	15	42	4.4	4.5	
D	24	9	42	2.6	2.75	

Control System

When designing the manipulator control system, the choice of Arduino microcontroller and STM was considered. After analyzing the specific AVR and STM controllers, it was found that the STM is a better microcontroller and has a lot of inputs/outputs, which is important when designing a system to control six drives. STM32L152 - energy-saving model, with Cortex-M3 core on Nucleo base board - L152RE was chosen.

It was decided that the communication between the microcontroller will take place via a Bluetooth connection using the Bluetooth HC-05 module.

The project involves the use of drives in the form of 5 stepper motors and one servo. The control of the servo is realized by connecting it directly to the STM controller. On the other hand, the control of stepper motors is more complicated because you need a suitable controller that is connected between the microcontroller and the stepper motor. The two most important parameters during the selection of the controller are the current supplying the motor and the way of controlling the motor, i.e. the appropriate resolution of the controller depending on the number of steps per motor rotation. On this basis, the A4988 driver used for small stepper motors in prototype projects was selected.

The stepper motor controller allows to power the drives with 8 - 35V. The adopted motors need a 12V power supply, but to minimize the risk of "lost steps" a higher voltage of 24V is used. For this reason, a suitable power supply LRS-150-24 was selected, which is a modular pulse type power supply with an output voltage of 24V DC and 6.5A. It provided an effective power supply for all manipulator motors.

3D Manipulator Model

The future of 3D printing is industry 4.0 and bioprinting (Maoa et al (2019); Stanco et al (2020); Farhat et al (2021)). In industry 4.0 can have a significant impact on short run and 'on demand' production. This will reduce the costs of transport and storage of the product (Wang et al (2014)).

In order to visualize and later print out the manipulator components on a 3D printer, a 3D model of the manipulator was made. Autodesk Inventor software was used.

The first step was to model the selected motors, and then adjust the appropriate mounting of planetary gears to them.

Each planetary gear has been designed to be as compact as possible, with the assumed durability during operation. The gear yoke is mounted in the gear cover with a lightweight HK 1612 needle bearing (dimensions: 16x22x12mm). The connection of the rim to the stepper motor is made by screwing it to the threaded holes in the motor. The connection of the central gear with the outer gear (sun) was realized by a positive connection.

When designing all connections, the possibility of easy and quick assembly and disassembly had to be taken into account. Another priority was to use as few parts as possible to assemble the entire manipulator.

The mechanism of rotation along the vertical axis in relation to the base is commonly called a turntable. A 1:2 ratio of the rotary drive gear is assumed. As this is an element at the base, attempts have been made to increase its dimensions in order to move the centre of gravity closer to the base. The turntable element with a gear wheel, bearing element and motor mounting with planetary gear is made of one element using 3D printing technology (Fig. 3).

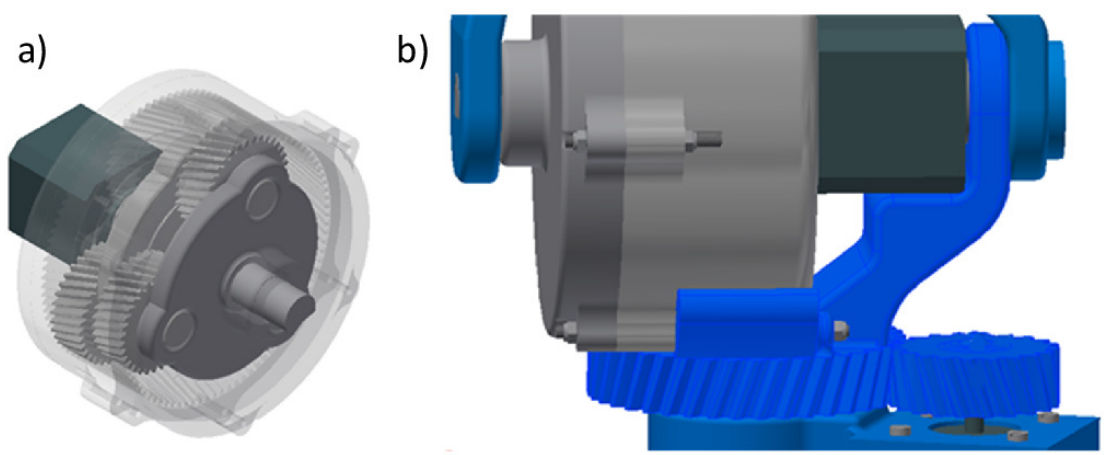

Fig 3. a) View of the two-stage planetary gear, b) assembly of the manipulator's turntable together with the motor and planetary gear

The entire manipulator is fixed with seven M4 screws to a plate which serves as a base for the entire structure. It also serves as a stabilizer and can be loaded with additional weight to protect the entire manipulator against loss of stability. Visualizations of the work of the modelled manipulator with six degrees of freedom are shown in Fig. 4.

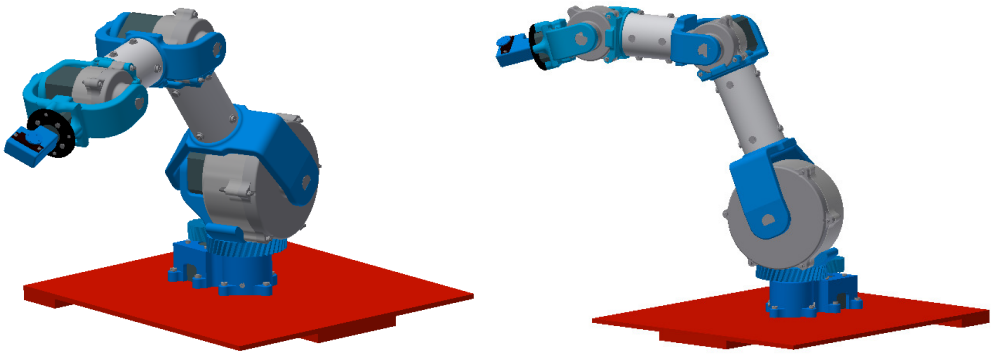

Fig 4. Visualization of the manipulator's work

Manipulator control

The communication between the smartphone and the microcontroller is realized by means of Bluetooth wireless communication.

The manipulator is controlled by means of a smartphone through the RoboticArm application having twelve buttons responsible for the movement of each of the motors in a given direction. The application was used when testing the operation of the algorithm implemented on the microcontroller and confirmed that the electronic circuit is correctly connected. A more advanced program was needed to conduct experimental studies based on the repeatability of movements. It was compiled on a PC. It allows you to control the motors in the same way as in a smartphone application, and has an additional function to create a list with the order of rotation of specific components by a given angle. The view of the proprietary application interface is shown in Fig. 5. The program was written in C++ language using QT Creator environment.

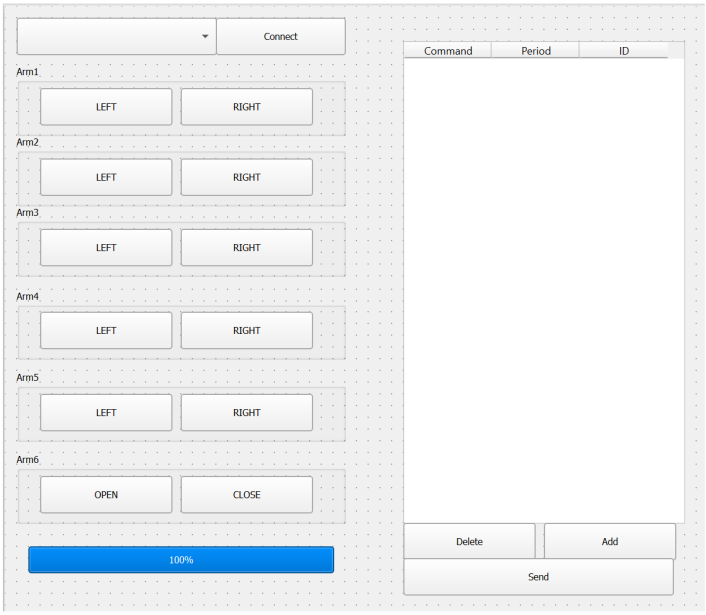

Fig 5. Application user interface for communication with the manipulator

Physical model of the manipulator

3D prints are made with Fused Deposition Modeling technology from a group of thermoplastics, because it is a commonly used method for prototype elements, and access to such a printer is the most common. The printer uses a dedicated program that generates the code with the filament path. The filament is applied from bottom to top - layer by layer.

The print parameters for ABS are set as follows:

- extruder temperature: 275°C,
- table temperature: 80°C,
- layer thickness: 0.14 – 0.19mm,
- degree of filling: 50 – 90%,
- fill type: default (cross).

Planetary gears were the priority element of the printout. It has been noted that the components produced after assembling do not have the necessary tooth play for the correct operation of the gear. It was decided to reduce the number of teeth in orbitals by one. In this way, sufficient play and correct operation of the gear is achieved. In addition, according to the formulas for the planetary gear ratio with the rim fixed, the number of orbital teeth does not affect the gear ratio change. Important parameters are the number of sun and rim teeth, which do not change.

The next design stage was to prepare the A4988 drivers to work with selected stepper motors. Each drive has a different upper limit of current flow through the coils. Exceeding the permitted electrical current may damage the motor. Setting the appropriate current on the controller is carried out on a potentiometer located on the controller board. The voltage to be set between the potentiometer and ground was calculated. The results of the calculations are presented in Tab. 3.

Table 1: setting of potentiometers in controllers of appropriate stepper motors

Motor	Maximum current [A]	Resistor [Ω]	Reference voltage [V]
JK42HS40-0504	0.5	0.1	0.36
JK42HS34-0404	0.4	0.068	0.19
JK35HY26-0284	0.6	0.068	0.30
JK42HW34-0334	0.33	0.068	0.15

The physical model of the manipulator described is shown in Fig. 6.

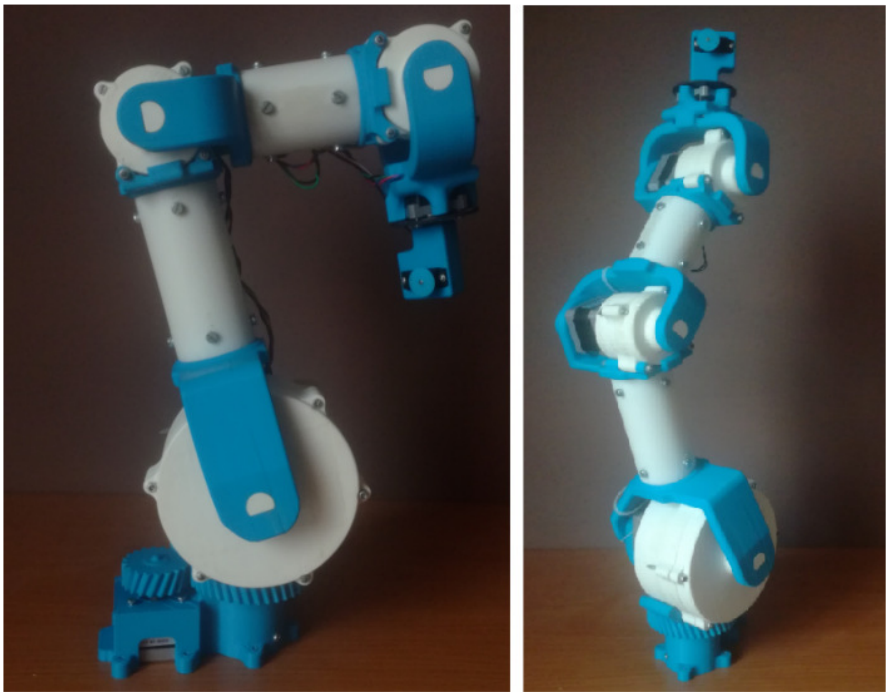

Fig. 6: A physical model of the designed manipulator

Tests and experimental studies

It was decided to test the designed and built control system and manipulator for its correct operation. In the first place, a division of the experimental research carried out was made. They list the following steps:

- checking the proper functioning of the motor control system outside the manipulator using a smartphone;
- testing the operation of motor-driven and telephone-controlled gears;
- testing the operation of planetary gears;
- mounting the drives on the manipulator and testing the strength of the structure;
- checking the correct operation of the assembled manipulator.

The first experimental study, according to the created list, was to check the correctness of cooperation of the control system with the engines themselves, using a smartphone with the installed control application as a control panel.

The application controls checked the operation of all motors, in each side and in different order of their start. Observing the set engine operation, it was found that the engines work correctly. On this basis, the correct functioning of the communication system was confirmed.

The next experimental study was to check the operation of the gears used in each gear. The first step was to check the correct gearing of the gear at the motor A (turntable), two-stage transmission B and transmissions C and D. Gear B is a two-stage gear so it was decided to test the first stage separately and the two stages simultaneously.

Based on this test, all gears were found to be working properly. In the case of a two-stage gear, it has been noted that the orbitals are subject to gentle vibrations and generate noise. Helical teeth were used mainly for this reason in order to reduce vibrations and the associated noise. When pressing down the orbitals, the vibrations disappear and the transmission becomes quiet. It was found that after putting the yoke and cover on, the gears are pressed down, which prevents the occurrence of vibration and noise.

Testing the operation of planetary gears involves putting a yoke on the gear orbital. Two different yokes were used in the project. The first one, with full orbital mount (around the entire circumference) and the second one with incomplete mount. It was observed that in the first case the orbitals rotate around their own axis while in the second case the orbitals do not always rotate in the axis of attachment. The reason for this is the presence of a force that causes the gears to slide out of the incomplete component along the circumference of the attachment. It was found

that the occurring phenomenon will be compensated for by the cover housing and will not adversely affect the operation of gears C and D, in which this type of yoke was used.

After analyzing the gear behavior, a cover was attached and screwed to the gear rim, restarting the motor with the completely assembled gear.

It was confirmed that the installation of the yoke and the cover pressed down the orbitals in the two-stage B gear eliminating the previously generated vibrations and noise. All gears run smoothly.

The most important experiment was to check that the manipulator will not damage during simple movements without load. Successful passing of this test allowed to conduct another one, under the load.

In the experiment, the system the system was connected to the power supply and the operation of the drives was checked, starting from the turntable and then from the drives located at the very end of the kinematic chain, i.e. drive F, E, D, C and drive B.

On the basis of the performed tests, correct operation of A, C and D gears and E and F drives was found.

The other parts of the manipulator are also robust enough not to be damaged during machine movements.

Due to the unforeseen increase in the weight of individual parts in relation to the assumed values, the testing of the maximum load capacity of the manipulator was abandoned. It was decided to weigh and verify the constructed parts and gears in order to determine the permissible lifting capacity of the manipulator. The masses of individual elements together with those assumed in the original assumptions are presented in Tab. 4.

Table 1: Comparison of individual elements of the manipulator in terms of actual and assumed mass

Component:	Assumed weight [kg]	Actual weight [kg]
Component 1	0.1460	0.229
Component 2	0.0795	0.185
Component 3	0.0360	0.080
Drive C	0.2800	0.364
Drive D	0.2000	0.288
Drive E	0.1300	0.130
Drive F	0.0090	0.009

Based on the masses obtained in Tab. 4, the possible lifting capacity "x" for each drive has been calculated. According to the calculations, it should be expected that a built manipulator can carry an object with the lowest calculated weight, i.e. not more than 0.3 kg.

The manipulators (robots) are required to repeat their movements. It has been noticed that the device has play in the fastening of yokes to the components. This allows the components to move inertly to a certain extent. This is due to the inaccuracy of the 3D printouts. In order to eliminate the existing play it would be necessary to make more precise prints of the gear elements on a 3D printer together with a high-quality filament.

Summary and conclusions

Nearly 90% of the manipulator's elements were made by additive 3D printing using the FDM method. The design has shown that printed parts are not always as parts modeled in the computer program.

Planetary gears are the key elements of additive technology. Their correct operation was demonstrated and two types of yokes were presented - with closed and open mounting. It was found that a better combination of orbitals is a yoke with a closed mount, because when the mount is open, the orbitals try to change their own axis of rotation in relation to the mount as a result of meshing force.The two-stage gear, despite previous concerns about its proper operation, behaves correctly and maintains the assumed torque.

The analysis of the work carried out shows that it has been possible to create a 6-degree manipulator control system controlled by means of a smartphone. The application for the phone and the program for the microcontroller were used. According to the conducted experimental research, the correct operation of the programs has been proved and the possibility of controlling the manipulator drives with a smartphone.

The manufactured manipulator in a static position poses no risk of damage to its components - the structure is durable. It is worth noting that the components were made with 80% filling and the gears with 50% filling. For this reason, the components turned out to be heavier than expected.

It was decided to calculate the maximum load capacity analytically as it was noted that it may differ from that assumed one due to the increased weight of the components. The analysis showed that the designed manipulator with the elements made with the additive technology with filling, presented in this paper, should lift an element of weight not exceeding 0.3 kg. The originally assumed value was 0.5 kg. Due to the use of improper material filling, it was not possible to achieve the assumed capacity.

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Collection of Reference Data for Durability Tests Using A Road Simulator

Marek STEMBALSKI
Wroclaw University of Technology, Faculty of Mechanical Engineering, Department of Machine Tools and Mechanical Technology, Wroclaw, Poland, marek.stembalski@pwr.edu.pl

Arkadiusz CZARNUCH
PhD student at Lodz University of Technology, Department of Vehicles and Fundamentals in Machine Design, Lodz, Poland, mail: arkadiusz.czarnuch@dokt.p.lodz.pl

Damian BATORY
Lodz University of Technology, Department of Vehicles and Fundamentals in Machine Design, Lodz, Poland, mail: damian.batory@p.lodz.pl

Abstract

The article describes the construction and principle of operation of the MTS 320, second in Europe Road Simulator used for durability studies. The first stage of the methodology of conducting sustainability studies on the Road Simulator is to collect reference data. For this purpose, 32 measuring sensors are placed on a large-size semi-trailer vehicle. Acceleration, displacement and stress were measured at selected points of the trailer frame and its support frame. The data were collected in configurations for a loaded and unladen semi-trailer moving on roads classified as motorways, national and local roads in central Poland. Statistical analysis of the obtained results was performed. Additionally, spectral analysis (ASD) was performed. The result of the conducted analyses was to determine the usefulness of the collected reference data in terms of their application for durability tests of large-size vehicles.

Keywords: MTS road simulator, sensor, reference data, durability tests, mechanical engineering.

Introduction

At present, many manufacturers of commercial vehicles (Spickenreuther M. Bersiner F. and Fricke E., 2012) carry out durability tests of their products. Dynamic testing plays an important role in the development of road vehicles. The main advantages of this type of tests are to check individual components of the vehicle as well as the overall assessment of the produced cars. In (Doddsa C.J. nad Plummer A.R., 2001), (Raath A.D. and Van Waveren C.C., 1998), (Azrulhisham E. Asri Y.M. Dzuraidah A.W. Nik Abdullah N.M. Che Hassan C.H. and Shahrom A., 2011), examples of stations with four forcing actuators, used for durability tests of vehicles, are reviewed. In turn, the ref. (Lyashenko M.V. Klementiev E.V. and Sokolov-Dobrev N.S., 2016) shows a station for complex tests of one vehicle axle. Another example of a dynamic test station with four actuators is described in (Morato M.M. Nguyen M.Q. Sename O. and Dugard L., 2019). In this solution, a vehicle structure with semi-active suspension system is tested. The analytical model of a four-actuator station is described in (Hassen D.B. Miladi M. Abbes M.S. Baslamisli S.C. Chaari F. and Haddar M., 2019). Thanks to such tests, already at the design stage, of prototype solutions, we can correlate the produced prototype with numerical simulations (Shafiullah A.K.M. and Wu C.Q., 2013), (Coutinho I.A. and Jr J.R., 2020), (Farrahi G.H. Ahmadi A. and Reza Kasyzadeh K., 2020). The purpose of durability analyses is to reduce the time and costs of product development, prevent breakdowns and optimise the vehicle structure (Bai-yan H. Shu-xin W. and Feng G., 2010), (Hay N.C. and Roberts D.E., 2006), (Liu W. Wang R. Ding R. Meng X and Yang L., 2020), (Petersen J.D., 1986). This way of proceeding very often helps to avoid numerous complaints about the product or its individual components. There are many examples of durability tests of components manufactured in commercial vehicles in the literature. Authors of work (Chin C.H. Abdullah S. Singh S.S.K. Ariffin A.K. and Schramm D., 2020) describe factors, including the quality of road surface, which affect the durability of the suspension damper. In turn, the ref. (Kong Y.S. Abdullah S. Schramm D. Omar M.Z. Haris S.M. and Bruckmann T., 2019) indicates that rural and off-road roads contribute the most to shortening the lives of the tested shock absorbers. In ref. (Coutinho I.A. and Jr J.R., 2020) is describes the methodology of endurance testing of brake chamber type components. Work (Hou Y. Zhou W. and Shen C., 2011) describes an experimental test of fuel and exhaust system tightness during durability tests in a passenger car.

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Passenger cars are not the only group of commercial vehicles that undergo durability tests. Single track vehicles are also of wide interest. Many literature reports (Chindamo D. Gadola M. Armellin D and Marchesin F., 2017), (Nehaoua L. Hima S. Arioui H. Seguy N. and Espié S., 2007), (Cossalter V. Lot R. Maso M. Massaro M. and Sartori R., 2008), (Petrone N. and Meneghetti G., 2019) describe how to test whole motorcycles as well as selected components, e.g. frames.

The authors of the article decided to carry out durability tests of a large-size semi-trailer type vehicle. The first stage of these studies is to collect reference data from actual runs on roads of different quality. During the trips, data will be collected to estimate the duration of durability tests. Also on their basis, the elapsed time will be determined, which will be mapped on the station during the planned durability tests.

MTS Road Simulator

The road simulator described in the article is the second one in Europe used for durability tests of large-size vehicles. The general view of the Road Simulator is shown in Fig 1. The largest element of the station is the seismic mass (1) of about 600 tons, placed on the foundation (7). Its task is to suppress the vibrations that occur during the work of the described station. The seismic mass can move from 0 to 50 mm above the foundation. During the operation of the Road Simulator, the seismic mass maintains a preset level above the foundation, while at the same time ensuring vibration insulation of the entire station. Its movement is ensured by 26 pneumatic shock absorbers (2). There are axle hydraulic actuators (3) on the seismic mass. These actuators can only operate in the vertical axis. For this reason it is not possible to simulate manoeuvres such as acceleration or deceleration. Each actuator is responsible for the operation of one wheel of the tested vehicle. The Road simulator software allows you to run any number of actuators in a given test. This allows 1, 2, and 3 axle vehicles to be tested. In addition, there is a coupling device (8) on the station. Its work is ensured by two actuators responsible for the operation of the kingpin. The main actuator (4), which introduces the forces in the vertical axis, and the side tilt actuator (5), by means of which the movements of the fifth wheel coupling will be simulated, similar to those occurring under real conditions in tractors. During the simulation, the station controls the angle between the main actuator and the side tilt actuator. If the angle of inclination is greater than 2°, the simulation is automatically interrupted and the station is switched off. This procedure protects against excessive lateral tilting of the tested product, which in extreme cases could lead to serious twisting of the frame and its irreparable damage.

The coupling device allows the installation of a semi-trailer coupling instead of a fifth wheel so that various types of agricultural products of the trailer type can be tested. In addition, in the case of vehicles with their own power unit, e.g. buses and trucks, it is possible to lower the coupling device below the top plate (6) and force the axles only.

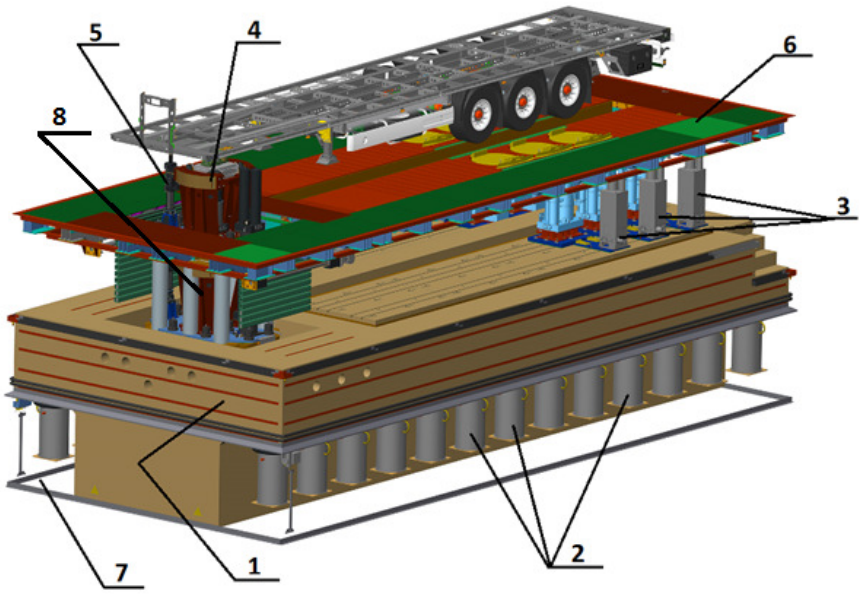

Fig 1. 1) seismic mass, 2) pneumatic accumulators, 3) axle hydraulic actuators, 4) main kingpin actuator, 5) kingpin side tilt actuator, 6) top plate, 7) foundation, 8) coupling device.

Arrangement of measuring sensors on the trailer

In order to collect the data which inform about the trailer's behaviour on the road, 32 measuring sensors were used. They were located in different parts of the vehicle. The displacement sensors and part of the accelerometers are positioned to measure the movement of the vehicle and its suspension relative to the road. The strain sensors were located at different points of the trailer's frame. Their location was dictated by numerical simulation results. In these locations during numerical analysis an increased stress value was observed. The following measuring sensors were located on the semi-trailer:

- 2 accelerometers (±300 m/s^2) measuring in three axes (6 measuring channels): placed in the central part of the front wall and the central part of the sidewall (Table 3);
- 6 accelerometers (±300 m/s^2) with measurement in one axis close to the wheels;
- 2 accelerometers (±300 m/s^2) with measurement in one axis at the front of the frame;
- 2 accelerometers (±300 m/s^2) with measurement in one axis close to the kingpin on the saddle;
- 6 displacement sensors (±0.32 m) located at each wheel, measuring the distance between axles and frame;
- 10 half-bridge strain gauge sensors located at critical points in the trailer's frame.

The HBM measuring system was used to record measurement data. The measurement path consisted of, apart from the sensors mentioned above, the following amplifiers: MX1601 (16 channels) for accelerometers, universal amplifier MX840 (8 channel) used for displacement sensors and amplifier for strain gauge sensors MX1615 (16 channels). All these amplifiers were connected to the CX22 data logger. The measurement data was recorded using Catman DAQ software at 300 Hz. No filters were used during the measurement. Due to the fact that the hydraulic actuators of the axles on the MTS 320 road simulator, which are responsible for their excitation, are only able to move in a vertical direction, it was decided that the cable displacement sensors and accelerometers would be placed on the axles near the wheel hub. This location of the sensors will allow for a more accurate measurement of the values that will be reproduced during the simulation on the station. The cable sensor was attached to the lower flange of the main beam. Fig 2 and 3 show how the sensors are mounted near the trailer's axles.

Fig. 2: The method of attaching cable sensors to the trailer axles.

Fig. 3: The way the accelerometers are mounted on the trailer axles.

Additional single-axle accelerometers were installed in the front part of the semi-trailer near the kingpin (Fig 4) and near the front stakes on the rim (Fig 5). They were used to obtain information on the accelerations occurring in the front of the trailer. Moreover, in the middle of the front wall of the semi-trailer and on the frame of the side wall, 3-axis accelerometers were installed. These sensors recorded accelerations in the upper part of the semi-trailer body. Fig 6. Show overall distribution of the sensors as accelerometers and displacement located on the trailer.

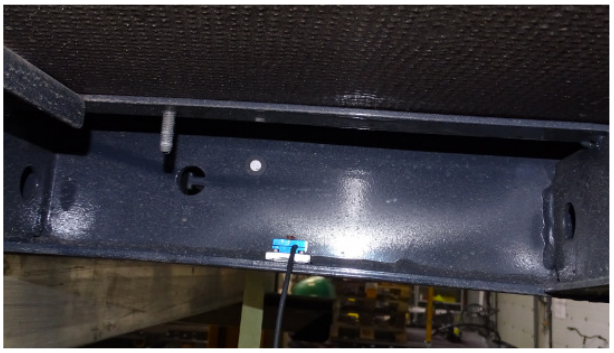

Fig. 4: The way the accelerometers are mounted in the vicinity of the trailer's kingpin.

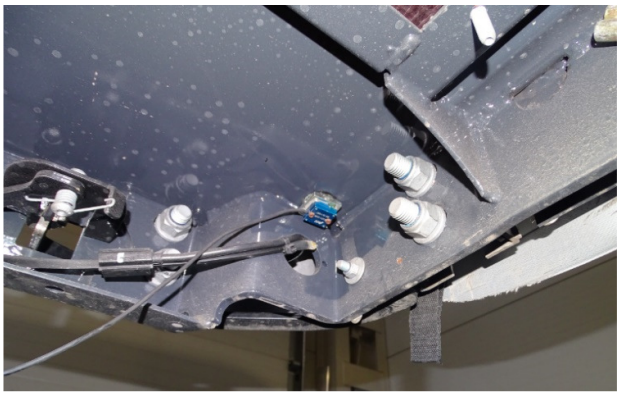

Fig. 5: The way the accelerometers are mounted near the front stakes.

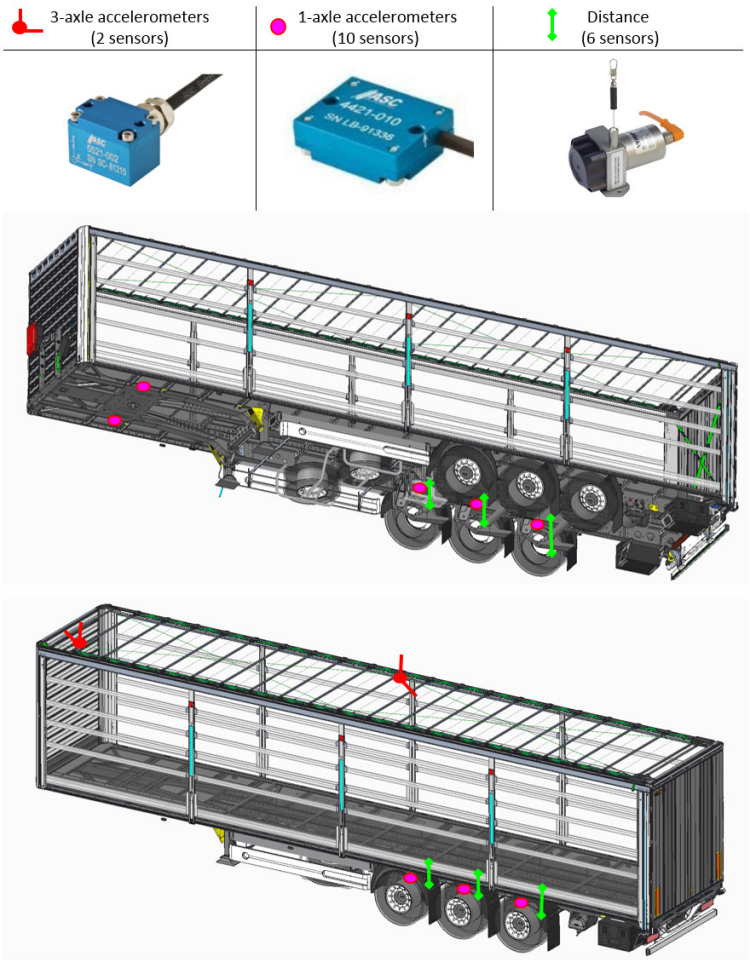

Fig. 6: Overall view of distribution of the accelerometers and distance sensors on the trailer.

Apart from displacement sensors and accelerometers, strain gauges were installed on the trailer at selected points. The locations of the strain gauges were selected based on previous simulations of numerical calculations. The locations of the strain gauges are shown on the Fig 7.

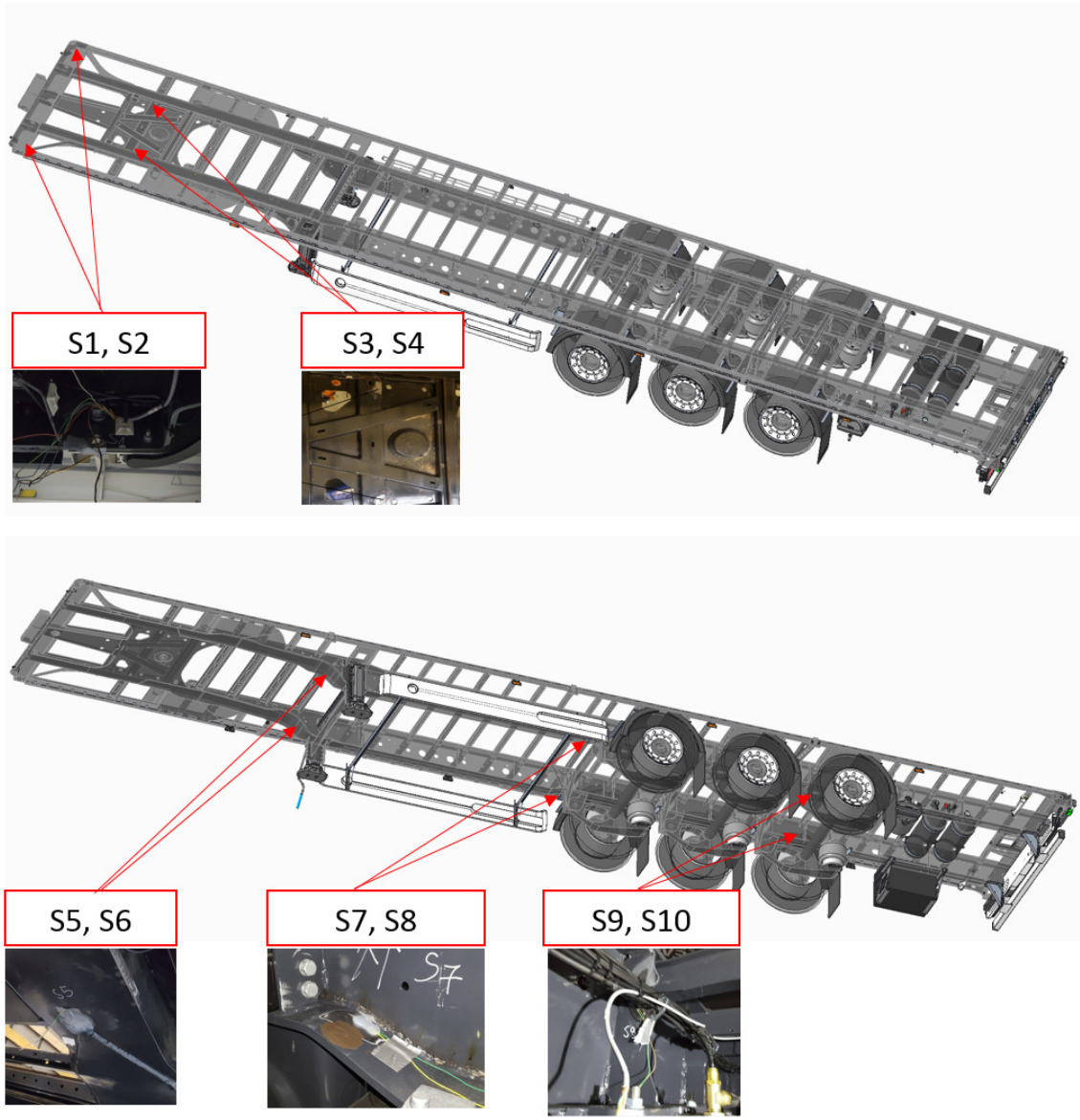

Fig. 7: Distribution of the strain gauges sensors on the trailer.

Acquisition of the Reference Data

After the measurement installation was completed, the signals were recorded during reference runs. These runs were made on previously selected road sections in Poland.

The physical values were measured by sensors for an unladen semi-trailer (unladen combination - semi-trailer + truck) and for a loaded semi-trailer. The load consisted of 26 concrete blocks, each weighing 1 tonne. The unladen set covered the distance of about 350 km. This route consisted of: 60 km of express roads which can be classified as very good quality roads, 180 km of national roads (of medium quality) and 110 km of local roads (of the worst quality). The 26T loaded set, on the other hand, covered 490km of which 180km were motorways and expressways, 200km national roads and 110km local roads. In total, statistical reference data were collected over a distance of about 850 km.

The route of the described set was chosen to collect measurement data for different types of roads. Having statistical data from several very large transport companies, whose number of vehicles ranges from 100 to 200 sets, it has been determined that during the operation of large-size vehicles of the semi-trailer type 90% of the routes are driven with semi-trailers loaded, while 10% of the semi-trailer routes - unladen. Moreover, it was found that most of the trailers drive on motorways (80% of routes). Statistically, local and national roads account for 10% each. In

addition, the statistics show that, on average, a semi-trailer travels from 90,000 km to 120,000 km per year. The statistics are different for smaller carriers (less than 100 transport units). In their case, during their operation, 50% of the trailers drive on motorways, 30% on national roads and 20% on local roads. In addition, the loaded sets account for 70% of all runs.

Due to the average number of kilometres driven, it was assumed that 500,000 km would be simulated on the road simulator, which is equal to a period of about 5 years of trailer operation.

Due to the fact that in the Polish market, a larger percentage of trailer users are small and medium-sized transport companies (Gmyz L., 2015), it has been assumed that 500,000 km with a load (which accounts for 80% of the simulated kilometres) and 100,000 km without a load (20% of the simulation duration) will be simulated. Additionally, it was assumed that 50% of the total number of simulated kilometres will be express roads, 30% will be simulated national roads and 20% local roads. Table 1 shows the statistical average annual vehicle mileage. On the other hand, table 2 compares the type of roads with the number of kilometres driven during the reference data collection.

Table 1: Statistical average vehicle mileage during the year

Reference data				
	Vehicle loaded (26 tonnes)		**Vehicle not loaded**	
	[km]	**[%]**	**[km]**	**[%]**
Annual mileage	**90,000**	**90 %**	**10,000**	**10 %**
Types of roads				
Highways	45,000	50 %	5000	50 %
National roads	27,000	30 %	3000	30 %
Local roads	18,000	20 %	2000	20 %

Table 2: Breakdown of road types with the number of kilometres travelled during reference data collection

Reference data		
Types of roads	**Vehicle loaded (26 tonnes)**	**Vehicle not loaded**
Highways	180	60
National roads	200	180
Local roads	110	110
Total	490	350

Analysis of Measurement Results

This chapter presents the results of measurements recorded by the sensors while driving an unloaded and loaded set (26 tons). Figures 8, 9 compare the results of the acceleration measurements on the axles, the frame and the front of the frame. Fig 10 shows the results of the stress measurement. In Fig 11 the results of relative displacement between the lower flange and the axle are collected depending on the road type. The following results apply to unloaded semi-trailer runs.

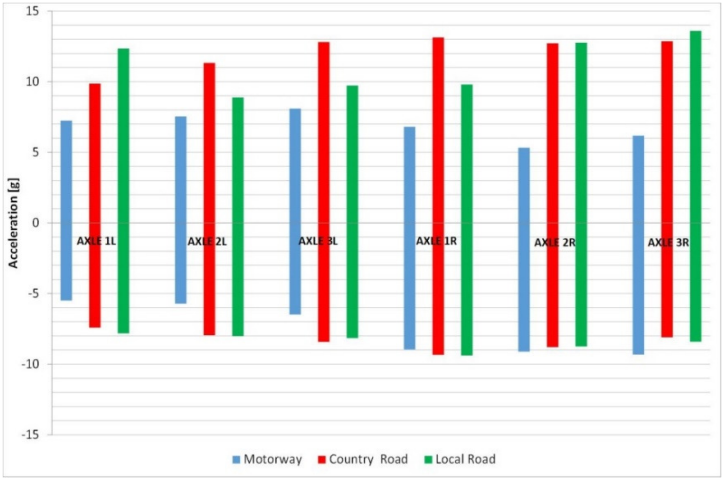

Fig 8. The acceleration value measured on the axles depending on the road type for an unloaded semi-trailer.

Fig 9. The acceleration value measured on the frame and on the fifth wheel and front of the frame depending on the road type for an unloaded semi-trailer.

Fig 10. The value of the measured stress at selected points of the frame of an unloaded semi-trailer when travelling on different types of roads.

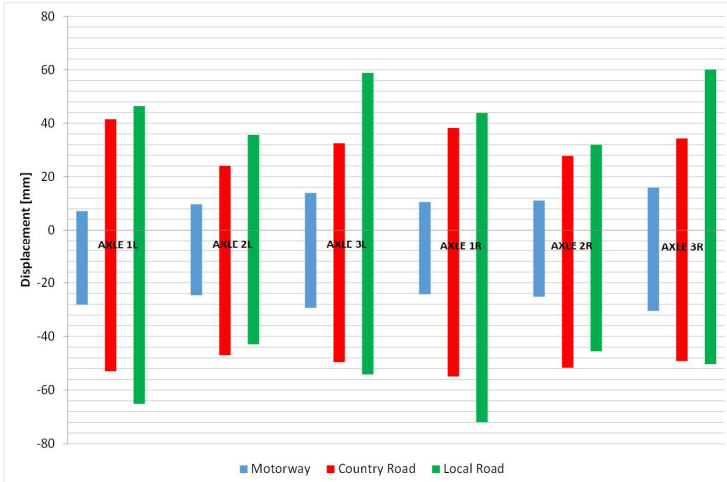

Fig 11. Measurement of the relative displacement between the axle and the lower flange measured when the semi-trailer is unloaded.

When analysing the results of the maximum amplitude values (for an unladen semi-trailer) of acceleration and stress, it should be noted that for both physical quantities the smallest amplitudes were recorded for roads with the best road surface type. No significant differences were observed between national and local roads. Taking into account the results of measuring the relative displacement between the axles and the lower flange of the semi-trailer, it was observed that the average amplitude value measured on the local road is 60% higher than on the motorway and 16% higher than on the national road. When analysing the stress indications measured with strain gauges, no significant differences resulting from the type of roads on which the test vehicle was running were noticed. The greatest stress was observed in the front part of the trailer frame and in the solebar lower flange. The measured stress values did not exceed 200MPa. The stress measured at other selected points of the frame did not exceed 50MPa.

Figures 12, 13 compare the results of the acceleration measurements on the axles, the frame and the front of the frame. Fig 14 shows the results of the stress measurement. In Fig 15 the results of relative displacement between the lower flange and the axle are collected depending on the road type. The following results apply to unloaded semi-trailer runs.

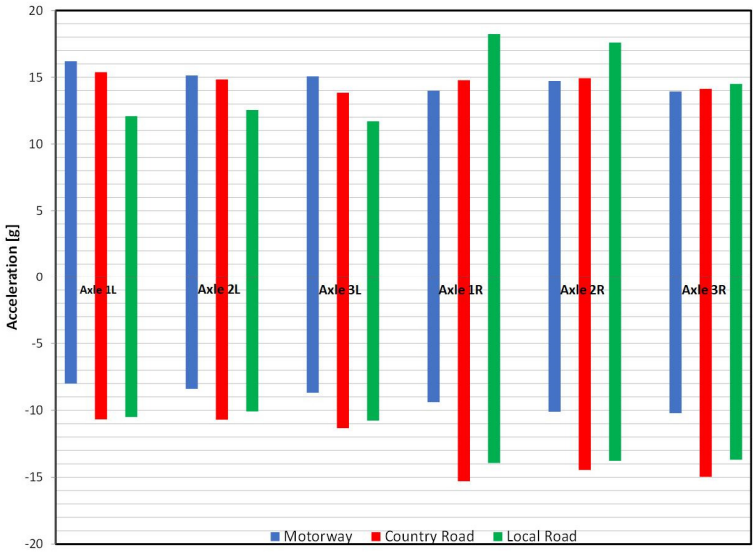

Fig 12. The acceleration value measured on the axles depending on the road type for a loaded semi-trailer.

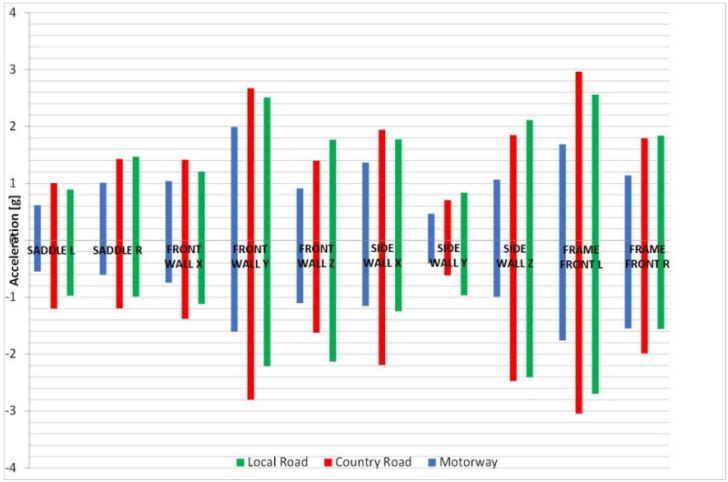

Fig 13. The acceleration value measured on the frame and on the fifth wheel and front of the frame depending on the road type for a loaded semi-trailer.

Fig 14. Measurement of the relative displacement between the axle and the lower flange measured during the run of the loaded trailer.

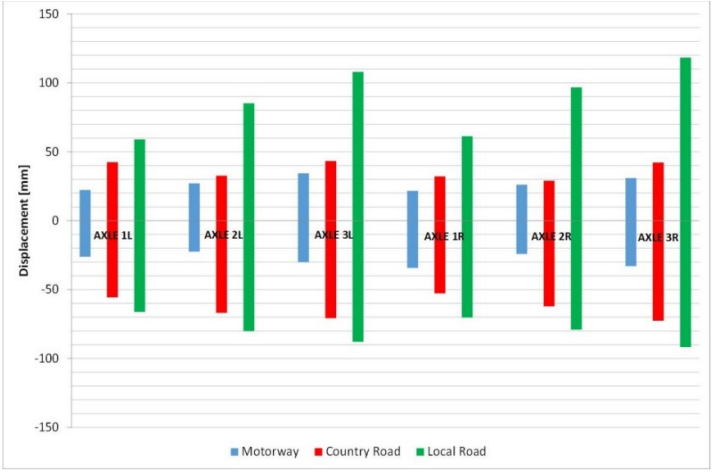

Fig 15. Measurement of the relative displacement between the axle and the lower flange measured during the run of the loaded trailer.

When analysing the results of the measured maximum values (for a loaded semi-trailer) of acceleration and stress, it should be noted that for both physical quantities the smallest amplitudes were recorded, as for the unladen semi-trailer, for roads with the best road surface type. Taking into account the results of measuring the relative displacement between the axles and the lower flange of the semi-trailer, it was observed that the average amplitude value measured on the local road is 66% higher than on the motorway and 38% higher than on the national road. In addition, it was noted that when driving on local roads, the sensors on the right side of the semi-trailer indicated on average 30% higher values than the corresponding sensors on the left side of the trailer. This trend can be explained by the fact that, when driving on local roads, the semi-trailer was going downhill, which had potholes in the asphalt surface. Right-hand traffic is in force in Poland.

By analysing the stress indications measured with strain gauges, the influence of the type of road on which the tested vehicle was running was observed. The greatest stress was observed in the front part of the trailer frame and in the solebar lower flange. The measured stress values did not exceed 250MPa. The stress measured at other selected points of the frame did not exceed 120MPa. For example, when analysing the stress measured on the lower flange of a loaded trailer, it was observed that the amplitude value measured on the local road is 61% higher than on the motorway and 46% higher than on the national road.

In addition to statistical analysis, a spectral analysis (ASD) of selected signals was performed. Fig 16. shows a comparison of the spectrum of signals measured by the accelerometer on the RH wheel of the third axle for runs with a loaded and unladen trailer on different types of roads.

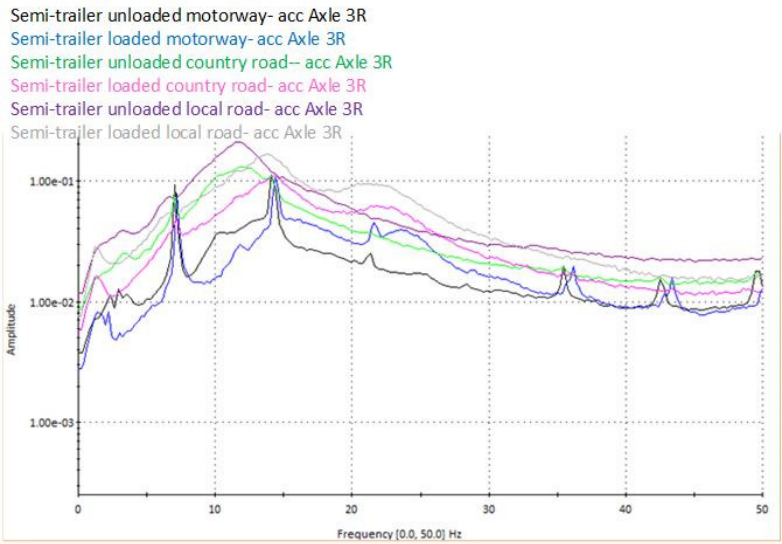

*

Fig 16. ASD spectrum for the accelerometer on the 3rd RH wheel.

Analysing the signal spectrum for the accelerometer it was noticed that for local and national roads there are two dominant frequencies. A basic frequency (2Hz) and another one of 12Hz. Several dominant frequencies were recorded for expressways (7,14,21,28,35Hz).

Fig 17. shows a comparison of the signal spectrum measured with a draw-wire displacement sensor on the RH wheel of the third axle for runs with a loaded and unladen semi-trailer on different types of roads.

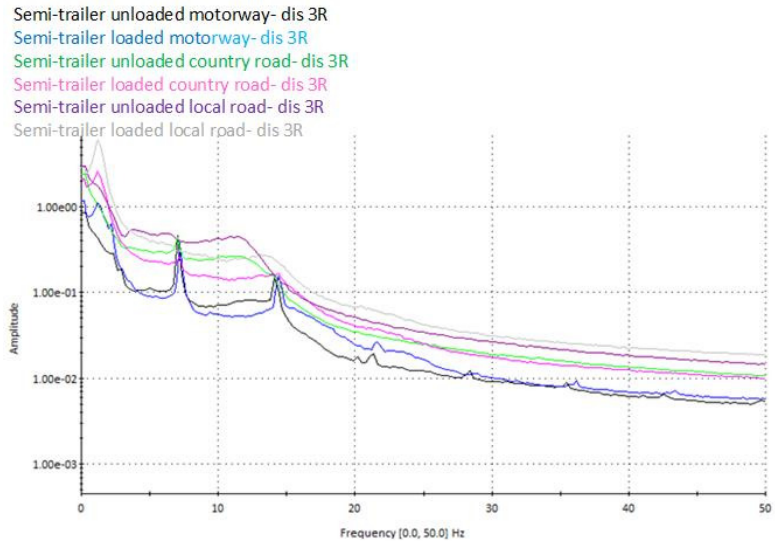

Fig. 17: ASD spectrum for the displacement sensor on the 3rd RH wheel.

Analysing signals from the displacement sensor, a similar character of the amplitude-frequency spectrum to that of the accelerometer was observed. There are several dominant frequencies on expressways regardless of the trailer load. As regards national and local roads, the basic frequency was 1.2 Hz. The amplitude level is the highest for local roads, as confirmed by previous statistical analyses. As in the case of statistical analyses, the highest amplitudes of the measured displacement were observed in the spectrum determined from the runs on local roads with a loaded set.

Fig 18 shows a comparison of the signal spectrum of the measured stress at a selected point on the structure (strain gauge placed on the saddle plate) for runs with a loaded and unladen semi-trailer on different types of roads.

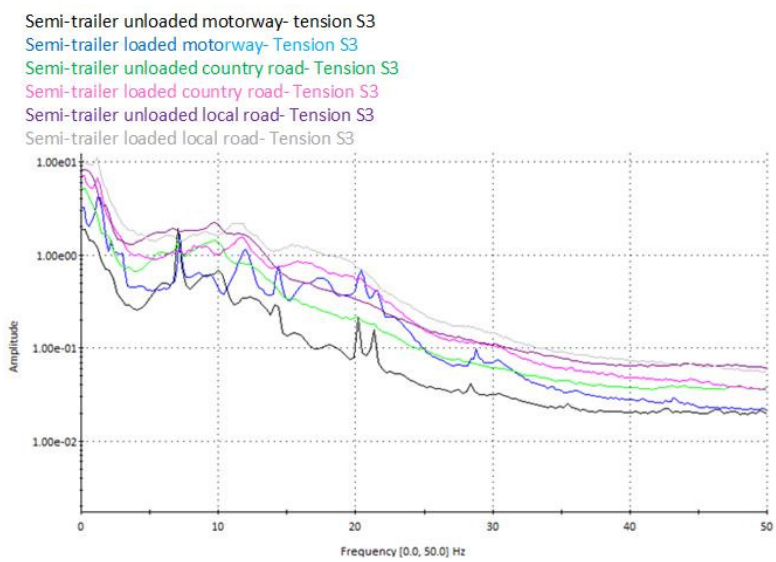

Fig 18: ASD spectrum for a strain gauge placed on the saddle plate.

Also in the signal coming from the strain gauge sensor, a repeating dominant frequency for expressways can be observed. Also the highest amplitudes were obtained for local roads with a loaded vehicle. The basic frequency for national and local roads was 1.2 Hz and coincided with the frequency obtained from displacement sensors. The data collected from various roads for a loaded and unladen semi-trailer showed that local roads had the highest amplitudes. Therefore, it can be assumed that it is the local roads that will make the greatest contribution to the strain on the structure of the semi-trailer during its lifetime. Conclusions from the conducted analyses are consistent with the results described in the literature [18].

Conclusion

The way of collecting statistical data on reference runs on roads of different quality described in the article is the first stage in the course of the proceedings during the durability tests of large-size vehicles. The collected data will be used to simulate durability on the test station of the MTS 320 simulator. The analysis of statistical data shows that the highest values measured with displacement, acceleration and strain gauges were recorded for local roads. Data from these routes should first of all be taken into account when developing the type of excitations for endurance testing. The method of data collection described in the article, using different sensors, will allow for mapping in a wider range of frequencies of signals occurring during endurance testing. This will be ensured by the use of cable displacement sensors and strain gauges. In spectral analysis, the dominant frequency measured using them was lower than that obtained for accelerometers.

The durability tests of a large-size vehicle, which include, among others, the implementation of a measuring system, collection of reference data, development of a road profile and durability tests on a dedicated stand, last about 6-8 weeks (simulation of 500,000 km). In fact, vehicles of this class they cover the distance of 500,000 km in about 4-5 years. The cost of this type of endurance test is approximately € 80,000. The main argument for the legitimacy of carrying out durability tests of large-size vehicles are the savings resulting from possible costs related to the repair of product defects that may occur during the operation of the vehicle. The level of savings resulting from identifying possible product defects already at the durability testing stage depends on the production volume. With unit production, savings will amount to hundreds of thousands of €. However, in the case of mass production, the savings scale can reach millions of euros. Testing on the bench allows for faster implementation of the product without hidden defects for series sale, which makes the company more competitive on the market, profiting from vehicles previously launched for sale.

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Corporate Anti-Corruption Disclosure: An Examination of the Coercive Pressure of Directive 2014/95/EU

Ewa RÓŻAŃSKA
Poznań University of Economics and Business, Poznań, Poland, ewa.rozanska@ue.poznan.pl

Łukasz MATUSZAK
Poznań University of Economics and Business, Poznań, Poland, lukasz.matuszak@ue.poznan.pl

Abstract

Purpose: This study examined anti-corruption reporting practices across companies listed on the Warsaw Stock Exchange, by looking at both the extent of anti-corruption disclosure and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory anti-corruption disclosure under the Directive 2014/95/EU (Directive). **Design/methodology/approach**: The sample comprised 71 selected listed companies over 6 years. Content analysis was used to measure the extent of anti-corruption disclosure. The econometric model was estimated using panel fixed effects. **Findings:** The Directive enforcement increased significantly the extent of anti-corruption disclosure Surprisingly inclusion in the Respect Index, government ownership and foreign ownership are not significant determinants of anti-corruption reporting. **Originality**: Our study contributes to the understanding of the impact of Directive and other coercive variables on anti-corruption disclosure, a specific subset of sustainability reporting. In particular, it presents the contribution of accounting to the struggle against corruption.

Keywords: anti-corruption disclosure; CSR disclosure; ESG disclosure; sustainability disclosure; non-financial disclosure; Directive 2014/95/EU

Introduction

There is a growing global demand for better disclosures provided by listed companies as stakeholders nowadays expect not only the financial performance of listed companies, but also their performance in corporate social responsibility (CSR) aspects, including anti-corruption.

Corruption may be defined as "the abuse of entrusted power for private gain" (Transparency International, n.d.). Corruption has negative consequences to society and hazardous impacts on companies (Barkemeyer *et al.*, 2015). Corruption matters for business because it hampers growth, escalates costs and poses serious legal and reputational risks (UN Global Compact, n.d.). Hence the transparency of corporate reporting may have an important role to play in constraining corruption.

Although corruption issues have become a standard element of mainstream reporting guidelines, such as those by GRI, research shows that, overall, anti-corruption disclosure practices around the world are still underdeveloped (Sari *et al.*, 2020; Issa and Alleyne, 2018; Islam *et al.*, 2017; Branco and Matos, 2016), especially when compared with other CSR aspect disclosure practices (Matuszak and Różańska, 2017). Reporting on corruption by many companies has often been superficial and incomplete because this issue is complex and highly sensitive and public disclosures of such topic can lead to misguided perceptions (ACCA, 2008).

In recent years, the European Union (EU) reached an important milestone in the enhancement of the transparency of listed companies' CSR aspects when EU issued its Directive 2014/95/EU (European Union, 2014) to require large companies with an average of 500 or more employees to disclose non-financial information. Large listed companies need to disclose, among others, information on their anti-corruption and bribery matter. More specific, for this matter, companies must disclose a description of their policy including the due diligence processes implemented, the outcomes of this policy, principle risks, and their management on a "comply or explain" basis, with considered reasons for non-disclosure. Companies were expected to comply with the new disclosure requirements of the locally transposed laws by 2018.

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Our study responds to a call in the literature to investigate pressure from regulators on companies to disclose anti-corruption actions (D'onza *et al.*, 2017). Such an examination can be made within the framework of the coercive isomorphism, a particular subset of institutional theory (Sari *et al.*, 2020). The rationale is that this specific principle reflects pressures from powerful stakeholder groups, including regulators (DiMaggio and Powell, 1983). Previous studies have tested the pressure from different coercive sources (Barkemeyer *et al.*, 2015; Sari *et al.*, 2020), but so far have not taken into account the pressure from mandatory accounting regulations.

Therefore, in this study, we referred to coercive isomorphism and we ask how Directive 2014/95/EU (Directive) pressure has shaped anti-corruption disclosure provided by listed companies in Poland, one of most corrupt country in the EU on Transparency International's report (Transparency International, 2019). Poland has become one of the then 28 EU countries that have transposed the Directive into their national legislation. Since then, anti-corruption disclosures are required among certain Polish enterprises by the Polish Accounting Act (PAA).

To fill the existing literature gap, this paper examines anti-corruption reporting practices of Polish listed companies, by looking at both the extent and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory anti-corruption disclosure under the Directive.

In order to explore the research question, we analyzed the anti-corruption disclosure using a content analysis for a sample of 71 companies listed on the Warsaw Stock Exchange (WSE). Our analysis shows that the extent of the anti-corruption disclosure across all content items increased significantly after Directive implementation period compared to the period before implementation. The findings reveal that the Directive enforcement is associated with the extent of anti-corruption disclosure. Surprisingly, other coercive variables, namely inclusion in the Respect Index, government ownership and foreign ownership are not significant determinants of anti-corruption reporting.

Thus, the current paper makes a number of contributions to the rare literature on anti-corruption disclosure, a specific subset of CSR reporting. In particular, we assume that our study contributes to the understanding of the impact of Directive on anti-corruption disclosure that reflects the role of accounting in combating corruption.

We begin with literature review, theoretical background and hypothesis development, followed by the methods, results, and conclusion.

Literature review and hypothesis development

Literature review

Corruption is an important topic for accounting researchers, among others. As the purpose of accounting is to provide information on the financial performance and, increasingly, the CSR performance of a company, its role also includes providing the data necessary to control and prevent corruption activities (Barkemeyer *et al.*, 2015). Increased transparency in corporate reporting therefore leads to a greater likelihood of detection of corrupt acts, which reduces information asymmetry between principals and agents and enables shareholders and other stakeholders to make more informed decisions (Wu, 2005). Hence the anti-corruption disclosure are closely related to the role of accounting in the struggle against corruption. To date, there is little but growing literature on anti-corruption disclosure practices as an integral part of CSR reporting.

First, there are descriptive studies which generally show low disclosure levels (Matuszak and Różańska, 2017; Issa and Alleyne, 2018). For example, Issa and Alleyne (2018) documented a state of limited maturity regarding the disclosure of anti-corruption procedures in the sustainability reports of 66 Gulf Cooperation Council companies in Saudi Arabia, Oman, Kuwait, Bahrain, UAE, and Qatar. In Polish setting, Matuszak and Różańska (2017) stated that among others CSR matters, anti-corruption deserves careful attention, as it is not disclosed by most companies listed on WSE.

Second, there are examinations of factors explaining the variability of disclosures. Previous studies proved among others that the pressure from different coercive sources has positive impact on the level of anti-corruption reporting. In particular, participation in corruption-related initiatives was found to be positively related to corruption-related reporting (Barkemeyer *et al.*, 2015; Branco and Matos, 2016). Moreover, variables related to the ownership structure, such as state or foreign ownership was found to have influence on anti-corruption disclosure. For example, Sari *et al.* (2020) showed that the dependence on government tenders and foreign ownership are associated with the level of disclosure. While, Branco and Matos (2016) documented that government-owned companies seem to exhibit greater concern to improve the corporate image through disclosure.

In fact, the literature also recommends examining pressure from regulators on companies to disclose anti-corruption efforts (D'onza *et al.*, 2017). Such an examination can be made within the framework of the coercive isomorphism, a particular subset of institutional theory (Sari *et al.*, 2020). The rationale is that this specific principle reflects pressures from powerful stakeholder groups, including regulators (DiMaggio and Powell, 1983). Previous studies so far have not taken into account the pressure from mandatory accounting regulations.

To fill the existing literature gap, this paper examines anti-corruption reporting practices of Polish listed companies, by looking at both the extent of anti-corruption disclosure and the determinants of that extent, in particular the potential pressure from the regulator that requires mandatory anti-corruption disclosure under the Directive.

Theoretical framework

The question of how anti-corruption disclosure provided by companies are shaped can be addressed through institutional theory that has been cited many times in the accounting literature (Barkemeyer *et al.*, 2015; Issa and Alleyne, 2018; Sari *et al.*, 2020). The theory is considered appropriate for this question as it provides a theoretical explanation of how firms respond to non-market pressures to undertake particular activities (DiMaggio and Powell, 1983; Issa and Alleyne, 2018), including anti-corruption disclosure practices. Within the framework of coercive isomorphism, a particular subset of institutional theory, an organization provides disclosure as a response to pressures from influential stakeholders (Deegan, 2014). Powerful institutions that can pressure an organization to adopt specific disclosure practices include governments, certification body, and politically powerful stakeholders among others (Deegan and Unerman, 2011). When pressures from these stakeholder groups arise, an organization needs to respond to obtain legitimacy (DiMaggio and Powell, 1983). However, organizations may have varying degrees of freedom to take strategic responses to institutional pressures (Barkemeyer *et al.*, 2015).

In response to previous recommendations from literature to investigate regulators' pressure on companies to report their anti-corruption efforts (D'onza *et al.*, 2017), this study adopted coercive isomorphism. This is because regulators reflect pressure through, for example law enforcement (DiMaggio and Powell, 1983), as in the case of transposing the Directive into the national legislation of EU member states. To strengthen contributions to the existing literature, this study explores not only pressure from regulators but also pressures from other possible coercive sources.

Hypotheses development

This paper investigates four key coercive variables potentially influencing the extent of anti-corruption disclosure in Poland. These variables are Directive enforcement, inclusion in the Respect Index, government ownership and foreign ownership.

Directive 2014/95/EU enforcement

The rationale for expecting Directive to significantly affect anti-corruption disclosure is that companies would be keen to follow new "norms" that are imposed upon them (Deegan, 2002). According to institutional theory, companies may strive to increase the insufficient and non-compliant level of anti-corruption disclosures to reduce regulatory pressure.

Assessments of the state of the art of non-financial reporting, before the implementation of the Directive, by Matuszak and Różańska (2017), showed that there was an information gap regarding some of the aspects required by the Directive. As noted by Matuszak and Różańska (2017) tested companies placed little emphasis especially on reporting about anti-corruption. After the implementation of the Directive, research conducted by Skoczylas-Tworek (2020) documented that companies still show considerable restraint in disclosing anti-corruption information. Unfortunately, no research confirms the potential impact of the Directive on the extent of anti-corruption disclosures.

In the previous literature, it was clearly stated that overall reporting quantity increased subsequent to a on-financial mandate (Damak-Ayadi, 2011; Kerret *et al.*, 2010). Considering that we expect that the extent of non-financial disclosers will increase even in such a sensitive area as the fight against corruption. Considering the theoretical and empirical evidence, we hypothesize:

> ***H1:*** **There is a positive relationship between the Directive 2014/95/EU enforcement and the extent of anti-corruption disclosure.**

Inclusion in the Respect Index

Participation in a particular CSR initiative, association or coalition can potentially result in coercive pressure being put on the company to undertake certain practices (Barkemeyer *et al.*, 2015; Sari *et al.*, 2020). This mainly includes international initiatives, like UN Global Compact which promote corporate engagement with corruption as part of a wider array of CSR aspects. But this could potentially also apply to local and regional initiatives that may exert a positive influence on corruption-related reporting. A key example here is the RESPECT Index which is the first index of companies respecting the CSR rules in the Central and Eastern Europe's region.

The RESPECT Index portfolio covers Polish companies listed on the WSE Main Market which operate in accordance with the highest standards of management with regard to corporate governance, reporting and investor relations standards, and which also include environmental, social and governance factors (Macuda *et al.*, 2015). The participating companies are screened by WSE and the Association of Listed Companies. If the company does not respond to coercive pressures from the project makers, the membership will be terminated. As transparency, accountability as well as communication with stakeholders are at the core of this project, we would expect that corporate inclusion in the RESPECT Index has a positive impact on anti-corruption disclosure. Past study document the statistically significant positive impact of inclusion in the RESPECT Index on non-financial disclosure practices, excluding ethical matters before Directive implementation (Dumitru *et al.*, 2017). Hence, we hypothesize:

H2: **There is a positive relationship between inclusion in the Respect Index portfolio and the extent of anti-corruption disclosure.**

State ownership

It is assumed that state ownership has a positive impact on CSR disclosures. Governments of most post-communist EU member states are struggling to address corruption effectively in their countries' regulations. In this regulated environment, governments have the potential to force companies to comply with anti-corruption laws and disclose their anti-corruption efforts. This coercive pressure is especially effective for companies whose capital structures are dominated by government shares. State owned enterprise themselves are usually politically sensitive as their activities are more visible to the public and there is a greater expectation that such firms will be aware of their public obligations (Muttakin and Subramaniam, 2015), in line with the coercive isomorphism tenet.

Previous studies showed inconsistent findings for this variable. A positively significant association between state ownership and the extent of CSR-related disclosures is quite well documented in the literature (Muttakin and Subramaniam, 2015; Branco and Matos, 2016). However, there are recent studies that show that the state ownership is not a significant predictor of CSR disclosure (Matuszak *et al.*, 2019), including anti-corruption disclosures (Sari *et al.*, 2020). Bearing the above in mind, the following hypothesis has been developed:

H3: **There is a positive relationship between state ownership and the extent of anti-corruption disclosure.**

Foreign ownership

It is assumed that foreign ownership can influence on CSR disclosure. According to Haniffa and Cooke (2005) foreign shareholders typically demand high-level corporate disclosure due to geographic separation. Moreover, a foreign shareholder is likely to be more interested in the company's global accountability, in particular how the company is trying to meet the global community's expectations in relation to sustainable business practices, including anti-corruption practices and reporting (Sari *et al.*, 2020). This is where coercive pressure from foreign shareholders can come into play. Foreign investors can push companies to report on anti-corruption activities and, by responding to this pressure, the companies may get continuous supports and legitimacy from this stakeholder group in the form of capital inflows (DiMaggio and Powell, 1983; Deegan and Unerman, 2011).

Studies investigating the effects of foreign ownership on CSR disclosures in an emerging economy context are scant and provide unclear results. A positive association between foreign ownership and CSR disclosure practices is documented in some prior studies (Khan *et al.*, 2013; Muttakin and Subramaniam, 2015; Sari *et al.*, 2020). However, there are studies that found the foreign ownership to have no statistically significant influence on CSR disclosure (Matuszak *et al.*, 2019). Thus, the following hypothesis has been developed:

***H4*: There is a positive relationship between foreign ownership and the extent of anti-corruption disclosure.**

Research Methodology

Research sample and data collection

Our initial sample comprises of all firms listed on WSE. To be included in our sample, companies have to meet the following criteria:

(1) They must be Polish companies (ISIN – PL)
(2) They must have been experienced in non-financial reporting at least in 2014.
(3) They have to fulfil criteria imposed by transposed Directive concerning employment, assets, and income for the period 2017-2019.
(4) They had to have required data for 2014-2019.

The final study sample was composed of 71 Polish companies (426 company-year observations).

The data concerning employment, assets, and income were obtained from the Notoria Service Database. The data concerning non-financial anti-corruption data were hand-collected from non-financial statements being a separate section of management commentary (not stand-alone) or being a separate stand-alone report. In order to verify developed hypotheses our time scope is 2014-2019 and it covers the period before (2014-2016) and after (2017-2019) implementation of the Directive.

Variables

To quantify the disclosure on anti-corruption practices (dependent variable), a content analysis method was utilized. In order to measure the level of anti-corruption disclosures, based on the Directive's requirements, the existence of non-financial content items was examined, namely:

1. A description of the policies pursued by the undertaking in relation to anti-corruption
2. A description of the outcome of anti-corruption policies
3. A description of the principal risks related to the anti-corruption
4. A description of how the undertaking manages those risks related to the anti-corruption.

If the content item was present in the management commentary or standalone CSR report, it scored 1, and 0 otherwise.

As PAA as well as Directive do not favor any content item over another, we treat each item as equally important, and we used the same binary scoring for each item. This approach allowed us to evaluate the extent of anti-corruption disclosure made by companies. Further anti-corruption disclosure index (AC) was computed according to the following formula:

$$\text{AC disclosure index} = \frac{\text{Sum of scores obtained by company}}{\text{4 (total number of content items)}}$$

Independent and control variables together with their measurement approach are presented in table 1.

Table 1: Description of the independent and control variables

Variables	Description/measurement approach
Independent variables	
Directive 2014/95/EU (DIRECTIVE)	Dummy = 1 for 2017-2019, or 0 for 2014-2016.
Respect index (RESPECT)	Dummy = 1, if company is listed in Respect index, 0 otherwise
State owned enterprise (SOE)	Dummy = 1, if State is a shareholder of the company and 0 otherwise

Variables	Description/measurement approach
Foreign investor (FOREIGN)	Dummy = 1, if company has at least one foreign shareholder having more than 5% of shares and 0 otherwise
Control variables	
Risky industry (RISKY_IND)	Dummy = 1, if company is a member of a risky industry, according to TI's Bribe Payers Index (Transparency International, 2019), namely: oil and gas, basic materials (including forestry and mining), defense, capital goods, construction, telecommunications, and utilities sectors; 0 otherwise.
Company size (SIZE)	Value of assets in mln PLN

Source: own elaboration.

In terms of control variables, in line with previous studies (Blanc *et al.*, 2017; Sari *et al.*, 2020), this research employs company size and industry type as control variables as these variables may influence anti-corruption disclosure practices.

Method of analysis

Three basic types of models, pooled models (OLS), fixed-effects models (FE) and random-effects models (RE), were used to model panel data in the study. All models were estimated with robust (HAC) standard errors. The proposed model is given as:

$$AC_{it} = ß_0 + ß_{1,it}DIRECTIVE + ß_{2,it}RESPECT + ß_{3,it}SOE + ß_{4,it}FOREIGN + ß_{5,it}RISKY_IND + ß_{6,it}SIZE + \varepsilon_{it}$$

In this research, the significance of the differences between groups (clustered years) was tested using the Wilcoxon signed-rank test. According to Field (2018), the Wilcoxon signed-rank test is a nonparametric test that can be used in situations in which there are two sets of scores to compare, but these scores come from the same participants.

Results and discussion

Descriptive statistics are presented in Table 2. Among Polish listed companies, the level of anti-corruption disclosures varies from the minimum level of 0 to the maximum level of 1. The average AC is 0.52 indicating that there is a room for improvements in terms of disclosure extent. Standard deviation of AC is 0.43 suggesting that there is a high variability among Polish companies in terms of anti-corruption disclosure.

Tabela 2: Descriptive statistics

Variable	n	Minimum	Maximum	Mean	Median	Std. Deviation
AC	426	0.00	1.00	0.52	0.50	0.43
AC1	426	0.00	1.00	0.64	1.00	0.48
AC2	426	0.00	1.00	0.60	1.00	0.49
AC4	426	0.00	1.00	0.44	0.00	0.50
AC5	426	0.00	1.00	0.39	0.00	0.49
RESPECT	426	0.00	1.00	0.33	0.00	0.47
SOE	426	0.00	1.00	0.20	0.00	0.40
FOREIGN	426	0.00	1.00	0.47	0.00	0.50
RISKY_IND	426	0.00	1.00	0.45	0.00	0.50
SIZE (mln)	426	97.08	348044.00	26289.55	2154.09	56276.81

Source: own elaboration.

In table 3 we compare the mean AC index and its components before and after implementation of the Directive. The results indicate that in each case the change between clustered years are statistically significant (p-value<0.001). After implementation of the directive, the AC index, and all components increased significantly (mean increase: 203%, 196%, 218%, 208% and 190% respectively), however the variability among sample companies decreased but only in relation to AC index, AC1 and AC2 components which is reflected in decreasing SD (31%, 58% and 36% respectively). In terms of AC3 and AC4 the variability increased (SD increased 22% and 31% respectively) which is unexpected result. This result can be explained indicating that before Directive implementation companies do not disclose much about anti-corruption issues in general. After implementation of the Directive, in majority cases companies started reporting about anti-corruption policies and their outcomes (AC1 and AC2), but some of them do not treat their activity as corruption exposed and thus do not identify AC risks and how they mitigate those risks (AC3 and AC4).

Table 3: Comparison of the mean AC index and its components before and after implementation of the Directive (2014-2016 versus 2017-2019)

		AC		AC1		AC2		AC3		AC4	
Period	n	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Before implementation (2014-2016)	71	0.26	0.38	0.32	0.45	0.29	0.42	0.22	0.37	0.20	0,36
After implementation (2017-2019)	71	0.78	0.26	0.96	0.19	0.91	0.27	0.67	0.45	0.59	0,47
Change		203%	-31%	196%	-58%	218%	-36%	208%	22%	190%	31%
Z		6.678		6.154		6.215		5.370		4.921	
p		<0.001		<0.001		<0.001		<0.001		<0.001	

SD – standard deviation. Source: own elaboration.

In order to verify developed hypotheses, the panel data analysis was utilized. Subsequent to running the necessary tests (F-test, Breush-Pagan test, Wald test, Hausman's test) for choosing the right model, the fixed-effect model with time fixed effect (FE model 2) was the most appropriate model for this research. Therefore, the results of the fixed-effect model 2 were considered for further discussion about the implications of the study (Table 4).

Table 4: Estimated coefficients from the panel data analysis covering years 2014 - 2019

AC (dependent variable)									
Independent variables	**VIF**	**Pooled model**		**Fixed effects models**				**Random effects model**	
		OLS		**FE model 1**		**FE model 2**		**RE**	
Directive	1.01	0.51	(10.73)***	0.52	(11.52)***	**0.64**	**(14.01)*** **	0.51	(11.00)***
Respect	1.30	0.27	(3.78)***	0.06	(0.71)	**0.04**	**(-0.50)**	0.18	(2.79)***
SOE	1.42	0.1	(1.13)	0.18	(1.41)	**0.14**	**(1.12)**	0.16	(2.25)**
FOREIGN	1.30	-0.04	(-0.61)	0.11	(0.85)	**0.11**	**(0.96)**	-0.00	(-0.06)
RISKY_IND	1.32	0.03	(0.49)	-0.28	(-10.21)***	**-0.18**	**(-5.50)*** **	0.04	(0.60)
SIZE	1.25	-0.00	(-0.39)	-0.17	(-2.21)**	**-0.00**	**(-4.01)*** **	-0.00	(-1.00)
INTERCEPT		0.17	(2.42)**	1.63	(2.65)***	**0.20**	**(2.90)*** **	0.17	(2.60)***
Firm fixed effects				YES		**YES**			
Year fixed effects						**YES**			
n		426		426		**426**		426	
Adj. R^2		0.47		0.58		**0.60**			
F-test				4.73***					

Breush-Pagan test								134.02***	
Wald test						**21.13***			
Hausman's test				13.10**					

** p<0.10. ** p<0.05. *** p<0.01. Source: own elaboration.*

According to the results, independent variables explained almost 60% of the variation in the dependent variable. Directive (DIRECTIVE) was found to have a positive significant effect on AC (b1 = 0.64; p-value<0.01), thus the first hypothesis (H1) is accepted.

The other independent variables namely RESPECT, SOE, FOREIGN have no statistically significant effect on AC, thus the H2, H3 and H4 cannot be accepted.

In terms of control variables, the current results show that size of the company (SIZE) and being a member of risky industry (RISKY_IND) have a statistically significant and negative impact on AC (b6 = -0.001; p-value<0,01; b5 = -0,18; p-value<0.01, respectively).

Conclusions, limitations, and future research agenda

This paper investigated anti-corruption reporting practices, by looking at both the extent of anti-corruption disclosure and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory anti-corruption disclosure under the Directive. An examination indeed showed that the Directive enforcement is associated with the extent of anti-corruption disclosure. This extent increased significantly across all content items, namely anti-corruption policy, the outcome of this policy, the associated risks and their management after Directive implementation period. Hence, this finding supports the institutional theory, by providing empirical evidence of how firms responded to regulatory pressure to provide anti-corruption disclosure. Unexpectedly, other coercive variables namely inclusion in the Respect Index, government ownership and foreign ownership are not significant determinants of anti-corruption reporting. Thus, anti-corruption reporting practices in Polish setting are therefore partially explained by coercive isomorphism.

This study makes at least two major contributions to the literature. Firstly, this study examines the extent of anti-corruption reporting, a specific subset of CSR disclosure which is rarely mentioned in the social accounting literature, although anti-corruption disclosure is very important as it reflects the role of accounting in the fight against corruption. Secondly, it provides a deeper understanding of the manifestation of coercive pressures related to anti-corruption reporting. In particular, our study contributes to the understanding of the impact of Directive on anti-corruption disclosure practices by EU companies. In other words, it presents the contribution of accounting to the struggle against corruption.

Our research has important implications for governments because it revealed that companies responded positively to the regulator's pressure by increasing anti-corruption disclosure. Our research suggests that as a result of Directive, stakeholders should be provided with more complex information about company anti-corruption activities.

As with all research, there are limitations related to our study. Firstly, while the assumptions of the analysis made it possible to examine the extent to which companies report their anti-corruption commitment, it did not allow us to shed light on their actual commitment to anti-corruption efforts. Secondly, our study focuses on disclosure practices in one EU country and it gives no insight into how companies from different EU countries would respond to the pressure of mandatory regulation in the area of anti-corruption.

These limitations open up some possibilities for future research. Firstly, the future research could examine the link between the extent of anti-corruption disclosure and the actual level of corporate involvement in anti-corruption activities. Furthermore, the pressure from enforced Directive 2014/95/EU could be investigated across multiple UE countries.

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Materiality of non-financial information: An Examination of the Impact of Directive 2014/95/EU

Ewa RÓŻAŃSKA
Poznań University of Economics and Business, Poznań, Poland
ewa.rozanska@ue.poznan.pl

Łukasz MATUSZAK
Poznań University of Economics and Business, Poznań, Poland
lukasz.matuszak@ue.poznan.pl

Abstract

Purpose: This study aims to investigate whether making non-financial disclosures (NFD) obligatory affect their materiality by focusing on the differences in the materiality of NFD across companies listed on the Warsaw Stock Exchange over the period surrounding the implementation of the Directive 2014/95/EU (hereafter the Directive). **Design/methodology/approach:** To this purpose, we constructed a novel, hand-collected materiality index of NFD in line with the reporting requirements introduced by Directive. The sample comprised 71 selected listed companies over 6 years. **Findings**: The materiality of NFD have increased over the years of analysis. The implementation of the Directive positively influenced the materiality of non-financial information. **Originality**: Our study contributes to the understanding of the impact of Directive on the materiality of NFD. It has important implications for policy makers because it revealed that mandatory regulations form a crucial instrument in improving the materiality of NFD. Our research suggests that, due to Directive, stakeholders should be provided with more material non-financial information.

Keywords: materiality principle, relevance, quality of non-financial disclosure; non-financial reporting; Directive 2014/95/EU; ESG disclosure, sustainability disclosure

Introduction

Over past decade companies have faced increased institutional pressure to report more about their environmental and social impacts. In this context, multidimensionality of non-financial reporting is associated with greenwashing (Marquis *et al.*, 2016), information overload (Wu and Pupovac, 2019) and decreased decision usefulness to stakeholders (Slack and Tsalavoutas, 2018). These issues mainly relate to voluntary non-financial reports, which have been criticized for the lack of material information in them, for selective content and for highlighting the positive aspects of corporate performance (Wensen *et al.*, 2011). The call for a greater focus on materiality in this context is therefore considered an important and possibly the most effective remedy against these issues (Eccles and Krzus, 2015).

Among many key principles of non-financial reporting, materiality is the most significant and complex. This principle represents the driver through which companies can identify and select issues that are essential to be included in non-financial reports, thus favoring the expectations and needs of all stakeholders (Global Sustainability Standards Board, 2018). The concept of materiality, in fact, acts as a filter to the voluminous data while satisfying key stakeholders and provides a balance on „selective reporting" and „mechanized reporting" (Zhou, 2011). In this way, materiality principle may play an important role in non-financial reporting.

Materiality of disclosure is one of the fundamental principles of the non-financial reporting regime introduced by the Directive 2014/95/EU (Directive). As Baumüller and Schaffhauser-Linzatti (2018) highlight, in designing the Directive, the EU commission acknowledged the importance of the materiality of disclosure to avoid information overload stakeholders. However, in the context of these new reporting requirements, the concept of materiality is different from existing definitions in the field of similar reporting practices. Moreover, the presented concept is difficult to interpret due to the fact that there are different kinds of "materialities" to be found within the Directive itself.

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According to the Directive, large companies (exceeding 500 employees) having headquarters in Member States are required to provide so-called "nonfinancial statement". Companies were expected to comply with the new disclosure requirements of the locally transposed laws by 2018.

In this study, we referred to mandatory reporting and we ask how Directive has impacted the materiality of non-financial reports provided by Polish listed companies? We focus on Poland as it has become one of the then 28 European Union (EU) countries that have transposed the Directive into their national legislation. Since then, non-financial statements are required among certain Polish enterprises by the Polish Accounting Act (PAA).

Empirical studies on the materiality of reports in the context of reporting obligations are rare in the literature to date. Several studies found an increase in overall non-financial reporting quality (Haji, 2013; Fatima *et al.*, 2015; Hąbek and Wolniak, 2016) including only one study (Hąbek and Wolniak, 2016) that used also relevance to proxy for reporting quality and documented that the legal obligation of non-financial disclosure (NFD) has a positive effect on the relevance of reports. However, this study compared voluntary reports with mandatory reports prepared in selected EU countries based on various national regulations in the field of non-financial reporting prior to introduction of the Directive. Thus, it did not examine the effectiveness of the new regulations in relation to materiality of NFD. Other studies found that a non-financial reporting mandate is associated with a decrease in quality (Pedersen *et al.*, 2013) and some studies did not draw a conclusion in either direction (Dumitru *et al.*, 2017).

These findings can be linked to institutional theory (DiMaggio and Powell, 1983), that provides ambiguous predictions concerning potential consequences of mandatory non-financial reporting on materiality as well as overall disclosure quality. According to this theory, companies' behavior is shaped by institutional forces which homogenize companies' practices (DiMaggio and Powell, 1983) including, but not limited to, NFD. This process called isomorphism is determined by coercive, mimetic and normative pressures. Due to the existence of various types of institutional isomorphism there is uncertainty about how companies will behave after the introduction of new mandatory regulations.

On the one hand, legislative pressure (coercive isomorphism) causes companies to adapt to new standards, to gain social legitimacy thus to provide high-quality information. However, companies are not passive players against these forces, and institutional theorists acknowledge that there is resistance to institutional demands and companies can even reject institutional expectations (Oliver, 1991). For example, due to regulations some companies may lose the opportunities to distinguish itself on the market and thus reduce the quality of the reports. Moreover, in some cases companies with passive sustainability strategies may tend to meet the minimum requirements of the regulation (compliance). In this way, companies can try to reduce reporting costs by "ticking the box" instead of reporting the most important issues and thus not focusing on quality. This is why coercive pressure can be a double-edged sword.

On the other hand, mimetic isomorphism suggests that the new mandatory regulations expose some companies to uncertainty about how to report under the new guidelines, causing these companies to imitate the reporting behavior of their peers' (e.g. more experienced in NFD) rather than disclosing information that is material to their stakeholders.

According to Gulenko (2018) some studies suggested such forces, however more research is needed to understand the forces behind companies' non-financial reporting behavior in response to new regulation. This call for new research is especially timely with regard to the materiality of the reports because there is almost no research in this area.

To bridge the gap in knowledge on the effect of mandate on materiality of non-financial reports, the purpose of the paper is to examine the effect of Directive implementation on materiality of NFD in Poland, the country that have introduced mandatory regulation on NFD for the first time.

To this purpose, it was useful to analyze NFD before and after the new legislation entered into force. To examine NFD, we used content analysis and developed a self-constructed materiality index applying the non-financial reporting regime introduced by the Directive.

The following three research questions are answered:

RQ1. To what extent are non-financial reports material?

RQ2. Whether there is a higher materiality of NFD because of Directive implementation?

RQ3. What are the specific materiality differences between reporting in the pre-implementation period and reporting in the post-implementation period?

The results indicate that there is statistically significant change in the materiality of NFD between the period before and after implementation of the Directive among Polish listed companies. Generally, implementation of the Directive has increased the level of materiality of NFD, but there is still room for significant improvements in particular in terms of providing materiality analysis, disclosing strategic approach to material non-financial issues in business model and including non-financial key performance indicators relevant to the particular business.

Our study contributes to the literature by developing a unique measurement tool namely a self-constructed materiality index applying the non-financial reporting regime introduced by the Directive. It also contributes to the understanding of the impact of Directive on materiality of NFD practices by EU companies. This research has also practical implications for policy makers, companies and its stakeholders.

The reminder of the paper is as follows: In Section 2, we analyze the concept of materiality according to the Directive requirements; Section 3 presents sample selection and methodology; Section 4 refers to the empirical findings and discussion while Section 5 presents concluding remarks.

Materiality based on the nonfinancial reporting requirements of the Directive 2014/95/EU

Overview

Despite the importance of materiality principle in both accounting in general and non-financial reporting, the Directive fails to define, and even mention, the concept of materiality (La Torre *et al.*, 2020). This is also clearly visible in the EU Guidelines 2017/C215/01 on non-financial reporting issued in 2017 (European Commission, 2017). The intent of these Guidelines "is to provide balanced and flexible guidance on reporting non-financial information in a way that helps companies to disclose material information consistently and coherently". Despite the unclear legal status of these Guidelines and its non-binding nature, they add clarity to the reporting requirements of the Directive and use a different, in some cases clearer, wording which directly relates to the term "materiality". However, these Guidelines also illustrate that the concept of materiality is not consistently applied to all requirements of the Directive and that several "types" of materiality are used, although closely related to each other (Baumüller and Schaffhauser-Linzatti, 2018).

Materiality in the context of the general provision for non-financial reporting (the minimum content and materiality matrix)

Art. 19a (1) of the Directive states: "Large undertakings […] shall include in the management report a non-financial statement containing information to the extent necessary for an understanding of the undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters […]".

It can be seen that there is the expression "information [...] necessary for understanding [...]" and not "material for". However, regarding this regulation, the EU Guidelines formulate a key non-financial reporting principle called "disclose material information". To clarify this principle, Guidelines refer to Art. 2 (16) of Directive 2013/34/EU, thus linking the materiality to the relevance of the information for users in making decisions.

Taking the above into account, quoted regulation in Art. 19a (1) of the Directive addresses three components of information which could possibly qualify for being material:

1. Information necessary for an understanding of the company's development, performance and position.
2. Information necessary for an understanding of the company's impact of its activity.
3. Information relating in each case to certain matters specified in the Directive.

Point 3 refers to material information on certain categories of issues that are clearly reflected in the Directive and should be disclosed as a minimum. These include: environmental, social and employee matters; respect of human rights; anti-corruption and bribery matters. The EU Guidelines explain that these set of issues refer to the breadth of information disclosed. However, the depth of information reported on a particular issue depends on its materiality. This means that the materiality of the information set is determined by points 1 and 2.

Point 1 relates directly to the general provision for the management report and links the reporting requirements of Art. 19a (1) to a strong financial perspective. Companies are required to report information that is relevant to their assets, liabilities, financial position and profit or loss. Thus, in this case, the materiality analysis is based on an outside-

in approach. It reflect how certain issues effect the company and issues are material depending on their ability to make such effects (Baumüller and Schaffhauser-Linzatti, 2018).

Point 2 introduces the new element to be taken into account when assessing the materiality of non-financial information namely impact of (the company's) activity. This element is specific to the sustainability reporting according to GRI standards, referring to the perspective of the company's stakeholders. In this context, GRI 101: Foundation 2016 (Clause 1.3) addresses to the following understanding of materiality: "Relevant topics, which potentially merit inclusion in the report, are those that can reasonably be considered important for reflecting the organization's economic, environmental, and social impacts, or influencing the decisions of stakeholders." Thus, two dimensions are distinguished, both of which can induce materiality independently: "influence" and "stakeholders". The combination of these two dimensions results in the so-called materiality matrix. This is the outcome of the materiality analysis, the process by which a company determines and prioritizes its relevant aspects and topics that need to be included in sustainability report (Bellantuono *et al.*, 2016). It is based on a list of topics that are potentially relevant, identified e.g. using interviews or checklist approaches. Thus, in this case, the materiality analysis is characterized by an inside-out approach. Topics are material if they reflect impact of the reporting organization on its stakeholders and the concept of sustainability as a whole (Baumüller and Schaffhauser-Linzatti, 2018).

Materiality in the context of nonfinancial KPIs

Art. 19a (1) (e) of the Directive requires the presentation of "non-financial key performance indicators relevant to the particular business" in the non-financial report. The EU Guidelines explain that the non-financial statement should contain material narratives and disclosures based on metrics commonly known as key performance indicators (KPIs). Further, the EU Guidelines encourage companies to disclose material KPIs, both general and sectoral (European Commission, 2017).

The requirement to present material KPIs relates to the matters included in the minimum content (in section 2.2). Moreover, as the EU Guidelines add, a company needs to disclose KPIs that are necessary to understand its development, performance, position and impact of its activity.

To meet this reporting requirement, first, a company needs to identify the material matters. Second, a company needs to identify possible non-financial KPIs for each of these matters, usually using a checklist approach. For each matter, the relevance of KPIs may differ. Thus, third, a company subsequently needs to judge the materiality of these possible KPIs in financial and stakeholder perspectives.

The materiality principle is expected to limit the number of KPIs to a reasonable amount. However, the wording of Art. 19a (1) (e) also suggests that each matter is to be supported by at least one KPI.

The role of stakeholder identification in the materiality analysis

The EU Guidelines outline the crucial role of stakeholder identification in the application of the materiality principle in non-financial reporting. They highlight that companies are expected to consider, as can be guessed, in the materiality process, the information needs of all relevant stakeholders. Companies should focus on the information needs of the stakeholders as a collective group and not on the needs or preferences of individual or atypical stakeholders or those with unjustified information demands. Where relevant, this may include, but is not limited to: investors, employees, consumers, suppliers, customers, local communities, public authorities, vulnerable groups, social partners and civil society (European Commission, 2017).

The materiality analysis is designed to meet the information needs of the company and its stakeholders, and in this respect is more effective if it can understand and capture the needs of the company's stakeholders. A proper understanding of these needs is essential to the effectiveness of non-financial reporting. This can explain the importance of the stakeholder identification process in the shift towards more material non-financial disclosure. Previous quantitative analysis conducted by Torelli *et al.* (2020) has shown that stakeholder engagement plays a fundamental role in the report production process, particularly in the materiality analysis itself.

It is not surprising then that the EU Guidelines recommend companies to provide material information on their engagement with relevant stakeholders, and how their information needs are taken into account.

Materiality and business model (strategy and objectives)

Art. 19a (1) (a) of the Directive requires the presentation of "a brief description of the undertaking's business model" in the nonfinancial report. The EU Guidelines add that this includes company's strategy and objectives. Disclosures

should provide insight into the strategic approach to relevant non-financial matters and explain the short, medium and long-term consequences of the information reported. Targets and benchmarks can be presented qualitatively or quantitatively. Where appropriate, companies may disclose material information based on scientific scenarios (European Commission, 2017). The new approach to materiality must focus on what is important to the business. But it needs to do so with a broader perspective to capture a long-term view of the problems that could affect the success of its strategy.

Materiality and consistency with other elements of the management reports

The materiality concept is expected to make the non-financial statement consistent with other elements of the management report. According to EU Guidelines the clear link between the information provided in the non-financial report and the other information disclosed in the management report makes the information more useful, relevant and cohesive (European Commission, 2017).

Research Methodology

Research sample and data collection

Our initial sample comprises of all firms listed on the WSE. To be included in our sample, companies have to meet the following criteria:

(1) They must be Polish companies (ISIN – PL)
(2) They must have been experienced in non-financial reporting at least in 2014.
(3) They have to fulfil criteria imposed by transposed Directive concerning employment, assets, and income for the period 2017-2019.
(4) They had to have required data for 2014-2019.

The final study sample was composed of 71 Polish companies (426 company-year observations).

The data concerning employment, assets, and income were obtained from the Notoria Service Database. The data concerning non-financial materiality data were hand-collected from non-financial statements being a separate section of management commentary (not stand-alone) or being a separate stand-alone report. In order to verify developed hypotheses our time scope is 2014-2019 and it covers the period before (2014-2016) and after (2017-2019) implementation of the Directive.

Non-financial materiality index

To quantify the materiality of NFD, a content analysis method was utilized. Following the Directive and its Guidelines (European Commission, 2017) analyzed in Section 2, we examined the existence of selected materiality items presented in Table 1.

Table 1: NFD materiality index and its components

Materiality items:			Measurement approach
MI1	**Materiality matrix**		1 = inclusion of materiality analysis with materiality matrix as part of the non-financial report; 0 = otherwise
MI2	**Non-financial KPIs**		1 = inclusion of non-financial KPIs relevant to the particular business; 0 = otherwise
MI3	NFD material matters sub-index (MMI)	Description of **environmental matters**	1 = existence of chapter or point about environmental matters; 0 = otherwise
MI4		Description of **employee matters**	1 = existence of chapter or point about employee matters; 0 = otherwise
MI5		Description of **human rights matters**	1 = existence of chapter or point about human rights matters; 0 = otherwise
MI6		Description of **social matters**	1 = existence of chapter or point about social matters; 0 = otherwise
MI7		Description of **anti-corruption and bribery matters**	1 = existence of chapter or point about anti-corruption and bribery matters; 0 = otherwise
MI8	**Sustainability strategy**		1 = inclusion of the strategic approach to relevant non-financial matters in business model; 0 = otherwise

Materiality items:		Measurement approach
MI9	**Targets for future**	1 = inclusion of targets for future with an explanation of the short-term, medium-term and long-term implications of NFD; 0 = otherwise
MI10	**Stakeholder's identification**	1 = existence of stakeholder's identification; 0 = otherwise
MI11	**Consistency with other elements of the management reports**	1 = clear links between the information presented in the non-financial statement and other information disclosed in the management report; 0 = otherwise

Source: own elaboration.

Each materiality item, in each company was scored separately. If the materiality item was present in the management commentary or standalone CSR report, it scored 1, and 0 otherwise. This approach allowed us to evaluate the selected materiality items for each company. As MI3-MI7 reflects the minimum content of material matters required by the Directive, we clustered them and computed the NFD material matters sub-index according to the following formula:

$$\text{NFD material matters sub-index (MMI)} = \frac{MI3 + MI4 + MI5 + MI6 + MI7}{5 \text{ (total number of materiality items MI3-MI7)}}$$

Further NFD materiality index (MI) was computed according to the following formula:

$$\text{NFD materiality index} = \frac{MI1 + MI2 + MI3 + MI4 + MI5 + MI6 + MI7 + MI8 + MI9 + MI10 + MI11}{11 \text{ (total number of materiality items)}}$$

Method of analysis

In this research, the significance of the differences between clustered years were tested using the Wilcoxon signed-rank test which is a nonparametric test that can be used in situations in which there are two sets of scores to compare, but these scores come from the same participants.

Results and Discussion

Descriptive statistics are presented in Table 2. Among sample companies the level of MI varies from the minimum level of 0.09 to the maximum level of 1. The average MI is 0.58 indicating that there is a room for improvements in terms of disclosure of material non-financial information. Standard deviation of MI is 0.31 suggesting that there is a high variability among Polish companies in terms of disclosure of material non-financial information. The highest mean values are for MI3-MI7 (0.92, 0.81, 0.69, 0.83, 0.65, respectively) indicating that the level of material content matters in sample companies is relatively high.

Table 2: Descriptive statistics

Materiality items	n	Minimum	Maximum	Mean	Median	Std. deviation
MI	426	0.09	1.00	0.58	0.64	0.31
MI1	426	0.00	1.00	0.27	0.00	0.44
MI2	426	0.00	1.00	0.39	0.00	0.49
MI3	426	0.00	1.00	0.92	1.00	0.27
MI4	426	0.00	1.00	0.81	1.00	0.39
MI5	426	0.00	1.00	0.69	1.00	0.46
MI6	426	0.00	1.00	0.83	1.00	0.37
MI7	426	0.00	1.00	0.65	1.00	0.48
MI8	426	0.00	1.00	0.21	0.00	0.41
MI9	426	0.00	1.00	0.54	1.00	0.50
MI10	426	0.00	1.00	0.50	1.00	0.50

Materiality items	n	Minimum	Maximum	Mean	Median	Std. deviation
MI11	426	0.00	1.00	0.52	1.00	0.50

Source: own elaboration.

According to Figure 1, all materiality items have increased over the years of analysis, which is a positive trend. Moreover, the increase within period before implementation of the Directive is visibly lower comparing with the increase after implementation. This suggests that implementation of the Directive could have a positive impact on materiality of non-financial information. This initial conclusion is confirmed taking into consideration the results of further analysis presented in Figure 2. The results indicate, that there is significant difference between the mean MI before and after implementation of the Directive. In order to assess the statistical significance of the changes between the clustered years before and after implementation of the Directive for MI and all materiality items Wilcoxon signed-rank test was utilized. As presented in Table 3, the Wilcoxon test showed statistically significant differences between the MI before and after implementation of the Directive (Z=6.89, p-value<0.001). Moreover, the variability of disclosure of material non-financial information decreased which is a positive trend (MI standard deviation decreased -31%). In terms of the materiality items, the Wilcoxon signed-rank test confirmed the statistical significance of the differences between the clustered years for all MI components. The highest increase is observed around MI8 (219%) and the lowest round MMI (76%). Therefore, it can be noted that the implementation of the Directive positively influenced the materiality of non-financial reports.

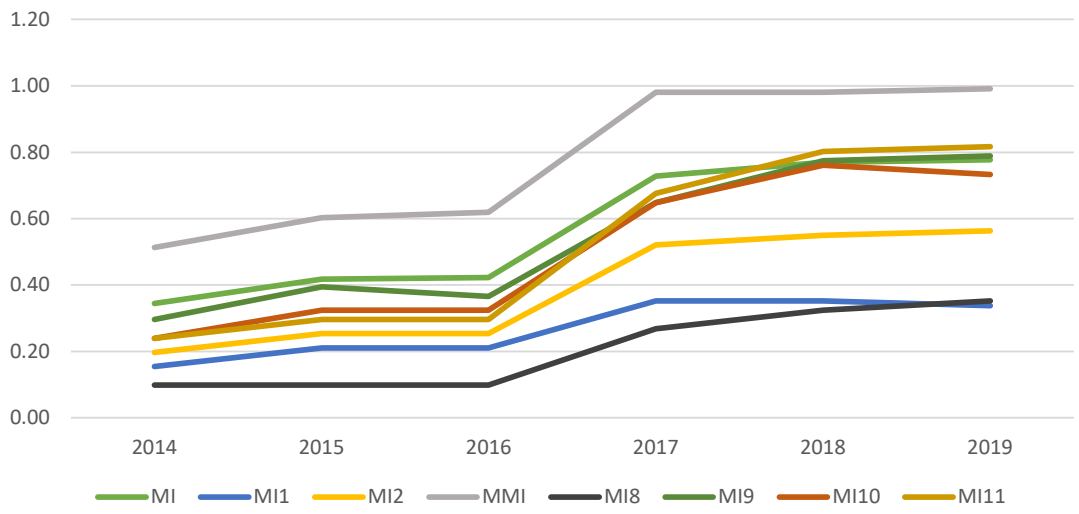

Figure 1: Share of companies disclosing selected materiality items across the years of analysis

Source: own elaboration.

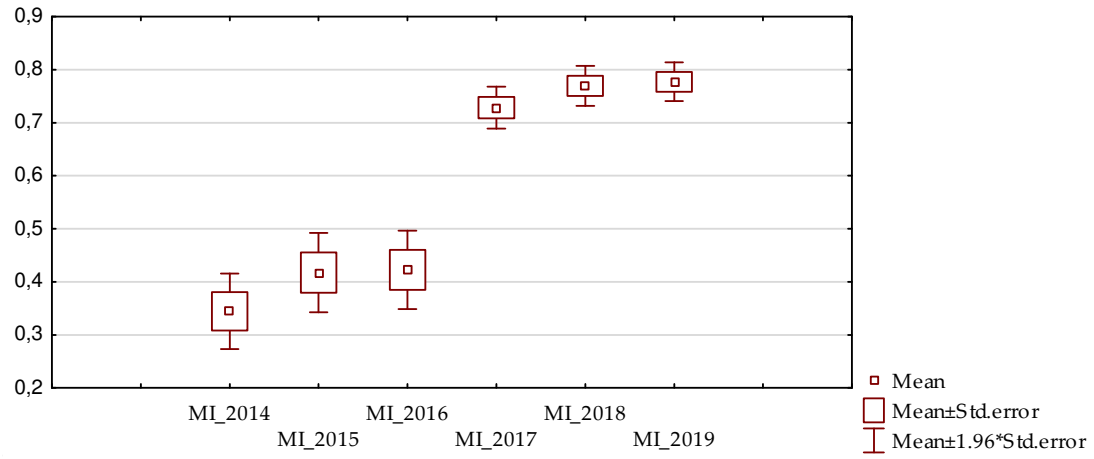

Table 3: Comparison of the mean NFD materiality index and its components before and after implementation of the Directive (2014-2016 versus 2017-2019)

		MI		MI1		MI2		MMI		MI8		MI9		MI10		MI11	
Period	n	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Before implementation (2014-2016)	71	0.38	0.22	0.18	0.26	0.23	0.32	0.56	0.23	0.10	0.23	0.34	0.36	0.28	0.31	0.26	0.28
After implementation (2017-2019)	71	0.76	0.16	0.35	0.46	0.54	0.48	0.98	0.06	0.31	0.45	0.74	0.41	0.71	0.42	0.77	0.36
Change		100%	-31%	90%	76%	142%	51%	76%	-72%	219%	96%	115%	12%	154%	36%	197%	28%
Z		6.89		2.09		3.93		7.11		3.31		5.17		5.27		6.10	
p		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	

* p<0.10. ** p<0.05. *** p<0.01. Source: own elaboration.

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Conclusions, limitations, and Future Research Agenda

The principle of materiality can play an important role in non-financial reporting by countering information overload and greenwashing.

In this paper, focusing on the evaluation of the materiality of NFD in Poland over the period surrounding the implementation of the Directive, we investigated whether making non-financial disclosures obligatory affect their materiality.

We found that the NFD of Polish WSE companies are increasingly material and that the Directive has significantly increased its materiality. However, there is still space for improvements in particular in terms of providing materiality analysis, disclosing strategic approach to material non-financial issues in business model and including non-financial key performance indicators relevant to the particular business. Hence, this study supports the institutional theory, especially coercive isomorphism in the form of regulatory pressure. However, this pressure is not very strong because companies are still resisting it.

Our study has important theoretical and practical implications. It contributes to the non-financial disclosure literature. First, we developed a self-constructed materiality index applying the non-financial reporting regime introduced by the Directive. Our framework conceives materiality as a multidimensional construct, constituted of the various types of materiality resulting from the analysis, contextualization and interpretation of the relevant sections of Directive and EU Guidelines. Second, our study contributes to the understanding of the potential impact of Directive on materiality of NFD practices by EU companies. Third, it adds to widen the empirical researches addressed to investigate the materiality of NFD in mandatory context.

This research has also implications for policy makers, companies and its stakeholders. First, it revealed that mandatory regulations are a crucial instrument for policy makers in improving the materiality of NFD. It also showed that there is a scope for the national government to introduce further guidance for companies to ensure higher materiality of NFD leading to higher quality of disclosures. Second, our assessment tool created for measuring the materiality of non-financial reports can also help those companies that are willing to self-assess their non-financial reports and/or improve their reporting process. Third, our research suggests that as a result of Directive, stakeholders should be provided with more material information.

Our research has several limitations that should be noted. The Directive is not the only one factor affecting the materiality of NFD. There may be other institutional forces impacting the materiality of NFD, especially mimetic isomorphism. Moreover, the impact of the Directive on the non-financial reporting of companies from other EU countries may be potentially different. Future research should consider extend our research along each of above-mentioned limitations.

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The Impact of Directive 2014/95/EU Implementation on Reliability of Non-Financial Information – Empirical Evidence from CEE Country

Łukasz MATUSZAK
Poznań University of Economics and Business, Poznań, Poland
lukasz.matuszak@ue.poznan.pl

Ewa RÓŻAŃSKA
Poznań University of Economics and Business, Poznań, Poland
ewa.rozanska@ue.poznan.pl

Abstract

Purpose: This study investigated the differences in the reliability of non-financial disclosure (NFD) across companies listed on the Warsaw Stock Exchange over the period surrounding the implementation of the Directive 2014/95/EU (Directive). **Design/methodology/approach**: To this purpose, we constructed a novel, hand-collected NFD reliability index in line with the reporting requirements introduced by Directive. The sample comprised 71 selected listed companies over 6 years. **Findings**: The reliability of NFD have significantly increased over the years of analysis. The implementation of the Directive positively influenced the reliability of non-financial information. **Originality**: Our study contributes to the understanding of the impact of Directive on the NFD practices by European Union companies. Our research has important implications for policy makers because it revealed that mandatory regulations form a crucial instrument in improving the reliability of NFD. Our research suggests that, due to Directive, stakeholders should be provided with more reliable non-financial information.

Keywords: reliability principle; credibility, CSR disclosure; Directive 2014/95/EU; non-financial disclosure; ESG disclosure; sustainability disclosure

Introduction

There is a growing global stakeholder pressure for reliable non-financial disclosures (NFD) provided by companies. Nowadays, we can observe that the number of non-financial reports or CSR reports increase, however, their quality in particular reliability, is different. These reports do not always provide stakeholders with expected information which in turn rises reliability problems such as lack of comparability of information or difficulties in evaluation of NFD. These problems are getting worse as there is still no single, commonly accepted standard according to which NFD should be developed (Hąbek, 2013).

The above-mentioned NFD quality problems motivated European Union (EU) to issue Directive 2014/95/EU (Directive), which has been transposed into law for all EU Member States, with the objective to "increase investors and consumers trust" (European Union, 2014). According to the Directive large public interest entities and groups should issue a non-financial statement, disclosing to their stakeholders the main corporate non-financial information, i.e. "information to the extent necessary for an understanding of the undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters, including: (a) a brief description of the undertaking business model; (b) a description of the policies pursued by the undertaking in relation to those matters; (c) the outcome of these policies; (d) the principal risks related to these matters including how the undertaking manage those risks; (e) relevant non-financial key performance indicators" (Matuszak and Różańska, 2017).

In this study, we referred to mandatory reporting and we ask how Directive has impacted the reliability of non-financial reports provided by Warsaw Stock Exchange (WSE) companies?

Research on the reliability of reports in the context of reporting obligations is at a nascent stage in the literature. Several studies found an increase in overall non-financial reporting quality (Frost, 2007; Damak-Ayadi, 2011; Haji, 2013; Fatima *et al.*, 2015; Hąbek and Wolniak, 2016; Mion and Loza Adaui, 2019; Mazzotta *et al.*, 2020). However,

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only three of them (Hąbek and Wolniak, 2016; Mion and Loza Adaui, 2019; Mazzotta *et al.*, 2020) used credibility to proxy for reporting quality. Hąbek and Wolniak (2016) documented that the legal obligation of NFD has a positive effect on the credibility of reports in selected EU countries prior to introduction of the Directive. Similarly, Mion and Loza Adaui (2019) showed statistically significant differences for the dimension of credibility of reports in Italian and German companies after the implementation of the Directive. Other studies found that a non-financial reporting mandate is associated with a decrease in quality (Pedersen *et al.*, 2013; Vormedal and Ruud, 2009) and some studies showed inconclusive results (Dumitru *et al.*, 2017; Lock and Seele, 2016), including only one study that was focused entirely on credibility (Lock and Seele, 2016). Lock and Seele (2016) operationalized the credibility of reports through the four aspects truth, sincerity, appropriateness and understandability. They fund that the regulatory context did not impact reporting credibility of European companies. Mandatory reporting of CSR in France and Spain did not consistently benefit reporting credibility.

These findings can be linked to institutional theory (DiMaggio and Powell, 1983), that provides ambiguous predictions concerning potential consequences of mandatory non-financial reporting on reliability as well as overall disclosure quality. According to this theory, companies' behavior is shaped by institutional forces which homogenize companies' practices (DiMaggio and Powell, 1983) including, but not limited to, NFD. This process called isomorphism is determined by coercive, mimetic and normative pressures. Due to the existence of various types of institutional isomorphism there is uncertainty about how companies will behave after the introduction of new mandatory regulations.

On the one hand, legislative pressure (coercive isomorphism) causes companies to adapt to new standards, to gain social legitimacy thus to provide high-quality information. However, companies are not passive players against these forces, and institutional theorists acknowledge that there is resistance to institutional demands and companies can even reject institutional expectations (Oliver, 1991). For example, due to regulations some companies may lose the opportunities to distinguish itself on the market and thus reduce the quality of the reports. Moreover, in some cases companies with passive sustainability strategies may tend to meet the minimum requirements of the regulation (compliance). In this way, companies can try to reduce reporting costs by "ticking the box" instead of providing reliable reports and thus not focusing on quality. This is why coercive pressure can be a double-edged sword.

On the other hand, mimetic isomorphism suggests that the new mandatory regulations expose some companies to uncertainty about how to report under the new guidelines, causing these companies to imitate the reporting behavior of their peers' (e.g. more experienced in non-financial reporting) rather than disclosing information that can build trust among their stakeholders.

According to Gulenko (2018) some studies suggested such forces, however more research is needed to understand the forces behind companies' non-financial reporting behavior in response to new regulation. This call for new research is especially timely with regard to the reliability of the reports because there is little research in this area.

To bridge the gap in knowledge on the effect of mandate on reliability of non-financial reports, the purpose of the paper is to examine the effect of Directive implementation on reliability of NFD in Poland, the country that have introduced mandatory regulation on NFD for the first time. To address this purpose, we used content analysis method and examined NFD of 71 Polish companies listed on WSE, for the years 2014-2019, to construct NFD reliability index. The results indicate that there is statistically significant change of the reliability of NFD between the period before and after implementation of the Directive among Polish listed companies. Generally, implementation of the Directive has increased the level of reliability of NFD but there is still room for significant improvements in particular in terms of comparisons in time and between entities as well as external assurance of NFD. To the best of our knowledge this study is the first investigating the impact of mandatory regulation on reliability of NFD in Poland.

We assumed that our study contributes to the understanding of the potential impact of Directive on reliability of NFD practices by EU companies. This research has important implications for policy makers since it revealed that mandatory regulations are a crucial instrument in improving the reliability of NFD. Our research suggests that in order to improve reliability of NFD, regulations should go further and expect at least, that NFD to be externally assured. Stakeholders that will be provided with more reliable NFD could be encouraged to use it in their decision-making processes to a greater extent.

The reminder of the paper is as follows: In Section 2, we analyze the concept of reliability according to the Directive and EU Guidelines; Section 3 presents sample selection and methodology. Section 4 refers to the empirical findings and discussion while Section 5 presents concluding remarks.

Reliability of the non-financial information required by the Directive 2014/95/EU and EU Guidelines

Overview

As it is mentioned above the main objective of the Directive is to "increase investors and consumers trust". According to Cambridge Dictionary (Cambridge Dictionary, 2020), trust is "to believe that someone is good and honest and will not harm you, or that something is safe and reliable" This definition indicates specific features of trust which are being safe and reliable. Relating this feature to information we could say that if the non-financial information is aimed at rebuilding investors and consumers trust it should be safe and reliable. In this sense reliability of non-financial information is a central point of the Directive and in the same time its final goal. Despite the importance of reliability feature for, both accounting in general and non-financial reporting, the Directive fails to define, and even mention, the feature of reliability.

Following Article 2 of the Directive, the European Commission prepared non-binding guidelines on methodology for reporting non-financial information, including non-financial KPIs, general and sectoral, with a view to facilitating relevant, useful and comparable disclosure of non-financial information by undertakings. The Guidelines refer to the expected quality of NFD indicating principles/dimensions that should be followed in order to build reliable non-financial information. The EU Guidelines 2017/C215/01 on non-financial reporting were issued in 2017 (European Commission, 2017). Despite the unclear legal status of these Guidelines and its non-binding nature, they add clarity to the reporting requirements of the Directive and use a different, in some cases clearer, wording which directly and indirectly relates to the term reliability feature. In this research we used content analysis and developed a self-constructed NFD reliability index applying the non-financial reporting regime introduced by the Directive and based on EU Guidelines.

In order to develop NFD reliability index we have analyzed the guidelines and checked where the regulator refers to reliability issue. Based on the analysis we selected reliability items which were included to our NFD reliability index.

Previous literature employed various methods to assess the reliability of non-financial reports. For example Lock and Seele (2016) as well as Mazzotta *et al.* (2020) operationalized credibility based on Habermas communication theory, by four constructs, namely understandability, being a precondition of credibility, truth, sincerity, appropriateness. Mion and Loza Adaui (2019) measured credibility index based on seven components: adoption of sustainability reporting guidelines, evidence of independent verification or assurance; evidence of stakeholder engagement, description of instruments used for stakeholder engagement in sustainability reporting process, availability of quantitative data about sustainability expenditures and performance and inclusion of a materiality analysis as part of the sustainability report. While Hąbek and Wolniak (2016) measured credibility index based on six categories namely: readability, basic reporting principles, quality of data, stakeholder dialogue outcomes, feedback, independent verification. None of above-mentioned research used Directive requirements to proxy for the reliability.

Reliability and understandability

Point 3.2 relates to "Fair, balanced and understandable" principle which is mostly linked with reliability issue. First it should be stressed that Guidelines place understandability together with fairness. This logic is fully supported by the communication theory where understandability has a special place in the credibility concept: It is a necessary precondition to enter discussions on credibility (Lock and Seele, 2016). In this context we can state, that to be reliable, non-financial information shall be understandable first. The Guidelines indicate the ways how to enhance understandability of non-financial information. The suggested activities are as follows:

- using plain language and consistent terminology, avoiding boilerplate, and, where necessary, providing definitions for technical terms,
- explaining key internals of the information disclosed, such as measurement methods, underlying assumptions and sources,
- disclosing both qualitative and quantitative information. While quantitative information may be effective in reporting some non-financial issues (KPIs, targets, etc.), qualitative information provides context and makes the non-financial statement more useful and easier to understand. A combination of narrative reporting, quantitative information and visual presentation supports (graphs, diagrams, charts, etc.) effective and transparent. According to study by Helfaya et al. (2019) the preparers and users of a company's environmental report perceived the use of visual tools a one of the most significant dimensions/features of reporting quality.

In this research according to the Guidelines understandability is proxied by three variables namely: (1) availability of visual presentations about NFD (visual tools), (2) evidence that information uses plain language and consistent terminology, avoiding boilerplate, and, where necessary, providing definitions for technical terms (readability), (3) availability of a description of measurement methods, underlying assumptions and sources (quality of data).

Reliability and being fair

Point 3.2 of EU Guidelines indicate, that non-financial information can be made fairer and more accurate through, for example:

- appropriate corporate governance arrangements (for instance, certain independent board members or a board committee entrusted with responsibility over sustainability and/or transparency matters),
- robust and reliable evidence, internal control and reporting systems;
- effective stakeholder engagement; and
- independent external assurance.

According to report of Irwin and McGill (2018) users of non-financial information (in particular investors) want to have a confidence in its reliability. The key element that contribute to their confidence, among the others, is external assurance. When the information is assured by an independent third party, users can have more confidence in the information, although it may not necessarily change how they use it. Moreover, the third party's expert view can influence the perception of management and the board in terms of their attitude and approach to controls, risk management and governance.

In this research according to the Guidelines being fair is proxied by the evidence that non-financial information is externally assured.

Reliability and comparability

Point 3.6 of EU Guidelines indicates that the content of the non-financial report should be consistent over time. This enables users of information to understand and compare past and present changes in a company's development, position, performance and impact, and relate reliably to forward-looking information (European Commission, 2017). Further, EU Guidelines highlight, that consistency in the choice and methodology of KPIs is important to ensure that the non-financial statement is understandable and reliable. KPIs should be used consistently from one reporting period to the next in order to provide reliable information on progress and trends. In this context existence of in-time comparisons should enhance reliability of non-information since it increases users understanding of the given phenomena and supports them in drawing better conclusions.

In this research comparability is proxied by availability of comparisons in time in NFD (consistent over time).

Research Methodology

Research sample and data collection

Our initial sample comprises of all firms listed on the WSE. To be included in our sample, companies have to meet the following criteria:

(1) They must be Polish companies (ISIN – PL)
(2) They must have been experienced in non-financial reporting at least in 2014.
(3) They have to fulfil criteria imposed by transposed Directive concerning employment, assets, and income for the period 2017-2019.
(4) They had to have required data for 2014-2019.

The final study sample was composed of 71 Polish companies (426 company-year observations).

The collected data are grouped in two categories: (1) data concerning employment, assets, and income comprised of the absolute values; and (2) non-financial reliability data used to calculate the statistics. The data from the first group were obtained from the Notoria Service Database. The data from the second group were hand-collected from non-financial statements being a separate section of management commentary (not stand-alone) or being a separate stand-alone report. In order to verify developed hypotheses our time scope is 2014-2019 and it covers the period before (2014-2016) and after (2017-2019) implementation of the Directive.

Non-financial reliability index

To quantify the reliability of NFD, a content analysis method was utilized. Following the Directive's guidelines (European Commission, 2017), we examined the existence of selected reliability items presented in Table 1.

Each reliability item, in each company was scored separately. If the reliability item was present in the management commentary or standalone CSR report, it scored 1, and 0 otherwise. In order to decrease the subjectivity of this evaluation, we employed cross-check analysis (scores given by one author were checked independently by the second author and conversely). Discrepancies across members of the research team were discussed and reconciled. This approach allowed us to evaluate the selected quality principles for each company. NFD reliability index (RI) was computed according to the following formula:

$$\text{NFD reliability index} = \frac{RI1 + RI2 + RI3 + RI4 + RI5}{5 \text{ (total number of reliability items)}}$$

Table 1: NFD reliability index and its components

Reliability items:		Measurement approach
RI1	**Visual tools**	1 = use of visual presentation in NFD, e.g. graphs, diagrams, charts, etc. ; 0 = otherwise
RI2	**Readability**	1 = evidence that information uses plain language and consistent terminology, avoiding boilerplate, and, where necessary, providing definitions for technical terms of definitions of technical terms; 0 = otherwise
RI3	**Quality of data**	1 = existence of at least one item: a description of measurement methods or underlying assumptions or sources; 0 = otherwise
RI4	**Consistent over time**	1 = existence of comparable non-financial information; 0 = otherwise
RI5	**Assurance**	1 = evidence that non-financial information is externally assured; 0 = otherwise

Source: own elaboration.

Method of analysis

In this research, the significance of the differences between years and/or groups was tested using the Wilcoxon signed-rank test which is a nonparametric test that can be used in situations in which there are two sets of scores to compare, but these scores come from the same participants.

Results and Discussion

Descriptive statistics are presented in Table 2. Among Polish sample companies the level of RI varies from the minimum level of 0 to the maximum level of 1. The average RI is 0.32 indicating low level of reliability of non-financial information. This suggest that there is a still room for improvements in terms of reliability of non-financial information. Standard deviation of RI is 0.30 suggesting that there is a high variability among Polish companies in terms of reliability of NFD. In terms of reliability items, the highest mean RI4 (mean=0,52) which indicate that on average 52% of companies disclose comparable information in their non-financial statements.

Table 2: Descriptive statistics

Variable	n	Minimum	Maximum	Mean	Median	Std. deviation
RI	426	0.00	1.00	0.32	0.20	0.30
RI1	426	0.00	1.00	0.48	0.00	0.50
RI2	426	0.00	1.00	0.36	0.00	0.48
RI3	426	0.00	1.00	0.15	0.00	0.36
RI4	426	0.00	1.00	0.52	1.00	0.50
RI5	426	0.00	1.00	0.11	0.00	0.31

Source: own elaboration.

According to Figure 1, the mean RI level as well as almost all its components (except RI5) have increased over the years of analysis, which is a positive trend. Moreover, the increase within period before implementation of the Directive is visibly lower comparing with the increase after implementation. This suggests that implementation of the Directive could have a positive impact on reliability of NFD. Surprisingly, RI5 level decreased over the years of analysis. In 2014 approximately 20% of sample companies verified their non-financial statement by external auditor. In the period 2015-2017 the share of such companies decreased to around 10%, and in 2019 non-financial statements were not assured. This indicate that after Directive implementation sample companies refrain from verifying NFD by external auditor.

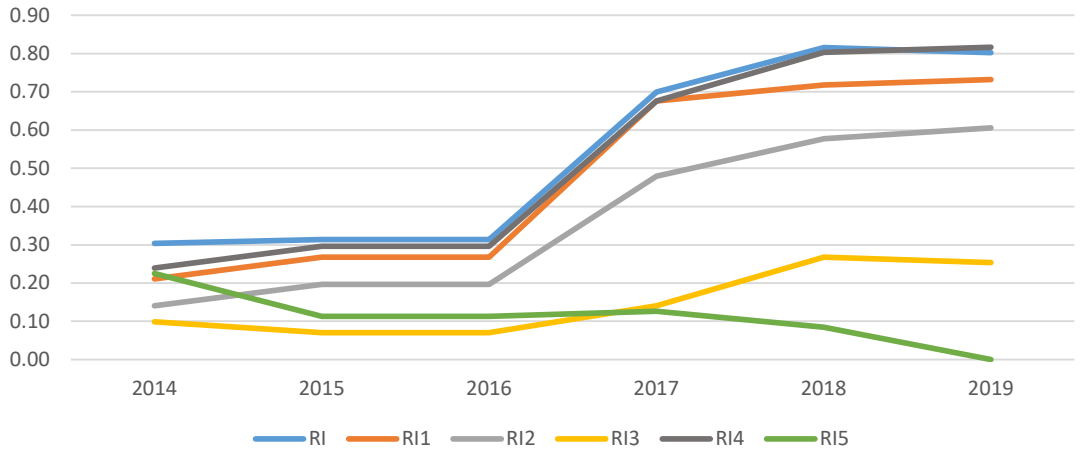

Figure 1: Development of the mean RI and its components

Source: own elaboration

Figure 2 and Table 3 presents a comparison of the mean RI across the years of analysis. The results on the graph indicate that there is significant difference between the mean RI in years before and years after implementation of the Directive (Figure 2). Moreover, in order to assess the changes between the years, Wilcoxon singed-rank test was utilized. The test confirms that mean RI between the years before and after implementation of the Directive differs significantly (p-value<0.001) (Table 3 – three stars). This difference cannot be observed within the years before and after implementation of the Directive.

Table 3: Comparison of the mean RI across the years of analysis

Years	RI_2014		RI_2015		RI_2016		RI_2017		RI_2018	
	Z	Sig.	Z	Sig.	Z	Sig.	Z	Sig.	Z	Sig.
RI_2015	0.2									
RI_2016	0.4		0.3							
RI_2017	4.8	***	5.1	***	5.1	***				
RI_2018	5.8	***	5.8	***	5.9	***	2.6	**		
RI_2019	5.7	***	5.7	***	5.9	***	2.2	**	1.2	

*** p<0.05, *** p<0.001. Source: own elaboration.*

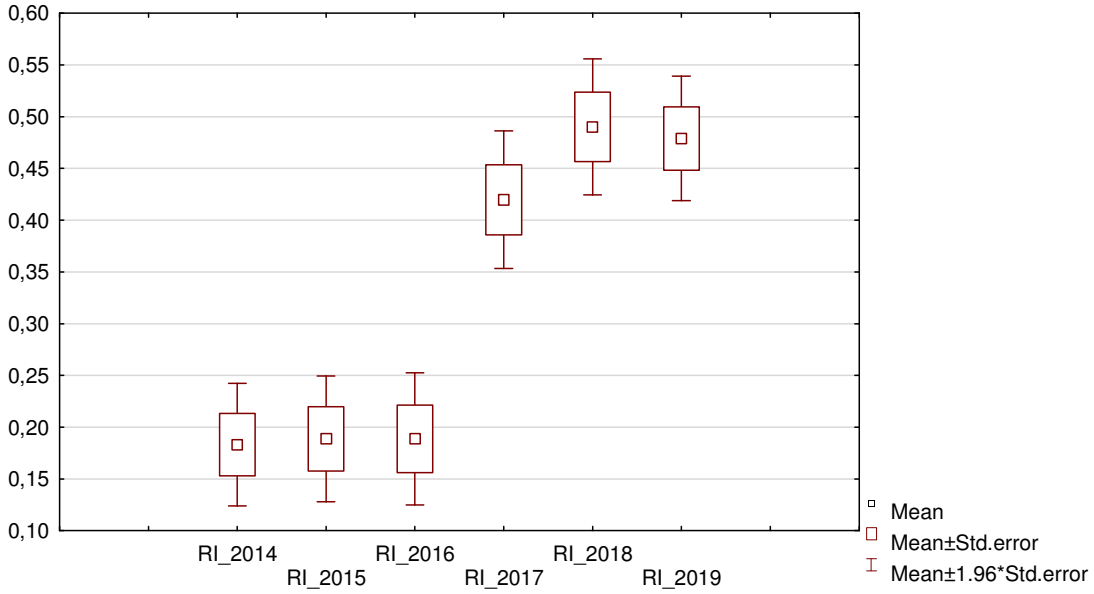

Figure 2: Comparison of the mean RI across the years of analysis

Source: own elaboration.

In order to assess the statistical significance of the changes between the clustered years before and after implementation of the Directive for RI and all reliability items Wilcoxon signed-rank test was utilized. As presented in Table 4, statistically significant differences can be observed between the RI before and after implementation of the Directive ($Z = 6.30$, p-value<0.001). The RI increased by 147% between clustered years having standard deviation on almost the same level. This indicate that relative variability decreased which is a positive trend. In terms of reliability items, the Wilcoxon signed-rank test confirmed the statistical significance of the differences between clustered years for each RI component. The highest increase is observed around RI2 (208%) and the lowest round RI4 (176%). In general, it can be noted that the implementation of the Directive positively influenced the reliability of non-financial information. The improvement in the reliability of non-financial reporting is in line with Hąbek and Wolniak (2016) and Mion and Loza Adaui (2019) findings.

Table 4: Comparison of the mean RI and its components before and after implementation of the Directive (2014-2016 versus 2017-2019)

		RI		RI1		RI2		RI3		RI4		RI5	
Period	**n**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**
Before implementation (2014-2016)	71	0.19	0.25	0.25	0.41	0.18	0.36	0.08	0.26	0.28	0.41	0.15	0.22
After implementation (2017-2019)	71	0.46	0.26	0.71	0.44	0.55	0.47	0.22	0.37	0.77	0.36	0.07	0.14
Change		147%	5%	185%	8%	208%	30%	177%	43%	176%	-12%	-53%	-37%
Z		6.30		5.42		4.98		2.96		5.87		2.26	
p		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	

*** p<0.001. Source: own elaboration.

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Conclusions

In this analysis, we examined whether the reliability of NFD provided by Polish listed companies has changed over the period surrounding the implementation of Directive. The undertaken analysis allowed us to confirm the statistically significant change of reliability of NFD between the analyzed periods. Generally, implementation of the Directive has increased the level of reliability of NFD but there is still room for significant improvements in particular in terms of comparisons in time and between entities as well as external assurance of NFD.

We assumed that our study contributes to the understanding of the potential impact of Directive on reliability of NFD practices by EU companies. This research has important implications for policy makers since it revealed that mandatory regulations are a crucial instrument in improving the harmonization of legislation of NFD. Our research suggests that as a result of Directive, stakeholders should be provided with more comparable and externally assured information. This could encourage them to use NFD in their decision-making processes to a greater extent.

Our research has several limitations that should be noted. In terms of measurement instrument developed for this study, we used binary codding scheme instead of rating scale. We focused only on the Polish setting. The impact of the Directive on the non-financial reporting of companies from other EU countries may be potentially different. Future research should consider extend our research along each of above-mentioned limitations.

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Human Rights Disclosure under Increasing Coercive Pressure: An Examination of the role of Directive 2014/95/EU

Łukasz MATUSZAK
Poznań University of Economics and Business, Poznań, Poland
lukasz.matuszak@ue.poznan.pl

Ewa RÓŻAŃSKA
Poznań University of Economics and Business, Poznań, Poland
ewa.rozanska@ue.poznan.pl

Abstract

Purpose: This study examined human rights reporting practices across companies listed on the Warsaw Stock Exchange, by looking at both the extent of human rights disclosure and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory human rights disclosure under the Directive 2014/95/EU (Directive). **Design/methodology/approach**: The sample comprised 71 selected listed companies over 6 years Content analysis was used to measure the extent of human rights disclosure. Panel data analysis was undertaken and the econometric random effect model was estimated. **Findings:** The Directive enforcement is associated with the extent of human rights disclosure. Also, inclusion in the Respect Index is positively related to human rights reporting, while UN Global Compact participation did not turn out to influence human rights reporting. **Originality**: Our study contributes to the understanding of the impact of Directive and other coercive variables on human rights disclosure, a specific subset of CSR reporting. In particular, it presents the contribution of accounting in promoting human rights and effective enforcement of corporate responsibility for respecting human rights.

Keywords: Human Rights Disclosure; CSR Disclosure; Non-Financial Disclosure; ESG Disclosure; Sustainability Disclosure; Directive 2014/95/EU

Introduction

The United Nation (UN) vision of the role of enterprises in human rights was realized by introducing the Guiding Principles of Business and Human Rights in 2011. Reaffirming the role of the state as a defender of human rights, it also defines the role of enterprises as those that should respect human rights, regardless of state obligations (McPhail and Ferguson, 2016). Despite the better recognition of human rights as a business issue in corporate reporting in recent years, especially in Western European, companies most reports remain silent about human rights policies or their performance (KPMG, 2017). There is also the gap between reporting on identified human rights risks and disclosure on what companies do about such risks (Frank Bolt, 2019).

Accounting literature generally show that, overall, human rights disclosure practices around the world are still underdeveloped (Christ et al. 2019; Cubilla-Montilla et al. 2019), especially when compared with other CSR aspect disclosure practices (Matuszak and Różańska, 2017). Previous studies also shows that companies failed to adhere to GRI's 'labour' and 'human rights' reporting guidelines (Parsa *et al.*, 2018). This may be explained by the fact that soft disclosure regulations give these companies grounds to avoid improvements in their human rights reporting (Islam and Jain, 2013) and that human rights obligations should be made mandatory rather than considered as a duty of care (Lauwo and Otusanya, 2014).

The rationale behind hard regulation is that disclosure can play a significant role in promoting human rights and fulfilling corporate responsibility to employees and the workforce in companies' value chains (Gallhofer *et al.*, 2011). Similarly, Gallhofer *et al.* (2011) stress the importance of governance in promoting and protecting human rights and emphasize that accounting through disclosure can play a significant role in this process.

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In recent years, the European Union (EU) reached an important milestone in the enhancement of the transparency of listed companies' CSR aspects when EU issued its Directive 2014/95/EU (European Union, 2014) to require large companies with an average of 500 or more employees to disclose non-financial information.

Large listed companies need to disclose, among others, information on human rights matter. More specific, for this matter, companies must disclose a description of their human rights policy including the due diligence processes implemented, the outcomes of this policy, principle human rights risks, and their management on a "comply or explain" basis, with considered reasons for non-disclosure. The Directive 2014/95/EU (Directive) is the first reporting regulation to explicitly mention human rights. Companies were expected to comply with the new disclosure requirements of the locally transposed laws by 2018.

Mandatory reporting on human rights can successfully provide the necessary impetus for the effective enforcement of corporate responsibility for respecting human rights. The question of whether the Directive fully succeeds in fulfilling this role, however, cannot be answered in an unqualified affirmative way (de Roo, 2015) and without empirical evidence.

Our quantitative study is motivated by this still unanswered question and provide an evidence on the role of Directive in human rights reporting.

An examination of pressure from regulators on companies to disclose human rights issues can be made within the framework of the coercive isomorphism, a particular subset of institutional theory. The rationale is that this specific principle reflects pressures from powerful stakeholder groups, including regulators (DiMaggio and Powell, 1983). Previous studies on human rights have tested the pressure from different institutional sources (Flynn and Walker, 2020; Cubilla-Montilla *et al.*, 2019), but so far have failed to take into account the pressure from mandatory accounting rules (Hubers and Thijssens, 2020).

Therefore, in this study, we referred to coercive isomorphism and we ask how Directive pressure has shaped human rights disclosure provided by listed companies in Poland. Poland has become one of the then 28 EU countries that have transposed the Directive into their national legislation. Since then, human rights disclosures are required among certain Polish enterprises by the Polish Accounting Act (PAA). In addition, there was no prior reporting legislation on human rights in Poland. We focused on the country of Eastern Europe as companies from this region, are much less likely to acknowledge human rights as a business issue than companies in Western Europe (KPMG, 2017).

To fill the existing literature gap, this paper examines human rights reporting practices of Polish listed companies, by looking at both the extent and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory human rights disclosure under the Directive.

In order to explore the research question, we analyzed the human rights using a content analysis and binary disclosure index in both management reports and, where issued, stand-alone reports for a sample of 71 companies listed on the Warsaw Stock Exchange (WSE). Our analysis shows that the extent of the human rights disclosure across all content items increased significantly after Directive implementation period compared to the period before implementation. The findings reveal that the Directive enforcement is associated with the extent of human rights disclosure. Also, inclusion in the Respect Index is positively related to human rights reporting, while UN Global Compact participation did not turn out to influence human rights reporting.

Thus, the current paper makes several important contributions to the scant literature on human rights responsibilities, a specific subset of CSR reporting. In particular, we assume that our study contributes to the understanding of the impact of Directive on human rights disclosure that reflects the role of accounting in promoting human rights and in meeting corporate responsibility to employees and workforce in corporate value chains.

We begin with literature review, theoretical background and hypothesis development, followed by the methods, results, and conclusion.

Literature Review and Hypothesis Development

Literature Review

The accounting through disclosure can play a significant role in promoting and protecting human rights (Gallhofer *et al.*, 2011). However, this specific issue of CSR reporting has not yet become a focus area for social and environmental accounting researchers. To date, there is little but growing research on human rights disclosure an integral part of CSR reporting.

First, there are scant empirical studies which generally show low level of human rights disclosure (Islam and Jain 2013; Matuszak and Różańska 2017; Cubilla-Montilla et al. 2019; Christ et al. 2019). For example, Islam and Jain (2013) focus on major Australian garment and retail companies and found a low level of human rights disclosures. Christ *et al.* (2019) gathered evidence about modern slavery disclosure by the top 100 Australian listed companies and documented that the volume and quality of disclosures are low. In Polish setting, Matuszak and Różańska (2017) stated that among others CSR matters, human rights deserve careful attention, as it is not disclosed by most companies listed on WSE and a large number of companies still have a considerable amount of work to do in order to improve the level of reporting in the area of human rights.

Second, interestingly, most of previous studies examine pressure from different institutional sources on companies to disclose human rights issues. In particular, Cubilla-Montilla et al. (2019) stated that society's cultural values as a normative institutional pressure are currently insufficient to increase information on the practices that companies undertake in relation to commitments to human and labour rights. A study by Christ *et al.* (2019) helps to understand the institutional pressures that currently drive the behavior of companies in relation to modern slavery issues. In more detail, the response of the sampled Australian companies to increasing pressure to report on their efforts to combat modern slavery practices remains very marginally in line with the concepts of mimetic and normative institutional pressures. This support the idea that legislation is needed to encourage further engagement. In line with coercive institutional pressure Islam and McPhail (2011) explored the role that International Governmental Organizations such as the ILO may have played in human rights disclosures. While, Parsa *et al.* (2018) examines how successful the GRI has been in enhancing comparability and transparency of 'labour' and 'human rights' reporting.

In fact, previous literature failed to take into account the pressure from mandatory accounting rules that are considered one of coercive institutional factors. Hubers and Thijssens (2020) made an attempt to assess the potential impact of the EU non-financial reporting regulation on human rights disclosures among Dutch financial services listed companies. However, the results of regression analyses, in which they control for time trends, show that in fact, there is no such effect. The lack of statistically significant results may be due to numerous limitations of the study, including a small research sample.

To fill the existing literature gap, this paper examines human rights reporting practices of Polish listed companies, by looking at both the extent of human rights disclosure and the determinants of that extent, in particular the potential pressure from the regulator that requires mandatory human rights disclosure under the Directive.

Theoretical Framework

The question of how human rights disclosure provided by companies are shaped can be addressed through institutional theory that has been cited many times in the accounting literature (Islam and McPhail, 2011; Christ *et al.*, 2019). The theory is considered appropriate for this question as it provides a theoretical explanation of how firms respond to institutional forces to undertake particular activities (DiMaggio and Powell, 1983; Flynn and Walker, 2020), including human rights disclosure practices. For example, regulators and civil society groups can coerce companies to act in certain ways, professional organizations exert a normative influence over companies, and interactions with peers lead companies to imitate each other (DiMaggio and Powell, 1983). Within the framework of coercive isomorphism, a particular subset of institutional theory, an organization provides disclosure as a response to pressures from influential stakeholders (Deegan, 2014). Powerful institutions that can pressure an organization to adopt specific disclosure practices include governments, certification body, and politically powerful stakeholders among others (Deegan and Unerman 2011). When pressures from these stakeholder groups arise, an organization needs to respond to obtain legitimacy (DiMaggio and Powell, 1983). However, companies are not passive players in this process, and institutional theorists acknowledge that there is resistance to institutional demands and companies can even reject institutional expectations (Oliver, 1991).

In this study we use institutional theory and its predictions about the effects of coercive institutional pressures on firms. This is because regulators reflect pressure through, for example law enforcement (DiMaggio and Powell, 1983), as in the case of transposing the Directive into the national legislation of EU member states. To strengthen contributions to the existing literature, this study explores not only pressure from regulators but also pressures from other possible coercive sources.

Hypotheses Development

This paper investigates three key coercive variables potentially influencing the extent of human rights disclosure in Poland. These variables are Directive enforcement, UN Global Compact membership and inclusion in the Respect Index.

Directive 2014/95/EU enforcement

The rationale for expecting Directive to significantly affect human rights disclosure is that companies would be keen to follow new "norms" that are imposed upon them (Deegan, 2002). According to institutional theory, companies may strive to increase the insufficient and non-compliant level of human rights disclosures to reduce regulatory pressure.

Assessments of the state of the art of non-financial reporting, before the implementation of the Directive, by Matuszak and Różańska (2017), showed that there was an information gap regarding some of the aspects required by the Directive. As noted by Matuszak and Różańska (2017) tested companies placed little emphasis especially on reporting about human rights. After the implementation of the Directive, companies still show low levels of disclosure in disclosing human rights policies, outcomes and risk management, according to the Alliance for Corporate Transparency Research database. Unfortunately, no research confirms the potential impact of the Directive on the extent of human rights disclosures.

In the previous literature, it was clearly stated that overall reporting quantity increased subsequent to a non-financial mandate (Damak-Ayadi, 2011; Kerret *et al.*, 2010). Considering that we expect that the extent of non-financial disclosers will increase even in such a specific area as human rights. Considering the theoretical and empirical evidence, we hypothesize:

***H1*: There is a positive relationship between the Directive 2014/95/EU enforcement and the extent of human rights disclosure.**

Participation in UN Global Compact

Another source of institutional pressure can be international human rights accords. These include International Labour Organisation and UN Global Compact among others. Although adherence to these accords is voluntary, companies experience coercion from the originators of these accords and from NGOs to commit to them (Flynn and Walker, 2020).

Previous studies showed that the ILO plays an important role in the emerging disclosure of corporate accountability for workplace rights. Since the ILO' standards were endorsed and accepted by the global community, the number of companies disclosing on workplace human rights has increased significantly (Islam and McPhail, 2011). With regard to UN Global Compact, it was found that this initiative has a positive impact on the comprehensiveness of CSR reporting (Fortanier *et al.*, 2011). Hence, we hypothesize:

***H2:* There is a positive relationship between participation in UN Global Compact and the extent of human rights disclosure.**

Inclusion in the Respect Index

Institutional pressures could potentially also apply to local and regional initiatives that may exert a positive influence on human rights reporting. A key example here is the RESPECT Index which is the first index of companies respecting the CSR rules in the Central and Eastern Europe's region.

The RESPECT Index portfolio covers Polish companies listed on the WSE Main Market which operate in accordance with the highest standards of management with regard to corporate governance, reporting and investor relations standards, and which also include environmental, social and governance factors (Macuda *et al.*, 2015). The participating companies are screened by WSE and the Association of Listed Companies. If the company does not respond to coercive pressures from the project makers, the membership will be terminated. As transparency, accountability as well as communication with stakeholders are at the core of this project, we would expect that corporate inclusion in the RESPECT Index has a positive impact on human rights disclosure. Past study document the statistically significant positive impact of inclusion in the RESPECT Index on non-financial disclosure practices, excluding ethical matters before Directive implementation (Dumitru *et al.*, 2017). Taking into account the above considerations, we hypothesize:

***H3:* There is a positive relationship between inclusion in the Respect Index portfolio and the extent of human rights disclosure.**

Research Methodology

Research sample and data collection

Our initial sample comprises of all firms listed on the WSE. To be included in our sample, companies have to meet the following criteria:

(1) They must be Polish companies (ISIN – PL)
(2) They must have been experienced in non-financial reporting at least in 2014.
(3) They have to fulfil criteria imposed by transposed Directive concerning employment, assets, and income for the period 2017-2019.
(4) They had to have required data for 2014-2019.

The final study sample was composed of 71 Polish companies (426 company-year observations).

The data concerning employment, assets, and income were obtained from the Notoria Service Database. The data concerning non-financial human rights data were hand-collected from non-financial statements being a separate section of management commentary (not stand-alone) or being a separate stand-alone report. In order to verify developed hypotheses our time scope is 2014-2019 and it covers the period before (2014-2016) and after (2017-2019) implementation of the Directive.

Variables

To quantify the disclosure on human rights practices (dependent variable), a content analysis method was utilized. In order to measure the level of human rights disclosures, based on the Directive's requirements, the existence of non-financial content items was examined, namely:

1. A description of the policies pursued by the undertaking in relation to human rights
2. A description of the outcome of human rights policies
3. A description of the principal risks related to the human rights
4. A description of how the undertaking manages those risks related to the human rights.

If the content item was present in the management commentary or standalone CSR report, it scored 1, and 0 otherwise.

As PAA as well as Directive do not favor any content item over another, we treat each item as equally important, and we used the same binary scoring for each item. This approach allowed us to evaluate the extent of human rights disclosure made by companies. Further human rights disclosure index (HR) was computed according to the following formula:

$$\text{HR disclosure index} = \frac{\text{Sum of scores obtained by company}}{\text{4 (total number of content items)}}$$

Independent and control variables together with their measurement approach are presented in table 1.

Table 1: Description of the independent and control variables

Variables	Description/measurement approach
Independent variables	
Directive 2014/95/EU (DIRECTIVE)	Dummy = 1 for 2017-2019, or 0 for 2014-2016.
Respect index (RESPECT)	Dummy = 1, if company is listed in Respect index, 0 otherwise
UN Global Compact (UNGC)	Dummy = 1, if company is a member in UN Global Compact, 0 otherwise
Control variables	
Risky industry (RISKY_IND)	Dummy = 1, if company is a member of a high-risks industry (Frank Bolt, 2019) namely: apparel, textiles, food, beverages sectors; 0 otherwise.
Company size (SIZE)	The value of assets in mln PLN

Source: own elaboration.

In terms of control variables, in line with previous studies (Dumitru *et al.*, 2017; Brammer and Pavelin, 2006) this research employs company size and industry type as control variables as these variables may influence human rights disclosure practices.

Method of analysis

Three basic types of models, pooled models (OLS), fixed-effects models (FE) and random-effects models (RE), were used to model panel data in the study. This procedure allowed us to choose appropriate model for further analysis. The proposed model is given as:

$$HR_{it} = ß_0 + ß_{1,it}DIRECTIVE + ß_{2,it}RESPECT + ß_{3,it}UNGC + ß_{4,it}RISKY_IND + ß_{5,it}SIZE + \varepsilon_{it}$$

In this research, the significance of the differences between groups (clustered years) was tested using the Wilcoxon signed-rank test. According to Field (2018), the Wilcoxon signed-rank test is a nonparametric test that can be used in situations in which there are two sets of scores to compare, but these scores come from the same participants.

Results and Discussion

Descriptive statistics are presented in Table 2. Among Polish listed companies, the level of human rights disclosures varies from the minimum level of 0 to the maximum level of 1. The average HR is 0.52 indicating that there is a room for improvements in terms of disclosure extent. Standard deviation of HR is 0.42 suggesting that there is a high variability among Polish companies in terms of human rights disclosure.

In table 3 we compare the mean HR index and its components before and after implementation of the Directive. The results indicate that in each case the change between clustered years are statistically significant (p-value<0.001). After implementation of the directive, the HR index, and all components increased significantly (mean increase 157%, 121%, 144%, 210% and 202% respectively), however the variability among sample companies decreased but only in relation to HR index as well as HR1 and HR2 components which is reflected in decreasing SD (-20%, -44% and -22% respectively). In terms of HR3 and HR4 the variability increased (SD increased 22% and 37% respectively). This last result can be explained indicating that before Directive implementation companies do not disclose much about human rights issues in general. After implementation of the Directive, in majority cases companies started reporting about human rights policies and their outcomes (HR1 and HR2), but some of them do not treat their activity as violating human rights and thus do not identify HR risks and how they mitigate those risks (HR3 and HR4).

Table 2: Descriptive statistics

Variable	n	Minimum	Maximum	Mean	Median	Std. Deviation
HR	426	0.00	1.00	0.52	0.50	0.42
HR1	426	0.00	1.00	0.67	1.00	0.47
HR2	426	0.00	1.00	0.61	1.00	0.49
HR4	426	0.00	1.00	0.44	0.00	0.50
HR5	426	0.00	1.00	0.38	0.00	0.49
RESPECT	426	0.00	1.00	0.33	0.00	0.47
UNGC	426	0.00	1.00	0.10	0.00	0.30
RISKY_IND	426	0.00	1.00	0.07	0.00	0.26
SIZE (mln)	426	97.08	348044.00	26289.55	2154.09	56276.81

Source: own elaboration.

Table 3: Comparison of the mean HR index and its components before and after implementation of the Directive (2014-2016 versus 2017-2019)

		HR		HR1		HR2		HR3		HR4	
Period	n	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Before implementation (2014-2016)	71	0.29	0.36	0.42	0.44	0.35	0.44	0.22	0.37	0.19	0.35

After implementation (2017-2019)	71	0.76	0.29	0.92	0.25	0.86	0.34	0.67	0.45	0.57	0.48
Change		157%	-20%	121%	-44%	144%	-22%	210%	22%	202%	37%
Z		6.43		5.69		5.58		5.19		4.86	
p		<0.001		<0.001		<0.001		<0.001		<0.001	

SD – standard deviation. Source: own elaboration.

In order to verify developed hypotheses, the panel data analysis was utilized. Subsequent to running the necessary tests ((F-test, Breush-Pagan test, Hausman's test) for choosing the right model, the fixed effect model was indicated. However, this model cannot be estimated due to collinearity issue among two variables UNGC and RISKY_IND. Therefore, following the Breush-Pagan test the results of random effect model was considered for further discussion about the implications of the study (table 4).

According to the results, Directive (DIRECTIVE) was found to have a positive significant effect on HR (b1 = 0.26; p-value<0.01), thus the first hypothesis (H1) is accepted.

Being listed on Respect index is positively and statistically significantly related with HR (b2 = 0.45, p-value<0,05), thus the H2 can be accepted. This cannot be said about being a member of UNGC, which have no statistically significant effect on HR, thus the H3 cannot be accepted.

In terms of control variables, only being a member of risky industry (RISKY_IND) have statistically significant and positive impact on HR (b4 = 0.03; p-value<0,05).

Table 4: Estimated coefficients from the panel data analysis covering years 2014 - 2019

Independent variables	**VIF**	**Pooled model**		**Random effects model**	
		OLS		**RE**	
DIRECTIVE	1.01	0.45	(9.29)***	**0,26**	**(6,16)*** **
RESPECT	1.30	0.25	(3.93)***	**0,45**	**(9,71)** **
UNGC	1.42	-0.01	(-0.08)	**0,14**	**(1,96)**
RISKY_IND	1.32	-0.12	(-1.66)*	**0,03**	**(0,28)** **
SIZE	1.25	0.00	(0.22)	**-0,16**	**(-2,19)**
INTERCEPT		0.23	(5.79)***	**0,26**	**(6,16)*** **
n		426		**426**	
Adj. R^2		0.39			
F-test				**4.77*** **	
Breush-Pagan test				**118.82*** **	
Hausman's test				**19.12** **	

** p<0.10. ** p<0.05. *** p<0.01. Source: own elaboration.*

Conclusions, limitations, and future research agenda

This paper investigated human rights reporting practices, by looking at both the extent of human rights disclosure and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory human rights disclosure under the Directive. An examination indeed showed that the Directive enforcement is associated with the extent of human rights disclosure. This extent increased significantly across all content items, namely human rights policy, the outcome of this policy, the associated risks and their management after Directive implementation period. Hence, this finding supports the institutional theory, by providing empirical evidence of how firms responded to regulatory pressure to provide human rights disclosure. Also, inclusion in the Respect Index is positively related to human rights reporting, while UN Global Compact participation did not turn out to influence human rights reporting. Thus, with regard to UN Global Compact institutional pressure have not produced the intended results.

The current paper makes two important contributions to the literature. Firstly, it provides an insight into corporate disclosure on human rights responsibilities, a specific subset of CSR reporting where there is almost no academic literature at present. Secondly, it contributes towards a better understanding of the possible coercive pressures on human rights reporting. In particular, we assume that our study contributes to the understanding of the impact of Directive on human rights disclosure that reflects the role of accounting in promoting human rights and in meeting corporate responsibility to employees and workforce in corporate value chains.

Our research has also important implications for governments because it revealed that companies responded positively to the regulator's pressure by increasing human rights disclosure.

As with any empirical study, this study has its limitations. Firstly, the research focuses on coercive factors and does not consider other institutional factors that pressure firms in normative and mimetic ways. Secondly, our study focusses on disclosure practices in one EU country and it gives no insight into how companies from different EU countries would respond to the pressure of mandatory regulation in the area of human rights. Future research should consider extend our research along each of above-mentioned limitations.

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The East v The West of European Union – Working Conditions and Upbringing of Children

Juraj HAMUĽÁK, Doc. JUDr., PhD.

The Comenius University in Bratislava, The Faculty of Law
The Department of Labor Law and Social Security Law
Šafaríkovo sq. No. 6, 810 00 Bratislava, The Slovak Republic.
e-mail: juraj.hamulak@flaw.uniba.sk

Denisa NEVICKÁ, Mgr., PhD.

The Comenius University in Bratislava, The Faculty of Law
The Department of Labor Law and Social Security Law
Šafaríkovo sq. No. 6, 810 00 Bratislava, The Slovak Republic.
e-mail: denisa.nevicka@flaw.uniba.sk

Abstract

Following the adoption of Directive (EU) 2019/1158 of the European Parliament and of the Council on the work-life balance of parents and carers, EU countries have begun to reform parental leave. This directive is based on the Swedish model, which should provide mothers and fathers with more equal division of parental leave to care for the child and at the same time give them an equal footing in the upbringing of the child. The authors analyze the Swedish model of parental leave, as well as the impact of the newly adopted directive on the legal systems of the Kingdom of Sweden, the Kingdom of Denmark, and the Slovak Republic. They question whether the Slovak Republic, as a former country of the Eastern bloc, is approaching Western models by the measures adopted, or on the contrary, the measures adopted do not meet the needs of practice or European standards.

Key words: Maternity Leave, Parental Leave, Work-Life Balance, Employee, Employer, Equality

Introduction

Discussions and efforts to reform parental leave have been going on in the European Union for years. For a long time, the legal regulations did not correspond to the real needs of parents and carers, it regulated only the basic requirements and it was scattered in several directives. As early as 2017, a proposal for a new directive was presented to ensure that the principle of equality between men and women is applied with regard to equal opportunities in the labor market and equal treatment at work. However, the Directive (EU) 2019/1158 of the European Parliament and of the Council on the work-life balance of parents and carers (also known as the Work-Life Balance Directive) was adopted in December 2019, with the Member States being required to transpose it by 02nd of August 2022. The model that inspired creation of this new directive was Swedish law, which is considered by professionals to be flexible and equal in the approach to childcare of both parents. However, till this day, not all countries provide parents with the same flexible childcare options as the Kingdom of Sweden. We consider the topic to be highly important, as only thanks to well-set childcare options can both parents adapt in the labor market in the same way. As Treľová states (2019)“ It is necessary to perceive the family as a whole, to look at the woman and the man as equal partners, who strengthen their family together, take care of their children and the household together, participate in the financial security of the whole family.” We therefore decided to compare the legal status of parental leave following the adoption of the directive on work-life balance in the Slovak Republic, as a country of the former Eastern bloc, the model Kingdom of Sweden and also Denmark, which is described as a country with an ideal work-life balance. The result of the comparative analysis are de lege ferenda proposals for better regulation as well as enhancement of the position of parents caring for a child.

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The New Directive and Legal Regulation in the Slovak republic

The adoption of the work-life balance directive brings many changes that Member States will have to transpose into their national legal systems (Barancová, 2003). For the purposes of the legal analysis of this article, we will focus on those changes that concern parents, not caregivers. Among the most significant changes brought about by the directive on work-life balance can be the introduction of paternity leave or leave of the other partner in the care of a child who is not the child's mother. According to the new regulation, the father of a child should be entitled to at least 10 days of leave in the period immediately after the birth of the child, which would be paid at least at the level of social benefit during temporary incapacity for work in the given state. Paternity leave cannot be linked to years worked or the length of employment with the employer (Hamuľák, Nevická, 2018).

Another significant change is the introduction of compensation for at least 4 months of parental leave and at least at the level of social benefits during temporary incapacity for work in the country. Certain part of parental leave to be reserved for each parent on a non-transferable basis and can be taken in installments up to 8 years of child's age. The employee must determine the length of the parental leave, which he or she wants to draw. Unlike paternity leave, it is possible to link parental leave to years worked, in particular with regard to the compensation provided.

The most resonant novelty is the introduction of greater flexibility in working hours. Parents caring for a child under the age of 8 should be entitled to shorter working hours, flexible working arrangement and flexibility in the place of work. The employer is obliged to respond to the request for flexible work organization and, in the event of a negative answer, to state the reasons why he did not comply with the employee. At the end of the need to apply flexible work organization, the employee is entitled to return to the original or equivalent job. At the same time, force majeure leave is introduced due to urgent family reasons, when the presence of an employee is required. The extent of such leave may be left to the discretion of the Member States (Hamuľák, Nevická, 2018).

The Ministry of Labor, Social Affairs and Family of the Slovak Republic has set the importance of transposing the new directive on work-life balance as of medium importance. We do not agree with this and we are convinced that the adoption of changes to the Slovak legal order should have the highest priority.

In the Slovak Republic, a distinction is made between the terms maternity leave and parental leave, while maternity leave can be taken exclusively by a woman and parental leave by both a man and a woman. As the concept of maternity is directly linked to a woman, the Slovak legislation does not recognize the concept of maternity leave for a man. In connection with the care of a newborn child, a man is also entitled to parental leave in the sense of a woman's maternity leave, i.e. a man's parental leave if the man is taking care of the newborn child. As Treľová mentioned (2016), in this context, the term parental leave for a man is synonymous with maternity leave for a woman. The term second parent is not introduced in the Slovak legal system and therefore we use the terms father of the child and mother of the child. Act no. 311/2001 Coll. the Labor Code (hereinafter also referred to as the "Labor Code") grants women the right to maternity leave and parental leave and men the right to parental leave. Pursuant to the Article 166 of the Labor Code, a woman is entitled to maternity leave in connection with childbirth to the extent of 34 weeks. A man is entitled to leave to the same extent as a woman, only if he is caring for a newborn child, i. e. for a basic period of 28 weeks. Maternity leave in connection with childbirth may not be shorter than 14 weeks and may not end or be interrupted before the expiry of 6 weeks from the date of childbirth. Both women and men are entitled to a maternity social benefit if they have been insured for at least 270 days before childbirth. However, they only receive maternity benefit for one child at the time. The amount of maternity benefit is individual for each mother and father, but not more than 75% of the gross wage assessment base. In order for the child's father to be entitled to maternity benefit, the child's father must take the child into care from the mother on the basis of a written agreement. Entitlement to maternity benefits arises for the father at the earliest from the sixth week after birth, but no later than until the child is 3 years old.

To deepen childcare, both mother and father can request parental leave. The employer is obliged to comply with such a request. Parental leave is provided to the extent requested by the parent, but not longer than 3 years of child's age. During parental leave, the parent is entitled to parental allowance under specified conditions, which in 2020 is € 270 per month if the parent has not met conditions for maternity benefit and € 370 per month if maternity benefit has been paid. Apart from parental leave and maternity leave, neither the father nor the mother of the child have other entitlements to special forms of leave (Krippel, 2019). A pregnant woman is only entitled to justified obstacles at work during examinations at the doctor's and the father can transport the mother of the child from and to the hospital during childbirth. The child's parents are not entitled to the flexibility of the place of work or the guaranteed place of the child in kindergarten. They may request appropriate working time arrangements if they are caring for the child on a permanent basis, but this may be refused by the employer if serious operational reasons prevent him from doing so. These operational reasons are not legally defined, hence abusable. Fulfillment of this

obligation is therefore enforceable only through the courts, which means that work time flexibility is hardly used in practice (Poruban, 2019). As part of the regulation of working hours, the category of women and men permanently caring for a child under three years of age (lonely women or lonely men permanently caring for a child under 15 years of age) is protected during overtime and on-call time, which they can perform only with their consent (Treľová, Matlák, 2018).

As follows, in the Slovak Republic it is still assumed that the primary breadwinner of the family will be the father of the child and the mother will take care of the child and the running of the household (Burda, Capíková, Nováková, 2018). Treľová also states that, although parental responsibilities also arise for the father in connection with the care of the child, he most often continues to work, leaves care to the child's mother and thus not exercising the right to take parental leave. Equality in childcare and the fulfillment of professional objectives within the meaning of the work-life balance directive are not transposed into the Labor Code at all, which is also reflected in the statistical survey of the European Institute for Gender Equality (Mesarčík, 2019). The results considers point 72.0 to be the European average of gender equality in the workplace. The Slovak republic achieved a result of 66.5 points, while up to 80% of domestic work is provided by women.

Parental Leave in the Kingdom of Sweden and the Kingdom of Denmark

As the authors have already stated, the new directive is largely inspired by the legislation of the Kingdom of Sweden (hereinafter "Sweden") and is based on the equal status of men and women in the upbringing of a child as well as the economic security of the household. The phrase parental leave is often used by the authors because it was Sweden, that first introduced paid parental leave for fathers in 1974. It is necessary to emphasize that the term maternity leave and paternity leave was replaced by the single term parental leave, so that the legislation itself avoided differentiation in giving parents time to care for the child. Sweden has become a model for new legislation on parental leave for liberality and progression in childcare.

Parental leave in Sweden provides parents with a total of 480 days of parental leave, of which at least 90 days belong to the mother and 90 days to the father. During the first 390 days, the child's parents are entitled to almost 80% of their average daily wage, but a maximum of € 92 per day, which is approximately € 2,576 per month. The remaining 90 days are paid in a lump sum. The condition for obtaining the right to paid parental leave is the duration of the employment relationship and the payment of contributions at least 240 days before the birth of the child. Those who do not meet this condition are entitled to social benefits, as the Swedish Institute for future studies states. Parents have the right to take up leave until the child is 8 years old, and at the same time until they have the right to ask the employer to reduce the working hours by up to 25%. The employer is obliged to comply with such a request.

Another benefit that the Swedish system provides to parents is 10 days of paid paternity leave after the birth of a child. Like the parental allowance, the payment of the paternity leave comes from the parental insurance, which must be paid by each employee and contributed to by the employer. It was the size and method of granting paternity leave in Sweden that also inspired the European Union to create a directive on work-life balance. In addition to the above, the state also contributes to the parents a child benefit up to the age of 16, in parallel with the receipt of parental allowance, in the amount of 115 € per month, as the Swedish national social institute states.

In addition, all children with Swedish citizenship are guaranteed a place in a free kindergarten and primary school, which provide them with free lunches. Healthcare is free for children and young people up to the age of 20, including dental care. The even distribution of parental leave was also reflected in the actual use of parents. An analysis by the Swedish National Social Insurance Agency from 2018 showed that up to 27% of the total cost of parental allowances was paid to the child's father, which is by 6.9% more than in 2012, as shown by the Swedish national social institute. Based on the above, it can be stated that the Swedish model in practice brought greater involvement of the father in the care of the child, enabled more women to return to work and thus brought a greater degree of equality in caring for the family between a man and a woman (Hamuľák, Nevická, 2018).

The legislation on maternity and parental leave in the Kingdom of Denmark (hereinafter also referred to as "Denmark") is similar to Sweden. The mother of the child is entitled to maternity leave in duration of 4 weeks before the planned birth and 14 weeks after the birth. This right is not transferable and belongs exclusively to the mother of the child. During maternity leave, the mother is entitled to maternity benefit if she was employed before giving birth and worked at least 40 hours a month for 3 months prior to giving birth. The father of the child is entitled to 2 weeks of paternity leave, which he must take during the 14 weeks after the birth of the child. Subsequently, both parents are entitled to 32 weeks of parental leave. Each parent has a non-transferable right to 32 weeks, which must be exhausted by the child’s age of 9, i. e. a total of 64 weeks. However, the child's parents are entitled to financial compensation for only 32 weeks. Statistics of the European Commission show, that the amount

of maternity and parental benefit depends on the parent's income, but it is up to a maximum of approximately € 590 per week. The condition for entitlement to maternity benefit is the fulfillment of all-day personal care for the child. Studies show that the child's fathers take primarily 2 weeks of paternity leave and only a minimum of parental leave, while mothers of children tend to take the full entitlement to both maternity and parental leave.

The working week in Denmark normally lasts from Monday to Friday and the established weekly working time is 37 hours. Overtime is possible but not recommended. Parents have a legal right to use state kindergartens and crèches from the child's age of 6 months. At the same time, when caring for a child, it is possible to request flexible working time arrangements as well as to work from home or another suitable place for 1-2 days during the week. This contributes significantly to the fact that up to 79% of Danish women are employed and up to 66% of their daytime they can engage in activities other than work, as shown by Denmark's government statistics.

The Comparative Analysis and *de lege ferenda* Proposals

The conclusions of the analysis of the position of parents in employment relations in the Slovak Republic show that they are far from close to the standards introduced in the European Union by the directive on work-life balance, as O. Hamuľák mentioned (2018). Fathers of children are not entitled to special paternity leave; they can only take the mother of the child from and to the hospital at birth. Although parental leave is provided relatively generously, in the range of almost 3 years, the amount of parental allowance does not even cover the basic needs of parents and their child (Ladiverová, 2018). In addition, the right to parental leave belongs to both parents and there is no specially reserved part that is non-transferable. We consider it appropriate to introduce a certain non-transferable period, which could only be used by the father or by the mother of the child in addition to maternity leave. Extending the non-transferable period would contribute to greater use of parental leave by fathers as well, as if they did not use up the time, they would lose their allowance in the same way as parental allowance.

Compared to Sweden or Denmark, we are of the opinion that the parental leave in the Slovak Republic is outdated and does not meet the needs of the labor market or modern parents. Parental leave is granted in both Sweden and Denmark for approximately the same range of 1 to 1.5 years. While taking parental leave, the parent receives a parental allowance that is approximately at the level of his or her previous salary. The child's parent can thus make full use of parental leave to take care of the child, without having to consider the impact of the time spent on the family budget. While in Denmark it is forbidden to work while receiving parental allowance, in the Slovak Republic the child's parent can work while receiving parental allowance if he or she has secured childcare. The authors are of the opinion that providing parents with parental allowance for almost 3 years, but in a lower amount, is ineffective, as most parents in Slovakia still work in addition to receiving parental allowance. Following the example of Sweden or Denmark, we propose to shorten the period of parental leave, respectively, leave it up to the parents to determine for how long they want to take parental leave so that they can aliquot increase their parental allowance.

The lack of paternity leave regulation and obstacles at work for force majeure family reasons in Slovakia is also inadequate (Freel, Kováčiková, 2013). The introduction of the institutes in question is not only about helping the mother, but also about equality in the care of the child within the meaning of the directive on work-life balance and Article 6 of the Labor Code. The legal regulation of an obstacle to work for force majeure reasons could be in the form of a justified obstacle to work without compensation of wages or with compensation of wages, with the employee working out the time later. It is a matter of enabling the combination of parental and caring responsibilities without a disproportionate burden on the employer in the form of wage compensation.

In line with the adopted work-life balance directive, it would be appropriate to introduce flexibility in the place of work for persons who are permanently caring for a child under the age of 8, given the employer's operating conditions allow it. As the practice in Denmark has shown, the reduction in working hours and the possibility to work from home or another suitable place makes a significant contribution to women's participation in the labor market, as they can combine family and work responsibilities.

We believe that the institutes introduced by the work-life balance directive are beneficial and positive for the labor market in the European Union. For Slovak labor relations, they will mean a step forward, provided that they are transposed quickly and correctly. For Western countries such as Sweden and Denmark, the new directive does not introduce substantial changes in principle, as they already provide more generous legislation for working parents.

Conclusion

Based on all the above facts and statistical information, the authors believe that the Swedish or Danish model has shown in practice that if the conditions for children 's fathers are favorable, they are also more interested in staying on paternity or parental leave. This contributes to greater equality and equivalence in the upbringing of a child. The legal regulations of the Slovak Republic provide parents with the possibility of caring for a child in an above-standard time range, but for compensation that does not correspond to the level of their salary evaluation. The drawing of parental leave up to 3 years of age of the child is insufficiently financially secured, which causes the participation of parents in the labor market during the receipt of parental allowance. The purpose of parental allowance or parental leave is therefore far from being fulfilled. Bureaucracy, ineffective settings, low contribution, and failure to take into account the needs of working parents thus certainly do not bring Slovakia closer to Western standards. According to the authors, the introduction of a 10-day leave for fathers immediately after childbirth could help not only the mother and the child, but also to increase the number of fathers who will later stay at home with the child and request parental leave. Statistics have clearly shown that there is interest among fathers, it is only necessary to create the right conditions for them. We also consider it necessary to adopt a more flexible form of parental leave as soon as possible so that parents can actually use it to care for their child.

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A Novel Infrastructure 2 Pedestrian Approach to Increase Human Life and Health Safety.

Pawel SKOKOWSKI

Faculty of Electronics, Military University of Technology, Warsaw, Poland
pawel.skokowski@wat.edu.pl

Krzysztof MAŚLANKA

Faculty of Electronics, Military University of Technology, Warsaw, Poland
krzysztof.maslanka@wat.edu.pl

Abstract

This paper presents a novel Infrastructure 2 Pedestrian approach to increase human life and health safety. After introducing the reader to the subject of the issue, the authors motivate their research area to improve pedestrian safety on the roads. In addition to purely human arguments, the economic factors supporting the need to develop this type of solution are also presented. Then, the concept of the proposed method and selected use cases with the possibility of applying the solution are introduced. The authors also estimate the potential profits from the implementation of the proposed concept. The article summarizes brief conclusions.

Keywords: pedestrian safety, infrastructure to pedestrian (I2P), accidents, human life.

Introduction

Human life and health are priceless. Every day, road users are killed or injured on the roads of the whole world. The victims include not only people involved in car accidents but also vehicle run-offs. The scale of this problem is enormous. More than 1/5 of people who die on roads do not use a car, motorcycle, or bicycle - they are pedestrians. Following the definition from World Health Organization (WHO, 2013): "a pedestrian is any person who is traveling by walking for at least part of his or her journey. In addition to the ordinary form of walking, a pedestrian may be using various modifications and aids to walking such as wheelchairs, motorized scooters, walkers, canes, skateboards, and rollerblades. The person may carry items of varying quantities, held in hands, strapped on the back, placed on the head, balanced on shoulders, or pushed/pulled along. A person is also considered a pedestrian when running, jogging, hiking, or when sitting or lying down in the roadway".

Pedestrians are most at risk of death or serious injury in a road accident. The death of pedestrians or their serious injury can often be avoided. It is obvious that to increase pedestrian safety on the roads, appropriate road investments are necessary. Proposals and recommendations for road safety systems should be consulted and presented to governing bodies and political leaders to implement systemic solutions. WHO (2013) published recommendations for implementing methods to improve pedestrians' safety on roads. In addition to tips on how to increase the awareness of road users, it also contains a description, still valid in 2020, how to prepare the road infrastructure and improve vehicle design for pedestrian protection (Euro NCAP, 2020).

The current technical and technological possibilities related to the automotive industry and wireless communication systems create an opportunity to use them to increase pedestrians' safety as road users. The most popular ones are those responsible for communication between the vehicle and pedestrian (Vehicle to Pedestrian - V2P), vehicles and infrastructure (Infrastructure 2 Vehicle), the pedestrian and the vehicle (Pedestrian to Vehicle - P2V). Details on the functioning are not the subject of this study, and information about them can be found in many publications, including (Gerónimo et al., 2010; Chen et al., 2017; Seo et al., 2017; Tahmasbi-Sarvestani et al., 2017; Vourgidis et al., 2020). The authors would like to present a new approach to increasing pedestrian safety on the roads. The original proposal concerns a novel Infrastructure 2 Pedestrian (I2P) approach to increase human life and health safety. The proposed solution may be an element of system implementations to increase pedestrian safety and allow for significant profits to secure human health and life and the consequences resulting from their loss.

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Motivation to research

Every year, as mentioned in the introduction, people die on roads worldwide - over 270,000 are pedestrians, which accounts for over 20% of all road fatalities. The accidents happen unexpectedly - during a walk, on the way to school, to shopping or a public transport stop. Apart from deaths, over a million pedestrians are injured each year due to accidents - some of the wounded require very long rehabilitation, and some of them, unfortunately, never recover (become permanently disabled). Considering physical health, it is also necessary to pay attention to the deterioration of the mental state and trauma after the accident, not only of the victims but also family to the accident victims. Many of these tragedies could have been avoided.

Human life and health cannot be converted into money. It cannot be valued. However, the costs associated with accidents involving pedestrians can be estimated. In the case of hitting pedestrians by vehicles, emergency services are necessary in almost 100% of cases. Additionally, the police are called to the scene to find the perpetrator of the accident. Each of these activities generates costs. The victim of an accident with more severe injuries is hospitalized. The length of stay in the hospital varies depending on the injury. After leaving the hospital, the victim of an accident often requires costly rehabilitation (sometimes short and sometimes requiring many years) to regain full fitness. In many cases, trauma after an accident also requires psychological support for both the accident victims and their relatives - additional costs. The economic impact of pedestrian road traffic hasn't been quantified. Still, following with the (WHO, 2010) report, road traffic crashes, in general, are estimated to cost between 1 and 2% of the gross national product.

Based on many studies, it is possible to indicate the causes of accidents and the methods of preventing them or minimizing the probability of their occurrence (WHO, 2013; Zegeer and Bushell, 2010; Job, 2012; Peden et al., 2004; Stigson et al., 2008; Mooren et al., 2011). The most critical factors influencing pedestrians' safety are vehicles' speed, alcohol consumed by drivers and pedestrians, deficiencies in infrastructure solutions, and inadequate, insufficient visibility of pedestrians on the road. While in the case of excessive speed and alcohol consumption, social campaigns and promoting road safety can make a difference, good pedestrian visibility, and supplementing the infrastructure with appropriate solutions will certainly improve pedestrians' safety on the road.

WHO presents the system safety approach ensuring pedestrian safety (WHO, 2013). It recommends solutions focusing on the construction of appropriate road infrastructure to minimize pedestrians' risk of accidents. A wide range of land-use planning and road design strategies to improve pedestrian safety have been developed and implemented in different countries (Sleet et a., 2011; Tiwari, 2011; Ewing and Dumbaugh, 2009).

The use of smartphones and other wearable things is growing exponentially worldwide. O'Dea (2020) estimated that in 2020 61% of the world's population owns a mobile phone, of which 73% are smartphones. By 2024 (O'Dea, 2020) mobile device users will increase over to 92% of the world's population. While the risk of talking and texting while driving a vehicle is now well documented (WHO, 2011), much less is known about walking and mobile devices distraction. Since 2005, several studies have been published that suggest pedestrians who are distracted by phone conversations, or other activities such as listening to music or texting, take more significant risks when crossing roads (Schwebel et al., 2012; WHO, 2011; Lacy et al., 2004; Stavrinos et al., 2011; Nasar et al., 2008).

"Many pedestrian safety problems cannot be solved simply by addressing one of the 'three Es' (engineering, education, enforcement) in isolation. Engineers, law enforcement, designers, planners, educators, and citizens should all play a role in identifying and implementing effective countermeasures for improving pedestrian safety" (Lacy et al., 2004). Specific interventions and focal measures for increasing pedestrian safety are listed in (WHO, 2013). The author's novel approach should be added to the list of perspective and promising solutions.

The situation in Poland in recent years is presented in this part of the article. According to the data included in (Jaździk-Osmólska and Korneć 2019)**Error! Reference source not found.**, the annual social costs of road accidents and collisions in Poland in 2018 were estimated at 56.6 billion PLN, i.e., over 12.5 billion EUR. Considering that more than 20% of road accidents and collisions involve pedestrians, it can be assumed that the cost of taking into account only victims of pedestrian accidents is EUR 2.5 billion. The largest share of the cost categories of road accidents and collisions in Poland in 2018 are:

– production losses by way of death or incapacity of the employee at work (58%),
– share of losses of material (21%),
– administrative cost and operational (17%),
– non-material losses and medical expenses (4%).

Unit costs of road accidents and collisions in 2018 were as follows:

– the unit cost fatality - 0.531 million EUR,
– the unit cost of the victim's hard morning - 0.73 million EUR,
– the unit cost slightly injured victims - 0.01 million EUR,
– the unit cost of road accidents - 0.31 million EUR,
– the unit cost of a road accident - 0.0059 million EUR.

The cost estimate unit consists of a valuation of the following categories of costs generated by the elementary traffic incidents:

– costs of police and rescue,
– costs and funeral services,
– costs of hospitalization,
– costs of criminal proceedings,
– costs of compensation and redress,
– material losses,
– economic losses of the country.

Based on reports of road accidents in Poland in 2018 (Symon, 2019) and 2019 (Symon, 2020), Table 1 represents quantitative data with the number of accidents. Authors selected three causes of accidents involving pedestrians:

– careless entrance to the road in front of a moving vehicle,
– crossing the road in an unauthorized location,
– entering the road at the red light.

Table 1: Number of accidents with pedestrians in Poland in the years 2018 and 2019

	The year 2018			**The year 2019**		
	Accident total	**Death**	**Injured**	**Accident total**	**Death**	**Injured**
Careless entering the road in front of a moving vehicle	1031	148	906	941	156	806
Crossing the road in an illegal place	262	53	212	218	54	166
Entering the road at the red light	202	18	195	155	14	145

For the data presented above, it is possible to estimate the costs related to these events. Due to the limitation of the volume of the article, the calculation was made for 2018. The adopted measures assumed 50% of serious and lightly injured cases of all injured victims.

Table 2: The cost of accidents with pedestrians in Poland in the year 2018

Costs in EUR [MILLION]	**Death**	**Seriously injured**	**Injured**	**Total**
Careless entering the road in front of a moving vehicle	78.58	330.73	4.83	414.14
Crossing the road in an illegal place	28.14	77.39	1.13	106.66
Entering the road at the red light	9.56	71.18	1.04	81.78
Total	116.28	479.30	7.00	602.59

As shown in Table 2, based on (Jaździk-Osmólska and Korneć, 2019), Poland's total social cost for these three causes of pedestrian accidents alone in 2018 is valued at over 600 million EUR. This amount shows how it is crucial to improve pedestrian safety on roads from an economic perspective. Considering the authors' solution, investments made in the appropriate road infrastructure can allow for huge savings. The funds obtained using this can be designated for other purposes of the economy. Jaździk-Osmólska and Korneć (2019) also forecast the costs of road accidents until 2023. The value of the estimated amounts is at the level of 12.5 billion EUR year on year. Therefore,

it can be assumed that the above calculation of road incidents involving pedestrians will also be valid in 3 years, and the period from 2021 to 2023 will amount to a total of 10 billion EUR.

Infrastructure 2 Pedestrian approach

Considering the arguments presented in the previous section, the authors propose a novel Infrastructure 2 Pedestrian (I2P) approach for increasing human life and health safety. The concept and idea of the proposed solution are presented in the figure below.

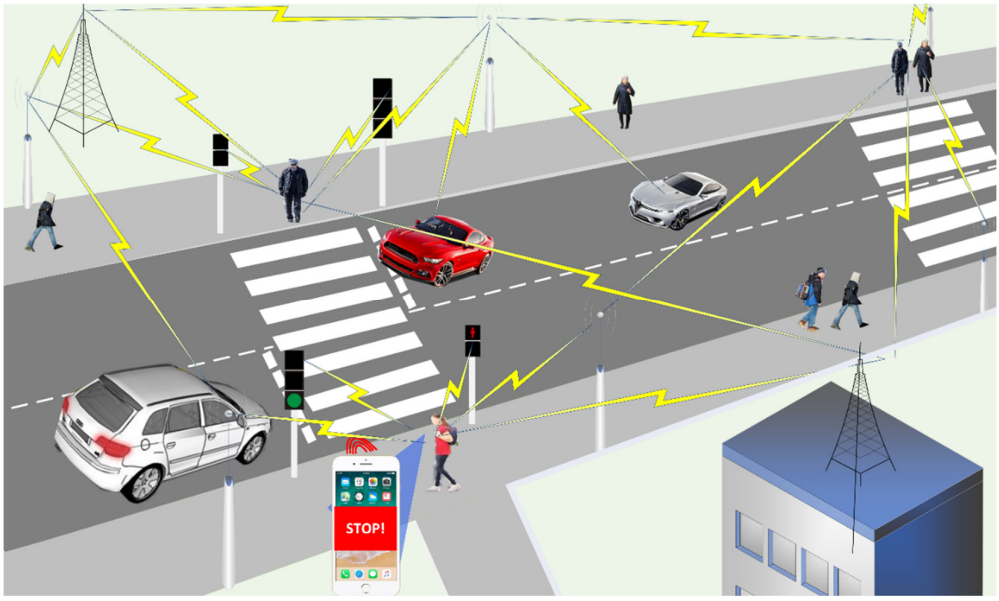

Fig. 1: Proposed a novel Infrastructure 2 Pedestrian (I2P) approach for increasing human's life and health safety

The proposed solution's basic assumption is to equip the existing or newly emerging road infrastructure with devices enabling communication between pedestrians and infrastructure elements. Bearing in mind that almost 80% of the world's society has smartphones, it can be assumed that pedestrians already have the appropriate equipment in the form of a mobile device for communication with external elements. Mobile devices equipped with appropriate wireless technologies, such as Wi-Fi, Bluetooth, 5G, or technologies developed in the future (Skokowski et al., 2017; Malon et al., 2017; Malon et al., 2018), can communicate with the infrastructure. Maślanka and Skokowski (2020) presents a possible technological solution for the proposed I2P method, considering the currently available technologies and newly emerging wireless systems, particularly 5G technology. In this study, the authors want to present a novel I2P approach to increase human life and health safety and estimate its implementation's expected profits.

The proposed approach is based on the communication of road infrastructure elements with pedestrian mobile devices to prevent dangerous road incidents involving them. The proposed Infrastructure 2 Pedestrian approach has an immense application potential and can directly contribute to increasing pedestrian safety and significant social benefits. Simultaneously, it should not generate enormous investment costs and, more importantly, not for the end-users of this system - pedestrians.

Use cases for the prosed I2P approach

In this part, example use cases will be presented. They do not cover all possible scenarios for which the proposed solution could be applied.

Preventing the causes of accidents involving pedestrians

The proposed solution can significantly improve safety and reduce the number of accidents involving pedestrians for the three causes of accidents mentioned above, i.e., careless entering the road in front of a moving vehicle, crossing the road in a prohibited place, and entering the road at a red light.

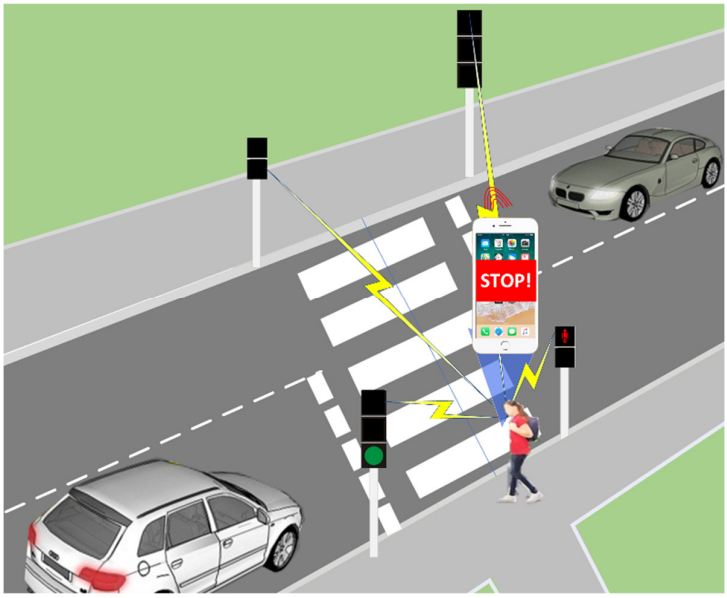

Fig. 2: Using the proposed I2P approach for preventing the causes of accidents

In applying the proposed I2P solution, the pedestrian could be notified, warned, or alerted by sending an appropriate message by the infrastructure to his mobile device (smartphone). Upon receiving such an alert, pedestrians would have a better chance of avoiding an accident.

Localization of dangerous places

Another case of using the proposed I2P solution may be the location of particularly dangerous places, i.e., places where accidents occur most frequently. Most pedestrian collisions happen when pedestrians are crossing the road (Crandall et al., 2002). The question is: where and how to collect data about sensitive places? Data on pedestrian facilities and road infrastructure may come from different sources (Zegeer et al., 2008; Litman et al., 2009) like road infrastructure and road safety audits, and police reports on road accident locations. The process of identifying particularly dangerous places due to the necessity to correlate data from many sources may take a very long time (data exchange between different institutions).

Suppose the infrastructure is equipped with the proposed solution in the event of an accident involving pedestrians. In that case, information may be immediately transferred to the central unit, where information about the place, time, and causes of the accident would be collected. In such a situation, there would be no need to correlate data from many sources, and the safety of the place where a significant number of accidents took place could be increased in a much shorter time. Such information directly reaches institutions planning roads or responsible for road safety.

Increasing visibility of pedestrians

One of the causes of accidents involving pedestrians is insufficient visibility. In (Maślanka and Skokowski, 2020), it was indicated that the reasons for this include:

– inadequate, or lack of, roadway lighting,
– bicycles and vehicles not equipped with lights,
– pedestrians not wearing reflective accessories important bridge at night,
– pedestrians are sharing road space with fast-moving cars.

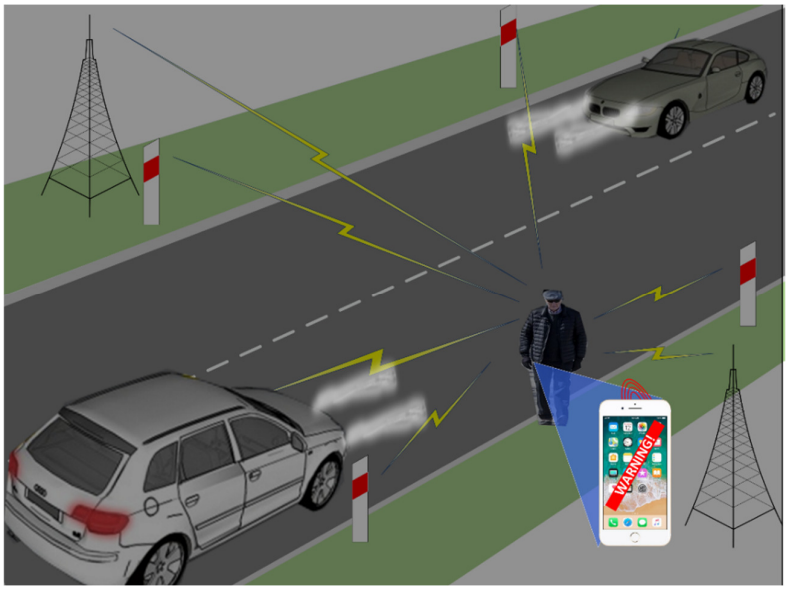

Fig. 3. Using the proposed I2P approach to increase pedestrians (for example, at night)

The use of the proposed I2P solution could indicate pedestrians' presence on the road through communication between their devices and the road infrastructure (displaying the so-called radio beacon (Maślanka and Skokowski, 2020)). The infrastructure could then use I2V technology to transmit information to connected cars approaching pedestrians. The vehicle driver would be notified with an appropriate message about a pedestrian's presence on the road despite the lack of visibility. In this case, a solution can also be indicated that the infrastructure will inform a pedestrian about the situation based on information about an approaching vehicle. The pedestrian then has a chance to react appropriately before the vehicle arrives.

Others

Basic use cases were presented before. If the proposed system is implemented, there would probably be many other I2P applications that can increase pedestrian safety and all road users' safety in general.

Profits from the application of the proposed I2P solution

Preventing even one fatal accident would already be a sufficient profit from the application of the I2P system. Human life is priceless, and it is impossible to define what the costs of implementing such a solution should be. As in point 2.1, the specific social costs related to pedestrians' participation in road accidents and collisions for Poland are presented. The potential public profits (savings) using the proposed I2P solution 'in a million EUR for different values of its' effectiveness are shown in table 3.

It can be noticed that even for very low efficiency, the profits achieved can be huge, and the saved resources can be used for other purposes. The authors believe that the costs of creating an I2P solution would concern only one of the parties, i.e., road infrastructure - pedestrians already have devices in the form of their smartphones, smartwatches, or other devices that can work with the infrastructure. Nothing excludes the possibility of creating dedicated devices, e.g., for the elderly or children who cannot operate modern devices. The concept of a technological solution for the proposed solution has been presented in the authors' study (Maślanka and Skokowski, 2020).

Table 3: Potential profits in Poland using the I2P solution

PROFITS in million EUR / efficiency of the solution	**100%**	**90%**	**80%**	**70%**	**60%**	**50%**	**40%**	**30%**	**20%**	**10%**
Careless entering the road in front of a moving vehicle	414.1	372.7	331.3	289.9	248.5	207.07	165.7	124.2	82.8	41.4
Crossing the road in an illegal place	106.7	96.0	85.3	74.67	64.0	53.3	42.67	32.0	21.3	10.7
Entering the road at the red light	81.8	73.6	65.4	57.2	49.1	40.9	32.7	24.5	16.7	8.2
Total	602.6	542.3	482.1	421.8	361.5	301.3	241.0	180.8	120.5	60.3

It should also be considered the penalties that await both drivers and pedestrians if they do not comply with the roads' rules. Of course, they depend on the country, but they are within the fine's upper limits, especially for drivers who do not give way to the pedestrian crossing in designated places. They increase significantly in cases of hitting pedestrians. In extreme situations related to severe damage to health or death resulting from hitting a pedestrian by the driver's fault, they end up with many years of imprisonment, which also generates high costs for the state budget (Ontario Ministry of Transportation, 2020; **Error! Reference source not found.**Poland In, 2019). The presented system would also make it possible to reduce the number of such offenses, which would encourage road users to use the elements of the I2P system.

Conclusions

Nowadays, there is a need to build road infrastructure that would increase pedestrian safety. The year-to-year social costs of each country related to the loss of life or damage to pedestrians' health connected with road accidents are enormous. Improvements should be sought that will allow us to achieve the goal - reduce the number of pedestrian casualties. Many solutions concern constructing safer crossings for pedestrians, right road marking, and separate lanes. The authors' infrastructure expansion approach shows the possibility of looking at the problem from an entirely new perspective.

The I2P concept can prevent road accidents involving pedestrians by equipping the infrastructure with appropriate technology. The presented estimation of potential savings, determined for one country (Poland), shows the global scale of profit by implementing the proposed solution. The novel using mobile device communication to an infrastructure approach to increase human life and health safety should be considered by relevant state authorities and institutions when developing solutions to improve pedestrian safety. With the synergy of the proposed I2P system with other factors taken into account in planning the road improvements, increasing road safety will increase the chances of achieving the final goal of zero injuries among pedestrians.

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Study of The Peculiarities of The Product and Geographical Structure of Russia's Non-Commodity Non-Energy Exports to North African Countries

TKACHENKO M.F.,
Vice-Chancellor (for scientific work) of Russian Customs Academy, professor of the Department of the International Economic Relations of Russian Customs Academy, Ph.D., professor,
Russia
marstav251280@gmail.com

AGAPOVA A.V.,
Head of the Department of International Economic Relations of Russian Customs Academy, Ph.D.of economics, Associate Professor,
Russia
av_agapova@rambler.ru

BUDARINA N.A.,
Professor of the Department International Economic Relations of Russian Customs Academy, Ph.D., Associate Professor,
Russia
natala5555@rambler.ru

KUSKOV A.N.,
Ph.D., Associate Professor, Associate Professor of the Department of International Economic Relations of the Russian Customs Academy, Ph.D., Associate Professor,
Russia
kopi85@mail.ru

TATAYEVA I.Y.,
Ph.D., Associate Professor, Associate Professor of the Department of International Economic Relations of Russian Customs Academy, Associate Professor of the Department of Management of Russian Customs Academy, Ph.D., Associate Professor
Russia
sergeevarta@yandex.ru

Abstract

The article analyzes the features of the commodity and geographical structure of Russia's non-commodity non-energy exports to the countries of North Africa. As a result of the analysis of the geographical structure of such exports, the main importer of such goods from Russia, which is Egypt, has been established.

The commodity structure of non-commodity non-energy exports to North Africa has been analyzed. There is a tendency of dominance of lower-processing goods when exporting to Egypt, Libya, Morocco, Sudan, Tunisia. In the structure of exports to Algeria the higher-processing goods dominate. The main goods related to non-commodity non-energy exports exported to North Africa have been identified. The main exported lower-processing goods for all countries are fertilizers, grain, semi-finished unalloyed steel products, ammonia. However, analyzing the export of non-commodity non-energy goods from Russia on the whole, as well as the share of Russia's exports to each North African country, it was concluded that the volumes of such exports from Russia are insignificant.

ВСЕ информация об авторах , университете, стране и адресах электронной почты.

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The article analyzes the features of the commodity and geographical structure of Russia's non-commodity non-energy exports to the countries of North Africa. As a result of the analysis of the geographical structure of such exports, the main importer of such goods from Russia, which is Egypt, has been established.

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For research purposes, it is necessary to determine the concept of commodity, non-commodity energy, non-commodity non-energy exports. The work uses the classification of the Russian Export Center (further - REC), according to which non-commodity non-energy products are divided into 3 groups by the degree of processing

Based on the data of foreign trade statistics, it can be concluded that the total volume of non-commodity non-energy exports (further - NNE) of Russia reached 155.1 billion U.S. dollars by the end of 2019. This is 0.5% more than in 2018.

Further analysis of such exports to North Africa (Algeria, Egypt, Libya, Morocco, Sudan, Tunisia) was carried out.

The study used data from the official statistics of the FCS of Russia, the data of the REC Sampling was carried out in accordance with the codes of UCN FEA EAEU.

The dynamics of non-commodity non-energy exports from Russia to Algeria is represented in Table 1. As can be seen from the table data, the largest volume of non-commodity non-energy exports was in 2017 (4.52 billion U.S. dollars). The share of NNE in Algeria in total Russian exports increased from 2013 to 2016, then decreased.

At the same time, in the structure of the Russian NNE from Russia to Algeria for the period from 2013 to 2019, a greater share is occupied by the top processingof such exports. Analyzing the structure of the products of the top processing, we can draw the following conclusions. In the first place from year to year there are always unclassified goods, except for 2014. Such products include, among other things, intelligent innovative products, IT products.

There was a significant increase (by 271.16%) of goods of group 8526 (radar equipment) in 2019 compared to 2018.

In 2018, goods of the group 8705 - special vehicles (0.18 billion U.S. dollars), groups 84 - mechanical equipment and equipment, computers (0.20 billion U.S. dollars) are allocated from the goods of the top redistribution in terms of export volumes.

However, in total Russian exports of NNE to Algeria took a small share: 0.09-1.34%. At the same time, since 2016, there has been a downward trend in the share of NNE in Russia's total exports to Algeria.

The volume of Russia's NNE to Egypt increased until 2018, and in 2019 there was a decrease in such volumes.

Analyzing the structure of NNE goods to Egypt, the following is established. Until 2019, the NNE was dominated by the lower processed goods (in the first place the goods of the group 10 - grain, 7207 - semi-finished unalloyed steel), in 2019 - the top redistribution of the NNE (according to the REC - unclassified goods).

In general, Russia's total exports saw an increase from 2013 to 2017, and from 2018 - a decrease in the share of exports from Russia to Egypt of NNE goods. However, Egypt is the leader of all North African countries in terms of the volume imported NNE goods from Russia .

Analyzing the volume and share of NNE to Libya in the total exports of Russia,it was found that NNE goods took a share of 0.03-0.05% in exports from Russia.

By analysing the structure of NNE products, the following conclusions can be drawn. Between 2013 and 2019, in the structure of the NNE to Libya lower-processed goodsdominate . According to the REC data, the largest share of such goods is occupied by the goods of the UCN FEA EAEU 10 group - grain, 7207 - semi-finished products of unalloyed steel

Analyzing the export of non-commodity non-energy products of Russia to Morocco,it was found that the share of GNE goods in Morocco increased from 2013 to 2019, from 0.02% to 0.11%. At the same time, the total volume of exports of such goods is also unstable, from 0.09 in 2013 to 0.33 billion dollars U.S. in 2019. However, the export of NNE goods to Morocco takes a small share of Russia's total exports.

Analyzing the structure of NNE goods in Morocco, it was found that between 2013- 2019, the structure of NNE goods in Morocco is dominated by lower-processedgoods, from 59.5 per cent in 2017 to 90.8 per cent in 2015. The largest share in such exports is occupied by the goods of the EAEU 31-fertilizer , 10 - grain, 7207 - semi-finished unalloyed steel products (from 2013 to 2017), 2814-ammonia (from 2018).

Analyzing the export of non-commodity non-energy goods of Russia to Sudan,it is established that the share of NNE goods in total exports of Russia is 0.02-0.12%. At the same time, the largest volumes of exports were in 2018 (0.5 billion U.S. dollars)

Analyzing the structure of NNE goods in Sudan,it was found that during 2013-2019, the export structure of non-commodity non-energy products is dominated by lower-processed goods (UCN FEA EAEU 10 - grain, in 2019 - group 1512 - sunflower oil).

However, despite the predominance of lower-processedgoods, in 2018 there is a significantshare of the higher-processedgoods: group 30 - pharmaceutical products (0.01 billion dollars). At the same time, the above lower-processed goodsremained on the first place.

The share of NNE goods in Russia's total exports to Tunisia is 0.02%-0.07%. Analyzing the export dynamics,it was established that the largest increase in exports of NNE goods was observed in 2014 (amounted to 156.12%).

The structure of NNE goods maintains a general trend for all North African countries - the predominance of lower-processedgoods (goods of the UCN FEA EAEU 7207 - semi-finishedunalloyed steel products, 10 - grain, 2814-ammonia, 1507 - soybean oil).

Thus, after analyzing the geographical structure of NNE exports of goods to North Africa, it was found that Russia exports the largest volumes of such goods to Egypt, the second largest import of such goods - Algeria. Since 2016, the smallest exports of such goods have come to Libya.Non-commodity non-energy exports to North Africa account for a small share (from 0.74% in 2013 to 3.13% in 2017). Exports of NNE goods to North Africa grew from 2013 to 2017, and from 2018 such volumes decrease.

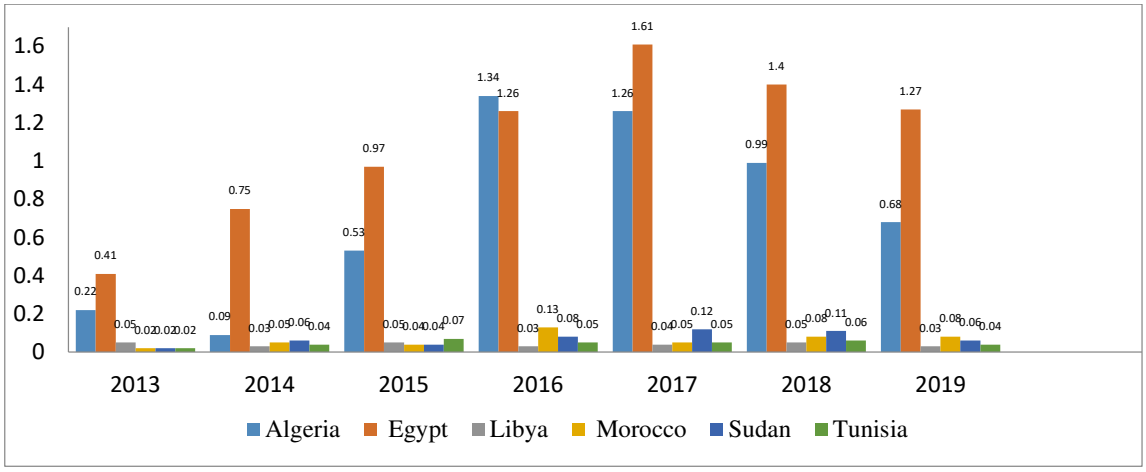

Fig. 1: Share of non-commodity non-energy exports to North African countries in total Russian exports , %

The NNE structure in North African countries tends to predominate lower-processed goods for all countries except Algeria, where NNE higher-processed goods (unclassified goods) is predominant.

At the same time, the main exported lower-processed goods for all countries are the following: goods of the group of goods on UCN FEA EAEU 31-fertilizers, 10 - grain, 7207 - semi-finished unalloyed steel products, 2814-ammonia 10 - grain.

The leader in importing NNE goods from Russia is Egypt. Thus, in 2019, the export of NNE to Egypt ranked 18th in the total volume of NNE goods from Russia, in Algeria-29, Morocco - 61, Tunisia - 69, Sudan - 80, Libya - 92

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Assessment of The Institutional Framework of Russia's Cooperation with North African Countries

TKACHENKO M.F.,
Vice-Chancellor (for scientific work) of the Russian Customs Academy, professor of international economic relations of the Russian Customs Academy, Ph.D., professor,
Russia
marstav251280@gmail.com

SHAFIEV P.M.,
Professor of International Economic Relations of the Russian Customs Academy, Ph.D., Professor,
Russia
roushafiev@gmail.com

BUDARINA N.A.,
Professor of International Economic Relations of the Russian Customs Academy, Ph.D., Associate Professor,
Russia
natala5555@rambler.ru

TATAYEVA I.Y.,
Ph.D., Associate Professor, Associate Professor of the Department of International Economic Relations of Russian Customs Academy, Associate Professor of the Department of Management of Russian Customs Academy, Ph.D., Associate Professor
Russia
sergeevarta@yandex.ru

BLUDOVA S.N., PH.D.,
Associate Professor, Associate Professor of the Department of International Economic Relations of the Russian Customs Academy
Russia
bludo@inbox.ru

Abstract

The article analyzes the existing institutional framework for cooperation between the Russian Federation and North African countries such as Sudan, Egypt, Morocco, Algeria, Tunisia and Libya. Trade interaction with these countries has both common positive and negative aspects, as well as qualitative differences, based on different levels of socio-economic development, political situation, level of development of trade and economic cooperation with the Russian Federation. The study attempts to consider promising areas of foreign trade cooperation and to propose an institutional basis for its implementation.

Africa is seen as one of the most promising areas of cooperation by the International Economic Community. The Russian Federation has long-term foreign economic relations with almost all countries of this region, but recently there has been a need to rethink the institutional framework of these links in order to intensify cooperation. This is largely due to the fact that Russia's increasing competition in this region is made up by Chinese entrepreneurs, establishing effective cooperation in various sectors of the economy of African countries. The aim of the study is to assess the established institutional framework of Russia's cooperation with African countries, determine the expediency of its use and develop recommendations for its improvement in accordance with current economic challenges and realities.

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Many studies have been devoted to studying the problems and prospects of Russia's foreign trade cooperation with African countries (Sozontov Yu, Sidorova G.M., Dzubkov I., etc.), but the institutional framework of foreign trade cooperation has not been sufficiently studied.

Considering the overall institutional framework of Russia's cooperation with African countries, it is worth noting that it is represented by the following institutions. On the part of the Russian Federation, cooperation with African countries is carried out by: embassies, Eximbank, the Russian Export Center, the Chamber of Commerce and Industry, the Roscongress Foundation, the Association for Economic Cooperation with African Countries (AECAC), the Russian-Egyptian Business Council, all sorts of commissions and forums working on the basis of bilateral agreements. In particular, the functioning of the Russia-Africa economic forum on the platforms of which a new dialogue mechanism- the Russia-Africa Partnership Forum was created- is promising.
On the part of African countries, the main institutions promoting foreign trade cooperation with Russia are:African Development Bank, African Export-Import Bank, Russian-Arab Business Council, various commissions and forums (e.g. forum of Russian-Arab cooperation) working on the basis of bilateral agreements.

Cooperation with African countries is implemented within the framework of signed agreements on bilateral cooperation. These agreements were often signed in the mid-20th century and now active work is carried out to renew them. The main platform at which cooperation is supposed to be implemented is the Russia-Africa Forum, where the goals and objectives of cooperation are formed every three years, as well as an action plan for three years.

At the present stage, strategic areas of foreign trade cooperation are the export to African countries of military-industrial complex goods, agricultural products, etc. Algorithm of work with African countries is often based on the performance of the won tenders of international organizations for the supply of food or other goods or on the implementation of treaties concluded at forums, exhibitions, fairs.

The countries under analysis have different levels of institutional and socio-economic development and therefore have different needs to form an institutional framework for foreign trade cooperation.

At the same time, the existing commodity structure of exports from Russia to Africa can potentially become a factor in stimulating the development of goods with a high share of added value.

Table 1 presents the data of the rating calculated by the Russian Export Center on the prospects of countries for non-commodity exports from Russia for 2018.

Table 1 : Rating of the prospects of countries for non-commodity exports from Russia for 2018.

Country	Rating REC (2018)	Import of RF	Trade complementarity	Import growth rate	Import simplicity	Transport availability
Sudan	98 (-8)	65	25	113	119	56
Tunisia	82 (+12)	72	31	119	53	84
Libya	68 (-7)	86	41	130	10	96
Algeria	62 (+3)	15	2	61	116	23
Morocco	28 (+4)	51	64	31	6	23
Egypt	14 (+10)	10	1	40	70	125

Source:https://www.exportcenter.ru/services/analitika-i-issledovaniya/interaktivnye-analiticheskie-rodukty/renking_perspektivnosti_stran/

According to the rating, the higher the indicators, the more expedient is to cooperate with the country. As can be seen from the table, the least interesting from the point of view of non-commodity exports is the development of foreign trade relations with Egypt, and the most promising are the foreign trade relations with Sudan. Thus, when it comes to the prospect of further development of foreign trade cooperation, especially in the non-commodity sector, it is in these countries that the institutions promoting foreign trade should be given the most attention. At the same time, as can be seen, the prospect of foreign trade cooperation on the most profitable goods for Russia does not correlate with the level of development of existing trade relations. Thus, the closest foreign trade cooperation is carried out with Egypt, but, based on the rating, cooperation with this country, from the point of the view of non-commodity exports, is not promising.

The next point for consideration is the existing key institutions of cooperation with the Sudan and their shortcomings. There are diplomatic relations between the two countries, several cooperation treaties in various fields. Russia has

been cooperating with Sudan in various investment, economic and educational projects. The Russian-Sudan Intergovernmental Commission on Trade and Economic Cooperation is a key escort mechanism. At the same time, the country does not have a foreign ministry of the Russian Foreign Ministry. The nearest diplomatic mission of the Russian Federation is in the Republic of Uganda. The REC has an expert on the country. There is also no Russian trade mission in the country. There are virtually no foreign trade cooperation organizations with Russia in the Sudan, and there is no representation of the African Export-Import Bank or other major African banks that promote foreign trade. At the same time, Sudan is one of the seven countries that make the largest purchases of goods from Russia.

In our opinion, a number of measures need to be taken to revive foreign trade relations:

1. To renegotiate the bilateral treaty on foreign trade cooperation in accordance with modern realities.
2. To consider the creation of an industrial zone or free economic zone in Sudan, for organizing Russian production facilities in the country with the possibility of further export of manufactured products to other countries
3. To consider the creation of supply chains and cooperatives in the production and sale of Russian companies' products in Sudan and surrounding markets
4. To establish a marketing agency in Sudan, which will study Sudan's needs for goods produced in the Russian Federation, to study the national characteristics of demand for goods, to conduct measures to generate demand for Russian products for those groups of goods that have not been exported to Sudan through international marketing tools.

It would be useful to consider intensifying cooperation, given that the country may, in the long-term, after the political problems have been resolved, improve both its economic situation and the volume of imports.

In general, the risks and barriers to foreign trade are identical for all African countries, with the exception of a few countries with good development, such as Algeria, Morocco, Tunisia and Egypt. Let's consider some parameters of formalization of foreign trade transactions based on the rating Doingbusiness (table 2,3 and 4)

Table 2: Data of rating Doingbusiness 2020 ranking by indicator "International Trade"

Country	General rating	Rating by indicator «International trade»
Morocco	53	58
Tunisia	78	90
Egypt	114	171
Algeria	157	172
Sudan	171	185
Libya	186	129

Source: https://russian.doingbusiness.org/ru/data/exploreeconomies

Sudan and Libya have the lowest ratings (table.2). It is in these countries, under certain conditions, that there is the potential to increase foreign trade with Russia. Of course, there are big political problems in these countries, but it is necessary to start building the foundation of fruitful foreign trade cooperation by forming an institutional structure now. For example, taking into account the data from tables 3 and 4, it is possible to begin to build a modern system of institutions to promote foreign trade with these countries, which is oriented to the characteristics of those countries.

Table 3 : Parameters of registration of export operations based on the Doingbusiness Rating by indicator "International Trade"

Country	Export clearance time: Border and Customs control(in hours)	Export clearance value: Border and Customs control (US $)	Export clearance time: paperwork (hours)
Morocco	6	156	26
Tunisia	12	375	3
Egypt	48	228	88
Libya	72	575	72

Algeria	80	593	149
Sudan	180	967	190

Source: https://russian.doingbusiness.org/ru/data/exploreeconomies

The assessment of the parameters of registration of import operations, based on table 4 data, shows that the greatest difficulties of registration of imports are in Sudan, while in Libya, import clearance is carried out with less complexity than in other countries.

Table 4: Parameters of the registration of import operations based on the Doingbusiness rating on the indicator "International Trade"

Country	Cost of import clearance: paperwork (US $)	Import clearance time: Border and customs control (in hours)	Import clearance cost: Border and Customs control (US $)	Import clearance time: paperwork (hours)	Cost of import clearance: paperwork (US $)
Libya	50	79	637	96	60
Morocco	67	57	228	26	116
Egypt	100	240	554	265	1000
Tunisia	200	80	596	27	144
Algeria	374	210	409	96	400
Sudan	428	144	1093	132	420

Source: https://russian.doingbusiness.org/ru/data/exploreeconomies

You can see that the best conditions in the field of cargo clearance are in Morocco and Tunisia. Sudan and Libya have the greater difficulties, primarily due to the unstable political situation.

Let`s consider the country risks that are present in foreign trade transactions with the countries being analyzed.

Cooperation with Sudan and Libya as with the most promising countries carries the following risks:

Political: political instability, threat of renewed military conflict (South Sudan)

Economic: low level of economic development and, as a result, low purchasing power of the population, high corruption component in decision-making, lack of foreign trade strategy, possible confrontation with Chinese companies.

Global: global crisis, pandemic, difficulties in moving goods due to border closures.

Barriers: the difficulty of entering the domestic market due to informal demands from officials, the difficulty of overcoming customs formalities on exports and imports, the absence of an organization that protects the economic interests of Russian FEA participants

Success factors: relatively well-established foreign trade links, high export capacity for high value-added goods, a large number of specialists in various fields educated in the Russian Federation, which can contribute to the establishment of foreign trade relations. In the future, the growth of labor resources and consumer demand. The presence of infrastructure projects or plans for their development (allow to increase the export of materials from the Russian Federation for their implementation).

Algeria, Egypt, Tunisia and Morocco generally share the same risks of foreign trade and barriers to entry into domestic markets. The risks of cooperation with these African countries are as follows:

Political : possible pressure from EU countries in case of sanctions against the Russian Federation and demand to reduce foreign trade cooperation

Economic: low purchasing power of the population, lack of foreign trade strategy of cooperation, possible confrontation with Chinese and European companies.

Global: global crisis, pandemic, difficulties in moving goods due to border closures

Barriers: historical economic ties with the EU that may hinder the development of cooperation with Russia, the absence of an organization that protects the economic interests of Russian FEA participants in Algeria and Morocco and Tunisia.

Success factors: established foreign trade ties, high export potential for high value-added goods, the current structure of foreign trade with Russia with accurately viewed new directions, a large number of specialists in various fields educated in the Russian Federation, which can contribute to the establishment of foreign trade ties, participation in the creation of a national industrial base and, accordingly, widely used Russian technologies and manufacturing processes. The presence of infrastructure projects or plans for their development (allow to increase the export of materials from the Russian Federation for their implementation). The ability to integrate into the world's production chains with a high share of added value and, in the long term, the possibility of export of higher-processed products to other countries . There is the possibility of direct exports from the southern regions of Russia and the creation of the necessary infrastructure there to expand export-import operations. In the future, the growth of labor and consumer demand is expected.

Thus, the analysis showed that unlike China, the Russian Federation operates on a promising African market without a certain strategy and not on a permanent basis. Despite the marked intensification of partnership, often specific activities are not present. The advantage of the Russian Federation can be the creation of a mechanism of mutually beneficial cooperation in the foreign trade sphere. China has an aggressive foreign trade position in the African market, related to the export of resources (primary sector products) and the export of its own goods to African countries (ready goods of the highly differentiated spectrum). China's reluctance to embed African countries in high-tech chains also gives Russia an advantage in using this factor. A possible alternative to such an aggressive strategy could be a strategy of mutually beneficial cooperation. In order to strengthen trade and economic cooperation, it is right to form a marketing agency (trade office) in each country, whose tasks will include studying the domestic market of each individual African country and searching directly on its territory for new niches for export-import operations. The main task of the agency should also be to promote selected goods to the market of each country.

Of course, the African market has common features, and yet cooperation with each country must be based on individual basis, taking into account its internal characteristics. The second area of work of such an agency should be the coordination of foreign trade cooperation with nearby countries. Within the framework of REC and country marketing agencies or trade missions it is advisable to analyze the needs of African countries in goods, independently look for suppliers of such products in Russia and help them to establish trade relations with African partners.

Given the complexity of doing business, it is possible to create technological maps and algorithms for passing customs formalities, obtaining trademarks and forming a catalog of reliable counterparties, with quarterly updates.

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Channels of Research Dissemination to Reach End-User Targets

Maria EGGINK
University of Mpumalanga, Nelspruit, South Africa
maria.eggink@ump.ac.za

Abstract

Dissemination of research is important in order to justify the research expenses and to reach the intended goals of the research. Unfortunately the findings of research do not always reach the intended end-user and the expenses are often fruitless. The aim of the research is to determine how the research findings of university researchers can reach the end user in order to ensure a return on investment, monetary or otherwise. Secondary data was used and a literature study was conducted to determine the current dissemination practices. Research repositories were reviewed as a proposed channel for research dissemination that is more accessible to end-users. It was found that the more popular dissemination channels were not necessarily the best channels that to reach the intended target. It is proposed that universities consider the establishment or improvement of institutional repositories in order for research findings to reach wider communities and end-users.

Keywords: Research Dissemination, Institutional Research Repositories

Introduction

The high cost spent on research is one of the reasons why it is important to ensure that dissemination of research findings takes place effectively (Neta *et al*., 2015:49; Wilson, Petticrew, Calnan and Nazareth, 2010:1; Holmes and Savgård, 2008:8; Bero *et al*., 1998:465). Lavis, Lomas, Hamid and Sewankambo (2006:621) mention the importance of linking discovery with application in order to ensure the benefits of the investment. According to Bero *et al*. (1998:465), not much attention is paid by researchers to disseminate their findings, despite the high cost of the research.

Derman and Jaeger (2018:121) regard dissemination of research results as ethical conduct of research and they stated that if research dissemination does not take place, it is regarded as a waste of resources and they further indicate that results should not be withheld, even if the results are negative. According to Uzwyshyn (2016: 19), publicly funded research, using taxpayers' money, should be publicly accessible through the publication of an article and by making original data available. Uzwyshyn opines that this will lead to healthier competition, commercialisation and have a positive effect on the economy.

Four associations, including the Association of American Universities, the Association of Research Libraries, the Coalition for Networked Information, and the National Association of State Universities and Land-Grant Colleges, working with research universities in the US, convened in 2008 to discuss possible ways to enhance research dissemination. These associations developed the following vision statement for the university's role in dissemination:

> "The creation of new knowledge lies at the heart of the research university and results from tremendous investments of resources by universities, federal and state governments, industry, foundations, and others. The products of that enterprise are created to benefit society. In the process, those products also advance further research and scholarship, along with the teaching and service missions of the university. Reflecting its investments, the academy has a responsibility to ensure the broadest possible access to the fruits of its work both in the short and long term by publics both local and global.

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> Faculty research and scholarship represent invaluable intellectual capital, but the value of that capital lies in its effective dissemination to present and future audiences. Dissemination strategies that restrict access are fundamentally at odds with the dissemination imperative inherent in the university mission" (Association of American Universities, Association of Research Libraries, Coalition for Networked Information, and National Association of State Universities and Land-Grant Colleges, 2009:1).

The roles of universities have changed from that of teaching to include knowledge creation and knowledge transfer. Eggink (2017), in a study on the changing role of universities, indicated universities' role in national innovation systems and how the universities' role, as actors in innovation systems, coincides with the change in views in economic theory from neo-classical theories to evolutionary neo-Schumpeterian economics. Eggink (2017) emphasised the important contribution of universities to the performance of innovation systems and eventually economic growth and development. Without dissemination of research findings, knowledge transfer is not taking place to the extent that it can make a difference in the performance of innovation systems and ultimately, the economy.

Dissemination of research results are treated as more important in certain fields of study than in others. In the medical field, for example, the research findings often have a direct practical application and therefore the impact is often measured. In the social sciences that is not always the case. Research results are often published without any follow up on the implication or use of this information by the intended end-user.

The research question is: how do university researchers disseminate their research findings and how can we ensure that the research findings reach the intended end-user? The aim of the research is to determine how the research findings of university researchers can reach the end user in order to ensure a return on investment, monetary or otherwise. These returns are not necessarily in monetary form. It may also be in the form of an improvement of living standards or any other outcome that was originally intended by the research.

For the study secondary data and a literature study was used to determine and debate the dissemination practices of university researchers. First, the different concepts are defined. Second, the importance of research dissemination is discussed. Thereafter the current dissemination practices are critically reviewed and reported on. Research repositories are reviewed as a proposed channel for research dissemination that is more accessible to end-users.

Concepts

Different terminology is used to describe how research findings are spread and made known to users of these findings or new knowledge. Dissemination of research is the term that will be used in this study and is defined as the transfer, imparting, distribution or communication of research findings or knowledge from producers to potential users. This definition is derived from components of different definitions of dissemination, knowledge transfer and knowledge translation. Louis and Jones (2001:8) define dissemination as consisting of "purposive, goal-oriented communication of information or knowledge that is specific and potentially useable" and emphasise that the intent of dissemination is not only to disperse information, but to do it in a way that will promote the use of the information.

Schillinger (2010:1) distinguish between the terminology that is used by the Centers for Disease Control and National Institutes of Health (in the US) and the Canadian Institutes of Health Research. The definitions of these terms used by Schillinger (2010:1), are specifically aimed at the health profession and research, but has elements that can be applied to a wider field, including social sciences research. The definition of dissemination that is used by these institutions, is as follow: "the targeted distribution of information and intervention materials to a specific public health or clinical practice audience". In order to have a more generic definition, dissemination is not necessarily aimed at a specific identifiable target group. Where some research is aimed, for example, at policy making in a specific government department or solving a problem in a specific community, other research may be aimed more generally at the broader public. Another term used in this context is the diffusion of knowledge. Diffusion includes, according to the terms defined in Schillinger (2010:1), successful adoption of the interventions.

Dissemination of research findings or knowledge does not necessarily include implementation or integration of research. The implementation and integration are in some cases the aim and function of the researcher, but in other cases these functions lie with the users of the knowledge themselves. Some applied research, action research, and contract research may, for example, include the implementation of the research knowledge by the researcher. On the other hand, in cases where the target or end user is more generally defined, the researcher does not have control over the implementation of the research findings or knowledge.

The definition of knowledge transfer that is used by the Canadian Institute of Health Research (Schillinger, 2010:1) states that knowledge transfer is "the imparting of research knowledge from producers to potential users". Fry *et al*. (2009:4) has a similar definition of dissemination by stating it as "…to pass on their [researchers] findings to those

who may be interested in them". These definitions do not limit the users to a specific target group, nor do they imply implementation or integration of the research knowledge. These definitions, however, imply the intent to reach the end user and form therefore part of the broader definition of dissemination that will be used in this paper.

Importance of dissemination of research findings

The amounts that are spent on research and development (R&D) varies per country, as indicated in Table1 for a few selected countries. The table indicates the data extracted from OECD.Stats and are given for 2016, as later figures are not available for all countries. The R&D spending are in some countries higher than three per cent of the Gross Domestic Product (GDP) and amounts for example in the USA to US$17 000 894,8 million (2010 dollars, constant prices, purchasing power parity). These amounts are often very high and should therefore ensure a sound return on investment. Even in countries where the R&D spending per GDP does not compare well with the rest of the world, these amounts are still high and cannot result to be fruitless expenditure. Businesses, aiming at making maximum profit, will most probably not tolerate R&D expenditure that does not have the potential to be profitable. The question is whether these decisions are also being taken seriously when it comes to public R&D expenditure.

Table 1: Gross domestic expenditure on R&D by sector of performance and field of R&D

Sector	Higher education	Business enterprise	Government	Private non-profit	Total intramural	Gross domestic product (expenditure approach)	Total R&D as a % of GDP
Measure	2010 Dollars - Constant prices and PPPs (Millions)						
Year	2016	2016	2016	2016	2016	2016	2016
Country							
Austria	2626,933	8300,169	837,628	57,811	11822,54	378 293,9	3,13
Belgium	2435,884	8315,671	1052,902	66,287	11870,744	466 307,0	2,55
Canada	10518,99	13754,664	1771,699	118,824	26164,178	1 534 102,4	1,71
France	12268,611	35543,509	7198,693	870,602	55881,415	2 483 915,3	2,25
Germany	18761,595	70892,982	14354,245	..	104008,82	3 565 468,1	2,92
Japan	18407,141	117686,15	11280,551	2063,784	149437,62	4 736 300,8	3,16
Netherlands	4823,353	9238,981	1788,717	..	15851,051	793 804,2	2,00
United Kingdom	10407,388	28785,718	2812,192	904,973	42910,271	2 550 975,8	1,68
United States	61 524,25	339 937,97	47 614,995	19 301,121	468 378,337	17 000 894,8	2,76
Non-OECD Economies:							
Argentina	1097,659	1016,425	2106,785	32,568	4253,437	796 305,7	0,53
Russia	3382,943	21813,125	11880,055	79,258	37155,381	3 387 299,3	1,10
South Africa	1807,25	2291,179	1276,445	157,736	5532,61	672 637,8	0,82
Chinese Taipei	3053,919	25196,785	4262,646	96,734	32610,084	19 413 282,7	0,17

Table compiled from data extracted from OECD.Stat

The importance of research dissemination is further emphasised by the reasons why researchers disseminate their findings. In a study by Wilson *et al*. (2010), based on a questionnaire sent to a sample of 232 UK-based principal investigators of publicly funded applied and public health research, the following reasons for disseminating research findings were indicated by the respondents, revealing also the percentages of responses: raise awareness of findings (93%); influence policy (85%); influence practice (84%); stimulate discussion/debate (75%); transfer research to practice (75%); raise the organisational profile (65%); attract future funding (62%); research assessment exercise (53%); justify public funding (48%); promote public understanding of research (40%); satisfy contractual requirements (37%); improve your own communication (24%); other (11%). The fact that this study focussed on research in the medical field may have an effect of the findings due to this kind of research that is aimed at a specific target group, such as government for policymaking. The direct outcome of the research is perhaps not aimed at the general public due to the technical nature and application possibilities thereof. Yet, the results of this study give an indication of the important reasons for dissemination. The percentages in brackets is how many researchers indicated the reason and it is not necessarily an indication of the importance of that reason. Yet, it is alarming that only 40% of the researchers indicate that their dissemination is aimed at promoting public understanding of research. It may be that only 40% of research has the public as end-users, but we should question whether researchers are reaching the end-user or not?

Further advantages of disseminating research data and/or findings, includes: collaboration on research projects, even internationally; reduced costs of data collection; and access to data allows diversity in research, resulting in a more holistic approach to solving problems (Shahi *et al*., 2014:244-246).

Dissemination Channels

In order to improve the effectiveness of dissemination, an active plan of dissemination should already be included in the planning process of the research. Holmes and Savgård (2008:6) emphasised the importance of including dissemination planning in the planning stage of the research, including the time and budget needed for the dissemination of the research.

In some cases it is recommended that the end-users be involved from the planning phase in order to make sure that dissemination takes place (Derman and Jaeger, 2018:121; Holmes and Savgård, 2008:10). For research that is commissioned and the end-user is the party who requested the research, it is almost given that the end-users be involved from the planning phase. Yet, it is not always possible to involve end-users. The funders or requesters are not necessarily the end-users. It is also possible that the end-users are the general public and not an identifiable specific target group.

The choice of dissemination channel is imminent for reaching the intended end-user target. The different channels of dissemination are summarised and the advantages and disadvantages of these channels, as identified by literature, is included in Table 2.

Table 2: Dissemination channels

Dissemination channel	Advantages	Disadvantages	Reference
Technical report	Effective method of factual information	Resource intensive; Limited audience; Retrieving of report later may be difficult	Holmes and Savgård (2008:15-18)
Non-technical summaries	Often available on the Web; Summaries of different qualities and styles can be generated		Holmes and Savgård (2008:15-18)

Peer reviewed publications	Appropriate channel for science community; Quality assurance and confidence in results; Indicators of quality and impact	Long timescales of peer review processes; Results in small changes in practice; Generally ineffective	Holmes and Savgård (2008:15-18) Fry *et al.*(2009:4) Bero *et al.* (1998:467)
Professional journals	Effective channel of communication with practitioners	Not always accepted for impact factor and citations among academic researchers	Holmes and Savgård , 2008:15-18;
Internet	Easy access of reports	Quality of websites are not assured;	Holmes and Savgård, 2008:15-18
	Cross-referencing possible; Audio and visual materials can be attached or linked; fast and flexible dissemination is possible; ability to publish a vast number of research; addresses the rights of the consumers to have access to research information	Intellectual property right protection challenges; Academic accreditation and peer review challenges	Duffy, 2000:350
Social media	Useful to develop and sustain networks and collaborations	Does not always allow two-way communication; networks are small and not widespread	Cooper, 2014:2;8;
Newsletters	Often used to keep extended users informed of developments	Difficult to get articles from researchers to publish	Holmes and Savgård (2008:15-18)
Face-to-face	Proper understanding can be enhanced through questions and explanations		Holmes and Savgård (2008:15-18)
Workshops and seminars	Suitable for targeted audience; Dialogue is possible; Enhance “buy-in”; Contacts and relationships are built	Limited number of end-users; Difficult to get end-users to attend	Holmes and Savgård, 2008:15-18

Conferences	Fast dissemination of changing fields, such as computer science	Generally ineffective	Fry *et al.* (2009:5) Bero et al. (1998:467)
Media reports	Reaching broader public	Misreporting	Wilson *et al*., 2010:7

Source: Own compilation

A large component of measuring universities' quality is based on their research outputs. Lecturers' performance and promotion at universities are in many cases also measured by evidence of their research outputs. The problem lies in how the research outputs are measured. Often research outputs are measured by the number of articles published in high-status or historically accepted journals and monographs or by the number of citations or h-index. The concerns are: do the research findings reach its target market? Do the findings reach the end-user? Do the number of citations imply that the end-user or target market is reached or do they publish only to be cited by other researchers and then still do not reach the target market? The study by Wilson *et al*. (2010), based on principal investigators of publicly funded applied and public health research (as was previously mentioned), indicated the communication channels used by them for dissemination. Academic journals were indicated by 98% of the respondents as a means of communication used, 96% indicated conference presentations, 91% that they report to funders, 62% use seminars, 57% workshops, 54% Web access to full report, 50% Web access to summary report and less than 50% indicated that they make use of other channels such as press releases, networking, face-to-face, newsletters, media interviews, etc.

Fry *et al.* (2009:5) opine that publications that are better-suited for the dissemination of applied or practice-based research and are aimed at non-academic target groups, is often viewed as low status and prestige among researchers. Researchers therefore often do not reach their target group through the channel of dissemination used. According to Fry *et al*. (2009:4), researchers have to make a choice between fast publication reaching the target audience, and slower dissemination or publication in a "high-status" journal. Fry *et al*. further indicate that publication is not only a means of communication, but also a means of measuring quality. Yet, Fry *et al*. (2009:7) reason that there is a risk that journal articles become dominant due to its popularity to be used as performance measurement. According to Holmes and Savgård (2008:15-18), the manner in which the research results should be disseminated will differ, depending on the needs and circumstances of the end-user. Bero *et al*. (1998:467) concluded in their study of systematic reviews, that passive dissemination "is generally ineffective, and at best, results only in small changes in practice". The passive dissemination that they refer to includes publication in conference proceedings or journals or mailing of educational materials.

Early dissemination of research findings is important. Balas and Boren (2000:60) found that it takes on average 17 years for research findings after dissemination to be implemented in practice. Their study was based on the medical field and done in 2000, but it does give an indication of the lag of implementation of research findings. Even if this process speeded up due to access to internet and the improvements in communication, there is still a lag from reaching research findings until it is disseminated and then implemented. The slow peer review process of many publications is an example.

Consideration should therefore be given to criteria such as academic quality, speed of dissemination, reaching non-academic targets, and the wider socio-economic impact (Fry *et al*., 2009:7).

Research repositories and open access publication

Research repositories is a means of overcoming some of the challenges of disseminating research findings to end-users. Lynch (2003:2) defines research repositories as follows: "a university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital material created by the institution and its community members". Students and researchers have access to libraries and online journal databases while registered or working at universities, but once they leave the university, their possibilities to access research information is reduced (Borah and Aguiniga, 2013:506). The broader public, who are often the intended end-users of research findings, do not have easy access to these resources either. According to Van Wyk and Du Toit (2016:108), only 5% of the global institutional repositories are in Africa and they state that "Lack of access to information and technology has a profound negative effect on the African digital scholarship". Many of the publications can only be accessed at a high cost. An institutional repository may enhance access for researchers and the broader public to research findings.

The advantages of a research repository include, inter alia: the provision of a reference database; to share research publications more easily; to improve visibility of research findings to the outside world; to reach more people outside their fields; to enable researchers to manage their own publications online; and to provide a flexible database (Hazzard and Towery, 2017:3-4; Robinson, 2009:134). According to Van Wyk and Du Toit (2016:107), it is important to manage the digital scholarship such as dissertations, theses, proceedings and publications, because it forms part of knowledge capital and should be seen as assets of the institution. By managing digital scholarship through a research repository, improves visibility and accessibility of research findings. Shahi *et al*. (2014:244) add advantages of data sharing such as collaboration on research projects, diversity in research leading to a more holistic approach, validation of each other's work, increased transparency, increased quality, and the reduction of costs.

The establishment of research repositories is not without challenges. The main challenges that are reported include, inter alia, the availability of funds, time and personnel, digitising, formatting, organising, maintaining, documenting, protecting and providing access to data, competition among researchers, and recognition of researchers (Hazzard and Towery, 2017:5; Shahi *et al*., 2014:245).

Conclusion

With the changing roles of universities from knowledge generation to knowledge transfer, it became important for university researchers to disseminate their research data and or findings in such a way that it reaches the intended target markets. The high costs of research, whether funded privately or publicly, as well as the importance of research findings for socio-economic changes, necessitates the avoidance of fruitless expenditure. There is an ethical responsibility by researchers to ensure the highest return on investment, measured in financial terms as well as social terms.

Literature revealed the importance of dissemination plans by researchers already in the planning phase – a practice that is not necessarily used by all researchers. In this paper the advantages and disadvantages of different channels of dissemination were analysed. It was found that certain channels, such as publication in high-status journals are of the more popular channels. The reasons identified for the popularity of these channels include the channel's ability to measure quality as well as performance through the numbers of publications and citations. It raises questions on the ability of these channels to reach the intended target. It is proposed that universities seriously consider the establishment or improvement of institutional repositories in order for research findings to reach wider communities and end-users. Institutional repositories are not without challenges, especially with respect to intellectual property protection, plagiarism, and ensuring of quality. Universities should therefore revise their policies and management of research dissemination, property protection and plagiarism to address these challenges. Universities should further revise policies on measurement of research outputs and performance in order to accommodate the different ways of research dissemination and not to limit it to publication through certain channels that restricts the end-users of research findings from accessing this information.

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Technical Features and User Reviews in The Smartphone Industry: The Four Market Leaders at A Glance

Francesca MICHELINO*, Vincenzo VARRIALE, Antonello CAMMARANO and Mauro CAPUTO

fmichelino@unisa.it vvarriale@unisa.it acammarano@unisa.it mcaputo@unisa.it
Department of Industrial Engineering, University of Salerno, Italy
*Corresponding author

Abstract

The paper analyzes the relationships between smartphone performances as to various technical features and scores obtained in user reviews for Samsung, Apple, Huawei and Xiaomi. Results show that usability is the feature that mostly influence the value for customers; significant value is also attributed to screen, dimension and manufacturing quality.

Keywords: user review, smartphone, Apple, Huawei, Samsung, Xiaomi.

Introduction

The role of user reviews in assessing the customer satisfaction and, therefore, the commercial success of products is more and more relevant. In particular, within the smartphone industry, customer satisfaction can drive the strategic decisions as to the development of specific technologies (Shin, 2015) since different design features can differently affect satisfaction of smartphone users (Liu and Yu, 2017). Customer satisfaction can turn into customer loyalty and therefore guarantee stronger competitive position (Bayraktar et al., 2012; Kim et al., 2016). For this reason, it seems critical to define how performances of smartphones as to different technical features can turn into an overall positive or negative opinion of the device.

This work is a first attempt of analyzing the relationships between technical performances and scores obtained in user reviews of smartphones from the four market leaders: Samsung, Apple, Huawei and Xiaomi. Indeed, such relationships define the technical features that most influence the value that customers attribute to the product and can guide strategic decisions of companies regarding the technologies on which invest more.

In what follows, after the literature review on the dynamics of the smartphone market and the use od bid data analysis, the methodology is presented and primary results are shown and discussed. Conclusions close the work.

Literature Review

The dynamics of the Smartphone Market

From 2007 until today the smartphone market has grown enormously thanks to the developments of new operating systems and innovative applications. Although such growth, the main smartphone Original Equipment Manufacturers (OEMs) have changed over time. In fact, brands like Nokia and Blackberry - which dominated the global sales smartphone market in the early years - were overtaken by Apple and Samsung in 2011. In recent years, manufacturers such as Huawei, Xiaomi and Vivo have been increasing their sales and market shares. Indeed, such companies adopted very different types of strategies to reach high market shares. One of the ways to gain competitive advantage in hi-tech companies is to constantly innovate (Michelino et al, 2015; Lamberti et al., 2017; Cammarano et al., 2019; Zhang et al., 2020) and competitive strategies in the smartphone world have changed over the years.

In the early years of cell phone production, the strategy used was cost-leadership (Lin and Wang, 2008). This allowed to optimize costs and processes and have large profit margins. In this way, OEMs moved their component production to developing regions such as South Korea and Taiwan. However, this strategy has been replaced by differentiation (Bayraktar et al., 2017): leading companies such as Apple, Samsung and Huawei decided to constantly innovate in the implementation of technology and design for phones. However, innovation comes also from component suppliers, in particular from semiconductor manufacturers such as Qualcomm, Broadcom, Intel, Nvidia, Sony and many others (Shin et al., 2017). In fact, the hi-tech market segment is characterized by intense competition, therefore it is necessary for each player in the supply chain to provide value added. Moreover, the Shanzhai case in China has attracted a lot of interest as Chinese smartphones have gained high market shares (Jin-Li et al., 2011). Shanzhai is a cluster of unbranded companies specializing in several activities. Each of them has specialized knowledge on a single

component that can facilitate and improve the performance of an OEM. Each company focuses on a single product which can be a processor, a display, DRAM memory or on the single process which can be the design of integrated circuits or the final assembly (Liu et al. 2015).

Finally, one of the key roles in the hi-tech sector is marketing management. Therefore, marketers have begun to recognize the importance of adapting their market to the tastes, preferences and desires of consumers (Zhou et al., 2009). Marketing managers have identified quality as a key concept for customer satisfaction. The quality of products and services is an important tool for companies to create greater value for the customer and to achieve high corporate profitability (Porter, 1980). From the consumer point of view, perceived quality is his/her perception of the overall quality of a product in relation to its final purpose, compared to other alternatives (Aaker, 1991). Certainly the quality perceived by the customer depends on many factors such as: reliability (Talke et al., 2009), design (Xue, 2019), price (Völckner and Hofmann, 2007), brand (Bauer et al., 2007), reputation (Cretu and Brodie, 2007) and many others. However, in high-tech markets, consumers perceive the quality of a product also in its relationship with innovation (Michelino et al, 2014; Cammarano et al., 2017). Indeed, consumers consider the company research and development efforts and innovative capacity as a positive proxy for products. For this reason, consumers usually buy a new product when the previous one was not satisfactory or if the new product offers greater value than the last version (Calantone et al., 2006).

Big Data Analysis

Since the 1990s, marketers have tried to predict new products or business ideas by capturing customer information such as demographics, complaints, and requirements using market-oriented planning to formulate new product development. Therefore, many studies have identified the usefulness of user information to improve the manufacturing process of a new product (Von Hippel et al., 2012). Traditional data collection methods involved surveys, questionnaires, personal or telephone interviews. The main advantages of these methodologies concerned the accuracy of the data by defining the analysis sample, the clarity of the qualitative data, e.g. personal satisfaction of the purchase (Yang et al., 2006). Of course, these methods are tedious and time consuming. The main disadvantages of these methods relate to sample size and response rates. In general, a large sample can improve the accuracy of the estimate and the generalizability of the results (Day et al., 1994). Non-response errors modify the information of the selected sample (Assael and Keon, 1982), thus decreasing the reliability and validity of a study and making it difficult to generalize. Therefore, to overcome these problems, scholars are pushing towards the adoption of the Internet and online content analysis (Yang et al., 2003), to take advantage of fast response times and access anywhere (Sackmary, 1998). Therefore, an innovative methodology in the statistics area is the use of big data analysis (BDA). BDA is linked to the explosion of information on the web with unstructured and heterogeneous variables that are produced in continuous time. In fact, it has become very convenient to store this information on the internet and use it over time. In this case the problem of observations is overcome, and the accuracy would be high if the information were independent and homogeneous. Big data are a collection of documents, video images, network data that should not be valued as a database, but as a source of discovery and knowledge (NRC, 2013). This growing demand for data across all levels of society has made data a valuable commodity. Indeed, many scholars used web information to uncover hidden patterns, unknown correlations, and market trends that could help companies to make more accurate and appropriate business decisions. For example, Vidal et al., used 69,961 tweets to investigate consumer behavior in relation to food. Zhou et al. (2015) conducted a sentiment analysis on online product reviews to identify customer needs. Therefore, it is important that companies know their customers' opinions on their products to increase sales (Atzmueller, 2012). User experiences have played a key role in identifying features that need to be improved in upcoming smartphone releases. In this way, the smartphone industry has grown over time and has brought new product and service innovations (Suh et al., 2017). However, information about user experiences posted in web communities is described in a non-systematic way for product improvement. For this reason, it is necessary to carry out some precautions during the evaluation and choice of the activities to improve. Therefore, big data must be collected cleanly to achieve research purpose, as this data are different from primary data created specifically by researchers to answer specific research questions (Walsham, 1995). In recent years, the literature is pushing more and more to exploit the availability of big data to carry out new research and theories (Johnson et al., 2019).

Methodology

The data source for the work is alaTest, a web service developed by International Consumer Services which aggregates thousands of user reviews and combines them into a single quality rating, named alaScore. The algorithm used for aggregating such reviews takes into account both experts and users reviews and provides a score ranging from 0 to 100. Moreover, ratings on a five stars scale are provided and positive and negative reviews are provided for different technical features: battery life, camera, design, dimension, manufacturing quality, performance, portability, price, reliability, screen, sound quality and usability.

We collected data regarding 257 smartphones launched from 2007 to 2020, for a total number of 496,381 reviews: for the purpose of this study, we focused on the reviews of the devices launched from the four current market leaders: Samsung, Apple, Huawei and Xiaomi and provided some descriptives, comparing the results of the four companies among them and with the average results of the sector.

Results

In Table 1 the sample is described as to number of smartphones and relative reviews analyzed.

Table 1: sample description

Brand	***# Smartphones***	***# Reviews***
Apple	21	224,309
Huawei	16	5,714
Samsung	39	162,303
Xiaomi	13	446
Other brands	168	103,609
Total sector	**257**	**496,381**

Figure 1 shows the market share of the four companies as of October 2019 - October 2020 (data source: gs.statcounter.com) and the average values of the alaScore.

Among the four companies only Huawei has an average alaScore value lower than the overall sector, thus confirming a general positive rating for the devices of market leaders. Yet, the highest value of alaScore is obtained for the company, among the four, which worst performs on the market. For this reason, a deepening of the analysis is performed, by breaking down the alaScore in its components.

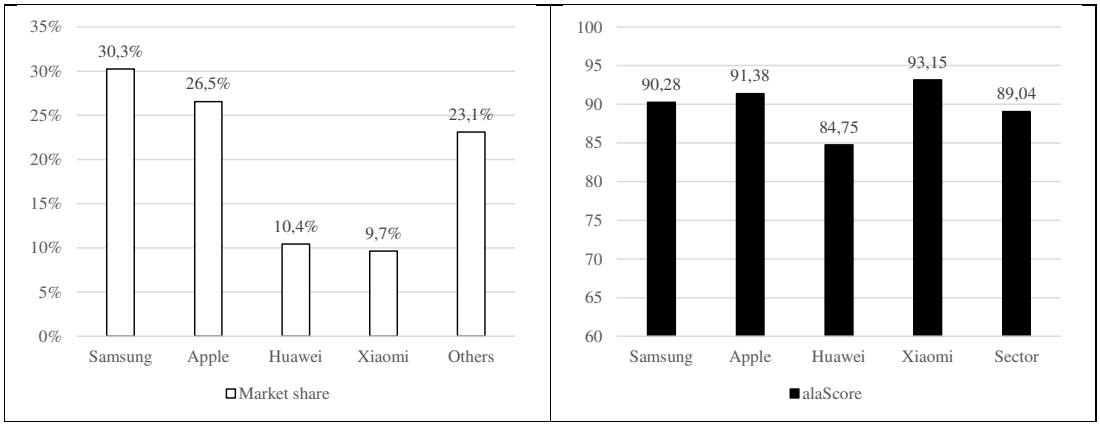

Figure 1: market share and average alaScore ratings

In Figure 2 average experts and users scores are reported together with the percentage of five and four stars ratings attained. It emerges that for all the brands the scores provided by users are higher than those coming from experts and such gap is particularly high for the two worst market performers (Huawei and Xiaomi). In a similar way, these two companies have a significant number of "good" (four stars) ratings, whereas Samsung and Apple have higher numbers as to "excellent" (five stars) ratings. Therefore, it seems that the commercial success is more related to expert reviews than to user ones and that only devices gaining a five stars rating are effectively capable of turning such rating into higher market share. Obviously, the result can also be associated to the higher prices of Samsung and Apple smartphones if compared to those of Huawei and Xiaomi: indeed, higher prices turn into higher revenues (and therefore higher market share) even when selling volumes are lower.

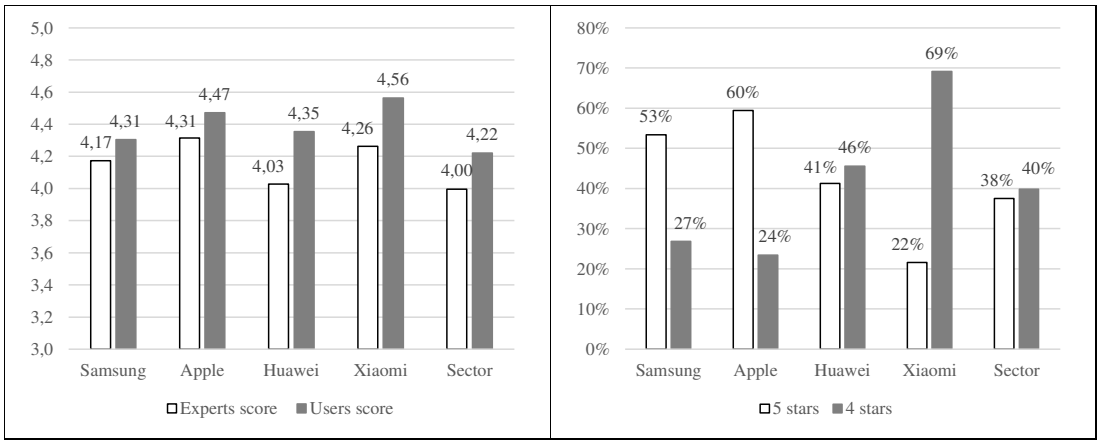

Figure 2: experts vs. users scores and five and four stars ratings

Figure 3 shows the average positioning of the four brands as to the technical features reported by alaTest: the percentage of positive feedbacks is reported, also comparing them with the average assessment of the sector (black dot). The percentages are calculated on the total number of reviews received, including not only positive and negative ratings, but also neutral ones.

Samsung is the best performer as to screen and portability if compared to both the other three companies and the sector as a whole; high values are also obtained for usability, manufacturing quality and dimension. Apple is the best performer as to usability and a good rating is also achieved for the dimension of the devices, whereas for all the other features quite poor rating are achieved. Huawei is the best performer as to dimensions and a good judgement is obtained also for battery life. Finally, Xiaomi gets the highest ratings as to performance, screen, price, battery life, manufacturing quality and reliability.

Results seem quite controversial: indeed, while Samsung and Xiaomi have a significant number of attributes for which positive ratings are obtained, Apple and Huawei are almost always under the sector average. This begs a question about the effectiveness in assessing the customer value of a smartphone through its technical features.

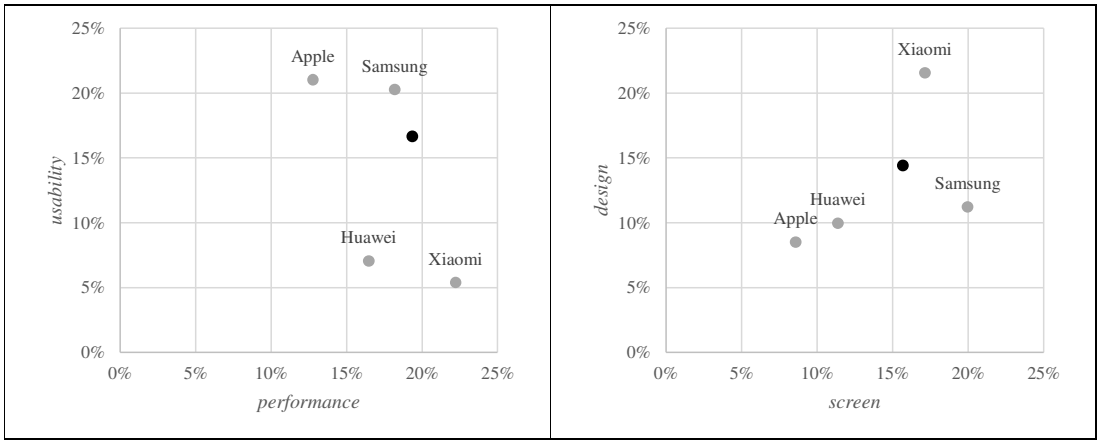

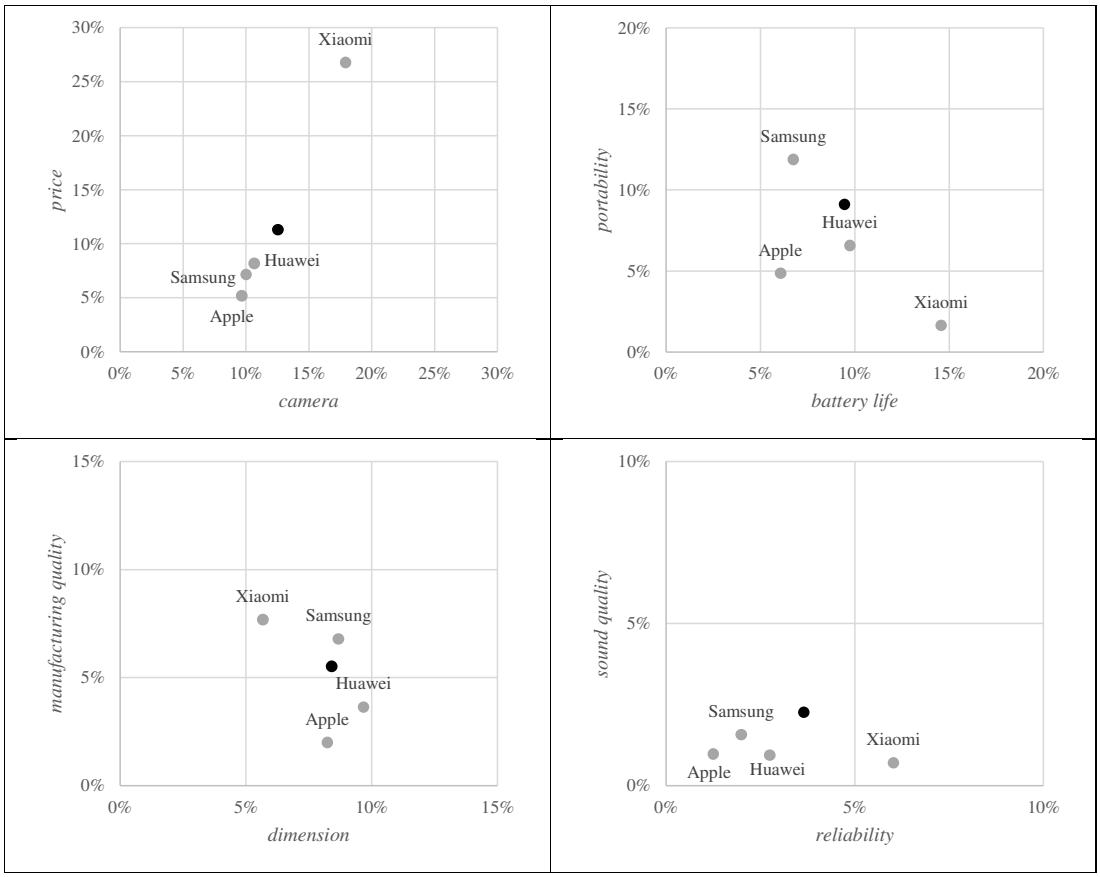

Figure 3: positioning maps as to the different technical features

Nevertheless, some conclusions can be drawn when analyzing the four companies together.
A synthesis of the results is provided in Table 2 where a plus is reported when the company performs better than the average values of the sector, a minus otherwise. In the upper rows of the table, where the overall scores are reported, the four companies seem to perform better than the other firms in the sector, consistently with their market supremacy: both experts and users scores are higher and at least one between five and four stars ratings is awarded. Yet, when we come to the technical features, surprisingly a general lower performance is recorded for the four leaders if compared to the sector average with the only exception of Xiaomi and, to some extent, of Samsung. For example, usability is the only feature for which both Samsung and Apple (overall more than 50% of the market share) perform better than the other companies in the sector: therefore, this can be considered as one of the most valued attributes when acquiring a new device. Other important features are the dimension - for which both Samsung and Huawei have higher values than the sector average - the screen and the manufacturing quality, with high scores for Samsung and Xiaomi, and the battery life, for which high ratings are obtained by Huawei and Xiaomi. Such results set the possible priorities on which companies should invest to strengthen their market position.

Table 2: sample description

		Samsung	***Apple***	***Huawei***	***Xiaomi***
scores	alaScore	+	+	-	+
	Experts score	+	+	+	+
	Users score	+	+	+	+
	5 stars rating	+	+	+	-
	4 stars rating	-	-	+	+
technical features	Performance	-	-	-	+
	Usability	+	+	-	-
	Screen	+	-	-	+
	Design	-	-	-	+
	Camera	-	-	-	+
	Price	-	-	-	+

	Battery life	-	-	+	+
	Portability	+	-	-	-
	Dimension	+	-	+	-
	Manufacturing quality	+	-	-	+
	Reliability	-	-	-	+
	Sound quality	-	-	-	-

Conclusions

This research is at a very early stage of development and this work is only a first attempt to define relationships between market performances, user reviews and technical features. Much effort should be done in at least four directions.

First, perhaps the time horizon (from 2007 to 2020) is too wide, and the analysis should be confined to shorter time periods by comparing scores and reviews of different periods with the market performances of the same period. Even if the alaScore is quite a stable indicator, which takes into account the *âge des tests*, a more confined analysis could provide better indications. Moreover, in doing so, a longitudinal analysis could be performed, pointing out how the relationships between technical features and market performances have changed over time.

Second, the market share as a measure of market success can be flanked by other indicators, such as the sales volume, which are not affected by price. Indeed, the use of market share overestimates the success of expensive devices and underestimates results of cheap ones. If it is true that a high price is justified when high value is attributed to the product, using sales volumes can provide new insights as to the features which are highly valued by a mass market.
Third, by considering the percentage values of positive reviews on the total number of reviews, including the neutral ones, the technical assessment may be underestimated: therefore, the authors are considering the exclusion of neutral reviews.

Lastly, the analysis should be widened to other players in the industry, as to compare results obtained by best and worst market performers and more robust statistical analyses should be performed to obtain more generalizable results.

All these directions will guide our future research.

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Organizational Support of the Management Control Process in Enterprises with State Participation

Irina V. MINAKOVA
Southwest State University, Kursk, Russia, irene19752000@mail.ru

Tatyana N. BUKREEVA
Southwest State University, Kursk, Russia, tnbinchina@yandex.ru

Yuri V. BUKHVOSTOV
Orel State Agrarian University named after N.V. Parakhin, Orel, Russia, jurasic83@yandex.ru

Elena V. ALEKSANDROVA,
Orel State Agrarian University named after N.V. Parakhin, Orel, Russia, 30Elena78@mail.ru

Irina G. KUZMICHEVA
Southwest State University, Kursk, Russia, tdime-swsu@mail.ru

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Abstract

The study has concluded the importance of complex tools to ensure a management control process at enterprises with state participation. The tools have been divided into two groups, basic tools and operational tools. In particular, the basic tools create the necessary management, financial and legal basis for enterprise's activities. The operational tools provide effective implementation of the goals and objectives designated by the management at the division level, as well as during direct business operations. As a result, it was created a multi-level system of the main tools for organizational support of management control at enterprises with state participation. The system allows getting a comprehensive idea of the functional purpose of various tools, adjusting the organizational processes. It also increases the responsibility of the executive management for the development and effective implementation of advanced management control system.

Keywords: Management Control, Basic Tools of Management Control, Operational Tools of Management Control, Enterprises with State Participation.

Introduction

Today, there is a rise of uncertainty and dynamism of the external environment, confusion of economic ties and mechanisms, and increase in competition for resources at all levels of management. These circumstances determine the relevance of the development and widespread implementation of successful management models.

Obviously, control in its various forms plays an important role in all links and management processes. A control function coordinates the work of individual subsystems of the control system, and identifies the reserves of the most rational use of resources.

Specific academic research interest is a problem of management control improvement in large companies with a high level of division of labor and management processes. Coordination and ensuring effective work of specialized elements within management structure in a large enterprise requires increase in control and changes in approaches to its organization. The described processes are typical for modern enterprises with state participation.

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The development and implementation of the effective control system in enterprises with state participation is an imperative requirement to ensure the adoption of managerial decisions on realizing their internal potential and creating a development strategy. It requires such enterprises to use an advanced (from the perspective of modern economic conditions) system of appropriate approaches, tools, techniques and various models.

Research material and methods

The study is based on the theoretical works on management control of the following foreign scholars: R.N. Anthony (1993, 1998), L.H. Gulick and L.F. Urwick (1937), J.D. Mooney (1931), U. Schäffer (2013).

The purpose of the research is to develop the organizational and methodological basics of management control system in enterprises with state participation, taking into account their special aspects.

The research results were obtained using general scientific and special methods: analysis, synthesis, induction and deduction, modeling, logical, complex and systemic approaches to the assessment of economic phenomena and processes.

Research Results

Management control system in enterprise can be characterized as a communication network of management accounting. Herewith, subjects of the system are vested with certain powers, or these subjects are responsible for monitoring the state of controlled object. In particular, the actual data are compared with the required figures; the deviations and the degree of their possible influence on the results of achieving the goals of organization development are assessed. Since control is needed at all levels of organization management, it ensures the effectiveness of management process at all stages (Bogataya, 2005), (Garrison, Noreen and Brewer, 2018).

It is a system that consists of input, output and a set of interrelated elements. The input is information support of control. The output is information about the object of management, obtained as a result of control procedures. The interrelated elements include technology, procedures, regulations, control environment, accounting system, and key areas of responsibility.

The characteristics of human resources, regulations, procedures, and corporate culture influence the effectiveness of management control (Minakova and Nosachevsky, 2019).

The costs of creating and ensuring the smooth functioning of management control system, together with the opportunity costs from an economic point of view, should not exceed the expected losses from the absence of such a system.

Among the main objectives of a management control system are resource conservation and resource efficiency, use of organizational potential of an enterprise, well-timed adaptation of an enterprise to changes in the internal and external environment, as well as ensuring the effective functioning of an enterprise in general (Bovykin, 2008).

The introduction of an effective management control system requires a solution of certain tasks. These tasks are related to observance of the following core principles: an enterprise's orientation to accomplish a strategic plan; ensuring the safety, effective use of resources and potential of an enterprise; ensuring the financial and economic stability of an enterprise in the face of constant changes of the internal and external environment; maintaining a relatively high quality of primary information for decision-making; compliance with organizational rules procedures, and legal requirements.

Enterprises with state participation have a particular economic importance; play a strategic role in certain industries and services. Thus, according to the Federal Antimonopoly Service (2018), the contribution of state and state-owned companies to Russia's gross domestic product in recent years has been about 70%. Enterprises with state participation have become a subject of this study. A significant part of the empirical research was carried out on the materials of the Russian Post JSC.

In Russia, the Russian Post is a natural monopoly in the public postal service industry, which includes 90 branches and separate subdivisions. The company employs over 20 thousand people. The study found that the management

control system of Russian Post enterprise is multi-level and involves a continuous exchange of information between the levels of enterprise management.

The procedure for interaction between structural units is enshrined in the regulations of the enterprise, including provisions on structural units and job descriptions of employees.

The insufficient amount of financial resources allocated for the development of the technical base, human resources, and integrated logistics infrastructure of Russian Post has led to the use of an ineffective technological mechanism for the functioning of the postal services system. The authors have found that the efficiency of Russian Post is lower than that of many commercial enterprises of public postal communications, transportation, and courier delivery services (Table 1).

Table 1: Analysis of the effectiveness of Russian Post and other relatively large companies operating in public postal services in 2018

Indicator	**Russian Post**	Other public postal services (307 companies)	DHL International	Pony Express	SPSR Express
1. Financial stability					
1.1. Autonomy ratio (financial independence), the share of the organization's assets, provided with its own funds	**0,08**	0,3	0,4	0,1	0,7
1.2. Investment coverage ratio, the ratio of equity and long-term liabilities to the total amount of capital	**0,2**	0,3	0,4	0,7	0,7
2. Financial responsibility					
2.1. Current liquidity ratio, the ratio of current assets to current liabilities of the debtor	**1,0**	1,3	1,1	1,4	2,7
2.2. Quick liquidity ratio, the ratio of liquid current assets to the debtor's current liabilities	**0,9**	1,2	1,0	1,1	2,6
3. Performance efficiency					
3.1. Sales profitability, the ratio of sales profit to revenue, %	**3,6**	5,2	17,1	3,5	5,4
3.2. Return on assets, ratio of net profit (loss) to the total assets of organization, %	**0,9**	5,2	77,6	2,0	5,2

Source: developed by the authors based on data from Rosstat, Russian Post, DHL International, Freight LINK, SPSR-Express.

In connection with the relatively low efficiency of the use of budgetary funds, there is an objective need to improve the efficiency of enterprises with state participation. Thus, we find it relevant to increase the profitability of an

organization with state participation. The success of solving this problem depends on management control system, including ensuring the effective use of budgetary and extra-budgetary funds.

A management control system in enterprises with state participation is a set of interrelated divisions and procedures for internal monitoring, processing and analysis of operating results, assessing and avoiding possible risks. These activities and measures intend to ensure the implementation of state policy in business, safety and efficiency of economic activities, reliability and verifiability of accounting records, compliance with legal requirements and regulations.

From an organizational perspective, the management control process in enterprises with state participation requires an integrated approach based on a reasonable combination of various tools.

Structurally, according to functionality, the tools for organizational support of the management control process in enterprises with state participation can be divided into basic tools and operational tools (Fig. 1).

Basic tools include managerial, financial, and judicial components. Operational tools include personnel, technological and informational components.

Management control is a key tool that allows tracking enterprise progress and reasons for deviations from established plans and strategies, promoting the differentiation of duties and responsibilities between organizational units for certain decisions, and finally it allows assessing and managing risks, leveling their consequences.

At the same time, the ability to avoid unwanted deviations protects enterprise from the adverse consequences caused by any activities.

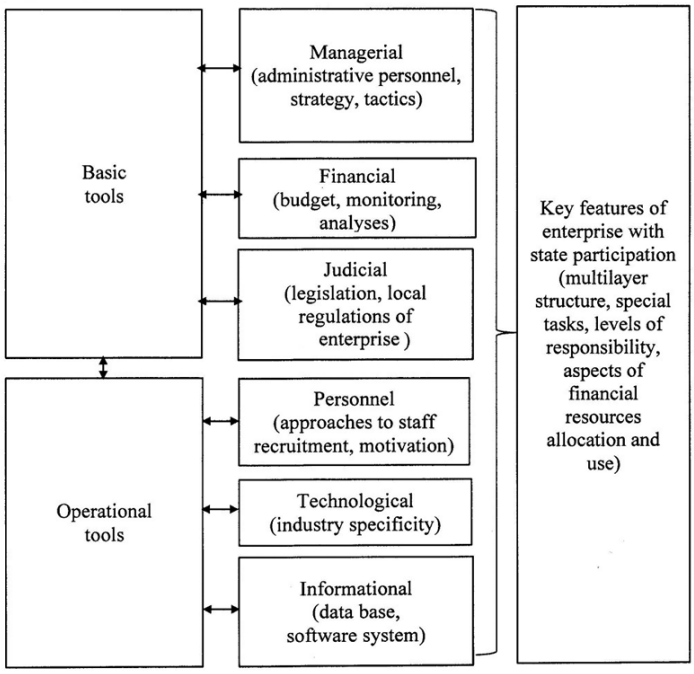

Fig. 1: A multi-level system of the main tools for organizational support of the management control in enterprises with state participation

To create an effective management control system, it is necessary to achieve controllability of each division of enterprise. It is important that the information obtained from a manager of certain level is submitted for a review to a manager of higher level.

The employee incentive system must stimulate employees to avoid negative deviations from the plans and regulate negative factors, appeared during the work of the department.

In addition to the fact that primary control should not be concentrated in the hands of one manager, it is necessary to assign each control function to a specific center of responsibility.

The absence, for various reasons, of a managerial control body should not affect the process of implementing control measures.

In this case, financial tools are characterized by the development of a set of internal accounting and reporting that meets the enterprise specificity and reflects the indicators that are most in demand for budget planning and substantiation of management decisions.

It is advisable to decentralize these indicators depending on the level of responsibility of a particular unit. This will ensure transparency and increase the reliability of management reporting, and reduce the time required to prepare reports for senior management.

It is also important to analyze competitors' reports, for example, to check open access documents. It will improve the quality of organization development plan, including financial planning.

In regards to judicial tools, it is important to note that the organizational structure provides legal expertise for the implementation of the current legislation, by-laws, and regulations of an enterprise. The organizational structure should effectively interact with all divisions of an enterprise.

This approach will guarantee to make legislatively grounded advanced management decisions aimed at sustainable development of an enterprise, to protect the company's property, including intellectual and business reputation.

Feasibility study of a project at the inception and planning phase can prevent contradictions in terms of the regulatory framework and company objectives.

In general, the basic tools for organizational support of the management control process in enterprises with state participation create the necessary management, financial and legal basis for activities, including:

- company strategy development and tactics (mission, goals, objectives, perspectives for development, and reasonable justification);
- creating new business lines by taking into account the profit maximization or obtaining social, environmental, and other non-commercial effect;
- optimal allocation of available resources, including financial;
- monitoring the resource efficiency;
- following the current legislation and proposing local rules for company development, etc.

To ensure management control, the personnel component, including the personnel resource of an enterprise, the qualifications of employees, their ability to work effectively in the current enterprise management system, increasing labor productivity has a significant importance.

In this regard, key employees responsible for management control processes and involved in a decision-making on the issue of improvement of a management control system should participate in staff retraining and professional development programs.

The technological basis of management control is a set of measures aimed at increasing the competitiveness of an enterprise using management technologies, information processing methods, introduction of advanced models for the implementation of control measures, taking into account industry aspects.

These tools allow quickly and effectively coordinate business processes in organization and its divisions, to aggregate and analyze accounting, management, operational and financial reporting with data, indicators and dynamics information, to form reasonable plans for the development of divisions and the organization as a whole.

In addition, another important aspect is to ensure information security and effective enterprise data transfer between employees (including transition to electronic document management system, restricting employee access to software in order to minimize cyber security risks), as well as between an enterprise and external environment.

Thus, the operational tools for a management control process in enterprises with state participation provide effective implementation of the goals and objectives designated by the management at the division level, as well as during direct business operations.

Of course, the executive management of an enterprise is subordinate to the board of directors and shareholders. The executive staff possesses the listed basic and operational tools and has the ability to adjust the functioning of organizational processes and, as a result, bears a significant share of responsibility for the development and implementation of the effective management control system in an enterprise.

Executive performance is evaluated by the superior body, focusing on internal data reporting and external data sources, at the same time paying attention to the quality of enterprise planning of business activities based on the results of financial, management, accounting reporting, avoiding failure, conflict situations, abuse of authority, as well as concentrating on achieving goals for a specific period of time.

Taking into account the complex structure of enterprises with state participation, certain divisions and services within an enterprise or interconnected vertically and horizontally integrated units are used as organizational forms of the management control system. There is also a mixed organizational form: every division appoints an employee responsible for collecting and providing relevant information.

Introduction of certain organizational form of management control system depends on the characteristics of organizational structure of an enterprise, focusing on the comparison of its advantages and disadvantages.

It is advisable to engage external specialists to perform audit procedures. They evaluate the efficiency of a management control system, as well as to substantiate recommendations for improving this system, taking into account resource constraints and the economic feasibility of the costs required.

The external auditors' attention should be focused on priority topics and in-depth analyses of issues, a list of divisions and levels of departments subject to control.

Conclusion

The study pays attention to the importance of a reasonable combination of various tools to ensure the process of management control in enterprises with state participation. Based on functional purposes, we have divided these tools into two groups (basic tools and operational tools), and specified their characteristics. In particular, the basic tools create the necessary management, financial and legal basis for enterprise's activities. The operational tools provide effective implementation of the goals and objectives designated by the management at the division level, as well as during direct business operations.

As a result, it was created a multi-level system of the main tools for organizational support of management control in enterprises with state participation. The system allows getting a comprehensive idea of the functional purpose of various tools, adjusting the organizational processes. It also increases the responsibility of the executive management for the development and effective implementation of advanced management control system.

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Economic Attractiveness of Tourism And Hospitality Sphere in Modern Crisis Conditions

Tetiana CHERNYCHKO
Doctor of Science (Economics), professor, Department of Economics and Finance,
Mukachevo State University, Ukraine
chernychkotanya@gmail.com

Olha MILASHOVSKA
Doctor of Science (Economics), professor, Department of Head of Hospitality Chair,
Mukachevo State University, Ukraine
Email: milashovska.olga@ gmail.com

Oksana FEYER
PhD, Associate Professor, Department of Management and Economic Processes Planning,
Mukachevo State University, Ukraine
Email: oksanafeyer@gmail.com

Tetiana SHYTIKOVA
Postgraduate student,
Mukachevo State University, Ukraine
Email: shedko.tatyana@gmail.com
ORCID ID: 0000-0002-5021-9807

Nadiia HOBLYK-MARKOVYCH
PhD, Associate Professor, Department of Head of Hospitality Chair,
Mukachevo State University, Ukraine
Email: gm_nadina@i.ua

Maryna RUBISH
PhD, Department of Head of Hospitality Chair,
Mukachevo State University, Ukraine
Email: marinarubish@ gmail.com

Abstract

The COVID-19 pandemic has posed uncertain challenges for the hospitality sphere and academia, the recognition and solution of which will build a new model for the development of the hospitality industry. The purpose of the article is to substantiate the parameters for assessing the economic attractiveness of tourism and the hospitality sector in crisis conditions (in the context of the COVID-19 pandemic). The research methodology is formed on the basis of system analysis, synthesis and generalization of scientific literature. The theoretical basis of the study was the latest articles and publications of scientists who studied the problem of the development of the hospitality sector in a crisis environment (in the context of the COVID-19 pandemic). It has been determined in the article that the sphere of hospitality encompasses a set of services related to accommodation, meals, transportation, organization of leisure for consumers of services, aimed at meeting their needs as much as possible. It has been substantiated that the economic attractiveness of the hospitality sector is the ability of entrepreneurial structures whose activities are aimed at meeting the demand of customers – consumers of hotel, tourist, excursion, restaurant and other forms and types of business, to ensure a high level of performance and efficiency. It has been concluded that in the context of worsening epidemic situation and rise in COVID-19 cases, tourism and hospitality enterprises should significantly revise the existing policy of economic attractiveness and change approaches to organizing work with consumers of

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services.

Keywords. COVID-19, sphere of hospitality, global tourism, economic impact, economic attractiveness.

JEL Classification. Z32.

Introduction

In recent years, more and more scholars are inclined to believe that important vector for improving the state of the European and world economy is the development of tourism and hospitality sphere. This component is especially relevant for regions with insufficient level of the production sector development, but with significant natural resource and historical potential.

Hospitality sphere is one of the key areas of the European economy development both in terms of employment and direct contribution to the economy (about 5% of GDP). Between 2013 and 2016, 1.6 million new jobs were created in the hospitality sector, increasing the number of employees from 10.3 million to 11.9 million, while the number of enterprises increased from 1.82 to almost 2. millions. Along with tourism, the hospitality sector is the third largest area of social and economic activity in the EU (White Paper for Hospitality in Europe, 2019). About 95% of the accommodation and catering sector in the European Union is classified as a small business with up to nine employees. Only 17% of employees work in large companies identified as having more than 250 employees (Mike Peters & Joerg Frehse, 2005).

The period 2019-2020 became extremely difficult for the development of the hospitality sphere. The problem of COVID-19, travel restrictions and the low level of consumer confidence in hospitality have a negative impact not only on the development of the industry itself, but also on the development of the European economy as a whole.

The COVID-19 pandemic has forced scientists to question the effectiveness of the Western economic model of hypercompetition and steady growth. The pandemic is an ideal period for the transition from Western economy to a convergence economy that focuses on the ability of enterprises to survive, adapt, evolve, and grow in the face of rapid change (Mike Peters & Joerg Frehse, 2005; Ambika Gandhi & Laurette Dubé, 2020).

COVID-19 continues to be reported around the world. In addition, many countries have reintroduced travel restrictions following the resumption of COVID-19 outbreaks, especially in Europe. Some countries have returned to partial restrictions and curfews, and in many countries borders remain closed. As a result, the number of consumers of hospitality services decreased by 700 million people in January-August 2020 compared to the same period in 2019, resulting in a loss of $ 730 billion for businesses, which is 8 times more than in 2009, during the global economic crisis (UNWTO, 2020).

The COVID-19 pandemic posed uncertain challenges to the hospitality industry and academia, the awareness and solution of which will allow building a new model for the development of the hospitality industry. One of the important areas of research should be to determine the parameters of economic attractiveness of enterprises in the hospitality industry in the crisis and the development of guidelines for its evaluation.

Literature Review

A significant amount of foreign research on the development of the hospitality industry in 2019-2020 proves that the COVID-19 crisis continues to have a negative impact on the activities of hospitality enterprises (Gössling, S., Scott, D., & Hall, CM, 2020; Dogan Gursoy & Christina G. Chi, 2020; Vik Krishnan, Ryan Mann, Nathan Seitzman & Nina Wittkamp, 2020). The spread of the pandemic poses a significant threat to the hospitality sector (Yang et al., 2020), given its dependence on human mobility (Domínguez-Mujica et al., 2011; Lamsfus et al., 2015).

Aims

The purpose of the article is to substantiate the directions of improving the economic attractiveness of tourism and hospitality in crisis conditions (in the context of the COVID-19 pandemic).

Methods

The research methodology is formed on the basis of systematic analysis, synthesis and generalization of scientific literature. The study analyzes the development of tourism and hospitality as important components of the national economy. The theoretical basis of the study were the latest articles and publications of scientists who have studied the development of hospitality in a crisis (in the pandemic COVID-19).

Results

Semantics of the concepts «hospitality sphere» and «economic attractiveness of hospitality sphere»

The concept of "hospitality sphere" has not so long been used in scientific and practical activities; until recently, the concept of "hospitality industry" was more common. In a broad sense, the content of the concept of "hospitality sphere" is associated with hotel activities, as well as with the manifestation of professional and personal attention to consumers of this service. Therefore, often, the characteristics of the concept are based on the level of customer service in terms of providing them with hotel, restaurant and additional services. It is the presence of the last component (additional services) that complicates the process of determining the content of this concept, since it covers a large number of components aimed at maximum satisfaction of the needs of tourists.

The multi-vector nature and lack of established approaches to the content of the concept of «hospitality sphere» complicates the research process at the theoretical level, as well as makes it impossible to form a system of applied measures. The issue of a clear scientific substantiation of the essence of this economic concept and the development of recommendations for the introduction of quantitative and qualitative parameters for assessing its economic attractiveness is becoming increasingly important.

The existence of the problem is evidenced by the diversity of approaches of scientists to the interpretation of the concept of «hospitality sphere». The vast majority of them, among the set of additional services allocates catering, accommodation, transportation, recreation (Skobkin, SS, 2000). Some provide services for cognitive, entertainment, business, health and sports purposes (Baranova, A. Yu., 2009).

The sphere of hospitality covers a large number of components aimed at maximum satisfaction of consumer needs:

- accommodation establishments (hotels, motels, campsites, botels, tourist bases, boarding houses, rotels, flotels, bungalows and others);
- commercial tourist enterprises (tour operators, travel agencies, tourist bureaus, excursion bureaus, other enterprises in the sphere of tourism);
- specialized transport companies;
- catering establishments (restaurants, cafes, bars, canteens, snack bars);
- institutions of culture and art;
- enterprises whose activities are aimed at providing individual and mass entertainment services;
- other enterprises whose activities are aimed at meeting the needs of service consumers.

Thus, the scope of the concept «hospitality sphere» covers *a set of services related to accommodation, food, transportation, organization of leisure for consumers of services, aimed at maximum satisfaction of their needs.*

The meaning of the concept "hospitality sphere" is a set of features combined in this concept, which allows determining how a particular object (phenomenon) differs from other objects (phenomena). The meaning of the concept «hospitality sphere» is formed as a combination of "sphere" (sphere, limits of something) and «hospitality» – the art of receiving customers – consumers of hotel, tourism, sightseeing, restaurant and other forms and types of business.

Characteristics of the «art of receiving customers» are proposed in the definition of «hospitality» given in the explanatory dictionary of N. Webster: «Hospitality is service based on the principles of hospitality, characterized by generosity and friendliness towards guests» (Webster, M., 2012) . From the point of view of the sphere of hospitality, the author proposed the following definition: «… sphere of entrepreneurship, consisting of such services that are based on the principles of hospitality and are characterized by generosity and friendliness towards guests» (Webster, M., 2012).

Similar to the previous one is the vision of Robert Brymer, who notes that hospitality is the secret of any caring

service. The care shown to the guest, the ability to feel the needs of the client is elusive, but such obvious features in the behavior of the employee. Hospitality is friendliness in receiving and entertaining guests, free reception and treats for travelers (Brymer, Robert A., 1995). According to the author, the sphere of hospitality «…is a collective concept for many and diverse forms of entrepreneurship that specialize in the market of services related to the reception and service of guests» (Brymer, Robert A., 1995).

Thus, the vast majority of scholars are inclined to believe that the main one of the most important aspects of the definition of «hospitality» is customer satisfaction and it needs to be constantly improved and enhanced.

According to J. Walker, the hospitality industry combines tourism, hotel and restaurant business, catering, recreation and entertainment, conferences and meetings (Walker, John R., Walker, Josielyn T., 2013).

The economic attractiveness of the hospitality industry is the ability of business structures whose activities are aimed at meeting the demand of customers - consumers of hotel, tourism, sightseeing, restaurant and other forms and types of business to ensure a high level of performance and efficiency.

It is possible to identify two main groups of factors that affect the economic attractiveness of the hospitality industry. The first group allows to determine the quantitative characteristics of the development of business structures. The second group contains qualitative characteristics that are quite difficult to define and evaluate, but their impact is a very important aspect of determining attractiveness as an economic characteristic.

Indicative list of these groups of factors is proposed in Table 1. It is variable, depending on the approaches used to assess economic attractiveness.

Table 1: Factors influencing the economic attractiveness of the hospitality industry

Quantitative factors	Qualitative factors
Number of hospitality enterprises and dynamics of their growth (decline)	The reaction of service consumers to the economic processes taking place
The magnitude of demand for services of business structures in the hospitality industry	Organizational-economic, technical-economic, social-economic and innovation-investment processes (their vector) in business structures of the hospitality sphere
Cost of services	The state of the competitive environment
The ratio of the cost of services and the average salary	Business environment
The average salary of a hospitality worker	Feedback from consumers and competitors
Sales of services	Ethics of corporate governance
Profitability of activity	Influence on the development of related industries or individual territories

Economic attractiveness of tourism and hospitality sphere in the context of the COVID-19 pandemic

In the face of the deteriorating epidemic situation and increase in the incidence of COVID-19, tourism and hospitality enterprises need to significantly revise their existing policies of economic attractiveness and change their approaches to organizing work with consumers of services.

The vast majority of experts and advisory organizations such as McKinsey and Company (Gössling, S., Scott, D., & Hall, CM, 2020) emphasize that it is the hospitality sector that is at maximum risk and the consequences of anti-epidemic measures for industries will be extremely difficult. It is in the hospitality sector that the maximum decrease in the number of jobs is predicted (20% of all vulnerable positions). In the restaurant industry, McKinsey and Company predicts a 13.4 million job loss, while food preparation and serving (including fast food) can affect 3.6 million workers.

Considering the projected options for the development of national economies in a pandemic, McKinsey and Company proposed nine potential scenarios based on the extent to which the spread of the pandemic is controlled and the effectiveness of economic policies to counter the effects of quarantine (Figure 1). A survey conducted by the company in the summer of 2020 among 2,000 global business leaders showed that scenarios A_3 (19% of respondents) and A_1 (33% of respondents) are considered the most likely.

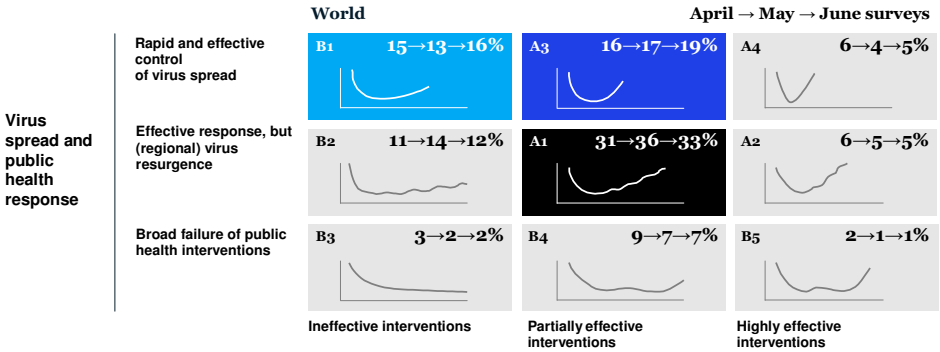

Fig. 1: Scenarios for the development of the national economy in the pandemic COVID-19 (McKinsey and Company, 2020)

Each scenario has different implications for the country's economy. Scenario A_3 predicts GDP recovery as early as 2021. A more conservative scenario – A_1 – predicts a delay in GDP recovery until 2023.

Regarding tourism and hospitality, scientists (Vik Krishnan, Ryan Mann, Nathan Seitzman & Nina Wittkamp 2020), based on the analysis of the relationship between the economic development of the national economy and the performance of enterprises in the industry, determined that under the A_3 scenario, the economy is recovering slowly, revenue for the available hotel room is falling by 53 percent in 2020 and returns to pre-crisis levels in 2022. Under scenario A_3, it will be six months after the restrictions are lifted before the behavior of service consumers begins to be based on traditional, economic factors.

The consequences of the development of the national economy under the A_1 scenario are more complex and negative for the hospitality sector: recovery to the level of 2019 occurs only after 2023.

It should also be noted that a significant proportion of restaurant customers (64.71%) and the majority of hotel customers (70.42%) believe that the use of different technologies to provide services will be necessary in the COVID-19 environment to minimize contact of a human with human (examples: work; contactless payments such as Apply Pay or contactless bank cards; digital menus that can be viewed on personal mobile devices using QR codes; contactless digital payments; keyless entry; contactless elevators, etc.) (Dogan Gursoy & Christina G. Chi, 2020).

Conclusions

To improve the economic attractiveness of hospitality activities in the context of the COVID-19 pandemic, it is necessary to adhere to the following directions:

1. Ensuring a balance of costs and revenues: business structures involved in the hospitality industry have a significant number of fixed costs (salaries, current accounts, investment activities, etc.). An indisputable advantage of these structures is the search for adequate ways to increase revenue by reducing costs, but against the background of not reducing the quality of services provided.
2. Ensuring income growth while maintaining a positive response from consumers. Typically, owners increase the cost of services, do not satisfy customers and create an imbalance between the offer of the business owner and the demand of the client.
3. Application of modern technologies. In recent decades, the means and capabilities of the global electronic Internet have played a significant role in the development of hospitality. The results of the survey showed that if customers are satisfied with the service, they tend to come back and spend more, while dissatisfied customers will go and never return because of just one negative experience in the hotel.
4. The close connection between the development of hospitality and the development of the economy and social sphere. The development of the hospitality industry is ensured by economic, social, industrial development and technological forces.

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Reshoring as a Modern Trend in the Development of the Global Economic System

Oksana A. SAGINA

K.G. Razumovsky Moscow State University of technologies and management (the First Cossack University), Moscow, Russian Federation, toxik_01@mail.ru

Sergey V. PONOMAREV

Financial University under the Government of the Russian Federation, Kaluga branch, Kaluga, Russian Federation, https://orcid.org/0000-0001-6216-1190, pionerday@yandex.ru

Aminat M. MUSAYEVA

Dagestan state agrarian University named after M. M. Dzhambulatov, Makhachkala, Dagestan Republic, Russian Federation, Musaeva.aminat@yandex.ru

Seyidullakh G. KHANMAGOMEDOV

Dagestan state agrarian University named after M. M. Dzhambulatov, Makhachkala, Dagestan Republic, Russian Federation, Kaf.stat@mail.ru

Evgeniya K. KARPUNINA

Tambov State University named after G.R. Derzhavin, Tambov, Russian Federation, https://orcid.org/0000-0003-4042-7343, egenkak@mail.ru (corresponding author)

Abstract

The purpose of the research is to reveal the economic essence of reshoring, and analyse the impact of reshoring on the effectiveness of economic systems in the world. Methods of economic analysis were used to study the influence of reshoring on the effectiveness of economic systems. The analysis and subsequent cross-country comparison were carried out in two periods: 1999-2007 and 2010-2018. The following indicators were used in the analysis: GDP growth; the share of industry in the GDP structure; the share of services in the GDP structure; the current account balance. It is revealed that currently reshoring is not an effective tool for overcoming turbulence in the world economy. The analysis of reshoring policy showed that: 1) its local performance in terms of increasing the share of manufacturing in GDP; 2) the process of restoring does not change the growth trend of "service economy" in most countries; 3) the weakness of the current reshoring to improve the balance of payments. It is justified that an increase in the flexibility of the reshoring policy in terms of taxes, regulations, effective personnel policy, and tariff reduction will help diffuse the weaknesses of reshoring and attract direct foreign investment, as well as create conditions for making the most of reshoring in developing sound competition and countering global crises.

Keywords: Reshoring, Offshoring, Industrialisation, Deindustrialisation, Sustainability, Economic Security.

Introduction

The current realities of the economic space are such that fierce competition is being waged not only at the corporate level, but also at the state level. At the same time, governments use the entire arsenal of tools, including trade wars, sanctions, embargoes, and new programmes to encourage the return of industries to their home countries, the so-called reshoring.

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Reshoring as a new trend in the development of the world economy appeared at the end of the first decade of the 20th century in the US economy and was aimed at strengthening the industrial basis of the state. According to official data, in response to the 2008 crisis, at the very beginning of the reshoring process, the American economy gained 1.86 trillion dollars in value added from the manufacturing industry and net-creation of 25 thousand new jobs in 2016 (instead of net-loss of about 220 thousand jobs in the industry on average a year in the early 2000s) (Holden, 2012).

Later, many developed countries also joined in the process of industrial reindustrialisation, thus starting the redistribution of production forces on the scale of the global economic system.

However, increasingly, experts say that in fact, the improvement in the employment in the US economy occurred due to a rapid increase in imports of non-oil goods and the attractiveness of the US economy for imports from developing markets due to the higher cost of goods than in developing markets, and the response of companies to the upcoming increase in import tariffs for Chinese goods during the US trade war with China, rather than the effectiveness of the reshoring policy.

What is the actual economic efficiency of reshoring? Can reshoring act as an effective anti-crisis tool to increase the stability of the world's economies? What is its impact on the economic security of modern states? The answers to these questions represent the purpose of our research and require detailed.

The first part of the article includes a literature review and hypothesis development. Methods of economic analysis were used to determine the effectiveness of reshoring and its impact on the development of world economies. Methods of comparison, historical and logical method, deduction and induction, and system method were used to justify the advantages and disadvantages of reshoring as an anti-crisis tool for improving the stability of the world's economies, as well as to establish its impact on the economic security of modern states and digitalisation processes.

Literature Review and Theory Development

This research is based on the study of the specifics of offshoring as an important economic and social phenomenon that determined the transnational movement or dispersal of activities that were previously carried out in the home country (Doh et al., 2009; Kenney et al., 2009; Manning et al., 2008).

In the works of scholars offshoring is as a clear trend towards deindustrialisation of developed countries, manifested in the long-term and consistent decrease in the production of industrial goods or in employment in the manufacturing sector; the substitution of industrial production for a massive sphere of services in the GDP or employment; the excess of imports of goods and services over exports and maintaining deficit in foreign balance.

If offshore solutions are considered as a way to accelerate the innovation process and a faster and more cost-effective introducing products into the market (Lewin et al., 2009; Di Gregorio et al., 2009; Dossani and Kenney, 2007; Kedia and Mukherjee, 2009; Roza et al., 2011) then the reshoring policy of US and other developed countries should have the opposite consequences.

However, research from a later period (Ellram et al., 2013; Fratocchi et al., 2014; Tate, 2014; Holden, 2012; Stevens, 2016) explains why once profitable offshore deindustralisation tools actually reduced domestic industrial production and led to a serious weakening of the technological level of development of specific industries.

Sukharev (2013) is sure that the reasons for the general economic decline, the decrease in the technological efficiency of many industries due to the lagging implementation of automation lie in deindustrialsation. Deindustrialisation, associated with the development of international outsourcing of production through the actual withdrawal of production from countries, led to the transnationalisation of corporations in order to minimise the costs of companies, as well as localisation of "serial" production in new economies unlimited cheap labour resources, especially in the Asian region. Other effects of deindustrialization were reduction in the number of well-qualified industrial personnel in the economies of developed countries, as well as copying basic technologies in the outsourcing countries and increasing competition. The result is a shift in the trade balance of developed countries towards increasing imports, an increase in the budget deficit, as well as a stronger dependence of the economies of developed countries on the situation in world markets and the economic and political stability in developing markets.

Many researchers note that offshoring of industrial production from the US economy (which began in the mid-1960s and continued until the economic crisis of 2008) resulted in a strong weakening of many industries in the US economy and the replacement of their products by cheap imports.

So, if in 1980 the share of American industry accounted for about 20% of the country's GDP, in 2010 this figure was already 12%. This is a very low value compared to other countries which are rivals of the United States (South Korea, China, Germany). The practice of offshoring also weakened the industry of developed countries by bringing industrial

products from developing countries to their market in the 1990s and 2000s. This attack of cheap imports was better tolerated by the economies of Germany and Japan due to a more successful restructuring of their industries, including the flow of technologies and resources from low-tech industries to medium-and high-tech ones, which allowed them to constrain the influx of cheap imports unlike the US economy, which failed to carry out a protective restructuring of its industry (Van den Bossche et al., 2014).

As a result, the American industry employs 12 million people, which accounts for a mere 8.4% of total employment, whereas employment in the healthcare sector is 11.2%, and the one in the public sector is 15.4%. In addition, the policy of deindustrialisation has led to another acute problem of economic security, namely a significant stratification of American society. According to official statistics, the ratio of incomes of 10% of the wealthiest and poorest citizens in the United States has increased up to 16 times, while the Northern European countries which did not allow a sharp deindustrialization the increased fivefold (Blyahman, 2013).

Thus, the study of reshoring processes is now becoming increasingly relevant due to the need to unlock its potential in order to use it for ensuring a balanced development of the world economy.

Material and Methods

The scientific hypothesis of the research is the assumption that reshoring is not only a modern trend in the development of the global economic system, but also an effective tool for increasing the stability of the world's economies during turbulence, as well as for ensuring their economic security, and a motivating mechanism for moving to a new digital stage of development.

To justify the proposed hypothesis, the following goals were set:

- to identify objective prerequisites for the emergence of reshoring in the modern global economic system;

- to reveal the economic essence of the process of reshoring;

- to evaluate the economic result of the reshoring process through its impact on the economy of individual countries and the world economy as a whole;

- to determine the effect of reshoring manifestations in terms of economic security.

The following methods were used in the research: economic analysis, comparison, historical and logical method, deduction and induction, and system analysis.

The method of economic analysis was used to analyse the dynamics of growth of production jobs and the number of companies transferred to the United States from offshore countries in the process of reshoring. To prove the effectiveness of reshoring as the main industrial trend in developed countries, we analysed its impact on the negative consequences of long-term deindustrialisation in the United States using the method of economic analysis and comparison. The method of economic analysis was also used to assess the growth dynamics of the "service economy" and improve the balance of payments as a result of the implementation of the reshoring policy in various countries.

The historical and logical method enabled us to identify the historical prerequisites for the emergence of reshoring in the economies of developed countries as a stage of overcoming the negative consequences of deindustrialisation. The methods of deduction and induction as well as the system method were used to justify the conclusions drawn from the data analysis, as well as to prepare guidance for the development of reshoring policy.

The information base of the research involves materials and analytical data of World Economic Forum, Euler Hermes Economic Research Department, Reshoring Initiative, Bureau of Economic Analysis, World Bank, OECD.

Results and Discussion

I. The phenomenon of reshoring in its modern sense emerged in 2010 first in the United States, and then in several European countries, and consisted in the rejection of previously popular policy of transfer of production to areas of cheap labour and the concentration of important high-tech industries inside developed economies with the aim of fighting for economic and industrial sovereignty (Competitiveness Policy Council, 1992). According to economists, the reshoring programme in developed countries is a political and economic response to the crisis of 2008-2009 (Van den Bosscheet al., 2014). Analysts estimate the effectiveness of the new US industrial policy in the form of multi-factor industrial growth, which stimulates employment growth in related sectors of the American economy, reduces the dependence of developed countries on imports and solves the problem of foreign trade deficits. In the term of economic security, they see the main reason for the success of reshoring in the presence of skilled workers in the

economies of developed countries and a strict state policy to stimulate growth in their economies (Tate, 2014). For example, in the main offshore industrial zone of the world, China, in 2004, the average salary of a worker at a factory was 58 cents per hour, and in 2014, a Chinese worker received $ 3. At the same time, the decline in the US industry, which was caused by the policy of deindustrialisation, led to a decrease in the cost of working hours in the US industry by 12% from 1995 to 2014 (Euler Hermes Economic Research, 2014). In addition, the leadership of the US economy in the new industrialisation is based on the idea that the US is a global center of financial capital and a global hub of human capital (Yudina, 2015).

According to experts of the research department of Euler Hermes Economic Research, the introduction of reshoring is not only an economic trend, but also a political vector of the struggle for votes (Euler Hermes Economic Research, 2014). Thus, the reshoring programme has become fundamental for US President Donald Trump, who made the protection and competitiveness of the American economy "Make America great again" the basis of his policy and proposed the transfer of the production of American giants Apple, Caterpillar, General Electric, Ford and others to their homeland.

Competition laws and robotisation push the EU countries to actively stimulate reshoring processes as well. For example, in Germany, the "National industrial strategy-2030" was adopted, according to which the process of reshoring is implemented by returning production facilities based on their mass robotisation (the "Industry 4.0" model) and is a step to a new stage of digital development. According to the World Economic Forum, robots accounted for about 29% of all working hours in 2018, and this share will have reached 50% by 2025. Robots already perform 47% of all tasks related to information processing, and 31% of work related to physical labour. The rate of robotisation of production over the past five years (2014-2018) is an average of 20% per year in the world (International Federation of Robotics, 2019; Molchan et al., 2019; Karpunina et al., 2019; Karpunina et al., 2020).

In 2018, there were 422,000 more robots in the world three-quarters of all equipment is concentrated in five countries-China, Japan, South Korea, the United States and Germany. Robots perform tasks faster than humans and reduce labour costs, so the cost of one working hour of human work in the German automotive industry is 40 euros, in China it is about 10 euros, and the cost of a robot's working hour varies from 5 to 8 euros. At the same time, the average cost of the most industrial robot for five years to 2017 decreased by 17% (from 53 thousand dollars to 44 thousand dollars) (International Federation of Robotics, 2019).

To assess the real impact of reshoring on the economy, it is necessary to analyse its volume and the volume of attracted direct foreign investment in the US economy. Thus, the American public business organisation "Reshoring Initiative" draws the following conclusions about reshoring operations in 2010-2018: the total number of production jobs transferred to the United States from offshore countries amounted to about 757 thousand, if we count from the point of minimum employment in the manufacturing industry in 2010, and the number of companies that conduct new re-profiling and receive direct foreign investment increased by 38% compared to 2017; the largest volume of reshoring (72%) in the US economy came from Asia and it created 77,967 jobs by 856 companies.

At the same time, the main volume of reshoring and direct foreign investment came to the United States in 2010-2018 from China (28%), which created 144,299 new jobs by 1,042 companies, from Germany (15%, 76,578 jobs, 323 companies), from Japan (14%, 70,964 jobs, 317 companies), from Mexico (7%, 35,851 jobs, 135 companies) and from Korea (5%, 22,301 jobs, 82 companies) (Reshoring Initiative, 2018).

II. To prove the effectiveness of reshoring as the main industrial trend in developed countries, we will conduct a real assessment of its impact on the negative consequences of long-term deindustrialisation in the United States.

For the assessment, we will focus on two periods: the "deindustrial" period (1999-2007) and the "industrial" (reshoring) period (2010-2018). From the economic analysis of the impact of reshoring on global economic trends, we essentially exclude the period of the global crisis of 2008-2009 to get a more realistic picture and diffuse out the impact of the crisis on the world economy (Figure 1).

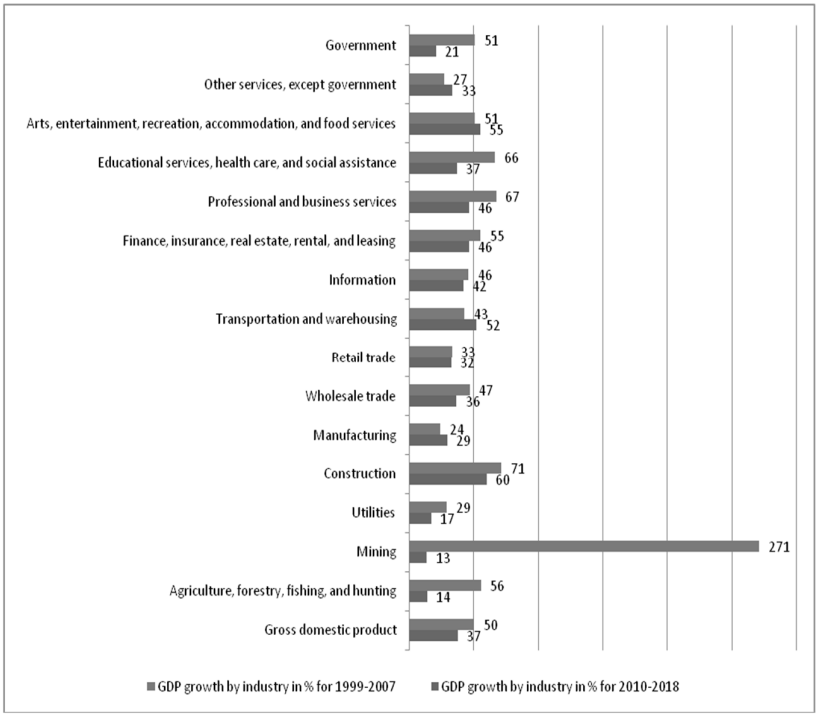

Fig. 1: Comparison of the US economy's GDP growth during the deindustrial period (1999-2007) and during the reshoring period (2010-2018), in %

(Source: own elaboration based on Bureau of Economic Analysis, 2019).

This data enable us to conclude that the negative trend of deindustrialisation to reduce the share of production in the structure of American GDP has not yet been overcome, but at the same time, the growth of GDP in industry in the period under consideration is 29%, which is higher than the growth of GDP in production in the deindustrial period (24%). At the same time, the share of production in the GDP structure continues to decline and was 18% at the end of 2018 (compared to 21.5% the share of industry in 2007). It should be noted that the reshoring period of 2010-2018 was also characterised by a decrease in the dynamics of GDP growth. Thus, the total GDP grew by 50% in 1999-2007, and by only 37% in the period from 2010 to 2018. Moreover, this comparable decline over the period from 2010 to 2018 occurred in all the basic sectors of the American economy, while growth was provided only in the manufacturing and transport sectors of the American economy. We can also note the stabilisation in the American mining industry, where aggressive growth in the period from 1999 to 2007 by 2.7 times was replaced by a mere 13% growth in GDP from 2010 to 2018. The negative trend of GDP growth in the US agricultural sector in the deindustrial period (56%) to 14% in the rating period, as well as in construction - from 71% to 60% in 2018, is also alarming. But we can note a positive trend of growth in the US transport industry from 43% to 52% of the total growth for the period from 2010 to 2018.

Since the majority of countries, both developed and developing, are involved in the American industry reshoring processes, let's consider at what happens to the change in the share of industry in the GDP structure of most countries (Figure2).

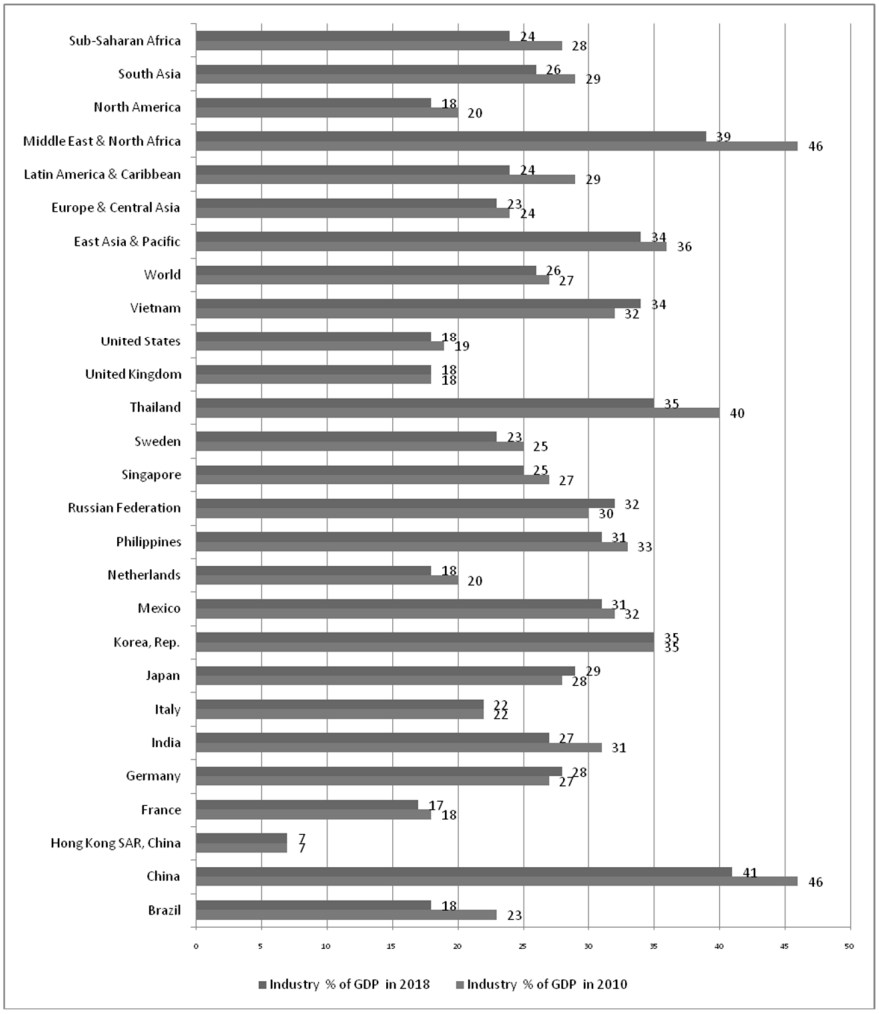

Fig. 2: The share of industry in the GDP structure in 2010 and 2018, %
(Source: own elaboration based on World Bank and OECD, 2019)

During the 2010-2018 reshoring period, the share of industry in global GDP decreased from 27% to 26%, and this pattern is observed in all regions. In Europe and Central Asia, the share of industry declined from 24% to 23%, in Latin America from 29% to 24%, in South Asia from 29% to 26%, and in the Middle East and North Africa from 46% to 39%.

At the country level, Thailand, China, and Brazil had the largest declines of 5%, and India had the largest declines of 4%. Industries in Sweden, Singapore, and the Philippines each lost 2% of their GDP. Mexico reduced the industry by 1%, a similar decline in the US industry. Despite the fact that Japan and Korea are the leaders in the number of firms transferred to the US, their industry grew as a share of GDP by 1% in the case of Japan, and Korea managed to keep its share despite the reshoring, as did Italy, Hong Kong and the UK. The share of industry in Vietnam and Russia has increased. Reindustrialisation programme, despite significant direct foreign investment and reshoring in the US economy, has enable German industry to increase its share in the GDP structure. The flow of most Western European industries to the United States also allows the German economy to actually absorb the EU economy (Figure 3).

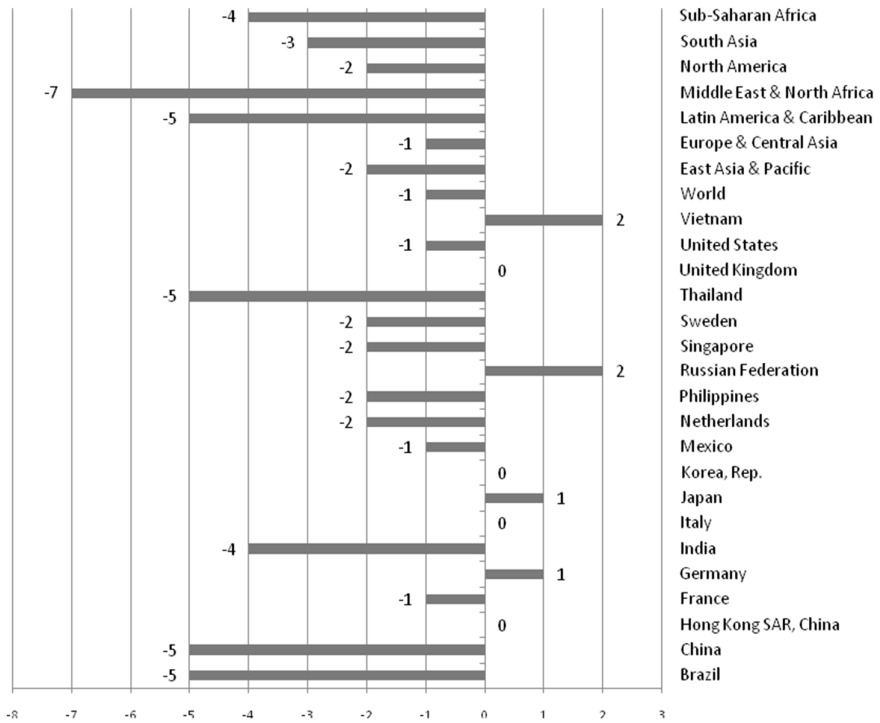

Fig. 3: Change in the share of industry in the GDP structure in 2018 to 2010, % (Source: own elaboration based on World Bank and OECD, 2019)

The same picture is shown by the following graph of changes in the share of production in the GDP structure during the reshoring and deindustrial periods, since the average global share of production has not changed (Figure 4).

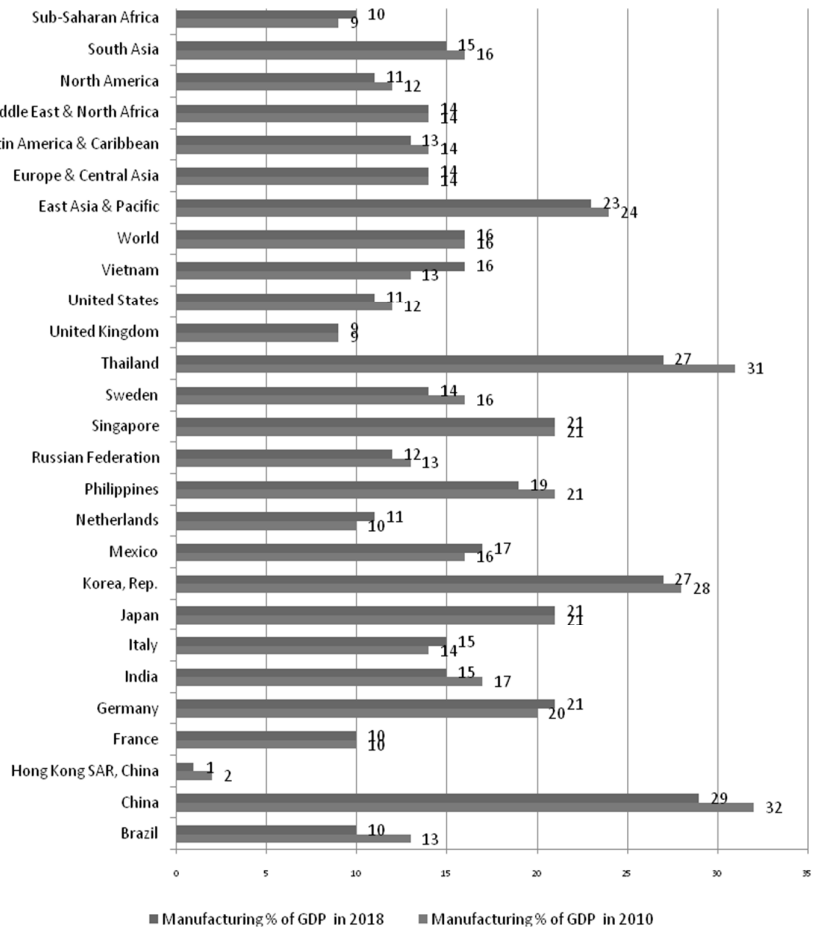

Fig. 4: The share of manufacturing in the GDP structure in 2010 and 2018, %
(Source: own elaboration based on World Bank and OECD, 2019).

Despite the development of reshoring and the growth of direct investment, the share of production in the United States fell to 11%. A decrease in production in Thailand (minus 4%), Brazil and China (3% each), India, the Philippines and tech-rich Sweden (minus 2%), as well as a 1% decrease in Hong Kong, Korea, and Russia. France, Great Britain, Japan and Singapore retained their share of production. The reindustrialisation programme allowed to increase the share of production in the structure of German GDP by 1%, and also, despite reshoring, to increase the share of production by 1% in Italy, Mexico and the Netherlands, while the largest increase in production was achieved in the economy of Vietnam.

A successful industrial reshoring programme should be based not only on the process of transferring industry from various countries to developed ones, but also on the transfer and re-profiling of the "service" part of the world economy to the industrial one.

Our analysis below allows us to conclude that the process of reshoring and the growth of direct foreign investment not only can not change the negative decline in the share of industry and production in the GDP structure, but also does not change the growth trend of the "service economy" of most countries. This conclusion can be made based on the data in the Table 1, which shows the growth of the "service" part of global GDP in China, Thailand, India, the Philippines, Hong Kong, Korea, Brazil, and the United States.

Table 1: Change in the share of services in the GDP structure in 2018 to 2010, %

Country	Services, value added (% of GDP) % of GDP		Change in the share of services in the GDP structure in 2018 to 2010, %
	2010	2018	2018/2010,%
Brazil	57,6	62,6	8,7
China	44,2	52,2	18,1
Hong Kong SAR, China	90,9	88,6	-2,5
France	70,7	70,3	-0,6
Germany	62,2	61,5	-1,1
India	45,0	49,0	8,9
Italy	66,3	66,1	-0,3
Japan	70,2	69,1	-1,6
Korea, Rep.	53,6	53,6	0,0
Mexico	60,4	60,2	-0,3
Netherlands	68,4	69,9	2,2
Philippines	55,1	60,0	8,9
Russian Federation	53,1	54,1	1,9
Singapore	67,8	69,4	2,4
Sweden	61,1	64,8	6,1
Thailand	49,5	56,9	14,9
United Kingdom	71,5	70,5	-1,4
United States	76,2	77,4	1,6
Vietnam	36,9	41,2	11,7
World	63,2	65,0	2,8
East Asia & Pacific	57,0	59,8	4,9
Europe & Central Asia	64,1	64,3	0,3
Latin America & Caribbean	55,8	60,3	8,1
Middle East & North Africa	47,4	54,0	13,9
North America	75,2	77,4	2,9
South Asia	46,6	49,9	7,1
Sub-Saharan Africa	50,7	52,4	3,4

Source: own elaboration based on World Bank, 2019.

It is likely that this growth in "service" GDP also reduces the share of industry in countries such as the United States, China, the Philippines, Thailand, India, and Brazil. A decrease in the "service" part of GDP in a number of countries, such as Hong Kong, Germany, Italy, Japan, Korea, and the United Kingdom allowed not only to resist the American reshoring, but also to increase the share of industry in the GDP structure or leave it at the level of 2010. This allows us to draw a conclusion about the current weakness of the American reshoring programme.

At the end of assessing the impact of reshoring on the economic systems of various countries, we suggest reading the following analysis of its impact on the foreign trade balance of payments (Table 2).

Table 2: Change in the current balance of payments, 2018 to 2010, millions of US $

Country	Current account balance, millions of US $		Change in the current balance of payments, 2018 to 2010, millions of US $
	2010	2018	2018/2010
China	237,810	49,092	-188,718
Hong Kong SAR, China	16,012	15,556	-0,456
France	-22,034	-19,014	3,020
Germany	196,220	291,199	94,979
India	-54,516	-65,599	-11,083
Italy	-72,994	50,556	123,550
Japan	220,888	174,719	-46,169
Korea, Rep.	27,951	76,409	48,458
Mexico	-5,269	-21,643	-16,374
Netherlands	61,820	99,063	37,243
Philippines	7,179	-7,879	-15,058
Russian Federation	67,452	113,455	46,003
Singapore	54,996	65,072	10,076
Sweden	29,196	9,458	-19,738
Thailand	11,486	35,159	23,673
United Kingdom	-83,113	-108,752	-25,639
United States	-431,271	-490,991	-59,720
Vietnam	-4,276	5,899	10,175

Source:own elaboration based on World Bank, 2019.

This analysis enables us to draw a conclusion about the weakness of the current reshoring to improve the balance of payments. Thus, the US economy, despite the optimistic assurances of politicians, continues to worsen its payment discipline. The deficit current balance of payments has grown to490 billion US $. At the same time, Vietnam, Korea and Germany are increasing their balance of payments surpluses, which allows them to effectively counter negative trends in reshoring and capital outflows. Our analysis confirms the problem of China's actual loss of its own market due to increased competition with major global market players. This problem is not only in reshoring, but also in the growing costs of companies that operate in the Chinese market, the insufficient rate of robotisation of the Chinese economy, as well as a tough trade war with the main US economy.

Conclusions

Our analysis has shown that reshoring can be an effective means of improving the situation in the economy of most countries during crises, increasing their economic security by optimising the employment situation, stimulating further robotics and automation, as well as a measure of stimulation in the transition to a new stage of digital development of the industry.

However, based on the results of the analysis, it can be concluded that reshoring has not yet become the main trend of the world economy, and often serves as a political element to relieve tension in a number of countries and sectors of the economy. The current weakness of reshoring as a tool for changing the "service" structure of the world economy's GDP, the predominance of information technology operations in the structure of world exports and imports, and overcoming the deficit balance of payments can be explained by its locality and fragmentation in ensuring political and economic stability during turbulence, especially during emerging sanctions and trade wars.

At the same time, the process of reshoring is very positive despite globalisation of economic processes, it stimulates the world economy to compete with new technologies and processes, allows local resistance to global crises, and also creates prerequisites for intensive digital development.

It is necessary to ensure stability and flexibility in the implementation of a reshoring policy for the further success of the return of production in the United States and other countries and for the future growth of direct foreign investment.

This is possible by improving the tax policy, implementing flexible regulations, effective personnel policy for training qualified labour, reducing tariffs and other barriers. It is necessary to maximise the positive forces of reshoring through further automation, the development of the Internet of things, the promotion of the "Industry 4.0" concept, and the implementation of the policy of forming environmental awareness. The flexibility of the new policy will help to diffuse the negative aspects in the process of reshoring as well as to attract direct foreign investment.

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Atypical Forms of Employment in the Slovak Republic

Silvia TRELOVA
Faculty of Management Comenius University in Bratislava, Bratislava, Slovak Republic,
e-mail: silvia.trelova@fm.uniba.sk

Abstract

The issue of flexibility in employment relations means an agreement between the employer and the employee, and this is beneficial for both of these subjects of employment relations. One of the manifestations of the effect of flexibility in labour law is the possibility to perform work through flexible employment relations, also referred to as atypical employment relationships. Atypical forms of employment include all forms of employment that are not the employment relationship for a determined weekly working time (full-time) and for an indefinite period. This article analyzes individual atypical forms of work, which are enshrined in the legislation of the Slovak Republic and clarifies the application of the relevant provisions in practice.

Keywords: atypical forms of employment, fixed-term employment relationship, part-time employment, job sharing, homework, telework.

Introduction

In the past, employers mostly used the typical (standard) form of employment to perform work. These classic employment relationships are characterized by daily eight-hour working hours, work evenly spread over five days a week and work performance agreed for an indefinite period. The typical form of work is currently in the background and the so-called flexible forms of employment are coming to the fore. In an ever-changing business environment, only flexible organizations „are able to adapt to current requirements, modify organizational structure, create flexible workplaces, flexible work regimes, and implement distance work. Such an approach places great demands on the introduction of innovations, on their acceptance and on changing attitudes to work. However, without such changes, today the organization would jeopardize its own existence in the market in which it operates." (Wojčák, 2013)

Flexible forms of work performance are considered to be beneficial for both employees and employers. The extent to which this is true depends on the type of flexible working arrangements. (Bajzíková, Šajgalíková, Wojčák and Poláková, 2013) As flexible work performance has not only positive features (e.g. individual work plan, the possibility of reconciling work and family), but also negative (e.g. employee isolation, health and safety problems and employee protection) and requires legislative changes, the issue of work flexibility is current and often discussed topic.

Fixed term employment relationship

Slovak labour law in accordance with the basic labour law regulation (the sources of labour law see Hamuľák, 2019a) - Act no. 311/2001 Coll. The Labour Code, as amended (hereinafter referred to as the "Labour Code") clearly prefers the conclusion of employment contracts for an indefinite period, in some cases their conclusion for a fixed period (for a predetermined time) is allowed. Compared to an employment contract for an indefinite period, a fixed-term employment contract is an atypical form of employment contract. Within the framework of employment relations, this type of employment contract should not prevail. Indicators of the development of the main forms of employment indicate a tendency for labour market flexibility, but the Slovak Republic still belongs to the countries with a monopoly position of employment based on employment contracts for an indefinite period.

In the field of EU law, the legal regulation of fixed-term employment is enshrined in Council Directive 1999/70/EC of 28 June 1999 concerning the framework agreement on fixed-term work concluded by ETUC, UNICE and CEEP (Directive 1999/70) and characterizes a fixed-term employment relationship as an employment relationship which expires on "objective conditions such as reaching a specific date, completing a specific task, or the occurrence of a

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specific event". This directive lays down general principles for fixed-term work, the prohibition of discrimination against fixed-term workers and the conditions under which fixed-term employment relationship may be concluded in such a way as to avoid abuse of the chain of fixed-term employment contracts and relationships - successive fixed-term employment contracts. or relationships (for more details see also Freel and Nováková, 2016).

A fixed-term employment relationship must meet all the legal characteristics of the employment relationship, and this also applies to the employment contract that establishes it. In terms of content, an employment contract establishing a fixed-term employment relationship contains a determination of the duration of the employment relationship, as this employment relationship is specific in that the duration of the employment relationship is defined in advance in the employment contract. Fixed-term employment ends with a legal event, in particular at the end of the agreed period. The duration of the employment relationship can be defined either by direct time information (e.g. a specific date of termination of employment) or in another way that does not raise doubts as to when the employment relationship should end. With a time limit in a form other than a specific date of termination of employment, a situation may arise that if such an event did not occur before the expiration of the maximum specified for the employment for a certain period of time (before the expiry of two years), a fixed-term employment relationship changes to an indefinite employment relationship. Such a change also occurs in the absence of a written form of employment contract, as an employment contract for a certain period must also be in writing. The lack of this requirement does not result in the invalid establishment of an employment relationship, but this employment relationship is considered by law to be an employment relationship for an indefinite period.

In connection with the duration of the employment relationship, the Labour Code establishes an irrebuttable legal presumption that if the employee continues to perform work with the employer's knowledge after the agreed period, this employment relationship will change to an employment relationship for an indefinite period, unless the employee and employer agree otherwise. It follows from the above that the reclassification of a fixed-term employment relationship to an indefinite employment relationship will take place only with the consent of the employer.

In order to prevent abuse of the chain of fixed-term employment contracts, Directive 1999/70 requires the Member States, after consultation with social partners in accordance with national law, collective agreements or practice, to adopt one or more of the following measures:

- set out the objective reasons for renewal of employment contracts for a fixed period,
- determine the maximum total duration of successive fixed-term employment contracts
- determine the number of renewals of such employment contracts.

It should be noted that these are not cumulative requirements of the directive, but they can be understood as alternatives.

In accordance with this directive, the Slovak Labour Code regulates the legal conditions for concluding a fixed-term employment relationship. Act no. 257/2011 Coll., which amends the Labour Code, as amended, and which amends some laws, extended the period of fixed-term employment to three years and increased the number of repetitions to three years as part of increasing the flexibility of fixed-term employment. (Freel, 2012) At present, the maximum permissible duration of a fixed-term employment relationship without any substantive reason is two years, while a fixed-term employment relationship may be extended or renewed at most twice within a two year period without the employer having a material reason to do so. A further extension or renewal of a fixed-term employment relationship to two years or over two years is possible only on the basis of substantive reasons, at least one of which must be stated in the employment contract. According to § 48 par. 4 further extension or renewal of a fixed-term employment relationship "can be agreed only in the following reasons:

a) substitution of an employee during maternity leave, parental leave, leave immediately linked to maternity leave or parental leave, temporary incapacity for work or an employee who has been given long term leave to perform a public function or trade union function,
b) the performance of work in which it is necessary to increase employee numbers significantly for a temporary period not exceeding eight months of the calendar year,
c) the performance of work that is linked to the seasonal cycle, which repeats every year and does not exceed eight months in the calendar year (seasonal work),
d) the performance of work agreed in a collective agreement."

If the agreement of a fixed-term employment relationship, its extension, re-agreement is in conflict with the law, this part of the employment contract on the duration of the employment relationship is invalid and this employment relationship is considered an employment relationship for an indefinite period.

A fixed-term employment relationship ends at the end of the agreed period without the employer or employee having to express an intention to terminate the employment relationship. This employment will end at the end of the agreed period, even in social situations such as temporary incapacity for work, pregnancy, maternity leave, parental leave. If there is an interest in terminating the employment relationship earlier, the fixed-term employment relationship may be terminated before the expiry of the agreed period in all ways provided for in the Labour Code.

The nature of the fixed-term employment relationship implies the fact that in the event of termination of employment, there is no need to discuss with employees' representatives, the employer is not obliged to offer the employee other suitable work before termination and the employee is not entitled to severance allowance. This does not apply if the employment is terminated before the end of the agreed period and the employee meets the conditions for entitlement to severance pay. Upon fulfillment of the conditions stipulated by law for the creation of the right to discharge benefit, the employee is entitled to this monetary benefit.

The labour legislation of the Slovak Republic responded to the changes caused by the COVID-19 disease. As a result of the state of emergency declared in connection with the COVID-19 disease, there was a legislative adjustment of the fixed-term employment relationship. If a fixed-term employment relationship is to end or has ended during this state of emergency or within two months after its dismissal, and if the material conditions for its extension are not met, this employment relationship may be extended once and for a maximum of one year. The employer is obliged to discuss such an extension of the fixed-term employment relationship with the employees' representatives. In the absence of negotiation, an fixed-term employment relationship is considered to be an employment relationship concluded for an indefinite period of time. We emphasize that this legislative change is of a temporary nature. As Hamuľák (2012) states, these measures can be included among the so-called employment protection legislation, the purpose of which is to introduce tools to ensure the protection of existing employment relationships in order to eliminate the increase in unemployment.

Employment relationship with reduced working time (part-time employment)

Part-time employment is a significant type of atypical employment and has a constantly growing tendency. A part-time employment contract is an employment contract establishing an employment relationship within which the extent of the employee's working hours does not reach the limit set for the established weekly working time for a particular employer. According to the Labour Code, an employee's working time is considered to be the period of time in which the employee is available to the employer, performs work and fulfills obligations in accordance with the employment contract. This definition of working time is in in accordance with Directive 2003/88/EC of the European Parliament and of the Council of 4 November 2003 concerning certain aspects of the organisation of working time, according to which “working time means any period during which the worker is working, at the employer's disposal and carrying out his activity or duties in accordance with national laws and/or practice”.

The length of the established working time is determined by the employer, which may not exceed the length of the statutory maximum weekly working time - 40 hours a week. According to § 49 par. 1 of the Labour Code “an employer may agree with an employee in the employment contract, a reduced weekly working time than determined weekly working time”. Reduced working time, which need not be distributed over all working days, may be agreed between the employer and the employee when concluding the employment contract or at any time during the employment relationship. Reduced working time may be agreed for both employment relationship for an indefinite period and fixed-term employment relationship. The employer may agree with the employee on the change of the established weekly working time to a reduced working time and the change of the reduced working time to the established weekly working time. Overtime work may not be ordered on an employee performing a part-time employment, but such an employee may consent to such performance (for more details see Hamuľák, 2019b).

The Labour Code does not define the concept of part-time employment. Who is considered a part-time employee is defined by Council Directive 97/81/EC of 15 December 1997 concerning the Framework Agreement on part-time work concluded by UNICE, CEEP and the ETUC (Directive 97/81/EC). According to this directive, it is “an employee whose normal hours of work, calculated on a weekly basis or on average over a period of employment of up to one year, are less than the normal hours of work of a comparable full-time worker.” The definition of a comparable employee is already defined by the Labour Code (§ 40 par. 9) as “an employee, who has agreed an employment relationship for an indefinite period and a determined weekly working time of the same employer or an employer according to § 58, who carries out or would carry out the same type of work or a similar type of work taking into consideration qualifications and experience in a relevant field”. Such an part-time employee shall be entitled to wages corresponding to the agreed reduced working time. The Labour Code prohibits discrimination

against employees working on the basis of a part-time employment relationship. Some rights are granted to such employees on a pro rata temporis basis, e.g. as regards holiday entitlement, minimum wage entitlements (for more details see Hamuľák, 2016).

We can state that the Slovak legal regulation of part-time employment is compatible with the Directive 97/81/EC and that an employee who performs part-time work is covered by all rights and obligations arising from the employment relationship. In Slovakia, in 2019, part-time work accounted for 8% of total employment (Eurostat, 2020a).

Job sharing

In order to increase the flexibility of employment relations, the Labour Code introduced a relatively new legal institute within the framework of an part-time employment established by an employment contract, namely a job sharing. At this institute, the employees organize (distribute) their own working time and job description appertaining to the job. In addition to the employment contract, an agreement on the assignment of an employee to a job sharing will be concluded between the employer and the employee. In accordance with the Slovak Labour Code, this agreement must be concluded in writing, otherwise it is invalid.

Before concluding an agreement on the assignment of an employee in a part-time employment to a job sharing, the employer shall notify the employee in writing of the working conditions applicable to the job sharing. The number of employees within a job sharing is not limited by law. The time interval that individual employees spend at work is not predetermined and is the sole responsibility of the employees themselves. In the event of an obstacle to work on the part of the employee in a divided job, the employees who share the job with him are obliged to represent him. "The obligation of the employee to represent one another in a job sharing is imposed by the Labour Code as a conditional legal obligation, unless the employee is prevented from doing so by serious reasons." (Barancová et al., 2019)

The agreement on the assignment of an employee to a job sharing may terminate in the form of notice in writing, both by the employer and the employee. The agreement expires one month from the date of notification of termination, unless the employer agrees otherwise with the employee.

Home work and telework

In addition to the atypical forms of work performance, another form of employment with elements of flexibility is regulated. If the nature of the work allows it, the employer can agree with the employee on the so-called home work or telework, according to the conditions agreed in the employment contract, either at home or at another agreed place. This form of employment is specific to the place, as well as the form of work performance.

As part of home work and telework, the employee does not have to be physically present at the employer's workplace and can perform his work agreed under the employment contract from the comfort of his home or at another agreed place. The place of work of the employee must be agreed in the employment contract as its essential requirement. On the basis of contractual freedom, the participants in this legal relationship may agree that the performance of this activity will be carried out either within an employment relationship for an indefinite period or a fixed term employment.

The Labour Code defines home work as the employment of an employee who performs work for the employer during working hours, which he schedules himself and this employment is governed by the Labour Code with exhaustively listed deviations. In addition to the provisions on the organization of the determined weekly working time, also the provisions on continuous daily rest, continuous weekly rest shall not apply to such an employee. Unless otherwise agreed between the employer and the employee, the employee is not entitled to wages for overtime work, wage benefits for work on holidays, wage benefits for night work and wage compensation for difficult work performance. Similarly, the provisions on downtime do not apply to this employee. A specific feature is also the important personal barriers to work on the part of the employee, for which he is not entitled to compensation of wages from the employer, with the exception of one obstacle, namely the death of a family member.

The above also applies to telework, which means the modernization of work organization and the possibility of reconciling the work and social life of the employee and, in particular, allows autonomy in the performance of the employee's duties. Telework is considered to be work of an employee performed in an employment relationship, which he performs for the employer according to the conditions agreed in the employment contract at home or at

another agreed place using information technology during working hours, which he schedules himself. Similar to home work this employment relationship is governed by the Labour Code with exhaustively listed deviations.

Although home work and telework have a lot in common, telework is characterized by a specific feature, namely the use of information technology. Due to this fact, the employer is obliged to provide, install and perform regular maintenance of hardware and software necessary for the performance of such a form of work. However, the employee can also use his own hardware and software equipment for telework. The employer is responsible for ensuring, especially with regard to software, protection for data processed and used in telework. At the same time, the employer is obliged to inform the employee about all restrictions on the use of hardware and software and also of the penalties for any breach of these restrictions.

Apart from certain exhaustively listed deviations, there is a tendency to place an employee who performs home work or telework on an equal footing with other employees. For this purpose, the employer is obliged to adopt measures to prevent employees performing home work or telework from becoming isolated from other employees and give them an opportunity to meet with other employees. The Labour Code places special emphasis on the creation of conditions on the part of the employer enabling such employees to meet other employees. Other measures precluding employee isolation are not specified by the Labour Code. In order to fulfill these measures, the employer should invite employees performing home work or telework to cultural and sporting events organized by the employer, provide them with meals in their own catering facility, if possible, and not forget to deepen their qualifications.

One of the important duties of the employer is the obligation to prevent the employee from being disadvantaged at home work and telework with a comparable employee at the employer's workplace. For this purpose, such an employee must also have comparable working conditions. As we stated in the section - Part-time employment, a comparable employee is defined by the Labour Code.

It should be noted that in the conditions of the Slovak Republic, the performance of activities in the form of home work and telework is beginning to be applied to a greater extent. Although Slovakia is one of the countries with a lower rate of teleworkers, the number of teleworkers is increasing every year. While in 2016 3.2% of the total number of employees worked from home, in 2019 it was already 3.7% of employed persons working from home. In 2019, 3.5% of men and 4% of women worked from home (Eurostat, 2020b). Although the benefits of home work and telework are more often emphasized, the pitfalls associated with telework cannot be underestimated. Dolobáč (2018) speaks of "the pitfalls associated with the fact that this employee must be de facto available at any time in certain circumstances", which can lead to “telechicane”.

It should be noted that in the conditions of the Slovak Republic, the performance of activities in the form of home work and telework is beginning to be applied to a greater extent. And currently in connection with the spread of coronavirus COVID 19, work from home is used both as a protective measure but also as a corporate benefit. In connection with the measures taken during the pandemic, in the performance of work, the so-called "Home-office" applies. However, the Labour Code does not define the term home office as such. According to the valid legal regulation, during this period the employer is entitled to order the performance of work from the employee's household, if the agreed type of work allows it and the employee has the right to perform work from his household, if the agreed type of work allows it and there are no serious operational reasons on the part of the employer. which do not allow the performance of household work.

There is a difference between housework and home office. Unlike home work, which is defined by the Labour Code, the concept of home office is not enshrined in legislation. Home work is performed from the employee's own household on a regular basis, it is of a permanent nature, the home office is used as a benefit that the employer offers to its employees. The work performed by an employee as a home office is of an occasional nature. This work is performed with consent, or in agreement with the employer.

Casual work

Another atypical form of employment is the performance of casual work, which could also be performed in an employment relationship with a non-standard determination of the extent of the employee's employment. Under this form of employment, the employer would not be obliged to allocate work on a regular basis, but would be bound only to the allocation of work in situations where the work agreed in the employment contract occurs and the employee is currently available to the employer. An employment relationship and an employment contract in relation to the performance of casual work would require a definition of the term "casual work" in the Labour Code. This form of employment could be enshrined not only in a fixed-term employment relationship but also in an indefinite employment relationship.

As the performance of casual work was not excluded from its material scope by the Labour Code, following Directive 1997/81 EC on the framework agreement on part-time work, the performance of casual work must be carried out on a part-time basis according to the applicable legal status.

The use of casual work could be relevant not only in times of economic crisis but also in other crisis situations that the employer will find in the future. At the same time, it is a very good alternative to unemployment, because even in such a legal form, the employee can maintain work habits and skills, which he often loses during unemployment.

Irregular assistance

As is clear from the concept of 'irregular assistance', these are legal situations where it is not possible to determine the extent of working time in advance for a longer period, because such work is governed by the employer's capabilities and, on the other hand, by the employee's capabilities. Within this job, the employee performs work only occasionally in accordance with the needs of the employer.

Temporary assignment of an employee

"Temporary assignment may refer to a complex of legal relationships between an employee, an employer and a third party." (Barancová et al., 2019) The Labour Code allows for two types of assignment of an employee to another employer, i.e. to the user employer. The first possibility is that the employee is temporarily assigned by his employer, for whom objective operational reasons are given for this procedure. The assignment is made on the basis of a temporary assignment agreement with the user employer. In this case, the employment relationship between the employer and the employee continues.

The second temporary assignment option is implemented through agency work through temporary employment agencies. It is typical that the agency employs a natural person on the basis of an employment contract in order to assign him to a user employer for a limited period of time. Agency employment, in addition „to being a flexible way of employment, enables the acquisition of work, work habits by those categories of employees who find it more difficult to find job." (Olšovská, 2014)

The temporary assignment may be agreed for a maximum of 24 months and may be extended or renegotiated to the same user employer up to four times within 24 months. If, in accordance with this, the employee is not temporarily assigned, the employment relationship between the employee and the employer or the temporary employment agency terminates and an employment relationship is established for an indefinite period between the employee and the user employer.

Agreements on work performed outside employment relationship

In addition to the employment relationship established by the employment contract, a employment relations may also arise on the basis of agreements on work performed outside employment relationship. These agreements represent an additional form of employee participation in the performance of work (work performance agreement, agreement on work activity, Agreement on temporary job of students). These are agreements that have a special position in the Slovak contractual system. According to the statistical data of the Social Insurance Agency, 411,028 citizens of the Slovak Republic worked on the agreement on work performed outside employment relationship at the end of 2019 (Social insurance Agency, 2020).

The purpose of the legal regulation of agreements on work performed outside employment relationship is to provide both subjects of the basic employment relation with certain advantages resulting from the specificity of the work.

Agreements on work performed outside employment relationship should be concluded only for small-scale tasks, respectively in the case of the needs of the employer, which are usually of a short-term nature or it is necessary to perform work tasks of a unique nature. The employment relation established by the agreement is significantly freer than the employment relationship and creates a relatively wide scope for the exercise of the contractual freedom of the participants. On the other hand, the agreement, unlike the employment relationship, does not establish several legal claims, in particular as regards entitlement to holiday, entitlement to compensation in the event of obstacles at work, remuneration for overtime work, provision of catering. However, these claims may be enshrined directly by the parties in agreements on work performed outside employment relationship.

Conclusion

In conclusion, we would emphasize that flexible forms of employment are one of the most typical manifestations of flexibility in labour law. Their aim is to contribute to the flexibility of the labour market, to increase employment. On the other hand, these forms of employment should only be an ancillary role in cases where it is not possible or expedient to work full-time for an indefinite period. In addition to specific selected types of flexible employment - fixed-term employment, part-time employment, home work or telework, agency work, agreements on work performed outside employment relationship, there are also other forms of employment containing elements of flexibility that could be in the near future to become a part of the Slovak legal order.

As the use of flexible forms of employment has a growing tendency, it is necessary to pay increased attention to them and there is a need for their sufficient legal regulation also with regard to the necessary protection of employees.

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Accelerating Progress Model (AP Model) in the SDGs Implementation – a Chance to Achieve 2030 Agenda Goals Under COVID-19 Conditions

Katarzyna CHŁAPEK,
Cracow University of Economics, Cracow, Poland, chlapekk@uek.krakow.pl

Sylwia KRAJEWSKA
Cracow University of Economics, Cracow, Poland, krajewss@uek.krakow.pl

Abstract

The implementation of 2030 Agenda with respect to social, environmental and economic issues is of key significance for the future of our planet and requires the current engagement of all the inhabitants of the Earth. All these aspects play a special role in the context of the COVID-19 pandemic, hence the need for assessing the SDGs progress with a view to adapting activities in this area to the present circumstances. The analysis presented in the paper points to an insufficient level of communicating SDG-related actions, particularly at the stage of sharing and disclosing good practices. Another issue is the lack of adequate and user-friendly measuring tools, facilitating the determination of the progress in the SDGs implementation by various stakeholders. The paper aims to present a model for accelerating the SDGs implementation (AP model), based on the verification of good practices related to the goals as well as an analysis of COVID-19 implications. The major advantage of the AP model is its simplicity as a measuring tool, which serves to strengthen an entity's sense of contribution to the achievement of 2030 Agenda. The paper stresses the necessity of undertaking further research on the possibility of measuring an individual company's impact on achieving Agenda goals. The awareness and knowledge of the impact of specific actions on the quality of life of future generations can accelerate the SDGs implementation. The conclusions presented in the paper may be put into practice by various groups of 2030 Agenda stakeholders, as well as stimulate further research at an academic level.

Keywords: MDGs, SDGs, COVID, good practices

Introduction

The issue of sustainable development has been discussed in the international arena for a number of years. In 1984, Douglas argued in his work on the "Meanings of the Sustainability" that it should be borne in mind that this term indicates "food self-sufficiency" (an economic perspective), "stewardship" (an ecological perspective), and "community" (a sociological perspective) (Barker *et al.,* 1988 p. 2). Considering the key significance to the well-being of the whole world, the issue of and attempts to take adequate action towards sustainable development are undertaken by international organizations including the United Nations (UN). The achievement of sustainability, aimed to ensure the security of present and future generations, can only be possible through international cooperation and mobilization of global resources.

The authors believe that the achievement of the Sustainable Development Goals (SDGs), as set forth by the 2030 Agenda (UN, Agenda 2030), can only be possible through SDG acceleration through, among others, applying relevant good practices. On a number of occasions, making contact with various groups of the potential stakeholders of the 2030 Agenda, we have observed cases of SDG-related ineffective communication, particularly with regard to the lack of necessary measurement tools.

In light of the above, the conducted study aims to identify the current progress in the SDGs implementation through verification of relevant good practices, and to analyse the consequences of the COVID-19 pandemic, which constitute the basis of the proposed model of the SDGs acceleration (AP model). The created model can serve as a tool for communication among all the entities engaged in the SDGs implementation and it can also be a basis for creating rankings of actions affecting the 2030 Agenda acceleration. The AP model is an uncomplicated measurement tool, mainly aimed to create a positive sense of contribution to the implementation of a global project – the 2030 Agenda.

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The model proposed in this work and the conducted analysis can be treated as guidelines for a number of entities which take up the challenge of implementing SDG initiatives, as well as an inspiration for further research on support tools aimed to accelerate achieving 2030 Agenda goals.

The main thesis of the paper is the statement that sustainable development goals (SDGs) under the conditions of COVID-19 can only be achieved through 2030 Agenda acceleration actions based on relevant good practices – hence the research goal is focused on an analysis of good practices and COVID-19 implications with a view to building a model for accelerating the SDGs implementation (AP model).

The basic research method is based on long-standing and in-depth observations on the SDGs implementation process, the employed good practices and proposed measurement tools related to achieving 2030 Agenda goals. The research study comprises a review of world literatures in the area of development gaps, the SDGs and the current conditions related to the COVID-19 pandemic. It also refers to earlier studies on the ways of communicating achievements in this area, presented in annual reports, and the possibilities of influencing SDGs progress by various entities, presented under a grant entitled "Non-Financial Reporting in the Perspective of Sustainable Development – a programme for adult education trainers" as part of "social innovation incubators in the field of adult continuing education", co-financed by the European Social Fund. The employed methods also include the observations and assessments of current world trends.

The work assumes that it will stimulate interest in strengthening the SDGs implementation, especially under COVID-19 conditions, through good practices as a source of inspiration for taking action, coupled with the measurement of individual contribution to the SDGs acceleration using the proposed model.

Sustainable development goals

The globalization of economic life offers a number of opportunities, but it also poses serious threats in various areas with respect to economic, social and environmental issues. For a number of years, the problems of the contemporary world have been the subject of interest of international organizations including the United Nations (UN). This organization undertakes actions aimed to counteract existing threats and seeks to achieve global goals – an initiative launched through identifying so called Millennium Development Goals in 2000 (MDGs) (UN, 2000), which give attention both to positive and negative effects of globalization. Undertaking actions aimed to bring benefits for all inhabitants of the Earth, the Organization identified the following fundamental values of international relations:

1. Freedom
2. Equality
3. Solidarity
4. Tolerance
5. Respect for nature
6. Shared responsibility.

Also, the key goals were set which translate the fundamental values to specific actions. As a result, eight MDGs were formulated:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Global partnership for development.

All member states declared their will to meet the goals by 2015 (Sachs, 2012).

The Resolution adopted by the General Assembly on 25 September 2015 (UN, Agenda 2030), referred to in this work as the 2030 Agenda, draws on the goals set in 2000, extending the list of goals from 8 to 17 (Griggs *et al.*, 2013). Table 1 presents the description of Sustainable Development Goals in accordance with the 2030 Agenda, and a comparison with 2000 goals.

Table 1: Millennium Development Goals and Sustainable Development Goals

Millennium Development Goals (MDGs)		Sustainable Development Goals (SDGs)	
1	Eradicate extreme poverty and hunger	1	End poverty in all its forms everywhere
2	Achieve universal primary education	2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3	Promote gender equality and empower women	3	Ensure healthy lives and promote well-being for all at all ages
4	Reduce child mortality	4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5	Improve maternal health	5	Achieve gender equality and empower all women and girls
6	Combat HIV/AIDS, malaria and other diseases	6	Ensure availability and sustainable management of water and sanitation for all
7	Ensure environmental sustainability	7	Ensure access to affordable, reliable, sustainable and modern energy for all
8	Global partnership for development	8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
		9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
		10	Reduce inequality within and among countries
		11	Make cities and human settlements inclusive, safe, resilient and sustainable
		12	Ensure sustainable consumption and production patterns
		13	Take urgent action to combat climate change and its impacts
		14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
		15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
		16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
		17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Source: authors' research based on (UN, 2000) and (UN, Agenda 2030).

The analysis of goals presented in Table 1 indicates that the MDGS are continued, but some specific global problems are also identified, the resolution of which are related to the SGDs.

The 2030 Agenda, apart from goals, contains 169 related targets (Biermann *et al.,* 2017, Schroeder *et al.,* 2018). The goals and respective targets are interdependent and indivisible (Blanc, 2015), ensuring balance between three aspects of sustainable development: economic, social and environmental (Fig. 1).

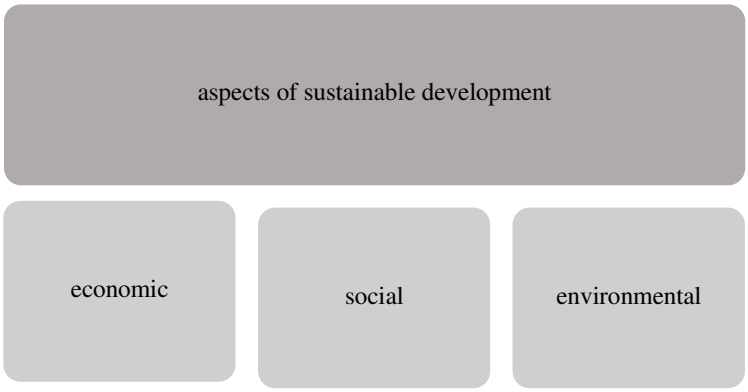

Fig. 1: Three aspects of sustainable development under the 2030 Agenda
Source: authors' research based on (UN, 2030 Agenda)

Efforts aimed to achieve development in all three dimensions should be integrated and balanced. Sustainable development in three dimensions (economic, social and environmental) is a key characteristic which enables various entities to adopt the SDGs (SDGF, 2016). It also enables them to understand that sustainable development is key to long-term successful and prosperous activities in contemporary markets.

A special role of good practices in the SDGs implementation

Actions aimed to meet sustainable development goals require participation of a broad range of actors. It is commonly stressed that humanity's actual progress towards sustainable development is very slow (Baumgartner R.J., 2011). To meet the current challenges, the Division for Sustainable Development Goals (DSDG) in the United Nations Department of Economic and Social Affairs (UNDESA) acts as the Secretariat for the SDGs, providing substantive support and capacity-building for the goals and their related thematic issues. DSDG plays a key role on advocacy and outreach activities relating to the SDGs and serves Member States, Major Groups and other stakeholders, as well as the general public, by providing wide access to information and knowledge for sustainable development, through its online Sustainable Development Knowledge Platform and social media outlets. The Division also supports, facilitates and monitors multi-stakeholder partnerships and voluntary commitments announced at its Partnerships for SDGs online platform (Partnerships for SDGs). DSDG's website provides information about the particular SDGs including events, publications and partnerships. Currently, 960 events, 1205 publications and 5132 partnerships are identified. Specific figures related to the particular SDGs with regard to partnerships are presented in Table 2.

Table 2: Partnerships by the SDGs

goal	1	2	3	4	5	6	7	8	9
partnerships	739	689	619	1081	833	598	642	1140	474
goal	10	11	12	13	14	15	16	17	
partnerships	433	622	807	981	1948	621	558	1152	

Source: authors' research based on (SDGS)

Many undertaken partnerships relate to several or sometimes all SDGs, hence the sum of all partnerships in all SDGs is not equal to all good practices, i.e. 5132.

The visualization of the number of partnerships related to the specific SDGs (See: Fig. 2) points to large discrepancies in the number of registered partnerships, depending on the goal.

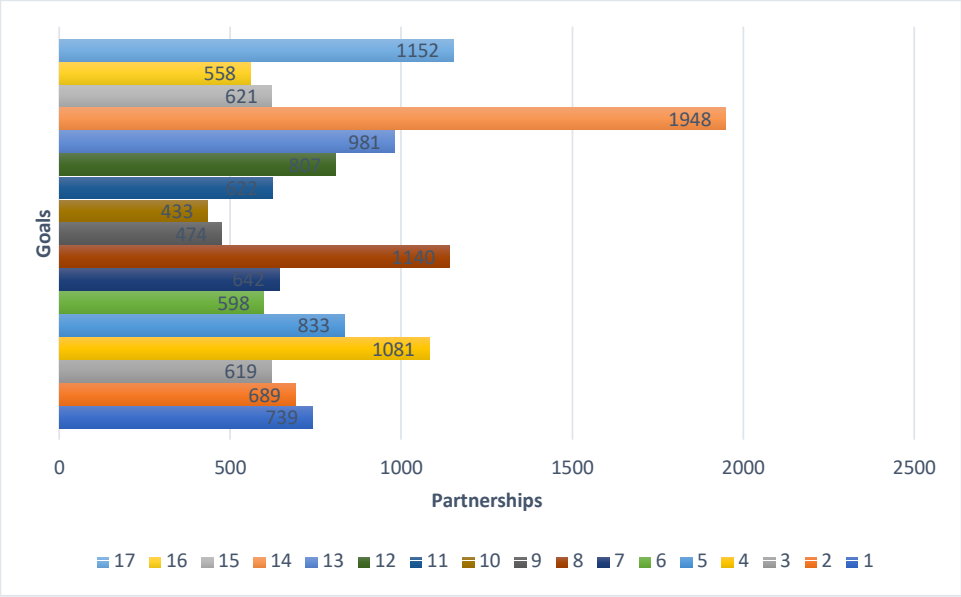

Fig. 2: Undertaken partnerships by SDGs

Source: authors' research based on (SDGS)

A detailed analysis leads to the conclusion that the number of initiatives undertaken under Goal 14 differs considerably from the remaining goals, comprising as many as 1948 registered initiatives. For goals 17, 8 and 4 the number of registered initiatives exceeds 1000, and for goal 13 it is close to 1000 (981 initiatives). Goals 10 and 9 rank lowest in terms of registered initiatives (below 500), and 16 and 6, for which the number of registered initiatives does not exceed 600 (displayed on an online platform).

The Partnerships for SDGs online platform is a global registry of voluntary commitments and multi-stakeholder partnerships made in support of sustainable development and the 17 SGDs. It also facilitates the sharing of knowledge and expertise among multi-stakeholder SDG-related partnerships and voluntary commitments, and for providing periodic updates on their progress. The Partnership for SDGs platform is open to all (Perez-Batres *et al.*, 2011). Everyone can register a voluntary commitment or multi-stakeholder partnership which aims to drive the implementation of the 2030 Agenda and the 17 SDGs and to provide periodic updates on progress. So, stakeholders, including Member States, civil society, local authorities, private sector, scientific and technological community, academia, and others, can register own good practice there.

The methodology of criteria of registration is based on a popular idea called SMART deliverables - Specific, Measurable, Achievable, Resource-based, and Time-bound. Registered initiatives should be:

- Specific: initiatives should aim for concrete deliverables, contributing to specific goals and targets under the 2030 Agenda.
- Measurable: initiatives should set measurable progress indicators, to facilitate review of progress.
- Achievable: initiatives should set attainable goals and strive to deliver results.
- Resource-based: registered initiatives should have a secured resource base, rather than merely project proposals,
- Time-bound: initiatives should be time-specific.

Only those initiatives which meet the above criteria, following a positive verification by the UN Secretariat, can be published on the online platform. Initiatives are encouraged to maintain up-to-date information and periodically self-report progress once a year through the online platform, focusing on how the initiative has contributed to the achievement of specific goals and targets in the 2030 Agenda.

Good practices can be adopted and registered on the platform by a wide range of stakeholders (Hajer *et al.,* 2015; Killian *et al.,* 2019). The division of good practices by sector is presented in Fig. 3.

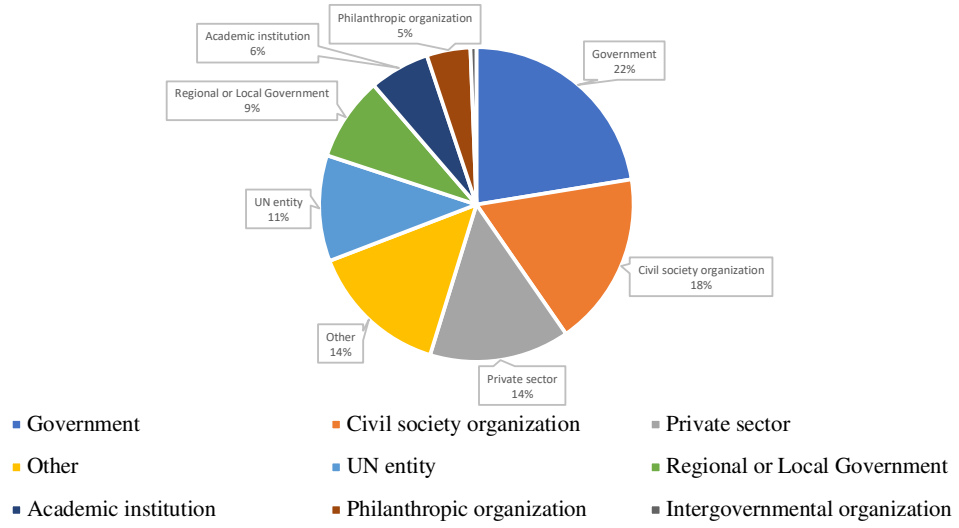

Fig. 3: SDGs good practices by sector

Source: authors' research based on (DSDG, 2020)

A sectoral analysis of initiatives indicates that government initiatives represent the largest group, followed by initiatives undertaken by civil society organizations. The entities least engaged in undertaking and registering good practices include intergovernmental organizations; also, the group of philanthropic organizations has a very low position in this ranking.

The data presented by the UN can be a basis for analysing initiatives by region (Fig. 4).

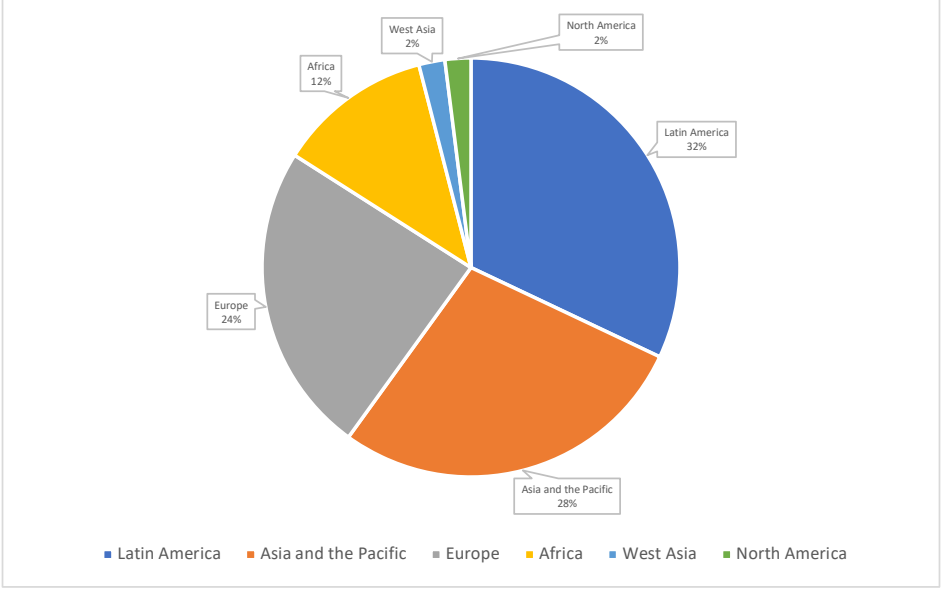

Fig. 4: Good practices in SDGs by region

Source: authors' research based on (SDG Good Practices, Success Stories and Lessons Learned in SDG, 2020).

The largest number of initiatives are undertaken by Latin America countries (32% of all initiatives), followed by Asia and the Pacific (28%), and Europe (24%). The smallest number of SGD initiatives are undertaken in West Asia and North America (merely 2%, respectively).

Before the pandemic, progress in achieving all the 17 SDGs was uneven, posing a challenge for organizations, governments, entrepreneurs and citizens. The current analyses suggest that the process of achieving sustainable development goals is likely to be delayed (Leal Filho *et al.,* 2020). Social and economic pressures and resulting failures lower the priority ranking of sustainable development goals. Moreover, the potential and possibilities created by sustainable development goals, e.g. eradicating extreme poverty and hunger, can be weakened by COVID-19.

Therefore, in order not to squander past achievements, it is necessary to take necessary action, at an academic and practical level, towards the SDGs implementation, giving attention to local and global threats resulting from the failure to do so.

The SDGs implementation and COVID-19 implications

In March 2020, overnight, we practically woke up in a completely different world. The COVID-19 pandemic poses a serious threat to the normal life and welfare of billions of people worldwide. From this perspective and in the context of an uncertain future, we should reflect on lessons drawn from this situation. Despite considerable damage done to people, their sources of income and the economy, COVID-19 can turn out to be an unexpected opportunity for building mankind's solidarity and transforming the crisis into a platform for the SDGs implementation.

"Stopping" the world is an opportunity to go back to the fundamental principles and build a sustainable world. However, to make it happen it is necessary to take relevant, holistic and prompt action, giving special attention to the implications of COVID 19. Table 3 presents facts referred to in the UN report (Report, 2020).

Table 3: Implementation of sustainable development goals before the COVID–19 pandemic and its implications

Goal	Before COVID - 19	COVID-19 implications
1	The world will not be able to eradicate poverty by 2030 [2010 – 15.7%, plan for 2030 – 6%].	COVID-19 causes the first increase in global poverty in several decades. In 2020, more than 71 million people plunged into extreme poverty.
2	The lack of food security was already on the rise. Depending on a region, inhabitants are affected by a moderate or serious lack of food security [2014 – 22.4%, 2019 – 25.9%]. The stopping of growth and devastation of children are likely to become more severe.	The pandemic (apart from climate change, military conflicts and locust) is another threat to food systems. The crisis hit small food manufacturers (they account for 40%–85% of all food manufacturers in developing regions).
3	Progress in many health-related areas continued, but it is necessary to accelerate it in the area of tuberculosis, HIV, child and mother health, and vaccines.	Healthcare disruptions may jeopardise several decades of improvements. In 2020, an increase by hundreds of thousands in deaths below the age of 5 is expected.
4	Progress towards inclusive education and fair quality was too slow. In 2030, more than 200 million children will not go to school.	Education gaps are widened by COVID-19. The effect of the closure of schools - 90% of children did not continue education. Distance learning is not available for at least 500 million children. Only 65% of elementary schools have basic hand washing facilities, which are key to combating COVID-19.
5	Despite some progress, full gender equality was not achieved. Fewer girls are forced to marry; more women perform leader functions.	Lockdowns increase the risk of violence against women and girls (physical, sexual and psychic). In some countries, the number of home violence cases increased by 30%. Women are at the forefront in the fight against the coronavirus. Women account for 70% of health care services staff and social workers.
6	Apart from progress made, billions of people have no access to water and sanitation services.	3 billion people worldwide do not have basic hand washing facilities in their homes (the most effective way of preventing COVID-19).

7	Scaling up is required in the field of sustainable energy. 789 million people are deprived of electricity (2018).	Inexpensive and reliable energy is key to the work of health care centres.
8	Global economic growth slowed down.	The world is facing the most serious economic recession since the Great Depression. During the pandemic, 1.6 billion workers of the informal economy face the threat of losing their income. Tourism is facing unprecedented challenges.
9	Growth in production output decreased due to customs duties and tensions in trade relations. R&D outlays increase, but they should be accelerated.	The air transport has gone through the most serious crisis in its history. The number of air passengers decreased by 51% from January to May 2020 (as compared with the respective period of 2019).
10	In some countries, income inequalities decreased. GINI index decreased in 38 out of 84 countries (2010–2017).	The most vulnerable groups are hit hardest by the pandemic (older generations, persons with disabilities, children, immigrants and refugees).
11	The percentage of urban population living in slums decreased to 24% in 2018.	More than 90% of the cases of COVID-19 are recorded in urban areas.
12	The world is still using its resources in an unsustainable way.	The pandemic is an opportunity for developing improvement plans for a more sustainable future.
13	The global community evades its obligations related to climate change, which results in catastrophic fires, hurricanes, droughts and floods	COVID-19 may lead to a 6% decrease in greenhouse gas emissions in 2020. There is still a lack of 7.6% of annual reduction aimed to reduce global warming by 1.5°C.
14	Ocean acidification is still a threat to the maritime environment and ecosystems. Ocean acidification is predicted to increase by 100-150% by 2100, affecting half of all sea organisms.	A drastic decrease in human activity caused by COVID-19 can be a chance for ocean regeneration.
15	The world does not achieve goals by 2020 in the area of the loss of biodiversity. More than 31 000 species are threatened by extinction. Two billion hectares of land were degraded, affecting approx. 3.2 billion people and resulting in the extinction of species and increased climate change.	Trade in wild animals destroys ecosystems and results in the spread of contagious diseases. Pangolins are likely to transmit the coronavirus.
16	Every day 100 civilians are killed in military conflicts despite the protection of international law.	COVID-19 implications constitute a threat to world peace and security. As early as in 2019, the number of people running away from war, persecution and conflicts exceeded 79.5 million – the highest level in history. In 60% of countries prisons are overcrowded, which leads to the spread of COVID-19.
17	No data available	

Source: authors' research based on (Report, 2020)

The 2020 Report on sustainable development goals presents up-to-date information which indicates that before the COVID-19 pandemic progress was uneven and we were not on the right track to achieve the goals by 2030. However, some positive trends were recorded: improved access to education and drinking water; a decrease in the occurrence of many contagious diseases; and an increase in the number of women in managerial positions. Simultaneously, the number of people suffering from hunger increased, the state of the environment deteriorated drastically, and dramatic inequalities persisted in all regions. The changes were insufficient in terms of their pace and range. The COVID-19 has made the achievement of the goals even more difficult. Johns Hopkins University in Baltimore conducts pandemic statistics based on data provided by international organizations, central and local governments and its own research. The report published in October 2020 indicates that the number of infections worldwide since the pandemic outbreak amounts to 38 006 121, the number of deaths - 1 083 875, and the number of recoveries - 26 354 211 (https://www.hopkinsmedicine.org/coronavirus/index.html).

Health care systems in many countries are on the verge of collapse. The lives of half of the world's work force have been hit hard by the pandemic. More than 1.6 billion pupils do not go to school, and dozens of millions of people are again affected by extreme poverty and hunger, which destroys the modest progress made in recent years. Limited access to food resources, education, work and medical services provides fertile ground for conflicts and social unrest, as well as an increasing interest in dangerous nationalistic slogans (Barbier *et al.,* 2020).

In this context, it is worthwhile to cite António Guterres, Secretary-General of the United Nations: (…) *At the start of this Decade of Action to deliver the SDGs, I call for renewed ambition, mobilization, leadership and collective action, not just to beat COVID-19 but to recover better, together – winning the race against climate change, decisively tackling poverty and inequality, truly empowering all women and girls and creating more inclusive and equitable societies everywhere*" (Report, 2020). The presented challenges and the need for global mobilization to achieve the SDGs provide incentives for academics to actively engage in research aimed to develop tools for large groups of stakeholders, which could also act as motivating factors. Therefore, special attention should be given to developing models based on good practices with a view to accelerating the SDGs implementation under new and difficult conditions, preventing the destruction of the hitherto progress [Leal Filho *et al.,* 2020).

In the context of the above challenges, an attempt has been made to build a model for accelerating SDG actions.

A model for accelerating initiatives in the SDGs implementation

On the basis of a literature review and UN reports on SDG implementation and challenges, undertaken and registered on the UN good practices platform, and considering the implications of the COVID-19 pandemic, an attempt has been made to build a model for accelerating the achievement of sustainable development goals (AP model). For this purpose, the following assumptions have been made:

1. As a point of reference, the number of good practices registered to this day is 5132, considering time limitations (after 5 out of 15 years for implementing the Agenda 2030), and also considering current threats and risks posed by COVID-19, and assuming that initiatives undertaken for each goal should reach the level of current good practices in the amount of 5132.
2. The percentage share is determined for the number of registered good practices for a given SDG in the total number of good practices, which is treated as the level of performance (%) of the target level of good practices set forth under point 1.
3. According to the provisions set forth under points 1 and 2, we calculate the percentage of good practices to be undertaken (performed). The achievement of these levels will facilitate acceleration actions in achieving specific SDGs. .
4. Considering the values presented under point 3, target levels for each goal are presented in the form of a coefficient.

The above procedure for building the model is a basis for necessary calculations – the sources of data for the AP model (see: Table 4).

Table 4: Calculations for the AP model

Goal (G)	1	2	3	4	5	6	7	8	9
Partnerships	739	689	619	1081	833	598	642	1140	474
% of performance	14	13	12	21	16	12	13	22	9
% to be performed	86	87	88	79	84	88	87	78	91
Model coefficient	0.86	0.87	0.88	0.79	0.84	0.88	0.87	0.78	0.91
Goal (G)	10	11	12	13	14	15	16	17	
partnerships	433	622	807	981	1948	621	558	1152	
% of performance	8	12	16	19	38	12	11	22	
% to be performed	92	88	84	81	62	88	89	78	
Mode coefficient	0.92	0.88	0.84	0.81	0.62	0.88	0.89	0.78	

Source: authors' research

Calculations based on the presented assumptions allow for building a model which indicates the share of specific good practices in accelerating the SDGs implementation (accelerating progress model (AP model) in achieving the SDGs) in the form presented below:

AP model =

0,86G1+0,87G2+0,88G3+0,79G4+0,84G5+0,88G6+0,87G7+0,78G8+0,91G9+0,92G10+0,88G11+0,84G12+0,81G13+0,62G14+0,88G15+0,89G16+0,78G17

AP model	=	0,86G1+0,87G2+0,88G3+0,79G4+0,84G5+0,88G6+0,87G7+0,78G8+0,91G9 +0,92G10+0,88G11+0,84G12+0,81G13+0,62G14+0,88G15+0,89G16+0,78G17

The interpretation of the AP model is as follows: if one initiative was undertaken affecting all the SDGs, the value in the model of accelerating the SDGs implementation would reach the value of 14.3.

The authors are aware of the imperfections of the proposed model. However, it is an innovative measurement tool which allows for determining the contribution of particular good practices in accelerating the SDGs implementation. The proposed model enables all entities which undertake initiatives towards the SDGs implementation, regardless of their size, form of ownership, legal and organizational structure or the goal of activity, to determine their individual contributions to the SDGs implementation. At this stage of the process, it is not possible to propose the desirable size of the AP model, but the authors intend to carry out further research in this area.

The global crisis caused by COVID-19 indicates that efforts aimed to achieve sustainable development goals and implement related initiatives are much more significant now than before the pandemic outbreak. The current global crisis is showing us the interdependence of our economic, social and natural spheres, which need to be approached in a holistic manner (Sustainable development in the European Union, 2020). The SDGs implementation can become an important element of policies aimed to improve the quality of life and to resolve the problems of the lack of water and food, and universal access to health care services.

Conclusions

Before the pandemic, progress in achieving all the 17 sustainable development goals was uneven (Barbier *et al.,* 2020). Although extreme poverty and infant and mother mortality rates have decreased since 2000, and low income countries have reduced their poverty rates, progress in these areas has been made to the detriment of other important goals, particularly environmental sustainable development goals 11–15 (Barbier *et al.,* 2020). It points to imbalances between the three aspects of sustainable development: economic, social and environmental, which prevents Agenda 2030 implementation. This adverse trend was strengthened by COVID-19, which had the most serious impact on developing countries. The pandemic is likely to have a negative impact on 12 out of 17 goals [1-8; 11, 13, 16, 17] (Barbier *et al.*, 2020), in which the implementation of good practices was insufficient.

The fight against COVID-19, similarly to the SDGs implementation, requires exchange of information on good practices among all the actors engaged in social, economic and environmental activities. Shaping individual attitudes should be initiated at the lowest educational levels with a view to developing the right attitudes and forms of behaviour in the future. The sum of individual actions can determine the success of the SDGs implementation. A key role is played by the communication of information on the progress in sustainable corporate development. The communication itself of information on initiatives and actions is a tool for disseminating sustainable practices. It has been observed that companies and various institutions should learn how to effectively tell their "stories" about sustainable development and its goals.

In this context, the following areas can be the subject of general interest:

- increasing the possibility of registering good practices on the Partnerships platform,
- strengthening a sense of individual contribution to the SDGs implementation, based on the use of the proposed model,
- strengthening a sense of global and overall responsibility through intensifying the exchange of information about the 2030 Agenda,
- the use of actions proposed in the 2030 Agenda in the fight against the COVID-19 pandemic.

The authors, being aware of the imperfections of the proposed solutions, have a justified conviction that achieving 2030 Agenda goals can be accelerated through influencing an entity's awareness of the possible impact on the 2030 Agenda acceleration.

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Intellectual Capital in The Business Model of An Economic Unit And Its Competitiveness at The Time Of COVID-19

Katarzyna CHŁAPEK
Cracow University of Economics, Cracow, Poland
chlapekk@uek.krakow.pl

Sylwia KRAJEWSKA
Cracow University of Economics, Cracow, Poland
krajewss@uek.krakow.pl

Abstract

Effective and informed business models are a challenge especially in terms of their impact on competitiveness of units. In the reality of the COVID-19 pandemic, intellectual capital has a special place in a business model. The aim of this article is to draw attention to the impact of intellectual capital, revealed in a business model, on the competitiveness of a unit and its particular importance in the current conditions of economic life. The article uses official financial and non-financial data of KGHM and results of the most popular business rankings. The research shows that there is a link between competitiveness of a unit and its intellectual capital activities in the business model. In the context of the threat to continuation of activities of many units, the article reveals the need for further research in the area of adjusting the business model to specific operating conditions, taking into account the role of intellectual capital. Only a re-examination and a substantial modification of the business model, based on intellectual capital, may enable survival in a crisis situation. Research of the study and formulated conclusions can be useful to both scientists and practitioners interested in opportunities to support units in tackling the challenges posed by COVID-19.

Keywords: Intellectual Capital, Business Model, COVID-19, Non-Financial Data.

Introduction

Functioning of enterprises in a global economy emphasises the importance of taking holistic actions and effective decisions affecting individual competitiveness. Analysing the content of currently published financial and non-financial reports of business entities, it can be seen that, apart from classic information function, they are also tools for influencing image formation and perception by a wide range of stakeholders, i.e. they become a kind of marketing tool.

Among many issues included in these reports, units present their business models, which, in accordance with the guidelines of the International Integrated Reporting Council, can be presented by indicating resources in the form of six capitals, which consist of: financial, manufacturing, human, natural, intellectual, as well as social and relational capital. The authors' interest was aroused by intellectual capital, which is presented in different ways in terms of content, visual and terminology in reporting units. A very important issue is also the place of this capital in the unit's business model in terms of building a competitive advantage.

In view of the above, the aim of the study is to identify the place of intellectual capital in the business model of the selected capital group and to attempt to determine the impact of that model on its market position.

The main thesis of the study is that the value-chain based business model of a unit affects its level of competitiveness in a dynamic and unstable market, and that properly defined and managed intellectual capital strengthens this position.

The basic research method is a thorough analysis of the relationship between intellectual capital in the business model and the possibility of achieving a competitive advantage, and verification of observed trends in the economic practice of units. The research reviewed domestic and foreign literature on intellectual capital and business model and verified four national rankings. Then an empirical analysis was made on the example of the KGHM Group.

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The assumption of the study is to arouse interest and discussion on the role and place of intellectual capital in the entity's business model, in view of the challenges posed by the reality caused by the COVID-19 pandemic.

The role of a business model in building a competitive advantage

Many Polish economic units have been subject to the obligation to describe their business model, which is related to the amendment of the Accounting Act (Act, 1994, Article 49b(2)), resulting from the implementation of provisions of Directive 2014/95/EU on the disclosure of non-financial information and information on diversity by certain large units and groups (Directive 2014/95/EU). Unfortunately, disclosures by units about the business model (also referred to as the business model), despite their experience in this area, are still a challenge in reporting process. Beginning with the issue of location in the statement (financial or non-financial, separate or integrated, complying with the relevant standard or according to their own standard), entities raise many dilemmas in the area of presentation of this issue.

There are many definitions of a business model in the literature, which additionally makes interpretation difficult. The analysis of the literature on the subject enables stating that there is no single, commonly accepted definition of a business model (Krasodomska, 2014, p. 108). For example, according to the International Integrated Reporting Council (IIRC), a business model is "a system of resources, activities, results and effects adopted by an organisation that aims to create value". (IIRC, 2013, p. 6). Components of a business model include (Bek-Gaik, 2015, p. 484):

- presentation of the entity, in particular information on its activity, area of activity and structure,
- the business strategy chosen,
- value chain - position of the entity and links to key inputs and output assets,
- financial results - a way to control profitability or generate revenue through a business model,
- creation of value - a way leading to value and desired effects through the entity's inputs and assets, as well as actions and relationships taken.

By presenting non-financial information, including the business model, economic units point to many benefits, which are also emphasised by the international organisation Global Reporting Initiative (GRI), indicating the five main ones (Anam, 2017, p. 2):

1) confidence-building, where particular attention should be paid to transparency on non-financial performance in order to contribute to reducing reputation risks and developing dialogue with stakeholders;
2) improving processes and systems, by diagnosing and improving internal management and decision-making processes;
3) progress in implementation of vision and strategy, through a comprehensive analysis of strengths and weaknesses and involvement of stakeholders, as necessary in sustainability reporting processes, leading to the development of vision and strategy and ensuring integration of sustainable development into business strategy;
4) reducing compliance costs by measuring sustainability performance;
5) competitive advantage, as companies seen as leaders and innovators are able to influence their position in terms of attracting investment, initiating new activities, entering new markets and negotiating contracts.

By pointing out the advantages of reporting non-financial data itself, resulting from scientific research, we can often encounter conclusions which show the link between their presentation and competitive position. It is possible to mention, among others, the basic benefits of non-financial reporting mentioned by M. Anioł: strengthening of the competitive position, more effective management of financial and non-financial risks, improvement of corporate governance and the management system, which facilitates internal processes and improves work efficiency. The author also mentions the advantages in the area of marketing issues, which include: creating a positive image as an employer, leading to an increase in the chances of retaining current and acquiring new, highly qualified employees, shaping a positive opinion on published financial data and building good relations with authorities, officials and public institutions (Sobczak, 2014).

From this perspective, we find a link with aspects of marketing in a new perspective, where it is postulated to build an honest and ethically operating organisation that offers values and benefits in the form of so-called ethical added value (Graczyk, 2008, p. 107). It is believed that the use of socially engaged marketing tools may contribute to (Krajewska-Nieckarz, Łuczak, 2013, p. 58):

1) building positive attitudes of external stakeholders (clients, local government, investors, contractors) towards the company;
2) increase in motivation and commitment of employees;
3) increase in purchases of products from a socially engaged company;

4) strengthening and making the company's mission credible, by including social and ethical elements;
5) improving internal and external image of the company;
6) increase in the value of the company and acquiring new investors, for whom social value is as important as financial value;
7) reducing consumer sensitivity to product prices;
8) increase in the efficiency of business operations;
9) increase in the company's innovativeness.

With regard to the issue of building competitive advantage, the business model and resources, as well as the relationships that are used and shaped by the unit, are of particular importance. In view of this aspect, it is worth recalling the scheme proposed by the IIRC for the value creation process, presented in Figure 1.

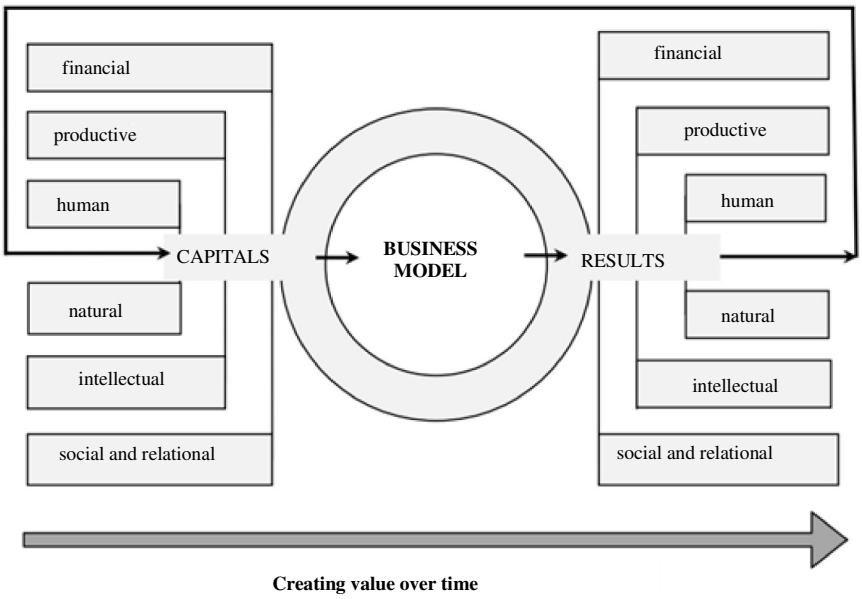

Fig. 1: Value creation process according to IIRC

Source: (Krasodomska, 2015, p. 80)

In accordance with the figure presented, it is proposed to units to present their business model by identifying resources in the form of six capitals: financial, productive, human, natural, intellectual, as well as social and relational. Thanks to the actions taken in the unit and relations in the area of the indicated resources, the unit can present the achieved results in an identical layout. So presented layout of the business model presentation clearly shows the process of value creation in the unit.

Intellectual capital - specificity and place in the business model

Intangible resources constitute an integral part of conducting business activity. Nowadays, a change in the importance of material factors in terms of creating company value is becoming noticeable. On the other hand, the role of the ability to adequately use "hidden" resources, which is undoubtedly intellectual capital, is growing (Grudzewski, Hejduk, 2004, p. 40).

The term *intellectual capital* appeared in 1969 and was used by J.K. Galbraith in a letter to Polish scientist, M. Kalecki (Śledzik, 2011, p. 57). In 1975, *"The Intellectual Capital of Michal Kalecki: A Study in Economic Theory and Policy"* was published. It was the first official publication on intellectual capital (Strojny, 2006, p. 65). Despite the passage of time, to this day it has not been possible to develop a single, universally accepted definition of intellectual capital or intangible assets in literature. It can be seen that, depending on the adopted perspective or research goal, the authors of the definitions emphasise the features, components or economic benefits resulting from the use of this very capital (Bombiak, 2016, p. 109). Difficulties related to creation of a uniform definition of intellectual capital have contributed to numerous explanations, among which the most commonly recognised and indicating the relationship with creation of an unit's value and the impact on its competitive advantage are contained in Table 1.

Table 1: Selected definitions of intellectual capital

Author	Definition
L. Edvinsson, MS Malone	Intellectual capital is a hidden asset, reflecting the gap between the market value and the book value of the company
D. Dobija	Intellectual capital is a source of financing of the company's intangible resources contributing to the generation of future benefits, and thus significantly influencing the process of creating goodwill
J. Fitz-Enz	Intellectual capital is the intellectual property of a company and a complex interweaving of processes and culture connected with a network of various types of relations and human capital.

Source: Own elaboration based on Edvinsson et al., 2001, p. 39; Fitz-Enz, 2001, p. 23-24; Bombiak, 2016, p. 110.

Among the presented definitions, the wording proposed by L. Edvinsson and M.S. Malone, who, defining intellectual capital as "the gap between the market value and the book value of the company", points to the particular importance of this resource in the entity from the perspective of value creation and, at the same time, competitive advantage, deserves special attention. Similarly, M. Dobija draws attention to the process of creating company value by intellectual capital, pointing out the significance of this resource in the process of creating company value.

Intellectual capital consists of many knowledge-based components that shape the market value of a company. As in the case of the definition of intellectual capital, as in the case of its components, we encounter various positions, as shown in Table 2.

Table 2: Components of intellectual capital by different authors

Author	The concept of intellectual capital	Components
Konrad's Group (Sveiby and company)	Konrad Report	- intellectual capital attributed to the unit (individual capital) - intellectual capital attributed to the organisation (structural capital)
Sveiby	Intangible Asset Monitor	-internal structure -external structure -individual competence
L. Edvinsson, (Company "Skandia")	"Skandia's" value scheme	-human capital -structural capital
Petrash, Edvinsson, Onge, Armstrong	Value platform	-human capital -client capital (relations) -organisational capital (structural)
Stewart	Identification of intellectual capital components	-human capital -structural capital -client-related capital

Source: Own elaboration on the basis of the study: Adamska, 2015, p. 18; Bontis et al., 2000; Stewart, 1991; Sullivan, 2000; Sveiby, 2001.

When analysing the components of intellectual capital, one can notice its reference to the individual competences of specific persons (Konrad Report and the Non-Material Assets Monitor).

Intellectual capital is certainly a complex category, created on the basis of the most valuable resource of contemporary organisations, namely knowledge (both the hidden one, gathered in the minds of employees, and the one codified in company documents). This knowledge is the basis for the creation of intangible assets in the unit. The difficulty in developing a uniform definition and approach to intellectual capital is mainly due to the fact that this resource is complex and unique. This uniqueness is a significant asset of the capital in question, as it enables the creation of a lasting competitive advantage for a given unit. On the other hand, it causes numerous problems in determining its value reliably.

From a financial accounting perspective, intellectual assets are not treated as a separate resource, but are included in goodwill. It is important to note that the goodwill of modern economic units many times exceeds the value of material assets at their disposal. It is also worth pointing out that only part of the intellectual capital is subject to typical legal regulations. We are talking about so-called intellectual property, including property rights to trademarks, utility and

industrial designs, patents and copyrights. It is these elements that are subject to valuation, planning and management. They have exceptional potential for creating company value.

There are numerous proposals for valuation of intellectual capital in the literature. Work in the area of recognition and measurement of intangible assets was initiated thanks to the difference between the market value of the company and the net book value of its assets (Paliszkiewicz, 2009, p. 119). Despite L. Edvinsson's statement, "it is better to measure roughly what matters than to measure exactly what is meaningless" (Stańczyk, Kryński, 2007, p. 251), and due to the complexity of the issue, no uniform methodology for measuring intellectual capital has been developed yet.

Both business practice and research are aimed at trying to construct new business models that are adapted to the current reality. Similar needs are reported in the area of intellectual capital management, which is one of the resources in the business model. Many business units make advanced attempts at intellectual capital management (Pobrotyn, 2012, p. 121). Their modern organisational models are characterised by the dominant role of human and intangible resources. It is a kind of 'escape' towards softer management elements. Contemporary companies, aware of the importance of employees for their effective operation, invest in intellectual capital, which allows to improve the technical and organisational efficiency of work systems, improves the quality of life at work, and the motivation of employees becomes stronger (Sokołowska, 2005, p. 17).

Focusing on intellectual capital is, above all, the result of its great importance in terms of building a company's competitive advantage. The proper combination and management of the components of intellectual capital contributes to its effective creation and expansion.

Optimal management of intellectual capital is intended to lead to a strong market position for the company. The appropriate shaping of the components of this capital should become necessary in the pursuit of development and effective competition (Beyer, 2012, p. 252). The effects in terms of competitive advantage generated by intellectual capital are presented in Figure 2.

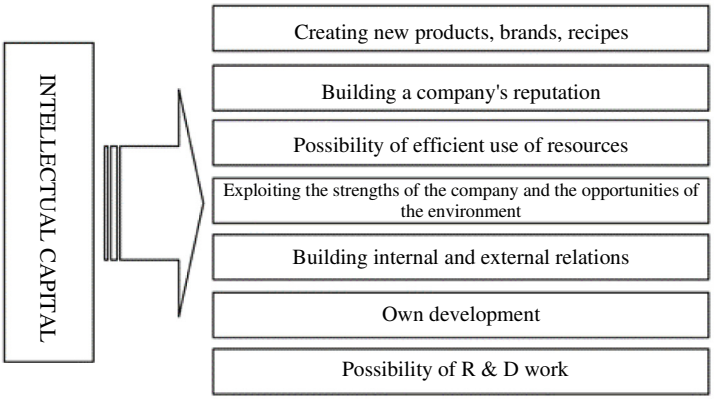

Fig. 2: Selected fields of competitive advantages generated by intellectual capital
Source: (Szara, Pierścieniak, 2007, p. 255)

The intellectual capital held is conducive to the creation of new products and brands and to building the company's reputation. Moreover, it is an opportunity to make effective use of the resources held by the unit and to make use of the strength of the company and the opportunities created by its environment. It initiates the construction of internal and external relations, as well as its own development and a very important opportunity to carry out research and development (R&D).

Today, the management of intellectual capital is regarded as one of the basic tools for managing the future. It is an opportunity to radically reorient the way all entities think and act. It brings units measurable effects in the form of: an increase in the value of intellectual capital, an increase in creativity, competitiveness, development of intellectual resources and promotion and management of knowledge. It is this knowledge, which allows to gain an advantage over other entities, that influences the final result, i.e. the value of the entity. Creating it, based on intellectual capital, gives the company a chance to gain and maintain efficiency at a high level in the long term (Pobrotyn, 2012, p. 132). In view of such perceived role of intellectual capital, we notice its particular importance in the process of value creation, described in the business model.

Presentation of intellectual capital in reporting of the KGHM Group in 2016-2018 and the impact of the business model on its competitiveness

The KGHM Group was chosen as a practical example to present the issues of intellectual capital in terms of business model and competitiveness. In the KGHM report we can read that "KGHM Polska Miedź S.A. Capital Group is a global, innovative organisation which conducts technologically advanced exploration, extraction and smelting activities. The KGHM Group is one of the world's leading producers of silver and copper. It also produces gold, nickel, rhenium, lead and platinum. For several decades, it has been extracting and processing polymetallic ores, mainly copper and silver - initially based on one of the largest deposits in the world located in south-western Poland, and currently operating on four continents - in Europe, South America, North America and Asia. KGHM Polska Miedź S.A. Capital Group consists of KGHM Polska Miedź S.A. as the parent company and several dozen subsidiaries - 75 entities in total, employing over 34 thousand people" (Sustainable Report of KGHM Polska Miedź S.A. for 2018). In addition, KGHM is extremely active in the fight against the COVID-19 pandemic through its activities for Polish hospitals and institutions. The initiatives taken for their own employees and their families deserve particular emphasis (https://kghm.com/pl/koronawirus). Taking into account the pandemic situation, KGHM identifies risks related to the significant importance of the Chinese economy for copper consumption.

The entity builds its competitive advantages in five areas: financial stability, innovation, integrated from exploitation to sale, global reach of operations, and, important from the point of view of intellectual capital, unique competences and skills.

The description of the unique competencies and skills shows that "during its over 60-year history, KGHM Polska Miedź S.A. has gained experience, knowledge and skills which have allowed it to transform itself from a local mining company into an international Group, playing a significant role on the global non-ferrous metals market. The skills of the employees are and will be used in the future as one of the basic elements of building a competitive advantage in the industry and in building a strong position of Poland as an industrial centre" (Sustainable Report of KGHM Polska Miedź S.A. for 2018). It would not have been possible to implement measures to increase competitive advantage if it had not been for cooperation with the Stakeholders, among them: employees, including trade union members, suppliers, customers, industry organisations, competitors and research and scientific institutions, as well as universities.

On the KGHM website it is possible to find electronic versions of integrated reports since 2005. After analysing the content of the individual years, it can be concluded that in the years 2005-2012, the entity prepared an "annual report", and issues related to the broadly understood intellectual capital were defined as: people and the environment, social responsibility, people with the greatest company capital, corporate social responsibility and employment. In the subsequent years 2013-2017, the report was described as an integrated report, and the term human and intellectual capital was used to present the issues discussed. For 2018, KGHM has prepared a sustainable report in which the human capital category appears. In the report for the following year, the term "Integrated Report" was reinstated, but no intellectual capital category was introduced (Integrated Report of KGHM Polska Miedź for 2019).

The information contained in the Integrated Reports of the KGHM Group for 2016 and 2017 shows that, similarly to the previously analysed reports, it was prepared in accordance with the guidelines of the Global Reporting Initiative (GRI), in version GRI G4 (KGHM Polska Miedź S.A. Integrated Report for 2016 and 2017).

The key financial and non-financial data ***statement***, presenting separately the significant values of KGHM Polska Miedź S.A., the KGHM Group and KGHM INTERNATIONAL LTD. and Sierra Gorda S.C.M., the data are divided by capital. Only in the case of KGHM Polska Miedź S.A., human and intellectual capital, treated together, was included among the listed capitals, i.e. production, natural and social capital.

Table 3: Human and intellectual capital of KGHM Polska Miedź S.A.

HUMAN AND INTELLECTUAL CAPITAL

	2016	2017
Total number of employees	18 266 people	18 198 People
Number of employees taking part in a single training event	31 133 people	28 387 People
Number of accidents	370	300
Fatal	13	2
Severe	2	4
LTIFR rate (Lost Time Injury Frequency Rates, total number of accidents / total number of hours worked x 1 million)	12.7	10.4

Source: Own elaboration on the basis of the study: KGHM Polska Miedź Integrated Report for 2017

In the reports presented, human and intellectual capital is presented literally, i.e. in conversion to employees. The total number of workers employed is given and classified according to the number of those involved in the training, and the number of accidents, including severe and fatal ones, is disclosed. In the years under consideration, the number of workers and accidents decreased slightly. In addition, there is the LTIFR rate, which indicates the ratio of the total number of accidents to the total number of hours worked. This rate has decreased in relation to the previous year.

The report also indicates that one of the priority elements of management is innovative activity aimed at raising productivity by increasing the role of intellectual capital and strengthening the protection of intellectual property. The most important activities undertaken in 2016 were also presented, including work on contractual clauses securing intellectual property rights in the case of contracts for research and development. In 2016, 12 R&D projects were continued with key industry partners as well as scientific institutions.

The Integrated Report of KGHM Group treats intellectual capital very generally. What is more, it was presented together with human capital. It can be concluded that this capital is embodied by the number of employees. The fact has been highlighted that management seeks to increase the role of intellectual capital. The presented R&D activities have been shown through the prism of innovative activity, which was particularly emphasised in 2016.

The report for 2017 states that "the most valuable capital of KGHM Group are its employees. The experience and commitment of our staff is the key to the development of all areas of our business model - it builds the global importance of the company and makes us an integrated, future-oriented organisation". KGHM intends to maintain and improve human capital and the related intellectual capital.

The report states that: "safety, cooperation, result orientation, responsibility and courage of employees translate into the results and position of the entire Group. The best experts and specialists are recruited and the knowledge and competences of experienced employees are used. KGHM shares its knowledge and ingenuity, and places great emphasis on commitment and honesty in its daily work. The consequence of such an approach is efficiency, the company's achievements and market position" (Sustainable Report of KGHM Polska Miedź S.A. for 2018).

In the case of the report for 2018, KGHM changed its name from "Integrated Report" to " Sustainable Report". It also does not use the term intellectual capital, but human capital, which is the most important and crucial in the continuous improvement of processes; equally important in the development is innovation and the involvement of employees.

Intellectual capital, alongside financial, productive, natural, social and relational and human capital, is a fundamental element of the business model. KGHM's business model is divided into seven areas through which the Group provides a full value creation chain - from exploration to the sale of finished products. On the basis of Figure 3, it can be concluded that the presentation of the business model in the KGHM Sustainable Report is very general and only visually and terminologically presents the process from the search for resources to their sale. This may be due to the reluctance of enterprises to disclose details of their business model as a key element in building competitive advantage in the global economy.

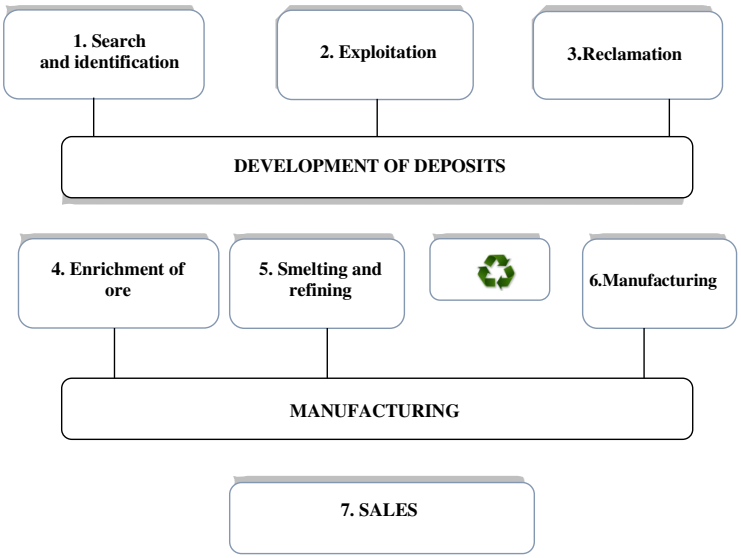

Fig. 3: Business model

Source: Own elaboration on the basis of the study: Sustainable Report of KGHM Polska Miedź S.A. for 2018

In the context of the impact of the business model on KGHM's competitiveness, four national rankings have been verified, which include:

1) R1/2000 companies - ranking of the Rzeczpospolita daily "List 2000", which presents the largest companies in Poland in terms of generated revenues (List 2000)
2) R2/200 companies - Wprost Ranking of "200 Largest Polish Companies", which presents the largest Polish companies in terms of generated sales revenues (200 Largest Polish Companies)
3) R3/100 companies - Ranking Wprost "Polish Ambassadors" (Polish Ambassadors)
4) R4/800 companies - Ranking of "800 largest industrial companies in Poland".

The statement includes sales value, net profit, assets, equity - all these parameters on an annual basis (2017 and 2018). The sale in 2018 serves as a criterion for sorting out the base of companies, which best illustrates the scale of their operations. The list includes companies directly involved in the production and extraction of raw materials and those providing services to industry (800 largest industrial companies in Poland).

KGHM's places in the individual rankings are presented in Table 4.

Table 4: Position of KGHM in the selected rankings

Ranking	2016	2017	2018	2019
R1/2000 companies	**7**	**7**	**7**	**no data**
R2/200 companies	**5**	**6**	**6**	**6**
R3/100 companies	**no data**	**1**	**no data**	**10**
R4/800 companies	**no data**	**6**		**no data**

Source: own elaboration

On the basis of the presented rankings for the years 2016-2019, it can be concluded that the entity occupies a high and stable place, which proves its high competitiveness and effectiveness of its value chain-based business model.

Despite the fact that in the knowledge era, intellectual capital is one of the most important elements creating the value of a company, there is still no commonly accepted way of disclosing information about it. Integrated reporting may provide a solution to this problem, provided that the IIRC guidelines are improved in the future.

Conclusions

When determining the components of intellectual capital, the studied entity is relatively compatible, i.e. it lists mainly experienced team, knowledge and innovation, strategies and integrated management. In terms of figures, repeated information is the number of workers employed and data on training and accidents at work. None of the reports analysed included an evaluation of intellectual capital. This may indicate that we are dealing with a relatively young phenomenon, but at the same time difficult to evaluate and interpret. The lack of top-down valuation rules means that the report providers simply stop at disclosing their resources. Each report contains information on the research and development activities carried out. Awareness of the huge role played by workers is also highlighted. In the case of the Integrated Report of KGHM Group, information on intellectual capital is marginal.

In view of the above, it is justified to develop a single, universally accepted definition of intellectual capital and to categorise its components. The need is also identified to develop commonly used methods of valuation of intellectual capital, which has a relevant importance in terms of building a competitive advantage of an enterprise.

At a time of unprecedented crisis related to the COVID 19 pandemic, there is a need to re-examine the business model and pay particular attention to human resources as a fundamental component of intellectual capital. Employees are the unit's most important stakeholders and play a crucial role in maintaining business continuity in difficult times. Business continuity planning and management covers infrastructure, cyber, employee, business, operational and communication risks, and aims to manage an organisation that faces new challenges and risks and ensure continuity of operations and production (PwC, 2020).

There is a need to re-examine the business model. Completing the missing elements in the risk management and business continuity strategy, adopting the changes associated with the digital transition and modelling scenarios such as 'what if ' may not be sufficient in the current crisis situation. It is becoming necessary to return to the fundamental foundations of the business model, which may be to investigate sources of revenue and identify all risks that disrupt the process of providing products and services to customers. It is crucial to have widely diversified and balanced distribution channels for products and services, in particular virtual functions using web, mobile and social platforms (Wagner, 2020).

Taking into account the above considerations and the exemplary presentation of the issues presented in KGHM, it is particularly important to pay attention to the place of intellectual capital in an unit's business model. This capital can be a key link in the process of creating value over time in view of the reality caused by the COVID-19 pandemic. Actions in this area, by building a competitive advantage, will make it easier to continue to operate in the face of the current challenges.

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Application of The Model of Risk Classes (MRC MODEL) In Covid Time

Katarzyna CHŁAPEK

chlapekk@uek.krakow.pl
Cracow University of Economics, Cracow, Poland

Abstract

The phenomenon of economic risk is the subject of many scientific considerations, and measuring it has been identified as a challenge. In addition, the current situation of the COVID-19 pandemic has a significant impact on business security around the world. The aim of the article is to draw attention to the possibility of measuring economic risk using discriminatory analysis tools, in the form of a model of risk classes. The advantage of the model is the availability of data from a financial statement. The study used official financial data of companies listed on the Warsaw Stock Exchange (WSE) and information collected from the websites of the entities subject to the study. The study shows that it is possible to use the proposed model in the economic risk analysis of units. This article recognises the need for future studies on how to adapt the model to current conditions, especially in the areas of non-financial data, in order to include them in the model of risk classes. The results of the study can be useful to both scientists and practitioners interested in economic risk assessment in economic entities.

Keywords: measurement of the risk, model of classes of the risk, discriminatory analysis, COVID

Introduction

The widespread topic of risk indicates an increase in interest in the world literature, but it does not bring a model approach to measuring economic risk, which could be implemented in the Polish reality. The opportunities created by the market are at the same time threats which very often hinder the survival of individual units and may create a real threat to their survival in a broad global market (Brunnermeier *et al.,* 2019). The fact that the risks arising from the globalisation process itself is repeatedly highlighted, which is linked to the need for economic units to constantly adapt to the broadly defined changes taking place in the economy (Liu, 2012, p. 287).

The issue of risk and its quantification on the basis of data from financial statements is a challenge to accounting as a system. Already R.C. Merton (winner of *the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel i*n 1997) emphasised the possibilities of creating goodwill through better use of risk management in the entity, which can definitely lead to an increased competitive position (Girotra, Netessine, 2011, p. 104). The dynamic development and changes in the economic reality make the measurement of phenomena more and more complicated (Walińska, 2014, p. 509), hence the methods of its implementation should be constantly verified and adjusted, both to the requirements and conditions of the market and to the possibilities offered by modern computing techniques. It is believed that a great role in the sphere of measuring such a complex phenomenon as economic risk is played by modern measurement methods, together with their technical support in the form of IT systems, using exploratory techniques that make it possible to carry out extremely complex calculations in the field of advanced mathematics, statistics and econometrics, which are a tool of extraordinary information capacity and rapid impact on the perception of scientific cognition of the phenomena studied, and which also increase the cognitive and representative value of the issues studied.

Confirmation of the need to create current models related to the subject of risk measurement is confirmed by the constant struggle on the theoretical ground in this subject, discussed among others in the Harvard Business Review (Merton, 2013, p. 51). The current situation of the COVID-19 pandemic poses another challenge and reveals the need for an in-depth analysis of the economic risk phenomenon (Noy *et al.,* 2020, p. 413).

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The main aim of the article is to present the concept of measuring economic risk, based on data contained in financial statements in the form of a model of risk classes, as a tool to support the analysis of this phenomenon in the COVID-19 pandemic. According to the author, the model, which is based on data from the period after the recent crisis, that is to say, after 2008, can be a tool to support economic risk assessment in economic entities, especially in the current conditions. The concept of economic risk in the article is limited to risks related to the activities of business entities.

Through the use of the research method, which is a controlled experiment, it was possible to create a model verified by the tools of discriminatory analysis, which means criticising the resulting knowledge in order to determine its application in practice, which was the main assumption of the author, since the developed model is to have the properties of implementation in the measurement of risk, with the simultaneous indication of the development possibilities of economic theories, both in terms of measurement methods and in terms of research conclusions. The classification into a specific risk class derived therefrom, which is the measure of risk, determines the average, rather than the strict and accurate relationship between the phenomena being studied, given the uncertainty of economic life.

Economic risk as a threat to individual safety at the time of COVID-19

The concept of risk is associated with every area of social life, by putting all events dependent on active human activity at risk. The origin of the word risk has not yet been unequivocally explained, as its etymology dates back to ancient times, but nevertheless, in all expressions, risk has two different but closely related meanings:

- a risks caused by human activity, as processes taking place within the human environment, but outside of the human activity,
- a risk that is a dangerous undertaking, taken by a man characterised by courage (Kaczmarek, 2010, p. 64).

Particularly noteworthy is the system proposed by F. H. Knight to distinguish between risk and uncertainty, which is based on the division into measurable and non-measurable uncertainty (Karmańska, 2008, p. 29-30). Based on these assumptions, uncertainty is defined as a state of immeasurable uncertainty, and risk is a quantifiable form of uncertainty. Another example of interpretation, proposed by Mr Bromiley, K. D. Miller and D. Rau (Bromiley *et al.,* 2001; Urbanowska-Sojkin, 2013, p. 19) refers directly, in the definition of uncertainty and risk, to a business entity, defining uncertainty as the unpredictability of the situation both within the entity and in its environment, and risk in the context of strategic management as the unpredictability of the variability of results of undertakings related to revenues, costs, profits and market shares.

Given the omnipresence of risk in business activities and the dynamic emergence of new risk areas, it becomes necessary to seek to assess existing and future threats (Lai *et al.,* 2009, p. 44). The prerequisites for sound risk assessments are tests to identify risks in the light of current market conditions, measurement using appropriate methods and techniques and on the basis of reliable and credible information, and proper interpretation of the results obtained.

The role of accounting in this matter is not insignificant because of its informative function, based on fulfilling both the requirement of reliability and the reliability of the information, aimed at the particular importance of the qualitative characteristics of economic information according to quality theory (Micherda, Szulc, 2013, p. 43). In the context of economic rationality and current trends to which both accounting and management are trying to conform, any sign of risk that represents both an opportunity and a threat is relevant and therefore perceived according to a neutral concept of risk (Jajuga, 2008, p. 13). With regard to management, the role of the threats associated with risk is emphasised, and preference is given to seeking to exploit them in order to achieve benefits, both in the development and day-to-day operation of the entity (Merchant, 2012, p. 32). In view of the definition of risk, which includes in its scope the results achieved as a result of operations (Nowak, 2013, p. 497) in the accounting conclusions, each result (understood as net financial result) is of significant importance, with particular attention paid to the negative result (net loss), resulting in a decrease in the value of the capital and, consequently, a decrease in the value of the unit, which is also connected with a negative impact on its development capabilities (Micherda, 2005, p. 199). Measurement of risk is particularly important for business security because "the risk is to involve all kinds of resources into activity: physical, financial and human. It also concerns the results that are achieved as a result of the activities conducted" (Nowak, 2013, p. 497)

The situation of the COVID-19 pandemic, which is a global phenomenon, undoubtedly represents an extremely important risk, which can be identified in the process of identifying the risks of business units. The so far unknown consequences of the various activities of market participants will be reflected in the financial results of all entities,

hence the particular need to examine the situation of entities on the basis of available data in the form of financial data generated by the accounting system.

Assumptions and classification capabilities of the model risk classes

The measurement of economic risk, based on the financial statements, is an attempt to assess the likelihood of a specific risk being realised and to evaluate the possible economic impact related to the realisation of the identified risk. In this respect, it means to determine first of all the impact of a specific risk factor on the financial situation of an enterprise (Walczak, 2008, p. 305). The market conditions of recent years have led to the concentration of the main objective of doing business not only on the increase in the value of the owners' assets (Skoczylas, 2009, p. 75), which responded to the postulated idea that "the main financial principle of a business enterprise is to maximise the owners' wealth" (Myddelton, 1996, p. 17), but also on the impact on social development and responsibility towards environmental problems.

The literature of the subject distinguishes a number of methods for a specific quantification of risk. The basic division, implemented from the analysis of the unit's activity, allows for separation of:

1. *the qualitative analysis methods* including:
- analysis of the structure of financial statements,
- analysis of the dynamics of the different values of financial statements (Skoczylas, 2009, 143).

2. *the quantitative analysis methods*, including methods of descriptive statistics: arithmetic mean, median, standard deviation. By classifying the methods of quantitative analysis it is possible to distinguish:
- comparison methods, also called deviation methods,
- deterministic methods,
- stochastic methods, including:
  - econometric methods of causal analysis,
  - discriminatory methods (e.g. *Altman's Z-score model (*Altman, 1968, p. 589-609)).

Professor Edward I. Altman (Professor at *the Stern School of Business at New York University)* developed *the Altman model, the Z-score indicator,* which combines traditional indicator analysis with multidimensional discriminatory analysis to enable the best possible differentiation of units at risk of bankruptcy. At a conference in New York, *Asset and Risk Allocation,* held in April 2013, he identified areas of major risk (Altman, 2013). During the *Credit Risk Seminar* at the Cracow University of Economics in March 2019, Professor E. Altman presented in a speech entitled *Credit Cycle Outlook and the Altman Z-Score Models After 50 Years* the possibility of using this model in assessing the condition of individuals and their risk of bankruptcy.

The methods used to analyse an unit's activities on the basis of financial statements, using a discriminatory analysis, may at the same time, on the basis of their cognitive value, constitute basic methods for quantifying risk. Their interpretative support may be provided by the construction of diagrams defining the uncertainty levels of an entity's situation, *grouped into specific classes* (Monkiewicz *et al.,* 2010, p. 24). The concept of risk measurement using risk classes is commonly used in the insurance and banking industry, as well as in all types of ratings (Korol, 2010, p. 77-78).

Drawing on the experience in this area (Sierpińska, Wędzki, 2010, p. 154), under the conducted research, it was decided to measure the risk using this methodology, specifying in detail the conditions of belonging to a specific risk class, including indications of the use of discriminatory analysis in the classification of objects into classes (Hand, 1994). On the basis of the review of the scientific acquis, the legislation and recommendations laid down in national and international regulations, the market analyses carried out and the systematic observation of units operating in a market environment on a multi-annual basis, the items likely to have a significant effect on an undertaking's financial position have been identified. The current trend towards the multiplication of owners' capital has also been confirmed, according to which a particular area of interest should be beneficial financial results, unambiguous with:

- making profits,
- maintaining financial liquidity,
- maximising the market value of the unit (Micherda, 2005, p. 12).

The research carried out has made it possible to specify the following attributes, which may be of significant importance in the context of the theoretical issues referred to above and the provisions of ISA 570 (ISA 570), including:

1. *a decrease in the balance sheet total*, where the basis for assessment is the *Balance sheet*,
2. *a negative net cash flow*, where the basis for assessment *is the Cash Flow Statement,*
3. *no dividend payment*, where the assessment is based on data from the *Cash Flow Statement,*
4. *a negative net financial result stream*, the assessment of which is based on the data contained in the *profit and loss account*.

Due to the assumptions of the method of discriminatory analysis, determining its application to the division of comparable objects into groups of objects as similar as possible, due to the properties describing them, it was decided to use linear discriminatory analysis (Panek, 2009, p. 278). This choice is also supported by the fact that, in the light of the latest research on the effectiveness of the analysed methods, discriminatory analysis took second place, behind the classification tree method (Dębkowska, 2012, p. 182).

The determined scale of the economic risk classes allows for its measurement in five steps, from the lowest risk, marked R0, to the highest risk, marked R4. In addition, each risk class from R0 to R4 has been assigned a corresponding numerical identifier from 0 to 4, characterising each risk class. The classification assumed an increasing trend, according to the assumed designations, from level 0, which is characteristic of an unit with a low level of risk, to level 4, which is characteristic of an unit with the highest level of risk in the assumed scale.

On the basis of these assumptions, the units were analysed in terms of the four characteristics listed and classified, specifying detailed conditions in the following ranges:

1. trend of the balance sheet total - in the case of a decrease in the balance sheet total, the unit is defined as meeting the condition of an unfavourable situation (the condition is met),
2. net cash flow - in a negative net cash flow situation, an unit is determined as meeting the condition of an unfavourable situation (the condition is met),
3. dividend - in the absence of dividend payment, an entity is defined as meeting an unfavourable situation condition (the condition is met),
4. net financial result - in a situation of negative financial result, i.e. net loss, an unit is defined as fulfilling the condition of an unfavourable situation(the condition is met).

Detailed classification assumptions for determining the appropriate risk class are set out in Table 1.

Table 1: Principles for classifying units into risk classes

Risk class symbol	Numeric symbol of risk class	Determination of risk class	Qualification conditions
R0	0	Risk at level 0	Does not meet any condition of an unfavourable situation
R1	1	Risk at level 1	Meets 1 condition of an unfavourable situation
R2	2	Risk at level 2	Meets 2 conditions of an unfavourable situation
R3	3	Risk at level 3	Meets 3 conditions of an unfavourable situation
R4	4	Risk at level 4	Meets 4 conditions of an unfavourable situation

Source: own elaboration

The model uses a classification using the Mahalanobis distance concept and uses a *posteriori probability,* i.e. probability based on knowledge of the values of other variables that a given case belongs to a specific class (Kaczmarek, Czajka, Adamska, 2008). In the study, the highest classification capacity was obtained on the basis of data from 2009, where data analysis was used for all variables and for variables selected by using ANOVA, Levene and Brown Forsythe tests.

The result of the conducted research process is a model of risk classes, on the basis of which it is possible to classify the selected unit to the appropriate risk class. The shape of the classification functions is presented in Table 2.

Table 2: The shape of classification functions for individual risk classes

Indicator abbreviation/risk class	R0	R1	R2	R3	R4
Constant	-94.3895	-82.0821	-78.2784	-60.4243	-226.480
W2	-13.4492	-12.8185	-14.0382	-13.1956	-32.604
W4	0.7200	0.6575	0.7482	0.7074	1.620
W7	-32.4344	-34.1088	-28.0344	-24.4290	-46.021
W8	416.5322	394.7925	378.2531	338.3605	636.514
W12	-1.0660	-1.0503	-0.9966	-0.9659	-2.238
W16	287.9066	239.9838	320.8627	296.6303	649.887
W17	-12.9711	-11.6148	-13.7309	-11.9249	-28.694
W18	4.8679	4.5385	5.3328	4.3248	11.742
W21	-0.2616	-0.0186	-0.7448	-0.8879	-1.864
W24	41.6464	37.6495	43.4848	35.7551	81.443
W25	7.1539	4.6743	6.6784	6.8128	11.681

Source: own elaboration

Each risk class is assigned a function defined by parameters. The determination of qualification to particular risk classes is based on 11 financial indicators selected for the model, presented in accordance with the Bronisław Micherda concept, described in Table 3.

Table 3: List of indicators selected for the model

Indicator abbreviation	Indicator name
W2	Payables turnover ratio
W4	Productivity rate
W7	Debt to equity ratio (financing structures)
W8	Debt ratio
W12	Leverage ratio
W16	Ratio of coverage of borrowed funds by financial surplus
W17	Return of sales (ROS I)
W18	Return of sales (ROS II)
W21	Return on equity (ROE)
W24	Financial liquidity index II
W25	Ratio of monetary self-sufficiency of financial activities

Source: own elaboration

The indicators selected as variables of the classification function characterise all the areas under analysis, in accordance with the adopted concept of indicator analysis, namely:

- W2, W4, W7, W8, W12, W16 enable an assessment of the asset and capital situation of the entity,
- W17, W18, W21 may be used to assess the profitability of an entity,
- W24 i W25 are among the indicators characterising the entity's financial liquidity.

When concluding on the shape of the classification functions, it should be noted that all the areas mentioned in the assessment of an entity's performance are important in measuring its risk.

The results of the conducted discriminatory analysis, indicating the classification and forecasting capabilities of the model created, are presented in Table 4.

Table 4: Classification and forecasting capacities in annual analysis based on 2009 data, after elimination of extreme and outlier cases

	correctness for the teaching sample (u)	correctness for the test sample (t)
for all variables	87.50%	35.71%
for variables selected according to ANOVA test	70.83%	42.86%
for variables selected according to Levene test	83.33%	50.00
for variables selected according to Brown-Forsythe test	41.67%	42.86%

Source: own elaboration

On the basis of the results presented in Table 4, it can be concluded that:

- high diagnostic power in the teaching sample (u) was obtained both in the situation of the analysis carried out for all variables and the analysis carried out on the variables selected according to the Levene test, the lowest in the analysis on the variables selected according to the Brown-Forsythe test;
- the highest diagnostic power in the testing sample (t) was obtained when carrying out the analysis on variables selected by the Levene test, and the lowest when carrying out this analysis on all variables,
- diagnostic power for variables selected according to ANOVA test showed average diagnostic power, both in the teaching (u) and testing (t) sample.

In the light of the information presented, a detailed analysis of the obtained results of the partial classification was performed in two studies: for all variables and in the analysis on variables selected by the Levene test (Table 5). The detailed analysis also included an analysis of the wrong choices, which strengthened the researcher's conviction of the reliability of the proposed model, due to the classification discrepancies, which fall within the vast majority within one class.

Table 5: List of the highest classification ability (2009) in the teaching (u) and testing (t) sample

List of the highest classification ability in the teaching (u) and testing (t) sample						
	for the whole sample	**R0**	**R1**	**R2**	**R3**	**R4**
after elimination of extreme cases and outliers for all independent variables in the **teaching sample (u)**	87.50	80.00	80.00	85.71	100.00	100.00
after elimination of extreme cases and outliers for all independent variables in the **testing sample (t)**	35.71	0.00	33.33	50.00	0.00	100.00
after elimination of extreme cases and outliers for independent variables selected according to the Levene test in the **teaching sample (u)**	83.33	80.00	100.00	71.43	100.00	66.67
after elimination of extreme cases and outliers for independent variables selected according to the Levene test in the **testing sample (t)**	50.00	33.33	66.67	50.00	0.00	100.00

Source: own elaboration

When analysing the results presented in Table 5, it can be concluded that the highest classification power in the group of units classified in class R4 has a discriminatory analysis performed on all independent variables (100% in the teaching sample (u) and 100% in the testing sample (t)). Among units classified in class R3 in both cases, the analysis showed the same results - 100% in the teaching sample (u) and -

0% in the testing sample (t). As regards the classification into the group of units in the risk class R2, significantly better results were obtained on the basis of the analysis carried out for all independent variables (85.71% in the teaching sample (u) and 50.00% in the testing sample (t)). In risk class R1, more favourable results were obtained on the basis of analysis conducted among units selected according to the Levene test - 100.00% in the teaching sample (u) and 66.67% in the testing sample (t). As far as the classification of units to the R0 risk group is concerned, in the teaching sample (u) the same results were obtained in both cases - 80.00%, while in the testing sample (t) better classification results were obtained by conducting the analysis on variables selected according to the Levene test.

Although the classification indicates some discrepancies, the proposed model of risk classes is a solution which supports the process of quantifying economic risk in units. Further research is needed to increase the credibility of the model and to adjust its parameters to the current market conditions, but it should be noted that the repeated attempts to build bankruptcy warning models have been characterised by a much lower level of effectiveness, which was even 50.6%(Sen *et al.,* 2004, p. 219-223). Despite the low credibility of the first models, they have become an inspiration for further attempts at scientific research. Currently, the bankruptcy warning models of E. Altman (Altman, 1968, 589-609) and A. Hołda (Hołda *et al.,* 2004, p. 169) are the models commonly used by auditors.

Model of risk classes (MRC model), as a tool to measure economic risk in COVID time conditions

The model of risk classes was developed on the basis of a survey which covered 54 entities (companies listed on the Warsaw Stock Exchange). The subject of the study were the financial statements together with the annexes for the years 2009-2012. This is a period in which economic entities have been confronted with the effects of the crisis which began in 2008. The verification of the model of risk classes was carried out on a sample of the same units from another period where the study included financial statements together with the annexes for 2013-2014. The scope of the study covered only financial information.

Taking into account the established research assumptions, the units surveyed were classified according to four specific attributes. The systematics carried out on the basis of the assumptions made allowed to group the units covered by the study into 5 risk classes, from R0 to R4. The units were then classified using the model of risk classes. The measurement results are presented in Table 6.

Table 6: Results of risk class classification for 2013 and 2014

Item	UNIT NAME	2013		2014	
		risk class by 4 attributes	risk class by the model of risk classes	risk class by 4 attributes	risk class by the model of risk classes
1	AWBUD	3	3	3	3
2	BUDIMEX	0	0	0	0
3	DECORA	2	2	2	2
4	ELEKTROTIM	0	0	0	0
5	NOWAGALA	3	3	1	2
6	RESBUD	2	2	1	4
7	ROVESE	4	4	4	4
8	TRAKCJA	2	2	2	2
9	UNIBEP	1	1	0	0
10	YAWAL	4	4	1	1

Source: own elaboration

Analysing the classifications received, it can be concluded that the model of risk classes achieved 100% effectiveness in 2013, but in 2014 there were differences in classification. The classification differences concern two units (Nowa Gala, Resbud), where the classification using the model of risk classes included the established companies in the group with a higher risk level. In the case of Nowa Gala, the classification discrepancies relate to a difference within a single risk class, while the Resbud classification indicates a divergent designation of a risk class as follows: according to four predefined attributes, the unit was classified as having a risk level 1, while the measurement of risk using the model of risk classes allowed the unit to be classified as having a risk level 4, which is a group of units with a significantly higher risk level. The reasons for this discrepancy are seen in the decline in the level of key indicators, the share of which in the classification function is high. Despite the discrepancies identified, there is a high level of credibility of the model of risk classes. The diagnostic capabilities of the model are confirmed by the observations made in subsequent years among the entities covered by the survey:

1. AWBUD - suspension of trading in shares on the WSE on 02.05.2019, then return to the WSE, but currently operates as PARTNERBUD S.A. in bankruptcy;
2. NOWAGALA - a decision is to be taken in November 2020 on the withdrawal of shares from the WSE;
3. RESBUD - suspension of trading in shares and return to the WSE in 2019;
4. ROVESE – deleted from trading on the WSE on 30.08.2016;
5. YAWAL – exclusion from the WSE on 27.10.2015.

All companies listed above have been classified according to the model of risk classes as entities with high risk (class 3 or 4).

Given the potential for misinterpretation using the model approach to measuring economic risk, it is planned to continue research on the tool developed. However, its high classification capacity is noted, which allows it to claim the possibility of using in COVID-19 time.

Conclusion and indication of future research

Remembering the words of Professor Elżbieta Burzym, quoted after E. Walińska (Burzym, 2008, p. 34; Walińska, 2014, p. 511), stating that:"(...) accounting is used to measure (or more broadly - to identify, measure, analyse and communicate), and this measurement concerns, based on prices, the value of economic states and processes and the results of these processes", one should aim at indicating methods supporting the appropriate quantification of economic life.

The proposed model of risk classes may make it possible to measure a very complex phenomenon, which is economic risk. It is a tool addressed both to the persons managing units, analysing financial statements, and to auditors, making it possible to assess the unit whose report is subject to the audit process. This is particularly important in the context of the threats faced by units, especially in view of the COVID-19 pandemic, which also implies the need for a thorough analysis of the situation of the units.

At the same time, the study also poses a challenge to continue research in the area of risk measurement in order to adapt the proposed model of risk classes to current market conditions, taking into account data from non-financial reports, including social and environmental issues.

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"Innovation Cultural Management Under I4.0 Environment A PROMETHEE II and CODAS Analysis"

Verónica SANSABAS-VILLALPANDO
Doctorate Program, Department of Industrial Engineering and Manufacturing, Universidad Autónoma de Ciudad Juárez, Ciudad Juárez 32310, México,and *al182970@alumnos.uacj.mx.*
https://orcid.org/0000-0002-4662-0702

Iván Juan Carlos PÉREZ-OLGUÍN
Doctorate Program, Department of Industrial Engineering and Manufacturing, Universidad Autónoma de Ciudad Juárez, Ciudad Juárez 32310, México and ivan.perez@uacj.mx. *https://orcid.org/0000-0003-2445-0500*

Luis PÉREZ-DOMÍNGUEZ
Doctorate Program, Department of Industrial Engineering and Manufacturing, Universidad Autónoma de Ciudad Juárez, Ciudad Juárez 32310, México and luis.dominguez@uacj.mx. *https://orcid.org/0000-0003-2541-4595*

Arturo WOOCAY
Division of Postgraduate Studies and Research, Tecnológico Nacional de México, Campus Ciudad Juárez. Ciudad Juárez 32300, México and awoocay@itcj.edu.mx. *https://orcid.org/0000-0001-9235-0494*

Resumen

Este estudio presenta los múltiples factores a considerar para establecer los principios, objetivos y estrategias que influyen en la cultura organizacional en materia de gestión de la innovación con énfasis en la I4.0., donde se identifican 99 factores en base a revisión de literatura. Este estudio es significativo al presentar la determinación de un número reducido de factores, seleccionando los más significativos, mediante los métodos CODAS (Combinative Distance Assessment) y Organización de Clasificación de Preferencias para el Enriquecimiento de las Evaluaciones (PROMETHEE II) de manera comparativa. El análisis incluye adicionalmente métodos de ponderación de reducción de la ambigüedad, que considera la ponderación basada en los conocimientos adquiridos por los investigadores en la cultura organizacional de innovación y el juicio de expertos bajo la escala Saaty. El análisis comparativo determinó que las alternativas propuestas por el análisis CODAS modificado y PROMETHEE II, tienen un factor de coincidencia 43% entre los principales 30 factores seleccionados de 99, de las alternativas iniciales disponibles, proporcionando mayor confianza en la selección de factores en gestión de la innovación, así como la toma de decisiones en la asignación de recursos disponibles en las organizaciones para estos fines.

Abstract

This study presents the multiple factors to be considered to establish the principles, objectives and strategies that influence the organizational culture in terms of innovation management with emphasis on I4.0. This study is significant because it presents the determination reduced of the number of factors, where 99 factors are identified based on the literature review, selecting the most significant ones, by means of the methods CODAS (Combinative Distance Assessment) methods and Preference Classification Organization for the Enrichment of Evaluations (PROMETHEE II) in a comparative way. The analysis also includes weighting methods for the reduction of ambiguity, which considers the weighting based on the knowledge acquired by the researchers in the organizational culture of innovation, and the judgment of experts under the Saaty scale. The comparative analysis determined that the alternatives proposed by the modified CODAS analysis and PROMETHEE II have a factor agreement of 43% of the main 30 factors selected from 99, of the initial available alternatives, providing greater confidence in the selection of factors in innovation management, as well as the decision making in the allocation of available resources e in the organizations for these purposes

Keywords: Innovation, Organizational culture, CODAS, PROMETHEE II, MCMD, I4.0

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Introduction

The study presents in a comparative way the multi-criteria decision making analysis tools CODAS methods and PROMETHEE II for innovation management with emphasis on the I4.0; the analysis additionally includes ambiguity reduction weighting methods, which considers the weights based on knowledge acquired by researchers in the innovation organizational culture, and the judgment of experts under the Saaty scale. The alternatives presented in the modified CODAS and PROMETHEE II comparative analysis have a factor agreement of 43% from the top 30, selected from 99 available initial alternatives, providing greater confidence in the selection of factors in innovation management, as well as decision making in the allocation of available resources in organizations for these purposes.

Theorectical And Conceptual Framework

The organizational culture is fundamental for innovation (Naranjo-Valencia & Calderón-Hernández, 2015; Hoogan & Cote, 2014; Krásnicka, Głód, Wronka, 2018), for increasing the companies competitiveness (Piccarozzi, Aquilani, & Gatti, 2018), for this reason, and considering the six dimensions established by the OECD (2015): (i.e. research and development, product, commercialization, quality and finances as the main ones),; 99 alterntives are identified in literature review and categorized in technology, finances, process, knowledge, organization and management of intellectual property (Sansabas-Villalpando, Pérez-Olguín, Pérez-Domínguez, Rodríguez-Picón & Méndez-González, 2019), considering Industry 4. 0 (Zhong, Xu, Klotz, & Newman, 2017; Adamik & Nowicki, 2019; Müller, 2019; Birkel, Veile, Müller, Hartmann & Voigt 2019; Braccini & Margherita, 2019), the use of new technological tools derived from artificial intelligence, the Internet of things, large data, automation, robotization, digitalization, etc., as relevant information for comparative analysis

Multi-criteria decision analysis methods (MCDA) have been successfully applied in different fields and disciplines (Roodposhti, Rahimi, & Beglou,2014; Sałabun, Wątróbski, & Shekhovtsov, 2020; Dachowski, & Gałek, 2020. The PROMETHEE II method (Preference Ranking Organization Method for enrichment evaluation), based on the preference function that can be effectively used on finite set of classification and selection alternatives based on some mutually independent and contradictory criteria, using pairwise comparison of alternatives where deviations shown by the alternatives according to each criterion are considered (Brans, & Mareschal, 2005).

The steps used in the development of the PROMETHEE II method.

Step 1. Standardize the initial decision matrix

For benefit criterial:

$$R_{ij} = \frac{[x_{ij} - Min(x_{ij})]}{[Max(x_{ij}) - Min(x_{ij})]} \tag{1}$$

- For non benefit criterial:

$$R_{ij} = \frac{[Max(x_{ij}) - x_{ij}]}{[Max(x_{ij}) - Min(x_{ij})]} \tag{2}$$

Step 2. Calculate the evaluative differences of the alternative *ith* alternative with respect to other alternatives.

Step 3. Calcule the values of the preference function:

$$P_j(a,b) = \begin{cases} 0 & si\ R_{aj} \leq R_{bj} \\ (R_{aj} - R_{bj}) & si R_{aj} > R_{bj} \end{cases} \tag{3}$$

Step 4. Calculate the added preference function:

$$\pi(a,b) = \left[\sum_{j=1}^{n} w_j P_j(a,b)\right] / \sum_{j=1}^{n} w_j \quad (4)$$

Step 5. Determine the input and output flow of the hierarchies:

Input flow:

$$\varphi^{+} = \frac{1}{m-1} \sum_{b=1}^{m} \pi(a,b) \quad (\mathrm{a} \neq b) \quad (5)$$

Output flow:

$$\varphi^{-} = \frac{1}{m-1} \sum_{b=1}^{m} \pi(b,a) \ (\mathrm{a} \neq b) \quad (6)$$

Step 6. Calculate the net outranking for each alternative:

$$\varphi(a) = \varphi^{+}(\mathrm{a}) - \varphi^{-}(\mathrm{b}) \quad (7)$$

Step 7. With the obtained values of $\varphi(a)$ the alternatives are hierarchized.

Methodology

This study is based on the multi-criteria analysis of the 99 factors that influence the promotion of an organizational culture towards innovation with emphasis on Industry 4.0, the CODAS methodology is applied, see the process in Figure 1. Subsequently, the initial CODAS analysis was evaluated, selecting the factors and considering the highest value, that differs from the initial analysis, which was consider the lowest value for classification purposes, thus defining the modified CODAS; continuing with PROMETHEE II, in both methods include the assignment of linguistic terms (HFLTS), are included for the assignment of values within a qualitative context, (Rodriguez, 2012). The weighting used is obtained by AHP (Wind & Saaty, 1980), the knowledge acquired and the reduction of ambiguity. Cronbach's alpha analysis is carried out to determine the consistency of the values included. A modified comparison of CODES and FTOPSIS is performed to determine the level of agreement in the higher-ranking factors.

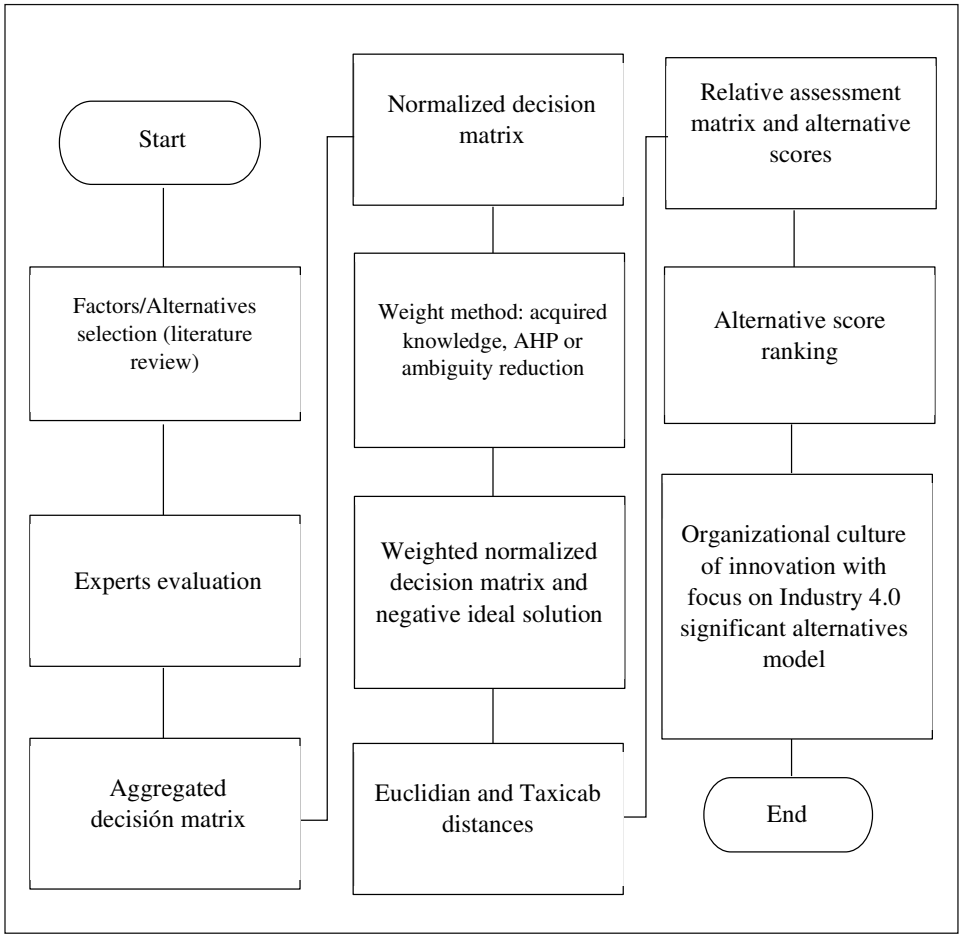

Fig. 1: CODAS methodology (Sansabas-Villalpando, Pérez-Olguín, Pérez-Domínguez, Rodríguez-Picón & Méndez-González, 2019).

Results

In the comparative analysis as a tool for decision making with the multicriteria methods of CODAS modified and PROMETHEE II, an agreement is found, in the selection of the factors of 43%, providing a reinforcement in the selection of organizational culture factors of innovation management, this applied allows to assignment of resources focus on relevant management. Table 1 presents the results obtained from the modified CODAS and Table 2 the results obtained from PROMETHEE II.

Tabla 1: Codas Modified ranking

CODAS MODIFIED					
				Assessment Weight	
ID	CODE	Ei	Ti	**Score**	**Ranking**
10	KM10	0.0931	5.9339	**-0.7353**	**28**
26	OM10	0.1005	6.6364	**-1.4214**	**1**
27	OM11	0.0992	6.3345	**-1.3078**	**12**
30	OM14	0.0970	6.4046	**-1.0992**	**16**
31	OM15	0.1005	6.6364	**-1.4214**	**2**
33	OM17	0.1005	6.6072	**-1.4175**	**4**
41	OM25	0.1004	6.5488	**-1.4120**	**6**
50	OM34	0.1004	6.5488	**-1.4120**	**7**
52	OM36	0.0994	6.2635	**-1.3301**	**11**
53	OM37	0.1005	6.6364	**-1.4214**	**3**
58	OM42	0.1005	6.6072	**-1.4175**	**5**
65	PRM3	0.0994	6.2927	**-1.3309**	**10**
85	TM1	0.0998	6.4559	**-1.3596**	**8**
81	IPM3	0.0962	6.0648	**-1.0266**	**17**
12	KM12	0.0933	5.7689	**-0.7622**	**26**
13	KM13	0.0938	6.0852	**-0.8018**	**23**
28	OM12	0.0970	6.2483	**-1.0993**	**15**
29	OM13	0.0930	5.8172	**-0.7308**	**29**
37	OM21	0.0936	5.3778	**-0.7990**	**24**
54	OM38	0.0946	5.6063	**-0.8860**	**22**
56	OM40	0.0990	6.0193	**-1.3007**	**13**
23	OM7	0.0933	5.7105	**-0.7600**	**27**
63	PRM1	0.0990	5.9901	**-1.2989**	**14**
66	PRM4	0.0957	5.9853	**-0.9829**	**21**
68	PRM6	0.0996	6.4094	**-1.3424**	**9**
69	PRM7	0.0960	6.1484	**-1.0094**	**18**
96	TM12	0.0958	6.1020	**-0.9965**	**20**
97	TM13	0.0958	6.0025	**-0.9989**	**19**
91	TM7	0.0930	5.8464	**-0.7306**	**30**
92	TM8	0.0938	6.0268	**-0.7980**	**25**

Conclusions

In the analysis carried out of the modified CODAS methodology and PROMETHEE II we found a 43% coincidence in the selection of the most significant factors; this allows us to conclude that the tool for decision making of factors the innovation in Industry 4.0 environment can be determined under any of the two methods as a tool that complements the selection of the allocation of resources by the decision-makers.

Table 2: PROMETHEE II, ranking

PROMETHEE II					
Ref	Code	ϕ+	ϕ-	ϕ(a)= ϕ+ (a)-ϕ-(b)	Rank
10	KM10	0.9393	0.0762	0.8632	1
26	OM10	0.1701	0.0402	0.1299	14
27	OM11	0.1452	0.0508	0.0943	24
30	OM14	0.1518	0.0534	0.0984	22
31	OM15	0.1701	0.0402	0.1299	15
33	OM17	0.1669	0.0405	0.1264	17
41	OM25	0.1701	0.0475	0.1225	19
50	OM34	0.1701	0.0453	0.1248	18
52	OM36	0.1468	0.0560	0.0908	27
53	OM37	0.1701	0.0424	0.1277	16
58	OM42	0.1701	0.0478	0.1223	20
65	PRM3	0.1468	0.0546	0.0922	26
85	TM1	0.1363	0.0572	0.0791	29
2	KM2	0.1912	0.0781	0.1131	21
5	KM5	0.2936	0.1246	0.1690	9
7	KM7	0.2054	0.0631	0.1423	13
32	OM16	0.4752	0.0168	0.4584	2
39	OM23	0.2234	0.0443	0.1791	6
40	OM24	0.2021	0.0514	0.1507	11
45	OM29	0.3000	0.0662	0.2338	5
19	OM3	0.2945	0.0323	0.2621	4
47	OM31	0.3418	0.0260	0.3159	3
48	OM32	0.1624	0.0740	0.0884	28
51	OM35	0.2637	0.1033	0.1604	10
20	OM4	0.1869	0.0917	0.0952	23
21	OM5	0.2190	0.0695	0.1495	12
24	OM8	0.2530	0.0750	0.1780	8
25	OM9	0.3461	0.1676	0.1785	7
72	PRM10	0.2177	0.1430	0.0746	30
88	TM4	0.1970	0.1039	0.0931	25
ϕ+ Positive input flow					
ϕ- Negative input flow					
ϕ(a) Hierarchy of alternatives					

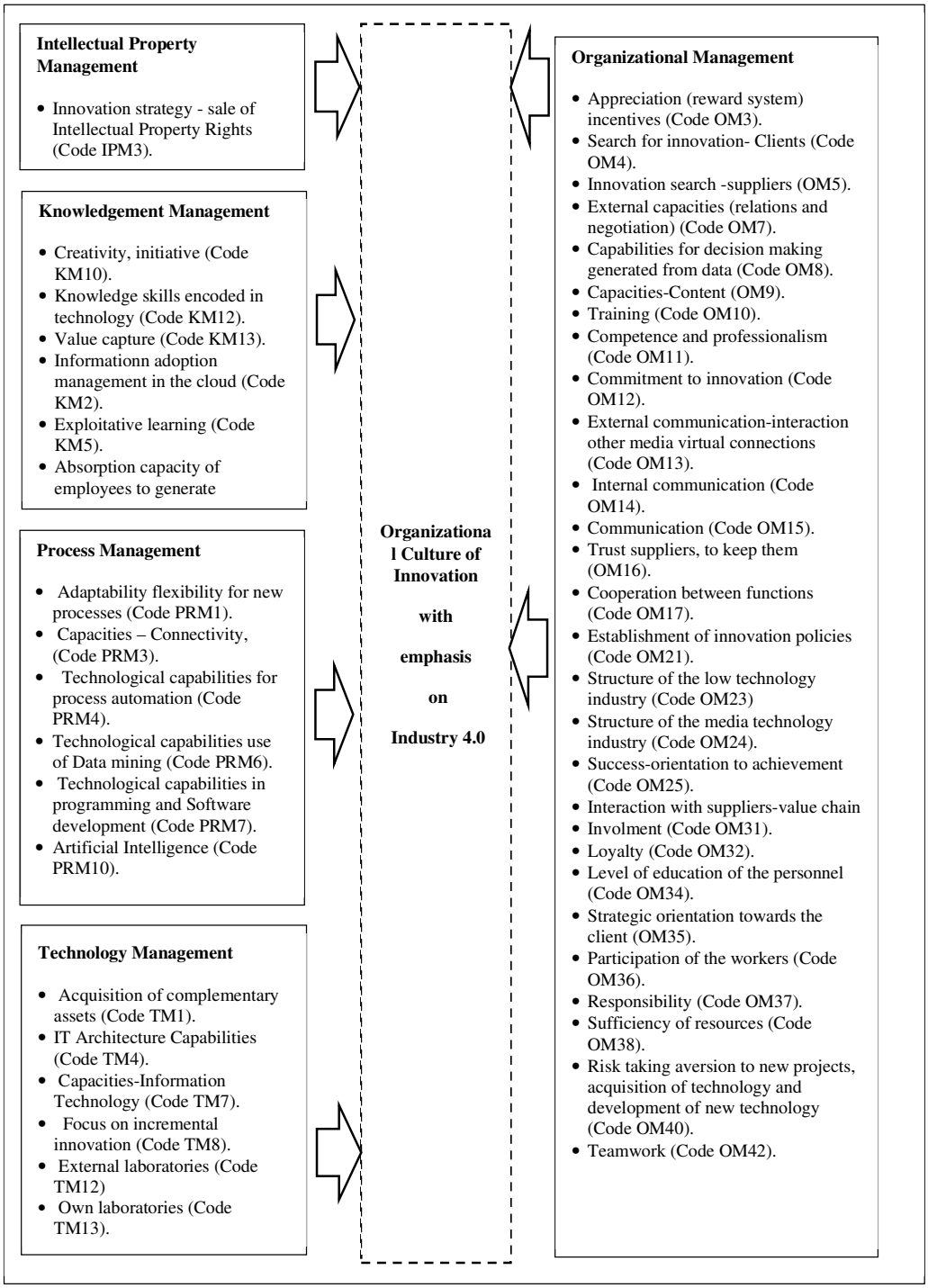

Figure 2: Model of organizational culture in innovation with emphasis on Industry 4.0. (CODAS-Modified and PROMETHEE II).

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Management of Labour Migration and Its Impact on Rural Sustainable Development: The Case of Ukraine

Svitlana LUKASH
Sumy National Agrarian University, Ukraine
E-mail: svitlana.lukash@gmail.com

Olena PIZNIAK
Sumy National Agrarian University, Ukraine
E-mail: bykhovets@latifundistmedia.com

Alina BRYCHKO
Sumy National Agrarian University, Ukraine
E-mail: alinkabrychko@gmal.com

Nataliia MASLAK
Sumy National Agrarian University, Ukraine
E-mail: n.maslak@ukr.net

Oleksandr MASLAK
Sumy National Agrarian University, Ukraine
E-mail: almaslak@ukr.net

Abstract

Labor migration is the main type of world migration in the XXI century. The paper summarizes the key routes through which internal and international migration impact rural development and some of the evidence pertaining to these effects in low-income countries. It concludes that, although the study of migration impacts on rural economies has come a long way from the early dual theories of development, some of the potentially more important aspects remain to be investigated systematically. International labor migration is a complex and ambiguous phenomenon and is a process of territorial interstate movement. Labor migration is a common feature of economic development. The main causes of labor migration in the world are analyzed and Ukraine is singled out. The mobility of people for temporary or permanent employment is a common characteristic of agricultural activity. In some regions, especially in rural areas, there are incredibly significant migration flows, which have a significant impact on people, households, and regions of origin. Despite the growing debate about the motivations and consequences of recent migration flows, the costs and benefits of this global phenomenon remain unclear and remain far beyond public policy. The purpose of this paper is to review key issues related to labor migration in rural areas; analysis of the impact of migration processes on economic development; identification of the main directions of migration management for improvement in interconnection of state governance and business representatives.

Keywords: migration, international labour migration, labour market, rural development, business, sustainable development

Introduction

International labor migration is a complex and ambiguous phenomenon and is a process of territorial interstate movement. Ukraine is now among the top ten donor countries for international migrants in the world. Labor migration is a common feature of economic development. The main causes of labor migration in the world are analyzed and Ukraine is singled out. Mobility of people for temporary or permanent employment is a common part of agricultural activity. In some regions, especially in rural areas, there are incredibly significant migration flows, which have a significant impact on people, households and regions of origin. Labor migration plays a key role in the redistribution of labor between countries, regions, and continents, thus changing the situation in the global, regional and national labor markets.

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The reasons for labor migration are often attributed to the problems of Ukrainians. According to a survey which was held by the sociological group "Rating" commissioned by the Center for Analysis and Sociological Research MRI from 30 to 31 July 2020, unemployment is one of the most important problems for Ukrainians (31% of respondents). The list also includes such problems as low production (19%) and delayed wages (5%).

Formulation of the goals of the article

Despite the growing debate about the motivations and consequences of recent migration flows, the costs and benefits of this global phenomenon remain unclear and remain far beyond public policy.

The purpose of this article is to review key issues related to labor migration in rural areas; analysis of the impact of migration processes on economic development; identification of the main directions of migration management for improvement.

Results of the research

Labor migration from Ukraine is growing every year. According to various estimates, 1-5 million Ukrainians are working in other countries. The Ministry of Social Policy of Ukraine notes that the current number of permanent labor migrants from Ukraine is 3.2 million, but due to the seasonal nature of this phenomenon, 5-7 million people are involved in the process.

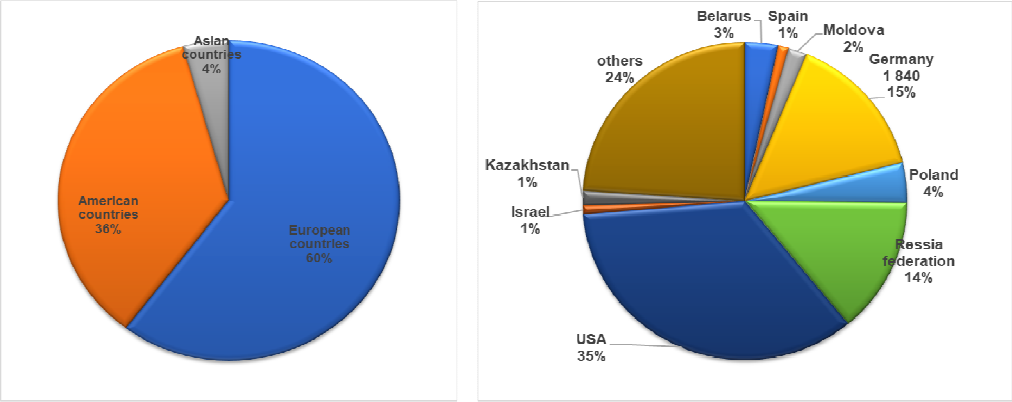

Source: developed by authors with data http://www.ukrstat.gov.ua/

Fig. 1, 2. Main countries of residence of Ukrainian labour migrants in 2019, %

According to the State Statistics Service [7], the total migration movement of the population in Ukraine in 2019 in rural areas amounted to 166 thousand people. For analysis of this situation was calculated ratio the amount of people employed in agriculture and the amount of people employed in rural areas. Thus, according to the State Statistics Committee in 2019, 3010.4 thousand people worked in agriculture. This number has increased compared to 2018 (2937.6 thousand people), but remains lower than in 2012 (3308, 5 thousand people). According to the results of the labor force survey, 5,205.7 thousand people are employed in rural areas out of a total of 16,668 thousand people.

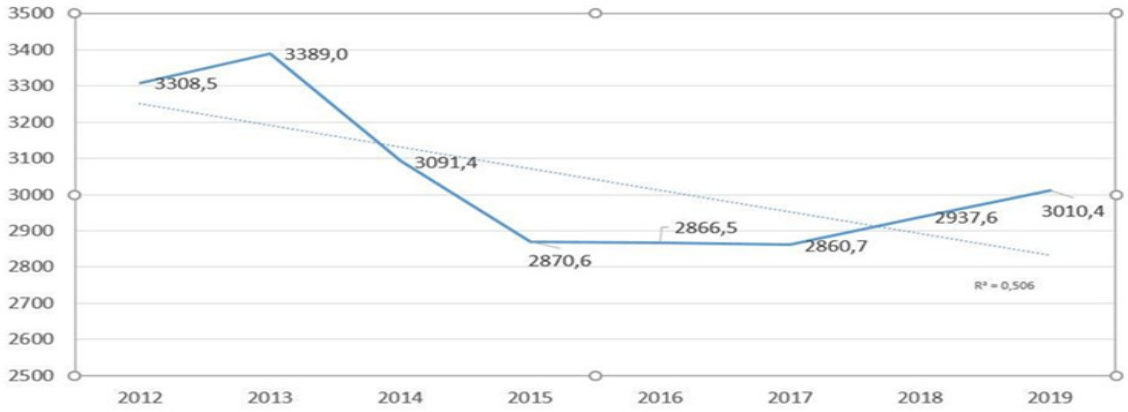

Fig. 3:Employment in agriculture, forestry and fisheries in Ukraine for the period 2012-2019 years, thousand people

Source: developed by authors with using www.stat.gov.ua

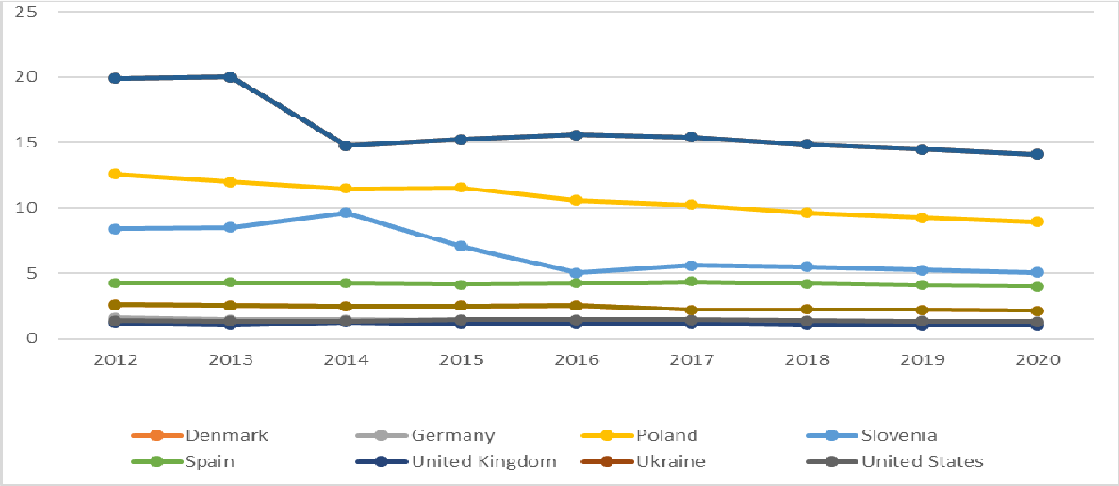

Fig. 4: Employment in agriculture (% of total employment) (modeled ILO estimate)

Source: developed by authors with using www.stat.gov.ua

Analyzing case of Ukraine, labor migration can be of two types: internal and external. The issue of international migration of the population of Ukraine, as well as internal, becomes especially relevant due to modern socio-economic threats. Internal migration, i.e. movement within the borders of individual states, is no less important for economic and social development than interstate. It does not affect the number and composition of the population, but causes changes in its location, gender and age structure of the inhabitants of individual regions, is a consequence and an important factor of regional differences, directly related to industrialization and urbanization, rural depopulation.

The reasons for the international labor migration of Ukrainians include military conflict, political instability, and unemployment. Also, the introduction of a visa-free regime with the European Union exacerbates the situation. There is the tendency of young people to study in European countries, which then remains to work in the EU after training. So, it has significantly affected the outflow of Ukrainians abroad. The reasons for migration can be completely different, but there are 2 common factors: the first is high wages, and the second is security.

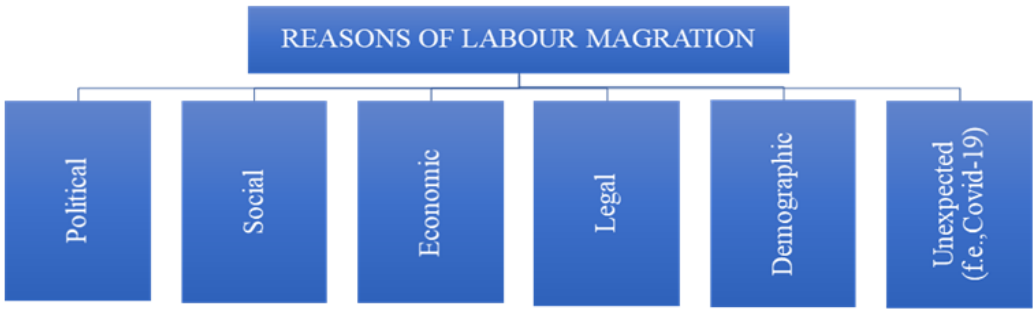

Fig.5: Classification of the main reasons of labour migration

Source: developed by authors

Political reasons for migration are political instability in the country, corruption in public bodies, military action in Donbass, etc. It is noted that according to the State Statistics Service, with the beginning of the war in the East in 2014, about 1.3 million Ukrainians migrated to other countries. As a result, there has been a significant problem of labor migration for the country as a whole and a shortage of professionals in the corporate and industrial sectors, which is acutely felt by business.

An unexpected reason for labor migration in 2020 was the situation with the coronavirus. According to the National Bank of Ukraine (NBU), 10% of labor migrants returned to Ukraine and another 10% of seasonal migrant workers stayed at home without being able to leave due to restrictions on movement. Also, the Polish Association of Employers of the Construction Industry reported that at the end of March 2020, 20% of Ukrainians workers involved in construction, left Poland because of quarantine regime.
The social reasons are the health care and education system, social life and leisure. It is noted that in 2019 the integrated Barometer was 2.61 points out of 5 possible on the Likert scale. Thus, the assessments of the health care system are divided: 58% of respondents are dissatisfied with the state of the system, while 42% assess domestic medicine satisfactorily or positively. Almost 52% were satisfied with the education system, with 48% saying that they were completely or partially dissatisfied with it.

Also, 72% of respondents are dissatisfied with the security situation in the country and feel insecure about their own future, 62% have a negative assessment of the legal framework and regulation in the country, in particular the lack of discrimination and the level of democratic freedoms.

The main economic reason of labor migration is unemployment. According to an analytical note on the situation on the labor market from the State Employment Service, the number of unemployed (according to ILO methodologies) in 2019 decreased by 91 thousand people compared to 2018. Thus, in 2019, the total unemployed population in Ukraine was 1.5 million people. Analysts of the State Employment Service note that in 2019 there was a reduction in unemployment in both urban and rural settlements. The unemployment rate in rural areas decreased by 23 thousand people (to 493 thousand people), in percentage terms - from 9.2% to 8.7% of the labor force.

The State Employment Service also notes that the unemployment rate in Ukraine is the highest among European countries. Thus, in the EU this figure decreased from 7.3% to 6.7%, and among young people (under 25) - 15.2% to 14.4%.

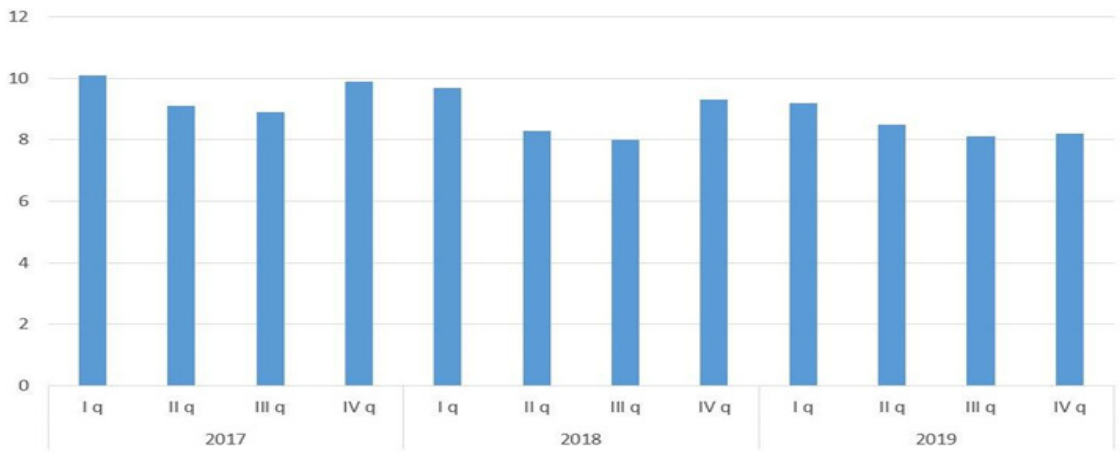

Fig. 6: Unemployment rate in 2017-2019 years

Source: developed by authors with using www.stat.gov.ua

Another important demotivator for Ukrainians is the average salary. In December 2019, it was 12.3 thousand UAH (366.3€). At the same time, the lowest salaries are received by workers in the field of agriculture, forestry and fisheries - only 7-9 thousand UAH (208€-268€). This fact is also quite significant, given that it is among the inhabitants of rural areas is popular work in agriculture.

The Ukrainian young specialist is primarily interested in a job with a high and stable income, which unfortunately cannot be guaranteed in rural areas. In addition to the lack of full-fledged infrastructure in the villages (lack of logistics, transport, internet, etc.), young people are frightened by the lack of prospects and lack of benefits to stay. Therefore, quite often young people go to a place where life is not complicated by inconveniences. According to the State Employment Service, 337.4 thousand young people received the status of unemployed in 2019. This is almost a third of the total number of unemployed.

Also, younger and rural people predominate among migrant workers: 41% of migrant workers are under the age of 35, compared with 34% of the total population. This is even more pronounced in Poland, where 47% of Ukrainian migrant workers are under 35 years of age. In addition, Ukrainian migrants are almost equally from urban and rural areas. As less than a third of Ukrainians live in rural areas, migration is twice as common there as in urban areas.

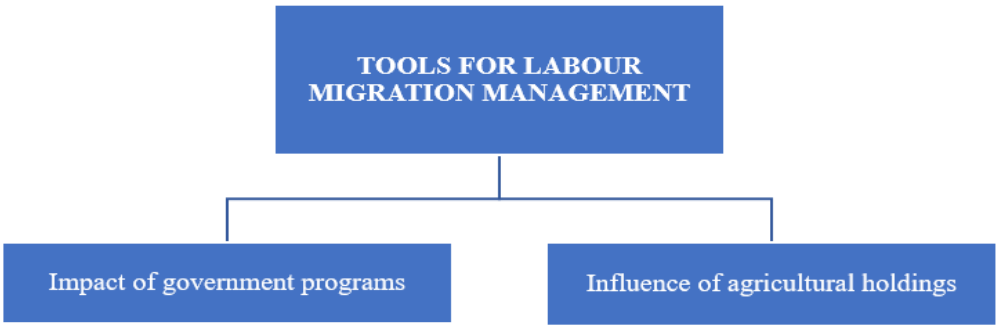

Fig. 7: Tools for labor migration management

Source: developed by authors

Among the measures that the state can take are:

- ✓ increase the size of the minimum wage,
- ✓ untie the amount of salary from all deductions,
- ✓ increase security (effective police and army),
- ✓ improve the legal environment and justice in Ukraine,
- ✓ continue health care reform,
- ✓ improve the environmental situation in the country,
- ✓ focusing on local communities – creating and supporting community-driven programs,
- ✓ attracting yang people for entrepreneur activity – supporting start-up programs.

There are many examples of state support decisions in management of migration processes. Start-up programs often require little more than a convincing idea and no income or record of accomplishment to allow individuals to work in the country. Their founders would usually not qualify for an employment-based visa. About half of OECD countries have introduced visas for start-up founders in the last years. In Australia and Canada, start-up entrepreneurs with innovative ideas who secured funding qualify for permanent residency immediately – irrespective of what happens to their company. Poland started offering in 2018 a “Poland Prize” pilot to attract foreign start-up and innovative firms. France now vies to offer the most attractive package with a lump sum for selected nominees and facilitations for family members and staff. These ideas could be used for stimulating citizens stay in the native country involving in own business and creating of the national GDP.

Additional source of influence for decreasing of labour migration is business. Business can also influence the interest of citizens to stay in Ukraine. First of all, through creation of job places. Also, agricultural holdings have such a lever as a salary. Raising wages and only a "white" salary will encourage people to work in Ukrainian companies. In addition, agricultural companies must ensure safe working conditions and promote the professional development and training of employees. The social contribution of companies in the regions of their activity is particularly important. Oleg Bakhmatyuk, CEO of Agroholding Ukrlandfarming, notes that the consequences of the growing scale of labor migration are particularly noticeable in the agricultural sector. There is tangible shortage of representatives of technical professions in Agribusiness such as drivers, combine harvesters, machine operators, agronomists - who have some specialized education and easily adapt to the environment of neighboring countries, such as Poland.

Agricultural companies are trying to solve the problems of social infrastructure development and others that motivate Ukrainians not to leave their native villages. Their facilities are mostly located in rural areas and they are actively involved for the process of creating jobs for residents. One such example is the annual competition from the Agro-industrial Holding MHP "Village. Steps to Development". The main goal of such and similar competitions from agricultural companies is the development of entrepreneurship in villages and united territorial communities (UTC), support of socio-economic, cultural and tourist potential of rural areas. Competition "Village. Steps to Development" started in 2016 when was implemented in 3 districts of Cherkasy region. In 2019 it was also implemented in 8 regions of Ukraine.

Other agricultural holdings also engaged in social responsibility activities and programs. It should be noted that the general infrastructure in rural areas often does not meet modern standards, to which young professionals are particularly attracted. Therefore, the agrarian company joins in creating a new, more attractive "face" of the villages. Agricultural companies help communities to develop social infrastructure: schools, kindergartens, recreation areas, sports grounds, parks etc. Also, they participate in such large-scale projects as road repairs, gasification, or construction of water mains.
Also, agricultural holdings themselves can create a demand for Ukrainians. So, for example, according to the sites for finding job positions, such as Work.ua, Robota.ua and AgroRobota.com.ua, every month there is opening about 700-800 vacancies in the field of agriculture. The average number of vacancies per month in agriculture on search sites is presented on the figure 8.

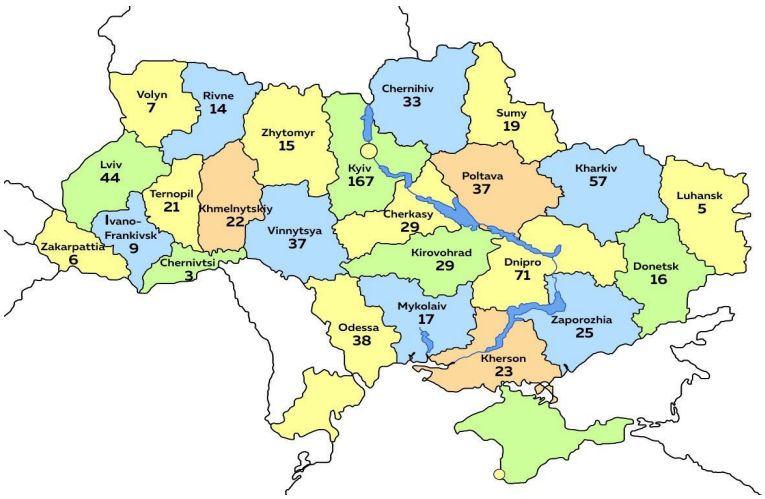

Fig. 8: The average number of vacancies per month in agriculture on search sites in Ukraine
Source: developed by authors

Most often offer agricultural work in the areas of sales (plant protection means, seeds, fertilizers) - about 200 vacancies, i.e. 4 part of all vacancies that are presented each month in the agricultural sector (as of 2020). Twice less, but also popular positions in the field of crop production: work for agronomists, assistants and chief agronomists, consultants and technologists, etc. - about 100 vacancies are presented (or it is 8th part of all offers).

Also, popular areas for work in agriculture are animal husbandry (vacancies for veterinarians, experts, livestock breeders), agricultural machinery (tractor drivers, engineers, managers) and trading (work for foreign trade and procurement managers).

In addition to the large number of vacancies in agriculture, the popularity of work in agriculture determines by the amount of the potential salary.

Table 1: Salary in agricultural sector in Ukraine as of July 2020

Profession	Salary as of July 2020, UAH (€)*
Stockbreeder	11 133 (332 €)
Tractor driver	13 200 (393 €)
Trader	15 840 (472 €)
Mechanical engineer	18 800 (560 €)
Agronomist	23 220 (691 €)

**) – currency exchange rate – 33.58 UAH/ 1 €*
Source: compiled by authors with using www.agrorobota.com.ua

Despite the fact, that the problem of labor migration in Ukraine is obvious, in agricultural companies the problem of outflow of personnel from enterprises in the regions is not called acute. For example, at MHP Agroholding's enterprises in Vinnytsia region, where about 10,000 employees work, the staff turnover at the end of 2019 was about 40%. Most of those fired are employees of production units. About 15% of those fired go for temporary and seasonal work in Poland, the Czech Republic, Germany, Denmark and other countries. The peak outflow abroad is the period April-June. Most often, after working abroad for 3 months, people return home and to the company.

Should be also noted that companies themselves do not refuse to re-hire migrants. Obviously, capacity of the labor market in the regions is not so great that companies can afford not to hire highly qualified workers. Most often they are electricians, mechanics, electric gas welders, engineers.

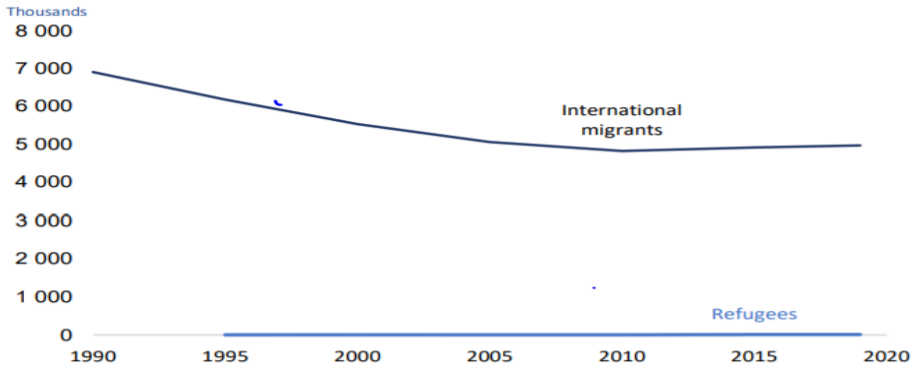

Fig. 8: Number of international migrants and refugees in Ukraine, 1990-2019

Source: UN DESA (2019a), UNHCR (2018) and UNWRA (2019)

Instead of the situation with migration, companies try to solve such problems in advance. The main method of solving problems in enterprises is increasing the material motivation of employees. Companies annually adjust the level of salaries in accordance with the labor market based on research that has shown in the Table 2.

Table 2: Salary in the biggest Ukrainian agricultural companies, 2019 year

#	TOP 20 agricultural holdings by land bank	Average wage in company, UAH (€)
1	Kernel	13 625 (410 €)
2	Ukrlandfarming	13 330 (400 €)
3	MHP	11 550 (345 €)
4	Agroprosperis (NCH)	14 740 (440 €)
5	Astarta-kyiv	9 200 (275 €)
6	Continental Farmers Group	10 000 (300 €)
7	Epicentr K	10 215 (305 €)
8	HarvEast	13 000 (390 €)
9	IMK	9 450 (285 €)
10	Ukrprominvest-agro	11 500 (345 €)
11	Agroton	9 100 (275 €)
12	Agrain	13 500 (410 €)
13	AST	9 500 (285 €)
14	Vitagro	11 500 (345 €)
15	Privat-agroholding	13 200 (400 €)
16	TAS Agro	12 400 (370 €)
17	NIBYLON	13 400 (400 €)
18	AgroVista	9 800 (295 €)
19	Svitanok	9 400 (280 €)
20	LNZ	10 800 (325 €)

Source: compiled by authors with using www.agrorobota.com.ua

The study of the main causes of labor migration allowed us to outline the directions of their solution or elimination (Fig.9).

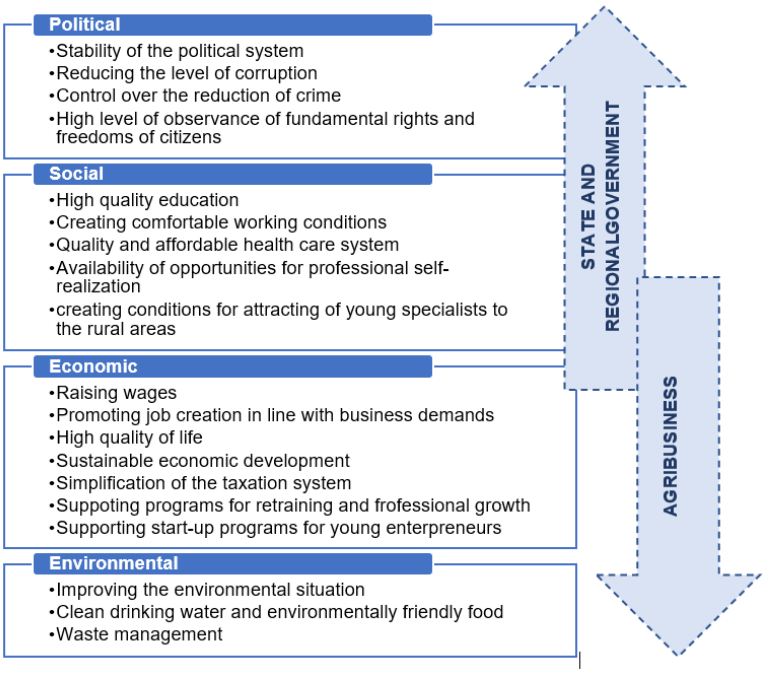

Fig. 9: Management of labour migration for sustainable development of rural areas

Source: developed by authors

Conclusions

The effects of migration in Ukraine have so far been positive, but if the significant net outflow of migrants is maintained, Ukraine will eventually suffer losses. Ukraine needs to develop an effective migration policy to be able to make the consequences more manageable. In a situation of shrinking labor and real wage growth faster than productivity, rising labor costs and labor shortages will eventually be a deterrent to investment. In addition, it will become difficult to finance national expenditures, such as pensions and infrastructure support, if more Ukrainians work and pay taxes abroad rather than at home. For a country with an aging population (increase in middle age due to increased life expectancy and low birth rate), prolonged net emigration of people of working age will create problems in the long run. To make conclusion there are three direction of migration management: economic, social and environmental. Synergy of measures of all direction will influence to the sustainable development of rural areas. Agricultural companies carry out a set of activities to motivate employees. But some of them does not take a wait and see attitude and is constantly working to improve the personnel motivation system. The company also brings the level of wages in line with the labor market based on annual research.

In addition to salaries, employees of the company have a lot of opportunities for additional earnings, a system of material and non-material incentives is working there are programs according to which employees who are recognized as the best at the end of the half-year receive a 20% bonus to wages during the next half of the year. There is a payment for seniority, vouchers are provided to the sanatorium.

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Regional Determinant in Critics of Stylized Approaches to Tax Incentives of Investment Activity in Russia

Viktor V. IVANOV
Doctor of Economics, Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: viktor.ivanov@spbu.ru

Neli R. ABRAMISHVILI
PhD, Associate Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.abramishvili@spbu.ru

Nadezhda A. LVOVA
Doctor of Economics, Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.lvova@spbu.ru

Natalia V. POKROVSKAIA
PhD, Associate Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.pokrovskaia@spbu.ru

Alexander Yu. ANDRIANOV
PhD, Assistant Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: alex@andrian.spb.ru

Abstract

The paper is devoted to discussing stylized approaches to tax incentives through the research of investment behavior in Russian regions. A review of research on the investment determinants made it possible to divide the influence on the investment process of companies, financial market and state policy. The empirical research was based on the socio-economic characteristics of Russia in the regional context. Based on the analysis of investment activity in the Northern regions of Russia, it was proved that companies operating in these regions especially need constant and timely updating of equipment as well as the volume of investment is insufficient and the lack of proper attention to this issue leads to the sharp deterioration of heavy working conditions in the region. It was substantiated that national specific of economy and investment behavior in Russia result in the need for a differentiated approach to investment tax incentives. The study was carried out with the financial support of the Russian Foundation for Basic Research within the framework of scientific project No. 19-010-00198.

Keywords: investments, investment activity, investment activity of Russian enterprises, tax incentives of investment activity, financial system.

Introduction

Investment processes are stagnating in Russia. The average investment rate in the country is stable at about 20%, with an average saving rate of 28% (Lvova and Semenovich, 2019). In 2015-2016 there was a decrease in capital expenditures, in 2017-2018 there was a sluggish growth, which stopped in 2019. In the third quarter of 2019, it was only 0.8% (Rosstat, 2019, p. 11; Central Bank of Russia, 2019). In 2020, the situation has worsened critically: it is predicted that the physical volume of investments will decrease by 7.4% (Institute for Economic Forecasting, 2020, p. 9) by the end of the year. Moreover, the degree of depreciation of fixed assets in recent years is approaching 50% with a renewal rate of 4% (Rosstat, 2019, p. 11; alternative (more pessimistic) assessments are presented in: Fomin and Khanin, 2017), which makes the problem of the investment recession critical for the Russian economy.

Against the background of the increasing role of the state (the state share in Russian banking assets increased in 2019 to 73%: Afanasyev and Shash, 2020, p. 115) in distribution processes, the tax incentives for investment discussion attracts a natural interest in this context. The instruments used in this area are obviously ineffective or insufficiently effective since they are the result of stylized approaches to the justification of tax policy, which are

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focused on a rather abstract investor. As a result, a significant part of investment tax incentives does not contribute to business development, but current consumption (Ivanov, 2019). The importance of tax regulation of economic processes arises against the background of the need to mitigate the consequences of the coronavirus crisis (Pogorletskiy and Sollner, 2020).

In contrast to stylized approaches, the specificity of the author's position lies in the fact that we do not seek to find a universal solution to the problem, believing that tax incentives for investment activity in Russian business require differentiated instruments. Continuing a series of studies on this issue (Ivanov et al., 2019b; Ivanov et al., 2020; Ivanov et al.,2021), we propose to approach its solution not only from empirical but also fundamental positions, analyzing the theoretical and practical prerequisites for an effective solution. As for the empirical support, at this stage of the study, we will focus on the regional features of the investment activity of Russian business, which will be revealed using the example of the regions of the North.

The purpose of the study is to substantiate the importance of a differentiated approach to tax incentives for investment activities with an emphasis on the regional aspect. The first part of the article will reveal the theoretical background of the introduction of this approach. The second part will focus on the typical limitations of empirical research in this area, which is based on a stylized approach, appealing to the conditional investor. In the third part, we will focus on methodology importance justification of researching investment activity in the northern regions of the Russian Federation. In the fourth part, we present the results of the study.

Theoretical prerequisite for a differentiated approach to tax incentives for investment

All leading scientific schools in economics have contributed to the development of ideas about the drivers of business investment activity. In the neoclassical theory, a decrease in the interest rate, an increase in productivity, and an expansion in demand were analyzed as the main drivers of business investment activity. According to the institutional approach, investment activity is a consequence of the formation and development of economic institutions. Keynes attributed the "marginal efficiency of capital" and "rate of interest" to the determinants of business investment activity, linking them with the expectations and preference for liquidity on the part of investors under conditions of uncertainty. In the studies of H. Minsky (post-Keynes direction), these drivers were investigated in more depth with an emphasis on the terms of investment financing, which highlighting the decisive role of relations between "lenders" and "borrowers" (companies in the financial and non-financial sectors, respectively).

Which theory does best reflect domestic practice? How does it lead us to the conclusion about the importance of a differentiated approach to tax incentives for investment?

On the first question, we share the position of I.V. Rozmainsky (2006), believing that the reasons for the stagnation of investment activity in Russian business are most clearly traced in the context of the post-Keynesian interpretation. First, it is essential to consider the interaction of the real and financial sectors of the economy, examining the problems of transforming savings into investments (the problem of a low propensity to invest with a relatively high propensity to save in the context of the specifics of investment processes in Russia has been repeatedly addressed by A.S. Bulatov (2017)). Secondly, it is no less important to take into account the importance of uncertainty in the perception of participants in the investment process, which makes the problem of "investment myopia" of Russian business (Rozmainsky, 2006) more urgent, in conjunction with limited financial availability.

According to entrepreneurs, investments are constrained by increased uncertainty, the required profitability does not compensate investment risks, and there is not enough money to implement projects. This position is reflected in the regular surveys of the Russian Statistic Service (Rosstat). According to its results, the majority of respondents consider "the uncertainty of the economic situation in the country" among the essential restrictions on investment activities (based on the results of recent years, these are, first of all, a high inflation rate, lack of own financial resources, investment risks, high percentage of commercial loans) (Rosstat, 2019, p. 106).

According to the National Research University Higher School of Economics, investments, as a rule, are made by Russian organizations forcibly due to the physical deterioration of fixed assets, and not to improve efficiency and expand the business (HSE, 2018, p. 6-9; HSE, 2019, p. 5-8). In these conditions, overcoming the stagnation of investment processes should objectively contribute to the development of channels for transforming savings into investments, subjectively - an increase in entrepreneurial confidence (Lvova and Semenovich, 2019, p. 30), which is linked with the revision of the national model of economic behaviour (Mirkin, 2019). Both tasks are incredibly complicated by the unfavourable external environment associated with international sanctions against Russia (Fedorova et al., 2016), which actualize the search for internal reserves of investment growth. This problem is actively discussed in the literature, including in the context of alternative trajectories for the national financial

system development (Mirkin, 2018) considering financial paradoxes (Lvova et al., 2016b) in emerging markets (Lvova et al., 2018).

International trends in tax incentives for companies' investment activity

The key areas of business investment activity stimulation through corporate taxation are direct tax incentives for investments in fixed assets (mainly by depreciation policy) or reducing the overall tax burden to keep free cash at the disposal of the business, used at the discretion of companies, including for investment.

In the second half of the twentieth century in developed countries there were a decrease in corporate profit tax rates and a decrease in the importance of corporate taxes in total tax revenues. At the same time, according to a study by M. Devereaux, R. Griffith and A. Klemm (2002), conducted in 16 developed countries from 1982 to 2002, the value of tax revenues as a percentage of GDP did not change significantly, which is explained by the expansion of the tax base, including reduction of investment tax deductions. In ten countries — the United Kingdom, Ireland, Australia, Canada, Finland, France, Germany, Italy, Spain and the United States — direct tax incentives to stimulate investment declined.

Detailed assessment of corporate taxation in 1983-2001 for the same 16 countries showed that a reduction in the corporate tax rate by 5 percentage points led to relatively higher capital expenditures, compared with tax deductions equivalent to an increase by 5 percentage point of investment present value. At the same time, an opportunity to increase the write-off rate had more significant results in countries with a higher corporate tax rate (Vartia, 2008).

A decrease in corporate tax rates and an expansion of the base of these taxes due to a lower present value of capital investments is noted for twenty-six OECD countries from 1982 to 2007 (Loretz, 2008). Characteristics of approaches to corporate taxation in 142 countries from 1996 to 2016 by E. Steinmuller et al. (2019) confirmed the widespread trend towards lower corporate tax rates. However, since 2003, the authors have not observed a clear tendency to expand the tax base. During this period, the present value of future profit tax reductions on investment expenditures fell in 70 countries, remained unchanged in 31 countries, and increased in 41 countries.

The positive effect of accelerated depreciation on capital expenditures was shown in a sample of various state corporate tax regimes in the United States in 2000-2010 (Ohrn, 2019) and as a result of enabling an accelerated write-off in the first year of use since 2007 in the UK (Maffini et al., 2019).

The model of taxation for Estonian businesses is of particular interest: since 2000, only withdrawn profits have been taxed in the country. At the same time, the object of property taxes in Estonia is land, not fixed assets. The exemption from taxation of non-withdrawable profits creates essential prerequisites for investing in further business development and makes the Estonian tax system the most attractive among the OECD countries (Lundeen and Pomerleau, 2004). However, the implications for European business are ambiguous (see, for example, the analysis of the background and implications of the mergers and acquisitions in Europe (Saksonova and Kantane, 2016)). At the end of the twentieth century, the demand for non-standard tax policy measures increased (see Lvova et al., 2016a), with the Baltic countries becoming laboratories for successful testing many such measures.

As a result of the tax reform, from 2000 to 2003, capital investments of Estonian companies increased by 17% (with the largest increase in investments typical for small companies). At the same time, over the same period, liquid assets increased by 12%, and retained earnings and reserves by 8% (Masso et al., 2013). A. Hazak (2009) also points out the potential inefficiency of asset allocation as a result of Estonian taxation, noting, based on the results of a study of the financial statements of Estonian companies from 1996 to 2004, a more significant increase in cash compared to long-term investments. Since 2017, taxation of withdrawn profits has also been implemented in Georgia, since 2018 - in Latvia (first impact of tax and monetary policy on economic growth in the country is considered in (Saksonova and Koleda, 2018)).

The ambiguous consequences of national business taxation regimes, among other things, can be explained by the peculiarities of measuring the relationship between tax incentives and business investment activity according to empirical data. The factors that determine the complexity of such a measurement are: the importance of correctly determining the analyzed period, taking into account the variability of tax policy; the difficulty of identifying the role of tax incentives in comparison with other factors, including macroeconomic ones; informational limitations of the financial statements; the possibility of data distortion due to the growth of investment activity during periods of tax incentives due to its artificial decrease on the eve of the introduction of benefits and a potential reduction after the cancellation of benefits; differentiated libation of tax incentives depending on the characteristics of the company.

Limitations of stylized approaches to tax incentives for investment in the Russian Federation

The limitations of scientific research on tax incentives for investment in the Russian Federation are related mainly to the peculiarities of empirical data used to substantiate recommendations. In other words, the critical flaw that unites many Russian works on this issue is the abstract presentation of the research subject. As a rule, we are talking about 'approximate' investor companies without specifying the industry, region and financial profile, including the problem of the availability of external financing for investment activities.

Evidently, investment theories are also based on macroeconomic data. For example, the problem of transforming savings into investments is analyzed in the context of institutional sectors of the economy. However, the conclusions about the drivers of business investment activity, based on these theories, require clarification. For example, it is curious that the approximate investor is usually viewed as a mature company by default. However, we have found that the stage of a company's life cycle is an essential factor in its investment activity (Ivanov et al., 2018; Ivanov et al., 2019a).

At the stage of intensive growth, companies aim to actively form fixed assets, attracting external financing, despite high interest rates for young and not enough creditworthy businesses. Having reached maturity, companies show restrained investment activity, mainly focusing on the adopted corporate strategy, which becomes indifferent to the influence of factors that could be influenced by traditional investment tax incentives. Ageing companies are losing their selectivity in finding significant investment targets.

The results obtained are a powerful argument in favour of a differentiated approach to tax incentives for investment activity in Russian business. However, these results are difficult to adapt for tax policy correctly. Assessment of corporate age in models of investment activity is somewhat arbitrary. These are the most uncomplicated scoring characteristics based on the indicators of the financial statements of companies (scoring models for assessing corporate age are widely used in financial research (for Russian enterprises, see, Cherkasova and Smirnova, 2012); in the author's research, an original modification of the corresponding model is introduced, which, however, does not eliminate the identified problem). As a result, in the conditions of the economic downturn, there is a widespread "ageing" of organizations. It does not fully correspond to the concept of the life cycle and comes into conflict with the tasks of stimulating investment.

At the same time, it is curious that the models of investment activity of Russian companies have an industry specification. According to the authors, it is the industry specifics that should attract priority attention when suggesting a differentiated approach to tax incentives for investment. In addition, the spatial aspect cannot be ignored. Let's reveal the regional features of the investment activity of Russian business in more detail using the example of the regions of the North.

Regional features of the investment activity of Russian business on the example of the North regions: formulation of the question

Russian regions differ significantly in terms of economic (Fedotov and Pokrovskaia, 2017), social and even climatic conditions. Equal development of regions is one of the priorities and common challenges for the Russian Federation. Moreover, a feature of Russia is its location close to the North Pole. Almost two-thirds of the country's territory is located in the permafrost zone. The climate is characterized by one of the lowest temperatures among all countries in the world. These facts determined the choice of regions for this stage of the study. Almost the entire territory of the country belongs to the territory of frosty winters. 65% of the country's territory belongs directly to the territories of the Far North (Abramov, 2008). Geography imposes significant restrictions on livelihoods on this territory. Part of the population lives on the territory permanently; part of them work on a rotational basis. The delivery of essential goods, raw materials, materials, equipment requires significant material costs. So, additional to the general national problems of investment activity, there are also features associated with regional development.

In contrast to international discourse (in the literature of other countries, issues of the economy of the North and the Arctic regions attract less noticeable attention; this is partly due to the fact that of the countries with geographic characteristics similar to Russia, only Canada can be noted – however, the northern territories of Canada are not so densely populated, and the issues of arranging these territories are not so acute), the issues of economic development of the northern regions are actively discussed in Russian literature. In particular, Uskov (2016) writes in his article about the exhaustion of the potential of the raw material industries as a source of economic growth in the country and the regions of the North. Many authors (see, for example: Matveev, 2015; Bykovsky, 2002) point to the advisability of increasing the efficiency of raw material enterprises and the development of state industrial

policy in this regard. At the same time, it is undeniable that a whole range of measures should be aimed at increasing the investment attractiveness of the region and increasing the investment activity of local businesses.

The following regions of the North were analyzed to assess investment activity: Arkhangelsk region; Murmansk region; Republic of Karelia; Komi Republic; Primorsky Krai; Khabarovsk region; Amur region; Kamchatka Krai; Magadan Region; Sakhalin Region; Zabaykalsky Krai; Chukotka Autonomous District; The Republic of Buryatia; Saha Republic; Krasnoyarsk region; Tyumen region.

These regions, although they belong to the regions of the North, are nevertheless not homogeneous in terms of population, area, level of industrial production, etc. For example, the population of the Tyumen region (including the Yamalo-Nenets Autonomous District and the Khanty-Mansi Autonomous District) is 3.76 million people as of January 01, 2020, while only 50,288 people live in the Chukotka Autonomous District as of the same date. Consequently, the previously identified problems are aggravated by the heterogeneous development of the regions of the North.

Under the purpose of the study, we analyzed the largest companies in terms of revenue in the indicated regions. The sample obtained by sorting the data by revenue in descending order included 10,000 companies from different industries. It should be noted, however, that the sample was not limited to large companies, including several medium, small and micro-organizations. Thus, we can conclude that in these regions, the total number of large companies does not exceed 10 thousand.

The analysis of the investment activity of companies was carried out in the regions of the Russian Federation. As an indicator of characterizing investment activity, the volume of funds spent for the acquisition of tangible assets was considered. Statistics for this indicator are kept in the Spark-Interfax database. Besides, the ratio of newly acquired assets to existing ones was analyzed.

Results of assessing the investment activity of Russian business in the regions of the North

According to the results, 5 out of 16 analyzed regions of the North have a negative volume of investments. It is mean that the material and production base of business is being destroyed (tab.1).

Table 1: Acquisition of fixed assets by companies in the regions of the North based on the results of 2019 in a regional context

Registration region	Number of companies	2019, Purchase of fixed assets, million RUB*	Contribution of each region to overall growth of fixed assets, %*
Amur region	433	11,413	2.72
Arhangelsk region	472	38,438	9.16
Zabaykalsky Krai	272	-9,042	-2.15
Kamchatka Krai	317	23,541	5.61
Krasnoyarsk region	1,631	-41,991	-10.01
Magadan Region	193	-2,841	-0.68
Murmansk region	360	-42,992	-10.25
Primorsky Krai	1,219	85,685	20.42
The Republic of Buryatia	223	-5,775	-1.38
Republic of Karelia	291	1,541	0.37
Komi Republic	344	83,466	19.89
Saha Republic	467	9,975	2.38
Sakhalin Region	488	29,246	6.97
Tyumen region	2,354	231,054	55.06
Khabarovsk region	881	5,234	1.25
Chukotka Autonomous District	55	2,672	0.64
Total	10,000	419,622	100.00
Note*: a negative number means that there was a decrease in the value of the corresponding assets			

Source: Authors' calculations based on the SPARK-Interfax.

55% of the total amount of investments falls in the Tyumen region, the largest of the northern regions. It should be noted that this region is considered together with the autonomous regions. Relatively large volumes of investments characterize Primorsky Krai and the Komi Republic. In other regions, the share of investments is 10% less in their

aggregate value in the regions of the North. At the same time, we emphasize that the object of analysis in this study is the largest enterprises in each of the regions – the situation in smaller companies is presumably even more difficult. The results of assessing the renewal of assets are presented in the table. 2.

Table 2: Share of newly acquired assets in total assets in the regions of the North at the end of 2019 in the regional context

Registration region	2019, Purchase of non-current assets, million RUB*	2019, Total Assets, million RUB*	Purchase of non-current assets to total assets ratio, %*
Amur region	11,413	494,567	2.31
Arhangelsk region	38,438	1,490,077	2.58
Zabaykalsky Krai	-9,042*	320,711	-2.82
Kamchatka Krai	23,541	382,472	6.15
Krasnoyarsk region	-41,991	6,066,852	-0.69
Magadan Region	-2,841	519,253	-0.55
Murmansk region	-42,992	834,803	-5.15
Primorsky Krai	85,685	9,317,915	0.92
The Republic of Buryatia	-5,775	150,634	-3.83
Republic of Karelia	1,541	292,457	0.53
Komi Republic	83,466	1,406,809	5.93
Saha Republic	9,975	1,683,547	0.59
Sakhalin Region	29,246	606,241	4.82
Tyumen region	231,054	19,820,062	1.17
Khabarovsk region	5,234	1,262,355	0.41
Chukotka Autonomous District	2,672	164,249	1.63
Total	419,622	44,813,004	0.94
Note*: a negative number means that there was a decrease in the value of the corresponding assets			

Source: Authors' calculations based on the SPARK-Interfax.

As it is shown table. 2, the maximum share of new assets characterizes the Sakhalin Region, while the largest region, the Tyumen Region, lags behind in this respect by almost three times. The average share does not exceed 1%, which is a relatively low indicator.

Conclusion

The study once again confirmed that tax incentives for investment activity in Russian businesses require a differentiated approach. Stylized approaches to justifying recommendations in this area are unacceptable and should be reviewed. Some aspects of criticism should be recognized, but it is challenging to consider. For example, the adjustment of the tax system which considers the stage of the life cycle of taxpayers. Nevertheless, the industry, regional and financial specifics of the business deserve due attention. At this stage, we substantiated this conclusion in more detail concerning the regional determinant of tax incentives for investment activities of Russian business, which we considered using the example of the regions of the North.

It was revealed that most of the companies represented in the northern regions of Russia operate in material-intensive industries. Thus, they need regular and timely updating of the production base. However, the analysis of empirical data showed that the volume of investments for this is insufficient. It is evident that the lack of proper attention to this issue leads to the aggravation of the already difficult working conditions. Further ignorance of the problem can cause undesirable economic and social consequences, so the continuation of research in this area does not lose its significance.

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Are Rural Accommodation Enterprises Efficiently Present Online?

Joana Maria Sampaio Rua FERNANDES
Instituto Politécnico de Bragança, *Campus* de Santa Apolónia, 5300-253 Bragança, Portugal
Centre for Tourism, Research, Development and Innovation (CiTUR), Portugal
joana@ipb.pt

Sónia P. NOGUEIRA
Instituto Politécnico de Bragança, *Campus* de Santa Apolónia, 5300-253 Bragança, Portugal
Research Centre in Political Science, Portugal
sonia@ipb.pt

Luís Carlos PIRES
Management Applied Research Unit (UNIAG), Instituto Politécnico de Bragança, *Campus* de Santa Apolónia, 5300-253 Bragança, Portugal
luica@ipb.pt

Abstract

This study regards rural accommodation enterprises (RAE) and how much of their business is made online and what can be done to improve it.
This work focus on 10 enterprises from the northeast of Portugal, since it is a more deprived and isolated region and far from the touristic centres. As such, these companies need to attract the visitors through their online presence.
We analysed their use of ICT, if they had a digital marketing strategy and what could be done to improve their presence and their results through online marketing tools.
It was possible to understand that the majority of the companies only have a minimal investment in online presence through the Booking platform and with their website. They do not work efficiently the social networks and they do not use, or know, most of the marketing online tools.
As a result, even though the studied companies are willing to evolve digitally and to enhance their presence in a more efficient way, this is limited to the investment that is required since they all feel they cannot invest at the time.
It is clear that for these companies and specially in these regions it is vital to bring European funds to help them evolve to the digital market in a knowledgeable and efficient way.

Keywords: Rural accommodation enterprises; Digital marketing; Online tools.

Introduction

It is not a new situation, however, more than ever, all over Europe there are countries that registered a severe loss of people in rural regions. These regions, in terms of tourism attraction, face difficulties due to distance from touristic centres, lower accessibilities, lower attractions, and so on (Johansson, Nilsson, and Westlund, 2019; Valdivia, 2018).

Even though economic sustainability, in regions with these characteristics, is very hard to maintain, there are still companies that continue their activity and remain there and, therefore, need to attract visitors to the region and to their businesses.

This study focus on 10 rural accommodation enterprises (RAE) located in the regions Douro and Terras de Trás-os-Montes, in the northeast of Portugal. It is the intention of this study to understand if these RAE use the information and communication technologies (ICT) available, if they have an efficient presence online, and if they have a digital marketing strategy in order to attract visitors to the regions.
The study is structured as followed: first an introduction is presented, secondly the theoretical framework that sustains the study is described, the third section describes the study, and finally, the conclusion is presented.

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Rural accommodation enterprises and online presence

In rural areas, particularly those that are characterized as isolated, depopulated or deprived regions, tourism is viewed as a tool to economically sustain and even promote its development. However, even in these regions the touristic activity has to be up to date with market mechanisms, specifically with communication and promotion techniques since they dominate the competitive market (Pilar, Pina, and Delfa, 2005).

Currently, the internet is present in every aspect of our lives and has a growing importance in the consumers' information search and buying process. According to Hérnandez-Maestro (2020) companies need to pursue a more active role regarding their online presence and their reputation. It is important to understand that customers appreciate and are influenced by the management interaction and response.

Furthermore, the companies, more than the necessity to be online, in order to appear in customers' search and have a possibility of being selected and their services bought, they need to understand the data that digital tools can give them in order for the companies to improve their services, direct their services to their target audience, and understand what the customers want. Data analytics are forcing enterprises to evolve in their operation activities, not only to respond to the demand of the customers, but also to allow enterprises to see new business possibilities. It can have a major impact in the performance of enterprises located in rural regions (Krói, 2019).

It is important, in order to plan the development, in an economic and social perspective, for a region, to know the characteristics and predilections of the consumers that are attracted to the region (Pilar, Pina, and Delfa, 2005). The same is valid for the enterprises. For them to develop an effective marketing strategy and digital marketing strategy, the enterprises have to understand how the customers perceive the region and the rural accommodations (Wang, Li, Wang, and Jin, 2020).
Due to the internet importance as the primer source of information, it is a marketing method, and companies understand that tourists search for relevant information about their destination and also share their opinion (evaluation) with others in their social networks (Wang, Li, Wang, and Jin, 2020).
Rural tourism establishments are not considered the most experienced in using effectively the internet or analytical tools, in fact, they usually use them less than other businesses that operate online (Krói, 2019).

The fact is that for a small rural business to be competitive it needs to have a market oriented strategy and the use of information and communication technologies have a positive influence in the results obtained (Peña, Jamilena, and Molina, 2011). However, not only the knowledge to use the internet and digital tools is sometimes harder to find, even the physical support can be a challenge, since rural and more isolated regions usually have a worse internet telecommunications and have more difficulties in using the full potential that digital tools allows (Roberts, Beel, Philip, and Townsend, 2017).
Even with all the influence and importance, already recognized, of marketing and digital tools for businesses, it is important to understand how companies located in more isolated areas can use these resources, or even if they are available to be used. More so, in the touristic area, to attract visitors to these regions and to bring them to their establishments, it is essential to have a presence online.

The case of the rural accommodation enterprises of Douro and Terras de Trás-os-Montes

The regions in study are Douro and Terras de Trás-os-Montes. Both the regions are located in the northeast of Portugal and are defined as isolated, deprived regions with an galloping aging population.
The region Douro comprises 19 municipalities – Alijó, Armamar, Carrazeda de Ansiães, Freixo de Espada à Cinta, Lamego, Mesão Frio, Moimenta da Beira, Penedono, Peso da Régua, Sabrosa, Santa Marta de Penaguião, São João da Pesqueira, Sernancelhe, Tabuaço, Tarouca, Torre de Moncorvo, Vila Flor, Vila Nova de Foz Côa, Vila Real – and has an extension of 4,032 km^2.

Terras de Trás-os-Montes (TTM) comprises nine municipalities - Alfândega da Fé, Bragança, Macedo de Cavaleiros, Miranda do Douro, Mirandela, Mogadouro, Vila Flor, Vimioso, Vinhais – and has an extension of 4,370 km^2. Both regions have approximately 30% of their inhabitants with more than 65 years of age (INE, n.d.).

In terms of touristic offer, in the latest record, in the Douro region there were 164 touristic companies, with the rural accommodations representing 38% of the total, with 63 units, and 23% were agritourism units. In Terras de Trás-os-Montes the official records identified 149 touristic companies, of which 87 (58% of the total) were registered as rural accommodations and 28 were agritourism units.

In both regions the majority of the tourism companies were located in the capital of the region, that were also the most populated municipalities. However, most of the 28 municipalities on both regions are not highly populated or even in touristic routes. The majority is located in the isolated and underpopulated areas.

This study focus on rural accommodation companies located in three municipalities with severe indicators, regarding economy, population, and tourism, namely Vila Flor, Freixo de Espada à Cinta and Torre de Moncorvo. In these municipalities, in 2016, 98% of the registered businesses were micro companies with two employees, on average (CIM-TTM, 2014; INE, 2018).

Objective, data treatment and analysis

This work regards the analysis of 10 rural accommodation enterprises with the intention to understand in what stage of engagement the enterprises were regarding their marketing strategy, digital marketing strategy and ICT overall presence on their businesses.

To do so, the methodology followed was a qualitative research with semi-structured interviews. With the qualitative approach it was possible to closely interact with the individuals involved, using informal language. Through the inductive process, after analysing the collected data, we present the reality perceived (Creswell, 2013). After an initial in-depth interview with the 10 enterprises' managers involved, it was made an in-depth follow up with each company in order to understand in loco how they used ICT, what marketing strategies they had, and finally if they were present online and had a digital marketing strategy.

Descriptive analysis

For the 10 establishments studied no distinction was made regarding their type, if they were rented by room or whole-house rental, due to the fact that only two were whole house rental but also had separate rooms to rent. All the 10 RAE studied were of small size - one only had one room, another three rooms, four of them had four rooms, three had six rooms, and only one had 10 rooms - and were family owned and explored. The information was obtained through the owner or responsible for the touristic activity, since they were considered as the ones that had a broader view of their business and since they are the ones that can approve and implement improvements that could arise from this study.

The first aspect that was analysed was the use of information and communication technologies, described in seven topics, starting from the existence of basic equipment until the use of specific software, as presented in Table 1.

Table 1: Use of information and communication technologies

Enterprise	yes	no
The company has informatic equipment?	10	0
The company has a printer?	9	1
The company has internet connection?	8	2
The company uses billing software?	7	3
The company uses a specific management software?	2	8
The company has their own server?	0	10
The company uses ERP software?	2	8
The company uses CRM software?	0	10

Table 1 shows that most of the studied companies only had the minimum requirement to have their company running. One can see that they all have a computer, almost all have a printer, however two of them don't have internet connection. From the 10 enterprises, seven already uses a billing software and two of them also use a management software. Regarding Enterprise Resource Planning (ERP) software, two companies already used it and were the only ones that knew about it, the rest never heard about this tool. Customer Relationship Management (CRM) software not only was not used by any of them, they never even heard about it.

Regarding their marketing strategy, some aspects were selected to better characterize the companies in this element and are summarised in Table 2.

Table 2: RAE's marketing strategy

Enterprise	yes	No
The company has a logo?	8	2
The company has a corporate identity?	7	3
The company invests in advertising and merchandising?	8	2
The company has a differentiation strategy?	8	2
The company has a brand positioning strategy?	9	1
The company has a segmentation strategy?	7	3
The company reaches different segments?	9	1
The company has a digital presence?	10	0

As can be observed in Table 2, the majority of the companies has a logo, a corporate identity and invests in advertising and promotion. Almost all have a brand positioning strategy. Even though only seven believe they have a segmentation strategy, they are aware that they have customers from different segments. All 10 companies stated that they have a digital presence, if not with their own website through digital platforms. The existence of a website and its potential was also an aspect that was considered during the study (Table 3).

Table 3: Rural tourism companies' website

Enterprise	yes	No
The company has a website?	6	4
The website is user friendly?	5	1
The website link is easy to type?	4	2
The website is multi device compatible?	2	4
The website has connections to official public websites?	0	6
The websites has connections to other online pages?	0	6
The website is updated regularly?	3	3
The website has special promotions regularly?	1	5
Is it possible to buy in the website?	6	0

In Table 3, it shows that only six companies have their own website. The remaining companies were not considered in the other aspects regarding the website.

Of the ones that have own website most of them regularly analyse the statistics about access and interaction of the visitors. However, in some cases they recognize that the website's address is not easy to type and that the website is does not enable visits using different devices. None of the involved companies has connections from the site to other online locations, not even to public entities such as the Portuguese Tourism website. Although it is possible to buy directly in the companies' website , most of them are connected with online booking platforms and almost 90% of their business is made through those platforms. This is the main reason why there usually are no special promotions in the website.

After this approach to their online presence, it was intended to understand if the companies had a deeper knowledge about the potentiality of the online services. Table 4 resumes it.

Table 4: Marketing strategy

Enterprise	yes	No
The company is aware of who visits the website?		6
Does the company analyse the website statistics?	6	0
The company uses search engine optimization?	2	8
The company knows about how to get better search results?	1	9
The company knows how google ads work?	5	5
The company is present in social networks?	10	0
The company sends emails marketing to clients?	0	10
The company send newsletters in a regular basis?	0	10

In Table 4, since there were four companies that stated that they did not have a website, in this table the first two aspects are reduced to the other six companies that do have a website.

As is observed in Table 4, the majority of the companies does not know who visits their website, however, all the companies stated that they analysed the website statistics. Mostly concerned to number of visits, number of contacts and number of reservations achieved. Also, almost all the companies were not aware of the tools available online, nor were they aware of what those tools could do for the company, in terms of visibility, best search results, and so on.

Regarding social networks, they are all present in Facebook, but only three are present in other social networks (such as Instagram or Twitter). Even though, currently Facebook may be the social network that the majority of their clients use, since they are more elderly individuals, with families, in the future they have to evolve to newer social networks or they will not reach new publics.

Another aspect that came to light from the study was that none of the companies build a client data base, and so, they did not send any marketing emails to the clients nor did they send any newsletter.

After the study, the conclusions were presented to the 10 companies with suggestions to improve their online presence and to help them develop a digital marketing strategy. The suggestions were very welcome by the companies particularly those that did not required an investment, such as increase the content of the website, update the information, interact more in social networks, or give more feedback to clients. The suggestions regarding the digital marketing had more resistance since the companies feel that to achieve the expected results they had to invest in more support, such as a professional manager for the online presence. In fact, the companies need to know who their clients are and need to define a digital marketing strategy for the target audience in order to attract their attention and facilitate their action to buy.
However, they all sustained that it was not possible to currently invest in online improvements due to budget constraints and they were hopping for the next European Union funds to improve their conditions.

Conclusion

This study presents a reality of 10 rural tourism companies in a rural and deprive area. These companies face several problems regarding their location, far from the touristic centres and with difficult road accessibilities in some cases.

Although the majority already has a digital presence, with a website, present in some social networks, and through the online booking platforms, they do not have a digital marketing strategy that could allow them to be more efficient online.

This study registered what the companies already had, in terms of ICT and digital marketing, and presented several actions and measures to be taken in order to improve their presence online and to have a better search results position when potential customers search online. However, it was also clear that the measures that implied an investment from the companies would hardly see the light of day, since most of them almost only makes just above breakeven point. As such, it would make great difference if these type of companies could have access to European funds to update their marketing strategy and their online position. This would represent a broader dissemination of the region and the companies and would increase the awareness of potential customers.

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Employee Development Management - HR Methodologies and Practices in The Western Balkans Region, Expert Survey

Bojan S. RISTIĆ
Information Technology School – Belgrade, Serbia.
email: bojan.ristic@its.edu.rs

Aleksandra HADŽIĆ
Information Technology School – Belgrade, Serbia.
email: aleksandra44820@its.edu.rs

Dušan STOJAKOVIĆ
Faculty of Contemporary Arts, Belgrade, Serbia
e-mail: dusan.stojakovic@fsu.edu.rs

Goran RADIĆ
Information Technology School – Belgrade, Serbia.
email: goran.radic@its.edu.rs

Milena ILIĆ
Faculty of Contemporary Arts, Belgrade, Serbia
email: milena.ilic@fsu.edu.rs

Abstract

The end of the 20th and the beginning of the 21st century has brought the technological revolution and the extremely present digitalization. Great advance in the field of information technology, but technology in general, is fundamentally changing the concept of the business environment and work ecosystem. In such a turbulent time, when one cannot keep up with the accelerated development of technology, and implement all innovations to improve the quality of life, there is a need for active involvement of business entities in creating new systems. The laws of the market testify that it is high time for us to adapt or to remain in oblivion. The same also applies to the human resources sector, which is the first to hit the new demands of employees, but also the market in general. Current topics are the new economy, the economy of knowledge, the economy that is global, but also the economy that brings completely new professions and occupations that we meet for the first time, and which are constantly emerging and disappearing. The human resources management sector, i.e. potentials, constantly strives to cope with all these changes, despite the factors of uncertainty, change and constant adaptation to new business conditions, through the development of employees at the organizational and individual level. Important issues that will be examined in the paper, in the part of the primary research through the survey of experts in the field of human resources in this context are: what are the key factors that determine the career path of employees; if employees' expectations are different, concerning seniority; how to adequately consider the differences between the markets of the Republic of Serbia and the countries in the region, when it comes to expectations, salaries and living standards of employees. Finally, we examine the part in which the most prominent factors are presented, from the above, which are crucial for the business of a company, as well as predictions for future trends in the human resources sector.

Keywords: human resources management, employee development, information technology, earnings, expert survey, new professions, employer branding

Introduction

The broader field of labor research is the transparency of companies in the region and how these practices can inspire the HR sector of Serbia to improve its current work methodology. In the market of the Republic of Serbia, there is a belief that salary transparency has a negative effect on the methodology, satisfaction, but also the career development

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of employees.

The paper presents research on the differences between the human resources market of the Republic of Serbia and the countries in the Western Balkans region. The attitudes of professionals in the human resources sector will be examined through the analysis of the research, both on the Serbian market and in the countries in the region. The aim is to prove the belief that there should be transparency of salaries in creative agencies since it is counterproductive if it does not exist and if it is not communicated with employees. Besides, it will be discussed what other differences between the observed markets in terms of expectations are.

Employee Career Development

Employees and their skills are the basic resource of any organization in a business environment. (Ranković, et al. 2020). Based on these main and secondary criteria, the contribution of professional staff to achieving the goals of the observed organization is assessed. Certainly, the word resource should be humanized and understood that it does not only imply the technical abilities of the individual, but also includes the subjective assessment of creativity, innovation, as well as the motivation of individuals and entire teams. Certainly, this includes the characteristic features by which each individual stands out in a unique way from the others in the company. (Ilić, 2018)

Strategic human resource management is a direct witness that the competencies of professionals in the human resources sector evolving. Moreover, as emphasized in the previous paragraphs, the phenomenon of strategic human resource management can be seen as a term that arose due to the conditional digitalization of traditionalist companies, which required a certain system to adapt to emerging market demands. The one of the characteristics of this phenomenon is the appearance and the spread of this term at a time when international pressure was exerted on many companies in Western economies due to non-competitiveness. Thus, it directly required the formation and establishment of new ways of working, as well as the search for staff to establish them.

Certainly, this interpretation only applies to a recognizable version of human resource management. Today, in everyday work, a freer use of the term that refers to any form of approach to workforce management is also used. In a wider, more general use, employment decisions can be made "ad hoc", can be reactive and short-lived. They can also include a so-called “value-based approach” or it can be calculative and multi-variable. Hence, only the field of strategic management can have more meaning or variation in setting a "strategy". It can be a plan, a pattern, a position, a perspe□tive, or an internal tri□k (Mintzberg, et al, 1998; Mintzberg, Lampel, 1999).

In the Republic of Serbia and the region of the Western Balkans, the human resource is organized within three types of sectors, the so-called administrative sector. "Human Resources", the Human Resources Department and the Employee Training and Development Sector. (Pržulj, 2002)

Technological development has caused an expansion of software solutions, which, as such, serve human resources professionals in performing day-to-day activities. Also, the new laws create new needs and the administrative sectors are now divided into more and more branches to be able to cover all those needs within the firm. Often, at this time there is no formal education and it cannot be said that someone has been trained for new occupations in this sector, but that does not mean that experts have not paved the way for future colleagues who will soon come to their places, ie created space for development. new professions. Besides, they will seek, up to one, real knowledge about business and the implementation of new strategies within organizations (Ristić 2020)

In terms of employee development, organizations can only decide to develop a higher level of management: top managers, senior managers and employees with extremely high development potential. Middle managers, most responsible for motivating and rewarding employees, are not included. Another possibility is to involve all employees of one organization in the development process, by redefining the development budget for each employee, which is a democratic principle that is fair but does not offer much in the scope and quality of training. Some organizations opt for traditional forms of education, ie for formal educational programs that are intended for the specific needs of the organization, such as courses, MBA programs, and others still choose more modern methods. (Ilić, 2018)

Chamorro-Premuzic, gave advice on how companies can identify high employee development potential (Fast Company, 2014):

- Clear criteria for promotion should be set that explicitly define which behaviors, achievements the company equates with the definition of an employee with great development potential;
- Strive to use objective and reliable methods to assess employee performance, while maintaining transparen□y, if not in terms of all parameters, at least within those measurable;
- Companies are advised, where possible, to clearly set and provide development support to those who do not

achieve the set goals on a personal and / or organizational level, despite attempts - the potential can be trained and enhanced;

- Don't focus only on past or current performance: personality is a better indicator of people's potential for a new role, especially when it involves managing people in the form of human resource management;
- What is obvious is that performance appraisals and supervisor nominations are not reliable methods for identifying employees with a high degree of development potential. They reveal people who can "look" like a future leader, but this is based on the perception of existing and past performance, but also the subjective assessment of the individual.

According to Hogan, the personality assessment test is an ideal empirical basis on which to build, ie according to which a certain program intended for the career development of employees with high development potential in a certain company can be created (Sage People, 2019). Hogan's high-potential model identifies leadership potential in three dimensions. Basics of leadership: the degree to which people can manage their careers, are rewarded for what they do, and who are good organizational citizens. The emergence of leadership: the degree to which people stand out from their peers, build strategic business relationships, exert influence and are seen as leaders. Leadership efficiency: the degree to which people can build and maintain high-performance teams and guide those teams toward organizational success. Hogan believes that this multidimensional approach to assessment paints a comprehensive picture of each person - their work habits, ideal job type, leadership potential - far beyond the information available in the traditional process. Most employees develop their careers through different work experiences and acquiring work habits. This includes interpersonal relationships, conflict resolution, responding to requests, tasks and dealing with other aspects of the job that employees face in their workplace (Bogićević Milekić 2015).

Gaining work experience during the career of employees takes place through the processes of increasing the job, rotating jobs, moving employees, promotion, but also moving to lower jobs. Also, employees can be temporarily sent to work in other organizations to break the monotony and gain new perspectives for doing the job. It is obvious that employee development is not only a matter of the scientific discipline Human Resource Management but also that many other sciences and scientific disciplines are gaining in importance, such as sociology and psychology (Ilić, et al 2019)

Research of differences between Serbian markets and countries in the region - Human Resources sector, Expert survey

Research Setting

According to an anonymous survey, after graduation, 52.4% of students see their future in a domestic company, and 77.1% want to get a job in a foreign company. Among the respondents, 50.4% are entrepreneurs, while 33.2% of students would be engaged in freelance work. The reason why a foreign company is more interesting than a domestic company in Serbia are standards, approaches to solving problems, but also the possibility of career development. Career development is the most mentioned reason (OpenIT, 2020)

Again, depending on what the seniority is, what the experience is, what the employees are striving for, this type of education is adapted to their development. Companies are ready to do that and that is the practice. Technologies change very quickly and only constant education can help to follow and see what it is where an individual can be found.

The maturity of our markets in terms of introducing new technologies into everyday business is an indicator that our market is still lagging behind the countries in the region. A large amount of research shows that for someone to be able to implement technology, they have to get acquainted with it in some way. Since companies are primarily acquainted with technologies, they must either have some experimental work or get some directive, a client initiative. That experimental work is something that requires a certain amount of time and investment in something like that.

Certainly, to implement everything, before education, it should be developed awareness about the need for constant, lifelong learning on the part of the human resources sector and the part of employees, but also from the perspective of companies as organizational units. Definitely, we are late, but an indicator of the community, people who talk about relevant topics, and even the students themselves, can show the initiative for change and shake the Serbian market to move towards positive change. The primary research in the form of a survey was aimed exclusively at HR professionals, both in the human resources market of the Republic of Serbia and in the countries in the region.

The conducted survey, addressed to HR specialists, was structured in such a way that it did not contain inappropriate questions and that they did not represent an attempt to reveal or disclose business secrets of companies backed by HR

professionals. Therefore, the survey is anonymous. A five-point Likert scale was used for individual attitudes, and a mean score was used to process the results. The questions are grouped into 4 segments: socio-demographic issues, a methodology of the HR sector, career development of employees and HR, EB & marketing.

Survey of the attitudes of professionals in the HR sector

The primary research was conducted in the form of an online survey. The survey was addressed exclusively to HR professionals from the Serbian market, but also to countries in the region to compare HR methodologies.

In order to reach the target group, the survey was set up within two groups that include exclusively HR professionals, on two different platforms - Facebook and LinkedIn. The first is a Facebook group called "HR Corner - HR community", whose founder is Katarina Šonjić, Employer Branding Specialist. The second group is "HR Tech Community", founded by Nikola Mijailović, the founder of the Joberty platform. The survey was posted on September 19, 2020. in the HR corner, while 22.9. also set up in the HR Tech Community, a community of HR professionals on the LinkedIn platform.

The survey lasted from 15.9.2020. until 25.9.2020, when it reached the number of 25 respondents - experts in the field of human resources management. At that point, the survey was closed, as the sample collected was sufficient for the relevance of the sample

Table 1 Socio - demographic sample characteristics

Demographic variables	n	%
Working status		
Employed	24	96%
Unemployed	1	4%
Country		
Serbia	20	84%
Serbia and Montenegro, cluster business	1	4%
Country in the region	3	12%
Education		
No school, unfinished primary school and primary school	0	0%
High school, grammar school and specialization	2	8%
Higher-education school, faculty, faculty +	23	92%
Length of work experience in the HR sector		
>1 year	1	4%
1 year	2	8%
2 years	1	4%
3-5 years	7	28%
5+ years	14	56%

On the first question about education, out of twenty-five respondents, 52% stated that they had completed basic professional or basic academic studies. Then, 40% of the respondents stated that they had completed master's studies, while the lowest percentage of 8% indicated that they had finished high school, high school and specialization. Another issue concerned the current employment status of employees. For the most part, as many as 92% of respondents are currently employed, while only 4% of respondents stated that they are not currently employed.

The third question is selective in this survey and it consists of two parts. Employees in the human resources sector could mark whether they operate on the domestic market (in Serbia) or abroad, ie in one of the countries in the Region. The third answer was recorded, which referred to the cluster of Serbia and Montenegro. 84% of respondents are from Serbia, while 12% said they currently operate in a country in the region.
The fourth, and last question in the first segment of the survey, in which general data were collected, provides answers regarding the work experience of employees in the HR sector. The majority of respondents, precisely 60.9%, stated that they have more than 5 years of work experience, which induces better first-hand insight in the form of digital transformation that they have experienced during their career.
HR sector-work methodology.

The fifth question, in the part of collecting general data, shows the way in which employees come to the current

knowledge and methodology that they apply in their daily lives. This serves as a starting point to clarify the question - how to get into the HR world? Is there a need for formal or non-formal education? Is it a professional practice, the advice of more experienced colleagues or the feedback of people who have already had interviews with the HR team at some point. It was necessary to opt for one or more methodologies and approaches to work that helped HR professionals in HR to get a job, but also to advance in their current job.

Experiences are various, and respondents could mark multiple responses, which they felt related to. For most, one of the choices was formal (48%) and non-formal education (56%). With the help of colleagues, the answer is the most ticked with an exceptional 60%. They are followed by items such as self-initiated education, which is commendable (44%), then professional practice in an agency and / or company (28%), feedback from people interviewed (10%), while less than 10% occupy items volunteer work (fairs, conferences, NGOs, NGOs, etc.) 16% and individual development plan (4%).

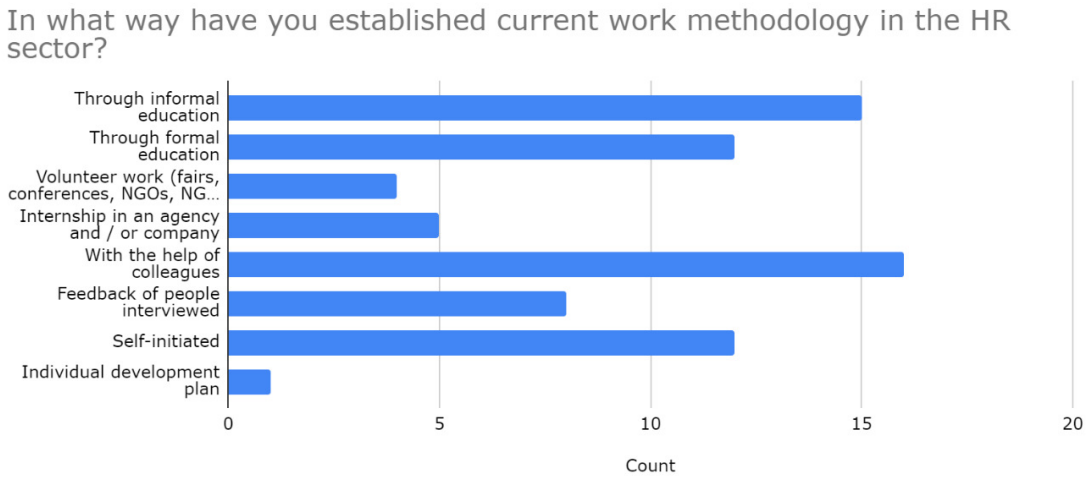

Graph 1: Overview of the methodology of work in the HR sector (author)

The sixth question in the survey, and the second in general, which refers to the methodology of work, is the individual position on the issue of the importance of employees for the success of the company. We start from the position that workers are not working capital and that they can identify their ideology with company values, which it presents to the public. It involves an individual's subjective assessment of the importance of the role of employees in the company in which they work.

It is encouraging that, on a scale of 1-5, from Not at all important to me to Extremely important to me, most of the respondents chose 5 (88%), while a few chose 4 (22%). However, it is exceptional to see from the sample that there are no neutral responses, nor the attitude that employees are not important in the organization. The average score for this question is high and it is 4.88.

Based on the seventh question, it is found out what is the priority for employees from the point of view of HR. This was a multiple question, and it was possible to mark more than one answer. It was necessary to decide on one or more options that have emerged as a result of previous work and insight, what is the priority for employees directly in employment, but also during employment in the company. It can be based on the information created in a company or personal opinion.

Somewhat logically, on the priority scale, the team (72%) and the salary (88%) are at the very top. After that, the benefits tailored to the individual (e.g. New Year's packages for employees who have children) and teleworking due to the newly created global situation (44%) were equally checked. Also interesting, clear communication of values (Identification of values and ideology with the company) is considered to be very important to employees (40%). Half of the HR experts pointed out that insurance is certainly extremely important for employees, which is a more uncertain economic situation (private health, pension and similar insurance - 52%). The product we are working on is inspiring for a third (28%), while the annual vacation is in one of the penultimate places, as much as 20%. There are also added answers that carry a couple of percentages (4%) and refer to the opinion that the answer to this question depends on the level of knowledge (junior / senior), from the industry - it is very individual from person to person (4%); as well as the possibility of advancement (4%)

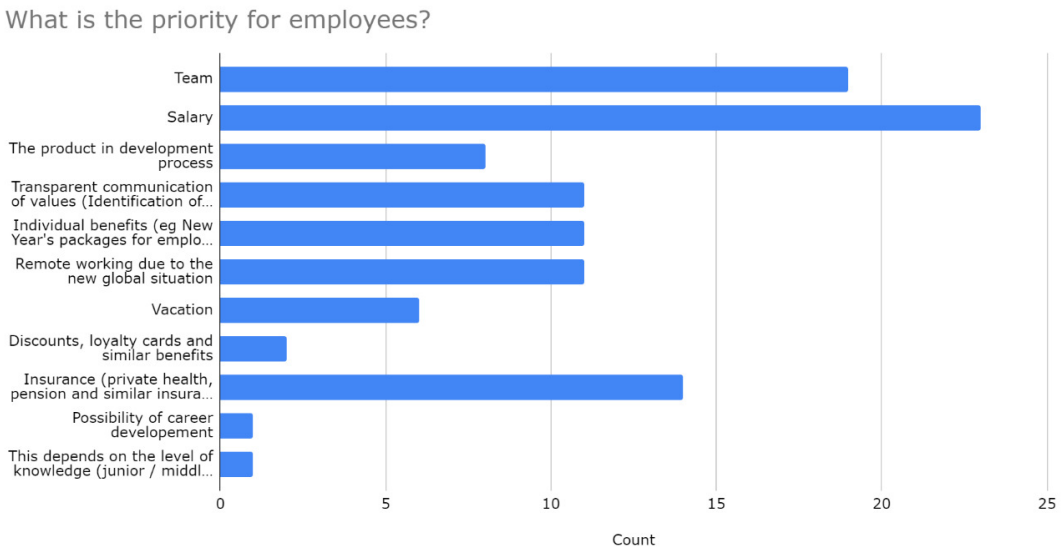

Graph 2: Presentation of priorities of employees from the angle of HR sector (author)

The eighth question is an introduction to more complex qualitative issues which will be quantified below. Experts shared in the survey the way they can check with employees whether the current conditions suit them. It is an individual choice for one or more options that have emerged as a result of previous work and insights. It can be based on information created in the company or personal opinion.

The interview is certainly the most prominent answer, since the half of the respondents wrote this option, 13/25 of them (44.8%), with a complement. Variations of the interview were as follows: one-on-one interview, career interview, face-to-face informal interview, open interview, interview with employee and / or manager. Furthermore, 9/25 (31%) of the respondents stated that it could be through a survey, with a complement (internal survey, satisfaction survey). The rest of the answers were based on the atmosphere and mood (24.1%), with variations on the topic, such as employee engagement research, motivation, the response in group activities, communication with colleagues and management, "employee experience", atmosphere in the workplace.

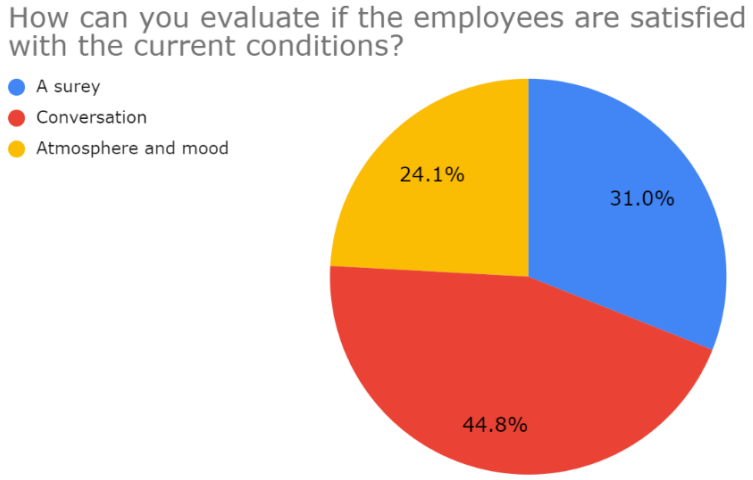

Graph 3. Overview of how to evaluate the benefits of current employment conditions (author)

The ninth question was quantitative and it is related to the expression of subjective assessment. The goal was to, on a scale of 1-5, determine the importance of a bad recommendation on a decision to hire a candidate. The question specifically referred to whether references from former colleagues and / or employers influence the selection of that candidate. Suppose it fits all other standards, but the only inconvenience is the reference, which is bad. No details were given, but it was necessary to determine the position on a scale of 1-5, to what extent this parameter affects the final decision on the next round of selection or potential employment. It could be based on information created in the company or personal opinion.

Interestingly, almost half of the respondents expressed a neutral attitude on the scale (44%). However, opinions ranged between "Yes, it can be crucial", five on the scale (20%) and "Yes, it is important to me, but not crucial", four on the scale (20%). Overall, 16% of the remaining respondents divided opinions into one and two on the scale, which initiate that it is not crucial to them, in the sense that it has other priorities (8%) or that it does not matter to them, but can take into account (8%). The mean score for this question is 3.36.

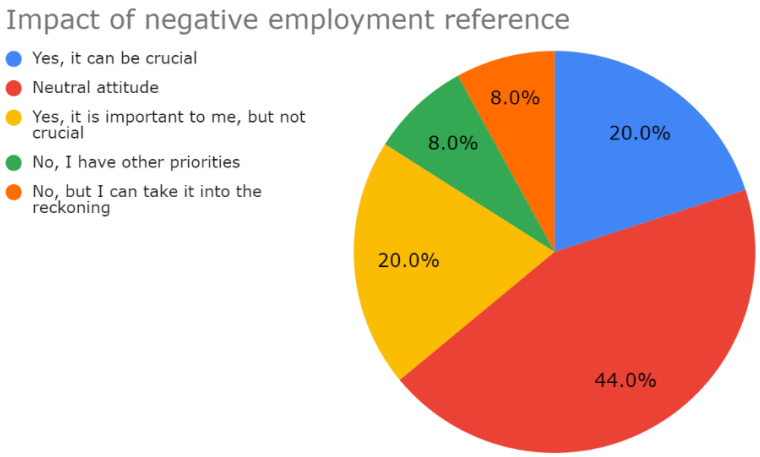

Graph 4: Overview of the impact of poor reference on employment (author)

Question 10 deals with the challenges that the HR sector faces in its daily life. The goal is to find out - what are the new or existing challenges. It can be based on information created in the company or personal opinion. What is definitely the biggest fear that experts of this profile face is the departure of good employees and the remaining of bad employees (68%). Experts are leaving for better opportunities, and those who have not yet come to their positions are not professional enough. The next choice, which, in some cases, is actually the reason why experts leave the company, is the so-called headhunting, ie theft of staff by competitors (48%). It's not discussed much, but it certainly exists. And there can be a lot of pressure and an aggressive approach on employees who are "targeted".

Next, we come to equally divided opinions that tend to almost half of the respondents. Lack of resources for the HR sector (financial, material, etc. - 44%) always lingers when it comes to the human resources sector, which is further disturbed by the fact that employees are simply not interested in education or training (44%). These two factors follow the next two which also pull 40% each. It is about the fact that the existing reward system is inadequate or does not exist (40%), which is caused by a somewhat lack of resources for the HR sector (financial, material, etc.) (40%).

On the one hand, some HR professionals say that the HR sector is left out of the strategic planning process and has no impact on the organizational structure (40%), and on the other hand, some believe that other sectors are still not sufficiently involved in the HR sector (selection, recruitment, induction) (28%). This is accompanied by a balance between adjusting employee requirements and company culture (24%).

Interestingly, transparency and wage reporting are not a challenge at all, when it comes to the human resources sector. So it seems to be up to the employer to keep the trade secret about the payment of each individual employee. Only 12% of respondents claim that this is a challenge for them.

The least marked answers are oriented towards the fact that colleagues from other sectors interfere too much in the work of the HR sector (2%). There are also a couple of individual answers, which are very interesting. They concern mainly internal processes, in terms of inadequate monitoring of internal business processes (4%), then the adaptation of new generations to the work environment (4%). Adaptation has been accompanied by very remarkable more comprehensive responses that affect this phenomenon of young people adapting to the new context of the work environment. It can easily come to the reduction of clear values from the top through HR that will not be passed on to young employees because they don't want to accept them. This can be further accompanied by unclear setting of career path of employees by management and lack of performance management and thus hampering the progress of employees (4%). Finally, there is the inevitable work-life balance, in the sense that it is necessary to provide "work-life" balance to employees, ie focus on feeling good in your own skin (4%).

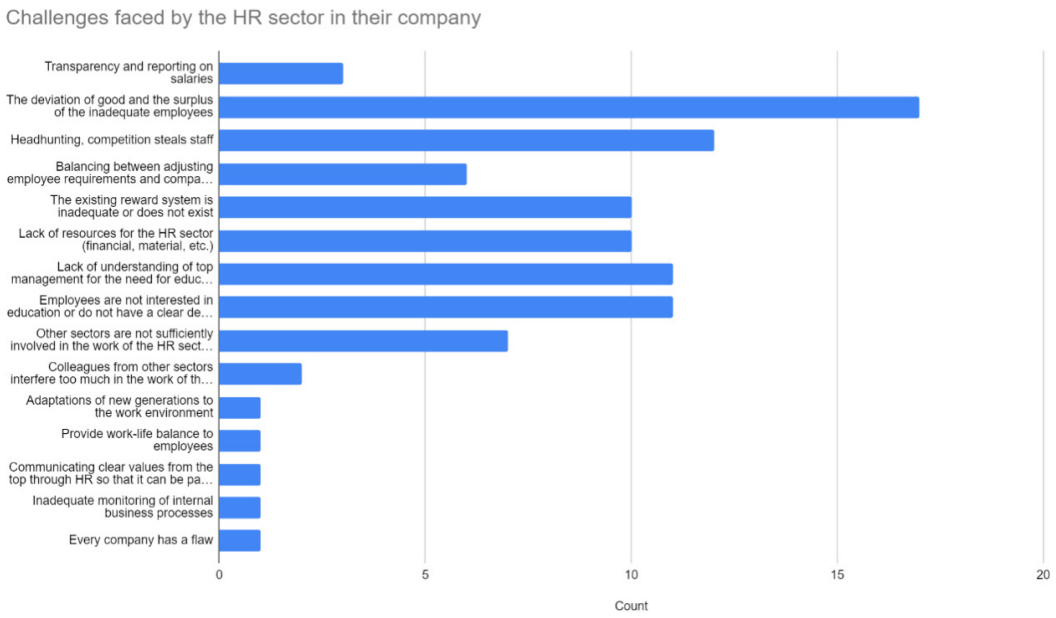

Graph 5: Overview of challenges faced by the HR sector (author)

The eleventh question, refers to the recognition of how rising talents are recognized in the organization, which can at one time possess the necessary knowledge and skills. The goal is to find out what are the parameters that can "reveal" the candidate that there is potential for work in the company. Whether these are the processes that will follow after that, such as testing, certain tests, tasks; Whether the research of a person's profile on social networks included, both in terms of personal life (social networks) and in terms of professional life (online portfolio, previous work experience) or are these some other little things that decide that this candidate is the perfect choice for company and to show that it can thrive. It can be based on information created in the company or personal opinion.

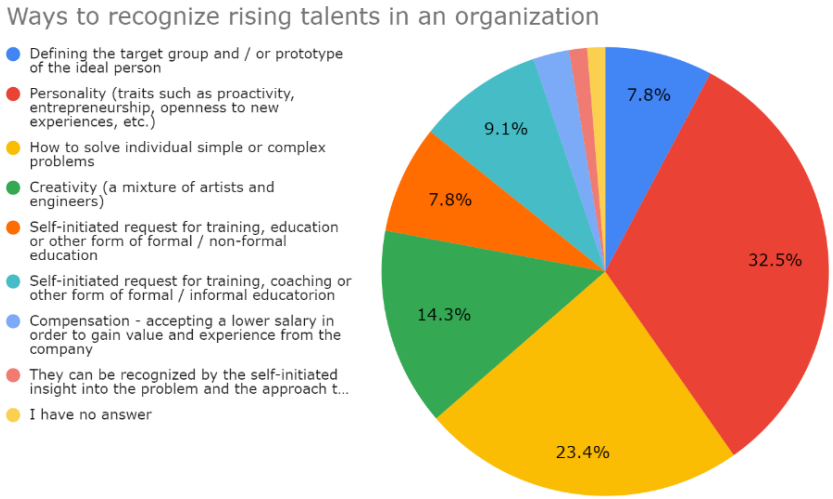

Graphic 6*:* Overview of ways to recognize rising talents in an organization (author)

The twelfth, also the last question in the second segment of the survey, aims to collect the necessary data on the turnover of employees who were in practice during their studies and / or remained in the company. What is needed here is not a comprehensive answer, but an individual position on whether there is a position for students who want to enter the professional world through professional practice for further training. It can be based on information created in the company or personal opinion.

Employee career development

The topic of the third segment of the questions within the online survey was the topic of career management, at the organizational and individual level, then mentoring. The starting point for forming the question was that only real employers will properly treat their people and be a role model and inspiration for career advancement. However, through answers to the following questions it is found out-whether it is a burden for employees to constantly work on themselves or find inspiration in their work environment to progress.

The thirteenth question concerned subjective assessment regarding employee career management, management at the organizational or individual level. The question is based on a general, personal assessment and respondents were able to express an opinion on a scale from 1 to 5, where 1 is exclusively at the organizational level and 5 exclusively at the individual level. Mean score is 3,2.

64% of respondents had a neutral attitude on this issue. This attitude is further followed by 16% of HR professionals who believe that management is conducted mainly at the individual level while 12% stated that it is still at the organizational level. A few stated that it was exclusively on an individual level.

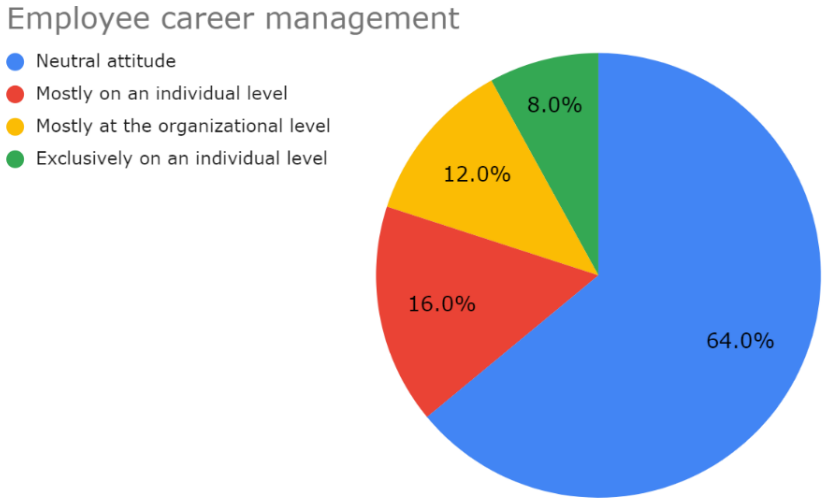

Graph 7. Overview of employee career management methods (author)

The fourteenth question is descriptive and related to the thirteenth question. If there is a plan in the organization where HR professionals, who filled out the survey, work, at the organizational and individual level for managing the career of the employees in the organization, then brief information on how the survey is conducted is needed here. However, if information of this type is exclusively and completely retained and no superficial answer is possible, respondents could declare that they do not have an answer (11,5%).

Substantially, it is an individual development plan that is part of the performance process (30,8%). “Growth framework” is also mentioned as a system and in more detail it means that the management is done on the basis of the individual development plans. Both employees and the manager are responsible for the organization, as well as the HR. Additionally, a training plan tailored to the position, individual needs and the potential of the employee leads us to the next group of responses, related to instructions, programmers, trainings and talent management plans (26,9%). This segment of the responses also means that the career of employees could be managed through lists of knowledge, competences, skills and results for each position, that are clearly defined and accessible to everyone, as well as the opening trainings for acquiring them.

Two large groups of responses follow a couple of more specific ones related to the HR sector strategy (11,5%), management at the organizational level (3,8%), but also that the management is based on matching the visions of the company and of the employee (3,8%). The HR team is here to define the guidelines but the responsibility for the career of the employees is accepted by the management and the specific employee. Everyone has an insight into how they can thrive within the company, not just departments-meaning available positions, necessary skills and knowledge and available resources.

Vision matching is complemented by the perspective in which the employee finds himself-whether he is in the company because he has too broad ambitions for ascent or he is there only to receive a salary. In this sense, the question of whether career development is important to that individual is still being worked out. The management sector itself can stimulate the team to be successful as well as the employees to advance in their career, and yet, on

the other hand, if driven by ambition it could remain at the individual level. Finally, the remaining 11,5% of respondents still believe that it is not managed at all.

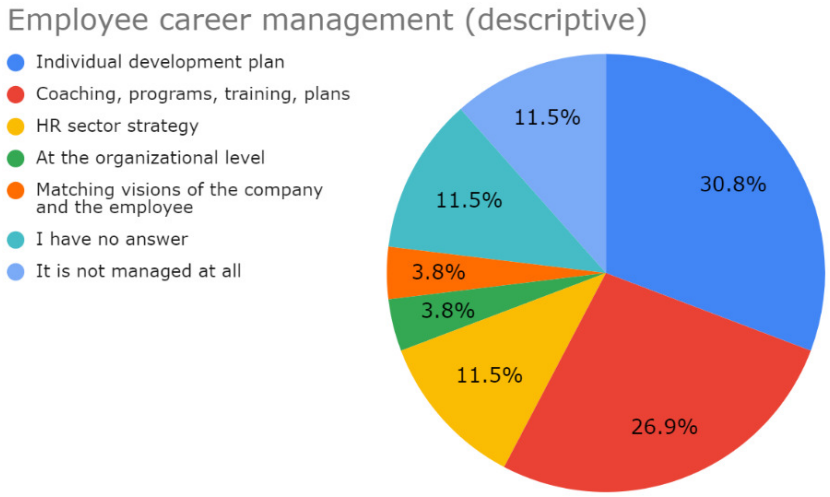

Graph 8: Overview of employee career management methods (author)

Within the fifteenth question, the starting point is that experience is not necessarily measured by age or the number of projects. On the contrary, by engaging, ie. by job rotation and diversity of experiences, dynamics can be brought into everyday work. A subjective assessment in response to this question was made on the basis on data related to previous experience on employee rotation for the sake of learning or their career development. No result is required if it turned out well, but only the primary information whether it is done or not, based on personal opinion.

Most of the respondents stated that they rotate employees for the sake of learning. They are monitored by HR experts who rotate them only if they wish that (24%). The next 24% keep this in mind as an option but do not implement it. Only 12% of respondents stated that they do not perform rotation while 8% of them are willing to do research and individual interviews with employees before the rotation.

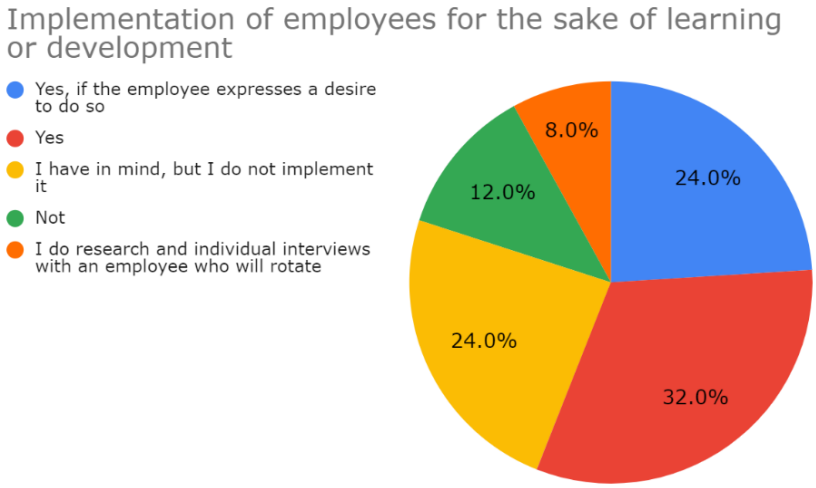

Graph 9: Overview of the implementation of employee rotation for learning (author)

Concerning the sixteenth question, it was necessary to provide only positive or negative answer to the question whether there are mentoring programmers in the organization. It did not go into the manner of their implementation. It is based on personal opinion. The majority stated that monitoring programmers exist and are being implemented in the organization (84%) while the minority was against it. Only 4% said it depended on the sector.

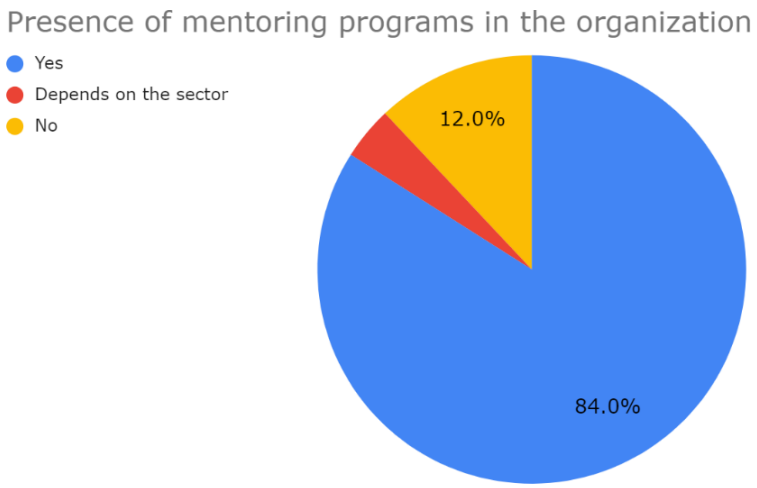

Graph 10: Overview of the presence of mentoring programs in the organization (author)

The seventeenth question aimed to provide answers regarding the way of conducting training quality evaluation and/or mentoring programmer. A vast number of respondents stated that this was through evaluation forms, questionnaires or formulas (40%). Furthermore, it is learned that the evaluation is done in written form, after the training is completed. The next type is the evaluation of the success of the application of newly acquired skills and knowledge. It is noted that the questionnaire solution is short-term while the long-term form of evaluation is visible through the work results. Furthermore, there are questionnaires containing qualitative and quantitative questions. Finally, defined patterns are also mentioned as one of the methods.

The next one is direct feedback (20%) and then conversation (16%). In one variation, it is thought on the basis of the report of the mentor and the feedback of the unemployed while other variations show that it is the feedback of the trained person, as well as the line manager. The general conclusion is that the feedback should be discussed with the employees, at the end of the training, and after a month, a questionnaire is to be sent to the employees to assess whether he has had the opportunity to apply the acquired knowledge so far.

A smaller percentage opted for the survey (8%) while the answers that accompany this one are self-evaluation (4%), then meeting, interview (4%), Kirkpatrick three levels and sometimes the fourth one (4%). The last option is that there is no evaluation in a particular company (4%).

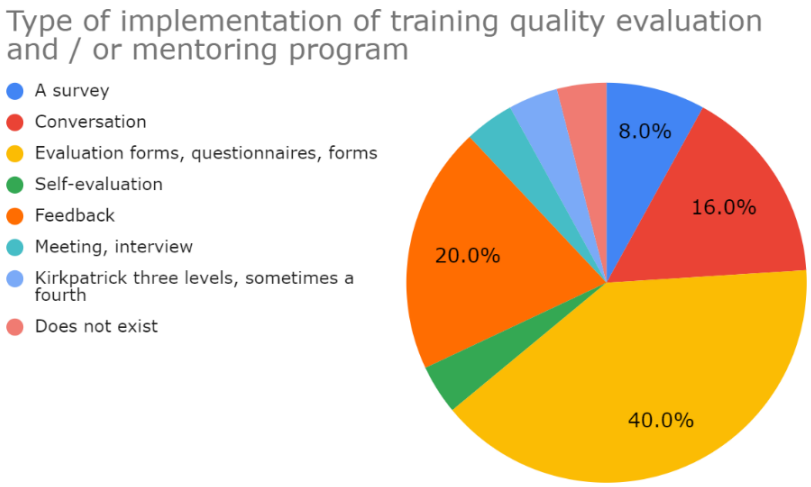

Graph 11: Overview of the type of implementation of training quality evaluation and / or mentoring program (author)

The eighteenth question deals with the subjective assessment of experts in this sector, when it comes to choosing the most sought-after profession, according to their experience so far. Undoubtedly, the majority belongs to the information technology sector (36%) in combination with professional engineers and technicians of various profiles

(32%). These two large fields are followed by three smaller ones that relate individually to economists (8%), e-business, marketing and sale (8%), but also to artisans and workers, people who are experts in specific fields (8%). Mass positions are the least sought after, warehousing and delivering (4%), while a few think it all depends on the industry (4%).

HR, EB & marketing synergy

The HR sector knows the target group of candidates best. That is somewhat logical since they have been there with them since the selection process to everyday life, work obligations and tasks. On the other hand, they are familiar with the culture and values of the company, which further provides knowledge about innovations that would be good to implement. The issue of synergy of HR, EB and marketing sector is very complex, given that one majority claims that they operate separately, while the other side stick to it that they should remain separate sectors. The question-how can this synergy improve the strategy of the human resources sector-will be addressed below.

The nineteenth question referred to the possibility of cooperation between the HR and EB sectors. Most of the respondents stated that there is a possibility of cooperation between these two sectors and that it is realized on a daily basis (64%). When it comes to the inevitable synergy between the two sectors, there is an opinion that quality cooperation between these two sectors can significantly affect the results of attracting candidates. HR knows what kind of employees/candidates the company needs while EB can attract the attention of such people with its creativity and good ideas for campaigns. This is confirmed by the increased form of applicants which requires additional energy in the pre-selection and selection of candidates. Employer branding can help the HR sector in this process by spotting certain specifications that betray a good future employee. The possibilities are certainly enormous. This synergy should be productive in the future.

On the other hand, a segment of respondents who believe that EB is part of HR activity (28%), emphasizes that EB is often not a sector unto itself. Thus HR plays an active role in forming and maintaining branding. There is certainly an opinion that EB must be in HR because HR knows people while marketing, as a tool, is what helps HR in that. Despite these examples of good practice, a minority of respondents also stated that there is no EB sector in their company (8%).

The twentieth question deals with the way in which HR can help in Employer branding strategy, that is what kind of initiatives and results of HR can help Employer branding. For example, if there is a deficit of certain candidate profiles, should investments be made in setting up an EB strategy (if any) and see it as an investment in the long run in order to reach new candidates. It is believed by 48% of respondents that HR helps EB activities and vice versa. Further, there is the creation of organizational culture as well as the creation of internal and external communications (16%). Only 12% of them remained restrained.

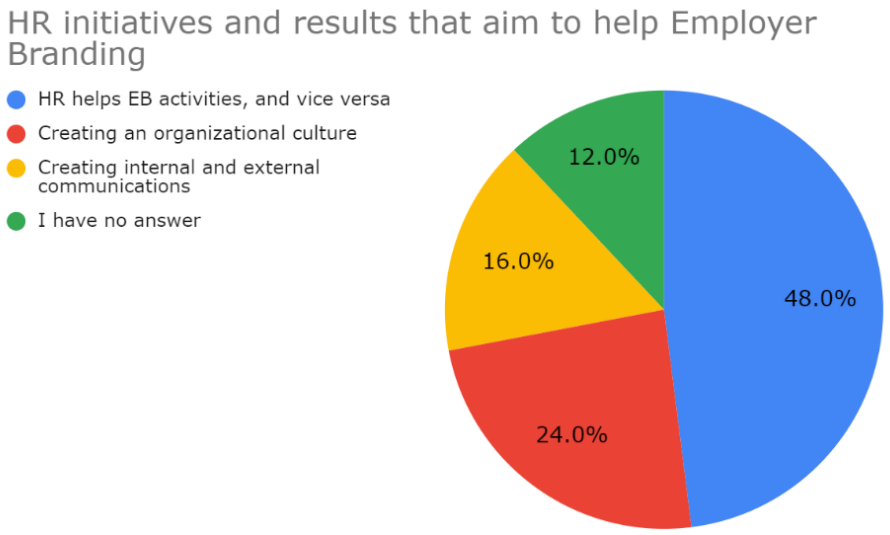

Graph 13: Overview of HR initiatives and results that aim to help Employer Branding (author)

Within the twenty-first question, people are definitely in focus of the HR sector, without equal (32%). Other answers and explanations are mostly people-oriented in the sense that 28% of respondents believe that development and inclusion of employees must be in focus which can lead to their professional satisfaction, in such a way that it will

have a direct impact on business goals.

Furthermore, there are divided opinions between experience, ie. employee satisfaction and the selection and retention of candidates (12%). The explanation is that people should be supported in order to feel satisfied in the company. It should be provided by setting up processes, nurturing organizational structure, giving feedback to management about employees and possible advice when making strategic decisions. On the other hand, selection of candidates who are most culturally suitable for the company, their development and retention, supports the creation of systems based on analytics that allows the same.

The penultimate 12% of them believe that it is still a strategic issue. It should be emphasized that each HR has a different strategy that is defined depending on the needs of the business. It is certainly common that all good examples should start from HR who is also responsible for providing support to those who need it. The remaining 4% of respondents have no answer to this question.

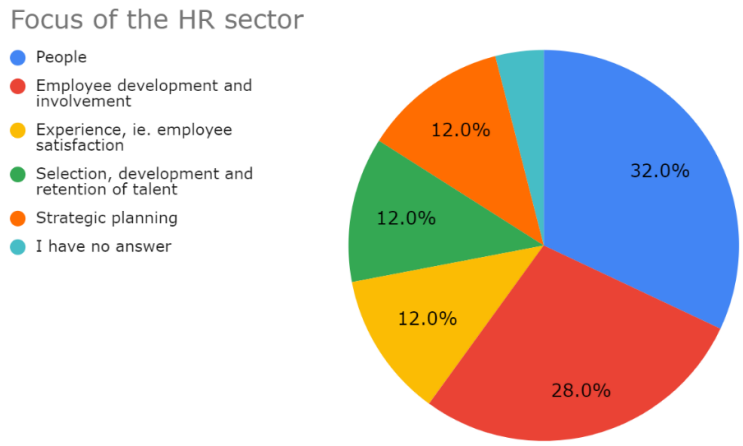

Graph 14: Overview of the focus of the HR sector (author)

The twenty-second question concerns the cognition of processes and sectors in which HR should be involved. Human resources sector should be involved in business transformation and strategic decision making that is considered by 25% of professionals. Internal communication and internal processes also require the involvement of the HR sector (25%). It is interesting that 20,8% of HR professionals believe that their sector should be involved in all processes or sectors in the company. In one of the companies surveyed, HR is in some way interwoven into all sectors by some part of all responsibilities. The processes are clearly set but the overall scope of HR is, actually, linked to many sectors.

This is followed by integration into the budget and finances. There are 8,3% of those who did not want to declare themselves, while the last process was Employer branding (4%). One should think in the direction of more flexible forms of employment or adapting existing models to the current needs of employees working from home. The optimization of these models is where the HR sector can get involved, because it is in direct contact with employees. The last explanation says that everything depends on the internal organization of the company (4%).

Conclusion

After conducting a survey with 25 verified experts in the field of human resource management, it is concluded that the HR market of the West Balkans is moving towards complete personalization, both products and services and a sense of personal satisfaction and fulfilment in a career light. Products and services are now intended for increasingly specific niches and working conditions are constantly adapted to people's needs, due to the new economic situation. Repressive systems become part of the past while the present is occupied by developmental ecosystems where creativity and further development and research have been nurtured, as opposed to outdated beliefs where it was important to satisfy management.

Three factors emerged as the main ones in the survey-career development of employees, employee satisfaction and salary transparency. One of them can be used to isolate another confirmation that the transparency of business leads to progress and better business of the company. Career development is mostly expressed through an individual development plan, made according to the needs of each individual, which is part of the performance process. Both employees and the manager are involved in their implementation, as well as HR. In addition, adequate trainings, programmers and talent management plans are provided through training plans that are adjusted to the position, individual needs and the potential of the employee.

The results of the survey testify that organizational culture, where creativity is nurtured, is also important, pointing out that management is based on matching the visions of the company and the employee. The HR team is here to define the guidelines, but the responsibility for the career of employees is accepted by the manager and the specific employee. Everyone has an insight into how they can thrive within the company, not just the department-meaning available positions, acquired skills and knowledge and available resources.

The comment that remains is that no matter how ideal the current situation on the Serbian market is, it is starting to change under the influence of various factors. Only this way of implementation of emerging trends can create a productive basis for further development of labor supply in the Western Balkans, primarily Serbia. The reason is that in non-transparent companies it is not possible to create a cultural climate that is adequate for progress and creative development, while in transparent business there are conditions for better strategic decision making, improvement of internal communications and processes but it is also an excellent basis for business transformation.

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Rewards Management in Organizations - A Retrospective on What Organizations Have Set Out and Achieved, In Order to Identify Future Actions

Radu MARIN

National University of Political Studies and Public Administration, Bucharest, Romania
radumarin62@gmail.com

Abstract

The current paper objective is to highlight the idea that the companies should aim to implement an efficient total reward management, in order to attract, retain, motivate and improve the performance of its employees. Different types of rewards which can be offered to employees and the evolution over time of employees' preferences for every type will be analyzed. This evolution has led to the transition from the compensation model to total rewards management model. By analyzing the studies published so far, the paper will present ways in which total rewards management can be effectively used within companies. The paper will also demonstrate that total rewards management has a determining role for increasing the performance of companies. The paper aims to present the influence of the entire package of rewards that can be offered by companies to their employees, given the fact that many of the studies published so far have focused only on the analysis of one or several rewards. This paper also aims to identify the full package that will be most appreciated by employees based on cultural, gender and age differentials.

Keywords: compensation management, total rewards management, employee attraction, motivation and retention, company performance

JEL Classification*: J33, M52, M54.*

Introduction

The present paper will analyze which were the factors that influenced the personnel policies choosed by the companies and determined the transition from compensation management to total rewards management. The role of compensation management is to design and implement within companies the full compensation package. In the literature, this is also known as salary administration, payroll management, reward management, although, as we will see in this paper, these concepst are either restrictive or too permissive regarding the rewards that are administrated within compensation management. In our opinion, we consider the concepts of salary administration and payroll management as being limited. Although they still have an important role in employees' preferences, they represent only a fragment of the rewards that can be offered to employees. Also, this concepts have a lesser impact on employees in the modern economy, especially on highly qualified employees, who, in general, have attractive salary packages by default. In our opinion, the use of the term compensation management is due to the fact that employees perceive the rewards received from the organization as compensation for their efforts, as compensation for the time spent working, in the expense of personal life. From a semantic point of view, perhaps the term of compensations better defines the fact that the rewards they contain are practically something offered in exchange (a compensation) for the employees' activity. On the other hand, in the modern view, compensations contain only the basic salary, bonuses, profit sharing or the option to buy shares, meals at the companys' canteen, different types of free subscriptions offered by the employer (practically all those rewards that have a financial expression). Total rewards add additional categories of rewards to the ones included in the compensation, which can take a variety of forms: health insurance, retirement plans, sickness insurance, incapacity for work, unemployment, life insurance, paid leave and any other benefits that employers can provide (flexible schedule, personal development and career development programs, a good work-life balance, job recognition programs). In addition, the

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difference between compensation and total rewards can also be seen in terms of time: while compensations reflect present or past rewards given for employees' activity, total rewards have an openness to the future. However, there are also organizations that have a broader view of the concept of compensation, including a number of benefits that generally exceed this notion, such as health and life insurance, retirement plans.

Research outline

We have aimed to analyse the studies published in the last two decades in order to identify the way in which employees' preferences have changed towards certain rewards and how companies understood to respond to those changes. Another goal of the study is to highlight how organizations' performance can be influenced in a favourable way by adopting the correct rewards package.

Gross and Friedman (2004, p.8) considered that the structure of rewards granted by the employer has changed due to the fact that employees' preferences for rewards have changed. Thus, if in the past employees were asking questions about how much they currently earn or how consistent their retirement plan will be, more and more employees are starting to ask questions about how much the whole rewards package will be over their entire activity in an organization. In the modern economy, based on knowledge and globalization, attracting and retaining a highly skilled workforce within organizations is essential in order to achieve the desired level of competitiveness and performance. In this regard, McCormick (2015, p.5) highlighted the opinion of successful companies that a comprehensive plan in terms of overall reward strategy can lead to differentiation from competition, attract highly qualified employees and increase the productivity, obtaining a better yield. This is why Bwowe and Marongwe (2018, p.2) consider that many organizations pay much more attention to the restructuring of the reward system, given its positive effect on employee motivation and retention. Rumpel andMedcof (2006, p.30) also consider that the implementation of a total reward system can bring the following functional benefits to the organization: attracting, motivating and retaining employees. Keeping the same approach, Adeoye and Fields (2014, p.345) considered that implementing a rewards management system allows the companies to gain a competitive advantage, due to the fact that they will attract qualified personel that can be transformed in a stable workforce. Moreover, Milne (2001, p.321) considers that, besides encouraging employee engagement, implementing a reward system will also contribute in an essential mode to the knowledge sharing behaviour among employees.

Another important aspect, in terms of the benefits gained due to compensation management, is analyzed by Greene (2014, p.7), which considers that the existence of a state of commitment, satisfaction and motivation among employees causes them to be more productive and more involved in relationship with the organization. The author concludes that, due to this fact, organizations have begun to consider employees involved in work as valuable resources. In the same direction, Maung and Walsh (2016, p.3) present the employees efforts as determinants for the success and survival of organizations and consider the reward system as an essential factor for obtaining employee motivation. We find the same idea presented by Bustamam and Abdullah (2014, p.393), which considers the implementation of a reward system within organizations as an essential management tool, which, by increasing employees' motivation and satisfaction, contributes to increasing the performance of the organization. In this regard, Adeoye, Atiku and Fields (2016, p.28) note that the main reason for awarding rewards is to shape employees' behavior in the direction that the organization needs them to go. Fernandes (1998, p.1) pointed out that, in order to increase productivity and ensure the attraction and retention of key employees, many employers have been forced to revise their reward policies. However, the author points out that certain rewards such as freedom, flexibility and delegation of decisions to employees can also lead to adverse effects, such as abusive entry into the employees' private space and the transfer of risks to the employee. Heneman (2001, p.ix) pointed out that, although the specyalised literature considers compensation policies to have a positive impact on the organization's efficiency, there is still very little information on how they can be linked to the organizations' business strategy. We find this idea also expressed by Dessler (2016, p.346), who stresed that a compensation package must be created in ordert to gain a competitive advantage, by modeling the desired behavior among employees, respectively to create a link between each type of rewards and a specific business objective. The author concludes that this is why many organizations use a total rewards strategy to support achieving their goals, noting that this strategy adds more challenging work, career development and recognition to the traditional rewards, such as payments, incentives, and benefits. Based on the theory of equity, the author considers that the award of compensation must be fair both externally, in terms of awarding rewards within the organization in relation to rewards for similar activities in other organizations, but also internally, respectively equity in terms of rewards for various activities within the organization. Awarded rewards should also be fairily distributed among employees performing comparable activities and the processes and procedures established for awarding compensation must be perceived by employees as being fair (Dessler, 2016, p.347). Day, Johnson and Barron (2014,

p.75) also present the fact that the resources allocation is generally influenced by three criteria, two of which are equality and equity. In the same direction, Bwowe and Marongwe (2018, p.3) find that, in order to promote fairness and correctness to different categories of employees, organizations must link performance rewards, otherwise it can become very difficult for organizations to offer the deserved recognition, which would lead to incorrectness.

Aksakal and Dağdeviren (2014, p.147) view rewards as what is offered in exchange for desired behavior, as a factor in motivating employees to have flexible and better performance and reward management, whose main goal must be to properly reward employees, must ensure the creation of the reward structure that operates within the organization. The authors believe that rewards management should focus on both financial and non-financial rewards. We can observe that, in the article, the authors believe that reward management must be based on two motivation theories: the theory of equity, because it emphasizes that its main objective is to properly reward employees and Skinner's theory, because considers the rewards to be a positive consolidation.

Findings

Reward packages evolution

Bussin and Van Rooy (2014, p.1) highlights a major problem that may arise if an unitary structure is to be implemented in terms of the reward policies adopted, namely the fact that, depending on the generation the employees are part of, certain types of rewards can be different. In today's organizations, with employees from multiple generations, choosing this type of unitary reward policies could lead to the impossibility of obtaining the desired result, namely the attraction, motivation and retention of employees. This, the authors conclude, could have a negative effect especially on labor markets with few highly and medium skilled workers, especially in the context of increased labor mobility (Bussin & Van Rooy, 2014, p.1).

Another aspect regarding the rewarding strategy is highlighted by the Worldatwork study (2015, p.3) which shows that HR specialists agree that the company's business strategy must be the foundation for implementing human resources policies and developing a strategy for rewarding employees. Khan, Aslam and Lodh (2011, p.90) considered compensation management to be very important so that organizations do not end up having problems and an important means that companies have at their disposal in trying to attract and retain valuable employees. Compensation policy is considered being part of human resources policies. The authors defined compensation as being represented by all forms of payment obtained by employees as a result of their work, but noted that the compensation includes both financial and non-financial rewards. The definition was taken from Dessler (2016, p.346) who considered salaries, incentives, commissions and bonuses as direct financial payments, and financial benefits such as insurance and paid leave as indirect financial payments.

Medcof and Rumpel (2007, p.60), based on the findings of previous studies, stated that total rewards include everything an employee appreciates in the relation with it’s employer, including payments, benefits, a challenging work, learning and career development and work / life effectiveness, but not limited to them. Therefore, they believed that establishing a package of total rewards should be based on an inventory of rewards that the organization has the opportunity to offer to its employees, but also on a study of the importance that each of these rewards has for employees (Medcof & Rumpel, 2007, p.62).

Martocchio (2017, p.3) considers compensation to be composed of intrinsic and extrinsic rewards received by employees in exchange for their work and membership in the organization.

Fernandes (1998, p.2-3) emphasized that employers should review their reward strategy so that, on the one hand, they can identify the most effective rewards and, on the other hand, strengthened the business objectives, showing that reward strategies must seek to motivate those employees who pursue both career-related aspirations, but at the same time pursue the achievement of the business objectives of the organization. In the same approach, Kaplan (2007, p.16) shows that the strategy regarding total rewards is "a holistic approach that aligns with business strategy and people's strategy", considering that it refers to everything that employees value in the relation with their employers. Gross and Friedman (2004, p.8) noted a paradigm shift in total rewards programs: while organizations initially viewed this type of program as an useful tool that can be used for attracting and retaining employees, over the timetime they began to aknowledge the role that employees have in achieving business objectives.

The study carried out by Alhmoud and Rjoub (2020), based on the finding that the current labor market is dominated by Generation X and Generation Y, sought to determine the extent to which different types of rewards impact employee retention. The authors divided the rewards into three categories: extrinsic, intrinsic and social. The conclusions of the study, although limiting as highlighted by the authors, given that the research was conducted in a single field of activity and in a single country, revealed that, in terms of retention among representatives of both generations, the role of the extrinsic rewards is decisive, neither of the two generations being influenced by the social rewards. The study concluded that, in terms of retention, intrinsic rewards are more appreciated by representatives of generation Y and are of no interest to those in generation X (Alhmoud & Rjoub, 2020, p.10-11).

Robbins, DeCenzo, Coulter and Anderson (2013, p.260) also believed that employees can be motivated to behave appropriately by applying a fair reward program, and based on previous studies concluded that not all employees thinks that the money are the most important reward. Based on a 2000 study conducted in Canada, the authors stated that, in terms of employee satisfaction, paycheck and benefits matter less than a reliable top management and a good work-life balance (Robbins, DeCenzo, Coulter & Anderson (2013, p.260). Based on these considerations, the authors proposed adding to the reward package employee performance recognition programs and performance-based payment programs, stock options and improved work-life balance (flexible work schedule, work sharing, telework). The paper presented by Pregnolato (2010, p.70-73) indicates that, in terms of employee retention, in the total reward package the components have the following importance: benefits (35.2%), performance and recognition (20%), remuneration (17%), the possibility to advance in career (10.3%), the learning opportunity (9.1%) and the work-life balance (8.4%). The paper found relatively small gender differences in preference for one or other of these components. With regard to age categories, it was found that, while for Baby Boomers and generation X the preferences follow the general rule, generation Y follows the general rule for four components, while in terms of work-life balance it is considered fourth in the order of preferences, while career advancement ranks last in importance.

Bussin and Toerien (2015) also conducted a study in South Africa, as in the previous study, but only on the workforce operating in the IT sector, considering the total rewards model developed by WorldatWork. The study found that there was an additional problem in establishing and implementing a total rewards package, due to the fact that employees' preferred rewards differed significantly in the three study scenarios, namely to join an organization, to be motivated within an organization and stay within an organization. However, analyzing the total rewards preferred by employees, the study found that the components of compensation (salary, incentives and bonuses) retain their predominant importance, benefits being also considered very important (health insurance, retirement plans) and also rewards related to work-life balance, life and flexible work schedule. Management quality has been identified as the most important reward in employee preferences.

Rumpel and Medcof (2006, p.27) shows the relationship between total rewards and compensations, The authors states that, in order to increase productivity, to reduce the employee desire to leave the company and to increase employee engagement, organisations can implement flexible working hours, training programmes, career development opportunities and a strong performance management and they can integrate them with monetary compensations. In this way, it can be achieved something that the authors define as “employee value proposition”, meaning all that the employees receive in exchange for their work within organization. (Rumpel and Medcof, 2006, p.28). In this respect, Jiang, Xiao, Q and Xiao (2009, p.178) states that rewards are a compensation received by the employee in exchange for it’s work and it can be monetary or it can be converted into a monetary form and also it can have non-monetary forms, such as: stable work place, good relationship with colleagues, decision making involvement, challenging tasks, development opportunities. Keeping the same approach, the authors define total rewards as being formed of monetary payments, benefits, flexible working hours, educational assistance and all the opportunities offered in order to achieve both professional and personal performance. The authors highlight that, although the term total rewards is assimilated to the one of total compensations, total rewards represents all the elements that employees appreciate in the relation with their employer and it is the most modern term related to rewards (Jiang, Xiao, Qi and Xiao, 2009, p.183). The authors started from the term total rewards introduced by Fernandes (1998, p.2), who defined it as "the sum of the values of each element in the employee's reward package".

Although organizations have been trying for a very long time to align total reward management with the organizations’ business strategy, Deloitte (2018a, p.2), having as starting point the Bersin Deloitte Consulting LLP “High-impact Total rewards research” 2018 study, points out that only a small percentage of respondents perceive the rewards offered by organizations as very effective in driving business outcomes. The study revealed that respondents consider the rewards offered by their organizations to be "very effective" in driving business outcomes in the following proportion: alignment

with business goals (12%), talent retention (8%), talent attraction (6%), talent growth and development (5%) and talent motivation (3%). A possible response to these results was provided by Deloitte (2018b, p. 33-35) which found out that total reward packages do not align with employees' preferences in three aspects: 1. employees have a more favourable reaction to agile compensation granted more often than those granted on an annual basis; 2. organisations fail to create a wider range of rewards, which would lead to a more diverse workforce, because they do not try to better understand employees' preferences; 3. employees do not perceive many of the current reward programs as being fair.

Total Rewards Model Evolution

Armstrong and Brown (2006, p.14), consider that a functional reward model for the 21st century will have to focus on the growth of employee involvement as they should be motivated and productive. The authors believe that a reward system should be based on four core values: fairness (people should be rewarded based on their contribution to the organization, and employees should feel that the rewards are fair), equity (equal rewards for the same type of work), consistency (rewards are not set arbitrarily and do not differ in time or between different people) and transparency (employees understand how the rewards system works and how it will affect them) (Armstrong and Brown, 2006, p.16-17).

Brown (2018, p.14) developed a total rewards model, defining the terms of total rewards, total remuneration, total compensation and total cash. Total cash payed to employees have as rewards basic payments (basic salary, hourly salary) and short-term variables (annual incentives, individual bonuses, team bonuses). Adding to the total money the long-term rewards / incentives (stock/equity, profit shares) the total compensations are obtained. If passive benefits (retirement plan, health and well-being plans, paid leave) and active benefits (business car, professional memberships, discounts) are added to these, the total remuneration is obtained. All these classes of reward elements are considered by the author to be extrinsic and a monetary value can be associated with them. If an element containing extrinsic rewards is added to total remuneration, meaning engagement factors (quality of work, growth opportunity, enabling environment, work-life balance, inspiration/value), a total reward system will be obtained.

Milkovich, Newman and Gerhart (2014, p.13) defined compensation as being represented by "all forms of financial rewards, tangible services and benefits that employees receive as part of the employment relationship". Taking this considerents as starting point, they presented a total returns structure that employees receives in exchange for their work within the organization, structure containing two rewards categories: compensation (monetary compensation and benefits) and relational rewards. Monetary compensation is formed of: basic salary, periodic monetary compensations (with adjustment role, which can be both performance-based salary increases, with the role of providing similar payments for similar work, and increases with the role of rewarding developments in terms of experience or qualifications or to offset increases in living costs), short-term incentives (performance-based payments, granted on a regular basis and based on previously communicated criteria) and long-term incentives, respectively those incentives granted to reward efforts that employees made over a longer period of time (the option to receive or buy shares at a set price). Benefits consist of: 1. those measures taken to protect the income of employees (income insurance during periods when, for various reasons, the employee is unfit for work or loses his job, health insurance, life insurance, savings programs and retirement programs), 2. work / life balance (which allow employees to integrate employee responsibilities with those related to personal life) and 3. allowances (for accommodation, transport). Relational rewards are related to recognition and status, employment security, challenging work and learning opportunities (Milkovich, Newman & Gerhart, 2014, p.13-17).

Tropman (2001, p.61-189) considers total compensation as an equation with ten unknown exponents: 1. base pay or salary (which, as the author notes, represents for the organization the highest cost in total compensation); 2. augmented pay (representing those payments granted on a one-time basis consisting of overtime payments, incentive payments, profit sharing and stock options); 3. benefits (unemployment insurance, health insurance, social insurance and retirement fund set up by the employer); 4. providing work equipment; 5. offering discounts for the purchase of the company's products; 6. advancement opportunity; 7. development opportunity; 8. psychic income (emotional rewards or disappointments related in particular to work itself and to relationships with colleagues and superiors); 9. quality of life (representing the relationship between professional activity and personal life, the way in which they intertwine); 10.the factor named by the author factor X. This factor refers to the special needs and desires of specific categories of employees, needs and desires that redefine their expectations in relation to employers. The author considers that it is the role of the compensation manager to identify the specific needs defined by the X factor. He/she must be proactive and have the ability not only to solve employees' requests, but also to generate requests from employees, by consulting them on their preferences.

Armstrong and Taylor (2014, p.357) considered that the reward strategy and the business strategy must be integrated and they defined the need to establish a reward strategy. This was designed to help both establish the reward system that the organization wanted to develop in the future and the steps to be followed in order to implement this system. The authors pointed out that this reward system should lead to benefits for both the organization and its employees. The constructed model considered that the total reward package should encompass both the financial rewards, considered by the authors as representing the total remuneration and representing the transactional rewards, and the non-financial or intrinsic rewards, considered by the authors to be relational rewards. The first class of rewards included, in the authors' opinion, the basic salary, contingent pay and employee benefits, and the second the attractiveness of work itself, work experience, non-financial recognition, achievement and growth (Armstrong & Taylor, 2014, p.365)

It is very interesting how WorldatWork has developed models on total rewards. The original model was developed in 2000 and was based on the interaction of the total reward strategy with the organization's strategy and employee results. The model considered that the reward strategy is based on the following five components: compensation, well-being, benefits, development and recognition. The stated purpose of the model was to lead to a productive, inspired and commited workforce. WorldatWork believed that, in order to implement a correct total rewards model, organizations must also take into account external influences. WorldatWork has always sought to improve the total rewards model. The model published in 2006 changes the five components of the reward strategy. Compensation and benefits were maintained, adding work-life balance, performance / recognition and development / career opportunities. The implementation of this model was to contribute to the attraction, motivation and retention of employees. The last change was made to the model in 2015. The model was based on a six-component rewards strategy. The two components that remained unchanged were compensation and benefits. The other four components that complemented the reward strategy were: work-life efficiency, recognition, performance management and talent development. This reward strategy was considered to contribute to employee attraction, motivation, retention and engagement. What should be noted is that at each change to the model, WorldatWork presented a total rewards inventory that broadly defined the rewards that can be awarded within each component of the total rewards strategy.

Discussions

As a first objective, this paper aims to analyse the evolution of the categories of rewards offered by organisations. The research was based on empirical studies, surveys, reports and books that have addressed this topic in recent decades. The two concepts used by organizations to manage employee rewards were analyzed: compensation management and total reward management. Based on the research carried out, we can say that there is still a confusion in the literature between the term of compensation and that of total rewards, often considering the two reward schemes to be identical. We consider that, while the compensation package includes only salaries, bonuses and, in some approaches, a number of benefits, representing practically costs of the organization, made to reward human resources, the total reward system should be seen as a summation of the investment that the organization makes in its own employees (compensation, ensuring personal and professional development) with those factors that make employees appreciate the fact that they work for a particular organization, such as career advancement, flexible work schedules, a good work-life balance.

The second objective of the paper was to identify any differences in employees' preferences in terms of a particular type of reward, based on age and gender criteria. We considered this analysis to be important, taking into account that in the current labour market we find a great generational variety, and women are taking on an increasingly important role. The results of the research revealed that, while the rewards awarded under the compensation package still play a very large role, organisations will have to pay increasing attention to those rewards related to good effectiveness of both work and personal life, recognition of employees' efforts and performance, effective performance management and talent development.

The third objective of the article was to analyze a number of models on the total rewards developed in recent decades. The study of these models was done in order to have a better understanding on how they helped define and explain the contribution that current reward packages make to achieving employee satifaction and business goals. We believe that the total rewards model developed and continuously improved by the WorldatWork Association can be currently used successfully to implement total reward management. The total reward management can be adapted in the future, based on to the evolution that will take place in terms of rewards, bearing in mind both the dynamic relationship between employees and organizations and the external influences that are faced by organisations. It should be noted that the article did not intend to present all the models that were developed during this period of time, considering that it is sufficient to present only those models that have definitely contributed to the development of the management of total rewards.

Conclusion

The conclusions drawn from the analysis of the works published so far show that the need to implement a system of total rewards has arisen with the aim of supplementing and diversifying the compensation system. From an organization perspective, this was necessary in order to make the rewards system more financially sustainable and to help the organizations align the reward system with business goals, achieve an increasing degree of employee attraction, motivation and retention. The increasing diversification of the types of rewards awarded is also intended to ensure the satisfaction in the workplace of as many employees as possible from an increasingly diversified workforce.

The literature highlights two important factors in establishing reward systems. The first factor is based on analysing employee preferences for certain types of rewards in order to implement a reward system that meets the needs of as many employees as possible, but focusing on the preferences of employees with a high level of knowledge and qualification, which are basically the employees who have the greatest contribution in achieving the organization's performance objectives and ensuring a high level of competitiveness. The second aspect to be pursued in the construction of the reward system is that they must be based on the principle of internal equity (rewards to be awarded non-discriminatoryly according to performance, position within the organisation, responsibilities, experience and qualifications), on the principle of external equity (rewards granted to be similar to those granted in the labour market) and can be borne by the company's budget.

Surveys undertaken in recent decades show that, while there have been many organisations that have set out to introduce effective reward management, very few have succeeded in this endeavour. They also showed that few of the organisations that had implemented the total management had achieved the expected results from its implementation. We consider these issues to be very interesting themes for future research.

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Forms of Spending Free Time by Generation Z of Consumers in Poland and Determinants of Their Choice

Jolanta TARAPATA

Military University of Technology, Faculty of Security, Logistics and Management, Warsaw, Poland, jolanta.tarapata@wat.edu.pl

Abstract

The paper presents the specificity of the group of consumers belonging to the so-called generation Z. Regardless of whether the biological or educational criterion of age is taken into account, this segment of the market requires detailed knowledge, as well as the determination of specific features that distinguish it from the adult part of society. The aim of the paper is to extend knowledge about the forms of spending free time by young consumers and the determinant of their choice. The study uses secondary sources of information, which made it possible to characterise free time, as well as aspects related to its quantity, deficit, and management by young consumers. Thematic books were used, as well as studies on the characteristics of the contemporary generation Z. To illustrate the considerations undertaken, reference was made to own research aimed at seeking a link between young consumers' preferred free time activities and their family environment, i.e. the material conditions of the family and the associated pocket money of young consumers, as well as their individual predispositions, i.e. their system of values and life goals, their interests and constraints, i.e. their time deficit. It has been assumed that these groups of factors have a decisive influence on the choice of activities undertaken by young consumers in their free time.

Keywords: Consumer Behavior, Free Time Spending, Generation Z.

Introduction

Free time is currently one of the scarcest and therefore valuable resources in human life. Today's young consumer gives it an extraordinary rank. Deciding on the choice of specific forms of free time management relates to his pursuit of specific goals and meeting needs. Most often this is done by consuming specific goods and services. Needs, motives, values and life goals are therefore the driving force behind the young generation of consumers (Naumovska (2017)).

In each society, young people are a separate and diverse group. A particularly interesting group of consumers manifesting increasing market activity is the generation Z, also referred to as the C generation, the multitasking generation, the quiet generation, generation@, generation V, or the Internet generation (Wyrwisz (2018)). It includes young people born between 1995 and 2009. They are one of the most active and influential consumer groups that is now entering adulthood and determining consumption trends. An important defining feature of the generation Z is the fact that the digital world has emerged and is growing up surrounded by it and that it actively participates in it. These people were born at a time when IT technologies were spreading rapidly and began to enter the everyday life of an ordinary person. The Internet slowly ceased to be a domain of so-called techno-elite and appeared in numerous households. Step by step, it began to transform the existing reality and invite you to discover the meanings of this new, virtual one (Jablonska (2018)).

Representatives of this generation do not know the world before the era of the Internet, smartphones, and Facebook, they are constantly online and their characteristic feature as consumers is their resistance to traditional advertising messages. Rather, they rely on the opinions of friends, influencers, and patterns from social media. Consumers of the generation Z are representatives of the information society. They are much more active than adults in using new technologies that are ubiquitous in all spheres of their lives (Immordino-Yang et al (2012)). Computer games, e-mail, Internet, mobile phone, instant messaging is an integral part of their lives. M. Prensky describes representatives of this consumer group as 'digital natives', claiming that they are 'native speakers' of digital language, computers, video

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games and the Internet. As a result of the ubiquity of the digital world, its volume and interaction with it, today's young people think and process information differently from their predecessors (Prensky (2001)). This is important from the point of view of analysing their consumer behaviour and the related activity they undertake in their free time.

Looking at the representatives of generation Z, several important aspects of their relationship to free time can be identified. However, some differences should be pointed out, depending on whether they are representatives of the so-called first wave, i.e. the early generation Z (born after 1995) or the generation born after 2000.

The paper focuses on the second group of representatives of the young generation, school-age youth. The research was conducted in May 2019 in one of the Warsaw secondary school and covered 80 students (15-16 years old). The research had a pilot character and was based on a diagnostic survey method.

The paper is organized as follows. In section 2 the essence of youth free time has been explained. Section 3 contains analysis of secondary research deal with forms of spending free time by school children. Section 4 contains results of own research and deals with selected aspects of consumer behaviour of generation Z in free time.

The essence of youth free time

Free time is sometimes presented in different ways, because the issues of free time are dealt with by representatives of many scientific disciplines. Each of them considers free time from their own research perspective, paying attention to other aspects of it and formulating their own definitions.

In common thinking it is understood as free time from work, school, household duties, time in which we rest and can pursue our interests and hobbies. It is also associated with inactivity, lack of activity or passive activities. This concept is defined differently by the authors of scientific studies.

By analysing different definitions of free time, you can group them into three streams:

- free time in a "pure" form is the time when a person does not perform any obligatory activities and duties;
- free time interpreted through the prism of specific behaviours undertaken in it. These behaviours may manifest themselves in all activities that lead to rest. They are individualized and based both on individual preferences of the individual and on generally applicable social norms;
- the third dimension accentuates the spiritual dimension of free time. In free time, man satisfies the needs of a higher order, striving for self-realization, self-improvement, and development (Bombol (2008)).

As it results from the above-mentioned definitions, free time belongs to the private sphere of the individual, characterized by freedom of action and voluntariness. It is the individual who decides about the ways of spending free time according to his or her own hierarchy of needs and values and interests and preferences.

Free time, as an important category in determining the behaviour of young consumers, is treated very ambiguously. Some young people define their free time as time out of school (26%), time out of regular classes (28%), or time when there is nothing else to do (27%), and even as Saturdays and Sundays (Olejniczuk-Merta (2009)). According to (Sowa (2013)) the youth's free time is the time remaining after the realization of school duties, which consists of the time of freedom (completely free, which the subject can freely decide about the development of at any time) and partially free time, the development of which results from commitments, interests or relationships with other people (e.g. home help, care of animals, playing sports, playing the instrument, gainful employment and others). The qualification of activities to appropriate groups depends on the individual situation of the entity.

The way a generation of young consumers spend their time is different from the way adults use it. In the case of school youth this way is not arbitrary, it is subject to control and intervention of adults. It is also determined by schooling and homework.

Forms of spending free time by school children – analysis of secondary research

The problem of youth's free time has become the content of many research papers and scientific papers in recent years. Much of the research is focused on the ways of spending free time depending on the influence of various factors.

To take a closer look at the way young people spend their free time, empirical research relating to this issue is presented. Free time can take two forms - active and passive. In the study Young Europeans – Eurobarometer 2007

(Young (2007)) the young people of the European Union were asked a question about what they most often do in their free time. The most frequent activities undertaken by the respondents were sport (45%), meeting friends (40%), reading (25%), using the Internet (21%), watching TV (19%), listening to music (16%) and others such as: helping at home, shopping or taking up paid work. The results concerned young people from various European Union countries. Therefore, it can be assumed that they will look slightly different in Poland. Further discussion deals with secondary research in Poland in this matter.

Research carried out by M. Dragan in one of the secondary schools shows that young people prefer to spend their free time passively. Most often they sit in front of a computer (62%), go to the cinema (49%) and watch TV (35%). Much fewer students spend their free time reading books, meeting friends, or playing sports (Dragan (2013)).

The computer is a constant element that young people decide on in their free time. A large part of middle school students, because 80% of them sit in front of it for more than one hour. Some (about 20%) spend more than 4 hours in front of the computer. Most junior high school students, because almost every third student spends up to 3 hours using the computer (Dragan (2013)). The use of a computer is more and more often one of the main activities performed by young people in their free time. This is also confirmed by research conducted by E. Machowska. It results from them that most young people spend their free time more often in front of the computer than at meetings with friends in the real world (Machowska (2015)). These results are like those of other authors, according to which the average time of using a computer by youth is about 2 hours per day. According to the authors, there is no significant relationship between the time spent by youths on a computer and their environment. The youths from countryside use the computer only 6 minutes less than the youths from a big city (Rabisz et al (2014)).

Middle school students use the computer to a large extent for surfing the Internet, this group makes up 30%, then every fourth high school student uses it to watch movies. Less than 21% of junior high school students use a computer to communicate, whether by e-mail or any kind of communicator and Internet telephony (Dragan (2013)). Wide access to the Internet makes young people feel little need to leave home and meet with friends. The need for contacts with others is satisfied by communicators, social networking sites and telephones that have access to the Internet. Watching TV is also less popular, because many movies, series can be watched over the Internet anywhere and anytime. Most of the respondents spend their free time using the Internet 1-3 hours a day, but there are also people whose whole free time activity comes down to it. (Machowska (2015)). These studies confirm that new technological possibilities relate to the increased amount of time spent in the virtual world. Young people more often choose to interact with friends over the Internet than face-to-face meetings.

From studies carried out by Puciato and Szczebak (2011) result that 43.6% of junior high school students spend their free time at home, while 40.6% of them spend their free time at sports facilities, in the backyard, in front of their block of flats, preferably 15.6% of them. The vast majority of the surveyed junior high school students (62.5%) take up free time activities with high frequency. Occasionally 34.4% of the respondents do it, but never just 3.1%. However, the forms of physical activity are not usually institutionalized. Participation in a sports club is declared by only 46.9% of respondents. Physical activity of youth is also indicated by other studies. They show that the most common form of activity undertaken within the so-called free time is participation in games and movement games with peers. This is claimed by 67.8% of the surveyed junior high school students. The second place is occupied by time spent watching TV - 58.5%, while the third place is occupied by the form of spending free time on computer games - 53.7%. The authors also prove that regarding two forms, i.e. time spent on computer games and helping parents in running their households, there is a difference between young people living in town and in the countryside. Young people living in the countryside help in running the household more often, while young people living in cities spend their free time on computer games more often (Rabisz et al (2014)). Other studies conducted by M. Malareczka show that junior high school students, apart from surfing the Internet in their free time, playing sports, watching TV, also spend their free time helping their parents, listening to music or meeting with friends. Moreover, most of the students participate in extracurricular activities organized in or outside the school (Malareczka (2015)). The use of electronic equipment, including cell phones and MP3 players, also turns out to be popular among youth. The average time of using such equipment per day is about 1.5 hours (Rabisz et al (2014)).

Analysing the available studies, it should be noted that a worrying phenomenon may be that as many as 40.6% of schoolchildren declared that there was no excess of free time, 31.3% claimed that they had too much free time, and 28.1% of them had no specific opinion on this issue (Puciato and Szczebak (2011)).

The cited research is reported to school-age youth, young consumers who are unemployed and dependent on their parents/caregivers. The way they spend their free time is certainly different from the ways preferred by older, financially independent youth or adults.

Selected aspects of consumer behavior of generation Z in free time – own research

Research on selected aspects of free time management by representatives of the young generation was conducted on a group of school-age youth (15-16 years old). The aim of the research was to determine the factors influencing the way young people spend their free time and to learn about their free time activities. This part of society expresses an interesting attitude to the concept of free time and its management. The study assumes that the behaviour of the young generation in free time determines the system of values and life goals of young people, their interests, as well as external factors such as, for example, their peers or financial resources available to young people. The study involved 80 students, of whom 48% were girls and 52% boys. This group consisted of students in the last grades of junior high school and eighth grades of elementary school. In the study a diagnostic survey method was used. The tool used in the study was a questionnaire. The questionnaire in paper form was distributed to the surveyed students.

Young people, when asked to respond to a few terms about their values and life goals, were most likely to point to love and friendship (45%) and interesting work in line with their interests (41%). An equally high percentage of respondents indicated successful family life, having children (29%) and being useful to others (21%). The life goal, to which youth does not attach much importance, is to achieve a high professional position and make a career (10% of respondents). One can risk a statement that this is a far-reaching goal, which takes on importance later in the consumer's life. The division of respondents by gender did not show significant differences in the choice of life goals. Respondents differ significantly only in relation to the value of love and friendship. Twice as many girls (61%) as boys (31%) give this life goal more priority.

Representatives of the young generation show different interests which determine, among others, their membership in different clubs or associations. 58% of respondents indicated interest in sport - this applies to both girls and boys. 43% of young people are interested in computers and the Internet - here the advantage is on the boys' side and a little less (41%) has artistic passions, is interested in art, dance, music, film and theatre. This area of interest was indicated by girls in the vast majority (as much as 74% of this population). Literature and reading books are of interest to a comparable number of girls and boys (29% and 21% respectively). 13% of all respondents are interested in the automotive industry. These are mainly boys, representing 21% of this population. Unfortunately, research has shown that there are young people who do not have interests and passions.

The conducted research proves that the young generation uses many forms of free time, in which a significant position is occupied by those that are the result of globalization, or the product of mass culture, and that they are conducive to establishing contacts, cultivating friendships, and exchanging views (Figure 1.).

The most common activity of youth is listening to music. This form of activity was indicated by 59% of respondents. Music accompanies young people with homework, using a computer and contacting other people. It is an activity undertaken in free time and even during the performance of duties, constituting a background for the activities undertaken. By filling in their free time, young people (55%) establish ties with their peers. Meetings with colleagues remain a popular way of leading a social life, however, their directness is increasingly often replaced by virtual contacts. As often declared as a form of spending free time, young people include practicing sports. 51% of respondents participate in sports activities. This shows a significant correlation with the declared high interest in sport. The representatives of the generation Z also attributed a significant position to computer use and surfing the Internet (45% of the respondents). Apart from the above-mentioned activities, which seem to be completely voluntary, young people take up activities which relate to the realization of their duties, commitments, or passions. These activities include attending various extracurricular activities such as instrument playing, art classes, language courses, computer graphics (48%).

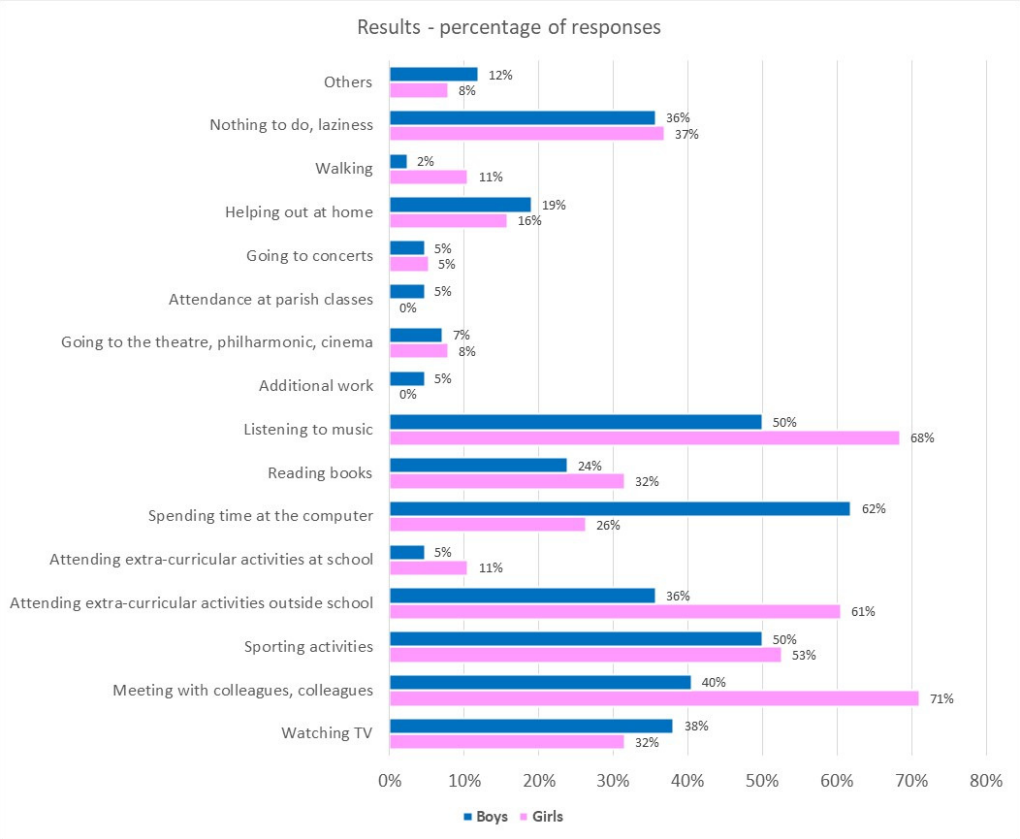

Fig. 1: Ways of spending free time by young people regarding their gender (maximum five activities per respondent were chosen)

A significant difference was observed between the preferences of girls and boys in the choice of selected activities. Girls, compared to boys, spend their free time more often with friends (71% of the girls' population). Only 40% of boys indicated this form of activity. Girls participate more often in extracurricular activities than boys (61% and 36% respectively). Boys, on the other hand, gain an advantage in the frequency of computer and Internet use (62% of the boys' population) over girls (26% of the girls' population). The Internet, which is used most often in free time, plays an increasingly important role in the use of free time, mainly due to its relatively low cost, universal accessibility or the benefits perceived by its users. It allows young people to relax, provides fun, or is a carrier of many information that the consumer uses. 31% of respondents spend about 2 hours on using the Internet during the day, 25% - about 1 hour, and 28% - up to half an hour. In the latter group there are girls in the vast majority (42% of the girls' population). There are also those who spend from 3 to 5 hours a day on the Internet (10%), and 8% of the respondents claim that they spend more than 6 hours a day on this form of activity - only boys belong to this group. For what purposes do young consumers most often use the Internet? The research shows that 59% of young people use the Internet to communicate with friends, e.g. through Facebook or chat rooms and e-mail. After 53% of young consumers listen and download music and watch and download movies and series, and 33% play online and social games. Around a quarter of young people search the Internet for information they need for school, study and as much as they browse through websites dedicated to their passions and interests. 14% of the respondents look at web shop sites and do shopping. A small percentage of respondents make new acquaintances via the Internet (8%) and read or download books and literary works (6%). The respondents of the female and male sexes do not differ significantly in terms of the purpose of using the Internet. The differences concern only two indicated purposes. As much as 82% of the girls' population and only 38% of the boys' population indicated communication with friends via the Internet, while 45% of the boys' population and only 18% of the girls' population indicated use of the Internet for online or social games. The results of the research indicating young people's approach to free time understood as doing nothing, resting or lazing are interesting. As many as 36% of the respondents claim that they spend their free time passively on doing nothing, relaxing or lazing. In view of the above, one can risk a thesis that there is a certain group of young people who identify their free time with passive rest, relaxation, but also a significant part of it fills it with activities related to pleasure and striving for self-realization. The choice of free time activities by the respondents, depending on the amount of money available to young people during the month, showed significant discrepancies for the selected forms (Figure 2). As the Figure 2 shows, there are activities that are undertaken only, or much more often, by young people who are financially less well-off or who do not have a fixed pocket money every month. These include attending

parish classes, watching TV, helping at home, going for walks. These young people meet with friends, do sports, spend time at the computer, listen to music or do nothing, less often than their more financially well-off peers.

Although most young people (97%) indicate their passions and interests, 21% say they do not belong to any circles, clubs, or associations. However, in most cases, the interests declared by young people translate into leisure activities. 20% of the respondents belong to sports clubs, including supporters, 14% to music groups and choir and 10% to dance groups and clubs. The last two activities are mostly chosen by girls. Similar activities are shown by girls and boys in areas such as: volunteering (11% of the total), scouting (5% of the total) and Catholic youth associations (4% of the total).

The aim of the study, in addition to learning about the forms of activities undertaken by young people in their free time, was to identify their preferences in this area, as well as to identify obstacles that make it difficult or impossible for them to spend their free time in their preferred way.

In terms of young people's preferences for spending their free time, some of them overlap with the forms of activity undertaken by young people. This mainly concerns meetings with friends, listening to music, using the Internet, or doing sports. There are also activities that the respondents would like to consider in their free time, and which for various reasons cannot be realized. 43% of the surveyed young people would like to realize their dreams connected with sightseeing and exploring the world, 30% read books, 28% go to the cinema, a little less, because 20% go to discos and youth clubs and 19% watch TV. After 11% of the respondents declare their willingness to go to the theatre and philharmonic and to develop their skills, e.g. in art, dance, vocal, etc. So, what is preventing young people from realizing their aspirations? Representatives of the Z generation increasingly often declare that they feel a lack of free time. The declaration of insufficient amount of free time for realization of preferred activities was made by the vast majority (66%) of young people taking part in the survey. The lack of free time is to a large extent a consequence of the increasing pace of life of young people. One of the reasons for the fast pace of life of the young generation is too many different activities that they perform in a unit of time and taking additional activities related to plans or dreams. This is confirmed by research, according to which a significant part of respondents (55%) claims that it is too much learning that prevents them from carrying out their preferred activities.

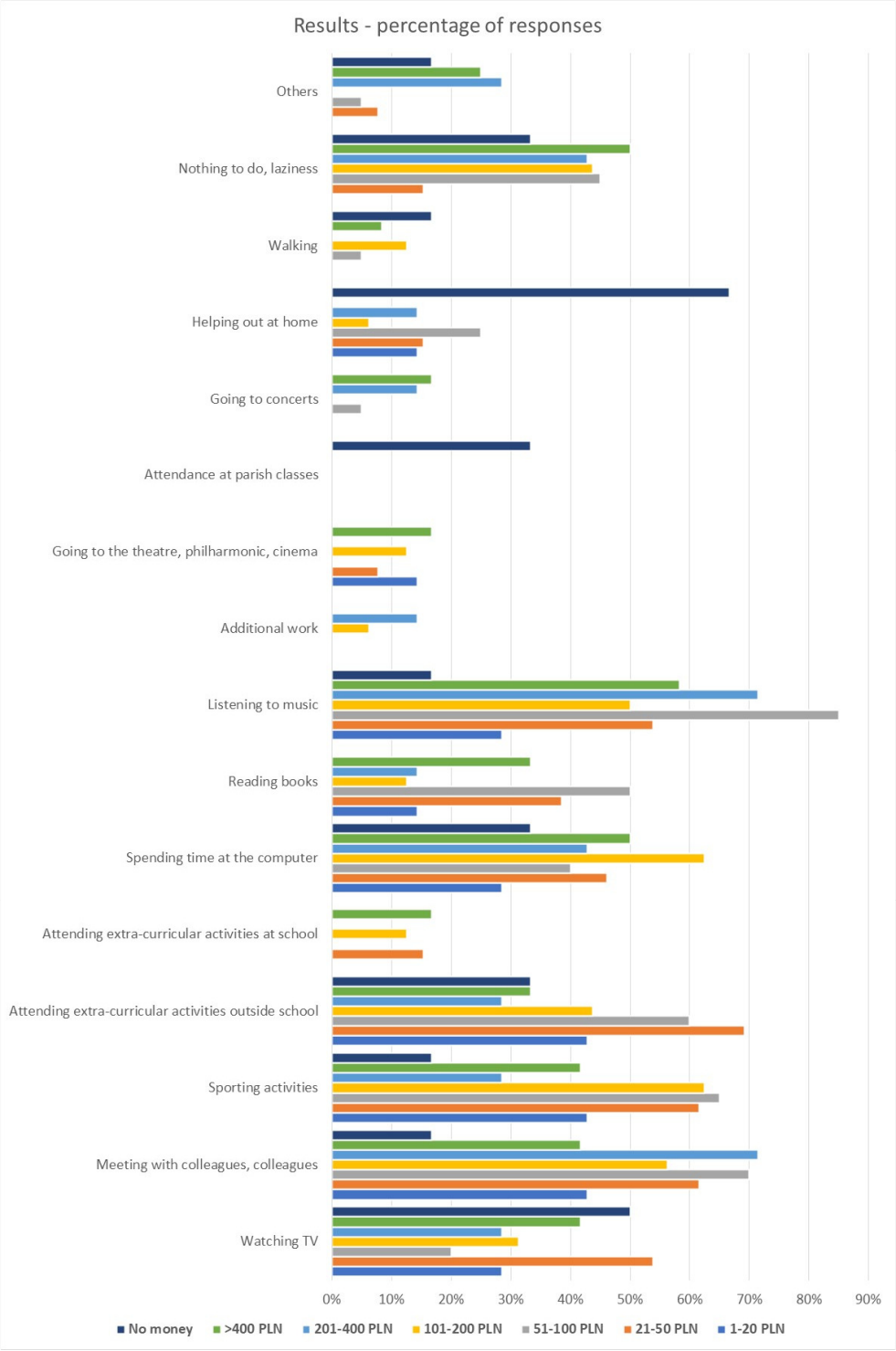

Fig. 2: Monthly financial resources (in PLN – Polish Zloty, 100 PLN ≈ 22,5 EUR) of young people and their preferred leisure activities

Another reason for feeling lack of free time can be the development of modern technologies, which instead of making life easier for consumers, often complicate them, detach them from learning, make it difficult to concentrate, e.g. constant signals of phone calls, text messages or notifications from social media. Young people often suffer from lack of time due to the desire to fulfil themselves in various social roles. They want to be good students, caring children for parents, available friends, people who care about their physical condition and appearance. This makes their free time insufficient. Other obstacles to their preferred free time activities indicated by young people are their parents'

lack of consent (28%) to undertake certain activities, i.e. going to discos, youth clubs and the related too young age of the respondents (16%) and lack of money (21%).
Among other aspects of the life of the modern young generation, the way in which they have their free time budget deserves attention. When asked about the monthly budget they have at their disposal to meet their needs, a quarter of them admitted that they receive between PLN 50 and 100 for their own expenses, 20% - over PLN 100 and 200, and 16% have between PLN 20 and 50 at their disposal (100 PLN ≈ 22,5 EUR). Among the respondents there are also people whose monthly budget is much higher - they receive over 400 PLN (15%), but there are also those who have up to 20 PLN (9%) or have no money at their disposal (8%). Significant differences between the sexes concern only budget ranges from PLN 51 to 100 and from PLN 101 to 200. In the first case, girls dominate (34% of the girls' population) over boys (17% of the boys' population). In the second case, boys (26%) over girls (13%). The increase in the value of time in the life of generation Z, as well as its continuous deficit translates into a growing interest of generation Z in eating meals or snacks outside the home. A wide range of catering establishments diversified in terms of offer, price, quality, location, makes it possible for everyone, even with a small budget, to find something suitable for themselves. Young people benefit from this type of services, especially those offering fast, tasty, and affordable meals. Therefore, as studies have shown, the Z generation spend most of their savings on food (75% of respondents). It does not matter what their gender is and what monetary budget they have (Figure 3).

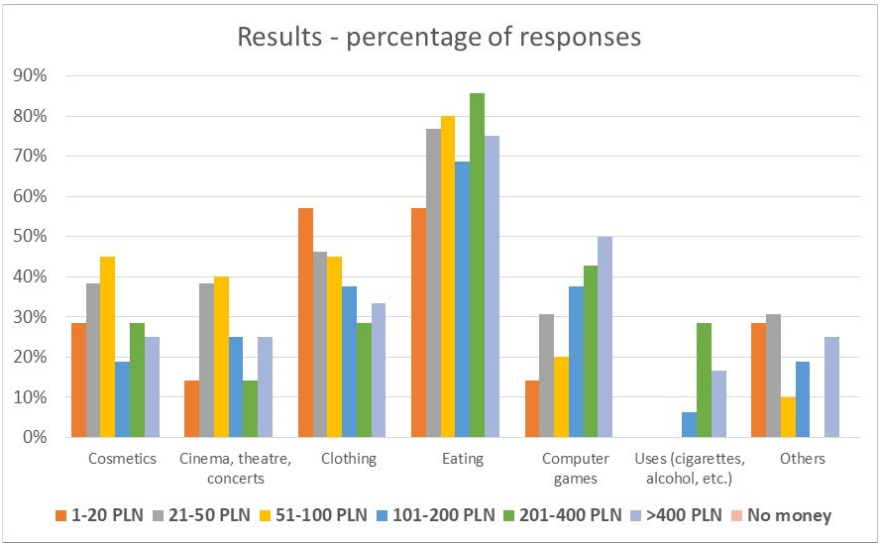

Fig. 3: Monthly financial resources (in PLN – Polish Zloty, 100 PLN ≈ 22,5 EUR) for young people and directions for their free time activities

A large proportion of respondents (41%) spend their money on clothes, and 31% each on computer games and cosmetics. Respondents differ in terms of gender. As much as 65% of girls spend their savings on cosmetics, while only 2% of boys. In the case of computer games, the situation is different. It is more boys (55%) who buy them, while only 5% of girls spend their money on them. About a quarter of the respondents spend money on cultural activities (cinema, theatre, concerts) and 8% on stimulants (cigarettes and alcohol). The second group is dominated by boys. The above chart also shows that young people with a monthly amount of over 100 PLN spend more often on computer games than young people with less money. The same applies to stimulants (cigarettes and alcohol), which are purchased by more financially well-off youth.

Summary

Free time plays an important role in the life of the young generation. It has a function of relaxation, rest, fun and entertainment. It is of great importance in the process of socialisation of young people, as well as in the intellectual development of individuals. Young people have specific values, life goals and interests that determine the choice of leisure activities. How they manage it also depends on the financial resources they receive monthly from their parents to meet their consumption needs.

Research has shown that contemporary youth attach great importance to peer contacts, which they make in both direct and virtual relationships. A significant proportion of the respondents invest in their intellectual development by participating in various extracurricular activities improving their language, technical and mathematical skills, as well as developing their interests and artistic skills, during art, dance, music, etc. For many young people, the physical fitness that they acquire during their sport is not without significance. Young people are reluctant to read books and

even less often go to the theatre, cinema, philharmonic or concerts. Young people spend a lot of their free time in front of the computer, surfing the Internet, thus compensating for the decreasing intensity of direct meetings with friends, as well as participation in cultural life by watching films or listening to music. The consumption behaviour of young people is conditioned by both their financial background and their declared interests.

Nowadays, the accelerated pace of life, absorbing compulsory classes at school as well as overtime activities contribute to limiting the free time available to young people. Young consumers are confronted with the problem of a time deficit. They are also starting to lack time for activities they would like to do in their so-called free time.

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Capital Structure Decision in Family Firms: Overview of Agency Theory and Ethnicity

Noorhayati YUSOF ALI
Faculty of Business Management, Universiti Teknologi MARA, Malaysia
E-mail: noorhayatiy@uitm.edu.my

Zuriyati AHMAD
Faculty of Business Management, Universiti Teknologi MARA, Malaysia
E-mail: zuriy271@uitm.edu.my

Abstract

Extending from the existing literature that has highlighted the distinctive features of Asian companies, this study attempts to link these special features with their financing behavior from an agency theoretical perspective. Drawing on the evidence indicating that prominent features of Asian companies notably are concentrated ownership with extensive family ownership and dominance of controlling shareholders controlled by two main ethnic groups in Malaysia, namely the Chinese and the Malays, this study also attempts to investigate the effect of ownership and ethnicity on financing decisions of Malaysian family firms. This study employs literature on family business and explains the possible impact of family and business reciprocity coupled with the issue of ethnicity within a family firm that drives the uniqueness of the firm itself. It is believed that the special characters, such as strong family ties, undiversified family holdings, and a strong desire to hand over the company to subsequent successors and higher concerns to maintain family reputation tend to offer different incentive structures, at least in regards to capital structure. Agency theory suggests that family companies have lower agency problems because owner-manager interests tend to be more consensual, thus giving creditors greater confidence to lend. Although this study is qualitative in nature, but it is unique, because it deals with the determinants of capital structure that is almost not found in developed countries. This provides an alternative explanation for financial variation and provides evidence of the capital structure theory solitary.

Keywords: Family Firms, Ethnicity, Bumiputera, Leverage, Agency Theory.

Introduction

Since the scientific work by Modigliani and Miller (1958), the theory of capital structure has become an important topic of debate in many studies. Evidencing from that, many studies have sought to identify the determinants of firm's capital structure in various economic markets. Among the determinants include taxability, firm size, asset tangibility, growth opportunities and profitability. The more recent and deliberate literature strands focus on the impact of in-house firm-specific features such as ownership structure on capital structure choices (Masdiah, Azizah & Nur Atiqah 2015; Lean, Ting & Kweh 2015)

Studies on the determinants of capital structure focus on developed economies with mixed results. The impact of ownership structure on company financing decisions in emerging markets such as Malaysia has yet to be explored (Fan, Wei & Xu 2011). Majority of companies listed in emerging markets are family owned. Claessen, Djankov and Lang (2000) found that almost 68 per cent of the sample of their Malaysian companies is family-run and 28.3 percent of market capitalization is run by 15 families.

Given the prevalence of family businesses in Malaysia, it provides a significant platform to analytically propose how family ownership in the rearm of agency theory is related to financing decisions, specifically, the levels of leverage. Another area that left greatly unexplored is the effect of ethnicity on capital structure. One possible explanation why this area of study is not addressed in many previous studies is due to the absence of ethnic diversity in most of other countries. Nevertheless, in Malaysia diverse ethnics who dominate firm's ownership is prevalent. Therefore, this study aims to explore whether there is a possibility that family ownership and ethnicity have an impact on the firms' capital structure decisions.

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Ownership Structure

Prior studies have grouped corporate ownership structures into two categories namely widely held and closely held firms. A major distinction between these two types of firms is that a widely held firm does not have any owners with substantial control rights. Meanwhile, a closely held firm is identified when its shares are owned by identifiable and "cohesive groups of insiders" (Claessens et al. 2000) that form ultimate control (Abdul Rahman & Salim 2009). These shareholders generally have long-lasting stable relationships with the company and typically a member of the company's founding families. Other forms of shareholders inclusive in this group are lending banks, government or other small groups of companies that are linked through cross shareholding, pyramidal ownership structure and dual class shares (Claessens et al. 2000; Manos et al. 2007). Cross shareholding and pyramidal ownership structure are common strategies extensively used by dominant shareholders to effectively exercise their control over the firm with relatively less direct stake in the cash- flow rights.

It is well documented in the literature that families are the most significant type of firm with concentrated ownership that shape a pattern of ultimate owners (Anderson & Reeb 2003; Abdul Rahman et al. 2009). Corporate ownership structures in the UK and US are more diffused as compared to ownership and control in Malaysian public corporations which are more concentrated and family dominant (Claessens et al. 2000). In Malaysia, family firms constitute for more than two-third of the total firms while the remaining is generally held by state or institutional investors or else categorized as widely held corporations (Driffield et al. 2007).

Previous research suggests that agency problems only exist in a firm with dispersed ownership structure (Fama & Jensen 1983). They argue that the separation of ownership and control is more likely to occur in the companies with dispersed ownership structure where shareholders have limited control over management activities. Therefore, the management will be more likely to practice more freedom in the use of companies' resources compared to companies that are managed by their owners. Consistent with this view, Jensen and Meckling (1976) and Fama and Jensen (1983) also agree that the issue of separation of ownership and control in the modern dispersed ownership corporations is the root of agency problems. In short, this view implies that agency problems will be minimized if the control of corporate wealth is concentrated in one or a few large shareholders.

Sharma (2004) suggests that research on family firms cannot be justified just because the existence of family owned companies has dominated most parts of the world. She suggests that study on family firms need to be more legitimatized by identifying unique features of family firms which make them different from other business organizations. Attributes of families, such as cohesive group of insiders, strong family ties, and feelings of loyalty and kinship obligations have been highlighted as features that distinctive to family firms (Miller & Le Breton-Miller 2005). It is expected that these unique features could benefited family firms to some extent.

Malaysia signifies insider ownership and control structure with concentrated shareholding dominated by families (Claessens et al. 2000; Abdul Rahman et al. 2009). One of possible explanation why Malaysian firms predominantly owned and controlled by families, in part, is due to poor legal system where the rights of minority shareholders are not well protected (Abdul Rahman et al. 2009). Consequently, non-family investors would not find the businesses as an attractive investment when their rights are less protected. As such, the business is more conducive for a family shareholder base but less conducive for a diverse shareholder.

Family Firms

Masdiah et al. (2015) demonstrate that family business dominates many emerging economies including Malaysia. Although ownership structure of firms in developed countries is rather diffused, the existence of family firms is still substantial (La Porta et al 1999). Unlike family firms in developed countries which typically employ professional managers, family firms in emerging markets are largely managed by inherited family members (Fan et al. 2011). These studies also reveal that ownership of family firms in the developed markets become dispersed more quickly after they become public, while ownership in emerging markets remains highly concentrated even long after going public.

Literature shows that there is a distinction between family and non- family firms. For example, Brenes et al. (2006) define family firms are firms that are dominantly owned and managed by a solitary root family. They further state that this family typically holds a significant proportion of equity stakes in the firms. Similarly, Driffield et al. (2007) find that in family firms, the management and ownership are rarely separated where firm leadership and top management team members are largely comprised of controlling owner and family members. The findings on Asian firms as reported by Fan et al. (2012) also support the definition put forth by prior studies. Fan et al. (2012) further add that since the controlling owner and management boards are members of the same family, it is expected that their interests are more closely aligned that leads to less agency conflicts.

An ambiguity exists on how practitioners (e.g. family business managers, consultants and fund providers) and researchers define family business (Chua et al. 1999). In an attempt to reconcile any conflict related to family firms, one must make a distinction amongst three fundamental elements that are ownership, control and management in defining family firms (Villalonga & Amit 2006). Although definitions vary, family firms would imply that family members own higher levels of equity in their firms, in which ownerships are symbolized (Fama & Jensen 1983). Family controlled firms are normally differentiated by ownership concentration as well as the existence of family-related person called 'Cronyman' (Driffield, Mahambare & Pal 2007).

According to Miller and Le Breton-Miller (2005) family business promotes stagnation, isolation, hereditary, cronyism, favoritism, disagreement, and nuisance leadership. However, they also suggest that unique characteristic of governance system such as cohesiveness, strong family ties, and loyalty and kinship obligations exist in family business. These unique features may help develop competitive advantages in terms of efficient investment decisions which enable firms to generate better performance and higher returns with low agency costs (Villalonga & Amit 2006; Maury 2006). Further, the interrelationship between family and business systems may offer some benefits such as low monitoring cost of management and better coherent in optimizing decision making.

Family firms have long been recognized as common organizational forms worldwide. For instance, a study on ownership structures by La Porta et al. (1999) on large corporations in 27 wealthy economies shows that relatively very few of these firms are widely held, but rather, these firms are usually controlled by families or government. Manos et al. (2007) report similar findings in which family is the dominant form of firms' ownership in developing countries due to prevailing market imperfections and information problems. Family firms are also found to dominate most of the East Asian corporations and have accounted significant amount of corporate wealth in the region (Claessens et al. 2000). Malaysia in particular, more than two-third of its companies comprise of family businesses. The contribution of family businesses towards economic growth is substantial. Ngui (2002) reports that family firms in Malaysia essentially contribute more than 50 percent of the country's Gross Domestic Product (GDP).

Although family firms as organizational forms have received a great deal of attention in recent years, studies that focus on financing-related issues in the context of family firms are still limited, particularly in the emerging markets (Colot & Croquet 2009). In emerging markets such as Malaysia the contribution towards this area of research is significantly less in numbers because studies on family related issues are still new in Malaysian setting (Amran & Che Ahmad 2009). Moreover, the contextual setting as indicated by Fraser et al (2006) reveal that Malaysian market comprises of many unique features (i.e., ethnicity, culture, political patronage etc.) that are left unexplored.

Sharma (2004, p. 9) states that "the intertwinement and reciprocal relationships between the family and business systems is being recognized as the key feature distinguishing this field of study from others". Additionally, the emphasis in the creation of unique resources (e.g. friend and family financing) and capabilities are also getting the attention of researchers in this field (Chrisman et al. 2003). The presence of unique features of family such as parsimony and personalism form its own governance systems that allow family owners to make decisions in ways that are largely unavailable to firms with other governance structures (Carney 2005). In sum, the preceding discussion of family firms suggests that unique attributes of family firms which potentially give rise to competitive advantages that serve interesting research setting to further explore the field.

Agency Problem in Family Firms

Agency relationship is a contract whereby the principal(s) engage another person (agent) to perform services on the principal's behalf (Jensen & Meckling 1976). This contract also involves entrusting some decision making authority to the agent. Due to incomplete contract between principal(s) and agent(s) and with the presence of residual control rights, the agent(s) may betray these rights to benefit his own welfare (Nwanji & Howell 2007). This betrayal contributes to the agency problem and it becomes a common issue of debate within companies. They also argue that managers who manage other people's money cannot be expected to monitor them with the same prudence as when they monitor their own.

Many prior studies often use agency theory as one of the most important research frameworks to explain the unique phenomenon in a family business. For instance, Morck and Yeung (2003) justify with evidence that the level of agency problems vary between companies with dispersed ownership and concentrated ownership. Shleifer and Vishny (1997) argue that narrowly held companies are expected to have lower agency problems as a result of better matching between control and cash flow rights. Likewise, Morck and Yeung (2003) suggest that agency problems might be lower in less diffused ownership such as those controlled by families. Therefore, the incentives of the controlling shareholder are more likely to favor the interests of other shareholders. They also reveal that much discussion of prior studies on ownership structure have shown the evidence that the presence of block shareholdings (e.g. family firms)

can assist the board to improve the effectiveness of monitoring in mitigating agency conflict. This issue of agency problem becomes more severe due to the significant phenomenon of the separation of ownership and control.

Fama and Jensen (1983) highlight that one major factor in determining the survival of any forms of organizations is a control of agency problems. These problems emerge because to set and enforce a contract among agents with conflicting interest is rather costly. Furthermore, Fama and Jensen (1983) show that agency problem which occurs in a firm with a separation of ownership and control, should be regulated by the firms' decision systems that separate the management and control. In discussing firms' value, Villalonga and Amit (2006) show that concentrated ownership should have a positive impact on the firm value because it can reduce the classical conflicts between owners and managers. Villalonga and Amit (2006) suggest that greater insider ownership is associated with better corporate governance. This is because the managers, who hold larger equity stake holding in the company, would prefer not to take actions that can reduce the value of their shares that affect their wealth. This shows that agency problem is low in narrowly held companies such as those controlled by families.

Nevertheless, agency problems could still exist in family firms due to conflict of interest between the controlling family and minority shareholders (Morck & Yeung 2003; Villalonga & Amit 2006). They argue that the coupling of ownership and control could result expropriation activities by the controlling families when they represent their own interests which may not coincide with the interests of other shareholders in the firms. Expropriation activities by the families have been found to affect the performance of the firms specifically when the families are able to extract wealth from the firms. Evidencing from literature, family controlled firms dominate Malaysian listed firms substantially (Claessens et al. 2000). Malaysia has unique corporate landscape resulting from its own historical background influenced by culture of various countries such as Britain that used to occupy Malaysia, and India and China that have had business practices in this nation (Eichenseher 1995; Haniffa & Cooke 2002; Johnson & Mitton 2003; Abdul Rahman & Salim 2009). Hence, Malaysian community is made up of different ethnics, religions, creeds, traditions and languages. These elements are expected to influence various expects of businesses, at least with regards to capital structure.

Ethnicity, Culture and Firms

As discussed in the previous section, Malaysia has a unique corporate landscape produced from its historical background that has evolved and influenced by the cultures of various countries such as Britain which once occupied Malaysia, and immigrants from India and China and brought their culture and traditions attached in business practice (Eichenseher 1995; Haniffa & Cooke 2002; Johnson & Mitton 2003; Abdul Rahman & Salim 2009). Therefore, Malaysian society is formed from various ethnicities, religions, beliefs, traditions and languages. Furthermore, the practice of affirmative action that occurs usually involves measures to increase the participation of less fortunate ethnic groups in a number of areas such as education and business can also influence enterprise financing decisions such as capital structure decisions.

One of the problems that often arise in most research related to capital structure is due to failure to explore cultural factors (Haniffa & Cooke 2002; Claessens et al. 2000). These factors can be explained by the various ethnicities that dominate family ownership. Haniffa and Cooke (2002) state that cultural factors are imperative because the traditions of a nation are embedded in its' society. Therefore, the value instilled can help explain why something happens as it is. Haniffa and Cooke (2002) also classifies the group multiracial into two main categories: 1) those who have a cultural affinity indigenous that comes from this region, classified as Malays or Bumiputera (literally means "sons of the soil"), and 2) those whose cultural affiliation is outside the indigenous group, which is classified as non-Bumiputera (consisting mainly of Chinese, Indians and others).

Since, Malaysia is a developing country with people of various races and backgrounds, ethnic issues can be debated in many fields of studies (CheAhmad et al. 2006). For example, studies by CheAhmad et al. (2006) and Yatim et al. (2006) show that ethnicity plays an important role in determining auditor choice decision and corporate governance practices and audit fees. Bates (1999) posits that in some countries the issues of ethnicity have shadowed political systems and have resulted in allegations of prejudice, discrimination, hostility and even violence. They both observe that ethnicity can generate impact on business and economic developments, particularly within East Asian countries. Bates (1999) argues that ethnicity elicits investment and the formation of capital and thereby enhances growth in developing communities.

As discussed by CheAhmad et al. (2006) and Yatim et al. (2006), corporate ownership in the Malaysian capital market can be clearly identified along ethnic and national lines, specifically Chinese, Bumiputera (Malays) and foreigners. This unique pattern of segmented capital formation is argued to result in differences in business organizations that can, in part, be explained by the ethnicity of the owners. Eichenseher (1995) argues that ethnic divisions across publicly

held corporations in Malaysia "can be linked to plausible variations in agency costs". One possible explanation to this variation is due to differences in business practices.

Although there are three main ethnic groups in Malaysia (primarily refer to Malays, Chinese and Indians) with a presence of various indigenous groups in the states of Sabah and Sarawak, only two major ethnic groups (i.e. Chinese and Malays) control the socio-economic and political environment of the country (Che Ahmad et al. 2006; Haniffa & Cooke 2002). Ethnic Malays (also known as Bumiputeras) are found to control the political administration while ethnic Chinese have heavily influenced the economic environment (Che Ahmad et al. 2006).

Weidenbaum and Hughes (1996) argue that Chinese is the most prevailing entrepreneurial ethnic group in the world. They empower the entrepreneurial exuberance in many nations including Malaysia, Thailand, Indonesia, Vietnam, and progressively in Japan (Ahlstrom, Young, Chan & Bruton 2004). Historically, and even at present, business in Malaysia has been dominated by ethnic Chinese (known as non-Bumiputera) even though ethnic Malays literally labeled as "son of the soil" account for more than 60 percent of the population. To tackle this continual socio-economic imbalance between ethnic groups (Malays versus Chinese), the government has made efforts to improve it through constructive and productive means. For instance, in the Eleventh Malaysian Plan (2016), the government has effectively created an environment of development based on growth with fair distribution of quality opportunities to stabilize the Chinese entrepreneurship domination in the country. One of the main thrusts of the National Mission is to ensure that Malaysia is capable of sustaining a positive growth impetus. This thrust emphasizes the philosophy of "growth with equity" to resolve socio-economic inequalities between two ethnic groups of Malays and Chinese (Eleventh Malaysia Plan 2016).

Family Firms and Leverage

Theoretical and empirical evidence confirms the existence of interrelation between family firms and financial structures. For instance, Margaritis and Psillaki (2010) investigate the relationship between capital structure, ownership structure and firm performance. They find that the firms with concentrated ownership (e.g. family firms) are highly levered and more efficient than the firms with dispersed ownership. This shows family characters of a firm can also play a significant role in determining level of debt. Further, Bopaiah (1998) suggest that unique features of "familiness" value in family firm provide incentives for behavior that reduce the moral hazard problems perceived by lenders. This implies that family firms can obtain loans more easily than non-family firms. Thus, it confirms the existence of debt level differential between family firms and non-family firms with regards to agency problems. In sum, based on agency theory, family firms are seen to have some motivations to reduce agency costs due to higher shareholding concentration (Anderson & Reeb 2003) where the separation of ownership and control is almost non exist.

Financing behavior of a family firm is a function of its characteristics (Colot & Croquet 2009). Debt level in family firms indicates an alternative means of financing which prevents the spread of ownership and loss of family control. Therefore, equity financing becomes the least preferred source of financing among family firms. Moreover, Jensen and Meckling (1976) suggest that family firms experience less severe classical agency problems compared to those in more diffused ownership, partly due to personal and familial ties between owners and managers. In line with that, when ownership structure of firms is highly concentrated and predominantly owned by families, these firms are likely to have greater concerns over family reputation and greater desire to pass the control of the business onto future generations. As a result this is likely to influence the financing decisions of the family firms (Maury 2006; Anderson & Reeb 2003).

Companies which are in an affiliated group (e.g. family firms) influence the way they are governed allowing them to increase capital (Khanna & Rivkin 2001). Therefore, leverage decisions in family firms are significantly different from one outside the affiliated groups (Manos et al. 2007; Chua et al. 2011). This signifies the uniqueness of ownership structure within the groups that creates its own virtual (or internal) capital resources among the members (e.g. family and friend financing). In addition, theories of market failure and policy distortion of business groups indicate that group-affiliated firms enjoy exceptional access to government and foreign loans (Manos et al. 2007).

Prior studies suggest that family firms comprise of a unique set of investors with undiversified shareholdings, thus reducing agency conflicts between controlling shareholders and management because shareholders (owners) are also managers (Anderson, Mansi & Reeb 2003). Consistent with the prediction of agency theory, when managers are also owners, managers are restrained from engaging in value-decreasing activities and they are likely to be more risk averse (Ensley and Pearson, 2005). As a result, debt defaults are likely to be lower for family firms and this leads to lower agency cost of lending, hence lower cost of debt (Anderson, Mansi & Reeb 2003; Chua et al. 2011). Bopaiah (1998) also provides evidence that family-owned companies have better credit availability because creditors consider them as

having lesser moral hazard problems than non-family firms. As such, borrowed funds may not be invested in value-destroying activities that could harm shareholders' wealth. Further, Bopaiah (1998) also reports that family-owned companies generally invest in relatively conservative investment choices, suggesting lower probability of debt default. As a result, creditors are more confident to lend to family firms as compare to its counterparts.

The preceding discussion shows that family firms whose ownerships and controlled are highly concentrated and in the hands of family members are likely to have higher levels of leverage than those firms whose ownerships are widely dispersed. The association between family ownership and leverage can be further explained in the context of Malaysian corporate landscape in which element of ethnicity is involved to help explain, if any, variations in leverage that may exist among family firms in Malaysia.

Ethnicity and Leverage

There are three major ethnic groups in Malaysian society, namely Malays, Chinese and Indians. These ethnic groups are commonly categorized as either Bumiputeras (i.e. majority ethnic Malays and other indigenous population) or non-Bumiputeras (i.e. mainly Chinese and Indian descendants). Historically, Malays and other indigenous population have been economically lagging behind compared to their non-Bumiputera counterparts. Back in 1970, the government instituted New Economic Policy (NEP) which primarily intended to reduce the socio-economic gaps particularly between ethnic Chinese and Malays. Among the initiatives included in the NEP programs were a number of economic and educational privileges accorded to Bumiputeras. Inequalities between Bumiputera and non-Bumiputera remain much in capital ownership and entrepreneurial spirit although gaps in areas such as educational achievement and occupational attainment have narrowed down (Nagaraj et al. 2007).

Fraser et al. (2006) and Johnson and Milton (2003) suggest that Bumiputera is ethnically-favoured and politically connected. This allegation is proven when the government has made continuous efforts to improve the socio-economic imbalance through constructive and productive means. For instance, in the Eleventh Malaysia Plan (2016), the government provides many privileges to Bumiputera firms such as awarding government contracts, providing greater access to capital resources, broadening opportunities to purchase privatised assets and extending substantial supplementary subsidies. With regards to access to financial supports, the government and its agencies such as Malaysian National Entrepreneur Development Corporation (PUNB) and Council of Trust for the Bumiputera (MARA) have established various funds in various forms including soft loans, grants, equity financing, venture capital, and financial guarantee schemes. In addition, Bumiputera entrepreneurs are given various business support services such as formal training, marketing channels, provision of business premises and technical guidance. All these privileges posit the government efforts and commitment to inculcate Bumiputera entrepreneurs, if not superior but at least are at par with Chinese entrepreneurs.

Further, the issuance of Lending Guideline established in 1988 by the National Central Bank (BNM) requires all commercial banks to extend at least 20 percent of the total loans outstanding of the preceded year to the Bumiputera community (Bank Negara Malaysia 1999). Following this guideline, statistic shows that bank loans extended to the Bumiputera community rise steadily and are used to finance wide range of business activities (Bank Negara Malaysia 1999, 2009, 2018). Given all these financial supports directed towards helping Bumiputera-controlled firms, it is predicted that these firms are likely to be highly levered compared to their non-Bumiputera counterparts.

Conclusion

This study is motivated by the unique corporate structure of Malaysian public listed firms whose ownership is dominated by a few largest shareholders and they are substantially family-owned. As suggested by agency theory, closely held firms specifically family firms can reduce agency problems because owner-managers' interests are likely to be more aligned. The dominant presence of family controlled firms coupled with unique corporate segments in which corporate boards and equity stake holding are dominated by two distinctive ethnic groups trigger this study to further explore whether family ownership and ethnicity can potentially offer evidence of capital structure variation that exist in these firms.

This study is unique because it deals with the issue of capital structure determinants outside developed countries. For instance, element of ethnicity has not been thoroughly investigated in the realms of capital structure in Malaysia and possibly none in other developed economies. This study offers an alternative explanation for the leverage variations and provides evidence on the universality of the existing capital structure theory. It enhances the body of knowledge pertaining to debt financing in shaping capital structure of Malaysian family firms

Evidencing on previous literature, this study will serve as a platform for authors to conduct empirical studies on this topic in the near future to further strengthen the relevant theories and arguments contained in the field.

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Statistical Analysis of the Risk Assessment of Investors' Investments in Securities Portfolio

Milutin DOBRILOVIĆ
Faculty of Economics, University of Belgrade, Belgrade, Serbia, email: dobrilovic@ekof.bg.ac.rs

Dragana PETROVIĆ
ITS – Information Technology School, Belgrade, Serbia, email: dragana.petrovic@its.edu.rs

Milena ILIĆ
Faculty of Contemporary Arts, Belgrade, Serbia, University Business Academy in Novi Sad,
email: milena.ilic@fsu.edu.rs

Bojan S. RISTIĆ
ITS – Information Technology School, Belgrade, Serbia, email: bojan.ristic@its.edu.rs

Abstract

The subject of the research study is the measurement of the total investment risk through the statistical measures of dispersion (variance and the standard deviation), which give the investor information on the deviation of the realized annual return from average returns when making decisions on investing in company shares on the market. However, we should bear in mind the fact that the investor also wants to know how returns on investments in the shares of different companies move together. This cannot be determined by observing risk dispersion measures. Therefore, when making a decision on investing in securities, investors also use the measures of the degree of the linear relationship between the shares, such as covariance and a correlation coefficient.

The aim of the research study is to point out the fact that diversified investors strive to provide the least risky instruments in their possession on the basis of risk assessment through statistical risk assessment measures. However, the problem of assessing the risk of investing in securities is a complex concept, because it includes the interdependence of assessing the rate of return on securities and investment risk, based on which the investor considers a possible return offered individually by each observed security.

Keywords: statistical analysis, investment risk management, variance, standard deviation, diversification

Introduction

On the financial market, investors can choose between a large number of the shares and bonds of various issuers. Before making an investment decision, potential investors consider the possible return offered by each individually observed security. However, in addition to the assessment of return, the investor should also make an assessment of investment risk when making a decision on investing in securities. Measuring portfolio risk and measuring portfolio return are interrelated, which makes it difficult for the investor to assess them. Therefore, investors often use the statistical measures of dispersion (variance and the standard deviation) that give them information about the deviations of the realized return from the mean value (the arithmetic mean) of the companies "A" and "B". Dispersion measures aim to determine the dispersion of shares in one sample around the mean value, i.e. the higher the sample dispersion, the higher investment risk for a diversified investor. Variance is the deviation of the value of the return of one share from the average value of the return. The standard deviation is an even more precise measure of dispersion, because it is calculated as the root of variance. This measure is most often used by investors when making a decision on investing in securities.

In addition to the statistical dispersion measures, investors also use the measures that show the degree of the linear correlation of shares. There are a large number of linear dispersion coefficients in the literature, and two dispersion

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measures will be analyzed in this paper, these namely being covariance and a correlation coefficient. Covariance is a measure of the connection between shares between two companies. If it is positive, it means that stock prices are moving in the same directions, and if it is negative, a diversified investor can conclude that stock prices are moving in the opposite directions. A correlation coefficient is obtained when covariance is divided by the product of the standard deviations of such two companies, and it shows how much the two shares are interconnected, i.e. how they react to each other. It ranges from -1 to 1, and in case the value is equal to 0, it means that there is no connection between the actions, where the numerical value shows the strength of the connection and the sign shows the direction of the connection.

The concrete examples of two companies will be used in the paper to show the calculation of these statistical coefficients and, based on that, the potential investors' decision to invest in the securities portfolio. Statistical analysis is an unavoidable and comprehensive analysis, because it includes the assessment of risks and returns, as well as their interdependence, based on which potential investors choose the financial instrument which to invest their funds in.

Management of the Risk of Investment in Financial Instruments

Measuring risk is one of the most important phases of the entire financial instrument investment risk management process. The most commonly used risk assessment methods are dispersion measures (variance and the standard deviation) and the measures of common variation or covariance (covariance and correlation). The market return variance is the expected square deviation from the expected return. (Brealey, et al. 2020)

Suppose an investor has a choice between investing in the shares of the Company A and the Company B, with the following individual characteristics (Table 1):

Table 1: The expected returns and risks of investing in the shares of the companies A and B

	Investments in the shares of the company A	Investments in the shares of the company B
Expected return	0.630	0.120
Standard deviation	0.432	0.093
Correlation coefficient	1.980	1.230

There is a low investment risk with the shares of the company for which a smaller standard deviation of the return and a smaller variance are determined. The investments in the shares of company A have a greater standard deviation than the investments in the shares of the company B by more than 5 times (0.630 : 0.120 = 5.25). This means that the return on the shares of this company can vary over 5 times more than the investments in the shares of the company B.

The main manner to reduce the investors' general (market) investment risk is to diversify the portfolio. Diversification is a very old term. The saying "never put all your eggs in one basket" originated before economic theory. The diversification model was developed by the creator of said saying, Harry Markowitz, in 1952, for which he won the Nobel Prize in Economics. During the 1990s, for example, many investors were only investing in stock portfolios. They did not want to invest in stock, bond, and other financial instrument portfolios so as not to make a smaller profit, because technology companies were on the rise at that time. After the collapse of the technology sector, however, investors felt how dangerous it was to keep a portfolio only consisting of the shares of one single company or similar shares. (Bodie, et al. 2009)

When investors are concerned, even a small diversification can provide a significant reduction in variability. (Brealey, et al 2020)

The investor will reduce general market risk based on the analysis of the effects that the shares of each company may have on the risk of the entire share portfolio. Diversification seeks to reduce (if it cannot already eliminate such risk) the risk characteristic of a company's share. These are the risks of fluctuations in the return of the market price of a company's share under the significant influence of the market (macroeconomic) trends.

Diversification can eliminate specific risks, but diversification cannot eliminate certain risks – namely market risk. (Brealey, et al. 2020)

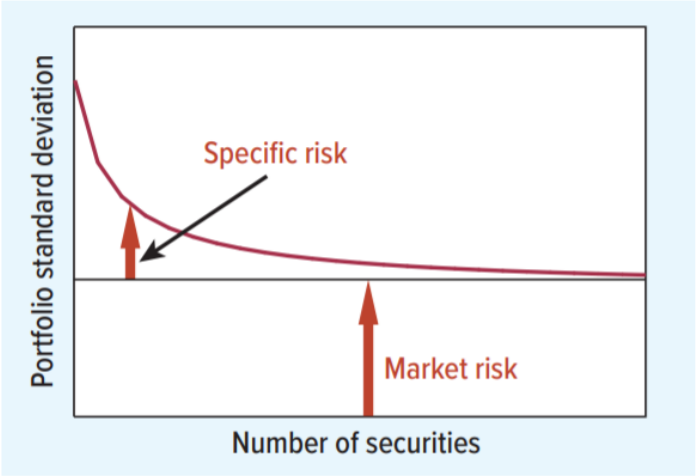

Figure 1. Diversification and risk (Brealey, et al. 2020)

In Figure one, risk is divided into two parts – a specific risk and a market risk. If an investor only had one stock, the specific risk would be very significant: on the other hand, if the investor opted for a portfolio of 20 or more shares, diversification would reduce the exposure to risk. For a well-diversified portfolio, only market risk is important. Therefore, the predominant source of uncertainty for a diversified investor is that the market will grow or that it will collapse, carrying with itself the investor's portfolio. (Brealey, et al. 2020)

Therefore, if an investor decides to form his portfolio from only one share, he will be exposed to company risk and general (market) risk. By diversifying a portfolio, i.e. by forming a portfolio from several instruments, the exposure of the securities (owned by the investor) to the influences within the issuing company is reduced because:

1. by investing funds in a diversified portfolio, the share of individual securities in the total portfolio is reduced. A reduction in the market price of only one of these securities will not have a significant impact (or any impact at all) on the market value of the entire portfolio. Conversely, if an investor owns a portfolio of only one security, with a change in the market price of that (one) security, the total market value of the portfolio will also change.
2. the market prices of individually observed securities change (either upwards or downwards), depending on the financial performance of the issuer. If an investor has a diversified portfolio, a shift in the market prices of some securities may affect the overall market value of the portfolio. The impact will be smaller or larger in the value of the entire portfolio, depending on the percentage share of the securities whose prices have changed. Practically, if the number of the securities in a portfolio was to increase indefinitely, no change in the market price of a financial instrument would have any impact on the market value of the portfolio (although this cannot be the rule).

We will support the claim that portfolio diversification reduces the risk of changes in the market price of one security to the total market value of the portfolio, with a concrete example. At the same time, the effects of increasing the number of instruments (in a portfolio) on the variance of individual securities will be considered. This variance, even more so the covariance of the entire portfolio, provides an answer to the questions: Why can diversification reduce a risk? and How much risk does it reduce? (Brealey et al., 2009)

For example, an investor intends to form his share portfolio by buying shares from the companies A and B. Before making a decision on investing funds, the investor will perform a risk analysis of investing in these companies. He will carry out said analysis based on the business results of the companies A and B in the previous period, taking into account the view that the present is a sum of the past and that the future is the projected present. In other words, in the real life of the company, riskiness in achieving returns in the past is most often confirmed in its future life, which our investor believes in. Suppose these companies achieved certain rates of return thanks to the investments of funds made by one (same) investor in the past period from 2015 to 2020.

The return growth rates were calculated according to the following equation:

Return in the current year i.e. in the year in which the calculation is made) $= \frac{\text{The market price for a share in the current year} - \text{The market price for a share in the previous year} + \text{The dividend in the current year}}{\text{Market share price in the previous year}}$

Using this formula, let us determine the achieved individual annual returns, based on which the average returns of the companies A and B are calculated:

Table 2: The annual rates of the realized growth (decline) of the returns of the companies A and B in the period from 2015 to 2020 (in %)

Year	The return achieved in the company A	The return achieved in the company B
2015	11%	48%
2016	56%	-30%
2017	-12%	5%
2018	-10%	120%
2019	26%	124%
2020	32%	150%
Total	103%	417%

The realized average return (AR) and the average value for the companies A and B are as follows:

$$AR_A = \frac{103}{6} = 17.17\% = 0.172$$

$$AR_B = \frac{417}{6} = 69.5\% = 0.695$$

Based on the arithmetic mean, no information on the differences between the individual values in Column 1 (Table 3) is obtained. An estimate of the deviation from the mean is needed. (Bodie et al., 2009). Thus, the deviation of the first value of the company A is as follows:

$$0.11 - 0.172 = -0.062$$

The other deviations are calculated in the identical way, as shown in Tables 3 and 4:

Table 3 : The squares of the deviation of the realized annual returns from the average returns of the company A

Year	The realized company return by years (1)	The arithmetic mean (2)	The deviation of the realized return from the arithmetic mean of the company A (3 = 1 - 2)	The squared deviation of the realized return from the arithmetic mean (4 = 3^2)
2015	11% = 0.11	0.172	-0.062	0.0038
2016	56% = 0.56	0.172	0.388	0.1505
2017	-12% = - 0.12	0.172	- 0.292	0.0853
2018	-10% = - 0.10	0.172	-0.272	0.0739
2019	26% = 0.26	0.172	0.088	0.0077
2020	32% = 0.32	0.172	0.148	0.0219
Total	103% = 1.03	0.172	0.00	**0.3431**

The arithmetic mean of the return achieved by the company A is 1.03 : 6 years = 0.172, i.e. 17.2%.

The total sum of all the deviations from the mean value is equal to zero, due to the mutual cancellation of the positive and negative deviations. One way to avoid undoing the positive and negative deviations is to square each deviation and then calculate their sum. These deviations are now squared in order to calculate variance and the standard deviation. The variance was obtained by subtracting the mean value from each value and squaring the results. The sum of the square deviations from the arithmetic mean of the company A is 0.3431. Finally, the mean square deviation from the value of the arithmetic mean (the variance) is determined by dividing the sum of the square deviations by n-1, where n denotes the number of the years of the analyzed period. The return variant of the company A is as follows:

$$s^2 = \frac{0.3431}{n-1} = \frac{0.3431}{5} = 0.0687$$

Variance shows the deviation of the realized return in each of the years of the analyzed period in relation to the average return.

The square root of variance is called the standard deviation, which in this case is as follows:

$$s = \sqrt{0.0687} = 0.26 \text{ or } 26\%$$

The previous procedure is repeated for the company B.

Table 4 : The squares of the deviations of the realized annual returns from the average returns of the company B

Year	**The realized company return by years (1)**	**The arithmetic mean (2)**	**The deviation of the realized return from the arithmetic mean of the company B (3 = 1 - 2)**	**The squared deviation of the realized return from the arithmetic mean ($4 = 3^2$)**
2015	48% = 0.48	0.695	-0.215	0.04622
2016	-30% = -0.30	0.695	- 0.995	0.99002
2017	5% = 0.05	0.695	- 0.645	0.41602
2018	120% = 1.20	0.695	0.505	0.25502
2019	124% = 1.24	0.695	0.545	0.29702
2020	150% = 1.50	0.695	0.805	0.64802
Total	417% = 4.17		0.00	**2.65232**

The arithmetic mean of the return of the company B in the period from 2015 to 2020 is as follows:
4.17 : 6 = 0.69, i.e. 69%.

The return variant of the company B is as follows:

$$s^2 = \frac{2.65232}{5} = 0.53046.$$

The standard deviation is (Baker, Powell 2005) is as follows:

$$s = \sqrt{0.53046} = 0.72 = 72\%$$

Based on the data from Tables 3 and 4, Table 5 is created as a comparative overview of the average returns and the standard deviations for the shares of both companies:

Table 5: The average return and the standard deviations for the shares of the companies A and B:

	Company A	Company B
Average realized return	17.2%	69%
Standard deviation	26.0%	72%

It can be concluded that Company B has the shares almost 3 times (72% : 26% = 2.8 times) riskier than the shares of Company A are. The investor also wants to know how these two financial instruments would behave together. He cannot find it out from the variance or the standard deviation, although these are the most well-known and the most frequently used dispersion measures. These measures were used to estimate the average deviation from the arithmetic mean. The investor also wants to know the difference between the realized return and the average return in both companies. It is necessary to calculate covariance and the correlation coefficient, which are the measures of the degree of the linear relationship between the shares.

The covariance between the shares of the companies A and B is calculated by not squaring the deviations, i.e. the differences of the individual returns from the arithmetic mean of the returns of these companies, but multiplying them by each other instead, as follows:

Table 6 : The calculation of covariance

Year	The realized return of the company A (1)	The realized return of the company B (2)	The deviation of the return from the arithmetic mean of the company A (3)	The deviation of the return from the arithmetic mean of the company B (4)	The product of the deviations of the companies A and B (5 = 3 x 4)
2015	11%	48%	-0.062	-0.215	0.01333
2016	56%	-30%	0.388	-0.995	-0.38606
2017	-12%	5%	-0292	-0.645	0.18834
2018	-10%	120%	-0.272	0.505	-0.13736
2019	26%	124%	0.088	0.545	0.04796
2020	32%	150%	0.148	0.805	0.11914
Total					**-0.15465**

$$\text{Covariance}_{A,B} = \frac{-0.15465}{5} = -0.03093$$

The negative value of the covariance indicates the fact that the shares of the companies A and B tended to move in the opposite directions in the period from 2015 to 2020. The negative covariance indicates the fact that there is no direct linear relationship between the shares of these companies. As the degree of the correlation between the stocks increases, the (positive) value of the covariance also does.

The correlation coefficient is calculated by dividing the covariance by the product of the standard deviations: (Copeland et al., 1988)

$$\text{Correlation coefficient} = \frac{\text{Covariance}}{(\text{Standard deviation for company shares A})\text{x}\,(\text{Standard deviation for company shares B})}$$

$$= \frac{-0.03093}{0.26\ x\ 0.72} = \frac{-0.03093}{0.1872} = -\ 0.1652$$

According to the correlation coefficient equation, it can be noticed that both the covariance and the correlation have the same (either positive or negative) value. The correlation value ranges from -1 (when there is a complete negative, i.e. inverse correlation) to +1 (when there is a completely positive, or direct correlation). In our case, the correlation coefficient is -0.1652. which indicates the fact that there is no relatively high degree of the negative correlation

between the shares of these companies, i.e. this correlation has 16% of the "strength" of a completely negative correlation.

Portfolio Diversification as a Way to Reduce Market Investment Risk

Faced with different risks of investing in securities, investors take appropriate countermeasures, depending on the type of investment risk. An investor cannot neutralize general (market) risks, but the effects of risk can significantly be reduced if financial instruments are diversified. (McMenamin, 1999) In practice, the largest number of investors opt for forming a portfolio from only a few securities. This determination arises as a result of the knowledge of the following:

a) most benefits of diversification can be realized based upon the ownership of only a few securities,
b) the expansion of the portfolio structure leads to a decrease in the marginal benefits of diversification and an increase in the marginal costs of such a movement (the transaction costs of monitoring), and
c) many investors are reluctant to buy the securities that they consider to be at unrealistic (overvalued) market prices, convinced that they can find undervalued financial instruments.

Company risks are much more easily and much faster coped with by the investor. If the investor has encountered risky securities for the first time (on the financial market), he can avoid being exposed to specific risk by choosing the instrument of the company that he considers to be risk-free. If the investor has a risky instrument, he will try to get rid of such an instrument by a further sale.

In the previous question, the past of the companies A and B, i.e. their respective returns, was realized on the basis of the investments in shares in the period from 2015 to 2020. Based on this analysis, the investor should make a decision for the future – a decision to invest money in stocks, convinced that the central tendencies (the average returns, i.e. the arithmetic means) will be maintained in the future.

There are two options for the investor to choose: the one implying forming a portfolio only from the shares of one company, and the other implying a combination of shares with their different shares in a single portfolio. The selection of the optimal combination is made based upon the analysis of the expected returns and standard deviations with the different combinations of the shares of both companies. The analysis is performed with the assumption that the performance indicators of these companies in the previous period (2015-2020) will be maintained in the future: the returns, the standard deviations and the covariances, which means that the expected return in the future will be at the level of the realized return from the period from 2005 to 2020, as follows: 17.22% for the company A and 69.5% for the company B. Starting from these assumptions, the investor will make the following calculation for one of the possible portfolio options (a total of 11 options are analyzed and presented in Table 7) that will be formed on the basis of an equal participation (50% of the shares of the company A and 50% of the shares of the company B):

The expected
average portfolio return = 0.5 (17.17%) + 0.5 (69.5%) = 43.44%
(50% : 50%)

The portfolio
variance = $(0.5)^2 (0.26)^2 + (0.5)^2 (0.72)^2 + 2 (0.5) (0.5) (-0.1652) (0.26) (0.72) = 0.1311$
(50% : 50%)

The portfolio standard
deviation = $\sqrt{0.1311} = 0.3621$, i.e. 36.21%
(50% : 50%)

The obtained data for the expected return and the standard deviation are entered into Table 7, under the sequence number 6, which is one of the possible portfolio options (if the investor opts for it): 50% of the shares of both companies. In the identical way, the expected return is calculated for ten different portfolio options more. Thus, for a portfolio formed on the 90 : 10% basis (the shares of the company A against the shares of the company B), the following would be appropriate:

The expected return = 0.9 (17.17) + 0.1 (69.5) = 22.40%
(90% : 10%)

The variance (Compendium, 2008) = $w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2$. $(0.9)^2 (0.26)^2 + (0.1)^2 (0.72)^2 + 2 (0.9) (0.1) (-0.1652) (0.26) (0.72) = 0.0543$
(90% : 10%)
The standard deviation = $\sqrt{0.0543} = 0.2330 = 23.30\%$
(90% : 10%)

Table 7: The expected returns and the standard deviations with the different combinations of equity participation in the portfolio

Seq. no.	Weight (the participation of the company shares in the investor's portfolio)		The expected return	Standard Deviation
	Company A	Company B		
1	100%	0%	17.2%	26.00%
2	90%	10%	22.40%	23.30%
3	80%	20%	27.64%	18.82%
4	70%	30%	32.87%	25.83%
5	60%	40%	38.10%	30.68%
6	50%	50%	43.44%	36.21%
7	40%	60%	48.57%	42.73%
8	30%	70%	53.80%	49.71%
9	20%	80%	59.03%	56.97%
10	10%	90%	64.27%	64.42%
11	0%	100%	69.50%	72.00%

With the different weights of the companies A and B, the investor may expect different returns: the lowest expected return (17.2%) can be achieved if the ratio of the shares in the total portfolio is 100% to 0%, in favor of the shares of the company A; the highest return (69.50%) is achievable with a portfolio of 100% of the shares of the company B. However, the lowest standard deviation (18.82%) is achieved with the third combination, when the shares of the company B have a 100% share in the total investor's portfolio.

If the investor does not want to take risk, he will opt for a portfolio formed from 80% of the shares of the company A and 20% of the shares of the company B, when the standard deviation is the smallest. He will do so because he wants to avoid investment risk, regardless of the fact that he could then expect a return of 27.64%, which is 2.65 times lower than the highest return (69.50 : 27.64 = 2.5). Of course, he can also opt for a portfolio providing him with the highest return, regardless of the risks. That would be the 11th combination, when the portfolio only consists of the shares of the company B, with the expected return of 69.50%. With such a choice, however, the greatest possibility of varying the return was estimated (as much as 72%), which not every investor will accept, because he does not agree to such a risk. If the investor only owned the shares of the company B, his return would vary almost three times more than they would if he only owned the shares of the company A (72% : 26% = 2.77). Therefore, the investor will not opt for a portfolio exclusively composed of the shares of Company B, nor of the shares of Company A. He will form a diversified portfolio. He will opt for one of the combinations (from 2 to 10 in Table 7), according to his personal affinity for the estimated risk and the expected rate of return.

Conclusion

It can be concluded that the risks of investing funds in one financial instrument are higher than those of investing in two or a larger number of financial instruments. Unlike a diversified investor, a non-diversified investor bears the risk specific to the company. If a portfolio is formed from two instruments (from the shares of the companies A and B), the standard deviation of such a portfolio is the function of correlating the return between these securities. As a correlation coefficient decreases, the standard deviation of the portfolio decreases as well. Then, the benefit of diversification increases. With an increase in the correlation coefficient of the return between these two instruments, the benefit of the portfolio diversification becomes smaller. Benefits will (to a greater or lesser extent) exist as long as a correlation coefficient is less than 1. (Copeland et al.)

Based on the previous analysis of the portfolio of the two financial instruments that confirmed the greater usefulness of investing in two securities rather than in a single security, it is logical to conclude that the investor will consider the usefulness of forming a portfolio from three or a larger number of instruments. However, there must be a measure

in that. The marginal benefits of diversification diminish with each introduction of a new instrument to the portfolio. This is because diversification can be expensive due to the fact that the costs of collecting necessary data, making an analysis and so forth are high. The diversified investors who already have a portfolio of the shares of a number of companies and who now want to include the shares of another company also ask themselves the question of market risk. That is the reason why they are referred to as marginal investors.

A diversified investor seeks to provide less risky financial instruments in his possession based upon a market risk assessment, which serves him as the basis for making an appropriate investment decision, which he makes being aware of the fact that a higher risk is a real challenge and an opportunity to earn more. As is shown in the paper, diversified investors successfully overcome the problem of return and risk assessment by applying the methods that are an indispensable tool in investment decision-making. Hence the investors' motivation to measure the risk and return of the securities portfolio by using the presented methods. The previous analysis shows how investors choose the optimal combination with the different shares of company shares in their portfolios, faced with the different risks of investing in securities. For that reason, they are also called diversified investors, who try to provide less risky financial instruments in their possession based upon this assessment. Only on the basis of this assessment will the investor make an investment decision appropriate for him, being aware of the fact that the expected return on investment and risk are interrelated, which means that a potential investor will invest in the securities that bring him a satisfactory return, with a risk acceptable for him.

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El Efecto De La Alfabetización Financiera Sobre El Endeudamiento De La Empresa Familiar: El Papel Moderador De La Etapa Generacional

Antonio MOLINA-GARCÍA
Universidad de Málaga, Málaga, España, antoniomolina@uma.es

Marta CAMPOS-VALENZUELA
Universidad de Málaga, Málaga, España, martacv@uma.es

Teresa GALACHE-LAZA
Universidad de Málaga, Málaga, España, mtgalache@uma.es

Julio DIÉGUEZ-SOTO
Universidad de Málaga, Málaga, España, jdieguez@uma.es

Vicente GONZÁLEZ-GARCÍA
Universidad de Málaga, Málaga, España, vgonzalez@uma.es

Abstract

La literatura previa es equívoca respecto al nivel de endeudamiento de la empresa familiar, a pesar de que el análisis de la estructura de capital ha generado gran interés en el campo de las finanzas. Los motivos que impulsan al propietario-gerente a endeudarse se encuentran aún inexplorados, surgiendo evidencia empírica opuesta. En consecuencia, la alfabetización financiera del propietario-gerente, entendida como el conjunto de conocimiento financiero y su utilización en la toma de decisiones, podría ayudarnos a explicar esta variación en los niveles de endeudamiento de la empresa familiar. Así mismo, la generación familiar en la que se encuentra la empresa es un importante determinante a tener en cuenta, así como su posible efecto moderador entre la alfabetización financiera y el nivel de endeudamiento de la empresa. Este estudio utiliza una muestra de 179 empresas familiares españolas, haciendo uso de cuatro regresiones lineales múltiples para contrastar los objetivos antes planteados. Además, se analiza la robustez de los resultados a través de una medición alternativa del endeudamiento. Se encuentra que un nivel elevado de alfabetización financiera incide de manera negativa y significativa en los niveles de endeudamiento de la empresa familiar, no dándose así para el transcurso generacional, siendo más propensas a la utilización de deuda las empresas familiares de segunda y posterior generación en comparación a las de primera generación. Sin embargo, y en contra de lo que cabría pensar, no se obtiene que la generación modere la relación entre alfabetización financiera y nivel de endeudamiento de la empresa familiar

Keywords: Empresa familiar; endeudamiento; alfabetización financiera; generación familiar.

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Real Estate Development Through Innovative Forms of Project Financing in Selected Countries

Monika PORADOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, monika.poradova@fpedas.uniza.sk

Lucia SVABOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, lucia.svabova@fpedas.uniza.sk

Abstract

Project financing is an innovative financing technique that is used to raise large amounts of capital. It is currently applied to funded long-term and costly projects such as real estate. The objective of the present article is to provide an analytical overview of the issue of real estate development through innovative forms of project financing in selected countries. The present paper consists of four parts. For the first parts paper, it deals with the issue of project financing and theoretical backgrounds. The second part focuses on methods of financing investment projects through bank loans, namely investment loans, mortgage loans or supplier loans. Also describes how to obtain the results of the analysis carried out. The survey involved 15 countries where banks from leading financial companies operating in each individual country were approached and selected. The survey included 70 banks, all of which were active in the market. The third part deals with the specific results of the analysis carried out. The analysis was carried out on selected countries on the basis of geographical locations and two categories of analysis were created. The first is "Central and Eastern European Economies" and the second category is "Other European Economies". The fourth part of the article focuses on discussion and the fifth part deals with the conclusions of the addressed issue. As a result of the present paper, a comprehensive view of real estate development through innovative forms of project financing in selected countries is the result. A descriptive method, analysis, mathematical-statistical methods, graphic methods, comparison and synthesis were used in the processing of the submitted paper creation.

Keywords: Real Estate, Project Financing, Innovation, Loan Portfolios,

Introduction

Funding is a key area of each project. Each project should take into account the possibilities of the project promoter or client. The choice of the type of project financing in enterprises is important both from the point of view of the enterprise, which will make a real profit from the final plan and from the position of the lender that invests the funds in the project. He will expect a return in the form of an agreed interest on his deposit. In recent years, project funding has recorded a significant increase in funded projects. This mainly concerned towing industry, energy, water management as well as development infrastructure projects. The growing interest in project financing has prompted economists, authors to dedicate themselves and explore this alternative form of financing for investment-intensive projects. In publications, we can meet several definitions of the concept of project financing. However, most authors agree and assign this form of financing to the investment banking component. (Aimurzina, Kamenova, Omarova, Bodaubayeva, Dzhunusova, Kabdullina, 2019)

Project financing as individual financing of an economic unit that first takes into account the future earnings and cash flow of the project from which the loan will be repaid. (Marquis, Raynard, 2015) Project financing is financing the development or use of rights, natural resources or other assets where the bulk of the financing is not used from own

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resources and must be mainly covered by the revenue of the project in question. (Yescombe, 2014) Project funding is tailored individually to the basic specific features and needs of each project. The main feature of project financing is that the borrower vis-à-vis the bank is a legally self-established special project company for a specific project, which is financed by credit lines without penalising the founders of the project company who put capital into it. (Feng, Gramlich, Gupta, 2009) This is financing that does not appear on the parent company's balance sheet and has no feedback on it. We can therefore say that the hallmark of project financing is the separation of project financing from other business activities of the investment unit. Both the granting and repayment of the loan are closely linked to the cash flows of the project both at the construction stage and in its subsequent operation. (Jakimowicz, Rzeczkowski, 2019)

Ultimately, we can define project financing as an innovative financing technique that is used to raise large amounts of capital. It shall also apply to funded long-term projects as well as specific, costly projects. This technique makes it possible to spread investment risk among the different stakeholders. (Kral, Janoskova, 2015) The advantage of this type of financing is that lenders usually do not require historical information from the potential borrower. When deciding whether or not to provide funds, the anticipated cash flow of the project is considered in particular as a source of repayment of the loan. (Michalkova, Frajtova Michalikova, Tanase, 2019) We can therefore conclude that it is most often about financing debt projects for infrastructure, industrial projects as well as public services. We define cooperation in these projects as a group of agreements and contracts between project sponsors, creditors and other partners forming a business unit that operates in a particular industry and determines the amount of credit required.

Over the last twenty years, financial instruments have been developed on the market, which expands the possibilities of obtaining funds for financing real estate projects. The choice of the appropriate method of financing depends on the specific structure and nature of the project. In practice, it is usually true that each project is unique. Lenders often look for projects with easily foreseeable political and economic risks. In general, we can say that financing is an activity that deals with obtaining financial resources for the establishment, operation and development of the company, in the necessary volume, time and structure, at the optimal cost of their procurement and with a defined price for their use. (Pazilov, Bimendiyeva, Ivashchenko, Aitymbetova, 2020)

When financing real estate development projects, the banking and financial sector is mostly an important source of finance. Especially in cases where own resources are usually not sufficient to finance projects. The financing of investment projects is a crucial aspect in the context of their preparation and implementation. Documentation needs to be prepared to secure sources of funding, whether from the bank or other partners. The whole negotiation of capital providers with the investor takes place in several phases. In the first phase, the investment plan of the project is presented. At the same time, the ideas of the stakeholders about the goals and parameters of the project are clarified. After a detailed analysis and verification of the investment plan of the project, at the end of the second phase, a method of financial security of the project is proposed. (Lyakina, Sheehy, Podhorska, 2019) Following the approval, in the third phase, the final terms of the contract are negotiated and the necessary financial resources are secured. When financing investments, objectives such as: securing the amount of capital for the investments envisaged or meeting the required rate of return should be pursued. Also, achieving the lowest possible average cost of capital, not disturbing the financial stability of the company together with other economic instruments creating pressure on the efficiency of investment. (Bartosova, Kral, 2016)

As a project-funded entity, the bank can act in two different positions. The first position is the arranger. Banks negotiate credit terms, assess project risks and project benefits. They also decide on the approval or rejection of the project. The second position is the agent position. Then the bank is not responsible for the loan decision but is responsible for the mechanical aspects of the loan. (Satish, 2019) Such as the coordination of loan drawdown and repayment, communication between financing participants, but also as a notification and information. Loans form a category among the most frequently used external sources of financing for the implementation of real estate projects. Most banks base their decision to grant a loan on a technical and economic study. (Hollowell, Kollar, Vrbka, Kovalova 2019) Thus, each application for a bank loan is subject to an analysis of the investment project and the creditworthiness of the applicant. Based on the results of these analyses, the bank then decides whether to grant the bank loan application and under what conditions or not. The basic factors for assessing the possibility of financing by the bank and factors influencing the price of bank loans can include the professional history of the investor, his financial health, reference projects, but also the amount of turnover. Also, the quality of the investment project, its risk, assessment of its economic efficiency, budget costs of the project, or type of contract. Proposal of the method of financing the project with the share of own funds, type of bank loan, amount, time and method of repayment, fixation of interest rate, etc.

When investing in bank loans, it is important to focus on the method of repayment. The loan may be repaid in a lump sum in the full amount of the loan provided, either at a specified maturity period or in the case of a loan granted for an indefinite period or after the expiry of the notice period. In both cases, the interest is paid gradually over agreed periods. With interim repayment, repayments may be irregular. For example, in the case of overdrafts associated with a current account, which the client draws by payment from the account and repays by incoming payments. Interim repayment may take the form of regular annuities or instalments. Annuity repayment is characterized by the fact that the client repays the principal and interest in regular amounts in regular constant instalments. (Esty, Sesia, 2010) When repaid in regular instalments, the principal payment does not change for the entire maturity period. Here, however, the interest payment changes according to the current amount of the loan balance. The maturity of the loan is also associated with the degree of credit risk for the provider of financial capital. Long-term loans represent a higher level of credit risk for the creditor, which also requires a higher return for higher risk. This causes higher costs for the financing company. This is mainly due to the fact that the degree of uncertainty of the development of the future economic conditions of the debtor increases with the length of time. In general, however, with increasing risk. (Valaskova, Kliestik, Kovacova, 2018) For that, the bank as a subject of project financing is very important and, given that it provides most of the financial resources of the project, it is irreplaceable.

Methods

The company most often obtains a bank loan in the form of investment loans, mortgage loans or supplier loans from banks to finance long-term investment projects.

Investment loans, which in practice are referred to as term loans. When financing, banks usually provide only a certain share of the estimated capital expenditure and, in order to reduce risk, require the company to participate in the financing. Term loans are characterized by a fixed interest rate and gradual amortization over its maturity period. Due to the higher degree of risk, term loans are more intensively associated with various guarantees, protective arrangements and set conditions in the event of default. Mortgage loans are loans that a company obtains from the development of the real estate. The loan is refinanced by issuing mortgage bonds issued only by duly authorized banks. Annual annuities are a common method of repayment. An important issue in mortgage lending is estimating the market price of real estate and its dynamics in the future. For a business, obtaining mortgage loans is usually longer and more complicated than with other types of loans. In addition to a bank loan provided by commercial banks, insurance companies, the company can also obtain a supplier loan for financing. It is provided by suppliers of fixed assets to customers. This type of loan does not involve the provision of direct cash but is a deferral or decomposition of the payment of the purchase price. In that case, the customer repays the delivered property together with interest for an agreed period, either once or gradually. Supplier loans most often occur in the supply of investment units for export.

The aim of this article is to provide an analytical overview of real estate development issues through innovative forms of project financing in selected countries. In 2019, a survey was conducted on the possible development of the loan, the one which is way the method of project financing real estate in selected countries. The survey involved 15 countries, where banks from the leading financial companies of the institution operating in each individual country were contacted and selected. The survey included almost 70 banks, all of which were active in the market. Banks were selected from among the leading financial institutions operating in each individual country. The majority the survey participant banks were local, i.e. those operating predominantly within one European country, whilst the rest were mainly regional banks, as well some multinational banks participated. Collected primarily via in-depth interviews and online questionnaires. Representatives from leading financial institutions have provided their views on the key issues influencing property lending. The questionnaire survey was conducted for the whole year 2019. Selected countries: Croatia, Serbia, Slovakia, Cyprus, Finland, Germany, Poland, Hungary, Ireland, the Netherlands, Greece, Romania, the Czech Republic, Slovenia, Bulgaria. Selected countries were compared on the basis of geographical locations and two categories of analysis were created. The first is the "Economies of Central and Eastern Europe". These countries are located in Central and Eastern Europe, including most of the Balkans. Due to their geographical proximity and the relatively comparable stage of economic and development of these countries, they are assumed to be similar mainly due to their advantages and challenges. Unlike Central and Eastern Europe, other European countries form the second category: "Other European Economies". Precisely because of their different economic capabilities, they provide a benchmark for evaluating data from Central and Eastern Europe.

Results

Lending as an external source of project financing is the most important and most frequent alternative to the implementation of real estate projects. The analysis will be based primarily on lending in selected countries.

This part of the survey focuses on banks' expectations with regard to the future of lending in real estate development. Also, on their development and strategic approach to real estate financing compared to other opportunities. Table 1 shows the strategic importance of real estate development financing for banks.

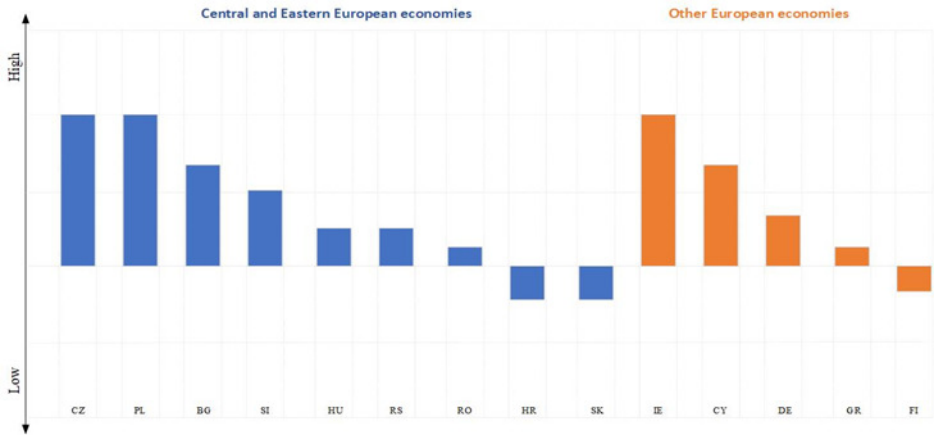

Fig 1. The strategic importance of real estate development financing for banks.

Source: Own processing according to Lending Barometer 2019.

The results of the survey revealed that the long-term gap between more functioning economies and those in Central and Eastern Europe in terms of the strategic importance of real estate financing has gradually narrowed. Banks from Ireland, Poland and the Czech Republic responded most positively. Most of the surveyed banks confirmed that they see the significant strategic importance of financing a real estate development project. Representatives of only a few countries, including Finland, Croatia and Slovakia, see average importance.

Figures 2 and 3 show the attractiveness of real estate financing compared to other industries in each country.

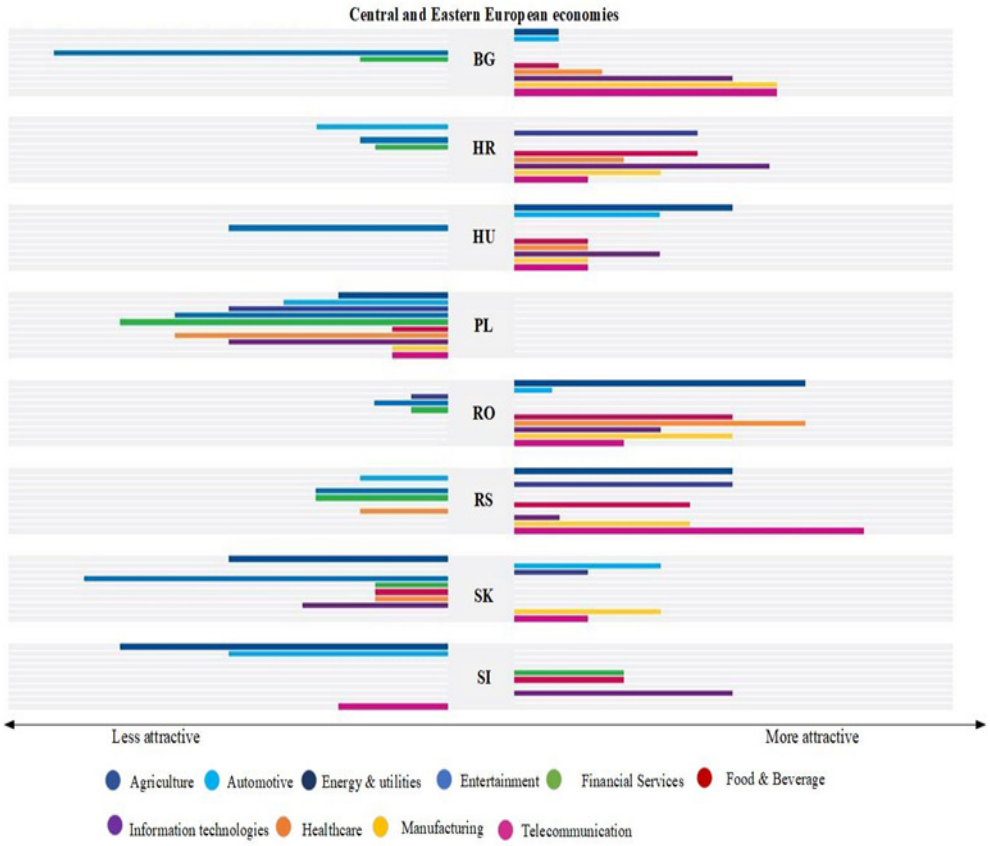

Fig 2. The attractiveness of real estate financing Central and Eastern European economies

Source: Own processing according to Lending Barometer 2019.

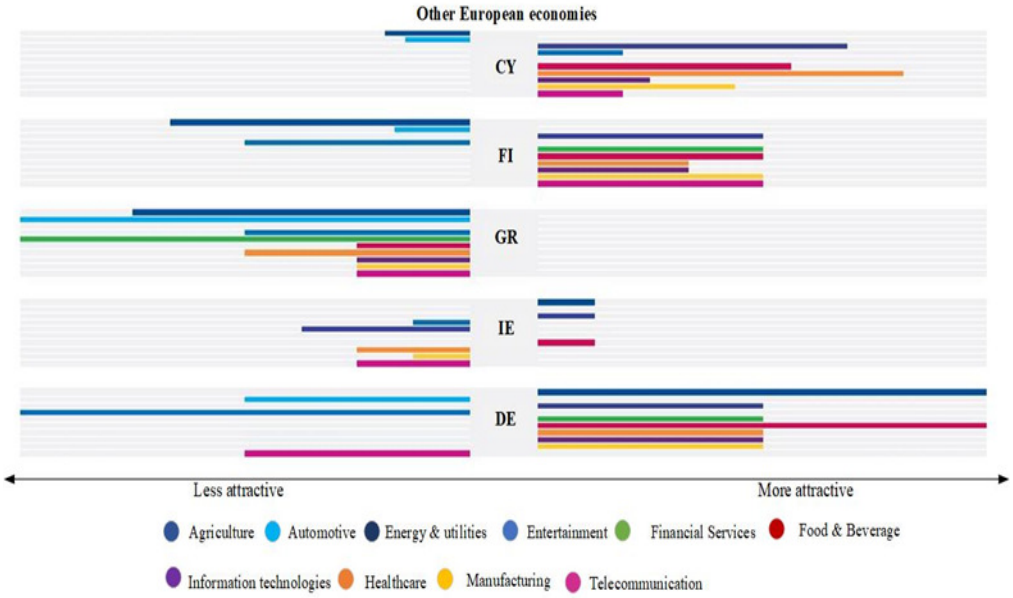

Fig 3. The attractiveness of real estate financing other European economies

Source: Own processing according to Lending Barometer 2019.

The survey examined how attractive real estate loan financing is with another industry. Overall, the food and manufacturing industries were the highest. This is followed by information technology, healthcare, energy, public services and, last but not least, telecommunications. Industries that proved to be less attractive than real estate were in the entertainment, automotive, financial services and agriculture sectors. Although the results potentially vary significantly from country to country, they show the relative strength of the different industries in each of them in the market. The survey also revealed even a regional comparison of responses. There were differences between Central and Eastern Europe and other lower-income economies, such as energy.

Another partial result was, as it turned out, their actual real estate financing with a loan compared to the previous year. The result is shown in figure 4 and 5.

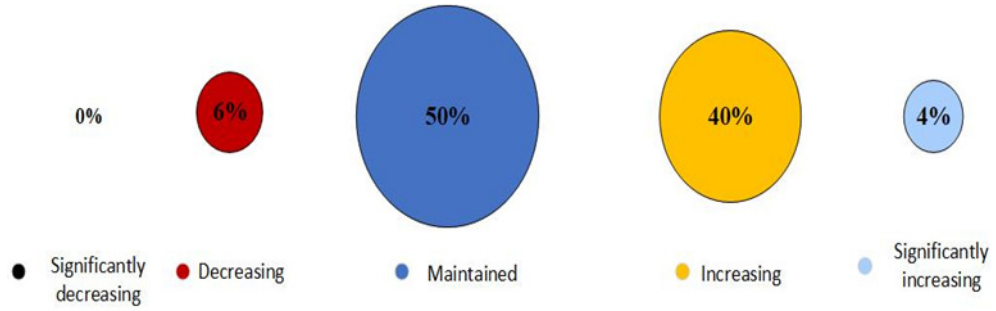

Fig 4. Actual real estate financing with a loan compared to the previous year in Central and Eastern European economies

Source: Own processing according to Lending Barometer 2019.

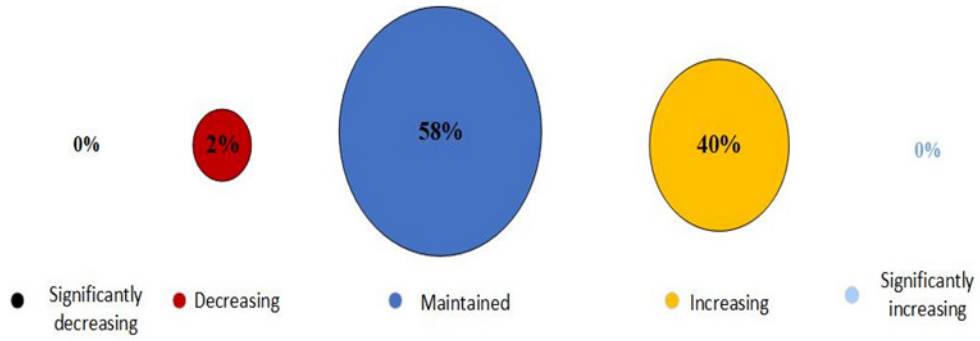

Fig 4. Actual real estate financing with a loan compared to the previous year in other European economies

Source: Own processing according to Lending Barometer 2019.

Banks in almost all countries indicated a significant impact compared to last year. The exception was in Romania, where banks said they had a decline in real estate financing compared to last year. Countries like Slovakia, Netherlands and Ireland have stated that they neither do not rise nor falling from last year. As a result, real estate financing is maintained in approximately the same way in both years. The most significant increases were recorded in countries such as Greece and Slovenia.

The last step to achieve the set goal of the research was to analyse the most important factors influencing real estate loan financing. The results of the survey are shown in table 1.

Table 1: Analyse the most important factors influencing real estate loan financing

Factor	Central and Eastern European economies	Other European economies
Macroeconomic conditions in the local market	* * * * *	* * * * *
Activities of European Central/National Banks	* * * *	* * *
Lack of prime properties	* * * *	* * * * *
Increased property values	* * *	* * *
Macroeconomic conditions in Europe	* * *	* * * *
Lack of equity	* *	* *
Lack of active investors	* *	* *
New strategy	*	*
Brexit effects	*	* * *

Source: *own processing according to Lending Barometer 2019.*

Representatives of banks in the survey identified key factors influencing the real estate market. The long-term trend prevailed, which was confirmed as the most serious factor for banks, namely Macroeconomic conditions in the local market. Increased identification uncertainty has arisen in a global and economic environment that keeps this aspect highly relevant to decision-making banks. Differences in the identification of factors were also in the factor Brexit effects, where it is the least important for Central and Eastern European economies, where in other countries they take it more into account. These were countries such as Ireland and Germany.

There have been no radical historical changes in the availability of credit in banks based on research. Countries have not shown a willingness to get rid of part of the loan. In the Czech Republic, Slovakia and Cyprus, they did not show interest in getting rid of part of the real estate loan. Only three countries, such as Greece, Ireland and the Netherlands, have shown a willingness.

Discussion

From the research, we can say that banks have their funding based on specific criteria, which, if you meet, you have no problem obtaining funding. So, let's look at the basic requirements:

1. Real estate management - the bank will lend only against a solid real estate. The criteria according to which the bank assesses real estate are mainly the location, employment opportunities in the area, transport connections, civic amenities in the area, etc. A safe investment in real estate must meet the same criteria as required by the bank. Therefore, the bank's opinion on the property is a kind of test of whether followed all the rules when choosing the right property.

2. The right type of real estate - The bank will provide financing only for real estate that is of interest in the real estate market. For example, apartments in apartment buildings with structural problems (statics, leaks, leaking roof, etc.) are very difficult to finance.

3. Repayment of the loan - the bank requires that companies have sufficient funds to repay the loan from income. A safe repayment amount is considered to be 30-40% of income. Banks have different criteria according to which they re-evaluate this factor, so it is best to discuss it with a mortgage broker. Unfortunately, as a novice investor, the bank will not accept rental income to assess a loan application. The reason is that you do not have the income for a long period of time. After about a year, however, some banks will also accept this income.

4. Loan to value ratio - the bank does not normally refinance the full purchase price. Usually, banks are willing to finance 80-90% of property value. However, it is important to say that the bank does not consider the purchase price as the value of the real estate. Banks rely on expert opinion and their own criteria. It may happen that even though the bank promises 80% of the financing, the bank can say that it will prefinance only 70 thousand euros if it thinks that the property has a value of only 90 thousand euros. (Kral, Valjaskova, Janoskova, 2019),

(Lyakina, Heaphy, Konecny, Kliestik, 2019), (Zabolotniaia, Cheng, Dacko-Pikiewicz, 2019), (Thierie, De Moor, 2019)

After applying for a loan, the bank will start checking situation in the credit register, a social insurance company, health insurance companies, etc. The bank is trying to find out if companies have any past mistakes regarding past outstanding loans, credit cards, overdrafts, payments to the health insurance company, etc.

Conclusion

Each project that is subject to bank financing by this financing technique is individual, and therefore it is important for the bank to treat all risks as much as possible so that the potential for loss in the future is minimized. For this reason, as well as the impact of the economic crisis, the current tightening of the conditions for providing project financing to banks, as well as the suspension of financing for some projects already under construction, is appropriate in today's situation.

Development projects are financed by banks depending on whether foreign resources are also needed for their implementation, or whether the developer decides to use the credit resources advantageous for him. Most large projects are financed from the own resources and payments of future property owners as well as from the resources of financing banks. One of the most costly requirements on the part of banks is to prove the developer's own resources. Each bank determines the amount of proof of the developer's own resources for an individual project individually. At least their required volume is 30%, in recent years up to 50% of the total cost of project implementation. When projecting real estate financing, banks provide short-term construction loans for a maximum period of two years. In the case of residential real estate, depending on the construction period of the project, it is usually for a period of 18 + 6 months, if necessary, it is extended by the time required for the sale of real estate. When financing a project with an investment loan, a shorter loan maturity is preferred. Currently, banks prefer a maximum loan maturity of eight years. When financing development projects, loan security is required, mainly due to the high risk of the business. The basic security of the loan is a lien on land and buildings in the first place, recorded as a debit on the title deed in favour of the financing bank at the relevant cadastral office. In the case of construction, the lien is registered immediately after reaching the disposition necessary for the registration of the property as under construction, in accordance with the conditions of the Building Act. The establishment of collateral for real estate is one of the basic contractual conditions for drawing credit resources.

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Sustainable Development of the EAEU Financial Market: Refining Research Methodology

Nadezhda A. LVOVA
Doctor of Economics, Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.lvova@spbu.ru

Zokhid Yu. RAKHIMOV
PhD applicant, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: zakhid93@gmail.com

Oleg Yu. KORSHUNOV
PhD in Economics, Associate Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: o.korshunov@spbu.ru

Natalya S. VORONOVA
Doctor of Economics, Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.voronova@spbu.ru

Ivan A. DARUSHIN
PhD in Economics, Associate Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: i.darushin@spbu.ru

Abstract

The paper addresses the methodology of research on the sustainable development of the Eurasian Economic Union (EAEU) financial market, the main elements of which include relevant concepts, hypotheses and approaches to testing these hypotheses. The paper describes the most important initiatives in the field of financial integration of the EAEU. The author's interpretation of the concepts of sustainable finance, joint priorities for sustainable financial development, and sustainable investment is presented. Research hypotheses are formulated regarding the choice of priorities and vectors of the EAEU financial market sustainable development. Methodological approaches to testing these hypotheses are proposed and approbated. The developed methodology allows to specify the directions for implementing the sustainable Finance paradigm in the strategy for forming the common financial market of the EAEU, with an emphasis on institutional conditions and new classes of financial assets in the context of national priorities for sustainable development and the specifics of financial systems. The reported study was funded by RFBR according to the research project № 19-010-00526.

Keywords: sustainable finance, sustainable financial development, Eurasian Economic Union (EAEU), financial markets.

Introduction

Research on the practice of introducing sustainable finance in developed and emerging markets shows that the industry of new financial services is represented unevenly (Financing for Sustainable Development Report, 2020). Notable progress, largely determining the future prospects for the development of sustainable financial systems, has been achieved in the sustainable investment sector (The rise of green finance in Europe, 2019; Lvova et al, 2020b). The sustainable segments of financial markets are actively developing, including the markets for green, social, and thematic bonds (Designing a sustainable financial system, 2018). The implementation of sustainable investment principles in the global economy contributes to the achievement of the Sustainable Development Goals (hereinafter referred to as the SDGs), allowing us to attract financing for significant projects, expand the classes of financial assets, provide new tools for managing financial risks, and improve the level of financial involvement and the quality of corporate governance.

The potential for sustainable investment is higher for developed markets and commercially attractive projects. For emerging markets and projects with relatively low expected returns, sustainable investments are intended to act

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more like an element of blended finance. Non-investment sustainable financing mechanisms are relatively more important in emerging markets than in developed ones. For the least developed economic territories, the availability of these mechanisms is crucial in the process of achieving the SDGs. The largest financial institutions show a noticeable interest in sustainable finance, imposing the demand for specialized financial services. However, we are still talking mainly about developed markets, while in emerging markets, including the markets of the Eurasian Economic Union member countries (hereinafter – the Union, the EAEU), sustainable finance is in its early stage.

What contributes to their formation and further development in the EAEU? Environmental challenges create a key impetus for this. An assessment of global sustainable development initiatives shows that the speed of the transition to sustainable financial system will largely depend on the ambitions of national governments in the domain of climate policy. These conclusions are confirmed by the results of generalization of scientific and information sources, in which sustainable finance is primarily associated with green finance. The development of green financial markets, including the climate segment, is extremely important for countries exporting hydrocarbon resources, providing an opportunity to increase investment attractiveness, bring a wide range of investors, and hedge the risks of hydrocarbon assets depreciation. It is no coincidence that the formation of sustainable finance in Russia started primarily with green initiatives, as can be judged by the program documents of VEB.RF and the Central Bank of the Russian Federation. A similar situation is observed in Kazakhstan. In particular, within the framework of the new world financial centre in Nur-Sultan (MFC "Astana"), along with other main segments, the sector of green finance functions.

The second most important impetus for the development of sustainable finance in the EAEU space is regionalisation, which in the face of current challenges is giving way to the globalisation of financial relations. Regionalisation creates a demand for the development of new segments of the financial market. Green and social segments can become drivers of financial development, helping to overcome the crisis, increasing competitiveness and expanding opportunities for interaction with other regions and countries. The expediency of developing these segments should be reflected in the strategy of Eurasian integration.

Thus, the topic of sustainable development of the EAEU financial market is extremely relevant, which determined the direction of the study. In the article, we will disclose a refined methodology for studying the sustainable development of the EAEU financial market, the main elements of which are relevant concepts, testable hypotheses and approaches to examining these hypotheses.

Research Background

The Eurasian Economic Union (hereinafter – the Union, the EAEU) is an international organization, the functioning of which is aimed at regional economic integration. The Treaty on the Eurasian Economic Union (2014) entered into force in 2015. The development of the EAEU presupposes a gradual transition to free movement of goods, services, labour and capital within the Union. Thus, not only economic, but also financial integration is planned – the creation of a common financial market for the EAEU. Moreover, according to the Treaty on the EAEU (cl. 130), the initial stage of financial integration should be completed within the next five years (until 2025). Upon completion of this stage, it is planned to harmonize the financial legislation of the Union countries and form a supranational financial Mega-regulator of the EAEU.

Since 2015, the EAEU member states have made some progress in ensuring conditions for financial integration. Basically, this progress can be traced in the field of legislation. Thus, a landmark event in October 2019 was the approval of the Concept for the formation of a common financial market of the EAEU (the Concept of formation of the common financial market of the Eurasian Economic Union, 2019a), including the banking, insurance segments and the securities market (hereinafter – the Concept of the common financial market). It specifies goals, principles, stages, criteria and main directions of financial integration of the EAEU. The following goals of creating a common financial market in the countries of the Union are recognized: firstly, increasing the availability, quality and variety of financial services for the private sector of the Union member states; secondly, the intensification of growth and competition, increasing efficiency in the financial services sector. It is noteworthy that the Concept of the common financial market identifies two stages in the formation of the common financial market – before and after 2025, whereas earlier the planning horizon for financial integration was limited to 2025.

In the review of this Concept prepared by the Central Bank of the Russian Federation (the Concept of formation of the common financial market of the Eurasian Economic Union, 2019b), the contribution of the document to the creation of conditions for financial integration of the EAEU, in addition to specifying the strategy and legal aspects of its implementation, is characterized by the following main direction: supervisory, administrative, informational cooperation within the framework of financial integration of the EAEU is provided; a vision of the development of

the financial market infrastructure is presented, including the declared task of forming a single exchange space of the EAEU; the importance of protecting the interests and rights of providers of financial resources, as well as of financial services consumers, is recognized; significant attention is paid to the issues of cyber security; directions for the development of the common payment space are established; tasks and powers of the supranational financial Mega-regulator are presented. It is important to note the envisaged provision of mutual recognition of licenses, that is, mutual admission of financial market participants in the EAEU countries. For this, a mechanism of the so-called "standardized license" is proposed, which will operate in all of the above sectors of financial services. Despite the fruitful international cooperation in the field of creating the necessary institutional conditions for the functioning of the common financial market of the EAEU, the challenges, exemptions and restrictions in this area do not lose their relevance. Let's consider the general profile of these challenges, which can be roughly divided into two main groups – exogenous and endogenous:

- Exogenous threats to the financial development of the EAEU countries and, above all, the Russian Federation, were realized according to a rather pessimistic scenario. Against the background of the coronavirus crisis, international financial sanctions against Russia significantly worsen the investment climate, impede the normal functioning of the financial market, limit the borrowing potential of the largest financial corporations and, in general, adversely affect the financial situation in the EAEU. This issue has been carefully reviewed in the literature, and general conclusions in this regard come to the fact that sanctions are a new reality, and participants in financial relations in the Union countries cannot radically change it.

- As for endogenous challenges, the key ones can be summarized by the phrase "financial development imbalances". These imbalances are observed in terms of spatial, institutional, instrumental characteristics. For example, we are talking about a dominant financial importance of the Russian Federation, and within it – about the financial dominance of Moscow, etc. For example, Russia accumulates over 90% of banking assets and the total capitalization of the EAEU share markets, almost the entire total volume of trading on stock exchanges, about 85% of the total number of banks, about 75% of insurance companies and 89% of financial infrastructure institutions (Lvova, Voronova, Ivanov, 2019).

Thus, on the one hand, Russia is capable of becoming a driver of financial integration of the EAEU, which has undoubted advantages for all countries of the Union. On the other hand, the imperfections of the Russian model of financial development will be translated region-wide, distorting the overall profile of the financial sector. What imperfections are we talking about? First of all, these are the previously noted financial imbalances. Russia demonstrates increased levels of concentration in certain segments of the financial system, financial instruments, key financial service providers and territories. Accordingly, financial accessibility in Russia (as well as in the EAEU as a whole) is uneven and not high enough.

In essence, this means that the Russian financial system is intermittently performing a distribution function. This is largely due to the influence of financial instability, but at the same time it is a prerequisite for financial instability (the "vicious circle" effect). It is characteristic that a low level of banking stability is observed in Russia in comparison not only with comparable, but also with financially less developed countries. At the same time, banks account for the bulk of financial assets in the scale of the Russian financial system, while non-bank financial services are relatively underdeveloped. In addition, the already high concentration of capital in the financial sector is increasing.

According to the authors, the key to understanding this situation, and, therefore, to overcoming the internal challenges of financial integration of the EAEU, is to stimulate competition. However, an inverse trend is observed in the financial systems of the Union countries. This cannot but be reflected in increased inefficiency. In the context of low competition, financial institutions have no effective incentives to fight for the consumer, which leads to a lack of financial accessibility. It is no coincidence that Russia remains practically aloof from the processes of sustainable financial development, which impose new requirements on the efficiency of financial services, tightening the conditions for competition in the financial sector.

Summarizing the foregoing, it should be noted that the Concept for the formation of a common financial market of the EAEU introduces important innovations, offering a popular set of tools for stimulating financial integration. However, the strategy of joint financial development needs to be improved with an emphasis on internal challenges. The dominance of Russia in the financial space of the EAEU, while the existing model of the financial market is preserved, calls into question the achievement of the stated goals of financial integration. Real rather than formal compliance with the requirements of fair competition and of improving the efficiency of financial services is required. The goals of financial integration should directly correspond to the goals of sustainable development of

the Union countries, envisaged by the world agenda for the period up to 2030, which are still reflected in the new Concept.

Conceptual research framework

C.1 An integrated sustainable finance concept

First (external) component of the integrated concept is connected with the fact that the phenomenon of sustainable finance must be studied in connection with sustainable development and sustainable investment. The integrated concept of sustainable finance integrates and refines current scientific concepts in the field of study. According to the authors, against the background of recognition of the importance of sustainable development, the concept of sustainable finance can claim the role of a new paradigm of financial science and financial development, reflecting the process of transformation of financial systems in response to the desire for *inclusive society* using flexible, maximally individualized mechanisms to overcome economic, social and environmental challenges.

Second (internal) component of the concept under examination concerns the content of sustainable finance, which combines three components: instrumental, institutional, functional (Lvova et al, 2019). In the first definition, sustainable finance is understood as an introduction of financial instruments that ensure compliance with environmental, social and organizational principles in the financial decision-making process. In the second – as institutional financial conditions for sustainable development, including the necessary financial resources to achieve the relevant goals and objectives. In the third, as the transformation of financial systems, including the acquisition of new, previously uncharacteristic functions (not only economic, but also social and environmental), under the influence of new financial thinking, which manifests itself on the supply and demand of financial services in the process of achieving sustainable development goals.

The interpretations of sustainable finance are inextricably intertwined, reflecting the vector of modern financial systems development (fig. 1).

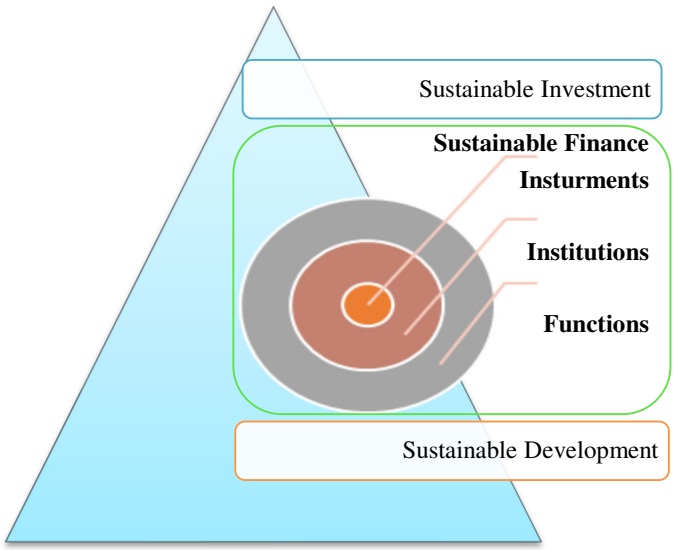

Fig. 1 The integrated concept of sustainable finance

Source: authoring.

C.2 Concept of joint priorities for sustainable financial development

Investment needs in the areas of sustainable development differ, but in general reach colossal levels, contributing to the introduction of sustainable finance in different forms and at different levels of the economy. For the poorest countries with underdeveloped financial systems, economic and social challenges come to the fore. For moderately prosperous countries, increasing environmental risks are becoming a priority. The latter are also significant for developed countries that have effective financial mechanisms to improve the economic, social, and environmental conditions for residents, but, in fact, "export" environmental problems to countries with less developed markets.

Different financial opportunities and uneven progress in achieving the SDGs predetermine ambiguous national priorities, which makes the search for compromise solutions urgent. However, this search should take into account the comparative financial potential of the participants.

C.3 Integrated sustainable investment concept

Generalization and analysis of scientific ideas about sustainable investment allows us to conclude that the terminology in this area is characterized by significant discrepancies. In a closely related sense, the categories "responsible investment", "socially responsible investment", "social investment", etc. are used. The systematization of the definitions of these categories with an emphasis on their defining features shows that the term "responsible investment" prevails in the analysis and assessment of the development of sustainable financial services. However, in the context of the concept of sustainable finance, one should speak rather not about responsible, but about sustainable investment. The latter is considered by us in a broad sense, integrating responsible, socially responsible and socially oriented investment (fig. 2).

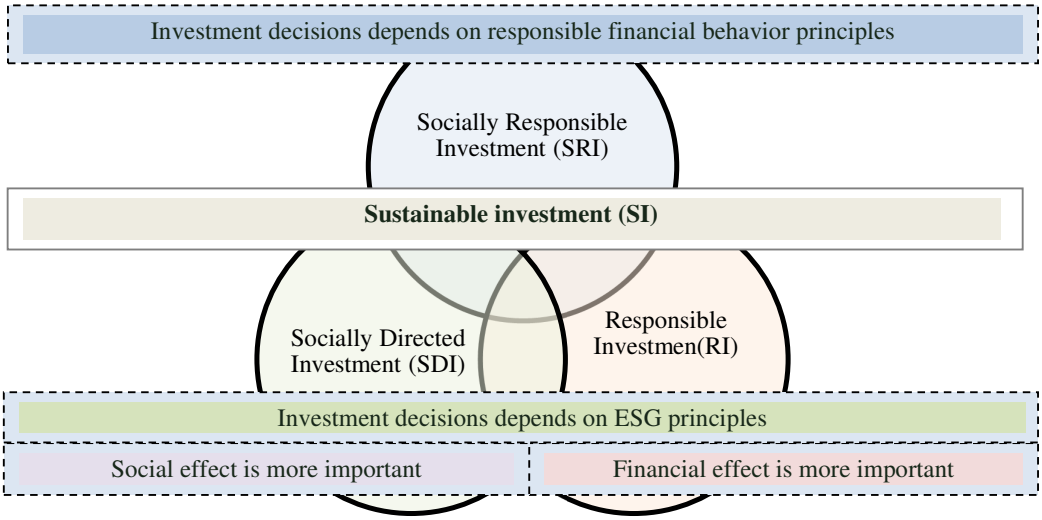

Fig. 2 The integrated concept of sustainable investment

Source: authoring based on (Lvova et al, 2020b)

The market system for responsible investing brings together actors (institutional and private investors), objects (companies and projects that meet the criteria for responsible investment), instruments (equity and debt), strategies (negative regulatory and positive screening, ESG integration, active ownership, etc.). However, in general, investing in sustainable development is not limited to the market component, including the public segment, as well as investments mobilized using blended finance mechanisms.

Research hypotheses and approaches to their verification

G.1 The first series of hypotheses consist in the fact that the priorities for sustainable development of the EAEU financial market are determined by: a) common sustainable development priorities for the Union countries; b) the comparative financial capacity of these countries.

M.1 Methodological approaches to assessing the importance of sustainable development of the EAEU financial market

On the one hand, in order to achieve the SDGs, one cannot abstract from the issues of financial development. On the other hand, it is the SDG system, in our opinion, that should underlie the substantiation of promising directions for the development of sustainable finance. This approach is introduced and evaluated by the authors for a more detailed assessment of the importance of sustainable finance in the SDG system (Lvova et al, 2020a). Identification of joint challenges for the Union countries based on information from the global monitoring of the SDGs achievement (Sachs et al, 2020), in turn, gives a preliminary idea of the priorities and significant vectors of sustainable development of the EAEU common financial market.

However, the concept of joint priorities for sustainable financial development implies a search for compromises in overcoming critical challenges. We propose to summarize these challenges taking into account a factor of *financial gravity*. By analogy with the foreign trade gravity models (Tinbergen, 1962; Anderson, 1979; Mogilat, Salnikov, 2015), the stylized financial gravity model combines the factors of financial depth and financial distance:

$$F = \alpha * \frac{FD}{FDIS}$$

F – the level of "financial attraction" of the economic territory;
FD – is the financial depth of the economic territory;
FDIS – financial distance of the economic territory;
α is a constant.

The model needs improvement and empirical approbation:

a) it is necessary to clarify the methodology for assessing financial depth – at this stage, it seems that preference should be given to absolute indicators of financial depth, including indicators of total financial assets and capital market capitalization;

b) the numerator of the formula (*FD*) can be adjusted to take into account the variety of financial instruments, which will allow you to get a more comprehensive idea of the attractiveness of the national market;

c) it is necessary to justify the methodology for assessing financial distance (*FDIS*); for this, for instance, rating methodology for global financial centres are applicable where such a distance or 'connectivity' is evaluated by an expert method (see f. i.: The Global Financial Centres Index 28, 2020).

Previously, we assume that the highest level of "financial attraction" will be shown by the Russian Federation and Kazakhstan. This assumption is confirmed by a comparative assessment of the financial depth of the Union countries (Lvova, Voronova, Ivanov, 2019), as well as the rating of global financial centres, which includes only these countries of the Union (The Global Financial Centres Index 28, 2020).

The proposed methodological approaches are combined to reveal the priority challenges for sustainable development of the EAEU financial market. The authors propose a cumulative algorithm to evaluating of comparative significance of SDGs, according to which 1 point is assigned for a specific goal for each corresponding "significant challenge" in the Union; 2 points – for each "main challenge"; 1 point – for the presence of such challenges in Kazakhstan; 2 points – in the Russian Federation. (tab. 1).

Table 1: the priorities for sustainable development of the EAEU financial market in 2020

Countries / SDGs	BY	KG	RU	KZ	AM	Points
Goal 1: No poverty						0
Goal 2: Zero hunger						9
Goal 3: Good health and well-being						10
Goal 4: Quality education						0
Goal 5: Gender equality						5
Goal 6: Clean water and sanitation						6
Goal 7: Affordable and clean energy						0
Goal 8: Decent work and economic growth						7
Goal 9: Industry, innovation, infrastructure						9
Goal 10: Reduced inequalities						9
Goal 11: Sustainable cities and communities						4
Goal 12: Responsible consumption, production						6
Goal 13: Climate action						5
Goal 14: Life below water						3
Goal 15: Life on land						6
Goal 16: Peace, justice and strong institutions						11
Goal 17: Partnerships for the goals						3

Countries / SDGs	BY	KG	RU	KZ	AM	Points
Number of priority goals	8	8	11	10	11	
Global SDG rank	18	52	57	65	75	
EAEU SDG rank	1	2	3	4	5	

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Notes:
BY – Belarus, KG – Kyrgyz Republic, RU - Russian Federation, KZ – Kazakhstan, AM – Armenia;

- achieving the goal is one of the main challenges for the country;
- achieving a goal is one of significant challenges;
- data not available.

Source: authoring based on (Sachs et al, 2020).

G.2 The second series of hypotheses concerns the vectors of sustainable development of the EAEU financial market, which are predetermined by: a) affordable financial solutions in the field of sustainable development; b) the range of sustainable financial services implemented in international practice; c) the specifics of the neo-continental model of financial development of the EAEU member states.

M.2 Methodical approaches to substantiating the vectors of EAEU financial market sustainable development

Justification of the vectors of sustainable development of the EAEU financial market, in turn, is divided into three successive stages: systematization of financial decisions in the field of sustainable development; structural and functional characteristics of the modern market for sustainable financial services; identification of the features of the EAEU member states financial development.

In order to systematize available financial solutions in the field of sustainable development, we start from the results of the United Nations Development Program (UNDP) project (Financing Solutions for Sustainable Development, 2020), which is a specification of the Addis Ababa Action Agenda (2015) and allows us to classify the sought solutions in the context of the SDGs (for more details see also: Financing for Sustainable Development Report, 2020). In the development of this approach, financial solutions for sustainable development are divided by us into three groups: investment tools; grant financing; financial regulation and/or risk management. The application of this approach is illustrated by the example of financial solutions for SDG 9 (tab. 2).

Table 2: Financial solutions to achieve SDG 9 "Industry, innovation, infrastructure"

Implementation tools / Financial solutions	Investment tools	Grant financing	Financial regulation and (or) risk management instruments
Social and development bonds	+	+	+
Crowdfunding	+	+	
Impact investments	+		
Diaspora funding	+		
Lotteries		+	
Corporate funds		+	
Compensation measures for the damage to biodiversity			+
Financial standards			+
State guarantees			+

Source: (Lvova, 2020).

To characterize the market for sustainable financial services, we introduce a classification matrix, which appeals to the characteristics of the financial corporations sector in the current version of the System of National Accounts (tab. 3).

Table 3: Characteristics of sustainable financial services market

Sustainable financial service providers	Sustainable financial services	Role in market development	Professional initiatives
Central banks	Auxiliary financial services	Support and promotion of sustainable financial development initiatives	National, regional, international
	Financial intermediation		
Financial intermediaries			
Depository corporations	Financial intermediation, financial risk management, liquidity transformation, auxiliary financial services	Reallocation of financial resources in the sustainable financial services industry	National, regional, international, in the context of individual market segments
Investment funds of the monetary and non-monetary market			
Insurance corporations			
Non-state pension funds			
Other financial intermediaries			
Auxiliary financial institutions			
Stock exchanges	Auxiliary financial services	Support and promotion of sustainable financial development initiatives	National, regional, international, in the context of individual market segments
Specialized financial information institutions			
Other auxiliary financial institutions			

Source: (Lvova, Rakhimov, Voronova, 2020).

Thus, financial institutions are structured according to the main groups of the financial corporations sector (classification by the *hierarchical method*). In this case, the second and third groups of financial institutions can be structured by the types, as presented in the table, or in more detail. This allows you to form a generalized or detailed description of financial services in the context of individual countries, regions and areas of financial activity (classification by the *faceted method*). The matrix has been validated by the authors for sustainable financial services provided by central banks, depository corporations and stock exchanges (Lvova et al, 2020b).

As for the neo-continental model of financial development, we are talking about the financial systems of post-socialist countries, which are associated with, against the background of institutional imperfections, the dominant position of banks, underdevelopment of direct financing mechanisms, a high concentration of ownership, a relatively small variety of financial instruments as well as with a high share of governmental ownership in financial sectors (Zhukova, 2015). It is curious that in Russia, which is the financial dominant in the EAEU space, the key features of the neo-continental financial system have become more and more distinct in recent years (Lvova, Voronova, Ivanov, 2019).

Accordingly, the prospects for sustainable development of the EAEU common financial market, including in specialized segments, will be associated primarily with large financial institutions (first of all, with Russian banks). However, Eurasian banks are also suffering from specific constraints, including insufficient level of competition, relatively low financial stability; increased importance of budget and corporate financing mechanisms (see in particular: Pak &, 2020). Therefore, development banks can play a leading role in this development, whose mission is to finance investment projects of strategic importance. Thus, sustainable investment will be in demand in blended finance projects that combine expertise, private and public resources.

Without denying the high importance of the development of collective investment institutions, the authors come to the conclusion that the prospects for the formation of a sustainable investment market in the EAEU according to the model of developed countries with a characteristically high role of non-bank financial intermediaries should be regarded with restraint (the culture of investment is not developed, the necessary infrastructure is absent, national financial markets, not excluding Russian, are not deep enough and diversified). Risks associated with the decarbonization of the global economy require special attention in the context of the EAEU financial market sustainable development. The realization of these risks entails the depreciation of carbon-intensive assets,

complicates access to international capital markets. Thus, for the EAEU as a whole, and for Russia in particular, the issues of participation in the global trade in carbon units and the creation of a supranational carbon exchange are extremely relevant.

Research Results and Discussion

The author's methodology for studying the sustainable development of the EAEU financial market contains theoretical concepts, hypotheses and approaches to their verification. Let's summarize the main components of the methodology, assessing their novelty and scientific significance (tab. 4).

Table 4: Assessment of the novelty of the research results

Results	Methodology component	Clarification of scientific concepts	New scientific result
C1	Integrated concept of sustainable finance	+	
C2	Concept of joint priorities of sustainable financial development		+
G1	A series of hypotheses on the priorities for sustainable development of the EAEU financial market		+
M1	Methodological approaches to assessing the priorities for sustainable development of the EAEU financial market	+	+
G2	A series of hypotheses on the vectors of sustainable development of the EAEU financial market		+
M2	Methodological approaches to substantiating the vectors of sustainable development of the EAEU financial market	+	+

Source: authoring.

Thus, the developed methodology makes it possible to specificate the directions of introducing the sustainable finance paradigm into the strategy of forming the common financial market of the EAEU with an emphasis on institutional conditions and new classes of financial assets in the context of national priorities for sustainable development and the specifics of financial systems. The methodology is consistent with such issues of government research as the institutional conditions for the development of sustainable finance in the EAEU; characteristics of the financial markets of the Union countries from the perspective of the prospects for the introduction of sustainable financial services; the potential for the formation of new segments of the EAEU financial market; effective financial solutions in support of the EAEU sustainable development priorities; the possibility of introducing new financial assets into the EAEU practice. Continued research in this area makes it possible to develop proposals for the inclusion of sustainable financial institutions and new financial instruments in the EAEU financial integration strategy.

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New Challenges and Threats to The Tourism Industry in The Fighting Against COVID-19

[1] Inna LEVYTSKA
National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine
ilevytska@nubip.edu.ua, inna_levytska@ukr.net

[2] Alona KLYMCHUK
State University Zhytomyr Polytechnic, Zhytomyr, Ukraine
alena_klumchyk@ukr.net

[3] Valentina POSTOVA
Vinnytsia Institute of Trade and Economics of Kyiv National University of Trade and Economics, Vinnytsia, Ukraine
valjapostova@ukr.net

[4] Nataliia KOTSERUBA
Vinnytsia Institute of Trade and Economics of Kyiv National University of Trade and Economic, Vinnytsia, Ukraine
nata03198630@gmail.com

Abstract

The article is devoted to the study of current problems of development of the tourism industry in the fight against COVID-19. The main trends in the development of the tourism sector are identified, as well as the tools that provide streamlining and regulation of the tourism industry in different countries.
The analysis of the state of the tourist industry in the conditions of pandemic spread is carried out. It is proved that the revival of the tourism industry is possible only based on the effective organization of the tourism business by forecasting and eliminating possible risks and dangers that cause significant losses to the industry.
The main problems and threats that affect the activities of the tourism business are identified. The reasons for the deterioration of tourism enterprises, the main of which is the inability to adapt to the conditions of doing business in a pandemic. Based on the conducted analysis the threats and dangers which can arise in the course of activity of the tourist enterprises of Ukraine are formed. This approach made it possible to propose stabilization measures that will revive the tourism sector in a pandemic. At the same time, strategic changes in the conditions of coronavirus spread should be quite flexible to changes in the external environment of the tourist enterprise.
It is established that ensuring the creation of a high-quality competitive product of the tourism industry is possible due to the training of specialists in the tourism business. Besides, the elimination of shortcomings in the regulatory framework for the regulation of the tourism industry should be a key prerequisite for the effective functioning of tourism businesses at all levels.
Based on the conducted researches it is established that revival of tourist activity in the conditions of a pandemic should take place in the direction of strengthening of cooperation with such elements of the infrastructure of hospitable business as tourist agencies, excursion bureaus, insurance companies, trade enterprises, advertising agencies, etc. agencies.
It is proved that measures to stabilize the tourism sector in the context of a pandemic must be adapted to new challenges and threats, as well as use effective tools to achieve new opportunities in the field of tourism.

Keywords: tourism industry, international tourism, sphere of tourism, COVID-19, pandemic.

Introduction

Tourism is one of the few sectors of the economy that is developing rapidly. The tourism industry provides leisure, contributes to the preservation of the historical and cultural heritage of society, has a stimulating effect on international trade, maintains a high rate of development of a large number of industries, stimulates economic growth in general.

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Tourism companies provide customer preferences for all tastes, thus guaranteeing competitive advantages and the opportunity to conquer the global market based on advanced technologies.
With access to booking systems, the presence of brands and business management strategies, meeting the needs of customers based on a wide range of knowledge, the tourism industry provides potential benefits to the national economy.

In this regard, the study of theoretical and methodological and scientific-practical issues of tourism development, identifying the main problems of the tourism services market in a pandemic and the formation of measures to prevent the negative impact of preventive tools associated with the spread of COVID -19, is an extremely important issue.

Materials and Methods

Analysis of recent research and publications. Important scientific achievements in the study of theoretical and methodological aspects of international tourism are the works of such well-known foreign scientists as R. Barton, F. Kotler, M. Porter, N. Taylor, J. Holloway, and others.

Scientific issues of tourism industry development are also covered in the works of such economists as Yu. Gorban, K. Zhadko, O. Zhykhor, A. Zanuda, V. Kyfyak, O. Kolesnyk, O. Lebedeva, O. Sakharchuk, O. Fedulin, and others. The scientific achievements of these authors are devoted to the formation and development of the tourism industry, determining its place in the world market of tourist services, highlighting the main aspects of the modern tourism industry, analysis of general and specific areas of industry.

However, it should be noted that to date, insufficient research has been disclosed on the development of the tourism industry in the fight against COVID-19 with the identification of major risks and threats. Solving this problem requires further research to study tourism and develop measures to improve the functioning of tourism.

Research methods allow to substantiate the scientific approach to defining the essence of the tourism industry, to summarize existing approaches to ensuring the effective functioning of tourism, to identify the main problems, challenges, and threats to the tourism industry in the fight against COVID-19, to justify the formation and use of sub-measures objects of tourist business, it is logical to generalize theoretical bases and to formulate conclusions of the research.

The theoretical and methodological basis of the study consists of the fundamental provisions of economic theory, scientific achievements of domestic and foreign scientists who have studied the tourism industry.

The information base of the research is normative-legal acts of Ukraine, official statistical materials, scientific publications on the mentioned problems.

The main method of research is the system analysis which is used for complex studying of problems of development of the tourist industry. Also in the research process, the following methods were used: theoretical generalization and abstract-logical - to study approaches to the development of tourism, substantiate the importance of the tourism industry and improve the functioning of the industry in the fight against COVID-19, the formation of conceptual foundations of pandemic impact on tourism. services both in the world and in Ukraine; system, comparative and economic-statistical analysis - for processing economic statistics related to determining the negative effects of COVID-19 on the tourism industry, graphic - for visual representation and schematic and graphical construction of theoretical and practical provisions of the study.

The purpose of the research

The purpose of the study is to identify new challenges and threats to the tourism industry in the fight against COVID-19 and to propose stabilization measures to revive the functioning of tourism entities.

Results and Discussion

Activation of tourism development due insignificant compared with other sectors of the need for capital investments at of organizations of tourist activity, the availability of natural, historical, cultural and ethnographic and infrastructural resources, the growing desire of society to visit other places, get acquainted with the culture of

other peoples, as well as the desire to meet the needs of organized recreation and recreation Based on the preferences of customers for a variety of travel services, most companies in the tourism industry organize domestic and international tourism.
During its existence, the tourism industry as a service sector has undergone many changes similar to the production of material goods. As a sphere of economic activity, tourism, on the one hand, is determined by the demand and consumption of visitors, and on the other - belongs to the goods and services that are produced to meet this demand. Thus, tourism covers a wide range of activities, including international and domestic transport, catering, entertainment, tour operators, and travel agents.

The tourism industry is formed from the enterprises letting out the goods and services without which modern tourism cannot exist, namely: the enterprises providing services in accommodation (hotels, motels, campings, boarding houses, furnished rooms, rest houses, etc.) , as well as catering establishments, which are an integral part of enterprises providing accommodation services (restaurants in hotels, canteens in boarding houses and rest homes, etc.); travel companies engaged in the organization and sale of tourist trips; transport organizations engaged in tourist transportation; educational institutions for training and advanced training of specialists in the tourism industry; information and advertising services; tourism management bodies (state foundations, the function of which includes managing tourism development in the country and in the regions) and research organizations engaged in the collection and processing of tourism statistics, streamlining scientific forecasts and research in the field of economics and sociology of tourism; enterprises for the production of tourist demand goods; retail enterprises for the sale of goods of tourist demand.

In addition to these enterprises, tourists are also engaged in those that may exist without them, but provided that the stay of tourists in the range of their activities expands. These are taxi parks, restaurants, cafes, leisure enterprises (sports clubs, museums, theaters, zoos, casinos, exhibition and congress halls, etc.).

The functioning of tourism entities is ensured on the basis of attracting effective public policy instruments:

- construction of new, restoration and improvement of existing tourism facilities;
- formation of a favorable climate for the development of active types of tourism;
- intensification of internal convertibility of tourist products on the basis of improving their quality and expanding the range, improving the conditions of tourist service;
- setting up the production of environmentally friendly agricultural products to meet the needs of consumers of tourist services in high-quality food products;
- establishing effective communication links in the direction of opening representative offices for the provision of tourist services abroad;
- attraction of funds of business structures, enterprises of the tourist sphere for development of infrastructure (roads, checkpoints, water supply and sewerage systems, communications, service services);
- improving the organization of insurance of compatriots traveling in Ukraine and abroad;
- R&D in the direction of development of recreational and tourist potential, use of natural resources and historical and cultural potential of the state;
- guaranteeing safe conditions for transport services for tourists;
- creation of a scientific center for the development of tourism.

For the dynamic development of tourism entities and integration into the world tourism space, the formation of conceptual foundations of organizational, legal and economic conditions for tourism development as a profitable sector of the economy, the government should consolidate efforts to support domestic and foreign (inbound) tourism; intensification of privatization of tourism business facilities; ensuring the effective use and restoration of natural and historical and cultural heritage; simplification in accordance with the world practice of visa, customs and border formalities.

It is worth noting that the effective development of tourism should be carried out on the basis of partnership, which provides for responsibility and trust in the direction of sustainable development. The emergence of socially responsible tourism, which develops on the basis of public interest and public need, thus ensuring social and economic justice, cultural heritage, respect for national identity, human rights, etc. [1].

A clear reflection of the essence of the partnership is the activities of the Italian Association of Responsible Tourism (AITR), a non-profit organization founded in 1998. The association actually acts as an intermediary, providing interaction between tourism enterprises, local communities and consumers of tourism. Over time, namely in 2004, the World Tourism Organization developed the concept of sustainable tourism development: “Standards and practices of sustainable tourism management can be applied to all types of areas, including mass tourism and

various niches. The principles of sustainability relate to the protection of the environment, economic and socio-cultural aspects of tourism development, and a balance must be established between these three aspects.

The domestic tourism business is currently open to international partnerships in the field of tourism, as such cooperation fully reflects the pan-European political, legal and socio-economic processes, based on basic national priorities. Taking into account national interests, the instruments of Ukraine's international policy in the field of tourism services are multifaceted and comprehensive, as they are based on economic feasibility and mutually beneficial partnerships with a particular country or region, taking into account the specifics of a particular tourism market. International policy in the field of tourism in Ukraine provides for the formation and implementation of a number of internationalmeasures aimed at promoting the sustainable development of the tourism industry, streamlining tourism services, ensuring their coordinated interaction and rational management of certain areas of tourism.Today, purposeful and systematic activities in the direction of development of international tourist services are the factor that brings Ukraine's integration into the European economic space, the development of socio-economic and cultural aspects of the country, the effective use of existing tourist products.

The creation of numerous world tourism organizations provides streamlining and regulation of the tourism industry in different countries. This is due to the intensive growth and expansion of the borders of world tourism, which occupies one of the leading positions in the international economy. World tourism organizations are one of the most effective tools for multilateral cooperation between Ukraine and other countries that are their members [2].

World tourism organizations are associations of state and national non-governmental organizations designed to achieve common goals in the field of tourism. There are intergovernmental and non-governmental international organizations. If only states are members of international organizations, then such organizations are called intergovernmental. If the members of the organization are national associations, unions or associations, and they are called non-governmental. The main purpose of activities in the field of international regulation of the tourism industry is to expand the legal framework of foreign relations, the conclusion of international agreements of intergovernmental and interdepartmental nature on cooperation in the field of tourism.

The conceptual basis for the establishment of international relations is the development of partnerships on an institutional basis, as through direct participation in the activities of world and international structures of all levels of Ukraine are practically implemented contractual agreements. 87].

In the current situation due to the spread of coronavirus infection, it is difficult to predict the further development of the tourism business. The crisis in the field of tourism in the pandemic is exacerbated by increased competition and deepening socio-economic conflicts that threaten the security of the tourism industry.

How innovative and creative tourism actors can be will determine the further development of this severely affected industry.

The revival of the tourism industry is possible only on the basis of effective organization of tourist and recreational potential by forecasting and eliminating possible risks and dangers that cause significant damage to tourism.

For a long time, tourism has been a major driver in many countries in the economic sector and job creation.COVID-19 in the global sense has probably had the most devastating effect on the industry. First of all, it is necessary to take into account international or outbound tourism, when the client leaves his usual living environment for a long period (up to several months).

According to the International Labor Organization (ILO), in 2019, 330 million employees were involved in tourism in the world (approximately 10.3% of the global employment rate). Among them, 144 million people - the staff of resorts, hotels and restaurants. Approximately 30% of those employed in this industry work in small businesses with up to ten employees.

Nearly 51 million such small companies are in danger of ruin and bankruptcy due to the seasonality of their activities, limited resources and difficult access to credit and credit.

According to the latest ILO estimates, the pandemic could affect 305 million people employed in tourism and tourist services: 100 million of them may lose their jobs, the rest will be transferred to part-time work with reduced wages. The most affected are women, who are mainly engaged in the tourism business [4].

The International Tourism Organization, given that coronavirus control measures and restrictions on freedom of movement have now affected half the world's population, estimates the industry could fall by 60-80%. In real terms,

this is a loss of 950 billion to 1.24 trillion dollars. However, some experts call the amount of losses in excess of $ 2 trillion.
According to Ukrinform, the UN has released disappointing statistics on the prospects for the recovery of the tourism industry in the context of the coronavirus crisis. According to the analytical report "Tourism and COVID-19", according to experts, the number of international tourists in 2020 may decrease from 58% to 78%, which will reduce the cost of visitors from $ 1.5 trillion (in 2019) to 310 -570 billion Further fight against the pandemic could lead to the loss of about 120 million people in this sector.

In turn, according to UN Secretary General Antonio Guterres, every 10th person on Earth works in the tourism industry and provides a livelihood for hundreds of millions of people, ie the industry is an integral part of the world economy and one of the key elements of conservation. natural and cultural heritage. "In fact, we can say that tourism itself is one of the wonders of the world. That is why it is so painful to see how the COVID-19 pandemic is ruining the tourism sector, ”Antonio Guterres said in his speech [5; 6].

However, Ulf Sonntag of the Institute for Tourism and Resort Research in Northern Europe notes that tour operators and their partners in the target regions are using the coronavirus crisis towards quality tourism to make their offerings more environmentally friendly.

"It is, of course, painful that a number of travel companies go bankrupt through no fault of their own. But even if competition declines at the end of the coronavirus crisis, demand will also decline at first. Because of the fears and warnings that people have, and because many of them will want to and will have to save first. Therefore, we do not expect prices to rise dramatically. But you shouldn't count on solid cheap offers either, ”Ulf Sonntag rightly argues.As for the situation in the field of tourism in Ukraine in the conditions of the pandemic, tourism was in a state of improvement after a significant decline due to the events of 2014.

In recent years, there has been a positive trend in the annual growth of total revenues from the tourist tax and tax payments from the tourism industry of Ukraine. As noted in a study by domestic tourism experts: "The fact that Ukraine is becoming increasingly popular among foreign visitors is evidenced by the fact that CNN, one of the world's most famous TV companies, has compiled a separate ranking of the top 11 tourist cities in Ukraine. It includes Lviv, Chernivtsi, Uman, Kyiv, Pereyaslav-Khmelnytskyi, Kharkiv, Chernihiv, Odesa, Uzhhorod and Kamyanets-Podilskyi. Ukraine has many beautiful places with a lot of tourist activities. Lively cities, ancient castles, stunning countryside, a variety of landscapes and hospitality - all this makes Ukraine a special place… "[7].
According to the updated document "Roadmap for Competitive Tourism Development in Ukraine", the Government of Ukraine continues to work to minimize the effects of the pandemic in the national economy and has proposed a number of measures, both financial and non-financial, to reduce the impact on the population and economics.

On the other hand, the government reorganized the Department of Tourism and Resorts of the Ministry of Economy and Trade of Ukraine and created the State Agency for Tourism Development. Currently, efforts are aimed at strengthening the position of the State Agency through human resources and financial support from the state budget [8, p. 18].

In turn, the Verkhovna Rada of Ukraine on June 16, 2020 supported in the second reading the draft Law "On Amendments to Certain Legislative Acts on State Support of Culture, Creative Industries, Tourism, Small and Medium Business in Connection with Restrictive Measures, associated with the spread of coronavirus disease (COVID-19) "[9].

On July 13, 2020, the President of Ukraine signed Bill № 3377, which means the implementation of the envisaged anti-crisis measures in the listed areas of Ukraine's economy during the quarantine period. In addition, on May 27, 2020, the Cabinet of Ministers approved the "Economic Incentive Program to Overcome the Consequences of the Covid-19 Epidemic" [10].

According to the Program, support measures should be extended to such sectors as: services (trade, hotel and restaurant business, education, creative industries, personal services); agriculture; industry; transport and infrastructure; energy; information and communication technologies. However, although the government document envisages a number of initiative programs to regulate the tourism sector (the implementation of which may take time), experts estimate that domestic tourism has not received adequate support from the state, which means that its stabilization will lag far behind the pace of tourism recovery. other countries.Before proposing measures that will revive the tourism sector in a pandemic, it is necessary to identify the main problems and threats that affect the activities of the tourism business. Increased competition due to the emergence of new competitors in the market,

which quickly adapted to the conditions of doing business in a pandemic and in a short period of time to update the range of travel goods and services, is one of the reasons for the deterioration of tourism enterprises.
In addition to the factors caused by the spread of coronavirus infection and the introduction of measures to combat the pandemic, the tourism industry has a number of other problems, among which are:

- ignorance of the management of the legal framework;
- unfavorable tourism policy of the state;
- instability of the political and administrative sphere within the state;
- selection of partners and investors with a dubious reputation;
- negative image of the tourism industry among partners and consumers;
- significant gaps in both tactical and strategic planning.
- inefficient management and unqualified staff.

In today's rapidly changing economic environment, professional development of specialists in the tourism business is due to the expansion of the needs of tourism enterprises in qualified personnel able to ensure the creation of a high-quality competitive product of the tourism industry.

Significant adjustments in the functioning of tourism businesses at all levels should primarily be to eliminate the shortcomings of regulatory and legal support, which regulate issues in the field of tourism and have an impact on the safety of tourism entities.

As a group of authors rightly points out, the lack of clearly defined relationships between executive bodies at all levels of government negatively affects the results of their activities in the field of tourism [11]. At the same time, OB Zhykhor, NV Kuzminchuk [12] singled out among the reasons for the decrease in the effectiveness of modern mechanisms of state regulation the imperfection of regulatory and legal support and the institutional framework of public policy, which led to uncoordinated actions of public administration.

At the same time, OO Kolesnyk [13] emphasizes that the imperfection and inefficiency of regulatory and legal regulation of the process of management of tourism entities in Ukraine is one of the problems of ensuring the development of the tourism industry [14].

Today, tourism management is associated with the imperfection of the legal regulation of tourism businesses at the regional and local levels, which is exacerbated by the lack of planning for the systematic development of tourist areas.

Based on the analysis of threats and dangers that may arise in the process of tourism enterprises of Ukraine, special relevance and significant impact have stabilization measures in the field of tourism in a pandemic (Fig. 1).

Among the expected negative consequences of the exacerbation of COVID-19 and preventive measures related to the spread of the virus, Ukraine is projected to fall in GDP to 7.7%, and the unemployment rate could reach 10% (IMF forecast, April 2020)

It is assumed that the countries of the world will probably be able to restore their economic situation in 2021, but it is impossible to fully compensate for the negative consequences caused in 2020 by the countries.

It is projected that the international economy will be able to reach the state of 2020 only in 2022.

According to the forecasts, not all economic spheres suffer serious negative consequences from the pandemic. And the most "affected" will be the economies of those countries that are directly dependent on transport and tourism [15].

Probable variants of the economic recovery model are presented by two possible scenarios:

- The first scenario: the restoration of both the global economic model and economic relations between the countries will take place according to the V-shaped scheme, which provides for the continuation of the situation in the "as is" state (according to analysts, this is the most likely option for Ukraine)
- the second scenario: a longer period of crisis (even recession) with significant social consequences, indefinite duration of the pandemic period, restrictions on movement. Which can lead to significant changes in the global socio-economic model.
According to the United Nations World Tourism Organization (UNWTO), quarantine measures in the world have led to the introduction of restrictions on the movement of 100% of all international destinations.
According to the UNWTO report of 29 April 2020:

- 97 destinations (45%) completely or partially closed their borders to tourists;
- 65 destinations (30%) completely or partially suspended international flights;

Clarification of the conceptual foundations of tourism development in a pandemic: threats, dangers and stabilization measures

The main risk factors in the field of tourism

-ineffective adaptation of management in a pandemic, the use of outdated or ineffective methods and tools;
- loss of attractiveness for consumers due to outdated material and technical base;
- ineffective marketing, advertising, and information policy;
-lack of use of effective communication technologies with partners, consumers, government agencies, and other contact audiences;
- incorrect assessment of the company's capabilities, errors in forecasting changes.

The main threats to tourism and the world economy due to the exacerbation of the coronovirus

- ineffective state regulation of the process of licensing and certification of tourism entities;
- incoordination of actions of public administration bodies;
- reduction of socio-economic development, which affects the standard of living and purchasing power of the population;
- unreliability of partners (enterprises and organizations that provide services for accommodation, meals, and transportation of tourists, etc.);
- threats of natural, man-made, biological nature, which pose risks to the life and health of tourists during the trip, for which the tourist enterprise is not aware;
- the threat of bankruptcy as a result of the inability to pay financial obligations to consumers of tourist products.

Measures to stabilize the tourism sector in a pandemic

- state support and stimulation of the activity of subjects of the tourist industry: continuation of the policy of cancellation of obligations from payment of the profit tax and the VAT;
- gradual introduction of the permission for the organization of open terraces, platforms for establishments of a cafe, restaurants (at the preservation of all necessary safety measures for protection);
- intensification of measures of the digital transformation of the domestic sphere of tourism;
- development of tourist vouchers for domestic tourism (as a variant of introducing a tourist card for a certain amount, which is exempt from taxation);
-introduction of a transparent mechanism for the use of funds received from local budgets from the tourist tax exclusively for the development of domestic tourism and related infrastructure;
- strengthening the staffing and technical capacity of medical institutions and providing medical care in areas with a significant seasonal influx of tourist flows;
- conducting an active information campaign to increase interest in domestic tourism, recreation
- rationalization of the use of available resources by the enterprises of the tourist industry;
- elimination of shortcomings in the system of management decisions that regulate relations in the field of tourism;
- coherence and coordination of actions of power structures, the system to manage the tourist-resort sphere;
- Improving the regulation of the tourism industry at the regional level due to the lack of effective regional programs for tourism development and real steps for their implementation;
- development of an effective mechanism for managing the development of tourism, the market of tourist services, security and protection of tourists in the regions;
-state support for financing projects in the field of tourism, which intensifies investments and financing the development of tourism activities;
- application in practice of the client-oriented approach in service of consumers of the tourist industry;
- improvement of financial control measures by the management, which will lead to the effective use of financial resources.

Figure 1: Clarification of the conceptual foundations of tourism development in a pandemic: threats, dangers and stabilization measures

Complited by authors on the basis of [8; 14]

- 39 destinations (18%) closed their borders on a more differentiated basis, prohibiting entry for passengers from certain countries of origin
The cruise business has also suffered from quarantine restrictions. Shares of Carnival Corporation, which owns Diamond Princess, as well as other leading cruise companies (Norwegian, Royal Caribbean) have fallen 60-70% since January 2020/

The practice of refusing cruise liners to park in ports has become widespread. Royal Caribbean has canceled 18 flights to Asia (causing $ 130 million in losses to the company). Norwegian has canceled 40 flights to Asia by the end of 2020 (causing the company a loss of $ 16 million). Carnival estimates its losses at about $ 440 million [8, p. 7-9; 14]

In order to minimize risks for owners and managers of companies providing tourism services in Ukraine, recommendations for the following categories are offered:

- hotels and other accommodation establishments,
- catering establishments;
- tourist and transport enterprises.

A number of specific recommendations were made and explained for each group, including: training and awareness, precautions, measures for cleaning and disinfection, control of disease spread [8, p. 19].

Based on the above research, the authorities of each country should focus their efforts on stabilization measures for tourism enterprises aimed at minimizing the negative impact of preventive actions related to the spread of COVID-19.

Achieving the optimal balance between safety, health, the environment and economic interests should be the main tool for revitalizing the tourism sector.

With regard to measures implemented at the national level to minimize the effects of the pandemic, Bill № 337911 was submitted to the Verkhovna Rada of Ukraine, which addresses the following issues:

- exemption of tourism service providers from: payment of VAT, payment of income tax and the Single Social Contribution (SSC), payment of land tax and tax on non-residential real estate;
- abolition of payment of tourist tax by the end of 2020;
- exemption from taxation when paying rent and land use, tenants of state and public property.Even if we take into account the fact that in the summer of 2020 the EU countries (which had the dynamics of improving the epidemiological situation and maintaining all necessary security measures for health) opened their borders and lifted restrictions on movement, it did not restore the previous level of tourism flows.

Countries that have opened their borders have introduced mandatory temperature measurements (or coronavirus tests) at airports when boarding planes. The main problem here is two issues: the reliability of rapid tests for coronavirus and the justification of the need for which time before departure passengers must pass the test. Some countries are raising the issue of introducing so-called health passports for all travelers, who will be informed about the presence of immunity to coronavirus. According to the updated document "Roadmap for competitive development of tourism in Ukraine" [8, p. 8], vaccination and medicines, unfortunately, "give little hope for economic recovery in the short term, especially with regard to travel and tourism."

It is also worth noting that the hotel and restaurant business is an integral part of ensuring effective business processes in the field of tourism. When ensuring the occupancy of accommodation facilities, hotel enterprises should be considered in terms of cooperation with the tourism industry.

In order for the tourism sector to intensify its activities in a difficult period, it is necessary to cooperate with a hotel company that has a good reputation in the market, a stable financial position and has a strong brand.

Revival of tourist activity in the conditions of a pandemic should take place in the direction of strengthening of cooperation with other elements of infrastructure of hospitality business: travel agencies, excursion bureaus, insurance companies, trade enterprises, advertising agencies, sports establishments, sports establishments.

The system of strategic changes in the conditions of coronavirus spread should be quite flexible to changes in the external environment of the tourist enterprise. At the same time, measures to stabilize the tourism sector in the

context of a pandemic must be adapted to new challenges and threats, using effective tools to achieve new opportunities in the field of tourism.
Implementation of measures to revive tourism in modern conditions should take into account the high level of dynamism and uncertainty of environmental factors, different scale of management and a high level of differentiation of economic activities in the tourism business, meaningful diversity of tourism industry and shaky starting positions of Ukrainian enterprises on the world tourism market.

Conclusions

According to the results of the research, it can be stated that today the identification of the main problems of this industry and the formation of a set of measures to adapt tourism to unstable environmental conditions is of particular practical importance for the effective functioning of the tourism industry in the fight against COVID-19.

Thus, the sphere of tourist services in Ukraine today suffers from the spread of the pandemic and the introduction of preventive measures related to the fight against COVID-19. It is revealed that the modern system of functioning of tourism business entities in Ukraine is fragmented and unsystematic, which is due to the lack of comprehensive interaction between the consumer and the tourism product.

At the same time, the lack of understanding of the need to form an interconnected systematic approach to the adaptation of the tourism sector in extremely difficult and uncertain environmental conditions demonstrates the low effectiveness of tools aimed at improving the performance of the industry.

The research made it possible to identify the main challenges and threats of the tourism sector at the macro-and microeconomic levels, which indicate the need to adapt the management of institutions to the requirements and financial capabilities of different categories of customers. Based on this, a list of recommended measures aimed at revitalizing the tourism sector in a pandemic that can adapt to changes in the market of tourist services.

Sustainable tourism development through the introduction of stabilization and loss reduction measures due to COVID-19 can be achieved in various ways. The diversity of directions and methods of achieving the set goals is an integral part of the implementation of certain principles in the direction of implementing management measures and ensuring the effective development of such an important sector of the economy as tourism.

In order to choose the most optimal tools for reviving the tourism industry in a pandemic, it is necessary to take into account industry specifics, territorial distribution of accommodation, seasonality of tourist services, capacity and technology of personnel selection and accounting.

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Application of the European Union Experience for the Russian Legislation Formation in the Housing Renovation and Integrated Development of Territories

Ludmila Lvovna RAZUMNOVA
Plekhanov Russian University of Economics, Moscow, Russian Federation
razumnova2003@yandex.ru

Galina Victorovna PODBIRALINA
Plekhanov Russian University of Economics, Moscow, Russian Federation
galvp@mail.ru

Tatiana Evgenievna MIGALEVA
Plekhanov Russian University of Economics, Moscow, Russian Federation
migaleva08@rambler.ru

Abstract

The study is devoted to the problem of improving Russian legislation in the field of housing construction from the point of view of analyzing the modern experience of the European Union. It is recommended to use the approaches and methods of formation and implementation of the EU Green Deal strategy in the legislative practice of state regulation for the Russian territories development.

Keywords: sustainable development, integrated development of territories, Green Deal, Renovation Wave, housing stock renovation, the COVID-19 pandemic

Introduction

The construction sector has a huge impact on the social, economic and environmental aspects of the industrial and domestic spheres of life in most countries of the world. In the EU countries, it accounts for 5.6% of value added (OECD. Stat, 2019.), in the Russian Federation – 6.4% (Rosstat, 2016). It should be borne in mind that this sector includes not only the housebuilding, but also the construction of power plants, auto routes and railways, airports and water supply facilities. At the same time, it is necessary to take into account the entire life cycle of the construction system, including the operation stage, which is one of the most important and longest. During the period of industrialization and post-industrial development various types of cities and towns as the areas with the maximum concentration of people become the main centers of contradictions in the human-nature system. Cities, raising the standard of living, at the same time reduce its quality and make the habitat too fragile, which becomes the main problem of the civilization development. In conditions when the costs of providing cities reach 80% of the world's energy, of which 40% are for buildings, the increase of their energy efficiency can significantly affect the saving of resources (Lunyakov, M.A., Akhmetov, I.A., 2019).

The problem of the integrated development of built-up areas and the demolition of dilapidated housing in the Russian Federation, despite the fact that much attention has been paid to its solution for several decades, it is still acute for the authorities in almost all country regions. Moreover, according to First Vice Prime Minister *Marat Khusnulin*, many regional leaders hide the volume of emergency housing stock in order to evade additional financial obligations to relocate the residents of such houses after their recognizing as unfit for habitation (With new housing ..., 2020). He emphasizes that the key task of integrated development is, in addition to the construction of new high-quality housing, the creation of all the necessary accessible infrastructure, including schools, kindergartens and clinics.

Housing construction in the context of a downturn in business activity and the spread of the COVID-19 pandemic, as well as the general low growth rates of the Russian economy over the past ten years, is considered as the main driver of economic growth. Over the past three years, the Russian government has been actively developing and

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implementing plans to renovate the housing stock: since 2017, the Moscow Housing Renovation Program has been implemented, which provides for the resettlement of more than 350 thousand apartments and 5,174 houses; an address list of 472 starting building yards has been approved; it is planned to build more than 7 million sq. meters of real estate$ an indicative list of resettlement was formed (Program of housing renovation, 2020). Since 2018, the National Project "Housing and Urban Environment" has been implemented, which includes four federal projects: "Mortgage", "Housing", "Formation of a Comfortable Urban Environment" and "Ensuring a Sustainable Reduction of Unsuitable Housing Stock" (Decree of the President of the Russian Federation ..., 2018). The goal of raising annual residential buildings construction to 120 million sq. m by 2024 is within the framework of the National Project. The "Standard for the Integrated Development of Territories" (Standard for the Integrated Development of Territories, 2020) was adopted, which suggests such areas as vacant territories development for housing construction, residential and multifunctional buildings and the improvement of open public spaces.

In September-November 2020, the problem of the housing stock reconstruction in Russia, or as it is commonly called renovation, was further developed at the legislative level. Two bills were submitted to the State Duma for consideration – "On the Renovation of the Housing Stock in the Russian Federation" (hereinafter "on Renovation") (Federal Law "On the renovation of the housing stock in the Russian Federation", 2018), prepared by deputies S.M. Mironov and G.P. Khovanskaya, and "On Amendments to the Urban Planning Code of the Russian Federation and Certain Acts of the Russian Federation (on Improving the Institute for Comprehensive Development of Territories and Mechanisms for Resetting Emergency and Dilapidated Housing)" (Federal Law "On Amending the Urban Planning Code ...", 2020; Senators proposed their own version ..., 2020) (hereinafter "on Amendments to the Urban Planning Code") by senators N.A. Zhuravlev, O.V. Melnichenko, A.A. Shevchenko and deputy E.S. Moskvichev. The first bill was rejected, and the second was adopted in the first reading on November 17, 2020.

There are overlapping positions on a number of key issues between these projects: both of them create a legal basis for the simultaneous renovation of the housing stock in all regions of Russia. However, you can find many differences. So, the draft law on Renovation clarifies the concept of "renovation", which means the reconstruction or demolition of housing facilities subject to capital repairs, housing construction on the vacated territory of communal, transport, social infrastructure facilities, as well as measures for the improvement of residential areas ". By contrast in the bill on Amendments to the Urban Planning Code Then the word" renovation "is not mentioned at all. The authors of the first draft law attach great social significance to the renovation process, emphasizing that it is carried out with "the aim of ... realizing the right to a high-quality urban environment by improving the living conditions of citizens, increasing the comfort and performance of the housing stock, preserving the architectural value of the urban environment" (Federal Law "On the Renovation of the Housing fund in the Russian Federation ", 2018).

The second drafted law completely excludes from the text the previously used concept of "sustainable development of territories" and replaced it with "integrated development of territories". A significant part of the amendments text of this document is devoted to describing a new mechanism for the territories development through the definition of their boundaries, obtaining and distributing building rights, etc. It is assumed that 2 trillion rubles will be spent on the implementation of only the first stage of this program within 10 years, including funds from the developers themselves and attracted financing from regional, municipal and federal budgets.

Consideration of these bills almost coincided with the adoption in October 2020 of a new European Union renovation strategy entitled "A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives" (A Renovation Wave for Europe…, 2020), aimed at doubling the annual rate of renovation of private and public buildings in the Union countries over the next ten years. Analyzing the text of this document, as well as other EU documents directly related to it, allowed us to highlight significant points that need to be taken into account in the subsequent revision of the adopted laws in the field of mass housing construction and land improvement.

Review of relevant studies and problem statement

A large number of studies by Russian scientists have been devoted to the problems of modern housing construction and land development. So, in the article (Afanasyeva E., Blednova A., 2020), based on the analysis of foreign experience in the renovation of industrial zones in order to create comfortable environmentally friendly zones for living and recreation, spatial tools for working with built-up areas of large agglomeration have been determined. The paper of (Golubev Ya.A., Veretennikov D.I., Korotych V.I., Krutenko L.V., Malyshev G.N., Nizamutdinova G.R., 2019), based on the typification of the urban landscape, proposes the author's model of intensive development of urbanized territories (as an alternative to the model of extensive development implemented during the renovation in Moscow), which allows to compact the city tissue by the forces of owners and small developers, relying on the principles of self-organization and sustainable development (Golubeva , Ya.A. & Co, 2019). Anton Murzin (Murzin, A.D., 2014) pays attention to the problems that hinder the sustainable development of Russian urban areas: he

demonstrates that their failure by local governments can lead to socio-economic damage and environmental degradation of territories. In the study (Fokin, A.E., 2015) the author proposes the own layout to determine the maximum productivity of using a built-up residential area for renovation by identifying the most significant criteria for the housing comfort. T.A. Vereshchagina, P. Ya. Degtyarev, A. I. Tyunin, using the example of one of the regions of the Russian Federation, analyzed the typical life cycle of a small town and assessed the intensity of depopulation processes, revealing the causes of the crisis in the traditional model of small towns' development (Vereshchagina, T.A. , Degtyarev, P. Ya., Tyunin, A. I., 2018). In the article (Lunyakov, M.A., Akhmetov, I.A., 2019) calculations were made to reduce the building operation cost by means of heating and ventilation energy consumption reduction and achieve savings of up to 60%.

Among the studies of foreign scientists the work (Canelo-Perez, JI, Mas-Alique, P, 2018) should be highlighted, which proposes a model for the selection and analysis of documentation, which allows transforming qualitative variables into quantitative ones and, therefore, prioritizing the company that is consistent with the sustainable development goals and socially responsible behavior principles. Study of (Albertí, J., Balaguera, A., Brodhag, C., Fullana-i-Palmer, P., 2017) attempts to develop sustainability standards for cities and urban areas through an integrated approach, taking into account the cities life cycle and the sustainable development principles. The authors found that, as a rule, existing tools for assessing the cities sustainability miss one of such aspects as the integrity of the assessment, focus on various environmental impacts, life cycle perspectives and the possibility of comparing the obtained assessments for different cities or urban regions. The study (Nematchoua, M.K, Nishimwe, M-R, A., Reiter, S., 2021), taking into account the main factors of energy consumption, including climate change, buildings reconstruction, the use of photovoltaic panels, sustainable mobility, and also urban areas classification, is devoted to a new scenario approach to improvement of the cities energy needs (example of Belgium). The study results showed that more than 90% of current energy consumption can be reduced on a district scale by combining factors such as intensive buildings renovation, use of electric vehicles and photovoltaic panels.

Research Methodology

The methodological basis of the research is the content analysis of legal documents and scientific publications of the European Union and Russia through the use of instrumental and methodological technologies of heuristic knowledge, including complex abstract hypothetical and logical tools, evaluative search methods, typology, comparison of expert assessments, classification and comparisons, identifying cause-and-effect relationships and constructing logical generalizations.

Results

A Renovation Wave is essentially a document integrated into the EU's long-term strategy for building a climate-neutral economy – the Green Deal, and is considered primarily from the point of view of improving the energy efficiency of buildings and the construction sector, which is one of the largest energy consumers in Europe - it accounts for more than one third of CO2 emissions in the European Union. Let's clarify that today 75% of construction funds in the EU are already energy efficient, and 85-95% of buildings will be in operation until 2050. Buildings take about 40% of all energy produced in the EU, while energy renovation comprises only 1%, which indicates the available opportunities to increase the efficiency of their operation (Stakeholder Consultation …, 2020). Living quarters, like industrial buildings, must meet the main goal of the Green Deal – to create a climate neutral habitat. It should be particularly emphasized that the Green Deal is underpinned by a clear action plan for the transition to a clean circular economy, reduction of environmental pollution and restoration of biodiversity, indicating the required investment to achieve the objectives. The goal of energy efficiency in buildings is one of the interrelated and interdependent goals of the Green Deal, which include the development of clean technologies, stimulating innovation in the industrial sector, the introduction of clean modes of transport, decarbonizing the energy sector and raising global environmental standards. The adoption of the main document on renovation in the EU was preceded by consultations and exchanges of views with a very wide range of stakeholders in January-August 2020 in order to identify positions and ideas on how to launch this project at the earliest stage, identify the main obstacles to its implementation and possible measures to overcome them.

As a result of the analysis of the existing barriers to the buildings renovation, it was revealed that the majority (70% or more) of respondents consider the lack of transparent and reliable information, simple and affordable financing instruments and government incentive measures$ the presence of risks and additional transaction costs (unpredictability of costs); the inability to recoup financial costs: interests divergence of participants (owners, residents, owners); difficulties in obtaining a bank loan for renovating residential buildings; insufficient technical experience of local and regional authorities and financial institutions; lack of skilled labor; lack of necessary knowledge for home owners – to be the most significant problems (see table 1).

Table 1: Main barriers to building renovation in the EU

Barriers to renovation of residential buildings in the EU	Percentage of respondents	Barriers to renovation of non-residential buildings in the EU	Percentage of respondents
Insufficient understanding of energy use and savings associated with various energy efficiency measures	85%	Lack of funding for public buildings	79%
Lack of simple, attractive and easily accessible government incentives for renovation (grants or tax)	83%	Lack of attractive and readily available financial incentives (loans, grants, tax breaks, etc.)	77%
Energy renewal does not pay off within a reasonable time frame	82%	Reluctance of organizations to allocate sufficient financial resources due to lack of interest in sustainable development	77%
Disagreement between several owners (apartment buildings)	79%	Lack of staff with the skills to handle the repair process	77%
Low awareness of available public and / or private financial products for building renovation	77%	Energy renewal does not pay off within a reasonable timeframe	75%
Onerous procedures and / or financial constraints to access government financial support	76%	Insufficient information on energy use and energy efficiency (no energy audit conducted)	73%
Lack of confidence or assurance that the repair will bring energy and cost savings or other benefits, lack of quality assurance	76%	Restrictive rules for procurement, annual budgeting and accounting	72%
Mismatch of interests between the landlord and the tenant	75%	Alleged lack of government support, unambitious politics	71%
Lack of simple, attractive and affordable private financial repair products (such as loans)	74%	Lack of major financial products (energy efficiency mortgages) that offer renovation costs coverage	70%
Reluctance to make repairs to reduce energy consumption, need for additional incentives	70%		
Regulatory and administrative barriers and planning complexity, including required permits, etc.	70%		
Alleged lack of government support, non-ambitious politicians	70%		

Source: Compiled from Stakeholder Consultation on the Renovation Wave Initiative. Synthesis Report, (2020). European Commission. Directotate-General for Energy. Directorate C - Renewables, Research and Innovation, Energy Efficiency. October 2020, p.18-21.

Decisions regarding renovation are influenced by factors such as multi-apartment buildings; environmental friendliness of materials (with a low carbon footprint); awareness of the new benefits of renovation; the complexity of public procurement procedures, etc. Representatives of the construction sector are concerned about such problems as the inability to reduce operating costs after complex repairs, the possible increase in the cost of buying and renting buildings after renovation, which generally makes the renovation process economically unattractive. It should be noted that more than a third of respondents consider the buildings reconstruction not only from the point of view of improving energy efficiency, but more comprehensively, including a circular economy, the buildings usability, its sanitary conditions improvement, preparedness for climatic influences, natural disasters, as well as an element of adaptation to climate change (Stakeholder Consultation …, 2020).

It is important that the renovation is complemented by the European Climate Bill, which translates political statements into legal obligations of countries (Proposal for a Regulation…, 2020). Regions, for which the Green Transition will be particularly difficult, will receive financial assistance in the amount of 100 billion euros during 2021-2017. The EU has already made great progress in tackling the negative effects of climate change. So, with GDP growth in 1990-2018 by 61% greenhouse gas emissions decreased by 23%. The promotion of sustainable product design translates into annual savings of up to € 150 per European. At the same time, the implementation of a broad program to improve the efficiency of energy use in construction, greening buildings, increasing the availability of heating, cooling, and lighting services can significantly improve the quality of Europeans life, preserving health and reducing the possible emergence of global warming risks in the future. According to experts, if the goals of the global climate policy are not realized in the coming decades, about 90 thousand people in the EU may die from overheating due to a temperature rise of 5 degrees, the number of asylum seekers in the EU may increase by 660 thousand people (The EU's track record ..., 2019).

At present, the rate of growth of energy renovation does not satisfy the EU authorities, since deep reconstruction, which reduces energy consumption by at least 60%, is carried out only in 0.2% of the housing stock per year; in some regions of the EU, energy repairs are not performed at all. If this situation persists, the energy transition to zero emissions in the construction sector for centuries could stretch. Therefore, it is planned that by 2030 the annual rate of energy renewal of residential and non-residential buildings will at least double, and their maintenance will contribute to the achievement of the goal of climate neutrality across the European Union by 2050 (A Renovation Wave for Europe ..., 2020). Within the framework of the renovation strategy, the EU countries set themselves specific quantitative targets. For example, Bulgaria plans to renovate more than 5% of public buildings per year, and Latvia intends to reconstruct 2 thousand multi-apartment and 3 thousand single-family houses by 2030 (National Energy and Climate Plans ..., 2020).

At the same time, the new renovation strategy is not limited to the goals of reducing electricity consumption and carbon emissions, but opens up opportunities for a variety of social, environmental and economic benefits, including sustainable buildings, resistant to natural disasters, a convenient network of charging points for electric vehicles and parking lots, new methods of planning and maintenance of smart buildings, reducing the new buildings construction pressure, preserving biodiversity and agricultural land, etc. Energy renovation can become a driver of growth for the green economy sectors, significantly affected during the current COVID-19 crisis, stimulating the creation of new workers places and supporting the business activity of small and medium-sized businesses. It is estimated that 160 thousand new green jobs will be created in the construction sector by 2030 (A Renovation Wave for Europe ..., 2020).

One of the priorities of the EU Renovation Wave is to combat energy poverty, which refers to a situation where households cannot properly heat their homes or receive other necessary energy services at an affordable price. In the EU, this is one of the key indicators of the social policy effectiveness in the energy saving availability field. Currently, about 34 million Europeans are affected by the problem of energy poverty and 800 thousand units of social housing stock are in need of repair, therefore the EU views the problem of energy poverty as its urgent task and plans to allocate an additional 57 billion euros to address it (A Renovation Wave for Europe…, 2020). All EU members have a responsibility to develop national measures to reduce energy poverty as part of their long-term strategies for the renovation of the residential and non-residential buildings stock in accordance with the revised version of the Energy Efficiency in Buildings Directive 2018/844. Social policy measures in the housing sector involve identifying categories of beneficiaries (households) that have insufficient own resources and limited access to commercial loans, cannot overcome the high initial costs of repairs and therefore need assistance to finance them. Thus, complex policy decisions, including social politics and energy efficiency in the residential sector, must reinforce each other without hindering the free functioning of energy markets (Commission Recommendation …, 2020). As KPMG studies have shown, in terms of energy poverty, Russia is 1.5 times higher than the EU, where 16% of Europeans have high energy costs (Cross-subsidization in the electricity industry in Russia ..., 2020).

Conclusions

The construction sector plays a huge role in any country, including the EU and Russia, primarily because it is dominated by local companies and is a labor-intensive sector that provides employment for a large number of people. As a pandemic spread, it can significantly support economic growth.

Our review of modern Russian research in the buildings renovation shows that this topic is comprehensively and deeply studied, while a number of publications contain an integrated, multi-aspect (environmental, social and economic) approach to solving the problems of sustainable urban development. Construction renovation is only part of a more general problem of ineffectiveness of the spatial organization of Russia, the damage from which is estimated at 2-3% of GDP. Losses associated with the operation of buildings are also significant: 75% of the existing Russian

housing stock represents the most energy-intensive houses in the world, and at least 45% of energy resources are spent on heating this stock, which is 2.3 times more than fuel consumption for electricity generation (Murzin, AD, 2014).

Based on the analysis of EU legislation, it can be recommended to closely link the adopted laws in the field of demolition of dilapidated housing, resettlement of citizens and the integrated development of territories with the already adopted laws and projects in this area and outline clear guidelines for long-term construction, taking into account climate goals and sustainable development. The official documents adopted by the European Commission (EC) - regulations, recommendations and messages - can be such examples of interconnection. Thus, only a one-page section on energy poverty of the EC Communication contains about two dozen references to legal and other clarifying documents on this issue (see A Renovation Wave for Europe ..., 2020).

Many developed and developing countries have adopted political programs for sustainable development, ratified international treaties, and made commitments. This concept is not an abstraction and distant from the real life of people. The EU holds a special place in the implementation of sustainable development strategies. Already in the 1970s the main provisions of the general European policy in the field of environmental protection were developed, generating impulses for qualitative changes in the economy, ecology and society. The Treaty in Amsterdam (1999), the Lisbon Agreements (2001), the Treaty on the EU (2007) contain the main directions of the macroregion's sustainability policy. Since the European Union positions itself on a global scale as a flagship of sustainable development policy and has achieved significant results, its experience should be used in the rule-making practice of Russia.

In the housing renovation legislation special attention should be paid to the concept of energy poverty: it is necessary to identify the causes and consequences of this phenomenon, to develop assessment criteria and indicators for monitoring, taking into account the peculiarities of Russian regions, and use this indicator providing new housing to socially vulnerable citizens. It will allow targeting these unprotected consumer groups, determining the form and amount of support needed, which will have a multiplier effect in terms of improving energy efficiency of the entire economy and implementing inclusive growth.

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Authentication and Authorization of IOT Devices in Federated Environments Using a Distributed Ledger

Michal JAROSZ and Zbigniew ZIELINSKI

Military University of Technology, Warsaw, Poland, michal.jarosz@wat.edu.pl
Military University of Technology, Warsaw, Poland, zbigniew.zielinski@wat.edu.pl

Abstract

This article describes how to authenticate and authorize IoT devices in federated environments. In our solution, we propose the use a distributed ledgers as a replicated database, which enforces consensus among federations. We also presented our performance results.

Keywords: Internet of Things, Authentication, Authorization, Federation environments, Distributed ledger

Introduction

The development of the Internet of Things is a rapidly growing branch of computer science that has become a permanent fixture in our homes. Nowadays we can observe many applications of the IoT like Health Care, Logistics, Smart City, Smart Home, Smart Grid, Industry 4.0, Smart Agriculture, and many others. In some of this application many of the assets that are included and managed in the networked environment belongs to different cooperating parties. For instance, Smart City [2] is an example of such environment that include local departments information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, etc.

In general, federation may include various cooperating entities with limited trust relationships, and its primary goal is information integration, which will enable the use of resources belonging to individual partners. In federated environments, where parties (federations) can be various bodies of government administration, local governments or enterprises. One of the critical challenges in deploying and using a federated environment is maintaining the security of information exchange. In order to ensure confidentiality and integrity of communication channels between IoT devices, a secure and reliable trust management mechanism must be implemented. Such a mechanism must meet a number of requirements, the most important of which include: scalability, IoT device authentication, support for resource-limited IoT devices, and resistance to compromising individual IoT devices. The limitations of IoT devices [1] mean that not every device can use the solutions used in normal computers. This leads to develop special algorithms adapted to this type of devices. In federated environments several device owners want/need to cooperate and must grant access to their devices. At present, this problem is being solved by using PKI and certificates[□]. However, this solution has several limitations. Firstly, the device must use asymmetric cryptography which requires more computing power than symmetric cryptography. Secondly it must store its certificate along with a pair of its keys and certificates of root CA. Thirdly, checking certificates and sending them over the network requires more bandwidth and consumes more electricity.

A distributed ledger is a decentralized, replicated database that requires consensus among nodes when we want to add new data. The data stored in a distributed ledger is immutable. Distributed ledgers are used in a situation where data must be shared between two or more parties (the parties want/have to cooperate with each other, but do not fully trust each other – "Trust but verify"). The conditions for adding data to the ledger are entered in the form of a program called a smart contract. Distributed ledgers are an example of a recent paradigm that has evolved into a practical approach to implementing reliable distributed trust management and authorization infrastructure. Especially interesting are permissioned distributed ledger solutions, such as Hyperledger Fabric [□]. Hyperledger Fabric could be used for support integration with existing federated identity and access management systems.

In the paper we proposed a solution that meets the above-mentioned requirements and is based on the use of distributed register technology and the entropy of the IoT devices themselves. As part of the work, a protocol was developed and implemented using the Hyperledger Fabric, performance tests and security assessment were also carried out.

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Description of the proposed solution

The proposed solution is based on a some "fingerprint" of each IoT device. Each device has its own parameter array. The parameter array consists of n-parameters and each parameter has a minimum 32 bits of entropy. The parameters can be:

1) Generated random values. In this case, the device stores the parameter array in memory.
2) Values generated from the unique characteristics of the device and files stored on this device. If the device has only parameters based on its traits then there is no need to store any additional data on the device because the parameter value can be obtained by executing a command. The program responsible for authentication and authorization will have the required commands in its code.

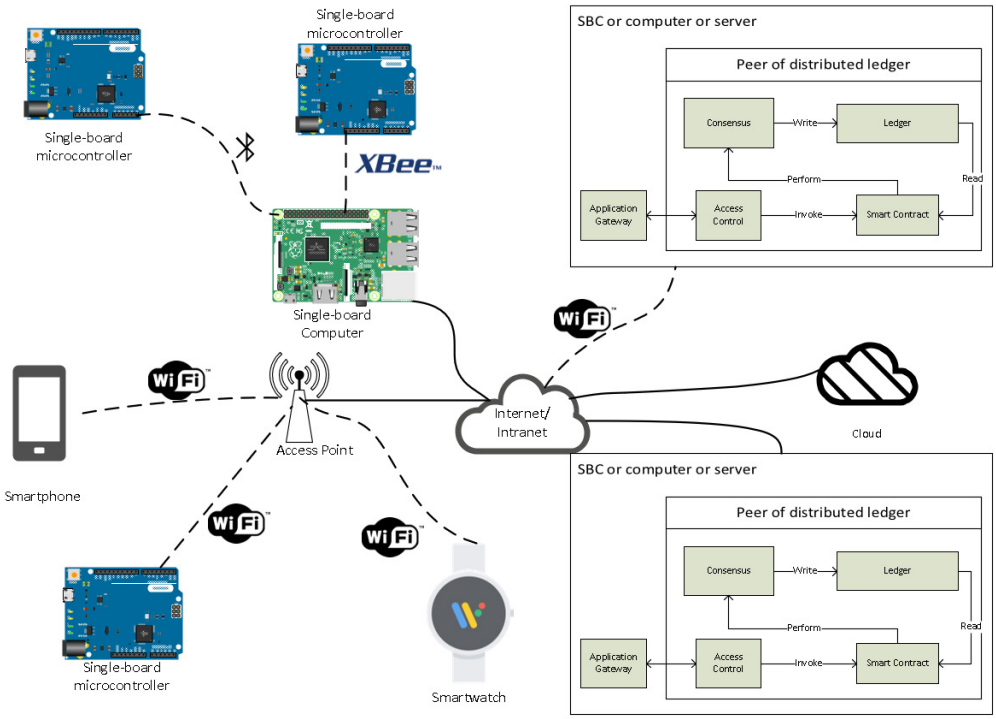

Figure 1: General architecture of the proposed solution.

Figure 1 shows the general system architecture. Access to the ledger is only possible via smart contracts. The execution of a smart contract requires appropriate permissions, therefore access to the smart contract is only available through the application gateway. In our case, the application gateway additionally performs data conversion from COAP + CBOR, which is used by IoT devices to save transfer to the TCP + TLS format used by Hyperledger Fabric.

To be trusted, a IoT device must be registered in a distributed ledger through a special registration procedure. In the registration phase the parameter array is sent to the distributed ledger node. Communication between the device and the node can take place in a protected environment or using a one-time password. As a result, only the device and the distributed ledger store the parameter array. The device receives a unique identifier from a distributed ledger node. In the described concept, authentication is based on the confidence that only the device and the ledger have a parameter array that is used to create the data encryption key. Authorization is performed on a distributed ledger node based on the rules stored in the distributed ledger. A device that wants to check whether another device can perform a specific operation on it must send a query to any node. The node responds with either acceptance or rejection.

In a situation where the device wants to send data to the distributed ledger, it must randomly select m-parameters from the parameters array. Then computes a hash function for concatenating of these parameters. The result of the hash function is a key using to secure communication between the device and the distributed ledger node. The device then encrypts the data and the current timestamp using this key and a randomly generated nonce. Timestamp is required to check when the message was sent. It must send to the distributed ledger node: device identifier, numbers of parameters that were selected to create the key, nonce value and ciphertext. Since only the device and the distributed ledger have an array of parameters, only they can create the key with which the data is encrypted. A distributed ledger node decrypts the packet and based on the decrypted data, decides what to do next. The response is generated similarly: the node take random j-parameters from the parameter array stored by the distributed ledger. It then creates a key to encrypt the message as a hash value of the parameter concatenation. The response with the

current timestamp is encrypted with this key. The packet with encrypted response contains also the device ID, the numbers of the parameters used and the nonce used to encrypt the data. The communication diagram is presented in Figure 2.

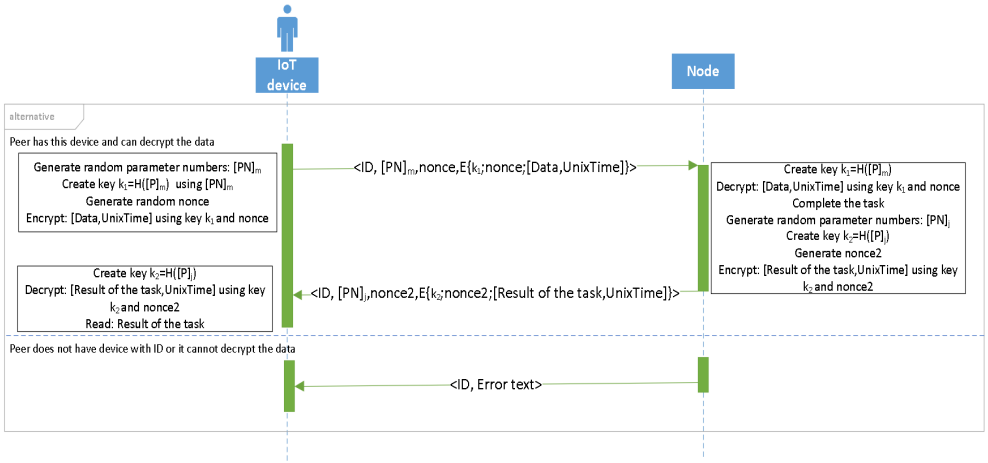

Figure 2: A scheme for communication between a device and a distributed ledger node to perform operations on it (e.g., check permissions).[1]

In case the IoT device wants to communicate with another IoT device, it must ask the distributed ledger node for the communication key. The operation of the device is similar to the previous scenario, except that the device in the data field transmits the ID of the device with which it wants to communicate and the ledger node checks if the devices can talk to each other. If they can communicate, the ledger node generates a key for communication between devices. This key is the result of a hash function of concatenating the following data: device IDs, the current timestamp, and k-parameter values randomly selected by the node. Created key, timestamp and parameter numbers are encrypted in the same way as in the previous scenario. These items are used by the device requesting the key to secure communication with another IoT device. After the device receives a packet from another device, it generates a key using its stored parameter array, identifiers and timestamps sent in the packet. Timestamp is required to check when the key was generated – the message will be rejected if the key was generated long ago. The key is used to decrypt the data. If the ciphertext is successfully decrypted, it means that the key was created by the distributed ledger node - because only it has this parameter table outside the device. This method of communication also provides that the devices can communicate with each other – otherwise the other device would not receive the communication key from the distributed ledger node. The communication diagram is presented in Figure 3.

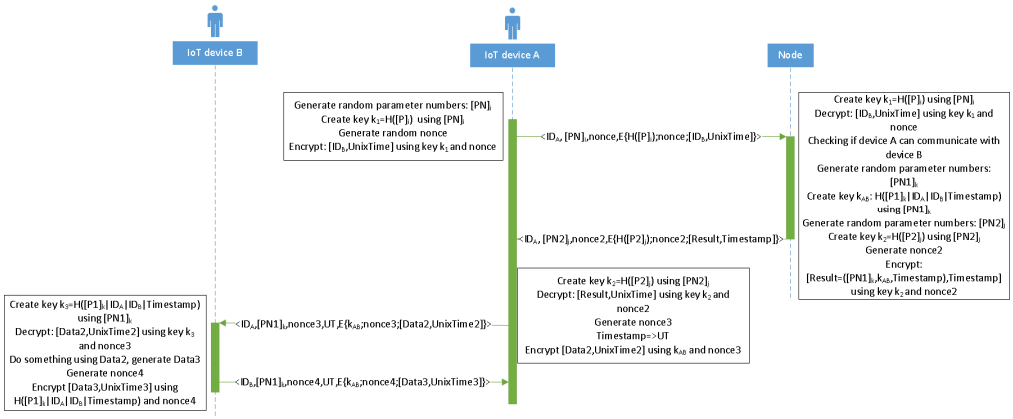

Figure 3: A scheme for communicating a device with a distributed ledger node to obtain a key to communicate with another IoT device.[2]

Results

The above concept has been implemented and pretested in terms of performance. The first test tested how many requests the device can generate. We used RaspberryPi 4, RaspberryPi 3B + and RaspberryPi zero WH for these tests. The results are presented in the Table 1. In this test, the device sends a request of writing data to a distributed ledger node. Several scenarios with different amounts of saved data were tested.

Table 1: The number of requests per second that the device can make, depending on the size of the data

The size of data	RaspberryPi 4 8GB	RaspberryPi 3 B+	RaspberryPi zero WH
20B	752,6	461,9	76,9
100B	726,0	445,7	76,1
1KB	373,3	231,8	53,38
15KB	49,45	30,56	6,75
30KB	26,21	16,08	3,42
50KB	16,4	9,78	1,68
100KB	8,3	4,98	Not tested

We tested the latency in generating keys for communication between devices. For this purpose, we simulated sending 25 requests generated by 4,000 devices. We conducted tests for a different number of distributed ledger organizations. Each node was a separate virtual machine with the following parameters: 4 vCPU (@ 2.6GHz), 16 GB RAM, 1Gb/s network interface, disk: SCSI HDD. The results are shown in Figure 3.

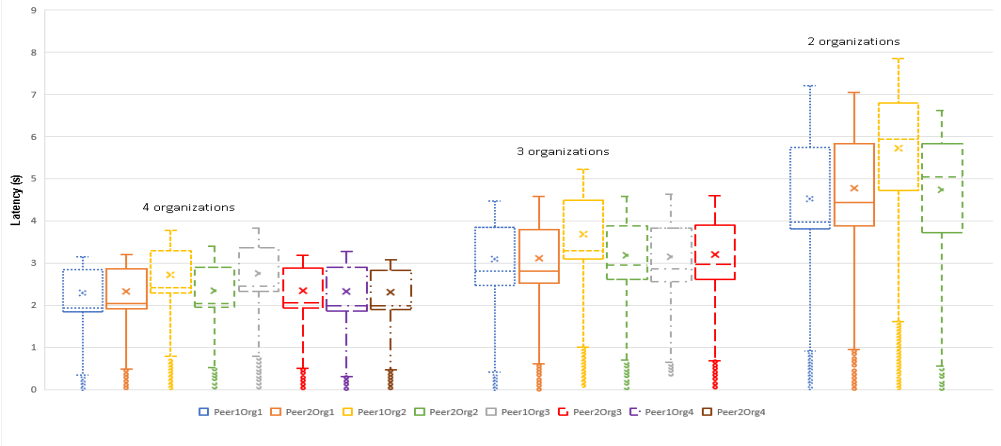

Figure 3: Delay in generating the key for communication between devices by distributed ledger nodes (peer) depending on the number of organizations. Each organization has 2 nodes.

Conclusions

In the paper, we proposed a fully scalable, distributed and decentralized solution to the problem of IoT device authentication and authorization in federated environments. Because it uses only symmetric cryptography and the encryption key is generated directly on the device - it is very effective - it does not require a lot of transfer to communicate with other system components. Establishing communication between two IoT devices requires only 3 messages while maintaining device authentication, data confidentiality, and authorization. In some distributed ledger implementations (such as Hyperledger Fabric), one can only force access to private data on certain nodes - thus extraneous nodes belonging to other organizations will not be able to create the encryption key. We are currently working on refining the details of our solutions. We also conduct further research on the performance and security of the proposed solution. Currently, we are also developing mathematical models to test the performance of the proposed solution using Hyperledger Fabric for various configurations.

Endnotes

1. Legend: ID – identifier of device; $[PN]_m$-m values of parameter numbers; H() – hash value of concatenation; $[P]_m$ – m value of parameters; E{key,nonce,data} – Encrypt *data* using *key* and *nonce*. Key is not transmitted.
2. Legend: IDA, IDB – identifier of device A and device B; $[PN]_m$-m values of parameter numbers; H() – hash value of concatenation; $[P]_m$ – m value of parameters; E{key,nonce,data} – Encrypt *data* using *key* and *nonce*. Key is not transmitted.

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Application of RAPP Method in Service Relationship Marketing with A Special Focus on Environmental Aspects

Ewa KORELESKA

UTP University of Science and Technologie in Bydgoszcz, Bydgoszcz, Poland

ewa.koreleska@utp.edu.pl

Abstract

The aim of this study is to present the possibilities of using the RAPP model in service relationship marketing. The subject of the study are catering outlets located on premises of Bydgoszcz universities. The research hypothesis assumes that students' expectations from catering outlets and the remaining elements of marketing, as set out in the RAPP model, are not fully met. Moreover, it is assumed that there is no significant link between the students' gender and their preferences concerning introduction of organic products into the offer of catering outlets. The survey was carried out in 2019 and 2020, and was divided into a few stages. Data collection methods such as a direct survey, group interviews and observations. The data was analyzed with the use of mathematical statistical methods. The survey results show that students' expectations from the offer of catering outlets situated on premises of the universities in Bydgoszcz are not fully met, especially in terms of 'Relations', and 'Arena of Presentation'. The element of marketing referred to as 'People' was the best rated. Moreover, no significant relation between the gender of students and their preferences regarding introduction of organic products into the offer of catering outlets was found. This confirms the research hypothesis. Summing up, it needs to be noted that the RAPP method proved to be useful in the survey, as it highlighted weaknesses and strengths of canteens functioning in Bydgoszcz universities, indicating the direction of changes to be followed by entrepreneurs in service marketing management.

Keywords: Marketing, Management, Healthier Lifestyle, Model RAPP, Service Relationship Marketing, Marketing Mix, Universities, Organic Food, Internet, Services Gastronomic

Introduction

In 2018 the number of catering outlets in Poland was 69829, (935 belonged to the public sector and 68894 was owned by private entrepreneurs (Rocznik … 2019). A part of them operated on premises of universities. Out of concern for student health, the quality of the services should be the highest. The goal of the survey was to check whether it was possible to use the RAPP model for assessment of marketing activity in these places. So far this model has been used in few domestic publications (Chłodnicki 2010, Rogozińska 2016). In turn, foreign and domestic publications contain numerous articles on quality and safety, as well as marketing of food offered by enterprises, including service ones (Dospinescu N., Dospinescu O., M. 2018; Dospinescu N., Dospinescu O., Tatarusanu M. 2020).

Research Goal, Material and Methods

The aim of this study is to present the possibility of using the RAPP model and service relationship marketing. The research objects were catering outlets located on premises of universities in Bydgoszcz. The outlets were assessed by students who had been using them. It was found that the time of studying was enough for students to become experts in this field. It was also found that university canteens should provide services of higher quality than the conventional ones.

The research hypothesis assumed that students' expectations from services provided by university canteens and the remaining elements of marketing, as set out the RAPP model, were not fully met. Moreover, it was assumed that there was no significant relation between the students' gender and their preferences regarding introduction of organic food into the offer of university catering outlets.

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The survey was divided into several stages. In the beginning, there was a literature review. The concepts of service and marketing and their significance in Poland were analyzed in reference to the RAPP model.

The next model was developed in the academic year 2019/2020 for Bydgoszcz universities by means of a direct survey carried out among students and with the use of a prepared measurement tool – a survey questionnaire. The initial assumption was a minimal size of the sample suggested for scope studies of regional character – 200 respondents (Kędzior 2005). Eventually 300 students took part in the survey.

The method of group interview was used in the successive stage of the survey. The sample was matched in a nonrandomized manner with 15 participants and in 3 repetitions. The survey enabled better interpretation of earlier results and presentation of marketing proposals for service companies for the period of the pandemic.

The next stage involved an analysis of 21 WWW websites of Bydgoszcz universities and of Kujavian-Pomeranian Voivodship universities from the perspective of information on the subject of canteens functioning on premises of the schools. In the next step, an example of a university with properly working catering outlets was presented.

The results were analyzed by means of mathematical statistical methods. Pearson's chi-squared test χ^2 was used.

The form of statistics is expressed by a formula (Sagan, Mynarski 2002):

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{k}\frac{(n_{ij} - n_{ij}^{'})^2}{n_{ij}^{'}}$$

where:

n_{ij} - observed populations in the *i* th verse of the *j* th column,

$n_{ij}^{'}$ - expected populations in the *i* – th verse and the *j* – th column.

The concept and significance of services in the Polish economy

According to The dictionary of the Polish language (1982), a service is defined as follows: ‘action of helping or doing work to meet someone’s needs, e.g. crafting, delivery of goods, food protection, health care, artistic activity, etc.” (Słownik Języka Polskiego 1982). In turn, Payna defines a service as a mathematical action which has an impact on people or objects that are at their disposal, without causing property transfer; after taking advantage of a service it cannot be resold or given to other persons (Payna 1997).

Since the beginning of the transformation of the Polish economy into a free market economy, the Polish service sector has dynamically developed due to:

- an increase in the society prosperity,
- higher level of education,
- more leisure time,
- more intensive use of modern technologies and the subsequent risks (Management Encyclopedia).

The role of services in the Polish economy after Poland’s accession into the European Union is presented by means of gross added value and its share in the service sector as compared to other sectors of economy, the number and percentage of people employed in other sectors of economy and investment outlays in other economy sectors.
In the analyzed period, gross added value (GAV) in services increased up to app. 93%, and accounted for 62.8% to 64.5% of GAV. It means that in that period gross added value created by the sector of services was higher than that of other sectors combined including: agriculture, forestry, hunting, fishing or the sector of industry and construction.

Table 1: Gross added value and its share in the sector of services as compared to other economy sectors

Years	Total	Agriculture Forestry Hunting Fishing		Industry Construction		Services	
	mln PLKN	mln PLN	%	mln PLN	%	mln PLN	%
2004	825345	30479	3.7	270306	32.7	524560	63.6
2005	870349	28703	3.3	285507	32.8	556139	63.9
2006	973627	28558	3.0	310549	33.1	598520	63.8
2007	1036486	35705	3.4	344059	33.2	656772	63.4
2008	1123819	32614	2.9	374348	33.3	716857	63.8
2009	1220098	34101	2.8	408995	33.5	777002	63.7
2010	1271475	37085	2.9	421694	33.2	812696	63.9
2011	1376956	44371	3.2	467421	33.9	865164	62.8
2012	1443624	43413	3.0	484646	33.6	915565	63.4
2013	1470864	47618	3.2	474236	32.2	949010	64.5
2014	1524940	44939	2.9	506332	32.2	973669	63.8
2015	1595276	41514	2.6	543674	34.1	1010088	63.3

Source: Nakonieczna-Kisiel, H. (2017). The role of services in the Polish economy after Poland's accession into the European Union. Studies and Works WNEiZ US, (49/2), 167-180.

The data included in table 2 shows that the most working people are employed in services. In thee considered period they accounted for 55.5% to 58,0% of all the number of employees in Poland. More than twice fewer people were employed worked in the sector of industry and construction (25.9% to 28.4%). The fewest employees represented the sector of agriculture, hunting and fishing (15.1% to 16.8%).

Table 2: The number and percentage of people employed in services as compared to those employed in other economy sectors

Years	Total	Agriculture Forestry Hunting Fishing		Industry Construction		Services	
	Thou.	**Thou.**	**%**	**Thou.**	**%**	**Thou.**	**%**
2004	12720	2140	16.8	3520	27.7	7060	55.5
2005	12891	2134	16.6	3519	27.3	7238	56.1
2006	13220	2135	16.1	3685	27.9	7400	56.0
2007	13771	2138	15.5	3908	28.4	7725	56.1
2008	14037	2128	15.1	3938	28.1	7971	56.8
2009	13782	2125	15.4	3775	27.4	7882	57.2
2010	14107	2376	16.8	3775	26.8	7956	56.4
2011	14233	2377	16.7	3825	26.8	8032	56.4
2012	14172	2378	16.8	3735	26.4	8059	56.9
2013	14244	2379	16.7	3683	25.9	8182	57.4
2014	14563	2385	16.4	3776	25.9	8402	57.7
2015	14830	2385	16.1	3844	25.9	8601	58.0

Source: Nakonieczna-Kisiel, H. (2017). The role of services in the Polish economy after Poland's accession into the European Union. Studies and Works WNEiZ US, (49/2), 167-180.

In the considered period the value of investment outlays in services was higher than in the remaining industry branches. From 2004 to 2015 it doubled.

Table 3: Investment outlays in services as compared to other sectors

Years	Total	Agriculture Forestry Hunting Fishing		Industry Construction		Services	
	mln PLKN	mln PLN	%	mln PLN	%	mln PLN	%
2004	120467	2627	2.2	50987	42.3	66853	55.5
2005	131055	2980	2.3	50982	38.9	7093	58.8
2006	154880	3427	2.2	67910	43.8	83543	53.9
2007	191714	4118	2.1	83924	43.8	103672	54.1
2008	217260	4600	2.1	96772	44.5	115888	53.3
2009	218581	4094	1.9	80128	36.6	134359	61.5
2010	217287	4282	2.0	76264	35.1	136741	62.9
2011	243346	5334	2.2	86351	35.5	151661	62.3
2012	237627	5730	2.4	83208	35.0	148689	62.6
2013	231155	6080	2.6	86464	37.4	138611	60.0
2014	250776	6155	2.5	98923	39.4	145698	58.1
2015	271836	6084	2.2	113351	41.7	152401	56.1

Source: Nakonieczna-Kisiel, H. (2017). The role of services in economy after the accession Poland into the European Union. Studies and Works WNEiZ US, (49/2), 167-180.

Relationship marketing of services

Marketing of services means all the marketing activities involved in the sector of services (Encyclopedia of Management). This Marketing involves the need to take into account the consumer co-participation in the process of service provision. In connection with this, marketing of services uses separate instruments to carry out the process of service provision. New elements are being added to the classic marketing-mix 4P composition – e.g. Process, Material certificate, People. Hence, 5P or 7P concepts are used (Koreleska 2018, 2019). Modern marketing of services tends to develop relations with the customer and maintain them for possibly the longest time (Prus, Berger 2013). Thus, there is a strong link between marketing of services and relationship marketing offering such tools as 5I composition (Sagan 2003) or RAPP (Rogoziński, 2000, Chłodnicki 2010). Sometimes it is assumed that services should be marketed exclusively using the relationship marketing (Dobska 2020). Table 4 presents features characteristic of the relationship marketing as compared to transactional marketing .

Table 4: Comparison of transactional marketing with relationship marketing.

Transactional marketing	Relationship marketing
The goal of transactional marketing is measured by the share in the market, penetration degree and the number of transactions	These actions are defined by the share in the customer 'heart', 'mind' and 'pocket', customer maintenance indicators, long term relations with a customer, Consumer Lifetime Value
Marketing is understood as a function to be performed in an enterprise	Marketing is understood as an integrator of relations between the company and the environment.
Gathered information is of ad hoc and cross-sectional character	Significance of continuous, the so called 'longitudinal', information, integrated with the system of decision support
Product understood as 'an object' or a stream of benefits for the consumer, innovations are of incidental character	Product' – service, understood as a 'process', series of episodes making up a relationship with a customer, diversified, innovations are implemented in a constant manner

Cost oriented price	Customer perceived value oriented price
Anonymous distribution	Personalized, virtual disribution
Communication is of mass character, is repeatable, one - directional, usually initiated by the 'sender' (company), who has the dominant position	Communication is of personalized, individual character, two – directional, also initiated by the 'recipient' (customer)

Sagan, A. (2003). Relationship marketing Marketing. Economic Academy in Kraków, Department of Market Analysis and Market Research, StatSoft editorial office, Kraków

Elements of the RAPP model and their interpretation

The RAPP concept consists of 4 marketing elements, i.e. Relations, Arena of Presentation, Product, Participants (Personnel and Buyers) (Rogoziński 2000). These terms are intended to mean:

- Product – a service to be offered, its scope, adjustment to the customer requirements, customer satisfaction, etc.
- Arena of Presentation – locations where services are provided, smell, wall color, lighting, equipment, cleanliness, marking, styling, atmosphere, etc.,
- Participants/Actors – including People/Personnel who are in direct contact with customers/Personnel to support /Customers/Stakeholders (directly connected with the company, e.g. financial companies, employees' families, etc.) – employees, their knowledge, politeness, greeting and parting formula, personal culture, customers, etc.,
- Relations– a relationship of the company with the customer, use of instruments (e.g. loyalty cards) to develop loyalty of customers who like the offered product (service), who would choose the product from products offered by other companies, who declare to purchase the service in the future, who are attached to ta given brand, company or product, etc.

Fig. 1: RAPP model and its elements

Source: own study based on Rogoziński K. (1998). New service marketing. Poznań: Publishing House of the Poznań University of Economics. [W:] Chłodnicki M. Professional services: the way to a customer is through the product quality, 2004.

Results

Assessment of catering outlets was carried out according to the RAPP concept. The first element to be assessed was 'Product' (fig.2). The offered assortment was well rated by many students because as many as 40% of respondents said it was good or very good. Students declared that the meals were very good in terms of taste and appearance. The next group of the respondents - 32% found the meals to be average. 30% of students declared dissatisfaction with the offered meals describing them as 'bad' or 'very bad'. Although there were fewer dissatisfied students, they made up a significant group of respondents. They said that is was poor quality of the offered products and poor assortment that affected their opinion. Some students said it was necessary to increase the assortment. The respondents indicated that 'although the number of people who refrain from eating animal products has significantly increased, no vegan meals are offered, therefore (…) there are customers who cannot order dishes they would like to choose". Moreover, more 'fit, healthy and dietetic food' was expected, including organic products, two course meals, hot meals, 'better choice of warm dishes' 'new products' which are not fast foods. On the contrary, other students proposed to reduce the number of dishes, claiming that 'it is better to focus on the quality and standardization which can help customers to

identify dishes, thus making it easier for them to make a good choice. Students postulated to improve the product quality and suggested more self-prepared products and less frozen food'.

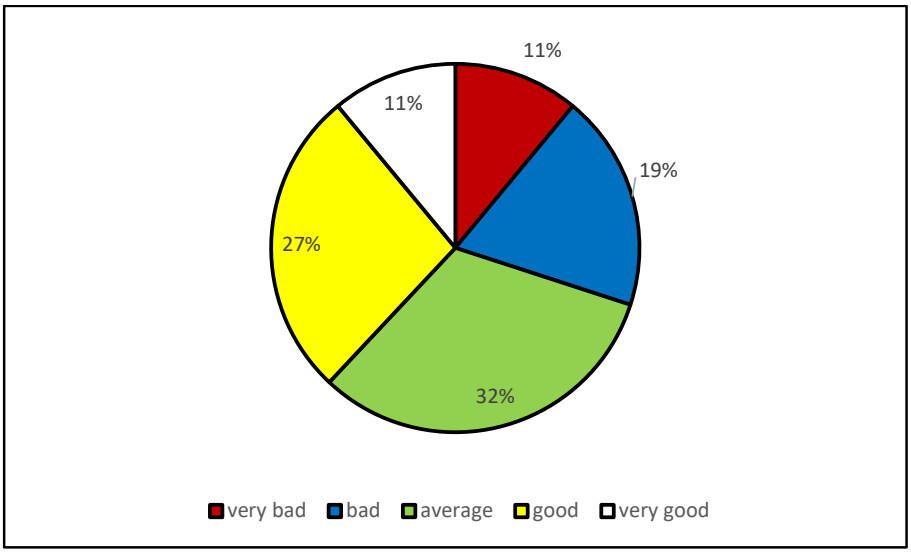

Fig. 2: 'Product' in catering outlets according to students

Source: own study

The next assessed element was 'Presentation Arena' (fig. 3). Its evaluation involved, among others, the outlet size and localization on premises of universities where the catering services are provided, smell, wall color lighting, equipment, cleanliness, marking, stylization, atmosphere. The outlets/canteens were criticized mostly for the size, as they were found to be too small to accommodate students in the peak hours, and for unpleasant smell associated with poor ventilation in one of the analyzed school. This proves that although earlier studies (Mazurek-Łopacińska, Sobocińska 2013) imply that it is the need to satisfy hunger or thirst as well as a lack of time that motivate students to buy meals in catering outlets situated on premises of their schools, the needs to be met while having a meal are also of post materialistic character. This has also been confirmed by the respondents for whom the possibility of spending a nice time with friends was the reason to use catering services provided by outlets situated within their schools. This motive was indicated by students at the third position (Mazurek-Łopacińska, Sobocińska 2013).

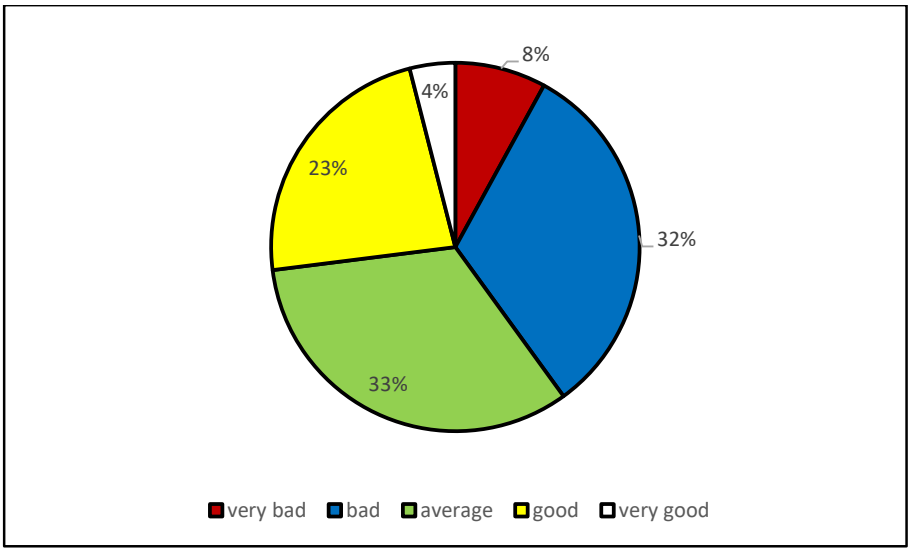

Fig. 3: 'Arena of Presentation' in catering outlets in the opinion of students

Source: own study

Actors/ People were best rated by a great majority of students. The study shows that the employees of most canteens located on premises of universities are polite, nice, laborious, competent and well qualified. Respondents described them positively using the following expressions: 'they always greet students and say good bye. They give advice and provide information on the offered food", 'very polite', 'always polite'. However, the respondents indicated one disadvantage, that is, a longer time of waiting for the order to be taken or too long staying of the personnel in the backroom.

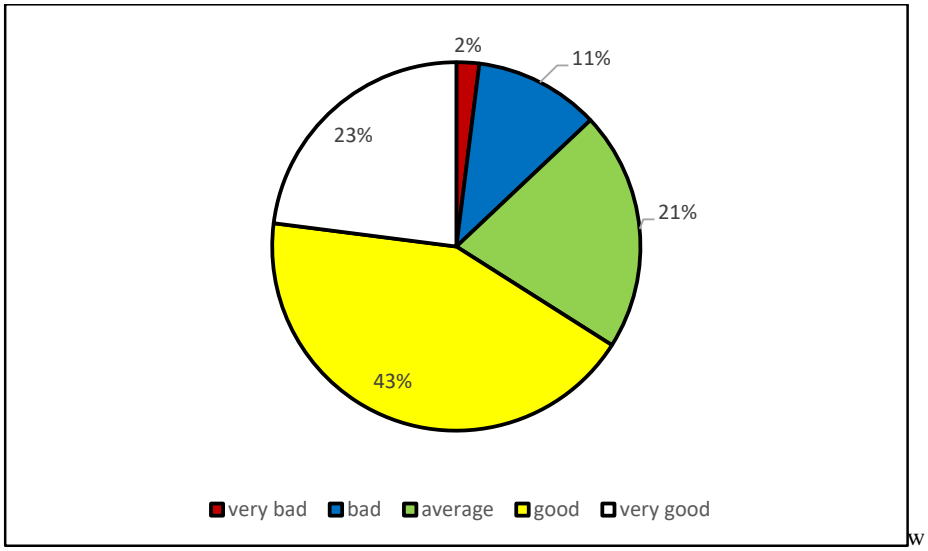

Fig.4: 'Participiens/Actors' of catering outlets in the opinion of the respondents

Source: own study

The next step involved assessment of 'Relationship' between the catering outlet and a student. The questions to be answered were: 'is there a relationship between a service company and a customer?' 'Do students prefer to purchase a catering service at the university or in other bars situated near their schools?' 'Does the outlet use any instruments for development of loyalty of its customers? The respondents' answers were diversified as 36% of students said that the relationship was very good and good and the same number (36%) said it was bad and very bad. It is worth noting that the relationship that is developed between people depends on the attitude of both sides. Despite a positive assessment of the previous marketing element – People, some students had negative feelings caused by a lack of loyalty programs, in creation of which not only the employees but also the outlet owners need to participate.

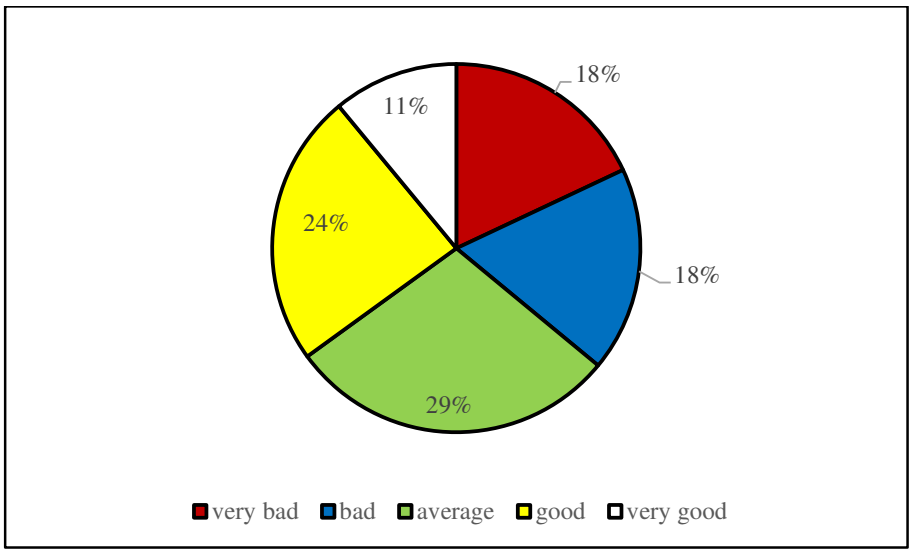

Fig. 5: 'Relations' in catering outlets in the opinion of students

Source: own study

Students also expressed their opinions on the possibility of introduction of organic food into the menu. A great majority of students - 83% declare that they discern such a necessity which is consistent with a growing interest of consumers in organic food (Szczepanek, Prus, Knapowski 2018, Roman, Roman, Prus 2020). It has been observed that more women than men are interested in a purchase of a catering service prepared from organic products. The observed difference between the share of women and men is not, however, of significant character (the value of consistence test is 3.24 and does not exceed cri $\lambda_{0,05} = 3.841$, $\lambda_{0,01} = 6.635$).

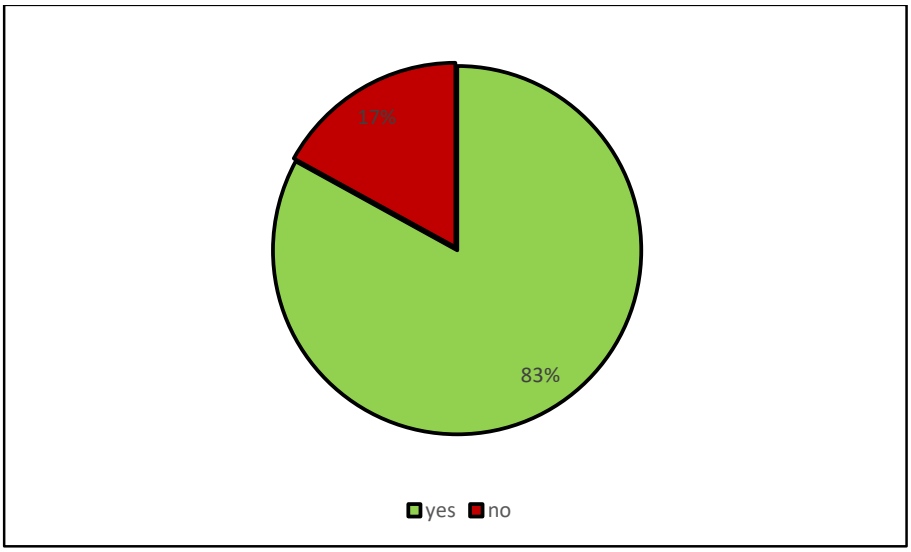

Fig. 6: The need to introduce organic products into catering outlets in the opinion of students
Source: own study

In the second stage of the study, students were asked to provide marketing proposals regarding actions to be taken by university catering outlets in the current situation of pandemic in Poland. It was postulated to introduce, among others, changes to the marketing element 'Relationship' of the RAPP concept. This modifications of 'Relationship' are supposed to deepen the bond of a customer with the company. Students advised the outlets to use social media marketing – 'being in contact with customers, providing information about the offer, or the company actions that are worth promoting" by means of the Internet. Such information placed in social media (e.g. Facebook) can be later made available for students' friends and relatives. This in turn would increase the number of potential customers. It needs to be noted that nowadays to reach a vast number of customers it is necessary to develop a website.

One of the respondents' proposals was also to add information about the canteen/outlet operation to the university website with the possibility of forwarding it to the website of the outlet. Therefore, the survey included additional assessment of 21 WWW websites of Bydgoszcz universities (Akademia Muzyczna im. Feliksa Nowowieskiego w Bydgoszczy, Bydgoska Szkoła Wyższa, Collegium Medicum im. Ludwika Rydygiera w Bydgoszczy Uniwersytetu Mikołaja Kopernika w Toruniu, Kujawsko-Pomorska Szkoła Wyższa w Bydgoszczy, Uniwersytet Kazimierza Wielkiego w Bydgoszczy, Uniwersytet Technologiczno-Przyrodniczy im. Jana i Jędrzeja Śniadeckich w Bydgoszczy, Wyższa Szkoła Bankowa w Bydgoszczy, Wyższa Szkoła Gospodarki w Bydgoszczy, Wyższa Szkoła Informatyki i Umiejętości w Łodzi – Wydział Zamiejscowy w Bydgoszczy, Wyższa Szkoła Nauk o Zdrowiu w Bydgoszczy) and of Kujavian-Pomeranian Voivodship universities (Kolegium Jagiellońskie – Toruńska Szkoła Wyższa, Kujawska Szkoła Wyższa we Włocławku – Wydział Zamiejscowy w Grudziądzu, Kujawska Szkoła Wyższa we Włocławku; Państwowa Uczelnia Zawodowa we Włocławku, Uczelnia Lingistyczno-Technologiczna w Przasnyszu, filia w Świeciu, Uniwersytet Mikołaja Kopernika w Toruniu, Wyższa Szkoła Bankowa w Toruniu, Wyższa Szkoła Demokracji im ks. Jerzego Popiełuszki w Grudziądzu, Wyższa Szkoła Kultury Społecznej i Medialnej w Toruniu, Wyższa Szkoła Przedsiębiorczości im. Księcia Kazimierza Kujawskiego w Inowrocławiu, Wyższa Szkoła Zarządzania Środowiskiem w Tucholi). The question was whether any of the academic centers took up this kind of initiative. The answer is 'none'. Only one non-public school in both branches added a general mention on the subject of vendor machines with snacks and coffee and bistros, where students can eat hot and a tasty meal at a good price (Wyższa Szkoła Bankowa w Bydgoszczy i w Toruniu). Two non-public universities in the region (Kujawsko-Pomorska Szkoła we Włocławku, Wyższa Szkoła Demokraji im. Ks. Jerzego Popiełuszki w Grudziądzu) showed a bar in a film promoting universities (a film available on the university's website). However, only one public school in Bydgoszcz mentioned the dormitory bufet (Akademia Muzyczna im. Feliksa Nowowiejskiego w Bydgoszczy).

Poznan University of Technology is a good example of how to provide online information on the subject of an academic catering outlet (fig. 7). In a tag ‘For students’ including, apart from typical news concerning scholarships, regulations, student exchange, a tag ‘Student life’ including, apart from student organizations, dormitories and assistance for people with disabilities, a tag ‘Canteen’, where one can find information about the canteen localization, prices of meals, subscriptions, opening hours and additional services -catering of conferences, training courses, student balls, take away meals, etc. Most importantly, there is a possibility to forward the menu onto a website of the canteen where students can find a detailed menu for the next days (fig. 8).

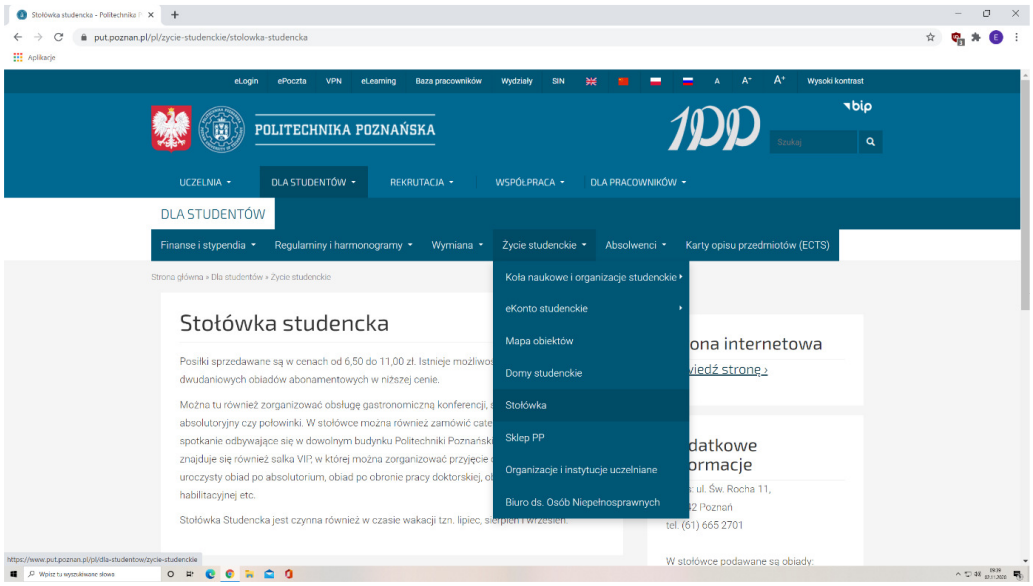

University for students recruitment cooperation for staff
Student canteen
Meals are sold from 6.50 to 11PLN. Two course meals are on the offer. Catering of conferences and student balls. Catering of meetings held in any building of the university. We offer a VIP room for organization of meetings, mid-term-parties, or Ph.D defense or habilitation parties. Student canteen is also open during holidays, that is, in July, August and September.

Map of objects
Dormitories
Canteen
PP store
University organizations and institutions
Bureau for people with disabilities

Fig. 7: WWW website of Poznan University of Technology

Source: Politechnika Poznańska. Dla studentów. https://www.put.poznan.pl/pl/zycie-studenckie/stolowka-studencka

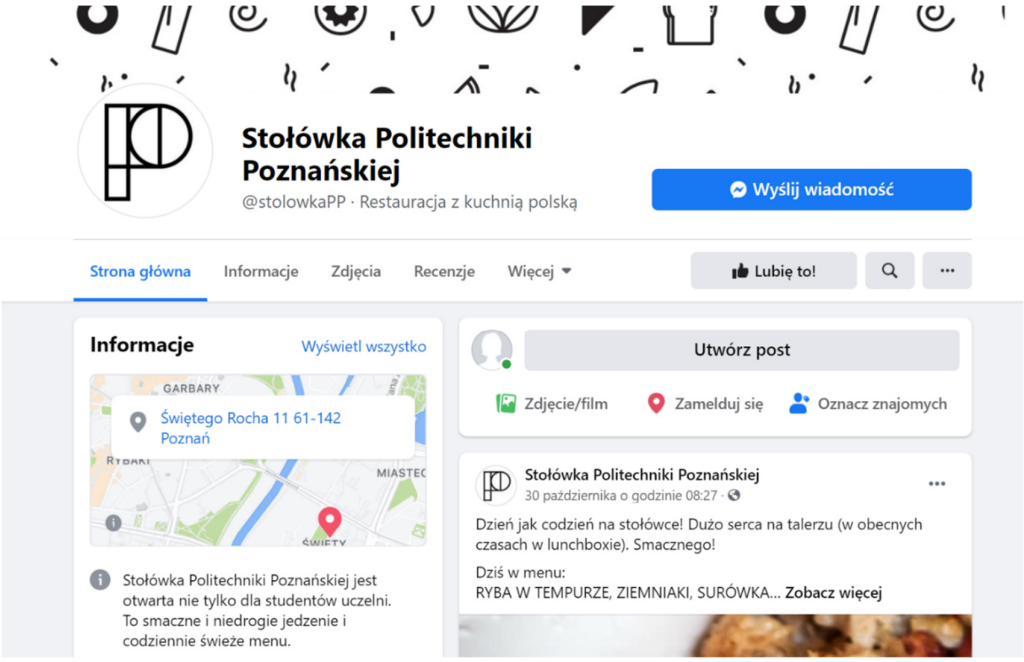

Canteen of Poznan University of Technology send a message
Home page Information Images Reviews More
Information

Saint Roch Canteen 11 61-142

Canteen of Poznan University of Technology is available not only for the university students. We offer fresh, tasty food at attractive prices.

Canteen of Poznan University of Technology
30 October 08:27
Day like any other in the canteen! A lot of heart on the plate (nowadays in a lunchbox) good appetite!
Today on the menu:

FISH IN TEMPURA, PATATOES, SALAD … See more

Fig. 8: Facebook site of Poznan University of Technology Canteen
Source: Stołówka Politechniki Poznańskiej https://www.facebook.com/stolowkaPP

Services offered for hospital staff in the form of hot meals could support development of good relations with this environment. According to students 'a company can improve its image" in this way. Moreover, it was found that 'if the staff is satisfied with the meal they will certainly remember it and recommend the catering services to other people'. In the opinion of the respondents the next step could be sale of meals to go. In fact, the postulate is already being implemented as currently organizations are switching to this form of running a business because of restrictions connected with the coronavirus pandemic.

Conclusions

According to the survey, students are not fully satisfied with the services offered by catering outlets, situated on premises of universities in Bydgoszcz, especially with 'Relations' and 'Arena of Presentation'. The best rated element were 'People'. Moreover, no significant relation between the gender of students and their preferences to introduce organic products into the offer of university canteens was found, which was confirmed by the assumed research hypothesis. Summing up, it needs to be said that the accepted RAPP model proved to be useful in the marketing assessment, it highlighted weaknesses and strengths of catering outlets operating on premises of universities, indicating the direction of changes to be introduced by entrepreneurs in the process of service marketing management. Based on the results obtained in this article, have been identified several future research directions. One of these could be the analysis of marketing, marketing-mix in catering outlets located on premises of universities a comparative manner by including other countries or geographical regions.

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Business Agility & Strategic Management. Parametric Strategic Management Concept Meets Agile-Methods II.

Alexander OBYDENOV

Financial University under the Government of the Russian Federation, Moscow, Russia,
alexander.obydenov@gmail.com

Abstract

We are developing an idea that Parametric Strategic Management represents business-agility of organizations very well. Moreover, Agile methods comply with the emergent strategy concept quite isomorphically, and follows it in a consistent manner. Renunciation of strategic planning in management of organizational development happens to a significant degree in that context. At the same time, inasmuch as it remains it takes on new, more flexible forms. The concept of self-organization management? which essentially appears to be Parametric Strategic Management, holds a special place in such trends.. In a case study of a Russian teal supermarket chain «VkusVille», we analyze, how such management can be practically applied. That case, as well as exploring limits and necessary conditions for implementation of managed self-organization, indicate that Parametric management is relevant for business practice.

Keywords: business agility, agile management, parametric strategic management, managed self-organization

Introduction

Same as our previous studies, this article is dedicated to the issues in organization functioning and development, which relate directly to one out of fifteen sections included in the principals of modern scientific research in management (Wankel, 2007).

This time we are discussing not only the correlation between the concept of Parametric Strategic Management, introduced earlier (Obydenov, 2016), and the Agile Management methods that became widespread in the business practice, but also the deep connection between Strategic Management and Agile Management methods as a whole.

It ought to be noted, that the interest in conceptual approach towards Agile has been growing as of late. For instance, one of the Extreme Programming developers and a signatory of the Agile Manifesto Ron Jeffries wonders: what is Agile – is it management or anti-management? If the former, then which type? Ron suggests, that it is more of an anti-tayloristic and pro-dumping management (Jeffries, 2019).

Business agility & Parametric Strategic Management

Drawing parallels between the concept of Parametric Strategic Management and Agile methods, we should mention that both serve as alternatives to the command-and-control method (Rigby, Sutherland, 2016).

Overall, business agility can be perceived as a part of Parametric Strategic Management. It is customary to view business agility as organization's ability to rapidly respond to alterations in market conditions (Felipe, Roldan, Leal-Rodríguez, 2016). Within Parametric Strategic Management we perceive self-organization as a basis for agility. And self-organization is viewed as a freedom to distribute and redistribute resources between various activity areas of an organization. It provides a good opportunity for businesses to adapt to the ever changing

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external environment. We may note, that elements of self-organization can be found in any establishment, even in a one-man company – it appears in a form of time division between work and play that the worker selects themself, which is also an element of business agility. "Rapid adaptation to the external environment is obtained through the seemingly chaotic process of receiving various feedbacks" (Grant, 2008). While discussing specific Agile framework, here's an example of how ScrumTrek (a leading consulting company, dedicated to promotion of Agile in Russia) defines Scrum in their report from 2017 (Report, 2017): "Scrum is the most easy-to-understand approach: a concrete set of rules that a self-organizing team should abide by". That is what managed self-organization is, in other words, Parametric Strategic Management via institutions.

Agile Management Methods and emergent strategies

We should note that the first serious inquiry into Agile Management methods was Hirotaki Takeuchi and Ikujiro Nonaki's «The New New Product Development Game» research, published in Harvard Business review in 1986 (Takeuchi, Nonaka, 1986), wherein authors analyzed the experience of using small self-organizing teams for innovative product development in Japanese corporations. Team-oriented product development approach was used in creation of «Xerox», «Honda» auto engines, «Canon» photo cameras, etc. One of the key elements of Agile methods is team self-organization, where a certain dynamic order emerges (Takeuchi, Nonaka, 1986). To avoid chaos, it is necessary to lay out how exactly each team member (and the department behind them) participate in the overall process, and the rules for interaction between all the members involved in the process. Moreover, lots of sources dedicated to Agile point out that instead of positions, roles are used.

To explore correlation between Agile Management methods and Strategic Management concept, we shall look into «Kenevin model», developed by David Snowden (Kurtz, Snowden, 2003). We are looking at a complex domain, where it's not always possible to retrace the inner communication within the organization, especially during it's early development stage. In a complex domain the connection between cause and effect can be mostly revealed in retrospect only, and results are often unpredictable (Konnor, 2018). The essential research technique and hypothesis testing in an organization like that would be by conducting an experiment. However, it is agreed a priori, that the experiment might not result in success. Various experiments may be conducted simultaneously or even contradict each other. While managing these systems one should mange those experiments in such a way, so that failing wouldn't hurt the overall organization, instead of attempting to create a "fool proof" environment within it.

A rather important point we should make for Strategic Management in a complex domain is that we cannot solve that domain's issues just by using cutting-edge practices, such as benchmarking. One's own successful practice is achieved through conducting these "non-destructive experiments", which reveal the weak spots in the organization that lead to failure of those experiments ex post, while highlighting strong points that lead to their success. That way, we obtain emergent procedures and practices, that are often unique in the field of complexity (Bridge). The existence of such practices within the complex domain allows to connect the dots between Agile Management methods and emergent strategies.

Conceptually, the essence of emergent strategies, which appear spontaneously in the course of implementing managerial decisions directed at reaching organizational goals and create a particular pattern of actions, was clarified by G. Mintzberg (Mintzberg, Ghoshal, Quinn, 2002). As it is known, spontaneous (emergent) strategies surface and unravel without any priorly settled planning, and do not follow company's laid out path to success (D. Good, 2018). Emergent strategies must generate permanently, as every company operates in an ever changing environment. It is believed that emergent strategies are resultative, if an organization follows a consistent action pattern (Bovaird, 2008) in unpredictable conditions (F. Neugebauer, F. Figge, T. Hahn, 2016) and have an improvisational quality, that results in creating unforeknown, yet successful products (Brown, 1998). In Stacey's opinion, implementation of self-organizing teams considerably increases the emergent strategies' strength (Stacey, 1992).

From the Parametric Strategic Management (managed self-organization) concept's point of view, certain guidelines must exist for a successful application of an emergent strategy. That strategy may be formed and applied with a simple set of rules (Eisenhardt, Sull, 2001), or strategic principles (Gadish, Gilbert, 2007). That subject is thoroughly explored in (Obydenov, 2018).

Agile Management methods and planning

The topic of planning within Agile Management methods deserves a special mention. It is considered that white-collar planning has become passé, and according to that, an updated idea is offered, of a more flexible planning that

makes requests which Agile Management has to comply with (Fiore, 2018). But planning company's financials is exactly what attracts investors! How does that work within Agile methods?

The solution is applying a hybrid of both agile and planned approaches based on risk analysis (Boehm, Turner, 2004). If the risks are higher for agile approach, then planning is selected. And vice versa.

As we promote the concept of Strategic Management, we are interested in placing it within Agile framework. For example, we offers transition to iterated prediction as part of the strategic planning (Hodgson, 2018), as well as moving from traditional and static planning methods to dynamic and flexible strategy, which adapts to alterations in market conditions, as a part of corporate strategic planning. That way, a "self-learning organization" is formed, based on a "review-and-adapt" feedback loop for a constantly developing and improving corporate strategy. As is the case with traditional strategic planning, the attention is directed to achieving balance between the vision of business and business results. The main difference, however, is that instead of wasting months on forming and finalizing plans, the company's management rather decides on HOW to plan (Leyborn, 2016).

Managed self-organization

Managed self-organization – that is what essentially both Parametric Strategic Management and Agile Management methods are. That unites them, among other things. We shall recall, that by self-organization within Parametric Strategic Management we mean title-for-title, resource, authority and responsibility exchange between different stakeholders, and the practice itself is carried through the selected managerial criteria – rules of the game.

Managed self-organization behind the Agile manifesto in particular, may be seen as an intention to discover a middle way between order and chaos (Appelo, 2010). Limit setting is of great importance in Management 3.0. Appelo concludes though, that sole self-organization is not enough, that it could and should be directed as well. In order to do that, we have to define certain boundaries, terms and rules. Manager's goal is to fine tune such settings, as: considering diverse competence of different team members, uninterrupted data exchange between employees and unobstructed communication between teams (Appelo, 2010).

Bill McKelvey states, that Jack Welch ran General Electric through simple directives (e.g. "Place at least first or second in your segment", "Simplicity... Self-esteem", "Ensure quality by using model 6Sigma", etc.) combined with powerful call-to-actions, deriving from the heritage of complex thinking (McKelvey,2001).

Glen Alleman points at the difference between ability to self-organize and ability to direct one's growth (Alleman, 2008). In accordance with that, self-organizing and self-directing teams are distinguished in Agile. By self-directing teams we mean those that select and define their own goals.

By setting boundaries and introducing regulations, managers affect the pattern of results that the self-organizing team produces (Lewin, Regine, 2001). In biology it is called «managed evolution» (Kelly, 1994). We can find mentions of evolving organizations in Robertson book as well (Robertson, 2015). Appelo distinguishes three main functions of a manager, which they should apply while setting limits within an organization: 1) system enhancement, 2) system protection, and 3) system direction (Appelo, 2010). In order to manage a group we must: put it together, set limits and goals for each member of it, and observe.

Appelo admits, which is fully compliant with our Parametric Strategic Management approach, that we should set an overall goal and limits to direct self-organization towards an attractor (an organization state with a ready-to-use product may be considered as such). That being said, we may destabilize the situation using external factors and change system's settings in order to switch between attractors (Appelo, 2010).

If we regard holacracy as a subset of agile management methods, we may mention that Chief Representative of David Allen Company in Russia states the following: "In holacracy, rules are given the authority to distribute responsibilities in such a way, that people can become leaders within their assigned roles" [Inshakov, 2018, p. 5]. Peter Drucker pointed out that "Culture eats strategy for breakfast", meaning that the company can execute it's long-term agenda only if it is consonant with the inner culture of an organization, which basically presents as a playbook of informal rules. So everything that contradicts the organizational culture is not being implemented. More than 500 companies introduced holacracy, Zappos and David Allen Company being among the most notable.
According to Robertson (Robertson, 2007), the founder of holacracy, it is not a mere theory, but praxis forged by trial and error. Holacracy includes following elements:

- The Constitution, that defines rules and redistributes competence territories;

- A new approach to organization structuring and role assignment, with regard to people's competencies;
- A unique process of decision-making while updating and reassigning roles and competencies;
- Holding meetings that are aimed at team activity synchronization and collaboration to obtain results.

All that points to the fact that holacracy also represents a managed self-organization, which stands behind the "rules of the game" of Parametric Strategic Management, where coordination is an essential component.

Case Study. Managed self-organization within «VkusVill» brand

Let's take a look at a case of managed self-organization in the «VkusVill» supermarket chain (Shepin, 2019). They are using a system of individual contributor commitments, which essentially present a system of guidelines, around 120 commitments overall. As the result of that approach, corporate management takes up just 1,5% of the revenue, which is considerably less than hierarchic management. Let's find out how that works.

One of the biggest advantages of Agile methods over hierarchy is employee's local knowledge. Why not simply hand out tasks to employees and just supervise? In «VkusVill» the person who knows best, whether one or the other goal is achievable and how resource-consuming it is, is the person who is carrying out the task. Completion of each commitment becomes employee's sole responsibility.

In comparison, as hierarchic organizations continue to grow and evolve they add extra layers of authority. For instance, at the fixed manageability rate (maximum possible number of subordinates for one executive director) of three people, the firm that consists of 4 people (including the CEO) has two-leveled hierarchy, firm of 5-13 colleagues – three levels, 14-41 members – four levels, 42-122 employees – five levels, etc. (Grant, 2008). If the hierarchy is of a bureaucratical sort and wields central authority, the growth of such company implies a constant increase in managing staff, relative to the number of subordinates; slower decision-making and accumulative loss of control (Williamson, 1967). That's why such corporate giants as Unilever, British Petroleum and General Electric carried through some organizational adjustments that included: reduction of hierarchy levels, decentralized decision-making, decrease in HQ staff. The main focus shifted from vertical communication to horizontal, from supervision and control to personal accountability (Whittington, Pettigrew, 1999).

But let's get back to our case, and take a look past the boundaries of commitments. «VkusVill» employees are presented with a variety of choices:

(1) There is no, nor there ever has been any form of dress code. Staff is free to clothe however they see fit.
(2) There is no penalty system in place.
(3) There is no "9 to 5" schedule. Strict timetable and attendance are not as vital as most employers think. As practice shows, employees with flexible hours work much more than those with fixed hours.
(4) There is no budget. Each employee may spend as much as suffices, but all the expenditures are transparent and become immediately known in the company. So the employee must at all times be ready to explain to his superiors, where did the money go and what have those expenses brought to the table.
(5) There is no HR in «VkusVill». Staff recruitment and selection may be done by managers or via head hunting agency. Moreover, applicant's competence and potential are not being evaluated. A "decent human being" is what they company is looking for, while the "time will show" theirs potential. That approach forms a team of likeminded people and intra-team culture, although the responsibility for the rookie is taken by the staff member, who employed them. That fact somewhat contradicts the hypothesis within the concept of Parametric Strategic Management, that only motivated and professional employees may work inside a managed self-organization.
(6) There is no planning in «VkusVill». At it's inception, strategic sessions were held every year, where the agenda was laid out for the next 12 months. But the experience has shown, that those projects haven't always been fulfilled, and other emerged that nobody planned or thought of.

To sum that up, «VkusVill» is a successful example of implementation of a managed self-organization in Russian business, in a possible form of Parametric Strategic Management. We can clearly see the following elements of that executive system:

(1) self-organization (employees' ability to assign their own tasks and explore ways of redistributing resources between those; ability to choose their own working hours by dividing time between work and play; ability to evaluate financial resources for the completion of tasks-at-hand).
(2) rules of the game that regulate self-organization.
(3) freedom from planning and finding other forms of management to replace it.

Limits to applicability of Parametric Strategic Management

In an attempt to summarize the presented analysis of correlation between Agile Management methods and Strategic Management, and the specific case study above, an interesting question arises – which type of organizations would benefit from implementing Parametric Strategic Management. As that approach substantiates self-organization in various ways, it would be appropriate to consider research work in the field of holacracy. As recent study shows [Velinov, Cassilev, Denisov, 2018], holacracy is mostly used in consulting and education (42%), followed by IT and digital marketing (27%). In more than 80% of the cases holacracy is used in small to medium enterprises (up to 250 employees), 23% of microcompanies (1-10 employees) and 45% of small companies (11-50 employees).

Holacracy implementation examples – Zappos company, Russian company Knopka /russian for «button»/ (Velinov, Cassilev, Denisov, 2018). At the time of the 2018 research, companies that use holacracy were mostly established in year 2004. On average, holacracy is introduced after 3,5 years, which is mostly due to the recent uprise in the application of holacracy.

When we talk about limits to applicability of Agile Management methods, the biggest obstacle would be the type of corporate culture that rejects core values of Agile (State of Agile, 2016; 2018). That issue is most notable in bigger companies.

The Parametric Strategic Management concept has a systemic and economic justification, which lays the foundation for a thorough study of necessary conditions for effective operation and of certain boundaries that help achieve successful implementation of Agile methods in business practice. We should note that it is considered that "there is no scientific proof as of now, that self-managing (read «managed self-organization» - A.O.) affects business profitability" (Fukolova, 2019).

Conclusion

While exploring correlation between Parametric Strategic Management and Agile Management methods, we reached a common level of reference between Strategic Management and Agile Management methods as a whole. Particularly in the area of emergent strategies and strategic planning, which are of great importance for a company's evolvement and attraction of investors.

We studied a case of a Russian supermarket chain «VkusVill», positioning itself as a teal level organization, and revealed certain elements of a managed self-organization which are compliant with the concept of Parametric Strategic Management.

The Parametric Strategic Management concept has a systemic and economic justification, which allows us to apply Agile Management methods more consciously: using conceptual analytical models and considering the necessary conditions for an effective introduction of Agile methods.

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Management of Contagion Risk in a Carpooling System

Grzegorz FILCEK

Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Wroclaw, Poland, grzegorz.filcek@pwr.edu.pl, ORCID: 0000-0002-9760-0656

Maciej HOJDA

Faculty of Computer Science and Management, Wroclaw University of Science and Technology, Wroclaw, Poland, maciej.hojda@pwr.edu.pl, ORCID: 0000-0003-3195-4862

Abstract

Carpooling as a means of reducing travel costs is a popular mode of transportation. Typically, passengers choose drivers based on a variety of factors, such as travel cost, travel time, comfort, and safety. In this paper, we explore the possibility of adding contagion risk as a key factor in the decision-making process. We consider a global coordinating system that provides passenger assignments and driver routes to a set of participating carpoolers..

Keywords: Transportation Management, Carpooling, Contagion Risk, Multicriteria Optimization.

Introduction

In essence, carpooling is a way of organizing transportation in such a way so that a group of participating carpoolers: drivers and passengers, can share resources -- cars -- in a way that optimizes a variety of criteria, such as travel cost, travel time, comfort and safety (Jamal et al. 2016). This requires solving at least two interconnected problems: passenger to driver assignment and vehicle routing, all the while satisfying constraints and preferences of participating stakeholders (Petrillo et al. 2017).

Multiple criteria can be considered jointly, which leads to multi-objective optimization problems (Filcek et al. 2017) that are especially difficult to solve as they often require interactions with the stakeholders to guide the solution towards an acceptable optimum in the Pareto sense (Żak et al. 2019). Transportation in a pandemic situation has suffered significant losses overall with passengers losing trust in public transportation. In consequence, many approaches to revitalize the transportation sector by making it safer have been made (Chen et al. 2020; Tan and Ma 2020; Tirachini and Cats 2020). Consequently, under the ongoing risk of contagion, further precautions have to be put in place to ensure that carpooling remains a safe method of organizing transportation. This results in new models and new decision-making algorithms.

In this paper, we propose a model for solving the carpooling problem, i.e. passenger to driver assignment and vehicle routing in a way that minimizes the total risk of contagion while keeping travel cost at reasonable levels. We introduce a multicriteria optimization problem where contagion risk is defined by several criteria. We propose to aggregate the criteria which results in a problem that can then be solved with the use of standard optimization methods such as genetic algorithms.

Carpooling model

We consider a map given by a graph $\mathbf{G} =< \mathbf{V}, \mathbf{E} >$, where $\mathbf{V} = \{1, 2, \ldots, V\}$ is the set of (indexes of) nodes and $\mathbf{E} = \{1, 2, \ldots, E\}$ is the set of (indexes of) arcs. We denote the set of (indexes of) drivers as $\mathbf{D} = \{1, 2, \ldots, D\}$ and an extended set $\tilde{\mathbf{D}} = \mathbf{D} \cup \{0\}$ (driver with index 0 is an artificial driver, to which passengers who do not carpool are assigned) and the set of (indexes of) passengers as $\mathbf{P} = \{1+D, 2+D, \ldots, P+D\}$. The set of all carpoolers (without the artificial driver) is $\mathbf{C} = \mathbf{P} \cup \mathbf{D}$ and an extended set is $\tilde{\mathbf{C}} = \mathbf{C} \cup \{0\}$. For each carpooler, we have a set of rides $\mathbf{R}_c = \{1, 2, \ldots, R_c\}$ to be performed over a period of time. For each ride $r \in \mathbf{R}_c$ we have an origin node $org_c^r \in \mathbf{V}$ and a destination node $dst_c^r \in \mathbf{V}$. In fact, we assume that $\mathbf{V}$ consists only of those nodes. We also assume that those nodes are unique for each carpooler and that each carpooler has to depart from his/her origin in time period $[\underline{s}_{c,r}, \overline{s}_{c,r}]$

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and arrive at the destination in time period $[\underline{t}_{c,r}, \overline{t}_{c,r}]$. Travel cost between nodes (i, j) for driver d is denoted as $q_{i,j}^{d} \geq 0$ and minimal travel times are denoted as $e_{i,j} \geq 0$. We also assume that pick-up and drop-off times are included in $e_{i,j}$. Effective car capacity is denoted as $a_d \in \{1, 2, 3, \ldots\}$.

Historical data about the number of recently underwent joint travels between two carpoolers c_1, c_2 is given by $\alpha_{c_1,c_2} \in \{0, 1, \ldots\}$. The aggregated risk that the carpooler c poses by participating in the carpooling process is given as $\beta_c \in [0,1]$. The aggregated risk that other carpoolers pose a threat to carpooler c is given by $\gamma_c \in [0,1]$. Aggregation can be done over multiple internal parameters of the carpooler, including the time since the last vaccination or the time since the last infection, as well as general resilience. In a realistic situation, some or all of the data might be unavailable, in which case the best guess based on statistical data has to be made. The risk of being infected could be estimated based on an assessment test composed of questions provided by WHO (World Health Organization), e.g. a test implemented in a mobile application "STOP COVID - ProteGO Safe" (STOP COVID 2020) or a BMA document (BMA 2020). We consider several safety-based criteria that describe the (negative) impact of carpooling on the spread of the disease. Passengers who choose not to participate in carpooling, are expected to use alternative transportation methods cost of which is $ATC_p^r \geq 0$ for passenger p in ride r.

We define the following type of variables $y_{p,r_1}^{d,r_2} \in \{0,1\}$ which is the assignment of passenger p in his/her ride r_1 to driver d in this driver's ride r_2 ($=1$ if assigned). The second type of variables is the route of the carpooler $x_{c,r}^{v_1,v_2} \in \{0,1\}$ which defines if carpooler c in ride r moves directly from node v_1 to node v_2 ($=1$ if so). For each carpooler c and ride $r \in \mathbf{R}_c$, we denote as $\underline{\tau}_{c,r}^{v}$ the arrival time in node v and as $\overline{\tau}_{c,r}^{v}$ the departure time from that node.

Carpooling Constraints

What follows is a brief description of constraints of the decision making problem. Constraint (1) ensures that for each carpooler c and their ride r, origin and destination nodes are on the route (and in correct place) and that the route is not disjoint. Constraint (2) guarantees that there are no subcycles. Then we use (3) to ensure that each passenger p and their ride r are assigned to exactly one driver. Following constraint (4) makes it certain that passengers assigned to drivers share portions of the same route. Number of passengers travelling in car at the same time is kept valid by constraint (5). Arrival $\underline{\tau}_{c,r}^{v}$ and departure $\overline{\tau}_{c,r}^{v}$ times need to fit into time windows which is ensured in (6).

$$\sum_{v \in \mathbf{V}} x_{c,r}^{v,w} - \sum_{v \in \mathbf{V}} x_{c,r}^{w,v} = \begin{cases} 0 & w \neq org_c^r \wedge w \neq dst_c^r \\ 1 & w = dst_c^r \\ -1 & w = org_c^r \end{cases}, c \in \mathbf{C}, r \in \mathbf{R}_c, w \in \mathbf{V}. \tag{1}$$

$$\sum_{v \in S} \sum_{w \in S} x_{c,r}^{v,w} \leq |S| - 1, c \in C, r \in R_c, S \in V, S \neq \emptyset, S \neq V \tag{2}$$

$$\sum_{d \in \mathbf{D}} \sum_{r_2 \in \mathbf{R}_d} y_{p,r_1}^{d,r_2} = 1, \ p \in \mathbf{P}, r_1 \in \mathbf{R}_p. \tag{3}$$

$$x_{d,r_2}^{w,v} \geq y_{p,r_1}^{d,r_2} x_{p,r_1}^{w,v}, \ p \in \mathbf{P}, r_1 \in \mathbf{R}_p, d \in \mathbf{D}, r_2 \in \mathbf{R}_d, v \in \mathbf{V}, w \in \mathbf{V}. \tag{4}$$

$$pn_{d,r}^{v} \leq a_d, \ d \in \mathbf{D}, r \in \mathbf{R}_d, v \in \mathbf{V}. \tag{5}$$

$$\begin{gathered} \overline{\tau}_{c,r}^{org_c^r} \in [\underline{s}_{c,r}, \overline{s}_{c,r}], \ \underline{\tau}_{c,r}^{dst_c^r} \in [\underline{t}_{c,r}, \overline{t}_{c,r}], \ \underline{\tau}_{c,r}^{v} \leq \overline{\tau}_{c,r}^{v}, \ \underline{\tau}_{c,r}^{w} - \overline{\tau}_{c,r}^{v} \geq x_{c,r}^{v,w} e_{v,w}, c \in \mathbf{C}, r \in \mathbf{R}_c, v \in \mathbf{V}, w \in \mathbf{V}, \\ y_{p,r_2}^{d,r_1} \overline{\tau}_{d,r_1}^{org_p^{r_2}} \in [y_{p,r_2}^{d,r_1} \underline{s}_{p,r_2}, y_{p,r_2}^{d,r_1} \overline{s}_{p,r_2}], \ y_{p,r_2}^{d,r_1} \underline{\tau}_{d,r_1}^{dst_p^{r_2}} \in [y_{p,r_2}^{d,r_1} \underline{t}_{p,r_2}, y_{p,r_2}^{d,r_1} \overline{t}_{p,r_2}], d \in \mathbf{D}, r_1 \in \mathbf{R}_d, p \in \mathbf{P}, r_2 \in \mathbf{R}_p, \end{gathered} \tag{6}$$

The number of passengers $pn_{d,r}^{v}$ in each node v of a route for driver d and ride r, which is used in (5) can be calculated the following way

$$pn_{d,r}^{org_d^r} = 0,\ \ pn_{d,r_2}^{v} = \sum_{w\in\mathbf{V}} x_{d,r_2}^{w,v}\, pn_{d,r_2}^{w} + \sum_{p\in\mathbf{P}}\sum_{r_1\in\mathbf{R}_p} y_{p,r_1}^{d,r_2} x_{p,r_1}^{org_c^r,v} - \sum_{p\in\mathbf{P}}\sum_{r_1\in\mathbf{R}_p} y_{p,r_1}^{d,r_2} x_{p,r_1}^{dst_c^r,v} \tag{7}$$

Travel cost for a carpooler c in ride r and then for and for the passenger p in ride r are given next

$$tc_{d,r}^{org_d^r} = 0,\ \ tc_{d,r}^{v} = \sum_{w\in\mathbf{V}} x_{d,r}^{w,v}(tc_{d,r}^{w} + q_{w,v}^{d}),\ \ d\in\mathbf{D},\ r\in\mathbf{R}_d,\ v\in\mathbf{V}, \tag{8}$$

$$tc_{p,r}^{org_p^r} = 0,\ tc_{p,r}^{v} = y_{p,r}^{0,1} ATC_p^r + (1-y_{p,r}^{0,1})\sum_{w\in\mathbf{V}} x_{p,r}^{w,v}(tc_{p,r}^{w} + \sum_{d\in\mathbf{D}}\sum_{r_1\in\mathbf{R_d}} \frac{y_{p,r}^{d,r_1} q_{w,v}^{d} P_d}{(1+pn_{d,r_1}^{w})}),\ p\in\mathbf{P},\ r\in\mathbf{R}_p,\ v\in\mathbf{V}, \tag{9}$$

under the assumption that the passengers and the driver in route split costs over each route fragment. The coefficient P_d expresses how is the cost split between driver d and their passengers (typically, $P_d \geq 1$). Then total travel cost for a carpooler c in ride r is equal to $tc_{c,r}^{dst_d^r}$. By splitting costs, driver d in raid r gains $((P_d-1)pn_{d,r}^{v}-1)/(pn_{d,r}^{v}+1)$ of the route cost from node v to the following node, so the income $ti_{d,r}$ from carpooling for driver d in raid r is as follows:

$$ti_{d,r} = \sum_{v\in V}\sum_{w\in V} x_{d,r}^{v,w} q_{v,w}^{d}((P_d-1)pn_{d,r}^{v}-1)/(pn_{d,r}^{v}+1),\ \ d\in\mathbf{D},\ r\in\mathbf{R}_d. \tag{10}$$

We assume, that the drivers expect, for their participation in the carpooling process, a payout, or at least a reduction in costs. The minimal benefit of $mb_{d,r}$ has to be met

$$ti_{d,r} - (tc_{d,r}^{dst_d^r} - q_{org_d^r,dst_d^r}^{d}) \geq mb_{d,r} \max_{p\in\mathbf{P}} \max_{r_1\in\mathbf{R}_p} y_{p,r_1}^{d,r}, d\in\mathbf{D},\ r\in\mathbf{R}_d. \tag{11}$$

Safety Criteria

For carpooler c, the risk of contamination consists of many factors. We represent them as different decision making criteria. The first one is the the average susceptibility to contamination based on the number of common travels with different carpoolers (12). Second is the average utilization of car capacity by passengers traveling jointly together per car (13). What follows is the average utilization of the drivers' travel times by average number of passengers while carpooling (14). Finally we have part of passengers' rides that were not assigned to any driver (15).

$$SF_1 = \sum_{c_1\in\mathbf{C}}\sum_{c_2\in\mathbf{C},\ \{c_1\}} \beta_{c_1}\gamma_{c_2}(\theta_{c_1,c_2}) / (\sum_{c_1\in\mathbf{C}}\sum_{c_2\in\mathbf{C},\ \{c_1\}} \alpha_{c_1,c_2} + \sum_{c\in\mathbf{C}_c} R_c), \tag{12}$$

$$SF_2 = \frac{1}{D}\sum_{d\in\mathbf{D}}\sum_{r\in\mathbf{R}_d}\sum_{v\in\mathbf{V}}((pn_{d,r}^{v}+1) / \sum_{w_1\in\mathbf{V}}\sum_{w_2\in\mathbf{V}}(a_d+1)x_{d,r}^{w_1,w_2}). \tag{13}$$

$$SF_3 = \sum_{d\in\mathbf{D}}\sum_{r\in\mathbf{R}_d}\sum_{v\in\mathbf{V}} pn_{d,r}^{v}((\overline{\tau}_{d,r}^{v} - \underline{\tau}_{d,r}^{v}) + \sum_{w\in\mathbf{V}} x_{d,r}^{v,w}(\underline{\tau}_{d,r}^{w} - \overline{\tau}_{d,r}^{v})) / \sum_{d\in\mathbf{D}}\sum_{r\in\mathbf{R}_d}((\overline{\tau}_{d,r}^{dst_d^r} - \underline{\tau}_{d,r}^{org_d^r}) \max_{v\in\mathbf{V}} pn_{d,r}^{v}). \tag{14}$$

$$SF_4 = \sum_{p\in\mathbf{P}}\sum_{r\in\mathbf{R}_p} \lambda_p y_{p,r}^{0,1} / \sum_{c\in\mathbf{P}} R_c. \tag{15}$$

Used in (12), the indicator θ_{c_1,c_2} of at least one common route between two carpoolers is calculated as follows

$$\theta_{c_1,c_2} = \max\{\min\{1,\alpha_{c_1,c_2}\},\{\max_{r_1\in\mathbf{R}_{c_1},r_2\in\mathbf{R}_{c_2},v\in\mathbf{V},w\in\mathbf{V}} x_{c_1,r_1}^{v,w} x_{c_2,r_2}^{v,w}\}\}, \tag{16}$$

Optimization problem

Anti-Contagion Carpooling Problem (ACCP)

$$\min[SF_1, SF_2, SF_3, SF_4] \tag{17}$$

under constraints (1)-(11).

This multi-criteria optimization problem can be solved using dedicated algorithms for multi-criteria optimization such as NSGA-II (Deb et al. 2002) in order to generate a Pareto front. However, to avoid the need for a separate decision-maker required for selecting a final solution from the Pareto front, we propose a different approach. The idea is to aggregate the quality criteria within a weighted sum and minimize the distance to the ideal point, which is $\overline{0}$. In conclusion, the goal is as follows

$$\min \sum_{i=1}^{4} (sw_i SF_i)^2 \tag{18}$$

under constraints (1)-(11), where sw_i are coefficients expressing the relative importance of each SF_i.

Conclusion and Further Works

In this paper, we present a way of modeling a multicriteria carpooling problem with an aggregated quality coefficient based on passenger safety in a pandemic environment. Minimizing this coefficient can serve to manage the global risk of contagion between participating carpoolers. This model can be used to represent realistic carpooling situations where the safety of drivers and passengers is paramount.

Further works should aim at evaluating the efficiency of standard methods of artificial intelligence, such as evolutionary or genetic algorithms. Another goal is to introduce more risk-related criteria and constraints, to better reflect the contagion risk.

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Ingenieria De Requisitos: Conocer Los Principales Enfoques Y Visualizar Las Nuevas Fronteras

Patricio E. RAMIREZ-CORREA
Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Ari MELO-MARIANO
Universidade de Brasilia, Brasilia, Brasil, arimariano@unb.br

Maira ROCHA-SANTOS
Universidade de Brasilia, Brasilia, Brasil, mairarocha@unb.br

Resumen

El objetivo del estudio fue realizar una revisión sistemática de la literatura sobre Ingeniería de Requisitos durante los últimos 10 años (2009-2019). La Ingeniería de Requisitos se ha convertido en un área de gran interés para los investigadores de software, pero su crecimiento ha llevado al desarrollo de diferentes enfoques y nuevos campos de estudio dentro del área. Esta investigación es de tipo exploratorio, con un enfoque cuantitativo a través de la teoría del enfoque metaanalítico consolidado. Se realizó una revisión sistemática de la literatura en las bases de datos Web of Science y Scopus. Se encontraron 2418 trabajos en WoS, 8168 en SCO. Como resultados se presentaron los autores más relevantes, los enfoques más importantes, los principales frentes de investigación en el área. Se encontró que las bases de datos investigadas están alineadas y ven como posibles frentes la validación empírica de requisitos, diseño del sistema, contexto del sistema, requisitos específicos de seguridad, actualizaciones y nuevas versiones de software y categorización en el sistema.

Palabra clave: Ingeniería de requisitos, revisión de literatura, nuevos campos.

Introducción

A medida que se desarrolla un área existe la necesidad de crear subáreas (Khurum Gorschek & Wilson, 2013; Jarke et. al., 2011; Avital & Te'Enin, 2009) como ocurrió con la Ingeniería de Requisitos, que nació de la Ingeniería de Software. Este estudio tiene como problema de investigación señalar ¿qué posibles frentes de investigación pueden ser campos dentro del área en el futuro? Para dar respuesta a este problema es necesario consolidar los hallazgos hasta el momento y observar los estudios que se destacan. Para ello se utilizaron análisis bibliométricos y de cocitación, que muestran los enfoques más importantes y el acoplamiento, que vislumbra posibles frentes de investigación (Mariano, & Rocha, 2017). Así, el objetivo de este estudio es consolidar las principales aportaciones de la literatura científica de los últimos 10 años, en el área de la Ingeniería de Requisitos.

Metodología

La investigación es exploratoria, con enfoque cuantitativo y cualitativo, a través de la Teoría del Enfoque Metaanalítico Consolidado - TEMAC de Mariano e Rocha (2017), con tres etapas. Los pasos están disponibles en la plataforma www.pesquisatemac.com, a través de lecciones en video gratuitas. Se eligieron las bases de datos Web of Science y Scopus porque son dos bases de datos que ofrecen resultados de investigación de calidad. Los resultados se analizaron con la ayuda de Microsoft Excel y Vosviewer.

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Revisión de la literatura y resultados

Preparación de la investigación

La búsqueda, en las bases elegidas, se realizó con las palabras clave "Ingeniería de Requisitos" y "software". Se encontraron 2.134 registros WoS, 8.778 registros SCO. Se aplicaron dos filtros, uno de los últimos 10 años (2009-2019) y otro de tipo de documento = artículo, y los resultados finales fueron 407 artículos de WoS y 851 SCO.

Presentación e interrelación de datos

El artículo más antiguo de WoS se refiere a Jureta et al. (2009) [5] y se considera un artículo fundamental, donde los autores establecen una ontología central para formular el problema de requisitos. El artículo más antiguo de SCO es de Patel & Ramachandran (2009), que establece una metodología de mejora basada en tarjetas (SMM-Story Maturity Model), en entornos ágiles de desarrollo de software. El artículo de WOS más citado fue “A survey of traceability in requirements engineering and model-driven development” de Winkler & von Pilgrim (2010), con 91 citas, donde los autores abordan la trazabilidad, avances en obras, eventos y los autores concluyen que el tema seguirá ganando importancia. El artículo más citado de SCO es “Wireless network cloud: Architecture and system requirements”, de Lin et. al. (2010), con 148 citas. Los autores abordan las generaciones de redes de comunicaciones móviles y la necesidad de utilizar requisitos para evaluar los desafíos de las cambiantes generaciones inalámbricas.

El autor que más publicó en WoS fue Gorschek, T, con 17 publicaciones, y sus artículos más importantes son “A method for evaluating rigor and industrial relevance of technology evaluations” (Ivarsson & Gorschek, 2011), con 76 citas que aborda un método para evaluar la aplicabilidad , rigor y relevancia industrial y “The software value map - an exhaustive collection of value aspects for the development of software intensive products” (Khurum Gorschek & Wilson, 2013), con 22 citas, donde el autor presenta un estudio de mapa de valor para el software. El estudio más citado por el autor reveló que la mayoría de las investigaciones necesitan validación, ya que el segundo estudio encontró beneficios sustanciales en la adopción del mapa de valores. En SCO se repite el mismo autor (Gorschek, T) como el que más publicó, pero el primero El estudio más citado aquí es " Handshaking with implementation proposals: Negotiating requirements understanding" (Fricker, Gorschek, Byman, & Schmidle, 2010), con 46 citas, que explica las buenas prácticas de especificación de requisitos, como Handshaking, a Técnica eficiente y flexible para entender los requerimientos, tomar decisiones de implementación creando valor y favoreciendo la estabilidad del proyecto.

En WoS, las revistas que más publicaron fueron Requirements Engineering (56), Journal of Systems and Software (36) e Information and Software Technology (34), mientras que en SCO se repiten los dos primeros lugares con (78) y (48) respectivamente y software IEE con 44 publicaciones.

Finalmente, se extrajeron las palabras clave WoS y SCO y se creó una nube de palabras utilizando el software Tagcrow.

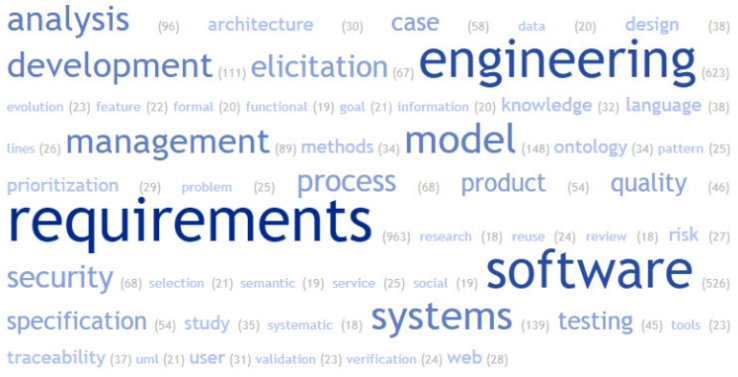

Fig 1. Web of Science Word Cloud

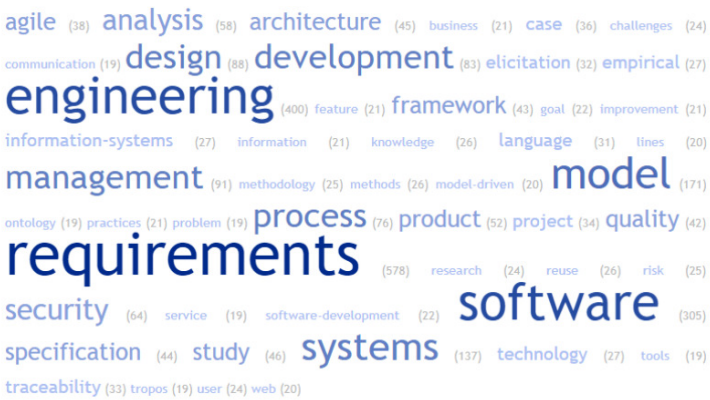

Fig 2. Scopus Word Cloud

Modelo Integrador Y Validación De Evidencias

Se crearon mapas de calor de co-citación y acoplamiento con el fin de encontrar los principales enfoques y los frentes de investigación.

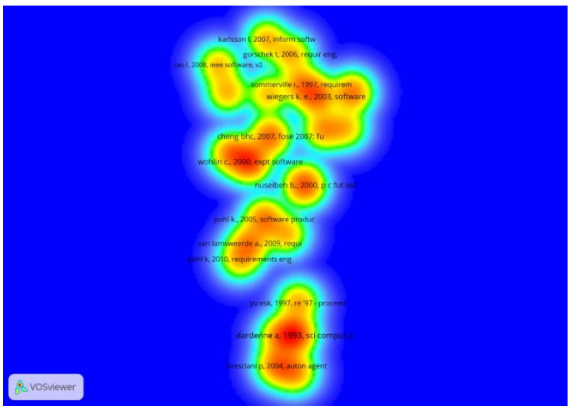

Fig 3. Mapa de Calor de cocitación *Web of Science*.

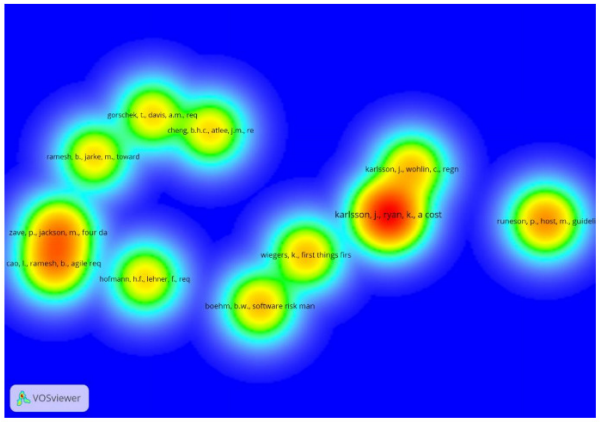

Fig 4. Mapa de Calor de cocitación *Scopus*.

En un primer Cluster se encuentran los trabajos de Karlsson, Gorschek, Sommerville y Wiegers, donde los autores tienen una preocupación concreta por clasificar, organizar y presentar soluciones en la Taxonomía de Requisitos. En el Clúster de la izquierda, el autor Cao, I, en su trabajo, explica 16 casos a través de 7 prácticas de desarrollo de software vía metodología ágil en Ingeniería de Requisitos En el Núcleo Wohlin y Cheng, los autores se preocupan por el futuro investigación sobre requisitos y enfoques prometedores en el área. Nuseibeh, por otro lado, dibuja una hoja de ruta para la Ingeniería de Requisitos. El siguiente grupo, formado por Pohi, K. y Van, L. y Variabilidad de requisitos y trazabilidad. Finalmente, en el último Clúster a continuación, se encuentran los trabajos de Yu Esk, Dardenne A y Bresciane B, que explican la importancia de los requisitos y cómo su uso ha ido creciendo para varios usos, incluida la interrelación con los objetivos organizacionales.

Se puede observar que el mapa de calor en SCO es muy similar al anterior, y que se repiten muchos Clusters. Atención especial a Ramesh y Jarke, quienes ratifican la trazabilidad de requisitos como un enfoque importante. Después de los mapas de co-citación de WoS y SCO, se realizaron mapas de acoplamiento con el fin de encontrar los principales frentes de investigación.

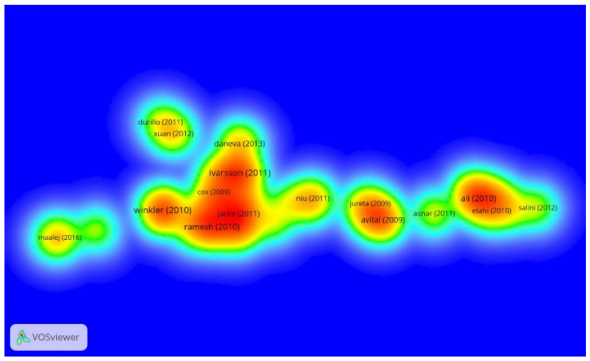

Fig 5. Mapa de Calor de Acoplamiento Web of Science.

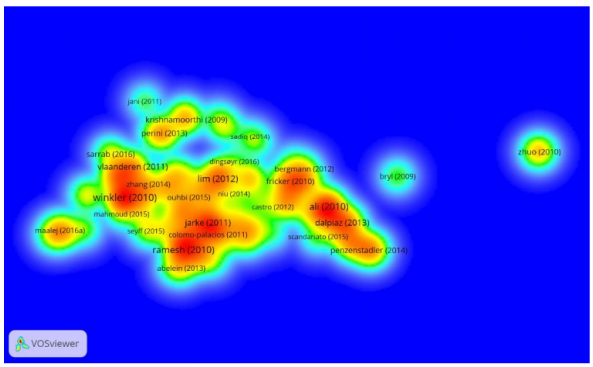

Figura 6. Mapa de Calor de Acoplamiento Scopus.

Se puede ver tres grandes núcleos rojos. El primero con Daneva, et al, (2014), Cox (2009), Jarke, et al (2011), Ramesh, et al (2010), Ivarsson y Gorschek (2011) y Winkler y Pilgrim (2010), donde los autores abordan el crecimiento de la Ingeniería de Requisitos y la necesidad de un uso más cuidadoso de las teorías en la investigación empírica, así como un mayor número de encuentros, adicionalmente, los estudios reclaman una mayor validez en los estudios, especialmente en lo que se refiere a su adherencia a la realidad del software. El segundo núcleo principal son Jureta et al (2009) y Avital y Dov (2009) señalan una preocupación por los diseños de los sistemas de información, así como por los nuevos enfoques de la ontología de requisitos. El tercer núcleo de Ali et al (2010) y Elahi et al. (2010) abordan la necesidad de observar el contexto en el que se inserta el sistema, además de las posibles vulnerabilidades que ocasionan problemas de seguridad, que pueden evitarse con una buena elicitación. Adicionalmente, Salini y Kanmani (2012), se enfocan en la seguridad, con su estudio de requisitos para este propósito.

Asnar et al (2011) en un núcleo cercano, más claro al lado adopta el discurso de la vulnerabilidad a través de la gestión de riesgos. Finalmente, los dos núcleos adicionales con Durillo, et al (2010) y Xuan, et al (2005) explican el problema relacionado con las próximas versiones de software y los problemas involucrados en las actualizaciones, mientras que Maalej, et al. (2015), aborda el tema de la clasificación automática de comentarios. En el segundo mapa de calor realizado en *Scopus* (figura 6) para encontrar los frentes de investigación, se encontraron los mismos núcleos de *Web of Science*, con pocas diferencias.

Los frentes de investigación encontrados que pueden ser en el futuro campos dentro del área son: validación empírica de requisitos, diseño del sistema, contexto del sistema, requisitos específicos de seguridad, actualizaciones y nuevas versiones de software y categorización en el sistema.

Conclusiones

El objetivo de este estudio se logró al presentar las principales aportaciones de la literatura científica de los últimos 10 años, en el área de Ingeniería de Requisitos en la Web of Science y Scopus. Para trabajos futuros, se espera validar con profesionales la fortaleza de los principales frentes para convertirse en nuevos campos.

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Factores Que Influyen En El Uso De *Cloud Computing* En Las Universidades

Patricio E. RAMIREZ-CORREA
Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Ari MELO-MARIANO
Universidade de Brasilia, Brasilia, Brasil, arimariano@unb.br

Eduardo KEMPER DA SILVA
Universidade de Brasilia, Brasilia, Brasil, eduardokemper25@gmail.com

Eduardo N. OLIVEIRA SENA
Universidade de Brasilia, Brasilia, Brasil, eduardonv.sena@gmail.com

Giovanna P. SOUZA MALNATI
Universidade de Brasilia, Brasilia, Brasil, giovanna28@gmail.com

João Pedro FRANCO SAMPAIO
Universidade de Brasilia, Brasilia, Brasil, joaofranco1311@gmail.com

Matheus BRITO FECHINE ROCHA
Universidade de Brasilia, Brasilia, Brasil, matheusbrito_mb@hotmail.com

Resumen

Esta investigación tiene como objetivo identificar qué dimensiones entre "calidad del sistema", "calidad de la información", "calidad del servicio" y "utilidad percibida" tienen más impactos en la satisfacción del usuario en el uso de sistemas de información académica en entornos virtuales. Los resultados identificaron que la satisfacción general del usuario se explicó en 72,2%, siendo la calidad del sistema responsable de explicar 32,30% y Utilidad Percibida en 30,93%, considerando las dos variables significativas en este modelo. El tamaño del efecto de la calidad del sistema y la utilidad percibida fue moderado.

Palabras clave: Sistema de información académico, Satisfacción del usuario, Brasil.

Introducción

En el contexto de las Instituciones de Educación Superior (IES), la necesidad de sistemas que satisfagan las necesidades de los usuarios es una constante. Estas instituciones están equipadas con una gran base de datos, que va desde la información de registro de los estudiantes hasta el acceso a información, como la reserva de libros, el estado de inscripción regular y el rendimiento de los estudiantes, entre otros. Así, las IES han buscado innovar y mejorar la gestión de estos datos para facilitar el acceso al más diverso espectro de información por parte de estudiantes y colaboradores (Reis, Pitassi & Bouzada).

Varias investigaciones nacionales e internacionales ya han estudiado este contexto, tales como: Faria-Duarte, Costa-Vieira & Magalhães da Silva (2016), Gaspar, Donaire, dos Santos & Silva (2009), Novo-Corti, Varela-Candamio & Ramil-Díaz (2013), Ainin, Bahri & Ahmad (2012), Chang (2013) e Harrati, Bouchrika, Tari,& Ladjailia (2016), entre otras. Analizaron la satisfacción del usuario, los factores que fomentan el uso continuado de los sistemas, la eficacia del e-learning y las dimensiones que impactan en la satisfacción del usuario. Considerando que este es un contexto que tiene una evolución continúa y considerando la constante evolución tecnológica, siempre es necesario investigar este entorno, buscando desarrollar los productos y servicios virtuales que ofrecen las IES a sus estudiantes y colaboradores. ¿Así el problema que guía esta investigación es cuál los factores que influyen en la calidad global de los sistemas de información académica?

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Por tanto, este artículo tiene como objetivo identificar qué dimensiones "calidad del sistema", "calidad de la información", "calidad del servicio" y "utilidad percibida" tienen el mayor impacto en la satisfacción del usuario en el uso de sistemas de información académica en entornos virtuales.

Marco Teórico

Según Petter, DeLone & McLean (2013), no existe un factor aislado que pueda ser utilizado para determinar el éxito de un SI, sino que se deben considerar varios factores para medir el buen desempeño del sistema y, en consecuencia, la satisfacción del usuario. Además de estas investigaciones, Ainin, Bahri & Ahmad (2012), afirman que el desempeño de un SI se puede ver en términos de satisfacción del usuario (es decir, desde la perspectiva de los estudiantes). En su estudio, Ainin, Bahri & Ahmad (2012), incorporarán los tres constructos (calidad del sistema, calidad de la información y calidad del servicio) introducidos por DeLone & McLean (1992), así como la utilidad percibida introducida por primera vez en los modelos de aceptación de la tecnología.

Aclarando los constructos adoptados, la calidad del sistema se restringirá a los aspectos técnicos y de diseño del sistema que permitan al usuario tener una interacción ágil y práctica y satisfacer las respectivas necesidades. La calidad del servicio estará correlacionada con el compromiso de resolver las dudas y situaciones que el usuario presente al sistema, involucrando o no - si es necesario - la ayuda de un agente externo capaz de demostrar disposición para resolver lo presentado. La calidad de la información, aunque no se puede medir fácilmente, estará representada por el nivel de satisfacción del usuario con el contenido de lo que se le presentó en respuesta a sus preguntas y si entiende cómo proceder.

Así, comprender si la satisfacción de los usuarios con el uso de la información académica virtual depende directamente de la calidad (sistema, información y servicio) y la utilidad percibida y si estas dimensiones están correlacionadas positivamente agregará conocimiento y permitirá la mejora continua de estos sistemas.

Metodología

Esta investigación es exploratoria, con un enfoque cuantitativo a través de ecuaciones estructurales vía varianza. El sitio de estudio fue Brasilia, Distrito Federal-Brasil. El objeto de estudio fueron estudiantes de educación a distancia de la Universidad de Brasilia-UnB. El instrumento de recogida de datos fue un cuestionario elaborado a partir del modelo de [6], con 5 dimensiones y 17 preguntas con una escala con ítem likert. El cuestionario fue validado (α = 0.915, Rhoa = 0.914, Cc = 0.943). La recolección de datos se realizó entre el 11 y el 14 de febrero de 2019 y se obtuvieron 100 respuestas. La muestra se calculó mediante el software G * Power 3.16, utilizando el tamaño del efecto como 0,15, la significancia fue del 5% y el nivel de poder estadístico fue de 0,8. Como el nivel más alto de complejidad de la relación es 4, el tamaño de muestra requerido fue de 85 encuestados. El total alcanzado fue de 100 personas, los datos fueron procesados en Microsoft Excel y calculados con el software SmartPLS 3.2.8. Los análisis se realizaron desde el enfoque de ecuaciones estructurales vía varianza (PLS-SEM).

Resultados

Según Ramírez, Mariano & Salazar (2014), la evaluación de modelos debe realizarse en dos etapas, valoración del modelo de medición y valoración del modelo estructural. La valoración de ambos modelos seguirá las instrucciones de Hair, Hult, Ringle & Sarstedt (2016). La valoración del modelo de medida alcanzó todos los índices recomendados por Ramírez, Mariano & Salazar (2014), en cuanto a validez y fiabilidad. Se realizaron pruebas de colinealidad y los resultados fueron inferiores a 3,3 (Hair, Hult, Ringle & Sarstedt, 2016).

La valoración del modelo estructural se realiza a través de las pruebas de magnitud del coeficiente de dirección, significancia, coeficiente de determinación (R2), descomposición del coeficiente R2 y tamaño del efecto (f2) (Figura 2) (Tabla 1).

Tabla 1- Modelo estructural

	Coeficiente estructural	t-value	p-value	F2	%	R2
H1. QI→SG	0,04	1,115	0,26	0,016	2,87%	0,722
H2. QS→SG	0,133	1,646	0,10	0,024	6,10%	
H3. QSI→SG	0,464	4,559	0	0,268	32,30%	
H4. UP→SG	0,441	4,298	0	0,197	30,93	

IQ (calidad de la información), calidad del servicio (QS), calidad del sistema (QSI), utilidad percibida (UP) y satisfacción global (SG).

Se puede observar que la satisfacción global de los usuarios se explicó en 72,2%, siendo la calidad del sistema responsable de explicar 32,30% y la Utilidad Percibida en 30,93%, considerando las dos variables significativas de este modelo. El tamaño del efecto de la calidad del sistema y la utilidad percibida es moderado. Los resultados confirman parcialmente el trabajo de (DeLone & McLean, 1992; Venkatesh, Morris, Davis & Davis, 2003), y demuestran la consistencia del modelo presentado por Ainin, Bahri & Ahmad (2012), encontrando las mismas variables como significativas.

Los resultados encontrados revelan que para mejorar la percepción de satisfacción global es necesario garantizar la calidad del sistema a través de instrucciones efectivas sobre el uso del sistema, facilidad de corrección de errores, información útil y velocidad de acceso entre páginas. El segundo factor que pareció predominar fue la utilidad percibida, que se materializa a través de un sistema de fácil manejo, hasta el punto de resultar intuitivo para el usuario. Así, en ambos casos, una correcta elicitación de los requisitos puede mejorar la satisfacción general del usuario de los sistemas de información académica al favorecer instrucciones claras para un sistema, la simplicidad operativa y el perfil del cliente (sus deseos y necesidades en relación con el sistema). Así, las instituciones deben consultar a los diferentes grupos de usuarios de sus sistemas para conocer sus expectativas y necesidades.

Conclusiones

Esta investigación tuvo como problema presentado en este estudio saber ¿qué factores influyen en la calidad global de los sistemas de información académica? El problema fue respondido a través de las Hipótesis H3: La calidad del sistema influye en la satisfacción global de los usuarios de los sistemas de información y H4: La utilidad percibida influye en la satisfacción global de los usuarios de los sistemas de información, teniendo como factores que más influyen en ellos. De esta manera se logró el objetivo de la investigación, revelando la calidad del sistema y la utilidad percibida como las dimensiones más importantes del modelo. Para futuros estudios pretendemos realizar una búsqueda descriptiva de mayor representación.

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Comportamiento De Uso De Big Data: Estudio Aplicado En Un Hospital Publico En Brasil

Patricio E. RAMIREZ-CORREA
Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Ari MELO-MARIANO
Universidade de Brasilia, Brasilia, Brasil, arimariano@unb.br

Simone Borges Simao MONTEIRO
Universidade de Brasilia, Brasilia, Brasil, simoneborges@unb.br

Ronaldo Rodrigues PACHECO
Universidade de Brasilia, Brasilia, Brasil, rona_pacheco@gmail.com

Resumen

Este estudio tiene como objetivo presentar los factores que más influyen en el uso de Big Data Analytics en un Hospital público del Distrito Federal. Para ello, se realizó una investigación exploratoria de carácter cuantitativo aplicada al sector responsable de implementar el uso de Big Data Analytics en el hospital mediante ecuaciones estructurales. Los resultados desvelaran que la expectativa de rendimiento explica la intención de utilizar Big Data Analytics en un 38,42% y la expectativa de esfuerzo en un 31,83%.

Palabras Clave: Big Data, Hospital Público, Brasil.

Introducción

El Big Data Analytics en Healthcare es una de las áreas de más rápido crecimiento, debido a los beneficios inmediatos que puede generar para los pacientes y el hospital (Luo, Wu, Gopukumar, & Zhao, 2016). Sin embargo, tanto en el uso de Big Data Analytics (BDA) para la salud como para las organizaciones en general, la mayoría de los estudios y trabajos centran sus objetivos en cuestiones técnicas de uso, características de herramientas y aplicaciones (Vale et al., 2019). De este modo son pocos estudios que se fundamentan en la intención de uso por parte del individuo (Cabrera-Sánchez & Villarejo-Ramos, 2020).

Un Hospital Público del Distrito Federal se interesó en conocer la intención de utilizar BDA por parte de a sus empleados involucrados en la transformación digital del hospital actual, para una organización que usa inteligencia de los datos con Big Data Analytics. En base a esta necesidad, si tornó importante medir los factores que más implican la intención de utilizar BDA para mejorarlo e implementarlo en su unidad.

Así, este estudio tiene como objetivo presentar los factores que más influyen en el uso de Big Data Analytics en un Hospital público del Distrito Federal.

Revisión de la Literatura

Pacheco et al., (2020), definen Big Data como un conjunto grande y complejo de datos que requieren tecnologías complejas para su almacenamiento, gestión, análisis y visualización avanzada. El uso del análisis de datos aplicado al escenario Big Data fue conocido en la literatura como Big Data Analytics (BDA). Así, BDA se ha convertido en una prioridad para las organizaciones, especialmente para aquellas que tienen un historial de uso de datos como parte de sus funciones, como los hospitales, por ejemplo.

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Cabrera-Sánchez & Villarejo-Ramos (2020) investigaron los factores que inciden en la adopción de Big Data Analytics a través de un modelo extendido de UTAUT (teoría unificada de aceptación y uso de la tecnología), al que se suman dos variables: resistencia al cambio, que explica el grado en que el usuario está de acuerdo o no en realizar cambios en las actividades diarias y el riesgo percibido (el grado que el usuario percibe sobre los riesgos de la actividad que realiza o de sí mismo) (Cabrera-Sánchez & Villarejo-Ramos, 2020).

Metodología

Esta investigación es exploratoria, a través del estudio de caso de una organización de salud, con un enfoque cuantitativo utilizando ecuaciones estructurales vía varianza. El lugar de estudio fue Brasilia y el objeto de estudio fue la percepción de los usuarios de los sistemas de información que trabajan en la implementación del hospital para el uso de inteligencia de datos a través de Big Data Analytics. El instrumento de recogida de datos fue un cuestionario adaptado de Cabrera-Sánchez & Villarejo-Ramos (2020). El sector estuvo formado por 40 profesionales, de los cuales 33 respondieron a la encuesta. Entre los encuestados, el 29% son mujeres y el 71% hombres. A partir de estos datos, se realizó un análisis software SmartPls 3.3.2, por ser un programa completo que ofrece análisis de validación de modelos previos.

Resultados

Antes de calcular el modelo estructural, es necesario asegurarse de que el modelo sea confiable y válido. Por eso, según Hair. et al. (2019) Se requieren 2 (dos) pruebas de confiabilidad y 2 (dos) pruebas de validez. Fueran realizadas las pruebas de confiabilidad del ítem, confiabilidad interna ($\alpha = 0.88$), asegurando la confiabilidad del modelo y la validez convergente (AVE$\geq$ 0.5) y la validez discriminante (HTMT <0.9), asegurando la validez del modelo. Por tanto, el modelo se considera fiable y válido. También se observó si existía multicolinealidad y todas las variables estaban por debajo de 3.3, como lo requiere la literatura (Hair, et.al., 2019)

4.1. Modelo estructural

Una vez que se garantiza la confiabilidad y validez del modelo, se puede calcular el modelo estructural. La Figura 2 representa el modelo calculado luego de que fue estabilizado usando los criterios de confiabilidad y validez.

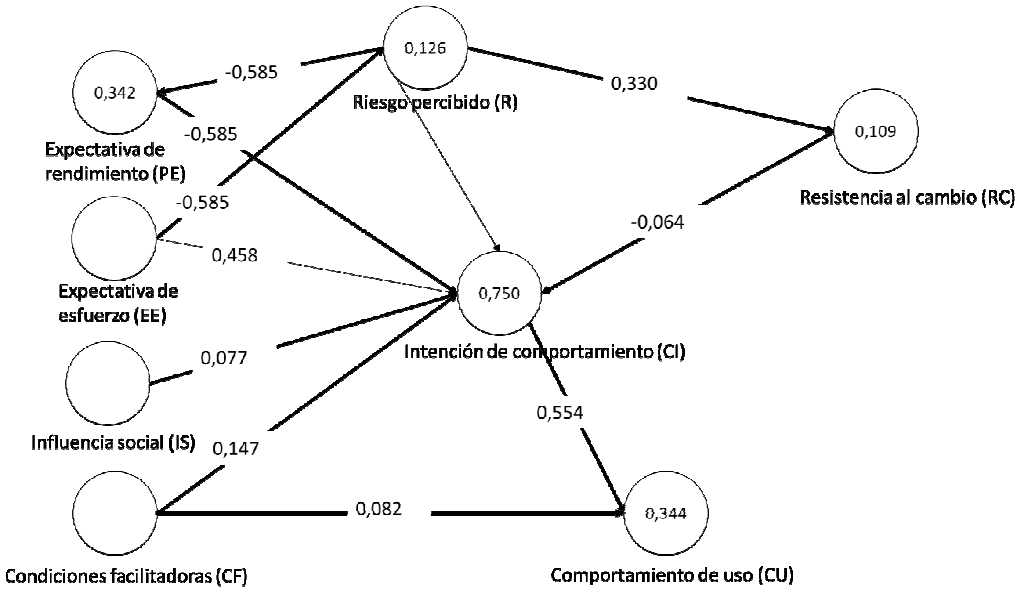

Fig 2. Modelo estructural calculado

Tabla 1: Resultado prueba de hipótesis

	Path (B)	%	t-valor	p-valor	Suportada?
H1: PE--> IC	0,58	38,42%	4,29	0,00	Sim
H2a: EE--> IC	0,46	31,83%	3,23	0,00	Sim
H2b: EE--> R	-0,36	12,60%	1,98	0,05	Sim
H3: IS--> IC	0,08	3,62%	0,76	0,45	Não
H4a: CF--> IC	0,15	4,81%	0,95	0,34	Não
H4b: CF--> BI	0,08	2,16%	0,34	0,73	Não
H5a: R--> CI	0,15	-5,71%	0,54	0,59	Não
H5b: R--> RC	0,33	10,89%	1,73	0,08	Não
H5c: R --> PE	-0,59	34,22%	5,82	0,00	Sim
H6: RC- -> CI	-0,06	1,98%	0,48	0,63	Não
H7: IC --> BI	0,55	32,19%	2,81	0,01	Sim
Condiciones facilitadoras (CF), Expectativa de esfuerzo (EE), Expectativa de desempeño (PE), Influencia social (IS), Intención comportamiento (CI), Conducta de uso (BI), Resistencia al cambio (CR), Riesgo percibido (R)					

Conclusiones

Los resultados muestran que las variables más influyentes son la Expectativa de rendimiento con 38,42% de grado de influencia. Esto significa que, para los usuarios de hospitales, mejorar la productividad, disminuir el tiempo de realización de la tarea e incluso aumentar sus ganancias financieras son buenas razones para adoptar Big Data Analytics.

La segunda variable más importante para la disposición a adoptar Big Data Analytics es la expectativa de esfuerzo (31,83%) (H2a). Por tanto, si el usuario cree que el uso gastará mucha energía, no adoptará el uso de Big Data Analytics. Se puede observar que estas dos variables (Expectativa de rendimiento y esfuerzo) explican la intención comportamental de utilizar Big Data Analytics en un 70,25%.

Así, disminuir la percepción de esfuerzo a través de la información y la formación y además explicar cómo el Big Data Analytics puede ser útil en las actividades que realizan los empleados del Hospital, aumentará la intención de utilizar Big Data Analytics. Otras hipótesis también se apoyaron estadísticamente.

La expectativa de esfuerzo está directamente relacionada con la percepción de riesgo (H2b). Así, si el usuario siente que el esfuerzo empleado para utilizar Big Data Analytics es mayor de lo que esperaba, existe la posibilidad de que vea Big Data Analytics como algo incómodo.

El riesgo a su vez impacta directamente en la expectativa de rendimiento en un 34.22% (H5c), en una relación inversamente proporcional, cuanto más grande el riesgo, más pequeña es la expectativa de rendimiento, es decir, si el usuario piensa que Big Data Analytics puede ser un riesgo, tiende a hacer consideraciones sobre el desempeño que ofrecerá.

Finalmente, la intención de uso y su relación con el uso en sí (H7). Aunque se espera que la preparación se convierta en uso, en la práctica hay varios factores que pueden afectar. Así, el Hospital debe trabajar asiduamente en la formación y en la información, además de mantener un centro de apoyo constante para las dudas y asistencia a los empleados, pues una vez que se sientan cómodos con el uso de Big Data Analytics, menor es la expectativa de esfuerzo. De ese modo, al disminuir la sensación de esfuerzo y aumentar las expectativas de mejora en el desempeño de los empleados, Big Data Analytics tendrá un mayor grado de aceptación de uso.

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Ambigüedad De Rol Y El Agotamiento En El Teletrabajo: Un Análisis Exploratorio En Costa Rica

Cristian SALAZAR-CONCHA
Instituto de Administración, Universidad Austral de Chile, Valdivia, Chile, cristiansalazar@uach.cl

Luis J. CAMACHO
Division of Business, SUNY Empire State College, USA, luis.camacho@esc.edu

Patricio E. RAMIREZ-CORREA
Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Resumen

Este trabajo explora el efecto de la intención de continuar teletrabajando sobre la ambigüedad de rol y el agotamiento en el teletrabajo en una muestra de teletrabajadores costarricenses que se encontraban teletrabajando en confinamiento preventivo por el COVID-19. Los resultados muestran que una actitud positiva hacia el teletrabajo es capaz de mediar de forma parcial los efectos negativos de la ambigüedad de rol sobre los niveles de agotamiento al trabajar en casa.

Palabras Clave: Actitud positiva, teletrabajo, Costa Rica, COVID-19.

Introducción

Las organizaciones además de diagnosticar factores psicosociales para prevenir amenazas y riesgos de la salud de los trabajadores deben ayudar a desarrollar recursos que se asocian al bienestar y a la promoción de la felicidad laboral. Abordar solo los aspectos higiénicos del teletrabajo nos puede distanciar de identificar los beneficios de esta modalidad y las actitudes que se deberían considerar para promover conductas saludables al trabajar desde casa.

Dada la naturaleza dinámica de las tecnologías, es importante evaluar los efectos de su uso en teletrabajadores (Salazar-Concha, Ficapal-Cusí and Boada-Grau, 2020). Los efectos del teletrabajo han trascendido la esfera del mundo del trabajo y de las organizaciones. Hoy es considerado por decenas de países como una forma de mantener la economía y el empleo. En este trabajo analizaremos el efecto mediador de la actitud positiva de en la intención de continuar teletrabajando (ICT) por sobre factores que potencian el agotamiento y la falta de vitalidad.

Hipótesis

La actitud positiva en el trabajo implica una disposición optimista y entusiasta dirigida a nuestra actividad laboral y a todas las personas involucradas en él (Kasemsukprakarn and Dowpiset, 2020). No obstante, existen elementos del ambiente laboral que tienen el potencial de deteriorar la salud mental de los trabajadores (Leka *et al.*, 2003). Uno de estos factores psicosociales es la ambigüedad de rol (AR) (Karasek, 1979), la cual puede aumentar los niveles de agotamiento en el teletrabajo (AGT) (Weinert, Maier and Laumer, 2015). De acuerdo con Schaufeli and Bakker (2004), existen elementos del ambiente de trabajo que tienen el potencial de generar bienestar y facilitar la realización del trabajo. Considerando que la ICT se asocia con un recurso que propicia una actitud positiva en el teletrabajo, proponemos:

H1: La AR aumenta los niveles de AGT.
H2: La AR disminuye la ICT.
H3: La ICT media la relación entre la AR y el AGT.

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Metodología

Se obtuvieron 52 encuestas *online* válidas aplicadas a teletrabajadores costarricences. La Tabla 1 muestra una población mayoritariamente con estudios universitarios, con edades entre 36-45 años, que viven en familia y teletrabajan entre 8-12 diarias.

Tabla 1: Antecedentes sociodemográficos

Variable	Categorías	Frecuencia	Porcentaje
Género	Femenino	32	,62
	Masculino	20	,38
Rango edad	20-35	10	,19
	36-45	31	,60
	Más de 45	11	,21
Estado Civil	Soltero(a)	14	,27
	Casado(a) / conviviendo	29	,56
	Separado	9	,17
Lugar en casa para teletrabajar	Si	42	,81
	No	10	,19
Formación para teletrabajar	Si	35	,67
	No	17	,33
Horas diarias de TT	Media Jornada	1	,02
	7-8 horas	17	,33
	8-12 horas	31	,60
	Más de 12 horas	3	,06
Nivel Educación	Universitario	33	,63
	Máster	17	,33
	Doctorado	2	,04

Dado que la técnica de modelos de ecuaciones estructurales (SEM) es apropiada en investigaciones de las ciencias sociales (Hair *et al.*, 2017), se realizaron los análisis a través del software SmartPLS v.3.3.2.

Resultados

Los datos obtenidos validan satisfactoriamente el ajuste del modelo, cumpliéndose todos los criterios (Hair *et al.*, 2017). La Tabla 2 muestra un resumen de la evaluación del modelo luego de la depuración de escalas. La ratio HTMT fue menor a 0,81.

Tabla 2: Análisis de fiabilidad y validez convergente

Variable	AC	FC	AVE	AGT	AR	ICT
AGT	0,893	0,934	0,825	0,908		
AR	0,750	0,858	0,669	0,671	0,818	
ICT	0,877	0,923	0,801	-0,665	-0,393	0,895

La evaluación del modelo estructural se presenta en la Figura 1. Se soportan H1 y H2. La variación del AGT es explicada en un 64,1% por AR. La ICT es explicada en un 15,4% por AR. Complementariamente, la AR afecta indirectamente y de manera positiva al AGT a través de la ICT. El efecto mediador de ICT es parcial dado que el VAF tiene un valor de 21%, por lo cual se soporta H3.

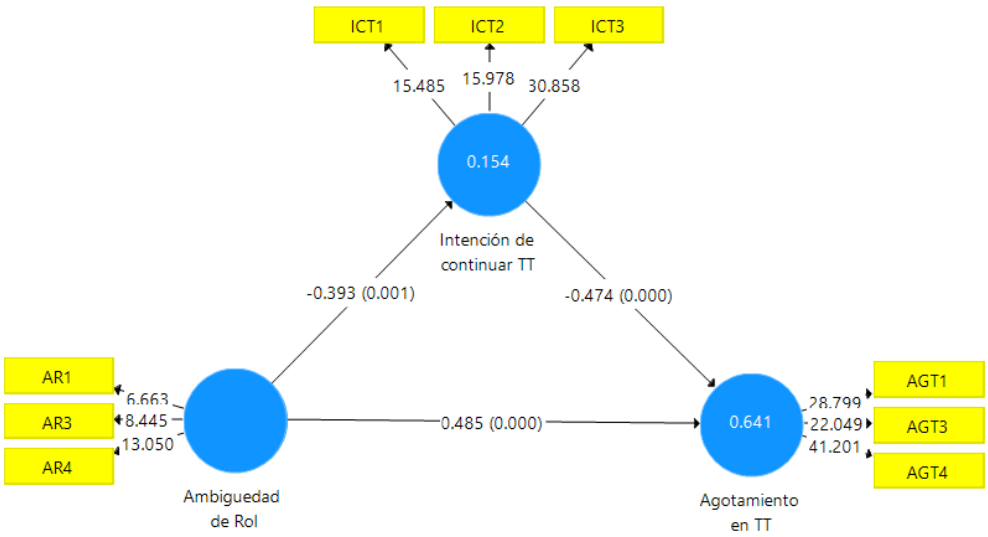

Fig. 1. Resultados PLS-SEM

Conclusiones

Se concluye que una ICT positiva media los efectos negativos de la AR. Recomendamos a las organizaciones promover una actitud saludable y positiva hacia el teletrabajo, mejorando canales de comunicación y entregando información clara sobre las metas y las responsabilidades que cada empleado debe cumplir. Futuros trabajos podrían medir el efecto de otros recursos laborales como mediadores/moderadores de las relaciones que afectan las emociones y la salud en el teletrabajo.

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Explorando El Efecto Mediador Del Conflicto De Trabajo Hogar Entre La Sobrecarga Y El Agotamiento En Teletrabajo

Patricio E. RAMIREZ-CORREA
Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Cristian SALAZAR-CONCHA
Universidad Austral de Chile, Valdivia, Chile, cristiansalazar@uach.cl

Luis J. CAMACHO
SUNY Empire State College, New York, USA, luis.camacho@esc.edu

Abstract

Utilizando modelamiento de ecuaciones estructurales se estudia la influencia de la sobrecarga de trabajo sobre el agotamiento y la intención de continuar teletrabajando en una muestra de teletrabajadores chilenos. Los resultados muestran que la sobrecarga de trabajo afecta el conflicto trabajo-hogar y el agotamiento, a su vez, esta sobrecarga y el conflicto trabajo-hogar influyen negativamente en la intención de continuar teletrabajando.

Keywords: teletrabajo, ecuaciones estructurales, Chile, COVID-19.

Introducción

Producto del COVID-19 las organizaciones adoptaron el teletrabajo (TT) como una medida para mantener la continuidad sus operaciones y su estabilidad financiera. El TT fue adoptado por distintos empleados, algunos con competencias para el teletrabajo y con espacio en su hogar para trabajar y otros no. Estudios han reportado que el TT en confinamiento puede aumentar distintos estresores laborales y poner en riesgo el deseo de teletrabajar en el futuro.

El presente estudio evalúa la mediación del conflicto trabajo-hogar (CTH) entre la sobrecarga de trabajo (ST) y el agotamiento (AGT) y analizará efectos directos e indirectos que influyen en la intención de continuar teletrabajando (ICT).

Hipótesis

TT transforma generando nuevas reglas organizacionales (Salazar and Pacheco, 2006; Salazar and Sanhueza, 2017), y se ha extendido mundialmente por COVID-19 (Kan et al., 2020). La ST y el CTH son estresores en el teletrabajo y afectan directa e indirectamente el AGT y la ICT (Baruch, 2000; Ayyagari et al., 2011; Golden, 2012; Weinert et al., 2015). El AGT es uno de los factores estresantes asociados al TT (Weinert et al., 2015) y quienes usan tecnologías para trabajar son más vulnerables a percibirlo (Moore, 2000). Teletrabajar puede afectar a las personas de manera distinta. La literatura sobre conciliación laboral-personal no es concluyente (Song and Gao, 2020), por tanto, deseamos medir el efecto de la mediación del CTH sobre la ST y el AGT. En este contexto se proponen:

H1: La ST incide positivamente en el CTH.
H2: EL CTH afecta positivamente el AGT.
H3: La ST afecta positivamente el AGT.
H4: El AGT incide negativamente en la ICT.
H5: El CTH media la relación entre la ST y el AGT.

Metodología

Se obtuvieron 64 encuestas de teletrabajadores chilenos. La Tabla 1 presenta una muestra compuesta en su mayoría por trabajadores entre 36-45 años, viviendo en pareja y sin formación previa para TT.

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Tabla 1: Antecedentes sociodemográficos

Variable	Categorías	Frecuencia	Porcentaje
Género	Femenino	36	,56
	Masculino	28	,44
Rango edad	20-35	21	,33
	36-45	41	,64
	Más de 45	2	,03
Estado Civil	Soltero(a)	19	,30
	Casado(a) / conviviendo	41	,64
	Separado	4	,06
Espacio en el hogar para teletrabajar	Si	44	,69
	No	20	,31
Formación para teletrabajar	Si	27	,42
	No	37	,58
% uso de TIC para TT (respuesta múltiple)	Email	51	,80
	WhatsApp	45	,70
	Teléfono	28	,44
	Videoconferencia	50	,78
Apoyo para teletrabajar (respuesta múltiple)	Dinero	25	,39
	Ordenador	30	,47
	Internet	13	,20
	Cuenta de luz	4	,06
	Materiales oficina	0	0

Para los análisis se utilizó SmartPLS v.3.3.2. La técnica de modelos de ecuaciones estructurales (SEM) es apropiada en investigaciones de las ciencias sociales (Hair et al., 2017).

Resultados

Los datos obtenidos validan satisfactoriamente el ajuste del modelo, cumpliéndose los criterios exigidos para validar SEM. La Tabla 2 muestra un resumen de la evaluación del modelo luego de la depuración de escalas. La ratio HTMT mayor fue de 0,787.

Tabla 2: Análisis de la validez convergente y fiabilidad

Variable	AC	FC	AVE	AGT	CTH	ICT	ST
AGT	0,915	0,948	0,859	0,927			
CTH	0,877	0,942	0,891	0,687	0,944		
ICT	0,930	0,955	0,876	-0,505	-0,397	0,936	
ST	0,784	0,872	0,696	0,633	0,674	-0,536	0,834

La evaluación del modelo estructural se presenta en la Figura 1, soportándose H1, H2, H3, H4. La variación del CTH es explicada en un 44,6% por ST. El AGT es explicado en un 50,9% por la variación de la ST y del CTH. La variación de ICT es explicada en un 24,3% por AGT. El efecto mediador de CTH es parcial, con un VAF de 34%.

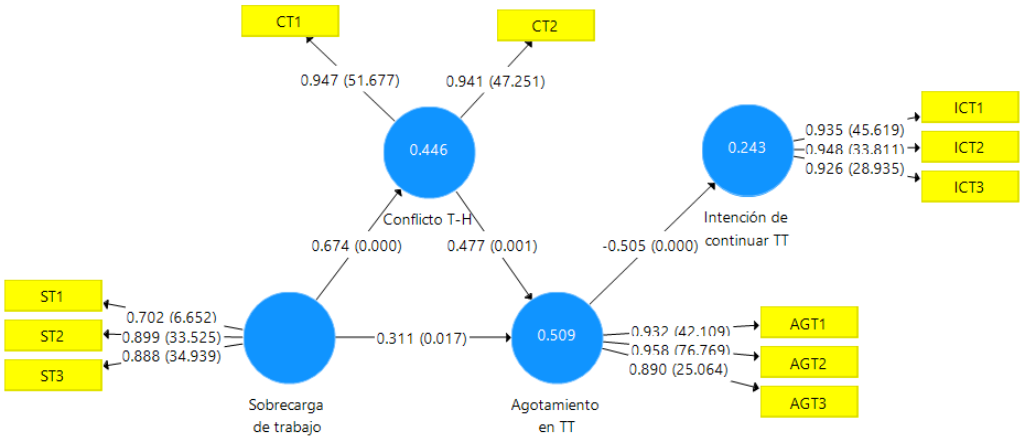

Fig. 1: Resultados PLS-SEM

Conclusiones

Los resultados muestran que la ICT es afectada de manera directa e indirecta y de forma negativa por todas las variables del estudio. El CTH media parcialmente ST y AGT. A la luz de estos resultados, las organizaciones deberían generar condiciones protectoras que ayuden a disminuir los factores de riesgos psicosociales que pueden experimentar sus empleados por el TT en confinamiento COVID-19 y establecer mecanismos de intervención.

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Big Data Y Empleo: Una Revision De Los Topicos En La Literatura De Administracion Y Sistemas De Informacion

Patricio E. RAMIREZ-CORREA

Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Abstract

Utilizando minería de texto se exploran los tópicos latentes en la literatura sobre *Big Data* y empleo.

Keywords: Big Data, empleo, LDA.

Introducción

Las implicaciones del *Big Data* en toda la sociedad es un punto de discusión (Kappler *et al*., 2018). Dentro de estas implicaciones, su relación con el empleo se considera clave en el desarrollo de las economías (Jeske y Calvard, 2020), tanto en países desarrollados como en vías de desarrollo (Hilbert, 2013). En este contexto, investigadores de diversas áreas han analizado forma creciente diversos fenómenos asociados a este foco en la última década. No obstante, la carencia de una revisión de los temas o tópicos que se han analizado obstaculiza la propuesta de una agenda de investigación útil para acelerar la generación de conocimiento en este ámbito.

En este documento entregamos los primeros resultados de un análisis sistemático dentro de las diciplinas de administración y sistemas de información cuyo objetivo es descubrir los tópicos latentes en la literatura sobre *Big Data* y empleo.

Metodología

El estudio utilizó para la exploración 160 artículos científicos Web of Science (WoS) publicados en revistas categorizados por WoS en MANAGEMENT, COMPUTER SCIENCE INFORMATION SYSTEMS, BUSINESS y INFORMATION SCIENCE LIBRARY SCIENCE entre los años 2012 y 2020. En la base de datos WoS se buscó como tema <'*big data*' *and employment*>.

Para el análisis de aplicó la técnica de aprendizaje automático *latent Dirichlet allocation* (LDA) de Blei *et al.* (2003).

Resultados

La Figura 1 muestra un análisis descriptivo de los artículos analizados, la mayoría de estos estudios son de autores de países desarrollados, como Estados Unidos y Reino Unido; por otro lado, *Management Information Systems Quarterly* es la revista que más se destaca y la clave *Big Data*, seguida de rendimiento y administración, es la más utilizada.

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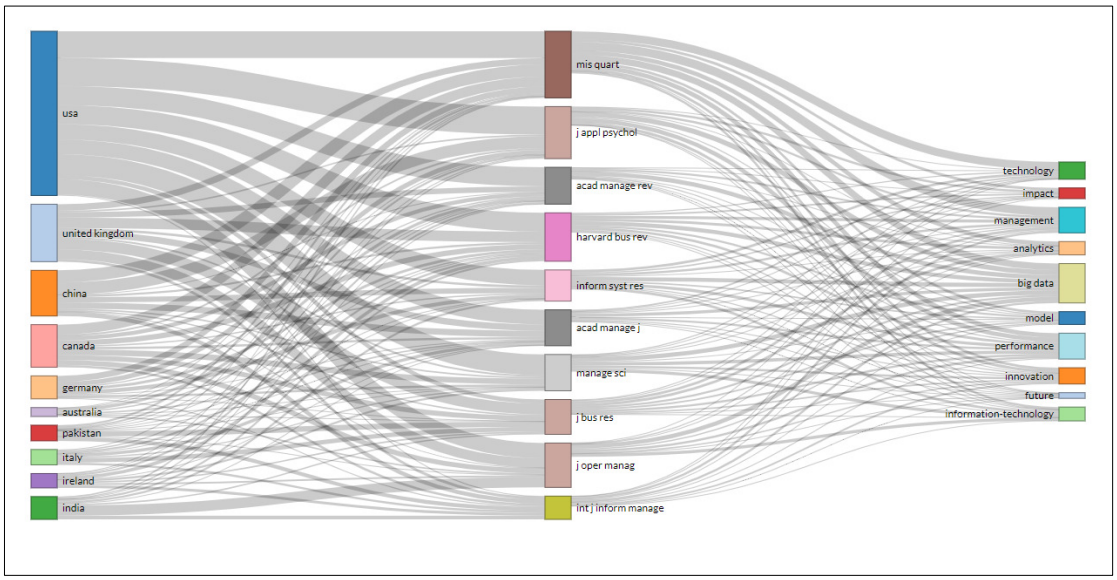

Fig 1. Análisis descriptivo de artículos

Se analizaron los resúmenes de los artículos con LDA. Antes de este análisis, los textos fueron procesados para eliminar *stopwords* (generales y de publicaciones científicas) y reducir las palabras a su raíz. Para determinar el número óptimo de tópicos se usó el índice propuesto por Cao *et al.* (2009), este análisis señala 7 tópicos latentes (ver Figura 2).

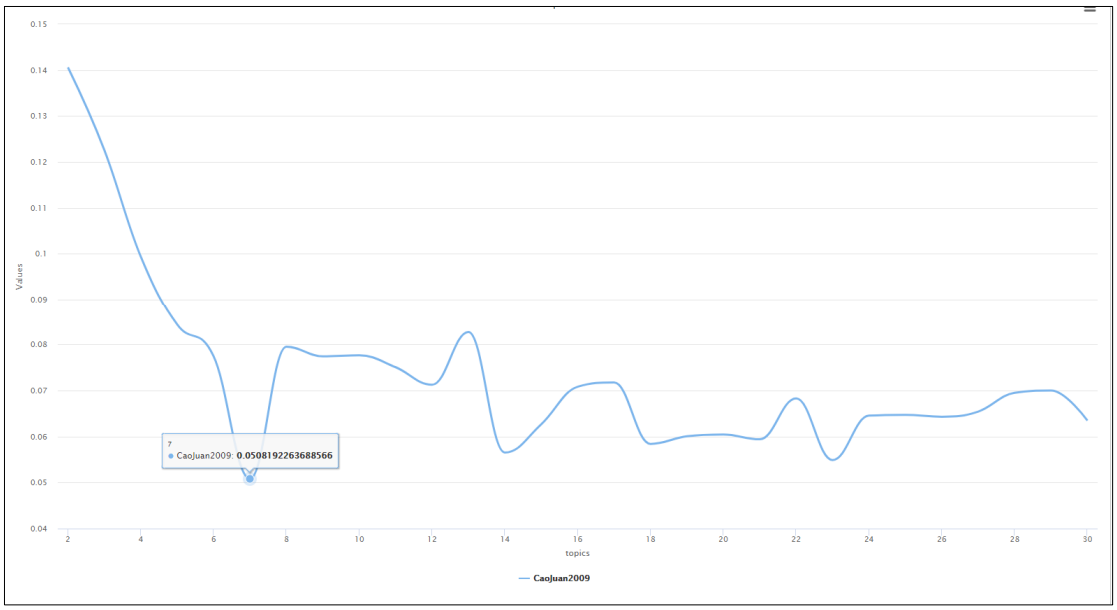

Fig 2. Número de tópicos y métrica de Cao

Seguidamente se examinaron las palabras que componen estos 7 tópicos y se les etiquetó. La Figura 3 muestra como una nube de palabras los primeros 10 tokens de cada tópico, y las Tablas 1a y 1b muestran las etiquetas propuestas con una lista de 25 tokens. En resumen, los tópicos latentes en *Big Data* y empleo son problemas de ciudad, oportunidades de empleo, entrenamiento de modelos predictivos, discriminación en la toma de decisiones, industria inteligente, mercado laboral y educación.

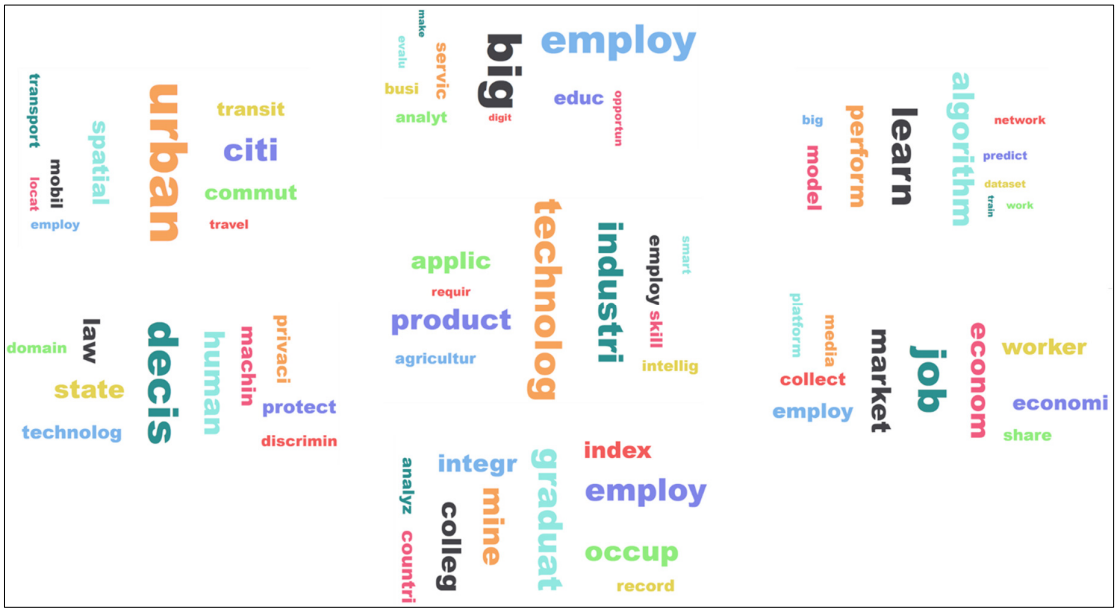

Fig 3. Tópicos de *Big Data* y empleo

Tabla 1a: Etiquetas y tokens

Problemas de ciudad		Oportunidades de empleo		Entrenamiento de modelos predictivos		Discriminación en la toma de decisiones	
urban	118	big	128	learn	84	decis	53
citi	72	employ	109	algorithm	72	human	37
spatial	54	educ	55	perform	59	state	32
commut	51	servic	51	model	50	law	30
transit	45	busi	46	big	31	machin	27
mobil	41	analyt	46	network	29	technolog	25
transport	37	opportun	35	predict	28	privaci	24
travel	33	evalu	31	dataset	26	protect	24
locat	32	digit	30	work	24	discrimin	21
employ	32	make	28	train	22	domain	20
polycentr	30	higher	27	includ	22	legal	19
plan	29	improv	25	effici	22	school	16
china	29	appli	24	machin	22	web	16
dynam	27	propos	24	achiev	20	program	16
resid	27	emerg	23	diseas	18	correl	13
hous	23	implement	23	target	17	consent	12
ridership	23	recommend	22	chronic	17	dark	12
land	22	integr	22	retir	16	medic	12
contain	22	iot	21	search	16	predict	12
access	22	analyz	21	accuraci	16	interest	11
environ	21	enterpris	21	increas	16	power	11
built	21	enabl	20	combin	16	lsat	10
trip	20	mobil	20	select	14	cannabi	10
rail	20	scienc	20	high	14	healthcar	10
traffic	18	comput	20	structur	14	status	10

Tabla 1b: Etiquetas y tokens

Industria inteligente		Mercado laboral		Educación	
technolog	89	job	73	graduat	32
industri	84	econom	52	employ	30
product	69	market	50	mine	29
applic	60	worker	42	occup	28
employ	43	economi	40	colleg	26
skill	41	employ	38	integr	24
agricultur	39	collect	33	index	22
intellig	38	media	31	countri	18
smart	31	share	30	analyz	16
requir	29	platform	29	record	16
food	28	firm	27	face	15
manufactur	26	destin	26	ecolog	14
artifici	26	onlin	26	nation	14
activ	25	creat	24	gender	13
advanc	24	sector	22	disabl	13
assess	21	monitor	22	nurs	12
compani	19	activ	22	gene	12
expect	19	labour	21	hbv	12
revolut	18	cost	21	month	12
process	17	profession	20	introduc	12
loop	16	region	20	age	12
digit	16	allow	20	polici	12
improv	15	balanc	19	suicid	11
ship	14	interact	17	decreas	11
construct	14	perspect	17	shelter	10

Conclusiones

Los resultados preliminares de este estudio indican que entre los artículos publicados en WoS sobre *Big Data* y empleo es posible detectar siete distintos focos, los tres primeros por el peso de sus tokens son problemas de ciudad, oportunidades de empleo y entrenamiento de modelos predictivos.

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Evaluando La Madurez De Datos: Un Estudio Empirico En Un Hospital De Brasil

Patricio E. RAMIREZ-CORREA
Universidad Catolica del Norte, Coquimbo, Chile, patricio.ramirez@ucn.cl

Ari MELO-MARIANO
Universidade de Brasilia, Brasilia, Brasil, arimariano@unb.br

Simone Borges Simao MONTEIRO
Universidade de Brasilia, Brasilia, Brasil, simoneborges@unb.br

Ronaldo Rodrigues PACHECO
Universidade de Brasilia, Brasilia, Brasil, rona_pacheco@gmail.com

Resumen

El objetivo de esta investigación fue presentar una opción para operacionalizar la evaluación de madurez de datos de Carvalho, et al. (2019a, 2019b, 2018 y 2017) en una organización hospitalaria. Se presentó un modelo operativo en tres etapas que logró satisfactoriamente el propuesto. Las etapas futuras serán las validaciones estadísticas y la predicción del modelo. Al probar el modelo en un Hospital del Distrito Federal en Brasil, la organización alcanzó el 50,15% de madurez en Análisis de Datos.

Palabras Clave: Modelo de madurez, instrumento, Hospitales.

Introducción

Según Vidal, Rocha, Vasconcelos & Abreu (2018) en las últimas cinco décadas se han aplicado modelos de madurez para sistemas de información (SI) a diferentes empresas y, específicamente en salud, estos modelos de madurez tienen la función de atender una amplia variedad desafíos y la alta demanda de implementaciones de SI (HIS) en los hospitales. Observando este contexto, en 2019, y después de una larga revisión de la literatura y validación de contenido con 46 expertos, Carvalho (2019a), Carvalho et al. (2017), presentó un modelo de madurez, no solo para parte de los datos, sino para toda la organización, ayudando a comprender la unión entre la madurez de los datos, denominada Análisis de datos y las otras etapas de madurez organizacional.

Para mejorar su conocimiento en el uso de datos, muchas organizaciones hospitalarias han buscado comprender dónde se encuentran y qué pasos deben tomarse para mejorar esta madurez. Así, el objetivo de este estudio será presentar una opción para operacionalizar la evaluación de madurez de datos de Carvalho, et al. (2019a, 2019b, 2018 y 2017) en una organización hospitalaria.

Revisión de la Literatura

En el dominio de la salud, se utilizaron modelos de madurez para enfrentar una amplia variedad de desafíos y la alta demanda de implementaciones de IS Hospital (SIH) (Carvalho et al., 2016, 2019; Gomes & Romão, 2018). Al aplicar un modelo de madurez al sector salud, (Gomes & Romão, 2018) afirman que la madurez de los sistemas de información en salud (SIH) son de crucial importancia para mejorar la eficiencia, costo-efectividad, calidad y seguridad de la prestación de atención. doctores. Según Carvalho (2019a), la madurez del análisis de datos es solo un pilar de la madurez organizacional. Carvalho (2019a) explica que hay 4 capas de madurez (Figura 1).

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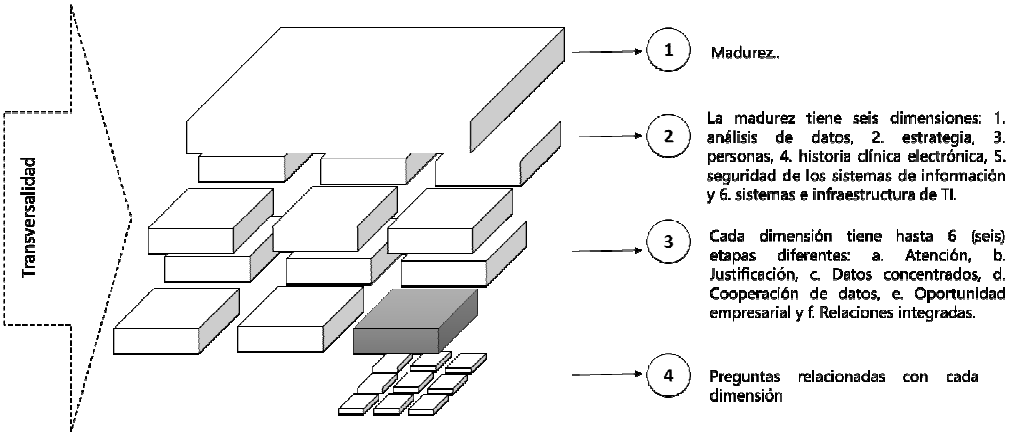

Fig. 1: Capas de madurez

Fuente: Adaptado de Carvalho (2019a)

Según Carvalho (2019a), la madurez es una gran capa que tiene un conjunto de seis pilares (1. análisis de datos, 2. estrategia, 3. personas, 4. historia clínica electrónica, 5. seguridad de los sistemas de información y 6. sistemas e infraestructura de TI). Cada uno de estos pilares de madurez es parte de la madurez organizacional. En este estudio, el pilar analizado fue el Análisis de Datos. Cada uno de los pilares a su vez se puede contemplar en 6 etapas diferentes (a. Atención, b. Justificación, c. Datos concentrados, d. Cooperación de datos, e. Oportunidad de negocio y f. Relaciones integradas.).

Una organización no necesariamente debe tener una fase completada para pasar a otra, son transversales como la cadena de valor y su presencia en una fase no implica la no presencia en otra. En otras palabras, la organización puede estar presente en diferentes niveles de madurez. Así, en este estudio se calculó el nivel de madurez del Hospital do Distrito Federal, según el modelo de (Carvalho et al., 2019).

Metodología

Se trata de una investigación exploratoria con enfoque cualitativo y cuantitativo. El objeto de estudio, la madurez en Análisis de Datos de un Hospital de Brasilia. Para la investigación, el modelo de Carvalho, et al. (2019a, 2019b, 2018 y 2017). Participaron 30 personas que trabajan directamente con datos en el Hospital. Este modelo se aplicó mediante cuestionarios a los usuarios de datos internos del hospital (profesionales que utilizan datos). Las etapas de la operacionalización propuesta se dividen en tres partes, a. Cálculo de la etapa de madurez; b. Cálculo del puntaje de madurez total y c. Validación de rostro y contenido.

a. Cálculo de la etapa de madurez

Para calcular la etapa de madurez, cada respuesta se convirtió de acuerdo con los siguientes criterios: 1. En desacuerdo (0 puntos), 2. Parcialmente en desacuerdo (1 punto), 3. Ni en desacuerdo, ni de acuerdo (neutral) (2 puntos), 4. Parcialmente de acuerdo (3 puntos) y 5. De acuerdo (4 puntos). Se consideró la puntuación máxima a alcanzar en las preguntas de cada etapa, calculada por separado, donde cada grupo de preguntas representa una etapa.

Por lo tanto, para cada etapa de madurez del análisis de datos, la puntuación se calculó de la siguiente manera (ecuación 1):

$$PF = \left(\frac{\mu_{\Sigma p}}{p_{máx}}\right)*100\% \quad (1)$$

Donde,

PF = Puntuación de la etapa

$\mu_{\Sigma p}$ = Suma del promedio de las preguntas

$P_{máx}$ = Puntuación máxima posible por etapa

De esta forma, cada fase tiene su propio porcentaje, y la organización puede participar en diferentes etapas de madurez, siendo la puntuación más alta la etapa más característica de la organización.

b. Cálculo del puntaje de madurez total

Carvalho (2019a), explica que existen 6 etapas posibles para una organización Hospitalaria en cuanto a madurez de datos, por lo que la madurez del Análisis de Datos se divide en 6 partes, equivalentes a 16.67 puntos por etapa. Para calcular el índice de madurez total en Análisis de datos, el valor de cada fase se multiplicó por 16.67 (como se explicó anteriormente) y se realizó una suma (ecuación 2).

$$PP = \sum_{(PF \times 16{,}67)} \quad (2)$$

Donde,
PP = Puntuación del pilar (puntuación de madurez total)
PF = Puntuación de la etapa

El promedio de la suma de los promedios de cada pregunta genera el puntaje promedio.

c. Validación presencial y de contenido

La validación presencial y de contenido se realizó con profesores y profesionales hospitalarios en reuniones presenciales de grupo. También se puso a disposición un cuestionario abierto (anónimo) de testimonios, con el fin de verificar los resultados de la escala y los descritos por los profesionales entrevistados.

Resultados

Una vez recolectados los datos a través de un cuestionario, se realizó el cálculo para encontrar el nivel de madurez en el análisis de datos del hospital. Como se preconiza (Carvalho et al., 2019), el comportamiento de madurez es fluido, pero una organización siempre tendrá un nivel preponderante.

Los resultados encontrados fueron qué el Hospital tiene un 50,15% de madurez. Entre las seis etapas posibles, la que mayor puntuación tiene el Hospital es la etapa I- Atención, con 64,29% de la puntuación que podría alcanzar y 10,72 puntos acumulados de 16,67. Así, la etapa más prevalente del Hospital es la etapa I. Aunque puntúa en todas las etapas, las etapas I. La atención y II Justificación son de suma importancia, ya que significan urgencia y fundamentos para apoyar el uso de diferentes análisis de datos, como BI, Data Science, Big Data, modelos predictivos y prescriptivos. En el estadio II, el Hospital obtuvo el 51,94% de la puntuación total posible, en una puntuación total de 8,66 de 16,67.

Establecer prioridades de acuerdo con la información encontrada en el análisis de madurez del Análisis de Datos, creando metas en base a los puntos a reforzar, en la etapa de “atención” y “razonamiento”. El Hospital también puntúa en el resto de las etapas, pero solo en las etapas I y II existe el compromiso de estar incluido en su duración, ya que son requisitos previos para el correcto uso de los datos.

Como paso de validación, se realizó un análisis de contenido de acuerdo con la opinión de los encuestados sobre posibles obstáculos para mejorar la madurez de los datos con el fin de confrontar lo encontrado en el resultado (Figura 2).

Fig. 2: Nube de palabras sobre obstáculos al análisis de datos

En opinión de los encuestados, existe falta de uniformidad de datos, falta de integración, falta de personal capacitado para trabajar con los datos, necesidad de comunicación formal sobre la importancia de los datos y conciencia del correcto llenado de los Insumos, mejora en la infraestructura, mejora en la calidad de los datos. Así, se puede observar que muchos de los problemas están directamente relacionados con las Etapas I y II, como se encontró. Sin embargo, aparecen otros puntos relacionados con los pilares "personas" e "infraestructura y TI" que pueden medirse en un análisis futuro. De esta forma, la operacionalización de Carvalho, et al. (2019a, 2019b, 2018 y 2017) en tres etapas: a. Cálculo de la etapa de madurez; b. Cálculo del puntaje de madurez total y c. Validación de rostro y contenido.

Conclusiones

Esta investigación tuvo la opción de operacionalizar la evaluación de madurez de datos de Carvalho et al. en una organización hospitalaria. Se presentó un modelo operativo en tres etapas que logró satisfactoriamente lo propuesto. Las etapas futuras serán las validaciones estadísticas y de predicción del modelo.

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The Pension Scheme in Poland And in Selected Countries of Central and Eastern Europe And Its Changes in The Context of Budgetary Deficit and Public Debt to The Year 2019

Jolanta Maria CIAK
WSB University in Torun, Poland
jociak4@gmail.com

Bożena KOŁOSOWSKA
UMK in Torun, Poland
bkolosowska@gmail.com

Abstract

The changes in the pension schemes of the Central and Eastern Europe countries, and first of all in the Polish national pension scheme are the subject of the paper. The study aims at reviewing the changes in the pension schemes and their impact on the public finance including the government budget. Research show that activities undertaken by the governments whose aim is to limit or even suspend the payments of contributions to capital funds cannot be described as reformative, but they are rather short-term solutions of the problem of deficit in the government budget. They improve the situation of the pay-as-you-go part of the public pension systems only temporarily, however threatening with a disassembly of the pension reform, which was very hard to introduce. Undoubtedly, the impact of the changes in the pension scheme on the public finance is significant due to a long-term imbalance in the government budget and the accumulating public debt. Evaluating the ongoing changes, the Authors notice that the solutions suggested by the government can be described as choosing between responsibility for the present and responsibility for the future.

Keywords: Pension scheme, Open Pension Funds, Occupational Pension Schemes, budgetary deficit and public debt

JEL Classification: H55, H62, H63

Introduction

As it has been seen for a long time, people live to old age, which creates the necessity to secure old age through a fair pension. It is a social and also economic problem. The fact that the society is ageing does not help the functioning of the contemporary social security systems, on the contrary, it brings challenges for governments.

Those issues are also observed in the countries of Central and Eastern Europe, and in Poland, where since 2010 solutions designed to finance current budgetary needs of the state have been sought. National budgets have to frequently face budgetary deficits and consequently high public debts, which makes the correct functioning of the public finance systems difficult, and social security systems constitute their part. The aim of the article is to present the changes in the pension schemes in the countries of Central and Eastern Europe and first of all in the Polish national pension system and their influence on the public finance including the state budget. Evaluating the current changes, the Authors discern that the changes suggested by the government can be assessed as the choice between being responsible for present and being responsible for the future. It is also significant that the impact of demographic changes on the state economy and budget is contemporarily connected with two trends – a decline in the population and the aforementioned ageing of the society. It should be underlined that the effects of the current changes in the pension system will burden the future generations and the sources of their financing will depend on the pursued in the future financial policy including the fiscal policy.

The Aim of and Reason for Creating Pension Systems

For many years, it has been societies' aim to live a dignified old age, when for natural reasons people are not able to work and be professionally active. For a long time, the solution of the problem was building extended families, in

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which the younger generation satisfied not only their own material needs, but also those of their parents or even grandparents, when they were no longer capable of earning money. Soon it was clear that such a method of guaranteeing a safe old age was not enough taking into consideration countries' socio-economic development and people's living long. Such a considerable social problem encouraged creating a state system of social security for old age. The first solutions in Europe were introduced in Germany in 1889 and they were elements of a reform introduced by Otto von Bismarck. Other pension systems followed in 1908 in England, also in 1910 in France. In 1935 the first formal pension system was established in the United States. The introduced solutions were a part of the New Deal economic program developed by president F.D. Roosevelt's administration (Chybalski 2009).

Nowadays pension funds constitute a part of the social security system, separated on the side of the object, for which the term "system" is also used. The pension system, also called the retirement security system, is frequently defined in the national and foreign literature.

The retirement security system can be based on both insurance construction and supply construction. Then the advantage of the social part over the economic effectiveness becomes its key element. Public institutions are the main executor of the social objectives and values (Jackowski, Abramowicz 2007).

Examples of the definition can be quoted after Chybalski (2009): "The retirement security system (retirement security, the pension scheme) can be defined as existing institutional solutions aiming generally through establishing the rules of 1) accumulating retirement savings and 2) paying pensions at providing system participants with appropriate non-profit means of subsistence for the old age." Also "The pension system is a method of dividing the current GDP between the working generation and the generation of pensioners. From the point of view of an individual participant of the system, it is also a tool of allocation of his income in the life cycle."

The first definition places emphasis on institutional arrangements as a form of accumulating saved funds for old age. The other definition is wider, it describes the pension system as a total of sources of social security for old age including individual forms of saving.

It can be seen that the pension system by creating new pension products becomes more flexible and tailored to people's needs in both short and long period of time. The society becomes a co-creator of the system not only by participating but also by forcing its changes. For this reason, the pension system can be treated as an element of the social security created with mandatory and voluntary forms of accumulating pension capital of a public and private, individual and collective character, which is paid once or in the form of multiple payments upon the acquisition of retirement benefits.

The main criterion deciding about the form and functioning of this system is the method of accumulating funds for paying pension benefits. Taking this determinant into account, two basic models of financing pensions can be indicated – a pay-as-you-go system and the capital system (Kołosowska 2004).

The premise of the first of the two, the pay-as-you-go (PAYG) system, is intergenerational solidarity (Jedynak 2014; Ciak 2002), and here benefits paid to today's pensioners are financed from social security contributions paid by working people (Szczepański 2006; Ciak, Kołosowska 2015; Ciak, Kołosowska, Piotrowska-Marczak 2019). The pay-as-you-go system is public and it constitutes the first plane of retirement security. Its advantages and disadvantages are indicated. This system is resistant to financial crises and inflation. Through using different arrangements, retiring people are guaranteed to receive benefits permanently regardless of the economic situation of a given country. The system is sensitive to the demographic situation, and first of all to the problem of ageing society and lengthening lifespan. For this reason, among the disadvantages of the pay-as-you-go system, longer lifespan, a low birth rate, also its sensitivity to political manipulations, unemployment and the level of wages can be found.

The other pension system functioning in the world is a model based on the capital fund, which constitutes the second plane of retirement security. It is usually of a sectoral character, though in some countries it is represented by private entities, which manage contributions. Allowing private entities to become a part of the public system was a new arrangement used in Europe in first of all the pension systems of the Central and Eastern Europe countries. Contributions paid by the insured are transferred to a pension fund, which, multiplying their value, deposits them in the financial market instruments. The fact that this system is not sensitive to demographic changes in the society of a given country constitutes its advantage over the aforementioned system. The supporters of capital funding claim that it makes the system resistant to negative impact of the demographic factor and that the rate of return on investments allows much higher benefits than in the case of the pay-as-you-go system (Czepulis-Rutkowska 2000). The negative aspects of such a solution include a significant correlation with the economic situation in a given country through its strong connection with for instance unemployment, inflation and crises on the financial market. Creating mixed systems led to minimalizing the disadvantages of the aforementioned arrangements. A three-pillar structure, in which

the entity responsible for financing the contribution is the main criterion for dividing into pillars, is the most often functioning form of a mixed model (Szumlicz 2005). Two kinds of such a model exist: a classic three-pillar model and the World Bank's concept. The former is characteristic for the Western Europe countries and the majority of countries of the Organisation for Economic Cooperation and Development. The World Bank's concept was used in creating the systems in Latin America and Central and Eastern Europe. The most considerable differences can be seen in the second pillar of the used arrangements. The one in the classic system is created by the employer, who is responsible for the employees' pension fund, whereas the World Bank's concept includes private entities managing contributions paid to capital pension funds based on the state's legal regulation and operating under the state's supervision.

Pension System in the World Bank's Concept

The key solution applied in the pension systems of the countries of Central and Eastern Europe was the one developed by the World Bank. In the years 1984 – 2004 the World Bank implemented a program for supporting the building and implementing of pension systems in 68 countries. The strategy advised the governments of the countries participating in the program to create a multi-pillar system. The institution, apart from financial help supported with loans, also offered consulting in the area of pension reform and it concentrated on the following: short-term and long-term financial stability of the proposed solutions, the impact of a reform of the system on the economic growth of a given country, the level of equivalence and distributiveness of the new system, also the risk accompanying the new arrangement (Holzmann 1999, pp. 3-6).

In 1994 the World Bank recommended the many countries that they should introduce a multi-pillar pension system consisting of three planes (Żukowski 2006, p. 61) with the following parts: a mandatory managed by the state part of the pay-as-you-go system, a mandatory capital part managed by private entities, and voluntary accompanying plans of individual saving for old age. Table 1 presents the three-pillar pension system proposed by the World Bank in 1994.

Table 1: The three-pillar pension system proposed by the World Bank in 1994.

Criteria	1st pillar	2nd pillar	3rd pillar
Subjective	State	Employer or person	Employer or person
Income	civic or minimal pension	employee or individual pension	employee or individual pension
Part of the system	Base	Base	additional
Way of joining	mandatory	mandatory	voluntary
Management	Public	Private	Private
Financing	Pay-as-you-go, that is provision method	Capital	Capital
Pension formula	defined benefits	defined contributions	defined contributions

Source: Averting the Old Age Crisis. Policies to Protect the Old and Promote Growth, Oxford: World Bank Policy Research Report, Oxford University Press, 1994, pp. 15 – 16.

The first pillar was of a public character and it was mandatory. It was supposed to guarantee the basic minimum subsistence in the form of a basic, civic pension financed from taxes. It was to prevent pensioners' poverty and had a redistributive nature. The second pillar, basing on the formula of a defined contribution, included mandatory and privately managed pension schemes financed with the capital method. Individual and voluntary capital pension plans, which were supposed to provide additional benefits, constituted the third pillar. The presented World Bank's concept was implemented to varying extent in the pension systems in the Central and Eastern Europe and in Latin America.

In 2005 the World Bank presented a new concept of the multi-pillar pension system suggesting a bigger diversification of the sources and methods of accumulating pension capital. Its solutions used differentiation of the financing methods and a bigger number of entities offering retirement security. The new planes included a social part financed with taxes, employee pension plans, a mandatory part with benefits depending on earnings and additional individual security for old age, also those of informal character of pension support. In this way, the model presumed the existence of five planes, that is pillars, which were supposed to finance pensions. The new solution was expected to limit the risk of poverty of people ending their professional activity and also to use the funds accumulated during working in a more efficient way. The differentiation of the sources of pension financing was supposed to limit the possibility of

reducing pension benefits when the economic growth lowed down and had a negative impact on the growth rate of payroll fund generating lower contributions. It also included mitigating the negative effects of the demographic factor, that is the increase in the number of pensioners in relation to the number of contributing people. Such a phenomenon can be observed when the birth rate decreases, an average lifespan gets longer or emigration increases. The third factor of political nature which can concern decisions about for instance pension valorisation, lengthening or shortening the retirement age resulting in limiting public expenditure is also indicated (Holzmann 2005). Table 2 presents the pension system pillars developed by the World Bank (Holzmann, Hinz, Dorfman 2008).

Table 2: Pension system pillars created by the World Bank

Pillar	Way of pension benefits financing
Zero Pillar	Basic benefits not linked to the amount of contribution financed by the state depending on its financial condition.
First Pillar	A mandatory pay-as-you-go system linked to earnings.
Second Pillar	A mandatory capital system of defined contribution with independent management of pension capital.
Third Pillar	A voluntary system with different forms (e.g. defined contribution, individual savings, sponsored by the employer).
Fourth Pillar	A form of an informal support (e.g. by family), other formal social programs (health care or housing) and other assets (e.g. property or reverse mortgage).

Source: Holzmann R., Hinz R., Dorfman C. (2008), Pension Systems and Reform Conceptual Framework 2008, http://documents.worldbank.org/curated/en/716871468156888545/Pension-systems-and-reform-conceptual-framework.

The aim of the applied solution is to guarantee comprehensive protection for old age taking into account needs of different groups of citizens, thus limiting the risk to which the pension system is exposed. It also includes using numerous subjects like the state, the employer, an individual entity, family, subjects offered by informal social programs and methods of financing such as taxes, contributions, individual income, financial and non-financial resources (Żukowski 2006).

The zero pillar, which provides social pension in connection with having a citizenship of a given country, aims at preventing poverty among the elderly including those who did not participate in the retirement security system or whose participation was only marginal. Basic pension is provided by the first pillar, which offers a particular replacement rate financed with the pay-as-you-go method. It is mandatory, which is supposed to prevent the risk of short-sightedness and longevity, and its sensitivity to demographic and political risks must be mentioned. The second pillar includes mandatory occupational and individual as well as capital pension systems providing additional pension. Capital pension plans of a voluntary nature are included in the third pillar. The last element of the model concept takes into consideration non-financial pension security offered by family and the state, also assets, which can also constitute the source of income in old age, like a property, which enables taking reverse mortgage (Holzmann 1999).

Nowadays the five-pillar concept of the World Bank is frequently used for comparing retirement security systems functioning in different countries. It is of a particular use for evaluating their mandatory and base or voluntary elements.

General Characteristics of Retirement Security Systems in the Countries of Central and Eastern Europe

The turn of 1980s and 1990s brings political changes in most of the countries of Central and Eastern Europe, owing to which the countries changed from centrally-planned economy to market economy. Numerous changes were observed, new expectations and possibilities emerged along with new challenges which needed to be met. In order to ensure the correct functioning of the market economy system, the countries' governments were obligated to introduce a number of new laws and reforms, also to create new institutions or reform those already existing (Siporowska 2001).

Reforming pension systems carries a high political risk, and the results of right decisions, but also of mistakes and omissions in this area can be felt by whole generations.
Changes were needed in the functioning pension systems, which in the post-communist countries shared numerous features like the following (Kołosowska 2004; Adamiak, Kołosowska 2011; Adamiak, Kołosowska, Mosionek-Schweda 2012):

- public pay-as-you-go pension systems, so sensitive to demographic changes, were the only source of pension benefits;
- numerous pension privileges, e.g. lower retirement age or a more favourable formula of pension, not burdened with an additional contribution;
- pensions were easily accessible as the established retirement age was low, numerous possibilities of retiring earlier were present, invalidity pension was relatively easily accessible;
- pensions were financed from contributions paid by employer only and their amount was not linked to the amount of contributions and established according to the rule of defined benefit;
- a systematic growth of the social security contribution, including retirement security, took place;
- contributions were not registered in individual accounts of the insured;

The threat of catastrophe of public finance and unfavourable demographic changes led to the fact that the governments of numerous countries chose introducing changes in pension systems. At the end of 1990s, in other countries of Central and Eastern Europe with the view to establishing a balance between pension income and expenditure and to maintaining financial stability, the formula of a defined contribution and capital financing was adopted. To some extent, an exemplary solution for the introduced changes was the fully capital system with a defined contribution introduced in Chile in 1981 (WIeprzowski 2016). Similar arrangements started to be successively adopted in a few countries of Latin America and Central and Eastern Europe. Other reforms aimed at introducing multi-pillar pension solutions based on capital and pay-as-you-go financing (Owczarek 2011).

Considerable importance was attached to the capital part, which was supposed to trigger the development of the capital market, and create a new institutional investor in the form of pension funds. Open pension funds managed by private institutions were therefore introduced in the public system.

After several years, in the period of crisis, the imperfections of pension systems were seen and the topic of their reform returned. Hungary was the only country in which the second wave of reforms forecast a complete, and in the case of other countries (including Poland) partial, withdrawal of the solutions introduced in the first wave of reforms (Żukowski 2013, the author indicates that the second wave of pension reforms after the financial crisis in this region can be seen as an adjustment of the pension systems to current conditions only).

Structural Pension Reforms in the Countries of Central and Eastern Europe

A considerable part of the countries of Central and Eastern Europe introduced structural pension reforms. They concerned creating multi-level pension systems with a mandatory second pillar of privately managed pension funds. Taking into consideration the fact that the new second pillar replaced a part of the pay-as-you-go public system, the reforms were also called a (partial) privatisation of the retirement security. Hungary (1998) Poland (1999) were among the first countries which introduced these reforms. Latvia (2001), Bulgaria (2002), Croatia (2002), Estonia (2002), the former Yugoslav Republic of Macedonia (2003), Slovakia (2005) and Romania (2008) followed. Only the Czech Republic, Lithuania and Slovenia keep their "Bismarckian" pay-as-you-go systems without the mandatory pension funds (Żukowski 2013).

The pension systems in the countries of Central and Eastern Europe from before the reforms can be specified as two-pillar systems. The first pillar, called a common one, based on the pay-as-you-go system. The second pillar included all voluntary forms of accumulating pension capital creating an informal, non-institutionalised and not so popular capital system.

The aim of the conducted reforms of the pension systems in our part of Europe was to introduce a three-pillar system. The first pillar is still the pay-as-you-go system, but in a few cases combined with a defined contribution, and not like before the reforms with a defined benefit. The second pillar, the capital one, is created by pension funds, the membership in which is mostly mandatory. The third pillar, also a capital one, is a voluntary, more or less formalised and institutionalised form of accumulating of pension capital (Chybalski 2009). The constructions of pension systems in the selected countries of Central and Eastern Europe from the first period of the reforms are presented in table 3.

Table 3: Constructions of pension systems in the selected countries of Central and Eastern Europe

Country	First pillar	Second pillar	Third pillar
Bulgaria	defined benefit system	mandatory pension funds	voluntary pension funds, employee pension plans managed by pension funds (also classified as the fourth pillar)
Croatia	defined contribution system	mandatory pension funds	voluntary pension plans offered by pension funds, trade unions or employers
The Czech Republic	defined benefit system (since 2010 defined contribution system	-	voluntary pension plans managed by pension funds
Estonia	defined benefit system	mandatory pension funds	voluntary pension funds or pension insurances offered by life insurance companies
Hungary	defined benefit system	mandatory pension funds	voluntary pension funds or pension accounts managed by banks or investment advisors (also classified as the fourth pillar)
Latvia	defined contribution system	mandatory pension funds	voluntary pension plans managed by loan institutions, life insurance companies
Lithuania	defined contribution system	voluntary pension funds which a part of contribution is transferred from the first pillar	voluntary pension funds
Poland	defined contribution system	mandatory pension funds	voluntary employee pension plans or individual pension accounts (also classified as the fourth pillar)
Romania	defined benefit system	since 1.01.2008 mandatory pension funds	functioning since 2007 in the form of employee pension plans
Slovakia	defined benefit system	mandatory pension funds	voluntary pension plans managed by pension funds, banks and life insurance companies
Slovenia	defined benefit system	Pension schemes (mandatory for selected groups of professions and voluntary for the other ones) managed by insurance or pension funds	voluntary pension plans managed by insurance companies or pension funds

Source: Chybalski F. (2009), Fundusze Emerytalne w krajach Europy Środkowo-Wschodniej, „Polityka Społeczna", No 2, p. 22.

New Pension System in Poland after 1999

The reform of 1999 was the crucial element of the process of creating a new pension system and its introduction was justified by the following (see: *Bezpieczeństwo dzięki różnorodności. Reforma system emerytalnego w Polsce* 1997):

- a threat of a disaster in the social insurance finance and in the public finance as a result of demographic changes that were to occur after 2010
- a large share of the budget in financing pension benefits
- a poor condition of the social insurance finance
- heavy burdening of employers with the labour cost
- a low level of benefits

As early as at the very beginning of the reform implementation, a lot of economists pointed out the existence of numerous unknown factors. Jan Czekaj claimed that not completely specified financial results of the reform in relation to the budget caused concern, also the pension funds' actual ability to maintain and multiply the value of the funds obtained from pension contributions raised reservations (Czekaj 1997). Unequivocal specification of the financial consequences of introducing the new system appeared particularly difficult due to the considerable number of variables, such as the activities rationalising the existing system and their effectiveness, the rate of GDP growth, the rate of the labour productivity growth, the impact of the reform on the economic growth and the shadow economy absorptions.

The alterations that have occurred in the social insurance system since 1st January 1999 have caused the growth in the expenditure borne by the state budget. It has been triggered by the following (Kołosowska 2004):

- transferring of a part of social insurance contributions to Open Pension Funds (20% of paid contribution),
- lowering social insurance contribution for the highest paid people due to the fact that contributions are deducted from the monthly income up to 2.5 of an average salary,
- an employer having the possibility of transferring a part of contribution (up to 7%) to an employee pension plan, the results of which are discussed later,
- introducing the obligation to pay social insurance contributions from the state budget (e.g. for employees taking child care leave, army soldiers),
- the increase in the costs of ZUS functioning resulting from among other things introducing a new information management system, correcting errors in the information management system and other things.

Considering the loss of a part of contribution transferred to Open Pension Funds (OFE), the Social Insurance Fund's (FUS's) liquidity ought to be secured through increasing the aids from the national budget. The situation is worsened by the fact that the existing deficit increased in connection with the reform being introduced. Since 1999 the amounts from the state budget transferred to the Social Insurance Fund have been increasing. In 1998 the aids amounted to about PLN 6.8 billion, a year later it amounted to PLN 9.6 billion, and in 2001 to over PLN 21 billion. The close-end grant and supplementary subsidy to the Social Insurance Fund amounted to as much as PLN 27 billion in 2002. These are the amounts that supplement the FUS funds on account of transferring a part of the funds to Open Pension Funds (OFE), exceeding the thirty times of the contribution assessment basis for the compulsory social insurance and supplement of funds for payment of benefits.

Over the years, other essential activities structuring the Polish pension system followed, and they were as follows (Jedynak 2014):

- re-establishment of the special pension system of uniformed services, excluding them form the standard pension system in 2003
- passing an amended act on the employee pension programs (PPE) and introducing individual retirement accounts (IKE) in 2004
- by way of trade unions' protests and pressing preferential pensions for miners were introduced in 2005
- the introduction of changes in the functioning of the second pillar in 2011
- raising and equalisation of the retirement age in 2012
- modification in the functioning of the Open Pension Funds and the possibility to transfer a part of funds from the Open Pension Funds (OFE) to the Social Insurance Institution (ZUS) in 2014

Changes in the Architecture of the Polish Pension System after 2012

Another significant stage of creating of the Polish pension system in 2012 was the decision to raise the retirement age to 67 and its equalisation for men and women. Until 2012 the retirement age was 60 for women and 65 for men, which corresponded to the retirement age in the 'old' system. The Act of 11th May 2012 stated that the modifications would be gradually introduced from 1st January 2013, raising it every three months by one month (the Act of 11th May 2012 *to amend Act on Old-age and Disability Pensions…*). Through such assumptions, men retiring after 2020 and women retiring after 2040 will reach the age of 67. However, there appear some derogations from this rule, such as among other things early retirement for people born before the 1st January 1969 who did not join OFE, bridging pensions, uniformed service pensions, miners, etc.

In 2014 again on grounds of a bad condition of the public finance and the poor performance of the second pillar, another correction in the pension system was introduced. The serious risk of exceeding the so-called second safety threshold (a situation when the public debt exceeds 55% of GDP) was an obvious symptom of a bad condition of the public finance. An annual deficit in FUS constituted only a part of burden to the budget that led to the difficult situation of the public finance. The claims of the poor performance of the second pillar concerned, above all, the functioning of the Open Pension Funds. The issues raised related to among other things the rationality of OFE purchasing the State Treasury bonds. (The Treasury borrowing requirements, connected above all with the necessity to cover the deficit in FUS, were in this way financed. Thus, through the State Treasury bonds being purchased by

OFE, other costs of transferring funds within the pension system were generated.) Moreover, the problem also concerned the obligation to transfer a part of contributions to OFE, the effectiveness of the mechanism of competition between individual OFE and also the limits of investing in particular categories of assets imposed on OFE. Additionally, the issues of relatively high charges collected by OFE caused uncertainty (Jedynak 2014, p. 56). Finally, by virtue of the Act of 6th December 2013 on the amendment of certain acts in connection with the determination of the rules for payment of pension from resources collected in the Open Pension Funds, the following corrections in the pension system were implemented (the Act of 6th December 2013 on the amendment of certain acts…):

- the transfer of the State Treasury bonds owned by OFE to ZUS and also their redemption with a simultaneous entry resulting from the rights of insured persons on capital sub-accounts in ZUS
- specifying the amount of contributions transferred to OFE as 2.92% of the basis of assessment
- enabling insured persons to make a choice concerning the participation in OFE
- the abolition of the mechanism of the minimum rate of return and the change of investment limits of OFE
- modification in the system of charges collected by OFE

In the period from 1st April to 31st July 2014, the members of OFE made a decision whether the contribution amounting to 2.92% of the basis of assessment is to be transferred to OFE. The members were asked to decide whether the part of the contribution was to be still transferred to OFE or recorded on a ZUS sub-account along with already transferred to this sub-account contribution amounting to 4.38%.

Contributions paid to ZUS are subject to an annual indexation, i.e. they are multiplied by an indexation ratio, contributions transferred to Open Pension Funds are multiplied through investments in financial markets. The indexation of the funds in ZUS pension accounts depends on the inflation and the increase in wages in the economy. The funds accrued on sub-accounts are subject to an indexation by a ratio equal to average annual dynamics of GDP in the last five years.

Contribution amounting to 19.52% of the contribution assessment basis, i.e. of gross wage, are paid to pension insurance.

From 1st February 2014 to the end of June 2014 the amount of pension insurance contribution was divided as follows:

- 12.22% recorded on a ZUS account
- 4.38% recorded on a ZUS sub-account
- 2.92% paid to an account in an Open Pension Fund.

Since July 2014, depending on the choice made by an insured person, a part of a pension insurance contribution amounting to 2.92% has been paid by the Social Insurance Institution to a selected by an insured person Open Pension Fund (OFE) or recorded on a person's ZUS sub-account (total of 7.3%).

The present form of the national pension system after all the changes and corrections is presented in table 4.

Table 4: The shape of the Polish pension system after the changes in 2014

<table>
<tr><th></th><th colspan="2">1st pillar</th><th colspan="2">2nd pillar</th><th colspan="3">3rd pillar</th></tr>
<tr><td>Form</td><td>Insured person's account in ZUS</td><td>Sub-account in ZUS</td><td colspan="2">OFE</td><td>PPE</td><td>IKE</td><td>IKZE</td></tr>
<tr><td>Managing bodies</td><td colspan="2">ZUS</td><td colspan="2">PTE</td><td colspan="3">Financial market institutions</td></tr>
<tr><td>Nature of participation</td><td>Mandatory</td><td>Mandatory with an option to transfer funds from OFE in the case of resignation</td><td colspan="2">Possibility of resigning</td><td colspan="3">voluntary</td></tr>
<tr><td rowspan="4">Amount of contribution</td><td rowspan="4">12.22%</td><td rowspan="4"></td><td colspan="2">7.30%</td><td colspan="3" rowspan="4">Limited amount</td></tr>
<tr><td>7.30%</td><td>0.00%</td></tr>
<tr><td colspan="2">or (insured person's choice)</td></tr>
<tr><td>4.38%</td><td>2.92%</td></tr>
<tr><td>System of financing</td><td>PAYG</td><td>PAYG</td><td colspan="2">capital</td><td colspan="3">capital</td></tr>
<tr><td>Benefit</td><td colspan="4">Retirement pension from FUS with funds accumulated in OFE</td><td colspan="3">"Additional pension"</td></tr>
</table>

Source: Uzasadnienie%20do%20projektu%20ustawy.pdf (2015), www.mpips.gov.pl.

The introduction of prohibition on investments in treasury bonds was also connected with the changes in Open Pension Funds. It entailed the necessity to transfer the funds invested in debt securities to Social Insurance Institution (*Appeals taken on decisions by ZUS 2014*).

Benefit payment was another amended area. As a result of the enforced Act, pensions were supposed to be paid by one institution. The amount of the future benefit would be calculated by dividing the value of funds accumulated in an account by an average further life expectancy. The main change concerns however an introduction of gradual transfer of funds accumulated in Open Pension Funds to the Social Insurance Fund. The process begins 10 years before a given person reaches the minimum retirement age. In this period of time, the whole contribution is transferred to the Social Insurance Institution (*Appeals taken on decisions by ZUS 2014*). The previous transfer of funds from OFE to ZUS is called a "security slide".

The changes also concerned the third pillar of the retirement security, and more precisely its part, IKZE, that is Individual Retirement Protection Account. From the moment of the introduction of this form of voluntary saving for old age, contributions to IKZE were exempted from the income tax unlike payments, which were taxed. The changes introduced in 2014 concerned a reduction of the tax rate for payments from IKZE. The preferential tax rate was to encourage using IKZE. As a result of those changes, "a lump-sum tax" of 10% of payments from IKZE accounts was introduced" (Rutecka 2014).

In the following year, further changes in the Polish pension scheme were introduced. On 1st May 2015 the Act of 5th March 2015 amending the Act on Old-age and Disability Pensions from the Social Insurance Fund was introduced.

Pension System Functioning after 2017

Citizens' lack of adequate awareness and their dissatisfaction with the current pension scheme constituted one of the main reasons for developing and implementing further changes, whose objective was to improve the existing system. In 2017 more modifications regulating provisions entering into force on 1st October 2017 were introduced.

A part of the society did not conceal dissatisfaction when the retirement age was increased in 2013, therefore during the preparation of new regulations concerning the pension scheme, the issue of the minimum retirement age was the main concern. The previous retirement age, that is age 60 for women and age 65 for men, was restored. Those changes also involve the rules concerning pre-retirement protection. The four-year period of protection against dismissal for women is set to age 56, and for men to age 61 (Piec-waznych-zmian-w-emeryturach-w-2017-rokuobnizony-wiek.html 2017). It should be added that currently women are entitled to a minimum pension after 20 years of professional activity and men after 25 years.

The introduced changes also concerned the second pillar of retirement security, that is OFE. The current regulations specify that the majority of funds accumulated in the Open Pension Funds should be transferred to Individual Retirement Protection Accounts (IKZE). The remaining funds will be transferred to the Demographic Reserve Fund.

In July 2016 the Capital Building Program, one of the pillars of the Strategy for Responsible Development, was presented by the Prime Minister Mateusz Morawiecki. It states that the Open Pension Funds should be transformed into investment funds – 75% of the funds should be transferred to Individual Retirement Protection Accounts (IKZE). The remaining 25% is to be transferred to the Demographic Reserve Fund, whose management is to be taken over by the Polish Development Fund (PFR).

The first objective of the Program is to create Employee Capital Programmes (PPK), which would constitute "the government's plan for the citizens to save systematically" (morawiecki-i-plan-budowy-kapitalu-co-sie-stanie-zofe-ike/m6v81r6 2017).

Employee Capital Programmes are supposed to become an additional source of saving for retirement, to which funds would be transferred by both an employer and an employee. They were to be introduced in 2019. Public Real Estate Funds, which would focus on investing in property, were a novelty in connection with the programme.

In connection with the changes introduced on 1st October 2017, further development of Employee Pension Programs (PPE), a type of organised, group and systematic saving for future retirement, was announced. Currently they are created by employers, who finance the basic contribution, which is transferred to a selected financial institution managing it until its payment.

In 2019 a final liquidation of pension funds (OFE) was announced and two alternative solutions to the problem of the remaining funds accumulated in the Open Pension Funds were presented. According to the draft bill, each of the 15.5 million Polish citizens with an account in OFE will have to decide whether all the pension fund savings will go to a

private Individual Retirement Pension Account (IKE) or to FUS. However, all those who will decide to transfer the retirement savings from OFE to IKE will have to pay 15% of so called transformation fee. Transferring money from OFE to IKE or to FUS is supposed to take place in January 2020. In the case of the latter, all pension contributions (19.52%) will go to ZUS, and the whole state pension will come from one source, that is from FUS.

Situation of the Polish Public Finance in the Context of Changes in the Pension System in the Years 2010 – 2019

During a crisis employment shows declining trends, and so do incomes from work. It results in a decrease in revenues from contributions (social insurance contributions are smaller) and in an increase in pension expenditure for disability pensions and earlier pensions (Kalina-Prasznic 2010).

The pension system formed in the last years, functioning within the framework of the public finance, has greatly influenced the financial situation of this sector. Both the earlier (2014) changes in OFE and the current changes (OFE liquidation, the introduction of PPK) in this area have an impact on the whole government sector. It is therefore useful to analyse the impact on the state budget deficit and the public debt and the public debt-to-GDP ratio. The analysis will start from the financial situation of the Social Insurance Fund (FUS) and of the state budget. Table 5 presents selected indicators in connection with the functioning of the Social Insurance Fund in the years 2010 – 2019.

Table 5: Situation of FUS in the years 2010 – 2019 (in PLN billion)

Specification	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FUS income	119.5	122.3	132.5	136.4	186.6	196.1	208.7	260.7	238.5	246.2
FUS expenditure	130.4	139.0	151.5	168.3	195.0	201.7	208.1	217.6	231.6	246.6
FUS balance	-10.9	-16.7	-19.0	-31.9	-8.4	-5.6	+0.6	+43.1	+6.9	-0.4
Grant from the state budget to FUS	38.1	37.5	39.5	37.1	30.4	42.1	44.8	40.9	35.8	38.9
Share of grants from BP in FUS income (%)	31.9	30.7	29.8	27.2	16.3	21.5	21.5	15.7	15.0	15.8
Funds from FRD	7.5	4.0	2.9	2.5	2.5	Bd	bd	-	-	-
Contribution refund to OFE	22.3	15.4	8.2	10.9	8.2	3.1	3.2	3.2	2.3	3.4
Loan to FUS	5.5	5.0	3.0	12.0	8.9	5.5	1.0	0.0	0.0	0.0
Loans to FUS in total:	10.87	15.87	18.87	30.87	47.0	53.8	45.3	14.8	8.6	8.6

Source: Own study based on: *Egzekucja należności z tytułu składek na ubezpieczenie społeczne. Informacja o wynikach kontroli*, *Sprawozdanie z wykonania budżetu państwa za lata 2010 - 2018* (2019) NIK, Warszawa; *Sprawozdanie z wykonania budżetu państwa za lata 2010 – 2019,* Council of Ministers.

The analysis of the data included in table 5 leads to drawing the following conclusions.

Firstly, FUS revenues to 2015 were insufficient to cover current expenditure. From 2010 to 2014, a growing deficit in FUS budget despite considerable funds in the form of a budget grant transferred annually was visible. Those funds constituted on average in that period 26% of the total FUS income. After 2014 a reverse tendency manifested itself. In 2016 FUS reached a small financial surplus, which in 2017 grew significantly to PLN 43.1 billion. It was the first such a considerable surplus achieved by FUS. IN the following year 2018 the surplus decreased significantly. In 2019 a deficit appeared again.

Secondly, every year FUS was co-financed with a budget grant (23.3% of its total income), whereby the highest contribution of a grant in FUS income was observed in 2010 (31.9%), and the lowest in the years 2017 – 2018 (15.7% and 15% respectively). It should be underlined that a lower demand for a state budget grant in those years resulted from a beneficial financial situation of FUS, which was influenced by the economic situation and prosperity on the labour market (*Sprawozdanie z wykonania budżetu państwa ..., 2019).*

Thirdly, FUS income is supplemented by funds from the Demographic Reserve Fund. In the years 2010 – 2014 they varied and ranged from PLN 2.5 billion to PLN 7.5 billion. In the following years (2017 – 2018) funds from the Demographic Reserve Fund were not used.

Fourtly, FUS permanent deficit was additionally supported with a loan from the budget outgoings, which means the flow of funds outside the budget. Such funds do not contribute to the increase of the state budget. FUS liabilities arising out of this amounted to PLN 45.3 billion at the end of 2016 (compared with an even higher amount in 2015). The reduction of FUS liabilities resulted first of all from the amortisation of interest-free loans from the outgoings of the state budget First, on the 1st January 2017, on the basis of the act of 2nd December 2016 on particular solutions for the realisation of the budget act for the year 2017, loans from the state budget in the years 2009 – 2014, whose period of repayment was due to expire on 31st March 2017 (PLN 39.2 billion) were cancelled. Then pursuant to the act of 8th December 2017 on particular solutions for the realisation of the budget act for the year 2018, on 1st January 2018 loans for FUS from the state budget in the years 2014 – 2016, whose period of repayment was due to expire on 31st March 2018, were cancelled (PLN 7.2 billion).

Fifthly, the necessity to transfer a part of pension contribution from ZUS to OFE resulted in a systematic loss of social security contributions in FUS. This loss was reimbursed by the state budget in the form of funds transferred to FUS in an amount equivalent to contributions for OFE. Their amount was different and in the years 2010 – 2018 it ranged from PLN 22.3 billion to PLN 2.3 billion. The fact that when in 2014 the bond part of OFE was transferred to ZUS (and amortised) and not many future pensioners stayed in OFE contributed to such a reduction. A part of people decided to stay in ZUS, in connection to which ZUS received funds from a transfer with so called "retirement slider". In 2019 it increased to PLN 3.4 billion.

Sixthly, despite the slight improvement of the situation of FUS, the earlier imbalances will come back (though only at the level of PLN -0.4 billion) as according to the information included in the publication after controls of the Supreme Chamber of Control, debit balance of FUS is supposed to increase in the forthcoming years and amount to PLN 56.4 billion in 2020, PLN 64.5 billion in 2025 (*Egzekucja należności z tytułu składek ...,* 2014). Also, worrying demographic indicators concerning the birth rate, a systematic growth in the number of people at the retirement age and emigration are of permanent character and will significantly worsen the financial situation of FUS.

Seventhly, the Covid-19 pandemic introduced in Poland in March 2020 unprecedently disturbed the functioning of economies all over the world, also in Poland. The effects of the pandemic are having (and will have) a negative influence on the FUS's financial situation. As the information on the FUS's financial situation presents, after two quarters of this year (2020), the expenditure is covered with contributions and derivatives only in 70% and this level is the highest since 2016 (*Informacja o sytuacji finansowej FUS…*, 2020).
It should be emphasised that the mentioned activities adversely affect the public finance, the state budget in particular. They also cause an increase of the borrowing requirements of the whole public finance sector. The government's permanent help for FUS (though reduced in recent years) has resulted in an imbalance in the state budget, which requires additional source of financing and increased borrowing needs of the state (Ciak 2012; Redo, Wójtowicz, Ciak 2018, Ciak, Kołosowska, Piotrowska-Marczak, 2019). The issues of income, expenditure and the government budget balance are presented in table 6.

Table 6: Income, expenditure and the government budget balance in Poland in the years 2010 – 2019 (in PLN billion)

Specification	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Income	250.3	277.6	287.6	279.2	283.5	289.1	314.7	350.4	380.1	400.5
Expenditure	294.9	302.7	318.0	321.4	312.5	331.7	360.8	375.8	390.5	414.3
Deficit	44.6	25.1	30.4	42.2	29.0	42.6	46.1	25.4	10.4	13.8

Source: Own study based on: The Minister of Finance on the State Budget Execution in the years 2010 – 2019.

In the period of time indicated in the table, significant divergences between the income and expenditure can be observed. The income tended to increase (apart from 2013), and the expenditure increased throughout he whole period (except 2014 with a smaller costs of the public debt servicing resulting from the amortisation of the bond part of OFE). The higher expenditure in the whole examined period resulted in a budgetary deficit amounting to from PLN 10.4 billion in 2018 to PLN 46.1 billion in 2016.

It should also be underlined that the budgetary deficit represented the highest share of the deficit of the whole public finance sector. It was significantly intensified by the requirements of the social insurance sector. For instance, in 2013 the budgetary deficit and the social insurance sector deficit amounted to PLN 74.1 billion. In 2018, owing to a better situation both in the social insurance sector (including FUS) and in the state budget (a low budgetary deficit), the

balance of the whole public finance sector was positive and amounted to PLN 1.3 billion (a surplus of 0.1% of GDP). *(Sprawozdanie z wykonania budżetu państwa…, 2020)*

As it was mentioned earlier, the loss of income from the social insurance contributions causes an increase in the state budget deficit. Additionally, its amount was influenced by the costs of the servicing of public debt for OFE. As indicated in the source literature, without the need to finance additional requirements for OFE (to finance earlier contributions to OFE), the debt to GDP ratio would have been much lower and even in the crisis years, i.e. 2009 – 2012, it would have amounted to 40% of GDP (*Przegląd funkcjonowania systemu* … 2013), and its amount would not have exceeded PLN 1 trillion (*Na liczniku długu* … 2015). Currently, the public debt has risen above PLN 1 trillion despite the mentioned above activities undertaken by the public authorities in the context of the acquisition of PLN 153 billion of OFE funds in 2014.

Table 7 presents the costs of the state debt servicing in the years 2010 – 2019.

Table 7: Costs of the state debt servicing in the years 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Costs of the state debt servicing in total (in PLN billion):	34.1	36.0	42.1	42.5	34.5	29.2	32.1	29.6	29.5	27.3
- national:	26.8	27.1	31.8	32.3	24.8	19.4	22.2	20.7	21.5	19.7
- foreign:	7.4	8.8	10.3	10.1	9.6	9.7	9.8	8.9	8.0	7.6
Costs in total as % of GDP:	2.4	2.3	2.6	2.6	2.0	1.6	1.7	1.5	1.4	1.3
Costs in total to state budget expenditure ratio (%):	11.6	11.9	13.2	13.2	11.0	8.8	8.9	7.9	7.6	6.6

Source: Own work based on: Dług publiczny. Raport roczny 2018 (2019), Ministry of Finance, Warszawa, p.93; Sprawozdanie z wykonania budżetu państwa za okres od 1 stycznia do 31 grudnia 2019r. (Reports on implementation of the state budget from 1st January to 31st December 2019), the Council of Ministers, Warszawa 2020, p. 78.

Taking into account the data included in table 7 , a slow improvement in the costs of the public debt servicing, particularly in the context of costs in total to GDP ratio and in relation to the state budget expenditure can be seen. However, the upward trend of the public debt itself in 2018 and for the forthcoming years (i.e. 2019 – 2021 – PLN 1.093 billion, PLN 1.131 billion and PLN 1.142 billion respectively) should not be neglected.

Conclusion

The aim of the article was to show the changes in the pension systems of the countries of Central and Eastern Europe, and most of all in the Polish national pension system, and their impact on the public finance. In each of those countries, reforms similar to those conducted in Poland in 1999 took place. Currently, the dispute concerning the role of the state and the market in the area of old age security can be heard again. Because of its construction, the current pension system becomes sensitive to crisis situations appearing in the changing environment. New solutions aiming at financing the current needs of the state budget are sought in order to decease deficits.

The actions taken so far by the governments, whose objective is to limit and even suspend the transfer of contributions to capital funds, cannot be described as reformative; they are rather short-term solutions of the problem of deficit in the government budget. They improve the situation of the pay-as-you-go part of the public pension system only temporarily threatening to undo the reform architected so painstakingly several years ago. The need to introduce necessary corrections in the system is not negated and acceleration of pro-development structural reforms in economy which would contribute to a lasting improvement of the state of the public finance should be demanded as numerous distinguished economists indicate. The changes aiming at introducing employee capital programmes can mitigate the negative tendency to reduce the future pensions only to some extent.

The conducted analysis indicates an unfavourable situation both in the state budget (budgetary deficits observed every year of various levels before 2019 and in 2020, according to the novelised budget act for 2020, the level of even PLN 109 billion: the Draft act *amending the budget act for 2020…*) and in the Social Insurance Fund before 2016, which

was not able to satisfy the needs of the new social insurance system (additional loans from the state budget). After 2017 an short-term improvement can be seen. The improvement resulted on the one hand from a good economic situation, on the other hand from a good situation on the labour market. Moreover, owing to the amortisation of FUS's liabilities resulting from loans from the state budget (from expenses) for the years 2009 -2016, FUS's liabilities decreased considerably. It should be underlined, that the demographic situation observed in Poland for a long time will have a negative influence on FUS's finance. Even now current contributions for social insurance are not sufficient to cover expenses connected with paying pensions. A higher number of recipients and a smaller number of contributors will build up the imbalance in the years to come and thus, according to the information included in the publication of the Supreme Chamber of Control, FUS's debit balance is expected to grow in the forthcoming years and amount to PLN 56.4 billion in 2020, and to PLN 64.5 billion in 2025 (*Egzekucja należności z tytułu składek…* 2014). Taking into account the situation with the Covid-19 pandemic, the debit balance can be even higher.

It means that the future generations will have to deal with the negative effects of the current situation and the effects of introducing a system in which – during the several decades of the transition period – the cost of the pension system functioning is doubled through financing current pensions and funding of capital pillar of social insurance. To what extent the cost for the future generations will have the form of higher taxes, smaller public expenses or a higher public debt will depend on the fiscal policy pursued in the futures**.**

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The Russian Market Waste: Trends Analysis

Natalia A. SHCHUKINA

Plekhanov Russian University of Economics, Moscow, Russia, e-mail: shchukinan@yandex.ru
Financial University under the Government of the Russian Federation, Moscow, Russia; e-mail: shchukinan@yandex.ru

Abstract

The research is devoted to the analysis of the waste processing industry in Russia. The volume of waste generation and processing in the EU and Russia was estimated. In Russia, there is a tendency to increase the volume of generated production and consumption waste. Most of the generated waste is industrial waste. Coal mining is the most waste-intensive of all industries. In 2019, this industry generated 5.2 billion tons of waste, or 67% of all industrial waste in the country. It should be noted that most of this waste is reused. The main method of waste disposal in Russia is landfill, while global trends are focused on recycling and backfilling. For the waste trade market, the most significant direction in Russia can be considered the waste paper market. Despite the global trends of decrease in the volume of MSW formation per capita, the accumulation rate in Russia tends to increase. This is due to an increase in the level of housing improvement and an increase in the number of packaging materials. About 10% of municipal solid waste is recycled annually. However, changes in the waste processing industry in Russia create prerequisites for the development of the waste management market.

Keywords: waste, waste management, recycling, municipal solid waste, waste market.

JEL Classification: Q53; Q56.

Introduction

The amount of waste generated in the world is increasing every year. Waste is a significant problem for all countries of the world. Unfortunately, the lack of available and comparable data does not always allow for a complete and reliable assessment of waste-related problems. Waste accumulates as a result of all sectors of the economy and is usually considered an unavoidable by-product of economic activity. The impact of waste on the environment, resources, and human health depends on both its quantity and nature. The environmental burden of waste generation and management includes emissions to the atmosphere, water, and soil that have potential impacts on human health and the environment. Most of the city's waste is disposed of, which leads to a significant burden on the environment. At the same time, only a small part of the waste goes to recycling. According to a world Bank study [Kaza & etc., 2018], about 2.01 billion tons of waste was generated worldwide in 2016.Around the world, almost 40 percent of waste is disposed of in landfills. About 19 percent undergoes materials recovery through recycling and composting, and 11 percent is treated through modern incineration [Kaza & etc., 2018].

There are various methods for dealing with waste, such as burying, landfilling, incineration, and recycling. Recycling is considered a more promising method. If you compare storage and incineration, incineration causes less damage to the environment. On the other hand, the economic benefits of recycling are lost during incineration. Despite constantly developing and implementing new technologies for waste disposal and recycling, their storage at the landfill remains a common practice for most countries.

Trends in waste management in European countries

Despite the economic difficulties faced by many States, the steady trend of increasing waste volumes in the world continues. The volume of TCL generation exceeded 1.3 billion tons. At the same time, according to the report Of the Department of Urban Development of the World Bank [Kazan & etm., 2018], by 2025 the number of MSW generated in the world will increase to 2.2 billion tons. The main contribution to this growth will be made by fast-growing cities in developing countries. Most of the consumption waste is generated by countries with developed economies. Thus, according to the world Bank report [Kazan & etm., 2018], the organization for European Economic Cooperation (OEEC) countries account for 44% in the structure of municipal solid waste generation. The

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dependence of waste generation on the level of well-being is confirmed by international experience. The specific indicator of total municipal waste generation per unit of GDP in the EU countries is shown in figure 1.

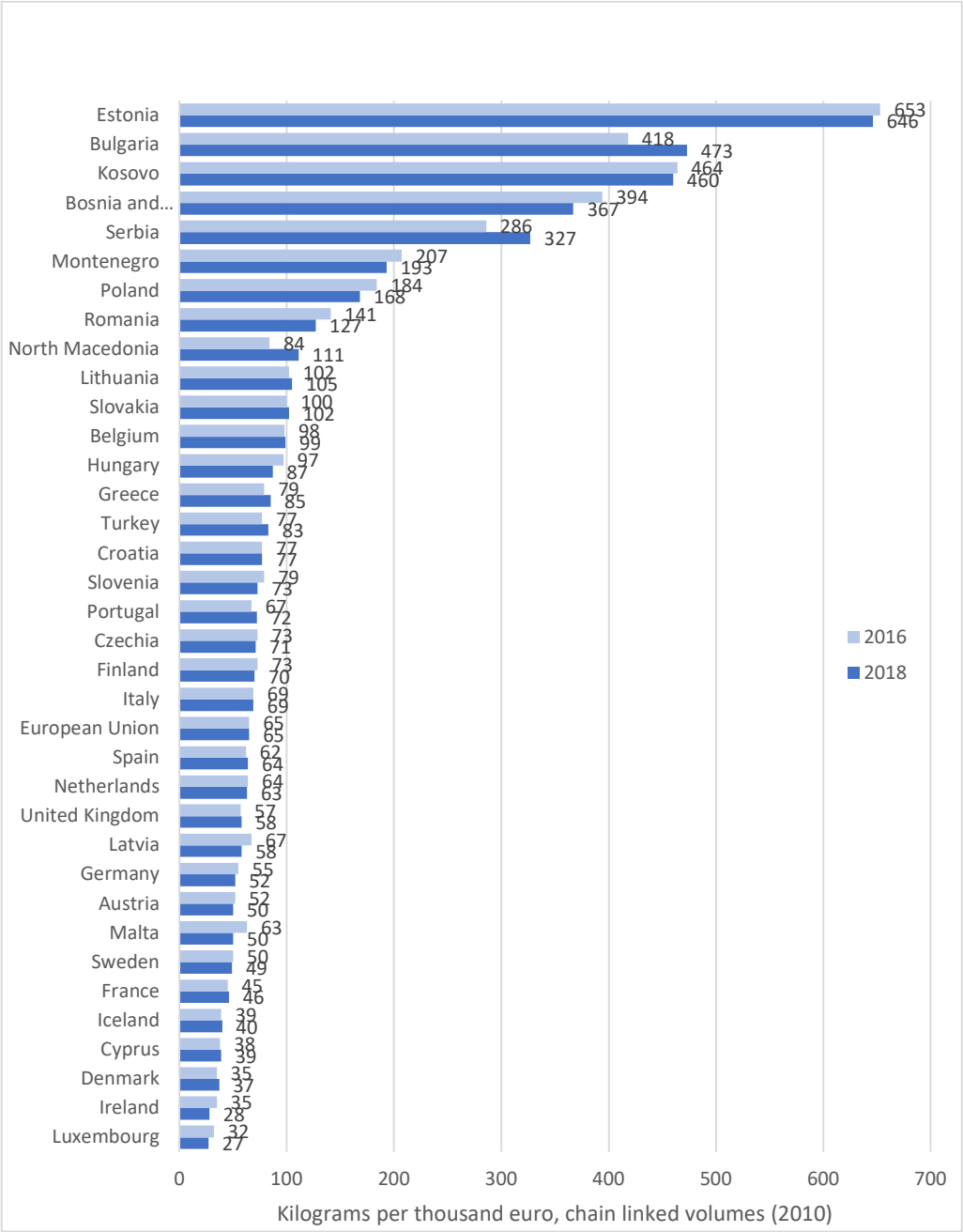

Figure 1: Generation of waste excluding major mineral wastes per GDP unit in 2016 and 2018
Source: Author

There is a direct correlation between the country's economic level of development and waste management. In a number of European countries, the share of waste recycling exceeds 60%. Figure 2 shows the trend of waste management in the EU countries: developed countries process a large share of waste, while countries in southern and Eastern Europe practice disposal.

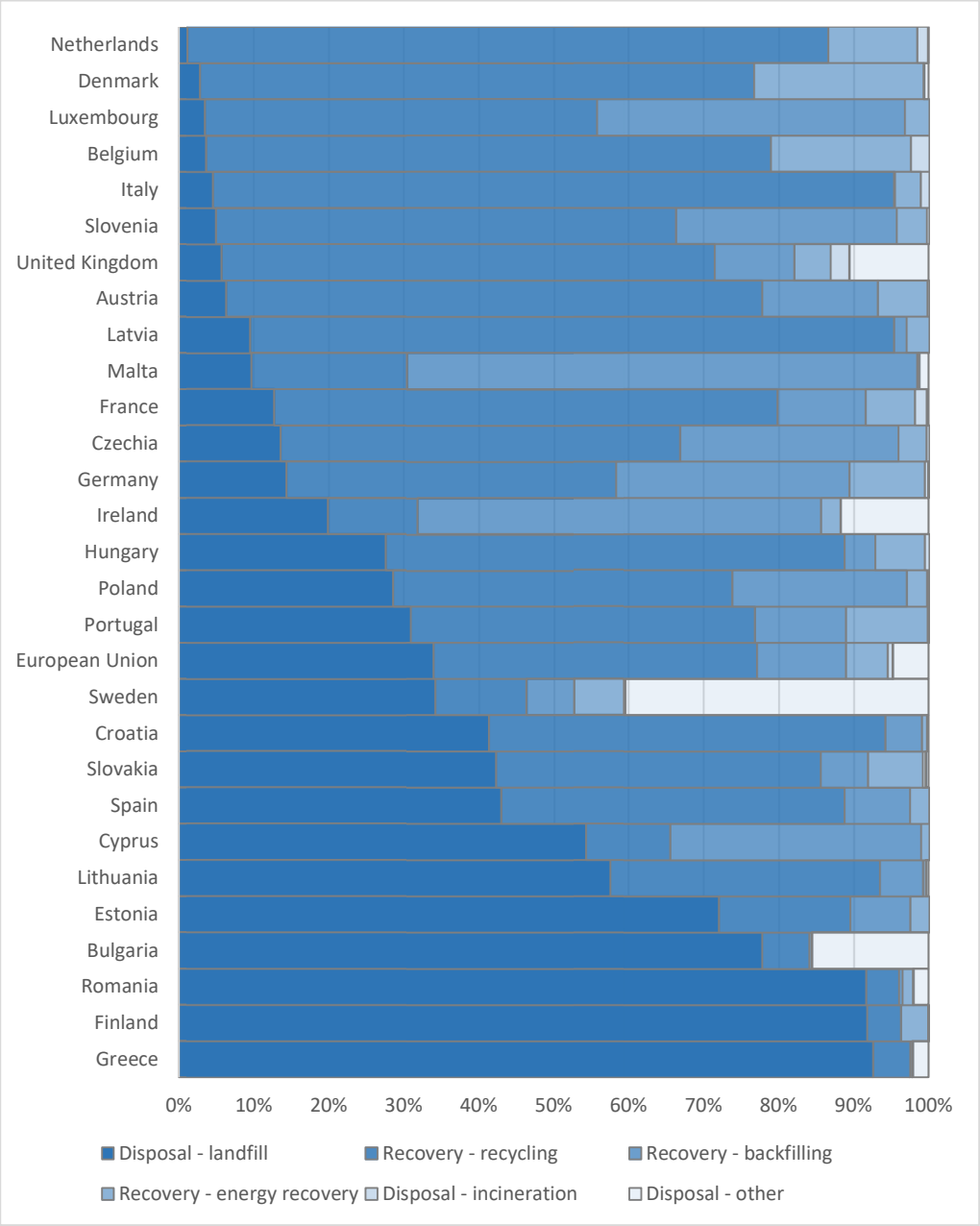

Figure 2: Waste management structure in the European Union countries in 2017

Source: Author

According to various estimates, the volume of municipal solid waste generation in the world currently amounts to approximately 3.6 million tons per day and may grow to more than 6 million tons per day by 2025. For some countries, the amount of municipal solid waste collected per capita in 2018 reached the following values (kg/person): Austria – 579, Bulgaria – 407, Germany – 615, the Netherlands – 511, the United Kingdom – 463. In some countries, there are trends towards stabilization and a slight decrease in the volume of MSW [Eurostat, 2020]. Thus, since 2010, some countries (Belgium, Hungary, Slovenia, Finland, Estonia, etc.) have experienced a decrease in the total volume of MSW per capita. In Russia, the situation is the opposite. Every year, Russia generates more than 60 million tons of MSW, which is about 480 kg of waste per person per year. The average specific volumes of MSW generation in EU countries are shown in Figure 3 [Eurostat, 2020]. According to the data obtained, high-income countries are characterized by a large share of waste generation. Figure 3 shows the number of municipal waste per capita in EU in 2018.

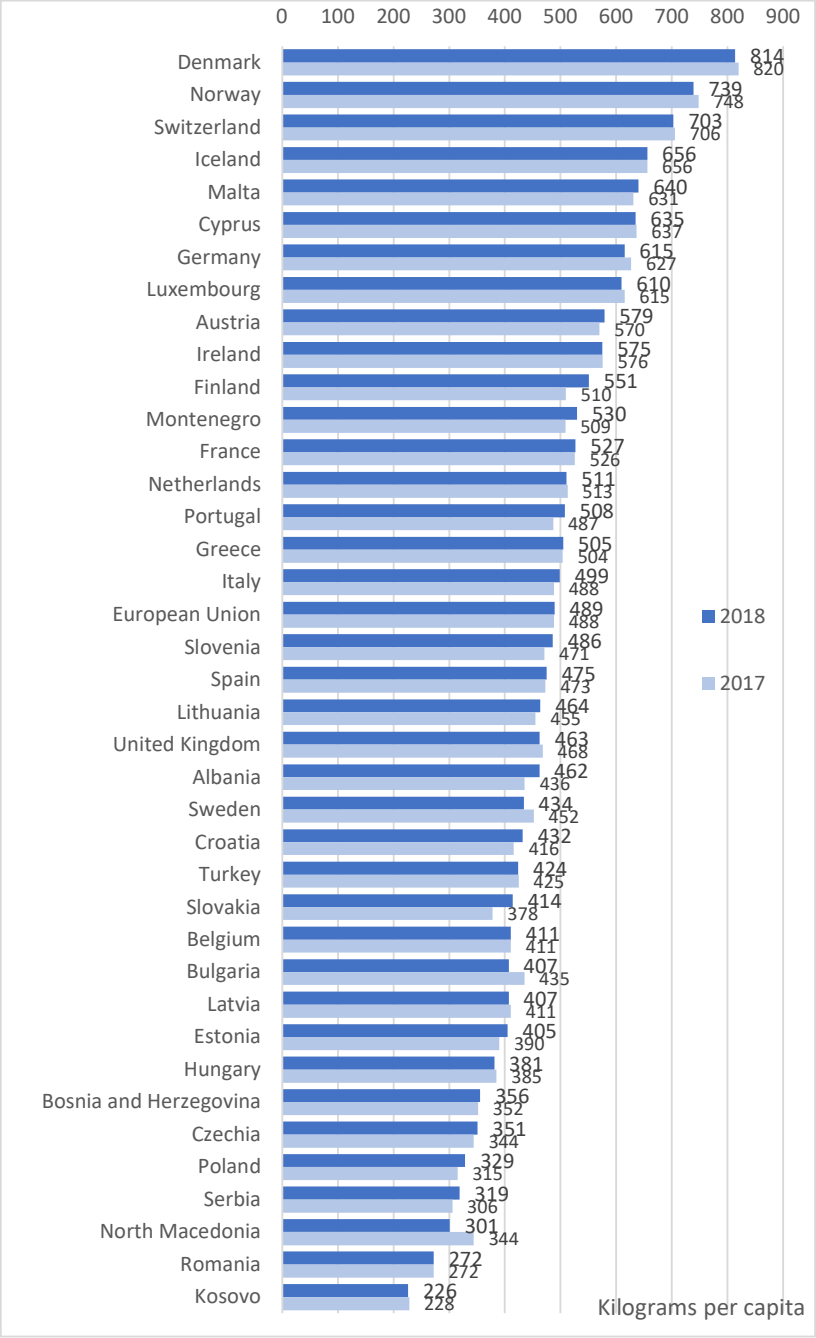

Figure 3: Generation of municipal waste per capita in EU in 2017-2018

Source: Author

European countries analyzed the extent of environmental damage caused by waste disposal, calculated the cost of lost resources, added huge areas occupied by waste, and concluded that waste management policies should be directed towards their reuse and recycling. To bring to the processing of the developed countries are introducing incentive or restrictive measures. The incentive consists in preferential taxation. The sale of waste by the population is not taxed in any developed country in the world [Mitina, 2020].

The state policy of most countries is focused on minimizing the generation and accumulation of waste. Developed countries consider waste recycling as one of the sources of profit. The global waste market is estimated at $ 320 billion, of which 20% is imports and exports, which for most countries is a key element of the smooth operation of the waste processing industry. The main players in the global waste market are the USA, EU countries, Japan and China [Wang, Chao and etc., 2019; Kellenberg, 2015; Wen Xu and etc., 2020]. In 2019, the world export of waste paper amounted to $46.665 billion). Exports of the world market of plastic waste amounted to $4.041 billion, glass

waste is at the level of $0.408 billion; rubber waste – $0.234 billion. European countries deliver about 87% of the collected plastic via Hong Kong to China. Japan and the US also export their plastic waste to China [ITC Trade Map, 2020]. The dynamics of world trade in scrap and scrap waste is shown in Table 1.

Table 1: Dynamics of global trade in waste, parings and scrap (billion US dollars)

	2015	2016	2017	2018	2019	2016/2015	2017/2016	2018/2017	2019/2018
Import, billion US dollars									
Waste. parings and scrap. of plastics	7.339	6.625	6.150	3.049	2.835	0.90	0.93	0.50	0.93
Recovered "waste and scrap" paper or paperboard (excluding paper wool)	49.67	47.43	54.82	63.71	52.75	0.95	1.16	1.16	0.83
Waste. parings and scrap of soft rubber and powders and granules obtained therefrom	0.229	0.214	0.230	0.295	0.291	0.93	1.07	1.28	0.99
Cullet and other waste and scrap of glass; glass in the mass	0.424	0.453	0.442	0.503	0.446	1.07	0.97	1.14	0.89
Export, billion US dollars									
Waste. parings and scrap. of plastics	5.817	5.362	4.874	3.601	3.041	0.92	0.91	0.74	0.84
Recovered "waste and scrap" paper or paperboard (excluding paper wool)	42.84	41.69	46.62	54.57	46.67	0.97	1.12	1.17	0.86
Waste. parings and scrap of soft rubber and powders and granules obtained therefrom	0.227	0.208	0.225	0.242	0.234	0.92	1.08	1.07	0.97
Cullet and other waste and scrap of glass; glass in the mass	0.392	0.371	0.388	0.422	0.408	0.94	1.05	1.09	0.97

Source: Author

Trends in waste management in Russian Federation

At the moment, the waste management industry in Russia is at the stage of formation. Solving the problem of environmental pollution by production and consumption waste is a complex of serious problems that require a systematic solution. The need to return production and consumption waste to circulation is obvious both from the point of view of environmental safety and economic feasibility. In the last few years, significant changes have been introduced to the legislation and regulations of the Russian Federation concerning the sphere of waste processing. The strategy of industrial development for processing, recycling and neutralization of wastes of production and consumption for the period up to 2030 [Industrial development strategy, 2018] provides for increasing the share of recycled and disposed waste in total waste from 59.6% in 2016 to 86% by 2030; increase the share of MSW sent for processing in the total volume removed from the field of education almost 10 times from 8.9% in 2016 and 80% by 2030. The fundamentals of the state policy in the field of environmental development of the Russian Federation for the period up to 2030 provide for the introduction of innovative resource-saving, environmentally safe and efficient technologies based on a single technological platform; sustainable use of renewable and rational use of non-renewable natural resources; stimulating investment in the introduction of resource-saving technologies, production of environmentally friendly products, research and development, etc.

Statistics can track the dynamics of waste generation and disposal/disposal. However, it should be noted that the system of state statistical observation covers only legal entities and individual entrepreneurs who carry out activities related to the management of production and consumption waste. The volume of waste generation, taking into account the population and other enterprises in the Russian Federation as a whole, has higher values.

According to official statistics [Rosstat, 2020], in 2019, the country generated 7,751 billion tons of industrial and household bypasses, or 144.65 kg per person per day. This is 6.7% higher than in 2018 and more than 2 times higher

than in 2009. In 2019, 3.882 billion tons of waste were disposed of and neutralized, and 3.801 billion tons were sent for storage or disposal, which is 49% of the volume of all generated production and consumption waste. Most of the generated waste is industrial waste. Therefore, the dynamics of changes in the volume of waste generation is closely dependent on the situation in production.

According to statistics, the volume of recycling and disposal of industrial and consumer waste has increased significantly in recent years. Compared to 2009, it increased by 2.34 times. Since the growth rate of this indicator is faster than the growth rate of generated waste, we can say that the situation in the waste management industry is changing for the better. A comparison of the volumes of waste disposal and disposal with the volumes of waste generation shows that the ratio of these indicators increased from 40% in 2006 and 2013 to 60% in 2016. However, in 2018 and 2019, it fell again to 53% and 50%, respectively. At the same time, the volume of waste sent to landfills for storage and disposal has shown a negative trend over the past three years. If in 2015 the volume of waste sent to landfills for storage and disposal amounted to 2.333 billion tons, in 2016 this figure was 2.609 billion tons, and in 2017, 2018 and 2019 – 3.204 million tons, 3.575 million tons and 3.801 million tons, respectively. Therefore, we cannot yet talk about reducing the harmful impact on the environment. Figure 4 shows the dynamics of production and consumption waste generation, utilization, and disposal.

Over the period from 2003 to 2019, the amount of waste generated annually increased from 2.613 billion tons to 7.751 billion tons, or 2.97 times (figure 5). In recent years (2017-2019), there has been an increase in waste generation by 14.3%, 16.8% and 6.7%, respectively. The change in the share of total waste generation per GDP unit was characterized by similar trends. The total increase in the specific indicator from 2011 to 2019 was 32.9 tons per 1 million rubles, or 62.5%. The dynamics of production and consumption waste generation in the Russian Federation and the specific waste generation per GDP unit (in 2016 prices) in 2011-2019 are shown in Figure 5.

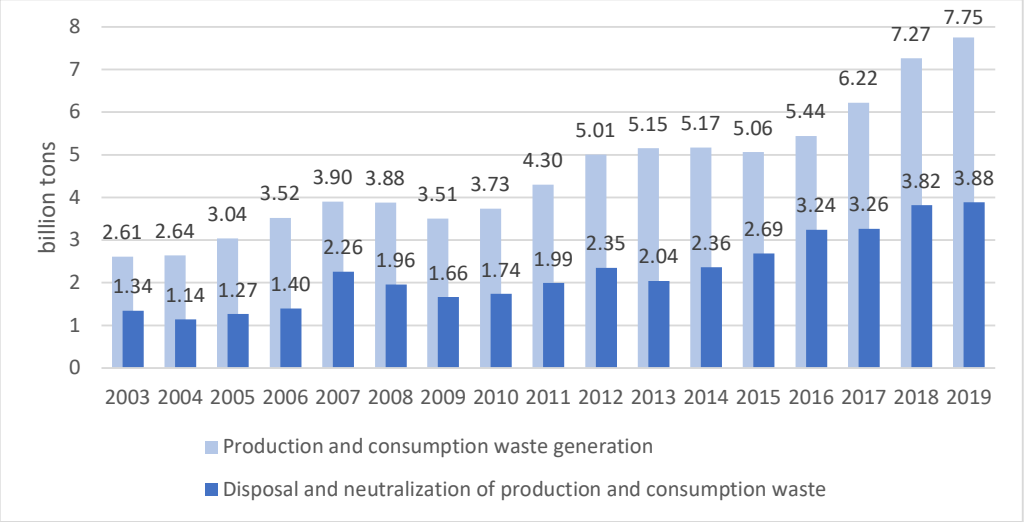

Figure 4: Dynamics of indicators of the volume of production and consumption waste generation and their disposal and neutralization in the Russian Federation

Source: Author

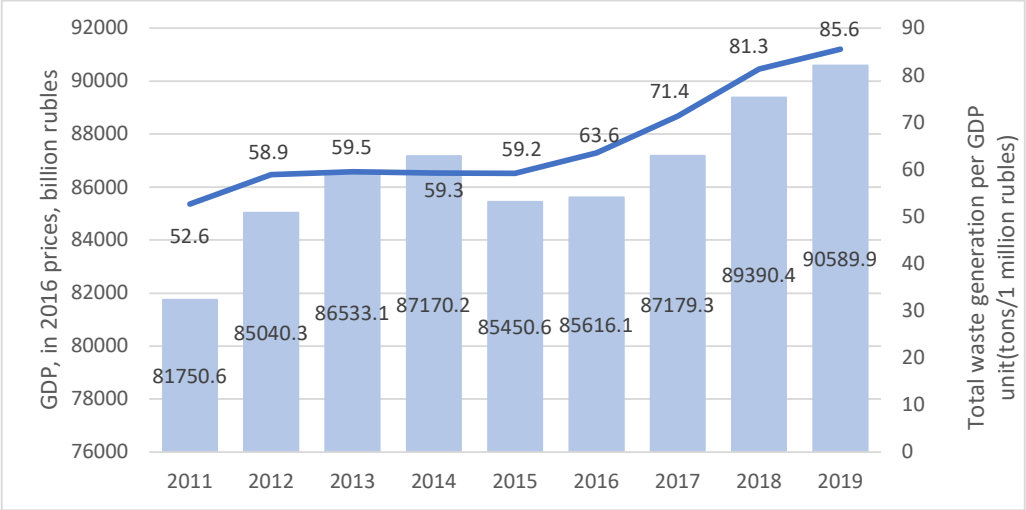

Figure 5: Dynamics of indicators of production and consumption waste generation in the Russian Federation and specific waste generation per GDP unit (in 2016 prices), 2011-2019

Source: Author

In the territorial context, the largest amount of waste generated in 2018 was recorded in the Siberian Federal district (4809.6 million tons, or 66.18% of the total amount in the country), and the smallest – in the North Caucasus Federal district (3,230 million tons, or 0.04 %) (figure 6). Such large volumes of waste generation in the Siberian Federal district are associated with mining (coal) in the Kemerovo region, the main coal-producing region of the Russian Federation. The structure of production and consumption waste accumulation in the Russian Federation varies slightly from year to year, as can be seen in Figure 6.

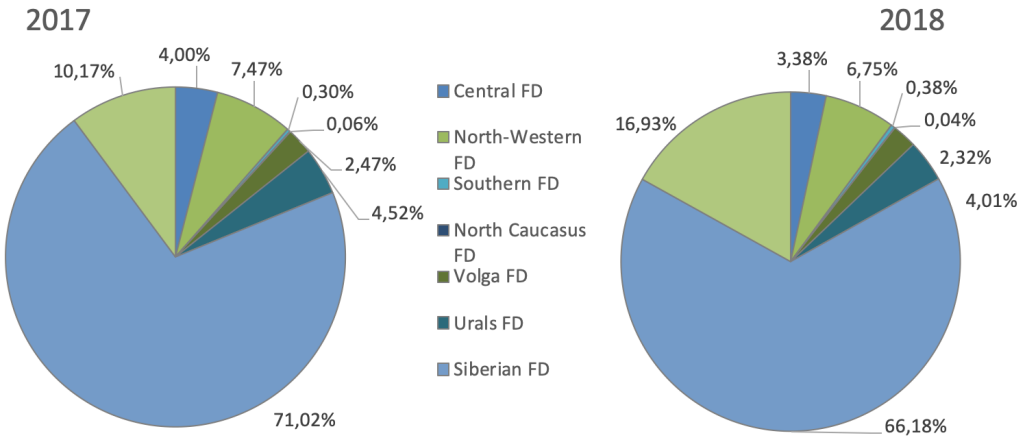

Figure 6: Distribution of production and consumption waste generation by Federal districts in 2017 and 2018

Source: Author

In all Federal districts for the period 2011-2018, the volume of waste generation increased, with the largest increase observed in the far Eastern (from 364.371 million tons to 1,230.454 million tons, or 238%), North Caucasus (from 1,636 million tons to 3,230 million tons, or 97%) and southern (from 16.457 million tons to 27.732 million tons, or 69%) Federal districts. In the Volga Federal district, the volume of waste generation in 2015 decreased from 149.131 million tons, but in 2017 and 2018, the growth trend resumed and for the entire period from 2011-2018, the increase was 6.171 million tons, or 4%. Indicators of the dynamics of production and consumption waste generation for 2011-2018 in the context of Federal districts are presented in Table 2.

Table 2: Production and consumption waste generation (billion tons)

	2011	2013	2015	2017	2018	2013/ 2011	2015/ 2013	2017/ 2015	2018/ 2017	2018/ 2011
Russian Federation	4.303	5.153	5.060	6.221	7.266	1.20	0.98	1.23	1.17	1.69
Central FD	0.209	0.235	0.260	0.249	0.245	1.13	1.11	0.96	0.99	1.18
North-Western FD	0.378	0.539	0.437	0.465	0.490	1.42	0.81	1.06	1.06	1.30
Southern FD	0.016	0.020	0.020	0.019	0.028	1.24	1.00	0.92	1.48	1.69
North Caucasus FD	0.002	0.002	0.002	0.004	0.003	1.16	1.30	1.51	0.87	1.97
Volga FD	0.163	0.189	0.149	0.154	0.169	1.16	0.79	1.03	1.10	1.04
Urals FD	0.260	0.292	0.271	0.281	0.291	1.13	0.93	1.04	1.04	1.12
Siberian FD	2.911	3.435	3.473	4.418	4.809	1.18	1.01	1.27	1.09	1.65
Eastern FD	0.364	0.440	0.446	0.632	1.230	1.21	1.01	1.42	1.95	3.38

Source: Authors

In terms of economic activity type, the largest volume of production and consumption waste generation in 2019 was accounted for by the type of economic activity "mining" – 7257 million tons, or 93.6% of the total amount of waste generated. The share of waste by economic activity type "manufacturing industries" in the total volume of waste generation was 3.8% of the total amount of waste, or 296.4 million tons of waste. The share of the economic activity type "agriculture, forestry, hunting, fishing and fish farming" in 2019 it accounted for 0.6% of the total amount of waste generated (47.7 million tons of waste). According to the economic activity type "electricity, gas and steam supply; air conditioning; water supply" and "water supply; water disposal, waste collection and disposal, wastewater disposal activities" in 2019, 0.4% of the total amount of production and consumption waste (30.9 million tons of waste) was formed. The dynamics of production volumes, as well as the volume of utilization and neutralization of production and consumption waste for 2016-2019 by economic activity type is presented in Table 3.

Table 3: Production and consumption waste generation and disposal and neutralization of production and consumption waste by economic activity type in the Russian Federation (million tons)

	2016	2017	2018	2019	2017/2016	2018/2017	2019/2018	2019/2016
Production and consumption waste generation by economic activity type in the Russian Federation (million tons)								
Total	**5441.31**	**6220.64**	**7266.05**	**7750.88**	**1.14**	**1.17**	**1.07**	**1.42**
agriculture, forestry, hunting, fishing and fish farming	49.24	41.50	42.77	47.66	0.84	1.03	1.11	0.97
mining	4723.84	5786.19	6850.49	7257.02	1.22	1.18	1.06	1.54
manufacturing industries	549.33	274.82	243.77	296.44	0.50	0.89	1.22	0.54
electricity, gas and steam supply; air conditioning; water supply	20.51	20.55	20.11	20.19	1.00	0.98	1.00	0.98
water supply; water disposal, waste collection and disposal, wastewater disposal activities	7.18	9.94	10.61	10.69	1.38	1.07	1.01	1.49
provision of other services	0.58	0.15	0.13	0.13	0.26	0.83	1.07	1.92
Disposal and neutralization of production and consumption waste by type economic activity in the Russian Federation (million tons)								
Total	3243.71	3264.55	3818.36	3881.87	1.01	1.17	1.02	1.20

agriculture, forestry, hunting, fishing and fish farming	42.06	32.39	36.21	39.06	0.77	1.12	1.08	0.93
mining	2885.55	3021.79	3585.21	3561.60	1.05	1.19	0.99	1.23
manufacturing industries	243.37	135.91	128.27	177.42	0.56	0.94	1.38	0.73
electricity, gas and steam supply; air conditioning; water supply	1.85	0.79	1.70	1.82	0.43	2.14	1.07	0.98
water supply; water disposal, waste collection and disposal, wastewater disposal activities	18.99	32.43	30.55	43.34	1.71	0.94	1.42	2.28
provision of other services	0.32	0.00	0.00	0.01	0.01	0.95	4.58	0.03

Source: Authors

The foreign trade volume is an important indicator of the Russian waste processing market. As can be seen from table 4, for the waste paper market, foreign markets are a significant supply direction (in 2019, waste paper raw materials were exported for $50,225 million). For other markets, the share of deliveries to foreign markets is no less significant. However, significant volumes of processing are accounted for by imports. From the point of view of the cost of secondary raw materials and the demand for it, the plastics market is extremely attractive for processors. However, the lack of a well-established system for collecting polymer waste causes a low share of their recovery and disposal [Volkova, 2018]. Among the wastes considered in this study, waste paper is not the most profitable, but the most affordable raw material. For this reason, the waste paper market is the flagship of the Russian waste disposal industry, which is in second place in terms of capacity after the scrap market [Table 4].

Table 4: Dynamics of trade in waste, parings and scrap in Russian Federation (thousand US Dollar)

	2015	2016	2017	2018	2019	2016/2015	2017/2016	2018/2017	2019/2018
Import, thousand US Dollar									
Waste, parings and scrap of plastics	17890	16285	15316	20279	25549	0.91	0.94	1.32	1.26
Recovered "waste and scrap" paper or paperboard (excluding paper wool)	6803	3056	5451	3472	5003	0.45	1.78	0.64	1.44
Waste, parings and scrap of soft rubber and powders and granules obtained therefrom	1220	1530	2621	2392	4116	1.25	1.71	0.91	1.72
Cullet and other waste and scrap of glass; glass in the mass	551	2130	3575	2620	3297	3.87	1.68	0.73	1.26
Export, thousand US Dollar									
Waste, parings and scrap of plastics	2330	2902	4931	6221	5117	1.25	1.70	1.26	0.82
Recovered "waste and scrap" paper or paperboard (excluding paper wool)	40073	31319	61234	71912	50225	0.78	1.96	1.17	0.70
Waste parings and scrap of soft rubber and powders and granules obtained therefrom	82	58	235	411	296	0.71	4.05	1.75	0.72
Cullet and other waste and scrap of glass; glass in the mass	314	116	82	69	37	0.37	0.71	0.84	0.54

Source: Authors

The volume of MSW formation in Russia tends to grow, despite the decline in the population. According to Rosstat, the volume of MSW waste increased by 26% between 2005 and 2010. A significant increase in the amount of MSW is due to an increase in the specific volume (intensity) of waste generation. In 2000, the average person accounted for about 220 kg of MSW per year, in 2010 this figure increased to 330 kg, and in 2019 – 450-480 kg.

According to Rosstat, the volume of municipal solid waste (MSW) exported from urban settlements in the Russian Federation as a whole in 2018 amounted to 275.4 million m3, or 0.88% of the total amount of waste generated. The volume of municipal solid waste exported to waste processing plants in 2018 amounted to 28.1 million m3, or 10.2% of the total volume of MSW. This volume corresponds to 1.87 m3 per person per year. For the period 2010-2018, the volume of MSW export increased by 40.023 million m3, or 17%; the rate of export of MSW to waste processing plants for the period under review decreased from 63.03% to 37.91% of the total volume of production and consumption waste (Figure 7).

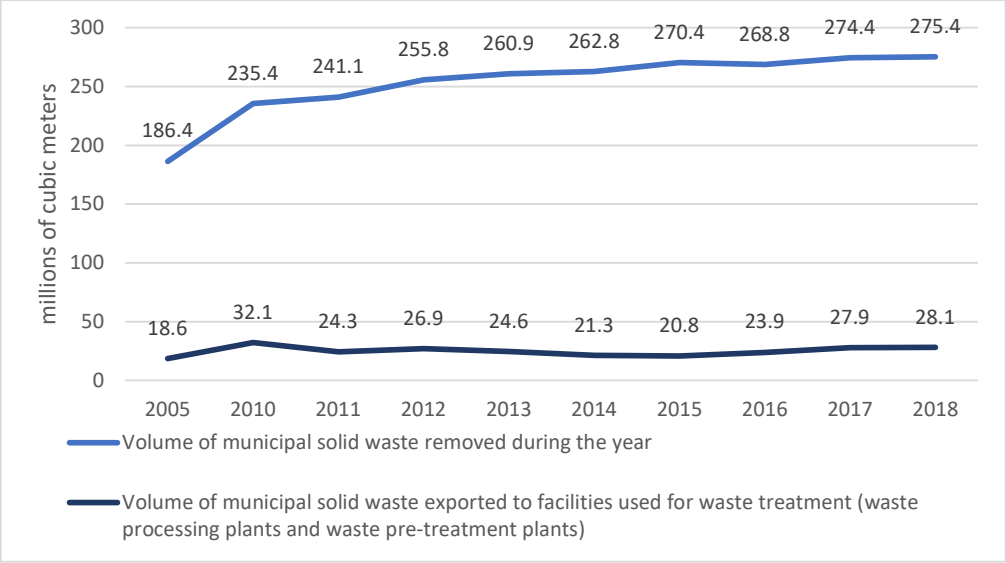

Figure 7: Volume of municipal solid waste removed during the year

Source: Authors

The increase in consumption and changes in its structure in Russia since 2000 is due to the growth of the population's wealth and purchasing power. The structure of consumption changed towards more "waste-intensive" goods and services, the share of non-food products in the consumer basket increased, the use of which is associated with the formation of a large amount of packaging waste. Systematic studies of the composition of MSW in Russia have not been conducted.

Conclusion

Taking into account the fact that the waste management industry in Russia is at the stage of formation and is defined in official documents as a new one [Industrial development strategy, 2018]. The targets outlined in the approved document suggest faster growth than expected in other areas of the Russian economy. At the same time, even in the innovative scenario, which is the target in the developed Strategy, a noticeable decrease in the amount of generated and buried waste and a radical increase in the share of disposed and neutralized waste is expected no earlier than the period 2025-2030.

The concept of a closed-loop economy opens the way to more than just sustainable development. but also health and decent working conditions with a careful attitude to the environment and natural resources. In recent years, this concept has played an increasing role in policy-making at the international and national levels of governance. as well as in consumer behavior. However, new waste management practices are complex and involve both infrastructure and management, as well as financial and socio-cultural components.

Further development of the waste processing industry should be based on a detailed analysis and forecast in the context of each market segment, and not only "clean" waste from production and commercial enterprises, but also useful MSW fractions should be taken into account. A correct forecast of the development of the situation is possible only if there are correct statistical data that take into account the dynamics of volumes and morphology.

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Risk Assessment of Financial Statements using the CFEBT Model

Lenka STRAKOVA
The University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, lenka.strakova@fpedas.uniza.sk

Pavol DURANA
The University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, pavol.durana@fpedas.uniza.sk

Abstract

This article discusses about risk assessment of financial statements using the CFEBT model and its modification. The financial statements of the entity serve as an information base for both external and internal users. Their function is to give a true and fair view of the financial position, performance and changes in the financial position of the entity. It is the effort to present the accounting entity in a more favorable image that leads the company's management to artificially improve the achieved financial results. This paper captures the development of profit or loss and cash flow, as well as the mismatch of accounting items in the entity's financial statements for a period of six years. Based on the CFEBT model and the modified CFEBT model, it is possible to assess whether deviations in the achieved values pose a risk of manipulation of financial statements beyond the scope of legislative rules. In the paper we use the analysis of selected models in order to evaluate the ability of users to detect the risk arising from the manipulation of financial statements beyond the true and fair view of accounting.

Keywords: Financial Statement, CFEBT Model, Creative Accounting, Financial Manipulation.

Introduction

The topic of this paper is an issue that appears continuously in accounting, both purposefully and unconsciously. Recent history has shown how fragile the confidence of investors and the public in the financial results presented is, and how easily any company can look successful in the minds of third parties, although the reality may be quite the opposite. From the very beginning of the accounting profession, there has been pressure from owners and management to "beautify" information about the performance and status of their business in the financial statements. It was only a matter of time before the company's management or employees began to abuse their more favorable position over all users of financial statements, such as investors, the state, customers, competitors and other stakeholders. This allows entities to make their results more attractive by using information superiority, while the reality may be quite different. (Huynh, 2019) However, an uninformed user usually has no idea. For most interest groups, accounting information is one of the basic and essential sources of information about a given company. (Kliestik et al., 2020) It is therefore logical that each interest group will expect different values to meet its objectives. (Valaskova et al., 2018) Evaluation of companies on the basis of mathematical apparatus or decomposition of indicators may not always yield an accurate result. This is where creative activity and accounting enter the process, and it also dreams of the possibilities that the company has within creative accounting. In certain circumstances, there may be a deliberate pursuit of objectives in order to present better financial results, which are reflected in the accounts and subsequently in the financial statements. (Hoang and Joseph, 2019) In practice, therefore, there may be opportunities to influence accounting information through the use of different methods and techniques of creative accounting, as a result of which the financial statements lose their function and thus lead to distortion of accounting data and profit manipulation. (Drabkova, 2017) Misleading financial reporting has negative impact on all stakeholders since financial records are the primary source of information on financial stability, economic activity, and financial health of any company. (Svabova et al., 2020) In the conditions of today's rapidly changing and growing global market, only the best will succeed, or only those with the best results. (Siekelova and Podhorska, 2020) And this fact is one of the motives that leads entities to make dishonest adjustments to financial results through increasingly frequent accounting manipulations.

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Theoretical Background

Creative Accounting

In the literature, however, we find several different perspectives on the issue of creative accounting, which can be understood as a process of manipulating accounting data to transform financial statements into the desired results or as a process in which economic transactions are carried out to achieve a more favorable result in accounting accounting units. (Karim et al., 2014) Creative accounting can represent abuse of accounting perceived by the general public and points to the constant lack of serious materials that would clarify the issue of creative accounting in more detail and define this phenomenon in more depth. It is a process of manipulating accounting data in order to transform financial accounting statements (Fizza and Qaisar, 2015) from the form as if they should be properly kept in a true and true representation of the accounting fact to the form that those responsible for keeping accounting data would like. and conducting economic transactions with the intent to recognize the required financial performance and cash flows of the entity. Drabkova (2017) points to the existing problem of defining the boundaries of accounting creativity or the so-called gray economy and identifying accounting fraud, also known as the black economy, which we already call economic crime. Shah, Butt and Tarig (2011) define the phenomenon of creative accounting as a purposeful intervention in the external financial reporting process with the intention of making an exclusive profit. Griffiths (1995) points out that companies present results that do not give a true and fair view of their transactions, but rather adjust them to the desired objectives. The economic results that enterprises report are based on appropriate, adjusted or changed data. (Svabova and Durica, 2019) These practices used in reporting business operations or performance are considered creative accounting. Naser (1994) explains creative accounting as a process of modifying economic results from the real picture to the desired results. This can be achieved by improper use, or even by abusing existing rules or omitting other rules. Naser sees the accounting system, especially in Anglo-Saxon countries, as an extremely receptive environment for creative accounting. Matica et al. (2009) refers to creative accounting as enronitis. This term is understood in the literature as a criminal offense of distorting accounting data on the state of management and capital, which in the case of capital markets poses a serious problem pointing to the error of the system in reporting assets and profits and misuse of information in business. In the professional literature, the definition of creative accounting varies considerably. However, it is possible to compare the prevailing views of the authors dealing with the issue, which show that if the determination of accounting procedures does not violate the Accounting Act or other related accounting regulations, it is creative accounting and not accounting fraud. Creativity in accounting thus represents a manipulation of financial statements (Khanh and Thu, 2019), which consists in adjusting the true and true image of accounting, which changes the accounting reality, but only to the extent that it is not illegal. Users of financial statements are subject to distorted information, which may not lead to objective decisions. Steker and Ortusinova (2016) describe which of the accounting information is important for internal as well as external users of financial statements. Internal users, such as shareholders, partners or owners, monitor the return on invested funds, and accounting serves as a tool for controlling managers, as managers have access to all accounting records and thus gain an advantage over other users of financial statements. The role of managers is also to ensure that the internal objectives set by the owners are met (Kristofik et al., 2019), thus opening up space for the manipulation of financial statements. External users of financial statements include banks that monitor a company's financial situation for the purpose of granting or not providing credit, insurance companies and financial authorities that oversee tax compliance, statistical offices that collect data for the government, ministries and the public. business partners that focus on performance and settlement of liabilities or competition that compares the financial indicators of entities and monitors their market position. Based on publicly available accounting data, not only internal but also external entities evaluate the financial health of the company, which means that if they are manipulated, it can have a negative impact on all stakeholders. For the most part, creative accounting is seen as a negative phenomenon. According to Shah, Butt and Tarig (2011), the use of creative accounting can also have a positive impact on users of accounting information in the case of a company in times of crisis, when the company meets the expectations of external companies.

Reasons for Manipulating Financial Information

The motives for using creative accounting vary depending on the type of groups of people who practice it. (Remantic and Kenfelja, 2018) Each entity involved in creative accounting practices has different interests, resulting in differing motives, and several may take place simultaneously.

- **Internal profit**

Shah, Butt, and Triga (2011) cite the need for managers to falsify books in order to meet internal goals set by top management, taking into account sales, performance, and stock price, as the main motives for practicing creative accounting. The motives leading to the implementation of creative accounting are also accompanied by the achievement of the manager's financial success, based on the results resulting from the financial statements, where the manager is financially motivated depending on the achievement of set goals. One of the motives for practicing creative accounting is the prestige of the manager. According to Drabkova (2017), modern theory points to various variants of managers' behavior, where their effort is either to maximize profits or to maximize their usefulness in order to report high values of profits. Another motive may be poor business management, where the use of creative accounting can have a positive impact on delaying the impending bankruptcy. The author also focuses on the issue of valuation as one of the motives for the implementation of creative accounting, drawing attention to the fact that the company may slip into off-balance sheet financing.

- **External Expectations**

The company has to face several expectations of stakeholders, the company's employees demand long-term presence in the company, customers expect their needs to be met, suppliers emphasize payments and long-term relationship with the company. (Pisar and Bilkova, 2019) The motivation for using creative accounting practices is also to obtain a loan, lease or other source of financing. Companies trading on the stock exchange adjust their financial statements in order to ensure a constant flow of income in order to attract the attention of investors and thus ensure stable share prices.

- **Tax Optimization**

One of the motives for practicing creative accounting is tax optimization. Shah, Butt and Tarig (2011) point to the high interest of top management in certain tax benefits, especially where corporate income taxation is high and the calculation of the tax base itself and consequently the tax itself is relatively complicated. In connection with creative accounting on the issue of taxes, Drabkova (2017) states that the given reason prevails primarily in countries where financial accounting is closely connected with tax accounting.

- **Management Change**

Another of the motives for the implementation of creative accounting is the change of management. (Merchant and Rockness, 1994) For newly hired managers taking over the management of the company after the previous management, the trend is to point out that the results of previous managers are even worse than they actually appear, with the result that new managers start at a lower level and thus create space for their future.

CFEBT Model

The CFEBT model was designed as a detection model for use in recognizing possible manipulation of financial statements. The CFEBT model is based on the hypothesis of a relationship between the pre-tax profit or loss and the development of cash flows. The CFEBT model is designed in the form of an audit test: in the 1st phase as an analytical test of factual accuracy (CFEBT M-score), where the resulting score is compared with materiality (level of significance). Phase 2 represents a modified version of the CFEBT model respectively, detailed test of relationships at the level of significance. The relationship between pre-tax profit development and cash flow over time can be detected in phase 1 by means of the detected M-score value. If the detected M-score value is higher than the determined materiality. This is followed by a test of the 2nd phase respectively, a detailed analysis of significant deviations in the development of accounting relationships of the tested accounting periods, when individual significant deviations are identified at the level of the development of significant values of financial statements and the development of cash flow. Through a detailed test, it is possible to detect risk areas in the reported book values and assess the risk of manipulating the results of financial analysis, especially for owners, investors, those charged with governance and management. (Kovalova and Michalikova, 2020)

Methods

In our research we use the analysis of selected models in order to evaluate the ability of users to detect the risk arising from the manipulation of financial statements beyond the true and fair view of accounting.

Results and Discussion

In this paper, we focus on an entity whose financial health is at risk. The individual financial statements of this accounting entity underwent an analysis of selected models in order to evaluate the ability of users to detect the risk arising from the manipulation of financial statements beyond the true and fair view of accounting. The following table presents the results of detecting the risk of manipulation of the financial statements of a given entity using the CFEBT model in five consecutive accounting periods. EBT represents the result of management before tax and CF represents the increase in cash flow.

Table 1: Assessment of the risk of manipulation of financial statements using the CFEBT M-score

Accounting items	Period						Sum
	2013	2014	2015	2016	2017	2018	
EBT (€)	-277,000	-328,000	-219,000	-174,000	-65,000	-312,000	-1,375,000
CF (€)	5,000	-3,000	247,000	39,000	-82,000	-63,000	138,000
Cash and cash equivalents (€)	5,000	2,000	249,000	288,000	205,000	142,000	891,000

Source: Made by authors

Based on the results from the table, it is clear that the EBT values and the change in cash flow differ significantly in the analyzed period from 2013 to 2018. The table further shows that the M-score of the CFEBT model reaches a high value. The results of cash flow increments in the analyzed accounting period point to the tendency of the risk of manipulation with financial statements in the accounting unit. In the period from 2013 to 2018, the entity reported a negative value of the profit before tax, which represents an accounting loss of -1,375,000 euros. The total value of cash flow increments reached a positive value of 138,000 euros. Based on the calculation of the M-score of the CFEBT model, this represents 110%, which is a higher percentage than the value of the considered materiality in the range of 5 to 10%. If the financial statements in a given entity were manipulated, two cases of such manipulation could occur here. The first direction of manipulation with financial statements points to manipulation with the economic result. The second direction of manipulation of financial statements refers to the manipulation of cash flow, which means that the cash flow was not reflected in the reported profit or loss, which means that the entity overstated the reported cash flow. The subject of manipulation of financial statements in a given accounting unit may be the reporting of costs and revenues or the maximization of operating revenues and the minimization of operating expenses. In the case of costs, they are incorrectly reported, which means that the reported costs were not reflected as expenses in the given accounting period 2013 to 2018, and thus the entity transfers them to the next accounting period in the form of provisions or reserves. Manipulation of financial statements in a given entity may cause an overstatement of costs. Overestimation of costs is caused by the implementation of techniques for manipulating financial statements, such as the use of big bath techniques or tax optimization of artificially created costs or the use of earnings management. Manipulation of the financial statements of a given entity may cause their understatement to be understated. Undervaluation of revenues arises as a result of incorrect valuation or the use of earnings management, which includes non-recognition of realized orders of the given accounting unit.

Table 2: Assessment of the risk of manipulation of financial statements using the Modified CFEBT

CFEBT and its adjustment for significant items in period 2013-2018	€
EBT before adjustment	-1,375,000
EBT underestimation	
Change in reserves and provisions	110,000
Amortization	45,000
Modified EBT	*-1,220,000*
Cash flow increment before modification	138,000
Overestimation of cash flow increase	
Reserves	0
Increase in short-term trade payables	-727,000
Increase in liabilities to controlled entities	-884,000
Change received advances	0
Modified cash flow increment	*-1,473,000*
CFEBT after modification	**21%**

Source: Made by authors

As part of maintaining a true and fair view of the accounting in the entity and by analyzing individual cost and revenue items, we identify risk items in order to detect manipulation that leads the entity to underestimate profit. Individual items that cause deviations in the development of EBT and cash flow increments, taking into account the true and fair view of the accounting, are adjusted for the differences that have arisen. The table shows the modified values of the CFEBT model and from these values a new value of the modified CFEBT model is subsequently calculated, which is at the level of 21%.

Based on the results shown in both tables, the difference between the achieved value of the CFEBT model and the modified CFEBT model is visible. The value of the modified CFEBT model decreased from 110% to 21%, but it should be noted that the achieved value of the modified CFBET model is still above the considered materiality of the deviation.

Based on the results of both models, it is clear that in order to achieve relevant results indicating the detection of manipulation of financial statements, it is appropriate to use a combination of several models that can more accurately identify risk points and reveal whether or not manipulation of financial statements has occurred. The CFEBT model provides a comprehensive view not only of the financial statements themselves, but also of the links related to the creation of profit and loss and cash flow, while capturing the development of financial statements and their links over several accounting periods, at least for a period of 5 years. A modified version of the CFEBT model provides insight that identifies risk factors arising from inconsistencies in cash flow and profit or loss, while respecting the individuality of the entity's financial statements.

Conclusion

Users of financial statements who choose to assess the financial health of an entity based on its reported financial statements should perform an analysis of risk items in their bookkeeping. In order to evaluate the risk of manipulation of financial statements beyond the true and true presentation of accounting, it is appropriate to monitor the development of risk items for at least 5 years. This paper captures the development of profit or loss and cash flow, as well as the mismatch of accounting items in the entity's financial statements for a period of six years. Based on the CFEBT model and the modified CFEBT model, it is possible to assess whether deviations in the achieved values pose a risk of manipulation of financial statements beyond the scope of legislative rules. The results

resulting from the CFEBT model reach a higher percentage than the considered materiality at the level of 110%, which indicates the fact that the entity manipulates the financial statements. Under the modified CFEBT model, while the percentage of manipulation risk is lower, its value is still above the level of materiality considered, which again points to the fact that the entity manipulates the financial statements.

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Education and Race in the USA: Equal Rights or Discrimination?

Boris V. NIKOLAEV
PhD in History,
Associate Professor at the Department of Criminal Law,
Penza State University
nikolboris@yandex.ru

Nataliia A. PAVLOVA
PhD in Education
Chair of the Department of foreign languages,
Penza State University
nataliia.pavlova@inbox.ru

Mikhail Yu. EMELIN
PhD in Law, Associate Professor at the Department of Law,
Moscow University named after S.Y. Witte in Penza
mikhemelin@yandex.ru

Abstract

In this article we examine the mechanisms of ensuring educational opportunities for racial and national minorities. This article provides the comprehensive examination of how race discrimination in the US education system is prevented. It examines the practice of the US Supreme Court on equal access to education for representatives of all racial and ethnic groups.

Keywords: Race, Education, US Constitutional Law, US Supreme Court, Principle of Equality, Discrimination

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The problem of racial and ethnic discrimination remains paramount for the entire North American society [Nikolaev, 2018: 128-129] despite the increasing attention drawn to the protection of other discriminated groups: disabled people, senior citizens [Nikolaev, Pavlova, 2016: 10875-10877], and sexual minorities.

Education in the modern world plays an increasing role generating broader economic growth as well as individual success. It is framed as a competitive necessity in which every person can win – through the partnerships it generates, the opportunities it opens, the fields and the minds it expands. Education nurtures the hopes of the country solving challenges and transmitting cultural values. It builds political understanding, models civic education and electoral culture. [Nikolaev, Emelin, Pavlova, 2020: 7715-7716].

American society as well as the education system tend to be ethnically and racially diverse and they have become more diverse in recent years. Moreover, official statistics indicate alarming trends regarding educational opportunities for various racial and ethnic groups.

About 2/3 of black children under 18 in the United States are raised in single-parent families (55% by single mothers, and 8% by single fathers) compared to 41% of Hispanic children, 24% of white children, and 14% of Asian children. Almost a third live in poverty (32%), compared to 25% of Hispanic children, 10% of white children and 9% of Asian children. This is also associated with parents' educational level: 65% of children live in poverty if their parents have a school education, compared with 8% if they have a bachelor degree [Hussar 2020: 4-5]. 67 percent of private elementary and secondary school students were White, 11 percent were Hispanic, 9 percent were Black, 6 percent were Asian, and 5 percent were students of two or more races. Pacific Islander and American Indian/Alaska Native students each constituted 1 percent of private school enrollment in 2017. [Hussar 2020: 31] Between fall 2000 and fall 2017, the percentage of students (enrolled in public elementary and secondary schools)

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who were White decreased from 61 to 48 percent, and the number of White students decreased from 28.9 million to 24.1 million. Similarly, the percentage of students who were Black decreased from 17 to 15 percent, and the number of Black students decreased from 8.1 million to 7.7 million. In contrast, the percentage of students who were Hispanic increased from 16 to 27 percent.
Among students ages 14–21 served under IDEA who exited school in school year 2017–18, the percentages who graduated with a regular high school diploma was highest for Asian students (79 percent) and lowest for Black students (66 percent). [Hussar 2020: 42-43]

In fall 2018, there were 16.6 million undergraduate students and 3.0 million graduate students attending degree-granting postsecondary institutions in the United States. Distribution of U.S. resident undergraduates (full- and part-time) by racial or ethnic groups varied among public, private nonprofit, and private for-profit institutions and between 2- and 4-year institutions. 64 percent of undergraduate students at private nonprofit 4-year institutions in fall 2018 were White, which was higher than the percentages of undergraduate students at public (56 percent) and private for-profit (44 percent) 4-year institutions who were White. The percentage of undergraduate students at private for-profit 4-year institutions who were Black (29 percent) was more than double the percentages at private nonprofit (13 percent) and public (12 percent) 4-year institutions. The percentage of undergraduate students who were Hispanic was higher at public 4-year institutions (20 percent) than at private for-profit 4-year institutions (18 percent), which in turn was higher than the percentage at private nonprofit 4-year institutions (13 percent).

The percentages of U.S. resident undergraduate students at public 2-year institutions in fall 2018 who were White or Asian (49 and 6 percent, respectively) were higher than the corresponding percentages at private nonprofit (39 and 3 percent, respectively) and private for-profit (35 and 4 percent, respectively) 2-year institutions. In contrast, the percentage of undergraduate students at private nonprofit 2-year institutions who were Black (41 percent) was higher than the corresponding percentages at private for-profit and public 2-year institutions (28 and 14 percent, respectively). Higher percentages of undergraduate students at public and private for-profit 2-year institutions (27 and 26 percent, respectively) were Hispanic than at private nonprofit 2-year institutions (11 percent). [Hussar 2020: 141-142] Thus, Blacks and Hispanic Americans are enrolled in less high-quality institutions of higher education, primarily in two-year colleges and four-year private for-profit institutions. On the contrary, the most prestigious private nonprofit and public colleges and universities cannot boast the large numbers of Black and Hispanic student populations.

The teaching staff development structure is quite evident. 79 percent of public school teachers were White and non-Hispanic. About 9 percent of teachers were Hispanic (of any race), and 7 percent were Black and non-Hispanic. [Race, 2020] Of all full-time faculty in degree-granting postsecondary institutions in fall 2018, some 75 percent were Whites; 12 percent were Asian/Pacific Islanders and 6 percent Blacks, 6 percent Hispanics. Among full-time professors, 80 percent were Whites, 11 percent were Asian/Pacific Islanders, for 4 percent Blacks, 3 percent Hispanics. [Hussar 2020: 151]

Thus, this context implies a strictly hierarchical conservative system in which a higher educational level means a decrease in the number of Hispanic Americans, and especially Black Americans, and, conversely, an increase in the number of White students and Asian Americans.

One of the newest and at the same time traditional trends for the United States is the increase in the number of "ethnic" universities targeted at applicants from various ethnic minorities such as Native Americans, Asian Americans, and Hispanic Americans. "Historically black colleges and universities" play a major role in giving Black Americans the platform to obtain higher education and agitate for their freedom. Many of these institutions are protected by law and their rights are guaranteed, both at the federal and state levels. Many researchers, including L. Fuchs, called this trend "voluntary diversity" [Fuchs, 1990: 5], and considered it a positive phenomenon that put an end to the "melting pot" and gave rise to the ethnic "kaleidoscope" [Arthurs, 1994: 262].

At the same time, this tendency manifests itself in the doctrine of "separate but equal", previously condemned by the public, court decisions and legislation. The doctrine has played such a dramatic and unsavoury role in the history of constitutionalism and the US education system. And although ethnic and racial minorities themselves gave an impetus to their educational opportunities the basic trends in this area were inconsistent and contradictory. Although the total number of black students in higher education institutions is increasing, the growth in the number of "historically black colleges and universities" stopped after 1967. In 1954, 5/6 of all black students enrolled in "historically black institutions of higher education". Even today they remain highly segregated and grant an advantage to Blacks because they continue to face barriers to equal access and opportunity and do not increase the white percentage of enrollment. [Clotfelter, 2004: 153-154, 160].

The US Supreme Court continues to play a key role in promoting the ideals of equality in various areas of American life. By its decisions, the US Supreme Court not only expanded the scope of constitutional and legislative rulings, but in some cases actively encouraged the executive branch to effectively implement the orders. Such judicial activism, especially manifested during the difficult stages of the desegregation process in the United States, was controversial, and in some cases contributed to the legal consolidation of the most reactionary norms and institutions.

Thus, one of the most significant decisions concerning higher education was the decision of the Supreme Court in the case of *Plessy v. Ferguson*, 163 U.S., 537, 544 (1896) [Plessy, 1997]. The "separate but equal" doctrine, "one of the most significant in US constitutional history" [Kern, 1972: 308], was first proclaimed by a Massachusetts court in *Roberts v. Boston* in 1850 Roberts v. Boston. Boston, 59 Mass. (5 Cush.) 198 (1850) The court stated that "the principle of equality of all before the law cannot be applied to diverse social conditions, since the infinite variety of circumstances of the social environment" presupposes legislative regulation that takes into account such conditions of life, including education [Kern, 1972: 13-14].

On behalf of the majority, Judge Brown stated that the purpose of passing the Amendment [XIV] to the U.S. Constitution was undoubtedly to enforce the absolute equality of the two races before the law, but, in the nature of things, it could not have been intended to abolish distinctions based upon color, or to enforce social, as distinguished from political, equality, or a commingling of the two races upon terms unsatisfactory to either. Laws permitting, and even requiring, their separation in places where they are liable to be brought into contact do not necessarily imply the inferiority of either race to the other, and have been generally, if not universally, recognized as within the competency of the state legislatures in the exercise of their police power. The most common instance of this is connected with the establishment of separate schools for white and colored children, which has been held to be a valid exercise of the legislative power even by courts of States where the political rights of the colored race have been longest and most earnestly enforced.

Judge John Marshall Harlan argued in his dissent stating that the purpose of segregation was to exclude the unification of blacks and whites and maintained the status of whites as the dominant race though he said "Our Constitution is color-blind, and neither knows nor tolerates classes among citizens. All citizens are equal before the law."

For almost half a century, *the Plessy v. Ferguson case* put in dead storage the policy of racial discrimination and segregation in the United States, including higher education. In 1906, in *Berea College v. Kentucky*, the US Supreme Court applied this doctrine to higher education institutions, affirming the state's right to prohibit the education of white and black students in the same classroom even in a private college [Millington, 1979: 312]. Berea College, since its founding in 1859, taught Whites and Blacks in its institution. However, the state of Kentucky obliged the institution on legal grounds to train white and black students in different premises at different times stating that "If the twentieth century is the progress of civilization, it will be due to the unadultered blood of the Anglo-Saxon white race and the outstanding representatives and geniuses of this race."
The US Supreme Court dispassionately and without delay upheld such a "racist" legislative decision [Lewis, 2004: 24]. Thus, the principle of the constitutionality of state segregation legislation was first applied to private institutions of higher education. Justice Harlan reiterated his opposition to "the arbitrary violation of personal freedom and property rights guaranteed by the XIV Amendment against state hostility" [Kern, 1972: 519].
Brown v. Board of Education examined by the US Supreme Court in 1954 (Brown v. Board of Education 347 US 483 (1954)) and in 1955 (Brown v. Board of Education 349 US 294 (1955)) was the decision that revolutionized the theory and practice of desegregation, including that in education. It is still one of the most cited precedents in the practice of federal and state courts.

Considering appeals from the courts of Kansas, South Carolina, Virginia and Delaware to prohibit the admission of black children to schools on a non-segregated basis (Plaintiffs saw a violation of the principle of equal protection by the law under the XIVth Amendment), the Court recognized the applicability of the doctrine "separate but equal" in several cases with respect to educational institutions, and for the first time it voiced the main concept of the dispute – which is "the impact of segregation on public education."

In addition, the court considered a broader approach to the consideration of this case and did not limit itself to referring to two dates - 1868, the time when the amendment was adopted, or 1896 - the year when the decision in the case of *Plessy v. Ferguson* was rendered. "We must consider public education in its full development in the life of the Nation." Thus, the court initially rejected the position of the minimalists, who insisted either on the classical precedent interpretation of this case, or on the equally classic interpretation of the will of the legislators who adopted the amendment. The court recognized education as "the most important aspect of state and local authorities" and "the foundation of good citizenship" and concluded that "the doctrine of "separate but equal"

cannot be found in public education". "Separate educational opportunities are essentially unequal." Therefore, the court found a violation of the provision of the XIV amendment on equal protection by the law in the cases under consideration. In May 1955, the Court outlined the basic procedures for ensuring the transformation of segregated systems into fully integrated ones.
Researchers describe the significance of this case as "striking a death blow to the doctrine of" separate but equal "[Millington, 1979: 317], as" the most important American national act, other than victories in the Civil War and World War II " [Kern, 1972: 529. That was "a turning point in America's willingness to face the consequences of centuries of racial discrimination dating back to the first settlements in the New World" [Kluger, 1977: X]. On December 22, 2005, the Brown 50th Anniversary Commemorative Coin Act was passed, emphasizing that the case "changed American history by setting an example for building greater equality" (Little Rock Central High School Desegregation 50th Anniversary Commemorative Coin Act, HR 358 / Public Law 109-146, Dec. 22, 2005; 119 Stat. 2676).

It was also in 1955 when the principles of the Brown case were applied to higher education in *Fraser v. Regents of the University of North Carolina*. Judicial practice has repeatedly confirmed adherence to the "Brown Doctrine" in combating racial discrimination in the education system.

American researcher Charles Clotfelter identifies five main factors that differentiate desegregation in US higher education from similar processes in primary and secondary schools:

"historically black institutions of higher education", voluntary admission practices and high tuition costs, well-developed federal and state laws and court practice on to civil rights protection in higher education, a large number of private educational institutions and the significant size of higher education institutions [Clotfelter, 2004: 153-158].

The Brown case decision fueled the growth of social activism and the development of legislation aimed at overcoming the practice of racial and ethnic discrimination. This very moment became a turning point in terms of political and public perception of the problem of racial segregation and other forms of discrimination. Thus, at Harvard, the share of students of color increased from 1.6 percent in 1954 to 32.8 percent in 2002 [Clotfelter, 2004: 148]. At the same time, racism in higher education persists in the United States, and "difficulties in establishing interethnic dialogue in academic environments" are noted [Simpson, 2003: 5, 18].

The Brown doctrine has had many implications for the legal regulation of higher education. The most radical legal institution generated by this court decision was "affirmative action". State authorities aimed not only to prevent discrimination in the future, but to create conditions for redressing apparent past wrongs, harms, or hindrances by providing additional advantages and more favorable conditions to discriminated racial and ethnic minorities, as well as women and persons with disabilities in employment and education.

In *Adams v. Richardson* 480 F. 2d 1159 (D.C. Cir. 1973) a federal district court ruled in favor of the plaintiffs and ordered the Department to enforce proceedings in ten state higher education systems. In the court's view, the Department's continued provision of financial aid to segregated higher education systems long after the amendment was changed violates the rights of plaintiffs and others in a similar position under the Civil Rights Act.

The Court of Appeal fully upheld the District Court's ruling for primary and secondary education, but changed the higher education order. The Department insisted that the enforcement of Title VI was the Department's discretionary power and was not, therefore, within the jurisdiction of the court.

The court identified significant differences in desegregation in colleges and universities from those in schools and pointed to the Department's lack of experience in this area. However, the court agreed with the District Court that the Department is still obliged to exercise its powers: "it has not yet formulated guidelines for desegregating state-wide systems of higher learning, nor has it commented formally upon the desegregation plans of the five states which have submitted them".

As regrettable as these revelations are, the stark truth of the matter is that HEW must carefully assess the significance of a variety of new factors as it moves into an unaccustomed area. None of these factors justifies a failure to comply with a Congressional mandate; they may, however, warrant a more deliberate opportunity to identify and accommodate them. «The problem of integrating higher education must be dealt with on a statewide rather than a school-by-school basis … A predicate for minority access to quality post-graduate programs is a viable, co-ordinated state-wide higher education policy that takes into account the special problems of minority students and of Black colleges».

The Court stated that, since a considerable time had passed since the Department requested plans for desegregation of higher education in the states, it was quite adequate to require that plans be submitted within 120 days, and then take active action against the states whose plans had failed. If an eligible plan was not filed within the additional 180 days, the Department must initiate enforcement proceedings, and bringing the case to a hearing did not preclude agreement between the parties.

Over the past decades, the response to this practice has varied in terms of different social, political groups, legal theories, court decisions, branches of government, states and, finally, different stages of social development.

T. Sowell, a conservative African American scholar, believes that affirmative doctrine and practice "sets in motion complex reactions that contrast minority and majority students and generate a state of stress and negativism between faculty, administration, and external interests" [Butler, 2005: 333]. Another minority member of the California State University Board of Regents, Ward Connerly, is a staunch opponent of this practice. He titled his policy paper as "My Struggle Against Racial Preference" [Connerly, 2000: B6-8].

In 2013 the US Supreme Court (Fisher v. University of Texas, 570 US (2013)) and 2016 (Fisher v. University of Texas, 579 US ___ (2016)) re-examined the theory and practice of affirmative action and determined its own doctrine on this issue.

The plaintiff in the new "reverse discrimination" case was Abigail Noel Fisher, who was denied admission to the University of Texas solely in her opinion on the basis of her race and the university's support for racial minorities. The University of Texas is one of the nation's leading institutions for awarding academic degrees to members of ethnic minorities. This admission policy has resulted in a 50% increase in Hispanic graduates and nearly double the number of African Americans. President of the University B. Powers in an official statement reaffirmed his commitment to a policy of admission that ensures a diversity of the student body reflecting the diversity of the American nation and its compliance with the orders of the Supreme Court in the Grütter case [Statement, 2012].

On June 24, 2013, the Supreme Court overturned the District Court's decision and returned it for further consideration. Thus, the court did not revise the concept of "affirmative actions" and did not set out its understanding of the constitutionality of the doctrine and practice of "affirmative actions". On June 23, 2016, the US Supreme Court ruled that at the time the race-sensitive admissions program was legal under the equal protection clause.

In general, the main features of the policy of the US Supreme Court in cases related to issues of equality can be formulated as follows. First, the principle of equal protection is not questioned, serving as the basis for all cases in this category. Secondly, the approach to equality issues is not just the prevention of discrimination in the future, but also the creation of conditions for overcoming the consequences of past discrimination by providing additional advantages and more favorable conditions to discriminated racial and national minorities, as well as women and persons with disabilities. Thirdly, favorable conditions are allowed only in case of a very specific state necessity. At the same time, adverse influence on representatives of minorities is not allowed.

The principle of equality continues to be fundamental for the entire American constitutional system [Nikolaev, Pavlova, 2018: 391-392]. The core of the anti-discrimination policy of the American state is combating racial and national discrimination. Recent events in the United States related to police brutality against black residents only exposed a wider range of problems of interracial relations in the political, economic, social and cultural life of the country.

Education is one of the key contexts. Ensuring equal educational opportunities for all Americans, regardless of race or nationality, can help create a socioeconomic environment to overcome racial discrimination and the consequences of legal and de facto segregation.

This requires more consistent and balanced legislation and judicial practice with regard to ensuring the principle of racial and national equality in the education system.

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Possibilities of Venture Investments for Slovak Small and Medium-Sized Enterprises and Effect on Their Capital Structure

Veronika VRABLOVA

University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 8215/1, 010 26 Zilina, Slovakia, veronika.vrablova@stud.uniza.sk

Abstract

Financing of small and medium sized enterprises (SME) is very discussed topic. In these times we can see that SME more concerning about alternative ways of financing such as venture capital. Because of this, we decided to focus on this financing among Slovak SME. Aim of this paper is to describe available venture capital opportunities for small and medium size and identify the effect of venture capital investments on capital structure of an enterprise. Main methods used to fulfill the aim were analysis of available studies and available literature. The effect of venture investments on company capital structure was demonstrated on case study of Slovak startup. We have reached several findings. Firstly, venture capital investments are very low in Slovakia, although there are several funds providing this financing. In 2017, SMEs raised only 2,9 million € by venture capital. Secondly, Slovak SME do not have high demand for this financing. And finally, the use of venture capital reduces indebtedness of the company.

Keywords: Venture capital, small and medium-sized enterprises, capital structure

Introduction

Nowadays, small and medium-sized enterprises use in more extent as a source of financing venture capital. Venture capital is capital invested by investors in startups with an innovative idea and the potential for rapid growth. An investor usually acquires a minority stake in a company for his contribution, which he may sell back to the company after some time or offer it to another investor (Sobeková-Majková et al., 2016).

Venture capital is a specific type of external financing, where the investor invests funds in a company with growth potential. This capital acts as equity in the enterprise, as the investor enters the company and, in exchange for the invested funds, acquires the usual share in the management of the company.

Venture capital and private equity investors can be described as formal investors, usually provide their free cash through funds or various organizations. Venture capital seem to be best way of financing for startups, because they do not have any history and thus, for banks and other institutions it is very risky to fund young enterprises such as startups. Therefore, venture capital investor are major entities in helping startups to overcome their resource constraints (Manigart and Sapienza, 2017). On the other side, invested capital can be provided also to established company. In that case it is called private equity.

When formal investors want to invest in a company, they will have to make detailed due diligence about the company. One of the most important things to look at are earnings of the company. Investors have doubts about a company which profits are very consistent, because they want to invest in a company that are stable and grow slowly. Consequently, the study about earning management (Kliestik et al., 2020) shows that among V4 countries are the biggest manipulators of earnings Polish enterprises and the smallest Slovak enterprises. On the other side, executive managers and accounting researchers in general should deeply consider the wrong link between earnings quality and financial performance, and the mediation of organizational reputation when analyzing earnings performance (Huynh, 2019). Moreover, according to Podhorska et al. (2019) earnings in its various forms enters in the lot of financial ratio. For investors is important to monitor the situation of the company they invested in. That is because bad financial health of the enterprise can negatively affect the operation of the company itself and can change the financial performance of investors that come into close contact with the enterprise (Valaskova et al., 2020).

Capital structure of an enterprise provide an information about share of own – internal capital and debt - external capital. 1 Identifying optimal capital structure of an enterprise is crucial for their business. On the other side

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enterprises face difficulties in determining the optimal capital structure. Belas et al. (2018) made a research, where they find out that the size of the company effects its attitude to volume of foreign and own capital used to finance its activities. SMEs do not see the debt negatively and do not connect it to the risk of failure (Kramolis and Dobes, 2020). According to Buzinskiene (2019) in order to increase business value, companies and their managers need a better understanding of the measurement of the intangible asset structure.

Importance of identifying and removing barriers to the development of SME enterprises is currently increasing in all countries with developed economies (Belas et al., 2020). Especially, when it comes to trade sector, small group of enterprises influences the development of this sector the most (Vrbka et al., 2019). Some of the factors which are affecting prosperity of enterprises are net return on capital, net working capital, current debt ratio or financial debt ratio (Valaskova et al., 2018).

Methods

Main method used in this paper is comparative analysis. Using this analysis, we were comparing usage and possibilities of Slovak small and medium-sized enterprises to fund their business through venture capital or private equity. For the comparison we were using several studies, such as Survey on the access to finance enterprises (SAFE) for years 2015 – 2019 and OECD evaluation report for years 2014 – 2017.

Other used method was synthesis, which was used to summarize fonds providing venture capital and private equity we used all available literature. To demonstrate positive or negative effect of venture capital on the capital structure, we choose a case study of one random Slovak small and medium-sized enterprise (SME) called Datamolino. Thus, we analyzed balance sheet from years 2013 and 2014 of the company for identifying related effects. Balance sheet is available online at Register of Financial Statements for Slovak Republic.

Results

Venture investment is relatively new way of financing. Thus, we can see only small amount of invested capital through venture capital in Slovak SME, where only 2,9 mil. € was invested in 2017. In comparison with other years, this amount was the lowest between 2014 – 2017. The biggest investments of venture capital funds were made in 2016, when investors fund 17,1 million €, as we can see in figure 1.

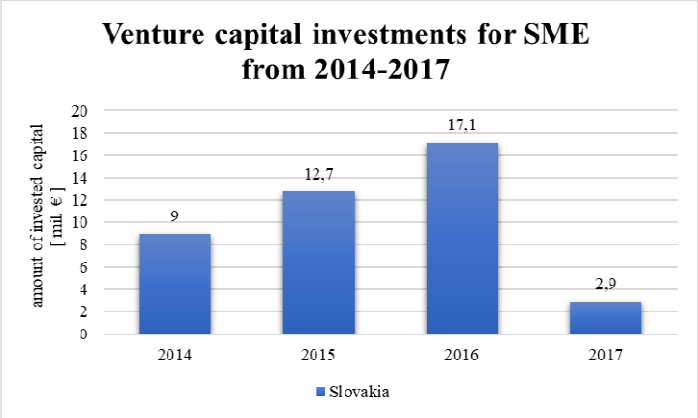

Fig. 1: Venture capital investments for Slovak SME from 2014 – 2017

Venture capital investments are not so widespread among European companies. In 2019, in the EU venture capital was relevant for 1768 companies, which accounted for 11.5% of all companies. The use of this type of financing in Slovakia is below the EU average. In Slovakia it was relevant only for 1,9 % of surveyed enterprises in that year. In comparison with previous years we can see decreasing demand for venture capital in Slovakia and also in Europe, as suggests the figure 2 below. The use of VC in Slovakia drops by almost 1 % and in Europe in general it was more than 2 % between years 2015 and 2019.

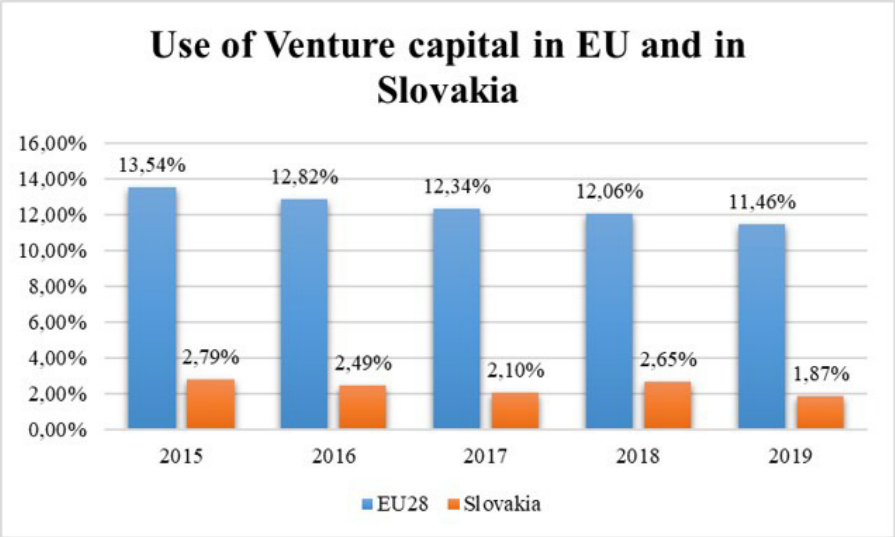

Fig. 2: Use of Venture capital in EU and Slovakia from 2015 to 2019

Possibilities of using venture capital in Slovakia are very wide. By analyzing available literature, we find out that in Slovakia there are several organizations and individuals providing venture capital financing. They usually collaborate in many different funds. Such funds operating in Slovakia are, for example, the Innovation and Technology Fund or Slovak Venture Capital and Private Equity Association (SLOVCA). Others available funds are described in the table 1 below. In the table 1 we can see weather the fund is providing venture capital for startups or private equity for established enterprises.

Table 1: An overview of some venture capital and private equity funds available to Slovak SMEs

Name of the fund	Investment interval	Investment horizont	Equity stake	Venture capital	Private equity
Innovation and Technology Fund	20 000 – 1 500 000 €	4 – 6	10% - 50%	✓	✓
Slovak Growth Capital Fund	500 000 – 5 000 000 €	3 – 4	minority (minimum of 25%)		✓
Neulogy Ventures	50 000 – 200 000 €	N/A	N/A	✓	
	300 000 – 1 500 000 €	N/A	N/A		✓
Limerock Fund Manager	500 000 – 2 000 000 €	4 – 6	–	✓	✓
CREDO VENTURES	50 000 – 3 000 000 €	N/A	5% - 25%	✓	
	2 500 000 € and more	N/A	15% - 35%		✓
Slovak Development Fund	500 000 – 2 300 000 €	3 – 5	34% - 75%		✓
National Holding Hund	individually	1 – 5	N/A	✓	✓

Case Study

For the case study we choose an enterprise which is classified as small and it is categorized as startup. This startup was founded in 2013 and has developed an application that allows other companies to have their paper invoices in

electronic form, so it can significantly save time for other companies. At the beginning of its business in 2013, Datamolino received a seed investment from the startup accelerator Wayra of total amount of 39 250 €. At the beginning of 2014, the company applied for another investment. They raised 500, 000 € from the Innovation and Technology Fund. This investment was divided into two stages. At first stage Datamolino received 300,000 € in exchange for a 12% stake. At the second stage, after a thorough preparation of the expansion plan to the markets, the startup got remaining 200,000 € in exchange for a minority stake of 8%.

From the balance sheet of the enterprise Datamolino for years 2013 – 2014 we can assume that using venture capital has a positive impact on the company capital structure. Total indebtedness decreased from 90,3 % in 2013 to 12,7 % in 2014. This led to smaller dependability of debt capital, because venture capital acts as own capital. In long term conditions is for the enterprise more suitable to use other sources of financing to rise debt capital, because own capital – equity is more expensive and produce more costs for the company.

Conclusions

Aim of this paper was to describe available venture capital opportunities for small and medium size and identify the effect of venture capital investments on capital structure of an enterprise.

Based on data from SAFE survey and OECD valuation report we can say that venture capital is not very used financing in Slovakia, although SMEs have lot of possibilities of venture capital financing. There are lots of VC and PE funds, which invest money into innovative small and medium-sized enterprises.

In capital structure venture capital acts as own capital, because investor enter to the enterprise, so he became one of the company owners. Thus, investor request share on the company in exchange for the invested capital. The effect of venture capital investments on capital structure is increased share of own capital. This way of getting fund for enterprise is suitable for enterprises which do not want to take bank or other loan and increase their indebtedness. In case study we demonstrated that the company used venture capital to decrease its indebtedness in short terms.

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Channels and Tools of Marketing Communication Strategy

Veronika OLEXOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, veronika.paurova@fpedas.uniza.sk

Lubica GAJANOVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, lubica.gajanova@fpedas.uniza.sk

Abstract

The current market environment is characterized by strong competition between companies. Therefore, if companies want to succeed in the market, they must constantly work to set and achieve their goals. The process by which an effective business operates is called a marketing strategy. A marketing strategy can be implemented by a combination of different tools. The goals that the company wants to achieve are important. If a company wants to be successful, it must create a certain position in the market and must also focus its activities on current as well as potential customers. Satisfying customer needs is the main task of marketing and is achieved through a marketing mix that represents the integration of 4 elements. One of the tools of the marketing mix is communication, which is important especially because it ensures the addressing of customers and the promotion of products as well as the entire company. The aim of the article is to point out the theoretical basis of marketing strategy with emphasis on its tools and channels. The practical part is focused on the analysis of secondary data with a focus on consumer preferred channels of brand communication during the coronavirus pandemic worldwide.

Keywords: Communication, Channels, Marketing, Strategy, Tools

Introduction

Companies are leading to respond flexibly to the activities of competing companies in the market and to constantly monitor changing customer requirements. According to Kramolis and Dopes (2020) the flexibility of a company makes it possible to eliminate the occurrence of certain risks. For a company to be able to respond effectively to the stimuli of competitors and customers, it must have developed a good marketing strategy, which results in customer satisfaction and profitability of the company. Marketing strategy is defined as a management tool that should contain general principles, in the application of which the company's management expects to achieve its marketing and economic goals within the selected target market (Jemala 2007). The choice of marketing strategy depends on how specific marketing tools are used. The marketing mix can be described as the basic source of marketing tools. This concept includes four main marketing tools that serve to realize long-term and short-term goals of the company. The basic marketing mix includes product, price, promotion and distribution. It is the marketing communication that we deal with in this paper that is an important and most visible part of the marketing mix. Communication itself is one of the most important components of everyday life, which can be described as a process of exchanging information either orally or in writing, which takes place at least between several participants (Nagyova, 2012). In the communication process, everyone expresses their ideas in a certain way and gives them a certain form. Communication is influenced by many factors based on the physical, social and cultural environment (Dedina and Odchazel, 2007). Marketing communication is an important tool of the marketing mix. If the company uses appropriate communication tools, it can effectively communicate with its environment and it helps it achieve its goals. As there are a large number of communication tools, the most suitable combination is that clearly, consistently and convincingly speaks about the company's products and services (Vastikova, 2014)

Marketing communication strategy is defined as a tool that a company uses to inform, persuade or influence today's or future potential customers. Its main characteristic is the communication of information and its content in order to guide the opinion, attitudes, expectations and behavior of consumers in accordance with the specific objectives of the company (Heskova and Starchon, 2009). Comprehensive marketing communication (promotional mix) in the

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practice of modern companies means communication with customers, suppliers, intermediaries and the public (Jemala, 2007).

Before the Internet became a popular marketing communication channel, traditional media channels such as newspapers, magazines, radio, television, direct mail, and the old favorite channel were the only options. Developing a marketing communication channel strategy for business has been easier in the past. In today's modern globalized world, with new technologies, advanced possibilities (Pisar and Bilkova, 2019and innovation one of the main characteristics of today is one of the most important communication just the internet. Thanks to the Internet, the conditions have also been leveled for smaller companies, which can compete with larger companies even with a smaller marketing budget. Businesses must use innovation in their activities. Innovation is an important source of economic growth (Jakimowicz and Rzeczkowski, 2019). Choosing the right marketing channel strategy to communicate with the target audience and build strong relationships with customers is more complicated due to strong competition. Therefore, companies must focus on choosing the right traditional and modern communication channels for business.

The paper is divided into two basic parts, theoretical and practical. In the theoretical part we deal with the definition of the basic theoretical background with emphasis on marketing communication and its tools and channels. In the practical part we deal with the analysis of secondary data through descriptive statistics. The aim of the practical part is to point out consumer preferred channels of brand communication during the coronavirus pandemic worldwide.

Theoretical background

A business communication understood Balmer (2000) as a system process comprising the three spheres, the primary, secondary and tertiary. In many companies, all three are balanced. Primary communication should present a positive image of the company and set the stage for a strong reputation. Secondary communication should be designed so that promote and strengthen primary communication. Tertiary communication should be positive and should result in a good reputation of the company. In the event, that corporate communication is properly designed, the head of personnel who carry out corporate communication can get venture into competitive advantage. Corporate communication is particularly important in that it creates a connection between the corporate identity of the organization and the set strategic goal, and it is possible to achieve a favorable reputation of the company through it. Horakova et al. (2008) define corporate communication as a process, which converts corporate identity to the image of the company, and not through a controlled and planned communications with critical target and interest groups. Communication is essential to it that all interest groups - employees, customers, shareholders and others understand the identity of the organization, its values and strategy. Business communication based on a well-chosen communication mix leads to increased consumer loyalty to products and their better placement in the market. For this reason, it is also important to create and build a long- term relationship between the company and customers through communication (Moise and Cruceru, 2012). Corporate communication is a term, which includes all methods, which the organization communicates with its surroundings and with various interested parties (Melewar and Karaosmanoglu, 2006). The aim of corporate communication is to adequately address individual target groups so that positive attitudes to the company are created, so that corporate communication becomes an important and inseparable part of the company because without appropriate communication and presentation of strategy and company values it is not possible to create the desired image (Vysekalova and Mikes, 2009). Kosiciarova (2017) considers strengthening the corporate image, providing information, stimulating and creating an offer, differentiating the product, emphasizing the value and usefulness of the product and stabilizing turnover as the main goals of corporate communication. The overall marketing communication program is also called the communication mix and consists of a combination of communication tools. Several authors (Cihovsky, 2001; Jemala, 2007) will agree on the fact that the basic marketing communication tools include advertising, promotion sales, personal selling, public relations and direct marketing (direct marketing). This as well as other tools will devote in a separate subsection within the framework of the theoretical part.

In connection with the communication Dedina and Odchazel (2007) point out the significance of electronic communications, that despite the fact that it has many forms, due to the rapid development of information technology it is possible to expect the emergence of its other forms. Enterprises use for electronic communications both Internet as a global network, and secondly their own intranets. Internet contains a vast amount of information about different products, companies, technologies and opportunities, so that the worker rather than a problem, something to find, addresses how to choose it necessary and current. Intranet has become a new distribution channel that is limited to the environment of corporate computer networks, includes a centralized corporate information and employees here can find various documents. Compared to the Internet is its content clearly defined and usually cataloged, employee thus can bet on certainty and not spend their time searching for data as in the case of the Internet. Sometimes contains sensitive information about the company, therefore, it is to place the adequate

security. The main objective of marketing communication is mainly: informed customers about the products or services, build preference services with customers, to persuade customers that have purchased this product or service, differentiate their offer from the competition (Vastikova, 2014). If customers have a better ability to express their preferences, it means a significant involvement for them (Kliestikova, et al. 2018) in the very process of buying and selling.

Marketing communication strategy is a combination of marketing communication activities, the company implements. The goal is to get the selected information to the target market segment through the most suitable channel. The communication channels are tools, which companies use to establish the relationship and communication with its audience. Communication channels increase the experience between the customer and the brand. Brand building is an important part of marketing strategy (Kliestikova, et al. 2019). Communication channels further increases the relational marketing and the result affect overall sales company. Enterprise can through communication channels, for example, to introduce customers to a new product or service; inform customers about all what the concerns of the business and respond and react to stimuli customers. Communication channels help build the brand and help to better understand the behavior of the target segment. According to Nadanyiova (2017) it is important to examine consumer behavior, because decisions about buying can be to a large extent influenced by emotions.

The traditional tools of marketing communication include advertising, sales support, personal sales, public relations. For reasons specific needs of customers and the development of information technologies arise new ways and tools of marketing communication: direct marketing, internet communication, communication on social networks, marketing events (event marketing), guerilla marketing, viral marketing and product placement. Advertising as a form of marketing communication is one of the oldest and most important tools. Advertising can have various forms, for example, a form of print advertising (posters, billboards); large or illuminated advertisements; printed advertisements contained is in the newspapers, leaflets, magazines, catalogs, brochures, audiovisual advertising (on television, in film); 3D advertising; new technologies and internet advertising. The advantage of personal sales is direct contact with several customers. The main goal is to achieve sales. Depending on the specific customer and situation, the seller can adjust the method of communication. This is a very expensive way of marketing communications for it, however, very effective, because the acts of communication, which is taking place between the two directions, where the possibility of confrontation between the seller and the buyer. When the service is a vital relationship, which is the personal interaction between providers of services and customers. Thanks to personal contact with the customer, relationships are strengthened, which is not possible with other types of communication strategy. Support sales associated with additional activities related to the sale of services. Often it is used to conviction buyer that you bought the product or service. The main disadvantage is that it works in the short term, use is just to meet the specific measures. For services, the most common way to promote sales is in the form of price discounts, which can be quantity or seasonal. Public relations is the deliberate, planned and sustained effort of the organization for securing and monitoring of understanding between the organization and the public to be improved its image. This is therefore the effort is mainly to get into the awareness of the general public and the favorable aspects of the work of the organization, probably the best people create the right image. The main task of public relations is building the credibility of the organization in the eyes of the public, and also facilitate the communication as externally, as well as inside, ie the employees of the organization (Vastikova, 2014).

In today's environment where technology is significantly impacted, digital marketing and online marketing channels are important for businesses. Online marketing channels consist of any e- marketing campaigns or programs, or longer terms of optimizing service internet search engines (SEO) programs paying for a real visit to the presentation (pay-per-click), partner programs, email, banners, or the latest internet channels for seminars on the internet (webinar), blogs, microblogs, RSS, recording audio and video transmissions (podcast), live web radio and web TV. Important they are also channels of social media, such as, for example, Instagram, Facebook, LinkedIn, Twitter, Pinterest, YouTube. Marketing on social networks (Ashander et al., 2019) is today the time for businesses invaluable marketing tools. People on social networks seek and follow the signs and businesses who are they liked and for that they have a potential interest. Social media makes it possible to create a branded community. This is a group of people, who are not interested in just about your products and services, but it really is committed to investing in your brand. Regular communication with these types of customers they not only keep, but also, they encourage to share your brand with their friends and family. It is a digital version of oral advertising. Social media is widely used as a strategy to strengthen the relationship with customers, because it allows, in addition to interaction with the brand, also direct interaction with the audience. Another important online channel is the company's website. Web pages are one of the most important communication channels. Thanks to the website, the company is more trustworthy for its target segment. Among the digital channels of marketing communications is content marketing, blogging and video content. Blogs and video content are two of the best types of communication channels for small and medium businesses. Using blogs can create a cycle of contributions and create new ways, as is closer to his audience. The most valuable way of communication is e- mail marketing. The main reason why is

this form of marketing importance, the database of e-mail list of customers, with whom can venture work. It can directly reach customers in the form of newsletters (Kotler, et al. 2007; Prykrylova, et al., 2019).

Methods

Due to the COVID-19 pandemic, the whole market environment has changed significantly. One of the areas affected by this pandemic is the perception of marketing activities by consumers. The aim of the practical part is to point out consumer preferred channels of brand communication during the coronavirus pandemic worldwide as of March 2020. It is an analysis of secondary data from Statista. The study was published by A. Guttmann, Apr 8, 2020. Survey was realized worldwide in 12 countries in time period March 23 to 26, 2020. Number of respondents was 12,000. Respondents had the opportunity to comment on 9 selected channels of brand communication. The average results from this survey can be found in Table 1. For a clearer descriptive analysis of the data, we used a graphical representation of the data in Figure 1.

Table 1: Consumer preferred channels of brand communication

Channels of brand communication	Average
TV, radio or newspapers	45%
E-mail	42%
The brand's website	33%
Facebook	31%
Instagram	21%
Twitter	19%
Texts	18%
Streaming videos	17%
Regular mail	11%

Source: own processing based on statista.com

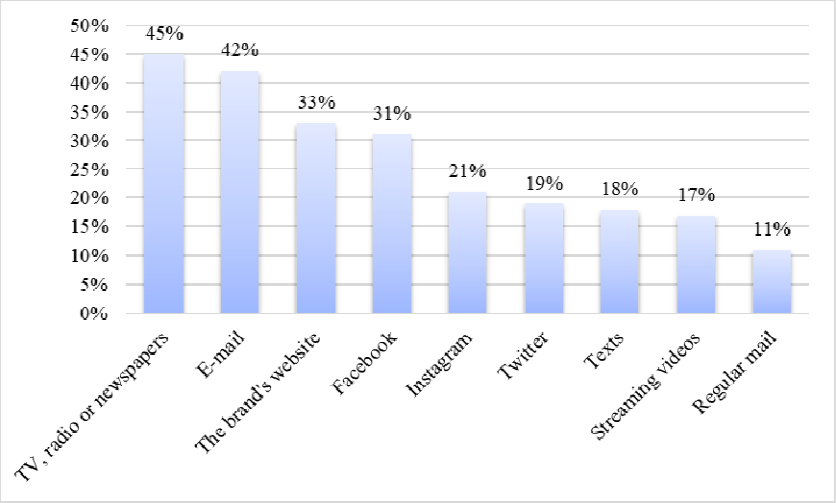

Fig. 1: Consumer preferred channels of brand communication

Source: own processing based on statista.com

Table 1 and Figure 1 show consumer preferred channels of brand communication during the coronavirus pandemic worldwide as of March 2020. Based on the above data, we see that the most preferred communication channel is TV, radio or newspapers (45 %), subsequently e-mail (42 %), the brand´s website (33 %), social networks as Facebook (31 %), Instagram (21 %) and twitter (19 %). Other communication channels are texts (18 %), streaming videos (17 %) and regular mail (11 %).

Results and Discussion

In today's market environment, companies must constantly strive to make the best possible market position, competitiveness and overall business efficiency. In connection with individual activities, companies must make several decisions. Constant competitive pressure, developed in hypercompetition in developed countries, forces companies to adapt flexibly to the situation (Zeman & Bogdan, 2019). Customers expect companies to interact, engage, and continually improve products and services (Deggans, et al. 2019). Many consumers currently require businesses to implement sustainable production (Hayhoe, 2019) as well as sustainability, which businesses must emphasize in their marketing activities. There are also risk factors associated with business that can influence a decision-making situation and which should be considered by managers (Buc, et al. 2013).

The current time when the COVID-19 pandemic has significantly affected a number of companies is forcing companies to implement a number of decisions much more efficiently. Some marketing communication tools can be significantly costly for businesses. However, there are communication channels that are affordable as well as effective. Such communication channels include, for example, marketing on social networks, such as: Facebook, Twitter, Instagram, Pinterest, LinkedIn, YouTube. Other channels are the company's website, Content Marketing: blogs and video content, and email marketing. These are tools that are at least financially expensive, but if the company devotes enough time to them, such a way of implementing a marketing communication strategy can be effective enough. Regarding the very choice of communication channel, it is important that the company chooses a combination of communication channels with respect to the target customers. It must adapt communication channels and their content to customer requirements and preferences. Corporate communication is all means of communication, a complex of all forms of behavior by which a company shares something about itself, whether with an external or internal environment. In connection with the communication in the company Dedina and Odchazel (2007), they state that communication clearly directly affects the performance of the entire organization, and therefore it is necessary to pay sufficient attention to it. Managing communication can give the company a competitive advantage and, conversely, its underestimation can lead to problems for the company. Therefore, it is necessary to pay attention not only to classical communication, but also to communication influenced by technological changes. In the process of globalization, these are the Internet, discussion groups and other new forms of communication between individuals and between organizations and the individual. Marketing communication helps to develop brand awareness, which means that consumers translate product information into a perception of a product's attributes and its position in the markets. Businesses also use marketing communications to maintain the product's current customer base and to strengthen relationships with customers and suppliers. A marketing communication strategy defines a business plan to disseminate product information and develop brand awareness. The built brand has the ability to facilitate the development, development and achievement of a competitive advantage of the company (Valaskova, et al. 2018). It is therefore important for companies to design an effective marketing communication strategy with one or more marketing communication tools. Advertising allows a product to reach a large audience through mass market or market targeting. Personal selling allows a company to communicate the benefits of a product directly to a customer in a retail environment. Direct marketing allows you to reach customers without third-party media. Sales promotion provides the customer with an incentive to buy a product from a company, such as a company that makes a charitable contribution with each sale.

Conclusion

Meeting the needs and requirements of today's consumers is currently a major challenge for businesses. One of the specific ways in which a company can fulfill its goals and reach the customer is the right marketing communication strategy. An appropriately chosen strategy increases the company's chances of success in the market. The company must adapt the marketing communication strategy to the target customers, as well as the product it offers and the market in which it operates. With the right combination of communication channels, a company can build brand awareness and reach new customers and thus create a larger customer portfolio. As technological progress significantly affects both traditional and modern tools, companies must constantly monitor trends and developments in this area.

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Tools of Marketing Communication with Customers

Eva NAHALKOVA TESAROVA
University of Zilina, Faculty of operation and economics of transport and communication, Department of Economics, Univerzitna 1/8215 Zilina, Slovak Republic,
eva.tesarova@stud.uniza.sk

Anna KRIZANOVA
University of Zilina, Faculty of operation and economics of transport and communication, Department of Economics, Univerzitna 1/8215 Zilina, Slovak Republic,
anna.krizanova@fpedas.uniza.sk

Abstract

The basis and a comprehensive part of the company's marketing efforts is a marketing communication. It is a strategy within a company or individual to reach the target market through various types of communication tools. Proper and effective marketing communication not only ensures the improvement of services but also provides for the constantly growing profit of the company. The increased intensity of communication with the target subject or group is not only the perception of corporate identity, achieving awareness but also better understanding. Regardless of what the goal of the marketing activity is - whether it is a new product, brand, product line, or the entire business activity - the development and application of communication forms is the task of marketing. In this article, we provide a theoretical background in the field of marketing communication tools. Based on the analysis of data from surveys in the Slovak Republic and abroad, we found that customers most trust the recommendations from people they know. The results can be used by companies to innovate or modify communication mix tools.

Keywords: Marketing Communication, Tools, Customers, Advertising.

Introduction

Every communication together with customer interaction represents marketing. From the very beginning, the company should have clearly defined who its customers and audience are. Therefore, a thorough analysis is needed. There is a difference in communication with entrepreneurs in the B2B market and directly with consumers in the B2C market. Here it is necessary to clarify and choose what language the company will use when communicating, but also what tools it will prefer when communicating with the customer in order to address him as much as possible. The second important thing is to know what values the company creates and what is important for the company (blog.Besteron, 2016). Companies with quality marketing communication are able to convince customers to perceive their products positively. Through this, they build a differentiated image and brand awareness (Murray et al., 2011). Marketing communication emphasizes two-way communication with the primary goal of supporting interactivity within a large marketing environment (Luxton, Reid, & Mavondo, 2017). The basis of marketing communication is in the exchange of information between customers, channel members, competitors, and the wider market environment. (Kumar, Keller, & Lemon, 2016). Under conditions of higher technological turbulence, new international companies with less marketing capabilities and less marketing communication are likely to be harmed, as customers would prefer companies with higher marketing capabilities and marketing communication. The higher the environment of technological turbulence, the higher the need for new international companies to use marketing communication for a stronger competitive strategy (Martin et al., 2020). According to surveys, up to 84% of people expect brands to create content. Approximately 45% of B2C marketers believe that visual content is their most important type of content, while 88% of B2B marketers agree that content creation sees their audience as a trusted source (Dautovic, 2020). The essence of marketing communication is to influence the shopping behavior of consumers through the means of the communication system, which includes the following main tools of marketing communication: advertising, sales promotion, personal sales, public relations. In the professional literature, we quite often encounter the extension of the basic tools of marketing communication by the item of direct marketing (Kotler & Armstrong, 2004; Birnerova & Krizanova, 2012). In addition, we know the division of marketing communication into over-line and under-line activities (Hornak, 2015). Due to constant technological progress, communication for understanding the external marketing environment is largely at the forefront of the past. Its key role is to attract and

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retain customers (Batra & Lane Keller, 2016). The profile of the customer's purchasing intentions and product perception is made up of visual media such as radio, television, newspapers, Internet advertisements, word of mouth, books, and more. Advances in technology mean that customers now have access to a variety of communication channels. That's why the visual and multimedia side of content has become part of marketing communication tools (John & De'Villiers, 2020). For example, budgets for social media advertising began to grow enormously, from $ 16 billion in 2014 to $ 31 billion in 2016 (Dautovic, 2020). The impact of electronic word of mouth in the case of a purchase project has long been known (Bickart & Schindler, 2001; Chevalier & Mayzlin, 2006; Park, Lee & Han, 2007). In the research of the comparison of electronic oral submission via websites or social networks, the information from the website has a greater influence on the customer's purchase intention due to the aspects of quality, reliability, usefulness, and acceptance of information (Erkan & Evans, 2016). The theoretical basis for convincing the consumer about the choice of goods or services in connection with marketing communication is the ELM model, which was created by Petty and Cacioppo in 1986. The scheme outlines two ways of individual belief, namely central and peripheral. (Li and Suh, 2015; Scott and Shu, 2014). The preferences in the choice of path depend on the motivation and ability of the individual to process the received message, i.e. information. Many circumstances may reduce the buyer's motivation, may result in a lower buyer's decision-making ability, or may cause both. In addition, when goods are cheap and low-risk, there is a tendency for transactional transactions and buyers tend to make quick purchasing decisions (Prince, Kwak & Priporas, 2019). John and De'Villiers (2020) used the ELM model in their research, which applies to visual media, especially online marketing communication. If a company sets itself the goal of acquiring a new customer, it needs on average six times more resources than in the case of retaining an existing customer. (Chlebovsky, 2005; Kotler & Keller, 2012; Krizanova, 2015). Currently, various studies show that the probability of sale to an existing customer is around 60-70%, while the probability of sale to a new customer is between only 5-20% (Starova, 2003). Businesses very often invest in groups of passively loyal and devoted customers (Aaker, 2003). According to Karlicek (2013), companies tend to take loyal customers for granted and put more importance on acquiring new customers. However, this approach can be very risky (Gajanova, Nadanyiova & Moravcikova, 2019). Over the years, marketing theorists have followed the behavior of message recipients and developed a number of models to show what marketing communication follows and what it wants to achieve. One of them is known as the AIDA model. Each letter represents the state of thought processes and behaviors of a certain group of customers: A = Attention, I = Interest, D = Desire, A = Action. The customer goes through this process, which begins with attracting attention, continues by arousing interest in the service, grows into a desire to own the product, and ends with the purchase of the product. This concept is very simple and attractive but ignores the intermediate stages of the customer's response to an advertising campaign or marketing communication campaign (Rostasova, 2006). In recent months, developments around the global COVID-19 pandemic have strongly accelerated the shift to online relationships. Equally, the rapid and partially ad hoc transfer of customer-company relationships to the online realm has revealed rich opportunities and unresolved challenges, focusing marketers on relationships to the strengths and weaknesses of their relational strategies (Steinhoff & Palmatier, 2020). At the beginning of the 21st century, we saw a boom in media development. For decades, Internet advertising has expanded the marketing communication tools used by marketers. However, traditional media will not disappear. Radio is experiencing a new boom with the advent of satellite and other digital formats. Outdoor advertising is becoming more creative, digital technology increases the potential for interactivity with customers in urban areas. Finally, although newspapers and magazines are most negatively affected by the new media, they are still important, among other things, among businesses and retailers. With the transition to an environment called the "hypermedia" environment (Hoffman and Novak, 1996), the nature of the communication model has changed and the concept of flow has become more important (Hoffman & Novak 2009). The central themes of the present are interactivity and digitality (Kim, Jun & Kim, 2018).

Methods

In the article, we focused on the theoretical background of marketing communication, specifically we examined the tools of the communication mix that companies use to interact with their customers. The aim of the paper was based on data from the survey conducted in 2016 to analyze the various tools of marketing communication and the degree of trust that customers perceive with specific tools. A representative sample, 1650 respondents, was made up of the adult population of the Slovak Republic. The results are also up-to-date over time, but over a period of several years, it would be necessary to repeat the survey and verify compliance or disagreement with the survey conducted in 2016. Respondents had to indicate on a dichotomous scale the instruments, which they considered credible. The foreign survey was conducted by Nielsen in a report entitled Global Trust in Advertising and Brand Messages, which was conducted online in 2013 in 58 countries. The survey was conducted during the third quarter of 2013. The agency's report also compared data from 2007 obtained in the first quarter. While the methodology of the online survey uses an enormous scope and global reach, it only reflects the attitudes of Internet users, not all residents of the countries where the survey is conducted. The analysis of individual results obtains an overview of the credibility or unreliability of specific tools of the communication mix by customers, and the comparison will show how Slovak data differ from foreign ones.

Results and Discussion

Marketing communication uses traditional but also new technologies and media, which serve as a channel for the transmission of information to the customer. Marketing communication tools can be divided into traditional and modern, which are related to the development of scientific and technical progress, information and communication technologies, and innovation. Traditional tools include advertising, sales promotion, personal selling, public relations, and direct marketing.

Traditional tools of marketing communication

Advertising

Advertising is any form of impersonal paid presentation and promotion of the sale of products, services, or ideas (Kotler Armstrong, 2004). The advertisement is mediated based on the media (*television, radio, cinema, newspapers, magazines, outdoor advertisement (billboards), internet, direct advertisement, point of sale*), which publishes the content of the advertisement to the target segment. Advertising is the most important communication tool, but we classify it in a sensitive category, which means that its incorrect use can cause the opposite effect and cause disgust or discouragement to the target entity (Birnerova & Krizanova, 2012)

Sales Support

All activities that serve to support the purchase or sale of services and products are another tool of marketing communication and that is sales promotion. Its goal is to increase the company's sales in the short term. For customer orientation, there are several tools with which sales support is provided and they are *samples, coupons, cash discounts, price packages, bonuses, client rewards, competitions, lotteries, games, promotional gifts, and others* (Kotler & Armstrong, 2004; Birnerova & Krizanova, 2012).

Public Relations

Another means of communication is public relations. PR is defined as the creation of planned and systematically maintained relations of the company with the public. The characteristic of this tool is building a positive corporate image.

Typical tools are press releases, speeches, written materials, websites, publishing your own corporate newspapers and magazines, sponsorship, charitable donations, support for the environmental movement, open days, and the like.

- Event marketing focuses mainly on the emotional component of each recipient. The recipient does not have to think for long but is guided by feelings from the environment. The main focus of event marketing is an event. If we were to go for a deeper search in event marketing, then it is mostly associated with Public Relations. Mutual ties create closer relationships with existing and new potential customers. In practice, this means an important link to the brand (Lenhart, 2007).
- Sponsorship is currently considered by many authors as a separate tool of the communication mix (Birnerova & Krizanova, 2012).

Personal sale

Personal selling means the oral presentation of a product to an individual or group of customers. The purpose of this instrument is to conclude a purchase agreement. The sales process includes individual steps:

- Identification and evaluation of potential customers
- Collection of customer data
- Making contact
- Product presentation
- Clarification of objections
- Conclusion of a purchase agreement
- Customer care after the sale

Within personal sales, we can also talk about relationship marketing, when there is a long-term relationship between the company and the customer. Based on his satisfaction and the creation of values, the customer remains loyal to the company (Kotler & Armstrong, 2004).

Direct Marketing

We define direct marketing as marketing activities that, through one or more media, offer products as nearly as possible to their target segment. The most commonly used tools are *mail, catalog marketing, direct response advertising in print, radio, and television, telemarketing, e-marketing, SMS-marketing, order vending machine.*

- E-marketing - is the most dynamic and revolutionary communication tool. The main tools of online marketing include: *online advertising, affiliate marketing, pay per click, search engine marketing, search engine optimization, Google AdWords, social media, eWOM, Website development, E-mail marketing* (Oancea et a., 2016).

Modern tools of marketing communication

We divide the tools of modern marketing communication into two groups. The first group is tools based on traditional media. This includes:

- guerilla marketing is the advertisement is placed in non-traditional places and is attractive for the recipient.
- ambient media is the placement of ads at seemingly unconventional places, thus utilizing ambient media denotes the formats wherein ads are placed other than the usual media consumed by people every day.
- shockvertising was created to define any advertising campaign which tries to attract the audience's attention by deliberately violating social values and norms. The aim of shockvertising is to create a strong emotion and reaction in the public.
- product placement is a method of advertising used by companies that want to make their product visible in a non-traditional way. Most often so that the product appears in the film - just so inconspicuously in the background or the character uses it in some way.
- advergaming is the creation of games in which the product is placed so that the user remembers it.
- viral marketing is a style of promotion that relies on an audience to generate the message of a product or service. It is characterized by low costs and works only if it creates a buzz (Ankiel, 2018).
    - Influencer marketing forms a subcategory of viral marketing. At present, we can monitor companies in choosing the most suitable way of communication with customers, which is the most financially affordable. One of them is influencer marketing. It most often uses tools such as blogs, Facebook, Youtube, Instagram, etc. In addition to the products themselves, potential customers are mainly interested in the opinion and experience with the product, the so-called reviews. The provision of information about an experience with products and services of the so-called word-of-mouth (WOM) has been going on among people since time immemorial, most often in the face-to-face form (Prikrylova & Jahodova, 2010). Kotler et al. (2007) define WOM as a form of personal communication that involves the exchange of information about a product or service between target customers, neighbors, friends, relatives, or colleagues. It basically gives the impression of selfless help or advice from a friend (Gundova & Cvoligova, 2019).

The second group of tools based on modern media consists of *social networking sites, blogs, discussion forums, virtual reality, services, and data sharing services* (Ankiel, 2018).

In the following section, we will analyze the data from the individual surveys. First, we will focus on data obtained through the adult population of the Slovak Republic. The credibility of the tools (Table 1) was determined in the third quarter of 2016 (Gubiniova et al., 2018). The next step will be the analysis of the data of the Nielsen agency survey from 2013 in comparison with 2007. The last part will be a comparison of the results of the Slovak Republic and abroad.

Table 1: Credibility of marketing communication tools in SR

Tools in marketing communications	Credibility
SMS Advertising	24%
Online banners	24%
Social Media Advertising	27%
Products placed in TV shows, series, video clips	32%
Advertising in cinemas	31%
Advertising in TV	35%
Advertising in radio	37%

Advertising in newspapers, magazines	44%
Billboards and external advertising	34%
Sponsorship advertising	55%
Required e-mail communication, newsletters	52%
Company Websites	63%
Reviews, customer blogs on the Internet	87%
Recommendations of Acquaintances	97%

For Slovak consumers, the most trustworthy tool of marketing communication is the recommendations of friends and acquaintances. They also trust the reviews and blogs of Internet users the most, they have the least trust in social media ads, online banners, and other marketing communication tools. These results could be useful for organizations that could use this survey to customize and innovate individual marketing communication tools.

In the case of a survey conducted in 58 countries around the world in 2013 (3rd quarter), recommendations from people known to customers became a credible tool. Compared to 2007 (1st quarter), this represents a difference of 6%. The second tool that customers trust the most is branded websites, whose credibility has increased by 9% compared to 2007. We've seen a 2% drop in magazine ads. If we look at the other side of the spectrum, we find that the tools that consumers least trust are the least text ads for mobile phones, online banner ads, and more. While companies may not be able to directly control news in earned media, such as consumer opinions published online, they can create a positive presence for their brands on their channels.

Table 2: Credibility of marketing communication tools abroad

Tools in marketing communications	Credibility	
	2013	**2007**
Recommendations from people I know	84%	78%
Branded websites	69%	60%
consumer opinions posted online	68%	61%
Editorial content such as newspaper articles	67%	-
Ads on TV	62%	56%
Brand sponsorships	61%	49%
Ads in newspapers	61%	63%
Ads in magazines	60%	56%
Billboards and other outdoor advertising	57%	-
Ads on radio	57%	54%
E-mails I signed up for	56%	49%
Ads before movies	56%	38%
TV program product placements	55%	-
Ads serves in search engine results	48%	34%
Online video ads	48%	-
Adss on soaicla networks	48%	-
Display ads on mobile devices	45%	-
Online banner ads	42%	26%
Text ads on mobile phones	37%	18%

If we compare the data from the tables in both cases (whether it is a survey conducted in Slovakia or abroad) people most trust the recommendations from their loved ones, friends, and acquaintances. And a 2018 BrightLocal report found that 91% of people aged 18-34 trust online reviews as well as personal recommendations. TrustYou, in its recent blog about “The Psychology of Online Reviews” pointed out another interesting statistic from research by social commerce company Reevoo: 68% of consumers trust reviews more when they see both good and bad scores,

while 30% suspect censorship or faked reviews when they don't see anything negative at all. (Lye, 2019). The average customer begins to trust the business after reading ten reviews (Murphy, 2019).

Conclusion

The foundation of an effective marketing communication mix is thus a clear definition of the goals and purpose for which the campaign is created. The clearer the objectives are defined, the easier it will be to measure the partial results (Rostasova, 2006) The aim of the paper was to theoretically define the issue of marketing communication tools. In terms of trust towards individual tools of marketing communication, we concluded that Slovak respondents trust the recommendations the most, traditional tools of marketing communication were placed at the bottom. When comparing results from abroad, the same phenomenon occurs. It is necessary to realize that marketing communication plays a decisive and important role in gaining new customers, and retaining existing ones.

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The Current Trends affecting Customer behaviour when buying Tourism Products

Jana STUCHLÍKOVÁ

Silesian University in Opava, Faculty of Philosophy and Science, Institute of Spa, Gastronomy and Tourism, Masarykova 343/37, 746 01 Opava, Czech Republic, jana.stuchlikova@fpf.slu.cz

Milena BOTLÍKOVÁ

Silesian University in Opava, Faculty of Philosophy and Science, Institute of Spa, Gastronomy and Tourism, Masarykova 343/37, 746 01 Opava, Czech Republic, milena.botlikova@fpf.slu.cz

Abstract

The paper discusses current trends affecting customer behaviour in order to briefly summarize what aspects affect clients when making purchasing decisions in the current turbulent times. Most attention is focused on the instruments that contribute most effectively to the success of sales of either new or existing tourism products. The contribution includes, among other things, graphically illustrated models with trends in popularity of individual forms of online marketing, examples of customer behaviour when buying tourist products and, last but not least, recommendations for companies, including an emphasis on sustainable development. In particular, secondary data from publicly available sources were used.

Keywords: Tourism, product, customer behaviour, modern marketing approaches and technologies

Introduction

People's preferences and behavior are constantly evolving, and with them the range of tourism services and products. Whereas in the past supply determined demand, today it is just the opposite. Increasing market saturation, growing consumer interest in themselves, higher disposable income and a growing leisure fund are affecting the success of tourism service providers. Being able to compete will become more and more challenging.

Companies face the difficult task of satisfying the needs and wishes of customers who have increasing demands not only on the product itself, on the way it is sold, on the level of communication from sellers, but also on the criterion of sustainability. Customers are increasingly interested in the origin and way of processing the raw materials used, prefer organic products and prefer regional suppliers, which is reflected in the decision-making process and consumer behavior in the provision of tourism services.

In today's turbulent times, it is necessary for all companies operating not only in tourism to find ways to satisfy clients' requirements for high quality services while maintaining a favorable price, using the most effective method of communication and meeting many other factors that influence their clients in purchase.

Due to the fact that it is easy to copy the competition in services, the best ones must be able to come up with constantly new ideas, offers, experiences and a unique overall customer care, of course in order to retain existing clients, but also to reach and gain new customers. This involves the "ant" work of all employees on whom the success or failure of the company depends. Therefore, in the article we focus on the activities necessary to achieve success in the form of the necessary volume of sales, turnover and especially a satisfied customer who will become a loyal client, hotel, restaurant, travel agency, transport company and other companies operating in tourism. This is not a list of all the steps that companies have to take, but selected factors affecting customer behavior, and in addition to traditional steps associated with building a brand, improving product quality or affecting customer emotions, we present trends that have been applied in recent years and they are mainly related to the use of new modern approaches and technologies. In addition, all companies are struggling to cope with the radical limitations of their operations due to "anticovid" measures, which are a completely new experience worldwide and that no one could have prepared for in advance. And so they try to look for ways to survive a difficult period. Those companies

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that use this time for their development, especially in the field of technology, will be ready to respond quickly to changes in the behavior of their existing and potential customers.

Traditional Factors Influencing The Success Of The Sale Of Services

Of course, the product/service itself, its price, the method of distribution and promotion as essential tools of the marketing mix are among the key factors that contribute in no small part to the success of sales of either new or existing tourism products. At the same time, workers, product packages, cooperation and material environment (physical evidence) cannot be ignored as part of an extended marketing mix (Vaštíková, 2014). In the following text, we focus on other important factors that are closely related to the above-mentioned marketing tools and at the same time have a significant influence on customer behaviour.

Brand Building

The brand is essential not only for easy identification of the company, but also helps to keep these companies the right employees, attract new suitable job seekers, increase the company's performance and, of course, attract customers. Brand building is important for companies of all sizes, not just the largest ones (Kotler, Keller, 2013). The basis of building a brand is long-term thoughtful communication not only outwards, ie. primarily to customers and business partners, but also within the company, which is related to corporate culture. The main principle is not to rush anything and to put your employees first, communication and cooperation with them. It is ideal to follow the principle of everything starting inside and start finding out the status from all employees. The essence of branding is to create strong relationships with current customers and motivate them to repeat purchases and disseminate positive references, which is not possible without satisfied employees. To achieve such a state, it is necessary to continuously monitor their changing needs and respond to them. The brand affects almost all aspects of a company, whether it's marketing, interest in products or services, or how the company works. According to Forbes, the main advantage of the brand that customers love is the increase in profits. In addition, TLS Marketing adds that a successfully built brand brings benefits in the form of a better company image and customer loyalty. The Content Marketing Institution survey shows that, according to 89% of marketing managers, the most important goal is brand awareness followed by the sale itself. Given the current unfavorable situation in tourism, it is important to realize that improving pre-crisis quality accelerates the building of goodwill before the crisis and also helps revitalize the post-crisis regime (LU, L., 2020). Here are ten steps companies can take to improve their brand: get to know your customers, differentiate yourself from your competition, be personal, pamper your customers, invest in your brand, be consistent, communicate with your customers, don't forget to measure, that is, monitor The number of visitors to the site, the number of fans, and the average number of minutes that customers spend on your site, and try to learn from these numbers and constantly improve them. Measurement will help you get to know your customer and his needs better, and will also reveal which marketing activities will be most effective for you. Build trust and keep up with the times - watch what is happening around you and react to it.

Quality

Quality is one of the most watched criteria, the concept of quality is very individual and depends on the client's expectations, his previous experience and especially on the ability to maintain its long-term stability. (Kotler, 2007) Probably therefore, the effort is to set parameters on the basis of which the quality can be assessed even in tourism companies, where it is not possible to fully apply, for example, ISO standards. Today, quality has actually become a competitive necessity, in the 21st century only those companies that offer the highest quality of their products will prosper.

Current studies of customer behavior state that price ceases to be a fundamental and decisive factor in purchasing and that demands on quality, equipment and staff are rising. In the Czech Republic, the following examples of quality measurement in the field can be mentioned, there is a Czech service quality system, which is a certified project suitable for all organizations in tourism, which cares about further development and strengthening its position in the market. The aim of this system is to pass on to managers and entrepreneurs the appropriate know-how on quality management, which they will then use to improve services, whether accommodation, catering, travel agency services, tourist information centers, golf, winter sports, public and private organizations. non-profit sector, etc. Organizations that meet the appropriate requirements will receive a certificate and the privilege of using the quality mark "Q", which people know from abroad, similar systems have been operating for many years in Spain, Switzerland, France, Great Britain and other European countries (www.csks.cz). Accommodation facilities also have the opportunity to obtain a certificate from the Association of Hotels and Restaurants of the Czech Republic, depending on the extent to which they meet the criteria given in the Official Uniform Classification of

Accommodation Facilities in the Czech Republic; Tourist information centers and other organizations operating in tourism are also certified. Whatever the entity, it is important to realize that it is a never-ending process and it is necessary to constantly look for ways not only to maintain quality, but also to improve it. There are certainly a number of companies that provide quality services even without a certificate, but it is more difficult for clients to find such facilities. You can also contribute to increasing quality by using other techniques and methods, such as Mystery shopping.

Effect on emotions

Tourism and the hotel industry are to a large extent a trade with emotions and trust, the technologies mentioned above can also help us, but they will never completely replace the human factor (Vysekalová, 2014). For example, nothing inspires more positive emotions at the moment than when, after a long journey, a housekeeping worker shows up at your hotel room door with a portable container, extra bathroom salt and a cotton towel, because he has received a message from the receptionist that you have mentioned that you are travelling in new shoes and that your feet are broken, and because your room has no bath but only a shower, he will also address you by name. Of course, there are a number of other ways to impress the guest with a personal approach, e.g. in the hotel Terasa U Zlaté studně in Prague, permanent guests have their own personal bathrobes embroidered with their name, or pillow service. It is important to realize which target group of customers we are targeting and to use emotional appeals that are in line with their mission. At the same time, ethical principles and approaches, including sustainability, must be borne in mind.

Modern Approaches And Technologies Used To Influence Customer Behavior

The use of modern approaches and technologies contributes significantly to the success of companies, which is why it is increasingly used in tourism companies. It is one of the effective marketing tools, but its portfolio is subject to fashion trends, which must be regularly analyzed and new creative approaches found. We also provide specific examples of the latest trends that are part of the so-called online marketing, which is on average the fastest growing sector. In the Czech Republic alone, the volume of Internet advertising in 2017 reached more than 23 billion crowns. Compared to 2016, this is an 18% increase, in which display advertising and search advertising contributed the most in absolute values. The highest relative growth was recorded in search advertising (+ 26%), catalogs and in-line advertising increased by 17% and display advertising by 16%. From the point of view of the method of purchasing advertising space, the programmatic purchase of display advertising grew by 20% and the highest, 68% growth for purchases in real-time auctions (RTB). Expectations for next year are again optimistic. Survey participants expect online advertising to grow by at least 13% to CZK 26.4 billion in the coming years. Online advertising accounts for more than a fifth (22.5%) of total advertising spending across all media types. The data come from a survey of the advertising performance of Internet advertising, which is carried out for SPIR by the Median agency. (www.spir.cz) The data was commented by the chairman of SPIR Ján Simkanič with the following words.

"Record investments in online advertising confirm its increasing importance, especially in the area of programmatic trading, where the increase is most pronounced. From the point of view of the advertising space, the internet in the Czech Republic, as in the previous year, further strengthened its position as the second most important mediatype." The increase in investment and the development of forms of online advertising is also evident from the figures No. 1 and 2.

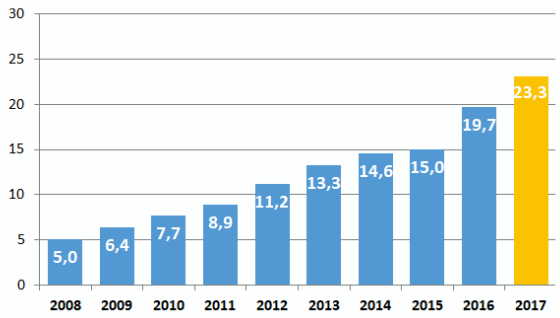

Fig. 1: Development of total expenditure on Internet advertising in the Czech Republic in 2008 to 2017 in billions CZK

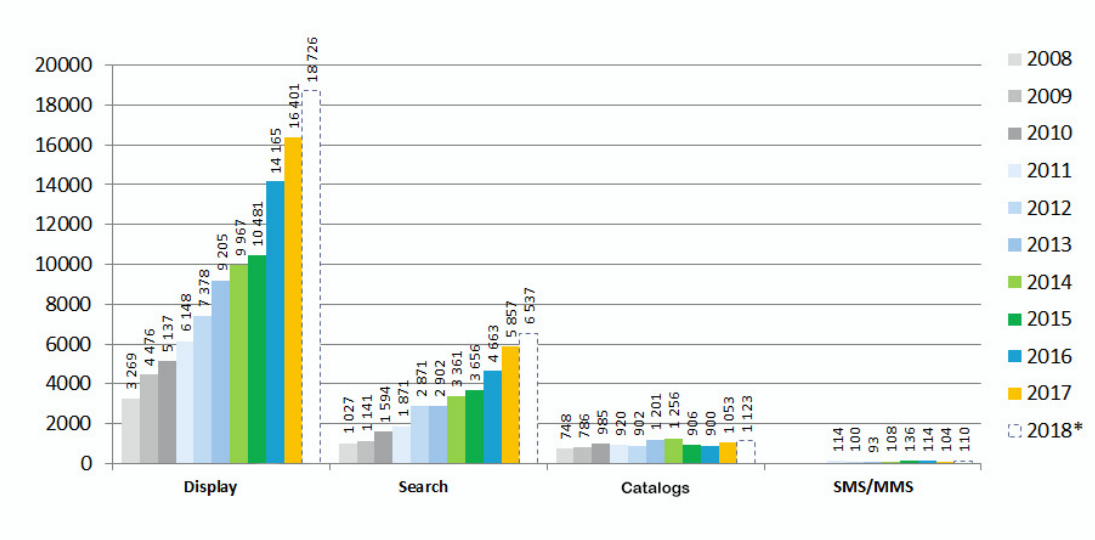

Fig. 2: Performance of individual forms of Internet advertising in the Czech Republic in the years 2008-2017 in millions CZK

IAB Europe announced at its annual Interact conference that digital advertising grew by 13.2% to 48 billion EUR in 2017 due to a large increase in investment in advertising on social and mobile platforms and video advertising. The AdEx Benchmark study provides a report on the state of the European digital advertising market. Twenty European markets grew by double digits, with investment in mobile advertising growing by double digits in all 27 markets mapped by the study. Display ads on mobile have increased by more than 40% and now account for 42% of total display advertising, while video accounts for more than a quarter of total display advertising. Social media advertising grew at the same 38% rate and increased its share of the display, while video grew at 35% rate, four times faster than non-video display advertising. The increase in video advertising was driven by out-stream advertising, which recorded a 73.4% growth compared to in-stream, which was up 6.9%, is also evident from the figure below No. 3.

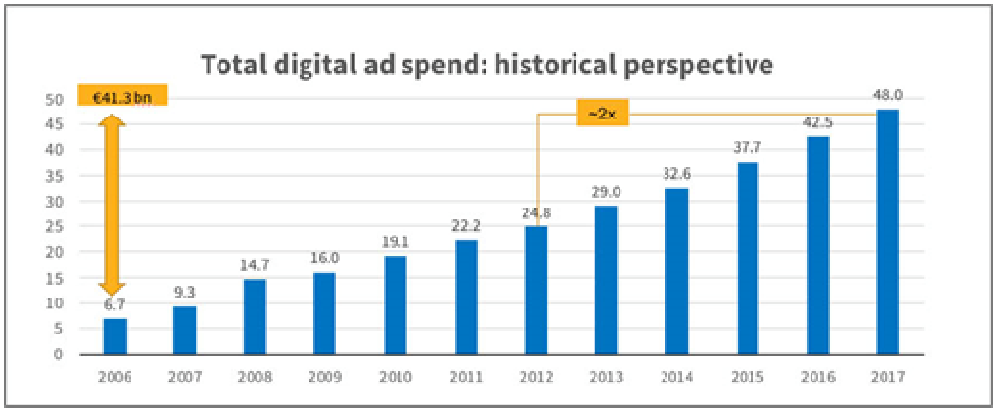

Fig. 3: Total digital ad spend: historical perspective in the years 2006-2017 in millions EUR

Mobile Advertising

Mobile advertising accounted for 17% of display advertising worth 2.87 billion in the Czech Republic in 2017. This represents an increase of 64% compared to 2016. For 2018, growth is estimated at 19%. If you are looking for some certainty, you can focus on mobile advertising, as it is expected to increase in 2019 and beyond. Why is that? We spend too much time on mobile phones. (Patrovský, 2018) According to the September NetMonitor 2018, the most visited days are Sundays and Mondays.

Video Marketing

Static banner advertising is a marketing trend of the past years. If nothing moves on the internet, you won't notice it. In the USA, they know this well, and this is where video advertising will account for 25% of campaigns as early as 2018 (eMarketer.com report: October 9, 2018). Believe that, in addition to burgers, the Czech Republic is also taking over this trend, and video formats will be seen on the Internet much more often in the coming years.

The growth of video advertising will be noticeable especially on social networks and YouTube, where it is a programmatic purchase. It is worth mentioning the fact that the video format presents the message better than a static banner and the website visitor will also notice it thanks to the movement. If you purchase a static banner ad, it will only appear to a large extent on computers or mobile devices. The video will run "cross-device" and we can say with certainty that it will increase your CTR (click through ratio) above the level of 1%. (SPIR, 2019)

Influencer Marketing

Recently, video marketing, which is closely linked to influencer marketing, has been increasingly used. An influencer is a person who has built a large community of people around him on social networks, where he expresses himself on various topics. If we look at the matter in general, influencers on social networks share experiences from their lives. They allow people to look into their privacy. But there are also influencers who specialize in one selected topic. On social networks, we can find a traveler who recommends specific destinations and hotels, a gourmet motivating others to a healthy lifestyle and more. Their huge advantage is that people trust them because they can present their ideas and opinions, address and engage potential customers of the company. Although they may not be experts, a large number of people trust them! The most successful Czech influencers have a community of several hundred thousand people around them. However, when cooperating with such large influencers, high costs must be taken into account. Therefore, especially among smaller companies, so-called microinfluencers have become popular, with, for example, around 10,000 followers, but their target audience is highly relevant. Influencers are very good at being able to incorporate a product into their content on social networks in a non-violent way, and thus become a bit of a modern star on social networks. The company's advertising does not only take the form of banners on the Internet, commercials on television or billboards around the roads, but is also placed, for example, on the Instagram profile of influecer in the form of product placement. However, it is important to be able to choose the right influencer to work with and consider who our customer is. Then it is no less important to agree on the content, style, budget and deadlines, then draw up a publication plan. It is necessary to keep in mind that no one will praise, for example, non-functional outdated hotel equipment, if this is not true, therefore it is necessary to always come up with a quality and proven product.

If a company has a problem with the presentation of its product or does not know how to sell it, it is important to entrust it to the right person from the ranks of influencers, who will then ensure a sufficient connection of your brand with the public. That is why many companies use influencers and associate their name with them. Influencers then incorporate the product into their posts and create the right impression. Influencer marketing trends include instastories or live video. Influencers can be addressed at trade fairs, use Google or use one of the influencer platforms for searching, such as Agorapulse, Buzzsumo or Achoo. If a company wants to be sure, it should contact one of the marketing or media agencies. It's important to find an influencer, because the trend is clear, which we can see in the figure No. 4 created in Google Trends.

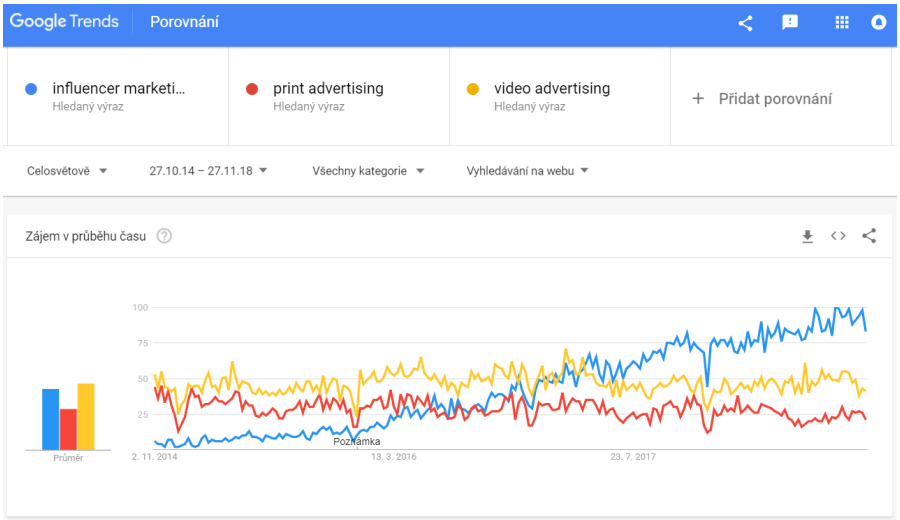

Fig. 4*: Worldwide development of interest in influencer marketing and in the years 2014-2018*

Robots

Robots are helping in the online environment more and more often. They index pages, collect information or respond in e-shops, when searching for flights, accommodation, etc. For example, when a customer just can't find their favorite hotel in a new destination. The goal is clear, cost savings and automation. It could be assumed that this is more of an example of Japan or the USA, but even in the Czech Republic it is beginning to expand. (Patrovský, 2018) For example, in April 2018, Kofola presented the campaign of a robot Karel looking for love. He was everywhere on the Internet, television and billboards, where he tried to find his desired partner and learn to love. On the Internet, the chatbot was behind the ad, which, after clicking on the banner, took you through its long, albeit passionate, conversation in the Messenger application. Interestingly, no one knew anything. So we use robots more and more often and working with them is very specific and requires an individual approach. However, with the right design, they will save you costs and give you the speed you need for your business.

Bluetooth Marketing

It is one of the latest trends, it works on the principle that an advertising message is first made in the form of an image, text, web link or QR code, then uploaded to the memory of the transmitter unit, which automatically sends it to devices with active Bluetooth technology, usually 100 meters in the open. space and according to the technology used, it is possible to increase the range. Of course, it is necessary for the customer to agree to receive these messages. The main advantages are low costs, the possibility of a campaign 24 hours a day, the possibility to operatively change the content of the message, a clear and regular evaluation of the success of the advertising campaign. The main disadvantage is the requirement to constantly turn on bluetooth on the target mobile device.

Sustainable Development

In addition to the use of modern technology, it is increasingly important to realize that the importance of ecology will continue to grow, in all fields. In tourism, this will cause increased demand for destinations in which nature and population will play an increasingly important role. The importance of individual regions within the destination is constantly growing, destination preferences are increasingly associated with the support of the local population and their friendly attitude to the growing number of arriving tourists. At the same time, ecotourism should not be confused with sustainable tourism development (ETC).

A fundamental aspect of sustainable development is defined in the Report to the United Nations World Commission on Environment and Development (WCED), which identifies the needs of the present as sustainable development without compromising the ability to meet the needs of future generations to meet their own needs. Another definition in the materials of the Ministry of Regional Development is particularly apt. Sustainable development does not only mean protecting the environment, but also trying to combine economic and social development with environmental aspects. Nor is he a scarecrow that "normal people" should be afraid of, because perhaps they would be in danger of living in caves by candlelight. It is not a step back, into the past. On the

contrary, it strives for modernization, the use of new efficient technologies and techniques that save time, energy, fuel and the environment. But even that is not enough, only a responsible life is sustainable, not a waste, a considerate life, not a selfish one. (MMR Czech Republic, 2007)

Conclusion

With the advent of the COVID-19 pandemic, there has been a great challenge to change behavior and approach to shopping, not just on the part of customers. Likewise, the supply side must adapt to the new situation, which involves a number of restrictions. Due to the fact that this is not a short-term matter, changes in established patterns of behavior are necessary. Many companies are literally struggling to survive because state assistance is very limited and they are trying to find new ways to communicate with the customer or distribution channels. Unfortunately, tourism companies are most affected by the new situation, they cannot, like other producers of tangible goods, supply their services through the e-shop. If the situation does not stabilize as soon as possible and tourism does not recover, at least in part, the number of tourism service providers will be expanded and forced to close down, but it will also mean leaving the market for many of their subcontractors.

At the same time, it should be borne in mind that the positive effects of a pandemic, such as the effect on environment, cannot be overlooked, and there is an opportunity to prepare for clients' interest after anti-epidemiological measures and to focus on introducing or improving, for example, their online marketing tools. even potential clients currently spend much more time on the Internet. There is also the fact that even though Czechs are still sensitive to price, the way it is perceived is changing. Customers are more concerned with the total value associated with meeting their expectations and appreciate fair dealing. Which leads to the need to constantly identify the needs of customers and strive to satisfy them to the maximum in the form of a quality product. It is important not to promise something that the customer cannot get. It is necessary to keep in mind that it is much harder to keep an existing client than to acquire a new one and adapt all business activities accordingly, and keep in mind that the best technology will not replace the human factor in providing services.

In terms of future developments, it can be assumed that clients will have greater demands on time savings, sustainability and will place even greater emphasis on individuality, experience and connection with lifestyle. While digitization and other modern technologies have helped make customers more informed, they are still people with all their needs, doubts, emotions and psychological characteristics that influence their decisions. We can only believe that hyperconsumption will become a thing of the past and people will increasingly think about so-called sustainable tourism when shopping.

Acknowledgment

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Titanium and Zirconia Implants and Market

Alexandru - Ionut BUZATU
University POLITEHNICA of Bucharest, Bucharest, Romania, alexandru.buzatu@upb.com

Georgiana MOICEANU*
University POLITEHNICA of Bucharest, Bucharest, Romania, georgiana.moiceanu@upb.ro

Olivia Negoita
University POLITEHNICA of Bucharest, Bucharest, Romania, olivia.negoita@upb.ro

Andreea BARBU
University POLITEHNICA of Bucharest, Bucharest, Romania, barbu.andreea92@yahoo.com

Mirona POPESCU
University POLITEHNICA of Bucharest, Bucharest, Romania, mirona.popescu15@gmail.com
*corresponding author

Abstract

In recent years, the dental implant market has grown significantly due to high demand. The main dental implants are commercially pure titanium (cpTi - grade 4) and zirconia (ZiO2). The aim of this paper is to analyze performances of both dental implants, in terms of mechanical and biological properties, and their growth on global market. Moreover, the paper follows the results of comparing the two dental implamts, in order to decide which one is more suitable.

Keywords: Titanium Implants, Zirconia Implants, Market Demand, Implant Price.

Introduction

Medical implants have been used since the 19th century, at a time when the metal industry was developing in various fields. Implantable materials and their design help to restore bone tissue as close as possible to normal functions.

Stomatology was one of the first fields to adopt the use of metallic biomaterials. Today, due to the evolution of manufacturing technologies, a much wider range of biomaterials is used in dentistry than in the past. The main biomaterials used are titanium and its alloys, cobalt-chromium alloys and zirconium oxide (zirconia).

Since the 1950s, titanium has been used in orthopedic applications. Nowadays, pure titanium is still used in implantology, especially in dentistry due to its low modulus of elasticity which is closer to that of bone compared to other metallic materials, good mechanical strength, great corrosion resistance and excellent biocompatibility (Saini et. al., 2015).

Dental implants made of zirconia have appeared on the market more recently, starting with 2007. Being a ceramic material and having a crystalline structure, it shows an excellent hardness and corrosion resistance. In addition, another advantage over metallic materials is the customizable aesthetics (Apratim, Abhishek, et al., (2015).

Given that the market for dental implants is dominated by materials based on titanium and zirconia, this paper will study the performance of each type of implant and their relationship with the price variation in Europe.

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Comparative Analysis of Implant Performance

Worldwide, more than 1,000 tons of titanium devices are implanted in patients each year. The dental implant biomaterial is a decisive factor for long term functionality of implants. The biologic environment does not accept completely any material, thereby the biologic performance must be optimized. A successful implant is represented by a fixed bond between the implant and the bone tissue. The type of biomaterial should be selected in order to reduce the negative biologic response. Dental implants are exposed to loads and fatigue cycles in function, thereby good mechanical properties are required (Daniel Jogaib Fernandesa, et al. 2015).

Biomaterials used in the manufacture of dental implants tend to corrode because of physiological conditions, therefore there is the possibility of high reactivity to the body (Saini et. al., 2015).

Composition and topography of implant surface induce high impact on the success of implant treatment (Liqiang and Zhang, 2018).

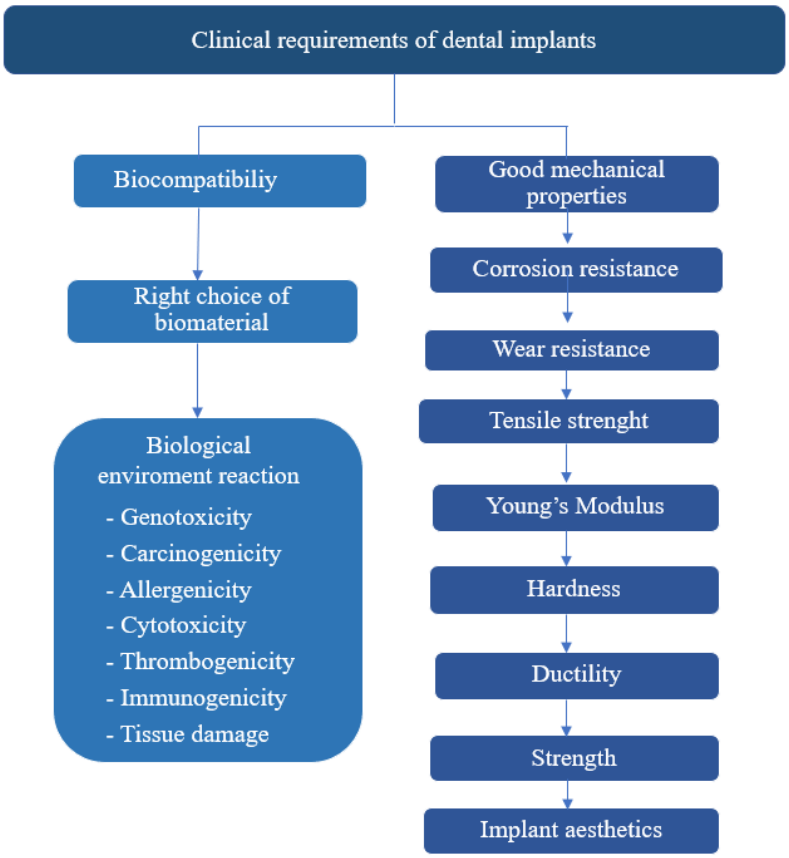

Fig. 1: Clinical requirements of dental implants (Daniel Jogaib Fernandesa, et al. 2015, Eliaz, Noam, ed., 2012).

Titanium Implants

Titanium has been successfully used as dental implant material due to its excellent biocompatibility, a result of formation of stable oxide layer (TiO2) on its surface. Biomaterials used in the manufacture of dental implants tend to corrode because of physiological, therefore there is the possibility of high reactivity to the body. The layer of TiO2 will not stop the corrosion process but it will significantly reduce the corrosion rate.

The commercially pure titanium (cpTi) is the most used as dental implant, because of its biocompatibility, strong osseointegration and toxic-free character. CpTi is classified into 4 grades, differentiated by their oxygen content. From a biomechanically poin of view fit for purpose and the succes rates are high over many years of functionality.

The elastic modulus of cortical bone is 20 GPa, and the most used commercial alloys have an elastic modulus ranging from 110 GPa for Ti6Al4V to 220 GPa for the cobalt-chrome alloys (Liqiang and Zhang, 2018).

Commercially pure titanium has an elastic modulus of 105 GPa, lower than most other biomaterials implant, which mean a low stress shileding effect. The aesthetic of titanium implants is not well apreciated by patients because of the gray color of titanium or, in some situations, the recession of soft tissue recession which highlights the metal components (Gubbi and Wojtisek, 2018).

Table 1: Mechanical properties of cp-Ti grade 4

Material	Compressive strength (MPa)	Poisson's ratio	Modulus of Elasticity (GPa)
cp - Ti grade 4	510	0.37	105

Zirconia Implants

Zirconia is a crystalline dioxide of zirconium (ZrO_2). Its mechanical properties are very similar to those of metals and is well known for the similar color with tooth color.

Over the years many all-ceramic systems have been proposed for a restorative material with a closer aesthetic of tooth. Nowadays dental research companies tend to prefer metal-free prosthetic restorations to improve aesthetical outcome of fixed partial dentures restorations. Natural look of soft tissue in contact with fixed partial dentures is influenced by two factors: mucosal thickness and typology of restorative material. The use of metal-free restorations conducts to a closer look of soft tissue to the natural one, compared to porcelain fused to metal restorations (Apratim, Abhishek, et al., 2015).

Zirconia is a well-known polymorph that occurs in three forms: monoclinic (M), cubic (C) and tetragonal (T). In fixed partial dentures restorations, the most used ones are ceramics produced at room temperature with a tetragonal phase only, called Tetragonal Stabilized Zirconia (TZP) TZP materials, containing approximately 2–3% mol Y2O3, are completely constituted by tetragonal grains at a nanometer scale. Yttria stabilized TZP is compatible for biomedical application due to low porosity, high density, high bending, and compression strength (Saini et. al., 2015, Apratim, Abhishek, et al., 2015).

The mechanical properties of Zirconia are similar to those of stainless steel. Its resistance to traction can reach 900-1200 MPa and its compression resistance is approximately 2000 MPa. This biomaterial also on cyclical stress (Manicone et. al.,2007).

Table 2: Mechanical properties of Zirconia

Material	Compressive strength (MPa)	Poisson's ratio	Modulus of Elasticity (GPa)
Zirconia (Y-TZP)	2200	0.32	210

Comparision of performance

As it can be seen form the graphic, cpTi and zirconia have different properties, each of the them having advantages and disadvantages.

In terms of modulus of elasticity, titanium has an advantage. Its lower modulus of elasticity is closer to that of human bone (15-20GPa) than the one of zirconia.

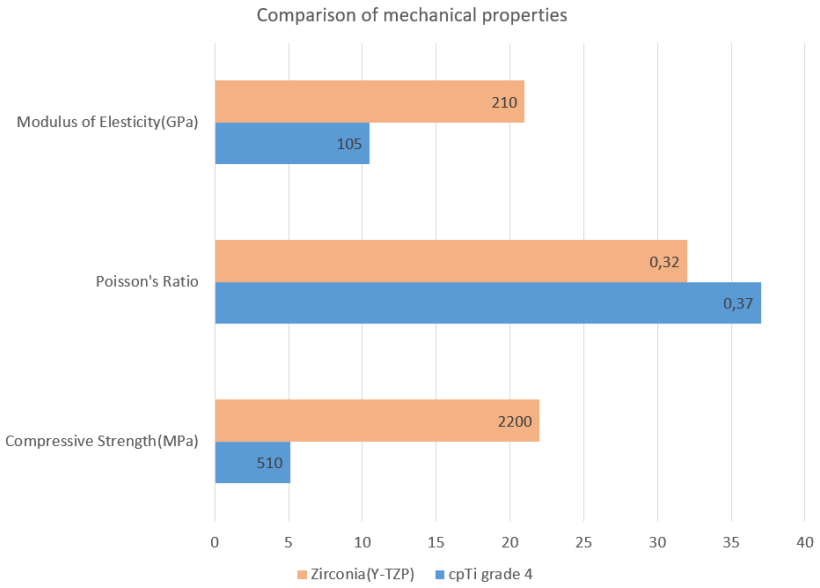

Fig. 2 : Comparison of mechanical properties

As it can be seen form the graphic, cpTi and zirconia have different properties, each of them having advantages and disadvantages.

In terms of modulus of elasticity, titanium has an advantage. Its lower modulus of elasticity is closer to that of human bone (15-20 GPa) than the one of zirconia. Poisson's ratio values of both biomaterials are close, with zirconia having a lower value. The cortical bone Poisson's ratio is around 0.3, thereby zirconia presents a better value.

Compression strenght is the category where the two materials differ greatly, zirconia having a value 4 times higher than cpTi. This translates into a much higher hardness, but also associated with increased fragility.

Economic analysis of titanium and zirconia implants in Europe

The major factor which influence the growth of the market is the increase in elderly population and the patients choices of Eastern Europe due to a more affordable dental treatment, Western Europe having the most expensive treatments in medical healthcare (iData Research Inc., 2019),.

There are five segments of dental implants market:

- Material
- Type of material
- Geography
- Implant design
- End - user

End - user segmentation can be reflected in figure 3, which contain six main stakeholders.

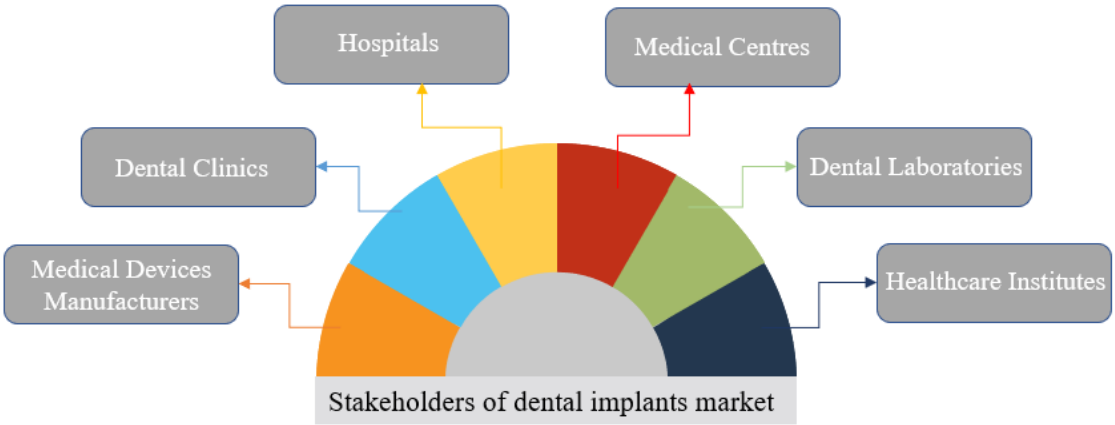

Fig. 3 Stakeholders of dental implants market

In Europe there are several companies that supply dental implants, between them being a high competition for gaining more of the market share. The competition is accentuated by the rapid advancement of technology, the prices of rivals, and changes of government policies (Straumann's Annual Reports for online users, 2019).

In Europe the main suppliers of dental implants made of titanium and zirconia are the following:

- Straumann Group;
- Dentsply Sirona;
- Zimmer Biomet;
- Danaher Corporation;
- 3M, Inc.;
- Astra Tech AB;
- Sweden & Martina S.p.A;
- ZL-Microdent Attachment GmbH & Co. KG;
- Timplant Ltd.;
- Leone S.p.A.;
- Tekka SA;
- OsteoCare Implant System Limited (iData Research Inc., 2019, Straumann's Annual Reports for online users, 2019).

Market demand for titan and zirconium implants

The popularity of the implants, mainly dental implants, is a result of extensive research done in the field of biomaterials, which suggested for implants improved systems. The disadvantages that were proved for metallic implants for instance, proved to scientists the fact that the materials used needed to be changed. Thus, titan and zirconium were the material proposed which proved to have a high demand on the market and respond to the same characteristics, even improving some aspects.

Although the market size for dental implant was evaluated in 2019 at 4.6 billion dollars, from 2020 to 2027 the size is expected to increase with an annual rate of over 9%. One reason for this increase can be found in the accidents that occur every year, data presented by the World Health Organization (WHO) (Grand View Research, 2020).

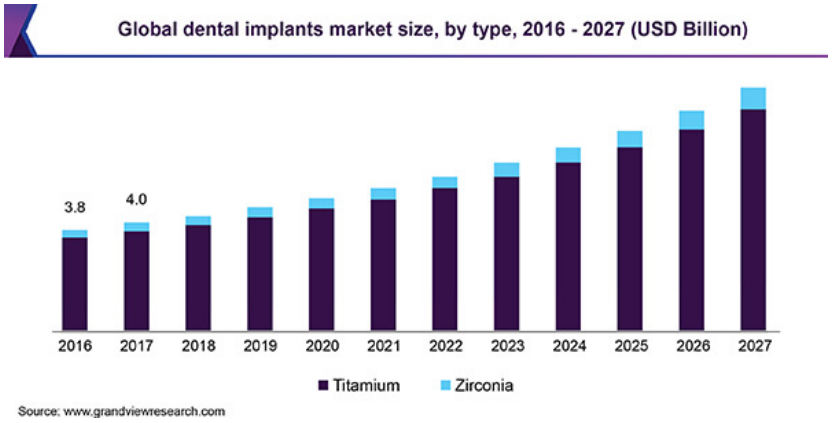

Fig. 4: Market evolution of dental implants (Grand View Research, 2020)

The price for a dental treatment cannot be mentioned without considering other aspects that are involved in total cost, these elements usually being unknown by a future patient because the level of data of information might not be enough of the future patient chooses a cheaper dental treatment. For these people it is necessary to answer one important question: how much does an implant cost?

This question is often misunderstood, or it is a wrong question because the doctor is not the one that sells the implant, he is the one responsible for a medical treatment using dental implant. The appropriate question, for the correct assessment would be" how much does a dental rehabilitation treatment with implant cost?"

Since the implant is actually, formed out of 3 main elements it is necessary to consider all these when conducting ana analysis regarding the price of the dental implant. Thus, the price is estimated between 600 – 2500 euros for the dental implant, 50 – 500 euros for implant screw and 150 – 1000 euros the crown, resulting in a treatment between 830 to 4000 euro.

Table 3: Implant costs in Romania (just for one implant)

No.	Company Name	Implant Type	Implant Price (euro)
1	Ortho Implant Center https://orthoimplantcenter.ro/	Dental implant Megagen AnyOne	450
		Dental implant Megagen AnyRidge	500
		Dental implant BIOMET 3I	750
2	Omnia Dental https://www.omniadental.ro/	Dental implant Bredent Sky Classic/ Dental Implant Bredent Blue Sky	595
3	Clinica Dr. Melnic www.clinicadrmelnic.ro	Dental implant AlphaBio (includes healing abutment and healing screw)	400
		Dental implant Sweden & Martina (includes healing abutment and healing screw)	500
		Dental implant Straumann Roxolide SLA	715
		Dental implant Straumann Roxolide SLA ACTIVE	775
		Straumann screw	245
4	DELTA CLINIC DENT https://www.dental-med.ro/implant-dentar-pret/	Monolithic Zirconia crown	210
		Monolithic Zirconia crown - multilayer	250
		Zirconia - ceramic crown	275
5	Velvet Dental https://velvetdental.ro/ro/	Zirconia implant crown	860
		Dental Implant ALPHA BIO (Israel)	515
		Dental Implant MEGAGEN (Coreea)	655
		Dental Implant STRAUMANN (Switzerland)	1100
		Zirconia screw - STRAUMANN	290

As it can be seen in table 3 the prices are variable for each implant but are in the range mention before. The material also is a very important part in the price establishment, and it also influences the quality of the work done. Thus, the main findings refer to the fact that the evolution in technology and in the quality of the implants should be considered by people when going to the doctor for a dental implant. The biomaterial domain is still developing thus prices today are changes according to the advances made in this area.

Conclusions

Both Zirconia and Titanium implant materials perform and integrate well with the bone, due to their mechanical and biocompatible properties. Titanium implants performance are well known, while Zirconia is still under research as it has not been used long enough to tell long-term success. Titanium implants are incredibly strong, have high flexural properties and resist fracture. Zirconia has a lower modulus of elasticity which can lead to a more compatibility with the bone, but it's lower elasticity can lead to more microfractures than titanium. Patients prefers zirconia implants when it comes to aesthetics, due similar color with tooth, but most of them choose titanium for its lower prices. Extensive research needs to be addressed when considering any kind of dental implant. The quality is a very important part which is also expressed by the material from which the implant is made of. The characteristics like osseointegration, durability, quality - benefits facts of dental implants are of interest and will be further analyzed.

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Attractiveness of The Slovak Market in Terms of Development of The Working Environment for Foreign Investors

Zuzana ROSNEROVA
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, zuzana.rosnerova@fpedas.uniza.sk

Ladislav VAGNER
University of Zilina, Faculty of Operation and Economics of Transport and Communications, Zilina, Slovak Republic, ladislav.vagner@fpedas.uniza.sk

Abstract

In today's business environment, the global economy creates more opportunities for everyone, but also more risks, as it is scaled by a wide dimension of information and communication technologies, international integration or the maturity of domestic markets. There are several possibilities for increasing the attractiveness of each country for foreign investors, while many of them also have favourable effects on the economy as a whole. The paper focuses on the evaluation of the macroeconomic development of regional disparities of individual regions of the Slovak Republic through the forecast of economic development in individual blocks of the macroeconomic module of Slovakia's regionalization. The aim of the article is to assess the attractiveness of the market of the Slovak Republic for foreign investors in terms of regional disparities and to assess the possibilities of eliminating the identified disparities through the use of foreign capital. The hypothesis we are working on in the article proved to be true, because it was confirmed on the basis of the analytical part of the article.

Keywords: Region; Regional Disparities; Labour Force; Economically Active Population; Foreign Investment.

Introduction

At present, the issue of regional development is one of the most serious problems of any global society. The main reason for the emergence and deepening of regional differences in countries is the different possibilities of regions to adapt to the requirements of economic and social transformation, adaptation to new development conditions, there is also a difference in the starting positions of individual regions. However, these differences are conditioned by the complex dispositions of financial and human resources, infrastructural, civil-cultural, but also positional, which increase, resp. reduce their developmental dispositions (Alvaro-Moya et al., 2020). The workforce is an important factor in achieving the country's prosperity, not only the number of the workforce is important, but also its distribution and structure in the country, especially gender, age and education. Several characteristics are used to measure changes in the age composition of the population, e.g. average age, aging index, load indices. These characteristics take into account only changes in the age structure of the population and do not take into account the impact of economic activity (Pazilov et al., 2020). It is therefore appropriate to use special characteristics to characterize changes in the age structure of the workforce. These are indicators that tell us how the workforce is burdened by the economically inactive population or. a certain group of the economically inactive population (Zygmunt, 2019). Another important indicator is the group representing the economically active population. The economically active population represents all persons, regardless of gender, who make up the supply of labour for the production of goods and services for a defined period of time, i.e. reporting period (Cruddas and Pitts, 2020). The production of goods and services must include the production and processing of primary products, whether for the market, for exchange or own consumption, the production of all other goods and services for the market and, in the case of households producing such goods and services for the market, the relevant part of production for own consumption. Furthermore, the economically active population can be represented by all persons, regardless of age, including persons younger than the age intended for measuring the economically active population who have not been economically active. The labour market models the development of employment, unemployment and wage development in individual regions of the country and determines the determinants of employment, including economic activity rate, unemployment rate, employment by sector of national economy, population structure, educational and professional structure, place of work and work productivity, etc. (Hraskova and Bartosova, 2014).

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According to Silvestri et al. (2020) there are divergent processes between the regions of the countries, which can be more stabilized at some levels through the financial capital of foreign investors. The macroeconomic view of foreign investment is based on the classical theory of international trade, especially the theory of comparative advantages; a more modern view of foreign investment is provided by Dunning's "Investment development path5", which describes their development in the country in five stages. The first phase is characterized by a low inflow of investment and almost no outflow, when domestic companies are unable to take advantage of their comparative advantages. In the second phase, foreign investment is gaining in importance, the country's production and productivity are increasing, but wages remain low, and domestic investors rarely invest abroad, especially in neighbouring countries, through export investments. In the third phase, there is an increase in wages, which loses the country's attractiveness of cheap labour, for investors there are new benefits, such as. growing consumption, technological and scientific development, involvement of domestic economic entities in foreign markets. In the fourth stage, domestic economic agents become major investors abroad, and in the final phase there is a convergence of import and export investment, accompanied by a slight increase in foreign investment inflows, which is determined by other variables than in the first stages (Duran-Nebreda et al. 2020). The possibility of increasing the well-being of citizens is derived from uninterrupted economic growth (Jakimowicz and Rzeczkowski, 2019). According to Kowo and Akinbola (2019) at the microeconomic level we can explain the determinants of foreign investment and the company's behaviour by product life cycle theory, which explains the various stages of the company's entry into foreign markets by dividing product life into 3 stages.

In the context of investment definitions, there is a wide variety of typologies that divide foreign investment according to different aspects. In terms of the target market, we encounter foreign investments that are oriented only to the domestic market, while the investor's effort is to satisfy the demand for products in the host economy, or to prevent competition from taking over market share. Foreign market-oriented investments are defined as export-oriented investments that take advantage of the host country but export most of their output (Ahmad et al. 2020). In terms of structure, investments are selected for horizontal and vertical investments. Horizontal investments flow into the same sector as in the investor's home country in order to meet demand and reduce the costs associated with the transport of goods. Vertical investments consist in dividing the production process into several levels and relocating part of the production abroad due to lower production costs. Vertical investments can be further divided into "backward" investments, which means that a company abroad produces an intermediate product that is exported to the investor's home country, and "forward" investments aimed at finalizing the product (Oliinyk et al., 2018).

In the past, foreign investment was almost exclusively linked to the area of production, recently the trend has changed significantly and is also used in the services sector. The positives of foreign investment also affect the government's efforts to support their inflow into the home country. Foreign investment can help a country in terms of economic growth or growth of the country's competitiveness (Janoskova and Kral, 2019). The main benefits that usually accrue to the host country include the inflow of capital that is lacking in the economy and at the same time long-term, it is also the influx of new technologies into the country, which over time are transferred to other companies in the country, resulting in increased productivity in the economy (Durana[1] et al., 2020). Foreign direct investment also brings new management concepts, marketing knowledge and thus improves the qualifications of employees, they have access to a number of professionals from around the world who help with business start-ups, training and coaching employees. Other advantages of foreign investment often include the improvement of environmental standards, infrastructure, development of regions, competitive environment (Kowo and Akinbola, 2019). In addition to the positive impact, however, foreign investment also has a negative side. The most frequently mentioned negatives include the crowding-out effect of domestic investment, the pressure to strengthen the currency, which disadvantages export-oriented entities, a temporary reduction in employment caused by the restructuring process, crowding out domestic competition unable to compete with economically strong competitors in terms of productivity and labour costs (Ludbrook et al., 2019). In addition to labour costs, the investor must also take into account the availability of labour (Durana[2] et al. 2020). If wages are low but employment is full in the country, the investor may have difficulty finding enough skilled workers, especially with a greenfield investment, which will cause a significant increase in wage costs (Wang et al., 2020). Therefore, in addition to wages, the investor must take into account the development of unemployment, the level of qualification of workers, the development of long-term unemployment or the structure of the unemployed by industry. Another negative impact of foreign investment is a situation during which the balance of payments may deteriorate through the repatriation of profits, which means that profits do not remain in the home country where they could be reinvested and help the country further develop, but are transferred to investors' foreign accounts. From the above effects, it is clear that any investment can have a positive but also a negative impact on the host country. However, in the final assessment of foreign investment, it is important to compare all the effects that the investment brings.

The aim of the article is to assess the attractiveness of the Slovak market for foreign investors in terms of unemployment indicators in individual regions, to evaluate the state of foreign direct investment in the Slovak

Republic and to derive the interest of investors in doing business on the Slovak market. We work with the hypothesis that more developed regions will be more interesting for foreign investors compared to less developed regions of Slovakia.

Methods

In this article, we deal with two basic macroeconomic factors on which a country's prosperity depends. We have chosen the issue of the workforce, which is a very important determinant for assessing the prosperity of the Slovak Republic. As the second important factor, we have chosen the issue of foreign investments and their inflow for the Slovak Republic, because the use of foreign investments is closely linked to regional development, which affects the issue of employment of individual regions. The following table shows the division of the Slovak Republic from a regional point of view. According to the regional division, Slovakia is divided into 8 regions depending on the regional cities, of which there are eight in Slovakia. This breakdown is given in Table 1.

Table 1: Amounth of residents within regions by permanent residence in 2019

Region	Amounth of residents
Bratislava Region	669 592
Trnava Region	564 917
Trencin Region	584 569
Nitra Region	674 306
Zilina Region	691 509
Banska Bystrica Region	645 276
Presov Region	826 244
Kosice Region	801 460
SLOVAKIA	**5 457 873**

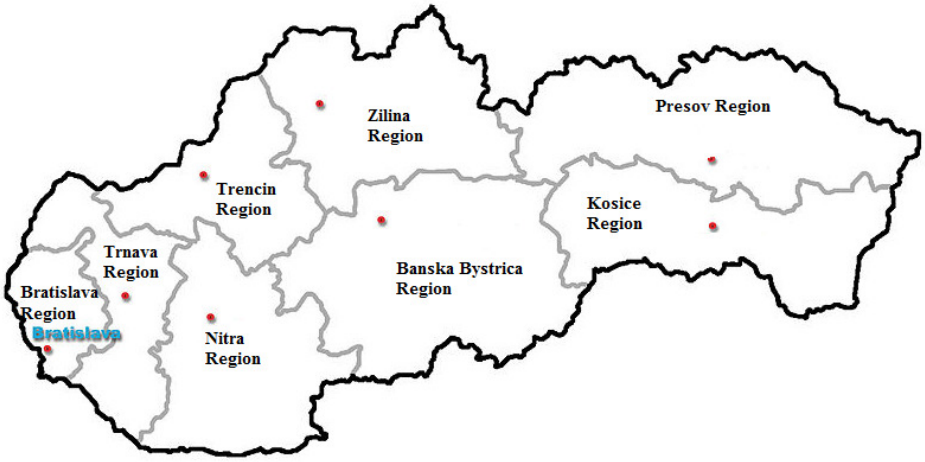

Figure 1: Division of the Slovak Republic according to regions

We used comparative methods to evaluate the above factors. To assess the development of the workforce, we selected the period March 2020 and March 2019, which we will evaluate one year on the basis of the findings with emphasis on the structure of the economically active population and the state of unemployment in Slovakia in the regional selection.

A: Labor force - economically active population

The workforce is an important factor in assessing the attractiveness of the environment for an investor who is considering investing in business in a given country. The labor force is the part of the population represented by the

employed and the unemployed who are actively looking for work. The work potential that is applied in the work is considered a real workforce and thus forms an economically active population, to which the following analysis is devoted.

Within the structure of the economically active population, we determined the number of job seekers in the mentioned periods on the basis of available statistics. The following table provides information on the volume of the economically active population for March 2020. It also includes information on the available number of jobseekers and also on the unemployment rate, which was registered in March 2020 according to the regional breakdown of the Slovak Republic.

Table 2: Basic indicators on unemployment in the Slovak Republic in March 2020

2020			
Region	**Economically active population**	**Available number of job seekers**	**Unemployment rate**
Bratislava Region	361 501	10 511	2,91%
Trnava Region	283 363	8 329	2,94%
Trencin Region	300 720	9 825	3,27%
Nitra Region	341 915	11 961	3,50%
Zilina Region	346 898	14 191	4,09%
Banska Bystrica Region	332 068	23 655	7,12%
Presov Region	403 714	35 128	8,70%
Kosice Region	382 575	29 393	7,68%
SLOVAKIA	**2 752 754**	**142 993**	**5,19%**

According to the data in the table, the lowest unemployment rate according to the regional breakdown in March 2020 was in the Bratislava countries with a rate of 2.91%, the worst situation was recorded in the Presov region, which recorded an unemployment rate of 8.70%. The largest volume of economically active population was recorded in the Presov region with 403,714 inhabitants and the lowest volume of economically active population was recorded in the Trnava region. The highest available number of job seekers was in the Presov Region and, conversely, the lowest number was in the Trnava Region.

Another breakdown of the workforce is the gender breakdown. The following table shows the state of the economically active population, the number of applicants available and the unemployment rate for the period March 2020, broken down by gender - women.

Table 3: Basic indicators on unemployment in the Slovak Republic by sex - women - March 2020

Basic indicators on unemployment in the Slovak Republic – women 2020			
Region	**Economically active population**	**Available number of job seekers**	**Unemployment rate**
Bratislava Region	174 565	5 696	3,26%
Trnava Region	130 332	4 541	3,48%
Trencin Region	137 334	5 040	3,67%
Nitra Region	156 291	6 738	4,31%
Zilina Region	152 114	7 235	4,76%
Banska Bystrica Region	158 664	12 896	8,13%
Presov Region	179 345	17 914	9,99%
Kosice Region	172 127	15 498	9,00%
SLOVAKIA	**1 260 772**	**75 558**	**5,99%**

The lowest unemployment rate by gender for women in March 2020 was recorded in the Bratislava region with 3.26%. The highest unemployment rate for women was in the Presov Region with 9.99%. The largest number of women who belong to the economically active population was in the Presov Region, on the contrary, the lowest number was recorded in the Trnava Region.

Table 4: Basic indicators on unemployment in the Slovak Republic by sex – men – March 2020

Basic indicators on unemployment in the Slovak Republic - men 2020			
Region	**Economically active population**	**Available number of job seekers**	**Unemployment rate**
Bratislava Region	186 936	4 815	2,56%
Trnava Region	153 031	3 788	2,40%
Trencin Region	163 386	4 785	2,87%
Nitra Region	185 624	5 223	2,69%
Zilina Region	194 784	6 956	3,42%
Banska Bystrica Region	173 404	10 759	6,11%
Presov Region	224 369	17 214	7,41%
Kosice Region	210 448	13 895	6,36%
SLOVAKIA	**1 491 982**	**67 435**	**4,39%**

The lowest unemployment rate by gender - men for the period March 2020 was recorded in the Trnava region with 2.40%. The highest unemployment rate for men was in the Presov Region with 7.41%.

Table 5: Basic indicators on unemployment in the Slovak Republic in March 2019

2019			
Region	**Economically active population**	**Available number of job seekers**	**Unemployment rate**
Bratislava Region	352 498	9 474	2,91%
Trnava Region	285 330	6 793	2,38%
Trencin Region	303 705	8 782	3,27%
Nitra Region	343 801	10 473	3,50%
Zilina Region	340 741	13 312	4,09%
Banska Bystrica Region	333 689	23 182	7,12%
Presov Region	400 733	34 955	8,70%
Kosice Region	382 003	30 991	8,11%
SLOVAKIA	**2 742 500**	**137 962**	**5,03%**

Based on Table 5, the lowest unemployment rate in March 2019 was in Slovakia in the Trnava Region, when the unemployment rate reached 2.38%, and the highest unemployment rate was in the Presov Region, where it reached 8.70%.

Table 6: Basic indicators on unemployment in the Slovak Republic by sex - women - March 2019

Basic indicators on unemployment in the Slovak Republic - women 2019			
Region	**Economically active population**	**Available number of job seekers**	**Unemployment rate**
Bratislava Region	172 664	5 354	3,10%
Trnava Region	127 866	3 902	3,05%
Trencin Region	138 846	4 641	3,34%
Nitra Region	157 024	6 191	3,94%
Zilina Region	148 330	7 052	4,75%
Banska Bystrica Region	158 208	12 957	8,19%
Presov Region	175 945	18 250	10,37%
Kosice Region	173 641	16 655	9,59%
SLOVAKIA	**1 252 524**	**75 002**	**5,99%**

The lowest unemployment rate by gender for women in March 2019 was recorded in the Trnava region with 3.05%. The highest unemployment rate for women was in the Presov Region with 10.37%.

Table 7: Basic indicators on unemployment in the Slovak Republic by sex - men - March 2019

Basic indicators on unemployment in the Slovak Republic - men 2020			
Region	**Economically active population**	**Available number of job seekers**	**Unemployment rate**
Bratislava Region	179 834	4 120	2,72%
Trnava Region	157 464	2 891	1,71%
Trencin Region	164 859	4 141	3,20%
Nitra Region	186 777	4 282	3,06%
Zilina Region	192 411	6 260	3,43%
Banska Bystrica Region	175 481	10 225	6,05%
Presov Region	224 788	16 705	7,03%
Kosice Region	208 362	14 336	6,63%
SLOVAKIA	**1 489 976**	**62 960**	**4,07%**

The lowest unemployment rate by gender - men for the period March 2020 was recorded in the Trnava region with 1.71%. The highest unemployment rate for men was in the Presov Region at 7.03%.

It is important for foreign investors to monitor the state of the workforce in the target market also by age. The following table shows the numbers of job seekers in Slovakia in the period March 2020.

Table 8: Job seekers in the Slovak Republic by age in the period of March 2020

	<25 years			25-54 years					55 years and older		Σ
Region	<20 years	20-25 years	25-29y.	30-34y..	35-39y.	40-44y.	45-49y.	50-54y.	55-59y.	60y. and older	
Bratislava Region	157	845	1 310	1 592	1 768	1 650	1 187	987	1 132	728	**11 356**
Trnava Region	249	948	1 164	1 189	1 282	1 278	1 079	1 023	1 125	654	**9 991**
Trencin Region	242	1 092	1 336	1 317	1 410	1 387	1 252	1 341	1 610	869	**11 856**
Nitra Region	370	1 322	1 521	1 580	1 721	1 835	1 622	1 746	2 026	1 277	**15 020**
Zilina Region	406	1 723	1 844	1 944	1 863	1 873	1 867	1 973	2 232	1 196	**16 921**
Banska Bystrica Re	711	2 515	2 976	3 200	3 372	3 554	3 352	3 520	4 011	1 889	**29 100**
Presov Region	1 785	4 573	5 035	4 872	5 033	4 744	4 589	4 324	4 532	1 921	**41 408**
Kosice Region	1 104	3 371	3 726	3 984	4 106	4 305	4 183	3 950	4 374	2 112	**35 215**
SLOVAKIA	**5 024**	**16 389**	**18 912**	**19 678**	**20 555**	**20 626**	**19 131**	**18 864**	**21 042**	**10 646**	**170 867**

Based on the table, we see that the highest number of job seekers by age was recorded for people aged 40-44 and the lowest number of job seekers in terms of age was recorded for the age category under 20 years. During this period, a total of 170,867 applicants applied for the job.

To approximate the state of unemployment, we present Graph 1, which shows the development of unemployment in the Slovak Republic for the period 2010 - 2021.

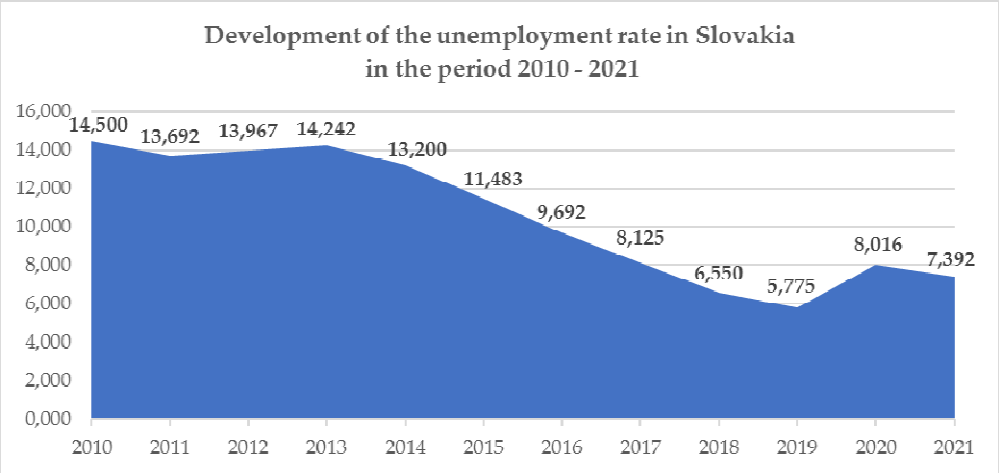

Figure 2: Development of the number of unemployed in Slovakia in the period 2010 – 2021

As Figure 2 shows, after a high level of unemployment, which was most pronounced in 2010, the unemployment rate gradually began to decline. The lowest unemployment rate was reached for 2019. A forecast is set for 2020 and 2021, which works with increasing unemployment.

For foreign investors, the development of wages in a given country is also a very important aspect when making decisions. The following table provides an overview of the amount of nominal wages achieved in Slovakia in 2019 according to the quarterly statement.

Table 9: Average nominal wage, nominal wage index and real wage index in 2019 in Slovakia by quarter

Indicator	2019			
	1. Q	2. Q	3. Q	4. Q
Average nominal monthly wage of an employee in the Slovak economy	1 023	1 101	1 068	1 177
Nominal wage index	107,10	109,70	107,70	106,90
Real wage index	104,60	107,00	104,70	103,90

According to Table 9, the nominal wage was the highest in the 4th quarter of last year at € 1,177.

B: Foreign investments

A relatively large number of countries around the world use different types of initiatives to attract investment. The main goal is to attract investors to specific sectors of the economy or localities and create positive externalities. For the investor, government support means reducing risks, costs and increasing profits. However, a prerequisite for successful development is the fact that the government can correctly determine which field is advantageous for the country and in which location. If it fails, allocation inefficiencies occur. Therefore, government agencies are created that reduce information asymmetries with the investor and help him decide on the location of the future business. With the removal of barriers to global capital movements, competition for investment began to intensify. According to statistical data, the main investment countries in Slovakia are the Netherlands, the Czech Republic, Austria and Germany. According to sectors, investors invest the most in manufacturing, financial and insurance services, wholesale and retail. These percentage figures show the following two graphs, which provide an overview for the period of 2017.

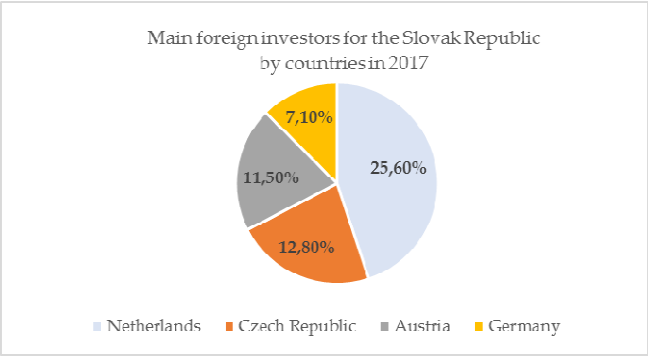

Figure 3: Main foreign investors for the Slovak Republic by country in 2017

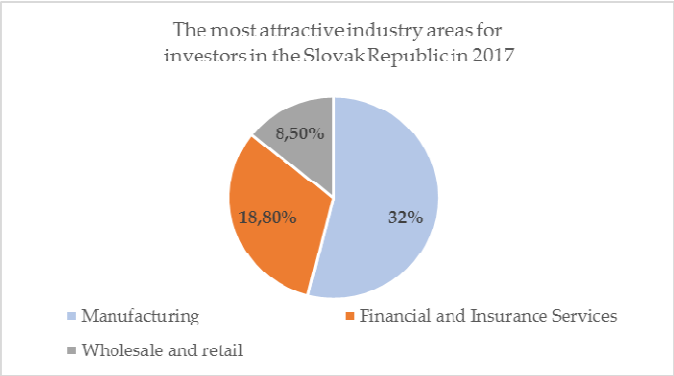

Figure 4: The most attractive industry areas for investors in the Slovak Republic in 2017

Table 10: Basic indicators of foreign investment in Slovakia in the period 2016-2018 (in billions of USD)

Foreign Direct Investment	2016	2017	2018
FDI Inward (in million USD)	805	2 277	475
FDI Stock (in million USD)	47 593	55 838	57 109
Number of Greenfield Investments	53	48	44

According to available statistics, the volume of foreign direct investment for Slovakia in 2016 was USD 805 million, in 2017 it was USD 2,277 million and in 2018 it was the volume of foreign direct investment of USD 475 million.

In comparing the level of unemployment with the level of distribution of foreign capital, we can state a certain relationship. Despite the fact that the level of unemployment is affected by many influences, it can be assumed that the entry of foreign investors has positive effects on regional demand for labor. In this sense, foreign investment can contribute to the regional reduction of unemployment in the host regions, as well as to the economic equalization of the regions concerned.

Results and Discussion

Based on data obtained through the analysis, unemployment in March 2020 was 5.19% and compared to March 2019, when unemployment was 5.03%, it was higher by 0.16%. In both 2019 and 2020, the unemployment rate in March was more unfavourable in terms of gender for women, when the unemployment rate reached a higher level compared to men. For 2020 and 2021, the development of unemployment in Slovakia is estimated in a negative sense, when forecasts predict an increase in unemployment. This knowledge is important for investors and can be an important factor for investors in terms of deciding on the release of investments for the Slovak Republic. Before entering the market, the investor notices the state of employment in the country and also the educational structure of the population, which becomes his potential workforce. An investor who will employ a workforce with an emphasis on working in a demanding sector prefers a sufficient number of cheap, albeit less educated, labour. The opposite is an investment in science and research, where there are enough experts, universities and scientific capacities at the forefront.

The regional demographic analysis showed that the best in terms of aggregate indicators of demographic development is the Presov Region, followed by the Kosice Region, which has the best development of the number of working age population as well as the number of economically active population. The worst development in terms of aggregate indicators occurred in the Trnava and Trencin regions. The lowest number of people of working age was in the Trnava Region in March 2020 and the largest number of people of working age was recorded in the Presov Region.

Among the eight regional cities of Slovakia, Bratislava, as an economic centre with an excellent geographical location, is destined for the inflow of foreign direct investment. It has a qualified workforce, more than 40% of Slovak university students study here and it is an important connecting point with Slovakia's neighbouring countries. Significant differences in the inflow of foreign direct investment in favour of western Slovakia are determined by several factors, especially the educational structure of the population - western Slovakia has a qualified workforce, also has a significant share of university-educated workers, transport infrastructure - good highway and rail connections and geographical location and thus related proximity to export markets, i.e. to Slovakia's largest trading partners.

The east and south of Slovakia suffer from a lack of educated professionals who go to western Slovakia or abroad, weaker technical infrastructure and transport services. The west of Slovakia benefits from the development of the automotive industry and good transport accessibility. Most of the large investments in the "green field" went here. Large investors require flexibility from their suppliers, which means that they try to set up businesses close to the largest customer. No significant investment in the east of Slovakia is expected in the near future, so it is important to use other options that would guarantee the sustainable development of this region. EU funds are a great opportunity to kick-start tourism and small and medium-sized enterprises. Eastern Slovakia is rich in natural and cultural monuments, there are four of the six Slovak monuments inscribed on the UNESCO World Heritage List. However, the completion of the infrastructure remains a necessity, without which further development is limited

In terms of the attractiveness of the Slovak market for foreign investors, we would highlight the important strategic position, political stability and favourable international relations. Alani, et al. states in its publication that in the case of investment, it is very important to address the strategic elements of investment (Alani et al., 2019). The labour available to investors in Slovakia is relatively cheap for them. Another important fact is that the Slovak Republic has adopted the euro as its currency and belongs to the Eurozone. Thus, it is possible to eliminate the risks associated with the exchange rates of other currencies and thus lead to financial stability.
In terms of the established hypothesis, we can state that our assumption, namely that the interest of foreign investors in Slovakia is focused more on more developed regions, has been confirmed.

Conclusion

The entry of the Slovak Republic into the European Union was a significant impetus for solving the problems of Slovak regions in the general ranking of socially perceived problems. The process of regionalization of Slovakia entered into a broader European context, became part of the processes of regionalization in the European area, which created the conditions for regional development through the inflow of foreign investment into the territory of the Slovak Republic. Slovakia's accession to the EU highlighted its unfavourable regional situation and the urgency of its solution also within the framework of EU regional policy. Current economic globalization processes are widening the cracks between regions by increasingly preferring regions with favourable development dispositions and high-quality human potential, which is again reflected in the increase in interregional disparities and the Slovak Republic is not bypassing this problem.

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Creationism, Prayer and the US Education System

Boris V. NIKOLAEV
PhD in History,
Associate Professor at the Department of Criminal Law,
Penza State University
nikolboris@yandex.ru

Nataliia A. PAVLOVA
PhD in Education
Chair of the Department of foreign languages,
Penza State University
nataliia.pavlova@inbox.ru

Mikhail Yu. EMELIN
PhD in Law, Associate Professor at the Department of Law,
Moscow University named after S.Y. Witte in Penza
mikhemelin@yandex.ru

Abstract

The article discusses topical issues of ensuring freedom of religion and the prevention of religious discrimination in the US education system. The article examines the position of the presidential administrations and the practice of the US Supreme Court on conducting school prayers, as well as ensuring academic freedom given the struggle between the theories of Creationism and Darwinism in the American education system.

Keywords: Religion, US Education, School Prayer, Creationism, US Supreme Court, Principle Of Equality, Discrimination

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Introduction

In recent years the United States has witnessed far-reaching changes in the implementation of the principle of equality, which forms the cornerstone of the American constitutional system [Nikolaev, Pavlova, 2018: 391-392]. The last decades have been marked by massive and noticeable efforts to protect against discrimination on the new grounds: health, sexual identity, age [Nikolaev, Pavlova, 2016: 10875-10877]. The past year has seen mayhem amid racial (fundamental for the United States [Nikolaev, 2018: 128-129]) relations, which again have colored the American public landscape black and white.

As most Americans think, hardly any issue has divided the American public and the highest judicial body in the United States as much as religious expressions and symbols used in public. Thus, attempts are made to reconcile "the requirements of the Constitutional Clause of the Establishment of the US "with the need for a unifying belief system and the importance and prevalence of religion in the lives of American citizens and the United States as a whole " [Smith, 2016: 846].

In this regard, education is a kind of borderline area. In modern society, education (at various levels) is becoming of more and more importance for the development of civil society, the electoral and civic culture of the population [Nikolaev, Emelin, Pavlova, 2020: 7715-7716], and the development of innovative forms of social consciousness and behavior.

Secondary and higher education in the United States have traditionally been a kind of testing ground for judicial lawmaking both on issues of racial equality and the separation of church and state, on the one hand, and, on guarantees of the free exercise of religion by every American citizen on the other.

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State and religious relations have been massively aggravated in recent years. The Democratic presidential administrations of W.J. Clinton and B. Obama made large-scale, sometimes overly radical innovations related to genetic engineering, the widespread permission of abortion, legalization of same-sex marriage and gender reassignment surgery, all with guaranteed government funding. This could not help but cause a conservative response from a significant part of North American society and the political establishment.

In this regard, Donald Trump's policy is indicative of this issue and was reflected in his public statements and executive orders. Executive Order on Promoting Free Speech and Religious Liberty (Executive Order 1379. May 04, 2017) stated that "The Founders envisioned a Nation in which religious voices and views were integral to a vibrant public square, and in which religious people and institutions were free to practice their faith without fear of discrimination or retaliation by the Federal Government". In particular, freedom of religious and political expression was guaranteed. The Ministry of Finance was prohibited from any adverse actions against individuals or organizations after their statements on political or moral issues with religious overtones. In addition, there were the intentions to change the policy of B. Obama to promote the idea of same-sex marriage and protect the rights of sexual minorities and transgender people and in health care.

Another executive order established a White House Faith and Opportunity Initiative (Executive Order 13831. May 03, 2018). Ensuring religious freedom has been declared a priority in US foreign policy (Executive Order 13926 — Advancing International Religious Freedom. June 02, 2020). The founding fathers of the Constitution who understood "religious freedom not as a creation of the state, but as a gift of God to every person and a right that is fundamental for the flourishing of our sockets our Founders understood" were mentioned over and over again. An order of May 28, 2020 (Executive Order 13925 — Preventing Online Censorship. May 28, 2020) prohibited online censorship condemning the "fundamentally un-American and anti-democratic" practices of leading media and online platforms (Twitter, Facebook, Instagram, and YouTube) by censoring opinions that contradict their own views (just within a few weeks, the White House received more than 16 complaints about political censorship on online platforms).

In recent months, a widespread protest movement in the United States has been accompanied by acts of vandalism unprecedented for the country. All that immediately led to the adoption of an Executive Order for the protection of American monuments (Executive Order 13933 — Protecting American Monuments, Memorials, and Statues and Combating Recent Criminal Violence. June 26, 2020) from "rioters, arsonists, and left-wing extremists." As D. Trump noted, Christian values were also under attack, since representatives of the protesters declared "that many existing religious depictions of Jesus and the Holy Family should be purged from our places of worship".

Thus, in the past quarter of the century the Trump administration has probably proposed the most detailed and varied agenda for the protection of religious values. He ensured religious freedom, including the constitutional right to prayer in public schools. Moreover, the following statement is perhaps one of the most pro-religious in recent decades: "In America, we don't punish prayer. We don't tear down crosses. We don't ban symbols of faith. We don't muzzle preachers and pastors. In America, we celebrate faith, we cherish religion, we lift our voices in prayer, and we raise our sights to the glory of God. In total, the word "God" was mentioned 9 times, along with the use of the words "prayer", "church", "cross", "faith", "preachers and pastors". In his recent official speeches D. Trump calls the upcoming elections the most important in the history of the country, noting that the last Democrat Convention removed the words "under God from the Pledge of Allegiance", not once, but twice." [Trump, 2020/27]

Although legislative activity and presidential lawmaking on religious relations are important, it is the US Supreme Court that stands as the real creator of legal regulation between the state, religion and the educational system. In this regard, we can consider two, perhaps the most significant and fascinating aspects of the Court practice in this area, namely the teaching of creationism and the conduct of prayer in education institutions.

The clash of religious and scientific worldviews in the US education system was most clearly manifested in the dispute between supporters of creationism and evolutionism. Researchers distinguish three stages of a complex judicial struggle between representatives of the two doctrines [Larson, 2013: 998]. Until the early twentieth century, the theory of the divine creation of man, or creationism, dominated widespread circles in American society and education, and was widely recognized as a fundamental value by the courts.

The triumph of the doctrine of creationism is related to the so-called "monkey process", a dispute between the government of Tennessee and school teacher J. Scopes (Scopes v. State, 289 S.W. 363 (Tenn. 1927)). The court openly supported the state authorities in opposing the spread of Darwin’s theory of evolution in the school system. However, most of the 20th century was marked by the gradual retreat of creationism under the pressure of Darwinism. Scopes' defeat was successfully made up for by another school biology teacher in Little Rock, Susan

Epperson. In 1968, the US Supreme Court (Epperson v. Arkansas, 393 US 97 (1968)) unanimously ruled the Arkansas law prohibiting the teaching of evolutionary descent in public schools and universities as contrary to the First Amendment to the US Constitution prohibiting the government to establish religion. In addition, the Court in this case defined the limits of possible judicial intrusion into the school educational process: the court, as a general rule, should not interfere with "the day-to-day functioning of the school system, except in cases that directly and definitely affect basic constitutional values".

In the second phase, the supporters of creationism changed tactics and strategy, challenging the exclusiveness of evolutionary theory in the school system, as well as putting forward the theory of "scientific creationism". This process culminated in the case of *Edwards v. Aguillard, 482 U.S. 578 (1987*). The state of Louisiana passed the Creation Act, which prohibited the teaching of evolutionism in public schools unless they taught creationism. The court by a majority vote (7 to 2) upheld the decisions of the lower courts on the contradiction of the above-mentioned law with the same clause on the prohibition of the state establishment of religion of the First Constitutional Amendment. By applying the Lemon test, the Court found that this act does not have a clearly expressed secular goal, does not contribute to ensuring academic freedom, "undermines the principles of scientific education, unacceptably supports religion, contributing to the spread of religious belief in the creation of mankind by a supernatural entity."

It should also be noted that only a few religious organizations (3) sent amicus curiae in support of Louisiana, while a wider range of organizations (10 in total) did that in favor of the other side. Among the organizations were the American Association of University Professors, the American teachers' association, 72 Nobel laureates, New York State, the American Jewish Congress, the National Academy of Sciences. The dissenting opinion of the majority of the Court was presented by the judge appointed in 1986, Antonín Scalia. He served on the Court until 2016 and was known as one of the most prominent and consistent spokesmen for the conservative wing of the US Supreme Court for three decades.

Supported by Chief Justice U. Renquist, A. Scalia spoke out against the "indoctrination" of students who, in his opinion, had the right to independently decide on the origin of life based on "faith and balanced scientific data". In addition, Scalia criticized one of the criteria of the Lemon test, which defines the secular or religious nature of the legislator's goal as vague and contrived. Perhaps this opinion of the minority determined the further strategy of the supporters of the theory of the divine origin of man.

In 1990, in a review of the book by W.R. Byrd, creationists were encouraged to abandon religious context and language in disputes with Darwinists, and rather challenge the exclusivity of evolutionary theory and the need to support freedom of critical evaluation of theory and academic freedom. "Nothing in the Constitution prevents the university from providing a forum for those who disagree with the theory of natural evolution, including dissenting atheists. The main difficulty lies in the prejudice of many intellectuals who identify naturalism with reason, prompting them to uncritically accept the views of Darwinists, who believe that all who disagree with Darwinism either do not know about the available evidence, or misunderstand "how science" works [Johnson , 1990: 434].

The concept of "intelligent design" is becoming a new slogan of creationists in the struggle for pluralism of opinions in the education system. The main obstacle is the first element of the triune Lemon test: "government action must have a decidedly secular purpose," as was in the case of *Freiler v. Tangipahoa Parish Bd. Of Educ., 185 F.3d 337 (5th Cir. 1999))*. The Conservative Christianity and Creationist majority of the Tanjipahoa Board of Education promoted (by a minimum majority of 5 to 4) the adoption of the rule that "classes concerning the origin of life and matter ... must aim to inform students of scientific concept and must not be intended to convince students against the biblical version of Creation or any other concept."

In addition, the Council recognized "the fundamental right of every student to form their own opinion and support the beliefs of their parents in this very important issue of the origin of life and matter." The court received a statement of claim concerning "forcing citizens to adopt fundamentalist Christian views." This appeal was supported by the American Civil Rights Union. Based on the first element of the Lemon test of the state's secular purpose, the trial court found that the main purpose of the Board of Education was to adapt the curriculum to a specific religious doctrine. The appellate instance, unlike the district court, considered it possible to take religious views and values into account in lawmaking, but generally supported the decision of the lower court. The US Supreme Court by a majority vote (6 to 3) refused to review the decision. Chief Justice Renquist, judges A. Scalia and Cl. Thomas voted against this decision.

In a similar case in Alabama, the Council also adopted an educational standard according to which "the explanation of the origin of life, plants and animals should be presented as theory, not fact." Subsequently, the Council approved of a more moderate version of the standard. Both versions were not challenged in court, and that threatened legal uncertainty in such a significant issue for the education system [Larson, 2013:1017-1018].

The situation was further complicated by the adoption of the so-called Santorum Amendment (named after Conservative Senator Rick Santorum) in the 2001 law committee report "No Child Should Be Left Behind": "Curricula should ensure that students understand why biological evolution is so controversial." In the revised final version, this passage read: "A quality science education should prepare students to distinguish between facts and verifiable scientific theories, on the one hand, and religious and philosophical beliefs that are claimed in the name of science, on the other. When exploring controversial issues (such as biological evolution), the curriculum should help students understand the full range of existing scientific views, and why such issues are controversial and how scientific discoveries can profoundly affect society" [Larson, 2013: 1020]

In *Selman v. Cobb Cnty. Sch. Dist., 390 F. Supp. 2d 1286 (ND Ga. 2005*)), Georgia, the state court recognized at least two secular goals in a school council document on the rules for studying evolution: to promote the development of critical thinking in students and to take into account the views of those residents of the local community whose religious beliefs are incompatible with Darwinism. However, despite the formally secular goals, the informed intelligent observer "must be aware of the "implicit" religious nature of the respective actions".

Kitzmiller v. Dover Area School District, 400 F. Supp. 2d 707 (MD Pa. 2005) challenged the changes in the teaching of evolutionary theory through the compulsory study of intelligent design theory based on the book "About Pandas and People". The court ruled against the school district, recognizing the concept of intelligent design as "a religious doctrine, a mere re-labeling of creationism, not a scientific theory." In addition, this case, according to the court, has a religious purpose, which provides a double violation of the Lemon test. Another area of opposition to evolutionism was the so-called academic freedom laws, which affirmed the right of students and teachers to freely express their views on controversial issues of the origin of biological species. In 2008, a similar law called the Science Education Act was passed in Louisiana.

A religious organization in *the Association of Christian Schools International v. Stearns* (678 F. Supp. 2d 980 (CD Cal. 2008)) sought protection from religious discrimination after the University of California had rejected five courses. The court supported the University in this case, confirming the unscientific and religious nature of the courses and textbooks offered for training.

Despite some anachronism, the traditional dispute between supporters of creationism and Darwinism remains very relevant and significant for modern judicial and social practice. Recent changes in the composition of the Supreme Court, the non-application of the Lemon test in some of the latest cases considered by the Court, the increasing activity of the Court in the application of the clause on freedom of religion allows us to predict the emergence of new cases and relevant decisions on balancing the application of the principle of scientific education and freedom of religious belief among students and teachers.

The Supreme Court upheld the right of followers of Jehovah's Witnesses to reject obligatory honors to the national flag because it would conflict with their faith (West Virginia Board of Education v. Barnett 319 US 624 (1943)), but denied the constitutionality of the daily denial of denominational prayer recited by teachers in public schools even if students are free to participate in such ceremonies (Engel v. Vitale 370 US 421 (1962)). The latter can lead to an extensive deterioration in the relationship between children who refuse to participate in such events and their peers and teachers as well as school administration (School District of Abington Township v. Schempp, 374 US 203 (1963)).

The judgment in *Santa Fe Independent School District v. Jane Doe 503 U.S. 290 (2000*) prohibited the conduct of prayers during public football matches, even when the students themselves performed such prayers and voted for the conduct of prayer and appointed the one who read the prayer. Chief Justice Renquist, supported by Judges Scalia and Thomas, expressed strong disagreement with the court's decision and regretted the violation of the existing precedent, and "the very tone of the court, showing hostility to everything religious in public life." (Irons, 2006: 489)

Despite the existing injunction, according to a 2019 Pew Center survey, 8% of public school students aged 13 to 17 declared their involvement in such unconstitutional practices (with more than 12% in the South of the country and only 2% in the North -East of the country). Moreover, 41% of students (including 68% of evangelical Protestant teens) of this age feel it's appropriate for a teacher to lead a class in prayer, of whom 29% know about banning such practices. (Fahmy, 2020)

It should be noted that the contradictory nature of legislation and court practice regarding the conduct of prayers in education institutions is evident both in the states and in the country as a whole. The Missouri Religious Freedom in Public Places amendment also known as the "Right to Pray" amendment was on the August 7, 2012 primary

election ballot in the state of Missouri. The amendment guaranteed students to express their religious beliefs in school assignments, as well as the right not to do the assignments that violated their religious beliefs [Schlacter, 2014: 293-294].
At the same time, such legislative initiatives can lead to discrimination against religious minorities, since it is quite challenging to organize the educational process in such a way as to meet the requirements of all religious denominations and groups represented in the United States, including those in education. It is even more difficult to organize prayers or ceremonies for all religious groups while taking into account the rights of atheists.

House of Representatives Speaker Newt Gingrich announced his intention to push for adoption of his proposal to amend the US Constitution relating to voluntary school prayer: "Nothing in this Constitution shall be construed to prohibit individual or group prayer in public schools or other public institutions. No person shall be required by the United States or by any State to participate in prayer. Neither the United States nor any State shall compose the words of any prayer to be said in public schools."

Legislation and court practice regarding prayer in education environments remain rather controversial. So, on the one hand, there are federal legal prohibitions on forcing children to pray during school hours, or to pray under the guidance of school teachers or other staff, as well as to organize prayer after school at some extracurricular events (graduation ceremonies or football matches) regardless of whether they are held under the guidance of a priest, teacher or student. On the other hand, legislation and court practice guarantee freedom of prayer for some students while eating lunch, taking school exams and tests, etc.

One of the most recent decisions of the Supreme Court on prayer came into conflict with criminal law. In *Mary Ann Sause v. Timothy J. Bauer* (et al. 585 U.S. (2018) 30) the court ruled per curiam. The lawsuit said two police officers visited Mary Anna Sauze's apartment after complaining about noise disturbing her neighbors and behaved "oddly and offensively." When Sauze tried to kneel down and start praying, one of the officers ordered her to stop praying, thereby violating her right to freely practice religion under the First Amendment to the US Constitution (along with the fourth Amendment's guarantees against warrantless searches and frivolous arrests). The US Supreme Court, on the one hand, recognized "the undoubted guarantee of the First Amendment to say prayers," but, on the other hand, pointed to the circumstances that could explain the police officer's order to interrupt the prayer at a certain time in a certain place (for example, when arrested and taken to a police car) . However, since the materials of the case did not contain any indication of the specific circumstances and motives of the police officer, the Court was unable to consider the case on its merits, therefore the case was sent to the Court of Appeal for a new examination. The court provided for consideration of all the previous comments made.

In 2019, the American Civil Rights (Liberties) Union filed a lawsuit against Smith County Schools on behalf of an atheist, military veteran and father to several children who said the school system regularly incorporated prayer into school events and proselytized students.

The family's accounts spanned several school years and included things like school-directed prayer during mandatory assemblies, the distribution and display of Bibles during classes, Bible verses posted in hallways and shared in notes from school staff to students, prayers broadcast through loudspeakers at school sporting events, coaches leading or participating in prayer with student athletes, and a large cross painted on the wall of a school athletic facility. The District Federal Court tried to find a balanced solution in this case. The court defined "prayer" as a communication (written or audible) with a deity, including, but not limited to, a benediction, an invocation, the Lord's Prayer, or otherwise calling upon a deity to offer guidance, assistance, or a blessing. Accordingly, "Prayer" does not include customaiy, polite expressions and greetings, including "God Bless You" or "Thank Heavens," or a student's religious expression responsive to a legitimate academic class assignment. "Prayer" also does not include a moment of silence, provided that School Officials do not direct, encourage, or imply that students should use the moment of silence for Prayer. The court ordered the school management to comply with a number of rules: school staff must refrain from organizing, facilitating, performing or participating in prayers during or in connection with school events. However, keeping the school staff quiet out of respect for prayer will not be interpreted as offering or participating in prayer. School staff should prevent third parties (including clerics) from organizing religious events. They are also prohibited from including prayer in various school events and activities, or appointing a time for it (which does not prohibit the so-called "quiet time", unless the staff encourages children to pray during this period). Any a religious title of a school event is prohibited. The school should allow a student to give a religiously neutral speech at school events and exclude prayer during such performance.

Thus, it should be concluded that the US legislation and judicial practice in the field of religious relations in education are contradictory. This can lead to severe clashes between various religious groups and atheists, to significantly lower the level of guarantees of citizens for the free exercise of their religious beliefs.

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Road Traffic law and Drivers' Response: Evidence from Lagos, Nigeria

Ogadimma ARISUKWU
Landmark University,
Omu-Aran, Nigeria
arisukwu.ogadimma@lmu.edu.ng

Abiola ASALEYE
Landmark University,
Omu-Aran, Nigeria
asaleye.abiola@lmu.edu.ng

Tunde ADEBISI
Landmark University,
Omu-Aran, Nigeria
adebisi.tunde@lmu.edu.ng

Abstract

Most studies focused on the causes of road traffic accident, this study looks beyond the effects of traffic crashes by examining the response of motorists to traffic law and its enforcement in a populous region as a countermeasure. The study focuses on the response of drivers to the enacted traffic law 2012 in Lagos, Nigeria. Responses of drivers to the traffic law were analysed using routine activity theory and deterrence theory to reflect the offenders and the law as means of social control perspectives. Qualitative data was elicited from the unobtrusive observation; commercial drivers (n=100), private drivers (n=100) and law enforcement officers (n = 60) using simple random sampling and purposive sampling techniques. Data were analyzed through content analysis. The study revealed that in spite of the fact that the law is embedded with some elements of draconian law, most of the drivers have no in-depth knowledge of the law. Although taking the deterrence theory approach, the traffic law has a great influence on the behaviour of drivers on the road. Furthermore, it was concluded the heterogeneity nature of Lagos requires a stiffer law that will deter potential offenders from violating the state's traffic laws which serves to regulate drivers and reduce road traffic jams and accidents.

Keywords: Road users, Traffic law, Compliance; Lagos.

Introduction

The official statistics showed that over 3,000 people die per day and about 1.3million deaths are recorded annually as a result of Road Traffic Accidents (RTA) World Health Organization WHO, (2013). Likewise, given the current trend without countermeasures, RTA can be the seventh cause of death by the year 2030 with an estimation of about 90 percent in developing countries WHO, (2015). It was also reported that 50 million people sustain different degrees of injuries from such road fatalities. Traffic accidents continue to inflict severe health and economic repercussions worldwide Ahmad & Emhaidy, 2011; Ihueze & Onwurah, (2018). This can be attributed to different factors among which include lack of adequate driver training, bad roads, unsafe vehicles, inadequate road facilities, inadequate awareness of road safety, non-compliance to the traffic rules and regulations. A study has shown that in Germany, the risk of road accidents is more among emergency responders driving with lights and siren, Prohn,& Herbig, (2020). In Saudi Arabia, young male drivers' behaviors (aggressive and speedy driving) which are related to attitudes towards road safety policies are linked to road accidents, Mohamed, & Bromfield, (2017). Studies have equally revealed that law enforcement agents, particularly the Nigeria Police are being overwhelmed with crime and are unable to effectively enforce rules and prosecute offenders, Arisukwu, (2012).

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Ironically in Nigeria, studies have documented that good road facilities have been accompanied by an increasing number of road accidents and fatalities Atubi & Onakala, (2009); Olawole, (2016). Despite major efforts to improve traffic safety and maintain good roads, traffic accidents have increased steadily over the last three decades. This alarming increase could be due to the violation of traffic rules and regulations by motorists. As of 2011, Nigeria is ranked 191 out of 192 countries in the world with 162 death rates per 100,000 population and 1,042 road accidents per 100,000 motor vehicles WHO, (2011). Despite the establishment of various institutions such as Federal Road Safety Commission (FRSC), Police Traffic Warders, Vehicle Inspection Officers (VIO), and Lagos State Traffic Management Authority (LASTMA), traffic management in Lagos is still a major challenge. It is important to examine the attitudes of the drivers towards Lagos State Traffic law 2012 to assess the impact of the law on road traffic management in Lagos. Urban centers often throw up the challenges of traffic and refuse management by government, Arisukwu, (2011). Also, the attitudes of drivers towards other road users equally constitute a problem to traffic management, Fruhen, Rossen & Griffin, (2019).

Other factors that cause road accidents include reckless driving, speeding, drunk-driving, and indiscriminate parking Batool & Carsten, (2018). Vranes and Mikanovic, Lazovic and Kosanovic (2018) emphasized the importance of road traffic laws to reduce road accidents. Poor feeding habit equally affects drivers conduct and performance on the road Arisukwu, Olasebikan, Asaleye,& Asamu, (2019). However, the roles and the perceptions of the agents and drivers about the law are vital to its success, Teye-Kwadjo, Salia Mensah.& Robert (2019). Poverty and ignorance equally affect various aspects of social life and decisions including driving, Arisukwu. Igbolekwu. Efugha INwogu, Eyitayo & Osueke, (2019).

Theoretically, the routine activity theory elucidates why drivers commit traffic offenses. The theory provides an in-depth understanding of crime from an offender's perspectives, which are expected to be the drivers. A likely or motivated offender will first assess the situation of things in the environment before embarking on the act Felson & Cohen, (1979). On the other hand, the deterrence theory explains how traffic law shapes the behavior of motorists, which are imposed by the law enforcement agency. Deterrence theory assumes that people will be deterred from committing a crime if the consequence of committing such crime outweighs the benefit of the crime Gibbs, (1975). The theory posits that individuals are affected by both the potential punishment and potential reward that constitute the consequence of a particular behavior. The conclusion that can be drawn from the theoretical perspectives is that to reduce road accidents, a country or state can introduce a traffic law that attaches a severe punishment to the violators.

Recent studies have focused on road accident and its causes; yet, there are scanty studies on the implications of road traffic law on drivers' responses Ortiz, Rammarayan & Mizenko, (2017); Rolison, Regev, Moutari & Feeney, (2018); Ihueze & Onuwurah, (2018); Farahmand & Boroujerdian, (2018); among others). Implementation of road traffic law can serve as preventive measures to ensure safe driving behavior, which on the other hand will have a significant effect on the reduction of the road accident Vranes, Mikanovic, Lazovic & Kosanovic, (2018). This study is however designed to enhance existing literature on traffic management; the research seeks to focus beyond the effect of traffic crashes by assessing the response of motorists to traffic law and its enforcement in a populous region. Therefore, the study focuses on Lagos, Nigeria, and the response of drivers to the enacted traffic law 2012 by the State Government.

Objectives of the study

The general objective of this study is to examine drivers' responses to the Lagos state traffic law 2012. The specific objectives include;

1. Level of awareness of the traffic law in Lagos.
2. To assess the level of compliance by drivers and examine the effect of the law on accidents, traffic jam and drivers behavior while driving in Lagos roads.
3. To examine drivers' perception of the traffic law to be harsh or friendly.

Review of the Literature

Traffic law and regulations play a prominent role in the reduction of traffic accidents in the world. These laws were designed to protect the general public, road users, and drivers from incessant road fatalities as well as the unhealthy environment Wood & Johnson, (1983); Ihueze & Onwurah, (2018); Teye-Kwadjo, Salia Mensah.& Robert (2019). Meanwhile, as societies experience a reduction in an outbreak of infectious diseases, road accident rates tend to be on the increase, particularly in the developing countries Varma, Souba, Faiz, & Sinha,(1992); WHO, (2015).

Studies in the literature have documented that causes of RTA include Human, Mechanical, and Environmental factors (European Transport Safety Council ETSC), (2011). However, these causes can be curtailed by the implementation of adequate traffic law, Douglas, Swartz, Richery, & Roberts, (2019). The human factor is attributed to such factors as speeding, drunk driving, indiscriminate parking, overloading of vehicles with both goods and passengers, lack of knowledge of road signs, poor eyesight, and over-confidence which accounts for about 90 percent of accidents. Studies by Arosanyin, Olowosulu, & Oyeyemi, (2012) and Ifeoma, et al, (2013) supported this argument. This shows that drivers' errors are prone to a large portion of RTA that was recorded. In a similar study by Rolison Regev, Moutari, and Feeney (2018), that investigated the factor responsible for the road accident. The assessment of the scholars was carried out with interviews with law enforcement agents and ordinary drivers. The findings of the scholars showed that there is a relationship between the sensitivities of the agents to the causes of the road accident. Some of the factors documented include inadequacies in law enforcement practices, drug and alcohol impairments, and defective eyesight.

Consequently, the mechanical factors are attributed to poor vehicle maintenance such as poor lights, broken down vehicles, and un-roadworthy vehicles. The environmental factors are associated with accidents caused as a result of rainfall, sun reflection, heavy wind, storm, potholes, and un-tarred road ETSC (2011). However, Olawole (2016) studied the impact of weather, specifically rainfall and temperature on RTA in Nigeria. The author reported that the correlation between RTA and the element of weather is quite low. Similarly, in Africa, there are cultural and traditional beliefs that misfortunes such as road accidents are caused as a result of supernatural forces Pelzer & Renner, (2003). However, these traditional and cultural beliefs are gradually going into extinction, but it is important to mention that they are functional to African economic and political situation. Nevertheless, several studies had indicated that non-compliance to road traffic regulations by road users is largely responsible for road traffic accident Al-Ghamdi, (2003) & Bendak, (2005). In a recent study by Sagbery (2018), it was stated that inadequacies of road traffic laws are accountable for the majority of RTA in Norway. In China, a study has shown that road policy promotes drivers' environmental awareness and pro-environmental behavior among road freight transportation, Fu, SunZha, Liu, He, Sun, Jing (2020).

Several approaches have been adopted by both government and non-governmental organizations to prevent the insurgent of RTA but the level of awareness was inadequate. Meanwhile, the literature had revealed that good knowledge of road signs and speed limits by drivers is paramount to road safety. Ifeoma, et al, (2013) investigated the relationship between road accidents and knowledge of safety measures in Nigeria using data from 407 commercial minibus drivers. The scholars reported 59 percent of the drivers had poor knowledge of road signs while only 3.2 percent of the drivers knew their maximum speed limit. The result further indicated that the drivers between 40 and 49 years old have the odds of a better knowledge three times higher than those between 20-29 years. In a similar study by Ogunnika (2013), the same view in line with Ifeoma et al (2013) was reported. However, lack of awareness of road traffic laws is not only peculiar to African countries. It was reported that in the United Kingdom 80 percent of commercial drivers have poor knowledge of their speed limit Ifeoma, et al, (2013). A similar result emerged in Vietnam, the statistics of Hanoi Traffic Police Apartment showed that out of 360 drivers studied, only 8 percent said they know and understand all of the traffic regulations, while 78 percent just knew some simple regulations and 16 percent do not know any traffic rule (Hanoi Traffic Police Apartment (HTPA), (2006).

A strand of the recent studies focused on the causes of RTA with scanty studies on the response of drivers to traffic laws. For example, Farahmand and Boroujerdian (2018) examined the effect of road geometry on driver fatigue in rural areas of Iran. In a similar study, Ortiz, Rammarayan, and Mizenko (2017) investigated the relationship between distraction and road user behavior in the United States of America. Although, the study by Vranes, Mikanovic, Lazovic, and Kosanovic (2018) analyzed the relationship between road traffic safety and public health in Serbia, the examination of drivers' responses is still under-researched. The study by Vranes et al. (2018) pointed out that an inverse relationship exists between the implementation of road safety law and RTA. This was observed due to the law implemented in 2009 and a significant reduction in RTA afterward. The benefit of implementing traffic laws to ensure safe driving across highways in developing countries cannot be under-valued. Batool and Carsten (2018) stressed that uncontrolled driving is one of the main causes of the accident in Pakistan. Likewise, Ihueze and Onwurah (2018) echoed that increase in the rate of RTA is one of the major problems in society, with preponderance occurrences in low and middle-income countries.

The Nigerian Government established the Federal Road Safety Commission (FRSC). The FRSC is the enforcement agency that ensures adherence to road traffic regulations as embedded in the Nigerian Highway Code. The body restored sanity by apprehending violators and applies punishment. Furthermore, drivers in Lagos, Nigeria often violate traffic rules daily. Lagos drivers are rated amongst the worst drivers in the world in terms of their road culture, respect for traffic laws, and respect for fellow road users Williams, (2013). The introduction of the Lagos state traffic law (2012) which was accompanied by severe punishment to the violators taking the approach of

deterrence theory aimed to put a measure and restore orderliness on the road, which on the other hand will reduce the rate of road accident within the state. The law's emphasis on the nonchalant attitude of road users prompted the criminalization of traffic offenses. In light of the importance and the gap identified in the literature, this study examined the relationship between traffic law and the response of drivers in Lagos, Nigeria.

Methodology

The combination of descriptive and exploratory designs was chosen because the problem being investigated (Lagos State Traffic Law 2012) is a relatively new realm of sociological inquiry that little has been done on it and for this reason, qualitative method of data collection was used. Moreover, to gain in-depth knowledge about the response of drivers to Lagos State Traffic Law 2012, the research instruments that were adopted are In-depth and key informant interviews. The study was carried out in Lagos State. Lagos State came into existence on May 27, 1967, by the virtue of state creation and transitional provisions Decree No 14 which restructure Nigeria's Federation into 12 states. The state is located in the South-Western part of Nigeria. It shares boundaries with Ogun State both in the North and East, on the West, with the Republic of Benin and in the South; it stretches for 180 kilometers along the coast of the Atlantic Ocean (Atubi, 2012).

Lagos State is the smallest of Nigeria's States with an area of 3,577 square kilometers, 22 percent of which consists of Lagoons and Creeks, yet it is the second most populous with more than 9.01million as at 2006 census NPC, (2006). However, the Lagos population is estimated to be around 15,000,000 with about 12,000,000 of this population living in Lagos, making the city as the fifth largest metropolis in the World Williams, (2013). The state has a total of 20 Local Government areas and 37 Local Council Development Areas. Lagos state is called 'Centre of Excellence' because of her role in the economy of Nigeria and remains the commercial nerve center of the country. Thus, it attracts a lot of travelers, the majority of whom travel by road. Lagos State was purposively chosen for this study because it is arguably the fastest growing city in Africa and heavily motorized city in Nigeria Atubi, (2012), with 224 vehicles per kilometer compared to a world average of 24 vehicles Williams, (2013).

Due to the heterogeneity nature of Lagos, the study population was redesigned. The study locations and populations were purposively selected to include private, public drivers, gender-mix, age, and other significant others in transportation management in Lagos. Lagos State was divided into two Areas which are: Lagos Island and Ikeja Local Government Areas. These two areas were selected because of their metropolitan status and prevalence of traffic congestion as a result of big markets they have, which attract a lot of motorists. The population of this study included both commercial and private drivers, officials of National Union of Road Transport Workers (NURTW) and a few stakeholders in the area of traffic management such as, officials of Lagos State Traffic Management Authority (LASTMA) and Federal Road Safety Commission (FRSC), who are directly involved in the enforcement of the traffic law. Given the nature and peculiarities of the participants of this study, probability and non-probability sampling methods were adopted. Thus, to select the commercial drivers, the study adopted a simple random sampling method to select one major motor park from each of the two Local Governments while purposive and accidental sampling methods were used to select the commercial and private drivers respectively. On the other hand, officials of the NURTW, LASTMA, and FRSC were selected purposively by their status and position in the area of traffic management. The method of data collection used for this study was qualitative data through primary sources of data. Collected data were analyzed through content analysis.

Theoretical Framework of the State Traffic Law

The theoretical framework upon which this study dwells on is Routine Activity theory and Deterrence theory. Routine activity theory was adopted to give an explanation on why drivers commit traffic offences. However, the theory is not adequately sufficient to explain this issue because it only explains from the perspective of the offender. On the other hand, the deterrence theory was adopted to analyze how the traffic law shapes the behaviour of motorists.

Routine activity theory is a sub-field of the rational choice theory that was propounded by Felson and Cohen (1979). The theory holds that for a crime to occur, three elements must be present at the same time and in the same space: a suitable target, the lack of capable guardian, and a likely and motivated offender. That is, when a crime occurs, the criminal must have identified a suitable target which could be a person, object or place coupled with an absence of capable guardian whose presence could have discouraged the motivated offender from committing the crime. The theory provides an in-depth understanding of crime from an offender's point of view. A likely or motivated offender will first assess the situation of things in the environment before embarking on the act. It suffices to note that, an offender will only commit a crime if he thinks that a target is suitable (opportunity), and a capable guardian is absent (security).

However, Felson and Cohen (1997) routine activity theory is relevant to this study in that it provides a straightforward explanation of why drivers violate traffic rules and regulations. For instance, most drivers will violate traffic rules when the traffic law enforcement agents are unavailable on the road. This implies that absent of capable law enforcement officers is an inducement for crime commission for rationally calculating offenders. It is paramount to indicate that a rationally calculating traffic offender will firstly take into consideration, the availability or effectiveness of traffic law enforcement agents before violating the traffic law.

The concept of deterrence is the use of punishment as a threat to deter people from offending. Deterrence is often contrasted with the act of retribution, which holds that punishment is a necessary consequence of a crime and should be calculated based on the gravity of the offence. This theory is adopted to explain how law and punishment seek to prevent drivers from committing the traffic offence. The assumption of deterrence theory is that people will be deterred from committing a crime if the consequence of committing such crime outweighs the benefit of the crime. This theory was developed by Cesare Beccaria and Jeremy Bentham as an explanation of crime and method of reducing it, Hagan, Gills & Brownfield, (1996). According to Gibbs (1975), 'Deterrence is the omission or curtailment of a crime for a fear of legal punishment '. That is, people may refrain entirely from committing a crime for a fear of being punished, or they may only restrict their commission of it. The theory posits that individuals are affected by both the potential punishment and potential reward that are the consequences of a particular behaviour. For example, Section 7 of the Lagos state traffic Law (2012) provides the penalties for neglect of traffic directions. Anyone who either

> "neglects or refuses to stop the vehicle or to make it proceed or to keep to a particular lane or direction of traffic when directed to do so by the officer in the execution of his duty; or drives his vehicle against oncoming traffic or fails to conform to the direction or indication given by the traffic sign, shall be guilty of an offence…"

On conviction, first-time offenders shall be liable to one-year imprisonment and forfeiture of the vehicle to the State, and second and subsequent offenders get three years imprisonment and forfeiture of the vehicle to the State. A driver that is aware that the punishment for just neglecting traffic signs is huge may choose to obey the traffic signs. In deterrence, the utmost importance is that punishment prevents crime Dambazau, (2011), the fear of future punishment will determine the actions people choose. The higher the certainty, severity, and celerity of legal punishment for a particular type of crime, the lower the rate of that crime. However, the most relevant aspect of deterrence theory to this study is that whatever punishment that must be given out for an offence, must serve a utilitarian purpose whereby it must refrain recidivism and also serve as deterrence to others.

The Lagos state traffic law 2012 can be said to be triggered by the assertion of deterrence theory so as to convince potential offenders to refrain from committing traffic offences. For instance, the fine in monetary value for not wearing seat belt while driving was increased from two thousand Naira to twenty thousand Naira, about 900 per cent increment. The deterrence mechanism can take two forms; these are Specific deterrence and general deterrence.

Specific deterrence implies that the punishment that a violator gets is severe enough to discourage him from committing a similar crime in future. This is the rationale behind the sudden increase in the amount payable for violating traffic laws in Lagos state. A driver that was fined for not using seat belt may not likely violate such law again because of the high penalty involved. The general deterrence, on the other hand, implies that the punishment given to the offender 'A' should be severe enough to discourage offender 'B' from committing a similar offence. This explains why most drivers in Lagos state are always conscious and afraid to break traffic rules knowing fully-well that if they are caught they will be punished severely.

Presentation of Findings

Socio-economic and Demographic Characteristics of the Respondents

A total of 260 participants were interviewed during the course of this study. It includes; 200 drivers (both commercial and private drivers), and 20 personnel each of National Union of Road Transport Workers (NURTW), Lagos State Traffic Management Authority (LASTMA), and Federal Road Safety Corps (FRSC). Tables 1 and 2 show the socio-demographic characteristics of the participants.

Table 1: Characteristic of Participants on Age, Gender, Religion, Education, driving experience, and Marital Status

Variable	Category	Number Interviewed
Age	20-29	20
	30-39	100
	40-49	100
	50-59	30
	60 above	10
Total Number (Age)		**260**
Gender	Male	240
	Female	20
Total Number (Gender)		**260**
Religious Affiliation	Islam	120
	Christianity	90
	Traditional	50
Total Number (Religious affiliation)		**260**
Marital Status	Married	150
	Single	50
	Divorced	30
	Widowed	10
	Separated	20
Total Number (Marital Status)		**260**

Variable	Category	Number Interviewed
Level of Education	Primary	50
	J.S.S	20
	S.S.C.E	100
	O.N.D	30
	B.SC	60
Total Number (Level of Education)		**260**
Driving experience	1-5	50
	6-10	100
	11-15	60
	16 above	50
Total Number (Driving experience)		**260**
Years in Service	1-5	8
	6-10	35
	11 – above	17
Total Number (Years in Service)		**60**

Source: Authors' Field Survey 2016

The table above shows that the majority of the participants were in the age group 30-39, and 40-49 years which means that most participants in this study were adults. Also, the majority of the participants were male, only 20 out of 260 participants were female and this is because the percentage of male drivers is more than female drivers especially among the commercial drivers. This is not peculiar to Nigeria alone this result confirms the statistics of WHO (2011) on road traffic deaths based on gender, which shows that 30.8 males die as a result of road crashes compare to 11.0 females. The table illustrates the marital status of the participants with 150 out of the total 260 married while 50 were single.

The drivers were asked about their level of education with 50 of the participants claiming that they only had primary school education while the rest claimed that they had both secondary and tertiary education. This implies that most of the drivers had formal education to some extent. Moreover, the drivers and officers were asked about their years of driving, most fell in the category of 6-10 and 11-15 years of driving, with 100 and 60 of the total 260 drivers respectively. There is the need to categorize the years of driving in this way because one cannot compare the experience of a 2 years driver with that of a 9 years driver. The implication of this is that data gathered from the participants would be a good sample for qualitative research. In the same vein, the personnel of NURTW, LASTMA, and FRSC were asked about their years in service to ensure that those interviewed were indeed key informants. Only eight out of total 60 claimed to have spent less than 5 years in service while others have spent more than 5 years.

Responses to Traffic Law Awareness

Traffic law and regulations play a prominent role in shaping the attitude of drivers towards the reduction of traffic congestion and traffic accidents. Hence, to examine drivers' response to the Lagos State traffic law, it was necessary to ascertain that the participants are aware of the law.

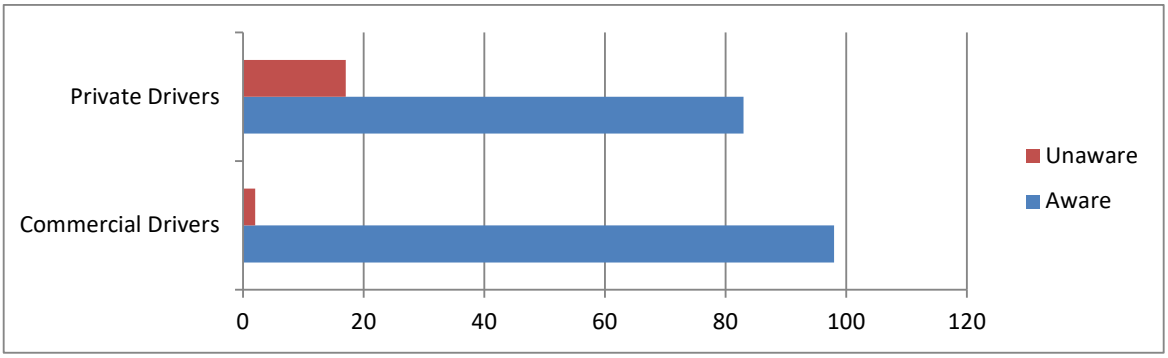

Figure 1: Awareness of Drivers to the Road State Traffic Law

Source: Authors' computation from Field Survey (2016)

Figure 1 presents the outcome of the response when asked questions as regards the awareness of the traffic law 2012. The majority of the participants claimed they have full knowledge of the Lagos State traffic law while less than twenty are incognizant of the law. These are parts of their acknowledgment 'Yes, am aware of it. I do not think there will be a driver that is in Lagos that will say he has not heard of the traffic law'. After affirming that the participants are aware of the traffic law, it is important to sample the opinion of drivers on the traffic law because they are the most targeted group. Drivers' opinion was sought on whether the law is driver-friendly or repressive. However, of all the participants interviewed, some drivers have contrary opinions on the awareness of the traffic law. One driver's response is as follows: 'I am aware of the traffic law but I don't know the details of the law because we were not well informed about it'.

Opinion of Drivers to the Road State Traffic Law

At the level of an individual, most of the drivers especially the private drivers opined that the law was friendly, a participant opined as follows: 'the law is friendly to me in the sense that no matter how soft law is, some people will still complain about it'. The above response is very important to achieve the objectives of this study. Although most of the commercial drivers have a contrary opinion on the traffic law some of them were quick to applaud the state government on the traffic law. They are of the view that the heterogeneity nature of Lagos city required a stiffer law that will deter potential offenders from violating the state laws. They are quoted as follows: 'the law is somehow severe especially to the commercial drivers but it will bring positive effect.

Also, another commercial driver that has a similar opinion stated that: 'the law is okay as it is because it will not deter people if the law is too friendly. But the problem with the law is that it can generate negative externalities such as corruption among law enforcement agents. Drivers may be compelled to bribe them because if you don't give them voluntarily, they will arrest you in-discriminatorily'. This is not surprising, studies by Asaleye, Ogunriola, Oloni and Ogunjobi (2017), Asaleye, Okodua, Oloni and Ogunjobi (2018) and, Oloni, Asaleye, Abiodun & Adeyemi (2017) have stressed that low standard of living, low income, and high unemployment rate are problems faced by the Nigerian government which has social effects on the country. Likewise, the Transparency International Corruption Perception Index (2017) revealed that Nigeria was ranked 148th out of 180 nations. Consequently, studies by Fashina, Asaleye, Ogunjobi, & Adedoyin (2018) and, Asaleye, Adama, and Ogunjobi (2018) pointed out that the Nigerian government should go beyond the attempt made to manage mismanagement of resources. The commercial drivers that have a contrary opinion to the law are of the view that the fines for most offenses highly outweigh the offenses. They cite the issue of the seatbelt as a case study. The fine for not wearing a seatbelt was increased in the traffic law 2012.

Even though there are elements of draconian law in some parts of the law, it beat one imagination to discover that some drivers still violate traffic rules. As observed in some areas, drivers especially commercial drivers only use a seatbelt when they sight traffic officials or when they are about to approach a checkpoint. One can deduce from the responses that the law is serving the purpose of deterrence but there is the need for government to flush out those corrupt officials who see the law as an avenue to enrich themselves. It is a general belief that whenever a change occurs in societal law, there is going to be a change in the behavior of the people. Consequently, there is a need to train law enforcement agents on how to conduct themselves while enforcing the new law and community members should be carried along, Arisukwu & Okunola, (2013); & Arisukwu, Igbolekwu, Oye, Oyeyipo, Asamu, Rasak, and Oyekola, (2020). So far law does not operate in a vacuum, at times, changes in the law are expected to generate reactions from the public. Therefore, an attempt was made to ascertain whether the punitive threat posed by the traffic law of Lagos state had a measurable effect on the level of compliance with traffic rules and regulations.

Effects of the Road State Traffic Law

Most of the drivers and law enforcement agents that were interviewed reported that the traffic law has a great influence on the behavior of drivers on the road. An informant stated thus: 'Yes since the law came into being; there has been a great difference in motorist's attitude'. The majority of the responses of the participants were not particularly different from the aforementioned except few participants who have a different view. One observed thus: 'I can say the law has a little influence on the way we drive because the enforcement is not that effective, before you came now, I saw a driver receiving a call while driving'.

Observation and findings from the study revealed that traffic law influenced the driving culture of motorists. Since there is no crime-free society, it will be unfair to conclude that the law only has a mere influence on drivers just because few people still violate the law. When asked about the factors responsible for traffic congestion, opinion differs as some of them believed that growth in population and high rate of motorized vehicles are the main factors responsible for the congestion of traffic.

Factors Responsible for Traffic Congestion

A member of the National Union of Road Transport Workers (NURTW) commented thus 'Population is the major cause of traffic congestion in Lagos and again numbers of vehicles on our roads are too much'. The responses above supported the existing statistics that Lagos State is one of the most populated states in Nigeria with about 10 million inhabitants as of 2006 census (NPC, 2006). Also, the state is the most heavily motorized in the country with about 224 vehicles per kilometer as compared to a world average of 24 vehicles (Williams, 2013). On the other hand, some participants rate other factors such as bad roads, impatience, and bad vehicles.

Predictably, all the drivers responded affirmatively to have heard about the Lagos State traffic law 2012. However, on whether they have in-depth knowledge of the traffic law; not surprisingly, the drivers stated that they have no in-depth knowledge of the law. The response of the drivers goes further to reveal the poor awareness campaign of the traffic law on the part of the state government. The findings of this study supported the view of Ifeoma, et al, (2013), in a similar study that assessed the knowledge of commercial bus drivers about road safety measures in Lagos. The result of which indicated that less than one-fifth of the drivers could interpret the road sign 'carriageway narrows' and only 3.2 percent of them knew the maximum speed limit on expressways. It is paramount to note that this finding is not peculiar to Nigeria alone, as it was observed in a study carried out among selected drivers in Saudi Arabia; that a relatively high number of participants lacked the knowledge of important traffic signs, especially signs designated for yielding to traffic and pedestrians (Ahmad & Emhaidy, 2011). Similarly, poor

knowledge of speed limits was also observed among drivers in the U.K where a large proportion of 80 percent of commercial drivers studied showed a lack of speed limit knowledge (Ifeoma, et al, 2013).

Conclusion

A road traffic accident is a ubiquitous phenomenon that mostly occurs every day in all existing human society. Although, the incidence of RTA has become a social problem in both developed and developing countries due to the immense socio-economic and health implication it posed to the victims, their families, and the society at large, the rate at which it occurs differs from one society to another. In developing countries, Nigeria in particular, human factors such as impatience, reckless driving, drunk-driving, lack of respect for fellow road users among other factors have been attributed to the high rate of road traffic deaths. This has triggered various state governments especially Lagos state government to come up with the law that criminalizes traffic offenses. Most studies focused on the causes of a road traffic accident, this study focuses beyond the effect of traffic crashes by assessing the response of motorists to traffic law and its enforcement in a populous region as a countermeasure. Consequently, the study focuses on Lagos, Nigeria, and the response of drivers to the enacted traffic law 2012 by the State Government. Responses of drivers to the traffic law were analyzed using routine activity theory from the offender's perspectives and deterrence theory from the perspective on how the traffic law can shape the behavior of motorists.

Qualitative data was elicited from the observation; commercial drivers, private drivers, and law enforcement officers using simple random sampling and purposive sampling techniques. Data were analyzed through content analysis. However, this study asserts that the extent at which such traffic law will help to reduce the incidence of road traffic accidents and congestion will depend on the quality of information at the disposal of the targeted group (drivers) an investigation has revealed that drivers lack the basic knowledge of road safety measures and traffic law. This implies that traffic education goes beyond the medium of both print and electronic media which the Lagos state government solely relied upon to educate the drivers on the new traffic law, as it is apparent that most of these drivers especially the commercial drivers that are prone to violation of traffic law are set of people who do not listen to radio nor watch television because they spend much of their time on the road. Suffice it to note that, as the state of knowledge of road safety measures among drivers gets worse, it is feared that the rate of road crashes will inversely increase if drastic measures are not taken. The study concluded that taking the deterrence theory approach by imposing severe punishment on the violators of the traffic law will serve as a countermeasure to causes of road accident in the city. This conclusion is in agreement with a study in Accra Ghana by Agyapong, & Ojo, (2018). Also Ernstberger, Joeris, Daigl, Kiss, Angerpointner, Nerlich, & Schmucker, (2015) Posited that road traffic enforcement leads to reduced deaths from accidents. However, there is a need to reduce the negative externalities such as corruption that arises from enforcement, for the law to have significant impacts.

Based on the findings, the study suggested: the need for adequate and continuous enlightenment of motorists on road safety measures; that government should reduce the speed limit on our roadways; government should genuinely improve on road infrastructure and invest more on an inter-modal system of transportation such as waterways and railways as this will reduce traffic congestion on our highly concentrated road; the traffic management authorities should be equipped. Finally, the government should ensure a framework that will reduce corruption among the enforcement agents. Furthermore, responses generated from the study showed that corruption may have an indirect effect on the implementation of traffic laws most especially in developing economies. This study suggested that future research should examine the nexus among traffic law, corruption, and its implications on the traffic road accident.

Compliance with Ethical Standards

This study complied with ethical standards in social science research. The drivers who constituted the unit of analysis were not coerced to take part in the study. Their confidentiality was equally maintained throughout the research. They were equally at liberty to discontinue the study any time they felt uncomfortable.

Research Involving human participants

This study involved human participants (drivers), and they were not exposed to any form of physical or emotional harm or danger during the study. The research team made sure all drivers who participated in the study were not driving during the interview sessions. This was done to avoid accidents due to distractions by the research team. Commercial drivers were allowed to go for their turn and continue after they have dropped their passengers and return to their park. This was done to ensure that they do not suffer any financial loss as a result of their participation in the study. The dignity and comfort of the participants were ensured during the study. They were not stressed out and disrespected in any form during the study.

Informed Consent

The informed consent of participants was obtained before they were allowed to participate in the study. The aim and objectives of the study were made known to them and they were free to decide and choose to participate or not. Their decisions were respected by the research team.

Disclosure of Potential Conflict of Interest

On behalf of the authors, the corresponding author states that there is no conflict of interest among the authors. There is also no funding for this study.

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Post–Harvest Preservation Methods of Beans and Fear of poison among Rural Consumers in Adamawa State, Nigeria

Ogadimma ARISUKWU
Department of Sociology
Landmark University
arisukwu.ogadimma@lmu.edu.ng
First and corresponding author.

Chisaa IGBOLEKWU
Department of Sociology
Landmark University
igbolekwu.chisaa@lmu.edu.ng

Festus ASAMU
Department of Sociology
Landmark University
asamu.festus@lmu.edu.ng

ED MIBZAR
Department of Sociology
Landmark University
ogachukwubueze@yahoo.com

Tunde ADEBISI
Department of Sociology
Landmark University
adebisi.tunde@lmu.edu.ng

Abstract

Post-harvest preservation is a fundamental aspect in agricultural production. Farmers strive to preserve their grains after harvest for so many reasons which include maximizing profit during scarcity and preserving seeds for next planting season. Although the adoption of chemical method seems effective, there has been some health risks linked to it as recorded over the years. This incidence has caused serious social apprehension to the people. Therefore, this study examines the level of perceived fear of consumption of contaminated beans among the people of Ganye. Rational choice theory was adopted for the framework. Research design for the study was exploratory and survey in nature. Data was collected using well-structured questionnaire The findings show that 61.1% of the respondents have observed a lot of post-harvest losses of beans in their area hence the common use of chemicals to preserve it. Also, 65.4% were apprehensive of consuming chemically preserved beans due to fear of food poising.

This study recommends the traditional storage facility which has low or no health risk. Farmers and merchants should be enlightened through the mass media on safer ways of preserving their grains.

Keywords: Post-harvest preservation; contamination; apprehension; Beans

Introduction

In Nigeria beans is a staple food consumed by many irrespective of their social class, religion or ethnic identity. It is eaten alongside other staple foods in Nigeria, like rice, cassava and yam. Beans is one of the cheaper sources of protean, multiple vitamins, minerals, and fiber, making it the ideal healthy meal for any household in Africa. The major challenge rural farmers encounter is how to preserve their produce after harvest to reduce post-harvest loss. Also, rural farmers lack the financial capacity to access some modern technology for beans preservation. Rural farmers often resort to cultural and traditional means of farming, transporting and preserving farm produce. Study has shown that, the cultural transmission of food habits is extremely relevant, given that it brings cohesion to and

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forges the identity of human groups (Quintero-Angel, Mendoza, Quintero-Angel, 2010). In Nigeria, beans also known as cowpea is prepared and served in many delicacies such as 'moimoi', 'gbegiri', 'akara; or 'beans cake', 'boiled white' and 'jollof'. Beans is usually in demand by many families across rural and urban markets in Nigeria. However, one of the major challenges confronting most farmers has been the method to be adopted in post-harvest preservation of beans to reduce loss and poison (Abubakar, 2008).

In food production, postharvest management is the phase of crop production directly succeeding harvest, as well as processing, sorting and packing or storing. Immediately a crop is harvested from the farm, or detached from its main plant, it begins to depreciate. Postharvest management basically standardizes last quality. The most significant goals of post-harvest treatment are storing the product, to avoid dampness loss and deliberately slow down unwanted acid shifts, preventing and delaying significant damage such as abrasions. When is preserved effectively and efficiently, it leads to food security within the rural community. Post- harvest wastages are drastically reduced. Farmers and sellers get return on their farming investment, while consumers get value for their money.

Spoilage and aggregate depletion leading to waste of foodstuff can be reduced using good preservation techniques or processes (Strahan and Page, 2003). Preservation is a technique or a procedure whereby agricultural harvest or produces are stored up for future usage (Thamaga-Chitja, Hendriks, Ortmana and Green, 2004). Study has shown that grains stored in Purdue Improved Crop Storage (PICS bags) are safer. The grains retain its weight without spoiling (Mutungi, Affognon, Njoroge, Baributse & Murdock, 2014). Research has shown that consumers are now interested in how food products are preserved and fortified with nutrients, (Ghoshal & Kansal, 2019).

Loss of grain in large quantity has been a serious problem to farmers, marketers and consumers of grain in Ganye Local Government. The insufficiency of grain after the time of harvest has led to food scarcity and has made the income of farmers and marketers to dwindle. Therefore, in an attempt to solve this problem, farmers, marketers and consumers employed several means of preserving their grain to prevent spoilage, waste and to allow the use of these grains in and out of season or to avoid its purchase when it's most expensive in the market. Post-harvest damages add to high cost of food items thereby making prices of supplies to be inflated (De Lucia & Assennato 1994). Lack of knowledge, inadequate technology or unavailable infrastructure has contributed greatly to the challenge of post-harvest losses. Thus, significant quantity is being lost annually to food spoilage, which leads to loss in quantity and value affecting the livelihoods of the population (FAO, 2010). Poor handling of grains, poor storage and insects or rodents' infestations also contribute immensely to postharvest losses in developing countries. (FAO, 2013). Despite efforts made in reducing food contamination and poising by chemicals, it has continued to be a public health concern in Africa, Patchimaporn, Tesfamicheal, Nsharwasi, CharitY, Bernard and Ranajit. (2018). With continued post-harvest losses of beans and other grains in rural communities, youths who ought to be the work foce of the community will be discouraged to participate in farming. Many youths may choose to migrate to urban centers in search of elusive jobs and exacerbate the challenges of urban poverty and crime.

Resolving the post-harvest management challenges in beans preservation involves the use of various post-harvest preservation methods. This includes the use of chemicals which often results in food poisoning. Beans could be preserved using either traditional or modern methods. The traditional methods include but are not limited to, sun drying- on drying floors, putting powdered chili pepper in sacks of beans, storing in local silos locally called humbum in Hausa language, in earthenware pots, jars, use of barns, local cribs and others (Nukenine 2010). While modern storage methods include the use of sophisticated steel silos, use of insecticides, rodenticides, or sprays of these chemicals, the use of metal or plastic drums, the use of improved storage bags.

The issues of preservation of grains faced by local famers have spurred the use of chemicals to preserve the grains. The chemicals last longer and sometimes farmers bring the grains with toxic residues to market. This leads to food poising and even death of innocent consumers. Effective grain preservation technique has major role in guaranteeing subsistent food production, and also alleviate food insufficiency at the domestic scale. (Adejumo and Raji, 2007, Tefera, Kanampiu, DeGroote., Hellin, Mugo, Kimenju, et al. 2011).

Grain pollution with pesticide pose severe danger to consumers of beans, (Nnamonu and Onekutu,2015) & Nukenine,2010). The occurrence of beans poisoning in some parts of Lagos and Gombi Local Government of Adamawa state Nigeria, led to hospitalization and death of many in the past. The indiscriminate use of chemicals to preserve beans after harvest, poses a significant risk to farmers, grain dealers and public health throughout the world. (Ochii, 2010). Though beans is a commonly consumed by families in Nigeria as it serves as a source of protein, the incidents of killer beans in Lagos in September 1996 made consumers afraid. The fear of killer beans spread around the country, resulting in beans being avoided by many households. What was known as 'killer beans' hit the South-Western region of Nigeria. (Ayomide 2017). During that period, at least sixteen people in the South-Western area of Nigeria were reported to have died from eating beans. A bean cake *(akara)* seller in Ogun state died

after eating her own beans cakes when she wanted to prove to her customers that her *akara* were not poisoned. (Ayomide, 2017).

Poverty and illiteracy are key factors that may cause people to consume contaminated beans products. When there is insufficient food, people are forced to consume stored foods, despite the effect of the chemical preservatives. Illiteracy has also played a role, as lack of understanding of the instructions on the use of chemicals and its duration in serving its purpose may result to consumption of active chemicals that are inimical to health. Indiscreet use of chemicals to preserve beans has both economic and health implications on the sellers and buyers (Alavanja, Hoppin, Kamel 2004), Erhunmwunse, Darrius, and Olomukoro. 2012). & (Devon, 2016).

This research is motivated by the desire to find lasting solutions to the apprehension caused by the fear of eating poisonous beans due to chemical method of post-harvest preservation in Ganye, Nigeria. The inability of people to identify the chemically preserved beans in the market by mere observation has become a major challenge. The dangers posed by eating poisoned beans on both human beings and livestock have become a challenge that needs to be investigated. Therefore, this study investigated the social implications of adopted methods of beans preservation in Ganye LGA. Methods of preservation and food poisoning are areas considered in most literature; however this research intends to fill the gap in knowledge, by uncovering the social implications of fear of consuming contaminated beans in the society. The study seeks to improve food security in rural Nigeria. When a safer method is adopted in beans preservation it saves beans after harvest and prevents scarcity associated with post-harvest loss. When the method of preservation is perceived to be safe, many consumers will buy it and farmers and seller will make profit. This financial reward will encourage them to plant beans again in the community. When farmers are in business, their livelihood is sustainably improved.

Theoretical Framework

Rational choice theory, also known as choice theory or rational action theory was pioneered by a sociologist George Homans (1961). Rational choice theory concept is a framework for comprehension and frequently officially demonstrating social and financial conduct. The theory places emphases on the determining factor on person's distinct selections (individualistic principles). Rational choice theory attempts to explain why human beings make choices and moves which have unique consequences, how they achieve this and to predict the selections they may make given positive situations. Rational choice theory suggests that individuals weigh risks and rewards when deciding whether to engage (Ray, Baker,& Caudy, 2020). Rational choice theory says that operators and others make decisions by systematically and consciously weighing all possible outcomes along all relevant criteria (Dekker, 2017).

The theory assumes that Individuals, acts rationally in pursuit of her personal self-interest and not in the pursuits of others. Individuals are looking for opportunities to maximize their gains and minimize their losses. An individual has enough statistics upon which to establish her possibilities and perform her rational analysis. Preferences are transitive in nature. This is a logical principle that sounds greater complex than it surely is. Rational choice involves a cost-benefit analysis before decisions or choice is made. Rational choice often comes from previous experience and perceptions of a commodity influencing your attitude and actions towards the commodity (Chen, Feng. Liu, Tian,2019). In this case past experience with poisoned beans will make the consumer to avoid or be careful next time the person wants to buy or eat beans.

Rational choice theory believes that people carry out calculative decisions to weigh the cost and benefits of their actions before execution. This decision making and action is applicable to the practices of farmers and other consumers of beans in this research as they individually decide on the method they will use in preserving their beans, taking into cognizance, its profits and consequences. Therefore farmers, traders or household consumers of grain carefully evaluate the outcome, and in turn, choose their preference based totally on their own alternatives and the limitations. These limitations coupled with poverty lead to poor feeding habits and its negative consequences on the people, (Arisukwu.O, Olaosebikan .D, Asaleye. A. & Asamu. F, 2019).The emphasis in Rational choice theory is in the consistent act of individuals in pursuing their preferred goods or services (Bridge, 2020).

In this research it is assumed that the consumer of beans prefers the grain that is not chemically preserved to that which is chemically stored out of anxiety or fear that something bad or unpleasant may happen if one consumes chemically preserved beans. It is assumed that consumers make their choice over alternative grains which are chemically preserved and those that are not. Study has shown that preference of food diets is affected by level of affluence of consumers, (Lusk, 2019). This means that the rural poor have less choice to make as beans remains the cheapest source of protein among them.

An individual is left to make decisions on the type of grains to purchase. This choice can be influenced by various exposures to health implications such as sicknesses, diseases or even death as a result of unintended food contamination initiated by residue from chemically preserved beans.

Methodology

The cluster sampling technique was employed to divide the community into smaller groups, thereafter; the simple random sampling was used to select the respondents. The study population comprises 250 farmers, marketers and consumers of beans within the Ganye community in Ganye local government area of Adamawa state, Nigeria. It included men, women, the young and old, from age 15 and above, who are active in farming within the study location, and who also, practice various storage methods of food grains preservation. The survey design was employed in this research; hence the quantitative data was elicited with the use of questionnaires. The questionnaire was structured with both close and open-ended questions.

The statistical package for social sciences (SPSS) was deployed to run the analysis. Data was analyzed using percentages and frequency counts.

Ethical considerations were duly observed, as respondents were informed, and their consent forms were obtained. Confidentiality, anonymity of the participants was guaranteed and adhered to. Those without formal western education had the content translated to them in their local dialect (Hausa). Respondents were also informed that they had the right to withdraw at any time they feel uncomfortable with the study.

Presentation of Results

Table 1: Demographic characteristics of the respondents

Categories	**Frequency**	**Percent**
Age		
15-20years	82	39.3
21-25years	38	18.3
25years and above	88	42.3
Total	**208**	**100.0**
Sex		
Male	114	54.8
Female	94	45.2
Total	**208**	**100.0**
Marital status		
Single	125	60.1
Married	65	31.3
Separated	18	8.7
Total	**208**	**100.0**
Religion		
Christian	110	52.9
Muslim	74	35.6

Traditionalist	24	11.5
Total	**208**	**100.0**
Occupation		
Farmer	51	24.5
Student	104	50.0
Merchant	20	12.0
Others	28	13.5
Total	**208**	**100.0**

Table 1 shows the demographic characteristics of the respondents. A large number (88%) of respondents used for this study falls within the age range of 25years and above in Ganye LGA. Similarly, (54.8%) of the respondents in this study are males.

The marital status of respondents revealed that (60.1%) respondents are Single, (31.3%) are married, and (8.7%) are separated. This shows that the respondents are predominantly single. As singles, they may therefore depend on farming of beans to improve their livelihood. The data on occupation of the respondents showed that (50%) respondents were students, (24.5%) are farmers, (12%) are merchants, and (13.5%) had other occupational categories. This revealed that majority of the respondents are students.

Table2: Distribution of Respondents by preferred methods for preserving beans.

Which method do you consider best for beans preservation	**Frequency**	**Percent**
Traditional	92	43.8
Use of chemicals	81	39.4
Use of PICS bags	35	16.8
TOTAL	208	100.0

Source: Researcher's fieldwork 2019

Results from table 2 shows that (43.8%) of the respondents prefer traditional methods, while (39.4%) consider the use of chemicals and (16.8%) chose PICS bags as the best method of preserving beans. This shows that larger population of the citizens of Ganye LGA prefers the traditional methods of storage to any other method. The preference of traditional method could be as a result of transference of indigenous knowledge of beans preservation from one generation to another. This local way of preserving beans may have been internalized as part of the Ganye culture. It could also be an evidence of lack of access to modern technology of food preservation among the rural farmers.

Table 3 : Distribution of Respondents by reasons for preference of traditional method of Beans preservation.

Reason for the preferred method of beans preservation	**Frequency**	**Percent**
It is safe and simple	50	24.0
It is cheap and common	34	16.3
No danger or health hazard	31	14.9
Its more effective	93	44.7
Total	208	100.0

Source: Researcher's fieldwork 2019

The above table shows that (44.7%) claim that traditional method of preservation is more effective, (24.0%) say that it is safer, (16.3%) claim it is cheap and common, and (14.9%) posited that it has no danger or health hazard attached. This result is in agreement with the rational choice theory adopted for this study. This theory believes that human beings do not just act, there is always reasons or motivations behind human actions.

Table 4: Distribution of Respondents by possible awareness strategies for safe methods of beans preservation

Suggest best **ways of creating awareness**	**Frequency**	**Percent**
Use of mass media	143	68.8
Community awareness/house to house campaign	45	21.6
Through government agencies	20	9.6
Total	208	100.0

Source: Researcher's field work 2019

Based on the analysis on table 4, (68.8%) of the population suggested the use of mass media as the best way of creating awareness on safe means of beans preservation, (21.6%) posited that the use of community awareness campaigns is preferable, (9.6%) are of the opinion that using government agencies is the best way of creating awareness. A greater percentage of the study shows that the use of mass media is the best. Mass media has been recognized as a vital tool for public enlightenment and advocacy. In addition, play lets, local songs, radio and agricultural extension officers should be used in enlightening rural farmers on beans preservation methods to reduce food poising.

Discussion of major findings

The study revealed that respondents prefer traditional storage method as they presumed that it was less hazardous to health. This is in comparison with the modern chemical methods which they perceived to be detrimental to both human health and livestock. Study has shown that traditional methods of food preservation still hold sway among indigenous people in Nigeria, especially where improved technology were absent or not enough (Adesulu-Dahunsi.A.T, Dahunsi.S.O &Olayanju.A, (2020). The use of traditional techniques was also preferred because it is considered to be cheaper by farmers and merchants in a bid to maximize value income. This traditional method can also be considered preferable as it is the technique handed over from past generation (Joke Falaju, (2018), Hence it is employed to prolong cultural values. Again, this is a typical reflection that Africa or Nigerian cultural heritage cannot completely go into extinct as feared by some scholars (UN, News 2012). The food practices in a society including preservation methods are product of cultural values of particular societies (Reddy, & Van Dam, 2020). Study has shown that to ensure safety and stability, without nutritional and sensory losses, suitable, effective and economic food preservation methods should be selected,(Taxman, Otles, Glaue & Gogus, 2019). The people and their way of life should be the centre of food production and post harvest handling. The government and its agencies should work with community members to enhance and adopt a sustainable food preservation method to reduce waste, loss and fear of consumption of poisoned beans, Arisukwu, Igbolekwu, Oye, Oyeyipo, Asamu, Rasak, & Oyekola, (2020). The activities of bacterial, virus, microorganisms and fungal on grains especially beans affect food supply in the community, (Fung, 2009).

Similarly, on the perceived fear of consumption of contaminated beans in the study area, a greater percentage of the respondents attested to the fear of buying chemically treated beans which has high possibility of being contaminated and can lead to unintended food poisoning. This makes the fear of consuming chemicals from food preservatives a public health phenomenon as agued by (Patchimaporn U.et al (2018). This is also consistent with the findings of Alavanja Hoppin , Kamel. (2004). This situation may further be compounded by the inability of the respondents to identify a chemically treated bean in the market before purchase, and the awareness of the health problems related to consuming contaminated produce has been minimal among rural dwellers.

Furthermore, the results of this research reveal high knowledge about the health implications perceived by consumers on the effects of storage methods of beans, as also reported by PAN (2012). Respondents were able to identify and list out some of the perceived health issues related to the techniques of preserving beans. These health challenges that consumers could encounter included; stomach pain, purging, stomach inflammation, vomiting and even death. This health hazards may not have been experienced by the respondents as individuals but they may have been heard from significant others or through rumors. Individuals believe that the system used to store grain have implication on consumption (Adegbola, Bamishaiye, and Olayemi (2011). Therefore, a storage process has likelihood of exposing consumers to certain health risk.

Furthermore, in line with the rational choice theory which believes that people make calculative decisions to weigh the cost and benefits of their actions before execution. This decision making and action is applicable to the practices

of farmers and other consumers of beans in this research as they individually decide on the method they will engage in preserving considering its profits and consequences. Decision is also taken by consumers of beans and its produce as to either purchase chemically stored grain or to purchase traditionally preserved grain. Their choice is being influence by their experience, stories of incidences of food poisoning or just perceived fear within them as individuals. These factors makes them to weigh the benefits of buying such produce and its cost be it economic (price value), or its health implications. Therefore farmers, traders or household consumers of grain carefully weigh the outcome, and then in turn, choose based on personal priorities and limitations.

Recommendations

The following recommendations were therefore made.

Farmers and merchants of beans in Ganye should be encouraged to adopt the traditional method of beans preservation in addition to use of the PICS bags. This will increase public confidence, consumption and trust of beans within the community.

The mass media should be utilized for enlightenment and advocacy on the best ways of applying chemicals for beans preservation and accessing modern technology for beans preservation among the rural populace in Ganye. The state and local government areas should take interest in rural agriculture and support farmers with subsidized farm tools and inputs. This will motivate youth's participation in farming and sustain food security in rural areas.

Declaration section

I write to confirm that ethical approval was obtained to conduct participate, and publish the article. The data is available and will be supplied on request. There are no conflict of interest and funding for this study. All authors participated fully at every stage of the study and the efforts of all the authors and field team are hereby acknowledged.

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Simulation of an Educational Mobile Robot

Paul Ciprian PATIC

Valahia University of Targoviste, Romania
patic@valahia.ro

Abstract

One important aspects in the evolution human is the use of tools that simplify the physical work. Robots also fall into this category, but they occupy a privileged position due to their complexity. Humans imagined intelligent mechanized devices that would take over a significant part of the physical effort. Thus its has built automatic devices and intelligent mechanisms or different robots.Robots are automatic electromechanical machines. Some of the robots are not fully automatic but are controlled by humans by remote control, using video cameras or other control systems. Most robots are used in manufacturing processes. Others can be used as remote-controlled, deep-sea manipulators. Another category of robots can be used in various laboratories where they work with radioactive substances or there are high temperatures or other dangerous places. Some robots are mobile, with a built-in locomotion system, being able to move on land, on water, in the air. The modes of propulsion are among the most diverse, such as on wheels, water, water jet or air etc.In this paper, one tried to present a simulation of an educational mobile robot, imposing a rather complex wiring diagram, a command and control of the robot made by a PIC16F84A microcontroller. This robot can be used in teaching activities, but also in surveillance tasks, monitoring of spaces difficult for humans to penetrate.

Keywords: Driving System, Mobile Robot Simulation, Microcontroller, Programming Controller, Sensor System, Simulation Program.

Introduction

In general, robots are a class of technical systems that mimic or substitute human motor or intellectual functions. This is achieved by combining different types of handling systems or locomotives, determining the anthropomorphic character of the robot, with different types of computing or logical equipment, which determines its intellectual functions. Robots operate in a specific environment, whose characteristics may remain constant or variable over time. Automatic control varies in complexity from simple relays to highly sophisticated computerized methods. Mobile robots, in most situations, are equipped with video cameras or other sensors to perceive the environment in which they operate. Human control is achieved by using simple buttons up to complicated logistics with responsive power.

Control systems include communication modules based on radio waves, sonar (acoustic), echolocation (screen guidance), fiber optics or cables. Many robots are built by chaining components that mimic segments of the human arm. All methods are limited by the impossibility of perfect matching with the maneuverability of the human hand under the control of the human eye and brain. Robot engineering has been heavily influenced by fiction, in the sense that it has its dose of utopia. However, a lot of money is still spent on research into obtaining artificial beings by duplicating hands and propelling by bipedal walking, as Armaș I. (2011) and Starețu I. (2012) said.

Presentation of the Mobile Robots

The uses for which mobile robots have been, are and will be designed are diverse and cannot be exhausted in such a small space. Many robots in the micro area find their use in medicine, being able to move along the vessels and tubes of the human body, for the purpose of investigations, surgeries, dosing and distribution of pills etc. Equally spectacular are many uses of macro-robots in: medicine, industry, agriculture, forestry, the military, public utilities, entertainment and recreation, services, security, rescue operations, space research etc.The mobile robot is a complex system that can perform various activities in a variety of real-world situations. It is a combination of devices equipped with servomotors and sensors (under the control of a hierarchical computer system) that operate in a real space, marked by a series of physical properties (eg. gravity that influences the movement of all robots

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operating on earth) and which must plan the movements so that the robot can perform a task according to the initial state of the system and according to the `a-priori` existing information related to the working environment.

Success in performing these tasks depends both on the knowledge that the robot has on the initial configuration of the work-space, and on those obtained during its evolution.The specific problems that occur in mobile robots would be the following: avoiding the impact with stationary or moving objects, determining the position and orientation of the robot on the ground, planning an optimal trajectory of movement , as Borangiu T. and Ionescu F. (2002) said.

In the case of an automatically distributed robotic system, the spatial positions are of extreme importance and the fulfillment of the desired goals and the functioning of the entire system depend on them. In other words, the robot must be able to plan its movements, to automatically decide which movements to execute to perform a task, depending on the current arrangement of objects in the work-space.Movement planning does not consist of a single and well-defined problem, but of a set of problems, some of which are more or less variants of others.Avoiding collisions with fixed or mobile obstacles in the robot's workspace can be done by several methods: making a mechanical guard that stops the robot by deformation, using sensors that measure the distance to obstacles in the direction of travel, use of proximity sensors, use of correlated information from several types of sensors.

The location of objects can also be achieved by physical contact, but it imposes restrictions on the speed of movement of the manipulated structure. Physical contact between the robot and objects in the environment generates reaction forces that change the state of the robot. High working speeds make the dynamic effects of physical contact with obstacles or manipulated objects risky (they can damage objects or the robot), as Berian S. and Maties V. (2011) uses in their research.

Robot navigation is also possible without a determination of position and orientation relative to a fixed coordinate system, but this information is useful for motion control systems.Among the most frequently used navigation methods can be mentioned: measuring the number of rotations made by the driving wheels, the use of accelerators and gyroscopes, electromagnetic buoys installed in the field, passive or semi-passive signals of optical or magnetic type.

Mechanical structure of a Mobile Robot

The mechanical structure of mobile robots consists of:

- locomotion system (on tracks or wheels), which ensures the movement of the robot on a work surface (within an increased autonomy);

- the handling system, which ensures the positioning and orientation of the working body.

The mobile robot in the process of moving on a certain trajectory is characterized by 3 functions:

1. locomotion function;

2. the perception-decision function;

3. location function.

The locomotion function includes the electric drive system (propulsion) and the support system (suspension). The propulsion modes are among the most diverse, such as: on wheels, with water jet, with air etc . Mobile robots can be equipped with a video camera or other sensors to perceive the environment in which they operate. The robot's memory contained in the microcontroller stores the knowledge necessary to locate all possible path segments, as Berian S. and Maties V. (2011) uses in their research.

Action driving of Mobile Robots

The action of a Mobile Robot is made with low power electric motors, with low inertia torque, with overload capacity, with high ratio reducers (i>100) and low inertia torque of processional or harmonic type. Integrated motor-reducer units can also be used. . Used low inertia electric motors:

- DC or induced disc motors;

- synchronous motors with permanent magnets;

- stepper motors with variable reluctance with induced glass and radial air gap or with induced disc type and radial air gap;

- synchronous motors with permanent magnets.

Dynamic performance analysis of drives based on $H_d(s)$ transfer function involves determining the parameters:

1. Accuracy that is determined using the transfer function by calculating the error stationary:
2. Promptness, which is calculated using the transfer site considering an optimal compromise accuracy-stability for a phase edge $M\Phi = 25 \div 45^{O}$

The tracking capability can be assessed with the help of the Bode feature. In order to improve the dynamic performances of the drives in certain frequency ranges, series or parallel correction elements with the transfer function are used. The operation of the educational mobile robot will be done using stepper motors. These are electro-mechanical converters that transform a digital pulse train into a proportional motion of its axis.

The movement of the stepper motor rotor consists of discrete, successive angular displacements of equal size and representing the steps of the motor. The stepper motor also has the property of being able to synchronize with the control pulses even at rest, operating without slipping and braking is also performed without leaving the synchronicity. Due to this fact, sudden starts, stops and reversals are ensured without loss of steps throughout the work area.

The speed of a stepper motor can be adjusted within wide limits by changing the frequency of the input pulses. Thus, if the angular pitch of the motor is 1.8 ° the number of pulses required to perform a complete rotation is 200, and for an input signal with a frequency of 400 pulses per second the motor speed is 120 revolutions per minute. Stepper motors can work for frequencies between 1.000 and 20.000 steps / second, with angular steps between 180° and 0.3°.

Stepper motor applications are limited to situations where no high power is required (usual power between micro-watt and kilowatt ranges).Stepper motors are used in low power applications, characterized by fast, precise, repeatable movements: XY plotters, floppy disk drives, print-head movement to printers, actuation of orientation and pressure mechanisms to robots, axial displacement of system elements optical, 2D positioning tables, for drilling machines etc.

The Sensory System

The mobile robot is put in a situation to perform actions similar to those of the human operator. This determines the existence of certain devices through which to collect information from the work environment, which can perform the robot interaction. environment with the help of environmental characteristics or objects in the environment and a central unit that processes in real time the sensory information, to transform it into a useful form for the control system, as Held G. (2008) uses in his research.

The sensory system is also called the measurement system. It ensures the measurement of physical quantities and possibly the perception of significant changes in these quantities.

Due to the sensory system, the geometric and chemical characteristics of the objects in the work environment can also be highlighted. The sensors due to their characteristics can explore the work area, the contact area, the near, the far, and the very powerful sensors even very far areas. The information gathered with the help of the sensory system serves to build a model of the world in which the robot evolves, a model according to which it will generate its future action plans.Depending on the constructive solution, the sensors are passive or active. Active sensors use the intrinsic characteristics of the environment, and passive ones generate changes in the environment to measure some characteristics.

Two other categories of sensors that a mobile robot can be equipped with are: sensors of internal dimensions of the robot (position, speed or acceleration of its own mechanical components) and sensors of external sizes (weight, shape, position, temperature, color, etc. of objects on which the robot acts), as Dutta A. (2015) said.

Systems and intelligent control

According with Borangiu T., Dumitrache A. and Anton F.D. (2010), the notion of "intelligent control" cannot be debated other than that of "intelligent system", which in fact means a nuance of the term "intelligent" used in the

two phrases. In fact, this term is found in the literature and in connection with "artificial intelligence". It is obvious that intelligent controllers are also designed to emulate faculties of mental behavior such as adaptation and training (learning), planning in imprecise conditions (uncertainty), the association of various information. Perhaps an alternative definition to "intelligent control" could be "autonomous control" to emphasize the pronounced degree of autonomy that an intelligent control system must provide.

An intelligent system has the ability to act appropriately in incompletely defined environments, by appropriate action meaning an action that maximizes the probability of success, success being the fulfillment of one of the partial objectives whose set is the ultimate goal.An intelligent system can be characterized by a number of attributes, or dimensions. These are degrees or levels of intelligence. A minimum level would be that of the capacity to recognize the environment, make decisions and take action to enforce them. A higher level of intelligence may involve recognizing events or objects, representing them in a model (eg a knowledge base), and compiling a long-term plan. The highest levels require the ability to perceive and understand, to choose wisely and to act appropriately in all circumstances, including in hostile environmental conditions.

An intelligent control system must be designed to achieve high-level objectives autonomously, even if the installation or process model and the structure and objectives of the system are not fully defined, either due to partial knowledge or due to changes. unanticipated.

A system is considered autonomous when it has the ability to act correctly in incompletely defined environments without external intervention over a long period of time. There are several degrees of autonomy, which could be associated with the control functions included in the intelligent control: a control system with fixed parameters has the minimum degree of autonomy; adaptive control systems have a higher degree of autonomy. To the extent that a system has a greater degree of autonomy, it is accepted that it also has a higher level of intelligence. Other criteria can be adopted to differentiate the degrees of intelligence, such as: the computing power of the system; the degree of complexity of the algorithms used for the acquisition, processing and evaluation of data obtained from the environment; data storage capacity. In most artificial systems, increasing the level of intelligence reflected by computing power and storage capacity is due to the increasing complexity of hardware structures and therefore can become an obstacle to application either by too high a cost or by the impossibility of real-time processing. of stored information.

The PIC16F877 Microcontroller

The best placed manufacturer on the PIC microcontroller market is Microchip. Another major manufacturer of PIC microcontrollers is Motorola. There are several families of PIC mirrors: PIC12, PIC16, PIC17, PIC18. The microcontroller used in this application is PIC16F877. PIC16F84A belongs to a class of 8-bit microcontrollers with RISC architecture. Its general structure is shown in the following sketch representing the basic blocks.
Program memory (FLASH) is for storing a written program. Because the memory that is made in FLASH technology can be programmed and erased more than once, it makes the microcontroller suitable for component development. EEPROM-data memory to be saved when there is no more power. It is usually used to store important data that should not be lost if the power supply is suddenly interrupted. For example, such a date is a preset temperature in the temperature controllers. If this data is lost during the power failure, we will have to make the adjustment once again when the power returns. Thus our component loses in terms of self-maintenance, as Gheorghe G.I (1996) said.

RAM-data memory used by a program during its execution. All intermediate results or temporary data that are not crucial when the power supply is interrupted are stored in RAM.The block diagram of PIC16F877`s Microcontroller is shown below, in figure 1, like Patic P. C. and Zemouri R. (2020) said.

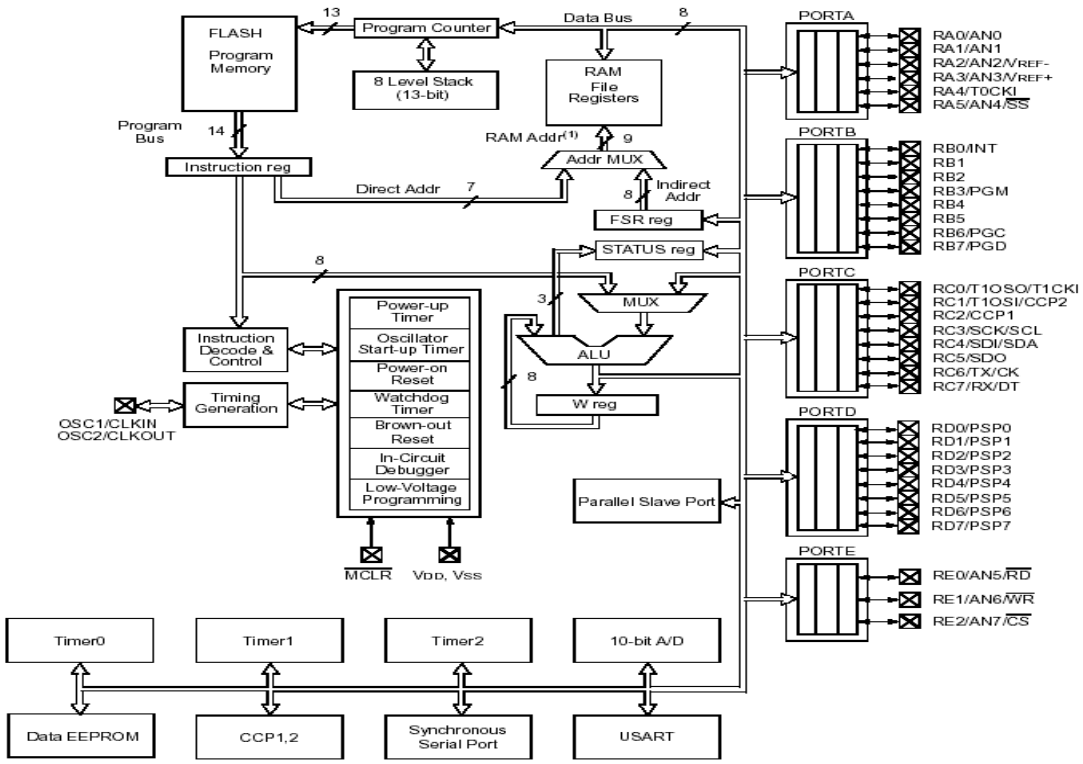

Fig. 1: Internal block diagram of the PIC16F877 microcontroller

Simulation and realization of the educational mobile robot

The following tasks are implemented in this application:

- stepper motor control;
- obstacle detection and change of direction of travel.

To make the application we used the following components:

- two stepper motors;
- two PIC16F84A microcontrollers and their assemblies;
- mechanical sensors made of mouse buttons and LEDs that light up when the sensors are activated;
- 9V batteries for powering circuits;
- wireless transmission modules.

Below, in figure 2 is a picture from the construction of the mobile robot., as Coșaru C.I. (2010) uses in his research

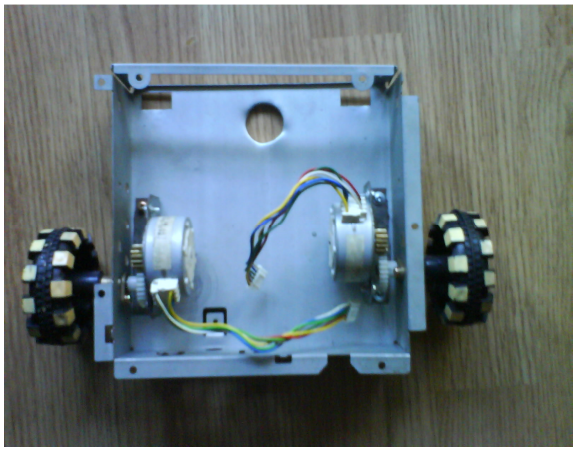

Fig. 2. The Skeleton and the stepper DC motors

Design of The Electrical Circuits

The wiring diagram software interface used is called: *Eagle Professional.* This program is a utility that is used to create and verify wiring diagrams, create and check wiring, position electronic components on the board, direct signals and self-route them. The following image shows the interface of the Eagle electronic design program.Following the realization of the electrical diagrams, the wiring related to the two assemblies of the robot prototype resulted. Both the wiring diagrams and the related wiring are presented below, in figure 3.

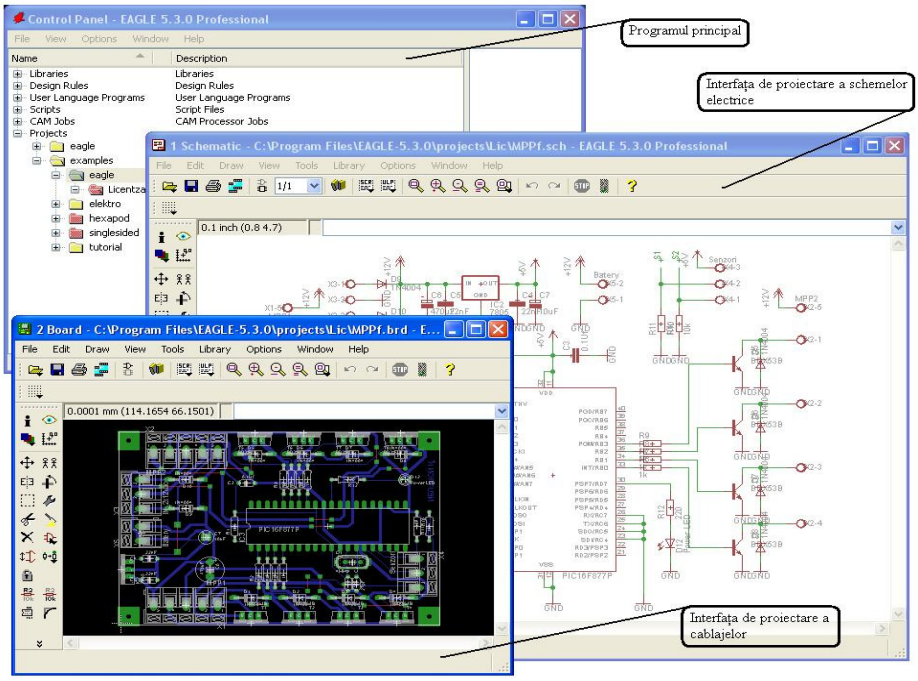

Fig. 3: Eagle Professional Interface

The transmission module has 5 inputs. These are located on port B of the RB2, RB3, RB4, RB5, RB6 pin microcontroller. The data is transmitted further through port A via pin RA0. For this module one made the following wiring diagram, presented in figure 4:

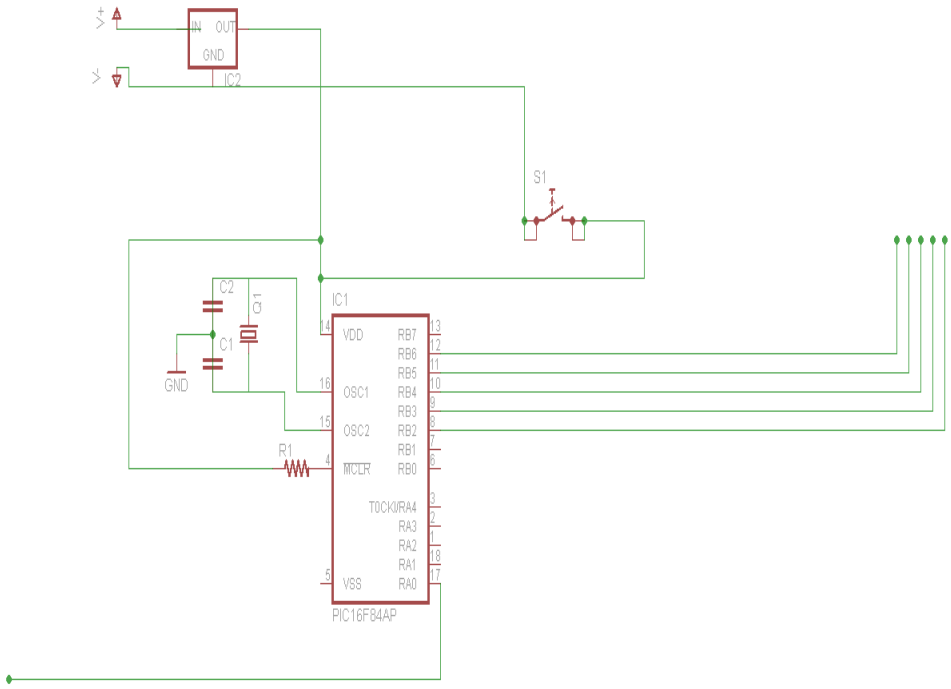

Fig. 4: Wiring diagram wireless module

Microcontroller Programming

The first step is to initialize the process which includes:

- declaration of engine outputs (1);
- declaration of engine outputs (2);
- declaring the input of the sensor (1) (the sensor placed at the top);
- declaring the input of the sensor (2) (the sensor placed at the bottom).

After declarations, the engines start maintaining their direction until one of the sensors is actuated. If one sensor is actuated, it is checked whether it is the sensor on the left or the right, if it is the one on the left, the robot will go backwards and then go to the right and vice versa for the other sensor.

Creating the simulation program

In a research study by Logofatu D. (2007), the software used to create the program to be implemented in the microcontroller is MikroC. MikroC is an application development utility for PIC microcontrollers. This software has a rich set of hardware libraries and is an easy way to program PIC microcontrollers.

MikroC is a high-level language, as is MikroPascal or MikroBasic, which simplifies programming, allowing you to write in one line or a few lines what many lines of programming in assembly language would require, as one shown in figure 5.

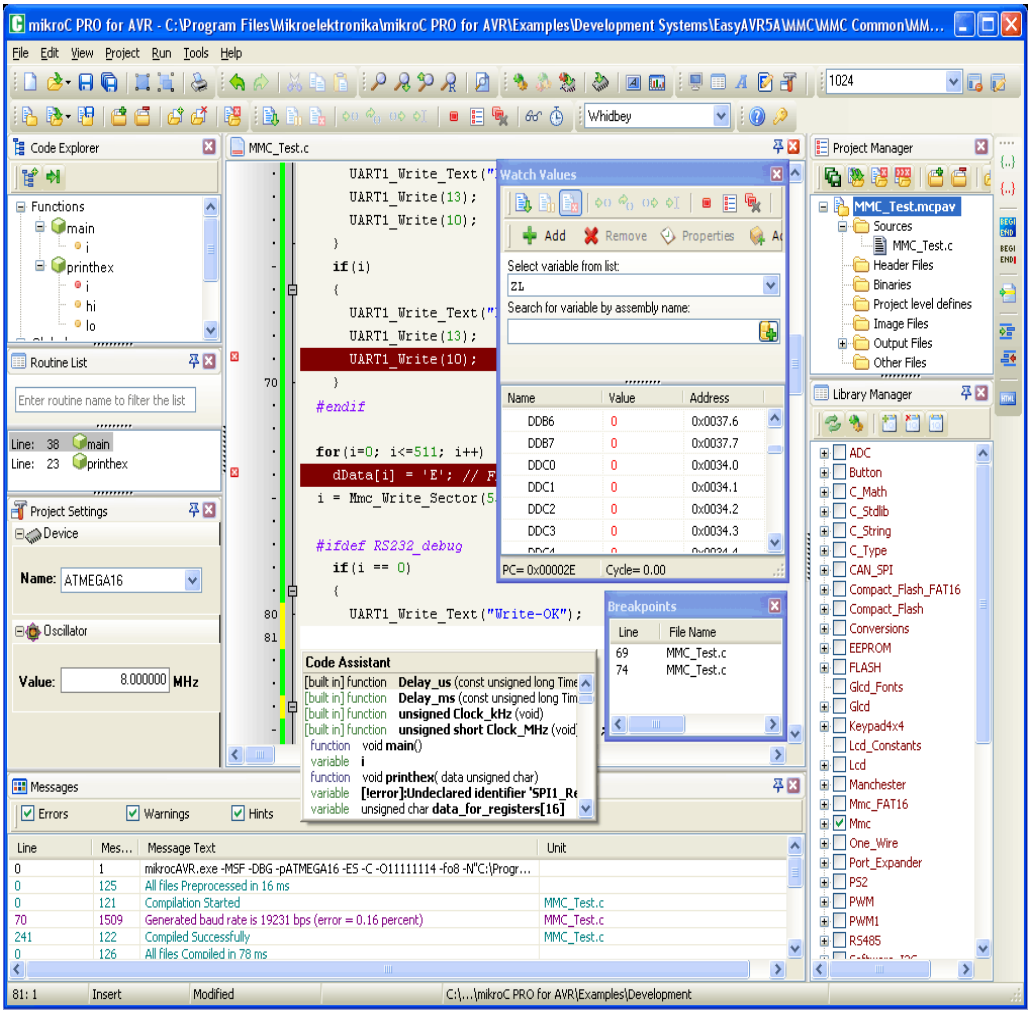

Fig. 5: MikroC programming language interface

According with Margineanu I. (2005), MPLAB is a Windows program package that makes writing and developing a program easier. It can best be described as a development environment for a standard programming language that is intended for programming a PC computer. Some operations that were done from the instruction line with a large number of parameters until the discovery of the IDE, "Integrated Development Environment", are now made easier by using MPLAB. However, our tastes differ, so even today some programmers prefer the standard editors and compilers in the instruction line. In any case, the written program is easy to read, and a well-documented help is available.

MPLAB consists of several parts:

- Grouping files of the same project into a single project (Project Manager);

- Generating and processing a program (Text Editor).

According with Coșaru C.I. (2010) and Patic P.C. And Zemoury R. (2020), written program simulator used to simulate the operation of the program in the microcontroller. In addition, there are support systems for Microchip products such as PICStart Plus and ICD (In Circuit Debugger). Because this book does not cover them, they will only be mentioned as options, in figure 6.

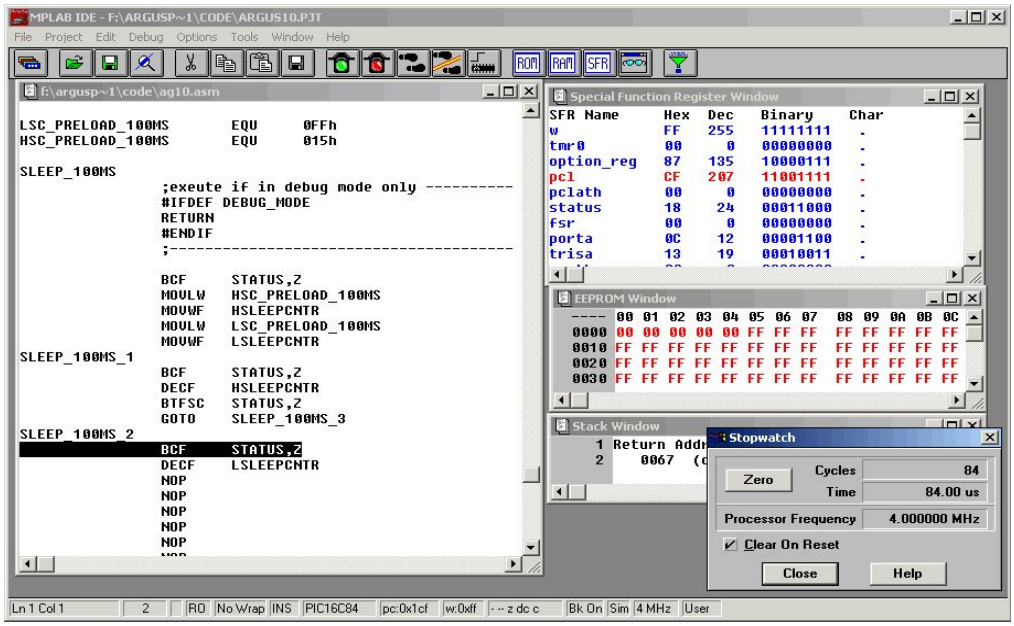

Fig. 6: MPLAB Interface

Conclusions

The mobile robot was designed to perform PC dependent tasks but with the possibility of modifying the program if other routines occur or you actually want to modify the program. All this is possible because the robot is equipped with a radio transmission / reception module, so commands are transmitted to the robot from the PC via the parallel port and the radio transmission module and information is received on whether or not to place the command. If various objects unforeseen by the work program appear in the robot's workspace, it can detect them with the help of mechanical sensors. After detecting the respective obstacle, the robot makes a detour subroutine, after which it returns and continues its routine that it had to execute, using this subroutine whenever necessary.

The power supply is made with 9V batteries, thus having autonomy for a very short time. The field of robotics is in a continuous development, and in the future we could see only robots working.

Some improvements and future research one could talk about a wide range of sensors that we could mount on the robot to increase its sensitivity to various objects or to use it to detect and catch objects with the help of arms mounted on it. Another improvement that could be made would be its programming using neural networks for making and storing maps. The field of robotics is in a continuous development, and in the future we could see only robots working.

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Energy and Economic Efficiency of Municipal Waste Processing Plant

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
E-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
E-mail: piotr.walag@urk.edu.pl

Mateusz SAMEK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,

Abstract

The main purpose of the paper is to conduct an energy audit for a mechanical and biological waste treatment plant. The energy audit consists in collecting data from a company or facility, about the devices used in the entire waste treatment process, and then on the analysis of proposing ways to improve the energy efficiency of the tested facility. The energy audit is based on the Energy Efficiency Act and the PN-EN 16247:2014 standard. Presented work consist two basic proposals for improving energy efficiency. The first suggestion is the optimization of the compressed air installation, which shows how much money can be saved by using a monitoring system and detecting air system leaks. The second proposal is the automation of electricity consumption and measurement systems. It is connected with saving electricity on the basis of continuous monitoring of electricity consumption, which is needed to power all devices on the installation.

Keywords: Energy, efficiency, optimization, line maintenance.

Introduction

Energy management, or energy consumption, is defined in a variety of ways in the literature. This definition is presented as, inter alia: systematic management and application of newer and newer technologies to improve the energy performance of the facility (ISO 50001:2018), control, monitoring and implementation of measures increasing energy efficiency (Bunse et al. 2011), continuous improvement of the plant's energy efficiency by introducing more and more effective measures and methods aimed at simplifying the implementation of pro-energy tasks, thanks to which the manager can provide a given facility with continuous utilities and reduce energy consumption costs (Javied et al. 2015). Regardless of the above definitions, it can be assumed that one of the main reasons for taking various actions related to the management of energy consumption and energy resources are the following points (after ISO 16247: 2014): willingness to increase energy efficiency, and hence - to reduce the costs of a plant or organization's operation, compliance with national or European legal acts related to energy efficiency, meeting European, national or customer standards. In order to facilitate the fulfilment of the above needs, environmental management systems, and more specifically energy management, are increasingly used in organizations. Energy management systems can be implemented on the basis of a specific standard, e.g. they can be based on the European standard ISO 50001:2018 or they can be dedicated systems created especially for a given organization. Regardless of the type of enterprise and the industry in which it operates, the energy management system should include (Abdelaziz et al. 2011; Weidong et al. 2011; ISO 50001:2018) the company's energy strategy along with operational and strategic goals, description of the current initial situation along with a detailed analysis of historical data - including a detailed report on the energy audit, description of procedures, measures and methodology for introducing optimization, a diagram of the entire organizational structure with precisely described responsibilities for staff assigned to implement changes, description of the training system, open and clear documentation keeping and the method of presenting the results in the report.
Poland as a member state of the European Union must constantly adapt to the EU policy. One such example is adaptation to the energy policy, which assumes that by 2020 Poland is to reduce electricity consumption by 20 percentage points in relation to the "business as usual" scenario (PEP2030). Currently, Poland is implementing the provisions of the EU energy policy very well. The energy intensity of GDP fell by 30% between 1999 and 2009, and it is further decreasing thanks to the greater awareness of people about this issue. This is a good result, however, the effectiveness of the Polish economy, converted as GDP per unit of energy (according to the euro exchange rate), is still two times lower than the European average (PEP2030). The significant economic development resulting from

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the modernization of the facilities and the automation of most plants translates into an increase in electricity consumption with a relative decrease in the availability of other forms of energy. Today, the issue of energy efficiency is the priority, and the progress that comes with it will have a significant impact on meeting all the goals (PEP2030). In 2014, the European Union's energy efficiency policy was slightly changed with a commitment to introduce 27% energy savings in relation to older forecasts. In 2018, this target was increased to 32.5% for all members of the European Union (PEP2040). Poland, as a member state, declared itself to make further progress related to increasing the energy efficiency of the economy. Based on the impact on GDP, the analysis of the effects of the measures taken and the savings potential, Poland declares a national target for improving energy efficiency by 2030 at the level of 23% in relation to the 2007 primary energy forecasts (PEP2040).

The purpose of the work is the energy audit usage to select the best method of improving plant efficiency, considering electricity, and then proposing modernization methods that will reduce electricity consumption, increase control over electricity consumption, which is associated with better management of energy consumption with overhead contact line, where it can reduce the cost of energy purchases.

Materials and Methods

The efficiency of the installation during the processing of municipal waste amounts to a maximum of 50 $Mg \cdot h^{-1}$, and during the processing of waste from selective collection, the efficiency is lower by half and amounts to approx. 25 $Mg \cdot h^{-1}$. The plant currently recovers nine recyclable raw materials - selective steel and aluminium scrap, paper, tetrapak (cartons of juices, drinks or milk), selective PET colourless, blue, green, polypropylene (PP), high-density polyethylene (HDPE), foil (LDPE) and cardboard box. Currently, work on the installation takes place in two shifts - first from 6.00 am to 2.00 pm, and the second from 2.00 pm to 10.00 pm.

The start of the process starts with loading the waste from the RTD bag breaker. Then, after cutting the larger bags, the machine evenly distributes the waste on a belt conveyor, where the waste is transported to a rotary sieve. Between the tear and the sieve there is a station where one person chooses cardboard and dimensions such as washing machines, refrigerators, carpets, tires or car bumpers. The sieve then divides the material into three fractions: below 80 mm, 80 - 340 mm, over 340 mm. The fraction above 340 mm goes straight to the containers and is treated as post-industrial waste, and then it is disposed of in a waste incineration plant in Kraków. The first two fractions, with separate conveyors, go to magnetic separators, where steel and aluminium scrap is recovered, which goes to the cabin and is cleaned manually by people. Then the waste goes to vibrating sieves, where the fraction below 80 mm is screened and treated as waste, and the rest of the material is divided into the 80 - 140 mm and 140 - 340 mm fractions. This is due to the fact that optical separators are able to separate different raw materials better. After sieving on vibrating screens, both fractions go to optical separators, which divide the material into paper and plastics. The partially separated paper is conveyed by conveyors to the next optical separators, where it is sorted more precisely. At the very end of the paper line, people clean the material, which in a loose form goes to the press and is formed into cubes for easier loading and storage. Plastics go to ballistic separators, and on them a foil is separated, which goes to optical separators and is later cleaned by people in the sorting cabin. The remaining plastics go to a series of six optical separators, which select three types of raw material: PET, tetrapack, polypropylene and high-density polyethylene. All these raw materials go to the sorting cabin for thorough cleaning by people, and then they are pressed into cubes and stored. Process residues go to a line leading through the NIHOT Air Separator to a waste shredder, where the waste is converted into alternative fuel (RDF).

The process of energy efficiency assessment begins with an initial visit to the tested facility. During the visit, the auditor should obtain an initial description of the site and process, and then agree with the facility authorities on the scope and boundaries of the energy audit. Next, the collection of data needed to conduct the audit begins, all data and information, at the request of the auditor, must be provided by the organization. If data is missing, then the auditor is required to complete the data by making measurements personally. The request for data may include: information on technological processes, information on the building, information on energy sources, shift system, installation operation time, efficiency and types of machines. After collecting the necessary data, the auditor reviews whether the information is sufficient for the agreed purpose, and then performs an initial analysis of the data held. If, after the analysis, there is still no data, the auditor should carry out additional measurements in order to, for example, confirm the suitability of the initial state or confirm energy consumption, energy balance or correction indicators. Then the auditor creates an extensive analysis, which includes the energy balance and energy distribution, energy performance indicators and the most important, i.e. identification and assessment of energy efficiency improvement opportunities (ISO 16247).

Results

In the process of waste segregation, the Installation uses 181 electrical devices with a total installed power of 1,605.35 kW. In average annual terms, the company processes approximately 105,000 Mg of waste. The most numerous groups of devices are belt conveyors (125 items), accounting for 69.1% of devices. In the balance of energy consumption, belt conveyors (417.55 kW) are in greatest demand, accounting for a total of 26% of the installed power in the plant. The production process uses three compressors with a total engine power of 360 kW. Other machines are dehumidifiers, electrical cabinets and blowers for heating the room. Compressed air is used to separate the waste stream after qualification by optical separators. The average annual energy consumption for production purposes was estimated at 4,822.05 $MWh \cdot yr^{-1}$. Converted to a unit of processed waste, we obtain consumption at the level of 0.05 $MWh \cdot Mg^{-1}$. The plant consumes a total of 414.62 Mg of oil equivalent (toe) of final energy per year (tab. 1).

Table 1: Energy consumption of the MBP technological process

Process	Average annual electricity consumption ($MWh \cdot yr^{-1}$)		Average annual consumption of final energy ($Mg \cdot yr^{-1}$)	
	summary	per unit of waste mass 1	summary	per unit of waste mass 1
transport	1 294.35	0.012	111.29	0.0010
separation	419.37	0.004	36.06	0.0001
fractionation	201.33	0.002	17.31	0.0002
material pre-processing	135.00	0.002	11.61	0.0001
shredding	960.00	0.009	82.55	0.0008
sorting	435.00	0.004	37.40	0.0004
air processing	1 080.00	0.010	92.86	0.0009
agglomeration	297.00	0.003	25.54	0.0002
SUM	**4 822.05**	**0.046**	**414.62**	**0.0037**

One of the proposals to improve energy efficiency is the introduction of preventive controls of the compressed air distribution system. Detection of leaks and leaks has an impact on generating financial savings. The value of the total efficiency is the higher, the higher the partial efficiency in the form of manufacturing efficiency, accumulation, distribution, use of air. An example of an economic analysis of the installation of flow meters in a compressed air system is presented below (Table 2). As part of energy efficiency measures, it is recommended to install a heat energy recovery system from the compressor system. Table 3 shows an example of an economic analysis for the detection and repair of leaks in a compressed air system.

Table 2: Presentation of investment in the purchase of flow meters for compressed air installations

Total power of compressors (kW)	360,00
Air production cost per year	88 000,00 EUR
Air production savings - 10% per year	8 800,00 EUR
The cost of purchasing 1 2 "flow meter (up to 1000 $m^3 \cdot h^{-1}$) and a monitoring system	2 500,00 EUR
Return on investment	~ 1 yr

Table 3: Presentation of investments in the detection and repair of leaks from the compressed air system

Air consumption ($m^3 \cdot min^{-1}$) - compressor ~ 360 (kW)	~ 1060,00
Air consumption ($m^3 \cdot h^{-1}$)	~ 63 600,00
Compressor operating time per year (hr)	3 200,00
Air production cost per year	8 140 800,00 EUR
Cost of leak detection and repair	15 000,00 EUR
Savings from air production – 10% per year	814 080,00 EUR
Return on investment	~ 1 yr

Optimalization of the compressed air system may provide in few different areas. The first area where savings may be provided air production. It is possible, in its case, to improve efficiency by up to 5-20%. Recommendations for the

compressed air intake area contains leak detection and repair is an important process because thanks to it we are able to reduce energy consumption by compressors by ~ 10 ÷ 15%. Most leaks are not audible: 1% less pressure reduction means 7% less energy consumed by the compressors and 13% less leakage; reduction of incorrect consumption - in this case, consumption can be reduced by about 10%; appointment of 1 or more energy efficiency leaders, combined with training of informed and responsible compressed air users; awareness of the cost of compressed air contributes to the unit cost of production through the installation of measurement and monitoring. Another area of potential savings is the area of air transmission, where we can obtain energy efficiency improvement by 5-20%. Recommendations for the compressed air transmission area: checking the capacity of pipelines, what is their diameter and length of arteries, additionally carrying out calculations of capacity and transmission losses; in terms of determining transmission losses, there is a significant improvement in efficiency, for this purpose the pressure drop measurement on the network is used; appropriate selection of pipeline material, the pipeline is made of aluminum. Pipelines made in this technology are of high quality, guarantee tightness for 20 years, with the possibility of reconstruction; a properly made installation occurs when it has properly selected cross-sections and lengths, the installation is additionally closed in a loop, moreover, there are exits from the side or from the top, the correct number of valves, reinforcement tanks, inclination for drainage, proper fastenings, material certification and ready network, recommended pressure drop below 2 ÷ 5% of the initial state. The last of the possible areas for improving the energy efficiency of the compressed air system is the consumption area, where we can demonstrate an efficiency improvement of 10 ÷ 60%. The cost of air is twice as high in this area. Leaks account for approx. 20-30%, but even up to 70% of the total compressed air produced. These values can be easily reduced by at least half, even up to 80%. The use of a special detector can locate potential leaks and calculate losses.

The second proposal to improve energy efficiency is the use of a continuous monitoring system for energy utilities consumption. The solution that allows to effectively carry out this task is the use of the SCADA program. It is proposed to use SCADA ASIX software and build a BMS platform. The use of ASIX software allows for monitoring of energy consumption by devices and departments in terms of effectiveness with the possibility of online calculation of EnPI - Energy Performance Indicator, control of the set goals and notification of the fact that they have been exceeded by means of communication (SMS, e-mail), creating reports for both the management and technical staff (tables, charts, histograms), choosing the most favorable tariff - based on energy consumption cost analyzes, conducting an analysis of the distribution of energy costs into departments and technological lines, reorganizing technological processes by shifting the load to cheaper energy zones, avoiding unnecessary consumption, access to historical data at any time, comprehensive data analysis, elimination of manual writing down of data from meters. The ASIX software package in the package price provides about 100 communication drivers that allow communication with meters, meters and drivers available on the market. This provides access to data from all measurement points. ASIX is a software that fully complies with all the requirements of the ISO 50001 energy management system. The program supports the implementation and maintenance of the energy management system by automating many processes, as well as supporting the circulation and archiving of documents. The ASIX system supports the implementation of the objectives and tasks of the policy of efficient energy use, and also allows to measure the actual effects of this policy. Estimated savings from the introduction of electricity consumption metering constitute about 5% of electricity costs. The cost of the system depends on the number of measuring points. In the case of installations for mechanical-biological treatment of waste, at least 70 measuring points shall be provided. The estimated investment outlays and savings are presented in the tables 4 and 5.

Table 4: Initial parameters for the calculation of the economic efficiency of an investment in the SCADA ASIX media consumption monitoring system

Net capital expenditure [EUR]	250,000.00
VAT	23.00%
Tax amount [EUR]	57,500.00
Annual energy savings [kWh]	110,645.50
Average annual energy cost [EUR·kWh^{-1}]	0.48
Annual net energy savings [EUR]	53,109.84
Discount factor 1	0.03
Discount factor 2	0.04

Table 5: Calculation of the economic efficiency of an investment in the SCADA ASIX media consumption monitoring system

YEAR	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
NCF (*Net cash flow*)	-250,000.00 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR	53,109.84 EUR
Present value - discount rate 3%		97.09%	94.26%	91.51%	88.85%	86.26%	83.75%	81.31%	78.94%	76.64%	74.41%
Present value - discount rate 4%		96.15%	92.46%	88.90%	85.48%	82.19%	79.03%	75.99%	73.07%	70.26%	67.56%
NPV – discount rate 3%		51,562.95 EUR	50,061.12 EUR	48,603.03 EUR	47,187.40 EUR	45,813.01 EUR	44,478.65 EUR	43,183.16 EUR	41,925.40 EUR	40,704.27 EUR	39,518.71 EUR
NPV – discount rate 4%		51,067.15 EUR	49,103.03 EUR	47,214.45 EUR	45,398.51 EUR	43,652.42 EUR	41,973.48 EUR	40,359.11 EUR	38,806.84 EUR	37,314.27 EUR	35,879.10 EUR
Cumulative NCF - discount rate 3%	-250,000.00 EUR	-198,437.05 EUR	-148,375.93 EUR	-99 772.90 EUR	-52 585.50 EUR	-6,772.48 EUR	37,706.17 EUR	80,889.33 EUR	122,814.73 EUR	163,519.00 EUR	203,037.71 EUR
Cumulative NCF - discount rate 4%	-250,000.00 EUR	-198,932.85 EUR	-149,829.81 EUR	-102 615.36 EUR	-57 216.85 EUR	-13,564,43 EUR	28,409.05 EUR	68,768.16 EUR	107,575.00 EUR	144,889.27 EUR	180,768.38 EUR
Sum NPV - the discount rate 3%	453,037.71 EUR	Sum NPV - the discount	430,768.38 EUR	NPV – discount rate 3%	203,037.71 EUR	NPV – discount rate 4%	180,768.38 EUR	IRR	12.12%	SPBT (year)	4.71

Summary

Over the past few decades, one of the main goals of energy and climate policy has been to promote the reduction of energy consumption in energy-intensive sectors such as waste management. The goal of reducing energy consumption without disrupting plant operations requires increasing electricity savings. Such improvement, however, means a reduction in the marginal costs of the energy service, which in turn may stimulate an increase in its demand. This phenomenon, or the so-called rebound effect, is associated with an increase in energy consumption which may partially or fully offset the expected increase in energy efficiency. If the magnitude of this effect is not negligible, policies to reduce energy consumption by promoting energy efficiency may not be fully effective. The rebound effect may also have unexpected economic or environmental effects, such as higher GHG emissions than expected. In order to fill this gap in the literature, an empirical analysis of energy efficiency in the waste management industry was carried out in the model enterprise. The obtained results show the average fuel efficiency at the level of 78%. From a European perspective, the results show that additional benefits can be obtained from policies that encourage electricity savings in countries that are relatively fuel inefficient. These policies should be linked to the appropriate price signals in the sector, i.e. applying specific taxes, promoting industrial automation and, where possible, providing alternative and environmentally friendly machines for production.

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Solidification of Hazardous Waste - Technology Case Study

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Justyna STABRAWA
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,

Janusz TABOR
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: janusz.tabor@urk.edu.pl

Krzysztof GÓRKA
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: krzysztof.gorka@urk.edu.pl

Abstract

The paper introduces a problem of hazardous waste that constitute a threat both the environment and human health. Particular attention is paid to waste in form of soil contamination. The article presents a mobile processing line for waste solidification. This is one of the methods that neutralize hazardous waste. Another essential aspect of presented technology is a waste processing, where waste and cement are both used in concrete production. The simply economic analysis shows costs of the installation use, annual profit possible to gain and discounted annual income which presents costs of the investment for the subsequent years of use.

Keywords: solidification, waste, neutralizing, installation

Introduction

Solidification of waste is one of the methods of hazardous waste disposal. The American Environmental Protection Agency hailed it as the most effective technology for neutralizing hazardous waste (Shi and Fernandez-Jimenez 2006). The main goal of the technological processes is the chemical transformation of waste into the form that is most inert to the natural environment (e.g. reducing water absorption, increasing mechanical strength, reducing leaching of pollutants, etc.). In this technology, waste is combined with binders, which are designed to solidify and stabilize the waste (Pyssa 2008, Grabowski et al. 2017). As a result, hazardous substances are blocked in the transformed material, which reduces the risk of harmful substances escaping into the environment (Misra and Pandey 2005).
Usually cement is used as a binding material for the solidification process (Wasiak and Różalska 2003). Cement is used very often because it has many advantages. The main one is that it has the ability to bind heavy metals effectively. It is also not very susceptible to external physical; chemical or biological factors and it is poorly soluble in water (Wasiak and Różalska 2003). Solidification of waste with the use of cements is based on (Shi and Fernandez-Jimenez 2006): 1. chemical binding of pollutants, occurring during the hydration reaction of cement components, and pollutants, 2. adsorption of pollutants on the surface of hydrated cement, 3. permanent isolation of contaminated waste.

The solidification process is innovative and most often used method to neutralize hazardous inorganic waste (or waste containing traces of organic compounds). These wastes pose a threat to the environment because there is a risk of toxic chemical compounds of metals penetrating. The advantage of this process is that the waste after transformation and neutralization can be used as road aggregate or as various building materials (Fengler 2012).

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Materials and Methods

The waste for solidification in studied installation was soil containing dangerous and toxic mercury. Most often, harmful chemical compounds appear in the soil near operating industrial plants or around objects that have already been excluded from use. Such pollutants pose a significant threat to the environment. It is from this type of place that the waste suitable for solidification and thus neutralization in the resulting installation will come from. The installation will receive waste, which will be pre-shredded, mixed and partially stabilized. The waste prepared in this way at the installation of "solidification of hazardous waste from technological processes" will be further processed and, as a result, will be neutralized in the resulting concrete. The capacity of the line is 10 - 12 $Mg \cdot h^{-1}$.

The process cost intensity, and the internal rate of return and investment (IRR) and its net present value (NPV) were determined. The following parameters were established for the economic analysis of the project: the value of net investment outlays was estimated at EUR 372,000.00; VAT 23%; annual income: EUR 90,044.40 (including profit from the sale of concrete); average annual cost of living: EUR 4 200.00; additional costs: EUR 6,000.00 (flat rate for operating costs related to the planned investment, including service costs, service costs). – The net present value of the investment (NPV) is calculated according to the formula (1):

$$NPV = \sum \left(\frac{D_t}{(1+r)^t}\right) - N_0 \quad (1)$$

where: D_t - net profit [EUR], r - discount rate [%] t - subsequent years of the forecast, N_0 - investment expenditure [EUR].

The calculations were made for the discount rate = 3% and the discount rate = 4%. The NPV indicator is helpful in considering whether the investment is profitable. If NPV ≥ 0, the investment is profitable and should be accepted. When NPV <0, the investments should be discarded.
The internal rate of return (IRR) is the value of the discount rate for which the NPV will be 0 (eq. 2):

$$IRR = r_1 + \frac{NPV_1 \cdot (r_2 - r_1)}{NPV_1 - NPV_2} \quad (2)$$

where: r_1 - 3% discount rate, r_2 - 4% discount rate, NPV_1 - present value of the net investment for the 3% discount rate, NPV_2 - present value of the net investment for the 4% discount rate.

Results

Wastes are delivered to the installations by cars with a covered trailer. After unloading materia lis transported into STELMAR BT-500 L4 hopper. From the charging hopper, the waste goes to a belt conveyor, which will be transported to a roller crusher. The belt conveyors will also come from STELMAR. In the crusher, wastes were crushed into a fraction with a maximum size of about 10 mm. A GR - 65 roller crusher from GOSTER was selected for this purpose. The shredded waste with a particle size of about 10 mm will fall by gravity into a charging hopper with conveyor belt. Subsequently, they will be transported by a conveyor belt to a mixer (mobile concrete batching plant). Proxy Trade's M1800 mobile concrete batching plant was selected for this technology. It has a double silo in which each silo container contains 2 x 2.4 m^3. The mixing container has adjustable mixing arms and scrapers which are made of steel and hard PVC. It is located on three electronic weighing sensors, which allow a weighing accuracy of +/- 0.5%. The advantage of the mixer is the possibility of automatic control of the entire process through the ICON 9000E control system, which controls all processes of the connected equipment. In the concrete batching plant, all concrete components are mixed and it is there that the ready concrete mix is formed. The silos are supplied with waste, sand, cement and a solution of sodium polysulfide to replace water. This solution is process water from another process that will be used in this plant. All ingredients in the correct quantities will be transported to a mixing container, where they will be mixed and made into concrete. The concrete created in this process is C16/20 class (similar to the former B20 class). This concrete is widely used in construction and road construction. The waste from the mixer will be transported to an intermediate tank from which the concrete will be peeled by other companies (fig. 1).

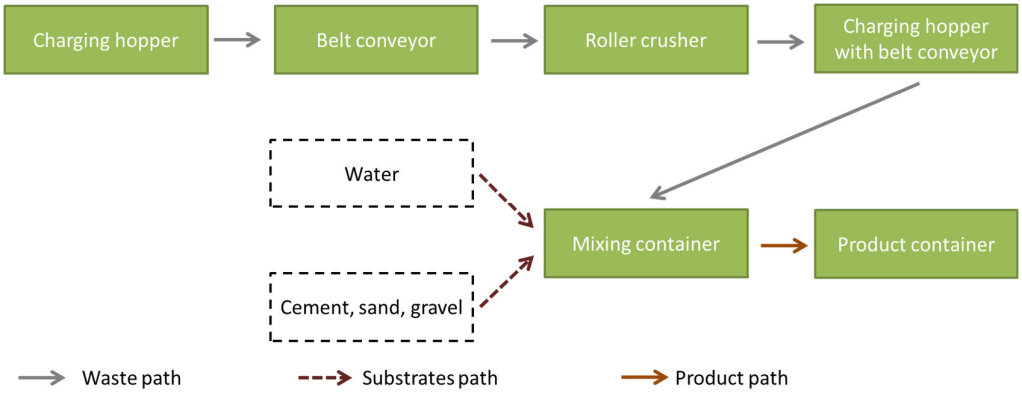

Fig. 1. Installation scheme

The NPV shows the flow of savings as a result of the investment. Initially, the NPV index is negative because it is the time it takes to build an installation, where there is no income but investment costs. In the following years, the installation will bring a net profit of 69,792.20 EUR (Table 1). The percentage present value of the capital employed for each of the periods in the year of the investment is presented in table 2. With the passage of time, the percentage present value of the investment, both at the 3% and 4% discount rates, decreases. The value of your investment decreases faster at a discount rate of 4%. The calculated values in Table 1 and 2 show the effect of discounting the residual value of the investment on its value in the subsequent years of use. It can be seen that with a discount rate of 3%, the values become positive after 6 year, and with a discount rate of 4% in 7 year of the investment. For the investment profitability analysis presented above, the following general profitability ratios were calculated: 1. Sum NPV - discount rate 3% is: 595,341.58 EUR; 2. Sum NPV - discount rate 4% is: 566,077.22 EUR; 3. NPV - the 3% discount rate is: 223,341.58 EUR; NPV - the 4% discount rate is: PLN 194,077.22; 4. Internal rate of return (IRR): 10.63%; 5. Payback period: 5.3 years.

Table 1 NPV values simulation

YEAR	NPV [EUR]	NPV 3% [EUR]	NPV 4% [EUR]
0	-372,000.00	-	-
1	69,792.20	67,759.41	67,107.88
2	69,792.20	65,785.84	64,526.81
3	69,792.20	63,869.75	62,045.01
4	69,792.20	62,009.46	59,658.66
5	69,792.20	60,203.36	57,364.10
6	69,792.20	58,449.86	55,157.79
7	69,792.20	56,747.44	53,036.33
8	69,792.20	55,094.60	50,996.47
9	69,792.20	53,489.91	49,035.07
10	69,792.20	51,931.95	47,149.11

Table2 IRR values simulation

YEAR	IRR 3%	IRR 4%
0	-	-
1	97,09	96,15
2	94,26	92,46
3	91,51	88,90
4	88,85	85,48
5	86,26	82,19
6	83,75	79,03
7	81,31	75,99
8	78,94	73,07
9	76,64	70,26
10	74,41	67,56

Summary

There are three market-leading technologies in waste solidification in Poland. One of them is the technology derived from Sweden - "Geodur". On the Polish market, it is represented by CDF - TECHNOLOGIE DLA ŚRODOWISKA s.c. from Zabrze. This technology uses its own products, from which it creates chemical mixtures needed for the solidification process. It focuses primarily on making the waste as a result of the process characterized by previously assumed properties and meeting certain standards. Another well-known technology is EnviroMix®, which is handled by Ecotech Polska S.A. It is most often used to neutralize soils, sludge and other solid wastes contaminated with hazardous substances. This method uses a material based on magnesium oxide, which is designed to bind impurities contained in the waste. The third company dealing with the stabilization of hazardous waste is MARBET® WIL Sp. z o. o., which introduced the SULTECH® technology to the market. This technology is known to use a sulfur binder in the process. It is most often used for the disposal of ashes from incinerators containing large amounts of heavy metals. From the transformed waste, this company produces concrete products, e.g. in the form of road curbs.
The designed technological line enables the transformation of waste with hazardous properties into a completely safe material that does not pose any threat to the environment. This solution allows you to reduce the waste sent to the landfill and thus reduce the costs associated with it. As a result of this process, concrete of the C16/20 class will be created, which has good physical properties. This concrete will be intended for sale, which will provide additional income. This is a big advantage, because the process will not only neutralize the waste, but the process will create a product that can be used. The installation is a mobile plant, which may be transported to designated places and waste transport limited.

The economic analysis performed showed that the designed installation is profitable. It will bring profit from the sale of the resulting concrete, approx. 70 thousand per year. PLN. The advantage of this installation was also confirmed by the calculated NPV coefficient. For both the 3% discount rate and the 4% discount rate, it takes a value above zero, which confirms that the installation is acceptable and will bring benefits in the next years of use. The profitability of the investment is also indicated by the calculated internal rate of return (IRR), which amounted to 10.63%. This value is much higher than the discount rate, therefore it confirms that the investment is profitable. Even though the capital expenditure is large, the payback time is approximately 5 years. The prepared analysis proved that the design of the installation for solidification of hazardous waste is profitable and will bring material benefits in the next years of operation.

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Impact of Wheel Transport on The Air Quality in The Urban Canyon – Case Study of Krakow

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Wiktoria SOBCZYK
AGH University of Science and Technology, Mickiewicza Av. 30, 30-059 Krakow, Poland,
e-mail: sobczyk@agh.edu.pl

Abstract

A three-year analysis of data from actual measurements of gaseous (NOx and CO) and particulate (PM2.5) pollutants inside the city street canyon in Krakow (Poland) was presented. The measurement results from the analysed period from May to September show the impact of transport on the dispersion of pollutants. In order to check the possibility of predicting air pollution, the OSPM model was used for testing the level of contamination. It was used for direct modeling of measured pollutant concentrations in a street canyon. The results of the research on air quality within a street canyon have shown that all sources of emissions in its area should be considered, and the impact of individual meteorological factors on the state of air pollution should be considered.

Keywords: Car, Traffic, Air Pollution, Street Canyon

Introduction

Road transport is one of the main sources of air pollution. Emissions produced during the combustion of fuels in internal combustion engines have a direct impact on human health and the environment. The last decade has seen a decrease in emissions of pollutants from the transport sector. This is due to the publication of a number of legal regulations and standards by the European Union (EC, 2008) and the World Health Organization (WHO, 2000). The introduction of increasingly restrictive regulations results in the creation of "hot spots" in cities with significantly exceeded emission standards.

The most important air pollutants that are attributed to means of transport include nitrogen oxides (NOx), sulfur oxides (SOx) and dust particles with a diameter less than or equal to 10µm (PM10). They mainly come from exhaust gases and are formed during wear of tires and brake pads in vehicles. European Union countries, the USA and Russia have recognized these pollutants as particularly important in urban agglomerations and responsible for numerous diseases of society (Franco et al., 2016; Genikhovich and Sciermeier, 1995; Genikhovich et al., 2002; Jain and Tiwari, 2016; Khreis et al., 2018; Lozhkina and Lozhkin, 2015; Lozhkina et al., 2016; Ni et al., 2018; Ntziachristos et al., 2009; Silva and Mendes, 2012; Singh et al., 2014; Taha, 2015; Yumino et al., 2015; Zachariadis and Kouvaritakis, 2003). According to a report published by the European Environmental Agency (2017), 39% of NOx emissions and 11% of PM10 emissions were generated by road traffic. Since 1990, the European Union has been constantly monitoring levels of airborne pollutants and requires permanent monitoring from member states (EC, 2008). The basic method of monitoring is the use of special measuring stations, which are located in places representing specific sources of pollution and allowing estimation of the degree of public exposure.

Currently, there are several instruments and policies in the world related to reducing emissions from road transport sources. They are necessary for transport development and planning. Each element of these documents is an assessment of air quality, which is to locate, determine the causes and indicate possible solutions to air pollution problems.

The basic problem of the modern air quality monitoring system is the limited number of measuring points. In order to complete the missing measurements data, pollutant dispersion models are used (Hülsman, 2014; Boltze and Kohoutek, 2010).

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The highest levels of air pollution in Europe are recorded around measuring stations representing the communication background. This fact results from the constant accumulation of pollution and poor street ventilation (Gliniak et al. 2015a; Gliniak et al. 2015b). In 2016, in Germany, about 50% of stations reporting exceedances of nitrogen oxides and particulate matter were communication stations (UBA, 2017). Lamsal et al. (2013), comparing NO2 emissions data and data on multinational urban populations, showed that a larger population contributes to increased air pollution by NO2.

The article presents the impact of various factors affecting air pollution in a street canyon. The aim of this study is to investigate the characteristics of emissions from road transport vehicles in the period May-September, in the years 2017-19. As part of the study, the distribution of pollutants related to the number of vehicles passing through the day was monitored. A typical municipal street canyon located in Krakow, which is one of the city's main thoroughfares, was selected for the study.

Materials and Methods

A typical municipal street canyon located on Krasinski Avenue in Krakow, which is part of the second ring road of the City, was selected for analysis (Fig. 1). It is a communication route with a significant amount of car traffic (over 3500 vehicles per hour). Within the street there is a communication pollution measuring station belonging to the Provincial Inspectorate for Environmental Protection in Krakow. The data used for the research comes from the above-mentioned station (http://krakow.pios.gov.pl/stan-srodowiska/monitoring-powietrza/).

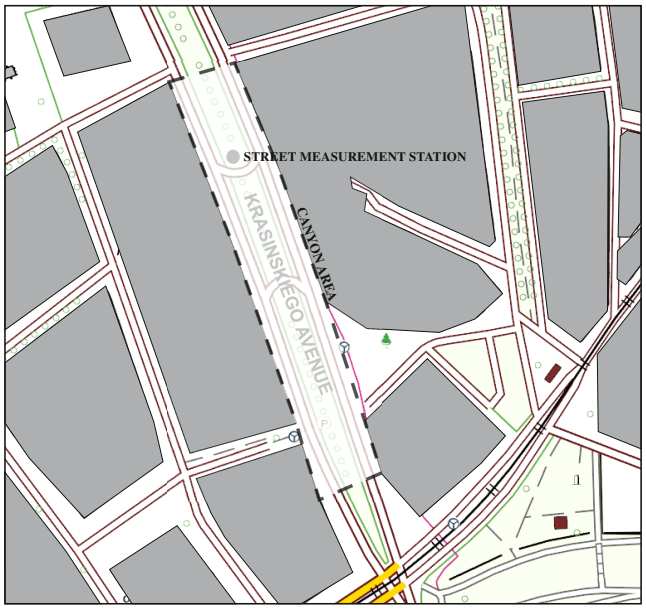

Fig. 1: Location of the research.

Krasinskiego Avenue is one of the most important transit streets in Krakow. It lies in the city center and is oriented in a north-south direction, with a road lane width and a building height of about 45 m and 25 m respectively, arranged in a continuous manner on both sides of the street. The area of the canyon is about 13,000 m^2. The monitoring station is located in the central part of the canyon, with the air intake port at a height of 2.5 m above ground level. The street is a busy one-lane street with about 8,500 vehicles a day. The average vehicle speed is 18 $km \cdot h^{-1}$.

The OSPM dispersion model was developed by the team of National Environmental Research Institute of Denmark. It is based on a combination of partial box models of direct impact of traffic. Direct impact is calculated on the basis of the plume distribution of pollution in space. It is assumed that both traffic and emissions are evenly distributed throughout the canyon. Atmospheric recirculation within the street canyon is determined on the basis of the trapezoidal vortex. Its shape assumes the maximum length of the upper edge as half the vortex length. Ventilation of the recirculation zone occurs through trapeze edges and may be limited by the presence of a building with wind if the building passes through one of the edges (Berkowicz, 2000; Ziv et al., 2002; Ketzel et al., 2003).

OSPM for calculations requires hourly traffic and vehicle speed, background pollution concentrations, meteorological parameters (temperature and solar radiation; wind speed and direction), emissions from traffic and street geometry. Traffic intensity observations were carried out on 10 randomly selected days of the week, each month (Figure 2). The

diversity of the vehicle fleet on the street averaged 90% of passenger cars, 2% of delivery vehicles, 1% of trucks and 7% of buses for the measurement period. To calculate emissions from traffic, the following input data is needed: emission factors, vehicle movement and speed for each hour of the day and correction of cold engine start. Emission factors based on the European emission model COPERT III (http://vergina.eng.auth.gr/mech/lat/copert/copert.htm) were used in the calculations for particular vehicle types, technology and engine power, fuel type as well as emission reduction (catalysts, particulate filters). It was recognized that there is no percentage of vehicles with a cold engine (ADEME, 2002; Ziv et al., 2002; Ketzel et al., 2003).

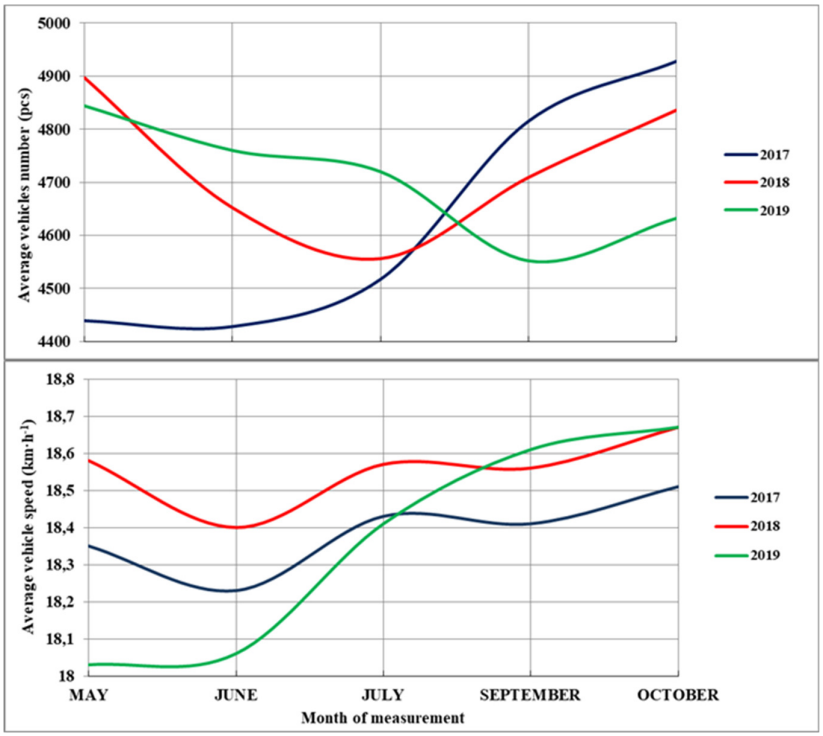

Fig. 2: Vehicle number and speed for measured months (vertical lines indicate middle day of the month).

Results and Discussion

Figure 3 presents changes in wind speed (due to the location of the test site no change of direction occurred) of the measured and modeled concentrations of NO, CO and PM2.5 There is a strong positive correlation between the analyzed air pollutants. The presented measurement data show that the holiday months (July and August) have the lowest concentrations of pollutants.

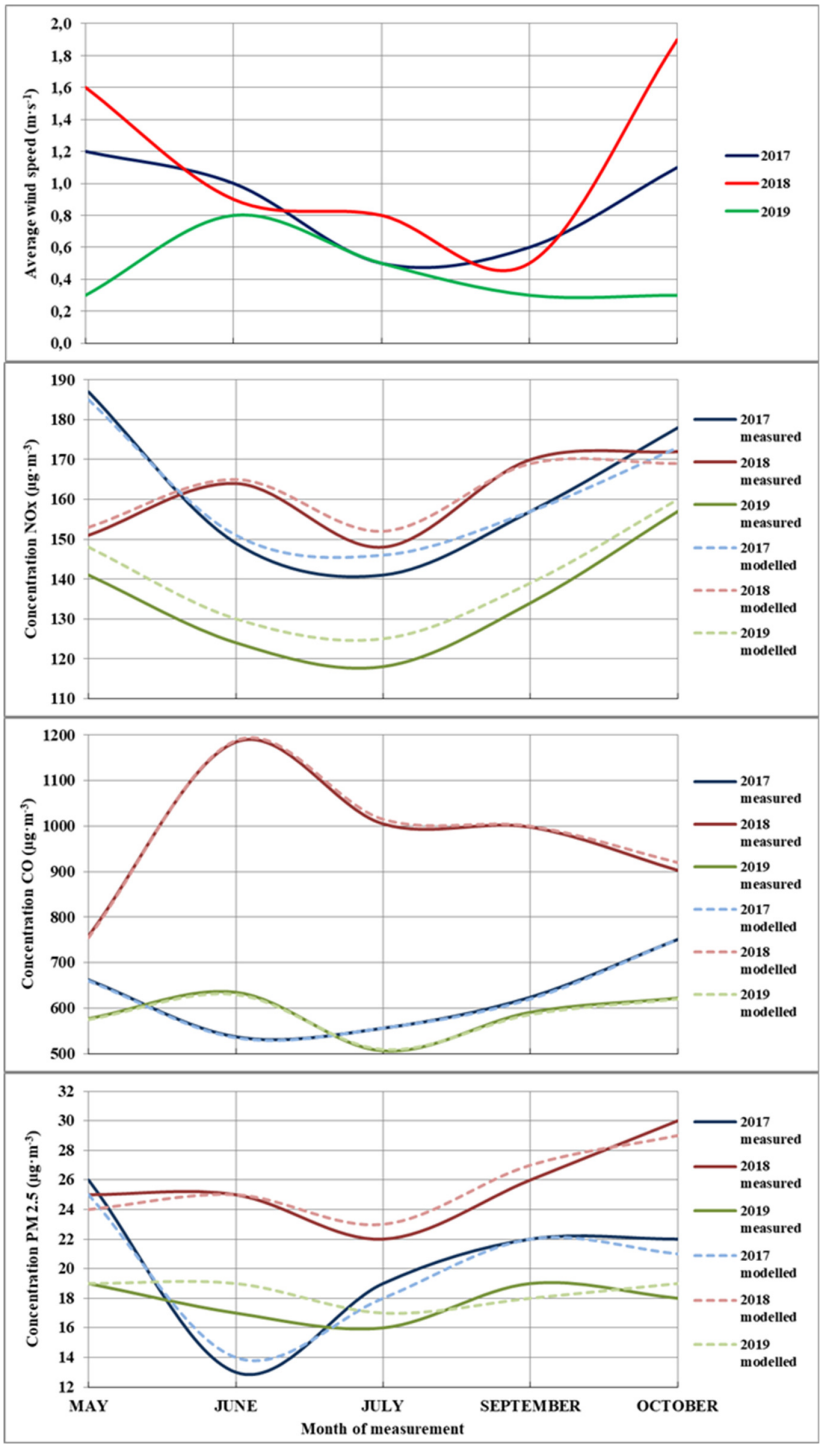

Fig. 3: Time series of research in the years 2017-19 (vertical lines indicate middle day of the month).

Their presence is not correlated with the wind speed recorded in the audited street canyon. Typically, lower wind speeds were observed in July and August compared to the other months covered by the study. This phenomenon should lead to an increase in the concentration of pollutants, however, the analysis showed that during these periods the number of vehicles using the street will also decrease. Higher wind speeds (2017 and 2018) were observed in the months of May and September than in the summer, which also resulted in an increase in the concentration of pollutants that could have get into the street canyon from the surrounding areas.

Modeling of the content of pollutant concentrations in the air shows up to 3% difference in comparison with the measured value. The results of OSPM modeling for nitrogen oxides (Fig. 3) for 2017 and 2018 present a good mapping of the actual measurements (correlation coefficient is 0.98), while in 2019 the OSPM model overestimated the recorded concentrations reaching a correlation of 0.96. Modeling using the OSPM technique has proven successful for the concentration of carbon monoxide in the air and PM2.5 dust, obtaining a correlation between actual data and calculated at 0.99. The relative share of concentrations of individual pollutants depends on traffic, day of the month and meteorological conditions. This system achieves lower values in the summer months and higher values during spring and autumn. The average monthly values of the measured concentrations of pollutants are smaller than the values allowed by WHO (2003). Comparing periods of high and low traffic with each other, the OSPM model describes the variability of pollution concentrations in a satisfactory manner. When analysing the concentration of nitrogen oxides and particulates, a slight overestimation of the measured values can be observed. Differences resulting from model tests and actual measurements can be caused by errors associated with the measurement of vehicle speed and applied simplifications (e.g. no change in wind direction, correction of cold engine start). In the case of CO, the OSPM model shows almost 100% convergence of calculations with real measurements.

Conclusions

PM2.5 particulate matter and concentration of gaseous pollutants (NOx and CO) were monitored simultaneously for a period of five months for three consecutive years in a canyon street. Time series of wind speeds and pollution concentrations were presented in order to reveal dilution conditions on the street for various wind speeds, as well as in cases of a diverse traffic.

The OSPM model was used to simulate NOx, CO and PM2.5 concentrations (direct modeling) and road traffic emissions (inverse simulation) in a street canyon. Direct simulation of the distribution of pollutants showed satisfactory results for NOx and PM2.5 concentrations, but it is not appropriate for the CO concentration. Based on the conducted research, it was found that 94.4% of the surveyed days showed a significant dependence between the number of cars and the size of pollutant concentrations. According to Rozbicka (2007), nitrogen oxides concentration values depend on the days of the week. Research conducted by teams of Derwent (1995), Zickus et al. (1997) and Drzeniecka et al. (2000) prove the relations between the value of nitrogen oxides concentration and weather conditions.

The performed tests showed variable air dustiness regardless of the season. The obtained test results indicate a low share of transport in the emission of particulate air pollutants. Therefore, when conducting research on air quality within a street canyon, all emission sources in its area should be considered, as well as the impact of individual meteorological factors on the state of air pollution should be considered.

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The Impact of The E-Commerce Market on Freight Transport – The Use of Regression Analysis to Simulate Logistic Processes

Dominika KOTULSKA
Cracow University of Technology, Warszawska Str. 24, 31-155 Krakow, Poland,
e-mail: dkotulskaa@gmail.com

Karolina TRZYNIEC
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: karolina.trzyniec@urk.edu.pl (corresponding author)

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The aim of the research was to analyze the impact of the development of the e-commerce industry on freight transport in Poland. As part of the work, the scale of interactivity of individual analyzed parameters was shown. Data from 2011-2019 were obtained to study the impact of the e-commerce industry on the transport of goods. All of the presented data describe the Polish market. The statistical analysis included the following tools: Pearson's linear correlation, least squares regression analysis, and the coefficient of determination R^2. A significance test was performed for each model. The conducted research has shown that the e-commerce industry has a direct impact on the development of road transport in Poland.

Keywords: E-Commerce, Regression, Transport, Simulation.

Introduction

The development of the Internet, the growing number of its users and the growing importance of information technologies are just some of the factors influencing the dynamic development of the e-commerce industry both in Poland and in the world. Market research shows that the e-commerce industry is one of the fastest growing in Poland. As a result, the number of consumers choosing this type of exchange of goods is increasing every year. Data contained in the Statista Digital Market Outlook report places Poland in 13th place in the ranking of the fastest growing e-commerce markets in the world. This is confirmed by the results achieved by this industry, which are growing every year. The value of sales on the Polish Internet in 2019 is estimated at PLN 51 billion, which is an increase of PLN 6 billion compared to the previous year. The number of online shoppers is also growing dynamically. In 2019, the group of e-consumers amounted to 26.3 million, while forecasts estimate their growth to approximately 29.5 million by 2023. Consumers are increasingly choosing to buy online. They are convinced by the convenience, simplicity, speed, as well as greater choice than those offered in stationary stores. The users' opinion on the security of online shopping is also improving every year. This contributes to the growing importance of non-cash transactions, which is why the ability to quickly transfer via the payment service is the most frequently chosen form of payment. The advantages of having an online store mean that an increasing number of entrepreneurs choose this form of distribution. Their greatest benefit is the lack of the need to have a point of sale, and thus no need to hire the necessary staff. This allows you to significantly reduce the costs of running a store. The growing competition on the e-commerce market poses more and more challenges to enterprises in the fight for customer acquisition. Companies are trying to better adapt to consumer requirements, which translates into the number of benefits from online shopping, i.e. free delivery or discount codes. More and more new technologies contribute to modification in the trade sector, and this means great changes in the industry in the following years.

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The e-commerce industry is closely related to logistics. Having an online store forces entrepreneur to adjust the appropriate model of e-store logistics service. The logistic service model should be best suited to the company's structure and clearly define the role of the logistics operator so that deliveries are organized in an efficient manner. In order to meet the growing demands of customers, entrepreneurs more and more often decide to entrust an external logistics company with additional tasks accompanying the distribution of goods, such as handling returns or order picking, which is called fulfillment. In order to improve the implementation of logistics processes, these companies implement modern solutions in the form of telematic systems that support all departments and areas of the company simultaneously.

There is a supposition that the development of e-commerce has a direct impact on freight. Based on this, it can be concluded that the sector that gains the greatest profit as a result of the development of e-commerce is the courier, express and parcel services (Horzela 2018). The progressive number of orders in online stores results in an increase in the volume of handled parcels. Courier companies more and more often decide to handle parcels cross-border. As a result, the length of the average load transport distance increases. The growing volume of transported goods and the distance of transport performed result in an increase in the transport performance in freight transport. The chapter examines the impact of the development of the e-commerce industry on freight transport in Poland. As part of the research, the scale of interactivity of individual analyzed parameters was shown.

Materials and Methods

The purpose of the research was to analyze the impact of the development of the e-commerce industry on freight transport in Poland. As part of the work, the scale of interactivity of individual analyzed parameters was shown.

The first stage of work was data collection. Data from 2011-2019 were obtained to study the impact of the e-commerce industry on the transport of goods. All of the presented data describe the Polish market. The data considered in the analysis are presented below (Table 1). The number of factors determining the development of transport, closely related to the phenomenon of online sales (marked as Y in Table 1), affects the accuracy of the results (the greater the number of factors, the more reliable the results of the analysis). Each of the analyzed Y is characterized by a different plane of the transport sector.

The second stage of work involved statistical analysis using tools such as Pearson's linear correlation, least squares regression analysis and the R^2 coefficient of determination. A significance test was performed for each model. The third stage is inference based on the calculations made.

Table1: Data used for analysis

Symbol	Verbal sign	Unit	Source
X1	number of Internet users	%	GUS
X2	value of the e-commerce market	mld PLN	UKE Report
X3	number of online stores	thousand pieces	Bisnode
Y1	average transport distance of 1t of cargo	kilometers	GUS
Y2	number of registered postal non-public operators	-	UKE Report
Y3	revenues from courier items	mln PLN	UKE Report
Y4	shipment volume	mln pcs.	UKE Report
Y5	number of operators in the courier items segment	-	UKE Report

The number of Internet users is the percentage of people aged between 16 and 74 who made an online purchase in a given year. These data are made available each year by the Central Statistical Office in the publication "Information society in Poland". This publication presents the use of information and communication technologies in enterprises, households and by individuals (GUS 2019a).

The value of the turnover generated by transactions concluded in electronic channels is defined as the value of the e-commerce market. Otherwise, it is the value of online sales. Data on the value of the Polish e-commerce market are presented in the Report on the state of the postal market for individual years, prepared by the Office of Electronic Communications (UKE Report 2020). Along with the increasing popularity of the Internet, the number of online stores on the Polish market is also growing. A large part of sellers decides to liquidate a stationary outlet in favor of an e-shop. At the end of June 2019, the number of online stores reached 31.7 thousand, which is the highest result on the Polish online sales market in history (Bisonde 2019).

More and more operators in the courier parcel sector decide to handle parcels across borders. The element of the European Union policy, which is the free movement of goods within the Member States, has a large impact on the distance of transported goods. Parameter Y1 specifies the average distance of transport of one ton of cargo and is expressed in kilometers. These data come from the report of the Central Statistical Office on road transport in Poland and concern only commercial transport (GUS 2019b).

The result of the ongoing evolution on the postal market is also a decline in interest in letter items. Increasingly, the exchange of private correspondence and documents in public administration units is carried out via the Internet. This means that the number of non-public postal operators is increasing on the market. They offer courier services and other postal services both in domestic and international traffic, including marketing parcels, commercial parcels or parcels weighing more than 10 kg. However, the strongest opponent for the postal items segment is the courier items market. This situation is the result of the prevailing trends and growing consumer requirements for deliveries. The services of courier companies, despite the higher price compared to the services of postal providers, are the most frequently chosen delivery channel in the e-commerce industry.

Data on the number of non-public postal operators and the number of operators in the segment of courier items in Poland are presented in the Report of the Office of Electronic Communications on the state of the postal market (UKE Report 2020). According to the UKE Report (2020), in recent years, the Polish market has seen an increase in revenues in each of the product categories. The highest revenue is observed in the courier shipment segment. The reason for this is the constantly growing volume of parcels purchased by e-consumers through online transactions (table 2).

Table 2: Data collected form years 2011-2019

Year	number of Internet users [%]	value of the e-commerce market [mld PLN]	number of online stores [thu pcs.]	average transport distance of 1t of cargo [km]	number of registered postal non-public operators	revenues from courier items [mln PLN]	shipment volume [mln pcs.]	number of operators in the courier items segment
	X1	X2	X3	Y1	Y2	Y3	Y4	Y5
2011	29.70	15	16.3	213	247	1489.12	90.96	81
2012	30.30	20	19.1	240	267	1575.04	110.06	85
2013	31.60	24	21.7	255	274	2290.56	136.46	99
2014	34.20	28	24.6	252	294	2708.12	194.46	93
2015	36.90	33	26.6	261	288	3208.30	216.44	101
2016	41.90	36	27,6	274	290	3585.20	264.30	98
2017	45,00	40	29.1	274	279	3978.00	308.10	89
2018	47.80	45	28.9	282	291	4643.50	368.70	94
2019	53.90	51	31.7	295	293	6017.20	457.25	95

Pearson's correlation coefficient is a measure of the linear relationship between two random variables X and Y. This coefficient is calculated by the formula:

$$r_{xy} = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2 \sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$$

where:

X_i, Y_i – i-th values of observations from the X and Y populations
$\bar{X}$, $\bar{Y}$ – X and Y population means
n – number of observations

The values of the correlation coefficient are in the range [-1.1]. Its sign indicates the direction of the relationship. When $|r_{xy}| = 1$, then there is an exact functional linear relationship between the variables. When the value of rxy is 0, then there is no linear relationship between the two variables (Dziechciarz 2003).

Interpretation of the correlation value (Greń 1974):

a) type of correlation

1. r > 0 positive correlation - when the value of X increases, the value of Y also increases
2. r = 0 no correlation - when X increases, Y sometimes increases and sometimes decreases
3. r < 0 negative correlation - when X increases, the value of Y decreases

b) the strength of the correlation for $|r_{xy}|$
1. < 0.2 - no linear relationship
2. 0.2 - 0.4 - weak dependence
3. 0.4 - 0.7 - moderate dependence
4. 0.7 - 0.9 - quite strong dependence
5. > 0.9 - very strong dependence

In order to test the relationship between the variables in the entire sample population, the Pearson correlation coefficient significance test is performed. In order to verify the hypotheses H_0 and H_1 should be defined.
H_0: $\rho = 0$ – no significance of the correlation coefficient,
H_1: $\rho \neq 0$ – the correlation coefficient is significant.

Statistics are used to test the truth of hypotheses t:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

where:

r - value of Pearson's linear correlation coefficient
n - sample size

Assuming that the H_0 hypothesis is true, the t statistic has the t-Student distribution. From the tables of this distribution, the critical value $t_{\alpha, n-2}$ (for the adopted significance level α and n-2 degrees of freedom) should be read. In the case when the critical value $t_{\alpha, n-2}$ belongs to the critical area $(-\infty; -t_{\alpha,n-2})\ U\ (t_{\alpha,n-2}, +\infty)$ then the hypothesis H_0 should be rejected in favor of the hypothesis H_1. When:

1. $|t| \geq t_\alpha$ – the hypothesis H_0 should be rejected,
2. $|t| < t_\alpha$ – there are no grounds for rejecting the hypothesis H_0.

The linear model parameters were estimated using the least squares method. The calculations were performed in the matrix notation for the variables X_3 (number of online stores) and each of the analyzed Y. After saving the vector of the observation of the dependent variable Y and the observation matrix of the explanatory variables X, the parameter vector should be determined using the formula:

$$a = (X^t X)^{-1} X^t Y$$

The parameter a explains by how many units the magnitude of the explained variable Y will change, if the explained variable X increases its value by one unit. Finally, the econometric model without the intercept can be written as follows:

$$y = Xa + \varepsilon$$

where ε is the random term.

The above calculations were performed both with the determination of the intercept b. The free word may inform about the value of Y in the case of a zero X, while in the case of this analysis it was adopted as an uninterpreted parameter.

The calculated simple regression parameters describe the sample population. In order to investigate the location of the general population regression line, it is necessary to define the confidence zone in which this line will be located. The probability of occurrence is selected individually. Simple confidence set $y = \alpha x + \beta$ it is limited by the confidence curves (the so-called Nevman curves). These curves determine the forecast range of the value of variable X for a given Y. Nevman curves are determined from the formula:

$$P\left\{\widehat{y_i} - t_\alpha s_{\widehat{y_i}} < \widehat{y_i} < \widehat{y_i} + t_\alpha s_{\widehat{y_i}}\right\} = 1 - \alpha$$

where:

$\widehat{y_i}$ – function value $\widehat{y_i} = \alpha x + b$

$\widehat{y_i}$ – wartość szacowanej funkcji regresji $y = \alpha x + \beta$
t_α - value of the variable with Student's t-distribution for the established confidence coefficient 1-α and for n-2 degrees of freedom
To calculate $s_{\widehat{y_i}}$, firstly determine the average deviation s_r to simple regression.

$$s_r = \sqrt{\frac{1}{n-2}\sum_{i=1}^{n}(y_i - \widehat{y_i})^2}$$

$$s_{\widehat{y_i}} = \sqrt{\frac{1}{n} + \frac{(x_i - \bar{x})^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2}}$$

The confidence interval determined with the probability of 1-α covers the true regression function $y = \alpha x + \beta$ in the general population.

The test of significance of linear regression analysis assumes checking the hypothesis concerning the coefficient obtained as a result of the calculations. In order for the obtained function to be considered a suitable tool for forecasting the value of one feature using the value of the other, the coefficient must differ from 0. Obtaining a coefficient equal to 0 means that the regression function in the population is constant, which indicates no dependence between the studied variables. The significance of the estimated equation is checked by verifying the hypotheses:

$$H_0: \alpha = \alpha_0,\ H_1: \alpha \neq \alpha_0.$$

Based on the determined regression function of the formula $y = \alpha x + \beta$ the average deviation should be calculated s_r, then the statistic value t.

$$t = \frac{\alpha - \alpha_0}{s_r}\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

The value of the t-statistic is the Student's t-distribution with n-2 degrees of freedom (assuming the H_0 hypothesis is true). From the Student's t-distribution tables, for the assumed significance level α, one should read the critical value tα satisfying the condition $P\{|t| \geq t_\alpha\} = y$. The comparison of the critical value tα and the calculated value of t is interpreted as follows:

1. $|t| \geq t_\alpha$ – the hypothesis H0 should be rejected,
2. $|t| < t_\alpha$ – no contradiction to the hypothesis H_0.

The R^2 coefficient, also known as the specificity coefficient, is a tool that allows to measure the fit of the model to empirical data. It shows what part of the dependent variable's variability is explained by this model. In other words, the R^2 determination coefficient carries with it information about what percentage of the dependent variable is explained by the explanatory variable. After determining the value of the determination coefficient, we are able to determine how much the value of X has an influence on the value of Y. The coefficient R^2 can assume values in the range [0.1], but most often its value is expressed as a percentage. The higher the R^2 value, the better the model fit is. The coefficient of determination is expressed by the formula (Gruszczyński 2004):

$$R^2 = 1 - \frac{\sum_{t=1}^{n}(\hat{y}_t - \bar{y})^2}{\sum_{t=1}^{n}(y_t - \bar{y})^2}$$

where:

y_t– the actual value of the variable Y at time t,
$\hat{y}_t$- theoretical value of the dependent variable (based on the model),
$\bar{y}$ - arithmetic mean of empirical values of the dependent variable.
Interpretation of the coefficient of determination [10]:

- 0.0 - 0.5 - unsatisfactory fit
- 0.5 - 0.6 - weak fit
- 0.6 - 0.8 - satisfactory fit
- 0.8 - 0.9 - good fit
- 0.9 - 1.0 - very good fit

The Fisher-Snedecor test is a tool that allows to test the significance of the R^2 coefficient. This method involves the verification of the following hypotheses:

H_0: $R^2 = 0$ – R^2 coefficient is not significant, regression is statistically insignificant,
H_1: $R^2 > 0$ – R^2 coefficient significant, regression statistically significant.
The first step in the calculation is to determine the value of the F-test statistic from the following formula:

$$F_{emp} = \frac{R^2}{k} : \frac{1 - R^2}{n - k - 1}$$

where:

R^2 – coefficient of determination
k - number of explanatory variables
n - number of observations in the model
Then, from the Fisher-Snedecor tables, the critical value Fα, v1, v2 should be read for the given significance level and the respective degrees of freedom v_1 (k) and v_2 (n-k-1). After determining the critical value, it is necessary to consider two cases:

1. $F_{emp} > F_{\alpha,V1,V2}$ – the hypothesis H_0 should be rejected,
2. $F_{emp} < F_{\alpha,V1,V2}$ – no grounds for rejection H_0.

Results

The purpose of the analysis was to show the impact of the e-commerce industry on freight transport in Poland. Thanks to calculations made with the use of statistical tools, the scale of interactivity of individual parameters was shown.

Interdependence of the e-commerce market and the transport of goods

One of the tools that allows to show the correlation between the variables is the Pearson correlation. The table 3 presents the values of the calculated coefficient of this correlation between the dependent variables and the potential exogenous variables.

Table 3: Pearson's correlation coefficient values

	Y1	Y2	Y3	Y4	Y5
X1	0.907	0.649	0.985	0.994	0.327
X2	0.961	0.770	0.986	0.988	0.476
X3	0.964	0.854	0.938	0.933	0.585

Nine out of fifteen calculated coefficients indicate a very strong correlation. The highest correlation is between the number of e-consumers and the volume of parcels, where the correlation coefficient is 0.994. This is a situation very close to a linear relationship because of the direct nature of the impact. The growing number of people shopping over the Internet generates more and more orders, and this translates into the volume of courier parcels served. The second highest correlation is between the value of the e-commerce market and the volume of parcels and amounts to 0.988. The growing number of transactions concluded via the Internet means that the number of parcels delivered to customers is also increasing. The value of this correlation is close to 1, which means that this correlation shows an almost exact linear functional relationship between these variables. This is the result of a situation where each new order placed in the online store generates one new shipment. The lack of a total functional linear relationship may be caused by the delivery option, which is self-collection, where the customer collects the order directly from the store, or consolidation of shipments in the case of picking a large order to the same recipient. A similarly high correlation exists between the value of the e-commerce market and revenues from courier services. It is directly related to the previously described situation, where the increasing number of shipments resulting from online transactions results in increasing revenues from these shipments. The smallest correlation is between the number of Internet users shopping online and the number of postal operators in the courier items segment and amounts to 0.327. This means that there is a weak relationship between these variables. The number of e-consumers is not a factor that significantly affects the number of courier companies on the market. This factor is the volume of orders generated by these internet users (table 4).

Table 4: The values of the Pearson correlation coefficient between potential explanatory variables

	X1	X2	X3
X1	1.000	0.979	0.920
X2	0.979	1.000	0.972
X3	0.920	0.972	1.000

According to the assumptions of the least square's method, used in the subsequent analysis, the correlation between the studied exogenous variables should be as small as possible. The greatest correlation occurs between the variable X_1 and X_2 (0.979), therefore it was decided to reject these observations from further analysis

The results of the test of significance of the correlation coefficient

To fully show the interactivity of the studied observations, the Pearson correlation coefficient significance test was performed (*r*) – table 5.

Table 5: The results of the test of significance of the correlation coefficient

Correlation	α	n-2	r	t	$t_{\alpha,n-2}$
X3-Y1	0.05	7	0.964	9.546	2.345
X3-Y2	0.05	7	0.854	4.337	2.345
X3-Y3	0.05	7	0.938	7.168	2.345
X3-Y4	0.05	7	0.933	6.865	2.345
X3-Y5	0.05	7	0.585	1.91	2.345

In the first four cases, the calculated t statistic is greater than the t-table value, which allows for rejecting the hypothesis H_0 that the correlation coefficient is irrelevant. For the last test between X_3 and Y_5, the value of t is not in the range$(-\infty; -2.345)\ U\ (2.345, +\infty)$, which conditions the rejection of the null hypothesis - the correlation in this case is not statistically significant. The obtained results are consistent with the correlation analysis. The undesirable low correlation between the number of online stores and the number of postal operators in the segment of courier items is not significant.

Least squares method - A model with a free expression

The calculations below present the estimation of the linear model parameters for the explanatory variable X_3 and the dependent variable Y_4. Due to the high interactivity of e-commerce and the industry and courier services, these variables were selected for the model. The X_3 variable representing the number of online stores is characterized by a high characteristic of the e-commerce industry, while the Y_4 variable describing the volume of online parcels is a parameter that clearly explains the state of the CEP market in Poland. In this method, the parameter α and the intercept were determined.

Table 6: Summary of data participating in the analysis along with the free word

Free word	X3	Y4
1	16.30	90.96
1	19.10	110.06
1	21.70	136.46
1	24.60	194.46
1	26.60	216.44
1	27.60	264.30
1	29.10	308.10
1	28.90	368.70
1	31.70	457.25

The table 6 presents a summary of the data that has been estimated. The first column contains the value of the intercept, which for each of the cases is 1. The first step in the least squares method is to transpose the matrix with X_3 values and the intercept.

$$X^T = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 16.3 & 19.1 & 21.7 & 24.6 & 26.6 & 27.6 & 29.1 & 28.9 & 31.7 \end{bmatrix}$$

Then the matrix product of the untransposed X and transposed X^T tables was calculated. The result of this operation is shown in the matrix below.

$$X^T X = \begin{bmatrix} 9 & 222.56 \\ 222.56 & 5862.78 \end{bmatrix}$$

In the next stage of calculations, it was determined $(X^t X)^{-1}$, that is, the matrix inverse to that resulting from the product.

$$(X^t X)^{-1} = \begin{bmatrix} 3.14 & -0.12 \\ -0.12 & 0.00 \end{bmatrix}$$

In the last step, the matrix product was made $X^T Y$ and $(X^t X)^{-1}$, to which the parameter α and the intercept were determined.

$$\begin{bmatrix} b \\ a \end{bmatrix} = \begin{bmatrix} -326.938 \\ 22.558 \end{bmatrix}$$

The value of the parameter *a* equal to 22.558 informs that in the case of an increase in the number of online stores by one unit, the value of the volume of parcels will increase by as many units as the size of the parameter *a*. The intercept is an uninterpretable parameter. Table 7 below shows the results of the estimation for X_3 and the remaining Y.

Table 7: Estimation results of other parameters - model with intercept

	Parameter *a*	**Free word**
X3-Y1	4.63	144.6
X3-Y2	2.61	214.87
X3-Y3	271.17	-3520.12
X3-Y5	0.76	73.64

The value of the parameter a gives information about how many units will increase in size Y_i (*i=1, 2, 3, 4, 5*), in the event that the number of online stores increases by 1 unit (1,000).

A model without an intercept

The estimate for the model built from the variables X_3 and Y_4 obtained as a result of the calculations was presented in the matrix form:

$$[a] = [9.978]$$

This means that when the number of online stores increases by one unit, the expected increase in the volume of parcels will be at the level of 9.978 units (table 8).

Table 8: Estimation results of other parameters - model without intercept

	PARAMETER *a*
Y1	10.20
Y2	10.88
Y3	135.72
Y5	3.6

The value of the parameter *a* informs by how many units the size will increase Y_i (*i=1, 2, 3, 4, 5*), when the number of online stores increases by 1,000.

Results of the test of significance of the regression coefficients

In order for the obtained regression function to be considered a suitable tool for forecasting the value of one feature using the value of the other, a test of the significance of the regression coefficient was performed. The calculations were made in the RStudio statistical program. The test results are illustrated by the code results below. The RStudio package reads the statistical test results based on the p-value. If this value is lower than the adopted significance level (α = 0.05), the null hypothesis that the analyzed parameter is irrelevant should be rejected. Additionally, the program

allows you to graphically read the significance test results by number „*" next to the P-value (max. number „*" = 3). Intercept represents the intercept, and X represents the values of the *a* parameter.

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  144.600     12.380  11.681 7.62e-06 ***
X              4.630      0.485   9.546 2.90e-05 ***
```

The p-value of the calculated estimates is smaller than the adopted α, therefore we can consider the significance of these parameters.

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 214.8733    15.3691  13.981 2.27e-06 ***
X             2.6114     0.6022   4.337  0.00341 **
```

The p-value of the calculated estimates is smaller than the adopted α, therefore we can consider the significance of these parameters.

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -3520.12     965.55  -3.646 0.008224 **
X             271.17      37.83   7.168 0.000182 ***
```

The p-value of the calculated estimates is smaller than the adopted α, therefore we can consider the significance of these parameters.

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -326.938     83.868  -3.898 0.005912 **
X             22.558      3.286   6.865 0.000239 ***
```

The p-value of the calculated estimates is smaller than the adopted α, therefore we can consider the significance of these parameters.

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  73.6365    10.2037   7.217 0.000175 ***
X             0.7636     0.3998   1.910 0.097750 .
```

The p-value of the computed intercept is smaller than the assumed α, therefore we can consider the significance of this parameter. In the case of the parameter *a*, the p-value exceeds the adopted level of significance, therefore there is no significance of *a*.

Model Fitting

The calculated values of the coefficient of determination R^2 for each X and Y are presented in the table 8.

Table 9: The values of the coefficient of determination R^2 expressed in %

	Y1	Y2	Y3	Y4	Y5
X1	82%	42%	97%	99%	11%
X2	92%	59%	97%	98%	23%
X3	93%	73%	88%	87%	34%

The highest fit of the model is for the independent variable X_1 and the dependent variable Y_4 and is 99%. This means that the fit of the model is very good, close to 100%, and this indicates a very high usefulness of the regression equation when predicting the value of the Y_4 variable using the independent variable X_1. Almost entirely the volatility

of the parcel volume is the result of the volatility of the number of internet users. The smallest match is between the variables X_1 and Y_5. This value indicates an unsatisfactory fit. It means that only 11% of the data on the number of postal operators in the segment of courier items is explained by the impact of the variability of the number of internet users.

Results of the determination coefficient significance test R^2

In order to test the significance of the R^2 coefficient, the significance test was performed using the Fisher-Snedecor method. The adopted significance level α is 0.05. Value read $F_{\alpha,V1,V2}$ for the corresponding degrees of freedom from the F-Snedecor tables it is 5.59. The calculated F_{emp} values are shown in table 10.

Table 10. Calculated values F_{emp} for X_3

X3	93%	73%	88%	97%	34%
k	1	1	1	1	1
n	9	9	9	9	9
f	91.13	18.81	51.38	47.13	3. 65

For four of the five analyzed cases, the Femp value is greater than the F_ value (α, V_1, V_2). It means that the hypothesis H_0 must be rejected, which says that the R^2 coefficient is not significant. The calculated coefficient of determination between X_3 and Y_1, X_3 and Y_2, X_3 and Y_3 and X_3 and Y_4 is therefore significant. In the latter case, with a given significance level of 0.05, the regression is statistically insignificant. Its significance occurs when the significance level is increased to α = 0.1.

Scatterplots of variables

Scatterplots show the relationship between the two analyzed features. The graphs below show the correlation between the number of online stores and all analyzed Y. Each of the graphs is a line, point graph. The red line marks the trend line, and the blue points show the place of the given pairs of observations in the coordinate system.

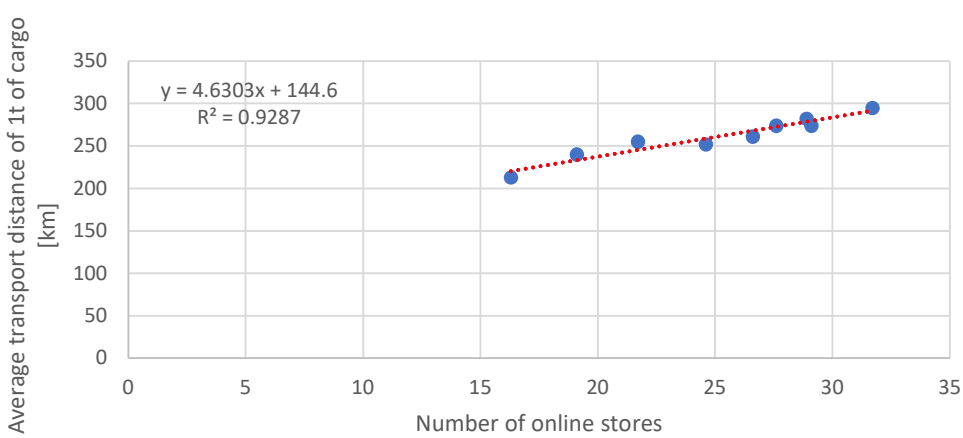

Fig. 1: Correlation between the number of online stores and the average transport distance of 1t of cargo

The above diagram is a scatter plot of the variables X_3 and Y_1. There is a positive relationship between the variables. A positive relationship means that an increase in the value of one variable is accompanied by an increase in the value of the other variable. The function presented in the graph informs us that when the number of online stores increases by one unit, the average transport distance will increase by 4,630 units. The number of online stores is a total value, so we can assume that as the average transport distance of 1t of cargo increases by one kilometer, the number of online stores will increase by about 5. The value of the R^2 determination coefficient equal to 0.9287 indicates a very good fit of the model.

Fig. 2: Correlation between the number of online stores and the number of registered non-public postal operators

The chart presented in Figure 2 shows the positive relationship between the number of online stores and the number of registered non-public postal operators. This means that as the value of the variable X_3 increases, the values of Y_2 also increase. The formula of the linear function presented in the chart provides information on how much the number of registered non-public postal operators will increase in the case of an increase in the number of online stores by one unit. In the case of this interdependence, the number of non-public postal operators will increase by about 3 units. The determined value of the R2 coefficient indicates a satisfactory fit of the model.

Fig. 3: Correlation between the number of online stores and revenues from courier items

The above scatter chart shows the relationship between the two features, which are the number of online stores and revenues from courier services. The correlation between these variables is positive, which can be seen on the basis of the rising trend line. The coefficient next to "x" in the linear function formula presented in the chart determines how much revenue from courier items will increase when the number of online stores increases by one unit. When the number of online stores increases by 1 unit, revenues from courier items will increase by approximately 271 units. The fit of the model is good, which can be seen from the calculated value of the determination coefficient.

Fig. 4: Correlation between the number of online stores and the volume of parcels

The relationship between the number of online stores and the volume of parcels is shown in Figure 4. The designated trend line indicates a positive relationship between these features. This means that in the case of an increase in the results of one variable, the increase in the results of the other variable is equal. In the case of this relationship, increasing the number of e-shops by one thousand will result in an increase in the volume of parcels by about 23 units. The values of the X_3 variable explain the collected data on the dependent variable Y_4 well, which can be found on the basis of the determined R^2 coefficient.

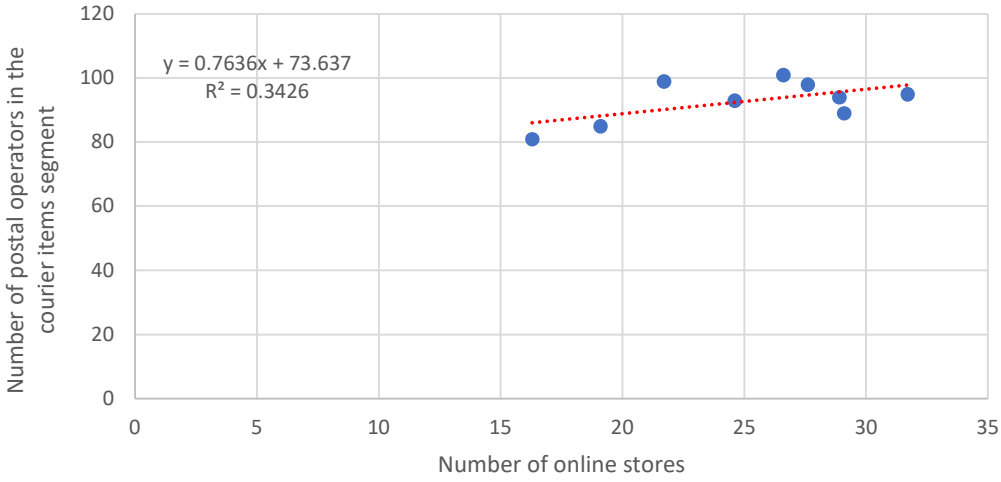

Fig. 5: Correlation between the number of online stores and the number of postal operators in the courie mail segment

The last of the studied relationships is that between the number of online stores and the number of postal operators in the courier items segment (Figure 5). The fit of the model in this case is unsatisfactory. The result is that the growing number of stores alone does not determine the number of postal operators. The factor that has a real impact on the increase in the number of operators are orders generated in these e-stores. In addition, in Poland, despite many companies in the courier parcel sector, for years the leading companies are: DPD, InPost and Poczta Polska. These operators handle almost the entire shipment turnover in the country. The designated trend line indicates a positive relationship between the analyzed features.

Summary

Numerous market studies show that the e-commerce industry is one of the fastest growing in Poland. This is confirmed by the dynamically growing number of consumers who choose this channel of goods exchange in recent years. The

ranking of e-commerce markets in the world with the highest growth, published by Statista Digital Market Outlook, places Poland in 13th place in this ranking. This is confirmed by the results achieved by this industry. Compared to 2018, the value of online sales increased by 6 billion PLN, reaching the result of 51 billion PLN in 2019. There was also a significant increase in the number of people who shop electronically. In 2019, the number of e-consumers was 26.3 million, and the forecasts carried out estimate their growth to 29.5 million by 2023.

The e-commerce industry is closely related to the TSL market. The development of e-commerce is one of the drivers that drives the transport market the most. The growing number of orders in online stores, increasing customer requirements for the quality of deliveries and the development of new logistics technologies place ever greater demands on the transport market, prompting continuous evolution.

The impact and strength of the interactivity of the e-commerce industry and the freight transport market in Poland were examined. The area of the TSL market on which the greatest emphasis has been placed is the courier, express and parcel services (KEP) sector, considered to be the largest beneficiary of the development of online commerce. The performed analysis was based on data obtained from numerous reports and the database of the Central Statistical Office and covered the scope of 9 years, from 2011 to 2019.

The strength of the correlation between the factors shaping e-commerce and transport indicators was tested using a statistical tool, which is the Pearson linear correlation. The highest relationship was observed between the number of e-consumers and the volume of parcels, where the value of the coefficient was 0.994. The dynamically growing number of Internet users shopping via electronic channels translates into an increase in orders placed in e-stores. Due to this situation, suppliers are forced to handle an increasing number of shipments, resulting from transactions concluded on the Internet. The second highest correlation, 0.988, between the value of the e-commerce market and the volume of parcels is directly related to the previously described increase in the number of e-consumers and the transactions they generate. The increase in the value of online sales depends on the growing number of orders, and this affects the increasing volume of shipments.

The results obtained by examining the model fit agree with the results of the Pearson linear correlation. The highest value of the R^2 determination coefficient is achieved for the X_4 indicator, which is the volume of parcels. The result of 99% for the number of e-consumers and the volume of shipments shows that, as can be seen, the almost complete variability of Y_4 is explained by the variability of X_3. The second highest model fit occurs in the case of the value of the e-commerce market and the number of parcels, where 98% of their number is determined by the value of online sales.

The conducted research has shown that the e-commerce industry has a direct impact on the development of road transport in Poland. Additionally, it drives the entire TSL sector. The area that achieves the greatest profits as a result of this evolution is the KEP industry. The transport indicator most affected by e-commerce is the volume of shipments handled by couriers. The current state of the transport market is just the beginning of changes conditioned by the development of e-commerce. This means that in the coming years, transport services will have to become even more flexible to the growing requirements of the e-commerce sector.

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Computational Vision System for the Classification of the Black Potato (Solanun Chaucha)

Alex PACHECO
Universidad Nacional de Cañete, Lima, Perú, apacheco@undc.edu.pe

Marco AÑAÑOS
Universidad Nacional de Cañete, Lima, Perú, mananos@undc.edu.pe

Consuelo ESPINO
Universidad Nacional Federico Villareal, Lima, Perú, coeespino@gmail.com

Enrique CONDOR
Universidad Nacional José María Arguedas, Apurímac, Perú, enricoti@unajma.edu.pe

Luis GUEVARA
Universidad Tecnológica del Perú, Lima, Perú, c19902@utp.edu.pe

Abstract

Machines and software represent technology in the production processes of exporting companies. The competition in the food products market is for technological development and the quality of its products to satisfy the need of consumers for increasingly demanding products. Automation is essential to streamline general product controls and minimum quality requirements in tuber classification. This research proposes as its main objective to put into operation a computer vision system for the classification of the black potato Solanun chaucha. The system is developed with the potato classification tests starting with the digital imaging technique process, followed by the image processing stages; capture, pre-processing, segmentation, description and recognition of images. Obtaining as a result 78.2% of true positives TP, 14.6% of true negatives TN, 0% of false positives FP and 7.2% of false negatives FN. According to the results, the classification time of 0.44 seconds demonstrates the effectiveness of the system. From the data. We can conclude that it is feasible and viable to carry out the classification of black potatoes through the computer vision system.

Keywords*:* Artificial Vision, Quality Requirements, Peruvian Market, Black Potato.

Introduction

The American market opens up an infinity of opportunities for companies in the agro-export sector, especially those dedicated to trade in products of native biodiversity, which have to meet certain requirements in order to export food products to the North American market (Bio Trade, 2010). Exporting companies must pay particular attention to food safety by complying with health certificates, in this way the US authorities prevent the entry of diseases and protect the consumer. Companies that use technologies in their activities have greater possibilities of increasing the productivity of their processes, generating greater benefits to comply with the regulations of the American market (Lall, 2000). This technological capacity plays a very important role in the trade and growth of agro-export companies because they generate greater competitiveness in export companies. Acquiring these new technologies is key to improving production processes, indirectly measuring process innovation (Valderrama and Neme, 2011). It generates lower costs, process times are greatly reduced, and it provides more information about the process, improving its planning and flexibility. Machine vision is intended to improve the productivity of production systems. It is used for the inspection or review of quality and control of products and of the processes themselves (Nunsys, 2019). It allows establishing procedures to process and understand images of reality through a camera. Image analysis can be performed very precisely and very quickly. This depends on the quality and processing of the camera. Computer vision or machine vision systems consist of the use of images that are captured by the camera and then processed by the software to measure, quantify and identify defective products (Infaimon, 2019). The vision system can make intelligent and automated decisions to reverse errors and discard products, following the parameters that have been programmed. Gro-export companies require industrial automation to improve and streamline quality controls at each

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stage of the potato tuber classification process in the black variety whose scientific name is Solanun Chaucha. These companies need to improve compliance with the minimum quality requirements and general control of the product during the export classification process. For these reasons, the research aims to put into operation an artificial vision system for the classification of black potatoes Solanun chaucha. At first, the traditional classification of potatoes began with the application of scales from 0 to 4 for its evaluation. The images are then captured by applying contrast enhancement and noise reduction. Followed by threshold selection and description of the region. Where finally the objects that are not recognized by the artificial vision system are discarded by the conveyor belt, which allows increasing productivity and reducing costs

Theoretical Bases

The vision

Light is considered a wave. According to the wave model, light returns two characteristics: as wavelength and intensity (Moeslund et al, 2006). The organ that captures light is the eye, the light passes through a lens called the lens that affects the retina. The retina in the presence of light generates neural impulses that are sent to the brain through the optic nerve. The brain processes these impulses generating sensations, this is known as visual perception. Visual perception is divided into achromatic perception and chromatic perception.

Acromatic Vision

Achromatic vision is oriented to the brightness and contrast of images, the feeling of brightness is related to two phenomena (Adams et al, 2013). First, a) Sensitivity to intensity: the visual system is able to perceive and distinguish a wide range of brightness levels, but is sensitive when there are many brightness levels involved at the same time, generating a loss of precision in differentiating brightness, needing adaptation periods for each situation. Second, b) Lateral inhibition: This phenomenon is related to disturbances at the borders of intensity change, which is generated when the cells of the retina, when detecting a level of intensity, inhibit neighboring cells, causing the perceived brightness not to be in proportion to physical brightness.

Chromatic Vision

The energy produced by each wavelength is related to the sensation we perceive (Garcia-Sanchez, 2019), this relationship is defined by the nuance; which depends on the dominant wavelength, that is, the one with the most energy in the spectral diagram. While the Saturation; measures the ratio of the dominant wavelength to the rest of the wavelengths. Color is determined when a combination of hue, saturation and brightness is perceived. The theory that three elements are needed to perceive colors is the basis of the tristimulus theory.

Artificial Vision

Artificial vision is the process by which information is extracted from the physical world, to recognize and locate objects from a representation of reality, which provides information on brightness, colors, shapes, and so on (Kurtulmus et al, 2016). These representations are usually in the form of static or moving images, or in some cases with three-dimensional scenes.

Stages of an Artificial Vision System

The first stage consists of capturing or digital images by means of a sensor. The second stage; It consists of the digital treatment of the images (Torregrosa et al, 2014). At this stage using filters and geometric transformations, desired parts of the image are removed or enhanced. The third stage; it is the segmentation, and it consists of isolating the desired elements of a scene to understand it. The fourth stage; This process is where objects with common characteristics within the space are classified. Finally: the stage of recognition or classification is reached, in which the segmented objects are distinguished, through the analysis of certain characteristics that are previously established to differentiate them.

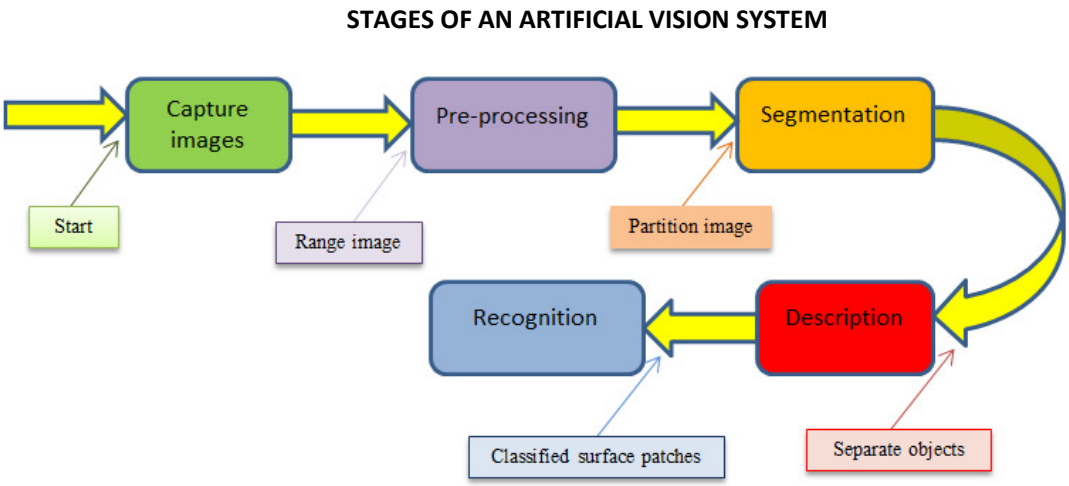

Figure 1: Stages of the process of an artificial vision system.

Confusion Matrix

The confusion matrix is a fundamental tool when evaluating the performance of a classification algorithm, since it will give a better idea of how the algorithm is being classified, based on a count of the successes and errors of each of the classes in the classification (Escobar, 2016). This way you can check if the algorithm is misclassifying the classes and to what extent.

The following table shows the confusion matrix for a classifier into two classes:

TABLE 1: Representative table of Confusion matrix.

		Classificatory	
		+	-
Real value	+	TP	FN
	-	FP	TN

Each column in the matrix will represent the number of predictions for each class made by the model, and each row the actual values for each class. With which the counts are divided into 4 classes, True Positive TP, False Negative FN, False Positive FP and True Negative TN, which mean the following:

True Positives-TP: They are the number of true positives, that is, of correct predictions for class +. False Negatives-FN: They are the number of false negatives, that is, the prediction is negative when the value should really be positive. These cases are also called type II errors. False Positives-FP: They are the number of false positives, that is, the prediction is positive when the value should actually be negative. These cases are also called type I errors. True Negatives-TN: They are the number of true negatives, that is, of correct predictions for the class. Also, with these four categories we can calculate more elaborate metrics such as sensitivity; also called recall or true positive rate. It gives us the probability that, given a really positive observation, the model classifies it and the specificity; also called true negative ratio. It gives us the probability that, given a really negative observation, the model classifies it.

Methodology

For the potato classification tests, each process of the digital imaging technique was taken into account.

Table 2: Traditional potato classification in general.

Classification	Caliber (cm)
Extra	>6.5
Select	5.6 – 6.5
Commercial	4.5 – 5.5
Domestic	3.4 –4.4
Baby	2.6 – 3.3
Chipped, damaged, misshapen	< 2.5 cm

The scale for evaluating processes from 0 to 4.

Table 3: Rating measure.

0	1	2	3	4
None	Bad	Regular	Normal	Good

Stages of Image Processing

It consists on the following Stages (Ma et al, 2017), (Dale et al, 2013).

A. **Acquisition of images.** A smart phone is suitable for our project in image capture.

Table 4. Comparison chart of smart phones.

		Dispositive	
Criterions	**Smart phone Blu C52019**	**Smart phone Y6 Huawei**	**Galaxy S20 ultra**
Resolution	3	4	5
Memorial	4	4	4
Transfer system	4	4	4
Capture speed	3	3	4
Total	14	15	17

B. Preprocessing.

- **Contrast enhancement**. To have a better image in contrast and brightness, the histogram transformation is suitable for this type of process.

Table 5: Contrast chart between contrast enhancement techniques in the preprocessing stage.

Criterions	**Histogram transformation**	**Edge accent**	**Contour detection**
Computational complexity	5	2	2
Uniform distribution of gray levels in the image	5	3	4
Highlight pixels of interest	2	3	5
Total	12	8	11

- **Noise reduction**. To minimize noise in the image and segment the Gaussian filter appropriately, it is the most suitable.

Table 6: Contrast chart between noise reduction techniques in the pre-processing phase.

Criterions	Aperture	Median filter	Gaussian filter
Preserves edges	4	4	3
Reduces impulsive noise	3	3	5
Smooth smoothing	4	3	5
Total	11	10	13

C. **Segmentation.** To analyze the object per image with a minimum cost, the threshold has been selected.

Table 7: Contrast chart of the techniques of the segmentation phase

Criterions	by threshold	Region Characteristics
Threshold selection	5	4
Analytical equations	5	3
Total	10	7

D. **Description.** We have chosen the region description since the figure of the black potato in its composition is many purple and black pixels.

Table 8: Table of contrast between techniques of the description phase.

Criterions	Outline descriptors	Region descriptors
Pixel quantity dependency on the target	4	5
Using clustering	4	4
Object homogeneity	2	3
Total	10	12

E. **Recognition and interpretation.** The theoretical decision technique was chosen for recognition since the adaptation by correlation varies greatly and you must have a database to be able to use it.

Table 9: Contrast table between techniques of the recognition and interpretation phase.

Criterions	Theoretical decision for recognition	Correlation adaptation
Descriptor comparison	4	4
Search by proximity	5	1
Total	9	5

Results

The results obtained when using the vision system based on the algorithms indicated in the methodology. To check the activity of the software, experiments were performed each with 315 images of the black potato, these images were captured in different scenarios, resulting in the following:

True positive (TP): When the image of the potato is identified by the artificial vision system (with the dimensions that meet the standard) it is classified correctly. TP = 78.2%, equivalent to 246 black potatoes.

True negative (TN): When the image of the black potato is identified by the artificial vision system (with dimensions that do not meet the standard). TN = 7.2%, equivalent to 23 black potatoes, is not correctly classified.

False positive (FP): When the image of the black potato is identified by the artificial vision system (with dimensions that do not meet the standard) it is classified correctly. FP = 0%, equivalent to 0 black potatoes.

False negative (FN): When the image of the black potato is recognized by the artificial vision system (with dimensions that meet the standard) it is not classified correctly. FN = 14.6%, equivalent to 46 black potatoes.

Table 10: Results in quantities of sensitivity analysis.

Amounts	Trues	Falses
Positives	246	0
Negatives	23	46

Table 11: Results in percentages of sensitivity analysis.

Percentages	Trues	Falses
Positives	78.2%	0%
Negatives	14.6%	7.2%

Discussion

The research is based on artificial vision to determine the classification of black potatoes, processing the images and analyzing the results, the following was obtained:

The classification of lemons that were correctly detected through artificial vision is sensitivity, showing 84%, which represents 264 images of the black potato of the total of 315. After comparing the results of the software with a manual measurement, we can affirm that the difference in sizes varies between ± 2 millimeters, which can cause a potato to classify another size, which automatically turns a true positive into a false negative. Which is 11.40% lower than artificial vision system for quality control of quinoa (Chenopodium quinoa willd) for export (Pacheco et al, 2020).

When the image of the black potato does not meet the stipulated standards, it should not be assigned a caliber. In this work, the specificity is a true negative whose value is 100%, while in the research (Arias and Sierra, 2016) a specificity of 91.91% was obtained, finding a difference of 9.09% in image processing.

The artificial vision system is viable to perform the classification of black potatoes because the classification time is 0.44 seconds per potato and the effectiveness of a number of hits (true positives and true negatives) that the artificial vision system has, applying the software results in 85.4% of a total of 315 black potatoes.

Conclusions

The result has been favorable due to the influence of the computer vision system for the classification of the Black potato, with the intervention of technology and algorithms.

The expected result in the sensitivity of the artificial vision system was obtained, the element annotated in the 84% image was located and correctly classified.

The expected result was obtained in terms of specificity, the true negative rate is 100%. In this way, it was possible to confirm in a supervised environment, only black potatoes will be analyzed and computer vision will not classify what is not found in the calibers allowed for a black potato.

The result of the time it takes for computational vision to detect and classify a potato of 0.44 seconds and the number of correct answers (true positives and true negatives) as a result of 85.4% was obtained.

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A Dichotomy of Processes of Structural Change in The Economic System

Piotr WALĄG

University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The occurrence of premature deindustrialisation processes in the employment category would point to a large part of the surplus agricultural labour force that will either remain trapped in this sector or be shifted to low-productivity industries in the informal sector and informal services.
The aim of this work is to show whether the stylized facts of the Polish economy (as an example of a catching up economy) in the years 1995-2018 allow us to state that in the structural changes to the economic system in that period we were dealing with a dual course of deindustrialisation processes.
There is also a hypothesis that the Polish economy is experiencing a dual course of deindustrialisation processes, which may be the main reason for the persistence of over-employment in agriculture (hidden unemployment) and high employment in low-productivity processing industries in the informal sector and in informal services.
The dual course of the processes of structural changes is the main reason for the persistence of a very high unemployment rate in the Polish economy between 1995 and 2015, at an average of 15.5%, and for the emergence and persistence of hidden unemployment in agriculture between 11% and 13% in the whole of the period 1995-2018.

Keywords: Deindustrialisation, Production Structure, Employment Structure, Sustainable Economic Growth, Full Employment.

Introduction

In the literature we can find many definitions of sustainable economic growth depending on the criterion and context in which the problem is being considered. One of the approaches to sustainable economic growth is the approach within the social market economy, promoted by its fathers - W. Eucken [Eucken W. 2003] and, above all, the creator of the German economic miracle L. Erhard [Mączyńska E., Pysz P. 2010]. According to them, sustainable economic growth is understood as economic growth with full employment, from which the economic crises have been permanently eliminated.

The issue of structural changes from the point of view of shaping and at the same time achieving sustainable economic growth through the efficiency of labour resources management (effective allocation) is a key area of research on changes in the structure of the economy as such [Zalewska A., Mickiewicz T. 2006].

At least three important phenomena have been recorded over at least the last decade in the context of structural changes in emerging economies. The first is premature deindustrialisation, followed by jobless industrial development in the formal sector and faster growth in services than industry. [Dasgupta S., Singh A. 2006].

Current literature indicates that the turning point for the share of industrial production and employment in total production and employment is at a much lower *per capita* income level in developing economies than was previously the case in the economies of today's highly developed countries. [Rowthorn R., Coutts K. 2004, p. 767-790; Ocampo J. 2005; Pieper U. 2003, s. 831-850]. The historical turning point took place at a level of about 10,000 US dollars in current prices, currently estimated to occur in countries already catching up at 3,000 US dollars, which is also confirmed by OECD studies on economic structures of economically advanced countries for 1950-1995 [Lipowski A. 1998; Lipowski A. 2000].

It is not clear whether this type of premature deindustrialisation, when the economy has not yet reached an appropriate level of industrial development and therefore a sufficiently high GDP *per capita*, is detrimental or beneficial to long-term sustainable economic growth.

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It should be stressed that it is possible, in view of the stylized facts of today's catching-up economies, for the economy to be deindustrialised in terms of employment and not yet deindustrialised in terms of demand. This dualism of the deindustrialisation process is usually found very often in countries that are catching up with the phenomenon of jobless economic growth. Deindustrialisation in terms of employment should be a cause for concern if its symptoms appear in many developing countries with low *per capita* income levels. The occurrence of premature deindustrialisation in terms of employment would point to a large part of the excess agricultural labour force that will either remain trapped in this sector or be shifted to low-productivity industries in the informal sector and informal services. [Dasgupta S., Singh A., 2006].

The aim of this work is to show whether the stylized facts of the Polish economy (as an example of a catching up economy), in the years 1995-2018, allow us to state that in the structural changes to the economic system in that period we were dealing with a dual course of deindustrialisation processes.

There is also a hypothesis that the Polish economy is experiencing a dual course of deindustrialisation processes, which may be the main reason for the persistence of over-employment in agriculture (hidden unemployment) and high employment in low-productivity processing industries in the informal sector and in informal services.

The presentation of the stylized facts occurring in Poland begins with an analysis of changes in the structure of employment and the factors that are the two main driving forces behind the changes in that structure, i.e.: differences in the rate of growth of labour productivity between sectors of the economy and changes in the structure of demand (for the production of particular sectors and sections of the economy). This will allow to check how these changes (occurring in the Polish economy) differ from the stylized facts that took place in the already highly developed Western economies. Because according to a simple model of deindustrialisation [Rowthorn R., Ramaswamy 1997] of Rowthorn and Wells, based on extensive research and empirical tests [Rowthorn R., Ramaswamy 1997], deindustrialisation in the employment category is the result / consequence of deindustrialisation in the production category. The two driving forces driving structural change are the foundation of the already classic theory of three C-sectors. Clark [Clark C. 1957, p. 492], A. Fischer [Fisher A. G. B., 1945, p. 56; Fisher A. G. B., 1933] and J. Fourastie [Fourastie J. 1972, p. 192], and at the same time constitute the basic criterion for dividing the economy into sectors and sections (its constituent elements).

At the turn of the 1980s and 1990s, new methods of production and delivery of services (information and communication technologies, ICT) emerged as a result of technological and technical developments, which resulted in large differences in labour productivity growth rates in the service sector. These changes, according to W. theory. J. Baumol, S. Blackman and E. N. Wolff have distinguished the sector from progressive, stagnant and asymptotically stagnant activities. In some of the changes in labour productivity rates have remained unchanged, in others they have increased very strongly [Baumol W. J., Blackman E. N., Wolff E. N. 1989]. It should also be noted what has been omitted in W theory. J. Baumol, S. Blackman and E. N. Wolff, that the emergence of new technologies in services and, above all, their wide application has not only changed the structure of demand within the service sector itself, but also in other sectors and in the economy at large.

Technological and technological developments have also caused large differences in the rate of growth of labour productivity in industry, distinguishing between declining industries belonging to traditional industry, such as mining, and new technology industries, such as the computer industry, belonging to the processing industry.

As a result, the classic division of the economy into three sectors (agriculture, industry, services) no longer fully explores the benefits of the criterion for dividing the economy, namely, differences in labour productivity growth rates and changes in demand patterns. Therefore, based on the classification of the CCIs, which currently serves as the basic classification for structural studies carried out by the OECD, the division of the economy into sectors has been made more appropriate for the criterion it adopts. The use of the criterion of this breakdown of changes in the structure of demand and differences in productivity growth rates between sections and divisions (according to the classification of the CCIs) will allow the resulting research benefits to be better explored.

Materials, methods, results and discussion

Based on the classification of PKD - 2007, the analysis of changes in the employment structure and its determinant was separated (after the unification, the ranking for the years 1995 - 2018 comparable data) for the following system of sectors and sections of the economy.

Adopted division of the economy into sectors and sections based on the PKD 2007 classification code:

A - Agriculture, forestry, hunting and fishing.

B - Mining and quarrying.
C - Industrial processing.
D - Electricity, gas, steam, hot water and air conditioning supply. - Water supply; sewerage, waste management and remediation activities.
E - Construction.
F - Wholesale and retail trade; repair of motor vehicles, including motorbikes.
G - Transport and storage. - Information and communication.
H - Accommodation and food service activities.
I - Financial and insurance activities.
J - Real estate activities. - Professional, scientific and technical activities. - Administrative and support service activities.
K - Public administration and national defence ; compulsory social security. - Education. - Human health and social work activities - Recreational, entertainment and cultural activities. - Other service activities.

The analysis of the impact of the prevailing factors[1] on changes in the structure of the economy begins with a study of demand volume indices in the Polish economy in the years 1995-2018, and a GDP per capita index.

Table 1: 1995 constant price demand volume indices and GDP per capita.

Years	Total	A	B	C	D	E	F	G	H	I	J	K	GDPpc
1995	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
1996	107,78	101,35	102,50	109,50	100,10	107,60	110,30	106,90	121,40	144,00	102,10	106,35	117,93
1997	117,73	100,23	103,42	124,17	103,50	118,79	120,23	116,52	133,78	199,01	113,13	106,74	134,08
1998	125,29	105,59	89,67	131,50	103,09	135,06	126,48	127,24	145,96	211,35	123,20	112,16	148,95
1999	131,55	102,39	86,80	134,52	107,42	141,14	139,13	139,07	170,04	312,16	126,64	111,70	158,06
2000	138,67	95,14	85,24	145,69	115,15	145,66	146,22	143,80	182,45	341,19	135,00	113,92	167,72
2001	137,42	98,09	80,46	139,72	125,86	141,87	145,64	148,26	173,51	301,61	142,16	113,62	172,88
2002	138,73	96,30	78,05	140,69	126,87	131,52	151,90	159,68	163,28	287,44	144,29	116,30	176,25
2003	144,00	95,87	75,32	154,34	127,88	125,86	146,58	168,46	161,97	309,86	154,82	121,49	177,77
2004	153,90	101,14	75,47	176,41	126,73	131,52	152,59	182,27	171,69	333,40	158,08	123,41	186,57
2005	159,93	99,89	74,94	183,12	132,94	148,36	155,49	190,29	181,30	354,74	164,40	127,40	191,44
2006	173,35	99,73	73,74	205,27	134,01	169,72	159,85	215,22	188,37	403,34	179,03	133,14	194,93
2007	189,00	100,85	73,96	228,88	138,03	195,18	171,51	231,36	201,75	481,19	192,99	140,62	202,22
2008	198,40	101,70	77,51	238,95	142,58	220,75	176,83	238,07	217,69	536,52	199,36	148,41	210,07
2009	194,52	105,26	70,37	219,06	161,01	232,42	180,75	291,49	219,45	454,81	185,07	137,12	215,99
2010	206,01	89,86	68,23	238,28	164,26	271,21	184,31	305,49	236,22	469,38	194,05	146,15	219,42
2011	215,51	93,56	71,39	259,54	168,59	293,34	178,66	323,86	256,36	490,59	203,26	144,27	226,47
2012	215,53	91,31	72,61	259,69	167,60	277,81	180,54	342,24	260,87	467,81	202,27	146,37	231,81
2013	219,20	94,64	70,51	268,37	172,59	273,39	181,75	349,48	278,80	504,60	199,92	147,13	232,79
2014	224,79	100,05	69,27	276,55	161,29	283,19	178,27	366,04	270,04	545,25	210,45	152,51	234,10
2015	228,13	95,55	69,45	294,26	173,46	299,05	188,89	386,93	272,27	585,59	225,98	156,30	236,69
2016	236,31	97,17	67,07	304,36	177,98	303,67	198,65	409,89	281,12	616,04	236,26	159,68	237,70
2017	248,08	100,35	64,48	326,10	171,21	309,64	207,53	443,06	277,52	610,12	251,88	163,43	242,19
2018	261,00	95,51	65,12	339,08	183,25	332,50	218,10	483,99	336,50	665,95	267,93	170,50	245,06

Source: Own calculations.

The analysis of demand volume indices in sectors and sections of the Polish economy in the years 1995-2018 presented in Table 1 shows that the real demand for agricultural production (A), taking into account the whole analysed period, is income-inelastic, although in the first years of the analysed period (1996-1999) it increased with the real income per capita. In addition, the focus on the production of extractive industries (B) was more or less constant over the period considered and did not increase with GDP per capita. However, the lack of relevance of

income growth to the real demand of this sector (B) observed in the table should not be equated as in the case of agriculture with lucrative demand inflexibility, but rather with increasing energy efficiency and decreasing material intensity[2]. In contrast, demand for the production and supply of energy, gas and water (D) increased with GDP per capita, but at a much lower rate (about 40% slower). Demand for the production of process industry (C) grew fastest in all sectors, slower only in the transport and storage section, and information and communication [G] as well as the financial and insurance activities section [I]). As GDP per capita grew, its rate was increasing. Throughout the period considered, this has resulted in demand for processing products growing faster than income per capita. It should be concluded that the real level of development expressed in GDP per capita in the Polish economy is still very far from saturating the demand for real production volumes of the processing industry. Demand for other market services (E, F, H, J) increased with income per capita, except that its growth rate was higher than GDP per capita, but lower than the growth rate of demand for the production of manufacturing, which is rather related to the need for the presence of these services for efficient market development and functioning. Therefore, as can be seen in the table, the demand for market services was much more correlated with the increase in demand for the production of processing industry than with GDP per capita, because on the one hand, the increase in demand for the production of processing industry results in an increase in demand for its services (within the demand side of the market), while the increase in market services enables a greater increase in demand and production of processing industry (within the functioning of the market), on the other hand. Demand for non-market services (K) (other) has grown in line with GDP *per capita* growth, and although its growth has been somewhat smaller (than GDP per capita growth), it is the most correlated with per capita income growth of all sectors and sections.

Assuming that changes in the volume of output are directly shaped/determined by changes in the volume of demand[3], it is legitimate to assume that the increase in total output during the period considered was mainly due to the increase in output of the manufacturing industry, which correlated positively with the increase in market services [4]. The increase in output of non-market services was much smaller than the increase in total output. On the other hand, the real volume of agricultural production and the mining industry remained almost unchanged throughout the entire period considered. This ultimately confirms that in the Polish economy in the period under study, in the category of changes in demand, we were dealing with the process of industrialisation.

The second driving force behind changes in the structure of employment in the economy (the prevailing factor[5]) is the different rates of change in labour productivity in individual sectors and sections of the economy.

Table 2: Productivity volume index at 1995 prices

Years	Total	A	B	C	D	E	F	G	H	I	J	K
1995	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
1996	105,70	94,34	110,38	107,05	107,27	97,52	106,97	105,99	112,16	107,13	97,02	114,81
1997	108,87	94,29	109,84	121,14	108,34	100,21	105,37	107,59	108,47	121,93	86,61	114,68
1998	114,31	98,62	107,54	132,59	108,33	109,92	109,15	114,55	110,02	136,85	80,96	118,15
1999	121,26	99,13	122,42	146,55	109,32	116,19	117,06	129,29	129,94	153,84	77,41	120,56
2000	128,02	95,83	143,24	171,22	120,97	130,04	123,42	144,96	132,76	228,35	75,00	111,13
2001	134,96	103,03	138,40	183,76	122,78	133,02	134,40	162,88	136,28	246,86	74,76	115,80
2002	137,66	104,55	132,50	189,52	120,75	131,86	137,82	172,40	134,42	236,64	72,27	119,11
2003	144,42	108,52	136,54	207,68	125,32	140,52	137,89	183,15	132,40	279,65	72,33	126,41
2004	150,90	115,94	136,49	227,07	140,35	149,88	145,25	197,71	138,17	286,63	72,66	125,71
2005	154,02	114,90	137,46	237,07	150,48	152,81	143,81	206,40	146,86	298,55	74,44	125,52
2006	159,15	112,26	128,46	265,11	138,33	153,75	147,91	214,02	143,68	300,39	74,58	126,82
2007	163,05	108,06	130,45	284,52	139,26	150,82	146,28	211,96	143,25	367,89	72,06	127,88
2008	167,87	107,00	135,68	314,18	139,13	153,58	146,44	207,94	130,44	401,94	71,69	128,61
2009	173,94	118,07	112,72	340,97	134,23	163,00	160,77	244,68	139,65	304,90	86,22	120,70
2010	180,45	77,93	117,52	386,56	144,95	188,43	171,47	248,06	142,02	304,09	98,60	127,67
2011	186,22	79,90	114,88	411,67	170,75	192,65	169,11	261,76	160,94	313,69	116,91	128,36
2012	190,09	76,26	115,65	420,94	176,77	194,52	178,94	287,51	160,78	281,27	135,81	128,41
2013	194,29	80,30	123,72	459,16	182,52	209,76	178,05	287,91	177,55	302,76	155,30	126,03

2014	195,64	78,78	122,57	452,46	175,67	224,25	173,31	287,78	167,91	352,10	187,23	127,69
2015	199,12	72,15	142,45	471,08	158,95	232,95	175,36	281,85	162,37	411,49	226,76	128,44
2016	199,58	74,19	148,54	473,85	173,27	209,43	178,07	281,48	146,17	420,84	250,17	127,07
2017	202,93	76,91	137,92	487,21	177,26	207,34	182,44	287,09	161,80	428,89	275,32	126,38
2018	199,24	69,08	121,02	455,30	174,36	227,83	179,19	289,27	149,48	461,48	348,36	111,93

Source: Own calculations.

The results of the analysis of the productivity volume index contained in Table 2 showed that incomparably the highest increase in the labour productivity rate occurred in the manufacturing industry (C = 455,30 %) and the financial and insurance activities section (I = 461,48 %). Such high growth rates of the productivity volume index in these two sections have driven the growth rate of the productivity volume index for the whole economy. Of the other sectors of the economy, the labour productivity growth rate for market services has been the fastest, with the highest growth rate of the productivity volume index being found in section (J = 348.36%), (G = 289.27%) and section (E = 227.83%), while lower rates of productivity growth have already been found in sections (F = 179.19%) and (H = 149.48%). A positive productivity growth rate, but already lower than the productivity growth rate for the economy as a whole (total = 199.24%), was found for the non-market services sector (K = 111.19%), the extractive industries section (B = 121.02%) and the generation and supply of energy and water sections (D = 174.36%). By contrast, the negative growth rate of the productivity volume index found in the agricultural sector (A = 69,08 %), where, as shown by previous analyses (Table 1), there was a constant level of demand volume (stabilised demand) and thus a constant volume of output throughout the period considered. This could indicate already at the research stage over-employment in agriculture (a symptom of hidden unemployment in this sector) The prevailing factors analysed so far shape / determine the employment structure presented in Table 3.

Having verified the prevailing factors representing the two main drivers of change in the structure of employment (key determinants), we come to the analysis of changes in the share of total employment of sectors and sections of the economy between 1995 and 2018.

Table 3: Employment structure (total economy = 100).

Years	Total	A	B	C	D	E	F	G	H	I	J	K
1995	100,00	15,61	2,67	23,21	2,01	6,19	14,24	6,27	1,39	2,01	4,15	22,24
1996	100,00	16,84	2,54	23,63	1,94	6,50	14,22	6,23	1,41	2,14	4,45	20,12
1997	100,00	16,33	2,36	22,99	1,87	6,86	14,91	6,26	1,46	2,21	4,98	19,78
1998	100,00	16,20	2,15	22,46	1,83	6,80	15,26	6,22	1,61	2,37	5,45	19,64
1999	100,00	16,31	1,89	21,54	1,82	6,74	15,43	6,18	1,59	2,86	5,72	19,92
2000	100,00	16,42	1,67	20,01	1,77	6,09	15,52	5,83	1,69	2,23	6,15	22,62
2001	100,00	16,90	1,68	19,43	1,91	5,72	15,29	5,55	1,69	2,23	6,54	23,06
2002	100,00	16,93	1,63	19,06	1,86	5,29	15,61	5,66	1,65	2,27	7,01	23,05
2003	100,00	16,97	1,58	19,30	1,84	4,88	15,85	5,58	1,69	2,06	7,33	22,91
2004	100,00	16,86	1,49	19,77	1,77	4,63	15,59	5,54	1,70	2,16	7,39	23,08
2005	100,00	16,63	1,44	19,46	1,69	4,83	15,97	5,43	1,70	2,29	7,37	23,18
2006	100,00	16,23	1,37	19,71	1,64	5,23	15,76	5,59	1,73	2,33	7,60	22,83
2007	100,00	15,61	1,31	19,95	1,56	5,67	15,93	5,61	1,74	2,38	7,93	22,31
2008	100,00	15,26	1,32	19,27	1,52	5,98	16,16	5,76	1,97	2,47	8,07	22,22
2009	100,00	15,42	1,33	17,56	2,09	6,40	15,81	6,77	1,83	2,42	7,61	22,74
2010	100,00	16,84	1,23	17,27	2,13	6,13	15,52	6,66	1,68	2,40	7,72	22,43
2011	100,00	16,70	1,23	17,17	2,08	6,39	15,17	6,87	1,67	2,43	7,94	22,35
2012	100,00	16,78	1,23	16,98	2,02	6,12	14,98	6,98	1,74	2,47	8,13	22,58
2013	100,00	16,70	1,18	17,00	1,98	5,69	14,90	7,03	1,72	2,47	8,39	22,94
2014	100,00	16,38	1,10	17,26	1,91	5,63	14,95	7,11	1,71	2,45	8,64	22,86

2015	100,00	16,08	1,00	17,41	1,85	5,66	14,98	7,32	1,70	2,36	8,91	22,72
2016	100,00	15,60	0,91	17,53	1,80	5,75	14,98	7,59	1,77	2,31	9,28	22,49
2017	100,00	15,19	0,88	17,65	1,76	5,82	14,94	7,90	1,85	2,25	9,51	22,25
2018	100,00	14,94	0,87	17,63	1,78	6,06	14,80	8,04	1,86	2,22	9,45	22,36

Source: Own calculations.

The results of the research in Table 3 showed that, over the whole period analysed, the share of employment in the economy as a whole (total = 100 %) fell in the mining sector (B between 2.67 % and 0.87 %, i.e. 1.8 %), and the manufacturing sector (C between 23.21 % and 17.63 %). The fall in the share of total employment in the manufacturing sector (C by 5.58 %) means that the economy is experiencing deindustrialisation in terms of employment. (to conclude) There has also been a small fall in the share of total employment in the manufacturing sector for the electricity, gas and water and steam supply sections (D 2,01 % to 1,78 %). The share of total employment in the non-market services sector remained stable throughout the period considered (K - around 22%), with fluctuations (19.64% to 23.18%) due to policy decisions taken by state and local authorities. While the increase in the share of total employment has been shown for the market services sector, only the following sections showed a significant increase: real estate activities, professional, scientific and technical activities, administrative and support service activities (J from 4.15% to 9.45%, or 5.3%) and transport and storage, and information and communication (G from 6.27% to 8.04%, or 1.77%). In market services, a slight steady increase in the share of total employment was shown by the accommodation and catering activities section (H between 1.39% and 1.86% or 0.47%), while in the other sections (E, F, I) the share of total employment changed by approximately 0.3%. The study results show changes in the share of total employment of sectors and sections of the economy clearly indicating deindustrialisation processes in the employment category. Moreover, it is important to note the constant share of the agricultural sector in total employment, which in the period under review oscillated at an average of 16%, which, with the declining labour productivity index shown in the analysis, means the trapping of excess labour in agriculture. It can also be noted that the market and non-market services sector was not able to absorb all the labour force pushed out of other sectors of the economy (in terms of the demand side of the labour market), this is the main reason for the persistence of a very high unemployment rate in the years 1995-2015, at 15.5% (CSO data - registered unemployment rate, state according to the last survey in the year).

Summary

The dissertation of the literature and, above all, the results of the analysis of stylized facts in the period 1995-2018 in Poland's economy make it possible to state that we are dealing with a dual course of deindustrialisation processes in structural changes to the economic system. The volume indexes of demand in constant 1995 prices grew the fastest for the manufacturing sector by 339.08% in 2018, while the volume index for the whole economy grew by 261% in 2018. Such a result of the research leads to the conclusion that in the Polish economy in the period under study we were dealing with the process of industrialisation in the category of changes in demand. The productivity volume index in constant prices from 1995 showed that the incomparably largest increase in the labour productivity rate occurred in manufacturing by 455.30% in 2018. with its growth for the whole economy at 199.24% in 2018. This result indicates that in the production processes of manufacturing industry in the analysed years there is a phase of industrialisation. However, the analysis of the structure of employment in the period 1995-2018 in the Polish economy, and in its scope, the study of changes in the share of the manufacturing industry in total employment, showed the greatest decrease of all sections by 5.58% in 2018. Therefore, it should be stated that the economy is experiencing deindustrialisation processes in the employment category.

Therefore, it is entitled to state that the results of the analyses carried out determine that the deindustrialisation process is taking place in Poland's economy on a dual basis.

The results of the analysis then showed, in the scope of the 1995 fixed-price index of productivity volumes. (1995 = 100) a negative growth rate in the agricultural sector of 69.08% in 2018, where the results of the 1995 fixed-price index of the demand volume index showed (1995 = 100), there was a constant level of demand volume over the whole period, and even a small decrease to 95.51% in 2018. (stabilised demand) and thus a constant volume of output. These findings suggest that excess labour has been trapped in agriculture. In addition, the analysis of the structure of employment in the period 1995-2018 in the Polish economy, and in its scope the study of changes in the share of total employment in the agricultural sector, showed for agriculture a constant share in total employment, which oscillated at an average level of 16%, which, with the analysis of the falling index of the volume of labour productivity, means that there was an excess of employment in agriculture. This represents hidden unemployment, which, based on the results of the study, can be estimated at between 11 and 13% for the whole of the period 1995-2018.

On the basis of the results obtained from the analysis, it can also be concluded that the dual course of structural change processes is the main reason why the market and non-market services sector was not able to absorb the entire workforce pushed out of the remaining sectors of the economy, which directly translated in the years 1995-2015 in the Polish economy into a very high unemployment rate, at an average of 15.5%.

[1] the predominant factor occurs and affects (causes real changes in employment) regardless of time and place, and its effects and results accumulate over time
[2]the phenomenon of the end of the 1960s in highly developed economies, caused by the increase in technological progress introducing savings and accompanied by the increase in raw material prices
[3] under the threat of an imbalance between supply and demand
[4] the growth of production in the processing industry entailed a faster growth of market services on the one hand and the growth of market services enabled a faster growth of industrial production on the other
[5]the predominant factor occurs and affects (causes real changes in employment) regardless of time and place, and its effects and results accumulate over time

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The Dualism of Deindustrialisation and Innovation

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl

Abstract

The issue of structural changes from the point of view of shaping and, at the same time, achieving sustainable economic growth through effective management of production factors (effective allocation) is a key area of research into changes in the structure of the economy as such. Sustainable growth is defined as sustainable economic growth at full employment, resilient to shocks and crises in the economy as well as to the shocks in demand and, for catching up countries, eliminates the risk of falling into the medium growth trap.
The aim of this work is to examine whether the dualism of the deindustrialisation process in the Polish economy between 1995 and 2018 was determined by the level of innovation in the industrial sector. How and whether the presence of this phenomenon in the economy may be an appropriate criterion for assessing the level of innovation in the industrial sector in the context of long-term sustainable economic growth.
There is also a hypothesis that in the Polish economy, the key determinant of dualism in the deindustrialisation process, and/or the main reason for the trap of average growth, was the lack of innovation in the processing industry sector. Despite the fact that the growing demand in the Polish economy, and above all GDP per capita, was the most decisive factor determining the share of manufacturing in total employment, and thus its production, causing the largest increase in its share in total production in the whole analysed period 1995-2018. It was the very low level of innovation in the manufacturing sector that caused the decrease in its share in total employment, being the main reason for the emergence of the phenomenon of dualism in the deindustrialisation process, which was a brake on sustainable economic growth and resulted in the economy being stuck in the trap of average growth.

Keywords: deindustrialisation, sustainable economic growth, dualism of the deindustrialisation process, average growth trap, criterion for assessing the level of innovation.

Introduction

The issue of structural transformations from the point of view of shaping and at the same time achieving sustainable economic growth through effective factor management (effective allocation) is a key area of research on changes in the structure of the economy as such [Zalewska A., Mickiewicz T. 2006; Dasgupta S., Singh A. 2006; Baumol W. J., Blackman E. N., Wolff E. N., 1989; Rodrik D. 2016; Giovanni Dosi, Federico Riccio, Maria Enrica Virgillito, 2020] Sustainable economic growth is defined as sustainable economic growth with full employment resilient to shocks and economic crises and demand shocks (financial, commodity, energy, covid 19 crises) and, for catching up countries, eliminates the risk of falling into the average growth trap [Eucken W. 2003; Mączyńska E., Pysz P. 2010]. In the long run, the efficiency of production factors and their allocation is achieved primarily through innovation.[Mazzucato M. 2016; Giovanni Dosi, Federico Riccio, Maria Enrica Virgillito, 2020]. Three important phenomena have been identified in the evolution of economies (structural changes in the economic system). The first is premature deindustrialisation, followed by jobless industrial development in the formal sector and faster growth in services than industry.[Dasgupta S., Singh A. 2006]. In these economies, the industrial sector, in particular, is seeing a low level of innovation, or even a complete lack of innovation. Most of them produce 'crisps' instead of 'micro chips'. [Giovanni Dosi, Federico Riccio and Maria Enrica Virgillito 2020].

Current literature indicates that the turning point for the share of industrial production and employment in total production and employment is at a much lower level of income *per capita* than was previously the case in the economies of today's highly developed countries. [Rowthorn R., Coutts K. 2004; Ocampo J. 2005; Pieper U. 2003]. As well as other deindustrialisation patterns (e.g. South Korea China) where there was no dual process of structural change in the economic system [Giovanni Dosi, Federico Riccio and Maria Enrica Virgillito 2020]. The historical

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turning point took place at about 10,000 US dollars in current prices, nowadays it is estimated that it occurs in countries that are already catching up at 3,000 US dollars, which is also confirmed by OECD studies on economic structures of advanced countries for 1950-1995 [Lipowski A.; Lipowski A. 2000]. The reason for this phenomenon, as demonstrated by Giovanni Dosi and others, is the lack of innovation in the industrial sector [Giovanni Dosi, Federico Riccio and Maria Enrica Virgillito 2020] . In view of these facts, it is becoming problematic to assess this change. It is not clear whether this type of premature deindustrialisation, when the economy has not yet reached a sufficient level of industrial development and therefore a sufficiently high GDP *per capita*, is detrimental or beneficial to long-term sustainable economic growth.

It should be stressed that it is possible, in view of the stylized facts of today's economies, for the economy to undergo deindustrialisation in terms of employment and not yet deindustrialisation in terms of demand structure. This dualism of the deindustrialisation process is usually accompanied by the phenomenon of jobless economic growth which is very common in the economy. Deindustrialisation in terms of employment should be a cause for concern if its symptoms appear in many economies with low *per capita* income. The occurrence of premature deindustrialisation in terms of employment would point to a large proportion of hidden unemployment in agriculture, which would either remain trapped in this sector or be shifted to low-productivity industries in the informal sector and informal services. [Dasgupta S., Singh A., 2006]. This phenomenon in the economy, as shown by various deindustrialisation patterns, is primarily due to the lack of innovation in the industrial sector [Giovanni Dosi, Federico Riccio and Maria Enrica Virgillito 2020].

The aim of this work is to examine whether the dualism of the deindustrialisation process in the Polish economy between 1995 and 2018 was determined by the level of innovation in the industrial sector. How and whether the presence of this phenomenon in the economy may be an appropriate criterion for assessing the level of innovation in the industrial sector in the context of long-term sustainable economic growth.

There is also a hypothesis that in the Polish economy, the key determinant of dualism in the deindustrialisation process, which was also the main cause of the trap of average growth, was the lack of innovation in the processing industry sector. The study (presentations) of dualism in the deindustrialisation process in the Polish economy presents an analysis of changes in the structure of demand volume and employment structure. Because according to a simple model of deindustrialisation [Rowthorn R., Ramaswamy 1997] by Rowthorn and Wells, based on extensive research and empirical tests [Rowthorn R., Ramaswamy 1997], deindustrialisation in the employment category is the result / consequence of deindustrialisation in the demand structure category. The two driving forces driving structural change are the foundation of the already classic theory of three C-sectors. Clark [Clark C. 1957, p. 492], A. Fischer [Fisher A. G. B., 1945, p. 56; Fisher A. G. B., 1933] and J. Fourastie [Fourastie J. 1972, p. 192], and at the same time constitute the basic criterion for dividing the economy into sectors and sections (its constituent elements). At the turn of the 1980s and 1990s, technological and technological developments led to innovation in services: new methods of production and delivery of services (information and communication technologies, ICT), which resulted in large differences in productivity growth rates in the service sector. These changes, according to W. theory. J. Baumol, S. Blackman and E. N. Wolff have distinguished the sector from progressive, stagnant and asymptotically stagnant activities. In some of the changes in labour productivity rates have remained unchanged, in others they have increased very strongly [Baumol W. J., Blackman E. N., Wolff E. N. 1989]. It should also be noted what has been omitted in W theory. J. Baumol, S. Blackman and E. N. Wolff, that the emergence of innovation: new technologies in services and, above all, their wide application has not only changed the structure of demand within the service sector itself, but also in other sectors and in the economy at large. Innovation, driven by technological and technological progress, has also resulted in large differences in labour productivity growth rates in industry, distinguishing between declining traditional industries, such as mining, and new technology industries, such as renewable energy sources, the computer industry, biotechnologies or nanotechnologies belonging to the processing industry. The 4.0 Revolution has initiated an avalanche of innovation in both product and production sectors, with whole innovative sections and divisions of the industrial sector being separated from each other. The emergence of innovation in industry has not only caused changes within this sector, but has also forced a high level of innovation in services and other sectors and the economy at large [Ślusarczyk B. 2018]. In addition, the emergence of new production technologies and techniques in industry, as well as new technological and technical products, has resulted not only in this sector, but also in an increase in energy efficiency and a decrease in material intensity throughout the economy. This has also resulted in changes in the structure of demand within the industrial sector itself as a whole.
As a result, the classic division of the economy into three sectors (agriculture, industry, services) no longer fully explores the benefits of the criterion for dividing the economy, namely, differences in labour productivity growth rates and changes in demand patterns. Therefore, by referring to the classification of the CCIs, which currently serves as the basic classification for structural studies carried out by the OECD, the division of the economy into sectors has been made more appropriate to the criterion it adopts. The use of this criterion for the breakdown of changes in the structure of demand and differences in productivity growth rates between sections and divisions (according to the classification of the CCIs) will make it possible to better exploit the resulting research benefits.

Materials, methods, results and discussion

Based on the classification of PKD - 2007, the analysis of changes in the employment structure and its determinant was separated (after the unification, the ranking for the years 1995 - 2018 comparable data) for the following system of sectors and sections of the economy.

Adopted breakdown of the economy by sectors and sections based on the PKD 2007 classification code

A - Agriculture, forestry, hunting and fishing.
B - Mining and quarrying.
C - Industrial processing.
D - Electricity, gas, steam, hot water and air conditioning supply. - Water supply; sewerage, waste management and remediation activities.
E - Construction.
F - Wholesale and retail trade; repair of motor vehicles, including motorbikes.
G - Transport and storage. - Information and communication.
H - Accommodation and food service activities.
I - Financial and insurance activities.
J - Real estate activities. - Professional, scientific and technical activities. - Administrative and support service activities.
K - Public administration and national defence ; compulsory social security. - Education. - Human health and social work activities - Recreational, entertainment and cultural activities. - Other service activities.

The analysis of the key determinants of dualism in the deindustrialisation process and the traps of average growth in the Polish economy in the years 1995 - 2018 begins with a study of changes in the structure of the volume of demand for selected sectors and sections of the economy.

Table 1 presents the structure of demand volume for sectors and sections of the Polish economy (years 1995 - 2018)

Table 1: 1995 structure of demand volume in constant prices

Years	Total	A	B	C	D	E	F	G	H	I	J	K
1995	100,00	8,84	3,06	32,37	3,93	7,57	15,42	6,12	0,91	1,81	7,85	12,12
1996	100,00	8,32	2,91	32,88	3,65	7,56	15,78	6,07	1,02	2,42	7,44	11,96
1997	100,00	7,53	2,69	34,14	3,45	7,64	15,75	6,06	1,03	3,06	7,55	10,99
1998	100,00	7,45	2,19	33,97	3,23	8,16	15,57	6,22	1,06	3,05	7,72	10,85
1999	100,00	6,88	2,02	33,10	3,21	8,12	16,31	6,47	1,17	4,29	7,56	10,29
2000	100,00	6,07	1,88	34,01	3,26	7,95	16,26	6,35	1,19	4,45	7,65	9,96
2001	100,00	6,31	1,79	32,91	3,60	7,82	16,34	6,61	1,14	3,97	8,13	10,02
2002	100,00	6,14	1,72	32,83	3,59	7,18	16,89	7,05	1,07	3,75	8,17	10,16
2003	100,00	5,89	1,60	34,69	3,49	6,62	15,70	7,16	1,02	3,89	8,45	10,23
2004	100,00	5,81	1,50	37,10	3,23	6,47	15,29	7,25	1,01	3,92	8,07	9,72
2005	100,00	5,52	1,43	37,06	3,26	7,02	14,99	7,28	1,03	4,01	8,07	9,66
2006	100,00	5,09	1,30	38,33	3,03	7,41	14,22	7,60	0,98	4,21	8,11	9,31
2007	100,00	4,72	1,20	39,20	2,87	7,82	13,99	7,49	0,97	4,60	8,02	9,02
2008	100,00	4,53	1,20	38,98	2,82	8,42	13,74	7,35	0,99	4,89	7,89	9,07
2009	100,00	4,79	1,11	36,45	3,25	9,05	14,33	9,17	1,02	4,23	7,47	8,54
2010	100,00	3,86	1,01	37,44	3,13	9,97	13,80	9,08	1,04	4,12	7,40	8,60
2011	100,00	3,84	1,01	38,98	3,07	10,31	12,78	9,20	1,08	4,12	7,41	8,11
2012	100,00	3,75	1,03	39,00	3,05	9,76	12,92	9,72	1,10	3,92	7,37	8,23
2013	100,00	3,82	0,98	39,63	3,09	9,44	12,79	9,76	1,15	4,16	7,16	8,14
2014	100,00	3,94	0,94	39,82	2,82	9,54	12,23	9,97	1,09	4,39	7,35	8,22

2015	100,00	3,70	0,93	41,75	2,99	9,92	12,77	10,38	1,08	4,64	7,78	8,30
2016	100,00	3,64	0,87	41,69	2,96	9,73	12,96	10,62	1,08	4,71	7,85	8,19
2017	100,00	3,58	0,80	42,55	2,71	9,45	12,90	10,93	1,01	4,45	7,98	7,99
2018	100,00	3,24	0,76	42,05	2,76	9,65	12,89	11,35	1,17	4,61	8,06	7,92

Source: Own calculations.

The conclusions of the analysis of Table 1 can be reduced to the following:

- the largest increase in the share (as well as the relative share) of volume in total demand and thus in total output volume over the period considered was recorded in manufacturing (C), followed by the largest increase in the share of volume in total demand and thus in total output volume in the following sections: financial and insurance activities (I), transport and storage, and information and communication (G), accommodation and food service activities (H) , construction (E), real estate activities, professional, scientific and technical activities, administrative and support service activities (J) , while a decrease in the share of total demand and therefore of total output for market services was found only in the wholesale and retail trade, motor vehicle repair (F) section;
- In contrast, the share of non-market services (K) in the total demand volume and, at the same time, in total output decreased, which proves that their production did not constitute a fixed part of total demand and total output in the Polish economy. However, we must remember that in most cases, the volume of demand, and thus the output of non-market services, is determined by political decisions taken by state and local government units;
- The share of agriculture (A) and mining (B) and, to a lesser extent, of the energy, gas, steam and water supply sections (D) in the total volume of demand and, at the same time, in the total volume of output, with agriculture (A) seeing the biggest drop. The obtained results of the analysis (Table 1) allow us to conclude that the change in the share of particular sectors and sections of the economy in the volume of total demand and, at the same time, in the total volume of output, indicates the presence of characteristics characteristic for industrialisation processes in the Polish economy. Therefore, we can state that in the Polish economy in the analysed period we deal with the process of industrialisation in the category of demand structure (its changes).

Assuming that the structure of output volume is directly shaped/determined by the structure of demand volume[1], it is legitimate to assume that the increase in total output over the period considered was mainly due to the increase in the volume of output of manufacturing, which correlated positively with the increase in market services[2] . The increase in output of non-market services was much smaller than the increase in total output. On the other hand, the real volume of agricultural production and the mining industry remained almost unchanged over the whole period considered. The most important is that studies on the change in the share of total demand in the volume of sectors and sections of the economy additionally confirm the fact that the increase in the total volume of output depends primarily on the increase in the volume of output in manufacturing [A. Lipowski 2000], [Dani Rodrik 2015], and [Giovanni Dosi, Federico Riccio and Maria Enrica Virgillito 2020].

We will then move on to the analysis of structural changes in the economic system in terms of employment structure.

Table 2: Employment structure (total economy = 100)

Years	Total	A	B	C	D	E	F	G	H	I	J	K
1995	100,00	15,61	2,67	23,21	2,01	6,19	14,24	6,27	1,39	2,01	4,15	22,24
1996	100,00	16,84	2,54	23,63	1,94	6,50	14,22	6,23	1,41	2,14	4,45	20,12
1997	100,00	16,33	2,36	22,99	1,87	6,86	14,91	6,26	1,46	2,21	4,98	19,78
1998	100,00	16,20	2,15	22,46	1,83	6,80	15,26	6,22	1,61	2,37	5,45	19,64
1999	100,00	16,31	1,89	21,54	1,82	6,74	15,43	6,18	1,59	2,86	5,72	19,92
2000	100,00	16,42	1,67	20,01	1,77	6,09	15,52	5,83	1,69	2,23	6,15	22,62
2001	100,00	16,90	1,68	19,43	1,91	5,72	15,29	5,55	1,69	2,23	6,54	23,06
2002	100,00	16,93	1,63	19,06	1,86	5,29	15,61	5,66	1,65	2,27	7,01	23,05
2003	100,00	16,97	1,58	19,30	1,84	4,88	15,85	5,58	1,69	2,06	7,33	22,91
2004	100,00	16,86	1,49	19,77	1,77	4,63	15,59	5,54	1,70	2,16	7,39	23,08
2005	100,00	16,63	1,44	19,46	1,69	4,83	15,97	5,43	1,70	2,29	7,37	23,18
2006	100,00	16,23	1,37	19,71	1,64	5,23	15,76	5,59	1,73	2,33	7,60	22,83
2007	100,00	15,61	1,31	19,95	1,56	5,67	15,93	5,61	1,74	2,38	7,93	22,31

2008	100,00	15,26	1,32	19,27	1,52	5,98	16,16	5,76	1,97	2,47	8,07	22,22
2009	100,00	15,42	1,33	17,56	2,09	6,40	15,81	6,77	1,83	2,42	7,61	22,74
2010	100,00	16,84	1,23	17,27	2,13	6,13	15,52	6,66	1,68	2,40	7,72	22,43
2011	100,00	16,70	1,23	17,17	2,08	6,39	15,17	6,87	1,67	2,43	7,94	22,35
2012	100,00	16,78	1,23	16,98	2,02	6,12	14,98	6,98	1,74	2,47	8,13	22,58
2013	100,00	16,70	1,18	17,00	1,98	5,69	14,90	7,03	1,72	2,47	8,39	22,94
2014	100,00	16,38	1,10	17,26	1,91	5,63	14,95	7,11	1,71	2,45	8,64	22,86
2015	100,00	16,08	1,00	17,41	1,85	5,66	14,98	7,32	1,70	2,36	8,91	22,72
2016	100,00	15,60	0,91	17,53	1,80	5,75	14,98	7,59	1,77	2,31	9,28	22,49
2017	100,00	15,19	0,88	17,65	1,76	5,82	14,94	7,90	1,85	2,25	9,51	22,25
2018	100,00	14,94	0,87	17,63	1,78	6,06	14,80	8,04	1,86	2,22	9,45	22,36

Source: Own calculations.

The results of the research in Table 4 showed that, over the whole period analysed, the share of employment in the economy as a whole (total = 100 %) fell in the mining sector (B between 2.67 % and 0.87 %, i.e. 1.8 %), and the manufacturing sector (C between 23.21 % and 17.63 %). The fall in the share of total employment in the manufacturing sector (C by 5.58 %) means that the economy is experiencing deindustrialisation in terms of employment. There has also been a small decrease in the share of total employment in the manufacturing sector for the electricity, gas and water and steam supply sections (D between 2,01 % and 1,78 %). The share of total employment in the non-market services sector remained stable throughout the period considered (K - around 22%), with fluctuations (19.64% to 23.18%) due to policy decisions taken by state and local government. While the increase in the share of total employment has been shown for the market services sector, only the following sections showed a significant increase: real estate activities, professional, scientific and technical activities, administrative and support service activities (J from 4.15% to 9.45%, or 5.3%) and transport and storage, and information and communication (G from 6.27% to 8.04%, or 1.77%). In market services, a slight steady increase in the share of total employment was shown by the accommodation and catering activities section (H between 1.39% and 1.86% or 0.47%), while in the other sections (E, F, I) the share of total employment changed by approximately 0.3%. The study results show changes in the share of total employment of sectors and sections of the economy clearly indicating deindustrialisation processes in the employment category.

The analysis carried out to date clearly shows that in the period under consideration (1995-2018), there is a dualism of deindustrialisation processes in the Polish economy, which will then allow us to examine the key determinants of this phenomenon. For this purpose, the regression analysis of models of changes in the share of manufacturing in total employment (c) and the developed mesoeconomic and macroeconomic indicators have been used.

Table 5: Regression analysis of the model of changes in the share in total employment in manufacturing (C).
Estimation method: CMSS

Observations used 1995-2018

Dependent variable: Y (ln) share of total employment in manufacturing (C)

Regression statistics								
Multiple R	0,974377							
R square	0,949411							
Matched R square	0,935359							
Standard error	0,027014							
Observations	24							
VARIANCE ANALYSIS								
	df	SS	MS	F	Significance F			
Regression	5	0,246524	0,049305	67,56227	4,99E-11			

Individual	18	0,013136	0,00073					
Time	23	0,259659						
	Factors	Standard error	t Stat	Value-p	Lower 95%	Top 95%	Lower 95.0%	Top 95.0%
Intersection	-16,3142	5,562733	-2,93277	0,008892	-28,0011	-4,62733	-28,0011	-4,62733
Variable X 1	4,332434	1,324236	3,271649	0,004238	1,550318	7,114549	1,550318	7,114549
Variable X 2	0,913685	0,26477	3,450867	0,002851	0,357425	1,469946	0,357425	1,469946
Variable X 3	-2,33338	0,861785	-2,70761	0,014417	-4,14392	-0,52283	-4,14392	-0,52283
Variable X 4	-2,50095	0,775164	-3,22635	0,004683	-4,12951	-0,87239	-4,12951	-0,87239
Variable X 5	-0,70429	0,254263	-2,76992	0,012624	-1,23848	-0,1701	-1,23848	-0,1701
		Critical value t	2,100922					

- materiality at 5%
Source: Own calculations.

Parameters of the model of changes in the share of total employment in manufacturing (C).
Variable X 1 - GDP per capita (current prices)
Variable X 2 - Imports of goods and services (current prices)
Variable X 3 - Value added index (current prices)
Variable X 4 - Domestic demand index (current prices)
Variable X 5 - Exports of goods and services (current prices)
All parameters are statistically significant, which makes their interpretation valid.
Explanatory variable - Share of total employment in manufacturing (C)

The parameters (explanatory variables) in the model presented (Table 5) were selected based on the basic models of deindustrialisation and the published literature, and empirically on the basis of the presented statistical research. This model in 94% describes / explains changes in the share of employment in manufacturing (C). The determination factor R2 = 0.94. All explanatory variables are statistically significant and were generally greater than the critical value. The regression analysis of the presented model showed that an increase of 1% of GDP per capita (parameter X 1) was the most decisive for the increase in the share of manufacturing in total employment (C) causing its increase by 4.33 percentage points, which indicates that the demand for manufacturing production in this economy is still far from saturated, which clearly speaks for the phase of the industrialisation process in the demand category. However, despite the steadily growing GDP per capita, as presented in the analysis of changes in the structure of employment in the economy, there has been a decline in the share of manufacturing in total employment, which indicates that deindustrialisation processes are taking place. This confirms that we are dealing with a dichotomy of the process of structural change, the evolution of the economy, which is the dualism of deindustrialisation processes. The lack of product and industrial innovation in the processing industry has meant that domestic production in an economy undergoing trade liberalisation has lost out to foreign production. An increase in domestic demand (parameter X 4) by 1% resulted in a 2.5 percentage point decrease in the share of total employment in the manufacturing industry (C), determining it most strongly after GDP per capita. Growing domestic demand was satisfied by product and technological innovation of foreign production. Then the lack of product, technical and technological innovation in industry led to an increase in the volume of value added in current prices (the index of industrial value added in the Polish economy grew relatively faster than the index of value added prices in economies with which trade liberalisation took place), hence domestic industrial production was not price competitive. As a result, as shown by a regression analysis, a 1% increase in the index of value added prices in current prices (parameter X 3) resulted in a 2.33 percentage point decrease in the share of total employment in manufacturing (C). On the other hand, a 1% increase in imports of goods and services (parameter X 2) resulted in an increase in the share of total employment in manufacturing (C) by O.91 percentage points, because the greater part of domestic production comes from finished components manufactured abroad, which is a direct result of the lack of technological and technical innovation in domestic industrial production processes. In addition, it should be noted that in the production of the processing industry sector in general, the share of production of the machinery and equipment division is marginal, because due to the lack of product innovation, it has been superseded by competition from abroad, as has the production of motor vehicles, trailers and semi-trailers. As a result of a very low level of innovation, or even a lack of innovation in the industrial sector (C), the 1% increase in exports of goods and services at current prices has resulted in a fall of 0.70 percentage points in the sector's total employment.

Summary

Assuming that the structure of the output volume is directly shaped / determined by the structure of the demand volume, it is justified to assume, on the basis of the results of the study on the structure of the demand volume (the largest increase in the share in the total demand volume was recorded by manufacturing from 32.37% in 1995 to 42.05% in 2018, i.e., by 9.68%), that the increase in total output in the studied period 1995-2018 in the Polish economy was caused primarily by the increase in the volume of output of manufacturing, which additionally forced (necessary to service the increase in demand for manufacturing) the increase in output of market services. On the other hand, the results of the analysis of the structure of the demand volume and employment structure in the years 1995-2018 clearly indicate the phenomenon of dualism of the deindustrialisation process in the Polish economy.
Despite the fact that the growing demand in the Polish economy, and above all GDP per capita, was the most decisive factor in the share of total employment in the processing industry, and thus its production, causing the largest increase in its share of total production in the whole period 1995-2018. It is the very low level of innovation in the processing industry sector that caused: low-processed, or only assembled from finished products with low added value, domestic production of the processing industry to be additionally energetic and labour-intensive without being price competitive, thus losing out in international trade. Therefore, as the regression analysis of the model of changes in the share of total employment in the processing industry showed, an increase in domestic demand translated into a decrease in the share of total employment in this sector. In addition, the lack of innovation in the manufacturing sector resulted in an increase in total added value so low in relation to foreign production that an increase in the value of its index in current prices, as the research has shown, translated into a decrease in its share in total employment. With too low a level of GDP per capita, especially when its main driver of growth is still industry pushed out of it, they were unable to absorb services, which forced unemployment in the Polish economy in 1995-2015 at 15%. This high level of unemployment was an automatic brake on sustainable growth.

As demonstrated by the dissertation of literature and, above all, the results of the analysis presented in it in the years 1995-2018 on the example of the Polish economy, a low level of innovation or lack of innovation in the processing industry for an economy subject to trade liberalisation will lead directly as a result of the takeover of domestic demand (demand) by foreign production to the trap of average growth, as well as indirectly being an automatic brake on sustainable growth.

[1] Supply must match demand (supply equal to demand) under threat of crisis.
[2] the growth of production in the processing industry entailed a faster growth of market services on the one hand and the growth of market services enabled a faster growth of industrial production on the other

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Searching for A Fair Price of a Financial Instrument on Financial Markets

Jan CHUTKA[1,a*], Ladislav VAGNER[2,b]

[1]University of Zilina, The Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovakia

[a]chutka.jan@fpedas.uniza.sk; jan.chutka@fpedas.uniza.sk

[2]University of Zilina, The Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovakia

[b]ladislav.vagner@fpedas.uniza.sk

*Corresponding author

Abstract

Our article deals with the issue of financial market prediction, specifically for finding a fair price of a financial instrument on the financial market and its use in the trading process. Today we can find a lot of research focused on methods of analyzing financial instruments with a focus on their effectiveness of prediction and the effectiveness of their use in trading systems. Therefore, we would like to focus our article on pointing out the connection between the analysis tool and the structure of the functioning of the financial instrument pricing process. The aim of our article will therefore be to describe in detail the Volume Profile indicator and identify its connection to the basic microeconomic processes of interaction between supply and demand. In the first chapter, we described in detail the interaction between supply and demand. We also dealt with the theory of the auction process. In the next chapter, we described in detail the Volume Profile method and its use in the process of predicting future price movements of financial instruments in financial markets. In the last chapter, we identified and clarified the connection between the function of this method and the basic microeconomic processes of mutual interaction of supply and demand. We consider the goal of our article to be fulfilled and we believe that it will be valuable in the research process in this area.

Keywords: Fair Price, Trading Volume, Volume Profile

Introduction

If we start to take a closer look at the issue of analysis of financial assets in the financial market, we will come across a large range of various sometimes conflicting indicators and methods of analysis. One of such areas is the area of analysis of the business volume of a financial instrument. This type of analysis falls under the responsibility of technical analysis, which is based on the claim that history repeats itself and that all eventualities are included in the price of a financial instrument. Opinions on technical analysis vary across the scientific spectrum. Some consider it a full-fledged area, others as a kind of "woo-doo finance". In our article, we will therefore explain in detail the background of the Volume Profile method and its connection to the basic microeconomic processes of mutual interaction of supply and demand [10, 15].

The theoretical background

Interaction of supply and demand

For the purposes of our article, we will be based on generally accepted microeconomic theories of demand, supply and market mechanism. One may point out that demand, supply and the market mechanism, as we know it, are not identical in the financial markets as in classical goods. However, on closer inspection, we identify that it is in the conditions of financial markets that we can see the most effective functioning of the market mechanism due to the number of market participants, trading volume and global interconnection [8].

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In microeconomic theory, demand can be defined as the amount of goods (or services) that buyers are willing to buy depending on its price (price is decisive, volume is derived from it). Since we consider the price of a good as determining the subsequently demanded quantity (for a specific price) we can describe it as the maximum amount of a good that an individual, group of people or population as a whole is willing to buy, per unit of time (day, month, year, etc.) and under certain conditions (price of goods, price of other goods, size of cash pensions, tastes and preferences of consumers, accumulated wealth, etc.). Of course, demand as such is not only a function of the price of the commodity, and it is also influenced by other factors which were considered to be immutable because the assumption of ceteris paribus has been maintained [4].

If we are to work on the very interaction of demand and supply, we still have to briefly define supply. In our case, we will derive the offer of financial instruments on the financial market from the general function of the offer.
When we begin to look for a definition of an offer, we find that we can generally define it as the maximum quantity of a given good (or service) that a producer or group of producers is willing to deliver to the market per unit time (day, month, year, etc.) and under certain conditions (input prices, technological possibilities of the producer, prices of other goods, state intervention, number of producers on the market, expectations of companies, etc.). As with the demand function, we cannot claim that supply is a simple function of the price of a good. In addition to the basic factor, which is the price of the good, the supply is also affected by other factors which were considered to be immutable because the ceteris paribus assumption was maintained.

The main task of the financial market is to execute individual trading orders as efficiently as possible, in other words, the financial market exists to ensure the best possible interaction of demand and supply of specific financial instruments over time. In the market, the interests of consumers (demand) and the interests of sellers (supply) meet, buyers offer the price of demand, i. max. the price they are willing to pay for a particular good in a given quantity of quality and the sellers who represent the price of the supply, i.e. the minimum price at which they are willing to sell the same goods in a given quantity and quality [1, 4, 14].

The basic result of the interaction of supply and demand is thus the equilibrium itself, in other words the current market equilibrium. The equilibrium of the market is thus defined by the equilibrium which occurs at such a price and such quantity of goods, when supply and demand are balanced and there is no deficit or surplus on the market.

If we start to be interested in the market mechanism in the financial markets, we get the result that the financial market itself can probably be considered as the closest real market to its theoretical description from microeconomic theory. So how do we explain if a market equilibrium emerges in the market, the fact that the price of financial instruments is constantly changing? From the theory of microeconomics we know three market states that can occur, equilibrium, deficit and surplus. However, these stocks may arise from changes in price or non-price factors affecting individual supply and demand functions. It is very important to identify the market imbalance on the basis of what kind of factor [4, 11, 12].

Market imbalance due to a change in the price factor can be like:

Surplus - If the price of goods P is higher than the equilibrium price of goods, there is a surplus of goods, there are almost always buyers who are willing to pay this higher price, but the volume of demand will be much lower than equilibrium volume. Conversely, the number of sellers willing to offer goods at a given price (higher than the equilibrium price) will increase and the volume of supply will increase and will be higher than the equilibrium volume. Sellers are dissatisfied because they cannot sell as much goods as they would like and to get rid of unnecessary goods, they start to reduce the price. As the price decreases, buyers begin to become more active, proving an ever-increasing demand for goods due to the ever-increasing attractiveness of the falling price. This situation will continue until the surplus is "absorbed" and the market is restored to its original equilibrium [4].

Deficit - If the price of the commodity is lower than the equilibrium price of the commodit, there is a shortage of goods on the market. This situation is referred to as excessive demand or deficit of goods. As prices fall below the equilibrium price, buyers will be willing to buy more products than sellers offer. Focusing on active demand, sellers will start to increase the market price. On the other hand, an increase in the market price will reduce the excess demand (the rising price of the good will be less and less attractive for buyers). The result of these processes will be a return to the previous equilibrium [4].

Based on the above dependencies, we see that if only the price factor changes in the market, we can assume the restoration of market equilibrium at the original point.

Distortion of the market equilibrium due to a change in the non-price factor:

Demand change - We assume that the demand curve will shift to the right and up (demand will increase at all price levels). If the market price remains at the original equilibrium level for some time, a deficit will arise as the volume of demand will increase from Quantity of equilibrium to Quantity of demand and supply will remain at the

level of Quantity of equilibrium. Active demand in excess of supply will stimulate price growth and the expansion of production of goods, and this will continue until the price balance is restored, but at a new level. The net effect of shifting the demand curve to the right (growth of demand) will be an increase in price and at the same time an increase in the production of the goods. The opposite reaction would occur when the demand curve shifts to the left (when demand decreases) [4].

Supply change - we assume a shift of the supply curve to the left (decrease in supply). Keeping the price at the original level for at least some time will cause a deficit in the production, because supply will be reduced to Quantity of supply and demand will remain at Quantity of equilibrium. An increase in demand over reduced supply will force the consumer to agree to a higher market price. However, with a higher price, demand will immediately start to decrease, and also a higher price will be an incentive for producers to start expanding production. Eventually, market equilibrium will be restored, but to a new level. The net effect of shifting the supply curve to the left (decrease in supply) will be twofold - inflation, a decrease in production (and the associated rise in unemployment). The opposite reaction would occur when the supply curve shifts to the right (when supply increases) [4].

Auction process on the financial market

Financial markets have undergone a complex development and a number of different changes since their inception. However, when we begin to analyze the financial markets in detail, we identify one constant and unchanging thing, and that is natural competition and, to a greater or lesser extent, the operation of the market mechanism. This competition in any market, in our case specifically in the financial market, is formed by the market participants themselves. The market mechanism in financial markets can be considered extremely fair. The reason is the distribution of the price in the form of an auction process. It is a simple two-party auction process during which the price moves at a given time in order to mediate as many trades as possible, either upwards or downwards, and thus represents a highly rational and efficient process. We can define distribution as the accumulation of individual positions, their distribution or a certain number occurring in a certain space, time or price [2, 3, 13].

A fact that many investors, traders and other market participants are often unaware of is the fact that there is no certainty in the market but only probability. Financial markets react to a large amount of different information, such as companies' results for the last quarter, central bank statements but also to the moods of high-ranking officials, but also to various types of natural disasters, terrorist attacks in different parts of the world and wars that cause different changes. short-term as well as long-term moods of financial market participants. Therefore, nowadays, most modern portfolios of theories are based on risk diversification between individual financial market instruments. In his book, Dalton pointed out that diversification by instrument type is not sufficient and added time-based diversification, in other words time frame [2, 3, 13].

The goal of the financial market can be described as an effort to enable the implementation of individual trades and thus to mediate trades between buyers and sellers. The market strives to transfer these executions in the most efficient way possible and thus to implement the largest possible volume of orders in the shortest possible time. The market, as we have already mentioned, strives for the greatest possible degree of efficiency, which means that it tries to fill as many orders in the market as possible. In the process of trading, over time, accumulated buy and sell orders are matched against each other. There are a huge number of individual participants in the financial market, which means that the market also represents a certain active flow of orders, where only the largest entities participating in the financial market can move the market price with their orders. Price movements are caused by the market mechanism. The market uses a market mechanism to determine whether there is an interest in trading or fulfilling individual sales or purchase orders at higher or lower prices. It follows that the financial market consists of only two basic building blocks, namely supply and demand. We consider this to be key knowledge in trying to predict future price movements in the financial market. In simplicity, it is how much of the underlying asset is offered by one party and how much of the underlying asset the other party is willing to buy. Despite the fact that the market is efficient, this does not mean that it will be fair. The price on the financial markets is highly prone to manipulation. Various large financial institutions or private individuals with a large amount of funds can act to manipulate the price. Thanks to the large volume of capital, they are able to place an enormously large order into the market, the settlement of which will move the market price. The market will mostly move in the direction of the volume of orders waiting to be settled, because, as we have said, the market is trying to make order execution as efficient as possible [2, 3, 6, 7, 13].

The actual auction process on the financial market is very similar to the standard auction process, which is used e.g. when selling antiques. For a better understanding, we will use a simple example. If the auction house wants to sell a certain painting, it will organize an auction with precisely defined rules to which they will try to allow access to as many potential buyers who are interested in the painting, have the necessary funds and agree to participate in the auction in advance. defined rules. The next step will be to determine the starting price, which will be considered the

lowest price at which the owner of the painting is willing to sell the painting. The course of the auction itself is defined by individual events and the growth of the price from its starting level to the level when no auction participant will be willing to offer a higher financial amount for a given image. However, the auction on the financial market is different. In the case of the sale of abrasion, we saw that the price only rose, but in the case of the auction on the financial market, the auction can proceed in both directions. Also, the subject of sale on the financial market is not only one contract, but there are usually a large number of them available, and therefore we can say that whenever there is a shift in the price on the financial market, there has been order execution, ie the sale of a certain amount of financial instruments [2, 3, 9, 13].

Volume Profile

When we start to look in detail at the market mechanism in the financial markets and price prediction, we will most likely come across the Volume Profile method. This method belongs to the predictive methods of technical analysis and is based on monitoring the market structure. This method allows the investor or trader to monitor the market structure of a particular financial instrument based on the display of trading volumes. The prerequisite for the use of this method is a precise definition of its application, both in time and price. In other words, the trader must precisely define the time and price interval of the historical data on which this method is to be applied. Because traders use the method to predict future price movements, they generally use the most up-to-date historical data that they expect to have the most informative validity. Subsequently, this method identifies individual trading volumes at individual prices within a given price range at a selected time interval and at a selected price range. Subsequently, it distributes this distribution of trading volumes in the price range in such a way that it identifies the average price on the basis of the trading volume and within the price interval divides the price level into groups according to the standard deviation. By default - + 3 standard deviations from the identified average are applied. The information thus obtained by applying this method is subsequently interpreted as follows. The average price is considered to be the fairest price in the selected time and price interval, the traders then compare the current price with the fair price [5, 13].

Results

Based on the above findings, we can therefore argue. The financial market can be considered the market that is closest to the theoretical description of the functioning of the net market mechanism. The market mechanism in the financial market seeks to restore the ever-changing market balance and eliminate the surplus and deficit of financial instruments in the financial market. Furthermore, we can say that the price of a financial asset can change based on the theory of demand, supply and their mutual interaction and auction process only if the influencing factors change on the demand or supply itself. By subsequently applying the volume profile, the trader can obtain information about the very structure of the price development of a given financial instrument. Therefore, we can claim that with this method we can identify the fair price of a financial instrument in a preselected time and price interval. This identified price is the price at which the largest volume of a given financial asset was traded within the selected intervals. When we can identify the maximum volume, we can say on the basis of microeconomic theory that this volume is an equal volume and therefore the price that belongs to it is the equal price that belongs to equilibrium and thus the price equilibrium within our chosen interval. The data interpreted in this way can subsequently be very valuable in further predicting price movements. If a trader identifies a market imbalance, he may assume that the market mechanism will seek to eliminate the imbalance. The market equilibrium may then be restored to the original equilibrium point or a new market equilibrium may be established on the market. We can distinguish between these two eventualities on the basis of the identification of a changing influencing factor. We know from microeconomic theory that if the market equilibrium is disturbed due to a change in the price factor, the market equilibrium is restored to the original point, but if the market equilibrium is disturbed due to a change in the non-price factor, the market equilibrium is restored to a new point.

Conclusion

The aim of our article was to describe in detail the Volume Profile indicator and identify its connection to the basic microeconomic processes of interaction between supply and demand. In the first chapter, we described in detail the interaction between supply and demand. We also dealt with the theory of the auction process. In the next chapter, we described in detail the Volume Profile method and its use in the process of predicting future price movements of financial instruments in financial markets. In the last chapter, we identified and clarified the connection between the function of this method and the basic microeconomic processes of mutual interaction of supply and demand.

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Crime Rates in The European Union Member States: A Legal and Comparative Analysis

Monika NIEDZWIECKA

University of Szczecin, Szczecin, Poland, monika.niedzwiecka@usz.edu.pl
ORCID 0000-0002-4341-5324

Abstract

The issue of crime is the subject matter of countless studies and research conducted across the world. Crime is a global problem plaguing mankind in every country and corner of the world. The only aspect that is different is the notoriety of crime and the characteristics of individual crimes. The aim of this paper is to compare crime rates in different EU member states. The paper offers a statistical analysis of crime that reveals the size, dynamics and structure of the most common criminal offences committed in the EU. The research is based on statistical data published by Eurostat, police and individual member states. Analysis of statistical data revealed a significant decline in the number of serious criminal offences, including homicide, assault and robbery that in the 2008-2017 period.

Keywords: Crime, Statistics, European Union.

Introduction

Due to the significant social and economic problems that crime can cause to individuals and communities, the issue of crime has long been the focus of attention of lawyers, sociologists, criminologists and psychologists. Researchers and practitioners from many walks of life are motivated to find new solutions to prevent and counteract crime, and to find effective ways to rehabilitate criminal offenders. It may be even said that crime is one of the most urgent problems of contemporary society. Each single day, in result of unlawful criminal behaviour, people's lives are taken, their health damaged and property lost. In many countries, combating crime has become a priority. Governments fund research connected to crime prevention, explore ways of reducing crime rates and implement novel, often tailor-made, crime prevention schemes (Bąk, 2015, p.44). Crime rates are affected by many factors. Secondary literature highlights that the most important factors driving crime are socioeconomic, such as: unemployment, income inequality, standards of living, family background (Hołyst, 2007; Sztaudynger, 2003, p.128). In contrast, Becker (Becker, 1974) argues that the roots of crime are rooted in economy, and can be explained by the economic theory of crime. Becker believes that the decision to commit crime is based on a national analysis of gains and losses.

Crime, similarly to other social phenomena, has to be analyzed based on statistical data that capture and reflect the problem. The knowledge about rates, structure and dynamics of crime helps in controlling it and informs crime prevention and policing strategies, and in result, helps prevent harmful social behavior. The primary aim of this paper is to provide an overview of the structure and dynamics of crime in the EU states. The secondary aim is to determine which types of crime are most common in the EU-27, and thus provide a comparative angle. The paper is chiefly based on statistical data provided by Eurostat.

It must be emphasized that comparison of cross-country statistical data is a rather difficult task. It is so since the way a country records its crime, which is reflected in official rates of specific crime types, is conditioned by many factors, i.a. legal and criminological setting, legal and customary environment, which determine the way a criminal offence is qualified. Therefore, the reservation must be made that the analysis of data presented in this article are only for reference and should be explored in further research.

Characteristics of crime in the European Union member states

Crime statistics of the EU states is mostly based on statistical data capturing the number of crimes committed most frequently. The most common EU crimes are: homicides, robberies and assaults.

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Homicides

Homicide is generally considered the most serious of all crimes perpetrated against another human being. Indisputably, it also has the most serious consequences for the victim. Human life, as a subject matter of legal and criminal protection, is a value paramount to all other rights and freedoms. The right to life is treated as first-generation right since without the right to life it is impossible to enjoy any other rights and freedoms (Wiak, 2012, p. 748).

The definition of homicide is not uniform across the EU states. Analysis of national laws reveals that European countries differ in what they consider a homicide, and thus the definitions they employ, i.e. they adopt a broad or narrow scope of the basic definition of homicide provided by the European Security Strategy (ESS). According to the ESS, homicide is defined as the intentional killing of a person (Eurostat), including murder, manslaughter, euthanasia and infanticide. However, the definition excludes death by abortion, dangerous driving and by help with suicide. To illustrate the differences in how homicide is defined in various EU countries, it suffices to mention the regulations adopted in the Netherlands and Hungary. In contrast, in some states, under the said regulations, the basic definition of homicide is extended to include abortion as a criminal offence, reflected in country's crime statistics. In Scotland, to illustrate the differences further, crimes classified as homicide include death by help in suicide (Gruszczyńska, Marczewski, Ostaszewski, Więcek-Durańska, 2015, p. 7).

Despite the differences in how homicide is defined across the European Union, still the said definitions vary less between countries than for some other types of crime, therefore homicide figures provided by Eurostat for individual EU states per calendar years may be regarded as comparable and reliable. The Table below presents police-recorded homicides in the 27 EU member states in the years 208-2017. Data on homicide statistics in the Netherlands are missing (not available for the said period).

In the 2008-2017 period, the biggest decline in homicide was recorded in Italy (40%), Poland (40%), Czechia (41%), Estonia (65%), Finland (48%) and Romania (39%). However, the homicide rate in 2017 remained high in France, Germany and Great Britain. France recorded the highest number of homicide in 2008, 2015 and 2016, with over 1,000 crimes of homicide per year. On the other end of the spectrum there is Malta, with less than 10 homicides per year in the 2008-2017 period.

The total number of homicides recorded by the police in the European over the 2008-2017 period declined by 1.100. As the figures presented below imply, since 2011 a continuous decline in homicide crime can be observed. In 2017, in the EU – 27 the total of police-recorded homicides was 5,155, which means that overall homicide rate dropped by 18.3% compared to 2008 (police-recorded homicides was 6,309 in 2008).

1. The total of police-recorded intentional homicides in the EU-27

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	4,786	4,577	4,310	4,066	4,092	3,737	3,481	3,416	3,103	2,610
Belgium	22,877	23,581	23,856	27,341	25,608	22,879	21,928	22,399	20,506	18,954
Bulgaria		150	148	128	141	109	112	126	79	95
Croatia	71	49	62	49	51	46	36	37	44	46
Cyprus	9	19	7	8	19	11	10	12	11	7
Czechia	113	105	105	83	95	90	81	88	65	66
Denmark	53	56	49	49	43	41	62	52	53	61
Estonia	84	70	70	65	63	52	411	45	33	29
Finland	133	120	119	110	88	89	88	82	74	69
France	1,021	819	796	856	784	777	914	1,157	1,031	942
Germany	656	721	699	699	619	623	645	655	747	738
Greece	139	143	176	184	165	141	105	86	81	78
Great Britain	737	708	755	642	628	602	589	652	786	809
Hungary	147	139	133	142	113	138	129	202	188	157
Ireland	51	53	55	42	52	51	53	31	37	41
Italy	615	590	529	552	530	506	487	471	404	371
Latvia	99	108	70	69	97	69	77	81	111	109
Lithuania	286	240	199	189	181	172	155	168	142	113
Luxembourg	7	5	8	4	3	2	4	5	5	2
Malta	6	4	4	3	10	6	6	4	5	9
Poland	460	493	436	449	377	296	282	287	256	278
Portugal	124	130	124	114	122	144	92	100	66	76
Romania	470	397	404	335	378	336	298	291	247	286
Slovakia	94	84	89	96	75	78	72	48	60	80
Slovenia	11	13	11	17	14	12	17	20	10	19
Spain	407	412	401	385	364	302	323	302	294	307
Sweden	82	93	91	81	68	87	87	112	106	113
The Netherlands	-	-	-	-	-	-	-	-	-	-
Total	**6,309**	**5,961**	**5,790**	**5,645**	**5,374**	**5,047**	**5,388**	**5,386**	**5,158**	**5,155**

Source: author's own compilation based on official figures published by Eurostat, International Homicide 2008-2017.

Robberies and Assaults

According to the European Sourcebook of Crime and Criminal Justice, robbery is defined as "stealing from a person with force or threat of force". Pick-pocketing, extortion and blackmailing were excluded from this standard definition (Gruszczyńska, Marczewski, Ostaszewski, Więcek-Durańska, 2015, p.46).

In all legal systems, robbery is perceived as one of the most common precipitating crime, and also, one of the most dangerous, whether it is armed, aggravated robbery or the so-called highway robbery. The social danger is implied by the twofold nature of the crime, which is a combination of theft and assault (Wiatrowski, 210, p.62). Robbery and assault, which are serious and violent crimes, are an attack against two fundamental values protected by law: property and human life.

Analysis of statistical data reveals a 20% decline in the overall EU police-recorded robberies and assaults in 2017, compared to 2008. The biggest decline was recorded in Estonia (78%) and Hungary (73%). A significant decline in robbery rates was also observed in Lithuania (68%), Czechia (66%), Slovakia (66%), Poland (62%) and Latvia (58%). In contrast, Luxemburg, Greece and Romania recorded an increase in robbery and assault. The most dramatic increase was seen in Greece, with a 29% rise in robbery in 2017 compared to 2008.

2. The total of police-recorded robberies in the EU-27

Country	2008	2017
Austria	3,606	3,625
Belgium	77,758	69,363
Bulgaria	3,038	2,811
Croatia	986	798
Cyprus	173	144
Czechia	4,786	4,767
Denmark	1,753	1,904
Estonia	103	76
Finland	1,974	1,581
France	231,909	241,687
Germany	142,903	137,058
Greece	1,101	1,510
Great Britain	373,822	517,631
Hungary	14,569	13,687
Italy	64,866	65,775
Ireland	3,681	4,047
Latvia	1,226	657
Lithuania	245	178
Luxembourg	596	585
Malta	180	186
Poland	11,011	7,304
Portugal	863	584
Romania	12,301	272
Slovakia	2,426	1,642
Slovenia	2,182	1,398
Spain	25,077	18,089
Sweden	5,594	4,685
The Netherlands	6,605	4,789
Total	**995,334**	**1,106,838**

Source: author's own compilation based on official figures published by Eurostat, Crime Statistics, 2008-2017.

Crime statistics in individual EU member states published by Eurostat cover offences by type of crime, so they also include statistics on assaults. As proven by quantitative data, the crime of assault is a common type of crime in the European Union. The highest assault rate was recorded in Great Britain. In 2008 GB recorded a dramatic figure of 373 866 offences classified as assault, and in 2018 the total skyrocketed to 517,775, thus showing an increase of 38%. In 2017, high assault rates were also recorded in France (241,687), Germany (137,058), Belgium (69,363), Italy (65,631) and Spain (18,089). In contrast, in the same year the lowest assault rate was seen in Estonia (76), Cyprus (144) and Lithuania (178). Overall, 2017 figures showed an increase of 11% in police-recorded assaults in the whole of the EU compared to 2008.

3. The total of police-recorded assaults in the EU-27

Country	2008	2017
Austria	4,786	2,610
Belgium	22,877	18,954
Bulgaria	2,868	1,558
Croatia	1,259	864
Cyprus	71	117
Czechia	4,641	1,585
Denmark	3,400	2,042
Estonia	909	201
Finland	1,696	1,640
France	106,633	100,080
Germany	49,913	39,849
Greece	3,293	4,271
Great Britain	84,242	79,212
Hungary	3,128	841
Ireland	2,328	2,187
Italy	64,535	31,167
Latvia	1,441	604
Lithuania	3,452	1,088
Luxembourg	326	454
Malta	147	202
Poland	21,085	8,114
Portugal	20,854	11,885
Romania	2,464	3,163
Slovakia	1,371	469
Slovenia	386	238
Spain	71,421	66,783
Sweden	8,909	8,649
The Netherlands	13,175	7,985
Total	**501,610**	**395,812**

Source: author's own compilation based on official figures published by Eurostat, Crime statistics, 2008-2017.

Summary

Based on the research findings, it is safe to conclude that a significant decline in the most serious and violent crimes, such as homicide and robberies, can be observed in the EU member states. Analysis of statistical data reveals some differences between member states with regard to the said crime rates. France, Germany and Great Britain continue to be troubled by the highest rates of homicide and robbery. However, it should be borne in mind that the figures published by Eurostat are based only on police-recorded cases, which means that the real total number of crimes committed in individual EU states is unknown.

Another important point is that national legislation on the said crimes differs within the EU, as does the definition of crimes and legal concepts, a fact that directly affects official crime statistics. According to Wierzbicka, also social and cultural factors play an important role in the reporting of a given crime, i.e. when and where the crime is reported (Wierzbicka, Żółtaszek, 2015, p. 67). Crime rates are also affected by other country-specific factors, such as the freedom to relocate and corruption levels.

Crime is a very complex issue, requiring a multidimensional analysis. As crime has such enormous social and economic consequences, it should be continuously studied and explored from as many perspectives as possible in order to develop universal crime prevention standards. Crime poses a threat to the proper functioning of the state, as it hugely affects the sense of safety enjoyed by citizens. Therefore, it can be concluded that since crime is a global problem, joined national and international efforts are needed to reduce and prevent crime.

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On the Issue of The Functioning of The Open Data Portal in The Russian Federation

Ilze V. PRIPADCHEVA
Southwest State University, Kursk, Russia, schumacher1994-2006@yandex.ru

Irina V. MINAKOVA
Southwest State University, Kursk, Russia, irene19752000@mail.ru

Artem A. GOLOVIN
Southwest State University, Kursk, Russia, cool.golovin2011@yandex.ru

Elena A. SENTISHCHEVA
Southwest State University, Kursk, Russia, elenasentischeva@yandex.ru

Vladislav I. GALIGUZOV
Southwest State University, Kursk, Russia, vlad.galiguzov@mail.ru

Abstract

The article is devoted to the topic of the functioning of the open data portal in the Russian Federation. On the basis of the analysis of the portal characteristics the main imbalances in its functioning are described. Based on this information, a quantitative and qualitative assessment of the effectiveness of the open data portal of the Russian Federation is being performed. Also, the main barriers that reduce the efficiency of the portal functioning have been identified and measures to overcome them have been described.

Keywords: Open data, the Russian Federation, open data portal efficiency, open data set.

Introduction

The wide use of information systems and information technologies in everyday practice and, in particular, in the public sector has led to its critical dependence on these systems and technologies. Governments and public organizations own a significant amount of data that, if being published in reusable open and machine-readable formats, can provide various benefits to individuals, organizations, governments and society at large. Open data are becoming a widespread practice of exchanging government data for reuse, and an open data portal has been created in the Russian Federation. Despite this fact, the number of truly open data sets is still low in comparison with other countries (Table 1).

Table 1: Number of hosted open data sets in different countries for 29.10. 2020

Country	Number of hosted open data sets, units
Canada	224235
the USA	215407
Germany	37841
Italy	36681
France	35538
the United Kingdom	33213
the Russian Federation	24018

Source: Compiled by the author on the basis of the open data portals of Canada, the USA, Germany, Italy, France, the Great Britain and the Russian Federation.

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As can be seen from Table 1, Russia ranks last in terms of the available open data set, behind the UK by 9,195 sets of open data, while the number of open data sets in Russia is 2.2 times higher than in the UK.

Therefore, to understand how effectively open data is used in Russia, it is important, first of all, to study the functioning of the open data portal, and secondly, to study the barriers affecting the placement and reuse of open data.

The aim of this work is the evaluation of the effectiveness of the open data use in Russia through the analysis and the work of the open data portal in the Russian Federation and the identification of barriers (legal and technical) on the use of open data.

Characteristics of the open data portal of the Russian Federation

The open data portal of the Russian Federation is a state information system located in the information and telecommunication network " the Internet" at data.gov.ru, which implements the main function of centralized storage of descriptive and reference information on open data, as well as individual machine-readable data of the state authorities of the Russian Federation, local authorities and associations acting on the territory of the Russian Federation, and also the function of conducting the summary register (A.A. Golovin, S.A. Statykh, O.I. Solodukhina & Z.A. Vasileva, 2019).

There are three levels of government in the Russian Federation: federal, regional and municipal. Therefore, when examining the number of open data sets, it is necessary to conduct a research on these levels (Fig. 1).

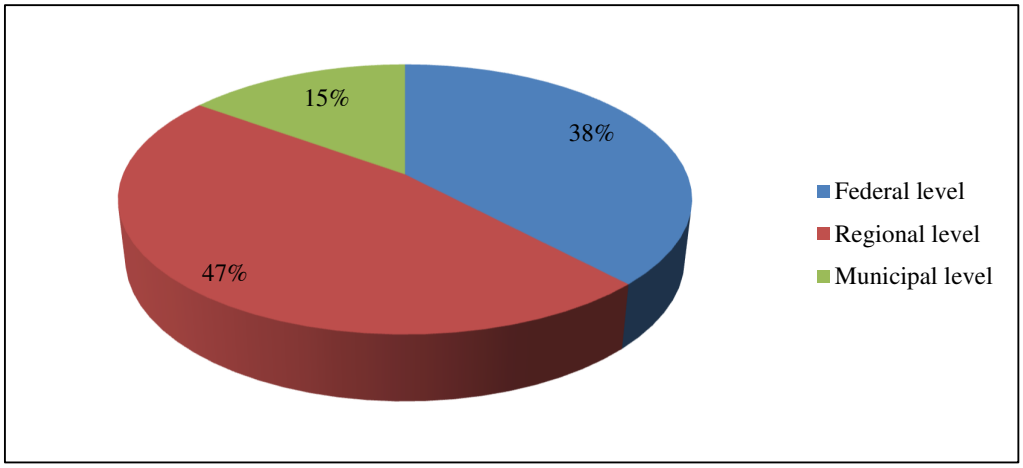

Fig 1. The structure of the open data set by levels of government in the Russian Federation

As can be seen from Figure 1, the main share of open data sets is represented by the regional level (47%), the municipal level - 38% and the federal level 15%. It should also be noted that in terms of the number of publishers, the structure of the number of open data sets has a different composition (Fig. 2).

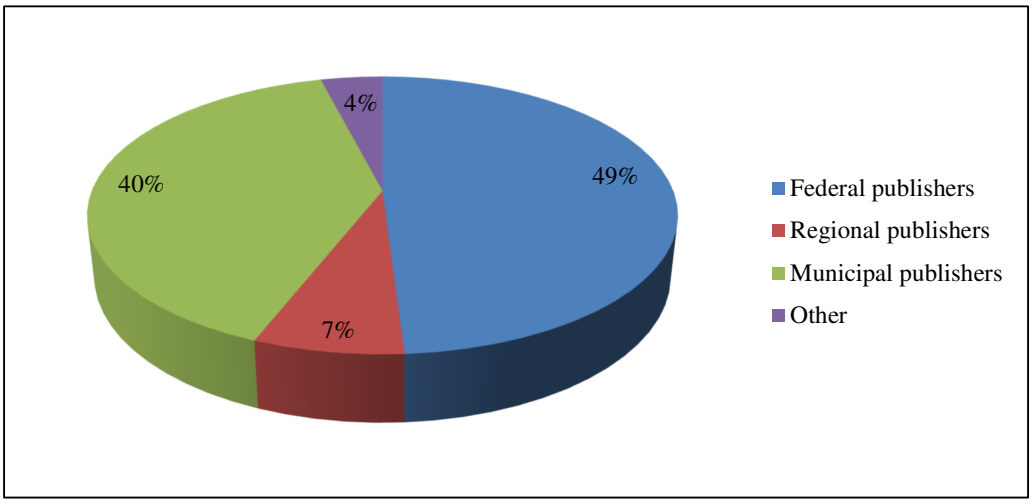

Fig 2. The structure of a set of open data on public administration publishers in the Russian Federation

As can be seen from Figure 2, the main share is occupied by federal publishers (49%), followed by municipal publishers (40%), in contrast to the amount of data set (15%), regional publishers make up 7%. This discrepancy can be explained by the fact that municipal publishers post open data sets regarding the region. Basically, this may be due to the fact that a certain industry is represented on the territory of one municipality. So, for example, in the Kursk region, mining of minerals (iron ore) falls on the Zheleznogorsk municipal district. In this case, the publisher will be Zheleznogorsk district, but the data set will be presented by the region.

It should be noted that the last posting of new data sets on the open data portal took place in the sections of safety, health, and transport on August 17, 2020. Table 2 shows the composition of open data hosted on the portal.

Table 2: The composition of open data on the open data portal of the Russian Federation for October 29, 2020

Section title	Number of data sets	Number of news	Number of applications	Total open data
The state	15287	433	18	15738
Economy	1566	57	6	1629
Ecology	1298	27	3	1328
Education	1276	46	7	1329
Health	678	15	4	697
Culture	635	13	8	656
Transport	635	30	23	688
Construction	448	9	0	457
Trade	329	14	0	343
Sport	247	4	3	254
Leisure and recreation	218	28	6	252
Tourism	214	12	18	244
Safety	207	16	4	227
Cartography	87	11	5	103
Electronics	29	32	2	63
Meteorological data	9	1	0	10
Total:	23163	748	107	24018

Source: Compiled by the author on the basis of the open data portal of the Russian Federation.

Thus, the bulk of open data placed on the portal up data sets (96.44%), followed for the news (3.11%) and applications are 0.45%. It should be noted that the tourism section contains more applications than news, and the electronics section contains more news than the number of data sets. Regarding the number of open data sets, it is worth noting that the state section occupies the largest share (65.53%), the rest of the sections include less than 10%

of open data sets. This phenomenon is explained by the fact that there are a number of barriers (legislative and technical) for the placement of open data. The establishment of these barriers is caused by the need to protect open data from unauthorized access and use.

Assessment of the open data work of the Russian Federation

Our research has shown that the open data portal of the Russian Federation is a complex system that includes many subsystems (data sets). In this regard, we consider it is important to assess the work of the portal using the methodology of a systematic approach, which makes it possible to give an adequate assessment of the functioning of the portal.

So, there are sixteen subsystems (data sets by category) can be described on the open data portal. As a rating criterion, it is advisable to use the following indicators: the number of data viewed, the number of data downloaded, and the number of user votes. Based on these criteria, there are two main stages in the assessment of an open data portal.

Stage 1. The analysis of reuse of open data sets.

At this stage, we conducted a research not only of the open data posted on the portal, but also of the open data used through views and downloads (Table 3).

Table 3: The research of the quantities of used open data sets on the portal of open data of the Russian Federation for October 29, 2020

Section title	Number of data sets	Number of viewed data	Amount of downloaded data
The state	15287	6114476	161809
Economy	1566	727412	21371
Ecology	1298	611500	16792
Education	1276	610300	17403
Health	678	368977	11296
Culture	635	347890	9465
Transport	635	316265	9157
Construction	448	237437	9309
Trade	329	165406	4492
Sport	247	166050	5766
Leisure and recreation	218	84140	1483
Tourism	214	115148	3877
Safety	207	130899	4562
Cartography	87	62079	4350
Electronics	29	30177	1658
Meteorological data	9	12127	1400
Total:	23163	10100283	284190

Source: Calculated by the author on the basis of the open data portal of the Russian Federation.

As can be seen from Table 3, one set of open data is viewed by users on average 436 times, and downloaded on average 12 times. It should be noted that views of open data are 35.5 times more than downloads. This trend is also observed across sections of open data sets. Regarding the shares, it can be noted that a large share of views falls on the state section - 60.54% and downloads - 56.94%. The rest of the sections include less than 10% of views and downloads by users.

The conducted research on the use of open data sets also indicates the presence of barriers (legislative and technical) to the use of open data sets. This is also evidenced by the structure of requests for open data sets (Figure 3).

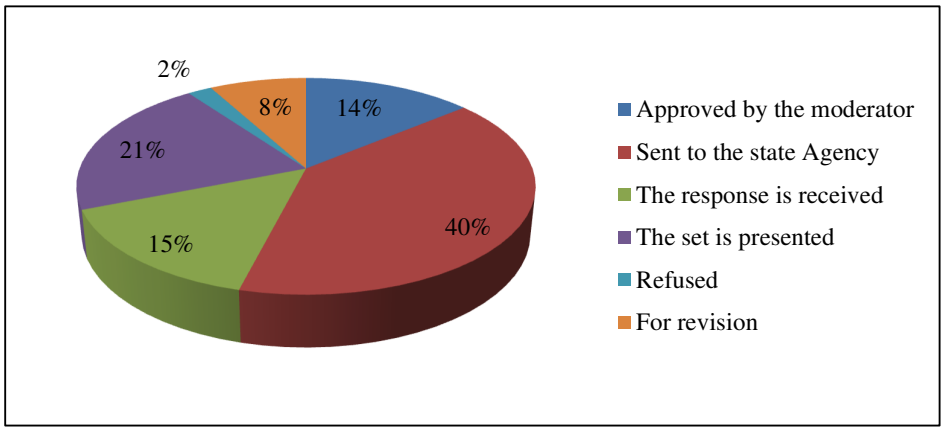

Fig. 3: Composition of requests for open data sets

As can be seen from Figure 3, most requests for open data sets were sent to government agencies for processing (40%), only 14% approved by moderators, deviations in the provision of open data sets were 2%.

Stage 2. Assessment of user satisfaction with the quality of hosted open data sets.

On the open data portal of the Russian Federation there is a section on the assessment of a set of public data users through voting. It should be noted that this assessment has a purely subjective assessment. This is also confirmed by the points by which users evaluate open data sets:

1. Description of the set of open data.

2. How would you describe these problems.

3. What benefit, in your opinion, will bring the requested data.

4. Your estimate of the economic and / or financial benefits of publishing this data.

Generalized evaluation results (polling) by collection of open data submitted s in Table 4.

Table 4: Qualitative user assessment of open data sets on the open data portal of the Russian Federation for October 29, 2020.

Section name	Number of votes
The state	-101
Economy	-508
Ecology	+7
Education	+38
Health	-285
Culture	-191
Transport	+2
Construction	+24
Trade	+58
Sport	-208
Leisure and recreation	-129
Tourism	-56
Security	+16
Cartography	-99
Electronics	-30
Weather	-47
Subtotal:	-1509

Source: Calculated by the author on the basis of the open data portal of the Russian Federation.

As can be seen from Table 4, the majority of users rate the usefulness of the posted open data negatively (1509 votes against). So, users believe that the most unprofitable data are open data sets placed in the economy (-508 votes), health (-285 votes) and sports (-208 votes) sections. Users consider the most profitable sets of open data placed in such sections as trade (58 votes), education (38 votes) and construction (24 votes).

Thus, the assessment of the work of the open data portal of the Russian Federation showed its inefficiency in the field of data reuse. This is confirmed by both the lower number of downloads compared to the number of views, and the subjective assessment of users about the usefulness of hosted open data sets.

Assessment of legislative regulation of open data in the Russian Federation

Our research has shown that the main barriers to the placement of open data and reuse are legislation and the technical component. In this regard, we consider it is important to assess the legal regulation of open data in the Russian Federation (I.V. Minakova, M.A. Parkhomchuk, A.A. Golovin & T.N. Bukreeva, 2018).

In the Russian Federation, in April 2012, the process of joining the largest initiative “Open Government Partnership” has begun. Within the framework of this project, the Open Data Concept was developed, it includes the following sections:

1. Goals and prospective results of placing information about their activities on the Internet in the form of open data by state and local self-government authorities.

2. Principles of placing information about their activities on the Internet in the form of open data by state and local self-government authorities.

3. Organization of information placement activities on the Internet in the form of open data.

Further joining “The Open Government Partnership” initiative led Russia to sign “The G8 Open Data Charter” in 2013.

Therefore, the main international legal act governing the open data portal of the Russian Federation is ‘The G8 Open Data Charter” signed in June, 2013. This Charter defines the basic principles for ensuring the availability of open data:

1. Open data by default;

2. Quality and quantity;

3. Use by all;

4. Data publishing for optimizing the management;

5. Data publishing for innovation.

The main regulatory legal acts that regulate the work of the open data portal of the Russian Federation are shown in Figure 4.

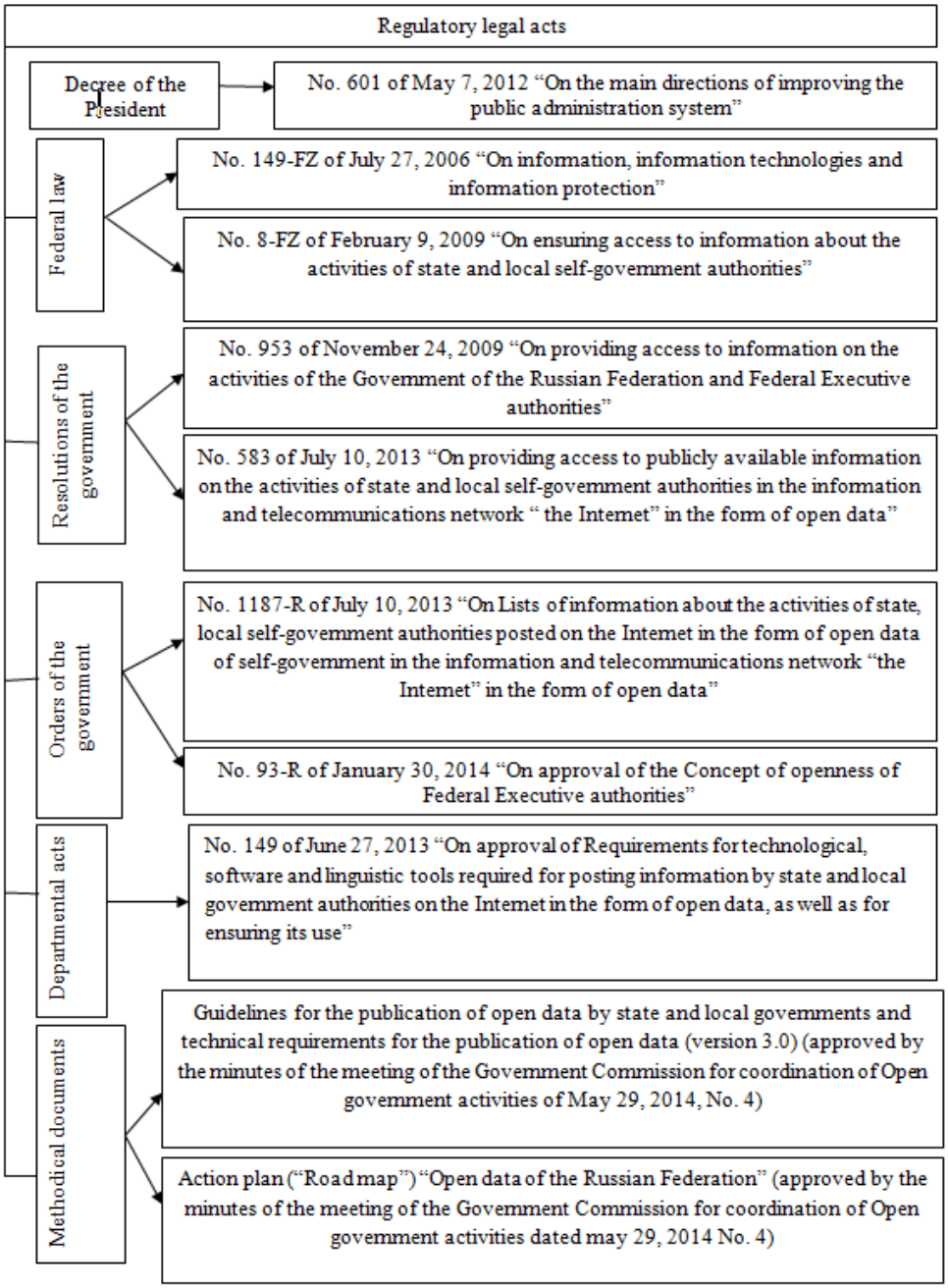

Fig. 4: Regulatory legal acts regulating the activities of the open data portal of the Russian Federation.

As can be seen from Figure 4, the regulatory legal acts regulating the activities of the open data portal of the Russian Federation cover all levels of the government. It is important to note that these are not all the regulations governing open data in the Russian Federation. Based on these acts, each department develops its own internal regulations and places them in the appropriate section.

A list of reference sections and open data portals that comply with regulatory legal acts includes the following departments (A.A. Golovin, S.A. Statykh, O.I. Solodukhina & Z.A. Vasileva, 2019):

– Federal Antimonopoly Service;

– Ministry of Culture of the Russian Federation;

– Federal State Statistics Service;

– Ministry of Education and Science of the Russian Federation;

– Ministry of Finance of the Russian Federation;

– Federal Air Transport Agency;

– Federal Road Agency;

– Federal Service for Labor and Employment;

The highest executive authority of state power in the city of Moscow is the Moscow Government.

Table 5 summarizes the structure of the reference sections.

Table 5: Study of the structure of the reference sections of open data

	Order	Data set	Composition of the working group	Departmental plan for the implementation of activities	Data disclosure schedule	Poll / Feedback
Federal Antimonopoly Service	+	-	+	+	+	+
Ministry of Culture of the Russian Federation	-	+	-	-	-	+
Federal State Statistics Service	-	+	-	-	-	-
Ministry of Education and Science of the Russian Federation	+	+	-	-	-	-
Ministry of Finance of the Russian Federation	+	+	+	-	-	+
Federal Air Transport Agency	-	+	-	-	-	+
Federal Road Agency	+	+	+	+	+	+
Federal Service for Labor and Employment	+	+	-	+	-	+
The highest executive authority of state power of the city of Moscow - the Moscow Government	+	+	-	+	-	+

Source: Compiled by the author on the basis of official websites and portals of departments.

As can be seen from Table 5, the reference section of open data on the agency's website should include the following information: orders (documents), data set, composition of the working group, departmental plan for the implementation of activities; data disclosure schedule; feedback. These sections are fully reflected on the website of the Federal Antimonopoly Service. The minimum information that must be accepted according to the requirements is open data sets, which we observe on the website of the Federal State Statistics Service. Considering the sections of open data at the regional level, one can note the same shortcomings as for the departmental sections.

So, the structure of the open data section on the website of the Kursk region administration is presented in Table 6.

Table 6: Composition of the open data section on the website of the Kursk region administration

The subsection of the open data section	Hosted data sets
The state	Multifunctional centers for the provision of state and municipal services
	Civil registration authorities of the Kursk region
	Executive authorities of the Kursk region, exercising powers in the field of promoting employment of the population and the delegated authority to make social payments to citizens recognized as unemployed in the prescribed manner
Wildlife and	Executive authorities of the Kursk region, exercising powers in the field of

hunting	protection and use of objects of the animal world
	State hunting register (information on legal entities and individual entrepreneurs carrying out activities in the field of hunting)
	State hunting register (information on the number of animals and birds classified as hunting resources)
	State hunting register (information on species, location, boundaries, ownership and condition of hunting grounds)
Health care	Executive authorities of the Kursk region, exercising the delegated powers of the Russian Federation in the field of public health protection
	Register of licenses for medical activities issued by the executive authorities of the Kursk region, exercising the delegated powers of the Russian Federation in the field of public health protection
	Register of licenses for pharmaceutical activities issued by the executive authorities of the Kursk region, exercising the delegated powers of the Russian Federation in the field of public health protection
	The register of licenses for activities related to the circulation of narcotic drugs, psychotropic substances and their precursors, the cultivation of narcotic plants, issued by the executive authorities of the Kursk region, exercising the delegated powers of the Russian Federation in the field of public health protection
Forestry	Characteristics of forests according to their intended purpose: about protective forests, about their categories, about commercial forests and about reserve forests
	Distribution of forest area and timber reserves by dominant species and age groups
	Composition of forest lands and lands of other categories on which forests are located
	Information about the death of forest plantations
	Fire hazard monitoring data in forests
	Information about contracts for forest plots (lease, permanent (unlimited) use, free use)
	Results of forest pathological examinations
	“Information about the federal state forest supervision “forest protection”
	Register of forest users - debtors on payment for the use of forests to the federal budget
	Information on the amount of financial support and the achievement of the values of indicators (indicators) of the state program "Development of forestry in the Kursk region"
	Information on priority investment projects in the field of forest development
	Summary information on the use of forest plots provided for permanent (unlimited) use on the territory of the Kursk region
	Summary information on the use of forest plots provided for free use on the territory of the Kursk region
	Summary information on the use of forest plots leased in the Kursk region
	Information on the planned provision of forest plots for use
	Information on forest reproduction
	Information on growing planting material and harvesting seeds
Education	Executive authorities of the Kursk region, exercising the delegated powers of the Russian Federation in the field of education
	Register of licenses for educational activities issued by the executive authorities of the Kursk region, exercising the delegated powers of the Russian Federation in the field of education
	Register of accredited educational institutions located in the Kursk region
Construction	Executive authorities of the Kursk region, exercising powers in the field of control over the observance of legislation on urban planning by local governments

	The executive authorities of the Kursk region, exercising powers in the field of state examination of project documentation and state examination of the results of engineering surveys
Ecology	Executive authorities of the Kursk region, exercising powers in the field of environmental impact assessment
	The plan for the state environmental impact assessment at facilities subject to state environmental control, carried out by the executive authorities of the Kursk region
	Information on the results of the state environmental impact assessment at the facilities subject to state environmental control, carried out by the executive authorities of the Kursk region

Source: Compiled by the author on the basis of the data presented on the official website of the Kursk Region Administration.

As can be seen from Table 6, on the website of the Kursk region administration in the open data section, there are open data sets for the main industries. The largest number of hosted open source data sets is forestry and the smallest one is construction. The total number of views of the data was 22,529 times, and downloads - 25,686 times.

Thus, the defective design of sections on departmental and regional sites is characterized by the following problems in legal regulation:

1. Low motivation of representatives of state authorities and local governments in publishing open data.

2. Lack of popularization of the use of open data.

3. The list of obligatory open data sets is not clear and detailed.

4. The terms of use of open data are unclear.

4. Assessment of technical regulation of open data in the Russian Federation

It should be noted that along with the legal barriers to the placement and use of open data sets, we have identified technical barriers.

Technical barriers for publishers of open data sets are mainly associated with the algorithm for working with open data on the open data portal of the Russian Federation (Fig. 5).

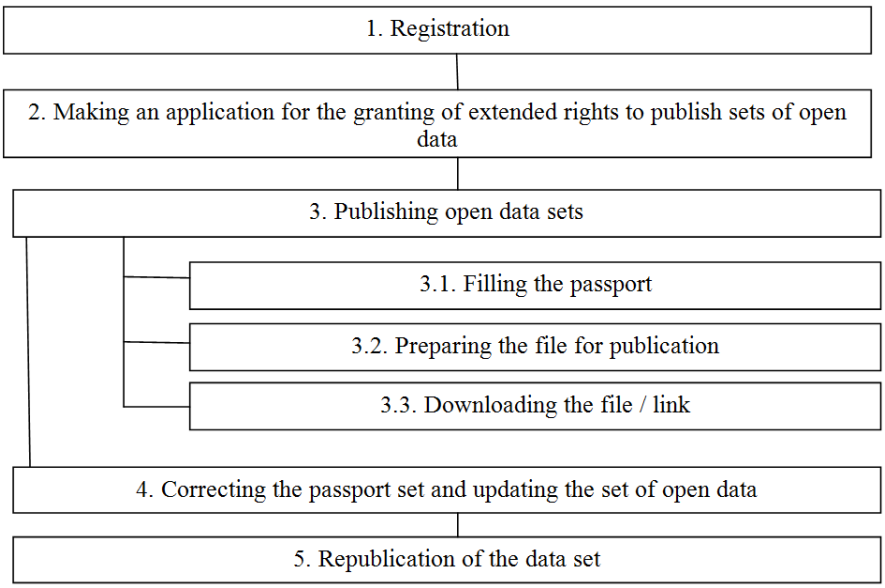

Fig. 5: Algorithm for working with open data on the open data portal of the Russian Federation

As shown in Figure 5, for publishers some technical difficulties may arise while making applications for extended rights for the publication of open data sets, preparation and downloading files.

The registration stage assumes two options - either authorization through social networks (Contact, Facebook, Instagram); or by indicating the e-mail address, surname, name and patronymic of the registrant.

The stage of applying for extended rights to publish open data sets presents a number of difficulties, as it involves filling in the following fields:

– information about the organization (search for an organization in the data base);

– information about the publisher (last name, first name, patronymic, position, telephone). The problem arises if the organization is not in the database, then you will have to fill in all the details manually. The organization is included in the database after the placement of the first set of open data.

The stage of publishing open data sets is the most technically difficult and involves solving three problems.

Filling out the passport of an open data set involves filling in the following fields:

– the name of the passport of the open data set (the short essence of the open data set);

– the identification number (TIN of the organization and the name of the set of open data in the Latin alphabet);

– the description of the data set (full description of the presented set of open data);

– the organization (the owner of the open data set);

– a responsible person;

– a phone number of the person in charge;

– the e-mail address of the person in charge;

– the date of the first publication of the open data set;

– date of relevance of the set of open data;

– heading;

– license.

It is important to note that the choice of the type of license implies the choice of the degree of information protection, that is, the possibility of re-use with an indication of the author, the possibility of re-use under the same license, the possibility of re-use without restrictions.

Preliminary preparation of a file for downloading with conversion assumes that the following requirements are followed from a technical point of view:

1. The file must contain data in tabular presentation (file format - xls, xlsx).

2. The table should have a flat appearance (the table lacks any hierarchy in columns and rows - there are no merged cells).

3. The table should not contain the table heading and other information (only a completed table with signed columns should be presented).

Uploading a file to the open data portal of the Russian Federation can be done in three ways:

1. The link to the file is used if this set of open data is already placed in the open data section of the departmental or regional website. The link is placed both in the data set field and in the data set structure field.

2. A reference to the API (Application Programming Interface) is used if the departmental or regional site supports the output of data on the API. In this case, two fields are filled in - this is the option for creating a set and a link.

3. Upload a file with or without conversion. It is used without conversion if the data file is prepared according to all the rules. With conversion, it is used if the existing data needs to be converted into a machine-readable format.

The edit data set passport and update public data set stage allows you to make changes if errors were detected. Updating assumes that data can be updated at a certain point in time, or that open data sets can be loaded, if it was not possible to do so at the previous stage.

The stage Re-publication of the open data set allows you to use the html-code of the passport to post it on the official departmental or regional website in the open data section.

Technical barriers for users of the open data set are presented in Table 7.

Table 7: Technical barriers for users of the open data set and ways to overcome them

Technical barrier	Characteristics of the technical barrier	Ways to overcome the technical barrier
Invalid data	Most of the data are placed in the CSV - format that causes the error, including the most popular one - the extra quotation marks and a different number of columns	1. The ability to visualize the data as the author and users want, and not as the system does. 2. The ability to set a data structure, deviation from which will generate an error and prevent data loading. 3. The complicated API and the ability to integrate with various data sources. 4. Community discussion, evaluation and review of data. 5. Data should not be located on servers in one country in order to avoid blocking them by the state.
Data fragmentation and lack of standards	Each service publishes data in any form. In addition, the data is scattered across different resources	
Lack of a single search mechanism	Due to the fragmentation of data, it is not possible to search through all government sources of open data	
Lack of the API for data access	The API that some resources have is not enough to work with data. Moreover, they are not sufficiently reliable for using in real-world projects	

Source: Compiled by the author on the basis of the data presented on the official website of research and forecasts in IT.

As you can see from Table 8, there are basically four main barriers - invalidity, fragmentation, lack of a single search and lack of the API for access. You can solve these problems by changing the visualization, standardization, the API and integration, socialization and internationality.

The possibility of using the Italian experience to improve the efficiency of the open data portal of the Russian Federation

In order to improve the efficiency of the functioning of the open data portal of the Russian Federation, we consider it is important to use foreign experience in overcoming similar problems. This is due to the fact that before the creation of “The G8 Open Data Charter” in 2013 many countries had experienced the same difficulties as Russia, despite the adoption of the Charter (Table 8).

Table 8: Structure of barriers to reuse of open government data in the EU (2012)

Generalized Barriers Category	Quantity, units
Data availability and quality	89
Protection of data and privacy at the legislative level	61
Negative and undesirable consequences	27
Relations and interactions of stakeholders when opening data	25
Coordination, organization, processes and management	24
Benefits and positive impact	24
Resources, costs and financing	22
Leadership, politics and strategy	21
Knowledge, skills and abilities	17
Technologies and tools	9
Total:	319

Source: Translated by the author from Jan Kučera (2017)

As can be seen from Table 8, 319 cases of generalized barriers were found. Issues related to data and metadata availability, accessibility and quality were the most frequently discussed barriers to the publication and reuse of open data. This category was followed by barriers related to legislation, licensing, data protection and privacy. There were also relatively few technological barriers and barriers associated with the availability of suitable tools.

The research of open data portals in most countries shows that they mostly solve the problem of data availability by increasing the number of open data sets hosted. It should be noted that the French open data portal also allows users to vote for the usefulness of hosted data sets. As for the Italian open data portal, it contains "The report on the maturity of open data in Europe" compiled on the basis of a survey in accordance with the PSI Directive.

This report was based on a questionnaire survey, which was attended by 23 state administrations. The questionnaire consisted of two parts (Italian open data portal).

The first part focuses on the reuse of open data and contains questions about information on reuse of public sector data, applications (smartphones, web-based, etc.) developed from open data, about any marginal costs applied by governments to access to information. This part was aimed at stimulating discussion of the possible economic benefits of the actual reuse of open data.

The second part of the survey focused on government-initiated open data policies and regulations for the provision and / or documents produced at the local level.

All administrations that participated in this survey organized and / or joined in communication initiatives and events dedicated to the promotion of open data in all entities operating in their territories. These initiatives have achieved the following results:

1. Developed a public roadmap for the municipality of the city of Rome. Citizens, businesses, civil society and open data experts participated in its development.

2. Promoting open data through an idea competition promoted by the Piedmont region. Within the framework of this competition, digital projects based on open data were considered, revealing the history of the development of Piedmont.

The introduction of this practice allowed Italy, by overcoming the legislative and technical barriers identified during the survey, to increase the number of posted open data sets by more than 4 times in 2013 - 2020. It also allowed to increase the quality of posted open data sets and the satisfaction of users and publishers.

In this regard, we consider that it is possible to apply the Italian experience to improve the efficiency of the open data portal in the Russian Federation.

Conclusions

"The Open Government Data Initiative" was created in many countries around the world, including the Russian Federation. Despite all efforts, many barriers to publishing and reusing open data still persist. Our research shows

that the spectrum of barriers is diverse and that both publishers and consumers of open data face these barriers. However, these barriers are not only diverse, but often interrelated. A perceived lack of clarity about the benefits of open data can weaken the willingness to share and reuse data. Therefore, overcoming barriers requires both an in-depth study of individual barriers in order to find solutions that would correspond to specific problems, and a holistic approach, covering the variety of barriers and the interconnections between them in order to be able to provide comprehensive recommendations to stakeholders. To assist organizations and individuals in solving this problem it is necessary to develop a set of advanced methods of exchanging information in the public sector. National and local governments, as well as international organizations and institutions, are developing their own guidelines for publishing and reusing open data. The future research should explore how these best practices and guidelines are being implemented and how they contribute to overcoming barriers to publishing and reusing open data. Some of the generalized barriers analyzed in this work were present throughout the entire or most of the study period. Future research on these barriers still seems relevant. Therefore, areas of future research should include:

– the quality of open data;

– the availability of open data;

– data protection, privacy restrictions or data security in connection with open data;

– open data licensing, legislation and legal framework for open data;

– stakeholder awareness of open data;

– the benefits of open data and their measurement;

– funding models to ensure sustainable provision of public data, as well as the policies and strategies of open data.

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Managing the Calculation of Logistics Costs in A Manufacturing Company Based on The Model Time-Driven Activity Based Costing

Arkadiusz GÓRSKI
Wroclaw University of Science and Technology, 27 Wybrzeże Wyspiańskiego St.
50-370 Wrocław, Poland, Arkadiusz.gorski@pwr.edu.pl,

Agnieszka PARKITNA
Wroclaw University of Science and Technology, 27 Wybrzeże Wyspiańskiego St.
50-370 Wrocław, Poland, agnieszka.parkitna@pwr.edu.pl

Kamila URBAŃSKA
Jan Dlugosz University in Czestochowa, 2/4 Dominika Zbierskiego St.
42-200 Częstochowa, Poland, kamilaurbanska99@gmail.com

Abstract

Having in mind the significantly increasing importance of logistic processes in production companies and their indisputable impact on the profitability of production, in this article the issues of accounting for logistic costs are presented, as well as a proposal to implement solutions proposed on the basis of research carried out in a production plant. The proposed methodology is based on the Time-Driven Activity Based Costing (TDABC) and is a solution that can be used in many manufacturing companies or become an inspiration to look for solutions pertinent to a relevant enterprise.
In the article a relatively uncomplicated and effective solution is proposed for the settlement of indirect costs in a production plant. On the basis of the research conducted, steps related to the implementation of Time-Driven Activity Based Costing in the area of logistic activities are indicated. It is shown what benefits are obtained from its implementation and how to interpret the obtained results and how to use them in the search for efficiency measures. It is shown how the proposed solution allows to find the unused production capacity within each of the logistic-related activities and to calculate the losses sustained in result, which is the search for efficiency measures related to the work planning in the workstations.

Keywords: Management, Logistics Costs, Cost Accounting.

Introduction

The dynamics of the growing importance of logistic processes in production management in terms of the calculation of the cost of manufacturing a product or providing a service increase the importance of identifying and estimating logistic costs (Kanogporn Suranatthakul & Supaporn Dokmaithong & Ruankwan Intanon & Warawit Phetruen & Nuatip Sumkaew, 2020). Unfortunately, commonly used cost accounting systems do not provide all the necessary information helpful to determine logistics costs, even essential for the proper management of an enterprise, as they are not adapted to explaining the structural and dynamic aspects of the management of logistic activities (Kaplan ,Anderson, 2007). From the accounting point of view, logistic costs are very often marginalised in manufacturing enterprises, as they are not directly production costs, and on the other hand, they are difficult to recognise as fixed costs (Themido & Arantes & Fernandes & Guedes, 2000). As a result, a detailed in-depth analysis of logistic costs is usually not carried out in the company, and very often even the board and managers do not know about their proper level. Enterprises mostly focus on direct production costs, forgetting that these are mainly indirect costs related to production which may affect the profitability of sales and, consequently, the entire conducted activity. They can be a place to look for savings and optimisation as well as obtaining the desired level of profitability, especially in the era when the competitive advantage in the market is built on increasing the cost effectiveness of the organisation. Most of the activities implemented in order to increase the competitiveness require an increase in the flexibility of production, shortening the waiting time, which ultimately influences the increase in the level of customer service (Lesiak, Zarządzania, & Mrp, 2014). However, appropriate tools should be at hand to enable obtainment of the data opening the prospect of looking for changes in areas where it is possible and it will bring proper results. According

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to Christhopher (Christopher, 1992), probably one of the most important reasons why the adoption of an integrated approach to logistic and distribution management has proved so difficult for many companies is the lack of appropriate cost information. (Themido, Arantes, Fernandes, & Guedes, 2000)

Cost-effectiveness in the area of logistic costs is grounded on carrying out a specific task at the lowest possible cost, so that the total cost of logistic is minimised with the implementation of many choices (Mahapatra, Panda, & Sana, 2020). Cost-effectiveness analysis can be complicated and controversial, but it is a crucial step in managing the production proces (Meijuan Kang, 2015). In the current era of economic development, manufacturing companies are looking for cost optimisation without negatively affecting the level of customer service (Witchulada Vetchagool & Marcjanna M. Augustyn & Mike Tayles, 2020). In such a context, the need to know logistic costs is also vital for the correct calculation of the cost of the product, which is indispensable in setting the selling price (Mohan & Babu, 2006). In this way, enterprises can control the level of efficiency of the organisation's functioning by establishing the appropriate relations between the volume of production and obtaining unit profit (positive financial result attributable to one unit of production). The aim of the conducted measurement of the effectiveness of the organisation's functioning is to choose and undertake such activities that will lead to the improvement of the organisation's results and an increase in the organisation's effectiveness (Czyż-Gwiazda, 2013). Focusing on the area of logistic is associated with a noticeable trend of the percentage increase in the share of logistic costs in the total costs of an enterprise. Moreover, companies should not focus on individual, isolated logistic activities, but instead they should try to reduce their total costs in this area. Cost reduction in one area may lead to an increase in other costs, e.g. related to environmental protection. Thus a question arises: *Will carrying out a logistic cost calculation improve the cost effectiveness of an organisation?*

Considering the above, it is practically useful and substantively advisable to monitor the level of logistic costs on an ongoing basis and to select an appropriate calculation method for the specific nature of an organisation. In the presented context, the authors of the study put the following research question: How to account for indirect costs, in particular logistical costs? Can the Time-Driven Activity Based Costing (TDABC) model be helpful in this respect? What steps need to be taken to account for logistical costs?

Logistic Costs

logistic costs are a specific category of costs showing in monetary form the consumption of the organisation's assets, caused by the planning, implementation and control of non-productive processes related to the transferring of various materials and products in time and space (Kufel, 1990). These are the consumption of resources, work facilities, living labour as well as external services presented in monetary form, which are related to the performance of logistic processes, as well as financial expenses, extraordinary losses and supposed foregone revenue due to irregularities in the implementation of logistic processes in the company and outside it (Skowronek & Sarjusz – Wolski, 2012). Logistic costs express the key importance of logistic for the entire economic situation of a company (Comelli, Mickael & Féniès, Pierre & Tchernev, Nikolay, 2008).

Logistic costs include a group of costs, which react the same way on any changes in values of certain affecting quantities. Logistic costs further include items, which, when calculating production costs, remain hidden, i.e. not taken into consideration. The goal of each logistic activity is to optimise logistic outputs using logistic components, logistic services and logistic costs. A substantial step in the process of logistic cost monitoring and registering is to define, which costs of corporate processes will be included in logistic costs and to specify the point of their contact with the rest of the units (procurement, production, sales etc.). Once the considered processes are specified it is necessary to select suitable parameters to express logistic outputs. (Kažimírová, Buša, & Eduard, 2015).

The share of logistic costs in the overall costs of enterprises is significant and depends on the industry or the size of an enterprise (Twaróg, 2003). Logistic costs of enterprises, as reported in the literature on the subject, may constitute from 10% to 35% of sales revenues, which makes it an area of potential and, at the same time, significant reserves for savings activities (Nowak, Piecchota, & Wierzbiński, 2004). Logistic costs are a barometer that shows how changes in the costs of individual logistic items affect the company's total costs and profit. Inadequate management when measuring and managing logistic costs leads to lost business opportunities and costly errors as well as reduced economic efficiency. The basic approaches to logistic costs and financial implications in the cost accounting of an organisation can be combined with the criteria for allocating logistic costs (Skowronek & Sarjusz – Wolski, 2012): i.e. layout of costs by type; costs by place of origin; basic phases of logistic process flow; basic components of logistic processes; commercial substance of costs. The adoption of one of these approaches determines the method of accounting records, which is the basis for their further calculation. Considering the above, the reasons for optimising logistic costs in production companies are:

- providing a reliable and credible image of all financial information carriers,

- efficiency management at various levels of its cultivation (economy, production efficiency and market effectiveness),
- learning the intensity of the impact of logistic costs on the profitability of individual products or services,
- optimal determination of the safety margin in estimating and budgeting,
- the need for constant control and monitoring of logistic efficiency,
- monitoring the efficiency level and assessment of production efficiency,
- freedom of accounting for logistic costs,
- ensuring the integration of financial information about the activities and resources of the organizsation by monitoring, measuring performance and making adjustments.

The literature on the subject defines cost accounting as the process of recognising, collecting, processing, presenting and interpreting cost data so that its recipients can evaluate costs and make related decisions (Bogdanoiu, 2009). Cost calculation should not only meet the needs for creating financial statements, but also provide the information needed to manage the organisation (Yu-Cheng Chen & Chiung-Yao Huang & Anchor Y. Lin i Stephanie Wei-Ling Huang, 2010). Cost accounting includes reporting cost accounting and management cost accounting (Świderska, 2003), which is important in efficiency measures. With regard to logistic processes, cost accounting is not widely used, which is a significant cognitive limitation, making it difficult to come to management decisions in this area.

Logistic cost accounting – barriers to recording logistic costs

Logistic cost accounting should be treated as "the process of determining the costs resulting from the implementation of logistic processes and the use of resources for the logistic service of manufactured products, provision of services and performance of various functions in economic activity." (Śliwczyńsk, 2007). When proposing and registering logistic costs and outputs it is necessary to carefully consider specific conditions of the enterprise given as the scope of included processes has a strong influence on the amount of reported logistic costs and their percentage over the total corporate costs. Within a centre, these are logistic outputs, which need to be used in order to execute logistic activities. Logistic costs interconnect corporate economy and logistic.(Kažimírová et al., 2015).

One of the most important issues in the analysis of the production process is the determination of the production cost of the product and its components, carried out within the cost calculation. However, in addition to the precise determination of the costs of products and services, the need is also visible in the field of obtaining accurate data on the course of individual phases of the product or service implementation. Traditional methods of cost calculation do not allow for precise determination of process costs, and without that it is difficult to talk about the success of the process approach, which is currently one of the main concepts in management of modern organizations (Dragomirescu & Solomon, 2011). Without accurate data on the costs of implemented processes, it is impossible to effectively and efficiently manage processes, in particular production processes, and thus their improvement (Kołosowski, 2015). If the recording is to be not only accounting, but also managerial, and at the same time reliable and providing a credible basis for the calculation of logistic costs, a number of barriers to the identification and reporting of logistic costs should be overcome, which include: (Blaik, 2010; Czyż-Gwiazda, 2013; Dianwei , 2006; Farahani, Asgari, & Davarzani, 2009; Hamrol, 2001; Lesiak et al., 2014; Straube & Pfohl, 2008) (Błaszczyk, 2015) (Hajdul, 2011) (Sinha & Anand, 2018)

- the complexity of the management of information flow, conditioning the appropriate efficiency of physical distribution processes,
- the complex nature of accounting records systems,
- difficulties in identifying logistic costs resulting from the complexity of the assortment structure and traditional accounting methods used in enterprises
- too high level of consistency of the processes carried out in the entity causing administrative and organisational difficulties in clearly identifying only the costs related to the company's logistic activity,
- trends in supply chains: in the case of frequent and small deliveries, this results in increasingly higher transport costs, increased traffic volume and consequently contributes to the extension of delivery times
- a complex structure of logistic costs and interrelations within it, which do not allow their calculation in accordance with individual divisions,
- difficulty in identifying logistic costs,
- coordination in a logistic network to ensure the on-time delivery of a product to end customers at low costs with the least environmental impacts,
- large accumulation of logistic costs in all groups of costs in the accounting system, and without their precise identification, it becomes impossible to assess the efficiency of the logistic system,

- The problem with the accuracy of determining the costs of individual processes in enterprises results from the fact that they are not recorded on separate accounts in traditional financial accounting systems of enterprises. They should be carefully selected from a layout of costs by type and from functional one.

The need to identify and calculate logistic costs is related to the determination of the intensity of logistic costs on the profitability of products. (Purdescu, Niculescu, & Purdescu, 2009)
Manufacturing companies support the entire process of accounting records with appropriate ERP systems supporting the processes of calculation and recording of financial and accounting information. Thanks to the rapid processing and data analysis, conditions are created that are propitious for making business decisions good for the enterprise. (Li & Lu, 2009) Each production company in the present times of globalisation is forced to introduce knowledge management, which, when combined with IT technology, is a key success factor for the organisation (Rakesh Narain & RC Yadav & Joseph Sarkis, 2007). As a result, the introduction of logistic cost accounting must be supported by appropriate IT systems. Information and data should be available as quickly and easily as possible (Zheng-Yun Zhuang & Shu-Chin Chang, 2017). In most cases, the biggest problem with them is that they are very extensive and scattered, so that searching for relevant information takes a lot of time (P. Everaert & W. Bruggeman & G. De Creus, 2007). Knowledge management systems are created for the purpose of searching for information so that it is efficient, reliable and trustworthy (Saveta & Anca, 2008). By investing and introducing the latest technologies, the company is able to assess and then innovate the system, which allows it to make the right business decisions. (Gunawan & Kurnia, 2018) Therefore, they can be a tool for effective recording of logistic costs.

When making decisions, you can use a decision support system. The data that is used by such a system can be located in the data warehouse. Such warehouses are used to collect and integrate databases. They focus on providing information that is designed to support decision-making in the enterprise (Sutedja, Yudha, Khotimah, & Vasthi, 2018). The quality of the received management information largely depends on the availability of data that is stored in databases supported by operating systems. (Assis & Martins, 2001)

Storing goods and all accompanying operations are a large part of the total cost that the logistic process generates, when warehouse management is optimised for cost reduction, efficiency increase, flexibility and speed of response of the supply chain (Pereira, Sousa, Ferreira, Sá, & Silva, 2019).

Case study – implementation and measurement of the effectiveness of logistic costs

The considerations, conclusions and proposals for the calculation of logistic costs presented in the further part of this study are based on research on the issues of logistic cost calculation in a railway industry manufacturing company conducted by the research team of Aleksandra Noster and Agnieszka Parkitna. In the company, it was possible to use the potential of records of the ERP program used. The surveyed company, the name of which is not important in the assessment of the collected material, and which can be classified as a medium-sized enterprise, uses a layout of costs by type, which consists of sixteen categories with additional subcategories. The costs are recorded using the SAP IT system. By using the modules of this system, the company is able to check whether the cost information is booked in the appropriate categories, and if not, it transfers them using appropriate movements in the system. The cost recording system is quite detailed, however, due to the fact that it is based only on the layout by type, the costs of individual processes cannot be determined. It is possible to quite accurately determine the direct production costs of products, however, the problem is the settlement of indirect costs, where you can look for optimisation, and thus efficiency improvement of the entire enterprise.

The company in question did not use logistic costs calculation. Therefore, using the potential of the company's IT system, improvements related to the method of calculating logistic costs were proposed as an experiment. Due to the fact that in this enterprise the production is unitary, it produces repetitive products to order, and there is rhythmic form of production organisation, as the production tasks are carried out in a continuous and progressive manner, it was decided that the basis for the calculation of logistic costs will be the Time-Driven Activity Based Costing (TDABC), the task of which is to optimise supply costs, as well as to assess the utilisation rate of resources.

The Time-Driven Activity Based Costing – TDABC is a derivative of the cost-intensive to implement Activity Based Costing (ABC) as it's more perfect development, allowing to determine the cost of the process and the utilisation rate of production capacity. The potential of the ERP system used in the enterprise is propitious for the cost records at an elementary level enabling its proper calculation adapted to the specificity of the production process.

Similarly to traditional activity costing, in the TDABC we use resources, activities and cost objects. The concept of TDABC is a simplification of standard ABC costing and is limited to one type of resource drivers, i.e. the duration driver, which is the unit necessary for the valuation and pricing of various activities. The cost calculation procedure

using TDABC starts with determining the cost of a time unit – the unit cost of production capacity (in Polish: jednostkowego kosztu zdolności produkcyjnych, JKZP),

JKZP (PLN/min) = cost of ensuring production capacity (PLN) / practical production capacity of provided resources (min)

Then, the cost of carrying out the activity should be determined, which is done by multiplying the JKZP by the time needed to perform the activity.

Cost of carrying out the activity = activity time * JKZP

The cost of carrying out an activity is often determined by determining the costs of actions that make up a given activity. Then, for each action, it is necessary to identify the cost driver, determine its floor-to-floor time (time per unit), and by multiplying by the JKZP, the rate of the given cost driver (SNK) can be calculated.

SNK = JKZP * action floor-to-floor time

By specifying the number of cost drivers for a given action, it is possible to multiply them by the floor-to-floor time to determine the total time for the action and by multiplying it by JKZP to determine the cost of a given action, which can also be determined by multiplying the rate of a given cost driver by the number of cost drivers.

Assigned action cost = SNK * number of cost drivers = number of cost drivers * action floor-to-floor time * JKZP

The sum of the assigned costs of actions allows to determine the assigned cost of the entire activity, which is the purpose of the TDABC, and which additionally allows to determine the degree of production capacity utilisation in relation to a given activity by referring to the practical production capacity of the organisation for a given action, which is determined by taking into account the number of employees involved in given activities, the percentage level of involvement in a given activity, or the number of working days in a month.

The presented concept of TDABC requires proper implementation in a specific company, which is not so easy. A solution to this problem was proposed in the further part of this study. Referring to the enterprise in question, an attempt was made to implement solutions allowing to determine logistic costs with the determination of the degree of utilisation of capacities in particular areas, which is an additional benefit from the management point of view.

For accounting purposes, the reference period of one month was adopted, and the time unit of one minute, while the adopted time and cost parameters were based on accounting data from the company and information obtained on the basis of interviews. No tools were used, such as time study, which allow for precise determination of the time of a given action or their number, neither was averaging for different variants of the course of a given action. At this stage it was considered more important to refine how to apply the accounting of logistic costs than to focus on setting individual parameters, which of course is extremely important.

Step 0 – Identification of logistic processes

In accordance with the idea of TDABC, the processes of logistic activity were identified in the first place. It was limited to the supply of materials and delivery to the customer. Then, for each of the indicated processes, its components were determined, and within each activity, the actions necessary in this regard were listed, as shown in Table 1.

Table 1: Processes, activities and actions in the area of logistic in the enterprise in question.

PROCESSES	ACTIVITIES	ACTIONS
Supply of materials	Order of materials	- Preparation of inquiries - Sending inquiries - Offers analysis - Acceptance of offers - Selecting suppliers
	Transportation of materials	- Order processing in the system - Implementation of transportation
	Acceptance of the delivery of materials	- Unloading the delivery - Acceptance of delivery to the system - Placement of materials in the warehouse

		- Invoicing - Payment for materials
	Supply quality control	- Delivering the material to the Quality Control Department - Material inspection - Transfering the material to the warehouse
	Storage	- Stock-taking of materials - Entering the stock-taking results to the system - Stock-to-stock transfers - Entering stock-to-stock transfers to the system
	Issue of material for production	- Call for material by production - Issue of material by the warehouse
	Internal transportation	- Loading the material - Implementation of transportation - Unloading the material
Delivery to the customer	Loading the final product	- Final product packaging - Loading of the final product
	Transport to the customer	- Implementation of transportation - Delivery of the final product to the customer

Identification of processes and their disaggregation to the level of actions is necessary, because the logistic cost calculation account is to allow for the determination of the cost of individual actions, and thus the activities and the entire logistic process together.

Only in the following, appropriate steps, costs will be settled for each activity and the degree of use of the production capacity of a given position responsible for a given action or activity will be determined.

The proposed method of settling costs is presented below for one of the activities, namely for the ordering of materials, which will introduce the methodology used. The procedure relating to the settlement of costs indicated from logistic activities should be repeated for other activities, which, however, would exceed the accepted scope of this paper.

Step 1 – Establishment of the practical production capacity of the activity

In the company in question, it was assumed that „ordering goods" is done by one person. It was assumed that this person is not engaged in any other activities. In accordance with the Labor Code, the average monthly working time is 168 hours, rounding the calculation down. Taking into account breaks at work, for example for breakfast, or physiological needs, an indicator of 90% of effective use of working time for performing assigned actions within a given activity was adopted.

Practical production capacity of the activity „ordering goods" = 168 h * 60 min * 1 person = 10.080 min.

Step 2 – Determinaion of the total cost of ensuring the productive capacity of the activity

In the next step, it is necessary to determine the total cost associated with the implementation of the actions of a given activity, which includes personnel costs together with mark-ups, costs of materials or services used, e.g. telecommunications or IT services. The company had extensive cost records, admittedly in a layout of costs by type, but allowing for a fairly accurate determination of this cost, which was calculated at PLN 8,000.

The cost of ensuring the production capacity of the activity „ordering goods" = PLN 8,000

Step 3 – Determination of the unit cost of a time unit for the activity

The basic measure used in the settlement of logistic costs is the unit cost for a given activity. In this case, the total cost of ensuring the production capacity relating to a given activity is calculated into practical production capacity, which was rounded up to PLN 0.79 for each minute of potential availability.

JKZP = cost of ensuring production capacity PLN 8,000 / practical production capacity 10,080 min = PLN 0.79/min

Step 4 – Establishment of actions within the activity

With regard to the factor „ordering materials", 5 basic actions are distinguished that are performed within it:

1. Preparation of inquiries
2. Sending inquiries
3. Offers analysis
4. Acceptance of offers
5. Selecting suppliers

Step 5 – Determining the time driver for each action and their parameterisation

Each action takes a certain amount of time. Time is devoured by the occurence of time drivers for each activity. For example, in the case of „preparation of inquiries", the number of items in the inquiry will be an important factor that determines the time needed to prepare a single inquiry. By parameterising the determined driver with the necessary time and determining the number of inquiries throughout the month, it will be possible to determine the time allocated to a given action and its cost. With regard to the cost driver for the task „preparation of inquiries", it was assumed that the cost driver in the form of one item in the inquiry requires a time of 25 minutes, and there's the average of 200 items per month in the inquiries. Relying on the cost driver eliminates the problem of different sizes of inquiries.
The approximate course of the procedure was carried out for each action, and the results collected in this regard are presented in the table below.

Table 2: Action and time driver.

Action	Time driver	Floor-to-floor time [min]	Number of drivers per month
- Preparation of inquiries	- item in inquiry	25	200
- Sending inquiries	- inquiry	4	100
- Offers analysis	- analysis	12	150
- Acceptance of offers	- conversation with the supplier	3	80
- Selecting suppliers	- choice	10	50

Step 6 – Determination of Total Run Time

Having collected and calculated data relating to individual actions, the total time used for a given action can be calculated and it's possible to assign it the total cost.
The total time absorbed by the activity „ordering goods" is the monthly sum of the time spent on the individual actions constituting the activity. On the other hand, the time of individual actions is determined by multiplying the determined floor-to-floor time associated with a given time driver and the number of occurrences of a given driver in a month. For the „ordering goods" activity, the total calculated and devoted time per month is 7,940 minutes.

Total time of ordering goods in a month = sum of times of individual actions = sum of product of floor-to-floor time and number of drivers in a month = 25*200+4*100+12*150+3*80+10*50 = 7,940 minutes

Step 7 – Determination of the assigned activity cost

Having the total time for a given activity and having the unit cost of production capacity calculated in the previous step, it is possible to determine the cost of the entire activity in a given month.

Assigned cost for ordering goods = total run time * JKZP =
7,940 min * PLN 0.79 PLN /min = PLN 6,272.60

The presented steps of the procedure allow to determine the cost of the selected activity, and then of the entire process, which is now indispensable when looking for efficiency measures. In management activities, when determining the cost of an activity, it is possible to indirectly determine the rate of the cost driver. For example, for a single item in the query, it will be PLN 19.75, which was calculated by converting the floor-to-floor time associated with a given cost driver (25 minutes) by the unit cost of production capacity (JKZP = PLN 0.79 / min). Determining the rate of the cost driver and comparing it with the number of occurrences of a given cost driver per month allows to quickly determine the areas within which savings should be looked for. Then it is possible to omit marginal cost drivers, the occurrences of which are few, use little time and, consequently, have a small impact on the total assigned cost for a given activity.

Step 8 – Analysis of the use of practical production capacity and determination of the cost of not using it

By comparing the established monthly practical production capacity of the activity „ordering goods" in minutes (10,080 minutes) with the indicated total time of ordering goods in a month (7,940 minutes), it is possible to determine the level of unused production capacity, which in the presented case amounted to 2,140 minutes (10,080-7940), i.e. over 21 % (2,140 / 10,080).
The unused production capacity can be directly converted into its cost, multipling by the unit cost of production capacity (PLN 0.79 / min) or by subtracting from the total cost of ensuring the productive capacity of the activity (PLN 8,000) the determined assigned cost of a given activity (PLN 6,272.60), which amounted to about PLN 1,700. Determination of the unused capacity allows to use the resources better, which lowers the cost of a given activity. For example, 20% of the working time of a person dealing with „ordering goods" may be used for handling complaints. It should be noted, however, that the search for savings should also take place at the stage of analysing the rates of the cost driver described in the previous step and their occurrences. Maybe it is worth considering whether it is possible to limit the number of occurrences of a given cost driver, or how to improve the process and procedures so that the time spent on a given cost driver is shorter.

It should be added here that the analysis carried out in the area of production capacity may show shortages that are „hidden" by employees through overtime work that is not paid, etc., and then it turns out that to improve the quality of service it is necessary to increase the cost of a given logistic activity.

Summary of the Research

The conducted research and the obtained results should be considered in several dimensions. It has been shown how relatively simple and effective settlement of indirect costs in a production plant is possible. On the basis of the conducted research, steps related to the implementation of Time-Driven Activity Based Costing in the area of logistic activities have been proposed. It has been shown what benefits are obtained from the implementation of the aforementioned cost accounting of activities and how to interpret the obtained results and how to use them in the search for efficiency measures. It has also been shown that the implementation of modern solutions in the field of indirect costs settlement can optimise the company's operation. The use of Time-Driven Activity Based Costing does not require a lot of time and is characterised by simplicity, which is extremely important when implementing this solution.

By using Time-Driven Activity Based Costing, the unused production capacities within within each of the logistic-related activities has been further explored and the unnecessary costs associated with these unused capacities have been calculated, which is extremely useful for managers when assigning tasks to workstations. The information obtained as a result of the method used makes it possible to properly develop the parameters of work inputs in each action.

Summarising the contribution of the study from both a theoretical and a practical point of view. In the theoretical as pect the work is a development of research on methods of calculation of indirect costs in the company. A proposal f or settlement of logistic costs was given, a methodology for settlement of logistic costs was proposed on a process b asis. From a practical point of view, the proposed methodology allows for its easy implementation, which has been t ested in the presented practical example. Future research should boil down to further testing of the proposed method ology and its possible improvement.

Conclusions

The introduction of logistic cost calculation in the organisation would facilitate the identification of the effectiveness of logistic processes, would enable reducing unnecessary costs and exercising greater control over logistic costs.

There is no doubt that the calculation of logistic costs in an enterprise can be carried out using the existing cost accounting, and that it can significantly improve the logistic processes in an organisation.

Due to the results of the research, it can be noticed that it is very important to constantly monitor the level of logistic costs and to select the appropriate calculation method for the specificity of the enterprise. By using logistic cost calculations, an organisation can gain a significant advantage over competitors, reduce total costs, and exercise greater control over logistic costs.

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Organizational and Economic Efficiency of Microcredit Institutions in Selected European Countries

Monika ZIOLO

Agriculture University, Cracow, Poland
E-mail address:monika.ziolo@gmail.com

Lidia LUTY

Agriculture University, Cracow, Poland

Abstract

The presence of financial institutions offering microloans has significantly improved access to external sources of financing for SMEs. Microfinance is now considered to be an innovative socio-economic tool to fill a gap in the financial market to combat social and financial exclusion. The aim of the article is to present the differences among the European countries in terms of activity in the field of microfinance. In the process of creating a synthetic measure of the assessment of the phenomenon, a synthetic variable defined in the TOPSIS method was used. The demand for microfinance services in Europe is steadily growing and there is a considerable potential for further growth in the years to come, as shown by the growth in the volume of microcredit granted. As the micro-enterprises take efforts to settle their liabilities to financial institutions on a regular basis, the percentage of non-performing loans and credit losses in most of the countries presented is relatively low. In the future, the fees and interest rates on microcredits should be modified, as in many countries they are higher for SME than for the traditional borrowers.

Keywords: financial efficiency, microcredits, European union countries

Introduction

The idea of microfinance originated in Asian countries, but it has become popular in South America and Africa, reaching also the United States and Europe. Microfinance, so far associated with the countries of a low level of socio-economic development, is now expanding also in the developed countries, although targeted at a narrower population i.e. the poorest, socially discriminated against and often without access to the financial market.

The importance of microcredit for the development of the global economy was emphasized by the United Nations that declared 2005 the International Year of Microcredit (Alińska, Czepirska 2018). Microfinance is recognised by the UN as a mechanism to advance the achievement of the Millennium Development Goals and, in particular, the eradication of extreme poverty (Kot 2008). According to the definition by the UN, "microcredit is linked to the provision of a small amount of money by banks or other institutions. They can be offered, often without additional security, in the form of individual or collective loans" (United Nations, 2004). According to the European Commission documents, microcredit is defined as a loan in the amount of no more than EUR 25 000 granted to new or existing micro-enterprises (Microcredit for European..., 2004, The regulation of Microcredit.., 2007). This consists mainly in microcredits and free financial education provided by banking and non-banking institutions and its main objective is to combat social and financial exclusion (Mikołajczyk 2009). The World Bank reports emphasise that microfinance is not a new form of banking, but an innovative tool of development, designed to achieve social and economic goals (Ledgerwood 1998).

Muhammad Yunus, the founder of the Grameen Bank, often referred to as the social bank, was the pioneer in providing microcredit (Yunus 2012). In Europe, the first microloans were granted in France, to the unemployed in order to stimulate the entrepreneurship, already in the 1980s. Nevertheless, the microfinance initiatives have been more intense in the Central and Eastern Europe than in the Western European countries, which was connected with the political and economic changes. The European Union became more seriously interested in the matter only at the beginning of the 21st century.

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The aim of the article is to present the differences among the European countries in terms of activity in the field of microfinance.

Literature Overview

The establishment and development of microfinance institutions in the economy of many countries resulted from the willingness to satisfy the market needs of business entities and social groups operating in areas of a lower level of social and economic development. The microfinance offer is addressed mainly to people living in rural areas and small towns, who are not able not use the services of traditional financial institutions usually represented by commercial banks, insurance companies or investment funds. Robinson characterised microfinance as a small-scale service, including in particular loans and savings granted to persons engaged in agriculture, fisheries or livestock farming in rural and urban areas in the developing countries (Robinson, 2002, Mersland et al., 2013). Benedyk believes that the advantage of the microloan system developed by M. Yunus stems from the opportunity to actively use the social capital, which is defined as a network of neighbours and friends who jointly guarantee regular loan repayments (Benedyk 2006).

Fila emphasises that microcredit products play an important social and economic role in the European countries. On the one hand, they promote social and economic integration of people who are at risk of poverty and counteract financial exclusion, and on the other hand, they help create jobs and stimulate economic development and entrepreneurship, inter alia, by creating conditions for microenterprises to operate (Fila 2011). Fila adds that the basic objective of the operations of such entities is not to earn money or seek to maximise the profits, but to counteract poverty and social and financial exclusion.

Micu concludes that microfinance has proven to be an effective tool for poverty mitigation, helping the poor to increase income, purchase machinery, equipment or materials and reduce vulnerability in emergencies and economic crises (Micu 2010). Kabeer expresses the conviction that the concept of microcredit itself results from a psychological discomfort felt by society regarding the economic and financial conditions of life of the poorest people (Kabeer 2005). The literature also draws attention to the fact that the development of microfinance requires respect for diversity, must comply with legal principles, must provide protection and must provide opportunities for development (Gerakan Bersama Pengembangan Keuangan Mikro, 2005).

The discussion on the exclusion of the poorest from access to financial services leads to two different views, as presented by Usman emphasizing that microfinance services should be tailored to the stakeholders' needs. The first point of view is that the poorest people do not need microfinance services, but direct social assistance. The opponents of this position claim, however, that people in need should have access to microfinance (Usman et al., 2004). Nonetheless, those who advocate this idea emphasise the shift in the paradigm of microfinance from financial support for enterprises in the form of microcredit to microfinance services such as, for example, savings schemes, emergency loans or microinsurance. According to Alińska, microfinance, of which microcredit (microloan) is the most widely recognised instrument, should complement the traditional financial instruments (Alińska 2008).

As emphasised by Ledgerwood, Steven and Moris, microfinance is an important factor contributing to the strengthening and expansion of the formal financial system and complies with the concept of sustainable development (Ledgerwood 1999; Stevens, Morris, 2001). According to Feigenberg, the essence of microfinance is closely linked to the concept of management at the local level. This view is based on the assumption that there are links between community members that facilitate coordination of activities and strengthen cooperation within the group, and are based on the beliefs, norms or rules specific to the group (Feigenberg et al., 2013).

Unfortunately, in many countries the mechanism for granting microloans seems to be too centralised and formalised. As a result, the poorest do not show own initiative, but only depend on government support through social programmes. In order to overcome the weaknesses of the centrally managed policies, some countries are involving religious institutions in the allocation and distribution of funds in order to bring microfinance services closer to the communities with difficult access to formal financial institutions (Abbas, 2010).

Microloans can constitute an additional source of external financing for innovative companies (Waggoner 2014), and may be a desirable element of the innovation system for two reasons (Nugroho and Miles 2009). Firstly, by facilitating access to finance and coaching for start-ups and the smallest companies (e.g. established by young people with no credit history) often offered together with the microloans. A well-developed segment of microloans may support the emergence of "small" product and process innovations on the market. Secondly, the availability of microloans may

foster diffusion of innovation among small companies and thus increase demand for innovative products and services offered by larger entities. (Potencjał innowacyjny... 2016).

Microcredit in European countries

Microfinance appeared in Europe only in the 1980s. Initially, it developed mainly in the countries undergoing economic transformation. Among the countries of the "old" Europe, France and Great Britain were the exception, as they established the microfinance systems relatively early. The 21st century brought about institutional and instrumental advancement in this area. At present, the economic downturn and continuing negative social phenomena increase the interest in microloans.

The characteristic features of microcredits include among others:

- small amount, short term and higher frequency of instalment payments,
- simplified credit acquisition and administration procedures,
- usually no need to provide collateral,
- interest rates higher than in the case of traditional bank loans, but lower than on black market loans,
- beneficiaries are usually the poor, socially excluded, unemployed and women,
- loans are intended primarily for the purposes of establishment or development of microenterprises.
- loans are repaid on time,
- loans are granted by local institutions,
- loans are accompanied by other financial, educational and information services,
- direct relationships between the clients and the financing institution (Mikrokredyty w Europie..., p. 19).

As follows from the research conducted by the European Microfinance Network (EMN), the primary objective of microfinance in Europe is to support the development of microbusinesses by ensuring that excluded entrepreneurs have permanent access to financial services. This objective is achieved through:

- creating jobs and promoting entrepreneurship,
- promotion of small and medium-sized enterprises and development of economy,
- preventing social exclusion and combating poverty.

In the European Union, microfinance is available to two groups of entities:

- people who have lost their jobs, are at risk of losing them, have difficulty entering the labour market, are socially and financially excluded,
- entrepreneurs, mainly those operating on a micro scale, who have problems with obtaining funds to start or develop their business or who require financing in small amounts.

The main features of the microfinance market in Europe are as follows:

- a short period of operations of institutions in this sector,
- a diversity of microfinance institutions, with the dominating role of non-profit institutions,
- as far as banks are concerned, microfinance is granted mostly by private banks,
- most microfinance institutions operate on a micro-scale.

A. Leyson and N. Thrift believe that the emergence of microfinance institutions in the European countries is connected with the restrictions of access to the financial system (Leyson, Thrift 1995). Financial exclusion is also defined as the inability of individuals, households or social groups to use the necessary financial services. This may be due to a low availability of services, their price, marketing or inadequate financial education. Iwanicz-Drozdowska links the concept of financial exclusion to the inadequate or non-existing banking penetration ratio (Błędowski, Iwanicz-Drozdowska, 2010).

According to the report of the European Commission: "Microfinance can be a tool to combat social and financial exclusion and to stop and reduce all its dimensions - poverty, low income, unemployment, which are the major components of and a reason for social exclusion".

In recent years, the microfinance sector has been growing steadily. In 2017, the microfinance institutions reported nearly 1 million active borrowers and the gross value of the microloan portfolio of more than EUR 3.1 billion. This confirms that the demand for microfinance services in Europe continues to increase and there is a considerable poten-

tial for further progress in the years to come, in particular due to a relatively low economic growth and the need to economically integrate those whose are disadvantaged and impoverished (Diriker, Landoni, Benaglio 2018).

The purpose of microfinance is to become an instrument stimulating entrepreneurship, which - by limiting financial exclusion and facilitating access to financial resources for those in need - should result in an increase in the wealth of the poor leading to an increase in their consumption, and thus allowing them to get out of poverty (Adamek, 2013). Adamek puts forward many arguments against the concept of microfinance, most of which are related to the economies of countries where the rule of law is not respected. Nevertheless, it is important to search for and describe the reasons of the inappropriate functioning of the microloans in some countries (Adamek 2014).

Research Methodology

In the process of creating a synthetic measure of assessment of the phenomenon, a synthetic variable defined in the TOPSIS method was used1 (Hwang, Yoon 1981), and a three-stage algorithm was adopted.

First of all, the features describing the activity of European countries in the field of microcredit were selected and described. Then the *n* values of (X_j) features for *N* statistical units (countries) are compiled in an evaluation matrix $[x_{ij}]_{n \times N}$, where x_{ij} - denotes the value of the feature X_j for object *i.*

Next, the features were normalised using the following normalisation method:

$$z_{ij} = \begin{cases} \dfrac{x_{ij} - \bar{x}_j}{S_j}, & X_j \in S \\ \dfrac{\bar{x}_j - x_{ij}}{S_j}, & X_j \in D \end{cases}$$

where: z_{ij} - value of the normalised feature X_j for object *i*; $\bar{x}_j, S_j$ - respectively, the arithmetic mean, a standard deviation of X_j, S, D - respectively, a set of criteria having a positive impact[2] and criteria having a negative impact[3]. The data were further transformed so as to achieve comparability. This is achieved by depriving the measurement results of titres and standardising their orders of magnitude (Walesiak 2014).

In the third stage, the values of the synthetic feature Q_i were determined for each object and for each level according to the following formula:

$$Q_i = \frac{d_i^-}{d_i^- + d_i^+}$$

where:

- $d_i^+ = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_j^+)^2}$ $\qquad z_j^+ = \begin{cases} \max_i z_{ij}, & X_j \in S \\ \min_i z_{ij}, & X_j \in D \end{cases}$
- $d_i^- = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_j^-)^2}$ $\qquad z_j^- = \begin{cases} \min_i z_{ij}, & X_j \in S \\ \max_i z_{ij}, & X_j \in D \end{cases}$

The highest value of Q_i indicates the best object. The values of the synthetic measure will make it possible to establish the ranking of the countries with regard to the level of microcredit development in the analysed countries.

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[1] The Technique for Order of Preference by Similarity to Ideal Solution.

[2] A criterion having a positive impact is a variable whose high values are a desirable phenomenon from the point of view of evaluation of an object, while low values are not desirable.

[3] A criterion having a negative impact is a variable whose high values are undesirable from the point of view of evaluation of an object, while low values are desirable.

Results and Discussion

In order to examine the imbalances between the European countries in terms of the level of development of the micro-credit market, three levels represented by statistical features were first identified.

Table 1 : Level of development of the microcredit market

Microcredit activity	
	X_1 - Average Annual Percentage Rate (APR),
	X_2 - Percentage of Active Woman Borrowers (PAWB)
	X_3 - Average Value of Microloans (AV)
	X_4 - Dynamics of the value of loans granted in the years 2016 and 2017 (D)
Credit portfolio quality	
	X_5 - PAR 30 credits delayed over 30 days
	X_6 - Write-off ratio
	X_7 - Provision
Financial Efficiency	
	X_8 - Return on Equity (ROE)
	X_9 - Return on Assets (ROA)
	X_{10} - Operational Self-Sufficiency (OSS)

Source: Own calculations

The data for analysis have been gathered from the Eurostat databases and the Microfinance in Europe Report (2018).

First, the relationships between the selected variables were analysed using a matrix of correlation coefficients. In most cases, the correlation between selected variables was not statistically significant. The highest coefficient (0.6) was obtained with regard to ROE and ROA, while in other cases it did not exceed 0.43.

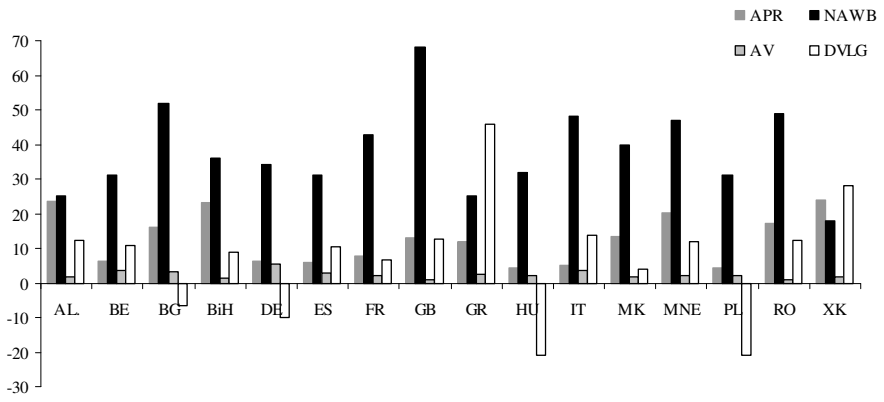

Figure 1: Values of features of activity in the area of microcredit

Source: Own calculations based on Microfinance in Europe Survey Report 2016-2017.

In the analysed group, in the case of four countries the value of microloans granted decreased in 2017 compared to 2016. The largest decrease, by more than 20%, was recorded in Hungary and Poland. An opposite trend can be observed in Greece where the value of microloans granted increased by 46%. A growing increase of interest in micro-credits could also be observed among the inhabitants of Kosovo (28%). The average value of the funding granted

varied between EUR 5312 in Germany and EUR 1020 in Great Britain. The average value of the funds provided in 2017 was 1479 euro, with lesser amounts disbursed only in Romania, Bosnia-Herzegovina and the United Kingdom.

Women play a special role among microfinance beneficiaries, and in many cases they are the target of the offer of institutions supporting the poorest social groups. In many cases, it is the women that become responsible for supporting their families. The women are most active in the UK, where they account for 68% of beneficiaries of the microfinance programmes. Bulgaria is next in line, with the percentage of active women exceeding 50%. Still, in most of the analysed countries the number of women applying for support is lower than the number of men. One can therefore state that the offer is not very attractive for women, or that in most families the traditional model with a working father is preserved.

A very diversified interest rate level is another feature of the microcredit system. The highest cost of microloan is observed in those European countries that have undergone political transformation. The highest interest rates on loans, above 23%, are paid by the inhabitants of Kosovo, Albania and Bosnia-Herzegovina. The most advantageous offer is addressed to the poorest clients in Poland and Hungary, where the interest rate on loans does not exceed 4.3%. In the countries with the lowest interest rates, the average amount of borrowings are the highest. On the other hand, in countries with the highest average loan amounts, the rate of growth in the volume of loans is the lowest.

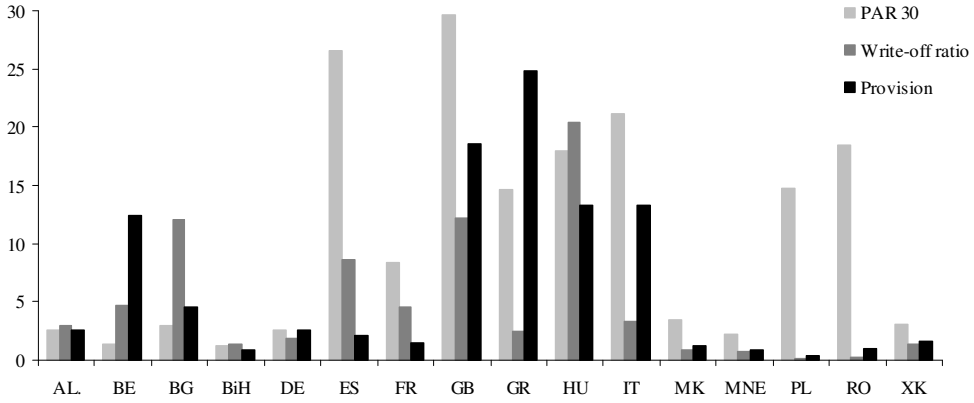

Figure 2: Values of credit portfolio quality in the European countries

Source: Own study based on the Microfinance in Europe Survey Report 2016-2017.

When assessing the loan portfolio quality, one may note that the largest percentages of overdue microloans (by over 30 days) are recorded in the UK (29%), Spain (27%) and Italy (21%). In 7 countries, however, the percentage of instalments not paid off on time did not exceed 3.5%. The inhabitants of Bosnia-Herzegovina, Belgium and Montenegro were those who repaid their liabilities most on time.

Credit losses entail a much greater risk to lending institutions. The worst situation is observed in Hungary, where the credit losses reach 20%, while the average for other countries is 4%. In the EU-15 countries, the lenders compensate for the losses with high fees.

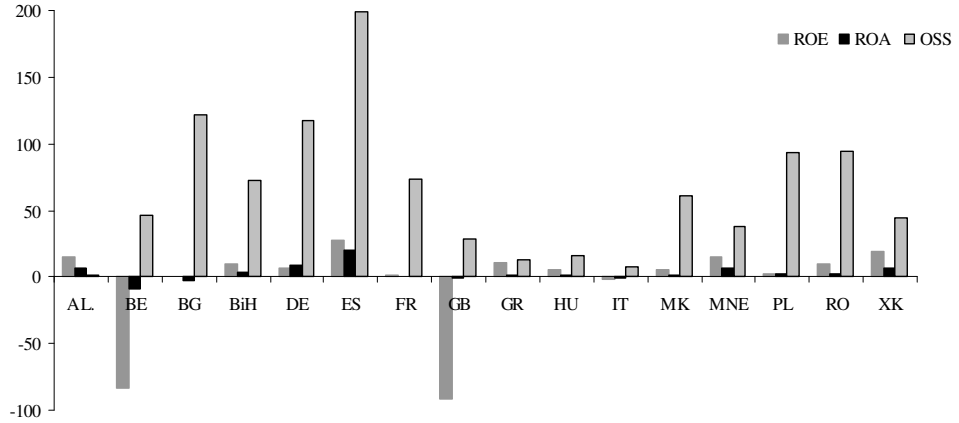

Figure 3: Values of efficiency in the European countries

Source: Own calculation

In terms of efficiency, one should pay attention to the United Kingdom and Belgium, where very high negative ROE ratios were recorded which confirms losses on invested equity.

The OSS of microcredit organisations is most favourable in Spain, Bulgaria and Germany, indicating the highest performance of institutions operating in these countries.

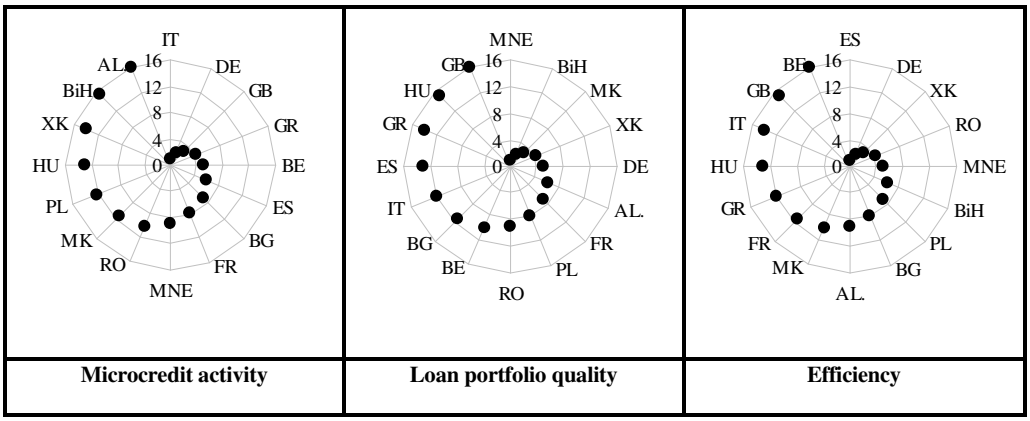

Figure 4: Ranking of European countries in terms of value of the synthetic measure for evaluation of microcredit activity at each level

Source: Own calculation

In the analysis of data describing the activity of residents in applying for funds from microcredit institutions, one can observe that the United Kingdom, Italy and Bulgaria are the leaders. This is connected with the high activity of women in applying for financial support. Hungary and Poland ranked last due to a decrease in the volume of loans granted.

A relatively unfavourable situation in terms of quality of the loan portfolio is observed in the countries of the "old" EU. The United Kingdom, Greece, Spain and Italy record the highest shares of non-performing loans and credit losses.

In terms of efficiency of the funds granted, the countries of Spain and Germany ranked highest followed by the countries of the former Yugoslavia: Kosovo, Montenegro, Bosnia-Herzegovina, while the “old” EU countries: Belgium, United Kingdom, Italy, Greece and France, took the lowest positions. This may have been affected by the economic recession.

In the European countries, there is a need for microfinance as an incentive for the unemployed to set up their own businesses.

As shown in the report by the William Davidson Institute, the presence of financial institutions offering microcredit has significantly improved access to external sources of finance for SMEs, making Bosnia and Herzegovina the most dynamic market for microcredit services among the Balkan countries.

Summary

In European countries, there is a large number of small entrepreneurs, often sole proprietorships, whose operations are hindered by a lack of initial or investment capital. From the social point of view, it is worth financing projects of people with the lowest incomes living in rural areas, i.e. the segment of customers ignored by commercial banks.

The presence of financial institutions offering microcredit has significantly improved access to external sources of financing for SMEs, and the rate of growth in the volume of loans granted indicates a rising demand for this type of support. SMEs constitute an important group in terms of the economic and social potential in the Central and Eastern Europe, where, due to the specific nature of the previous system, large companies were characterised by low productivity, and efforts were taken to discourage entrepreneurship. Since microbusinesses take efforts to settle their liabilities to financial institutions on a regular basis, the percentage of non-performing loans and credit losses is relatively low in most of the countries presented. Due to the high risk they pose to banks and low revenues in comparison to large companies, in many cases SMEs are deprived of the opportunity to obtain bank funds, and the documents and cash collateral required by banking institutions extend the process of granting credit and significantly increase the related costs. It is important to adjust the amounts of fees and interest charged on microcredits so that they are not too burdensome for start-ups.

Microloans cannot be treated as a remedy for financial exclusion. They are certainly one of the possibilities of activating those social group which are not able to meet the conditions set by commercial banks when granting loans.

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Analysis of Factors Influencing the Intention of Indonesians to Invest in Retail Green Sukuk

Mas DHIRADHARANA and Sri DARYANTI

Department of Management, Faculty of Economics and Business, Universitas Indonesia, Jl. Salemba Raya, Senen, Jakarta Pusat, DKI Jakarta 10430

E-mail : masdhiradharana@gmail.com; sri.daryanti@ui.ac.id

Abstract

This research aims to analyze the explanatory variables of the intention to invest in Retail Green Sukuk, an investment product offered by the Directorate General of Budget Financing and Risk Management (DGBFRM), Ministry of Finance of the Republic of Indonesia. In the relationship model proposed, the intention to invest in Retail Green Sukuk can be explained by three variables: the socially responsible consumption of individuals; their perception of personal gain; and their perception of the effectiveness of their actions. The relationships between the variables were analyzed using the Partial Least Squares – Structural Equation Modeling technique. The data were collected through a survey involving 265 respondents in Indonesia who had purchased financial or investment products. Based on the results, the intention to invest in Retail Green Sukuk is explained by the proposed explanatory variables. The socially responsible consumption habits of investors and their perception of the effectiveness of Retail Green Sukuk have a direct and positive effect on the intention to invest in the product. However, the perception of personal gain only has an indirect effect on the intention through the mediation of the perception of the effectiveness of actions. These findings should be taken into account by DGBFRM when designing marketing and communication strategies for Retail Green Sukuk.

Keywords: Retail Green Sukuk, Partial Least Squares, Socially Responsible Consumption, Consumer Behavior, Socially Responsible Investment

Introduction

Indonesia, as a member country of the United Nations (UN), has agreed on the global commitment to the Sustainable Development Goals (TPB/SDGs) 2015-2030. The country is seriously committed to implementing SDGs in order to improve people's economic welfare sustainably; to ensure the sustainability of social communities; improve the quality of the environment; and implement inclusive development and governance that can maintain the improvement in the quality of life from one generation to the next (Bappenas, 2017).

To achieve the stated SDGs, the Indonesian government needs a large budget. In the 2030 Indonesian SDGs Roadmap, the investment financing requirement for Indonesia in the Business as Usual (BAU) scenario in 2020 was IDR 2,778 trillion and would rise to IDR 7,721 trillion by 2030 (Bappenas, 2019). With the 2020 State Budget spending target of IDR 2,540 trillion (Ministry of Finance, 2019), the government faces a tough challenge to achieve the SDGs by relying solely on funding from the State Budget. Therefore, the government needs to make breakthroughs and innovations to find alternative investment financing to achieve its SDG goals.

In the Spring Meetings of the International Monetary Fund - World Bank Group 2019 in Washington D.C., Sri Mulyani Indrawati, the Minister of Finance of the Republic of Indonesia explained how Indonesia mobilized funds to achieve the SDGs through philanthropic actions. The first way is through a blended, or mixed, finance scheme, consisting of funds from the government, public, private sources and philanthropic funds that are integrated into the SDGs Indonesia One platform. The second way is through issuing sukuk as one of the Islamic financing instruments, namely the Global Sukuk Wakalah, which is the first Green Sukuk in Indonesia and Asia. Indonesia was considered to be a pioneer in issuing green bonds in Southeast Asia through the issuance of Green Sukuk worth US$ 1.25 billion in March 2018 (Anggraini, 2018). However, the Green Sukuk were only available for institutional investors and were not yet available for individual or retail investors.

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Retail Green Sukuk ST-006, which was issued in 2019 by the Ministry of Finance's DGBFRM, is the first retail sukuk instrument in the world to be issued using a green concept and made available for individual or retail investors. Retail Green Sukuk is issued to finance or refinance government green projects in accordance with its green framework (DJPPR, 2019). The issuance of Retail Green Sukuk is one of breakthroughs made by the government of Indonesia in terms of financing to support the achievement of SDGs.

However, the yield offered by Retail Green Sukuk is lower compared to other retail investment instruments issued by the Ministry of Finance's DGBFRM throughout 2019. With relatively lower yields than Retail SBN products or other retail SBSNs, the Ministry of Finance's DGBFRM needs to anticipate a diminish in the level of demand for and sales of Retail Green Sukuk, especially from individual investors who only consider traditional criteria, such as financial returns, risk and liquidity, in making their investment decisions.

According to Lozano, Albareda & Balaguer (2016), there is currently a new consumption pattern in which consumers, in addition to considering traditional criteria, also consider the social commitment of companies and brands. In the financial sector, this type of consumer is an investor who does not only consider the criteria of profitability, risk and liquidity when determining what instrument they invest in, but also considers for what purpose their money is invested. In other words, these investors consider social, environmental and ethical issues, both in terms of the financial products they buy and the financial institutions that offer them (Palacios-González, 2018).

As the Retail Green Sukuk product was issued in the context of financing and refinancing green projects established by the government of Indonesia and supporting the achievement of SDGs, the Retail Green Sukuk is, in fact, a socially responsible investment product. Sandberg, Juravle, Hedesstorm & Hamilton (2009) define socially responsible or ethical investment as an action that incorporates environmental, ethical, social and corporate governance criteria in the process of purchasing financial products (savings or investment), by encouraging companies to adopt socially responsible policies and commitments to projects or sectors that support community welfare and contribute to sustainable development.

Although there have been studies analyzing the sociodemographic characteristics of socially responsible investors (Tippet & Leung, 2001; Clark-Murphy & Soutar, 2004; Nilsson, 2009; Cheah, Jamali, Johnson & Sung, 2011; Dorfleitner & Utz, 2014), research that analyzes the attitudes of such investors remains scarce. Several previous studies have shown that the attitude of investors can influence their intention to buy certain financial products (Shanmugham & Ramya, 2012; Sachse et al., 2012; Warsame & Ireri, 2016; Ashidiqi & Arundina, 2017; Kunz et al., 2017). Research on attitudes needs to be strengthened, because the majority of research conducted to date showed that the fundamental difference between socially responsible investors and conventional ones does not lie in their sociodemographic characteristics, but in their attitudes (Williams, 2005, 2007).

Previous research regarding the intention to invest in sukuk in Indonesia has been conducted by Ashidiqi and Arundina (2017) using the theory of planned behavior (Ajzen, 1985, 1991). However, this research was only conducted on student respondents in Indonesia. There has been no research related to the intention to invest in sukuk by the general public in Indonesia, especially relating the characteristics of the sukuk with the behavior of socially responsible investors. In addition, the Retail Green Sukuk product is an investment product which was officially launched on November 1, 2019 by the Ministry of Finance of the Republic of Indonesia, so this research is one of the first empirical studies conducted regarding the intention to invest in the product.

This study adapted research conducted by Palacious-Gonzalez and Chamorro-Mera (2018) who found that the intention to invest in a socially responsible manner is influenced by three attitude variables relating to investors, namely socially responsible consumption, perception of personal gain, and perception of the effectiveness of their action. Understanding the attitudinal factors that encourage individual investors in Indonesia to invest in Retail Green Sukuk will be useful for the Ministry of Finance's DGBFRM as policymaker in developing effective communication and marketing strategies for Retail Green Sukuk.

Theoretical Review

Attitudes towards Socially Responsible Behavior

Most of the research conducted on socially responsible behavior has been based on the theory of reasoned action put forward by Azhen and Fishbein (1975) and its development theory, the theory of planned behavior (Ajzen, 1985, 1991). In this study, the researchers focused on one of the variables in the theories of reasoned action and planned behavior, namely the attitude that shapes an investor's intention to invest in socially responsible investment products. To explain such behavior, several theories related to attitudes are used to analyzed socially responsible behavior. In previous studies, the attitudes that contribute to socially responsible behavior include perceived consumer effectiveness, socially responsible consumption, the perception of personal gain and the perception of the effectiveness of the action.

Perceived Consumer Effectiveness

This variable measures the control perception of an individual; the extent to which consumers believe that the actions of an individual can influence or solve a problem that exists in the individual's environment, be it environmental or social problem (Roberts, 1996). There is agreement in the literature regarding the positive effect of perceived consumer effectiveness on socially responsible behavior. Some of the examples are studies that focus on ecological behavior (Kinnear et al., 1974; Ellen, 1994; Roberts, 1996; Straughan & Roberts, 1999; Akehurst et al., 2012; Izaguirre-Olaizola et al., 2013; Zhao et al. 2014) and studies that focus on ethical behavior (De Pelsmacker et al., 2005; D'Astous & Legendre, 2009), as well as research that analyzes socially responsible behavior in general (Webster, 1975; Antil, 1984; Webb et al., 2008).

Other studies have found that this variable has a positive and significant impact when used in research on the intention to take a specific action: for example, research regarding the intention to book an environmentally friendly hotel (Han & Yoon, 2015); the intention to consume organically (Kabadayi et al., 2015); and the intention to buy products from a sustainable business (Lee et al., 2015).

Socially Responsible Consumption

Webster (1975) defines a socially responsible consumer as one who considers the public consequences of his consumption or someone who attempts to use his purchasing power to bring about social change. Socially responsible consumption is often operationalized by using only items of consumer behavior related to environmental awareness. An example is Webster (1975), who created the Socially Conscious Consumer Index, which is related to the socially responsible consumption of individuals, such as the use of recycling services, reuse of paper shopping bags or use of low-phosphate detergents. In a similar vein, Brooker (1976), Belch (1979, 1982) and Antil (1984) measured socially responsible consumption behavior through scales or indicators that focused on environmental concern.

The research of Roberts (1995, 1996) was the first attempt to involve social aspects in measuring socially responsible consumption. Roberts developed a scale to measure socially responsible consumption based on two dimensions, namely those of ecologically conscious and socially conscious consumer behavior. Later, Crane (2001) created a framework in which ethical augmentation affects products at four different levels, namely at the product, marketing, company and country levels. The framework shows that the concept of socially responsible consumption behavior can consist of four dimensions, namely the characteristics of the product itself, how the product is sold, the behavior of the company, and the country where the product comes from.

Based on these two measurement scales, François-Lecompte and Roberts (2006) conducted a study to determine whether consumers in France showed concern regarding the general social and environmental issues expressed by Roberts (1995, 1996) or instead focused on the specific social and environmental aspects of a product, as claimed by Crane (2001). The François-Lecompte and Roberts (2006) study produced five scale factors for measuring socially responsible consumption behavior, consisting of company behavior, products with causes, small businesses, country of origin, and volume of consumption.

The first scale factor of socially responsible consumption is company behavior, which represents the act of consumption related to irresponsible corporate behavior (François-Lecompte, 2006). These behaviors include company's disrespectful attitude toward employees, harmful to the environment, links with reprehensible organizations, child labor forces, etc.

The second factor is products with cause, which corresponds to the purchase of cause-related products. This factor represents the preference to purchase cause-related products that help the unfortunates, the people from developing countries, or small producers (François-Lecompte and Roberts, 2006).

The third factor, small businesses, represents the willingness of the consumer to support small businesses. Similar with the second factor, this factor represents the social aspect of the consumer. According to the research conducted by François-Lecompte and Roberts (2006), being a socially responsible consumers consists of supporting traditional small businesses as opposed to bigger businesses, such as hypermarkets and supermarkets.

The fourth factor, country of origin, indicates that consumer in France prefers to buy products from their country of origin or from Europe. This factor represents the social aspect of the consumer. This factor has a similarity with 'country of origin level' concept expressed by Crane (2001). According to Crane (2001), the 'country of origin level' of a product is a significant ethical consideration, with positive augmentation for domestic products and negative augmentations for products made in countries with government policies deemed unacceptable.

The last factor, volume of consumption, corresponds to an idea of reducing individual's consumption as a manifestation of environmental concern. According to François-Lecompte and Roberts (2006), this behavior focuses on concerns regarding the impact of consumption on the environment and tries to minimize such impact by reducing consumption.

Perception of Personal Gain

This variable is defined as a subjective assessment of an individual regarding the advantages and disadvantages they receive when they take socially responsible action (Ellen, 1994). Although perceptions of this variable can be expressed in positive language, that is, regarding the expected benefits, most studies define it through questions that are used negatively or conversely to describe feelings of being harmed (such as paying a higher price or needing to spend more time during the purchase process).

Individuals who have a high perception of personal gain have a higher tendency to take socially responsible actions than those who have a low perception of personal gain (Antil, 1984; Ellen, 1994; De Pelsmacker et al., 2005; De Pelsmacker & Janssens, 2007). Moreover, the perception of personal gain affects intention, as shown in the findings of a study conducted by Lee et al. (2015), in which the perception of personal gain affected the intention to buy fair-trade products.

Perceived Effectiveness of Action

This variable refers to the individual's view of the ability of an action to affect the environment and solve the problems in question (Banegi & Chamorro, 2002). An individual who has a certain level of concern for a social problem may have the belief that they will not have any influence on the environment through their actions or behavior, but through some other actions they can contribute efficiently to solving a problem.

This variable can be measured by using positive issues (e.g. sorting domestic waste can help reduce contamination) or negative ones that show distrust or low confidence in the impact of an action (e.g. sorting domestic waste is an ineffective way to save the earth).

De Pelsmacker et al. (2005) and De Pelsmacker and Janssens (2007) analyzed scepticism about fair trade; that is, individuals who do not believe that fair trade companies can operate effectively in a world dominated by capitalist economic models. Their research shows that the variable perceived the effectiveness of the action, which is measured in negative or opposite terms, and has a negative effect on purchasing fair trade products.

Proposed model for the intention to invest in Retail Green Sukuk

This research is aimed to investigate the attitudinal factors that explain the intention to invest in Retail Green Sukuk among investors in Indonesia. With reference to research on intention to invest in a socially responsible manner conducted by Palacious-Gonzalez and Chamorro-Mera (2018), a relationship model, as shown in Figure 1, was developed to examine intention to invest in Retail Green Sukuk.

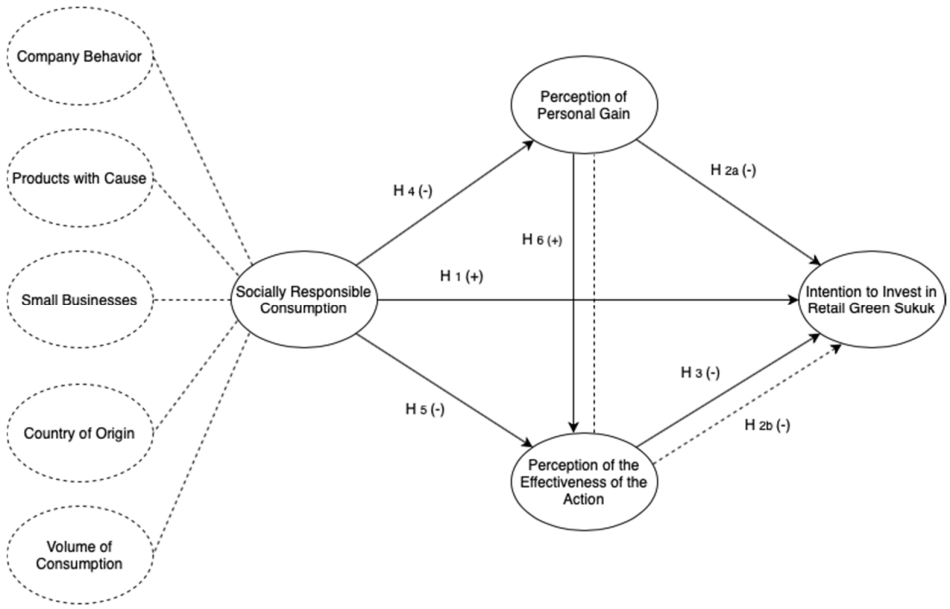

Fig. 1: Conceptual Framework

The effect of socially responsible consumption on the intention to invest in Retail Green Sukuk

Palacious-Gonzalez and Chamorro-Mera (2018) found that the greater the socially responsible consumption, the greater the intention to invest in a socially responsible manner. This is based on the justification that certain types of socially responsible behavior influence the intention to perform other newer behaviors. Several studies that support

the result of study conducted by Palacious-Gonzalez and Chamorro-Mera (2018) are study of Han and Yoon (2015) on the relationship of individual's recycling and reuse behavior and their intention to visit environmental management certified hotels as well as study of Izaguirre-Olaizola et al. (2013) who found environmental activism and recycling activities have a direct positive influence of the purchase of organic products. Based on these studies, a hypothesis is proposed:

H1: Socially responsible consumption has a positive effect on the intention to invest in Retail Green Sukuk.

The effect of the perception of personal gain on the intention to invest in Retail Green Sukuk

Palacious-Gonzalez and Chamorro-Mera (2018) stated that in the financial sector, perception of personal gain is measured in terms of sacrifice, which relates to the possibility that socially responsible investment entails lower return and greater risk level. However, some other studies that compared the return of the socially responsible investment products and the conventional ones (Hellsten and Mallin, 2006, Renneboog et al., 2008, Ortas et al., 2013; Martí-Ballester, 2015; and Huan, 2016) showed that sometimes the return is greater and sometimes is lower. A study conducted by Jansson and Biel (2011) concluded that investors believe socially responsible investment may provide lower return in the short run compared to conventional investments. In the study, Jansson and Biel (2011) also found that perception of personal gain had a significant influence on the intention to invest in a socially responsible manner, which means the investors have greater intention to invest in socially responsible manner when the socially responsible products have better financial conditions. However, Palacious-Gonzalez and Chamorro-Mera (2018) found that perception of personal gain only indirectly influences the intention to invest in a socially responsible manner through the mediation of perception of the effectiveness of the action.

Based on the mentioned studies, the following hypotheses are proposed:

H2a: The perception of personal gain has a negative effect on the intention to invest in Retail Green Sukuk.

H2b: The perception of personal gain has a negative effect on the intention to invest in Retail Green Sukuk indirectly through the perception of the effectiveness of the action.

The relationship between perception of personal gain and the intention to invest in Retail Green Sukuk is expressed in negative sign as the perception of personal gain is measured in terms of sacrifice in financial conditions (Palacious-Gonzalez and Chamorro-Mera, 2018).

The effect of the perception of the effectiveness of the action on the intention to invest in Retail Green Sukuk

According to Palacious-Gonzalez and Chamorro-Mera (2018), the perception of the effectiveness of the action refers to the belief that socially responsible investment can encourage companies to behave better, hence, help to resolve social and environmental problems. On their study, Palacious-Gonzalez and Chamorro-Mera (2018) also found that the perception of the effectiveness of the action from the investors has positive influence on their intention to invest in socially responsible manner which is similar to the result of studies conducted by Nilsson (2008) and Wins and Zwergel (2015). Based on these findings, the following hypothesis is proposed:

H3: The perception of the effectiveness of the action has a negative effect on the intention to invest in Retail Green Sukuk.

As the previous studies measured the perception of the effectiveness of the action in terms of negative beliefs, the relationship between the perception of the effectiveness of the action and the intention to invest in Retail Green Sukuk is expressed in negative sign.

The effect of socially responsible consumption on the perception of personal gain

Palacious-Gonzalez and Chamorro-Mera (2018) found that the greater socially responsible consumption of an investor, the better their perception of personal gain. Based on the finding, this study proposes the following hypothesis:

H4: Socially responsible consumption has a negative effect on the perception of personal gain.

The relationship between socially responsible consumption and perception of personal gain is expressed in negative sign as the perception of personal gain is measured in terms of sacrifice.

The effect of socially responsible consumption on the perception of the effectiveness of the action

A study conducted by Palacious-Gonzalez and Chamorro-Mera (2018) concluded that the greater the socially responsible consumption of an individual, the greater their perception of the effectiveness of the action. Palacious-Gonzalez and Chamorro-Mera (2018) stated that this is based on the logical thinking that the individuals who behave in socially responsible manner will be more confident that ethical investment can resolve social and environmental problems. Therefore, the following hypothesis is proposed:

H5: Socially responsible consumption has a negative effect on the perception of the effectiveness of the action.

The relationship between socially responsible consumption and perception of the effectiveness of the action is expressed in negative sign as the perception of the effectiveness of the action is measured in terms of negative beliefs.

The effect of the perception of personal gain on the perception of the effectiveness of the action

Palacious-Gonzalez and Chamorro-Mera (2018) found that the greater the perception of personal gain from investing in socially responsible financial products, the greater the perception of the effectiveness of the action. This means that if individuals perceive that socially responsible investment products have better financial condition, they will tend to think that they will be able to help resolve social and environmental problems through socially responsible investment products. Based on the study above, the following hypothesis is proposed:

H6: The perception of personal gain has a positive effect on the perception of the effectiveness of the action.

Based on the studies of Palacious-Gonzalez and Chamorro-Mera (2018) and François-Lecompte and Roberts (2006), the constructs and indicators for this study as shown in Table 1 are developed.

Table 1: Constructs and Indicators

No.	Variables	Dimensions	Indicators	Code	Scale	Sources
1.	Socially Responsible Consumption	Company Behavior	I try not to buy products form illegal companies	CB1	Likert 1-5	François-Lecompte and Roberts (2006)
			I try not to buy products from companies that employ underaged workers	CB2	Likert 1-5	
			I try not to buy products from companies that disrespect their employees	CB3	Likert 1-5	
			I try not to buy products from companies that harm the environment	CB4	Likert 1-5	
			I try not to buy products from companies or businesses affiliated with political organizations that have bad reputation	CB5	Likert 1-5	
		Country of Origin	When I have the choice between purchasing Indonesian and foreign products, I choose to purchase Indonesian products	O1	Likert 1-5	
			I prefer Indonesian products	O2	Likert 1-5	
			I buy fruits and vegetables produced by Indonesian's farmer	O3	Likert 1-5	
			I buy products made in Indonesia	O4	Likert 1-5	
		Products with Cause	I buy products which part of the price is given to humanitarian cause	PC1	Likert 1-5	
			I buy products which part of the price is given to a program to improve small enterprises	PC2	Likert 1-5	
			I buy products which part of the price is given to a good cause	PC3	Likert 1-5	
			I buy fair-trade products	PC4	Likert 1-5	
		Small Businesses	I buy my daily needs from small businesses as often as possible	SB1	Likert 1-5	
			I help the storekeepers in my neighborhood with my purchases	SB2	Likert 1-5	
			I avoid doing all my shopping from big retail companies	SB3	Likert 1-5	

			I go to small markets to support small fruit and vegetable producers	SB4	Likert 1-5	
		Volume of Consumption	I try to reduce my consumption to my needs	V1	Likert 1-5	
			In general, I try to reduce my level of consumption	V2	Likert 1-5	
			I try not buy things that I can provide/make on my own	V3	Likert 1-5	
2.	Perception of Personal Gain		Investing in Retail Green Sukuk entails greater risk than other conventional investment products.	PPG1	Likert 1-5	Palacious-Gonzalez and Chamorro-Mera (2018)
			Working with Ministry of Finance's DGBFRM entails higher risk than other financial institutions.	PPG2	Likert 1-5	
			Working with Ministry of Finance's DGBFRM entails accepting worse financial conditions.	PPG3	Likert 1-5	
3.	Perception of the Effectiveness of the Action		Retail Green Sukuk is only a marketing action that does not truly contribute to resolving social and environment problems in Indonesia.	PEA1	Likert 1-5	
			Retail Green Sukuk is only a marketing action and beyond that, there is no real concern from Ministry of Finance's DGBFRM.	PEA2	Likert 1-5	
			Retail Green Sukuk does not really contribute to Ministry of Finance's DGBFRM having better social and environment behavior	PEA3	Likert 1-5	
			Working with Ministry of Finance's DGBFRM will not help resolving social and environmental problems in Indonesia.	PEA4	Likert 1-5	
			I do not believe that I can contribute to resolving social and environmental problems in Indonesia by investing in Retail Green Sukuk.	PEA5	Likert 1-5	
4.	Intention to Invest in Green Sukuk Ritel		With similar rate of returns, I prefer investing in investment products offered by Ministry of Finance's DGBFRM than other financial institutions.	INT1	Likert 1-5	
			I am willing to invest in Retail Green Sukuk to resolve social and environmental problems with the same rate of returns with other financial institutions.	INT2	Likert 1-5	
			I am willing to invest in Retail Green Sukuk although the rate of returns offered is lower than other financial institutions.	INT3	Likert 1-5	
			I am willing to accept lower rate of returns for investment products offered by Ministry of Finance's DGBFRM.	INT4	Likert 1-5	

			I will recommend my friends and families to invest in Retail Green Sukuk.	INT5	Likert 1-5	

Research Methods

The data required for the study were collected through a questionnaire distributed to Indonesian citizens with the help of the Google Forms platform.. The measurement scale used was a 5-point Likert scale. Only individuals with the status of Indonesian citizens (WNI) were included, considering that only individual Indonesian investors can invest in Retail Green Sukuk. Another criterion set for respondents to be processed in this study was that they had previously invested in financial or investment products. The sample was selected using nonprobability sampling techniques and convenience sampling.

The data collected were then processed using the Partial Least Squares technique - Structural Equation Modeling (PLS-SEM) and SmartPLS 3.0 software. The PLS-SEM method was employed because it is the recommended method when there are reflective and formative latent variables in a structural model (Hair et al., 2017; Chin, 2010). In the proposed research model, the socially responsible consumption variable is a formative latent variable that is formed by five dimensions, namely company behavior, country of origin, the volume of consumption, products with causes, and small businesses (François-Lecompte and Roberts, 2006). Meanwhile, other variables, namely the perception of personal gain, the perception of the effectiveness of action and the intention to invest in Retail Green Sukuk are reflective latent variables.

Analysis, Results and Discussion

A summary of the results from testing the hypotheses using SmartPLS 3.0 software is presented in Table 2.

Table 2: Research Hypothesis Test

	Relationship according to hypothesis	Path Coefficient	T-Statistic (|O/STDEV|)	P-Value	Description	Hypothesis Accepted?
SRC →INT (H_1)	+	0.319	4.455	0.000	Significant	Hypothesis Accepted
PPG →INT (H_{2a})	-	-0.017	0.247	0.805	Not Significant	Hypothesis Rejected
PPG → PEA → INT (H_{2b})	-	-0.118	3.733	0.000	Significant	Hypothesis Accepted
PEA → INT (H_3)	-	-0.380	5.167	0.000	Significant	Hypothesis Accepted
SRC → PPG (H_4)	-	-0.203	3.471	0.001	Significant	Hypothesis Accepted
SRC → PEA (H_5)	-	-0.367	5.678	0.000	Significant	Hypothesis Accepted
PPG → PEA (H_6)	+	0.310	4.026	0.000	Significant	Hypothesis Accepted

The critical t-value used in the one-tailed tests was 1.645, with a p-value of 0.05, and with a confidence level of 95% and $\alpha = 5\%$. The t-value and p- value are used as references in rejecting or accepting the hypotheses formulated for the study.

Based on the results obtained, the hypothesis that socially responsible consumption has a positive effect on the intention to invest in Retail Green Sukuk, as denoted by H1, is accepted. The result confirms the research conducted by Palacious-Gonzalez and Chamorro-Mera (2018), who found that there was a positive effect of socially responsible consumption on the intention to invest in a socially responsible manner. The results of this study also support research conducted by Han and Yoon (2015) which found that the behavior of an individual with regard to recycling and reuse had a positive relationship with the intention to visit a hotel that is certified in environmental management. Han and Yoon's (2015) research showed that socially responsible behavior that already exists in an individual will encourage that individual to take other socially responsible actions.

The hypothesis that the perception of personal gain has a negative effect on the intention to invest in Retail Green Sukuk, as denoted by H2a, is rejected. The result confirms the study conducted by Palacious-Gonzalez and Chamorro-Mera (2018) who found that perceptions of the personal gain of socially responsible investment products did not affect the intention to invest in a socially responsible manner. Neither the results of this study nor that of Palacious-

Gonzalez and Chamorro-Mera (2018) support the research findings of Jansson and Biel (2011) who showed that if investors have the perception that buying socially responsible products does not have a negative impact on their financial condition, they will have a greater intention to invest in a socially responsible manner. On the other hand, the results of this study support the research of Nilsson (2008) who showed that the risk perception of investors regarding socially responsible investment did not have a significant influence on the behavior to invest in socially responsible investment products.

The hypothesis that the perception of personal gain has a negative effect on the intention to invest in Retail Green Sukuk indirectly through the perception of the effectiveness of the action, as denoted by H2b, is accepted. The result is similar to the study of Palacious-Gonzalez and Chamorro-Mera (2018) who found that the perception of the financial conditions of socially responsible investment products does not influence the intention to invest in a socially responsible manner, but does have a significant effect when mediated by the perception of the effectiveness of the action. This indicates that the perception of the returns and risks of Retail Green Sukuk products from the potential investors will affect the intention to invest in Retail Green Sukuk when they believe that investing in Retail Green Sukuk products will help resolving social and environmental problems in Indonesia.

The hypothesis that perception of the effectiveness of the action has a negative effect on the intention to invest in Retail Green Sukuk, as denoted by H3, is accepted. The result confirms previous research conducted by Palacious-Gonzalez and Chamorro-Mera (2018) who showed that perception of the effectiveness of the action has negative influence on the intention to invest in a socially responsible manner. The results of this study also support the research conducted by Nilsson (2008) and Wins and Zwergel (2015, 2016), who showed that investors' perceptions of the effectiveness of a socially responsible investment product in overcoming social and environmental problems has a positive effect on investors' intention to invest in socially responsible investment products. This result also indicates that the more the investors believe that Retail Green Sukuk products would help to resolve social and environmental problems in Indonesia, the more they will tend to invest in them

The hypothesis that socially responsible consumption has a negative effect on the perception of personal gain, as denoted by H4, is accepted. The result confirms research conducted by Palacious-Gonzalez and Chamorro-Mera (2018) who found that there was a negative effect of socially responsible consumption on the perception of personal gain. This indicates that potential investors who have socially responsible consumption habits tend to think that Retail Green Sukuk products have good returns and risks.

The hypothesis that socially responsible consumption has a negative effect on the perception of the effectiveness of the action, as denoted by H5, is accepted. The result is similar to the research conducted by Palacious-Gonzalez and Chamorro-Mera (2018) who showed that socially responsible consumption has negative effect of on the perception of the effectiveness of the action. This indicates that potential investors who have socially responsible consumption habits have more confidence that Retail Green Sukuk products will be able to resolve social and environmental problems in Indonesia. This is because people with such habit have a high concern for the environment and understand that the Retail Green Sukuk investment products are issued to finance government programs for resolving social and environmental problems.

Finally, the hypothesis that the perception of personal gain has a positive effect on the perception of the effectiveness of the action, as denoted by H6, is accepted. The result confirms the study conducted by Palacious-Gonzalez and Chamorro-Mera (2018) who found that there was a positive effect of the perception of personal gain on the perception of the effectiveness of the action. This indicates that investors who have a good perception of the financial conditions of Retail Green Sukuk products tend to think that they can help to resolve social and environmental problems in Indonesia by investing in Retail Green Sukuk.

Conclusions and Recommendations

The results of this study show that respondents' perceptions of the effectiveness of Retail Green Sukuk in resolving social and environmental problems in Indonesia have the most significant influence to the intention to invest in Retail Green Sukuk. Therefore, in preparing advertising messages for Retail Green Sukuk products, the Ministry of Finance's DGBFRM needs to emphasize that Retail Green Sukuk investors are contributing to resolving social and environmental problems by investing their money in Retail Green Sukuk. In addition, the Ministry of Finance's DGBFRM needs to provide real examples of green projects financed by Retail Green Sukuk investment and presents the tangible results from these investments when marketing Retail Green Sukuk.

The results of the study also show that socially responsible consumption has a significant influence on the intention to invest in Retail Green Sukuk. Therefore, community groups that have socially responsible consumption habit and concern about the environment are effective target audiences for the Ministry of Finance's DGBFRM to market Retail Green Sukuk. These communities include individuals who are members of or involved in various communities or institutions that advocate for social and environmental issues in Indonesia.

Although the research results show that the perception of the financial benefits of Retail Green Sukuk products only affects the intention to invest in Retail Green Sukuk products indirectly, the communication strategy of the Ministry of Finance's DGBFRM should still pay attention to the perceptions of the benefits that will be obtained by investors and images related to the financial performance of such products. The message created by the Ministry of Finance's DGBFRM in the promotional materials for Retail Green Sukuk should not give the impression that Retail Green Sukuk gives lower return or worse financial conditions than other investment products. This can be done by presenting a comparison of the returns between Retail Green Sukuk and other investment products that have relatively lower yields (such as savings or deposits). The Ministry of Finance's DGBFRM should also encourage Indonesian people to consider noneconomic personal gain from investing in Retail Green Sukuk, which may include the positive feeling generated when someone has done something socially responsible, or the positive social image that is formed when someone becomes an investor of Retail Green Sukuk. The use of the terms 'Heroes of the Country' and 'Investment Heroes' for Retail Green Sukuk and Retail SBN investors, as has been previously done by the Ministry of Finance's DGBFRM when advertising Retail Green Sukuk, can be one of effective strategies to support the formation of positive social image among the investors.

This study has several limitations that could be a concern and provide an opportunity for further research. For institutions that have access to a list of investors in each province in Indonesia, the use of probability sampling techniques – such as cluster sampling will provide equal opportunities for people in each province to become respondents in further research. This is important to reduce research bias and to increase the representation of respondents from all over the country. In addition, the number of samples involved in this study is relatively small. It is suggested that a larger number of respondents could be involved in future research to further improve the generalization of the results.

Considering that Retail Green Sukuk investment products are financial products based on Islamic financial principles, further research could also involve the variable attitudes of individuals related to Islamic and religious aspects, such as individual's religiosity, perceptions of Islamic financial principles, and other related aspects. Future research could also involve moderating variables related to the sociodemographic aspects of the respondents, such as focusing the research on millennial generation or differences among generations. In addition, further research could also compare the intention to invest in Retail Green Sukuk between respondents who have previously invested in Retail SBN and those who have not.

Future research should note that there may be social desirability bias when the respondents completing the questionnaire, particularly the possibility to overvalue the positive valuation of the socially responsible consumption. Further research could also be conducted on socially responsible investment products issued by non-governmental financial organizations in Indonesia, such as those issued by listed companies that are members of the SRI-KEHATI index, a green index initiated by PT Bursa Efek Indonesia and the Biodiversity Foundation, Indonesia.

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Factors Affecting Indonesian Customers' Intention to Invest in Green Sukuk

Farhan NAUFAL
Islamic Economics, Faculty of Economics and Business, Universitas Indonesia, Depok, Indonesia
farhanaufal19@gmail.com

Sri DARYANTI
Management Department, Faculty of Economics and Business, Universitas Indonesia, Depok, Indonesia
sri.daryanti@ui.ac.id

Abstract

Climate change is occurring today due to the widespread exploitation of natural resources undertaken by humans in order to meet their needs. To deal with these problems, it is necessary we play an active role in preventing and/or dealing with climate change, such as using alternative energy sources and conducting environmentally-friendly activities. Responsible investment can support action taken against climate change. As a financing instrument in the Islamic economy, green sukuk can support such action by financing environmentally-friendly projects. This study aims to establish the factors that affect the intention to invest in green sukuk by using the theory of planned behaviour (TPB). The study respondents were 377 Indonesian citizens aged over 18 living in the country. The study found that religious values, issuers' reputation and knowledge have a positive and significant effect on attitude, and that subjective norms and perceived behavioural control have a positive and significant effect on the intention to invest in green sukuk.

Keywords*:* Green Sukuk, Intention, Structural Equation Modelling, Theory of Planned Behaviour

Introduction

Climate change occurring in the world today is a serious problem that needs to be addressed. It is even included as the 13th of the Sustainable Development Goals (SDGs), namely climate action, in which humans need to play an active role in preventing and/or dealing with climate change, such as adapting and taking mitigation measures if necessary. Indonesia has shown its commitment to supporting the realisation of the SDG program by linking most of the SDG targets to the national medium-term development plan, or RPJMN. In addition, the signing of Presidential Regulation No. 59 of 2017 concerning the Implementation of Achieving the Sustainable Development Goals is also one of the supporting pillars in realising the achievement of the SDGs in Indonesia. To adapt to these problems, Indonesia established the National Action Plan for Climate Change Adaptation (RAN-API) as a framework for national development planning.

In an effort to realise its commitment, Indonesia has developed various approaches, which include green bonds and green sukuk to fund eligible green projects, ones which, for example, support moves towards lower emission levels, and the growth of resilience to climate change, including mitigation of the problem, adaptation and biological diversity. Green bonds can help overcome the problem of climate change and help conserve the environment (Dupont & Su, 2015). Green sukuk are intended to be a source of financing to support programs that aim to achieve sustainable development in Indonesia. Sukuk are investment instruments that comply with sharia law, which includes the welfare of the earth and everything on it (Moghul & Safar-Aly, 2015).

The 2016 National Survey of Financial Literacy and Inclusion conducted by the Financial Services Authority found that the Islamic financial literacy index of Indonesian people was 8.1%, markedly different from the conventional financial literacy index of 29.5%. Moreover, the Islamic financial literacy index in the financial institution and capital market industry was 0.02%, in contrast to the Islamic banking literacy index of 6.6%. The Islamic financial inclusion index is 11.1%, which is also very different to the conventional financial inclusion index, which is 65.6%. In 2019, the Islamic financial literacy index experienced a slight increase to 8.93%, although there was a decrease in the Islamic financial inclusion index to 9.1%. The two indices are very different from the conventional ones, namely the conventional financial inclusion index of 75.28% and the conventional financial literacy index of 37.72%.

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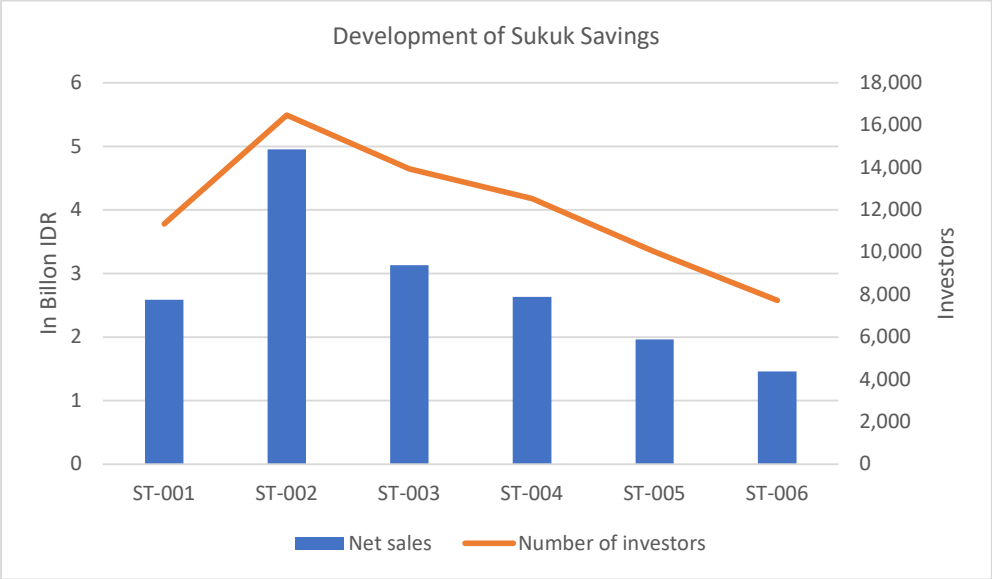

Fig. 1: Development of Sukuk Savings 2016-2019
Source: Ministry of Finance DJPPR (reprocessed)

Indonesia has a population of 267 million (World Bank, 2019) and a Muslim population of more than 207 million (Ministry of Information and Communication, 2017), which makes it the country with the highest Muslim population in the world. The Pew Research Center (2019) projects that the Muslim population will rise to around 230 million, or around 87% of the total population by 2020. The large Muslim population gives the potential for new investors to invest in the sukuk market. However, not only the Muslim community can invest in green sukuk; green sukuk issuance in Indonesia has potential investors who are very similar to state sukuk investors, regardless of their religious background (Suherman & Manzilati, 2016).

The potential for high green sukuk issuance in Indonesia must be managed as well as possible, so it is necessary to conduct research into the public's intention to invest in it, including people from various religious backgrounds, and not limited to ones with investment experience. This study aims to analyse these issues.

Based on the studies previously mentioned, TPB was also used to research the intention of both investors and non-investors to invest in green sukuk, and not limited to those with Islamic religious backgrounds. Many previous studies have examined investment intentions with regard to sukuk, but none has analysed the intention to invest in green sukuk, either by investors and non-investors, and none has examined respondents' religious backgrounds other than Islam.

This research can be used as material for consideration to develop policies to increase the development of sukuk, especially the green type. It aims to provide an overview of what can be improved in order to involve more investors in green sukuk, and also to provide the necessary data to ascertain the intention of certain groups of people to invest in green sukuk. As a result, policies could be well enforced well and remain on target.

Theoretical Review

Sukuk

Sukuk comes from Arabic, and is the plural form of 'sak', which is defined as a document (Iqbal & Mirakhor, 2007). The Accounting and Auditing Organization for Islamic Financial (AAOIFI) defines sukuk as certificates that show proof of ownership of a tangible asset, in the form of benefit rights, services or ownership of the assets of a particular project or investment activity. Based on POJK 18/POJK.04/2015, sukuk are Islamic securities in the form of certificates or proof of ownership of the same value and represent an inseparable or undivided share (syuyu '/ undivided share) of the underlying assets. Another definition of sukuk is found in the MUI DSN fatwa No. 32/DSN-MUI/IX/2002, namely that sukuk (sharia bonds) are long-term securities based on sharia principles issued to sharia bondholders, which oblige the issuer to pay income to the bondholders in the form of profit sharing, margin or fees, and to repay bond funds at maturity. Sukuk are financial instruments issued by government institutions or corporations that aim to finance a variety of projects and have been popular for the past two decades (Mcmillen, 2007). They have

some similarities with conventional bonds, such as cash flow and the element of risk (Miller, Challoner, & Atta, 2007).

Green Sukuk

Green sukuk are an investment instrument in the form of state sharia securities issued by the government, the proceeds of which are used to finance green projects. Sukuk are similar to bonds, but there are differences in the application of sharia principles in them. Green sukuk are in accordance with the government's commitment to dealing with various global environmental issues, considering that Indonesia is very vulnerable to the impact of natural damage.

The emergence of green sukuk originated with the issuance of green bonds by the World Bank in 2008. The Climate Bonds Initiative (CBI), in collaboration with the Clean Energy Business Council of the Middle East and North Africa and Dubai-based Gulf Bond & Association, initiated the formation of green sukuk. They are also known as Socially Responsible Investment (SRI). According to Moody's Investor Service (2019), Indonesia was the second largest sukuk issuing country in the world in the first half of 2019. The issuance of Indonesian sukuk was worth 15 billion USD, equivalent to 1,244 trillion rupiahs, and represents 18% of total world sukuk issuance, behind Malaysia, whose issuance was worth of 36 billion USD, or 41% of total global sukuk issuance.

Theory of Planned Behaviour (TPB)

TPB is a theory which explains that a person's behaviour can be predicted based on the intention to perform the behaviour. Ajzen (1991) defines intention as a tool to measure how strong a person desires to adopt or perform certain behaviours. The theory is a further development of that of reasoned action proposed by Ajzen and Fishbein (1967).

There are four main factors in TPB, namely attitude, subjective norms, perceived behavioural control and intention. This research adds the factors of knowledge, religious values and issuers' reputation as variables that affect attitude.

Research Methods

This research used a conclusive-descriptive approach because it aims to test the hypotheses compiled and to measure and establish the influence between the variables. Primary data were used, obtained directly from respondents using a questionnaire created with Google Forms and then distributed online via social media.

Questionnaires were distributed to a total of 378 respondents. One respondent who was not in accordance with the screening question was eliminated, so the total respondent data for analysis were from 377 respondents. The number of samples required for the SEM method should be five times the number of indicators (Hair, Sarstedt, Hopkins, and Kuppelweiser, 2014). In addition, certain criteria had to be met by individuals to become respondents, namely that they were aged ≥ 18 years, an Indonesian citizen (WNI) and domiciled in the territory of Indonesia.

The respondents were divided into two categories, namely those with Islamic or non-Islamic backgrounds, and those who had invested in an instrument before and those who had not. This was done to observe the differences in intention between those with different religious backgrounds, and those with different investment experience.

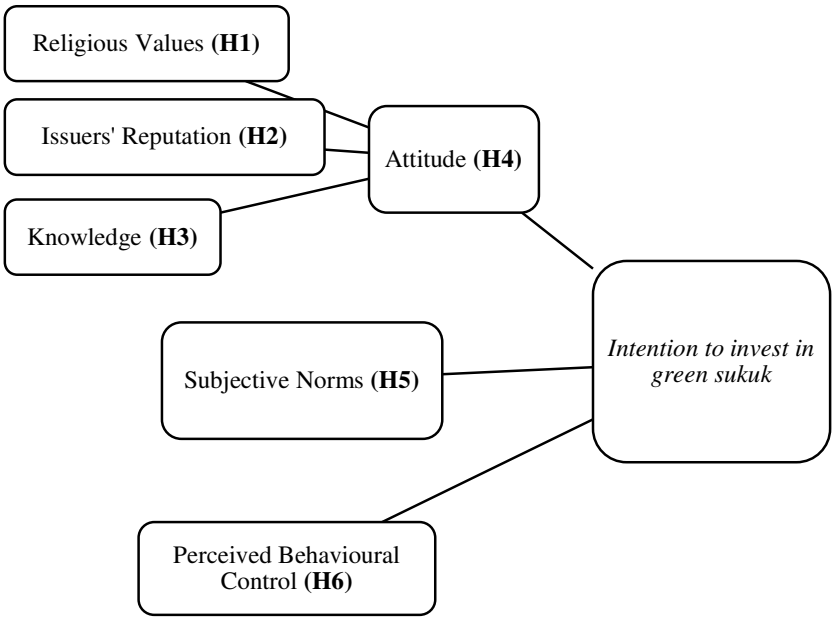

Fig 2: Research Model

ource: Authors' Elaboration

The adopted research model was that of Ashidiqi and Arundina (2017) and is a modification of the conceptual framework of TPB. The model aims to determine the effect of religious values, issuers' reputation and knowledge on attitude, and the effects of attitude, subjective norms and perceived behavioural control on the intention to invest in green sukuk. The following research hypotheses are proposed.

H1: Religious values have a significant positive effect on attitude.

Religion is one of the strong factors influencing a person's decision to take action (Kashif, Zarkada, and Thurasamy, 2016). Research conducted by Ashidiqi (2017) found that the variable that most influenced students' intentions to invest in sukuk was attitude, with the most significant influence being the religious factor. Osman et al. (2019) examined the determinants of behavioural intention towards green investment in Malaysia using TPB, finding that religious values had the most significant effect on attitude. Louche et al. (2012), in their research on the behaviour of religious organisations towards sustainable investment, including Protestant Christian, Buddhist and Hindu ones, found that religious investors were pioneers in investments that had a positive impact. Therefore, religious values or factors and their relation to attitude are the basis of H1.

H2: Issuers' reputation has a significant positive effect on attitude.

Barnett, Jermier and Lafferty (2006) examined whether customer behaviour was influenced by customer satisfaction when someone was aware of the reputation of a company. Duqi and Al-Tamimi (2018), in their research on the intention of investors in the United Arab Emirates to invest in sukuk, found that the reputation factor of the sukuk issuer had a positive and significant influence on the intention to make such an investment. Therefore, the relationship between reputation and attitude is examined in H2.

H3: Knowledge has a significant positive effect on attitude.

Research conducted by Valor and Cuesta (2007) in Spain found that a high level of awareness and understanding of sustainable investment influenced investing behaviour in religious groups. In addition, Suki (2016) states that knowledge of green products influences individuals to buy environmentally-friendly ones to help preserve nature. Therefore, knowledge and its relation to attitude are covered in H3.

H4: Attitude has a significant positive effect on the intention to invest in green sukuk.

Warsame and Ireri (2016) found that attitude had a significant influence on intention. Alam and Sayuti (2011) also discovered that attitude, subjective norms, and behavior control had a significant effect on the intention to buy halal products. Therefore, the relationship between attitude and intention is investigated in H4

H5: Subjective norms have a significant positive effect on the intention to invest in green sukuk.

Subjective norms were found to significantly influence the intention of Nigerian consumers to buy insurance (Omar & Frimpong, 2007). Lada et al. (2009) also found that subjective norms had a positive effect on intention. Therefore, the relationship between subjective norms and intention is explored in H5.

H6: Perceived behavioural control has a significant positive effect on the intention to invest in green sukuk.

Alam and Sayuti (2011) found that perceived behavioural control had a significant effect on the intention to buy halal food, while Ashidiqi and Arundina (2017) found that it had a significant effect on student intentions to invest in sukuk. However, research by Hofmann, Hoelzl and Kirchler (2008) found no significant relationship between perceived behavioural control and the intention to invest. Therefore, perceived behavioural control and its relation to intention are analysed in H6.

The data obtained were then analysed using descriptive analysis to establish the frequency distribution, and structural equation modelling (SEM) employed to observe the effect of the independent variables on the dependent variable, namely the intention variable. Different analyses were then made using an independent samples t-test to ascertain the difference in influence between the group of Muslim respondents and those with a non-Islamic background, and between group of respondents with investment experience, and those who had never invested.

Results

The data were then analysed using descriptive analysis, SEM and an independent samples t-test.

Table 1: Variable Descriptive Statistics on Intention to Invest

Variable	Total Mean
Attitude	4.7
Subjective Norms	4.0
Perceived Behavioural Control	4.4
Knowledge	4.4
Issuers' Reputation	4.5
Religious Values	5,0
Intention to Invest	4.4

Source: Authors' Elaboration

Based on the descriptive analysis, all the variables had a total mean of ≥ 4, so it can be seen that the respondents tended to "somewhat agree" with the statements in the questionnaire. Religious values had the highest total mean, 5.0, so it can be concluded that respondents tended to "agree" with the statement on the the religious values variable.

Table 2: Causal Relationships Between Independent Variables and Dependent Variable

Hypothesis	SLF	T-value	Result
(H1) Religious values → Attitude	0.09	**1.87***	Significant
(H2) Issuers' Reputation → Attitude	0.37	**6.05***	Significant
(H3) Knowledge → Attitude	0.52	**7.44***	Significant

(H4) Attitude → Intention to invest in green sukuk	0.39	**5.35***	Significant
(H5) Subjective Norms → Intention to invest in green sukuk	0.37	**5.62***	Significant
(H6) Perceived Behavioural Control → Intention to invest in green sukuk	0.13	**1.80***	Significant

Source: Authors' Elaboration

Based on Table 2, the results of the research hypotheses shown in Table 2 can be analysed by comparing the t-values of the hypotheses with the critical value of ± 1.645 ; it was found that all the hypotheses formulated had a positive and significant effect.

Discussion

Table 3: Research Hypothesis Test

Hypothesis		t-value	Summary
H1	H0 (1): Religious values do not have a significant positive influence on attitude. Ha (1): Religious values have a significant positive influence on attitude.	**1.87***	**Reject H0:** Religious values have a significant positive influence on attitude.
H2	H0(2): Issuers' reputation does not have a significant positive influence on attitude. Ha(2): Issuers' reputation has a significant positive influence on attitude.	**6.05***	**Reject H0:** Issuers' reputation has a significant positive influence on attitude.
H4	H0(4): Attitude does not have a significant positive influence on the intention to invest in green sukuk. Ha(4): Attitude has a significant positive influence on the intention to invest in green sukuk.	**5.35***	**Reject H0:** Attitude has a significant positive influence on the intention to invest in green sukuk.
H5	H0(5): Subjective norms do not have a significant positive influence on the intention to invest in green sukuk. Ha(4): Subjective norms have a significant positive influence on the intention to invest in green sukuk.	**5.62***	**Reject H0:** Subjective norms have a significant positive influence on the intention to invest in green sukuk.
H6	H0(4): Perceived behavioural control does not have a significant positive influence on the intention to invest in green sukuk. Ha(4): Perceived behavioural control has a significant positive influence on the intention to invest in green sukuk.	**1.80***	**Reject H0:** Perceived behavioural control has a significant positive influence on the intention to invest in green sukuk.

Source: Authors' Elaboration

Analysis of the coefficient of determination (R^2) was conducted by analysing the reduced form equation value obtained from the Lisrel output results. This value describes how much variance in the dependent variable can be explained by the independent variables.

- Att = 0.52*Kno + 0.37*Rep + 0.093*RV, Errorvar.= 0.28, R^2 = 0.72
- Int = 0.37*SN + 0.13*PBC + 0.20*Kno + 0.14*Rep + 0.036*RV, Errorvar.= 0.43, R^2 = 0.57

This equation shows that the attitude variable can be explained by the variables of knowledge, issuers' reputation and religious values at 72%, with the other 28% explained by other variables. Furthermore, the variable of the intention to invest in green sukuk can be explained by the variables of attitude, subjective norms and perceived behavioural control at 57%, with the other 43% explained by other variables.

Different analysis using an independent samples t-test obtained the results shown in the tables below:

Table 4: Group statistics based on investment experience

Group Statistics					
Code		N	Mean	Std. Deviation	Std. Error Mean
Int	Never Invested	184	43.8478	9.86791	.72747
	Have Invested	193	43.6269	10.25029	.73783

Source: Authors' Elaboration

Table 5: Independent samples test based on investment experience

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Int	Equal variances assumed	.108	**.743**	.213	375	**.831**	.22088	1.03710	-1.81837	2.26013
	Equal variances not assumed			.213	374.964	.831	.22088	1.03615	-1.81651	2.25828

Source: Authors' Elaboration

Based on Table 4, there is a difference between the average scores of the respondents who had invested and those who had never invested. As seen in Table 5, the significance value of Levene's Test for Equality of Variances is 0.743. It can therefore be said that the variance between the groups of respondents who had invested and had never invested is homogeneous, as it has a value of > 0.05. The 2-tailed significance value used is the value on the equal variances assumed line, which was 0.831. This indicates that there was no significant difference between the two groups with regard to investment experience, because it has a value of> 0.05. Furthermore, based on the comparison between the t value and the t table, there is no significant difference between the two groups, because it has a t value <t table, which is 0.213 <1.960.

Table 6:1 Group statistics based on religious background

Group Statistics					
Code		N	Mean	Std. Deviation	Std. Error Mean
Int	Non-Muslim	50	36.62	17.819	2.520
	Muslim	327	26.99	20.468	1.132

Source: Authors' Elaboration

Table 7: Independent samples test based on religious background

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Int	Equal variances assumed	18.984	**.000**	3.149	375	.002	9.632	3.058	3.618	15.646
	Equal variances not assumed			3.487	70.335	**.001**	9.632	2.762	4.123	15.141

Source: Authors' Elaboration

Based on Table 6, there is a difference between the mean scores of respondents with non-Muslim and Muslim religious backgrounds. As shown in Table 7, the value of significance in Levene's Test and Equality of Variances is 0.000. It can therefore be said that the variance between the groups of respondents with non-Muslim and Muslim religious backgrounds is heterogeneous because it has a value of <0.05. The 2-tailed significance value used is the value on the equal variances not assumed line, which is of 0.001. This indicates that there is a significant difference between the groups of respondents with non-Muslim and Muslim religious backgrounds because they have a value of <0.05. Furthermore, based on the comparison of the t value with the t table, there is a significant difference between the two groups because it has a value of t count> t table, which is 3.487> 1.960.

Conclusion

The study aimed to investigate the effect of religious values, issuers' reputation, knowledge, attitude, subjective norms and perceived behavioural control on the intention to invest in green sukuk. The results can be concluded as follows:

- Religious values have a positive and significant effect on attitude.
- Issuers' reputation has a positive and significant effect on attitude.
- Knowledge has a positive and significant effect on attitude.
- Attitude has a positive and significant effect on the intention to invest in green sukuk.
- Subjective norms have a positive and significant effect on the intention to invest in green sukuk.
- Perceived behavioural control has a positive and significant effect on the intention to invest in green sukuk.
- There are differences in influence between respondents with Islamic and non-Islamic religious backgrounds.
- There is no difference in influence between respondents who have invested and those who have never invested.

From the results of the descriptive analysis and the causal relationship analysis it can be concluded that the respondents tended to "somewhat agree" with their intention to invest in green sukuk. The variable with the highest causal relationship was the relationship between the knowledge variable and attitude, which indicates that with a good understanding of green sukuk, the tendency to assess investment behaviour in it will be better, so will increase the intention to invest in it.

It is indicated that the group of respondents who have those characteristics above is the millennials. The millennial generation lives side by side with technological developments, which makes technology an inseparable part of their life. This technology is used for various purposes, one of which is to seek knowledge and information about green sukuk. Therefore, the existence of technology is one of the factors that can increase knowledge.

In addition, the significant and positive influence of the issuers' reputation variable on the attitude variable shows that the good reputation of the green sukuk provider also affects respondents' assessment. The better the reputation of the green sukuk provider, the higher the attitude, which will increase the intention to invest in green sukuk.

However, there is a contradiction that the influence of religious values on attitude is not very strong (t-value = 1.87); even though statistically descriptive, this variable has the highest tendency, with a total mean of 5.0, meaning respondents tended to "agree". In addition, based on the results of the analysis of the difference test, there are

significant differences between Muslim and non-Muslim respondents. This indicates that respondents have a low tendency between their religious values and the behaviour of investing in green sukuk. These findings are similar with those of reference research conducted by Osman et al. (2019), namely that religious values have a positive and significant influence, but there are differences; in the reference research, the religious values variable has a strong influence. It is indicated that this is due to differences in views between Muslim and non-Muslim respondents, and the use of indicators that tend to be universal.

The results of the difference test analysis also show that there is no significant difference between the investor and non-investor respondents. In addition, the influence of the subjective norms variable on investing in green sukuk is the strongest compared to the variables of attitude and perceived behavioural control. Therefore, individuals can invest in green sukuk with the approval of those around them.

The influence of the variable of perceived behavioural control on the intention to invest in green sukuk shows a positive and significant effect, but is weak. This is due to the lack of information that can be retrieved from individuals, so the tendency to judge whether it is easy or difficult to invest in green sukuk is weak. For the millennial generation, this can be overcome by using technology to find sources of information about green sukuk. The assessment also depends on the resources owned by individuals so that they can assess the ability to invest in green sukuk.

Recommendations

Based on the results of the analysis and the conclusions drawn, knowledge has been shown to have a significant positive influence on the intention to invest in green sukuk. This shows that respondents who have more knowledge about green sukuk have a more positive tendency towards investing in green sukuk, so they also have a higher tendency towards the intention to invest in it.

For this reason, it is suggested that public understanding of green sukuk should be increased by providing more widespread and creative information or socialisation which will attract people's attention. Socialisation can be made online on social media, which is widely used by the community, especially the millennial generation, such as Twitter, Instagram and YouTube. Based on *Thematic Gender Statistics: Profile of Indonesian Millennial Generation* published by the Ministry of Women Empowerment and Child Protection, millennials are also the generation who have an interest in continuing their education to a higher level, so socialisation can be conducted in places such as schools or universities. As a result, public literacy regarding green sukuk will be higher, which will increase the tendency of people to invest in green sukuk.

Increasing public understanding of green sukuk will increase people's intention to invest in it, and increasing the number of investors will influence perceived behavioural control. People who have not invested in green sukuk will feel external factors from the people around them who have become green sukuk investors, which could increase the intention of non-investors to invest. In addition, the influence of the subjective norms variable on the intention to invest in green sukuk is strong, which indicates that individuals can invest in green sukuk with the approval of those around them. However, there are not many investors in green sukuk, so this needs to be increased.

In addition, the respondents do not fully agree that investing in green sukuk is based on religious motivation. Although sukuk are an investment instrument in the Islamic economy, they are not limited to Muslim investors, so this is an opportunity to attract investors from various religious backgrounds. With effective socialisation and marketing, it will be easier for the public to obtain information about green sukuk, so they will be able to increase their interest in finding out more and their desire to invest in it.

For future researchers, the authors recommend that the study could be extended by:

- Including other factors that can also influence the intention to invest in green sukuk, such as the risk and return variable, which is not included in this study as it follows the use of indicators in the reference articles that is the research by Osman et. al. (2019), Warsame and Ireri (2016), which also does not include this variable because it aims to include non-investor respondents.
- Measuring the tendency of respondents to be pro-environmental or not.
- Seeking a sample of respondents with more experience in investing in green sukuk to gauge their investment intentions.

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Role of Digital Technologies in The Russian Economy

Gulmira NURGAZINA
Russian State Academy of Intellectual Property, Moscow, Russia, gulmiranurgazina64@gmail.com

Alexander ANISIMOV
PhD, associates professor, Moscow, Russia, anisimov_au@mail.ru

Valentina BRITVINA
Moscow Polytechnic University, Moscow, Russia, saaturn2015@mail.ru

Galina KONYUKHOVA
Moscow State Technological University "STANKIN", Moscow, Russia, maurico@yandex.ru

Ekaterina BOBROVA
Lomonosov Moscow State University, Moscow, Russia, cat.katrin@rambler.ru

Olga PYATAEVA
Russian State Academy of Intellectual Property, Moscow, Russia, opyataeva@gmail.com

Abstract

The paper deals with the influence of "digital economy" development on production efficiency. The place of a country in the international arena and the welfare of its citizens depend on the ability of the state to implement an effective digitalization policy. In a market economy they help to increase the competitiveness of business entities, increase the income of the population and solvent demand for goods and services, expand international economic ties and attract foreign capital, increase the efficiency of production as a whole. Digital technologies are a factor in the growth of innovations that contribute to the creation and application of digital technologies, a digital platform, in today's Russian economy.

Keywords: Digitalization, Production Efficiency, Innovativeness, Competitive Advantages, Innovations.

Introduction

Improving production efficiency is a key issue in the economy, and it receives particular and significant attention. The modern 4th industrial revolution in production efficiency is associated with the emergence of new technical solutions, production technologies, modernisation of organisational and management structures, i.e. improvement of the management system. [5] With the digitalisation of the economy, the development of digital technologies is necessary in order to increase the level of production efficiency and maintain competitiveness in modern conditions. One of the main sources is the possibility and ability to develop, transform and apply knowledge and skills, as well as the continuous search for and use of new methods and areas of their implementation in modern conditions.

With the introduction of digitalisation into the economy, this process has become revolutionary - new digital production technologies have appeared: artificial intelligence, robotics, smart homes, networks and cities. At present, we are witnessing fundamental changes in the nature of production and management, which are called "Industry 4.0", "Society 5.0", based on fundamentally new platform systems.

The current state of the Russian economy already allows us to note positive developments in digitalization. According to J'son & Partners Consulting data, Russia ranks first in Europe in terms of the number of Internet users and fourth in the world in terms of the number of users of fixed broadband Internet (FBI). However, there is still a serious gap from world leaders.

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Scientists and researchers such as V.V. are involved in digital production issues. Alexandrov, A.V. Babkin, A.I. Borovkov, Yu.M. Martinov, V.M. Maruseva, Y.A. Ryabov, V.A. Sarychev, Y.A. Sidorenko, Frolov, K. Schwab, A.V. Schmid, A. Venkatesh, etc.

Digital technologies are currently becoming an important factor in economic growth. Digital technologies connect all sectors of the market economy, contributing to its stabilization and balanced development. [2] The efficiency of their operation is manifested in the acceleration of the reproduction process, which inevitably leads to lower costs, maximization of profits, growth in GDP and national wealth. They also contribute to increasing the competitiveness of economic entities, increasing the population's income and solvent demand for goods and services, expanding international economic ties and attracting foreign capital, and increasing the efficiency of production as a whole. In this regard, it is particularly important to actively develop and continuously improve the Russian digital technology market. At present, the digital technology market is beginning to occupy a priority position in the system of market relations. In general, this will contribute to the formation of a qualitatively new economy - the digital economy.

Role of digital technologies in sustainable development

Digital technology is an important factor that determines the level of competitiveness of modern business leaders, as well as of entire countries. They facilitate the integration of business, science, development institutions and authorities and act as a generator of growth in the innovation economy. [3] Countries that are at the forefront of technology development have a high level of competitiveness and sustainable development. The introduction of new digital technologies creates a powerful foundation for increasing economic efficiency. Digital platforms can help solve pressing social and global problems. They are an important lever for economic development, encourage active business participation, improve the effectiveness of management decisions and the role of civil society in the formation of the country's prosperity. The digital economy model helps to increase the speed of exchange, especially the exchange of innovations. [8] Innovation by its nature has a pronounced multiplier effect, which is manifested in its close relationship with the economic and social component. Innovations contribute to the development of the market for new technologies and new products (goods and services). The formation and effective development of the innovation market is one of the important mechanisms of innovative sustainable economic development.

At present, Russia has not yet overcome the consequences of decisions made 30 years ago in the transition from a planned economy to a market system, which led to the destruction of the existing effective research and development system. As a result of these reforms, the innovative potential of the Russian economy has been reduced. As a result, market innovations in Russia are in poor condition and are only now beginning to develop.

In Russia, internal research and development (R&D) expenditure in 2018 was RUB 1,019.2 billion, which is 2.6% higher than in 2017 (in constant prices). The share of expenditures in gross domestic product (GDP) in 2017 increased from 1.1 to 1.11%. On the whole, the dynamics of internal research and development costs in the period 2013-2018 looks positive [4]. In 2018, the costs of implementing technological innovations in industrial production amounted to 848 billion roubles, and over the period 2013-2018 the volume of investments decreased by 10% (in constant prices), to a greater extent the reduction is carried out at the expense of medium-sized technological production organizations [5]. The dynamics of the number of technologies created annually from 2013 to 2018 had a positive trend - the growth rate was 2.9%, but in 2018 the value of the indicator decreased to 11.6%, or by 2.0%. Based on the results of monitoring the development of the information society in Russia in terms of private indicators, it can be noted that the main growth is in 2015 and covers the industrial sector.

Problems and risks of digital technology development in Russia

In today's world, the development of the digital economy is relevant for all countries, as digital technologies have become an integral part of all areas of society. The introduction and use of digital technologies in economic activity has led to structural changes in many areas of business, politics and society, and the emergence of more modern forms of organisation in the public and private sectors of the economy [6].

Russia's digital economy has been developing in recent years, but there are a number of indicators that show that the Russian Federation lags far behind the leading countries. For example, the slow development and introduction of new technologies, low levels of digitalisation, low rates of productivity growth and a small share of the digital economy in the country's GDP. Russia's competitiveness in the development of its digital economy is reflected in the World Digital Competitiveness- ness Ranking. 63 countries were included in the rating. The USA, Singapore, Sweden, Denmark and Switzerland remained in the leading positions for 2019. Russia was placed on line 38 of the rating, while China rose significantly in 8 positions. To determine the competitiveness of the digital economy, such

indicators as knowledge, technology and readiness for the future are considered. Russia's position in the rating is improving every year, but is still insufficient.

With the introduction of digital technologies, it is first necessary to improve the level of economic security; therefore, at this stage it is important for Russia to raise its level of progressiveness relative to developed countries. Many domestic technologies do not conform to the world standard, which is why Russia imports them from abroad, which creates a technological dependence, which will have a negative impact on the stability of the economy in the future.

Russia has a good starting point for the development of the digital economy. Russia's strengths for the development of a digital economy include the availability of information and communication technologies (ICTs), the population's ability to use ICTs, a high level of adult education and literacy, the development of ICT infrastructure, and more [8]. It should be noted that the programme "Digital Economy of the Russian Federation" approved by the Government is still being implemented. [6]. However, this programme is not clear and has not been sufficiently developed. As a result, this programme does not have a holistic concept of its implementation. There is no description of the concept of digital economy, how it should relate to the state economy, the factors that should be taken into account in the implementation of the programme are not specified, there is no clear structure of the programme, and there is no correlation with other national programmes. If these problems are not eliminated in the regulatory framework, it will be rather difficult to accelerate the scientific and technical development of our country. In addition to the problems in the programme, there are other risks and threats that poor implementation of the digital economy entails. Another factor hindering the development of the digital economy in Russia is the lack of specialists in information technology. "Every year, Russian universities produce about 25,000 IT specialists, but only 15% of them are ready for immediate employment", says the report of the National Research University Higher School of Economics "What is the digital economy? Trends, competencies, measurements" [4].

Methodology

The following common scientific methods were used in the research process: deductive and inductive analysis tools, which made it possible to combine the conclusions of individual authors and formulate their vision of the problem and the method of analysis. Modern literature as well as conference proceedings and statistical data were studied. On the basis of the collected and analysed data, an opinion on the problem and possible ways of solving it was formed.

Results

The main directions and priorities for increasing the country's competitiveness are to increase production efficiency through the development of the digital economy. Based on the Digital Economy programme in Russia, it is planned to increase productivity by 30% by 2024 [1] It is necessary to develop innovative companies in such areas as robotics, artificial intelligence, the Internet and the processing of large data. The task is not only to develop high-tech business in key areas of the 4th industrial revolution and its successful entry into high-tech global markets.

Production efficiency can be improved at the enterprise by optimising processes. Digital technologies can improve the efficiency of managing the enterprise's value chain, optimising resource use through data analysis and time management. [7] Digital solutions (advanced data analysis) allow optimisation of resources per unit of production, which in turn can increase productivity. Russian companies seeking to become a digital ecosystem must react as quickly as possible to changes in consumer behaviour and accept new challenges. The digitalisation of the economy generates products, processes and organisational forms that are distributed on a massive scale and which fundamentally change all areas of production, consumption and behaviour in modern society. At the same time, it is appropriate to recall the lessons of the past, when the introduction of computers required a radical overhaul of management processes, the system of education and training of professional staff. In the era of digitalisation of the economy, serious changes must be implemented. By 2025, 5G mobile communication networks should be deployed, artificial intelligence, quantum computing, distributed registers, advanced robotics, a powerful computing and information and telecommunications infrastructure should be in place, and 97% of Russian households will have broadband Internet access. In Russia, the main obstacle hindering its development is the lack of material conditions for the digital development of industrial production.

In order to solve the problems identified, it is necessary to define priorities for the technological development of the digital economy, identify and develop individual areas of the digital economy. It is necessary to involve regional authorities in the implementation of the programme.

It is necessary to stimulate business development related to the digital economy. In order to provide support, the state can provide guarantees for bank loans, establish investment trust funds and provide support through the public procurement mechanism. It is necessary to provide privileges to companies that develop digital technologies and to provide such companies with orders.

In addition, there is a need to increase the number of IT specialists, which will improve the level of specialists' training and eliminate a serious shortage of staff.

Cyber security systems are also important. There is a need to improve legislation on cybercrime [5].

One more task is to strengthen the introduction of STR in the economy. Continuous acquisition of new knowledge, introduction of innovations in production, stimulation of all this by the state will allow to ensure the development of the digital economy on the technical side and will provide a basis for the full development of the digital economy. The development and introduction of scientific and technical developments in the digital economy is one of the most important conditions. Russia has launched a large-scale system programme for the development of Russian companies, scientific, research and engineering centres. The system of education and vocational training must be adapted to digital economy professions.

Thus, in order to make the market economy in Russia effective, it is necessary to ensure rapid growth of digitalization of all its spheres. To achieve this, it is necessary to eliminate the above-mentioned problems in the development of the digital economy. Digital technologies are creating a new digital space. Only in this way will Russia be able to move away from traditional development models and achieve effective modeling in digital technologies.

The development of digitalisation has an impact on production efficiency. Thanks to the process of "digitalization" many companies in the country managed to take the leading positions in the industry: the first place in terms of efficiency in the industry "Energy" in 2016 - 2018 was taken by PJSC Enel Russia, an increase of 9%; JSC "Concern Rosenergoatom" (2nd place, "Energy") - growth of 33%; "Oil Company Rosneft" (11th place, "Oil and Gas Industry") - growth of 18%. [6].

To sum up, the digital economy is the foundation of the fourth industrial revolution. Innovative technologies are the basis for increasing production efficiency. The implementation of the digital economy should contribute to the competitiveness of its economy by making greater use of digital technologies.

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Trends in Transport Documentation in International Law

Konrad Garnowski

University of Szczecin, Szczecin, Poland, konrad.garnowski@usz.edu.pl
ORCID 0000-0002-7976-1333

Abstract

The paper deals with the evolution of regulations of international conventions governing transport by rail (CIM Convention), by road (CMR Convention) and by air (Montreal Convention) regarding the issue of transport documentation. The author points out that the regulations concerning the consignment note, as a main document involved in the transportation process, have undergone significant changes over time. However, some of the regulations are better adapted to current socio-economic conditions than the others. The author states that from the perspective of the instructional and informative function of the consignment note the best solution is provided for in the Montreal Convention. From the evidentiary perspective, all of the conventions set forth a similar rule, according to which the consignment note is currently only a proof of contract. Nowadays this is the only rational solution, which deserves credit. From the perspective of the form of the consignment note the best regulations are included in the additional protocol to the CMR Convention. The legitimising function of the consignment note, connected with the right of disposal, is also regulated in a similar way in all of the acts, but in this case the regulations in force raise some doubts. Due to the technical and technological progress the legitimising function is not as important as it used to be and currently it is mainly a reminiscence of the past legal concepts.

Keywords: Contract of Carriage, Consignment Note, CMR Convention, CIM Convention, Montreal Convention.

Introduction

The contract of carriage is documented in a different way than most types of contract. It is a consequence of the specific features of the contract of carriage. First, this contract is often concluded between parties who are not in any close relationship and are not bound by mutual trust. Second, the sender, as a person entrusting the carrier with goods, is deprived of control over the goods for a certain period of time. Due to the risks arising as a result of these two factors the regulations regarding the contract of carriage were created on the assumption that it is necessary to prepare detailed documentation confirming the conclusion of the contract which would also stipulate the condition of the goods and the events occurring during the execution of the contract.

There is no doubt that this approach was fully justified in the past, when the transportation process was relatively long and communication between participants of the carriage was limited. However, due to the technical and technological progress these issues have acquired a different perspective because nowadays the transportation process is faster and the parties are able to communicate directly in real time.

This raises a question whether the regulations in force are in line with the current socio-economic and technical environment or whether they are just legacy of the past. The aim of this paper is to analyse the evolution of the legal norms regarding documentation of the contract of international carriage by rail, by road and by air and to determine if the adopted regulations are still adequate to the requirements of modern day conditions.

Consignment note – the main document in the contract of carriage

Regulations concerning particular branches of transport provide for various carriage documents. Among others, they include the charter party, the booking note or the bill of lading, which are typical for the maritime transport (see more: Aikens, Lord, Bools, (2006), p. 106, Stec, 2011, p. 1093, Ogiegło, 2013, p. 962). Nevertheless, there is no doubt that one of the most important documents connected with the contract of carriage is the consignment note. This document performs an essential role and is present at each stage of transportation, including the conclusion and the performance of the contract of carriage. The regulations regarding the consignment note can be found in legal acts governing most of the branches of transport. On account of this it is possible to compare the regulations present in particular acts and their evolution.

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Historically, the practice of drawing up a consignment note was an answer to the development of industrial production. Due to the growing demand for services of entrepreneurs who professionally transported goods over a wide geographical area and the need to pass information between the sender and the consignee it became necessary to create relevant documents (Górski, 1959, p. 31). The origin of the consignment note comes from the "regular" note addressed by the sender to the consignee (Górski, Wesołowski, 2006, p. 23; Górski, Mendyk, 2005, p. 42). This document was attached to the consignment in order to provide the necessary information about the goods. This aspect shows the oldest function of the consignment note – the informative function. Moreover, it also performed an instructional function, because the document also contained information on the required conditions of transportation, which was addressed to the carrier.

Apart from the functions described above, two other functions of the consignment note came into light. The participants of carriage began to include information on the condition of the goods. It also served as a document confirming the carrier's acceptance of the goods for transportation. It created a presumption that the content of the consignment note corresponded to the actual state of affairs. This led to the formation of the evidentiary function of the consignment note. As the consignment note evolved, another function became visible. It was the legitimising function, which involved the authority to exercise the right of disposal of goods on the basis of a copy of the consignment note. This right entitled the particular person holding the consignment note to give the carrier binding instructions regarding further transportation.

The development of the four functions described above has eventually resulted in a specific shape of the consignment note and the contract of carriage in general. The contract of carriage has received a formal character, which meant that the consignment note was an obligatory document for the conclusion of the contract. This document was supposed to incorporate the content of the entire legal relationship and provisions not included in it did not have legal effect (Górski, 1983, p. 140; Stec, 2017, p. 1654). At the same time the handing over of goods was another requirement for the contact to be effectively concluded (Górski, 1983, p. 131; Sośniak, 1974, p. 51; Stec, 2017, p. 1653). This solution can be seen in the first international convention regarding rail transport. Provision of Art. 8 (1) of the International Convention Concerning the Carriage of Goods by Rail signed in Berne on 14 October 1890 (CIM 1890) stipulated that the contract of carriage is concluded once the carrier accepts the goods with the consignment note. This regulation raised some practical problems, most important of which was the fact that it was difficult to classify the actions taken before the conclusion of the contract (for example packaging or loading the goods). Despite this, the formal character of the contract of carriage was present for a long time, even in the initial text of the new convention of 1980 (Uniform Rules Concerning the Contract of International Carriage of Goods by Rail (CIM) – Appendix B to the Convention concerning International Carriage by Rail (COTIF) of 9 May 1980 – CIM 1980). This situation lasted until 1999 when the additional protocol to the convention was signed (the Protocol of Modification signed in Vilnius on 3 June 1999). At this point the contract of carriage by rail lost its formal character.

The same issue was regulated differently in other conventions. The first act governing air transport (Convention for the Unification of Certain Rules Relating to International Carriage by Air signed in Warsaw on 12 October 1929) stipulated that the consignment note had to be issued by the sender on the request of the carrier (Art. 5 (1)), but the absence, irregularity or loss of the consignment did not affect the existence or the validity of the contract of carriage (Art. 5 (2)). The same solution was adopted in the Montreal Convention (Convention for the Unification of Certain Rules for International Carriage by Air signed in Montreal on 28 May 1999), which replaced the Warsaw Convention. The authors of the CMR Convention (Convention on the Contract for the International Carriage of Goods by Road signed in Geneva on 19 may 1956) clearly agreed with this approach and Art. 4 CMR provided for a similar provision. As can be seen, in two of the three described branches of transport the contract of carriage was free from any formal requirements from the beginning. The only exception was transport by rail, in relation to which it took over one hundred years to eliminate the formality of the contract of carriage.

Undoubtedly, depriving the contract of carriage by rail of a formal character was an important step towards liberalization of the contract. There should be also no doubt that this change was justified, since currently there is no reason to impose any formal requirements regarding the conclusion of a contract. Moreover, the consensual character of the contract was the solution to the described problem of the actions taken before issuing the consignment note, because within this approach the contract is concluded once the parties reach an agreement and the activities that follow are considered as a part of performance of the contract. Nevertheless, this was only a change regarding the formation of the contract of carriage by rail. There is still a question whether other regulations were also adapted to the current conditions. To clarify this issue, it is necessary to analyse four main functions of the consignment note in the light of the evolution of the regulations regarding the documenting of the process of carriage.

Instructional and informative aspect of the consignment note

The informative and instructional function of the consignment note are closely connected with the issue of the content of the document. The CMR and CIM conventions are similar in this aspect and provide for a long list of mandatory particulars of the consignment note. According to Art. 6 (1) CMR, the consignment note shall contain eleven particulars, which include among others: the date of the consignment note and the place at which it is made out, the name and address of the sender, the carrier and the consignee and charges relating to the carriage. The CIM convention provides for sixteen particulars (Art. 7 § 1 CIM). However, the current wording of CIM is a result of the evolution of the rail convention. CIM 1890 provided for eleven particulars. This number was reduced to eight in CIM 1980 and later it was increased to the current number of sixteen. Admittedly, rail transport is a specific branch of transport, in which some additional information might be necessary (for example the number of the wagon). Moreover, some of the particulars mentioned as mandatory are in fact conditional particulars (for instance the costs relating to the carriage which must be paid by the consignee (Art. 7 §1 o) CIM) or the number of the railway vehicle, if it is handed over for carriage as goods (Art. 7 § 1 k) CIM)). Nevertheless, even if these conditional particulars are omitted, the mandatory content of the consignment note in transport by rail is still extensive. The same applies to the CMR Convention, under which only one particular has a conditional character (Art. 6 (1)(f) CMR) and apart from that there are ten mandatory particulars.

A solution far different from the others is provided for in the Montreal Convention. The mandatory particulars include only the data necessary to determine the application of the convention (Art. 1) and the limits of the carrier's liability which depend on the weight of the goods (Art. 22 (3)). As a result, Art. 5 of the Montreal Convention stipulates that the consignment note should contain only three particulars. The first one is the indication of the places of departure and destination. The second is the indication of at least one place of landing if the places of departure and destination are in the territory of one State Party and one or more agreed places of landing are in the territory of another State. The third particular is the indication of the weight of the consignment. However, the narrow scope of particulars of the consignment note in transport by air was not present from the beginning. According to Art. 8 of the Warsaw Convention in its original version, the scope of data contained in the consignment note was much wider and included seventeen particulars. This number was limited under the Hague Protocol (Protocol to Amend the Convention for the Unification of Certain Rules Relating to International Carriage by Air, signed in Warsaw on 12 October 1929, done in Hague on 28 September 1955) and as the Warsaw system evolved the particulars were changed, but the number remained the same.

The comparison of the solutions adopted in particular conventions shows two different approaches. The wide scope of information in CIM is probably a reminiscence of the time when the consignment note was a mandatory document for conclusion of the contract of carriage, which had to include all of the important data. It also explains the wide range of particulars in CMR, which, although it never provided for the formal character of the contract, is clearly influenced by the wording of the CIM convention. However, in both cases it should be stated that if currently the contract can be concluded in any form and the consignment note is not necessary, it is also not justified to require the parties to include such a wide range of data. Of course including some of the particulars leads to important consequences (for example providing the information on the costs which must be paid by the consignee creates the obligation for the consignee to pay these costs – Art. 13 (1) CMR, Art. 17 § 1 CIM), but the decision on placing such data should be left to the parties of the contract. These arguments speak in favour of the narrow scope of the mandatory particulars in the consignment note present in the Montreal Convention. Bearing in mind the fact that nowadays the consignment note is a document connected with the performance rather than conclusion of the contract of carriage, this solution seems to be more adequate for the current conditions.

Evidentiary aspect of the consignment note

The evidentiary function of the consignment note is one of the most important roles of this document. The consignment note can serve as proof of the conclusion of the contract and its conditions, proof of acceptance of the consignment and its conditions, as well as proof of the execution of the contract (Górski, 1982, p. 117; Górski, Mendyk, 2005, p. 38; Stec, 2005, p. 150; Dąbrowski, 2014, p. 190-193; Dąbrowski, 2015, pp. 134- 137). However, only the first two aspects are regulated in the conventions. Provision of Art. 8 § 3 CIM 1890 stipulated that the consignment note was proof of the contract of carriage. This provision was not present in the original version of CIM 1980, but according to the 1999 version the consignment note is considered as *prima facie* evidence of the conclusion and conditions of the contract of carriage and the taking over of the goods by the carrier (Art. 12 § 1 CIM). A similar solution was adopted under Art. 12 (1) CMR and Art. 11 (1) of the Montreal Convention. Some of the conventions have provisions which favour different parties of the contract of carriage, for example the CIM and Montreal Convention are favourable for the carrier (Art. 12 §§ 3-4 CIM, Art. 11 (2) of the Montreal Convention), while CMR is more favourable for the sender (Art. 9 (2) CMR). Nevertheless, the general concept of treating the consignment note as *prima facie* evidence is the same.

This solution is also connected with the character of the contract of carriage. Applying the concept of *prima facie* evidence means that the consignment note is not a document constituting the contract of carriage, as it used to be under the CIM convention in the past, but it is one of the tools used to document the legal relationship (see also: Hill, Messent, Glass, 2000, p. 65). This regulation is well-balanced, because on the one hand it places the consignment note in a special position, providing the basis for a preliminary hypothesis, but at the same time it does not finally prejudge the issues covered by the document and allows the parties to prove the facts contrary to the information included in the consignment note. This concept, although introduced many years ago, still remains valid and corresponds with the needs of today's socio-economic environment.

The evidentiary aspect of the consignment note should also be analysed from the perspective of the form of the document. Currently all of the acts provide for the possibility of replacing the written form with the electronic form. According to the additional protocol to the CMR Convention (Additional Protocol to the Convention on the Contract for the International Carriage of Goods by Road Concerning the Electronic Consignment Note signed in Geneva on 20 February 2008) it is possible to issue a consignment note with the use of electronic means of communication (Art. 2 (1)), but the document has to be confirmed with a reliable electronic signature (Art. 3 (1)). A more liberal approach is presented in the two other acts. The Montreal Convention allows substitution of the consignment note with any other means which preserves a record of the carriage to be performed (Art. 4 (2)). Provision of Art. 6 § 9 CIM includes the possibility to establish the consignment note in the form of electronic data registration which can be transformed into legible written symbols. This regulation requires the procedure to be equivalent from the functional point of view, in particular from the perspective of evidentiary value. Moreover, in the report of 8 September 2014 containing suggestions of the working group CIM UR (OTIF, 2014) it was proposed to prioritize the electronic form of the consignment note and allow the authentication "by means of an electronic signature or another appropriate method".

From the evidentiary perspective the possibility to replace a written consignment note with an electronic equivalent is fully justified. The obligation to apply the written form would create unnecessary difficulties for the parties, especially since the electronic signature has equal evidentiary value. However, provisions of the CIM and Montreal Convention go a step further and they do not limit the available forms to the written form or the form with an electronic signature. At the same time, in comparison to the additional protocol to CMR, regulations of these two acts are not fully precise, which creates a risk of uneven application of the conventions in various countries, especially considering the possible differences in national law. Taking into account the role of the consignment note as *prima facie* evidence, it is important to set clear boundaries as to what can be considered as this type of document. Consequently, the best regulation is the one adopted by the additional protocol to CMR. This regulation takes into account the opportunities of technical progress, without introducing too far-reaching solutions.

Legitimising aspect of the consignment note

The consignment note performs also a legitimising function, which is connected with the right of disposal. The right of disposal is the right to issue the carrier with binding statements concerning the carriage (Wesołowski, 2013, p. 234, 237). The statement may include, among others, indication of a new destination or another recipient. The right of disposal may be exercised by the sender (Art. 18 § 1 CIM, Art. 12 (1) CMR, Art. 12 (1) of the Montreal Convention), but also by the consignee (Art. 18 § 3 CIM, Art. 12 (2) CMR and Art. 15 (2) of the Montreal Convention). Execution of the right of disposal entails possession of the consignment note. In order to exercise this right, the entitled person should produce a copy of the consignment note to the carrier (Art. 19 § 1 CIM, Art. 12 (5) CMR, Art. 12 (3) of the Montreal Convention).

The above mentioned rule has not changed in any of the acts over time and it is still necessary to produce the consignment note to the carrier. However, these regulations are another reminiscence of the time when the contract of carriage had a formal character and the issuing of the consignment note was essential. Nevertheless, unlike the evidentiary function of the consignment note, the legitimising function of this document has decreased. In the current conditions, due to globalization of transport and shortened transportation time, producing a consignment note to the carrier in many situations is impossible. As a result, this function of the consignment note has minor practical importance. The electronic form of the consignment note may give a chance to restore the meaning of this function, but so far it is mainly used for evidentiary purposes. This may be a sign that the legitimising function is not as important as it used to be in the past.

Conclusion

Despite many changes the consignment note has undergone, it is still one of the most important documents in the process of transportation. Its functions have evolved and nowadays some of them are less important, but there is no doubt that the document itself is necessary. Currently greater emphasis is placed on the evidentiary function, but also on the instructional and informative aspect of the document. The legitimising function, although still present in the

regulations, plays a minor role, which relates not only to the change of the character of the contract of carriage, but also to the development of transportation. This does not mean that the right of disposal is redundant, but it may suggest the need to re-evaluate the connection between the exercise of the right of disposal and the consignment note.

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Intelligent Management of Data Storage in Big Data: Relational VS NOSQL, HDFS VS REHDFS

Manar SAIS
Laboratory of Computer Science Research, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
E-mail: manar.sais1996@gmail.com

Najat RAFALIA
Laboratory of Computer Science Research, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
E-mail: arafalia@yahoo.com

Jaafar ABOUCHABAKA
Laboratory of Computer Science Research, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
E-mail: abouchabaka3@yahoo.fr

Abstract

Humanity produces gigantic amounts of data every day. By 2020, the amount of information we want to store to keep them will be around 44 trillion gigabytes. So far, however, our traditional databases are limited in the storage and processing of this large and complex data and we do not have a reliable physical storage medium that can withstand the weather. The most obvious solution is of course to multiply storage units. This general principle is not valid for large data and its realization does not flow from source. So, With the advent of Big Data, a new set of data storage technologies has emerged, but their success is limited and it poses a wide range of problems in the coming years. In the interest of saving time and efficiency, many researchers believe that they have found the solution to this problem, either develop and add an intelligent touch to the available technology (Hadoop and REHDFS), or have discovered solutions. effective in the field of chemistry, DNA for example. The objectives of this article are to present a comparative study between two generations of data storage, a classic relational generation and other more advanced generation that we call NoSQL. Thus, a representation of the two future storage solutions with its advantages and value-added analyses by both approaches.

Keywords: Storage, Big Data, REHDFS, DNA

Introduction

Global digital content is growing rapidly and is expected to reach 35 zettabytes over the next decade. A huge amount of data is generated by social networking websites / applications such as Facebook, Twitter and WhatsApp, as well as the growing number of sensors used.

The massive amount of data collected continuously from these sources contains emerging trends in the market / environment. Most organizations can make informed decisions if they can use information on emerging trends. Organizations that traditionally used data mining tools to analyse historical structured data are now investing heavily in development tools to analyses recent, unstructured, rapidly growing data to understand popular market trends and predict customer behaviour. The knowledge gained through the use of these tools helps to improve their decision-making process, refine their current processes and adapt their policies to better compete in the marketplace. These storage and analysis needs represent a challenge for traditional data storage tools and a big challenge for relational databases, so the evolution of Big Data storage and analysis tools is highly desirable.

The first part of this article presents an experiment that aims to compare different databases belonging to different generations (relational and NoSQL). In order to become familiar with these new technologies and extract values added by NoSQL databases.

The second part is devoted to the analysis of two approaches that have the objective of improving the process of storage and management of Big Data. The first solution is an Enhanced HDFS (REHDFS) which explores different placement and block read strategies, proposes a scalable architecture and load-based block access strategies to give

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better results than other strategies. extraction of blocks. More features of reading and random writing based on pessimistic and optimistic models. The second solution is the DNA strands, which demonstrate an incredible storage power of thousands of gigabytes in a perfectly reliable manner, and which could be the solution to store a maximum amount of data on a minimum of space.

Related work

The volume of data has increased considerably from various sources (transactions, social networks, geolocation) and the amount of data produced by humanity is increasing rapidly every year and will surely grow very rapidly in the years to come.

In 1987, a group of researchers from the University of California at Berkeley developed RAID technology. they investigated the possibility of having two or more hard drives recognized as a single entity by the system. The result was a storage system with much better performance than single hard drive systems, but with very low reliability and not suitable for big data. (Sharma & Jha, 2020) proposed a secure system for storing data in the cloud virtual space, they determined the architecture of cloud storage platforms, the associated risk when migrating data to the cloud storage platform and different models of security and security analysis of current cloud platforms. (Erraissi & Belangour, 2019) presented Hadoop, the new Big Data storage and processing technology with its different components, as well as a meta-model for the storage layer which aims to allow Big Data distribution providers to offer standard and unified solutions for a Big Data System. But unfortunately, the main problem is that our production of information exceeds our storage and processing capacity and despite the advent of all these technologies, their success and durability is limited and still pose problems in its development path.

Theory

This part is dedicated to introducing the relational model and identifying the most important challenges it faced that led to the emergence of the big data and NoSQL.

The Relational Model

Between 1965 and 1975, with the development of computing in large accounts, the need to organize data according to a model that would allow a clearer separation between the logical representation of data and their physical organization was more and more feel. The relational data model was defined in 1970 by the IBM computer scientist Edgar F. Codd, and published in his article A Relational Model of Data for Large Shared Data Banks. Since the 1990s, the relational data model has been used in the vast majority of databases.

Definition

The relational model was defined in 1970 by Codd. This proposal succeeded hierarchical models and networks, with the aim of defining a model that is easy to understand, based on solid mathematical bases (logic and set theory), and which can lead to an improvement in the performance of the tools. The basic idea is simple: put the data "flat" in arrays, so that every value appearing in the "boxes" of the array is atomic. This simplification is the main explanation for the performance of the relational model, because it avoids recursive processing (traversing complex graphs and trees) (Badri, 2009).

The structure of a relational database is based on set theory. Recall that a set is an unordered collection of distinct elements, to be distinguished from the sequence (when the elements are ordered) and from the multiset (when we accept duplicates).

The relational model makes it possible to represent the data that we are going to manage using a very small number of very simple concepts:

- Relationships or tables: rows and columns
- Value domains: each cell of a table takes a unique value in a predefined domain.
- The keys: there are boxes whose values must be unique and not zero.
- Foreign keys: there are boxes that must take an existing value in the boxes of another table (Crozat, 2018).

ACID Properties

Stability and robustness of databases are evaluated according to their respect for ACID properties:

1. Atomicity: Within databases, the atomicity of transactions means that all changes to data are done totally, or not at all. that is, if a transaction is not completed, the database returns to its initial state.

2. Consistency: Consistency means that transactions must meet the data integrity constraints of the database, so any transaction that begins execution in a database in a consistent state must leave the database in a consistent state.

3. Isolation: Isolation means that a transaction is protected from the effects of other transactions running concurrently, i.e. successful transaction writes and reads will not be affected by writes and reads from other transactions, only they succeed or not (Bastie, 2018).

Limitations of relational DBMS

The relational model is based on a solid mathematical model based on the logic of first-order predicates. It is based on simple concepts that are both strength and weakness.

Distributed storage is a real obligation that weighs on relational systems today, to which is added the complexity of data structures manipulated by systems.

- Relational databases and impedance defect.
- Data type.
- Limitations of SQL Language.
- Non-optimal query problem after using joins (Bloor, 2003).

The emergence of Big Data and NoSQL

Software evolutions naturally follow hardware evolutions. The first DBMS were built around mainframes and depended on the storage capacities of the time. The success of the relational model is due not only to the qualities of the model itself, but also to the storage improvements that reduced data redundancy allows. With the increase in bandwidth on the Internet and the fall in the cost of moderately powerful machines, the generalization of network interconnections, new possibilities have emerged, in the field of distributed computing and virtualization, this is the Big Data and NOSQL.

Big Data

Big Data refers to the explosion in the volume of computer data traveling around the world. This data becomes so large that it can no longer be stored in full-sized databases, leading to the use of increasingly powerful computer tools to store and manage it. Big Data can be defined by its four major characteristics, all starting with the letter V: velocity, variety and volume.

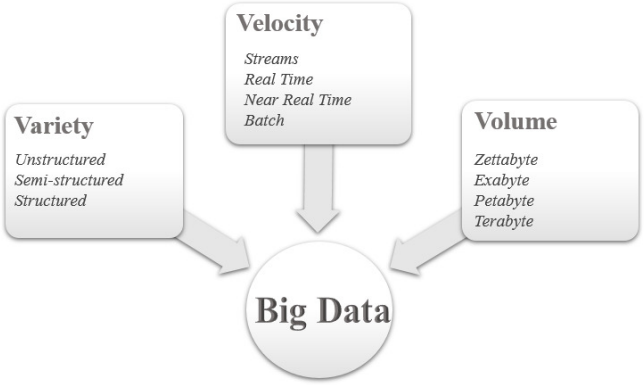

Fig. 1: The three Vs of big data

Each component represented in Figure 1 is shortly expressed below.

1. Variety: Variety refers to the different types of data that we can use, it makes Big Data really big.

2. Volume: Volume or size of data refers to the huge amounts of data generated every second is now more than terabytes and petabytes.

3. Velocity: Velocity refers to the speed at which new data is generated and moves and required not only for big data, but for all processes as well (Sagiroglu & Sinanc, 2013).

NoSQL

Relational databases do not lend themselves well to the demands of massively parallel applications that use large amounts of data. NoSQL (Not Only SQL) databases mark a fairly abrupt break with the way data schemas are conceived in recent decades.

There is a plethora of NoSQL solutions that respond more or less well to special needs. The purpose of this part is to quote the existing solutions. However, these approaches can be broadly grouped into four categories:

1. Key-Value Store: a key-value database (also called a key-value store and a key-value store database) is a type of NoSQL database that uses a simple key / value method to store data. Among the open-source key-value DBMSs are: Memcached, Redis, Riak and Voldemort.

2. Document Store: a document-oriented database contains documents, which are records describing document data, as well as actual data. Document database does not care about simultaneous read and write performance, but rather about ensuring large data storage and good query performance. Typical document databases are MongoDB, CouchDB (Jing, et al., 2011).

3. Column Store: a column-based DBMS is a database management system (DBMS) that stores data tables by column rather than by row. Column oriented databases are HBase, Yale University HadoopDB, Facebook's Cassandra.

4. Graph Store: Offer a model based on graphs with nodes, edges and their respective properties. This category excels at handling data with a high degree of interdependence and allows you to quickly traverse complex data by traversing relationships between nodes (Acheli & Khour, 2017). Neo4J is the most popular graph-based base right now.

The CAP theorem

The CAP was initially presented in the form of "consistency, availability, partition tolerance: choose two"(that is, you can have CA, CP, or AP, but not all three).Many authors now prefer the following formulation: if there is no network partition, a system can be both consistent and available; when a network partition occurs, a system must choose between consistency (CP) or availability (AP) (Kleppmann, 2015).

1. Consistency: Data has only one visible state regardless of the number of replicas.
2. Availability: as long as the system is running (distributed or not), the data must be available.
3. Partition Tolerance: Regardless of the number of servers, any query should provide a correct result.

Experience Environment

This study was conducted in a single-user environment characterized by the following hardware and software aspects:

Software

- Oracle VM VirtualBox
- Cloudera-quickstart-vm-5.13.0-0-virtualbox

Hardware

- Intel (R) Core (TM) i3 CPU -370M 240GHz, 8GB RAM

Comparative study of two generations of database (relational vs NoSQL)

The objective of this part is the presentation of the different storage architectures namely relational storage and NoSQL using several tests on NoSQL databases.

Simulation: relational (MySQL) vs NoSQL (HBase)

This experiment aims to compare the relational database (MySQL) and the NoSQL database (HBase) at the level of data storage and processing and also represents the strengths of HBase compared to the relational model.

Transfer data from a relational database (MySQL) to a NoSQL database (HBase)

The purpose of this test is to transform a database from one MySQL relational architecture to another with a different architecture and operation (HBase), in order to extract the strong points and properties added by the NoSQL databases.

The structure of the retail_db database with which we will work is shown in the following figure.

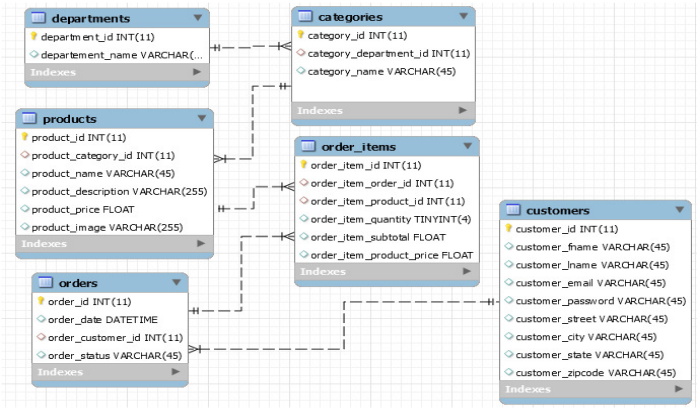

Fig. 2: Retail_db database

- ***Import the database into HDFS with sqoop***

In order to transform the database from MySQL to HDFS and HBase, we need to find a tool that allows easy transfer of structured data while preserving the structure. Apache Sqoop is the right solution.

```
$ hadoop fs -mkdir -p /staging/mysql/retail_db
```

```
$ sqoop import-all-tables --connect jdbc: mysql: // localhost: 3306 / retail_db --username root -
-password cloudera --warehouse-dir '/staging / mysql / retail_db' -m 1
```

The result:

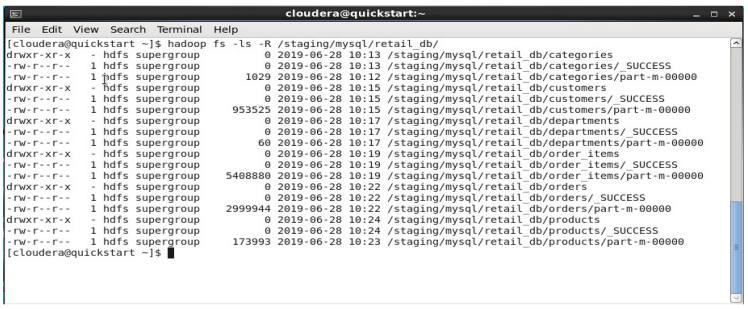

```
cloudera@quickstart:~
File  Edit  View  Search  Terminal  Help
[cloudera@quickstart ~]$ hadoop fs -ls -R /staging/mysql/retail_db/
drwxr-xr-x   - hdfs supergroup          0 2019-06-28 10:13 /staging/mysql/retail_db/categories
-rw-r--r--   1 hdfs supergroup          0 2019-06-28 10:13 /staging/mysql/retail_db/categories/_SUCCESS
-rw-r--r--   1 hdfs supergroup       1029 2019-06-28 10:12 /staging/mysql/retail_db/categories/part-m-00000
drwxr-xr-x   - hdfs supergroup          0 2019-06-28 10:15 /staging/mysql/retail_db/customers
-rw-r--r--   1 hdfs supergroup          0 2019-06-28 10:15 /staging/mysql/retail_db/customers/_SUCCESS
-rw-r--r--   1 hdfs supergroup     953525 2019-06-28 10:15 /staging/mysql/retail_db/customers/part-m-00000
drwxr-xr-x   - hdfs supergroup          0 2019-06-28 10:17 /staging/mysql/retail_db/departments
-rw-r--r--   1 hdfs supergroup          0 2019-06-28 10:17 /staging/mysql/retail_db/departments/_SUCCESS
-rw-r--r--   1 hdfs supergroup         60 2019-06-28 10:17 /staging/mysql/retail_db/departments/part-m-00000
drwxr-xr-x   - hdfs supergroup          0 2019-06-28 10:19 /staging/mysql/retail_db/order_items
-rw-r--r--   1 hdfs supergroup          0 2019-06-28 10:19 /staging/mysql/retail_db/order_items/_SUCCESS
-rw-r--r--   1 hdfs supergroup    5408880 2019-06-28 10:19 /staging/mysql/retail_db/order_items/part-m-00000
drwxr-xr-x   - hdfs supergroup          0 2019-06-28 10:22 /staging/mysql/retail_db/orders
-rw-r--r--   1 hdfs supergroup          0 2019-06-28 10:22 /staging/mysql/retail_db/orders/_SUCCESS
-rw-r--r--   1 hdfs supergroup    2999944 2019-06-28 10:22 /staging/mysql/retail_db/orders/part-m-00000
drwxr-xr-x   - hdfs supergroup          0 2019-06-28 10:24 /staging/mysql/retail_db/products
-rw-r--r--   1 hdfs supergroup          0 2019-06-28 10:24 /staging/mysql/retail_db/products/_SUCCESS
-rw-r--r--   1 hdfs supergroup     173993 2019-06-28 10:23 /staging/mysql/retail_db/products/part-m-00000
[cloudera@quickstart ~]$
```

Fig. 3: Importation of databases into HDF

- ***Import the database into HBase with sqoop***

The following steps describe how to import the data from the DBMS to the Hadoop HDFS database.

1. Creation of empty tables in HBase.

Sqoop does not use a default table name when importing into HBase. Before all, it is necessary to create tables in HBase of families of columns.

```
hbase(main) :001 :0> create 'departmentsdemo', 'departmentfm'
hbase(main) :001 :0> create 'categoriesdemo', 'categoryfm'
hbase(main) :001 :0> create 'customerdemo', 'customerfm'
hbase(main) :001 :0> create 'order_itemsdemo', 'order_itemfm'
hbase(main) :001 :0> create 'orders', 'orderfm'
hbase(main) :001 :0>list
```

Import the tables

```
& sqoop import   - -conncet jdbc: mysql://localhost/retail_db --table categories --hbase-table
categoriesdemo --column-family categoryfm --hbase-row-key Category_id -m 1
```

The result:

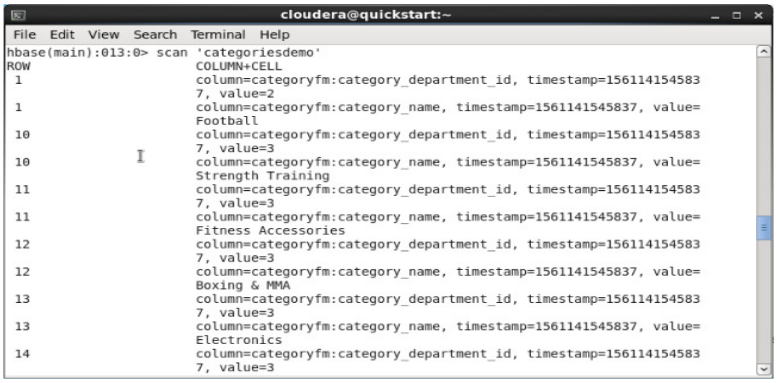

Fig 4: Importation of databases into HBase

The flexibility of the HBase model

HBase does not have a fixed predefined scheme which makes it very flexible. In addition, there is theoretically no limit to the number of column families that can be created and the number of columns in each family. Once again, everything depends on the needs of the client, you the creator of the HBase table and the cluster capacity.

Adding family columns

A new family column is added using the "alter" command

```
hbase(main) :001 :0>alter 'categoriesdemo', {NAME=>'categoryfm_4'}
```

The notion of timestamp in HBase

Compared with other databases, HBase does not differentiate between adding rows to the table (write operation) and updating them (edit rows operation). Each update operation is an addition of a new version of the same data line. The versions of the same row are distinguished using a timestamped value called Timestamp. This Timestamp is the date to the millisecond to which the update was made. By default, HBase stores the last 3 versions of a column value (while automatically removing old versions). The depth of "Versioning" can be controlled and configured (Chokogoue, 2019).

System Properties Comparison HBase vs MySQL

The following table presents a comparison of the different properties between HBase (NoSQL) and MySQL (relational model).

Table 1: Properties Comparison HBase vs MySQL

Name	***HBase***	***MySQL***
Description	Wide-column store based on Apache Hadoop and on concepts of BigTable	Widely used open source RDBMS
Primary database model	Wide column store	Relational DBMS
License	Open Source	Open Source
Implementation language	Java	C and C++
Data scheme	schema-free, schema definition possible	Yes
SQL	No	Yes
Partitioning methods	Sharding	horizontal partitioning, sharding with MySQL Cluster or MySQL Fabric
Replication methods	Master-master replication	Master-master replication
MapReduce	Yes	No
Consistency concepts	Immediate Consistency or Eventual Consistency	Immediate Consistency
Transaction concepts	Single row ACID (across millions of columns)	ACID
Concurrency	Yes	Yes
Durability	Yes	Yes

SQL databases are mainly called relational databases (RDBMS); whereas the NoSQL database is mainly called distributed or non-relational database. Among the key difference between relational (Mysql) and NoSQL (HBase):

- **Schema**: relational databases have a predefined schema while NoSQL databases have a dynamic schema for unstructured data.

- **For the type of data to be stored:** SQL databases are not suitable for hierarchical data storage. However, the NoSQL database is better suited for hierarchical data storage because it follows the key-value pair method to store data similar.

- **For complex queries:** SQL databases are perfectly suited to the environment requiring many queries, while NoSQL databases are not suitable for complex queries.

- **Scalability:** In most situations, SQL databases are vertically scalable. You can manage the increased load by increasing the processor, RAM, SSD, etc. on a single server. On the other hand, NoSQL databases are scalable horizontally. You can simply add a few additional servers easily to your NoSQL database infrastructure to handle heavy traffic.

- **For properties:** SQL databases focus on ACID properties (Atomicity, Coherence, Isolation and Durability), while the NoSQL database follows the Brewers CAP theorem (Coherence, Availability and Partition Tolerance) (Kleppmann, 2015).

Smart approaches for optimal storage management in Big Data

In this part we will present two Big Data storage solution. the first solution is an REHDFS system to improve the HDFS system and the second is DNA, a biological storage medium capable of archiving our data in the long term.

Approach 1: The REHDFS system

The Hadoop Distributed File System (HDFS) is a highly scalable and fault-tolerant distributed file system that can be deployed on low-cost hardware. The content stored in the HDFS system is partitioned into blocks, which are replicated to multiple data nodes. Different block placement strategies can be used to make it highly fault-tolerant and to improve throughput and access time. The HDFS system allows the user to specify the block size to be used to partition a given file, to issue only sequential read and append operations. It does not allow the user to perform random read and write operations. This section provides an enhanced HDFS (REHDFS) that explores different placement and block read strategies, a load-based block-access strategy, pessimistic and optimistic models for performing random read and write functions (Rao Chandakanna, 2018).

This part is dedicated to represent the HDFS system and its additional functionalities compared to the traditional HDFS system.

HDFS: architecture and functionality

Hadoop Distributed File System (HDFS) is a distributed file system that stores and retrieves files in record time. This is one of the basic components of the Hadoop Apache Framework, and more specifically its storage system. HDFS Hadoop is one of Apache's top-level projects.

Due to its massive capacity and reliability, HDFS is a storage system that is very suitable for Big Data. In combination with YARN, this system increases the data management capabilities of the HDFS Hadoop cluster and thus enables the efficient processing of Big Data. Among its main features, there is the possibility of storing terabytes or even petabytes of data.

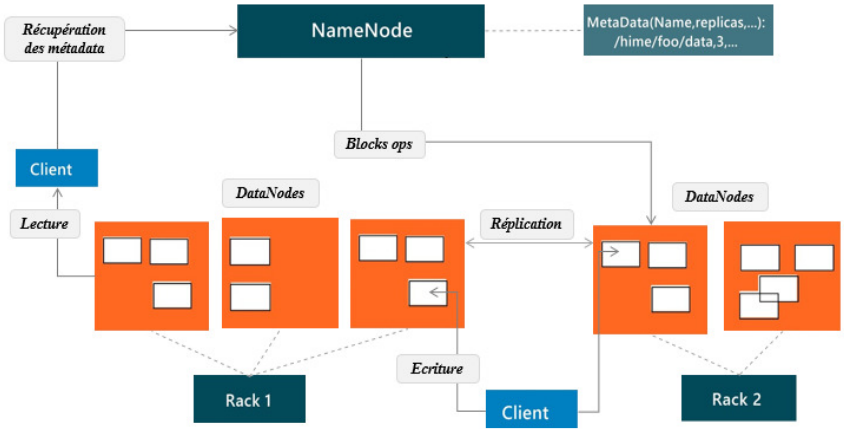

Fig. 5: Apache HDFS Architecture

HDFS is a distributed file system and follows the master-slave architecture. HDFS uses a cluster to store and manage data. The HDFS cluster includes a master server (Namenode) and the number of slave servers (Datanodes). A master server serves as a name node that manages the namespace of the file systems and accesses the files stored on the file system by the clients while the slave servers contain data nodes that actually store the data files (Bastien, 2017).

Limitation of HDFS storage system and new functionality with REHDFS storage system

HDFS allows the user to perform read and append operations only on files. To modify a single byte of a file, you must create a new file with the modification and replace the old file with the new file. Consider the following scenario. A project team has to manage a larger set of files related to their project. They can be changed by any member of the project team, but consistency is essential and must be highly available and fault tolerant. Project team members must modify these files frequently using different tools to work effectively with the files. Random access and random write features are essential in such scenarios. Applications that support such scenarios should ensure that the data is highly available and fault tolerant.

A group of people or a set of processes that need to work consistently on a set of files can keep the files in HDFS. When data consistency is the most important factor, the current model of copying the file locally from HDFS, making

changes and replacing the file in HDFS will not work. With the current template, one user's changes can be overwritten by changes made by the other user. (Rao Chandakanna, 2018)

Providing the random write operation is a difficult problem to solve in the HDFS context. This involves propagating changes to all replicas (hosted on different data nodes) consistently, coordinating different nodes, enforcing ACID properties, and providing a recovery mechanism for data nodes that were down during a transaction.
The proposed solution is an extended storage system (REHDFS), with equipment added to the HDFS architecture, which solves several problems and allows the user to experiment with various operations at the level of storage and data processing.

The new features provided by the REHDFS system:

- Block placement strategies.
- Choosing the block size.
- Block caching and retrieval strategies.
- Data Node selection strategies.
- Random read and random write.

REHDFS Architecture and Features

The REHDFS architecture is shown in the figure above. Its main components are a name node, a set of data nodes, a client module, a cache module, and a lock / validation manager.

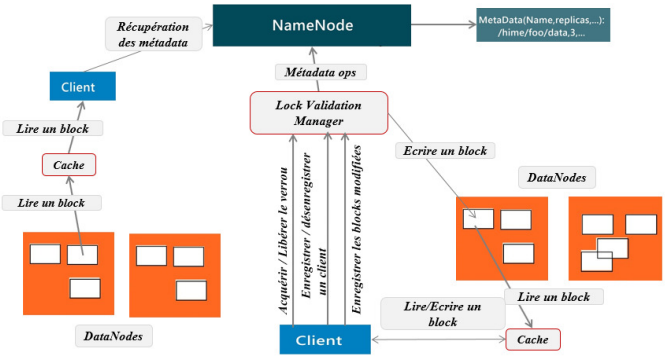

Fig. 6: Extended HDFS architecture based on RMI

In order to achieve additional functionality and support random write operations, a new component called Lock / Validation Manager is added to the HDFD architecture, which supports two models for the implementation of the operation of random writing, one pessimistic model and another optimistic.

Location and access transparency

Each file stored in REHDFS has a unique file path that begins with a well-known prefix (for example, dfs: //) to distinguish itself from file paths used in other file systems. The path to a REHDFS file hides the details of the storage location of the blocks in a given file and gives the transparency of the location. The client module contacts the name node to retrieve the metadata associated with a given file. The end user uses the API of the client module to work on a given file. The Client module provides an API similar to that of a local file system, which provides access transparency (Rao Chandakanna, 2018).

Placing blocks on datanodes

Block placement strategy for achieving maximum fault tolerance is described in Algorithm 1.

Input*: File F to be placed in HDFS, block size BSF, replication factor RF, number of Data Nodes in the primary rack MF, number of racks r, input constraint (RF> r).*

Begin
blockCt = ceiling (NF /BSF);

```
nextDataNode = 1;
For Each i from 1 to blockCt do
  Place one copy of blocki on each non-primary rack;
  Replica = 0;
   For Each replica of blocki form 0 to RF – r do
      Place blocki on the nextDataNode of primary rack;
      nextDataNode = (nextDataNode % MF) + 1;
      replica ++;
   End for
End for
Return
```

Algorithm 1: Block locations for maximum fault tolerance

When you want to place a file in HDFS is divided in one or more blocks, the number of blocks needed depends on the file size and the size of the block, and it is calculated from these last. A copy of each block is placed on each non-primary rack, the remaining replicas are placed on different data nodes in the primary rack to ensure maximum fault tolerance (Rao Chandakanna, 2018).

Retrieving from REHDFS

Different techniques for quickly downloading blocks from data nodes are described in this section.

1. On demand/Look ahead block retrieval

The strategy for recovering blocks from the datanode is described in Algorithm 2.

```
Input: File descriptor (Fdes), buffer to Keep the content (buffer), byte count to read (size)
Begin
currentPosition = getValue (Fdes, '' CurrentPosition '');
blockSz=getValue (Fdes, ''BlockSize'');
lookAheadBlkCt = getValue (Fdes, ''LockAheadBlockCt'');
endPosition = currentPosition + size – 1;
startingBlock = curPos/blockSz;
endingBlock = (endPosition /blockSz);
For Each i from startingBlock to endingBlock do
  If (blocki is not in Cache) Then
     Download blocki from a Data Node that hosts;
    Add the blocki to the Cache;
  End If
End For
Copy the content from download blocks to buffer;
If (lookAheadBlkCt > 0) Then
  Create a thread to download blocks to buffer;
  Add the download blocks to the Cache;
End If
Return
```

Algorithm 2: Location of blocks for maximum fault tolerance

In response to a client's read () request, one or more blocks retrieved and cached by the Client module. As described in Algorithm 2, the client module calculates the block numbers corresponding to the user's read () request. If a block retrieved from a data node is not present in the cache is placed directly to the cache. After specifying the number of look-ahead blocks, the client starts a thread to retrieve the blocks ahead of the current block asynchronously.

2. Data Node selection strategies

When multiple data nodes in the main rack host a block, the download duration of the block depends on the data node selected to retrieve the block. REHDFS supports three strategies, namely First, Random, and Load Based to select a data node in all data nodes in the main rack to download a block.

```
Input: Block id(blockId), Data Nodes hosted the block (dataNodeList), Policy (policy)
Begin
If (policy is First) Then
   dataNode = getNodeAt(dataNodeList,1);
Else if (policy is Random) Then
  m = numberOfNodesIn (dataNodeList);
  selectdIndex = random (1, m);
```

```
  dataNode = getNodeAt (dataNodeList,selectedIndex) ;
Else (policy is LoadBased)
   dataNode = minAvgResponseNode( dataNodeList)
End if
block = donwload (blockId, dataNode);
Record the block download time (dTime) ;
Add the block to the Cache;
          //Revise the average response time
If (policy is LoadBased) Then
   qSize = getQueueLenght(dataNodeName) ;
   avgRespTime = getAvgRespTime(dataNodeName) ;
   EstDownloadTime = (avgRespTime*qSize) + dTime ;
   avgRespTime = EstDownloadTime/(qSize+1) ;
   setAvgResponseTime (dataNodeName, avgRespTime) ;
End If
Return
```

Algorithm 3: Block download based on a load

Random access and random write

The first part of this section covers the details of implementing a customer's non-sequential access requests. The models for implementing random write are discussed in the last part of this section.

1. Random Access

The strategy of random access is described in the algorithm 4.

```
Input: File Descriptor (FId), bytes to move(offset), Relative to begin/end/current (whence)
Begin
      //Calculate the file pointer position w.r.t beginning
If (whence is Begin) then
     FilePosition = offset;
  Else If (whence is End) Then
  FilePosition = FileSize - offset;
Else (whence is current) then
  FilePosition = FilePosition + offset;
End If
If (filePosition is beyond the range) then
  Return error (Invalid seek Parameters);
End If
metadata = get Metadata (FId);
block Size = getBlockSize(metaData);
blockNo = FilePosition/blockSize;
blockId = getBlockId(blockNo,metaData) ;
If (blockId is not in the Cache) then
   dataNodes = getHostingNodes (blockId,metaData) ;
   block = policyBaseddownload (blockId, dataNodes, policy);
End If
setFilePosition(FId, filePosition);
Return
```

Algorithm 4: Random Access (fseek)

The client module offers transparency of access. It allows the user to access a file as if it were a local file, i.e. access any part of the file by issuing an fseek request (fileDescriptor, offSet, whence). HDFS does not support random access and random write (Rao Chandakanna, 2018).

2. Random Write

A file in HDFS is divided into one or more blocks, and each block is replicated to multiple data nodes. Replicas make it difficult to implement random write and are not supported by HDFS. REHDFS offers several models for implementing random writes. Random entries can be made using either an optimistic or a pessimistic approach.

- **File Level Lock with a Pessimistic Model (FLPM)**

As illustrated in Figure 7, a file in a pessimistic model can be in one of three states: closed state, open state, and locked state.

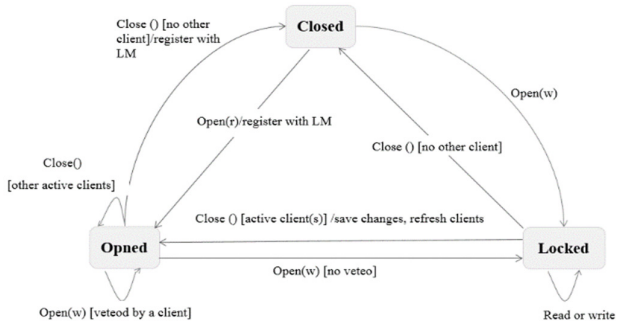

Figure 7: State diagram of a file in a pessimistic model.

Each file starts in a closed state. Opening the file in read (write) mode changes the state from closed to open (locked) and registers the client with the lock manager (LM). the diagram describes the states of a file which change according to the actions and requests of the clients (Rao Chandakanna, 2018).

- **Optimistic model with file level consistency (OMFC)**

As shown in Figure 9, a client of the optimistic model can be in one of four states: inactive, register (register with the validation manager), update (by modifying the read blocks), and record (trying to save the modified blocks). the following diagram describes the states of a file in the optimistic model.

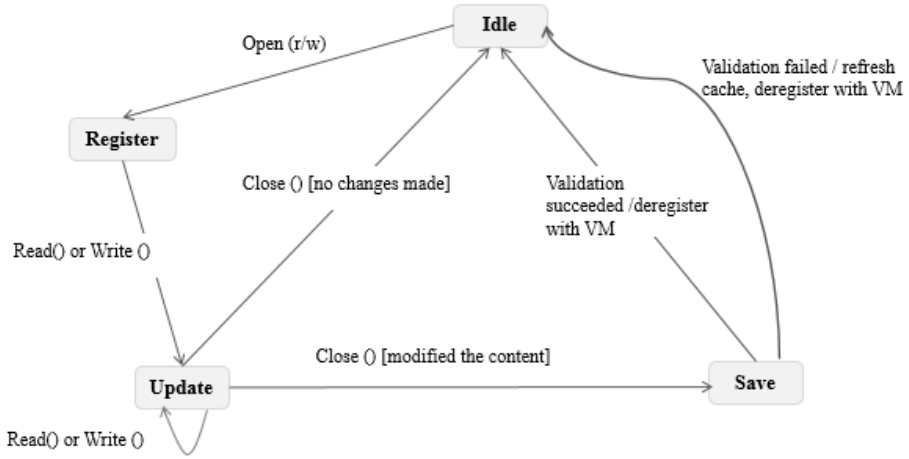

Figure 8: The state diagram of a customer in the optimistic model

- **The FLPM and OMFC comparison**

In the pessimistic model, to modify a file, the client must acquire a lock from the lock/validation manager. In the optimistic model, a client can modify the blocks of a cached file without acquiring a lock. The request to save changes may fail when other clients are running on the same file.

The table compares the two models (FLPM and OMFC) in terms of request overload when several clients are working on the same fil.

Table 2: comparison of FLPM and OMFC

Model	*Issue*	*Description*
FLPM	Deadlock	May occur when multiple clients attempt to operate on multiple files in a specific order.
OMFC	Starvation	May occur when a client's repeated attempts to validate () request fails
FLPM	conflict resolution	The lock associated with the file is issued to only one client. Rest of the clients are put on a waiting queue.
OMFC	conflict resolution	The client with lowest timestamp will succeed and the rest of the clients will rollback (invalidate the blocks in the cache and restart the transaction by calling the open () call.).

Approach 2: DNA genetic storage media

The storage volume of computer data is a challenge but the persistence of data over time is another. Today All of the storage technologies we have developed have limited life cycles and are sensitive. There is therefore a growing need for computer media capable of storing a large amount of data in a sustainable manner. The idea of biological storage of information by DNA comes into play to address these issues and this continuing demand and that sees as an ideal storage medium of choice for the next generation because of their durability and their high density of information.

Fig. 9: DNA-based data storage—the big data storage solution of the future (Church & Edward, 2014)

Presentation and system model of DNA data storage technology

DNA, or deoxyribonucleic acid, is the carrier of the genetic information of all living organisms on the planet. This is a very long, but nevertheless very simple, double helix molecule. Absolutely all the information necessary for the development and functioning of a living being is there.

Modern DNA synthesizers can concatenate the four DNA-based nucleotides to form arbitrary-chain molecules of molecules. Each nucleotide (nt) in such a chain called oligo is considered to represent in principle 2 bits of digital data. Thus, the digital data can be stored in oligos, and even the stored data can be retrieved by reading the data representing oligos with DNA sequencers (Takahashi, et al., 2019).

synthetic DNA is the new technology for data storage, it is extremely dense which can store data up to 1 exabyte/mm3, no electricity is required to operate and has half-life of 500 years in harsh environment.

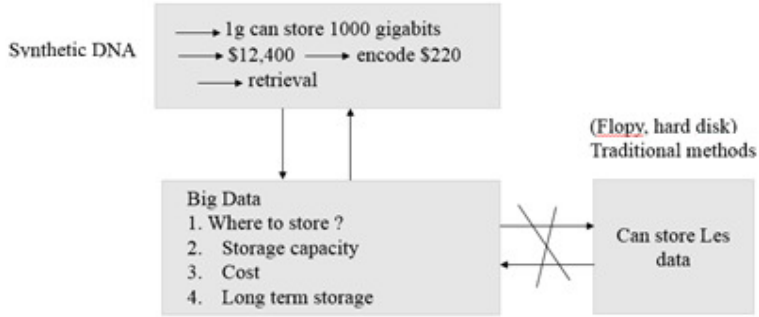

Fig. 10: Big Data in Synthetic DNA

The model in figure 10 shows the advantages of storing big data in synthetic DNA as compared to other traditional methods. For encoding and decoding Huffman coding is being used. We have also figured out that the cost for encoding data in synthetic DNA is 1.55$ approximately per 1000 Gigabits (125 Gigabytes) of data. Also, the cost for decoding data from synthetic DNA is 0.0275$ approximately per 1000 Gigabits (125 Gigabytes) of data. This model clearly depicts that how beneficial it is to store data in synthetic DNA (Sharma, et al., 2019).

Automated storage on DNA

Before a file can be written into the DNA, its data must first be translated from 1 to 0 into A, C, T, and G. The encoding software module is responsible for this translation and for the addition. the error correction in the sequence of the load. Once the sequence is generated, additional bases are added to ensure that its primary and secondary structure is compatible with the reading process and the DNA sequence is sent to the synthesis module to be instantiated into molecules of Physical DNA (Takahashi, et al., 2019).

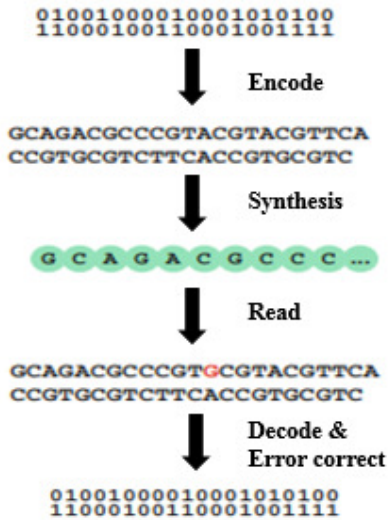

Fig. 11: The steps of coding the data on DNA

Storage process

The researchers succeeded in making a machine capable of automatically transforming numerical data (sequences of 0 and 1) into DNA sequences (nitrogenous bases A, C, T and G). The prototype is made with glass bottles where synthetic DNA strands are made, and using an Oxford Nanopore sequencer to decode and reconvert them into digital data (Valdek, 2019).

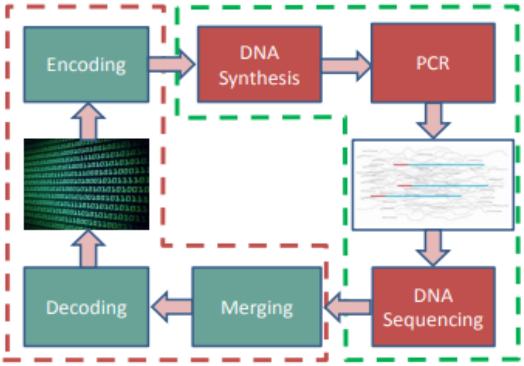

Fig. 12: Block diagram of a DNA storage system

The system consists of the following components:

- The source data in bits.
- Encoding mechanism including all error correction codes and nucleotide bit modulation.
- Synthesis of the DNA of several strands of DNA.
- PCR amplification of DNA pools
- Storage of DNA archives.
- DNA sequencing.
- Fusion and assembly of several strands of DNA.
- Demodulation and decoding of all codes for reliable recovery (Goela & Bolot, 2016).

Possible approach to the DNA computing for Big Data

The process of storing information in the DNA molecule goes through two stages:
A. Process
B. Encoding / Decoding algorithm (Hakami, et al., 2015).

- Encoding algorithm

1) Read data stream: A
2) Check size of the data [r,c,n] = size (A) where
r = rows, c = columns, n = number of matrix
3) Calculate DNA sequences size for image
4) Create a zero matrix of DNA sequences size
5) While DNA sequences size = max

A. Convert even smallest piece of data to binary form.
B. Insert binary DNA code of an individual data cell to DNA sequence.
C. Continue till all of max size of DNA sequence is reached

- Decoding algorithm:

1) Read DNA sequence
2) Calculate size: length, size of individual cells
Convert DNA to real data decode

A. Convert one cell to data
B. Insert the converted value to template data matrix
C. Stop when entire DNA is converted

Error Correction Code

During the process of storing data in DNA, several types of errors may occur, including insertion, deletion and substitution errors in oligonucleotides, missing DNA strands, synchronization errors on several oligonucleotides with the same address.

in order to overcome these problems and to design a feasible system, several levels of error protection are required. the system equips each oligonucleotide with a unique address code in order to identify it. Digital information is stored on multiple oligonucleotides, protected by modern two-dimensional matrix codes. While accuracy of recovery is paramount, these codes must be effective in reducing the overhead costs associated with DNA synthesis and sequencing (Blawat, et al., 2016).

The benefits of storing DNA data

As mentioned above, global data is growing sharply at an exponential rate. Traditional media cannot sufficiently meet the demands of large data storage. DNA can serve as a digital data storage medium, with its potential advantages such as high density, high replication efficiency, long-term durability and long-term stability.

Information stored in DNA can be recovered even after thousands of years, provided the DNA is stored in dry, dark and cold conditions. The storage process is done by encoding and decoding binary data to and from synthesized short DNA strands and the data is stored in a long virtual DNA molecule. Short strands will allow easy manipulation of the data (Sharma, et al., 2019).

Scientists have managed to recover DNA frozen for 60,000 years, showing that if stored under ideal conditions, it can outlast anything humans have invented. Thus, storing them in DNA media is simple, convenient and cost-free and can maintain data fidelity for a long time (Sun, et al., 2019).

Conclusion

The current production of data at exponential rates has created a demand for better storage devices, and finding new solutions for sustainably storing our data is becoming necessary. So, to store more data, faster, more sustainably, and with less energy. Researchers have turned to new approaches that have the goal of adapting and adding improvements to the technology and the means available, or discovering new, more effective and efficient ways.

In this document, I gave a brief overview of the different solutions that exist today, how they work and, above all, it's added values.

The first approach is a process of improving the HDFS storage system which presents a more powerful REHDFS. Thanks to the algorithms the system is able to perform additional tasks, for example: experimenting with various block placement strategies, access to the blocks proposed according to the load, different levels of lock granularity, random access to a given file, plus the random writing based on two optimistic and pessimistic models. Among the points that can be noticed at the level of the two models of the random writing is that in the pessimistic model (FLPM), a client must acquire a lock on a file before being able to modify it. When a client group wants to modify a set of files, the order in which the requested locks can cause a deadlock. On the other hand, in the optimistic model, all clients are allowed to modify the blocks in their respective caches. However, only the client with the minimum timestamp will be able to save their changes. This makes the OMFC model more than the FLPM model when multiple clients are running on the same file. And in the future, the REHDFS will be expanded to support more detailed random write operations and make it more secure.

The second approach is the DNA memory strands. The solution for a sustainable storage of information that gave us a chance to store a large volume of data on a very small volume. But we are facing a challenge with this technology because it is still very expensive and it requires a large team and high-end hardware.

We have arrived at the end of this paper but we cannot conclude without giving a glimpse of the future and an idea about new research. Researchers in chemistry, biochemistry and computer science at the University of Ghent, Belgium, have developed a revolutionary new data storage technique inspired by the idea of genetic storage of information. Powdered data storage could become a viable alternative and a more environmentally friendly technology.

Data storage in powder is an idea that might seem totally surreal. Yet researchers at the University of Ghent, Belgium, have managed to develop this technology. An innovation that could well replace USB keys and hard drives in the not-so-distant future.

Indeed, unlike traditional storage media, the powder does not require the massive use of heavy metals. In addition, it does not require the use of energy-intensive servers to ensure data security. For more information on this innovation, the full study published in the journal Nature Communications by (Martens, et al., 2018) .

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The Impact of The Region Transport Infrastructure and Services on The Social and Economic Performance of Russian Regions

Anna Yu. KOSOBUTSKAYA
Voronezh State University, Voronezh, Russia
anna.rodnina@mail.ru

Irina A. DYADYUN
Institute of Service, Tourism and Design (branch of North Caucasus Federal University), Pyatigorsk, Russia
iwka275@yandex.ru

Marina N. PISKOVATSKAYA
Institute of Service, Tourism and Design (branch of North Caucasus Federal University), Pyatigorsk, Russia
mari.shestakowa@yandex.ru

Abstract

The article is devoted to the analysis of correlation between transport infrastructure indicators and social and economic performance in a region. Correlation analysis of the given indicators for 57 subjects of the Russian Federation located in the European part of the country was carried out. As a result, a high correlation between the state of transport infrastructure and services of road transport as its part, and the indicators characterizing social and economic development of regions was identified. The study uses logical and econometric analysis to perform calculations and verify the results. The revealed correlation also confirms the efficiency of regions' transport infrastructure investments in terms of complex social and economic effect. The correlation suggests the transport infrastructure indicators maximally connected with the development of the region for influencing, helps to forecast the impact of the transport infrastructure investments on the development of the economy, growth of the living standards indicators in the region.

Keywords: Region Economy, Transport Infrastructure, Correlation, Service Infrastructure of Road Transport.

Introduction

Transport industry in Russia is a traditionally important and, it seems fair to say, vital industry. According to Analytical center for the government of the Russian Federation (2018) transport industry in 2018 accounted for 6.2% of Russian GDP. 2.6% of all employed people in the Russian economy worked in this industry (estimated by the authors based on Rosstat (2018) and Rosstat (2019)). Transport industry is the basis for the intercommunication and territorial integrity of regions, federal districts and, ultimately, a country, an important part of the infrastructure for population life and activities, for economy functioning, and for commodity exchange.

Transport and logistics are important for increasing the efficiency and competitiveness of the Russian economy. Makarov (2018) mentioned, "Logistical costs is 19% of GDP, while in the Western world it is about 7-11%".

The task to increase the efficiency and competitiveness of the Russian economy has been set at the highest government level for a number of years, and this growth can be achieved not least by increasing the efficiency of the transport industry. The industry is one of the drivers of the economy. Transport industry contribution to the Russian GDP in 2018 was 6.2 % (Analytical center for the government of the Russian Federation (2018)). Average nominal wage for the group of industries is 41% higher and its growth rate is 42.5% higher than the statistically average wage in the Russian economy (refer to Table 1).

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Table 1: Ratio between the main indicators of the transport complex and the Russian economy in 2018 (estimated by the authors based on Rosstat (2018) and Rosstat (2019))

Compared indicators	Russian economy	Transport complex	Ratio between the indicators, %
Growth rate (GDP for Russian economy, and freight turnover for transportation industry), %	2,30	2,80	122
Average gross monthly wage, rubles	39167	55419	141,5
Average gross monthly wage growth rate, %	10,7	15,3	142,5
Turnover per 1 enterprise, thousand rubles	29372	37479	127,6

Let us describe the industry. As reported by Rosstat (2018) the freight turnover of transport in Russia in 2018 grew by 2.8%, outpacing the Russian GDP growth rate of 2.3%.

Road transport is extremely essential in the economy of a region. Service enterprises of regional road transport infrastructure as a component of a road transport system are the most numerous and overwhelm other transport service enterprises in most Russian regions due to the following reasons.

The impact of road transportation in total freight volume in the Russian Federation is sufficient. In 2018, 67% of all cargos (excluding cargos carried by pipeline) and 60.7% of all passengers were carried by road transport (calculated by the authors based on Ministry of Transport of the Russian Federation (2018)).

The number of vehicles in the Russian Federation is growing rapidly and the pace of development of transport infrastructure, including its service component, is insufficient. As per Rosstat (2018) in 2017, the number of registered vehicles (trucks, cars, buses, etc.) increased by 74% as compared to 2005, and the total number of service infrastructure facilities on federal highways increased only by 10%.

Competition in the sphere of motor service and maintenance is extremely intense. At the end of 2018, there were about 76 thousand registered car service centers in the Russian Federation (the figure is presented by the AVTOSTAT analytical agency (Loboda (2018)), and therefore service enterprises of road transport especially need to improve methodological tools for effective development. This task is relevant for most regions.

Methods of Research

The authors have analyzed the interrelationships between the indicators of the region's transport infrastructure, primarily road transport infrastructure, and indicators of socio-economic development of regions. The study is based on the data of a substantial number of regions of the European part of Russia. All the regions are comparable in terms of economic development and transport infrastructure development. The purpose of the analysis is to identify statistical indicators of socio-economic development of the regions, which are most relevant to the indicators of transport infrastructure development in the region.

In the authors' opinion, the identification of such indicators makes it possible to program, evaluate and monitor within the region the impact of the development of transport infrastructure, and service enterprises of transport infrastructure as its' integral part, as well as to assess their impact on the socio-economic development of the region according to the main statistical indicators. It also makes possible to confirm the effectiveness of transport infrastructure investments for the socio-economic growth of the region.

The authors carried out the analysis of interrelation, correlation of transport infrastructure indicators, including service enterprises, and economic indicators of 57 regions of the European part of Russia (Central, Northwestern, Southern, North Caucasian and Volga Federal Districts). The regions were selected for the following reasons. According to Rosstat (2019), these federal districts account for 58.38% of Russia's GDP. The density of their transport infrastructure, homogeneous and complex development of industries allow them to be compared with each other. Meanwhile the Far Eastern and Siberian Federal Districts differ markedly from the districts of the European part of the Russian Federation. The method of indicators selection is based on the logical relationship of the studied indicators of the regional economy with the region's transport system development. These indicators are grouped depending on the aspect of the region's transport development they potentially characterize.

A number of researchers utilized correlation and regression analysis to indicators of the regional transport infrastructure development earlier (the results of study by the co-author of the article are presented by Kosobutskaya (2020)). For example, Terentieva (2016) carried out a similar analysis over the years, but it was limited to one region - the Republic of Tatarstan. Ivanov (2016) carried out the analysis on the federal districts basis but only for one pair of indicators. The analysis showed a high correlation (0.7) between the GRP values and the total length of transportation routes in these districts. The approach of Ivanov (2016) seems to be universal, but contains a number of limitations and assumptions. The calculation of linear correlation on eight pairs of values cannot be recognized as sufficiently reliable (Grjibovski (2017)). The Far Eastern and Siberian Federal Districts differ significantly from other administrative regions of the Russian Federation in many respects, including: geographical extent, a significant length of transport routes and their low road density, low population concentration, specific development of transport and some types of transport infrastructure. These features appeared due to natural and climatic characteristics, a shorter period of development of these regions.

Pearson correlation coefficients r_{xy} are used to measure linear correlation between two variables. They are calculated using the formula (1) and allow estimating the direct impact and interrelationship of the indicators, excluding possible simultaneous influence on the value of the indicator of a group of other indicators.

$$r_{xy} = \frac{\sum_{i=1}^{n}(X_i - \bar{X}) \times (Y_i - \bar{Y})}{(n-1) * \sqrt[2]{\frac{\sum_{i=1}^{n}(X_i - \bar{X})}{(n-1)}} \times \sqrt[2]{\frac{\sum_{i=1}^{n}(Y_i - \bar{Y})}{(n-1)}}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1),$$

where X_i , Y_i are the values of analyzed regions' variables, indexed from 1 to n, where n is the sample size;
$\bar{X}, \bar{Y}$ are the means for the variables X_i и Y_i.

The analysis revealed indicators that have a positive and high (more than 0.70) paired correlation at 95 % confidence level, calculated using the Fisher z-transformation (Grjibovski (2017)). Moreover, even that correlation was analyzed from the point of view of logic and systems-based approach to regional economy.

The authors believe that the proposed approach provides greater reliability for the following reasons. First, the study examines a large number of regions. Second, due to the selection of akin regions for analysis, the results obtained are characterized by greater reliability and less margin of error. The authors treat the obtained indicators of regional transport infrastructure that have a high correlation with the socio-economic indicators as drivers for regional economies growth.

Results

The following groups of indicators can characterize the regional road transport infrastructure and transport service infrastructure as its component.

Indicators of logistic and maintenance support of regional transport infrastructure. This group of indicators characterizes the physical parameters of transport infrastructure, shows the ability of transport to ensure economic exchange, use of the region's resources both within the region and in economic interaction with other regions, in transit traffic. Some of the proposed indicators are among 49 main indicators of region's competitiveness, presented by Treshchevsky (2009) to characterize the development of transport.

Economic indicators of transport infrastructure performance. This group of indicators characterizes the demand for transportation services, cargo carriage volume and passenger traffic flows. Economic indicators of regions, freight-traffic volume, passenger traffic flows and part of indicators of logistic and maintenance support of regional transport infrastructure have already been used by other researchers, for example, Terentieva (2016).
The complete list of indicators for these groups is presented in table 2.

Table 2: Correlation between transport infrastructure indicators and socio-economic indicators of 57 regions of the European part of Russia taken as a whole in 2017

Transport Infrastructure indicators \ Socio-economic indicators	GRP in 2016, mln rubles	Turnover of organizations by economic activity “ Transport and Communication” , mln rubles	Average annual number of employed, thou. persons	Average per capita money income of population; per month, rubles	Consumption expenditures per capita; per month, rubles	Gross nominal average monthly wages of employees, rubles	Conveyance of goods, mln tones	Passenger traffic, mln persons
Indicators of logistic and maintenance support of regional transport infrastructure								
Density of railway tracks, end of 2017, km per 10,000 sq. km of territory	0.66	0.73	0.17	0.63	0.59	0.63	0.10	0.66
Length of railway tracks, end of 2017, km	0.06	0.10	0.17	0.24	0.30	0.25	0.52	0.18
Density of paved public roads, end of 2017, km per 1000 sq. km of territory	0.73	0.76	0.70	0.61	0.57	0.55	0.09	0.68
Length of paved public roads, end of 2017, km	0.10	0.12	0.28	0.21	0.32	0.00	0.71	0.32
Fixed assets of the regional transport infrastructure, end of 2017; at total book value; mln rubles	0.80	0.83	0.82	0.72	0.71	0.73	0.45	0.79
Economic performance of transport infrastructure								
Enterprises and organizations by economic activity "Transportation and Storage", thou.	0.89	0.92	0.92	0.81	0.79	0.77	0.43	0.91
Average annual number of employed by economic activity "Transportation and Storage" in 2017, thou. persons	0.95	0.96	0.99	0.84	0.83	0.77	0.52	0.97
Conveyance of goods, mln tonnes	0.34	0.35	0.48	0.48	0.50	0.34	1.00	-
Passenger traffic, mln persons	0.93	0.93	0.98	0.81	0.80	0.72	-	1.00

Calculated by the authors based on Rosstat (2019).

Indicators of regional transport service infrastructure. They characterize the capabilities of the transport services infrastructure to ensure efficient operation of transport. These indicators have not been met in the papers of other researchers and are introduced be the authors in accordance with the research objectives. Consumer services - subgroup "Maintenance and repair of vehicles, machinery and equipment", million rubles - is an important indicator of road transport service infrastructure in the region. It is presented in statistics yearbooks of the administrative regions of the Russian Federation, as 96% of motor vehicles and 61% of freight transport are owned by individuals (Rosstat (2018)). The complete list of indicators for this group is presented in Table 3.

The analysis of cross impact and interrelation of regions' socio-economic indicators and regional transport infrastructure indicators was carried out. Values of social and economic indicators of the regions, characterizing the

regional economies, volume of freight and passengers transported, labor force and income standard and level of consumption are given in columns of tables 2 and 3.

Table 3: Correlation between indicators of road transport' service infrastructure and socio-economic indicators of the regions of the European part of Russia in 2017

Socio-economic indicators / Transport service infrastructure indicators	GRP in 2016, mln rubles	Turnover of organizations by economic activity " Transport and Communication" , mln rubles	Average annual number of employed, thou. persons	Average per capita money income of population; per month, rubles	Consumption expenditures per capita; per month, rubles	Gross nominal average monthly wages of employees, rubles	Conveyance of goods, mln tonnes	Passenger traffic, mln persons
Indicators of transport service infrastructure								
Enterprises and organizations by economic activity "Trade, maintenance and repair of motor vehicles and motorbikes", thou.	0.61	0.62	0.66	0.54	0.54	0.50	0.36	0.70
Turnover of organizations by economic activity "Trade, maintenance and repair of motor vehicles and motorbikes", mln rubles	0.99	0.96	0.94	0.79	0.74	0.74	0.28	0.90
Household services by type of services "Maintenance and repair of vehicles, machinery and equipment", mln rubles	0.82	0.87	0.90	0.73	0.75	0.61	0.52	0.88

Calculated by the authors based on Rosstat (2019).

Analysis results. The authors have analyzed the correlation between the transport infrastructure indicators, including the transport service infrastructure, and the economic indicators of 57 subjects of the Russian Federation for 2017. Most of the obtained correlation coefficients are in ranges from 0.5 to 0.69 and 0.7 and above which, according to Chaddock's scale (Chaddock (1925)) demonstrates noticeable and high correlation of observed phenomena. The correlation coefficient 0.70 at sample size n=57 and at the 95 % confidence level (P=0.05) calculated by the authors using the Fisher z-transformation should be in the range from rL=0.53 to rU=0.81. Thus, the analysis meets the necessary reliability condition. Statistical significance for this sample at P=0.01 is 0.25.

Having analyzed the values of correlation coefficients of the indicators of logistic and maintenance support of regional transport infrastructure with the social and economic indicators of the regions (refer to Table 2), we can state the followings. High positive correlation is observed in the indicators of the Density of the paved public roads with such indicators as GRP (0,73) and Turnover of organizations by economic activity "Transport and Communication" (0,76) of the regions, Average annual number of employed (0,7); noticeable correlation (0,68) is observed with Passenger transportation.

This indicates a significant role of automobile transport to ensure economic connectivity and labor mobility of the population in these regions. Average but noticeable correlation with Density of paved public roads is demonstrated by Average per capita money income of population (0.61), Consumption expenditures per capita (0.57) and Gross nominal average monthly wages of employees (0.55). There is a high correlation between Length of paved public roads and Conveyance of goods (0.71). The value of fixed assets of transport infrastructure (roads, bridges, vehicles, garages, etc.) located in the regions characterize the development of infrastructure and logically shows a high positive correlation (0.7 and more) with the majority of regional development indicators from Table 2. The observed positive correlation and values of correlation coefficients allow to conclude that the developed transport infrastructure and, first of all, road transport infrastructure (not the length of roads, but the density of roads and their equipment with fixed assets) are closely interconnected with the economic development of the region. It has a direct impact on the region's economy and, to a high degree, on socio-economic indicators and living standards in the region.

Commenting on the indicators of economic performance of transport infrastructure, it is necessary to note positive and high and very high correlation of GRP with the number of Enterprises and organizations by economic activity "Transportation and Storage" (0.89) and the Average annual number of employed by this economic activity (0.95).
In addition, the regions under study are characterized by quite close correlation of the latter two indicators (Conveyance of goods and Passenger traffic) with indicators of living standards - Average per capita money income of population and Consumption expenditures per capita. The correlation coefficients range within 0.77-0.84. We also observe a logically expected high correlation of the number of transport enterprises, the number of employees employed by them with the impact of transportation in GRP (more than 0.91 for both coefficients), and with the indicator of passengers traffic (0.91-0.97 respectively). It seems logical to conclude that the more developed a region's transport infrastructure is, the higher the value of socio-economic indicators. The converse case is also true. A well-developed regional economy fits with a developed transport infrastructure that is quite efficient for a region.

The results of the impact-analysis of service infrastructure of motor transportation on socio-economic indicators of the region (refer to Table 3) allows to draw the following conclusions. We point out that the indicator “Turnover of organizations by economic activity "Trade, maintenance and repair of motor vehicles and motorbikes"” has positive correlation (high values of correlation coefficients) with such indicators as: GRP (0.99); “Turnover of organizations by economic activity Transport and Communication”" (0.96) of the regions; “Average annual number of employed people” (0.94), and indicators of living standards (0.79 and 0.74 respectively).

Slightly lower, but still high values of correlation with the studied socio-economic indicators also has the indicator Household services by type of services "Maintenance and repair of vehicles, machinery and equipment”. Strong correlation is observed with such indicators as GRP, Turnover of organizations by economic activity “Transport and Communication”, Average annual number of employed, and Passenger traffic. Correlation coefficients are 0.82, 0.87, 0.9 and 0.88 respectively.

Correlation of the number of enterprises and organizations in this economic activity with majority of the socio-economic indicators presented in Table 3 is reliable, positive, and noticeable.

Noticeable correlation of these indicators has logical explanation. The region where more cars are bought and serviced should be more prosperous. The fact that 61% of freight transport and 51% of the bus transport in Russia belong to individuals should be concerned as additional substantiation of high and very high correlation of the indicator Household services by type of services "Maintenance and repair of vehicles, machinery and equipment” with the socio-economic indicators. For the same reason, this indicator was included in the study. Based on the observed values of the correlation coefficient, it can be stated that the efficiency of the region's economy (GRP) and of the region's transport (Turnover of organizations by economic activity “Transport and Communication”) depends on the operation efficiency and development of the transport service infrastructure. It can be estimated with the help of the turnover and household services provided.

Conclusions

The analysis results show that according to the basic statistical indicators: GRP, indicators of employment and level of incomes of the population, volumes of cargo and passenger transportation inside the regions there is a strong mutual influence of transport infrastructure, and service infrastructure of transport as its component, on social and economic development of the region. Thus, it is reasonable to identify a number of transport infrastructure indicators in the region, which can be used as drivers for the development of the region's economy. According to the results of the analysis, the increase in the density of public roads, the growth in the number of transport infrastructure enterprises, including the service enterprises of the road transport infrastructure and their employees, the development of their facilities can be considered as such drivers.

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Analysis of Application of the Industry 4.0 in a Selected Company

Gabriel KOMAN
Department of Management Theories
Faculty of Management Science and Informatics, The University of Žilina
Žilina, The Slovak Republic
gabriel.koman@fri.uniza.sk

Milan KUBINA
Department of Management Theories
Faculty of Management Science and Informatics, The University of Žilina
Žilina, The Slovak Republic
milan.kubina@fri.uniza.sk

Kristína ŠUŇOVÁ
Department of Management Theories
Faculty of Management Science and Informatics, The University of Žilina
Žilina, The Slovak Republic
kristina.sunova@fri.uniza.sk

Abstract

The advancing mechanization and digitalization in its current state has a significant impact on many industrial, social and personal facets. Everyday tasks are, and will be even more intensively aided by smart, connected devices and their state-of-the-art machine-learning applications. It was observed that especially the industrialized nations currently boost their efforts in several regulatory and technical fields. Germany should be mentioned here as a prime example, since it has a relatively high manufacturing degree and thus its economy and wealth is highly dependent on +technological superiority. The content of this paper present how processes are being influenced by digitalization. Based on the analysis of a common issue at the production line, the paper presents the possibilities of the implementation of the Industry 4.0 in a selected company. The chosen company is major European automobile manufacturer with its production site in Slovakia. The matter will be structured in an initial explanation of the digitalization in a broader view, including the theoretical basis for terms like the Internet of Things, the Industry 4.0 and the subject of maintenance. The subsequent chapters analyze the conceptional course and the implementation of the IT infrastructure into the selected assembly line equipment, highlighting the underlaying managerial and analytical preparations.

Keywords: Industry 4.0, Management, Analysis, Digitalization, Internet of Things.

Introduction

The digitalization and accompanying developments are generally driven by all sizes of corporations, mainly with a technological background, in order to keep or gain the competitive edge on their specific markets. Often these corporations are seek partnerships with research institutions and universities or establish joint ventures in order to gain know-how and back the immense investments. Additionally, the importance of technological leadership on a nation-wide scale has been understood by political leadership of many developed countries. Public attention and institutional support regarding these tendencies is steadily increasing accordingly. The majority of the developments in digitalization aspects are stated under the headline of the so called the Fourth Industrial Revolution. It is considered a revolution, because in the result it fundamentally changes the way of producing goods and services. These changes are driven by the most precious resource of our days: Data. The ongoing development of new technologies for manufacturing and businesses and their adaption in life is progressing into the era of digitalization. Digitalization of manufacturing is the phenomenon of intelligently connected machines powered by information and digital technologies. (Parida et. al, 2015, Hittmar et. al, 2015, Ferenc et. al, 2017) Gartner business dictionary says that digitalization is the use of digital technologies in a way to change a business model, so that the business will provide new revenue and opportunities. It is the transformation to a digital business. (Gartner, 2020) In another way, digitalization is transforming analogue input, e.g. information carried in tangible formats as paper, into the digital format used by computers. All information is now used and stored in databases, data warehouses or online in

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clouds and easily accessible by various electronic devices. Digitalization brought up many new possibilities and opened up space for improvements and raised the efficiency of manufacturing. There is a focus on development toward the future and adaptation to new trends. One of the important outcomes of digitalization became automation. According to Cambridge Dictionary, the term automation means the use of machines that operate automatically, which means independently without human control. (Cambridge Dictionary, 2020) Digital technologies like computers, laptops, tablets, smartphones, robots and many other devices work with data. In order to make this work more efficient, automation involves programming machines and robots and making them work autonomously with a minimum human interaction. Synchronized and seamless movements of the interacting machines is the targeted scenario. (Jankalova, Jankal, 2016, Soviar et. al, 2017) One path that has been trying to achieve this targeted scenario utilizes, in historical terms, a recently invented tool for global data transfer: The Internet. It is not only changing the daily interaction of people, but it plays a major role in digitalization of the business world, in a form that includes all "things" involved in the process.

Literature Review

In the further technological development all possible digital devices can be now connected to the Internet. That enables them to connect with each other as well as to share information. Since these devices are connected to the Internet, this communication is happens online in real-time. This phenomenon is known as the Internet of Things (IoT) introduced in 2000 by Ashton and his colleagues. The main idea driving their vision was ubiquitous automated identification technologies and their applications. They envisioned all kind of electronic devices networked and electronically tagged that would allow remote, wireless communication of their contents. (Sarma et. al, 2000) Since the time of the introduction of this phenomenon and its progressive implementation, people started to discuss this topic frequently and came up with their own understanding of the Internet of Things and definitions. (Dorčák et. al, 2017, Soviar et. al, 2019) The following table summarizes three chosen definitions by different authors (see Table 1).

Table 1: Definitions of the Internet of Things

Reference	Definition
Guido Bartels	"The IoT links the physical and digital worlds. The massive amounts of data that instrumented devices collect provide businesses the opportunity to learn about the environment in which they operate, gleaning insights that can be turned into actions." (Bartels, 2017)
Xiaoge Xu, Niranjan K. Ray, and Ashok K. Turuk, Eds. 2017	"It can be defined as the combination of smart devices communicating with other devices, objects, environments and producing a huge volume of data. These data can be processed into useful actions that provide command and control to the things to enhance the quality of life." (Xu et. al, 2017)
Mehdi Khosrowpour, 2017	"The term "Internet of Things" (IoT) refers to a worldwide network of uniquely identifiable interconnected objects that can seamlessly interoperate using communication protocols like Radio Frequency Identification (RFID), Bluetooth, Near Field Communication (NFC), barcodes, as well as embedded sensors and actuator nodes." (Khosrowpour, 2017)

The Internet of Things is more than just an approach discussing connectivity of devices. It involves many cooperating technologies. For example, wireless sensor networks hardware including Wireless Senor Network (WSN) Protocol Layer, Secure Data Aggregation/Fusion, WSN Middleware Technology and RFID Communication. (Xu et. al, 2017, Jankalova, Jankal, 2018)

The Internet of Things is applied in a wide range of spheres such as healthcare, smart cities, smart homes, sport and other. However, the focus is nowadays on its application in the industry since digitalization has became a business priority for a significant number of organizations worldwide. (GE Digital, 2020) The Internet of Things used in industrial conditions is called the Industrial Internet of Things (hereinafter referred to as IIoT). There are two key trends playing an important role in IIoT Systems. The first one is the spreading of the use of the sensors. The cost of the sensors as well as interfaces is steadily decreasing. This fact is causes the high availability which allows tracking more variables and different types of data. The second trend is the era of distributed processing systems such as PLC (Loop Process Control / Loop process controller). By placing PLC closer to machines, it eliminates bottlenecks and improves the efficiency and flexibility of the production. (ElektronikaB2B, 2020) The potential of

the Industrial Internet to change the industry is undoubtful and GE Digital, subsidiary of the American corporation General Electric, predicts the benefits of the IIoT to the global economy (GE Digital, 2020) as follows:

- 46% of the global economy can benefit from the Industrial Internet.
- 100% impact of the Industrial Internet potential on energy consumption.
- 44% impact of the Industrial Internet potential on global energy consumption.

Besides the demands of the business to business and business to customer markets and the internal requirements for getting the state of data demand are to be considered. Therefore, in order to be able to analyze the state of a machine and make a prediction, a structured data collection is necessary. The important part of the IoT and IIoT are sensors that continuously collect important data about the key parameters involved in the process. The data is collected periodically or when the threshold is exceeded. Sensors send the collected data to a cloud system or database through a wireless gateway. Once the data arrives at the predefined destination, it is processed to extract key parameters and the trending could be visualized. (Khushraj, 2017, Soviar et. al, 2018)

As it is stated above the Internet of Things describes an abstract and generalized subject, including the future way of manufacturing, the connectivity of devices and their collection, handling and analysis of data. The next logical step is the implementation of the IoT subject in a real industry and manufacturing case respectively. In this term, the leading industrial nation Germany, pushed forward on a nation-wide scale, described the term "Industry 4.0" as follows:

The term Industry 4.0 has been known since 2011 when German representatives promoted an initiative to enhance competitiveness in manufacturing industry called die Industrie 4.0. Ideas of this initiative were later adopted by German federal government in High-Tech Strategy for 2020. The digital transformation of the manufacturing plays a significant role in the national development not only in a European scale. However, not every country has an opportunity to expand in the tempo of modern industrialization. It depends on the country's position, competitive advantages and aspirations. Nascent countries have an array of production bases. These can be ranging from a significant production base that is either shrinking or at risk of shrinking, a small base that is growing, or a small base due to limited industrialization. Countries with limited production bases may initially try to capture traditional industrialization. In comparison, countries with larger production bases are more likely to expand into advanced manufacturing. A way of showing the potential of countries to modernize their manufacturing processes utilizes their readiness for those modernization activities. (Company internal documents, 2018, Deloitte, 2020) The understanding of the so called fourth industrial revolution by several authors is summarized in the following table. (see Table 2)

Table 2: Definitions of the Industry 4.0

Reference	Definition
P. Kopacek. 2015	"The basic principle of Industry 4.0 is that by connecting machines, workpieces and systems, it is possible to create intelligent networks along the entire value chain that can control each other autonomously." (Kopacek, 2015)
Cheng-Ju Kuo, Kuo-Cheng Ting, Yi-Chung Chen, Don-Lin Yang, and Hsi-Min Chen. 2017	"The term Industry 4.0 refers to trends in automation and data exchange in the area of manufacturing. It includes analysis of consumer demands, physical monitoring processes, networking multiple machines, predictive maintenance, and quality control." (Kuo, 2017)
Yang Lu. 2017	"Industry 4.0 can be summarized as an integrated, adapted, optimized, service-oriented, and interoperable manufacturing process which is correlated with algorithms, big data, and high technologies." (Lu, 2017)
Australian Government	"Industry 4.0 (the 'fourth industrial revolution') refers to the current trend of improved automation, machine-to-machine and human to-machine communication, artificial intelligence, continued technological improvements and digitalisation in manufacturing." (Australian Government, 2020)

As a leading European country in industrial manufacturing, Germany sets the pace for Industry 4.0 as an example for other countries. The initiative "Industrie 4.0" later converted into a platform uniting economic sectors, professional associations, the scientific community, trade unions, and the government. The platform systematically connects digitalization and production nationally and internationally as one of the largest and most diverse Industry 4.0 networks. It also fosters coordinated processes in the economic sector and in the society through the harmonization of the various perspectives and approaches. It is operated by and for the political stakeholders, the business sector, the scientific community, professional associations, and trade unions and unites all relevant civic stakeholders for the purpose of advancing the digital transformation of the industry. The platform Industrie 4.0 has

prioritized five fields of activity to be worked on and it is Reference Architectures, Standards and Norms, Research and Innovation, Security of Networked Systems, Legal Framework, Work, Education and Training. (Federal Ministry for Economic Affairs and Energy, 2020)

The significant impact of the fourth industrial revolution made its signature in the subject of maintenance. The maintenance plays an important role in the industry and has a reasonable impact on the production. It should not be understood only as a manual laboring work, nor as a managed activity involving Information Technology (IT).

Role of Management in the Industry 4.0

The German Fraunhofer Institute for Material Flow and Logistics uses a 4-Phase-Model tool for a company's management in order to help develop a solution for the management of the Industry 4.0. It is a step by step process, in order to create convincing business cases and management approaches. The model starts with the first phase which is meant to develop a common understanding of the Management of the Industry 4.0. It is called "Kick-off" and deals with topics of centralized and decentralized management, vision, strategy and goals of the focused group. The expected outcome of this start phase is to bring transparency of status quo, fields of action, approaches and objectives. The next phase has a goal to analyze the starting points for the development of innovative business models for the Industry 4.0. Possible important topics in this phase are models for transparency and information quality in the supply chain, innovative organization models supporting fast decision making or models for an increase of flexibility in a supply chain. Desired outcome is the identification of innovative business models for the Management of the Industry 4.0. The third phase is focused on measuring and control models with the goal to deliver conception of optimized measurement and controlling models. After taking a closer look on topics like new planning and optimization assistant systems or models for an increase of productivity, at this stage the connecting factors for a comprehensive Management of the Industry 4.0 should be clarified. The final phase is called Recommendations for Action and its goal is to define approaches for a successful implementation of Management of the Industry 4.0. The topics discussed in this part should be individual business and management model of a company, strategies for conversion into new management model, innovative concepts of knowledge management and learning platforms. The end phase is meant to deliver action framework for the Management of the Industry 4.0. (Daňková, Droppa, 2015, Madzík et. al, 2017, Straková et. al, 2017, Frauenhofer (a), 2020, Frauenhofer (b), 2020)

Action frameworks are usually larger complexes of certain plans. For a more efficient implementation they are possibly split into several projects. The projects then deal with certain specific topics.

Materials and Methods

The paper focuses on the analysis of the possibility of the application of the Industry 4.0 solutions in a selected company. In sequence, the paper describes suitable metrics and elements for implementation of the predictive maintenance. The main goal is divided into partial goals which are supportive in the process of achieving the main goal of the analysis i.e.:

- introduction of the topic of the Industry 4.0 and Predictive Maintenance,
- analysis of the selected company and their approach towards the Industry 4.0,
- analysis of the production process and maintenance approach,
- identification of the suitable objects for the installation of a predictive maintenance solution and identification of the parameters and measuring methods for condition monitoring.

According to studies of the theoretical backgrounds to the topic of the Industry 4.0, general overview of the topic was gained. In the theoretical and analytical part of the paper, book sources, scientific and research articles, analysis performed by companies working on relevant topics, internet sources and internal documents of the cooperating company were used. The cooperation was established with a car production factory located in Slovakia, which brought closer perspective and practical insights to the analysis. During the work on the analysis, working procedures such as search for relevant resources, studies and processing of the resources, selection of the suitable methods and tools for the analytical part of the paper, analysis of the company's internal documents, analysis of current approaches and operations in field~~s~~ of the Industry 4.0. During the work on the analysis, we used methods such as research of available resources and well as deduction based on research, analysis of the current situation in the selected company, structured interviews with responsible employees within the qualitative research, analysis of internal documents of the company, communication with the company representatives and survey on the premises were used. For summarization of the acquired findings about maintenance methods in the company, the method of synthesis was used.

Results

This part of the paper focuses on the introduction of the selected company, analysis of the company's external and internal environment which deals with the issue of the Industry 4.0, the company's main and supportive processes and the maintenance of selected machines. The cooperation with the company was based upon an agreement, that name of the company shall be anonymized, and confidential data will be modified with a Bulgarian constant.

Company Introduction

The selected company is an original equipment manufacturer of the automotive industry. It was established in Slovakia since 1991. It is the biggest and the oldest car production company in the country. In the last quarter of the century the chosen factory in Bratislava became one of the most modern factories of a German concern. Its uniqueness is in innovative technologies and complexity. In 2016 the company reached the historically highest financial return and became then number one in Slovakia. More than 11.000 employees contribute to the production and performance of the factory. The company belongs to a German concern which includes another eleven automobile brands. The Group consists of two divisions. It is the Automotive Division and the Financial Services Division. The Automotive Division comprises the Passenger Cars, Commercial Vehicles and Power Engineering Business Areas. Five different models from five different brands are being produced under the roof of the company's factory seven days in the week. The whole production consists of 57% of SUV models and 43% of city cars models. One version of city car is purely electric. In the beginning of 2018 the company started production of a new model with an annual capacity of 40 000 vehicles. During the time of its existence the factory produced more then 4.5 million cars, 6.8 million gearboxes and 400 million components within the three company's factories in Slovakia. Since the start of the production, 13 different car models were built in the Bratislava factory. In 2016, 388 687 vehicles left the production line. Automobile production makes 35% of the whole industrial export of Slovakia. The cars produced by this company are exported worldwide into 148 different countries. The automobiles of the Slovak~~ian~~ facility were mostly exported to Germany (32%), USA (16%) and China (11%). In 2016 the company reached record turnover of 7.6 billion EUR what represents 5% increase compared to the last year. The net profit margin reached the level of 145.3 million EUR. It was historically the highest level reached in investments. The Factory in Bratislava was built new halls, made reconstructions, and built new infrastructure. In total the company reinvested 550.7 million EUR what represents 33% increase compared to the last year. (Volkswagen Slovakia (a), 2020)

The investments into the development of the company, its infrastructure and technologies have in the last quarter of the 20th century raised by 3.4 billion EUR on record. The automotive industry is progressing along with it is the company too. It is getting ready for the global changes such as is the electromobility, dynamic development of assistance systems and the future of autonomous driving. In order to maintain future shares on the highly competitive car market, more than 550 million EUR were invested for further enhancement of the company, as well as for production processes. According to these enhancements and digitalization aspects, parts of this budget were used for applications in the field of the "Industry 4.0". The company brand is completely repositioning itself with the 2025+ strategy. The focus here is on strengthening the market position across the regions and segments, flanked by a significant increase in efficiency and productivity. At the same time, the brand will invest in e-mobility and connectivity. Furthermore, in the reporting period, the Board of Management and the General Works Council at the company made a pact for the future, which is aimed at initiating the return of the company brand to a profitable course for growth. The program at locations in Germany with around 120,000 employees is intended to significantly increase competitiveness, in addition to ensuring that the company is secure enough to meet future challenges. It creates the prerequisites for the transformation from a pure automotive manufacturer to a successful mobility provider in the age of digitalization and increasing e-mobility. (Volkswagen Slovakia (b), 2020)

Results of Analysis of the External Environment

External environment has a significant influence on the company and should be analyzed in order to clarify its intensity and impact: (Kollar, 2016)

- Market: The three various carmakers in Slovakia produced together 1 043 237 vehicles in 2016. This represents a rise by 4 734 automobiles (+0,46 %) compared to the last year. The second time in row more than one million cars in the year were produced in Slovakia. The car production makes up represents 30% of the whole industrial production of Slovakia. The strong elements of automotive industry are three car production companies and their

supplier networks. The selected company with the factory in Bratislava produced 37% out of the total number of cars made in the country in 2016. In comparison with two other competitors it is more than one third of the whole car production. The percentage of the production made by three car manufacturers is shown in the following graph.

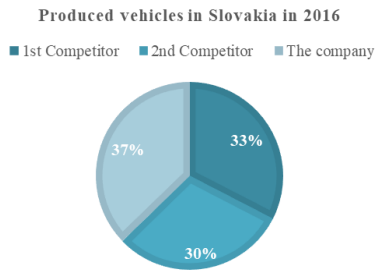

Fig. 1: Ratio of produced vehicles by companies on the market (Kollar, 2016)

- Electromobility: All-important car producing companies are investing significant amounts in the development of electro mobiles. The number of electro mobiles have doubled in 2017 in comparison to 2016. More than one third from the millions of the new cars with electric engine had been sold in China. The Slovakia is trying to support the sale of electro mobiles by sale grants. The support from the country can possibly cover the purchase cost of more than 1000 vehicles. The interest in these grants was indicated by only 300 registered applications. (Kollar, 2016)
- Human resources: The automotive industry plays a strategic role for Slovakia from the point of concentration of the human resources, number of produced cars and ration of the produced cars in the whole industrial production. More than 250 000 working positions are currently connected to the Slovak automotive industry. More than 129 000 people work directly in the production, including 1 470 working positions in research and development. (Kollar, 2016)
- Export: The automobile production represents 35% of the whole industrial export of Slovakia. The Exit of Great Britain from the European Union is a threat for the future development in the automotive industry in case it would happen without agreement about free market. Potential barriers on the USA market could be critical as well. Customs on the imported cars were discussed during the administrative change in the country. (Kollar, 2016)

The external environment sets the company in the position of the leading car manufacturer in Slovakia. The market is growing and it is expecting the increased production and introduction of the electro mobiles, which has an impact on the company development strategy. Adaptation to these external influences requires implementation of new technologies and investments in technological development. This could include technologies connected with the fourth industrial revolution. The analysis of the internal environment of the company should uncover if the company is aware of market expectations and if the company´s position is appropriate.

Results of Analysis of the Internal Environment

Modern, highly efficient car production would be inconceivable without reliable and extensive automation technology. According to the manager of the department of IT Project House, 95% of operations in the bodywork shop are fully automatized. Automation could be considered as a significant step in the industrial development and a solid base for more advanced upgrades. Networking and digitalization in production already played an important role well before the term Industry 4.0 was coined. The company is exploring new technological solutions in many evaluation and implementation projects, including identification, localization and visualization of components, equipment and the whole production, energy management and predictive maintenance and condition monitoring, data-driven analysis and control of production processes, and the use of wearables such as smart glasses in logistics processes. Recently, one of the most modern centers for production flow management was opened in the concern. In the Bratislava factory, the biggest 3D printer in the world for the print of the metal parts was installed. Xline 2000R is currently the biggest three-dimensional laser printer with Selective Laser Melting (SLM) mechanism which is used in the company. The company production in Slovakia was the first in the world which implemented this technology in the operation. SLM is one of the 3D print technologies which uses laser for melting of the metal

dust in the dust cabin. Aluminum and steel are used for printing parts and prototype parts. (Volkswagen Slovakia (c), 2020)

As the automobile manufacturer, the main activity of the company is the production of vehicles. The whole process of production involves several follow-up activities which are operated decentralized in the subordinated divisions. The existence of each automobile production takes place in the press shop where supplied metal coils are concerted in three-dimensional metal parts by several deep-drawing and cutting steps:

- the body construction,
- the paint shop,
- final assembly.

Even though the manufacturing is tightly scheduled, following the pull, just-in time and just-in-sequence principles, in between the production sections there are storages. So, each part, module or body is stored from usually hours up to days till it enters the next level of the production hierarchy. In theory, those buffer storages are unnecessary cost factors. In reality, it would be too risky to set those buffers aside. In the whole chain of actions of an automobile production are just too many possible failures which would affect the following step and eventually negatively influence the overall performance of the factory. If there is for instance a productions stoppage in the body construction shop caused by a mayor failure of the robotics controlling system, it would just affect the stations of the body construction shop. The following paint shop could normally continue, since its production gets fed by the buffer storage between the body construction and the paint shop, for at least one to three days.

Results of the Analysis of Maintenance and Critical Assets

The maintenance process is provided by the specialized maintenance department. Basic maintenance is scheduled and performed according to manufacturer's regulations for the machine maintenance. This planned maintenance is scheduled in SAP system and usually includes inspection, cleaning and lubrication. When the immoderate harm on the equipment is found, a direct fix is provided. The general maintenance approach could be defined as preventive. Apart from the scheduled preventive interventions there are no specific maintenance approaches implemented. Occasionally occurring incidents are approached in a reactive manner. The most common case is when a worker on the assembly line notices a malfunction of the equipment themselves. Each asset in the factory has an identification label with all important information including the name, identification number and a responsible person in case of fault. A faulty machine can be then easily identified and the employee knows who he/she should notify. The notification is usually made by telephone or ~~by~~ transmitter. Some of the more advanced machines are connected to a visualization system and signalize the fault automatically. The system is administrated by a responsible person who assigns incidents to a technician. Afterwards the technicians go on a survey of the incident location and evaluate the range of defect and decide if spare parts will be needed for the fix and if it is possible to fix it on the spot. In any case, they schedule the repairs on the next possible suitable timeslot.

The mapping of the maintenance process was performed on the premises of the company accompanied by interview with the technical personnel staff. During this mapping procedure, maintenance tasks and relations between involved roles intervening in the process were discussed. The whole maintenance process was drawn in to the process map and is visualized on the following flowchart diagram (see Fig. 2).

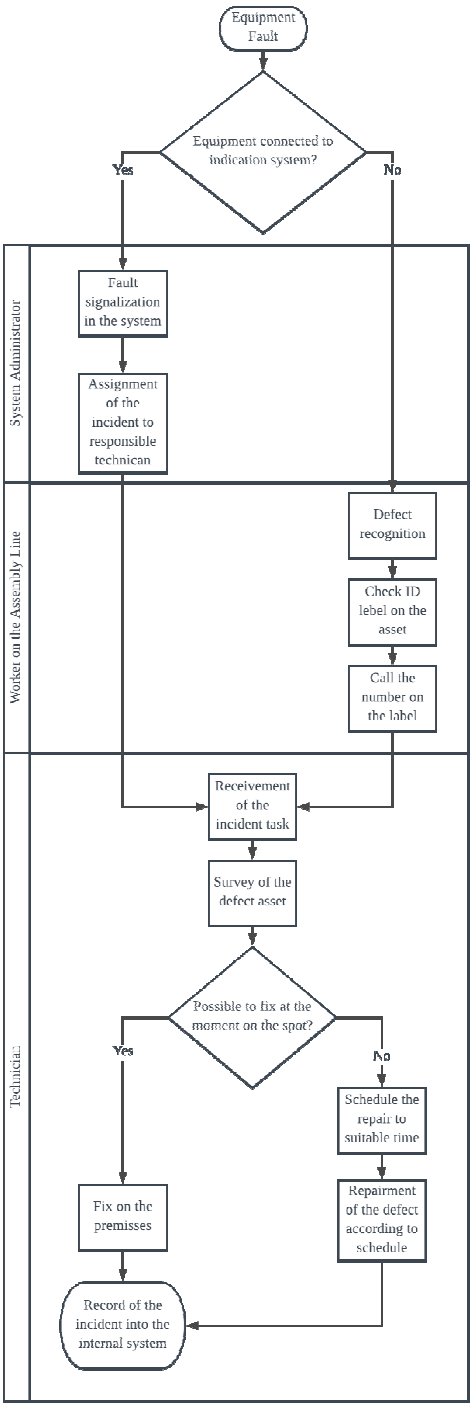

Fig. 2: The Maintenance Process Map

The maintenance operations are supportive processes of the main production process of the company. Some maintenance activities are outsourced and performed by a specialized service provider. The process owner of the maintenance of the selected machines is the external company. This company is responsible for the immediate reparations of the contracted machines the moment incidents occur and eventually it shall avoid any shut-down of the assembly line. Hence, there need to be a continuous communication line between the company and the service provider, to be able to act and respond instantly and meet the requirements of the instructing party. A state-of-the-

art IT infrastructure and regular meetings help ensure the consistency and quality of the information flow. The outsourced service providers work for the Maintenance department which is responsible for keeping the whole production in technically adequate conditions. The main authority is the head of Maintenance department who is responsible for maintenance strategies, approaches and plans. The head of the Maintenance department is considered as the process owner of the whole maintenance process in the company. External companies have their own organization structures and are organized by a manager from the company Maintenance department.

Conveyors delivering car bodies from the paint shop to the assembly line are maintained by different external company than conveyors and platforms in the assembly hall are. All machines in the assembly line are maintained by only one contracted provider. However, the company has, except external maintenance contractors, its own department responsible for all screwing technics in the factory.

Predictive Maintenance

In order to ensure process stability throughout the whole production line. The company runs a comprehensive maintenance department. Assets must be in top conditions all the time. Continuous operations and availability have a high priority. The issue of predictive maintenance is relatively new in the Slovak branch of the company and up to now there is no solution of this kind that has been implemented yet. Although the company does not have experience in this field, it is open and positively disposed. The approach towards the Industry 4.0 is implemented in the company strategy, so the application of predictive maintenance is the designated way to achieve the set goals. The way of integrating this approach in a larger scale is performed carefully from the company's management side. Before a final decision is made, the concept should be verified in praxis. The company's expectations on the predictive maintenance as a holistic approach focus on the following general, production-wide improvements:

- prediction of production losses,
- predictive maintenance,
- increased production efficiency and productivity,
- reduction of maintenance costs,
- reduction of production losses by 50%,
- increase of the production line availability.

Identification and Selection of the Critical Subjects

Each result of the analysis was consulted with technicians and mechanics. After discussions and consideration of all challenges which could possibly affect the project, the final decision was made. Three machines were chosen representing the best conditions for a successful project implementation with a significant impact on breakdown reduction. The following table (see Table 3) briefly describes the three selected equipment pieces, their function at the assembly line and specifies which of their mechanisms is responsible for the outage times:

Table 3: Equipment characteristics

Machine	Purpose	Defects
Hinges	transport of hanging cars during assembly	prone to faults of bearings in the transportation wheels and electric motor overheating
Platforms	transport of cars placed on the platform during assembly	prone to faults of bearings in the transportation wheels
Transfer Desk	lift pushing the platforms to an appropriate height	prone to faults of electric motors driving the lift mechanism causing the platform tilt/inclination

While the implementation of the project has a direct impact on the production and assembly line, risks and critical aspects should be considered and evaluated in advance. The system failure has a very high effect on the production and high effect on the business considering the cost of the outage. The restoration of the system can take 30 minutes to 4 hours and so it results in significant costs. The connection of the data analysis and a judgement of the experienced specialist brought synergic effect and resulted in the identification of the most suitable equipment to be

monitored. The monitoring of those parts of the assembly line can prevent occurrence of the failures and so save the company from unwanted costs. For the design of the predictive maintenance solution it is necessary to analyze specific equipment functions, their most common faults and the way how they are currently maintained.

Results of Problem Analysis

Each selected equipment has its own significant purpose and a task to accomplish. This chapter describes the function of the equipment, technical issues occurring during its lifetime and statistics about breakdowns and their durations.

- The Platform: The major issue causing breakdowns is the bearing friction of the wheels located under the platform. This friction is causes overheating of the bearing. Inner parts of the bearing are lubricated in order to prevent this friction. Nevertheless, overheating of the bearing causes a reduced functionality of the bearing and eventually causes a blockage of the wheel. This blocked wheel is breaks the platform and subsequently the whole train breaks as well. Faults of this kind are cause vibrations in the platform and noise emissions.
- The Transfer Desk: The critical part of the transfer desk is the lifting mechanism driven by an electric motor. The most incidents are caused by faulty gears or spindles. These is cause the platform to tilt or rather to incline.
- The Hinges: The major breakdowns of the conveyor are caused by wear of the bearing. This causes a blockage of the transportation wheel which is which sits on the trail. The blockage of the wheel could also originate by overheating of the bearing due to a continuous operation of the system and a limited lifespan of the part. A further part prone to fault are the electric motors. Breakdowns are mainly caused by overheating of the motors. These motors are control the motions of the transportation system, including the combination of the whole conveyor plus the car hooked on the hinges. Throughout the whole track the engine thrust must cope with and balance different speeds as well as many inclining and declining segments of the track. Obvious breakdowns are usually recognisable by noise of the bearing and regular visual examinations. In addition, there are sensors measuring heat, flow or vibrations in many places. Their function is to warn when the parts of the system reach critical conditions.

Discussion

In order to meaningfully implement the condition monitoring in a production system, it is firstly necessary to understand the object to be monitored, its structure and mode of operation. In conjunction with the cause identification of the past failures, relevant parameters for the planned monitoring can be derived and defined in order to subsequently select the necessary and to locate them in suitable positions. This approach provides an important basis for the value of the data collected and also contributes significantly to the success of the installed monitoring equipment. In order to evaluate the condition of the observed machines, parameters should be specified as they are critical elements of the system. These individual measured items will provide data repeatedly every certain time period what will create a big picture of the behavior of the machine in the course of time. The following table includes all considered parameters to be monitored and explains the reasons for monitoring them.

Table 4: Parameters to be monitored

Parameter	Reason to monitor
Temperature	Increasing temperature of bearings/wheels and driving electric motors indicates a higher probability of failure.
Vibrations	Changing vibrations pattern indicates incoming failure of bearings in wheels & electric motors.
Barcode	To identify platforms and hinges, scan their position & measure the driven distance (km) without failure.
Electric current	Increasing current consumed by the motors indicates an overload.
Inclination	The increased tilt of the platform on the transfer desk causes the assembly line to stop.
Sound	Accompanying phenomenon of issues with bearings can be used for sound analysis.

Each parameter will be measured using a specific method with the aim to achieve the best results. For this purpose, a specialized sensor technique will be used. Consultations with technicians resulted in specification of the most suitable measuring method and clarified the suitable options for their use. On each of the selected assets, more parameters can be measured at the same time. The following table describes how and where certain parameters will be measured.

Table 5: Measuring methods and placement of the sensors

Parameter	Measuring Method	Placement
Temperature	measured by Infrared (IR) contactless temperature sensors	- 6 wheels/bearings on each platform - 1 electric motor & 2 wheels/bearings of each hinge - 4 electric motors of the transfer desk
Vibrations	measured by special vibration sensor (bearing fault detector)	- 6 wheels/bearings on each platform - 2 wheels/bearings on each hinge
Barcode	read by barcode readers	- at the transfer desk - on selected places along the assembly line
Electric current	measured either by an electric power meter (in the power distribution box) or by contactless current transducers on the power wiring or their combination	- 1 electric motor of each hinge - 4 electric motors of the transfer desk
Inclination	measured by special 1 or 2 axis precision inclination sensors	- 1 sensor on each monitored platform
Sound	features extraction of sound from microphones	- 6 wheels/bearings on each platform

Each machine was surveyed by an IT team and technicians in detail in order to consider the right placement of sensors for monitoring of the discussed parameters. for monitoring of the discussed parameters. Obstacles on the trail system were identified and assessed. The implementation of the condition monitoring system contributes to company strategy fulfilment and prepares the company environment for the implementation of the predictive maintenance in larger scale. The condition monitoring project in a form of proof of the concept verification is a very good way how we can figure out what works for the certain conditions present in the company and test various options in order to evaluate what works better. The documentation of the whole procedure and the related information will help in the future implementation of the Industry 4.0 strategies.

Conclusion

The analysis deals with the internal and external environment of the company what resulted in conclusion that company has favorable conditions for the implementation of the Industry 4.0. The external environment requires technological development and progress in delivering the electro mobiles. The IT organization structure is developed in a good manner to support the company technology needs. The current interest and involvement in projects dealing with issues of the fourth industrial revolution show the way the company has selected. After the analysis of the maintenance process of the selected assembly line parts it could be concluded that there is a reactive maintenance approach with a combination of the preventive maintenance program. A high level of the required reliability and continuous operation of the whole assembly line puts maintenance under the pressure. The maintenance department is open to solutions which will help to prevent any shut down of the assembly line. As it was mentioned earlier, the expectation of the company is the increased production efficiency and productivity, reduction of maintenance costs, reduction of production losses by 50% and rise of the production line availability. This guides to the adaptation of new maintenance program meeting these expectations. The condition monitoring as the first step towards the predictive maintenance can help to better understand machinery conditions by using IoT technology, data analytics and visualization tools. They can enhance to localize faults more quickly and efficiently.

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The Elements of Technical Support for Integrated Safety Management in The Industry 4.0

Marcin BERLIK

Poznań University of Technology, Faculty of Engineering Management, 2 J. Rychlewskiego Str. 60-965 Poznań, Poland, berlikmarcin@gmail.com

Malgorzata SLAWINSKA

Poznań University of Technology, Faculty of Engineering Management, 2 J. Rychlewskiego Str. 60-965 Poznań, Poland, malgorzata.slawinska@put.poznan.pl

Abstract

Enterprises in the information age are characterized by an integrated approach to managing qualitatively diverse components, such as: technical organization structure, work items, raw materials and semi-finished products, people, databases, etc. Therefore, in order to minimize the risk of management decisions in which the dynamics of significant accompanying phenomena are taken into account, a process approach and modeling of the production process are required. As a result, in assessing the achievement of the company's goals, it is required to use appropriate indicators and measures that will combine economic criteria with key performance indicators appropriate for the organization. Such indicators include rates of accidents at work, employee turnover rates, employee energy expenditure indicators, machine fitness indicators, etc. As can be noticed, the basis for the development of industry 4.0 is modeling the relationships that occur between planned tasks and the closer and distant environment. Understanding the interplay between elements of the production process is the basis for designing feedback. Thanks to them the process variables are regulated due to the accompanying phenomena in the area of work planning, implementation of work tasks, operation of technological devices, in the field of security engineering as well as IT systems and others. That's why, it should be assumed that various categories of resources are equally important for the organization, expressed by technological variables, by the parameters of the employee's functioning and parameters of use of technical facilities, as well as by variables of communication processes. Man and his reliability have a great impact on the process. The multi-faceted description of industrial processes makes it possible to identify critical points in relation to all important enterprise resources. It allows to understand the sources of organizational deficits, but importantly it is the basis for designing regulatory mechanisms and implementing industry 4.0 principles, including: interoperability, visualization, decentralization understood as the ability of subsystems to operate autonomously, real-time attribute, orientation on services and modality.

Keywords: integrated safety management, industry 4.0, smart workplace, human factor, ergonomy

Introduction

Enterprises in the age of information are characterized by an integrated approach to the management of qualitatively diversified components, such as: technical structure of organization, components of operation, raw materials and semi-finished products, people, databases, etc. In relation to the above, in order to minimize the risk of managerial decisions, in which dynamics of the substantial accompanying phenomena are considered, a process-oriented approach and modeling the system relationships is required. A process-oriented approach in organization of work is necessary, in order to include dynamics of phenomena in the supply chain management. Whereas, modeling the system relationships is fundamental for understanding the situational context and risk management. The culmination in its assessment is knowledge of problematic situations and access to all records concerning the effects of adverse events, i.e. including accident scenarios. "A wider analysis of adverse events can only be possible if the organization has an access to the information from a significant number of occurrences" (Ewertowski, 2018).

In order to minimize the risk of adverse events that are not limited to the sole employee, but also to the company, the customer and the society, a universal responsibility for the entire safety of the system should be established and

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developed taking into account all interactions between man, the workstation (machines, technical equipment) and the working environment (Górny and Sadłowska-Wrzesińska 2016).

In the integrated safety management, where priority is given to the economic efficiency, a focus is made on regular identification of hazards, occupational risk assessment and precise determination of actions required for the effective prevention of accidents and losses especially through use methods and tools dedicated for this aim/objective (Misztal and Belu 2016). Implementation of the above requires access to the resources of information and the respective technical environment. However, real-time updated data enables the reduced threat of errors, as a response to the following questions: “What should be avoided and what company's goals are being regarded?”; “What actions should be taken to extend time limits for critical decisions, the so-called one-chance decision?”; “Which system relationships are important for improvement in the safety of industrial processes?”

The purpose of this papers is presentation of an innovative approach in the field of integrated system resources, on the basis of monitoring the parameters of employee's operation. The efficiency of planned activities and long duration of tasks is adopted as a control variable during modeling, that is crucial for the improvement of labor safety. IT technologies and safety devices have been determined as the resources that jointly provide new opportunities in the management of safety, in the Industry 4.0.

Unreliability causes for operator's tasks

Among all groups of accident causes, the group related to the human factor constitutes the group with the highest number of classified accidents. According to the data published by the Central Statistical Office in Poland, as much as 61% of accidents is included in this group, which are primarily caused by improper behavior of an employee (Auksztola and Buńko 2019). Lack of attention and nuisance of employees are determined as direct accident causes, thus the factors of human operation and causes for man's unreliability, in the organizational context, should be identified in details, in order to efficiently improve the safety. “More and more frequently, workers function in the operator subsystems whose efficiency (reliability) results from the relationships between a man and a technical system. In such a case, the efficiency of the operator system constitutes a synergic result, which is, at the same time, attributed to a technical device, operator and their common environment as well as the system of the interrelationships” (Mościcka-Teske et al. 2017).

The knowledge of component characteristics, as well as characteristics of system parameters, are fundamental in designing the technical and social systems, with regard to the relationships between these components, as well as the components and their surrounding. The identified mechanisms of errors in a human being are assumed as specific properties of a human being. Conditions accompanying difficult situations, with emphasis on time deficit, are assumed as crucial with regard to the properties of the system. An example of labor method in which the aspects of above system operation are seen as important for the safety, is labor of the diagnostic and safety system operator in the automated manufacturing process. On the diagram illustrated in Fig.1, tasks related to error handling and solving were identified. Such tasks comprise of: process stoppage and reconfiguration, as well as a changes in the algorithm of system operation. Each specified category of the operator's tasks imposes high requirements on the employee, i.e. including stress resistance, high responsibility, involvement and high professional competences. Discontinuation of the process, when a decision on technological chain stoppage is required, is implemented concurrently with the IT system. Whereas, the operator frequently performs a task of the reliable redundant structure component, and operates in the event of technical failure. Reconfiguration of the process requires from the employee much experience, intuition and ability to evaluate the risk, as well as decisions in the conditions of optional solutions. Changing the algorithm of action requires from the operator considerable psychophysical skills. These situations are accompanied by a high level of psychical stress, as a result of the following phenomena: 1) an increase in input information, its complexity, variability and ambiguity; 2) laking relationship between the signal and the reaction; 3) increased participation of the neural system in the course of pursued activities.

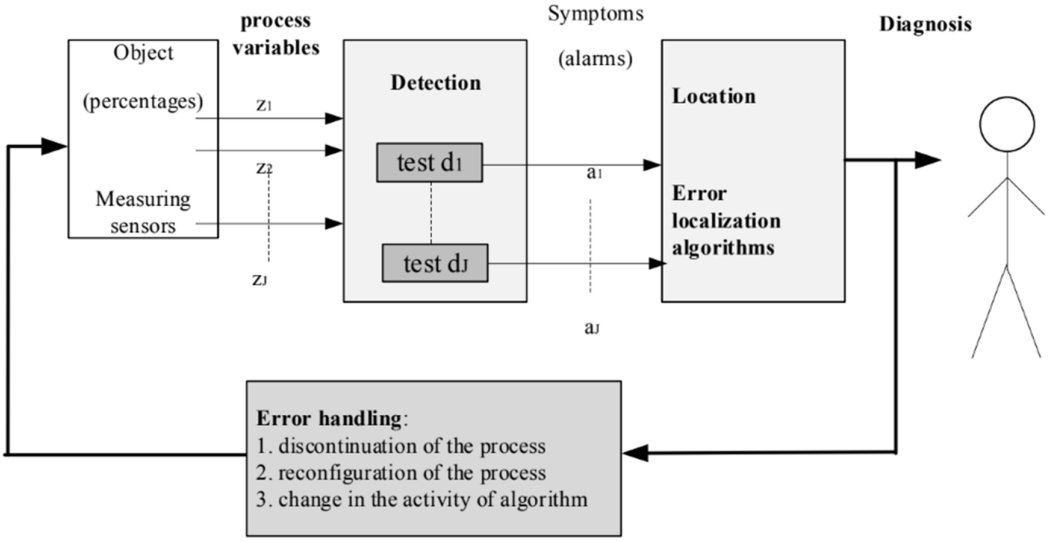

Fig. 1: Diagram of the diagnostic and safety system in the industrial process (own research)

The verification of perfecting engineering solutions is carried out during critical tests, during simulation of difficult situations:

- overloads when requirements exceed capacity,

- triggering obstacles, when there are unexpected and problematic stimuli,

- generating conflicts, when there is a conflict of requirements, needs, values, norms, etc.,

- stimulating the conditions of deprivation, when a time deficit, information deficit and lack of resources take place.

Evaluation for the level of mental stress requires the measurements of the system and appropriate indicators, in order to obtain knowledge of factors reducing the requirements imposed on the user of the designed norms, as well as may contribute to the occurrence of unacceptable events.

Human factor as a key element integrating the system

The human factor is still crucial for the industrial safety, despite stable technological advancement, possibility of interaction between individual system components, and possibility of implementing the increasingly complex processes without any direct involvement of a man. When the human factor is under research, not only the operator performing a task should be considered, but also the constructors, people performing repairs, maintenance and management works. In all areas of activity, the human factor will influence on operation of other system resources, on the basis of mutual interactions. Despite direct connections between the devices, a person is simultaneously a general factor affecting their interaction, because a person i.e. programs, operates, maintains and supervises the devices during operation. (Berlik, Dahlke and Sławińska 2018)

There are many human factor models. One model is called the SHELL model and is used in aviation, in order to depict the role of a human factor as a component connecting other resources.

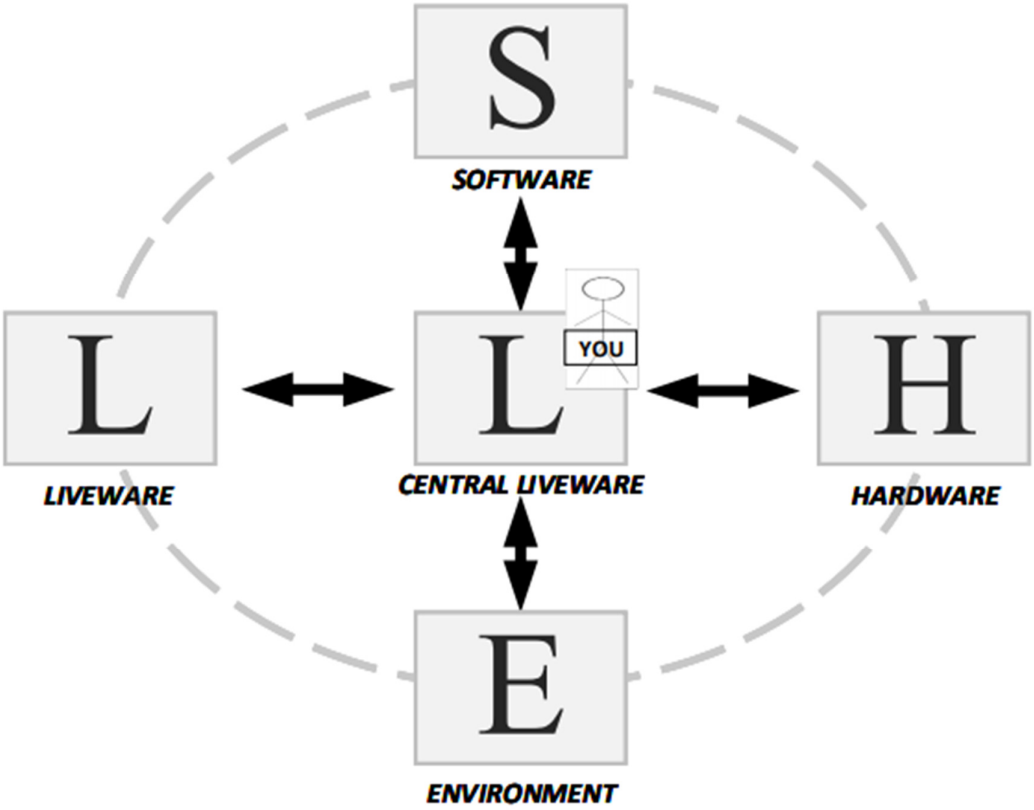

Fig. 2: Diagram of SHELL model [own study based on (Cantamessa et al. 2018)]

In the SHELL model, a man plays a key role integrating the cooperation of other system components. A man interacts with Software (programs, procedures, logistics), Hardware (machines, devices, tools); Environment (surrounding and conditions for operation of all system components - economic, physical, organizational); Liveware (a man with his psyche, knowledge, attitude, conduct, physicality, susceptibility to stress, etc.). A connection between Liveware and Liveware should be noted in this point, i.e. the mutual relationship between the people constituting components of the system. Ignoring the role of a man would be a big mistake, even at a particular instance of the process that is seemingly performed without his involvement. It should be remembered, that the responsibility for planning the process, its supervision, design, device programming and manufacturing of tools, etc., lays in the hands of a man. Paradoxically, autonomy of the process leads to the increased importance of the human factor, as a result of its greater susceptibility to hardly-detected latent errors. (Dąbrowska 2011)

Importance of the integrated safety management in the Industry 4.0

The concept of the integrated management of operational safety is a response to the requirement for the improved efficiency of operation within the organization. It was demonstrated in the research, that improvements in the safety beneficially affect other system components (Górny, Sławińska and Sobczak 2016). Whereas, focusing on the employee is fundamental for the following postulate, namely the operation of the whole system depends on the operation of a single unit, in the systemic approach. Therefore, when emphasis is made on a human being who is a trouble spot of the safety, operation of the whole system can be effectively improved (Górny 2015). Hence, adopting a strategy oriented on the improvements in labor safety is crucial for the effective management of organization. In the safety management, it is necessary to recognize the boundary constituent capabilities and indicate the critical resources enabling proper evaluation for the moment in the system, when it loses its capabilities of operation (Berlik and Ewertowski 2019). Employee's errors, with stipulation of their causes, are identified with regard to the human factor. Each error has its own mechanism, or mechanisms, thus analysis of documented phenomena can lead to knowledge of their causes. It is extremely important to design documents dedicated to such analyses, similarly to the case of ergonomics analysis for interface operation in the sewage treatment plant. The importance of error mechanisms occurring at a human being is identified in the presented concept. The first - generalization (of a stimulus or reaction), which indicates the requirement for individual experiments for each operator. The error is treated as a

natural and unavoidable phenomenon, constituting the operational principle of human nervous system. The second - habituation, namely a decrease in reactivity, an increase in the sensitivity threshold, with respect to the regularly recurring continuously influencing stimuli, at a particular time. It can be clearly observed in so called stand-by tasks. The third - anticipation, i.e. keeping a particular content in the mind until a particular goal is achieved, whereas new information can be omitted at that time. A particular number of errors occurs as a result of lacking control of a human being for two or more information streams, with means of own perception. Fourth - the principle of single-channel conduct limiting synchronization of actions, thanks to which a person may understand why the time required for the reception of a stimulus is much shorter than the time required for the selection of a stimulus. Designing a technique with regard to knowledge of psychological error mechanisms in a human being is based on cognitive ergonomics, or ergonomic engineering (Sławińska 2019). The efficiency of such projects can be evaluated with means of systemic safety indicators and key performance indicators (KPIs), which together enable integration of various rationales into the management decisions. Then, all relationships between the technical and organizational elements and the employee are taken into account. In the context of conditions multiplying fatigue of a human being, the following issues are taken into account:

- tasks are not accepted by an employee,
- negative opinion on labor organization, also with respect to breaks at work,
- excessive exposure to stress,
- unreasonable restrictions on creativity and involvement,
- lack of intuitive tools and means of work,
- forced posture at workplace,
- excessive efforts,
- unacceptable risk of exposure to harmful factors.

A detailed examination for the problems above is crucial for understanding the mutual interaction between the components of the industrial process, planning and implementation of tasks at the workplace, operation of technological devices and safety components, IT systems, as well as other components. This knowledge is implemented in the mechanisms of adjustment, therefore the risk of safety failure can be significantly reduced, as well as completation of the resources can be controlled (Sławińska et al. 2019).

It is impossible to monitor the large scope of diversified phenomena without any support of modern technical solutions (Sławińska et al. 2018). Implementation of modern IT technology in organizations is a must. The Internet of Things solutions should be considered in this respect. The importance of such solutions is prevailing, because it enables the following goals:

1. integration of system elements in the IT system environment,
2. application of safety elements that are used in the industrial processes,
3. monitoring the dynamics of phenomena in the industrial processes,
4. responding to difficult situation indicators,
5. implementing the knowledge of individual error mechanisms of a human being at particular workstations,
6. implementing the preventive mechanisms against adverse events, by supplementing the essential system resources
7. optimizing decisions during operation of utility chains, according to the scale required by decision-makers in the integrated organizational chain.

The consequence of the integrated safety management is application of systemic indicators and measurements, which include: a measuring device determining condition of the human body, such as body temperature, heart rate, measurement devices indicating dynamics of system relationships, thanks to which the mutual influence between operational components of the system can be monitored, as well as trend indicators for critical parameter values determining the efficiency of industrial processes.

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Technical support for the industrial process safety

A separate problem that needs to be solved while improving the safety in the Industry 4.0 is designing the system's resistance to emergency situations, in which the primary importance is assigned to communicational processes during operator's tasks. Authors understand the safety of the system as a feature of system's resistance to the influence of factors triggering the safety threats, which requires a much wider application of technology in the process, in order to support the operator interacting with the interface.

Complex technical and social systems are equipped with safety control devices, with respect to the relevant process parameters. Such devices comprise of safety switches, interlocks, safety sensors, control modules, authorization devices, control devices, etc. They are designed to specific technical solutions, but they can simultaneously provide active support for the required labor ergonomics, as well as they affect the sustainable development in the management of distribution chain. As a result of their design, they integrate system data, thus handling the information for the improvement of labor ergonomics is made easier. Thus, the level of employees' fatigue can be significantly reduced.

Safety switches used for safety guards, that must be closed during device operation. They can also be blocked during a labor break, hindering improper use of such devices. When the cover is opened, the activating element is separated from the safety switch and a message can be displayed, motivating for a respective action, whereas the supervisor simultaneously receives information about such non-compliance.

Electromagnetic safety interlocks operating in conjunction with machine control elements, e.g. motion control modules or modules with a clock unit, that prevent the condition of opening the safety guard until the end of a dangerous condition, i.e. the end of approaching movements, as well as may inform about duration of such interlock and the possible supportive actions at time of waiting for the end of the primary process. Alternatively, the employee can be informed about the relaxing activities in so-called micro-breaks, when he waits for the end of operation. Electromagnetic safety interlocks are also used in the cases, when opening the safety guard constitutes unauthorized interference by third parties. The electromagnetic safety interlocks can be a specific indicator for a problematic situation and indicate the requirement for occupational risk analysis, because they are equipped with safety measures against improper locking condition.

Limit switches with a safety function, which are used at sliding and tilting guards.
Anthropometric features should be here included, in order to eliminate the forced body posture during a specific task, following detection of dangerous machine component movements at time of maintenance works. Their installation in any assembly position provides this feature.

Application of **magnetic safety sensors** is particularly advantageous when an exceptional level of dirt is possible, or when high hygiene standards must be complied with. Possibility of mounting in a location hidden under non-magnetic materials is an advantage. As a result of this, workspaces and storage spaces can be arranged in such a way, that dirt does not accumulate on the edges. When applied, they ensure compliance with the requirements of bio-mechanics, as well as norms pertaining to load limits for body-posture. It is extremely important for the reduction of employee's fatigue.

Immobility control modules are used to securely record machine's inactivity, as well as control the electromagnetic safety interlocks. Depending on the arrangement of external circuits, the safety system may cause the forced switching. Motion control modules are equipped with an Integrated Diagnostic System (ISD) for quick and simple detection of errors. The user receives information from the immobility control module and the sensor, with means of LEDs. Data obtained from such devices is collected in the operational database and constitutes the source of information for anticipation of phenomena accompanying difficult situations, as well as can directly support operators during their labor with means of noticeably reduced stress. Delay clock modules are frequently used against dangerous situations that may occur after deactivation of the machine or installation, for example as a result of approaching movements. Knowledge obtained from these sources is fundamental for reorganization of manufacturing processes with regard to cost accounting, with consideration to biological and environmental losses.

Emergency stop cable switches are mounted on machines and installation sections, that cannot be protected with covers. Unlike mushroom emergency stop buttons, the cable switch enables triggering the emergency stop command at every point of cable. Emergency stop cable switches are activated by pretensioning the cable, e.g. in the case of dynamic logistic tasks within the area of communication routes. The signals recorded from these sources can be interpreted as conditions of increasing fatigue, when mistakes and deviations to stereotypic activities take place.

Authorization device (dead man button), together with other safety measures, are used to protect people from potentially dangerous situations, when machine guards must be completely or partially deactivated in special operating modes. These special situations include configuration of the machine, maintenance works and inspection. The device can be used in designing the labor method with consideration to individual pace of activities of a particular employee, when the button is released by the operator and the machine is safely stopped. The ability to adapt the pace of machine operation to current employee's capabilities is one principle of high-quality ergonomics of labor methods..

IT technologies in the management of the intelligent workplace

A significant advancement took place in recent years, enabling utilization of many new solutions within the same scope. Wireless communication is one important transmission medium for data and information to other devices. Information is sent wirelessly, without any application of cables, by means of electromagnetic waves, radio frequencies and infrared. The authors point out the innovative application of 4G and 5G data transmission standards, that have transformed the cellular telephony and available wireless services, such as the following examples:

- **4G LTE** (Long Term Evolution), a standard that will provide broadband Internet access, fast data transmission, a wide range of mobile services that can be used to e.g. monitor the presence and process of people's relocation with means of supporting devices, as well as registering their relevant technical parameters;
- **Wi-Fi** (Wireless Fidelity), fast wireless connection implemented at short ranges between the Internet and mobile devices, i.e. as a communication channel;
- Bluetooth, a short-range radio standard with means of electromagnetic field, for transmission of signals at short distances between telephones, computers and other devices. This technological standard enables simple communication and synchronization between devices, thus the required stimuli can be communicated, as well as the management of user's operation can be assisted, etc.

These examples of modern technology greatly affect the improvement in labor conditions in the established and dedicated communicational space, with mapping of crucial system relationships in the integrated organizational management, as shown on the diagram (fig. 2). The presented diagram for information processes enables localization of very important feedback loops, when the construction of control model based on accident scenarios is the starting point. The reference point in the constraint-control algorithm constitutes the process model and the control model. Constraint-control algorithms include human error mechanisms, thus the communication system can be generated in compliance with the model of operator's tasks. On the other hand, control functions are implemented with means of variety of sensors, that are intermediary points during the reaction with means of improvement mechanisms. Controlling the course of intended tasks is adequate to the monitoring algorithm for critical system resources.

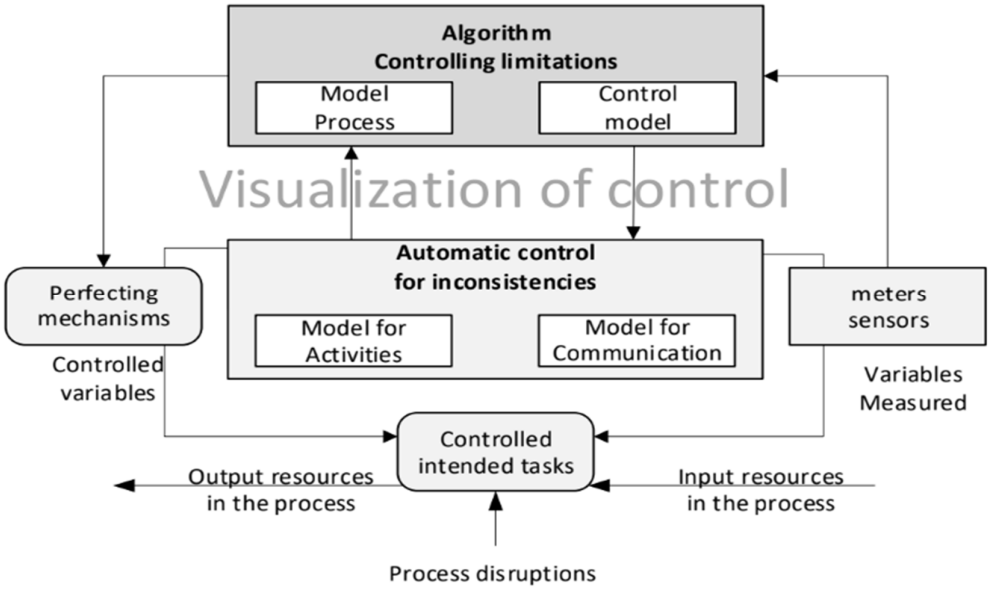

Fig. 2: The information system diagram for controlling the intelligent workplace (own research)

The concept of using technology in the field of the Internet of Things is an innovative approach that rises the "monitoring" to a higher level, without any additional involvement of employees. A technical support is obtained when controlling the employees' attention and motivating them to safe behavior. Devices and sensors within the manufacturing hall record and generate data in the network, to which individual devices and software are connected, as well as trigger the respective stimuli sources. Most often in the form of human voice, signals imitating the sounds of nature, or images that visually communicate the content desirable for a particular situation. Here proper algorithms are the solution, that can independently take actions on the basis of available data and important control variables, in the context of particular applications and activities.

An example of relevant data is an interactive wristband, by which the employee's activity status is evaluated. The control variable for this status is heart rate, whereas the control variable is comprised between the minimum and maximum values specific to a particular person. At output, an action directed to the employee is triggered, in order to inform about the threats, as well as to the superior, in order to motivate the employee and cause a change beneficial and planned for a particular situation. This enables the pro-active management of labor methods in actual processes, with knowledge of existing constraints and available resources.

The concept of implementing technology in the field of the Internet of Things constitutes a considerable feedback in limitation of the stress induced by dangerous behavior of employees, when a human being who interacts with the industrial process becomes the component of the redundant reliability structure, i.e. a human being performs tasks of the "reserve" element in the event of emergency. As a result, what support should be provided to the operator, in order to make him do the entrusted tasks in the event of the safety threat? Designing the conditions that will provide the respective time that is required for tasks within the framework of emergency procedure is the main difficulty. "Fighting with" deficit of time required for activities securing the system in the event of a safety threat is understood as the interface designed with knowledge of human capabilities. A proper interface translates into time required for operator's tasks. If postulates and requirements for ergonomics are implemented in the IT system, the control of automatics in the labor system will be extended with sustainable resource management modules, that were stipulated in item 4. In this respect, procedure stages are presented on diagram, fig. 4.

At the initial design stage, the analysis for available records of all discrepancies is carried out. Substantial system relationships, that are a decisive factor for occurring problems, are identified. A solution method for a particular problem is searched in the practiced solutions. When such solutions are lacking, a decision can be made to eliminate the source of threat and change the technology of industrial processes. Most often, many potential solutions exist. From the list of identified solutions, a solution demonstrated by economic calculations,that is profitable to a particular organization, is selected. At the decision-making stage for the selection of technical solutions, numerous workstand experiments are carried out, in which system relationships are examined and the complexity of the ergonomics design is verified (Sławińska 2019). The scope of these works determines the size of operational knowledge database and competences relating to risk management. From the point of view of integrated safety management in the Industry 4.0, the areas of human integration should be pointed out in details, as well as tasks should be clearly allocated between the technical elements and the operator's tasks. The major problem pertains to modeling the feedback loops, after inclusion of the intervention range with regard to the reliable structure with functional redundancy. Planning the methods of generating the feedback data guarantees the following effects (Ratajczak 1988):

- reducing the loads imposed on visual organs, with respect to the perception of objects,
- ensuring accurate reception of information transmitted by indicator devices,
- enabling the most comprehensive information synthesis during the executive decision-making tasks,
- inclusion of the appearing information in the man-made subjective model of activities,
- inclusion of additional (supplementary) information sources into the general circulation of information,
- giving a man the opportunity to keep necessary information in the so-called operational memory,
- enabling the development of specific strategies of actions, e.g. the possibility of obtaining additional information.

Summary

Integration of system resources with respect to the human factor requires priorities given in the management of organization, as a result of the process safety and active support of employees. Focusing on difficult situations constitutes the basis during anticipation of the safety failure situations and the accompanying losses. Implementing the resource control projects in organization, with regard to the human factor, is fundamental in terms of increasing the reliability of technical and social systems, and simultaneously enables the efficient exploitation of all system resources. Creating a flexible technical environment on the basis of modern information technologies, as well as

manipulating the information, makes organizations open to new directions of development, also to particularly difficult situations, such as the current state of coronavirus pandemic (Oleśków-Szłapka et al. 2019).

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Social Support and Satisfaction with Life in Perception of Youth from The Perspective of Young People with Autism Spectrum Disorder – Asperger Syndrome

Anna GAGAT-MATULA
Pedagogical University of Cracow, Cracow, Poland, anna3006@op.pl

Bozena FRACZEK
University of Economics in Katowice, Katowice, Poland, b.fraczek@ue.katowice.pl

Abstract

This paper discusses the issues of social support and the quality of life of young people with Autism Spectrum Disorder (ADS) - Asperger Syndrome - who are temporarily orphaned due to their father/parents migrating. The paper pays particular attention to social support and the quality of life of migrant families from the perspective of young people with ASD - Asperger Syndrome. The study applied the quantitative method, as well as the Satisfaction With Life Scale (SWLS) created by Ed Diener and adapted by Zygfryd Juczyński, and the Social Support Scale developed by K. Kmiecik-Baran. Participating in the study were 50 young people (39 boys and 11 girls) aged 16-18 whose parents had gone abroad for economic reasons. The results of the research show that the quality of life and social support for temporarily orphaned young people with ASD - Asperger Syndrome are at a low or medium level.

Keywords: Autism Spectrum Disorder, Asperger Syndrome, socioeconomic status (SES), social support, quality of life, migration.

Introduction

During the period of juvenescence in every young person's life, a sense of satisfaction of with one's own life as well as the support obtained from the social environment take on significant importance. These factors have an influence on the formulation of plans regarding the future, and determine future activities. They are also essential for every young person, especially for a person with a disability, in particular when changes occur in the family structure as a result of migration of a parent or parents.

The term "satisfaction with life" is ambiguous, multidimensional and interdisciplinary. The following terms are used by researchers interchangeably and regarded as synonymous: quality of life, contentment with life, well-being, happiness (Argyle 2004, Cegła and Bartuzi 2004, Czapiński 2004, De Walden-Gałuszko 1994, Jaracz 2001, Veenhoven 1991).

According to Czapiński (2004), "life satisfaction" is depicted as the emotional and/or cognitive balance of life at the value level (pleasant-unpleasant, good-bad). Jaracz (2001) defines "satisfaction with life" as a criterion of the quality of life. She regards it as a conscious judgment, the result of evaluation and valuing areas of life and life as a whole. Juczyński (2001) defines "life satisfaction" as the result of a conscious, cognitive comparison of one's own situation with individually determined standards. When the result of such a comparison is positive, a person feels a sense of satisfaction. The above definition is accepted for the aims of this work. Young people with Asperger syndrome have problems with social functioning, resulting from Autism spectrum disorders, a complex neurological disorder, the ethology of which is still unknown. Existing studies identify a series of genetic, neuroanatomic and immunologic anomalies, as well as dysfunctions in the area of activity. In 2013, DSM-5 replaced Autistic Disorder, Asperger's Disorder and other pervasive developmental disorders with the umbrella diagnosis of autism spectrum disorder (ASD) (https://www.psychiatry.org/psychiatrists/practice/dsm). Asperger's syndrome is the mildest form, with a mild spectrum of autism disorders.

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In diagnosis of ASD, two axial symptoms must be observed: disorders of communication/social interactions and stereotypical, repetitive behavior.

In the case of Asperger syndrome, there is no retardation or impairment of general language development or cognitive functions. This means that people with ASD - Asperger's, despite normal (or sometimes extraordinary) intelligence face certain difficulties, for example, in accepting the views of other people, regulation of their own behavior based on reactions to their environment, and lack of control over eye contact, facial expressions, body posture or gestures (Cybulska et al. 2016). In addition, people with ASD, especially young adults entering adulthood, experience significant difficulties in achieving independence (including financial independence). An important aspect that is seldom highlighted is that people with ASD, especially young adults entering adulthood, may be afraid of financial responsibility (paying bills, filing taxes, making financial decisions regarding saving, investing or borrowing money etc.) (Cheak-Zamora et al., 2017).

Thus, a social support network is of significant importance in such a person's day to day functioning and in their perception of reality. More and more attention is also being paid to financial education and the importance of incorporating it into early education to empower these people. Research indicates that for people with disabilities, psychological well-being, overall independence and at the same time satisfaction with life may be improved by being able to manage their own finances (Abbott and Marriott 2013; Taylor et al. 2011).

According to Sęk (2005), social support from the functional perspective is regarded as a type of social interaction undertaken by one or both parties, who participate in a situation that can be problematic, difficult, stressful or critical, considering that in the course of such an interaction, an exchange takes place of emotions, information, action instruments and tangible property. Such an exchange can be unilateral or bilateral, and the direction donor-recipient can be constant, but can also change. In a dynamic arrangement of interactions, we can distinguish seeking and supporting persons, and receiving or donating persons. In order that such a social exchange is efficient, it is essential to adjust the type of support to the needs of the recipient. The aim of supporting interactions is to maintain and de-escalate the crisis or level of stress by accompanying the recipient, participating in an exchange of emotions, creating a feeling of identity, safety and hope, working towards a solution to the problem, and overcoming difficulties
Sęk (2001) proposes a classification of types of support depending on the content of the social exchange:

1. Informational support (cognitive), is the provision and exchange of information and the giving of advice, which promote understanding of a situation, of a person's own situation in life, and their problems. This also concerns providing feedback on the efficiency of remedial actions taken by the supported person, as well as the sharing of their own experience by persons undergoing similar problems. Informational support meets the necessity of understanding the essence of critical events and their causes. This type of support is most often provided by persons with whom we have social relations.

2. Instrumental (material) support, consisting of providing direct help in the form of loans, gifts or services. It also includes providing information on particular ways to proceed, and a model of efficient remedial behavior. Such support can take the form of activities that are to the benefit of the people in need: providing meals, shelter, a home, funds or medicines. This type of support, similarly to informational support, is most expected and required in situations such as catastrophes, natural disasters etc.

3. Appraisal support consists of expressing acceptance and respect, and of acknowledging the value of the person. It is often the case that evaluative support can be expressed by supporting parties in non-verbal forms. This can take place in situations when such potential is appreciated and emphasized, such as achievements in various forms of activity: social roles, artistic production, physical achievements and sports rivalry.

4. Emotional support consisting of relaying supporting, calming emotions, being a manifestation of concern, and maintaining a positive attitude towards the supported person. Supporting behavior is also aimed at creating a feeling of belonging, care and increasing self-esteem. Thanks to emotional support, those suffering can be free of their stresses and negative feelings, and can express their fears, anxieties and sadness. This has an influence not only on the improvement of the supported person's self-esteem, but also on his or her state of being. Appropriate behavior on the part of the supporting person also releases a feeling of hope. Such support ensures an individual that he or she is loved and that people care about him or her.

Some authors propose that the division of social support includes two more types based on the structural features of support. These include:

- perceived support, resulting from the convictions of a person and his/her knowledge about from whom and where he/she might obtain support in a difficult situation, as well as the availability of the support network,
- obtained support (provided), which is objectively evaluated by the recipient as the actually obtained type and amount of support (Sęk 2001, Cieślak and Eliasz 2006).

Social support contributes to limiting the negative effects of critical life events, stress, apathy and low self-esteem. Support provided by various existing social bonds gives a feeling of closeness, acceptance and understanding from other people. Contact with other people results in a feeling of belonging, favors social integration, shapes self-evaluation, and has an influence on increasing self-esteem. It also enables wider social contacts, at the same time revealing useful ways of coping with various problems.

In this article, the types of support presented should additionally be analyzed in the context of financial/economic conditions, as disabilities, including intellectual disability among children with ASD - Asperger syndrome, may affect the socioeconomic standing of entire families (Kałużna-Czaplińska et al. 2018).

Socioeconomic status (SES) encapsulates the subjective perceptions of social status and social class, but it also encompasses income, educational attainment and financial security, in other words quality of life attributes (Assari et al. 2019). It should be stressed that the economic/financial possibilities of providing particular forms of social support, as well as the economic situation of a particular family both have an influence on satisfaction with life and social support (Pisula 2017, Singh-Manoux et al. 2003).

In the case of young people with ASD - Asperger syndrome, indispensable therapy provided by professional entities within the scope of particular types of social support or its supplementation requires appropriate financial expenditure [Roddy & O'Neill, 2018; Horlin et al., 2014]. In professional therapy for people with communication disorders, the most commonly used services are adjusted to the needs of particular patients. These services are provided by therapists, nurses, dieticians and psychologists, as well as by providers of alternative therapeutic services, e.g. music therapy, aromatherapy and many more (Ghasemtabar et al. 2015, Helps 2016, Olsson et al. 2013). As elements of indispensable therapy, these services generate relatively high costs. In many cases, the situation also requires additional support in terms of effective application of financial resources (financial consulting).

It should also be mentioned that taking care of children with disorders is a burden on the family budget. The worse economic situation of families with children with Asperger syndrome is a result of both increased expenditure and decreased income (Frączek and Gagat-Matuła 2018). Due to the worsening economic situation of families and the limitations in particular forms of social support, parents often decide that one of them should migrate for economic reasons. The circumstances of the migration of one of the parents cause additional disadvantageous conditions which can have an influence on the satisfaction with life of young people in the period of juvenescence with ASD - Asperger syndrome. Such circumstances determine a particular need for social support.

Meanwhile, social activities conducted as a part of social support for families with children with ASD do not always answer the reliable and comprehensive diagnosis of the needs and conditions required for the functioning of these families, and are also often chaotic, sporadic and incomplete. Additionally, the knowledge and experience of people employed in organizations providing care and rehabilitation services is inadequate in many ways. All these factors together may result in the obtained aid being incomplete and sometimes inadequate (Otrębski et al., 2014).

In relation to these considerations, the aim of this article is to determine the relationship between perceived social support and the satisfaction with life of young people with ASD - Asperger syndrome in families in which parents migrate.

Research Principles

The aim of the study was to determine the relationship between perceived social support and the satisfaction with life of young people with ASD - Asperger syndrome in families in which parents migrate. The aims were expanded in the form of the following research question: *To what degree does social support as perceived by young people with ASD - Asperger syndrome who are temporarily orphaned due to a parent's migration have a relation to their satisfaction with life?* Detailed questions were also developed:

1. What is social support as perceived by young people with ASD - Asperger syndrome temporarily orphaned due to the migration of a parent?

2. What is the satisfaction with life of young people with ASD - Asperger syndrome temporarily orphaned due to the migration of a parent?
3. What is the satisfaction with life of young people with ASD - Asperger syndrome temporarily orphaned due to migration of a parent, who perceive less social support in comparison to those perceiving greater support?

This work does not state a hypothesis to the research problem as the character of the problem is explorative. In order to determine satisfaction with life, *the Satisfaction with Life Scale* (SWLS) by Ed Diener and adapted by Zygfryd Juczyński was used. The Scale of Social Support by K. Kmiecik-Baran was used in order to determine the level of social support. The study was conducted in 2019 at a clinic for people with Autism. The analyzed group was of 50 persons (39 girls and 11 boys), aged 16 to 18, whose parents were economic migrants. Purposive sampling was used in the research.

Analysis of Results

In the first stage, analysis was conducted of the social support provided to young people with Asperger syndrome whose parents had migrated. This presents the level of obtained social support in the general, as well as its particular types. The raw results and results in stens are given.

Table 1: Level of social support perceived by young people with ASD - Asperger syndrome temporarily orphaned due to the migration of a parent

Type of support	M	Sd	Median
General support	130. 99	24.85	126
Informational support	30.01	9.80	32
Instrumental support	34.23	9.43	35
Appraisal support	30.98	9.28	31
Emotional support	32.35	9.22	32

The study results presented in Table 1 show that social support as perceived by young people with ASD - Asperger syndrome is poor in the general scale as well as in its particular types. The total sum of points in this study could amount to: between 48 and 240 in the general scale, and between 12 and 60 in the subscales. Young people with Asperger syndrome temporarily orphaned due to migration of parents had a mean value at a level of 130.99, while the median was 126. Each group consisted of 25 persons.

The next step was to determine the satisfaction with life of young people with ASD - Asperger syndrome temporarily orphaned due to the migration of parents. Table 2 presents the results in this area.

Table 2: Basic Satisfaction with Life Scale (SWLS) results statistics for young people with ASD - Asperger syndrome temporarily orphaned due to the migration of parents

Satisfaction with Life Scale (SWLS)	Young people with ASD - Asperger syndrome **(N=50)**	
	M	**SD**
1. In most areas, my life is close to being ideal.	20.9	5.55
2. My conditions of life are perfect.	21.7	5.79
3. I am satisfied with life.	21.1	6.01
4. So far, I have completed some important things that I wanted to fulfil during my life.	27.9	6.84
5. If I was to live my life again, I would not change almost anything.	23.2	6.23

The results indicate the average satisfaction with life among the respondents. The highest results were noted in the following scales: *So far, I have completed some important things that I wanted to fulfil during my life.* (M=27.9*); If I was to live my life again, I would not change almost anything*. (M=23.2). *I am satisfied with life*. (M=21.1). The

lowest, but still average, results of young people with Asperger syndrome temporarily orphaned due to the migration of parents were noted for: *In most areas, my life is close to being ideal*. (M=20.09). *My conditions of life are perfect*. (M=21.7).

In order to determine the differences between respondents who perceived poor and high social support in the field of satisfaction with life, the Mann-Whitney U test was used, the values of which were expressed in Z units. Young people with Asperger syndrome temporarily orphaned due to the migration of parents perceived higher social support and higher satisfaction with life in the scale So far, I have completed some important things that I wanted to fulfil during my life. M2=53.99), in comparison to young people who perceived poor social support (M1=50.99). The difference is statistically significant - $p<0.05$. The results for the other scales were not statistically significant.

Table 3 presents an analysis of the dependencies between social support and perceived satisfaction with life of young people with ASD - Asperger syndrome temporarily orphaned due to the migration of parents.

Table 3: Dependencies between social support and satisfaction with life

KWS / SWLS	Informational support	Instrumental support	Appraisal support	Emotional support	Overall support
Sum 1	0.020	-0.079	0.133	0.137	0.032
Sum 2	0.030	-0.102	0.135	0.279	0.036
Sum 3	0.031	-0.106	0.139	0.277	0.045
Sum 4	0.229	-0.121	0.129	**0.405****	0.269
Sum 5	-0.089	0.234	-0.237	-0.087	-0.031

A positive relationship of moderate strength was found between emotional support and the scale So far, I have completed some important things that I wanted to fulfil during my life, which was statistically significant at the level of $p<0.05$. This indicates that young people with Asperger syndrome with a higher level of emotional support more often feel fulfilled in life and experience joy in relation to realization of their own plans and dreams. The correlation is significant at the level of $p<0.05$.

Conclusions

1. Social support as perceived by young people with ASD - Asperger syndrome temporarily orphaned due to the migration of parents is poor both in the overall scale as well in its particular types.

2. Young people with ASD - Asperger syndrome temporarily orphaned due to the migration of parents perceive an average satisfaction with life.

3. Young people with ASD - Asperger syndrome temporarily orphaned due to the migration of parents, who perceive social support to be greater, more often feel satisfaction with life in the scale So far, I have completed some important things that I wanted to fulfil during my life, than young people who perceive social support to be poorer. The former group have plans and dreams that they want to fulfil, and they feel that their lives have sense. The difference between the results of respondents from both groups is statistically significant at the level of $p<0.05$.

4. A statistically significant relationship at the level of $p<0.05$ was found between emotional support and the scale: So far, I have completed some important things that I wanted to fulfil during my life,. Young people with ASD - Asperger syndrome with a higher level of emotional support more often feel fulfilled in life and experience joy in relation to realization of their own plans and dreams.

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Household Income as A Factor in The Long-Term Liquidity of The Russian Banking Sector: Taking into Account Additional Factors

Olga S. MIROSHNICHENKO,
Doctor of Economics, Professor, Tyumen State University, 6 Volodarskogo Street, Tyumen, 625003 Russia, E-mail: o.s.miroshnichenko@utmn.ru

Valery V. GAMUKIN,
PhD, Professor, Tyumen State University, 6 Volodarskogo Street, Tyumen, 625003 Russia, E-mail: valgam@mail.ru

Natalia V. POKROVSKAIA,
PhD, Associate Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.pokrovskaia@spbu.ru

Natalya S. VORONOVA,
Doctor of Economics, Professor, Saint Petersburg State University, 7/9 Universitetskaya nab., Saint Petersburg, 199034 Russia, E-mail: n.voronova@spbu.ru

Abstract

The article is devoted to the study of the income of individuals as a source of the long-term resource base of the Russian banking sector, for the period 1999-2019 and up to the beginning of 2020. It has been established that household deposits are the basis of long-term resources of the Russian banking sector. In the analyzed period, there are fluctuations in the share of long-term deposits of the population in bank liabilities, while the same indicator for the total deposits of individuals demonstrates positive dynamics, which required an analysis of a number of additional factors. It is noted that the introduction of the institution of compulsory deposit insurance had a stronger positive impact on the attraction of long-term deposits of the population by banks, in comparison with the attraction of total deposits of individuals. The influence of taxes on personal income on the structure of financial investments of the population was revealed. It is substantiated that changes in the personal income tax on investments in financial assets affect the investment preferences of the population. It is noted that in the context of a pandemic COVID-19, a reduction in long-term household deposits can have a negative impact on the long-term liquidity of the Russian banking sector. The relevance of the study of the impact of household deposits on the resource base of Russian banks is substantiated, taking into account the practice of taxation of personal income from investments in various financial assets.

Keywords: income of the population; deposits of the population; financial investments of the population; personal income tax; pandemic COVID-19.

Introduction

The change in the technological paradigm, which has led to the digitalization of public life in all areas, requires large-scale long-term investments. In the Russian model of corporate finance, which is based on banks, the latter bear the burden of responsibility for providing long-term resources for the development of the economy at an acceptable pace. This possibility depends not only on the capital base of the banks, but also on the term structure of liabilities.

The modern economy presupposes the formation and subsequent effective use of capital of a mixed structure by economic agents. In addition to its own funds, the bank's capital is formed by liabilities to financial and non-financial counterparties (Manuylenko et al., 2016). In turn, the availability of long-term corporate financing ensures the stability of the corporate sector, reduces the volatility of growth of corporations - borrowers, including in times of crisis (Demirgüc-Kunt et al., 2017). Bank loans play a leading role in this.

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Effective decisions on the placement of funds have a positive effect not only on the profitability of an individual bank and the banking sector of the national economy, they contribute to strengthening the banking financial stability, prevent (or significantly reduce) the costs of supporting the banking and financial sector in general, which is especially important in conditions of crises (Pokrovskaia t al., 2020).

A feature of the modern Russian credit market is the increasing role of households as the most important suppliers of domestic resources of various urgency, including long-term ones. At the same time, the predominant form of accumulating free funds of the population is bank deposits.

The purpose of this work is to study the deposits of the population as part of the long-term resources of the domestic banking sector as a source of financing the investment needs of the economy and to reflect the influence on the investment potential of factors caused by taxation of household income from investments in various financial assets.

There is a difference in the purpose of funds attracted by banks for periods of more than a year. Namely, there are differences between the goals of forming bank sources of financing for the long-term needs of the economy and the goals of providing the bank with its own funds. Our work is focused on the study of the long-term resource base in terms of liabilities, and does not affect the attraction of sources aimed at the formation of the bank's regulatory capital. An attempt has been made to substantiate the influence on the investment behavior of the population of the peculiarities of taxation of income of individuals from investments in financial assets, which undoubtedly affects the dynamics of bank deposits of the population.

Review of Relevant Research

The study of household deposits in banks is quite often the object of interest of researchers (Iannotta et al., 2007; Trofimov, 2017; Nielsen and Weinrich, 2019; Miroshnichenko et al., 2020).

Aggregate deposits (including deposits of individuals) have an impact on the financial performance of banks. Thus, when assessing the financial stability of banks, B. Tabak, D.Fazio, K. Paiva and D. Cajueiro (2016) use several indicators that imply the inclusion of deposit indicators in their calculation: balance sheet, the ratio of customer deposits, defined as the percentage of customer deposits to total banking assets / liabilities, is used to assess the financial penetration of the banking sector's deposit operations (as an indicator of the availability of banking services) - total deposits in banks per square kilometer of the country's area. The approach that presupposes the assessment of the financial stability of a single national banking sector operating throughout the state is based on the assumption that banks operate in the same legal and institutional environment (Bouheni and Hasnaoui, 2017). These authors also use the ratio of deposits to total banking assets / liabilities as one of the indicators to assess the cyclical nature of the financial stability of the banking sector.

The work of A. Demirguch-Kunt, T. Beck, P. Honovan (2016) is devoted to the study of the influence of financial penetration on the income of the population. The authors argue that the development of the financial and banking sectors contributes to an increase in the share of incomes of the poorest strata of the population and a decrease in the level of poverty.

Russian researchers M. Malkina and I. Khramova (2017), conducting a country and regional analysis of the factors of the population's savings, argue that the savings rate in a particular country is not related to current per capita income, but ultimately depends on long-term income growth rates and demographic structure of the population.

The study of the behavioral aspects of the choice of an economic person is carried out by V. Ivanitsky and S. Alexandrov (2017). The exogenous conditionality of prices and consumer income is characterized as one of the limitations that must be taken into account when building a model of an economic person; in conditions of incomplete information, a person gives preference to his own interests.

National features of taxation of personal income from investing in financial assets that differ in investment attractiveness are considered both for the purposes of cross-country comparisons (OECD, 2018) and within the framework of characterizing trends in the financial behavior of the population (Abramov et al., 2020). However, the predominant focus of these studies is investing individuals in the stock market.

Thus, studies devoted to the analysis of the relationship between the income of the population and the term structure of bank deposits of individuals are not fully represented in the scientific literature. At the same time, the fact that the dynamics of bank deposits of the population is significantly affected by additional factors, in particular, taxation in the field of income of individuals from investments in financial assets, is overlooked.

Information and Methodological Base of The Research

For the study, a statistical base was formed, including indicators of the banking sector and macroeconomic indicators of the Russian Federation.

The data on the total income of individuals was obtained from the official publication of the Bank of Russia 'Review of the Russian banking sector'.

Data on deposits of organizations in the banking sector, on issued bank certificates (deposit and savings), on the value of assets / liabilities of credit institutions for 1999-2020, on deposits of individuals for the periods 1999-2003. and 2007-2020 obtained from the website of the Bank of Russia, section 'Statistics', subsection 'Banking sector', database 'Indicators of activity of credit institutions. Information on the funds raised '.

According to the regulator's approach and the current reporting standards, the liabilities of credit institutions are divided into the following groups based on urgency: on demand, for a period of up to 30 days, for a period of 31 to 90 days, for a period of 91 to 180 days, for a period of 181 days to 1 year, for a period of 1 to 3 years and for a period exceeding 3 years. In this work, liabilities with maturities from 1 to 3 years and for a period exceeding 3 years were summed up, and further analyzed as long-term.

This author's approach is due to prudential requirements for the fulfillment of mandatory liquidity ratios, and, first of all, the long-term liquidity ratio, the calculation of which involves the use of data on bank liabilities for a period of more than one year, or long-term from the position of liquidity.

To analyze the conditions for taxation of personal income on bank deposits, the information base was presented with statistics from the Global financial development Database of the World Bank, as well as a description of the conditions for taxation of interest income of individuals from EY's Worldwide Personal Tax Guide.

Results

Long-term resources of the banking sector are accumulated as a result of the use of such financial instruments of attraction as deposits and bonds; bank counterparties for the specified financial instruments are individuals, as well as non-financial organizations; bank bonds can be purchased by other credit institutions. Data on the share of long-term deposits of non-financial organizations, the population, and issued bonds in bank liabilities are presented in Fig. 1.

As the data show, since 2001 and throughout the entire subsequent analyzed period, household deposits prevail in the long-term resources of the banking sector. In 2015, there is another decrease in the share of long-term deposits of the population in liabilities, and as of the beginning of 2016, this share corresponded to the share of long-term deposits of non-financial organizations. The share of issued long-term bonds in the composition of bank liabilities is insignificant, in the analyzed period does not exceed 2%.

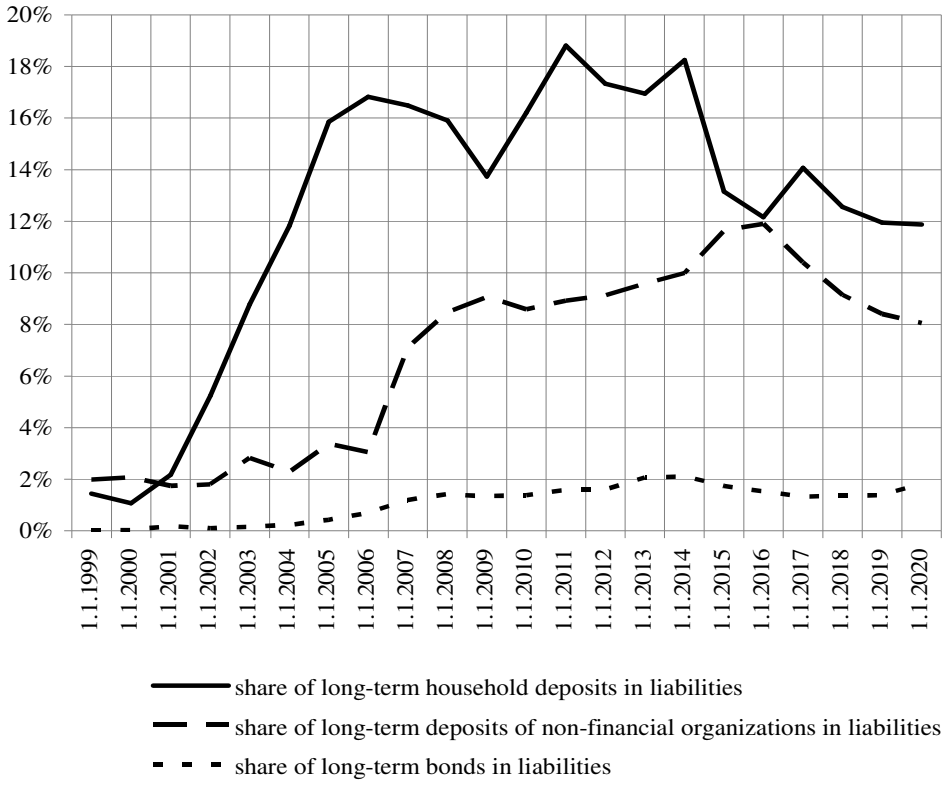

Fig. 1: Dynamics of the share of long-term resources in the liabilities of the banking sector in 1999-2020, at the beginning of the year

Source: Authors' calculations based on data from the Central Bank of the Russian Federation.

It can be concluded that banks issue long-term bonds for purposes other than the formation of sources of long-term investments in the economy, which is confirmed by research (Miroshnichenko and Tarasova, 2018).

The dynamics of the share of long-term deposits of non-financial organizations is of interest. During the post-crisis recovery period, which fell in 1999-2001. and the period of economic recovery that followed, until 2006, non-financial organizations used long-term resources in their activities, and did not actively place funds in the banking sector. During this period, macroeconomic and global conditions were favorable for the development of the real sector. The progressive development of the economy has led to the formation of an increased volume of long-term temporarily free resources in organizations of the non-financial sector, which not only cover their own needs of non-financial organizations, but are also sent to the banking system.

It seems that this fact should be assessed, rather, as unfavorable, since it indicates a decrease in the investment capacity of the real sector of the economy in the analyzed period, a reduction in the possibility of effective use of long-term resources, and production development. This trend continued until 2016, when non-financial organizations needed funds to maintain their current activities, in the absence of surpluses.

The main source of the formation of the long-term resource base of the domestic banking sector is the funds of the population.

In the analyzed period, there are fluctuations in the share of household deposits in long-term bank liabilities. The increase in the share is typical for 2000-2005, 2009-2010, 2013 and 2016. Growth period 2000-2001 is a period of post-crisis recovery of the Russian economy, which happened much faster than analysts predicted (Greenspan, 2017). The following years (2002-2005) fell on a period of economic growth. Reduction of the share of long-term deposits of the population from the beginning of 2006 to 2008 due to the development of residential mortgage lending, in which deposits previously placed in banks acted as a share of the mortgage borrowers' own funds in the loaned transaction. Growth in household deposits in 2009-2010 largely due to the growth of their foreign exchange component, which took place against the background of the depreciation of the ruble. In 2008, 2011, 2014 and 2017, the points of the beginning of the reduction phases of the analyzed share are marked.

The formation of an unfavorable trend in attracting long-term deposits of individuals by banks is noted. So, if in 1999-2010 the trend of cyclical fluctuations in the share of household deposits in long-term bank liabilities had a positive trend, then after a fall in 2011-2012 and subsequent insignificant, not reaching the value of the beginning of 2011, growth in 2013, there is a negative trend direction.

The dynamics of the ratio of deposits to household income, which has a pronounced upward trend, is indicative. As of the beginning of 2003, when the inflation rate dropped to less than 20%, and during the subsequent period, there is an excess of the ratio of deposits to household income over the inflation indicator, which can be regarded as the beginning of the formation of a savings model of household behavior. The trend is growing due to a historical event for Russia of the same period: in December 2003, Federal Law No. 177-FZ 'On Compulsory Insurance of Deposits in Banks of the Russian Federation' was adopted, which influenced the public's confidence in the banking system as a result of the formation of the deposit insurance institute.

As D. Macmillan (2019) notes, the introduction of a compulsory deposit insurance system, the main goal of which is to level the banking risk associated with the 'flight of depositors', to create equal competitive conditions in the market for household deposits, at the same time neutralizes the depositor's risk; despite the emergence of a high probability of moral hazard (Bouheni and Hasnaoui, 2017). A number of researchers come to the conclusion that the introduction of deposit insurance increases the likelihood of banking crises due to the acceptance of high risks by banks (Allen et al., 2015; Qian et al., 2019; Ji et al., 2018; Macmillan, 2019).

Nevertheless, the institution of compulsory deposit insurance is present in the vast majority of countries. The answer to this paradox is substantiated by Yang Ji, Wenlong Bian and Yiping Huang (2018), who divided the effects of the creation of the institution of compulsory deposit insurance into 'direct' and 'indirect'. The 'direct' effect is to increase the likelihood of banking crises, the 'indirect' effect is to reduce the likelihood of non-bank financial crises. Results based on data from 64 countries over the period 1970–2009. showed that the 'indirect' effect is 2-5 times higher than the 'direct' effect, thereby substantiating the expediency of the most important institution of modern economics.

When comparing the data on the dynamics of the ratio of household deposits to liabilities, and the ratio of deposits to household income, it was found that households with surplus income place deposits in banks, and the presence of such households has not become widespread. The introduction of the institution of compulsory deposit insurance had a more significant positive impact on the attraction of long-term deposits of the population by banks, in comparison with the attraction of total deposits of individuals.

In fig. 2 presents data on the ratio of total deposits of the population and money income of the population in comparison with the Gini index. As evidenced by the data (see Fig. 2), the ratio of the total deposits of the population in the banking sector and money income in comparison with the Gini index has a significant variation in values. The largest number of observations falls on the values of the Gini index in the range of 41% -42%. In other words, in the specified range, there is a higher increase in deposits compared to an increase in income. At the same time, the ratio of the quantities under consideration is not linear. Consequently, in addition to cash income, other factors that require further study also affect the total volume of deposits of individuals in Russian banks, excluding the timing of attracting.

A somewhat different situation is typical for the activity of the population in placing incomes in long-term deposits (see Fig. 3).

It can be concluded that there is a relationship between indicators at minimum and especially maximum values of the Gini index. With the growth of the Gini index, the population is more active in placing income in long-term bank deposits of the banking sector. Thus, long-term deposits in the Russian banking sector determine the incomes of the wealthiest households, which poses a threat to the long-term banking resource base, since with a decrease in rates in the economy, an outflow of funds from banks to other sectors of the financial market is likely.

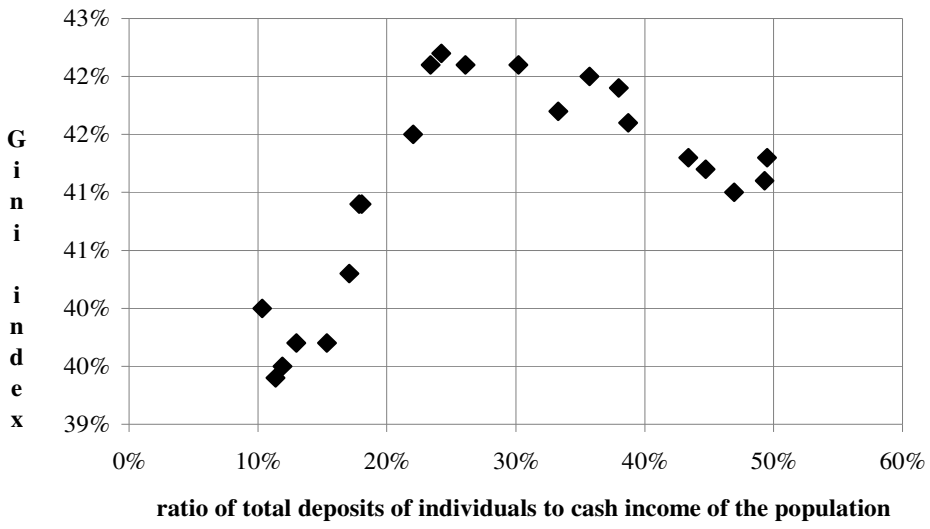

Fig. 2: The ratio of total deposits of individuals and cash income of the population, in comparison with the Gini index

Source: authors' calculations.

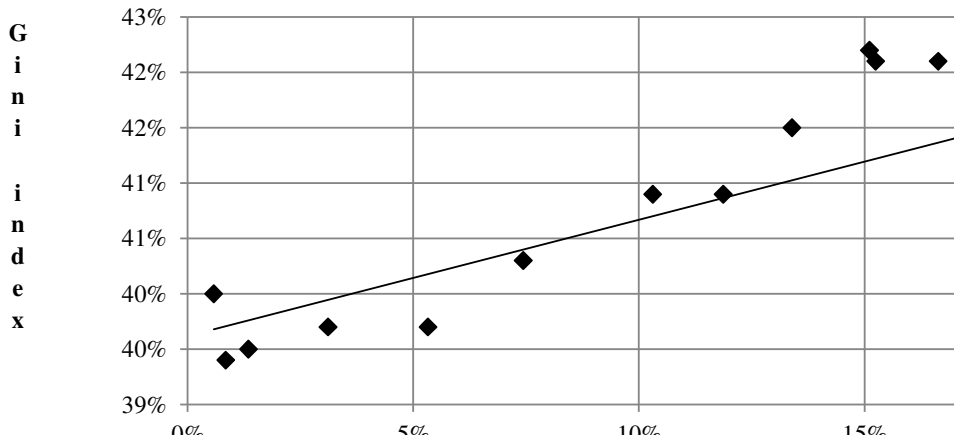

Fig. 3: The ratio of long-term deposits of individuals and cash income of the population, in comparison with the Gini index

Source: authors' calculations.

The preferences of the population in choosing the timing of investing in a bank deposit can be influenced by the system of taxation of bank deposits. In particular, in the Republic of Belarus income from bank deposits since the 1990s were exempt from taxation, but from April 1, 2016, a tax of 13% (a single rate of income tax in Belarus) began to apply on these incomes. Tax is levied only on deposits in Belarusian rubles placed for a period of less than one year, and deposits in foreign currency for a period of less than two years. Demand deposits and current accounts, the interest rate of which is equal to the rate of demand deposits, are not taxed. Thus, through taxation, an attempt has been made to regulate the duration of placing funds on a bank deposit. According to the National Bank of Belarus, in 2015 the share of bank deposits for more than 1 year in national currency was 18.4% of all deposits, in 2016 this share increased to 29.5%, and in 2019 - to 34.5%.

The national policy in the field of taxation of household income from bank deposits and other types of financial investments of the population is associated with the importance of the banking sector. The World Bank calculates the ratio of bank deposits to GDP in the framework of the assessment of global financial development. The corresponding indicator allows comparing the importance of bank deposits as a way of saving, as well as the scale of the banking system, taking into account the economic development of the country.

With total bank deposits accounting for more than half of global GDP, the values for individual regions and countries vary significantly. In seventeen out of one hundred sixty-seven countries for which information on demand, time and saving deposits at domestic deposit money banks as a share of GDP for 2017 is provided, the volume of bank deposits exceeds GDP, in thirty-seven - it is more than 80% of GDP, half of the countries (eighty two) - over 50% of GDP.

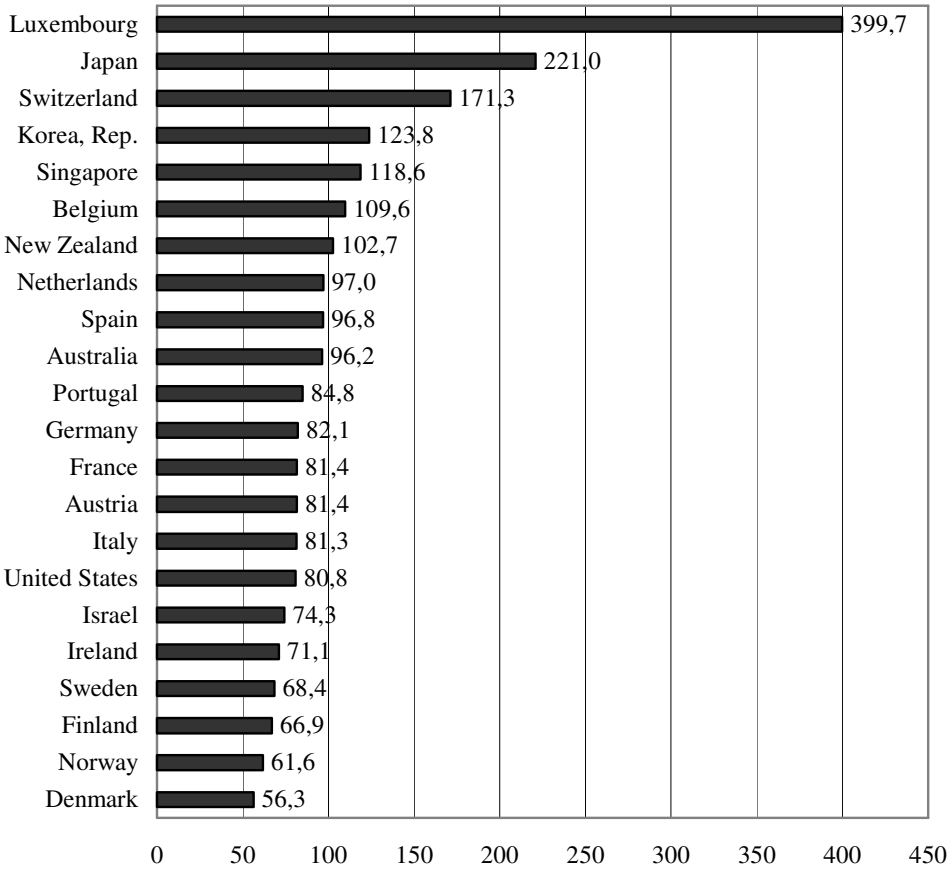

Fig. 4: Bank deposits as a percentage of GDP in developed markets in 2017
Source: Global financial development Database. World Bank.

At the same time, when comparing countries in terms of the corresponding indicator, it is important to take into account both the differences in the value of GDP and the focus on actively attracting bank deposits from non-residents (for example, in Luxembourg, Hong Kong, Cyprus, Switzerland, etc.).

The ranked values of the ratio of the volume of bank deposits to GDP for countries with developed and emerging financial markets are shown in Fig. 4 and 5.

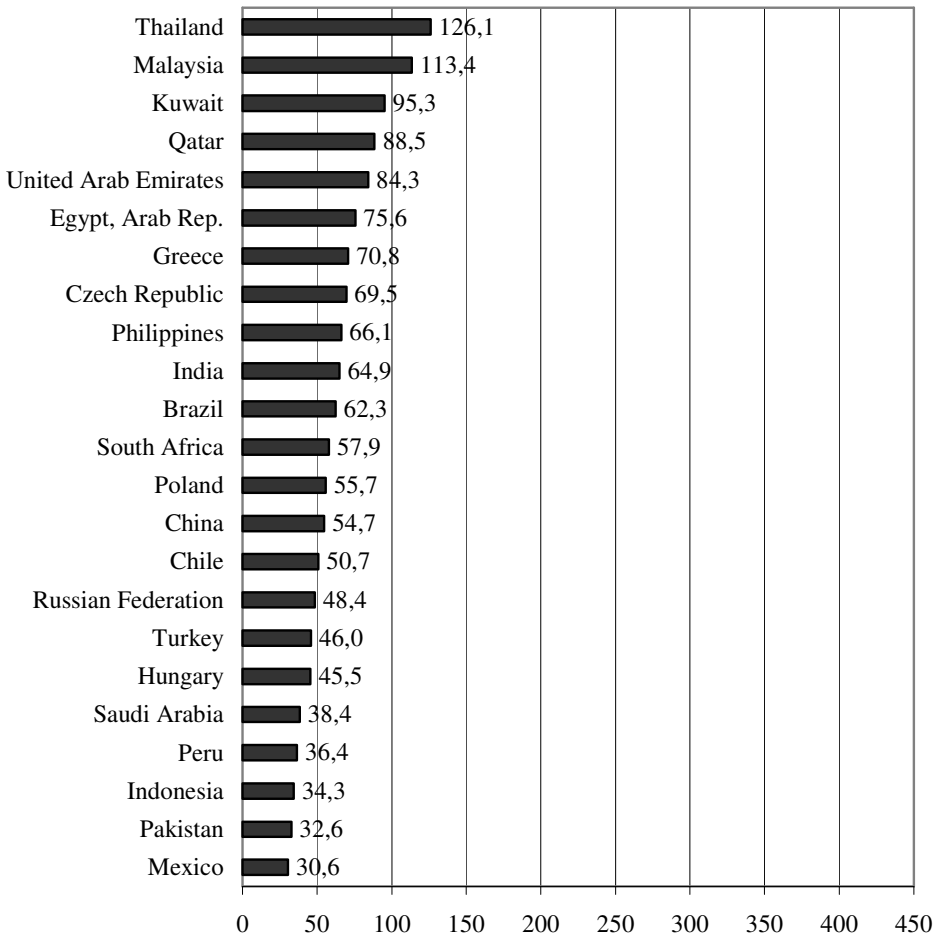

Fig. 5: Bank deposits as a percentage of GDP in emerging markets in 2017
Source: Global financial development Database. World Bank.

While the ratios of bank deposits to GDP are similar in selected advanced and emerging market economies (eg Norway and Brazil, Portugal and the UAE, Thailand and the Republic of Korea), the group averages differ. Whereas in emerging market countries the average value of bank deposits in 2017 is about 60% of GDP, in developed market countries this value is twice as high - 121% of GDP.

Tax conditions of taxation of income on bank deposits (Table 1) reflect the degree of development of the financial market. The average tax rate in emerging market economies is lower than in developed market economies. At the same time, there are significant differences within the groups as well. Tax conditions may reflect national (Victorova et al., 2020b) and cultural characteristics (L'vova et al., 2016), the level of digitalization (Victorova et al., 2020a), separation of tax powers (Bannova et al., 2015; Salina, 2011; Pokrovskaia, 2020), level of the shadow economy (Fedotov and Pokrovskaia, 2017) and other economic parameters.

Table 1: Taxation of bank deposits in developed and emerging markets

Country	**Tax rate for bank deposit interest income**
1. Emerging markets	
Brazil	from 15% to 22.5%, depending on term
Chile	35%
China	Non taxable
Czech Republic	15%
Egypt, Arab Rep.	20%
Greece	15%
Hungary	15%
India	10% for interest exceeds INR40,000 and INR50,000 for senior citizens age 60 or older
Indonesia	20%

Malaysia	8%
Mexico	20%
Pakistan	15%
Peru	20%
Philippines	20%
Qatar	10%
Russian Federation	35% for deposit on non-market conditions
South Africa	15% ZAR23,800 and ZAR34,500 for senior citizens age 65 or older
Thailand	-
Turkey	15%
United Arab Emirates	-
Average for emerging markets	17%

Source: compiled by author's on EY, 2019.

Country	**Tax rate for bank deposit interest income**
2. Developed markets	
Australia	10%
Austria	25%
Belgium	15%
Denmark	8% for first DKK50,217 42% for next DKK 507,844 56% over DKK,061
Finland	30%
France	30%
Germany	25%
Ireland	35%
Israel	15%
Italy	26%
Japan	20%
Korea, Rep.	20%
Luxembourg	20%
New Zealand	10.5%, 17.5%, 30% or 33% according to tax identification numbers
Norway	22%
Portugal	28%
Singapore	15%
Spain	19% for first EUR5,999.99 21% for amount from EUR6,000 up to EUR49,999.99 23% for amount from EUR50,000
Sweden	30%
Switzerland	35%
Average for developed markets	22%

Formally, the highest tax rate on income in the form of bank deposits among countries with emerging financial markets and economies in transition is set in the Russian Federation - 35% (the rate is applied from 1997 to 2020). However, the specified rate is applied in Russia not to all bank deposits, but only to deposits whose interest rate exceeds a certain limit - the refinancing rate (since 2016 - the key rate), increased by 5 percentage points (for deposits in rubles), or 9% (for deposits in foreign currency); in other cases, income from bank deposits is exempt from taxation. In other words, at a nominally very high tax rate, in reality it is not paid in most cases. Since this restriction was conceived as an obstacle for bank deposits attracted on non-market conditions, the specified tax rate is intended to play only a regulatory role, and that has lost its relevance due to the development of tax legislation in terms of determining conditions based on the results of transactions between related parties. At the same time, the existing taxation procedure for income from bank deposits in Russia has repeatedly shown its disincentive influence during periods of financial crises, primarily in 2008 and 2014, incl. due to the shortcomings of using the refinancing rate as a benchmark for raising funds from the population.

At the same time, despite the challenges of the COVID-19 pandemic for the Russian banking system, the vector of personal income taxation is changing from 2021. Interest on bank deposits in Russian banks will be taxed at the base income tax rate of 13% with tax exemption for interest on deposits of up to 1 million rubles for each tax resident of Russia. The declared goals of this innovation is to increase the fiscal significance of the tax in the framework of ensuring social justice. However, if the significance of potential tax revenues for solving urgent problems of the state raises doubts, then the negative consequences of the outflow of private savings from the Russian banking system can be observed already at the end of 2020.

As a result of the study, it was found that among the long-term liabilities of the banking sector, which provide financing for the investment needs of the non-financial sector of the economy, there are deposits of individuals, organizations, and also long-term bonds. At the same time, deposits of individuals prevail in the structure of long-term bank liabilities. Differences in the activity of the population to place income in bank deposits, depending on the term, were revealed. Incomes have a greater impact on the activity of the population in placing long-term deposits than on the activity in placing in aggregate, without specifying the term for attracting, bank deposits.

The institution of insurance of bank deposits, introduced in Russia in mid-2004, is not a primary factor in the placement of income by the population in bank deposits. The ratio of long-term deposits of the population and bank assets / liabilities is characterized by the nature of fluctuations, while a similar indicator calculated for total deposits without taking into account the term of attraction shows an unambiguous positive trend. An unfavorable trend was noted in relation to long-term deposits and liabilities of the banking sector.

The revealed tendency does not contribute to strengthening the long-term resource base of the domestic banking sector, which funds long-term investment loans to non-financial organizations. In the context of the COVID-19 pandemic and the expected decrease in household income, it is very likely that the population's long-term deposits in banking resources will decrease, which should be reflected in the adjustment of banking policies and taken into account by the regulator when controlling the risk of long-term liquidity of the banking sector

Acknowledgement

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Social Health in The Context of Phenomenological Risks

Lyudmila KILIMOVA
South-Western State University, Kursk, Russia, e-mail: lyuda-klv@yandex.ru

Michail CHERKASHIN
South-Western State University, Kursk, Russia, e-mail: cherkashin07@mail.ru

Olga NISHNIANIDZE
South-Western State University, Kursk, Russia, e-mail: olgan73@yandex.ru

Abstract

The article defines the essence and content of social health. It has been shown that reproduction of health reflects birth process of healthy generation, the basis of which is a full-fledged set of genes and hereditary factor. Health preservation is not only a biological problem. Health is directly related to the level, mode and quality of life of each person and the population of the country as a whole.

Keywords: Social Health, Social Risks, Human Capital, Pandemic, Coronavirus.

Introduction

The problem of social health, without exaggeration, is one of the significant problems of modern society. Health is a fundamental value of a person. This concept is associated with "life" has an antonimic relationship with the concept of "disease". In general, it is an estimated category by the functional optimum of human body. Therefore, health, its criteria, properties and its protection cause not only medical but also multidisciplinary scientific interest. Health of each member of the society increasingly suggests functioning effectiveness of each sphere of life. Russian scientist V. Kolesov, considering the problem of human social health, notes that its relevance is due to a number of important reasons such as: global changes in socio-economic situation, changes in familiar life stereotypes, profound changes in the society consciousness and huge information flows that affected the vast majority of citizens. It is naturally that many difficulties appear in such conditions and people have to adapt to rapid changing conditions of nature and the society [Kolesov, 2009, p. 218].

At the beginning of the 21st century, the intensity and diversity of risks increased. Therefore scientists began to talk about risk as an integral part of modern society which can lead society to destruction and death. Over the past decades, a number of new risks have appeared and become a part of modern life. Today, society creates new types of risks that lead to instability and self-destruction. The problem, however, is not only to consider the diversity of risks, their scale and focus, but also that safety sometimes becomes a danger or becomes a risk. In general, risks to the social health of population are formed in the process of social interaction and "become determinants of behavior".

Among many global risk-related problems of humankind that actualize the study of social health, pandemic phenomenon has a special place. The pandemic is one of the constant things of humanity's existence since ancient times. This is evidenced both by texts of a religious-mythological orientation and recorded events in historical existence. The pandemic has always been and it is an emergency situation that threatens the existence of humanity. Today's situation with coronavirus has become a significant threat factor to social health for the entire world community. Now coronavirus pandemic, with all the medium-term uncertainty of the outcome, seems to be a milestone event that has broken not only economies of many countries, but also the most comfortable model of socio-cultural development related to the protection of social health of population.

Research Methods

The methodological program of the study has a comprehensive interdisciplinary character, combining the main strategies such as: social phenomenology; terminology analysis to define such basic concepts as "social health," "risk society," "social risks." To analyze the phenomena of social health and risk, systemic and interdisciplinary approaches

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were used and made it possible to combine theoretical achievements of scientific discourses of the society, risk and social health in a single semantic field. The application of systemic principles and structural-functional analysis made it possible to study the phenomenon of social health comprehensively, to distinguish its main substantive characteristics.
Methods of analysis, synthesis, generalization, comparison, analogy and historicism were used to clarify main substantive characteristics of social health. Complementary application of these methods made it possible to outline problematic field of social health and indicate meaningful characteristics of its components.

Results

Describing the category "social health," it should be emphasized that its semantic field is very wide and polysemic. It accumulates a wide range of social, economic, psychological, cultural and other indicators. T. Parsons and E. Fromm interpreted health as a complex social phenomenon, formed in the process of interaction of a particular social group, personality with the society and reflecting one or another level of this interaction [Parsons, 1997; Fromm, 2011]. The concentration of attention on social health as a certain state of personality, group and the society is described by foreign researchers [Herzman C., Boyce T., 2010; Trenton, 2017].

The integral nature of "health" should be noted. In the Constitution of the World Health Organization (WHO), the concept "health" is formulated as "the state of complete physical, mental and social well-being but not only the absence of physical defects or diseases". This interpretation made scientists look differently at the essence of "health" concept itself. In this context we are talking not only about a person's lack of certain deviations at the somatic level, but also about the significance of mental and social components of person's health. "Health" is regarded not only as the absence of disease, but also as the state which characterizes internal (psychological) characteristics in the context of outside attitude to life, taking into account its social aspects. As we can see, the social component of health is clearly traced. Social well-being which is in the basis of "health" definition, according to the World Health Organization, directly points to the importance of social component of health. [Charter (Constitution) of the World Health Organization, 1946]

Physical health should be understood as the perfection of self-regulation of body functions, optimal physiological processes and maximum adaptation to various factors of external environment. Mental health is the harmony of mental processes and functions, as well as denial and overcoming diseases. Social health reflects the degree of social activity, person's active attitude to the world, his social relevance. A narrow interpretation of health as a purely medical concept is not correct.

It should be noted that recently (10-20 years) the problem of social health in general and the essence of the concept "particular" is gradually beginning to develop in various fields of sciences, including pedagogy, psychology, sociology, social pedagogy, medicine, economics and others. Nowadays, two main areas of study of "social health" concept have developed. One of the directions is the definition of social health of the population (society as a whole). The second direction is the definition of individual social health (personal social health) [Lisitsin, 2015, p. 341]

Characterizing the concept of social health, R. Ovcharova identifies it with personal. "Social (personal) health, in her opinion, is a certain level of development, formation and perfection of forms and methods of individual interaction with the external environment (adaptation, balancing, regulation), the level of mental and personal development, which allows you to realize this interaction successfully [Ovcharova, 2003, p. 78].

It should be noted that social health of a person is ensured not only by physical and mental well-being of a person, but also by the state of spiritual health of social environment. A harmoniously developed person (with a high level of health culture) is able not only to resist the effects of sick society, but also to promote its recovery. One of the signs of social health is the desire for public welfare, active participation in public work, the ability to be interested in solving social problems.

Let us dwell more on social health of the society as a whole. Reproduction of health reflects the process of healthy generation birth. The basis of which is a full set of genes and a hereditary factor. Maintaining health is not only a biological problem [Nishnianidze et al. 2019]. Health is directly related to the level, mode and quality of life of each person and the population of the country as a whole. The production of health and its improvement is carried out by the forces and means of medical institutions, ensuring the accessibility of medical care, necessary for its volume and quality, requires resource capabilities strengthening of the health system. The essence of health is in the fact that any loss of health leads to inevitable costs of its restoration. Therefore, economic assessment of health is carried out in terms of harm that society can suffer as a result of its decline. Health is an efficiency resource, both for the individual

and for the population as a whole. Improving the level of health and increasing life expectancy becomes not only a personal goal, but also an indicator of social well-being and success of the country [Kilimova L. et al. 2019].

Studying human potential of the economy, I.V. Soboleva characterizes it, first of all, as the reserve of physical and moral health accumulated by the population. The author defines a long healthy life as a basic need, associating the possibility of its satisfaction not only with external factors and an income factor, but also with internal resources of a person accumulated human capital. From a replicated point of view, the process of meeting needs increasingly implies not a simple reproduction of labor force (reimbursement of spent physical and nervous energy), but the development of human potential and the accumulation of intangible wealth embodied in people (in contrast to the objective component of intangible wealth (knowledge, information) is preserved on tangible media). According to I.V. Soboleva, the increase in health care costs in the structure of an employee reproduction cost is an investment component necessary to improve the workforce. The author connects this factor with the growth and dynamics of changes in the requirements for quality characteristics of a person as a producer [Sobolev, 2007].

Studying health of employed population, I.B. Nazarova groups possible approaches to the study of the category "health" from the point of view of capital theory, the theory of social status, the theory of inequality and social justice [Nazarova, 2007, p. 12-56]. Capital theory allows considering health from the point of view of human and social capital, taking into account their conversion into each other. G. Becker defines the health of an individual (physical and psychological) as a component of human capital, as a certain resource [Becker, p. 56-57]. Another approach is proposed by V.V. Radaev, considering physical capital as one of the independent forms. The incorporated state of which is the ability to work [Radaev, 2002, p. 20-22]. Social capital in support of a physical resource – health- can be considered as a system of connection networks and support: related, friendly, administrative, etc. It can also be as an access to necessary resources in preserving the life and health of the individual. Thus, social capital can be seen as an institutional aspect of the reproductive process of population health.

Inequality theories and social justice of population health level are associated with the individual's access to adequate living conditions, when opportunities depend on the level of justice and the degree of inequality. The main predefined variables that determine a person's life at birth are income and parents' level of education, living in a city or in a village, sex and race of a child. When markets are imperfect, inequality in power and wealth is transformed into inequality of opportunities. As a result productive capacity is not fully used and resources are not allocated efficiently. Inequality concept in health is related to inequality in access to various benefits: medical care, safe working conditions, and eco-friendly products. Research analysis about of mortality and socioeconomic interconnection, behavioral factors affecting health showed that their structure and health status are mainly associated with two indicators: lifestyle and health.

The individual not only poses a demand for health but also produces it. It inherits an initial health margin that is amortized over time, but every person can invest in maintaining health and boost its margin. At the same time, it should be noted that the consumer needs health and not only medical services. Demand for health services in this way is an indirect demand for health. The production of health also requires time from the individual, tearing off both market and non-market activities. Thus, a person not only buys health but actively participates in its production, combining resources in accordance with the state of knowledge and the level of technology. [Chubarova, 2008, p. 11].

The modern system of social reproduction exists in conditions of limited traditional resources and economic growth is increasingly dependent on the use of information resources and sources. It is necessary to determine that human capital in modern conditions of social reproduction is the main value of the society and the main factor in economic growth. The process of human capital forming requires considerable costs from the society and the person himself. S.A. Dyatlov defines human capital, using functional-targeted approach, as formed investment complex of knowledge, skills, abilities, motivations, which are usefully used in a particular sphere of social reproduction, contribute to the growth of labor productivity and production efficiency and thereby affect earnings (incomes) growth of a person [Dyatlov, 1992, p. 26].

Therefore, it is important that scientists distinguish, first of all, "health" component in the structure of human capital. In any field of professional activity, each person needs immunity to diseases, qualitative increase in active labor activity, endurance and physical strength for productive activity.

Investment in human capital is the only action that enhances person's professional skills and productive abilities and thus his or her productivity. Expenditures that promote human productivity can be investments because recurrent costs are expected to be compensated many times by an increasing flow of income in the future.

The prospects for rapid changes in social development cannot be considered without reasonable investments in people. Maintaining efficiency by reducing morbidity, increasing the productive period of life, should become necessary factors for investment attractiveness. The normal turnover of labour in production depends largely on effective investment. Investments in health ensure a normal turnover of workforce. Health capital is an integral part of human capital.

Thus, general social need to maintain health of all members of the society, regardless of their material level, guarantee equal access to a minimum set of the most important types of medical care, especially in threat to life and makes it possible to classify social health as a public good. The cost of medical care is determined not only by market factors, but, above all, by socially necessary costs for the production and reproduction of medical care, without recognizing their public usefulness by the market.

Numerous studies in the field of medicine conclude that the main content of "health" concept is maintenance of a certain level of response and adaptation of human body to environmental conditions, in which negative (destructive) effects of external environment on the body are neutralized. This interpretation of health goes back to well-known doctrinal definition of English scientist A. Campbell: health is "autonomy sufficient to adapt a person to changing conditions of human life and training in how to cope with the reality of suffering and death...» [Campbell, 1995, p. 257].

This interpretation of health is heuristic in the context of the study of various risks affecting the social health of the society. According to G. Behmann, "the concept of risk has recently made a dizzying career in the field of social theory" [Behmann, 2010, p. 73]. A society of risk arises on the basis of the destruction of traditional forms of social order, transformation of social structure, the role and significance of social, class, value-normative system and system of social protection. As a result uncertainty, unpredictability and insecurity arise in the life of individuals and groups. A risky situation is a kind of uncertainty, for example, when there is a possibility of possible events and this probability can be estimated. In a risk situation, it is possible to quantify the effects of decisions, which cannot be done in a situation of uncertainty. So this is a key factor that distinguishes risk and uncertainty. Uncertainty is expressed in the impossibility of exhaustive knowledge of dynamically changing reality, in the reduction of the possibility of forecasting remote and even near future. At the individual level, there is a sense of uncertainty and constant need to take risks. At the same time, survival in conditions of risk and payback for its consequences becomes a direct individual character, contributing to the individualization process. At an objective level, individualization is expressed in the independent design of one's own life with individually determined trajectories in various areas (work, education, leisure, marriage, etc.).

Risks impose responsibilities on those who try to evade them and force communication about risks between those who do not want to interact with others. In this sense, risks break through "self-referencing" of some systems in economics, science, politics, as well as risks radically change priorities in the actions of enterprises and establish relationships between competitors.

Risk can be defined as systematic interaction with threats and hazards that are generated by the modernization process. Based on the fact that the production of risks is carried out in all spheres of life (economic, political, social), it is impossible to distance from risks in modern world. Therefore there is a problem of minimizing risks and managing them.

E. Giddens sees specifics of the society in a special risk status. This status is not simply an increase in risks, but in that the concept of risk has become a property of expert and mass consciousness. E. Giddens points out that the concept of risk becomes central in modern society [Giddens, 2004, p. 111]. Society recognizes itself in the categories of risk, uncertainty and the need for choice. At the same time, any situation can be risky, even inaction.

Today's situation with coronavirus pandemic has shown that traditional risk management does not work well. Coronavirus pandemic was in the form of a global socio-ecological epidemiological system that ensures the preservation and spread of infection on a planetary scale. The pandemic found inequalities in access to health care, both within and between states, gaps in social protection and above all, the international community's lack of preparedness for the global health crisis. This was stated by UN Secretary General António Guterres, presenting his recommendations on ensuring universal coverage of medical services. General coverage in the UN is understood as follows: all inhabitants of the planet should be able, if necessary, to receive high-quality medical care in spite of unbearable financial burden. This right is stated for every person by World Health Organization. WHO Member agreed with this document by signing the Alma-Ata Declaration in 1978.

From the point of view of a civilized society, the main indicators that determine the activities of health care system are the availability and quality of medical care. The Amsterdam Declaration of the WHO European Office on Patients'

Rights defined the availability and quality of health services as the basic social rights of citizens that European states should maximize in their health systems.

The analysis shows that Russian citizens are not protected from financial impoverishment when they are ill, despite the fact that Russia spends a significant portion of its budget on medicine. But, despite a slight increase in budgetary financing of the health sector in recent years, its per capita amount remains rather low. Social organizations work poorly: many citizens cannot fully realize their professional knowledge, find a good job.

Potential of people who have fewer abilities or limited physical abilities to work, who find it difficult to join standard working conditions and labor relations, is not fully realized. There is an excessive inequality in income and in access to resources and public goods in the society. A certain degree of differentiation is natural in a mature market economy, but an excess gap is perceived as injustice and becomes a source of social tension. Despite a number of reforms implemented in the field of health and education, availability and quality of services are not adequately ensured.

Conclusions

One of the most important problems of state regulation of the innovative development of health care system is the need to create conditions that would make heterogeneous socio-economic system capable of self-transformation in the context of network formation of multi-organizational management structures. Activities of such structures are designed to increase the level of social justice in health care system, to introduce an intersectoral approach with the involvement of various sectors of national economy on the basis of accepted standards, rules and measures designed for building health potential and focusing on maintaining healthy lifestyle.

In this case, public confidence in government, social solidarity and a scientific approach to problem solving can play an important role in overcoming the crisis associated with the pandemic, in addition to various medical interventions.

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Analysis of Abusive 112 Emergency Calls In Romania

Mihail BĂRĂNESCU
The Bucharest University of Economic Studies, Bucharest, România, baranescumihail@yahoo.com

Ionel-Sorinel VASILCA, (Corresponding Author)
The Bucharest University of Economic Studies, Bucharest, România, sorinvasilca@gmail.com

Madalina TABARCIA
The Bucharest University of Economic Studies, Bucharest, România, madalina.tabarcia@gmail.com

Professor Nadia CIOCOIU
The Bucharest University of Economic Studies, Bucharest, România, nadia.ciocoiu@man.ase.ro

Professor Madlena NEN, PhD
The Bucharest Military Technical Academy "Ferdinand I" , Bucharest, România, madlenanen@yahoo.com

Abstract

The abusive calls subdivision of the non-emergency calls made to the 112 emergency system represent a concern for the administrators of other such services worldwide, since they generate suboptimal use or even waste of resources. Preventing this scenario requires countermeasures to limit the impact of such calls on the operational performance of handling genuine emergency cases.

In this article, we intend to formulate recommendations for improving the operational performance of the 112 emergency system in Romania.

To this purpose, we have conducted a study focused on the abusive calls generated specifically by adults. Our study solely included aspects of quantitative analysis, while those arising from qualitative methods will form the subject of a separate article.

In the first stage, we performed an analysis of the calls directed 112 between January 2017 and May 2018, so as to detect whether there existed any spatial pattern of distribution across the different administrative jurisdictions of Romania. We also conducted a more detailed analysis of call distribution across months, days and hours.

Based on this, we focused our analysis onto the class of abusive calls generated by adults, with the purpose of subdividing it further into lesser categories such as frivolous, malicious and prank calls. Taking the above steps allowed the administrator of the 112 emergency system to target the right audience in order to reduce the number of abusive calls.

Keywords: characteristics of calls, quantitative comparison, 112, emergency calls, non-emergency calls, abusive calls, public safety answering points, single national emergency number.

Introduction

Emergency call numbers such as 911 in the Americas, 112 in Europe and parts of Asia, or 111 in Australia and New Zeeland, are implemented worldwide so as to provide citizens with a single point of contact for reaching first responder agencies (e.g. the Police, Fire Rescue or Medical Emergency Services) whenever they need state authority support related to their personal lives, premises or even their environment.

Having a single number to be dialed in any emergency situation is very convenient and comfortable for a caller under duress because it shortens the intervention time and reduces the impact of crime and other critical matters through a faster emergency service.

The International Telecommunications Union recommends that member states selecting a primary or secondary emergency number choose either 911, 112 or both (ITU, 2008). The 112 systems operated throughout the European Union are managed and financed by each of the member states, who also decide on their implementation models and on the organizational architecture of the emergency call centers. Candidates for EU accession and members of the European Economic Area agreement have also adopted the 112 emergency number.

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In Romania, the Special Telecommunications Service is the administrator of the 112 Single National Emergency Call System, as appointed through Government Emergency Ordinance no. 34/2008. At the present time, the 112 system has been running across Romania for approximately 16 years. Throughout its operation, one of the areas consistently marked for improvement by the system administrator has been a reduction in the number of non-emergency calls, which would result in a tangible improvement on the overall quality of the service it delivers to citizens dialing 112.

All emergency services across the world are affected by such false or non-emergency calls. Every time someone dials an emergency number in an unsubstantiated manner – whether deliberately or not – the timely intervention of life-saving services for those who are in real need will undoubtedly be affected. In addition to the toll erroneous calls take on the victims of true emergencies, they also cause an important financial burden as well. Every time emergency services respond with an intervention to a false alarm, they are expending valuable tangible and financial resources (Boyle, 2012).

Non-emergency calls made to the 112 system directly contribute to the depreciation of its quality of service and represent a considerable waste of resources. The administrator of the 112 emergency system therefore aims to decrease the volume of non-emergency calls made every year by analyzing their characteristics, such as the callers' age range, as well as geographical and time distribution.

This research paper aims to discuss a specific category of non-emergency calls, namely those generated by adults in comparison to those generated by children, by exploiting a large volume of data recorded within the emergency system's archive.

In the first stage, we analyzed the non-emergency calls addressed to the 112 emergency system between January 2017 and May 2018, in an attempt at identifying any geographical similarities between their patterns of origin.

In the next step, we narrowed down our study to detect if any preferred period of time existed for such incoming calls, focusing our analysis from December 2017 until May 2018. Those six months were selected in such a way as to cover both the winter and spring seasons, which host large holidays such as Christmas and New Year's Eve, as well as the school spring break. Furthermore, we also chose that particular period in order to cover the naturally higher tonus and willingness to work felt by citizens during the more accommodating spring temperatures. We aimed to detect whether any correlation existed between the abusive calls and their distribution over time, across months, days of the week or even hours of the day. If successful, such an analysis could calibrate the media awareness messages about the scope of the 112 service to reach their intended audience in a more efficient way.

Following that, we went further in our analysis and considered the abusive calls subclass of non-emergency calls, analyzing its main categories of frivolous, malicious and prank calls. Our aim was to better understand their proportion within the larger volume of abusive calls, along with their associated financial impact, so as to devise better countermeasures for reducing the number and duration of these abusive calls.

Literature Review

Currently, there exists no standard or uniform definition of what constitutes a false or abusive call, which makes it difficult to compare or aggregate different studies on this matter.

The larger category of false emergency calls includes unintentional false emergency calls (misdials, pocket calls, inappropriate judgement of emergencies, etc.) as well as deliberate emergency calls.

According to Sampson (2004), the problem of misuse and abuse of the 911 emergency number has been broken down into unintentional calls, misdials, hang-up calls, and prank calls. Their study differentiated between the "misuse" and "abuse" of 911, categorizing accidental dialing or multiple reports of the same event differently than those calls that were intentional.

A representative study on false emergency calls was conducted by the European Emergency Number Association (EENA), which included a definition of this type of calls and proposed measures and procedures to deal with such situations.

According to EENA (2011, p. 5), an abusive call represents the event in which a person deliberately contacts the emergency services in a rude or insulting manner toward the public-safety answering point (PSAP) call-taker, without actually reporting an emergency incident.

The concept of false emergency and abusive calls is not always the same across the emergency services employed by European countries (EENA, 2011).

False emergency calls that are made intentionally form the most pressing concern for authorities. There are many instances when citizens call simply as a joke, to be abusive to dispatchers, or simply to ask for information regarding unrelated concerns. Children have been known to call as well while playing with the phone and emergency phone numbers, thinking it is all a matter of fun and games.

In Romania, by false emergency calls we understand abusive calls, unintentional calls, information calls and silent calls (EENA, 2011, p. 14).

We would like to specify that a search conducted throughout the Web of Science and Scopus databases using keywords such as false emergency calls, single national emergency call system, prank calls, abusive calls, and misuse calls led to an extremely small number of existing publications that corresponded with the scope of the present study.

A similar literature search carried out on Google Scholar using the same keywords also failed to produce multiple results.

Various studies were conducted to analyze how citizens use emergency medical services and to characterize the frequent users of emergency department services (Pines at el. 2011). Other authors tried to identify the factors and reasons that play an important role in the non-urgent use of this type of service (Lee et al., 2000) and to explore socioeconomic and geographical determinants of inappropriate emergency department use (Noura et al., 2019)

Many researches focused on the resources allocated to dealing with non-emergency situations (Rudman, Clarke and Metzl, 2003; Blackstone, Buck, and Hakim, 2007, Honigman et al., 2013), on the characteristics of non-urgent emergency callers (Honigman et al., 2013; Lehm, Andresen and Riddervold, 2016) or the characteristics of frequent users of emergency departments (Afilalo et al., 2004; Milbrett and Halm, 2009).

The study coordinated by Rudman, Clarke and Metzl (2003), under the auspices of the Council of Foreign Relations of the United States of America (USA), showed that responding to false calls made to police, firefighting, and ambulance services formed a significant part of the resource consumption registered by said departments.

Blackstone, Buck and Hakim (2007) have studied the economics of emergency response in the USA. Based on previous studies, the authors concluded that false alarms formed 10 to 20% of all calls made to police services, while 94–99% of police responses were to false calls. In terms of costs, the average cost to the police ranges from $60 to $100 per call. Non-valid fire responses represent 58% of all responses at an average cost of $365–$1050 per call and false ambulance responses comprise 25% of all calls at an average cost of $100 per call (Blackstone, Buck and Hakim, 2007).

Even though globally there has been a decrease in the number of false calls made to emergency systems throughout the previous years, the issue continues to remain in the attention of practitioners and researchers.

The widespread nature of mobile phone technology has made important contributions to the development of emergency service call centers. Dispatchers believe that the number of calls is on the rise mostly because of the accessibility of said mobile technology. It has become increasingly easier to dial 911 on a cell phone, and so pocket dials abound. Nowadays, mobile networks are also available almost everywhere to help citizens initiate an emergency call and maintain communication in emergency situations (Landoni, Biselli, Maj and Zangrillo, 2007).

Among the researchers' concerns is the issue of finding the most efficient measures for reducing the number of these false calls. Legislation dedicated to the fight against abuse in emergency services has thus far made no significant contributions, so the concern of the specialists in the field has steadily moved toward investigating means of increasing population awareness and employing technical preventive measures.

A more recent study by Blushtein, Siman-Tov and Magnezi (2019) measured the effect of a call tracking technology, developed and implemented by the Israeli emergency system since 2005 for the diminution of harassment calls. The authors performed a statistical analysis based on a retrospective interventional study of all emergency calls made to Israel's national Emergency Medical Service (EMS) during the years 2012–2016. Their study demonstrated that abusive calls were gradually minimized, and even almost eliminated altogether, without increasing the number of human resources. The above conclusion also provided a confirmation of the fact stipulated by any criminology course on the subject: it is not the value of the penalty fees that discourages abusive calls but rather the probability of having one's call traced by location and being apprehended by the authorities.

Gomes et al. (2019) analyzed a real data set from an emergency call center from a Brazilian city, in order to evaluate the impact of failures on an emergency call system. They considered service-level metrics such as the number of affected calls per failure and the time an emergency service took until it recovered from a failure. Among the authors' contribution, we would highlight the cost analysis regarding how different data center architectures can improve the availability of emergency services.

Regarding the most universally used research methods, we noticed either the statistical methods or the analysis of conclusions from interviews with dispatchers or patients.

Naouri et al. (2019) applied a multilevel logistic regression model of determinants of inappropriate use of emergency departments throughout France.

The conclusions of the study developed by Blushtein, Siman-Tov and Magnezi (2019) were based on a series of statistical calculations made on a large data sample.

Lehm, Andersen and Riddervold (2017) use descriptive statistics on the characteristics of level-E (i.e. not serious) patients who called the emergency medical communication center in the Central Denmark Region from August 2013 to July 2014. This study brought to light new knowledge regarding non-urgent 112 callers and included the capability of following a patient's course by using their unique civil registration number, as well as other routinely and prospectively collected data.

Honigman, Wiler, Rooks and Ginde (2013) performed a cross-sectional statistical analysis of the 2006-2009 National Hospital Ambulatory Medical Care Survey in the USA and analyzed resource utilization, including diagnostic testing, treatment, and hospitalization within five acuity categories representing immediate, emergent, urgent, semi-urgent, or non-urgent events, based on a triage nurse's judgment about the patient's need for immediate evaluation, stabilization, and/or treatment.

The scholars and practitioners mentioned diverse measures for reducing false emergency service calls.

One of the best ways of reducing false emergency calls is to educate citizens on the proper use of emergency numbers and the tremendous cost resulting from those times when emergency calls are made in error. Serious sanctions applied to those who abuse emergency phone numbers, the charging of heavy penalties and following through with prosecution could also be included in the legislation (EENA, 2011).

School-based education, public service announcements and a greater degree of care with each call that is received by dispatchers can also contribute to reducing false emergency calls (EENA, 2011; https://www.emergencymentors.com/false-emergency-services-calls/).

In addition to automatic call sorting systems – depending on the characteristics of the respondents – numerous other technical measures were mentioned: an automatic greeting that will screen erroneous calls before they are patched through to dispatchers, warnings, callbacks, etc.

Weinlich et al. (2018) researched the use of smartphone geolocation data and a worldwide emergency call support system for improving the intervention in cases of disorientation and language barriers.

Even if, from a technological point of view, many solutions can lead a reduction in the number of abusive calls, a thorough study performed on the characteristics of the calls and callers can provide valuable insights for designing more appropriate measures to deal with this unfortunate phenomenon.

Data collection and Research Methodology

Data collection on non-emergency calls. Spatial distribution of non-emergency calls

Romania has a surface area of 238,397 km^2 and a population of 20,121,641 (according to the census of 2011), thus resulting in a population density of 84.4 people per km^2.

The country is administratively split into 41 local jurisdictions, as depicted hereunder. In each county, there is a Public Safety Answering Point (PSAP) receiving the 112 calls generated by the inhabitants or visitors of the county. Figure 1 represents the population density for each county (darker shades of blue representing higher ratio values).

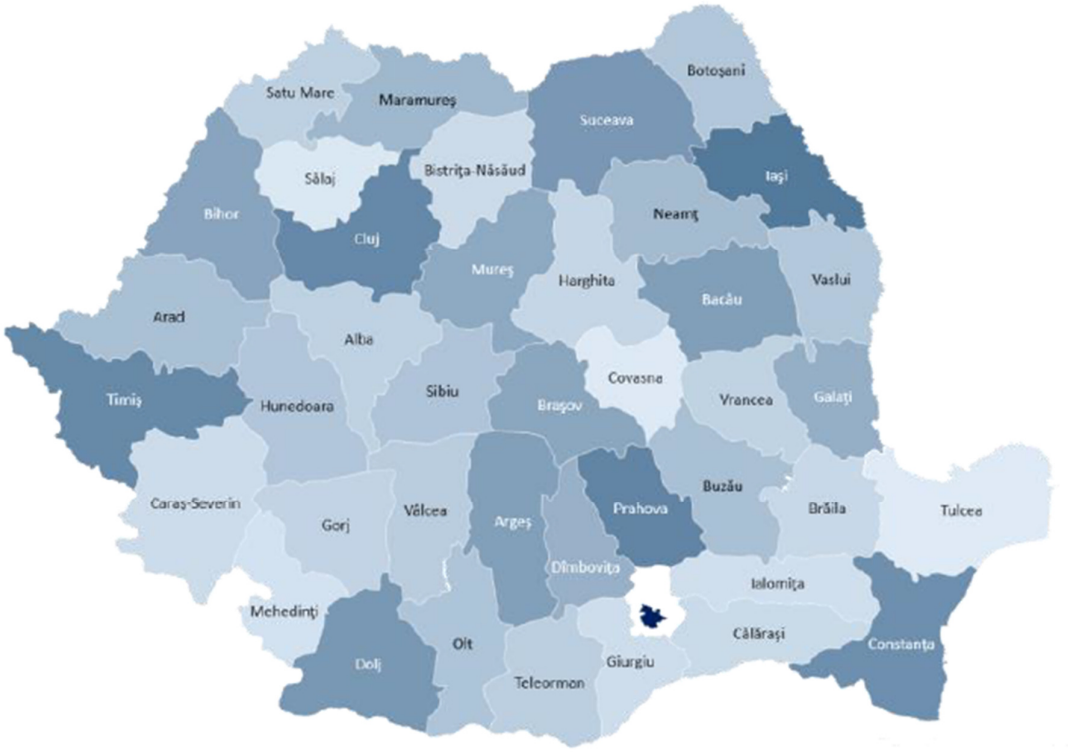

Fig. 1: Population density per county (population per km^2)

Source: the authors

We automatically collected the incoming calls received by each PSAP from December 2017 to May 2018, meaning a total of 5,956,240 calls. From that large volume of records, genuine emergency cases represented only 45 .

The collected data has been processed and represented in graphs, by using Microsoft Excel features and the ESRI GIS Desktop application.

The incidence of non-emergency calls expressed as a ratio from the total number of calls received per counties is represented in Figure 2 below. One could easily observe that the ratio of non-emergency calls per counties is different reported to the total volume of calls per counties, and the calculated values do not reveal a correlation to the number of their inhabitants, but rather one tied in with the citizen's personal awareness and their attitude and behavior toward the 112 emergency service. This particular representation can aid the 112 system administrator in focusing their awareness campaign on the most troublesome counties.

We must note that the white color surrounding Bucharest is actually the county of Ilfov. Bucharest and Ilfov have a metropolitan PSAP that receives all calls generated from their regions, and that is why we will continue to see this white color around Bucharest when referring to calls.

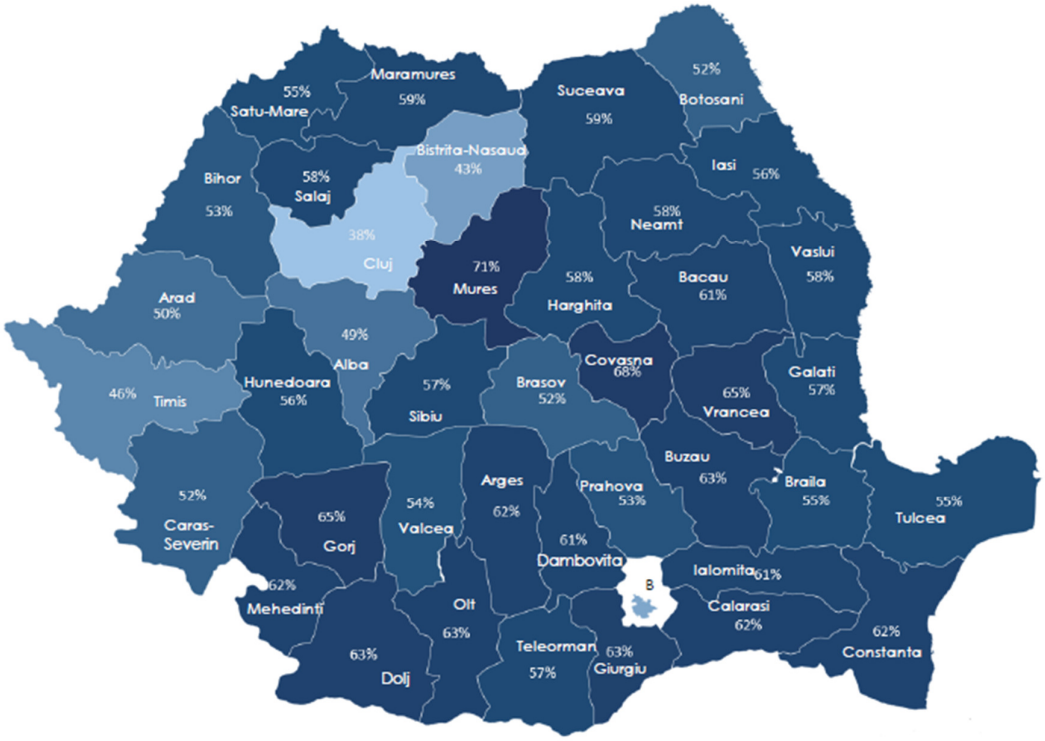

Fig. 2: Non-emergency calls per county (Jan 2017 – May 2018)

Source: the authors

It is indeed concerning to note that in 35 counties the number of non-emergency calls represents more than 50% of the total calls made. Such figures must definitely be corrected, or the emergency services might not be able to bring any actual value to the safety and security of people.

The highest percentage of non-emergency calls are recorded in Mureș (71%), Covasna (68%), Vrancea and Gorj (65%), while the lowest percentages were recorded in Cluj (38%), Bistrița-Năsăud (43%) and Timiș (46%). In the Capital of Romania, Bucharest, 41% of calls made to the 112 emergency number proved to be non-emergencies.

This geographical representation shows us at glance which counties must be first approached in terms of a communications campaign meant to increase the awareness of people on the scope and role of the 112 emergency system.

Types of non-emergency calls. Calls timestamp and their pattern

From December 2017 until May 2018, we inserted a specific field into the file case screen of the 112 call takers, so as to allow them to discriminate between the different types of non-emergency calls.

The classes added to the newly created field in the interface comprised of a choice between informative, unintentional, associated, abusive, and other type of calls, but not genuine emergency calls.

Calls were diverted to the informative category if the callers asked questions unrelated to their safety and security of life, premises or environment, thereby giving the operators the opinion that the actual scope of the 112 emergency system was not known by enough people.

Unintentional calls were recorded by the 112 call takers whenever they faced pocket dialing or dialing by mistake, with no intention from the caller of actually reporting an emergency.

Associative calls were those calls reporting a real emergency that was already attended to, for instance repeated calls for the same fire or car crash reported by different individuals. Such calls border on the precipice between real emergency and non-emergency calls. Still, we ultimately chose to list them as non-emergency calls due to the fact that the real emergency was already known and in progress of being tended to by first responders by the time they were made.

The abusive call class was selected by 112 call takers if the received call had been intentional and of a frivolous, malicious or prank nature.

In the "other calls" class we included those calls generated by technicians, conference calls between 112 call takers and other such test and supportive calls.

The distribution of these categories of calls in the six months beginning in December 2017 is depicted hereunder:

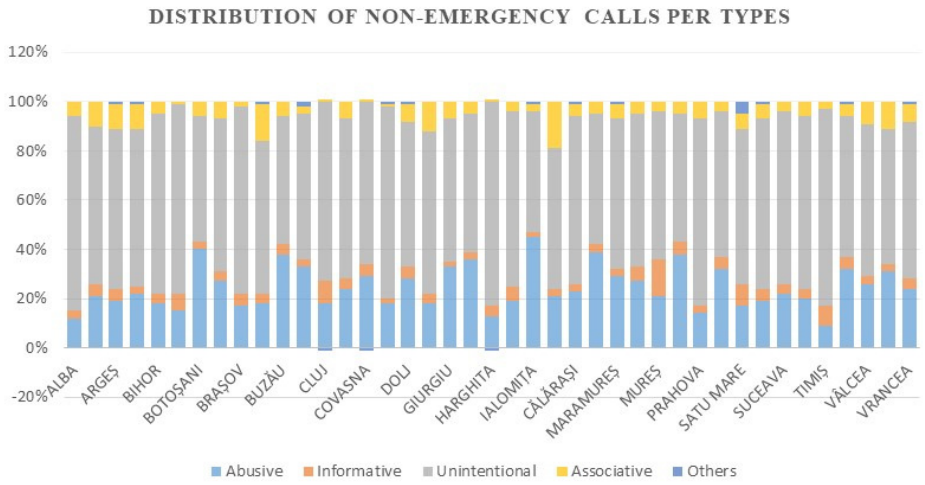

Fig. 3: Types of non-emergency calls per county (Dec 2017 – May 2018). From bottom to upper side: abusive, informative, unintentional, associated, others. Source: the authors

Data collected throughout this period revealed 3,275,932 non-emergency calls, cumulating a total wasted time of 10,967 operator hours. A number of 661 call takers responded to these non-emergencies and the incoming calls had been generated by 1,008,140 callers.

On average, the 112 system recorded 18,000 non-emergency calls per day, representing 60 hours of discussion between 5,500 callers and 380 operators. Moreover, a significant percentage (66%) of calls were pocket dials (11,510 daily calls) and 35 hours were therefore lost by 112 call takers listening to these unintentional calls.

The geographical distribution of informative calls (expressed as a ratio reported to the total number of non-emergency calls) highlighted those counties with a lack of knowledge about the scope of the 112 emergency service. These counties are to be approached immediately with a targeted public communications campaign.

Mureș county is above all other counties based on this criteria, followed by some other neighboring counties, mostly located in Transylvania.

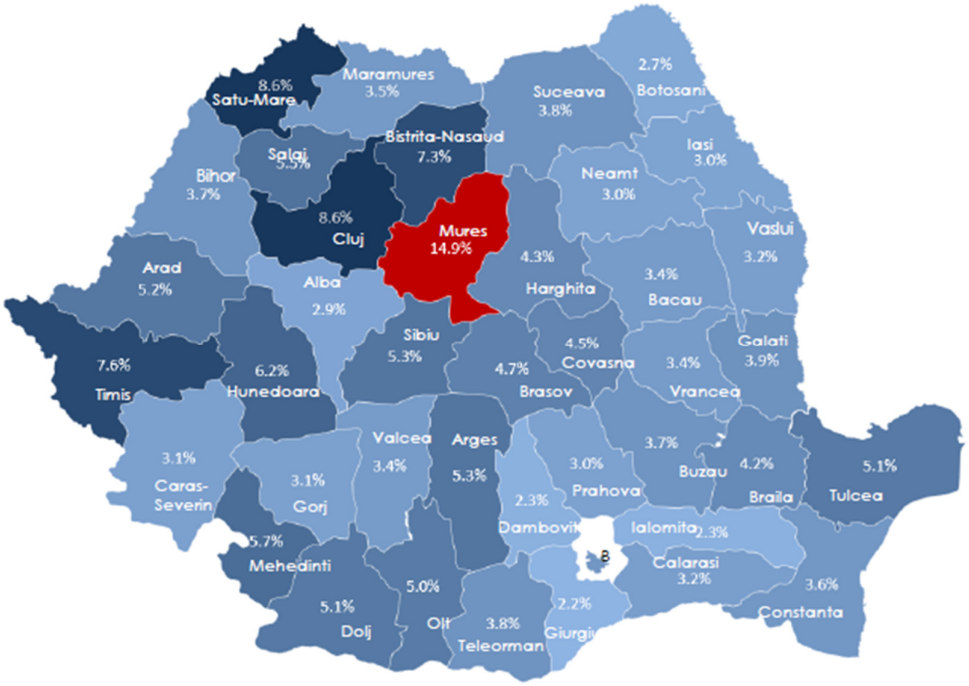

Fig. 4:Informative calls per county (Dec 2017 – May 2018). Source: the authors

For unintentional calls, the map in Figure 5 shows a dispersion of those calls all over Romania.

Pocket and unintentional dialing form common causes of generating 112 calls in all of the other EU member states, across different types of phone and smartphone terminals. It bears mentioning that we encountered some hardware configurations and software patches that automatically started dialing PSAPs for unknown reasons upon reboot. These phone types have been reported by the administrator to the National Regulatory Agency for further investigations and we will hopefully detect less and less of such calls to 112 as a result.

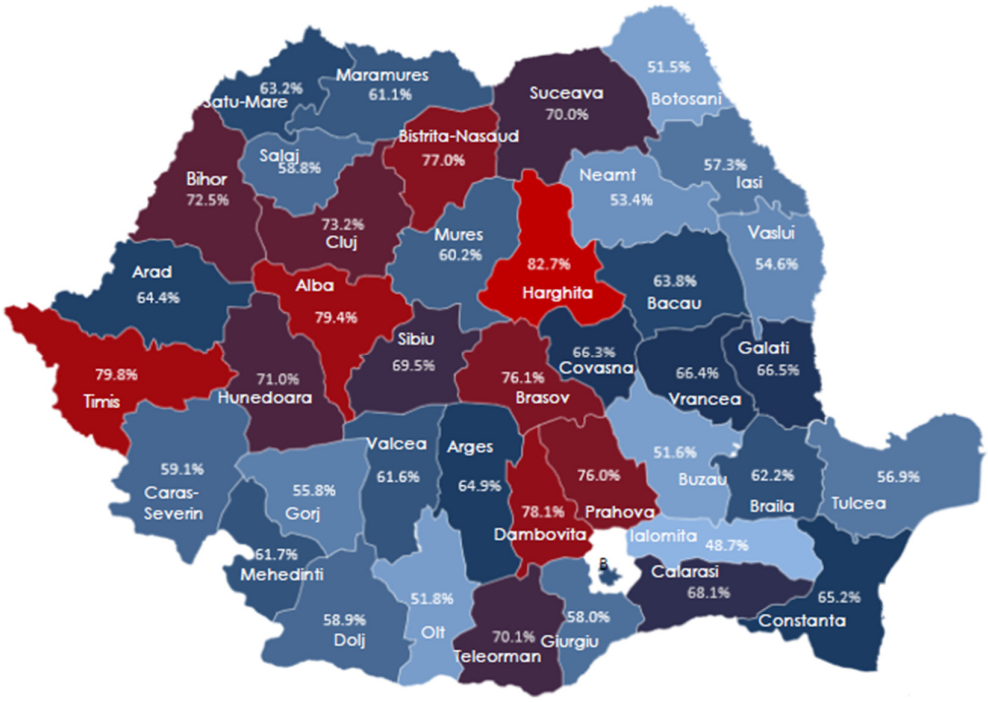

Fig. 5: Unintentional calls per county (Dec 2017 – May 2018).

Source: the authors

The abusive call distribution shows a more dispersed ratio for this type of calls, which asked for more research work to be performed in order to obtain a more accurate picture.

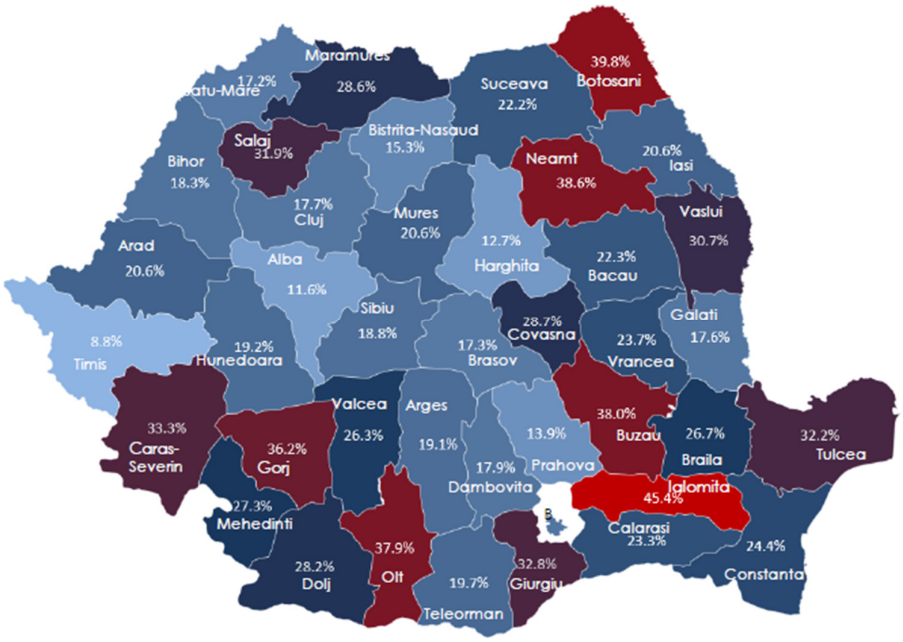

Fig. 6: Abusive calls per county (Dec 2017 – May 2018).

Source: the authors

When analyzing abusive calls further, the first action we undertook had been to set up a new field to be completed by the call takers so that they could discriminate between children and adult initiators. This age flag was particularly easy for the operators to set, after performing a quick analysis of the caller's voice by tone and the vocabulary used.

For our analysis, we considered adults those callers above the ages of 16-18. This means that those teenagers whose voices had changed were considered adults for the purposes of our research.

The representation of abusive calls distributed via age thematic maps show different ratio as follows:

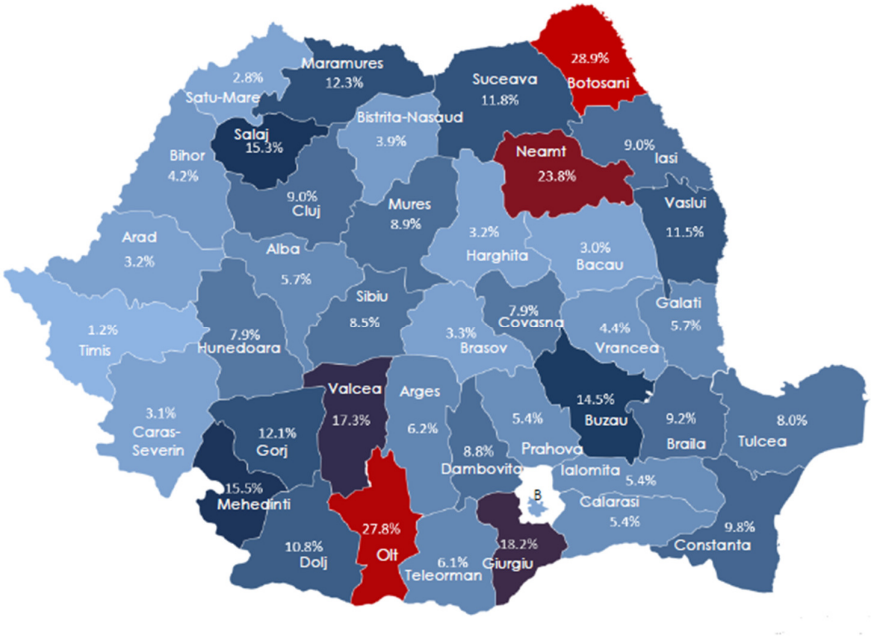

Fig. 7: Abusive adult calls per county (Dec 2017 – May 2018).

Source: the authors

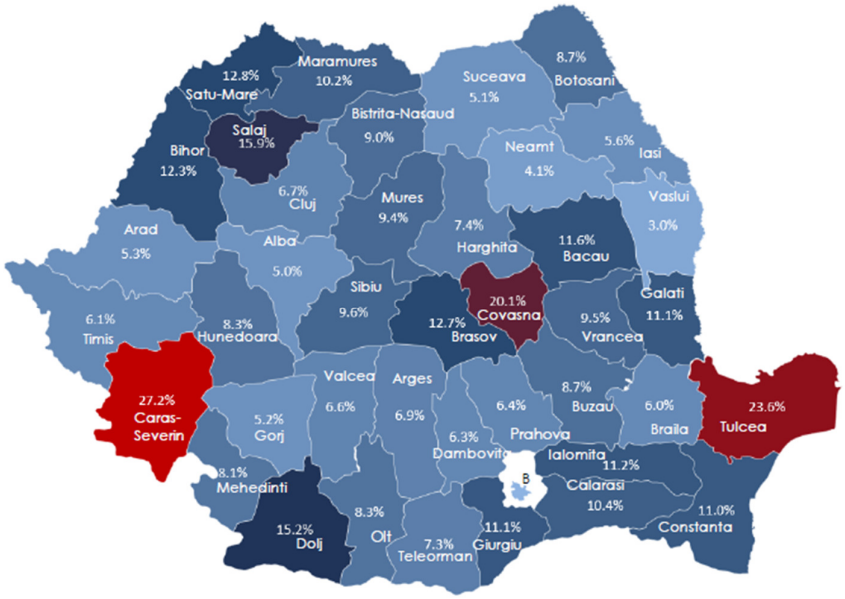

Fig. 8: Abusive children call per county (Dec 2017 – May 2018).

Source: the authors

If the above spatial representation gave us relevant information as to which county will be approached with the awareness campaign first, the time pattern indicated how the message should be shaped, to whom it should be addressed and at what time it would be more effective in reaching its audience.

The graph distribution per months showed no significant variance in volume across four months (dark blue – Dec 2017, lighter blue – May 2018):

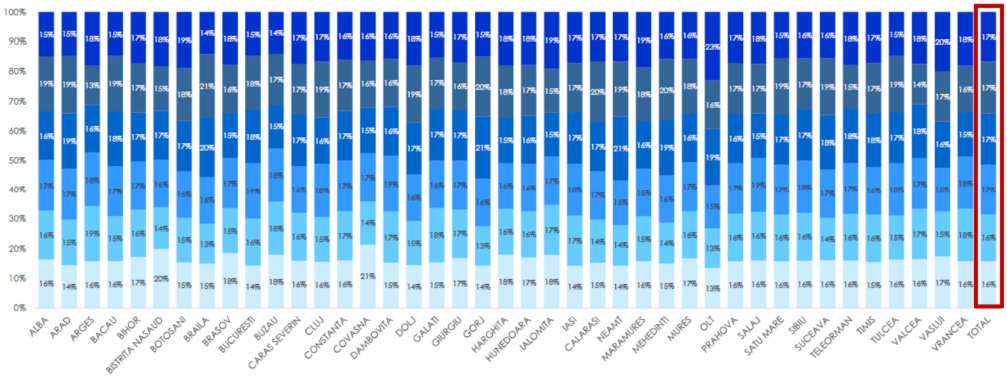

Fig. 9: Abusive calls per months (Dec 2017 – May 2018).

Source: the authors

The distribution of non-emergency calls per hours revealed that the calls arrived at the 112 PSAPs in a higher number from 7 AM to 10 PM, meaning the active period of the day for both adults and children. People working night shifts and feeling lonely or those people needing to communicate with someone else during nighttime generated a much smaller percentage, as expected.

County	Distribution of non-emergency calls per hours [%]																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ALBA	1	1	1	1	1	1	2	4	5	6	6	6	7	7	7	8	7	6	6	6	4	4	3	1
ARAD	2	1	1	1	1	1	2	4	5	6	6	6	7	6	6	6	6	6	6	6	5	4	3	2
ARGEȘ	1	1	1	1	1	1	3	4	5	5	6	6	7	7	7	7	7	7	7	6	5	4	2	2
BACĂU	1	1	0	0	1	1	2	4	5	6	6	7	7	8	8	7	7	6	7	6	5	3	2	1
BIHOR	1	1	0	0	1	1	2	4	5	6	6	7	7	7	7	7	7	7	6	6	5	4	2	2
BISTRIȚA NĂSĂUD	1	1	1	1	1	1	3	4	5	6	6	6	7	7	7	7	7	6	6	6	4	3	2	1
BOTOȘANI	1	1	1	1	1	2	2	4	4	5	5	6	6	6	6	6	7	7	6	7	6	4	2	2
BRĂILA	2	2	1	1	1	1	3	4	4	5	5	6	6	7	7	7	7	6	6	6	4	4	4	2
BRAȘOV	1	1	1	1	1	1	2	4	5	5	6	7	7	7	7	7	7	7	7	5	5	3	2	1
BUCUREȘTI	2	1	1	1	1	2	3	4	4	5	6	6	6	6	6	6	6	6	6	6	5	4	3	2
BUZĂU	1	1	1	0	1	1	2	3	4	4	5	6	5	6	6	6	6	8	8	7	6	6	5	2
CARAȘ SEVERIN	1	1	0	0	1	1	3	3	4	5	7	9	10	8	7	6	6	6	6	5	4	3	2	2
CLUJ	1	1	1	1	1	1	2	4	5	6	6	7	7	7	7	7	6	6	6	6	4	3	2	2
CONSTANȚA	1	1	1	1	1	1	3	4	5	6	6	6	7	7	7	7	7	7	7	6	5	4	2	2
COVASNA	1	0	0	0	0	1	2	4	5	6	6	7	7	7	7	8	7	6	6	6	4	3	2	1
DÂMBOVIȚA	1	1	0	0	1	1	2	4	5	6	7	7	7	7	7	7	7	7	7	6	5	3	2	1
DOLJ	1	1	1	1	1	1	2	4	4	5	6	6	6	6	6	7	7	7	7	6	5	4	3	2
GALAȚI	1	1	1	1	1	1	2	4	5	5	6	7	7	7	7	7	7	7	7	6	5	3	2	1
GIURGIU	1	1	1	1	1	1	2	3	5	5	6	6	6	6	7	7	6	7	7	7	5	4	3	2
GORJ	1	1	1	1	1	1	2	4	4	5	5	6	7	6	6	7	7	7	7	6	6	4	3	2
HARGHITA	1	1	0	1	1	1	2	4	5	6	7	7	7	7	7	7	7	7	7	6	5	3	2	1
HUNEDOARA	1	1	1	1	1	1	2	4	5	6	6	6	7	6	7	7	7	7	6	5	5	4	2	2
IALOMIȚA	2	1	0	1	0	1	3	4	4	7	7	5	6	6	5	6	5	8	8	7	4	5	3	1
IAȘI	2	1	1	1	1	1	3	4	4	5	5	6	6	6	7	7	7	7	7	6	5	4	3	2
CĂLĂRAȘI	1	1	1	0	1	1	2	4	5	6	6	7	6	7	7	7	7	7	7	6	5	4	3	2
NEAMȚ	1	1	1	1	1	2	3	4	4	5	5	5	6	6	6	6	7	7	7	6	6	5	4	3
MARAMUREȘ	1	1	1	1	1	1	3	4	5	6	6	7	7	7	7	7	6	7	6	6	4	3	2	1
MEHEDINȚI	1	1	1	1	1	1	2	4	5	6	6	6	7	6	6	7	7	7	7	6	6	4	3	2
MUREȘ	1	1	1	1	1	1	3	4	5	6	6	6	7	7	7	7	7	6	6	6	5	4	2	1
OLT	1	1	1	1	2	1	2	3	4	5	5	6	6	6	6	6	7	7	9	7	5	4	3	2
PRAHOVA	1	1	1	1	1	1	2	3	5	6	6	6	7	7	7	7	7	7	7	6	5	4	3	2
SĂLAJ	1	1	0	0	0	1	2	3	4	5	6	6	7	6	8	7	8	7	7	7	5	4	2	1
SATU MARE	1	1	1	0	1	1	2	4	5	6	6	7	7	7	7	7	6	6	6	5	5	3	2	2
SIBIU	1	1	1	1	1	1	2	4	5	6	6	7	7	7	7	7	7	7	6	6	5	4	2	1
SUCEAVA	1	1	1	0	1	1	2	4	5	5	6	6	7	7	8	7	7	7	6	6	5	4	2	1
TELEORMAN	1	1	1	1	1	2	3	4	5	6	6	6	6	6	7	7	6	7	7	6	5	4	2	2
TIMIȘ	1	1	1	1	1	1	2	4	5	6	6	7	7	7	7	7	6	6	6	6	5	4	3	2
TULCEA	1	1	0	0	1	1	3	4	5	6	6	6	7	7	7	7	6	7	7	6	5	4	2	1
VÂLCEA	1	1	1	1	1	1	3	4	5	6	7	6	7	7	7	7	7	7	7	6	4	3	2	2
VASLUI	2	1	1	1	1	1	3	4	4	4	5	6	6	6	6	6	7	7	6	7	6	5	4	3
VRANCEA	1	0	0	0	1	1	2	4	5	5	6	7	7	7	7	7	7	8	7	7	4	3	2	1

Fig. 10: Non-emergency calls per hours (Dec 2017 – May 2018)

Source: the authors

For the category of abusive calls, we registered a shift of 1-2 hours toward the right side of the time spectrum compared to the non-emergency calls depicted above in Figure 10.

County	Distribution of abusive calls per hours [%]																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ALBA	2	1	1	1	0	2	1	2	4	4	4	4	8	8	6	10	5	5	6	7	5	5	4	3
ARAD	4	2	2	1	1	1	2	3	4	6	5	5	6	6	6	6	6	5	7	6	5	5	3	3
ARGEȘ	2	1	1	1	1	2	3	4	4	5	4	5	6	6	7	7	6	6	6	6	6	5	3	3
BACĂU	1	1	0	0	0	1	2	5	5	6	6	7	6	9	8	8	6	6	6	5	4	4	2	1
BIHOR	1	1	0	0	0	1	1	3	5	5	6	7	7	8	8	8	8	8	7	6	4	3	3	3
BISTRIȚA NĂSĂUD	2	4	2	2	1	2	1	3	3	5	6	7	6	7	5	7	7	7	6	6	4	4	2	1
BOTOȘANI	2	2	2	2	2	2	2	2	3	3	4	6	5	5	5	6	6	8	7	8	8	6	3	3
BRĂILA	4	3	3	2	1	1	2	1	2	3	3	5	5	7	7	10	6	5	5	5	5	4	7	4
BRAȘOV	1	1	1	0	1	1	1	3	4	4	6	7	6	7	8	9	9	6	7	5	5	3	2	1
BUCUREȘTI	4	4	4	3	3	4	3	3	3	3	4	4	4	5	5	5	4	5	6	5	6	4	4	4
BUZĂU	1	1	1	0	0	1	1	2	2	2	3	5	4	4	4	5	6	8	10	9	8	10	9	2
CARAȘ SEVERIN	1	0	0	0	1	2	3	3	3	3	9	13	13	10	7	5	4	4	4	4	3	3	2	1
CLUJ	2	1	1	1	1	1	1	2	4	5	5	7	7	7	7	7	6	7	7	6	4	4	3	3
CONSTANȚA	1	1	1	1	1	1	3	3	4	5	5	5	8	7	7	7	8	8	7	5	5	4	3	3
COVASNA	1	0	0	0	0	1	2	4	5	6	6	8	7	7	6	9	8	6	6	6	3	3	2	1
DÂMBOVIȚA	1	1	1	1	1	2	2	3	3	5	6	6	5	8	7	8	8	8	8	5	5	4	2	1
DOLJ	3	2	1	1	1	1	3	3	3	5	4	5	6	6	6	6	6	6	6	7	6	5	4	4
GALAȚI	1	1	1	1	0	0	1	3	5	5	7	7	9	9	7	7	7	7	7	5	5	4	2	1
GIURGIU	2	1	1	1	1	2	3	3	5	4	5	6	6	6	6	6	6	8	6	7	6	4	3	2
GORJ	2	2	1	1	0	1	2	3	3	4	3	4	6	6	5	6	6	8	8	7	9	7	4	3
HARGHITA	1	1	1	1	1	1	1	2	3	5	8	8	6	7	6	6	7	6	8	6	7	4	2	2
HUNEDOARA	3	2	1	0	1	2	2	2	3	4	5	5	7	6	7	7	6	8	6	4	5	5	3	4
IALOMIȚA	3	3	1	1	0	1	3	5	2	9	8	3	5	5	3	5	4	8	10	8	3	7	4	1
IAȘI	4	1	1	1	1	1	2	3	3	4	5	6	6	6	6	6	6	7	7	6	6	5	4	3
CĂLĂRAȘI	2	1	1	0	0	1	1	3	4	5	5	7	7	7	7	7	7	7	6	5	4	4	4	2
NEAMȚ	2	2	2	2	2	2	2	2	3	3	3	4	4	5	5	6	6	6	7	7	8	7	6	4
MARAMUREȘ	1	1	0	1	1	2	3	3	5	6	6	7	7	8	7	7	6	7	6	6	4	3	2	1
MEHEDINȚI	3	1	1	1	1	1	2	2	3	4	5	5	6	5	6	7	6	6	7	6	7	6	5	3
MUREȘ	1	1	0	0	1	1	2	3	4	5	6	6	7	7	7	7	7	7	6	7	6	4	2	1
OLT	2	2	1	2	4	2	1	2	3	3	4	5	4	4	4	6	6	7	12	9	7	5	4	2
PRAHOVA	2	1	1	1	1	1	1	2	3	4	4	5	6	6	9	7	7	7	7	5	7	5	4	3
SĂLAJ	1	0	0	0	0	1	1	3	3	5	6	6	8	5	8	7	9	9	9	7	6	4	2	1
SATU MARE	1	0	1	0	1	1	1	3	5	4	6	7	7	9	7	9	7	6	7	5	5	2	3	3
SIBIU	1	1	0	1	1	1	1	3	4	6	5	7	7	7	7	8	7	7	7	6	6	3	2	2
SUCEAVA	1	1	1	0	0	0	1	2	2	3	4	5	6	7	9	8	7	7	7	9	9	7	3	2
TELEORMAN	1	2	2	2	4	4	2	3	4	4	4	4	5	6	6	6	5	7	7	7	6	4	3	2
TIMIȘ	2	2	2	1	1	1	1	2	3	4	6	5	7	7	7	9	6	7	7	6	4	4	4	3
TULCEA	0	1	0	0	0	1	2	3	4	6	6	6	7	7	7	7	6	8	7	8	6	4	2	1
VÂLCEA	1	1	1	1	1	2	2	4	5	5	8	6	6	6	7	7	6	7	7	6	5	4	2	2
VASLUI	5	2	1	1	2	2	2	2	2	2	3	3	3	4	4	4	5	6	6	9	8	10	8	7

Fig. 11: Abusive calls per hours (Dec 2017 – May 2018)

Source: the authors

A very clear representation of time windows for adult abusive calls versus children abusive calls is shown in the figures below.

Most abusive calls generated by adults were registered in the afternoons or following the working hours (i.e. between 2 PM and 10 PM), while for children, the time window with heaviest numbers was between 12 AM and 4 PM, when they were mainly bereft of adult supervision.

County	Distribution of abusive calls initiated by adults per hours [%]																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ALBA	4	1	1	1	1	2	1	2	3	3	5	3	10	7	6	9	4	4	6	7	6	7	6	4
ARAD	4	4	3	2	1	1	2	3	3	5	5	5	6	3	6	4	5	5	6	7	5	7	3	6
ARGEȘ	4	1	2	1	1	2	4	4	4	4	4	5	5	4	5	6	4	6	5	7	7	6	5	5
BACĂU	1	1	0	0	0	1	1	3	2	3	4	5	7	7	6	7	5	7	8	8	7	6	4	3
BIHOR	4	1	1	1	0	1	1	2	4	4	4	4	4	8	7	6	6	7	6	6	5	6	5	6
BISTRIȚA NĂSĂUD	2	5	4	3	1	1	1	1	2	3	5	4	7	5	4	4	8	8	5	8	6	6	3	2
BOTOȘANI	3	3	3	3	2	2	2	2	2	2	3	4	4	4	4	6	6	8	6	9	9	7	4	3
BRĂILA	3	2	3	2	1	1	2	1	2	4	2	4	4	9	10	6	5	4	4	6	5	5	10	6
BRAȘOV	4	3	2	1	1	1	1	3	4	2	4	4	4	5	7	9	7	6	6	5	8	5	6	4
BUCUREȘTI	5	3	3	2	3	3	2	3	3	3	3	3	3	5	5	4	5	5	7	7	7	6	6	5
BUZĂU	1	1	1	0	0	1	2	2	2	2	3	4	3	4	4	5	5	8	9	9	9	11	10	3
CARAȘ SEVERIN	2	2	2	1	1	2	2	2	4	3	4	5	5	6	6	4	5	8	5	7	7	7	5	6
CLUJ	2	2	1	1	1	1	1	3	4	5	5	6	6	7	6	6	6	6	6	7	4	4	3	4
CONSTANȚA	3	2	1	1	1	2	4	3	3	3	3	4	6	6	5	6	6	7	9	6	6	5	5	4
COVASNA	2	1	0	1	0	2	3	2	4	5	5	6	5	5	5	12	8	6	6	7	5	5	4	2
DÂMBOVIȚA	2	2	1	1	1	2	2	3	3	4	5	5	4	9	6	7	7	9	9	5	6	5	2	1
DOLJ	5	4	2	1	2	2	4	2	2	3	3	3	4	4	4	4	4	4	5	7	7	7	8	8
GALAȚI	3	2	1	1	1	1	2	3	4	3	4	5	7	6	7	5	6	7	7	6	6	6	4	3
GIURGIU	3	2	2	2	2	2	3	3	3	3	4	4	4	4	4	4	5	9	7	9	7	6	5	3
GORJ	2	2	1	1	0	1	2	3	3	3	3	3	5	5	4	6	6	7	9	8	10	7	5	4
HARGHITA	3	2	2	2	4	2	1	3	2	3	4	5	3	5	4	6	8	8	8	7	7	6	4	3
HUNEDOARA	3	3	2	1	2	3	2	1	3	3	5	2	5	5	6	6	5	10	6	4	7	7	5	5
IALOMIȚA	2	3	1	1	0	1	4	2	2	5	5	4	4	6	4	6	6	7	9	9	6	6	3	4
IAȘI	4	2	1	1	1	2	2	2	3	3	4	6	5	5	6	6	6	7	8	6	7	6	4	3
CĂLĂRAȘI	3	2	2	1	1	1	1	4	5	5	3	5	6	5	4	6	6	8	6	5	4	6	7	4
NEAMȚ	2	2	2	2	2	2	2	2	2	2	3	3	4	5	4	6	6	6	7	8	9	8	6	4
MARAMUREȘ	2	1	1	1	1	2	3	4	4	6	6	6	6	8	7	7	6	6	6	5	5	3	2	2
MEHEDINȚI	4	2	2	1	1	1	2	2	2	3	4	4	5	4	5	5	5	6	7	7	9	8	7	4
MUREȘ	1	1	1	0	1	1	2	4	4	5	6	5	6	7	7	6	7	6	7	7	7	5	3	2
OLT	2	2	1	2	5	2	1	1	3	2	3	4	3	3	4	4	5	7	13	10	7	5	5	3
PRAHOVA	3	3	2	2	1	1	1	1	2	3	2	3	5	4	9	6	5	6	6	6	8	8	7	5
SĂLAJ	1	0	1	0	1	1	2	3	4	4	6	6	7	5	7	7	8	8	8	7	6	5	3	2
SATU MARE	2	1	3	1	5	0	2	1	4	4	8	5	4	6	4	6	4	7	5	6	4	4	8	5
SIBIU	2	1	1	1	1	2	1	3	3	6	4	5	6	6	6	7	6	7	6	6	8	5	4	4
SUCEAVA	1	1	1	1	0	0	1	1	2	2	3	4	5	6	8	6	6	6	7	11	12	8	4	3
TELEORMAN	2	2	4	4	9	8	2	2	2	3	3	2	3	4	4	4	4	8	6	7	8	5	3	2
TIMIȘ	4	4	5	4	2	1	0	1	1	5	3	3	4	4	5	7	4	5	6	3	6	8	7	8
TULCEA	1	2	1	1	1	1	1	2	3	4	3	5	6	8	6	7	5	6	7	8	8	6	4	4
VÂLCEA	1	1	1	1	1	2	3	4	5	5	7	6	6	6	6	7	6	7	7	6	5	4	2	2
VASLUI	6	2	1	1	1	1	2	2	2	1	2	3	3	3	3	2	4	6	5	11	11	12	8	10

Fig. 12: Abusive adult calls per hours (Dec 2017 – May 2018)

Source: the authors

County	Distribution of abusive calls initiated by kids per hours [%]																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ALBA	0	0	0	0	0	0	0	3	4	6	5	5	7	11	6	12	8	6	6	6	4	3	2	1
ARAD	1	0	0	0	0	0	1	2	4	4	6	6	10	9	7	9	8	8	8	6	6	4	3	1
ARGEȘ	0	0	0	0	0	1	2	3	4	5	6	7	8	9	9	9	7	6	6	6	5	4	1	1
BACĂU	0	0	0	0	0	1	2	5	5	7	7	8	8	10	9	9	7	7	6	5	4	2	1	1
BIHOR	0	0	0	0	0	0	1	3	4	5	7	8	8	8	9	9	9	9	7	6	4	2	1	1
BISTRIȚA NĂSĂUD	0	1	0	0	0	0	1	3	3	7	7	9	7	9	5	9	7	8	7	6	4	3	3	0
BOTOȘANI	1	0	0	0	0	2	2	4	5	6	6	8	7	6	7	9	8	9	7	5	4	2	1	0
BRĂILA	0	0	0	0	0	1	3	4	5	4	4	6	8	6	6	15	9	9	6	3	2	1	1	0
BRAȘOV	0	0	0	0	0	1	1	3	4	5	6	8	7	8	9	9	10	7	8	5	4	2	1	0
BUCUREȘTI	0	0	0	0	0	0	2	3	5	5	6	8	8	8	9	9	7	9	6	5	4	3	2	0
BUZĂU	0	0	0	0	0	1	1	3	3	3	5	7	7	6	7	7	7	10	15	8	6	2	1	1
CARAȘ SEVERIN	0	0	0	0	0	1	3	3	3	3	10	14	15	10	7	5	4	4	4	4	3	3	1	1
CLUJ	1	0	0	0	0	0	2	2	4	5	6	9	9	9	9	9	8	9	8	4	4	2	1	0
CONSTANȚA	0	0	0	0	0	0	2	4	5	6	6	7	10	9	8	8	8	8	6	4	3	2	1	1
COVASNA	0	0	0	0	0	1	2	5	5	7	7	8	8	8	7	9	8	6	6	6	3	2	2	1
DÂMBOVIȚA	0	0	0	0	0	1	2	3	4	6	6	8	7	9	8	10	9	7	7	5	4	2	1	1
DOLJ	0	0	0	0	0	1	2	3	5	7	6	6	8	7	8	7	8	8	6	7	4	3	2	1
GALAȚI	0	0	0	0	0	0	1	3	6	6	8	8	10	10	8	7	8	6	7	5	4	2	1	0
GIURGIU	0	0	0	0	0	0	2	4	7	6	7	8	9	9	9	9	7	6	6	4	3	2	1	0
GORJ	0	0	0	0	0	1	2	4	4	7	7	6	8	7	8	6	7	9	7	6	5	2	2	1
HARGHITA	0	0	0	0	0	0	1	2	4	7	11	10	7	8	8	6	7	6	8	5	7	3	1	0
HUNEDOARA	1	0	0	0	0	1	2	3	4	6	6	8	10	7	7	9	7	9	7	4	4	3	1	1
IALOMIȚA	0	0	0	0	0	0	1	3	3	6	7	6	8	9	7	9	8	10	8	5	4	2	1	0
IAȘI	5	1	0	0	0	1	2	3	4	5	5	8	7	7	8	8	8	7	7	5	3	2	2	2
CĂLĂRAȘI	0	0	0	0	0	0	1	4	5	5	6	8	6	8	8	9	9	7	7	6	4	3	2	1
NEAMȚ	0	0	0	0	0	2	1	4	7	7	5	6	8	7	7	8	6	8	8	5	4	2	1	1
MARAMUREȘ	0	0	0	0	0	1	1	3	6	8	7	8	7	9	7	8	6	8	7	6	4	3	1	0
MEHEDINȚI	0	0	0	0	0	0	1	3	4	8	8	8	9	6	8	11	9	8	7	4	3	2	1	1
MUREȘ	1	0	0	0	0	1	2	3	4	6	7	7	8	8	8	8	8	7	6	6	5	3	1	1
OLT	0	0	0	0	1	0	1	2	5	5	6	7	7	6	6	10	9	9	8	6	5	4	2	1
PRAHOVA	0	0	0	0	0	1	1	2	4	5	6	7	8	9	10	8	8	8	7	4	5	2	2	1
SĂLAJ	0	0	0	0	0	0	1	2	3	5	7	6	8	5	9	7	10	9	9	8	6	2	1	0
SATU MARE	0	0	0	0	0	1	1	3	5	4	6	8	7	9	7	10	8	7	7	4	5	2	2	2
SIBIU	0	0	0	0	0	0	1	2	5	6	6	8	8	8	9	8	8	8	7	5	4	2	1	0
SUCEAVA	0	0	0	0	0	0	2	4	5	6	8	7	7	7	8	8	9	10	6	6	6	2	0	0
TELEORMAN	0	0	0	0	0	0	1	4	4	4	6	6	7	9	11	10	6	7	7	6	4	2	2	1
TIMIȘ	1	1	1	0	0	0	1	2	3	4	7	6	8	8	8	10	7	8	7	6	4	3	3	1
TULCEA	0	0	0	0	0	1	2	3	4	6	7	6	8	7	7	7	7	8	7	8	5	4	1	0

Fig. 13: Abusive children calls per hours (Dec 2017 – May 2018)

Source: the authors

A comparative side-by-side view per days of the week can also be found below:

Distribution of abusive calls initiated by adults per hours of day [%]							
Hour	Mo	Tu	We	Th	Fr	Sa	Su
1	2	2	3	3	2	3	3
2	2	2	2	2	2	2	2
3	1	1	2	2	1	2	2
4	2	1	2	1	1	1	2
5	2	1	2	1	1	2	2
6	1	2	1	2	2	2	2
7	2	2	2	2	2	2	2
8	2	2	2	2	2	3	2
9	3	3	3	3	2	3	3
10	3	3	3	3	3	4	3
11	3	4	4	4	4	4	4
12	4	4	5	4	4	4	4
13	5	5	4	5	4	5	5
14	5	4	5	5	6	5	5
15	5	4	6	6	5	6	5
16	5	6	5	6	6	5	6
17	6	5	5	6	6	6	5
18	7	7	7	7	7	6	6
19	8	7	7	7	7	7	7
20	8	8	7	7	8	8	7
21	8	7	7	7	8	7	8
22	7	8	6	7	6	6	6
23	5	6	5	5	6	5	5
24	4	3	4	4	3	4	4

Distribution of abusive calls initiated by kids per hours of day [%]							
Hour	Mo	Tu	We	Th	Fr	Sa	Su
1	1	0	0	0	0	1	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	1	1	1	1	1	1	0
7	2	2	2	2	2	2	1
8	3	3	4	3	3	4	3
9	4	4	5	4	4	5	5
10	5	5	6	5	5	6	6
11	6	6	7	7	6	7	7
12	7	8	7	8	7	8	8
13	8	8	8	9	8	9	9
14	8	9	8	8	8	8	8
15	8	9	8	9	8	7	8
16	9	9	8	9	8	7	8
17	8	8	8	7	8	7	8
18	8	8	8	8	8	8	8
19	7	7	7	7	7	7	6
20	5	5	6	5	6	5	5
21	4	4	4	4	5	4	4
22	2	3	2	2	3	3	2
23	1	1	1	1	1	2	1
24	1	1	1	0	1	1	1

Fig. 14: Abusive calls per hour initiated by adults versus children (Dec 2017 – May 2018)
Source: the authors

For each category, we hardly observed a higher intensity of colors during the working days compared to the weekends.

Insights on abusive calls generated by adults, their distribution and main findings.

After we formed preliminary conclusions based on the above spatial and time distribution on the class of non-emergency and abusive calls, we began rolling the awareness campaign in high-percent counties, primarily in schools, so as to target children during school hours. These campaigns resulted in a significant decrease in the national percentage of abusive calls generated by children.

We then focused our research on the adult sub-category of abusive callers. For that reason, we appended three new predefined categories of calls, which could be selected by the call takers during their interview with the caller – either frivolous, malicious and prank calls. Our research began by collecting data from 1st September 2018 until 31st December 2018 (i.e. the 4th quarter of 2018).

The differences between frivolous, malicious and prank calls are detailed below, as follows:

a) Frivolous Calls – when incoming calls are initiated either for fun, or by accident while playing with a phone's keypad, or testing a phone's various functionalities;

b) Malicious Calls – when incoming calls address the emergency service or the 112 operators using insults or gratuitous verbal attacks;

c) Prank Calls – when incoming calls are intentionally dialed for reporting false alerts that ask for the field intervention of 112 agencies (Police, Gendarmerie, Medical Emergency Services or Fire brigades).

We found the distribution of abusive calls according to the matrix presented in Table 1 below.

Table 1: Abusive Calls distribution per type of call (4th quarter of 2018)

Month	Frivolous Calls	Malicious Calls	Prank Calls
September	13,976	6,544	805
October	13,684	7,385	808
November	12,946	7,382	667
December	16,299	8,593	621

Source: the authors

The total number of abusive calls generated by adults throughout the analyzed quarter was 89,710, having systematically the highest percentage of frivolous calls (about 65%), followed by malicious calls in the range of 32% and the smallest percent being the prank calls (approximately 3%).

It is noticeable that in December the number of frivolous and malicious calls increased, but the number of prank calls decreased. It seemed that citizens did not entertain the idea of spending money to pay fines in December, but had instead a good appetite for jokes, or checking the functionality of their newly purchased phones compared to the rest of the year.

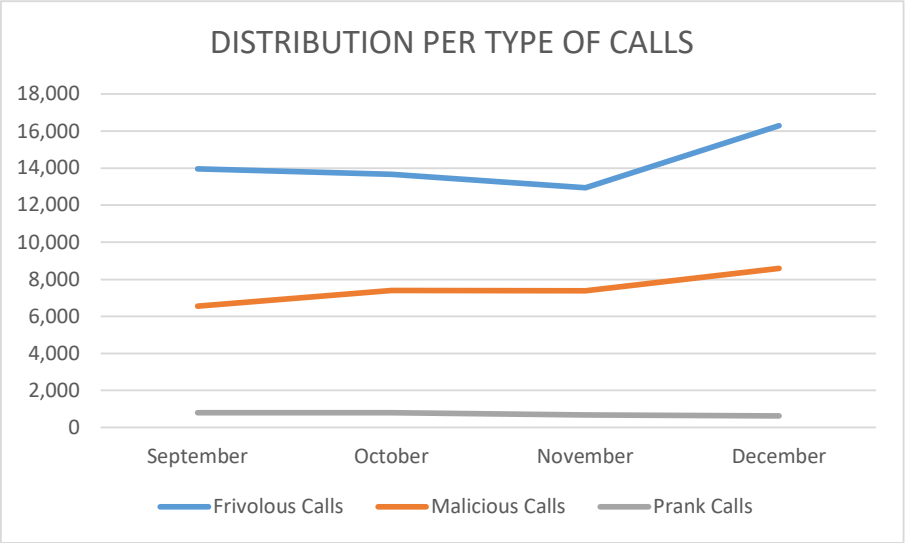

Fig. 15: Time series for categories of abusive calls (4th quarter of 2018).

Source: the authors

The split in the number of abusive calls directed to 112 by adults per each Romanian county is represented in Figure 15. The X-axis depicts the county codes, while the Y-axis represents the number of abusive calls.

Reducing the number of abusive calls is essential for the proper operation of PSAPs, particularly in times of widespread disasters, including the current COVID-19 pandemic, when 112 acts as a primary contact point for reporting illness. The representation below supports the administrator in prioritizing the launch of public awareness campaigns in the most affected counties.

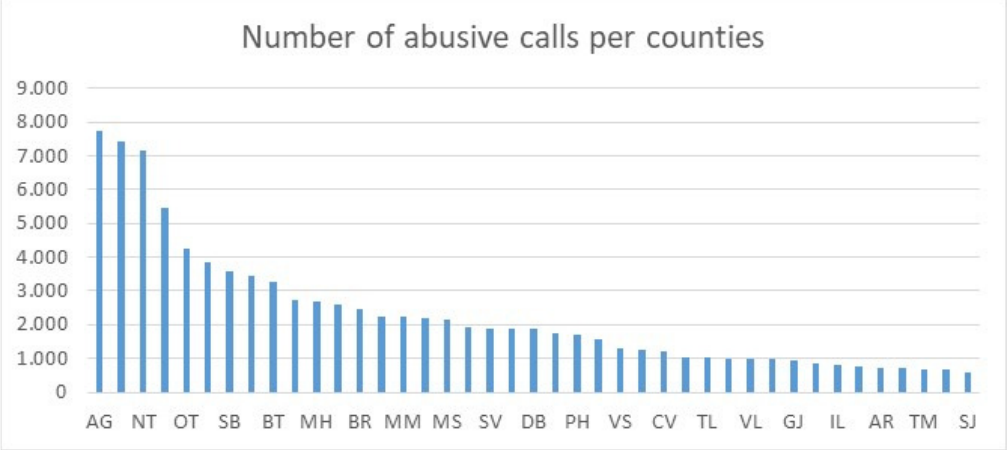

Fig. 16: County distribution of abusive calls (4th quarter of 2018).

Source: the authors

The normal distribution in the number of adult abusive calls across the counties in Romania is depicted in Figure 17 below.

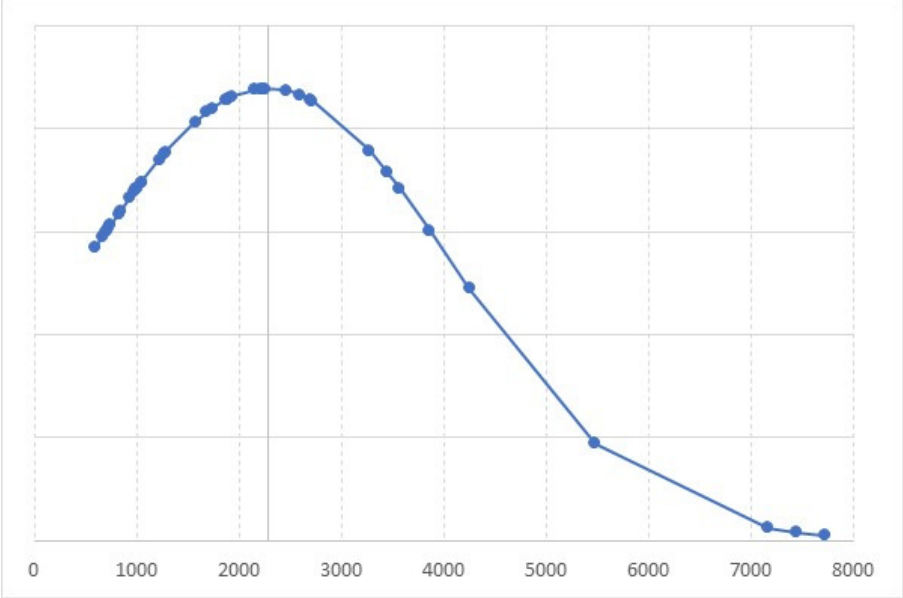

Fig. 17: Normal distribution of the number of adult abusive calls per counties in Romania

Source: the authors

The calculated median value is 2,284 and the standard deviation σ is 1,817.6. In 28 out of the 41 counties, the observed numbers are below the mean, while only 13 range above this value, with notable numbers recorded for the capital and the adjacent Ilfov county that are treated as one metropolitan region. Nevertheless, it is important to note that the capital does not amount for the largest observed number of calls.

The impact of abusive calls on operational performance and financial losses

The histogram of the average time of non-emergency conversations shows large variations, ranging from 11 seconds to 50 seconds for dealing with such calls. Even at the national level the operators have the same job description and receive the same instructions on how to handle this type of calls, so it is a must to reinitiate training courses with all call takers on that aspects, in order to achieve a similar way of handling the calls all over the country.

Furthermore, at the time of the analysis, the number of operators on duty per shift were the same, except for the Bucharest PSAP which employed a higher number of call takers.

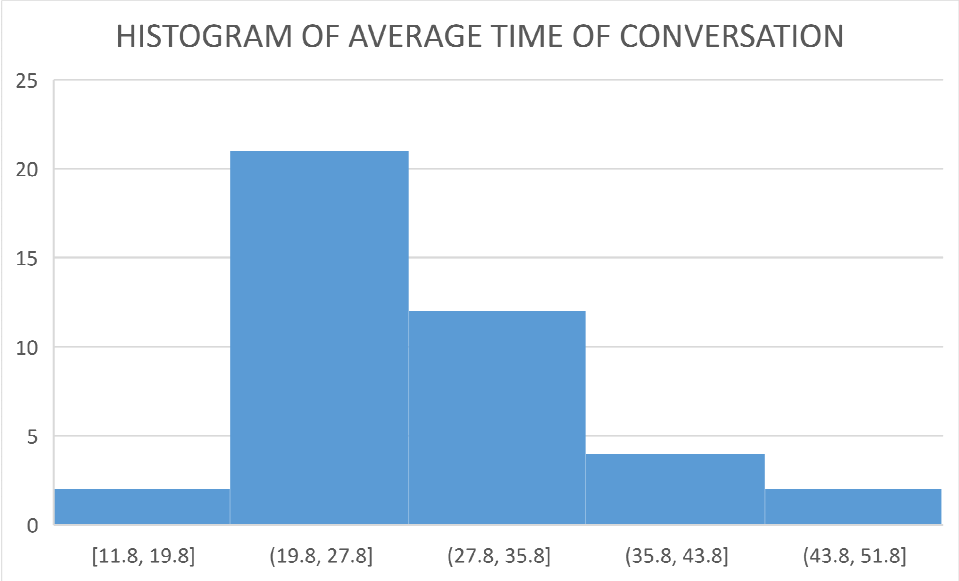

Fig. 18: Distribution of average time of conversation (clustered into seconds).

Source: the authors

The waiting time in the queue is an important parameter of any emergency call center's performance, due to the fact that its value represents the duration of time someone in real need has to wait before they can report a genuine emergency. Considering that emergency calls are still coming in between those large numbers of non-emergency calls, it becomes mandatory that the 112 administrator takes operational and technical actions in order to decrease call waiting times as much as possible.

The number of abusive calls made to the 112 system in the 4th quarter of 2018 collectively amounted to a total call duration of about 1 entire month. This time was essentially wasted by the operators having to deal with such non-substantiated calls.

One month of non-valuable conversation time per quarter could occupy a shift of 5 call takers, since each quarter (25) of the total conversation time to 112 is wasted on answering abusive calls generated by adults.

In financial terms, considering that frivolous and malicious calls are not transferred to first responder agencies, the direct cost of non-emergency calls is actually represented by the call takers' salaries. We estimated that the authorities are paying one shift of 5 operators to deal just with those categories of calls for 1 month per quarter. If their salaries cost around 5,000 EUR per month in each quarter, then losses of up to 20,000 EUR per year can be incurred only to answer frivolous and malicious calls. The opportunity costs associated with those categories of calls are much higher in reality, because non-emergency calls render call takers unavailable to handle real emergencies for people in need.

However, the most important direct financial losses are incurred because of prank calls made to the 112 systems. First responders are generally mobilized due to this particular type of calls, as they usually request the dispatch of resources to the place of reported incident (e.g. officers, medical staff, firefighters equipped with specific tools and devices, automobiles, motorcycles and even helicopters). If we only take into consideration that figure of 2,900 prank calls per quarter, in Q4 of 2018 the estimated cost of unnecessary intervention could be easily approximated to 500 EUR per call, resulting in total losses of 1.45 million EUR per quarter and approximately 5.8 million EUR per year.

We would like to note that our particular calculation is still likely optimistic, considering that in the case of long-range or heavy conditions interventions requiring the cooperation between more than one first responder agency the costs could rise up to even thousands of euros per call.

Recommendations

The most significant volume of non-emergency calls remains that generated by pocket dialing. This could be addressed both from a technological perspective (via countermeasures or actions to be addressed by mobile

networks/device manufacturers allowing emergency calls to be initiated even when the terminals are locked), but also through an awareness campaign informing people to lock their phones when not in use.

Abusive calls represent the second most important source of unjustified calls – and the costliest ones. The cases encountered are varied, but most stem from a lack of civic responsibility and information on behalf of the callers. Both of these facets are addressable through targeted awareness campaigns. Upon investigating the archive of emergency calls, we even found situations with people who had called 970 times over a period of 6 months. For such isolated cases, an education campaign would likely have no effect, but a fine might prove more effective in diminishing the numbers of calls.

One recommendation that is likely to greatly bolster the responsibility of callers is the modification of the national legislation regarding the purchase of prepaid SIM cards. In this respect, the mandatory declaration of the the purchaser's identity at the shopping desk should be considered.

In order to decrease the number of abusive calls, the 112 service administrator in Romania will continue to run the media campaigns on the role and scope of the 112 emergency number. Considering the results of our research, it appears especially important to continue fine tuning these in terms of message content, wording, representations and time spots to reach the right audience more effectively.

The quality of the service will be augmented by activating either temporary or permanently a number of supplementary call centers to deal with the issue of special calls, such as the one for medical assistance and support for COVID-19, or for chronic issues that do not actually represent real emergencies.

Communication about the 112 service must be performed to large audiences and adapted to the modern lifestyle, via official websites, TV, digital media, social networks, search engines, etc.

Conclusions

In the present study, we collected data pertaining to incoming 112 emergency calls in Romania, conducting an analysis over an extended period of time, and then focusing on the specificity of non-emergency calls. Ultimately, we concentrated on studying the abusive calls generated by adults.

The scope of our research was to identify the dominant characteristics of the abusive calls, which would in turn allow the 112 administrator to target the right audience, using the right channels at the right time.

By implementing the proposed solutions, we succeeded in decreasing the volume of non-emergency calls under the value of 50%, from 2019 until the time of writing. We will continue to increase the quality of services in terms of availability and the performance delivered by the Public Safety Answering Points as well.

Our results showed that the most important number of abusive calls originated by adults were frivolous calls. We also calculated that the time wasted by the operators taking abusive calls generated by adults amounts to about one month lost per quarter. To combat this type of calls, we would need a dedicated shift of 5 operators specifically tasked with taking only abusive calls.

All of these non-emergency calls incur costs, which turn into real financial losses for the national budget. These losses shall be presented to the citizens in an attempt at making them aware of the situation, as well as of the huge opportunity cost of involving first responders in prank calls.

Therefore, the steepest financial cost and impact on the public budget comes from the prank calls category, with a total estimated cost of at least 5.8 mil EUR per year.

The information on the spatial distribution of non-emergency calls per county, weekdays and hours is useful for optimizing the process of allocating different numbers of operators per counties, so as to reduce the waiting time for emergency calls on a nationwide basis.

It would seem though that our findings and insights have already begun to bear fruit. According to the data collected by the PSAPs of the 112 emergency system, during the period January - November 2019, there were in total 10,437,328 calls made to 112, out of which 5,404,650 (51.7%) reported real emergencies. Due to the efforts of the 112 administrator, it is for the first time in 16 years of operating the 112 system that we are above the 50% line of real emergency calls made to 112. We will of course continue to optimize our efforts so as to maintain this trend of decreasing non-emergency calls in the following years as well.

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Factors Influencing Intention to Adopt Cryptocurrency

Saad ALAKLABI[1,2] and Kyeong KANG[1]

[1]University of Technology, Sydney, Australia

[2]Shaqra University, Saudi Arabia
saad.alaklabi@student.uts.edu.au
Kyeong.kang@uts.edu.au

Abstract

The global financial market is influenced by relatively new technologies such as cryptocurrencies Bitcoin, Ethereum, Litecoin, and others. Cryptocurrencies are a challenging area in finance that requires additional attention from the academic community as they can have a potentially large impact on society and the economy. The aim of this study is to investigate the usability of digital money among the citizens of Saudi Arabia. Various factors that are related to user behaviour and have an impact on user intent towards cryptocurrencies based on a combined approach are analysed. The basis from which we started is The Theory of Reasoned Action (TRA), together with four other constructions: perceived risk (consisting of privacy risk, financial risk, and security risk), perception of enjoyment, perceived usefulness, and personal innovation. The method used to collect the data is a questionnaire. The results showed that variables such as subjective norms, security risk, perception of utility, and enjoyment influence the adoption and use of cryptocurrencies. A row of these variables includes the perception of pleasure as well as the perception of utility.

Keywords: Cryptocurrency, Technology Adoption, TRA.

Introduction

A cryptocurrency is a digital currency and represents digital records of certain values stored in digital databases. The goal of developing cryptocurrencies is to suppress printed money from the market and to establish a system that will not be under the supervision and control of the state and government. Bitcoin is the first cryptocurrency that was developed in 2009 (Satoshi, 2008) whose value is extremely growing, so it is often called digital gold. In 2017, the value of cryptocurrencies was almost $ 800 billion (Alzahrani, and Daim, 2017) while in May 2019, bitcoin reached a market capitalization of close to $ 100 billion (Kaspersky, 2019). Some estimates suggest that by 2024 the number of Bitcoin users will reach as high as 200 million (Alzahrani, and Daim, 2017). According to the Kaspersky Lab report, only 10% of people understand the meaning, significance, and system of cryptocurrencies, while 35% of people believe that cryptocurrencies are a trend (Kaspersky, 2019). The data from this report has shown that 19% of people were hacked, and 15% of respondents were victims of cryptocurrency fraud. The lack of rigorous standards that can prevent fraud and hacking of cryptosystems is a factor that leads to concerns and a lack of trust (Kaspersky, 2019) when it comes to the use of cryptocurrencies. Also, the biggest obstacle to understanding this whole system is ignorance of computer technology, terminology that is almost exclusively in English as well as lack of knowledge about cryptocurrencies (Kaspersky, 2019).

Before implementing any new technology, it is necessary to assess the possibility of its adoption. The founder and pioneer of the Bitcoin Investment Trust, Barry Silbert, argues that the adoption of cryptocurrencies is a process that occurs in five phases (Charalambos et.al, 2015): (i) the experimentation phase, (ii) the early adoption phase, (iii) the venture capital phase, (iv).) wall street phase and (c) global consumer adoption phase. However, although theoretically, these phases are necessary, the actual adoption of cryptocurrencies depends on many other factors specific to each country and its economy. This research aims to assess how people in Saudi Arabia view the process of adopting cryptocurrencies and what intentions they have. to achieve this, we explored the TRA and related factors, namely subjective norms (SN), attitude (AT), and intent to adopt cryptocurrency (IACC). Besides, we investigated the perceived risk (PR), perceived usefulness (PU), perceived enjoyment (PE), and personal innovation (PI). TRA's model explains how the various factors associated with one's attitude relate to a particular behavior. According to this model, each individual will act without inhibitions and restrictions after the intention's formation, and changes can

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occur by including additional explanations. This theory has shown high validity with the possibility of comparing the results obtained in other studies. In this research, TRA will be the basis with which we will try to get answers to the formed hypotheses. This model has a good foundation and literature support and allows authors to identify gaps and draw correct conclusions. The TRA model is reliable in determining users' affinity towards the use of cryptocurrencies, especially since it is a new technology. This research introduces three new aspects of this model:

1. It explores the factors that influence the intention of Saudi citizens to become cryptocurrency users.
2. The study includes participants who use social networks such as Twitter, which implies that they are technologically literate.
3. This study includes participants who already have some prior knowledge of cryptocurrencies, which will provide new insights into how people who already know the new technology perceive it and how likely they are to become users.

Theoretical Background and Model Development

Related Works

Many studies have used these models or a combination of these models to investigate influential factors not only in the field of cryptocurrencies but also in other areas. Concerning cryptocurrency adoption, the authors aimed to investigate the degree of acceptance of blockchain technology for financial transactions. The study involved 277 participants, of whom 72% were men and 28% women (Albayati, Kim, and Jeung Rho, 2020). This study's findings showed that trust is the main variable influencing the acceptance of new technology, while regulatory support and experience affect trust (Albayati, Kim, and Jeung Rho, 2020). In contrast, in work of Ku-Mahamud et al. (2019) the results showed that most respondents believe that blockchain technology and cryptocurrencies are stable and secure. The study aimed to analyze the factors influencing the adoption of cryptocurrencies (i.e., Awareness, Adoption, and Trust) in Malaysia on a sample of 304 respondents (Ku-Mahmud et al., 2019).

Sohaib et al. (2019) developed a model analyzed factors such as technological readiness (optimism, innovation, discomfort, and uncertainty), acceptance of technology, perceived ease of use and utility, and intention to use cryptocurrency on a sample of 160 participants (56% men and 44% women). The main impacts were estimated using partial least squares SEM (PLS-SEM), while artificial neural networks (ANN) were used to rank the most significant factors (Sohaib et al,2019). The results of the study showed that perceived ease of use is positively correlated with optimism, while perceived ease of use is negatively correlated with discomfort, followed by uncertainty. The results also showed that perceived ease of use has the strongest effect on perceived utility, while perceived utility has a highly significant positive effect on the intention to use cryptocurrencies (Sohaib et al., 2019).

The adoption of bitcoin from the monetary exchange attitude was investigated in Wood et al. (2018) using TAM and the development innovation diffusion theory. The study was conducted on 121 respondents and showed that relative advantage, easy use, visibility, and compatibility have a big positive impact on bitcoin utilization (Wood et al.,2017).

Wood at al. (2017) explored the seen advantage and chance related to bitcoin utilization. The authors created TAM based on a test of 86 respondents (95% were male). The results showed that the fluctuating esteem, the hazard of money-related misfortunes, and the need for customer assurance are the most influencing people's purposeful to utilize bitcoin. But, ease of utilizing has the weakest impact on bitcoin utilization (Abramova & Böhme, 2016). The acceptance of Bitcoin was too examined in work of Lee Won (2018) utilizing TAM, which included 224 respondents. The comes about appeared that seen convenience has the most grounded impact on the deliberate to utilize Bitcoin (Lee Won, 2018).

In the study of Ayedh et al. (2020), elements affecting the investment in the Bitcoin market were investigated. The study covered 200 Muslim respondents (25% male and 75% female) in Malaysia, and the factors have been investigated using SEM. The factors that were determined were extracted from TPB, TAM, and diffusion of innovations theory. It was observed that facilitating conditions, awareness, and compatibility have a tremendous effect on making investments in Bitcoin [25]. On the contrary, trust, profitability, subjective norms, and ease of use had been discovered not to have a widespread effect on Bitcoin funding (Ayedh et al., 2020).

Al Shehhi, Mayada Oudah, and Zeyar Aung (2014) analyzed the factors that affect the popularity and value of cryptocurrency. The study looked at eight cryptocurrencies: Bitcoin, Litecoin, Ripple, Peercoin, Dogecoin, Kittehcoin, Darkcoin, and Vertcoin. The sample included 134 online users, with 95.5% male and 4.5 % female participants. Studies show that young participants choose cryptocurrency based on name and logo. Additionally, participants believe that ease of mining, strong community, privacy, anonymity, value, popularity, and possibly better use of cryptocurrency (Al Shehhi, Mayada Oudah, and Zeyar Aung, 2014).

Zarifis et al. (2018) Investigated consumer confidence in digital currency transactions using a sample of 41 participants (23 men and 18 women). The results suggest that those who understand technological innovations have more confidence in these technologies than those who do not. It has also been shown that confidence can be boosted if the government is involved and regulates (Zarifis et al., 2018).

The factors associated with Litecoin cryptocurrency were examined using a sample of 119 participants (Gibbs, and Suwaree Yordchim. 2014). This study explores four main factors. The first deal with future professional training should be in Litecoin development, while the second factor suggests that the concept of digital currency should be more understandable, and its benefits should be presented. The third factor indicates the need for education in cryptocurrency, while the last factor indicates that the sample did not know what Litecoin was, which in turn indicates the need for education (Gibbs and Suwaree Yordchim, 2014).

Model Development

To evaluate cryptocurrency users' behavior, we adopted the TRA model and included three additional constructs - PR, PU, and PE. TRA was developed by Fishbein in 1967 and aimed to explain the relationship between a particular subject or action and human attitudes toward human behavior (Fishbein, 1967). It is used to predict actions based on people's behavior and past behavior. The main concepts of TRA are attitude, subjective norms, and behavioral objectives.

The purpose of the behavior is the main factor influencing behavior and is driven by attitudes and norms. If the attitude towards that behavior is strong, and if subjective norms allow such behavior, the person will behave. The behavioral objective (Hale et al., 2002) can be expressed as:

$$BI = (AB)W_1 + (SN)W_2$$

where AB is a person's attitude toward behavior, SN is a person's subjective norm related to a particular behavior, and W is the weights. The attitude towards AB behavior can be expressed as (Ajzen, and Albarracín. 2007:

$$AB = \sum b_i e_i$$

where bi is the strength of the belief that a particular behavior will have a certain outcome i, and ei is the evaluation of outcome i. Furthermore, the subjective norm can be expressed as:

$$SN = \sum nb_i mc_i$$

where nbi are normative beliefs connected to a certain outcome i, and mci is the motivation to comply to the particular behavior.

Attitudes can be defined as beliefs towards a particular behavior (Ajzenm and Albarracín. 2007). When these beliefs come together, they create a positive, negative, or neutral attitude toward behavior (Ajzenm and Albarracín. 2007). The literature suggests that if a person believes that the result of the behavior will be positive (Ajzenm and Albarracín. 2007; Fishbein. 1967) and vice versa, he will develop a positive attitude towards a particular behavior. A study by Agustina (2019) showed that this behavior significantly affects the intent to use cryptocurrency trading applications. Therefore, to examine the effect of attitude on Saudi citizens' intention to adopt cryptocurrencies, the following hypothesis has been proposed:

H1: Attitude has a positive effect on the intention to adopt cryptocurrencies.

Behavior is also influenced by subjective norma, which can be defined as "perceived social pressure to perform or not perform the behavior" (Ajzen, and Albarracín. 2007). These social pressures stem from expectations from major groups and individuals' views, and they shape the perception of the individual's behavior. People mingle with their environment and social sector. Therefore, it is important to consider the need to conform to others' perceptions following subjective standards (Fishbein, and Ajzen, 1975) Social influence has been found to influence behavioral intention to introduce cryptocurrency. In this study, the following hypothesis is proposed:
H2: Subjective norm has a significant positive effect on introducing cryptocurrency.

As mentioned above, in addition to TRA constructs, this study also looked at PR, PU, and PE. PR shows how consumers are aware of the risks associated with using this technology. This can be defined as the notion of the undesirable consequences of purchasing or using a particular product/technology (Faqih, 2016). PR covers many aspects, including privacy risk, security risk, and financial risk. Privacy risk is the privacy of your information, and security risk refers to your uneasiness about using certain technologies. Economic risk is related to the cost of using

technology. In previous studies, PR uses several technologies, including mobile banking (Thakur and Srivastava, 2014; Kishore and Sequeira. 2016). Internet banking (Martins, Oliveira, and Popovič, 2014) and e-commerce (Belkhamza, and Wafa, 1970; Lai and Tang, 2018), as well as consumer purchasing intent [David et al., 2001; Kannungo, and Jain, 2004.). It is shown to influence intent. Considering that cryptocurrencies carry potential risks that can affect user attitudes and behavior, the following hypothesis are proposed.

H3a: Privacy Risk has significant negative effect on attitude.
H3b: Security Risk has significant negative effect on attitude.
H3c: Financial Risk has significant negative effect on attitude.
H4a: Privacy Risk has significant negative effect on intension to adopt cryptocurrency.
H4b: Security Risk has significant negative effect on intension to adopt cryptocurrency.
H4c: Financial Risk has significant negative effect on intension to adopt cryptocurrency.

PU is interested in people's opinions about how behavior improves people's performance (Davis, 1989). Davis found that PU had a weak relationship with attitude (Davis, 1989). He added that the intention to adopt this technology has a strong and direct impact on PU. PU is also affected by the cost-effectiveness model (Davis, 1989.) This is explained by the fact that people make decisions based on the effort required to use the technology and its benefits. Also, PU has been shown to have a significant impact on using cryptocurrencies (Ajay, Shrestha, and Vassileva, 2019). PUs is so subjective (Davis at al., 1989) that they are highly dependent on the user's capabilities and cannot be used independently of other components to explain the use of technology. Therefore, considering the importance of the combined approach, we will investigate the relationship between PU, trends, and the purpose of adopting cryptocurrencies and propose the following hypothesis.

H5: Perceived Usefulness has significant positive effect on attitude.
H6: Perceived Usefulness has significant positive effect on intension to adopt cryptocurrency.

PE can be defined as "engaging in an activity" because of an individual's interest in or performance. Numerous studies have shown that PE influences using technologies such as mobile services (Moon, and Kim,2001) mobile learning (Al-Zoubi, and Ali, 2019; Huang, Lin, and Chuang, 2007) and financial services. When considering cryptocurrencies, it is understood that the repurchase of bitcoins and cryptocurrency are significantly affected by enjoyment. PE has been found to have a strong influence on perceived efficacy (Shrestha and Vassileva, 2019). Therefore, to investigate the impact of adopting PE and cryptocurrency in Saudi Arabia, the following hypotheses have been suggested:

H7: Perceived Enjoyment has significant positive effect on attitude.
H8: Perceived Enjoyment has significant positive effect on intention to adopt cryptocurrency.

Personal innovation (PI) is one of the personality traits that researchers believe plays a role in adopting technology (Agarwal and Prasad 1998). It is defined as "the degree to which an individual or other adoption unit adopts new ideas relatively earlier than other members of the social system" (Rogers 2003, p. 22). Personal innovation can also be used to reach a group of people who are normally at risk of using an innovation. The link between personal innovation and behavioral intentions is present in the literature (Lu, 2014). As discussed in the literature review, PI was included to predict people's behavioral intention to use technology. For example, individual differences, including the level of risk and personal innovation, have been associated with implementing e-commerce technologies (Agarwal and Prasad 1998; Alalwan et al. 2018; Thakur and Srivastava 2014; Williams 2018) and they are also used in the context of electronic commerce. In Saudi Arabia (Al-Jabri 2015) and mobile learning (Al-Hujran, Al-Lozi & Al-Debei 2014). Besides, among previous studies that confirmed the importance of intellectual property, there were several concerns in which the information security literature suggested contextualizing the use of public relations. For example, public relations can be used differently depending on the context and innovation under study. The following hypotheses were proposed:

H9: Personal innovation will have a positive effect on attitudes towards the adoption of cryptocurrency in Saudi Arabia.

H10: Personal innovation will have a positive effect on Saudi Arabia's intention to introduce cryptocurrency. The proposed model is presented in Figure 1.

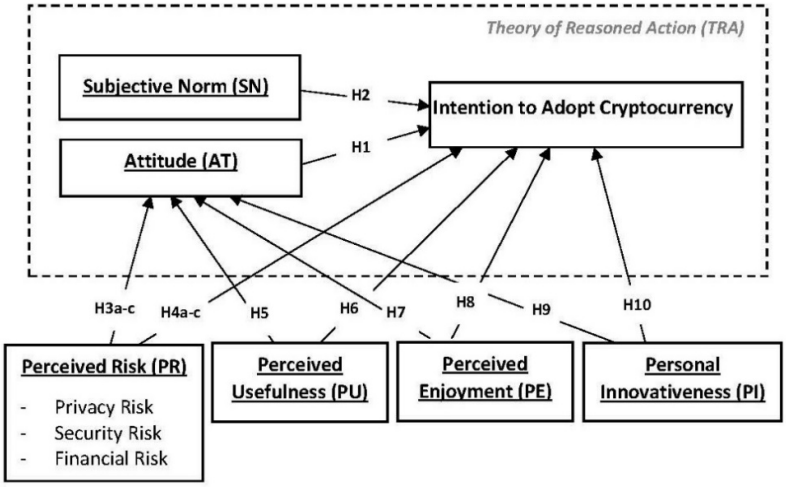

Figure 1: The proposed model

Research Methodology

The research methodology included a survey consisting of validated elements and concepts from previous studies. The proposed model is a combination of factors related to TRA (i.e., subjective standard, attitude, and intent to adopt the technology) and perceived risk, usefulness, enjoyment and personal innovativeness (as shown in Figure 1). All constructs consist of several elements from the literature.

The survey was conducted by a questionnaire method. An online survey created and was consisted of three parts: questions related to demographic data, profiles of knowledge about cryptocurrencies, and model building questions. Survey responses were collected from September to November 2019. According to social media statistics published by Global Media Insight (2019), 56% of Saudi Arabia's population has active Twitter accounts (18.96 million people), so a link to the survey was posted on Twitter and cryptocurrency users Shared with (that is, users who tweeted and commented on cryptocurrencies). The selection criteria included cryptocurrency users who lived in Saudi Arabia, used Twitter, and were 18 years of age or older. The Qualtrics platform was used to poll participants on the Internet, encouraging participants to participate in the survey. After receiving 562 participants, we removed the incomplete questionnaire, resulting in 368 questionnaires included in the analysis. Respondents agreed to participate by filling out the question. The questionnaire was anonymous and kept secret throughout the study.
The data collected were analyzed using SPSS, and the SEM was constructed using AMOS.

Results

Descriptive Statistics

Table 1 shows the descriptive statistics of the respondents' profiles. We can see that 95% of the respondents are male. This percentage of respondents using cryptocurrencies represents the population of people using cryptocurrencies.

Considering the respondents' age, we can see that 45% of the respondents are 30-39 years old, followed by 20-29 years old (36%) and 40-49 years old (16%). Cryptocurrencies rely on the Internet, and the first cryptocurrency, Bitcoin, was developed in 2009, making it more attractive to young people (Alaeddin and Altounjy, 2018).

In terms of nationality and language, 88% of respondents are Saudi Arabians. Therefore, 88% of respondents are expected to speak Arabic, and 12% are expected to speak English (Table 1). Besides, 61% of respondents have a bachelor's degree, followed by 19% with a graduate degree and 12% with a university degree. Only 8% of respondents have a high school degree.

In terms of location, the maximum number of participants who participated in this survey and knew about cryptocurrencies is in the central (35%) and western (24%) of the country. This is in line with current development statistics. The central region of Saudi Arabia has the highest Human Development Index in the country, followed by the north and west regions. In addition, 15% of respondents are from the east of the country, 14% are from the north, and 13% are from the south.

Table 1: Descriptive statistics of the dataset

Item	Values	Frequency	Percentage
Gender	Male	367	95.3
	Female	18	4.7
Age	< 20	7	1.9
	20-29	130	35.6
	30-39	165	45.2
	40-49	59	16.2
	≥ 50	4	1.1
Nationality	Saudi	337	88.2
	Non-Saudi	45	11.8
User language	English	47	12.2
	Arabic	339	87.8
Education	High school	29	7.8
	College degree	44	11.9
	Bachelor's degree	226	61.1
	Postgraduate degree	71	19.2
Part of Saudi	Centre	130	35.0
	South	48	12.9
	West	87	23.5
	North	52	14.0
	East	54	14.6

Cryptocurrency knowledge profile

In relation to the cryptocurrency knowledge profile, ie, participants' knowledge of cryptocurrencies, various aspects were reviewed (Table 2). It is important to note that the questions in this section attempt to gauge participants' familiarity with cryptocurrencies. First, participants were asked if they had a technical background. Participants are almost evenly distributed because 52% of them have a technical background, and 48% do not have a technical background. This is an interesting finding as it suggests that participants may be interested in cryptocurrencies regardless of their professional or educational background. Also, participants had to rate their knowledge of cryptocurrencies, and the results showed that most participants (69%) knew, followed by 21.5% of participants who rank themselves in the initial rank. Only 9.3% of participants said they are cryptocurrency experts, while 0.3% said they do not know cryptocurrency. These findings confirm the need for this technology and the participants' interest in learning more about it and entering into the cryptocurrency market. More than half (52.7%) respondents have already participated in cryptocurrency activities such as trading, investing, analytics, etc., mostly with Bitcoins (10.9%), followed by Ethereum (9.6%). In practice, this situation means that people with practical knowledge of cryptocurrency may differ in their response. Therefore, an additional study of respondent representation is necessary to determine statistical bias. The other types of cryptocurrencies (REBL, Litecoin, Tron and others) are much less represented in the observed population.

Table 2: Cryptocurrency knowledge profile

Item	Values	Frequency	Percentage
Do you have any technology background?	Yes	184	47.8
	No	201	52.2
How do you classify your knowledge about cryptocurrency?	No knowledge	1	0.3
	Beginner	83	21.5
	Knowledgeable	266	68.9
	Expert	36	9.3
Have you ever participated in cryptocurrency activities?	Yes	202	52.7
	No	181	47.3
Which cryptocurrency have you participated in?	Bitcoin	42	10.9
	Ethereum	37	9.6
	REBL	15	3.9
	Litecoin	14	3.6
	Tron	11	2.8
	XRP	7	1.8
	Binance	7	1.8
	Cardano	5	1.3
	Others	66	17.1

Construct Reliability and Internal Consistency

The reliability of the first scale needs to be verified to work with new factors. Cronbach developed Cronbach's Alpha as a measure of the internal consistency of the test/scale [62]. It can take values in the range of 0 to 1, with 1 indicating good reliability. However, Cronbach's most popular alpha values range from 0.70 to 0.95 (Nunnally, 1994).

Cronbach's first construction had an alpha PR of five items, valued at 0.92, indicating the items' high reliability inside the construction. The SR consists of two items with an alpha value of 0.817, which confirms the element's reliability. The FR construct consists of five items with an alpha value of 0.884. For PE, the obtained alpha value is 0.913, with four items. The PU consists of five items with an alpha value of 0.908, while SN Construction has an alpha value of 0.844 with two items. Looking at the perspective, Cronbach's Alpha got a value of 0.90 with five construction items. Finally, the IACC construction consisted of four items value of 0.887 Cronbach's.

Considering each item element's loading, all loads are above 0.6, which indicates a strong relationship between constructs and constructs items. These results are presented in Table 3.

Table 3: Reliability of constructs

Latent variable	Indicators	Factor loading	Cronbach's alpha
PR	PR1	0.783	0.920
	PR2	0.934	
	PR3	0.876	
	PR4	0.849	
	PR5	0.752	
SR	SR1	0.645	0.817
	SR2	0.976	
FR	FR1	0.7	0.884
	FR2	0.897	
	FR3	0.834	
	FR4	0.724	
	FR5	0.615	

Latent variable	Indicators	Factor loading	Cronbach's alpha
PE	PE1	0.802	0.913
	PE2	0.9	
	PE3	0.908	
	PE4	0.772	
PU	PU1	0.793	0.908
	PU2	0.853	
	PU3	0.908	
	PU4	0.903	
	PU5	0.637	
SN	SN1	0.643	0.844
	SN2	0.959	
	SN3	0.713	
	SN4	0.909	
	SN5	0.785	
PI	PI1	0.761	0.805
	PI2	0.731	
	PI3	0.804	
AT	AT1	0.787	0.901
	AT2	0.812	
	AT3	0.813	
	AT4	0.734	
	AT5	0.768	
IACC	IACC1	0.765	0.887
	IACC2	0.888	
	IACC3	0.67	
	IACC4	0.594	

Model Results

The following table shows the compatibility indices of the structural model. The Chi-Square value of the conceptual model is significant ($\chi2 = 1114.486$, $p = 0.000$), ensuring a good model fit. The GFI value shows a satisfactory fit with a value greater than 0.8 [64]. The TLI, CFI, and IFI values should be close to 1 to indicate the best fit, as the results of Table 4 show (Hair et al., 2010).The RMSEA shows a good fit, as the value is less than 0.05 (Hair et al., 2010). The most important measures to note is the AIC or Akaike Information Criterion. Taking this value into account, the model obtained a score of 1324.49.

Table 4: Model results

Fit indices	Value
$\chi2$	1114.486
df	636
ANOVA p	0.000
GFI	0.865
TLI	0.949
CFI	0.953
IFI	0.954
RMSEA	0.044
AIC	1324.486

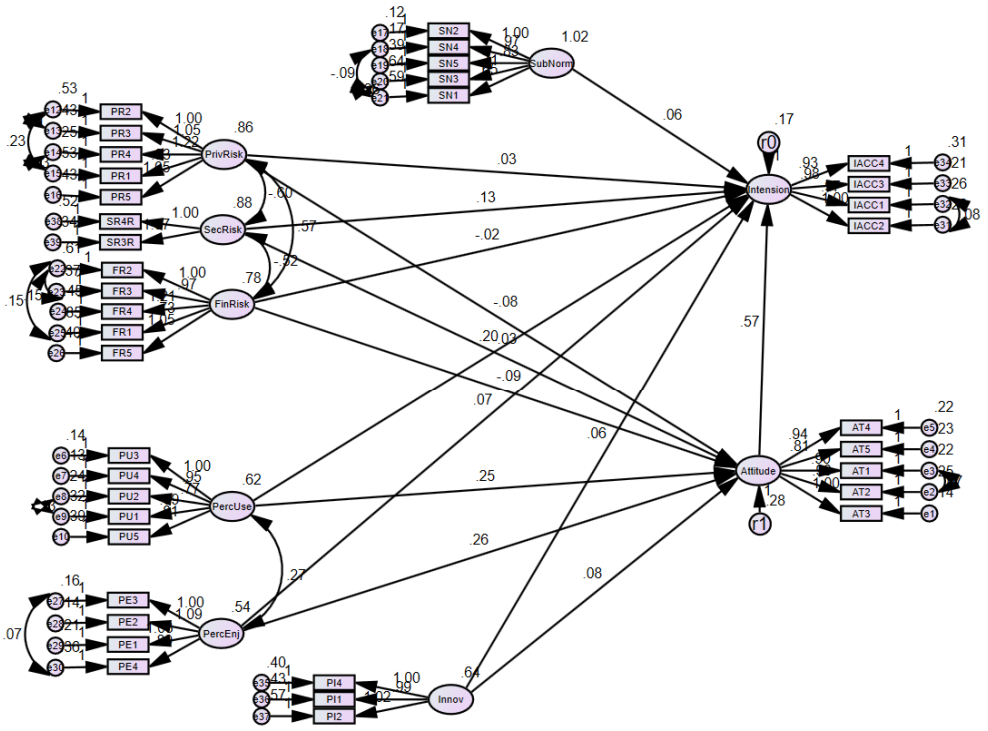

Hypothesis Testing

We can observe the t-value and its corresponding significance (p-value) to decide whether to accept or reject the hypothesis (Table 6).

The first hypothesis, "Attitude has a significant positive impact on the intent to adopt cryptocurrencies," is supported based on significant t-values (t = 9,116, p = 0.000). This result supports most of the results in the literature. In particular, Doblas (2019) found that attitudes had a significant impact on adopting cryptocurrencies. "One unit increase in attitude increases the probability of hiring 11.49 times while other variables are constant." Kings. Wang, Dou, and Zhou (2008) also found that attitudes had a significant impact on product adoption, and Mutamarba (2019) found a significant positive effect of attitudes on the intent to adopt cryptocurrencies.

The second hypothesis, "subjective norms have a significant positive effect on the intent to adopt cryptocurrencies," is also supported (t = 2.189, p = 0.029). The construction of subjective norms related to cryptocurrencies was studied in work of Mutambara (2019) and had a negative effect, but not statistically significant. On the contrary, Schaupp, and Festa (2018) found that subjective norms are an important factor influencing the intent to use cryptocurrencies. This supports our assumptions and hypothesis.

There was not enough evidence to support assumption that privacy risk has a significant negative effect on behavior (t = −1.405, p> 0.05), nor does security risk have a significant negative effect on behavior. (t = -0.556, p = 0.578). This finding is consistent with the literature (Walton and Johnston, 2018) where researchers found that the security risk does not affect attitudes to the intent to use bitcoin. The H3c hypothesis, "Financial risk has a significant negative effect on behavior," does not support 95% confidence interval (t = .61.648, p = 0.099), so it can be rejected. Furthermore, there was not enough evidence that the adoption of cryptocurrency (t = 0.503, p = 0.615) is impacted by privacy. Still, there was also evidence that cryptocurrency (t =2.510, p=0.012) is negatively affected by a security risk. 2.510, p = 0.012).

Considering H4c, it cannot be concluded that the adoption of cryptocurrency is negatively affected by the severity of the financial risk, as the value of value exceeds 0.05, while the t value is less than ±2. These results are in line with some studies in the literature which show that the intention to use PR construct is not important enough to explain using cryptocurrency (Oliva, Pelegrín-Borondo, and Matías-Clavero, 2019; Gibbs and Yordchim,2014). This means that people who use cryptocurrencies expect to be at risk, so they may not feel threatened as an important factor when

deciding to use cryptocurrencies. These results also show that people are generally more concerned about the loss of money and information (i.e., security risk) than current costs (i.e., financial risk) and loss of personal information (i.e., privacy risk).

This study found that the perceived usefulness (t = 5.499, p = 0.000) was positively correlated with the intention to adopt cryptocurrency (t = 4.558, p = 0.000). Considering the factors that influence the adoption of cryptocurrency, this is in line with some of the literature findings, where PU positively affects the intensity and behavior of cryptocurrency adoption (Sohaib et.al., 2019; Won, 2018). Albayati et al. (2020) found a statistical effect of strategic orientation, social impact, self-efficacy, and novelty on two mediation variables (perceived usefulness and ease of use). Furthermore, they found that the two mediation variables had a significant effect on adopting blockchain technology (Nuryyev et.al., 20120). The results obtained in this study validate these findings, as the perceived utility has a significant effect on adopting cryptocurrency. Furthermore, Mendoza-Tello et.al (2018) have found that the most influential factor in adopting cryptocurrency is perceived usefulness.

Predictable enjoyment also positively affects the trend (t = 5.241, p = 0.000) and the intensity of adoption of cryptocurrency (t = 4.558, p = 0.000). PE has been found to influence the decision to use technology in numerous studies, including the significant influence of PE on intent to repurchase bitcoins (Athar Nadeem et al., 2020), mobile instant messaging (Guych Nuryyev et al., 2020), social networks (Zong, Yang, and Bao, 2019), or use of blockchain technology (Shrestha, and Vassileva, 2019). Finally, individual innovation's positive effect on trends is not conducive to a 95-confidence interval (t = 1.900, p = 0.057), thus dismissing this assumption. The same effect was observed in the last hypothesis, where the effects of individual innovation on adopting cryptocurrency were examined. The results show that the hypothesis is not supported (t = 1.640, p = 0.100).

Table 6: Hypothesis test results

Hypothesis	Path	Path coefficient	t-value	p-value	Result
H1	AT → IACC	0.565	9.116	0.000	Supported
H2	SN → IACC	0.058	2.182	0.029	Supported
H3a	PR → AT	-0.080	-1.405	0.160	Not supported
H3b	SR → AT	-0.031	-0.556	0.578	Not supported
H3c	FR → AT	-0.093	-1.648	0.099	Not supported
H4a	PR → IACC	0.026	0.503	0.615	Not supported
H4b	SR → IACC	0.126	2.510	0.012	Supported
H4c	FR → IACC	-0.022	-0.432	0.665	Not supported
H5	PU → AT	0.255	5.499	0.000	Supported
H6	PU → IACC	0.201	4.558	0.000	Supported
H7	PE → AT	0.262	5.241	0.000	Supported
H8	PE → IACC	0.068	4.558	0.000	Supported
H9	PI → AT	0.079	1.900	0.057	Not supported
H10	PI → IACC	0.061	1.640	0.100	Not supported

Discussion and Conclusion

The purpose of this research was to assess the factors influencing the adoption of cryptocurrencies. In particular, this study used an integrated approach by combining the TRA model with three other constructs, mainly PR, PU, and PE, to observe the influence of these factors on cryptocurrency users' attitudes and their intention to use them. Cryptocurrency. Eight hypotheses were tested using data from a survey. The results showed that the intention to introduce cryptocurrency is influenced by attitudes, subjective norms, perceived benefits, and enjoyment. In personal innovation, privacy risk, and financial risk, which are the dimensions of perceived risk, are not associated with intention to adopt cryptocurrency, rather the security risk affects behavioral intent. In light of attitudes, this study shows that perceived risk does not affect users' attitudes towards using cryptocurrencies. In contrast, perceived usefulness and perceived entertainment significantly affect consumer attitudes. These results are not surprising. Cryptocurrency represents a relatively new technology, so not enough information is available to the general population. That being said, consumers are expected to be influenced by others' opinions (i.e., thematic theories). Furthermore, consumers are attracted to technologies that help them work faster and understand them. It's easy. When

deciding to use cryptocurrencies, consumers are more concerned about the security of their data and accounts. The intention to adopt cryptocurrencies in Saudi Arabia is influenced by the consumer's attitude, which is greatly influenced by the benefits of technology and the consumer's satisfaction from using such technology.

Our goal was to identify the factors affecting cryptocurrency adoption through a questionnaire involving questions related to TRA. There were more males than females in our sample, which can be considered a limitation of the study, but this is also consistent with the literature findings, such as in work of Shehhi, Oudah, and Aung (2014) where the reasons for choosing cryptocurrency were investigated, and 95% male participants were male. Another study that examined cryptocurrencies, in particular, found that the usefulness of bitcoins included more men than women (75% of the sample), confirming that cryptocurrencies were mostly male-dominated. Women are also represented below in the cryptocurrency trade(Alshamsi, and Andras,2019). A study by Vejacka and Palova(2019) examined gender differences among Slovak citizens, which affect their attitudes towards cryptocurrencies. Male respondents generally have more information about cryptocurrencies, using cryptocurrencies more frequently for payments and are significant. Cryptocurrencies are more likely to be mined than women. In general, men were judged to be more positive about cryptocurrencies than women (Vejacka and Palova, 2019) which explains why women are underrepresented and generally not interested in cryptocurrencies.

Another possible limitation of this study is that the sample was composed of younger people; hence the results might not represent the older population well. Comparing these proportions to the proportion of educated people aged between 20-39 years old, the participants in this study have higher educational shifts, and respondents with high school degrees or college degrees have a small representation in the sample compared to known data of General Authority for Statistics in Saudi Arabia. This shows that people who know about cryptocurrency are well educated compared to the Saudi population. The majority of people who were involved in the study are highly educated, and their behavior may differ from the general population because it was shown that educated people are more prone to adopting new technologies easier (Welch, 1970; Lleras-Muney, and Lichtenberg, 2002; Riddell, and Song, 2017) Additionally, the study focused on people who already know about cryptocurrency so that the results can be applied only to a specific population segment. This may add biases to the results, as the opinions are not referring to the general population. Hence future studies will focus on other population segments.

This research has several implications. This study's results can be used by governments, corporations, and other decision-makers by incorporating the experimental factors into the development of cryptocurrency systems and strategies. Special attention should be paid here to security risks by regulating the use of cryptocurrencies so that users have a clear understanding of the security risks they may face and how they can be protected. Also, users are likely to embrace the new technology if they can see its benefits. It is, therefore, necessary to provide accurate information about the system. Since the model must offer the possibility of connecting the practical and theoretical aspects, the model's implication also includes the possibility of connecting the model with real situations. Because the presented model provides sufficient clarity to be used and understood for various technology-related studies, new research in cryptocurrency adoption should be able to use this model as a theoretical basis. Finally, developers and decision-makers must consider the usefulness of cryptocurrency in developing such systems.

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Alternative Sources of Financing and Earnings of Startups

Veronika JURICKOVA
University of Zilina, Faculty of operation and economics of transport and communication, Department of economics, Univerzitna 1/8215 Zilina, Slovak Republic, veronika.galgankova@fpedas.uniza.sk

Elena GREGOVA
University of Zilina, Faculty of operation and economics of transport and communication, Department of economics, Univerzitna 1/8215 Zilina, Slovak Republic,
elena.gregova@fpedas.uniza.sk

Abstract

A startup is a business form that is designed to implement original business ideas that are based on new technologies and the Internet. They represent an attractive alternative for young entrepreneurs compared to traditional employment in a company. They succeeded thanks to the success of companies that were founded at universities or in the garage, and today their founders are the richest people in the world. Technical progress, the opportunities of today's entrepreneurs, and positive examples from the past have influenced the increase in the number of this type of business. Especially in the first stages of a company's life, it is necessary to secure sufficient funds. The main goal of the article is to examine possible alternative possibilities of obtaining financial resources for startups, as well as earnings of startups. Based on this information, it is then possible to determine the advantages or the disadvantage of individual sources of financing, to determine which source of financing is the most used among this type of enterprise. The article uses methods of analysis to obtain the necessary information and methods of comparing the results obtained. The result of the research is a summary and mutual comparison of individual financing options for startups.

Keywords: Startups, Financing, Earnings

Introduction

Today brings many new stimuli, ideas, trends, but also opportunities. New companies, individuals, or teams are entering the market. Who start their business in an environment of rapid development, in an environment of the information society, social networks, and technical progress. It is technical progress and innovations that form the basis for building new business units - start-ups.

From an economic point of view, start-ups not only bring with them innovations, new ideas, or improvements to the already established ones, but they have considerable potential to lift the national economy through entry into a global business, production of innovations, and cultivation of human capital, they have new opportunities for job creation. Currently, the number of countries whose governments support start-ups as a source of employment and innovation is also increasing. The popularity and importance of start-ups are also growing significantly in the Slovak Republic, thanks to information technology, media, support from state and non-state entities.

It is the impact of startups on the country's economy that is the main reason for choosing a given topic for further and more detailed research. In the first phase of the research, we focused on examining the possibilities of financing startups in individual phases of the life cycle.

The concept and the essence of business startup

The usage of the term start-up refer to a specific type of business originally spread in the United States during the so-called dot-com bubble between 1997 and 2001 - a period of the unhealthy rapid growth of technology and software companies. However, the definition of a start-up is still not uniform.

According to entrepreneur and one of the founders of Viaweb, the first software in the form of a service company, Paul Graham, the start-up is: "a company designed for rapid growth". However, it is not a fast-growing company, but one that commits to growing rapidly, and this commitment accepts the potential for growth rather than a factual description (Kiska, 2014).

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Steve Blank, the “godfather” of the start-up, came up with the most quoted definition: “A start-up is a temporary organization used to look for a repeatable and scalable business model”, adding that such an organization is: “temporary because the goal of the start-up is paradoxically not to be a start-up, but to become a large organization, or to fail as soon as possible and find another opportunity in the market.” (Blank, 2011).

Erik Ries, entrepreneur and founder of the Start-up Lessons Learned blog and author of a new kind of approach to business, Lean Start-up, says: "Start-up is a people-made institution designed to create a new product or service under extremely uncertain conditions." He adds that the definition is incomplete, as it does not deal with the size of the company, industry, or economic sector (Ries, 2015). "The success of a start-up is not the result of good genes or being in the right place at the right time. A successful start-up should be driven by following the right process, which means it can be learned, which means it can also be taught.”

Luger and Koo (2005) define three criteria defining the framework for start-ups: 1. new, 2. active, and 3. independent:

1. new - only newly established entities registered in the Commercial Register are considered start-ups. Companies with a business history that have only changed their name, ownership structure, registered office, or legal status do not meet this condition.
2. active - another defining criterion is the active participation of newly registered companies in business relations. This attribute excludes companies that, for various reasons, appear only "on paper".
3. independent - the category of newly established/registered companies active in business relations may also include subsidiaries controlled by the parent company. For this reason, the authors also apply the criterion of independence that excludes these branches.

Neil Blumenthal, a successful businessman and founder of Warby Parker, described the start-up as "a company that seeks to solve a problem for which there is no clear solution yet and whose solution is not guaranteed in any way" (Obehmed, 2013).

Senor and Singer (2009) define start-ups as a small company developing a new innovation that has great commercial potential. At the same time, the authors emphasize that innovation is not necessarily linked to new technology. For example, a business model that applies to a given start-up can be innovative. The authors emphasize innovation, which, however, does not have to consist of the development of radically new technologies. Start-ups can in an innovative way combine existing available technologies and thus have a significant competitive advantage over established companies or other start-ups (Gray-Hawkins, Michalkova, Suler, Zhuravleva, 2019).

Multinational institutions understand the term start-up as any start-up business. The OECD uses a similar definition in its regular publications Entrepreneurship at a Glance, where it defines a start-up as a company that has not been in place for more than two years. The public, the start-up community, and professional literature has a common definition that emphasizes the innovative potential of this type of business (OECD, 2017).

Bednar and Tariskova (2016) focused on the difference between income in a traditional company and a start-up. Start-ups operate in the blue ocean, which means in a completely different new market, where business rules are still being formed. The term blue ocean was described by Kim and Mauborgne (2009), where the blue ocean represents a new, undemanding market space where new demand is created and competition becomes irrelevant.

In terms of strategy and leadership, Ljudvigováa (2016) examined start-ups, who considers the inability to create a quality team to be one of the most common causes of start-up failure. The founder of the start-up is also the bearer of a business idea and vision, but he is no longer enough to implement them himself, but he needs to create a quality team.

There are factors necessary for the stability and competitiveness of the start-up. The most important are a simple, scalable, and marketable product, brand value, the right and diversified source of funding (Whittle, Gregova, Podhorska, Rowland, 2019).

Methodology

The main goal of the article is to theoretically describe the individual possibilities of financing and achieving earnings in startup companies. The article defines the very concept of the startup from the perspective of several authors of institutions and organizations. At the same time, the article evaluates the individual financial possibilities for these companies, the advantages, and disadvantages of individual sources for obtaining finance. The method of analysis was used in the writing, we started from a general evaluation of the problem to reach concrete results. Based on theoretical knowledge we reach the conclusion. The information used in writing the article was obtained from the Web of Science Core Collection, conference articles, and articles in economic journals of the Slovak Republic, books of domestic and foreign literature. The reason for choosing the topic was the authors' interest in the issue, its topicality,

and the effort to bring the topic closer to the general public. The contribution of the article lies in the theoretical summary of the issue of alternative sources of finance and achieving earnings in startups.

Results

In general, alternative sources of funding are those that are used to finance enterprises in smaller quantities than from own and external sources, and most enterprises have little or no information on their nature and acquisition process (Michalkova, Frajtova Michalikova, Tanase, 2019). They are considered as new forms of business financing. Alternative sources of financing are understood as a novelty in the Slovak Republic, but this does not apply to Western Europe and countries using the Anglo-Saxon banking system (Gregova, Valaskova, Adamko, Tumpach, 2020). There are these alternative sources of funding commonly used.

Family, friends, fools

FFF (family, friends, fools) - family friends and fools are investors who bring the first external investments to the start-up. They often make their investment decisions not only for the purpose of potential appreciation but are largely based on personal relationships and mutual sympathies. It is therefore likely that the level of risk is not sufficiently assessed, and for moral reasons, the founder should warn his family members, friends, and supporters that the investment is unlikely to return (Moyer, 2016).

Venture capital

SBA (Slovak Business Agency) characterizes venture (venture and development) capital as “Venture capital is a means of financing a company's start-up, development or expansion, where a venture capital investor acquires an agreed share of the company's equity for a certain amount of financial capital. It is primarily a partnership between entrepreneur and investor. Investment in the form of risk capital is not a one-time provision of funds, but a several-year process of coexistence of a business entity with a venture capital investor ”(SBAGENCY, 2020).

According to Vlachynsky (2009) "Venture capital enters small and medium-sized enterprises in order to acquire a stake in a company implementing a promising, albeit risky, project."

If we plan to establish, expand, or restructure a business, or to buy a business or part of a business, private venture capital can help us meet our goals. Compared to the USA, venture capital is less developed in Europe. From the point of view of the Visegrad Four, venture capital is the least developed in Slovakia (Podhorska, Siekelova, Olah, 2019). Venture capital financing is different from standard loan financing. Banks require the repayment of borrowed funds, accrued interest, and also remuneration for the risk incurred, to which they are legally entitled (Dengov, Tulyakova, Gregova, Sviridov, 2020). All this happens regardless of whether the company is prospering or not.

Business angels

Another possibility of support in the first stages of a business is to obtain assistance from the so-called business angels or business angels. These are natural persons who have free financial resources, mostly up to 1.5 mil. € and bring to the company, in addition to capital, also their own experience. These are people looking primarily for a suitable space for investment and business challenges. They usually choose promising projects in areas they understand and enter into a partnership with an entrepreneur not only with financial support but also with business and management boards (Pisar, Bilkova, 2019).

Nevertheless, these projects have only a 25% success rate. The success of every fourth project should not only offset the costs of the unsuccessful but also ensure a profit. Business angels usually leave companies between the ages of three and five. They sell their stake either to a strategic investor, a venture capital fund, or to the original co-owners. We meet business angels through organized networks, widespread especially in Anglo-Saxon countries. Here we find agencies organizing the so-called Exchange of promising projects, where the first contacts with business angels are mediated (Okruhlica, 2013).

Crowdfunding

Crowdfunding is one of the emerging alternative forms of financing, directly connecting those who have funds available and want to borrow or invest them with those who need funds to finance a specific project. As the English term itself suggests, crowdfunding campaigns work on the principle of collecting smaller individual contributions from a large number of people, respectively crowd, mostly via the Internet. Projects usually focus on funding relatively smaller objectives, but there are exceptions.

On the one hand, in a crowdfunding transaction, there is a person (the project owner) with a project idea who will prepare a crowdfunding campaign, and on the other hand, there is a "crowd" of people who give money to implement this idea, the so-called contributors. A huge driving force of crowdfunding is the rise of the Internet, which has enabled

and facilitated access to a large number of people for money from many small contributors, instead of a few large ones. For this purpose, internet crowdfunding platforms are being set up, where individual projects are presented (Hecht, Valaskova, Kral, Rowland, 2019).

However, Crowdfunding is still in its early stages of development, and so its various models, benefits, and risks are constantly changing. The constant increase in popularity and use of crowdfunding can also be seen in the expansion of crowdfunding platforms, which operate on the basis of a certain fee from project owners. It is estimated that there were more than 200 crowdfunding platforms in Europe in 2012. The most famous are Kickstarter, Indiegogo, Fundedbyme, Gofundme (SBAGENCY, 2014).

Finetrading

The name finetrading is composed of the English words "finance" and "trade", ie trade finance. It is a relatively clear and unbureaucratic tool for financing stocks and purchasing. The company agrees with its supplier in the country or abroad on the terms of trade as it is customary. At this point, when sending the goods, a finetrading company enters the store, which immediately pays the supplier the invoiced amount. The buyer of the finetrading company (finetrader) sets a maturity of up to 6 months for consumer goods and up to 12 months for investment units.

Finetrading is used especially in cases where the company is experiencing rapid expansion and needs to buy a large amount of stock, as well as sudden seasonal discounts on raw materials when the company needs to quickly buy a larger amount of these raw materials, i. from. pre-stock, and spread the payment for that purchase over months, or if the bank refuses to finance a particular business transaction. Finetrading is also used in obtaining the so-called discount from customers, which is a discount on the purchase price when paying in cash.

The main advantages of finetrading include the possibility of obtaining additional liquidity, creating a time reserve, improving the company's image, increasing security, and improving the company's creditworthiness (Finetrading, 2020).

Hedge funds

Hedge funds are financial institutions for collective investment. Their origin is most often associated with the name of Alfred W. Jones, who founded a hedge fund in 1949, after the adoption of the Investment Company Act of 1940, which tightened the regulation of investment funds in the United States. They were identified as funds that were not registered under the law and used financial instruments and strategies to hedge investors from losses in the event of "falling" markets. The aim was to regulate all mutual funds. However, the existence of one exception, where legislators considered that if the investor is rich enough, then he does not have to be protected. People with more than $ 1 million were considered a wealthy investor. Those funds that did not have at least 100 such investors and did not provide advice were exempted from the regulatory rules (National Bank of Slovakia, 2007).

The $ 1 million limits exists to protect retail investors. From a macroeconomic point of view, the money will be transferred to the poorer people, who will spend it first, which would not be the case for the rich. This promotes economic growth. As wealthy investors do not experience temporary losses so intensely and, of course, they have a better supply of important information about the fund itself and its investment strategy. On the contrary, if a small investor loses a significant amount of his invested money, this loss has several times greater impact on him and his family (Jilek, 2006).

Today's hedge funds focus on far more diverse trading strategies in order to achieve an absolute positive return regardless of the direction of the markets. Hedge funds differ from traditional collective investment schemes, which are also known to Slovak investors, mainly by the low degree of direct regulation and the use of relatively large financial leverage (Khuong, Liem, Minh, 2020). Over the last few years, the volume of financial assets managed by these institutions has grown rapidly and their weight within the financial systems has been increasing.

Defining hedge funds is not easy because there is no clear and generally accepted definition (including legal). For this reason, most publications on the topic of hedge funds only list their most general features:

• use of a wide range of trading strategies, techniques, and financial instruments, including short selling, arbitrage, derivatives, and leverage,
• they are not correlated with stock and bond markets, as they aim to achieve a positive absolute return (not a relative return to a benchmark),
• their investor base consists mainly of wealthy individuals and families, and increasingly institutional investors (pension funds, private banks, foundations, insurance companies),
• they often use the outsourcing of all their activities except for decisions on trades with prime brokers (execution, clearing, and settlement of trades, risk and liquidity management),
• generally have a relatively high minimum investment limit,

• the investor can monetize his share mostly on a periodic basis after the lock-up period,
• managers, in addition to the management fee (1-2% of assets), also receive a "performance" fee (15-25% of revenue),
• often invest significant amounts of the fund manager's own resources,
• do not disclose information about themselves,
• for tax and regulatory reasons, they are mostly located in offshore jurisdictions, while the fund managers themselves are based onshore (in Europe, especially in London).
However, such a definition of hedge funds is also rather embarrassing (especially from the regulator's point of view), as many of these characteristics, including the financial instruments used and trading strategies, also apply to other types of financial companies (National Bank of Slovakia, 2007).

Sources of financing of startups

The following figure shows the usage of individual sources of financing by startups in the conditions of the European Union.

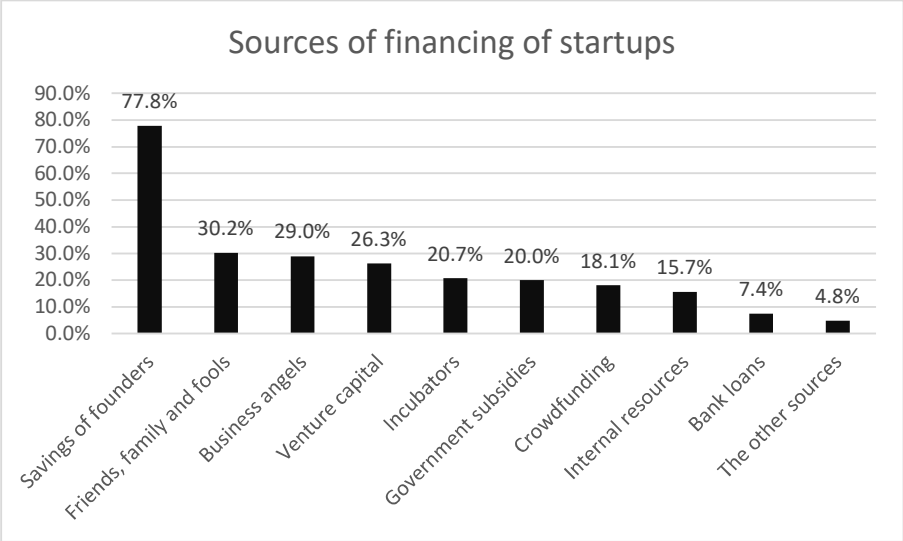

Fig. 1: Sources of financing of startups in EU
Source: Steigertahl, L., Mauer, R., et al., 2018.

Based on the figure, it can be stated that the most used source of financing for startups is the savings of the founders, up to 77.8%. The reason is precisely the fact that it is a cheap and quickly available source of finance, as there is no need to pay interest on it and repay it. The disadvantage may be the fact that the founders run the risk of losing their own funds, which will not be returned to them and they could invest these funds in other projects. In second place was the source of funding - friends, family and fools - 30.2%. Again, this source of funding is quickly available. Friends, family, and fools are often unaware of the risks they are taking and their funds may not be returned to them. On the other hand, the founder of the startup is protected from starting his own finances. Another important source is the business angels. In most cases, these are business units that have sufficient financial resources and thus provide their free funding for the development of start-ups. For startups, this relationship has the advantage that such an entrepreneur provides him with valuable information, know-how. The disadvantage for a startup is the fact that every such entrepreneur expects a return of their investment. A very interesting source of finance for startups are internal sources - earnings - 15.7%. This means that the startup is already able to produce its own earnings, and thus has partially established itself on the market and creates its own internal resources to finance its activities (Durana, Zauskova, Vagner, Zadnanova, 2020). The disadvantage of this source is that it is not possible to expect it right at the beginning, but only after a certain period of time.

Table 1: Advantages and disadvantages of sources of financing

	Advantages	Disadvantages
Family, Friends, Fools	quick access to finance, no interests	the relationship may deteriorate
Venture capital	permanent support of the venture capital investor, uses knowledge and experience its manager, contracts,	repayment of loans, share of ownership in the company

Business angels	obtaining advice, support and assistance of business angel	return of investment, share of ownership in the company
Crowdfunding	flexibility and speed of fundraising	limited amount of funding, risk of theft and realization of the idea
Finetrading	improving business indicators	higher costs compared to long-term loans, limited funding volumes

Source: processed by authors

Conclusion

Startups are understood as new companies or companies that are in the initial stages of creating a business plan. However, a definition of this type is not is complete or accurate. The word startup has recently been associated with the public with start-up companies, which do business in various areas of services or goods, but only a small percentage of them can consider it a real startup. This type of business also has a significant impact on the country in which it is established. From an economic point of view, start-ups not only bring with them innovations, new ideas, or improvements to the already established ones, but they have considerable potential to lift the national economy through entry into a global business, production of innovations, and cultivation of human capital, they have new opportunities for job creation. Currently, the number of countries whose governments support start-ups as a source of employment and innovation is also increasing.

The main goal of the article is to theoretically describe the very concept of a startup from the perspective of several authors. The article also contains a description of several alternative sources of financing for this type of business, advantages, disadvantages, and the use of individual sources of financing in startup companies within the European Union.

The contribution of the article lies mainly in the description of the basic characteristics of selected possibilities of obtaining funds in startups and the evaluation of their positive and negative aspects. The article provides the information needed to decide on a suitable option for financing a business plan. At the same time, the use of alternative financing options in the article is also shown through a graph. The reason for choosing the topic was mainly the authors' interest in the given area of research. In the future, we would like to deepen research in the field of financing and profits of startups and focus on obtaining finance in the Visegrad Four countries, or Slovakia.

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An Analysis of Value Management in Forestry Practice

S.S. MORKOVINA
Voronezh State University of Forestry and Technologies named after G.F. Morozov,
Voronezh, Russia, E-mail: tc-sveta@mail.ru

E.A. PANYAVINA
Voronezh State University of Forestry and Technologies named after G.F. Morozov,
Voronezh, Russia, E-mail: panyavina-e-a@mail.ru

I.V.SIBIRYATKINA
Voronezh State University of Forestry and Technologies named after G.F. Morozov,
Voronezh, Russia, E-mail: i-sib@mail.ru

V.D. PETROVA
Central branch of the Russian state University of justice, Voronezh, Russia

P.A. MAKSIMCHUK

Correspondence: S.S. Morkovina Federal State Budget Educational Institution of Higher Education «Voronezh State University of Forestry and Technologies named after G.F. Morozov», 394087, Voronezh, Timiryazeva Street, 8, E-mail: : tc-sveta@mail.ru

Abstract

The article deals with the problem of using the cost analysis method for evaluating innovative technologies and managing innovative projects in the field of reforestation and growing forest seedlings. Using the method of cost analysis based on the calculation of cost and evaluation of the significance of functions, the operations of innovative technology for growing oak seedlings with a closed root system in one and two crop rotations in greenhouses are studied. The expert method was used. the selection of functions is made according to the ranking and the largest discrepancy between significance and cost.
The study allows us to develop a methodology for cost analysis in relation to the assessment of innovative technologies in the field of reforestation. Using the organizational scheme of the seedling growing process in addition to the cost analysis method allows you to more fully study all operations in innovative technology, assess their significance and identify "problem" functions in the technology of growing forest seedlings.
Using the methodology of cost analysis allows you to set the most expensive functions and manage the innovation process taking into account reliable information. the use of cost analysis reduces the cost of innovative technologies. The effectiveness of the va method for evaluating innovative technologies in forestry is achieved primarily due to a new, different from the traditional, cost classification, reliable and sufficient information. The introduction of the va method in the practice of reforestation provides cost savings while improving the quality of growing forest seedlings.

Keywords: Innovation, Value Analysis Methodology, Reforestation, Cost, Management Analysis.

Introduction

A distinctive feature of the development of economic systems in modern conditions is its focus on the creation and use of innovations as a factor providing competitive advantages. There is a direct link between the effects of the choice of innovation and the state of the company. Shakina (2020) notes the formation of competitive advantages among companies applying innovations and investing in innovative activities. Innovation as a key economic category is the engine of economic growth of companies and employment of the population of the regions.

This is relevant not only for high-tech industries, but also for all sectors and economies, including forestry (Jarský, V., 2015).

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Climate change and its consequences pose serious challenges to the global community in terms of forest ecosystems. Therefore, European countries are actively discussing the implementation of environmental innovations in forest management. The ability to innovate and put it into practice is critical to the success of enterprises in traditional sectors such as forestry (Štěrbová, M. et al., 2019).

So in the work of Rodriquez J. and Wiengarten F. (2017) it is noted that the creation of environmental innovations presupposes the availability of both resources (i.e. internal and external research and development, the acquisition of machinery, equipment, software, patents and licenses) and new knowledge, which contributes to the development of innovative processes. Most often, innovation is associated with the development of production methods, followed by innovation in the field of goods and services (Lovrić, N. at al., 2020). At the same time, innovations in forest management should be assessed primarily in terms of their functions for solving environmental problems.

Value management (VM) was first introduced in the United States of America around the 1940s, and the method was initiated by the development of the Soviet engineer Yu.M. Sobolev (element-wise economic analysis) and the American Miles L.D. (value analysis / value engineering, VA / VE) (1972). In the works of Miles L.D. focused on the choice between functions and their cost (Kassa, A.O., 2018).

VA has been known for over 60 years and is a powerful and versatile approach to evaluating processes, products, and production planning (Jay, C.I. at al., 2015). The use of VA in construction and design is noted in the works of Kelly J. et al. (2004) and Oke A.E. et al. (2011), however, Bowen P. et al. (2010) emphasize that it is possible that in practice the results of its application may be exaggerated. In the works of Green S.D. and Liu A.M.M. (2007) and Spaulding W.M. et al. (2007) noted the value of the method from the standpoint of individual projects, in particular, ensuring their viability, return on investment, accessibility to stakeholders and the possibility of adjusting to account for changing conditions. The successful application of the VM method for project funding management purposes is noted in the studies of Liu G. and Shen Q. (2005).

Bowen P.A. et al. (2009), assessing the impact of investment projects on the environment, noted the promise of using the value management (VM) method. These projects address environmental and socio-economic issues and involve multiple functions that need to be assessed.

In a number of works, Ellis R.C.T., et al. (2005) indicated that VA is part of design and planning, which improves investment efficiency and productivity.

At the same time, Morkovina S.S. et al. (2018) argue that the cost analysis process is a separate process that does not depend on design and standards and can be used to evaluate any process, including the creation of innovative products and technologies. This is especially important for forestry, where traditional forestry processes are strictly standardized and the introduction of innovative technologies is limited by climatic and natural factors.

Crosbya A.D. has demonstrated the wide application of VA based assessment of the significance of various functions. et al. (2020) when they used his methodology to develop a strategy for the conservation of avian biodiversity in the western Upper Peninsula of Michigan, USA. The development of VA / VM is associated with the recognition of its versatility in various systems, including for the purpose of assessing the effectiveness of creating innovations in the forest sector of the economy.

Thus, the problem is that VA / VM usage priorities are shifted towards construction, engineering and design, which creates a practical and theoretical gap in other areas of expertise. In our study, we focus on assessing the possibility of using the VA / VM method as an alternative way to manage innovations in forestry and evaluate innovative biotechnologies.

Accordingly, this article is primarily aimed at analyzing the value analysis (VA) method in forestry, both from a theoretical point of view and from the point of view of the possibility of practical application for the purpose of assessing innovative technologies and managing innovative projects in the field of reforestation and growing forest seedlings. Secondly, the identification of cause-and-effect relationships between the functions of the production process of seedlings of woody plants using innovative technologies and their cost, taking into account the influence of unfavorable environmental factors. Thirdly, to analyze individual functions as part of the considered innovative technologies for the purpose of reforestation from the standpoint of their significance and cost. Finally, the identification of the functional and cost mismatch in the performance of separate operations as part of each function.

The rest of the document is organized as follows: Section 2 analyzes and systematizes possible influencing factors on the relationship between the functions of creating seedlings of woody plants using innovative technologies and their cost, and provides an overview of the relevant literature, Section 3, using the VA methodology, presents an analysis and ranking of individual functions (main, auxiliary and final) as part of innovative technologies for the purposes of reforestation from the standpoint of their importance and cost. The process of forming production costs for growing seedlings with a closed root system is described.

Section 4 describes the results of our study. Finally, the last section provides some concluding remarks and suggestions for further research.

Theoretical, Informational, Empirical, and Methodological Grounds of the Research

The need to assess innovation in terms of causal relationships between functions and costs in forestry is due to a number of reasons. Climate change and population growth lead to significant losses in forest ecosystems. The response to these changes is the systematic reforestation and afforestation activities in all countries of the world.

The growing demand for timber and timber products requires accelerated growth of trees and new species of tree species with growth rates and resilience.

Growing forest seedlings requires investments, the payback period of which is significantly extended in time and can be calculated in tens of years.

All of this necessitates not only the creation of innovative technologies, but also their economic assessment, taking into account the influence of these factors.

The condition of forests has changed significantly over the past decades. The Russian Federation retains its leadership in forest area - 815 mln ha, or 20.4% of the total forest area in the world. The share of the forest area in Brazil is 12.3%, Canada - 8.7, USA - 7.7%, China - 5.2%. Globally, the world's forest resources continue to decline as population grows and demand for food and land increases. In 1990, there were 4128 million hectares of forest in the world; by 2015, this area had decreased to 3999 million hectares. (FAO, 2015.). The land area occupied by forests has decreased by 30.6%.

While forest area declined by 5,135.5 thousand hectares between 1990 and 2015, the world's population has increased, which means that forest area per capita is declining - a trend that has existed for millennia. For fifteen years, the area of forests per inhabitant has decreased by 10 - 30%.

The most significant losses are incurred by the equatorial countries of Brazil and Indonesia, where the loss of forest resources amounted to 30 percent or more. The only exception is China, where forest area per inhabitant has increased by 7% over the past fifteen years (Table 1).

Table 1: Trends in forest areas per capita in countries

Country	Forest area, ths ha					Population, mln human		Forest area per inhabitant, ha / human	
	1990	2000	2005	2010	2015	2000	2015	2000	2015
Russia	808950	809269	808790	815136	814931	146,6	144,0	5,52	5,65
Brazil	546705	521274	506734	498 458	493538	170	209,3	3,06	2,35
Canada	348273	347802	347 576	347 302	347069	35,8	36,0	9,72	9,64
USA	302450	303536	304 757	308 720	310095	281,8	324,5	1,08	0,96
China	157141	177001	193044	200610	208321	1284	1409,5	0,14	0,15
Congo	160363	157249	155692	154135	152578	80	81,3	1,96	1,88
Australia	12841	128841	127641	123211	124751	23	23,0	5,60	5,42
Indonesia	118545	99409	97857	4432	91010	212	264,0	0,46	0,35
Peru	77921	76147	75528	74811	73973	30	31,3	2,53	2,36
India	63939	65390	67709	69790	70682	1010	1339,2	0,06	0,05
Mexico	69760	67856	67083	66498	66040	121,6	129,2	0,56	0,51
Colombia	64417	61798	60201	58635	58502	48	48,2	1,29	1,21

Bolivia	62795	60091	58734	56209	54764	10,8	11,3	5,56	4,84
Angola	60 976	59 728	59 104	58 480	57 856	29,8	30	2,00	1,92
Zambia	52800	51134	50301	49468	48635	15,2	16,4	3,36	2,96

The problems of forest reproduction at the level of the countries of the world are relevant against the background of significant climate changes and population growth. The decline in forest area per capita, coupled with a steady increase in demand for timber and forest ecosystem services, indicates that the pressure on forests will increase in the coming years. To solve these problems, it is necessary to accelerate the processes of reforestation and afforestation.

The annual deforestation is 1.4 mln ha, which is approximately 0.1%. Understanding the threats of deforestation is forcing countries to increase reforestation areas. The average annual growth rate of reforestation in 2010–2015 amounted to 3.2 mln ha per year. The main area of reforestation was in the USA, RF, Indonesia and Brazil, with annual reforestation from 0.5 to 3.0 mln ha of forest (fig.1).

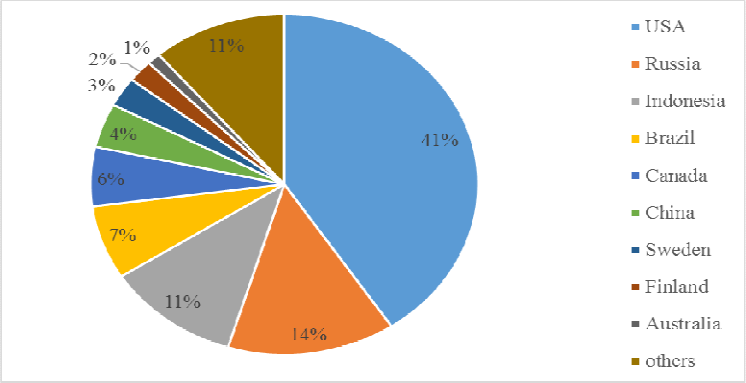

Fig. 1: Distribution of countries by area of reforestation in 2015

The dynamics of reforestation in the Russian Federation is shown in the graph in figure 2. Despite the growth in reforestation over a ten-year period, a stable imbalance in the disposal and reproduction of forests in the RF remains.

The current imbalance between reforestation and deforestation of territories, as well as low growth rates of forest planting, are explained by many reasons, including economic ones.

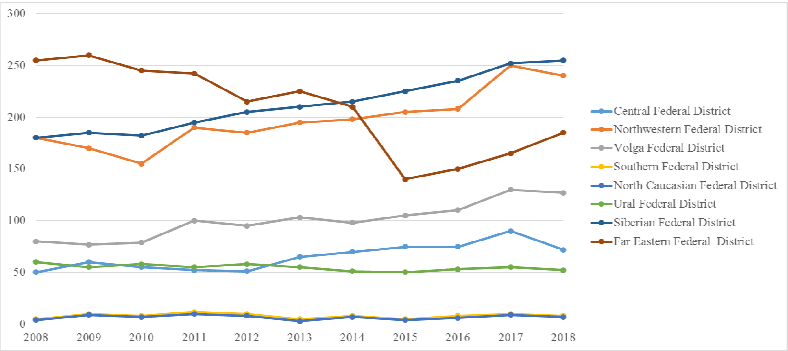

Fig. 2: Dynamics of reforestation volumes in the regions of the Russian Federation, ths ha

In the structure of costs for reforestation, the largest share is the cost of growing tree seedlings (fig. 3). The traditional process of growing forest seedlings is highly labor-intensive, which affects the cost of the grown seedlings. However, it is not possible to solve them by traditional methods of reforestation in a short time, and, therefore, innovative technologies of forest growing are in demand.

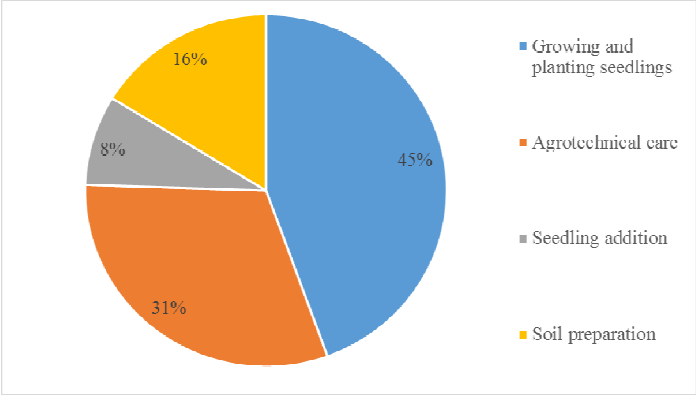

Fig. 3: Reforestation cost structure

These technologies must be high-tech, which will reduce the cost of growing seedlings and provide a solution to environmental problems - accelerated reforestation and resistance of forest seedlings to adverse environmental factors.

In recent years, there has been a certain breakthrough in forestry in terms of innovative technologies for growing seedlings of woody plants. However, the areas in need of reforestation in the Russian Federation are 31749.9 ths ha, about 1000 ths ha are restored annually, while the share of forest crops created by planting material with improved hereditary properties does not exceed 5%.

In the Russian Federation, the issues of reforestation and afforestation are acute, and at least 15% of all forestry costs are allocated annually for their solution. The structure of costs for the maintenance, protection and reproduction of forests in the Russian Federation is shown in figure 4.

In these costs, innovative technologies and their development account for no more than 4%, mainly these are funds carried out in the course of R&D by scientific organizations and universities.

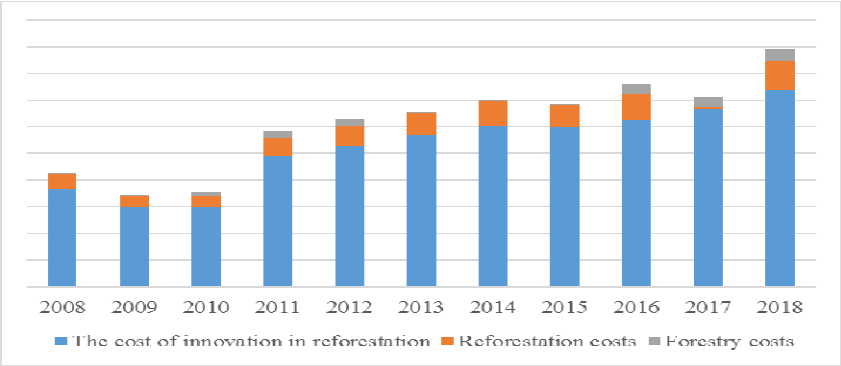

Fig. 4: Dynamics of costs for reforestation, including the use of innovative technologies, €

Companies that use forests and logging practically do not invest in the development of innovative technologies. In a number of regions of the Russian Federation, in order to ensure reforestation, forest selection and seed-growing centers have been created on the basis of greenhouses, which make it possible to increase the number of grown forest seedlings due to all-season work. However, the forest seedlings grown on their basis have a high cost and are not competitive, first of all, in terms of price. In this regard, it is necessary to study the processes of formation of the cost of seedlings with improved hereditary properties. Justification of the application of innovative technologies for the purpose of reforestation requires an analysis of not only the technology as a whole, but also individual functions in its composition from the standpoint of their significance and cost.

The methodology of functional-cost analysis allows to indicate possible ways to improve cost indicators. Calculating the cost of a separate function in the FSA allows you to get a large amount of information for making a decision.

In the course of the analysis, they find out what functions the object should perform and what functions it actually performs. All functions of the object are formulated, systematized and evaluated. The peculiarity of conducting VA when assessing innovative technology is to establish the appropriateness of a set of functions that make up the entire process of creating a new product.

The assessment of the effectiveness of the results of the creation of new technologies in forestry is based on the following principles:

- when comparing the results of different technologies, their comparability should be ensured;
- when comparing alternative solutions, preference should be given to the one with the greatest effect value;
- When evaluating the effectiveness, the time factor should be taken into account, i.e. inequality of different costs and results (preference is given to earlier results and later costs);
- taking into account only forthcoming costs and receipts;
- taking into account all the most significant consequences of the use of technological solutions, both directly economic and silvicultural;
- taking into account the impact of inflation (changes in prices for various types of products and resources during the creation and commercialization of the results of the introduction of new technology);
- taking into account the influence of risk factors of various nature.

In this research study, we used the VA method to estimate the cost of each function in growing woody seedlings with a new technology.

The object of our research was the processes and operations of innovative technology for growing seedlings in forest seed-breeding centers, based on greenhouses.

An innovative technology was adopted for growing oak seedlings with a closed root system in a forest selection and seed-growing center, based on greenhouses.

At the same time, two options were considered for an innovative technology for growing oak seedlings with a closed root system in a forest selection and seed-growing center, on the basis of greenhouses - with one rotation and with two rotations. In the technology with two rotations of seedling growing, the production load and an increase in the number of grown seedlings during the year twice as much as with one rotation was provided.

Functional-cost analysis to assess the innovative technology of growing seedlings with a closed root system in a greenhouse is implemented in stages, and at the first stage, the sequence of functions necessary for the production of seedlings is determined.

Closed-root planting material is grown in greenhouse complexes for one year. In this case, the following types of work are carried out:

- cleaning, processing and drying of acorns;
- treatment of acorns before sowing with fungicides;
- preparation of a substrate for growing seedlings, fertilization;
- filling cassettes with nutrient substrate;
- planting acorns in cassettes;
- forming a stack of cassettes;
- transportation of packs of cassettes to the greenhouse;
- watering seedlings;
- fertilizing with mineral fertilizers;
- spraying oak seedlings with fungicides;
- selection of seedlings, sorting, accounting and packing.

In the second phase of the VA implementation, for each function, the total annual costs and number of work hours are determined. For each type of work on growing seedlings, the required amount of machines and tools, fuel, electricity, water, fertilizers was determined. The need for workers and maintenance personnel was also calculated. For each attracted resource, the norms of time of its use were determined for performing the operation using the method of time observation. The process of making time observations includes:

- preparation for observation;

– monitoring and measuring the cost of working time;
– processing time observations and setting standards;
– analysis and systematization of the received material for the purposes of rationing.

The whole process of growing seedlings with a closed root system was represented by an organization diagram (fig. 5).

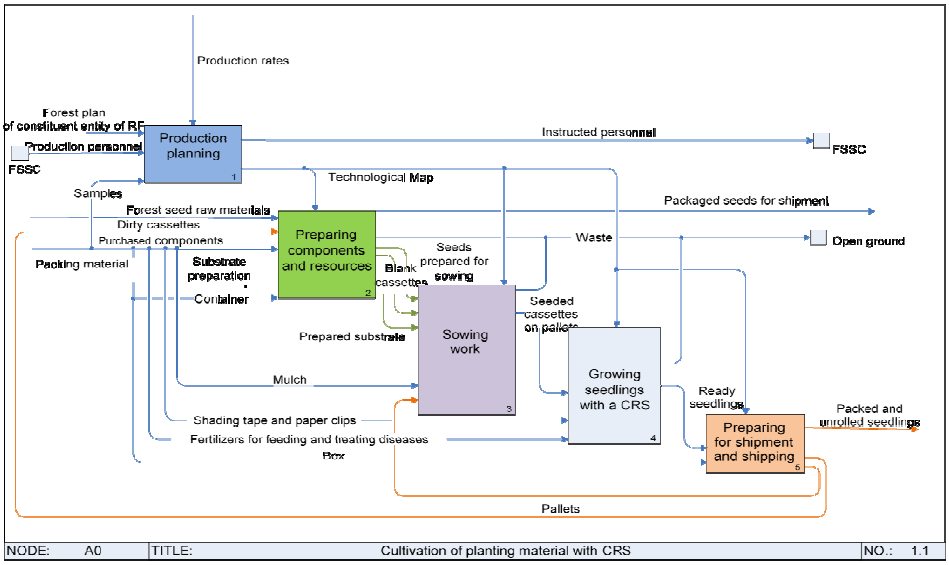

Fig. 5: Organizational diagram of the process of growing seedlings with a closed root system

For each function in the presented diagram, a separate operation is defined for which, using the norms of time and resources, a quantitative characteristic is determined - the cost of its implementation. In forestry, all costs are usually divided into production and overhead.

The organization chart reflects the process of generating production costs. To calculate production costs, the study used flow charts. In these maps, the composition of work, the system of machines, standard-forming factors, production rates, wage grades of work and wage rates, the need for mechanisms, the labor costs of workers in man-days, the need for materials were determined. After all the costs for all functions have been determined, a full calculation of the costs for growing seedlings with a closed root system is carried out.

The VA methodology included the following sequence of works:

1. building a functional and structural model of processes;
2. building a functional-cost diagram and ranking functions but their significance and costs based on their greatest mismatch;
3. building a diagram of the interaction of functions.

The next important step was the expert assessment of the significance (ranking) of the evaluated functions. At the first stage, the data array is generated, i.e. of all functions, only those are identified that affect the achievement of the goal - making the right management decision related to changing the management object.

To minimize the cost of implementing the VA method for growing forest seedlings, the number of experts should be optimal. The solution to this problem within the framework of a scientific study is based on a survey of thirty experts in the field of growing forest seedlings in a greenhouse. The selection of functions is made according to ranking and the greatest mismatch between significance and cost.

In the regional context, the existing costs for the production of seedlings with a closed root system differ significantly (fig. 6).

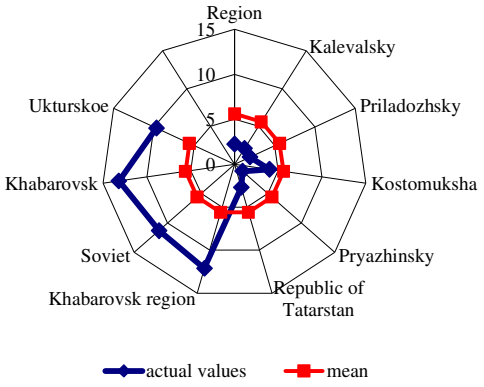

Fig. 6: Histogram of the cost level for growing seedlings with a closed root system in forest seed-breeding centers and greenhouses of the regions of the Russian Federation

Differences in the cost of growing seedlings are a consequence of differences in the cost of the resources involved. Taking into account the fact that in the conditions of forest selection and seed-growing centers and greenhouses the process of growing seedlings with a closed root system is standardized, we determined the costs of growing oak seedlings with an open root system (traditional technology) and a closed root system (innovative technology) (Table 2).

As a typical, we used the following grouping of costs for growing oak seedlings according to the following cost items:

- «Materials»;
- «Expenses for wages of workers»;
- «Expenses for the maintenance and operation of machinery and equipment».

The article «Materials» included the costs of materials used directly during the work on growing oak seedlings, mineral fertilizers, plant protection products, fuel, electricity, water and other types of material resources.

Table 2: Costs of growing oak seedlings with open root system (traditional technology) and closed root system (innovative technology)

Indicator name	Costs of growing seedlings with an open root system (ORS)	Costs of growing seedlings with a closed root system (CRS)	
		One rotation	Two rotations
Maintenance of machinery and equipment, €	1123.10	128009.23	193650.38
Wages of workers, €	3163.30	10177.63	20269.45
Materials, fuel, electricity, €	1537.60	21567.81	43135.63
Total costs, €	5824.01	159754.69	257055.46
Yield of standard planting material, ths pcs / ha	5.80	37.57	75.13
Production cost of one seedling, €, incl. costs for:	0.01	0.05	0.04
Maintenance of	0.002	0.040	0.030

machinery and equipment			
Wages of workers, €	0.006	0.003	0.003
Materials, fuel, electricity, €	0.003	0.007	0.007

The item «Expenses for the wages of workers» reflected all the costs of wages for production workers employed directly in the work of growing oak seedlings, calculated according to the wage systems adopted in the forestry of the Russian Federation.

The item «Expenses for the maintenance and operation of machinery and equipment» included depreciation deductions for the full restoration of machines and mechanisms, as well as production fixtures and equipment accounted for in fixed assets, the cost of maintenance, maintenance and repair.

It has been established that the largest share of costs in traditional technology is for workers' wages, while in innovative technology the largest share is occupied by the costs of maintaining machinery and equipment. The most expensive is the production of seedlings with a closed root system in one rotation. With an increase in the number of growing rotations, the volume of produced seedlings increases to 6.48 ths pcs / ha and the production cost is reduced to 0,04 €.

In order to identify the most costly operations, the entire process of growing senets with a closed root system was presented in the form of a structural-elementary model. This approach made it possible to establish the most costly functions and identify functional-cost mismatch.

Results

The main elements of the process of growing seedlings with SCS are preparatory work, the main work on planting acorns and growing seedlings with CRS, final operations on the selection of seedlings, sorting, packing (fig.7).

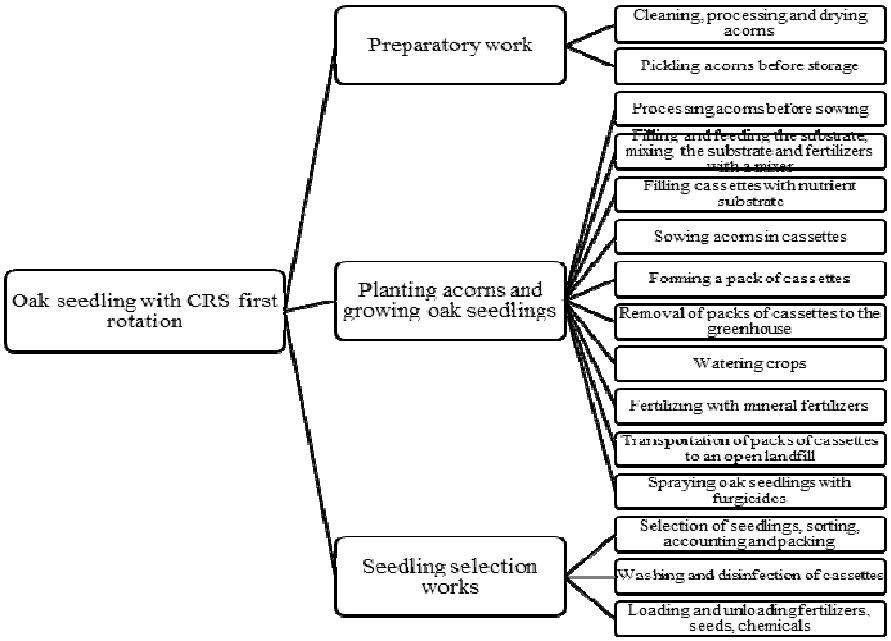

Fig. 7: Structural and elementary model of growing oak seedlings with a closed root system

The functions of the technology for growing oak seedlings with a closed root system in one rotation are presented in Table 3.

Table 3: Functions of the technology for growing oak seedlings with CRS

Name of operation	Functions	Code
Growing an oak seedling one rotation	Main	F0
Preparatory work	Basic	F1
Cleaning, processing and drying acorns	Supporting	F1.1
Etching acorns before storing TMTD	Supporting	F1.2
Planting acorns and growing oak seedlings	Basic	F2
Treatment of acorns before sowing TMTD	Supporting	F2.1
Filling and feeding the substrate, mixing the substrate and fertilizers with a mixer	Supporting	F2.2
Filling cassettes with nutrient substrate	Supporting	F2.3
Sowing acorns in cassettes	Supporting	F2.4
Forming a stack of cassettes	Supporting	F2.5
Removal of packs of cassettes to the greenhouse	Supporting	F2.6
Watering crops	Supporting	F2.7
Fertilizing with mineral fertilizers	Supporting	F2.8
Transportation of packs of cassettes to an open landfill	Supporting	F2.9
Spraying oak seedlings with fungicides	Supporting	F2.10
Seedling selection works	Basic	F3
Selection of seedlings, sorting, accounting and packing	Supporting	F3.1
Washing and disinfection of cassettes	Supporting	F3.2
Loading and unloading fertilizers, seeds, chemicals	Supporting	F3.3

The study analyzed the cost of functions in the context of the main, auxiliary and final processes associated with the cultivation of forest seedlings with closed and open root systems. (Table 4).

Table 4: Costs of functions and significance when growing oak seedlings

Indicator name	Code	Technology costs, €			Significance of functions by technology, %		
		Traditional	Innovative, one rotation	Innovative, two rotations	Traditional	Innovative, one rotation	Innovative, two rotations
Full prime cost of growing seedlings	F0	5757.3	157923.7	254109.3	100	100	100
Preparatory work	F1	3339.2	79.0	122.0	58	50	48
Main process (sowing seeds, watering, leaving)	F2	1727.2	66.3	114.3	30	42	45
Selection, sorting, packing of seedlings	F3	690.9	12.6	20.3	12	8	7

As the results of the expert assessment showed, the significance of functions in the processes of growing seedlings with open and closed root systems is different. According to experts, in traditional technology, preparatory functions are the most important, while in innovative technologies the importance of the main processes increases. Thus, the performed work on the functional-cost analysis of growing oak seedlings with a closed root system made it possible to establish that the traditional technology of growing oak seedlings is inconsistent and requires significant changes.

The function «Preparatory work» in an innovative technology with one rotation has the greatest discrepancy and ranks first in terms of the sum of costs and significance.

The function «Planting acorns and growing oak seedlings» in the second rotation has the greatest discrepancy and ranks first in terms of the sum of costs and importance.
In general, it is necessary to modernize the identified «problem» functions in the technology of growing oak seedlings with a closed root system.

Conclusions and Recommendations

The use of the VA method in assessing and planning innovations in reforestation has great prospects. Thanks to this method, it becomes possible to establish the most costly operations throughout the entire technological process, as well as to identify mismatched ones among them.

The VA method used to evaluate the innovative technology of growing oak seedlings made it possible to establish the advantages of two rotations when growing seedlings in a greenhouse. This advantage comes from an increase in the number of grown seedlings, the so-called economies of scale and more efficient organization of production.

The VA method used to assess innovative technology made it possible to establish that the innovative technology of growing oak seedlings in two rotations, concentrated on the main processes, is more balanced, including in terms of the costs of performing certain functions.

Thus, the effectiveness of the VA method for assessing innovative technology in forestry is achieved, first of all, due to new, different from the traditional, cost classification, reliable and sufficient information.

At the same time, the experience of using the VA method in forestry is ambiguous: studies have shown that, along with the positive results achieved, the introduction of this method is associated with certain difficulties.

In some cases, the scale of tasks and the nature of the analyzed objects do not correspond to the specifics of the method itself. Functional value analysis is a time consuming and complex analysis tool that requires well trained, highly skilled workers. Its introduction into management practice is possible on the basis of large industrial enterprises.

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Some Aspects of The Transformation of State Financial Control in The Framework of Public Administration Reform in Ukraine

Valerii PAVLIUK
PhD in Public Administration, Co-founder of the NGO "Association of Social Innovations and Scientific Communications", Kyiv, Ukraine, pavliukvaleri@gmail.com

Mykhailo KUZHELIEV
Doctor of Economics, Professor, Director of Educational and Scientific Institute of Finance and Banking, University of the State Fiscal Service of Ukraine, Irpin, Ukraine
m-kristo@ukr.net

Svitlana MAROVA
Doctor of public administration, Professor, Rector of Donetsk State University of Management, Mariupol, Ukraine
marsvefel@gmail.com

Myroslava BEDRINETS
PhD in Economics, Associate Professor of Department of Finance named after L.L. Tarangul, University of the State Fiscal Service of Ukraine, Irpin, Ukraine
mira_may@ukr.net

Oksana LISNICHUK
PhD in Economics, Associate Professor of Department of Finance named after L.L. Tarangul, University of the State Fiscal Service of Ukraine, Irpin, Ukraine
oksanaskvur81@gmail.com

Abstract

Purpose: Ukraine is undergoing a systemic reform of public administration, which does not bypass public finances. This article is devoted to the formation of a modern system of state control, which aims to ensure optimal supervision over the formation and use of public resources / finances. Conceptual principles of public financial control are evolving in accordance with structural and procedural reforms in public authorities. We should consider existing practices and procedures, as well as identify in a timely manner the need to revise approaches to modern forms and methods of control activities. Legislators and officials must take into account the peculiarities of the development of public administration since independence, the presence of negative features of Ukraine as a state. Corruption, economic crisis, and outflow of investment require changes in the methodology of control actions from formal procedures to performance audits. **Methodology**: During the study, a systematic approach was used, which allowed to consider the form and the content of modern public financial control in Ukraine. The historical approach allowed us to study the evolution of the system of state control since independence. The method of extrapolation made it possible to use world and European experience in building an effective system of internal and external financial control in developed economies. **Conclusions**: The result of the study presented reasonable vision of how to build an effective system of public financial control in the country with a Soviet past, the signs of corruption in government, the raw materials economy. The features and characteristics of the post-Soviet system of state financial control with its inherent features, forms and content are clearly defined. A new concept of building an effective system of controlling bodies is proposed, the work of which is aimed at meaningful and effective supervision over the filling of the state's financial resources and their reasonable and rational use. **Implications**: Clearly defined directions for reforming the system of public financial control allow the relevant authorities to exercise internal control over the effective use of public finances by budgetary institutions, as well as to establish effective procedures for conducting independent external public financial control. As part of public administration reform, new approaches, forms and methods of conducting control procedures are emerging.

Keywords: public administration reform, public financial control, internal and external financial control, efficiency audit.

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Introduction

Public administration reform implies radical changes in the activities of public authorities in accordance with the area of competence of each of them.

There is a problem of designing and implementing a comprehensive system of public financial control, focused on economic development, optimization of public infrastructure. Public financial control is currently undergoing the transformation and needs to work out processes and obtain the first practices that meet the new regulatory framework. Ukraine is taking measures to bring its national legislation in accordance with EU legislation in the relevant areas, particularly in public financial management.

It should also be borne in mind that Ukraine is implementing the reform of decentralization of power (LOGICA, 2019), which implies:

- transfer of powers and finances from state authorities as close as possible to the people - local governments;
- transition from the classic (article-by-article) system of planning and spending of budget funds to the program-target method, which is focused on achieving specific results (hereinafter - PCM).
-

According to Oleg Shevchuk (Shevchuk, 2017), in order to carry out a single public financial policy effectively, financial bodies of the state power should function as a system, as only a systematic approach allows to make financial control an unalienable part of social and economic life of society, to analyze and take account of all significant factors influencing the economic development of the state, professionally assess and predict the consequences of the decisions made related to the financial and material sphere. The systematic approach to public financial control provides, in the first place, for the search of the ways of constructional interaction of controlling bodies of different levels, legislative ensuring of their organization and functioning, a single methodology of common activity, creation of a single information space.

Andrew Lawson, Co-Director of Fiscus Limited, argues (Lawson, 2015) that effective public service delivery is closely linked to poverty reduction and growth; countries with strong, transparent, accountable public financial management systems tend to provide services more efficiently and equitably and regulate markets more effective and fair way. In this regard, good public finance management is a necessary, if not sufficient, condition for most development results.
A key element of statehood is the ability to pay taxes fairly and efficiently and to spend money responsibly. These are the main characteristics of "inclusive" public institutions that generate trust, promote the development of innovative energies and allow society to prosper.

Efficiency improvement of the public financial management system leads to broad and long-term benefits and, in turn, can enhance societal shifts towards inclusive institutions and, consequently, stronger states, poverty reduction, greater gender equality and balanced growth.

Volodymyr Pikhotskyi in his fundamental research (Pihotskyi, 2015) notes that in a market economy and in the transitional stage of its development, research on the functioning of public financial control should be carried out on the basis of a systematic approach, which provides, along with researching the essence of public financial control, clarification of its functions, classification criteria, principles and objectives.

According to experts of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ, 2020), the structure of public finances provides for two levels, due to the administrative-territorial structure of Ukraine, namely the division into national and local finances.

Ukrainian researchers also insist on the need to use modeling tools in public administration, given the effects of the pandemic on replenishment of the budget, for example, at the expense of funds from labor migration (S. Kozlovskyi, D. Bilenko, M. Kuzheliev, 2020). Due to quarantine in almost all developed host countries labor migration that has been established over the years may change significantly. New conditions call for new methods never used before, such as, modeling new economic development scenarios taking into account the spread of viruses. Further development of epidemic model can be associated with attempts to create simulation models. There are two types of simulation models, one of them is system dynamics, and the other one is agent-based model.

Public financial control, according to Andriy Khmelkov (Khmelkov, 2013), is seen as an integral part of good governance of public finances, a set of measures aimed at ensuring legality, financial discipline and efficiency of formation and spending, including budget, and other assets in the process of possession, disposal, use and alienation

of state property, compensation for damages and the establishment of liability in case of violation of financial, including budgetary, legislation.

As part of their activities, the main audit bodies - the State Audit Office of Ukraine and the Accounting Chamber of Ukraine - actively analyze the functioning of economic entities and the results of public policy in various areas («National Economic Strategy 2030», 2020). During 2019 and January-September 2020, the State Audit Office conducted 2103 audits of financial and economic activities, 223 inspections of procurement, 16010 monitorings of procurement, 617 state financial audits, including 321 audits of business entities and 119 audits of local budgets. The Accounting Chamber has conducted more than 20 comprehensive audits of the efficiency of budget funds.

The inspections revealed financial violations and shortcomings totaling UAH 625.1 billion. Ukraine is one of the largest countries in Europe in terms of territory and population, but at the same time one of the poorest countries in the region. Despite the fact that we rank 56th in the world in terms of GDP in absolute terms, Ukraine ranks only 119th in terms of GDP per capita.

At the same time, since the last century, the world community has been based on the postulate that quality management control systems are important for a well-managed organization.

Experts of the joint initiative of the OECD and the EU (SIGMA – Support for Improvement in Governance and Management) believe that Creating effective management control procedures is difficult in any organization. The more complex the management system and the relationship with other parts of the economy is, the broader and more complex the necessary management tools are. (SIGMA Papers No. 4, 1996). Management control can be summarized as the organization, policies, and procedures, used to ensure that government programs achieve the intended results; that the resources used to implement these programs correspond to the stated goals and objectives of the relevant organizations; that programs are protected from waste, fraud and mismanagement; and the fact that reliable and timely information is received, stored, communicated and used for decision-making. Effective management control is undoubtedly important for the success and well-being of government organizations, both as protection against waste, abuse and fraud, and as a means of ensuring that the organization implements the policies set out by senior management. However, even the most carefully designed management systems have their limitations, in part because, although they allow top managers to control the organization, they do not control the top managers themselves. Constant vigilance is required to ensure that systems are not undermined by fraud or unresponsiveness to changing circumstances and operating procedures.

Conceptual principles of formation of the Ukrainian system of state financial control

Having functioned for almost 30 years as an independent state, Ukraine is moving towards European community via a radical reorganization of public administration. The legal framework is being formed and improved, state institutions are being transformed, the content of the work of public authorities in the direction of adaptation and harmonization with EU legislation and the implementation of effective world practices in the field of public administration is being revised.

Control and accountability are the two main concepts that ensure the efficient use of public funds and are implemented through a wide range of mechanisms. Over the past few years, a number of measures have been introduced in Ukraine to improve the system of control over public finances. Today, the Public Financial Control (PFC) system is extensive and has been established in several institutions at different levels. It is mainly a section on internal and external control / audit functions in relation to state or local budgets. Therefore, it is necessary to conduct a thorough review of the current situation in financial management at the state level to understand the role of key stakeholders – Ministry of Finance / Department of Harmonization of Public Internal Financial Control, Accounting Chamber of Ukraine, State Audit Office of Ukraine. The task of the state is to form a culture of public finance management that will ensure the effective, legal and appropriate use of public resources for the welfare of the population and sustainable socio-economic development of the country. Poor management and lack of proper financial and organizational control create preconditions for inefficient or illegal use of public finances. The driving mechanism for improving the mechanisms for managing budget funds and state assets is the introduction of effective systems of internal control and internal audit in the executive branch.

In the early 1990s, Ukraine inherited the regulatory framework, organizational structure, and methodology for conducting state financial control from the Soviet Union. The main subjects of control were control and audit departments and other specialized bodies of state control: tax inspections, financial departments and so on. Despite the stagnancy, planned approach and certain corruption, this was the basis for restructuring, and during the first ten years both infrastructural and substantive changes took place. Entrepreneurs experienced a meaningful liberalization of relations with inspection bodies for the first time, when in 1998 the Decree of the President of Ukraine “On some measures to deregulate business activities” was issued, which declared the norm that the “right to conduct a scheduled

on-site inspection of the subject of business activity is provided only in the event that no later than ten calendar days before the date of the inspection, a written notice was sent to it, indicating the date of inspection".

Public financial control with all its components in practical terms should be considered as a multifaceted system of monitoring and verifying the legality, feasibility, rationality and efficiency of the formation and use of financial resources at any level of government to assess the effectiveness of management decisions and achieve economic progress (Pihotsky, Rysin, 2019). For completeness and integrity, it must be complemented by control over the use of state property. When considering the state financial control as a whole, consisting of parts, it should be noted that one of its stages must be to establish the accuracy of accounting and reporting data and other documentation of the audited entity, regardless of its form of ownership to determine its actual financial condition, establishing the efficiency and effectiveness of activities, ie conducting an audit, which is an integral part of public financial control. At the same time, the authors acknowledge that Ukraine is in the first stage of implementing a state audit.

Myroslava Bedrynets believes that «a serious obstacle to the successful implementation of economic reforms is the rather cumbersome structure of public financial control bodies. We believe that an important issue in improving control is to eliminate duplication of actions of control bodies, which is to perform different functions of different bodies (Ministry of Finance, Accounting Chamber, State Financial Inspection of Ukraine) in relation to the same objects of control. The tasks of public financial control bodies are not specific enough, the limits of their responsibility are blurred, and activities are poorly coordinated. They must work more closely together while maintaining the responsibility of each body for its area of control» (Bedrynets, 2015).

In any field of activity control has its types and forms. Therefore, first of all, it is necessary to provide a certain list of features that classify control in general and public financial control in particular. There are previous, current and subsequent (next, retrospective) control. By regularity – scheduled and unscheduled; according to data sources – documentary and factual. The form of control depends on the depth of clarification of the issue – audit or verification. There are also continuous and selective control.
If we distinguish features within the state control, including financial, it can be argued that there is independent (external) and internal control.

Control is an undividable part of the budget process system. It aims to identify deviations from accepted standards, identify violations of legality, resource efficiency, bring perpetrators to justice, and take measures to prevent or reduce such violations in the future.

The key subjects of state financial control in Ukraine are:

- Ministry of Finance of Ukraine;
- Accounting Chamber of Ukraine;
- State Audit Office of Ukraine;
- State Treasury Service of Ukraine.

The object of state financial control is what the subjects enter into a controlling legal relationship and what the control activity is aimed at. Such an object is all the money that is formed in the process of cost distribution, redistribution and use of centralized financial resources. Thus, the object of public financial control is the financial activities of economic entities (Pikhotskyi, 2015).

Each subject of control has its own powers from the implementation of a unified state policy in the field of control to the targeted, effective and efficient use of budget funds.

In recent years, there has been a serious convergence of the format and approaches to the implementation of activities in accordance with the rules established by international control institutions. Several concepts for the development of the state financial control system have been developed and are being implemented. For example, the CONCEPT of Development of Public Internal Financial Control till 2017, which declares the separation of internal control and internal audit, insists on managerial responsibility for management and development of the entity as a whole, defines the components of the internal control structure (CONCEPT, 2008). In 2018, the Prime Minister of Ukraine initiates and the Cabinet of Ministers approves the CONCEPT for the implementation of public policy in the field of reforming the system of public financial control until 2020. From now on, the efficiency and effectiveness of the use of budget funds will be studied from the standpoint of measuring the socio-economic consequences of the budget manager and its management decisions, including the level of achievement of goals, efficiency of tasks in the relevant field, achievement of social goals, expected results and so on. The concept is aimed at the development of the State Audit Office of Ukraine (CONCEPT, 2018).

In addition, over the past ten years, the Ministry of Finance has developed and implemented a list of guidelines, manuals, forms of documents, reports, codes and standards governing the work of public controllers and auditors and forming new institutions of public financial control. Systematic work and comprehensive coverage of methodological issues allowed to form the basis of new methods and content, for example, internal control by managers of budget funds (BASIC PRINCIPLES, 2018).

Each of the participants in this process, from manager to executor, should have a certain minimal level of specialized skills in the field of control. The high competence of specialists allows to implement reforms and direct control actions towards determining the effectiveness of controlled objects. Competence allows you to correctly interpret the law, optimize control procedures and find rational solutions based on its results.

Competence is formed by comprehensive perception and understanding of the procedures, which take place in the control system.

In the work "Control and Audit" (Pavlyuk, 2006), it is indicated that “control as a control element is a complex process aimed at verifying the compliance of objects with the proposed requirements and parameters. Elimination of detected deviations is also a task of control. By detecting deficiencies in the activity of the object being inspected, the control signals the imperfection of certain parts of its mechanism. The subject of management (of control) uses the information obtained to make effective management decisions”.

As part of the training of modern specialists in management, control and audit, economics in Ukraine, the young controller should be given a clear idea of the content and form of control over the procedures. So, considering the differences of various forms of control, you can view them graphically, while providing verbal definitions. For example, they demonstrated a wide coverage of data during the audit and the depth of their study during inspections (Fig. 1).

The graphic image of the revision and checkup shows the desire of the controllers:

- when conducting a revision - to cover the maximum number of stages of the reproduction process, using selective control;
- during the checkup - to maximize the coverage of data on one process or type of operation, based on the benefits of continuous control

The same clarity should be maintained when training specialists in methods of control.

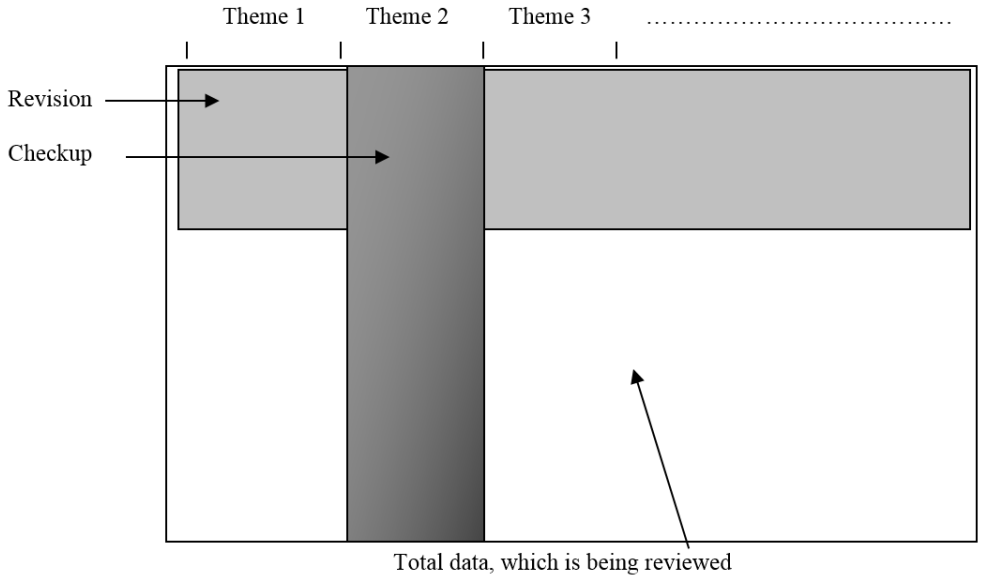

Fig.1: Coverage of data by various forms of control

Source: built by the authors based on materials Pavliuk, 2001.

Relevant training of specialists allows to develop clearer recommendations on the methodology of control, choosing its most effective forms in accordance with the object of control and the task.

At the same time, the evolution of the system of public financial control is quite slow. This is due to the complex crisis in the political and economic spheres. The "old system" is trying to maintain its viability. However, we will attempt to demonstrate positive examples and positive vectors of reforming public financial control on the way to efficient use of budgetary resources, as well as find and identify the most promising formats for effective public financial control in general.

Development of the system of state financial control in modern Ukraine

The evolution of the modern system of public financial control involves the integrated development of its components/elements/components. The Verkhovna Rada, the Cabinet of Ministers, and the Ministry of Finance should elaborate certain characteristics (signs), methods and forms of control, creating appropriate regulations and monitoring the gradual implementation of changes. This will facilitate functioning of each body of state financial control. The formal addition of content into the control processes is not enough, it requires charisma, desire and perseverance of both managers and performers.

The materials discussed above allow us to state that the system of public financial control in Ukraine is established and functioning. The institutional transformation has already been carried out and the first stage of methodological and normative-legal support of the activity of control bodies has been passed.

However, uncertainty and constant transformations of the conditions of functioning not only of the market, but also of public administration, require the formation of a flexible and mobile, in terms of the functions, system of public financial control.

Based on the new international standards, guidelines and regulations for the public audit sector developed by INTOSAI, as well as the guidelines for control of the Lima Declaration, we will consider the significance of current achievements in public administration reform, as well as identify priorities for the second stage of development of a new system of state control in Ukraine.

One of the main focuses of changes in the SFC system is the introduction of internal control over the activities of budgetary institutions (PIFC). Internal control is a means to ensure transparent and accountable management, which aims to obtain information on compliance with regulations and regulations, confirmation of the reliability of financial statements and efficiency, economy in the implementation of budget programs (LOGICA, 2019).

A sufficient number of scientific and practical studies are devoted to the principles and standards of INTOSAI, the content of the Lima Declaration and world practices of implementing internal control systems, so we consider it appropriate to give examples of successful Ukrainian initiatives that have positively influenced the development of state control.

Example 1. The case of the Ministry of Economic Development and Trade during the tenure of Minister Aivaras Abramavičius shows how the executive branch can perform not only basic functions, but also focus on establishing an internal control system within the institution, using monitoring, inspection and communicative information environment. After analyzing the structure of the ministry and the number of staff, the minister team concluded that public resources are used sparingly, which affects the efficiency of the institution. At the same time, the available human resources do not provide a high level of efficiency of the state body. During the year, the staff was reduced by 50 percent, and the released resources are aimed at increasing wages and stimulating the efficient work of officials. The creation of an information web portal for exporters has been initiated, which informs and serves as a platform for quick feedback, despite the time and distance, because exporters are the very people who directly support the Ukrainian economy.

Example 2. The second case is not only about one ministry, but about the whole system of procurement, which was created in Ukraine on the initiative of Deputy Minister of Economic Development and Trade Maxim Nefedov. According to him, there is no difference between fixing ineffective public administration or business. In both cases, you need to analyze existing business processes and develop more efficient ones. He and his team made a systematic reform of the tender process in e-procurement in Ukraine - Prozorro System "Everyone sees everything" - the official slogan of the reform. After the end of the tender in the electronic system you can see all the information about the submitted proposals of all participants, the decisions of the tender commission, all qualification documents, etc. This information is available for the general public through a convenient analytics module. This system solution immediately affects the quality of public administration and leads to: eradication and systemic prevention of corruption, transparency of the entire tender process, inadmissibility of discrimination of applications, objective evaluation of tender applications, simplicity and ease of application of tender procedures, transition to electronic document management, full reporting and analysis of all public procurement, open decision-making procedures, wide

public involvement, creation of private electronic platforms. Prozorro received the International Public Sector Procurement Award for the creation and implementation of an electronic system with a unique architecture. During the first three years of operation, the Prozorro Public Procurement System allowed the state to save about UAH 86 billion on procurement (RBC.UA, 2019). As for today, Prozorro has been integrated into a number of government agencies and registries.

Example 3. Within the activities of public authorities there is a significant demand for the possibility of coordinated and effective interaction between different institutions. A number of laws have their own definitions of interoperability. The Ministry of Digital Transformation of Ukraine together with other public authorities, local governments and international partners is working to ensure interoperability - the principle when different information resources can interact with each other on the basis of unified interfaces and protocols. That is, automated information interaction of public authorities is consciously a priority of public administration reform and will undoubtedly contribute to the efficiency, transparency and, as a consequence, the effectiveness of public financial control procedures.

We have deliberately cited various examples of public administration reform, which show the optimization of processes in the use of state financial resources. The more transparent and simple the activities of officials become, the more citizens associate themselves with the state and become responsible taxpayers.

External (independent) financial control in Ukraine has an established list of entities that exercise their powers within the statutory functions. But budget managers must independently ensure the legality and efficiency of the use of allocated state resources. Therefore, the organization of internal public financial control should be considered as a strategic task of the next stage of reforms.

The internal environment, risk management, control measures, monitoring, information and communication are elements of the internal control system in public administration. And for independent Ukraine, such issues as risk management, information and communication component and the organization of permanent monitoring of activities are quite new and unfinished components of public financial control. Building a modern internal environment is also a rather complex task that requires management to work out a set of issues regarding the organizational structure, staff, resources, technology and understanding of the goals and objectives (functions) of the budget institution.

Decentralization of public administration leads to decentralization of state control. There are new requirements for control directly in the state institution together with the concept of "internal control", the terms "financial audit", "audit of administrative activities" appear.

Public Internal Financial Control (PIFC) is a structured model for guiding national governments in creating a state-of-the-art control environment in their revenue and expenditure centers. It aims to provide reasonable assurance that operations comply with the principles of sound financial management, transparency, efficiency, effectiveness and economy, as well as relevant legislation and budget descriptions. Public Internal Financial Control (PIFC) systems aim to provide adequate and transparent methods and organizations to provide reasonable assurance that public funds are being used for purposes chosen by the budgetary authority (ie the government and parliament). In addition, the modern internal control environment is an effective tool for preventing corruption and fraud. (Welcome to the world of PIFC, 2006).

Transparency is a manifestation of the principle of government accountability to the public, which has elected it to generate revenue and expenditure on its behalf. Modern internal control is focused on transparency both in terms of clear boundaries of responsibility and in terms of harmonized methodology and standards. The traditional post-Soviet system of public financial control emphasizes the legality and regularity of expenditures. However, the modern system of state internal control must consider the criteria of economy, efficiency and effectiveness in the management and control of public funds.

Taking into account the conceptual apparatus of the audit of administrative activities, a basis for determining the next stages of modernization of internal financial control is created. Efficiency is the ratio between a product (service) and the resources used to produce it. Economy is the minimization of the cost of activity-oriented resources, given the appropriate quality. Effectiveness is the results compared to the goals compared to the resources used to achieve these goals.

Formal establishment of internal control and audit units in a state institution will not lead to their effective work. The key indications of successful "modernization" will be high-quality content of the new organizational structure, building quality communication, establishing boundaries of communication, the correct placement of competent personnel who are aware of all the risks of control activities. Identification of risks consists of their systematic

detection and study in each structural subdivision of the budgetary institution for elimination or neutralization. In a changing environment, competent risk management effective control procedures possible.

Today the system of public financial control in Ukraine is at the stage of development and accumulation of content of the subsystem of internal control (audit) of public institutions. Performance audits and compliance audits should be disseminated both at the central government and at the local government level.

At the central level, these are usually already established institutions that need to work out the activities of audit units quickly. The local level is being transformed so intensively as part of decentralization reform and new powers that local governments need to re-establish or re-establish all internal control units, while providing quality administrative services and verifying the legality, timeliness and efficiency / quality of their provision.

At both levels of public financial control, internal audit becomes a priority. This is due to the implementation of market / business control tools in public administration. Along with the program-target method, the project method is intensively implemented. Efficiency audit forces government agencies and their management to prove the effectiveness of their work, not just to justify the legality of the use of public finances.

Conclusions

The study proved that the system of public financial control in Ukraine is established and functioning. Institutional transformation is taking place in the direction of European integration processes and the use of world experience in the creation of state control bodies and the methodology of its implementation. The first stage of organizational restructuring, methodological and regulatory support of the activities of public financial control took place.

The traditional system of public financial control in Ukraine was focused on verifying the targeted use of resources, legality and timeliness of transactions. The creation of modern state control in the field of finance requires consideration of economical issues, efficiency and effectiveness of each financial control body.

First, it can be done through the introduction of effective control methods in accordance with the functions of the entity; creation of meaningful communication within the framework of information interaction of control bodies and within a state institution during internal control measures; ensuring the transparency of the activities of public authorities and the results of control obtained during the relevant activities.

Secondly, the shift of emphasis towards internal financial control, which allows to assess the effectiveness and efficiency of the public administration as a whole, its management, and to analyze the activities of a particular unit. The creation of internal audit departments intensifies the development of new approaches and areas of control, allows to assess the effectiveness of management decisions, the effectiveness of the institution's use of budget funds and increase the responsibility of officials for the implementation of delegated powers.

Decentralization reform directs a significant amount of budget funds to the field and therefore the establishment of internal control units in local governments is a mandatory measure and requires the development and implementation of new procedures for controlling resources, generated locally, and aimed at financing territorial development.

Areas of further research will be an in-depth study of the methodology of internal audit in public administration, namely performance audit and compliance audit. In addition, a separate area of research will be the development of optimal methods of work of internal financial control units in local governments.

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Financial Balancing in Creating Shared Value in Ukraine

Dr. Natalia S. SYTNYK
Ivan Franko National University of Lviv, Lviv, Ukraine, nsytnik@ukr.net

Dr. Andrij V. STASYSHYN
Ivan Franko National University of Lviv, Lviv, Ukraine, andriy.stasyshyn@lnu.edu.ua

Dr. Olena V. GERASYMENKO
Ivan Franko National University of Lviv, Lviv, Ukraine, gerasymenkoolena999@gmail.com

Abstract

The manuscript focuses on the fact that creating shared value (CSV) is a new managerial practice of improving the financial efficiency of a business and ensuring the effective cooperation between the state, business, and society. The correlation of relative volumes of positive and negative factors of influence on balance level is presented. It has been proved that it is necessary to modify state influence on innovative and investment activity to create shared value. Important indicators of CSV are analyzed. The necessity of forming of terms for market self-regulation of the financial system is described. The importance of solving problems of the creation of a favorable investment climate of the state, achievement of its financial balance, and support it on a due level is proved.

Keywords: financial balance, investment, innovation, creating shared value.

Introduction

In modern society, most successful international companies are aimed not only at profit but also at the creation of shared value. The concept of shared value has been built on the fact that markets are formed not only by economic but also by social needs, such as quality nutrition, better health care, ecology, etc.

Principles of shared value apply to commercial companies, non-profit organizations, and government bodies. Attention is accentuated not on the costs that have been invested or on the work that has been accomplished, but on the result that has been achieved (human needs satisfying, new markets servicing, and so on). As for Ukraine, only a few domestic companies think about their activities from the side of usefulness for society and nature. State bodies aren't ready to help companies to take care of society.

And the problem of financial balancing in Ukraine defines a condition of state security in the financial sphere from the influence of multifactorial threats. They are conditioned by insufficiency and disbalance of financial resources. (Baranovsky, 2004) examined financial balancing not only from a position of achievement of a certain condition of the financial system but also from a position of the process of achievement and maintenance of the necessary financial system condition on the due level.

The article's purpose is to considerate the world experience of creating shared value (CSV) and features of CSV in Ukraine with the purpose of financial balancing.

There are scientific articles that include some aspects of CSV between the state and business, taking into account their role in the process of creating society's value. Particulars of state and private institutions' development and the collaboration of public administration and business during the forming of a strategy of CSV were described by scientists for the moment.

Let's start with the definition of the term "shared value". (Porter, 2011) noted that the term "shared value" is determined as a management practice of increasing the financial efficiency of a business, which combines getting profits and giving all the best for society. The main task of a business is profit for its owners. So, companies in the process of CSV should build their strategy to search for profitable types of activities to improve life quality.

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The creation of shared value should begin with the adoption of a business strategy, a rethinking, and reconciliation of social and financial goals. An important step is to identify the strong and weak sides of the business to solve social problems. The company must choose a social problem to take care of, using its resources, the situation in society, and the market. But the company certainly needs the support of the state and the attraction of innovative and investment resources.

The actuality of innovations' research continues to grow in Ukraine because of the proclamation of an innovative model of development of the economy.

And the category of innovations, which is closely connected with CSV, is characterized by the presence of a wide spectrum of definitions. Some authors consider innovation as its practical realization. Others consider them a cycle from the occurrence of an idea to its commercial development. But some authors believe that innovations are "all-new" (each idea, activity, or material result, which considerably differs from existing forms).

According to the Law of Ukraine "About innovative activity" (2002), innovation is a new created (introduced) and (or) advanced competitive technologies, products or services, and also organizational-technical decisions of industrial, administrative, commercial, or other characters which essentially improve the structure and quality of manufacture and (or) social sphere.

Some researchers don't deny that innovation is a complex process. It unites science, technics, economy, business, and management. So, according to (Zvjagintseva, 2013), "the innovation extends on a new product (service), a method of their manufacture and realization, any innovation in organizational, financial, research sphere, and any improvement which provides economy of expenditure or creates conditions for such economy" (p. 144).

(Neurov, 2014) offers the following definition: innovation is a complex process that consists of creation, working out, reduction to commercial use and distribution of the new organizational, technical, marketing, logistical, or other innovative decision satisfying the certain requirement and leading to qualitative changes in the manufacture and advancement of production.

Investments are the basis of financial materialization. Thus, there is a necessity of activation of investment processes for providing extended recreation, creation of potential of positive changes in the conditions of intensifying of socio-economic contradictions, threats of self-development, and independence of the state.

According to (Avci, 2020), "FDI (foreign direct investment) affects development directly/indirectly as an external source of capital/through its effect on domestic investment" (p. 171).

So, it's important to analyze the dynamics of investments and innovations data to realize their influence on financial balancing in the process of CSV.

Results and presentation of key research findings

It's impossible to imagine a process of CSV of the state, business, and society without investment and innovative processes.

Innovative and investment politics and strategy in Ukraine are in close intercommunications. Negative dynamics of indexes of innovative and investment components creates the threat of disbalance of the financial system. In the given context authors consider expedient to trace interrelation and interference of variation of innovative and investment processes and level of financial balance.

One of the variants of evident reflection of the concept of balancing, Shubin (2014, p. 261) (the correlation of relative volumes of positive and negative factors of influence on balancing condition) describes the dynamic of balancing levels over time. The investigated period is broken into three parts: negative disbalance, long-term balance, and positive disbalance. There are lines of ideal balance and borders of maximum deviations on the figure. With the help of top and bottom borders of maximum deviations, we can see if there is a balance at the moment or not.

A line of the chart in the zone of negative disbalance (through the predominance of negative factors of influence above positive) is below the border of ideal balance. In the zone of positive disbalance, a line of the chart is higher than the border of ideal balance (through the predominance of positive factors of influence above negative). The zone of balancing is characterized by being of the line of the presented chart in this period in borders of disbalance.

And borders of disbalance are the mathematical category of error of calculation of balancing level due to rounding, predictable unauthenticity of data through ignoring a certain row of factors that actually can have a substantial influence on the eventual value of the balancing level. Thus, borders can deviate from a certain middle level in time. It helps to get more exact results of current and long-term levels of balancing with greater probability to investigate the dynamics of balancing level. Also, it allows doing prognoses of future variation of balancing level.

Even the ideal balancing can't remain permanent and have the appearance of a horizontal line. So, balancing is the middle value of indexes of positive and negative factors (although in the short-term period mainly expedient is the establishment of a certain permanent size of ideal balancing, it follows to reach).

The predominance of positive or negative factors influences on the result (presence or absence of balancing).

Disbalance as something imperfect exists from society's origin. Even at constant tracing of negative tendencies in the ideally balanced financial system, any factor can essentially infringe a condition of balancing and lead to the disbalance. It's important to note that self-balancing is possible only at minimum state influence on the financial processes. But it's impossible because of external influence and the necessity of fulfillment state functions.

According to the authors of the article, CSV as a result of effective interaction between the state, business, and society is closely linked to the assessment of the balancing level of the financial system. In this case, the financial system is the close relationship between the state, business, and society in the financial market. Therefore the balancing level may be an indicator of CSV.

The methodology for calculating the balancing level of the financial system has already been presented in several periodicals. In particular, we're talking about (Gerasymenko, 2012). The balancing level of the financial system (BLFS) depends on the relative values of the factors of positive (RVFPI) and negative impact (RVFNI), as well as on the relative value of the comparative indicator (RVCI). The balancing level of the financial system is calculated according to formula (1):

$$BLFS = (RVFPI - RVFNI) / RVCI \quad (1).$$

Relative indicators (the basis for calculating all other indicators) to calculate the balancing level are the amount of cash income and expenditure of the population of a given area. They are the most important factors indicating the area's current financial condition.

The balancing level is calculated based on group indices, which greatly simplifies the elucidation of the causes of disbalance, and also the search for ways to achieve financial balancing.

The territory of the country or region is divided into areas, for each of which group indicators of financial balance are calculated.

Next, the balancing level of the financial system of each of the study areas is calculated. After that, the overall balancing level of the financial system of each region is calculated. And based on the last indicators the state balancing level of the financial system is defined.

The process of CSV is at regional and national levels. This confirms the possibility and expediency of correlating the level of financial balancing and the current situation of CSV. This issue is especially relevant in the context of decentralization processes.

In this case, we are interested in the national level of financial balancing and the peculiarities of CSV at the global level.

As for Ukraine, it sensitively reacts to any influence factors (especially external). Therefore it is difficult to predict any processes with high accuracy and on long prospects under these conditions. For evident submission of the last assertions fig. 1 was built. It displays dependence between indicators of Ukraine's financial system balancing, GDP, and volumes of innovative and investment incomes in it.

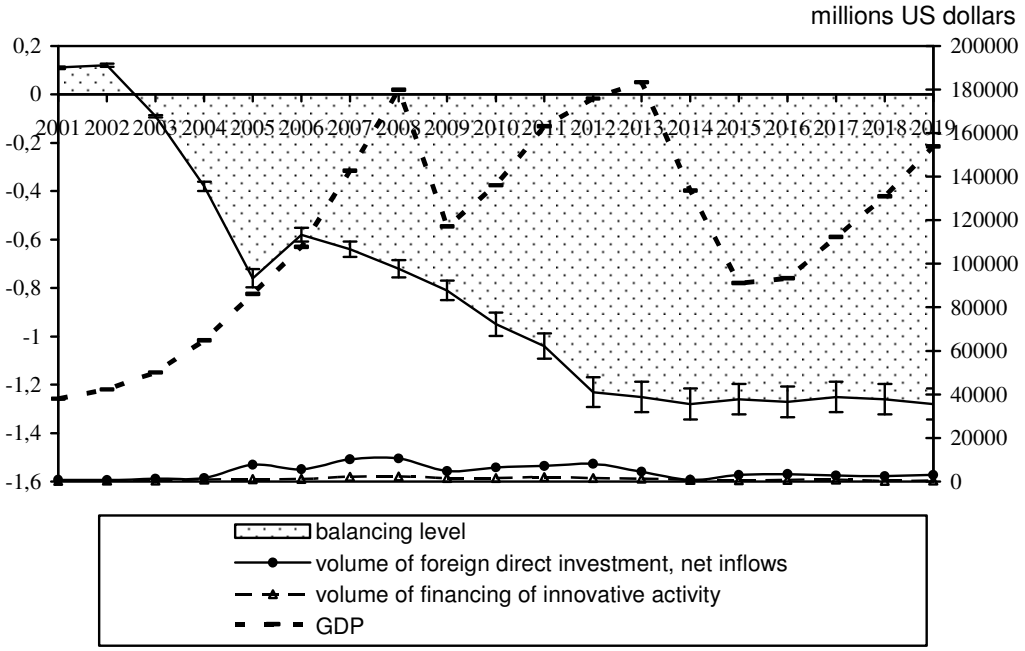

Figure 1: Comparative dynamics of volumes of investment and innovative incomes, GDP and balance value of Ukrainian financial system

Source: Built by the authors based on data of the State Statistics Service of Ukraine (2019), and data of the World Bank Group (2019)

From fig. 1, we trace that the GDP level is unstable and there isn't visible dependence between GDP and balancing level. At the increase of foreign direct investment receipts, the negative disbalance of the state financial system increases too. This constantly has been deepening since 2003. But there is a stabilization of the balancing level during the last years. However, it can be the consequence of the reduction of receivables of foreign direct investments and the reduction of financing of innovative activity.

The authors consider that the tendency is a result of the irrational use of investments. Therefore the financial system feels the increasing requirement of a search for effective methods of rebalancing. With the help of a reasonable influence on the use of foreign direct investments, it will be possible to receive a desirable result for a short time.

Also, it does not follow to ignore the different opinions of scientists about the role of foreign investing. In particular, (Podvysotskyj, 2009) marks that the receipt of direct foreign investments, at least at certain terms, has a substantial positive influence on economic development (additional capital investments, receivables of the newest technologies, foreign currency, that is especially actual during a crisis). (Berezhna, 2011) accents attention to the role and value of foreign investments in the conditions of global world integration.

And a favorable investment climate is providing the important constituent of investment activity.

For today Ukraine's investment climate is in the negative position that is confirmed by basic international indexes on which investors are oriented. A part of foreign direct investments in a general volume diminishes constantly. The threat of capital outflow abroad and difficulties in bringing in additional foreign investments to Ukraine can result in the financial disbalance of the country.

Process of forming of investment projects that need state support is not integrated into a general budgetary process. A crisis considerably narrowed internal sources for investments. International financial resources became almost inaccessible. In turn, international investors force to behave carefully about the risks of the country. So, (Moskal, 2012) noted that the low investment image of Ukraine makes the state less attractive for international capital.

To provide foreign capital inflow in the real sector of the economy increase, it is necessary to create a favorable investment climate. The corresponding program of bringing in foreign investments is not worked out yet. That would contain the methodology of determination of the priority of investments in industries of the economy.

In this context, the issues of CSV of business, the state, and society are particularly relevant. (Bakumenko, 2015) distinguishes three levels of CSV:

- rethinking (for the public interests) identifying markets with unmet needs, analyzing social utility or harmfulness of products, developing profitable products that meet customer needs, and improving the quality of customers' life;
- rethinking productivity in the value chain – increasing the productivity of the company or its suppliers with the simultaneous solution of social and environmental constraints in the value chain;
- promoting the development of local clusters - increasing the productivity of the company by the encirclement of the environment, the solution of existing social problems in the places of basic dislocation of the company.

After entering the first level, the second and third options are open to the company. Its own economic and social results are tracked for each level. Among the expected economic gains, it is advisable to name: growth of incomes, reduction of expenses, increase of market share, and among social gains – increase of educational quality of the population, diminishing the quality of food, reducing the level of water consumption. Also, all three levels of shared value creation mutually reinforce one another.

However, for the effective operation of the company in CSV, the strategy is not enough. It is necessary to remember that the process of CSV of business and society is impossible without communication with the state authorities.

Now there are employees in the staff of corporations whose functional duties include cooperation with the government's representatives. Also, business representatives have the opportunity to influence state processes through the public sector, business associations, expert and public councils, foundations, associations, etc. Their goal is business support and development activities. In their turn, the state government authorities are creating transparent communications at the ministries, local authorities, where business representatives can open their position, point to existing issues, and propose ways of cooperation.

Among the most important indicators of CSV quality are corruption level, population, and GDP per capita growth (fig. 2).

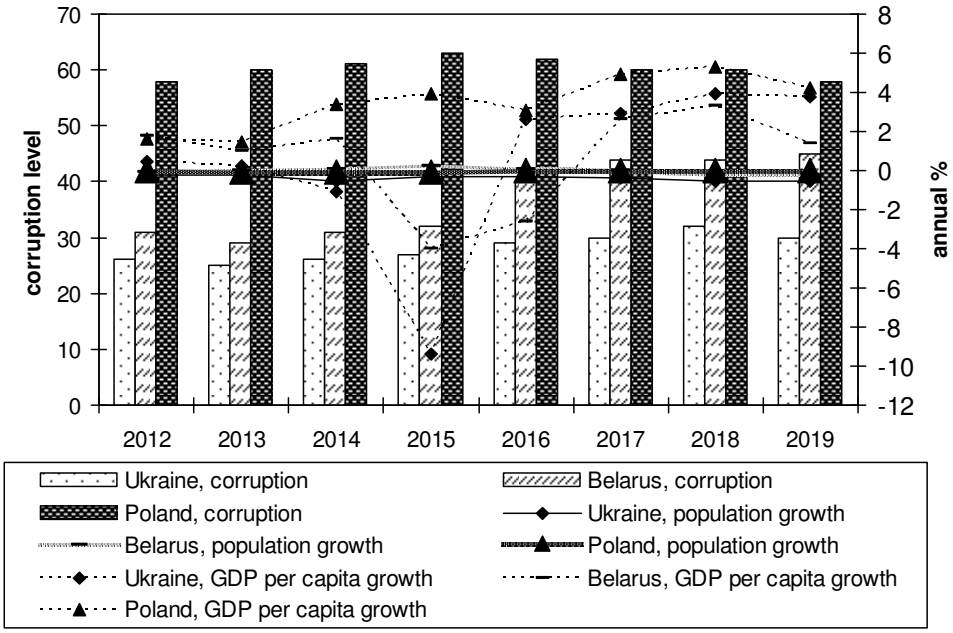

Figure 2: Dynamic of corruption level, GDP per capita and population growth as indicators of creating shared value

Source: Built by the authors based on data of the World Bank Group (2019) and Transparency International (2019)

As we can see on the fig. 2, the lower corruption level causes a higher population and GDP per capita growth (example of Poland). Higher corruption level causes lower (or negative) population growth and unsuitable GDP per capita growth (example of Ukraine).

It should be noted that Ukraine, Poland, and Belarus are quite comparable countries in mentality, climatic conditions, and development prospects. But they differ slightly in the area and population density.

As the experience of foreign countries shows, the active involvement of society in the process of dissolving and realizing public management solutions leads to the creation of transparent relations between the state and society. (Sytnyk, 2019) marks that the system of communication interaction between the state and society doesn't eliminate the diverse and inadequate coordination of the activities of various departments.

During the last years, an effective system of communicative interaction between the state and society was formed in the developed countries of the world.

The ideal model of communications of the state and business presupposes the existence of dialogue for the sake of assistance. Also, an important step towards effective communication between business and the state during CSV can be the development of GR (government relations) communications.

(Kislov, 2015) noted that GR is a social or public activity, the purpose of which is seeking alternatives to mutually beneficial cooperation with the state, development of the state-private partnership, legal lobbying of interests of certain structures or organizations.

GR instruments are actively used in communication between the state and business in economically developed countries. They have not only led to effective cooperation but have become instruments of transparent relations between business and the state.

Conclusions and Recommendations

Summarizing the above, we have to note that CSV is a way of doing business that combines the profit of the company with the decision of social problems. Such a concept can’t solve all social problems, but it allows the companies to become leaders of social progress. The creation of shared value is an innovation for many countries for the moment, including Ukraine. But over time, this concept becomes standard practice. So, companies will be able to build a profitable and sustainable business that will be better than a traditional practice. And domestic companies should restructure their business strategy for maximizing profits and minimizing costs. They can improve nature quality and solve social problems. In turn, governments should promote the conduct of business with the creation of shared value to improve the life quality of each society member.

The analysis of the data of Ukraine, Poland, and Belarus improves that there is a negative disbalance of the financial system of Ukraine. This country needs special attention and support in the process of CSV.

And there is a necessity of modification of state influence on innovative and investment activity with the aim of CSV in Ukraine. Simplification and organization of state administration, forming of terms for market self-regulation of innovative and investment components of the financial system are necessary for solving different problems (creation of a favorable investment climate of Ukraine, the achievement of its financial balancing, and its support on a due level).

For support of innovative and investment components of Ukraine's financial system on a due level, it is necessary: to create corresponding financial terms for providing the regular investing of innovative projects; to provide functioning of legislative mechanisms of protection of rights for domestic and foreign investors; to modify the structure of the Ukrainian economy for passing to producing high technology innovative products; to create economic terms for investing modernization and innovative piling up of basic capital.

Providing a proper level of financial balance in Ukraine is possible on the condition of a complex approach with a determination of reasons of the negative phenomena of its basic components. Using the correction of negative influences, it is possible to define positive processes in the financial system of the state. Without neutralization of the educed threats and financial disbalance, it will be difficult to provide balanced development of the state and to create shared value.

Prospects for further research are to calculate and compare the level of financial balancing of the countries of Eastern Europe and Central Asia to identify problem areas for CSV. The authors plan to find ways to improve the efficiency of the process of CSV.

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The Impact of Board Characteristics and Director Ownership on Real Earnings Management: Malaysian Evidence

Rahayu ABDUL RAHMAN
Accounting Research Institute and Faculty of Accountancy, Universiti Teknologi MARA, Tapah Campus, 35400, Tapah Road, Perak, Malaysia (rahay916@uitm.edu.my)

Naimah AHMAD YAHYA
Faculty of Accountancy, Universiti Teknologi MARA, Tapah Campus, 35400, Tapah Road, Perak, Malaysia (naima713@uitm.edu.my)

Mohd Taufik MOHD SUFFIAN
Faculty of Accountancy, Universiti Teknologi MARA, Tapah Campus, 35400, Tapah Road, Perak, Malaysia (taufik815@uitm.edu.my)

Maheran ZAKARIA
Faculty of Accountancy, Universiti Teknologi MARA, Machang Campus, 18500, Machang, Malaysia (maher835@uitm.edu.my)

Abstract

The main objectives of this study is to investigate how board characteristics and director ownership affect real earnings management. In this study, we specifically examine how board size, board independence, duality role and director ownership influence real earnings management practices of Malaysian listed firms. Consistent with prior research, this study uses three proxies to measure real earnings management; abnormal cash flow from operations, abnormal production costs and abnormal discretionary expenses. Using a sample of 1,878 firm-year observations from 2000 to 2007, the results show that board independence and director ownership are significantly negative associated with proxies of real earnings management. Duality role, however, is not associated with real earnings management.

Keywords: board characteristics, managerial ownership, real earnings management, Malaysia.

Introduction

Board of directors play a key role in the implementation and oversight of controls to mitigate corporate misconducts (Nguyen 2016). Indeed, prior studies have highlighted that managerial misconducts such as financial fraud, financial restatement, and opportunistic earnings management can be attributed to the board monitoring failures in corporate financial reporting (Virk, 2017; Subair et al., 2020; D'onza, & Rigolini, 2017). Opportunistic earnings management is one of the managerial misconducts that occurs when managers use judgment in financial reporting to alter accounting number to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes (Healy & Wahlen, 1999). According to Fields, Lys and Vincent (2001), managers can influence reported accounting numbers by managing accounting choices using real-based transactions which also known as real earnings management (REM). Examples of REM include reductions in discretionary spending such as research and development (R&D), advertising and maintenance expenditures, aggressive price discounts to increase sales volumes, overproduction to report lower cost of goods sold (COGS) and repurchase common share. Given the fiduciary responsibility of the boards to monitor management against managerial opportunistic behaviour, thus, this study attempts to examine the impact of board characteristics and director ownership on real earnings management.

The remainder of the paper is organized as follows. Section two reviews the literature and develops the research hypothesis. Section three elaborates the research design. Section four presents and discusses the findings. The final section provides the summary and conclusions.

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Literature Review

Real Earnings Management and Board Independence

Fama and Jensen (1983) theorised that the board of directors is the highest internal control mechanism responsible for monitoring the actions of top management. However, they argue that the ability of the board to act as an effective monitoring mechanism depends on its independence from management. Independent directors are believed to be able to monitor managers as they have incentives to develop their reputations as experts in decision control (Agrawal & Chadha, 2005). Thus, the presence of independent directors on the board is seen as the check and balance mechanism in enhancing a board's effectiveness and constraining opportunistic behaviour among managers.

Consistent with these views, prior studies found evidence that supports the effective monitoring role played by independent directors in deterring accounting fraud (Beasley, 1996) and earnings management via discretionary accrual (Davidson et al., 2005; Klein, 2002; Peasnell et al., 2005; Su, 2001). For example, a study by Beasley (1996) revealed that dominant non-executive directors on the board are less likely to be related to the fraudulent practices of U.S. firms. Further, in a study involving family-controlled firms in Taiwan, Su (2001) showed that family-controlled firms without independent directors on the board are likely to have more abnormal accruals. In a similar vein, Peasnell et al. (2005), Davidson et al. (2005) and Klein (2002) also found that the probability of abnormal discretionary accrual decreases as the proportion of outside (independent) directors increases for a sample of U.K., Australian and U.S. boards, respectively. On the other hand, some authors such as Chtourou et al. (2001), Siregar and Utama (2008), Saleh et al. (2005) and Abdul Rahman and Ali (2006) found that independent boards for public firms in the US, Indonesia, and Malaysia have no significant influence on abnormal discretionary accrual. Despite this conflicting result, this study predicts a negative association between board independence and earnings management practices as the theory suggests.

H_1: Board independence will be negatively related to real earnings management.

Real Earnings Management and Board Size

Jensen (1993) and García-Meca and Sánchez-Ballesta (2009) suggest that the number of directors is one of the important factors in the effectiveness of the board. There are two views regarding this issue. Proponents of agency theory believe that a larger board has more opportunity to control and monitor the actions of management as it has a greater number of people with more expertise (Dalton et al., 1999), and valuable experience (Xie et al., 2003) to prevent or limit managerial opportunistic behaviour. Further, Finkelstein and D'Aveni (1994) noted that a larger board has more problem-solving capabilities as the burden of the directors is equally shared among them.

However, a larger board, as proposed by agency theory, also has drawbacks. For example, Lipton and Lorsh (1992) and Jensen (1993) argue that a larger board size beyond seven or eight people is less likely to function effectively. That is because the ability to process problems competently reduces as board size becomes larger (Jensen, 1993).

Empirical evidence generally shows a link between board size and discretionary accruals (Bradbury et al., 2006; Chin et al., 2006; Abdul Rahman & Ali, 2006; Xie et al., 2003). Nevertheless, results regarding the effect of board size on discretionary accruals are conflicting. While Chin et al. (2006) and Rahman and Ali (2006) found a positive association between board size and abnormal accruals in Hong Kong and Malaysia, respectively, other authors report a negative association between both variables (Bugshan, 2005 in Australia; Bradbury et al., 2006 in Malaysia and Singapore; Xie et al., 2003 in the US). Due to the conflicting results, this study does not predict any direction on the association between board size and earnings management.

H_2: Board size will be related to real earnings management.

Real Earnings Management and Duality Role

CEO duality or the 'dominant personality' phenomenon occurs when the same person holds the two most dominant posts in the firm, namely those of CEO and chairman. Advocates of agency theory argue that CEO duality—which implies CEO dominance over the board—promotes CEO entrenchment and hence, can lead to opportunistic and inefficient behaviour that reduces shareholder wealth (Jensen & Meckling, 1976). Nevertheless, empirical evidence on the association between CEO duality and earnings management seems not to support this theory as most authors do not find any significant relation (Bradbury et al., 2006; Bugshan, 2005; Davidson et al., 2005; Abdul Rahman &

Ali, 2006). Due to that, this study does not predict the sign of the relationship between duality role and real earnings management.

H_3: Duality role will be related to real earnings management.

Real Earnings Management and Director Ownership

Jensen and Meckling (1976) argue that shareholdings by management including firm's directors would reduce agency costs as high insider-ownership implies a greater alignment of interests between management and shareholders. This would reduce the opportunistic behaviour of managers. According to the incentive-alignment argument, managerial or director ownership can be seen as a mechanism to constrain the opportunistic behaviour of managers as insiders will become more involved in the company when they own greater shares of the firm and, consequently the need for outside monitoring will be reduced. Nonetheless, excessive management shareholdings could lead to management entrenchment. Fama and Jensen (1983) postulate that firms that are controlled by management are more likely to manage earnings.

Empirical results on the association between managerial ownership and earnings management are mixed. While Warfield et al. (1995) and Salleh et al (2005) find negative relationship between managerial ownership and discretionary accrual in U.S. and Malaysia firms, Gabrielsen et al. (2002), and Bradbury et al. (2006) fail to find significant empirical evidence for Danish, and Singaporean firms respectively. Due to the conflicting results, this study does not predict a direction for the association between director ownership and earnings management.

H_4: Director ownership will be related to real earnings management.

Research Design and Methodology

Sample Selection and Data Collection

The sample for this study covers Malaysian firms listed on Bursa Malaysia from 2000 to 2007. Data required for computing earnings management and control variables measures are collected from Thompson Reuters Datastream. Other non-financial data were collected from the companies' annual reports. We exclude firms in the banking and finance sector because they have different guidelines and governance systems (Abdul Rahman and Mohamed Ali, 2006). We also exclude firm-year observations with missing earnings management measures data. This procedure yields 1,878 firm-year observations.

Operationalisation of the Dependent, Independent and Control Variables

Dependent Variables: Real Earnings Management

Following to Roychowdhury (2006) and Cohen and Zarowin (2010), this study refers real earnings management as actions managers take that deviate from normal business practices. Consistent with prior research (Roychowdhury, 2006; Cohen & Zarowin, 2010), this study employed three metrics to examine real earnings management, namely the abnormal levels of cash flow from operations (RCFO), abnormal production costs (RPC) and abnormal discretionary expenses (RDE).

Consistent to Roychowdhury (2006), the study estimates RCFO, RPC and RDE as the residual from the following model respectively.

$$CFO_{it}/A_{it-1} = \beta_1 [1/A_{it-1}] + \beta_2[Sales_{it} / A_{it-1}] + \beta_3[\Lambda Sales_{it} / A_{it-1}] + \varepsilon_{it}$$

Where,

CFO_{it}	Cash flow from operation in period t
A_{it-1}	Total assets of firm i in year t-1;
$Sales_{it}$	Sales of firm i in year t
$\Lambda Sales_{it}$	Sales of firm i in year t less revenues of firm i in year t-1;
ε_{it}	A residual term that captures the level of abnormal cash flow of firm i in year t.

$$PROD_{it}/A_{it-1} = \beta_1 [1/A_{it-1}] + \beta_2[Sales_{it} / A_{it-1}] + \beta_3[\Lambda Sales_{it} / A_{it-1}] + \beta_4[\Lambda Sales_{it-1} / A_{it-1}] + \varepsilon_{it}$$

Where,
$PROD_{it}$ The sum of cost of goods sold and change in inventory of firm i in year t;
ε_{it} A residual term that captures the level of abnormal production cost of firm i in year t.

$$DISCEXP_{it}/A_{it-1} = \beta_1 [1/A_{it-1}] + \beta_2 [Sales_{it-1} / A_{it-1}] + \varepsilon_{it}$$

Where,
$DISCEXP_{it}$ The sum of R&D expenses and SG&A of firm i in year t;
ε_{it} A residual term that captures the level of abnormal discretionary expenses of firm i in year t.

Control Variables

To test the hypothesis, this study controls for firm-specifics characteristics. First, the study controls for firm size. Large firms often receive more media attention, have higher analyst following and face regular political scrutiny (Ahmed & Duellman, 2007; Watt & Zimmerman, 1978). Therefore, they would tend not to manage their earnings upwards. Second, the study controls for debt. Firms with higher levels of debt would have their earnings scrutinized by debt providers or their agents, e.g., trustees, such that they do not inflate earnings to benefit the shareholders or mangers at the expense of the debt providers through dividends and earnings-based compensations (Ahmed et al., 2002). Third, the study controls for growth. Growth firms are likely to have higher accruals because of increased revenue-generating activities, such as credit sales. Fourth, the study controls for profit. Abdul Rahman and Ali (2006) note that firms with low performance (ROA) have more incentive to engage in earnings management.

Multivariate Regression Models

A multiple regression analysis was employed to test the research hypothesis. The following three multiple regressions were estimated to investigate the impact of board characteristics and director ownership on each proxy of real earnings management. The regression equations are as follows:

$$REM_{ft} = \alpha\alpha + \alpha_1 BODIND_{ft} + \alpha_2 BODSIZE_{ft} + \alpha_3 DUALITY_{ft} + \alpha_4 DIROWN_{ft} + f(control\ variables) + \xi\varepsilon \quad (1)$$

Where,
Dependent variables:
REM proxies:
$RCFO_{ft}$ Natural log of absolute value of abnormal cash flows of firm *f* in year *t*, or
RPC_{ft} Natural log of absolute value of abnormal production costs of firm *f* in year *t*, or
RDE_{ft} Natural log of absolute value of abnormal discretionary expenses of firm *f* in year *t* computed on the basis of RDE Model (Roychowdhury, 2006),

Independent variables:

$BODIND_{ft}$ 1 if the proportion of independent directors on the board more than 50 percent and 0 otherwise,
$BODSIZE_{ft}$ The number of directors on the board,
$DUALITY_{ft}$ 1 if CEO is board chair and 0 otherwise,
$DIROWN_{ft}$ Total percentage of director shareholding,
Control variables:
$SIZE_{ft}$ Natural log of total assets of firm *f* in year *y,*
$LEVERAGE_{ft}$ Natural log of total liabilities to total assets of firm *f* in year,
$GROWTH_{ft}$ Natural log of market to book ratio of firm *f* in year *y,*
$PROFIT_{ft}$ Earnings (EBIT) to total assets
$YEAR_{ft}$ Year,
IND_{ft} Industry.

Results and Findings

Multivariate Analysis

Ordinary least squares procedures (OLS) are used to estimate the models stated in Section 3.3. The results of the above models are reported in the following subsections.

Real Earnings Management and Board Characteristics and Director Ownership and Control Variables

Table 4.1 reports the results of the regression of board characteristics, and director ownership on the REM proxies and control variables.

The results show that BODIND has significant negative association with REM proxies; RCFO and RDE. The results indicate that firms with with a higher composition of independent directors on the board (more than 50 percent) are less likely to engage in real earnings management practices involving cash flow from operations and discretionary expenses. In addition, the results reveal that DIROWN has significant negative association with RPC.The significant association infers that the director ownership deter real earnings management practices involving production costs in Malaysian listed firms. With regards to the board size, the significant positive association found between RPC and BODSIZE. The findings indicate that firm has large number of board members are less likely to mitigate REM via production costs. The results consistent prior studies found evidence that supports a larger board size beyond seven or eight people is less likely to function effectively in limiting managerial opportunistic behaviours (Lipton & Lorsh, 1992;Jensen ,1993).

For the control variables, all REM proxies have significant negative association with SIZE (except for RPC) and POFIT. The results in line with the findings of previous studies that argue information asymmetry is often smaller for large firms because they produce more public information. This in turn limit earnings management practices. In addition, there are positive associations found between REM proxies with LEVERAGE and GROWTH, consistent with the findings of Sweeney (1992) documented that managers of firms approaching debt covenant default are more likely to make income-increasing changes in periods before the violation. She also found that managers continue to make income-increasing changes in years following the first year of default.

Table 4.1: Results of the Relation between REM and Board Characteristics and Director Ownership and control variables

$$REM_{ft}=\alpha\alpha+\alpha_1 BODIND_{ft}+\alpha_2 BODSIZE_{ft}+\alpha_3 DUALITY_{ft}+\alpha_4 DIROWN_{ft}+f(control\ variables)+\xi\varepsilon \quad (1)$$

Variables	RCFO	RPC	RDE
Independent Variables:			
BODIND	-.068*** (-2.646)	-.038 (-1.156)	-.052** (-1.349)
BODSIZE	-.045 (-1.592)	.064** (1.792)	.024 (.581)
DUALITY	-.011 (-.428)	-.034 (-1.108)	.048 (1.280)
DIROWN	.031 1.232	-.075*** (-2.332)	-.023 (-.600)
Control Variables:			
GROWTH	.238*** (6.075)	-.049*** (-1.593)	.211*** (6.125)
PROFIT	-.107*** (-2.453)	-.115*** (-3.576)	-.181*** (-2.333)
SIZE	-.227*** (-5.545)	.023 (.678)	-.235*** (-5.830)
LEVERAGE	.068*** (1.722)	-.048*** (-1.546)	.096*** (1.542)

Intercept	-2.684*** (-7.108)	-2.188*** (-11.144)	-2.677*** (-7.009)
Observations	1,878	1,878	1,878
Durbin-Watson	1.722	1.657	1.721
R-Square	11.41	11.38	10.01
Adjusted R-Square	10.9	9.86	8.07

Summary and Conclusion

The purpose of this paper is to examine the association between board characteristics, director ownership and real earnings management. To capture real earnings management, the study uses three different measures: the abnormal cash flows, the abnormal production costs, and the abnormal discretionary expenses developed by Rochowdhury (2006). The study employs a sample of 1,878 Malaysian listed firm-year observations from 2000 to 2007.

Overall, the results of the study support the view that board characteristics and director ownership limit real earnings management. In particular, the findings indicate that there is a significant negative relation between BODIND and two measure of real earnings management: RCFO and RDE. The results show that Malaysian firms with a larger composition of independent directors on the board are less likely to manage accounting number by using abnormal discretionary cash flow from operation and abnormal discretionary expenses.

In general, the findings are consistent with the findings of Liu and Tsai (2015), Zgarni et al. (2014), Hsu and Wen (2015) and Chouaibi et al. (2018).who find that some board characteristics affect real earnings management practice which in turn increase the quality of accounting numbers.

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Proactive Environmental Strategy: A Study of Malaysian Manufacturing Firms

Naimah AHMAD YAHYA

Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400, Tapah Road, Perak, Malaysia
(naima713@uitm.edu.my)

Roshayani ARSHAD

Accounting Research Institute and Faculty of Accountancy, University Teknologi MARA (UiTM), Selangor Branch, Shah Alam Campus, 40450 Shah Alam, Selangor, Malaysia
(roshayani@uitm.edu.my)

Amrizah KAMALUDDIN

Faculty of Accountancy, University Teknologi MARA, Selangor Branch, PuncakAlam Campus, Bandar Puncak Alam,42300, Selangor, Malaysia
(amrizah@uitm.edu.my)

Rahayu ABDUL RAHMAN

Accounting Research Institute and Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400, Tapah Road, Perak, Malaysia
(rahay916@uitm.edu.my)

Mohd Taufik MOHD SUFFIAN

Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400, Tapah Road, Perak, Malaysia (taufik815@uitm.edu.my)

Abstract

In recent years, the adoption of proactive environmental strategy (PES) in addressing the environmental challenge and maintain firms' competitiveness have gained more acceptance by many countries. PES embraces minor improvements to the current technology in the existing products and process, and innovative solutions to reduce material and energy consumption. This paper presents an empirical assessments on the current state of PES implementation in Malaysian manufacturing firms. A questionnaire based survey was conducted among 224 managers of Malaysian firms. Descriptive statistics was utilised to basic features of variables used. The result shows that greening strategy is moderately practiced in Malaysian manufacturing firms. It was found that manufacturing firms are paying higher attention to greening strategy as compared to beyond greening strategy. The study adds to existing literature by introducing business development indicators within beyond greening strategy. Tested measure of PES shall help managers to assess their state level of PES to achieve their competitive and sustainability goals. Further, some important managerial and policy implications are discussed in this study.

Keywords*:* proactive environmental strategy, greening strategy, beyond greening strategy

Introduction

The proactive environmental strategy (PES) has progressively gained acceptance as the means of addressing the environmental issues and achieving firms' competitive advantage. Over the years, the diffusion of PES has spread to several region in the world, including emerging economies like Malaysia. The transition from reactive and short term approaches to proactive approaches encompasses complex organizational changes to solving environmental

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inefficiencies into innovative environmental behaviours (Fraj, Matute and Melero, 2015; Aragon-Correa and Rubio, 2007)

This study addresses the above research area in the manufacturing sector because many pollution issues have been connected with the manufacturing process through their supply chain activities such as procurement, production, and distribution (Yahya, *et al.*, 2019; Kuppusamy and Behrooz, 2015; Eltayeb, Zailani and Ramayah, 2011). As highlighted by Porter and Van der Linde (1995), pollution is the concrete evidence of incomplete material utilisation, inefficient and ineffective use of resources. The process of converting raw materials into useful goods in manufacturing firms produces by-products of manufacturing waste materials left over or substances that contribute to air and water pollution (Hassan, Ashari and Nordin, 2016). The inefficient use of these materials is harmful to the environment due to the difficulty to reuse and reprocess these hazardous substances for other purposes (Osibanjo and Nnorom, 2007).

The empirical studies have shown that the implementation of PES, which is based on the innovative technology is highly associated with competitive advantage of improvement in process and product innovation (Banerjee, 2001), product differentiation (Sellers, 2009), enjoy price premium (Nishitani and Itoh, 2016), and higher revenue and lower cost (Lopez-Gamero and Molina-Azorin, 2016; Masoumik, Abdul-Rashid and Olugu, 2015). In contrast, the reactive environmental strategy such as pollution control does not effectively reduce waste and pollutants, but enforce manufacturing firms to incur additional cost of handling, storage, processing and disposal of discharges that reduces their competitiveness (Porter and Van der Linde, 1995).

To date, the PES strategy have been practiced widely in the developed countries where the firms have more resources to implement proactive systems and technologies (Sambasivan, Bah and Jo-Ann, 2013). Therefore, we cannot presume that perception or receptive on PES in Malaysia is similar with the developed countries. Porter and Van der Linde (1995) contended that firms from developed countries are more competent in addressing environmental issues as compared to developing countries. Lack of developing country perspectives in the PES literature has prompted this study to fill the gap in the current literature. In addition, evidence about PES implementation in Malaysia is still lacking. Thus, this research attempts to investigate the current state of PES implementation in firms within manufacturing industry in Malaysia.

Literature Review

Proactive Environmental Strategy

The proactive environmental strategy model was drawn from Natural Resource-Based View (NRBV) developed by Hart (1995). The NRBV highlights that firms' competitive advantage depends on how resources and innovative technology solutions or PES are managed to address the environmental issues (Hart, 1995). The NRBV outlined three key strategic capabilities namely pollution prevention, product stewardship and sustainable development (Hart and Dowell, 2011; Hart, 1997; Hart, 1995). These three key strategic capabilities were later separated into two group namely greening strategy and beyond greening strategy. Greening strategies constitute pollution prevention and product stewardship, which focus on minor improvements or adjustments to the current technology in the existing products and processes.

Pollution prevention is related to product or process adaptation that involves with modification to existing product design or basic changes to the manufacturing process with a purpose of reducing any negative environmental impact on the environment at any stage of manufacture, use, disposal or reuse (Klassen and Whybark, 1999). This strategy seeks to prevent waste and emissions by reducing the use of hazardous material, using waste produced as input for internal processes or outside parties and modifying existing processes or products to reduce the production of pollutants, rather than cleaning them up (Sharma and Vredenburg, 1998).

Product stewardship expands the scope of pollution prevention to incorporate the entire value chain or life-cycle of the firms' product systems (Hart and Dowell, 2011). Product stewardship associated with minimizing the products impact on the environment throughout its life-cycle involving the whole process of designing, manufacturing, distributing, usage and disposal stages by using materials that are easily composed, reused or recycled (Eltayeb and Zailani, 2009; Fowler and Hope, 2007; Hart, 1997; Hart, 1995)

Beyond greening strategy or also known as sustainable development is classified into clean technology and base of pyramid. The focus of the strategy is on the application of future technologies or innovative solutions that can reduce the material and energy consumption which lead to future market opportunities (Hart and Dowell, 2011; Hart, 1997). The strategy does not only restrict to environmental concerns, but also producing product in a way that can be maintained indefinitely into the future and focusing on economic and social benefits (Hart and Dowell, 2011).

Clean technology calls for firms to reduce the toxic materials, natural resources and energy consumption by building up the internal development and venturing into more sustainable technologies to position the firms for competitive advantage in the market (Hart and Dowell, 2011; Hart and Milstein, 2003). The main purpose is to reduce material and energy consumption to ensure sustainable future market by substituting the traditional energy sources with renewable energy sources, and reducing energy consumption through better maintenance procedures and changes in process technology. Recently, there is a growing interest in clean technology commercialisation or business development, which involves entrepreneurial activity and venture capital investment (Hart and Dowell, 2011). Successful commercialisation process enables companies to explore opportunities for trade and market expansion, maximise return on inventions and gain competitive advantage (Shakeel, Takala, and Lian-Dong, 2017). Nonetheless, previous scholars did not find clear indicators or suggestions to measure base of pyramid strategy.

Practice of PES in Malaysian Manufacturing Firms

A study on waste management method practiced by Malaysian industries was conducted by Mallak and Ishak (2012). The study found that Malaysian industries practiced end of pipe management system rather than other management options. They suggested that management system of waste management should be changed towards more sustainable management regime. They further suggest the necessity of mandatory or legal measures with suitable guidelines to be introduced to provide framework for practicing waste minimisation or pollution prevention among Malaysian industries. Sambasivan *et al.*, (2013) highlighted that a lot of firms in Malaysia have employed a combination of proactive and reactive strategies.

Eltayeb and Zailani (2009) investigated the adoption of product stewardship or green supply chain initiatives by ISO 14001 certified manufacturing firms in Malaysia. The paper studied the strategy initiatives specifically in terms of green purchasing, eco-design and reverse logistics. The result revealed that eco-design strategy has higher level of adoption, as compared to green purchasing and reverse logistic. The result also shows that participating firms in green interested associations have significantly higher level adoptions of green supply chain initiatives as compared to firms that do not participate in associations.

A study conducted by Masoumik, Abdul-Rashid and Olugu (2015) indicated that Malaysian manufacturers paid more attention to perform pollution prevention strategy, as compared to product stewardship and clean technology. It may be caused by the regulatory pressures in Malaysia that encourage firms to focus on pollution prevention. Pollution prevention also results in greater environmental performance as compared to product stewardship and clean technology, but imposes lowest impact on competitive benefits.

In the area of clean technology, the Third National Agriculture policy, Fuel Diversification Policy and the introduction of Feed-in-Tariff Scheme under Renewable Energy Act have boosted renewable energy such as biomass, biogas, municipal waste, solar and mini hydro and in the promotion of cleaner production in industrial manufacturing (Mat Sahid *et al.*, 2011; Hezri and Hasan, 2006). Malaysia has been highlighted as having the highest renewable electricity potential compared to its share of the ASEAN population (Kardooni, Yusoff and Kari, 2016).

The imposition of stricter international environmental regulations that requires Malaysian manufacturers to export greener products (Devadeson and Chenayah, 2010) and the introduction of green technology policy in 2009 that promotes sustainability and safety of the environments should be able to gear momentum for Malaysian manufacturing firms to embrace the PES (Ridzuan and Chew, 2018; Bujang, Bern and Brumm, 2016; Fan *et al.,* 2016). This is due to the notion that the industry relies on global market that consider environmental impact of its operation to stay competitive.

Research Method

Measurement Instrument

The development of measurement scales involved suggestions from 16 numbers of industry professional and subject experts in the relevant area. The purpose of asking for expert review is to establish questionnaire's content validity and reliability. This process led in further purification of the items and improvement in the structure and content of the questionnaire draft. The revised questionnaire draft was then continued for pre-testing to establish test of face validity. In total, twenty three (23) of the questionnaire drafts were evaluated in terms of respondents' answers and comments. In the pre-testing phase, out of 25 items, only 12 variable items of PES were identified as the items to be employed for the pilot study. The pilot study was carried out with 110 respondents. A pilot study assist researcher to conduct a larger study or examine particular aspects of the research to see whether the selected procedures will actually worked as expected. During pilot phase, a total of 7 variables for greening strategy (Table 3) and 5 variables for beyond greening strategy (Table 4) were sorted out after factorial analysis. Finalised measurement scales were

used to gather data. Respondents were asked to indicate their answers on a Likert scale of seven-points (1- strongly disagree to 5-strongly agree).

Measurement scale of greening strategy was designed with the indicators identified in the pertaining literatures (Eltayeb and Zailani, 2009; Carter and Ellram, 1998; Sarkis, 1998; Sharma and Vredenburg, 1998). In beyond greening strategy, clean technology was measured on a modification scale derived from literature (Sharma and Vredenburg, 1998). However, the available literatures and expert review did not find clear indicators or suggestions to measure base of pyramid strategy. Thus, the base of pyramid trait was excluded in the questionnaire. Surprisingly, during the expert review session, a new component of beyond greening strategy was highlighted by the participants known as business development, which was referred by Hart and Dowell (2011) as commercialisation of clean technology. As a result, the scale was updated to include the dimensions and definition. Consequently, as indicated in Table 1, items (11, 12) were developed and items (1, 2, 3, 4, 5, 6,7, 8, 9, 10) were modified.

Data Collection and Sampling

This research attempts to investigate the current state of PES adopted by Malaysian manufacturing firms. Consistent with the purpose of the study, it attempt to examine the Malaysian manufacturing sector as a population of interest. The sample of this research was drawn from Federation of Malaysian manufacturers (FMM) directory that provides a list of manufacturing firms in Malaysia. The sampled manufacturing firms comprise food products and beverages, fabricated metal products, chemicals and chemical products, coke, refined petroleum products and nuclear fuel, wood and cork, motor vehicles, trailers and semi-trailers, publishing, printing and reproduction of recorded media, rubber and plastic products and many more. The unit of analysis of the study was a 'firm'.

The study utilised simple random sampling, which involves random selection of sample in such a way that every element in the population has the same probability of being selected (Awang, 2012; Sekaran and Bougie, 2010). In the data collection process, the questionnaires were mailed to 1200 managers of the selected manufacturing firms. Focus of questions are directed to the state of PES implemented by the manufacturing firms and demographic profile of respondents and firms.

Out of 1200, only 235 questionnaires were returned and usable for the data analysis. This represented an effective response of 19.58%. 11 questionnaires out of 235 were removed due to outliers, represented a final sample of 224. The highest response was received from chemicals and chemical products (17.02%), followed by food products and beverages (11.9%), rubber and plastic products (10.2%), fabricated metal products(8.09%), electrical machinery (7.23%), motor vehicles, trailers and semi-trailers (7.23%) and other types of manufacturing firms (38.33%).

In total, about more than half of the respondents worked in firms that have been established more than 25 years. In terms of certification, more than half (56.6%) of the firms have environmental management certification. Majority of the respondents are male (76.3%) and the remaining (23.7%) are female. The respondents are top management and middle management level of managers dealt with environmental management (40.2%), manufacturing and production (31.7%), general management (12.8%), research and development (5.8%) and others (6.4%).

Data analysis techniques

This research utilised the Statistical Package for Social science (SPSS) version 22.0. Screening the data entry was performed to examine the accuracy of data entry, missing values, outliers and normality. Factor analysis was conducted to ensure content validity and construct validity of the variables being measured in developing valid instruments. This is of particularly important since the items of the main variables were developed based on various sources including adaptation of items used in previous studies and interviews.

Exploratory Factor Analysis (EFA) was conducted on each of the two proactive environmental strategies identified in the study. Table 1 explains the factor loadings and the percentage of variance explained of PES. For greening strategy, the varimax rotated exploratory analysis produced one component which showed 53.601% of the total variance. The varimax rotated exploratory analysis for beyond greening strategy also produced one component which showed 60.302% of the total variance. All the factor loadings are greater than 0.4 which meet the minimum requirement for sample size around 200 as suggested by Hair et al., (2010). Bartlett's Test of Sphericity was significant and Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.842 and 0.755 for both strategies, which was above the recommended value of 0.6.

Table 1: Final structure of Proactive Environmental Strategy strategy questionnaire

PES strategy	Description of variable	Factor loading	Cum % of variance explained
Greening strategy			53.601%
Pollution prevention	1. Our company reduces the use of hazardous material	0.828	
	2. Our company uses waste produced as input, whether for internal process or to outside parties	0.786	
	3. Our company modifies existing process or product to reduce the production of pollutants	0.746	
Greening strategy; product stewardship	4. Our company uses life-cycle assessment to evaluate the environmental impact of its product	0.738	
	5. Our company produces products that have reused or recycled materials in their contents such as recycled plastics, glass and paper	0.695	
	6. Our company produces products that are free from hazardous substances such as lead, mercury, chromium and cadmium	0.681	
	7. Our company collects used products for recycling, reclamation of materials or reuse	0.633	
Beyond greening strategy			60.302%
Clean technology	8. Our company substitutes the traditional energy sources with renewable energy sources	0.826	
	9. Our company reduces energy consumption through better maintenance procedures	0.728	
	10. Our company reduces energy consumption through changes in process technology	0.807	
Beyond greening strategy: Business development	11. Our company ventures into business development in environmentally related activities which is directly related to our core business	0.822	
	12. Our company ventures into business development in environmentally related activities which is indirectly related to our core business	0.836	

In order to determine the internal consistency among the items or indicators in summated scale, a reliability test was conducted. The main purpose is to ensure that all indicators are measuring the same construct and be highly correlated (Hair *et al.*, 2010).

As shown in Table 2, the reliability coefficient for “greening strategy” and “beyond greening strategy” were above 0.7 which indicate the acceptable level of consistency.

Table 2: Reliability Coefficients (Proactive Environmental Strategy)

Proactive Environmental Strategy	N	Cronbach's Alpha	N of items
Greening	224	0.847	7
Beyond Greening	224	0.832	5

Results and Discussions

In this study, descriptive analysis is used to assess the state of PES implementation in Malaysian manufacturing firms. Descriptive statistics is normally used to describe characteristics of research sample including mean, standard deviation and range of scores (Pallant, 2013). As highlighted in Table 3, Malaysian managers fairly agreed that the "greening strategy" with mean score of 3.68 and "beyond greening strategy", mean score of 3.36, was practiced in their organisation. Nevertheless, the "greening strategy" has higher mean score as compared to "beyond greening strategy".

Table 3: The Descriptive Statistics of Greening Strategy, Beyond Greening Strategy and Overall Proactive Environmental Strategy

Variables	N	Min	Max	Mean	Std. Dev
GS: Greening Strategy	224	2.00	5	3.68	.67
BGS: Beyond Greening Strategy	224	1.00	5	3.36	.74
PES: Proactive Environmental Strategy	224	2.00	5	3.55	.62
Scale: Strongly disagree (1) to strongly agree (5)					

Greening Strategy

As shown in Table 4, the greening strategy practiced by Malaysian manufacturing companies involving pollution prevention are reducing the use of hazardous material (mean of 4.05), using waste produced as input (mean of 3.51) and modifying existing process or product (mean of 3.73). Product stewardship strategy are using life cycle assessment (3.36), creating products that have reused or recycled materials in their contents (3.49), manufacturing products that are free from hazardous substances (3.88) and collecting used products from customers for recycling, reclamation of materials, or reusing (3.73). In general, the greening strategy is moderately practiced in Malaysian manufacturing firms. Among the seven greening theme, the mean for "reducing the use of hazardous material" is higher than other greening strategy indicators.

Table 4: The Descriptive Statistics of Greening Strategy

Variables	N	Min	Max	Mean	Std. Dev
Greening Strategy	224	2.00	5.00	3.68	.67
hazardous material	224	2.00	5.00	4.05	.73
waste as input	224	1.00	5.00	3.51	.88
modifies process	224	2.00	5.00	3.73	.80
life cycle assessment	224	1.00	5.00	3.36	.92
recycle materials	224	1.00	5.00	3.49	1.08
free hazardous	224	1.00	5.00	3.88	1.04
collects used product	224	1.00	5.00	3.73	1.01

Beyond Greening Strategy

Beyond Greening Strategy as highlighted by Hart (1997) and Hart and Dowell (2011) refers to sustainable development that includes clean technology and base of pyramid, which focus on tomorrow's technologies and markets. Based on literatures and expert reviews conducted in developing the survey instrument, only clean technology strategies have been widely practised by Malaysian manufacturing companies in recent years. Therefore,

this study excludes the base of pyramid strategy measures. However, based on responses in the phase of expert review, this study has developed new items to measure another dimension for beyond greening strategy that is business development, which can be described as commercialisation of clean technology.

As indicated in Table 5, the beyond greening strategy practiced by Malaysian manufacturing companies that involve clean technology are renewable energy sources (mean of 3.08), reducing energy consumption through changes in process technology (mean of 3.76), business development in environmentally related activities which is directly related to their core business (mean of 3.07) and business development in environmentally related activities which is indirectly related to their core business (mean of 2.97).

The managers slightly agreed that beyond greening strategy are being practiced in their firms. The indicator of "reducing energy consumption through changes in process technology" shows the highest mean among the five beyond greening strategy theme. As compared to greening strategy, beyond greening strategy shows lower adoption by Malaysian manufacturing firms. One possible reason could be due to lack of institutional capacities to enable R&D and commercialisation of innovation in developing countries. Significant studies have found that expensive international licensing, exclusionary rights and patents are significant barriers to the diffusion of clean technologies from developed countries to developing countries (Raiser, Naims and Bruhn, 2017).

Table 5: The Descriptive Statistics of Beyond Greening Strategy

Variables	N	Min	Max	Mean	Std. Dev
Beyond Greening Strategy	224	1.00	5,00	3.36	.74
renewable energy	224	1.00	5.00	3.08	1.12
maintenance procedures	224	2.00	5.00	3.94	.72
process technology	224	2.00	5.00	3.76	.79
direct business development	224	1.00	5.00	3.07	1.03
indirect business development	224	1.00	5.00	2.97	1.07

The research finding that indicate manufacturing firms are paying higher attention to pollution prevention and product stewardship as compared to clean technology is consistent with Masoumik (2015). However, this study has contributed to the new finding about the state of business development practiced by Malaysian manufacturing firm, which is absent in previous studies.

Conclusion and implication of the study

In general, Malaysian manufacturing managers fairly agreed that the greening strategy and beyond greening strategy were in practiced in their organization. However, it appears that greening strategy has been practiced more widely among the manufacturers as compared to beyond greening strategy. It was revealed that the adoption of substitution of the traditional energy sources with renewable energy sources, venturing into business development in environmentally related activities directly or indirectly related to their core business have been lacking behind as compared to other proactive environmental strategy practices in the manufacturing firms.

This study contributes to the existing literature of NRBV, especially in the non-western context. The practice of PES, especially in beyond greening strategy is relatively low. Therefore, the government should find ways to increase the growth of PES practice. In order to address the lower practice of beyond greening strategy, government should take several courses of actions to control market risk and reduce the cost of renewable energy technology. The measurement of PES in this study contributes to the financial accounting and reporting practices. The design of survey instrument involved development of preliminary items adapted from literatures, expert review, pre-test and pilot study before the actual survey was conducted. The new measurement of business development indicators highlighted during the expert review is useful to fill in the deficiency of such measurement and indicators in the available reporting method.

Limitations and Recommendations

This study is not without limitations. Firstly, generalisation of the findings should be cautioned because the questionnaire was specially designed for the manufacturing industry. To conduct study in different industries, the questions would have to be redesigned for the purpose at hand. In addition, the sample of this research was taken from the Federation of Malaysian Manufacturers' (FMM) directory. Whereby firms that were not listed in the directory were excluded. Therefore, the current study cannot generalise the findings of this study to all manufacturing

firms in Malaysia. Finally, a future research should also consider investigation on the relationship between PES with important outcomes such as environmental and financial performance.

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The Effects of Managerial Ownership on Real Earnings Management and Company's Performance in Malaysia

Mohd Taufik MOHD SUFFIAN
Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia.
(taufik815@uitm.edu.my)

Rahayu ABDUL RAHMAN
Accounting Research Institute and Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia.
(rahay916@uitm.edu.my)

Zuraidah MOHD SANUSI
Accounting Research Institute, Universiti Teknologi MARA, Selangor Campus, Shah Alam Branch, 40450 Shah Alam, Selangor, Malaysia.
(zuraidahms@uitm.edu.my)

Naimah AHMAD YAHYA
Faculty of Accountancy, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia.
(naima713@uitm.edu.my)

Abstract

This study examines the effects of managerial ownership on real earnings management and company's performance in Malaysia. By utilising the data from 646 Bursa Malaysia-listed companies that were active from 2013 until 2017, the panel results show that managerial ownership have negatively significant relationship with real earnings management proxy by abnormal cost of goods sold and negatively significant with company's performance proxy by Tobin's Q. This result aligned the Agency Theory that concerns the problems between managers and shareholders. The result also depicts that the earnings management is strongly related to the performance of the company. It is an essential resource for any market participant since it provides a reduced volume of information asymmetries between managers, investors, regulatory agencies, society and other stakeholders. The current findings can be treated as tools to lessen the earnings management activities and to increase the company's performance by the management and stakeholders by applying monitoring mechanisms on companies through managerial ownership which have to curtail opportunistic behaviour among the management.

Keywords*:* Managerial Ownership, Earnings Management, Company's Performance.

Introduction

Managerial ownership means that the manager has direct or indirect shares in the company. Jensen and Meckling (1976) suggest that CEOs diverge from aiming for the goal to maximising the shareholders' wealth by consuming perquisites when they do not have an ownership stake in the company. Consequently, in order to restrict managers' value-reducing (or non-value-maximising) behaviour when ownership and control are distinct, there will be written contracts, often containing accounting-based constraints that the managers need to adhere (Warfield et al., 1995). Hence, lower managerial ownership has greater incentives to manage accounting numbers to relieve or relax the behavioural constraints imposed in accounting-based contracts (Warfield et al., 1995). Previous studies have found a significant negative affiliation between managerial ownership and earnings management (Alves, 2012; Ebrahim, 2007; Klein, 2002; Warfield et al., 1995). It is supporting the alignment of interest hypothesis, which proposes that the higher the managerial ownership, the lower the level of discretionary accruals (Ali, Salleh, & Hassan, 2008; Banderlipe & Mc Reynald, 2009; Dhaliwal, Salamon, & Smith, 1982). This suggests that managers who own a

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significant portion of equity in a company have less incentives to manipulate reported accounting information, and that large shareholders reduce the scope of managerial opportunism.

Ownership structure has a significant influence on company performance. Companies with high ownership concentration can increase the company performance as they wield the authority in the management. A study by Abramov, Entov and Chernova (2017); and Wang and Xiao (2009) found a negative relationship between government ownership and company efficiency, meaning that a lower level of ownership structure can boost the company's performance. The association between ownership structure and company performance provides an idea about the effectiveness of alternative corporate governance mechanisms (Mandacı & Gumus, 2010). Significant managerial ownerships can align managers' interests with those of the outside shareholders so that managers can have strong incentive to pursue value-maximizing behaviour (alignment effects). In contrast, Demsetz (1985) argued that too much an ownership stake by managers could potentially lead them to worry more about their self-interests, not those of outside shareholders; thus, decreasing the company's value (entrenchment effects).

Previous studies have found contending results on the relationship between managerial ownership and company's performance. A study done by Jensen and Meckling (1976) have identified that when managerial ownership increased, the company's performance will increase as the conflict would decrease. On the other hand, Fama and Jensen (1983); and Morck et al. (1988) argued that greater stock ownership by managers increased the power of the internal owners and decreased the power of the external owners in terms of influencing performance. Nonetheless, the result will appear insignificant when accounting profit rates were used as an alternative performance measure. Due to the lack of studies in these areas, it provides an opportunity to scrutiny the effects of managerial ownership on real earnings management and company's performance.

Literature Review and Hypothesis Development

Managerial ownership means that the manager has direct or indirect shares in the company. Hence, lower managerial ownership has greater incentives to manage accounting numbers to relieve or relax the behavioural constraints imposed in accounting-based contracts (Warfield et al., 1995). Previous studies have found a significant negative relationship between managerial ownership and earnings management (Alves, 2012; Ebrahim, 2007; Klein, 2002; Warfield et al., 1995). It is consistent with the alignment of interest hypothesis, which suggests that the higher the managerial ownership, the lower the magnitude of discretionary accruals (Ali et al., 2008; Banderlipe & Mc Reynald, 2009; Dhaliwal et al., 1982). This means that the managers will entrench when their increment in the managerial share ownership excessive certain percentage. In other words, the managers will favour maximizing their personal benefits than minority shareholders, which is in line with entrenchment hypothesis (Morck et al., 1988). This suggests that managers who own a significant portion of equity in a company have less incentives to manipulate reported accounting information, and that large shareholders reduce the scope of managerial opportunism, which is consistent with both the alignment of interest hypothesis and the efficient monitoring hypothesis.

According to Jensen and Meckling (1976), managerial ownership is negatively related to agency cost and yet is positively associated with the company's performance. This finding is supported by Gordon et al. (2004) that is aligned with the conflict of interest hypothesis. It is supported by the agency theory, as it claimed that managerial ownership could reduce the agency conflict due to the separation of stock ownership and control between managers and stockholders. It is noticed that if management ownership rises, then the interest of shareholders and managers begins. Managerial ownership is an internal monitoring mechanism. In managerial ownership, EM practices are inversely proportional to the company's performance. The agency theory is supported by the positive relationship between managerial ownership and the company's performance (Fauzi & Locke, 2012). Furthermore, MANOWN does not create a conflict of interest between the owners, managers and employees. In return, MANOWN increases the performance of the company as the managers' priority is to maximise the company's wealth.

Therefore, lower managerial ownership presents greater incentives to manage accounting numbers to alleviate behavioural constraints due to accounting-based contracts (Warfield et al., 1995). Previous studies have found significant negative associations between performance and manipulation of earnings (Alves, 2012; Ebrahim, 2007; Klein, 2002; Warfield et al., 1995). It supports the coordination of the hypothesis of interest, suggesting that the higher the ownership of the manager, the lower the level of discretionary accrual (Ali, Salleh, & Hassan, 2008; Banderlipe & Mc Reynald, 2009; Dhaliwal, Salamon, & Smith, 1982). Managers with majority of equity in the company have less incentive to manipulate reported accounting information and that large shareholders reduce the scope of manager opportunism, consistent with the alignment of the interest hypothesis and the efficient monitoring hypothesis.
Hence, this study hypothesizes that:

H1*: There is a negative association between managerial ownership and earnings management.*

Previous studies have found mix results on the relationship between managerial ownership and company's performance. A study by Jensen and Meckling (1976) argued that as management ownership increased, corporate performance would increase with a downturn in conflict. On the contrary, greater ownership of shares among the managers increases internal ownership and decreases external ownership in terms of performance (Amran & Ahmad, 2013; Fahlenbrach & Stulz, 2009). There is a zigzag trend for concentrated ownership and the company's performance. Consequently, the association increased between 0% and 5%, decreased between 5% and 25%, and increased more than 25% (Vroom & Gimeno, 2007). The result was also significant when other control variables such as R&D and advertising ratios, leverage, size, growth and industry statues were incorporated into the model. However, the results were insignificant when accounting profit rates were treated as alternative performance measures. Currently, there is a limited study on the effect of managerial ownership on company performance.

H2*: There is a positive association between managerial ownership and company's performance.*

Research Methodology

This study is using a quantitative data taken from annual report of public listed companies. The data covers from year 2013 until 2017. There were 646 listed companies in Bursa Malaysia out of a total of 3,260 company-observations in this study. The data were analysed using STATA Software version 14. This study is using panel data based on Fixed Effect model. This study also includes five control variables which are current ratio, financial distress (Altman Z-score), firm size, leverage and growth. Below are the models for real earnings management:

(A) The normal level of Cash Flow from Operations (CFO)

$$CFOt / At\text{-}1 = \alpha 0 + \alpha 1\ (1 / At\text{-}1) + \beta 1\ (St / At\text{-}1) + \beta 2\ (\Delta St / At\text{-}1) + \varepsilon t \quad (1)$$

Where: CFOt = Cash flow from operations (current year)

At-1 = Total assets (previous year)

St = Sales (current year)

ΔSt = Change in sales (current year)

εt = Residual value

Equation 1 is based on study conducted by Roychowdhury (2006). The residual value is the suspected companies that were engaged in abnormal CFO. Residual value is said to exists is the usual CFO intensity varies with the actual CFO amount. Suspected companies are those companies based on linear regression with the residual values.

(B) The normal level of Cost of Goods Sold (COGS)

$$COGSt / At\text{-}1 = \alpha 0 + \alpha 1\ (1 / At\text{-}1) + \beta 1\ (St / At\text{-}1) + \varepsilon t \quad (2)$$

Where: COGSt = Cost of goods sold (current year)

At-1 = Total assets (previous year)

St = Sales (current year)

Equation 2 is based on study conducted by Roychowdhury (2006). The residual value is the suspected companies that were engaged in abnormal COGS. Residual value is said to exists is the usual COGS intensity varies with the actual COGS amount. Suspected companies are those companies based on linear regression with the residual values.

(C) The normal level of Discretionary Expenses (DISEXP)

$$DISEXPt / At\text{-}1 = \alpha 0 + \alpha 1\ (1 / At\text{-}1) + \beta 1\ (St\text{-}1 / At\text{-}1) + \varepsilon t \quad (3)$$

Where: DISEXPt = Discretionary expenses (current year)

At-1 = Total assets (previous year)

St-1 = Sales (previous year)

Equation 3 is based on study conducted by Roychowdhury (2006). The residual value is the suspected companies that were engaged in abnormal DISEXP. Residual value is said to exists is the usual DISEXP intensity varies with the actual DISEXP amount. Suspected companies are those companies based on linear regression with the residual values.

The coefficients derived from each model are then added to the model to generate the normal operating cash flow, production costs and discretionary expenses. Then, the real coefficient value earlier is decreased by the usual values

in order to obtain the abnormal values of each calculation used as a proxy for REM (Darmawan, Sutrisno, & Mardiati, 2019). According to Cohen et al. (2008), each value was summed up, and then abnormal operating cash flows and abnormal discretionary costs are multiplied by −1 to match the relationship with REM. The REM model is estimated using the example below;

(D) The Aggregate Real Earnings Management

$$AREM = (ABCFO*-1) + ABCOGS + (ABDISEXP*-1) \quad (4)$$

Where,
AREM = A combined measure of abnormal real earnings management
ABCFO = Abnormal cash flow from operation
ABCOGS = Abnormal cost of goods sold
ABDISEXP = Abnormal discretionary expenses

Results and Discussions

Multiple Regression on Earnings Management

The result of regression on EM is shown in Appendix 21. The regression results showed that MANOWN's findings were mixed with EM. Nevertheless, only ABCOGS was significantly associated with EM in a positive direction of 10% (t-value= 0.25). It evidenced that the companies show an increase in earnings as well as in earnings are less vulnerable to EM. Generally, CEOs and senior management are often compensated by equity incentives to align shareholder goals with managerial objectives and to provide space for agency conflicts (Coles et al., 2006). Such opportunistic behaviour could increase if there is a direct relationship between these incentives and the financial benefits of company management. Hence, this study is rejecting hypothesis 1.

Table 1: Multiple Regression of Earnings Management

	ABCFO	ABCOGS	ABDISEXP	AREM
Constant	-.4913732 (-3.34)***	-.1073318 (-2.25)**	-.4749766 (-6.28)***	.859018 (5.35)***
MANOWN	.0006521 (0.42)	.0000804 (0.25)*	.000078 (0.07)	-.0006497 (-0.30)
CURRATIO	.0138125 (0.51)	.0022734 (0.41)	.0281574 (1.63)	-.0396965 (-1.14)
ALTZ	-.1063069 (-4.31)***	-.0163473 (-4.27)***	-.0002433 (-0.03)	.0902029 (3.69)***
FSIZE	-.0103877 (-1.14)	-.0019539 (-1.32)	-.0040949 (-1.17)	.0125287 (1.28)
LEV	-.0543153 (-0.33)	.0408298 (1.54)	.1656184 (2.02)**	-.0704733 (-0.39)
GROWTH	1.440813 (0.06)	-3.500365 (-0.31)	-23.51916 (-1.40)	18.57799 (0.62)
Company Effect	Yes	Yes	Yes	Yes
Observation	3,230	3,230	3,230	3,230
R Square - within - between - overall	 .0300 .3629 .2395	 .0196 .2016 .1608	 .0145 .0147 .0147	 .0173 .2754 .2153
Adjusted R Square - between - within - overall	 .0252 .3597 .2357	 .0156 .1984 .1574	 .0102 .0107 .0107	 .0133 .2725 .2121
F-stat	3.95***	2.74***	1.99***	2.20***

Note: This table shows the model summary of each earnings management measurement for a sample of 3,230 company-year observations.
****Significant at the 1% level (1-tailed); **Significant at the 5% level (1-tailed); *Significant at the 10% level (1-tailed).*

Multiple Regression on the Company's Performance

The results for regression are shown in Table 4.2. MANOWN was significantly negative correlated with TOBINSQ at 5% (t-value= -1.09). Previous studies have found significant negative relationships between managerial ownership and company's performance (Alves, 2012; Ebrahim, 2007; Klein, 2002; Warfield et al., 1995). This relationship is parallel to the hypothesis of importance, which indicates that the higher the ownership, the lower the company's performance. The finding supports the findings by Amran & Ahmad (2013) and Fahlenbrach & Stulz (2009) that found the managers build upon their increased shares in managerial ownership. In other words, managers prefer to maximise the benefits for themselves at the expense of minority shareholders. This situation is a manifestation of the hypothesis of incorporation (Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). Managers who own a majority of equity in the company have less incentive to manipulate accounting information. Furthermore, the presence of large shareholders helps to reduce the room for opportunistic behaviour among the managers. These situations are consistent with the alignment of the interest hypothesis and the efficient monitoring hypothesis. Therefore, this study is rejecting hypothesis 2.

Table 2: Multiple Regression of Company's Performance

	TOBINSQ	ROA	ROE
Constant	-.3333685 (-1.07)***	.0002351 (0.01)***	-.0346694 (-0.68)***
MANOWN	-.0016958 (-1.09)**	-.0001057 (-0.57)	.0000658 (0.18)
CURRATIO	-.02131 (-0.78)	.0059636 (1.90)*	.001075 (0.20)
ALTZ	.1313335 (4.31)***	.0603409 (14.26)***	.0416615 (7.03)***
FSIZE	.0086543 (1.43)***	.0001713 (0.21)	.0009325 (0.58)
LEV	.7217286 (4.67)***	-.0133321 (-0.74)	-.0853377 (-2.51)
GROWTH	2.230549 (3.03)***	5.684916 (0.92)	-3.52564 (-0.31)
Company Effect	Yes	Yes	Yes
Observation	3,230	3,230	3,230
R Square - within - between - overall	 .1208 .0417 .0484	 .3365 .2670 .2637	 .1034 .2016 .1622
Adjusted R Square - between - within - overall	 .1175 .0381 .0449	 .3332 .2633 .2600	 .0989 .1976 .1580
Wald chi2	-	-	-
F-stat	5.16***	18.35***	6.58***

Note: This table shows the model summary of each earnings management measurement for a sample of 3,230 company-year observations.
****Significant at the 1% level (1-tailed); **Significant at the 5% level (1-tailed); *Significant at the 10% level (1-tailed).*

Conclusion

This study examines the effects of managerial ownership on company's earnings management and performance. The findings found a significant positive relationship between managerial ownership and earnings management; but only through abnormal cost of goods sold. The finding indicates that the managerial ownership in the company did not reducing the level of earnings management activities. However, there is a significant negative relationship between managerial ownership and company's performance through Tobin's Q. This indicates that the company's performance is reducing when the company is having a managerial ownership.

It is an essential resource for any market participant since it provides a reduced volume of information asymmetries between managers, investors, regulatory agencies, society and other stakeholders. The current findings can be treated as tools to lessen the earnings management activities and to increase the company's performance by the management and stakeholders by applying monitoring mechanisms on companies through managerial ownership which have to curtail opportunistic behaviour among the management.

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The Evolution of Economies – Changes in The Structure of The Real Economic System

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The article reflects the diversity of issues related to real changes in the structure of the economic system in market economies of highly developed countries, which underwent a strong phase of industrialisation, and then relocations of industrial production (to countries with cheaper labour factor), revealing as the first (the United States and the United Kingdom) in their economies the presence of the deindustrialisation process. As well as in the evolution of the market economy of developing countries, which are entering the deindustrialisation phase prematurely. The presentation of the most important issues of structural changes at the cognitive level allows us to attempt to outline possible interpretations of the effects for the countries under study and to assess the evolution of their economies, and above all the changes in the structure of employment at the empirical level, as well as to identify the main determinants, their individual patterns of changes in the structure of the economic system, and development. On the basis of the analysis of changes within the main sectors of the economy, changes in their share in total employment for the whole economy in the period 1970-2019 were examined for selected key countries. Using the regression analysis of structural change models, the main determinants of individual development patterns and the course of evolution of economies were examined and interpreted based on the results of the research.

Keywords: industrialisation, relocation, deindustrialisation, economic evolution, employment structure, patterns of changes in the structure of the real economic system.

Introduction

The transformations of fundamental rights and economic mechanisms which are often reduced to the phenomenon of the constitution of a new paradigm of economic development have their origin in the natural conditions associated with the structural changes in market economies, understood as changes in the real structure of production and employment, which is the essence of the evolution of the economy and the entire socio-economic system. Technical progress and changes in the structure of population consumption, inherent in the essence of the functioning of a market economy, lie at the heart of the mechanism of real structural changes. The uniformity of these changes, which only manifests itself in long research periods, does not deprive them of the profound specificity that lies behind individual national circumstances. The most striking feature is the diversity of structural change processes in the group of highly developed countries and those which are still developing. Naturally, the changes which are taking place, leading to increases in production and employment in the services sector at the expense of their share of the industrial sector in the earliest industrialising countries, which have so far recorded relatively high social welfare, should not induce developing countries today to 'jump over' the stage of industrialisation of the economy in conditions of competition on global markets.

The following are the subject of real structural changes and their patterns in economies that have experienced strong industrialisation under market conditions and those that have not undergone this kind of intensive phase of industrialisation and are already seeing symptoms of deindustrialisation.

The structure of work includes four main chapters. The first two chapters present the effects of research in the literature on structural changes that have taken place in market economies today and in developing economies. The analytical chapter presents changes between the main sectors of the economy, which transparently reflect the course of the process of real structural changes in the economic system of selected economies. It also analyses the impact of key determinants of the economy's evolution and presents interpretations of the results obtained in the study. The fourth chapter describes more important conclusions.

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"Prevailing factors" and changes in the structure of market economies in highly developed countries.

The scale of changes in the shares of individual sectors in the development of market economies today's highly developed ones was clearly driven by two factors which were considered to be common to many complex phenomena and whose cumulative effects were clearly observable over time, despite the action of other variables. Technological progress (measured by productivity) and changes in the structure of consumption are mentioned as determinants of structural changes in market economies (Fourastie, 1972; Fisher, 1945; Fourastie, 1954; Clark, 1957; Kwiatkowski, 1980). Productivity increases in agriculture resulted in increasing food production volumes. At the same time, there was a continuous increase in income *per capita*, which caused changes in the structure of consumption. As income increased, the share of food in total expenditure decreased. There was also a shift in demand from agricultural products to industrial products and then services. Growing demand for industrial products increased production levels in the industrial sector, mainly in industrial processing. Initially, with low productivity, this growth was mainly through employment gains. In this way, the industrial sector absorbed labour out of agriculture, a process which became all the more pronounced the greater the difference between the productivity growth rate (initially slow) and the growth rate of demand in the industrial sector. Accelerating productivity growth rates in industry through the inventions of the first and second industrial revolutions narrowed the gap between achievable production volumes and demand. As production volumes driven by increasing productivity exceeded the levels of reported demand for industrial products, employment began to fall. Just as in the final phase of the agrarian era, large increases in productivity and production were causing increasing income growth already at the peak of industrialisation (Fisher, 1952: 828). The Caldor, on the basis of empirical material provided by Kuznetz and Chenery and Syrquin, pointed to the importance of analysing economic growth through structural changes in agriculture, industry and services, as well as through their mutual relations. He argued that industry (alongside agriculture) has contributed most to stimulating growth. In industry, due to the absorption of technical progress, relatively high productivity growth rates are recorded (Kaldor, 1967). Through the strongly manifesting scale effects in industry, dispersion effects, easy vulnerability to international trade (Dasgupta, Singh, 2005), as well as the absorption of poorly qualified labour resources (Rodrik, 2016: 19-20), increasing the share of industry brings with it great pro-growth opportunities. Technological advancement has been a factor in productivity growth in industry and, for the most part, in job losses in this sector (Rodrik, 2016: 4, 27). In industrialisation, management processes were dominated by the imperative of efficiency. Higher productivity of machinery, introduction of the principles of 'scientific management', better use of working time was supposed to lead to higher production, higher profits and increased welfare. These changes clearly indicated that the emerging system would lead to almost 'unlimited production possibilities' and the displacement of labour (technological unemployment) (Rifkin, 2001: 73, 112). The income increases that have taken place have generated further changes in the structure of demand, from basic products to higher-level products (Fisher, 1952: 828). This resulted in a change in the structure of expenditure, in which the amount of industrial goods decreased and the amount of services increased. This constant increase in demand for services, with relatively low or no productivity growth in the sector, resulted in the whole labour force being absorbed, driven out of industry during the period of deindustrialisation. In the services sector, employment determines the volume of production above all. Due to the constantly growing, virtually unlimited, demand for services and the achievable rate of productivity growth at relatively low levels, the service sector continues to be the sector taking over labour from agriculture and industry. However, the observation of growth processes in many developed countries (industrialised and with strong comparative advantages), as well as developing countries (e.g. India), suggests that the conclusions drawn so far on the role of the services sector in productivity growth in the economy as a whole should at least be approached with caution. It is pointed out that services such as information technology services, financial services, retail, telecommunications, business services and transport have strong dispersion effects in the economy, create new products and processes, are often trade-sensitive (Dasgupta, Singh, 2005: 28) and can thus make a significant contribution to productivity growth. On the other hand, however, the growth of some services seems to depend on the scale of development of manufacturing (Dasgupta, Singh, 2005). However, the high heterogeneity of the services sector makes analyses of this sector, conducted at a high level of aggregation, of little use in providing knowledge about the essence of services (Piketty, 2015: 116) and their contribution to the productivity developments of individual economies.

Structural change in developing countries

Many developing country economies are registering faster growth in the services sector than in the industrial processing sector. Such symptoms of structural change as deindustrialisation are also found in the literature and are often accompanied, with significant GDP growth, by jobless economic growth (Dasgupta, Singh, 2005).

The historic turning point in the transition of today's highly developed economies from the dominance of industrial production to the production of services was almost USD 10 000 at current prices. It is now estimated that it is already at USD 3 000 in some (developing) countries. In view of these facts, it is becoming problematic to assess this change. It is not clear whether this type of premature deindustrialisation, when the economy has not yet reached an appropriate

level of industrial development, is harmful or beneficial to the long-term development of the country. It should be stressed that it is possible for the economy to undergo deindustrialisation in terms of employment, while, at the same time, deindustrialisation in terms of production (measured by added value or global production) has not yet taken place. This dualism of the deindustrialisation process is possible with the phenomenon of jobless production growth that is very common in developing countries. Deindustrialisation in terms of changes in production and changes in employment is not negative if it is the result of a natural response to changes in income and technology. However, this phenomenon can be a cause for concern if its symptoms appear at low levels of income *per capita (Dasgupta, Singh, 2006: 5-6)*. Rodrik points out that, without proper industrialisation, developing countries face the negative symptoms of 'premature deindustrialisation', which has serious negative effects on the structure of employment and the strengthening of economic growth. The effects of these negative symptoms are declines in average productivity in the economy, with declines in the income and welfare of the population, poor absorption of unskilled labour, weakening export opportunities. While in today's highly developed countries, structural change, including deindustrialisation, has been determined mainly by technological progress and a change in the structure of demand determined by income growth, in today's developing countries deindustrialisation in terms of employment is mainly driven by trade liberalisation, as demand for industrial production and the real volume of that production are still growing rapidly there. A particularly unfavourable situation arises in this respect in developing countries which do not have strong comparative advantages. Under such conditions, these countries not only become net importers of industrial processing goods, but are exposed to unfavourable trends in relative prices. The pressure to reduce the prices of goods from the processing industry in countries with a high level of technological progress is also spreading through trade to countries that import these goods. As a result, developing countries are recording declines in the share of industrial processing in employment and production. Depending on the extent to which developing countries have a solid comparative advantage in the production of processed goods, the balances of changes in the impact of technology and trade will significantly reduce the shares of production and employment in industry in developing countries. A stronger impact of technological advancement in these countries will increase the shares of production and employment in industry, while the dominance of the impact of foreign trade in these countries will reduce these shares accordingly (Rodrik, 2016). Different scenarios of the evolution of the economy are possible, and the greatest differences in the pattern of the changes in the real structure of the economy are observed among the economies of developing countries (G. Dosi, F. Riccio, M. Virgillito, 2020).

Analysis of structural changes in selected economies

The evolution of economies is perhaps most evident in the real changes that are taking place between their main sectors. The analysis of structural changes in selected key economies begins below with the presentation in Table 1 of the study on the evolution of employment structure in the period 1970 - 2019 for the economy, the UK, Germany, Poland and the United States.

Table 1: Employment structure in selected market economies in the years 1970-2019 (shares of particular sectors in total employment).

	Time	1970	1980	1995	2000	2005	2010	2015	2019
UK	Agricult.	2,07	1,62	1,01	0,90	0,58	0,57	0,63	0,54
	Industry	40,68	33,27	22,48	19,58	15,42	12,51	12,41	11,89
	Construct	5,96	5,41	4,40	5,39	6,32	5,38	5,02	5,10
	Services	27,03	31,70	40,27	41,74	42,79	43,12	44,04	43,95
Germany	Agricult.	1,36	1,09	1,66	1,56	1,38	0,85	0,78	0,73
	Industry	55,78	38,80	28,60	26,92	25,37	23,48	22,54	21,83
	Construct	-	8,26	9,52	8,32	6,12	6,11	6,24	6,23
	Services	-	25,97	31,55	33,41	35,31	38,07	38,82	39,05
Polend	Agricult.	-	-	3,36	2,17	2,08	1,78	1,71	1,53
	Industry	-	-	34,56	30,69	29,35	27,16	27,43	28,37
	Construct	-	-	7,10	7,96	6,48	8,12	7,43	7,31
	Services	-	-	25,11	29,87	32,12	34,75	35,49	35,39
US	Agricult.	1,74	1,72	1,68	1,74	1,56	1,59	1,64	1,55
	Industry	31,01	26,33	19,12	16,99	11,52	10,18	10,37	10,04
	Construct	5,81	5,56	5,42	6,30	7,94	6,56	6,72	7,25
	Services	61,44	66,40	73,78	74,97	78,99	81,66	81,28	81,16

Source. Own calculations on the basis of: Data extracted on 11 Nov 2020 23:35 UTC (GMT) from OECD.Stat

Table 1 illustrates the changes in the structure of employment for selected highly developed market economies and the Polish economy. In the analysis of data from the period between 1970 and 1980, deindustrialisation processes were first observed in the most developed economies, i.e. the United States, Great Britain and Germany. These processes were further strengthened by the pursuit of a demand policy towards industry in the 1960s, which undoubtedly contributed to the crisis of the 1970s, which was compounded by the rise in raw material prices. This crisis was characterised by rising prices and stagnation. The liberalisation of world trade, which began in the 1970s, accelerated the processes of deindustrialisation by relocating the production of mature industries in which the rate of productivity growth was significantly slowed down and their share of world consumption was dependent on the price of labour, from highly developed countries to developing countries. Instead of the relocation of mature industries, in line with industrial development, new industries were created with very high productivity growth rates. All in all, since the 1970s, industrial productivity in the United States, the United Kingdom and Germany have started to grow even faster and, with it, the share of industry in total employment has started to fall, as demand for its products in the most developed countries was already heavily saturated.

The long-term shift in employment from industry to services since the early 1970s (de-industrialisation) has proven to reflect mainly the impact of differences in productivity growth between manufacturing and services. For, if the real output of manufacturing does not tend to grow faster than the real output of services in the long term, and productivity in manufacturing, caused by rapid changes in production technologies, increases disproportionately faster than in services, then the employment structure will shift from manufacturing to services. The services sector will have to absorb a larger proportion of total employment in order to keep the real volume of production on a par with the real volume of industrial production. Rising employment in services will have to lead to a relatively faster increase in the price of their production than that of products from manufacturing, and therefore a change in the structure of production at current prices.

Productivity growth has been sustained at a faster rate in some (technologically progressive) activities than in others (technologically stagnant) . Industrial processing is, in general, technologically progressive, which is why its importance to the economy seems to be undoubtedly the most important. Such characteristics of industrial processing are associated with its internal attributes, i.e. ease of standardisation, the possibility of formalising information necessary for production into easily repeatable information packages. Services, on the other hand, are significantly different from manufactures in this respect. For example, *non-personal* (*impersonal)* services, such as telecommunications, have characteristics similar to industry and can be qualified as 'technologically progressive'. Personal services (non-market services), however, such as medical care, for example, cannot easily be standardised, cannot be subject to mass production methods and are therefore called 'technologically stagnant'. (Baumol, Blackman, Wolff, 1989). The development of the world market as well as technology gives more and more dynamics to those features of services which previously closed them within the boundaries of internal markets. Increasing the commercial capacity of services additionally strengthens the role of the service sector in the path of economic development of countries (more: Kłosiński, 2011: 213-215).

The literature assumes, at the theoretical level, that productivity growth in industry is likely to be less important than before for the increase in overall productivity and living standards in advanced economies due to the stabilised consumption of its products (saturation of demand). However, in developing economies, it will be the main driver of economic growth due to its strong technological progress and increasing consumption and increasing globalisation.
As the process of deindustrialisation continues, productivity growth in the economy will increasingly depend on productivity growth in the service sector, not so much on productivity growth in industry. In contrast, the evolution of service sector productivity will depend on future developments in areas such as information technology and changes in the competitive structures of the sector (Rowthorn, Ramaswamy, 1997: 22; Dasgupta, Singh, 2006). However, according to Kaldor, the rate of productivity growth in the whole economy depends on the expansion of the industrial sector, which not only leads to faster productivity growth in industry, but has a dispersal effect on the whole economy (operation of Verdoorn's law). In a context of trade liberalisation and globalisation of commodity flows in the economies of highly developed countries, despite the almost saturated demand for industrial goods, the industrial processing sector (and its rate of productivity growth) continues to be the most important for the growth of GDP *per capita* and the overall productivity of the economy, as Kaldor believed. After an increase in total employment in market services (including primarily banking services) in the UK by around 10% in the 1990s and the first period of 2000, and a decline in total employment in the industrial sector from around 20% in the US and 26% in the UK to almost 30% in the German economy, the emergence of the crisis in 2007-2008 forced the industrial policy support in these economies and stopped the decline in the share of manufacturing in total employment. These measures have prevented these countries from falling sharply in terms of GDP *per capita* growth. This sustained, albeit very slow, GDP *per capita* growth has allowed these countries to increase the share of non-market services in total employment, as in the US, for example, through increased government spending on health and education, in the face of a collapse in global demand and rising unemployment.

Observing the highest GDP per capita growth in Germany's economy and its slowest slowdown during the 2007/2008 crisis in the context of structural changes, there emerges an almost 100% higher share of total employment in the industrial sector (at around 24%) than in the UK and US economies (at around 10% to 12% on average), which are at similar GDP *per capita* levels.

In order to examine the main determinants and determine the causes of real changes in the structure of the economic system, a regression analysis of models of changes in the share of the industrial sector in total employment of selected key economies for this process was conducted, successively: United Kingdom, Germany. The United States and Poland. The results of the research are presented in the Table appropriate for the economy of the analysed country: 2, 3, 4 i 5.

Table 2: Regression analysis of the model of changes in the share in total employment of industry in the economy The United Kingdom between 1970 and 2019.

Estimation method: CMSS
Observations used 1970-2019
Dependent variable: Y (ln) share of total employment in manufacturing in the UK economy.

Regression statistics								
Multiple R	0,98641							
R square	0,973005							
Matched R square	0,971857							
Standard error	0,069512							
Observations	50							
VARIANCE ANALYSIS								
	df	SS	MS	F	Significance F			
Regression	2	8,185742	4,092871	847,045	1,36E-37			
Individual	47	0,227101	0,004832					
Time	49	8,412843						
	Factors	Standard error	t Stat	Value-p	Lower 95%	Top 95%	Lower 95.0%	Top 95.0%
Intersection	8,627551	0,13606	63,40973	3,47E-47	8,353833	8,90127	8,353833	8,90127
Variable X 1	1,134815	0,112686	10,07059	2,55E-13	0,90812	1,36151	0,90812	1,36151
Variable X 2	-2,11146	0,158955	-13,2834	1,59E-17	-2,43123	-1,79168	-2,43123	-1,79168
		Critical value t	2,011741					

- materiality at 5%
Own calculations based on Data extracted on 11 Nov 2020 23:35 UTC (GMT) from OECD.Stat

Parameters of the model of change in the share of total employment of industry in the UK economy.
Variable X 1 -- Gross domestic product (expenditure approach) UK.
Variable X 2 -- GDP per capita at current prices and current PPPs, US dollars (UK).

All parameters are very statistically significant, which makes their interpretation valid.
Explained variable - Share of total employment of industry in the UK economy.
Variable Y -- Employees in industry (UK).

The parameters (explanatory variables) in the model presented (Table 2) (as well as other models presented in Tables 3, 4 and 5) were selected based on the basic models of deindustrialisation and study of the literature on the subject, and empirically on the basis of statistical studies of stylized facts occurring in the analysed economies. This model in 97% describes / explains changes in the share of total employment in the industry sector. Determination factor R2 = 0.97. All explanatory variables are very statistically significant being significantly higher than the critical value. The regression analysis of the presented model showed that an increase by 1% of GDP - expenditure approach (parameter X 1) strongly determined the increase in the share of employment in the total economy of the industry sector, causing

its growth by 1.13 percentage points, which indicates that the demand for industrial production is not fully saturated. However, domestic production in the UK, losing in a liberalised market since the 1970s, was relocated to countries with cheaper labour costs (labour). Hence, as shown in Table 1, the share in total employment of industry since 1970 from 40.68% dropped to 11.89% in 2019, while the increase in GDP per capita (parameter X 2) by 1% resulted in a very significant decrease in the share in total employment of the industry sector by as much as -2.11 percentage points. This may be the reason for an increase in the demand for services, and therefore the demand for labour and employment in the service sector, on the one hand, and may suggest a very large increase in income inequality on the other.

Table 3: Regression analysis of the model of changes in the share in total employment of industry in the economy Germany between 1970 and 2019.

Estimation method: CMSS
Observations used 1970-2019
Dependent variable: Y (ln) share in total employment in the industrial sector in the German economy.

Regression statistics								
Multiple R	0,987606							
R square	0,975366							
Matched R square	0,974317							
Standard error	0,047356							
Observations	50							
VARIANCE ANALYSIS								
	df	SS	MS	F	Significance F			
Regression	2	4,173173	2,086587	930,4537	1,59E-38			
Individual	47	0,1054	0,002243					
Time	49	4,278573						
	Factors	Standard error	t Stat	Value-p	Lower 95%	Top 95%	Lower 95.0%	Top 95.0%
Intersection	9,07055	0,925933	9,796115	6,2E-13	7,207812	10,93329	7,207812	10,93329
Variable X 1	-0,27548	0,145941	-1,8876	0,065262	-0,56907	0,018117	-0,56907	0,018117
Variable X 2	-0,17049	0,117171	-1,45504	0,152304	-0,40621	0,065229	-0,40621	0,065229
		Critical value t	2,011741					

- materiality at 5%
Own calculations based on Data extracted on 11 Nov 2020 23:35 UTC (GMT) from OECD.Stat

Parameters of the model of changes in the share of total employment in industry in the German economy.
Variable X 1 -- Gross domestic product (expenditure approach) Germany.
Variable X 2 -- GDP per capita at current prices and current PPPs, US dollars (Germany).

All parameters are very statistically significant, which makes their interpretation valid.
Explained variable - Share of total employment in industry in the German economy.
Variable Y -- Employees in industry (Germany).
For the German economy, the regression analysis of changes in the share of total employment in the manufacturing sector showed that the model presented in Table 3 is not statistically significant. Both variables GDP (expenditure approach) and GDP per capita are smaller than the critical value. This shows that in the German economy, the manufacturing sector is strongly supported in all dimensions by active state policies. This clearly shows that the share of total employment in the industrial sector is shaped by German industrial policy. Hence, as previously shown in the studies in Table 1, the share of manufacturing in total employment (at around 21.83%) is clearly more than 100% higher in the German economy than in the UK (at around 11.89%) and the US (at around 10.04%), which are at similar levels of GDP *per capita*.

Table 4: Regression analysis of the model of changes in the share of industry in total employment in the economy The United States between 1970 and 2019.

Estimation method: CMSS
Observations used 1970-2019
Dependent variable: Y (ln) share of total employment of manufacturing in the US economy.

Regression statistics								
Multiple R	0,984927							
R square	0,970081							
Matched R square	0,968808							
Standard error	0,069243							
Observations	50							
VARIANCE ANALYSIS								
	df	SS	MS	F	Significance F			
Regression	2	7,30669	3,653345	761,9666	1,53E-36			
Individual	47	0,225347	0,004795					
Time	49	7,532038						
	Factors	Standard error	t Stat	Value-p	Lower 95%	Top 95%	Lower 95.0%	Top 95.0%
Intersection	23,19675	1,220934	18,99918	1,08E-23	20,74054	25,65295	20,74054	25,65295
Variable X 1	-4,26691	0,338796	-12,5943	1,13E-16	-4,94848	-3,58534	-4,94848	-3,58534
Variable X 2	4,608474	0,405858	11,35489	4,53E-15	3,791993	5,424955	3,791993	5,424955
		Critical value t	2,011741					

- materiality at 5%
Own calculations based on Data extracted on 11 Nov 2020 23:35 UTC (GMT) from OECD.Stat

Parameters of the model of changes in the share of total employment in industry in the United States economy.
Variable X 1 -- Gross domestic product (expenditure approach) US.
Variable X 2 -- GDP per capita at current prices and current PPPs, US dollars (US).

All parameters are very statistically significant, which makes their interpretation valid.
Explained variable - Share of total employment of industry in the US economy.
Variable Y -- Employees in industry (US).

The regression analysis of the model in Table 4 showed that 97% describes / explains changes in the share of total employment in the industry sector. The determination factor R2 = 0.97. All explanatory variables are very statistically significant, being significantly higher than the critical value. Regression studies of the presented model showed that an increase by 1% of GDP - expenditure approach (parameter X 1) very strongly determined the share of the total employment of the industry sector in the economy, causing its decline by as much as -4.3 percentage points. Because, as Krugman has already shown in its research, the balance of US trade, especially for manufacturing, has always been negative. Krugman clearly indicated that Japan's policy, with which the states had the highest trade turnover in industrial production, was to reduce the exchange rate of the yen (the Japanese currency from the US dollar), which gave a price advantage to Japanese products (they were pushing US production out of the market).

On the other hand, an increase in GDP per capita (parameter X 2) by 1% resulted in a very large increase in the share of total employment in the industry sector, by as much as 4.6 percentage points, which argues for a yet insufficiently saturated demand for industrial products on the one hand, and a relatively smaller increase in income disparities on the other hand (in relation to the UK). In the United States and the United Kingdom, the countries in which the process of deindustrialisation was the earliest to occur, industry currently plays a relatively smaller role than, for example, in the German economy. In the UK, industrial companies (parent companies) only have their headquarters, to which profits are transferred. Real production in the UK, as in the United States, based on labour (production that is no longer affected by technological progress) was already the end of the 1970s relocating to other countries where labour costs were lower. In Germany, on the other hand, relocation processes did not begin until the 1990s, and were further severely restricted by state policy.

Table 5: Regression analysis of the model of changes in the share of industry in total employment in the economy Poland between 1970 and 2019.

Estimation method: CMSS

Observations used 1970-2019

Dependent variable: Y (ln) share in total employment of the industrial sector in the Polish economy.

Regression statistics								
Multiple R	0,962762							
R square	0,92691							
Matched R square	0,916943							
Standard error	0,022115							
Observations	26							
VARIANCE ANALYSIS								
	df	SS	MS	F	Significance F			
Regression	3	0,136454	0,045485	92,9997	1,19E-12			
Individual	22	0,01076	0,000489					
Time	25	0,147213						
	Factors	Standard error	t Stat	Value-p	Lower 95%	Top 95%	Lower 95.0%	Top 95.0%
Intersection	7,164206	0,600085	11,93865	4,39E-11	5,919706	8,408706	5,919706	8,408706
Variable X 1	-0,32366	0,051002	-6,34611	2,19E-06	-0,42943	-0,21789	-0,42943	-0,21789
Variable X 2	-0,5836	0,207209	-2,81647	0,010052	-1,01333	-0,15387	-1,01333	-0,15387
Variable X 3	1,319467	0,397465	3,319705	0,003113	0,495175	2,143759	0,495175	2,143759
		Critical value t	2,011741					

- materiality at 5%

Own calculations based on Data extracted on 11 Nov 2020 23:35 UTC (GMT) from OECD.Stat

Parameters of the model of changes in the share in total employment of industry in the Polish economy.
Variable X 1 -- Gross domestic product (expenditure approach) Polend.
Variable X 2 -- GDP per capita at current prices and current PPPs, US dollars (Polend).
Variable X 3 -- Real Gross domestic product (GDP), volume, 2001=100

All parameters are very statistically significant, which makes their interpretation valid.
Explained variable - Share in total employment of industry in the Polish economy.
Variable Y -- Employees in industry (Polend).

The model presented in Table 5 describes / explains changes in the share of total employment in the industry sector in about 93%. The determination factor R2 = 0.9269. All explanatory variables are statistically significant, being larger than the critical value. The regression analysis of the presented model showed that an increase by 1% of GDP - expenditure approach (parameter X 1) determined the change in the share of employment in the total economy of the manufacturing sector, causing its decrease by -0.32 percentage points. Also, an increase in GDP per capita (parameter X 2) by 1% resulted in a decrease in the share in total employment in the industry sector, by -0.58 percentage points, which resulted directly from the subjection of the Polish economy to trade liberalisation, with very large differences in productivity in the industrial sector with highly developed countries. In addition, the Polish currency has been subject to constant depreciation. Therefore, domestic production which was not competitive in terms of price and quality was very strongly pushed out of the market by imports. However, for the Polish economy, a model with a real GDP (X 3) volume parameter turned out to be statistically significant, whose 1% increase translated into a 1.32 percentage point increase in the share of total employment in the industry sector. Because the increase in real GDP, the volume of which was drawn primarily by the industrial sector, with constant or even decreasing employment per unit of production, meant an increase in productivity, which translated into an increase in the price competitiveness of domestic production, and thus an increase in its sales, volume and employment, which ultimately translated into an increase in the share of total employment in the industrial sector.

Summary

The excessive increase in the share of financial services in the added value of economies generated by their nominal profits in the 1990s and the demand crisis initiated by the collapse of the financial markets in 2007/2008 update the applicability of Kaldor's views on the role of the expansion of the manufacturing industry, as it leads to an increase in average productivity throughout the economy. The increase in the share of industry in the structure of the economy leads not only to a faster increase in real productivity in industry itself, but also has the physical effect of its dispersion into the real sphere of the whole economy. In developing countries, industrial processing is the area of the economy which potentially absorbs the resources of the low-skilled workforce most quickly. As the experience of the recent crisis has shown, the industrial sector continues to be the most important guarantor of sustainable economic growth for the economies, and this seems to be a supranational issue. Economic analyses show that only with a sufficiently high level of GDP *per capita is* the service sector able to absorb all the labour force pushed by new technologies from agriculture and industry. Indeed, the emerging system will lead to almost 'unlimited production possibilities' and the displacement of labour (Rifkin, 2001: 112). In some approaches to the analysis of the possible effects of these changes, this makes it necessary to reformulate the social contract in relation to employment and create conditions for social participation away from the market (Rifkin, 2001: 299-301). A new essence is given to structural change by the vision of a strong multiplier effect resulting from the 'synergy between the pillars of the industrial revolution', which is to be based on renewable energy sources and the Internet as growth areas (Rifkin, 2011). Despite Rifkin's pessimism in the mid-1990s (Rifkin, 2001), the aspirations for the new energy and communication structure of economies presented by him in the second decade of the 21st century quite clearly indicate the hopes that are still placed in the reindustrialisation of economies.

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Industrialisation and Deindustrialisation and The Real Divergence of The Polish Economy

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

Socio-economic processes initiated by industrialisation are leading to the natural effect of deindustrialisation in this age of development. This stage of shaping the structure of economies, particularly in terms of employment, has brought with it a wide range of ambiguities, including negative ones, from the displacement of the labour force from industry to growing wage and income inequalities, to losses in economic growth potential.
The main aim of the study is to show the course of structural change processes in the conditions of Poland as an economy (subjected to systemic transformation processes), which, entering the phase of deindustrialisation, has not yet fully exhausted the potential offered by industrialisation, with still not saturated internal demand for industrial goods and unused opportunities to develop stronger comparative advantages than before and, most importantly, to reduce the very significant distance of divergence of the real economy.
On the basis of a theoretical presentation of the problems of industrialisation and deindustrialisation of economies, an analysis of the conditions of the Polish economy was conducted. Simple measures were used, such as those from the first Kaldor law, measures of saturation of sectoral demand, GDP per hour worked, GDP *per capita*.
The conclusions obtained during the analysis point to industrialisation as an important source of growth in labour productivity and income in Poland and justify the approach to reindustrialisation as an element of economic policy in the process of developmental catching up, through the faster pace of real convergence processes with the economies of highly developed countries, with which, as the results of research have shown, the Polish economy is more than 40 years apart. The fast pace of the convergence processes and the reduction of the divergence distance between the real Polish economy and those countries is a necessary condition for obtaining economic benefits from economic liberalisation.

Keywords: Industrialisation, Deindustrialisation, Reindustrialisation, Systemic Transformation, Real Economic Divergence, Economic Convergence Processes.

Introduction

The first industrialising countries - introducing new production techniques and product innovations - have seen significant changes in labour productivity, contributing to initiating the process of changing the structure of expenditure and production in the economy. These changes have led the national economy to develop broad opportunities for increasing the economic welfare of society. From the 19th century onwards, new manufacturing methods such as innovation spread from the UK to other countries, strengthening their industrialisation processes, with positive economic and social consequences. In contrast, production in developing countries remained largely dominated by an agricultural sector with very low productivity levels. Economic growth in industrially based developed countries (United Kingdom, United States, Belgium, Switzerland, France, Germany, Japan) has generated growing demand for services that are primarily related to the functioning of product markets. They have also abandoned the production of old industries such as mining and labour-intensive production in agriculture. Transport and ICT communication, which expanded trade channels, strengthened exports of agricultural and mining products to developed economies from catching up countries. These goods processed in industrial countries were then re-exported to developing countries, largely depriving them of the potential to shape their own industrial expansion in production with high added value and product innovation. The post-war years of the 20th century brought opportunities for developing countries to quickly catch up with economic growth, which was strongly linked to the phenomenon of late industrialisation stimulated by globalisation processes or the expansion of technology transfer opportunities[1].

[1] A. Szirmai, *Industrialisation as an engine of growth in developing countries*, 1950-2005, "Structural Change and Economic Dynamic" 2012, no 23, p. 406-420.

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Industrialisation, with the division and specialisation of labour that it undoubtedly involved, has created the conditions for stable productivity growth in the currently highly developed countries[2]. Industry has been a driving force in the catching up process in countries such as Japan, Taiwan and South Korea. However, the social and economic processes triggered by industrialisation are leading to the natural effect of deindustrialisation in this age of development. This stage in the structure of economies, particularly in terms of employment, has brought with it a wide range of ambiguities, including negative ones, from the displacement of the labour force from industry to growing wage and income inequalities, to losses in economic growth potential. In terms of demand and production, deindustrialisation has developed as a less drastic and more uniform phenomenon in individual countries (D. Rodrik 2016).

Both the problem of (re-)industrialisation and deindustrialisation have many analytical threads. The aim of this work is to show one of the approaches to the problem of economic growth, which is addressed from the point of view of structural changes in the economies, including the Polish economy.

(PL) Mr President, at the heart of the mechanism for structural change in the highly developed countries today was mainly technical progress and changes in the structure of demand / consumption of the population. In countries catching up, increased international trade as a result of trade liberalisation (late industrialisation stimulated by the development of technology and globalisation) played an important role. Both the sources of structural change are inextricably linked to the essence of the functioning of the market economy.

The research question boils down to an assessment of the correctness of structural changes and the desired direction of these changes for the economies catching up with Poland as an example.

The main aim of the study is to show the course of structural change processes in the conditions of Poland as an economy which, entering the phase of deindustrialisation, has not yet fully exhausted the potential offered by industrialisation, with still not saturated internal demand for industrial goods, and with not outlined, developed and used opportunities to develop stronger comparative advantages than before.

Following the example of Kaldor's approach (on the production side) and using simple macroeconomic indicators (on the demand side), the argument has been put forward for the justification for reindustrialisation in Poland in order to strengthen the foundations of economic growth in that country and reduce the real divergence between Poland and economies such as the United States, Germany or the United Kingdom, and, above all, with highly developed EU countries with which Poland has entered into trade liberalisation.

The first part of the work covers the theoretical basis of the problems considered, which will then be analysed and concluded later in the study. The subject of theoretical considerations is mainly such issues as the effects of deindustrialisation and industrialization of economies, which are anchored in the literature. The distinction between these effects will be presented for developed and developing countries, which will allow to strengthen later conclusions for the Polish economy. Then, in the empirical part of the article, simple measures and economic dependencies were used (first Kaldor's law, state of saturation of demand, GDP per hour worked, GDP per capita), on the basis of which interpretations were made in order to outline the possible advancement of industrialisation and deindustrialisation in Poland.

Theoretical conditions of the economic consequences of industrialisation and deindustrialisation of market economies

Industrialisation is understood as an increase in the share of industrial processing in production and employment of a given economy.

Socio-economic processes triggered by industrialisation lead over time to the natural effect of deindustrialisation[3] As deindustrialisation continues, productivity growth in the economy increasingly depends not so much on productivity growth in industry as on productivity growth in services. However, the evolution of productivity in the service sector will depend on the future development of areas such as information technologies and changes in the competitive structures of the sector. Technological development means that certain types of services will develop at a much faster rate than others, and therefore significant structural changes are taking place in this sector over time. It should be

[2] Level of net national income (GNI) per capita above USD 12,736 calculated using the World Bank Atlas method (as of 1 July 2015); http://data.worldbank.org/news/new-country-classifications-2015 (19 May 2016).

[3] De-industrialisation can be classified in two categories - measured by the relative decline in industry's share of total production or measured by the relative decline in industry's share of total employment.

noted, however, that product innovation in industry will continue to play an important role because of the dispersion effect that will promote productivity growth in services (R. Rowthorn, R. Ramaswamy 1997).

The table below summarises the main effects of the process of industrialisation and deindustrialisation of market economies.

Table 1: Summary of the main disclosed effects of industrialisation and deindustrialisation of market economies

breakdown criterion	affecting changes in the production structure	affecting changes in the structure of employment
Industrialisation		
caused by technological progress	productivity gains in industrial processing generate *a structural change bonus in the* form of *per capita* income gains	reallocation of resources from agriculture to industry
	favourable conditions for capital accumulation in the industrial processing sector (more than in agriculture or services) through greater opportunities for concentration in this sector	mass access to the labour market of low-skilled labour resources
	favourable conditions for the disclosure of economies of scale	
	favourable conditions for technological development both in terms of tangible and intangible progress	
	technology diffusion from industry to other sectors of the economy and within industry itself (*spill over effects*) - positive externalities from investment in knowledge and technology	
	strong *linkage* effects - positive externalities resulting from investments in a given sector	
caused by changes in consumption patterns	the increase in per capita income results in a decrease in the share of expenditure on agricultural products in total expenditure, and the share of expenditure on industrial products increases	
deindustrialisation		
caused by technological progress	relatively low increases in labour productivity in services reduce the possibility of generating income comparable to that of the industrial sector	a declining share of employment in industrial enterprises in developed economies
	relatively weak productivity growth results in a relatively large increase in the price of current services	stagnation of average real wages in services and increase in wage inequalities
	den investments - collapse of old industries	Declining trade union strength
caused by trade and globalisation	the rapid growth of trade cooperation and capital mobility between developed and developing countries	as the reallocation of input resources to the service sector increases, the economy's revenues tend to fall
	relocation of mature industries to developing countries	the massive increase in unemployment in most developed

		European economies since the early 1970s
caused by changes in consumption patterns	income growth is changing the structure of consumption towards an increase in the use of services, these are relatively expensive (low productivity) and therefore a correspondingly high per capita income is necessary for their demand for the economy	opening up new employment opportunities as soon as sufficient demand for services is reported

Source: study based on: Shirmai 2012, pp. 410-417; Norton R. D., Industrial Policy and American Renewal, Journal of Economic Literature, vol. XXIV, 1996, p. 17;

With the shifting of production factors between sectors (from industry to services) as well as between countries (from highly developed countries to developing countries), new phenomena emerge that occur on their own or coexist with earlier phenomena - wage inequalities, the weakening role of trade unions, a massive increase in unemployment among the uninvolved and low-skilled.

The general process of structural change in economies is revealed in the sequence of economic changes. The emerging variations in the rate of change in labour productivity between sectors, sections or divisions of production in the economy trigger changes in employment, and these entail changes in prices (inverse of productivity) and changes in the structure of nominal production (the level of real production remains stable).

Consequences of deindustrialisation in developing countries

Most highly developed economies are in a phase of structural change, which, as a result of natural reallocation processes, is registering deindustrialisation trends, especially in the area of employment changes. Over the last century, the productivity-driven industrialisation of these countries has enabled multiple increases in purchasing power (different for individual goods) (T. Picketty 2015).

The growing role of the service sector in the structure of the economy, in which the national income generated so far has not allowed for a stable increase in the sale of services, is a significant burden on the path of rapid economic growth. This situation mainly concerns developing economies without strong comparative advantages.

The identified negative effects of premature deindustrialisation come down mainly to highlighting the advantages arising from the activities of the processing industry sector:

1. Production activities developed in the processing industry are strongly pro-efficient, which is due to the possibility of technological progress (this phenomenon is much less observed in the services sector)
2. The processing industry sector absorbs significant amounts of unskilled labour;
3. Goods resulting from processing production are easily marketable and, in a low-income economy where demand is very insatiable, there is no demand restraint (D. Rodrik 2016).

In highly developed economies, deindustrialisation has become more apparent in employment than in production. Technological progress in these countries remains the main determinant of these structural changes. However, a large proportion of the labour redeployment concerns unskilled workers, who are being pushed out of production processes by increasingly advanced technologies.

In developing economies, however, as in developed economies, the share of technological progress in deindustrialisation processes is less obvious. D. Rodrik is more inclined to explain these changes by the adjustment of relative prices (a fall in the prices of relative processing goods as a result of differing technological progress) as a result of increasing trade cooperation between countries and globalisation. At the same time, economies that have been successful in developing strong comparative advantages on international markets have seen a weak impact of deindustrialisation on employment (D. Rodrik 2016).

Materials, Methods, Results and Discussion

Analysis of industrialisation conversions in Poland

Methodological Approach

Kaldor's indication of a strong relationship between growth rates of industrial processing and GDP growth is included as Kaldor's first law (production-side approach). It says that the more production growth in manufacturing exceeds GDP growth, the higher the GDP growth (S. Dasgupta, A. Singh 2006; N. Kaldor, 1966 i 1967). Based on this relationship, the discrepancy between growth rates in industrial processing and services and GDP growth rates in Poland between 1995 and 2018 will be shown. This approach will also illustrate de- and industrialisation trends in that country.

On the basis of data on the development of changes in demand / demand for industrial processing products in the country, the state of saturation of markets with industrial goods produced in Poland will be shown (approach from the point of view of changes in the demand / demand structure).

The changes in the structure of employment between 1995 and 2018 for particular sectors of production in Poland will allow to illustrate the intensity and direction of de- and industrialisation trends.

Data on GDP per hour worked as a percentage of the US level (US=100) and on GDP per capita in constant prices, PPS, USD, GDP p. c. (USA = 100) will additionally shed more light on the analysed dependencies in the context of the overlap of real convergence processes of the Polish economy.

Outline of the conditions for changes in the industrial sector in Poland

The years of economic transformation in Poland have brought significant damage to the industrial potential of the Polish economy. Among production entities in industry established before 1949, and those built in the years 1949-1989, 43% of the number of plants (subject to the survey) was recorded, as a result of which 37% of assets, 38% of production and almost 50% of jobs in the surveyed plants in this sector were lost (70% of the total number of plants in industry was surveyed). The whole sectors - light industry, mining, metallurgy, electronics, IT, shipyards, mechanical engineering in the Śląskie, Mazowieckie, Łódzkie and Dolnośląskie Voivodships - suffered a particular loss. As a result, during the 24 years of economic transformation, the industry's output sold grew by an average of 3.6% per annum, which was twice as high as during the industrialisation of the socialist economy.

Currently, in Poland, the processing industry is significantly based on small and medium-sized enterprises (20% of employees in industry, a 9-fold increase in production sold since 1989), which does not, however, lead to the formation of a stable basis for the growth of production capacity with a strongly developed development and research base (the number of people working in research and development in the majority of large enterprises in 2012 was 14.5 thousand, in 1988 it was 60.5 thousand). As a result, production in industry in Poland (mainly in the automotive, electronics and engineering industries) is not able to carry out the "full cycle of final production" and is mainly based on assembly of industrial products from imported components. Such a picture of the economic situation of the industry is not without influence on such economic figures as: about 2 million of registered unemployed people (reaching even 3 million in some periods of transformation), over 2 million emigrants - working people, in 40% with higher education (S. Paradysz 2015).

Conclusions of the study

The ratio of changes in real production (measured by volume of added value) in manufacturing and services to changes in real production in the whole economy is to show, on the basis of Kaldor's observations, the intensity of industrialisation processes in a given country. For the Polish economy, this relation is presented in Table 2.

Table 2: Value added volume index (1995 constant prices) for the years 1995-2018 in sectors and sections of the Polish economy

Years	Total	A	B	C	D	E	F
1995	100	100	100	100	100	100	100
1996	105,71	101,78	104,82	109,00	103,36	105,87	103,85
1997	112,58	100,22	100,25	124,05	103,99	113,79	105,45
1998	118,03	103,59	89,44	132,50	101,69	121,35	107,71
1999	123,13	99,52	88,00	138,07	100,26	130,15	109,63
2000	128,05	95,83	89,53	147,61	106,27	135,87	113,05
2001	130,01	106,63	83,91	148,16	112,02	137,87	115,63
2002	131,88	101,05	77,55	149,10	106,80	140,18	118,22
2003	136,59	102,70	76,47	163,33	108,04	142,41	123,17
2004	143,62	106,87	72,54	184,10	117,67	148,86	124,16
2005	148,55	99,04	71,25	191,69	122,02	155,95	126,17
2006	157,41	97,77	65,26	222,64	111,25	165,50	128,73
2007	168,00	96,47	65,86	251,95	111,33	178,93	132,14
2008	176,31	98,66	70,14	273,93	110,39	189,32	134,95
2009	179,36	109,46	57,89	266,03	143,51	201,59	127,27
2010	190,47	73,80	56,93	303,58	161,54	218,01	135,86
2011	198,31	102,56	56,49	324,24	187,81	233,45	137,36
2012	201,57	95,50	56,38	326,55	188,39	247,89	138,19
2013	207,07	105,34	58,41	358,32	191,54	262,22	138,51
2014	213,11	98,35	54,98	366,49	181,21	290,03	142,92
2015	220,94	91,57	59,04	392,06	161,61	325,72	145,58
2016	228,40	102,87	58,15	409,49	177,19	353,99	147,03
2017	238,54	103,68	53,37	435,50	182,53	388,21	148,59
2018	251,31	84,63	51,85	441,75	196,83	448,69	154,13

Own calculations.

Adopted division of the economy into sectors and sections based on the PKD 2007 classification code:

A - Agriculture, forestry, hunting and fishing.
B - Mining and quarrying.
C - Industrial processing.
D - Electricity, gas, steam, hot water and air conditioning supply. - Water supply; sewerage, waste management and remediation activities.
E - Market services.
F - Non-market services (social and personal).

The first Kaldor's law is revealed the more variables are presented for years distant from the base year (1995), i.e. the weaker the impact of prices is reflected in variables. Thus, it can be concluded that on the production side of the Polish economy there is a strong industrialisation process. In market services (those inextricably linked to the growth of manufacturing output of the processing industry), the excess of the growth rate of value added is also significant, which indicates that there are ongoing processes of servicing in the economy, which are included from the production side / category.

As shown in the theoretical part, industry, especially industrial processing, is a key determinant of the economic growth process (G. Dosi, F. Riccio, M. E. Virgillito 2020). As long as global production and imports increase (along with employment), a process of industrialisation is observed. Once the saturation point is reached (when

manufacturing output in manufacturing begins to stabilise and productivity continues to increase), there is a natural reallocation of the labour factor to the service sector.

The inclusion on the demand side (Table 3) will aim to indicate whether there has been a state of saturation with industrial processing production and thus whether it is possible to conclude on the natural pace and direction of the structural changes in question.

Table 3 is shown:

- domestic demand volume index (fixed prices 1995),
- industry output volume index (C) (in constant 1995 prices),
- GDP volume index (fixed prices 1995),

for the period (1995-2018).

Table 3. Volume index:
- domestic demand,
- industrial output (C),
- GDP at constant 1995 prices.

Years	National demand	C	GDP
1995	100,00	100,00	100,00
1996	118,59	109,50	117,97
1997	135,35	124,17	134,14
1998	149,63	131,50	148,98
1999	159,37	134,52	158,03
2000	172,08	145,69	167,63
2001	177,18	139,72	172,77
2002	181,07	140,69	176,05
2003	182,98	154,34	177,39
2004	189,99	176,41	186,11
2005	193,76	183,12	190,86
2006	197,29	205,27	194,19
2007	203,18	228,88	201,37
2008	211,88	238,95	209,19
2009	217,60	219,06	217,16
2010	222,38	238,28	220,80
2011	231,28	259,54	227,95
2012	237,98	259,69	233,37
2013	237,52	268,37	234,17
2014	236,67	276,55	235,37
2015	235,92	294,26	237,80
2016	236,08	304,36	238,64
2017	240,34	326,10	243,11
2018	244,45	339,08	245,93

Own calculations.

In Poland, global production in industrial processing continues to grow, and these changes are the main source of economic growth in Poland (measured by GDP) and naturally create demand for market services. This means that demand is not saturated with industrial products.

Moreover, although the demand in the economy (global production plus imports) of Poland is growing, mainly in the processing industry, employment in this sector is decreasing the most (see Table 4).

Table 4: Employment structure in the years 1995-2018 (total economy=100)

Years	Total	A	B	C	D	E	F
1995	100	15,61	2,67	23,21	2,01	34,25	22,24
1996	100	16,84	2,54	23,63	1,94	34,93	20,12
1997	100	16,33	2,36	22,99	1,87	36,67	19,78
1998	100	16,20	2,15	22,46	1,83	37,71	19,64
1999	100	16,31	1,89	21,54	1,82	38,52	19,92
2000	100	16,42	1,67	20,01	1,77	37,52	22,62
2001	100	16,90	1,68	19,43	1,91	37,02	23,06
2002	100	16,93	1,63	19,06	1,86	37,47	23,05
2003	100	16,97	1,58	19,30	1,84	37,40	22,91
2004	100	16,86	1,49	19,77	1,77	37,01	23,08
2005	100	16,63	1,44	19,46	1,69	37,60	23,18
2006	100	16,23	1,37	19,71	1,64	38,23	22,83
2007	100	15,61	1,31	19,95	1,56	39,26	22,31
2008	100	15,26	1,32	19,27	1,52	40,41	22,22
2009	100	15,42	1,33	17,56	2,09	40,86	22,74
2010	100	16,84	1,23	17,27	2,13	40,11	22,43
2011	100	16,70	1,23	17,17	2,08	40,47	22,35
2012	100	16,78	1,23	16,98	2,02	40,41	22,58
2013	100	16,70	1,18	17,00	1,98	40,20	22,94
2014	100	16,38	1,10	17,26	1,91	40,49	22,86
2015	100	16,08	1,00	17,41	1,85	40,94	22,72
2016	100	15,60	0,91	17,53	1,80	41,67	22,49
2017	100	15,19	0,88	17,65	1,76	42,27	22,25
2018	100	14,94	0,87	17,63	1,78	42,43	22,36

Own calculations.

This type of pattern of structural change, which is characteristic (in most cases) of developing countries, is revealed mainly in the conditions of trade liberalisation of these countries with highly developed countries. Under such conditions, because growing demand is met by competitive production from developed countries.

In highly developed countries, changes in employment in industry are strongly dependent on the demand for industrial products. With increasing demand, the industrial sector absorbs the labour force, and the reallocation of labour from industry to the services sector follows the stabilisation of demand for industrial products, which has been reflected in these countries with relatively high GDP *per capita*.

In Poland's economy, there are large changes in output, but without an increase in the share of total employment in the processing industry. Observing the structure of demand, industrialisation processes are revealed in the economy. On the employment side, structural changes indicate deindustrialisation.

As a result, when comparing the Polish economy with the market-advanced economies of the euro area or the UK, a real development gap appears - a conclusion based on the data / research results presented in (Table 5, Table 6).

Table 5: GDP per hour worked, as a percentage of US level (US=100)

GDP per hour worked			As % of the USA (USA=100)			
Country	**United States**	**Germany**	**United Kingdom**	**Poland**	**Euro area (19 countries)**	**European Union (28 countries)**
1970	100,0	69,4	65,3	..	..	..
1971	100,0	69,8	67,0	..	..	..
1972	100,0	71,6	69,3	..	..	..
1973	100,0	73,5	68,9	..	..	..
1974	100,0	77,1	69,0	..	..	..
1975	100,0	77,9	66,7	..	..	..
1976	100,0	79,6	68,0	..	..	..
….1977	100,0	82,0	69,6	..	..	..
1978	100,0	83,9	72,3	..	..	..
1979	100,0	85,9	74,2	..	..	..
1980	100,0	86,6	75,0	..	..	..
1981	100,0	86,0	77,6	..	..	..
1982	100,0	87,2	80,2	..	..	..
1983	100,0	87,7	82,2	..	..	..
1984	100,0	88,1	79,8	..	..	..
1985	100,0	88,5	79,3	..	..	..
1986	100,0	87,9	79,6	..	..	..
1987	100,0	88,5	81,8	..	..	..
1988	100,0	89,7	80,8	..	..	..
1989	100,0	92,0	80,4	..	..	..
1990	100,0	93,7	79,9	..	..	..
1991	100,0	95,7	80,5	..	..	..
1992	100,0	94,9	81,5	..	..	..
1993	100,0	96,3	84,2	29,0	..	..
1994	100,0	98,0	85,6	30,6	..	..
1995	100,0	99,2	87,2	32,4	88,5	74,5
1996	100,0	98,3	88,3	33,0	87,2	73,8
1997	100,0	98,1	90,0	34,1	87,5	74,2
1998	100,0	97,0	87,9	34,7	87,2	74,1
1999	100,0	95,7	86,5	36,0	85,7	73,2
2000	100,0	94,0	89,0	37,2	85,7	74,0
2001	100,0	94,7	89,2	37,9	85,6	74,3
2002	100,0	94,5	89,9	39,8	85,5	75,1
2003	100,0	93,5	89,3	39,7	83,0	73,5
2004	100,0	92,8	89,9	40,6	81,5	72,8
2005	100,0	90,2	86,0	39,4	79,9	71,2
2006	100,0	90,9	88,0	39,9	81,9	73,1
2007	100,0	91,2	86,5	40,7	82,0	73,3
2008	100,0	91,3	87,6	41,7	82,5	74,2

2009	100,0	87,7	82,6	42,4	80,4	72,0
2010	100,0	87,7	83,8	45,9	80,2	72,4
2011	100,0	90,9	83,4	48,7	81,8	74,0
2012	100,0	90,9	83,0	49,7	82,3	74,3
2013	100,0	92,6	83,8	50,5	84,4	75,9
2014	100,0	93,8	82,8	50,1	84,2	75,6
2015	100,0	93,1	83,8	50,5	84,2	76,0
2016	100,0	97,5	84,5	52,0	87,1	78,3
2017	100,0	99,2	85,2	53,7	88,3	79,6
2018	100,0	97,4	83,8	55,2	87,0	78,8
2019	100,0	97,0	83,9	57,1	87,2	79,3

Own calculations.

The data presented in Table 5 are from the 1970s (since 1970), because this is the period of the highest growth of the industrial phase (exactly the beginning of deindustrialisation processes) in the US and UK economies, where deindustrialisation processes were the first to occur. In the German economy, industrialisation has lasted the longest, and its processes are strengthened by active state policy to this day (the share of industry in total employment in the German economy is on average about 10% higher than in the UK economy, and highly developed economies of EU countries (19 countries). Hence, the GDP per hour worked index used in the research is on average about 10% to 15% higher for the German economy. The income and productivity measure used in Table 5 indicates the average level of labour productivity in the economy reflected in income (or nominal value added), drawn by large (the largest of all sectors) industrial productivity growth rates (R. Rowthorn, K. Coutts 2004). In the Polish economy, which entered the deindustrialisation phase very earlier (at a relatively very low level of GDP per capita in relation to highly developed countries, as presented in Table 6), the GDP per hour worked ratio was (at the beginning of the deindustrialisation process in Poland) in 1995 at 32,4% and was more than 100% lower than the level of this indicator (69.4%) for the German economy in 1970 (35 years earlier), while in the equivalent year 1995 it was already almost 200% lower than the German economy (at the level of 99.2%), and the EU 12 most developed economies (88.5%) and the UK (87.2%) It is puzzling that with such drastic differences in the level of real development of the economy (differences in the development of the real structure of the economy), Poland's economy was liberalised with that of the EU-12, and above all, trade liberalisation. Despite submitting to international competition under such unequal conditions of real economic development, in 2019, the Polish economy reduced the differences in the level of GDP per hour worked (57.1%) to the highly developed countries, which are 97% in Germany, 87.2% in the EU-12 and 83.9% in the UK.

Table 6: GDP per capita, constant prices, PPS in USD, GDP p. c. US = 100 (Expenditure approach)

Gross domestic product per head. (expenditure approach)					**Per head, constant prices, constant PPPs, OECD base year**	
Country	**United States**	**Germany**	**United Kingdom**	**Poland**	**Euro area (19 countries)**	**European Union (28 countries)**
1970	25258,4	20855,3	18147,3	..	..	..
1971	25763,3	21334,0	18683,9	..	..	..
1972	26829,8	22146,8	19432,6	..	..	..
1973	28075,1	23134,1	20654,0	..	..	..
1974	27667,6	23333,2	20136,2	..	..	..
1975	27344,5	23219,2	19843,0	..	..	..
1976	28539,7	24481,0	20424,1	..	..	..
1977	29560,8	25349,6	20935,8	..	..	..
1978	30869,1	26140,0	21820,6	..	..	..
1979	31496,1	27217,2	22613,7	..	..	..
1980	31053,8	27530,5	22119,0	..	..	..

1981	31525,9	27635,6	21933,8	..	..	..
1982	30662,9	27555,7	22398,0	..	..	..
1983	31779,1	28065,3	23333,3	..	..	..
1984	33781,7	28959,9	23823,4	..	..	..
1985	34878,6	29702,0	24747,8	..	..	..
1986	35760,0	30372,7	25468,9	..	..	..
1987	36668,0	30787,5	26785,7	..	..	..
1988	37853,9	31766,6	28265,4	..	..	..
1989	38875,2	32768,7	28912,2	..	..	..
1990	39166,0	34192,1	29042,4	10928,3	..	..
1991	38606,8	35665,0	28621,5	10140,9	..	..
1992	39439,0	36112,9	28663,5	10378,5	..	..
1993	40001,6	35563,1	29311,5	10752,9	..	..
1994	41112,0	36323,6	30361,0	11312,9	..	..
1995	41719,5	36811,4	31042,1	12092,2	32819,2	29121,5
1996	42791,6	37036,1	31739,5	12819,9	33272,8	29619,9
1997	44163,4	37679,5	32878,3	13646,9	34075,1	30416,1
1998	45608,5	38468,5	33982,8	14279,7	35026,5	31320,7
1999	47233,5	39206,1	35022,6	14948,0	35972,8	32218,8
2000	48648,4	40330,6	36102,2	15635,3	37232,1	33379,3
2001	48647,1	40978,6	37033,3	15832,5	37912,9	34074,3
2002	49025,1	40866,9	37732,6	16163,8	38067,6	34437,6
2003	49964,4	40595,2	38795,5	16755,8	38106,0	34753,3
2004	51396,3	41119,1	39509,1	17623,2	38770,1	35487,4
2005	52711,1	41480,6	40453,0	18247,9	39203,9	36081,6
2006	53703,4	43150,7	41298,0	19390,3	40283,2	37153,4
2007	54189,1	44534,3	41962,3	20763,1	41265,6	38116,1
2008	53609,2	45088,7	41502,5	21645,5	41229,1	38147,4
2009	51790,6	42669,9	39460,7	22043,7	39249,5	36376,8
2010	52682,9	44563,7	39910,1	22818,7	39993,9	37068,1
2011	53113,6	46318,1	40188,6	23958,0	40564,7	37649,2
2012	53924,4	46424,6	40514,1	24338,2	40100,9	37402,4
2013	54541,8	46500,5	41122,0	24697,5	39915,8	37436,5
2014	55516,7	47330,2	41873,5	25529,0	40386,5	37997,1
2015	56812,5	47622,3	42522,2	26529,0	41085,6	38759,7
2016	57375,4	48292,9	42982,7	27361,8	41723,2	39415,2
2017	58336,1	49364,9	43536,0	28716,6	42721,6	40374,0
2018	59712,4	49840,7	43856,7	30259,7	43404,4	41074,8
2019	60709,9	50004,7	44233,8	31533,5	43831,6	41579,3

Own calculations.

The GDP per capita index in 1995 for the Polish economy, which, as indicated above, was entering a phase of deindustrialisation at that time, was 12092.2, which is almost 300% lower than that of the United States, 250% from Germany, 200% from the EU of 19 countries and the United Kingdom. Comparing the GDP per capita of the Polish

economy in 1995 with the GDP per capita of the 1970s (35 years of difference) of the highly developed countries that were undergoing deindustrialisation in those years, the difference in the levels of this indicator was around 250% to the United States, 200% to Germany and 160% to the United Kingdom respectively. According to the studies presented, the delay in changing the structure of Poland's real economy to highly developed countries in 1995 was around 35 years, while the real divergence is already over 40 years. Despite such a long delay in the real development of the Polish economy in 2019, the difference in GDP per capita has narrowed, but the delay in real economic development still remains significant.

The measures / criteria adopted for the development gap indicate even twice as low a level of GDP per hour worked or GDP per capita at constant prices. This means not only poor opportunities to develop Poland's comparative advantages with these countries, but also the need to conduct trade policy carefully. Such a significant real divergence indicates unambiguously the risk of deepening economic integration by monetary integration with these countries (the risk of Poland adopting the common currency, the euro) on equivalent terms.

Summary

If deindustrialisation is treated as a state of equilibrium at a low level of growth caused by imperfections resulting from failures of coordination at the level of state policy, then the validity of the approach to an active industrial policy towards reindustrialisation is strengthened.

Basing economic growth models appropriate to the economic conditions in question on pillars other than those consistent with industrialisation may lead a country on a path of average economic growth or to economic stagnation (G. Dosi, F. Riccio, M.E. Virgillito 2020). Building growth on services, even "technologically progressive" ones (i.e. finance, communication and information technology, robotics, research and development) and easily transferable could largely be an equivalent alternative to industrialisation, but resource requirements (highly qualified labour) tend to disqualify developing countries in this approach (D. Rodrik 2016). It should also be borne in mind that their share of total added value is only about 10%. On the other hand, the establishment of the basis for the production growth of developing economies on services, which are characterised by low levels of productivity and poor commercial capacity (e.g. personal services), is limited by the income of the economy and thus cannot lead to the achievement of the goals set in the catching-up process (A. Karpiński, S. Paradysz, P. Soroka, W. Żółtkowski 2015). Concentrating political resources and intellectual efforts on developing a stimulation of industrial development that is appropriate for the Polish economy is an important element of pro-development activities in the country for the next decades. W. Eucken in the first half of the 20th century pointed to industrialisation as social and economic processes which particularly revealed the need to develop national economic governance (rules and rules of the market game) appropriate to the given economic conditions. The contemporary complexity and dynamics of the economic changes taking place (population movements, successive stages of the manufacturing apparatus, revolutionary role of technical knowledge) have far exceeded the area of economic behaviour, which additionally emphasizes the need to adjust economic policy. One of the proposals of economic policy is to safeguard competition and to focus on "respecting the regularities that are revealed in the economic process and clearly intend to activate them (W. Eucken 2005). In such an orderly economy, economic decisions are determined by the market, which is headed by a law that consistently blocks all manifestations of monopolisation of economic power (E. Mączyńska, P. Pysz 2003).

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Regulations in The Economy and The Change of The Real Structure of The Economy Under Conditions of Systemic Transformation

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The economies of transforming Central and Eastern Europe, as countries burdened with multiple barriers, which are the remnants of the socialist economic system, are included as an area of research into the possible impact of regulation on the directions and pace of change in employment and production structures. It is often possible to point out certain significant similarities between the changes taking place in these countries and those taking place in countries that are advanced in the development of a market economy. Changes in economic structures are the result of numerous, varied and separate processes. The legacy of the planning economic system is the backwardness associated with the development of the services sector, which has made up for its development significantly in response to the needs of developing business in the country and the freedoms carried by law for private enterprises. Deregulation has been widely undertaken, often as part of a structural adjustment programme, mainly with the aim of relieving market economy mechanisms of their regulatory constraints and making fuller use of their developmental potential. The scale of the impact of regulation on economic growth was strongly determined by the regulation of key sectors of the economy.

The aim of the article is, on the basis of the analysis of key economic measures, to indicate and determine the possible relationship between the regulatory burden, generally understood as state control, restrictions on entrepreneurship, free trade and investment, and the shape of the structure of selected CEE economies.

Keywords: real structure of the economy, deindustrialisation, reindustrialisation, deregulation, regulation, systemic transformation, economic governance, market competition.

Introduction

The regulation is a response to the socio-economic challenges posed by market structures. However, although the regulatory framework must take into account the intra-sectoral structure, the relationships between actors in the individual markets and in the sector as a whole are a decisive factor in shaping the sector's performance. Regulation is only a stimulating or blocking element in this process and rarely becomes a determining factor (J. Stern 2006). Economic development is always seen in terms of new products and processes, but it seems to overlook the fact that every new product replaces both the old one and the old processes. Economic change is inextricably linked to the process of destruction. Those who lose out in economic growth want to eliminate these losses, but this can only be done by halting growth, which threatens to create losses. Thus, either individually or in groups, society's search for economic security leads to a reduction in the real rate of growth by generating a tendency to create a ossified society which is largely unable to adapt to new conditions. For example, L. Thurow calls this phenomenon the inability to play a zero-sum economic game (L. Thurow 1980). The economies of developing countries undergoing economic transition are a good laboratory for assessing the impact of alternative economic policy approaches and market evolution on the economic health of enterprises (M. Bałtowski, M. Miszewski 2007).

The transforming economies of Central and Eastern Europe are countries with multiple barriers that are the remains of the socialist economic system. However, it is often possible to point out important similarities between the changes taking place in these countries and those taking place in countries which are advanced in the development of a market economy. The changes in economic structures are the result of numerous, significantly different and separate processes. The legacy of the planning economic system is the backwardness associated with the development of the services sector, which has made up for its development significantly in response to the needs of developing business in the country and the freedoms carried by law for private enterprises. Deregulation has been widely undertaken, often as part of a structural adjustment programme, mainly with the aim of relieving market economy mechanisms of their regulatory constraints and making fuller use of their developmental potential. The scale of the impact of regulation on economic growth was strongly influenced by the quality of state management, including sectoral regulation (H.

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Jalilian, C. Kirkpatrick, D. Parker 2006).The aim of the article is to indicate and determine the possible relationship between the regulatory burden, generally understood as state control[1], restrictions on entrepreneurship, prohibition of free trade and investment, and the shape of the structure of selected Central and Eastern European economies.

The conditions for structural change in transforming economies.

The economic transformation of post-socialist countries has forced the reallocation of their production factors. The transformation is often presented in Polish literature as "a process of successive elimination of structural deformations" remaining after the period of functioning of centrally planned economy. Companies were "sensitized to efficiency" (P. Glikman 2002; P. Glikman, A. Lipowski 1997; S. Gomułka 1998).

The literature has identified numerous factors determining the evolution of the structure of the economies of the transforming countries. As in developed economies, structural changes are caused by two main factors, i.e. changes in labour productivity caused by technological progress and changes in the structure of consumption. These variables were influenced - in turn - by a series of events that, by changing their sequences and intensity, shaped the final picture of the structure of the economy. Table 1 presents the most important factors shaping the structure of the economy by influencing changes in productivity and consumption structure in the developing economies of Central and Eastern Europe.

Table 1: Selected factors of structural change in individual sectors for developed and developing economies

<table>
<tr><th colspan="2">agriculture</th><th colspan="2">industry</th><th colspan="2">services</th></tr>
<tr><td colspan="6">developed economies</td></tr>
<tr><td>changes in productivity in the sector</td><td>changes in consumption patterns</td><td>changes in productivity in the sector</td><td>changes in consumption patterns</td><td>changes in productivity in the sector</td><td>changes in consumption patterns</td></tr>
<tr><td colspan="6">developing economies</td></tr>
<tr><td>changes in productivity in the sector caused by increased imports</td><td>changes in the structure of consumption due to the marketisation of prices</td><td>changes in productivity in the sector caused by increased competition</td><td>changes in the structure of population consumption</td><td>technological advances</td><td>changes in consumption patterns</td></tr>
<tr><td>no restructuring</td><td rowspan="3">liberalisation of foreign trade</td><td>restructuring affected by significant shortcomings</td><td>liberalisation of foreign trade</td><td rowspan="3">increasing human capital in enterprises</td><td rowspan="3">strong income disparities</td></tr>
<tr><td rowspan="2">introducing competition in national markets</td><td>change of organisational forms of restructured and newly created companies</td><td rowspan="2">reorientation of foreign trade - changing the structure of exports in particular towards the demand of EU countries</td></tr>
<tr><td>privatisation of companies</td></tr>
</table>

Source: Own study

The deepest changes in the product structure of the economy occurred in the industrial sector. Industry has been the one that has seen the strongest change in labour productivity, and it is also the one that has seen the most income changes in the economy. Alongside changes in the volume of internal demand, exports were a strong factor of change. The reorientation of exports took place against the background of a sharp decline in exports of highly processed goods, i.e. machinery (previously exported to the Comecon countries[2]), towards unprocessed and partially processed products, which were in demand in the competitive markets of Western European economies. In Poland, there was mainly a decline in the production of goods previously exported to eastern markets, and over time, the production of machinery and products from the chemical industry gradually gained positions in western markets. In Hungary, the 1995 reform package resulted in a decline in textile, chemical and several other industries, but exports included the production of more technologically advanced goods. In the Czech Republic, on the other hand, many more industries were reduced after the cessation of trade with the Comecon countries, and the largest resumption of production took

place in the transport sector. In Slovakia, the greatest fall was recorded in arms production. Signs of trade revival in the country were seen in foreign investment in the transport and light industry.

In post-socialist countries, the emergence of new, smaller companies, the use of existing technology and equipment for contracts with Western companies, the emergence of new foreign investment, mainly in the automotive, electronics and electrical sectors[3], has resulted on the one hand in increased industrial production dynamics. On the other hand, however, it has made production in these countries largely dependent on foreign capital, which, based on low labour costs, has drained profits and wages abroad.

In the market economies of today's highly developed countries, the impact of two decisive factors on changes in the structure of production and employment has varied from changes in productivity to profitable elasticity of demand (Engel's law) or saturation of demand (J. Fourastié 1972) to changes in the structure of demand. In post-socialist transformation economies, the main factors of changes in the structure of employment remained most often unchanged (changes in productivity, changes in the structure of demand), while the broadly understood specificity of the transformation process itself, as well as completely different economic conditions, meant that the stylized facts occurring in transformation economies differed from those that took place in today's already highly developed world economies. The specificity of the post-socialist transition process with regard to structural change was based more on the emergence of market demand for products and services as a result of the market price mechanism (marketisation of prices) than on a change in global demand as a result of an increase in society's income (E. Kwiatkowski 1980; A. Lipowski 1994; A. Karpiński, S. Paradysz, J. Ziemiecki 1999). The structure of demand revealed in this way, after a break in the development of the market economy during the socialist period (which did not result from an increase in GDP *per capita* and real economic changes, but from the marketisation of prices[4]), led directly to changes in the structure of production and employment. In addition, increased competition led to an increase in productivity, mainly due to an increase in economic rationality of labour factor management (decrease in over-employment) (A.B. Czyżewski, W.M. Orłowski 2000). Organisational changes in forms of economic activity resulting from divisions and bankruptcies of state-owned enterprises[5] had their significant share in the increase in labour productivity. The opening of the economy to the world and the inflow of foreign capital, as well as the liberalisation of trade, and in particular the process of integration with the European Union, implied changes in the structure of demand (related to trade) and the structure of production, and thus also the structure of employment (E. Kwiatkowski 1980), and, moreover, opened developing economies to competition from highly developed economies. As a result of these changes, productivity growth determined the extent to which individual sections of the economy could benefit from increased demand, increasing production and employment. Production, whose productivity levels were outstripping external competition, was eliminated from the market by imports, which resulted in an increase in domestic production and thus employment below that of demand.

Materials, methods, results and discussion

In the post-planning economies of Central and Eastern Europe, changes in the structure of employment have not been accompanied by sufficiently strong phenomena of a decrease in the share of agriculture in production and employment. The share of industry in production and employment remained, however, at a level which moderately stimulated increases in labour productivity. However, phenomena characteristic of premature deindustrialisation and servicing have begun to appear.

Table 2 presents an outline of changes in the structure of production and employment in selected post-socialist transformation countries.

Table 2. Economic structure by agricultural, industrial and service sectors in selected countries in the production and employment category, (percentage, whole economy = 100) for 1995-- 2019 Structure of the economy in the production category: gross value added (previous year's prices, EUR million, total = 100).

TIME	GEO (Labels)	Euro area - 19 countries	Czech Republic	Hungary	Poland	Slovakia
	Agriculture	0,0	4,1			2,6
1995	Manufacturing	0,0	24,0			22,7
	Services	0,0	71,9			74,8
	Agriculture	2,3	3,5	5,3	3,5	2,1

2000	Manufacturing	19,7	26,1	22,6	18,3	22,3
	Services	78,0	70,4	72,1	78,1	75,6
	Agriculture	1,9	2,7	4,6	3,5	1,9
2005	Manufacturing	17,8	26,9	22,4	18,8	24,6
	Services	80,3	70,4	73,0	77,6	73,6
	Agriculture	1,5	1,5	2,7	2,8	1,8
2010	Manufacturing	16,2	24,4	21,8	19,2	20,4
	Services	82,3	74,1	75,5	78,0	77,8
	Agriculture	1,7	2,7	4,5	2,8	2,9
2015	Manufacturing	16,5	26,9	24,1	19,3	22,8
	Services	81,8	70,4	71,4	77,9	74,3
	Agriculture		2,2	3,9	2,6	2,8
2019	Manufacturing		25,4	21,6	19,2	20,4
	Services		72,4	74,5	78,2	76,8

Structure of the economy in the employment category (employed in thousands of people, total = 100).

TIME	GEO (Labels)	Euro area - 19 countries	Czech Republic	Hungary	Poland	Slovenia
	Agriculture	0,0	5,3	8,5	22,1	14,0
1995	Manufacturing	0,0	26,6	23,2	21,2	30,0
	Services	0,0	68,1	68,3	56,7	56,0
	Agriculture	4,7	4,7	7,0	20,2	11,7
2000	Manufacturing	17,4	27,4	24,5	20,1	27,2
	Services	78,0	67,9	68,5	59,7	61,1
	Agriculture	4,0	3,7	5,1	17,3	9,7
2005	Manufacturing	15,7	27,3	22,4	19,7	25,1
	Services	80,3	69,0	72,5	63,1	65,2
	Agriculture	3,5	3,1	4,2	13,0	8,3
2010	Manufacturing	14,0	24,7	19,9	18,6	20,4
	Services	82,5	72,2	76,0	68,4	71,3
	Agriculture	3,3	3,2	4,1	11,5	8,0
2015	Manufacturing	13,5	26,6	18,4	19,4	20,3
	Services	83,2	70,2	77,5	69,1	71,7
	Agriculture	0,0	3,0	4,0	9,2	7,0
2019	Manufacturing	0,0	26,3	18,9	20,5	21,1
	Services	0,0	70,7	77,1	70,3	72,0

Source: Own calculations based on Eurostat statistics:

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- Last date update: 04/11/2020 23:00
- Last structure update: 24/03/2020

On the basis of the results of research on changes in the real structure of the economy presented in Table 2. a very unfavourable situation can be observed in the Polish economy in relation to the agricultural sector. Although its share in total production in 2019 was relatively low (2.6%), with (2.8%) in Slovakia and the lowest in the Czech Republic at 2.2%. It is among the four analysed countries that, in terms of employment, the agricultural sector in Poland remained at worryingly high levels, reaching more than three times higher than in the economies with the lowest shares (Slovakia, the Czech Republic) or on average in the euro countries. This reflected the poor performance of productivity factors in this sector of the Polish economy. The Slovak economy, where the decrease in the share of agriculture in total output was the largest among the countries analysed, recorded the highest increase in the share of the services sector in total output, while the share of industrial production decreased. In Slovakia, the processes of deindustrialisation and servicing have been most pronounced, including the strongest in 2005-2015, and even more so than in developed euro area countries. Signs of de-industrialisation have also clearly emerged in the Hungarian and Polish economies, with a fairly stable or slightly declining share of industry in both production and employment. The transfer of labour from agriculture and industry to services seems to have been fairly smooth in the economies of the Czech Republic, Hungary and Slovakia. The production and employment structure of the analysed economies, which was the most suitable to the structure of developed economies, for which the group of 19 euro countries was assumed in this article, was formed in the Czech Republic. In the Czech economy in the whole analysed period 1995-2018, on average about 25% was the share of industry in total production, and the share in total employment was on average over 26%, and was higher than the share in total employment of the Euro area-19 countries, while the share in total employment of agriculture decreased from 5.3 % in 1995 to 3 % in 2018. This shows that the transfer of labour from agriculture to services was relatively efficient, because the service sector was able to absorb all labour force displaced from other sectors of the economy. It can therefore be concluded that the mechanism for changing the real structure of the Czech economy worked very smoothly, just as it did in highly developed countries. Slovakia and Hungary are the economies which, as the next in the analysed group of countries, have most developed similar structures to those in developed countries. Poland remains among the analysed countries the economy with the most unstable, even inhibited transfer of labour from agriculture to industry (more than 9% of the employed in agriculture in 2019 and on average in the whole analysed period 1995-2019 at about 15%, with the share of agriculture in total production at 2.6% in 2019). This indicates that a large labour force has been trapped or is stored in the agricultural sector, as services are unable to absorb the entire labour factor pushed out of the sector. Therefore, it is legitimate to say that the mechanism of changes in the real structure of the Polish economy did not proceed as in the highly developed countries, causing a clear real divergence with them. In the Polish economy, the phenomenon of immature servicing is also manifested - a relatively high share of services in production, with a relatively low share of services in employment.

Measuring economic regulation in the markets

The presence of the State in the process of pro-growth stimulation is manifested, firstly, as to stimulate and safeguard competition in naturally competitive markets and, secondly, to create and guarantee the smooth operation of mechanisms to ensure conditions close to competition in markets where monopolisation brings socio-economic benefits. The sources of structural change can, therefore, be seen in the form that the regulation of the most important areas of the economy, the regulation of markets in individual economies, has taken.

Two types of regulation indicators will therefore show the scale of the regulatory burden in selected post-socialist economies. The indicator relating to the regulation of product markets consists of a set of component indicators which measure the extent to which state policy intensifies or inhibits competition in naturally competitive product markets. These indicators reflect consistent measures of regulation across the economy and the market environment for 1998, 2003, 2013[6] and 2018[7].

The General Indicator for *Product Market Regulation (*PMR) includes three indicators reflecting areas that directly determine the strength of regulation, such as: *State Control, Barriers to Enterprise Development, Trade and Investment Development Barriers*. Each of these three areas of economic regulation is made up of formative factors. The *State Control framework* includes data on *Public Property* (Scopes of State Enterprises, Government Involvement in Network Industries, Direct Control of Enterprises, Governance of State Enterprises), Involvement in Business Operations (Price Controls, Ordinance and Control Regulations). The measurement of *Barriers to Enterprise Development* includes *the Complexity of Regulatory Procedures* (Licensing and Authorisation System, Communication and Simplification of Rules and Procedures), *Start-Up Administrative Burden* (Administrative Burden on Corporations, Administrative Burden on Sole Operations, Service Sector Barriers), *Regulatory Protection of Incumbent Entrepreneurs* (Legal Entry Barriers, Antitrust Exemptions, Network Sector Barriers). Indicators reflecting the state of regulation relating to *Trade and Investment Development Barriers* measure *Open Trade and Investment Barriers* (Foreign Direct Investment Barriers, Customs Barriers) and *Other Trade and Investment Barriers* (Different Treatment of Foreign Suppliers, Trade Enhancement Barriers) [8].

Regulatory load indicators in the network sectors, i.e. energy (electricity, gas), transport (aviation, rail, roads), communications (post, telecommunications). The measurement of regulation at sectoral level is carried out within several categories of regulation: *Input Regulation, Public Property, Vertical Integration, Market Structure, Price Control*. However, entry regulation, public ownership, vertical integration, market structure is measured for the entire energy sector and rail transport, entry regulation and public ownership is measured for air transport, entry regulation, public ownership and market structure is measured for the communication sector, entry regulation and price control is measured for road transport[9].

Regulation in selected developing economies

When assessing structural changes according to economic criteria, it is possible to focus on analyses of the direction and pace of changes in the structure of the economy itself (qualitative and quantitative structural changes and correlations between those changes and the impact of institutional factors - market or state regulation), as well as on analyses of the efficiency and effectiveness of economic institutions in the context of their impact on the structure of production (direct causal relations between changes in institutions and structural changes taking place with them) (W. Jakóbik 2000).

Tracking developments in product markets, which are characterised by natural competitiveness, and in network industries with strong monopolistic burdens, can be an important part of the structural changes taking place in the socialist economies.

Table 3: OECD indicator for regulation of product markets from selected countries for years: 1998, 2003,2013, 2018

Countries	Regulation of product markets					Regulation in network industries				
T.E.	**1998**	**2003**	**2008**	**2013**	**2018**	**1998**	**2003**	**2008**	**2013**	**2018**
Czech Republic	2,64	1,88	1,5	1,39	1,3	4,42	2,96	2,45	2,01	1,23
Hungary	2,66	2,11	1,54	1,33	1,32	4,39	3,31	1,87	1,73	1,5
Polend	3,19	2,42	2,04	1,65	1,45	4,71	3,2	2,7	2,34	1,63
Slovakia	.	2,18	1,62	1,29	1,52	4,77	3,33	2,28	1,88	1,41
H.D.E.	1998	2003	2008	2013	2018	1998	2003	2008	2013	2018
Germany	2,23	1,8	1,41	1,29	1,8	2,5	1,87	1,33	1,27	1,08
United Kingdom	1,32	1,1	1,21	1,08	0,78	1,89	1,3	0,98	0,79	0,56
United States	1,5	1,3	1,11	.	.	1,98	1,91	1,65	-	-

Source: http://www.oecd.org/economy/reform/indicators-of-product-market-regulation/ (as at 05.11.2020)

Of those analysed, the economy that was most burdened with regulations turns out to be the Polish economy - an economy with a production and employment structure that is most distant from that of developed countries. However, the Czech Republic's economy, classified as the one with the closest real structure to that of the euro area countries (where the mechanism of changes in the structure of the real economy followed the patterns of developed countries), cannot be classified as one with the lightest regulations, which is particularly evident in the regulations of network sectors. Hungary and Slovakia, respectively, show the weakest regulation in comparison with other analysed countries. The results of the presented studies indicate that there is a clear correlation between the course of the process of changes in the structure of real CEE economies and the level, and particularly the relevance (analysis of the Polish economy *versus* the Czech Republic), measured by the economic efficiency of regulation. The effectiveness of the desired and intended effects of regulations determines, as indicated by the analysis, the direction and pace of structural changes, especially in economies undergoing systemic transformation.

Too early, rigid regulation may hamper initial productivity increases, cost reductions and profit increases. However, regulation is necessary in the initial periods of growth, in a situation of threat from dominant market players. Appropriate identification of appropriate paths of interdependence between capital and labour in the simple pursuit of higher investment lays the foundations for the degree of efficiency of structural change in the country. The regulations are integrated into the pattern of structural policy in the country, where the factors stimulating and impeding the development of the economy are hidden in the structure of production and employment. These factors, which are conditioned by the historical context, are strongly interlinked, so that overcoming certain constraints may provide a good basis for opening up new opportunities on the one hand, while exploiting certain stimulating

opportunities may give rise to production structures that are not burdened by constraints on the other. The intensity of these interdependencies depends on the degree of diversity of production systems at different levels of aggregation of production activities (A. Andreoni, R. Scazzieri 2014).
This reveals the need to be cautious, to constantly observe how society, the economy and the political system react to the stimuli created by regulations.

Summary

G. Majone pointed to a redefinition of the role of the state as a key economic actor, leading to structural changes (G. Majone 1997; G. Majone 1994). Different levels of economic development determine the roles of the different drivers of economic growth and the different role the state has to play. Tracing the competitiveness levels of economies distinguished by M. Porter (factor-based growth stage, investment stage and innovation stage) shows the evolution of the state's participation in the economy from providing stability and basic legal and economic infrastructure for success in the first stage of development, through activation in the area of supporting industries and enterprises with the highest growth potential and in the area of the permeability of financial channels, labour markets, existing education and technology, to the creation of the right set of institutions combining the capabilities of the government, the educational system, the academic research base and private enterprises for each country. A special role is played by the entire regulatory system when it comes to the constitution of an innovation economy where the market does not function, because you simply do not have it. For example, the emergence of a market (demand and supply) for energy from renewable sources requires appropriate regulations which, as in most innovations, must create / guarantee primary supply and demand until the innovation becomes a mass product (M. Mazzucato 2016). Imported productivity increases in the economies under consideration, based to a great extent on incentives for foreign investors in the form of low wages, are approaching or have already run out of potential, and the attention of the governments of these countries is now being focused on domestic sources of multiplication of innovation seen as an engine of development. Further growth is seen in strengthening the industrial sector of the economy towards innovation.

[1] State presence through public ownership and interference in economic decisions.
[2] The Council for Mutual Economic Assistance existed between 1949 and 1991. Its aim was to integrate the Eastern Bloc countries under the leadership of the Soviet Union. Particular emphasis in the statute of the GCC was placed on accelerating technical progress, industrialisation, labour productivity and economic prosperity in the Member States.
[3] Industrial Competitiveness in East-Central Europe, red. M. Myant, Edward Elgar Publishing, Cheltenham 1999, s. 14-15.
[4] The structure of demand was not due to an increase in people's incomes, but to a change in prices caused by trade liberalisation - increased competition.
[5] Industrial Competitiveness in East-Central Europe, red. M. Myant, Edward Elgar Publishing, Cheltenham 1999, s. 5.
[6] Koske, I., I.Wanner, R. Bitetti and O. Barbiero, The 2013 update of the OECD product market regulation indicators: policy insights for OECD and non-OECD countries, OECD Economics Department Working Papers, 1200/2015.
[7] http://www.oecd.org/economy/reform/indicators-of-product-market-regulation/
[8] http://www.oecd.org/eco/growth/indicatorsofproductmarketregulationhomepage.htm
[9] http://www.oecd.org/eco/growth/indicatorsofproductmarketregulationhomepage.htm

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- Online data code: **NAMA_10_A64_E** last updated: **04/11/2020 23:00**

Criteria for Desirable Structural Changes in Market Economies

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Sylwester TABOR
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: sylwester.tabor@urk.edu.pl

Abstract

OECD research into the production structures of highly developed countries for the years 1950-1995 shows that they are subject to the phenomenon of agrarianisation, industrialisation, stabilisation of industry's share of GDP, deindustrialisation and servicing. The most recent research of the economies of the catching up countries for the years 1995 -2020 has shown that the course of these processes may have different patterns, and the direction of structural changes, as well as economic effects.
The aim of the article is to define the criteria for the desired structural changes, and to assess the difference between economies in the real structure of the economy, that is to say the course of economic evolution processes.
In its initial part, the evolution of changes in the structure of employment (evolution of the economy) is presented in the context of its directions and main determinants. In the further part, the role and importance of industry in the structural changes of market economies is described. In the final part, different from the literature presented so far, the assessment of structural changes in the context of their economic consequences is outlined.

Keywords: prevalent phenomena, prevalent factors, real price, agrarian era, evolution of economy, allocation of production factors.

- ***"If society is to benefit from the effects of technological and economic progress, there must be a continuous transfer of factors of production in a dynamic economy in the most efficient way, under the threat of economic crises.***
- ***A. Fisher***

Introduction

OECD research into the production structures of Western countries for the years 1950-1995 shows that they are subject to the phenomenon of agrarianisation, industrialisation, stabilisation of industry's share of GDP, deindustrialisation and servicing. The agrarianisation in connection with the domination of agriculture in the initial stages of economic development of Western countries, with the need to intensify development rather than expansion due to natural barriers and with changes in the structure of population consumption as it moves towards higher and higher levels of income to the detriment of the share of food is "an over-systemic regularity of any economy" . Industrialisation has taken place in more developed countries (France, Austria, Italy) at around USD 8 000 to 12 000 of GDP per capita (at constant 1990 prices), in poorer countries (Spain, Greece, Portugal) at around USD 3 000 to 6 000. The stabilisation of the share of industry in GDP shows the saturation of the structure of demand in the economy with industrial production, which in the first group of countries mentioned above was around USD 12-15 000 of GDP *per capita*, in the second group at around USD 6-8 000. The deindustrialisation achieved in economically more advanced countries[1]at around USD 15 000 of GDP per capita, in less developed countries at around USD 8 000 of GDP *per capita* resulted from the installation of dynamically developing sectors in the structure of the economy more than industry and agriculture, which was also fuelled by the relocation (*reemployment*) of processing industry. The servicing accompanying deindustrialisation is the result of the expansion of mainly financial and business services, accompanied by the advancement of market institutions (A. Lipowski 1998; 2000). Recent studies of catching up economies for the years 1995-20-20 have shown that these processes can have different patterns and direction of structural change as well as economic effects (G. Dosi, F. Riccio, M.E. Virgillito 2020). The aim of the article is to define the criteria for the desired structural changes, and to assess the difference between economies in the real

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structure of the economy, that is to say the course of economic evolution processes. In its initial part, the evolution of changes in the structure of employment (evolution of the economy) is presented in the context of its directions and main determinants. In the further part, the role and importance of industry in the structural changes of market economies is described. The final part outlines the concepts, different from those presented in the previous literature, of the assessment of structural changes in the context of their economic consequences.

Theoretical Basis, Methods, Results and Discussion

Changes in the structure of employment in market economies - directions and factors of change.

In the humanities and social sciences, there is no uniform time - there are no periods at the end of which events are repeated identically (events never have the same form in time), which means that time is different. None of the periods defined in time is therefore homogeneous. Moreover, events are distinct and autonomous even when they are not independent, which means that they have their own characteristics, evolutions and *sui generis* behaviour. Therefore, it is impossible to know the overall problems (general price movements, global crises, general competition, global production), as countless factors would have to be specified. J. Fourastie proposes to look for autonomous events and prevailing phenomena in economics. Preponderant phenomena are characterised by two basic characteristics. Firstly, these phenomena are common to a large number of complex phenomena. Secondly, they accumulate, which means that they cause effects that grow despite changing circumstances at the time and place. It should be borne in mind, however, that if time is not homogeneous in social sciences, the prevailing phenomena will not be constant over time, which means that when they occur over a very long period (one hundred years, for example, in economics) they are poorly captured in the medium term (five years) and completely insignificant in the short term (six months), and it should be noted that their severity will depend on the pace of change in economic conditions. Following this line of reasoning, it would be unreasonable to seek to identify the desired changes in the structure of the economy before first exposing the key determinants of its changes (phenomena / prevailing factors) and understanding the mechanism of the process of evolution of economic structures. Figure 1 below shows how productivity, on the one hand, and consumption at the turn of 200 years, on the other, shape employment in agriculture.

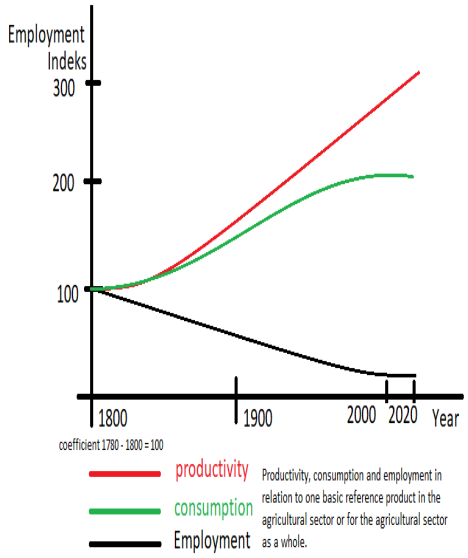

Figure 1

Source: Own calculations based on; OECD, GUS (Statistics Poland)

Productivity, consumption and employment in relation to one basic reference product in the agricultural sector or for the agricultural sector as a whole.

This graph shows how the employment equation: *e-t* stands in contrast to the productivity equation: ^{et}. Thus, we obtain one type of employment curve as in the graph (whether for a given agricultural product or for agricultural production as a whole), where productivity results in production levels outweighing consumption, and a completely different type of curve would be formed under conditions where consumption levels outweigh production levels.

As can be seen in the graph, the change in employment is the ratio of the change in consumption to the change in productivity ($\Delta S / \Delta W = \Delta Z$, where S - consumption, W - productivity, Z - employment), and that, in reality, supply and demand should balance under the threat of crisis and unemployment for each product, the volume of production, which is the measure of supply, must equal the volume of consumption, which is the measure of demand. Assuming that productivity is the ratio of the change in production to the change in employment ($\Delta Q / \Delta Z = \Delta W$, where Q - production), we can say that the condition of balancing supply and demand causes a greater increase in ΔS than an increase in the ratio of$\Delta Q / \Delta Z$ will result in an increase in production, an increase in employment. On the other hand, a smaller increase ΔS than an increase in the ratio $\Delta Q / \Delta Z$ will cause a decrease in employment while increasing production.

The stagnation of food consumption at a constant level was argued by J. Fourastie in the economies developed today by a steady or small increase in population and a physical reduction in the consumption of food products by individuals. In the first stages of the period of industrialisation, the rapidly increasing rate of demand for industrial goods with a much slower rate of productivity growth in industry resulted in a large increase in employment in the sector. This situation is presented in -

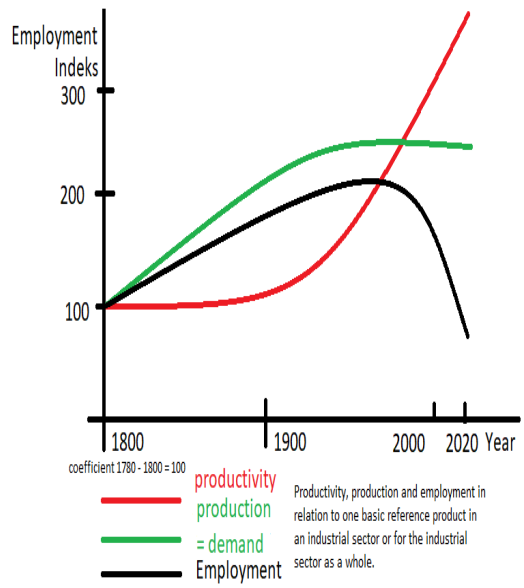

Figure 2

Source: Own calculations based on; OECD, GUS (Statistics Poland)

They resulted in strong productivity gains in industry. Looking at the graph above, we see that, over time, productivity growth is beginning to overtake consumption, causing production to start exceeding demand. Then the employment equation contrasts, as in the previous case, with the productivity equation, and begins to fall, which ultimately gives the employment curve a pathway to asymptote 0. In manufacturing, although consumption does not stay constant as in agriculture, productivity growth is still increasing, (technical progress has the strongest impact) while consumption growth is decreasing. This ever-growing gap between the productivity growth rate and the consumption growth rate causes employment in industry to start to fall, as industrial production starts to outweigh demand.

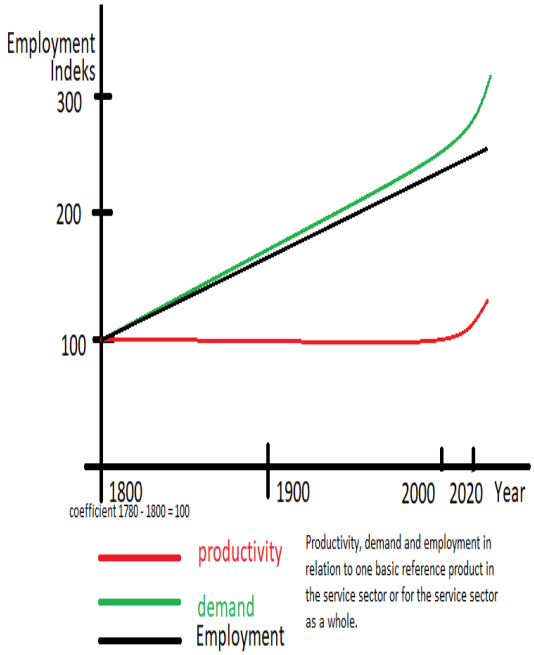

Figure 3

Source: Own calculations based on; OECD, GUS (Statistics Poland)

As can be seen from the graph above, ever-increasing consumption and small to zero productivity increases in services are causing the sector to experience continuous employment growth, first at the expense of the agricultural sector and then of industry. As demand in services is constantly increasing and as it seems to be unlimited, with very little impact of technological progress, this sector will continue to absorb labour displaced from agriculture and industry. The increase in production in services will depend on employment in the other two sectors.

A phenomenon that has transformed the world over the last 200 years and has also been a predominant factor has been technological progress. The second factor is the changing structure of demand. The distinction between the three major types of response to changes in technology and consumption[2] is a fundamental criterion for separating the main sectors of the economy, because productivity and consumption are those phenomena in the economy that also determine the changes in the structure of the economy as adopted. Due to the three types of response, the entire economy can be divided into three sectors. Agricultural products, although not all of them, of course, but most of them, have a primary response, so agriculture as a whole will be the first sector of the economy. The second sector of the economy, which has a secondary response, although, as in agriculture, not all its products have this type of response, is industry as a whole. Services in which the tertiary response is predominant will constitute the third sector of the economy(J. Fourastie 1972; 1954).

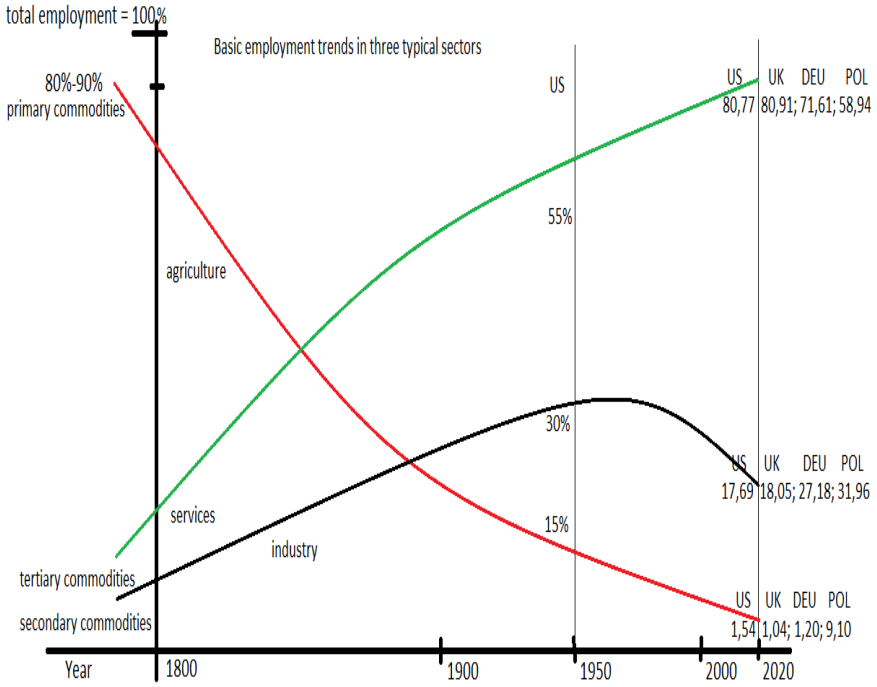

Figure 4

Source: Own calculations based on; OECD, GUS (Statistics Poland)

The chart of primary goods illustrates employment in the agricultural sector, secondary goods in industry and tertiary goods in services. Analysing the typical employment trends in these three sectors, it becomes apparent how technological progress and changes in demand shape the structure of employment in the long term. Employment in the third sector (services), with no restrictions on the demand side, is determined by employment in the other two sectors. This means that services will absorb all the labour force, driven out of the other sectors.

Table 1: Percentage share of employment in particular sectors of the economy in total employment for selected countries

Agriculture										
Datatablefor:EmploymentbyactivityAgriculture/Industryincludingconstruction/Services,Thousandpersons,1960-2019										
Location ▾	1960	1965	1970	1980	1990	2000	2005	2010	2015	2019
Germany		8,41	6,68	4,21	2,87	2,65	2,37	1,65	1,39	1,20
Poland						18,69	17,28	13,05	11,50	9,10
UnitedKingdom						1,47	1,33	1,21	1,13	1,04
UnitedStates	8,30	6,13	4,40	3,39	2,71	1,80	1,55	1,59	1,63	1,54
Industryincludingconstruction										
Datatablefor:Employmentbyactivity,Agriculture/Industryincludingconstruction/Services,Thousandpersons,1960-2019										
Location ▾	1960	1965	1970	1980	1990	2000	2005	2010	2015	2019
Germany		50,77	50,80	47,19	40,57	33,67	29,84	28,31	27,69	27,18
Poland						30,85	29,24	30,28	30,44	31,96

UnitedKingdom						24,99	22,10	19,07	18,53	18,05
UnitedStates			34,35	30,53	24,21	21,95	19,81	17,18	17,60	17,69
Services										
Datatablefor:Employmentbyactivity,Agriculture/Industryincludingconstruction/Services,Thousandpersons,1960-2019										
Location ▾	1960	1965	1970	1980	1990	2000	2005	2010	2015	2019
Germany		38,95	41,07	50,23	52,79	63,69	67,79	70,04	70,92	71,61
Poland						50,46	53,48	56,67	58,06	58,94
UnitedKingdom						73,55	76,58	79,72	80,34	80,91
UnitedStates			61,25	66,09	73,08	76,25	78,64	81,24	80,78	80,77

Source: Own calculations based on; InformationondataforIsrael:http://oe,cd/israel-disclaimer

The above table shows in more detail, in relation to Figure III, the changes in the structure of employment for selected of the most developed economies, and the Polish economy. Noteworthy here is the period between 1960 and 1970, where, although employment in agriculture fell in the most developed economies and services grew, there was a steady increase in the share of total employment in industry, and even in some countries compared to 1950, such as the United States, its growth. This was mainly due to a demand-driven policy towards industry, which undoubtedly contributed to the crisis of the 1970s, compounded by the rise in raw material prices. This crisis was characterised by rising prices and stagnation. The liberalisation of world trade, which began in the 1970s, accelerated deindustrialisation processes through relocations from highly developed countries to developing countries, mature industries in which the rate of productivity growth was significantly slowed down and their share of world consumption was dependent on the price of labour. In their place, in line with industrial development, new industries (industrial innovations) were created, recording very high rates of productivity growth. All in all, since the 1970s, industrial productivity started to grow strongly and with it the share of industry in employment started to fall. The exception for highly developed countries is the increase in the share of industry in employment (between 1990 and 1995 in the German economy). However, this phenomenon is explained by a large and sudden increase in consumption resulting from the merger of Germany (West Germany) and the GDR (East Germany belonging to the block of socialist countries before the merger), where (in the GDR) the demand for industrial products was highly insatiable. The causes of the crisis of 1990 and 2007 also have their structural origins, but they overlap with the fight against inflation and the liberalisation of financial services, which is beyond the consideration of this work.

Changes in the production structure in market economies, directions and factors of change - importance of industry.

As we have seen so far, increasing productivity and stagnant (or slightly increasing) consumption are leading to a decline in employment. By contrast, a fall in employment inevitably entails a fall in prices. For if income per head is taken as one, price is the quotient of employment divided by the volume of production. Thus, if employment falls and production volumes rise, prices must fall (as a result of productivity growth). The supply-demand balance condition is that, when consumption stops at a constant level and there is a continuous increase in production, there is a continuous increase in productivity, resulting in a fall in employment and therefore in prices. The price evolution is shown in Figure 5.

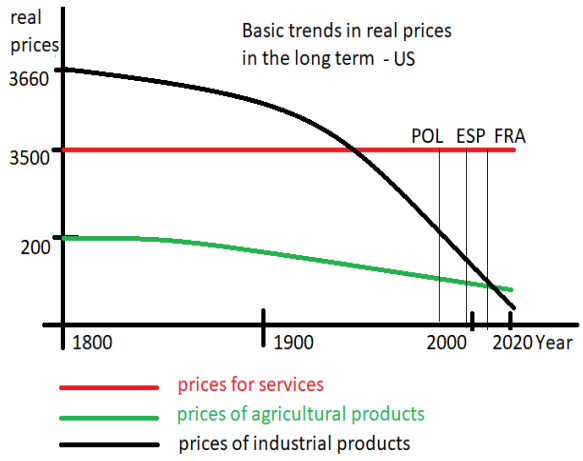

Figure 5

Source: Own calculations based on; OECD, GUS (Statistics Poland)

The price changes over time are represented by real prices, which are the quotient of the current price divided by current hourly wages. The price scale, on the other hand, determines the value of the ordinates for the relevant years, so it will be different for each of the three curves. This is not a matter of accuracy in detail, but rather of plotting the different types of price responses of agricultural, industrial and service products in time and space to changes in productivity and consumption. As can be seen from the graph below, the prices of agricultural products have been starting to fall in the long term since 1800. Before 1800, they varied little from country to country. Today, however, these differences are very large. For example, the real price of a quintal of grain before the first industrial revolution was 200 wage hours, and by 1950 it was 25 wage hours in the most developed economies. By contrast, it was at a much higher level in the less developed economies. Therefore, today the price differences between countries are very serious. An example of this is not only grain, but also potatoes, fruit and vegetables. We can also see how the prices of industrial products show a strong downward trend over time, under the influence of technological progress. As in the case of agricultural products, in the past, the range of prices for industrial goods between countries was small, but today it is even extremely high as a result of differences in productivity levels between different economies. If, before 1800, the price of the mirror in all countries was 36 600 wage hours, then in 1950 it was already 200 wage hours in the most developed economies. The price of iron, aluminium, electricity and cars is also an example. We see a fundamentally different type of reaction for the price of services. They do not change at all, or very little even over a very long period of time, because the impact of technological progress on them is very small. As the prices of services have not changed over time, they have not changed in space either. Therefore, they are the same for highly developed and less developed countries. An example of this is the decorative fabric. Only differences in exchange rates make them expensive in highly developed countries and cheap in countries at a lower level of development. The current situation of economies at different levels of development is presented in the projection (A-Poland, B-Spain, C-France) on curves representing the most developed countries (US, UK, Germany). Thus, through differences in real prices, a lag in development (caused by differences in productivity levels) is visible. As a result, prices for agricultural and industrial products will be higher in countries with lower levels of development. For example, the lag in Poland's economic development means that the prices of products affected by technological progress are at the same level as they were in the most developed countries about 30 to 40 years ago.

Changes in the structure of employment and changes in relative prices between different sectors of the economy change their share of total output at current prices. As can be seen in Figure VI (below), there is a continuous decline in the share of agriculture. The share of industry first increases to a maximum and then begins to decrease. The share of services has a growing trend throughout the period. The shares of individual sectors in total output in current prices coincide with their shares in total employment. However, the fall in the share of agricultural production is not due to a fall in real production, but to the fact that it has remained stable and prices have fallen. By contrast, the decline in the share of industry is mainly due to the fall in prices. And, the real volume of production is constantly increasing, as a result of constant increases in productivity. The increase in services is due to increased employment and rising prices.

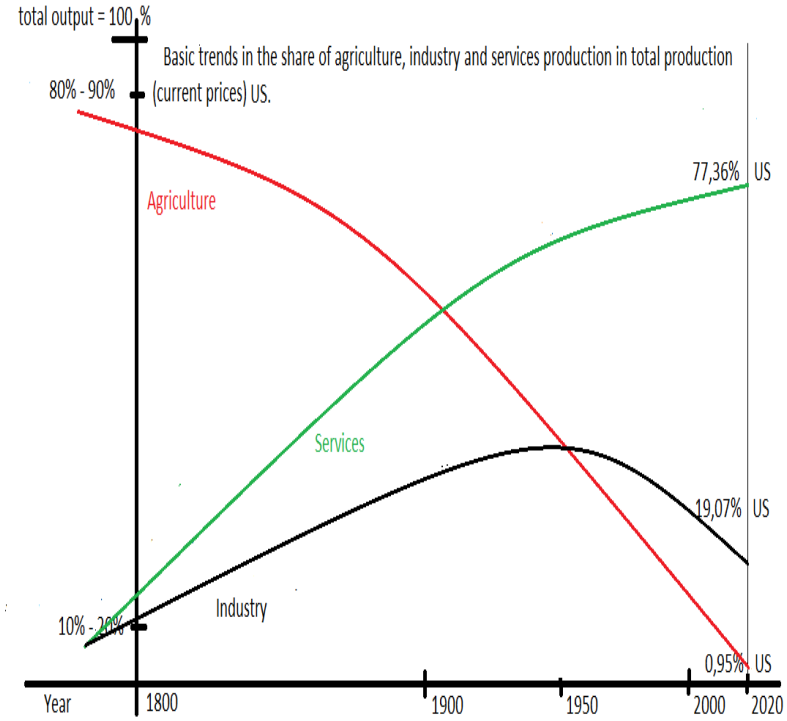

Source: Own calculations based on; OECD, GUS (Statistics Poland)

The table below, which describes in more detail the changes in the shares of individual sectors of the United States economy in output at current prices and in constant prices between 1970 and 20018 , shows clearly that, despite declines in the shares of industrial production in current prices, its value in constant prices (adopted even in 2000) does not change. The same is true of agricultural production. We can therefore say that, despite the declines in the industry's share of total output in current prices, its real production volume is constantly increasing.

Table 2 Share of sectors in total production, in % for US between 1970 and 2018

	Value added Current prices - US			Value added Constant prices -US					
	Current prices	**Current prices**	**Current prices**	**Current prices**	**Constant prices**	**Current prices**	**Constant prices**	**Current prices**	**Constant prices**
Year	1970	1980	1990		200		2010		2018
Agriculture,	3,23	2,68	1,92	1,19	1,30	1,08	0,95	0,90	0,95
Industry	27,22	26,47	21,71	18,63	23,66	16,42	20,02	15,12	19,07
Services	63,92	64,15	68,93	75,52	72,33	78,89	76,46	79,77	77,36

Source: Own calculations based on; OECD, StatExtracts, iLibrary ttps://data.oecd.org/natincome/value-added-by-activity.htm, Data extracted on 11 Nov 2020 08:38 UTC (GMT) from OECD.Stat

As the process of deindustrialisation continues, productivity growth in the economy will increasingly depend, not so much on productivity growth in industry as on productivity growth in services. In contrast, the evolution of service sector productivity will depend on future developments in areas such as information technologies and changes in the competitive structures of the sector (R. Rowthorn, R. Ramaswamy 1997). However, according to Kaldor, the rate of productivity growth in the whole economy depends on the expansion of the industrial sector, which not only leads to faster productivity growth in industry (operation of Verdoorn's law[3]), but has a dispersion effect on the whole economy.

In Search of a Pattern of Change in Employment Structure

The assessment of structural change from the point of view of its impact on opportunities for increasing economic prosperity is a key area of research into economic structures. Therefore, the issue of developing reliable criteria for evaluating these changes remains strategic. Comparing changes in the structure of employment in Poland with

changes in economic structures in more advanced countries, i.e. such as the EU, for example, is burdened by the mistake of imposing structures that have already been formed in advance (in conditions that are sometimes completely incomparable) and the lack of argumentation from economic facts (stylised facts - data provided by statistical offices) to support them, because from where the crises and the impossibility of ending them come. Accepting as model structures established in EU economies, without reference to the specific internal conditions of a given economy and external conditions, leads to errors of doctrination and is not supported by both theoretical and empirical foundations, which will be done in this chapter. On the other hand, from almost 200 years of development of free market economies, we can adopt the main determinants of these changes (explain the prevailing factors), which will then make it possible to define the criterion of positive structural changes, both objective and desirable at a given time and economic conditions.

When we add to the theoretical analysis of the aforementioned phenomena accompanying the changes in the structure of production and employment observed in developing countries, the changes in the structure of consumption (because its size is both a determinant of these changes and a criterion for the desired directions of these changes), the question of defining positive structural changes for the long-term development of the economy will be more transparent. For, as was shown earlier in the theoretical part, it is only when an increase in productivity results in the volume of industrial production exceeding the volume of demand for its goods, which means that demand has been saturated and the rate of growth of production exceeds the rate of growth of consumption, that the condition of balancing demand and supply causes employment to fall there and prices to fall with it. After all, until the moment when demand for industrial goods was not saturated in today's highly developed countries, production and employment grew, and industry was the most important engine of economic growth. This was because the order of things is that it was the large and constantly growing demand for industrial goods that caused the increase in production and employment in industry, and that the impact of technological progress (as has been shown earlier) is the greatest there, the increase in industrial production causes the greatest rate of GDP *per capita* growth. Therefore, if, with a large and dynamically growing consumption of industrial goods, production increases only as a result of productivity growth, and employment falls (economic growth without employment in industry should take place only with a stabilised consumption of industrial production in a given economy), there will be (unfavourable changes) - labour force will be displaced from industry (deindustrialisation with a very small GDP *per capita*) and there will be no possibility of its complete absorption by services. In such an economy, instead of dynamically growing also due to the increase in employment in industry at a stage when the consumption of industrial goods is growing faster than the production volume, it is growing much more slowly due to the unemployed growth of industrial production, although sometimes due to erroneous comparisons its rate seems to be impressive (e.g. comparisons with the current rate of growth in highly developed countries). Too low a level of income *per capita* means that the increase in the consumption of services is not so great that the demand for labour can rise there in order to absorb all the labour force pushed out of industry. We know (from previous considerations) that an increase in income causes a change in the structure of expenditure and an increase in demand for services, which increases the demand for labour in this sector. The phenomenon of deindustrialisation at a very low level of income *per capita* and jobless growth of industrial production in developing countries (in some cases) can be explained by the liberalisation of trade with real structures (productivity levels) too far removed from the highly developed countries.

Competition from products imported from highly developed countries is insurmountable in the short term, so that production growth only takes place under the influence of productivity growth, caused by a fall in employment. As a result, developing countries in which the growing consumption of industrial production is not used to increase employment and production, but is taken over by imports, are unable to achieve the high level of GDP per capita that the developed countries had at the time of deindustrialisation. With increasing imports, there is a trade deficit, which must be offset by exports or a surplus in the capital balance. If this is done by exports, it is mostly labour-intensive production in developing countries. And if the balance of trade between developed and developing countries were to be offset in man-hours (depending on differences in productivity levels) it would be: 200 man-hours to 20 man-hours. This looks much worse when the trade deficit has to be reduced by a surplus in the capital balance, as this in turn forces an increase in the interest rate, which weakens investments (e.g. what a large return on investment would have to be in Poland in 1995, when the interest rate was 30%) and a currency appreciation, which further increases imports. Penetration of developing economies by imports also takes place when, ignoring the differences in real structures, the nominal structures are being sought to equalize. Worrying phenomena related to structural changes in developing countries may also be caused by the policy of equalizing nominal structures at all costs (e.g. constantly strengthening the national currency) before full real convergence - costs are disproportionate to profits - as is the common currency with widely differing real structures. However, a full (satisfactory) explanation of why deindustrialisation is taking place in developing countries with very low *per capita* income levels and jobless industrial growth requires, in addition to a broader theoretical analysis, an empirical analysis of the factors of structural change in specific economies, which goes beyond the framework outlined in this article.

Summary

To sum up, the theoretical considerations on the criteria for desired structural change, and they are so transparent that we can say that there are positive structural changes based on both productivity and consumption, which determine the desired structural change if society is to benefit from technological progress, if the industry's share of production falls only as a result of falling prices when real production increases, and its share of employment falls when demand for its products stabilises (when production volumes exceed demand) and there is a sufficiently high level of income *per capita to allow* it to absorb all the labour force pushed out of industry.

[1] with the exception of Italy, where the share of industry has been increasing throughout the 45 years of the OECD study

[2] three types of reference reactions: primary, secondary and tertiary. The first type of reaction - primary, characterises products that have a triple property: they are agricultural products, they have been affected for 150 years by major technical progress, but less than most industrial products, their per capita consumption has reached its maximum in highly developed countries. The secondary one, the next type of reaction, forms the majority of industrial goods, where technical progress has a very high impact and consumer demand has a growing tendency. And the last, tertiary reaction type characterises products and services that have a dual property draw very little from technical progress, and consumer demand is growing strongly without signs of slowing down.

[3] faster production growth increases productivity due to increasing economies of scale

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Designing Warehouse Systems in Factory I/O

Marcin TOMASIK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: marcin.tomasik@urk.edu.pl (corresponding author)

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl

Abstract

Virtual tools that allow the implementation of innovative solutions (e.g. in the configuration of the arrangement of machines or room re-planning in order to modernize the production plant) come to the rescue. The result of a system analysis of technological processes is the need for a rational and safe arrangement of machines, devices and technical equipment. To assess the functioning of all components in the conditions of computer simulation. In the process of designing technical systems, computer programs that enable the visualization of implemented projects play an increasingly important role. One such program is the Factory I/O.

Keywords: warehouse, transport, mechanical engineering, organization

Introduction

The dynamic technological development causes that new development concepts are constantly being created, and the time of their implementation should be as short as possible (Sacco et al., M., 2010). In fact, however, this time is still long, due to many factors. One of them is the need to build prototypes, projects presenting functionality (Drath and Horch 2014). Virtual tools that allow the implementation of innovative solutions (e.g. in the configuration of the arrangement of machines or room re-planning in order to modernize the production plant) come to the rescue (Jiang et al. 2014). The result of a system analysis of technological processes is the need for a rational and safe arrangement of machines, devices and technical equipment. To assess the functioning of all components in the conditions of computer simulation. It takes on particular significance in internal linking and locations in the spatial white technical systems, processes, transport, handling and organization of surface storage (Riera et al. 2016). Construction of a production plant requires the creation of a new spatial layout on production lines or warehouses. Often, the high complexity of a production plant makes it difficult to analyse the current state of a given system of production or logistic units and the forms of their internal connections in a purely theoretical manner. Computer software for building a digital model or a virtual factory can be helpful in solving such problems (Bengtsson et al. 2010).

In the process of designing technical systems, computer programs that enable the visualization of implemented projects play an increasingly important role. One such program is the Factory I/O (Arango et al., 2008). It represents advanced and modern development environment, which makes it possible to create and simulate the real-time industrial systems using the most popular technologies automatically (Rüßmann and Lorenz 2019). It allows you to design and program the operation of the production line, transport systems on production lines and high-bay warehouses. It is possible to connect to a PLC controller and test the operation of such a system in computer simulation conditions (Wiendahl et al. 2015). Thanks to high-quality graphics and sound as well as implemented physics, this fully interactive simulation perfectly reflects the industrial reality (Fig. 1).

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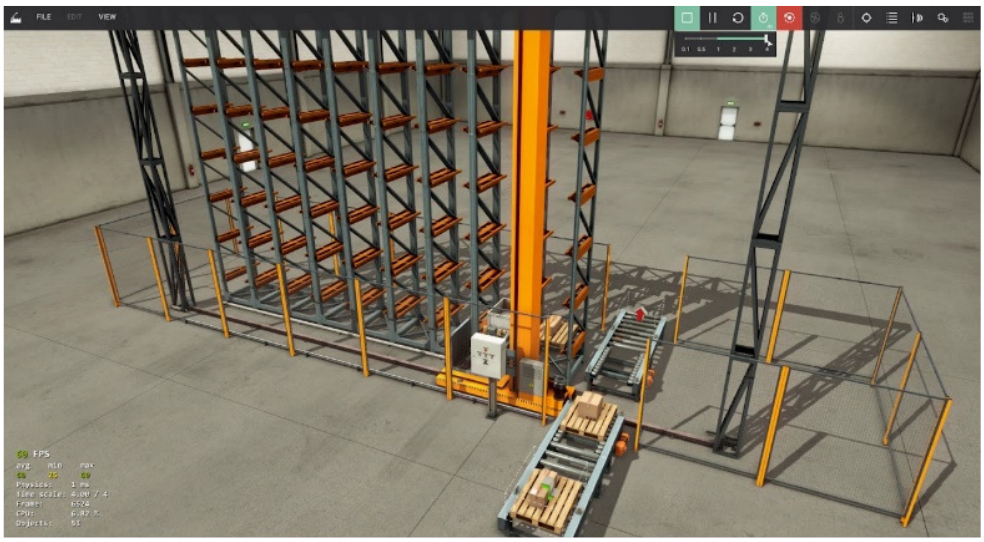

Fig. 1: An example of a project showing a warehouse stacker crane

The program is ready for more than 20 scenes that can be used in designing through their modification, of course you can create your own e scene from the ground (Fig. 2).

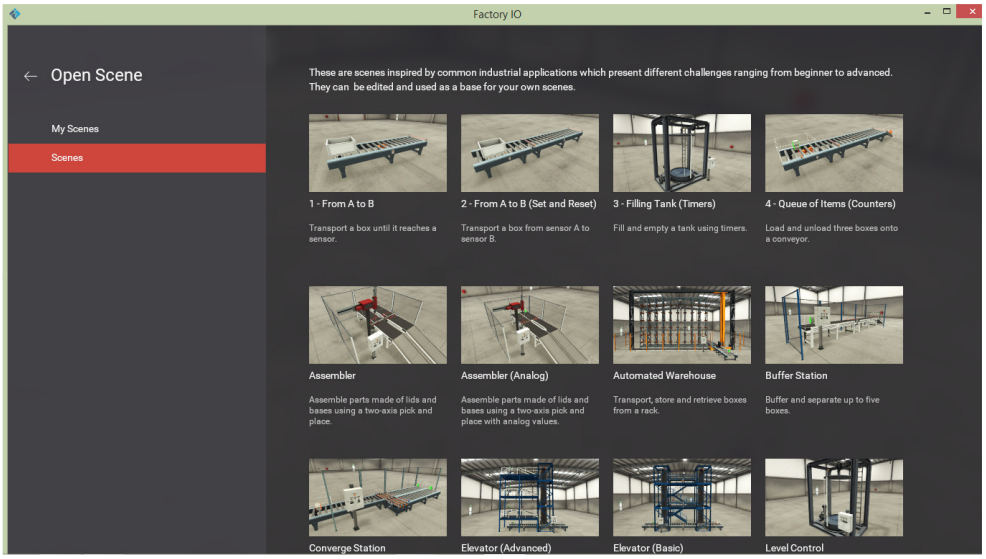

Fig. 2: Program library with ready-made scenes

The tool library used for programming contains elements that are necessary to build and simulate technological processes. There are: conveyors, sensors, manipulators, buttons, control panels, fences, platforms, palletizers, stacker cranes and tanks. In addition, it contains details that can be used in the simulation of sorting and transport systems. In total there is there p thence 80 industrial machinery and equipment.

Fig. 3: Examples of the tool library items

The control program in the visualization program can use PLC controllers of most manufacturers (they communicate with the program via the Ethernet interface) or a dedicated CONTROL I/O extension. It allows you to program visualizations using a virtual driver. For programming, the program uses a method that resembles Functional Block Diagram (FBD) programming in its structure, appearance and operation. The program is modelled on schematic diagrams, and it consists in an appropriate combination of blocks and control elements, which corresponds to the programmed function. These include timers, counters, Bool's algebra blocks, flip-flops and memories.

Design assumptions of the designed sorting system

Internal transport is one of the main pillars without which none of the manufacturing companies would be able to exist on the market. Such transport consists of activities aimed at continuous or intermittent flow of elements (materials), taking place on the premises of a given enterprise.

A properly designed, automated transport system, combined with its efficient and effective operation, ensures smooth production and increases efficiency, thus improving the company's results, which is important in its location on the production market. Internal transport is also referred to as internal or close transport. It takes place in large numbers on belt conveyors.

Conceptual system presenting a capability in the design of transport systems. It realized by control and computer visualization of the process of sorting, transport to the warehouse and automated it distribution of pallets on shelves Fig. 4. The system has been divided into two closely cooperating technical systems: sorting packages into individual pallets with palletizers and a transport line to a high-bay warehouse with stacker cranes.

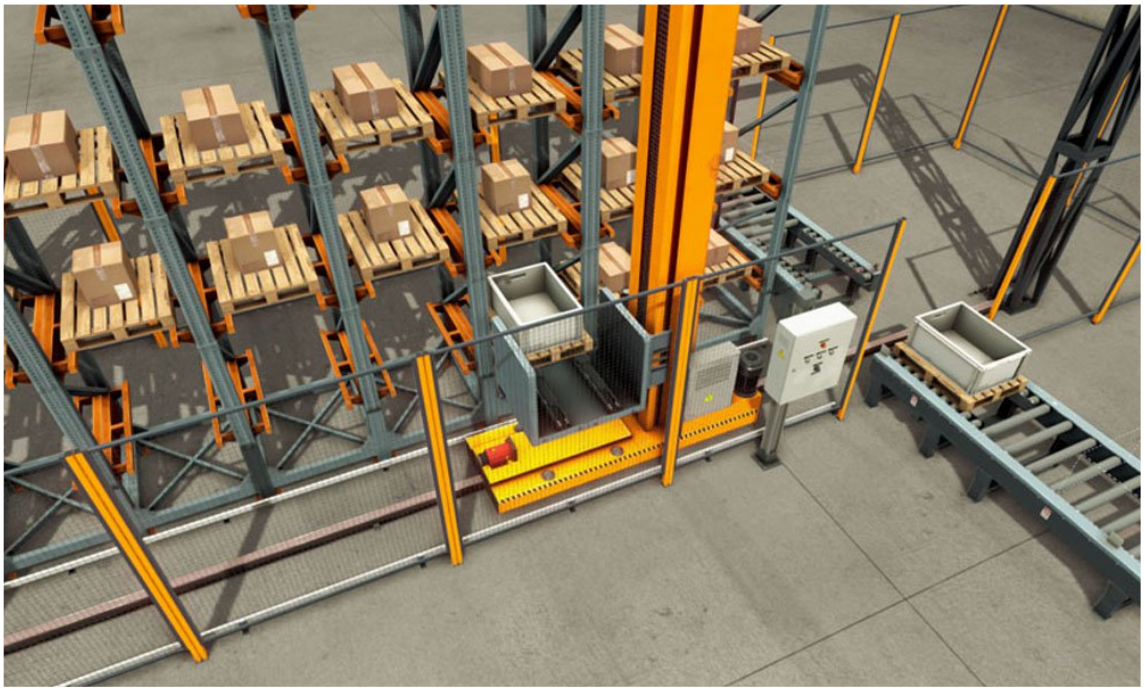

Fig. 4: Pallet distribution on the warehouse shelves

Parcel Sorting System

Sorting packages on the designed technological line is carried out in two stages. The first stage is the detection and classification of parcels according to their height. In the second stage, the mass of the objects is considered. There are four types of packages in the program library. Each of the released emitters of packages differs from each other in terms of dimensions (Fig. 5).

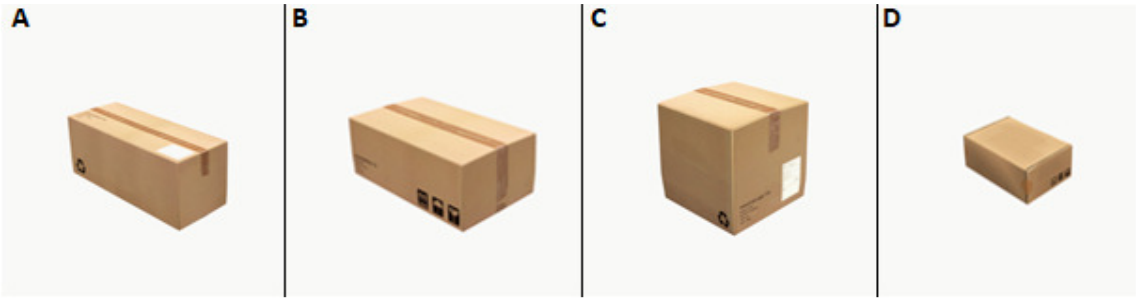

Fig. 5: Packages used in the project: A - size S, B - size M, C - size L, D - size XS

The complete sorting line is shown in Fig. 6. It was built of a system of conveyors delivering sorted packages to four palletizers, located at the ends of conveyor belts. Palletizers place parcels on a pallet, which, when full, are sent to the warehouse with the transport system.

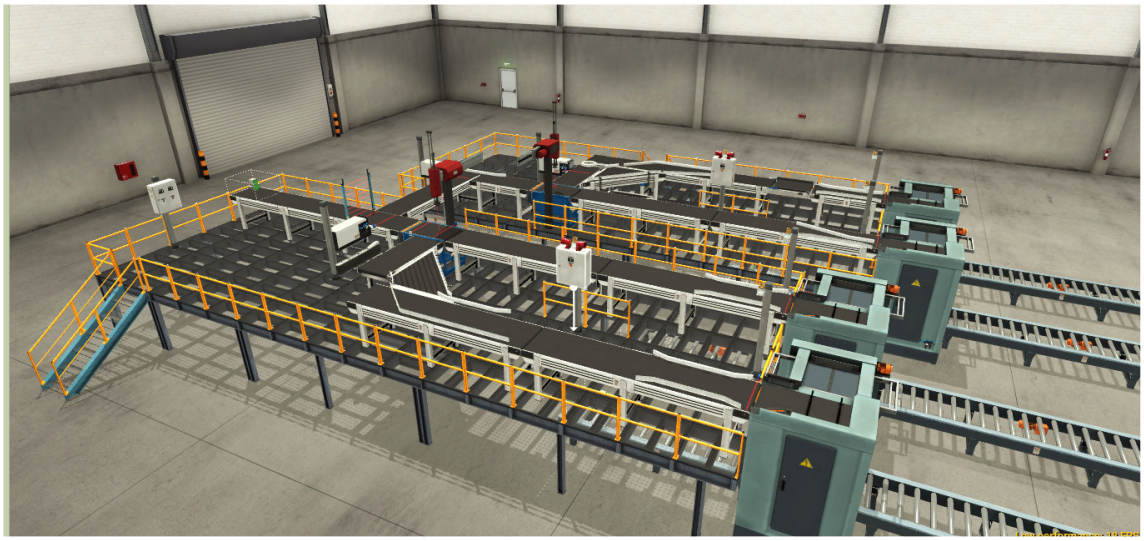

Fig. 6: Line for packages sorting

The process of sorting starts ny is by measuring the amount of packaging by means of the light barrier (Fig. 7A) and said segregation is carried out first. The parcels are divided into two groups, the smaller parcels are moved to the side conveyor (fig. 7B). The first group consists of S and M size parcels, and the second group includes XS and L size parcels. The next stage is segregation, this time in terms of weight. In both groups, the packages are separated. The final stage is palletization, i.e. stacking sorted packages on pallets.

a) b)

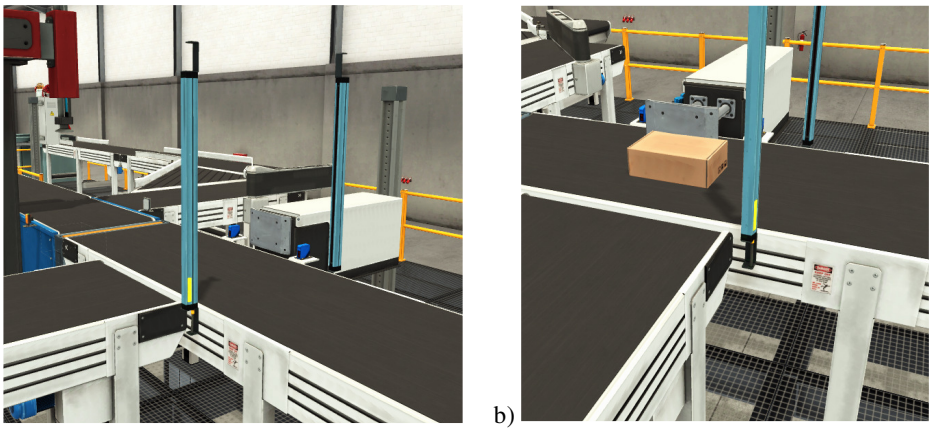

Fig. 7: Sorting packages using a light barrier: B - light barrier, B - piston cylinder moving the package onto the conveyor

In Factory I/O it is possible to program functions for stacking loads on pallets. Implementation of positioning and laying realizes palletizer by means of the actuators. Fig. 8 shows the operation of two such devices.

Fig. 8: Stacking packages on a pallet

The automated warehouse of high storage

In the program, it is possible to build a high-bay warehouse from ready-made racks to be joined and stacker cranes. They allow for the automated movement of goods placed on pallets and their placement on racks in specific places. Stacker cranes are in the form of one or two columns on which a gondola with forks moves along the vertical axis. The whole structure moves in the corridors between the racks on rails placed on the floor and under the roof supporting frame. Instead of the standard forks, the following can be used: telescopic forks with three-fold storage depth, a roller conveyor or a gripper for round bales. The technical parameters that determine the possibilities of the stacker crane are also important: lifting capacity, maximum dimensions of the load, lifting/lowering height, speed of movement, degree and speed of fork extension. The advantages of these devices include: automation of the entire storage process, constant monitoring and identification of assortment in stock, elimination of human errors, the possibility of working in unfavourable conditions. e.g. in freezers, cold stores, sterile drug stores. Thanks to automation and management programs, it is possible to coordinate the course of production and warehouse processes. Figure 9 shows the warehouse stacker crane available in the Factory I/O program.

Stacker crane on rails used for storing heavy loads. It includes a trolley, vertical platform and two forks that can be moved to both sides. Two laser rangefinders placed on the trolley and the platform measure the horizontal and vertical position of the platform. Racks are vertical steel frames connected by horizontal steel beams to store loads. The available rack is a single depth rack, also known as a selective rack, which only allows loads to be stored down to a depth of one pallet. Loads can be stored on both sides of the rack.

Each rack must be flush with one end of the rails so that the stacker crane stops in the correct position. The stacker crane can be controlled with digital, numerical and analog values according to the selected configuration. Virtual stacker crane parameters:

- s bun carriage: 1.2 m,
- s bun trolley 10.5 m,
- s bun platforms: 6.625 m,
- p nd the speed of carriage: 1.4 m/s,
- p nd the speed of carriage: 0.5 m/s,
- p nd the speed of the platform: 1.7 m/s,
- pallet on the shelf 18,
- pallet which can handle one rack 108.

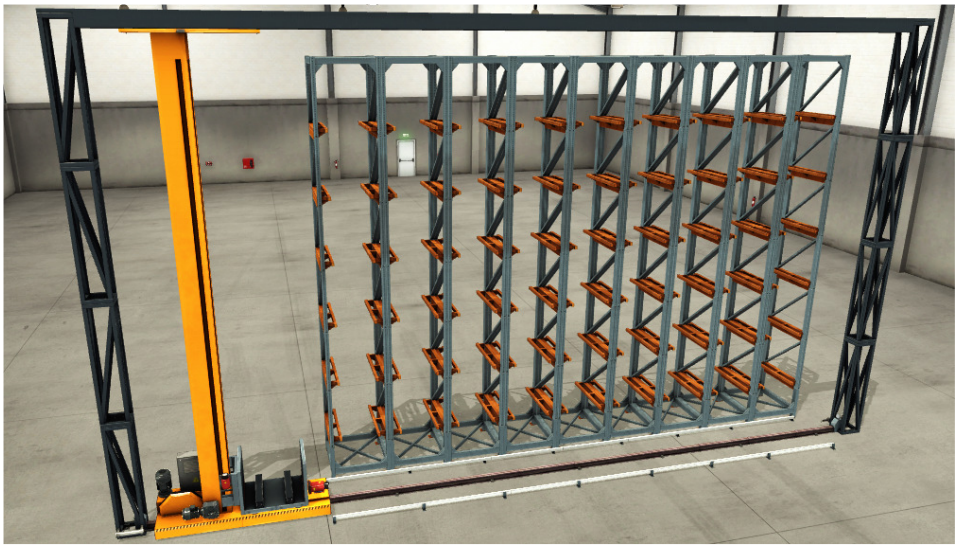

Fig. 9: Stacker crane with a system of shelves

The stacker crane is controlled by several variables, shown in Figure 10. First, the place where the pallet is stored - in the presented example, it is marked as 1 (Stacker Crane 1 Target Position). The next step is to start the conveyor drive through the Forced task. If the rack is next to the place of storage pallets, pickup truck with a pallet over the place (the variable - Stacker Crane 1 Lift), then pull out the fork with t s left (Stacker Crane1 Left), has left SCIC trolley (Stacker Crane 1 Lift). The palette will sit on the orange rails. Now you can slide the forks back into the forklift and safely withdraw the forklift to its home position (Fig. 11).

Fig. 10: Placing the load on the pallet place

Fig. 11: Basic position of the stacker crane trolley

The complete high bay warehouse is shown in figures 12 and 13. There are 2,160 pallet places in it, served by 20 stacker cranes. All stacker cranes are connected by a system of conveyors responsible for delivering and collecting loads from stacker cranes. One of the most important functions is controlling three different cameras. S sluice to navigate the 3D space and are key to the interaction of the components or to create new scenes. Three types of cameras can be used: orbiting, flying - drone and first-person view.

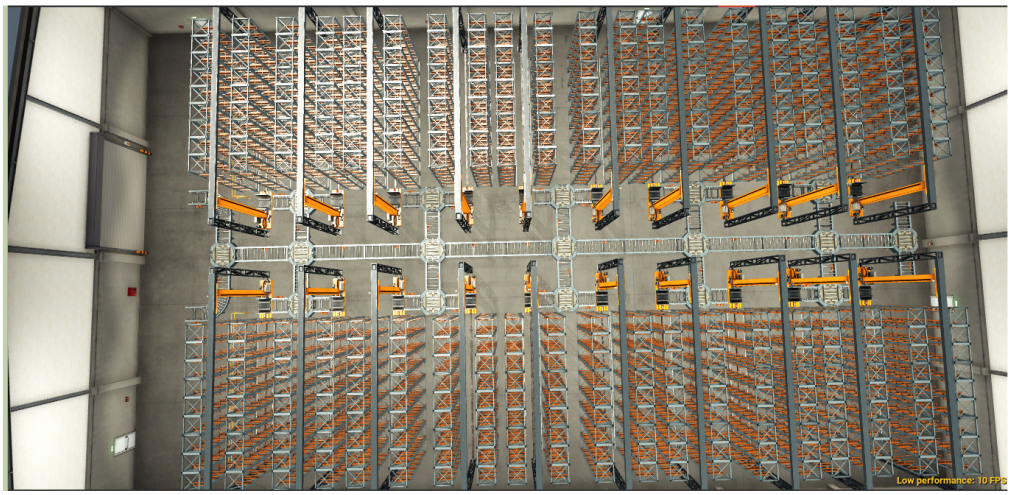

Fig. 12: High bay warehouse - view from the drone

Fig. 13: High bay warehouse - conveyor belts for distributing loads

Control I/O Control Program

The control program in the visualization program can use PLC controllers (Fig. 14) of most manufacturers (they communicate with the program via the Ethernet interface) or a dedicated CONTROL I/O extension. It allows you to program visualizations with a kind of virtual driver. For programming, the program uses a method that resembles Functional Block Diagram (FBD) programming in its structure, appearance and operation. The program modelled on schematic diagrams, and it consists in an appropriate combination of blocks and control elements, which corresponds to the programmed function. These include timers, counters, Bool's algebra blocks, flip-flops and memories.

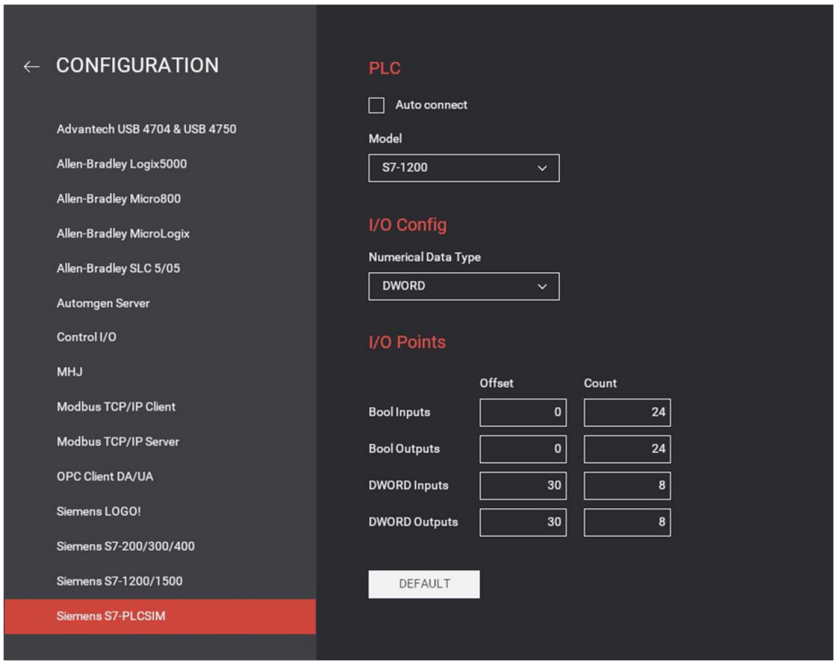

Fig. 14: Selection of the PLC control system

Figure 15 shows a fragment of the pallet sorting control program with a specific program structure in the form of address blocks, OR, NOT and AND functions as well as binary memory blocks.

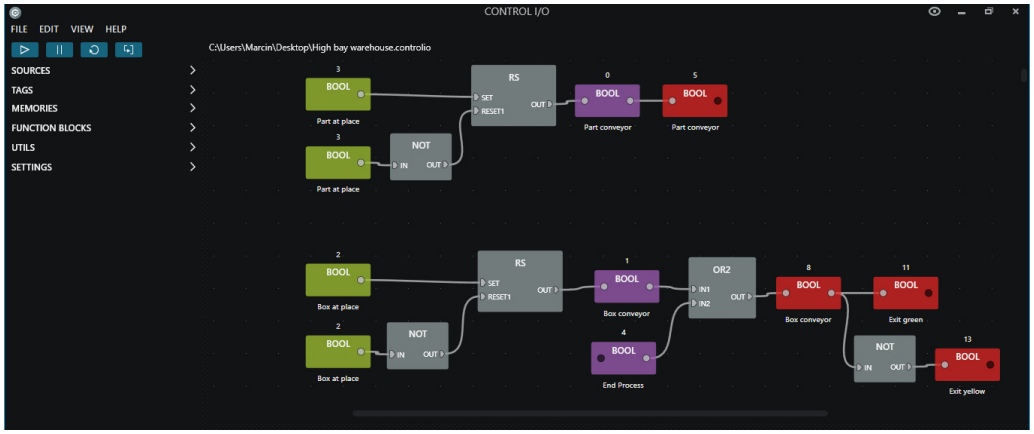

Fig. 15: CONTROL I/O view

Each sensor or actuator has one or more tags. Tags are used to link the values of actuators and sensors to the controller. However, tags can also be used to manually control actuators.

The tag consists of a name and a value. When creating parts, names are automatically assigned to tags. It is usually good practice to rename tags with short and descriptive names as they will be used when mapping actuators and sensors to the external controller. Tags can have three different data types depending on the type of sensors and actuators and configuration:

- Boolean for on / off values,
- Float for analog values (real numbers),
- Integer for specific data.

The system control program was created as a block diagram. 41 input addresses were used, which are assigned to sensors and buttons and 27 output addresses, they were assigned executive elements such as: conveyors, transferand stacker cranes and warning devices. The whole, together with function blocks, is about 200 elements, they are: logical blocks, flip-flops, edge-controlled, timers, counters and memory blocks, as well as blocks that perform operations on numbers. The entire structure has been divided into several cooperating parts.

Summary

The use of a virtual circuit design target for logistic processes abolition of the you to the assessment adopted in a new system based on agreed criteria and constraints. The presented system solution can be assessed in virtual work conditions, which is already an aspect of logical validation of the technical solution. A key aspect of the so-called c A compact industrial revolution (also known as the digital industrial revolution) is a high degree of flexibility and the application of modern, intelligent information technologies at every stage of the production chain, from the design phase to the production of final products. Digitization of production plants, which is the basic assumption of the Industry 4.0 concept, allows companies to more effectively cope with potential disruptions occurring at every stage of the supply, production and distribution chain, and allows for rapid changes in production and logistics processes. The implementation of the virtual factory concept enables you to digitize resources, create your own libraries, animate and move around in virtual plants in 3D space, which facilitates and accelerates the execution of planned real activities (Back et al.,2010).

With reference to the above arguments, a computer visualization of a virtual logistics warehouse was designed in the FACTORY I/O program. It shows package sorting process as regards height, stacking them on pallets using palletisers and placing on the high-bay warehouse, which have been executed. In addition, CONTROL I/O has been programmed to control technical devices in order to accurately reproduce the operation of the whole.

The system simulation is mostly automated, the operator has access to the control panel, where his role is to turn on the system and observe the entire process from a platform located on the platform. Two displays inform about the stock levels of the stored pallets. For safety reasons, appropriate fences, barriers and balustrades as well as warning lights were used. The visualization shows the process in the so-called virtual reality, it allows you to simulate the operation, it will facilitate the scaling/calibration of sensors and analog actuators, as well as other software blocks under real conditions. It is worth noting the possibility of connecting a programmed PLC controller to a virtual factory model, which will also eliminate errors in the implementation of the actual technological line.

Acknowledgements

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The Impact of Energy Efficiency of The Transport Process on The Organization and Maintenance of Vehicles in The Small Company

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Sławomir KURPASKA
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: slawomir.kurpaska@urk.edu.pl

Janusz TABOR
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: janusz.tabor@urk.edu.pl

Krzysztof GÓRKA
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: krzysztof.gorka@urk.edu.pl

Abstract

Energy efficiency has become the main purpose of energy policy in the world. It has conditioned a policy towards energy-intensive sectors such as road transport. However, improving energy efficiency can lead to changes in the demand for energy services that would offset some of the energy savings obtained. As a result, the projected energy savings may be overestimated. The article analyzes the energy efficiency of road transport in a model service company in Poland. A common methodology was used to estimate the energy demand function using the algorithm described in EN 16247-4 Energy audits: Part 4 - Transport. The obtained results indicate that the achieved energy efficiency is largely maintained.

Keywords: Transport, Organization, Efficiency, Energy, Mechanical Engineering

Introduction

One of the common problems with sustainable development is the increase in transport volumes around the world. Transport causes many environmental problems, the most serious of which are carbon dioxide (CO_2) emissions, causing climate change and the depletion of fossil fuels. Scientific research also shows that, compared to other economic sectors, the transport sector's contribution to environmental degradation has deepened over the years (Hysing 2009). Moreover, it has been argued that transport is one of the most important sectors for the overall achievement of sustainable development (Berger et al. 2014, Lorek and Spangenberg 2001). To meet its sustainability and policy challenges, the European Union (EU 2012) has set several targets to reduce carbon dioxide emissions and increase the share of renewable fuels in transport system. Individual EU Member States, such as Sweden, for example, have decided on environmental targets and policies to increase the share of renewable fuels and promote the socio-technical transition to a less environmentally harmful transport system (Söderholm K. and Wihlborg 2015). One of the best examples is the Swedish environmental transport policy "Fossil Fuel Independent Car Fleet until 2030" This policy is about replacing fossil fuel cars with alternative fuel vehicles. The policy announced in 2009 has so far been discussed, and in some cases criticized, for being too ambitious, given the lack of real measures taken so far to achieve it (Sköldberg et al. 2013). This policy has been systematically implemented since its announcement, but little is known about supporting it by taking appropriate action. This is a problem because previous research shows that in addition to policy coherence and commitment to policy, understanding public responses to policy is important to increasing its chances of successful implementation (Hysing 2015, Cools et al. 2012, Sovacool and Hirsh 2009). Moreover, users, in this case car owners, contribute to shaping public opinion, which often shapes actions at the political level (Perlaviciute et al. 2016, Puhe and Schippl 2014).

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In recent decades, there has been growing interest in adopting new energy and environmental policies that stimulate the reduction of energy consumption. The main goals of these policies are to reduce dependence on fossil fuels and reduce pollutant emissions and greenhouse gas (GHG) emissions. In 2010, freight transport accounted for around 43% of global energy consumption in transport, which in turn accounted for 12% of total energy consumption and 10% of energy-related CO2 emissions. The amount of fuel used by the transport industry is expected to increase in the US and the EU, where cars emit 67% of transport-related GHG (Mitigation… 2013, McKinnon 2010).

The main way to solve these problems is to promote energy efficiency. Different countries have adopted different goals and policies to achieve energy and environmental goals. In the European Union, where transport is responsible for 25% of energy-related greenhouse gas emissions, the European Commission has adopted specific guidelines for this sector. Since the introduction of Council Directive 88/77/EEC in 1988, followed by other legislation, the implementation of the Euro standards and the 2001 White Paper on Transport, the goal of reducing energy consumption has been partially achieved. An additional target was to reduce greenhouse gas emissions by 80-95% below 1990 levels by 2050. The European Commission concluded that specific targets for the transport sector should be lowered to 60% due to its complexity (Walnum et al. 2014, White Paper… 2011). The development and implementation of new and more efficient technologies remains one of the main strategies to achieve these goals.
This article presents the energy efficiency of different kinds of transport devices in a small company from Poland.

Materials and Methods

To prepare an energy audit for transport devices, the PN-EN 16247-4 Energy audits: Part 4 - Transport standard was used, describing the procedures for various means of transport, transport of various ranges and various transported goods. This European Standard covers the performance of energy audits of movable property, e.g. vehicles, railways, ships, aircraft as well as mobile installations. It details the requirements, methodology and results specific to carrying out work in this field, regardless of who is the operator and whether they are involved in transportation only or not. It also includes information on both the issue of optimizing energy for each mode of transport as well as choosing the best mode of transport for each situation.

Due to the mobility of assets in the transport sector, energy audit in this area is particularly demanding (it is more difficult to carry out an inspection, focus resources for verification, etc.). The classification included in the regulation in question allowed, however, to distinguish aspects specific to each of the means of transport. According to the definitions, transport is defined as the activity of moving people or goods from one place to another by means of vehicles, that is, energy-consuming transport objects that may include a container, trailer or cart. Energy used in transport includes fuels including biofuels, electricity from regeneration / regeneration of energy from braking etc. (the standard excludes raw material such as aqueous urea, i.e. Adblue ISO 22241-1).

In relation to PN-EN 16247-4 Energy audits: Part 4 - Transport, an assessment was carried out based on information provided from small company, which is the owner of the vehicle fleet. According to the provision in art. 37 sec. 2 points 2 of the Energy Efficiency Act of 20/05/2016, fuel consumption in the company is not subject to detailed verification.

As part of the cooperation, due to the complexity and time criticality, the leading auditor was provided with access to appropriate personnel responsible for the implementation and control of transport processes in the company, as well as access to records and documentation. The following sampling method was adopted for the audit in question: vehicle type / model / year of production / average fuel consumption / kilometres travelled / types of energy carriers in monthly periods over the period 2014÷2016, which was considered to be representative of the fleet and justified from the point of view of the effects to be achieved. In addition, as part of the interview, general information was obtained on: criteria used to plan transport operations tasks, description of routes performed, operator training, specificity of operations in the field of optimizing transport productivity, procurement criteria for suppliers and sub-suppliers, activities in the field of development and testing of new techniques and methods reducing greenhouse gas emissions by reducing energy use or using alternative sources. The work related to the audit consisted in the coordination of the following departments: operational, technical, maintenance and financial, thanks to which the obtained data was appropriate for the process being conducted. After receiving the complete documentation, conducting an on-site inspection, it was found that the presented historical data are reliable and there is no need to re-verify with the use of recorders, records from on-board computers and other devices used to record the routes. It was also not considered necessary for the auditor to perform a test run with the operator.

Results

Information on the means of transport received from the Company was used to assess the energy condition of transport. The information received concerns the means of passenger, truck and special transport owned in 2014-

2016, which had 54 transport devices grouped into three categories (Fig. 1). The identified vehicles are equipped with internal combustion engines that run on both gasoline and diesel oil.

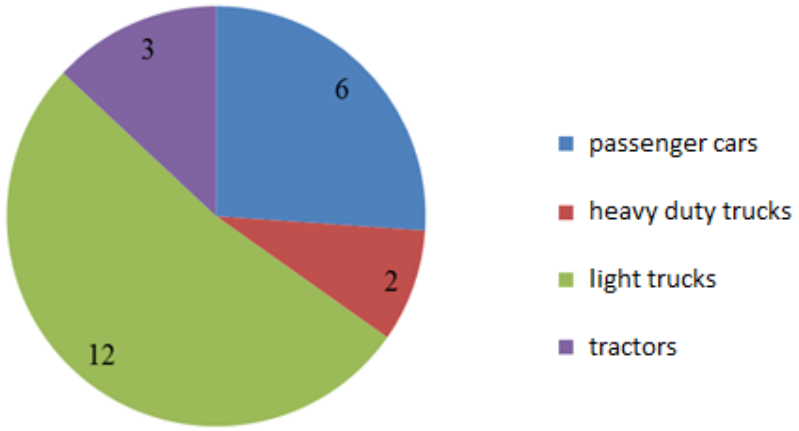

Fig. 1: Quantitative list of vehicles in the company

The identified vehicles are equipped with internal combustion engines that run on petrol, diesel oil and LPG (Fig. 2). Vehicles powered by a gasoline engine have fuel consumption in the range of 8.9-10.0 ltr·100km^{-1}. The vehicles have 2 to 5 seats and can carry 1-4 passengers at a time. Diesel powered vehicles are mainly forklift trucks. Fuel consumption is in the range of 12-14 ltr·100km^{-1} and 1.7-5.9 ltr·mth^{-1}. In the years 2014-16, traveled a total of 374,689.00 km or worked 43,083.00 mth. Due to the specificity of the enterprise in the field of production, parameters such as loading factor, planning, schedules, road topography choices, the influence of various energy influences on productivity, evaluation of energy efficiency resulting from outsourcing some activities to a transport company.

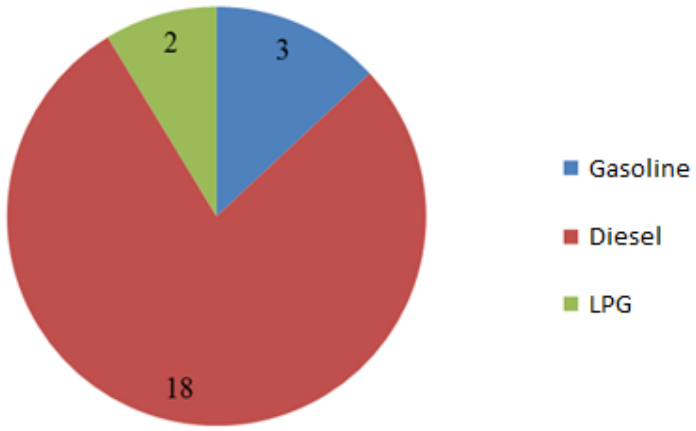

Fig. 2: List of vehicles in the years 2014-2016 by fuel type

The company has identified 12 types of electric devices for internal transport – forklifts (13 devices). The total installed power in these devices is 437.20 kW. Based on the information provided to the Company, the electricity consumption for intra-company transport was estimated at 354,561.00 kWh per year.

The following indicators were used to evaluate the energy efficiency of the owned rolling stock (their selection was dictated by the measurability criterion adopted by the standard for non-electric transport devices used in the organization) - Table 1. The balance of electricity and fuels used for transport is presented in Table 2.

Table 1: Indicators of the energy performance of transport

Indicator	Unit	Average value for years 2014-2016
average annual operating speed of the vehicle	[km·h^{-1}] [mth·h^{-1}]	48.40 5.75
fuel consumption	[kgoe·km^{-1}] [kgoe·mth^{-1}]	0.10 3.52
energy consumption index	[kWh·km^{-1}] [kWh·mth^{-1}]	1.19 40.92

Table 2: Consumption of energy carriers in transport

Energy type	Average Energy consumption for years 2014-16 [GJ·rok^{-1}]	Final Energy consumption [kgoe·rok^{-1}]
Diesel	2,302.19	55,252.6
Gasoline	228.30	5,479.3
LPG	0.57	13.7
Electricity	1,203.55	28,885.2
Summary	**3,734.61**	**89,630.8**

Due to the specificity of the company's operations, an efficient and economically profitable fleet is one of the areas on which it should focus. Due to the fact that cars are in good technical condition and with different service life (years of production from around 2000 for trucks and from around 2006 for passenger cars), it is suggested to consider renewing the fleet of trucks. In the case of fleet renewal and extension plans, one should consider the availability of certain types of vehicles on the domestic market and their equipment with an engine meeting the EURO6 exhaust emission standard. Based on the analyzes of the company's fleet, it was found that there was no possibility of substituting means of transport or using the multimodal option due to the lack of available infrastructure and the location of the company's headquarters.

In the recommendations offered for reducing energy consumption, specific points of transport are considered:

- during the organization and planning of transport in the company, a GPS system in vehicles was introduced and a vehicle monitoring system is implemented on an ongoing basis, with the help of which the company has the ability to keep records of time, route travelled, kilometres travelled and consumption, which affects not only the efficiency of logistics processes,
- the company maintains current documentation and records of the routes travelled and fuel used for individual cars in a complete manner,
- when planning routes, pay attention to the possibility of the most frequent right-turns of the vehicle in the city, which will allow for faster movement and reduce fuel consumption,
- reconfiguration of the owned fleet over 5 years of age, in which the vehicles that do not meet the current exhaust emission standards and are characterized by high fuel consumption should be replaced (e.g. heavy goods vehicles, the oldest passenger cars),
- the enterprise, employing qualified staff with appropriate courses and training, allows you to implement eco-driving techniques,
- when hiring new staff, the company pays particular attention to the experience and qualifications of drivers and equipment operators, and organizes all necessary and appropriate courses and training for new employees
- thanks to the introduction of a vehicle fleet maintenance program in the Company through the purchase of fleet fuel, which reduces maintenance costs and rationalizes the use of individual vehicles or the work of drivers. Fuel cards offer considerable savings in the purchase of fuel only and the cost of accounting for expenses.

In terms of transport policy, the enterprise is well developed and properly conducted. The vehicles belonging to the company's fleet are monitored by the GPS sensors installed in them, and fuel consumption by fuel cards and vehicle cards. The employed persons are properly trained and have appropriate qualifications.

Summary

Over the past few decades, one of the main goals of energy and climate policy has been to promote the reduction of energy consumption in energy-intensive sectors such as road transport. The goal of reducing energy consumption without disturbing the flow of traffic requires increasing fuel economy. Such improvement, however, means lowering the marginal costs of the energy service, which in turn may stimulate an increase in its demand. This phenomenon, or the so-called rebound effect, is associated with an increase in energy consumption which may partially or fully offset the expected increase in energy efficiency. If the magnitude of this effect is not negligible, policies to reduce energy consumption by promoting energy efficiency may not be fully effective. A rebound effect may also have unexpected economic or environmental effects, such as higher GHG emissions than expected. This article shows that while there is a large theoretical and empirical literature on the rebound effect, the concept has not been sufficiently researched for road transport.

To fill this gap in the literature, an empirical analysis of energy efficiency in the road transport industry was carried out in a model company. The obtained results show an average fuel efficiency of 78%. It was also analyzed by simulating that during three years of the fleet's use, the reduction of environmental impact may not be achieved after efficiency improvement. From a European perspective, the results indicate that additional benefits can be gained from policies that encourage fuel economy in countries that are relatively fuel inefficient, not least because of improved fuel efficiency. These policies should be linked to the appropriate price signals in the sector, i.e. applying specific taxes, promoting intermodality and, where possible, providing alternative and environmentally friendly modes of transport such as rail.

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Cost Assessment of Tourism Infrastructure Functioning in Village Commune

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Sabina WIATR
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,

Abstract

The development of tourism in rural areas is limited by the lack of financial resources. The study was conducted expertise of tourism infrastructure over the 2010-2015 years in the community of Tuchów. Shows the net cost of the sale of tourist services, net income from the sale of tourist services, subsidy budget to secure the provision of tourist services and the gain (loss) on sale of tourist services, and prepared SWOT analysis contains a number of factors significant for the development of the community. The analysis can be seen that tourism in the community is not propagated. To enrich the tourist attractiveness should modernize existing tourist facilities and to finance the creation of new attractions.

Keywords: cost assessment, organization, infrastructure, management

Introduction

The local community is the essence of rural tourism, which is rich in many elements. Rural tourism is detailed with the advantages of a given area, its inheritance and culture, rural activities and life, tourists choosing the period of searching for a valuable and authentic price from the rural and local community (http://ksow.pl/, access date: 26.10.2020).

Currently, agritourism is one of the most important tourist areas in the countryside. Its development in Poland began in the early nineties of the last century. In the table, a rural farm was used as accommodation. Agritourism is about providing the prices of hospitality on the farm, as well as accommodation options, food, participation in the production of fruits, their purchase and spending free time in the bosom of nature. It is a unique educational opportunity for people living in big cities and industrial agglomerations (Firlej 2002).

Summarizing the purchase prices, agritourism should be interpreted as a search taking place in a provincial area, where accommodation and a holiday list related to the farm or its holidays (nature, production and service) are provided. Agritourism in its form is one of the components of the multifunctional development of the Polish countryside (Firlej 2002).

The development of the integration of functions in the territorial area has been carried out for over a dozen years in the country: The rural region, the state of its development is not appropriate and does not affect their political development. Numerous benefits from the development of tourism obtained by the townspeople, tourist services, as well as explanations on tourist support, as well as support for the inhabitants of local communities, to the limits of the fragments of problems bothering the countryside, need to intensify this process. They prove the experience of countries with long traditions of rural tourism, as well as the experience of those regional tools and rural communes in Poland, which were the first to notice development through tourism.

In Poland, the development of rural culture has great opportunities. This is favored by, among others. in. picturesque and preserved in an intact landscape, large areas of technical support (national parks, landscape parks, nature reserves), great courses of forests and water reservoirs, rich cultural resources, large and unused labor resources, unused housing resources, village holiday traditions. Alternative tourism, including agritourism and ecotourism, is

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becoming more and more popular among city dwellers. This phenomenon has a large impact on the development of rural tourism (Sikorska-Wolak 2007).

Rural tourism in areas outside the city center and areas with unfavorable agricultural management conditions has a significant impact in mobilizing local communities. Agricultural production is difficult here due to the negative soil and natural conditions for its development (lowland areas) and terrain (mountain areas). In areas particularly rich in natural resources, rich in natural areas, constituting a pile in the country and the international system of protected agriculture, agriculture is limited by regulations and plans for their protection. They are in areas with valuable values (Sikorska-Wolak 2007).

López Olivares (2009) distinguishes four support groups facilitating the development of development functions in rural areas:

1. A new tourism-recreational relationship analyzed in a postmodern society, which is a stretch for too much urbanization, is manifested by an interest in assets found in the open air, in contact with nature, ancestors (eg Grandparents) and tradition.
2. Modernizing the public opinion in relation to the areas and their natural, cultural and EU resources.
3. Increase in accommodation base in rural areas and the legal and organizational regulations covering it (on the regional and national lists).
4. Various urban processes of rural space manifested by the expansion of the accommodation base, as well as the commercial space, as well as the increase in the number of so-called "Seconds", which resulted in the emergence of a new, multi-functional tourist space for the reception, meeting the expectations of homes.

The idea of dynamism of rural areas in terms of tourist choice from the search and choice of rural tourism. For rural tourism, only a part of rural areas as economic entities is useful. Objective criteria films, eg by geographers, copyright use. The divisions and standardizations proposed in the public opinion may be of auxiliary nature for the tourist product. The subjective opinion of tourists is more important, about what is the possibility of development and this should be the main criterion for its evaluation. The image of rural tourism is approximately different dimensions of "ruralness" constructed socially, not only by experts: idyll, tradition, hospitality, escape from stress, healthy lifestyle, unpolluted environment, tranquility, contact with nature, intimate scale. It is these elements that determine the tourist potential of rural areas in Poland (Program ... 2015).

The absolute majority of rural areas in Poland manage the potential for the development of rural tourism. However, multi-agency cooperation and substantive, organizational and financial support are necessary and projects in rural areas (Program ... 2015). The main functions of rural areas in Poland, in terms of the frequency of occurrence and the orientation towards satisfying external needs, are among the bioproductive functions - commercial agriculture and forestry, technical and production - industry, and among the service functions - tourism and recreation and residential (residential) (Palka 2010).

Among the diverse categories of non-agricultural activity, tourism is a real source of income growth in many areas of Poland. The dynamics of the growth of the tourist function depends on a whole set of factors, among which both external and internal factors play an important role. Summing up, it is also worth noting that apart from many factors supporting the activity supporting the development of tourism in rural areas, there are also barriers resulting from the economic situation in the country. Thus, the influence of factors supporting the development of tourism is reduced by the existence of many barriers on which economic success depends on overcoming. In order to accelerate and intensifying the development of tourist services in rural areas in Poland, it is worth increasing farmers and entrepreneurs' access to cheap sources of financing ensuring, inter alia, investments (Palka 2010).

Material and Methods

The analysis of information on tourism and tourist traffic in the commune of Tuchów in 2010-2015 was carried out in 3 stages. The first stage of the research was to obtain data for analysis from the Tourist Information Office in Tuchów, which is located in the Municipal Cultural Center. The second stage of the research was to obtain and analyze financial information from the Tuchów Commune concerning tourism (section 630 of the commune's budget). To analyze the financial statements, a simplified financial result account was used in accordance with the Accounting Act (Dz. U. 2016, item 1047), which is described by equation (1):

$$Z = D - K \tag{1}$$

where: Z - profit (loss) from the sale of tourist services, D - net income from the sale of tourist services, K - net costs of sale of tourist services

Due to the specificity of the issue, which is part of the promotion and strategic activities of Tuchów, the provision of tourist services in the analyzed years was subsidized from the Commune's budget. Due to the above situation, to calculate the real profit (loss) from the provision of tourist services in the Tuchów Commune, the method of analyzing financial statements was modified by extending the equation (1) by the amount of subsidy for the implementation of tourist services included in the budget of the commune, giving the equation (2):

$$Z = (S + P) - K \tag{2}$$

where: Z - profit (loss) from the sale of tourist services, S - budget subsidy to secure the provision of tourist services, P - net income from the sale of tourist services, K - net costs of sale of tourist services

The last stage of research on the state of tourism in the Tuchów Commune is to define the prospects for its development in the coming years. The analysis is based on strategic documents regarding the possibilities and directions of the commune's development. A SWOT analysis was used to present these possibilities. The first step was to identify strengths (current actions are considered effective in relation to present and future needs) and weaknesses (presence of weaknesses in relation to present and future needs). The next step was the identification of external factors, on the basis of which opportunities were defined (the scope of activities that can be supported by the anticipated concepts

and have a positive impact on the development of the commune) and threats (activities that will have a negative impact on the development of the commune). The SWOT analysis covers the diagnosis of the situation of the Tuchów Commune.

Results

Presented in Fig. 1 net costs from the sale of tourist services (e.g. purchase of construction works or services, architects' fees) are on the average level of PLN 6,500.00. The increase in costs recorded in 2011 by 700% in relation to the remaining analyzed years resulted from the receipt of a subsidy by the Tuchów Commune for the creation of a tourist information point in the MSIT network. When analyzing the volatility of net costs from the sale of tourist services (Fig. 3), their annual increase by approximately PLN 990.30 was observed.

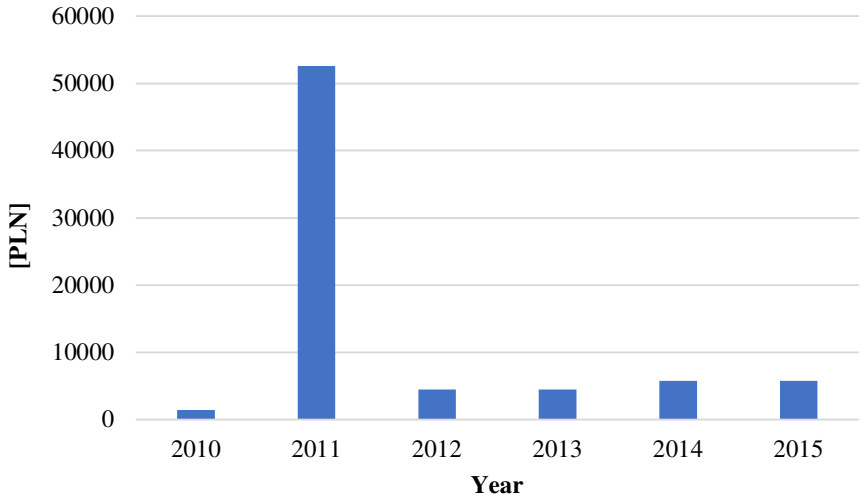

Fig. 1: Net costs of selling tourist services

Presented in Fig. 2 net income from the sale of tourist services (e.g. accommodation, meals) is around PLN 5,000.00. Similarly, to the net costs from the sale of tourist services, in 2011 there was an increase in the net income of the commune, which resulted from the creation of a tourist information point in the MSIT network in the commune. When analyzing the volatility of net income from the sale of tourist services (Fig. 4), their annual increase by PLN 990.30 was observed.

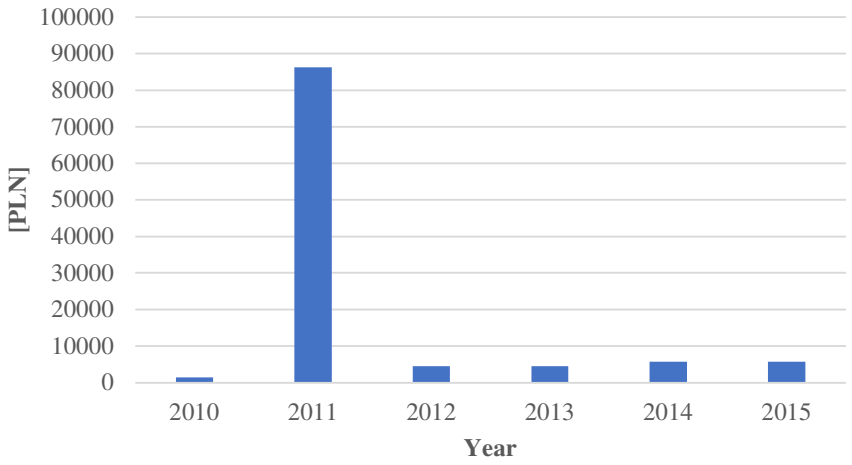

Fig. 2: Net income from the sale of tourist services

Presented in Fig. 3 the budget subsidy for securing the provision of tourist services (e.g. subsidies for tourism) is at the level of PLN 3,500.00 per year. The ranking highlights the year 2011, when the subsidy was increased by PLN 85,000.00 due to the reorganization of the tourist service provision system in the Tuchów Commune (construction of the MSIT center). When analyzing the variability of the budget subsidy for securing the provision of tourist services (Fig. 3), their annual increase by approximately PLN 1,100.00 was observed. In 2012 and 2013, the budget subsidy for securing tourist services amounted to PLN 0.00.

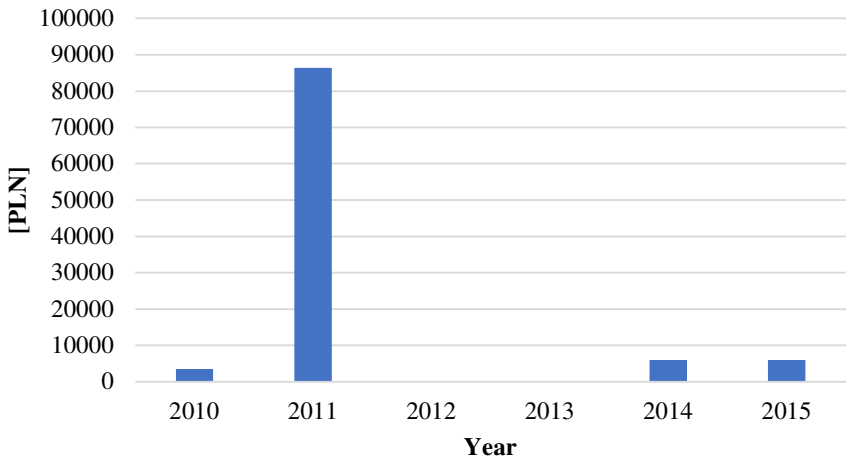

Fig. 3: Budget subsidy to secure the provision of tourist services

Presented in Fig. 4 the loss on the sale of tourist services in the years 2012-2013 (e.g. ticket sales at tourist facilities) is at the average level -1300.00 PLN. The presented amount proves the low profitability of tourist services in the region and requires additional funding from the commune budget. The increase in profit recorded in 2011 by 700% was due to the fact that the Tuchów Commune obtained a subsidy for the creation of a tourist information point in the MSIT network. When analyzing the volatility of profit from the sale of tourist services in 2014-2015 (Fig. 4), their annual increase by approximately PLN 109.70 was observed.

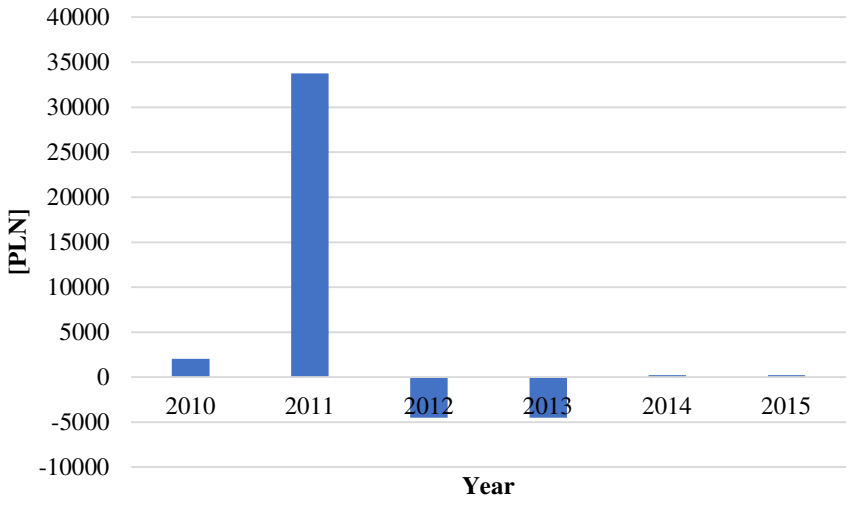

Fig. 4: Profit (loss) on the sale of tourist services

The SWOT analysis presented as a result of presented short tourism infrastructure economy contains a number of factors important for the development of the Tuchów Commune, divided into 4 categories:

1. Strengths:
   - ability to obtain external funds,
   - natural and landscape attractiveness,
   - an extensive network of hiking, cycling and horse-riding routes, Nordic walking routes,
   - cyclical events of a supra-local nature,
   - favourable conditions for the development of organic farming, vegetable and horticultural production and fruit growing,
   - a high level of activity of non-governmental organizations and informal groups (including sports associations and clubs, Rural Housewives' Clubs, Volunteer Fire Department, folk groups and orchestras) in the implementation of projects related to meeting the needs of the local community,
2. Weaknesses:
   - lack of sufficient investment funds,
   - insufficiently developed infrastructure of the free time offers and the poor technical condition of some routes and tourist and recreational facilities,
   - no integrated system for promoting the leisure offer in the commune,
   - lack of a coherent system of visual identification (including information boards and markings of routes, trails, historical places, tourist points),
   - low level of space aesthetics in connection with the existing advertisements and signs
   - poorly developed promotion and sale of local products, including handicrafts and crafts,
   - no educational offer based on local heritage,
   - poorly developed accommodation and catering infrastructure (including agritourism and regional cuisine),
   - a small number of organizations and informal groups operating in the field of tourism,
3. Chances:
   - availability of external financing sources, including new financial perspective of the European Union for 2014-2020,
   - viticulture as a chance for the development of agriculture and wine tourism (enotourism),
   - fashion for weekend activity, active and cultural tourism,
   - great interest in local products,
   - popularity of folklore, traditions and folk art,
   - pro-ecological policy

Summary

The stay of tourists in the commune is limited mainly to one or several-day visits. The parking and accommodation facilities are an important object of tourism development and constitute an important supplementary product to the area's basic tourist products. The assessment of a given place by a tourist is shaped to a large extent by the assessment

of the gastronomic offer. Technical infrastructure is the main factor that enhances attractiveness and accessibility of the region's tourist offer. For this reason, the increase in infrastructure largely determines the spectacularity and perception of a commune as a tourist market, and affects its assessment. The perception of the uniqueness of the tourist offer will depend on the possibility of coming to the region, i.e. communication convenience and the internal network of transport connections to services, tourist and recreational attractions located in the region. Tourism may become one of the most important areas of the local economy of several villages in the area. In order to increase the tourist traffic and extend the stay of tourists, it is necessary to use the rich natural, cultural and landscape resources adjacent to rural areas and to create new attractions for tourists there, as well as to implement an appropriate information policy.

In order to improve the tourist attractiveness in the commune of Tuchów, it is necessary to take the following actions:

1. Inventory of the technical condition of roads, tourist routes and bicycle routes, road markings, including those running through the area's most frequently visited by tourists.
2. Development of transport services in the region (including increasing the number of accommodation places
3. and parking at tourist, sports and recreational facilities).
4. Extension of the current tourist facilities.
5. Building new tourist attractions (e.g. Rope Park, Amusement Park, Water Park).

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Organization of Public Transport in The World - Application Overview

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Marcin TOMASIK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: marcin.tomasik@urk.edu.pl

Abstract

Public transport is most often reduced to the functioning of urban transport. Its problems are considered in the context of energy consumption, time of use, improvement of user mobility or improvement of the quality of the environment related to limiting the traffic of passenger vehicles. This article presents the main features of the various methods of organizing transport that are currently used to organize public transport around the world. As a result of modelling the public transport strategy, tariffs, transport identification systems and connection patterns are created. In this respect, the simplest system is found in Vienna, London and Seoul. The most important element of the transport organization system is the tariff system. Its shape and functioning result from the continuous learning of the system, the efficiency of information processing and the degree of adaptation to errors.

Keywords: Transport, Mechanical Engineering, Organization.

Introduction

Public transport is most often reduced to the functioning of urban transport. Its problems are considered in the context of energy consumption, time of use, improvement of user mobility or improvement of the quality of the environment related to limiting the traffic of passenger vehicles (Utsunomiya 2015, Vuchic 1999, Knoflacher 1996). It is a global trend triggered by social change. These changes are aimed at a significant reduction in the ownership of vehicles, improvement of the natural environment and the need to ensure high-quality public transport (Davis and Dutzik 2012, Dalan and Doll 2010).

The essential aspect of public transport is its organization and institutionalization. They result from the high labour and cost consumption and the mass character. The concentration of transport organization is based on economic efficiency, mutual relations between operators and public institutions, privatization processes and the development of international transport. Well-organized public transport should be useful and easy to manage. This is an important issue that will be assessed by potential passengers. One of the examples of a systemic approach to the organization of transport is Verkehrsverbund. The organization systems developed in Germany, Austria and Switzerland are based on the multifactorial improvement of the traveller service (Krause 2009, Pucher and Kurth 1995). However, due to the high individualization of travellers, the methodology for improving the organizational structure cannot be defined in a framework.

Organizational changes in public transport are one of the manifestations of its development and adaptation to the current needs of users (Koike and Wada 2012, Kaiser 2008). In historical studies, the authors rarely describe the organizational issues of transport. Currently, the issues of functionality analysis (Bekken et al. 2006, Bayliss 2002, Costa 1995), comparisons of different ways of functioning (Gwilliam 2008, Brons et al. 2005, Docherty et al. 2004, v.d. Velde 1999) or case studies (Mouwen and Rietveld 2013, Tang and Lo 2008, Engartner 2008) are discussed in the field of public transport. The main reference in these issues, which proves the organizational structure of transport, is operational or economic efficiency. Examples of such studies are the works of Roy and Yvrande-Billon and Roy (2006), Piacenza (2006) Badami and Haider (2007), Iseki (2008), in which the issues of organizing bus transport were discussed. Most often, in published scientific papers, the authors describe transport from the perspective of carriers or local and institutional authorities.

This article presents the main features of the various methods of organizing transport that are currently used to organize public transport around the world.

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Public Transport Modelling Methods

In the history of public transport, many business modelling methodologies have been developed. Each of them had its advantages and disadvantages as well as a strictly defined operating framework. Organizational modelling of transport is often schematic. Most of them have been in use for over 100 years, but with technological development, new organizational tools have emerged. They are based on the issues of operations research, business process analysis and resource management.

In the literature on the organization of transport to date, the most extensive review of business methods has been presented by Haga (2011). He based his considerations on the computerization of decision-making processes used in static and dynamic modelling. A dynamic process refers to flows such as labour or capital. This modelling has a well-defined start and end as well as input and output data. The flowchart is one of the common forms of modelling this kind of process. The cycle of this process is faster compared to static methods and allows simultaneous analysis of parallel processes. Static models refer to functions that do not often change over time.

Organigram is one of the oldest methods of business modelling. Organization charts have a long tradition and were used in their original form until the mid-19th century. A change in this system was proposed in 1855 by Daniel McCallum and George Holt Henshaw, who developed the Erie Railroad Company organizational chart (McCallum and Henshaw 1855). The authors decided to change the existing linear approach to the map approach. They presented a diagram of the stations and railway lines with technical facilities in the form of a map. The individual elements of the scheme were connected by lines according to individual network managers. Elements accompanying connection handling are marked with circles of various sizes. The presented solution was to present the organizational and operational structure of the railway, which was one of the first modern branches of industry and required clear management systems (Wolmar 2010, Yamanouchi 1998). Based on railway studies, Vuchic (2005) made a similar model solution for local transport. They based their concept on the division of transport into three levels representing the dependencies of hierarchy and relationship. According to them, a local transport company is classified into three layers - strategy, tactics and operations. The strategy refers to the achievement of long-term goals that result from political decisions. According to van de Velde, it should be quantified in terms of modality, profitability, coverage and connectivity with other modes of transport. The tactic layer determines the mid-term planning. They define the basic features of the services provided (e.g. ticket prices, route schedule, departure times from stops, purchase of rolling stock). The operation level should represent the sale of services and its derivatives. They include, among others ticketing, public information, infrastructure management, vehicle maintenance, staff turnover.

Application Examples

The most common examples of modelling the organizational structure of public transport in the UML system are Vienna, London, Seoul and Tokyo. They are considered model cities because the organization of transport in them is structural. In modelling the transport system in the analyzed cities, the needs of the system users are important. During organizational analyzes, the so-called utility as aggregation of a series of dependent variables. These include, among others ease of use by passengers, intuitive operation, speed of implementation of the assumed algorithms, time needed to recreate the saved system paths, error analysis (e.g. wrong ticket purchase, wrong connection selection, wrong direction of travel) and satisfaction with the use of solutions.

Since 1983, the public transport system in Vienna has been integrated with the Verkehrsverbund Ost-Region. Currently, together with the federal ministry and Vienna, VOR acts as the local transport authority coordinating public transport services offered in the region. It is operated by the Vienna city operator as well as many private bus companies as well as the national railway company. VOR and other authorities propose a uniform line identification scheme: for example, the symbol 'U' plus a number is used for underground railways, 'S' plus a number for suburban railways, and three numbers for regional buses. VOR offers a unified (integrated) tariff system applicable to all means of public transport in the region. The organizational structure of the services offered is quite complex, but from the passengers' point of view it is quite simple and intuitive.

In London, the urban transport system reports directly to the authorities of the Greater London Authority (GLA). In London, the underground rail service is carried out as an internal activity of the municipal transport authority. The operation of bus lines and other rail services (e.g. commuter trains) is outsourced to private companies. The GLA coordinates the tariff system, its line and service identification scheme, and the brand, and users don't need to be concerned about the fact that the operators on each line are different. There are two different fare systems - one for rail-based modes (metro and commuter train) and one for road-based modes.

In Seoul, Seoul Metropolitan Government is the central body for Transport with its affiliated organizations. Transport is mainly carried out by mass transit by rail (underground and suburban railways) and is carried out by a wide variety

of public sector operators. The buses are operated by around 86 different private companies but coordinated by BusAssociation. The buses are divided into four colour groups - blue for city lines, green for suburban lines, yellow for district services, and red for regional lines. In this system, users need to recognize two systems - Seoul city subway and the bus system - and not each operator.

The organizational structure of transport in Tokyo is complex. There are Japan Railway city services, seven large private railway companies with bus subsidiaries, two underground rail operators, several mixed public and public-private operators. Basically, each operator makes its own transport decision, although the Ministry of Transport (at national level) and the Tokyo Metropolitan Government, as well as the surrounding prefectures, are taking steps to standardize the system. From a passenger's point of view, there are many different systems, often serving different parts of an urban agglomeration, but sometimes competing with each other. There are many tariff systems and line and service identification schemes. Frequent problems faced by many passengers are different and incomplete lines and service identification schemes.

The public transport strategies in Vienna, London and Seoul are created by the needs of local authorities, considering the satisfaction of supra-regional needs of a given country. In each of these cities there is a separation between the authorities and transport operators. In Seoul and London, operators are centrally managed by city officials. The opposite of this solution is Tokyo and Vienna. In Tokyo, transport operators are private companies that have reserved themselves to operate independently of decisions made by city officials. The most complex system is in Vienna, where there are both local and supra-regional operators who have different managing and substituting institutions.

Summary

As a result of modelling the public transport strategy, tariffs, transport identification systems and connection patterns are created. In this respect, the simplest system is found in Vienna, London and Seoul. These cities have integrated tariff systems for various means of communication and operators. Due to the simplicity of the organizational system and the unification of the visualization system, orientation is very simple. The opposite of this solution is the Tokyo transport system. There are several tariff systems in the city, many carriers and a fragmented system of unification of carriers.

The most important element of the transport organization system is the tariff system. Its shape and functioning result from the continuous learning of the system, the efficiency of information processing and the degree of adaptation to errors. Complex tariff systems often hinder the functioning of the system and limit its learning abilities, as well as increase the risk of errors in the form of incorrectly purchased tickets. The most optimal solution is to connect operators who provide services in the same utility zones. This solution improves the operational capability of the system and its coherence, and increases the transparency of the system for passengers who make fewer errors. In this respect, Tokyo has the most complex transport system - it has several independent tariff systems. Vienna and London have a differently organized zonal tariff system. In Seoul, there is one tariff zone based on the distance the passenger wants to cover. Additionally, in the analyzed cities there are special contactless cards for saving tickets.

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Building Life Cycle Analysis as A Tool Supporting Environmental Decision-Making Processes

Maciej GLINIAK
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: maciej.gliniak@urk.edu.pl (corresponding author)

Abstract

The building sector is important in global greenhouse emissions and electricity consumption. The purpose of this Master's thesis is analysis a Life Cycle Assessment (LCA) for an office building, at the design stage, which can be a tool supporting comprehensive assessment and decision-making processes of the environment. The scope of work includes a literature review of assessment methods and applications of LCA in construction. The research part includes conducting the LCA analysis in the One Click LCA program for the research office building and interpretation the results obtained. The assessment of the life cycle of the analyzed object allows to develop which stages and structural elements of the office building contribute the most to the environment. The assessment covered various impact categories. The LCA analysis can be used as a tool supporting decision-making environmental processes, including by choosing more environmentally friendly materials.

Keywords: transport, organization, efficiency, energy, mechanical engineering.

Introduction

Increasing public awareness of the importance of environmental protection made it possible to promote the concept of sustainable development, the tool of which is the life cycle assessment. It is helpful in identifying and understanding the environmental impact of a given product or service. The assumptions of the life cycle assessment method are close to the broader concept of life cycle management. LCA is primarily a technique that determines the size and type of environmental impacts throughout the life cycle of a given product, process or organization, as well as striving to minimize the negative contribution (Kurczewski 2010; Soust-Verdaguer et al. 2016). The use of LCA is related to the analysis of many data concerning the company or product, providing information of an environmental nature and thus supporting the decision-making process. Marketing activities can be another function of Life Cycle Assessment. In this way, the promotion of the company or its products may take place through the environmental labeling system, preparation of environmental statements or environmental product declarations, e.g. a construction object (PN-EN ISO 14040: 2009). LCA can be an independent tool for identifying the most important environmental issues, as well as an integral part of the company's environmental management system. The LCA method is described in a series of international standards, mainly PN-EN ISO 14040: 2009 and PN-EN ISO 14044: 2009 (Nitkiewicz 2015).

The construction industry is responsible for the high level of consumption of various products and energy, and thus also generating a large amount of pollution. It is estimated that, both in Poland and in Europe, the construction sector is responsible for approximately 36% of the total greenhouse gas emissions and 40% of the electricity consumed (Milewska 2016). The concept of "green building" was launched in the early 1970s in order to minimize the negative impact on the environment and save energy. The interest in new solutions in construction engineering resulted primarily from the energy crisis and significant environmental pollution, which began to be addressed. In this sector, long-term assumptions should be based mainly on the gradual development of the design and construction stage of facilities that will meet the assumptions of sustainable development and the integrated design process (Juchimiuk 2011).

The research of Sharm et al. (2011) cover a wider range of buildings' existence as well as their environmental impact. In this work, a variety of building structures, both residential and non-residential, were reviewed. They were compared in terms of energy consumption and greenhouse gas (GHG) emissions depending on the building type as well as the phase of the facility's life cycle. It has been observed that commercial buildings have a greater environmental impact than residential buildings. The difference is mainly due to the much higher demand for electricity in non-residential buildings. The key factors for energy use in the life cycle of buildings are the sourcing of raw materials, transport and production of construction materials during the construction phase. However, during the use of the facility, it is the consumption of electricity, HVAC (heating, ventilation and air conditioning), water consumption, waste generation and use of natural resources, as well as the recycling of explosives in the decommissioning phase of the facility. Over

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the entire life cycle of a building, the impact of the construction process is relatively small (0.4–11%). In turn, the environmental load during the use phase of a building contributes to 52% of the total global warming, 66% of the total acidification and 71% of the total photo-oxidant formation potential, respectively. Such a significant impact of the operation phase makes it necessary to look for alternative and sustainable building design methods.

The LCA analysis of an office building located in Bangkok, Thailand with a gross area of 60,000 m^2 was performed by Kofoworola and Gheewala (2008). The study covered the entire life cycle of this facility, including the 50-year service life adopted at the design stage. Three categories of environmental impact of the office building were assessed as significant, namely the global warming potential (GWP), the acidification potential of water and soil (AP) and the photo-oxidant synthesis potential (POCP). In the 38-storey building, concrete and steel turned out to be the most significant materials, accounting for 80% and 5.6% of the weight of all materials used for construction, respectively. These products, however, led to 17% and 64% of greenhouse gas emissions and the formation of between 30% and 45% of the factors affecting photochemical smog and acidification in this module. At the same time, the production of cement, which requires less energy, contributes to around 42% of the GWP of the entire life cycle of the test facility. The life cycle of the analyzed office facility is focused on the operation stage, which is strongly related with the demand for electricity. It is the longest-lasting phase of a building's life, therefore it has the greatest environmental impact in all 3 impact categories.

The aim of the work is to analyze a construction object, which is an office building, in the entire life cycle "from the cradle to the grave". The possibility of using LCA analysis as an effective tool supporting the comprehensive evaluation of an office building and environmental decision-making processes was also presented.

Materials and Methods

The construction object under study is model office building in typical open space office architecture. It refers to the architecture of the surroundings in which it was erected and agrees with the local spatial development plan. The facility is an office building intended for rent. The space for users' work has been designed as an open space. The building has an area of 15,297.8 m2 and consists of 6 overground storeys and 1 underground level, which is intended for parking spaces. It has the shape of a single cuboid with a frame structure made of reinforced concrete. On the south side there is a facade of the building, which has been fully glazed, while the remaining facades are made of alternating windows and cover panels. The roof is made of green construction in order to protect the biologically active surface. The analyzed office building is in the final stage of the construction process.

The life cycle assessment of the building under study was performed using the One Click LCA software. It was realized and introduced to the market by the organization Bionova Ltd. The software is used in certification processes, incl. BREEAM, LEED, CEEQUAL, HQE. It is also compliant with European and international standards, i.e. EN 15978, ISO 21931-1 and ISO 21929-1. It is used not only for the life cycle analysis of the building, but also for life cycle cost analysis and estimation of emitted CO2 and other negative environmental factors. Verification of the impact of construction products on the basis of their life cycle analysis is carried out by type III environmental declarations (EPD), developed in accordance with the PN-EN 15804 standard. It is a document detailing the product's environmental impact during the entire life cycle. Thanks to this, One Click LCA allows for a precise analysis of a building for a specific region in which it is built, from the design and construction stage, through operation, to demolition. The software enables a large selection and change of the building materials used and their source of origin from the local data bank, and the simulation of methods of reducing environmental pollution. One Click LCA is therefore a tool that offers solutions for the construction industry, allowing the design and construction of greener and at the same time economical residential, office, industrial and other buildings.

The analyzed office building has been divided into structural elements that include specific materials used during its construction. Most of them occur in the material production phase (A1-A3) and their transport (A4) and in the last phase of the building's life (C1-C4). Selected products are also present during the use of the building (B1-B5).

Results

One Click LCA allows you to determine the environmental impact of a building in different pollutant categories. In the analyzed case, the obtained results allow to estimate the impact of both a given life stage of an office building and individual groups of materials. The environmental impact of the tested object is assessed by the emission of various factors, such as: carbon dioxide (CO_2), sulfur dioxide (SO_2), phosphates (PO_4), trichlorofluoromethane (CFC-11), ethene (C_2H_4). The figure below shows the percentage share of the successive stages in the life cycle of an office building in the emission of pollutants.

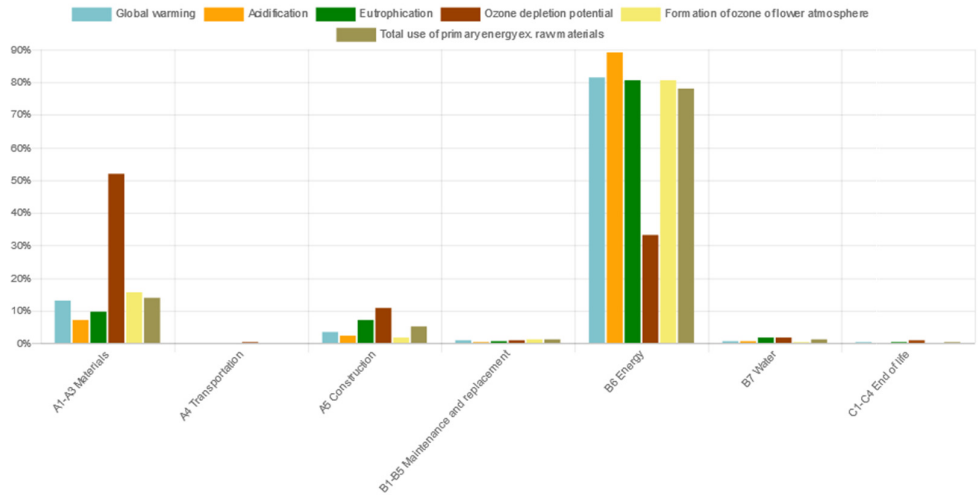

Fig. 1. Percentage share of building life stages in individual environmental impacts

At each stage of the life cycle of a building object, the most significant factor is electricity consumption, which accounts for approximately 75-90% of the total environmental impact in each category. The CFC-11 emission is an exception, for which over 50% is caused by the production phase of building materials. In this category, 30% of all ozone depleting substances are due to the energy related phase B6. Relatively small, but significant is also the construction phase, which mainly affects the destruction of the ozone layer, equal to 11.9%. These three phases in the entire life cycle of an office building are the most environmentally responsible. The remaining life cycle modules, i.e. transport, maintenance and servicing, water consumption and building demolition, play a relatively small role in pollutant emissions in each category. The results in this category are inconsistent as the LCA analysis of a building located in Krakow showed that the production of materials is primarily responsible for the destruction of the ozone layer. Of the impact categories considered, 2-6% is waste management at the end of the life cycle, a small but significant environmental impact. According to the results of this study, the A4 and A5 modules have a negligible influence. Similarly, the phase of material production and building operation is responsible for over 90% of the formation of photochemical oxidants. The results also showed that electricity consumption is the dominant factor in building use and is equally burdening the environment. On the other hand, the maintenance and demolition phase of the facility is the least significant, accounting for approximately 0.1% of GHG emissions. Figure 2 shows the impact of individual groups of materials on the effects of the tested object on the environment.

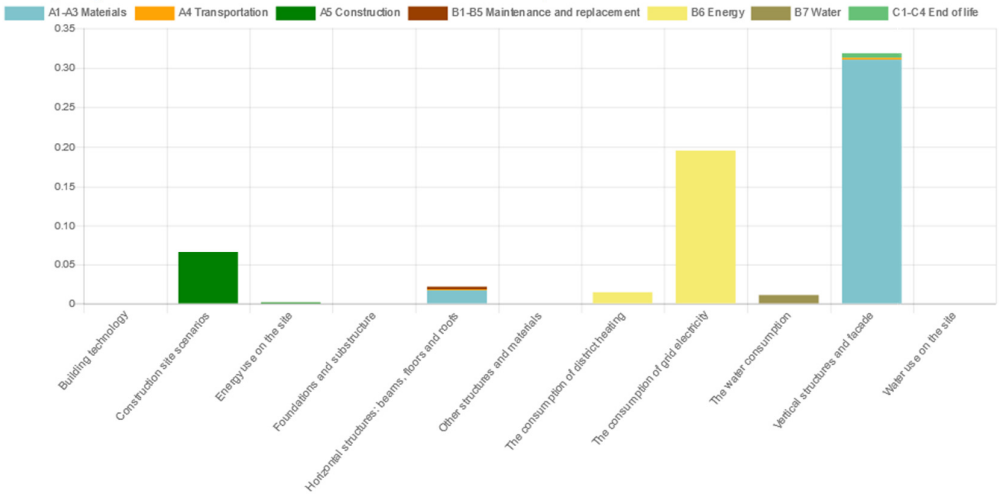

Fig. 2. The share of individual structural elements in terms of the building's environmental impact

The group of materials used to create internal walls and non-load-bearing structures of the building constitute the greatest environmental burden. It contributes to 72-83% of CO_2 emissions and substances that cause eutrophication, acidification or depletion of the ozone layer. The exceptions are emissions responsible for photochemical smog, the main source of which are the load-bearing vertical structures of the office building with a result equal to 42%, and 30% are the materials used for the construction of internal walls. In addition to these elements, the external walls and the facade are also important in the entire structure of the building. In the final analysis of the facility, One Click LCA

software assesses its impact on a seven-level emissivity scale from A to G, where A is the building with the lowest emissions and G the most polluting for the environment. The result of the analysis is shown in Figure 3.

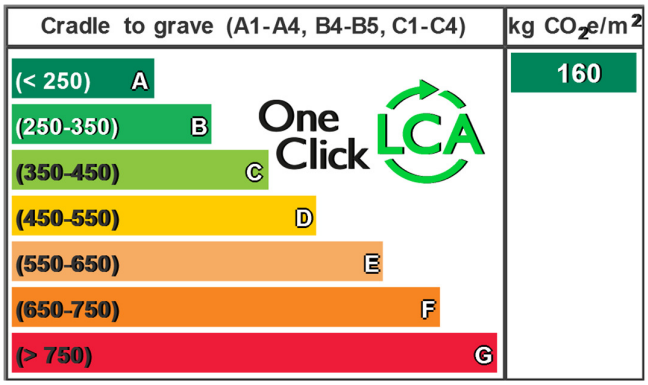

Fig. 3: The building's emission class, converted to CO2e

Based on the entered data, the analyzed office building obtained a result of 160 kg CO2e/m^2, thus being classified as level A in the emissivity scale of buildings commercial. It is an annual value for an assumed building lifetime of 99 years, including module A1-A4, B4-B5, C1, C4.

Summary

The functioning of the idea of sustainable development in various branches of the economy requires appropriate methods and tools to measure and compare the environmental impact of individual products or services. These impacts include emissions to the environment and consumption of non-renewable resources as well as land use etc. (Sharma et al., 2011). An environmental management technique can be LCA, which assesses environmental hazards throughout the life cycle of a given product. Considering all the ecosystems and its components affected by each element of a building structure, it is possible to comprehensively estimate its impact on the natural environment. For this reason, creating a building that is environmentally friendly depends on the knowledge of its impact at each stage of the life cycle (Grzesik 2006).

The purpose of this study is to assess the life cycle of an office building, which can be used for effective environmental management. Cradle to grave analysis covers the entire life cycle of a facility, from the production of building materials to facility demolition and waste management. The data was used to determine the impact of the building in various environmental categories caused by individual building components and specific building materials. It has been observed that the most harmful to the environment is the electricity consumption in modules A4 and B6, in 4 out of 5 impact categories it is responsible for 75-90% of total pollutant emissions. Such a large share of this module in the pollution of the environment with harmful gases may result from the nature of the Polish energy sector, which is based on fossil fuels. These results are also confirmed by the studies discussed above, such as Ylmén et al. (2019) or Kofoworola and Gheewal (2008). At the same time, building operation is the longest-lasting stage in the entire life cycle, in which energy consumption by HVAC systems, office equipment, lighting, etc. it is very big. Therefore, it is crucial to reduce the impact of the use phase on pollutant emissions. At the same stage, it is important to proper management of the building and installed systems. Nevertheless, reducing the impact should start with a building design that complies with low carbon standards. The construction of such facilities is possible through the use of building materials that meet specific parameters and requirements, e.g. very good thermal insulation, tightness of the building structure, elimination of thermal bridges. Such activities will allow, among others to reduce electricity consumption, including by HVAC systems, where technological solutions are also important. Apart from the B6 module, it is the building materials and the construction stage that contribute the most to environmental pollution, according to the LCA analysis. The A1-A3 module generates more than 50% of ozone-depleting compounds, while in the remaining categories its share is between 8% and 16%. Therefore, the choice of building materials is important not only in terms of the further use of the facility, but also in terms of emissions during the production and construction process. The construction of low-emission buildings is often associated with a higher initial environmental burden, e.g. by higher consumption of certain raw materials and products ready for construction. Ultimately, however, this translates into economic and ecological benefits in the subsequent stages of the building's life cycle. The remaining phases of the office building are of little importance in relation to the energy consumption and the product phase.

In the case of the construction groups of an office building, the dominant influence is on the internal walls and non-load-bearing systems. They are responsible for 30% of the emissions of gases causing photochemical smog, but in

the remaining categories a total impact of 70-85% is observed. Other significant groups are also: pillars and load-bearing structures, as well as external walls and facade, as well as land development. The pollutants emitted by these groups may result primarily from: the use of large amounts of non-renewable raw materials, the consumption of large amounts of electricity for their processing and the need to use a large number of finished products at the construction stage. The reduction of the generated pollution can be achieved by using recycled materials for construction, or by managing demolition waste to create another facility. Due to the high environmental impact of the construction sector, the introduction of the idea of sustainable development is of key importance. The results of the LCA analysis allow the identification of impacts, the assessment of the impact and its systematization, and the comparison of different buildings at each stage of the life cycle. Determining ways to minimize the impact of a building object is possible through a comprehensive analysis of environmental aspects, which allows to identify places that generate the greatest load. The results of the analysis also allow for the comparison of the materials used, giving clear guidance when choosing alternative raw materials and finished products. The information provided by LCA is extremely important for building designers, constructors and the client. Environmental management using LCA allows you to plan and make better material choices and make appropriate decisions that will make your building more environmentally friendly. It also enables economic and ecological optimization of each stage in the building's life cycle, including the dominant phase of operation.

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Three Selected Management Models As Supportive Quality Tools In Creating A Marketing Strategy

Anna KUBJATKOVA
University of Zilina, Faculty of operation and economics of transport and communication, Department of economics, Univerzitna 1/8215 Zilina, Slovak Republic, anna.kubjatkova@fpedas.uniza.sk

Margareta NADANYIOVA
University of Zilina, Faculty of operation and economics of transport and communication, Department of economics, Univerzitna 1/8215 Zilina, Slovak Republic,
margareta.nadanyiova @fpedas.uniza.sk

Abstract

The current competitive environment and the constant pressure of customer requirements cause a growing need for a quality marketing strategy, which is already a necessary element of the long-term existence of companies. Businesses must strive to meet customer needs and create new and effective marketing strategies that ensure that business goals are met. In the field of management, certain methods can be used to create a marketing strategy, which can provide certain benefits and speed up or simplify this extensive process. The primary goal of this work is the analysis of selected management methods and their use in creating a marketing strategy for the company. These methods are the Business Canvas model, the Balanced Scorecard, and Porter's model of 5 forces. The aim was to describe the possibilities of using management methods in areas essential for the creation of a marketing strategy and also to derive the benefits of these management methods. Within this work, methods of analysis, synthesis, induction, deduction, and comparison of the issue were used, based on which specific conclusions were drawn. According to the performed analysis of individual management methods, we determined the areas of their use in the process of creating a marketing strategy and we also determined the benefits provided by these management methods. Based on clear processing in the form of tables, companies can use these management methods in a specific area of the process of creating a marketing strategy.

Keywords: marketing strategy, Business Canvas model, Balanced Scorecard, Porter's model of 5 forces

Introduction

In a successful business, the company must achieve predetermined goals through the use of marketing strategies. Setting the right marketing strategy is, therefore, a key factor in meeting the company's goals. Without a properly planned, designed, and implemented marketing strategy, a profitable business entity would probably disappear. The development of marketing strategy over the years has shown that authors dealing with this issue in the past have often limited themselves to creating a marketing strategy based only on internal information of companies, without taking into account the influence of the market and competition. Today, the influence of the external environment on the marketing strategy and its creation is a matter of course, and it is a time-consuming and personnel-intensive, and complex process.

Marketing strategy is the marketing logic by which a company achieves its marketing goals. The marketing strategy consists of decisions on marketing costs, the marketing mix, and the allocation of marketing resources about expected environmental and competitive conditions. The marketing strategy builds on the basic policy and goals of the company, which also helps to shape and determine and is the result of a comprehensive analysis of competition, environment, demand, but also its own strengths and weaknesses. (Jakubikova, 2012)

In his study, Varadarajan (2010) comments on defining a marketing strategy and explains it as an integrated model of an organization's decisions that specifies its critical product, market, marketing, and marketing resources in creating communication and delivering products to companies that offer value to customers, in exchange, thus enabling this integrated model of the organization to achieve specific objectives. The main goal of the marketing strategy is to state the optimal variant and direction of the company to ensure the sustainable development of the company. Strategic management plays an important role in achieving the set goal of the organization, as it forms the basis for the

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application of management, and provides a starting point for the area of the most important and long-term oriented management activities. We can consider marketing strategy as one of the most important tools for the strategic management of a company operating in a highly competitive market environment.

The author Lesakova (2011) claims that the correct formulation of individual marketing strategies leading to the achievement of set marketing goals becomes a prerequisite for the success of the company in the long term. However, the basic process for formulating strategies should cumulatively meet the following requirements for business management:

- respecting the mission of the company and following the basic corporate marketing direction, which covers all corporate units and activities,
- high awareness of the results of marketing situation analysis,
- the use of marketing situation analysis as a key starting point for formulating a strategy,
- unconditional respect for the primary and secondary goals, for the fulfillment of which the individual strategies are formulated.

The specific marketing strategy of the company should work in a balanced way, focus on the long-term goals of the company, and respect the internal and external conditions to achieve the expected market effect. The task of the marketing strategy is to select the market segments on which the company will focus and help it achieve its marketing goals. (Kotler, 2007)

Available global resources define marketing strategy as the effort to develop effective responses to the changing market environment by formulating market segments, developing and locating product offerings for target markets. (Hooley et al., 1998) A marketing strategy can act as a plan in which product decisions, placement, and promotion are tools to help a business respond to market changes. It represents market orientation and satisfying customer needs and marketing concepts to indicate how the overall strategy of the company should go and how these needs will be met. It also introduces the company's philosophy of how to carry out its marketing activities efficiently and effectively, is primarily focused on the customer and his needs, influencing the customer through various influences, such as classic marketing mix tools or the use of modern tools such as media and social networks (Gavurova, Bacik, Fedorko, Nastisin, 2018). Focusing on the customer and increasingly creating private labels is key for companies that are focused solely on achieving a certain level of profit (Gregova, Dengov, Tulyakova, Mustafaev, 2020). To achieve the required level of profit, in addition to focusing on customer requirements, it is necessary to determine the optimal price of products, which is an integral part of the process of creating a marketing strategy (Oliinyk, Kozmenko, Wiebe, Kozmenko, 2018). The essence of the marketing concept is for the company to focus primarily on profit instead of sales volume and for the customer to return to the product and also to acquire new customers based on references from existing customers (Goeldner et al., 2014). The professional literature states that the marketing concept is based on 4 pillars, while each element of the marketing concept adds value to the following element:

- focus on the market,
- customer orientation,
- coordinated marketing,
- profitability. (Jakubikova, 2012)

For a quality marketing strategy, it is necessary to know what the real needs and wishes of customers are and to be able to anticipate them in time, for example, anticipate the customer's future needs and understand trends. As with chess, the company must be able to predict future market developments and deploy its forces ahead of time in strategically advantageous locations. The company should evaluate the profitability of the project, the complexity with which it will be implemented, possible vulnerability, and make sure that it does not lose more than it can gain. (Tručka, 2013)

Rajnak et al. (2007) argue that pricing is the essence of pricing and is a complicated process. A properly designed price is the quickest way for a business to maximize its profits. An appropriately priced price can even increase profits faster than increasing turnover. Of all management decisions, price decisions are the most visible and have a significant impact on the overall profitability of the business.

Methodology

Creating a marketing strategy is a complex process in which it is possible to use many procedures, models, and methods from various areas. In the field of management, it is possible to use various methods to support and create a marketing strategy. These selected management methods are:

- Business Canvas model,
- Porter's model of 5 forces,
- Balanced Scorecard.

Business Canvas model

It is a simple tool for designing, analyzing, and innovating a business model created in graphical form and designed by Alexander Osterwalder. This model is best described based on nine building blocks that show the logic of how a company wants to make money. These nine elements cover four main areas: customers, supply, infrastructure, and financial viability. We can, therefore, perceive the business model as a detailed plan of a strategy to be fulfilled through organizational structures, processes, and systems. This model helps companies to coordinate individual activities and provides a relatively comprehensive view of the business. This tool is popular with entrepreneurs because it presents room for improvement and innovation in the company. By consolidating the view of activities and aspects related to business, it enables the discovery and subsequent elimination of non-profit parts of the business plan and the depiction of opportunities for business growth. (Osterwalder, Pigneur, 2012)

The basic components of the Canvas business model are:

- customer segments,
- added value,
- channels
- customer relations,
- sources of income,
- key resources,
- key activities,
- key partnerships,
- cost structure.

Porter's model of 5 forces

Porter's five-force model is a tool that examines the competitive environment. Porter assumed that the profitability of an industry depends on five dynamic factors that affect prices, costs, and the necessary investments of companies in the industry. The aim is to enable an understanding of the forces operating in this environment, to identify those that are most important for the company in terms of its future development and which may be affected by strategic management decisions. It should also be noted that in individual sectors factors of equal importance because each industry is unique and has its own specifics. (Srpova, Rehor, 2010)

These 5 forces include:

- the rivalry between current competitors,
- the threat of entry of new competitors,
- the threat of substitutes,
- bargaining power of suppliers,
- bargaining power of customers.

In a competitive environment, it is important to identify the competitive advantages that a company could use to gain market leadership. Valaskova, Kliestikova, and Krizanova (2018) argue that knowledge of the customer's preferences is key in determining the purchasing power of consumers, which is crucial for the competition and its position in the market. According to Chetthamrongchai and Saengchai (2019), gaining customer loyalty is therefore essential for companies in the competition, while goodwill or company image also derives from customer loyalty (Kliestik, Kovacova, Podhorska, Kliestikova, 2018), (Tuan, Jusoh, Mardani, Streimikiene, 2018). According to Podhorska, Gajanova, Kliestikova, and Popescu (2019), goodwill and its key value indicators are important in the competition, especially to ensure the growth of its market value.

The acquisition of a competitive position in the market is preceded by the acquisition of information and analysis of the competitiveness of the company itself using various analyzes and indices (Parobek, Palus, Kalamarova, Loucanova, Krizanova, Repkova Stofkova, 2016). It is important to note that gaining a competitive position is not as important as maintaining that position in the market. To maintain a competitive position in the market, companies use a large number of marketing tools, and in today's environment, not only the media and innovation but also respect for the environment come to the fore. According to Moravcikova, Krizanova, Kliestikova, and Rypakova (2017),

therefore, the relationship between the company's sustainable competitive position on the market is inextricably linked to the principles of green marketing.

Balanced Scorecard

Balanced Scorecard (BSC) is a strategic management tool. It is also referred to as a system for measuring the performance of the organization or a system of balanced performance indicators of the organization. The set of balanced indicators is the basis of the Balanced scorecard, and we can compare these indicators with each other. BSC emphasizes that financial and non-financial measures must be part of an information system available to employees at all company levels. Frontline employees must understand the financial implications of their own decisions and actions, and senior management must understand the drivers for long-term financial success. BSC's goals and measures are more than just an ad hoc set of financial and non-financial performance measures but are derived from a vertical process given by the company's mission, vision, and strategy. BSC should accompany the company's mission and strategy into tangible plans and gauges, as it is more than a tactical or operational system of gauges. This strategic management tool translates the company's vision and strategy into goals and indicators, which are contained in the following four perspectives (Kaplan, Norton, 2007):

- financial perspective,
- customer perspective,
- the perspective of internal processes,
- the perspective of learning and growth.

According to Krylov (2019), we can consider the Balanced Scorecard to be a sufficiently tested management tool that is known to all market participants in the world.

Implications of management models to creating a marketing strategy

There are a large number of possibilities to use the mentioned management methods in creating and shaping the company's marketing strategy. In the following table we have created an overview of the areas of use of individual management methods in creating the company's marketing strategy:

Table 1: Areas of application of management methods in creating a marketing strategy

Area of application	Methods	Business Canvas Model	Porter's model of 5 forces	Balanced Scorecard
Customers		Breakdown of customers into customers that the company wants to reach and those that it wants to ignore, emphasis on segments, channels, and customer relationships	Efforts to prevent the growth of customers' bargaining power	Focus on creating value for the customer and the investor
Competition		Focusing on added value and finding a competitive advantage	The greatest emphasis on competition, focusing on an existing and a potential competitor	Focusing on competition analysis for the learning needs to move forward in value create
Resources		Determination of sources for financing, analysis of sources of income	Determining the sources of financing to ensure the most suitable competitive position	Identifying resources to achieve the company's vision and strategy and resources to make the company more attractive

Information	Emphasis on information from the environment of resources and innovation	Emphasis on information to gain a strong competitive position in the market	Emphasis on information to ensure long-term growth and improvement of the company
Communication	Selection of communication channels based on selected and ignored customer segments	Improving communication with customers, but also with suppliers	Detecting business process imperfections based on a thorough communication network
Product	Creating a specific offer based on the definition of customer segments	Prevention of substitutions, emphasis on originality and quality	Emphasis on the attractiveness of the product not only for customers but also for investors

Source: processed by authors

The advantages of individual management methods and their use can be stated based on theoretical knowledge and a processed table as follows:

Table 2: Advantages and use of Management Methods in Creating a Marketing Strategy

Methods	**Business Canvas Model**	**Porter's model of 5 forces**	**Balanced Scorecard**
Use	promoting understanding, discussion, and creativity in creating a marketing strategy	thorough and detailed analysis of the competitive environment in creating a marketing strategy	measuring the performance of the organization and putting goals and strategies into practical and achievable tasks to support the creation of a marketing strategy
Benefits	clarity and time-saving	brevity and complexity	practicality and perspective of the future

Source: processed by authors

Conclusion

The issue of creating a marketing strategy for organizations is currently considered one of the most important. Theorists and practitioners agree that the existence of a strategy is a basic prerequisite for the survival of the organization, the specification of its position in the market, and its development. When formulating the marketing strategy of the company, it is possible to use various theoretical and methodological sources, while the resulting strategy of each company has a unique character. Among other things, many methods from the management environment can be used to support the marketing strategy, using which companies can make the necessary decisions necessary for the formation of the final business strategy. The essence of creating a marketing strategy is primarily complexity, systematicity, and an effort to make the most of the possible synergistic effect of all implemented decisions.

Management methods analyze the company from different perspectives and allow a comprehensive overview of the internal and external environment of the company, as well as changes affecting it from both of these environments. These methods and models, therefore, help the company in obtaining information for a comprehensive creation of a marketing strategy. It follows that management models and methods are an integral tool to support marketing strategy, and their use helps to make decisions that shape a comprehensive marketing strategy of the company.

Each of the selected models has a significant contribution to the creation of a marketing strategy. The use of the Business Canvas model in the creation of a marketing strategy allows companies to quickly and clearly graphically arrange all the elements needed for improvement and innovation in the company. This model also evokes creativity

and encourages collective work in the process of creating a marketing strategy. Porter's model of 5 forces provides a brief overview of the various impacts on society, while its biggest advantage can be considered a comprehensive assessment of the competitive environment, which is very important in creating a marketing strategy. The Balanced Scorecard also has very practical use in creating a marketing strategy, where it provides companies with measurable and achievable tasks as a result of goals and strategies, while this model provides companies with a perspective of the future.

Individual management methods help in creating the company's marketing strategy, especially by creating an information base in various areas. These methods can be combined and complement each other, as well as other methods to support the creation of a marketing strategy, thus helping companies to create a comprehensive and integrated strategy.

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The Role of Innovative IT Systems, based on GPS Services, in Human Resource Management Processes Which Takes Place in a Job Performed by a Football Coach

Wojciech LEWICKI

Faculty of Economics, West Pomeranian University of Technology Szczecin, Poland.
e-mail:Wojciech.Lewicki@zut.edu.pl

Abstract

The article presents a research study on the role of innovative IT systems, based on GPS services, in human resource management processes which take place in a job performed by a football coach. The literature on the subject emphasizes that the issues of human capital management are not only limited to enterprises and management staff. There is a strong tendency to transfer the issues of human capital management to other organizational forms, such as sports clubs or coaching staff. In the case of sports coaches, one of the key tasks involves management using monitoring of physical parameters. Today, this process uses the data obtained by means of innovative services and information technologies based on positioning systems. In the study, the data from the football match was collected using the innovative CATAPULT IT system equipped with GPS transmitters. One of the key parameters of the coaches' assessment was analysed, i.e. the intensity of the player's run depending on the phase of the game, i.e. attack or defence. The study covered players in the major football league in Poland in the autumn of the 2018-19 season. The aim of the article was to evaluate the hypothesis that on average the attack in the offensive phase cover longer distances than in the defensive phase and that the distance covered during intense running as well as peak speeds are higher in the first and not the second half of the match. Not only does this research study make an important contribution to the literature by providing up-to-date information on the aspects of human resource management in terms of commitment, but also on the data analysis and its use for training methods in sport. The study results are an important element of R&D in a job performed by a professional trainer.\

Keywords: Human Resource Management, Involvement, Data, IT System.

Introduction

The literature emphasizes that human resources are of great importance to the effective operation of any organization. They do bring tangible results (Schuler,1992). In the book by Griffin (2012) human resource management, or "personnel management", as it is sometimes called, used to be a secondary task in many organizations, but in the last two decades its importance has grown enormously. This results from the increasing complexity of the legal matter, and recognition that human resources are a valuable means of improving efficiency, as well as realization of the costs associated with their inappropriate management.

Many authors (Casico,1992; Bratton & Gold 2012;Mathis & Jackson 2011; Mishra, Sarkar & Singh 2012) emphasize that human resources include knowledge, skills, experience and attitudes identified as commitment. Currently, many researchers in the field of human resource management acknowledge the fundamental role of the latter postulate (Kuimet et al. 2015; Naeem et al. 2019; Kein, Brinsfield & Cooper, 2020). By emphasizing it in the knowledge-based development, the importance of behavioural levers grows, including the employee's commitment, which is an important determinant of how their potential is fulfilled. Therefore, it is necessary to change the traditional model of human resource management in order to build and develop a management model based on commitment.

The available literature mentions that football is a sport characterized by physical involvement (Drust, 2010). One of the researchers emphasizes that it requires unique qualities and skills from the players (Akenhead et al. 2013). Their complexity is determined by a variety of behaviours on the pitch, such as variability of the speed of movement during the game (e.g. walking, running, sprint), or sudden changes in the direction of runs, e.g. (transition from attack to defence) (Morgans et al. 2014). According to the available studies, a player performs an average of 150-200 different actions during one match. Apart from the aforementioned changes in the speed and directions of runs, this type of effort includes, among others, jumps, accelerations or slowdowns (Ferraz, Tillar & Marques 2017). In the literature on the subject more and more emphasis is put on the role of players representing the attack as those who have a decisive influence on the result of the match (Goumas, 2017). The analysis of the available research studies shows that players in the forward or wing positions cover the longest distances during

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sprints, i.e. when they run at the highest level of intensity (Mohr, Krustrup & Bangsbo 2003). In addition, other authors emphasize that the vast majority of goal-scoring situations is preceded by a forward's or winger's sprint, which means that this type of a running action has an impact on the result of the match (Kermarrec 2015). Therefore, the assessment of running abilities at the highest level of intensity may be crucial for a football coach in human capital management processes (Faude, Koch, & Meyer 2012).

Therefore, it is important to analyse the distance covered during sprints (an activity at the highest level of intensity), both in the offensive and defensive phase of the match.

Although analyses based on the Global Positioning System (GPS) are widely used by professional football clubs, and provide an insight into commitment (physical activity during training), the application of these systems to analyse physical characteristics of particular formations in a real match is still an open research question. (Neville et al. 2012; Scott, Scott, & Kelly 2016; Coutts & Duffield 2010; Wisbey et al. 2010). In particular, it is applicable in the field of research on human resource management in a job performed by a professional football coach.

The analysis of the literature on the subject shows that no studies on this issue have been carried out yet (Larsson 2003; Varley, Fairweather, & Aughey 2012; Theodoropoulos, Bettle & Kosy 2020), which additionally emphasizes the grounds for examining it in terms of science and practicality.

The aim of the study was to evaluate the hypothesis that on average the attack in the offensive phase cover a longer distance than in the defensive phase and that the distance covered during their runs with the highest running intensity and the peak speeds are higher in the first half, and not in the second half of the match.

The paper is organized as follows. Chapter 2 provides a detailed description of the research approach to answer research questions. Chapter 3 describes the results of the experimental research. Chapter 4 contains their interpretations. Chapter 5 presents final conclusions of the research, indicating their limitations, a practical application and future directions of research in this field.

Research Approach

Design and Procedure

The literature emphasizes that the use of innovative solutions based on GPS technology enables to conduct an assessment of approximately 500 to 1,500 physical parameters (Theodoropoulos, Bettle & Kosy 2020). The complexity of the physical process, which takes place during a football match, required an innovative approach from the authors. The variables which were crucial for the research and the subsequent analysis included the distance covered by the player while sprinting in the offensive and defensive phase; the peak speed during highly intense actions in both phases of the game; development of the values of these characteristics in the first and second half of the match. For the purposes of the research, it was assumed that sprint is a situation in which the player runs at a speed of over 7 m/s. The offensive phase is a situation in which the team of the player under study has possession of the ball, while the defensive phase is a situation in which the team loses control of the ball and makes attempts to win it.

Instrument

The crucial data for the research was collected using innovative IT systems devices in the CATAPULT OPTIMEYE G5 (10Hz) system equipped with GPS transmitters. Observation of the game reality shows that these technologies are more and more frequently used by the training staff of the largest football clubs for defining commitment and conducting an assessment of the physical potential of particular players (Brewer et al. 2010). All information was collected during football games played on grass pitches. The study covered 19 matches in the autumn of the 2018-19 season of Ekstraklasa (a Polish major football league).

Participants

Affirmative actions were taken with regard to the correct selection of people for the research. It was assumed that the study would cover 18 forwards playing in the major Polish football league in the autumn of the 2018-19 season. The average age in the study group of players was 25.9 ± 3.5 years, while their average height was 185.5 ± 5.9 cm. The research results are presented in tabular and graphic form.

Results

The analysis of the collected data (Table 1) showed that in the group of forwards the average sprint distance covered during the match in the offensive phase (93.6 ± 40.2 m) is 21.4% longer than this distance covered in the

defensive phase (77.1 ± 30.7 m). The highest value of that parameter for one player in the period when his team had possession of the ball was 160 m, while the lowest value was 82% less and equalled 28.8 m. In the defensive phase, the highest value of the parameter under study was recorded at a level of 139.4 m, which was 876.7% more than the minimum value (15.9 m) for this phase (Table 2).

Table 1: Average ($\bar{x}$±SD), minimum and maximum distance [m] covered by the forwards at a speed of >7 m/s, broken down by game phases

Game phase	1. half			2. half		
	$\bar{x}$ ± SD [m]	Min.	Max.	$\bar{x}$±SD [m]	Min.	Max.
Offensive phase	51.25±33.35	0	108.62	42.35±28.44	0	101.92
Defensive phase	38.75±24.87	0	80.1	38.35±24.02	0	72.58
Both phases	90±40.15	0	132	80.7±34.66	0	147.82

Table 2: Average ($\bar{x}$ ± SD), minimum and maximum distance [m] covered in the match by forwards at a speed of >7m/s

Game phases	Entire match		
	$\bar{x}$ ± SD [m]	**Minimum**	**Maximum**
Offensive phase	93.6±40.22	28.79	159.98
Defensive phase	77.1±30.71	15.9	139.38
Both phases	170.7±41.13	88.91	232.94

The peak speed reached by the players under study in both phases of the game is presented in Table 3. The average I ts value calculated on the basis of the data collected in the offensive phase was 8 ± 0.41 m/s, and was 1.1% less than its average value noted in the defensive phase (8.09 ± 0.45 m/s). The peak value of the crucial parameter for the offensive phase was 9.36 m/s, which was 37% more than the bottom value of 6.83 m/s. The highest value of the peak speed measured in the defensive phase reached a level of 9.43 m/s, which was 37.7% more than the lowest value of the parameter observed for the forwards in that phase of the game (6.85 m/s) (Figure 1).

Table 3: Average maximum speed ($\bar{x}$ ± SD) [m/s] recorded by the forwards, broken down by game phases

Game phase	1. half	2. half	Average for both halves
	$\bar{x}$ ± SD [m/s]	$\bar{x}$ ± SD [m/s]	$\bar{x}$ ± SD [m/s]
Attack phase	8.11 ± 0.63	7.9 ± 0.53	8 ± 0.41
Defense phase	8.23 ± 0.76	7.95 ± 0.52	8.09 ± 0.45

The data analysis showed that the average value of the distance covered in the forwards' sprint was significantly higher in the first half than in the second half for each of the game phases (Table 1). In the offensive phase, the distance covered for running with the highest intensity in the first half of the match was on average 51.3 ± 33.4 m, and was 21% more than the distance covered in the second half of the game (42.4 ± 28.4 m). In the defensive phase, the average sprint distance covered in the first half of the game was 38.8 ± 24.9 m, and was 1% more than the distance covered in the second half (38.4 ± 24 m).

However, the highest value of the parameter for the results achieved during the first half in the defensive phase was 80.1 m, and was 10.4% more than the highest value achieved by the forwards in the second half of the match (72.58 m). The top values for the distance covered in the first half during sprinting in the offensive phase reached a level of 108.62 m, which was 6,6% more than in the second half of the game (101.92 m) (Table 1).

The average peak speed measured in the offensive phase was recorded at a higher level in the first half of the match (8.11 ± 0.63 m/s) than in the second half (7.90 ± 0.53 m/s). The difference was at a level of 2.7%. As for the defensive phase, the results were similar, with a 3.5% difference between the average values of the parameters. For the first half, in this phase of the game, the average value was 8.23 ± 0.76 m/s, whereas for the second half it equalled 7.95 ± 0.52 m/s (Table 3).

The highest value of the peak speeds reached in the first half (offensive phase) was 9.43 m/s, which was 7.3% more than the peak value in the second half (8.79 m/s) (Figure 1).

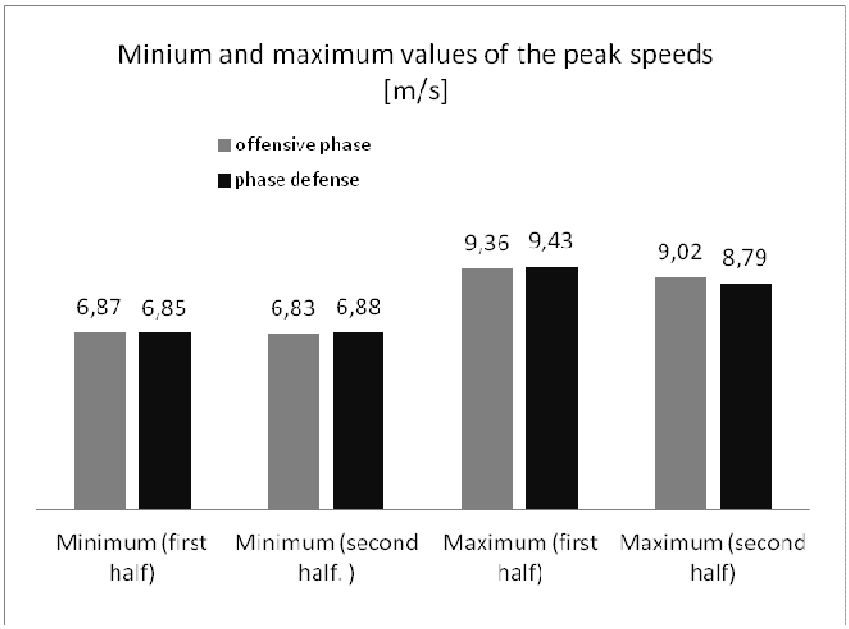

Fig.1: Minimum and maximum values of the peak speed [m/s] recorded by the forwards, broken down by game phases

Source: own study

The lowest values for the time when the team was in defense were 6.85 m/s (first half) and 6.88 m/s (second half). The difference was 0.4%. In the first half in the offensive phase the highest peak speed was 9.36 m/s, which was 3.8% more than the highest value for the second half in the phase of the game under study (9.02 m/s). The lowest value of the parameter under study before the break was 6.87 m/s, which was 0.6% more than after the break when the lowest value of the peak speed was 6.83 m/s.

In order to perform our analysis objectively, the players' results were included in the test only after they had played for the entire duration of the match. After each game played, the average values of the characteristics of the players analysed in both halves of the game were calculated. Then, the obtained values were averaged for the entire population under study. The application of an appropriate statistical tool supported by Excel allowed to present differences between the sprint distance and the peak speeds reached by the forwards both in the offensive and defensive phase, as well as show how the values of these parameters change in each half of the match.

Discussion

One of the main elements of modern concepts of human resource management is the management of the employee's commitment (Cox, Zagelmeyer & Marchington 2006). As other researchers point out, commitment is a kind of reflection of the willingness and ability to perform work. It may be looked at from different aspects, e.g. commitment to the organization or work (Zhou, Fan & Son, 2019). There are many factors which have influence on the level of the employee's and the organization's commitment (Seeck & Diehl 2017). It remains true, however, that in the case of a sports discipline such as football, this commitment has a physical dimension (Friedrich & Mason 2017). Innovative IT systems based on GPS services are tools that can be used to assess and measure the

physical involvement of particular players. Currently, no one doubts that the trainer is responsible for measuring and evaluating this commitment. The aim of the research study was to evaluate the hypothesis that on average forwards cover a greater distance in the offensive phase than in the defensive phase of the match. Moreover, the study aimed at discovering whether the distance covered during highly intense runs and the peak speeds reached by the study group of players were determined by higher values in the first or the second half of the match.

The research results allowed to confirm the hypotheses formulated by other researchers (Miñano-Espin et al. 2017; Di Salvo et al. 2007; Andrzejewski et al. 2016) that on average the study group of forwards covered longer sprint distances in the offensive phase than in the defensive phase, and that the values of an average distance covered in the sprint as average peak speeds were higher in the first half of the game than in the second half of the game. At the same time, the study rejected the hypothesis promoted in the literature that forwards reach higher peak speeds in the offensive phase than in the defensive phase of the match (Ferraz et al. 2017; Lago et al. 2010). The authors put forward an argument that in the case of forwards the defensive phase is primarily an attack on defenders and a quick return to defence after offensive fragments of the game. One of the researchers emphasizes (Carling,2010) that in such situations larger spaces are created on the pitch, which results in longer and faster sprints. Additionally, it should be taken into account that forwards often dribble in the offensive phase, which may affect their peak speed.

Our analyses allow to state that the forwards who played in the autumn of the 2018-19 season covered a much longer distance on the field (21.4%). During the offensive phase their running was the highest in intensity. It is normal, because players in this position should have special skills for the offensive game (Tenga et al. 2010). The differences between extreme values of the analysed parameter for each phase of the game were at a relatively similar level, but it is worth noting that on average the distance covered during a single sprint was longer in the offensive phase, which was confirmed by higher extreme values of the parameter under study.

The results of the comparative analysis, broken down by two halves of the match, were also confirmed in the research studies conducted by other authors (Gregson et al. 2010). The values of the parameters covered by the study (average distance covered in the sprint, average peak speeds) were higher before the break.

The results of the analyses provided interesting data on the average distance of the forwards' runs that were the highest in intensity (sprints). They were longer by 21% before the break (offensive phase) compared to the game after the break. However, for the corresponding periods of the defensive phase the difference to the advantage of the first half of the game was only 1%. In the future, the relationship of this particular parameter with the result of the match should be analysed in detail. As for the change in the level of average peak speed values depending on the half of the match, they were at a higher level before the break in both phases of the game. In the offensive phase this difference was 2.7% to the advantage of the time on the field before the break, while in the defensive phase it was 3.5%. Therefore, it should be noted that similar decreases in the value of these types of variables took place, which shows that in both phases of the game the forwards were able to maintain runnig at a similar level of efficiency and intensity with regard to the parameter under study.

Some extremely interesting research results were obtained by analyzing the average values of the peak speeds calculated for each phase of the game (Varley, Fairweather, & Aughey 2012; Bush et al. 2015). It would seem that an offensive player, who is a forward, should achieve much better results for this parameter when his team is in the offensive phase than in the defensive phase. However, the data analysis shows that slightly higher average peak speed values were reached in the defensive phase of the game. This may mean that forwards do not fulfil their maximum physical potential in the offensive phase of the game (Wrigley, et al. 2012; Dellal et al. 2011). This information regarding their real physical abilities may be crucial for the players themselves and their coaches.

Conclusions and practical implications

The analysis of the data collected using the innovative CATAPULT IT system equipped with GPS system transmitters from the players of the attack who play in the Polish Premier League clubs in the autumn of the 2018-19 season points to the following conclusions:

- During sprints (> 7m/s) the study group of forwards covered a longer average distance in the offensive phase than in the defensive phase. The difference was 21.4%. This is in line with the originally adopted hypothesis. Forwards are more involved in the offensive actions of their teams.
- For the group of players under study, the average distance covered and the average peak speeds reached during sprints in the match were higher in the first half than in the second half, which confirms the hypothesis. The growing fatigue, as the match progresses, means that the forward usually has weaker physical parameters in the second half of the match.
- The average sprint (> 7 m/s) distance covered by the group of forwards in the offensive phase was longer by 21% before the break than after the break. The difference was only 1% to the advantage of the time on the field before the break for the defensive phase in particular periods of time in which the parameter was analysed. In

the future, it will be necessary to conduct an additional research study on the impact of the match result and changeable tactical guidelines.

- The average peak speeds for the study group in relation to the halves of the match in both phases (offensive and defensive) remained at a higher level before the break. In the offensive phase the difference was 2.7%, whereas in the defensive phase it was 3.5%. Both differences are therefore comparable.
- The players in the attack reached higher peak speed values in the defensive phase than in the offensive phase. The differences were 1.5% for the first half, and 0.6% for the second half. The reasons are that in the offensive phase a forward often runs with the ball by his foot and has to focus on avoiding being offside, which translates into a slightly lower peak speed compared to the defensive phase.

The research study on building physical commitment shows that increasing the level of physical commitment in a team is an important organizational challenge in a job performed by a football coach.

The issues related to the analysis of the physical commitment of footballers are an important factor which has its influence on their sport achievements and financial success (Swayne & Dodds 2011). Monitoring of commitment also influences other requirements, such as knowledge, skills, health, or motivational processes. Therefore, involvement in human capital management grows in importance, as is the case with modern information technologies based on GPS services. Without a doubt management skills are required from the management team, or they are important competences of a professional football coach. Although the results of this study provide interesting conclusions for football coaches, more research is necessary to take into account other factors such as changes in tactics after conceding a goal, changing positions on the pitch, or losing a player. This data may provide a broader context and insight into the relationship between the effects of the parameters of running and developing innovative training methods. Therefore, an analysis of the data obtained from innovative IT technologies based on GPS transmission services related to the purposes of coaching will be the subject of future studies on the improvement of the optimization of human resource management.

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Techniques of Handling of Accounting Documents And Detection of Creative Accounting Using Foreign Models In The Conditions of The Slovak Republic

Roman BLAZEK[1]
1University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovakia,
roman.blazek@stud.uniza.sk; blazek17@stud.uniza.sk

Pavol DURANA[1]
[1]University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovakia,
pavol.durana@fpedas.uniza.sk

Abstract

This article deals with creative accounting and specific handling techniques, which are widespread throughout the world and thus in the Slovak Republic. The situation that Enron started has gradually spread around the world, as evidenced by the scandals of WorldCom, Tyco, etc. Techniques began to be used to manipulate accounting documents and records, putting companies in a better position, managers being able to meet the goals originally set by the company's management, thus enriching themselves in the form of rewards, but achieved illegally, which later stands the company name. customers or, in the worst case, the whole existence. These techniques need to be pointed out because they have a negative impact on companies, employees, customers, donors, but also on the region in which the company operates or on the state. The article also presents methods to detect this illegal activity, which can ultimately and with timely interventions can once again steer companies in the right direction, ie in a direction without manipulation. No country in the world can avoid manipulating accounting documents. People are resourceful and want their businesses to make a profit. The combination of these two aspects always exists with manipulation, so it is necessary to inform the general public about this phenomenon. The aim of the article is to reveal the current situation of using techniques for manipulating financial statements and to describe the methods of their detection.

Keywords: Creative accounting, Purposeful manipulation, Detection models, Accounting documents

Introduction

Fraud has been here in the past and continues to this day, and therefore seems to be part of human nature. We encounter ethical dilemmas ourselves almost every day. These dilemmas often concern not only our personal lives, but also our professional lives. From current and past events, such as the so-called decline of Enron, we can observe that this dilemma also applies to companies. Business fraud is committed mainly for the personal benefit of the perpetrators or society as a whole, but often has devastating consequences for the surrounding economic environment. But there are always two sides of the coin. On the one hand, there is fraud, on the other hand, tools for combating this fraud, or doing everything possible to prevent fraud from occurring. In this article, we will try to describe the actions of companies that lead to fraud, but also methods that can detect this fraudulent behaviour of companies and thus reduce the number of companies that do not operate under the rules of applicable law and are destroyers of the reputation of the country where they do business.

The aim of this article is to point out the manipulation techniques and methods by which we can detect these techniques. The article is divided into several parts. In the Literature review chapter, the opinions of various authors of various studies are on how they understand manipulation, also where people can encounter manipulation everywhere and what the consequences are associated with manipulation. In the next chapter, the reader will read about possible techniques for manipulating accounting documents. We focused on several techniques, which we also described, so that the reader can imagine what kind of manipulation he is writing about. In the following chapter, we focused on methods of detecting creative accounting, ie how to detect a manipulative company. There are various methods that include world-renowned fraud detection models. In the chapter Result and discussion, the reader will

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learn the conclusions that arise from the use of manipulation techniques. This chapter also discusses the current situation, which is largely affected by the Covid-19 pandemic. Finally, in the Conslusions chapter, we described a possible scenario for the development of a pandemic and the impact of the pandemic on the economies of the Visegrad Four.

The aim of the article is to describe the manipulation techniques used by companies to manipulate their statements, which then do not show the correct values, and so companies can change their obligation to pay taxes.

Literature Review

Fraud is committed in companies that seek to cover up their large revenues in the form of profits, whether from the subject of business in limited liability companies or from stock exchange trading, which is characteristic of joint stock companies. At the end of their accounting period, all these companies seek to make a profit that can help their companies manage them, or use this profit to expand the company, use it to expand into a new business or country, or redistribute it between company owners and employees, in the form of bonuses. The authors of Siekelova & Podhorska (2020) explain that "profit is the final effect of a company's business and at the same time often a measure of whether a company is successful or not." Company performance data is one of the cornerstones of further business planning and decision making. "The authors of another study, specifically Siekelovaet et al., Agree with this statement. (2019).

This has also been noted by Yang & Lee (2020), whose research may expand this knowledge as corporate fraud risk management strategies are increasingly becoming a sustainable business development goal. Recent reforms in forensic accounting technology to manage the corporate fraud risk around the world have opened up new avenues for the implementation of corporate governance and internal control mechanisms. Liao et al. (2019) found that the fact that the use of manipulation is expanding is hampered by a single factor, and that is women in financial management that reduce the likelihood of their businesses engaging in accounting fraud. Furthermore, this fact has shifted not only to private companies but also to public ones, where we can see the same trend of non-participation in the fraud. In an article by Wang et al. (2019), we can learn more about how investing in mutual funds also reduces accounting fraud. The study focused on the bivariate probit model, which examines the relationship between mutual funds and accounting fraud between 2007 and 2014. The authors found through their research that open-end mutual funds outperform closed-end mutual funds in detecting accounting fraud and reduce fraud commissions. An interesting finding was made by Beneish et al. (2012), who found that companies with a higher probability of manipulation, based on the M-score, achieve lower returns in each portfolio of deciles sorted by: Size, Book-to-Market, Momentum, Accruals, and Short-Interest. The M - score is also used as one of the tools for detecting manipulation of financial statements, as evidenced by the article by Blazek et al. (2020), who in their study focused on the Beneish model and examined the use of creative accounting in the conditions of industry A - Agriculture, forestry and fishing in Slovakia. Manipulation of financial statements can mean an advantage for the company in the area in which it However, manipulation is a fraud, a criminal act that can very quickly turn against the user and later, exactly as described in their study by Wang et al. (2019) that this information is gradually entering the capital market, which may have devastating consequences for the company, in particular for companies operating in the capital market. Such...

Gray (2008) writes in his publication that "Forensic accounting investigations include litigation services related to a variety of situations, including the following: business purchases, valuation of divorce assets, property damage, lost profits due to embezzlement and other illegal acts, tax evasion, and money laundering schemes." Goel & Ansari (2015) noted that companies use creative accounting to inflate stock prices. Subsequently, shares are held that hold overvalued prices. The "misuse" of creative accounting, in the case of Satyam Computers Limited, was possible due to a failure of the audit and a general failure of the CG's system. Okoro & Okoye (2016) argue that creative accounting helps organizations mitigate year-on-year changes in profits by shifting profits from. Stlowy & Breton (2004) argue that accounting manipulation is well known to companies and can be found in the literature under various designations, such as income smoothing, big bath, creative accounting, earnings management, creative bookkeeping, or window dressing. As can be seen, many authors have tried to describe manipulation, explain how manipulation occurs, or why it still persists.

Possibilities of editing accounting documents

This chapter of the article is devoted to techniques of manipulation of accounting data, documents. Here, the reader can, in a brief overview, read about the most used techniques of manipulation of accounting documents in the Slovakia.

Techniques for manipulating accounting documents

Volkánová (2014) explains that the most serious types of misstatement of financial statements include:

- "sudden changes in sales, market share or profit margin,
- unattainable target values of key indicators, especially short-term ones,
- Indirect pressure caused by linking the motivational component of management's salary to certain financial indicators."

Through the application of thoughtful manipulation techniques, we can indicate data manipulation. These techniques can be divided according to the degree of difficulty.

Embellishment of financial statements

Simon Constable (2014) in his publication he defines window dressing as the creation of cosmetic arrangements of the portfolio before the end of each quarter. It is about improving the position of the company, covering up mistakes so that the owners look more successful. The purpose of this technique is to get the results in the reports that managers want to see. Among the most popular handling techniques we include, for example:

- **Failure to comply with the precautionary principle**

In this case, the entity does not recognize revenue that is indeterminate. However, if it has possible losses, it is obliged to account for them and subsequently report them in the financial statements.

Off-balance sheet financing

According to Krupová (2001), the definition is as follows: "This is the financing or refinancing of business activities that may not appear on its balance sheet in compliance with legal requirements and accounting principles."

Exchange of financial leasing for operational

Leasing is considered to be an easily available source of external financing. At present, we can rank leasing among the most used methods of financing, especially for long-term tangible assets. Leasing is a mutual obligation. It is a relationship between the lessor and the lessee, where the lessee rents the lease and is obliged to pay the lessor in advance. Leasing is divided into:

a) **Financial leasing** (or even financial leasing): in terms of time, we incorporate it into a long-term lease. The lessee may use it to refinance the acquisition costs even though he is not the owner of the leased object**,**
b) **operating lease** (or also operating lease): in terms of time, we include it in the short-term lease. It is intended mainly for those business entities that need the need to finance seasonal needs.

Failure to report liabilities arising from outstanding receivables

A provision for a receivable is created mainly for a receivable for which it is reasonable to assume that the debtor will not pay it in full or in part, and for the disputed receivable from the debtor with whom the recognition dispute is pending. Based on § 26 par. 3 of Act no. 431/2002 Coll. on Accounting, as amended (hereinafter referred to as the Accounting Act), the accounting entity is obliged to adjust the valuation of assets, create provisions and depreciate assets in accordance with the date on which the financial statements are prepared with accounting principles and methods. This means posting a provision the receivables belong to the closing accounting cases. The creation, drawing as well as dissolution of provisions is specified in entrepreneurs, accounting in the double-entry bookkeeping system in § 18 of the accounting procedures. From the accounting point of view, we create provisions for receivables for costs, in the full or partial amount of the outstanding receivables.

Creation of reserves

A reserve is a liability with an uncertain timing or amount. The creation and accounting of reserves or the tax assessment of reserves is regulated by:

- Accounting Law,
- measure of the Ministry of Finance of the Slovak Republic on 16 December 2002 no. 23054 / 2002-92 laying down the details of the accounting procedures and the general chart of accounts for entrepreneurs accounting in the double-entry bookkeeping system,
- Act no. 595/2003 Coll. On income tax, as amended.

The provision is created by the entity on the basis of the precautionary principle for possible risks and losses. A provision is a liability that represents an entity's existing obligation arising from past events, it is probable that it will reduce the entity's economic benefits in the future, and if the exact amount of the obligation is not known, it is estimated to be sufficient to meet the existing obligation at for which the financial statements are prepared taking into account risks and uncertainties. Under the Accounting Act, an entity is required to adjust the value of assets, create provisions and depreciate assets in accordance with accounting principles and accounting methods as at the date on which the financial statements are prepared. "

Incorrect selection of depreciation method

An entity is required by law for accounting to depreciate tangible assets other than inventories and intangible assets other than receivables in accordance with accounting principles and accounting methods. Exceptions for fixed assets are land and objects made of precious metals, which are classified as non-depreciable fixed assets. Depreciation represents the actual rate of depreciation of fixed assets used by the entity, but not exceeding the amount of the valuation of the assets in the accounts; they are accounted for on a monthly basis on the basis of a depreciation plan. By choosing the depreciation method, an entity may affect the amount of operating costs to some extent and thus the profit or loss. It has occurred since 2020 in the Slovak Republic, a change in the depreciation of assets. The accounting entity is obliged to classify tangible fixed assets into one of the 7 depreciation groups. A different depreciation period applies to each depreciation group (Table 1).

Table 1: Depreciation period for individual groups

DEPRECIATION GROUP	DEPRECIATION PERIOD (IN YEARS)
0	2
1	4
2	6
3	8
4	12
5	20
6	40

Source: own processing according to the Income Tax Act, Act no. 595/2003 Coll.

The change, which became effective in 2015, says that for depreciation groups 1, 4, 5, 6, the entity can no longer arbitrarily decide which depreciation method to choose. It can only use the straight-line method. For the two groups (groups 2 and 3), he can still choose the straight-line or accelerated depreciation method. Since 2020, the number of depreciation groups has been expanded by depreciation group 0. Here, the same rule applies as for depreciation groups 1, 4, 5 and 6, ie an entity can only use the straight-line method.

Multiple depreciation groups, and a stricter definition of the depreciation method for separate depreciation groups, may to some extent discourage entities from applying creative accounting, as these measures have reduced the scope for excessive creativity.

Fictitious Invoices

It is a relatively common practice in creative accounting to issue fictitious invoices. This is the invoicing of unrealized trade. This shop only exists on paper and entrepreneurs help each other with this method, especially at the end of the year when the so-called they incur costs in order to be able to reduce their tax liability. A viable way to detect such invoices is through certain common features that these invoices show. These are invoices that are issued for services or various advice. In such activities, it is difficult to prove whether this service was actually performed, in contrast to invoices for goods and the like. The texts of the invoices are relatively brief and there are no attachments to the invoices. These invoices are issued only sporadically.

Methods of detecting creative accounting

We have several methods for detecting fraud that will help detect economic crime. We divide them into financial and non-financial.

Procedures for detecting possible accounting delays are based on analytical models. These are mostly complex statistical methods or techniques of obtaining data, through which we can identify hidden, unusual patterns that indicate fraud. These analytical models therefore serve to detect various errors and fraud in accounting.

Beneish model

It is a mathematical model by Professor Messod Daniel Beneish of the University of Indiana (1999). The model includes eight variables and we can use it to identify the data manipulation based on financial statements.

The model works with two accounting periods and can be performed on a monthly, quarterly or annual basis.
Mantone (2013) writes in his publication that he correctly identifies Beneish's model, 76% of revenue manipulation cases.

Furthermore, Mantone (2013) argues that the model is an excellent tool for the person performing the audit or control of financial statements not only by providing overall control of the financial statements, but each part of the model also provides control of individual details of the financial statements by measuring changes that occur between periods. These indices provide some guidance as to which area the audit or control person should focus on in the subsequent review of the details of the documentation.

Jae (2010) described the model as a summary of the following eight variables:

DSRI (Days' Sales in Receivables Index)	$\dfrac{\frac{receivables_t}{sales_t}}{\frac{receivables_{t-1}}{sales_{t-1}}}$	(1)
GMI (Gross Margin Index)	$\dfrac{\frac{added\ value_{t-1}}{sales_{t-1}}}{\frac{added\ value_t}{sales_t}}$	(2)
AQI (Asset Quality Index)	$\dfrac{1-\frac{current\ assets_t - PPE_t - equities_t}{total\ assets_t}}{1-\frac{current\ assets_{t-1} - PPE_{t-1} - equities_{t-1}}{total\ assets_{t-1}}}$	(3)
SGI (Sales Growth Index)	$\dfrac{sales_t}{sales_{t-1}}$	(4)
DEPI (Depreciation Index)	$\dfrac{\frac{depreciation_{t-1}}{PPE_{t-1} + depreciation_{t-1}}}{\frac{depreciation_t}{PPE_t + depreciation_t}}$	(5)
SGAI (Sales, General and Administrative expenses Index)	$\dfrac{\frac{fixed\ costs_t}{sales_t}}{\frac{fixed\ costs_{t-1}}{sales_{t-1}}}$	(6)

LVGI (Leverage Index)	$\dfrac{\dfrac{current\ liabilities_t + long-term\ commitments_t}{total\ assets_t}}{\dfrac{current\ liabilities_{t-1} + long-term\ commitments_{t-1}}{total\ assets_{t-1}}}$	(7)
TATA (Total Accruals to Total Assets)	$\dfrac{\dfrac{operating\ profit_t - CF_t}{total\ assets_t}}{\dfrac{operating\ profit_{t-1} - CF_{t-1}}{total\ assets_{t-1}}}$	(8)

The main definitional relationship is based on the equation:

$$Mscore \quad -4{,}84 + 0{,}92 \cdot DSRI + 0{,}528 \cdot GMI + 0{,}404 \cdot AQI + 0{,}892 \cdot SGI + 0{,}115 \cdot DEPI - 0{,}172 \cdot SGAI + 4{,}679 \cdot TATA - 0{,}327 \cdot LVGI \quad (9)$$

According to Tumpach (2015), "if the value of M is greater than -2.22, this indicates a high probability of manipulating the financial statements. Conversely, if the value of M is less than -2.22, the probability of manipulating the financial statements is low."

Modified Jones model

Dechow et al. (1995) decided to modify the Jones model, namely the change in sales ($_{\Delta}$REV), which they replaced by a change in receivables ($_{\Delta}$REC). The authors found that if the model was created using revenues, an error rate occurred, so they decided to change, which was to reduce the lack of EM detection. The first stage remains unchanged, the change occurs in the second stage, where the NDA is expressed as follows:

$$\frac{NDA_{it}}{A_{it-1}} = \frac{TA_{it}}{A_{it-1}} \qquad \alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it} \qquad (10)$$

Where:

NDA_{it}	non-discretionary accrual in year t;
TA_{it}	total accrual in year t;
A_{it-1}	total assets in year t-1;
ΔREV_{it}	year-on-year change in sales in year t;
ΔREC_{it}	year-on-year change in receivables in year t;
PPE_{it}	tangible fixed assets in year t;
α_0, α_1, α_2	coefficients,
ε_{it}	prediction error.

In this part of the article, we have introduced some of the world's most recognized methods of detecting business manipulation. There are also other models, such as the model from the authors Svabova et al. (2020), who in their study tried to create a discriminant model of the detection of earnings manipulators in the conditions of the Slovak economy.

In their research, Susanto et al. (2019) focused on empirical evidence on the impact of tax aggression, which is one of the key objectives of manipulation.

A similar idea was addressed by Hoang & Joseph (2019), who examined the adoption of new rules that approach International Financial Reporting Standards. Working together, they found that there had been an improvement in the quality of revenues since the companies moved to the new accounting regime. Huynh (2019) also analysed Vietnamese companies, arguing that in analysing earnings performance, accountants and managers should think deeply about the vicious link between revenue quality and financial performance and mediating the organization's reputation. Khanh & Thu (2019) also described a number of facts in their study.

The authors of Kliestik et al. (2020) also applied other statistical methods in their study, which sought to identify a significant monotonous trend in the manipulation of earnings in the V4 countries.

Valaskova et al. (2018) used multiple regression analysis in their study, where they tried to identify statistically significant determinants that affect the future financial development of the company, which can again be attributed to the list of methods that seek to detect manipulation.

Result and Discussion

In this section, one of the models that can detect manipulation is applied. Benford's law will be used. This law states that each digit should be represented in the form of a percentage. This proportion is shown in the table below.

Tab. 2: Probability of occurrence of the number D in the first place

NUMERAL	FREQUENCY OF OCCURRENCE OF THE FIRST NUMBER
0	-
1	30,10 %
2	17,61 %
3	12,49 %
4	9,69 %
5	7,92 %
6	6,69 %
7	5,80 %
8	5,12 %
9	4,58 %

Source: own processing according to Durtschi et al. (2004)

The percentage of each digit is given by the formula:

$$P\ (D) = \log\ (1 + \frac{1}{D}) \qquad (11)$$

Tab. 3 : Probability of occurrence of the number D in the first place in Slovak companies

NUMERAL	FREQUENCY OF OCCURRENCE OF THE FIRST NUMBER
0	-
1	25,51 %
2	20,30 %
3	12,96 %
4	9,62 %
5	8,37 %
6	7,12 %
7	6,17 %
8	5,73 %
9	4,22 %

Source: own processing

For the research, we chose all companies in the Slovak Republic that have a large and very large designation in the Amadeus database. Based on the application of Benfod's law, we found that companies are trying to manipulate, because the differences between the actual representation and the table, which is higher, the results do not differ significantly and therefore we could say that in Slovakia companies do not resort to manipulation. However, to better

capture, manipulation, we recommend combining Benford's law with one of the Beneish or Modified Jones models, which are world-renowned and achieve good results with their application.

In the article, we have listed some of the possible techniques that have been discovered in the world and are also used in the conditions of the Slovak Republic. Of course, there are certainly even more techniques. In a study by Kou et al. (2004), we read that there are other techniques such as credit card fraud, telecommunications fraud, or computer intrusion and third-party data transcription. In another study by Blazczynski et al. (2020), it is written that credit card fraud has reached a higher level and is therefore no longer a card fraud but in the form of a car loan. The authors argue that, a car loan is a significant financial product that has not yet been examined in the literature, in contrast to, for example, the misuse of credit cards. In view of the recent increase in fraudulent car loan application transactions, their article is testing a new data set for car loan applications using a technique that has not yet been examined to predict financial fraud, namely the dominance-based set of balanced rules (DRSA-BRE) and after him."

In order to avoid the use of manipulation techniques, it is necessary to use manipulation detection methods. As mentioned above, there are several world-renowned models that are widely used. But people who use these models also cannot go unnoticed. These people are auditors, whether internal or external. In their article, Zhang et al. (2007) define the work of the auditor, as well as his independence, and also try to describe the weaknesses of internal control, as internal control and audit are not the same. Firms are more likely to be identified as an internal weakness in control if their audit committees have less financial knowledge or, more accurately, less accounting financial knowledge and non-accounting financial knowledge. They are more likely to be identified with a weakness of internal control if their auditors are more independent. In addition, companies with recent auditor changes are more likely to have weaknesses in internal control. According to the results of Felo et al. (2003), it can be said that it may be beneficial for investors to require more expertise in audit committees than just to require one expert in the audit committee. But we cannot blame internal auditors. Of course, many auditors are unaffected and do their job to the best of their knowledge and belief. Prawitt et al. (2008) state that internal auditors often perform work that is important to the financial reporting processes of their hosts.

Conclusions

As we can see, it follows from this article that companies resort to the manipulation of their accounting data, statements, documents and have a wide range of possibilities for this, which they can use to "beautify" their accounting. Fortunately, there are studies that allow us to identify businesses that are behaving illegally. Such companies are usually punished in the form of financial fines, arrests of directors, bankruptcy and even the bankruptcy itself.

The current situation regarding the global pandemic caused by Covid -19 is not conducive to business. Many companies are currently reaching the bottom of their strengths. We can see it e.g. in the Slovak Republic, but also close to the borders, as neither the Czech Republic, Poland, Hungary, Austria nor Ukraine are doing well. The gastronomy industry is destroying. Similarly, there are fitness centres, theatres, ... Kwasny et al. (2019) also describe industrial clusters that are key players in economic growth and innovation in the global economy, which needs very suffer. All these institutions are doing very badly, as their operations have been closed. Many companies have also been affected by this, as they are now unable to repay their liabilities, which they would otherwise be able to repay. The closure of the plants has disrupted the existing supply chain. Another big problem is that employment (even in these sectors) is falling and it is estimated that unemployment will rise by 12 million for the whole of Europe, which is a very critical figure. As movement has been restricted (closure of airports, borders leading to disruption of supply routes), export-oriented economies are suffering. Slovakia, the Czech Republic and Hungary suffer most closely from the Slovak Republic, where total exports represent 80% of GDP (in Slovakia, exports of goods and services represent 96% of GDP). All these aspects will lead entrepreneurs to engage in manipulation, as there is a high probability that businesses will not be able to survive this period and will be forced to disappear.

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Transfer Pricing Issue: A Tool for The Tax Base Influence Elimination

Anna SIEKELOVA

University of Zilina, Faculty of Operation and Economics of Transport and Communications,
Univerzitna 1, 010 26 Zilina, Slovakia
anna.siekelova@fpedas.uniza.sk

Abstract

The article deals with the theoretical side of the transfer pricing issue. Based on the globalization trends and related changes in legislative, transfer pricing is the current topic. Until 2015, transfer pricing was an unknown term within smaller enterprises doing business across the territory of the Slovak Republic. Since 2015, the obligation to keep documentation for transfer pricing has begun to apply also to smaller enterprises doing business only in the Slovak Republic. Since then, the legislation in the field of transfer pricing has been changed. It can be stated that transfer pricing is subject to international regulations, which also apply in Slovakia. The aim of the contribution is to present transfer pricing issue as a tool for eliminating the purposeful influence of the tax base. Authors dealt with the theoretical background of transfer pricing issue, as well as the determination the usual price on the market and compare it with the transfer price between related entities focusing on committing transfer pricing rules. The article contains the historical development of transfer pricing, definitions of basic terms as well as methods usable in the process of transfer pricing. The practical part presents a model of the use of transfer pricing as a tool for the tax base influence elimination.

Keywords: Transfer Pricing, Related Entities, Earning, Earnings Management

Introduction

Based on the globalization trends and related changes in legislative, transfer pricing is the current topic. Until 2015, transfer pricing was an unknown term within smaller enterprises doing business across the territory of the Slovak Republic. Since 2015, the obligation to keep documentation for transfer pricing has begun to apply also to smaller enterprises doing business only in the Slovak Republic. Since then, the legislation in the field of transfer pricing has been changed. It can be stated that transfer pricing is subject to international regulations, which also apply in Slovakia. (Kliestik et al, 2020; Khanh and Thu, 2019)

Companies are focused on the ways to influence its profits. The tax reducing can be one of this way. In an effort to increase profits by reducing tax obligation, multinational corporations can shift their profits or losses among related entities. The tax burden tends to be at different levels in different countries, it is the reason that profits are often transferred between related entities in different countries. (Fama, 1970; Healy and Wahlen, 1999; Vrbka et al, 2019). In order to avoid purposefully influencing the tax base, individual states, including the Slovak Republic, have applied transfer pricing rules into their legislation. The essence of these rules is that the tax base achieved in transactions between related entities should be the same as in comparable transactions in comparable circumstances between unrelated entities. (Sumiyana, 2020; Susanto et al, 2019; Svabova and Durica, 2019)

The aim of the contribution is to present transfer pricing issue as a tool for eliminating the purposeful influence of the tax base. Authors dealt with the theoretical background of transfer pricing issue, as well as the determination the usual price on the market and compare it with the transfer price between related entities focusing on committing transfer pricing rules.

Theoretical Background of Transfer Pricing

The following part of the contribution is focused on theoretical background and literature review of transfer pricing issue.

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Transfer Pricing – Definition

For the purposes of transfer pricing, the related party means:

- a close person,
- an economically, personally or otherwise connected person or entity,
- a person or entity that is part of a consolidated group for consolidation purposes.

1. According to the Civil Code, *a close person* is a direct relative.
2. *Economic connection or personnel connection* according to the Income Tax Act means the participation of a person in the property, control or management of another person or the mutual relationship between persons who are under the control or management of the same person, his close person or in which this person, his close person or entity has a direct ownership interest or an indirect ownership interest. Participation in property or control must be at least 25% of the share capital, voting rights or profit.
3. The third group of related parties are *persons belonging to one consolidated group*. It is a group of parent companies and subsidiaries.
4. *Another connection* means a relationship established between two persons for the purpose of reducing the tax base or increasing the tax loss. Even if it is not an economic, personnel or close connection, or persons who are part of a consolidated group, if significantly favorable conditions are used, it is possible to define an agreement between the two parties to reduce the tax base or increase tax loss. This relationship of persons can also be described as a relationship between related entities.

The entrepreneur should deal with transfer pricing and related obligations when he plans to start doing business transactions with his related parties. The term *"controlled transaction"* has to be defined. According to the Income Tax Act, a controlled transaction means a legal relationship or other similar relationship between two or more related parties, at least one of whom is a natural person with business income or a legal person who archives income from the business activity or disposal of property. On the other hand, uncontrolled transactions are business or financial operations between unrelated parties. (Watts and Zimmerman, 1978; Whittle et al, 2019)
Entrepreneurs are also obliged to provide information on controlled transactions with related parties in the tax return. (Svabova et al, 2020; Whittle et al, 2019; Brabenec, 2010; Copeland, 1968)

Transfer pricing – definition and development of legislative

United States legislation has begun to regulate the pricing rules between related entities in the 1930s. The basics of transfer pricing can be dated back to 1928, when the rules of transfer pricing were codified in the United States. Section 45th dealing with the allocation of income and deductions stated that "*in any case of two or more trades or business (whether or not incorporated, whether or not organized in the US, and whether or not affiliated) owned or controlled directly or indirectly by the same interests, the Commissioner is authorized to distribute, apportion, or allocate gross income or deductions between or among such trades or businesses, if he determined that such distribution, apportionment or allocation is necessary in order to prevent evasion of taxes or clearly to reflect the income of any such trades or businesses*". (Revenue Act, 1928)

Since 1935, regulations have utilized the *"arm's length"* standard as the means to fulfill the provision. It can be defined as the main tool in international taxation that allows an adequate allocation of profit taxation rights among countries that conclude double tax conventions, through transfer pricing, among each other. Transfer pricing issue can be found also in the US War Revenue Act of 1917, as well as the US Revenue Act of 1921. However, the provisions in these acts cannot be considered sufficiently precise. In 1968 International Revenue Code came into force in the US. It provided further guidance to transfer pricing issue in the 482 section.

Transfer pricing regulations issued in 1968 provided further guidance on the application of the arm's length standard, including pricing methods and additional rules for certain intercompany transactions. However, the United States recognized that the effective application of transfer pricing rules requires international cooperation. Otherwise, there is double taxation. Therefore, campaign aimed at the widespread adoption of the principle of an independent relationship as an internationally recognized standard was launched a coordinated by the US. The culmination of this campaign was the year 1979, when the Organization for Economic Co-operation and Development issued the report *"Transfer Pricing and Multinational Enterprises"*. Transfer pricing and the arm's length principle was one of the focal points of the Base Erosion and Profit Shifting project developed by the OECD and endorsed by the G20.

So far, the last update of the OECD Guidelines was issued in July 2017, adding changes that were passed in the two previous years and from 2013. The main changes are focused on the areas, e.g. transfer pricing for commodity transaction, inside-group service with low added value, new allocation system within transfer pricing documentation, application of the transactional method of profit sharing, including examples, the principle of an independent

relationship and its application, safe harbor rules, redefined categories, functions and risk within tangible assets, cost sharing agreements. (Transfer Pricing And Multinational Enterprises, OECD, 1979)

A significant milestone in the area of transfer pricing in the Slovak Republic was the accession to the Organization for Economic Co-operation and Development in 2000. In the Slovak legal and tax system, the OECD Directive has recommendatory nature, the Slovak legal and tax code does not refer to it. On the other hand, the Slovak Republic declares the acceptance of this OECD Directive.

The Slovak Republic acceded to the Convention on the elimination of double taxation in connection with the adjustment of profits of associated enterprises (the so-called Arbitration Convention) in 2006. It is one of the directives of the European Union on direct taxation. The EU Arbitration Convention establishes a procedure to resolve disputes where double taxation occurs between enterprises of different Member States as a result of an upward adjustment of profits of an enterprise of one Member State. The Convention provides for the elimination of double taxation by agreement between the contracting states including, if necessary, by reference to the opinion of an independent advisory body. The Convention thus improves the conditions for cross-border activities in the Internal Market. The Arbitration Convention guarantees the settlement of disputes within 3 years, which has a significant benefit over bilateral double taxation conventions. (The Arbitration Convention)

The Arbitration Convention was successively extended through the Convention on the accession of the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia and the *Slovak Republic* to the Convention on the elimination of double taxation in connection with the adjustment of profits of associated enterprises. Transfer pricing in the Slovak Republic is regulated by the Income Tax Act. It stated that tax based within related parties include the difference by which the prices or conditions in the controlled transactions differ from the prices or conditions which are applied between unrelated entities in comparable transactions. This difference reducing the tax base or increasing the tax loss. (Income Tax Act, 2003) Other paragraphs define the basic rules of transfer pricing. The Income Tax Act defines an obligation for the taxpayer to keep records of controlled transactions containing the method used to determine transfer prices. The content and scope of this documentation is determined by the Ministry of Finance of the Slovak Republic. The Income Tax Act describes following methods for transfer prices determining based on price or profit comparison.

- The independent market price method.
- Resale method.
- Method of increased costs.
- Profit sharing method.
- Net trading margin method.

Use of the selected method requires the consent of the tax administrator. A detailed description of transfer pricing methods can be found in the OECD Guideline. Chosen methods are described in more detail in the next part of this paper.

Methodology

The aim of author's contribution is to present transfer pricing issue as a tool for eliminating the purposeful influence of the tax base. This chapter describes following transfer pricing methods:

- The independent market price method.
- Resale method.
- Method of increased costs.
- Profit sharing method.
- Net trading margin method.

The Independent Market Price Method

The independent market price method is based on a comparison of the price in a controlled transaction to the price in the uncontrolled transaction. These transactions have to be comparable. This method should be used in the cases where comparable transactions can be found between unrelated parties, or if there is an internal comparable uncontrolled transaction with an unrelated company. The use of this method always takes precedence over other methods. Precondition for its use is a sufficient number of comparable uncontrolled transactions.

Resale Method

Based on the resale price method, price is determined from purchase price used in controlled transaction between related parties. Subsequently the product is sold to unrelated company. This price is reduced by the usual market margin of comparable unrelated sellers. The transfer price is calculated by deducting the sales margin from the price at which the distributor sells the product to an independent customer. This transfer price must be compared with the purchase price of the product. The resale price method is recommended by the OECD Guidelines mainly for distribution and brokerage activities, or for marketing activities.

Method of increased costs

According to the increased costs method, price is determined from direct and indirect costs within controlled transactions. These costs are increased by a reasonable profit margin compared to the profit margin achieved in the same uncontrolled transactions. The OECD Guidelines recommend the use of this method mainly in transactions involving the production, sale of materials, semi-finished or finished products, whether goods or services. It is most often used in the valuation of long-term contract production. The transfer price is calculated as an independent price plus the supplier's profit margin.

Profit sharing method

The profit sharing method is based on the distribution of profit in a controlled transaction achieved by the related parties and the distribution of profit in an uncontrolled transaction achieved by the unrelated companies. Profits should be distributed objectively and fairly between related parties. Thus, this method is applicable when data from comparable transactions between unrelated parties are not available.

Net trading margin method

Net trading margin method is focused on the achieved net profit within controlled transactions. This method can be compared to the method of increased costs and the resale price method. In contrast, no gross but net profit margin achieved by comparable companies in the market is examined. Two types of net trading margin methods are distinguished:

- *Net trading margin method based on costs*

Transfer price is calculated as follow. Costs directly incurred on products, goods and services sold are added to other operating costs. The result is multiplied by the sum of the margin and the number 1.

- *Net trading margin method based on sale price*

Transfer price is calculated as follow. The independent price is multiplied by the difference between the number one and the profit margin. Subsequently, operating costs are deducted from the result.

The profit margin achieved in transactions with unrelated party should be the same as in transactions with related party. If the company does not perform such transactions, it is possible to use the profit margin of a comparable company in comparable transactions. Only financial data that is directly or indirectly related to the controlled transaction and of an operational nature should be used in determining net profit. However, some items that cannot contribute to the determination of the net profit ratio should be excluded here. These are:

- Costs and revenues that are not related to the relevant managed transaction
- Profits from transactions that are not similar to the audited transactions examined
- Non-operating items (interest income and expenses, income taxes)

The net profit ratio is usually measured by assets, sales or expenses.

Results and Discussion

Transfer pricing is realized on a model example of a selected company using selected method. The transfer pricing model consists of the following parts.

1. Company selection

Selected company is the members of the multinational group of companies According to the ownership structure, it is clear that selected company is an economically, personally or otherwise connected person or entity vis-à-vis another company. It can be stated that these companies are related parties as was defined within theoretical part of the contribution.

2. Method selection

Transfer pricing methods were described within the methodology part of the contribution. According to OECD Guidelines, there are some factors, that have to be considered in the process of method selection. These factors are as follow:

- *Suitability of the method based on the nature of the controlled transaction.*
- *Availability of reliable information needed to apply the selected method.*
- *The degree of comparability between controlled and uncontrolled transactions, including the reliability of comparability adjustments that may be necessary to eliminate significant differences between controlled and uncontrolled transactions.*

If the traditional transaction methods can be applied as well as traditional transaction methods, traditional transaction methods are preferred. The independent market price method is considered as the best method for transfer pricing. Due to the fact that in many cases price data are not publicly available, the method cannot always be used.

The OECD Guideline further recommends the use of the net trading margin method, mainly for distributors. The transaction method of the net trading margin examines the net profit achieved by the taxpayer in the controlled transaction. Net profit can be calculated from publicly available information. The income statement is published on the website of the Register of financial statements. Following the above, the net trading margin method was chosen to verify the principle of an independent relationship of the chosen company to its related parties.

3. Comparable companies' selection

The search strategy, as well as the qualitative analysis, were based on the provisions 3.38 of the OECD Guidelines. Basic search criteria are as follow:

- Company activity - companies actively doing business activities should be considered.
- Geographical factors - companies doing business in the same market should be considered.
- Relevant market - companies doing business in the same sector should be considered.
- Shareholders - companies doing business with their parent companies should not be considered.
- Subsidiaries - companies doing business with their subsidiaries should not be considered.
- Type of accounts - companies with non-consolidated accounts should be considered.
- Quantitative indicators - it is necessary that comparable companies have the operating profit indicator available in all of the monitored years. The operating profit indicator is required to calculate the net distribution margin.
  The TP Catalyst database can be used for comparable companies selection.

4. Calculation of the profitability indicator for comparable independent companies

An indicator the share of Operating P/L and Sales was selected and calculated. Profitability data of independent comparable companies can be used either for a period of one year or for a period of several years.
The next step in the profit analysis is to create the usual profit margin. In general, statistical theory says that aggregate results are spread around the median. Results that are either higher or lower than the median are just as representative as the median value, and thus there is no specific reason to limit yourself to this single point. However, points that are at opposite extremes of the curve run the risk of being anomalous and therefore unrepresentative for establishing an independent relationship. There are several approaches. Arm's Length Range, interquartile range, Interpercentile range, a single comparable transaction can be also used, the result is not a margin but a single point that can be considered an independent price in certain specific situations.

5. Calculation of the profitability indicator for selected company

An indicator the share of Operating P/L and Sales was also selected and calculated for selected company.

6. Comparison trading margin selected company to comparable independent companies

The value of the net trading margin of selected company for the distribution of goods purchased from dependents is compared with the usual trading margin of comparable independent companies ascertained.

Conclusion

The aim of the contribution is to present transfer pricing issue as a tool for eliminating the purposeful influence of the tax base. Authors dealt with the theoretical background of transfer pricing issue, as well as the determination the usual price on the market and compare it with the transfer price between related entities focusing on committing transfer pricing rules. The practical part presents a model of the use of transfer pricing as a tool for the tax base influence elimination.

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Implementation of The Staged Self-Directed Learning Model in The Creation of Distance Student Entrepreneurship Competition About Blue Ocean Strategy

Maria M. SIMCHUK
Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia, mari_s.98@mail.ru

Diana YURKOVLYANETS
Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia, diana.yurkovlyanec@gmail.com

Anastasii I. KLIMIN
Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia, klimin_ai@spbstu.ru

Sergey V. SALKUTSAN
Peter the Great St. Petersburg Polytechnic University, Saint Petersburg, Russia, salkutsan@spbstu.ru

Abstract

The article aims at presenting the reader with a proposal of implementation of the Blue Ocean Strategy and The Staged Self-Directed Learning Model (SSDL) in higher education distance programs in order to provide students an environment where they can obtain skills necessary for their future career. First, the reasons why students of all specialties are in need of acquiring basic entrepreneurial skills by creating innovative projects and startups, using Blue Ocean Strategy, are provided. Second, the challenges of transforming the educational process in higher education due to meeting the needs of Generation Z' students will be discussed. Third, the implementation of the Staged Self-Directed Learning Model will be proposed in order to create a convenient learning environment for modern students using distance teaching methods and new ways of communication via social networks. Fourth, the results of pilot implementation of this method of creating distance learning process in "The Blue Ocean Open Polytech Entrepreneurship Competition" in the Saint Petersburg Polytechnic University of Peter the Great with the support of The Russian-German Center for Innovation and Entrepreneurship "Polytech Strascheg" and Graduate School of Technology Entrepreneurship will be discussed by the way of analyzing online questionnaire with 120 responses with the purpose of measuring effectiveness of distance learning process created with the use of the SSDL model.

Keywords: The Staged Self-Directed Learning Model, Blue Ocean Strategy, eLearning.

Introduction

Literature Review

Freeman M.A., Johnson S.L., Staudenmaier P.J. and Zisser M.R. (2015) mentioned that entrepreneurs create the vast majority of new jobs, pull economies out of recessions, introduce useful products and services, and create prosperity. Rising need for entrepreneurs and innovations leads to the rise in demand for entrepreneurship education. In a research study by Valliere D., Gedeon S.A. and Wise S. (2014) it is clarified that universities respond to this demand by creating new programs and institutions dedicated to entrepreneurship.

In the book by Weindorf-Sysoeva M.E., Gryaznova T.S., Shitova V.A. (2020) the educational environment is developing as well and it should meet the requirements set up by the needs of the new generation of students and the market as well.

Jajal, T.D. (2018) mentioned that the current world is constantly on the brink of disruption, and these conditions require companies and startups to open new market spaces instead of using already existing demand and fiercely competing for it within an industry. The studies of Kim W. Ch and Mauborgne R. (2005) and also Yurkovlyanets D., Simchuk M.M. and Klimin A.I. (2019) show that in order to create new market space, there should be a value innovation in the core of a product or service. It is discussed in the research of Dehkordi, G.J., Rezvani, S. and

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Behravan, N. (2012), that according to the Blue Ocean Strategy, industries which have not yet been defined and currently do not exist are called Blue Oceans, where there is no competition so far. Value innovation' concept focuses on both creating a higher consumer value and lower costs, according to the article of Kim and Mauborgne (2004). Authors of the Blue Ocean Strategy emphasize in their books (2015, 2017) that anyone can create value innovation if they know the basics of Blue Ocean Strategy and apply step by step a set of greatly explained instruments.

According to the article of Three Day Startup' team (2017), mentioned basic entrepreneurial skills would benefit students of all specialties. They will learn how to think outside the box and create innovations that would develop the market and economy. The authors of this article suggest creating a student entrepreneurship competition in order to provide an opportunity for students of all specialties to learn the basics of startup development with the use of Blue Ocean Strategy. This learning framework is developed from the integration of digital environment with entrepreneurship competition and the SSDL model, which is greatly described in the research of M.F. Ali, L.M. Tahir, M.N.H.M. Said, J. Junaidi, N.A. Atan and A. Hahsan (2017). There is a great opportunity to create a new form of distance teaching and learning the basics of entrepreneurship, using convenient for generation Z' students digital tools. This is the main goal of this paper.

Organization of eLearning process from the perspective of Generation Z' theory and the SSDL model

Currently, due to the coronavirus pandemic, the education system is rapidly moving to a natural information environment for generation Z, actively using distance learning technology, which are discussed in the research of Dubgorn, A., Abdelwahab, M.N., Borremans, A. and Zaychenko, I. (2019). Representatives of generation Z have a number of strengths that are quite difficult to implement in the framework of distance learning format at the university. Generation Z students are team players, multi-taskers, highly entrepreneurial and "intrapreneurial". According to Barclays' report (2013), they are more likely to want to run their own businesses while working "with" organizations. In the table below we present the overview of the portrait of a modern student, who belongs to generation Z, based on the results of researches from tutorial book of Weindorf-Sysoeva M.E., Gryaznova T.S. and Shitova V.A. (2020).

Table 1. The portrait of a modern student

Characteristics	**Portrait of a student - Generation Z (born after 1995)**
Problems in traditional university education	The student does not have a complete understanding of the subject, perceives the material in portions, strives to get a mark, not knowledge, and is limited in time.
Problems in distance learning	Lack of self-organizing skills, often does not know how to work in teams on the same problem.
Familiar ways of communication	Uses hand-hold devices to solve educational issues (forums, social networks, chats).
Recommended learning format	Interactive learning in a familiar environment (social networks), team competitions, consistent development of self-motivation and self-organization on practise.

Nowadays teachers are quite conservative in their views, and the transition to a new educational environment often causes difficulties. Teacher's age only affects the speed of mastering modern technologies and decision-making, so it is important to provide teachers with professional support and adapt them to the new environment.

It is discussed in SkillsCenter' team report (2020) , that the methodology of the higher education learning process should take into account the characteristics of representatives of different generations and ensure comfortable and effective work based on students' needs. Conducting interactive educational competitions will involve both students and teachers in the process of a new format of education, which includes both learning new concepts and creating big ideas and projects in teams.

Furthermore, according to the article of Schawbel (2014) generation Z is more focused on working for themselves, more ambitious and is poised to become the most entrepreneurial generation we've ever seen. It is important to give students the necessary knowledge in the field of entrepreneurship, to help to obtain competences that will be useful

in their career. Particularly popular today is the Blue Ocean Strategy, which is actively taught in the USA in a format of entrepreneurship competition with currently more than 720 participants from all over the world.

Blue Ocean Strategy is convenient for teaching students basics of entrepreneurship because of a set of tools and models, by using which people with different backgrounds can learn how to create new market spaces step-by-step. We decided to teach students a path of creating a startup' business model with the use of six basic instruments of Blue Ocean Strategy. Some of these instruments are greatly described from the perspective of students in the article of Bravo and Pintado (2020):

1. As-Is Strategy Canvas shows basic analysis of current industry offering and trends from the perspective of a customer.
2. The Buyer Utility Map outlines the full range of customer experience and problems that arise in certain steps of customer cycle.
3. Formulation of hypotheses about target audiences that could be engaged to the industry as additional demand, using Three Tiers of Noncustomers.
4. Marketing research conduction to find opportunities to engage new demand to the industry, using the Sixths Paths Framework for expansion of market boundaries.
5. The Eliminate-Reduce-Raise-Create Grid helps to redistribute resources to create an innovative product or service, in order to simultaneously increase the consumer value of the product and reduce the cost of its production and operation.
6. Creating the unique selling proposition for the selected target audience groups (noncustomers) using the To-Be Strategy Canvas.

The volume of theoretical material is extensive, usually this strategy is taught partly in different subjects during the whole term. In conditions of distance learning, the main goal was to make the process of learning the Blue Ocean Strategy as simple and understandable as possible for a large number of students.

The solution to the problem, as was suggested by the authors of the article, was holding a student competition "The Blue Ocean Open Polytech Entrepreneurship Competition", where students can learn the basics of Blue Ocean Strategy, try to solve real company problems using it and create their own project which can later they can develop as a startup. The competition was open for students from different universities and fields of study.

In order to provide an opportunity for students to learn step-by-step complex material and get not only knowledge, but also practical experience, we used the SSDL model, described in a research study by Grow. G. (1991), for creating competition's scenario. We suggested that using this model we would be able to create a distance learning environment, in which students could move from dependency to more self-directed learning and become capable of creating ideas and projects in their daily life, using Blue Ocean Strategy.

Developed entrepreneurship competition consists of 4 stages, which include all of the stages of the SSDL model. In the table below we provide main information about the scenario of the competition, and how participants, teachers and organizers should interact in each of these stages with each other. Also, we provide information about the usage of what distance learning instruments we were able to provide these formats of interaction.

Table 2. The scenario of the online entrepreneurship competition based on the SSDL model

Stages of the competition and the SSDL model	Roles of students as participants and teachers and organizers according to the SSDL model	Instruments, used for providing students needed facilities for accomplishing certain stage of motivation
1. Introduction to Blue Ocean Strategy basic theory and instruments. Relates to Stage 1: Learners of Low Self-Direction	Students: High level of dependency. Need guidance and authority who would provide them with a clearly organized explanation of the subject and competition rules. Teacher and organizers ("Coaching" stage): Provide a clearly-organized approach to the subject. Prescribe clear-cut objectives and straightforward techniques for achieving them. Mostly one-way authority communication.	1. Introductory webinar about the basics of Blue Ocean Strategy theory. With small discussion by guidance from the experts. 2. Case-learning webinars with structured path of implementation of this strategy in real companies. 3. Providing a guide with detailed explanation of a path of creating a startup or project using already mentioned in previous webinars Blue Ocean Strategy' instruments. There are provided more details and step-by-step techniques.

2. Real problem-solving case of partner company "Beeline" for teams, using Blue Ocean Strategy instruments. Relates to Stage 2: Learners of Moderate Self-Direction.	Students: Are interested in the subject, willing to do assignments if they see motivation for it. Need two-way communication with feedback on their ideas. Teacher and organizers ("Motivating" stage): Inspire and motivate to go through obstacles and see purpose in the tasks, provide teacher-led discussions.	1. Additional materials, such as articles describing real successful stories of implementation of Blue Ocean Strategy. 2. Q&A sessions with experts on the subject of their tasks. 3. Q&A session with representors of the partner company, where students can ask questions and get insights. 4. Creating common chat in Telegram messenger where participants can communicate with each other and organizers. 5. Additional motivation includes special prizes from the partner company.
3. Creating own projects in teams, using Blue Ocean strategy. Relates to Stage 3: Learners of Immediate Self-Direction.	Students: Have enough knowledge in skills needed to start their own path in learning Blue Ocean Strategy' concepts and applying it according to their needs and interests. Teacher and organizers ("Facilitating" stage): Provide equal communication, support them in their own process of learning. Share experience with them, provide new insights and tools.	1. Introductory webinar with mentioned ways where to find an idea for a project. 2. Links to additional materials where students can learn more about Blue Ocean Strategy by themselves. For instance, online mini-course, YouTube-channel of international Blue Ocean Strategy competition with examples of other students' projects. 3. Personal consultations in Zoom with all teams, which want to discuss their initial ideas and get insights whether their ideas applied to Blue Ocean Strategy and what they can also improve in their project. 4. Additional motivation includes cash prizes, additional points to final scores for Polytechnic University' higher education programmes on technological leadership and entrepreneurship.
4. Sending students' projects for international competition. Relates to Stage 4: Learners of High Self-Direction	Students: They set up their own goals, find resources for implementing them. They take responsibility for achieving these goals and acquire help from tutors if needed. Teacher and organizers ("Delegating" stage): empower students' ability to learn on their own practical experience by providing them new ways and opportunities when they can gather this experience.	1. Personal consultations for those who would like to send their projects to the international Blue Ocean Strategy competition. 2. Notification about various entrepreneurship competitions and hackathons, in which students can also present their projects or train their knowledge of Blue Ocean Strategy in other projects and tasks. 3. Providing opportunity from the University to write their diploma based on their startup' ideas.

The competition was organized fully in online format with the usage of the most popular in Russia social media "VKontakte", according to the research study by Klimin A.I., Tikhonov D.V. and Efimov A.M. (2017). We used it as a platform for keeping all necessary information, recordings of webinars, one-on-one communication with participants. Therefore, "Zoom" was used for providing online webinars. It allowed us to cut costs for organizing this competition greatly, with no need to create and maintain a special site or a platform for this competition. Students have been interacting with the competition in social networks which they commonly use in their daily life.

To evaluate the effectiveness of the proposed method of learning and scenario, created with the SSDL model, we conducted an online questionnaire after the 2nd round of the competition. In this survey took part 120 respondents who finished 1st and 2nd round of the competition and were going to participate in the 3rd round too. There were 3 questions about characteristics of our participants and their teams, and other 5 questions were supposed to evaluate the effectiveness of the proposed method of distance learning that was created using the SSDL model. Fig.1 presents the information about the ages of the participants, this data was analysed from the first question of the mentioned questionnaire about team's names and data from the initial registration form of all participants of these teams, which was completed before the competition has started.

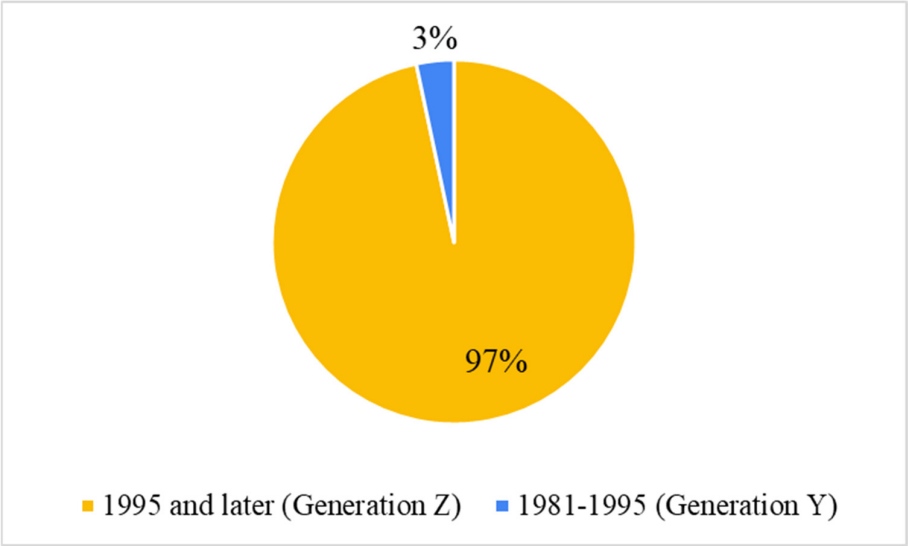

Fig. 1: Ages of the participants of the competition

According to data presented in the Fig.1, the majority of the participants (97%) were born in 1995 year and later. According to the theory of generations they are assumed to belong to a generation Z. The minority of the participants (3%) belong to generation Y. It is important to mention because the main goal of our study is to evaluate the effectiveness of developed methods of creating a framework for efficient learning according to the needs of those students who belong to generation Z.

Results of the study

Fig. 2 and 4 consists answers for questions related to clearness and convenience of learning such complex material as Blue Ocean Strategy using teaching methods mentioned in the table 2. The Fig. 2 shows the clearness of the presentation of the materials in online webinars from the perspective of participants (from scores “1” to “5”).

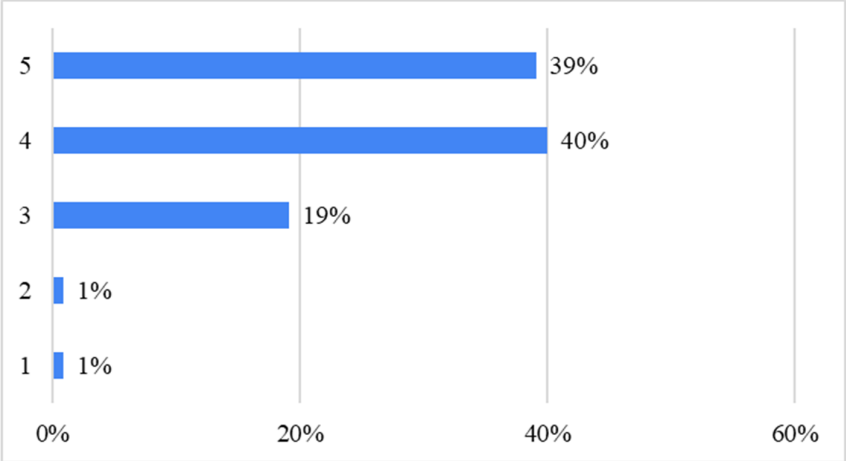

Fig. 2: The clearness of the presentation of the materials in a format of online webinars

Results show that this method of teaching was rather clear and even in online format it was convenient for students to learn about complicated Blue Ocean Strategy theory. Along with webinar’s recordings we provided timing which students can use in order to easily navigate through videos while searching for a different part of the webinar. Beside webinars, we provided students with additional resources and would like to know what kinds of them were helpful in the process of solving a case (Fig. 3).

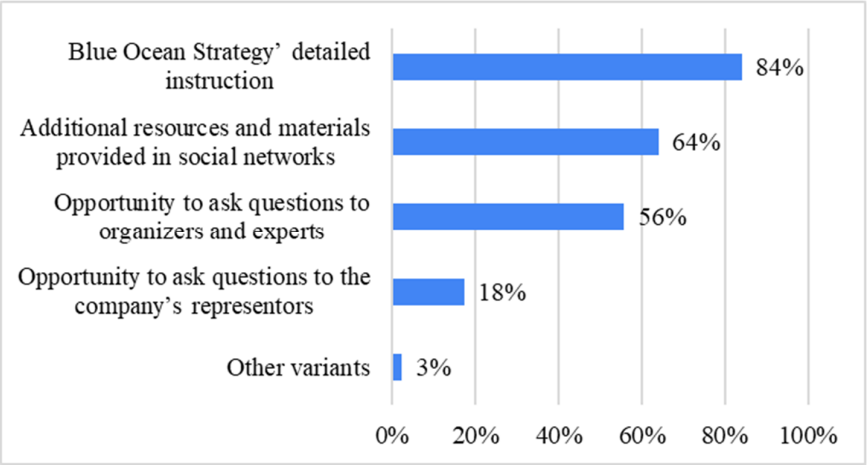

Fig. 3: Additional resources that were used by students

As a result, we approved our suggestion that additional resources should be provided in order to help students get a deeper understanding of a subject without an information overload in online lectures. The most useful material was Blue Ocean Strategy' detailed instruction. This PDF-file consisted of detailed but basic description of Blue Ocean Strategy' instruments and road maps with step-by-step described path of how to use these instruments in order to create an innovative idea.

64% of respondents valued additional resources presented in social networks, such as articles and posts about Blue Ocean Strategy and competition, designed according to current trends of social networks. More than a half of respondents (56%) pointed out that it was helpful for them to receive feedback on their questions. Furthermore, 3% of respondents added that they valued open communication with organizers, who helped them to solve their problems and overcome obstacles as soon as possible.

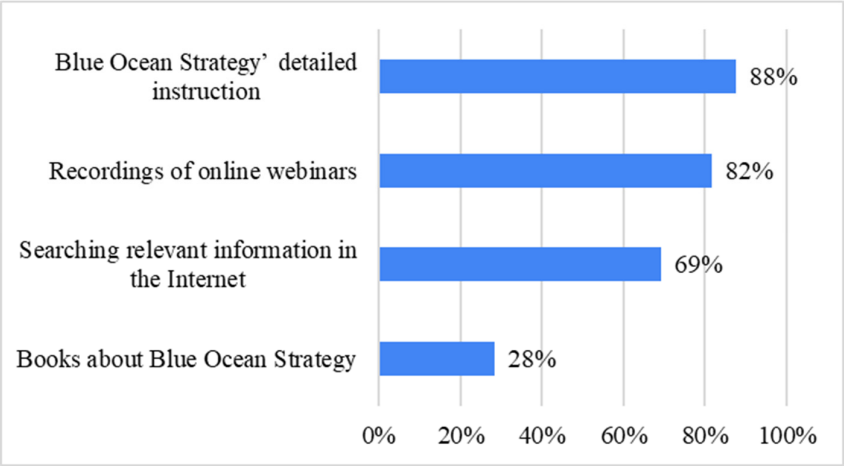

Fig. 4: Which sources students used during solving a case of 2nd round

Based on the research, students most often used such methods of self-study as reading the instructions for creating a Blue Ocean, watching online webinars and searching for information on the Internet. The most popular methods were those that were prepared in advance by the organizers of the competition and did not require much time from students to search for additional information.

Graphs 5-6 provide information about the team composition and their previous team working experience.

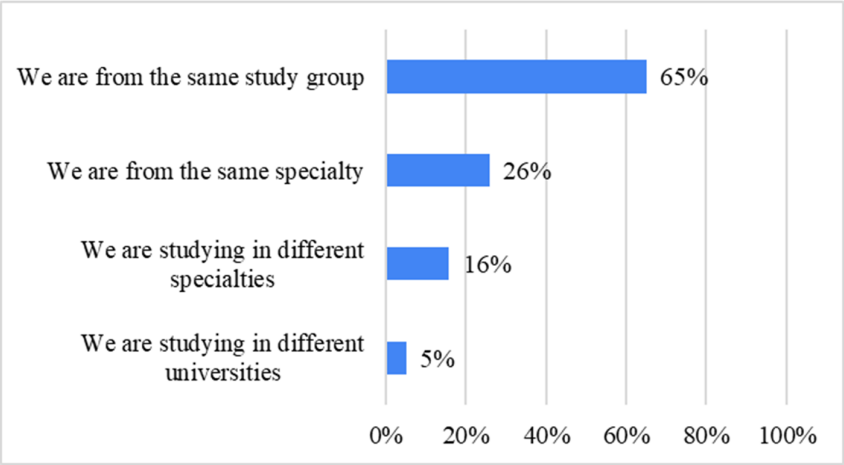

Fig. 5: Team composition by belonging to the same group/field of study/university

Based on graph data (Fig. 5), the majority of participants (65%) created a team together with their group mates. 16% of the participants study in different specialties with their teammates. And only 5% of participants formed teams with students from other universities.

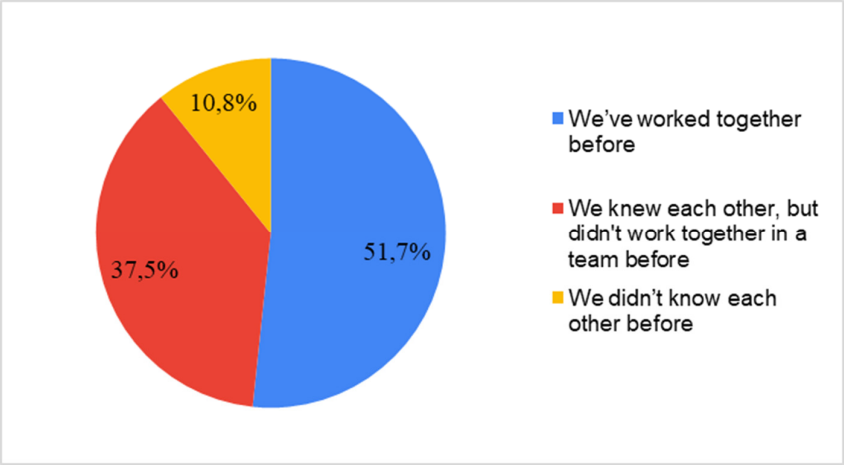

Fig. 6: Have team members had an experience of working together in a team before

According to the study, the majority of participants (51,7%) already had experience working in one team. 37,5% of participants knew each other before competition but did not work together. This format of learning still allows students to develop teamwork skills within the competition. Although most people still prefer to work with team members that they have already known and had shared experience of working together before.

The graph (Fig. 7) shows the ratio of students' mentions of the opportunities at the 2nd stage of the competition that they were most interested in.

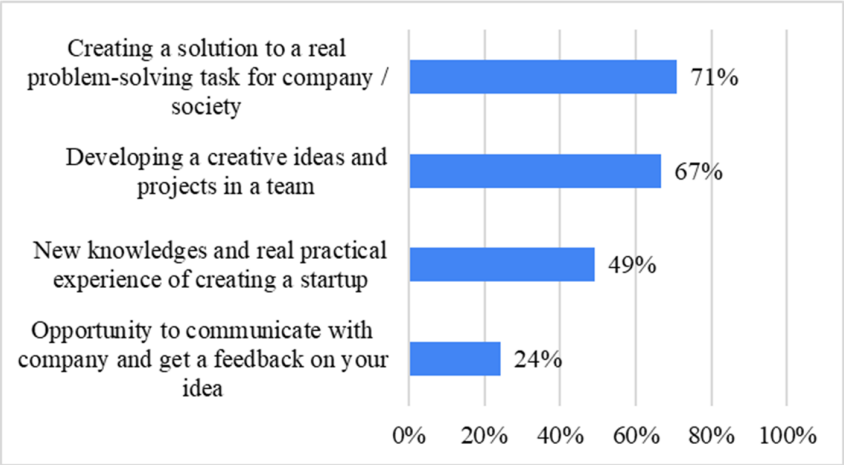

Fig. 7: What students find the most appealing in the 2nd stage of the competition

According to graph (Fig. 7), during the 2nd stage of the competition students liked to develop a solution for the company's existing problem, as well as develop creative projects in a team. This confirms the assumption that modern students are interested not only in learning new concepts, but also in applying knowledge in real practice. They have a chance to benefit from their activities while studying at the university and gain valuable experience.

Figure 8 shows an initial assessment of learning effectiveness at the 1st and 2nd stages of the competition in terms of preparing students for the difficult 3rd stage where they will create their own project using the Blue Ocean Strategy.

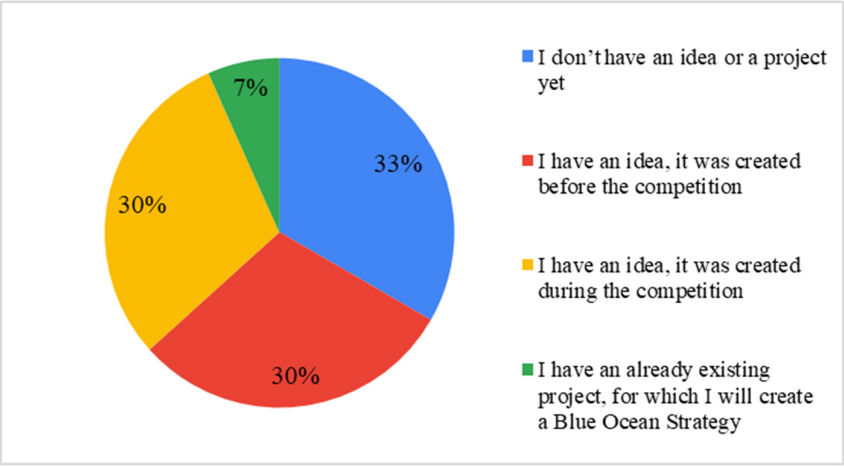

Fig. 8: Do participants have an idea or a project for a 3rd stage of the competition

Based on the results of graph (Fig. 8), the majority of students already have an idea or project that they will work within the next stage of the competition (67%). 30% of them came up with an idea during the competition. At the same time, we should pay attention to the 33% of participants who do not have an idea or project yet. In order to help them with this choice, at the 3rd stage of the competition, we have prepared additional materials, studying which students will be able to come up with an idea for their project. Materials contain articles that describe how to create innovative ideas, as well as examples of Blue Oceans that were created by students. It was done to inspire students who doubt their abilities by the stories of other students and convince them that not only for professional businessmen can create a Blue Ocean.

Conclusions and Discussions

Based on the results of the study, we can make a conclusion about the effectiveness of using the SSDL model to form a methodology for education in a digital environment, using distance learning technologies. The process of studying entrepreneurship consisted of learning theoretical material about the basics of the Blue Ocean strategy and using it in solving real cases and creating own projects in teams.

We emphasized that special attention should be paid to three aspects of learning in a digital educational environment:

1. Carefully build the educational process taking into account the needs of end users, in this case, generation Z students.

This makes it possible to increase the effectiveness of educational programs that are aimed at developing students' soft and hard skills, and to create more effective methods of teaching students. In our experiment, we consider the need for generation Z students to develop self-organization skills, motivation, teamwork, and information perception piecemeal.

Instead of long lectures in text format, we offered students a piecemeal learning process: series of posts in social networks, designed with usual SMM trends in the social network “Vkontakte", three webinars, that gradually described the theory with real examples and timing for easier navigation. According to the results of our research, these methods of presenting information were highly appreciated by students and were actively used in case solving.

2. Active use of distance learning technologies, social networks, and trends in the fields of copywriting and design.

Firstly, the education process transferring to students' usual information environment will increase the information perception through new formats of its presentation (posts, videos, articles visualized in the A4 format with 5-6 images). These methods are actively used in online courses development, which are especially popular in the context of distance learning. We suggest implementing this practice in higher education as well, in order to modernize traditional education.

Secondly, it will give an opportunity to build more personal communication between teachers and students, outside of the classroom. Such communication in messengers or social networks allows students to ask clarifying questions, discuss ideas, and create projects together. The importance of timely feedback and support is confirmed by the results of our research and 1-3 stages in the SSDL model.

3. Organize the process of receiving feedback from students about education formats in order to get a complete picture of the effectiveness of the proposed subjects’ structure and methods used.

In the educational process, it is important to take into account the vision of the teacher and the students. Emerging problems are always an opportunity to make the course even better and clearer for the next stream of students. Our suggested interactive learning format involves both students who are engaged in organizing and developing the competition methodology from the perspective of end users and teachers as experts. Such interaction allows to simplify the transition process in a distance learning environment for teachers who are used to traditional offline formats of education.

Nevertheless, we should highlight several issues that require further study in order to obtain more data about the effectiveness of the SSDL model in the development of distance learning programs and the methods of teaching generation Z students:

4. Due to the active transition of the traditional education in universities to the information environment, more research is required to evaluate the effectiveness of different methods of organizing the educational process, which would be focused on the needs of the modern students. We should analyze the effectiveness of other interactive teaching methods in order to understand which methods are applicable in various cases during the distance learning process.

5. As part of our experiment, we need data from the 3rd and 4th competitions' stages in order to accurately assess the effectiveness of using the SSDL model. We also need to track students' progress of applying knowledge in their further learning process and developing their startups.

6. The research does not contain information about those students who registered but refused to participate in competition before 1st or 2nd stages. During the effectiveness evaluation of the considered methods, it is necessary to take into account the opinions of students who, for one reason or another, decided to participate, but later refused it.

7. There is an open discussion about the implementation of this method of creating a design framework of other formats of teaching for different disciplines, and the costs needed for its realization.

8. From the perspective of the developed entrepreneurial competition, which includes problem-solving tasks for students from companies, there is a question of how to establish further partnership with development of generated and investically promising ideas. This topic includes the regulation of intellectual property rights between students and companies and the ecosystem in the university which would help participants to grow their business further. Our developed entrepreneurship competition is focused on teaching how to create an innovative idea and business model from the perspective of value innovation. There is a question in which format should be organized the process of teaching the basics about further development of a startup, from generating and testing an MVP to getting investments, registering a company and so on.

Acknowledgement

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Appendix A. Questionnaire

1) Write down the name of your team.
_____

2) Rate from 1 to 5 the clearness of the presentation of materials at the webinars?
1. 1
2. 2
3. 3
4. 4
5. 5

3) Which formats of support were the most useful for you?
1. Additional resources and materials provided in social networks
2. Blue Ocean Strategy' detailed instruction
3. Opportunity to ask questions to organizers and experts during solving a case
4. Opportunity to ask questions to the company's representors
5. Other_____

4) What sources did you use while you were solving a case?
1. Recordings of online webinars
2. Blue Ocean Strategy' detailed instruction
3. Books about Blue Ocean Strategy
4. Searching relevant information in the Internet

5) Choose the sentence which more likely describes your group?
1. We are from the same study group
2. We are from the same specialty
3. We are studying in different specialties
4. We are studying in different universities

6) Have you worked with your team members before?
1. We've worked together before
2. We knew each other, but didn't work together in a team before
3. We didn't know each other before

7) What did you find the most appealing in the 2nd stage of the competition?
1. Creating a solution to a real problem-solving task for company / society
2. Opportunity to communicate with company and get a feedback on your idea
3. Developing a creative ideas and projects in a team
4. New knowledges and real practical experience of creating a startup

8) Do you have an idea or a project for the 3rd round of the competition?
1. I have an already existing project, for which I will create a Blue Ocean Strategy
2. I have an idea, it was created before the competition
3. I have an idea, it was created during the competition
4. I don't have an idea or a project yet

A Framework of Visual Literacy Competences for Engineering Education

Alfonso MARTÍN ERRO
Universidad Politécnica de Madrid, Madrid, Spain, alfonso.martin.erro@alumnos.upm.es

Silvia NUERE MENÉNDEZ-PIDAL
Universidad Politécnica de Madrid, Madrid, Spain, silvia.nuere@upm.es

Raúl DÍAZ-OBREGÓN CRUZADO
Universidad Politécnica de Madrid, Madrid, Spain, raul.diazobregon@upm.es

Adela ACITORES SUZ
Universidad Politécnica de Madrid, Madrid, Spain, adela.acitores@upm.es

Abstract

Visual literacy is essential for engineers and technical professionals. Across the higher education curriculum and VET training, students are required to use and produce visual materials, and they must be prepared to do so.
We present in this paper a framework for the development of Visual Literacy competences required for engineers and technicians. Its objective is to provide adequate resources to develop their Visual Literacy competences and then contributing to improvement of engineering and VET education. This guide therefore intends to provide a reference for engineering education institutions as well as technology educational programs in general.
The methodology used is supported by the conviction that it can be provided a presentation to Visual Literacy for engineering and its particular competences according to a rigorous academic research but also accessible and useful. Teachers, educators and HE/STEM stakeholders can find it directly relevant to the opportunities and challenges they face. Our goal is to understand, catalogue and communicate the Visual competences, skills and abilities specific to engineering that most contribute to engineers' creativity and productivity.
ETCS establishes generic as well as specific competences. Goal of this research is to establish the set of Visual Literacy competences specific to engineering. In this Framework it is established the relationship between visual literacy and engineering education and undertaking an assessment of what represents competence attainment.
We expect that the VLEE Competence Framework shall be a new element of teaching for Higher education as well as VET organizations.

Keywords: Engineering Education, Vocational Education and Training, Visual Literacy, Visual skills and abilities.

This section should follow keywords. This section should provide background of the study and highlight research motivation.

Introduction

Visual Literacy is acknowledged to be of great importance in engineering (Henderson, 1995) (White, 2015) (Martin-Erro, 2016) (Keller, 2018). Engineers are problem solvers who interpret, process and create visual information of many types and different abstraction levels. Technical drawings, electronic schemes, computer graphics, freehand sketches as well as physical models are resources that engineers applies to ideate and share concepts. These are expressed in a visual language, which is made up of symbols, standardized pictorial representations and annotations. This language is specific to the engineering domain and requires an expertise level. To envision ideas and find problem solutions by handling visual information is also fundamental for engineers, and particularly, three-dimensional shapes (Sorby, 2000). Engineers also need to interpret and express analytical information. They use graphic representations of data in all of the development stages of a product or a system. This is also an important part of engineer´s Visual Literacy.

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Visual literacy competencies are therefore of great importance for modern engineers and all technicians. Engineers must be visually literate to be successful engineers (Miller & Bertoline, 1991), therefore it must be taken into account in educational programs. Engineering Graphics (EG) are the subjects where Visual Literacy was traditionally developed in engineering education. The main objectives of these subjects are to teach the technical visual language and develop three-dimensional visualization abilities, which are required for problem solving (Miller & Bertoline, 1991). The first is covered by teaching how to interpret and create engineering drawings, according to standards. The second, visualization, is developed by practice, for instance, drawing from dihedral projections to axonometric perspective and vice versa.

With the objective of enhancing the Visual Literacy of engineers and technicians, The VLEE project was set up in 2019. It includes representatives from Poland (West Pomeranian University of Technology in Szczecin-ZUT & Federation of Associations of Scientifically Technical Notes-NOT), Spain (Universidad Politécnica de Madrid), Denmark (Technical Education Copenhagen), Ireland (Momentum Marketing services limited) and United Kingdom (Canice consulting limited), covering the scope of Higher Education and VET organisations.

VLEE (Visual Literacy for Engineering Education) takes the approach to foster the Visual Literacy by applying innovative training resources into Engineering Education and Vocational Training. It recognizes that the possibilities for developing these competences have grown exponentially, thanks to the proliferation of digital technology." The results of the work of the VLEE project were divided into three intellectual Outputs. The first one is a framework which identifies the visual competences specific to engineering.

Definition of Visual Literacy

The first step of VLEE project was to agree what we understand as Visual Literacy. Academic and grey literature review showed a plenty of definitions. Since John Debes (Debes, 1969) wrote the first one, Visual Literacy definition evolved from simple to more detailed, in order to take into account its complexity, as well as the continuous innovation on Visual resources, such as digital media. The fact is there is neither a common nor an agreed explanation of what Visual Literacy is. That results on a difficulty for researchers (Braden (1996), cited by Avgerinou, (2011)). Arslan (Arslan & Nalinci, 2014) concluded the difficulty to enclose in one definition all skills related to Visual Literacy. Therefore, it suggests that a common Visual Literacy definition cannot list and describe skills or abilities, doing that better in a framework.

Another important question is where these skills or abilities are expressed or perceived. Many definitions mentioned the term "images". As it could be valid for the early definitions, the innovation on visual resources demands to take into account a broader term. In that sense, other definitions applies "visuals", "visual media" or "visual materials" (Brown, 2015).

In her analysis of Visual Literacy definitions, Maria Avgerinou indicated that the terms "skill", "ability" and "competency" are applied as if they had the same meaning. Most recent definitions use the term "ability", such as the one proposed by the ACRL (ACRL, 2011) and the "operational definition" by Maria Avgerinou (Avgerinou, 2007):

"In the context of human, intentional visual communication, visual literacy refers to a group of largely acquired abilities, i.e., the abilities to understand (read), and to use (write) images, as well as to think and learn in terms of images."
Since the term "ability" is adequate in the academic context, according to our project goals, we used the term "competence". In addition, the concept of Visual Literacy is not completely treated in reviewed definitions. In most of the cases, it just only relates it with communication (Metros, 2008), as well as other takes into account the idea of learning (Debes, 1968). Maria Avgerinou (Avgerinou, 2003) indicated that Visual Literacy is clearly linked to communication, thinking and learning. Therefore, these three aspects must be taken into account.

From our point of view, a common and valuable in time definition of Visual Literacy must be concise but precise in the terms, mentioning the cognitive processes involved but not in detail, and not only talk just about images but in a broader sense to mention Visual Materials, which enclose images, pictures, mock-ups, digital visuals and other resources which are to be developed in the future). Our proposal of Visual Literacy is the following definition:

"Visual Literacy means the competences to understand (read), to create (write) as well as to think and learn using images, pictures, graphics or any kind of Visual Materials. "

This definition comes from reviewing Averignou's operative definition of Visual Literacy (Avgerinou, 2007)

Competences

Identifying VLE competences was our main research goal, so it was of great importance to clarify this term. For this project, we adopt the definition of competence as it is specified by in the EFQ definition (Recommendation 2008/C 111/01):

"The European Qualifications Framework (EFQ) defines Competence as 'the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy'"
It is important to take into account the difference between the term "competency" and "competence". "Competency" appears in definitions (Debes, 1969) as well as in frameworks (Wagner, E. & Schöau, D., 2016) and was a term usually treated interchangeably between "abilities" or "skills" (Avgerinou, 2003) without specifying differences between them. We adopt the term "competence" as more adequate, following Edward`s clarification: "competence and competences refer to broad capacities; in contrast competency (plural competencies) is a narrower, more atomistic concept used to label particular abilities" (Edwards et al., 2008).

Research

The development of the VLEE competence framework was led by UPM partners from the VLEE project. They coordinated and performed the required research, with the support of the rest of the project partners. Research was mainly qualitative. The goal was to identify skills, abilities and knowledge involved on Visual communication and Visual Thinking which allowed to define competences as well as the definition of a competence model and rating scales.

The methodology consisted of the compilation of visual skills, abilities and competences identified from an in-depth analysis of selected works. To specify these according to the engineering domain. A Visual Literacy in Engineering Theoretical Basis was generated.

This work was performed from a literature review, by selecting and analyzing academic papers related with this topic. The theoretical Basis pursued to agree a definition of Visual Literacy, to clarify what we understand as "competence" as well as to find the main characteristics of Visual Literacy in engineering. These elements gave the guidelines for mapping the Visual Literacy competences specific to Engineering.

A list of VLE skills as well as key competence areas was then elaborated from an in-depth literature analysis of selected papers which were closer to our goal (e.g. (Edwards et al., 2008; Keller et al., 2018; White et al., 2015) and other more general (Avgerinou, 2007). In these cases, Visual skills and abilities were extracted from lists included in these works, and in other were identified according to a thematic analysis of relevant papers (e.g. (Ferguson, 1994; Miller & Bertoline, 1991; Ullman, 2002). This analysis gave a previous list of specific competences and skills of Visual Literacy in Engineering.

To define the framework structure an analysis of selected competence guides such as DigComp (2020), DigCompEdu (2020), ACRL (ACRL, 2011), and CEFR-VL (Wagner, E. & Schöau, D., 2016) was made. In-depth analysis of Framework inventory was conducted for commonalities, similarities of skills, competences and subcompetences, taking into account Visual Literacy for engineering theoretical basis. Outcomes was a competence list, the addition or deletion in case of any preidentified skills or competences from the in-depth literature analysis.
Research ended with an empirical work focused on VLEE target groups. Surveys were deployed to engineering educators and students, as well as VET institutions and VET trainers. Goal of this research was to have a perception of the presence of Visual Literacy in these institutions as well as how it is valued. This information gave an important feedback on the effectiveness of the competence framework as we ensured that covers the needs of students and teachers. Survey´s results also indicated guidelines for the identification of new pedagogical strategies and resources.

The Visual Literacy for Engineering Education Competence Framework

As a result of the research, a draft of the competence Framework was written and sent to a selected group of experts for their feedback. Final version of the framework was then generated including details according to the comments and suggestions from the expert`s review, expecting to have reached our goal to provide a comprehensive guide for developing Visual skills and abilities for the engineering students, that allow them to be considered as "visually literate".

The Visual Literacy for Engineering Education competence framework intends to offer a reference for technology educational programs for both Higher education and VET training. Its contents describe visual skills, abilities and knowledge that shapes a list of competences and how can be assessed.

VLEE framework is conceived to cover all of the Visual competences for engineers, educators, trainers and students. They can select some of its elements, in order to cover their specific educational needs. It is structured in six different areas, taking into account the different characteristics of the engineering processes, which requires the involvement of Visual Materials. These key competence areas are shown in Fig. **1**:

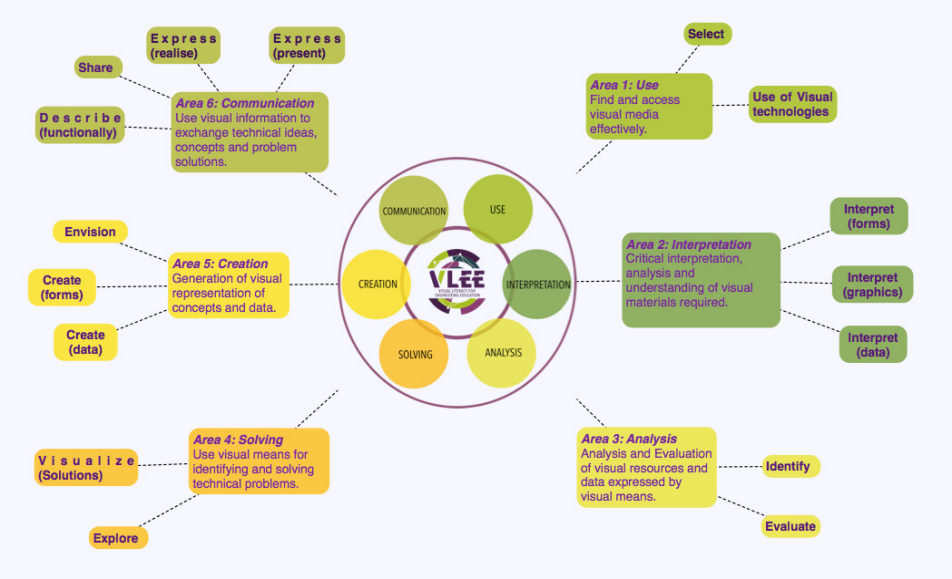

Fig. 1: Graphic Summary of the VLEE competence framework

VLEE areas focuses on the general engineering processes for product development across all engineering domains. In addition, competence areas are interrelated to the Visual Thinking processes as it was defined by Robert McKim (McKim, 1972): (See-Imagine-Draw) (Fig 2). For the step of the Visual Thinking process: "See" are related the competence area 1 (Use) and competence area 2 (Interpretation). Competences into this key competence area cover the skills and abilities for perceiving, interpreting and reading visual messages. For the step of the Visual Thinking process: "Imagine", are related the competence area 3 (Analysis) and area 4 (Solving). Competences into these competence areas cover the skills and abilities for visual reasoning, visualization and creative ideation. For the step of the Visual Thinking process "Draw", are related the competence areas 5 (Creation) and competence area 6 (Communication) which covers the skills and abilities of expressing visually.

Fig. 2 : VLEE competence framework related to engineering & Visual Thinking process (McKim, 1972)

Competence area 1: Use

This area covers the effective use of images, graphics or objects for engineering tasks. It is expressed in the ability to use visual media in an effective way, not only enhancing individual capabilities, but also for their professional

exchanges with colleagues and other interested parties. Also, it is useful for their individual professional improvement and for the collective optimal and permanent innovation in the enterprise and the engineering profession. In doing so, existing images, graphics and objects become resources to help reaching specific goals according to the engineering process. This competence area therefore describes the act of dealing with visuals as resources.

Table 1 Competences for area 1: use

Select	Identify effectively the adequate visual resource for a concrete purpose within the engineering process. Identify, assess and select digital resources to support and enhance teaching and learning.
Use of Visual technologies	Use the required graphic tools for engineering practice, able to use every graphic technique, use visual media effectively.

Competence area 2: interpretation

This area englobes the competences related to perceive and understand visual information: interpret the technical meaning of visual resources, understanding of the product through ideation and graphic expression as well perceiving means to use the senses to create internal ideas based on external stimuli. The initial stimulus is compared with mental representations and leads to recognition. That requires previous technical knowledge for understanding the function of the part/assembly as well as the meaning of all the standardized symbols, dimensions and graphic representations. Design intent, the purpose of a visual engineering representation to be interpreted is covered in this competence area.

Table 2 Competences for area 2: Interpretation

Interpret (forms)	Interpretation of an object/assembly using engineering means and developing a specific understanding of the object through creation. Understand the meaning of an object/assembly in terms of technological purposes.
Interpret (graphics)	Interpretation of an engineering graphic representation. Process a graphic representation to find meaning.
Interpret (data)	Interpretation of all available data representations expressed by visual means such as diagrams, tables, equations, graphs, as well as 3D FEM/CFD models

Competence area 3: analysis

The competence area 3 enlist those for analysis of visual information. Analysis is closely related with the competence area of interpretation. It comprises a further step following the perception/interpretation of a part/assembly. It is a set of methodological competences, particularly with respect to methods in engineering education.

Table 3 Competences for area 3: analysis

Identify	Identify visually the characteristics of engineering designs. Critical analysis of visual information.
Evaluate	Evaluation of images and Visual information. Evaluating Visual data, information and Visual digital content.

Competence area 4: solving

This area of competences treats about how to find problem solutions with the help of visual means. One skill involved is visual thinking, to conceptualize solutions to problems. Also, competences for ideation using visual

means are considered. Visualization, Spatial abilities, Visual Association and Visual reasoning are implied in this competence area.

Table 4 Competences for area 4: solving

Visualize (Solutions)	Generate an image of the problem solution in the mind. Manipulate mental images (combine, modify) for problem solving. Use various forms of visual communication and visual imagery to solve technical problems. Use visual techniques to solve a given problem.
Explore	Using graphic representations to solve problems. Develop an idea or concept by visual perception and the mental processing derived by exploring and reflecting involves searching and exploring of alternatives and idea variants

Competence area 5: creation

The area of creation covers the competences for the generation of significant visual resources as well as the production of images and objects for idea's expression. Create means to process and give form to the concept intended to be expressed using selected methods and resources. In may be related to creative process depending on the intention and or function of creating (e.g. to express graphically, to present, to study or to visualize). That means to express creatively through digital media and technologies. Creation includes how to generate knowledge with the support of digital visual tools. This area is closely linked to methodological competences for handling different visual materials and media that are applied during the creative process. It also depends on technical rules (conventions, regulations, standards) as well as knowledge related to using media, materials and tools.

Table 5 Competences for area 5: creation

Envision	Generate images in mind from perception and from visual images earlier visual impressions.
Create (forms)	Intentional production of components/assemblies.
Create (data)	Create visual media that represents data.

Competence area 6: communication

This area enlists competences which uses visual resources to share meanings between people or to exchange information. Communicating involves knowledge from all areas in the competence model: technical as well as cultural and creative knowledge and skills, but also knowledge related to media and its possibilities and an attitude that is directed to others.

Communicating by visual means requires an understanding of how to combine different modes (visual, verbal, auditory) and of specific problems of understanding. Communication also means knowledge of visual grammar and syntax as well of technical visual vocabulary, that included the knowledge of the basic components of visual language. As well as visual conventions (signs and symbols) and their socially agreed meanings (within the western culture).

Table 6: Competences for area 6: communication

Share	Share ideas/concepts, narratives, or arguments with visual media. Exchange visual technical information.
Describe (functionally)	Describing perceived design intent on engineering drawings and function of machines and engineering elements.
Express (realise)	Implement, execute or put into service an idea of an engineering design. That means to implement an idea for an external representation
Express (present)	Communicate the final creation of a component/assembly, taking into account that is perceivable to others

Competence Assessment

In order to evaluate the progress degree in the development of visual competences, a gradation in levels has been established. VLEE thus provides a measuring resource for evaluating student's progress. The levels correspond to the specific scope of a target in relation to an ability or skill. In some cases, activities related to competence at a specific level are also described.

VLEE competence framework applies a three-level scale for the proficiency progression of competences: "Basic", "Intermediate" and "Proficient". Bloom's revised taxonomy was taken into account in competence levels definition as is in line to the cognitive phases of any learning development: "Remembering", "Understanding", "Applying" "Analysing", "Evaluating" and "Creating". Therefore, Bloom's first stages "remembering" and "understanding" corresponds to Basic proficiency level. The Intermediate level with the stages "Applying" and "Analysing", and the Proficient level to "Evaluating and creating".

In the basic level, engineers assimilate new information and develop basic Visual and Graphic practices. At the Intermediate level, engineers apply, further expand and reflect on their graphic and visual practices. Finally, in the proficient level, engineers pass on their knowledge, critique existing practice and develop new ones.

Conclusion

Visual literacy is agreed as a critical area for student learning across the higher education curriculum and VET training. The Visual Literacy Framework for Engineering Education (VLEE) is the result of an international European multidisciplinary research group of engineering education and digital teaching resources to help covering this need. This is the first time to present visual literacy skills and abilities specific to engineering.

The research provided a revised definition of Visual Literacy, a clarification of what competence means as well as to confirm the needs for learning resources that focus on Visual communication and Visual Thinking. The main conclusion of the research is that specific components of Visual Literacy in engineering have to do not also with the Visual language of engineers, but with the thinking processes, which engineers applies for problem solving and ideation.

This competence guide is proposed for all those involved in technical tasks, since Higher Education institutions of engineering, as well as VET organizations, including professional engineers and stakeholders willing to take new learning initiatives. The VLEE competence framework brings teaching resources to help educators enhancing the visual skills and abilities. VLEE project works responding to the needs of Higher Education where students can have opportunities to enhance their capabilities for problem solving, communication and creativity. VET trainers and organizations shall have a support for updating their pedagogic strategies enabling the use of digital technologies. Professionals also can be benefited as they can improve their skills in this area. It is expected these organizations and institutions as well as stakeholders are motivated to introduce this new teaching initiative.
The competence framework here presented may be used complete or partially, depending on specific needs and the engineering domain. It is intended to include its contents in the engineering subject's educational programs as Visual Literacy competences are implemented.

It is also expected that this Visual Competence's guide become a resource for the development of innovative teaching, focusing on the web-based and digital tools.

Notes

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Perfil Emprendedor En Los Estudiantes De Ix-X Ciclo De La Escuela Académico Profesional De Administración De La Universidad Nacional Micaela Bastidas De Apurímac, Sede Abancay, 2019

Naysia QUISPE LUDEÑA
Universidad Nacional Micaela Bastidas de Apurímac, Abancay, Perú
naysiadmi114@gmail.com

José A. SOTOMAYOR CHAHUAYLA
Universidad Nacional Micaela Bastidas de Apurímac, Abancay, Perú
sotomayor551@hotmail.com

Mario AQUINO CRUZ
Universidad Nacional Micaela Bastidas de Apurímac, Abancay, Perú
mario.ac23@gmail.com

Resumen

El estudio sobre perfil emprendedor en estudiantes universitarios, sobre todo aquellos que ya están por últimos ciclos, son subjetivos y complejos de entenderlos pero no imposibles.
La Universidad Nacional Micaela Bastidas de Apurímac alberga estudiantes en distintas especialidades, siendo Administración una de las carreras en la que se llevan cursos de Emprendimiento con más énfasis en los últimos ciclos. Pero en mayoría los estudiantes de los últimos ciclos de IX y X, sólo piensan en ocupar puestos laborales del sector público o privado y pocos son los que deciden emprender. Eso significa que el estudiante no se siente realmente capaz de confiar en sí mismo y asumir riesgos para tomar decisiones y liderazgo para designar tareas a sus colaboradores con el fin de alcanzar y lograr lo que se llama perfil emprendedor óptimo. Según (CURRÍCULO DE ESTUDIOS, 2017), muestra, que el 8% de los egresados logran tener negocios propios; el 45% opta en trabajar en entidades privadas y el 37% opta por laborar en el sector público (p. 28) Este estudio es de tipo básico, enfoque cuantitativo y diseño transeccional- descriptivo, se utilizó la técnica de la encuesta aplicándose a una muestra de 83 estudiantes entre mujeres y varones, asimismo obteniendo resultados, que generalmente existe un nivel alto de perfil emprendedor en 48 encuestados con una representación porcentual de 57,8%, en referencia a ello se puede evidenciar que casi la mitad de encuestados poseen un perfil emprendedor bajo y moderado.

Palabras clave: Emprendedor, Emprendimiento, Perfil Emprendedor

Introducción

Según los estudios de Bonilla & García (2014), quienes realizaron una tesis, en la Universidad Autónoma de Manizales, Colombia; denominada "Caracterización del perfil emprendedor en graduados de la maestría en Administración de Negocios: Un análisis empírico en la ciudad de Manizales" con el propósito de determinar las características del perfil emprendedor de los graduados de la maestría en Administración de Negocios de la Universidad Autónoma de Manizales, llegando a la conclusión de evidenciar el alto desarrollo de las características personales que tienen los graduados de la Maestría en administración de negocios, esto ha reflejado en manejo de niveles de autonomía, capacidad para la toma de decisiones racionales, comportamiento guiado por la responsabilidad y capacidad creativa e imaginativa, como aspectos fundamentales para el desarrollo de actividades de emprendimientos. Asimismo otro estudio según Benavides & Tupayachi (2015), realizaron la tesis "Emprendimiento y perfil del emprendedor en la Escuela Profesional de Ciencias Administrativas de la Universidad Nacional de San Antonio Abad del Cusco, periodo: 2014-2015", con una muestra de 170 estudiantes, el propósito de estudio fue describir la situación actual del emprendimiento e identificar perfil del emprendedor del estudiante y en la que se llegó a la conclusión, las experiencias laborales de los alumnos están centradas en el campo laboral dependiente representado por un 60%, mientras que el 40% de los estudiantes tiene la expectativa de emprender un negocio propio, esto se explica principalmente, porque en las economías con mayores ingresos per cápita hay mayores oportunidades de conseguir empleo, por ende los emprendimientos tienden a disminuir, por ello las instituciones en

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la que se vienen desarrollando programas de fomento emprendedor deben apoyar en este sentido a desarrollar emprendimientos, así mismo los eventos académicos extracurriculares deben motivar a los estudiantes a desarrollar nuevos emprendimientos e incrementar el porcentaje de titulados bajo la modalidad de caso empresarial, es por esta razón que los estudiantes de la Escuela Profesional de Ciencias Administrativas aún tienen un perfil emprendedor **medio**, con un promedio de 17,14 y 16,93 puntos para las mujeres y varones respectivamente, caracterizado por buscar oportunidades, tener iniciativa, fijar metas y también correr riesgos.

Cabe señalar, que los resultados de la preparación y enseñanza en emprendimiento se ven influenciados por la condición de su entorno, algunas características de su personalidad y psicológicos del estudiante universitario y he aquí la investigación se realiza porque se desconoce y existe desinterés sobre el perfil emprendedor en los estudiantes de IX y X ciclo de la Escuela Académica Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019; teniendo en cuenta las afirmaciones de Montoya, Marulanda y Vélez (2014); (Serida, Guerrero, Alzamora, Borda y Morales, 2018, p. 51) y (Soto, 2012, pp. 85-95), sobre la importancia del emprendedor y para su estudio existe la necesidad de conocer el perfil emprendedor y de acuerdo a ello plantear propuestas que sirvan como mecanismos para mejorar los problemas que más adelante pueden ser perjudiciales para los estudiantes y la Universidad misma.

Es necesario ser parte del problema y analizar de forma consciente la realidad con distintos problemas renuentes, porque sirven como aporte y antecedente para realizar otras investigaciones basadas en emprendimientos.

Marco Teórico

Este trabajo de investigación según su criterio teórico, desarrolla el estudio del perfil emprendedor a partir del modelo propuesto por William B. Gartner, quién clasifica en características personales, sociales y psicológicas, que permitirá explicar después en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019. Cuyo objetivo consiste en conocer el perfil emprendedor en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019.

De acuerdo a los estudios realizados para esta investigación se tomó en cuenta el enfoque de los rasgos de personalidad que analiza al emprendedor desde lo que es, para así llegar a entender cómo estos rasgos influyen en el espíritu empresarial. Por lo tanto Gartner (1988), define que las características de la personalidad del empresario son auxiliares a los comportamientos del empresario, además que los emprendedores se diversifican por su iniciativa personal, que es un rasgo importante de las personas que emprenden su propia empresa (Quispe, 2016, p.23). Además se menciona que los primeros estudios e investigaciones se centraron en el análisis de las características resaltantes de la personalidad del emprendedor.

Adicionalmente, Gartner, (citado en Restrepo, Tapasco y Vidarte, 2016) afirma, que un emprendedor posee las características personales, sociales y psicológicas, ubicando dentro de cada una de ellas un conjunto de competencias que ante su eficiente desarrollo configuran un perfil orientado al emprendimiento.

A continuación se muestra el modelo conceptual de Gartner, en la siguiente figura:

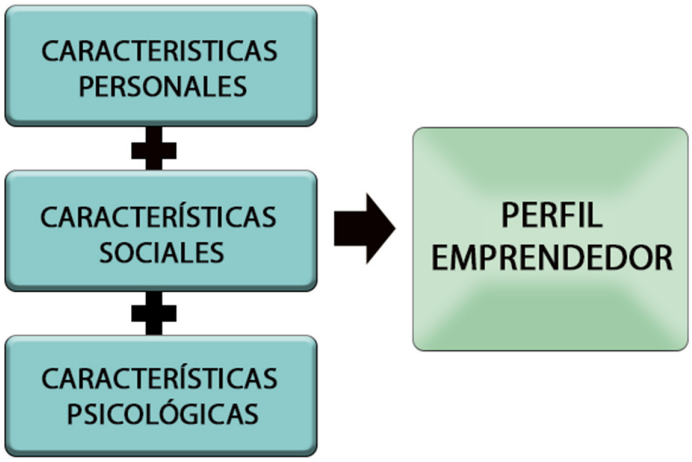

Figura 1: Características de un emprendedor según Gartner

Fuente: Gartner (2002)

Las características mostradas que conforman el perfil del emprendedor se encuentra dentro de los procesos del emprendimiento que tiene cada persona. Por lo tanto, se presentan y desarrollan a continuación las siguientes características.

Características Personales.

De acuerdo a Bonilla y Garcia (2014), definen que las características personales hacen referencia al conjunto de cualidades que forman el carácter y la personalidad de un emprendedor, y que le permiten movilizar y mantener su gestión empresarial. Dentro de estas características se pueden encontrar la autonomía, toma de decisiones, responsabilidad y creatividad.

Autonomía

Según Carter, Gartner, Shaver y Gatewood (2003), "mencionan que una de las razones para comenzar un emprendimiento es la autonomía, la cual representa un deseo individual de libertad, control y flexibilidad en el uso del tiempo por parte del emprendedor."

Toma de decisiones.

Según Estrada (2007), "menciona que las decisiones que se toman en el ámbito delos negocios son importantes mientras puedan ser efectivas y conseguir resultados. Por lo tanto el autor afirma que en la toma de decisiones se presentan tres etapas:"

- Encontrar coyunturas en las que se presenta una decisión a tomar, lo que se puede vincular con una inteligencia en el contexto castrense.
- Inventar, desarrollar y analizar diferentes posibilidades, lo que podría calificarse una acción de diseño.
- Elegir entre las opciones posibles simbolizando una acción de "opción/elección" u "optativa".

Asimismo, este autor afirma también, que las decisiones corporativas no son independientes, sino más bien son ejecutadas en función a coyunturas específicas, como modificar procedimientos de marketing, comunicaciones, acrecentar las ventas, disminuir gastos, permitir estímulos, entre otras.

Responsabilidad

"Es una cualidad que implica una relación entre personas de índole social, la cual se caracteriza por tener como objetivo un fin en común" (Preziosa, 2005).

En un principio a responsabilidad social se dedicaba a ser filantrópica, actualmente el concepto ha cambiado y se practica la Responsabilidad Social Empresarial (RSE). En este sentido, las empresas deben desarrollar relaciones responsables con sus grupos de intereses para lograr su objetivo de crear valor, así como poder transferirlo" (Cancino y Morales, 2008).

Creatividad.

De acuerdo a Filion 1994 citado en Orrego (2008), define "La creatividad es el núcleo en el que se basa el emprendimiento, además establece una visión de las metas después de identificar los medios para su consecución"
Se refiere a que el centro naciente para dar inicio un emprendimiento es la creatividad, ya que a raíz de ello se puede llegar a concretizar con acciones."

Características Sociales

Una de las características que presenta el emprendedor y que muestra un acercamiento al conocimiento de su perfil son las características sociales."

Liderazgo

El liderazgo es considerado la habilidad para persuadir, guiar, motivar a un grupo de personas u organizaciones. Por ende mantienen una connotación positiva a diferencia del concepto de autoridad o de dirección. Asimismo, los

gerentes pueden planificar, coordinar proyectos, resolver problemas; en cambio, los líderes además de ello pueden inspirar a otras personas a un objetivo en común y lograr cambios positivos en la organización (Quispe, 2018).

Tras los estudios de estos autores, infieren que, fortalecer el liderazgo debe ser una estrategia de comportamiento eficaz, para aquellos emprendedores que desean obtener el compromiso por parte de sus equipos para competir con otras firmas que tienen un mejor posicionamiento en el mercado y mayores recursos."

Trabajo en Equipo

"Es la habilidad que tienen las personas para el logro de un objetivo en común, priorizando los objetivos grupales sobre los individuales (Robles y Zárraga, 2015).

El trabajo en equipo exige complementariedad, compromiso y comunicación, condiciones que gran parte de universitarios no tienen. Esta característica debe ser inherente en la praxis administrativa, ya que ella implica transferir autoridad y responsabilidad a posiciones inferiores de la jerarquía, proceso conocido como la delegación de funciones.

Solidaridad

Según Moenne (2010), la solidaridad parte de la naturaleza misma del ser humano, mostrando que las personas interactúan con otros. En este sentido, desean vivir en un entorno compartido, debido a la naturaleza social del ser humano. Por ello, el ser humano no puede desvincularse de sus semejantes o tratar de desarrollar sus competencias de forma individual."

Características psicológicas

"Las características psicológicas están dadas por la influencia de valores culturales y sociales Liñan (citado en Bonilla y Garcia, 2014).
Por tanto se presentan las características psicológicas relacionadas con el emprendedor."

Necesidad de logro

El autor David MacClelland, señala que, si la necesidad por el logro es alta, posiblemente habrá más personas que se comporten como emprendedores, actuando para producir más de lo que consumen."

De esta forma, el emprendedor suele aparecer a los ojos de los demás como alguien guiado internamente por un imparable deseo de lograr sus objetivos, como alguien que busca la excelencia. Su fuerte carácter competitivo le lleva a aceptar ciertos riesgos y a perseguir objetivos que le motiven."

Minimización de temor al riesgo

De acuerdo a Cantillón (citado en Rodríguez, 2009), "el emprendedor se caracteriza por asumir riesgos en condiciones de incertidumbre. Por tanto, clasifica a los productores de la economía de mercado en""contratados", que perciben salarios y rentas fijas; y los "emprendedores" que obtienen beneficios variables e inciertos. Asimismo, señala que el emprendedor opera en una sociedad mercantil donde la competencia y la incertidumbre son relevantes al momento de tomar decisiones que impliquen un determinado nivel de riesgo."

Metodología

El estudio investigativo es de tipo básico, enfoque cuantitativo y diseño transeccional- descriptivo, se realizó una encuesta a los estudiantes de IX y X ciclo de la Facultad de Administración en la Universidad Nacional Micaela Bastidas de Apurímac de la provincia de Abancay, región Apurímac. Se aplicó el muestreo no probabilístico, de tal forma que se seleccionó a 83 estudiantes de la misma cantidad de población, entre mujeres y varones."

El cuestionario tuvo 36 preguntas distribuidos de la siguiente manera; 15 ítems para la dimensión Características personales, 12 ítems para la dimensión Características Sociales y 09 ítems para la dimensión Características Psicológicas. Donde el instrumento tuvo una escala de distintas categorías (1=Totalmente en desacuerdo; 2= En

desacuerdo; 3= Ni de acuerdo, ni descuerdo; 4= De acuerdo; 5=Totalmente de acuerdo), seguidamente para el respectivo análisis y procesamiento de datos se empleó el software Excel y SPSS23 y así la obtención de resultados a través de las tablas de frecuencias y la prueba estadística."

Para determinar la confiabilidad del instrumento, además del juicio de expertos, se determinó estadísticamente haciendo el uso del coeficiente de alfa de Cronbach en la que se mostró como resultado 0.913, coeficiente que indica "excelente", por lo tanto se pudo deducir que el instrumento utilizado para este trabajo de investigación es aceptable, que dicho sea de paso pueda servir para posteriores investigaciones que se requiera realizar."

Resultados

Descripción de las tablas de frecuencias de la variable Perfil Emprendedor

Tabla 1

Frecuencia y porcentaje de la variable perfil emprendedor en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019.

Perfil del emprendedor					
		Frecuencia	**Porcentaje**	**Porcentaje válido**	**Porcentaje acumulado**
Válido	**Bajo**	12	14,5	14,5	14,5
	Moderado	23	27,7	27,7	42,2
	Alto	48	57,8	57,8	100,0
	Total	83	100,0	100,0	

Fuente: Elaboración propia, 2019 según instrumento (cuestionario) procesado en el SPSSV23.

Interpretación

En la tabla 3, se puede observar de los encuestados, que 12 de 83 estudiantes poseen un perfil emprendedor bajo, seguido de 23 estudiantes que aducen tener moderado y mayormente 48 estudiantes señalaron tener un perfil emprendedor alto. Por lo que se puede decir que generalmente existe un indicador alto del "Perfil emprendedor en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Descripción de resultados de las tablas de las dimensiones del perfil emprendedor.

Tabla 2

Frecuencia y porcentaje de la dimensión "Características personales en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Características Personales					
		Frecuencia	**Porcentaje**	**Porcentaje válido**	**Porcentaje acumulado**
Válido	**Bajo**	4	4,8	4,8	4,8
	Moderado	15	18,1	18,1	22,9
	Alto	64	77,1	77,1	100,0
	Total	83	100,0	100,0	

Fuente: Elaboración propia, 2019 según instrumento (cuestionario) procesado en el SPSSV23.

Interpretación:

En la tabla 4, se puede observar de los encuestados, que sólo 4 de 83 estudiantes tienen características personales de nivel bajo, seguido de 15 estudiantes que aducen tener características personales de nivel moderado y mayormente 64 estudiantes señalaron tener características personales de nivel alto. Por lo que se puede decir que generalmente existe un indicador alto de "Características personales en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Tabla 3.

Frecuencia y porcentaje de la dimensión "Características sociales en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Características Sociales					
		Frecuencia	**Porcentaje**	**Porcentaje válido**	**Porcentaje acumulado**
Válido	**Bajo**	6	7,2	7,2	7,2
	Moderado	19	22,9	22,9	30,1
	Alto	58	69,9	69,9	100,0
	Total	83	100,0	100,0	

Fuente: Elaboración propia, 2019 según instrumento (cuestionario) procesado en el SPSSV23.

Interpretación:

En la tabla 5 se pudo observar de los encuestados, que sólo 6 de 83 estudiantes aducen tener características sociales de nivel bajo, seguido de 19 estudiantes que aducen tener moderado y mayormente 58 estudiantes señalaron tener un perfil alto. Por lo que se puede decir que generalmente existe un indicador alto de "Características sociales en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Tabla 4.

Frecuencia y porcentaje de la dimensión "Características psicológicas en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Características Psicológicas

		Frecuencia	**Porcentaje**	**Porcentaje válido**	**Porcentaje acumulado**
Válido	**Bajo**	7	8,4	8,4	8,4
	Moderado	16	19,3	19,3	27,7
	Alto	60	72,3	72,3	100,0
	Total	83	100,0	100,0	

Fuente: Elaboración propia, 2019 según instrumento (cuestionario) procesado en el SPSSV23.

Interpretación:

En la tabla 6 se puede observar de los encuestados, que solo 7 de 83 estudiantes aducen tener características psicológicas de nivel bajo, seguido de 16 estudiantes que aducen tener moderado y mayormente 60 estudiantes señalaron tener un perfil alto. Por lo que se puede decir que generalmente existe un indicador alto de "Características psicológicas en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019"

Conclusiones

1. Con respecto al objetivo general, el 57.8% de los encuestados poseen un perfil emprendedor en un nivel alto. En consecuente se puede concluir que generalmente existe un indicador alto de perfil emprendedor en los estudiantes de IX-X ciclo de la Escuela Académico Profesional de Administración de la Universidad Nacional Micaela Bastidas de Apurímac, sede Abancay, 2019; siendo un número exacto de 48 estudiantes, lo que indica que aún permanece la mitad de estudiantes que no se sienten suficientemente capaces de poseer esas características emprendedoras y abismarse al campo de acción sin ningún tipo de prejuicios que obstaculicen sus objetivos y metas y por ello al culminar su carrera u otros hasta sin llegar a concluir deciden buscar trabajo y en en el trayecto se queden muchos desempleados o en proceso de búsqueda.

Con respecto a los objetivos específicos:

2. Con respecto a las Características personales, de acuerdo a Gartner (1988) son un conjunto de cualidades que forman el carácter y personalidad de un emprendedor y que permiten movilizar y mantener su gestión empresarial; en consecuente los resultados de esta investigación muestran que el 77.1% de los estudiantes poseen un nivel alto de características personales. Esto quiere decir que los estudiantes al estudiar la carrera de Administración y estando en los últimos ciclos ya tienen la seguridad de sí mismos de asumir responsabilidades y consecuencias luego de tomar decisiones para emprender o elegir rumbos de manera independiente, eso es la autonomía, conocerse lo suficiente para asumir responsabilidades y aceptar las consecuencias que cada acción trae consigo y de esa forma asumir decisiones (de forma racional) para elegir la mejor alternativa que permita realizar sus actividades logrando alcanzar sus metas y en caso se presente algún problema situacional saberlas manejar de manera inteligente, razonable y profesional, como administradores que son.

3. Con respecto a las características sociales, según Gartner se componen de los siguientes indicadores; el liderazgo, siendo uno de ellos, según (Quispe, 2018), es considerado como una habilidad para persuadir, guiar, motivar a un grupo de personas u organizaciones, además de ello pueden inspirar a otras personas a un objetivo en común y lograr cambios positivos en la organización, por otro lado se encuentra el trabajo en equipo, según Alles (2008), define como la capacidad para colaborar con los demás, formar parte de un grupo y trabajar con otras áreas de conocimiento que no son nuestra especialidad, todo en búsqueda de trabajar una estrategia y conseguir los objetivos trazados y por último la solidaridad, que según Moenne (2010), comenta que es parte de la naturaleza misma del ser humano, mostrando que las personas interactúan con otros. En ese sentido, desean vivir en un entorno compartido, debido a la naturaleza social del ser humano. Seguidamente, para hacer más convincente y válido lo mencionado en el anterior acápite, los resultados muestran en un nivel alto que 69.9% de estudiantes poseen características sociales, por lo que se puede concluir que en el caso de los estudiantes en el indicador del liderazgo, destacan más, debido a que existe la tendencia social de liderar, tomar el mando y dirigir a cierta cantidad de personas, logrando captar su atención para luego señirse en cumplir los objetivos en común, sin embargo también los demás indicadores como el trabajo en equipo y solidaridad complementan pero en menor medida.

4. Finalmente con respecto a las Características psicológicas, Liñan (citado en Bonilla y Garcia, 2014), menciona que se da por la influencia de valores culturales y sociales. Al respecto David MacClelland, define uno de los indicadores que es necesidad de logro, caracterizando a una persona la forma de cómo ejerce el control sobre los medios de producción y tiene la capacidad de producir más comparado con lo que él pueda consumir, con el objetivo primordial de obtener ingresos individuales, además considera que los individuos fuertemente motivados por el deseo del triunfo muestran mayor desenvolvimiento e iniciativa que los otros. Asimismo varios autores comentan acerca del siguiente indicador que es la minimización del riesgo, de los cuales mencionaremos algunos postulados de los siguientes autores como Cantillón (citado en Rodríguez, 2009), define que todo emprendedor se enfrenta a asumir riesgos en condiciones de incertidumbre. Por otro lado Bucardo et al (2015), señala que el emprendedor se caracteriza por ser un tomador de riesgo, no sólo por arriesgar su patrimonio, sino también por arriesgar su imagen social y los costos psicológicos que impliquen un posible fracaso en su emprendimiento. Es así entonces que tras obtener los resultados, que el 72.3% de estudiantes poseen un nivel alto de características psicológicas, se puede concluir en el caso de los estudiantes que tiene mayor primacía en la necesidad de logro debido a que existen necesidades para que luego estén satisfechos y esas necesidades son mayores expectativas de superación profesional y obtención de algo que en el momento mismo no posee, pero sí después, concuerda con el postulado de David MacClelland; mientras más alto es el nivel de la necesidad de logro , posiblemente habrá más personas que se comporten como emprendedores, actuando para producir más de lo que consumen en el momento.

Reconocimiento

Cabe señalar que el presente estudio de investigación se realizó gracias a la facilitación accesible de información por parte de la Escuela Académico Profesional de Administración, asimismo a los estudiantes universitarios de los ciclos

IX y X de la Facultad de administración, que permitieron hacer posible a través de sus respuestas en el llenado del cuestionario recopilar información necesaria para su diagnóstico, investigación y generación de resultados.

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Peculiarities of Regional Strategizing in The Light of The Promising Specialization of Territories

Elena V. Kozonogova
Ph. D. in Economical Sciences, associate professor of Economics and Finance Department, Perm National Research Polytechnic University, Perm, Russia, e-mail: elena.kozonogova@gmail.com

Julia V. Dubrovskaya
Ph. D. in Economical Sciences, associate professor of Economics and Finance Department, Perm National Research Polytechnic University, Perm, Russia, e-mail: uliadubrov@mail.ru

Abstract

Successful management of the regional development in the EU countries is based on the concept of "smart" specialization and technology of "smart" benchmarking. At the same time, these instruments are based on the need to determine the most promising types of economic activity in terms of their contribution to regional development. In Russia, this task could be implemented by creating interregional clusters - unions, whose enterprises are located on the territories of several constituent entities of the Russian Federation. At the same time, it is believed that the development of a constituent entity of the Russian Federation occurs through the growth of indicators of economic efficiency of enterprises belonging to the interregional cluster. In this work, we tested the hypothesis that the effective operation of an interregional cluster is an important tool for regional strategizing, realizing the potential for the development of promising specialization of territories. Studying the results of the activities of the Russian interregional clusters, as well as the analysis of the geoinformation systems in Russia in the field of regional development, the authors empirically proved the formulated hypothesis, and also substantiated the relevance of creating a platform for finding potential partners in order to build added value chains in different regions, taking into account their specializations.

Keywords: Strategizing; Region; Interregional Clusters; Promising Specialization; "Smart Benchmarking".

Introduction

Over the past ten years, the EU countries have been successfully implementing regional development management based on the concept of smart specialization and smart benchmarking technology, which have become the main principles of building the European Plan 2020 (Foray et al., 2009). The approach to the formation of the economic structure of the territories, presented in the concept of smart specialization, is based on the need to determine the most promising types of economic activity in terms of contribution to regional development. Speaking of smart benchmarking, we note that this technology of strategizing involves preliminary identification of structurally similar territories, called "identical regions." At the same time, the determination of the development priorities of the object under study is based on borrowing the successful experience of regions that are identical for it (Dubrovskaya et al., 2018).

Thus, when working out development strategies in the EU countries, firstly, the specialization of the studied territory is taken into account; secondly, the level of development of this industry in neighboring regions is investigated; thirdly, only the experience of those regions is taken into account that are identical to the studied one in terms of socio-economic development (according to smart benchmarking). The first two of the three dimensions we identified as those which reflect the concept of smart specialization; the third one embodies smart benchmarking technology.

It is important to note that smart specialization has also spread outside the EU and is now used in the developments of the The Organisation for Economic Co-operation and Development (OECD, 2012b, 2013b) and the United Nations Economic Commission for Europe (UNECE, 2014, 2015).

The development of regional strategies in Russia, taking into account the specialization of territories, begins with the approval of the Strategy for Spatial Development of the Russian Federation for the period until 2025, which assigned to

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each subject of the Russian Federation the so-called "promising industries of specialization". According to this document, the strategy of regional development should be carried out within the framework of promising economic specializations.

At the same time, the processes of spatial development, taking into account their promising specializations, should not proceed spontaneously. Coordination of potential participants in the implementation of promising interregional investment projects is required, usually within the framework of interregional clusters.

In most developed countries, interregional clusters are an effective mechanism for interaction between economic agents located in different territories. A feature of such clusters abroad is that the cluster members are located on the territory of different countries. A large number of interregional clusters are located on the territory of the Scandinavian countries: Service cluster Denmark (Denmark, Sweden, Finland, Great Britain); Media evolution (Sweden, Denmark, Austria); Cluster of aluminum technologies Aluklaster (Denmark, Sweden, Norway), etc. (Stryabkova and Lysykh, 2019).

Despite the wide spread of interregional clusters abroad, a large number of studies in the domestic literature have not been devoted to the research of interregional clusters. This is partly due to their small quantity. So, in 2019, there were only 7 interregional clusters in Russia: the industrial cluster of fiber-optic technologies "Photonics", the industrial cluster of metro car-building enterprises, the national aerosol cluster "Arnest", the pump-building cluster, the composite industrial cluster "Composites without Borders", the oncological cluster of nuclear and photodynamic medicine, a cluster of electronic devices, materials and components. These clusters include about 80 industrial enterprises based in 14 regions (Belgorod region, Voronezh region, Moscow, Ivanovo region, Lipetsk region, Moscow region, Perm region, the Republic of Tatarstan, Saratov region, Sverdlovsk region, Stavropol region, Tver region, Tula region, the Udmurt Republic) [11].

It is theoretically assumed that the cooperation of enterprises localized in various constituent entities of the Russian Federation is an important tool for realizing the potential for the promising specialization development of the territory (Song, 2007; Fritsch, 2003). It is important to note that most of the interregional clusters in Russia were organized in the last 3 years, this fact does not allow for an objective assessment of their operational functioning.

In practice, potential participants in an interregional cluster experience difficulties due to the need to overcome organizational and administrative problems, the need for universal methods for assessing the economic benefits of cooperation, as well as the lack of opportunities for enterprises participating in clusters to bear additional labor, financial and investment costs for organizing a large, but non-transparent project considering its effectiveness.

Thus, the purpose of the study is to analyze the effectiveness of the interregional cluster as an important tool for regional strategizing, realizing the potential for the development of promising specialization of territories.

Methods

Such methods as a comprehensive analysis of statistical data, a comparative analysis of various theoretical concepts, a grouping method, as well as systematization of research results were used in the research. The authors used analytical data on the results of the Russian interregional clusters activities within a period from 2014 to 2018. The following units of enterprises currently operate in the status of an interregional cluster in Russia: 1. the industrial cluster of fiber-optic technologies "Photonics" (Perm region, Sverdlovsk region, the Udmurt Republic); 2. industrial cluster of metro-car building enterprises (Moscow and Tver regions); 3. national aerosol cluster "Arnest" (Stavropol region, Tula region); 4. pump-building cluster (Voronezh and Lipetsk regions); 5. composite industrial cluster "Composites without borders" (the Republic of Tatarstan, Moscow and Saratov regions); 6. oncological cluster of nuclear and photodynamic medicine (Moscow, Ivanovo region); 7. cluster of electronic devices, materials and components (Stavropol region, Belgorod region).

The interregional industrial cluster of fiber-optic technologies "Photonics", which unites enterprises of the Perm region, the Sverdlovsk region and the Udmurt Republic, was chosen as the object of research. The hypothesis of the study is the assumption that the effective activity of an interregional cluster is an important tool for regional strategizing, realizing the potential for the development of promising specialization of territories.

Results

One of the reasons for creating an interregional cluster is to get co-financing of their projects from the state. However, it becomes difficult to find potential partners on the territory of one region, since one of the conditions for obtaining co-financing, according to the current legislation, is the requirement for the percentage of cooperation of cluster participants to be at least 20%. To reach this threshold, participants have to go beyond the territorial boundaries of their subjects in search of cooperative ties. At the same time, when searching for potential partners, it is important to know the specialization of the region where the enterprise is located.

For example, let's consider the industrial cluster of fiber-optic technologies “Photonics”, which unites enterprises of three subjects of the Russian Federation (Perm region, Sverdlovsk region and Udmurtia). Cooperation of enterprises within the interregional cluster of these three regions is not accidental. The analysis of the specializations for the regions indicated in the Spatial Development Strategy showed that the specializations of the regions under consideration coincide in 14 types of economic activity. At the same time, a total of 24 specializations are assigned to the Sverdlovsk region, 20 to the Udmurt Republic, and 21 to the Perm region. Note that all three regions have such specialization as "production of computers, electronic and optical products", which is the main activity of the “Photonics” cluster.

Currently “Photonics” is implementing several projects in various fields. In the educational sphere we are to highlight the project called “Engineering Elevator”, which consists in step-by-step training of highly qualified personnel starting from an early age (3-7 years) and gradually increasing children's interest in this profession. The social sphere includes preparing for re-profiling of the secondary schools and formation on its basis of the Polytechnic school “Photonics”, which should become an educational center of professional self-determination of students in the engineering field and campus. In the industrial sphere, we have to mention a set of measures to strengthen the position of the Perm region in the field of fiber-optic technologies in international development (Dubrovskaya et al., 2017).

At the same time, the “Photonics” cluster is interesting to us, first of all, as an Association of enterprises localized in various regions of the Russian Federation, that is, as an interregional cluster, and also the effectiveness of its activities is interesting. The effectiveness of the interregional cluster will confirm the relevance of this study.

The authors have analyzed the performance indicators of the cluster functioning for the period from 2014 to 2018 (Table 1). It should be noted that the innovation-territorial cluster “Photonics” received its status in 2014. The status of an interregional cluster was assigned in 2017. And the agreement on joint activities between the enterprises was signed on 03.02.2016.This determines the adequacy of our comparison of the dynamics of changes in the performance indicators of cluster participants in 2015 to 2014 and in 2018 to 2017. Also, before proceeding with the analysis of the panel data presented in Table 1, we note that the systematization of indicators was carried out for the following cluster members: Perm Scientific and Production Instrument Making Company JSC (Perm), Inkab LLC (Perm) , LLC PNPPK-Electron-Contract (Perm), LLC Inversion-Sensor (Perm), LLC PNPPK - Marine Electronics (Perm), LLC PNPPK - Kvantek (Perm), Okey-Cable LLC (Perm), Kedron LLC (Perm), MetTechnology LLC (Izhevsk), Modern Production LLC (Izhevsk), TochMekh LLC (Yekaterinburg).

According to the data presented in Table 1, the effectiveness of the decision to merge enterprises located in various constituent entities of the Russian Federation is obvious. Thus, according to all five indicators, there is a positive growth trend during the period of the cluster functioning in the interregional status. And, conversely, during the period of the cluster's activity, which was a cooperating enterprise of only the Perm region, the dynamics of a number of indicators was negative (the number of employees in organizations participating in the Cluster who underwent professional retraining; the amount of work and projects in the field of research and development carried out jointly by two or more organizations - members of the Cluster).

Table 1: Analysis of performance indicators for "Photonics" cluster functioning from 2014 to 2018

N п/п	Cluster performance indicator	2014	2015	2016	2017	2018	2015/2014	2018/2017
1	2	3	4	5	6	7	8	9
1	The number of employees in organizations - members of the Cluster who have undergone professional retraining in additional professional programs in the field of innovation management (people)	131,0	108,0	120,0	122,0	123,0	-17,6%	0,8%
2	The amount of work and projects in the field of research and development, carried out jointly by two or more organizations - members of the Cluster (million rubles)	4808, 7	4542, 4	4815, 4	7 082, 9	9 073,2	-5,5%	28,1%
3	Productivity per employee of the organization (mln rubles)	1,825	2.076	2,114	2,573	3,118	13,8%	21,2%
4	The volume of innovative products of its own production shipped by the organization, as well as innovative works and services (million rubles)	6252, 2	10410,5	6287,6	10042, 9	12576,0	66,5%	25,2%
5	The total revenue of the organization from sales of products in the external market (thousand rubles)	4254, 4	5136,5	5511,6	6165,1	6819,1	20,7%	10,6%

Thus, the solution of the currently actualized problem of cooperation between enterprises localized in various constituent entities of the Russian Federation is not only an important step towards increasing the efficiency of the functioning of interregional clusters. The solution to this problem is the most important priority of regional strategy (Dubrovskaya et al., 2018). This assumption is due to an objective increase in the efficiency indicators of enterprises in the cluster. Consequently, real cooperation of enterprises operating in various constituent entities of the Russian Federation will also increase the GRP of the territories where cluster enterprises are located, which in turn will lead to an increase in GDP (Dubrovskaya et al., 2017). Thus, the organization and development of interregional interaction of the subjects in the Russian Federation entails an increase in GDP.

Such a small number of interregional clusters suggests that in practice it is difficult for potential enterprises participating in an interregional cluster to organize and come to an agreement with each other. These difficulties are caused by the objective problem of their misunderstanding of the advantages connected with working as a single cluster, their unwillingness to bear additional labor, financial and investment costs for organizing a large, but non-transparent project in terms of efficiency.

At the same time, as the advantages of working within a single cluster, one can note, at a minimum, the possibility of obtaining state support, as a maximum - the expansion of cooperation and trade ties, the capitalization of the company, an increase in financial stability and performance. Receiving subsidies is regulated by the Decree of the Government of the Russian Federation No. 779 dated 15.07.2015 (amended on 02.08.2018) "On industrial clusters and specialized organizations of industrial clusters".

In practice, determining the list of organizations that are potential participants in an interregional cluster is a time-consuming task, the solution of which involves determining the specializations of the territories were enterprises are located, as well as studying specialized databases. For example, such databases include the Network Edition "Information Resource SPARK" (Online publication "SPARK Information Resource", 2020), RUSLANA (National database "Ruslana", 2020), IAS "FIRA PRO" (First Independent Rating Agency, 2020), etc. Access to such databases is paid, which objectively complicates the process of cooperation of potential participants in interregional clusters. An alternative to obtaining paid information is the systematization of data about enterprises contained in publicly available electronic maps (for example, Yandex Maps, Google maps, etc.), as well as in specialized geographic information systems (for example, a map of HSE clusters (Map of clusters of Russia, 2020), state information system industry, geographic

information system of industrial parks, technoparks, clusters (Geographic information system “Industrial parks. Technoparks. Clusters”, 2020), etc.).

Let us dwell in more detail on the specified specialized geographic information systems. Firstly, the HSE project “Map of Clusters”, which is a unified interactive database of domestic clusters and their projects. The practical use of the Map lies in the ability to receive not only general information about the clusters, but also professional information, giving an idea, including about their specialization, products (services), development priorities. Also, Map users have access to information about the participants and partners of clusters, governing bodies, implemented, current and promising projects. The key documents of the clusters regulating their activities are posted in the public domain (Map of clusters of Russia, 2020).

Secondly, the geographic information system of industrial parks, technology parks and clusters of the Russian Federation. It is a system for entering, storing, organizing, analyzing and graphically visualizing spatial data on a schematic map and related information about industrial parks, technology parks and clusters of the Russian Federation. The system was developed as a part of the State program "Development of industry and increasing its competitiveness" implementation (Geographic information system “Industrial parks. Technoparks. Clusters”, 2020).

Thirdly, the state information system of industry, created by order of the Ministry of Industry and Trade of the Russian Federation for the implementation of industrial policy, the goals of which are: the formation of a high-tech, competitive industry, ensuring the transition of the state's economy from the export-raw-material type development to an innovative type of development; ensuring the country's defense and state security; ensuring employment of the population and improving the living standard of citizens in the Russian Federation.

However, these platforms contain information about existing clusters. At the same time, enterprises and authorities need information about enterprises that are possible participants in clusters. In other words, it is necessary to create a platform, i.e. a system for analyzing and graphically visualizing data on enterprises operating in different industries and on the territory of different regions on a geographical map. However, the map shows only those businesses whose activities are closely related to each other. It means that enterprises in these industries can be potential suppliers/buyers of products for each other. Thanks to such a platform, the spatial boundaries of economic activity will expand: it will be easier for enterprises to identify target markets and then unite in a cluster, and for state authorities to see the spatial specialization of the country's territories outside the borders of regions.

Previously, the authors developed a Web application (http://ruclusters.ru), in which enterprises that are potential participants in interregional clusters are displayed on a geographical map (Dubrovskaya et al., 2019). The Web interface contains a map and 2 drop-down lists: the first drop-down list contains a list of reference clusters, which we called "specialization of an interregional cluster"; the second list is a set of activities included in each specialization of interregional clusters. When you select a specialization, the map shows regions that are potential cores of interregional clusters in red, and regions that are potential participants of an interregional cluster in yellow. After selecting the type of activity you are interested in (or several types of activities), business entities are filtered at the user's request (by clicking the "Find" button). Depending on the scale, the map displays information about the number of companies specializing in the selected type of activity, as well as their contact details.

Our comparative analysis of the capabilities of individual geographic information systems allowed us to identify and systematize the advantages of the author's Web application. Only this Web application developed by us allows displaying potential clusters and satellite regions, and it is the only one of all geoinformation systems that allows displaying a complete list of enterprises at a time.

Conclusion

As a result of the study, based on statistical data, the effectiveness of the interregional cluster “Photonics” has been proved. Combining enterprises located in different regions of the Russian Federation is important for improving the efficiency of interregional clusters. And the development of inter-regional relations is the most important priority of regional strategizing.

Taking into account the analysis of geographic information systems, the authors proved the relevance of creating a platform for searching the potential partners in order to build value added chains in different regions, taking into account their specialization.

The analysis of the "Photonics" interregional cluster effectiveness proved its importance as a tool for regional strategizing, realizing the potential for the development of promising specialization of territories.

Scientific justification for determining effective interregional clusters can become a significant factor in stimulating economic activity in the territories of individual regions, as well as a factor in the development of the entire national economy.

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Assessing the Convergence of the Social Infrastructure Development in the Context of the Economy Digitalization: Spatial Analysis

Elena V. Kozonogova
Ph. D. in Economical Sciences, associate professor of Economics and Finance Department, Perm National Research Polytechnic University, Perm, Russia, e-mail: elena.kozonogova@gmail.com

Julia V. Dubrovskaya
Ph. D. in Economical Sciences, associate professor of Economics and Finance Department, Perm National Research Polytechnic University, Perm, Russia, e-mail: uliadubrov@mail.ru

Abstract

The aim of the work is to study the convergence of regions according to the main socio-economic indicators, taking into account digital aspects and spatial location. The following hypothesis is tested in the article: there is a conditional and unconditional β-convergence of the readiness levels for digital transformation as regards the social and housing infrastructure in the Russian regions. To test for unconditional β-convergence, the empirical model specification proposed by Barro and Sala-I-Martin. The most important parameters of the social infrastructure development, such as health care and housing and communal services, taking into account the spatial location of the regions, were chosen as the analyzed indicators. The authors used estimation of β-convergence for the data of the period from 2009 till 2017. Global and local indexes of Moran's spatial autocorrelation were calculated, spatial scattering diagrams were constructed by the analyzed parameters based on the tools of spatial econometrics. The study used a matrix of inverse distances and a boundary matrix of weights. A regional unconditional β-convergence of the healthcare level was revealed, as well as a positive global spatial autocorrelation in terms of per capita living space for all analyzed periods. Based on the study, it was concluded that, firstly, the distribution of the selected indicators of regional activity is determined by their spatial location, and secondly, the regions, demonstrating convergence processes, are ready for a full digital transformation.

Keywords: Spatial Heterogeneity; Digitalization; Convergence; Interregional Inequality; Empirical Estimates.

Introduction

The digital transformation of the economy, launched during the fourth industrial revolution, is designed to form a new infrastructure in which "smart" objects with artificial intelligence systems will dominate. The creation of so-called "smart" cities is already on the agenda, the concept of creating which represents a managerial approach, which made the city management system flexible and adaptive to people. The main goal of building smart cities is to improve the quality of life of citizens, and not the race for inventions. Therefore, to implement the innovative practice of the "smart city", the government of the Russian Federation approved the Project of Urban Economy Digitalization as a part of the national project "Housing and Urban Environment" (Vasilenko and Egorova, 2019).

The introduction of modern intellectual solutions in various spheres of public life, including health care, housing and communal services, as well as the expansion of the distance interaction scale in the field of education, will reduce the importance of location factors and physical distance, and therefore will inevitably lead to a spatial organization transformation of the economy.

At the same time, it has already been proven that the penetration of broadband into the economic activity of economic entities significantly decreases with the physical increase in the size of their localization territories (Cruz-Jesus et al., 2012). Therefore, the urgent problem to study the prospects for the social infrastructure transformation under the influence of digitalization in relation to large territories remains, such as the USA, Canada or Australia, where access to reliable and fast digital connections is experiencing intermittent failures, remains actual (Freeman et al., 2016). The territory of the Russian Federation is even more difficult in this regard to ensure reliable operation of ICT and the quality of communication

At present, the issue of spatial heterogeneity and interregional inequality is acute in Russia. Thus, interregional differentiation in terms of the levels of spatial socio-economic development, living standards of the population, the level of healthcare development and education, is one of the highest in the world (Dutta and Lanvin, 2019). The state

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is trying in various ways to solve this problem. For example, the goal of the Strategy for Spatial Development of the Russian Federation for the period until 2025 is to reduce interregional differences in the level and quality of life of the population, as well as accelerate the pace of economic growth and technological development. However, in official statistics it is difficult to find information on why some regions are developing faster than others, and vice versa.

In our opinion, the geographical position of the region plays an important role. Extensive empirical evidence suggests that the rates of economic growth in different regions of one country vary significantly. At the same time, there is probably a spatial correlation between regional growth rates (Ivanova, 2014). At the same time, not only the volume of mineral deposits or the presence of access to the sea, but also the proximity of the federal unit with other entities, as well as the distance to, possibly, more developed units due to the different activities and structure of economic processes are important. The study of the influence of the region's neighbors on the growth rate is of particular research interest.

Thus, the aim of the work is to study the convergence of regions according to the main socio-economic indicators, taking into account digital aspects and spatial location.

Methods

The β-convergence model suggests that there is a negative relationship between the initial level of the indicator under study and its average annual growth rate over a certain period. To test for unconditional β-convergence, the empirical model specification proposed by Barro and Sala-i-Martin (Barro and Sala-i-Martin, 1991):

$$\frac{1}{T}\left(\ln y_{i,T} - ln\, y_{i,0}\right) = \alpha - [\ln(y_{i,0})][(1 - e^{-\lambda T})/T] + \varepsilon_i, \quad (1)$$

where $y_{i,0}$ — value of the studied indicator in region i in the initial period (2009), $y_{i,T}$ — value of the studied indicator in region i in the last considered period (2017).

To evaluate the convergence rate of regions by the considered indicator (λ), it is necessary to estimate the coefficient β in the regression $\frac{1}{T}\left(\ln y_{i,T} - ln\, y_{i,0}\right) = \alpha + \beta \ln(y_{i,0}) + \varepsilon_i$, and then we can count:

$$\lambda = -\frac{\ln(1+\hat{\beta}T)}{T} \quad (2)$$

If λ (or $\beta < 0$), then this means that regions with a lower value of the studied indicator grow faster than regions with a higher income, i.e. unconditional β-convergence takes place.

Unconditional β-convergence implies that all regions strive for a single path of balanced growth. Conditional β-convergence suggests that different regions have different balanced growth paths that are determined by specific regional development factors (Kolomak, 2010), including factors of the spatial arrangement of regions relative to each other. Consequently, the basic convergence model is limited because it does not take into account interdependence between regions. Recent studies of scientists (Ertur et al., 2006; Rey and Montouri, 1999) show that the non-inclusion of the spatial relationship between regions in the model can lead to ineffective and / or biased evaluation of the coefficients. Therefore, to take into account the interdependence between the regions, it is necessary to take into account their position relative to each other.

To verify the assumption that the distribution of the regional indicators considered by us is explained by the spatial arrangement of the regions, we will use the Moran global spatial autocorrelation index.

Thus, according to our assumption, the rate of convergence of regions according to the studied indicator will depend on their spatial location: the rate of convergence across the country will be lower compared to the rate of convergence of groups of regions with similar values of the studied indicator.

The study covers the period from 2009 to 2017. The objects of the research are the subjects of the Russian Federation.

Results

Evaluation of unconditional beta convergence models in Russia for 2009–2017 was carried out in the statistical package Stata 13. Evaluation of models where the logarithm of the growth rate for the living area per 1 inhabitant acts as the endogenous variable, the logarithm of the growth rate of the population per doctor for the period 2009-2017 gave the result presented in the table 1.

Table 1: Evaluation of unconditional convergence models for 2009-2017

Variable	Coefficient	Standard error	t-statistics	p-value
The logarithm of the growth rate for the living area per 1 inhabitant (ln(home_2017/home_2009))				
Const	0.0229814	0.0153946	1.49	0.140
Ln(home_2009)	-0.0028684	0.0049442	-0.58	0.564
Coefficient of determination				0.0044
Logarithm of population growth rate per doctor (ln(doc_2017/doc_2009))				
Const	0.1688025	0.024387	6.92	0.000
Ln(doc_2009)	-0.0315033	0.0045404	-6.94	0.000
Coefficient of determination				0.3847

As it can be seen from the obtained values, there is no statistically significant relationship between the GRP growth rate, as well as the growth rate of the area of residential premises per 1 inhabitant and their initial state. Therefore, it is impossible to conclude that there is unconditional convergence, or divergence. However, a statistically significant relationship was found between the growth rate in the variable "population per doctor" and their initial state. Consequently, between the regions of Russia there is convergence in terms of the healthcare development.

The results of calculating the convergence rate and the time to overcome half the distance separating the regional economy from the balanced growth trajectory are presented in table 2.

Table 2: The results of calculating the rate of convergence and the time to overcome half the distance that separates the regional economy from the balanced development trajectory

Indicator	Convergence rate λ, %	Time to overcome half the distance hl, year
Population per doctor	3.7	18.7

According to the data obtained, in about 19 years, the regions of the Russian Federation will go half way to the path of balanced growth.

Next, we will check whether the distribution of the regional activity indicators studied by us is explained by their spatial location. For these purposes, we will use the Moran global spatial autocorrelation index. The following matrices were used as weights: the binary neighborhood matrix (Wn) and the inverse distance matrix (Wd).

Table 3: Dynamics of the global Moran index by the studied indicators

Year	Living area per 1 inhabitant		Population per doctor	
	Wd	Wn	Wd	Wn
2009	0.087***	0.378***	-0.112***	-0.060
2010	0.089***	0.385***	-0.101***	-0.052
2011	0.085***	0.371***	-0.100***	-0.044
2012	0.097***	0.380***	-0.100***	-0.004
2013	0.109***	0.343***	-0.093***	0.020

2014	0.101***	0.363***	-0.104***	0.011
2015	0.086***	0.358***	-0.086**	0.057
2016	0.090***	0.374***	-0.080**	0.074
2017	0.115***	0.400***	-0.064	0.093

*Note: ** p<0,05; *** p<0,01*

The results of the calculation of the global Moran index indicate the presence of a positive global spatial autocorrelation in the area of living quarters per 1 inhabitant for all studied periods. According to the indicator "Population per doctor", negative spatial autocorrelation was found when using the matrix of return distances in 2009-2016.

Comparing the results described in tables 2 and 3, we note that if there is regional convergence, then according to the indicator under study, there will be no "constant clusters" during the study period of time (the presence of statistically significant spatial autocorrelation).

For each studied indicator, we divide the regions into 4 groups according to spatial scatterplots (Fig. 2).

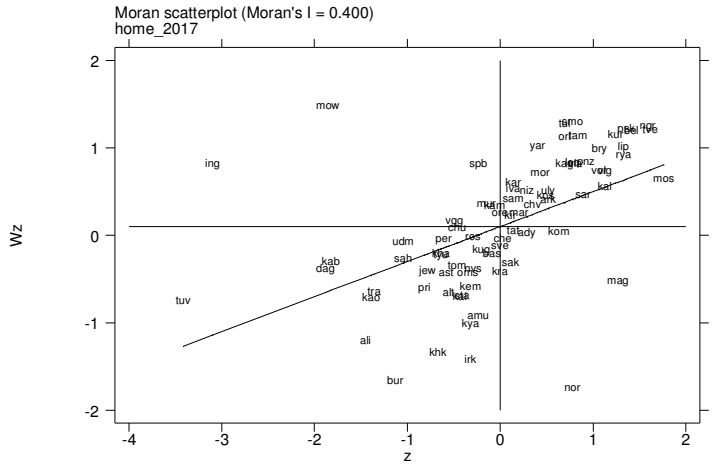

a) Living area per 1 inhabitant, 2017 (Wn)

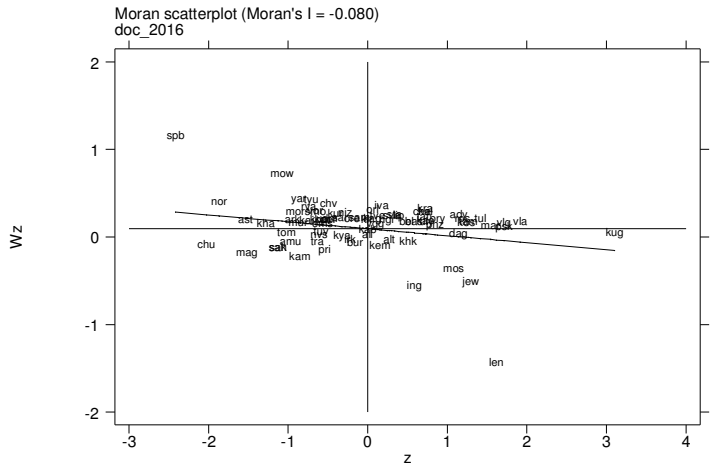

b) Population per doctor, 2016 r. (Wd*)

Figure 2: Spatial diagrams of scattering by analyzed indicators

Check the convergence of the analyzed indicators in homogeneous groups of regions (Table 4).

Table 4: Evaluation of conditional convergence models for 2009-2017.

Index	Quadrant of spatial dispersion diagram	Number of regions	Regression coefficient $\widehat{\beta}$	Convergence rate λ, %	Time to overcome half the distance hl, year
Living area per 1 inhabitant	High-High	34	-0.0271243**	3,11	22,29
	High-Low	4	-0.0268443	-	-
	Low-High	7	-0.0306938	-	-
	Low-Low	30	0.0048247	-	-
Population per doctor	High-High	29	-0.0492863***	6,51	10,64
	High-Low	6	-0.0878388	-	-
	Low-High	28	-0.0433167***	-	-
	Low-Low	12	-0.0350628	-	-

The analysis showed the presence of conditional β-convergence in all studied parameters. The convergence rate of the "rich" regions in terms of the "Population per doctor" indicator exceeds the country value, while the "rich" regions will go half the distance separating their level of health care from its stable state in about 10 years, when as a region all countries have more than for 18 years. In terms of housing provision, there is no convergence across the country as a whole, however, among the group of "rich" regions, the convergence rate is only slightly more than 3%.

Thus, on the basis of our study, we can conclude that the distribution of the indicators of regional activity that we are studying is determined by their spatial location.

Conclusion

Despite the awareness both of the scientific community and the leaders of individual states about the importance of digital changes, so far most researchers do not have a clear understanding of the socio-economic consequences happen due to modern technological innovations and what measures should be taken by authorities in order to increase the welfare of the population in the context of the ongoing spatial transformation.

In addition, the groundless declaration of the need for the widespread dissemination of information and communication technologies is not based on a scientific study of the spatial organization of territories in terms of their readiness for digitalization. In particular, there are no comprehensive studies defining the possibilities and directions of improvement on the basis of ICT development of such basic subsystems of the spatial organization of regions as housing and communal services and the social infrastructure system.

An attempt is made in the issue to evaluate the readiness of the social and housing infrastructure of the regions for digital transformation. Global and local indexes of spatial autocorrelation of Moran were calculated, spatial scattering diagrams were constructed by the analyzed parameters based on the tools of spatial econometrics. As a result, a regional unconditional β-convergence of the level of health care was revealed, expressed in the indicator "Population per doctor". The results obtained also indicate the presence of positive global spatial autocorrelation in terms of the living area per 1 inhabitant for all analyzed periods. Based on the study, we can conclude that, firstly, the distribution of the selected indicators of regional activity is determined by their spatial location, and secondly, the regions of Russia, demonstrating convergence processes, are ready for a full-fledged digital transformation.

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Homelessness in The European Union Law - Between Poverty and Social Exclusion

Ewelina CALA-WACINKIEWICZ

University of Szczecin, Szczecin, Poland, ewelina.cala-wacinkiewicz@usz.edu.pl

https://orcid.org/0000-0002-5439-4653

Abstract

The main purpose of the research is to demonstrate effectiveness (of lack thereof) the European Union's legislative activity in the area of preventing (limiting) homelessness. Implementation of this purpose will be reaffirmed by confirming or falsifying the research hypothesis according to which without firm legislative activity to combat homelessness (*sensu stricto* approach) and without combating poverty and mitigating social exclusion of certain social groups (*sensu largo* approach), it will not be possible to limit homelessness effectively, which is one of the most telling manifestations of undermining the dignity of the person. Homeless persons, as a social group which requires special legal protection, need support of states and the international community. Without their systemic action intended to assess properly in normative terms the rights and freedoms of homeless persons, which are based on regulations dedicated to this social group *explicite*, it will not be possible to counteract this occurrence or, all the more so, to protect their rights.

Verification of the above hypothesis will outline the scope of further reflections carried out on the basis of the analytical method and the method of interpretation of applicable law, supported by the statistical method.

Keywords: Homelessness, Poverty, Social Exclusion, Homelessness, European Union Law.

Introduction

Saying that homelessness is a form of violation of human rights is like saying that due to its immanent coupling with poverty it undermines the inherent dignity of every person which is a fundamental category of human rights. There is no doubt that dignity as such is not only the essence of the person, but most of all it is a source of human rights and freedoms, afforded to anyone, regardless of the state authority or any other political circumstances. The concept of dignity deriving from Latin "dignitas" is nothing else but "a sense of one's own worth and respect for oneself" (Słownik Języka Polskiego PWN). As seen by V. Niemi and E. Ahola "homelessness is a difficult social problem. It is an extreme violation of human rights and basic human needs" (Niemi, Ahola, 2017, p. 39).

Even due to the lexical meaning of the concept of dignity, it is reasonable to say that homelessness *per se* is in opposition to human rights. Therefore, no specific research or extended explications are necessary to conclude that the fact of depriving homeless persons of rights afforded to them and of the possibility to protect these rights, in its essence undermines human dignity. Human rights have a specific function which comes down to the obligation, encoded in them *implicite*, to protect human dignity. Therefore, as it is seen by S. Zieliński, dignity of the person should be a foundation of interpretation of all human rights, as well as all regulations which are intended to implement human rights and freedoms in the system of the law. Thus, this leads to a conclusion that in consequence the applicable and planned regulations alike should be subject to a test of compliance with the principle of human dignity (Zieliński, 2019, pp. 123-124). In this approach dignity is not only a certain abstract notion, but - which is especially valuable from the normative perspective - a principle which is an axiom of democratic states and their legal orders.

The above solutions of an introductory nature substantively outline why now protection of human rights *in genere* is so crucial, and also (or perhaps most of all), protection of these social groups which for various reasons are doomed to be socially excluded, including homeless persons. Support of this statement may be found in global statistical summaries, according to which "no less than 150 million people, or about 2 percent of the world's population, are homeless. However, about 1.6 billion, more than 20 percent of the world's population, may lack adequate housing" (Chamie, 2017). The said exemplification of the scale of homelessness throughout the world is unfortunately accompanied by European trends. As emphasized by the European Parliament, "an estimated 700.000 people were

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homeless in the EU in 2019, with numbers rising across Europe, except in Finland, which reported a decrease of 45%. Latvia saw an increase of 389% between 2009 and 2017, and homelessness in Ireland increased by 203% between 2014 and 2018" (Commission statement, 2019/3013(RSP)). These statistics, therefore, make it legitimate to generalise that not only the mere essence of the problem of homelessness is particularly important (the fact of being homeless), but the scale of the occurrence is also concerning. If, additionally, we were to take into account the temporal element, as this year it will have been 10 years since the European Union announced 2010 to be the Year for Combating Poverty and Social Exclusion (Decision No 1098/2008/EC), the above factors (substantive, statistical and temporal) are a sufficient stimulus to undertake actions dedicated to homelessness. It needs to be remembered that on the ground of European Union's legislation, the category of homelessness is presented usually jointly with the issues of poverty and social exclusion. These categories in their essence are interrelated in terms of cause and effect, which is clearly evident.

Given the above, research aiming to outline to what degree (and in what scope) legislative activity of the European Union in terms of preventing (limiting) homelessness is effective and to what degree there is still room for things to be done must be considered particularly desirable. Depriving homeless persons of effective legal protection affects their legal and human status. There are no doubts that homelessness is one of these social problems which cannot be reduced without effective and firm systemic actions from states and the international community.

The relation of homelessness with poverty and social exclusion presented above has its *ratio* in the approach of the European Union itself, which addressed the issue in question. The European Commission emphasized that "homelessness and housing deprivation are perhaps the most extreme examples of poverty and social exclusion in society today. Although access to affordable accommodation is a fundamental need and right, guaranteeing this right still represents a significant challenge in several Member States Developing appropriate and integrated responses, both to prevent and tackle homelessness, shall remain an important element of the EU's social inclusion strategy" (point 3.1 of the Communication). What is interesting, the European Union invokes the category of "social inclusion" in the context of homelessness, which convenes with the noticeable (recently) trend of presenting certain categories in a positive approach (inclusion of socially excluded persons). Such perception of specific phenomena gradually pushes out the negative narrative which talks about social exclusion as such, though unfortunately the latter has a rather founded place in the said perception and social awareness.

Therefore, if one were to assume that homelessness and housing exclusion (housing deprivation) are one of the most severe forms of poverty, leading to lasting marginalisation of these persons in society, the proclaimed assessment of efficiency of preventing (limiting) homelessness by the European Union must be done not only on the basis of the analysis of regulations focusing on homelessness *explicite*, but also those which in their content address the subject-matter of poverty and social exclusion. This observation allows outlining a substantive framework of his study, bringing reflections devoted to the discussed categories down solely to the ground of regulations adopted by the European Union, both those of a binding nature and those which do not have such a status (the example of which includes the described so-called soft law which greatly shapes the matter in question).

The said framework of the study, determining the scope of research, allows specification that their main goal is to recognize the efficiency (of lack thereof) of legislative actions of the European Union in terms of preventing (limiting) homelessness. Implementation of this purpose will be reaffirmed by confirming or falsifying the research hypothesis according to which without firm legislative activity to combat homelessness (*sensu stricto* approach) and without combating poverty and mitigating social exclusion of certain social groups (*sensu largo* approach), it will not be possible to limit homelessness effectively, which is one of the most telling manifestations of undermining the dignity of the person. Homeless persons, as a social group which requires special legal protection, need support of states and the international community. Without their systemic action intended to assess properly in normative terms the rights and freedoms of homeless persons, which are based on regulations dedicated to this social group *explicite*, it will not be possible to counteract this occurrence or, all the more so, to protect rights of homeless persons.

Verification of the above hypothesis will outline the scope of further reflections carried out on the basis of the analytical method and the method of interpretation of applicable law, supported by the statistical method.

Given that the issue of homelessness has not been the subject of considerable scholarly or judicial analysis and that the literature presents this category in various semantic concepts (Pawlik, 2015; Luba, Davies, Johnston, Buchanan, 2018; Robson 1994; Stoner, 1995), quite a concise definition of this notion was adopted for the purpose of this study. It involves a "literal" understanding of the concept of homelessness and brings its essence down to the lack of "a roof over one's head" or not having "one's own" housing (I. Kaźmierczak-Kałużna, 2015, p. 21), without going into details such as reasons for being homeless, duration of this homelessness or types for homelessness, with the underlying diverse legal and factual situation of homeless persons. For this reason, the issues associated with the fact of having residence in the territory of one of the EU states or with the right to housing as such cannot be omitted in this study.

It needs to be remembered that homelessness "has become one of the biggest social problems facing the world in the twenty-first century" (Alowaimer, 2018, p. 1).

Homelessness in binding European Union law

Homelessness is a normative category which does not always feature independently in the European Union's primary legislation. Sometimes EU treaties only refer to the other discussed categories, i.e. poverty and social exclusion, which is why it is so important to present at the outset the interrelations between then and to prove that they are of interest to the European Union. In order to make the analysis comprehensive, it is worth remembering that the problem of homelessness is emphasized particularly in the context of the right to housing or the requirement of having residence in the territory of one of the EU states, which shall be discussed later.

The above-mentioned assumptions are to a certain degree reflected in the Treaty on European Union (hereinafter TEU) which is part of the Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007. Therefore, the need to eliminate poverty was enumerated among the goals of the European Union, i.e. in Article 3(5) TEU. According to it, in external relations the Union upholds and promotes its values and interests and contributes to the protections of its citizens, contributing i.a. to eradication of poverty and to the protection of human rights. The provision was expanded in the part of the Treaty devoted to internal activity of the European Union, its Article 21(2)(d) to be precise. It states that the Union defines and pursues common policies and actions, and works for a high degree of cooperation in all fields of international relations, in order to i.a. foster the sustainable economic, social and environmental development of developing countries, with the primary aim of eradicating poverty. The Treaty (Article 3(3)) enumerates combating social exclusion and discrimination and promotion and protection of social justice among the aims of the European Union. However, the Treaty on European Union does not refer to homelessness directly, it does not address the right to housing or other issues associated with residence within Member States of the European Union either.

The case is similar in the second treaty that forms the Treaty of Lisbon, i.e. the Treaty on the Functioning of the European Union (hereinafter: TFEU) Its Article 208(1) points out that the main objective of the Union's cooperation policy involves reduction and, in the long term, eradication of poverty, whereas Article 9 TFEU stipulates that in defining and implementing its policies and activities, the Union takes into account i.a. requirements linked to the fight against social exclusion. The discussed category is also addressed in Article 151 of the Treaty, which invokes the combating of exclusion under the framework of the European Union social policy. However, it is worth specifying that combating social exclusion was inscribed by means of Article 153(1)(j) TFEU in the framework of competence of individual Member States whose activities the European Union is obliged to support. Moreover, which cannot be overlooked, the Treaty conditions the array of rights afforded to the Union's citizens on having residence in one of the EU countries. This is seen in the following provisions of the Treaty, in which the enumerated rights each time are subject to having residence in one of the EU Member States: a right of access to documents of the Union's institutions, bodies, offices and agencies (Article 15(3) TFEU), the right to vote and to stand as candidates in elections to the European Parliament (Article 20(2)(b) and Article 22(2) TFEU), the right to address a petition to the European Parliament (Article 227 TFEU) or the right to file complaints at the European Ombudsman (Article 228 TFEU).

In primary legislation of the European Union direct references to the phenomena in question may also be found in the Charter of Fundamental Freedoms appended to the Treaty of Lisbon. Its Article 34(3) stipulates that in order to combat social exclusion and poverty, the Union recognizes and respects the right to social and housing support to ensure, in accordance with principles established in the Union's law and national legislations and practices, life in human dignity. However, one cannot overlook the fact that the Charter refers multiple times to the requirement (obligation) to have residence, which inspires a reflection about homeless persons. It is done so in the case of rights afforded to the citizens of the European Union, i.e. the entitlement to social security benefits and social services (Article 34(1) of the Charter), the right to vote and to stand as a candidate at elections to the European Parliament (Article 39 of the Charter), a right of access to documents of the institutions, bodies, offices and agencies of the Union (Article 43 of the Charter) or the right to petition the European Parliament (Article 44 of the Charter).

In the Union's secondary legislation, the categories of homelessness, poverty and social exclusion are invoked directly, as seen in the example of Regulation (EU) No 223/2014 of the European Parliament and of the Council of 11 March 2014 on the Fund for European Aid to the Most Deprived. When outlining the objectives of the European Union, the Regulation (Article 3) names the need to reduce the number of persons at risk of poverty and social exclusion by at least 20 million. According to its provisions, the Fund should contribute to alleviating the worst forms of poverty which most quickly result in social exclusion, such as homelessness, poverty among children and food shortages.

When it comes to combating poverty and social exclusion and also access of homeless persons to services relating to health care, employment and education, notice must be given to the provision of Regulation (EU) No 1304/2013 of the European Parliament and of the Council of 17 December 2013 on the European Social Fund and repealing Council Regulation (EC) No 1081/2006, which, like the former Regulation, is an express form of the European Union's striving to reduce significantly the phenomena in question.

Homelessness in non-binding European Union law

The category of homelessness is also present on the ground of non-binding European Union law, which, as needs to be remembered, is rather diverse in its form and content. A brief analysis alone of legal acts adopted by EU institutions inspires a reflection that the category of "homelessness" occurs within them much more frequently than in the primary EU law, but more than anything in much more diverse semantic contexts.

It may be seen in the example of the European Parliament resolution of 14 September 2011 on an EU Homelessness Strategy. Pursuant to this resolution, homelessness was recognized as one of the most extreme forms of poverty and deprivation which has been showing growing trends recently and requires a comprehensive political approach. Its provisions are referred to in another European Parliament resolution on an EU homelessness strategy, resolution of 16 January 2014, which proves a certain consistency of the European Parliament in treating homelessness against other social problems as a priority.

A similar stand, though much more complex and multidimensional, was taken by the Committee of the Regions, which saw the role of local and regional authorities in taking practical and vigorous action to combat homelessness, understood as an extreme form of poverty and social exclusion. The Committee emphasized that homelessness afflicts individuals of various level of education, cultural background or previous economic circumstances. It is increasingly affecting women and children, who have often no power to change their situation. In the Committee's opinion, which cannot be disagreed with, homelessness, involving personal tragedies, impedes economic development of many countries. It also violates the fundamental rights of the individual and their human dignity and the right to control their own life (Opinion of the Committee of the Regions of 6 October 2010 on 'Combating homelessness').

It is also worth invoking the position of the European Economic and Social Committee of 27 October 2011 on 'The problem of homelessness' (own-initiative opinion), which clearly emphasized that policies to combat homelessness must be based on complete respect for human rights, which include the right to affordable, adequate housing. The Committee thus associated being homeless with violation of human rights by inability to ensure the right to housing and also noticed that although at the EU level there is no common functional definition of homeless persons and homelessness itself is diverse in personal and material terms (many types and groups of homeless), reasons for homelessness are also often complex and interrelated. In the context of the research hypothesis set out in the beginning, special notice is due to the Committee's observation that the existence of this right is a basis for initiating and developing effective policies to combat homelessness (Opinion of the European Economic and Social Committee). This thought should be borne in mind when formulating conclusions.

Summary

As has been shown in the research, on the ground of the European Union law homelessness does not often feature independently. Coupling it with categories of poverty and social exclusion expressed in the EU's legal acts (both binding and non-binding) complements it with normative content always where it needs to be particularly emphasized that without systemic actions intended to protect the homeless as a special social group, protection of their rights and freedoms will not be possible. Observations made in this study, therefore, allow one to confirm the research hypothesis formulated at the outset which stresses the need for firm legislative actions in terms of combating homelessness.

However, it needs to be highlighted that primary and, as a rule, secondary legislation of the European Union (which has primacy in application and a direct effect on the ground of legislations of individual Member States) do not sufficiently protect homeless persons. The normative requirement (obligation) to have residence in the territory of one of the Union's states adopted on the Treaty ground (Treaty on the European Union, Treaty on the Functioning of the European Union and Charter of Fundamental Rights) is not only counter-productive in the context of protection of homeless persons, but more than anything - having the status of a *sine qua non* requirement - deprives homeless persons of any power to exercise the rights and benefits afforded to them. It is not permissible to grant rights on the one hand, and on the other hand to formulate the conditions for exercising them in such a way that legally and factually this implementation is not possible.

Absence of residence as such predetermines that a homeless person cannot exercise - in the context of the analysed provisions - an array of rights stipulated for in the European Union law, implementation of which requires having residence. This, in turn, does not only lead to discrimination of homeless persons (and it is discrimination on the ground of the European Union law), but it also deepens their social exclusion, contributing to increased poverty. Taking this as the basis, it needs to be postulated that firm legislative actions should be taken and that this fundamental problem should be focused on. Without normative estimation of rights and freedoms of homeless persons combating their problems will not be possible. This, in turn, referring to the test of compliance of regulations with the dignity of the person invoked in the beginning, will result in a conclusion that homelessness, constituting a form of violation of human rights, undermines the inherent dignity of every person. This is why it is so important for regulations which undermine rights of homeless persons to be amended as soon as possible since they do not meet the requirements of the said compliance test. Dignity is not only a foundation of human rights, but, in this approach, it is also an element of harmonization and ordering of legal norms that shape the system of the law of the European Union.

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The Most Common Myths and Challenges Connected to Knowledge Management – Between Theory and Practice

Teodora PÎRȘOI

PhD. Student, Craiova, Romania, t.pirsoi@gmail.com

Abstract

The objective of the current article is to emphasize and interpret the major myths that have developed over the recent years regarding knowledge management, as well as the fundamental challenges that the executives have to overcome in order to succeed in leading a successful organization. The evaluation is carried out by analysing and debating the main differences between theory and practice through the means of both previous research works and particular experiences. The findings have a peculiar importance in building up a fair overview concerning the authentic meaning of knowledge management and the challenges connected to the process of applying its main principles within a firm. The conclusions prove that knowledge management still represents a huge challenge for the contemporary managers who are looking for attaining a competitive advantage by creating, developing and exploiting their organizational knowledge.

Keywords: knowledge management; knowledge creation; managerial challenges; managerial myths; intellectual capital.

Introduction

Ever since 1597, the famous philosopher Francis Bacon stated the fact that *knowledge means power*. His assertion has certainly withstood the passage of time and its significance has become progressively valuable in the last decades. The concept of *knowledge* might seem common at a first glance, but, from the scientific point of view, it surely has a considerable number of diverse and complex meanings. From a managerial perspective, short while ago, knowledge started to be considered and understood as one of the most important resources within a company.

Peter Drucker, the so-called father of management thinking, in order to define a specific category of activities, used the avant-garde notion of knowledge work for the first time in 1959. This peculiar advanced division of workers primarily gathered scientific researchers, programmers, systems' analysts, academic professionals and so on. The importance of knowledge constantly and substantially has increased in the last years of the 20th century, as a newly re-discovered managerial resource, to the extent of becoming the most influential capital for an executive.

For nowadays managers, knowledge management (KM) represents at the same time an unique growth opportunity and an utmost challenge. Alongside with the unequivocal advantages achieved by implementing the main principles of KM within a company, the one running an organization gets to deal with many threats that need to be taken care of. The myths that have arisen over the last century actually illustrate, in a precise way, some of the most frequently debated topics concerning the typical transformations that such a managerial behaviour can produce.

The opinions according to which one would be able to guarantee the most appropriate data and information usage, sharing and/ or exploitation, make the best use of the employees' experience or store the intellectual capital, through the specific means and methods of KM, have been partly invalidated by the results of several previous research studies. Carol Hilderbrand (1999), Yogesh Malhotra (2000) or Matthew Parsons (2004) are only a few of the researchers within the KM field who brought into attention these ideas and discussed their certain probability of realization. Their preliminary work represents, however, only a limited segment of a far more complex research process, essential to be conducted in order to comprehend KM's challenges fully.

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The main objective of the present research article is to carry out an objective analysis of the most common myths that have evolved throughout time about knowledge management (Burlea-Schiopoiu, 2007). By utilizing the critic analysis as the main research methodology, the current report outlines not only some of the most prevalent misunderstandings of the concept itself, but also the particular challenges that an executive needs to overcome through the medium of his/ her managerial skills and behaviour. In the contents of the paper, we investigate the level of reality of each perception on the given subject and discuss the most appropriate ways of conducting a business within the modern economy.

The first section of the study depicts the preeminent theories concerning the knowledge creation and its best usage for the benefit of the contemporary organization. The approaches used for exploiting data and information have an indisputable role in the managerial process, so we are going to focus on the most constructive methods of taking advantage from these unique resources. The theoretical framework will also be oriented towards the main connection existing between the basic knowledge sources and the company's performance, that is to say the intellectual capital.

Is there any managerial pattern that could guarantee the best usage of the information collected or accumulated experience? Does the classic strategy of the right time, the right person in charge or the right place truly work in case of knowledge management? Is it possible to store human intelligence or professional experience through the means of knowledge management? Which could be the greatest challenges one would encounter when adopting this innovative managerial behaviour? To answer these questions, we have employed plenty of scientific works based on a qualitative research of KM and its fundamental implications.

Depending on the observations of the current analysis, we establish a framework for the modern organization based on knowledge, within which the intellectual capital has a leading position. Both the operational and strategic objectives are to be achieved through the means of intelligence - innovative concept that defines the work based on awareness, continuous learning, observation, knowledge, expertise and complex interpretation of all of the above.

Knowledge management (KM) development

Ever since 1911, Frederick W. Taylor asserted the fact that, from the scientific point of view, the fundamental objective of management should be to achieve the maximum prosperity for the employer as well as for each employee. Due to this reasoning, a considerable number of research works were centred on the idea of understanding the concept of *prosperity* as *the development of every branch of the business to its highest state of excellence*. A firm's prosperity should not be perceived only as the significant material gains of its manager, but also as learning the most convenient way of exploiting its tangible and intangible resources, so that its growth can become permanent. Likewise, the employees' benefits should not be exclusively focussed on earning higher wages, but on their development, in order to reach their maximum point of efficiency.

The attitude of each employee towards his/ her professional duties and the principles on which Maslow developed his hypothesis regarding the pyramid of needs, determined Douglas McGregor to advance two completely antagonistic theories, namely X and Y theory. The first one points out the managers who are likely to develop a pessimistic view on their employees, presuming that the workers are naturally demotivated and/ or generally detest their job responsibilities. X theory's main principles are commonly expected to be applied within the businesses involving repetitive tasks and/ or staff members avoiding to respect their obligations, circumstances under which the managers are typically required to adopt a "carrot and stick" approach. This certain way of managing a firm's activity is based on a large number of controls, supervision at every step of the process and forced work delivery, strategy that often calls for according additional rewards in order to complete the specific tasks.

On the other hand, managers who have a positive opinion regarding their people, so that the management style used can be certainly described as a participative one, characterize Y theory. The employees are generally considered to be self-determined, work on their own initiative and take full responsibility of their actions, in which case the obstacles are overcome in an efficient and creative way. Given the fact that this type of management is generally associated with little need of direction, it has become more and more suitable among the modern organizations (Burlea-Schiopoiu and Idowu, 2016).

Throughout the years, most of the research studies on the matter have concluded that a more convenient alternative of efficiently administrating the modernized societies is to combine essential principles of the two theories mentioned above. The successful manager is the one who succeeds in adapting his/ her behaviour towards the company's workforce capabilities, according to their involvement, experience and knowledge; for new starters there would certainly be needed a lot of guidance and strict controls of most of the process's phases, while in the case of experts, a

supervisor should allow them to work under their own initiative, so that the relation established between the two sides involved would be predominantly based on collaboration, not control.

Further studies on the issues of the intellectual capital (Drucker, 1959; Burduș and Căprărescu, 1999; Lazăr, 2002; Burlea-Șchiopoiu, 2003; Maslow, 2007) place the human resource, as part of the intellectual capital, on the very first place when it comes to the leading factors of the firm's development. Nowadays, the intellectual capital of any company/ institution is considered one of its most important resources. It practically represents the only real potential that a manager could benefit from, by creating and exploiting knowledge at the organizational level.

Ichijo and Nonaka consider that an authentic success of the contemporary organization can be determined exclusively by the extent to which its leaders succeed in forming and developing a reliable intellectual capital by creating and disseminating knowledge globally. The emphasis on the overall change of the business environment places the knowledge management among the essential measures that companies need to adopt and optimize in order to cope with the rapid changes generated by globalization. Thus, the managers of the new world have to identify, verify, confirm and, finally yet importantly, respect a series of principles of knowledge management, based on the intellectual capital had at their disposal.

The art of management has undergone many inherent transformations over time, knowledge management proving to be one of the recently individualized branches and, at the same time, intensely capitalized on the current entrepreneurial environment. In accordance with the principles that correspond to this particular way of managing resources, the organization came to be understood as a functional multilevel system, which is generally organized on two distinct dimensions, namely the leading subsystem (managerial level) and the managed one (human resource), solidly tied through a connection of synergetic nature.

Based on the permanent interaction developed between the two levels, the implementation of knowledge management and its principles ensures a continuous communication flow within the organization. The main responsibility of the human resource engaged in the production process is to disseminate truthful and verified data and information to the managers, complex resource that strengthens the administrators' capacity to adopt specific or general decisions, on the short, medium or long run. However, an optimal pursuance of the embraced decisions would not be possible in the absence of the three types of knowledge developed within the organization's internal and external environment, which are to say: implicit (social) knowledge, tacit (intuitive) knowledge and explicit (rational) knowledge.

KM fundamental principles

Starting from as early as 1998, Thomas Davenport perfected part of his research work in the management field by delineating five fundamental principles of the knowledge-based work. This peculiar scientific contribution has represented the cornerstone of the managerial behaviour adopted by the most successful executives up to the present day. Through analysing, understanding and assimilating the essential conditions, which have to be complied with in order to create and genuinely exploit organizational knowledge, the representative of the scientific community claimed that KM's leading lines are established in accordance to the following principles:

- Promoting awareness of the real value of the exploited knowledge, as well as the desire to constantly invest in the process of generating it
- Identifying the key workers who are responsible for capitalizing the pieces of knowledge that can be combined in a joint merger effort
- Highlighting the inherent creative potential, in the context of the complexity and diversity of ideas, considering the differences as positive elements, and not as potential sources of conflict, as well as avoiding the formulation of simple answers to complex questions
- Clarifying the need for constant knowledge resources, by the means of encouraging, rewarding and directing it towards a common goal
- Introducing new measures and benchmarks of success that fully reflect the authentic value of knowledge, compared to the simple balance sheet accounting procedure

KM myths and challenges

The administrative approach based on exploiting data, information and/ or personal experience, which is to say the actual process of implementing knowledge management within an organization has provided a large number of questions, myths and challenges. Aiming to fully comprehend the great majority of the emerged beliefs, the studies of

several experienced researchers (Hilderbrand, 1999; Malhotra, 2000; Parsons, 2004; Garfield, 2017; Nakamori, 2020) summarized the most frequently met myths, as it follows:

1. *Knowledge management's implementation could guarantee the usage of the right piece of information, to the right person, at the right time*

The most important goal to be set when implementing any type of management within an organization is to maximize the results, by using the minimum amount of resources. However, applying the fundamental principles of knowledge management in order to ensure efficient access and use of data and information, at the most appropriate time and by the most experienced worker is considered an unlikely approach. Since both the technological evolution and informational revolution were the main factors to influence the unprecedented market transformation, they also determined an indisputable development of knowledge management. Nowadays, through KM, managers are given the opportunity to develop their abilities of predicting upcoming challenges, by observing and analysing the past situations overcome and experience gained over time.

The functional characteristics of the modern entrepreneurial environment highlight the fact that the new business development model is characterized by a fundamental, but not a quantitative change, this current trait being in full accordance with the evolutions of the information age. The decision-makers of the contemporary organizations are increasingly using long-term business planning strategies, focusing on flexible forms of arrangements, through which they have the opportunity to prevent or counteract any potential challenges (Burlea-Schiopoiu, 2008). Under these circumstances, it is practically impossible for the company directors to manage the set of available resources by using system thanks to which they could permanently designate the most suitable person to solve a task or choose the right time to do it. The same applies when talking about their ability to certainly determine which data and information would have the highest potential for creating and capitalizing the knowledge required in order to overcome the given obstacles.

As probably, the most accepted of the myths that have arisen regarding knowledge management, the model based on applying the pattern of the right person in the right place at the right time proves to fail in guaranteeing an increased efficiency in real life. The perspective of the referred model remains predominantly just a theoretical pattern. Practically, most of the entrepreneurial environment representatives proceed to developing the capacity of constantly adapting to the new conditions of the profile markets, as well as to the consumer behaviour's evolutions.

The need for such a fundamental managerial change, based on the organizational knowledge has become increasingly visible within many important areas of activity at the national level. According to the Romanian national security experts, for instance, the management model recently adopted within the intelligence services has experienced a major paradigm shift, moving from the need to share action model to a more proactively one, characterized by the need to know. Thus, the paradox of the innovative metamorphosis of the managerial act is given by the very recognition of the reforming opportunities of the classical principles of this art of knowledge-based resource management, stated centuries ago by the English philosopher Francis Bacon (16th century), according to which science means power".

2. *Through knowledge management, both experience and human intelligence can be stored*

The informational and technological contemporaneity of the business environment gave managers the chance to store the data and information with a high potential of influencing the development/ improving the results of their company very easily. The main issue that remains though is the fact that, especially in the case of large corporations, the space occupied on the hard drive can reach values of terabytes. Even the most developed databases or software applications do not have the ability to store the whole complex of ideas generated because of the human intelligence contribution, that is to say the evaluations, analysis, synthesis and connections made through the previously stored information. In addition, over the time it has been demonstrated that the information itself is very subjective, in terms of each individual's perception, as it is usually appreciated in various different ways. According to Hilderbrand (1999, p. 51), the way in which data and information are understood by their intermediate or final beneficiaries can vary considerably depending on the context (context-sensitive).

The fact that each of its recipients can understand the same data and information corpus in a completely different way remains a universally valid truth, matter that explains the main reason why the competitive companies within the entrepreneurial environment are easily differentiated and classified by consumers. Conforming to the specialists in the field, one can interpret and exploit identical knowledge elements in an entirely particular manner at certain moments in time, compared to previous situations and depending on the context of their knowledge. The decisions made or the

actions taken because of their perception on peculiar informative aspects can experience a vast diversity, even for the same individual considered at various time circumstances.

Knowledge, defined as the sum of a person's understanding and experiences, is generally stored only in the form of static representations, which are usually characterized by a unique degree of veracity. The output obtained by using a certain volume of data and information is considered authentic and genuinely effective only in a number of situations, for the resolution of which the entire set of resources available at that time was managed. With every such challenge, regardless of the degree to which the organizational objectives are achieved, its human resource accumulates new experience and knowledge. Although the additional learning could be easily recorded within the appropriate databases, IT systems do not have the capacity to make the necessary connections in order to fully develop and individualize correct and complete solutions that might prove vital in case of the critical situations through which an enterprise can pass.

According to Lewis Platt (the executive director of Hellwett Packard), in the current century a company can achieve a certain success level only if its manager succeeds in capturing, storing and applying their employees' knowledge. The idea regarding the possibility of storing knowledge and/ or experience by using specific software programmes or hardware devices remains only a unconfirmed myth, since the availability and ability to capture, manage, analyse and evaluate data and information are features which exclusively characterize the human intelligence, the indispensable resource of any company. Despite the fact that, due to the recent technological progress, the aspects learnt as a result of the passed over experiences can be archived to some extent on various servers or databases, human intelligence remains the main source of creating knowledge and undoubtedly represents the cornerstone of knowledge management and its development for the next coming decades.

3. Human intelligence can be distributed / shared by implementing knowledge management

In accordance with the definitions attributed to the concept of knowledge management since its early stage of individualization, one of its main characteristics has been established to be represented by the distribution/ share of knowledge within the organizational team. The opinion above is mainly promoted by a significant number of specialists within the field (Davenport and Prusak, 1998; Ichijo and Nonaka, 2006; Burlea-Schiopoiu, 2009; Drucker, 2012; North et al., 2018), but it should not be mistaken by a potential possibility of sharing human intelligence as being assured by implementing the scientific management model based on knowledge.

The idea of sharing the human intelligence tends to be conventionally refuted given the above-mentioned principle regarding the impossibility of storing and/ or transferring knowledge, understood as the ability of each individual to identify, analyse and exploit the resources available at a certain moment in time. Even though the members of a team can surely take advantage from the experiences shared, enriching their knowledge, in case of a future problematic situation, each of them will generate distinct ideas and solutions, regardless of having the same information input. The counterstatement of the hypothesis regarding the managerial ability to intuit who is the most suitable employee to solve certain tasks and which is the optimal data and information needed in order to achieve his goal, as a result of implementing knowledge management represents an additional counter-argument of the idea of the possible human intelligence sharing process (Burlea-Schiopoiu et al., 2017).

One of the most important efforts carried out in order to develop the organizational knowledge through the managerial act is to entirely concentrate the information resources, whether primary or processed during similar situations, which were previously overpassed, in a common database, accessible to all team members. However, several experiences related to this practice have shown both the contemporary entrepreneurs and researchers that, unlike knowledge, human intelligence has a unique character of singularity, which is impossible to be virtually shared, regardless of the team members' degree of involvement in the processes performed with the aim of achieving a common goal (Burlea-Schiopoiu and Remme, 2017).

According to the idea advanced by Hilderbrand (1999, p. 50) and retaken by Malhotra (2000, p.11), the major advantages of implementing knowledge management within any organization are unquestionably represented by the creation and substantiation of a common vision, namely the use of the newly developed technologies, by focusing on increasing the firm's efficiency. The researchers also emphasized over the fact that the entire information set can be archived using the most modern technologies in the field, but these "repositories of knowledge" continue to be static and, most often, taken out of context, since the data storage mechanisms do not have the capacity to renew existing knowledge or to create new ones in the absence of human intelligence.

By ensuring a correct and multilateral managerial approach, the knowledge acquired during the specific activity development within an organization can generate a real benefit and guarantee a competitive advantage on the market. Still, the two benefits cannot be earned in lack of human intelligence, indispensable intangible resource within the process of any society's development. As knowledge management represents a scientific branch in full expansion, the specific strategies developed so far are mainly based on its fundamental principles, which are likely to confront plenty of interpretations, criticisms and challenges on the medium and long run. The only possibility to confirm the veracity of the existent myths regarding the advantages and disadvantages conferred by its implementation depends on each entrepreneur and their degree of reluctance or openness towards innovation.

Drucker (1997), Davenport (2005) and Nakamori (2020) believe that knowledge management's implementation can provide the advantages of both rapid and continuous growth, but it also implies several potential inconveniences or difficulties. This factors mishmash explains the alternation of progress or decline periods in the life cycle of a company. Yoshiteru Nakamori (2020, p. 72) retakes the idea originally issued by Thomas Davenport (2005, p. 43) regarding the so-called decline of knowledge management and its main triggers, analysing the whole process through databases and information stored in order to provide the raw material needed in order to create knowledge. The two researchers' opinion underline the idea according to which during its existence on the market, any economic entity can accumulate knowledge in all areas adjacent to the activity performed. In other words, contemporary managers are given the opportunity to gain knowledge both as a result of observing the socio-economic behaviour of their competitors and/ or the evolution of the consumer preferences, as well as the effect of exploiting their own "lessons learned" or using information resources such as best practices.

Despite the benefits secured by adopting knowledge management as an essential tool for organizing and conducting specific activities within an organization level, whether for each individual or for a whole team, the beginning of the 21st century revealed a significant number of cases where its implementation was not a full success. According to Davenport (2005, p. 44), the main reasons why some companies have experienced a partial fiasco when applying the above mentioned administrative method can be summarized by the following aspects:

- Insufficient physical time which is needed by the employees endowed with a significant level of intelligence to systematically record and organize the knowledge created as a result of the work and efforts;
- The complexity and difficulty in using archives and databases, amid the assiduous storage of all available information resources, respectively the uselessness of this huge volume of data, if the company in question has reduced its capacity or area of expertise.

The contemporary managers can successfully complete the prevention or counteraction of these risks / challenges' materialization by using certain alternative techniques in order to improve/ increase intellectual productivity, the level of operational efficiency, as well as the degree of knowledge sharing process. Considering the studies developed by certain researchers within the field (Davenport, 2005; Nakamori, 2020), some of the most practical techniques could be the following:

1. Groupware - defined as the method of forming a complex closed-loop information system that allows associate members to communicate and collaborate effectively, actively encouraging the transfer of knowledge and the sharing/ exchange of ideas and experiences between participants. A recent example with significant relevance in terms of the changes related to this technique is the creation of digital platforms used for sharing or requesting proper data and information in order to create knowledge or identify optimal solutions meant to overcome uncertain situations.

2. Implementing an intelligent management system – a technique that has a high degree of applicability especially in the decision-making process with multidimensional impact. It is based on the creation and use of a complex mechanism ensured by fulfilling the functions of collecting, storing and retrieving the data and information representing the basis for the organizational knowledge's creation. Setting the objective of obtaining results as close as possible to the team leaders' desideratum, the information resources held and processed according to the requirements of each experience overpassed by the representatives of the executive level are accessible to all members of the group.

3. The creation of a database and the establishment of its means of exploitation - remains one of the most useful techniques related to knowledge management. Given that data is generally collected in a raw, primary format, its "storage" in archives can generate real benefits only if the persons responsible for its use possess the

qualities needed to ensure its maximum exploitation. Since, most of the times, the volume of data is huge and implicitly difficult to manage, the first requirement of the proposed management model is to store it according to a series of criteria (division into specific categories, organization according to time points of registration etc.), in order to facilitate the access and exploitation processes by any of the team members. The following step needed to be understood, mastered and completed correctly in order to achieve the set objectives is data mining. The data mining process, as it is called within the scientific community, indicates, in fact, the structural technique of extracting useful knowledge from the created database, because of the numerous searches, selections or processing of the primary form under which it was stored.

4. The implementation of a documents' management system is an imperative feature, especially for the large corporations' representatives. Nowadays, in addition to collecting or accessing an impressive amount of data, managers of many companies frequently come into the possession of a significant number of documents that require to be examined correctly and in a comprehensive approach. In this context, the digitization of the official documents created for an easy and efficient use or management is one of the basic needs of the modern management. The implementation of this normative particularity can be easily ensured through the creation of a system that allows both storage and administration of the documents, which are indispensable to the organizational progress.

Conclusions

For most of the managers of the present day, knowledge management can easily become either a great opportunity to achieve an important competitive advantage within the market or a burdensome challenge that could actually damage the whole company. Depending on their own approach towards the specific tasks to be accomplished, the supervisors can generate certain favourable circumstances so that the managed human resource would be constantly motivated and boosted in terms of performance or they would simply not get involved in the process, leaving the company to run passively.

The myths and challenges associated with knowledge management's implementation process emerged in the last decades have mistakenly correlated its application to the assurance that the right piece of information given to the right person at the right time would succeed in solving a problematic situation. The great majority of the studies previously carried out on the subject by a considerable number of researchers have illustrated the fact that implementing knowledge management as the main administrative pattern gives an executive more chances to succeed, but it does not guarantee the actual success. The quintessence of the managerial process still remains the leader's ability to motivate its human resource, increase and exploit their knowledge and experience.

Since the most frequently presumed strategy of the right data – right person – right time does not always secure an optimal usage of an organization's resources in terms of knowledge, one might believe that the technological boom and/ or the remarkable progresses made due to the information era and globalization could help with storing/ sharing the organization knowledge. Unfortunately, the assumption is only half correct. Human intelligence can be exploited in teams, can be shared with the team members, but it cannot be stored within any software or data bases. One can make useful connections or perform complex analysis, processes that eventually lead to making useful decisions in order to overpass a problematic situation, can share his/ her experience with the team members, but in case a future such event, each of them would develop different solutions, based on their own knowledge and experience.

Knowledge management still has a lot of unexplored treasures to be found and a lot of challenges to be faced, but it is for sure one of the most useful and valuable administrative strategies that a manager could adopt within nowadays society. Its implementation can be a demanding process and there could be many easy paths that could prove to be leading towards less or poor results than expected, but one thing is for sure: (organizational) knowledge is essentially based on human intelligence, an intangible individual resource that cannot be stored or completely shared. The complex managerial process is still evolving and as all the great goals to be achieved, it equally demands great efforts, time and involvement.

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Analysis of the Housing Situation in Poland and the European Union Countries

Marcin SUROWKA*and Joanna WYROBEK**

*Cracow University of Economics, Collegium of Economics, Finance and Law, Institute of Finance, Cracow, Poland, marcin.surowka@uek.krakow.pl

**Cracow University of Economics, Collegium of Economics, Finance and Law, Institute of Finance, Cracow, Poland, wyrobekj@uek.krakow.pl

Abstract

The publication aimed to compare the Polish housing market situation with the situation in other European Union countries. The authors verified the hypothesis that Poland's situation is one of the worst in the EU when it comes to overcrowding, the number of young people without their own dwellings, housing availability, housing standards, and accessibility of mortgage.

Keywords: Housing, Real Estate, European Union.

Introduction

It is intended that this publication provides an analysis of the current housing situation in Poland compared to other European Union countries and the answer to the question of whether, after 16 years of membership in the European Union, Poles are facing a similar housing situation to the other Member States. This research also analyses the number of new developments and their purchase prices to assess the availability of dwellings for Polish residents.

The research hypothesis put forward in the paper assumes that the situation in Poland is one of the worst in the European Union. The circumstances in the housing market will be analyzed from the point of view of numerous criteria: overcrowding, the number of young people living with their parents, the number of dwellings per 1,000 inhabitants, the number of completed dwellings, housing availability in terms of residents' income, availability of financing tools.

Literature Review

According to Mayo and Stein (Mayo, Stein, 1995), after the Second World War, Poland had an extremely low level of available dwellings, and for 60 years the centrally planned economy failed with the reconstruction of housing to the level observed in other countries (Morton, 1979). Presently, the situation on the Polish market still remains far from the European average, but the authorities have pursued many initiatives to improve it. During the economic transformation in Poland, the investment costs for building a house could be deducted from tax (Merill, 2000). The early 2000s saw the construction of TBSs (Social Construction Associations), which admittedly did not offer to acquire ownership, but allowed rental for a relatively low contribution equal to 1/3 of the dwelling value (unfortunately, some of the TBSs had low-quality projects, built of cheap materials, with thin walls and poor thermal insulation). The next step of the authorities were mortgage financing programs (Radzimski 2014, Kierzeniowski 2008, Glocker, Plouin, 2016) which promoted the purchase of dwellings and mortgage financing. Unfortunately, attempts of governmental assistance, targeted in particular at young people for the purpose of gaining independence and moving away from parents, and in the long term starting a family, does not take into account the very low earnings of many young people and work on "junk" contracts that prevent them from purchasing a dwelling (Baranowska-Rataj, 2011). Quite often, young individuals cannot even afford a mortgage (Świąder, Szewrański, Kazak, 2017). It is nothing uncommon when young people have to financially support their parents, as the pension system in Poland does not ensure a decent life in retirement (especially in the case of workplace accidents or disability). Thus, social inequalities and low wages translate into low effectiveness of government aid programs, which mainly help relatively wealthy people. Then there are also the high construction costs of dwellings in Poland which, due to the climate, must be made much more robust than in countries with higher winter temperatures. In Poland, it is not possible to build houses with single glazing or thin insulation, because the costs of heating in winter would exceed the financial capacity of the residents (heating a flat in Poland during the winter often costs the equivalent of the national average

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salary, but is spread over the entire year, so heating is settled in installments). Apart from that, due to the dramatic increase in real estate prices in the last 20 years, dwellings have become a common way of investing capital, which further increases their prices (Olszewski et al., 2019, Dąbrowska, 2019). Wealthy people purchase dwellings for rent or as an investment, which means that the prices of not only dwellings, but also land in cities are constantly on the rise. In many cities there is already a shortage of construction properties (e.g. Cracow), and those that are available reach very high prices. It is estimated that there is still a deficit of approx. 2.5 million dwellings in Poland (Kubow, 2016, Napiórkowska-Baryła, 2020). For many young people, the only chance for their own dwelling is to emigrate and save sufficient capital to purchase a dwelling in Poland (Krzaklewska, 2019). It is claimed that a vast number of young Poles looking for a job in the UK (and finding it thanks to the high quality of their work) was one of the main reasons for Brexit (Favell, Barbulescu, 2018). Even though the increasing number of people considers the prices to be excessively high and forming a speculative bubble, they do no cease to increase (Siemińska, Krajewska, 2019, Czerniak, Kawalec, 2020).

Conclusions from own Research

The research conducted for the purpose of the publication was analytical and comparative. The objective was to diagnose the current situation on the Polish market against other European Union countries. Chart 1 demonstrates the share of public housing expenditure in total GDP in 2018. As the chart makes clear, expenditure for this purpose in Poland represents 0.7% of GDP, while the EU average is 0.6% of GDP, and 0.5% of GDP for Western European countries. In percentage terms, Poland ranks ninth in the EU in terms of public housing spending (after: Bulgaria, Cyprus, Romania, Croatia, France, Hungary, Latvia and Great Britain). In amounts, Poland ranks sixth (behind France, Great Britain, Germany, Italy and Spain). That is not bad, but the comparison of social rental housing spending statistics gives a substantially worse picture, as shown in Figure 2. Expenditure for this purpose in Poland is around 0.08%, while the EU average is 0.5%, and for countries such as Germany, Great Britain or France it is 1% of GDP (OECD, 2020). To conclude, it is significant that expenditure on housing construction is one of the highest in the European Union, but expenditure on social housing is one of the lowest.

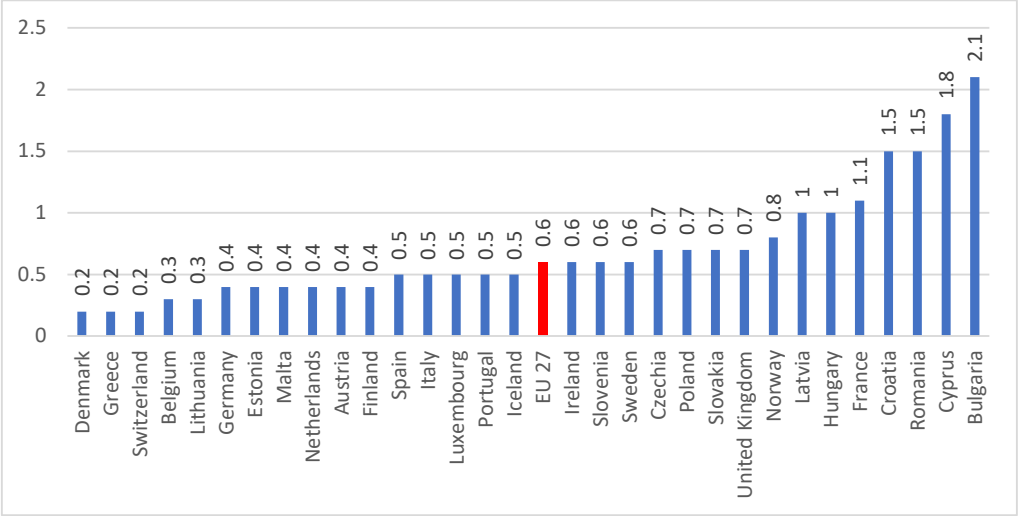

Fig. 1: Housing and community amenities, central government expenses as a percentage of the GDP, Eurostat, [gov_10a_exp]

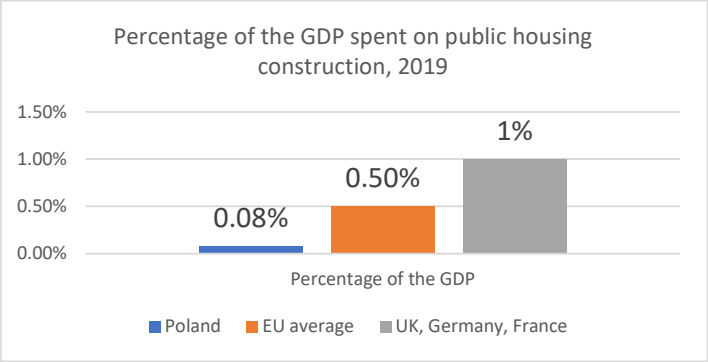

Fig. 2:Recent trends in public spending on social rental housing in selected EU % of GDP (2015, 2018), OECD, [PH4.1.]

A further aspect of assessing the situation on the housing market in Poland is the overcrowding rate. The overcrowding rate is defined as *the percentage of the population living in an overcrowded household. A person is considered as living in an overcrowded household if the household does not have at its disposal a minimum number of rooms equal to: one room for the household; one room per a couple in the household; one room for every single person aged 18 or more; one room per pair of single people of the same gender between 12 and 17 years of age; one room for every single person between 12 and 17 years of age and not included in the previous category; one room per pair of children under 12 years of age. (Eurostat).* As shown in Figures 3, 4 and 5, this rate for Poland was 26.2%, which put it in eighth place among the EU countries. Even for the upper quantile of the income distribution, this rate exceeded 20% (for 25% of the highest-earning Poles), while for the lower quantile (25% of the lowest-earning Poles) it was over 35%. The situation was virtually identical for both rural and urban areas (where the overcrowding rate approached 40%), and somewhat better for small towns and suburbs, while it was worse in Bulgaria, Romania and Slovakia, but unfortunately Poland was one of the top countries with the worst-case scenario in this respect (however, overcrowding rate has decreased by 13.4% in the last 10 years (Czajkowska, Raczkiewicz, 2020, p. 41).

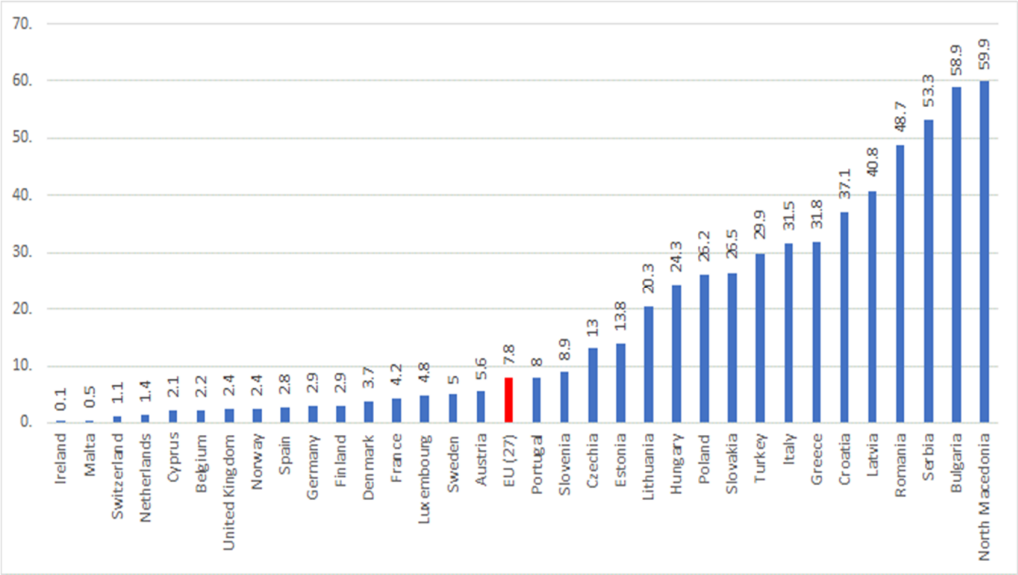

Fig. 3: Overcrowding rate in the European Union, 2018, Eurostat

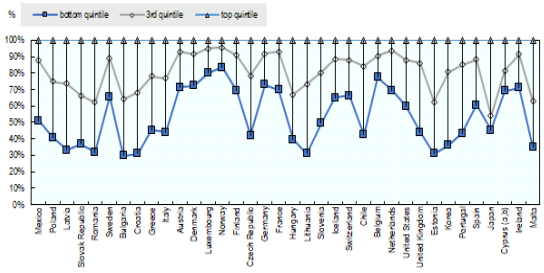

Fig. 4: Share of overcrowded households by quintiles of the income distribution, 2018, Eurostat

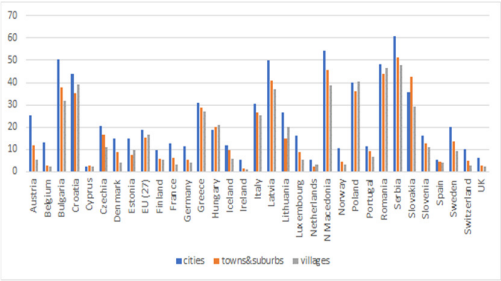

Fig. 5: Overcrowding rate by the degree of urbanization, 2016, [%], Eurostat

If one looks at the composition of household types among young people aged 20-29, it is worth drawing attention to the considerable share of people living with their parents. This indicator in Poland is close to 60%. That said, this is not a record result in the entire European Union, as the highest share belongs to Italians, where this value exceeds 70%. Slovakia and Greece are just behind Italy, followed by Slovenia and Spain, Portugal, Luxembourg, Ireland and Hungary. Nevertheless, if these figures are compared with countries such as Denmark, Finland or Norway where the percentage is close to 10%, there is an evident difference, caused by the financial situation and housing prices rather than the voluntary choice of more than half of the population.

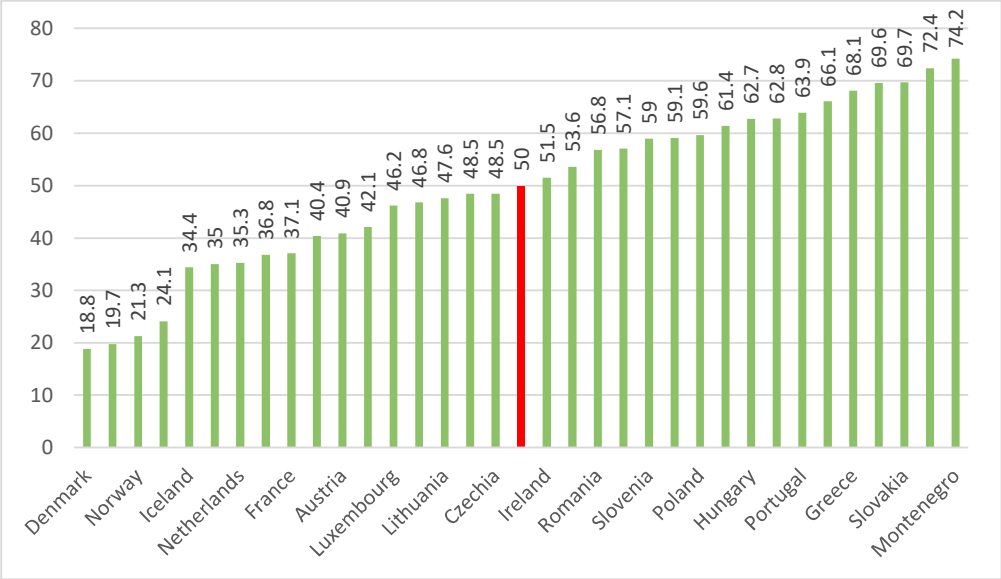

Fig. 6: Percentage of people in the age of 20-29s living with parents in 2017 [%]

The number of dwellings per 1000 inhabitants also implies numerous dwellings deficits in Poland, where there are 387 dwellings per 1000 inhabitants. As shown in Figure 7, this result is much lower than that of all Western European countries except Great Britain. Given the above, the statistics mentioned previously showing that there is a shortage of 2.5 to 1.7 million dwellings in Poland are not surprising.

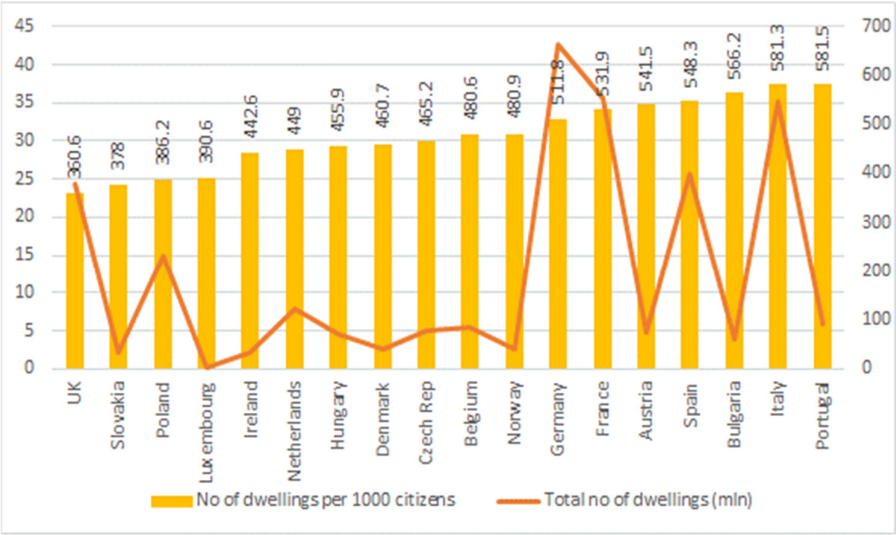

Fig. 7: The number of dwellings per 1000 citizens, 2018, Eurostat

Figures 8 and 9 show the pace of development of the housing market in the European Union countries. Concluding from these figures, in 2018 there were 5.41 completed dwellings per 1,000 inhabitants in Poland, which makes it one of the highest scores in the EU. Only Norway, France and Luxembourg ranked a larger score than Poland. Equally high for Poland is the indicator of initiated dwellings, which amounted to 6.18 dwellings per 1000 inhabitants. A higher indicator for the EU countries could be observed only in Luxembourg, where it was 8.92 dwellings. Nevertheless, Luxembourg is the seat of many institutions of the European Union and at the same time a very small country, therefore such a high rate of construction was rather a matter of foreigners rather than the housing needs of Luxembourg citizens.

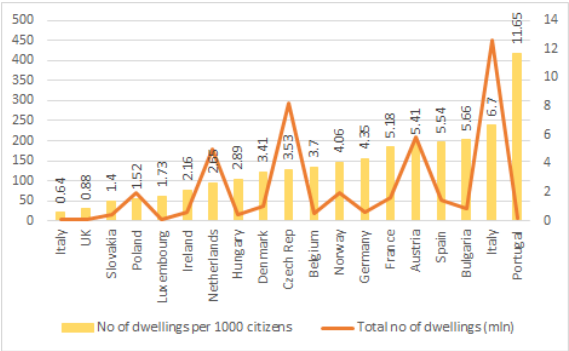

Fig. 8. Housing development intensity, index of completed dwellings per 1000 citizens, 2018, Eurostat

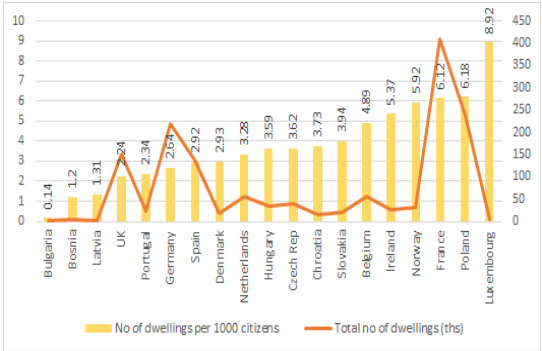

Fig. 9. Housing development intensity, index of the number of initiated dwellings per 1000 citizens, 2018, Eurostat

Figures 10 and 11 demonstrate the measures of housing availability for residents of a given country. Figure 10 portrays the relationship between the average annual gross salary in a given country and the price of a 70-meter dwelling (the average national price of a dwelling). Given the results indicated above, one can see a considerable intermingling of the old and the new Union countries (convergence process is well documented in Kucharska-Stasiak et al., 2020). There is no clear division into countries of Western Europe and Central Europe. That said, Poland appears to be in the group of countries with a high ratio, approaching 8, while for Belgium or Portugal, the ratio is around 4. This proves high purchase prices for dwellings, which may be due in part to dwelling shortages and enormous demand.

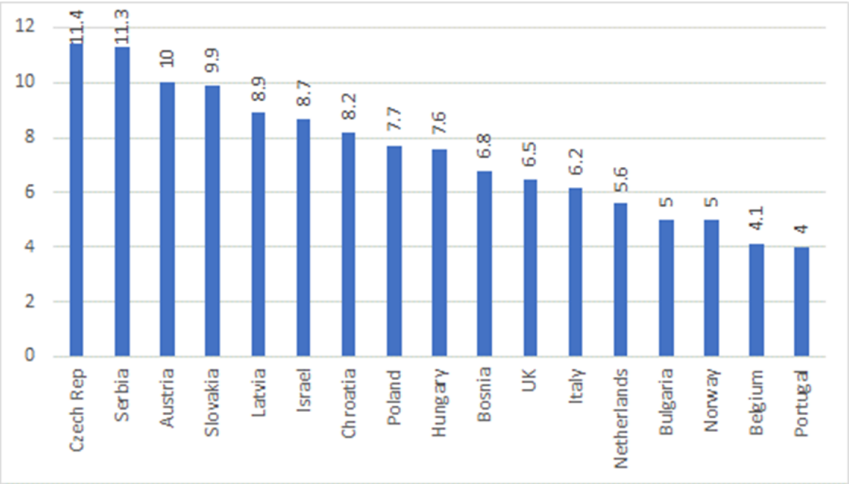

Fig. 10: Affordability of own housing, multiple of annual gross salaries to purchase a 70 sqm dwelling

Theoretically, Poland's housing prices (Figure 11) are not very high compared to those in other EU member states. The average price of a 120-meter dwelling in 2018 did not exceed EUR 3,000 per square meter, but it represents a several-month gross salary of an average Pole (and it is known that over 50% of Poles do not earn the average national salary at all). Therefore, prices may be attractive as investments for Western Europe's inhabitants but are often prohibitive for the inhabitants of Poland and other Central European countries. This is likely to cause a huge number of investment funds allocating assets in construction in Poland. They represent a considerable share of companies listed on the Warsaw Stock Exchange. Such an investment demand for residential real estate in Poland makes them more expensive, regardless of the financial capabilities of many Poles.

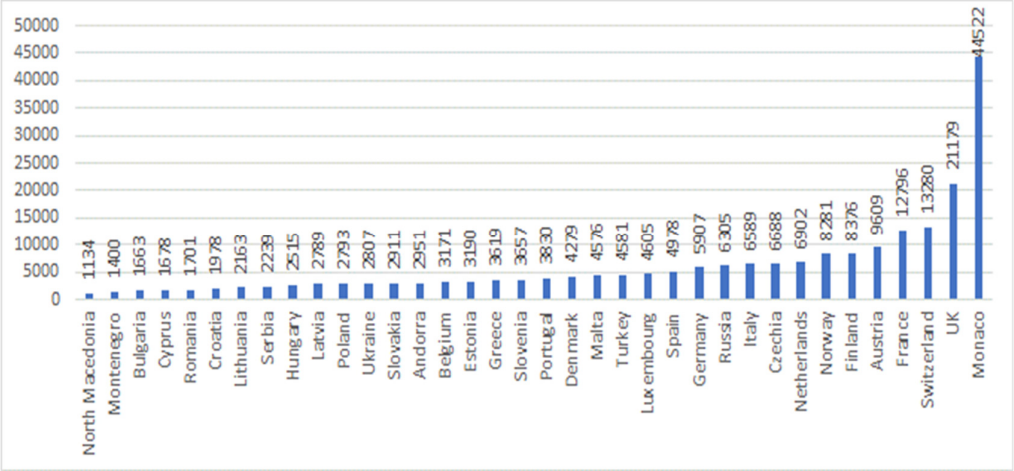

Fig. 11: The average price for 120 sq m dwelling in the most important city in a given country, 2018, [euros/sqm]

The last criterion for assessing the situation in the housing market in Poland is housing conditions. It follows from Figures 12 and 13 that in 2016 about 40% of Poles lived in poor housing conditions (according to European Union standards), and for as much as 14%, these were substandard conditions. If one compares Poland to the rest of the European Union countries, Poland takes 16th place (out of 27 member states (Ulman, 2019, p. 70)). Merely around 10% of Poles used a mortgage, as the rest could not afford such a loan. An extensive group (over 65%) of citizens were owners of dwellings without an outstanding mortgage or housing loans, which, however, cannot be regarded as a satisfactory outcome in the face of the huge housing deficit in Poland. A severe problem that is worth putting into the analysis are the types of dwellings popular in Poland. In 40% of cases, these are dwellings (smaller, cheaper) and over 50% of houses (expensive, larger). Due to their size, if not overcrowded, houses provide better conditions for having children, so it would seem that the proportions are quite favorable, but the age of individual dwellings is not shown here - many houses were built by older generations, and they are not accessible to young people. The majority of people working in cities (and more than 60% of Poles live in cities) purchase dwellings due to the poorly developed road infrastructure, which makes commuting to the city center difficult, even from the outskirts of the city. Therefore,

Poles who work in cities usually purchase small dwellings because daily commuting to the workplace is completely unprofitable. This strongly increases dwellings' prices in cities and restricts the scope of space where new dwellings are built.

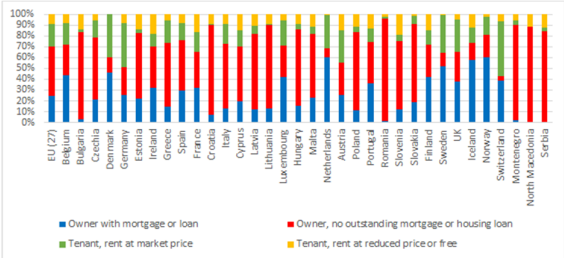

Fig. 12. Population distribution by tenure status, 2016 [%] of the total population, Eurostat

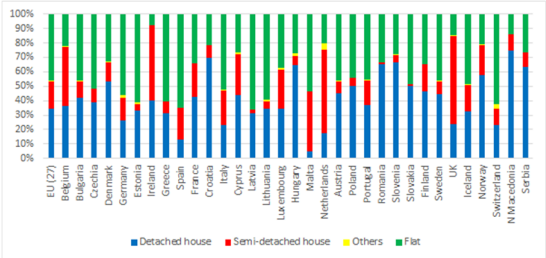

Fig. 13. Distribution of population by dwelling type, 2016 [%] of the total population, Eurostat

Conclusion and Ending Remarks

Concluding the considerations included in this paper, it appears that there are no grounds to reject the hypothesis that the housing situation in Poland is among the worst in the European Union countries. Moreover, it seems that there is a fairly clear division of housing issues between Western Europe and Eastern Europe. In Western Europe, there is no strong growth in housing because the inhabitants of these countries do not experience a shortage of dwellings. The problem there is rather the renovation and modernization of existing dwellings and perhaps concern for the fate of the poorest, while in Poland and Central European countries, the issue is the lack of a place to live and the need to live in substandard conditions. Admittedly, Poland is not the worst country in terms of the analyzed indicators, but in practically every category (except for the number of completed dwellings) it is one of the worst states in the European Union. If we look at the figures, the number of square meters per capita in Poland is 2/3 of that value for the entire European Union (28 square meters and 39.6 square meters per capita, respectively). The aforementioned relation is much worse when comparing Poland with the average for Western European countries.

Poland is continually incorporating more and more radical housing subsidy programs for young people; however, it seems that housing prices are rising faster than government aid. The average housing price growth rate for the last 20 years is about 20-25% annually. It is worth noting the periods when prices of building materials grew by nearly 50% during the year. This induced the bankruptcy of many construction companies in Poland, which entered government tenders where prices had been fixed in advance and could not be renegotiated. Losses in tenders were so high that companies that had been operating for more than half a century were forced to apply for bankruptcy.

Acknowledgements

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Analysis, In the Monitoring and Follow-Up of COVID-19 Patients, Using Digital Technologies. A Review of The Scientific Literature

Cristobal Mondalgo-Rodriguez

Universidad Autónoma del Perú, Lima, Perú
cmondalgo@autonoma.edu.pe

Michael Cabanillas-Carbonell

Universidad Autónoma del Perú, Lima, Perú
mcabanillas@ieee.org

Abstract

The world is currently experiencing a health crisis over SARS-CoV-2 disease. It is therefore important to follow up and monitor the patient on the disease. The study conducted is a review of the scientific literature, which includes 158 articles from the databases; EBSCO Host, IEEE Xplore, Medline Full Text, ScienceDirect and Scopus. According to our inclusion and exclusion criteria, 30 articles were systematized. Showing the digital technologies that facilitate the control, follow-up and monitoring of the disease in patients.

Keywords: Monitoring and Control, Digital Technologies, Systematic Review.

Introduction

SARS-CoV-2 (called Covid 19), is a disease that generates various symptoms to the patient's body, including shortness of breath, tiredness, malaise, chest pain or pressure, etc. When the symptoms become very serious, it can even lead to the patient's death. Those in charge of public health do not keep an adequate control or follow up of all the patients, causing some patients to die. (Shaw, Kim and Hua, 2020).

Therefore, the aim is to learn about the use of digital technologies, to facilitate proper control, follow-up and monitoring of infected patients and improve response times between one patient and another, this prevention in practice saves lives. (Lee et al., 2020).

The review of the scientific literature, allows to look for or to solve the problems that at the moment the dependencies of the public health suffer on the control, pursuit and monitoring of the patient on the disease. (Kamel and Geraghty, 2020).

Methodology

A. Type of Study

For the elaboration of the article, the systematic review of the scientific literature will be used. Yordanov et al., 2020.

B. Research Questions

The proposed research questions are as follows;

RQ1. What digital technologies allow a better control, follow-up and monitoring of patients diagnosed with the disease?

RQ2. What digital technologies can be used for the control and monitoring of patients diagnosed with the disease, from public health centers?

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C. Search Strategies

To answer the research questions, a search was made of articles published in the main databases EBSCO Host, IEEE Xplore, Medline Full Text, ScienceDirect and Scopus. Where 158 scientific articles were collected.

When applying the search for our research, the following keywords have been considered: “covid-19 technology”, “monitoring patients with covid 19 using ti”, “tracing patients with covid 19 using ti”, “covid information technologies”, “covid-19 monitoring patients”, “covid-19 AND monitoring” “covid 19 AND patient”, “covid 19 and monitoring”, “covid 19 monitoring software”, “covid it”, “covid-19 and technology and monitor patients”.

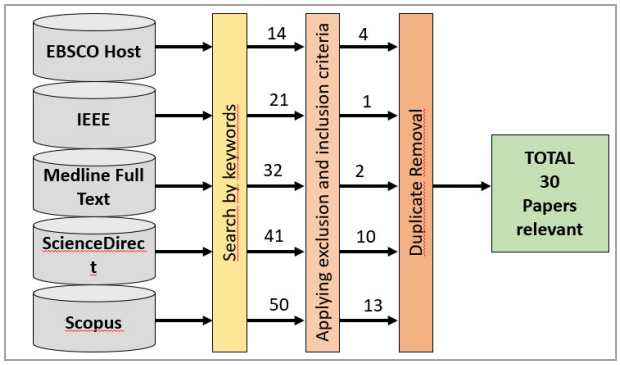

Fig 1. Prisma Diagram Methodology

D. Inclusion and Exclusion Criteria

For the systematic review study, the following inclusion and exclusion criteria were applied in the following table.

Table 1: Inclusion and exclusion criteria

Criteria		
Inclusion	I01	Articles related to digital technologies for the Covid 19
	I02	Medical articles related to technologies for the Covid 19.
	I03	Articles related to the monitoring of patients Covid 19.
Exclusion	E01	Articles not related to the technologies used in Covi 19
	E02	Articles not related to the monitoring of patients Covid 19.
	E03	Articles related to patient monitoring, but does not make use of digital technologies.

Results

We analyzed 158 articles found in the databases related to the research topic, of which 20 duplicated articles were discarded or did not contribute similar topics to the research. After reviewing the articles, 30 were selected, excluding 108 according to the exclusion criteria and that did not contribute to answer the research question. Obtaining 30 articles for the systematic review.

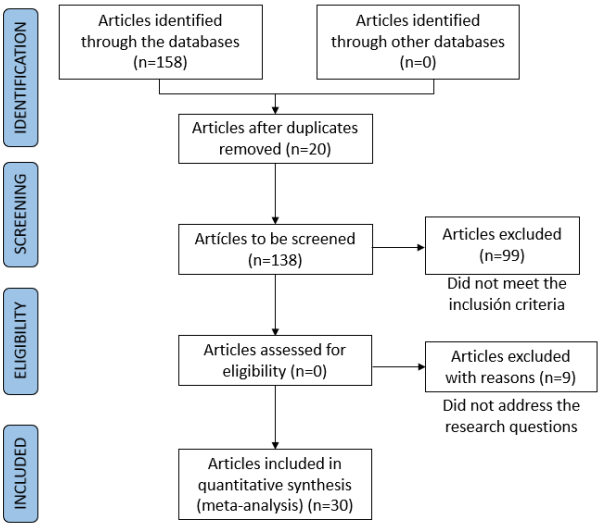

Fig 2. Document inclusion and exclusion flowchart

This graph shows the number of items found by the database.

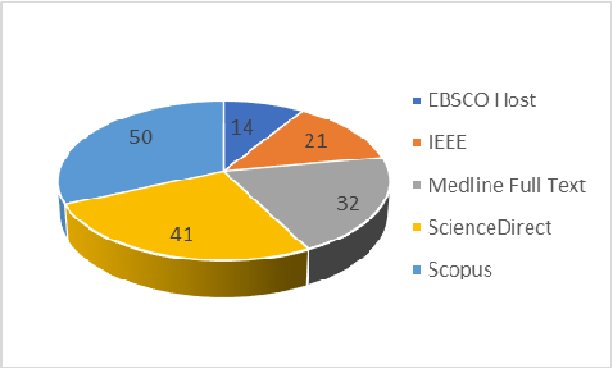

Fig 3. Items by database

This graph shows the number of articles published per month and database.

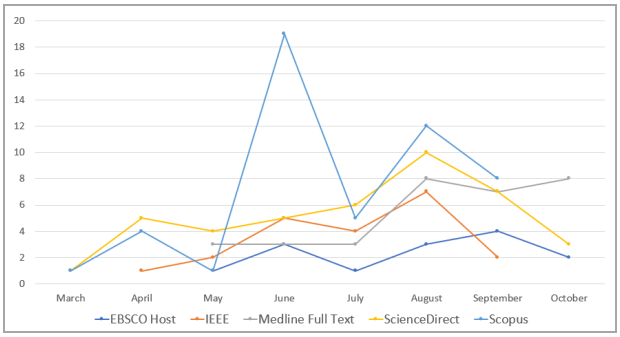

Fig 4. Articles by month and database

This graph shows the number of articles published per continent

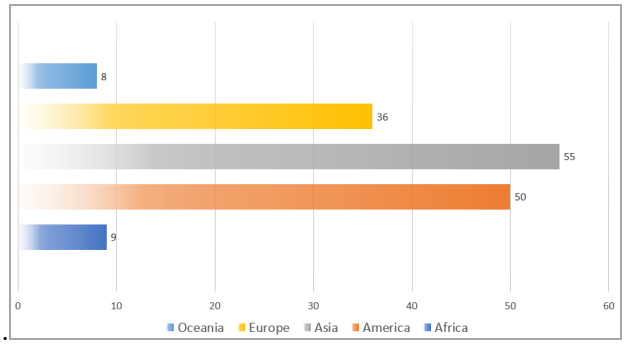

Fig 5. Articles by Continent

This graph shows the number of selected articles published by country.

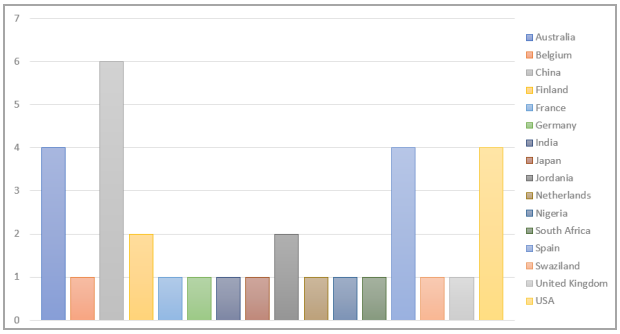

Fig 6. Articles by country

This graph shows the number of selected items grouped by database and category.

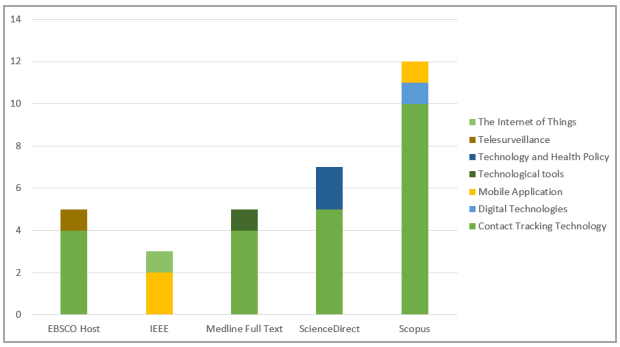

Fig 7. Articles by database and category

The following table shows the article classification categories according to the results found.

Table 2: Tabularization of articles according to the results of obtained

Categories	Articles
Mobile Application	(Azad et al., 2020); (Cheng and Hao, 2020); (Islam et al., 2020)
Technological tools	(Abuhammad, Khabour and Alzoubi, 2020)
The Internet of Things	(Siriwardhana et al., 2020)
Contact tracking technology using mobile equipment	(Naik et al., 2020); (Nijsingh, Bergen and Wild, 2020); (Mbunge, 2020); (Gomez et al., 2020); (Leslie, 2020); (Taiwo and Ezugwu,

Categories	Articles
	2020); (Wu et al., 2020); (Martínez et al., 2020); (Martínez et al., 2020); (Gerke et al., 2020); (Walrave, Waeterloos and Ponnet, 2020); (Annis et al., 2020); (Kleinman and Merkel, 2020); (Wang, Ding and Xiong, 2020); (Cascón, 2020); (Coghlan, Cheong and Coghlan, 2020); (Culnane, Leins and Rubinstein, 2020); (Culnane, Leins and Rubinstein, 2020); (Van De Beek et al., 2020); (Lucivero et al., 2020); (Urbaczewski and Lee, 2020)
Technology and Health Policy	(Shaw, Kim and Hua, 2020); (Lee et al., 2020)
Digital Technologies	(Kamel and Geraghty, 2020)
Telesurveillance	(Yordanov et al., 2020)

The following table shows the classification topics of articles according to the results found.

Table 3: Classification of articles according to categories and topics of functionality

Themes and functionality	References
These articles argue that mobile applications allow control and monitoring of patients with the disease, as long as it is connected to a health control system.	(Azad et al., 2020); (Cheng and Hao, 2020); (Islam et al., 2020)
These articles argue that technological tools allow the control and monitoring of patients with the disease using technologies in general.	(Abuhammad, Khabour and Alzoubi, 2020)
This article argues that the use of the technologies of the Internet of things allows to develop and to lean on the technologies of the telemedicine, telehealth, etc.	(Siriwardhana et al., 2020)
These articles argue that the use of contact-tracking technology using mobile equipment allows for the control of patient follow-up using data privacy.	(Naik et al., 2020); (Nijsingh, Bergen and Wild, 2020); (Mbunge, 2020); (Gomez et al., 2020); (Leslie, 2020); (Taiwo and Ezugwu, 2020); (Wu et al., 2020); (Martínez et al., 2020); (Martínez et al., 2020); (Gerke et al., 2020); (Walrave, Waeterloos and Ponnet, 2020); (Annis et al., 2020); (Kleinman and Merkel, 2020); (Wang, Ding and Xiong, 2020); (Cascón, 2020); (Coghlan, Cheong and Coghlan, 2020); (Culnane, Leins and Rubinstein, 2020); (Culnane, Leins and Rubinstein, 2020); (Van De Beek et al., 2020); (Lucivero et al., 2020); (Urbaczewski and Lee, 2020)
These articles argue that the use of technology and health policies used in patient care should be supported by technology in the use of disease control and monitoring systems.	(Shaw, Kim and Hua, 2020); (Lee et al., 2020)
This article argues that the use of Digital Technologies allows the automation of	(Kamel and Geraghty, 2020)

Themes and functionality	References
processes related to the control and monitoring of patients diagnosed with the disease.	
This article argues that Telesurveillance allows the patient to be seen through the internet from a mobile device, pc, etc. In order to be able to control and monitor the disease.	(Yordanov et al., 2020)

Discussions

In this systematic investigation of the scientific literature, the aim is to answer the proposed questions;

RQ1. What digital technologies allow a better control, follow-up and monitoring of patients diagnosed with the disease?

According to Figure 5, it can be seen that the articles related to our topic in mention come from the continents of Asia, North America and Europe (from highest to lowest). This result indicates that there is a greater knowledge of the technologies related to the control and monitoring of patients diagnosed with the disease.

According to Figure 6, it can be seen that the articles related to our topic in mention come mostly from the countries of the USA and China. This result indicates that there is greater experience in the control and follow-up of patients diagnosed with the disease.

According to figure 7, it can be seen that the articles related to our topic in mention use the technology of; contact tracking, health policies, mobile application, etc. This result indicates that these technological categories allow controlling the follow-up of patients diagnosed with the disease.

According to Table I, you can see the categories of articles related to our topic in mention use the technology of "Contact Tracing using Mobile Equipment". This result indicates that this category is one of the most used to control the follow-up of patients diagnosed with the disease.

RQ2. What digital technologies can be used for the control and monitoring of patients diagnosed with the disease, from public health centers?

According to figure 7, it can be seen that the articles related to our topic in mention use the technology of; contact tracking, health policies, mobile application, etc. This result indicates that these technological categories allow controlling the follow-up of patients diagnosed with the disease.

According to Table I, the categories of articles related to our topic in mention use the "Mobile Application" (The mobile application must be connected to a matrix health system which provides patient information). This result indicates that this category is one of the most used to control the follow-up of patients diagnosed with the disease.

According to Table II, we can see the functionalities of the categories of articles related to our topic in mention, using "Technology and Health Policies". This result indicates that this category related to the use of systems interconnected to mobile applications allows to control the follow-up of patients diagnosed with the disease. Since it allows the use of systems.

Conclusions

After having made the systematic investigation of the scientific literature of 30 articles related to the topic in mention, it is concluded what;

The tools or technologies that allow a better control in the follow-up and monitoring of patients diagnosed with COVID 19 disease, are the technologies associated with "Contact Tracing using Mobile Equipment", "Technology and Health Policies" and "Mobile Applications" connected to a health control system.

In addition, most patients accept the implementation of technology in contact tracking to track COVID-19 disease, as long as privacy data security is applied. Therefore, the use of technology in "contact tracing" should be tempered with a focus on data privacy and cyber security.

The results of this systematic review may be helpful for future research on finding technologies that allow the monitoring and follow-up of COVID 19 patients using digital technologies.

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Analysis of ICT Tools to Prevent Animal Abuse: A Review of The Scientific Literature From 2013-2020

Pierre Ortega-Zapata
Universidad Autónoma del Perú, Lima, Perú, portegaz@autonoma.edu.pe

Nelson Campos-Gutierrez
Universidad Autónoma del Perú, Lima, Perú, ncamposg@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

Animal abuse is an issue that is known worldwide and is one of the most serious problems of society, which despite the times continues to emerge until today. There are several ways to prevent it, but not the complete disappearance of it. To prevent animal abuse, information and communication technologies are used (ICT). This research is a systematic review of the literature and aims to make an analysis of ICT tools. For which, a compilation of 45 articles was made and systematized, which were taken from databases such as Scopus, IEEE Xplore, Ebschost, Scielo and Sciencedirect. The result of this work is that there are three tools that stand out: artificial intelligence, Internet of Things (IOT) and applications. These tools promote in great quantity the decrease and control of the animal mistreatment (Abstract)

Keywords*:* Animal abuse, tools ITC, systematic review, preventing, society.

Introduction

Despite the times, animal abuse is still heard today, are still easy targets of abuse, violence and aggression, is considered a crime in all countries of the world, where a person with irrational attitudes and behavior abuses an animal either physically, psychologically or sexually , in our society where we live the animals as much as domestic animals or abandoned, they are vulnerable since there are many cases that when people hurt or mistreat an animal mostly is not denounced, in addition that the denunciations by mistreatment animal is very difficult that is carried out to prosecute since the animals do not speak nor can be defended by themselves(Parfitt y Alleyne, 2018).

However, there have been many cases of people who unfortunately have carried out a frequent violence or aggression on the same animal, either psychic or physical, reaching numerous cases where even get to kill the animal itself(Jaurrieta Ortega, 2019).

The Information and Communication Technologies (ICTs) today have a great relevance for everything, for this topic even more, since thanks to the "ICTs" we can use them for the benefits of the animals, preventing the animal mistreatment with the use of the technologies, grouping together elements and systems attributed in the method and transmission of information, they are tools that can be taken advantage of to help prevent and avoid the mistreatment and to generate a well-being for our society (Hernández et al., 2014). As well as the use of social networks, websites or mobile applications with which people who are in favor of animals and love animals can give talks and advice to other people what to do if they live an animal abuse in their area and what measures to take about it, so this research aims to analyze the use of ICT tools to prevent and avoid animal abuse in our society. Therefore, the following question will be asked in order to answer: How much do we use ICT tools to help prevent animal abuse in our society?

Methodology

A. *Type of study*

This article will be elaborated with the use of the systematic review of scientific literature defined in the PRISMA guide (Prefered Reporting Items for Systematic Review and Metaanlyses).

Cite this Article as: Pierre Ortega-Zapata, Nelson Campos-Gutierrez and Michael Cabanillas-Carbonell "Analysis of ICT Tools to Prevent Animal Abuse: A Review of The Scientific Literature From 2013-2020" Proceedings of the 36th International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-5-7, 4-5 November 2020, Granada, Spain.

B. Review Questions

The research questions according to our criteria are the following:

RQ1. What are the ICT tools that are used to prevent animal abuse?
RQ2. Which of the technological tools benefits animals the most?

C. Search Strategies

With the intention of generating an answer to our questions that were raised for the progress of our research, we searched for scientific articles in databases such as: Scopus, Sciencedirect, IEEE Xplore, Scielo, Ebschost. We found 45 scientific articles from 2013-2020.

When the articles were searched in the 5 databases mentioned, they were searched using key words such as: "animal violence", "animal abuse" "tools TIC", "technology and animals", "The Tics", "animal cruelty", "animal defense technology".

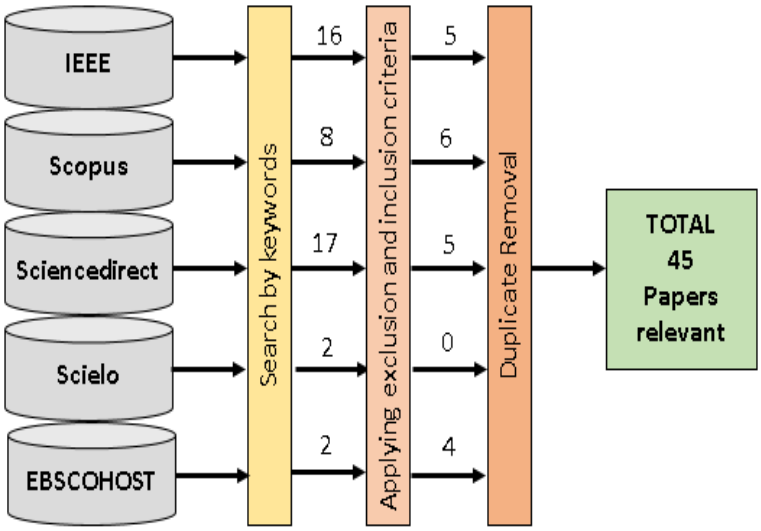

Fig. 1 : Prisma Diagram Methodology

D. Inclusion and Exclusion Criteria

The following table shows the criteria for inclusion and exclusion from our research.

Table 1: Inclusion and Exclusion Criteria

CRITERIA		
Inclusión	I1	Articles related to ICTs with animal abuse.
	I2	Articles published between 2013-2020
	I3	They were found in English and Spanish.
Exclusión	E1	Some articles are not associated with the study variables
	E2	Some articles do not apply to engineering, social science and computer science.
	E3	Identical articles in different databases
	E4	Articles in languages other than English and Spanish

Results

The following result was made by means of the investigations that were found in 45 articles obtained in different data bases, next, the process of analysis that was made will be shown:

E. Extracted and analyzed articles

Sixty-five articles from different databases were reviewed, in which 20 articles that did not meet the criteria for inclusion, repeated articles, or did not match the questions asked earlier were excluded. Finally, as a result we obtained 45 articles that did meet the inclusion criteria so that they could be reviewed and systematized.

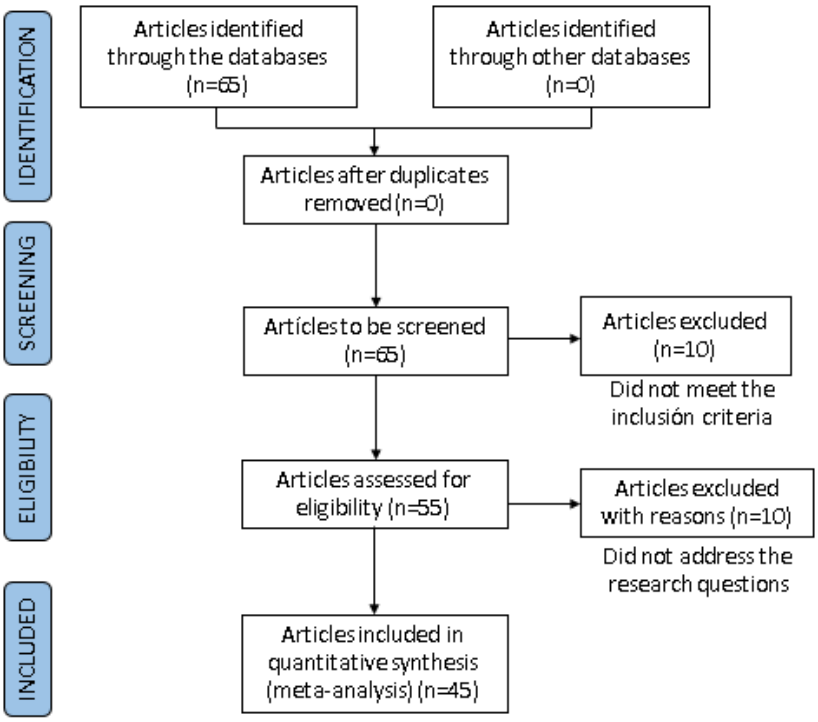

Fig. 2: Prisma Flow Diagram

F. Distribution of the databases found

Fig. 2 shows the number of articles reviewed by percentage according to the database from which they were extracted. It shows that mainly articles from the IEEE and Sciencedirect databases were used.

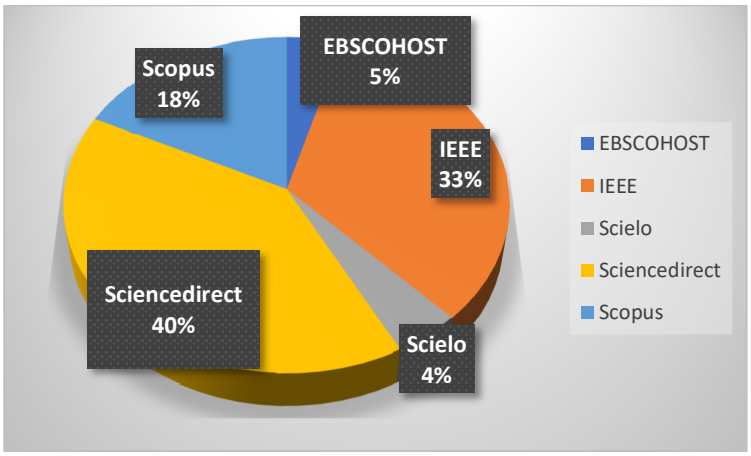

Fig. 3 : Distribution of the databases

G. Number of selected items per year

According to the articles collected, we can see in Fig. 4 the number of articles published during the period between 2013 and 2020, where we see that in 2020 a greater number were published.

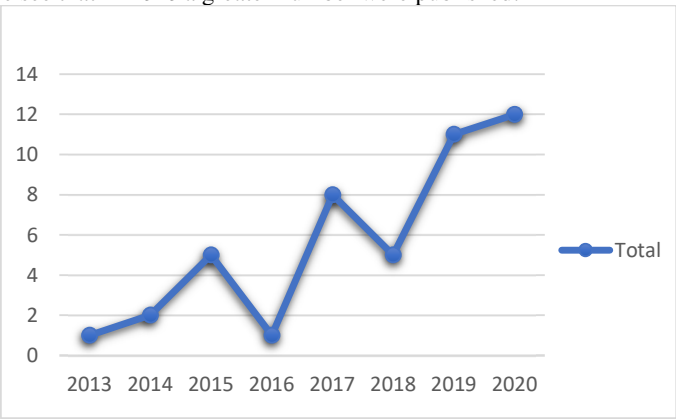

Fig. 4 : Number of items per year

H. Number of articles per year and its database

We identified through the results in Fig. 5 that the IEEE and Sciencedirect databases have a greater range of articles related to the main theme in the years 2019 and 2020.

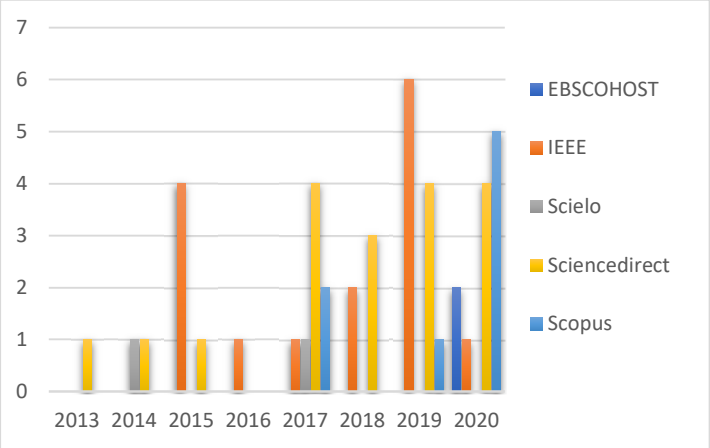

Fig. 5: Number of articles per year and its database

I. Number of items per year and continent

According to Fig. 6, the most predominant items are found in the continents of Asia and Europe between 2019 and 2020.

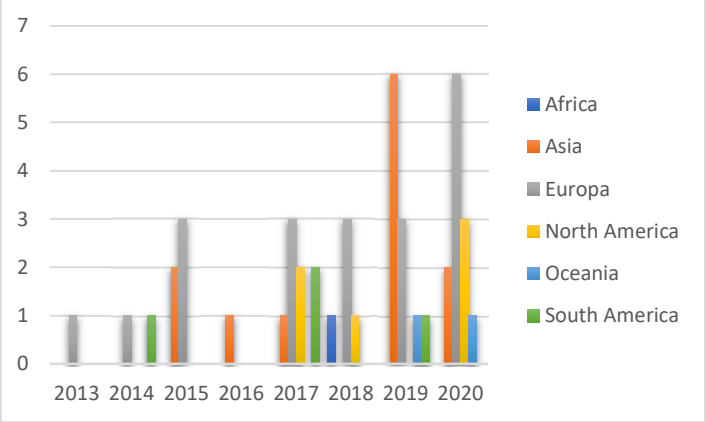

Fig. 6: Number of items per year and continent

J. Number of items per category

In Fig. 7 we see the different percentages according to the categories assigned to the different articles, standing out among them the use of technological tools in animals with 37%.

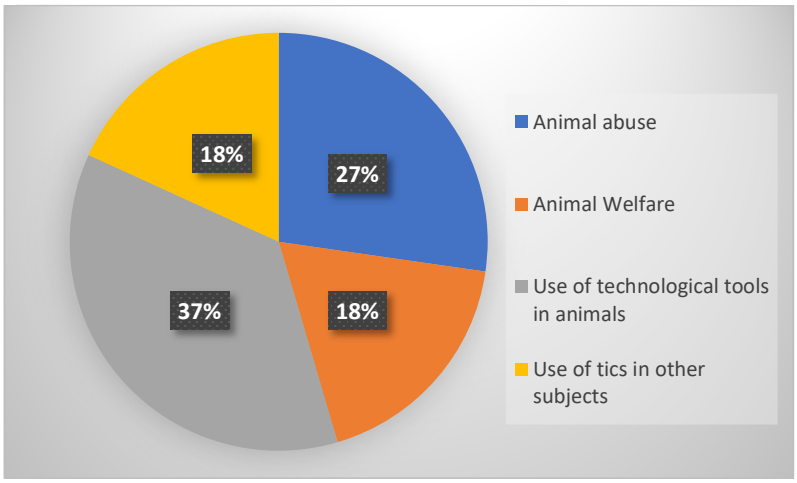

Fig. 7: Number of items per category

K. Number of items per category and continent

The following Fig. 8 details that according to each continent obtained is contrasted with the categories raised in which we see Europe predominating in the use of technological tools in animals.

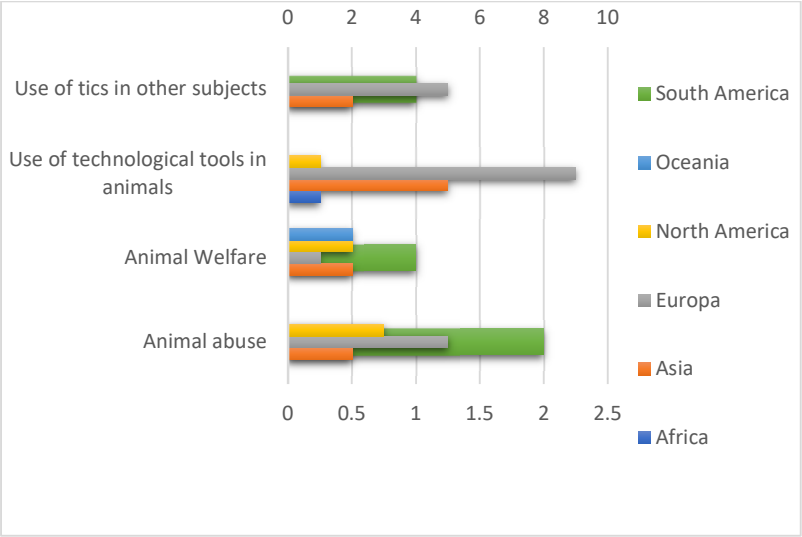

Fig. 8: Number of items per category and continent

In the 45 articles, the following classification is made by categories of each one of them according to the content, it will be reviewed which technological tool was used.

Table 2: Classification by article categories

CATEGORIES	ARTICLES
Animal abuse	(Jaurrieta Ortega, 2019), (Hawkins y Williams, 2020), (Joo, Jung y Chun, 2020), (Newberry, 2017), (Monsalve, Ferreira y Garcia, 2017), (Parfitt y Alleyne, 2018), (Bright *et al.*, 2018), (Chan y Wong, 2019), (Monsalve *et al.*, 2019), (Burchfield, 2020), (Guazzaloca, 2020), (Matijczak *et al.*, 2020), (de Juan García, 2020).
Use of technological tools in animals	(Wada, Yamamoto y Watanabe, 2015), (Demir y Erman, 2018), (Budianto y Yunus, 2017), (Cheng, 2019), (Hammam, Soliman y Hassanein, 2019), (Naik *et al.*, 2020), (Volk *et al.*, 2015), (Oh *et al.*, 2014), (Sierra *et al.*, 2015), (Vimalajeewa *et al.*, 2019), (Krause *et al.*, 2013), (König von Borstel y McGreevy, 2014), (Verhaegen *et al.*, 2018), (Hennessy, Zhang y Bai, 2017), (Tang *et al.*, 2020), (Shanahan *et al.*, 2020)
Use of Tics in other subjects	(Bakieva y Muradkasimova, 2019), (Sun *et al.*, 2019), (Hernández *et al.*, 2014), (Oregi *et al.*, 2015), (Villa-Henriksen *et al.*, 2020), (Yoon, 2017), (Biere Arenas y Arellano Ramos, 2017), (Álvarez-Rodriguez, Bellido-Márquez y Atencia-Barrero, 2019)
Animal Welfare	(Zin *et al.*, 2016), (Olmez y Karaarslan, 2019), (Mitrovic, Milosevic y Greconici, 2019), (Odeón y Romera, 2017), (Neethirajan *et al.*, 2017), (Winter, 2020), (Golicz *et al.*, 2019), (Hammond *et al.*, 2020)

Table 3: Classification of Technological Tools

TECHNOLOGICAL TOOL	ARTICLES
Artificial Intelligence	(Hammam, Soliman y Hassanein, 2019), (Budianto y Yunus, 2017), (Cheng, 2019), (Bakieva y Muradkasimova, 2019), (Hernández *et al.*, 2014), (Yoon, 2017), (Álvarez-Rodriguez, Bellido-Márquez y Atencia-Barrero, 2019)
The Internet of Things	(Villa-Henriksen *et al.*, 2020), (Naik *et al.*, 2020), (Sierra *et al.*, 2015), (König von Borstel y McGreevy, 2014), (Verhaegen *et al.*, 2018), (Hennessy, Zhang y Bai, 2017), (Tang *et al.*, 2020)
Geolocation technology(gps)	(Demir y Erman, 2018), (Krause *et al.*, 2013), (Biere Arenas y Arellano Ramos, 2017)
Applications	(Wada, Yamamoto y Watanabe, 2015), (Sun *et al.*, 2019), (Volk *et al.*, 2015), (Oh *et al.*, 2014), (Vimalajeewa *et al.*, 2019), (Oregi *et al.*, 2015), (Shanahan *et al.*, 2020)

Discussion

This systematic review research sought to determine through different articles which are the information technology tools to prevent animal mistreatment and which of these tools benefit animals the most.

According to the information obtained from Fig. 7 we can ensure that, together, the category Use of technological tools in animals and Use of tics in other subjects add up to a total of 55% of the articles reviewed, giving us a substantial range of tools used in each. In addition, in Fig. 8 we can find that Europe is the continent that makes more use of technological tools in animals, followed by Asia.

RQ1. What are the ICT tools that are used to prevent animal abuse?

According to Table 2 we see the articles corresponding to each revised category. According to Table 3 we can see the technological tools used against animal abuse, being 4 used which are: artificial intelligence, internet of things (IOT), geolocation technology (GPS) and the applications.

RQ2. Which of the technological tools benefits animals the most?

As identified in Table 3 we can realize that there are 3 tools that stand out which are: artificial intelligence, Internet of Things (IOT) and applications. These tools promote in great quantity the decrease and control of the animal mistreatment

Conclusion

This document presents a systematic review of the literature on ti tools to prevent animal abuse that have been used during 2013-2020. As a conclusion, it was obtained that the main tools used to prevent this problem are artificial intelligence, Internet of Things (IOT) and applications, which are very effective and if applied together in new projects against this problem would result in excellent ways to help prevent animal abuse. Besides we can assure that the continents that make more contribution with respect to the topic treated with Europe and Asia. For the next researches the interested parties could focus on the following questions: How could one work with artificial intelligence, Internet of Things (IOT) and applications, all this together in order to provide a better opportunity to decrease animal abuse to a great extent?

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Impact of ICTS On Mathematics Education: A Review of The Scientific Literature Between the Years 2015-2020

Juan Buitron-Luna
Universidad Autónoma del Perú, Lima, Perú, jbuitronl@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

The importance of academic performance is a problem that is seen in many educational institutions, becoming the main problem for students and teachers. ICTs provide us with multiple ways of representing problem situations that allow students to develop problem-solving strategies and better understanding of mathematical concepts that are worked on during an academic session. The present document is a systematic literature review which was systematized 50 documents collected from BD IEEE Xplore, Eric, Microsoft Academic, ScienceDirect, Scielo.

Keywords*:* "ICT", "mathematics education","Augmented Reality", "Learning Process"

Introduction

There are different reasons to affirm that education is key in the development processes of individuals and of the societies in which they live and the incorporation of Information and Communication Technologies (ICT) can contribute to improving access to the educational system and the quality of school results (Abdullah, A. H., 2016).

The objective of mathematics in the first years of schooling is to develop in students abilities that will allow them to function adequately in everyday situations. This initial training can condition their job opportunities and monetary income during adulthood (Aguirre, A. M. G., 2018).

ICTs have a great contribution to the pedagogical approaches to education, which try to take advantage of every last interactive, didactic and innovative resource that it offers to the learning of students. (Arguedas-Méndez, S. M., 2016). Learning with TICS methods helps students to be able to explore content without having to be in class or at home, at the time and in the order that interests them the most. This combination allows students to convert any place as a learning setting (Arnaldo, F., 2019).

The use of information technology has not reached all institutions, it can be said that there are few, organizations that have risked implementing this new strategy in their student processes (Ávila, C. M. V., 2019).

Methodology

A. Type of study

The systematic review of the scientific literature defined in the PRISMA guide (Prefered Reporting Items for Systematic Review and Meta-analyzes) will be used.

B. Research Question

The proposed research questions were as follows:

RQ1: What is the impact generated by the use of ICT in mathematics education?

RQ2: What ICTs are used in mathematics education?

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C. Search strategies.

In order to provide an answer to our research questions, a search was made for scientific articles from the following databases: IEEE Xplore, Eric, Microsoft Academic, ScienceDirect, and Scielo, where 50 documents were collected considering the period 2015 - 2020.

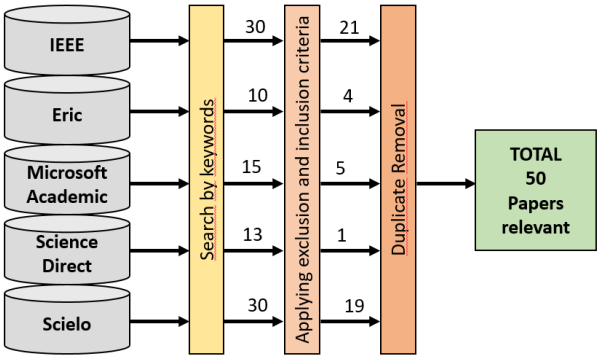

Figure 1. Study database

D. Inclusion and exclusion criteria

In the studies, the inclusion and exclusion criteria were applied to be able to filter the articles according to each defined criterion.

TABLE 1. INCLUSION AND EXCLUSION CRITERIA

Research Criteria		
Inclusion	I1	Articles related to the use of ICTs in mathematics education
	I2	Articles published from 2015 to 2020
	I3	Articles published in Latin America, USA and Europe
Exclusion	E1	Articles that do not meet the research line.
	E2	Similar articles in various databases.
	E3	The search results were not scientific articles

Results

The results of the investigations are oriented to the findings of the investigations. The analysis process that was carried out was as follows.

A. Articles extracted and analyzed

Based on the results of the research, they revolve around the research findings, the scientific journals, and their stratification by names and year. The analysis process that was carried out was as follows.

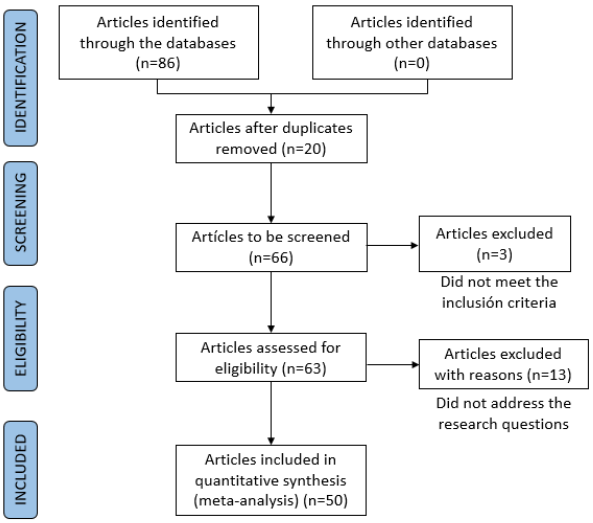

Figure 2. Items extracted

The 50 selected articles met the established inclusion criteria. Now we will carry out the final count of articles per database:

TABLE 2. RESULTS FOUND IN EACH DATABASE

No.	Database	No. of items
1	IEEE Xplore	30
2	Eric	15
3	Microsoft Academic	20
4	ScienceDirect	13
5	Scielo	18

B. Distribution of articles by year

The following figure shows from the base obtained, the number of articles since 2015 according to the source of origin. Demonstrating that the most used article sources for research were obtained from the years 2015, 2017 and 2018.

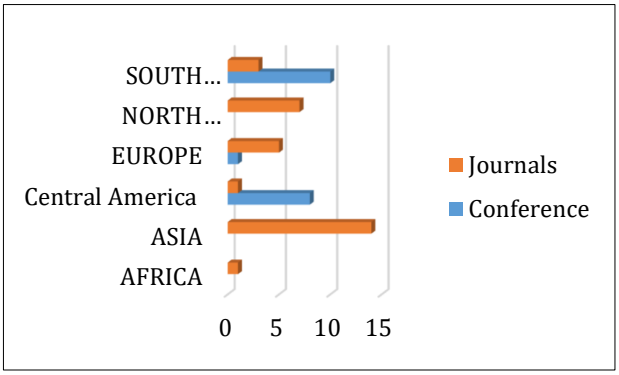

Figure 3. Number of articles per year

C. Distribution of publications by continents

The graph below shows the number of publications that were made according to the continent of origin. Where you can see SOUTH AMERICA and ASIA above the rest of the continents.

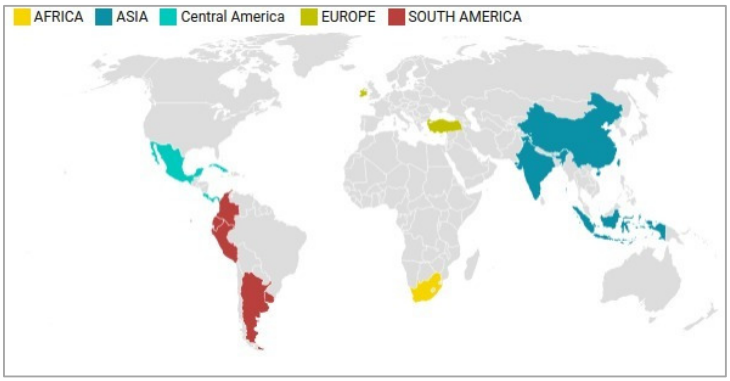

Figure 4. Publications by continents

D. Publication type by continent

The following figure shows us the type of publication that was made according to the continent of origin. Where it is appreciated with superiority that Journals is the type of publication that is being used the most in research.

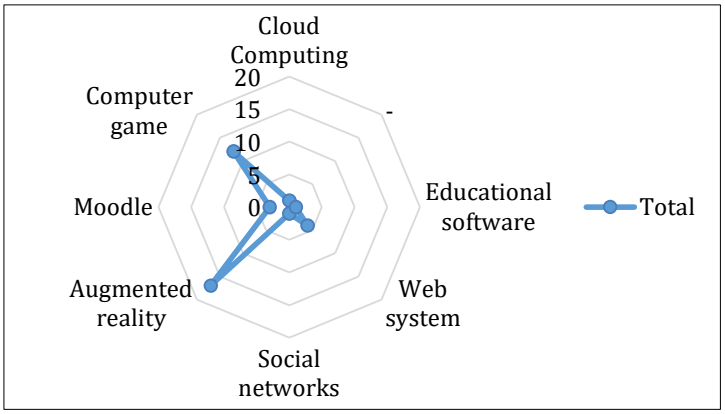

Figure 5. Publication by continent

E. Most used font

The following figure shows us the percentage of sources used in the research, with IEE XPLORE with 42% being the most used source followed by Scielo with 48%.

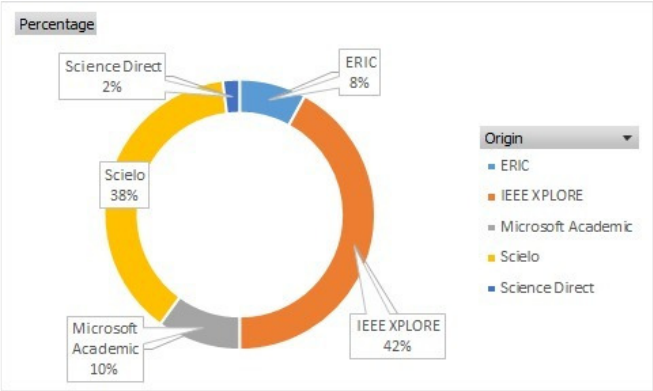

Figure 6. Most used font

F. Classification of articles according to technology.

In this table we can see the list of categories and in which articles we can see it.

TABLE 3. RESULTS FOUND IN EACH DATABASE

Analyzed Technology	Articles
Social networks	(Qi, L, 2017)
Augmented reality	(Ávila, C., 2019), (Brito, M., 2019), (Chen, H., 2015), (Fernández-Abella, R, 2019), (Abdullah, A., 2016), (Mann, M. D, 2017), (Nagaraju, K, 2015), (Paris, E., 2015), (Roberto, P., 2015), (Reinante, Y., 2016), (Reséndiz-Balderas, E., 2020), (Rueda, R., 2018)
Moodlee	(Arguedas-Méndez, S., 2016),(Frade, B., 2015), (Liu, R., 2018)
Computer game	(Abdullah, A., 2016.), (Cahyono, B., 2018), (Cortés, J., 2016), (Giubergia, M., 2017), (González, L., 2018), (Han, S., 2015), (Harris, J. L., 2016), (Hartono, M., 2017), (Hernandez, R., 2017), (Kukey, E., 2019), (Li, Q., 2015), (Sun, Y., 2017), (Szabo, P., 2018), (Téliz, F., 2015), (Triana-Muñoz, M., 2016), (Vasanti, G., 2015), (Venter, M., 2015), (Vértiz-Osores, R., 2019)
Cloud Computing	(Bhatti, A., 2017)
Educational software	(Moeck, P., 2019)
Web system	(Mota, L. F., 2017), (Muñoz, M., 2019, (Sergey Pozdnyakov, A., 2018) (Steegman, A., 2016)

G. Study of the technologies analyzed

The following graph shows the percentage of technologies analyzed in the research obtained on the topic of ICT as an impact on mathematics education. This figure allows us to know the most influential technology for research, being then, Augmented Reality and Computer Games, the technologies that generate the most impact in mathematics education.

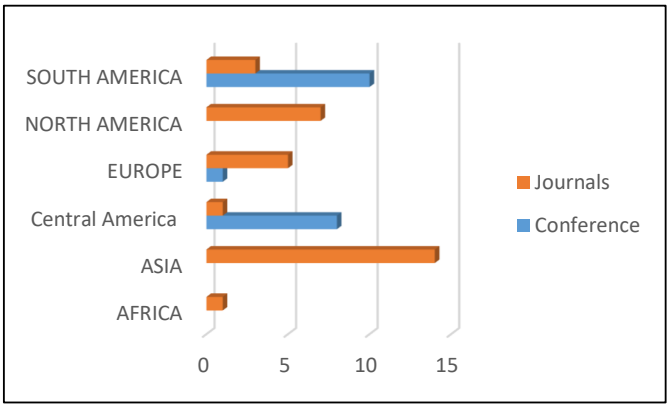

Figure 7. Technology analyzed

H. Study of the impact of ICTs in mathematics education

TABLE 4: CATEGORIZATION OF THE STUDY OF THE IMPACT OF ICT IN MATHEMATICS EDUCATION.

Impact of TICS on mathematics education	
Impact of ICT in primary education	(Ávila, C., 2019), (Brito, M., 2019), (Chen, H., 2015), (Fernández-Abella, R., 2019), (Abdullah, A., 2016), (Lynch, T., 2017), (Mota, L. F., 2017), (Muñoz, M., 2019), (París, E., 2015), (Qi, L., 2017), (Roberto, P. 2015), (Reinante, Y., 2016)
Impact of ICT in secondary education	(Hartono, M., 2017), (Kukey, E., 2019), (Steegman, A., 2016), (Triana-Muñoz, M., 2016), (Vasanti, G., 2015), (Venter, M., 2015)
Impact of ICT on higher education	(Moeck, P., 2019), (Nagaraju, K., 2015), (París, E., 2015), (Roberto, P. 2015)
Impact of ICTs on teachers	(Cortés, J., 2016), (Escueta, M., 2017), (Kukey, E., 2019), (Lynch, T., 2017), (Mantri, A., 2019)

The table shows us some impacts of ICTs where we classify the articles according to the content of reference, 12 articles in primary education, 6 articles in secondary education, 4 articles in higher education and 5 articles that reflect the impact of ICTs on teachers.

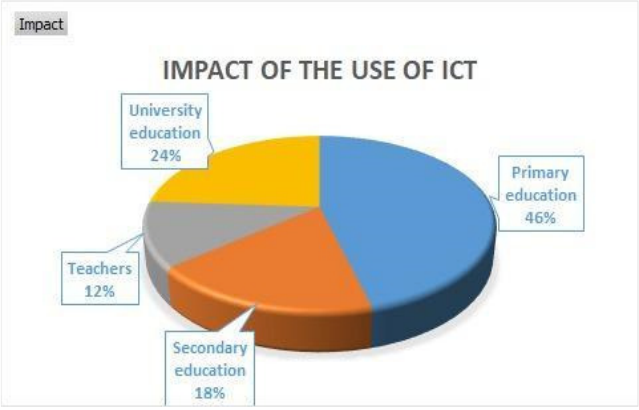

Figure 8. Impact of the use if ICT

These articles argue that ICTs in mathematics education generate a positive impact, significantly improving learning and academic performance, even the use of new technologies helps the teacher in the progress of their students.

Discussion

In this investigation of the systematic review, the study of which would be the best technologies and strategies to use as support in mathematics education and, in addition, the impact that these technologies generate on students was determined.

According to the literature review, The present shows us that access to ICT is an important requirement to participate in a technological society. The adoption of ICT in the medium, as access and continuity, will have as a starting point, breaking with the digital gaps, of a society that still does not comply with the dynamism of adaptation. The teaching-learning process in the classroom, making use of ICT, requires a set of competencies that the teacher must acquire with the logic of adding a methodology capable of taking advantage of technological tools, where teacher training should be considered one of the first options before facing new educational challenges.

As indicated in Figure 7, a greater scope of the analyzed technology can be appreciated where augmented reality and computer games are the topics of most interest when using ICTs as an aid in the teaching-learning process within a classroom.

As can be seen in Table 4, it shows us the impact that ICTs generate on the educational scale where primary-level students have a greater interest in participating and learning about technology, achieving better academic performance, likewise ICTs help the teacher in the student progress.

Conclusion

This research demonstrates the importance and impact of ICT in mathematics education. Since, reviewing the literature obtained from 50 articles since 2015, we can show that no matter the circumstance or place where an analysis was carried out on the impact of ICT in education, it is always favored by methodologies related to technology.
We also conclude that the best technology to promote learning are tools related to Augmented Reality together with computer games since they provide a higher level of interest in the student when learning. These presented results will serve for future related research.

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Trends in Smart City Service Initiatives – A Systematic Literature Review From 2014-2020

Luis Cabanillas-Carbonell
Universidad San Martin de Porres, Lima, Perú, luis568@gmail.com

Michael Cabanillas-Carbonell
Universidad Politécnica de Madrid, Madrid, España, mcabanillas@ieee.org

Abstract

In recent years the Smart city model has been defined as an immediate solution to the problems facing a city, however, the problems a city faces are different according to its socio-cultural level, economy and geographical location. In this document a systematic review of the literature was carried out, of the initiatives regarding the services of the Smart city model towards the citizen; using the Prisma methodology we approached this bibliography considering scientific articles between the years 2014 to 2020 from the IEEE Xplore, Scopus, Science Direct and Ebshost databases, having as object of study 155 articles and obtaining as result the categorization in Domains of Services, location and study of the main initiatives of services of the model Smart city for 46 countries, as well as, which continents have more developed each one of the initiatives based on their particular problematic.

Keywords: Smart city, systematic literature review, services, Prisma.

Introduction

Urban growth and global overpopulation are the current problem facing all cities worldwide, in 2050 almost 70% of people will live in cities (Cities, no date), (Clohessy, Acton and Morgan, 2014); urbanization leaves aside open spaces and brings the problem of managing a process of transformation to not only meet the needs of citizens, but also to effectively carry out this process with clear indicators to measure management, sustainability and continuous improvement. The Smart City was born in the 90's (Aljowder, Ali and Kurnia, 2019), (Hernandes, Pellenz and Calsavara, 2018) and has been developed with several hypotheses and definitions, especially in the last years as a methodology or framework to solve this inconvenience, both in the public and private sector (Sundari et al., 2019), (Julieta Cedillo-Elias et al., 2019). However, there is no single definition or single method to implement it, we have ISO norms and international standards, but they all fall into one of these 3 categories:

Table 1: Categories of Smart City Initiatives (Heaton and Parlikad, 2019)

Strategic	It establishes strategies, plans and objectives, provides a high-level framework.
Processes	Supports the development of a framework to aid interoperability with data standardization and categorization.
Technical	Technical support and guidance on the development of the digital infrastructure including protocol and sensors.

Likewise, there is a contradiction in terms of its implementation between the less developed and more overpopulated countries and the more developed countries with smaller populations (Neirotti et al., 2014); it is the latter that have more initiatives on the Smart City model (Organização das Nações Unidas, 2018).

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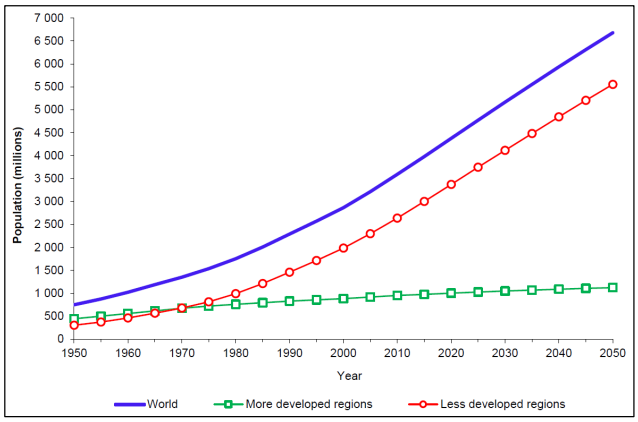

Figure 1. Estimated and projected urban populations of the world, the more developed regions(Organização das Nações Unidas, 2018)

The most accepted definition for a Smart city means using the ICT infrastructure to efficiently and sustainably manage the city's resources and citizen services (Kazmi, Serrano and Lenis, 2019). As we know there are several models around the Smart city, however the most used dimensions are 6: People, Government, economy, mobility, environment and living (Hirtranusi et al., 2019)(Anthopoulos, Janssen and Weerakkody, 2015), (Aljowder, Ali and Kurnia, 2019), it is the responsibility of political leaders to choose and implement it. For this research paper we will also use the categorization in 3 service domains: Smart Economy, Smart Society, Smart Environment that a citizen receives.

Within each Smart city Service Domain, Smart city service initiatives are classified.

Table 2: Smart City Services Domain (Firmansyah *et al.*, 2017), (Tay *et al.*, 2018)

Smart Economy	Industry, Economy, Payment and Banking, Small Business, Startup, Tourism, Mobility, Commerce
Smart Society	Safe and Security, Health, Government, Education, Smart Generation, Open Data
Smart Environment	Energy, Environment, Water, Solid Waste, Region management

Within the Smart Cities model there are 3 facilitators: ICTs, which are the technological support, People, with their education and acceptance of change, and Government through governance (Alawadhi and Scholl, 2016), (Lopes, 2018) to implement holistic, transparent and sustainable policies.

Finally, this document aims to review the literature on the methodology of a Smart city, locate and catalog the service initiatives that have been developed in different parts of the world and in turn enrich knowledge about the Smart city with the various previous research worldwide. The methodological aim is to contribute to policy makers' leaders in their location and suitability with respect to the development of these services.

Methodology

This document is based on the systematic literature review approach, in accordance with the framework defined by B. Kitchenham (Kitchenham, 2004) to recapitulate the various Smart City initiatives. It consists of three phases: planning, implementation, and reporting.

A. Stage1: Planning

Two research questions have been formulated to begin research based on the adoption of Smart City initiatives and the geographic context where they are located and/or developed.
The questions asked are written below:
RQ1. ¿ What are the main Smart city service initiatives?
RQ2. ¿ Where these Smart City service initiatives are most developed?

B. Stage 2: Executing

The automated search was carried out within scientific databases containing more relevant references on the subject of the research. The main sources are Scopus, ScienceDirect, EBSHOST, and IEEE Xplore.

For this purpose, we use the following search string: "smart city" or "smart cities" and "services" and "model"; furthermore, we have limited the publication years from 2014 to 2020.

The search was carried out between June and August 2020. The filters were applied only to the titles of the articles in order to make it more relevant and detailed on the subject of this research. This resulted in 1086 documents. A high volume due to the recent growth around the Smart city context. Next, we filtered the non-service publications that agree and classified them in Table II, also the duplicates were removed and the results are according to their relevance and agreement with the topic, finally we started with the reading of the titles and summaries of the remaining interesting articles. Finally, there are 155 articles published.

Table 3: Inclusion / Exclusion Criteria

Inclusion	I01	Articles related to services smart city.
	I02	Articles published from 2014 to 2020.
	I03	Articles written in English and Spanish.
	I04	You can download the full version of the document
Exclusion	E01	Articles not related to services smart city
	E02	Articles after 5 years of research.
	E03	Articles written in a language other than English or Spanish.

C. Stage 3: Reporting

Of the 155 articles chosen for this research most of 75% are from the BD IEEE XPLORE, since we have unrestricted access as members of this organization, followed by 11% of Scopus, 8% of EBSHOST and finally 6% of Scient Direct.

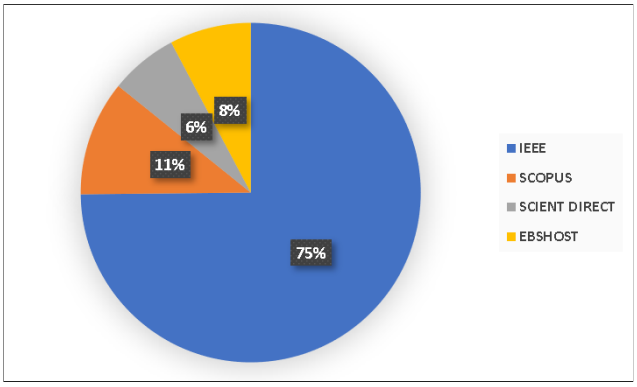

Figure 2: Investigations analyzed according to database

Throughout the research process, the Mendeley desktop tool was used to read, sort, classify and remove duplicates, as well as an Excel database to make the tables and graphs.

Results and Discussion

For the systematic literature review (SRL) phases of this document, we use the PRISMA 2009 flowchart method (Preferred Reporting Items for Systematic Reviews and Meta-Analysis), which is a minimal set of evidence-based elements that helps the researcher to make transparent his/her research on a wide range of systematic reviews and meta-analyses described in Figure 3.

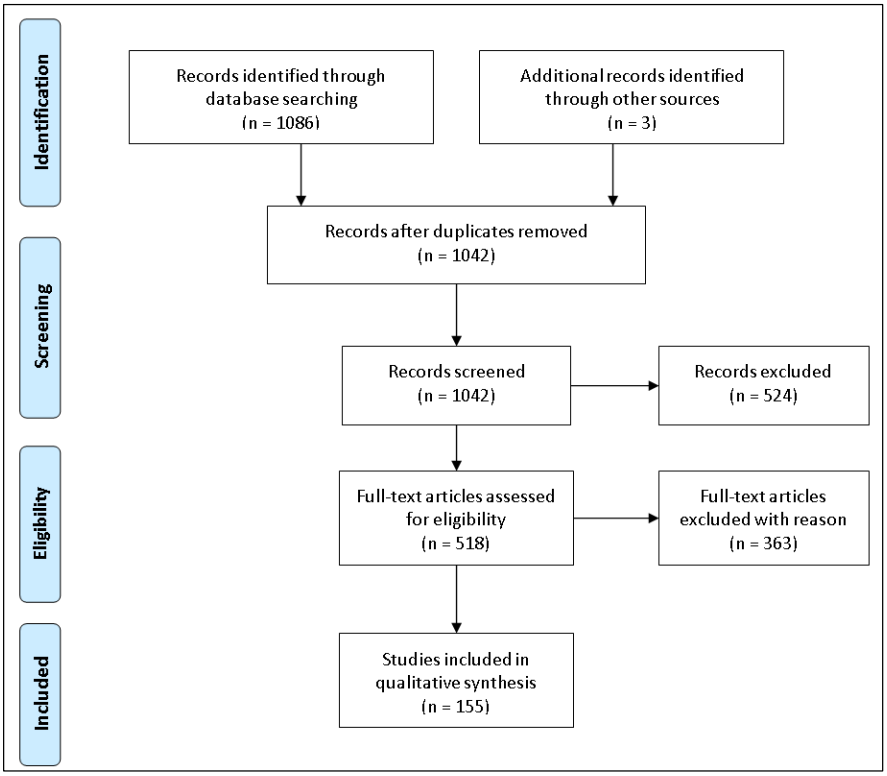

Figure 3: Prisma Flow Diagram(Bonfill, 2011)

From the selected documents we answer the questions formulated in section II of this research.

1) Number and demographics of the selected documents

Asia with 46% has the highest number of publications on the service initiatives provided by the Smart city model, Table 4.

The global trend is represented in Figure 4, the graph shows the positive trend in the number of documents from 2014 to 2018 but by 2019 you can see a slight decrease and by June 2020 there are still very low number of articles published yet, is understood as one of the main causes of the pandemic of COVID 19.

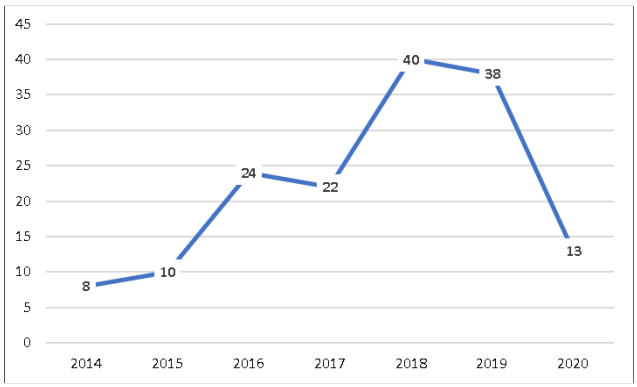

Figure 4 : Numbers of documents per year of publication (Bonfill, 2011)

Table 4: Number of Documents Analyzed by Continent

ASIA	46%
EUROPA	38%
AMERICA	13%
AFRICA	3%

In 2014 and 2015 the greatest number of documents are in the European continent. In 2016 there is a tie for both continents and in 2017 the greatest number of documents published are in the Asian continent with 12 publications against 9, In 2018 the Asian continent is in first place with 20 publications and in second place Europe, however, by 2019 we can see a slight decrease in publications from 20 to 18 in Asia and from 13 to 11 in Europe, on the other hand we can see that in the American continent for the years 2017 to 2019 the trend is upwards from 1 to 9 publications. Fig 5.

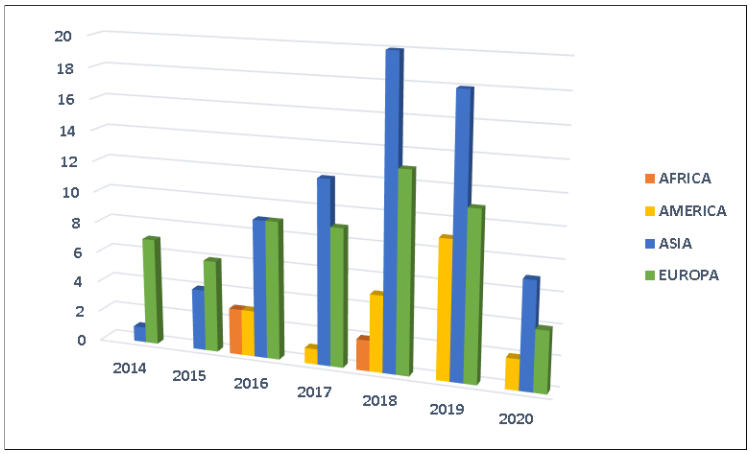

Figure 5: Number of documents per year and continent

2) Smart city services domains

Of the 155 selected Smart city service initiative documents, they have been classified into the 3 major service domains: Smart Economia, Smart Environment and Smart Society.

Table 5: Classification of Documents in Service Domain

Smart Economy	(Ji *et al.*, 2014) (Vagnoli *et al.*, 2014) (Pla-Castells *et al.*, 2015) (Farkas *et al.*, 2015) (Bouali *et al.*, 2015) (Belhajem, Ben Maissa and Tamtaoui, 2016) (Salvi, Tufo and Natale, 2016) (Soliman and Elsaadany, 2016) (Malagund, Mahalank and Banakar, 2016) (Mohamad Mezher and Aguilar Igartua, 2017) (D'Silva *et al.*, 2017) (Makarova *et al.*, 2017) (Mallus *et al.*, 2017) (Mangiaracina *et al.*, 2017) (Horažďovský and Svítek, 2017) (Casino *et al.*, 2017) (Araújo *et al.*, 2017) (Chen and Englund, 2017) (Vakula and Kolli, 2018) (Kanteti, Srikar and Ramesh, 2018) (Lazaroiu *et al.*, 2018) (Satyakrishna, 2018) (Kalašová, Kristián and Kubíková, 2018) (Sotres *et al.*, 2018) (Liao *et al.*, 2018) (Igihe.com, 2018) (Chang and Chang, 2018) (Raja *et al.*, 2018) (Chiariotti *et al.*, 2018) (Dhatrak and Gandhe, 2018) (Ibrahim, Driss and Rachid, 2018) (Lin *et al.*, 2018) (Zenkert *et al.*, 2018) (Malik, Shah and Khattak, 2018) (Tan and Leon-Garcia, 2019) (Khattak *et al.*, 2019) (Rizvi, Zehra and Olariu, 2019) (Choi *et al.*, 2019) (Casillas Mora, Ochoa Ruiz and Aguilar Lobo, 2019) (Al-Shariff *et al.*, 2019) (Herrera-Quintero *et al.*, 2019) (Liao *et al.*, 2019) (Garcia-Perez *et al.*, 2020)
Smart Environment	(Menniti *et al.*, 2014) (Zeiger and Huber, 2014) (Delfanti *et al.*, 2015) (Imteaj, Chowdhury and Mahamud, 2015) (Yusoff *et al.*, 2015) (Ceuca

	and Corsiuc, 2015) (Wen *et al.*, 2016) (Idwan, Zubairi and Mahmood, 2016) (Jokinen, Latvala and Lastra, 2016) (Saputra, Supangkat and Iqbal, 2018) (Sikder *et al.*, 2018) (Mohamed, Al-Jaroodi and Jawhar, 2018) (Gambin *et al.*, 2018) (Ravi and Jawahar, 2018) (Chaudhari and Bhole, 2018) (Duangsuwan *et al.*, 2018) (Faheem *et al.*, 2019) (Bingol, Kuzlu and Pipattanasompom, 2019) (Mahesa, Yudoko and Anggoro, 2019) (Shelestov *et al.*, 2019) (Bran *et al.*, 2020) (Kim *et al.*, 2020) (D'Alpaos and Andreolli, 2020) (Dos Reis, Tonkoski and Hansen, 2020) (Yoon *et al.*, 2020) (Jovanovska and Davcev, 2020)
Smart Society	(Clohessy, Acton and Morgan, 2014) (Mirri *et al.*, 2014) (Ghafoor, 2014) (Tei and Gurgen, 2014) (Lin *et al.*, 2015) (Djahel *et al.*, 2015) (Lijing, Yanrong and Jianhua, 2015) (Priano and Guerra, 2016) (Effendi *et al.*, 2016) (Srinivasan, 2016) (Deng and Zhou, 2016) (De Filippi *et al.*, 2016) (Bork *et al.*, 2016) (Seeliger *et al.*, 2016) (Benfares, El Bouzekri El Idrissi and Amine, 2016) (Ahlgren, Hidell and Ngai, 2016) (Javidroozi *et al.*, 2016) (Gascó, Rosenthal-Sabroux and Negre, 2016) (Ahn *et al.*, 2016) (Gongora and Bernal, 2016) (Samani and Zhu, 2016) (Alawadhi and Scholl, 2016) (Navidi and Hashemi, 2016) (Yang and Huang, 2016) (Firmansyah *et al.*, 2017) (Terán Tamayo *et al.*, 2017) (Alghanim, Rahman and Hossain, 2017) (Sajjad *et al.*, 2017) (Mishbah, Sensuse and Noprisson, 2017) (Khatoun and Zeadally, 2017) (Bryant *et al.*, 2017) (Islam *et al.*, 2017) (Malik and Shah, 2017) (Lohokare *et al.*, 2017) (Anthopoulos, 2017) (Torrinha and Machado, 2017) (Postranecky and Svitek, 2017) (Ruhlandt, 2018) (Hayar and Betis, 2018) (Lopes, 2018) (Fuchao, 2018) (Amer *et al.*, 2018) (Hernandes, Pellenz and Calsavara, 2018) (Quero *et al.*, 2018) (Sarabia-Jacome *et al.*, 2018) (Kesswani and Kumar, 2018) (Tay *et al.*, 2018) (Goldberg and Zhang, 2018) (Kazi *et al.*, 2018) (Muhammed *et al.*, 2018) (Achmad *et al.*, 2018) (Maria De Fuentes *et al.*, 2018) (Wibowo, 2018) (Mehta *et al.*, 2018) (Mohsin, Ali and AlKaabi, 2019) (Lou *et al.*, 2019) (Kazmi, Serrano and Lenis, 2019) (Mardones, Reyes-Chamorro and Chandia, 2019) (Lee, Kim and Seo, 2019) (Shetty *et al.*, 2019) (Sundari *et al.*, 2019) (Camboim, Zawislak and Pufal, 2019) (Keshvardoost *et al.*, 2019) (Hirtranusi *et al.*, 2019) (Qiu *et al.*, 2019) (Heaton and Parlikad, 2019) (Sundaravadivel *et al.*, 2019) (Seidi, Eshghi and Kelarestaghi, 2019) (Yuan *et al.*, 2019) (Yadav *et al.*, 2019) (Abbasi-Moud, Vahdat-Nejad and Mansoor, 2019) (Larasati, Handayaningsih and Sumarsono, 2019) (Bouzguenda, Alalouch and Fava, 2019) (Lim, Edelenbos and Gianoli, 2019) (Anagnostopoulos, Ntalianis and Tsapatsoulis, 2019) (Jiang, Geertman and Witte, 2019) (Julieta Cedillo-Elias *et al.*, 2019) (Aljowder, Ali and Kurnia, 2019) (Dobre and Marcu, 2019) (Dattana, Gupta and Kush, 2019) (Samarakkody, Bandara Dilum and Kulatunga, 2020) (Fang *et al.*, 2020) (Romero *et al.*, 2020) (Rani *et al.*, 2020) (Adiyarta *et al.*, 2020) (Tan and Taeihagh, 2020)

Figure 6 shows that 56% of service initiatives are in the Smart Society domain, 27% in the Smart Economy domain and 17% in the Smart Environment domain.

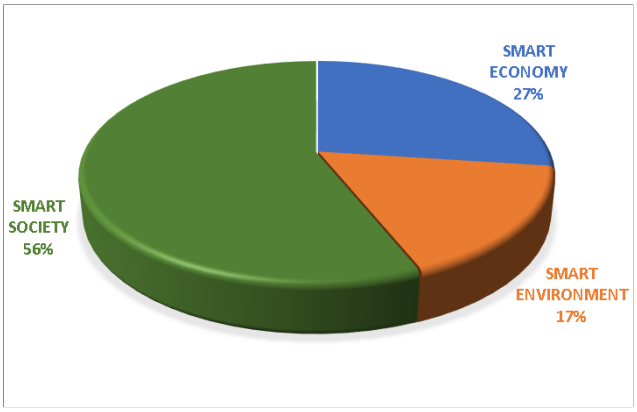

Figure 6: Percentage of documents by Service Domain

Likewise, when analyzing according to the continent where the publications originate, Europe, Asia, America and Africa are developing more initiatives of the domain Smart Society, which is an indicator that globally the service initiatives Smart city are oriented to solve the problems of Safe and Security, Health, Government, Education, Smart Generation, Open Data in second place we see the domain Smart Economy (Industry, Economy, Payment and Banking, Small Business, Startup, Tourism, Mobility, Commerce), finally the domain Smart Environment (Energy, Environment, Water, Solid Waste, Region management). Fig7.

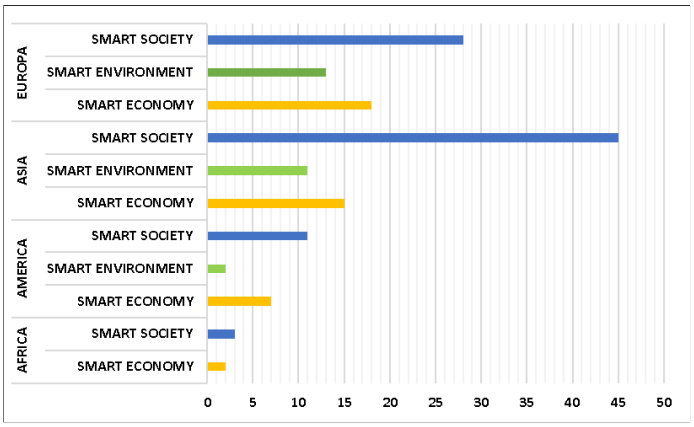

Figure 7 : Number of documents per Domain Service and Continent

3) Smart city service initiatives

Smart city service initiatives are oriented to the service of the citizen or the conservation of the environment, which in the end is also a service to the citizen. The most developed Smart city service initiatives within the documents analyzed is Mobility (Herrera-Quintero et al., 2019), (Farkas et al., 2015), which consists of various services implemented and/or projects such as intelligent traffic, intelligent parking (Ji et al., 2014) and switching to renewable energy vehicles (Ibrahim, Driss and Rachid, 2018)

In second place are the models and/or frameworks that serve as a guide to implement a Smart city (Javidroozi et al., 2016); (Daneva and Lazarov, 2018) third place are the Health smart service initiatives (Lohokare et al., 2017) with projects such as cloud-based patient monitoring and predictive diagnostics (Yusoff et al., 2015); followed by Energy and Government, in last place we can find the Education and People initiatives.

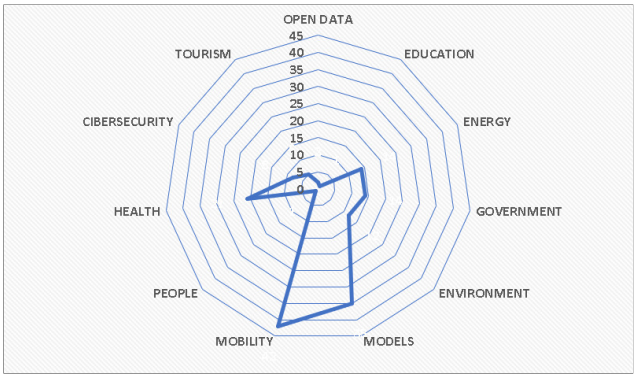

Figure 8: Number of documents by Smart city initiatives

The Asian continent shows a greater number of developments in service initiatives for models and / or frameworks of Smart city, which gives us an important indicator for the implementation of the same, another service initiative with more developments is Health also with great importance for the Asian continent.

The mobility service has greater importance for the European continent, to solve problems of urban transport, environmental pollution and vehicle congestion, this is another good indicator if we want to implement these initiatives, followed by the initiatives of Energy (Dos Reis, Tonkoski and Hansen, 2020), (Faheem et al., 2019) for the management of renewable energy, controlled and predictive energy consumption.

On the American continent there are few well-defined service initiatives we can rescue those of Mobility and Health. Fig 9.

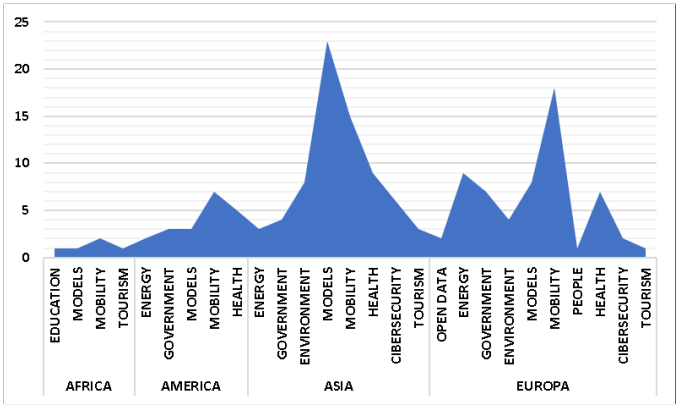

Figure 9: Number of documents service initiative and continent

The country with the most research on Smart City service initiatives is India with 11%, followed by Italy with 8%, China with 7%, and Indonesia in fourth place with 6.45%.

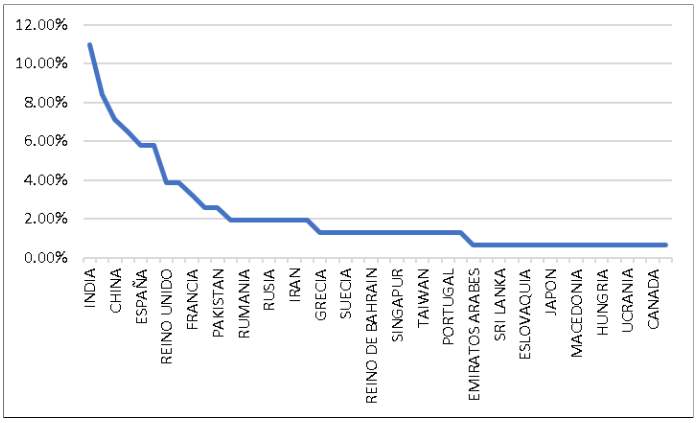

Figure10: Number of documents by country

When analyzing in more detail we find that the Mobility service initiative has more research in India with 7 publications, the largest development of models or frameworks of Smart city has Indonesia with 6 publications, Energy, Italy with 4 publications, Health, United States with 4 publications, this provides a clear and important idea about which countries developed or have more projects in terms of each initiative and what models we should make an analysis when adopting any Smart city project.

Table 4 shows a summary of the countries and number of developments in a service initiative.

Table 6: Numbers of Initiatives Smart city for Country's

INDIA	**17**
MOBILITY	7
MODELS	3
GOVERNMENT	2
CIBERSECURITY	2
ENVIRONMENT	2
HEALTH	1
ITALIA	**13**
MOBILITY	6
ENERGY	4
ENVIRONMENT	1
OPEN DATA	1
GOVERNMENT	1
CHINA	**11**
MODELS	3
CIBERSECURITY	2
MOBILITY	2
TURISMO	1
GOVERNMENT	1
ENERGY	1
HEALTH	1
INDONESIA	**10**
MODELS	6
ENVIRONMENT	2
CIBERSECURITY	1

GOVERNMENT	1
ESPAÑA	**9**
MOBILITY	4
HEALTH	3
MODELS	2
USA	**9**
HEALTH	4
ENERGY	2
GOVERNMENT	2
MOBILITY	1
REINO UNIDO	**6**
MODELS	2
CIBERSECURITY	1
HEALTH	1
GOVERNMENT	1
MOBILITY	1
COREA DEL SUR	**6**
ENERGY	2
HEALTH	1
CIBERSECURITY	1
MODELS	1
MOBILITY	1
FRANCIA	**5**
PEOPLE	1
GOVERNMENT	1
CIBERSECURITY	1
MODELS	1
MOBILITY	1

Conclusions

This research presents a systematic review of the literature on service initiatives in a Smart city model, finally we will proceed to answer the research questions:

RQ1. What are the main Smart city service initiatives; we have found that the main Smart city service initiatives are Mobility, Models, Health, Energy; leaving aside the Environment initiatives, we recommend that greater attention be paid to the problem of the environment, recycling and waste management, which makes the Smart city model sustainable.

RQ2. Where are these Smart city service initiatives more developed; the development of the Smart city service initiatives has been increasing however in the last year 2019 we have seen a stagnation in the number of publications, the continent with the highest number of investigations is ASIA, with the domain of Smart Society service, within this we can see that the most developed and researched service initiative is Mobility, and the countries with more publications are India and Italy; then follows Smart city Models or Frameworks in Indonesia.

Finally, it is important to understand that in order to start any Smart City service project, several examples must be studied and even then, adaptations must be made according to the reality where they will be implemented

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Value Perception of Private Educational Institutions' Students on Co-Taught Virtual Entrepreneurship Courses

Khan RAHATULLAH Muhammad

Effat University; Jeddah; Saudi Arabia
mkhan@effatuniversity.edu.sa

Abstract

Concrete and widely available evidence for effectiveness of virtual co-taught classrooms from most important stakeholder i.e. the student is lacking. It is the student who receives the education the way policy makers' desire. However, this paper provides an insight into student stand point on such courses. This paper provides student perception on the effectiveness of virtual co-taught courses from pedagogical and diverse angles to help faculty and policy makers. The study is based on quantitative survey carried on www.surveymonkey.net and the analysis using the SPSS and MSexcel of 55 participating students in a co-taught course delivered over one semester at two institutions in USA and Saudi Arabia. The students were asked the questions related to existing pedagogy, role of technology in education, co-teaching over internet and others. It was designed to understand the benefits, challenges and future role of such courses from student perspective. Results show virtual classrooms co-taught by instructors from diverse cultural backgrounds, locations, expertise and approaches is indeed a success. Virtual classrooms will stay and define our future teaching pedagogy and learning.

Keywords: Virtual teaching; Student perception; Co-teaching.

Introduction

How can we teach students if we do not know how they learn and their understanding of effectiveness of the teaching strategies and pedagogies we apply to help them learn, improve, be a better person and contributor to the society. It is the learner who is, for the most part, in charge of what he/she learns. Our job as academics and planners is to keep innovating strategies aimed at maximizing the learning experience of the students.

Use of Internet in teaching is common and widely acceptable and practiced. However, co-teaching in a virtual class room to students of two different institutions is new. We also do not have concrete and usually available evidence for its effectiveness from the most important stakeholder i.e. the student. This study aimed to understand efficacy of strategies employed in two courses co-taught virtually in a Saudi (Effat University and US (Hope College) Institution. The course taught was "Inter Cultural Communications at junior and sophomore levels for undergraduate degree in business. Both the institutions are members of the Global Liberal Arts Alliance (GLAA). The co-taught courses are announced and coordinated by the GLAA.

The two instructors from these institutions exchanged the syllabi and made minor adjustments in the study and teaching plans to fit requirements students from both institutions. The details of the students' performance and brief profile were exchanged. The course was taught over the use of internet through skype sessions. Each week 2 sessions of 1 hour each were held. Each session led by instructor of respective institutions.

The students were distributed in mixed groups where they carried out assignments together and presented virtually by the group. The course topics were equally divided among the faculty who delivered teaching during their respective sessions. The course coordination was carried out by the instructors. Student questions were answered mostly by both the instructors during the live skype video calls.

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The results show that virtual class rooms co-taught by the two instructors from diverse cultural backgrounds, locations, expertise and approaches are indeed a great success. These classrooms are here to stay and define our teaching pedagogy and learning in the 21st century. This study will set a path and help guide strategists to develop future plans and tactics to commence co-taught virtual learning courses.

Literature

The traditional classroom has been dominated over the past 50 years by a teacher-centered approach to teaching (Roland 2014; Feden, 1994). Lecturing, modeling, instructing, illustrating, demonstrating, and coaching have remained the main teaching strategies-of teacher centered approach (Brown, 1998; Castling, 1996). These strategies mainly involve the teacher in making a formal exposition of a desired teaching content.

On the other hand a student-centered teaching approach focuses on empowering the learners by providing them with sufficient guidance, practical experience, meta-cognition, and self-evaluation through small-group interaction (Withycombe et.al. 2016; Kliegl & Weaver 2014). Its teaching strategies may include group discussions, debates, simulation games, role-playing, case studies, projects, field trips, cooperative learning, and problem based learning. These strategies are however 'process oriented problem based, contextual, interdisciplinary and meta cognitive in nature' (Brown, p.49)

As professional teachers, academics are facing a difficult challenge from learning technologies, as they have to renew and develop their model of the learning process well beyond the traditional transmission model (Essed et. al. 2018; Schön, D. A. 1987). Exploration of an innovative strategy requires a teaching approach to turn academics into reflective practitioners as professionals in teaching and research Wenger, E. (1998).

A new teaching and learning approach is fast becoming reality with the help of Internet Min Wu, et.al. (2008). It is an open, flexible and technologically accessible means of dissemination and communication. It is also a powerful tool for breaking the limitations of time and space that exist in traditional forms of teaching and learning Peter, M. Y., James, N. C., (2006). Hence the term virtualization is gaining ground. Virtualization of the learning process through the use of IT equipment based on Internet is becoming popular (Sabo et. al. 2015 and Uceda & Senén, 2010). They also assert that as online teaching and learning is faculty-delivered instruction via the Internet. Two parallel processes take place in such an environment and these are that students become more active and reflective learners and students and teachers engage in learning through the use of technology. This helps them become more familiar with technology.

Online teaching and learning is most effective when delivered by teachers experienced in their subject matter (Imbernón, et.al. 2011, Bersin, 2002). The online teaching and learning approaches of 'synchronous' and 'asynchronous' (which is learning takes place any time anywhere) are known; Berge, Z, L., 2002; Feenberg, A., 1998 and http://www.emoderators.com/moderators/teach_online.html). Synchronous learning includes live chat, audio and video conferencing etc. Whereas, asynchronous learning methods use the time-delayed capabilities of the Internet including e-mail, threaded discussion (Roland 2014 and Mark, T., 2012). Web based Learning Primer, available at http://www.c2t2.ca/landonline/primer.html). Online teaching and learning may also help to adopt student-centered teaching and learning and help students become more versatile learners (Withycombe et.al. 2016; Berge, Z, L., 2002 and Bersin, J., 2002).

Another form of teaching and learning approach is collaborative learning. It helps the students become more active participants in the learning process with easy access to global resources. It helps the students to easily access online databases in the online classroom (Donald C., et.al. 2010, Uceda & Senén, 2010). Experiential learning through multimedia presentations utilizing new technologies can be used to engage and motivate the students (Kliegl and Weaver 2014 and Brian T., 2012).

Teaching online offers the advantages like the opportunity to think about teaching in new ways; provide ideas and techniques to implement in traditional courses, expand the reach of the curriculum, professional satisfaction for instructors and instructor convenience (Laurie, P., 2011). Some of the challenges for instructors of teaching online include familiarity with the online environment, capacity to use the medium to its advantage, being available to students on an extended basis electronically, providing quick responses and feedback to students (Massy, W., 2002, Castling 1996).

On the other hand De Vry. et.al. (2000) posit that the three primary challenges associated with online teaching are effectively structuring online courses, creating community in virtual classrooms and facilitating and encouraging online discussions. Structuring an online course includes course planning, course organization and communication.

Bruner, J. S. 1960 asserts that the pedagogy is the science and art of education. Its aims range from the full development of the human being to skills acquisition and different techniques and tools applied by teachers to help students learn. According to Lawrence, C, R., (1999) it is important to develop online communities in the classes being taught. Creating community includes student-to-student interaction, faculty-to-student interaction, allowing students to post student-to-student communication to get answers to questions, pair each student with a "buddy" in the course, encourage peer response, structure opportunities for personal interaction.

Another interesting and pertinent report by Regalbuto, J., (1999) on "Teaching at an Internet Distance: the Pedagogy of Online Teaching and Learning", a sense of group and community among electronically assembled individuals can be created by a combination of team building activities, facilitation skills, and conferences for specific groups and tasks. It suggests that faculty-to-student interaction and principles of good practice highlight the importance of faculty-student interaction in promoting learning in such environments.

Gaps

This discussion shows use of Internet in teaching is on the rise and widely acceptable and practiced. However, we do not have the concrete and widely available evidence for its effectiveness from the most important stakeholder i.e. the student, the customer and especially in entrepreneurship related courses.

Keeping the literature in view the researcher aimed to carry out a detailed survey of the students who have taken virtual co-taught courses. Two such institutions were identified. Their names are not revealed due to permission not granted from institutions to use their names. However, the consent was given to conduct the survey, analyze the findings and provide recommendations.

Researcher intends to bridge the knowledge gap on student value perspective on the virtually co-taught courses. The higher education institutions spend huge funds on providing the right education to the students. They carry out expensive research and develop the curricula to enhance student experience and achieve certain learning outcomes. However, we have limited knowledge on student perspectives that how can these learning outcomes be better achieved. This study aims to seek answers of following questions.

- What is student value perspective on virtually co-taught entrepreneurship courses?
- What is the student perspective on knowledge acquisition through such courses?
- What is the student perspective on benefits for students of such courses?
- What is the student perspective on acquiring intended learning outcomes?

This paper based on the following methodology will attempt to understand the perspective of the students of co-taught virtual entrepreneurship courses on feasibility as teaching pedagogy and learning mechanism.

Methods

Research Design

A business cannot succeed unless it is customer centric. Therefore, in order for the co-teaching to succeed, the researcher planned to reach out to the customer (students) to know their perspective and identify the triggers of satisfaction on this relatively newer concept. If faculty does not know the standpoint, needs, expectations and requirements of the students from such courses, these might not succeed.

Design Stages

The following table shows the stages of research this study went through.

Table 1: Research stages

.Stages	Explanation
Exploration	The study explores the literature on co-taught courses to develop a scholarly view of the co-taught courses in higher education.
Identifying Gaps / Conceptualizing	The next stage was to conceptualize the research. Identifying gaps and developing execution strategy.
Execution	Detailed look at methodology is provided to develop appraisal of the appropriate methods to investigate and analyze the results.
Data presentation and Discussion	At this stage the data had been collected with the help of the international counterpart. The data was then analyzed and presented with the help of statistical tools including SPSS.
Conclusions and Recommendations	The data analysis and discussion assisted to draw conclusions and make recommendations in light of the findings.

Validity and Reliability Issues

It is a repeatable, systematic procedure to produce validation results. The specific aspect of validation methods as opposed to a general view of methods is that user validation always starts with an objective and assessment criteria. The analysis of the research methods is completed by a validation exercise carried out in order to assess the content and face validity of the results through measures stated below.

- Validity of measure in quantitative research
- Questionnaire design effects, problems and considerations

At the end of the course an online survey was conducted and 55 out of the 59 involved students responded giving more than 93% response rate. The questionnaire was developed on 5 ratings scale of, Do not agree (1), May be (2), somewhat agree (3), Agree (4) and fully agree (5) with the statement. The aim of survey was to understand students' standpoint on a variety of issues related to a co-taught entrepreneurship course in virtual settings including following.

1. Attributes of Teaching and Learning in a co-taught virtual classroom
2. Benefits of virtual class room learning
3. Challenges that arise in the virtual class room for the students, including effectiveness of the use of IT and Internet, the use of multicultural teams for assignments and projects, teaching and Learning across cultures and borders
4. Pedagogical approaches and their effectiveness in virtual classroom, it includes Teaching Strategies adopted and which ones could be more successful, skills development in virtual classroom setting and what to do in order to help students acquire knowledge. It also identifies the effective learning methods and role of virtual classroom in developing Cognitive skills of the students and what do students think of the experience of such an environment
5. Accruing opportunities for students, faculty and partnering institutions
6. Overall success of the virtual Teaching and Learning

The entrepreneurship course of "starting new business" was co-taught in virtual online environment. The survey instrument was placed on www.surveymonkey.com and the students of both the class rooms in Saudi Arabia and USA participated. The data was then downloaded in SPSS for analysis and presentation.

A pilot study for survey was conducted and seven Saudi Institution students participated and minor changes asked for were incorporated. The survey was placed online on December 11th and results obtained on December 30, 2012. The students were sent emails and were reminded twice during this period. As the names of the institutions cannot be revealed, the institutions are located in Saudi Arabia and the USA. The institutions would be labelled in the following sections as Saudi and US institution.

Data Presentation

The degree duration of the students from Saudi Institution was five years whereas it was four years in respect of the students of US Institution. Majority of students from Saudi Institution were from year 1 and year 3, whereas, from US Institution year 3 and 4 students attended these courses. The number mix of the student maturity seems normally distributed at the different levels of the degree, i.e. except 2 students from year 5 at Saudi Institution all other respondents were from among year 1 to 4.

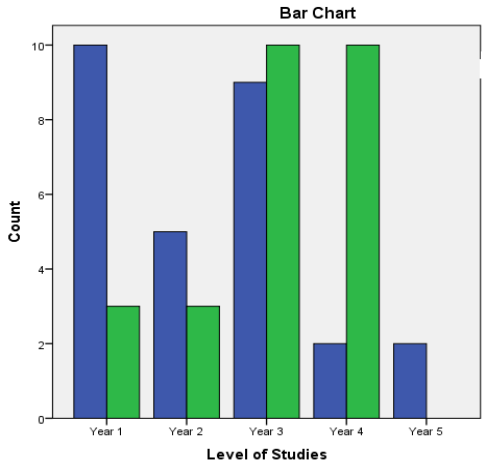

Level of Studies * 'Student At' Crosstabulation

Level of Studies	Student At		Total
	Saudi Institution	US Institution	
Year 1	10	3	13
Year 2	5	4	9
Year 3	9	10	19
Year 4	2	10	12
Year 5	2	0	2
	28	**27**	**55**

Students at Hope College USA | Students at Effat University Saudi Arabia

Table 2 figure 1 – Student levels at two institutions

Results and Discussion

This section shows results and discusses the possible implications of the answers. The results and discussions will be carried out on teaching and learning attributes, benefits, challenges, pedagogy, classroom experience, skills development and opportunities. Correlations are carried out in the end between the benefits and challenges and pedagogy for further clarity.

Teaching and Learning Attributes

The following table 2, figure 2 identify the student perspective on the attributes of the co-taught virtual classrooms. It shows that the majority of students are of the standpoint that in the virtual classrooms the workload gets heavy for them. However, there is also a notable population of respondents disagreeing with the majority.

Table 3: Teaching and Learning Attributes in a virtual classroom

Descriptive Statistics		
	Mean	Std. Deviation
The argument and evidence becomes norm	2.9111	1.20269
The workload can get heavy	3.2000	1.05744
The course becomes concept central	3.3111	1.16428
Principles and concepts are practically looked at	3.4000	1.09545
There is more active interaction	3.7500	1.22237
Course content becomes linked to real life	3.8222	1.13396
Valid N (listwise) 54		

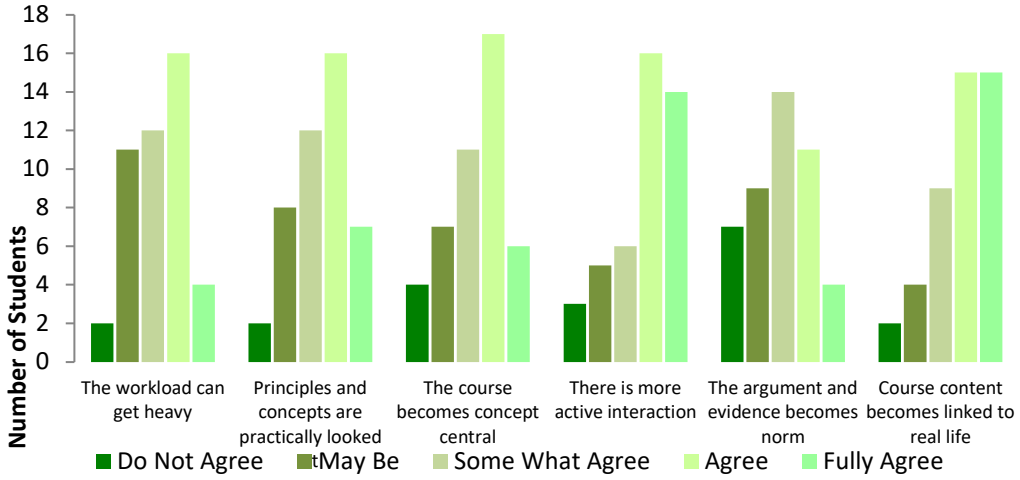

Figure 2: Teaching and Learning Attributes in Virtual Classroom

Majority of the students (with little variation from norm in the answer pattern realized from standard deviation) express their belief in such courses and suggest that these are very practical and applicable to the real life. Similarly, responses also suggest that the interaction in the class and the practicality of the concepts is central to the teaching and learning in these environments.

Benefits of the co-taught virtual class room

The figure 3 shows the viewpoint of the students regarding possible benefits they gained from co-taught virtual classrooms.

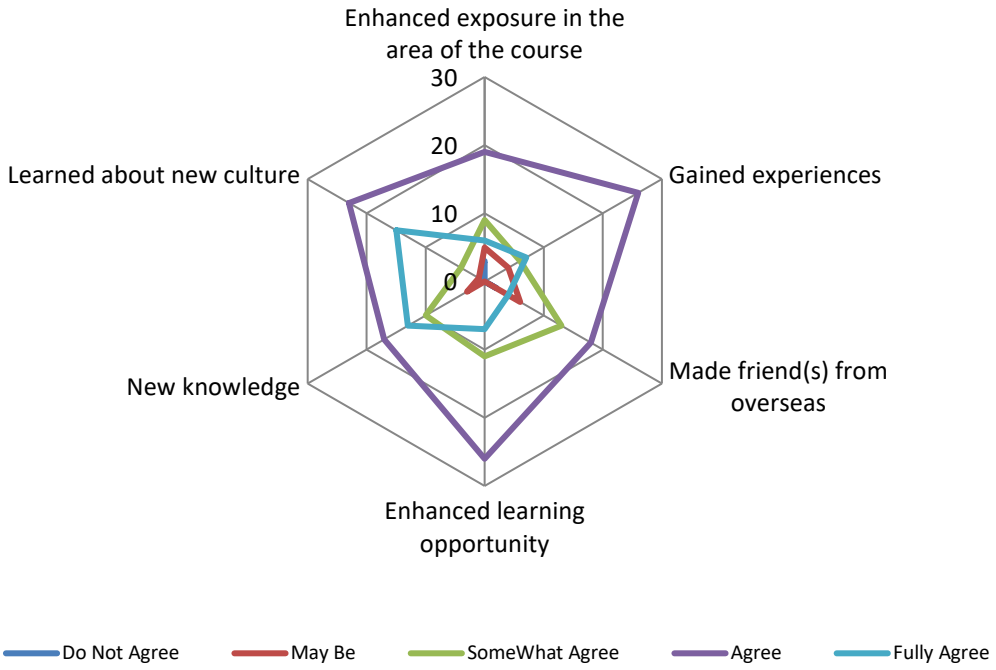

Figure 3: Benefits of Virtually Co-taught Courses

Looking at the numbers 0 to 30 are the student respondents, it seems that gaining experience and new knowledge, enhancement of the learning opportunity and learning of new culture have been identified as major benefits of the co-taught virtual courses. Looking at the student learning stage, it shows that the students seek acquiring of 'new knowledge and knowing culture' as more important benefits. The students also regard it as important experience. Comparatively smaller number of students regard it as opportunity to make new friends, gain experience and learn new culture.

This is perhaps due to the fact that the co-taught virtual courses are organized across boundaries and when such an opportunity arises it assists the students to expand their horizon and learn more. The students response seemed a little cautious in making friends, this is may be owing to the fact that they require more time to acquaint themselves with each other and that knowing better each other may require meetings as well other than online.

Challenges in the co-taught virtual classrooms

The following chart in figure 4 shows that the students think that managing differences in different cultures is a challenge. The virtual co-teaching is supposed to happen in two different institutions and in this case it was two countries with a time difference of 8 and nine hours in summer and winter timings. The students pointed out that managing the time difference is another challenge, the policy makers and colleges and universities contemplating such alliances may take into account. Such a big time difference can mean that students and instructor(s) of at-least one institution have to make sacrifice of their time and they might need to be compensated for it.

Similarly, the students note the issue of internet connectivity, online meetings and sound system. There were a number of assignments to be completed in a team. This increased workload on the students and they also found it hard to find time and get connected with the colleagues in two different countries because of the time difference.

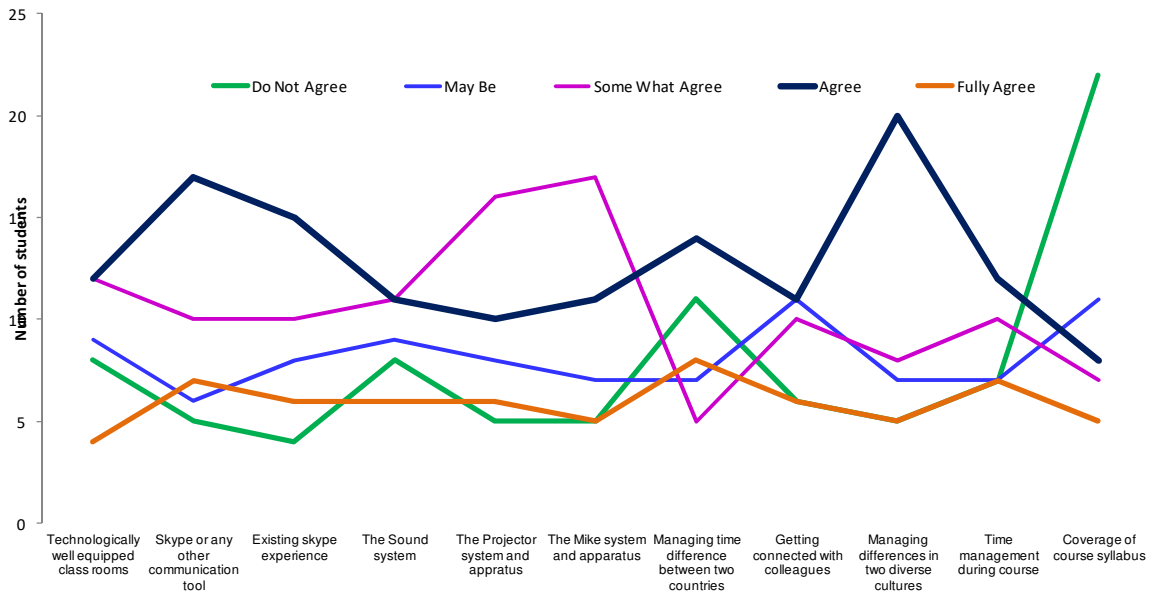

Figure 4: Challenges of the c-taught virtual classroom teaching and learning

This future virtual classroom would need to be better equipped and time differences should be managed. Likewise, it is important that the institutions collaborating must take into account the difference of the time zones they are in.

Table 4: Challenges of the co-taught Virtual Courses

Challenges	Mean	Std. Deviation	Level of Studies				
			Year 1	Year 2	Year 3	Year 4	Year 5
			Mean	Mean	Mean	Mean	Mean
Technologically well equipped class rooms	2.8889	1.24722	3.38	2.75	2.56	3.30	2.00
The Sound system	2.9556	1.31349	3.75	3.25	2.94	3.90	2.00
Getting connected with colleagues	3.0000	1.27589	3.63	3.50	2.76	3.44	5.00
Managing time difference between two countries	3.0222	1.48460	3.38	2.38	2.83	3.40	2.00
Coverage of course syllabus	3.0682	1.35368	3.38	2.88	3.17	3.00	2.00
The Mike system and apparatus	3.0889	1.14460	3.13	2.63	3.11	3.50	2.00
The Projector system and appratus	3.0889	1.18364	2.25	3.00	2.89	3.80	4.00
Time management during course	3.1163	1.33112	2.50	3.25	3.00	3.10	4.00
Existing skype experience	3.2558	1.19708	3.38	3.38	3.22	3.20	4.00
Managing differences in two diverse cultures	3.2889	1.19891	2.88	3.75	3.00	3.00	3.00
Skype or any other communication tool	3.3333	1.22474	3.00	3.57	3.00	2.80	4.00
Valid N (listwise)	55						

Table 4 shows that the younger students of year 1 and 2 consider the skype experience and technology as major challenge. They also think that due to this the completion of the course content may become difficult. This also shows their maturity level. Getting connected with counterparts from other institution is a challenge for students except the year 3 pupils who recognize it as comparatively less of it. The students from year 4 and 5 take the projector system, time difference and skype as main challenge. It means that students are fully aware of the issues and challenges that may arise in their class rooms and they feel cynical.

Pedagogical approaches and their effectiveness

The figure 5 shows that majority of the students agree that the co-taught virtual classrooms provide more opportunities to reflect and think about the subject matter and lecture topics. This could be because the co-taught virtual classrooms in disguise develop a sense of competition between students' from two distinct institutions. This can act positively in achieving course and learning objectives set. Similarly, the students agree that such courses provide more opportunities for in and out of class discussions and lecture becomes more interactive

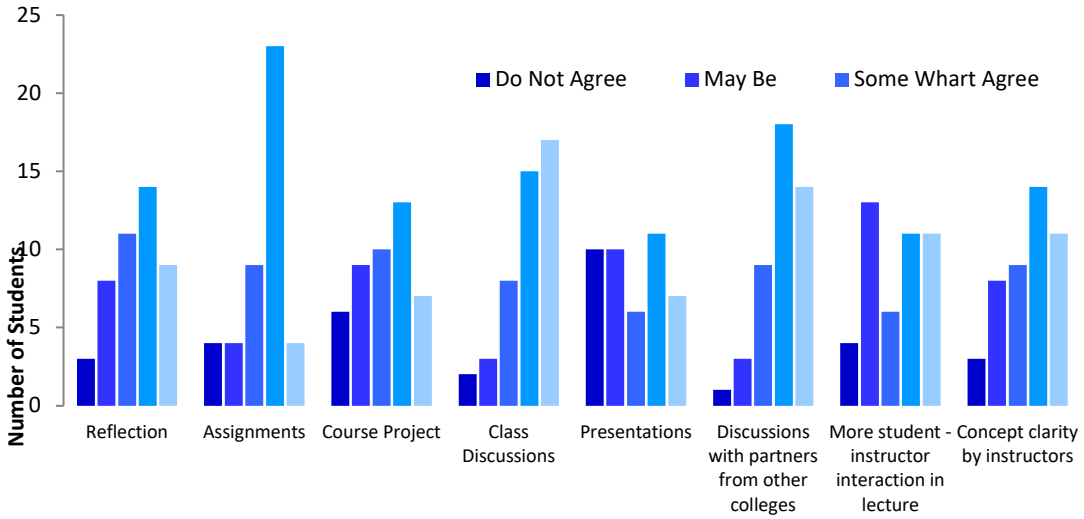

Figure 5: The basis of co-taught courses / pedagogy (1)

The figure 5 reveals that less than 10% respondents' believe that co-taught virtual classrooms do not provide the better opportunity to learn. Overwhelming majority of more than 95% assert that these classrooms are more interesting and fun generating while educating with increased interaction from two instructors. The increases the confidence level of the students and the quality of both teaching and learning is enhanced. Correspondingly, more than 93% students responded that these courses added to the learning value and showed great deal of instructor – student commitment and students achieved more than in student / teacher centered lectures.

Table 4 – Pedagogy

Pedagogy, Teaching Strategies	Std. Deviation	Pedagogy, Teaching Strategies	Std. Deviation
Presentations	0.4341	Teacher - Student commitment	0.2362
Research	1.1481	Joint assignments	0.2505
Course Project	1.2898	More confidence to students	1.1119
More student - instructor interaction	0.3551	Higher interest from instructors	1.0745
Better achievements qualitatively	1.2177	Added Value to learning	0.1232
Learning from two instructors	0.4557	More interest and fun	0.2227
Better learning opportunity than normal class room	0.3169	Knowledge to be used practically	1.0908
Reflection	0.1947	More interaction	0.1862
Enhanced quality of teaching and Learning	0.3054	Opportunity to students to broaden their horizon	0.1985
Assignments	1.0869	Discussions with peers	0.2996
Perspective of two or more faculty	0.3409	Class Discussions	1.1160
Concept clarity by instructors	0.2362		

Students were asked to respond on their likeness of strategies adopted and possible benefits and reasons for liking. The table 4 above shows that new values accrue from co-teaching. The students seem to agree that the diversity of presentations, increased interaction with two instructors and learning from their experiences provided more room for reflection. The students also showed interest in joint assignments that led to understanding cultures and making friends across the borders. However, it is also evident that the students showed that the co-taught virtual or normal class room teaching and learning provides similar outcomes and generate interest regarding research and use of knowledge in practical life.

It is also evident that according to students these courses will develop their communication skills which may be because of several factors like discussions with partners from other institutions, amount of class room interaction and discussions.

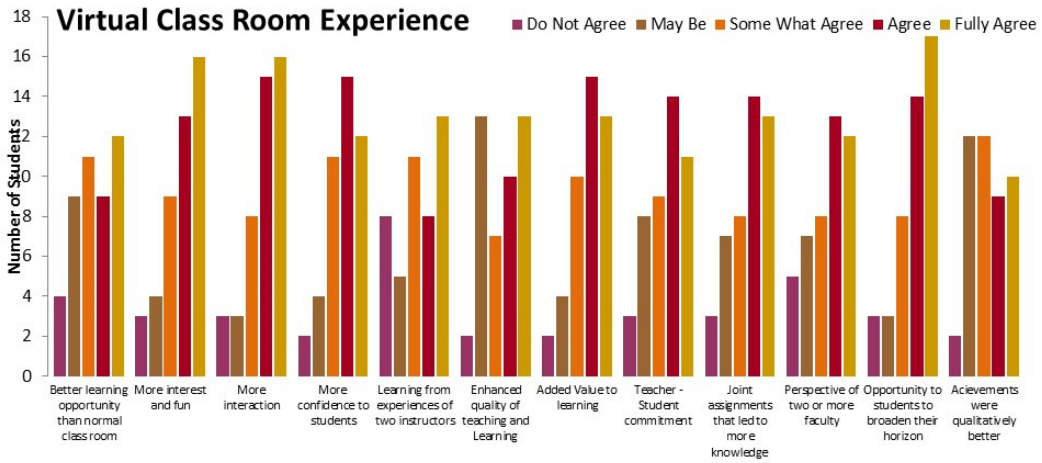

Figure 6: Education Experience in Classroom – Pedagogy (2)

Looking at the number of students responding on x axis in figure 6 or in figure 7, the students were asked to opine whether and to what extent they agree that the knowledge acquired in the classroom is usable in practical life, such environment generates more interest for teachers and opportunity to research. The view of the students' show that respondents agree largely that the instructors show more interest and the knowledge students acquire is practical in nature that can be used in their practical life. Students also have agreed that such classes generate more opportunities for research for them. It may be because the instruction comes from two teachers who want their students to conduct investigation into diverse areas.

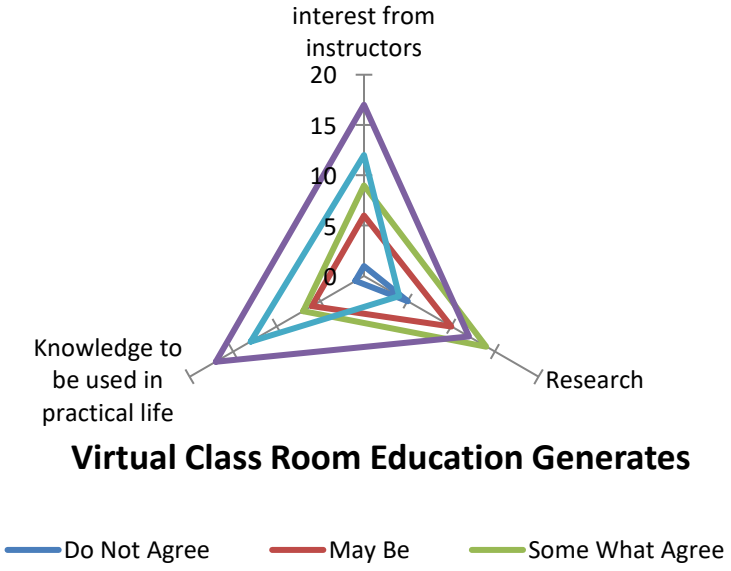

Figure 7: Pedagogy (4)

Achieving Skills Learning Outcomes

Similarly in order to understand the student opinion regarding skill development in a co-taught virtual classroom they were asked to rate if the class room experience provided them opportunities to develop communication and the interpersonal skills. However, it is not the case that interpersonal skill ability does not occur. It entails that students' better interpersonal communication happened interacting their counterparts

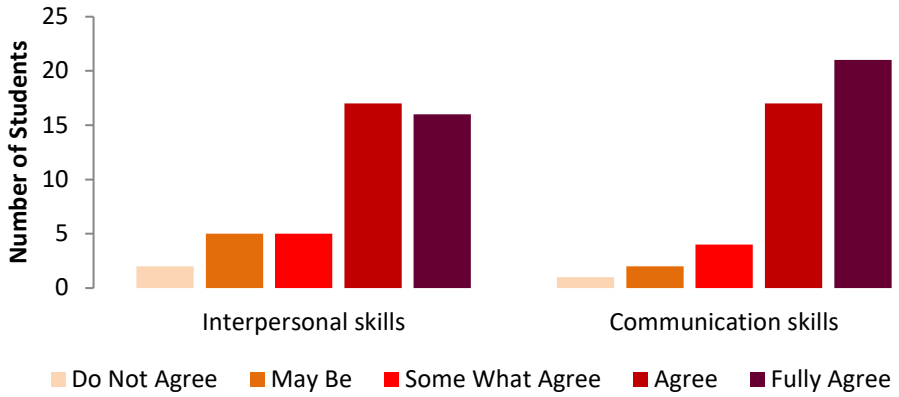

Figure 8: Skills development – Pedagogy

Opportunities presented by the co-taught virtual classrooms

The students shared their views on conducting such courses identifying that such courses may generate future collaboration opportunities for the institutions and develop better course materials. It is seen that majority of the students agree to the fact that these classrooms will generate collaborations at both the student and institutional levels. This identifies importance students attach to such an environment for knowledge acquisition

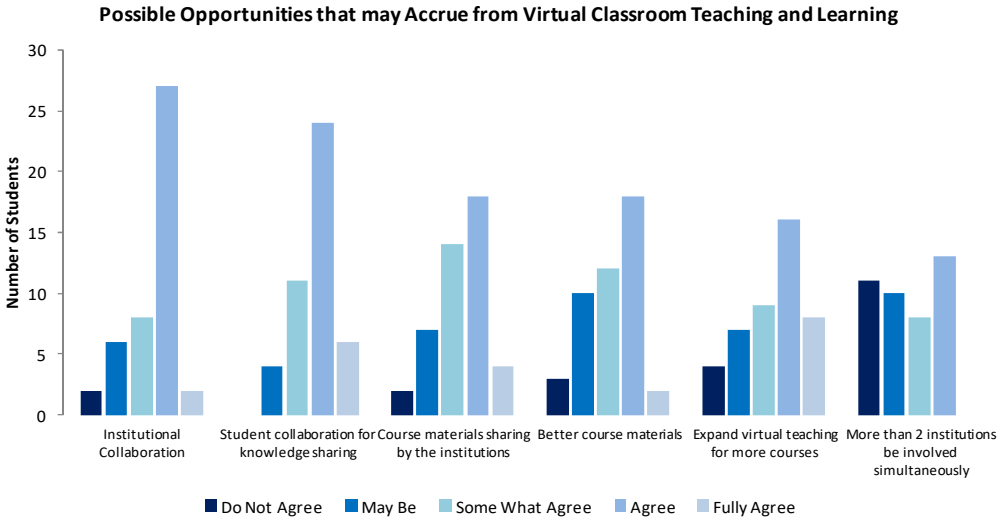

Fig. 8: Possible Opportunities to accrue from virtual classroom settings by two institutions

Value Perception

A number of benefits were identified by the students as shown in preceding discussions. In order to understand the student value perception of the virtual co-taught courses the benefits were correlated with certain value propositions as enumerated in the literature and developed by the researcher as possible values through brainstorming with students.

Table 5: Correlations between Benefits, Challenges and Pedagogy

Benefits	Value Accrued									
	More interest and fun	More interaction	Learning from experiences of two instructors	Enhanced quality of teaching and Learning	Joint assignments that led to more knowledge	Opportunity to students to broaden their horizon	Acievements were qualitatively better	Class Discussions	Discussions with peers from other institution	Concept clarity by instructors
Enhanced exposure in the area of the course	0.333	0.353	.427**	0.388	.237	0.418	0.319	.198	.217**	.262
	.312	.218	.005	.111	.131	.601	.594	.208	.034	.093
Gained experiences	0.384	0.481	0.31	.240	.559**	0.478	.256	.215**	0.363	.194
	.110	.108	.404	.012	.020	.201	.097	.016	.169	.211
Enhanced learning opportunity	.386**	.498**	.451**	0.603	0.299	.405**	0.513	0.411	0.459	.527**
	.010	.001	.002	.100	.484	.006	.890	.601	.802	.010
New knowledge	0.386	0.424	0.46	.418**	.139	0.503	.418**	.283	.150	0.342
	.106	.805	.800	.005	.375	.110	.005	.066	.337	.493
Learned about new culture	0.391	0.416	.460**	0.33	.079	0.508	0.375	.185	.266	.295
	.869	.100	.016	.287	.612	.990	.123	.231	.181	.052

N=55

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The above correlations show that learning from the experiences of the two instructors enhances the student exposure even more. It also provides students with an opportunity to broaden their horizon, reflect, complete their assignments and course / project work in a better manner. This provides them with valuable experience and enhances their learning emanating from two instructors. The students also seem to suggest that this environment of learning and teaching is better in order to have concepts clarity and engage with their counterparts from participating institution(s). It can be implied that this provides students with new knowledge and presumably may augment student – instructor commitment. This satisfies what Bersin (2002) opined that the class discussions are considered vital in order to enhance learning, add value and achieve better quality in assignments and course work.

Since the quality of teaching is enhanced as two instructors provide their views, feedback and lectures. These are from different perspectives. Similarly, the class discussions are more diverse and multicultural. The assignments are completed by the students groups working together from across borders. The responses show that these help gain better experience for the students. The interest, interaction and learning from experiences of two instructors improves the learning experience. Similarly, new knowledge is acquired through class discussions and the virtually co-taught courses opened avenues to learn more about the new cultures.

Skill Development

Numerous higher education quality frameworks for the teaching and learning in higher education rate learning outcomes of 'communication' and 'interpersonal' skills (Nkhoma et. al. 2014; Havnes & Prøitz 2016; Rahatullah 2014) acquisition by the students as integral and important part of class room experience. The figure 9 below shows that students agree that virtually co-taught courses help increase interpersonal and communication skills.

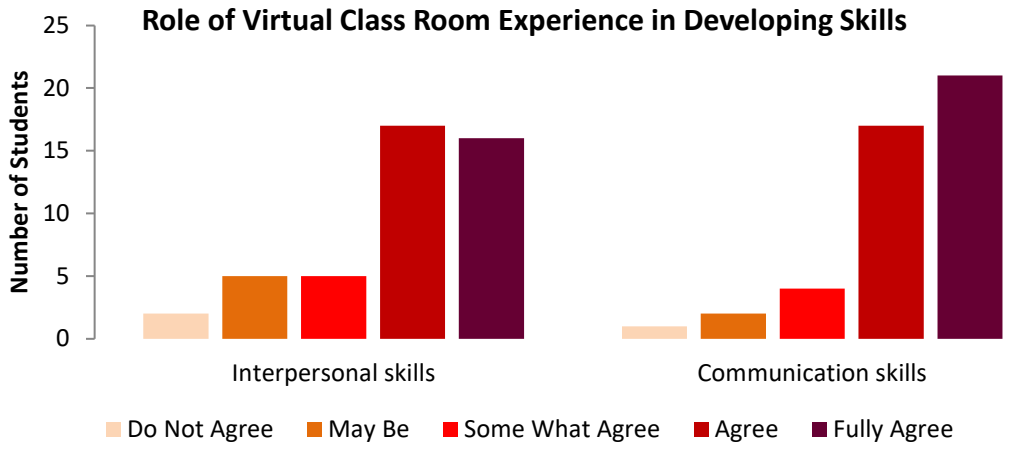

Role of Virtual Class Rooms in Student Skill Development

Overall Ratings of the co-taught virtual courses by students

Students were asked to rate overall success of the co-taught virtual courses. Following table 7 and Figure 10 show that they highly rated the success of these courses.

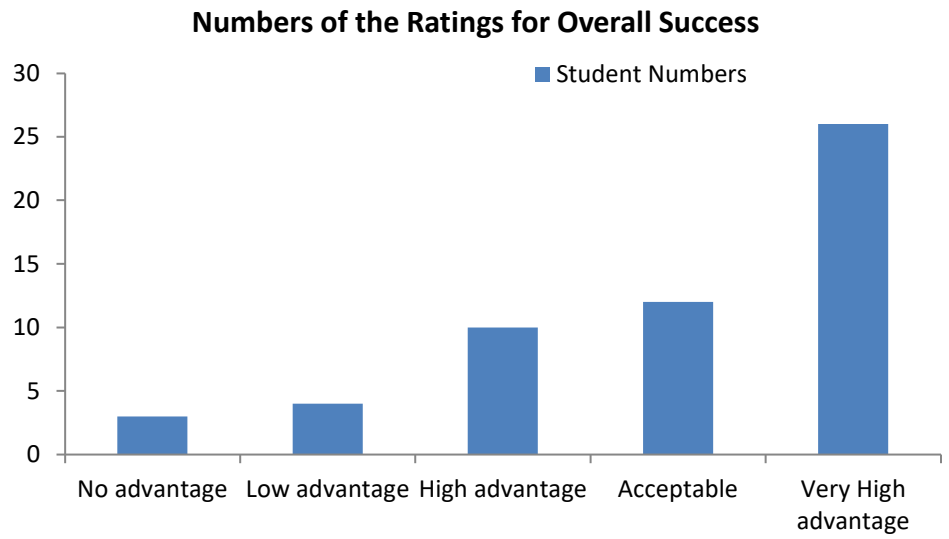

Figure 10: Overall Success Ratings

In all forty eight students rates the course as acceptable to high and of very high advantage. There were however, 7 students who are unconvinced of the experience and they rate it of low advantage or of no use. Their percentage is 12.7. Nonetheless, the percentage of respondents who rate it successful is more than 83%

Conclusions

The above discussion reveals that the co-taught virtual class room experience is success. The academia has to develop the teaching strategies that can capture the pedagogies emphasized by the students as effective. Similarly, there is a great need to develop the technology infrastructure before embarking into this venture.

In such an environment the courses become more concepts central and linked to practical life experiences. Co-taught virtual classrooms are great source of motivation for the students as they learn about new cultures and it increases their exposure to the subject and provides opportunity for enhanced learning. The future virtual classrooms would need to be better equipped and time differences should be managed.

The study has answered the questions raised to an extent that warrants change in our approach to develop courses. The students seem to like the innovative approaches to the education and learning.

The practical courses where the students need to perform jointly in assignments and other forms of assessments, a co-taught virtual classroom would be a viable psoposition.

The co-taught virtual classrooms may offer blessing in disguise by developing a sense of competition between participating students' and help in achieving course objectives and learning objectives set. This could also help in determining and setting the strategies for deep learning and holistic education.

The sound systems, the video conference tools and associated technology need to be perfect. This environment is positive, more interesting for both students and teachers, generates research, collaboration and partnering opportunities.

Recommendations

If the student perspective is not taken into account and if the institutions randomly kept on developing co-taught courses without knowledge of the student perspectives the pedagogy might not deliver the anticipated results.

The co-taught courses are gaining momentum and this study can set a path and help guide strategists to develop future plans and tactics to commence co-taught virtual learning courses.

A similar survey on a larger sample involving more students and faculty as well needs to be carried out. The concept may be taken further.

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Analyzing Adaptation of Accounting and Finance in Retail Sector in Industry 4.0 (Cyber-Physical Systems - CPS)

Rahat SAMEEA Muhammad

BPP university, Birmingham.
rsameea@bpp.com; rsameea@outlook.com

khan RAHATULLAH Muhammad

Effat University, Jeddah, Saudi Arabia
mkhan@effatuniversity.edu.sa

Abstract

The business has gone through numerous evolutionary stages. However, the current industry 4.0 revolution promises a huge revamp of the business processes and the way the businesses are conducted. This paper analyses the adaptation of Accounting and Finance in retail sector in Industry 4.0 (Cyber-Physical Systems - CPS). It has been concluded that the accounting has also been impacted and especially in retail sector. It has changed significantly and industry would need more expertise and knowledge of soft-wares, analytical skills, leadership, economics, globalization and internationalization effects of the firms and a lot more. Similarly, block-chains would help collect and keep large volumes of information with its numerous types more quickly. The digital production and acquisition of data would positively affect the accountants and auditors.

Keywords: Industry 4.0, Retail sector, Accounting,

Introduction

The history provides evidence various revolutions through its course, impacting heavily the global geopolitical and economic landscapes. However, over the past 300 years, 4 major industrial revolutions have changed the economic scene of the world. Two of these events happened in last 50 years or so. The 4th industrial revolution is based on cyber-physical systems and required digital leadership at industrial and individual levels bringing disruptive changes. The Ptolemy project at Berkeley university describes Cyber-Physical Systems (CPS) as "integrations of computation, networking, and physical processes where embedded computers and networks monitor and control the physical processes, with feedback loops where physical processes affect computations and vice versa" at https://ptolemy.berkeley.edu/projects/cps/#:~:text=Cyber%2DPhysical%20Systems%20(CPS),affect%20computations%20and%20vice%20versa. The governments, conglomerates and SMEs have adopted the CPS through digital leadership in order to provide better services to their customers in cost and time effective manner.

This essay provides a critical analysis of the effect of the Industry 4.0 on our profession and accounting sector. It also discusses the likely future course of the sector in changing scenario and making conclusions. During the whole discussion the paper will benefit from understandings of digital innovation, how internal innovation model is applied and need and role (already played and future expectations) for action oriented vested and visionary leadership to achieve organizational growth through KPIs and realizing goals.

Accounting and Finance Adaptation of Industry 4.0

Accounting and finance are a basics of management field as in simple terms, it's a guideline / rules to operate a business and origination. Accounting has been around for 100 years, it's all about how to count things and keeping score. We add

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numbers in a book, and make sure they provide a logical and correct result in terms of numbers. For this we need human assistance to make sure we have added a right number and are useful in future.

Accounting has digitalized and changing during the course of Industry 4.0. It is becoming the lubricant of organization. Therefore, effective v1isionary leadership can provide right management approach necessary. The computerization has freed up our time and we can focus more on vital strategic organizational issues and help the firm make better decisions. We can now verify numbers and conduct extrapolations and predictions enhancing trust in the performance data. The data now travels in high speed like a block chain. This enables the transactions to be carried out in a more time and cost effective manner increasing confidence levels of both customer and the firm and has brought more efficiency.

The Institute of Chartered Accountants of England and Wales (ICAEW) website (https://www.icaew.com/technical/technology/block-chain/block-chain-articles/block-chain-and-the-accounting-perspective#:~:text=Block-chain%20is%20an%20accounting%20technology, the%20analysis%20of%20said%20information.) introduces the block-chain in following manner.

"Block-chain is an accounting technology concerned with the transfer of ownership of assets, and maintaining a ledger of accurate financial information. The accounting profession is broadly concerned with the measurement and communication of financial information, and the analysis of said information. Much of the profession is concerned with ascertaining or measuring rights and obligations over property, or planning how to best allocate financial resources. For accountants, using block-chain provides clarity over ownership of assets and existence of obligations, and could dramatically improve efficiency".

This use of new technologies is changing the future of accounting and finance. Some accountants are afraid that automation and artificial intelligence (AI) will replace their jobs but I believe that, that fear is misguided and unfounded for two reasons, i.e. firstly, Radmillo 2004; argues that new technology doesn't wipeout jobs but reinvents work opportunities and even create new openings. Secondly, automation cannot replace every aspect of an accounting job. Technology can only replace routine and non-creative tasks (Can et.al. 2019). Therefore, robots aren't coming for our job they're coming alongside and taking up our routine mind numbing tasks freeing us to move into a more advisory strategic role. I believe now the accountants would have more time to strategically analyze, interpret, strategize and recommend policies and systems to the organization. Thus providing more depth to their importance as a key player in organization growth and enhancing profits.

It will mean that accountants will likely redefine themselves as strategic advisors using technology and AI. Machine learning will automate routine tasks that take up precious hours of accountants and allow them to look at the bigger picture and delve into advisory roles. I understand and agree with Can et.al. 2019 that accounting firms of the future will use automation to become more efficient communicate key insights to clients and continue to build their reputation as trusted advisors.

Industry 4.0 Influence on Accounting Profession through Block Chain

Block-chain enhances the accounting profession by reducing the costs of keeping and reconciling ledgers. It offers certainty regarding the ownership and history of assets giving clarity to the accountants on available resources and accruing obligations of their companies. It frees up accountants' time to concentrate on planning and valuation, rather than only recordkeeping. It is a replacement for bookkeeping and reconciliation work. It prompts more value-based level bookkeeping, however, not by bookkeepers. Rather, future successful accountants will take a shot at analyzing the monetary translation through block-chained records, comparing, contrasting and evaluating the records for financial reality, adding overall value to the accountants' outputs.

The block-chain would help auditors to analyze and use their competencies to answer more important questions raised during the audit and assist the organization under review. Block-chain also impacts external audit as it has applications for it. Performing confirmations of an organization's money related status would be less essential assuming a few or the entirety of the exchanges that underlie that status are obvious on block-chains. This proposition would mean a significant change in the manner auditing is performed. A block-chain solution, with the help of data analytics, would assist the transactional level transactions during audit process.

How

Block-chain can assist the Accountants

Petrucci and Rivera 2018, said that it's crucial for all digital leaders to implement a digital roadmap outlining the business goals and identifies the digital initiatives, long term and short-term objectives. Essentially, it's the blueprint for actions that all aligned to the digital strategy.

I understand that the block-chain is to be further developed, stakeholders taken on board and necessary trainings conducted by governing bodies for their members to help the professional and practitioners understand the contemporary block-chain, its future and implications. This will help the block-chains further developed, standardized and optimized for greater impacts. A number of start-up businesses are developing the block-chains and its applications but majority are in their infancy stage. The biggest challenge I can identify is developing rules, laws, and regulations, codes of conduct and industry standards. This would direct and compel the accountants to learn technology, analytical and advisory skills, hence more value added.

Need for Digital Leadership Skills required for Successful adoption of Block-chain

Hernandez 2015, Twenge 2017 and Petrucci and Rivera 2018 identified a number of digital leadership skills and include the following that would be required to adopt and adapt the block-chain in our profession.

1. **Communication**
2. **Clear Vision**
3. **Digital Literacy:** Research from a Harvard Business Review with 1,000 CEO's, showed that 90% leaders believe their business is being disrupted or reinvented by digital business models. But when asked about their capabilities, 70% believe they do not possess the right skills, leader or operating structure to adapt.
4. **Strategy**: A robust strategy is required to complement the above skills
5. **Innovation**
6. **Risk-Taking:** Risk taking is crucial part of digital leadership. Mark Zuckerberg, stated that "the biggest risk is not taking any risk. In an ever changing world the only strategy guaranteed to fail, is not taking risks".
7. **Information Security**

Developing, adopting and adapting to a block-chain would require capability and people related leadership (Vested and Visionay) digital leadership which Foka, 2018 defines, as "the strategic use of a company's' digital assets to achieve its business goals". This use could be at organizational and individual level. At individual level, it is carried out by those responsible for overseeing the digital assets. According to Fisk 2002 and Rahatullah 2017, the digital governance and or management requires an effectual leader aware of the business goals and knows how their job responsibilities support it.

Whereas, Wade and Obwegeser 2019 suggest that at an organizational level the digital leader could for example be a company that has successfully taken advantage of their digital assets to gain and maintain a competitive advantage. Professor Stijn Viaene at Vlerick Business School in Belgium described the digital leader as shown below.

https://www.europeanbusinessreview.com/what-digital-leadership-does/

In contemporary world, digital leadership requires a unique set of skills to drive success for an organization and overall workforce. Deloitte identifies that "42% of major companies now believe to be more successful by use of enhanced digital tools employing digital leadership by adopting following skills.

Conclusions

The profession faces huge challenge which is a motivation in itself that we may well be working with robots and complicated digital systems. Therefore, accountants would need to comply with the expanding digital developments. It seems imperative to adopt to the block-chain to attain greater benefits and induce more professionalism.

The discussion above reveals that the accounting has changed and would change more significantly, therefore, we would need more skills and broaden our horizon out of accountancy and acquire additional skills and knowledge of soft-wares, analytical skills, leadership, economics, globalization and internationalization effects of the firms and a lot more.

As we know that the data size is dependent on magnitude of organization and the bigger the firm, the bigger the mass of data it produces. Block-chains help collection and keeping of large volumes and several types of information quickly. The digital production and acquisition of data would positively affect the accountants and auditors.

We will not need to acquire in depth knowledge of how block-chain works. What is necessary for us to understand is to know how block-chain works and how can we advise on its adoption and impact of block-chain on their businesses and clients.

"Block-chain is an accounting technology concerned with the transfer of ownership of assets, and maintaining a ledger of accurate financial information. This would spare time for accountants and gain clarity over the resources available and obligations of their firms. This will free their resources to concentrate more on planning and valuation and not recordkeeping.

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Pie Paradise
Evolving Social Contract and Personal Commitment Produces Start-up Success in a Harsh Masculine Entrepreneurship Ecosystem

Khan RAHATULLAH Muhammad

Effat University; Jeddah; Saudi Arabia
mkhan@effatuniversity.edu.sa

Abstract

Saudi Arabia scores 36 in 'long term orientation' dimension in Hofstede's studies. People in such societies exhibit great respect for traditions. Similarly, Saudi Arabia is labelled as a collectivistic society where the hierarchies are recognized and followed. This is even true in families as the males dominate. Saudi Arabia therefore, is seen as an ultra-conservative society where the rights of women are often limited and they need male permission to perform any and every work or even study and travel. The driving ban on women has only recently been lifted. The society has started to evolve and the women are now asserting their skills and acumen. The traditions still remain very tightly followed. The national entrepreneurship ecosystem is also considered harsh as women participation is negligible. However, there are signs of cracks appearing in the old-fashioned tradition clad society. The women have been successful as start-ups. Having a faceoff with conventional elements is exceptional as this case narrates. It brings to light the changing nature and the role of society, family and determination of the start-up to face challenges and succeed. The case identifies the challenges, punitive and strict systems and social laws. It identifies evolution occurring in social contract where there seems an implicit agreement among the society to accept women in business fields among others. Case helps the reader understand the prowess of young female start-ups; how some of these young females are breaking fetters and taboos attached are blown. The role of personality characteristics and assertiveness are important in changing scenario.

Keywords: Female entrepreneurs; Saudi Arabia; Harsh entrepreneurial ecosystem; Leadership

Introduction

Pie Paradise was formally established in August 2015, however, the company was working for a few months casually and on order basis. It is a start-up specializing in baked pies' of a high quality sold on premium pricing. It is based in Jeddah Saudi Arabia and its owner Ayah Enani is a graduate with a business degree at BS level. The entrepreneur is married and expecting her first child in 2016. She does not belong to a business family and currently has two full time staff working with her. She is also a chef and has her own program on the TV channel, Fatafeat. The business sells online and has strong social media presence. Ayah talks about her startup and experience as "Having your own business is really easy nowadays with Internet, but the issue is how to maintain it. My experience so far was really good, and with marketing and adding new flavors consumers are more interested. Also it is considered the first Pie business in Jeddah, so the demand was really high, but with new entrees and competitors we are trying to keep our business with the highest quality and flavors, and best prices". Pie Paradise is currently skimming the market through high price and better quality. The company delivers the products for individuals, businesses, office and domestic parties.

The owner has typical start-up motives of becoming own boss, earning money, exploiting the opportunity available in the market and getting social recognition satisfying Maslow's hierarchy of needs concept leading to esteem needs. This is a little different than the push/pull or necessity/opportunity models. Here it seems a mix of the push/pull or the necessity/opportunity basis. The start-up seems to have been largely drawn into business to bring work-life balance, independence and flexibility, i.e., through mix of the circumstances.

Ayah is of the view that there are a number of challenges faced by the women start-ups in Saudi Arabia. She mentions issues related to setting, running and managing her business like, skills, knowledge of planning, including business, strategic, operations, financial, budgeting, HR etc. Since Saudi Arabia entrepreneurship ecosystem is evolving these startup, launching and operations related skills and knowledge related difficulties are being identified and an effort is underway to provide assistance to startups. Similarly, as reported in ecosystem study the information on Saudi labor and business laws also hinder the smooth startup and launching. Skills like communications, time management and sales also were identified as delaying and deterring factor. On the other hand the issues that always signify the Saudi society and culture did not seem to be of any significance when it came to the Pie-paradise. These included family

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issues, social taboos, education restrictions from family and husband and managing family and business together. Hence the main challenges can be categorized into startup, operational, skills and Knowledge related. Ayah successfully overcame these challenges as shown below.

Factors of Success

There are a number of factors for the success of the female startups. The start-up literature deliberates on about the education and its kind and level as a determining factor of success of the female start-ups. The occupational and sectorial expertise and prior business experience are regarded as a key to success. These are regarded important and underlying factor of success.

At Pie paradise the success has not been attributed only to these factors. The entrepreneurs' success has been realized by eight factors that helped overcome the challenges mentioned. It was Ayah's deliberate strategy to tune into these areas, get benefits and succeed. These factors could be termed as schemers.

- The entrepreneur also asserts contrary to literature on Saudi society. She says that the society has never been sarcastic or behaved in a restrictive manner. The people had been very receptive, open and agreeable to her concept of a pie business. This is in total contradiction to many studies and literature who pinpointed these as challenges but in the case of Pie Paradise these were unfounded. Instead Ayah found that the society at large was very receptive, full of support and encouragement. This was not possible a few years back but now the society has opened to new ideas and adopts to the latest trends and changes asserts Ayah.

  This has been a huge achievement of the Saudi society itself.

- The success has come through the entrepreneurial skills Ayah acquired in her studies, while hosting her program at Fatafeat and taking extra courses. She mentions the role of her studies and professors who assisted her in her endeavors both formally and informally. She proudly mentions that the role of education specially related to the entrepreneurial skills including development of communications, sales and negotiations helped her a great deal. She attended short courses on the leadership, team building and time management.

- Ayah identifies the role of coaches and mentors as special to her success. She has been advised by mentor on diverse range of issues. She says whenever she faced a difficulty she contacted her mentor and sought the advice. Her mentor is a seasoned entrepreneur who went through the similar challenges and problems. She has received the assistance in the areas of business planning, operations and launching of the startup.
- Ayah has been instrumental in exploiting the social media. She capitalized the facts that 58.84% of population uses internet and 29.58% population has social media accounts. Similarly, 173% of population has mobile phone accounts which means that a large majority of people have more than one phone. A considerable 25.72% of population has active mobile social accounts (http://www.smartinsights.com/social-media-marketing/social-media-strategy/new-global-social-media-research/). Her strategy of creating social media accounts and reaching out to clientele has worked wonders. She has presence on . As according to same website Saudi Arabia ranks 6th on g+, 23rd on Facebook, 13th on You tube and 3rd on Twitter. This showed the potential of generating traffic and securing orders for her Pies. Annual growth in the uses of these social media is above 20% and she is confident of the success in future as well.

- Ayah identifies assistance from both the strategic and institutional level entrepreneurship ecosystem stakeholders as important foundation of the success of her start-up. She particularly mentions services of the chambers of commerce, banking sector and other initiatives of the Saudi Arabian government providing a number of motivational and encouraging assistance to startups like that from Human Resource Development Fund (HRDF) etc.

- The entrepreneur also believed that the right market conditions that include the demand of the product, her own marketing and business development expertise, right pricing and affordability served as important elements to succeed as well. The per capita income in Saudi Arabia is $52, 800 according to the CIA fact book and it provides a lot of flexibility to such businesses. People have money to spend on expensive snacks and related items. A very clear market opportunity existed that was identified by Ayah and then fully exploited.

- Similarly, the role of family played an important and vital role in success. Ayah received a lot of moral assistance from the family. However, she neither required nor the family offered any financial or coaching or mentoring assistance.

- The role of husband has been undeniable fact in success of the Ayah's Pie Paradise. He has been her coach and mentor, helped her maintain a balance between family life and the business. He also fully supported the business with money and encouraged, motivated, guided and also provided moral assistance.

Ayah is confident that the coming years would be even more successful.

Conclusions

Since 2016 the Kingdom has witnessed huge changes and it seems the social contract is under evolution. This appears to be true as the case narrates the role of society, family and husband to be more accepting. The coaches and mentors who are mainly male also have been laying a positive role in grooming the female to start and manage their businesses. The ecosystem at the strategic level has been very helpful by developing new policies and procedures which are more gender specific and geared to assist female owned enterprise. These stakeholders have penned the laws, statutes and rules to develop right market conditions for startups in general and female startups in particular.

The Saudi women like their counterparts elsewhere are pulled into success by their personal commitment and skills. These away from norm attitude and behavior has assisted a great deal to the startups. The social media is abuzz and the businesses of all types benefit from it in the Kingdom.

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Wellness Tourism:
Exploratory Analysis of Portuguese Consumers' Profile

Karen VILLARROEL
Instituto Politécnico de Bragança (IPB), Bragança, Portugal
a37879@alunos.ipb.pt

Alcina NUNES
UNIAG (Unidade de Investigação em Gestão), Instituto Politécnico de Bragança (IPB), Bragança, Portugal
alcina@ipb.pt

Abstract

Wellness tourism is a recent and fast-growing trend globally that plays a significant role in the economic development of many tourism destinations around the world. Portugal already possesses a range of wellbeing activities to offer, for instance, the thermal springs that can constitute a more authentic tourism regional/local destination. This type of tourism offer can boost regional economies, improving both tourists' and residents' quality of life. In such a context, this research work intends to understand how the Portuguese residents understand the wellness tourism activities, particularly the thermal offer and to identify a customer profile. A questionnaire was conducted, to guide businesses into the comprehension of market needs and expectations according to the customers' profile, and an exploratory statistical descriptive analysis has been applied. The results allow designing a set of strategies according to the profile defined.

Keywords: Wellness tourism, thermalism, consumer profile, Portugal.

Introduction

According to the United Nations (2010, p.1), tourism can be defined as "a social, cultural and economic phenomenon related to people's movement to places outside their usual place of residence, pleasure being the regular motivation". By this definition, it is possible to comprehend that movement is the basis of tourism. A reason why the pandemic situation generated by the COVID-19 is having a massive impact on this sector of the economy since it has been leading countries to close its borders, implementing quarantine procedures and lockdowns to reduce movement as measures to lower the containment curve. Due to the COVID-19 outbreak, the UNWTO registered a 22% global decrease in the international tourist arrivals, only in the first quarter of 2020, with a possible reduction between 60% to 80% for the year (World Tourism Organization, 2020). Although the borders have been reopened, and travelling is allowed again, the sector's damage will probably be even more significant.

The current scenario demands tourism destinations to re-evaluate its strategies and adapt them to the current circumstances and market demand, to be able to overcome the negative impact of the pandemic. A proof of this trend is that some countries are studying the virus's influence in the consumer's behaviour, for instance, Portugal (Turismo de Portugal, 2020). This type of stimulation to the tourism comes from the fact that this sector represents a critical economic development source due to its impact on the economy, the environment, the local population of the tourism offer and the visitors themselves (United Nations, 2010). A fact that occurs due to tourism influence on the region/country's GDP, the increase in the employment rate, and the rise in tax revenues related to the tourist's spending in the destination (Romanova et al., 2015).

However, the formulation of special programs and action plans to support, stimulate and strategically invest in tourism is not something that emerges from the current crisis. It has been an international concern since globalisation has facilitated travelling. For instance, Portugal has designed a strategic plan named *Turismo 2020,* which is based on

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several trends related to economy, demography, culture, transportation, technology and environment, to increase its tourism revenue (Turismo Portugal, 2014).

From many different types of tourism, this research work discusses a modality related to an idea that has become a flourishing and profitable movement in the 21st century: the wellness tourism Global Wellness Institute (2019). With roots on ancient civilisations, wellness is a modern concept defined as the individual active chase of activities, choices, and lifestyle that lead to a state of health and wellbeing (Global Wellness Institute, 2019). Seen by some authors as a niche to be explored (Stara, Jana & Peterson, 2017) or as a product that evolved from a niche demand to a more mainstream holistic appreciation (Pyke et al., 2016), the fact is that wellness can lead to relevant economic developments in smaller tourism destinations.

The increased interest in wellbeing and a healthy lifestyle can be used by Portuguese businesses as an opportunity to boost demand on cities that have a wellness offer, such as thermal springs and resorts, and are located mainly in the central and northern regions of the country. However, before making investments to profit from this favourable market circumstances, private firms and public authorities must understand the wellness consumers' profile, needs, and expectations. By this understanding, it can be possible to formulate marketing strategies, increase awareness related to the concept of wellness tourism and then invest in innovative and differentiate products and experiences to enhance competitiveness (Fyall et al., 2013).

To guide the type of market profiling business could develop to study their consumers, this paper has created an online questionnaire to collect data about the tourism habits of the residents of Portugal. It was designed to analyse the participants' particular characteristics and evaluate the role they may play concerning the degree of familiarity with the concept of wellness tourism. The data collected through the questionnaire has been the object of exploratory descriptive analysis that allowed to start to understand the profile, needs and expectations of potential Portuguese consumers and therefore to begin reasoning about possible marketing strategies that boost the activity. The comprehension of the customers' market profiling allowed the development of a set of marketing strategies applicable to each particular demand and expressed the importance of collective work among private business and public authorities to create a complementary and unique offer in each wellness destination. A collaboration that can build a business opportunity and generate benefits for all parties involved, bringing economic development to the tourism destinations and increasing the quality of life of both tourists and locals.

The paper is divided as follows. Next section presents a brief literature review on wellness tourism for a better understanding of the topic. The section of literature revision is followed by a section that describes the methodology applied to obtain and treat the data. The results are presented in section 3. The paper ends with a section devoted to conclusions.

Literature Review

It is not only the nature of the trip that defines tourism, but it is also related to the journey's objective (Lickorish & Jenkins, 1997). As already mentioned, this study's object is focused on wellness tourism, which is a type of travel related to the seeking of maintenance or increase of personal wellbeing (Global Wellness Institute, 2018). For some scholars, this type of tourism can be understood as a subgroup of health tourism; however, this category emphasises medical-treatment-oriented activities (Lehto & Lehto, 2019), that travel to seek treatment for some medical condition. By contrast, as defined by Romanova et al. (2015), wellness tourists are generally formed by people on the pursuit of preserve or increase their health. The Global Wellness Institute (2018) explains that there are two types of travellers included in this tourism market. Primary wellness travellers motivated by wellness to travel or choose their destination based on its wellness offer. Secondary wellness travellers seek to maintain wellness or engage in wellness activities during any travel, representing the most significant part of the wellness travellers.

Wellness tourism is a type of travel that deserves attention for many different reasons, not only because it has become a health-conscious international trend (Stara, Jana and Peterson, 2017) that influences a person's wellbeing and due to its economic representativity. Even though the wellness tourism does not represent a leading type of tourism if measured in the number of tourists, it has a tremendous positive economic relevance on the segment due to the high costs usually attributed to this service (Romanova et al., 2015). According to the Global Wellness Institute (2018), this tourism segment represented a growth twice faster than general tourism in 2017, generating a $639 billion revenue among many elements of the global tourism industry in the same year. Moreover, the average expenditure of wellness travellers per trip is 53% higher than the typical international tourists and 178% more than domestic tourists.

Understanding the concept, the benefits and the demands of the market concerned with wellness tourism can help develop or strategically enhance products to fulfil this need. Being aware of this prosperous industry allows

companies, regions and countries to promote wellness activities and design a new market positioning related to this type of tourism (Stara, Jana, & Peterson, 2017). It is also an opportunity for business and tourism destinations to invest in creating a strategic advantage based on wellness orientation (Lehto & Lehto, 2019).

Based on the knowledge acquired about elements that contribute to traveller's wellness (Lehto & Lehto, 2019), marketers can detect a set of competitive advantages among location, quality of service, image, price (Romanova et al., 2015). To that end, it is necessary to establish an objective destination plan that should consider all factors of the internal and external environment, especially the human resources, which help to identify the uniqueness of the destination (Borseková et al., 2015). Moreover, the tourism staff, usually highly qualified labour, can be considered one of the essential sources for shaping the tourism offer's competitive advantage (Panasiuk, 2018).

When a product differentiation and positioning strategy is selected aiming to increase travellers' wellness by improving their personal experiences and expectations, an intangible tourism product is created (Lehto & Lehto, 2019; Romanova et al., 2015). Furthermore, positioning must consider target-consumers and attributes and the organisation's ability to communicate its offer to effectively create relevant differentiation aspects for their tourism destination brand (Brito & Pratas, 2013). Moreover, Brito and Pratas (2013) argue that tourism destination brands must have its concept well defined to meet the needs and desires of the tourist segments to target, using marketing concepts and tools to promote the tourism destinations. Another thing to remember is that wellness tourism offers have to be well advertised and diversified to avoid one of its main challenges: seasonality.

The travel process starts before the trip, while travellers are searching for information related to tourism destinations, mostly gattered online (Lehto & Lehto, 2019). A distribution channel that can also be an advantage when well-managed due its convenience, ease and comfort of purchase methods (Nizioł & Żeglen, 2017). A reason why the promotion of tourism destinations can make use of traditional and mobile websites (Romanova et al., 2015), offering the possibility of online booking and interactive communication (Lopes et al., 2013). It can also happen through partnerships with the destination's tourism authorities (Pongwat, 2017), and social media applications, which can provide a variety of multimedia information (Roque & Raposo, 2013). Digital brochures, printed media and television could also be considered (Brito & Pratas, 2013) if it suits the business purposes and size.

Another attractive option could be the design of "tourism packages" offering a variety of goods and services provided by the region around the main attraction that could serve many different purposes, expanding sales and increasing the economic development of that destination (Nizioł & Żeglen, 2017). Innovative strategies that can give wellness tourism providers a more effective method of reaching consumers create favourable conditions to provide complementary services and generate opportunities to cooperate with other stakeholders of the tourism area (Panasiuk et al., 2016). In the opinion of Pyke et al. (2016), the concept of wellness as a product has moved from a niche market to a more fundamental type of demand, representing an opportunity that offers potential economic growth for the tourism destination that includes it in their business strategies. Innovative and marketing orientated approach can promote wellness tourism destinations to develop healthy lifestyles and increase wellbeing to attract visitors who are willing to have this type of experience (Pyke et al., 2016).

Wellness tourism consumption is a business that brings benefits for all its stakeholders. Firstly, to the traveller through their worthwhile personal experiences. Secondly, it offers new possibilities for creating new job positions, increasing employment, attracting tourists and inhabitants, developing tourism orientated entrepreneurs, and stimulating the social-economic of the destination (Borseková et al., 2015). According to Romanova et al. (2015), health and wellness tourism are strongly influenced by social, national and cultural traditions and peculiarities related to geographic locations and local features. In addition to this fact, understanding the demands of the wellness market can lead its tourism sector to develop services and products to address the current trends of this market (Stara, Jana and Peterson, 2017). Furthermore, it allows business and countries to design and promote wellness tourism to attract tourists even out typic tourism high seasons.

Portugal is a country in the top ten wellness tourism market in Europe (Global Wellness Institute, 2018). The thermalism is one of the seven subproducts of health and wellness tourism that Portugal can provide, including Thalassotherapy, SPAS, Medical Tourism, Aesthetics Tourism, Holistic Tourism and Climatism (Silva & Carvalho, 2011). Significantly, the country is known for its vast and varied range of thermal resources, with a thermalism based mostly in the medicinal, therapeutic, and social aspects of this offer and SPAs and wellness facilities (Cavaco et al., 2008). The country's Northern region has the most significant quantity of thermal resorts and SPAs, 21 in the total, which represents 40% of the national offer (Porto e Norte Termas, 2016). Still, other areas in the country also provide a thermal offer, for instance, the Center region and Açores.

It is possible to understand that the concept of wellness provides various related products to be explored by the tourism sector, promoting a healthier lifestyle to visitors and an economic development to the destination as a whole. However, Portugal's thermal springs and resorts should understand the new expectations of tourists and follow recent international trends in wellness tourism, providing unique and creative experiences to visitors. Moreover, the atmosphere linked to structure, staff, and activities must be attractive and match the new market requirements for this sector. Another key to remember when rebranding the country's thermal facilities is to establish network connections and partnerships between the resorts and other tourism offers and products in the region where the company is based. Each area of the country has a different set of tourism particularities in its geography, variety of products and services, that make the place unique serving as a complement to the thermalism present in the same region can provide exclusive trips to customers. This one-of-a-kind services and goods package can help the destination to gain a competitive advantage in the market, which will increase the economic development of that particular place, and in a further instance, also improving the Portuguese income.

Above all, this joint effort must have the Portuguese national and regional tourism organisations' participation through policies and investments in the sector. Their central role should be the support of opportunities to businesses overcome financial constraints, design new national marketing strategies that can attract investors and create a diversified operational structure of networking, which may increase the chance of companies succeed in the market (Nizioł & Żeglen, 2017). Furthermore, the government plan strategies must increase investments in the education of tourism-related courses to provide better prepared and highly qualified labour force to the market, which would raise the quality of a significant part of production factors in the tourism economy (Panasiuk, 2018). As a wellness activity, the thermalism in Portugal has to meet new demands to change its image, innovate and conquer new markets, and survive and prosper. To be more competitive and attract more tourists, Portuguese companies must follow international trends in online access to information, quality and innovative infrastructure, plus propose an extensive and original range of programs, treatments and activities (Gonçalves & Guerra, 2019).

Methodology

In order to achieve the objective of this research work was necessary to collect primary data. The data collection relied on a questionnaire that was promoted online due to the limitations generated by the COVID-19 pandemic. The safety measures adopted to lower the contamination numbers lead to the temporary closure of many SPAs and thermal springs, making it almost impossible to apply the questionnaire with their customers. Furthermore, due to the social distancing required and mobility reduction during the pandemic, travels to question people in person had to be avoided. The questionnaire has been formulated with quantitative and qualitative questions, based on two questionnaires already tested and present in the literature review. The first is a questionnaire made by the Turismo de Portugal (2006) to analyse the profile of the consumer of health and wellness tourism in Portugal. This paper also selected some questions from Luo et al. (2018) that aimed to correlate the quality of life and the wellness tourism experience. Moreover, some items of those questionnaires were added, excluded, or adapted to fit this study's purpose.

The questionnaire was distributed randomly online, and it was asked to Portuguese residents answer it between September and October 2020. During two months was possible to collect 121 valid answers from all over the country.

The questionnaire's variables proportionate a better understanding of the tourist profile related to its gender, age, educational level, occupation, marital status, household income, nationality, and residence local. Furthermore, this research also aimed to gather information about their tourism habits, such as the motivation to travel, media used to find information related to the destination place, methods used to reserve and acquire activities and accommodation. Plus, for how long, when, and how many times the respondents prefer to travel, also answering if they are more inclined to do a solo or an accompanied trip. The last part of the inquire was designed to comprehend if the tourists know or would like to discover the concept of wellness tourism.

The data is analysed using descriptive statistics for the explanatory variable and the logistic regression method to define the Portuguese residents' profile statistically.

Results and Discussion

As explained, the questionnaire was divided into three different categories. The first two are general questions for all respondents. The last part leads to a particular set of items displayed accordingly to a positive or negative answer about being familiar with the concept of Wellness tourism.

The first stage of the questionnaire (Table 1) is related to the personal profile of the 121 participants.

It is possible to identify some peculiarities at this stage, starting with the difference related to gender in interest in answering a questionnaire associated with Wellness tourism. The number of female participants is almost double of the male respondents, representing 80 members (66,9%), which can illustrate that women are more sensitive to the appeal of this type of tourism. At the same time, 77 of the answers are coming from people that are more than 36 years old (63,6%). Concerning the level of education, 81 persons do not have an academic degree, which may connect with the oldest part of the mature participants. Regarding occupation, 66 people were employed (54,5%), while the rest were students, retirees or unemployed. A slightly most significant part of the answers received was from single or widowers participants, characterising 67 people (55,4%). The majority of the respondents earn less than 2.000€ per month (63,6%). Almost all participants were Portuguese, responsible for 106 observations (87,6%), while 70 responses (57,9%) came from the North of Portugal.

Table 1: Socio-demographic profile

Variable	n	%	Total (n)
Sex			
Female	80	66.1	
Male	41	33.9	121
Age			
Young (18-35)	44	36.4	
Mature (36+)	77	63.6	121
Education			
Basic education	81	66.9	
Graduation	40	33.1	121
Occupation			
Employed	66	54.5	
Other	55	45.5	121
Marital State			
Married	54	44.6	
Other	67	55.4	121
Income			
<2.000€ month	77	63.6	
>2.000€ month	44	36.4	121
Nationality			
Portuguese	106	87.6	
Other	15	12.4	121
Region - NUTS II			
North of Portugal	70	57.9	
Other regions	42	34.7	121

The next table (Table 2) also represents universal questions concerning the participants' tourism habits, a part of the questionnaire that aimed to understand, for instance, the respondents' motivation to travel, among other tendencies.

It was possible to identify that the seeking of wellness is not the first desire when travelling, corresponding to only 25 of the answers (20,7%), almost one-third of the first position related to discovering new places. Amongst the variety of information sources, with the technology advances, the internet is the top option of search by being the primary source of 61 people (50,4%) using the offers and destinies websites, plus 17 answers (14%) of people that use social media as a research tool.

Their acquisition or reservation of tourism attractions is also mostly done online, using the attraction's websites, related to 67 answers (55,4%). The first two positions among the participants' favourite options are nearly tied in which concerns accommodation since hotels with 4 or 5 stars have received 32 of the choices (26,4%) and hotels with 1 to 3 stars were the most used accommodation of 31 people (25,6%). Associated with the travel itself, 45 respondents (37,2%) do not have a preferred time to travel, the average length of 3 days to one week was the choice of 94 participants (77,7%) and half of the inquired people travel two times per year, representing 61 of the answers (50,4%). Moreover, their last habit questioned was related to travelling company, to which 90 people (74,4%) have answered that family is with whom they are used to travel.

Table 2: Tourism habits

Variable	n	%	Total
Which is your motivation to travel?			
Seeking of Wellness	25	20.7	
To discover new places and people	69	57.0	
To escape the routine	3	25.0	
Entertainment	24	19.8	121
How do you search for tourism offers and destinies? (Select the primary source of information)			
Travel agencies	13	10.7	
Brochures and/ or catalogues	1	0.8	
Specialised press	5	4.1	
Family and friends	20	16.5	
Social media	17	14.0	
Tourism offer/destiny website	61	50.4	
Other	4	3.3	121
Where do you acquire or reserve a tourism attraction? (Select the main option or the one that is used the most)			
Travel agencies	27	22.3	
At the place/at the tourism attraction	17	14.0	
Tourism attraction website	67	55.4	
Other	10	8.3	121
Which type of accommodation are you used to reserve?			
Local accommodation	23	19.0	
Apartments or tourist villages	16	13.2	
Family's or friends' house	3	2.5	
Hostel	8	6.6	
Hotels (1-3 stars)	31	25.6	
Hotels (4 or 5 stars)	32	26.4	
Camping parks	2	1.7	
Guesthouses or inns	1	0.8	
Housing tourism or in the countryside	4	3.3	
Other	1	0.8	121
Which is your favourite period to travel?			
Throughout the year, regardless of the week	45	37.2	
During scholar vacations	39	32.2	
Long holidays	12	9.9	
Weekends	17	14.0	
Other	8	6.6	121
Which is the medium length of your stay when you travel?			
From 1 to 2 days	13	10.7	
From 3 days to one week	94	77.7	
From 2 weeks to one month	14	11.6	121
How many times do you travel along the year?			
One time	18	14.9	
Two times	61	50.4	
Three times	27	22.3	
Four times or more	15	12.4	121
You usually travel with…			
Friends	21	17.4	
Family	90	74.4	
Alone	10	8.3	121

This study is relevant because it can guide marketing strategies to stimulate the interest on week points revealed by the survey. For instance, the seeking of wellness can be better promoted by companies that work in this field, such as SPAs, Thermals, meditations camps, etc. The approach also can be designed using this research as it has shown that most of the tourists search on the internet for information and acquisition purposes. It can help a business to understand where to concentrate the marketing investments. The preferred type of accommodation, the period for

travelling, the length of the travel, periodicity of the trips and favourite company can be used as a guideline to create promotions and tourism packages specially designed for each group of tourists.

Among the overall participants of this questionnaire, 74 have responded that they are aware of the concept of Wellness tourism (61,2%). The Thermals is responsible for 24 answers (19,8%) related to which wellness tourism attraction they have already done. Moreover, the primary reason for 47 people (38,8%) to choose a wellness activity was due to their personal initiative, and 61 respondents would like to repeat the experience. Furthermore, 41 participants (33,9%) answered that they had acquired the wellness activity with a tourism package. This information is pertinent to stimulate the collaborative work amongst tourism destinations that can create partnerships in that region, making the offer in that region a unique and exceptional experience for the tourist. This type of package can increase the income of that region, as shown in the literature, by being a win-win opportunity for locals, business and travellers.

From the initial 121 participants, 47 (38,8%) were not familiar with the concept of Wellness Tourism. However, 42 (34,7%) of them said they were interested in discovering this type of experience. Among the respondents, 35 people (28,9%) affirmed that they knew that thermals are a wellness activity even though they could not fully understand wellness tourism. Moreover, 28 participants (23,1%) have visited before a thermal facility and would like to repeat the experience. The number of negative answers can give to wellness activities business, especially thermals SPAs, the notion of how this type of tourism offer lacks promotion, proportionating to companies the necessary knowledge related to the formulation of new marketing strategies.

The profile of the participants that know what wellness tourism is is mostly formed by women (74,3%), mature people (60,8%), with an academic degree (71,6%), employed (56,8%), not married (60,8%), having an income lower than 2.000€ per month (56,8%) and predominantly from the Northern region of Portugal (51,5%). The group of the ones that know the concept and enjoy repeating the experience is composed generally by women (77%), mature participants (57,4%), that pursue an academic degree (72,1%), employed (55,7%), single or widowers (60,8%), who earn less than 2.000€ per month (62,3%) and are residents of the North of Portugal (51,7%).

The data clarifies that people that are familiar with this type of tourism and tourists that know the wellness concept and would appreciate repeating the experience is very similar. This characterisation can provide to business an idea of which type of approach to use with those consumers that already know and enjoy wellness activities, that could be more related to the reinforcement of customers' loyalty. By contrast, companies can develop strategies to captivate tourists that are unfamiliar with wellness offers or that for some reason do not wish to repeat a wellness experience.

People who ignore the meaning of wellness tourism but are interested in discovering are constituted by women (54,8%) and mature people (66,7%). Still, this time, tourists with no academic degree are more interested in learning this concept (71,6%). Employed people and not married are tied, each group, respectively, is formed by half of the respondents (50%). Simultaneously, the other variables remain similar to previous cases. Participants having an income lower than 2.000€ per month represent (78,6%) and are predominantly residents of the Northern region of Portugal (80%). Accompanying the negative answers related to the knowledge about the wellness concept, at the beginning of this questionnaire section, a definition of this type of tourism was given to allow the respondents to be familiar with the term. Among the 47 participants unfamiliar with wellness tourism, 42 were interested in trying it for the first time (89,4%). By having this result, companies can understand that a share of the market is willing to experience a wellness activity after learning the meaning of this particular offer. For instance, businesses can create special promotions for tourists with a low income or specific packages designed to people who are not married but would like to travel alone, with friends or family to profit from some time of relaxation.

Final Remarks

From the managerial perspective, for wellness tourism businesses established in Portugal, mainly if they are focused on the thermal segment, this type of market study is essential. It allows resorts and SPAs managers to understand customer' profiles, needs and expectations and formulate future strategies to first, increase the awareness about this tourism offer to then, through their satisfaction, motivate customers loyalty.

The knowledge related to the market demands associated with efficient marketing and managerial approaches can result in a better performance for the company, leading to a more remarkable economic development of the region if tourism businesses work in collaboration to proportionate to consumers a unique experience. All factors associated can increase the number of tourists returning to the wellness activities to profit from all offers available in that tourism region, generating a better quality of life for locals and visitors (Fyall et al., 2013). A reason why national and regional governments must invest in strategies and policies to develop public-private partnerships in tourism destinations, which can bring benefits to all wellness tourism stakeholders (Romanova et al., 2015).

Through packages or promotions, this unique product created by an association of regional wellness companies, accommodation and food sectors, can increase the competitivity of the tourism industry in that place. Among people familiar with wellness tourism, 55% had answered that when they acquired a wellness activity, they have purchased this offer with a tourism package, which illustrates the importance of this collaboration to increase product differentiation. Moreover, the creation of wellness services packages associated with other tourism offers can also increase the awareness of the meaning of this type of experience, boosting the level of interest in this variety and reach different market segments (Gonçalves & Guerra, 2019; Nizioł & Żeglen, 2017; Panasiuk, 2017).

When product differentiation and positioning strategies are adopted, marketers can define a set of competitive advantages, that can be chosen among image, location, quality of service, physical attributes and price (Romanova et al., 2015). For instance, a rebranding of the wellness thermalism could change the impression that this activity is only for the elderly with health problems. By promoting this experience as a source of relaxation and a healthy lifestyle focused on recreation (Boekstein, 2014), young people could be more interested in experiencing this tourism proposal. The wellness industry is also more associated with female public, as proved here - women are more aware of the wellness tourism concept. The diversification of products focused on male consumers, such as men-only SPAs or male-related types of treatments (Tawil, 2011), could work as an image transformer, raising men's interest in this segment. As 74,4% of the participants declared that they usually travel with their families, location and infrastructure can also play a role in promoting wellbeing initiatives (Pyke et al., 2016), when designed to entertain tourists of all ages and genders.

As analysed by this paper, the general perception is that wellbeing related types of tourism are formulated to upper-class consumption (Pyke et al., 2016), that has a better-understood concept among high-income people, as this paper has confirmed with the survey results. However, amid the group not familiar with wellness tourism, the most interested participants were those with income lower than 2.000€. Special promotions developed to target this group, as day-spas or weekend packages, could break the barrier related to the perception of a tourism offer only to elites and stimulate the low and middle classes consumption of wellness activities. Management actions can also help solve another challenge faced - the seasonality (Romanova et al., 2015). This kind of promotion can be offered along the entire year, to attract tourists with different activities even in the low season.

Even though the Northern region of the country is responsible for the second-largest thermal offer, its residents are less familiar with the wellness concept than the rest of Portugal, which illustrates the lack of promotion. Furthermore, the North of Portugal's thermalism lost 19,1% of its customers in 2014 (Turismo de Portugal, 2015), which demands a new approach if this type of tourism aims to be profitable and competitive. Another vital information given by this study is that if put together websites and social media, more than 64% of the respondents have affirmed that they use the internet as a primary source of information related to destinations and tourism activities. The internet, accompanied by word of mouth (the advice of friend or family) and their own experiences, is one of the main channels of communication for wellness businesses (Romanova et al., 2015), a reason why companies and destinations should increase their promotion on this media.

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Organizational Culture Impact on Talent Management

Gabriela Alina PARASCHIVA
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, gabriela.paraschiva@student.upt.ro

Dana FATOL
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, dana.fatol@student.upt.ro

Diana ROBESCU
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, diana.robescu@student.upt.ro

Anca DRAGHICI
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, anca.draghici@upt.ro

Larisa IVASCU
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, larisa.ivascu@upt.ro

Abstract

Talent management has been recognized as an interdisciplinary field of research and practice that support strategic and/or global human resource management. The literature review on talent management and the critical review of relevant global surveys (of McKinsey in 2018 and Deloitte in 2020) developed in this field have proved the interest of exploring cultural influence on talent management activities. Started from these points, this article aims to highlight the influence of organizational culture plays to the complex and emerging field of talent management. The research is based on the qualitative evaluation which have underlined that organizational culture has a highly essential effect on managing talents, and that it is not enough to identify, retain, develop talented employees but also it is important to develop and nurture organizational culture that supports the development of talented employees. Thus, talent management provides a way to focus and facilitate its tools, which has started to install a talent mindset in the culture of an organization, with focusing on employee's engagement to develop a framework for streamlining the talent management process. This study concluded that organizational cultures that have a strong strategic vision and a strong focus on ethical high-performance behavior, have a strong effect on talent attraction and retention, are highly commitment to employees' career development and have a very strong motivating work system.

Keywords: Organizational Culture, Talent Management, Models, Strategic Human Resources.

Introduction

In the last twenty years, the "talent management" (TM) topic has become a growing one, most related to a new transformation in the human resource management (HRM) practices. The meaning and definition of TM is associated with "talent strategy", "succession management", "human resource planning", "strategic human resource management" or "global human resource" are often used interchangeably (Lewis & Heckman, 2006). It has been also recognized that the scientific discourse still largely views and understand TM as still a not very well defined an understand concept, lacking rigor and relevant empirical studies (Garavan, 2012; Sparrow & Makram, 2015; Gallardo-Gallardo & Thunnissen, 2016; Thunnissen, 2016; Sparrow, 2019; Berger, 2020).

Consulting companies and TM practitioners have recognized that employers are concerned of new technologies (e.g., artificial intelligence applications for talent acquisition, the use of cloud technologies (Albert, 2019; Sivathanu & Pillai, 2019)) and other innovative approaches in the field (as specialized algorithm or data mining technologies that

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could predict and anticipates employees behaviour, reactions (Mihalcea, 2017; Bai, 2019)). Undoubtedly, these new methods and tools for TM are not only shaking the traditional and well-established practice of HR but they could be considered as threats and/or opportunities for TM (Sparrow, 2019; Berger, 2020).

There have been recognized that TM focus in HR is no longer a "war for talent" (Michaels et al., 2001). Current in this field the battle is now about how to engage and retain valuable employees by offering them interesting and challenge work experiences (real and digital, too). Talent acquisition process is now being challenged to think differently about the recruitment and selection processes; once the person is accepted for the hiring process, TM becomes the organizational architect of the employee experience where the physical environment, technology and culture are integrated (Morgan, 2017). Thus, a win-win-win situation is generated for the employer, the employee, and ultimately the customer. Furthermore, there have been recognized that "TM practices are no longer meeting the needs of their workers. Instead, employers focus their attention on developing a meaningful employee experience to attract and nurture the talent they need. A new breed of talent management practitioners is developing an HR stack that includes other management frameworks such as design thinking, agile management, behavioral economics, and analytics to augment their HR competencies" (Claus, 2019).

The major changes that face TM have proved an extension of the filed by integrating knowledge from a large diversity of sciences, not limited to managerial sciences only. From the practical perspective, companies are now facing with the dilemma of how to address TM activities and reformulate strategies considering today's global pandemic and economic challenges (Fatol et al., 2020; Caligiuri et al., 2020; Berger, 2020).

In this context, the purpose of this paper is to apply knowledge from disciplines adjacent and cultural perspective to TM and look at how the new wave is currently impacted the organizational practices and how new approaches could be designed (perhaps no longer even called talent management or HR as anticipated by the study of (Claus, 2019)). Recent studies have anticipated a disrupted current of paradigmatic thinking (Liu et al., 2020; Praise & Kah, 2020), the present paper focuses on the debate of the impact that organizational culture can have on TM; the proposed reengineering referring to the analysis of some models and approaches from the dynamic space of TM practices. The analysis aims to identify new ways to integrate cultural dimensions in existing and adopted TM models by organizations in the desire to enrich the HRM field of science. This paper uses qualitative information collected by the authors through the study of literature in recent years in the field of TM. The structure of the research approach includes: (1) a brief literature review of the TM field through which it was wanted to identify the way in which the culture - TM relationship has been exploited so far. In addition, some models of characterization of the culture will be presented and some evidence from practitioners will be debated; (2) to proposes a new architecture for TM and a set of new competencies for TM (which must be held by practitioners in the field) to add value to organizations and the re-engineering of TM processes. Finally, the conclusions of the study will describe some broader issues that individuals, employers, and society need to explore and address in the future of TM.

Literature Review

In the next sessions there will be presented a brief overview of the literature in the field of TM together with some facts from global or international surveys developed by prestigious consulting companies.

A brief synthesis of TM

Generally, TM is considered a continuous process that involves attracting and retaining high quality employees (very talented in terms of the need of an organization), skills development and their continuous motivation to improve their professional performance (Schiemann, 2014; Kestilä, 2020). The main goal of TM is to create a motivated and continuously involved workforce that will remain within the organization in the long run (Momtazian, 2020; Berger, 2020). According to the proposed processual perspective in TM (or also known as TM process model or TM lifecycle model), Figure 1 described a related model. This perspective into the TM field has been associated with the implementation of organizational strategies to improve productivity through upgraded processes for attracting, developing, retaining and employing individuals with requisite skills and aptitude to meet contemporary and future business requirements (Kestilä, 2020).

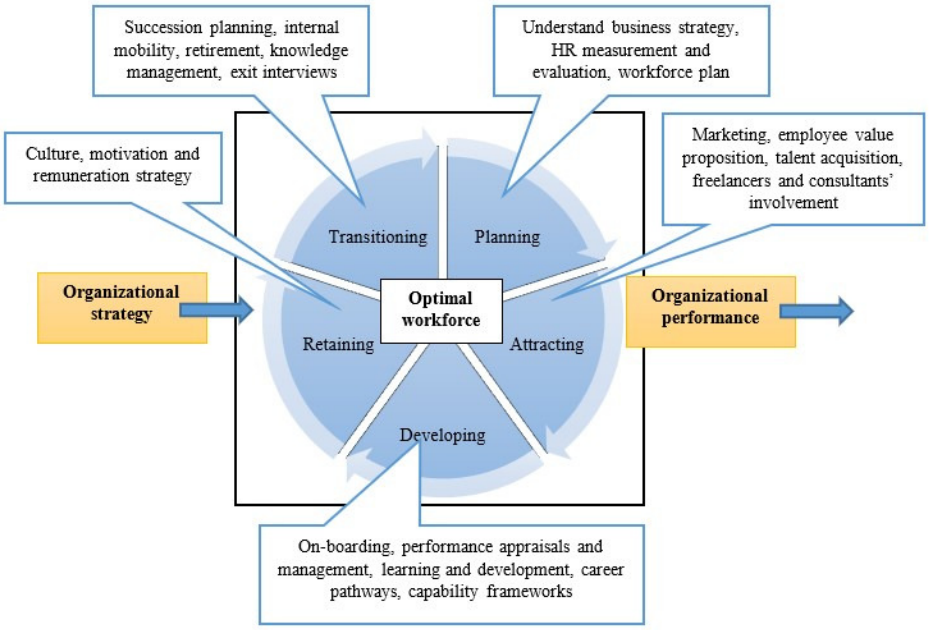

Fig. 1: A processual model of TM (adapted from (Momtazian, 2020))

Furthermore, the processual model of TM has been defined in a variety of shapes and that is most because of the different context where it has been implemented. As supported by the literature and the practice, there is no standardized or general valid model for TM, some HR professionals have proposed excellent models that any organization can use to define their own TM framework and the following, the TM strategy (Thunnissen, 2016). Finally, there must be observed that the processual perspective in TM, the TM process model or TM lifecycle model are the first approaches in the field, and they were meant to define TM and to create a general framework of implementation (Schiemann, 2014; Kestilä, 2020).

Chronologically, the next approach has been defined by the "integrated model of TM" is another trend in the field, and it has been associated with HRM activities integration. This approach describes an integrated approach to recruiting, development, performance management, compensation, development planning, and learning. The goal in this approach was not only to make the HRM more effectively and efficiently, but more importantly to create an integrated system of methods and tools for managing the human side of enterprise which lets the organization rapidly and effectively respond to business needs (Egerová, 2013). The concept is almost 10 years old and it suffer different changes including a TM Maturity Model (as described in (Bersin, 2015a) published by Deloitte). This approach is still used for creating sustainable competitive advantage (Rabbi et al., 2015; Stoyanova & Stoyanov, 2019; Claus, 2019) or organization excellence (Berger, 2020). Table 1 presents a more actual form of this approach as supported by the research of (Minocha & Hristov, 2018).

Table 1: A framework of TM integrated model (a synthesis from (Minocha & Hristov, 2018))

ASPIRE →	ARTICULATE →	ACT →	ACCOMPLISH
Business imperatives Stakeholders experiences Metrics of success Values and culture	Industry / Job	Hiring Development Performance Succession, planning and retention	Workforce impact
	Competency model		Customers impact
	Individuals		Business impact
Define organization identity	**Translate organization's vision into TM requirements**	**Align and harmonize TM processes**	**Measure and evaluate results**

With this short overview of the main approaches in defining the TM model there could be concluded that: (a) TM processes and activities are strongly aligned with business strategy; (b) There is not explicitly considered the cultural perspective on defining a TM model or a related approach. Some authors weakly touch the subject by referring to organization identity and brand, in connection with the creation of performance-oriented culture that could stimulate TM.

TM from the organizational practice. Identifying the key role of cultural impact

This part of the research is based on a critical review of two global surveys developed in the field of TM. Debates were made by exploring cultural influence on TM activities, practices, and the potential of organizational cultural dimension for an effective TM.

a. The McKinsey Global Survey from 2018 supports the idea that TM has a positive effect on business performance and. The study results suggest three practices that are most closely link with effective TM (Table 2): rapid allocation of talent; HR specialists' involvement in developing exiting, interesting employee experience; a strategically minded HR team.

Table 2: Survey results on organizational practices that are most closely link with effective TM (extract from (McKinsey & Company, 2018))

#	Practices that are most closely link with effective TM	Standardize regression coefficient
1	Movement of talent among strategic projects as priorities arise and dissolve is fast or very fast	0.163
2	HR function ensures positive employee experience across employee life cycle	0.143
3	HR leaders have comprehensive understanding of organization's strategy and business priorities	0.114
4	Employees understand organization's overall strategy	0.094
5	Organization's executive team is moderately or very involved in TM	0.093

Respondents in the McKinsey Global Survey (2018) who say all three practices are in place (just 17%) are significantly more likely than their peers to rate their organizations' overall performance, as well as the total returns to shareholders (TRS), as better than competitors' (Figure 2). They are also 2.5 times more likely than others to rate their organizations' overall TM efforts as effective. The debate on the results of the McKinsey Global Survey (2018) has concluded that there have been identified several areas of TM that could be positively influenced by the organizational culture:

- Rapid talent allocation (related to internal agility of HR);
- Positive employee experience (currently considered as having a huge potential for TM and that could mobilize organization creativity for attracting and retaining young generation talents);
- Strategic HRM which cannot be separated from organization's mission, vision, and values and which emerge from the organizational culture.

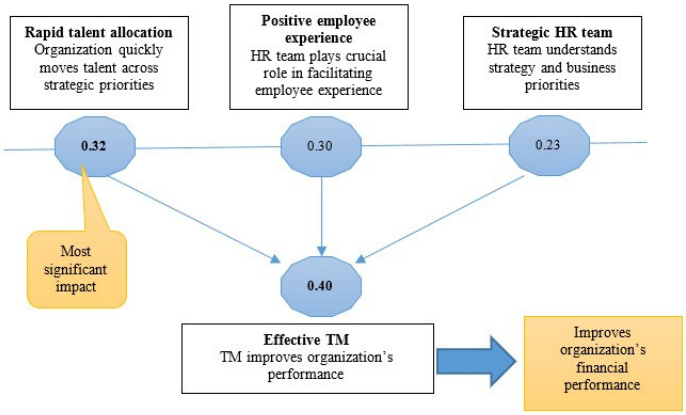

Fig. 2: The relationship between TM and organizational performance (McKinsey & Company, 2018)

b. The recent **Deloitte (2020) study "Talent Edge 2020: Blueprints for the new normal"** (the second longitudinal survey series after the last one published in 2010) has exploring talent strategies, concerns of global companies, and unfolding employee trends as companies confront a new set of challenges that we expect will influence the next decade and beyond. Two key ideas have arisen from this study:

- "Nearly three in four executives surveyed predict talent shortages in research and development (R&D). Companies are increasingly challenged to develop the next generation of leaders: looking at the more complex and challenging global business environment and the pending retirement of Baby Boomers and senior leaders, many executives expressed concern over their companies' leadership development programs and pipelines;
- Executives who participated in this survey believe developing leaders and succession planning is the current top concern and talent priority. They also believe this will be the number one talent priority three years from now;
- More than four in ten executives surveyed (41%) rated competing for talent globally as one of their most pressing talent concerns— the highest of any answer in the category;
- Companies self-described as "world-class" have a clear sense of the pressing talent issues three years from now and are more likely to make investments in creating career paths and challenging opportunities for employees (46% for "world-class" firms vs. 36% for all others), developing leaders and succession planning (48% vs. 36%), and recruiting hard-to-find skill sets (42% vs. 29%);
- Companies with a retention plan reported they will ramp-up financial and non-financial incentives in the year ahead: 69% will "significantly increase" or "increase" their focus on compensation vs. 48% of those without a retention plan; 76% of those with a retention plan will expand benefits vs. 55% without a plan; and 70% with a plan in place will boost nonfinancial incentives vs. 52% of those without a plan".

Furthermore, Deloitte study (2020) has identified that companies (considered in the sample) differentiate themselves by culture, compensation, and future opportunities offer to their employees:

- "Most executives surveyed believe their companies are doing a good job distinguishing their employer brand in the talent marketplace;
- More than half (53%) believe their employer brand is an important differentiator in the talent market and 21% describe it as "world-class" (see Figure 3);
- When asked which talent retention initiatives to set them apart, surveyed executives led with company culture (28%), followed by benefits (27%), job flexibility (24%), compensation package (24%), and future career opportunities (23%)."

Companies' managers involved in the survey have recognized that they deploy different strategies to appeal to different generations, research results being synthesis in Table 3.

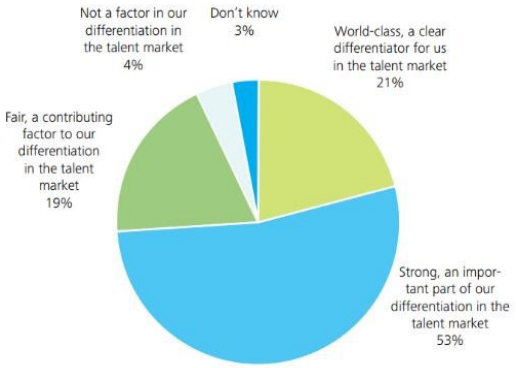

Fig. 3: How do you describe your organization's value proposition/employer brand?
(research results from (Deloitte, 2020))

Table 3: Most effective retention initiatives by generation (research results from (Deloitte, 2020))

Rank	Generation Y (under age 30)	Generation X (ages 30-44)	Baby Boomers (ages 45-64)	Veterans (over age 65)
1	*Company culture* (21%)	Additional bonuses or financial incentives (21%)	Additional benefits (i.e., health and pensions) (26%)	Additional bonuses or financial incentives (25%)
2	Flexible work arrangements (20%)	Additional compensation (19%); Strong leadership and organizational support (19%)	Additional bonuses or financial incentives (23%)	Additional benefits (i.e., health and pensions) (24%)
3	New training programs (19%) Support and recognition from supervisors or managers (19%)	Customized/individualized career planning (18%) Succession planning (18%)	Additional compensation (21%) Strong leadership/ organizational support (21%)	Flexible work arrangements (20%) Corporate social responsibility (20%)

The executives who participated in this survey looked favorably on a wide range of retention tactics. Still, one fact stood out - executives clearly believe different retention tactics appeal to different age groups within their workforces. As described in Table 3, the survey results demonstrate clear differentiations between the retention initiatives in the case of different generations:

- "When asked which retention initiatives would be most effective in appealing to Generation Y, non-financial incentives topped the list, led by company culture (21%), flexible work arrangements (20%), new training programs (19%), and support and recognition from supervisors or managers (19%);
- For Gen Y, additional compensation was ranked 14 out of 15 and "additional bonuses or financial incentives" was ranked 11 out of 15 (see figure 15);
- For Generation X, executives focused on financial incentives or career advancement opportunities, listing additional bonuses or financial incentives first at 21%, followed by additional compensation and strong leadership or organizational support (19% each), and customized career planning and succession planning (18% each);
- Baby Boomers were assumed to favor greater compensation and benefits, according to survey participants who cited additional benefits (26%), additional financial incentives (23%), additional compensation, and strong leadership (21% each). In addition to greater financial incentives (25%) and benefits (24%), executives believe Veterans are attracted by more flexible work arrangements and greater opportunities for community involvement through corporate social responsibility initiatives (both 20%)".

The Deloitte study (2020) confirms the already known characteristics of generations (from the perspective of their professional life), also argued by other authors. The most interesting thing is that Generation Y places great value on organizational culture when it comes to hiring, so it is obvious that TM practitioners must take this into account and be able to contribute to increasing the visibility of corporate culture (in collaboration with other specialists of HRM and communication and image at the company level). Thus, there could be imagine that using the Develop-Deploy-Connect model (Deloitte, 2017), organizational culture should be defined related to all three actions of TM, and this will positively impact organizational performance (Figure 4).

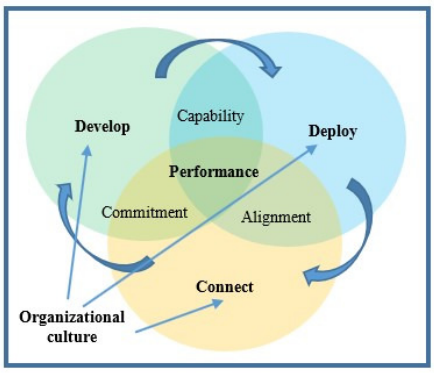

Fig. 4: Develop-Deploy-Connect model (adapted from Deloitte, 2017)

In different studies published by Deloitte during the last five years (Bersin, 2015b; Deloitte, 2017; Deloitte, 2020) some ideas have arisen when connecting organizational culture with TM. In the following there are presented a collection of this considerations (proved by the results of different studies developed by the consulting company):

- It is important to building an organizational culture of leadership and learning by providing development and learning opportunities to key talent segments and efficiently integrating leadership development with other areas of TM;
- Supporting a strong or high culture of learning;
- TM practitioners should encourage diversity and multiculturalism (e.g., in project teams) and support the development of an inclusive culture, through an inclusive TM initiative;
- Supporting a coaching culture which has been proved to be highly correlated with business performance, employee engagement, and overall talent retention;
- Strong interest in changing the culture to emphasize performance or develop a recognition culture. This type of cultural dimension must be implemented through the social reward systems (tools that give people points or kudos to reward to others), weekly or monthly thankyou activities, and a general culture of appreciating everyone from top to bottom;
- Encourages a culture of growth.

Furthermore, there can be observed that cultural perspectives in TM practices have been of great interest in the last five years and thus because the shift on generations at work that push HR specialists in finding new approaches, methods and tools for TM.

Integrating cultural dimensions into TM – a new proposed architecture

An overview of the current research about cultural influence on TM

Today, cultural challenges include cultural differences from country to country, the power of labor unions in different cultures, management style differences etc. Furthermore, multicultural dimension has been recognized as having a great impact on HRM (Liu et al., 2020; Caligiuri et al., 2020). Organizational culture theories have evolved in parallel with the globalization development. The culture of an organization represents the way things are done in the organization. It mainly revolves around the behavioral patterns and relationships. Culture is developed over a period in the organization by the people who work for it. To create a dynamic culture organization's core value and its vision is a fundamental requirement (Times, 2013). Corporate culture is an intensely rooted form of social control that influences employee behavior. Culture is omnipresent and works unconsciously. It acts as a glue that ties people

together and makes them feel part of organization. It motivates employees to internalize its core values as it gives them social identity. It helps employees understand organizational events, communicate more efficiently and reach higher standards of cooperation as they share common values (Schein & Schein, 2019). Furthermore, Mahajan (2019) associates several functions with organizational culture such as conflict resolution, control and coordination, motivation and competitive advantage. Furthermore, (Wombacher & Felfe, 2017) and (Canning et al., 2020) supported the idea that culture provides a sense of identity, generates organizational commitment as well as commitment to the organization mission and reinforces behavior standards. Authors also, emphasize that culture influences employee attitude and behavior in the organization which results in better commitment of employees towards organization and higher performance is delivered.

Organizations must face certain external (outside the organization) and internal (within the organization) challenges which call for a culture of external adaptation, internal integration and anxiety reduction. It is supported in the research of (Bhaduri, 2019; Mahajan, 2019) that organizations are not necessarily associated with only one type of culture, rather there will be different cultures depending upon the nature of task to be performed, determined goals, external environment, rules and regulations, policies and different types of employees. Furthermore, Mahajan (2019) has supported the idea that organizational culture impacts three TM components: recruitment, development and retention (considered as dominant activities in TM). Recruitment is the first point of contact for a candidate with the organization. Organizational culture is a determinant in attracting talent towards the organization (as supported previous by (Wilska, 2014; Wombacher & Felfe, 2017).

The organizational culture has a highly essential effect on managing talents, it is not enough to identify, retain, develop talented employees but also it is important to develop and nurture organizational culture that supports the development of talented employees. Thus, TM provides a way to focus and facilitate its tools, which has started to install a talent mindset in the culture of an organization, with focusing on employee's engagement (Al-Dalahmeh and Dajnoki, 2020). Also, AlDalahmeh and Dajnoki (2020) have concluded in their study that the literature focus on clarifying the relationship between talent management and organizational culture but most of the studies analyzed how organizational culture could affect the TM process and it found that they are deeply connected in an inverse relationship, which could be a further area for future research. As a conclusion, in the literature are presented few extended studies about organizational culture impact on TM and they recognized the importance of the culture but do not offer practical solutions or an existing framework. *3.2. A proposed architecture for TM*

In the new approach there have been preserved the idea that TM as a practice, involves a series of processes, arranged in a systematic manner for a streamlined execution (the TM lifecycle or the processual approach in TM). The traditional TM model is based on key HR activities and responsibilities as: selection, recruitment, TM, development and analytics, and performance management. The major flaw which renders this model obsolete in today's times is its operation in silo or isolation. This model lacked the element of integration and association with other organizational processes. Moreover, pertaining to today's dynamic, ever-evolving business scenario, the traditional model is deficient to deliver the elements of flexibility and accuracy as well (Aldrich, 2020; Berger; 2020).

A new TM architecture (considered as an evolute model) is one that is not only integrated with other business processes but is supported by actual technologies (Albert, 2019; Sivathanu & Pillai, 2019; Mihalcea, 2017; Bai, 2019)). The proposed TM architecture is relevant to today's times and adapts to the slightest shift in the business environment. Along with the use of emerging technology solution, the next-generation HRM tools like those using data mining and data analytics, artificial intelligence, online learning and training development (supported by digital libraries integrated into learning management system), neuroscience applications etc. also serve in this new approach. As described in brief in Figure 5, the architecture with a modernized way of functioning (e.g., using cloud technologies to share applications and databases, repositories) has integrated systems, systematic approach, accuracy, structured growth, and effective talent development. Future research should consider the TM architecture operationalization by considering a specific company or group of companies related to an industry, to develop in detail the specific methods and tools for an effective TM.

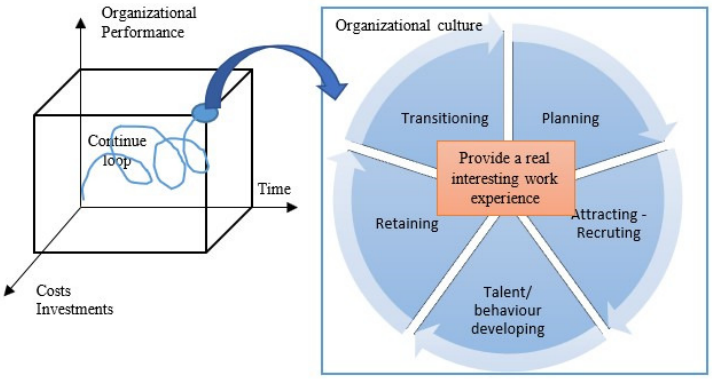

Fig. 5: A proposed architecture for TM

Conclusions

TM is facing new challenges from a large variety of phenomena that happen at the micro-, mezz-o and macroeconomic level. As we have shown in the literature analysis, there are still knowledge gaps that should be fulfil in the nearest future. In view of workforce trends, such as shifting demographics, global supply chains, the aging workforce and increasing global mobility, forward-looking organizational leaders must rethink their approach to TM to best harness talent (Bersin, 2015a; Bersin, 2015b). By doing so, leaders will be positively positioned to succeed in a highly competitive marketplace. In addition, organizational culture, employee engagement and leadership development have a significant impact on TM a tendence supported by the Deloitte studies in the last five years and other authors (Claus, 2019; Berger, 2020). Thus, TM could offer a pathway toward sustainable business success and performance. A critical analysis of TM approaches has underlined different knowledge gaps (Sparrow, 2019). Anticipated workforce changes and cost-effective ways to access talent are keys to the next generation of TM (Aldrich, 2020). Predictive workforce monitoring will lead to effective strategic talent decision-making. Factors such as flexible talent sourcing, customized and personalized rewards, distributed and influential leadership, and unified and compassionate workplace cultures will be important for successful TM (Claus, 2019; Caligiuri et al., 2020).

As demonstrating in this study, managing talent is incessant. The HRM must be vigilant enough to proceed according to the new architecture and assess its effectiveness alongside. The adequate TM model for a company must follow business goals and priorities. This requires HR professionals to erect strategies that recognize critical roles, responsibilities, and plan of action. Moreover, the proposed approach of TM needs regular upkeep to maintain its flexibility at the company level. Thus, it will be robust and dynamic enough to withstand evolving business scenarios. Effectual communication by HR to all management levels is fundamental to the executive TM exercises. A well-established combination of all such intricate processes, from recruitment to transition is what makes a real effective TM model. Future research should be developed in an interdisciplinary manner to better detail the proposed architecture and valorize the existing fact and tendencies from the literature and the global studies in the field of TM.

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Analysis of The Implementation of Business Process Management Processes, A Review of Scientific Literature From 2015-2020

Neil Mancilla-Grau
Universidad Autónoma del Perú, Lima, Perú, nmancilla@autonoma.edu.pe

Maicol Paredes-Lavado
Universidad Autónoma del Perú, Lima, Perú, mparedesla@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

The implementation of processes using BPM in companies greatly impacts all participants in the organization where it is implemented and the level at which it benefits each of them according to the processes carried out. The use of processes with BPM generates a positive impact in many aspects in organizations and improves communication between areas, thereby optimizing and making internal processes more efficient; the adaptability of the users is verified in a positive way to the processes with BPM, which does not generate any problem in the implementation and daily use. This research is a scientific review and its objective is to analyze the improvement obtained when implementing processes with BPM in a company. For this purpose, a compilation of 69 articles related to the topic in question was made and databases from the IEEE Xplore, Science, Scopus, Scielo and Redalyc were taken.

Keyworks: WorkFlow, BPM processes, Improvements with BPM, Adaptation of processes with BPM.

Introduction

Currently we see that more companies are migrating to a working mode based on process management and with this they automate the areas so that time, costs and productivity can be optimized in the areas, (BPM) is the set of methods, tools and technologies that make it possible for our process management to combine with information technologies. BPM is a collaboration between business people and technologists to promote effective, agile and transparent business processes since it encompasses people, systems, functions, businesses, customers, suppliers and partners

It should be noted that BPM is also defined as a management discipline aimed at improving business and academic performance, optimizing levels of competitiveness and productivity, with the goal of continuously improving and being supported by Information Technologies. BPM directly fosters an increase in the effectiveness of processes through adaptive automation and the coordination of people, information and systems

Companies, at a global level, tend to be more dependent on Information Technology (IT), not only for the operational maintenance of the organization's instances, but also for the increase of value to the company through exploitation data. We can realize that the (FCE) that affect BPM implementations and that the Critical Success Factors can be explained from the combination of three theories: a) contingency, b) dynamic capabilities and c) fit between tasks and technology.

Methodology

A. *Type of Study*

For the development of the following article, the search methodology in repositories and scientific databases that have antecedents on the implementation of BPM for process improvement was used

B. *Research Questions*

For the development of the research we ask ourselves the following questions:
RQ1. What difficulties arise when implementing the BPM methodology for process improvement?
RQ2. What are the benefits of implementing processes with BPM?

C. *Search strategies*

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In order to provide an evidence-based answer to each question posed for the development of the research, a search was made for scientific articles in the databases of IEEE Xplore, Redalyc, Scopus, Science, Scielo and finding a total of "69" articles comprised between the years 2015-2021.

For the search of these articles, the following keywords were considered according to the database: IEEE Xplore and Scopus: "WorkFlow", "BPM Processes" and "improvements with BPM". Scielo, Redalyc and Science: "BPM implementation" or "management by BPM processes".

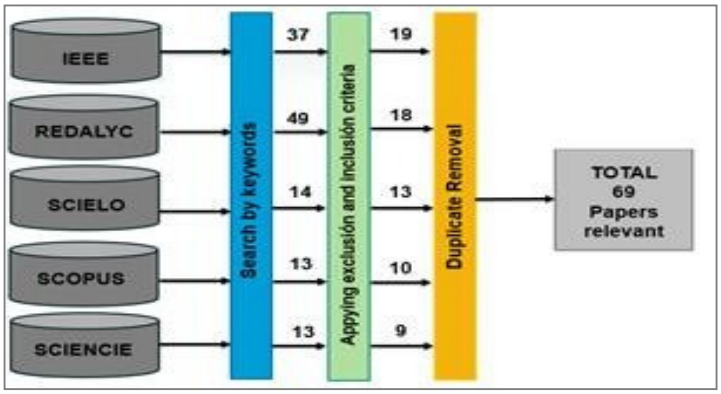

Figure 1: Database Graph

Within the databases that were filtered we can find 69 articles which we can see in the following table.

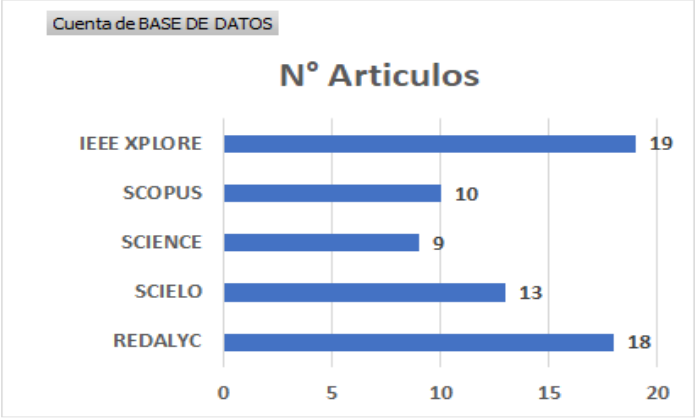

Figure 2: Number of Items

A. *Results Found.*

TABLE 1: RESULTS FOUND FROM EACH DATABASE

No	Database	Number of Articles
1	IEEE Xplore	19
2	Redalyc	18
3	Scielo	13
4	Scopus	10
5	Sciencie	9

a. In the studies, the inclusion and exclusion criteria were applied to be able to filter the articles according to each defined criterion. Table 2 shows the criteria.

TABLE 2. INCLUSION CRITERIA

Criteria		
Inclusion	I 1	Articles related to the use of Business Process Management in Organizations.
	I 2	Articles published from 2015 to 2020.
	I 3	Articles that refer to the topic of workflow, Management by processes and Business Process Management..

TABLE 3. EXCLUSION CRITERIA

Exclusión	E1	Similar articles in different databases on Business Process Management in Organizations.
	E2	Articles published with the problem in previous years.

b. Criterion E1 applied in the first filter to reduce the number of researched articles. For the second filter, criteria E1 were applied, according to which 7 were eliminated, with criterion E2 they were filtered by articles related to the problem and 3. After determining criteria I1, I2 and I3, it was concluded with 69 review articles.

Results

126 articles taken from the various databases and repositories were reviewed, discarding and excluding 57 articles that were not taken by the parameters and the review that was given to the content of each one, 69 articles were obtained that do contribute to the analysis of the points The following are intended to be achieved in this review:

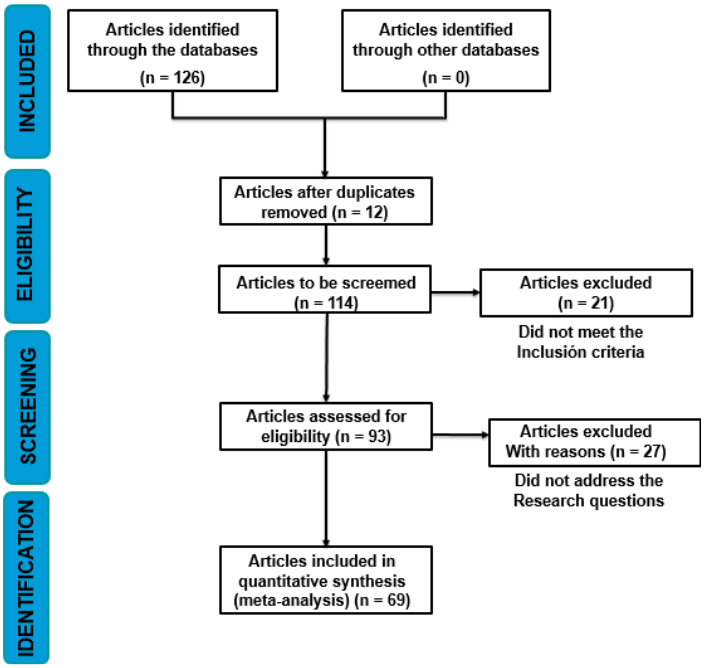

Figure 3. Search Process for article inclusion

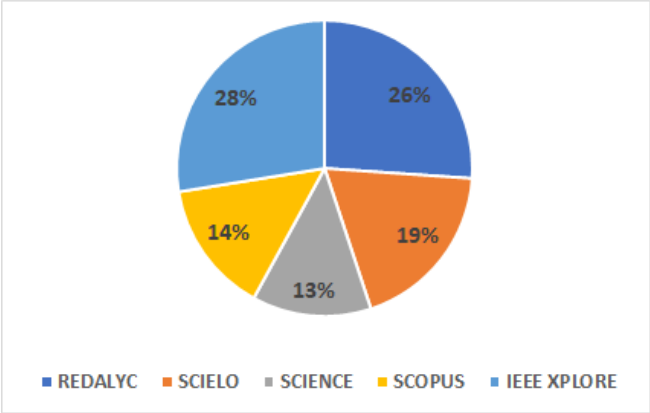

Figure 4: Database quantity distribution

As a result, 69 articles were obtained that meet the inclusion requirements and above all that refer to the analysis of the present work, the searches were carried out in 5 databases that have worldwide repositories.

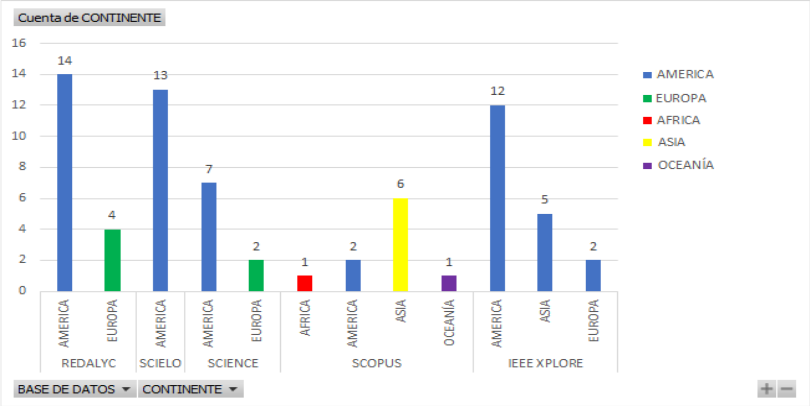

Figure 5: Representation of the repositories and the continents of each article.

Articles extracted and analyzed

The results of the investigations revolve around the findings of the investigation, the scientific journals and their stratification by names and year. The following graph shows the data obtained:

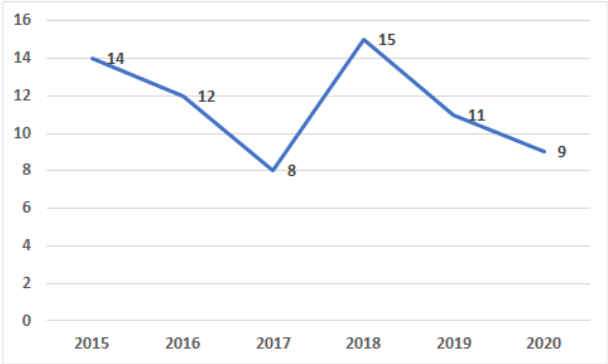

Figure 6: BPM article publications per year

Within the 69 articles, the following classification of each of them is made according to the content, the analysis of the implementation of Business Process Management, the methods, the benefits and the places where this method is most implemented will be verified

TABLE 4. CONTENT CATEGORIZATION OF ARTICLES

ARTICLE CONTENT CATEGORIES	ARTICLE NUMBER	#
Study of the Impact of Business Process Management	(García et al, 2016),(Cazañas y Parra, 2017),(Carranza et al, 2018),(David Holdford, 2018),(Wixson et al, 2015),(Hammond et al, 2017),(Sánchez et al, 2017),(Ruiz et al, 2018),(Zhou et al, 2017),(Aleksandrova et al, 2020) ,(Javad y Koupaee, 2016) , (Amy Van Looy, 2020), (Li Tang et al, 2019) ,(Daqing Yun et al, 2017) ,(Celia Desmon, 2015),(Buyun Sheng et al, 2019) ,(Barrera et al, 2018),(Soares et al, 2017),(Fernandes y Leite, 2020) ,(Portugal y Hermoza, 2015) ,(Steven Walczak, 2015),(Yan Li et al, 2015),(Yuhai Zhao and Ying Yin, 2016),(Dong Han and Yinhua Tian, 2020), (De Sousa Batista et al, 2016)	25
Background investigation of Business Process Management	(Bonifacio et al, 2017),(Gomez et al, 2015),(Muñoz et al, 2015),(Arias y Rojas, 2016),(Martins et al, 2019),(Velazquez et al, 2016),(Diego Ferreyra, 2017),(Michalus et al, 2015) , (Tocto et al, 2018),(Manrique et al, 2015),(Guanjun Liu et al, 2016) ,(Goswami et al, 2020) ,(Long Wang et al, 2015),(Liquan Deng et al, 2020),(Rodríguez y Silva 2017) ,(Lizano y Palos, 2020),(Torres y Schmidt, 2016),(Casanueva Ojeda, 2015),(Costa et al, 2019) ,(Do Prado et al, 2019) ,(Peralta el al, 2016) ,(Rajarathinam et al, 2015),(Zhao et al, 2015),(Gunduz and Khader, 2020),(Qi Mo et al, 2020),(Habba et al, 2019),(Machado Filho et al, 2016)	27
Analysis of Business Process Management methods	(Menéndez y Castellanos, 2016),(Ramírez et al, 2016),(Arias y Durango, 2015),(García-Azpeiti et al, 2018),(Burbano et al, 2015),(Suárez et al, 2018),(Shafiq et al, 2018),(Zhang et al, 2018),(Miklosik y Evan, 2019) ,(Sánchez-Quinto et al, 2020),(Alexander Gutiérrez, 2018) ,(Berger y Torres, 2019),(Carrion y Schwengber, 2019) ,(Cheng He et al, 2015),(Nan Feng et al,2016),(Cheng et al, 2018) ,(Tarapuez et al, 2016)	17

Discussion

In the present study and analysis of the various articles, the different aspects of the implementation of the processes with Business Process Management were identified.

As shown in Table 1, of the 69 articles the most popular aspects of studies related to processes with BPM, the investigations of the antecedents and predictions on processes with BPM and the most common methods in the implementations, these analyzes contextualize the advance and growth of organizations applying this work method.

RQ1: What difficulties arise when implementing the BPM methodology for process improvement?

In the Research Articles it can be seen that the implementation of BPM has a problem in the management of training. Here it puts the users and the systems in operation which pushes the processes into action in order to achieve the business objectives. In the training, it must be detailed that the process is the tool with which organizational success is achieved.

As we can see in Table 3 where the exclusion criteria are detailed, in E2 where Articles published with the problem in previous years are dealt with, we could observe that the problem basically began due to problems of resistance to change of some users.

With a BPM, you can bring together the systems, tools, methods, methods, process development techniques, and system process management, with the visibility and controls necessary to direct and fine-tune it

RQ2: What are the benefits of implementing processes with BPM?

In the articles of Investigation of the antecedents and predictions, he indicates that BPM facilitates the aims and business objectives of the Organization, with which we achieve revenue growth and performance improvement; There is also an increase in innovation, improved productivity, increased loyalty and customer satisfaction, and significantly improved staff efficiency.

In Figure 6 we see that in recent years interest in the research of the methodology has been awakened and it is that as can be seen in Figure 5, BPM is already found in the 5 continents and awakens a need for change in the organizations and private entities that want an improvement in their processes.

BPM incorporates the ability to align operational activities strategies and objectives; It focuses on the resources and work of the organization in creating value for customers. Additionally, it also allows a rapid response to change, thus promoting the speed necessary for continuous improvement.

Conclusion

The study carried out presents a systematic review of the literature on the implementation of processes with Business Process Management, as a result it was necessary that the implementation of processes with BPM, in organizations, private entities and companies generates a very positive result. The BPM allows to achieve better results in all the areas or departments of the organization or place where it is applied and in this way generates positive global results that benefit the organization at the macro level, leaving aside the outline of the objectives by areas or departments. On the other hand, it was also analyzed to what extent the workers of an organization or private entity can adapt to the use of working with Business Process Management processes and it is verified that the method cannot be implemented without problems of adaptation of the users. With future research can focus on some of the following questions. What other alternatives will be created to improve processes that can compete with Business Process Management? What are the positive and negative effects of process-based work with Business Process Management after the global pandemic? What is the impact in the future, will new methodologies be created for process improvement? With these questions, it will be possible to analyze the various changes, evolution and impact that the implementation of processes with Business Process Management can have in a positive way in organizations and Private entities.

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Impact of Distance Education on The Learning of University Students, Period 2009 - 2019: A Review of The Scientific Literature

Bernie Benavides-Benavente
Universidad Privada del Norte, Lima, Perú, n00053286@upn.pe

Carlos Yacha-Genes
Universidad Privada del Norte, Lima, Perú, n00162170@upn.pe

Michael Cabanillas-Carbonell
Universidad Privada del Norte, Lima, Perú, mcabanillas@ieee.org

Abstract

In recent years, tele-education has been catalogued thanks to the massification of the Internet as an accepted means of learning due to the acquisition of new technologies and access to large amounts of information for distance learning. The following work aims to specify the level of impact of tele-education during the learning process of students in a methodological environment of systematic review of literature and PRISMA strategy, we obtained a total of 82 articles which was reduced to 40 final articles found within the databases Scielo, Dialnet, IEEE Xplore, OEI, Redalyc, Researcher, ScienceDirect, Scopus, VirtualEduca and WOS. We obtained 29 articles (73%) that show positive impacts of distance education, 5 articles (13%) that show negative impacts and 6 articles (15%) that contain certain methodologies to obtain positive results during the online classes; that is why we recommend the inclination for the use of this modality of study which favors the learning of the students.

Keywords: Distance Education, Learning, Systematic Review.

Introduction

Education has been a determining factor for the evolution and transcendentalism of societies, allowing the human being to transmit his knowledge through time. Due to the acquisition of new technologies and the access to great amounts of information, the exclusion of education for distance learning becomes essential.

This educational modality is established in apogee in countries like Spain and the rest of the European countries; given that the norms established for the traditional education find a solution to the current formative needs, the conflict to attend regularly to a center or an extension to the superior education, everything aggravated as a whole to the inexorable necessity to update the content given to the students (Mora, 2004). Likewise, countries such as Peru have been forced to provide distance education. The need to overcome obstacles and the time it takes to carry out certain processes during face-to-face education; the alternative has emerged of improving the quality of education thanks to the constant advance of technology in relation to information and communication in general (Rama and Dominguez, 2011).

Virtual education in Latin America has been strengthened by the use of technologies brought about by online programs such as (Arboleda and Rama, 2020) In countries such as Colombia, Venezuela and Mexico, we can see the beginning of distance programs and the increase of computer tools focused on the development of practices and the maturity of skills, as well as in the environment of public online programs.

In the Peruvian case the scenario is somewhat better, since students are predisposed to soak up knowledge through the use of technology as mentioned (Alcántara, 2017) about the 30% annual increase in registration of places of study with distance mode, providing the opportunity to study to many young people.

With what has been exposed, it is reflected how important is the implementation of distance education, but there are still points to improve and thus take advantage of the resources to the maximum.

As it is stated (Dorfsman, 2013) the advances in the world of information, basically the education in the profession, is experiencing transformations that correspond to the obtaining of new abilities and that compete to the so called

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digital dimension, linked to the effect that the factors of the world of information have in the learning and that will allow the formation of teachers to produce and to extend their content, to share their tasks and to design spaces of work, creativity, cooperation, meeting and reflection.

For (Abreu, 2014) the current society requires that everyone participate to guarantee the development and persistence, for that the professionals in education must be trained with a high level to guarantee a good performance as a professional.

The techniques for learning have changed over time as have the follow-ups to them. And for (Rama, 2017) "The distance education allows a greater individualization of the learning, more selective education to the particularities, follow-up and tutoring of the teachers and students, and better learning resources. Everything is conforming a scenario of better possibilities".

To achieve quality teaching and learning under the virtual education modality, universities must take the first step by changing to the virtual mode and where learning is focused on competition and that they are integrated with the plans of the institutions (Dominguez, 2013).

According to (Weller, 2002) online learning has foundations such as constructivism, resource environment, collaborative, problem-based and situated learning.

On the one hand (Kearsley, 2000), mentions that online education consists of characteristics such as collaboration, connectivity, student centeredness, community, exploration, shared knowledge, multisensory experience and authenticity. Developing in the student new skills and learning methods.

On the subject of how to evaluate students in the virtual mode (Ryan, Scout, Freeman and Patel, 2000), they suggest "a process by which students gain an understanding of their own competencies and progress, as well as a process by which they are graded.

For its part, international organizations such as UNESCO and the OAS support this mode of distance education, based on the results obtained worldwide and the opportunities it offers to form creative and visionary minds in all areas of knowledge, and for teachers to acquire another profile with virtual education.

Given the above, the research group seeks to answer the following question What is the level of impact of tele-education on the learning of university students in the last 10 years? Considering that the data obtained must be the most adequate having in mind the model of our research topic.

Thus, the study objective is based on determining the level of impact of tele-education on the learning of university students in the last 10 years through a systematic review. For this purpose, we resorted to the search of information in several articles and journals published in specific databases with previous analysis of this.

Methodology

Type of study

Systematic reviews consist of the best effort to collect and synthesize scientific evidence on a topic, using a model that guarantees that the limitations mentioned in the previous article of this series are the minimum possible. For (Beltran, 2005), Systematic review is defined as an integrative, observational, retrospective, secondary study, in which studies examining the same question are combined.

The documentary research work based on the PRISMA methodology is characterized, unlike other methodologies, by an extensive document detailing the explanation and justification of the 27 items established by PRISMA, as well as the elaboration process of each one of them. (Urrutia and Bonfill, 2010).

Research Questions

For the development of the investigation, we ask ourselves the following questions:

RQ1. In what way does Machine Learning determine the level of impact of distance education on students of the engineering faculty of the private university of the north, los olivos, 2020?

Search Strategies

In order to be able to search for information about our research topic; we had to perform certain word filters in the database search engines:

Keyword: keywords were used to search for "virtual AND education", "distance education", "e-learning", "educational virtualization", "online AND classes", "distance education AND learning", "e-learning AND learning" and "tele-education"; all of them in English and Spanish languages and in the Cielo, Dialnet, IEEE, OEI, Redalyc, Researcher, ScienceDirect, Scopus, VirtualEduca, WOS databases.

Date of publication: all articles and journals found had to be in the range of 2009 - 2019; prioritizing among them those recently published.

Inclusion and Exclusion Criteria

These sources mentioned above had to meet the following criteria in order to be included in our systematic review

- ✓ Longevity of studies no longer than 10 years, that is, covering the periods 2009 to 2019, in order to understand and analyze the changes that have arisen as a result of virtual education.
- ✓ Practical studies in the Latin American context of distance learning whose purpose is to find repetitive variables for later comparison and analysis based on the results.
- ✓ Studies of a methodological nature on proposals to enrich current research.
- ✓ The articles or magazines must be in digital presentation and in English and Spanish languages.
- ✓ The information found must belong to at least one of these databases (Cielo, Dialnet, IEEE, OEI, Redalyc, Researcher, ScienceDirect, Scopus, VirtualEduca, WOS).

Based on these inclusion criteria, all articles that do not comply with them, i.e. outside the publication year interval, language other than Spanish or English and others, would be EXCLUDED and would not be part of our list of articles/journals (TABLE 1) to be included in our research.

Results

Extracted and analyzed articles

After performing an exhaustive search of articles, journals or papers in some of the databases such as Scielo, Dialnet, IEEE, OEI, Redalyc, Researcher, ScienceDirect, Scopus, VirtualEduca and Wos; in search of providing the necessary basis to support our research topic, we obtained a total of 82 articles within an interval of years between 2009 and 2019. After counting on that amount of material, we started to apply our exclusion criteria, which are: suppressing articles that were less than the year 2009, suppressing articles that are different from the English and Spanish languages, and articles that are not found in a reliable database.

The final total number of 40 articles selected to present the results.

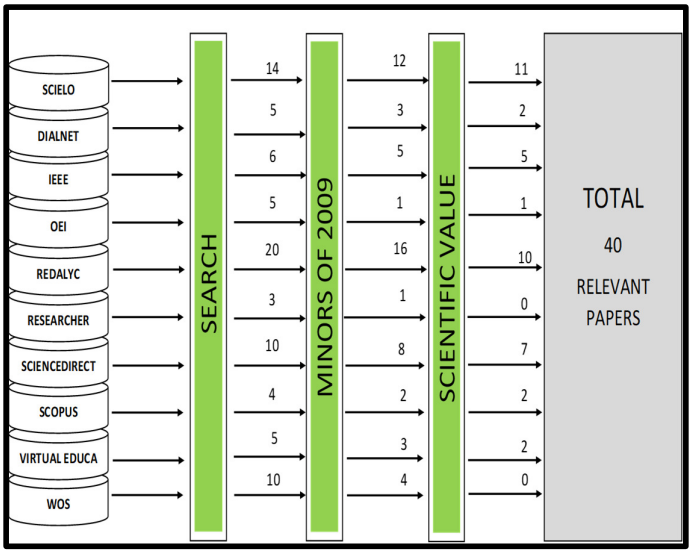

Fig 1: Selection process

Distribution of articles

These 40 selected articles have certain characteristics such as the year of publication, the type of study, the databases to which they belong, the language in which they are written, etc.

These data will then be presented as follows:

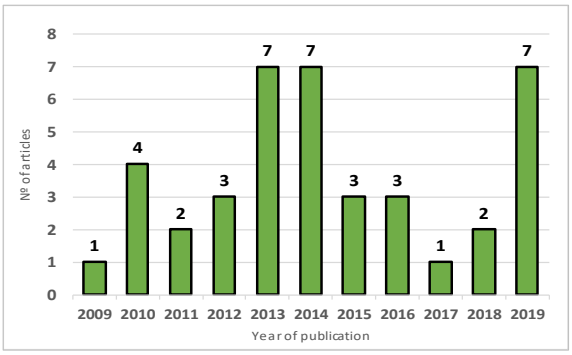

Figure 2: Number of articles by year of publishing

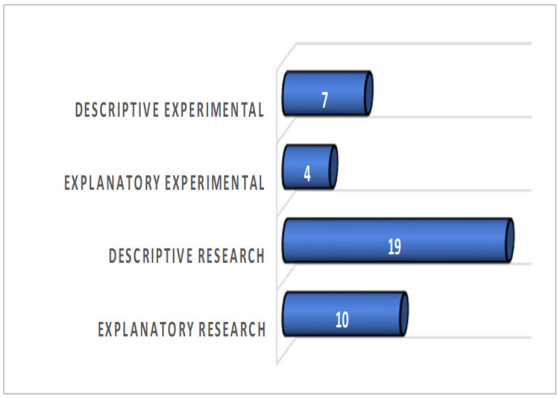

Figure 3: Number of articles published by type of study

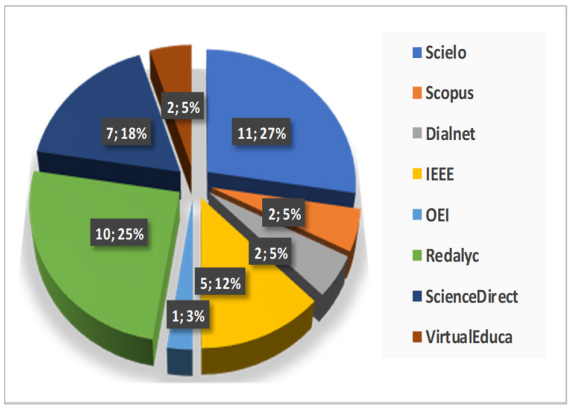

Figure 4: Percent of articles published by database consultanted

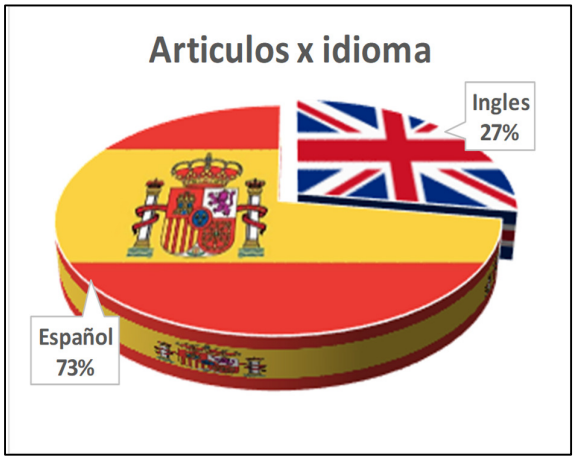

Figure 1: Number of articles by language

Systematization of research

These 40 in 3 important groups: articles with positive impacts (29) in virtual education (73%), articles with negative impacts (5) in virtual education (13%) and articles with methodologies (6) that applied in distance education (15%). Each one of them contains categories that support their classifications.

A. Positive impacts on distance education

In this group 29 of the 40 articles show a positive impact by the distance education; which we can find them in 4 categories

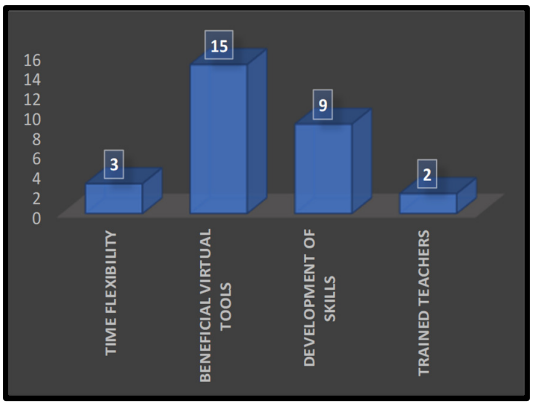

Figure 6: Number of articles published by type of positive impact by distance education.

The first category is contained in 3 articles (10%) which refers to the flexibility of time, which is a point taken into account by many of the articles since it allows the student to arrange and organize their time to expand their educational spaces that would not only be reduced to the physical classroom, but also allows students to study other careers at the same time or perhaps work and study at the same time thanks to the use of this new modality of study. Below are the articles found in this category.

Table 1: Articles with positive contribution of time flexibility

Reference	Description of the contribution	Category
Gómez and Caicedo, 2015	The student has more time to study other courses.	Time flexibility
Almazán and Cárdenas, 2012	The student manages his time to study and work better.	Time flexibility
Falcon, 2013	The student has more time to study other courses	Time flexibility

A second category is contained in 15 articles (52%) that talk about the virtual tools that support virtual classes and get good results; that is, the interaction with digital tools produces the so-called "computer pedagogy" which is taken advantage of for the student. On the other hand, virtual environments and new technologies are capable of enhancing the processes of teaching and learning in education, becoming inescapable instruments for it. Another of the tools with which positive things were achieved was the desktop videoconference which has managed to increase the level of interaction to such an extent that 76% of students consider very useful for their learning, managing to establish a good academic relationship with the teachers who shared information through this tool.

It is important to mention that the use of the tics is also of great support in the formation of the students because they are effective and efficient tools in which the student understands much better the classes; that yes applying the technique and methodology adapted to obtain it. Next, it is shown the articles that are in this category.

Table 2: Articles with positive contribution of useful virtual tools

Reference	Description of the contribution	Category
Carlos and Gómez, 2011	Chat is a virtual social communication tool	Beneficial virtual tools
Amato and de Jesús Novales-Castro, 2014	Videoconferencing is a useful modality for your learning	Beneficial virtual tools
Quiroga and Padilla,2014	Students prefer to read texts in multimedia formats	Beneficial virtual tools
Quiroga and Padilla,2014	Virtual tools are capable of enhancing teaching processes.	Beneficial virtual tools
Tapia-Repetto, Gutiérrez and Tremillo-Maldonado, 2019	The students established a good relationship with the teacher through the videoconference	Beneficial virtual tools
Córdova et al., 2013	The student has the facility to obtain through the web	Beneficial virtual tools
Zhang and Bao, 2010	Students with disabilities benefit from virtual tools.	Beneficial virtual tools
Saleh and Farouk, 2013	Digital tools produce a "computer pedagogy".	Beneficial virtual tools
Medina-Gamero, 2019	The videoconference is the tool that achieves the interaction of the student	Beneficial virtual tools
Vidal Martínez and Aguilar Valenzuela, 2014	The tools improve interaction between students and teachers	Beneficial virtual tools
Mohammad et al., 2013	Provides methods to improve the quality of teaching through tics	Beneficial virtual tools
Marianela and González-Solano, 2009	Provides methods to improve the quality of teaching through tics	Beneficial virtual tools
María and Andrés, 2012	Provides methods to improve the quality of teaching through tics	Beneficial virtual tools
Vásquez Lopera, Ricaurte Avendaño and Arango Vásquez, 2011	Chat is a virtual social communication tool	Beneficial virtual tools
Peretó et al., 2010	The importance of the quality of the study material	Beneficial virtual tools
Cervantes, 2012	There are virtual spaces to acquire information and knowledge	Beneficial virtual tools

A third category is contained in 9 articles (31%) that deals with the development of the skills and strategies that students acquire thanks to virtual classes; as they are self-directed in the discovery, understanding and learning; managing to sustain their own learning pace.

In addition, these allow them to develop new skills and abilities, as well as strengthen the knowledge and enhance the thinking of the student. There is a greater satisfaction with the learning materials of the virtual environment, causing an immediate feedback and improving the capacity of analysis and synthesis.

Below are the articles found in this category.

Table 3: Articles with positive contribution of skills development

Reference	Description of the contribution	Category
Jasso Peña, Tamez Solis and Torres Reyes, 2019	The student self-directs his discovery and learning	Development of skills
Conde and Boza, 2019	The student develops new competences and skills	Development of skills
Abuchar Porras and Simanca Herrera, 2014	The virtual course strengthens the knowledge and potentiates the student's thinking	Development of skills
Abuchar Porras and Simanca Herrera, 2014	It empowers children in the successful conduct of their learning.	Development of skills
Abuchar Porras and Simanca Herrera, 2014	The use of interactive exercises improves the competence of analysis and synthesis.	Development of skills
Campillo-Serrano et al., 2013	Students better understand the classes through the platform	Development of skills
Fernández-Abella et al., 2019	Students improve memory and basic skills.	Development of skills
Durán, Estay-Niculcar and Álvarez, 2015	The students evaluated favorably in the virtual writing	Development of skills
Lozano Martínez and Tamez Vargas, 2014	Evaluates improvement in student participation and motivation	Development of skills

Finally, the fourth category is contained in 2 articles (7%) that refer to the training of teachers, which greatly influences the positive impact of distance education, since adequate teacher preparation generates better teaching and learning, in addition to favoring the development of innovative programs in the educational area.

Below are the articles found in this category.

Table 4: Articles with positive contribution of trained teachers

Reference	Description of the contribution	Category
Juca Maldonado, 2016	The quality and preparation of teachers improve the teaching and learning of students.	Trained teachers
José et al., 2014	The process of adapting teachers to publish material is described.	Trained teachers

B. Negative impact on distance education

In this classification we found 5 articles out of 40 total (13%) that show why distance education is not so favorable.

There are several reasons such as the lack of training of teachers, because the use of virtual tools is very complex, this affects the level of learning of students, another reason is the lack of immediate feedback and misinterpretation of information received generating a low understanding by the student.

Below are the articles found in this category.

Table 5: Articles with positive contribution of trained teachers

Reference	Description of the contribution	Category
Rosario Peláez-López, Johnny Morales-Roela, Cilda Lara-Vásconez, 2018	The use of virtual tools by teachers is complicated and affects learning.	Lack of training
De La Hoz, De La Hoz and Fontalvo, 2019	Students do not get better test scores.	Lack of training
González López Ledesma, Alvarez and Bassa, 2018	The information received is misinterpreted	Lack of training

Reference	Description of the contribution	Category
Barreto, 2011	The use of virtual tools by teachers is complicated and affects learning	Lack of training
Dorrego, 2016	The use of virtual tools by teachers is complicated and affects learning	Lack of training

C. Methodologies in distance education

There are 6 scientific articles (15%) where the variable of the methodology and style of teaching is highlighted. Under this model, (Costa, 2013) establishes methodologies for online teaching, emphasizing the use of printed material in correspondence with (Nora et al., 2010) where it is shown that 100% of printed materials were used. However, despite the use of printed material, the use of internet materials that was recorded was 94%. Considering the importance of didactic materials (Guerrero et al., 2010) based on 3 control groups, it shows an improvement in performance based on pragmatic materials (sounds, images, videos and different visual tools). Similarly, (Martín et al., 2014) points out the need for training teachers in video tools to improve the quality of the "teletraining" course.

Of the selected articles there is an incidence of the educational platform "Moodle" as a resource for the application of e-learning as it stands out (López et al., 2009) , where the preference of "Moodle" as a virtual platform is reported by the surveyed institutional entities. Similarly, (Guerrero et al., 2014) its use stands out because it contains various tools to address different ways to generate content.

Conclusion and Discussions

From the systematic review based on the objective of determining the level of impact of tele-education on the learning of university students in the last 10 years.

Attention is drawn to highlighting both the positive and negative impact and methodologies applied, as well as their respective level of impact on student learning.

We were able to identify the positive impact of tele-education as an accepted means of learning throughout the years due to its 4 beneficial factors: the increase in the speed of obtaining knowledge due to the flexibility of time, which represents 10% (see Table 1) of the articles with positive impact; the improvement of feedback due to the time of availability of the use of virtual tools, which represents 52% (see Table 2) of this group of articles; and the increase in the development of skills to maintain their own rhythm of study: self-learning, self-critical and analytical thinking thanks to feedback which represents 31% (see Table 3) of the total of this group and the last factor which is the adequate training of the teacher to interact correctly with the virtual platform and the students; these represent 7% (see Table 4) of a total of 29 articles based on positive impacts. With respect to the methodologies to be implemented in the virtual modality, it is recommended that teachers in charge of distance education be constantly trained in another type of pragmatic teacher-student interaction where the correct learning is sought with the use of didactic materials (video tools, sounds, images, among other visual tools) to improve the retention of the knowledge taught; this represents 15% of the total articles based on methodologies in virtual education.

In terms of learning and student-student interaction, tools that improve academic performance are highlighted, such as chat rooms that promote communication and interaction between students by encouraging group work.

Also considered are limitations in terms of the negative impact of learning (5 articles out of 40 which represents 13% (see Table 5) of the total) on distance education due to the lack of resources, as well as the lack of constant training of the teachers in charge of providing education and correct feedback of the session.

There are other systematic reviews that explore learning in virtual education, such as the study (Montagud, 2014) of which within the computer tools I use "Moodle" because of its diversity to generate content. (Trujillo, Echeverry, Eduardo, Heredia and Anselmo, 2009), mentions "Moodle" as a fundamental tool for e-learning.

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Analysis of Natural Language Processing Algorithms to Detect False News in Social Networks. A Review of The Scientific Literature From 2015 - 2020

Hernan Inga-Arteaga
Universidad Autónoma del Perú, Lima, Perú, hinga@autonoma.edu.pe

Dayanne Mayta-Matienso
Universidad Autónoma del Perú, Lima, Perú, dmaytam@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

Modern society is characterized by the great diversity of information that is created and distributed at great speed thanks to technology. Due to this, artificial intelligence techniques are used in order to automate the work of classifying news for its veracity. The algorithms in the Natural Language Processing (NLP) family are especially used and studied with respect to this area. The tendency of information to be almost real time, sometimes prevents the correct analysis of sources, which can result in widespread misinformation by a news with false foundations, or half-truths. In this work 67 articles were systematized, from different databases (IEEE Xplore, Scopus, Science Direct, Scielo, Proquest). As a conclusion we can say that a large number of algorithms are useful for analyzing the veracity of news transmitted on social networks, also these can prevent the dissemination of false information, in addition to the algorithms in the family of natural language processing are especially useful for unstructured data environments such as social networks.

Keywords: Natural language processing, machine learning, social networks, fake news.

Introduction

Modern society relies on the use of a variety of algorithms for multiple purposes. Natural language processing algorithms are a group of special algorithms that are widely used for the analysis, understanding, correction and translation of natural language. They are involved in everyday activities such as detection and translation between languages, personalized assistance systems, classification, chatbots, information and keyword extraction, etc (Saquete et al., 2020). All these possibilities are thanks to the advance in technology and its availability (Toumey, 2016).

The exponential growth of technology in recent decades has allowed the application of machine learning techniques and the development of new branches related to this discipline, and the algorithms have become more complex and sophisticated. Machines are rapidly increasing the number of neurons (referring to those existing within a neural network), to the point of equating to the estimated brains of small insects (Martinez-Plumed et al., 2018). On the other hand, specialized artificial intelligence (AI) algorithms have been performing key activities in many fields in multiple aspects, from research to economy and recreation.

Compared to algorithms that are oriented to similar behavior of living beings, expert systems and other types of algorithms do not use massive amounts of neurons. They specialize in performing well-defined, one-off tasks, while manipulating large amounts of data, transforming them, processing them, and generating important information for the end user or an interpretable or comparable result (Hussein et al., 2020). Depending on their approach to the problem, natural language processing algorithms can process pieces of data in order to build a sea of knowledge, with which the content can be "understood". This gives NLP algorithms the ability to abstract information similar to a person.

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Methodology

A. *Research Question*

RQ1: In what fields are the NLP algorithms most used?

RQ2: What do they contain? Do you do more research using NLP algorithms?

RQ3: Which database is the most suitable for research on NLP algorithms?

RQ4: What kind of NLP algorithm is the most used to detect false news?

After determining the research questions, articles published between 2015 and the present were searched in multiple databases, which are mentioned below.

B. *Search process*

The development of the research was carried out a review of scientific literature in different databases, using the keywords according to the scientific orientation of each database. The main electronic sources and databases consulted are listed below:

- IEEE XPLORE
- SCOPUS
- SCIENCEDIRECT
- PROQUEST
- SCIELO

It is also necessary to highlight that scholar (from google) was used as an alternative search engine, in the cases of not having results in the search engines of each database.

C. *Search strategy*

In order to get answers to our research questions, we search the databases mentioned above for articles, using keywords such as: "NLP", "Natural Language Processing", " Detection Fake news" "Natural Language Processing".

D. *Inclusion and exclusion criteria*

For this review, the following inclusion and exclusion criteria were applied as shown in the table below:

Table 1: Inclusion and exclusion criteria

CRITERIA		
Inclusion	I01	Articles related to the natural language processing algorithm
	I02	Articles published from 2015 to 2020
	I03	Articles related to false news detection
Exclusion	E01	Articles not related to the natural language processing algorithm
	E02	Articles published from 6 year to more
	E03	Articles not related to the detection of false news

E. *Application of criteria*

As part of the research, the main topics of the investigation were taken into account, as well as the key words and with these they were considered in the filters of the articles. They were evaluated in multiple databases, which were mentioned above, and after making the filters we were left with 67 articles.

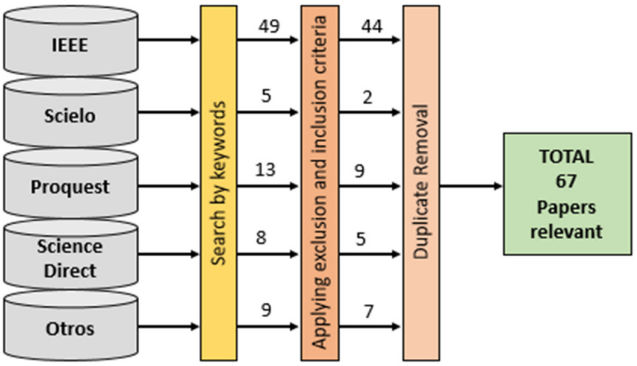

Fig. 1: Prism diagram methodology

We analyzed 81 articles in the databases mentioned above, of these 14 articles were discarded according to the exclusion criteria and finally we were left with 67 articles.

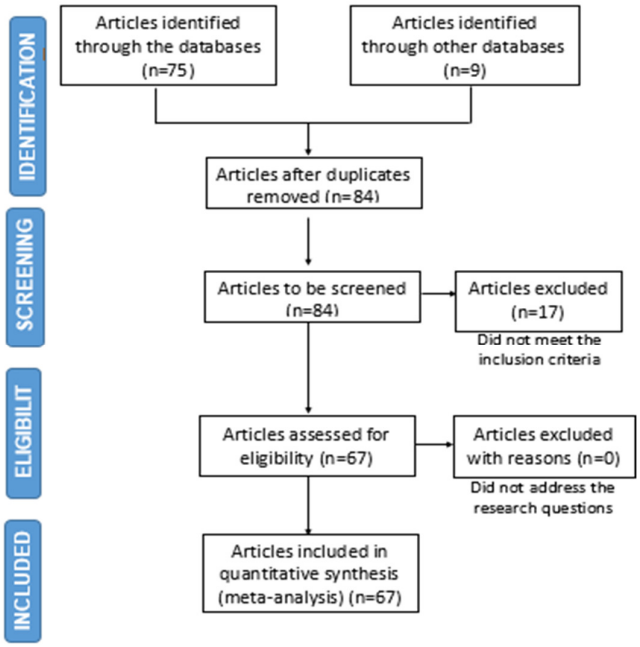

Fig. 2: Flow chart methodology

Results

The results of the research allow us to understand the before, during and after data, and the status of the research topic. Next we proceed to describe graphic visualizations with the purpose of giving a more assimilable sense.

A. Choropleths map

This graph allows us to visualize the preference of the countries with respect to the databases. In this case IEEE Xplore is the database with the highest results for this research and the distribution shows preference for this database.

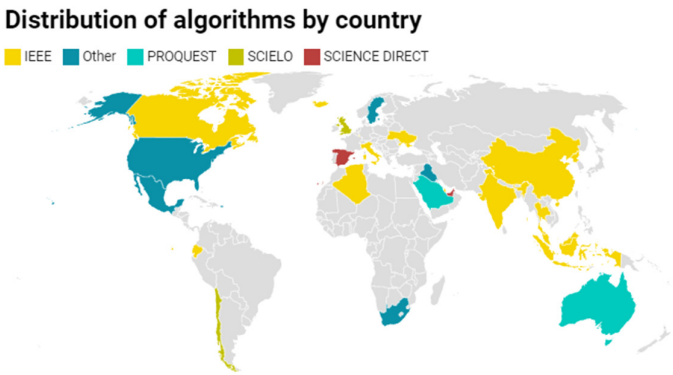

Fig. 3: Choropleth map of the distribution by country of the articles

B. Distribution by year of publication of the article

In this graph we can see that the distribution of the collected items tends towards the last years (representing the years 2020, 2019 and 2018 an accumulated 84% of the total items). These are limited to 2015 due to the time range chosen in the research.

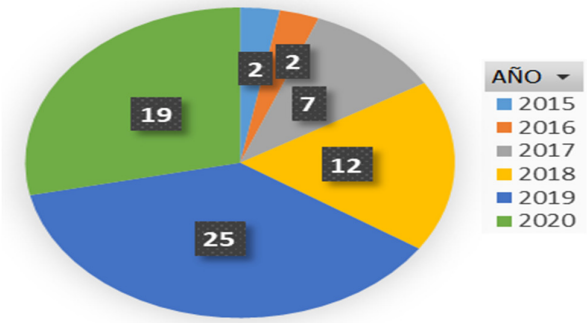

Fig 4. Diagram of radial distribution per year of the articles

C. Algorithm type distribution by year

With this graph we show a predilection for the use of algorithms for classification and content extraction. The types marked as "other" refer to the accumulation of several types where algorithms are used outside the NLP branch, or in combination with others and masked within the scope of use of NLP algorithms, as well as those that indirectly use NLP algorithms after other processes have been addressed by other models.

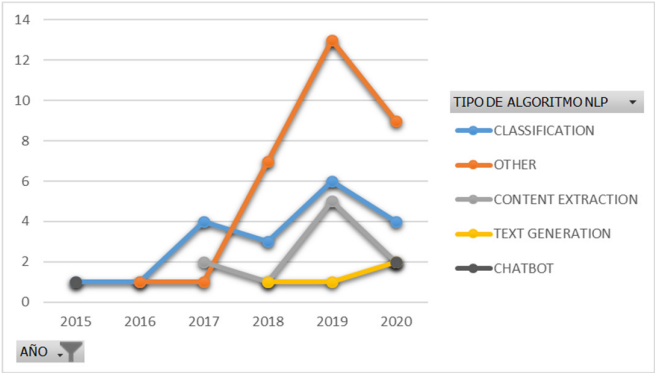

Fig 5. Diagram of line distribution per year of the types of NLP algorithms used

D. Database distribution with per year

In this case we show the results obtained from each database with respect to the years reviewed. It is shown that the IEEE is the one that has more constancy through the years and in the general count.

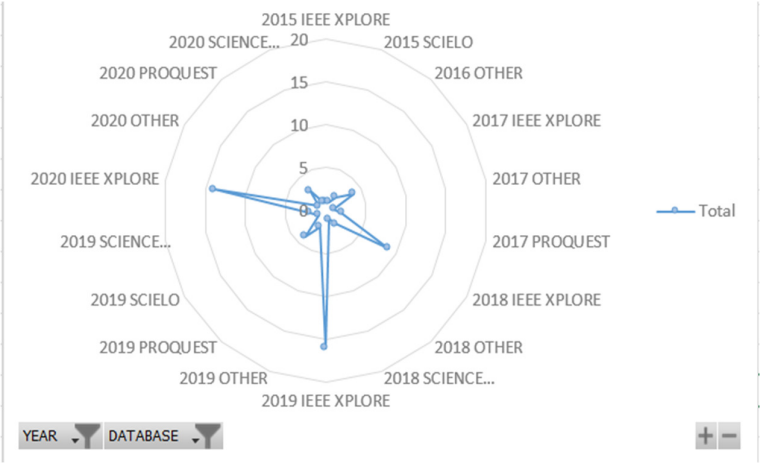

Fig 6. Polygon diagram of the distribution of the databases with respect to the years

E. Distribution of articles by country

This graph shows the distribution of NLP algorithm types with respect to countries. India, China and the USA account for the majority.

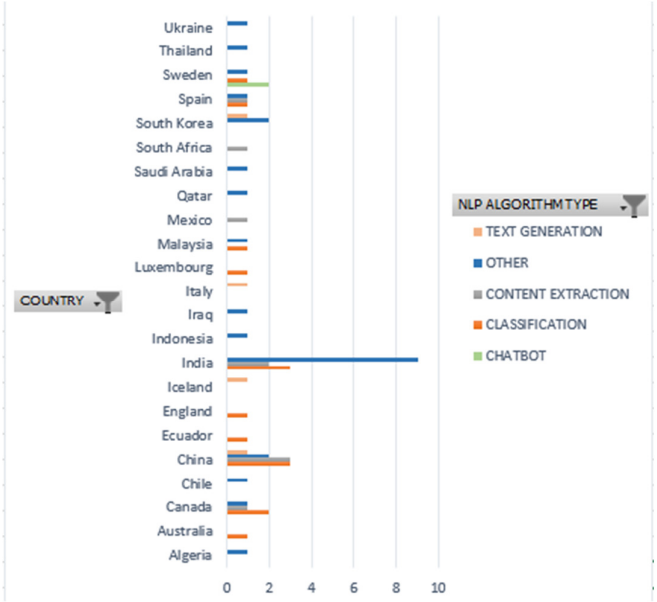

Fig 7: Horizontal bar diagram of the distribution of NLP algorithm types with respect to countries

F. Distribution of articles by continent

In this case, the graph shows the predominance of the Asian continent with respect to the number of articles referenced in this work. Complementing the graph in the previous point, India and China position Asia in the first place.

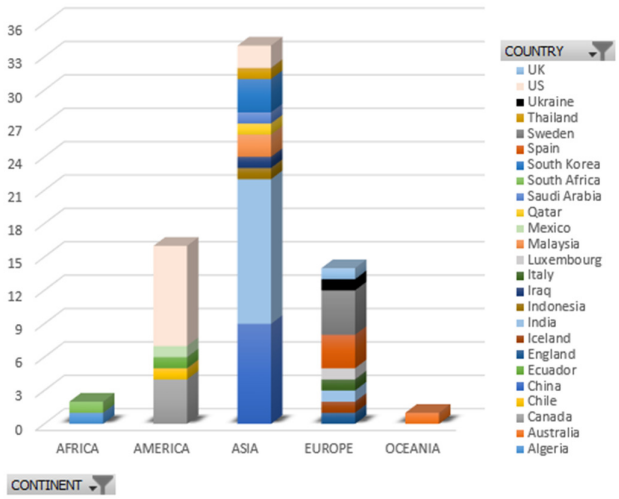

Fig 8. Stacked column diagram of the distribution of items by country and continent

G. Relationship tables

Table 2: Relation of articles with the themes of the research

THEME	ARTICLE
Fake news	(Ahmad et al., 2020), (Antoun et al., 2020), (Barua et al., 2019), (Benamira et al., 2019), (Bhutani et al., 2019), (Guinadya et al., 2020), (Hiramath et al., 2019), (Kaliyar et al., 2018), (Kesarwani et al., 2020), (Kim et al., 2019), (Kim et al., 2018), (Granik et al., 2017), (Mahid et al., 2018), (Nyow et al., 2019), (Poddar et al., 2019), (Qi et al., 2019), (Manzoor et al., 2019), (Seo et al., 2018), (Sharma et al., 2019), (Smitha et al., 2020), (Uppal et al., 2020), (Yanagi et al., 2020), (Zhang et al., 2020), (Zhang et al., 2019)
Artificial intelligence	(Amine et al., 2019), (Dilawari et al., 2018), (Krishnamurthy et al., 2018), (Martinez-Plumed et al., 2018), (Reddy et al., 2020), (Sanchez et al., 2019), (Toumey, 2016)
Social networks	(Granizo et al., 2015), (Jimenez et al., 2018), (Toujani et al., 2019)
NLP Algorithms	(AbuShawar et al., 2015), (Agarwal et al., 2018), (Ait-Mlouk et al., 2020), (Ait-Mlouk et al., 2020), (Alberts et al., 2019), (Aldwairi et al., 2018), (Alhaj et al., 2019), (Arora et al., 2015), (Arumugam et al., 2019), (Bakis et al., 2017), (Bauskar et al., 2019), (Calvo et al., 2017), (Chen et al., 2020), (Conroy et al., 2015), (Fang et al., 2019), (Gelbukh et al., 2018), (Ghosh et al., 2018), (Heppner et al., 2019), (Hu et al., 2020), (Huo et al., 2020), (Hussein et al., 2020), (Kim et al., 2018), (Lippi et al., 2019), (Liu et al., 2020), (Maldonado et al., 2017), (Meel et al., 2020), (Mukherjee et al., 2017), (Park et al., 2019), (Saquete et al., 2020), (Schmidt et al., 2017), (Shelke et al., 2019), (Tissot et al., 2020), (Wang et al., 2020), (Whitehead et al., 2017).

H. Abbreviations and Acronyms

Multiple abbreviations and acronyms have been used to avoid repetition of long names or denominations.

NLP: Natural Language Processing
IEEE: Institute of Electrical and Electronics Engineers
USA: United States
Chatbot: System designed to answer questions in a similar way as a human would
AI: Artificial Intelligence

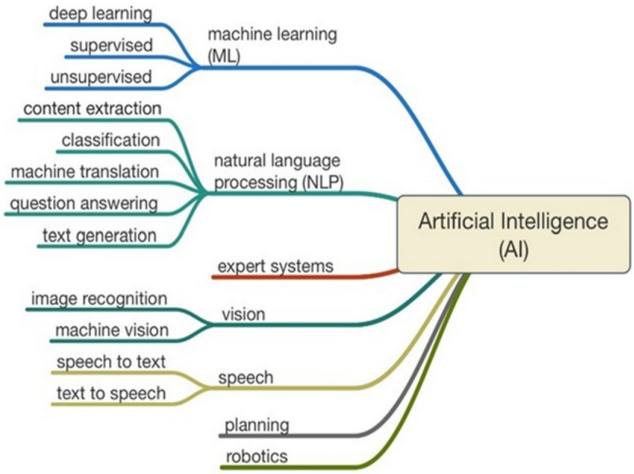

Fig. 9: Image representing the branching of artificial intelligence algorithms; because of the objective of the algorithm, it may or may not belong to the NLP family of algorithms

Discussion

RQ1: In what fields are the NLP algorithms most used?

They are mainly used in the analysis of big data and unstructured data. Because the most popular social networks have approximately 80% to 90% of unstructured data, NLP algorithms are very important for content extraction and classification.

RQ2: Which continent conducts more research using NLP algorithms?

According to our literature review we can conclude that Asia is the continent that carries out the most research with respect to NLP algorithms, with China and India being the main countries where the articles we take into account were published.

RQ3: Which database is the most adequate for research on NLP algorithms?

According to our research we can conclude that IEEE Xplore is indisputably the most used database in NLP algorithm research.

RQ4: What kind of NLP algorithm is the most used to detect false news?

Rating is the most effective type of algorithm. Naïve Bayes has proven to be effective, despite its simplicity.

Conclusion

The systematic review of scientific literature carried out in this work allows us to evidence that artificial intelligence as a discipline has evolved in an accelerated manner, spreading in multiple fields of study and application. Algorithms within the natural language processing family have been especially useful for solving problems related to large non-relational databases and unstructured data, such as social networks. In the latter, there is an exponential growth in the speed with which a news item spreads, which leaves a door open for false news, which due to the above, can cause problems in case they do not go through a verification process.

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Sustainability Reporting of European Healthcare Services Organizations According to GRI Standards: Management Approach

Małgorzata MACUDA
PhD, Poznań University of Economics and Business, Poznań, Poland
malgorzata.macuda@ue.poznan.pl

Ryszard ORLIŃSKI
PhD, Calisia University, Kalisz, Poland
ryszard.orlinski@poczta.onet.pl

Abstract

In 2016, the Global Reporting Initiative transitioned from providing guidelines to setting the first global standards for sustainability reporting – the GRI Sustainability Reporting Standards, developed by the Global Sustainability Standards Board. According to the GRI Standards, general requirements for reporting the management approach cover the following disclosures: explanation of the material topic and its boundary, the management approach and its components, and evaluation of the management approach. The aim of the paper is to examine the non-financial reporting practices related to the management approach through analyzing sustainability reports prepared in line with the GRI Sustainability Reporting Standards by European healthcare services organizations. The aim was achieved by studying the GRI Sustainability Disclosure Database where non-financial reports are published, and performing a content analysis. The key findings are the following: (1) 17 organizations from only 4 European countries prepared their sustainability reports according to the GRI Standards; (2) 12 organizations communicated about all three aspects of the management approach. This research fills a research gap in the field of non-financial reporting practices related to the management approach in the European healthcare sector.

Keywords: Non-Financial Reporting, Sustainability Reports, GRI Standards, Healthcare Organizations, Management Approach.

Introduction

The Global Reporting Initiative promotes the use of sustainability reporting as a way for organizations to become more sustainable and contribute to a sustainable global economy. Being sustainable (socially responsible) healthcare organization is more and more frequently communicated by issuing non-financial reports containing information about CSR-related activities. Integrating sustainable health practices into strategic and operational activities and supporting the efforts for transparent and accountable sustainable change inside and outside healthcare organizations turn out recently to be one of the main challenges in healthcare sector (Block, 2016). Given the focus on health, safety and quality, questions have arisen regarding the practical application of sustainability concepts in healthcare facilities and whether such concepts can be compatible with healthcare outcomes (Zadeh et al., 2016). Effectively implementing sustainability in healthcare organizations presents a unique challenge because healthcare is one of the most complex and rapidly changing industries (Boone, 2012). Although many healthcare organizations include sustainable practices in their strategic and operational activities, non-financial reporting is still at the nascent stage comparing to organizations from other sectors. The aim of the paper is to examine the non-financial reporting practices related to the management approach through analyzing sustainability reports prepared in line with the GRI Sustainability Reporting Standards by European healthcare services organizations. The aim was achieved by studying the GRI Sustainability Disclosure Database where non-financial reports are published, and performing a content analysis.

The use of GRI Sustainability Reporting Standards in the healthcare sector

The Global Reporting Initiative (GRI) has been established due to the lack of a common sustainability reporting standard. Originally, the aim of the GRI was to elaborate and promote guidelines for sustainability reporting. Having achieved this, the GRI currently strives to make non-financial reporting a standard practice for all

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organizations by offering a range of supplements developed to address sector-specific circumstances and challenges (Zinenko, Rovira, Montiel, 2015). "The aim was to create the first accountability mechanism to ensure companies adhere to responsible environmental conduct principles, which was then broadened to include social, economic and governance issues. The GRI envisions a sustainable future enabled by transparency and open dialogue about impacts. This is a future in which reporting on impacts is common practice by all organizations around the world. In 2016, the GRI transitioned from providing guidelines to setting the first global standards for sustainability reporting – the GRI Standards" (GRI's mission and history, 2020). The GRI Standards developed by the Global Sustainability Standards Board (GSSB) are the first and most widely adopted global standards for sustainability reporting, and remains currently valid.

The GRI Sustainability Disclosure Database comprises 2400 non-financial reports published by 629 healthcare organizations from all over the world, including 809 reports issued by 245 organizations delivering healthcare services and 1591 reports prepared by 384 organizations involved in manufacturing and selling healthcare products. The empirical analysis shows an increased interest in publishing non-financial reports over the last 10 years in the healthcare sector worldwide. Since 2016, in subsequent years a growing number of sustainability reports, prepared in compliance with the GRI Standards by organizations operating in the healthcare sector, appearing in the GRI Sustainability Disclosure Database may be observed.

In total, 275 sustainability reports in the worldwide healthcare sector (11,2%), published in the GRI Sustainability Disclosure Database, are complied with the most up-to-date GRI Standards, including 99 reports issued by 77 healthcare services organizations all over the world and 130 reports by 85 healthcare products organizations worldwide. In Europe, 29 reports are prepared by 17 European healthcare services organizations and 59 reports by 33 European healthcare products organizations. The rest 187 non-financial reports are produced by healthcare organizations from Africa, Asia, Latin America and the Caribbean, Northern America, and Oceania.

Results of the Conducted Research

The Table 1 presents the characteristics of European healthcare services organizations and their reports prepared according to the GRI Standards and issued in the GRI Sustainability Disclosure Database. It includes the name, size and type of European healthcare services organizations, the number of non-financial reports and their number of pages. A content analysis of these reports have been applied in order to examine the area of disclosures regarding the management approach. General requirements for reporting the management approach in line with the GRI Standards are the following:

1) Disclosure 103-1 Explanation of the material topic and its Boundary
2) Disclosure 103-2 The management approach and its components
3) Disclosure 103-3 Evaluation of the management approach

If management approach disclosures are combined for a group of material topics, the reporting organization shall state which topics are covered by each disclosure. If there is no management approach for a material topic, the reporting organization shall describe any plans to implement a management approach or the reasons for not having a management approach.

Table 1: Disclosures of management approach in sustainability reports elaborated according to the GRI Standards by European healthcare services organizations

Name	Size / Type	No of CSR reports	Year of publication	No of pages	Accessibility	Disclosure 103-1	Disclosure 103-2	Disclosure 103-3
Grecce								
Apivita	Large, PC, NL	1	2018	74	Pdf file	√	√	√
Athens Medical Group	Large, PC, L	1	2018	108	Pdf file	√	√	√
Hygeia Group	MNE, S, NL	1	2019	254	Pdf file	√	√	√
Italy								
Reale Mutua Assicurazioni	Large, PC, NL	1	2018	110	Pdf file	-	-	-

Spain								
Activa Mutua	Large, PI, NL	2	2019	198	Pdf file	√	√	√
			2018	236	Pdf file	√	√	√
Consejo General de Colegios Oficiales de Farmacéuticos de España	SME, NPO, NL	2	2020	174	Pdf file	√	√	√
			2019	109	Pdf file	√	√	√
Consorci Hospitalari De Vic	Large, PI, NL	1	2018	-	Online	√	√	√
Consorci MAR Parc de Salut de Barcelona	SME, PI, -	2	2018	158	Online	√	√	√
			2017	144	Online	√	√	√
Consorci Sanitari Integral	Large, PC, NL	1	2018	93	Pdf file	√	√	-
Guttmann - Fundació Institut Guttmann	Large, NPO, NL	2	2019	170	Pdf file	√	-	-
			2018	110	Online	√	-	-
Hospital de Molina	SME, PC, NL	3	2020	67	Online	√	√	√
			2019	62	Pdf file	√	√	√
			2018	98	Pdf file	√	√	√
Hospital Plato	Large, NPO, NL	1	2018	206	Pdf file	√	√	-
Institut Català d'Oncologia	Large, PI, NL	3	2020	101	Pdf file	√	√	-
			2019	106	Pdf file	√	√	-
			2018	90	Pdf file	√	√	-
Organización Sanitaria Integrada Barrualde-Galdakao	Large, F, -	1	2019	108	Pdf file	√	√	√
Union de Mutuas	SME, PC, NL	2	2019	153	Pdf file	√	√	√
			2018	153	Pdf file	√	√	√
United Kingdom								
Mediclinic International plc	Large, PC, L	4	2020	78	Pdf file	√	√	√
			2019	77	Pdf file	√	√	√
			2018	55	Pdf file	√	√	√
			2017	64	Pdf file	√	√	√
Medix Group	MNE, PC, NL	1	2019	54	Pdf file	√	√	√

Source: own work based on https://database/globalreporting.org/

Legend: L – Listed *NPO – Non-profit organization*
NL – Non-listed *PC – Private company*
PI – Public institution
F – Foundation
S - Subsidiary

As it may be noticed in the Table 1, non-financial reporting practices being in line with the GRI Standards in the healthcare sector in Europe are not very widespread. Only 17 organizations from four European countries prepared their sustainability reports according to the global standards. However, most of the healthcare services organizations disclosed the management approach. In total, 12 organizations communicated about its all three aspects: explanation of the material topic and its boundary, the management approach and its components, and evaluation of the management approach. One organization disclosed nothing related to the management approach. One organization presented only explanation of the material topic and its boundary. Four organizations informed about explanation of the material topic and its boundary, and the management approach and its components, but they did not disclosed evaluation of the management approach.

Conclusions

In the last two decades, non-financial reporting appears as a new trend in the European healthcare sector. The number of sustainability reports published according to the GRI Standards is growing and further countries start to communicate about their economic, environmental and social issues, including the management approach. This research contributes to a growing literature on the standardization of sustainability reporting in the healthcare sector by providing an empirical insight into the actual use of the GRI Standards. It fills a research gap in the field of non-financial reporting practices related to the management approach of European healthcare services organizations. The key findings are the following: (1) 17 organizations from only 4 European countries prepared their

sustainability reports according to the GRI Standards; (2) 12 organizations communicated about all three aspects of the management approach. The research sample is little, so in the near future, the European healthcare sector should be monitored and new non-financial reports, prepared in line with the GRI Standards, becoming available in the GRI Sustainability Disclosure Database ought to be studied. This research lays foundations for future research on the intra-organizational practices, structures and systems that are the result of standard compliance with the GRI Standards. Further studies might investigate the effects of its application on management practices by comparing the intended and actual implementation of the GRI Standards and their consequent influences on organizational processes.

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Ecological Behavior of The Future Generations of Professionals in Business Administration in The New Normality

Elizabeth Emperatriz GARCÍA-SALIRROSAS
Universidad Privada del Norte, Lima, Perú, elizabeth.garcia@upn.edu.pe

Karina SÁNCHEZ ZAPATA
Universidad Privada del Norte, Lima, Perú, ksanchez.zapata@gmail.com

Yessenia VILLANUEVA FLORES
Universidad Privada del Norte, Lima, Perú, yessenia.vf18@gmail.com

Abstract

The objective of this research was to analyze the ecological behavior of business students in the context of a COVID-19 pandemic. The study was developed under a quantitative approach, descriptive in scope, non-experimental cross-sectional design. The sample consisted of 400 business students from a private university in North Lima. The instrument used was the Ecological Behavior Scale (ECE), which was adapted to the Peruvian reality; This questionnaire had a Cronbach's Alpha of 0.817. Likewise, said instrument had three categories: 1) water use, 2) energy use, and 3) household waste disposal. For the analysis and data processing, Microsoft Excel and SPSS tools were used. The study concluded that there is a positive / moderate ecological behavior in business students. Therefore, it is recommended that university institutions contemplate the insertion of this subject within their curricular structure.

Keywords : Pro-environmental behavior, ecological behavior, environmental behavior, environmental behavior.

Introduction

The increase in the consumption of products and the generation of waste in the last three decades is considered in the scientific literature to be one of the most worrying causes for the deterioration of the environment, which definitely compromises the lives of future generations (Severo et al, 2018).

For its part, the United Nations (UN) is seeking a solution to human, social and economic problems. For this purpose, in 2015, it presented the Sustainable Development Goals (SDGs) to be achieved in 2030. These goals should guide the actions of governments, civil society, academics, business, among other participants in society. All this implies the obligation to implement tools that allow the creation of an inclusive and fair society, at the service of the people of the present as well as of future generations (ECLAC, 2018).

To achieve the SDGs, the business world has a leading role, since it has political, economic and social power (Sachs, 2015). For this reason, it is necessary for this sector to commit itself to sustainable development by applying its strategic management for the care of the environment. In this way, both companies and consumers must carry out better environmental practices, to achieve a more responsible consumption, developing products that are friendly to the environment (Severo et al., 2018).

According to the aforementioned, it is important to know the pro-environmental profile of the future professionals in business administration that will lead the organizations in the near future, since they will be the ones who will implement the business policies, and will make the decisions regarding responsible practices. of caring for the environment. In this sense, there are some studies related to the ecological behavior of future professionals, as we can mention:

De Sousa et al. (2015) carried out a study whose objective was to understand the causes that influence the ecological behavior of business university students. To do this, it surveyed 486 students from public and private

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Higher Education Institutions of the administration course, in the state of Piauí-Brazil; In this investigation, he detailed that similar results have been shown to the study carried out by Pato and Tamayo (2007); however, a difference is shown in the factors found. Since in the investigation of Pato and Tamayo (2007) they specified 4 factors such as: "Urban cleaning", "Energy", "Activism-Consumption" and "Recycling", and in the investigation of said author they determined 6 factors: "Savings of water ",“ Cleaning ",“ Activism-Consumption ",“ Saving energy ",“ Recycling "and“ Activism ". They came to the conclusion that their research served for decision-making in the university sector, helping future managers and student coordinators to contribute to their ecological behavior.

For their part, Camacho and Jaimes (2016) sought to recognize the correlation between environmental attitudes and behaviors, for which they scored 190 college nursing students in Colombia. Their results showed that ecological attitudes were positive, but they were not manifested in their behavior; That is why they recommended improvement in environmental training and their professional performance.

Vargas et al. (2017) studied the values, environmental knowledge, organizational commitment and job satisfaction of workers. Taking the case of the Bahías de Huatulco hotel in Mexico. His research sought to determine the determining components of ecological behavior. For this analysis, a questionnaire was applied to 178 hotel workers. The results reflected that the environmental knowledge that the workers had was developed based on the talks and training provided by the organization. The objective of which was to impart a culture and responsible participation, based on the reserve of natural resources and the promotion of ecological habits. They came to conclude the existence of a significant relationship between values, environmental knowledge and pro-environmental behavior.

On the other hand, Pincay et al. (2018) conducted a study in the city of Guayaquil, Ecuador, the objective of which was to determine the ecological attitudes and behavior of adult consumers. To do this, they interviewed 196 people between 18 and 45 years of age, from socioeconomic levels B and C. The results showed that some of the participants had an ecological conscience and that this was basically due to the media and concluded that the attitudes Ecological factors are detailed in three types of causes: Eco posture, Cognition and Ecoactivity.

Ecological Behavior

Different authors refer to ecological behavior as voluntary and true work or activity, which are committed to collective and personal requests, which results in environmental conservation (Páramo, 2017). Additionally, ecological behavior was being accepted; since, it had as objective to favor the ecosystem. In turn, he determined it as a favorable will and they use said term of ecological behavior to emphasize the behavior that benefits or harms the ecosystem (Rivera and Garcés, 2018). Pro-ecological behavior develops when an individual commits to employing actions that help conserve, protect and safeguard the ecosystem, as well as promote peace of mind for all human beings (Álvarez and Vega, 2009).

Environmental behavior was conceptualized as the different acts that an individual uses to be able to take care of the environment, that is; It not only intends to conserve its own environment, but also seeks to reduce the environmental problems and impacts that its purchases generate (Bianchi et al., 2019; López et al., 2015). Pro-environmental behavior could also be defined as the commitment to protect and prevent environmental deterioration (De Sousa et al., 2015).

Different authors agreed that sociodemographic variables are indifferent to be able to explain pro-environmental behavior, considering the psychographic and knowledge variables of greatest interest (López et al., 2015).
For their part, Corral (2010) and Flores (2019) specify the topics for the study of recycling such as: Recycling, Water consumption, Energy saving, Reading of environmental topics, Environmental aesthetic actions, Preservation of ecosystem.

Theories of Ecological Behavior

A theoretical model would be given by reasoned action which consists of pro-environmental behavior made up of beliefs. This theory supports two dimensions: 1) the individual's attitude towards behavior and 2) the perspectives based on the behavior that the individual observes in their social environment, which is classified as a normative social influence. This theory is supported by the individual's routine actions that would be associated simultaneously with the stimulation of acceptable behaviors, mandatory guidelines imposed by society called attitude and that shows a concordance to said behaviors, called subjective norms (Worchel, Cooper, Goethals , and Olson, 2009).

For her part, Flores (2019) supports the model oriented to ecological behavior developed in five indicators, which are: 1) personal values, 2) new ecological paradigm, 3) awareness of the consequences, 4) attributions of responsibility and 5) norms. personal.

Cerrillo (2010) points out a new ecological paradigm, opposite to the traditional environmental paradigm regarding the visualization of the planet. The peculiarity lies in the conviction that individuals developed regarding nature. This model shows the contribution of values, beliefs and effects on behavior. The model details the following dimensions: limits to growth, the very exceptional anti, environmental balance, environmental problems, and anthropocentrism.

After reviewing some background and theories, the study was carried out that aimed to analyze the ecological behavior of business administration students in the context of a Covid-19 pandemic.

Method

The research followed a quantitative approach, descriptive scope, non-experimental-cross-sectional design (Hernández, Fernández, & Baptista, 2014). The data collection was obtained through a self-administered questionnaire by university students who were studying business administration at private universities in North Lima. For the selection of the participants, the following inclusion criteria were defined: University students from the first to the tenth undergraduate academic cycle, who are studying a business career, who are enrolled in the 2020-2 school period and are willing to participate with the filling out the questionnaire.

The sample size was calculated for infinite populations, with a confidence level of 95% and a margin of error of 5%, where the individuals in the study should have been 385 students, however, it was possible to apply the questionnaire to 400 students, which generated a more representative and consistent investigation. The sampling was non-probabilistic for convenience. The sample was made up as follows: 63% female, 37% male, and 1% preferred not to say so. Regarding age, it was made up as follows: 66% were between 17 and 21 years old, 29% were between 22 and 26 years old, and 5% were between 27 and 30 years old.

Regarding the academic cycle, the sample was made up as follows: 8% of students belonged to the first cycle, 1% in the second and third cycles, 26% and 16% to the fourth and fifth cycles respectively, 12% in the sixth cycle, 8% at the seventh cycle, 15% at the eighth cycle, 4% at the ninth cycle and 9% at the tenth cycle.

To collect the information, the Ecological Behavior Scale (ECE) was used, which was developed and validated by Pato (2004) in Brazil. The scale consisted of 17 items, on the Likert scale (1 = Never, 2 = Almost Never, 3 = Sometimes, 4 = Many times, 5 = Almost always and 6 = Always). The items were distributed in 3 dimensions, related to: 1) Water use, 2) Energy use and 3) Disposal of household garbage. The instrument had to be adapted according to the cultural characteristics of Peruvian university students. And an analysis of the psychometric properties was carried out.

The Kaiser-Meyer-Olkin test (KMO = 0.801) was performed. The reliability analyzes as internal consistency yielded a Crombach Alpha of 0.809, which implies that the scores have a very small error and are highly reliable.

Results

The results are shown below:

Table 1: Characteristics of ecological interest of business students

		Frequency	Percentage
Affiliated to an environmental institution	No	346	87%
	Si	54	14%
	Total	400	100%
Work in an environmental institution	No	391	98%
	Si	9	2%
	Total	400	100%
Environmental collaboration	No	317	79%
	Si	83	21%
	Total	400	100%

According to table 1, it can be observed that very few students are affiliated with an environmental institution or collaborate with the environment. The lowest percentage being those who work in an institution in this sector.

Table 2: Characteristics of ecological interest of business students

Behavior regarding energy use	**Mean**	**Median**	**Dev.**
1.I avoid leaving the lights on in environments that I'm not using	5.0	5.0	1.1
2.I avoid opening the refrigerator if I am not sure what I am going to use	4.7	5.0	1.3
3.I turn off the light every time I leave an environment	5.0	5.0	1.2
4.I avoid wasting electrical energy	4.7	5.0	1.5
5.I avoid having the refrigerator open so as not to waste energy	4.4	5.0	1.0
6.I avoid leaving the television on if no one is watching	4.9	5.0	1.6
7.I avoid connecting multiple electronic devices at the same time	3.3	3.0	1.2
Behavior regarding the use of water			
8. I avoid leaving the spout open when taking a bath	4.8	5.0	1.5
9. I avoid wasting water and other natural resources	4.4	5.0	1.5
10. I close the spout while brushing my teeth	5.2	6.0	1.0
11. I turn off the shower to get soap	4.6	5.0	1.6
12.I save water whenever possible	4.7	5.0	1.2
Behavior regarding garbage disposal			
13. I avoid disposing of all kinds of waste together	3.0	3.0	1.5
14. I have a can for each type of waste	2.7	3.0	1.5
15. I avoid buying products with plastic packaging	3.3	3.0	1.3
16. I separate the garbage according to the type of waste	2.7	3.0	1.3
17. Just the paper to later be recycled	3.3	3.0	1.6

If we consider that it is a six-point scale, the results indicate that in general terms the ecological behavior of the students would be located at a positive / moderate level (M = 4.16). However, after a differentiated analysis we can establish that the students have a more responsible behavior regarding the use of water in item 10 (M = 5.2), related to closing the spout while brushing their teeth. Items 1 and 3 (M = 5.0) are also rescued, where they demonstrate a more responsible behavior related to the use of energy, related to avoiding leaving the lights on in environments that are not being used and turning off the light every time they go out of the environment, which are indeed closely related.

The category where students demonstrate negative ecological behavior in almost all items is related to garbage disposal, where it can be seen that the lowest level is item 14 (M = 2.7) which has to do with with the fact of having a bin for each type of waste.

Discussion and conclusions

It also showed relevance in that the respondents were not affiliated with an environmental institution and did not work in it, nor did they participate in environmental issues in the last two years, which suggested that there is very little ecological interest in business students. It could be due to lack of knowledge due to the fact that the existing communication media in Peru do not promote said environmental awareness, of which Corral (2010) made mention of the importance of generating environmental awareness through all communication platforms; since this contributes to generate interest in different individuals regarding ecological problems.

The low level of ecological behavior may be due to the lack of ecological culture that were not reflected in their habits and behaviors, as mentioned by Palavecinos et al. (2016) in his study where he discovered a positive attitude in environmental care, but his behavior was not always consistently in favor of the environment.

Regarding the use of water, an inappropriate use was observed because on several occasions they made unnecessary waste of this natural resource. Also, the research by Vargas et al. (2017) developed an approach based on the importance of being able to transmit an adequate culture and collaboration focused on the preservation of natural resources, thereby developing appropriate environmental practices and customs.

A regular level was also seen regarding energy use, since the respondents avoided connecting different electronic devices at the same time or leaving them to charge for a long time; however, a continuous behavior is not visualized in them. The opposite was the case with the research by Camacho and Jaimes (2016) who saw that attitudes were not always related to action in behavior, despite the fact that the vast majority of their respondents showed good ecological attitudes.

Finally, in the household garbage disposal factor, an unfavorable level was observed in most of the items, this could be due to the fact that young people consider that it is a bit difficult to do this activity. The opposite case happens with the study carried out by Corral and De Queiroz (2004) who observed a development in ecological behavior according to good environmental practices regarding the separation of waste.

This research had as limitations the scarcity of studies under the same context, which is why it was decided to take as a reference research related to the topic addressed with other variables.

This study will serve so that organizations, universities that can implement and improve their curriculum regarding the teaching of ecological behavior because it is important that future professionals can be more aware of these types of concerns. This would generate new knowledge and new habits for future graduates who will lead companies where they will make decisions and apply practical actions within them. Also, this research can be taken as a reference for future research.

This work is part of the previous results of a general investigation. In which it will seek to deepen greater knowledge relating the variable of ecological behavior and environmental concern.

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Research Funding in Polish Higher Education – Moving on To Highly Competitive System

Barbara GRABINSKA
Cracow University of Economics, Cracow, Poland
grabinsb@uek.krakow.pl

Abstract

Research funding plays a key role in directing the development of science and stimulating the research productivity, which is crucial in today's economy based on knowledge. Around the world, we can observe the growing dissemination of the model of research financing based on the composition of competitive grant funding for individual researchers and performance-based funding for subsidizing institutions of higher education. Poland has transformed in a relatively short period of time from a system of block-based research funding to highly competitive model of research financing, where substantial amount of total research resources is allocated for project funding and institutional financing is based on performance metrics.
The aim of the study is to present the evolution in the structure of revenues for research activity of public higher education institutions (HEI) in Poland with the focus on project financing distributed by two research agencies: National Science Center - responsible for basic research and National Centre for Research and Development - responsible for supporting applied and experimental research.
The study is based on the data from the financial statements of public HEI over the period 2011 – 2018. Conclusions are vital for the evidence-based policy regarding research funding.

Keywords: Higher Education; System of Public Research Financing; Project Funding; Poland.

Introduction

Financial determinants regarding both the level and mechanism of funds allocation are regarded as significant, if not crucial, factors of research development and quality. Therefore, it is not surprising that mechanisms and tools of financing universities attract attention from the part of researchers and policymakers.

Research funding systems around the world have undergone profound changes in the last decades. Reforms introduced in many countries have been based on two pillars: performance based funding systems for distribution of core institutional funding and competitive project funding for individual researchers. Lately, it has been common to include also a third source of financing in the form of excellence funding - providing a stable source of money for the best institutions. In recent years a shift toward greater participation of project funding in research institutional budgets has been observed. The pace of changes around the European systems of higher education is different and composition of research revenues of universities is diversified.

In this regard, Poland provides very interesting example transforming in relatively short period of time from a system of block-based research funding to highly competitive model of research financing, where substantial amount of total research resources is allocated for project funding and institutional financing is based on performance metrics.

The aim of the article is to present the evolution in the structure of research for research activity of higher education institutions (HEI) with the focus on project financing distributed by the research agencies (councils).

The study is based on the data from the financial statements of public HEI over the period 2011 – 2018. Conclusions are vital for the evidence-based policy regarding research funding.

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Literature Review

One of the most significant changes in public research funding in recent decades has been a shift from an internal block funding model toward the system with performance based institutional financing and selective funding of research proposal of individual academics. The consequence of this reform has been an increase in the proportion of funds competitively allocated in relation to financing based on discretional, administrative decisions of policy makers. Competitive project-based financing via research agencies or councils has become an important way of distributing public resources for science in many countries and it is in line with New Public Management approach. It is perceived as more efficient way of research funding than institutional subsidizing. Selective funding of grant proposals employs quasi-market-like mechanisms in the system of higher education with the goal of stimulating competitiveness.

It is worth to mention however that studies on efficiency of selective grant funding, distributed by research councils usually after peer-review of research proposals, are not unequivocal. There are also problems with defining and measuring outcomes of science systems, as the research output is heterogeneous and should not be limited to the most frequently considered scholarly output e.g. highly cited publications, but also it should include patents or societal relevant knowledge.

Jacob and Lefgren (2011) provide evidence for relatively small impact of receiving grant on subsequent publications and citations in competitive US market for research funding. They find that receipt of an NIH grant in years 1980 - 2000, with an average value of $1,7 million, leads to 1,2 additional publication over the next five years, which corresponds to 7 % increase in scientific output comparing with unsuccessful applicants. This modest growth in scientific productivity is explained by the so called displacement phenomenon, which means that unsuccessful applicants shift to another source of funding. This is possible in the model of multiple funding agencies and a competitive market for research funding, in which rejected author can obtain financing from alternative agency, his or her institution or a co-author . The authors stress however that despite the small impact of NIH grant on the marginal applicant, there may be an aggregate positive effect of the agency support in the long run, if overall funding is in fixed supply.
Mongeon, Brodeur, Beaudry and Lariviere (2016) measure the relation between the amount of funding provided to nearly 13 thousands of researchers in one of the Canada's province - Quebec over the years 1998 to 2012 and their scientific output from 2000 to 2013. They conclude that in terms of both the quantity of papers produced as well as their scientific impact, the concentration of funding in the hands of relatively small and elite group of researchers generally results in diminishing marginal returns.

Sandstrom and Van den Besselaar (2018) point out that competitiveness in science system is usually defined and measured as the share of project funding in total research revenues (the higher the share, the more competition in a research system), but they notice also others factors: existence of performance based financing and national evaluation, which influence the level of competition. The authors examine data on input and output in 18 countries and challenge the popular statement that the higher the share of project funding, the higher the efficiency of the system. They find that a moderate to small, but negative correlation of about 0,3 between efficiency and the level of competitive project funding.

Győrffy, Herman and Szabó (2020) in their Hungary-based study observe an impressive 47 % increase in publication output following the receipt of basic research grant. They explain this radically strong effect by the fact that in emerging economies there are less sources of research funding than in highly developed countries and not receiving grant very often means that unsuccessful researchers have to wait till the next year call when they can resubmit the proposal.

Even larger complications arise in the case of international comparative studies, because of the lack of comparable data especially about inputs in research and many factors which have to be controlled when measuring differences in efficiency of national science systems (e.g. structural characteristics of science systems like: university autonomy, level of academic freedom, level of competition etc.) (Sandstrom and Van den Besselaar, 2018).

Country Setting

Higher education sector, which is at the center of public research system in Poland, has been subject to many reforms over the past 30 years since the economic and political transformation in 1989.

The main achievements of Polish higher education in recent decades are connected with impressive growth in access to higher education with gross enrolment rate at 12,9 % in academic year 1990/1991 and 46,2 % in 2018/2019 (Statistics Poland, 2005 and Statistics Poland, 2019). But on the side of quality of performed teaching and research,

Polish universities still stand out from the leading centers in Europe. The position of Polish universities in international rankings is weak. According to the Academic Ranking of World Universities 2020, only eight universities from Poland have been included in the top 1000 ranking, with our highest- ranked institution - University of Warsaw, in the fourth hundred of the list.

Government is searching to improve the performance of Polish universities and is looking at higher education system in Western Europe as the benchmark model.

In the academic year 2018/2020, there were 392 higher education institutions in Poland of which about one third were public. The private higher education sector in Poland is numerous, but it is made up of small institutions with students accounting for around 1/4 of total students and academic teachers accounting for around 12% of full-time employed academic staff (Statistics Poland, 2019).

Non- public higher education institutions are usually teaching-oriented and only a small proportion of them is engaged in research activities.

Public as well as private universities are entitled to state financing of research activities. Polish funding system is not diversified, with government dominating as by far the biggest funding provider. Poland has a dual funding structure with public financing of research provided through two routes: institutional core grants and competitive research council grants.

Organizational (institutional) funding is based on performance measures of research activity and it depends on the outcomes of nation-wide evaluation carried out by Committee for Evaluation of Scientific Research Institutions. Evaluation takes place every four years and it results in categorization of research units. The next evaluation in 2022 will be organized according to the new rules and it will be performed across the scientific disciplines, not across research units.

Different criteria and metrics are taken into account in the assessment process. The most important of them include: number and quality of publications, patents, revenues from cooperation with industry and other external sources of R&D funding, number of scientific degrees awarded.

Poland was in the early 1990s one of the first countries in Europe, which implemented the distribution of science funding based on assessment of research institutions. Over the years, the evaluation system has undergone substantial reforms. In 1990s. it was the peer review categorization of research institutions. In 1999 a new system was launched with significantly limited role of expert opinions, but based on a parametric assessment. From 2010 another phase in the history of evaluation was pronounced with setting up the board responsible for national evaluation (Kulczycki, Korzeń, Korytkowski, 2017). The first assessment after this reform was carried out in 2013, then in 2017 and the next one will take place in 2022.

The main objective of this system is to provide funding to scientific units according to their scientific achievements, with number and quality of publications as the most important component in the evaluated outcomes. The quality of a given scientific unit is expressed as one of four categories: A+, A, B or C.

It is worth to mention, that Poland belongs to the minority of European countries (together with UK), where the whole research component of basic state contribution is performance-based (ETER, 2019).

The second pillar of financing is project funding allocated to individuals or research groups on the competitive basis in the process of research proposal assessment.

In 2010, a major change was introduced in the area of project funding in Poland, which consisted in transferring the competence to allocate funds form the ministry of science and higher education to the executive agencies: The National Science Centre (NSC) and The National Centre for Research and Development (NCRD) (Supreme Audit Office, 2020).

NSC was established in 2011 and it is the most important funding mechanism for basic research in Poland. NSC invests in excellent research aimed at generating new knowledge with long-term benefits to Poland. Funding rounds occur several times annually and are divided into programs intended for researchers of varying position and seniority. During the years 2011 – 2018, in competitions organized by the National Science Center, about 90 thousand applications were submitted, of which nearly 17 thousand projects were selected for financing, with allocation of over PLN 7 543 723 thousand for their implementation.

About 6,5 thousand researchers benefited from the NSC funding and about 37 thousand publications were reported as output of these research projects. It is worth to underline that in the period 2011-2018, 76 % of all applications were submitted by researchers employed in HEI. So, the majority of public funding for basic research goes to higher education sector (Supreme Audit Office, 2020).

The functioning of the current project support system for scientific activity is overall assessed positively by the scientific community. The most common concerns are related to the following problems: over-formalization and ineffective system of application evaluation.

There is also a need of strengthening the mechanisms of management control executed by the agency over the funded projects. So far, the NSC audit procedure was largely based on the information provided by the beneficiaries without direct verification (Supreme Audit Office, 2020).

The second government agency - the National Centre for Research and Development (NCRD) was set up in 2007, although its role till 2011 was limited. The science and higher education reform adopted in October 2010 brought new legal regulations, which expanded significantly the responsibilities of NCRD as the main public institution financing R&D. It was also a breakthrough to take over from the ministry the role of the intermediary body in several European Union operational programmes supporting growth and knowledge economy (National Centre for Research and Development, 2012). NCRD's duty is to encourage Polish enterprises, research institutes, universities and other types of scientific units to create and implement innovative solutions based on the results of research carried out by scientists and innovators. Its role is to strengthen cooperation between science and business in Polish economy.

In recent years the enterprise sector has had the biggest share of the NCRD total funding (e.g. 39 % in 2018 and 71,5 % in 2017), but universities are still significant beneficiaries in funding distributed by this executive agency (National Centre for Research and Development, 2019).

Data, Results and Discussion

The majority of revenues of public HEI comes from teaching (77 % in 2018), while the revenues for research activities accounts for 14 % of all revenues in 2018. The overall negative tendency can be observed in the structure of financing with decrease in share of revenues from research activity from over 16 % in 2011 to 14 % seven years later. Taking into account the progressive decline in the number of students over the whole period, this can indicate a low priority of research in the budgetary system (Picture 1).

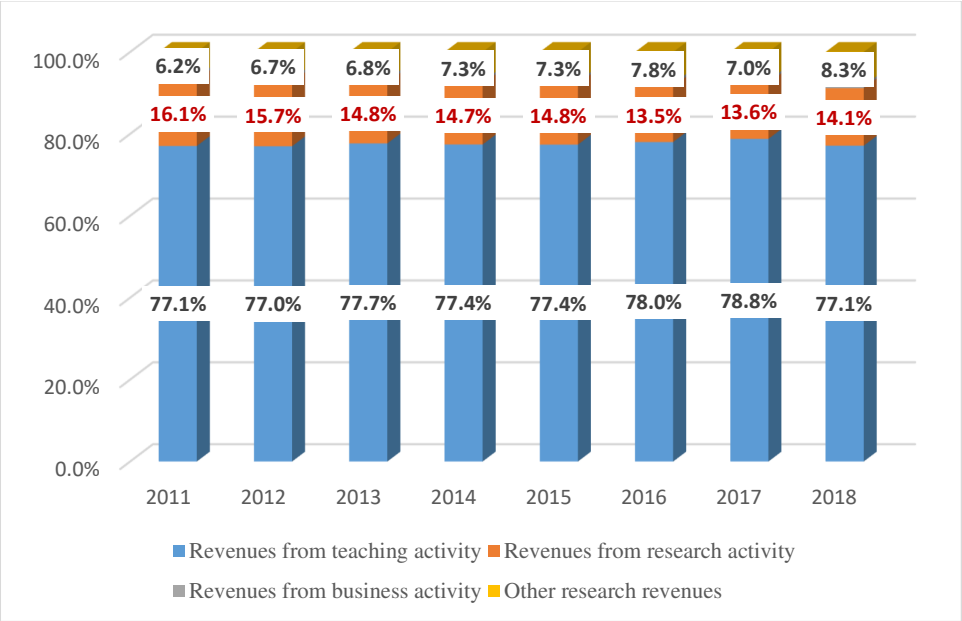

Picture 1: Structure of revenues in public HEI in years 2011 – 2018

Source: Own elaboration on Ministry for Science and Higher Education data.

In years 2011 - 2018 the revenues for research activities in public higher education sector have grown at a slow rate of several percent annually, however with a significant decrease of 11 % in 2016 (Picture 2). The fall of research funding in 2016 was mainly caused by a dramatic drop in EU funding caused by delays in the implementation of projects from the Structural Funds and from reimbursement of unused funds from HEI (Supreme Audit Office, 2017). In 2016 the expenditures of the EU funds budget in the budgetary section 730 Science decreased by 75 % comparing with the revenues from previous year, which translated into lower revenues of universities. The budgetary financing of NCRD, which acts as an intermediary institution in the distribution of EU funds for R&D, fell by 50 % in 2016 (Ministry of Science and Higher Education, 2017).

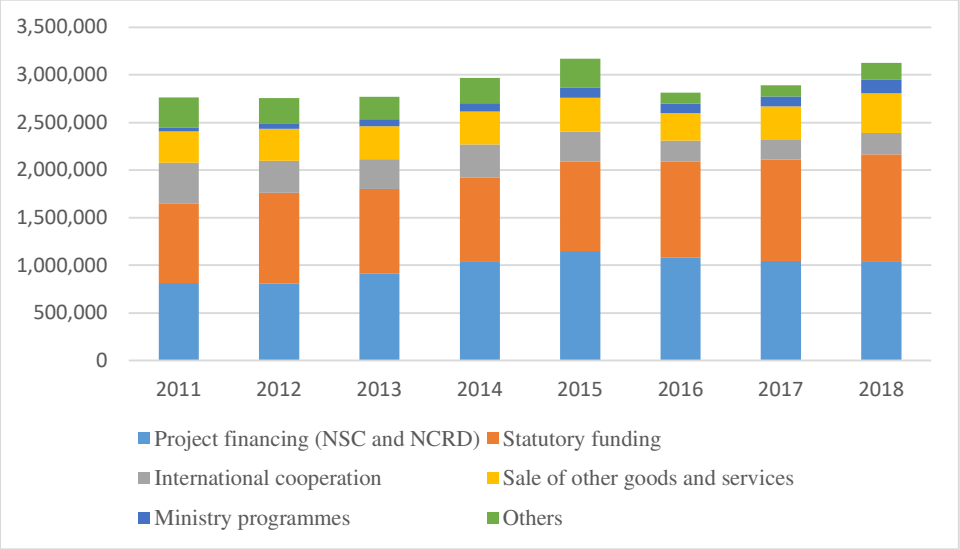

Picture 2: Revenues for research activities and its components in public HEI in years 2011 – 2018
Source: Own elaboration on Ministry for Science and Higher Education data.

Revenues for research activities consists of several categories (Picture 2) with the most important: statutory subsidy and project funding by two executive agencies (NSC and NCRD).

The most significant source of research revenues for public HEI remains still the government statutory subsidy allocated between institutions on the basis of defined performance criteria. This type of funding has a clear advantage over project funding, which is a stability of funding for HEI. Project financing's share is only slightly lower than subsidy financing. During the years 2011 - 2018 grants from two agencies accounted for about 1/3 of all research financing (Picture 3).

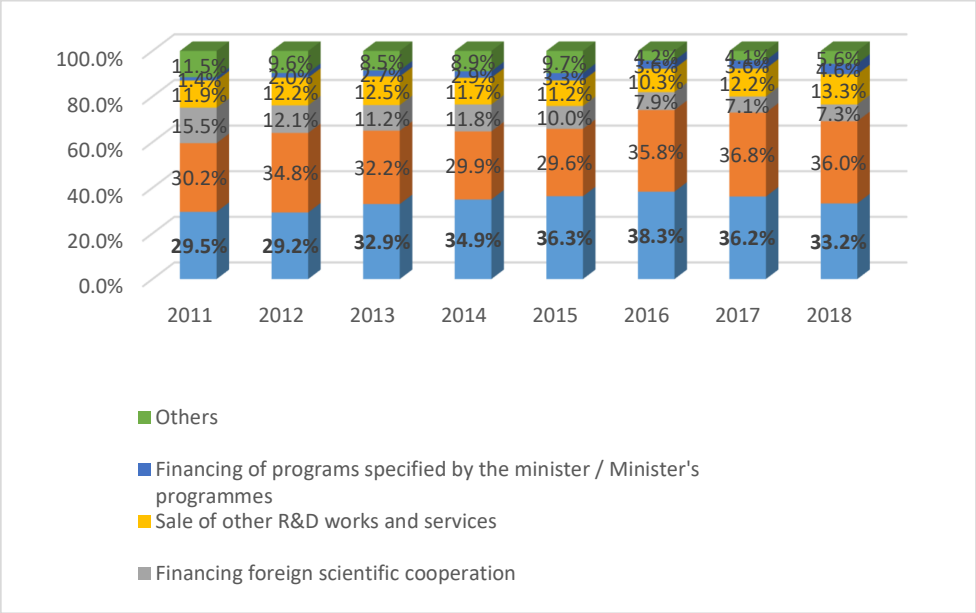

Picture 3: Structure of the revenues from research activities in public HEI in years 2011 – 2018
Source: Own elaboration on Ministry for Science and Higher Education data.

The share of project funding in research revenues is diversified and changing in time for different groups of HEI (Picture 4). At the beginning of the analyzed time period, technical universities were characterized by the biggest share of project financing in their revenues, while for the group of general universities this source of funding was relatively less important. But in recent years these relationships have reversed. The group of universities consists of big institutions with highly diversified areas of research activity and usually with strong research orientation. Therefore it is not surprising, that these institutions are gaining advantage over other institutions. In the case of technical universities, the fall of project financing share can possibly be connected with decreasing funding from NCRD. NCRD gravitates towards supporting corporate R&D and consequently technical universities, which used to be big beneficiaries of funding for applied research distributed by this agency, are now in relatively worse situation than a few years earlier. We can observe the big leap for medical HEI, which from 2016 have been much more active and efficient in gaining project financing. There is no clear pattern for economic universities over the period, but this group is relatively small and individual factors contributing to the success of one of the economic university, can influence greatly the picture for the whole group.

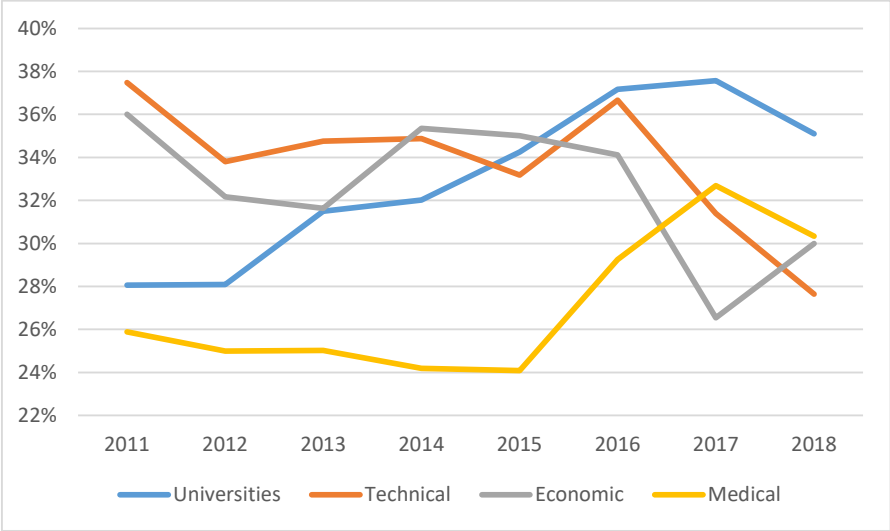

Picture 4: The share of project funding (NSC and NCRD) for selected groups of public HEI with regard to the classification of Statistical Office in Poland in years 2011 – 2018
Source: Own elaboration on Ministry for Science and Higher Education data.

The selective funding of research proposal together with dissemination of performance formulas in distributing research institutional subsidies cause that distribution of research financing is highly uneven. Relatively narrow group of institutions benefit from the selective procedures of allocations.

Table 1: Gini Coefficient of revenues from project funding agencies (NSC and NCRD) per teaching staff in public higher education sector 2011 – 2018

Year	Gini Coefficient	No of public HEI receiving grants
2011	0,7	91
2012	0,62	94
2013	0,67	93
2014	0,69	91
2015	0,8	88
2016	0,62	85
2017	0,6	88
2018	0,56	87

Source: Own elaboration on Ministry for Science and Higher Education data.

Gini coefficient is a frequently used measure of inequality of distribution. It is commonly used for presenting the inequalities in income and wealth distribution. As HEI in Poland are very different is size, the better measure of reflecting differences in their research project potential is to apply the measure of financing per academic staff.

A Gini coefficient takes the value from zero to one, where zero, in this case, implies a perfect equality, meaning that all universities receive the same funding per teaching staff, while a Gini coefficient of one implies the maximal inequality.

Table 1 presents a Gini Coefficient of revenues from project funding agencies (NSC and NCRD) per teaching staff in public HEI.

The scale of distribution inequalities seems to decrease with time with the largest annual decline in 2016 with coincide also with the significant drop in research funding provision. It can be explained by the fact that at the moment of introducing the new tool of allocating financing for research, only a minority of well- informed institutions decided to compete for funds and as time goes by more and more researchers from different HEI started to be active in submitting research proposal, which translated into their growing participation in research money per academic teacher. Still, the level of inequalities of funding per academic staff is significant and as experiences of developed countries suggest, it is doomed to remain at high level.

Conclusions

The patterns of funding research from budgetary sources are well established in developed countries. They are based on two pillars: institutional funding usually distributed on a basis of performance measures and project funding providing individual researchers or research teams with money allocated by research councils (agencies) on selective and competitive basis. Poland also adopted this mechanisms with setting up two financing agencies: in 2011 - the National Science Centre (NSC) responsible for basic research and in 2007 - the National Centre for Research and Development (NCRD) with focus on applied and experimental research. Within a decade since the implementation of project financing of science, Poland and Czech Republic stand out from other Central and Eastern European countries with a high share of funds allocated by financing agencies. It seems that in the future we should not expect a further increase in the share of project financing in universities' revenues, as institutions need in their research activity a good balance between competitive financing and stable and more secure sources of funding allowing to them to set research priorities in a long run.

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The Markets for Economic Governance in Social Market Economy Policy

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

This article presents the principles of interventionism in the light of the deliberations and actions of the Ordo Liberal economists - In Eucken. and L. Erhard - constructivist economic order. The consequences and coherence of the principles of economic order shaping economic policy are contrasted with the mistakes resulting from the discretionary practice of economic policy, within the framework of manifestations of state interventionism in the economy. In the conditions of globalisation in liberalising markets, the interpenetration of economic and political models (Anglo-American capitalism, the European model of the social market economy, Asian capitalism) is inevitable, in which the most important process is to direct economic interaction towards optimising economic and social utility. The organically shaped economic "order" (the rules of the market game) in liberalism differs significantly from the constructivist concept of conducting policy of shaping economic order in ordo liberalism. The creation of a legal basis, rules of deception for free, equal and responsible individuals was supposed to be a tool for reversing the process of self-destruction of liberalism, to which the effects of boundless freedom in the operation of individuals were to lead (freedom in an extremely liberal view is a threat to itself). The construction of a competitive economic order developed as the foundations of ordo liberalism is perceived by the author of this article as the creation of rules / principles necessary to achieve the pro-effective and free market system goal. Particular emphasis within the framework of interventionism is placed not on the policy interfering directly in economic processes, but on the policy setting the rules / conditions of market play. This article states that: economic transformation, seen in the light of the need for a faster pace of change, cannot be dissociated from the strong influence of the state in shaping economic order, and is therefore doomed to constructivism, and interventionism as the most effective but highly imperfect approach possible.

Keywords: Social Market Economy, Ordo Liberalism, Economic Governance, Systemic Transformation, Organic Constructivist Processes, Interventionism,

Introduction

Under the conditions of globalisation in liberalising markets, there is an inevitable interpenetration of economic and political models (Anglo-American capitalism, the European social market economy model, Asian capitalism), in which the most important process is to focus economic interaction on optimising economic and social utility. In an increasingly competitive environment, the approach of classical liberalism to shaping the rules of the game / market conditions through the actions of companies needs to be adapted / modified. The full freedom and unlimited scope of action of the farming units is intrinsically linked to their desire to eliminate all barriers to profit maximisation. Through this, the spontaneous inclination of companies to minimise market competition distorts the material aspect of management and the main social values (economic freedom of others / free market), which liberalism itself is supposed to serve. The organically shaped economic "order" (the rules of the market game) in liberalism differs significantly from the constructivist concept of conducting a policy of shaping economic order in ordo liberalism. The creation of a legal basis, rules of deception for free, equal and responsible individuals was supposed to be a tool for reversing the process of self-destruction of liberalism, to which the effects of boundless freedom in the operation of individuals were to lead (freedom in an extremely liberal view is a threat to itself). The construction of a competitive economic order developed as a foundation for ordo liberalism is seen by the author of this article as the creation of rules / principles necessary to achieve the pro-efficiency and freedom objective of the market system. Particular emphasis within the framework of interventionism is placed not on the policy that directly interferes with economic processes, but on the policy that sets the rules / conditions of market play.

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Theoretical basis, methods, results and discussion

Organic and constructivist rules / rules of play in the markets.

The limitations of human knowledge, the incompleteness and asymmetry of information most often result in imperfect contracts or opportunistic behaviour of economic relations partners. A natural feature of the behaviour of profit-oriented economic entities is the desire to eliminate competition, which results in inefficiency. This imposes the need for restrictions - institutions - to ensure low transaction costs[1]. The purpose and effect of institutions is therefore to minimise transaction costs (Williamson, 1998, p. 31)[2]. Institutions are seen as "frameworks and forms of collective action". (Ząbkowicz , 2003) Institutions create a platform on which business entities acquire dynamism - entrepreneurship, risk-taking, flexibility, motivation to acquire knowledge on a permanent basis are supported.

By pointing to transaction costs as a risk mitigating and near-optimal factor, Figure 1 presents a model approach to the differences between D. C. North and J. Wilson's approach to transaction costs proposed by B. Martens (2004).

Fig. 1: *Ex ante* trading baskets and *ex-post* risk

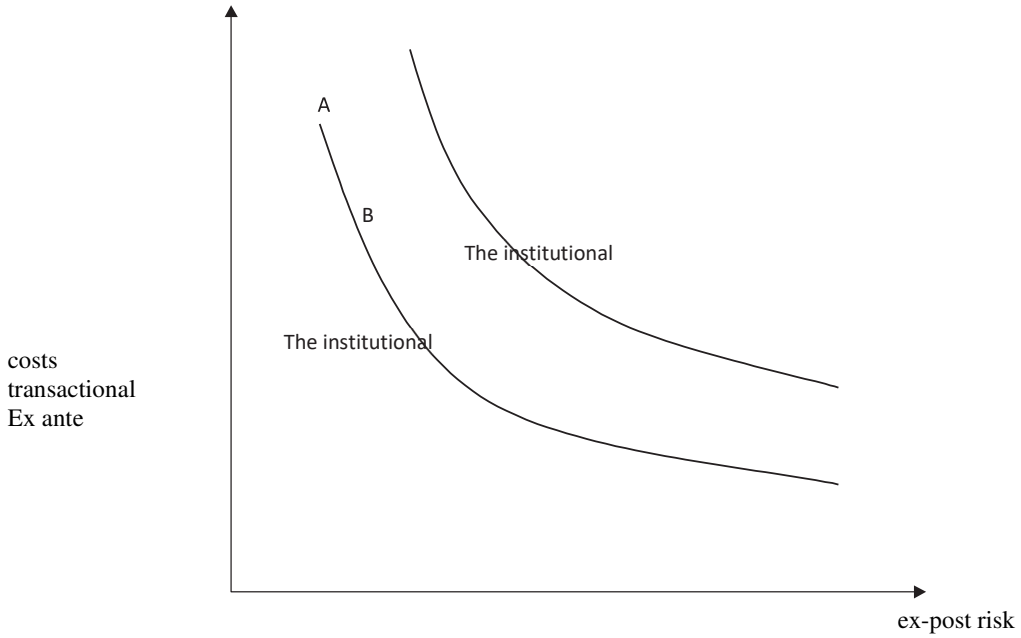

Source: Own study.

The greater attractiveness of *Institutional Environment B results from a* lower level of risk for individual *ex-ante* transaction costs than in *Institutional Environment A*. An improvement in the incentive structure occurs both when, for a given level of *ex-ante* transaction costs, potential transaction costs (level of uncertainty) decrease, and when, for a given level of uncertainty, the amount of *ex-ante* costs accompanying the replacement decreases. Reducing transaction costs involves introducing better institutions. *Ax-ante* costs can be minimised by increasing *ex-post* risk (shift from A to B) or by introducing institutional changes (shifting the *institutional environment* to the beginning of the coordinate system). The shape of the *institutional* environment curve is influenced, in addition to factors shaping the efficiency of the institution, by the cost determinants of perception and information processing depending on the quality of the cognitive resources of the entity (human capital).

In D.C. North's economic theory, the analysis focuses on the relationship between the state, a type of socio-economic order that depends mainly on the system of property rights (North, 1997). The state as a system of institutions and organizations providing individuals and groups with protection of their rights as well as social and economic order is a function of legal and customary norms. According to D.C.North's economic theory, the real productive capacity of the economy is determined by structural rather than technical boundaries. The difference between these two boundaries can be very large, with serious losses of potential product and social welfare. The formalisation of the statements of D.C.Northa was proposed by R. Findley and J.D.Wilson, introducing into the traditional function of production, which describes the relationship between production,

Y, and labour input, L, and capital input, K, factor - economic order P, which in their analyses is derived from property rights. **Y = f(L, K) x p(G)**

It is an aggregate production function in which the economic order is created by the state. p(G) is a function of the production of the economic order (Eggertsson, 1999, pp. 317-358). In this modified function of production, the idea of D has been formally presented. C. Northa, where economic order (especially the structure of property rights) determines the productive effects of the economy. In the economic theory of the D.C.Northa model, the economic order presented in this way is the same as the structure of property rights. It follows that the economic order is presented in a rather narrow sense. The foundations for a broader economic order in economic theory were laid by F. A. von Hayek, where it is always a kind of adaptation, "adjustments to a great number of circumstances and events that are known to all members of society, taken together, but are not known as a whole to individual people. For such an order to exist, it is necessary 'that all individuals follow clear rules or that their actions are limited to a certain extent'. (Hayek, 1973, p. 44). The economic order understood in this way emerges as a result of the adjustment of institutions (formal and informal), market mechanisms and the behaviour of economic operators to changing economic factors and circumstances external to the economic system. W. Eucken argues that this approach to economic order does not safeguard the efficient allocation of production factors as a result of changes in the economic environment, and the application of the principle of laissez-faire in the area of shaping economic order is disastrous, as economic operators always look for sources of pension, thereby generating profits as a result of the transfer of losses to other operators. This is manifested by liberating themselves from market competition by creating monopolistic structures[3.]

The condition of economic order shows another feature of the economic order to impose certain restrictions on the behaviour of the holding units. This means that clearly defined rules of the market game must apply to everyone. Such a broad approach to the economic order makes it necessary to distinguish between the order of management rules and the order of the management process. Such a distinction in the analysis of the economic system is introduced by G. Gootmann and defines the order of economic processes as the degree of ordering the relations between the elements of the system - from which, in W. Eucken's theory of economic order, the primacy of economic freedom of the managing entities in economic processes results in achieving the highest possible economic efficiency, taking into account the superior social value, which is the freedom of the individual. Whereas the order of economic rules is defined as an external framework conditioning the economic process, which includes the so-called economic forms together with economic and social norms (Gootman, 1993, pp. 40-41) Such an approach to the role of the state is consistent with the economic theory of the state, which has been incorporated into the new institutional economy. This distinction between the order of management rules and the order of the process is of fundamental importance in constructing the principles of economic policy and its formal institutions in the concepts of the social market economy. Therefore, the order of management rules (economic order) in a broad sense will be presented as a structure of formal and informal institutions of a given economy, delimiting the boundaries of socially acceptable behaviour of the economic entities. The concept of order understood in this way is much broader than the concept of D. C. Northa, because the institution of property rights (property rights structure) is only a certain element of the management rules order, i.e. the structure of formal and informal institutions of the economy. The extension of this concept does not change the validity of the basic D thesis. C. Northa about the impact of the economic order on the macroeconomic activity and efficiency of the economy, because according to his theory, institutions not only determine the behaviour of the economic operators, but also reduce uncertainty in economic relations and reduce transaction costs. Given the broader concept of economic order in these considerations, the term economic institution structure may be replaced by the North's ownership structure. Thus, the aim of the state's economic policy would be to adjust the order of economic rules (economic order, economic order, structure of economic institutions) to the changing conditions of the economic environment if the economy is to be close to the technical limit of production capacity. This approach to the role of the state results from the economic theory of the Northa state, which has been incorporated into the new institutional economy. It is this approach to the role of the state that introduces and justifies the role of economic policy in creating the economic order and not in shaping the order of economic processes (if any), which is also consistent with the approach to the role of the state in shaping the principles of economic policy of W. Eucken. In this way, the state fills the gap that would arise in real production between real production achieved in a positive economic order and real production achieved in a negative economic order. The role of the state is to create a rational, efficiently functioning institutional framework for the economy - formal institutions which aim to create economic order. Therefore, it boils down to interfering in macroeconomic results only by intervening in the economic order, and under no circumstances in economic processes. It also emphasises the strategic importance of cohesion and consistency in the implementation of economic policy tasks.

The role of market rules/rules in shaping economic governance according to the economic policy concepts of Walter Eucken and Ludwig Erhard.

The inclusion of economic order in the issue of laissez-faire does not safeguard the effective allocation of production factors. The actions of economic entities under conditions of unbridled economic freedom have shown signs of destruction of the market system. The survival of liberalism was seen in the creation of rules of market play that were uniform for each entity. The creation of institutions in the economic policy concepts of the Ordo Liberalists is done in the constitution of a competitive economic order. The creation of an institutional framework for the operation of the social market economy is treated as a primacy over interference in economic processes. The approach of Ordo Liberalist is most often confronted in the literature with the views of F. von Hayek, who leaves it up to the market to regulate itself to shape the framework for economic activity. A distinction is made here between a liberal view of shaping economic order in an organic (spontaneous) manner and an ordo liberal view of constructivism as a method of building institutional order in the economy. Leaving the market the creation of an institutional framework for the operation of economic entities was seen by Ordo Liberals as a fundamental mistake, arguing that the operation of economic entities is driven by the internal need to exclude themselves from competition and the need to gain market power. This showed the inherent power of the market economy to move towards monopolistic and oligopolistic structures. Their economically unjustified presence on the market results in institutions which are the domain of the free market (such as property rights institutions) even having negative economic effects. A common element in the approach of W. Eucken and L. Erhard's approach, which distinguishes them from other advocates of ordo liberalism, is to see the market as unquestionably the most effective mechanism for organising the management process ("mechanism for optimising the allocation of resources and goods") and a way of creating and maintaining the freedom of the economic units (Pysz , 2008, p. 18). W. Eucken sees the state as an impartial arbiter who decides over the interests of (often contradictory) groups of market players or as a set of formal institutions safeguarding the observance of the rules of the market game. The role of the state as a night watchdog appears to him to be far from being a matter of course in the face of natural market forces aimed at creating monopolistic structures with economic power. Mr Erhard, in promoting the fight for economic freedom and responsibility, sees the state, like Mr Eucken, as the guarantor of the social order of the market economy, aimed at preventing any attempt to take a position of market advantage. Particular sensitivity can be seen in the distinction between interference by state institutions in economic processes and the establishment of a framework to safeguard the competitive operation of market players. Economic governance serves the material task of the economy and the realisation of social values and is an end in itself (Pysz, 2008, p. 40). The principles that make up economic governance need to be supplemented by regulating rules, according to W. Eucken, when other forms of market appear in some markets instead of competition. According to Mr Erhard, selective interference in management processes takes place by extending the scope of economic governance policy and extending the list of its objectives (social policy, responding to sudden negative external and internal shocks). W. Eucken's concept of competition policy takes the creation and maintenance of an efficient pricing system of perfect competition[4]as a guiding principle for economic governance, which is a 'fundamental principle of the institutional constitution of the economy' (Social market economy ..., 2003, p. 73-103). This is a move away from an economic policy that does not give in to any pressure, leading to distortions in the price system. It is important in a system of rules creating an economic order that this constitutional principle of economic policy be respected in all spheres of economic policy (fiscal policy, exchange rate policy) and there can be no exception to it. This principle is not just a ban, but is more related to the need to achieve the objective of creating a market of perfect competition. An efficient pricing system is a strategic point of the system created by W. Eucken. An efficient monetary policy, open markets, private ownership, freedom of contract, responsibility and a stable economic policy complete the construction of Eucken's economic governance. According to L. Erhard, competitive economic governance includes price competition (opposition to monopolisation of market power, adjustment of supply offer to the requirements of sovereign consumers), full employment, price stability and diversification of assets in society (Pysz, 2008, p. 103). W. Eucken's research into over a hundred years of economic liberalism has revealed the principles that constitute his theory of competitive order. The guiding principle of freedom is to ensure freedom and autonomy in decisions and actions, equality - no privileges or advantages of any economic entity, and responsibility - to bear the consequences of actions taken on the markets. Mr Erhard's concepts of social market economy governance combine the need for freedom and responsibility on the part of the economic operators, which is intended to grow from the principle of full employment, equalisation of opportunities through the possession of production factors and a sense of social security, provided not by state social benefits, but by strengthening the freedom and responsibility of individuals in the management process. Freedom at Ordo Liberals was seen not only as the freedom of action of individuals within the limits of the state-constituted social and economic order, but

also as an independent self-restriction of freedom to ensure freedoms for others (Wunsche, 2005, pp. 26-28). The importance of consistency and coherence of economic policy measures is also stressed by the Ordo liberal economists. They are opposed to the mistakes resulting from discretionary economic policy-making, which result in the loss of an overall view of the economy. Solving economic problems 'in sections' - in the short term and inconsistently - increases the creation of new complications and reduces the effectiveness of the framework of action created.

Creating economic governance as part of the economic transition process.

In the sense of the Ordo liberal economists, the institution of economic governance emerges in the complementarity of all the institutions that make up this governance - they all exist together, because neither of them can exist because one of them results from the other and if it exists it works in the opposite direction[5]. Apart from the transformation seen as a change in the economic system, the transformation is connected with the creation of a new economic order, secured by new rules of law. The transformation is treated as a change in the broadly understood economic order, an institutional reform. Therefore, it is treated as a change in the institutional structure creating the economic order understood in this way. The transformation of the economic order is the final form of adjustment of the system of formal institutions (property rights, contracts) to the challenges posed by changes in the internal and external environment. These adjustments are very deep in the case of Poland and other post-socialist countries, because the adaptation mechanisms of institutions operating within the broadly defined institution of the socialist economy have failed. The literature on the subject points out that due to the fact that the structure of these institutions has to change, the change of economic order entails the need to go through a period of chaotic adjustments (Hockuba, 1993). The condition of complementarity between the institutions which create the economic order is the most important consequence for the economic transformation treated in this way. Therefore, the lack of complementarity between institutions and their structures results in large losses in actual production and social injustice. Institutional governance in post-socialist economies is created in the process of introducing changes and implementing new systemic elements, as a result of the institutional disorder caused by the collapse of "continuity and stability of most of the institutional foundations of the social system". (Porwit, 2001, pp. 179-180). When considering transformation in the context of the types and duration of systemic transformation processes, in which organic and constructivist approaches are contrasted, it should be stressed that transformation processes are doomed to constructivism as the most possible but highly imperfect approach. Transformation in the light of the need for a faster pace of change cannot be dissociated from the strong influence of the state in shaping economic governance. Its shape, however, must take into account the preferences of the largest possible social group (Bałtowski, Miszewski, 2006, pp. 62-72). The transition from coordination of the activities of market entities through state administration to coordination through agreements has created the need for Polish enterprises and other market entities to create rules of cooperation appropriate to the newly emerging situation. Often, legal rules had to be replaced or supplemented with informal standards, which increased transaction costs resulting from the conclusion and enforcement of agreements (Lissowska, 1999). The process of economic transformation is also determined by non-institutional factors of change (e.g. the attitude of society to strategic economic reforms in the early 1990s). However, they are very difficult to grasp within the framework of state influence, and their evolutionary formation shows a high degree of spontaneity (Bałtowski, Miszewski, 2006, p. 40).

Summary

The first conservative revolution in the field of economic policy - the 'minimum state' revolution carried out by M. Thatcher and R. Reagan - showed the enormous potential of capitalism to raise the living standards of humanity. Many countries of the world have undertaken reforms towards a market economy, where capitalism has taken very heterogeneous forms. The mere introduction of a market mechanism does not ensure satisfactory results; rules and principles are needed within which economic entities that maximise their profit can move safely (Albert, 1994, p. 10). The effects of applying a liberal approach to solving economic problems (e.g. the Washington Consensus), in the absence of an institutional framework that would secure it, have brought about effects that were far from expected (Stiglitz, 2004). A poor understanding of the scope (the activity of the state in the economy) and strength of the state (the ability of the state to conduct policies and enforce laws transparently - the potential of the state and institutions) may give the opposite direction to actions resulting from potentially effective mechanisms (e.g. introduction of competition without proper protection of property rights) . The study on the impact of different dimensions of statehood on the development of economies carried out by F. Fukuyama shows that a limited range of functions of the state including high efficiency of institutions would be economically optimal (Fukujama, 2005, p. 25).

This would indicate confirmation of the recommendations of the Ordo Liberal economists to form strong and consistent rules for the market system. This is of strategic importance, especially in conditions where there are high transaction costs, for example, at a time of economic transformation, when the lack of organically developed principles of market interaction imposes the need for a strong, formal institutional foundation.

When analysing the two decades of transformation of Poland's economy, the fundamental importance of the rule of law must be irrefutably confirmed, and we cannot fail to notice the informal layer of market contacts, which either as a result of the imperfections of the legal and enforcement system or as filling a gap in the law become the basis for countless socially desirable market transactions.

[1] the economy is perceived by J.R. Commons as a 'stream of transactions between people', conditions of uncertainty as to the behaviour of others compound the incompleteness and asymmetric access to information, hence the conclusion of transactions must entail the costs of seeking, processing and transmitting information, constructing, concluding and enforcing contracts, i.e. transaction costs

[2] e.g. bill of exchange as an institutional tool to stimulate the mobility of capital, price lists reducing the cost of information, insurance reducing the cost of risk (North, 1997)

[3] This subject will be further elaborated in the next chapter of the minor article

[4] perfect competition, as W. Eucken understood it, occurs when buyers and sellers compete on the market, plan their business activities taking into account the existence of competitors, accept the prices formed on the market, do not have any influence on them - they are the recipients of prices

[5] ownership cannot exist without freedom of contract or free markets

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The European Union in The Face of The Phenomenon of Relocation In the Process of Dustrialisation

Piotr WALĄG

University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

In debates on economic development in developed countries, the subjects of wage inequality, unemployment and falling living standards are often associated with the process of deindustrialisation and the accompanying phenomenon of relocation. Although only undesirable effects of these phenomena are politically exposed, it is important to show their economically positive consequences. In particular, due to the high short-term costs of deindustrialisation processes and the phenomenon of relocations in certain areas, the need for an active role for the state emerges, for example, in shaping a policy of industrial transformation towards a modern economy and innovation. The main aim of the article is to show deindustrialisation as a natural process of economic development and to take a critical look at the phenomena that accompany it, and particularly at relocations as part of the European Union's competitiveness policy. **The thesis of the article is that deindustrialisation and the associated phenomenon of relocation are desirable processes if economic development is to be marked by a transition towards economies with high levels of productivity and innovation. However, the EU's competitiveness policy should be conducive to this transformation.** The next parts of the article will show the process of deindustrialisation and the strongly related phenomenon of relocation, and then, using Eurostat statistics, will present the challenges facing EU economies as part of structural changes in industry and, in the final part, will highlight the opportunities and dangers arising from deindustrialisation and relocation which European Union policy faces.

Keywords: Relocation, Reallocation of Production Factors, Industrial Policy, Deindustrialisation, Competitiveness, Industrial Transformation, Innovation.

Introduction

Deindustrialisation is a feature of the economic development process which is inevitable if society is to benefit from the effects of economic progress (Fisher, 1945, p. 56); (Fisher, 1933). It is a natural process of transfer of production factors, and in particular the labour factor, at the appropriate stage of economic development, from the industrial sector to the service sector[1], dictated by the regularity of changes in the economic structure. However, deindustrialisation can be bought, as a result of slow structural adjustments, by socially undesirable phenomena such as unemployment, income inequalities, a slowdown in the growth of living standards, a reduction in social security. These phenomena may be exacerbated by negative supply shocks, as was the case in the 1970s in the UK, where deindustrialisation has shown itself to be an absolute decline in industrial production, with serious consequences for the UK economy. There has been an absolute decline in the volume of production as well as the number of industrial companies, leading to an absolute decline in industrial employment (Kilpatrick, Lawson, 1980). The emergence of deindustrialisation through economic phenomena such as investment, the collapse of old industries, declining trade union strength, the relocation of mature industries to developing countries, and wage differentials are evidence of a painful but desirable adjustment for further economic growth.

The flexibility of response to increasingly rapid economic change, forced by deindustrialisation, shows the capacity for structural adjustment as the most important feature of economies with a high level of economic development in the sequence of inevitable changes taking place in them. However, the symptoms of deindustrialisation, although their positive and negative effects could be balanced in theory and empirically, should be carefully analysed in relation to the economies of individual countries and economic groups, i.e. the European Union.

The European Union's policy on deindustrialisation is closely linked to measures to increase economic competitiveness and adapt to structural changes (Communicatio, 2003). The competitiveness of the EU economy has been highlighted as one of the priorities of the European Union's policy since the development objectives of EU

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countries were set as part of the Lisbon Strategy in 2000. In order to stimulate competitiveness, efforts are being made to adapt EU economies to structural changes, to reallocate industrial activity to developing economies, to relocate jobs to new industries, and to take risks associated with the deindustrialisation process.

Competitiveness is mainly determined by the increase in productivity in individual sectors of the EU economies and, in particular, their capacity for structural adjustment.

In order to neutralise the negative phenomena brought about by deindustrialisation by developing higher levels of competitiveness, the EU is looking for ways to operate more efficiently in areas such as innovation, ICT, entrepreneurship, competition, education and training as those whose activation is a key condition for achieving the social and economic objectives of the Member States.

The main aim of the article is to show deindustrialisation as a natural process of economic development and to take a critical view of the phenomena accompanying it, and particularly of relocations as part of the European Union's competitiveness policy.

The thesis of the article is that deindustrialisation and the associated phenomenon of relocation are desirable processes if economic development is to be marked by a transition towards economies with high levels of productivity and innovation. However, this transformation should be fostered by an appropriate EU competitiveness policy.

The article consists of three chapters, the first of which deals with selected theoretical aspects of deindustrialisation. The second chapter illustrates deindustrialisation in the context of the challenges it poses to the EU economies. The final chapter of the article details the need for political solutions with regard to the risks and opportunities associated with the deindustrialisation and relocation process.

Theoretical Basis, Methods, Results and Discussion

Selected theoretical aspects of the deindustrialisation process.

It would seem unjustified, it would be unreasonable to pretend to understand the phenomena and problems presented in the introduction, related to the process of deindustrialisation, taking place in the economies of advanced countries, without first realising the fundamental evolution of the structure of these economies (Fourastie, 1972, p. 182).

Structural changes and the collapse of long-term economic trends were the subject of research long before the deindustrialisation processes in world economies actually came to light.

The process of deindustrialisation is inseparably accompanied by the phenomenon of relocations. This is linked to the law of industrial growth. The law of industrial growth indicates that industries mature when the main benefits of technology end, slowing down cost reduction, market expansion and sales growth, and making ageing industries sensitive to the competition of younger rivals with faster productivity growth (Alderfer, 1942).

As one of the sources of structural change, Lawrence mentions the possibility of the comparative advantages shifting over a long period of time as the production of mature products is shifted to low developed countries (Lawrence, 1984). This phenomenon was analysed by Vernon, who attributed each of the three stylised stages of product development to different locations in the world. In the first stage, a typical new product is developed and produced in large American cities, close to the necessary skilled workforce and market. At the second stage, a production acceleration is observed, partly due to fear of taking over the domestic market by foreign competitors (this pushes American companies to establish their branches in e.g. Europe). The third stage - the stage of maturity, is characterised by the possibility of production everywhere and high benefits resulting from low labour costs in the low-developed countries (this is mainly visible in the production of textiles, small electronics, etc.) (Vernon, 1966, p. 190-207).

The ripening phase of the industry and its main production centres, when the growth rate of the market is slowing down, when fundamental issues related to product design have been solved and when the necessary machinery has been constructed, is transformed into a dispersion phase. The key to explaining this process is work. Over time, when technological progress makes work largely routine, when a concentrated and highly qualified workforce is no longer necessary to carry out the production process, industries move to areas where wages are relatively lower and production conditions are more flexible than in the home production areas. However, this does not mean that the maturity of the industry, which is commonly combined with decentralisation, will or should result in the gradual dispersion of production. Indeed, at the same time, a permanent process of new industries is under way (Hoover, 1948, pp. 174-175).

Hansen has introduced a kind of *natural right to an ageing industry*. This can be explained as the disappearance of industries after they have undergone a phase of strong growth in investment activity, maturity and decline, which causes deep stagnation in the economy and may take a long time before a similarly strong economic force acting in the opposite direction appears (Hoover, 1948). Burns wrote in his *growth law that the* growth rates of individual industries tend to fall as the age of the industries increases. Unlike Hansen, Burns did not see the ageing of industries as a problem, but saw it as a natural part of the growth process. A more general approach to the problem of product ageing is the *maturity hypothesis* developed by Kindleberger and independently by Olson. Kindleberger's maturity hypothesis was aggregate in nature, referring neither to the life cycle nor the "S-shaped" growth of industry (*per capita* production tends to grow in the early stages of growth, then slow down as the economy reaches the economic maturity stage). Maturity here means an increasing capital-production ratio or a reduction in the savings rate, or both. Maturity may therefore presuppose the existence of a rich society, where consumption is made at the expense of investment. Olson points mainly to the political side of economic maturity, highlighting the role of interest groups. He stresses that the older the roots of industrial development are, the more time is needed to work out the efforts of individual interest groups to develop a climate conducive to business growth (Norton, 1996, p.2,19-20, 38-39).

Challenges of EU economies to the deindustrialisation process.

One of the most important challenges for the EU economy in the face of the deindustrialisation process should be to strive for its closure. By closing deindustrialisation we mean eliminating the absolute decline in industry in production and employment, and for deindustrialisation to take place in terms of the relative changes in the share of industry in employment with the relative share of industry in production remaining unchanged (or falling as little as possible).

Relative changes in industry's gross value added are revealed with a progressive decline in the percentage share of industry's value added in the value added of all sectors of the economy. Table 1 shows the evolution of changes in added value for selected EU and US economies.

Table 1: Gross value added in industry calculated as % of all sections and divisions (calculated at basic current prices and current exchange rate)

Countries	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EU-27	23,4	23,3	23	22,4	22,3	21,7	21,1	20,5	20,3	20,2	20,2	20,2
EU-15	23,1	23,1	22,9	22,3	22,2	21,6	20,9	20,2	20	19,8	19,9	19,8
Czech Republic	33,5	33	31,2	31,8	31,6	31,5	30,5	29,5	32,1	31,4	31,7	-
Germany	24,9	25,1	25,3	24,8	25,1	24,9	24,6	24,5	25	25	25,4	26
Ireland	31,5	33,1	34,8	35,8	34,7	34	34,3	30,5	27,9	26,2	25	-
France	-	-	-	18	17,7	17,2	16,6	15,9	15,4	14,9	14,4	-
Hungary	26,3	28,1	28,2	27,7	27,2	25,6	24,6	25,1	25,4	25,3	25,4	25,3
Poland	26,7	26,1	24,9	24,6	24	22,5	22,3	23,7	25,2	24,7	24,7	23,3
Slovakia	31,6	28	27,5	29,7	29,2	28,5	26,8	28,9	30,3	29,4	28,6	30,3
Great Britain	25,6	24,8	23,3	22,3	21,9	20,6	19	17,7	17	17,4	17,5	16,6
United States	-	-	20	19,6	19,4	18,1	17,5	17,3	17	-	-	-

Source: Own calculations based on the Eurostat database.

The information in the table above clearly shows the decline in industrial value added in the EU-27, the EU-15, Ireland, France, the UK and the US. This means that there is deindustrialisation in terms of changes in the relative shares of industry in production. However, the newly acceded EU Member States are recording an increase in the share of added value in industry, which may explain the processes of convergence and relocation of mature industries from highly developed countries. It should be noted, however, that the relative decline in industrial value added occurs in current prices at the current exchange rate, while in constant prices, the share of industry in value added as a percentage of all branches should remain at least unchanged (taking into account the decline in the prices of industrial goods as a result of the increase in productivity in industry, as was the case in the 1970-1994 period in highly developed countries).

Kuznetz stresses that sustainable economic growth requires the emergence of new industries which, by achieving high growth rates, will 'compensate' for the inevitable slowdown in the spread of inventiveness and innovation in old

branches (mature industries). Therefore, the high growth rate of the whole economy is accompanied by significant shifts in relative importance between industries as old ones collapse and new ones emerge (Kuznetz, 1959, p. 33). The increase in employment in high- and medium-high technology industries may indicate a strengthening of the industrial base that is adapted to an increasingly competitive environment (more employment is due to the creation of more companies).

Table 2: Employment in high- and medium-high technology industries[2]
(% share in total employment = 100)

Countries	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EU-27						30,34	30,89	31,42	31,98	32,18	32,36	32,78
Czech Republic			22,83	22,56	22,78	24,03	24,11	23,82	24,42	24,52	24,98	25,07
Germany	26,89	27,91	28,56	29,23	29,92	30,37	31,02	31,80	33	33,36	33,55	34,13
Ireland	29,27	30,15	29,38	30,42	31,28	31,76	31,98	33,46	33,44	33,49	34,02	34,93
France	33,48	33,55	33,92	34,29	34,73	34,69	35,04	35,53	36	36,16	36,72	36,9
Hungary		25,27	25,37	25,83	25,49	26,5	26,31	26,46	27,95	28,47	28,27	28,42
Poland										24,32	24,23	24,66
Slovakia				22,99	24,18	24,48	25,33	24,01	24,14	25,05	25,59	24,87
Great Britain	36,78	37,25	37,86	38,44	39,46	39,81	40,54	40,92	41,1	42,11	42,39	43,01

Source: Own calculations based on the Eurostat database.

Relatively high increases in employment in high- and medium-high technology industries in countries such as the United Kingdom, Ireland and Germany indicate that, although there is a decline in industrial value added, due to the relocation of mature industries, these economies are strengthening in high-tech areas. This phenomenon is not visible in the economies of selected Central and Eastern European countries, where high and medium-high technology industrial sectors have seen marginal employment growth. Therefore, we can conclude that the relocation to Central and Eastern European countries concerns mature low-technology industries from highly developed countries.

The key problem with the relocation of economic activities is the absolute decline in industry in production and, consequently, the absolute decline in employment. Meanwhile, employment in industry is determined by the relationship between the closure and creation of industrial enterprises. Table 3 shows the largest and smallest rates of business creation and bankruptcy, which, together with additional statistical information from Eurostat, is intended to assess the extent to which selected EU economies are coping with the creativity and destructiveness of the market system, and thus to assess the extent to which they are adapting to such deindustrialisation phenomena as well as investment and relocation.

Table 3: Largest and smallest rates of business creation and bankruptcy (actual establishment or bankruptcy of companies in a given year), calculated as the percentage of active companies operating in a given year.

Business failure rates				
Years	2009	2012	2015	2018
The biggest	Great Britain: 10,48	Lithuania: 13.43	Great Britain: 11,16	Great Britain: 10,87
The smallest	Finland: 6.76	Portugal: 4.36	Sweden: 5.16	Latvia: 3.87
Business start-up rates				
The biggest	-	Lithuania: 16.2	Romania: 18.74	Great Britain: 13,68
The smallest	-	Sweden: 7.03	Sweden: 6.07	Sweden: 7.02

Source: Own calculations based on the Eurostat database.

From the data in the table above, the example of the United Kingdom shows that the rate of company closures was lower than the rate of start-ups only in 2018, which undoubtedly led to a reduction in unemployment (4.8%, 2018) and an increase in the employment rate in high- and medium-high technology industries (42.39% of total employment for 2018). In Sweden, where the lowest rate of business creation has been recorded since 2012, a relatively high unemployment rate has been recorded since 2015 (5.6% - 2015, 6.3% - 2017, 7.4% - 2018).

Of the data available for the EU countries for 2009-2018, countries where more companies were established than Slovakia, the Netherlands, the United Kingdom, Spain, Italy, Luxembourg, Portugal, Romania, Slovenia, Finland, Sweden, have collapsed.

The greatest challenge for EU economies in the face of deindustrialisation and relocation processes is to ensure the conditions for the creation of as many high and medium-high technology industrial enterprises as possible. For their location, the classic comparative advantage has lost its importance in the age of industries based on human intellectual potential. Instead of physical capital, companies fighting for shares on world markets compete for qualifications and knowledge (human capital). These resources become the only source of comparative advantage and a strategic factor in the process of deciding on the location of economic activity (Thurow, 1998).

Changes in the relative values of sectors (individual branches) of the economy are a long-term process of economic development resulting from changes in consumption structure and technological changes. Therefore, processes of relocation of industry between EU countries seem desirable. The effect of this is the intensification of the forces of competition in the EU's single market, which forces the emergence of high-tech industries in economies from which mature industries are relocated. The high productivity generated in modern industries means that industry does not lose its relative share of production (or its decline is very small), but the relative share of industry in employment will disappear.

EU policy on risks and opportunities related to the deindustrialisation process.

Inability to act, external shocks intensified by poorly implemented policies, particularly evident in the 1970s and 1980s, have contributed in many countries to a situation where many industries have become areas that delay the development of the economy more than stimulate growth and structural transformation (Lall, 1992). An example is the UK economy, where in the 1970s there was an absolute decline in the number of industrial enterprises, an absolute decline in industrial production and therefore employment, with dramatically declining exports of industrial products in increasing international trade, causing economic stagnation. Such phenomena began to occur in a growing number of highly developed countries in the 1980s, where they were often referred to as the 'menopause' of Britain[2].

Despite the negative phenomena that deindustrialisation manifests itself, it is a natural and therefore desirable phenomenon. In order to eliminate or shorten the negative effects of deindustrialisation in the short term, a competitiveness policy would seem to be the most appropriate to close deindustrialisation to absolute change. Mitigating the negative effects of deindustrialisation is about increasing productivity through the creation of high-tech companies, which will reduce the absolute and relative decline of industry in production, and at the same time contribute to the increased absorption in services of the labour force freed from industry as a result of growing demand for services (productivity growth in industry will result in an increase in income, and the largest share of growth in income is in demand for services, increased demand for services at a much lower productivity in services than in industry results primarily in increased labour demand). The issue of structural change, which includes deindustrialisation processes, exposes the efficiency of factor allocation, which is closely related to competitiveness issues. As A. Fisher pointed out, in a dynamic economy, in order to generate high levels of social welfare, there must be a continuous transfer of factors of production in the most efficient way, under the threat of economic crises (Fisher, 1935, p. 18); (Fisher, 1945, p. 56).

Competition policy should, above all, be aimed at creating economic conditions (economic governance) which would force economic entities to increase their efficiency. The objective of increasing competitiveness as a priority of EU policy has been in place at least since 2000, when, as part of the Lisbon Strategy, EU Member States declared that they would make efforts to make the EU the most competitive economy in the world, capable of adapting to structural changes, relocating economic activity and reallocating production factors. In 2002, at the Seville European Council, the Competitiveness Council was set up to strengthen the implementation of the economic dimension of the Lisbon Strategy, reducing it to the framework of an integrated strategy for improving competitiveness, regularly monitored with regard to horizontal[3] and sectoral issues, and to be developed by the European Commission. The Lisbon Strategy, renewed in 2005, adopted a new direction, particularly strongly geared towards economic growth and employment, in which the EU economies are to undergo a process of adjustment to structural changes and strengthening in the pursuit of higher levels of productivity. The new Community Lisbon Programme since the 2006 European Council is based on four priority areas: knowledge and innovation, unlocking economic potential, investing in human capital and modernising jobs, energy and climate change. Unlocking economic potential can follow a number of paths, of which EU policy includes: implementation of the Small Business Act, reducing administrative burdens, simplifying procedures, strengthening the internal market, increasing competition in the services sector, and extending financial services market integration. It should be stressed, here, that the relocation of mature industries is also an important part of the process of releasing manufacturing factors, and the labour factor in particular.

The strategic task of the EU institutions is to create a framework for European companies to compete successfully on the intensely developing international markets. It is the task of the European Commission, and in the subsequent legislative stages of the European Council and the European Parliament, to examine the impact in economic, social and environmental terms of key legal proposals and to launch specific policy initiatives that will make it possible to stimulate competitiveness to the fullest possible extent.

The issue of competitiveness, seen in the context of the risks of a possible deindustrialisation process in the EU economies, has been particularly acute during periods of slower economic growth or periods of recession. Undoubtedly, the adjustment process associated with the changing structure of EU economies can be very costly. The good macroeconomic condition of the economies should, however, cushion the harmfulness of unavoidable structural changes, ensuring not only an improvement in productivity, international competitiveness and the ability to create new jobs in the industrial sector, but also support the creation of conditions for the development of the service sector (Communicatio, 2003). Research by (Blackman, E.N.Baumol and E.N.Wolff, 1989) has provided ample evidence that, as industry's relative share of employment decreases, industry alone will no longer be able to provide a reliable engine for growth as it has in the past.

Deindustrialisation and the relocation that is most strongly associated with it in Europe are the consequence of structural changes brought about by the economic transformation of Member States to ever higher levels of productivity and the challenges of globalisation. In the short term, they entail socially burdensome effects (mainly a fall in employment), but in the long term, surrendering to them is the only way to efficiently allocate productive resources from outdated industries, economic growth and social welfare.

Schumpeter's vision of development is achieved through painful structural changes. With brutal optimism, Schumpeter even saw the economic depressions as an indispensable element in clearing the economy of outdated practices and restoring efficiency (Schumpeter, 1939). Consequently, such creative destruction determines the growth of new industries. The reallocation of resources to areas increasing the potential for innovation and the human capital base in a given economy is a source of increasing labour productivity and strengthening the comparative advantage on international markets. The competitiveness of economies, which is defined by constant productivity growth, is affected by stimulating investment, intensifying market competition, strengthening the ability of enterprises to generate innovation through increased investment in research and development (R&D) and in human capital, facilitating rapid technological transformation, and The Commission is committed to the development and implementation of the European Research Area, to the development and implementation of the European Research Area, to the development and implementation of the European Research Area, to the development and implementation of the European Research Area, to the development and implementation of the European Research Area.

Industrial transformation entails changes in the distribution of employment between sectors (industry and services). Decreases in total employment caused by the relocation of mature industries to developing countries are offset by increases in employment in modern industries and services. The process of these structural changes is attributed to an increasing difficulty in the EU-15 in maintaining or regaining employment, especially for the low-qualified. However, it should be mentioned that this is about keeping or regaining employment for the low-skilled at the same level of real wages. Low-skilled workers who lose their jobs in mature industries can only be employed as a result of absorption by the service sector, where incomes measured in purchasing power parity are at a much lower level due to lower labour productivity than in industry. The persistence of employment in the economy must then lead to income differentiation, as was the case in the United States (Thurow, 1980). This segment of the labour force is particularly sensitive to structural changes in the economy. The continuing structural problems in highly industrialised economies such as those of the Netherlands, France and Germany are evidenced, among other things, by the high long-term unemployment rate[5], which in 2005 was 50%, 39% and 39% respectively (estimated figure). In these economies, expenditure on labour market policy in 2005 measured both as a percentage of GDP and as expenditure per person wishing to take up a job is among the highest in Europe, compared to the EU15 average (2.2% of GDP) of 3.363% of GDP and 18.014.2 in PPS, 2.524% of GDP and 11.765.2 in PPS, and 3.315% of GDP and 9.805.5 in PPS respectively. In the economy where deindustrialisation and relocation processes were observed the earliest, in the United Kingdom, after nearly 30 years, the long-term unemployment rate is one of the lower (from the available data), amounting to 19%, and estimated expenditure on labour market policy did not even reach 0.7% of GDP in 2005.

The process of structural adjustment can be particularly burdensome in local economies. Therefore, local policy is treated as a priority in EU policy as a whole, as evidenced, for example, by the over 35% share of regional policy expenditure in the EU's annual budget expenditure. Indicators of the high importance of local issues in EU policy are the amount of EUR 223 million spent in 2000-2006, EUR 41 billion absorbed by development projects in 2007 and the adoption of over 400 programmes supporting local development in the new phase of the 2007-2013 funding cycle. The following are particularly mentioned as objectives of local development in EU documents: equalisation of conditions for economic growth by modernising infrastructure and improving living standards in the least developed

EU countries, improvement of the social and economic environment for the development of competitiveness and the creation of new jobs, and strengthening fruitful cooperation between the border and interregional level. It should be noted at this point that it is precisely the processes of relocation within the EU that naturally lead to and promote the achievement of all the aforementioned objectives.

The migration of research and development activities from the EU is another threat to the future of the European economy, particularly in view of the relocation of businesses. Businesses are conducting more and more research outside Europe, especially in high-technology and research-intensive sectors (pharmaceuticals, biotechnology, electronics). Such activities are increasingly relocating to the United States, where they benefit from a more favourable regulatory, structural and financial environment and a more accessible skilled workforce (Communications..., 2003). This means that exports of high-tech products exceed the level of the United States (26.13% of total exports) only in Ireland (28.88% of total exports), Luxembourg (40.59% of total exports), Malta (54.61% of total exports) and the United Kingdom (26.48% of total exports), which may also indicate a low potential for Member States to generate high-tech goods within the EU.

Relocation reflects the changing comparative advantages of the location of different types of industries (mature and high-tech industries) and/or different business conditions. Better cost conditions (labour cost) abroad attract industries that are unable to produce internationally competitive products in the high-wage environment of modern industrialised economies. This contributes to the growth process of less wealthy economies of trading partners. It follows that relocation is limited to activities involving the use of low technologies and making strong use of labour in manufacturing processes. Relocation (in terms of labour liberation) in highly developed economies is often accompanied by the creation of new jobs mainly in services (design, marketing, distribution, leisure activities). At the same time, relocation (in terms of freeing up capital) contributes to the growth of investments (including the creation of new enterprises) in high and medium-high technology industries. The changes taking place between EU regions in manufacturing specialisation are a reflection of changing comparative advantages, where the more developed part of the EU retains those jobs that absorb human capital, high technologies and are characterised by high productivity and high real wages, while mature industries will be located in less developed regions (developing countries). Furthermore, the trade links between countries observed in the context of relocations of activities benefit not only the host countries, as they increase exports but also imports. Therefore, the countries of the highly developed part of the EU, which are losing some of their businesses as a result of relocations, are registering increased exports as a result of increased production and income in the countries receiving the relocated businesses. This increase in exports in the EU economies will make it possible to increase production and employment in other sectors. On the other hand, the share of imported industrial goods in the expenditure of the population of developed regions from which mature businesses are relocated will continue to be only a small percentage of total expenditure in these EU countries. Domestic goods, especially services, will continue to dominate domestic spending and maintain employment growth in this sector. However, there may be a situation where jobs will be lost in regions that are being abandoned by mature industries if they are unable to locate high-tech industries and produce internationally competitive goods, taking advantage of growing international trade flows fuelled by the growth in income of developing countries.

The countries to which the industries are relocated are developing countries (with less affluent populations than in developed countries), which means that they need to import capital and thus seek trade deficits. Trade deficits in these countries mean increased capital exports and trade surpluses for developed countries, including the EU (Pieper, 1999). Furthermore, the success of competitiveness policy should be supported by a favourable macroeconomic policy, the creation of an environment in which the cost of financial capital is low and the presence of export promotion (Singh, 1995). Reducing balance of payments constraints supports macroeconomic stability. Balancing current accounts at the desired rate of economic growth helps to avoid excessively sharp business cycles. This in turn reduces the cost of capital, as there is no need to reduce the current account deficit through fiscal and monetary restrictions. Macroeconomic stability, industrial policy and an evolving economic structure interact positively on the economic development path.

Summary

The last decades of development of world economies have been marked by the transition to highly productive economies. The reasons for this state of affairs are mainly seen in the intensification of competitive forces in individual markets[6], which force the introduction of new technologies. The continuous increase in the level of productivity in economically advanced countries proves that deindustrialisation in terms of relative changes in the share of industry in employment is a natural process of economic development (if societies are to benefit from technological progress).

Relocation within the EU should help to strengthen the competitiveness of EU enterprises, contribute to reducing production costs and prevent the movement of economic activity to China and India. It is an alternative to the painful desires of investment, because mature industry in highly developed countries is not able to generate competitively priced industrial products, as is the case in the developing countries to which these industries are relocated.

However, there is strong resistance from the politicians of the 'old Europe' to the idea of relocation. (mainly France and Germany, which are the worst affected by relocation), where relocation is seen primarily through the prism of job losses. Hence, action within the EU to set a minimum level of taxation on the profits of companies operating in the EU, to counteract the distribution of structural funds that encourages relocation, to halt the liberalisation of the EU services market.

The problem of relocation can be seen as one of the tools of domestic policy-making. The conclusion is that relocation is the cause of only around 4% of [7] all redundancies in European companies, which, in view of the much more serious consequences of the sources of job losses, such as mergers, restructurings and company closures, makes it a phenomenon which is relatively harmless to society.

Moreover, the problem for politicians in the 'old Europe' should not be relocation as such, but ways of dealing with the challenges posed by this phenomenon, such as developing tools to create more jobs than the number of job losses. Relocation should be an important tool in the competitive struggle of businesses. This is why the European Commission's policy, which prohibits the use of EU funds by companies which relocate their activities, seems undesirable.

[1] capital as a production factor is relatively less important in the service sector than in the industrial sector - Fisher A. G. B., Capital and the growth of knowledge, The Economic Journal, 1933, p. 384, after Kwiatkowski E., Teoria trzech sektorów, PWN, Warsaw 1980, p. 93

[2] The definition of high- and medium-high technology industrial sectors is based on the OECD definition, where this breakdown is carried out in relation to the ratio of R&D expenditure to GDP.

[3] the collapse of old and unsuccessful attempts at the successful functioning of new industries, the fall of TFP, the fall of production (Norton, 1996, p. 17)

[4] Actions for sustainable development in areas identified as particularly sensitive, i.e. equal opportunities, environment, information society, local and regional development

[5] People under 25 years of age who are unemployed for more than 6 months and people over 25 years of age who are unemployed for more than 12 months. Indicator calculated as a percentage of the total number of registered unemployed.

[6] Remarks by Chairman Alan Greenspan, Structural change in the new economy, Before the National Governors' Association, 92nd Annual Meeting, State College,Pennsylvania , July 11, 2000.

[7] Karnaszewski P., Miliard for flagship investments. Fight against delocalisation, Forbes 10/2007.

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The Markets for The Ordo Liberal Concepts and Market Competition

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The last decades of development of world economies have been marked by the transition to highly productive economies. The reasons for this state of affairs are mainly seen in the intensification of competitive forces in individual markets[1], which force the introduction of new technologies and innovations. In view of this, it makes sense to ask what economic conditions are most conducive to strengthening the forces of market competition. The concept of competitiveness of economies is used to assess their economic condition and is analysed by looking for ways to achieve the highest possible levels of position and competitive ability. The competitiveness of an economy is determined by the strength of competition in its individual departments and branches. However, it is in the nature of economic entities to avoid the conditions in which they must be subject to the requirements of competition and to look for opportunities to benefit from a pension. The pursuit of the pension, however, lowers the productivity of the operation of the managing entities and makes the allocation of production resources sub-optimal. In conditions where none of the operating entities can take advantage of the market advantage, competition is born which forces continuous productivity growth. Otherwise, higher productivity is the result of competition, which eliminates the possibility of achieving a pension and forces a quick and effective reallocation of resources, as well as the search for and introduction of new technologies and innovations. In Ordo liberal concepts, economic governance is subordinated to the material purpose of management as well as to overarching social values. The ideas of ordo liberal, which are at the heart of the social market economy, constitute the freedom of the individual in social and economic life, which is achieved under conditions in which the decisions and actions of individual individuals give shape to economic processes. Securing economic freedom is achieved in a constructivist approach to creating a competitive economic order. Competitive economic order aims at creating conditions and securing full competition between entities, where economic profitability is achieved only as a result of increasing / increasing the level of productivity and innovation, while at the same time the low efficiency of economic entities, through bankruptcy, eliminates them from the market. In addition, the economic policy principles of the Ordo Liberal concepts meet the requirements of theoretical coherence and feasibility. The aim of this article is to present a competitive economic governance developed within the framework of ordo liberal theories as an appropriate approach to be applied to improving the competitiveness of the economy and the challenges of the new era. The first part of the article will present the approach to competitiveness, then the introduction to ordo liberalism as the theoretical basis for competitive economic governance, and the final part will specify the principles of competitive economic governance that serve / lead to the achievement of higher economic competitiveness.
The thesis of the article is that the basis for achieving a high growth in competitiveness is to strengthen the forces of competition by creating and safeguarding the conditions for the development of economic freedom.

Keywords: ordo liberalism, competitive economic governance, the phenomenon of misappropriation, principles that constitute economic governance, cost transfer, economic competitiveness, economic freedom, economic viability, innovation.

Introduction

An approach to economic competitiveness

The concept of competitiveness is emerging as a result of a changing environment driven by globalisation, advances in communication, the free movement of knowledge, ideas, values and practices between and within companies, an environment which, on the one hand, stimulates competition and, on the other hand, is a source of profit. Hence the need to establish the rules of the market game to encourage productivity growth and competitiveness.

It is not the purpose of this chapter to analyse competitiveness by definition. The category of competitiveness will be based on the concept developed by the institutions, probably using it to the fullest extent in practice - the European

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Commission. The competitiveness of the economy adopted as part of work on the Lisbon Strategy is understood as the existence of conditions in which we are dealing with an economy with a high, sustainable productivity rate.

In order to increase competitiveness, efforts are being made to adapt EU economies to structural changes, to reallocate industrial activity to developing economies, to transfer labour and capital resources to new industries, and to risk the deindustrialisation process. Competitiveness is determined mainly by the increase in productivity in individual sectors of the EU economies, and hence, in particular, its ability to make structural adjustments. Therefore, in order to achieve higher levels of competitiveness, the EU is looking for ways to operate more efficiently in areas such as innovation, ICT, entrepreneurship, competition, education and training.

Theoretical basis, methods, results and discussion

The 'struggle' for increased competitiveness is manifested by the diversity of conditions in the individual economies of the Member States. Table 1 presents the productivity indicators for selected countries in the period 2007-2018.

Table 1: Labour productivity (GDP by PPP per person employed compared to EU-27, EU-27 = 100) for selected economies

Economic area	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Eurozone (16)	117,4	117,2	116,0	114,6	113,1	112,2	111,5	110,4	110,6	110,3	110,0	109,7
Germany	114	112,4	111,7	107,9	106,6	106,2	108,5	108,1	109,2	108,6	107,2	106,9
Czech Republic	60,4e	60,1e	61,8	61,7	63,2	62,9	66,4	68	68,5	69,8	71,8	73,1
Hungary	61,5e	62,5e	61,8	64,5	67,7	70,6	71,6	72	72,3	73	73,1	74
Poland	46,7e	47,7e	49,3	50,8	52,1	53,9	60	61,5	61,3b	61,2	60,9	61,5
Slovakia	54,4	56,2	56,5	57,9	60,4	62,5	63,3	65,5	68,6	71,6	75	77,5
Great Britain	108,8	109	108,9	110,6	111,6	112	112,4	113,6	112,2	111,9	111,8	113,1
US	138,9	140	141,9	139,8	137,9	137,6	139,4	140,6	141,4	141,1	140,4f	142,3f

Source: Own calculations based on the Eurostat database.

On the basis of the information presented in the table above, one can clearly point to the United States as an economy in which the objective of a relatively high and steady increase in labour productivity is being achieved. Although the euro area countries, Germany and the United Kingdom have shown productivity increases relative to those of the EU-27, their developments have been uneven and declining for recent years. Poland, the Czech Republic, Slovakia and Hungary record significantly lower productivity than the EU-27, although it is clear that productivity has been increasing steadily in the last three years.
The key issue is to distinguish between the general economic conditions under which the competitiveness of operators is measured.

Ordo liberal concepts of economic policy principles for increasing economic competitiveness.

From the point of view of the (role of the state) creation in the economy of the conditions most conducive to achieving a high, sustainable productivity rate, the following reasons speak for referring to the Ordo Liberal concepts:

1 - In recent decades, Keynesianism, despite the revival of its concepts, has lost its importance in economic debates. As well as, standing in opposition, monetarism M. Friedman's monetarism and the supply economy of the 1980s have not maintained their position. Liberal concepts as a theoretical basis for the formation of economic order were strongly criticised both in literature and in debates on economic policy (Sadowski, 2003). The criticism by J. Stiglitz of A. Smith's "invisible hand of the market", whose mechanism within the free market results in spontaneous achievement of high efficiency, should also be mentioned (Stiglitz, 2004).
2 - The creation of economic conditions through incoherent and isolated actions aimed at solving selected parts of current problems creates new problems. The lack of consistency, coherence and uniformity of policies reveals a high inefficiency of economic policy actions and leads to continuous interventions in the management process.
3 - Efficiency of management and the shaping of the order of competition not only requires the need to release spontaneous undertakings of economic entities in the spirit of liberalism, but also demonstrates the need for the state to introduce the main principles determining economic order. Such a constructivist approach to the creation of a

competitive economic order, Ordo liberalism as a higher development of liberalism, shaping its mission and further development, in which the freedom and spontaneity of economic entities and the operation of the free market are in the general interest, is aimed at overcoming the defects of liberal doctrine revealed today (Pysz, 2005).

Knowledge not only of the market effectiveness of allocation and coordination and its pro-efficiency motivation to act, but also knowledge of market failure in various situations which are increasingly recognised by science, forms the basis for asking ourselves whether achieving greater and greater competitiveness can be achieved if the shaping of economic governance, as well as the very course of the management process on the scale of the entire economy, is left to the decisions and actions of economic entities on the market. Classical liberals believed that in conditions of full economic freedom, market forces and mechanisms will themselves shape competition and competitive economic governance. However, according to the liberals' ordo , this was a fundamental mistake, because the motives of individuals guided by their selfish interests under conditions of freedom to shape the course of their own economic activity, as well as the rules of the market game, will push them to gain a dominant position in the market, which will allow them to find themselves outside the reach of the forces of market competition. It could be concluded from this that market competition is not a 'law of nature', since entities with market advantages will use the economic power thus gained to eliminate competition. This is because a market economy has the internal forces and conditions for the creation of monopolies or oligopolies that crowd out competition (Eucken, 1990). According to Ordo Liberal's views, the application of the principle of laissez-faire in the area of shaping economic governance was disastrous for capitalism, which was threatened by capitalists themselves. This issue was highlighted by W. Ropke, who claimed that economic operators actively seeking a pension generate profits by transferring losses to other operators. This happens when they want to free themselves from or avoid market competition by creating monopolistic structures (Ropke 1994). The representatives of the Ordo Liberal economy did not stop at saying that the process of shaping economic governance should not be left to the free decisions of economic operators, but they maintained that it should be the task of the state, as an impartial arbiter, within the framework of economic policy, which they sought to establish a theoretical foundation. Therefore, the main issue was to formulate the principles by which the state can pursue a policy of competitive economic governance. They accepted the thesis that economics is a servant science and should take up the challenges posed by management problems of major importance to society (Eucken, 1990). The definition and formulation of the rules of the economic game was intended to enable economic units to adapt to the challenges posed by industrialisation (Lippman, 1945). Today, economies are facing new and more complex processes. They have to face the challenges of globalisation of the world economy and major structural changes brought about by deindustrialisation and the need to adapt to an era where social existence will be based on knowledge and the production of services. The liberalism incorporated into the social market economy is achieved through the coexistence of competitive governance and an increase in employment and income from work. A key issue related to the social market economy in the context of developing higher levels of economic competitiveness seems to be competitive economic governance.

Competitive economic governance as a method of increasing the competitiveness of the economy.

The concept of competitive economic governance is based on the principles of the market game, which is a stabilisation and protection against any restriction on the economic freedom of individuals.

The principles which constitute a competitive economic order, built by Eucken on the basis of an analysis of more than 150 years of the history of the liberal economy, are based on three most important demands: freedom as the freedom to act and make decisions, equality as the lack of privileges and the functioning of the same rules for all economic entities, responsibility as the consequences for economic entities for their decisions and actions.

In the ordo liberal concept of competitive economic governance, the essence is to achieve an effective solution to the problem of the transfer of resources and the coordination of economic activity across the economy. As A. Fisher pointed out, if society is to benefit from the effects of economic progress, there must be a continuous transfer of production factors in a dynamic economy in the most efficient way, under the threat of economic crises (Fisher, 1935; Fisher, 1945). According to the creator of competitive economic governance, W. Eucken, the solution to this fundamental problem is to be based on the main principle that constitutes competitive economic governance - an efficient price system of perfect competition (Eucken, 1990). The effectiveness of the functioning of the price system - its information function, in the framework of which prices are to reflect the intensity of scarcity of resources is realized only in conditions of market competition and only then prices are objective market parameters. Under such conditions, economic operators have to adapt their activities to the scale of rarity reflected in prices, and this adaptation process results in an optimal allocation and transfer of resources throughout the economy. It follows that the launch of a functioning price system of perfect competition must be a fundamental criterion for assessing any economic policy action, with the aim of stopping economic policies which, under any pressure from a given situation,

distort the price mechanism, for example through credit expansion, state subsidies, price freezes or import bans (Eucken, 2003).

L. Thurow stressed that productivity growth is conditioned by the speed of factor transfer from low-productivity to high-productivity activities. However, this is not supported by any state interference that distorts the competitive price system (Thurow, 2001).
Any instability in the purchasing power of money causes the relationship between prices to be distorted, forces to achieve macroeconomic equilibrium to be shaken and productivity to be reduced due to inappropriate decisions made on the basis of incorrect economic accounts. Hence the constitution of another principle, which is the stabilisation of the value of money.

Any restriction of access to market supply or demand by the economic operators leads (serves) to restrict or even destroy competition. Restricted access to the market encourages and facilitates the creation of monopolies. If there is even free competition and the markets are closed, the lack of access to them from outside / their isolation distorts the mechanism for the desired allocation of resources in the economy. The most important consequence of closing markets is a weakening of the forces of competition, which forces an increase in productivity, and a reduction in the motivation to increase competitiveness.

Private ownership, which is essential to the existence of economic governance, under conditions of free competition, leads to a balance in the distribution of economic power between owners of the means of production. In a competitive environment, private ownership of the means of production does not give the owners of the means of production economic power, and by guaranteeing the free management of private means of production it serves the social interest. This is because the function of ownership depends on the form of the market that gives it its proper character. Within the framework of the competitive order, private ownership serves to increase productivity, because the market mechanism of competition will result in the loss of the right to dispose of the means of production of anyone who fails to maintain at least an average level of productivity on a permanent basis. This is because of the high economic efficiency of the competitive order.

The freedom to conclude contracts, as well as the right of ownership, can play different roles in the economy, depending on the form of the market, but the existing form of the market depends on the law (guaranteeing freedom of contract). On the one hand, the maintenance of competition requires that freedom of contract be guaranteed, while on the other hand, the freedom to conclude individual contracts, resulting from the need to ensure the smooth running of economic processes, must be exercised under conditions of competition. This is to safeguard it against being used against freedom (freedom of contract in the absence of full competition may be used to strengthen monopolistic structures in the economy).

The freedom of the individual who constitutes the competitive economic order of Eucken is inextricably linked to responsibility for himself and his environment. In order to prevent decisions that waste resources, economic operators should be responsible for their actions. This would be served by the need for thorough market research, which in turn would protect against the emergence of market structures that are destructive to competitiveness (monopolies, oligopolies, etc.).

Improving competition for the highest possible levels of productivity in the ordo liberal concept of economic governance must be complemented by responsibility as part of the process of 'free competition management'. Responsibility is essential in seeking to achieve higher levels of productivity through equivalent/equivalent management effects, and to smoothly remove from economic activity those who are inefficient in terms of their productive resources, which are reflected in their losses. Responsibility is linked to one of the most important conditions for increasing productivity - the speed of transition from low to highly productive activities and the exclusion of inefficient entities from the range of economic activities (Thurow, 2001).

When analysing productivity growth patterns, long-term investment is an important determinant of these, on which the attention of the Liberals' ordo was also very much focused. They considered the stability of economic environment parameters to be the most important determinant of investments geared towards a long payback / depreciation period. Knowledge of the scale of taxes due to the state, commercial and insurance regulations, etc., strengthens entrepreneurs' propensity to undertake investment projects. What is more, Ordoliberals also point to strong incentives for entrepreneurs to consolidate their capital in the conditions of instability of economic policy (observing the phenomenon of mergers of enterprises or their departments in the face of the search for ways to minimise the risk coming from the institutional and legal environment).

Table 2: Indicators reflecting the adaptation of selected economies to the principles of competitive governance

Table 2 is an attempt to present some principles for selected economies in order to illustrate their adherence to the ordo liberal principles of economic resource management. Countries	A system of prices able to fulfil resource scarcity index functions (State aid granted to the agricultural, industrial, - coal, transport sectors - in addition to railways and other services, as % of GDP, 2018)	Money value stability (inflation rate, 2018)	Openness of markets			Material liability of economic entities (recovery rate - number of cents per dollar)	Economic policy stability (volume of venture capital investments as % of GDP at market prices in 2018)	
			Business start-ups: number of procedures/quantity/cost as % of GNP *pre capita/minimum* capital as % of income *per capita*	Licensing: number of procedures /number of days/cost as % of income *per capita*	Closure period in years/cost of closure as % of assets		Investments to start up operations	Investments aimed at developing the company
Germany	0,36	2,3	9/18/5.7/42.8	12/100/63.1	1.2/8	53.4	0,011	0,033
Czech Republic	0,15	3	10/17/10.6/34.9	36/180/18.5	6.5/15	21.4	0	0,001
Hungary	1,57	7,9	6/16/17.7/65.1	31/211/10.4	2/15	38.4	0,005	0,035
Poland	0,59	2,6	10/31/21.2/196.8	30/308/159.8	3/22	27.8	0,001	0,008
Slovakia	0,33	1,9	9/25/4.2/34.1	13/287/14.9	4/18	45.2	0,0009	0,0014
Great Britain	0,08	2,3	6/13/0.8/0	19/144/64.6	1/6	84.6	0,224	0,406
US	-	2,85	6/6/0.7/0	19/40/13.4	1.5/7	75.9	0,0346	0,1467

Source: Own study based on the Eurostat database.

The data on State subsidies presented in Table 2 as State aid granted to the agricultural, industrial, coal and transport sectors in the countries with the highest productivity levels are very low, for example, 0.08% in the UK. In Germany, on the other hand, which was at a high level of productivity with high subsidies, there is a steady decline in productivity. However, among the countries selected in the table above, which are at a much lower level of productivity than economies such as Germany, the United Kingdom or the United States, we can observe that the highest productivity growth in the observed years was recorded in Slovakia, which had the lowest subsidies. In the case of the Hungarian economy, which has the highest productivity levels among selected post-socialist countries, large state subsidies and high monetary instability in relation to other countries are compensated for by the openness of markets. Hungarians have the smallest number of days and procedures to open companies and the smallest closure period, as well as one of the smaller opening costs and the smallest closure costs. Slovakia, on the other hand, which maintains the highest rate of productivity growth, has the lowest opening costs, which indicates that markets are very open. However, all these post-socialist countries are fundamentally different from the results achieved in highly developed countries, where open markets are characterised by a very low number of days and procedures for both opening and closing and extremely low or even zero (United Kingdom, United States) start-up costs. The cost of company closures is a reflection of the speed and quality of the desinvestment process, directly linked to the reallocation of resources in the economy. Low exit costs mean efficient design for investment, which translates into productivity growth in the economy (Thurow, 2001). The following dependency could emerge here: in countries where the cost of opening up and the minimum capital needed to start up a business is relatively low, where competition appears to be intense in most markets, productivity increases.

An important feature of Ordo liberal economic ideas is the responsibility of economic operators for their actions. Measuring this property of the economy with the rate of recovery of debts from a bankrupt company, it can be concluded that most cents per dollar are recovered in countries with high levels of productivity (Germany, the United Kingdom and the United States), which indicates not only an efficient system of bankruptcy law in these countries,

but also a relatively strong sense of responsibility. Likewise, the relationship is also with regard to another feature of ordo liberal economic governance - the stability of economic policy, measured by the volume of *venture capital* investment. The countries with the highest levels are Germany, the United Kingdom and the United States.

Concluding the analysis of the above table, one more observation comes to mind here that the structure of factors determining productivity growth and economic growth is appropriate (different) for each economy (Zienkowski, 2007) due to different market conditions. In order for companies to function, it is necessary to have a broadly understood infrastructure - a set of conditions necessary to conduct a given business activity. Infrastructure can be divided into heavy (e.g. roads) and light (which is the legal and institutional environment - rules of the game) (Pietrzyk, 2007). And since all companies when planning their activities refer directly to infrastructure, it is possible that a problem related to the phenomenon of misappropriation may occur. Therefore, building (creating) light infrastructure (legal and institutional environment) cannot be left to economic entities. When companies operating in a given industry want to develop, they have to make a number of investments in broadly understood infrastructure, the effects of which will be available to new companies entering the industry, for which the lack of this infrastructure may constitute a barrier to entry. If existing companies calculate that the entry of new companies will introduce so much competition that they will lose the opportunity to benefit from the pension and the profits lost to the benefit of the competition will outweigh the benefits of the investment, they will not be taken up. In such a situation we are dealing with the problem of misappropriation (Krugman, 2007). Companies prefer to give up their growth just to prevent the entry of new companies. The inhibition of competition leads to companies focusing on maintaining their position and benefiting from the pension instead of focusing on improving efficiency. One possibility of eliminating the effect of misappropriation is the creation of economic governance by the state, which automatically creates the institutional and legal infrastructure, and within this framework the infrastructure is effectively created in a broad sense, in accordance with the decisions taken by the managing entities. In this way, by creating an environment, the state will eliminate natural barriers to entry for new enterprises and create conditions conducive to the creation of economic order, securing competition and developing competitiveness.

Another attempt to show the close link between competitiveness and economic freedom is to present in Table 3 the levels of the competitiveness index for the 10 most competitive countries and the freedom index for the 10 best and worst economically liberal countries.

Table 3: Freedom index and competitiveness index for selected countries

Competitiveness index	**Index of freedom**	Place in the Freedom Index ranking (out of 157 classified countries) for 10 least competitive countries
(main factors of the competitiveness of the economy: functioning of the economy, efficiency of the government, efficiency of the company, infrastructure)	the index includes 10 freedoms: freedom to open, conduct and close a business, freedom of international trade, fiscal freedom - scale of the tax burden, size of government - construction of expenditure, monetary freedom - price stability, freedom to invest - free movement of capital, financial freedom - banking security and independence from government, property rights - ability to accumulate state-secured private property, freedom from corruption, freedom at work - freedom of interaction between workers and businesses, without state intervention)	
Competitiveness - the ability of the economy to create and maintain an environment conducive to maintaining the competitiveness of enterprises (private and public), where economic value and prosperity are created in the first place	Economic freedom includes the freedoms and rights to produce, distribute and consume products and services. The highest form of economic freedom provides the absolute right to property, the full exercise of freedoms in the movement of labour, capital and goods, the absence of any restrictions on economic freedom other than those necessary to protect and maintain freedom.	
10 countries with the highest index		
United States	Hong Kong	
Singapore	Singapore	
Hong Kong	Ireland	
Luxembourg	Australia	
Denmark	United States	
Switzerland	New Zealand	

Iceland	Canada	
The Netherlands	Chile	
Sweden	Switzerland	
Canada	Great Britain	
10 countries with the lowest index		
Venezuela	North Korea	148 [45]
Indonesia	Cuba	119 [53,9]
Croatia	Zimbabwe	113 [54,6]
Poland	Libya	83 [59,5]
Argentina	Burma	108 [55,1]
South Africa	Turkmenistan	57 [63,2]
Brazil	Iran	101 [55,9]
Turkey	Belarus	74 [60,8]
Mexico	Bangladesh	44 [66,4]
Ukraine	Venezuela	133 [51,1]

Source: Own study based on the Eurostat database.

On the basis of the analysis of Table 3, a certain pattern emerges - the countries where the highest economic competitiveness is achieved are also characterised by high levels of the freedom index. However, as can be seen from the above article - the assumptions of the ordo liberal concepts - the starting point for achieving sustainable productivity growth in the economy is to create conditions for economic freedom. Therefore, the countries which currently have the highest levels of competitiveness are those in which the overriding objective of economic policy has been and is to create conditions for the greatest possible economic freedom. However, the countries with the lowest levels of competitiveness are, at the same time, at the lowest positions in the index of economic freedom, or have a relatively short historical period of introducing and consolidating economic freedom. What could confirm the the thesis raised in this article is the fact that none of the economies that have a low position in the index of freedom has achieved a high level of competitiveness. Of the 10 least competitive economies included in the IMD study in Lausanne (World Competitiveness Yearbook), none of them significantly exceeded the freedom index at 70[2] (Argentina was the only country in this group to have a freedom index between 70.61 and 74.67), which means that they have moderate economic freedom, lack economic freedom or economic freedom is suppressed.

Summary

The main idea of the article is to show competitive economic governance as the most appropriate method for creating economic conditions conducive to achieving high levels of economic competitiveness. In its light, economic freedom is the foundation for building and maintaining economic competitiveness. Eucken's Ordnungstheorie (Ordnungstheorie) theories of economic governance have also created principles of economic policy which serve to implement the order of competition, under which the course of economic processes is left to the decisions and actions of economic entities, while the form and principles of market play are created and protected by the policy of shaping economic governance. A competitive market economy is not the 'law of nature', and it is in the selfish interest of economic operators that the desire to free themselves from the mechanism of market competition, called by Lippman 'the merciless dictatorship of the market', is imprisoned. (Lippman, 1945). Strengthening the forces of market competition is to be achieved by, among other things, such principles that constitute economic order as the responsibility of economic entities, open markets, stability of the value of money, and a permanent and not discretionary economic policy. In other words, according to the theoretical foundations of competitive economic governance, market competition is intensified by creating and securing conditions for the development of economic freedom.

Ordo liberal concepts include both the material purpose of management and overarching social values such as individual freedom and social justice, which have a timeless significance (Pysz, 2007).

Today's markets are increasingly expanding into global markets, but their lack of reliability remains. This state of affairs forces the introduction of a framework of action which, while suppressing the harmful elements of the impetuosity of economic freedom, does not eliminate its pro-productivity characteristics. Such conditions are recognised in the ordo liberal constructivism of the economic order.

Empirical observations also confirm the indications in theory, although the structure of the productivity factors varies from country to country, as W. Eucken pointed out when he said that the quality of the parameters of the economic environment corresponding to the ordo liberal rules depends on the specific characteristics of each country.

[1] Remarks by Chairman Alan Greenspan, *Structural change in the new economy*, Before the National Governors' Association, 92nd Annual Meeting, State College, Pennsylvania , July 11, 2000.

[2] the rate (percentage) of freedom in the range 80-100 indicates the existence of full economic freedom, 70-79.9 - dominant economic freedom, 60-69.9 - moderate economic freedom, 50-59.9 - dominant lack of economic freedom, 0-49.9 - suppression of economic freedom.

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Appraisal of the Adjustment of Poland's Economy to the Introduction of the Euro

Bogumila MUCHA-LESZKO
Maria Curie-Sklodowska University, Lublin, Poland, mucha@hektor.umcs.lublin.pl, http://orcid.org/0000-0002-1288-4662

Magdalena K. KAKOL
Maria Curie-Sklodowska University, Lublin, Poland, mkakol@hektor.umcs.lublin.pl, http://orcid.org/0000-0003-4825-422

Abstract

The 2008+ crisis and its impact on the image of the euro area called into question the benefits of joining the monetary union of catching up countries. They incurred tremendous costs of the structural maladjustment of economies to the common currency area, which includes countries with strongly diversified economies: highly developed and catching up. The need to stabilize the situation in the euro area and counteract similar crises intensifies the discussion and actions aimed at deepening integration and strengthening the fiscal function in the EMU, i.e. creating the foundations of a fiscal union. These proposals are a challenge for countries with a derogation, including Poland. The authors considered it justified to prepare the assessment of Poland's economy adjustment to the introduction of the euro. Analysis of the catching up process and evaluation of the achieved level of convergence cover the years 2002-2019 and the following economies: Austria, Germany, France, Netherlands, Spain, Portugal, Slovakia and Poland. The average periodic indicators of changes in GDP, labor productivity, employment, investments, unit labor costs, TFP, unemployment, exports and inflation were used as well as indicators illustrating the situation in public finances, external equilibrium and measures of convergence. The empirical analysis was based on the OCA theory. The results of this analysis can be summarized as follows: 1) the catching up effect has been achieved by Poland; 2) nevertheless, Poland does not yet meet the criterion of real convergence with the euro area; 3) by resigning from its own currency, it could suffer economic shocks, and the greatest risk is a decline in the competitive advantage and exports, and consequently economic dynamics; 4) observing the economic problems of Spain, Portugal and Slovakia, this can be expected.

Keywords: Monetary Union, The OCA Theory, Economic Convergence Process, Poland's Catching Up Effects, Economic Gap as A Risk Limiting the Benefits from The Common Currency.

Introduction

By joining the European Union, Poland and other Central and Eastern European countries committed themselves to the introduction of the euro in the Accession Treaties. However, due to the lag in economic development in relation to the countries operating in the common currency area, the new member states from CEE obtained a special status allowing for the postponement of the euro adoption date. The official EU documentation terminology uses the name of countries with a derogation, which are obliged to pursue a policy accelerating the reduction of the economic distance in relation to more developed countries and a policy of structural changes driven by technological progress.

The adjustment of the economy to the effective functioning in the common currency area consists in reducing the economic and technological gap and catching up with countries with a higher level of development. As a result, the new member states have greater opportunities to permanently meet the treaty criteria of the monetary union. Even more important from the point of view of effective participation in the euro area, i.e. the possibility of achieving economic, but also social and political benefits, is the fulfillment of the conditions for participation in the monetary union defined by the authors of the optimum currency area (OCA) theory. In the conditions of high economic openness and increased interdependence of development processes in the global dimension, and the rising impact of the foreign exchange and financial market on the real economy, the interest of countries in more advanced monetary integration is growing. The free movement of capital and speculative transactions contribute to destabilization of exchange rates and financial markets. In the conditions of growing risk and uncertainty in doing business and

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recurring financial and economic crises, countries without currencies of recognized international credibility are increasingly interested in joining monetary unions. For these reasons, some of the CEE countries adopted the euro (Slovenia, Slovakia, Estonia, Latvia, Lithuania), and Poland, the Czech Republic, Hungary, Bulgaria and Romania have retained their national currencies. On the one hand, these new premises support the introduction of the euro throughout the European Union, but on the other hand, the effects of the 2008+ crisis contributed to a decline in the interest of Poland, the Czech Republic and Hungary in implementing the euro.

In 2008-2009 there was a significant drop in investment and consumption demand, capital flowed away to home countries, the inability to pursue national monetary policy and the lack of mechanism of the nominal exchange rate limited the possibilities of intensifying adjustment processes and mitigating the effects of the crisis. Such a situation was interpreted as a weakness of the monetary union resulting from the incapability to adjust the countercyclical policy to the course of the business cycle in individual countries, and the greater possibilities of smoothing the business cycle in countries with their own currency were emphasized.

Another argument undermining the benefits of catching up countries resulting from joining the monetary union were the consequences of the 2008+ crisis in Greece, Spain and Portugal. They incurred high costs of the structural maladjustment of economies to the common currency area created by more developed countries. The effects of the crisis seriously damaged the image of the euro area as a group of countries in which the game of economic and political interests of countries prevail over the pursuit of greater economic and social cohesion and the improvement of the governance model of the common currency area. A noticeable change in the public perception of this situation was a significant drop in support for the introduction of the common currency in Poland. As a result, the interest of the national authorities in conducting a consistent policy aimed at abrogating the derogation concerning the accession to the third stage of EMU also decreased. There was also a polarization of positions on this issue among politicians and economists from academia and business. Taking into account the problems with maintaining the macroeconomic equilibrium in the euro area and the problems that have occurred in the global dimension as well as the growing economic and political uncertainty, as well as the EU strategy leading to the strengthening of the position of the common currency in the grouping's territory, it is worth asking two questions: *Has Poland already reached such a stage in economic development that ensures the realization of the benefits of belonging to the monetary union and has the 16-year membership in the EU favored the adjustment of the economy to the conditions of functioning in the monetary union? What are the biggest threats that may increase the costs of adopting the common currency?* Such questions are justified by the economic outcomes of Poland: high and sustained long-term economic growth and increase in labor productivity, TFP and exports.

Purpose and research method

The aim of the paper is to assess the adjustment process of the Polish economy in terms of the pace of reducing the development and technological gap with regard to ensuring the benefits of adopting the euro. The starting point for the implementation of the research objective is the assessment of Poland's economic position in relation to the euro area and its selected countries. A more detailed approach to the research goal is expressed in research questions: *What are the strengths of the Polish economy? In what areas is there the greatest risk of negative effects of giving up the national currency?* The analysis of the process of adjustment of Poland’s economy to the euro adoption and the level of convergence achieved within the EU is confronted with the experiences of Spain and Portugal. More broadly, the analysis of Poland's economic performance covers two groups of countries: catching up and highly developed. The first group includes: Poland, Slovakia, Spain and Portugal, and the second are the hard core countries: Austria, Germany, France and the Netherlands.

In the assessment of Poland's adjustment process to the adoption of the euro and its economic position in relation to the euro area and selected countries, the following average periodic indicators were used: growth/decline of GDP, labor productivity, employment, investment, unit labor costs, TFP, unemployment, exports, inflation and changes in general government net lending, balances on current accounts, public debt in relation to GDP and measures of convergence (GDP per capita according to purchasing power parity EA = 100). The analysis of the indicators was carried out with the distinction of three 6-year periods: 2002-2007 (relatively good economic situation), 2008-2013 (recession-stagnant), 2014-2019 (post-crisis recovery). The analysis is based on data obtained from the following databases: Ameco, Eurostat, OECD, The Conference Board and UNCTAD.

Preconditions of potential benefits of participation in the monetary union - theoretical introduction

The significance of exchange rates as the price of money and an adjustment mechanism in the process of restoring current account equilibrium gained importance with the development of international trade and the growing trade openness of countries. In the 19th century, customs unions and monetary unions were aimed at eliminating trade barriers and reducing the risk of exchange rate volatility. The theory of market and monetary integration began to develop intensively from the 1960s, when the creation of the European Economic Community was a confirmation of the commitment of France, Germany, Italy, Belgium, the Netherlands and Luxembourg in building a common Europe. Initially theorists of economic integration focused attention on the benefits of market integration. Pioneering contributions to the development of the integration theory were made at that time by B. Balassa (1962) and R. A. Mundell. The first of them presented the differences between the countries of the premises and goals of integration, but above all defined the stages of the gradual advancement of integration, emphasizing the legitimacy of sequentially achieving higher and higher stages. In 1973, in the conference materials, B. Balassa presented his position on the monetary union, claiming that in the common European market, the appropriate exchange rates should be crawling pegs, but the ultimate goal - the monetary union (Balassa 1973).

The author who initiated the most important discussion to date on the monetary union, known as the Optimum Currency Area (OCA) concept, was R. A. Mundell. He considered the optimum currency area to be a region which borders are determined by the internal mobility of production factors (labor and capital) and the lack of external mobility (Mundell 1961). The second pioneer of the OCA concept was P. B. Kenen and he did not agree with the criteria defining the limits of OCA presented by R. A. Mundell. He recognized that the optimal currency area can be created by countries diversified in terms of production and exports, but at the same time similar in terms of economic structure (Kenen 1969). Diversification of production and exports mitigates asymmetric shocks, as the fall in demand also varies depending on the spheres of the economy and product groups. Small countries with specialized economies are most exposed to asymmetric shocks. In contrast, the similarity of the structures of the monetary union's economies is important from the point of view of the possibility of unifying economic policies, but it is also treated as a criterion of the achieved level of economic development.

The third pioneer of the traditional OCA concept is R. I. McKinnon (1963). He considered trade openness to be the most important criterion for creating an optimal currency area due to the large impact of world prices on domestic prices, also as a result of changes in exchange rates. He argued that the monetary union and fixed exchange rates had the potential to stabilize prices. However, in conditions of low openness, floating rates are a more effective mechanism for achieving equilibrium.

In conclusion, it is worth noting that: 1) the traditional concept of OCA was created in the 1960s and originated from the Keynesian economy, 2) its authors focused on defining such OCA criteria that would reduce the costs of abandoning the economic policy instrument and the external equilibrium mechanism, which is the exchange rate, 3) the OCA concept was developed during the functioning of the monetary system established in Bretton Woods, that was based on fixed exchange rates and the dollar - losing its purchasing power since the beginning of the 1960s, which resulted in increased interest in the discussion on methods of limiting currency risk in international transactions, 4) traditional OCA concepts remained theoretical assumptions without the possibility of empirical verification.

The evolution of the monetary union theory, including the OCA concept, was influenced by: 1) changes in the situation in the world economy, 2) changes in the rules of the international monetary system, 3) destabilization of currency relations in the world, and 4) the acceleration of monetary integration in the EEC after presentation and adoption for implementation of the Werner plan (economic and monetary union 1970/71). In 1971-1973 the dollar-gold system collapsed. The transition of most countries to floating exchange rates (1973) brought about a fundamental change in the conditions of international trade due to increased exchange rate risk and price competitive advantage. The destabilization of monetary relations was deepened by energy crises and rising inflation. After the abolition of the golden dollar parity, the EEC established its own European Unit of Account (1975) based on a basket of the currencies of nine member countries. Changing the rules of functioning of the international monetary system, the effects of introducing floating exchange rates, high inflation and manipulation of exchange rates in order to increase the competitiveness of exports by the Member States of the Community threatened the development of mutual trade (Mucha-Leszko 2007, p. 49). In the ensuing situation, the priority was to stabilize monetary relations of the Community. The plan to establish its own zone of currency stability was negotiated and prepared in the second half of the 70s. It was justified by three basic factors (Swann 2000, p. 209): 1) general lack of acceptance of floating exchange rates after the collapse of the Breton Woods system, 2) favorable

impact of fixed exchange rates on cross-border business activity, allowing for real calculation of costs and income from exports in the national currency, 3) destabilizing impact of fluctuations in exchange rates, including especially the US dollar, on the real economy. As a result of decisive actions inspired by France, in agreement with Germany, in 1979 the European Monetary System (European Bretton Woods) was introduced in the EEC. In addition to the above-mentioned factors, the evolution of the concept of optimum currency area was influenced by the decline in the importance of Keynesian economics in favor of neoclassical economics.

F. P. Mongelli calls the 70s the period of reconciliation in the development of the OCA concept (Mongelli 2002, p. 11-14). The benefits and costs of joining the monetary union continued to be analyzed and assessed. The number of OCA criteria increased, the scope and degree of trade and investment ties between countries were taken into account, as well as the comparability of inflation. The research was deepened by estimating the benefits and costs of joining the monetary union as a whole and for individual countries. The largest contributions to the scientific achievements regarding the OCA concept were made in the 1970s by: Corden, Mundell, Ishiyama, and Tower and Willet. In 1973, R. A. Mundell revised his views on the monetary union, treating it as a way to limit the manipulation of exchange rates in trade policy and as an opportunity to create a currency reserve pooling that could absorb asymmetric external shocks (Verde 2009, p. 113). W. M. Corden (1972) considered the possibilities of absorbing demand shocks which countries may experience after joining the monetary union, when the real exchange rate rises and causes a decrease in export competitiveness. He came to the conclusion that the most effective mechanism for restoring external equilibrium is price and wage flexibility (Mongelli 2002, p. 12). I. Ishiyama (1975) argued that every country interested in functioning in a monetary union should estimate the benefits and costs from the point of view of its economic goals, taking into account the consequences resulting from conducting the welfare state policy. He also pointed out that optimum currency areas are at risk if one criterion is used as the justification for their creation. I. Ishiyama, like W. M. Corden, attached great importance to the comparability of inflation rates between countries aspiring to OCA. This was understandable because after the price-stable 1960s, inflation in many countries was double-digit and geographically diverse. The development of the OCA theory in the 1960s and 1970s did not increase the interest in empirical research in this field and the need for it was noticed by E. Tower and T. Willet (1976) (Mongelli 2002, p. 12).

After the second energy and economic crisis (1979-1982), monetary relations in Europe began to stabilize. The anti-inflation policy imposed by Germany within the European Monetary System contributed to the decline in inflation and the stabilization of exchange rates (from the mid-1980s). Currency stabilization in the world was much slower. The international monetary system, based on floating exchange rates and key currencies, did not ensure the effectiveness of the foreign exchange market adjustment mechanism. The expanding international financial market and the US monetary policy had an increasing influence on exchange rate movements. Current account imbalances required the coordination of monetary policies to prevent the growing diversification of benefits from international trade (Mucha-Leszko and Twarowska 2016). Despite problems with stabilizing currency relations in the global dimension, fluctuations in the exchange rates of the largest economies in the 1980s were smaller than in the previous decade. Due to the reduction of currency risk, the interest of economic theorists in the OCA concept decreased.

A decisive revival of discussions and research on the monetary union took place together with the presentation of an alternative approach to the OCA concept in the publication of the European Commission (Commission of the European Communities 1990). It was fundamentally different from the real OCA criteria. The authors of the new concept of the monetary union considered the nominal economic criteria determining the stability thresholds of prices, public finances and exchange rates for the EMU candidate countries as sufficient to create a common currency area. The countries' qualification for Stage III of the EMU took place under the conditions of sharp discussions between France and Germany regarding the introduction of the single currency in the economically weaker southern EU countries, which clearly formed a separate area, peripheral in relation to the countries constituting a coherent economic group of the EMU's hard core (Germany, Belgium, the Netherlands, France and Luxembourg). Political considerations prevailed and the euro area, established on 1 January 1999, included 11 countries. Theoretical achievements concerning the criteria which should be met in order to reap the benefits of the common currency,, including higher economic efficiency, were not of great importance. Moreover, the authors of the OCA concept formulated warnings that there is a risk of asymmetric shocks and economic problems in a monetary union that does not meet the OCA criteria (e.g. Mundell 1961, Haberler 1970, Fleming 1971). Examples of countries that did not meet the OCA criteria and adopted the euro were, among others, Portugal and Greece. Their economies were the most structurally unadjusted to the economies of core countries. Portugal joined the EMU with a large development gap expressed in low labor productivity (about 1/3 of that in Germany), a large share of traditional industries in the economy, and low competitiveness of exports based on labor-intensive products. Moreover, as late as 1995, Portugal did not meet any of the EMU criteria laid down in the Maastricht Treaty. This

goal was achieved as a result of an intensive anti-inflationary policy and budget savings, and thanks to general government revenues from the privatization of state-owned enterprises (Mucha-Leszko and Kąkol 2011).

In connection with the arrangements made on the implementation of the EMU at the meetings of the European Council in Strasbourg (December 8-9, 1989) and in Rome (October 27-29, 1990), nominal criteria were agreed upon to define the boundaries of the common currency area. They have been narrowed down to the stability of prices, exchange rates and public finances. These findings sparked an increased interest in research into potential countries that could create an EMU in light of the OCA criteria. The authors of this type of empirical analyses examined the degree of homogeneity of the potential currency area and identified groups of countries within the EMU in terms of similarities in the characteristics of economies. T. Bayoumi and B. Eichengreen (1992, pp. 34-36) investigated the correlation of demand and supply shocks between EU countries and compared the level of shock correlation between EU countries and US regions in 1963-1988. The obtained results showed: 1) greater idiosyncratic nature of demand shocks, 2) higher degree of correlation of demand shocks in the group of core EU countries, 3) larger fluctuations in demand and greater idiosyncratic nature of shocks in peripheral countries than in the EU's hard core. In addition, the authors of these studies found significant convergence in the scale and coherence of the demand shocks of Germany, France, Belgium, the Netherlands, Luxembourg and Denmark with the US regions. T. Bayoumi and B. Eichengreen (1996, 1997) and many other authors tested the economies of the EU countries in terms of meeting the OCA criteria (Artis 2002; Jager and Hafner 2013). Examination of the economic homogeneity of the common currency area and OCA properties, which accelerate adjustment processes in the event of asymmetric shocks (price and wage flexibility, labor mobility, financial market integration and financial transfers), was and is of fundamental importance in the conducted analyzes. Whereas, from the point of view of the risk level of asymmetric shocks, the following are essential: GDP per capita, GDP growth rate, level of labor productivity, unit labor costs, similar economic structures, trade openness, degree of specialization, intraregional trade. All studies conducted to assess the fulfillment of the OCA criteria by candidate countries to the EMU, and those already operating in the euro area, showed: 1) differentiation of countries in terms of GDP per capita, labor productivity and economic structures, 2) impact of this differentiation of economies on reducing the effectiveness of adjustment mechanisms and on increasing sensitivity to asymmetric shocks.

There is a conviction that the idea of European economic integration is still based on the endogeneity hypothesis, which was a real breakthrough in the discussion on the OCA criteria after it was presented by J. Frankel and A. Rose (1998). According to their position, the single currency contributes to the rise in the intensity of trade, and the growing economic interdependence results in an increasing synchronization of business cycles. As a consequence of these processes, the pace of convergence within the common currency area is enhancing and the OCA criteria can be met ex post. The 2008-2009 financial and economic crisis, prolonged economic stagnation (until 2014) and the scale of the crisis of public finances led to deepening of divergence processes in the euro area (Mucha-Leszko 2016). The hypothesis about the endogeneity of the OCA criteria did not defend itself, but contributed to the revival of the discussion on strengthening the governance of the euro area by means of monetary, fiscal and budgetary policy instruments. It is about strengthening the macroeconomic stabilization function. Symmetric shocks also destabilize the economies of the monetary union, so a common euro area budget could be used to mitigate cyclical fluctuations (Rosati 2020). Moreover, symmetric shocks may cause asymmetric effects resulting from the structural maladjustment of economies. For many years, P. De Grauwe has been among the advocates of the common budget of the euro area and the political union. He lists three basic elements of a political union (De Grauwe 2009, pp. 24-26): 1) the federal budget, 2) institutionalization of the coordination of policy instruments influencing the macroeconomic situation, 3) increasing the responsibility of the EU institutions for macroeconomic decisions, including the ECB. R. Baldwin and Ch. Wyplosz are also supporters of fiscal transfers, i.e. mutual compensation of the effects of asymmetric shocks in the EMU. They believe that the only solution is to accept the community and eliminate nationalist attitudes (Baldwin and Wyplosz 2009, pp. 337-340). The existing controversies in the literature regarding the OCA theory in the context of the functioning of the EMU focus on the problems of the scope of institutionalization of macroeconomic policy at the EU level (banking union and fiscal union) (Kąkol 2017), which may ensure higher efficiency of adjustment mechanisms and acceleration of real convergence.

Does Poland meet the criterion of real economic convergence with the euro area?

Long-term economic growth in Poland continued for almost three decades (1992-2019). As a result, the development gap in relation to the countries of Western Europe, which increased in the 1980s, narrowed significantly. The pace of the economic convergence process significantly accelerated with the accession of Poland to the European Union. At that time, the following factors had the greatest impact on the growth rate of the Polish economy: an increase in capital expenditure, labor productivity, investment in industry and infrastructure investment financed from aid funds. Domestic demand was also stimulated by cheap loans. The rise in GDP was also influenced by foreign direct investment, which in 2004-2019 ranged from 4.8% to 1.7% of GDP, except for

2013, when it amounted to 0.5% of GDP, tab 6. In order to evaluate the results of Poland's economic convergence process, tables 1-5 present the most important economic indicators with the division into three six-year periods (2002-2007), (2008-2013) and (2014-2019). This division is expected to show different convergence outcomes and their sources. In the case of Poland, such a division is of particular importance because the effects of the convergence process measured by the increase in GDP per capita in relation to the EA-19 average were the highest in the recession-stagnation period and reached 11 pp. But in the six years before the crisis, Poland's economic gap narrowed only by 6 pp (and by the same amount of 6 pp in 2014-2019). This means that in the period of crises and weak economic situation in Europe and in the world, the Polish economy not only remained on the path of economic growth, but also achieved a 3% increase in GDP (annual average), while in the euro area there was a decline of 0.2% of GDP.

Table 1: Main economic indicators of Poland and selected Euro Area countries,

annual averages in 2002-2007

Indicator/Country	**EA-19 Average**	Austria	France	Germany	Netherlands	Portugal	Spain	Slovakia	**Poland**
Real GDP growth rate (%)	**2.0**	2.5	1.9	1.3	2.0	1.1	3.4	6.9	**4.5**
Real labor productivity growth (GDP per hour worked, %)	**1.0**	2.1	1.3	1.2	1.4	1.3	0.5	5.8	**3.5**
Real labor productivity as % of EA-19 level (GDP per hour worked, EA-19=100)	**100.0**	112.8	115.0	111.7	118.5	65.8	85.4	56.8	**49.3**
Total factor productivity growth (%)	**-0.2**	0.6	0.0	0.2	0.0	-0.7	-0.9	3.3	**1.4**
Investment growth (in %)	**2.7**	2.3	3.0	0.5	2.9	-1.3	5.4	6.5	**9.8**
Employment growth (in%)	**1.1**	1.0	0.6	0.2	0.8	-0.2	3.5	1.1	**1.1**
Unemployment rate (in %)	**8.6**	4.9	8.5	10.0	4.4	7.0	10.0	15.9	**16.7**
Inflation rate (HICP)	**2.2**	1.8	2.0	1.7	2.0	2.8	3.3	4.7	**2.1**
General government balance (% of GDP)	**-2.2**	-2.4	-3.2	-2.6	-1.2	-4.7	0.7	-3.7	**-4.2**
Gross public debt (% of GDP)	**68.6**	66.5	64.5	64.3	47.9	68.3	43.6	37.8	**45.3**
Growth in exports of goods and services (%)	**5.4**	5.9	3.2	7.6	4.8	5.2	3.9	16.4	**9.9**
Increase in nominal unit labor costs (%)	**1.5**	0.7	1.8	-0.3	1.6	2.0	3.2	2.7	**-0.5**
Current account balance (% of GDP)	**0.3**	2.5	0.5	4.2	6.4	-8.7	-6.4	-6.9	**-3.9**

Source: Own elaboration and calculations based on: Ameco (2020), Eurostat (2020), OECD (2020), The Conference Board (2020).

The pace of the convergence process was lower in 2002-2007, as the GDP growth rate in all surveyed countries was positive, but varied considerably, the highest in Slovakia (6.9%), and Poland was second with an average annual result of 4.5% . The average annual GDP growth rates in Portugal (1.1%) and Germany (1.3%) were significantly below the average for EA-19 (2.0%). The main sources of Poland's economic growth in 2002-2007 were: an increase in investment (9.8%), labor productivity (3.5%) and exports of goods and services (9.9%). It is also worth paying attention to the increase in TFP, i.e. the total factor productivity (1.4%), which proved the reduction of the technological gap in Poland. Nevertheless, Slovakia achieved a higher pace of convergence, its GDP per capita increased by 13 pp against the EA-19 average while Poland's result was 7 pp (tab. 4). Among the remaining countries, the rise in GDP per capita compared to the EA-19 average was obtained by: Spain (6 pp), the Netherlands (2 pp), Austria (1 pp), Portugal (1 pp). Germany did not change its position, but France lost 4 pp. In summary, the effects of the process of Poland's convergence within the European Union and the adjustment of the economy to functioning in the common currency area, it should be noted that in comparison to Slovakia, Poland's results in 2002-2007 were modest. The main sources of the high dynamics of the Slovak economy were: foreign direct investment (in relation to GDP) which was much greater than in Poland, and the exceptionally high growth of exports (16.4% on average annually), as well as a greater increase in labor productivity and TFP (5.8% and 3.3%), tab. 1. Slovakia decided to introduce the euro as early as 2009, i.e. in conditions of a deep recession. The advantage of Slovakia over Poland also consisted in a greater reduction of the gap in terms of the level of labor productivity in relation to the EA=100, which in 2007 accounted for 63.3% of the euro area average, in the case of Poland it was 51.4% (tab.5). Labor productivity is the basis of competitive advantage in trade and its low level increases the risk of violating the external balance after adopting the common currency. This was especially experienced by the

peripheral countries, although their imports declined in the recessionary period and, consequently, the current account deficit decreased.

As was emphasized, Poland's great success in the crisis years 2008-2013 was the sustained economic growth and high dynamics of convergence. Poland's GDP per capita in 2013 increased to 62% of the average GDP in EA-19, i.e. by 11 pp. In Slovakia, the dynamics of economic convergence decreased and amounted to 6 pp, but the GDP per capita level achieved indicated an improvement in Slovakia's economic position in the euro area. It was already 72% of EA-19's GDP. In other countries, the losses of GDP varied in individual years, and overall, their economic positions in the euro area shifted throughout the six-year period. Austria and Germany were characterized by an increase in positions measured in GDP per capita. Both countries enlarged their advantage in relation to the average GDP per capita in EA-19 by 8 pp, and France by 3 pp (tab. 4). The Netherlands suffered major losses during the crises and its economic advantage weakened by 4 pp. But the greatest losses in the analyzed group of countries, as well as a significant weakening of the economic position and destabilization of public finances, affected Spain. The divergence process in terms of GDP per capita in 2008-2013 was as much as 10 pp, and in Portugal 2 pp.

Table 2: Main economic indicators of Poland and selected Euro Area countries,

annual averages in 2008 – 2013

Indicator/Country	**EA-19 Average**	Austria	France	Germany	Netherlands	Portugal	Spain	Slovakia	**Poland**
Real GDP growth rate (%)	**-0.2**	0.5	0.4	0.7	0.1	-1.3	-1.3	1.9	**3.0**
Real labor productivity growth (GDP per hour worked, %)	**0.7**	0.6	0.4	0.5	0.3	1.2	1.7	1.9	**3.0**
Real labor productivity as % of EA-19 level (GDP per hour worked, EA-19=100)	**100.0**	116.2	112.9	111.2	118.4	67.9	87.9	65.8	**56.4**
Total factor productivity growth (%)	**-1.0**	-0.9	-0.9	-0.6	-1.0	-1.3	-1.0	-0.4	**0.4**
Investment growth (in %)	**-3.2**	-0.6	-0.9	-0.1	-3.4	-7.4	-8.1	-1.3	**0.6**
Employment growth (in%)	**-0.4**	0.9	0.1	0.9	-0.1	-2.1	-2.8	0.1	**0.4**
Unemployment rate (in %)	**10.1**	4.9	9.2	6.5	5.2	12.2	20.2	13.0	**9.2**
Inflation rate (HICP)	**2.0**	2.3	1.8	1.7	2.0	1.7	2.1	2.5	**3.2**
General government balance (% of GDP)	**-4.3**	-3.0	-5.3	-1.4	-3.6	-7.3	-8.8	-5.0	**-5.2**
Gross public debt (% of GDP)	**84.4**	79.5	84.8	76.8	61.1	106.4	67.6	42.7	**52.4**
Growth in exports of goods and services (%)	**1.7**	1.5	1.6	2.4	2.3	2.7	1.8	4.9	**5.3**
Increase in nominal unit labor costs (%)	**1.9**	2.3	1.9	2.3	2.1	-0.1	0.5	1.8	**2.5**
Current account balance (% of GDP)	**0.1**	2.5	-0.7	6.2	7.7	-6.4	-2.9	-2.7	**-4.4**

Source: Own elaboration and calculations based on: Ameco (2020), Eurostat (2020), OECD (2020), The Conference Board (2020).

The high resilience of the Polish economy to shocks in the conditions of the global recession and the decline in GDP across the EU in 2009 by over 4% increases the weight of its 3% (average annual) GDP growth in 2008-2013 as compared to a decline of 0.2% in EA-19 . Compared to Poland, the GDP growth was significantly lower in Slovakia (1.9%). The several factors had a positive effect on economic growth in Poland: an increase in labor productivity, investment, TFP, employment and exports. When developing the issue of the sources of economic growth, it is worth emphasizing that the main factor creating domestic demand in Poland was public investment related to the need to use EU funds. Unemployment dropped significantly compared to the previous period, and the remaining macroeconomic indicators did not signal any serious imbalances. (tab. 2). Apart from the above-mentioned factors, positive impact on the dynamics of the Polish economy had low real exchange rate and low unit labor costs, which increased the competitiveness of exports and, consequently, the GDP growth rate (OECD 2014, p. 18). The inflow of FDI in relation to GDP (annual average) decreased from 3.35% to 2.17%, but it was stable, except for 2013 (0.5%), tab. 6. Foreign direct investment (annual average) in Slovakia decreased from 10.55% in 2002-2007 to 2.18% of GDP in 2008-2013 and ranged from 5.5% to - 0.6% of GDP. The data show that the reduced FDI could have caused a slight decline in the GDP growth rate in Poland. However, it had a major impact on the decrease in the GDP growth rate in Slovakia. Summing up, Poland's macroeconomic results in 2008-2013 provided positive evidence of potential opportunities to reduce the development gap. Nevertheless, the positive assessment of the adjustment process should also take into account the level of labor productivity in relation to the

EA-19 average, and in this respect Poland did not catch up with Slovakia. In 2013, these indicators were as follows: labor productivity in Poland accounted for 59.1% of EA level (EA-19 = 100), and in Slovakia 67.8%, tab 5. Considering all the analyzed indicators, it can be stated that in 2008-2013 Poland reached the contact level of economic homogeneity with the euro area.

Table 3: Main economic indicators of Poland and selected Euro Area countries, annual averages in 2014-2019

Indicator/Country	**EA-19 Average**	Austria	France	Germany	Netherlands	Portugal	Spain	Slovakia	**Poland**
Real GDP growth rate (%)	**1.8**	1.7	1.5	1.7	2.1	2.2	2.6	3.1	**4.2**
Real GDP growth rate (%)	**0.7**	0.6	0.9	0.8	0.2	0.1	0.5	2.1	**3.6**
Real labor productivity growth (GDP per hour worked, %)	100.0	115.1	112.9	111.3	115.2	66.5	88.5	70.9	63.1
Real labor productivity as % of EA-19 level (GDP per hour worked, EA-19=100)	**0.2**	-0.1	0.0	0.3	0.0	0.1	0.3	0.8	**1.6**
Total factor productivity growth (%)	**3.9**	3.2	2.8	2.4	5.5	6.3	5.5	5.7	**5.6**
Investment growth (in %)	**1.2**	1.2	0.8	1.1	1.6	1.8	2.2	1.8	**0.9**
Employment growth (in%)	**9.5**	5.4	9.6	4.0	5.4	10.1	18.8	9.1	**5.8**
Unemployment rate (in %)	**0.9**	1.5	0.9	1.2	1.0	0.7	0.6	1.0	**0.7**
Inflation rate (HICP)	**-1.4**	-0.9	-3.2	1.2	0.0	-2.8	-4.0	-1.9	**-1.8**
General government balance (% of GDP)	**88.6**	79.1	97.2	67.3	58.7	126.9	98.5	51.0	**50.3**
Gross public debt (% of GDP)	**4.3**	3.7	3.4	3.5	4.5	5.2	4.1	4.2	**7.6**
Growth in exports of goods and services (%)	**1.0**	1.9	0.4	1.9	1.0	1.3	0.4	3.1	**1.9**
Increase in nominal unit labor costs (%)	**2.9**	2.2	-0.6	7.8	9.1	0.5	2.3	-1.9	**-0.6**

Source: Own elaboration and calculations based on: Ameco (2020), Eurostat (2020), OECD (2020), The Conference Board (2020).

The third stage of the analysis of the process of convergence of the Polish economy with the euro area was marked by a fundamental change in the EU's economic situation. From 2014, a sustained recovery began, spreading to all EU countries. Until 2019, in the group of countries studied, Poland maintained the highest average annual GDP growth rate, which was more than twice as high as the SE-19 average and amounted to 4.2%. The main factors of economic growth in Poland included: labor productivity, TFP, investment and especially exports of goods and services. It is also worth emphasizing the increase in the inflow of FDI, which on annual average amounted to 2.5% of GDP and proved stable. In Slovakia, the FDI inflow continued to decline and in 2014-2019 it decreased to 1.35% of GDP on average annually. Thus, Poland was a greater beneficiary of the inward FDI than Slovakia. The aforementioned factors made Poland the best result in the process of economic convergence. GDP per capita increased in relation to the average EA-19 from 63% to 69%, in Spain from 84% to 86%, and in Portugal from 72% to 74%. In the Netherlands, Austria, Germany and Slovakia divergence was recorded, while France's GDP per capita remained at the level of the average GDP per capita of EA-19. Efficiency convergence measured by the increase in labor productivity in relation to EA-19 = 100 can also be considered a great achievement of Poland – a rise from 59.4% to 68.6%. In Slovakia, the increase in the level of labor productivity in relation to the average SE-19 was 4.7 pp (from 68.6% to 73.3%). In the other countries surveyed, changes in this respect were slight or almost none. To sum up, in a subsequent period, Poland significantly narrowed the economic gap in relation to the average macroeconomic indicators which characterize the entire euro area.

Table 4: The convergence process: GDP per capita in purchasing power parity (EA-19 = 100) in 2002-2019 (countries ordered by value in 2019)

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
EU-28	90	91	91	91	92	92	92	92	93	93	94	94	94	94	94	94	95	95
EA-19	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Netherlands	125	122	123	125	126	127	130	128	125	125	125	126	123	122	120	121	122	121
Austria	113	114	116	116	115	114	115	117	117	119	123	123	122	122	121	119	120	120
Germany	107	108	109	107	106	107	107	107	111	114	115	115	118	116	116	116	115	114
France	103	100	100	101	99	99	98	99	100	100	100	101	100	99	98	97	98	100
Spain	88	89	90	91	94	94	93	92	88	85	84	83	84	85	86	86	86	86

Portugal	74	74	74	75	76	75	74	76	76	72	70	72	72	72	73	72	73	74
Slovakia	48	50	52	55	58	61	66	66	70	70	71	72	72	73	68	67	69	69
Poland	**43**	**44**	**46**	**46**	**46**	**49**	**51**	**55**	**58**	**60**	**62**	**62**	**63**	**65**	**64**	**65**	**66**	**69**

Source: Own calculations based on: Eurostat (2020).

Table 5. Real labor productivity as % of EA-19 level (GDP per hour worked, EA-19=100)* in 2002, 2007, 2013 and 2019

	2002	2007	2013	2019
EA-19	100.0	100.0	100.0	100.0
Austria	110.3	116.5	115.5	115.4
France	114.8	114.5	112.1	113.7
Germany	111.1	112.4	110.8	111.2
Netherlands	116.4	119.8	116.5	113.3
Poland	46.4	51.4	59.1	68.6
Portugal	65.1	66.6	68.4	67.0
Slovakia	50.9	63.3	67.8	73.3
Spain	86.4	84.6	89.4	88.1

*Note: *GDP per hour worked in US dollars, constatnt prices, 2015 PPS.*
Source: Own elaboration and calculations based on: OECD (2020).

Table 6: Inward foreign direct investment as % of GDP

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EA-19	**3.1**	**2.3**	**1.1**	**2.2**	**2.8**	**4.3**	**0.9**	**2.5**	**2.5**	**2.9**	**2.2**	**2.2**	**1.8**	**5.0**	**2.4**	**2.5**	**2.2**	**2.5**
Austria	0.1	2.4	1.1	3.4	1.4	6.6	1.7	2.3	0.7	2.5	1.0	1.3	1.0	0.4	-2.2	3.6	0.5	1.0
France	1.4	0.4	-0.1	1.5	1.1	2.4	1.3	1.1	0.5	1.1	0.6	1.2	0.1	1.9	0.9	1.0	1.4	1.3
Germany	2.6	1.3	-0.4	1.7	1.9	2.3	0.2	0.7	1.9	1.8	0.8	0.3	-0.1	0.9	0.5	1.6	1.9	1.0
Netherlands	5.3	5.7	1.9	5.7	1.9	13.5	-0.7	4.5	-0.8	2.7	3.0	5.8	5.1	23.4	3.9	7.3	12.5	9.3
Poland	**2.0**	**1.8**	**4.8**	**2.7**	**4.2**	**4.6**	**2.3**	**2.3**	**2.7**	**3.0**	**2.5**	**0.5**	**2.6**	**3.2**	**3.3**	**1.7**	**2.4**	**2.3**
Portugal	1.2	4.8	0.9	1.1	5.2	1.2	1.4	0.7	1.2	3.0	3.8	3.7	2.1	3.8	2.5	3.4	2.8	3.5
Slovakia	23.6	8.8	9.3	6.3	10.1	5.2	5.0	0.0	2.0	3.5	3.2	-0.6	-0.5	0.1	0.9	4.2	1.1	2.3
Spain	5.6	2.9	2.3	2.2	2.4	4.4	4.7	0.7	2.8	1.9	1.9	2.1	1.7	0.7	2.6	3.0	3.2	0.9

Source: Own elaboration based on: UNCTAD (2020).

We supplement the analysis conducted with a graphic presentation of macroeconomic indicators illustrating the level and dynamics of GDP growth and labor productivity in the surveyed countries in 2019 (fig. 1 and 2). These figures facilitate the assessment of the position and economic effectiveness of peripheral countries, including Poland, vis-à-vis selected, most important countries of the group that forms the hard core of the EMU. But most of all, they illustrate the dimension of economic heterogeneity in the euro area - income (GDP per capita) and productivity gaps. From the point of view of the OCA theory, this is a major barrier limiting the benefits of introducing the common currency.

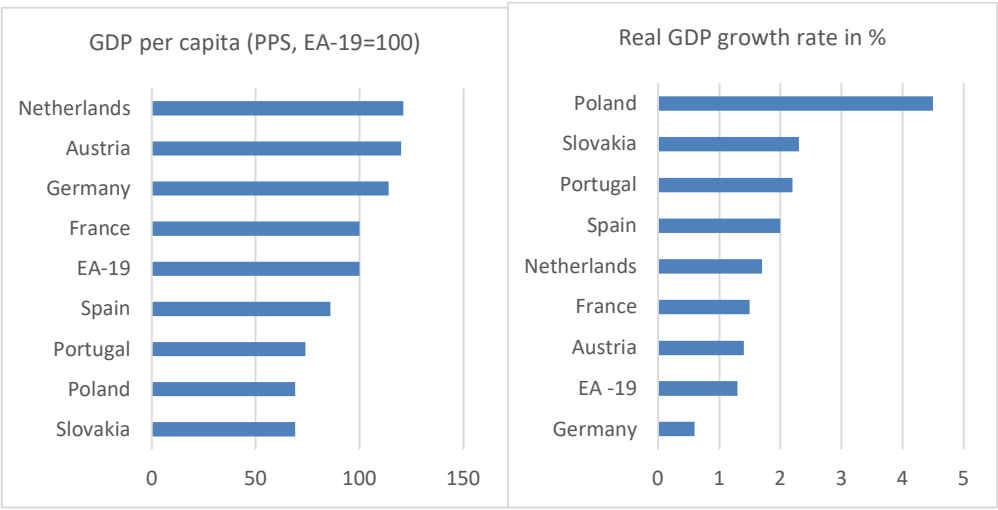

Fig. 1: GDP per capita (as % of EA-19 level) and real GDP growth rate (in %) in 2019

Source: Own elaboration based on: Table 4 and Eurostat (2020).

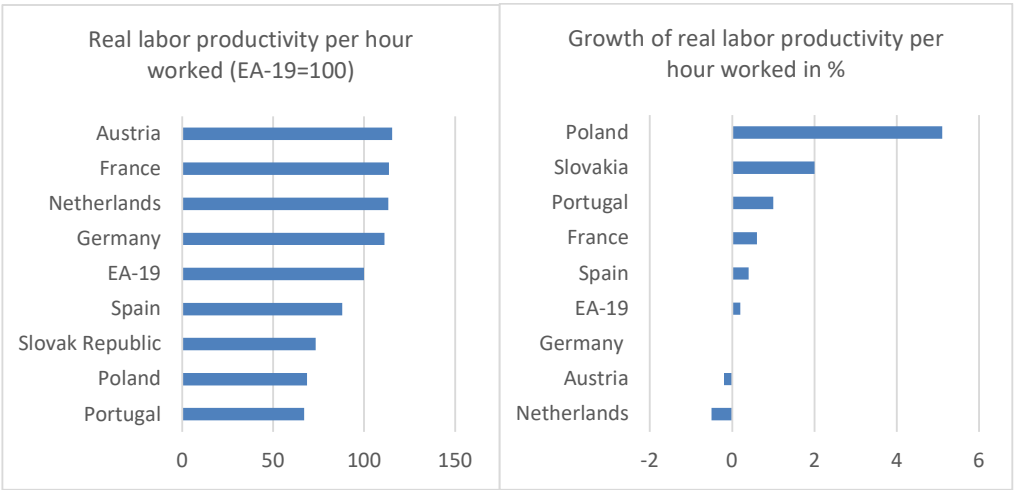

Fig. 2: Real labor productivity per hour worked (as % of EA-19 level) and growth of real labor productivity per hour worked (in %) in 2019

Source: Own elaboration based on: Eurostat (2020) and OECD (2020).

When assessing the studied group of countries in terms of the homogeneity criterion, it should be stated: a large spread of GDP per capita from 69% of the EA-19 average in Slovakia and Poland to 121-120% in Netherlands and Austria. The dispersion of GDP growth rates is at first glance high, if we evaluate them on the basis of the spread of the rates between Poland (4.5%) and Germany (0.6%). After eliminating the extreme values, the differentiation of the growth rates is only 1 pp. The scale of differentiation in labor productivity is close to GDP per capita: from 67.0% of the EA-19 average in Portugal to 115.4 in Austria. Labor productivity growth rates indicate great potential for narrowing the gap between the core area and peripheral countries, especially in Poland (5.1%). The analysis of the level and rates of growth in labor productivity is important as it determines the competitive advantage in the monetary union and, as a result, the distribution of benefits from mutual trade, as well as affects current account balance and economic growth.

Conclusion

The study sought answers to research questions concerning: 1) Appraisal of the results of the adjustment process conditioning the achievement of benefits from the adoption of the common currency; 2) Assessment of 16-year membership in the EU in terms of creating favorable conditions for dynamizing the process of economic convergence; 3) Indication of the greatest threats that may result from the introduction of the euro; 4) Identification of the strengths of the Polish economy and the areas of the greatest risk of the consequences of giving up the national currency. Responding to the questions, it should be emphasized that the euro area does not meet the OCA criteria to a greater extent after the 2008+ crises than in the first years of its functioning. The effects of financial-economic and public finance crises were greater in the peripheral countries, and they deepened economic divergence. The experiences of Spain, Portugal and especially Greece constitute a serious warning of how risky the introduction of the common currency can be in economies that are characterized by a development gap: low GDP per capita, low labor productivity and trade competitiveness, and a large share in the economies of traditional sectors. The results of the analysis, the purpose of which was to assess the process of convergence of the Polish economy against the background of selected countries, indicate that Poland has achieved the catching up effect. Its GDP per capita as a percentage of the EA-19 average increased in the period considered from 43% to 69%, and in Slovakia from 48% to 69%.

Do not depreciating the high economic dynamics of Poland and the fundamental reduction of the gap in terms of labor productivity, it should be noted that in 2002-2007 the possibilities of catching up effect were not fully used. The advantage of the Polish economy is its high dynamics, large internal market and export growth, as well as ability to adapt in conditions of deterioration of the economic situation. Having macroeconomic policy instruments at the national level and the mechanism of a nominal exchange rate facilitate the achievement of economic goals. Despite the undoubted achievements in the process of catching up with the economically developed countries, Poland does not yet meet the criterion of real convergence with the euro area. Therefore, by resigning from its own currency, it could experience economic shocks, the greatest risk of which is the decline in competitive advantage and exports, and consequently in economic dynamics. Observing the economic problems of Spain, Portugal and Slovakia since the 2008+ crisis, one can be afraid of this.

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Chinese Craft in E-Commerce

Katarzyna MAZUR-KAJTA,
Opole University of Technology, Faculty of Economics and Management, Department of Enterprise Management, E-business and Electronic Economy, Opole, Poland, e-mail: k.mazur-kajta@po.edu.pl

Elzbieta KARAS
Opole University of Technology, Faculty of Economics and Management, Department of Enterprise Management, E-business and Electronic Economy, Opole, Poland, e-mail: e.karas@po.edu.pl

Abstract

The purpose of this article is to answer the following questions: Does Chinese craftsmanship also have a future in the e-commerce space? How do Chinese craftsmen find their professional activity in the field of e-commerce? What issues related to Chinese crafts and e-commerce are the topics most often shown by scientific articles and the media? The research used an analysis of the literature on the subject, reports, and the works of Polish, English and Chinese journalists published on the Internet. The article describes the formation of the Chinese internet industry, which has surprised many with its dynamics and scale over the past 30 years. Chinese craftsmanship in the area of e-commerce was presented from the perspective of shaping the spirit of craftsmanship as well as changes and modern trends in the contemporary economy. This paper analyzes the profiles of the "young" generation of craftsmen, who show an openness to changes and introducing new solutions, as well as the willingness to follow the latest trends. The presented results are important for the scientific community, mainly due to the apparent lack of materials related to craftsmanship and e-commerce; as well as for groups of craftsmen planning to expand their business with activity in the e-commerce space. Research results can contribute to increasing the knowledge about the activity of craftsmen in the field of e-commerce, and exploring the information presented by the Polish, English and Chinese media.

Keywords: E-commerce, People's Republic of China, crafts, economic culture.

Introduction

Chinese craft is currently undergoing the so-called 'third wave' (Mignosa & Kotipalli 2019). This ongoing scientific discussion of craft has been reflected in papers written by: Sinikka Pöllänen (2009), Anzelika Smagina & Iveta Ludviga (2020), Daniela K. Rosner (2009), Ellya Zulaikha & Margot Brereton (2011), William M. Waite (1996), Bogna Gudowska (2020), Bill Lucas & Ellen Spencer (2016), Xenophon Zabulis et al. (2020), Oluwayemisi A. Abisuga-Oyekunle & Ian R. Fillis (2017), Qinglan Luo, Chunyan Wang, & Ying Zhao (2020), Zhu Qiandao & Yu Yan (2019). The value of craftsmanship has been appreciated mainly due to the quality of handmade goods and the consumption habits of customers. The second group of factors includes: cultivating the existing habits (this applies primarily to representatives of the older generation), paying attention to the small impact of the production activities of "an individual" on the natural environment (small-scale production often using natural materials) and a sentiment regarding tradition passed from generation to generation, promoting local practices and favouring regional demand (Zhang, Walker & Mullagh 2019, 5-6). The demand for products and services offered by craftsmen is also satisfied due to the personality traits of a trustworthy craftsman, diversified activities (including offer) and decentralized location – proximity and accessibility (Graszewicz 1973, 196-197). The benefits resulting from online sales, specifically, convenient availability in terms of location and time, favour the last of the above-mentioned elements even more. *Electronic commerce*, also known as *e-commerce* or *online commerce* is a new economic concept that has recently emerged and is becoming more and more popular with each passing year, also with regard to technical activities. Offering products and services via the Internet lowers production costs (including the use of commercial space and intermediaries, by using ready-made programs which facilitate the development of online business, etc.), and expands the market by enabling product targeting in a growing number of fields even during the COVID-19 pandemic. This method is also used to reach young customers, who have developed new consumption habits and intuitively use online resources.

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Chinese craftsmanship, being a component of China's intangible cultural heritage and a permanent element of the economic structure (Graszewicz 1973, 179), clearly marks its presence in e-commerce, which provides new opportunities – primarily in the economy, but also in education and culture.

Research Aim

This article aims at answering the following questions:
– How does Chinese craftsmanship, associated with tradition and cultural heritage, fit into the economic concept of e-commerce?
– How do modern craftsmen in China find themselves in e-commerce?
– What issues related to Chinese craftsmanship and online commerce are discussed in Polish, English and Chinese scientific articles and media?

Material and methods

The research was based on a review of literature, reports of research institutions and articles provided by Polish, English and Chinese journalists published on the Internet. Despite the fact that craft it is not a new element of the economic structure, it has not been explored by economic researchers for years. Although technical descriptions and articles about innovative solutions are available on Internetwork, craftsmanship as a "whole" is rarely discussed. This applies to articles on both Polish and Chinese craft written in Polish, English and Chinese, which were analysed in this study. Along with the change in the attitude of the Chinese government, which now attempts to revitalise Chinese handicraft (Zhang, Walker & Mullagh, 7), some articles discussing this revival are now available on the Internet. However, these are very brief and general materials. Most frequently, these articles refer to the importance of the *spirit of craftsmanship* [工匠精神]. This category appears regardless of what specific topics are being researched. Therefore, this study is subject to a number of limitations which indicate the need for continuing research in the future.

Craftsman - A Definitional Approach

The perception of craftsmanship continues to evolve, therefore, the definitions which describe it are also changing. According to the Merriam-Webster dictionary definition, artisans are characterised as, workers involved in trade or craftsmanship, as well as skilful people, who demonstrate artistic skills (*Merriam-Webster Dictionary*). The Oxford Learner's dictionary describes craftsmanship as, having special skills in handcrafting beautiful things (*Oxford Learner's Dictionary*). Craft work also includes making products that are based on ready-made patterns and instructions (Pöllänen 2009). Anzelika Smagina and Iveta Ludviga defined craft entrepreneurship as "creating, organizing and managing a business venture that involves the use of human skills and manual labour as well as the creation of products or utility services accompanied with a certain extent of aesthetic value" (Smagina & Ludviga 2020). The definitions of craftsmen and craftsmanship also refer to the economic aspect of professional activity, e.g. running a business and performing work, which also includes investing time (Rosner 2009). Ellya Zulaikha and Margot Brereton emphasised the differences in defining the relationship between craftsmanship and manual labour (only or in some cases) and working with tools and / or machines, as well as in arts and crafts. According to these researchers, both craftsmanship and art can be associated with aesthetic values, however, they may differ in the degree of it. Craft is perceived as more decorative, richly visual and respecting the material and the process of creation. According to Howard S. Becker, it is also helpful to distinguish between artistic craftsmen and the so-called ordinary craftsmen. The first group emphasizes beauty and usability of their products, while the second group responds to the needs of customers (Zulaikha & Brereton 2011 [after:] Metcalf 1993; Zulaikha & Brereton 2011 [after:] Becker 1978). A craftsman is also described as an individual, who runs a business on one's own initiative, personally or together with family members (*PWN Encyclopedia*), most often as a micro, small or medium entrepreneur, although this may depend on the legislation of the country in which this economic activity is located.

Nowadays, the so-called "third wave of craftsmanship" becomes evident[1] (Gudowska 2020). Craftsmen sell their products both locally and more widely through online sales. The renaissance of the craft industry is connected with the digital economy and industry 4.0, which is associated with digitization and thus with the emergence of new consumption habits.

Chinese Internet Industry

The concept of online economy in China was introduced in the People's Republic of China (PRC) in the early 1990's. After 1993, the company Sohu.com [搜狐], which turned out to be the most influential provided services

related to online advertising, games and research. In 1996, the first e-commerce company specializing in business-to-business (B2B) solutions was established in China. In 1998, the Chinese Ministry of Information Industry was established, which was replaced by the Ministry of Industry and Information Technology [中华人民共和国工业和信息化部] in 2008. In 1999, the technology corporation Sina [新浪] was established. It provides such services as: social media platform Sina Weibo [新浪微博], Sina Mobile [新浪移动] – an online information portal which includes - Sina News, Sina Finance, Sina Sports, Sina Entertainment, Sina Blog and Sina.com [新浪网] offering online advertising and marketing solutions. The IT sector in China grew at a rate of 25% annually. In the years between 2000 and 2002, the IT industry faced a crisis which ended by 2003. Between 2005 and 2008 the IT sector grew by more than 40% annually. The following corporations dominated the market: Tencent [腾讯控股有限公司], Shanda [盛大互动娱乐有限公司] and Alibaba [阿里巴巴集团控股有限公司], which also includes the AliExpress sales service [全球速卖通], which is well-known in Poland (Du 2009, 1175-1178). In 2009, the Chinese Ministry of Commerce [中华人民共和国商务部] established the specification of the e-commerce model and the standards of online shopping services (Yue 2017, 3). Due to the fact that e-commerce promotes innovation and improves efficiency in production, the online sector was selected as a starting point in the process of restructuring and furthering the economic development of the PRC. Furthermore, according to some experts in China, E-commerce promotes corporate innovation, improves a company's internal organization, optimises supply chain operations and the performance of the external economic environment (Wang & Wang 2019, 3). In 2018, Alibaba was the strongest player in the B2B e-commerce. It owns Alibaba.com [阿里巴巴网], 1688.com [1688 网], Tmall.com [天猫网], Taobao.com [淘宝网] and Lazada.com [来赞达网]. In 2019, Alibaba continued to lead in the ranking of e-commerce retail sales with 55.9% share, followed by Jingdong.com [京东网] – with a 16.7% share (*China Ecommerce 2019*). As part of B2B industry, the following platforms are also active in the Chinese market: HC360.com [慧聪网] and VIP.com [唯品会网] (*E-Commerce in China,* 3-4). In terms of business-to-end customer relationships (B2C), Tmall.com, which covers more than half of the Chinese market, is followed by Jingdong.com, VIP.com, Suning.com [苏宁易购] and Pinduoduo.com [拼多多网]. China is also the largest mobile payment country in the world. Alipay, owned by Alibaba, dominates the online payment market. Alipay offers a number of convenient services which allow customers to collect a payment only after the ordered goods have been received (*E-Commerce in China,* 17-18). During her studies in the PRC, the author often bought fruit directly from wheelbarrows of visiting farmers, who replaced a price list with QR codes to be paid via WeChat Pay [微信支付] as part of Tencent. This proves not only the universal character of such solutions, but also the convenience of the service. The application allows the customers to make internal transfers, purchase tickets for events, and even occasional transfers, known in China as a *red envelope* [红包] which may be personalized (by specifying the amount assigned to a specific recipient) and randomised (with a specific total amount and number of recipients, the application randomly distributes funds, thus making symbolic transfers). In 2019, online retail sales in China generated nearly US $ 1.5 trillion, which is 1/4 of total retail sales achieved.

This has been reflected in the increasing competition in e-commerce, and thus the need to cover the costs of acquiring and maintaining customers. On average, Chinese consumers spend 44% of their time using social platforms, mainly WeChat and Sina Weibo.com microblogging [微博] – TikTok, they also watch, share and create short videos on Douyin.com [抖音短视频] and on Tencent video streaming services – Wetv.vip [腾讯视频] (Bu, Wang, Wang & Zipser 2019, 1, 3, 7, 10). It is estimated that by 2023, this continuing online activity will result in e-commerce sales accounting for 63.9% of total retail sales in China (*China Ecommerce 2019*).

Results and Discussion - E-commerce as part of Chinese crafts

China currently dominates the production of handicrafts around the world (*Global Market Assesment for Handicrafts* 2006). In the Chinese web portal *TianYanCha.com* [天眼查] under the heading *e-commerce crafts* [工匠电子商务], 328 companies are registered which provide handicraft services with share capital between 100,000 RMB [approximately US $ 14,688] and RMB 500 million [US $ 73,436,198]. However, most often customers search for these services online through e-commerce platforms – Taobao.com and Jingdong.com. There has also been a development of mobile handicraft applications for smartphones and tablets, enabling online shopping, communication, access to instructional videos and graphic tips. They include such apps as: *Do-It-Ymaourselfer* [手工客], *Funny Cut-Outs* [妙趣剪纸] designed to create traditional Chinese cut-outs, *Shicui* [拾翠] providing personalized traditional Chinese craftsmanship services, *Eastern Designers* [东家] and *Wowtao* [哇陶] devoted to ceramic modelling.

Along with online trade, e-commerce embraces other activities such as telling stories, sharing passions, conducting trainings, presenting both national/regional culture and documenting the process of creating products. As well as the use of other modern technology tools as part of embodied interaction; it can be used to enhance the learning

experience of intangible cultural heritage - by increasing understanding of cultural heritage by simulating the gestures and points of view of craftsman (Tan et al. 2019).

For example, the city of Jingdezhen [景德镇], also known as the hub of porcelain, organise online broadcasts which last several days showing the firing of ceramics. Live broadcasts attract over 3 million viewers to computer screens (*电商时代的工匠们*). It can be said that the craftsmen of the 21st century are becoming the celebrities of the Internet [网红工匠].

For example, the welder Geng Shuai [耿 帅] attracts over 3.6 million viewers by using a short video platform to showcase his inventions. Similarly, the designer of paper umbrellas Yu Wanlun [余万伦] presents the creation process and his products on the Internet (刘峣 2019). Chu Chengzhang [储诚长] uses e-commerce platforms to distribute tea, enabling the virtual planting of it. In this way, potential customers can learn about tea culture and develop an interest in drinking tea (王磊 2015). These types of activities are financially significant – through advertising and promotion they increase sales.

It is believed that this tendency will continue to develop. Moreover it has been estimated that live broadcasting will have an increasing impact on consumer shopping behaviours. According to the Coresight Research Report, in 2020 the Chinese e-commerce industry will focus on operations (including sales and e-customer service), using applications designed to create short films (10-20 seconds long), active online sales of previously owned goods, develop group purchases (cheaper purchases when ordering more goods), introduce mini-programs as a supplement to existing sales channels (launching additional functions within already used applications), accelerate deliveries (by modernizing the logistics infrastructure and increasing the capacity of customs warehouses), develop a data-driven C2M model (factories will become consumer-driven, which will speed up e-commerce), provide vertical e-commerce sites (sales platforms targeting specific customer groups which capable of cooperating in online community) and strengthen cross-border electronic commerce.

In some rural areas, specialized production centres have been established, focusing on traditional local crafts (*E-commerce in China. Opportunities for Asian Firms*, 16, 23). *Taobao villages* [淘宝村] are e-commerce hubs located in rural areas, such as the provinces of Zhejiang [浙江], Guandong [广东] and Jiangsu [江苏]. In 2013, there were 20 of them, and five years later – 3200 (*The "Taobao Villages" Phenomenon: How E-commerce (also) Redefines Rural Areas in China*). One example is the village of Aicun, which, through the development of e-commerce and crafts, created jobs for 800 people, increasing the annual income of its inhabitants by over 20,000 RMB (US $2992). *Taobao villages* boost the local economy, generating nearly 6.8 million jobs between June 2018 and June 2019. In 2019, 63 villages collectively generated approximately RMB 2 billion revenue (US$ 293,734,071) through online sales of handicrafts, agricultural produce and industrial goods (Wang 2019). The e-commerce market for Chinese and Indian crafts is distinguished by, among others, the fact that Chinese entities have more modern technology in the field of production and marketing (Renu & Anupama 2018).

In the Chinese articles, the issues of e-commerce and handicrafts are most often presented by referring to either the spirit of craftsmanship or handicrafts' changes and adaptation to modern trends in the contemporary economy.

Studies related to the *spirit of craftsmanship* aim at answering the question whether nowadays, in the age of globalization and broadly understood digitization, it is necessary to cultivate the *spirit of craftsmanship*. This concept not only proves the quality of services diligence, dedication and continuous improvement of a given professional group but also requires following an ethical path – maintaining high standards, gaining social respect and increasing craftsmen' social status. The spirit of craftsmanship, according to the assumptions of Chinese culture, is passed down from generation to generation, and is treated in China as a part of the humanistic wisdom for the great rejuvenation of Chinese culture (Gu 2019). This category gained particular importance in China in 2016, when Prime Minister Li Keqiang in one government report referred to fostering the spirit of craftsmanship of continuous improvement, and then, a year later this category also appeared in the reports of President Xi Jinping. The articles not only present socialist ideas, but also warn against false artisans operating online, who are defined as incompetent. According to the *Report on the Integrity of the E-Commerce Industry* [电商行业诚信度调研报告] presented in 2018, over 90% of consumers shop online, and more than half of them – 49% – have experienced unethical online behaviours. The unethical behaviours of false craftsmen manifest in deliberately suppressing a product's defects (an inability to see the goods before purchasing them), offering products that do not comply with what has been advertised, failing to meet pre-sale obligations, delays in deliveries (too long a waiting time) and unfair price manipulation. The importance of intellectual property protection is also emphasized through filing patents and promoting professional ethics. Spreading the *spirit of craftsmanship* starts in vocational schools, e.g. by

developing a university culture on campus [校园文化] (*浙江缙云县以"工匠精神"滋养学生职业教育*), as well as by its introduction during classes, among others (Luo et al., 2020):

- a serious approach to the learning of exercise - reliability study;
- working in concentration;
- working with dedication;
- persistence at work;
- evaluating the professionalism of activities;
- sense of responsibility;
- combining the science of theory with practice.

The second tendency promotes young craftsmen, who are China's new strength in supporting industrial innovation. Young craftsmen are described as more innovative, courageous, open to changes, and able to use the strength of the team and various marketing strategies in running their own profit-making activities. In order to develop such skills among the young generation of craftsmen and craft teachers, they can participate in training and competitions devoted to online craft activities. These include:

– *Bayu Craft* Competition [巴渝工匠], directed at vocational schools of the city of Chongqing, organized by the Chongqing Vocational School of Transport [重庆交通职业学院].The competition consists of three stages: decorating an online store, e-customer service and supporting the operation of the online store (*开网店 做运营"巴渝工匠"杯电子商务技能赛项开赛*);
– Competition for Vocational Schools in Hunan Province [湖南省], organized by the Hunan Department of Education [湖南省教育厅], Department of Human Resources and Social Security of Hunan Province [湖南省人力资源和社会保障厅], Provincial Cross-Border E-Commerce Association [湖南省跨境电商协会] and the Publishing House of Universities [高等教育出版社]. The competition concerns data analytics, visual marketing, marketing planning, online marketing, customer service, online store operations, product integration and teamwork (*【工匠文化节专题】2020 年高职电子商务技能竞赛我校两支代表队双双荣获一等奖*);
– Competition of Skills in *Mushroom Crafts* [菇乡工匠], targeting e-commerce people in Qingyuan County [庆元县] on tackling poverty and innovation in the development of e-commerce, organized by the Talent Group Office of the Qingyuan County Party Committee [中共庆元县委人才工作领导小组办公室].The competition includes: creating short videos, e-customer service, support activities for courier companies and e-commerce in rural areas. In addition to cash prizes, winners are awarded certificates of professional competence (*【青·关注】庆元县"菇乡工匠"技能擂台赛暨第六届农村电子商务技能比武大赛来啦！*);
– Competition for e-commerce lecturers *Putian Craftsman Cup* [莆田工匠杯], co-financed by the China International E-Trade Center [中国国际电子商务中心], the Local Government of Putian [莆田市人民政府], the Teaching Committee for Higher Education specialised in E-commerce [教育部高等学校电子商务类专业教学指导委员会] and the China Association for Continuing Engineering Education [中国继续工程教育协会] (*莆田工匠杯"第四届中国电商讲师大赛全国总决赛圆满收官*);
– Project of technical vocational videotraining [勒流街道 2020 年电子商务"视频制作"], organized by the Human Resource and Social Security Office in the Liuliu District of Foshan city [佛山市德区勒流街道人力资源和社会保障] (*勒流街道2020 年电子商务"视频制作"技术职业技能工匠班招生啦*).

Conclusion

The Chinese online industry has been growing consistently since the 1990's. It has been estimated that e-commerce sales will account for over 60% of total retail sales in China in a few years. Due to the development of information and communication technologies in the manufacturing sector, transformation towards digitization and automation has become evident (Xu, Chin & Cao 2020). This also applies to Chinese crafts. New online solutions are also used for craft services. Therefore, craftsmen use online sales platforms, become active online, create applications for mobile devices, etc., while maintaining the tradition which is inextricably linked with the essence of craftsmanship.

By offering their services through the latest communication channels, craftsmen continue to be tradition-oriented, share their passion, receive recognition (followers), and use short videos to talk about their works/products and methods of manual production. By doing so, they aim at developing and maintaining these specific interpersonal

and indirect relationships and establishing a sense of closeness and accessibility between the creator – craftsman and the final e-customer, which results in customers' interest in their work.

As part of Chinese craftsmanship, e-commerce is presented in the media mainly from the perspective of developing the *spirit of craftsmanship* – the features of an exemplary craftsman both in terms of ethics and a professional mastery, as well as the need to introduce changes and follow modern tendencies. Articles devoted to this issue are written in the spirit of political correctness. The presented profiles of young craftsmen show educated people, who gain professional experience in a plant or in industry, are open to changes and introduce new solutions, also in online sales. Owing to e-commerce, along with economic benefits, they can achieve educational and social goals and by establishing a relationship with customers from outside China they can also share knowledge about the history and culture of their country - cultural heritage.

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[1] The first wave of the development of the craftsmanship is associated with the development of the Arts and Crafts movement in the nineteenth century, the second wave is associated with the hippie movement that took place in the years 1960-1970.

A Model for Estimating Skills And Competencies in Industry 4.0

Silviu Nicusor SURU
Politehnica University of Timisoara, Management Department,
Timisoara, Romania, silviusuru@gmail.com

Gabriela PROSTEAN
Politehnica University of Timisoara, Management Department,
Timisoara, Romania, gabriela.prostean@upt.ro

Petra Lucia PROSTEAN
Timis Bar Association,Timisoara, Romania, petra.prostean@yahoo.com

Radu Cristian TABUICA
Timisoara, Romania, radutabuica@yahoo.com

Abstract

The continuous development of technology and the progress of Industry 4.0 have expanded the boundaries of production but also those of human relationships in a way that is distinct from everything we have experienced so far. In this sense, the paper aims to present the ontology of an IT system for selecting the most suitable candidates for specific positions in Industry 4.0, explaining the steps of conceptualizing the system. The paper starts with a section about ontology, conceptualization and brief immersion in its issues. In the following, a literature review highlights models based on ontologies, dedicated to such recruitment processes. In the third part of the paper, is presented a practical application based on testing procedures that frame as well as possible the candidates for specific jobs. The work ends with the presentation of the legal framework for the implementation of the proposed model.

Keywords: Industry 4.0, tests, skills, ontology.

Introduction

In the current context of Industry 4.0, in which employees are already selected based on specific skills, the problem arises that they can integrate into the so-called “Smart Process Era” (Sinur et al., 2013), so that they have the opportunity to communicate with smart devices in an unprecedented way. Industry 4.0 allows manufacturers to connect with each other, thus obtaining a synergistic link between the supplier, the factory, the product itself, the distributor, maintenance and after-sales service. Society needs to study the impact that digitalization has on the statuses and social roles of individuals and we can do this by studying the interactions between them as well as on each individual.

Through this paper, we intend to formalize and develop a model for skills evaluation ontology-based in the 4.0 industry. Recently, numerous ontologies have been performed in related fields, such as in the IT field, in the economic field, but we intend to make our own skills ontology especially for Industry 4.0, starting precisely from its base, namely from the process of staff recruitment and selection. One way to improve the integration process is to build the selection process by implementing methodological techniques based on the developed ontology. Such current practices represent an important step in streamlining the system for selecting and recruiting qualified staff for Industry 4.0.

Numerous studies have been conducted that have highlighted the importance of this massive digitalization and the role that the human factor plays in this "revolution." The proposed approach is an important step to improve and increase the efficiency of employees in Industry 4.0, taking into account the psychosocial environment, pursuing results on improving the quality, work efficiency, and implicitly of employees' lives, aspects then reflected in society.

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Our proposal is a trust indicator factor that searches various information on resumes or CV'**s** and also relates them with Linkedin (Fig.1), where we can link to the professional network of the person and see their social status for a better personal evaluation, mainly after getting the person application and agreement for the use of personal data. Linkedin is a professional network where people have contact with other individuals or groups that share the same interest and that information. Linkedin users make profiles that include educational content, accolades and business. Linkedin is designed to improve users communicate with co-workers and peers, search for a job, and get business updates.

Given that the applicant's CV no longer provides enough data for him to be eligible for a testing process for recruitment, the research in this paper studies the problem of identifying additional information of a social and professional nature. In this case, it is also useful to access professional platforms such as Linkedin, where you can better study the skills, competencies and social role of the applicant.

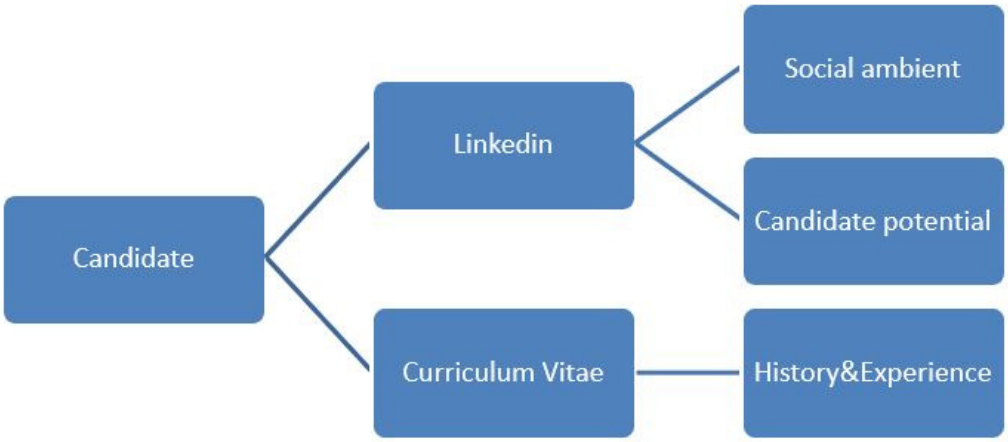

Fig. 1: Candidate data collecting

Related papers

In their paper *"A Formal Approach to Ontology-Based Semantic Match of Skills Descriptions"* the authors established an application of Ontology-Based Semantic Matchmaking in which Skills demand and supply were assembled and oriented to work in finding the best and more accurate way for a given task or project based on logical profile description that shared a common ontology. Their matching engine is based on Java servlets and their ontology is enriched of approximately 70 concepts, and they intended to expand their framework to include skills matching for the architecture of working teams (Colucci et al., 2003).

In the application *"Semantic Matchmaking for Job Recruitment: An Ontology-Based Hybrid Approach",* Maryam Fazel-Zarandi along with Mark S. Fox, presents an ontology-based approach to match job seekers and job postings alike, which uses a deductive intuitive model that can determine the match between a job seeker and a posting and can rank applicants. They focus on identifying and matching positions and individuals, propose a deductive model from which to determine the match between an individual person and a job posting, and then they determine the measure to use in order to rank the applicants (Fazel-Zarandi et al., 2009).

Also, in the paper *"An Ontology for Skill and Competency Management"***,** the authors focus on the problem of indexing human resources in a changing environment and present some motivating scenarios in which Informal Competency Questions were added for better human resource recruitment in the sense that they studied for identifying skill requirements for better performance and determining whether an individual possesses a certain skill. After that, they propose a systematic way to characterize activity performance and evaluating its quality. They also propose the subskill of to infer knowledge about many individual skills in the absence of other various data (Fazel-Zarandi et al., 2012).
The research *"Semantic Searching IT Careers Based on Ontology"* proposes an inductive searching model for the specific concepts based on a semantic annotations-based ontology, where it's used Web Ontology Language, which defines the terms of IT skill and IT education in associations with computer field knowledge (Minghwan et al., 2013).

In the paper *"DKDOnto: An Ontology to Support Software Development with Distributed Teams"*, the authors propose a knowledge base called DKDOnto, a domain-specific ontology for distributed development, aiming to help projects with a common vocabulary, allowing to assist better the distributed software development process". "The main classes of the ontology were created from the concepts used in Software Engineering, with the particularities for distributed teams", and the language OWL was used for the construction of the ontology (Rocha et al., 2018).

At the level of changes, due to the influence of increased digitalization, there are the following imperative requirements for all employees in Industry 4.0: lifelong learning, technical skills, detailed understanding of technical processes, media skills, learning programming languages, understanding cybersecurity, creativity, development of entrepreneurial thinking, solution orientation, conflict resolution, decision making, analytical and research skills, efficiency orientation, intercultural intercommunication and language skills, networking skills, ability to work in a team, interact and to cooperate, to transfer the information as well as the need for leadership skills, flexibility, desire for continuous improvement, adaptability, stress resistance, initiative, knowledge of standardization of the degree of protection in Industry 4.0 (Heklau et al., 2016)**.**

At the same time, in addition to studying the importance and development of the industry from ancient times to what is now Industry 4.0, the paper: *"Industry 4.0 for the construction Industry: Review of management perspective"* focuses on the German model and which involves the strict implementation of safety rules in any establishment (Maskuriy et al., 2019).

The paper: *"Are the leaders ready to embrace Industry 4.0?"* emphasizes the importance of training leaders in adapting and permanently assimilating the enormous information flow generated by the galloping development of Industry 4.0 (Nasir et al., 2019).

The research: *"An investigation of industry 4.0 skills requirements after making a brief immersion in what Industry 4.0 means for South Africa"*, systematizes the skills necessary for its harmonious development and proposes a conceptual model to meet the needs of adaptation to impressive technological development (Maisiri et al., 2019).

The authors of the paper: *"Industry revolution 4.0 skills and enablers in technical and vocational education and training curriculum"* propose an operational model for implementing a curriculum that incorporates the skills needed for Industry 4.0 and can make similarities with skills that are not required for this type of industry but can find a correspondent in it. It also outlines some limitations of the models found in the German literature (Amiron et al., 2019).

In the paper: *"Human Resources Readiness for Industry 4.0"*, a brief detail is made of the potential of the Czech people to adapt to Industry 4.0. Then the influence of digitalization and the Internet in society and of students seen as an important human resource is probed (Vrchota et al., 2019).

Explicit conceptual model for team building for an industry 4.0 specific project

The model goes through three steps, each including several procedures, presented below through the following case study:

Case study - Presentation of the situation

The research refers to the process of selecting the right candidates for the recruitment process, necessary for a project, which aims at production operations in the automotive industry. The essential skills of the candidates aim at competencies in the management of digitization algorithms, through the Internet of Things (IoT) and, respectively, managed with the help of the resource planning systems of the ERP type enterprise.

In general, such a project dedicated to Industry 4.0 encounters a series of unforeseen situations, which can cause delays in project completion or budget overruns, consequences that could be avoided in the case of a harmoniously formed team for a certain purpose, in which it can be triggered, synergistic action through effective communication between team members. Due to the necessary mix between the project team members presented above (analyst, developer, tester, IT engineer, beneficiary), the steps of the team formation framework model were applied for team selection and formation, as follows:

Step 1

The first step includes the conceptualization of 7 procedures, configured on topics specific to the team configuration process, through which filters are designed to select the required skills of potential members. Each procedure can be carried out by conceptualizing tests specific to the field of interest.

- **Procedure 1** contains successive tests for defining the team goals, as shown in Fig.2.

Fig. 2: Team goals defining

- **Procedure 2** contains successive tests for defining the fundamental rules, as shown in Fig.3.

Fig. 3: Defining the fundamental rules

- **Procedure 3** contains successive tests for defining how the candidate relates within the team as shown in Fig.4.

Fig. 4: „Karma" identifying for each candidate

- **Procedure 4** contains successive tests for defining ways of efficient collaboration as shown in Fig.5.

Fig. 5: Individual strategies for efficient collaboration

- **Procedure 5** contains successive tests for identifying the candidate's creative abilities as shown in Fig.6.

Fig. 6 :Creative abilities

- **Procedure 6** contains successive tests for identifying the candidate's operating style as shown in Fig.7.

Fig. 7: Operating style identification

- **Procedure 7** contains successive tests for identification of the candidate's digital skills as shown in Fig.8.

Fig. 8 : Digital skills

Step 2

The second step evaluates the results of the filters, applied through the selection procedures in step 1, for each candidate. The results of the filters will frame each possible candidate in a certain category of technical skills, time availability, respectively interpersonal skills (Fig. 9).

Our proposed model frames the completion of the first two steps in the stage called "primary selection of suitable candidates".

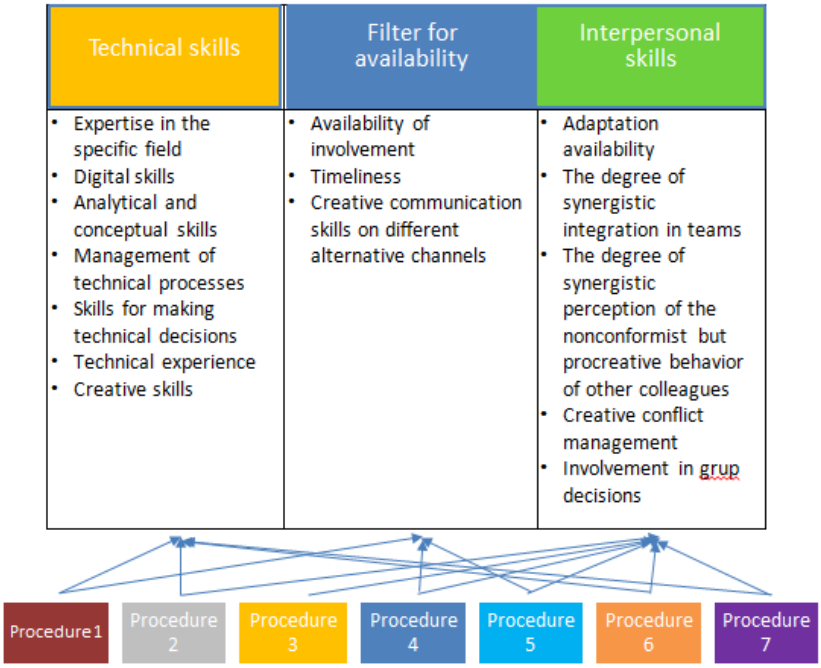

Fig. 9: Application of filters for the correct identification of each possible candidate

The major difference between skills and competencies is that competencies are a combination of skills plus behaviour and knowledge. On the other way, skills are specific learning activities. This we consider being important because competencies will have a higher status rank in the social point of view and it will be difficult to measure them in a formal way.

A resume or a CV is including a set of skills and competencies but there are many types of templates that are used for making them. A CV is seen like a detailed well-structured informative form about the professional experience or qualifications. The CV is mainly structured in chronological sequence and extensively point the work education, experience and achievements.

By reason of the of the document detailed nature, a CV mainly consists of minimum two pages. Moreover, contrasting a resume, a CV does not convert depending on the post for which you are registering. A resume provides an immersion of your education, work experience, and other similar information. A resume generally is no longer than a sheet of paper, and its data is mainly selected especially for the post for which you apply. For the reason that a resume is somehow customizable, it goes without to be in a chronological form or to document the entire professional experience (Amico et al., 2020).

It is desirable to formalize the experience in a curriculum but also there are some advantages and disadvantages for any form of template used. For example, the chronological curriculum, which is one of the most used, show the linear progress that was made thru years, increases of the task or of the career, promote the stability of a career, emphasized a logical order but its disadvantages are that is showing the lack of inactivity, the periods of changes of responsibilities and the lack of training or updates. Another example of a given template of the curriculum is the thematic or the functional one, which emphasized the skills, and its pros are that it is good for shadowing a period of inactivity, it shows adaptability and remove the age barrier but also have the disadvantage that recruiters can think that some information was hidden. On the other way, another type of curriculum is the combined or the mixed one, which is mixed of the first two presented above, and have the advantages that can empower skills and the experience and it shows all the periods even the inactivity and for that is not being noticed negatively, but it's a disadvantage is that it is not suitable for each position chosen.

The other type is the video CV, which is ideal for a communicative person or active ones, but its disadvantage is that because of its shortness it cannot collect much and effective information. The Euro-pass model is a widely known model of CV, and the principal advantage of it is that's formalized and standardized but the main disadvantage is that it is too strict and not so comprehensive like other types.

Step 3

The information configured and systematized for each candidate is stored in a Human Resources database, which is integrated in the conceptual model of the IT system proposed in this paper for estimating skills and competencies in Industry 4.0 (Fig. 10).

The target of the System designed for estimating skills and competencies in Industry 4.0. is to identify the correct profile of the requested candidate within a certain project, based on certain specific digital competencies and abilities, which are configured in the conceptualization module of the conceptual model in Fig.10. Within this module, the necessary characteristics for the requested candidates are extracted.

Fig. 10 presents the block diagram of our approach. Knowing these, we are going to make explicit these approaches and to establish the conceptual model that we propose for the project and that is the basis of the ontology that we will use. This ontology is made up of fundamental concepts, their properties, relationships between these concepts and particularizations for specific situations depending on the content of each project. We state that the profile of the ideal candidate is made following algorithms specific to Industry 4.0, which will help us to personalize the candidate's profile so that we can then establish his competencies. In the human resources database, we collect information about each candidate such as personal/factual data, his cognitive profile, competencies, specific abilities. We collect all this information after analyzing the CV and the Linkedin profile. Finally, after adjusting the profile through the skills filter, we will set up a database with applications for each job.

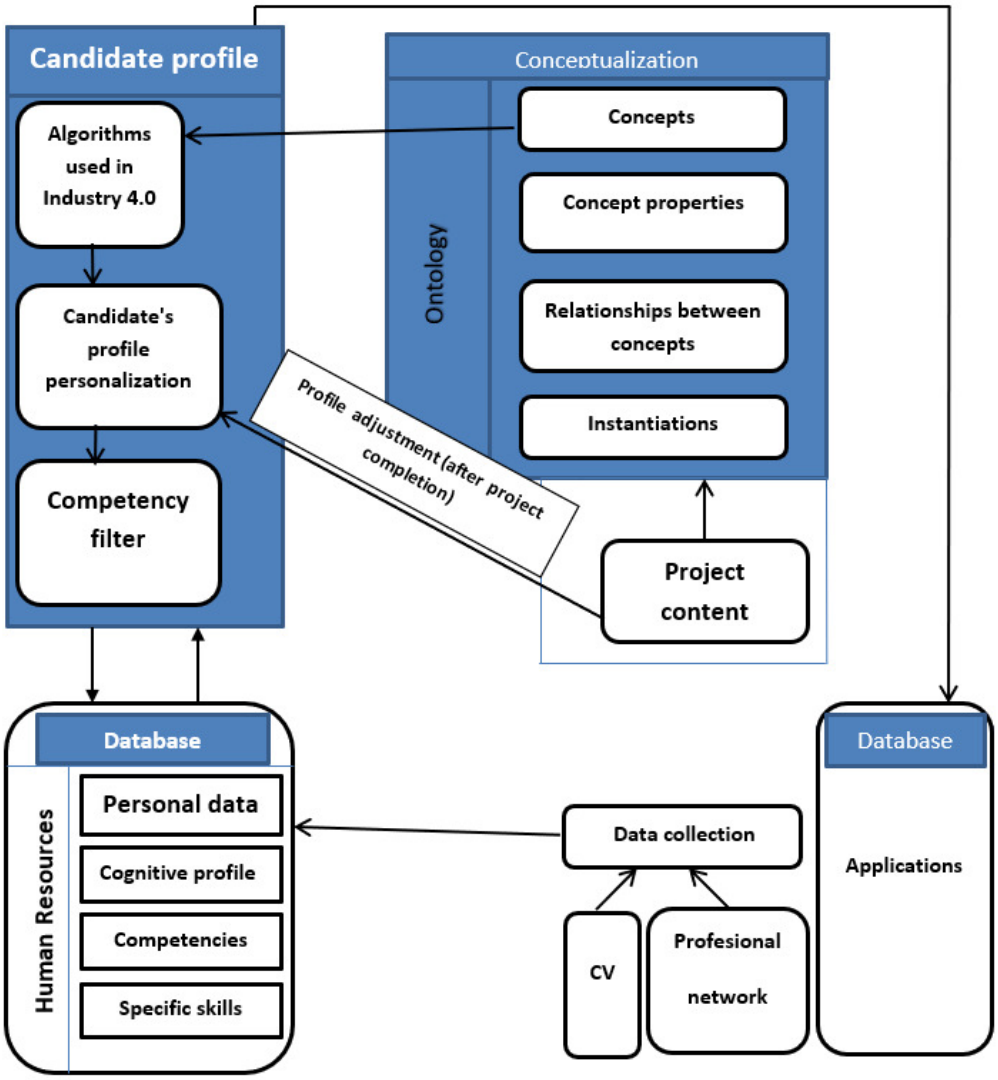

Fig. 10: Conceptual model for estimating skills and competencies in Industry 4.0

In general, the companies from Industry 4.0 approach their targets in a project vision, in which the teams are configured with employees for an indefinite period, having specific skills. There is also the possibility of employment for a determined period, so that, according to the specifics of the project, the correct profile of the necessary human resources is configured.

Taking into account the specifics of the procedures presented in this article, which integrate both psychosocial aspects and technical specifications, the proposed final model aims at a more accurate recruitment of human resources, suitable for each specific project.

To exemplify applications in Industry 4.0, we can detail the human resources with skills in intelligent systems for real-time optimization of selecting the most profitable options for production orders, taking into account the total number of orders, market price, number of machines, processing times and costs involved in the technological flow. Also, these resources must have all the necessary skills to use ERP information systems, through which the entire logistics flow can be optimized.

In conclusion, the proposed concepts and the relations between them are activated by all the procedures presented above, respectively the necessary filters, for the final decision.

The impact of European legislation on the implementation of the proposed model

Given the nature, characteristics and purpose of the presented model for skills evaluation, intended to process personal data in order to select and recruit qualified staff for Industry 4.0, it must be implemented in compliance with the provisions of the “EU General Data Protection Regulation” (GDPR or Regulation 2016/679).

The aforementioned Regulation, which entered into force in 2016 and implemented in 2018, representing the biggest change in the data protection law since 1995, establishes the obligation on operators who manage personal data of any kind, to carry out certain additional operations to protect individuals in this field, respecting in this way the specific principles introduced by the normative act.

The type of information that falls under the GDPR

By the generic name of "personal data", the legislative text refers to any information relating to a natural person likely to lead to its direct or indirect identification, whether such data are entered (in whole or in part) by automated means or are processed by other instruments that are part of a data record system or that are intended to be part of a data record system. Therefore, it is not covered by this law the anonymous information that is not related to an identified or identifiable natural person or to data of a person who is anonymized, so that the subject is not or is no longer identifiable, even if that data is used for statistical or research purposes. In other words, the principles of data protection apply only when the personal data leads to identification (of any kind) of a natural person, situation that overlaps with the one proposed by this paper.

Entities to which it is addressed

The main entities to which the stipulations of the GDPR are addressed are represented, on the one hand, by the operators who establish the purposes and means of personal data processing, and on the other hand, by the persons empowered with the responsibility of processing personal data in the name of a data operator. From a territorial point of view, the Regulation covers both operators and authorized persons established within the European Union (EU) and those established outside it, if they provide goods and services to the EU or if they monitor the behaviour of individuals in the EU.

Principles of personal data protection introduced by the GDPR

The European regulation stipulates the measures that personal data controllers must adopt, by establishing imperative principles. The presentation of this principles leads to the steps that must be taken by the personal data operator to be in accordance with the law in this field. Therefore, they must integrate the following concepts in the adopted measures, in order to comply with the law in force:

- *Responsibility*, meaning that the data controller is solely responsible for implementing appropriate measures for the protection of personal data and for the possibility of demonstrating this circumstance. This includes documenting these processes through appropriate policies and procedures, such as registries, analyzes, agreements with trading partners, documented consents, information to individuals.

- *Lawfulness, fairness and transparency*, concepts that impose the obligation to process the data of citizens of the European Union legally and correctly towards the natural person concerned. Meeting the requirements imposed by the GDPR means that the operator has to provide the necessary directions (lawfulness), performing the entire process explicitly, so that the person can understand the reasons and purposes of collecting his personal data (transparency) and last but not least, has to comply with the purpose presented to the natural person before taking over the data (fairness). It also includes the using of data only for the period indicated in advance.

- *Purpose limitation*, representing the obligation imposed on data controllers and data processors to comply with the purpose presented to natural persons at the time of data collection and data processing, without exceeding it and without using the data in other areas.

- *Data minimization*, which involves not processing data that exceeds the proposed "framework", collecting the minimum data needed.

- *Accuracy*, imposing the obligation to store always up-to-date data.

- *Integrity and confidentiality*, principles referring to the obligation of data controllers and data processors to protect by appropriate measures the data taken over by individuals, implementing efficient anonymisation or pseudonymisation systems to protect the identity of the individuals and security programs for the stored information.

Conclusions

The recruitment process for Industry 4.0 is specific to digitization skills and therefore the combination of skills and abilities for different dedicated teams, becomes a difficult process. Our proposal will be a challenge due to the socio-human involvement and the interdisciplinary approach of the recruitment mode for Industry 4.0. Of course, other researches have been undertaken in the field, but on the one hand there was no emphasis on the construction of a specific ontology to be assigned to artificial intelligence in a continuous development, and on the other hand the social environment was not surveyed. useful that a professional network such as Linkedin can provide.

For the construction of the program we will use Python language, and we conclude that will build a "dataMust" class in which to introduce an initialization function that contains the targeted skill variables. The representation function of this class will return the "dataMust" matrix that will contain the targeted skills. We also intend to build another class, which this time includes the concrete skills of the applicants.

We will call this second class "dataHave", and its representation function will return the "dataHave" matrix which will contain the actual skills of the applicants. Between these two classes we will undertake an analysis and implement the following functions: __eq__, __lt __, __ gt__, to discover the similarities and differences between them. The __eq__ (equal) function will return the similarity between the two classes, the __lt __ (less than) function will return what is missing from a class, and the __gt__ (greater than) function will return the largest class.
We also consider that if the number of skills consists of more than 10 elements it is necessary to link these elements in a decimal link and for each decimal link found after the above analysis to return a score.

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Implementation of Work-life Balance in Companies of the West Pomeranian Province in Poland

Patrycja ZWIECH

University of Szczecin, Szczecin, Poland
E-mail: patrycja.zwiech@usz.edu.pl

Abstract

The purpose of this paper is to present the concept of work-life balance in the theoretical approach and research results demonstrating implementation of systemic solutions which make it easier for professionally active people to maintain a balance between their jobs and private lives and which facilitate combining various social roles to achieve satisfaction in both spheres of life in the companies of the West Pomeranian province in Poland.
The layout of the paper is dictated by the implementation of the objective. The first part introduces the subject matter of work-life balance. Then results of a research conducted among 601 employees from the West Pomeranian province in Poland are described. The research results show that about half of respondents, women slightly more frequently than men, declare that their companies implement programmes that facilitate reconciling work with a private life. At the same time, employees believe that good health, a happy family life, a good standard of living and a satisfying job are the most important factors for a successful life and if one were to sum up responses which refer to job-related factors it would turn out that a job is a factor that most determines a successful life.

Keywords: work-life balance, human capital, company, Poland.

Introduction

Negative consequences of absence of a balance between a private life and a professional life contributed to the emergence in the USA in the 1970s of the concept of a "work-life balance" (Sadowska-Snarska, 2014, pp. 33-34). At first, definitions of a lack of balance tended to focus only on the interface between work and private life (Resch, 2003), and with time this lack of balance was defined in broader terms as a harmonious interface between different life domains (Frone, 2003). Currently WLB is defined as an ability to combine work with other life dimensions, i.e. a family life, social activity, one's own development, rest and personal interests so that work does not appropriate life outside of it and non-professional life is not limited by one's work situation (Borkowska, 2011, p. 18; Sadowska-Snarska, 2014, pp. 21-46). Robak and Słocińska (2014, pp. 114-116) suggest that WLB should be understood as a continuous process of balancing work with a non-professional life. In turn Clutterbuck (2005, p. 26) defines WLB as a subjectively perceived state in which an individual manages the potential conflict between these two spheres of his life in the context of time and energy devoted to them and the sense of self-fulfilment. The work-life balance may be also defined as efficiency of the relation between work and private life or as systemic solutions which enable professionally active people to maintain a balance between their jobs and a private life and help in combining various social roles so as to achieve satisfaction in both life spheres. To sum up, WLB is defined in various ways and different authors refer in their definitions to: the ability to combine, the efficiency of the relation, a process, a state or to systemic solutions implemented by organizations.

At the same time, we need to define what is meant when we talk about "balance". Greenhaus, Collins and Show (2003, pp. 510–531) mostly point to the time devoted to the main areas of functioning of professionally active people, i.e. work and family. Great involvement in one's work often contributes to devoting maximum time to it, often to the detriment of other significant values, which makes the entire life style to adapt to the requirements of the job. In turn, Greenhaus, Collins and Show (2003) believe that WLB should refer to three different balances:

- time balance
- involvement balance
- satisfaction balance (equal satisfaction with work and family)

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Kisil (2018) points out that we should consider an individual's resources of time, energy, thoughts and emotions which are difficult to divide into separate parts between work and private life as they are used in both these spheres.

It is also pointed out that the concept of balance may be inadequate and a different one should be suggested in its place – the concept of work and personal life *integration* or *interaction* (Warhurst, Eikhof, Haunschild, 2008). The term work-life *balance* implies that work and life are distinct spheres and that time should be split "equally" between work and private life. Rapoport, Bailyn, Fletcher et.al (2002) point out that people may have differing priorities in that regard, and that the aim is not always an even balance between the two. Apart from this, Campbell Clark (2000, p. 748) notes that not everyone wants to integrate the domains of work and family/personal life. On the contrary, some people balance their work and personal life by keeping the two strictly separate.

In this paper the author assumes that WLB does not mean an "equal" division of time, involvement and satisfaction between work and other activities, and similarly, the amount of time allocated to certain activities and their frequency does not constitute the importance of these activities to an individual. This results from subjectivism in the assessment of a relation between work and private life, which is a result i.a. of the individual's system of values, his family situation, job type, behavioural features, age, gender, health, social culture, socialisation and the company's organizational culture. WLB should, in turn, mean an optimal division for the individual.

The purpose of this paper is to present the concept of work-life balance in the theoretical approach and research results demonstrating implementation of system solutions which make it easier for professionally active people to maintain a balance between their jobs and private lives and facilitate combining various social roles to achieve satisfaction in both spheres of life in the companies of the West Pomeranian province in Poland.

The issue of reconciling work with private life – current knowledge

WLB is usually analysed in the context of a conflict between various requirements relating to involvement in one's work and playing other important life roles. There is a large body of literature examining the predictors and outcomes of work-family conflict based on the definition given by Greenhaus and Beutell (1985, p. 77). They defined WLB as "a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect". This definition stresses the bidirectional relationship. This conflict is understood on the one hand as work appropriating private life in a situation where non-professional life is carried out to the detriment of work (Borkowska, 2004, p. 54, Clutterbuck, 2005, p. 26). On the other hand, this conflict may be also understood in a contrary way, when private life appropriates work life. Family can interfere with work and work can interfere with private life. Recently, work-family enrichment and work-life facilitation concepts have stressed positive interdependencies, noting that work can also benefit private life and vice versa (Greenhaus, Powell, 2006; Grzywacz, Marks, 2000).

In the context of the theory of conflict, a balance between a professional and private life is defined as a state in which an individual manages the potential conflict between various demands on his time and energy so that his desire for well-being and satisfaction is met (Campbell Clark, 2000, pp. 747–770). Thus, an individual perceives WLB as a satisfactory state with a possibly minimal parallel conflict of roles.

The consequences of distorting the balance between family and professional life may be approached both in a broad social perspective and in an individual perspective (Borkowska, 2003, p. 15). The effects of lack of work-life-balance include i.a. burnout, diminished well-being, physical ailments, mental ailments, health issues, lack of satisfaction from work or life, stress, growing frustration, low self-esteem, family conflicts and problems with fulfilling family roles, divorce or addiction. The outcomes affecting an individual entail consequences to companies, such as diminished work effectiveness, fluctuation, disorganisation of work, increased backlog, missed deadlines, sickness-related absences, increased operational costs or deteriorated atmosphere at work. They also cause consequences to the state and society: they lead to declining birth rates, increase social inequalities, lead to family dysfunctions, cause a breakdown of social bonds, increase the health care system's burden with new patients suffering from heart issues, oncological diseases and neurological conditions or increase work-related passivity.

Integration of company goals with employee goals is the basis of effective company operation. Thanks to this, all actions which facilitate reconciliation of private and professional life of staff contribute to a greater efficiency of the company. Activities for work-life balance are, therefore, a manifestation of investing in human capital and at the same time contribute to increasing the company's competitive leverage. Usually these activities concern five areas (Cascio, 2001, p. 180):

- assisting an employee in looking after their children (including also increased access to child care places and dependent persons' facilities),
- flexible working conditions,

- occasional days off at the request of an employee,
- information services in terms of e.g. health, law, culture,
- ensuring broadly understood help and assistance for employees in non-professional spheres.

But one can also add to them preventing professional qualifications from getting outdated while being absent from work due to family obligations and promotion of male employees' greater involvement in family obligations.

When analysing detailed work-life balance tools, one can note that a great majority of them also act as a motivational stimuli intended to influence employees (e.g. admission to cultural or sporting facilities, organizing events for special occasions, vouchers that help employees financially or health care packages). Whereas supporting employees in reconciliation of professional and parental roles is far less frequent – here examples may include contributing to the costs of holidays for children, flexibility of work time, remote work, contributing to childcare costs, in-house nurseries, additional days off for families with children, longer maternal or parental leaves financed by employers. These tools also build an appropriate atmosphere at work, inspire creativity, attract valuable persons to work and build the company's reputation as an employer.

The WLB problem is an issue studied in many countries due to numerous consequences not only for the individual, but also companies and entire societies. Results of research carried out last year demonstrate that companies which offer WLB activities note cases of burnout and stress among their employees less often (Cascio, 2001, s. 192), which has a positive impact on work efficiency. Therefore, it can be concluded that creating an offer for the professional work-family life balance may contribute to building the company's competitive advantage. An employee's involvement in a professional career and family life at the same time leads to great tensions – especially in specific periods of life. Such a moment may include having to get more involved in family roles (looking after one's children, caring for dependent persons, caring for one's parents) in the course of a professional career at a time when an employee also steps into a particularly demanding stage due to an opportunity of promotion and taking up new responsibilities, which automatically entails increased involvement in the work role.

Research concerning WLB has also been carried out in Poland. A basic conclusion can be made on its basis that the issue of reconciling work and non-work life is not the strongest side of Polish companies.

A study carried out as part of the 6th edition of the Human Resources Management Leader competition organised by IPISS in 2006 shows that only 36.4% of organizations treat WLB as an element of the company's official policy, and 50% of them treat it as the employee's individual issue (Urbaniak, Bohdziewicz, 2006, p. 134; Buchelt, Jupowicz, 2008, pp. 154-155). The research repeated in 2008 as part of the 9th edition of the competition showed that 44% of organizations treat WLB as an element of the company's official policy while 56% as the employee's individual concern (Urbaniak, Bohdziewicz, 2008). Whereas research conducted in May 2006 by the Department of Labour and Social Policy of the University of Łódź concerning female employees shows much worse results. Only 14.5% respondents declared that they always or quite often saw manifestations of protection of the work-life balance from their companies, while close to 2/5 had never experienced this (Feliniak, Ratajczyk, 2008, p. 237). At the same time, this research showed that the larger the company, the less interested it was in problems of reconciling professional responsibilities with non-work life (Feliniak, Ratajczyk, 2008, p. 239).

Research carried out at the end of 2018 by Hays Poland shows that 38% of employees of large companies believe that the work-life balance is maintained at an average, bad or very bad level. At the same time, the said research shows that being able to maintain a healthy balance between work and private life is, from the point of view of the individual, one of the main reasons for considering changing jobs, and from the point of view of employers it is one of the elements which help the organization in attracting new talents (Hays, Mind&Soul Center, p. 4). Research carried out at the same time by Mind & Soul Center in cooperation with Mobile Institute demonstrates that 52% of respondents declare that their private life is subordinated to their work life, 50% declare that they work over 40 hours a week, 46% of companies contact their employees outside office hours, while 34% of respondents work after hours because the employer makes them (Hays, Mind&Soul Center, p. 7).

The most recent research conducted by the Responsible Business Forum at the turn of 2019 and 2020 entitled "Professional work and fulfilment of care-related roles by women and men in Poland" showed that employers in a vast majority meet employees' expectations offering them various solutions that encourage reconciliation of work and care-related roles. As many as 80% of employees who are also carers declared this. Employers offer on average 2-3 such opportunities (Baszun, Zamęcki, Joniewicz, 2020, p. 13). A detailed analysis showed that solutions most often offered by companies include being allowed to leave work upon request during the day for a short while with the possibility of covering this absence by using one's leave (36% employers), flexible working hours (22%), part-time employment (19%), working from home (16%), not reducing bonus due to taken leave, including sick leave (15%), banning overtime for parents of children under 4 (15%) and no shift work for persons with care-related responsibilities (13%). Opportunities such as: in-house nurseries or a nurse hired by the company to visit adults in

care of the company's employees were only applied by 3% of employers. Paying towards nurseries was applied by 6% of employers, payment towards care-related services - 5% (Baszun, Zamęcki, Joniewicz, 2020, p. 14).

Research Methodology

This study presents results of a survey of human resources management systems in companies of the West Pomeranian province carried out in the Institute of Human Capital Management of the University of Szczecin on a sample of 601 employees of the investigated companies (primary sources; for the adopted significance level (0.05) and admissible maximum error of estimation (+/- 4%) it was established that 598 units were the minimum sample to ensure reliability of research).

The research was carried out in the period between March and May 2017, and the territorial scope covered the West Pomeranian province in Poland. Employees in the companies were the research population. An individual company employee was the sample unit where the questionnaire could reach many employees in individual companies. Data from sample units qualified to the sample was gathered by means of a questionnaire consisting of 78 questions, including 10 in the bio data segment. A random sample unit selection method was applied. In the analyses of differentiation of declarations in selected groups of respondents, four categories of differentiation were identified for the needs of this study: company size, gender, position in the company and length of service. This study uses respondents' answers to 2 questions from the questionnaire addressing the investigated matter. Out of the factors deemed most necessary for a successful life 10 were selected for in-depth analysis: good health (X1), happy family (X2), good standard of living (X3), satisfying job (X4), respect among people (X5), a lot of free time (X6), education (X7), managerial position (X8), acting in accordance with religious teachings (X9) and political activity (X10).

Reconciling work with private life – Research Results

The investigated population were asked what in their opinion was most necessary for a successful life. A respondent could mark a maximum of 3 options. Table 1 presents the data in a general approach and in groups of respondents identified according to the company size criterion and the position held, length of service and gender.

Table 1: Factors declared by respondents as most necessary for a successful life in general and in groups of entities distinguished due to size and in groups of respondents according to their position, length of service and gender (in %)

	good health	**happy family**	**good standard of living**	**satisfying job**	**respect among people**	**a lot of free time**	**education**	**managerial position**	**acting in accordance with religious teachings**	**political activity**
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
total	26.6	24.8	20.7	13.5	5.3	3.6	3.5	0.9	0.7	0.4
criterion: entity size										
micro	27.4	26.1	19.1	13.7	5.2	3.6	3.6	0.6	0.6	
small	26.1	23.3	22.2	14.7	4.5	3.5	2.7	1.8	0.6	0.6
medium-sized	26.8	25.3	21.0	12.7	6.1	4.1	2.8		0.8	0.5
large	26.2	25.7	19.4	13.1	6.1	3.4	3.9	1.0	1.0	0.5
criterion: post held										
regular worker	26.2	24.9	20.9	14.0	5.2	3.8	3.2	0.7	0.9	0.4
lower-level manager	27.3	25.8	21.6	14.9	3.1	3.1	2.6	1.5		
mid-level manager	28.9	23.7	22.4	8.6	7.2	3.3	3.3	2.0		0.7
higher-level manager	25.3	30.7	16.0	12.0	12.0	2.7	1.3			
criterion: length of service										

up to 0.5 year	27.4	22.3	17.7	16.6	4.0	4.0	4.0	1.1	1.7	1.1
0.5 to 1 year	25.5	23.5	21.4	12.3	3.7	5.3	6.2	1.2	0.8	
1 to 2 years	27.3	24.8	21.1	11.2	6.2	4.1	3.3	0.8	0.8	0.4
2 to 5 years	26.3	26.0	22.1	14.1	5.4	3.6	1.7	0.5	0.2	
5 to 10 years	26.8	27.2	17.6	17.2	3.8	2.5	2.5	1.7		0.8
more than 10 years	26.7	25.5	20.7	11.4	8.1	2.4	3.3		1.2	0.6
criterion: gender										
man	27.5	22.9	16.6	12.6	6.0	5.5	5.0	1.5	2.0	0.3
woman	26.3	25.5	22.0	13.7	5.1	2.9	3.0	0.7	0.3	0.5

Source: author's own compilation on the basis of research results.

Good health (26.6%), a happy family (24.8%) and a good standard of living (20.7%) were factors that respondents thought to be the most important for a successful life. If the responses pointing to good working conditions and a satisfying job were to be summed up, it would turn out that work is a factor that most determines a successful life. The other end of the summary (in a general approach) would include political activity (0.4%), acting in accordance with religious teachings (0.7%) and a managerial position (0.9%).

The same order was preferred by respondents identified due to the company size criterion, where it needs to be noted that those from micro- and large enterprises valued a good standard of living slightly more that those working in small or medium-sized enterprises.

When analysing the responses in correlation to one's position, we can see that for people in highest positions the "respect among people" element is much more important than for other groups, while a "good standard of living" is statistically less important for them. Most probably this results from the fact that their needs of economic security (the sense of financial stability, securing income in the event of sickness or loss of income from the current job, having savings, insurance) are secured to a much greater degree than in other groups. According to A. Maslow's hierarchy of needs human behaviour is motivated by two principles: deficiency and growth. The first one assumes that man strives to satisfy an unsatisfied need and for people in higher positions the need of security is usually satisfied. Thus greater focus is given to the need for respect, desire to have good reputation and appreciation among other people.

Taking into account the length of service as the differentiating criterion, it needs to be concluded that employees with a shorter time of service overall more often point to the importance of the "a lot of free time" factor than other employee groups. Greater weight attributed to education is also noteworthy. In turn, employees with the length of service of over 10 years pointed to respect among people much more often than other groups.

The respondents' gender was the only factor that statistically differentiated their declarations. Good health, a happy family and a good standard of living were factors that both men and women thought to be the most important for a successful life. However, if we look at it closely it turns out that declarations of both genders differed significantly. Both a happy family and a good standard of living were statistically more often declared by women than men. The difference for a good standard of living reaches 5.4 p.p., while for a happy family - 2.6 p.p. At the same time, men statistically more often than women pointed to "a lot of free time" and "education". Political activity, acting in accordance with religious teachings and a managerial position were at the opposite end of the summary, though the order was different for both genders. As the research has shown, women found the following to be the least important: acting in accordance with religious teachings (0.3%), political activity (0.5%) and a managerial position (0.7%), while for men they were: political activity (0.3%), a managerial position (1.5%) and acting in accordance with religious teachings (2%). The resulting differences concerned women's and men's attitudes to acting in accordance with religious teachings and the managerial position factor. What is interesting, men needed acting in accordance with religious teachings more than women to have a successful life.

In addition, the research focused on whether companies are trying to solve problems of reconciling work and private life by offering organizational solutions such as programmes facilitating the issue in question. Table 2 presents the structure of respondents' answers to the question whether their companies implement programmes facilitating reconciliation of work with private life. None of the criteria differentiating respondents' declarations proved statistically significant.

Table 2: Structure of respondents' answers to the question whether their companies implement programmes facilitating reconciliation of work with private life in general and in groups of entities distinguished due to size and in groups of respondents according to their position, length of service and gender (in %)

Implementation of programmes that facilitate reconciling work with private life	yes	no
total	51.3	48.7
criterion: entity size		
micro	54.1	45.9
small	52.1	47.9
medium-sized	49.2	50.8
large	50.7	49.3
criterion: post held		
regular worker	51.3	48.7
lower-level manager	56.1	43.9
mid-level manager	46.8	53.2
higher-level manager	52.2	47.8
criterion: length of service		
up to 0.5 year	48.3	51.7
0.5 to 1 year	55.7	44.3
1 to 2 years	53.8	46.2
2 to 5 years	50.4	49.6
5 to 10 years	51.9	48.1
more than 10 years	49.5	50.5
criterion: gender		
man	48.5	51.5
woman	52.2	47.8

Source: author's own compilation on the basis of research results.

About half of respondents declared that their companies implement programmes that facilitate reconciliation of work with private life, with women pointing to it marginally more frequently than men (52.2% and 48.5%, respectively). Implementation of such programmes was also statistically more often pointed to by employees of micro-enterprises, lower-level managers and employees with a length of service between 0.5 to 1 year.

Conclusion

Contemporary economic and social changes result in increased problems and challenges associated with striving to shape appropriate relations between work and non-work life, including harmony between time and involvement devoted to the main spheres of functioning of professionally active people, that is work and family, giving the individual specific satisfaction from roles they play. The research conducted in Polish companies shows that activities undertaken by employers for mitigating the work-life conflict only do so for selected problems. Employees believed that good health, a happy family life, a good standard of living and a satisfying job are the most important factors to have a successful life and if one were to sum up responses which point to a good standard of living and a satisfying job, it would turn out that a job is a factor that most determines a successful life. At the same time, the research showed that only half of employees declared that their companies implement programmes facilitating reconciliation of work with private life.

Combining work with care-related responsibilities is a common thing among Polish employees, both male and female, therefore the employer's implementation of activities that support these persons in combining such roles is necessary. Meeting their expectations may prevent withdrawal from the labour market of people that are valuable to employers and may reduce employees' stress which inevitably translates into work efficiency.

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Data Mining in Logistics – choice or challenge?

Krzysztof WOJTKOWIAK

Nicolaus Copernicus University in Torun, Faculty of Economic Sciences and Management, Poland
k.wojtkowiak@umk.pl, ORCID: 0000-0003-3295-3271

Abstract

The article is focused on the identification of data mining logistics processes and describing them. The development of digital technologies such as Web 2.0, Internet of Things, and Industry 4.0 (Govindan, Cheng, Mishra, Shukla, 2018) resulted in data mining gaining more attention nowadays. The article indicates theoretical aspects of data mining and relates to numerous examples of data mining usage in logistics (especially in transport and supply chain management) described in literature and papers. Logistics, as a data-driven branch of science (Lekić, Rogić, Boldizsar, Zoldy, Torok, 2019) can significantly benefit from introducing operations on large datasets. The main aim of the article is to identify examples of logistics operations that were possible to introduce because of the data mining application and therefore, synthesize theoretical, conceptual, and empirical literature in which data mining procedures are used as logistics tools, from the general to the specific. The set goal is accompanied by the following research questions: What are the potential challenges in using more data mining operations in logistics? The systematic literature review method was used to identify the literature on data mining in logistics. The research was carried out following the methodology described in the publication of Tranfield, D., Denyer, D., Smart, P., Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review, 2003, British Journal of Management 14(3), pp. 207-222. The author conducted research in 3 stages, i.e. defining the plan of the literature review and main aim of the research, selecting publications, and analysing the content. Full-text foreign databases such as Springer Nature Journals, Web of Science were analyzed. The author concluded the article by developing a summary of examples described and suggesting the possible direction of future research.

Keywords: data mining, logistics, big data

Introduction

The rapid development of digital technologies enables collecting and accumulating data at a dramatic pace which results in the growth of huge databases which are called Big Data. It is worth mentioning that this term also describes computing strategies and technologies developed in order to handle such databases. The dataset is considered large when the data included in it is too large to process by traditional tools or a single computer (Lekić, Rogić, Boldizsar, Zoldy, Torok, 2019). This phenomenon of data growth is visible in all areas of human presence. From well-known examples such as shops transaction data, telephone calls details, credit card usage records (due to the dynamic growth of the cashless payments (Polasik, Jakubowska, 2018) to the more exotic ones like medical records or images of astronomical bodies (Hand, Mannila, Smyth, 2001). Creating the possibility to extract previously unknown and potentially useful patterns from these huge databases was the reason why the idea of data mining was born (Hussan, Sayal, Raju, 2019). Nowadays, it is a very active research area and there are actions to bring data mining, statistical analysis, and artificial intelligence together to address some of the issues (Bhojani, Bhatt, 2016). However, before one is able to present the results of the data mining process, several conditions must be met. Firstly, one has to make sure that input data is complete (there are no blanks), secondly one has to choose the best calculating method for each case. The last condition that has to be met is checking the visualization for mistakes and eliminating them (Wojtkowiak, 2020). Big data has become a very important trend in logistics, as the optimization of service properties like delivery times, resource utilization, load placement, or warehouse management are continuous challenges in this science field. The results of optimization are dependant on quality, accuracy, and availability of information. Access to such information is the condition of effective cooperation between members of the supply chain. Another important advantage of using data mining methods is that it provides insight into the global flow of goods that is serviced by logistics operators which enhances analysis of customer experience. Logistics is naturally associated with collecting and storing large sets of data, for example, origin, destination, size, and content of shipments. With data mining techniques, we are able to discover new values. To underline the potential of introducing more data mining into

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logistics, it is worth adding that only a part of logistics, transportation, consumed 60% of oil worldwide in 2011 and the number is increasing (Paul, Saravanan, Thangaiah, 2011). Logistics is also going through an important strategic shift – from product-related to information related services (Mehmood, Graham, 2015), which requires modern information technologies to be fully effective.

Methodology

For the systematic literature review, the author chose the procedure proposed by D. Tranfield, D. Denyer, and P. Smart (Tranfield, Denyer, Smart, 2003), who divide the methodology into three stages. During the first stage, the author defined a detailed plan of the literature review, established the aim of the research conducted and research questions. The next stage consisted of choosing basic literature, selecting publications for analysis, and creating the publication database. The last stage (bibliometric analysis), which included analysis of the number of publications and quotations, was carried out using search engine tools in the following full-text databases: Springer (Citations.Springer.com) and scholar.google.com. Additionally, databases such as academia.edu and reserachgate.net were used for obtaining access to more sources. For analysis, the author picked 21 sources (both foreign and Polish books and papers) which are presented in the "references" section. The last (third stage) is the presentation of the results of the review.

Data mining in Logistics – a theoretical framework

The author decided to split a theoretical framework about the usage of big data and data mining in logistics into several paragraphs as it is such a large field to discover, beginning from general applications, to detailed usage in supply chain management, transport (cargo and costs reduction), costs optimization, warehousing, production civil services, CRM and e-commerce.

In the research conducted by Mikavica, Kostić-Ljubisavljević, and Radonjić-Dogatović (2015) the authors mention the increasing possibility of improving operational efficiency, customer experience, and creating new business models, through properly-implemented big data analytics. However, several key conditions have to be met in order to fully use the huge potential of big data analytics. The first one being match big data projects with corresponding business functions, the second one is determining whether this way of conducting analysis would provide information that is not available through traditional analytics. Moreover, it requires a cooperative team of business and technology experts.

In the previous paper (Wojtkowiak, 2020), the author indicates numerous examples of data mining benefits for DHL which is the world's leading logistics company, employing 380,000 people in over 220 countries. The company is said to deliver 1,588,000,000 parcels per year, as of 2019. The author synthesized real-life examples of data mining procedures from the company's report "Big Data in Logistics: a DHL perspective on how to move beyond the hype". The main reason behind introducing Big Data mentioned in the report is optimizing the last-mile, which is the final stage in the supply chain and it is connected with the majority of the cost. The company utilizes 2 different approaches to this process. The first one is to process a massive stream of information to maximize the performance of a conventional delivery fleet and is achieved by real-time optimization of delivery routes. The second approach utilizes data processing to control the new last-mile delivery model which allows for the replacement of a highly optimized workforce with just the raw capacity of a huge crowd of randomly moving people. Besides the mentioned processes, Big Data enables solving travelling salesman problem, which is strongly connected to every cargo transporting action, by providing correlated streams of real-time events for combinatorial optimization procedures which allow to re-route vehicles on the go by updating onboard navigation systems. In the case of DHL, Big Data may also be a suitable way of utilizing the data provided by other participants of the road network such as taxi drivers or commuters. Increasing the number of such associates allows taking the load off the delivery fleet. However, it still has to be incentivized. This process will require extensive data processing capabilities, answered by big data techniques like geocorrelation or complex event processing. DHL also uses data mining techniques in optimizing utilization of resources (to improve the reliability of planning and the level of detail), strategic network planning (by gathering more information for creating scenario modelling techniques and advanced regression), improving and perfecting the customer service and CRM systems performance (by identification of the most valuable customers by clustering, semantic text analytics, and natural-language processing). Small and medium enterprises can also benefit from DHL's use of big data by utilizing the extracted data which would not be possible otherwise, because of the lacking capacity to conduct their own research. What is more, they could use DHL Address Manager, the software that uses daily freight, express, and parcel delivery data to verify addresses which may not seem like an issue in industrialized nations but it is a noticeable problem in developing countries. All aforementioned examples come only from one enterprise which perfectly sums up the versatility of big data and data mining techniques.

Another example of using data mining analytics in transport is presented by Paul, Saravanan, and Thangaiah (2011). The authors conduct the clustering-based experiment which leads to the conclusions that some of the shipments researched are handled as air freight (because of the high total distance of 3,000 miles, relatively short travel time of 24 hours, latitude and longitude values). Similar analyses are applied to characterize the remaining clusters which enable indicating the distinctive features of shipments.

Data mining methods are used in the study conducted by Nohuddin, Zainol, Lee, Nordin, and Yusoff in the beginning stage in the attempt of developing a methodology for knowledge acquisition from an input source culminating in a knowledge base for the development of intelligent systems. In the presented case study of Malaysian Army logistics, the authors use frequent pattern mining and association rule mining to discover that, for example, ordnance items are the frequent items that have been distributed between January and December (during the time of the research).

Big data and data mining in logistics can also be used for setting up the rank values in comparisons. In the study conducted by Grochowski and Zwierzchowski (2015), data mining allows for scattering analysis of key factors of the market competing in researched enterprises. The most important factors are identified as quality and brand of the product, level of costs of the enterprise, adjusting the offer to demand. These are the factors that were pointed out in more than 50% of the answers. Then, the analysis of scattering is conducted to identify that dominating in quality and brand of the product is enough to maintain the market advantage, as it has 76,03% value in the analysis of scatter. The authors add that such methods can be used in solving other business problems.

The study conducted by Lekić, Rogić, Boldizsar, Zoldy, Torok (2019) includes very interesting observations on the topic. The authors analyse business information provided by the warehouse about how many shipments were made, to which countries and cities. Date, time, volume, and weight were recorded and stored in an Excel spreadsheet. Through the data mining, the authors were able to present the following conclusions (about the studied case), concerning quantity: the company needs less time to prepare for smaller quantities, most of the quantities came to the warehouse in January and August (in the researched period of time from March 5, 2018, to June 7, 2019.). Through analysis of data connected to the volume of shipments, the authors come to the conclusion that springtime was the time when the most significant value of volume comes to the warehouse. Finally, they discover that the most significant value of weight comes at the same time as volume, in spring. Such a conclusion may greatly contribute to the overall efficiency of the warehouse, for example, by using such data in planning space for future shipments.

In their study, Mojaveri, Mousavi, Heydar, and Aminian (2009) compare some machine learning techniques and support vector machines with traditional methods in forecasting demand in the supply chain of an Iranian automobile components supplier company, a time-series with the trend and seasonal patterns, in the attempt to reduce the bullwhip effect. Before creating the forecast, the data that affect customer demand was identified by cluster analysis. During the second part of the research, the effectiveness of an artificial neural network with three layers and three middle units and support vector machines is compared to moving average, exponential smoothing, and exponential smoothing with the trend (traditional methods). Results show that an artificial neural network can forecast precisely better than other methods. It proves that, when given extra time and resources, big data methods can prove more valuable than the traditional counterpart.

Mehmood and Graham (2015) extend the usage of the Markov logistics model to present the integration of big data and smart cities in the health-care transport sharing aspect. Their model is designed to illustrate how sharing transport load (and capacity) in a smart city can improve efficiencies in meeting the demand for city services. Conducted research proves that using large scale databases is more effective to replicate the perspective of city-network rather than using individual health care transport schemes, which may lead to inefficiency. The research is said to be carried on in the near future.

Several high-quality examples of using data mining in warehouse logistics are given by Reining, Bousbiba, Jungen and ten Hompel (2017). They mention the paper that present approach to improve the efficiency of order picking systems by finding associations between orders. The associations are the basis for heuristics to minimize the travel distance. Another example is utilization of data mining to find relationships among customer orders. The identification of relationships helps to determine rational storage locations to minimize the picking effort. Moreover, an approach to use machine learning for predictive inbound logistics planning was presented. It facilitates the system's adaptation to future scenarios. Their approach is based on the development of a logistics information structure (ontology). Another example introduces an approach to predict the workload of order picking zones based on past data. The forecast can be used to determine the required number of employees and their assignment within the warehouse in a rational manner.

In logistics, the potential of big data and data mining is not only limited to transport or warehouse related activities. In his study Weiland (2017) identifies big data as a source of information in the e-commerce sector. The author points

out that the information is the effect of data turning into it during the course of processing. In the paper, the author implicates that the data should be considered as all forms of unstructured facts about an object or event. These unstructured facts such as results of observations, raw statistical data, or various records can become meaningful when being transformed into information. For e-commerce, this data can be obtained from sources like Social Media, mailing systems, Google Analytics, or advertising systems. It is stated that small and medium enterprises are usually not able to conduct research using data mining methods on their own (as the author mentioned in earlier cases). Such situation creates an opportunity for developing information logistics which can help SMEs to build a competitive advantage, as the author suggests. The main role of information logistics is to help the decision-making process to improve not only the company's efficiency but also the customer's satisfaction. The author signalizes the very important advantage of the data collected from the mentioned sources – it can be used for regulating the price of the product on the go. By comparing prices on price-comparison websites or applications, not only the company knows about its logistics costs but also can benchmark the price with the competition. Another strong point of using data mining and big data tools in e-commerce is learning about the clients and their preferences. Weiland, in his paper, stated that *the analysis of data acquired through such systems as CRM, Google Analytics, AdWords, and AdSense, it is possible to get a holistic perspective on the client's sphere of interests*. Such a perspective can be useful when introducing a new product, which would be adjusted basing on the customer's perspective or when the already existing product needs reworking and a destination for this process has to be found. Knowing the client's interests has another value in the process of creating a personal offer. Google analytics influences the website of the shop in a way, where the customer sees a well-suited variety of products based on his or her requirements or the previous activity on the website. For example, thanks to big data, we know that customers who bought a new graphics card may also be interested in buying a new computer monitor. It helps to create a network of associated products. The access to large datasets of transactions in e-commerce may also prove useful in locating the weakest link in the process of completing a purchase. Fixing that link would result in a decrease in failed orders and lead to better optimization.

The paper by Migut (2004) puts across the procedure of using cluster analysis (data mining tool) on the data provided by custom relationship management software (CRM). 8995 records of customers of the department store in the USA were obtained, every case included 14 variables such as income, sex, age, occupation, education, language, number of children, marital status. The analysis is conducted with the aim to identify market segments and identify the unique features of customers belonging to each segment. Because there are no starting conditions, the cluster analysis is chosen as a tool. The result of the study is as follows: the group was divided into 3 clusters, in the first one customers with average income are grouped, the second one includes the most well-off customers and the third one gathers customers with the lowest income. As the importance plot shows, the most important variables for this example process are marital status, age and the least important are sex and language.

Conducting procedures connected with big data or data mining can only be effective if the software that is used in the process fulfills the requirements of an organization. The review of software that is used to conduct big data or data mining procedures is the main aim of the paper published by Chuchro and Piórkowski (2010). The paper is focused on describing the features of the 8 applications that can be used in data mining processes. For the research, the following software, both commercial and open source has been chosen: Weka, Statistica, R, Clementine, Rattle, RapidMiner Community Edition, Matlab, MS SQL Server 2008 (Analysis Services). For testing the features of the software, the basic effectiveness data has been collected from sewage farms in Polish cities Baranów Sandomierski, Kraków, Sandomierz, Tarnobrzeg, and Warszawa Research procedure consists of 3 stages. The first one being the standardization of input data, the second one is creating the model, classification, and forecasting. For forecasting tools, an automatic neural network has been chosen (unsupervised learning). The authors conduct data mining with all aforementioned applications and identify the differences between them. For example, Rapidminer is easier to use because of the clear graphical user interface, Statistica and Clementine can import data from various file formats, Weka has large, well-written documentation. Another example of software used in the process is DBMiner, which is well-described in the paper by Han, Wang, Fu, Koperski, Chiang, Gong, Li, Lu, Rajan, Stefanovic, Xia, Zaiane (1999). The authors conduct several basic data mining procedures in the software, for example, multiple-level characterization, the discovery of discriminant rules, multiple-level association, classification. The system has been said to *provide a user-friendly, interactive data mining environment with good performance*. The authors suggest that DBMiner should be further enhanced in the field of power and efficiency of data mining in relational database systems including the improvement of system performance. In addition, integration and merge of several less interesting rules are advised. Finally, the authors recommend expanding data mining techniques available in the application to special-purpose database systems and the internet information base. It should be added that from the time of publication of the paper, DBMiner has been significantly upgraded.

The subtle variability should be carefully considered whenever choosing the optimal tool for the task. The manager of SMEe would prefer open-source software to minimize costs, when the person connected with large companies would appreciate the versatility of, for example, Statistica or R environment.

Summary, conclusions, implications, limitations

Undoubtedly, the enormous success of various logistics application areas of data mining is the main reason why it establishes itself as the major upcoming analysis tool in the future. It has shown potential for future developments, especially when datasets are growing bigger and bigger. One of the biggest direction would be web mining because of the dynamic growth of e-commerce and information logistics due to the pandemic. It would be reasonable to say that big data and data mining will remain the main focuses of research all over the world, mainly because of its versatility. Only in logistics, it is possible to find examples of the practical and theoretical uses in transport, warehousing, e-commerce, production planning, and more. The further rapid development of digital technologies allows presenting big data processes in a more approachable way, mainly through more visible GUIs and more developed documentation.

On the other hand, there are still many concerns. Maximum privacy and safety of the data must be ensured, due to the amount of data, there is still a need for better performance of software, especially in the field of optimization for older computers. This technology is still relatively new and the previously-existing software needs to be adjusted. The is also a need for better cooperation between the companies and new IT sections which will eventually conduct big data analysis which may require investments and changes in the organizational structure of an enterprise.

Undoubtedly, the mentioned issues will eventually be eliminated, because of the cost-decreasing big data potential. Nowadays the companies simply have to follow new trends if they want to survive and maintain profitability. One can conclude that now not only the amount of data is important, but how it will be used and what one can do with it. Especially when modern enterprises will compete in generating information, rather than collecting raw data.

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Employment Quality in CSR: Evidence from Poland

Patrycja ZWIECH

University of Szczecin, Szczecin, Poland
E-mail: patrycja.zwiech@usz.edu.pl

Abstract

The purpose of this paper is to identify additional areas of employment quality and to present their characteristics for Poland. The layout of the paper is dictated by the implementation of the objective. The first part introduces the subject matter of employment quality. The next part describes results obtained for Poland from research focused on 4 areas of employment quality, i.e. safety in employment (including: work in hazardous conditions and accidents at work); equality in employment (including: access to employment, vertical segregation, inequalities in remuneration, wage gap, discrimination, mobbing); employment guarantees (including: type of contract, employment in temporary employment agencies and being self-employed and working for one client only) and work-life balance (including: working time and work-life balance). The presented results show that companies in Poland face a number of challenges in terms of improving employment quality.

Keywords: employment quality, human capital, CSR.

Introduction

According to the concept of corporate social responsibility (CSR), organizations do not only take economic and ecological issues into account voluntarily in their activity, but also social ones. The voluntary nature in this concept is understood as an option, not an obligation. CSR has evolved from philanthropy to informed planning of socially responsible conduct strategies. A new approach to CSR has begun to emerge in the 21st century, in which the concept of social responsibility is defined as a company's responsibility for its impact on society. This concept intends to maintain a balance between the company interest and the social interest. Company welfare cannot be contrary to social expectations. Therefore, CSR is a philosophy of conducting business activity in which the company takes into account the interest of stakeholders (Haliżak, Kuźniar, Symonides, 2004, p. 284). On the one hand, a socially responsible company is such an organization which stays open and listens to its environment (by conducting dialogue with various groups of stakeholders, that is actors which can affect the operation of the company or actors which are affected by it), and draws conclusions and takes relevant actions on the other.

Employees are one of the important groups of stakeholders. According to the CSR concept, companies must ensure good relations with employees while taking into account the fact that their involvement largely determines the survival and success of the organization. The undertaken actions should go beyond legal requirements which are only a certain minimum of building ethical relations in the company-employee line. Therefore, corporate social responsibility assumes that an entrepreneur will take into account in his activity the welfare of his own employees, having regard to social justice and absolute prohibition of infringing human dignity. Creating an atmosphere of cooperation and mutual trust at all levels of the organization in not only a management style, but also an indispensable requirement of building a learning organization and the entire knowledge-based society in the long run.

A derivative of the obligation to implement the said values in the economic activity involves caring for employment quality. Fair employment terms should be the basis of the CSR strategy of companies. According to M. Olędzki (1981, p. 26), employment quality may be defined as a social value resulting from individual, merged substantive satisfaction, determined by qualifications and predispositions to good work and achieved work results, but also material and social conditions of the work environment adapted to contemporary social standards of employment quality.

When addressing employment quality it needs to be emphasized that it refers to spheres such as quality of life, social policy or regulations relating to the labour market. Besides, employment quality is a multidimensional concept. It includes both the quality of the post (type of work, requirements it sets for an individual or quality of outcomes: products, services, activities performed) and the quality of the work environment: social, organizational

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or physical. The purpose of this paper is to identify additional areas of employment quality and to present their characteristics in Poland. For analyzing the mentioned aspects for the case of Poland we used as source for data The Central Statistical Office in Poland.

Literature Review Regarding Employment Quality

Employment quality is dealt with on the international arena by i.a. the International Labour Organization, the Organisation for Economic Co-operation and Development (OECD), the European Commission, the European Foundation for the Improvement of Living and Working Conditions (Eurofund) or the United Nations, whereas in Poland by the Chief Labour Inspectorate, the National Labour Inspectorate, the Central Institute for Labour Protection, the Institute of Occupational Medicine and the Ministry of Labour and Social Policy.

The United Nations are suggesting that the following areas be taken into account as part of investigating employment quality. Safety and ethics of employment (that is in particular: safety at work, child labour and forced labour, fair treatment in employment); income and benefits from employment (income and non-wage pecuniary benefits); working time and work-life balance; security of employment and social protection; social dialogue; skills development and training; employment-related relationships and work motivation (United Nations, 2015, p. 5).

The author identifies the following basic research areas in the framework of employment quality in this study:

- safety in employment (including: work in hazardous conditions and accidents at work);
- equality in employment (including: access to employment, vertical segregation, inequalities in remuneration, wage gap, discrimination, mobbing);
- employment guarantees (including: type of contract, employment in temporary employment agencies or self-employed persons working for one client only);
- work-life balance (including: working time and work-life balance).

Safety in employment is related to health and physical safety of employees. Safe work which does not pose a risk to life or health is a basic requirement inscribed in all CSR principles, but also one resulting from provisions of the law. Evaluation of the status and monitoring of changes concerning risk factors arising in the work environment are crucial to ensuring that working conditions of employees are compatible with applicable standards. Situations of people working in hazardous conditions and accidents at work are investigated in the framework of this issue. People working in hazardous conditions may be at risk of:

- harmful factors associated with the work environment (e.g. noise, industrial dust, cancerous or fibrous substances, including carcinoges and mutagens, electromagnetic fields, vibration, hot or cold microclimate, ionizing, laser, ultraviolet, infra-red radiation);
- difficult work conditions (e.g. forced bodily posture, heavy exertion, insufficient lighting of the work station);
- mechanical factors related to operation of particularly dangerous machines.

Another issue that falls under employment quality is **equality in employment.** Equal access of individuals to employment and to adequate pay are essential elements here. In this case, the problems concern inequalities in employment and disfunctions in managing human capital. Inequalities in employment may be illustrated by:

- access to employment,
- vertical segregation,
- pay inequalities,
- pay gap,

whereas dysfunctions in managing human capital may be illustrated by:

- discrimination,
- mobbing.

Access to employment is associated with arbitrary limitations of access to certain jobs (legal regulations), characteristic profiles of candidates (e.g. their qualifications, experience, social competences, motivation for work) and a problem of equal opportunities of candidates from various groups in access to employment. In the employee selection process such situations may result from the lack of opportunity to demonstrate their skills, inadequate specification of requirements of the position (descriptions of positions drawn up wrongly, including the positions' qualifying profiles), inadequate specification of personal requirements, inadequate establishing of terms and

conditions of employment and selection criteria, and also being guided by stereotypes and discrimination. Access to employment may be illustrated by employment rates, unemployment rates and long-term unemployment rates different for individual social groups.

Vertical segregation boils down to much lower participation of specific social and economic groups among decision-makers (e.g. women, immigrants or national minorities). For various reasons, not in all jobs and not in all positions are persons from individual social groups accepted. It is easy for persons from certain groups to enter low-paid jobs which offer little opportunity for promotion, whereas many highly-paid or prestigious professions are unattainable for them or this access is very limited. In this case, employment of various groups of persons in managerial positions is examined. When investigating vertical segregation for groups of women and men one can use various indicators, such as the vertical gender segregation indicator S_{pw} or vertical gender segregation relational index RS_{pw} (Zwiech, 2013, p. 425). The vertical gender segregation indicator S_{pw} demonstrates by how much the share of women in the professional group of managers is greater (for negative values) or smaller (for positive values) than the average share of women among total employed persons. The RS_{pw}, in turn, demonstrates by how many per cent the share of women in decision-making circles is greater or smaller than the average share of women among the employed.

Inequalities in rearnings may be illustrated by comparing average monthly and hourly gross remuneration for individual groups. The pay gap, in turn, serves to compare the earnings between individual groups of persons. This indicates by how many per cent the earnings of the investigated group is different than the earnings of another social group (GUS, 2017, p. 6).

Dysfunctions in managing human capital are contrary to CSR principles in the area of human rights and employee rights. Discrimination involves violation of the principle of horizontal equality of society. This principle means identical treatment of people regardless of their characteristics and orders equal treatment of people with similar social and professional and demographical features (Zwiech, 2011, p. 17). Pursuant to Convention No. 111 of the International Labour Organization, discrimination in the labour market means "any distinction, exclusion or preference made on the basis of race, colour, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation". When discussing discrimination on the work grounds, it is worth identifying the following types (Zwiech, 2011, pp. 17-20):

- employment discrimination – referring to the right to the same opportunities of employment and equal criteria of selection;
- profession-related discrimination – referring to the right of choice of a profession and employment and to permanent work and equal work conditions;
- post-related discrimination – referring to the right to promotion;
- discrimination in access to training – referring to the right of access to training;
- wage discrimination – referring to the right to equal remuneration for work of the same value.

Council Directive 76/207/EEC of 1976 mentions direct and indirect discrimination. Direct discrimination involves treating somebody worse due to their characteristics, while indirect discrimination involves application of universally recognized criteria, which, however, cannot be met by a considerable social group.

Mobbing is another problem in the framework of equality in employment. Mobbing is a systematized form of mental abuse that co-workers direct at their victims. Acts of psychological violence include threats, intimidation, verbal insults (offensive remarks, using profanity, name-calling, mocking), hostile behaviour (shouting, yelling, shaking one's fist, spitting), offensive and provocative gestures, boycotting and ignoring the presence of an employee, ostentatious silence in the presence of the victim, creating and spreading rumours and false information, passive aggression (threatening body posture, hostile gaze), physical aggression towards objects and items belonging to the victim (hitting their desk, throwing objects, slamming doors), vandalism and damage to employee or company property (Chappell, Di Martino, 2006).

The third research area of employment quality is **certainty of employment.** Employment guarantees may result from CSR principles applied in the company, but in Poland they mostly result from labour law and in-house regulations between employers and trade unions. The following types of contract have weaker employment guarantees: fixed-term contracts, employment in temporary employment agencies and being self-employed and working for one client only.

Another issue of employment quality related to social responsibility of companies involves **work-life balance**. This problem has become one of the key challenges of our times. In-depth understanding of this issue requires knowledge of the social and cultural environment. Activities for work-life-balance are a manifestation of investing in human capital and at the same time allow for increasing the company's competitive leverage (Cascio, 2001, p. 180). Reconciliation of professional and family life covers three interrelated areas in terms of everyday life and social policy alike. These areas concern:

- work life and employment policy;
- work life and social policy;
- differences concerning the division of roles due to gender, gender equality and roles attributed to men and women at work and in families.

In the first area, ways to facilitate reconciliation of work and family obligations are sought. The following solutions are suggested: teleworking and mobile working, remote work (home office), flexible organization of work time, shift work, flexible working hours, tasked-based work time, part-time work, annual settlement of work time or shared work time. As part of the second area, the following are postulated: increasing access to childcare facilities (creches, nurseries) and senior-care facilities and preventing professional qualifications of parents (father, mother) from being outdated during a gap in the working time resulting from fulfilling family obligations. The following are pointed out in the framework of the third area: promoting greater involvement of men in family functions and mitigation of stress resulting from having to reconcile work and family roles.

Employment quality in Poland - research results

The first investigated area is **safety in employment.** Situation of persons who work in hazardous conditions and accidents at work are being analysed under this aspect. In 2019 82,400 companies employing 6.1 million people in Poland were investigated in terms of working conditions. 442,500 people in this group worked in hazardous conditions, which accounted for 7.3% of employees in the investigated companies (GUS, 2020b, p. 11). The indicator "number of people employed in hazardous conditions per 1,000 employed persons in the investigated population" is a significant measure informing about the scale of employment in hazardous conditions. It takes into account changes in the group of people working in hazardous conditions and in the total number of people employed in the investigated companies. The number of people working in hazardous conditions per 1,000 people employed in the researched companies was 72.9 (GUS, 2020b, p. 12).

In 2019 in Poland, 258,300 persons were exposed to risks arising from work environment, which was 4.3% of the total number of investigated employed persons (GUS, 2020b, p. 13). The risks arising from strenuous work in 2019 were the second biggest group of harmful factors affecting employed persons. In the investigated period 111,4 thousand persons worked in strenuous conditions. The smallest group were the risks associated with particularly dangerous machinery, which affected 72,900 employees (GUS, 2020b, p. 14).

Additionally it must be noted that that employees may be simultaneously exposed to several physical health risk factors in their workplace (i.e. risks arising from work environment, strenuous work or particularly dangerous machinery). Taking into account the data on people employed in hazardous conditions counted as many times as the number of risk factors these persons were exposed to, in needs to be emphasized that in 2019, the number of people working in hazardous conditions reached 532,3 thousand, most of whom were exposed to risks arising from work environment – 316,4 thousand people (59.4%), 132,4 thousand people were exposed to risks arising from strenuous work (24.9%), and 83,6 thousand people (15.7%) were exposed to particularly dangerous machinery.

Among the factors associated with work environment noise was the greatest risk, with 186,4 thousand people exposed to it. The number of employees exposed to risk factors arising from noise was close to three times more than employees exposed to risk arising from industrial dusts (50,4 thousand people). Among harmful factors arising from strenuous work, excessive physical exertion was in the majority (GUS, 2020b, pp. 15-17).

The analysis of risks arising from physical health risk factors shows that in 2019 in Poland the greatest risks occurred in mining metal ores. A high risk also marked certain branches of manufacturing. In the majority of the section, the highest ratio concerned risk factors arising from work environment; more risks factors arising from strenuous work were only noticed in the following sections: manufacturing and electricity, gas, steam and hot water supply, transportation and storage, information and communication and education (GUS, 2020b, Table 1 and Table 3).

An accident at work means a sudden incident caused by external factors resulting in injury or death which occurred in connection with work. When investigating accidents at work the accident rate is analysed. It means the number of

injured persons per 1,000 employed persons. In the first half of 2020 this rate was 1.77. 24,040 persons injured in accidents at work were reported, including 58 fatalities and 127 persons seriously injured (GUS, 2020c, pp. 1 and 4). Highest accident rates were reported in the following sections: mining and quarrying (5.34), water supply; sewerage, waste management and remediation activities (4.52), human health and social work activities (3.10), manufacturing (2.75), transportation and storage (2.20), agriculture, forestry and fishing (1.90), administrative and support service activities (1.81) and construction (1.51) (GUS, 2020c, pp. 4-5).

The second investigated area is **equality in employment.** In the framework of this area the following are investigated: access to employment, vertical segregation, inequalities in remuneration, pay gap and dysfunctions in human capital management (discrimination and mobbing).

The employment rate of people at the working age in the second quarter of 2020 in Poland was 74.1% where this rate was 69% for women and 78.6% for men. The following rates applied to individual age groups: for persons aged 15-24 it was 27.9%, for persons aged 25-34 - 80.2%, for persons aged 35-44 - 84.7%, for persons aged 45-54 - 82.3%, and for persons aged 55-59/64 - 62.5%. Among the identified age groups the highest unemployment rate, 9.5%, was reported for persons aged 15-24. Whereas the highest number of unemployed persons was observed for the 20-24 age group. The lowest intensity of unemployment was reported for university graduates, and the highest for graduates of basic vocational schools. Unemployed persons with education no higher than lower secondary looked for work for 10.1 months on average, those with basic vocational education - 9.1 months on average, secondary vocational education - 8.3 months and general secondary education - 8.2 months, while for those with tertiary education it was 6.9 months (GUS, 2020, Table 4, 3.6, 3.14). These rates looked different when broken down according to gender or nationality.

When investigating vertical segregation for groups of men and women indicators such as the vertical gender segregation indicator S_{pw} and the vertical gender segregation relational index RS_{pw} can be used (Zwiech, 2013, p. 425). For Poland, the vertical gender segregation indicator S_{pw} went up 2.8 in 2018, which means that the share of women in decision-making circles in the sphere of professional work was lower than their share in employment by 2.8 percentage points. In turn, the RS_{pw} indicator in 2018 was 5.6, which means that the share of women in decision-making circles was by 5.6% smaller than the share of women among the total employed persons. In 2010 these indicators for Poland were 4.4 and 9.2, respectively (Zwiech, 2013, pp. 425-440). At the same, investigating the structure of earnings broken down by occupations showed that in 2018 8.5% of employees (in companies in the entire national economy which employ at least 10 people) were classified in the "Public officials, senior officials and managers" group, where this rate was higher for men than for women by 1 percentage point (9.0% vs 8.1%).

Inequalities in remuneration may be illustrated by comparing average monthly and hourly gross earnings for individual groups. The average monthly total gross earnings in October 2018 was PLN 5003.78. Average earnings received by men were higher by 8.9% than the country's average (i.e. higher by PLN 443.46); women's earnings were lower by over 9.2% (i.e. lower by PLN 460.42). This, in consequence, means that average male earnings were by 19.9% (by PLN 903.88) higher than average female earnings (GUS, 2020d, p. 14). At the same time it needs to be noted that average hourly gross earnings amounted to PLN 27.79. Average hourly earnings received by men were higher by 6.0% than the average hourly gross earnings, while women's earnigns were lower by 6.7% compared to the average. Therefore, average male hourly gross earnings were higher by 13.6% (by PLN 3.53) than average female hourly gross earnings (GUS, 2020d, p. 13).

Compared to the average monthly earnings in the national economy, average monthly earnings for individual occupational groups constituted between 52.5% (for hairdressers and beauticians) and 295.6% (for managing directors and chief executives) (GUS, 2020d, p. 14). Whereas, when analysing proportions between employees of the higher level, i.e those in managerial and specialist positions, and employees of the minor and lower levels, i.e. technicians, service workers, workers who deal with elementary occupations, it may be concluded that these proportions amounted to the following for the national economy: 1.8:1; for women – 1.7:1 and for men – 2.0:1; for employees of the private sector – 2.0:1 and for employees of the public sector – 1.4:1 (GUS, 2020d, p. 18). At the same time it needs to be noticed that 66.0% of all employees received gross earnings lower than or equal to the average gross monthly earnings (i.e. ≤ PLN 5003.78). Women prevailed in this group (share of women - 53.0% , where 60.9% of men and 71.2% of women earned this much) and so did employees in the private sector (72.5%) (GUS, 2020d, p. 22).

Employees in the public sector earned on average more than private sector employees. In the public sector, average total monthly gross earnings were higher by 4.4% than in the private sector and they were 3.0% higher than the country's average (GUS, 2020d, p. 15).

The pay gap, in turn, serves to compare the earnings between individual groups of persons. This indicates by how many per cent the remuneration of the investigated group is different than remuneration of another social group (GUS, 2017, p. 6). For example, in 2018 the pay gap between women and men according to average monthly gross earnings was 16.6% and calculated on the basis of hourly earnings -12.0%. The pay gap for persons under 24 years of age compared to persons aged 65 or more was -49.9%, whereas the gap calculated for social groups examined in relation to their occupation – computed for persons working in elementary occupations compared to the public officials, senior officials and managers group was -68.7% (GUS, 2020d, p. 16).

Dysfunctions in human capital management will be illustrated by discrimination and mobbing. Most frequently quoted reasons for discrimination include gender, race, ethnic backgrounds, nationality, citizenship, religion, faith, belief, age, sexual orientation and gender identity, but they can also include personal features such as appearance, social origin and financial situation. Research commissioned by the Commissioner for Human Rights shows that 73% of people who experienced or witnessed discrimination in 2018 did not report it to any public institution while 28% of Poles do not know that discrimination is prohibited in spheres such as employment and the labour market. This may evidence high social acceptance for discriminatory behaviours and poor efficiency of legal and practical mechanisms of supporting the principle of equal treatment (RPO, 2018, p. 11).

At the same time, nationwide research in Poland shows employees' growing awareness of discrimination and mobbing. Research conducted by the Centre for Public Opinion Research (CBOS) in 2002 on mobbing demonstrates that 17% of employees in Poland were victims of harassment at a work place by superiors, and 6% of them experienced mobbing from co-workers (CBOS, 2002). Research conducted by W. Kisiel-Dorohinicki at the beginning of 2009 shows that 30% of respondents experienced mobbing in their professional work, of which 15% in the last five years, whereas research by M. Jędrzejko showed that 46% of respondents often experienced bad treatment and vulgar language from a superior, while 36% of employees noticed mobbing in their place of work (*Pracownik* …2011). Research carried out by the All-Poland Alliance of Trade Unions (OPZZ) in 2011 revealed that 43% of respondents declared mobbing in their work environment, while one third of them declared they did not experience such occurrences (OPZZ, 2011, p. 8). Different research conducted in 2014 by CBOS (2014, p. 2) showed that 17% of employees declared they were harassed by their superiors in the last five years, while 8% declared harassment by co-workers. At the same time, 24% of employees declared cases of harassment of other people by superiors in their work place, and 17% by colleagues. Another research carried out by the Faculty of Human Capital Management of the University of Szczecin on the sample of 601 employees in the period from March to May 2017 showed that 31.2% of respondents declared that they did encounter cases of mobbing at work, where this rate was slightly lower for women than for men (32% vs 29%) (Zwiech, 2019, p. 347). The most recent report of the Safe at Work Coalition (Koalicja Bezpieczni w Pracy, 2019, p. 24), referring to research conducted in July-August 2019, shows that 14% of respondents experienced mobbing multiple times, while 34% of them witnessed occurrence of it once or twice.

Despite such data, there are surprisingly few mobbing-related cases in Polish courts. For example, in 2014 the courts examined more than 14 million cases in total among which those related to mobbing amounted to 428 only, where only 10 people were awarded compensation and 8 people were awarded recompense for mobbing. In 2020-2014 2,384 mobbing-related cases were reported (Ministerstwo Sprawiedliwości, 2015, pp. 5, 7, 10 and 24). Reasons for this may be sought in the difficulty in proving mobbing and in the fact that witnesses (co-workers) refuse to testify in fear of losing their jobs.

The third research area of employment quality is **certainty of employment.** The following types of contracts have weaker employment guarantees: fixed-term contracts, employment in temporary employment agencies and being self-employed and working for one client only.

A fixed-term employment contract carries lesser employment guarantees than a permanent employment contract (due to limiting the period of employment and a shorter notice period). In the second quarter of 2017 21.4% of employees in Poland worked under such a contract type, where in the 15-24 age group it was as many as 61.3% and in the 25-34 age group – 29.1% (GUS, 2017, p. 17).

Limited employment guarantees also concern people employed by temporary work agencies. Such a form of employment applied to approximately 100 thousand people in Poland. Taking into account the age of the employee, the greatest share of temporary workers is reported for people under the age of 25.

Being self-employed and working for one client only, where the employee conducts an economic activity not on their own initiative but because they are forced to work in such a form and such a form is preferred by the mandator (usually due to lower employment costs) gives smaller or zero guarantees of employment. Being self-employed and working for one client only concerned 7.8% of all self-employed persons in Poland which do not have employees

(8% of women and 7.7% of men). There are many more such persons who come from cities than from villages (11.4% vs 5.2%)(GUS, 2017, p. 18).

When analysing another area of employment quality – **work-life balance** – it needs to be noticed that in Poland women are part of a group most affected by the lack of balance between work and family life. Traditional perception of roles of men and women in a family makes the burden of family obligation rest mainly with women, which in effect contributes to their unfavourable position in the labour market compared to men. This is evidenced by lower employment rates among women, higher unemployment and economic inactivity rates. The employment rate for persons in the working age (18-59/64) in the second quarter of 2020 was 69% for women and 78.6% for men. Unemployment rates for women and men were comparable (3.3% vs 3.2%) (GUS, 2020, Table 1.3). Whereas when analysing the population of economically inactive people, it may be observed that in the second quarter of 2020 their population was 13,471,000 and in the scale of the year a significant increase of these numbers among women in this group was noted, i.e. by 195,000 (that is by 2.4%) and a drop by 23,000 (i.e. by -0.5%) among men. The changes described above have contributed to the depth of the disproportions between people not economically active broken down by gender. In the second quarter of 2020 women accounted for 62.1% of economically inactive people. At the same time it needs to be noticed that the most frequent reasons for this inactivity were: family responsibilities (34.1%), education and training (25.0%) and illness and disability (23.4%) (GUS, 2020, p.11).

Combining work obligations and family life requires relevant management of time devoted to professional work, domestic work and rest. An average weekly working time in Poland is 40.3 hours (41.9 hrs for men and 38.5 hrs for women). 5.3% of women and 17.6% of men work professionally more than 50 hours a week. At the same time women more often than men worked part time, though not on their own initiative (2.3% vs 0.9%) (GUS, 2017, p.11).

Women devote more than four hours a day to domestic work, while men more than two hours. Thus, 125,000 men and 725,000 women point to family and household responsibilities as a reason for being economically inactive (GUS, 2020, Table 4.4). Family responsibilities were the reason for 8.6% of economically inactive men resigning from work and for as many as 33.4% of women. The different distribution of burden relating to professional and domestic work between the two sexes in Poland results from tradition, social and cultural norms and stereotypes.

Conclusion

CSR is a dynamic process that inspires creativity in companies, which is manifested in innovative solutions which satisfy society's needs. Caring to ensure employment quality may be treated as part of more broadly understood corporate social responsibility.

4 areas were analysed in the framework of assessment of employment quality in Poland. First off, when analysing safety in employment the situation of persons who work in hazardous conditions and accidents at work were analysed. 7.3% of employed persons worked in hazardous conditions, of whom most cases involved risk factors arising from the work environment and risk factors arising from strenuous work. Among the risk factors arising from the work environment the greatest risk factor was noise, whereas among the risk factors arising from strenuous work, excessive physical exertion prevailed. When investigating accidents at work, the accident rate was analysed which was lowest in the following sections: mining and quarrying, water supply, sewerage, waste management and remediation activities and human health and social work activities.

The second investigated area was equality in employment. In the framework of this area the following were investigated: access to employment, vertical segregation, inequalities in remuneration, pay gap and dysfunctions in human capital management (discrimination and mobbing). Access to employment was determined by age, gender and education which was demonstrated by the employment rate and the unemployment rate. Vertical segregation demonstrates women's worse position in the labour market as shown in the vertical gender segregation indicator and the vertical gender segregation relational indicator and the different share of men and women in the occupational group receiving highest earnings, i.e. the public officials, senior officials and managers group. Inequalities in earnings and the pay gap revealed the worse position of women, young persons and persons working in the private sector. In turn, dysfunctions in human capital management were illustrated by discrimination and mobbing. The research showed that more than 70% of persons who experienced or witnessed discrimination did not report this fact to any public institution and at the same time 30% of respondents declared that they did encounter incidents of mobbing in their work place.

As part of the analysis of the third area it was revealed that groups most at risk of absence of certainly of employment include persons aged 15-24. More than 60% of these persons are employed under a fixed-term employment contract. Persons younger than 25 also prevail among those employed by temporary work agencies. At

the same time, more and more employees are forced to resign from employment contracts in favour of being self-employed and working for one client only.

When analysing another area of employment quality – work-life balance it was noticed that in Poland women are part of a group most affected by the lack of balance between work and family life. This results in greater economic inactivity of women, since major reasons for this inactivity among women included family and household responsibilities. The different distribution of burden relating to professional and domestic work between the two sexes in Poland results from tradition, social and cultural norms and stereotypes.

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Logistical Outsourcing as A Lever for Enterprise Activity Improvement

Oleg TKACH
D.Sc., Professor, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine,
alexweber2311@gmail.com

Liubov HRYNIV
Ph.D., Associate Professor, Vasyl Stefanyk Precarpathian National University, Ivano-FRankivsk, Ukraine,
grunivl@ukr.net

Halyna MYKHAILIV
Ph.D., Associate Professor, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine,
galamych@gmail.com

Abstract

The purpose of the article is to substantiate logistics outsourcing as an effective mechanism for improving the efficiency of the enterprise. The authors summarize the arguments and counterarguments in the scientific discussion on logistics outsourcing as one of the best methods of optimizing resources in the activity of enterprises, one of the important factors of modern business. Systematization of the results of the research of scientific sources made it possible to identify the problems of outsourcing use in various spheres of activity of economic entities. Systematization of studies of aspects of enterprise management on the basis of logistic approaches, has allowed to formulate the statement that special value all over the world in logistics is devoted to outsourcing. For many years there is a tendency in this area to transfer a part or all of the logistics functions to specialized companies and outsourcing of logistics services is used by the vast majority of enterprises. Because, as higher the level of consumption in the country, there is more need to involve in the supply a chain the goods of qualified logistics operators and transfer part of their operations to logistics outsourcing. The authors estimate the logistic outsourcing of the enterprise of PE "VEGA LTD" for the method of Zhelinskiy Yu.A., which combines the change of income and expenses of the enterprise. Based on the calculations, it is proved that outsourcing for PE "VEGA LTD" is profitable. Therefore, it is advisable to use outsourced services not only for transport logistics, but also for other logistic activities of the enterprise.
In the process of investigating the problems of logistics outsourcing and its impact on the efficiency of foreign economic activity of the company, the authors proved that outsourcing in logistics is one of the most modern business models. The use of this approach makes it possible to achieve significant competitive advantages in the activity of the enterprise. The main motives that drive outsourcing of logistics functions are: the desire to make the business manageable, reduce transaction costs while obtaining quality service and profit. The results of the study are of practical importance and may be useful to scholars interested in the study of logistical outsourcing, as well as to the enterprises where outsourcing is most commonly used.

Keywords: Logistic Outsourcing, Types of Outsourcing in Logistics, Logistics Providers, Operators, Forms of Cooperation of Enterprises, Logistics Services.

Introduction

Competition aggravation and intensification in the different business processes, new information technologies development and its universal using in all types of life and business activity, transaction speeding up, life cycling obsolescence and abbreviation, consumers' demands and strictness rising have made the Companies to look over their strategies of business acts. These challenges caused qualified firms attraction that some part of its own business functions including logistics were passed on.

Logistics outsourcing has taken a place in a practice of the many Companies independently from the scale and type of activity that had taken an attention of the researches.
Today, the logistics outsourcing market is being under development wave because the quantity of the new Companies have been founding and some percentage of them are looking for qualified specialist which could logistics functions manage outside of the Company (Hrytsyna L.A., Koshivska M.V., 2018).

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The article matter – motivating factors research, outsourcing advantages and disadvantages implementation in Enterprise logistics and managing decisions using improving concern of logistics functions passed to outsourcing on.
The research object is logistics activity of Vega Ltd. logistics system.

The subject research is a logistics outsourcing as an effective Enterprise activity rising.

Literature Review

The terms and conditions of logistics outsourcing were widely described in the Western scientists works such as Bagchi, P. & Virum, H. (1996), Langley, J. (2018), Sahay, B. S., & Mohan, R. (2006). By these authors a content was opened and scientific-theoretic issues summarized for all types of logistics outsourcing implementation as an effective enterprise activity mechanism.

One of a popular resources optimization method in the different activity spheres and basic business providing factor is an outsourcing.

The problems of outsourcing implementation providing in a different types of Enterprise activity were researched by number of local scientists, it was described in the works of the next scientists as Dovba M.O. (2011), Krasnoshapka, V.V. & Trohumets, I.I. (2015), Tryfonova, O.V. & Trushkina, N.V. (2019).

The outsourcing in logistics has special mean all over the world. In this sphere a tendency has been monitored of a partial or all the logistics functions transfer to specialized companies and outsourcing of logistics services is used by the enterprise majority.

As high a demand in a country, a need arises for goods network organizing involve of qualified logistics operators and transfer to ones of the operation parts for logistics outsourcing.

The researches of an enterprise management on a base of logistics in Ukraine were concluded by the next scientists: Glushenko, T.M. (2014), Krasnoshapka, V.V. & Trohumets, I.I. (2015), Zavgorodniy, K.V. (2016).

Notwithstanding to a number of scientific work concern to logistics and outsourcing cohesion in the aspect of enhancement of enterprise competition rising and expenses decline in present, innovative development model searching still is actual and one of this model presumes an implementation of logistics outsourcing in an enterprise management.

Pasichnyk A.M., (Pasichnyk A.M., et al.2014)Bilovskyi K.E. (2016), Hrytsyna, L.A. (Hrytsyna, L.A., et al. 2018) Tryfonova, O.V. & Trushkina, N.V. (Tryfonova, O.V., et al. 2019) were involved into research of transport logistics, logistics outsourcing and its development in transportation system, a transfer of logistics functions to outsourcing with a term of enterprise management optimization.

Transportation, storage and assembling are main points have been transferred to logistics outsourcing in Ukraine. These three logistics activity spheres make 85% of profit to logistics operators.

Hryniv, L.V. (Hryniv, L.V., et al. 2010) states that logistics is a key factor to enterprise management improvement, the transportation flows as a local and international, including Ukrainian transit potential.

Mykhailiv, H.V. (Mykhailiv, et al. H.V., 2017) researched outsourcing implementation by the local Ukrainian enterprises like a new type of cooperation that will permits to provide economic activity more effective, to release an additional resources and direct it for enterprise development and to strengthen the market competition positions.
Tkach, O. (Tkach, O., et al.2017) researched outsourcing as a modern method of different economic subjects cooperation that permits to obtain the mutually beneficial results within short period and long period of time.

Methodology and Research Methods

In this article the research had been concluded concern to management decisions effectiveness justification of logistical outsourcing implementation. In the process of logistics outsourcing expediency researches the methods of scientific knowledge of phenomena and processes in economic activity, such as comparative analyze. Within local and foreign scientists work summarizing, historical method (for logical outsourcing means specification and with a purpose for driving forces and problems with logical servicing raising in a modern enterprise activity; formal logical method and summarizing method (by the types of logistics providers definition and definition of cooperation

by PL-provider with a range of services); analyze and synthesis (within estimation of possible risks from taken decisions concern to outsourcing using); induction and deduction (within typical model of definition concern implementation of managing decision about logistics outsourcing possibility using by foreign trade activity).

The Results

In the modern changeable, dynamic, compatible terms of external environment there are many of the Companies are looking for the ways of improving all of the activity spheres. This also concern to its logistics. Basic point of enterprise activity is a delivery network management of the products and information current guarantee along the whole enterprise delivery network. Thus, they are more concentrated and specialized with a help of outsourcing activity, which is far away from its basic business.

For bigger number of the enterprises logistics is not a major business competence but logistics needs a lot of resources and attention due to keep logistics Department (Dpt.) functioning. Use to be an own logistics Dpt. – does not mean a high level of logistics servicing and low level of logistics expenses. In addition, hired managers demand wages constantly raising up that does not confirm desired results and manager competences. As a result, sometimes more profitable is to pass logistics outsourcing out.

Outsourcing in logistics activity means passing this activity out to a third part, as a logistics servicing supplier. As an outsourcer can be as separate enterprise or several Companies, thanks to them, it is a possible to decline the expenses to logistics.

With a time some enterprises came into conclusion that without a cooperation of the knowledgeable logistics specialists to improve the business process in this sphere is practically unreal. Once the logistics were developed by the enterprise having invested money into the workers, the warehouses and so on, but with a time they came into conclusion that logistics outsourcing is more optimal way for expenses decline. Outsourcing of logistics activity makes effectiveness rising from 9% to 15% capacity and quality rising (Glushenko, T.M., 2014).

The enterprises in logistics use to be take one of the two alternatives – either to provide logistics functions by them or pass it out. The number of enterprises does not pass logistics services out concern to some reasons. They establish own Dpt. It is usually happen in the enterprises where for the owner is important to keep the logistics schemes in unique.

Due to define the mean of logistics outsourcing some samples had been invented in a literature. For example, Sink and Langley (1997) and Millen et al (1997) sais, that logistics outsourcing is an external supplier using for conducting some or all logistics services of the firm which are provided by the firm. Those definitions are being kept by (14), which added that logistics outsourcing is getting more force tendency in the modern enterprise because of the number of priorities are brought by. In the presented research all different propulsions and problems have been estimated with a connection of logistics servicing rising (Liginenko, L.O., & Frolova, Yu.Yu.,2000).

Outsourcing is one of the successful business models which include passing non basic functions enterprise out and all the connected activities to outsourcer management.

With connection of several profiles of this point such as logistics outsourcing (outsourcing of logistics decision) is vied from the following theories:

1. Resources bound theory.
2. Network theory.
3. Transaction cost economy.
1. Resources bound theory (RBT).

RBT looks at the Company like resources totality which spread heterogeneous (Tryfonova O.V., Trushkina N.V., 2019). Hereby, mean of logistics is defined as management optimization by the material and related its information and financial flows. Term “resources” concerns not only material resources such as warehouses, equipment and factories but also non-material actives such as knowledge, know-how and organizational activities. According to this theory the Company needs to ensure right type of resources effective flow from its surrounding with a purpose of survival on the market, competition rising and stability (Krasnoshapka, V.V. & Trohumets, I.I., 2015).

Logistics servicing transfer to outsourcing permits the Company to get an access to wide not owned resources spectrum, to keep competition on the market and to obtain an access to additional resources. By the way, the fact of

the additional resources access does not explain the reason fully why the Companies transfer own logistics servicing to the suppliers of logistics that takes to Network Theory (NT).

2. Network Theory (NT).

The effectiveness of logistics activity is defined by component elements synergies effect of right established logistics network, logistics system and also system cooperation. The theory NT stipulates that outsourcing permits the Company manage by the supply network as a whole through relations forming and network coordination. Thus, a need is occur by the resources exchange between of the Companies (Pasichnyk A.M., Lebid I.H., Kutyriev V.V., Buherko K.M.). This theory points out that thanks to system establishing, links creation and cooperation between the Companies, they can obtain necessary (and absent) resources. Attention concentrates on alliance forming between the Companies.

3. From the point of economy cost transaction theory view the Companies logistics servicing transfer was based on a sum of transaction minimization and production expenses. This theory is based on a point that supplier logistics servicing outsourcing is to be happened when there was a possibility to decline transactional expenses.

Stipulated principles are explained (Bilovskyi K.E., 2016) and noticed that in a case of low transactional expenses the Company will face to outsourcer service, if these expenses will be high the Company will provide this activity by itself.

Hereby, this theory does not explain all the logistics processes and the connected decisions with it.
Basically, the reasons that make the functions transfer to outsourcing are following:

- Own resources absent;
- Limitation expenses needs;
- Basic types of activity concentrated necessity;
- Competitive advantages obtaining desire.

Necessary to recall next two reasons:

a) Company management does not know how to act;
- There is not future perspective of further development of a present activity direction;
- The Company is starting to lose an own market advantage;

b) Management of the Company is not able to formulate an exit from a current situation.

In a whole, outsourcing is effective by following terms;

- Is worked out process with history of the successful and profitable contracts;
- Gives a chance to obtain improvements which are not achievable by any of the departments;
- Improves a Company activity and defined process;
- Proposes expenses surveillance which is not possible by internal Dpt. acts;
- unpredictable expenses limiting;
- servicing quality improvement;
- permits to be a competiveness;
- gives a possibility to concentrate on the basic types of activity and the sources of profit;
- is an effective method of corporative culture changes;
- proposes not reachable by inner Dpt. quality level;
- foreseen a flexible attitude to workers quantity;
- Gives an opportunity to improve own knowledge.

Very often mean of “outsourcing” is used in the context of problem solving “to produce” or “to buy” (https://studme.com.ua/1595021014291/logistika/autsorsing_kak_instrument_servisnoy_logistiki.htm.). But today the mean of outsourcing coming out from its common means – as a method business providing when second types Company activity are passed on to external organization. This organization is able to use all given resources by the interests of the Company’s customer.

The present experience testifies that outsourcing implementation has a reason in the following cases:

- need has occur as for labor and material resources;
- activity of the Company in different directions is not connected between each other;
- job accomplishment requires to use an experience and professional knowledge;
- Company activity is undo survival of different market fluctuation that led to high expenses for stuff education;
- Technology is changing so fast, that demands big investments.

In addition, outsourcing is considerable expenses control. Its realization insures:

- more serious expenses transparency for business management and its process;
- service-provider involves the own stuff for the projects realization as necessary;
- cooperation of organization with service-provider ensures expenses decline which are used for infrastructure and tools etc.

The specialists use to separate some type of outsourcing as following:

- business-process outsourcing: foresees the tasks delegation that are not concern to a main type of work for implementation by another Company;
- productive outsourcing: for instant, new product creation with an implementation by another Enterprise service;
- IT outsourcing;
- Bookkeeping outsourcing;
- Out staffing; submitting the stuff for a period to some separated tasks providing.

Commonly, outsourcing is used for entrepreneurs support and development. These are:

- Scientific research and analytical work organization according Company points;
- Entrepreneurial education;
- Infrastructure organization development program had been invented for small and medium business support;
- Inventing practical manuals and training materials by the special directions.

Due to stipulated work algorithm a Contract between Company - Customer and outsourcing Agency has been accomplished where following information is mentioned:

1. Names, addresses of the Parties; terms of the Contract; description of the Customer acts are transferred to management by accepting Party.
2. Management manual, rights and obligations are confirmed for each manager.
3. All types of characteristics are to be passed on to responsibility of the Supplier according the Contract including Dpt's are to be leaved in client organization.
4. Contract terms for validation and termination.
5. Negotiations terms concern to the Contract prolongation.
6. Risks / profit distribution terms.
7. Problems solving terms which could arise under the acts of external (force majeure) acts, for instance, low change and the ways of influence toward Contract implementation.
8. All payments and compensations characteristics are belong to service supplier and Client.

Outsourcing is a new progressive activity management organization which ensures the not related to basic production functions transfer to the specialized Companies with qualified stuff (Zaloznova Yu.S., Trushkina N.V., & Kocheshkova I.M., 2018).

Local Enterprises outsourcing implementation is:

- A new type of production which permits to the Enterprises to provide economic activity more effective, to release additional resources and direct it for Enterprise development and make strongest competitive position on a market.
- The point of economic effectiveness outsourcing implementation improvement needs to be further developed including Ukrainian law system development in these directions and also mechanism of outsourcing supplier reliability settlement.

Outsourcing is in the beginning level in Ukraine and gives a possibility to use it as a base for system management improving of the number of the Enterprises which have not been providing a similar experience.

We think that logistics is more perspective sphere which is enriched by progressive and aimed to oriented professionals which are ready to adapt to new management instruments implementation and to risk with a matter of strategic targets achievement.

Outsourcing is a modern type of different economic subject cooperation that gives a possibility to obtain positive mutual results within short time and long time periods. In the developed countries and Ukraine so on this cooperation has rising the chances and perspectives of high economic development. By this, is important to define for any of the Contract and terms an outsourcing which means optimal type.

In Europe the value of logistics functions are transferred to outsourcing Companies such as 61% transportation service; 35% - warehouses; 25% - information system; 15% - revers logistics; 13% - fleet management; 11% - costs

minimization; 8% - supplier management; 6% - order scheduler sheets; 5% customers support (http://ukrstat.gov.ua/operativ/menu/menu_u/tr.htm).

The main obstacle for outsourcing development in Ukraine is lowest state support, impossibility for effective control for an outsourcing provider and its economic status. One of a drawback is partnership relations which happened could be unreliable.

Also the obstacle in the process of logistics outsourcing can be logistics infrastructure absence. Logistics infrastructure development gives to the Western Countries not only to ensure own needs by transport - logistics servicing but also gives them to another Countries. Ukrainian transit potential is used only for 60%. The income from transit and coherent servicing complex are 6% GIP. Because, ineffective using of Ukrainian potential occur that the Country did not received 2.5 mln. usd. (Sharchuk, T.V. 201).).

In addition, outsourcing progression state support is pretty important in the modern economic conditions. (Hryniv, L.V., & Vachil, O.P. 2015). For example, India and Ireland are the world leaders on outsourcing market thanks to the State support and state structures of development. Despite for the obstacles on the outsourcing development way in Ukraine there are some advantages which support the outsourcing operations providing, thus low wages compare with Europe and USA, high unemployment rate of qualified stuff; ability to communicate by foreign languages.

Outsourcing is influential factor concern to Companies effective operations. It is main element for expenses reducing. Also outsourcing influence concern to enterprise competitive position.

Priorities and disadvantages of outsourcing are stipulated concern to economic activity (Glushenko, T.M. 2014).
Common advantage of logistics outsourcing includes following points:

- Risks clear distribution;
- Business-process and ways of its effectiveness rising;
- Expenses quantity shorting thanks to stuff quantity reduction.

These are management advantages of logistics outsourcing:

- Management control improving capability;
- Growing potential definition possibility and all the possible obstacles cancelation;
- Perspective to locate attention and necessary resources on the main activity like a customer demands and company targets concern to the technical-technological advantages necessaries;
- High level mission accomplishment access and necessary technology using;
- Reliable servicing and its quality rising.

Due to implement logistics outsourcing in Ukraine is necessary to avoid the obstacles that cause for its unfavorable development (https://yellow.com.ua/rList.aspx?r=1008).

These obstacles can be: uncertainty concern to Company secrets announcing by involved stuff, uncertainty concerns stuff professionally. Thus, the managers are not able to trust to other Companies do not take into consideration that these Companies thanks to narrow specialization are supported by the qualified stuff which have been cooperating with many other Companies and implement their experience in the different spheres of activity.

In a case of implemented decision by the Board of Directors is necessary to understand how will tide the Company up with the future Partner. It means what kind of cooperation the Company has been looking for: for hierarchical or market oriented.

By hierarchical cooperation very tide interdependence is aroused, on practice it means cooperation between main and daughter Companies.

In case of mutual work organized by the type of external partnership its being qualified as a market oriented.

Very important is the fact for what period these links are established: long term or short term or it can be made for once (Mykhailiv, et al. H.V., 2017).

It is necessary to consider: as much number of the Enterprises are to be involved into cooperation (Dovba, M.O. 2011). Additionally, in case of long term cooperation to conceal the Contract is more difficult. It can be possible only in case of big expenses costs.

Necessary to consider, the decision about outsourcing cooperation is big influence to enterprise structure. That is important to be prepared properly and estimate all advantages and risks properly.

In this cooperation the Contract forms are very important because in case of nonfulfillment obligations the Parties will require losses compensation. (Hrytsyna, L.A. & Koshivska, M.V. 2018)

All expenses are aroused within some business-project conducting control could be estimated only approximately and this is big drawback. The quality problems can be regulated basically by a number of acts implementing toward quality management for example logistics data.

Some instruments are to be involved for the expenses analyzing due to display the separate expenses for each provided decision and evaluate it.

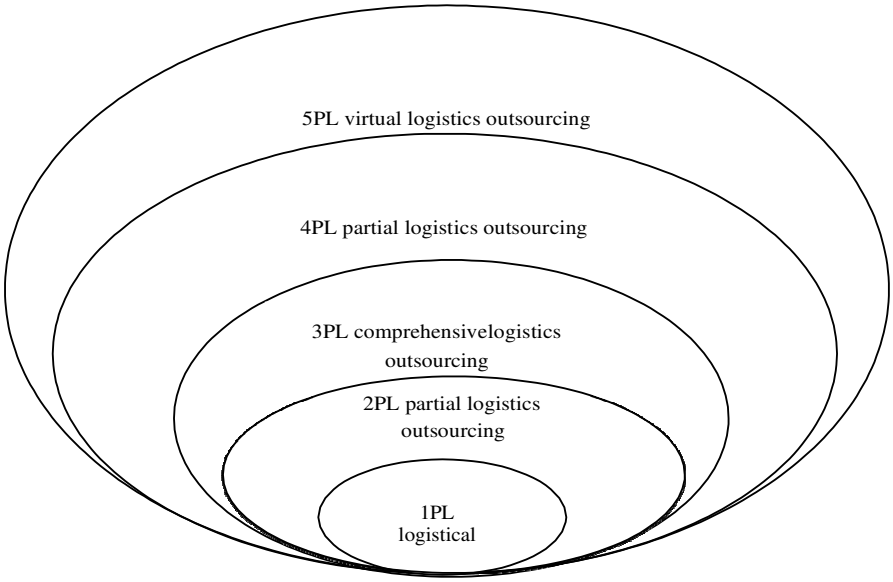

Logistics providers – enterprises make logistics servicing complex. Different providers are different by technological level and servicing range (Langley, J. 2018).

Fig. 1: Interconnection of the PL-providers with services range. (2)

First level logistic is called internal logistics where all transportation, storage service and other operations are to be concentrated inside of the organization – Customer. 1PL-providers are not logistics intermediary, because all functions are to be made by cargo owner.

Second level logistics are external (2PL) and make ordinary servicing range which link to transportation and storage. 2PL-providers are logistics intermediary.

For above mentioned could be: transportation Companies; custom brokers; expeditors; custom warehouses; temporarily storages; agents; warehouses complexes and the cargo terminals.

2PL providers have a narrow specialization but nevertheless they have checked data base and work experience in some sphere. Second level providers work on the local or regional markets.

Third level logistics (3PL) are external logistics that cooperates to all logistics services into one complex and includes additional services such as cargo storage, invent and design of different information systems with helper using servicing.

3PL-provider commonly called an intermediary which gives the logistics services complex to the customer. This type of the Enterprises take into own control some or all logistics functions. These logistics intermediaries commonly work within interregional areas on the base of long terms Contracts.

Fourth level logistics (4PL) cooperate by external and internal logistics. 4PL providers main difference from 3PL system attitude implementation toward all customer logistics process management. These logistics providers work on the world market on the terms of strategic partnership.

Fifth logistics level (5PL) – internet logistics. 5PL provider submits the whole complex of the service for account of world network using. This is vertical partner: from one side he has all information about the network member's capabilities, from another – IT product which gives a possibility to create the optimal network inside of the logistics systems.

Logistics services suppliers' differentiation is made on the basis of partner's qualification definition of the separate sector and all different type of aroused situation. On the beginning of the cooperation stage the logistics services supplier are being held as the subcontractors, in innovative attitude in a process of cooperation they look like "co-authors" and "designers" or "managers" of delivered network. On the picture 2 the characteristic of the main logistics services basic supplier were presented.

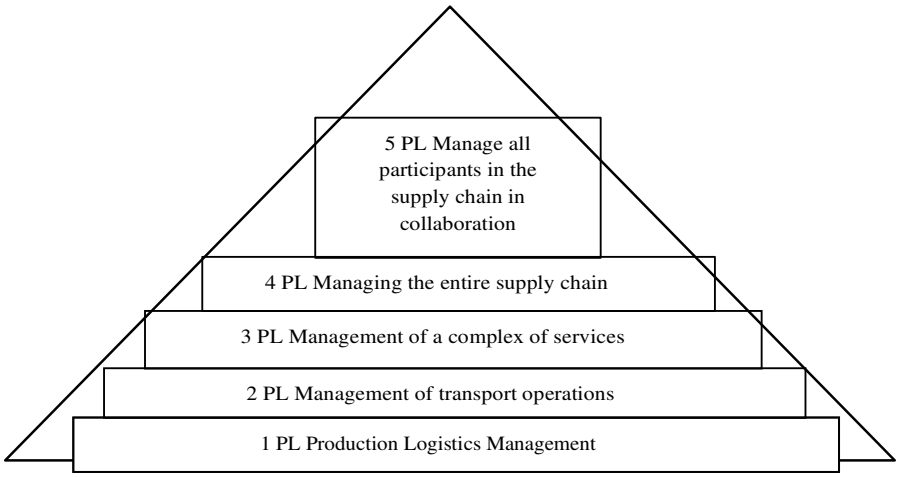

Fig. 2: Logistics services type's supplier characteristics.

Source: developed by the authors.

Having being existing scientific theses analyzed the researches testify that main attention is made toward the Companies consume the logistics services, but not big attention are to be paid to outsourcers are providing these services. Logistics effectiveness and Enterprise effective activities are defined by a term of effective cooperation by all the processes parties.

Foreign trade activity foresees the Enterprise activity out of the native country, that has being accompanied by the risk and uncertainty rising. These are defined for foreign market logistics outsourcing using.

In case the Enterprise has trade-economic connections with the foreign trade suppliers or has a plan to come out to the foreign markets with own product the necessity has been aroused for stuff looking out which able to provide the above processes. In case of Enterprise strategic orientation to foreign markets is necessary for own Dpt. establishing with the international specialists in it. But in case, when the necessity of foreign trade activity is aroused only sometimes, to keep working this Dpt. is unjustified expensive.

The best way to dissolve this problem is foreign trade outsourcing (https://tsl.kname.edu.ua/index.php/en/8-glavnaya/26-logistic-outsourcing.).

Foreign trade outsourcing has foresees organizational and technical processes transfer connected with imported goods buying and export sale to aside Company – outsourcer. This method priority is additional recourses release of the Company (financial, labor, timing) which can be directed to production and business. In nature, logistics outsourcing means to authorization specialized aside Company all the type of the works connected with foreign trade activity.

Outsourcing advantages by foreign trade activity:

1. Better understanding of the market and consumers market features (tastes and consumers preferences).
2. Expenses shortage for Company establishing, office opening and wages, taxes payments.

3. Wide range receiving of the logistics services.
4. Products sale rising and sale Enterprise foundation as a result.
5. Deduction (nonpayment) of some foreign currency payments, customs procedures.

Logistics servicing providing by foreign trade activity:

- Foreign supplier selection and commodity buying;
- Paper work;
- Commodity storage organization with a complex of satellite services;
- Balance keeps checking in real time;
- Foreseen and readiness for demand growing;
- Commodity moving control by WMS on line system;
- Transportation logistics and commodity insurance by foreign trade operations are to be made by outsourcers;
- Foreign Contracts preparing and management;
- Customer and brokers servicing;
- Export and import permission preparing;
- Commodity certification;
- Most trading effective scheme selection;
- Work with regulated bodies;
- Foreign currency regulation;
- VAT payments and another type of payment.

Custom clearance needs professional and experienced stuff. This complex permits to invent the best version of deliveries organization and custom clearance (Tkach, O.V. & Voloshchuk, I.A., 2017)..

Thus, logistics outsourcing permits to the Company to minimize expenses, to raise a work effectiveness concern to foreign partner searching, to speed the process up thanks to transportation points solving by complex .

Taking into consideration validity and difficulty of this point, taking management decision concern outsourcing implementation into enterprise foreign trade activity needs to be carefully weighted and justified. This management decision implementation process is made in the terms of uncertainty. It makes the process more difficult and reduces effectiveness of the accepted decision (Tryfonova, O.V. & Trushkina, N.V. 2019).

Within a need stipulation by logistics outsourcing a model decision making is proposed about logistics outsourcing implementation by foreign trade activity providing (Fig. 3).

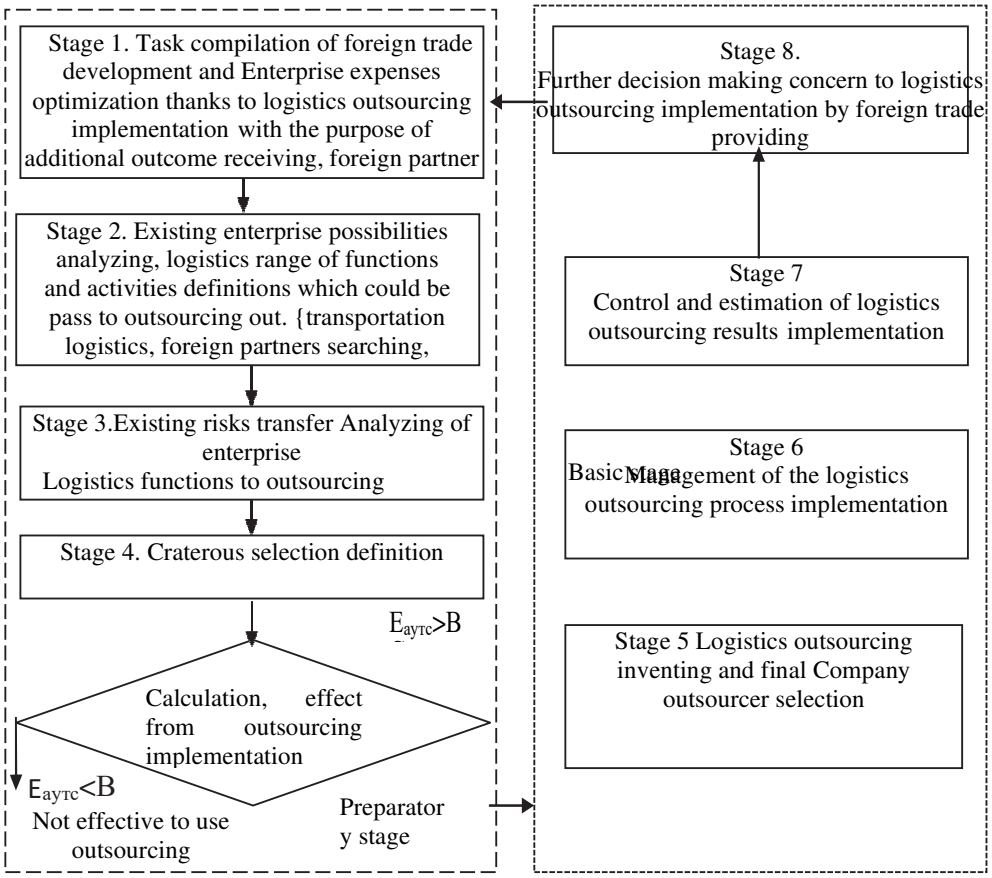

Fig. 3: Management decision making concerns to logistics outsourcing implementation possibility by foreign trade enterprise activity.

Designed by the authors on the base of (Zavgorodniy, K.V. 2016).

According to the fig 2 this decision making process has to be made in two stages – preparatory and basic. On the preparatory the tasks are to be defined including foreign trade activity development; enterprise expenses optimization thanks to logistics outsourcing implementation, additional outcome receiving and foreign partners searching. All these tasks can be solved successfully by outsourcing implementation.

On the stage of existing enterprise advantages is necessary to define logistics functions and activities ranges which can be passed into outsourcing out, besides this concern to transportation logistics, foreign partners searching and custom clearance. These functions transfer can be full (all enterprise logistics functions passing out into outsourcing) or partial (only some functions, for example, transportation logistics).

Next stage requires perfect estimation of possible risks from decision making concerns to outsourcing using and also from its economic validity. Within these instruments can be used Mc. Kinsey model: “Price watehouse Coopers” methodology, BCG model (proposed by Derting), Khlebnikov outsourcing matrix, Y. Mitrophanov proposed matrix, M. Tatjanok Methodology, Y. Zhelinskyj methodology.

Table 1: Compatible characteristic methodology of evaluation management decision making concerns to logistics outsourcing.

Name of methodology author	Characteristic	The parameters that the technique takes into account
Mc. Kinsey model (Bagchi, P. & Virum, H. 1996)	Outsourcing is to made on the basis of: 1. Export evaluation of involvement to technological network for consumer's value creation. 2. Profitability of non profile activities from the view of the clear expenses and Enterprise outcome contribution . Thus, business process separation according to the reasons: "profitability" and technological process involvement". This methodology gives a possibility to reveal non profile and unprofitable process and Dpt.	Displays two criteria's: non profile actives involvement to technological network concerns to consumer value creation
Price waterhouse Coopers (Liginenko, L.O., & Frolova, Yu.Yu. 2005)	Matrix has two factors: active importance and active strategic importance. Options of these facts combinations in the matrix give four options of a solution. Combination of a low strategic importance and competition actives importance transfers the Dpt. functions factors to an aside organization	Analyze had been made on the basis of comparison parameters – "active compatible importance" and "strategic importance of Dpt. for Enterprise and separates four types of decision making
BCG outsourcing matrix (Pasichnyk A.M., Lebid I.H., Kutyriev V.V. & Buherko K.M. (2014)	Permits to provide business processes separation expedien-cy outsourcing analyzing according to following elements – strategic influence; financial influence, business – influence; business - risks	Analyzing is to be provided on the basis of five elements: financial elements; strategic influence; business – influence, business – risks
D. Khlebnikova (Liginenko, L.O., & Frolova, Yu.Yu. (2005).	Two factors instruments analyzing: the analysis is to be made by two basic factors: "strategic importance" and "competencies quality compare with competitors and market totally" which are estimated by three levels. This matrix of outsourcing is a method of object review separation to 3x3 matrix segments, by which can be a separate proceedings Dpt., type of work toward to a separated specialist, the carrier of a competence. This method is to be differenced by estimation criteria scale. In case of data separation by the matrix field the variants are to be produced of decisions making.	In the two measurements matrix were given: strategic importance, competences quality /works/, the results compare with existed on the market. Strategic importance has own components: technological involvement which consider some type of Enterprise activity: profitability factors; owner intentions; social – economic and political aspects of possession. Outsourcing matrix horizontal scale is – competences quality/works/ results compare with existed on the market. Due to estimation the matrix is necessary: To understand that the Company makes the goods are buying; To know which competency confirms the business and to answer to a key question: why makes important to analyze real stuff competencies; To analyze competitive environment; On the infrastructure analyzing base to define of market terms; To give a possibility to make a transformation
UBS ((Liginenko, L.O., & Frolova, Yu.Yu. (2005).)	Business functions separation on decision to outsourcing is to be made with a decision making matrix invented by IBS consulters. By axis X the matrix is made service value relation inside of the Enterprise to the value of the same value on the market; by axis Y – business-functions quality characteristics compare with the market. By this result, the matrix is being divided for nine segments, each of the segment confirms one from fourth conclusions: Outsourcing implementation - Refusal from the own Dpt. and buying the same goods on the market; - Development – improvement of	Outsourcing matter is to be considered by four important aspects: Strategic priorities economical effectiveness; Services management transferred to outsourcing; Reliability and risks

	business functions for the quality raising services or cost reducing; - Development or outsourcing – two decisions are possible (advantages depend from Enterprise policy to considered business-functions separation – business function is compatible and can be separated in different business for profit receiving.	
Zhelinskogo methodology (Źeliński, J. A. 2008)	Outsourcing effectiveness is a sum of outcome and expenses in a separate sphere of activity. The changes could be positive and negative but sum of the needs is to be more then 0. Difference between total incomes and expenses after outsourcing implementation needs to be bigger from difference of the profits and expenses	Enterprise profits and expenses analyzing

The methodology method permits to make estimation by the parameters complex. It's not consider human being factor within transferring of the own Company management functions to the management by aside Enterprise.

The risks (the disadvantages) of logistics outsourcing implementation are to be arisen by the following cases:

- Big value of the expenses rising with a connection of a process and the functions to outsourcing;
- Big value of expenses are used with a purpose of survival cooperation with the suppliers which supply outsourcing services;
- Non foreseen ability of outsourcing Company bankruptcy;
- Professional ability improving of the another Enterprise than own stuff;
- Limitation of logistics outsourcing juridical regulation definition.

By definition of logistics outsourcing effectiveness is necessary to consider alternative value that is possibility of released finance using for another Company activity. It is advisable to use only partial transfer (some separate logistics functions) to logistics and to rise the activity in future by a term of effective cooperation. Besides, on all levels of outsourcing implementation in logistics is necessary to use a comprehensive control and results evaluation of logistics outsourcing implementation.

The most important factor by Enterprise logistics system outsourcing is effective organization of economic activity.

According to management decision making invented model concerns to logistics outsourcing implementation by enterprise activity calculates outsourcing implementation effectiveness. For this we used Zhelinstskiy Y. methodology (13).

According this methodology for outsourcing effectiveness evaluation the sum of incomes and expenses needs to be calculated in the enterprise activity spheres after and before outsourcing implementation. As a result the difference between total incomes and expenses after outsourcing implementation needs to be more from difference of incomes and expenses before outsourcing implementation.

A formula is to be developed:

P_1 – total incomes before outsourcing implementation;
V_1 – total expenses before outsourcing implementation;
P_2 – total incomes after outsourcing implementation;
V_2 – total expenses after outsourcing implementation.

Logistics outsourcing evaluation of Vega Ltd. provides with a method where changes of Enterprise incomes and expenses are combined.

This methods group confirms to common attitude for result evaluation on the base of incomes and expenses changes and is very simple for use.

Private Enterprise Vega Ltd. has been established at May 08, 2008. The main activities consist of: whole sale of wheat and animals feeds, vegetable oil for technical purpose and truck service. 20 workers work on this Enterprise.

The Enterprise sales the products as in the internal market and provides foreign trade activity. Export of the commodities has been providing to Lithuania, Estonia, Poland, Czech Republic, Belorussia and Moldova but not

exceeding the products sale on external market because of tough policy and EU quotas. In EU Countries a biodiesel is produced from vegetable oils and from second raw materials such as a press an animal feeds are made which afterwards are coming back to Ukraine as a premixes and a protein – vitamin mineral supplements.

Additionally, the Enterprise gives a service of trucking of liquid, bulk, cargo and assembled cargos to the countries such as: Austria, Germany, Nederland, Greek, Bulgaria, Romania, Czech Republic, Slovakia, Poland, Latvia, Estonia, Moldova, and Belorussia. The oils, juice concentrates, jams, wheat, wood products, parts of furniture, fire wood and the pallets are exported from Ukraine. The mineral fertilizers, metal sheets, animal feeds are imported into Ukraine.

Among the basic negative factors influences to Enterprise work are: corruption on a custom, Ukrtranssecurity corruption that connected to Poland and Austria issuing permission; credits involvement with a high rate.

The Enterprise has an intension to make transportation logistics outsourcing with a Polish Company which provides dispatching services, minimizes an empties trucks running that influenced toward transportation Dpt. within long period of time and expenses caused. In the future this Enterprise plans to pass goods sales out to a foreign market for outsourcing.

Due to understand a reason and main of transfer some function by Vega Ltd. to outsourcing let's see the following example:

A truck (type DAF and truck tanker) makes move for a rout – Chortkiv (Ukraine) – Orkhly (Moldova) – Voljkersdorf (Austria). From Moldova to Austria a juice concentrate is transported.

To calculate an expenses: 24mt. x 110 euro (1 mt. transportation cost) = 2640 hrn. x 26,9 (euro exchange rate)

1. Fuel – 1000 km x 0,38 (consuming with cargo) x 26,9 (exchange rate) = 10222 hrn.
2. Insurance (green card) = 2000 hrn.
3. Permits:
- Moldova (1 pcs.) = 500 hrn.
- Transit via Moldova through Ukraine = 2690 hrn.
- Poland (1 pcs.) = 190 hrn.
- Czech Republic (1 pcs.) = 170 hrn.
- Austria (2 pcs. – entrance/exit) = 610 hrn.
4. Payment a truck transit with ecological secure class not lower than Euro 5.
- Moldova – 0 hrn;
- Poland – 880 km x 0,27 zl. = 338 zl. x 6,357 (exchange rate) = 1513 hrn.
- Czech Republic 340 km. x 3 cor. = 1020 cor. X 1,07 (exchange rate) = 1091 hrn.
- Ausria 202 km. x 0,4 euro = 81 x 26,9 (exchange rate) = 2179 hrn.
5. Driver wage – 71016 x 0,14 (percentage wage) = 9942 hrn.
6. Taxi driving – 1000 km. x 0,22 (fuel consuming without cargo) x 26,9 (exchange rate).
7. Truck amortization for a one route – 4810 hrn.
8. Bookkeeping, director's wages, 2 mechanics wage, office manager wage with taxes – 750 hrn. per one route.

Total expenses for the route is 42 588 hrn. Before Enterprise was planning to transfer logistics to outsourcing the truck had been returning to Ukraine without cargo that was making the profit lower and caused the losses sometime.

Thus, calculate an outcome before transferring logistics to outsourcing:

71016 – 42585 = 28431 hrn. cleaned profit.

The trucks are coming back with the other loads after faced to outsourcing. Let's look at the sample: the truck is backed from Austria and Czech Republic was loaded by glycerol 24 mt. x 95 euro/mt x 26,9 (exchange rate) = 61 332hrn.

A route Volkerscdorf (Austria) – Znajmo (Czech Republic) – Dybno (Ukraine).

Expenses calculation:

1. Tank cleaning - 140 euro x 26,9 (exchange rate) – 3766 hrn

2. Expenses for the route Volkerscdorf (Austria) - Znajmo (Czech Republic) = 170 x 0,22 (fuel consuming for 100 km without cargo) x 26,9 (exchange rate) = 1006 hrn.
3. Expenses for the rout Znajmo (Czech Republic) - Dybno (Ukraine):
905 km x 0,38 (fuel consuming for 100 km with cargo) x 26,9 (exchange rate) = 9251 hrn.
4. Custom duty for entrance to Ukraine – 620 hrn.
5. Driver wage – 8300 hrn.
6. Tank cleaning 2 – 1600 hrn.
7. One route track amortization 4810 hrn.
8. The wages of bookkeeper, director, two locksmith office manager, mechanic with the taxes – 750 hrn. per one route.
9. According of the logistics outsourcing Contract N1608/18 dd.01.08.18. outsourcer receives 10% of profit from the cargo founded by him without expenses connected to truck taxi to a place of loading.

Thus outsources profit is 61332 – 1006 (gas consuming for the rout Volkerscdorf (Austria) - Znajmo (Czech Republic) – 60326 x 10% - 6033 hrn.

Gross expenses for this rout are 30576 hrn.

Cleaned profit for this rout is 28431 + 30756 = 59181 hrn.

E = 59187 – 28431 = 30756 hrn.

From above mentioned – the profit is growing after logistics transferring to outsourcing. It means for Vega Ltd. outsourcing is profitable.

Let's make a forecast for Vega Ltd. to 2020 with two variants of development – without transportation logistics transfer to outsourcing (variant 1) and in case of outsourcing Contract implementation to Enterprise transportation logistics (variant 2).

The truck for one month makes 4 routs. Per one year the truck works 9 months. For this period the truck makes 4 x 9 = 36 routs.

In case for one rout the profit is 59187 than one truck for 36 routs makes 59187 x 36 = 2130732 hrn.

Enterprise transportation logistics effectiveness calculation is submitted in a table 2 with a possibility of any type of development.

Table 2: Two variants of the Enterprise logistics activity data.

Data	Variant 1	Variant 2
Expenses (1 rout) hrn.	42585	30756
Cleaned profit (1 rout)	26431	59187
Cleaned profit (a gear)	1023516	2130732

In winter months with a weather matters the truck will not be involved for any of the services. The first working month would be – a march. For March and April the truck makes routs. Thus, (picture 4):

Variant 1 (blue line) the Enterprise would get a profit – 26431 x 8 = 227448 hrn.
Variant 2 (red line) the Enterprise would makes a profit 59187 x 8 = 473496 hrn.
By the same way Enterprise approximate profit to another months: up July and October.
July:
- Variant 1 26431 x 20 = 568620 hrn.
- Variant 2 591187 x 20 = 1183740 hrn.

October:
- Variant 1 – 28431 x 32 = 909792 hrn.
- Variant 2 – 591187 x 32 = 1893964 hrn.

So, the outsourcing is profitable for Vega Ltd. That is why it is a reason to outsources services using not only concern to transportation logistics, but for another enterprise activity.

Conclusions

During the research of the logistics outsourcing and its influences to foreign trade Enterprise activity the following conclusions were made:

1. In logistics activity the outsourcing is a modern business - model. This implementation attitude gives a possibility to get utmost competitive advantages in Enterprise activity. Basic motives caused for logistics functions transfer to outsourcing are: to make business more manageable; to reduce the transaction costs and within this to obtain a profit.
2. Due to define a necessary of second functions transfer to outsourcing is necessary to take into account all positives and negatives sides of this activity.

By the outsourcing process development the positive and negative factors have been operating as well. But there is a matter that the most important limitation has to be an economic profit and its using. Because, there are many cases when to transfer to external management other functions is not reasonable.

Possibility for the Enterprise - Customer to concentrate the trade activity by the own forces within basic directions of business is most advantage of outsourcing, that is only why the Enterprises second functions transfer to other specialized Companies lowering the servicing expenses of business-project; provision of favorable conditions and world class of services, outcome rising, foreign currencies welcoming.

3. For the modern Enterprises problem is actual logistics outsourcing implementation. The calculations were made concern to research Enterprise logistics transportation outsourcing effective using present the advantages of these steps.

The foreseen for 2020 year with two tips calculation (with using of outsourcing and without) indicates for bigger opportunity for profit dynamic of the Enterprise.

4. Thus, a transition to logistics outsourcing – is a strategy that is directed for profit and competitiveness rising by long term period. During outsourcing implementation in Enterprise logistics the Enterprise received a possibility to concentrate the resources within profiled business and do not be involved to establishing and supporting of an infrastructure unconnected with it.
5.

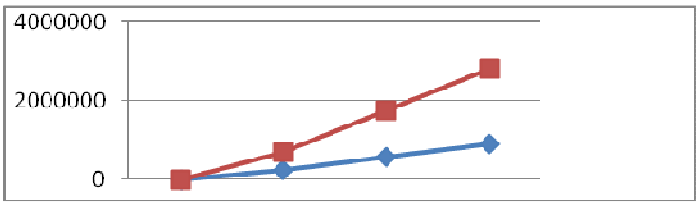

Fig. 4: Profit rising forecast to 2020 without outsourcing and by the logistics transfer to outsourcing.

In present, within a transfer of logistics business - process to outsourcing analyze is necessary for each of the case. The outsourcers - enterprises expenses present a necessity to account the number of terms and factors with a matter to make an outsourcing project successful for the Customer and Outsource – Company.

The concrete analyses help to clarify in which directions outsourcing implementation are more effective and resources saving with outsourcing help give a possibility not only to survive in the crisis conditions but to get a success.

Using of the considered and improved models and attitudes will help to raise a relevant management decisions anyway, but hardly make the process of decision making easier.

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Impact of the COVID-19 Pandemic on The Choice of Economic Value of Students

Agnieszka GOZDEK

University of Szczecin, Szczecin, Poland
agnieszka.gozdek@usz.edu.pl

Aneta SOKOL

University of Szczecin, Szczecin, Poland
aneta.sokol@usz.edu.pl

Abstract

Colloquially, the term "value" is understood as something particularly valuable, meeting high requirements; it is something we want, desire and which is the goal of human aspiration. The values can be classified differently. One of these classifications takes into account economic values. In order to learn about the preferred values and their hierarchical arrangement, the authors of the articles decided to study the impact of the coronavirus pandemic on the volatility of economic values among students. This social group, shaping its economic values at this stage of life, will in the future influence the processes of economic socialization of the next generations. Therefore, the article verifies the research hypothesis: The Covid pandemic determines a change in the approach to economic values among the young generation. The aim of the research will be to examine a group of young people through the use of focus group interviews in terms of changes or lack thereof resulting from the pandemic in their economic values. And the conclusion for the research was the answer to the following research question: In the opinion of the respondents, did economic values change under the influence of the conditions arising in the covid pandemic among young people? The verification of the research assumptions allowed to indicate that the change in economic values among the studied group under the influence of the coronavirus pandemic is rather invisible according to the surveyed students.

Keywords: value, economic value, covid, pandemic.

Introduction

COVID-19 is the disease caused by a new coronavirus called SARS-CoV-2. World Health Organisation (WHO) first learned of this new virus on 31 December 2019, following a report of a cluster of cases of 'viral pneumonia' in Wuhan, People's Republic of China (www.who.int). The SARS-CoV-2 epidemic was recognized as a pandemic (a worldwide spread of a new disease) by the WHO on March 11, 2020 (Gandjour, 2020).

Economic values are especially important for the development of an economic culture in society. They are shaped from the beginning of birth. Their first source is the family, where the social unit acquires value through economic socialization at this stage. Successive stages of life either strengthen the values in a person or change. The Covid-19 pandemic period is a special time that may result in social changes also in the aspect of economic values among young people, whose views are still being shaped and their implications of the changes may be significant. Hence, in order to show a certain area of science and analyze it, the article distinguishes two currents. The first one, of a cognitive nature, focuses on the analysis of the literature on the subject. These studies included foreign and Polish literature, which allowed for a critical analysis and shaped the research framework. They concerned concepts related to economic values and values. The second trend, the study one, focuses on research conducted in the form of focus group interviews on the impact of the coronavirus pandemic on the change or lack thereof in the perception of economic values. The research was conducted on a group of young people. Students from the first-year of management were participated in the interviews. The opinions obtained in this way made it possible to verify the assumed hypothesis and research goal. The conclusion for the conducted research will be the answer to the following research question: In the opinion of the respondents, have the economic values changed as a result of the

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conditions emerging in the covid-19 pandemic among young people? In connection with the above, the following hypothesis was posed: The Covid pandemic determines a change in the approach to economic values among the young generation.

Value in the literature

Economic value, as well as the notion value per se, raise on the philosophical, moral, ethical, social ground. Value is a broad term and multidimensional. It is discussed in many disciplines.

In psychology, value is treated as an individualized, subjective concept, depending on the preferences of the evaluator. Value in this approach is a trait of things or people desirable for individuals (Nadolna, 2011, p. 170). The notion of value depends on the context in which it is considered. Values are internalized cognitive structures that guide choices by evoking a sense of basic principles of right and wrong, a sense of priorities, and a willingness to make meaning and see patterns (Oyserman, 2015, p. 1).

One of the fresh, actual theory in psychology is Schwartz's theory. Professor J. Cieciuch analysed publication of Schwartz and synthesized the term value, referred to the previous theories. According to J. Cieciuch Schwartz's theoretical proposition is a far-reaching modification, extension and improvement of Rokeach's theory, along with its synthesis with Allport's approach (Cieciuch, 2013, pp. 39, 43). According to the value theory there are six main features of values (Schwartz, 2012, pp. 3-4.):

1. Values are beliefs linked inextricably to affect.
2. Values refer to desirable goals that motivate action.
3. Values transcend specific actions and situations.
4. Values serve as standards or criteria.
5. Values are ordered by importance relative to one another.
6. The relative importance of multiple values guides action. Any attitude or behaviour typically has implications for more than one value.

In classic model Schwartz distinguished 10 values (Schwartz, 2012, pp. 5-7):

- *self-direction* – independent thought and action - choosing, creating, exploring;
- *stimulation* – excitement, novelty, and challenge in life;
- *hedonism* – pleasure or sensuous gratification for oneself;
- *achievement* – personal success through demonstrating competence according to social standards;
- *power* – social status and prestige, control or dominance over people and resources;
- *security* – safety, harmony, and stability of society, of relationships, and of self;
- *conformity* – restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms;
- *tradition* – respect, commitment, and acceptance of the customs and ideas that one's culture or religion, or family provides, respect for tradition, humility;
- *benevolence* – preserving and enhancing the welfare of those with whom one is in frequent personal contact (the 'in-group', family member, friends).
- *universalism* – understanding, appreciation, tolerance, and protection for the welfare of all people and for nature.

These 10 values are grouped in four *higher order values:*

1. *self-transcendance* consisting of *universalism and benevolence* ;
2. *self-enhancement* consisting of power and *achievement*;
3. *openness to change* consisting of *self-direction* and *stimulation*
4. *conservation* consisting of conformity, tradition and *security*.

Hedonism it is a border value that is part of two neighbouring groups of values - self- enhancement and openness to changes.

After study in 10 countries in 2010 Schwartz et al. (2012, pp. 7-8) proposed refined version of basic human values. Refined theory divides the circular continuum of values into 19 motivationally distinct values. After deeper analysis some values were divided and one, face, has been added (Cieciuch, Schwartz, Vecchione, 2013, pp. 26-28). Refined values theory provides greater precision of prediction and explanation for a diverse set of attitudes and beliefs than the original theory (Schwartz et al, 2013, p. 23).

In a research study of value preferences among students, to the most preferred values this group includes: benevolence - dependability, benevolence - caring and self-direction—action. Then appear successively: self-direction—thought, universalism-societal concern, security-personal and universalism-tolerance. The least preferred are: conformity-rules, universalism—nature, power-dominance and power-resources (Cieciuch 2013, p. 284). Schwartz S. (2012, p. 3) explained in the simplest way definition of value, "it is what we think is important to us in life". The complexity comes then each person has their own numerous values, which may be unimportant for another person.

From sociological point of view, values are given a social dimension. Values are arise, develop and evolve with changes taking place in the world (Nadolna, 2011, p. 170). A research study concerning clinical practice (Calman, 2004, p. 366) shows that values can and do change. Nevertheless, there are certain core values (as an example Calman quoted articles from Universal Declaration of Human Rights) that may be unchanged over a long period of time. The reason why value may change is due to either new knowledge or new area of work, changes in social and cultural values and norms, and changes arising through an individual's personal experience of life.

Collins and Porras 2003 (cited in Walecka-Jankowska, Zimmer, Gągała-Sokołowska, 2020, p. 2) highlighted that core values do not undergo any fashion or trends, they are independent from the market situation and stress the authenticity of convictions.

The sociological and psychological approach to the value is reflected in the economy. From the economic theory point of view, a value is considered a feature (or set of features) of a thing, often expressible in money, which is perceived as more or less desired, useful and respected. In the theory of economy there are three main schools, which referred to the term value (Nadolna, 2011, p. 172):

- classical economics (*Adam Smith, David Ricardo, Karl Marx*)
- neoclassical economics (*S.M. Longfield, A. Marshall, J.B. Clark)* began in Europe around the 1870s.
- Austrian School (marginalism) (*C. Menger, W.S. Jevons, F. Wieser, L. Walras)*

Classical school is objective Theory of Value. Focus on the conditions of production (King, McLure, 2015, p. 1). Values, meaning things or phenomena useful to a certain system, that is, supporting the existence or development of it system. Such a system can be an individual, a social group or an organization value (Nadolna, 2011, p. 172). Adam Smith distinguished two concepts of value: value-in-use and value-in-exchange. First one expressed the "utility" of commodity, the second, means "the power of purchasing other goods" that the commodity carries (Gupta, A. 1960). Smith made work a measure of value. However, Smith treated work not as a normal manifestation of human life, but as a kind of "sacrifice", an alternative cost to freedom, peace and happiness (Drenda, 2016, p. 43). Subjective approach focus on the preferences of consumers. This approach is closer to neoclassical economics and especially Austrian school. Value in this approach refers to marginal utility. The utility that an individual derives from the consumption of a quantity of a particular good is determined by his or her subjective assessment of the pleasure, or satisfaction, derived from consumption. 'Marginal utility' refers to the satisfaction that an individual gains from the consumption of an additional unit of a particular good in a given context King, McLure, 2015, p. 6). King and McLure conclude that in modern, digital world, world of twitter, we are prone in direction of subjective theory of value.

Due to the multidimensionality of the value concept, defining economic value in an unequivocally way may result in difficulties. In the literature to define and measure value the notion of economic value is used. Especially when it comes to economic choices, involving trade-offs in allocating resources. Measures of economic value are based on what people want – their preferences. Those choices, preferences are limited by the time, income. Economic value is measured by the most someone is willing to give up in other goods and services in order to obtain a good, service (King, Mazzotta, 2000).

Economic value is characteristically in what is useful. Based originally upon the satisfaction or bodily needs, the interest in utilities develops to embrace the practical affairs of business world - the production, marketing and consumption of goods, the elaboration of credit and accumulation of tangible wealth. Economic value is measured subjectively in market places in terms of labour and commodities (Gupta, Sharma, Thakur, 2011, p. 71).

From the other hand, in the literature there is accounting approach which need objectivism in economic value. According to Nadolna (2011, p. 178-179) considerations, economic value is a category that provides a wide range of information to managers and investors. It is a conceptual category focusing on monitoring the economic effectiveness of decisions regarding the use of a given resource from the point of view of the benefits generated for all stakeholders of the enterprise. As a basic drawback she considers the subjectivism of the estimates, which may lead to the loss of credibility of the information generated by it. A generalized definition of economic value is presented by A. Karmańska (2009, p. 143), *who defines it as a judgment of a given person based on market*

analysis, carried out in relation to each component of resources involved in the economic activity managed by him, i.e. things, systems, laws, financial means and instruments, concepts various business solutions, knowledge, ways of organizing operational activities, various management concepts, methodological solutions, customer relations and many other broadly understood economic resources as to the possibility of recognizing a recognized component as a source of generating economic benefits (cited in Nadolna, 2011, p. 178).

According to Leibniz approach, some material goods produced are so useful that society expresses an urgent need to increase their quantity. The measure of work is not the quantity of material goods produced, but the achieved saving in the work done. Work saving is the microeconomic, empirical equivalent of the concept of economic value (LaRouche, 1995, p. 63). According to L. Drenda (2016, p. 41) economic values are characterized by the creative dimension of humanity. The overarching goal of economic values is to serve life. The threat that appears in the analysis of economic values is reducing them only to the criterion of utility. Mainly due to utilitarization, some of the higher values are available only to a very narrow group of recipients. Only utilitarian disinterestedness guarantees that value is universally useful, and access to it is not rationed. She quotes after Zuziak (2012, cited in Drenda, 2016, p. 42) that work is one of the factors that combines economic values with ethical values. Human work, which is the commitment of activity and freedom, becomes a contribution to self-realization and satisfaction. It becomes a medium of social communication and gives opportunities for the realization of humanity. In similar approach Profesor J. Hausner (2019) seeks the new economic value theory, other than utilitarian. According to his considerations, the meaning of goods, that is, the existential value, is given by cooperating people. Economic value cannot be reduced to profit, any more than good cannot be reduced to goods and utility.

When discussing economic value, the choice function is important. Subjectivism comes in here. Individual preferences, desires, making a choice based on your own needs. Economics as a science teaches about managing unlimited needs and the scarcity of goods. During the pandemic period, we were limited, of course for the higher good of life. Nobody would have imagined that the economic value of a good such as toilet paper would increase so dramatically at the beginning of March 2020 in Poland, and in other countries a little earlier. Basic goods found in nature, which seem immeasurable, have acquired high economic value.

The impact of the coronavirus pandemic on economic values among young people

Material and method

The article presents the scope of the issues of own research. The research area of the presented subject matter includes getting to know the discussed issues on both the theoretical (literature studies) and empirical levels (focused group interviews). Based on the application of appropriate scientific methods and procedures, the concept of economic values and values and their variability under the influence of the covid-19 pandemic were defined. This means that the following methods will be used in the research: analysis, synthesis, induction and deduction. The conclusion for the conducted research will be the answer to the following research question: In the opinion of the respondents, have the economic values changed as a result of the conditions emerging in the covid-19 pandemic among young people? In connection with the above, the following hypothesis was posed: The Covid-19 pandemic determines a change in the approach to economic values among the young generation.

In qualitative research, focus group interviews (FGI) were conducted. The interviews were focused on 4 areas: general recognition of economic values and the impact of the coronavirus pandemic on their change (as an introductory area). Completing an appropriate group of respondents caused many difficulties in obtaining research material. However, the authors hope that the results that were gathered during the research process made it possible to systematize the above-mentioned ones. The essence of the study is: conducting a group interview in the presence of a moderator who supervises the appropriate course of the study, establishing a research scenario using previously selected tools. Research conducted in this way allows solving the problem of the respondents through observation and conclusions that result from this process. Focus group interviews were conducted in a group of students using the online method (MS Teams) in October 2020. The group consists of 12 first year management students, aged 19 to 23.

Findings and Discussion

Therefore, at the beginning of the discussion, participants were asked about the definition of value. One participant defined "personal beliefs that are most important to a person, principles that are important to a person." Another participant, supplementing a colleague's statement, said that in her opinion "values can be divided into material and spiritual". After receiving the response, the respondents were familiarized with the definition of value from the literature on the subject. M. Łobocki defines "values as everything that is considered important and valuable for the

individual and society and is desirable, which is associated with positive experiences and is at the same time the goal of human aspirations" and According to S. Kowalczyk, value is a desired object, what is desired by man, what is the goal of his endeavors". It turned out that without an introductory introduction to the subject, students understand this concept very well. Students were asked what values they know and to arrange them in the order appropriate for themselves? According to the respondents, the general values are happiness, love, friendship, sense of security, health, being resourceful and hardworking. Students indicated important values in human life that determine proper social development. In connection with the above, the students were asked to answer the question whether the concept of value is changing nowadays and whether greater material or spiritual values are important? The respondents decided that the values as such have not changed recently, perhaps for some people health, family and the possibility of keeping a job became a more valuable value. Therefore, students were asked what the concept of economic values meant for them. Initially, it turned out that, unfortunately, students already have a problem with defining this issue. The basic definition of economic values was also presented to the respondents so that the rest of the analysis could be carried out correctly.

Then the respondents were asked what economic values they particularly appreciate. The respondents mentioned as value primarily work and the way it is performed (respect for it, reliability of approach to work, resourcefulness) and education. They were then asked to clarify how the coronavirus pandemic since March 2020 has changed their approach to these economic values. To a large extent, the respondents stated that the pandemic did not change their approach to these economic values. In addition, it turned out that two people got a job thanks to the coronavirus pandemic and considered it valuable as young people and not at risk of severe infection. For them, finding a job before the pandemic was difficult. In addition, their attitude to work, reliability and resourcefulness at work increased. They were therefore asked what can be considered a value in connection with work and its performance. The respondents decided that thanks to diligence, which they considered a value, one can achieve a lot in life. This was stated by the majority of the surveyed students. Conscientiousness and respect that you have a job came second. On the other hand, other people indicated that the pandemic enabled them to take a different approach to new skills in the form of using programs that help in distance learning. One of the respondents stated that thanks to distance learning she could have taken up additional extramural studies. If there was a normal time, she would not be able to study on the weekend in an additional field of her choice due to the considerable distance. Selected people appreciated the possibility of distance learning and the chances of getting another profession and the possibility of getting a better job in the future.

Summary

Summing up the research carried out, it should be noted that it turns out that the respondents are able to freely define the issue of value without any problems, it was difficult for them to define the concept of economic value. The change in economic values under the influence of the coronavirus pandemic is rather invisible, according to the surveyed students. What students lack in remote study are real contacts, meetings. On-line communicators definitely facilitate the existence in the period of isolation, but they are not a substitute for traditional face to face conversation. Values such as closeness, kindness, relationships with others have been noticed in the sanitary regime. However, it is noteworthy that a small number of respondents indicated positive aspects for their perception of values resulting from the Covid-19 pandemic. It is very interesting that young people appreciated the possibilities of getting a job and noticed that work itself is a value, but also its reliable performance, resourcefulness and additional education resulting from distance learning. Referring to the posed hypothesis, it is worth noting that the pandemic affects the views of young people regarding economic values, but the impact is small. This may be due to its too short duration. This may be due to the situation of the respondents, as the vast majority are still dependent on their parents. Certainly repeating the research in some time and looking at the emerging volatility may show a completely different aspect of this issue. Perhaps the research conducted by the authors will become the basis for further analyzes, which will be deepened and will allow the emergence of new threads enriching this research aspect.

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The Relevance of The Tax Effect To Explain The "Return On Equity" (Listed Companies – France, Germany, Portugal And Spain)

Liliana FERREIRA
Instituto Politécnico de Bragança (IPB), Bragança, Portugal, liliana__ferreira@hotmail.com

José LOPES
Centro de Investigação em Contabilidade e Fiscalidade (CICF), Instituto Politécnico de Bragança (IPB), Bragança, Portugal, jlopes@ipb.pt

Alcina NUNES
UNIAG (Unidade de Investigação em Gestão) and Instituto Politécnico de Bragança (IPB), Bragança, Portugal, alcina@ipb.pt

Abstract

Financial statements provide information that could explain the return on equity. The DuPont extended model identifies five key ratios/indicators that might explain the performance of a company – tax effect, interest burden, earnings before interest and taxes (EBIT) margin, assets turnover and financial leverage. This study aims to analyse the relevance of the tax effect on the "return on equity" (ROE). For the purpose of the study we selected a sample based on listed companies from the stock markets of France, Germany, Portugal and Spain. The number of companies of the sample is 516. The Ordinary Least Square (OLS) method was used to determine the individual impact of each factor on the "return on equity". According to our findings, the tax effect and the interest burden play the most important role in order to explain the return on equity.

Keywords: tax effect, return on equity, DuPont model, stock markets.

Introduction

The evaluation of a company's performance is always a relevant issue in the management field. The tax burden (or tax effect) is a variable that significantly affects any company's financial performance. Consequently, all companies do tax planning, tax avoidance or even tax evasion, to reduce the tax burden. Therefore, the tax burden analysis in return on equity (ROE) is necessary if the managers intend to present better results to shareholders. An evaluation of performance could be performed using accounting or markets data. The financial statements provide the raw material to do the financial analysis. The DuPont model is a well-known model that uses financial accounting to analyse the company's performance. The most intuitive way to compute the return on equity is by dividing net income by equity. For detailed information about the factors which influence the ROE, the DuPont model claim that ROE depends on three factors: "net income margin", "assets turnover" and "leverage". A modified version suggested by Hawawini and Viallet (1999) extend the model to five factors: "tax burden", "interest burden", "EBIT margin", "assets turnover" and "financial leverage". Thus, in this study, considering that we are focused in tax burden relevance, using a sample with 516 companies listed in stock markets in France, Germany, Portugal and Spain, we calculate all the DuPont's components which affect the ROE in the 2017 year (which consists in on cross-section analysis). Then, we used the OLS method to find evidence about each variable' relevance, particularly the tax burden, to explain the ROE, according to the main objective. This study is structured as follows: firstly, we present a brief background about the topic; secondly, we expose the data, sample, variables and method; thirdly, we present and discuss the results. Finally, we disclose the main conclusions.

Brief Literature Review

For shareholders, the companies' taxation is an essential factor that influences the performance of any company. Therefore, managers try to reduce the tax burden. Thus, how mentioned previously, tax planning is a strategic followed to improve the shareholders' net income.

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The ratios' use in research has been one way to find evidence about the taxation impact on the companies' performance. The ratios could be used to measure several kinds of performance, at know, the financial performance. Therefore, in many studies, the company' performance is measure as a financial ratio (Lazar, 2016). For example, the ratios analysis can be defined as the use of ratios to interpret the financial statements to analyse the historical performance and current financial position (Sahu & Charan, 2013).

One of the most know and use ratio (in the profitability ratios category) is the ROE. As ROE, profitability ratios are like the confirmation that one company is efficiently capable of using their available resources to grow sales and/or the net income (Ciurariu, 2015). This ratio use net income as a reference in profitability measure (Kijeeska, 2016). However, can be get information more deep reformulating this formula. The main objective of DuPont model is learning how the other factors/ratios could be affecting ROE. DuPont model was first introduced by F. Donaldson Brown, an electrical engineer who integrated the financial department of a chemistry company in 1914 (Kharatyan, Lopes, Nunes & Aghababyan, 2016). The three facts formula is:

$$ROE = \frac{net\ income}{EBIT} \times \frac{sales}{total\ assets} \times \frac{total\ assets}{equity} \quad (1)$$

A change was introduced by Hawawini and Viallet (1999). Two more factors were added, constituting a total of five ratios combined to form ROE. The equation suggested by previous authors claimed as:

$$ROE = \frac{net\ income}{EBIT} \times \frac{EBT}{EBIT} \times \frac{EBIT}{income} \times \frac{income}{total\ assets} \times \frac{total\ assets}{equity} \quad (2)$$

Where EBIT is income before interest and taxes, EBT is income before interest and ROE is given by the following formula:

$$ROE = tax\ burden \times interest\ burden \times EBIT\ margin\ \times assets\ turnover \times leverage \quad (3)$$

In this ROE' formula, tax burden measure tax effect in ROE, interest burden measure effect that interest burden as tax has in ROE, EBIT margin measure ROE's operational profitability, assets turnover measure how efficiently company use its resources to generate income and financial leverage measures the relation between equity and asset turnover.

The DuPont method analysis requires a few simple calculi, as emphasised by Liesz and Maranville (2011) and offers managers the possibility to realise strategic financial planning. In literature, we can find several studies that use the DuPont model to explain profitability. However, some authors (e.g. Kharatyan, Lopes, Nunes & Aghababyan, 2016) claim that, individually, financial ratios indicate incomplete information of a company. Therefore, in many investigations, other ratios were also considered (e.g. current ratio or price/price). For example, Batchimeg (2017) examined which ratios can determine the financial performance of Mongolian companies. He used sales growth, income growth, assets growth, earnings per share, gross profit margin, cost/revenue ratio and return on profit, costs, short-term debt-to-assets ratio, current assets-to-total assets ratio, long-term debt to total assets, fast ratio, current ratio and cash ratio as explanatory variables. Return on assets (ROA), return on equity (ROE) and return on sales (ROS) were choose as the performance indicators.

The DuPont model has no regard the relation between return and risk, as capital asset pricing model and modified versions. However, it is always an essential tool for analysing a company's profitability and understanding the factors contributing to better performance.

We can find in literature many studies on performance issues. Lazar (2016) analysed specific determinants of Romanian companies' profitability during the period 2000-2011. He found that tangibles, leverage, size, and work intensity negatively affected a company's performance.

In addition to the previous factors, we believe that the "tax burden" will always be an important factor in improving profits shareholders. Sometimes, "tax burden", "interest burden" and, consequently, "capital structure" are linked to explain profitability. In 1963, Mogliani and Miller, based on two different companies, one financed by external

sources and other funded by intern sources, they find that the use the external sources seems to have an advantage due to deductions from interest costs. However, considering the taxation of corporate profitability, the weighted average cost of capital is influenced not only by the tax rate but also by the capital structure (Modigliani & Miller, 1963).

In terms of leverage, according to Ribeiro (2015, p.8) "hopes that companies more leveraged show effective taxes lower", mentioned that Richardson and Lanis (2007) and Kraft (2014) find a negative significative relation between leverage, using as a proxy the capital structure and effective taxes rates (ETR). Therefore, if the debt cost is less than the investment of profitability, due to a tax deduction of interest, the return on equity will increase.

Using a sample of 20 companies listed in the stock market of Bucharest and the net income and return on assets as a performance measure, effective tax rate, companies' size, capital structure, long term debt and financial leverage, Pitulice et al. (2016) analysed a possible influence of corporate tax on a company' financial performance. They found that the effective tax rate negatively influences the dependent variable (ROA); lower net profit 5,63% compared to 0,32% in ROA.

Constantin (2012), concerning the correlations between financial indicators and effective tax rate (ETR), found a negative relation between the asset ratio and the ETR: an increase of 1% in the ratio between fixed assets and total assets, the effective tax rate at company level decreases 0,3251%; the relation between effective tax rate and ROE is negative; sales margin and ETR show an indirect relation.

Xianyu (2011) finds that the tax burden on macro and micro operational performance has a significant negative impact on companies' performance listed in China.

The relation between the effective tax rate and leverage, calculated as the ratio debt to capital, occurs in some studies as negative (Md Noor et al., 2010; Richardson & Lanis, 2007; Gupta & Newberry, 1997). The authors found a significant negative relation between corporate tax and financial performance using an asset's profitability as a variable measure.

One study realised by Rotimi and Henry (2016) confirms a significant relationship between corporate tax and manufacturing companies' performance in Nigeria. The results show a negative relation between the corporate profitability tax and earnings per share, "indicating that a unit increase in tax cost reduces earnings per share in approximately 38,3%, during analysing' period".

Concerning component "assets turnover", Soliman (2008) study the decomposition of profits: assets turnover, profit margin and market association with DuPont components, either in long windows tests as in short windows. He found that assets turnover has an explicative power to future variations in "return on operating net assets".

Methodology

Objectives

The tax burden is always an essential factor that reduces the available profit to shareholders. The impact could be bigger or smaller considering tax rates, tax benefits, tax incentives and tax adjustments to "profit before tax" to calculate the "tax profit". Therefore, it depends on tax law and, consequently, is dependent on the country in analyse. Thus, this study's main objective is to calculate the impact of tax effect in return on equity, considering the DuPont model's variables as a whole.

Data and sample

The data was selected from financial statements in companies listed in stock markets in Germany, France, Portugal and Spain available in database Amadeus (http://amadeus.bvdinfo.com). The accounting information needed to the study is the data about results before tax, net profit, EBIT, sales, total assets turnover and equity. After getting the database information (march, 2019), the data was analysed and defined to avoid biased results. Data were obtained from 2017 financial statements, so the analysis is a cross-section. In the data preparation process, several companies were excluded according to the following guidelines:

(a) Financial institutions were removed from the database because they use a different accounting system with specifics accounting standards. Therefore, financial information isn't comparable with the purpose of this study;

(b) Companies with values considered outliers, which could bias the results (e.g. ROE values above 100% and negative);

(c) Companies with missing variable values, not allowing the calculation of ratios;

(d) Companies with no activity in 2017;

(e) Companies that didn't pay corporate taxes in 2017;

(f) Companies without financial charges ("positive" financial costs, i.e., tax profits higher than expenses).

As a result of our approach, the database includes 516 companies listed in the following values: Germany (199), France (233), Portugal (18) and Spain (66). Then, after identifying the extended DuPont model variables, values for these variables were calculated according to their formulas (see Table 1).

Variables

The variables used are the following: ROE, tax effect, interest burden, EBIT margin, asset turnover and financial leverage. Table 1 identifies the variables, descriptions and formulas, and the expected association between each variable and ROE.

Table 1: Identification and description of the variables included in the extended model.

Abbreviation	Variable	Description	Formula	Expected Association
ROE	Return on equity	Amount of income returned as a percentage of shareholders' equity	$\frac{net\ income}{total\ equity}$	n/a
tax_effect	Tax effect / tax burden	The proportion of the company's profits retained after paying income taxes%	$\frac{net\ income}{pré - tax\ income}$	+
interest_burden	Interest burden	Measures the effect on interest on ROE	$\frac{pré - tax\ income}{EBIT}$	+
EBIT_margin	EBIT margin	Measures how much is left of revenue considering the cost of goods sold and operating expenses	$\frac{EBIT}{sales}$	+
asset_turnover	Assets turnover	Measures the efficiency of a company's use of its assets in generating sales revenue	$\frac{sales}{total\ assets}$	+
leverage	Financial leverage	Is the use of borrowed capital to increase the potential return of an investment	$\frac{total\ assets}{equity}$	+/-

Source: Author's elaboration

ROE is the dependent variable (the one we intend to explain). All the others are the independent variables (the ones that we expect to have some association/effect on the ROE). Regarding the type of association with ROE, all independent variables are expected to present a positive association. For example, the higher the tax effect ratio value, the lower the tax to be paid. In other words, if the ratio increases, the tax burden decreases. The same happens with the interest burden. Regarding the EBIT margin, the higher the ratio, the better. Concerning the financial leverage, the higher the ratio value, the greater the leverage level.

Method

About the model, the traditional OLS regression method was used in this study to identify the most relevant indicators in explaining variations in ROE and quantify the relationship between each variable and the return on equity. Therefore, the OLS regression method is applied to determinate which variables are more explanatory/have better power of association in the ROE's variables.

The complete linear regression is present in equation (4). The OLS method application in equation (2) requires the use of logarithms. The equation estimate is the next:

$$ROE_i = \alpha + \beta_1 effect_tax_burden_i + \beta_2 effect_interest_burden_i + \beta_3 effect_EBIT_margin_i + \beta_4 effect_assets_turnover_i + \beta_5 effect_financial_leverage_i + e_i \quad (4)$$

Results and Discuss

First of all, it is important to remember the coefficients found in estimating the OLS model that relates the independent variables with the return on equity. Thus, the values found are shown in Table 2.

Table 2: Analysis of ROE by factors.

	Tax effect	Effect of the interest burden	Effect of EBIT margin	Effect of assets turnover	Effect of financial leverage
Estimated coefficient	1.20	1.64	0.33	0.10	0.27
R^2	0.29	0.35	0.13	0.01	0.02

Source: Author's elaboration

Note that the variation of 1% in the variables in the study, induces an increase between 0,10% and 1,64% in return on equity. The variables that encourage a higher increase in ROE by an increase of one unit in these same variables are the "interest burden effect" and the "tax effect", respectively. The variables have significant explanatory power, except for the variables "effect of financial leverage" and "effect of asset turnover" which have a determination coefficient of only 2% and 1%, respectively.

The main objective of this work is to evaluate the tax effect on the profitability of listed companies. Therefore, models were analysed with more than one explanatory variable, intending to conclude how the tax effect was manifested according to the analysed variables. Firstly, it isn't possible to perform the analyses with all the explanatory variables. Since the ROE is the product of the multiplication of all five explanatory variables, the model presents itself with perfect multicollinearity, which doesn't allow the estimation of that same model. Thus, the solution found is to remove each of the variables, in turn, and estimate the model.

Table 3 shows the models constants and the value of the variables in each model and the value of the adjusted coefficient of determination of the model. Model 1 corresponds to the estimation of ROE without considering interest burden, model 2 to the estimation of ROE without considering EBIT margin, model 3 to the estimation of ROE without considering assets turnover and model 4 without considering the financial leverage.

Table 3: Estimation of ROE for studied models

Explanatory variables		Model 1	Model 2	Model 3	Model 4
Constant		0.46	-2.23	-1.77	0.47
L_tax_effect		1.11	1.04	0.94	0.97
L_effect_interest_burden		-	1.68	1.64	0.71
L_effect_EBIT_margin		1.19	-	0.27	0.86
L_effect_asstes_turnover		1.24	0.05	-	0.91
L_effect_financial_leverage		0.85	0.75	0.88	-
Model adjustment accuracy indicators	**R^2 adjusted**	0.75	0.66	0.74	0.81
	F(4.511)	559.46	179.75	218.60	476.93
	P value(F)	0.00	0.00	0.00	0.00
Model information criteria	**Schwarz**	189.75	834.86	700.10	534.06
	Akaike	168.52	813.63	678.87	512.83
	Hannan-Quinn	176.84	821.95	687.19	521.15

Source: Author's elaboration

Model 1 shows that, with a 99% confidence level, it is possible to affirm that the 1% increase in any of the explanatory variables that are part of the model increases return on equity between 0.852% and 1.238%. The variable "effect of

asset turnover" is the one that most contributes to the variations in the variable ROE and the variable "effect of financial leverage" that least causes variations in the variable ROE. The adjusted determination coefficient indicates that the variations that occur in the explanatory variables with the "interest burden effect" as a variable omitted explain 90.3% of the variations that occur in ROE. This value is very high, so this model has high explanatory power. The F test assesses the joint significance of the variables and in this model, this parameter is statistically significant, which means that the variables together form a good model.

By analysing model 2. at a 99% confidence level. it is possible to state that the 1% increase in the variables "tax effect". "effect of interest burden" and "effect of financial leverage" increases the return on capital 1.041%. 1.675% and 0.752%. respectively. Although the variable "effect of assets turnover" indicates that if it undergoes an increase of 1%, the variable ROE increases by 0.050%. There is insufficient statistical evidence to affirm that this variable has significance in this model. The variable "effect of interest burden" is the variable that most changes the variable ROE and the variable "effect of financial leverage" is the one that causes the lower changes in the dependent variable. The variations in the explained variable are justified in 65.6% by the variations of the independent variables when the variable "effect of EBIT margin" is omitted, as shown in the adjusted determination coefficient parameter. This value is reasonable, so this model has some explanatory power that is in line with what is indicated in the F test result. This test indicates statistical significance, so these variables form a good set that allows building a model.

Model 3 shows that. with a 99% confidence level, it is possible to affirm that the 1% increase in any explanatory variables increases the ROE between 0.268% and 1.640%. It is the variable "effect of interest burden" that causes the bigger change in the dependent variable and the variable "effect of EBIT margin" is the one that least induces changes. By the adjusted coefficient of determination, it is possible to identify that 73.5% of the variations in the return on equity are explained by the variations in the independent variables when the variable "effect of assets turnover" is missing. The F teste shows that the variables together make a good model. The result is significant for a 1% significance level.

Model 4 shows that, with a 99% confidence level, it is possible to state that the 1% increase in any of the explanatory variables increases the ROE variable from 0.712% to 0.973%. The variable that causes the most changes in the dependent variable is "tax effect". The variable that has the least influence on the return on equity in this model is the "effect of interest burden". Observing the adjusted determination coefficient is possible to verify that 80.8% of the variations in the return on equity are justified by variations in independent variables. This value is high. So this model has an explanatory value. The F test proves that the use of this set of variables forms a good model with significance for a level of statistical significance of 1%.

Comparative analysis and discussion between models

Model 1 had an adjusted coefficient of determination of 90.3%, indicating that 90.3% of the variations that the return on equity suffers are justified by the variations in the explanatory variables that the model includes. It is a high value, so the model has good explanatory power. The F test confirms the explanatory power since it indicates that the set of variables form a good model. at a significance level of 1%.

In the observation of the adjustment accuracy of Model 2. it is noted that the model has an adjusted coefficient of determination of 65.6%. The variations in the profitability of equity are explained only 65.6% by the variations of the explanatory variables that integrate the model. Although it is not a high value, it is considered reasonable and allows us to conclude that the model has some explanatory power. The joint significance test indicates that the variables used form a good model at a significance level of 1%.

Model 3 has an adjusted coefficient of determination of 73.5%. The variations that occur in the profitability of equity are 73.5% explained by the variations of the independent variables that constitute this model. It is a high value and indicates that the model has explanatory power. With this, by observing the F test result, it can be affirmed that the variables together form a good model for a significance level of 1%.

Concerning Model 4, the adjusted coefficient of determination shows that 80.8% of the variations that occur in return on equity are explained by the variations of the model variables. This value is high and, therefore, the model has explanatory power. The F test proves this fact as it indicates that the set of variables forms a good model at a significance level of 1%.

As for specifying model information, three criteria - Schwarz. Anaike and Hanna-Quinn - were analysed. They allowed choosing the best model among the five models studied. According to the criteria selection rules, the model

with the lowest values is chosen. Thus. one can conclude whether the best model is Model 1 (see Table 3). as it has lower values. Accordingly, the adjustment coefficient also indicates, which is the best model that has the highest value (90.3%).

As for the worst model, it can be concluded that it is Model 2. The model has the lowest value in the parameter of the adjusted determination coefficient, indicating that the variations in the explanatory variables justify it in a lower percentage (compared to other models) changes in return on equity. In the three information criteria understudy, it is the model with the highest values.

The impact of the tax effect – global simple

The "tax effect" variable plays an important role in determining the return on equity. The impact measured in percentage terms, for each unit, varies between 0.944% and 1.112%. That is. if the tax effect varies by approximately 1%. the return on equity will vary between 0.944% (Model 3) and 1.112% (Model 1). Concerning the other variables, the "effect of financial charges" under Models 2 and 3 and the "effect of asset rotation" under Model 1 stand out.

In general, concerning the "fiscal effect". the results are in line with the studies carried out by Xianyu (2011). Constantin (2012). Pitulice et al. (2016) and Rotimi and Henry (2017). which show an effect positive effect of the "tax effect" on the return on equity. Concerning the other variables, the direction of the influence on the return on equity is also in line with other studies already carried out. In particular. with the evidence of Batchimeg (2017) who observed a positive influence of the "EBIT margin effect". Also, Gupta and Newberry (1997), Richardson and Lanis (2007), Soliman (2008) and Md Noor et al. (2010) obtain the same results. They are stating that the "effect of asset rotation" is positive. When this variable is negative, the results are in accordance with the results of Janssen and Buijink (2000) and Adhikiri et al. (2006). Regarding the "financial leverage effect". the results are in line with those of the investigation by Delen et al. (2013). who concluded that it had a positive impact.

Conclusion

Using data from companies listed on the German. French. Spanish and Portuguese stock markets we analysed the DuPont models' factors where the tax effect is included. The evidence shows that taxation plays an essential role in explaining ROE. The tax effect alone explains about 29% of ROE. In terms of the impact on ROE, if the tax effect increases by 1% (that is. the tax paid decreases. according to the model), ROE increases by 1.20% which shows the importance of this factor in the decision-making process about investment decisions. The interest burden is the factor that has the most significant impact on ROE and explains approximately 35%.

The analysis was carried out with companies from all countries (global sample). It is important in future research to extend the analysis to each country, taking into account the differences in ETR. The conclusions of this study must be considered taking into account the context of the DuPont model. From the initial sample, we had to eliminate several companies due to the deferred tax accounting procedure. When we think about the DuPont model, we can have the following premises: taxes will decrease profit before taxes and the interest burden will also decrease profit before interest paid. Currently, due to the general adoption of IASB international accounting standards (IAS. IFRS), the accounting context for deferred taxes may not be well understood when using the DuPont model; we expect taxes to decrease profit after tax. not the other way around. Therefore, although we have removed from the sample, the companies that present profits after taxes higher than profits before taxes, the results can be influenced by deferred taxes.

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Remote Education During the CODIV - 19 Pandemic – How to Motivate Yourself to Learn and Stay Motivated

Katarzyna SZMYD

Jesuit University Ignatianum in Krakow, Krakow, Poland
katarzyna.szmyd@ignatianum.edu.pl
https://orcid.org/0000-0002-6016-8564

Motivation is what gets you started.
Habit is what keeps you going.
Jim Ryun

Abstract

The article attempts to approximate the topic related to the use of e - learning as a form of education and related opportunities to motivate participants to learn. Modern education must meet the demands of today's world. The CODIV-19 pandemic became the perpetrator that made remote learning no longer an experiment zone but a fact. This situation also allowed us to look at the nature of man and his motivation to learn in conditions other than traditional teaching. At the outset, the motivation that stimulates the body to act is characterized and the desire to achieve the goal. In turn, remote teaching is described as a support in the didactic process, taking into account its advantages and disadvantages.
The study focuses on the role of lecturers - teachers as external motivators that stimulate and trigger the motivation of students - pupils to learn and thus to achieve their goals. As a summary of the considerations, the author presented examples of recommendations for lecturers conducting remote education.

Keywords: Motivation, E-Learning, Teacher, Process.

Introduction

E - learning is becoming not only an integral part of academic education, but also of learning at its lower levels. It continues to cause controversy and it is certainly not possible to speak of a full acceptance of this teaching method in a not only research and teaching environment but also among participants of distance learning. This form has long been used in universities or enterprises to improve the knowledge of employees, but it has never included such a large group of participants. The CODIV-19 pandemic has accelerated the development of distance learning. All its participants had to adapt to the new reality.

The subject of the article is important due to the psychological and emotional aspects, the impact on the motivating process, how to get motivated and how to stay motivated. Classes prepared for its participants on the e-learning platform should consist of several components. On the one hand, they should allow for the consolidation of messages, on the other hand, they should allow for better assimilation of knowledge and another for building social bonds that are so important.

The main purpose of the article is to provide recommendations for lecturers who should be a kind of mentor for listeners, students and the driving force behind their motivation to learn. It also shows the motivation that is needed by the teachers themselves. The analysis of the presented issues required taking into account many aspects, such as: psychological, pedagogical or social, as well as technical conditions for remote education. The Author interchangeably uses the words lecturer - teacher or student – pupil.

For the purposes of this study, the Author has formulated research questions in order to better analyse the topic undertaken.

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Research Questions

Q1: Motivation and social bonds, or how does working in a group make us "want"?
Q2: How important is the teacher himself in the teaching process?
Q3: How does the teacher influence the student's level of motivation?
Q4: How is the teacher motivated, what drives him to act?
Q5: What will make us motivated at a later time?

The answers to these questions are included in the content of the study.
The article has a theoretical character and was created as a result of literature studies, analysis of the surrounding reality and own experience. In the future, the Author intends to conduct extensive research on the problems faced by students in distance learning and what makes it most difficult for them to motivate to learn and what are the learning outcomes.

Motivation as a source to achieve the goal

Motivation arises when we feel an unmet need, it can become consciously or unconsciously. It is this need that set us a goal and makes us take specific actions, as a result of which - we expect to achieve our goal. If the action taken does not bring the expected results, it is certain that in the future we will no longer take the same action to achieve it. However, if we have chosen the right course of action and the objective has been achieved, we will probably use it again when the need arises. In research on the essence of motivation, the definition of Oleksyn stands out, who used the phrase: motivation aims at making people want to want (Nieżurawska - Zając J., 2020, p. 22). It is the "desire" that encourages us to take further steps or to begin them.

An unmet need motivates people. In literature, there are numerous classifications of needs, they can be summarized as follows: biological, social, achievements, recognition, development, the need for power. Motivation arises from needs, as well as goals and expectations, the motivation is stronger the more people care, how much they believe that their efforts will be crowned with a reward worth the effort, that the need will be met (see Armstrong M., 2007, p. 34-35).

Motivation consists of three phases. In the first, there is a factor called "Motive", it triggers readiness to act, that is, triggers certain behaviours. The choice is then made of a certain behaviour which is intended to have an effect - result (phase II). In the last third phase, there is satisfaction or lack of it. This is, of course, a very simplified scheme of motivation, but it illustrates it in a very clear way.

Motivation can be divided into external and internal. The former consists of the factors that are aimed to trigger certain behaviours, undertake tasks to get the desired effect. Generally speaking, external motivation describes what others are doing to motivate us - in the topic described, it will be primarily a lecturer who will try to liberate the desires and motives to learn by the student - pupil. On the other hand, the internal motivation arises from the work itself, it has not been provided by anyone from outside. "External motivation has a quick and effective effect, but it doesn't last long. Internal motivation related to the "value of work" gives deeper long-term effects "(Armstrong M., 2007, p. 36). Internal motivation is like gold, it is the energy for action that is within every person. They're kind of mechanisms that come into the right mode to propel you even more. There is a situation when we want something very much, something we particularly care about, which causes our thoughts to revolve only around a given goal. At such moments, the very mechanism that is inside us is released.

There are huge deposits of motives in man, located in his consciousness. According to Professor S. Szuman, the ease or difficulty of learning motivation is based on a four-factor theory of development and depends on (Szuman S., 1959, pp. 145-158):

1. our capabilities and properties - they have a genetic basis;
2. our activity change with age;
3. the environment in which we live in, which affects us and to which we adapt;
4. how we are brought up and how and what we learn.

Our motives for action depend on the interaction of the above-mentioned factors and the learning process.

It is worth citing the definition of motivation according to Griffin (Griffin R., 2006, pp. 518-519), which defines it as a system of forces that encourage people to behave in a certain way. In contrast, Lindsley (Lindsley D.B, 1957, 44-105) recognizes that motivation is a collection or a result of forces that initiate, direct and sustain goal-oriented

behaviour. Mitchell (Mitchel T.R., 1982, pp. 80-88) described motivation as a psychological process that initiates direction of actions, and then prompts them to undertake voluntary activities aimed at achieving goals (Nieżurawska - Zając J., 2020, p. 20). All these definitions combine need and purpose, a goal that is an indispensable driving force for action. According to Dweck, goal-oriented students strive to develop their abilities. They confront tasks, striving for their perfect execution. They regard the difficulties associated with this as a natural element of the learning process (Mietzel G., 2008, p. 303). The development of students is a very important element of teachers' motivation, because the most important motivating factor is the learning progress in their learning (Tin L. G., et al., 1996, p. 28).

When determining what motivates other people, care should be taken on the assumption that the source is their constant personality trait. In the first stage, it is important to observe what incentives or risks flow from the outside. Then, to take into account social motivation, Alfred Adler believed that problematic behaviours often have their sources in a sense of personal mismatch and perceived social threats. A healthy personality compensates for this with the purpose or need for cooperation and a desire for acceptance from others, Adler called it a social interest (Zimbardo P., et al., 2017, p. 22). Currently, psychologists try to combine social motivation with external incentives and threats, calling it a "power of the situation."

Motivation is very important in everyone's life. It helps in the proper functioning of our mental and physical sphere. It is needed for, among other things, work or study. The current situation related to the coronavirus may affect this motivation to a varying degree. Unfortunately, space constraints and the introduced general restrictions can have a negative impact on the level of effectiveness of our operation. The emotional state of students turned out to be a serious problem, caused by both epidemic as well as social distance, feelings of loneliness, fatigue and exhaustion. That is why the motivation that lecturers should “infect” with an impulse to make an effort is so important.

E - learning - support in the didactic process

Remote learning, or so called e - learning takes advantage of the opportunities offered by the Internet through which we can disseminate knowledge. At this point, it is necessary to reflect on one of the aspects of its social role. "A social bond comes down to the feeling of" identifying "an individual with a group, i.e. identifying one's aspirations and aspirations of other group members ”(Woźniak - Zapór M., 2017, pp. 18-19). In the process of remote learning, it is very difficult to "ensure the implementation of social functions performed by a group of learners: stimulating interest through social pressure, mobilizing to effort by fighting for the recognition of the group (...),the social effects of grouping people in a similar social situation" (Woźniak J., 2009, p. 56).

The Internet has emerged in many areas of life, from various forms of education, through entertainment, interpersonal communication, to remote work, as we already know and use. The Internet is no longer just a technical domain. It is necessary to focus on its social activity for many groups, it has become an indispensable part of social functioning that allows to satisfy the majority of social needs and motivations (Zając J.M., Krejtz K., 2008, p. 191).

E - learning covers six areas such as technology, content, people, context, behavior and communication, they are interrelated and influence each other. In order for a given course, training to be successful, regardless of the unit in which it is implemented, it cannot take place without taking any of them into account. A well-prepared e-learning training should meet the relevant requirements in terms of: content, learning process, personalization of e-learning, learning culture and technology (Plebańska M., 2011, pp. 13-15). Today, technology plays a key role in the teaching process. Modern forms of communication have become a catalyst for the progressive integration and globalization, these processes have a direct impact on the operation and functioning of the educational sector (Olearnik J., 2011, p. 13).

In 1996, the concept of a knowledge-based economy was defined by the Organization for Economic Cooperation and Development, it was recognized as "an economy based directly on the creation, distribution and use of knowledge and information" (The Knowledge - Based Economy, Paris, 1996, p. 7). The knowledge-based economy of its kind is based on a constant increase in quality and productivity, and the demand for knowledge itself and for qualified employees is growing, which is the result of didactic work (Olearnik J., 2011, p. 11). However, it should also be noted that in 2010 the European Council adopted the Europe 2020 strategy, which has one of the priorities being "smart growth: development of an economy based on knowledge and innovation" (Europe 2020, p. 6).

The forms of distance learning have been used for many years and are an effective tool to support education not only adults but also children. Remote learning enables a wide range of education levels in society. One of the priorities of the European Union is to support the electronic form of teaching, building open, attractive and accessible learning environments for everyone.

Selected advantages and disadvantages of the distance learning system (Lorens R., 2011, Warszawa – Bielsko – Biała, p.10.).

Advantages:

- freedom to choose the time and place of learning
- the independence of the student's and learner's location,
- reduced participation costs (e.g. travel, accommodation, meals, loss of working day),
- quick access to teaching materials,
- the possibility of repeated acquaintance with the teaching material,
- modern, interactive educational materials,
- greater opportunities to individualise work with a student who is capable or has learning difficulties,
- more contact possibilities with the teacher outside of school hours,
- improving the use of information and communication technology in practice,
- shaping the ability to take responsibility for development and education,
- acquiring the skills of systematic work, opportunity to improve IT skills.

Disadvantages:

- the need to have both adequate computer equipment and high-speed Internet connection,
- the need to know how to use your computer and efficient typing,
- limited personal contact between learners and teacher,
- greater possibility of dependent work on the part of students,
- limited possibilities to motivate the student,
- difficulties with the systematic work of the student,
- poor ability to control the student's work, decrease in motivation in case of technical problems with the platform.

Only selected advantages and disadvantages are listed above, of course it is impossible to list them all. E-learning will surely always have its supporters and opponents. However, one thing is certain, technological progress meant that, despite the adversity brought about by the pandemic, we are able to meet the requirements for the transfer of knowledge to teachers, lecturers and trainers.

Summing up, special attention should be paid to the important fact that humans play a decisive role in both traditional and online teaching. Based on the most modern techniques of knowledge transfer, it is people who are a key part of this system, both the learner and the taught person.

Motivating learners on e-learning courses - the role of the teacher and the learner as a joint process for achieving the goal

In time with the development of information technology, there are changes in the roles of students and lecturers. A teacher - lecturer who has the competence to conduct classes in his discipline, has numerous scientific achievements, should also expand his skills in the organization and implementation of the didactic process. As it turned out, during the coronavirus epidemic, many teachers were surprised by the lack of even basic knowledge about creating and operating courses in distance learning. Lecturers were confronted with the fact "overnight", for many it was a completely foreign tool especially for teachers in primary or secondary schools.

According to the research conducted during the coronavirus epidemic, which was carried out by Centrum Cyfrowe in cooperation with the Centre for Civic Education and the School with Class Foundation, as many as 85% of the teachers surveyed had no previous experience with remote learning (Centrum Cyfrowe, 2020, p. 5). However, it is hardly surprising that the basic model of traditional education was the classroom form.

Teachers were put to a great test and had to develop a new teaching methodology, which entailed some limitations. You cannot forget about an additional psychological factor not only for teachers but also for students for whom, as a result of a pandemic, the learning process has become a highly traumatic and stressful experience. In such situations, the motivation to work and study is, unfortunately, strongly weakened. Despite various obstacles encountered by the lecturers, whether they were problems with the equipment, Internet access or prosaically lack of space for peaceful learning, they were up to the task. Most teachers have even decided to use more than one e-learning method despite being aware of their extra time. Their motivation to take such actions is primarily the desire to facilitate and improve the learning process. Meeting students and not, in rare cases, parents.

The role of a teacher, lecturer, trainer, any person conducting classes or various types of online courses should be to motivate students and to be interested in what is happening at any given moment, as well as to further independent learning, in this way "students learn independence in organizing their time and the place of study, thus also in the future they should not have problems in acquiring knowledge, skills or expanding their competences ”(Woźniak - Zapór M., 2017, p. 57).

In view of the above, sample guidelines have been developed - recommendations for lecturers conducting remote learning:

1. Easy to provide up to date information on the teacher-student line.
2. Additional feedback provided to individual participants.
3. Carefully prepared educational content rich in multimedia forms.
4. Creating tests, questionnaires that will not only be motivating by focusing on success, but will provide an opportunity to enrich and deepen the mastered content.
5. Create short and short-term training modules. Short modules will contribute to a greater motivation of the student and will also result in the completion of the course to a significant extent. However, in this case, the strongest factor is the individual need resulting from the need to absorb the content learned during the classes.
6. Presented multimedia educational content, created in such a way as to create the possibility of additional interest of the student.
7. Maintaining adequate flexibility in on-line teaching.
8. During remote classes, the teacher should give a sense of security and be fully committed.
9. The process of motivating to learn will be facilitated by the on-call aspect - consultations appointed by the teacher for students, they will be able to address questions and problems during this time – an individual approach. Involvement and listening will make the participant feel special and thus will be more motivated to continue working.
10. The lecturer should organize work in groups during the classes - such a procedure will have a positive effect on getting to know the participants and making closer relationships, secondly, it can trigger a competitive factor, which will additionally be a motivating factor for further learning.
11. React to the participants' signals, you should "read between the lines" - that is, to try to capture the suggestions of the listeners during the course.
12. Apply rewards and punishments (assessments), in the education process it is important to shape behaviours, norms and values and it is important to check that they are respected. In this way, we teach the hierarchy of norms. However, experience and research indicate that positive reinforcements are more effective. The award provides positive emotions and thus motivates the repetition of behaviours that led to success.
13. The lecturer as a "leader" should not dominate, but skilfully convince students to achieve a common goal (transfer of knowledge and encourage further study - the lecturer and the student's goal will be, for example, to pass an exam or to work in a dream position in connection with obtaining the appropriate qualifications).
14. The last point, but how important it is to be not only a teacher, but also in a certain way, a psychologist, the ability to pick up and react to emotions.

This thread is especially important during the coronavirus pandemic. Isolation from social life, lack of contact in the real world makes students lost and they do not know how to control their emotions – to find themselves in a new situation for all of us, which also affects their poor motivation to learn. In the United States, the concept of "learning social and emotional skills", in short SEL (Social and emotional learning) has started to appear in curricula since 1995. It has been proven that SEL is an active component of programs that improve learning ability. “Helping children to develop self-awareness and gain self-confidence, control emotions and impulses and the development of empathy leads not only to better behaviour, but also to a measurable improvement in academic performance” (Goleman D., 2005, p. 15). Such preparation gives invaluable results in facing problems in further professional and personal life.

The motivation of lecturers is extremely important, substantive preparation, positive attitude and their commitment strongly influence the motivation of students. It is the external motivation that the lecturer is able to offer that can lead the student to fulfil his / her needs and, consequently, to satisfaction. The student will remain motivated in the long term through memories, he will be able to return to the moments that gave him a positive motive to act.

Summary

Modern education must meet the demands of today's world, keep up with the need for a growing knowledge society. These needs arise from the need to solve problems not only with those we have to face now during the CODIV-19 pandemic, but in the broader perspective, because the growing technological capabilities give us a wide range of activities, especially opportunities to use it in education. Participation in distance education has become a fact, it required of teachers, or at least from the majority of them, as the research shows, quick acquisition of skills and a methodological workshop based on information and communication technologies. The article is devoted to remote education, but it is a tool for motivation for both lecturers and students. Motivation works in two ways. Motivated to work teacher will be happy to pass on substantive knowledge, which he will be able to pass on in an interesting way to his students, who, encouraged to learn, will be motivated to make an effort to also draw satisfaction from the lessons acquired. To sum up, in such a closed circuit, lecturer – student – lecturer will all drive themselves to action, they will motivate themselves and with such an attitude they will remain motivated - perhaps for a long time to continue to act, recalling the positive aspects of motivation.

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Selected Initiatives of CSR Practices Towards Employees as An Expression of Concern for Human Capital in The Light of Findings of Primary Studies

Agnieszka KWARCIŃSKA

Department of Human Capital Management, Institute of Management, University of Szczecin, Szczecin, Poland

agnieszka.kwarcinska@usz.edu.pl

Abstract

The significance of the condition and advancement of human capital currently comprises a determinant of the dynamics and progress of both economies as a whole, as well as different actors functioning on markets. It is therefore important that we pay attention to the need for caring for human capital in various dimensions and that we continuously look for alternatives to improve its condition and create growth opportunities. This is where the concept of corporate social responsibility, or CSR is helpful. With its principles, CSR is fully consistent with the sphere of responsibility of entities (organizations) for, among others, employees. Because of that, in the dimension of performance, the delivery of activities in this field can effectively determine the quality and development of human capital. The aim of the article is essentially to present the results of primary research conducted in 2019 on a group of 301 enterprises from the Zachodniopomorskie Voivodeship in Poland, regarding the implementation by these entities of selected activities addressed towards employees in the field of corporate social responsibility. The results of these studies provided the basis for the formulation of key proposals regarding, inter alia, the degree of involvement of these entities in the implementation of CSR-related activities towards employees, as well as shaping human capital. The studies allowed to indicate a peculiar insufficiency of taking responsibility in this area of CSR and the need to raise awareness about the importance of caring for the human factor in the organization.

Kod JEL M12, M14

Keywords: Employee, Human Capital, Human Resources Management, Corporate Social Responsibility, Stakeholders

Introduction

Human capital as a function of abilities, knowledge, skills, education, specific characteristics of particular individuals, their experience, attitudes, health, willingness to work, motivation and commitment represents the most important factor of development in the macro and microeconomic dimension. The levels of interest in the quality of human capital include both individuals, who in a somewhat direct way care primarily for personal development, as well as organizations, enterprises that engage and use the human factor in an economic sense and derive specific benefits, in a scope more than merely material, and finally countries aware of the importance of this determinant as the major driver of long-term socioeconomic development. This article focuses on the level of enterprises in an entity-based approach; this point of view was used to exemplify two groups of entities representing the service sector. On the other hand, in a subject-based approach, an attempt was made to analyze the degree of undertaking practical steps towards employees by the surveyed companies as part of implementation of the concept starting points of corporate social responsibility (CSR), assuming their favorable influence on the condition and development of human capital. Examples of corporate involvement cover the two main factors of staff management, namely occupational health and safety and health protection.

Both the entity-based and subject-based approach were of interest mainly for two reasons. First, because of the importance of the service sector today. Secondly, in view of the fact that modern enterprises undertake the implementation of the broadly understood concept of corporate social responsibility. It should be added that the second premise is the leading issue of this article, which comprised the base for preparation and analysis of the research material. The primary focus was specific activities in the field of CSR concepts undertaken by enterprises in relation to their employees, and the legitimacy of their implementation was compared to a specific support for the care of human capital. It can be noted that the research efforts are extremely important, which can be demonstrated

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by the ever-growing number of publications covering similar issues (Kwarcińska, 2018; Zieliński, 2014; Furmańska-Maruszak, Sudolska, 2017; Badura-Mojza, 2016; Kaźmierczak, 2018). These publications refer to the theoretical aspects of CSR concepts concerning the relations with staff in the organization, as well as the human resource management process (Herrera, Heras-Rosas, 2020; Voegtlin, Greenwood, 2016), and often have an application dimension (Nowak-Lewandowska, 2009; Gadomska-Lila, 2012). Dissatisfaction could be caused by the lack of comprehensive and clear approaches to this topic, probably also due to the variety (Kwarcińska, 2019) of possibilities for individual organizations to become involved in the implementation of the CSR concept.

The functioning of enterprises on the basis of the principles of corporate social responsibility

Assuming the evolutionary nature of the development of enterprises, taking into account the increasing number of determinants of their functioning and the increasing competitiveness, it can be observed that today's organizations are increasingly turning towards the awareness of responsibility. What follows is that they take into account the impact of their activities on various groups of stakeholders and the consequences associated with it, and at the same time recognize the meaning behind analyzing this impact and creating mutual relations. Such assumptions of responsibility form grounds for the concept of corporate social responsibility known as CSR (Kwarcińska, 2015). It is worthy to mention that the source of social responsibility is probably the idea of sustainable development, and its application dimension represents a set of activities undertaken, among others, by enterprises in relation to their broadly understood environment. In this sense, two dimensions of considering corporate social responsibility are most often indicated: external and internal. In this approach, the external dimension includes:

- "impact on local communities,
- relations with business partners, shareholders, suppliers, customers, public institutions,
- respect for human rights,
- care for the natural environment" (Bartkowiak, 2011).

On the other hand, the internal dimension takes into account:

- "safety at the workplace,
- human resources management,
- management of raw materials consumed by the enterprise and
- environmental impact" (Bartkowiak, 2011).

This means that when running their primary business activity, enterprises, i.e. de facto representatives who manage them, are aware of the subject-based links functioning on the market and take into account the importance of the values at their disposal and those which they direct to all colleagues. At the same time, they know the importance of the impact of mutual relations on a number of decision-making processes and the future of the company, and therefore on a practical level of their activities they undertake a number of heterogeneous activities in various areas of responsibility. The intensity of involvement in individual dimensions is driven by a number of factors, and a comprehensive approach often becomes a long-term development challenge.

The importance and adaptation possibilities of CSR for various organizations have been repeatedly indicated and emphasized by various types of international organizations in the form of peculiar normative guidelines (Kwarcińska, 2016) while keeping their application and the freedom to select a set of specific activities on a voluntary basis. By way of example, it is worth quoting the proposed OECD provisions of the Guidelines for Multinational Enterprises, dealing primarily with the aspects of disclosure of information, human rights, employment and labor relations, environmental protection, combating corruption, protecting consumer interests, science and technology, competition protection. One could also mention the principles of the Caux Round Table relating to conducting business, as well as the Global Compact principles covering the main areas of business operation, such as: human rights, labor standards, environmental protection, anti-corruption strategy. Finally, also worthy of special notice is the "Green Paper: Promoting framework for Corporate Social Responsibility" prepared by the European Commission, in which, given the division of responsibility into the internal and external dimensions, the following aspects are emphasized: investing in human capital, health and safety, change management, interaction with the local community, business partners and suppliers, customers and finally public authorities, and responsibility for the natural environment.

The normative basis that allows various organizations to engage in shouldering of responsibility in the most active and holistic manner seems to be the ISO 26000 – Guidance on social responsibility (Norma ISO26000). It serves as a kind of a practical guide to systematized aspects covering seven main areas of the organization's functioning, among which various issues are taken into account. The first aspect relates to organizational order and, in its assumption, concerns the functioning of the entire organization and thus all areas of social responsibility. Then, the sphere of human rights is indicated, in which there are issues such as: due diligence, threats to human rights, avoidance of complicity, treatment of complaints, discrimination and particularly sensitive groups, civil, personal and political

rights, economic rights, fundamental principles and rights at work. Another area known as the best practices at work covers employment and industrial relations, working conditions and social protection, social dialogue, occupational health and safety, as well as human development and on the job training. The next important area according to ISO 26000 is the environment, and this is where prevention of pollution, sustainable resource use, mitigation and adaptation to climate change, environmental protection, biodiversity and the restoration of natural habitats come into play. Aspects of fair market practices are also stressed, including: anti-corruption strategy, responsible involvement in political activities, fair competition, promoting social responsibility in the value chain, and respecting property rights. The penultimate area relates to consumer concerns, and the following are considered important: fair marketing, truthful and objective information and fair contractual practices, consumer health and safety, sustainable consumption, consumer service, support and complaints and dispute resolution, data protection and consumer privacy, access to basic services, education and awareness. The final area is social engagement and the development of the local community, which emphasizes social commitment, education and culture, creating jobs and developing skills, technological development and access, creation of wealth and income, health, social investment. The CSR areas presented on the basis of the ISO 26000 standard are, on the one hand, a synthetic and structured approach, and on the other, a broad spectrum of subjective interactions and subject-based dependencies of each organization. This may be the reason why applying this standard to the guidelines allows not only to take fragmentary actions as part of implementation of CSR, but also to notice the significance and exact scope of each area and to find a way to take this otherwise moral obligation of responsibility in a comprehensive manner.

Based on the cited basic normative provisions concerning the principles and specific problem areas of corporate social responsibility, it can be noted that the essential framework of its scope has been outlined. Therefore, it is the responsibility of entrepreneurs, as an expression of voluntary commitment to the implementation of CSR, to initiate concrete actions towards their stakeholders, among whom employees are repeatedly considered the most important group.

Employees as the basic stakeholders of enterprises

For good reason, the staff of organizations are assigned a particular rank as the most important stakeholders. The dynamism of the contemporary world means that only people are able to meet the requirements of the ongoing need to adapt to change with their knowledge and commitment. This seems possible mainly through the application of analytical skills and reacting flexibly. Such are the abilities of employees in organizations, and they are those who have a direct impact on the functioning of each market entity, generate its competitive position and enable it to maintain it in the long term. The force of their impact is often essential for shaping all dependencies and processes in the enterprise, both internal and external. After all, the commitment and determination of the staff determine the effectiveness in achieving the objectives of economic entities. It is also a kind of showcase of the organization and creates its brand. The recognition of these interdependencies and of the value of employees by employers is therefore the basis for building the organization's sustainable development and often represents the first step in the direction of taking responsibility towards employees in accordance with the concept of CSR. A practical embodiment of the implementation in enterprises of such assumptions is each time, regardless of the type of stakeholders, a set of specific initiatives undertaken towards employees, subject to general normative guidelines. The main subject of this article are primarily measures taken towards staff. These measures take different forms depending on a range of determining variables. Selected examples of employee engagement activities of Polish enterprises, arranged according to the aspects of human resource management, are presented in Table 1.

Table 1: CSR initiatives of employers towards employees with a view to selected aspects of human resource management

Area of involvement	Examples of initiatives
Personnel planning	programs for pupils and students, patronage agreements with schools, internship programs, apprenticeships, scholarships, field trips for students, programs for talented students, participation in job fairs, presence in social media and specialized websites, cooperation with career offices, employee referral programs
Induction,	initial training, foreign training campuses, onboarding programs, support from experienced employees
Staff appraisal	evaluation system taking into account the achievement of objectives, assessment of competences and skills
Renumeration and rewarding	uniform remuneration rules, open remuneration system, bonus remuneration system, holiday subsidies, gift cards, housing loans, non-returnable random allowances, co-financing of theater tickets,

	concerts, packages for children of the employees, transport for employees, co-financing of integrative events
Education and development	organizing stationary trainings, e-training, on-line training for various positions, foreign language courses, postgraduate studies, career reviews, managerial programs, projects promoting women's development
Motivating	implementing ideas of employees that improve efficiency, introducing individual goals, regular work quality assessments, internal recruitment
Balance between work and private life	shortening the working hours for pregnant women while maintaining full-time remuneration, shortening the working hours for all employees, e.g. by 2 hours, family day, visiting the workplace by the family, workshops, advice, exercises on the subject of professional burnout, building family bonds, coping with stress, supporting the passion of employees through participation and rewarding, one-time financial support on the occasion of the birth of a child, flexible working hours, home-office
Communication	face-to-face meetings, intranet, videoconferences, posters, e-mail, platforms - employee forum, travel meetings, newsletters, corporate magazines, message boards, support in communicating changes
Employee satisfaction	staff satisfaction surveys, competitions for employees, company picnics for employees and their families
Corporate volunteering	aid schemes, engagement in charity, donating blood, collection of batteries and waste electrical and electronic equipment, collection of Christmas presents for the poorest families

Source: Compiled on the basis of selected social reports submitted in the 12th edition of the "Raporty Społeczne" ("Social Reports") competition, [http://raportyspoleczne.pl], quoted after: (Kwarcińska, 2019).

The set of initiatives undertaken by employers presented in Table 1 is not exhaustive and does not mean that each of the cited examples was present in every organization. In this respect, one can notice significant variations in the surveyed enterprises both in terms of the type of involvement, i.e. the choice of a specific activity, and its intensity in individual aspects of staff management. It is striking that Polish employers are even taking up the challenge of accepting responsibility towards their employees. This allows to draw a constructive conclusion about the growing degree of companies' awareness about the importance of employees. The reaction in the form of generating interest in the staff, their plans, degree of job satisfaction, motivation, future, development, and even their private life is moving in the direction of recognizing the value of involved human capital. Therefore, there are visible initiatives that include in their scope care for individual elements of human capital, and thus for its condition and development.

Implementation of selected CSR activities towards employees in the light of the results of primary research

Focused empirical analyses presented in the further part of the article concern primarily a verification of the level of commitment of the surveyed enterprises in CSR activities towards employees in terms of ensuring occupational health and safety and health protection. It was assumed that the efforts made by employers, inter alia, in these two aspects are also determinants of care for human capital.

Research Methodology

The basis for conducting research, whose partial results are presented in this article, was the analysis of social reports of Polish enterprises published at http://raportyspoleczne.pl. This analysis represented a primary source of information on non-financial CSR activities towards employees of these organizations. The selected initiatives were contractually assigned to certain aspects of staff management and addressed in the form of survey questions regarding their implementation to a group of 301 enterprises from the Zachodniopomorskie Voivodeship in Poland conducting business activity in the service sector. The structure of the questioned respondents, with respect to the scope of their business, included 150 entities conducting accounting and bookkeeping activities, as well as tax consultancy (PKD 69.2 section) and 151 entities operating in the field of cleaning services (PKD 81.2 section). On the other hand, considering the number of employees, it comprised almost 86% of establishments employing from 1 to 9 people, 13% of organizations with 10 to 49 employees and 1% of companies employing 50 to 249 people. The aim of the study was to determine the extent of involvement of the questioned respondents in the implementation of selected CSR activities towards employees. The rationale for formulating questions about concrete initiatives is the observation that companies often undertake various types of actions towards their employees, but are not aware that those actions

could be classified as CSR activities. That is why the set of initiatives selected from social reports was treated as a reference point for the application of good practices with the possibility of supplementing with other activities undertaken by the questioned respondents in each of the proposed aspects of human resource management.

Research Results

Table 2 shows the percentage of replies confirming the implementation of selected activities in the aspect of occupational health and safety in both groups of enterprises, broken down into their current implementation, their presence in the past, i.e. during the last three years of the enterprise's activity, and planning for their implementation in the coming year.

Table 2: Percentage of replies confirming the implementation of selected measures in the field of occupational safety and health

Type of action / PKD section	The action is being implemented		The action has been implemented		The action will be implemented	
	69.2	**81.2**	**69.2**	**81.2**	**69.2**	**81.2**
measurement and monitoring of activities in the field of health and safety	54,67	49,67	15,33	9,27	7,33	8,61
adopting additional goals, e.g. "zero accidents"	10,00	11,92	0,67	3,97	0,67	5,96
additional security plans	18,00	27,15	5,33	3,97	0,67	3,97
short but frequent lectures on health and safety issues	19,33	40,40	4,67	18,54	0,67	15,89
organizing a health and safety week	2,67	4,64	0	0	0	0,66
applying additional protective measures	8,00	17,22	2,00	4,64	0	5,96
health and safety knowledge competitions	3,33	1,99	0	0,66	0	0,66
instructional videos	11,33	4,64	4,00	1,99	0	0,66
security fairs	8,00	3,97	0,67	0	0,67	0
anonymous helpdesk	1,33	0	0	0	0	0

Source: Compiled on the basis of primary research.

The analysis of the structure of responses in the field of occupational health and safety allows, first of all, to observe that activities in this aspect in both groups of enterprises focused on measuring and monitoring occupational health and safety activities. Such action was indicated by over 54% of companies conducting accounting and bookkeeping, as well as tax consultancy operations, and nearly 50% of companies providing cleaning services. On the one hand, such a scale of responses seems relatively high considering the percentage of replies confirming a different type of activity, but on the other hand, one could stress dissatisfaction and fears that half of the surveyed enterprises do not implement such major activities from the point of view of protecting employees during the performance by staff of official duties. Another conclusion shaped on the basis of the presented results is the synthetic constatation that, by far, a relatively higher percentage of companies cleaning facilities compared to accounting and tax advisory companies:

- adopts additional health and safety objectives, e.g. "zero accidents" - approx. 12% compared to 10%,
- applies additional health and safety security plans - approx. 27% compared to 18%,
- organizes brief, but frequent lectures on health and safety - approx. 40% compared to approx. 19%; at the same time, almost 19% of the surveyed cleaning companies declared that such activities had been implemented and almost 16% that they would appear in the future,

- organizes a health and safety week - approx. 4.6% compared to 2.7%,
- applies additional protective measures - approx. 17% compared to 8%.

The main justification for such results is probably the unique quality of activities of both groups of enterprises. The risk of various types of hazards, dangers, harmful and burdensome factors in the workplace in cleaning companies is much greater. In this case, it is therefore more justified to apply additional security plans and supporting protective measures.

Another observation following the analysis of results presented in Table 2 concerns the relatively more frequent involvement of accounting and tax consultancy firms compared to facility cleaning companies in occupational health and safety competitions, safety fairs, presenting instructional films and launching an anonymous helpdesk. Nevertheless, it has to be underlined that in each of these exemplary activities, the participation of both groups of enterprises is still minor, simultaneously with the prevailing indications that such initiatives have not been implemented and will not be undertaken. It therefore seems that these measures are definitely not used readily. This leads to the question about justification of the lack of such interest, which could probably form the basis for the implementation of further, in-depth research in this area.

On the other hand, Table 3 demonstrates the percentage of replies confirming the implementation of selected healthcare measures in both groups of enterprises, taking into account also their division into the current implementation, their occurrence in the past, i.e. during the last three years of the company's activity and planning their implementation in the coming year.

Table 3: Percentage of replies confirming the implementation of selected measures from the aspect of health protection

Type of action/PKD section	The action is being implemented		The action has been implemented		The action will be implemented	
	69.2	81.2	69.2	81.2	69.2	81.2
medical care packages for employees and their families	33,33	23,18	7,33	5,30	9,33	3,97
sports cards for employees and their families	12,00	9,27	0,67	0,66	4,00	1,32
life insurance packages	42,00	33,77	8,67	3,31	6,67	5,96
amenities for cyclists	0	1,32	0,67	0	0,67	1,32
organizing meetings with experts in health, healthy nutrition and lifestyle	0,67	0	0,67	0	0	0
psychological support	2,67	0	0,67	0	0	0
swimming co-financing	0	0	0,67	0	0	0
instruction in preventive exercises for those working with monitors	4,00	0	0	0	0	0
cooperation with suppliers of healthy food for employees	0,67	0	0	0	0	0

Source: Compiled on the basis of primary research.

The basic conclusion that can be drawn after analyzing the structure of replies confirming the implementation of selected activities by both groups of enterprises concerns the relatively most common indications with regard to offering life insurance packages to their employees. Exactly 42% of accounting and tax advisory companies as well as nearly 34% of cleaning companies declared to offer life insurance packages. Concurrently, a relatively large

number of indications also concerned the use of medical care packages for employees and their families, with indications of approximately 33% in the case of accounting and tax advisory companies and approximately 23% in the case of cleaning companies. It seems that activity in this area is perfectly justified and could probably be promoted among companies that have not declared their position in this respect.

A characteristic effect revealed on the basis of the results presented in Table 3 is the relatively prominent involvement of employers in the area of sports activities, and to a slightly greater extent in accounting and tax advisory companies - 12% declared offering sports cards for employees and their families, compared to 9% of cleaning companies. Such a result confirms that practicing sports is probably perceived by the surveyed entrepreneurs as a crucial element of health care, and the differences in the degree of involvement of individual groups of enterprises are justified, for example, due to the type of professional activities, which, for the most part, are more physically demanding in cleaning companies.

The last conclusion following the analysis of data in Table 3 actually concerns answers confirming the involvement of enterprises in the implementation of all other activities and boils down to the conclusion that both groups of enterprises are not favorable to their implementation, with a relatively minor exception being the use of preventive exercises for people working at monitors and psychological support by accounting and tax consultancy companies.

Conclusion

Certainly, the formulation of overall conclusions on the basis of fragmentary research does not constitute a comprehensive, clear and unambiguous picture of the situation. That said, it allows to recognize the basic positives and indicate the existing imperfections in the scope of the undertaken research area. The thematic scope presented in this article is related to two extremely important issues. Firstly, it takes into account one of the most important areas for modern business entities to engage in the implementation of the CSR concept involving employees. Secondly, it explores the significance of the application dimension of specific activities from this aspect for the care of human capital. Taken as a whole, both issues allowed to indicate the overall undertaking of activities in the field the surveyed enterprises' involvement in the implementation of the basic assumptions of corporate social responsibility in the employee aspect, however, with a view to a shortfall, if only in these two aspects of human resource management selected for analysis. Concurrently, although to a moderate extent due to the narrow research dimension, they have contributed to formulating the constatation covering the statement that today's employer is not yet fully aware of the range of activities that he could pursue to take care of the human capital in every employee. It is therefore appropriate to conduct further research in this field, expanding, for example, the degree of involvement of enterprises, also from other sectors and specific scopes of activity, in taking CSR activities towards employees in further aspects of human resource management. It also makes sense to call attention to the necessity to undertake educational and training activities covering both the application dimension of the concept of corporate social responsibility and the area of shaping awareness of the importance of human capital for the organization.

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Banks Needs for Predictive Analytics and Predictive Models in Cost Management System[1]

Mariia SIGOVA
ITMO University, Saint Petersburg, Russia
sigovamv@ibispb.ru

Sergei KONIUKHOV
ITMO University, Saint Petersburg, Russia
rick@ibispb.ru

Ekaterina SOLIAR
International Banking Institute named after Anatoliy Sobchak, Saint Petersburg, Russia
catherine.mew@yandex.ru

Abstract

One can only trust the numbers, like any other information, after its scrutiny. Data on our actions matters much more than data on our words and intentions. Big data is a series of approaches, tools and methods for processing structured and unstructured data of a large volume and its diversity to obtain human-perceived results. It is effective in conditions of continuous growth, distribution over numerous computer network nodes, formed in the late 2000s, as an alternative to traditional systems and solutions for managing database information in the Business Intelligence class. Big data is a proven, albeit relatively young field of technology that has spread to many areas of business and plays an important role in a business development. Big data technologies have marked the moment when the concept of "information society" has acquired a full meaning. Information has become the status of a valuable asset, a kind of new oil that drives the information society, just as traditional oil was the main resource in the era of industrial society. Big data technologies are vital for modern banking. Asset management, risk assessment, retention and expansion of the customer base – these are options unavailable to perform without training in Big data.

Keywords: Big data, data mining, data science, cost management, banking, predictive analysis.

Introduction

There are three illusions about digital infallibility:

Firstly, the numbers are accurate. When some doubt occurs, the first desire is to add digits after the decimal point to make them look more accurate. In fact, numbers are only as accurate as the process that generates them.

Secondly, the numbers are objective. In reality numbers can be as biased as words, but in numbers it is much easier to hide the bias. For example, while forming a set of data on the rates at which foreign companies pay taxes, three indicators of tax rates are presented: from a simple average value of rates for all enterprises in the sector, which gives the lowest value, to weighted average rates calculations exclusively for profitable enterprises, which gives more value. If we want to show that foreign companies pay little taxes, then we will show only the first figure and will be silent about the rest, and if we want to convince people otherwise, we will take the last figure.

Thirdly, the numbers give us control. A person strives for control, and numbers help him. It seems to us that attaching a number to an unstable or uncontrolled indicator allows us to control it.

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One can only trust the numbers, like any other information, after its scrutiny [7].

Data is not equal to information. The data is different. Data on our actions matters much more than data on our words and intentions, for example, an upbeat social media post on Apple is not as useful as data on buying Apple stock. It should be taken into account that there is a general trend towards combining social media data with financial data to create "super" databases. The main task of data analysis should remain not to create distracting graphs and statistics, but to transform data into information.

If everyone has data, then in fact no one has it. Data has its real added value in case we have exclusive access to it or a unique method of processing this data. That is one reason why investors cannot turn broader access to financial data into a source of profit.

Not all data can be used. For example, if a company offers a specific set of products and services, it must be prepared to modify existing products and services or introduce new ones based on the information received [1].

Characteristics of the concept of "Big Data"

The term "Big data" is relatively recent. Since 2011 Google Trends has seen an active growth in the use of this phrase, and these days the term has already been used quite often.

But what exactly does the term "Big data" mean?

According to the common definition, "Big data is a field that treats ways to analyze, systematically extract information from, or otherwise deal with data sets that are too large or complex to be dealt with by traditional data-processing application software. Data with many cases (rows) offer greater statistical power, while data with higher complexity (more attributes or columns) may lead to a higher false discovery rate. Big data challenges include capturing data, data storage, data analysis, search, sharing, transfer, visualization, querying, updating, information privacy and data source. Big data was originally associated with three key concepts: volume, variety, and velocity. When we handle big data, we may not sample but simply observe and track what happens. Therefore, big data often includes data with sizes that exceed the capacity of traditional software to process within an acceptable time and value" [4].

Using Big data mechanisms, we do not operate with a specific set of data but rather with methods of processing the entire set of data which is allowed for distributed information processing. The mentioned processing methods can be used both for processing a truly large amount of data – the content of all web pages on the vastness of the World Wide Web, and for processing relatively small amounts of data – the content of this article.

Here are some examples of data sources that may require Big data technology to process:

1. logs of user actions on the Internet;

2. indicators of the game players' online activities;

3. data collected from the Large Hadron Collider;

4. digitized medical records of patients;

5. data on all bank clients' transactions;

6. a log of data on purchases of a particular store chain.

As the number of data sources grows steadily, interest in big data technology is also in demand [8].

Based on the definition of Big data, we can formulate the basic principles of data maintenance:

1. Horizontal scalability shows the amount of unlimited data; in this regard any system that assumes the processing of big data must be scalable.

2. Fault tolerance emerges in horizontal scalability; it implies that there can be several machines in a cluster, so methods of working with big data must take into account the possibility of large-scale failures and their ability to survive without significant consequences.

3. Locality of data is in large distributed systems, data is distributed over a large number of machines.

All modern tools for working with Big data somehow follow these three principles. To follow them, one needs to invent some methods, techniques and paradigms for developing data mining tools.

The Big data field is characterized by the following features:

Volume is the amount of accumulated data.

Velocity is the speed of data accumulation.

Variety is data diversity, the presence of structured and unstructured multi-format information that can be processed.

Veracity is driven by the concept that “only reliable data matters”.

Value is data significance.

If the above 5 conditions are met, the accumulated data volume can be classified as large.

The scope of Big data technology is extensive, it can be used to clarify customer preferences, study the effectiveness of marketing campaigns, or conduct risk analysis. As a result of a survey by the IBM Institute on the use of Big data technology in business, the following data was obtained: most of the companies use Big data technologies in the field of customer service, the second most popular areas are operational efficiency and risk management, but the use of Big data at this stage is the least widespread.

It should also be noted that Big data is one of the fastest growing areas of information technology; in accordance with statistics, the total amount of received and stored data doubles every 1.2 years.

Thus, Big data is a well-established, albeit relatively young, field of technology that has spread to many areas of business and plays an important role in business development.

Data Analytics Models

It is customary to distinguish four types of data analytics which differ in the level of information complexity and the degree of human participation:

1. Descriptive (descriptive) answers the question “What happened?” by creating a summary of historical data for later analysis.

2. Diagnostic analyzes information to answer the question “Why did it happen?” In this case, statistical methods of data analysis are used to classify, drill down and identify correlations in order to determine the key factors affecting the results.

3. Predictive (prediction, forecasting) predicts unknown events in the future, answering the question “What can happen?” based on the analysis of accumulated information using the following methods: mathematical statistics, modeling, machine learning and other areas of Data Science, as well as data mining.

4. Prescribing (prescriptive) answers the main management question “What to do?”, using the methods of intelligent data processing. All accumulated and processed data is analyzed to find the optimal solution for each specific situation.

Application of predictive analytics (data mining) as part of Big data technologies in the banking sector.

The bank, like any commercial organization is undoubtedly interested in increasing profits.

Let us consider the options for using Big data technology in the banking sector.

Get a complete view of your customers with their profiling.

Customer segmentation has long been common in the financial services industry, as it allows banks and lending institutions to categorize their customers into clear demographic categories, but basic segmentation is not detailed enough for banking institutions to understand the true wants and needs of their customers [11]. The use of Big data technology in the banking sector helps to bring segmentation to a new level by building detailed customer profiles. These profiles must take many factors into account:

1. Demographic composition of clients.

2. Number of customer accounts.

3. Products and services that customers currently use.

4. Offers that customers have turned down in the past.

5. A set of products and services that customers are likely to purchase in the future.

6. Major events in the life of clients.

7. Their relationships with other clients.

8. The attitude of clients towards the bank and the financial services industry in general.

9. Behavioral models

10. Service preferences, etc.

Individual approach to each client.

Almost a third of customers expect the companies they do business with to take into account the personal characteristics of customers. Based on the analysis of data over the past year, it was found that almost 33% of potential customers abandoned the services because of the insufficient personalization of the offers. And if the bank strives to increase the number of reliable customers, increase profits and prosperity, then the introduction of data mining technologies, including predictive analytics is a strategic necessity.

Analysis of buying activity.

Almost all of the data in banking is generated either through customer interactions with sales and service representatives, or through transactions. While both forms of customer data are of immense value, the data generated through transactions gives banks a clearer understanding of customers' purchasing habits and over time broadens understanding of behavioral patterns [2].

Credit risk analysis.

Based on the analysis of information on the credit history of existing customers, profiles of reliable and unreliable customers are formed; the bank can divide borrowers by risk groups, set individual conditions for the amount of borrowed funds, interest, and loan term.

Identifying opportunities for increased sales and cross-selling.

Statistically, the probability of selling something to an existing customer is 60% -70% higher than the probability of selling something to prospective customers, which gives banks a great opportunity to increase profits through cross-selling. Usage of data mining tools allows one to easily get all the necessary data to increase sales.

Reducing the risk of fraud.

Reducing the risk of fraud is one of the fastest growing forms: in 2019 fraudsters carried out RUB 5.7 billion in transactions with retail accounts, a record high from the previous record high in 2018. Monitoring the structure of customers' expenses and identifying unusual behavior is one of the ways to use Big data technologies. Banks can prevent fraud and increase the level of customer security.

Evaluation of the business projects profitability.

With the help of Big data technology it is possible to analyze a significant amount of data on investment projects, their profitability, possible risks, excluding the possibility of a subjective human assessment of the facts.

Assessment of competitiveness.

There is an information analysis about banking organizations that have the most similar characteristics, further segmentation into groups based on similar parameters to represent the hierarchical structure of the banking industry.

The potential value of the information available is surprising: within recent years, the amount of data has increased significantly, while the cost of processing it has decreased. Distinguishing truly meaningful data from other – irrelevant information contributes to more effective problem solving and strategic decision making [5]. Real-time analytics help you understand the problem holding your business back, while intelligent analytics helps you choose the right method to solve it. Perceptibly better results can be achieved by integrating analysis into the banks workflow to avoid potential problems in advance.

No method is universal, each method has its pros and cons, and the right choice depends on the goals and circumstances.

Data Science makes this process more automated, accurate, productive, and less costly for employees.

Below you can consider different ways of using Big data technologies to solve micro and macro tasks.

The Central Bank of the Russian Federation is using artificial intelligence and Big data in order to accurately adjust monetary policy and quickly understand the problems of financial markets.

The Central Bank of the Russian Federation is working on a number of projects – from analyzing cash data for assessing inflation to machine learning in bank reporting and collecting macro data. These projects are aimed at improving the quality of forecasting and the soundness of decisions in the field of monetary policy.

The relevance of such data for politicians and investors has increased in the context of the coronavirus outbreak, when immediate solutions are required, and official statistics reflect the situation with a significant delay and often distorted.
Macro data collection is a baseline that will show how indicators adjust over time as new information arrives, which will serve to improve forecasting accuracy for decision-making on monetary policy [10]. In the longer term, it is planned to build news indices that will be used in short-term forecasting of macroeconomic indicators.

Online inflation – data processing from online cash registers – is an algorithm being prepared for the automatic classification of an expanded range of products.

Banking control. The Central Bank of the Russian Federation is also acquiring competence in working with big data and artificial intelligence in the field of banking supervision, and official banking statistics are analyzed using machine learning to predict an imminent violation of the rules by the bank. At the next stage it is planned to conduct

automatic analysis of news about the bank and companies that it accredits. Negative news will indicate an increase in risk and warrant oversight to pay attention to.

Sberbank is introducing a system called "Labyrinth", which initially finds mass founders. This system allows one to identify interesting financial schemes – a kind of fraud when several companies, seemingly completely independent from each other, take loans and then at some point disappear, or through interaction with each other, "scroll" credit funds, withdraw them and then disappear. At the same time, the connection between these companies is not visible on the surface, but if additional external data is available, the risk that the company is a conglomerate of suspicious organizations may be detected. The "Labyrinth" also makes it possible to identify the so-called "hidden holdings".

It is known that Sberbank has quite a lot of clients both individuals and legal entities. Certain production chains can be tracked in transactions. For example, when enterprises pay each other regularly for services, and in fact form a de facto holding, although they have not yet been formalized. And if the algorithm detects such production chains, then this group of companies can be offered special corporate products suitable for holdings, which will allow companies to be faster, more convenient, at lower costs, etc. This allows companies to use banking services more conveniently. This information is a graphic image: a certain company is depicted and around it there is a cloud of interconnected customers. To solve the problem the client's counterparties are considered; it turns out which companies the client provides with services, which companies provide services to the counterparty. Graphically, it looks like a client and around him there are diverging rays-counterparties. The analysis begins, as a rule, with large clients, and then all chains are expanded further.

A project for tracking the status of a customer and a client based on historical information "News Monitoring" is under development. New sources are processed as text where you can find important events concerning the bank's customers. For example, if a large amount of information appears in the news about legal cases with some organization, then for the relevant client manager this is a reason to inquire in more detail, for example, their financial status.

Thus, the main directions for the usage development of Big data technologies in the banking sector are:

Improved algorithms for detecting fraudulent transactions. Using the analysis of stereotypes of fraudulent and legal transactions, the self-learning system issues a warning which allows banks to promptly prevent suspicious transactions and not eliminate the consequences of fraudulent actions.

High risk assessment. Big data connected to business intelligence tools with automated analysis and predictive capabilities can signal customer profiles with higher levels of risk than others [14].

Increased customer retention. In-depth customer profiles make it easier to build stronger and more lasting customer relationships.

Product personalization. Demonstration of a desire to understand each individual customer who is expressed in the development of products, services, etc.

Customer feedback. Staying on top of current customer issues, comments and concerns, using big data to sort feedback and respond in a timely manner.

Workplace improvements. Creating an environment where employees of a financial institution are motivated to carry out effective work, using Big data technologies to monitor performance indicators, assess employee feedback and corporate culture, and assess overall employee satisfaction.

Modern problems of implementing Big Data analytics. The implementation of Big data tools for analyzing banking information meets the interests of any financial institution. There are several things that banks and financial institutions should be aware of before embarking on implementing Big data technologies.

Outdated computing systems have lack of a modern infrastructure to analyze large amounts of data, which creates a significant load on outdated systems. Therefore, banks are advised to upgrade their existing computing systems before implementing a strategy for dealing with large amounts of data.

Data quality management should be one of the top priorities when using Big data technologies. Even if a bank upgrades its system, "dirty" data – inaccurate, inconsistent, incomplete, duplicate or outdated – can skew the results

[13]. Before the digital era much data was entered manually, which created a risk of human error; banks should carefully analyze and consolidate existing data before entering it into a new system in order to identify and eliminate cases of entering "dirty" data and identify data entry sources to reduce the number of new cases of "dirty" data entry.

Conclusion

Big data technologies have marked the moment when the concept of "information society" has acquired a full meaning. Information has gained the status of a valuable asset, a kind of new oil that drives the information society, just as traditional oil was the main resource in the era of industrial society. Big data technologies promise great benefits in several areas: the emergence of new business models based on an individual approach to the client; improving the health care system; improving the crime situation in big cities; combating fraud, etc.

Big data technologies are vital for modern banking. Asset management, risk assessment, retention and expansion of the customer base – these are options unavailable to perform without training in Big data.

According to the consulting company Alacer, the largest US banks have already accumulated more than 1 exabyte (1,018 bytes) of information. This amount of data is contained, for example, in 275 billion audio recordings of songs in mp3 format.

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The Impact of the COVID-19 On Eurozone and the United States Banking Sectors. Contribution to The Post Pandemic Scenarios

Piotr ŁASAK
Jagiellonian University, Faculty of Management and Social Communication
Kraków, Poland
Email: piotr.lasak@uj.edu.pl
ORCID: https://orcid.org/0000-0002-3726-3862

Abstract

The article discusses the role of banking sectors in Eurozone countries and the United States in times of the COVID-19 pandemic. The presented analysis is related to the commercial banks' sector and central banking during the pandemic. It shows that commercial banks were affected by the consequences of the pandemic situation in terms of capital market indices, lending activity and profitability of banking sector. Both central banks, the European Central Bank and Federal Reserve, implemented new phases of the quantitative easing (QE) policy as the reaction to the economic situation triggered by the pandemic. In consequence the value of balance sheets of both of central banks almost doubled during the last twelve months. In the short-term, such policy is beneficial for both economies. The long-time outcome is unknown. Another challenge is the scenarios of economic recovery. There are some positive, negative, and neutral scenarios possible to happen. The positive expectations assume that the economic activity will be restarted. The pessimistic one indicates some acute problems and asymmetrical recoveries (especially in some Eurozone countries) which might trigger political tensions among countries. There is still a significant role of a banking sector for further support of economies in the post-pandemic time.

Keywords: COVID-19 pandemic, Eurozone banking sector, US banking sector

Introduction

Banking sectors play crucial role in the economy of every country. Banks are responsible for money circulation and credit intermediation, and a well-functioning banking system is necessary for every country. It is especially important in the bank-oriented model of financial markets (so called 'continental model'). The COVID-19 pandemic has had a large impact on the banking system in almost every country. The pandemic outbreak and its economic consequences were sudden and long-range. In such situation banks, in many countries around the world, were expected to provide and important role in absorbing the shock and providing credits to households and corporate sector. The efforts of commercial banks were facilitated by central banks and governments. In such context it is important to pose the research questions:

1) How the pandemic of COVID-19 impacted on the banking sectors in the United States and Eurozone countries?
2) What is the potential impact of the applied countercyclical lending policies, provided by the selected central banks, on banking sectors and economies?
3) What is the role of banking sectors during pandemic and when the pandemic is over?
4) What are the post-pandemic scenarios in the analyzed countries (the United States and Eurozone countries)?

The main role of the research is to provide the overview of banking sectors in the United States and Eurozone during the first phase of the COVOD-19 pandemic. It is still too early for an insightful analysis, as the presented data and accessible information are related to the first two quarters of the 2020. It is, however, very important to recognize the main mechanisms of the banking activity at the outset of the specific time of pandemic. The processes are very different, compared with the nature of the pre-crisis banking functioning. Such a short term and initial analysis might contribute to the further research of these problems.

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The Impact of COVID-19 Pandemic on Banking Sectors

Commercial banks are the oldest financial institutions and play important role in every economy. They are situated in the center of every financial system and they link financial systems with real economies. The main banking activities is the intermediation between depositors and creditors. The activity embraces accepting deposits and making loans. Banking systems are also responsible for organizing the money circulation in the whole economy and participating in payment systems. Moreover, they also provide many other services, like running accounts, advising their customers, organizing securities purchases, providing foreign exchange services, offering insurance services, and many others (Valdez, Molyneux, 2013). These are only the basic banking functions and in fact the banking activities are much more sophisticated. These institutions provide services in almost every aspect of the economy and they are critical for stimulating economic growth, especially by increasing the funds for investment and improving the quality of investments.

The very important feature accompanying the role of banks is that these institutions are susceptible to unwarranted withdrawals of deposits during panics, spread of contagious micro and macroeconomic shocks, and many other mechanisms which lead bank failures or even banking crises (Calomiris, 2015). On the other hand, they play important role in stabilizing the real economies in times of turbulence.

The condition of the American and Europe's largest banks before the pandemic was good. These banks are very well capitalized but after the financial crisis of 2007-2009 they had less complex business models and limited risk appetite than several years ago, during the financial crisis of 2007-2009. Moreover, their supervisors have become more supportive (The Corner, 2020). Such situation resulted in the possibility of banking sectors to play very crucial role during pandemic time. All of the countries affected by the pandemic implemented unprecedented initiatives and measures at important challenges: dealing with health emergency needs, supporting economic activity and employment, preserving monetary and financial stability, and preparing the ground for recovery (Gortsos, 2020).

The development of the pandemic exerted, however, a great impact on the institutions and impaired their financial efficiency. Banks, that are especially endangered, are those which focus on lending to small business and consumers. These two groups of bank customers are suffering the most. As a consequence of lockdowns in many countries, millions of companies have fallen into bankruptcy since the outbreak of the pandemic (Morris et al., 2020). It exerts a big pressure on banks and their financial situation. Even those, which are not exposed to the riskiest investment assets and were not engaged into financing the endangered entities, are in a bad situation. It will be difficult to make profits in environment with interest rates fluctuating near zero and when the future of global economy is gloomy.

The biggest challenge for the banking sectors during the COVID-19 pandemic might be losses caused by bad debts. Some of the difficulties were created by governments and other authorities. Banks were obliged to provide payment holidays on credit cards, mortgages and other assets, which created stress on banks' loan books (Buehler et al., 2020). The governments offer some help for banks and participate in various recovery programs, so there is a chance that finally the situation in credit losses will not be the worst effect of the pandemic crisis. Another concern is related to investments. The low interest rate environment creates pressure on investors. The banks' dividends and share buybacks create pressure on stock market and banking indices (Figure 1, Figure 2).

Fig 1. NASDAQ bank index chart for the period January 2020 – November 2020

Source: https://www.marketwatch.com/investing/index/bank (accessed: 9.11.2020)

Fig 2: STOXX European 600 banks for the period January 2020 – October 2020

Source: https://www.stoxx.com/index-details?symbol=SXXP (accessed: 9.11.2020)

The COVID-19 pandemic crisis has a global dimension, and it exerts an impact on every person, every aspect of society, economy, and industry. The banking industry can act as a source of stability, providing help for real economies. It means that banks are participating in many countries in the process of exiting from the COVID-19 pandemic crisis. Their main role is to provide the needed funds which are necessary in these abnormal circumstances. Among the main actions which have been undertaken are: liquidity supports for endangered firms and support the flow of credits, investments in government bonds. Banks struggle to keep their distribution channels open, and to manage the revenues and customers' expectations in the environment of low interest rates and growing pressure from their balance sheet challenges.

The situation observed on the stock exchanges is very pessimistic, compared with the activity of respective banking sectors. The Figures 3-4 present the situation in consumer credit activity in the United States and Eurozone. Comparing to the pre-COVOD-19 pandemic, the situation in both of the credit markets worsened.

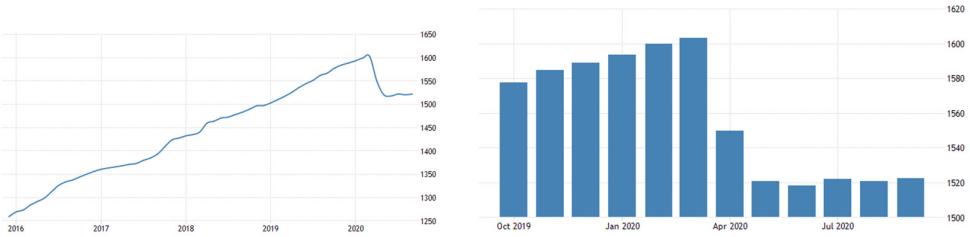

Fig. Consumer loans at commercial banks – US (in billion USD)

Source: Trading Economics

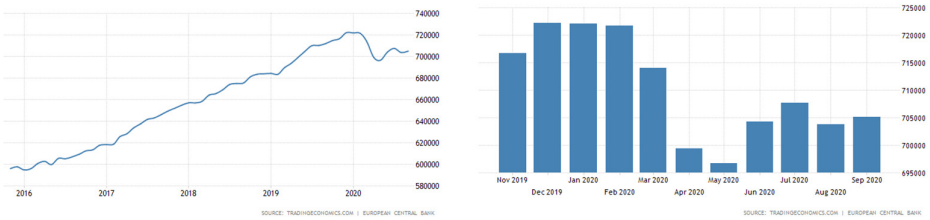

Fig. Consumer credit – Euro Area (in million EUR)

Source: Trading Economics

The main determinants of the decline of the credit activity during the pandemic were the consequences of the lockdown, the near-zero interest rates (as result of the monetary policy), which affected bank's profitability, and the growth of credit risk (Ferrando, 2020; Acharya, Steffen, 2020). It is assessed that the aggregate spending was at the level of several dozen percent (depending on the severity of the government restrictions on mobility and economic activity in particular country) (Andersen et al, 2020). However, it must be highlighted that the decline in credit activity

in both markets, the US and the Eurozone, was confined by the monetary policy and prudential measures. Without such actions, the situation might be much more severe (Altavilla et al, 2020).

Commercial Banks' Profitability

Apart from the credit activity, very important determinant of the banking activity is the profitability, usually best expressed by the return of equity ratios. In the Eurozone banks the ratio achieved 0% return on equity in the second quarter of 2020. It is the worst result for the last years (Figure 5). The same situation is in the United States (Figure 6). The low interest rate is reducing the commercial banking sector profitability. The return of equity for the period of Q1.2016 – Q2.2020 is the lowest since the beginning of 2020.

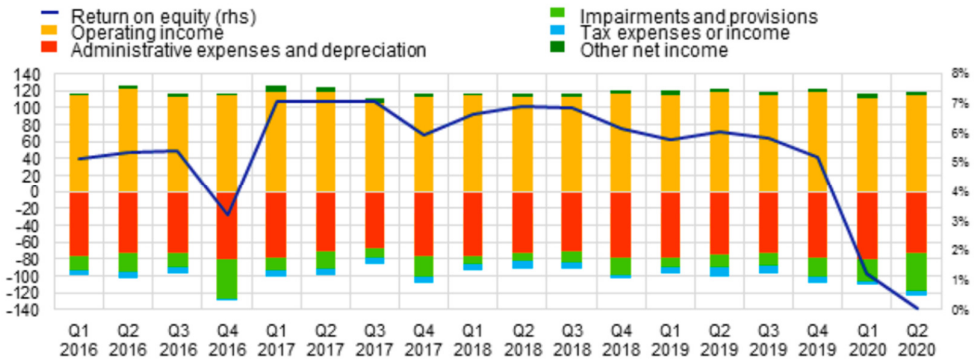

Fig. 5: Return on equity and composition on net profit and loss by reference period in banking sector in Eurozone countries (EUR billions, percentages)

Source: ECB.

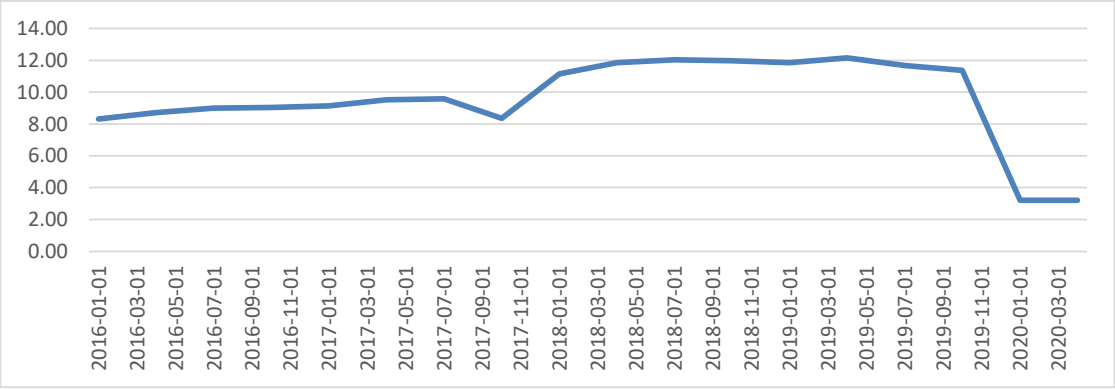

Fig 6. Return on equity for all US banks (percentages)

Source: FRED Economic data.

The profitability of Eurozone and the US banking sectors, presented in Figures: 5 and 6 is related to the situation after the first wave of the pandemic. It should be expected that the situation after the second wave will be much more severe. The growth of the NPL will have a great impact on banks' ROE indicators. The pending question is how the low interest rate environment and the fiscal stimulus from the governments are able to mitigate the situation in short- and long-term (Carletti et al, 2020).

Quantitative easing policy as central banks' reactions

The reactions from central banks for the COVID-19 pandemic resulted in the implementation of quantitative easing policy (QE). Both central banks, the FED and ECB applied such solutions as their reaction to economic downturn caused by the pandemic. These actions are assessed as the necessary approach in times of an extraordinary circumstances. Their impact is not only direct, but also indirect, and it assessed that the policy would have persistent effect on the economies via different channels (Dedola et al., 2020; Hartley, Rebucci, 2020; Jinjarak et al., 2020;

Cortes et al., 2020). Among them is the improvement of liquidity in short-term markets, but also the stimulus for the public plans for the economic recovery.

The COVID-19 pandemic had a strong impact on the economy in the United States. It triggered not only the severe health threat, but also disrupted lives and created severe economic slowdown. It led to decrease of the retail sales, national industrial production, and high unemployment rate. Some assessments highlight that putting together the health and economic problems creates the scale of the crisis which is unprecedented in the history of the United States (Bauer et al., 2020). In such situation there was the reason for the Federal Reserve to support the economy. Among the FED actions might be enumerated (Cheng et al., 2020):

- low interest rates (the federal funds rate is below 0,1 percent since April 2020),
- the "forward guidance policy" which says that the interest rates will remain low,
- securities purchase (QE) – the FED balance in 2020 almost doubled (from 4,15 trillion USD to 7,18 trillion USD) (https://www.federalreserve.gov/monetarypolicy/bst_recenttrends.htm),
- supporting financial markets in many ways (e.g., lending to securities firms, repo operations, direct lending to banks and corporate employers, relaxing regulatory requirements, supporting loans to SMEs, households, and municipal borrowers).

The American central bank takes all the necessary steps to provide maximum employment, stability of prices and of financial system. Many of these actions were aimed at supporting the flow of credit in the economy. The consequence of the reaction is the unprecedented growth of the central bank's assets, which exceeded the 30% of GDP of the country (Figure 7). It is also worth noting that doubled during the last year.

The situation in Europe is severe as well. Similarly like in the United States, in the Eurozone numerous actions were undertaken dedicated to economic and social welfare such as to aid companies affected by the crisis in Germany, France, Spain, Italy, and some other countries (Nicola et al., 2020). The unprecedented reaction was also implemented by the European Central Bank. It has a name *Pandemic emergency purchase program* (PEPP) and was initiated in March 2020 (Grund, 2020). Originally the ECB launched EUR 750 billion, but the assumption is that it will last until the pandemic is over. Its main goal is a temporary asset purchase of private and public sector securities (https://www.ecb.europa.eu/mopo/implement/pepp/html/index.en.html). The ECB has a big dilemma, with implementing QE policy, compared with the FED, as its only goal is to ensure price stability in the euro area. The explanation of undertaken actions is that there are also secondary objectives for the ECB, and they can be pursued as long as they are not implemented at the expense of price stability (Claeys, 2020). The second dilemma is that prior to the pandemic, the ECB already implemented QE actions, like purchasing about EUR 20 billion each month in government and regional authorities' bonds, corporate bonds, asset-backed securities, and other securities under the existing Asset Purchase Program (APP). It led to enormous engagement of ECB into the operations. The bank's balance sheet growth is even greater than the FED, exceeding 45% of GDP (Figure 7).

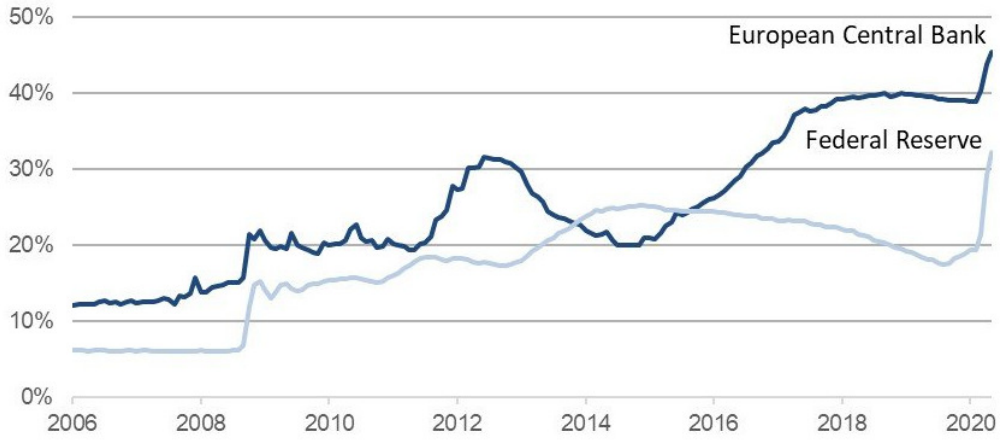

Fig. 7: The ECB and FED balance sheets (central bank assets as a percent of GDP)
https://www.ceps.eu/whats-the-ecb-doing-in-response-to-the-covid-19-crisis/ (Retrieved: 15.11.2020).

It should be highlighted that the short-term impact of the QE policy, both, in the United States and in Eurozone is positive. The significant question is how it will impact in the long run on the world economy and, especially on these economies where the policy was implemented.

The situation in the post COVID-19 economy

The recovery from the pandemic is crucial for every country and it will exert big pressure on different parts of economies. The process of exiting from the pandemic will vary in speed and intensity across industries, countries, and regions. There is no doubt, that safety and soundness of the financial systems and economies will depend on bank's financial resilience (McKinsey & Company, 2020). And vice versa, the situation of the banking industry will depend on the economic recovery of real economies in the post-pandemic future. Regarding the possible scenarios of recovery, they will depend on the standing of the crisis situation. The length of the pandemic and the accompanying lock down will exert a great pressure on economies and on banking sectors. The longer the pandemic lasts, the worse impact it has on economies.

There are forecasts of some possible scenarios of the post-COVID economic situation, namely positive, negative and neutral. In the positive one, the economic activity after the pandemic will be restarted, and a process of stable recovery can be expected. Such scenario is optimistic, and beneficial for the US and Eurozone economies. In Europe many countries were struggling with the unbalanced growth before the COVID-19 pandemic. It means that during the post-pandemic time the problems will still continue in these countries. The situation also has impact on banks. The tentative calculations suggest that in the case of the Eurozone banks, the bank's market-implied losses as a consequence of COVID-19 pandemic range from 7% to 43% of banks capital and reserves (Renders et al., 2020). It is estimated that in the next three years European banks will face losses of more than EUR 400 billions of credit losses (Wyman, 2020; Morris, Walker, 2020). In worse scenario, it is predicted that the value of the losses may even double. Banks will experience bad loans and revenue decline. Moreover, recovery from the pandemic may be very slow. When linked with the new level of public debt, it might lead to the stagflation in Eurozone (Bonatti et al., 2020). The neutral scenario means that the economy will need a permanent public stimulus, because in new normality, the private sector will not be able to play such role, as it played before the pandemic. There is, however, still possible to have even worse scenario, when the problems faced by the governments, central banks and economies, will lead to deep structural problems, and finally asymmetrical recoveries might trigger tensions and lead to some negative political decisions, undertaken by some of the weakest Eurozone countries. In such scenario the economic situation might trigger a political problem for the whole process of economic integration.

Regardless of which scenario is more accurate, similarly, like during the pandemic, also in time of recovery, the banking sector will play a crucial role. It is especially prevailing in the Eurozone, where the whole financial sector is banking oriented. The important feature of the EU banking sector is that the structures of banking vary in different Eurozone countries. Some of them face lower credit losses due to better condition of the economy (Germany), while in other countries the situation is more serious (Italy or Greece), where the levels of NPLs are higher and the pandemic exerts stronger influence. The situation before and after the pandemic in selected countries is presented in Table 1.

Table 1: The situation on the banking sectors in pre-COVID-19 and post-COVID-19 in selected Eurozone countries

Country	2019 Pre COVID-19		2022 Outlook		Concentration
	ROE	NPL ratio	ROE	NPL ratio	Market consolidation
France	7,2	3,4	6,0	8,1	Low
Germany	1	2,2	3,7	4,2	High
Spain	9,1	4	7,4	8,4	Medium
Netherlands	6,7	2,6	5,6	6,5	Low
Italy	5	8,9	5,5	13,2	High
Greece	3,3	40,1	4,2	47,1	Low
Portugal	2,8	8,3	4,1	11,7	Low

Source: own elaboration on the basis of Oliver Wyman, Aim for revival. Not just survival. European Banking 2020, www.oliverwyman.com (accessed: 17.11.2020).

The situation of banking sector in the United States is similar to the situation of banks in the Eurozone. The US economy experienced a dramatic collapse as a consequence of the pandemic, and it exerted the pressure on the banking sector. The economic shock caused by the COVID-19 pandemic triggered a sharp increase in demand for cash and short-dated investments. Similarly like in Europe, banks in the United States are working in tandem with the governments to provide assistance and prevent businesses from collapsing, thereby affecting the whole economy. The situation on the market resulted in significantly constrained liquidity, higher cost of capital, increased margin requirements and other negative processes (Kothari, 2020). However, it is a fact that banking system in the US will recover faster than many banking systems in Europe. They are more profitable than their European peers and they will be able to retain a greater share of their earnings to rebuild their cushions. It is estimated that while European

banks' ROE stays well below cost of capital until 2025 the US banks return to precrisis levels of ROE by 2023 (McKinsey & Co, 2020).

It becomes obvious that the COVID-19 accelerated some of the trends which already existed in banking sectors. The pandemic will deepen and lengthen the period with very low interest rates. It also accelerates the process of digitalization of banking services. Almost all aspects of the banking industry are becoming digital – the services offered for bank customers, internal processes (remote work), and the transformation of bank operating and business models (Carletti et al., 2020). It will create the new environment for the further development of banking sectors. Together with such changes, there will be a need for banks to return to lending policy in new economic circumstances. As lockdown is lifted, the economies will come back to normal functioning. There will be many difficult situations in business, and banking sector should provide necessary financing. The bad debts must be restructured if unsustainable, and other measures must be undertaken to support the recovery of economy. There is also a need for banking sector to be prepared for the post-COVID-19 recovery actions (Blanchard at al., 2020). It means that the governments must prepare necessary programs for past-pandemic time. Among the crucial areas should be selected: helping workers to adjust to new normal, helping firms in their short-term problems, restructuring the unsustainable debts, and providing new investment loans. It means that new, post-pandemic strategy for banking sector is needed.

Conclusions

The economic deterioration in the Eurozone and United States, together with the engagement of banks in the countercyclical lending during the COVID-19 pandemic exposed banking systems to additional stress. It is, however, different in respective banking sectors, depending on the pre-crisis characteristics of the banking sector in particular country (Demirguc-Kunt et al., 2020). In general, it cannot be concluded that the situation is better in the United States than in Eurozone countries, and vice versa. The potential long-term impact of the policies provided by the selected central banks is still unpredictable and all of the scenarios, positive, negative and neutral are equally possible. The role of banking sectors during the pandemic and after is crucial for fostering real economies.

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First click Eye Tracking A/B tests of Web-Page Interactive Elements

Julia FALKOWSKA
Wroclaw University of Science and Technology, Wroclaw, Poland
julia.falkowska@pwr.edu.pl

Janusz SOBECKI
Wroclaw University of Science and Technology, Wroclaw, Poland
janusz.sobecki@pwr.edu.pl

Abstract

Eyetracking metrics can be calculate and analyze in user experience web sites evaluation. This paper presents the results from the experiment where 11 commercial websites where tested with first click A/B tests. Used methodology are user observation and eyetracking data recording. Aim of the study is to verify the legitimacy of the use and interpretation of a specific set of eye-tracking metrics for the purpose of their universal application in user experience research on websites.

Keywords: eye tracking, user experience, eyetracking metrics, A/B tests

Introduction

Nowadays the designing user-oriented interfaces are of great importance. More and more money are spent on not only web-page usability assurance but also User Experience improvement. Researchers are using different devices to monitor web user's behavior. Researches carried out by Schall, A. et al. (2014), Horsley et al. (2014) and Bojko (2006) present useful methodologies for application of eye tracking in usability testing of web pages. These methodologies are also applied in comparison of web page designs at different stage of design process (Poole, A and Ball, Linden, 2006). Most of them are based on the assumptions that fixation point determines user interface elements that attract attention and that are invisible or incomprehensible during the completion of the task on the tested web page (Pashler and Homan, 1998; Rogos-Turek, B. 2015).

In this paper we present the experiment that verifies usability of the common commercial websites of hotel, e-shops, restaurant, fitness club, energy provider, social networking, and insurance company have been presented to the respondents. The experiment was built as a standard A/B test, version A – more friendly user interface, version B – less friendly user interface. User interface elements of group A has increased visibility and/or readability with modified size, contrast or added graphics (Goldberg, Joseph and Kotval, Xerxes, 1999), (Kotval, Xerxes and Goldberg, Joseph, 1998). In the research nine examples of the pairs of design versions of the same websites have been presented to the separate groups of users. For each sample we measure gaze points and calculate seven eye tracking metrics to confirm whether the difference of measures for these two versions of design are significant (Bojko, 2013; Nielsen and Pierce, 2009).

The paper is constructed as follows. First, we present the experiment stimuli, then we give the description of the experiment methodology followed by the experiment setup. Then we present the experiment results. At the end we give some conclusions.

Experiment stimuli

Different versions have been prepared by adding or changing visually one of the elements, or group of elements on the website' design. A task was prepared for each pair of design versions, which correct solution was to click on the modified / tested element. Eleven web-page designs in two versions have been prepared for the study, however only nine of them have been analyzed, as in the case of two prepared scenarios have not been understandable for all respondents, as they reported in the interview after the study.

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Table 1 presents the stimuli (web page address), type of the design modification as well as the task for the respondents. Access to following webpages: 1-15.11.2019.

Table 1: Experiment description details.

Name	Source page URL	version A (more user friendly)	version B (less user friendly)	Task
C21	https://www.c21stores.com/	Main menu tab "Stores & Events" without appropriate iconographic	Main menu tab " Stores & Events" with appropriate iconographic	You will see a clothing shop website. Imagine you want to go to their closest physical store. Click where you would look for that information.
GE	http://www.greenmountainenergy.com	Group of links with appropriate iconographic in section "What can we help you with?" at the bottom	Group of links without appropriate iconographic in section "What can we help you with?" at the bottom	You will see energy provider website. Imagine you just get your first bill from this company and you need help with understanding it. Click where you would look for information about that.
LS	http://www.loursinseattle.com	All caps main menu tabs	Sentence case main menu tabs	You will see a restaurant website. That restaurant sometimes organizes food presentation days. Imagine you want to find more details about that. Click where you would look for information about that.
PP	http://www.peachpit.com/store/adobe-photoshop-elements-2019-classroom-in-a-book-9780135298633	Submenu tabs (About, Description, Reviews, Sample, Content, Updates) at the bottom with gray background	Submenu tabs (About, Description, Reviews, Sample, Content, Updates) at the bottom with white background	You will see a bookshop website, with a particular book presented. You wanna know what other readers think about that book. Click where you would look for information about that.
POPO	www.poopourri.com	Black and underlined link (Shop best sellers >) under the product picture	Gray and underlined link (Shop best sellers >) under the product picture	You will see a cosmetic shop website. Imagine that someone recommended you this shop and you don't know any of their products so you want to see products that people buy the most. Click where you would look for information about that.
SS	www.swissotel.com	Gray background of button with language changed (English)	White background of button with language changed (English)	You will see a hotel website. Imagine you want to change the website language. Click where you would look for information about that
RM	www.rockymountainsoap.com /products/beech-tree-bud-eye-cream	Orange submenu elements (ingredients, how to use, shipping)	Gray submenu elements (ingredients, how to use, shipping)	You will see a page from an e-shop with a product presentation. Imagine you want to buy this product and you want to know more about delivery. Click where you would look for information about that
FB	www.fitnessblender.com	White submenu font in the center of the website. Submenu elements: Workout Videos, Workout Programs, Meal Plans, FB Plus with descriptions.	Gray submenu font in the center of the website. Submenu elements: Workout Videos, Workout Programs, Meal Plans, FB Plus with descriptions.	You will see a fitness website. Imagine you have a specific training program and now you want to change your eating habits. Click where you would look for information about that.
HL	www.healthline.com	Framed input e-mail field	Underlined input e-mail field.	You will see a website with articles. Imagine you want to receive their newsletter. Click where you would enter an email address.

The off-line versions of the pages listed in the table 1 have been the basis for preparation of the research stimuli used in the experiment. Modifications were made on specific elements to create user interface more (A) or less user friendly (B). Clicking on the specific part of each element have been led to the tasks solutions. These elements have been also the source on the eye tracking metrics.

Experiment Methodology

In the experiment with users two methods have been applied: observation and one-on-one interviewing. With information about the study, the user was asked to sit in front of the laptop and interact with websites selected for testing. Each respondent was asked to complete eleven tasks, eight of which were analyzed later and presented in the table 1. We have used eye tracking system to record the user activity. Using this system, the fixation paths has been recorded together with screen and mouse activity. After finishing all tasks, the users have participated in a one-on-one sound recorded interview that aim was to verify understanding of the task as well as confirmation of seeing the web-pages for the first time. In the study 22 participants have been engaged, what made 11 participants for each web-page in less or more user-friendly variant. The web-pages have been presented using laptop with 15" LCD screen. The sessions have been recorded using Tobii Eye Tracker X60 (60 Hz) and Tobii Studio software.

The experiment has been conducted at the University of Technology Sydney, Australia (UTS) from 27.11.2019 to 6.12.2019. The methodology of the study has been approved by the local Ethical Committee (UTS HREC ETH19-3452). In the study participated 22 respondents (9 - UTS' PhD students and 13 - staff members), out of which 12 - women and 10 - man.

Experiment Results

In this section the experiment result will be presented. The statistical significance will be verified by two-tailed t-tests (Cho 2013; Ruxton 2010). The results will be presented in tables. In bold-face results that are statistically significant will be given (with p=0.05). The more user-friendly version results are given in row A and the less user-friendly version in row marked as B.

In table 2 the number of errors in task accomplishment? for each version (A and B) will be given.

Table 2: Number of errors for each version.

	C21	**GE**	**LS**	**PP**	**POPO**	**SS**	**RM**	**FB**	**HL**
A	3	5	3	0	2	0	2	3	1
B	6	6	4	0	2	0	4	2	3

For two web sites designs : C21 and RM there were half less incorrect task realizations on more user friendly versions, then on worse. For other 3 web sites designs (PP,POPO,SS) there were no differences. In other cases there were usually one error less on more friendly version.

In table 3 time to first fixation for two versions of 9 designs is presented. Time to first fixation is defined as the time from the start of the stimulus display until the test participant fixates on the AOI (Bojko, 2013).

Table 3: Mean time to first fixation on the A and B version of designs

	C21	FB	GE	**HL**	LS	POPO	PP	RM	SS
A	4,51	6,75	14,37	**9,18**	5,96	6,43	5,83	6,08	2,27
B	8,63	7,51	11,55	**18,93**	3,86	7,71	7,47	8,1	2,7

In 7 out of 9 designs average time to first fixation was longer for design B then design A, however there was only one significant difference in the scores for HL website (input filed modified). Version A (M= 8,515, SD=3,71) and Version B (M=14,93, SD=11,61), t(13)=-2.64, p=.020.

Table 4 presents the results for the mean value of a measure fixation before, which equals the number of fixations prior to first fixation on an AOI (Bojko, 2013), for the A and B versions of designs.

Table 4: Mean fixations before on the A and B version of designs

	C21	FB	GE	**HL**	LS	**POPO**	PP	RM	SS
A	10	12,5	43,29	**19,38**	9,57	**9,5**	13,83	16,29	3,3
B	16,38	18,43	22,75	**45,88**	9,29	**17,29**	20,12	16,8	1,75

There were two significant difference in the scores for: HL website version A (M= 19, SD=6,72) and version B (M=42, SD=27,68), t(14)= -2.63156, p= .019726 and POPO website version A (M=10,5, SD=6,20) and version B (M=19, SD=3,99), t(14)= -2.55, p=. 023

Table 5 presents the results for the mean value of a measure of total fixation duration on AOI, for the A and B versions of designs.

Table 5: Mean total fixation duration on the A and B version of designs

	C21	FB	GE	HL	LS	POPO	PP	RM	SS
A	**3,16**	1,98	1,27	0,77	0,9	0,53	1,56	1,06	1,22
B	**1,35**	1,43	1,06	0,72	0,78	1,02	1	1,16	0,81

There was only one significant difference in the scores for C21 website version A (M= 2,92, SD=1,10) and version B (M=0,72, SD=1,45), t(12)=2.53, p=.026.

Table 6 presents average values of fixation count over AOI, for the A and B versions of designs.

Table 6: Mean fixation count on the A and B version of designs

	C21	FB	GE	HL	LS	POPO	PP	RM	**SS**
A	11,67	8,88	4,29	3,25	4,14	3,6	4,83	2,71	4,5
B	5	6	5,5	2,75	2,86	4,86	3,38	2,8	3

There were no significant results for this measure.

Table 7 presents the results for the mean value of visit count over AOI, for the A and B versions of designs.

Table7: Mean visit count on the A and B version of designs

	C21	FB	GE	HL	LS	**POPO**	PP	RM	SS
A	**5**	2,25	2,14	2,38	3,43	**1,6**	4	2,14	2,6
B	**2,38**	2,86	2	2	2,29	**3**	2,38	2	1,75

There were two significant difference in the scores for: C21 website version A (M= 5, SD=0,89) and version B (M=2, SD=1,6), t(12)= 3.6, p= .0036 and POPO website version A (M=1,5, SD=0,7) and version B (M=3, SD=3,99), t(15)=-2.56, p=. 021.

Table 8 presents the results for the mean value of time from the first fixation on AOI to the mouse click within this area, for the A and B versions of designs.

Table 8: Mean time from first fixation to mouse click on the A and B version of designs

	C21	FB	GE	HL	LS	POPO	PP	RM	**SS**
A	10,74	5,17	2,25	2,28	17,76	4,02	4,15	3,6	**2,02**
B	4,58	2,65	5,86	2,11	26,24	5,29	2,5	2,68	**1,15**

There was only one significant difference in the scores for SS website version A (M= 1,65, SD=0,79) and Version B (M=1,2, SD=0,47), t(16)=2.29, p=.035.

Table 9 presents the results for the mean value of fixation duration on AOI for the A and B versions of designs.

Table 9: Mean Fixation duration on the A and B version of designs

	C21	FB	GE	HL	LS	POPO	PP	RM	SS
A	0,27	0,22	0,3	0,24	0,22	0,15	0,32	0,39	0,27
B	0,27	0,24	0,19	0,26	0,27	0,21	0,3	0,41	0,27

There were no significant results for this measure.

Summary

The experimental results and statistic verification shows that in most cases of designs and corresponding measures there is no significant differences in average values. In the case of designs FB, GE, LS, PP and RM, for no measure reaches significant difference between designs A and B. We may notice however that in most cases the average values of the proposed measures, the values (higher or lower) indicate that the improved design A is better than B, but mainly these differences are not statistically significant. However we must note that the low frequency (60Hz) of eye tracking data registration resulted in the lack of precise fixations on small interface elements and numerous shifts. This in turn resulted in fewer samples than registrations and had an impact on the significance calculations.

There could be several reasons for the obtained results, however it seems that the difference between proposed samples of designs have no significant influence on the users interaction. Most of the participants were very experienced web users, so they often used web pages with better and worse designs as they have to get used to that. We are going to repeat that kind of experiments with some changes in web page designs and also we will recruit both experienced and less web experienced users. We are also planning to change the eye tracking system from Tobii X60 to Tobii TX-300, which registers eye tracking data with much higher frequency (300Hz) and is using workstation with 17"LCD screen.

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Decentralization Reform and Prospects for Economic Development in Ukraine: Impact Assessment

Vasyl MARCHUK
Doctor (Ph.D hab.) in History, Professor at Political Science Department, the Faculty of Philosophy and Arts , Trnava University, Trnava, Slovakia
vmarchuk@ukr.net

Nataliya MARCHUK
Ph.D in Political Science, Associate Professor of Journalism Department. Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine
natali.marchuk@gmail.com

Olha YEMETS
Ph.D. in Economics, Associate Professor of Theoretical and Applied Economics, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine
olaif2005@gmail.com

Abstract

A thorough and systematic reform of local self-government has been launched since 2014 in Ukraine. The experience of Central and Eastern European countries in combination with international standards and recommendations for the positioning of the institution of municipalities is entrusted to the development of relevant legislation and mechanisms for the practical implementation of change. The updated legal framework has significantly contributed to the municipal consolidation in the country and created the appropriate legal conditions for the implementation of the developed reform and the effective functioning of local authorities and economies.
The study analyzes and evaluates a new phenomenon for Ukraine - political and economic decentralization of power and it's impact on economic development. The reform is carried out in favor of the formation of the basic level of government through the formation of new primary structures - united territorial communities. The influence of the principle of subsidiarity on the formation of local self-government structures on the economic development of communities is studied. The first stage of decentralization reform is generalized taking into account the projected changes, real results and expected risks.

Keywords: decentralization, united territorial community, economic development, investment.

Introduction

The purpose of the study is to analyze the features of the economic impact of decentralization processes in the context of local government reform in Ukraine. The complexity of the subject of research determines the use of a set of methods for analysis and identification of features on the issue. The application of the historical method makes it possible to trace the retrospective of decentralization processes in world practice. Systematic approach used in the study of the decentralization process in Ukraine as the complex legal, political, administrative and economic measures designed to strengthen local communities. The empirical research was carried out by analyzing international recommendation documents concerning the powers of local self-government, as well as legislative projects and acts of the Ukrainian state authorities.

Main Research

The formation of the basic principles of local self-government is associated with the formation of industrial capitalist relations in the nineteenth century. The French historian and public figure A. de Tocqueville (2000) developed a "theory of free communities", guided by the idea of the historical primacy of the community and secondary - of the state. A. de Tocqueville noted the direct leadership of the people as a source of power in the community and the delegation of some powers to the state. According to this concept, we can define the community as an independent basic administrative unit in its competences, which is empowered to independently conduct business and carry out local government taking into account the local interests.

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The main provisions of the state theory of local self-government were developed by professor of the University of Vienna Lorenz von Stein and professor of the University of Berlin Rudolf Von Gneist (1869) in the nineteenth century. They came to the conclusion that there are no special public affairs because they are all essentially belong to state. The transfer of some powers of governance to local communities is necessary in order to ensure more effective decision-making. This theory of local self-government is now used in many countries around the world, including the Anglo-Saxon legal system.

The dualistic theory of local self-government reveals its dual essence. It considers local government as a synthesis of autonomy in local affairs and delegated government functions at the local level. According to this theory, local governments, performing functions delegated by the state, go beyond local interests and act as a tool of public administration. This mechanism is based on the manifestation of a counter-initiative: on the part of the population, which entrusts local governments with a number of important functions, and on the part of the state, which instructs local authorities to address a number of issues important not only for a particular municipality but also for the state.
In scientific research, the term "decentralization" can be used in a broad and narrow sense. We can talk in general about the mechanism of redistribution of power and the delegation of some functions from the central to the local level. At the same time, this concept can be considered as a certain system of relations between the state and administrative-territorial units of the lower level. The process of transferring powers to local authorities, increasing the capacity of local self-government and expanding its powers, which are transferred from the center to local communities on a subsidiary basis, is an objective basis for decentralization. The processes of decentralization and centralization should be considered as processes of concentration or distribution of powers, and not only in the sense of the level of approximation or delimitation of decision-making processes to the national level.

Decentralization involves the transfer to the local, regional level of as many powers as the local government can actually perform in order to fulfill its responsibilities. Local authorities need to focus on providing public services and improving the well-being of people living in a particular area. Decentralization should involve citizens in solving current problems of local development, increase citizens' self-awareness as "owners" of the territory, as well as find internal resources and introduce effective incentives and levers aimed at stimulating economic growth of communities. We can affirm that decentralization covers a huge range of activities: from the development of political consciousness of citizens, the formation of civil society and to improve the economic development of the territory and the specific territorial community.

Decentralization processes, which entered an active phase in Europe at the end of the twentieth century, are aimed at a radical reorientation of policy to the level of municipalities, where the possibility of forming horizontal interactions is much higher. The most interesting for the study is the economic aspect of decentralization, namely how decentralization can affect the stimulation of economic growth of territorial communities in Ukraine.

The experience of European countries in reforming the institutions of local self-government in individual territories and in general is extremely valuable for Ukraine in terms of developing the legal framework and practical mechanisms for implementing the new principles of governance. The determining factor of such changes can be considered the unification and standardization of international principles of self-government through the development and adoption of agreements and treaties between countries with the assistance of intergovernmental organizations.

Based on the reforms carried out in Central and Eastern Europe, five basic factors of the decentralization process are identified by Pigul N.G., Lyuta O.V. (2016). The first and most important is the development of local and regional autonomies as a way to achieve the democratization of society. Solving local problems and freedom as a result of local and regional autonomy are also important factors. This also includes guarantees of ensuring and supporting cultural, linguistic and ethnic diversity and stimulating economic competition between authorities at various levels.

Decentralization in the European Union has become an integral feature of governance. It covers both the issue of decentralization within individual member states and the specifics of the division of responsibilities between countries and European institutions throughout the association. EU countries are constantly looking for an effective model of public administration. This search provides several options that have a higher or lower level of decentralization. One of the most effective examples of decentralization in recent years is the experience of Poland. After 1989, democratization processes took place in Poland aimed at forming a democratic system characterized by the protection of individual rights and civil liberties. This process was accompanied by the reform of the economic system, namely the formation of a market economy based on private property. At the same time, the system of public financial management was reformed. Decentralization has become not only a mechanism for solving the problems of the regions and the state budget, but, most importantly, a condition for ensuring the economic development of the country as a whole, although this conclusion is not supported by all scholars. The experience of the Republic of Poland is very useful for Ukraine because of the common historical past, the closeness of mentalities and the similarity of the

management system before the beginning of the decentralization reform. Theorists of decentralization reform in Ukraine have widely used the experience of Poland and implemented some of its provisions.

Prior to the implementation of the decentralization reform in Ukraine, the Law on Local Self-Government was the main legal document that defined the status and powers of local government structures, principles and the system of self-government. Article 5 of the law defines the structure of the local government system, which includes the territorial community, village, settlement or city council, village, settlement or city mayor and relevant executive bodies.

Decentralization reform in Ukraine began in 2014 with the adoption of basic legislative documents. This should include the Concept of local self-governance and territorial power reforming (2014), Law of Ukraine 'On voluntary unification of united territorial communities' (2015) and Law of Ukraine "On cooperation of territorial communities" (2014). Also important in terms of financial decentralization are changes to the Budget and Tax Codes.

First of all, analyzing the the Concept of local self-governance and territorial power reforming, it is necessary to highlight a number of important problems, which, in fact, this reform is designed to solve. In particular, the decline in the quality and accessibility of public services as a result of the lack of sufficient resources of a significant number of local governments and their inability to perform their own and delegated powers. Also the problems of icommunal services, namely the critical condition and lack of repair of heating, sewerage, water supply networks, as well as emergency housing, and the risks of man-made disasters due to lack of sufficient funding and small local budgets. A large number of territorial communities, especially those where there are no numerous cities, face the problems of nation aging, urbanization and the decline of rural areas. Another area of problems is the lack of coherence of local socio-economic development policy with the public interests and enhanced centralization of powers and financial resources by the executive branch.

To solve these problems, the Concept of local self-governance and territorial power reforming provides local governments with basic powers in accordance with their human, financial, infrastructural potential and resources on a new territorial basis. The purpose of the Concept is aimed at identifying mechanisms, areas and deadlines for creating an effective system of local self-government and optimal territorial organization of government to provide citizens with quality administrative services.

The basis for the redistribution of powers and the strengthening of local self-government was the European Charter of Local Self-Government, ratified by the Verkhovna Rada of Ukraine on July 15, 1997. The decentralization reform in Ukraine is planned in 2 stages, the first of which was preparatory and lasted in 2013-2015, providing organizational, analytical and research processes in studying the real state of local government, choosing the best ways to implement reform. The second stage includes the period 2015-2020 and is aimed at implementing the reform, with the task of completely renewing the administrative-territorial organization, completing the process of forming united territorial communities.

It is important, in our view, that decentralization transfers basic powers directly to the local level, thus speeding up the resolution of local problems. The ability to act independently motivates the population and the leadership of the local community to develop and improve conditions. Through the reform, the united territorial communities are empowered in such areas as local economic development, local infrastructure development, improvement and development of the territory of the united territorial communities (UTC), provision of housing and communal services, management of secondary, preschool and out-of-school education institutions, provision of health care services, development of culture and physical education, provision of social assistance and administrative services.
The Law of Ukraine 'On voluntary unification of united territorial communities' (2015) defines a single mechanism for the formation of a new administrative-territorial unit, and emphasizes the voluntary nature of such association and the initiative of residents of the village, town or city, deputies and relevant councils, local self-organization bodies. The united territorial community is the legal successor of the property, rights and obligations of the united territorial communities from the date of official receipt of certain powers by the elected community. It follows that the united territorial community receives in its activities a significant number of powers from the preceding local governments. Markovych, H. (2019) emphasizes that the financial side of the reform is provided by the amendments to the Tax and Budget Codes, which from January 1, 2015 increased the economic capacity of the united territorial communities by obtaining more finances. The budget of the united territorial communities (UTC) is 60% of the personal income tax, 5% of the excise tax on the sale of excisable goods, 100% of the single tax, 100% of the property tax (land, real estate, etc.). In addition, local budgets remain at the disposal of 100% of the income tax of enterprises and financial institutions of communal property, 100% of payments for the provision of administrative services and 25% of the environmental tax.

Amendments to the Budget Code fix funding from district budgets in the field of secondary health services and activities at the district level, regional funding of educational institutions, at the level of state subventions. Local budgets of municipalities will be supplemented by revenues from state duties, administrative services, collection of administrative fines, collection of tourist income, payment of licensed economic activities, rent for the use of communal property, subsoil and water resources.

The fact of establishing direct inter-budgetary relations with the state budget remains important, because before the reform such relations were available only to the budgets of oblasts, rayons and cities of oblast significance. It is also possible to approve the local budgets of the united territorial communities (UTC) regardless of the date of adoption of the Law "On the State Budget".

For the successful implementation of the reform, the budgets of the united territorial communities (UTC) receive support from the state authorities in the form of subventions. Exercising the powers delegated by the state, local governments receive appropriate transfers in the form of grants, educational and medical subventions, subventions for community infrastructure development, socio-economic development of territories, etc.

The councils of the united territorial communities (UTCs) also have the right to make local borrowings to the budgets of the UTCs, both local and domestic, including by obtaining loans from international financial institutions. Borrowings are made to the development budget and funds are directed to the implementation of investment programs (projects), the purpose of which is the development of communal infrastructure, introduction of resource-saving technologies, renewal of long-term strategic facilities.

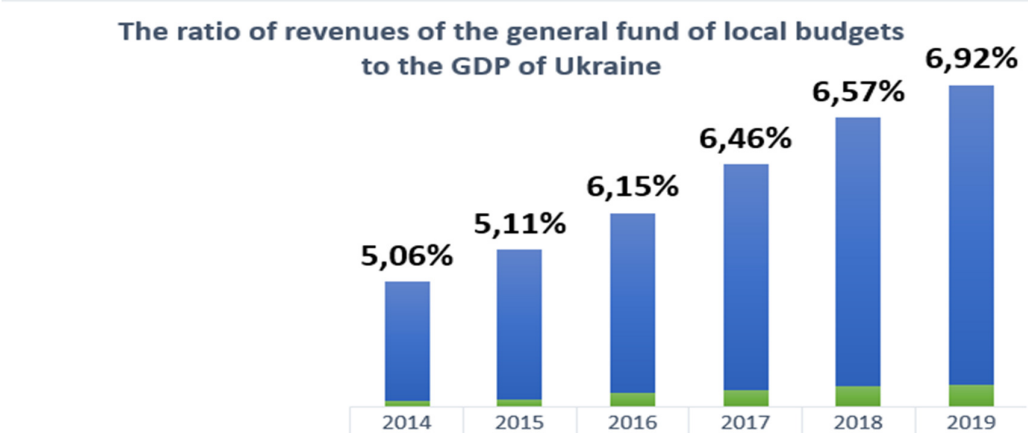

	2014	2015	2016	2017	2018	2019
The share of local budget revenues in GDP	5,06%	5,11%	6,15%	6,46%	6,57%	6,92%
GDP, UAH million	1 586 915	1 988 544	2 385 367	2 983 882	3 560 596	3 974 564
Revenues of the general fund of local budgets (excluding transfers), UAH million	80 230,00	101 574,00	192671	234105	275169	291745

The main macroeconomic indicators (2020)

Since the beginning of the decentralization reform and the formation of united territorial communities, the share of revenues of the general fund of local budgets (excluding transfers from the state budget) in GDP has gradually increased - from 6.15% in 2016 to 6.92% in 2019. This indicator shows the positive dynamics of decentralization reform as local budget revenues are growing rapidly. Such results are possible due to the expansion of powers and increasing the interest of local governments in increasing revenues to local budgets, attracting reserves to fill them and increase the efficiency of administration of taxes and fees.

During decentralization reform the Government of Ukraine has approved 24 long-term plans for the formation of the UTCs with 100% coverage of the country's territory. From 2015 till September, 10, 2020, 983 united territorial communities were created out of 1466 provided by the new system of administrative-territorial organization. New prospects for economic development of communities are envisaged after the liquidation of districts in accordance with the Resolution of the Verkhovna Rada of Ukraine "On the formation and liquidation of districts" of July 17, 2020. This normative act liquidates the existing 490 districts and forms 136 new districts in Ukraine. The village,

township, and city budgets will no longer depend on the district. All 1,469 territorial communities, the territories of which have already been approved by the Government, will switch to direct inter-budgetary relations with the state budget which opens new prospects for UTCs.

Conclusions

The launch of decentralization reform in 2014 has become both a tool for improving the development of local democracy and an effective tool for increasing the financial capacity of local communities. The adoption in April 2014 of Concept of local self-governance and territorial power reforming in Ukraine launched a complex procedure for updating local government. The priority of the reform was the formation of about 1,500 united territorial communities with the possibility of independent local development and the provision of affordable administrative services. The same task was due to the elimination of the "duality" of administrative powers of state and municipal authorities.

Based on the analysis, we can identify the positive aspects of decentralization reform in relation to the economic development of territories. One of the benefits of the reform is the increased efficiency of resource allocation through establishing direct inter-budgetary relations with the state budget. Another advantage is the increase in the level of targeting in the allocation of state resources. Attracting most of the taxes to the local budget was encouragement for local businesses get involved in territorial development. At the same time, we can single out the risks of decentralization, which require the development of new management mechanisms. These include a reduction in the government's control over public finances, the problem of efficient use of resources in newly created communities and the need to control municipalities in attracting and repaying loans.

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Stress Management Strategies And COVID-19 Pandemic

Karolina DRELA

University of Szczecin, Institute of Management, Faculty of Economics, Finance and Management, Szczecin, Poland, karolina.drela@usz.edu.pl
ORCID ID: 0000-0003-0358-7938

Abstract

The aim of the research was to identify problems concerning workplace stress during the COVID-19 pandemic, including those related to the applied stress management strategies. The research conducted in the article was based on quantitative secondary data and analysis of available source literature. Research methods adopted in the article include: critical analysis of source literature and an analysis of secondary data. The aim of the article is to discuss the phenomenon of stress in the workplace during the pandemic, to indicate the methods of dealing with stress in an organisation during the pandemic and to identify the symptoms of work-related stress.
The following research question was formed in the paper: do employees experience additional stress in the workplace during the COVID-19 pandemic and do they have an opportunity to cope with stressful situations caused by the COVID-19 pandemic in their organisation?
The analysis and assessment carried out in the article indicated that the COVID-19 pandemic and its consequences causes social trauma and extreme stress related to a work situation which is not handled well by many employees. Taking appropriate precautions to protect and maintain physical health in the workplace can help to relieve the stress and anxiety which may be associated with COVID-19.
The results obtained may be used to develop programmes to effekt stress at work to counter the effects of the crisis in organisations.

Keywords: Stress, Stress at Work, Management Strategies, Covid-19, Pandemic, Organisation.

Introduction

The reason for changes in working conditions and the workplace is constant social and civilisational development. Work-related stress poses one of the main challenges in respect of health and safety. It is present in the life of every person and, despite concerns about its effects, it is often impossible to prevent it. Occupational stress is a significant type of stress, as it leads to irreversible consequences which pose a threat to the mental and physical health of different professionals. It results from the human body's internal reaction to external environmental stimuli. Stress at work stems from situations which cause mental discomfort. Most people link stress with difficult conditions and requirements at work. They tend to associate this phenomenon with a sense of failure, helplessness or anxiety. Stress may also be motivating, it allows a person to concentrate better on a task or increases an energy level. Many people seek to counter adverse effects of stress so that they do not feel discomfort outside of their professional lives. Is it possible during the COVID-19 pandemic?

The changes brought about by the COVID-19 pandemic did not spare the labour market either. Increasingly often work occupies human life and therefore plays a significant role in our existence. As a result, more and more people are experiencing situations harmful to health, which are reflected, inter alia, in their work and affect their surroundings. Employees are constantly thinking about the workplace and the work itself, and for many, the end of the weekend is a cause for concern, as every week brings a great deal of new responsibilities and problems they must face (Ryder, 2020). Work-related tension accompanies employees every day, regardless of the type of work they perform or position they hold (Harnois, Gabriel, 2000). Stress is therefore a natural response to everyday challenges and changes in life, not only negative but also positive. Any activity can be stressful: air travel, an important exam, the first day at work or losing one's job. There are numerous sources of stress, including personal difficulties (e.g. conflicts with relatives, loneliness, lack of income, fear for the future), problems at work (e.g. conflicts with co-workers, extremely demanding or insecure job) or serious social threats (e.g. the COVID-19 pandemic, violence, illness, economic crisis or lack of economic opportunities) (Ahorsu, Lin, Imani, Saffari, Griffiths, Pakpou, 2020; Brooks, Webster, Smith, Woodland, Wessely, Greenberg, Rubin, 2020; Hossain, Tasnim,

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Sultana, Faizah, Mazumder, Zou, Ma, 2020). It is stress that is considered to be one of the main threats in the workplace and, compounded by the COVID-19 pandemic, it has an even greater impact (Pappa, Ntella, Giannakas, Giannakoulis, Papoutsi, Katsaounou, 2020; Pakpour, Griffiths, 2020).

The aim of the research was to identify problems concerning workplace stress during the COVID-19 pandemic, including those related to the applied stress management strategies. The research conducted in the article was based on quantitative secondary data and analysis of available source literature. Research methods adopted in the article include: critical analysis of source literature and an analysis of secondary data. The aim of the article is to discuss the phenomenon of stress in the workplace during the pandemic, to indicate the methods of dealing with stress in an organisation during the pandemic and to identify the symptoms of work-related stress. The following research question was formed in the paper: do employees experience additional stress in the workplace during the COVID-19 pandemic and do they have an opportunity to cope with stressful situations caused by the COVID-19 pandemic in their organisation?

Literature Review

Many researchers have been trying for years to define the concept of stress in scientific terms, which means that this problem has been addressed in a variety of ways. It is traditionally defined as a set of responses of a human body to actions which disturb its balance, mobilise it or, on the contrary, disturb the balance of an individual. According to the contemporary view on stress, it may be classified subjectively, which means that it is a process located in the subject, or systemically, defining stress in the category of subject-environment relations. Given the multitude of the related terms, the ambiguity and the number of different criteria for classifying stress, the nature of stress may be considered as non-specific – it is a “broad response to difficulties”. This concept of stress was formulated by Selye (1950; 1974) and it is advocated by most authors. When defining stress, the relationship between stress and negative affects, such as fear, anger or sadness, must be considered.

Change is an inevitable part of human life, for example: illness, death, choosing a new school, taking a new job, promotion or dismissal, but also everyday frustrations: exams, late-coming, noisy flatmates, car crashes and the like (Holmes, Rahé, 1967). All these factors provide stress that affects the functioning of a human body (Holmes, Rahé, 1964).

Often stress occurs only in work-related situations, however other factors, such as personal matters, financial situation or environment in which a person lives and surroundings in which they function, play an important role as well. These aspects are also closely linked to work. People devote a significant part of their life to professional work, even if, due to the development of technology, it may be carried out at home – it actually consumes more and more time (Lazarus, Folkman's, 1984).

In the first half of the 20th century, in the era of industrialisation, the man was treated as an addition to a machine and this approach was widespread in the industry. It was only the hands, eyes and simple skills that mattered most, and the man as a whole, with his psychological, spiritual and social needs, was not a matter of entrepreneurs’ interest. Such approach to an employee often proved to be economically inefficient, as the person treated in this way was uncommitted to work, alienated, tired and made many mistakes. This adversely affected the quality of the manufactured product.

In Japan, the term “karoshi”, which refers to death from overwork, is still valid today. For cultural reasons, Japanese workers were not uncommitted to work, yet their physiological response was no different than in other countries, hence the costs of maintaining health had to be borne as well. In order to maintain quality, the control stations had to be multiplied, and this increased the costs even more. As a result, where the market position of a company's product depended on the highest quality, the production managers abandoned the dehumanising “assembly belts” and introduced the so-called teamwork.

The following years of industrialisation saw the development of trade unions, which enforced increasingly “humane” treatment of workers. In the post-war years, the Human Relations paradigm of promoting managers' interest in the psychological and social needs of employees began to spread in management, and as a result of its evolution, an even greater theory emerged, Organisation Development, which combined the humanist orientation “towards employees” with the perspective of the organisational and management corporate system (Caplan, 1994).

At the end of the 1970s, one of the promoters of management theory and practice based on the Organisation Development theory was Adams (1987), who at that time proposed a novel approach to diagnosing and improving the company’s management system. He suggested that the functioning of the company's management system should be viewed through the prism of stress experienced by employees and managers. The identification of processes and

places which are the sources of unnecessary stress of organisation's employees and managers was aimed at identification of those organisational areas which (in the name of increasing effectiveness) were to become an area of improvement and more reasonable solutions. Adams' analyses demonstrated that the constant, stressful working conditions included above all: continuously raised standards of productivity, insufficient time to complete tasks, only negative feedback from a superior, unclear standards of evaluation and conflicts between organisational units. Those are accompanied by daily problems, such as changes in instructions, the requirement to work overtime, sudden increase of work rate and any restructuring.

Today, we are witnessing a remarkable technological development and the related modern and humanistic forms of management organisation in knowledge-based areas, i.e. those whose growth depends on the mental efficiency of employees. However, it appears that in various areas of economy – industry, large-scale trade, financial services – the "traditional" practices of exploiting workers and managers are reintroduced. The "more efficiency, less expenditure" principle is applied. The globalising economy is contributing to over-exploitation of resources, including human resources. Companies not only reduce social benefits and privileges, but also reduce job security, which is a stress-inducing factor. At the same time, more and more funds are being spent on health care. This is not only due to the high cost of the latest medical technologies, but mainly due to the increasing number of people suffering from health problems caused by work-related stress (Buddeberg-Fischer, Klaghofer, Stamm, Siegrist, Buddeberg, 2008).

The working environment is constantly evolving under the influence of new technologies, changes in work organisation as well as economic, social and demographic transformations (Cooper, Rout, Faragher, 1989). Health and safety policy and practice must therefore be adapted to changes in the labour market, and the changes in the European labour market concern, inter alia, the workforce which:

- is ageing;
- consists of a growing proportion of working women;
- is composed of an increasing number of migrant workers, both legal and unregistered;
- is more frequently engaged for temporary and part-time work;
- increases the use of new technologies.

Changes in the working environment have strained the traditional coping mechanism. There is a growing pressure for greater productivity and longer working hours. There is a need to absorb and use more and more information. The sense of job security is poor (threat of dismissal). Demographic changes and the need for both men and women to reconcile work and family life are additional aggravating factors (Ruotsalainen, Verbeek, Mariné, Serra, 2014).

Stress has an economic dimension. The effects of stress affect the employee turnover and absenteeism rates. The higher the above rates, the heavier losses a company incurs. Stress additionally has other consequences which include the lack of motivation, low productivity, burn-out and poor performance of individuals and teams (Fontana, 1990).
Stressed employees tend to:

- make unintentional errors and mistakes;
- have accidents at work;
- suffer from chronic and severe diseases requiring expensive treatment;
- lose interest in their job (burn-out);
- come into conflict with their superiors;
- fail to comply with safety rules;
- be reluctant to change or innovative solutions;
- take frequent sick leaves;
- quit their jobs (frequent staff rotation).

These behaviours may cause losses to companies, for example as a result of accident costs, changes in work efficiency, lost equipment, lost profits, the need to train new employees or spend additional funds on replacements (Cooper, Payne, 1978).

Work-related stress symptoms during the COVID-19 pandemic

As the situation with regard to the spread of the pandemic and the resulting increase in workplace stress is constantly changing, it is essential that employees recognise the signs and symptoms of work-related stress as they emerge and refrain from ignoring or suppressing them. Recognition of signs and symptoms of stress is the first step

to develop plans to build up immunity, deal with symptoms and seek help when needed (Singh, 2020). During the COVID-19 pandemic, work-related stress may affect employees and cause the following symptoms (Maintaining Positive…, 2020):

- physical symptoms: increased heart rate, fatigue or burn-out, loss of or change in appetite, difficulty sleeping, muscle tension, frequent headaches, persistent nausea, dizziness;
- emotional or psychological symptoms: anger, irritation, denial, sense of insecurity, nervousness, constant worrying, lack of motivation, loss of self-confidence, low self-esteem, racing thoughts, sadness, depression, hypersensitivity, guilt or lack of commitment to work;
- behavioural symptoms: difficulty concentrating or inability to concentrate, poor judgement, limited decision-making, neglecting work and/or family responsibilities, procrastination, reduced productivity.

The COVID-19 pandemic has exacerbated the existing problems related to stress and anxiety in the workplace. For certain people, the reality of public work during the global pandemic raises serious health and safety concerns. For others, working from home involves its own challenges. Others are still unemployed and experience serious financial difficulties, which also contributes significantly to stress and anxiety (Time to Change…, 2020).

For those working at home (online), the stress of social isolation may easily lead to burn-out, which is a common syndrome suffered in the workplace and recognised by the World Health Organisation (2020). The requirements for adaptation to COVID-19 and social distancing measures can significantly impede creativity and efficiency of the workflow of blue-collar workers (organisations). Moreover, many employers may not provide adequate personal protective equipment or, for fear of employees' health, grand them paid leave (Labrague, De los Santos, 2020).

The situation resulting from the spread of COVID-19 and reactions to the pandemic have affected a vast majority of employees. According to the research conducted in the US, almost 70% of American employees consider COVID-19 pandemic as the most stressful period in their career and 88% of employees experienced moderate to extreme stress in the first months of the pandemic (America's State…, 2020).

The main factors which increased employees' stress and anxiety during the pandemic included:

- concern for personal health or the health of family and friends;
- fear of a difficult financial situation or concern about losing one’s job;
- change in sleep or eating patterns;
- difficulty sleeping or maintaining concentration;
- deterioration of pre-existing chronic conditions;
- deterioration of mental health;
- higher consumption of caffeine, nicotine, alcohol or other substances.

It should be noted that these stressors also affected significantly the employees' productivity. Among employees reporting increased levels of stress during the pandemic, 62% claimed they their productivity dropped at least by one hour a day, and 32% reported a loss of as many as two hours a day. This resulted in the loss of nearly $ 23 billion in the short period from the beginning of the pandemic to April 2020 (America's State…, 2020). The protracted COVID-19 pandemic is leading to a loss of productivity, increased health costs and is threatening employees’ well-being.

Furthermore, as a result of the coronavirus, the number of prescriptions for anti-anxiety drugs and the accompanying risks have increased. During the pandemic antidepressants and anti-anxiety drugs, many of which have a number of negative side effects, such as cognitive disorders and high risk of physical dependence, are prescribed more frequently (Labrague, De los Santos, 2020).

To conclude, people nowadays experience chronic stress, and in the COVID-19 era its level is even higher, which contributes to the development of mental problems in healthy people and exacerbation of the existing conditions (Gavidia, 2020). People who have never received psychiatric treatment begin to suffer from sleep disorders, anxiety disorders and depression. Initially patients experience adaptive disorders, however later some of them may develop symptoms of a depressive episode. The instability, uncertainty of the current situation causes fear fuelled by rapid changes in forecasts and further spread of the epidemic. People are experiencing fear of becoming infected, fear for themselves and their loved ones, which lasts many weeks. It is very difficult for some people to witness others in crisis situations. There is a sense of social risk. Stress may be additionally caused by limitations resulting from sanitary and epidemiological regulations, e.g. staying at home, telecommuting. In the era of COVID-19 pandemic, mental health may be also adversely affected by the professional and economic instability, limited opportunities to earn a living and support a family, as well as by the fear of stigmatisation of a person infected with the coronavirus

(Ahorsu, Lin, Imani, Saffari, Griffiths, Pakpour, 2020). Chronic stress generates losses, as the reality is distorted by anxiety. In times of stress and epidemic, the ability to think creatively is diminished. More mistakes are made which cause new fears and increase frustration (Singh, 2020). The somatic symptoms of anxiety – chest tightness, irregular heartbeat or abdominal pain – make it necessary to visit a doctor to discover their medical causes, yet not a psychiatrist, but a cardiologist or an internist. However, after the diagnosis which excludes a disease, some patients are unable to accept the thought that they suffer from a stress-based, psychological problem. The quarantine forces a significant change in functioning in terms of habits, routine and daily contacts with household members. Suddenly it turns out that the whole family have to stay together in one place, that remote work is not easy, as the time allocated thereto needs to be shared with children and other household members. Apart from that, isolation is always a source of additional anxiety.

The problem of coping with stressful situations caused by the COVID-19 pandemic in the organisation – discussion

There are many actions that may be taken, also by an organisation, to deal with stress and promote positive mental health and well-being among employees during the COVID-19 pandemic. To adequately address the growing problem of stress and anxiety in the workplace, both during and after the COVID-19 pandemic, and the associated consequences for physical and mental health, a multifaceted approach is needed. This approach should include the provision of additional mental and emotional health support from employers in the form of employee care programmes, as well as innovative approaches to psychotherapy and the use of pharmacology. Such a programme should be sponsored by employers who should ensure that employees have access to advisory services and other resources. It is also recommended that those programmes address challenges in every day life of an employee which contribute to stress and anxiety, such as childcare services, financial assistance, legal advice, etc. (Marsh, 2020). They should also include telephone and online counselling, online chat and face-to-face sessions. The resources provided by employers will play a key role in the maintenance of mental health and well-being of employees, as well as in efficiency, productivity and reduced employee turnover (Mayer, 2020).

It turns out that employers are not able to cope with stress of their employees (Biskupski, 2020). According to a survey by HRK (2020), recruitment company, more than half of employees are concerned about losing their jobs and income. Unfortunately, the actions taken by employers which should alleviate stress are considered unsuccessful. Currently, as many as 52% of employees are concerned about sudden loss of employment and a source of income. Among other concerns, employees indicate the fear of making a mistake (28%) which will have serious consequences, as well as the fear of the boss (15%) – their unjustified criticism, lack of appreciation, recognition of accomplishments and unclear communication in the daily delegation of tasks. For 43% of the respondents, clear and two-way communication is the basis for all activities, as it allows mutual exchange of experience, information and resolution of doubts. Straightforward communication creates less ambiguity and thus fewer stressful situations, and this is lacking in Polish companies during the COVID-19 pandemic.

It should be emphasised that one of the important action strategies at the organisational level, reducing the stress level of employees during the epidemic, involves a systematic provision of reliable and up-to-date information. It should relate to the epidemiological situation in the workplace, as well as any ongoing activities carried out by an employer to reduce the risk of infection as well as the procedure to be followed during this period. The information in question may come not only from superiors but also from occupational medicine physicians and occupational health and safety specialists. Where possible, helplines, instructional videos and training webinars should be made available. It is the practice of some wealthier companies to invite experts (e.g. virologists) to provide employees with more specialised knowledge.

Moreover, it is necessary to support employees in carrying out tasks in new conditions, different from the standard ones, as well as to ensure an opportunity to maintain an individual approach to working hours or productivity. To provide information support, additional trainings for employees present in the workplace regarding the tasks of those who, for various reasons, will not be able to return to work, may be considered.

It may also be good practice to provide support to the members of middle management who should communicate with their teams, yet may not have the necessary tools which are available to top managers. This may be accomplished by organising online or other trainings on team management methods.

Another very important organisational strategy to be implemented in this difficult period to prepare employees for return to work is the development of rules of conduct towards employees who have recovered from the infection. They may feel deeper anxiety due to their situation, which is more difficult than that of others; they may feel isolated from the rest of the team and ignored in the life of a corporate community. This poses a genuine dilemma

for an employer: how to respect the employee's privacy, how to keep their health status confidential (to which they are fully entitled), yet at the same time take care of the health and safety of other employees (OECD, 2020).

To allay the fear of stigmatisation of those who recovered from the infection, it seems crucial to advise them of anti-mobbing procedures and a policy of "zero tolerance for psychological abuse" applicable in the company. Such a policy fosters a culture of mutual respect and fulfils its purpose of ensuring the well-being of employees in any situation, and especially in crisis situations such as an epidemic. Pursuing the policy of "mutual respect", it is also important that the employer remains sensitive to the needs of a person who has recovered, to their particular condition, physical weakness, as well as to possible problems with concentration and severe stress and concern about their health (OECD, 2020).

It would therefore be advisable to hold a brief and regular forum to provide the employees with an opportunity to express their concerns and ask questions as well as to encourage them to support each other. In the Anglo-Saxon tradition, for example, such forms of mutual support which involve sharing opinions, concerns and advice are extremely popular and strongly encouraged by employers.

Remote employees who are less burdened by the presence of other family members, should try to follow a fixed daily routine based on their daily work routine. This is particularly important for telecommuters who are more vulnerable to changes and disorganisation of routine procedures, which may cause them strong anxiety, lack of concentration and worse performance at work.

All employees, including telecommuters and those returning to work, should be encouraged to use different forms of physical recovery that support individual resistance to stress, including regular physical exercises such as jogging, stretching, etc. As indicated above, they significantly improve mood by reducing the level of anxiety.
Mental rest, including a break from work, for example, to indulge in one's hobbies, relaxing books or to take a walk, also reduces the level of anxiety.

Conclusions

For many people work is the major source of problems and stress in life. Occupational stress may affect employees regardless of their position and age. Considering that stress is a widespread social phenomenon, it would be advisable to implement measures to reduce or completely eliminate it from companies. Solutions which involve monitoring and immediate response at an early stage of problem identification in an organisation, would allow for a quick reaction and reduction of psychic costs and economic losses.

Methods of managing workplace and occupational stress and developing resistance may help to overcome the adversities faced by employees who adapt to different work environments, such as those working in normal places of work/offices or those returning to the workplace after the company had been reopened. It would therefore be advisable to inform employees of the rules and procedures applicable in the workplace in order to reduce the risk of the spread of coronavirus and protect their health. To prevent the infection from spreading, the rules and procedures established in the workplace as well as public health recommendations should be followed (e.g. frequent hand-washing, respiratory etiquette, physical distance, cleaning and disinfection of the workplace). Taking appropriate precautions to protect and maintain physical health in the workplace can help to relieve the stress and anxiety which may be associated with COVID-19.

The ongoing epidemic causes social trauma and extreme stress related to a work situation which is not handled well by many employees. In order to alleviate this stress, we generally use intuitive forms of self-help and help others in an intuitive, spontaneous manner. Fortunately, despite isolation and social distance, thanks to technology we are not alone in this situation.

People differ in their ability to adapt to this new reality and many struggle with it. This is a cause for concern, especially since the threat of coronavirus is still beyond human control. The vaccine has not been developed yet and the health system is overloaded, which makes it more difficult to receive assistance immediately.

Whenever we experience chronic stress, the risk of developing or exacerbating symptoms of mental disorders, including mood and anxiety disorders, but also other conditions, increases significantly. As a source of a long-term stress, the pandemic already has a major impact on the mental health of employees and will probably continue to affect them for a long time after it finally dies down.

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Assessment of Corporate Safety Across Economic Sectors During The Second Wave of SARS COV2 Crisis - The Employees' Perspective

Wojciech PIESTRZYNSKI

Pomeranian University, Slupsk, Poland
wojciech.piestrzynski@apsl.edu.pl

Ewa MATUSKA

Pomeranian University, Slupsk, Poland
ewa.matuska@apsl.edu.pl

Abstract

The paper presents the analysis of quantitative research conducted during second wave of the economic crisis caused by Covid-19 pandemic among the sample (N=795) of Polish employees representing three economic sectors: services, production and public sector. Two variables**:** the type of the sector and the level of the subjective sense of safety and their elements were statistically controlled via two-way analysis followed. Obtained results show employees differ in their experiencing prolonged stress caused by the COVID-19 pandemic and most of them (employed in service and in production sector) perceive disturbances in their subjective sense of safety. Employees of all economic sectors connect their sense of safety with the degree of satisfaction of their basic needs, the safety of their relatives, and their appreciation of the corporate order currently existing in their organizations. The employees' assessment of the corporate safety is more critical in case of enterprises, both in service and in production, in compare to the evaluation of public sector organizations. The found results can be used as recommendations for introducing more intense and accurate anti-crises interventions addressed to the sector of enterprises.

Keywords: corporate safety, sense of safety, employees, COVID-19 crisis

Introduction

In the situation of the COVID-19 crisis the foundation of the socio-economic order is threatened by an objective and serious stressor of biological nature, which has many socio-economic repercussions. Government and regional administrations, organizations and individuals are trying to face this stressor since the first quarter of 2020. Social distancing, self-isolation and economic restrictions are causing reduced turnovers across all economic sectors and thus - the risk many jobs can be lost (Tucker 2020, Nicola et al 2020, Ritter and Pedersen 2020). The second wave of the crisis situation (from early autumn 2020) is visible both in the intensity of the daily sickness and death rates as well as in various economic indicators (e.g. rising unemployment, number of corporate bankruptcies, etc.).These indicators mirror also the effectiveness of already implemented anti-crisis interventions at the government or regional level, which are evaluated not only by experts, but first by citizens, employees and employers (Carnevale and Hatak 2020, McKinsey & Company 2020).

The main theory underlying the article is the concept of the safety broadly defined as an objective state of non-threat that is subjectively felt by individuals or groups (Korzeniowski 2000, Czajkowski 2014). This approach includes two perspectives of understanding phenomenon of safety: an objective, related to the external factors that are important for a safe life, and subjective, concerning individual, subjective assessment of the state of possession or availability essential goods and relating to the individual's experience. The stressfulness of the COVID-19 crisis is revealed at the level of subjective perception of different threats which can be assumed as the measure of the subjective sense of safety. The sense of safety, in literature (exchangeable called as sense of security), is variably understood, but one of the leading meaning is that it represents the subjective state of belief of individual in having sufficient resources to take own action or development activity (Bar-Tal 2000, Klamut 2012, Piwowarski 2014). The general sense of safety can be defined as a state of internal balance resulting from having acceptable level (from the point of view of individual) of own goal-oriented activity. Three internal variables of the sense of safety reflecting its emotional

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dimension (Klamut 2019) include: the degree of satisfaction of the basic life needs, the level of perceived safety of relatives, and the assessment of the possibilities of continuing own social or economic participation.

Authors of the article used above specification to plan own research. The paper content is conceptualized based on the literature review and on the basis of the execution of own quantitative research. The on- line questionaries regarding the sense of safety was disseminated in Oct. 2020 among employees of the three economic sectors in Poland, namely: services, production, and public institutions, and obtained results were followed with ANOVA and correlation analysis.

Research Concept and Design

The research main assumption was that emotional context of ongoing stressful COVID-19 situation is a risk factor both for employees economic well-being as well as for their corporate participation. The subjectively experienced sense of safety of employees reflects not only the trust to their organizations (corporations or institutions), but also to the relevant administrative bodies (governmental/regional) responsible for undertaking adequate anti-crisis interventions. As COVID -19 especially hit the service sector, employees of that sector are probably more vulnerable with weakening their own sense of safety in compare to employees of other sectors.

The sample of 795 women and men, working in organizations located in north regions of Poland (Pomerania, West Pomerania, Masuria and Warmia) was randomly selected and checked for the level of their perceived sense of safety. Respondents were representing three economic sectors: services, production, and public institutions. The study was conducted in first half of Oct. 2020 when COVID-19 pandemic restrictions were minimized after summer when the speed and range of the disease spread was lighter. In that time the governmental anti-crisis tools were already implemented as the aid for organizations. Information about the research sample is presented in a Table 1.

Table 1: Descriptive statistics of respondent sub-grups

Employment sector	Number /N	Median/M	Standard Deviation /SD
Services	216	17.722	4.49
Production	238	18, 336	3.17518,336
Public sector	341	18,563	2.768

Source: own elaboration

The following problems and hypotheses were formulated:

1. *Does the sense of security experiencing during second wave of COVID-19 pandemics differ in case of employees of three economic sectors?*
   H1 – it is supposed that there are significant differences for the three sectors, especially between employed in services versus other subgroups.
2. *Does exist the correlation between the employees' sense of safety and their level of satisfaction referred to filling basic life needs during the second wave of COVID-19?*
   H2 – it is supposed significant correlation exists between employees' sense of safety and their level of satisfaction referred to filling basic life needs.
3. *How does the sense of safety of employees correlate with the assessment of the safety of their relatives during the second wave of COVID-19?*
   H3 – it is supposed correlation exists between the employees' sense of safety and their assessment of the safety of their relatives.
4. *What are the correlations between employees' sense of safety and their assessment of the corporate safety during the second wave of COVID-19?*
   H4 – it is supposed correlation exists between the employees' sense of safety and their and their assessment of the corporate safety.

The research have used the Safety Experience Questionnaire (SEQ) standardized for Polish population by Klamut (2019) and adopted to the on-line version. Three internal variables of the sense of security were examined: the degree of satisfaction of the basic life needs, the level of perceived safety of relatives, the assessment own possibility to act as an appreciation of perceived corporate order . The norms for raw scores of global sense of safety in SEQ were following: raw scores (min 5 – max 25); from 5 to 15 - low sense of safety; 16 - 20 - moderate sense of safety; 21 - 25 high and very high sense of safety. For data statistical elaboration the analysis of variance (ANOVA) and the Pearson correlation coefficient (r) were used.

Results and Discussion

Tables 2a and 2b summarize descriptive statistics of the sense of safety for examined employees of the three investigated economic sectors.

Table 2a: ANOVA for sense of safety of employees of (S), (P), (PB) sectors*

Source of variance	SS	df	MS	Test F
Between subgroups	95.129	2	47.564	5.262
Inside of subgroups	7 158.337	792	9.038	
Sum	7 253.466	794		
p = .005				

** (S) - services, (N = 216; M = 17.722; SD = 3.172), (P) - production (N = 238; M = 18.336; SD = 3.175), (PS) – public sector , (N = 341; M = 18,563; SD = 2,768); SS - sum of squares; df - degrees of freedom; MS - mean of squares*
Source: own elaboration

Table 2b: Post hoc Tukey's test for sense of safety of employees of (S), (P), (PB) sectors*

Pair	Tukey's statistics HSD Q	p values of Tukey's HSD Q	p
S versus P	3.073	.076	Nonvalid
S versus PS	4.548	.003	** p<.01
P versus PS	1.263	.632	Nonvalid

Source: own elaboration

ANOVA have showed statistical differences in the level of the sense of safety between studied subgroups (F = 5.262; p = .005). When looking for answers to what pairs' treatments contributed to the above overall result, the post hoc Tukey test was used, thanks to which significant differences in the sense of safety were established only between those employed in services (M = 17,722) versus those employed in the public sector (M = 18,563), where the value of p = .003. The results confirm assumptions of the first hypothesis (h1) – employees of the three investigated sectors significantly differ in the level of their sense of safety, and a special differences were found in case of employees of service sector (low raw score of sense of safety) compared with those from public sector (high raw score of sense of safety). Employees of production estimated their sense of safety on a moderate level. It could suggest that employees of the service sector doesn't perceive sufficient corporate aid.

Summarizing, employees differ in their experiencing prolonged stress caused by the COVID-19 pandemic but most of them (employed in service and in production sector) perceive disturbances in their subjective sense of safety in time of COVID -19 crisis.

In order to verify the next hypothesis (h2) using the Pearson correlation coefficient, it was established that, regardless of employment in a specific branch of the economy, the sense of safety of employees correlates with the degree of satisfaction of their basic life needs (Tab.3).

Table 3: Correlations of the sense of security of employees in subgroups with the degree of satisfaction of their basic needs

Employees in subgroups	Variable 1	Variable 2	Pearson's r	p < 0,05
Services	Sense of safety	The degree of satisfaction of basic needs	682	.001
Production	Sense of safety	The degree of satisfaction of basic needs	694	.001
Public sector	Sense of safety	The degree of satisfaction of basic needs	.621	.001

Source: own elaboration

The research also attempted to establish a relationship between the sense of safety of employees and the safety of their relatives (see hypothesis no. 3). A moderate (significant) correlation was established for all subjects (Tab. 4).

Table 4: Correlations of the sense of safety of employees in subgroups with the safety of their relatives

Employees in subgroups	Variable 1	Variable 2	Pearson's r	p < 0,05
Services	Sense of safety	The safety of loved ones	.452	.001
Production	Sense of safety	The safety of loved ones	.443	.001
Public sector	Sense of safety	The safety of loved ones	.567	.001

Source: own elaboration

The verification of the last hypothesis (h4) concerned the correlation between the employees' sense of security and their appreciation of the corporate safety perceived by order in the organization to which they belong in the professional dimension. The corporate order was estimated by employees as the level of the various aid instruments offered within organizations which were benefited also from side of governmental/regional institutions as anti-crisis interventions. Statistical analysis of correlation coefficients (Tab. 5) shows that in the case of employees employed in services and production, there is a moderate relationship between the above variables. On the other hand, a weak correlation was noted in case of budgetary sector employees, what suggest they not connect so much those two variables in compare to other ones.

Table 5: Correlations of the sense of security of employees in subgroups with their appreciation of the corporate order

Employees in subgroups	Variable 1	Variable 2	Pearson's r	p < 0,05
Services	Sense of safety	The degree of appreciation of corporate order	.546	.001
Production	Sense of safety	The degree of appreciation of corporate order	.557	.001
Public sector	Sense of safety	The degree of appreciation of corporate order	.325	.001

Source: own elaboration

Summing up all hypotheses were confirmed. The employees of investigated economic branches in Poland generally estimate their subjective sense of safety during second wave of COVID-19 pandemics from low to high level and differ in their experiences. Especially vulnerable seem to be people employed in service sector which was most hit by crisis restrictions even during summer of 2020. Not significantly more safe feel employees of production, and relatively most safe are those employed in a public sector. Examination of particular components of the phenomenon of the sense of safety revealed that employees of all branches connect their sense of safety with the degree of satisfaction of their basic needs, with the safety of their relatives, and with their appreciation of the corporate order currently existing in their organizations.

Conclusions and Implications

The corporate order in the research was estimated by employees on the base of their satisfaction with aid instruments offered within their organizations in connection with COVID-19 crisis problems. It is necessary to note that the level of organizational aid is mostly depended on time and accuracy of anti-crisis interventions offered by governmental or regional institutions. In case of employees of services and production the corporate aid was perceived as moderately correlated with their subjective sense of safety, compared with weak correlation noted by budgetary sector employees. Obtained data suggest that from the employees' perspective, their assessments of the corporate safety across various economic sectors during second wave of Sars Cov 2 crisis differ. They are more critical in case of enterprises, both in service and in production, in compare to the evaluation of public sector organizations. The results show employees of budgetary sector feel subjectively more safe in compare to those employed in service and production sectors. All it suggests the need of implementation of more intense and adequate anti-crisis interventions addressed to the sector of enterprises in Poland.

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Labour Migration as One of The Factors Influencing Economic Security

Izabela Szkurlat

Pomeranian University in Slupsk, Poland

E mail: izabela.szkurlat@apsl.edu.pl

Abstract

Maintaining economic security is one of the foundations of the functioning of the state. It also relates to the security of the national economy and the threats associated with it. We assume that the economy must generate profits and function smoothly. The problem of an ageing population and shortages of human resources may affect its disruption. Labour migration may be the solution. One of the aims of this article is a statistical analysis which shows the scale of economic migration of Poles to other countries, including Europe. This affects the Polish labour market and the need to fill it with economic migrants from other countries.

Keywords: Economic Security, Labour Migration, Emigration, Immigration

Introduction

Economic security according to E. Haliżak is: "The notion of economic security of a state refers to the notion of threat to the security of the national economy, i.e. a situation in which the economy cannot <<develop, generate profits and savings for investment, or where external threats will lead to disruptions in its functioning, which will put citizens and businesses at risk, and possibly threaten the physical survival of the state>>" (M. Plecka, A. Rychły-Lipińska, 2013).

By identifying threats to economic security, we can include, among other things, the inadequacy of the directions of financial and economic policy in the country and, above all, human resources. In developing the concept of human resources, we mean, firstly, an ageing society, secondly, a lack of highly qualified workers and, thirdly, deficits in the regions which offer jobs. In other words, there is a shortage of workers who are ready to work for the wages offered (A. Bralewski, 2018).

The phenomenon of migration is an important problem that has been under consideration for centuries. It affects many aspects of life, including political, cultural, social and economic aspects. Definitions, divisions of migration, models and new trends occupy a considerable amount of contemporary literature. We consider migration to be a phenomenon: "the constant movement of individuals and groups from place to place. Migration is one of the basic processes in human history. (...) Immigrants usually provoke hostility among the local population, which accuses them of taking jobs and weakening local culture (...)" (Slownik politologii, 2008).

Focusing on the needs of articles on labour migration, we are dealing with a change of residence or place of stay for economic reasons. The pushing factor is the impossibility of earning or earning too little in relation to expectations and costs of living. The push factor is also often the lack of any possibility of earning money at the place of residence due to the high unemployment rate. The attraction factor for a given place is an alternative that will allow you to meet your own expectations in financial terms and the possibility of finding a job.

Analysis

Analysing the situation of Poland and the economic migration of Poles, we find that Poland's accession to the EU in 2004 has opened up opportunities for work in other countries of the Community. Despite the opportunity to introduce transitional periods for citizens of other countries, which would consist in restricting the labour market, countries such as the United Kingdom, Ireland and Sweden, among others, have not made use of this right. This made it possible to take up work outside Poland's borders and caused many Poles to leave the country for work. According to the Central Statistical Office, it is estimated that they emigrated from Poland for temporary residence to European Union countries in 2004 – 770,000 people, and in the following years this number has been increasing significantly, assuming values: 2005 – 1200,000 ; 2010 – 1.685,000 ; 2011. – 1.670,000; 2012 – 1.720,000; 2013 – 1.789,000; 2014 – 1.901,000; 2015 – 1.983, 000; 2016 – 2.096,000. In 2018, there were an estimated 2,455 Poles abroad, including

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about 2,155 in Europe. For example, there were 706,000 Poles in Germany, 695,000 in the UK, 123,000 in the Netherlands and 113,000 in Ireland (Informacja, 2019).
In 2018, more than 90% of migrants chose European countries. There were 4.4k people migrating to Germany and 2.7k to the United Kingdom. Migrants were mostly people of working age 25-44 years (Human capital, 2019). Migration of Poles, above all to other European Union countries, resulted in changes on the labour market in Poland. According to a report prepared by Work Service in November 2018, 8.6% of Poles who are professionally active or who will be potential persons on the Polish labour market consider emigration within 12 months. This is estimated at 1.6 million people. Currently, the direction of paid work is mainly Germany - 23%, Norway - 16%, Sweden - 15%. The profile of a Polish immigrant is as follows: 45% - 18-34 years old; 68% - inhabitants of villages or smaller towns up to 100 thousand, 31% - inhabitants of central Poland; 69% - people with lower education, 82% - people with employment in Poland. Preferred economic trips of Poles are mainly for 3 months 37.1%. Only 4.4% prefer to leave for six months, 9% for a year, 22.9% for several years, 19.2% for permanent residence, and 7.4% are not determined (Migracje zarobkowe, 2018).

It is estimated that already in 2006 there were shortages of workers on the labour market in Poland in quantities: 20% construction companies, 21% automotive industry, 25% furniture industry, 34% woodworking, 24% paper industry (Pujer, 2017). Due to the continued economic emigration of Poles and the lack of willingness to work for the remuneration offered, it was necessary to admit citizens from other countries to the labour market.

Thus, migrants as less skilled workers are usually employed in the agriculture, hotel and catering sector. In the years 2015-2019, Poland has seen a systematic increase in the issuance of work permits for foreigners. Analysing statistical data, 6,578 permits were issued in 2015 and 127,394 permits in 2016, 235,626 permits in 2017, 328,768 permits in 2018. In 2019, however, 444.7k permits were issued, of which 74.3% were work permits for Ukrainian citizens (Zezwolenie, 2020).

According to statistics from the second quarter of 2014, carried out on a population of 54,000 people aged 15 to 64, approximately 70% of immigrants are active in the labour market, of which 45% are employed. They most often work in sectors such as industrial processing, trade and vehicle mechanics. In 33% of the professions they have been specialists. As many as 23% of immigrants declared to have higher qualifications than their current occupation. For comparison, the percentage of indigenous citizens was lower at 19.9% (Informacja, 2015).

Tabel 1. Total fertility rate

	FR	SE	UK	CZ	UE	ES	PL	NL	DE
2004	1,92	1,75	1,75	1,23	1,50	1,31	1,23	1,72	1,36
2017	1,90	1,78	1,74	1,69	1,59	1,31	1,48	1,62	1,57

Source: own elaboration based on Poland in the European Union A statistical portrait, p. 22.

Another factor that has affected the labour market in Poland is, as in other European countries, the ageing population. This means that the number of indigenous citizens is significantly decreasing, which leads to a situation where the demand for workers from other countries is increasing. It is estimated that the population in Poland, according to the economic age groups defined as the mobile group, will decrease from 14 million in 2020 to 11 million in 2035, decreasing to 9 million in 2050. The forecast of the immobile group, on the other hand, assumes a significant increase from 7 million in 2020 to over 8 million in 2035, with an upward trend to 10 million in 2050 (Population, 2014).

The fertility rate, as in other European countries, is far from what is expected. Births are the most important factor influencing the structure and size of the population. Comparing the figures since 2000, it has remained at a level in subsequent years: 2000 - 1.37; 2005 – 1.24; 2010 – 1.38; 2015 – 1.29; 2016 – 1.36 and 2017 – 1.45. In comparison with 1955, the fertility rate in Poland was 3.61 (Urodzenia, 2018).

The Sussmith Commission report of 2001 states that, among other things, Germany is a country that benefits and will continue to benefit from migrants when it comes to staffing. The same is true of the United Kingdom. Following analysis by the Home Office over a period of 30 years, it has been recognised that there are potential benefits in using migrants to fill vacancies. The first factor that determines this is the economic factor. Firstly, developed countries are unable to move all jobs for the low-skilled and low-paid out of their territory. In some sectors of the economy, industries must operate where their customers live (e.g. construction services, restaurants, hotels). The second factor is the demographic factor. Developed countries considered rich have a marked decline in fertility rates. Of course, it is not possible to change the fertility rate with the help of migrants in order to halt the ageing of societies. It is assumed that the benefits of migration in relation to the fertility process are usually short-lived (S. Castles, M.J. Miller, 2011).

There are different positions that are being considered by economists assessing the impact of migration on the economies of the host countries. These are both negative and positive assessments. Focusing on the positive analyses made by the Home Office, it appears that labour migration has an impact on economic growth, which consequently increases the welfare of indigenous citizens and migrants. Similarly, the analysis carried out by the Home Office assumes that migration does not have negative effects on indigenous workers. The analysis concludes that migrants make the labour market complete, which increases productivity and reduces the pressure of inflation (S. Castles, M.J. Miller, 2011).

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Modelling an Effective Occupational Fraud Prevention Technique in Malaysian SMES

Nor Hafizah ABDUL RAHMAN
Faculty of Accountancy
Universiti Teknologi MARA
Shah Alam, Malaysia
Email: hafizah587@uitm.edu.my

Noradiva HAMZAH
Faculty of Economics and Management
Universiti Kebangsaan Malaysia
Bangi, Malaysia
Email: adibz@ukm.edu.my

Razana Juhaida JOHARI
Faculty of Accountancy
Universiti Teknologi MARA
Shah Alam, Malaysia
Email: razana@uitm.edu.my

Yusarina MAT ISA
Faculty of Accountancy
Universiti Teknologi MARA
Shah Alam, Malaysia
Email: yusarina@uitm.edu.my

Abstract

In recent years, various occupational fraud cases involving Malaysian Small and Medium Enterprises (SMEs) have bankrupted the SMEs. Occupational fraud among the SMEs' employees includes asset misappropriation, corruption, and financial statement fraud. This study aims to model an effective fraud prevention technique for SMEs in Malaysia. Data for this research was collected through a qualitative approach using an interpretive multiple case study. This study used a purposeful sampling technique to select three SMEs in the manufacturing industry as the case studies. The data was analyzed using content analysis in terms of within-case analysis and cross-case analysis. Based on the key findings from this study and the organizational fraud triangle model by Free, Macintosh, and Stein (2007), several items were identified as crucial for the leadership, management control, and culture elements in an effective occupational fraud preventive technique. The items in the proposed model include, among others, ethical leadership, realistic performance target, code of ethics, sound internal control system, and compliance with policies and procedures. The proposed model would serve as a benchmark to provide guidelines for the SMEs on preventing fraud in their organizations.

Keywords: SMEs, Occupational Fraud, Fraud Prevention.

Introduction

Small and medium enterprises (SMEs) are the drivers for economic developments and innovations in Malaysia. The SMEs represent 98.5% of the total business community, with its Gross Domestic Product's (GDP's) expansion rate of 6.2% higher than the overall Malaysian economy (SME Annual Report 2018/2019). In a developing economy, SMEs' sustainability has become a concern in the business community amidst the rising occurrence of corruption, fraud, and other criminal activities. KPMG's Fraud, Bribery, and Corruption Survey of 2013 revealed that fraud was a problem for business organizations in Malaysia. According to the Association of Certified Fraud Examiners (ACFE), small businesses face an increasing number of frauds with a range of different types of crimes, in which occupational fraud represents a significant threat (ACFE, 2014). The losses that the small businesses suffer carry more severe consequences (Johnson & Rudesill, 2001) as they usually do not have sufficient funds to absorb the

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loss (Nawawi & Puteh Salin, 2018). The ACFE reports for 2014, 2016, and 2018 disclosed that the greatest financial impact of fraud occurs in the small business environment with an average organization loss of 5% of their revenue every year. Thus, fraud is very costly to small businesses. Small businesses are also at far greater risk and are more vulnerable to fraud than large corporations because they do not have the resources that larger companies have. The few fraud controls that they do have may be less-effective (ACFE, 2012; Laufer, 2011). Generally, small businesses do not have an anonymous fraud reporting system, do not have a code of conduct, do not perform fraud awareness training, and have weak internal control (Sow, Basiruddin, Mohammad & Abdul Rasid, 2018). Bressler and Bressler (2007) argued that the most cost-effective way to deal with financial loss through fraud is prevention. However, to date, there are limited studies conducted to identify the effective means to prevent fraud, particularly for SMEs. Despite the significant contribution of small businesses to the country's economic growth, previous research has overlooked the fraud issues that are threatening the sustainability of those businesses and, instead, focuses mainly on large and public limited companies (Sow et al, 2018). Therefore, this study's primary objective is to identify the fraud prevention techniques used in the Malaysian SMEs. This study used the interpretive multiple case study method to identify the current fraud techniques adopted in the SMEs. Its results would serve as a benchmark to provide the SMEs with guidelines on preventing fraud in their organizations. Furthermore, with this benchmark, the SMEs can adapt and establish an appropriate anti-fraud approach that will be more suited to their specific business needs and organizational requirements.

Literature Review

This section discusses the review of previous literature that is important to this study.

Occupational fraud

ACFE (2018, pp. 6) defined occupational fraud as "the use of one's occupation for personal enrichment through the deliberate misuse or misapplication of the organization's resources or assets." Hrncir and Metts (2012) highlighted that employees utilize many methods to conduct their fraud. The methods used depend on several factors, including assets that the employees have been entrusted with and the level of access to the company's funds. The ACFE (2018) classified occupational fraud into three primary categories: asset misappropriation, corruption, and financial statement fraud. Assets misappropriation presents the greatest risk. It can be broken down into cash and non-cash misappropriations. Cash is the most commonly stolen asset. Cash misappropriations include cash skimming, cash larceny, and fraudulent disbursement. Some specific examples are paying fraudulent bills and fictitious vendors, embellishing an expense account, and check tampering (Omar, Nawawi & Puteh Salin, 2016; Parker & Kresse, 2012; Laufer, 2011). Non-cash misappropriations include stealing assets either through misuse of physical assets (such as inventory or equipment), false sales and purchases, or misuse of proprietary information (Omar et al., 2016). Employee fraud in terms of cash and merchandise is the most frequent fraud and the most costly. Therefore, these types of fraud are most concerning to the owners (Krambia-Kapardis & Zopiatis, 2010; Kuratko, Hornsby, Naffziger, & Hodgetts, 2000).

On the other hand, corruption involves employees misusing their influence in a business transaction in a way that violates their duties to the employer in order to gain a direct or indirect benefit. Corruption represents a high risk in every department of business, particularly purchasing (ACFE, 2018). Next, financial statement fraud is a scheme in which an employee intentionally causes a misstatement or omission of material information in the organization's financial report. Examples of this fraud are recording fictitious revenue, understating reported expenses, or artificially inflating reported assets. Hence, Parker and Kresse (2012) revealed that, in the rise of the recession, occupational fraud now occurs more frequently and includes a new wave of crimes, such as customer identity theft, intellectual property theft, and sabotage. They also uncovered that employees' fraud is a causal factor for small businesses' bankruptcies. Prevention is the most cost-effective way to deal with fraud (Bressler & Bressler, 2007). Fraud prevention reduces the opportunities of fraud from occurring. Moreover, prevention measures are less costly than the time and expenses required for fraud detection and investigation (IIA, AICPA, ACFE, n.d.). The lack and non-existence of anti-fraud controls, such as lack of internal control and inadequate segregation of duties, would result in employee theft (Said, Alam, Ramli, & Rafidi, 2017; Parker & Kresse, 2012). Laufer (2011) emphasized that the amount of opportunity an employee has to commit fraud is usually a function of their position of authority and level of trust. Cressey (1950) theorized that for fraud to occur, each of these three criteria must be present: perceived pressure, perceived opportunity, and rationalization.

Organizational Fraud Triangle

The criminologist Donald Cressey (1953) initially developed the Fraud Triangle Theory, where three different factors contribute to a person deciding to commit an act of fraud. These factors are pressure, opportunity, and

rationalization. The pressure is the motivation of the person to commit fraud when they are having financial problems, for example. Opportunity, on the other hand, is the method by which the crime could be committed given, for example, loose control procedure in an organization. Rationalization is how the person justifies, in their mind, committing the fraud. Added to this theory was the capability of an individual to commit fraudulent acts (Wolfe & Hermanson, 2004). Capability is a trait of the individual committing the fraud that drives them to seek and exploit an opportunity. In other words, the potential perpetrator must have the skills and ability to commit fraud. The fraudster recognizes the particular fraud opportunity and is able to turn it into reality. Position, intelligence, ego, coercion, deceit, and stress are the supporting elements of capability. The fraud triangle was further expanded by adding competence and arrogance (Howarth, 2011). The component of competence is an approach to an individual's ability to override internal controls and control situations. All these elements, focused on the individual-level, explain how fraud occurs within organizations. At the organizational level, leadership, management control systems (MCS), and organizational culture form the three points of the organizational fraud triangle shown below.

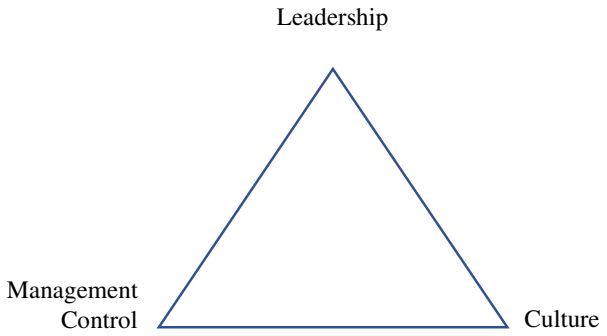

Figure 1: Organizational fraud triangle (Free, Macintosh, & Stein, 2007)

The organizational fraud triangle was initially developed by Free, Macintosh, and Stein in 2007. The elements used for the organizational fraud triangle are leadership, management control systems (MCS), and organizational culture developed through research on case studies involved in Enron's collapse. Leadership, systems, and culture are the main branches that influence people's actions in an organization. The fraud triangle illustrates that the most important lessons from Enron lie in how a corporate culture championed by CEO Skilling overcame a sophisticated and widely lauded set of management controls and the importance of carefully balancing the core concepts of leadership, organizational culture, and control within the organization. Through each of these components, fraud can and will occur throughout the organization when such opportunities emerge. Free et al. (2007) proposed the concept of the organizational fraud triangle, underpinned by (1) charismatic leadership, (2) subverted management control, and (3) a permissive culture.

Fraud Prevention

Fraud prevention is especially crucial for small business organizations since they have limited resources to establish an internal audit department and install sophisticated detection and security systems. Fraud prevention measures include practices attempting to stop irregularities from occurring. Meanwhile, fraud detection measures include procedures designed to identify anomalies in the business. The strongest defense against potential fraud is a well-designed and effective operating system of internal control, where controls are focused on effectively mitigating identified risks (European Commission, 2013). Indeed, the designing and operating of an internal control system in the form of an anti-fraud program is the management's responsibility and can result in reductions in opportunities for employees to commit fraud. Holtfreter (2004) argued that fraud prevention and detection methods could be of two different techniques. Firstly, strategies that are implemented at the pre-employment stage to screen the applicant's historical status. Secondly, measures that take place during employment to prevent fraud from occurring. Organizations should pay particular attention to recruitment decisions especially when engaging people with a history of fraudulent behaviour (Kalovya, 2020). Jolly (2003) stated that organizations must create a sense of responsibility among employees, which is possible by creating a positive environment in the organization. While creating trust and responsibility, the organizations also have to ensure that they implement adequate precautionary measures to protect the employees from resorting to fraudulent opportunities. Therefore, the extent of the organizational level of fraud should be given utmost attention to prevent and deter such actions.

Research Objectives and Design

This paper aimed to propose a model for an effective occupational fraud prevention technique for SMEs in Malaysia. It also aimed to identify the current fraud prevention techniques adopted in the SMEs. The sub-objectives of this study are: 1) to illustrate the elements of fraud prevention techniques adopted in the SMEs; and 2) to identify factors that hinder effectiveness of the current fraud prevention techniques in the SMEs. To achieve these research objectives, the following questions were developed:

RQ1: What are the fraud prevention techniques currently adopted by the SMEs?
RQ2: What are the factors that inhibit fraud prevention in the SMEs?

Sample

SMEs are defined based on two criteria, namely annual sales turnover and the number of full-time employees of a business. For the manufacturing and manufacturing-related services, SMEs refer to enterprises with a turnover of less than RM25 million or full-time employees of less than 150 workers, while for services and other sectors, SMEs are those with a turnover of less than RM5 million or have less than 50 workers. A business that meets either one of the criteria will be deemed as an SME. SME businesses can be legally structured as entities registered either under the Registration of Businesses Act 1956 (Act 197) or the Companies Act 1965 (Act 125). This study selected three SMEs that reported incidences of fraud in Malaysia. For confidentiality reasons, they are named as SME A, SME B, and SME C. In general, these SMEs encountered employee fraud in terms of stolen inventory, corruption, and collusion among employees, which happened mostly in the warehouse and the procurement department. To ensure that the findings were unbiased, these three manufacturing SMEs have similar characteristics:

1. Fall under the manufacturing industry. This industry was chosen because the 2013/2014 Kroll Global Fraud Report highlighted that the manufacturing sector shows an increase in the prevalence of fraud. The report stated that the manufacturing sector has the highest overall fraud incidences and the second-highest rate of financial losses.
2. Won awards as winners of 50 Enterprises organized by the SME Corporation Malaysia to celebrate and highlight the achievements of small and medium-sized enterprises that are well-positioned for the future.
3. Have audited financial records for three consecutive years.

Research Method

This study used an interpretive multiple case study and survey design. Yin (2003) described the multiple case study method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not evident. In other words, the method enables the researcher to cover contextual conditions that are highly pertinent to the phenomenon of interest. Most multiple case designs are likely to be stronger than single-case designs (Yin, 2003). This study used a multiple case study approach for two reasons. Firstly, this approach enables comparative or cross-case analysis to be conducted between the units of analysis. Secondly, findings obtained in one case could be used as guidance in the analysis of another case. Besides, selecting multiple cases can add to the distinct advantages of multiple sources of evidence and replication of findings.

Instrument

This study used semi-structured, open-ended interviews that consisted of predetermined questions to obtain data. The interview questions were guided by an interview protocol designed to reassure consistency. The design of the protocol was based on previous studies on occupational fraud and fraud prevention. An interview protocol is necessary to assist the researcher in collecting the data. It is more than a list of interview questions; it also extends to the procedural level of interviewing and includes a script of what the researcher will say before and after the interview, prompts for the interviewer to collect informed consent, and remind the interviewer of the information that he is interested in collecting (Jacob & Furgerson, 2012).

Data Collection and Analysis

The data was collected through in-depth interviews with the owner of these manufacturing SMEs. The real names of these manufacturing SMEs are not disclosed to maintain anonymity and confidentiality. The interviews focused on occupational fraud prevention. They were guided by an interview protocol, and each interview lasted around one hour. The interviews were recorded with permission to ensure that every statement was documented. Interview

transcripts provide raw data that needs to be analyzed systematically. This study used the content analysis operationalized via Nvivo12 Plus to analyze the semi-structured interviews with a word-based and code-based approach together with several analytical strategies adopted for the interviews (Stake, 2006). According to Krippendorff (2004), content analysis can range from the simplest form of word count to thematic analysis or conceptual analysis. Huberman and Miles (1994) also suggested the preliminary 'counts' of data and determine how frequently codes appear in the database. This kind of analysis can be useful for discovering patterns of ideas in the body of the text. The conceptual content analysis begins with identifying research questions and choosing a sample or samples. Once chosen, the text must be coded into manageable content categories, sometimes called themes. The process of coding is one of the selective reduction methods. By reducing the text to categories consisting of a word, set of words, or phrases, the researcher can focus on, and code for, specific words or patterns that are indicative of the research question.

Findings and Discussions

This study highlights the elements of fraud prevention techniques adopted in the SMEs and identified factors that hinder the effectiveness of their current fraud prevention techniques. A proposed model of an effective fraud prevention technique in SMEs is provided at the end of the discussion.

Profile of the SMEs

SME A
SME A is known for its premium ice-blended coffee and beverage solution in Asia since its establishment in 2001. SME A currently holds the Halal, HACCP, and ISO22000 certifications. It has also received notable awards and recognition throughout the years from the SME Corporation Malaysia. SME A initially started with its flagship product, the 'Ice-Crushed Cappuccino', and currently has sixty gourmet flavors ranging from coffee and non-coffee products in their product line. SME A believes in being an ethical company and delivers customer satisfaction through its expanding developments in the beverage industry.

SME B
SME B initially focused on recycled glass bottles in 1991 and has now ventured into manufacturing, selling, and distributing bottled beverages for soft drinks, isotonic energy drinks, and clarified sparkling fruit juices. Over the years, SME B has received various awards and recognition, most prominently the 'Prime Minister Award' in the agriculture and agro-based industry sector. SME B envisions to expand further in the local and export beverage industry through continuous innovation.

SME C
Since 1983, SME C has been producing a variety of dairy-based products, such as fresh yogurt fruit, Greek yogurt, and yogurt beverages. With more than 30 years in the industry, SME C has received numerous accreditations, particularly from the SME Corporation Malaysia. It is certified as a Malaysian brand by SIRIM QAS International. SME C aims to create more products in the market, with their motto 'belongs in every fridge'.

This study illustrates the elements of fraud prevention techniques adopted in these SMEs from the perspective of the organizational fraud theory to answer the following research question:

RQ1: What are the fraud prevention techniques currently adopted by the SMEs?

Leadership

Leadership is critical to the creation and maintenance of culture; there is a constant interplay between culture and leadership (Moris, 2009). It is possible that an organization's ethical culture and leadership can affect the management's perceived ability to rationalize and commit fraud (Trompeter, Carpenter, Desai, Jones, & Rriley, 2013). Within organizations, cultural norms arise and change due to what leaders tend to focus their attention on, their reactions to crises, their role modeling, and their recruitment strategies. Based on the interviews conducted, the following responses represent their leadership commitment to culture:

…From day one of company establishment until today, what we believe in… what is our value system, what is our philosophy… we introduce ourselves to our employees, even to our suppliers, customers, agents, and distributors…we do not practice corruption, so we are corruption-free company…

…From my point of view, I will show my commitment in terms of employee welfare. I put aside some money to help my employees if any one of their family is sick, in financial difficulty, and so on. Once a month, I will do a spot check on them to show that I really mean that unethical behavior is not permitted in my company…

Role modeling, in terms of ethical organizational behavior, is derived from ethical conduct and ethical leadership. The senior management must lead by example by adopting an ethical tone and being transparent in all their communications and actions. Violations of ethics, trust, and responsibility are at the core of fraudulent activities (Dorminey, Flrming, Kranacher, & Riley, 2012). Serving as role models, leaders can influence lower-level employees to act ethically or unethically (Trevino & Brown, 2005). Therefore, it is important to set a good tone at the top, which in turn relates to the leaders' moral character and values. Based on the interviews conducted, it can be said that the top management of the SMEs is committed to the showing of ethical behavior. This conclusion is based on the following responses that reflect those commitments:

…When a fraud case is impacted, I think our staff will see how we respond. It is not about the loss it makes but about how management sees this, how we respond to it. They are watching us and see what management will do, and what action we take. If we take it lightly, then they will say... "oh my company actually don't care much about that" …

…We incorporate zero tolerance for fraud and dishonestly and basically, as a leader, we show commitment by leading management practices by example…

In terms of the allocation of rewards and status, there should be fair compensation and realistic individual performance goals. In the same essence of relieving undue pressure to reach performance targets, an organization should work towards the adoption and timely revision of realistic individual performance goals for their managers and executives. Revising bonus plans and performance benchmarks allow organizations to remove potential fraud pressures.

Management Control

Management controls refer to the tools that seek to elicit behavior that achieves the strategic objectives of an organization. The organization should maintain an effective system of internal controls and financial checks to prevent employee fraud. Proper segregation of organizational duties is the key to defeating most fraud schemes (Peltier-Rivest, 2018). This is based on the following responses:

… We have different people with authorization approval role. One person prepares the quotation, then another person will authorize and approve. The same procedure in the factory, there is always one person who prepares the document, one approves, one check or approve, there will be at least two persons or three people will get them to sign on certain thing…

…When we make cash sales, for example, there will be one person who received the cash, he/she will issue receipts. After that, another person at a different department will receive the cash, verify, and bank in. After that, the accounting department will reconcile with invoices…

Maintaining good accounting procedures or systems designed to promote efficiency by imposing surprise audits or random verifications by the internal auditor are also effective in preventing and detecting employee fraud. Surprise audits would make the fraudster's fear getting caught (Wells, 2011). The following responses describe the situation:

…For accounts and sales, we have a good system…proper stock checking systems in terms of physical check and verification with computer recording system…

…We also implement monitoring methods and external financial audits to ensure that the systems are working properly…

Assuring compliance with policies and preventing fraud should reflect organizational objectives as well as regulatory and legal obligations. The likelihood of employee fraud and its potential impact should be analyzed and evaluated in the context of an organization, its industry, and its overall operating environment (Dorminey et al, 2012).

…Every year we have a surveillance audit from HSCCP and ISO to do the evaluation and assessment, especially on our documentation. Then, we have an internal audit and management review every year…

Organizational culture

Organizational culture is the shared principle of beliefs and assumptions that influence how individuals or groups of people behave in an organization (Schein, 1985). Several earlier studies has identified that organizational culture plays a crucial role in shaping the employees' attitudes toward fraud (Holton, 2009; Pfister, 2009; Davis & Pesch, 2013). Organizational culture encompasses values, beliefs, and principles that come from employees, management, as well as the vision and mission of the organizations (Needle, 2010). This is how the organizational culture, which later shapes the individual's course of action within an organization, is built. The SMEs in this study have their own organizational culture based on the following response:

…What we believe, and practice is understanding and application. We can talk about a lot of things, which is written. But if those written things do not create meaning or are not relate to them, so it is just a statement. We need to be practical. We need to explain, and employees need to understand why we practice this and how does this affect them…

Accepted 'rules of the game' are inclined towards the climate of group interaction, shared meanings, and shared knowledge for socialization. These rules can be further elaborated in terms of publicly announced espoused values, and visible cultural artifacts, such as corporate mission statements, corporate metaphors, and important symbols, with the aim of making sense of the relationship between the company's culture and its management control system. This finding is based on the following response:

…during the weekly meetings, we align our employees' belief with the company's mission, the company's direction. Our company stands for ICQ, which I stand for Innovation, C for Commitment, and Q for Quality. Now and then, this ICQ is not only a slogan but what we believe in and we need to respond in our work performance…

Organizations should develop comprehensive compliance risk management programs. Norms relating to risk-taking and acceptable competitive behavior are usually reflected in the business activities, for example, an open bidding policy, and regular monitoring of current and potential vendors. Also, to detect and transform a culture of fraud, organizations should take advantage of the monitoring abilities of their employees and external stakeholders (Bishara & Schipani, 2009). This suggestion is based on the following response:

…We practice internal monitoring methods even though there were no formal risk assessment procedures in place. The information must be available in a timely manner when needed, emphasize on check and balance work procedures as well as effective monitoring…

Prevailing rationalizations of action by the SMEs is in terms of their code of ethics. The Code, which is signed and reaffirmed annually by every employee, underpins their formal control system that lays out the accepted behaviors. This discovery is based on the following response:

…First thing when people join our company, we provide them with training where they have to go through all the company regulations. The employee will sign the "Aku Janji" declaration, with someone as a witness, that the employees will follow the rules and regulations, and acknowledge the action taken when the rules have been broken…

Within the organizations, the impact of culture and leadership on even the most sophisticated management control system must not be overlooked or minimized. It is often too easy to consider cultural and management control systems separately, with culture being a soft issue and management controls a hard one.

Identifying factors that hinder the effectiveness of the SMEs' current fraud prevention techniques is to answer the following research question.

RQ2: What are the factors that inhibit fraud prevention in SMEs?

Weak internal control and the ease with which the existing controls can be overridden enable employees to commit fraud without being caught (Girgenti & Hedley, 2011). KPMG Malaysia (2013) found that weak or inexistent internal control is the leading factor that fosters fraud in business, especially in small businesses. In this case, implementing strong internal control within the SMEs contributes to their success. This finding is based on the following response:

…Our offices are all open (in one big room with a partition)… everybody can see each other than they have been seeing each other what they do, that means there is no restriction area…

However, an open space office may lead to fraudulent activities when staff is left alone or unattended. Furthermore, there is no proper control for confidential processes of data, which could expose the company to fraud relating to information security.

Limitation of the resources to strengthen anti-fraud control includes the internal audit function. According to Hernandez and Groot (2007), a study on auditor experiences, observations, and perceptions to determine the most important mitigating control concluded that an important fraud prevention mechanism is mitigating controls over management attitudes. Based on the interviews conducted, most SMEs have the same problems of limited resources. One of the SMEs stated that:

…We do but not in a proper way. We do not have enough manpower. Besides, it is time-consuming… Honestly saying that… we may not be able to go in-depth or go into very detailed cost and measurement. We do not have specialties or consultation of doing such process…

The SMEs also suffer from lack of fraud awareness by employees, where all their employees are unfamiliar with the business conduct policies. Hence, statements of operating procedures and copies of the aforementioned policies should be issued to all employees to enhance their awareness and understanding of such procedures and policies (Sow, Basiruddin, Abdul Rashid, & Md Husin, 2018). The lack of awareness was identified based on the following response:

…There was no formal documentation of fraud prevention and no formal communication with employees on this matter…

The lack of commitment to the management in promoting high values of honesty is likely to lead employees to commit fraud (Murphy & Dacin, 2011). According to Sengur (2012), by setting up a culture of honesty, top management identifies acceptable ethical behaviors and communicates them to the employees.

Proposed model of effective fraud prevention technique in SMEs

Based on the findings above, this study proposed a model of effective occupational fraud prevention techniques in SMEs as shown in Figure 2.

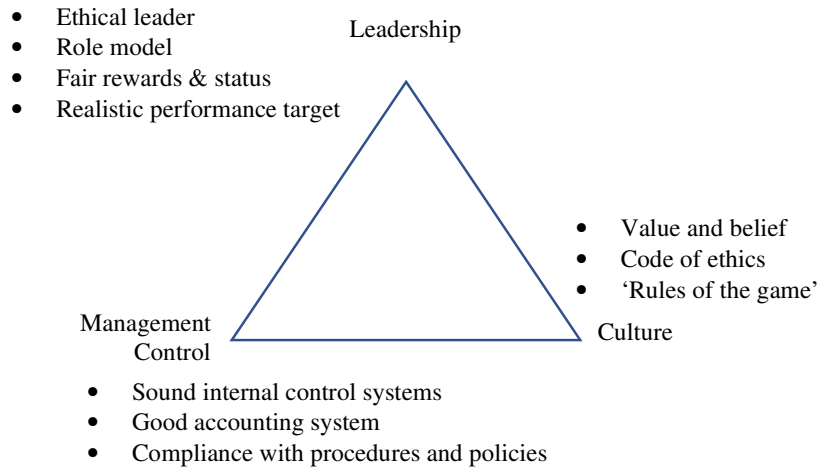

Figure 2: Propose model of effective occupational fraud prevention technique [Adapted from 'Organisational fraud triangle' by Free, Macintosh, and Stein (2007)]

Conclusion

It is frequently observed that fraud has a greater economic impact on society than any other category of crimes. No other issue has had as strong an impact on the business economy that make SMEs bankrupt as fraud. In light of this impact, SMEs should proactively design anti-fraud control measures that help them to prevent employee fraud. The prevention model in this paper proposed that, at the organizational level, SMEs should have good and strong

leadership, tight management control systems, and a positive environment of organizational culture. These are the main branches of fraud deterrence techniques for the people in the organization. Understanding the organizational vulnerabilities to occupational fraud may assist in streamlining the prevention, detection, and resolution of occupational fraud cases (Kalovya, 2020). However, the findings of this study cannot be generalized to the whole population of SMEs in Malaysia since the study focused only on SMEs in one specific industry.

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Evolution of the Talent Management Concept

Dana FATOL
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, dana.fatol@student.upt.ro

Gabriela Alina PARASCHIVA
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, gabriela.paraschiva@student.upt.ro

Diana ROBESCU
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, diana.robescu@student.upt.ro

Anca DRAGHICI
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, anca.draghici@upt.ro

Larisa IVASCU
Politehnica University of Timisoara, Faculty of Management in Production and Transportations, Timisoara, Romania, larisa.ivascu@upt.ro

Abstract

The concept of talent management (TM) has grown into one of the first priorities of businesses in the last decade and subject to theoretical models for many scholars. The people having the competences as defined by their roles are driving the competitive advantage of the organisations, however, practices did not yet reach the expected level to overcome an unexpected crisis as the 2020 COVID-19 pandemic created. The present study is highlighting the evolution of the TM concept and has a closer look at seven of the most debated and applied TM frameworks in the last two decades, by identifying the common and new approaches. Aiming to have a base for TM concept research, we acknowledged two potential solutions for its further development and applicability.

Keywords: Talent management, people development, talent concept, human resources management, behaviour change

Introduction

Talent Management (TM) was explored through original concepts and implemented since decades. Achieving high performance was always a target of any business. There is no general model or framework that can be applied for a consistent talent approach, as many people's development areas remained unexplored. The initial thinking assumed that organizations should have stable activities, repetitive processes, and a plan to correspond to annual budgeting. Nowadays, the business environments are transforming, and the old approach no longer fit for purpose. The capacity to adapt and the flexibility to respond immediately to market requirements are the new norm for the companies. Things are developing fast; crisis can come unexpectedly and there is no plan that can be set up and followed through the end. The global business context was challenged in 2020 by the COVID-19 pandemic, and companies realized they need to be prepared for a range of business continuity scenarios. We will propose two solutions for supporting future developments of the talent concept and create a base for further research.

Research Methodology

In the context of the presented research, we have conducted research on the existing literature related to TM and people's development of the last seventy years. Our target was to find those theoretical and practical models and

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frameworks that had the biggest impact in the academic literature and influenced the business practices. We have learned that the concept of TM was developed more over the last 22 years and identified seven such frameworks that we will present in the current paper:

- Four steps to win the war for talent published in 1998 by McKinsey;
- Develop-Deploy-Connect model published in 2006 by Deloitte;
- The Talent Trifecta published in 2007 by Ulrich;
- The talent-on-demand framework published in 2008 by Cappelli;
- A theoretical model of strategic TM published in 2009 by Collings & Mellahi;
- A theoretical framework for how GTM links to MNEs' performance published in 2018 by by Collings et al.;
- A conceptual model for integrating employee's proactive behaviour into TM published in in 2020 by Meyers.

A Historical Perspective of People Development Approaches

Looking back to the last seventy years, when the people development followed the needs of the businesses, we can identify few prominent trends. In the 1950s and 1960s, the internal talent development was the most common practice, focusing on executive coaching, 360-degree feedback, job rotation and high-potential programs. In the 1970s, the marketplaces became unpredictable due to increased complexity of the economic environment and the old type of practice could not support the organizations in the same manner anymore (Cappelli, 2008).

A research done for over 20 years on management, careers evolution, employees learning and development at MIT Sloan School of Management was published in 1976 to support the idea of organizations becoming more dependent on employees. The primary reason was the vulnerability to human error when working with complex technologies emerging. To decrease the level of human error, it was identified the need of having well-trained line or people managers, and individual contributors (Schein, 1977).

The severe recession in the early 1980s led to the end of the lifetime employment, many restructuring and reorganization initiatives were conducted worldwide, cutting layers of hierarchy, and boosting the rethinking of how the talent should be developed and maintained. Many people were let go, especially the white-collar workers (office and management employees). The 1990s were the start of a new era for talent recruitment and management. The business environment was trying to recover and implement new practices.

Companies were focusing on hiring from the laid-off talent pool, but also from the competitors, and rethinking their retention policies. Expertise could have been easily lost, as the head-hunting practices gained more popularity and outside hiring became expensive. As a side effect, the new employees were a blocking factor for internal promotions and retention. During this decade, hiring and keeping the right talent in-house became one of the major concerns of the organizations (Cappelli, 2008). How this was addressed over the following period until today was subject to several theories and practices.

After the great recession of 2009, the term "new normal" emerged when thinking of adjusting business and talent strategies to face economic crisis. Globalization and aging workforce, including the Baby Boomers entering retirement period, were creating additional pressure for the companies to adapt novel approaches. Deloitte issued in 2011 the "Talent Edge 2020" blueprint to highlight the potential trends for the following decade, based on the answers of 334 senior executives and talent managers at big organizations across the globe. They could notice that the "war for talent" was still in place and it was taking place worldwide. The top three derived concerns were related to the global talent competition (41% of the respondents), developing leaders and succession planning (38% of the respondents) and people's retention as per 37% of the respondents (Kwan, Schartz and Liakopoulos, 2011).

The efforts of identifying the best practices for talent development were continuing year over year, moving towards better employee experience approach, supported by the new emerging HR technology. Ten years later after the last recession, when the 2020 global COVID-19 pandemic disrupted all the business environments and people's lifestyles, and the term "new normal" got a new meaning.

The Talent Frameworks

TM steps to win the war for talent

McKinsey consultants conducted an extensive research on 77 companies in different industries to understand how the talent is managed. The "war for talent" concept was mentioned for the first time. The results of their investigation were published in a 1998 report with the main conclusion that TM should be a top priority for any company that aims to be successful and have a competitive advantage in the market. One surprising finding was that many people managers were not accountable for their teams' talents. The job mobility was increasing worldwide, the average executive professionals have worked in five companies so far but was estimated to be seven in the next ten years.

It seemed that executive talent was not managed in the right way in the last twenty years. The people were not a priority for many organizations, as their other assets. Only 23% of 6000 executives confirmed their companies attract high-performers and only 10% that they manage to retain them. The talent-building mindset was missing, as well as the link with the business strategy.

A recommendation was to have senior executives hired from outside the company, to better support the refresh of the talent pool and accelerate growth by coming in with the fresh views.

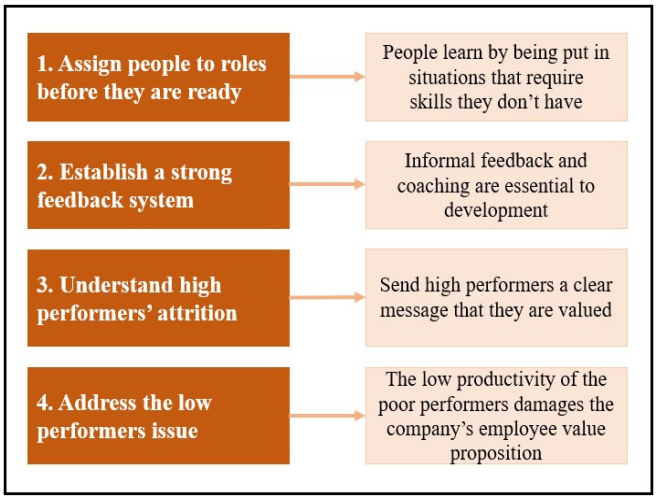

Fig. 1: Talent Management Steps (adapted from Chambers et al., 1998)

The research concluded that there are four steps, as presented in Figure 1, to follow to have a good and consistent talent program:

- Step 1: to use the learn by doing approach and move people cross-functional. However, only 10% of the 200 executives directly interviewed for the research confirmed they are using job assignments for developing their employees.

- Step 2: to implement a powerful system for collecting also informal feedback and using coaching to support the people development. 73% of executives agreed to this, but only 30% were confirming they have it in place at a good level.
- Step 3: to understand the company's retention problem by documenting why top performers are leaving.
- Step 4: to address the low performers' issue and avoiding their stay in same positions for years, negatively influencing others and damaging the company's employee value proposition. The research showed this is the most difficult action and usually left behind by organizations (Chambers *et al.*, 1998).

Three years later, McKinsey consultants ran another research at 56 large and midsize US companies. Both studies showed a discrepancy between the talent issue and the actions taken on that. Only 14% of the managers confirmed that their companies attract top performers, comparing with 23% in previous study. Only 3% of the respondents to both surveys strongly agreed that their organizations have an effective talent development program (Axelrod, Handfield-Jones and Welsh, 2001). They could not notice progress in this direction in the last period, although the competition for talent increased.

The Develop-Deploy-Connect model

Another well-known consulting company, Deloitte, launched an analysis to understand the talent crisis within the energy sector (oil and gas, utilities, and mining organizations) and what initiatives are ongoing to overcome it. They surveyed 1396 employees from 60 countries. One of the fundamental things noticed was the strong link between TM and organizational performance. Some critical issues appeared to be attracting the required competence (67% of respondents confirmed), attracting new talent (60% of respondents confirmed), and retirement of the Baby Boom generation (49% of respondents confirmed). Hiring and retention were the focal points when speaking about TM. However, the development, deployment, and connecting employees were not enough appreciated, and that would have generated long-term talent shortage.

The consultants proposed the Develop-Deploy-Connect model, considering the people's needs for growth opportunities and communication. This framework illustrated in Figure 2 was one of the first to address the importance of the employee experience.

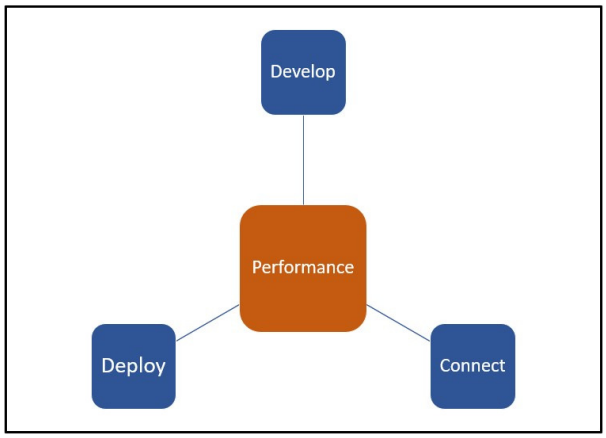

Fig. 2: Develop-Deploy-Connect Deloitte model (adapted from Serrat, 2017)

As seen in Figure 2, the "Develop" dimension can include the stretched assignments, peer-to-peer learning programs, mentoring, and coaching. "Deploy" can incorporate the actions taken by the companies to understand what motivates the employees and facilitate challenging assignments for them. "Connect" can refer to bringing people together according to the similarities of their interests and purposes, creating a sense of belonging through communities, coaching, mentoring and social networks. Productivity is the first to be impacted when a crisis occurs. The model is built to increase that, additionally to attract and keep top performers of many workers (Serrat, 2017).

The Talent Trifecta

A simplified formula was introduced in 2007 by Dave Ulrich and contained three items: competence, commitment, and contribution as shown in Figure 3. Talent equals competence times commitment times contribution. If one item was missing, it was considered unreplaceable and equation would have collapsed. Competence was referring to the knowledge, skills and values needed mostly for future jobs, according to customers' expectations. Commitment is the factor that creates value for the competence. These two items were forming the main framework for talent so far. In order to keep the people's motivation and interest at high level, the contribution element was introduced. The time and effort translated to success and real meaning of the work same time, can create value for both company and employee. HR professionals can partner with the managers and engage them in actions for improving those three elements for their team members. The talented individuals should have the skills, wills and purposes (Ulrich, 2008).

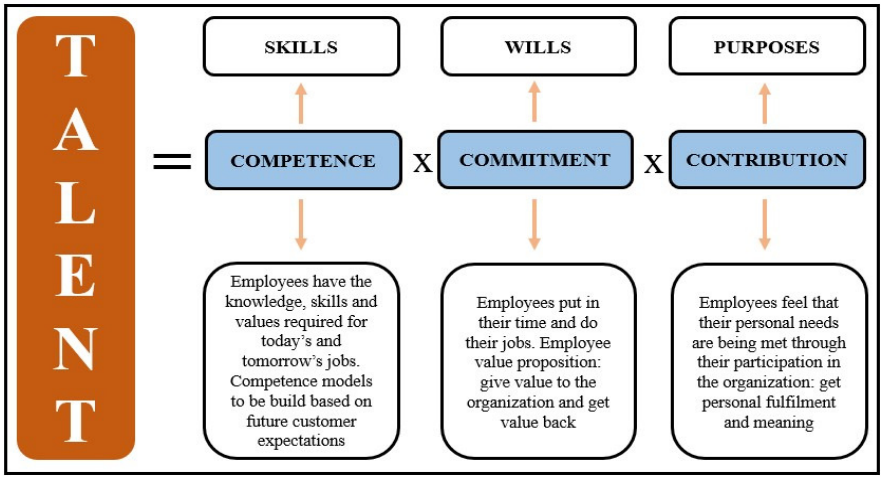

Fig. 3: The Talent Trifecta (adapted from Ulrich, 2008)

The talent-on-demand framework

One of the most innovative approaches for talent management released in the 2000s was using four principles similar with the ones used in the supply chain management, considering the demand and the supply, as illustrated in Figure 4. The starting point should be the forecast of a product demand, comparable with the one for talent need. Both are eventually referred to cost and time and could be categorized into three items:

- The least expensive and the fastest process to create a product or to develop a talent; • The outsource of the internal production processes or hiring from outside;
- Delivery in due time is strongly related to succession planning.

The two principles addressing the demand side are tackling the balance between make and buy decisions and how to manage the uncertainty of the demand for talent. On the supply part, the principles are considering the importance of the return on investment in development programs and how to protect this investment by balancing employee-employer interests. TM is an investment that must support the companies' growth. The talent-on-demand framework is operating based on the business needs and able to address the potential challenges and unpredictability of the markets (Cappelli, 2008).

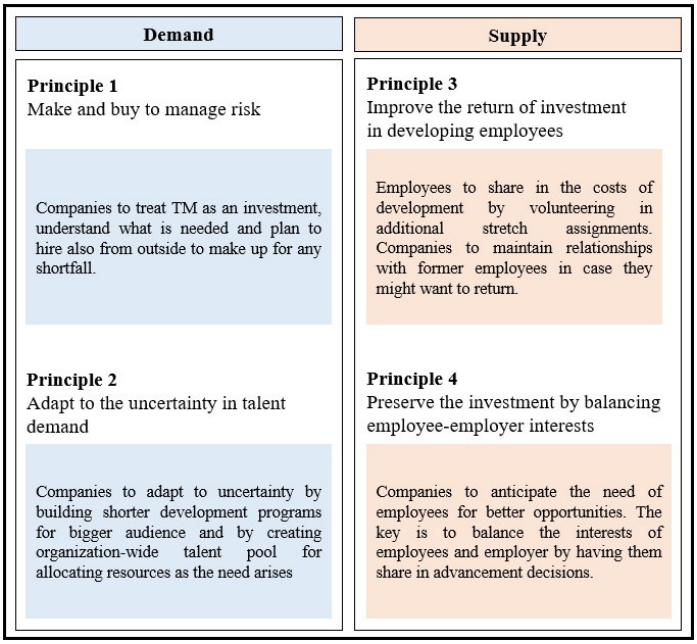

Fig. 4: The talent-on-demand framework (adapted from Cappelli, 2008)

A theoretical model of strategic TM

At the end of 2000s, although the TM as a concept was already discussed and debated also on academic level, it remained a poor developed area. Some scholars viewed the strategy of TM based on identification of the company's key positions (not only executive positions), the development of a talent pool to fill in those positions and a differentiated human resource architecture to facilitate placing the right people in the right jobs (Figure 5).

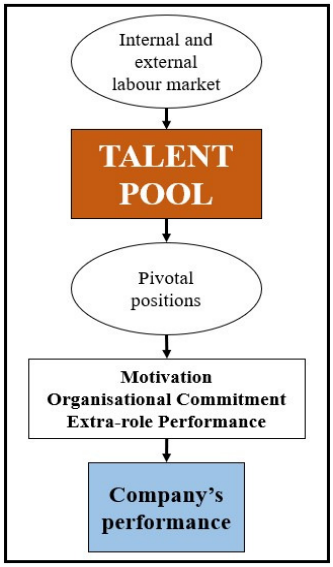

Fig. 5: A theoretical model of strategic TM (adapted from Collings & Mellahi, 2009)

Strategical or pivotal positions should get top performers to increase the competitive advantage of the company. The proposed HR architecture has a crucial role for making sure the high performers are committed to their goals. The whole framework is concentrating around the employees that have pivotal positions or will be developed to get such roles.

The focus should be on individual performance to obtain the organizational one. The employees' behaviour related to work is sustained by their motivation for that and represents the link between the HR practices and company's performance. Furthermore, the link between TM and organizational performance is the organizational commitment. At the individual level, the stronger the link between the personal values and the company's values, the higher the level of organisational commitment. The extra-role behaviour or performance come as an effect of the in-role performance and can be translated into additional voluntary efforts to support the organisational effectiveness.

The key positions are requiring proactivity and flexibility to better contribute to firm performance. The key elements represented by motivation, organisational commitment, and extra-role performance are directly influencing the link between strategic TM systems and company's performance as shown in Figure 5 (Collings and Mellahi, 2009).

A theoretical framework for how GTM links to MNEs' performance

We can notice a simplification of the theoretical approaches for TM, and a focus on the role of HR professionals for facilitating the frameworks. Nine years later since the strategic TM model was released, same authors propose a global framework having the human capital at its core. The model is developed for the multinational enterprises (MNEs) and outlines the link between global talent management (GTM) and the performance at the headquarters (HQ), subsidiaries, and employee levels as illustrated in Figure 6.

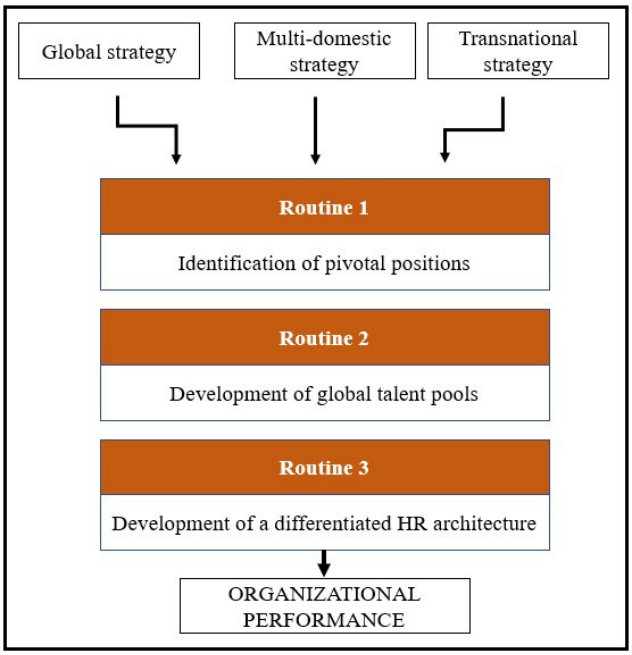

Fig 6: A theoretical framework for how GTM links to MNEs' performance

(adapted from Collings et al., 2018)

The new framework is based on three repetitive and recognisable actions named "routines": identification of pivotal positions, development of global talent pools, and development of a differentiated HR architecture. Identification of the key roles of organization should be the first step. Such a recurrent action will respond to the business needs on long term. A global organization will need both global and local expertise for sustaining a successful transnational strategy. Therefore, developing a global talent pool to feed those pivotal positions should be the second routine. The third one is focused on having a differentiated HR architecture to support the development of the human capital to get a high level of performance in any dynamic business environment. All these routines are very well connected one with the other and depend on each other. The authors state that "no universal approach to GTM exists; rather, the appropriateness of GTM systems depends on the overall degree of congruence with the MNE's competitive strategy" (Collings, Mellahi and Cascio, 2018).

A global strategy will be coordinated from HQ, so are the GTM routines, giving less local autonomy for its subsidiaries. On the opposite side is the multi-domestic strategy, oriented on local needs and independent of HQ in developing their human resources and routines. Transnational approach is sharing the practices of the first two strategies mentioned, recognizing the importance of balancing both global and local context for managing the talent pool and providing more of the cultural diversity. Following this theoretical model, four propositions about achieving high performance were defined. The adopted strategies influence the routines, which will further impact the organizational performance, with bigger impact on a global level for routines managed by HQ, with major local impact for those managed by subsidiaries. The development of human capital is strongly influenced by what kind of approach is chosen for GTM, therefore having strong impact on organizational performance (Collings, Mellahi and Cascio, 2018).

A conceptual model for integrating employee's proactive behaviour into TM

The people's proactive behaviour at the workplace and the TM were brought together into a new model highlighted in Figure 7, that explores three potential relationships between these two dimensions. In the past, all the TM frameworks were considering the employees as passive players who will comply with the company's already created processes. The proposed relationships take the people as active participants who influence the practices due to their proactive behaviour. Furthermore, this proactive behaviour can have three roles: predictor, mediator, and moderator, and they can be converted into three propositions.

- Proposition 1 (P1): "Talent proactive behaviour has a positive effect on individual access to TM (practices)" derived from the idea that proactive behaviour can be a predictor of this access to TM practices such as

development programs, project assignments, job rotation and shadowing, coaching, and mentoring, feedback and assessments, promotions and others.

- Proposition 2 (P2): "Talent proactive behaviour mediates the relationship between individual (access to) talent management (practices) and employee reactions to talent management". The reactions could be affective like satisfaction, engagement, motivation, cognitive such as belief in their knowledge and skills, and behavioural as performance and effort.
- Proposition 3 (P3): "Talent proactive behaviour moderates the relationship between individual (access to) talent management (practices) and employee reactions to talent management" This proactive behaviour can be related to work, career and strategic behaviour (Meyers, 2020).

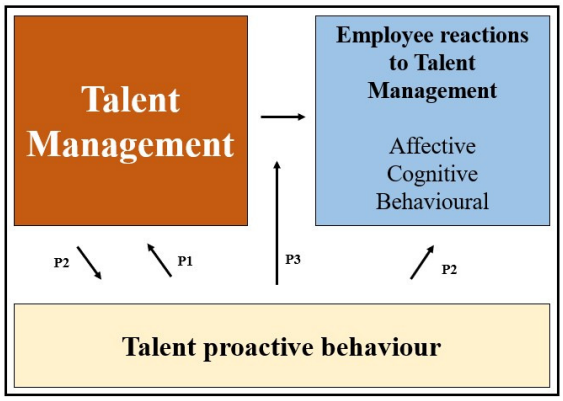

Fig. 7: A conceptual model integrating employee's proactive behaviour into TM
(adapted from Meyers, 2020)

The previously released models show TM as influencer of people's affective, cognitive, and behavioural reactions that produce the positive outcomes for the organization, including a high performance. The partnership between the company and its employees in sharing the responsibility for building a strong TM system is the prerequisite for keeping a competitive advantage within the market.

Debates on the Research Results

Following the research and analysis done, we have identified two solutions that can support future developments of the talent concept and create a base for further research:

- Internal mobility as a source for professional development opportunities
- Significant experience throughout employee lifecycle facilitated by the HR technology

The organizational culture that sustains internal mobility

The change of any organizational culture starts with a shift of mindsets. Incorporating the internal mobility in the culture of a company can begin from outlining the benefits of retaining the employees as much as possible due to costs and loss of productivity and knowledge reasons. When employees' turnover is increasing, mainly on top performers, can have a negative impact on company's brand and talent cycle. If the organization will not offer enough development opportunities, the needed competences for promotions or career changes will not be available, therefore no career planning will be possible and internal mobility will not take place. Mainly the employees part of the talent pool will search for assignments outside their organization and increase the turnover (Erickson, Moulton and Cleary, 2018).

A solution to get out of this cycle is to facilitate an internal talent marketplace. The 2019 Deloitte Human Capital Trends research showed that 35% of companies now have a network of teams, with shared resources across companies. More organizations think of finding solutions for supporting their people to develop through learning on the job by getting new roles, being part of different projects, or having a mentor. Employees can advertise their skills within a dedicated internal platform, and they can apply or be found for different assignments. The same Deloitte report stated that 65% of respondents confirmed it is easier to find a job outside their companies than inside. The

companies can change that by offering internal opportunities and the benefits will be seen on both employer and employees side (Bersin, 2020a).

The HR technology that facilitates employee experience

In the 1970s, all the information about employees' development was collected within the HR department and was based on the managers' assessment for the strengths and weaknesses, as well as for the future development needs. The link to the organizational needs was missing, and the feedback was not done through a well-designed system. As an interesting aspect back then, some believed that the development systems will not be effective if they are not driven by the direct managers of employees. (Schein, 1977) Yet, no real action was taken. Today, the main role of the line managers is seen as critical for people's development.

HR technology changed dramatically from the system of record to automate documents handling in the 1970s and 1980s, to system of talent in the 1990s and 2000s that had new tools for introducing mainly the self-service and applicant tracking and to a cloud-based system of engagement in the 2010s, that integrates everything and supports companies to move towards digital transformation. Currently and moving forward, the system of intelligence will take over due to increasing use of artificial intelligence (AI) that can support easier tracking and identification of talent and its performance, as well as can suggest learning opportunities and how to become more effective (Bersin, 2020a).

All these converge to the idea of employee experience. If by end of 2019, "the team and work management" was the central focus when talking about the future, after the COVID-19 pandemic emerged beginning of 2020, there was a rapid shift to "integrating work and life". The "HR technology" became the "work technology", where communication, collaboration, project management and safety were part of the new concept. TM platforms will become talent experience platforms and will include career planning, job markets, records tracking and productivity tools. The new tools using AI will focus mainly on employees' behaviour change to improve engagement and productivity (Bersin, 2020b).

Conclusions

The theories around a consistent TM developed more after the McKinsey consultants published twentytwo years ago a considerable analysis on how to build a successful system by following four steps inspired from the actual business practices. Another consulting firm, Deloitte, released the DevelopDeploy-Connect model in 2006 and offered a solution to increase the employee experience, a new concept that gained more and more popularity.

One year later, the HR influencer Dave Ulrich brought to the world's attention his simple talent equation with three dimensions: competence, commitment, and contribution. An innovative approach using the supply chain management principles (demand versus supply) was introduced in the 2000s and talent-on-demand framework was created.

Some theoretical models continued to be explored over the next years. Strategic TM model released by scholars in 2009 outlined the importance of having pivotal positions identified within organization, and a strong differentiated HR architecture to support the development and placement of human capital in such roles. While we have approached the end of 2010s, with globalization taking over most of the industries, a GTM approach was needed.

In the presented research, we have identified a framework that recognizes global, multi-domestic and transnational strategies, bringing to the next level the previous strategic TM model of same authors. One of the newest elements to be included in the future investigations of the scholars is the human behaviour, seeing the employees as active players within the HR architecture and TM strategies. An innovative theory released this year was highlighting the three potential roles of the proactive behaviour: predictor, mediator and moderator, for influencing TM practices. The critical talent seems to suffer a scarcity in the last years due to the skills gap, retirement of the Baby Boomers (people born between 1946–1955) and social integration mainly characterized by fast information flow and mobility. Companies moved away from focusing only on replacement and succession of executives to create talent pools across their businesses, to be ready to face the upcoming challenges (Serrat, 2017).

Those talent pools will need to be developed and have opportunities to grow and accomplish their personal and business targets within their organization. We can think of two potential solutions to achieve that: facilitating internal mobility and a great employee experience throughout the work life. The employees' experience can be supported by all-in-one HR platform, AI driven, accessible from any device, anytime, and currently is becoming one of the most desired HR investments.

Since 1977, the role of the line managers was highly important when discussing people development. Nowadays, this role is critical, as well as having a strong HR architecture that makes sure the people with the right competence are placed in the key roles that are well developed and remained committed to their goals. The next focus will be the employees' behaviour change through the new HR technology and with the support of the line managers, to improve engagement and performance.

Models and frameworks continue to be created and discussed, now having the employee experience as focal point, by integrating both life and work. People need to prepare for the unexpected and to learn how to live in an uncertain environment. The partnership between the company and its employees in sharing the responsibility for building a strong TM system is key.

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Corporate Responsibility Towards A Silent Stakeholder – The Natural Environment from The CSR Perspective[1]

Ewa MAZUR-WIERZBICKA

Institute of Management, University of Szczecin, Szczecin, Poland,
E-mail address: ewa.mazur-wierzbicka@usz.edu.pl

Abstract

The increasing manifestations of a global ecological crisis observed in contemporary world require relevant efforts to limit this detrimental phenomenon. For organizations, one of such efforts includes taking up pro-environmental actions i.e. to minimise companies' negative impact on the natural environment, which at the same time fall under one of the dimensions of the concept of corporate social responsibility (CSR) which is becoming increasingly popular. The aim of this paper is to identify the actions taken by socially responsible companies towards a silent stakeholder - the natural environment. The paper is composed of three parts. In the first part the place of the natural environment in the operation of the company is identified. In the second part focus is given to the core subject/dimension concerning the natural environment as one of fundamental aspects of the CSR concept. In part three manifestations of companies' environmental awareness under the CSR concept are identified and presented. The paper is based on a critical literature review and available non-financial reports and existing data.

Keywords: corporate social responsibility, natural environment, companies

Introduction

In the age of globalization, threats or social changes, the approach to the role of business in society has changed noticeably. It is no longer solely a product or service supplier, but it is required to take various social actions and efforts orientated towards the protection of the natural environment. As a result, the concept of corporate social responsibility has gained significance in recent years, whose basis is considered to involve the company taking responsibility for their actions in the economic, social and ecological dimension and the company's observance of ethical principles.

Throughout the last few decades the need to verify the current approach taken by companies (and not only them) to the issues of environmental protection has been increasingly signalled. It seems that a response to such a state of affairs involves i.a. pro-environmental involvement of companies, which is manifested i.a. in their taking responsibility for the natural environment as part of e.g. actions in line with the CSR concept.

Given the above, the aim of the paper is to identify the actions taken by socially responsible companies towards a silent stakeholder - the natural environment. Individual parts of the study have been assigned to the implementation of this purpose. Those said parts shed light on the place of the natural environment in the operation of the company, they identify and describe the environment dimension of CSR from the ISO 26000 perspective, and they discuss manifestations of environmental responsibility of companies under the CSR concept. The paper is based on a critical literature review and available non-financial reports and existing data.

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The place of the natural environment in the operation of the company

Companies, wanting to maintain their position in the market or increase their participation in it, focused on long-term operation, must appropriately address the issues of environmental protection, which currently is gaining significance due to even ongoing climatic changes or noticeable pollution of the natural environment (both by producers and consumers - excessive consumption). Pro-environmental (green) behaviours of companies are largely dictated by the operation of two forces. These are the ecological push and the ecological pull (Figure 1). These actions undertaken by companies are greatly determined by the sector, field of operation, competition and level of society's environmental awareness.

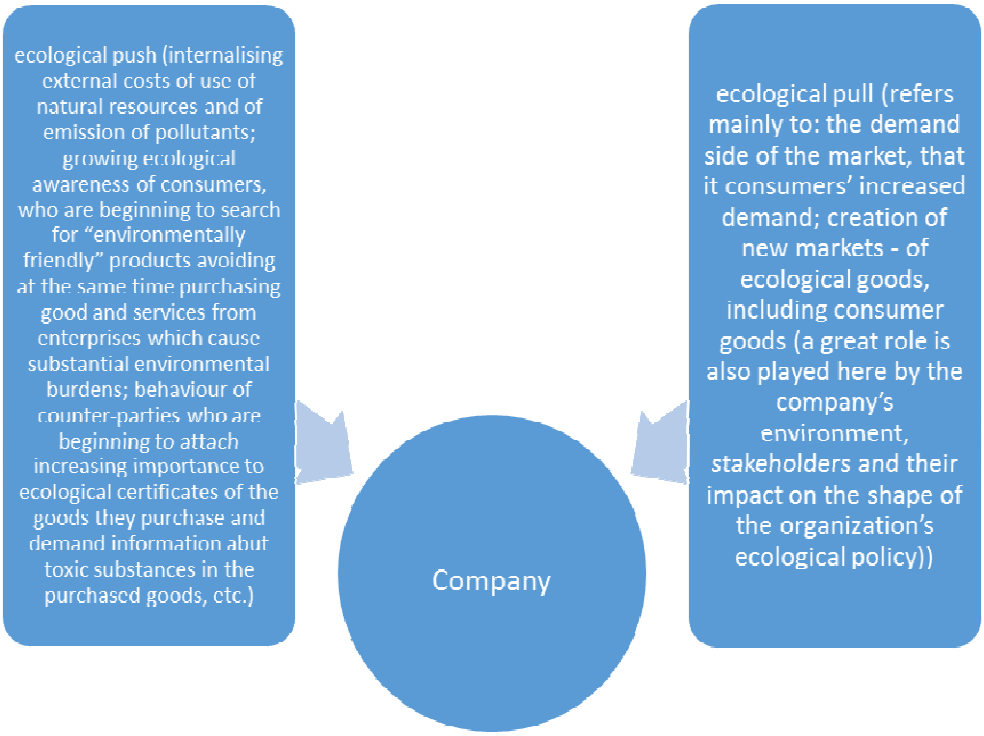

Fig. 1. Forces impacting a company in the environmental protection area

Source: author's own compilation on the basis of (Hallay 1996; Pohl 2001).

Next to traditional attributes such as price or quality, the market has started to take into account factors associated with the natural environment, i.e. impact of the manufactured product/provided service on the natural environment or the production process of the manufactured product. At the same time these factors have started determining companies' success and they have also become determinants of their credibility and social trust.

At the moment the existence of a belief (legislation, strategies adopted by individual countries, international organizations) that companies are entering the so-called ecological phase is increasingly noticeable. It may be seen in their strategies which focus on the protection of the natural environment, the so-called environmental strategies. They are a binder of various areas of a company's operation and guide companies in what they should do to reduce their impact on the natural environment. The constructed and introduced environmental strategies should be feasible and implementable (which means that an organization should have resources to carry them out), as well as proactive, that is future-oriented (cf. Ferri, Pini, 2019).

There are many various classifications of environmental strategies. One most often used is the classification of environmental protection strategies in the market approach (Figure 2).

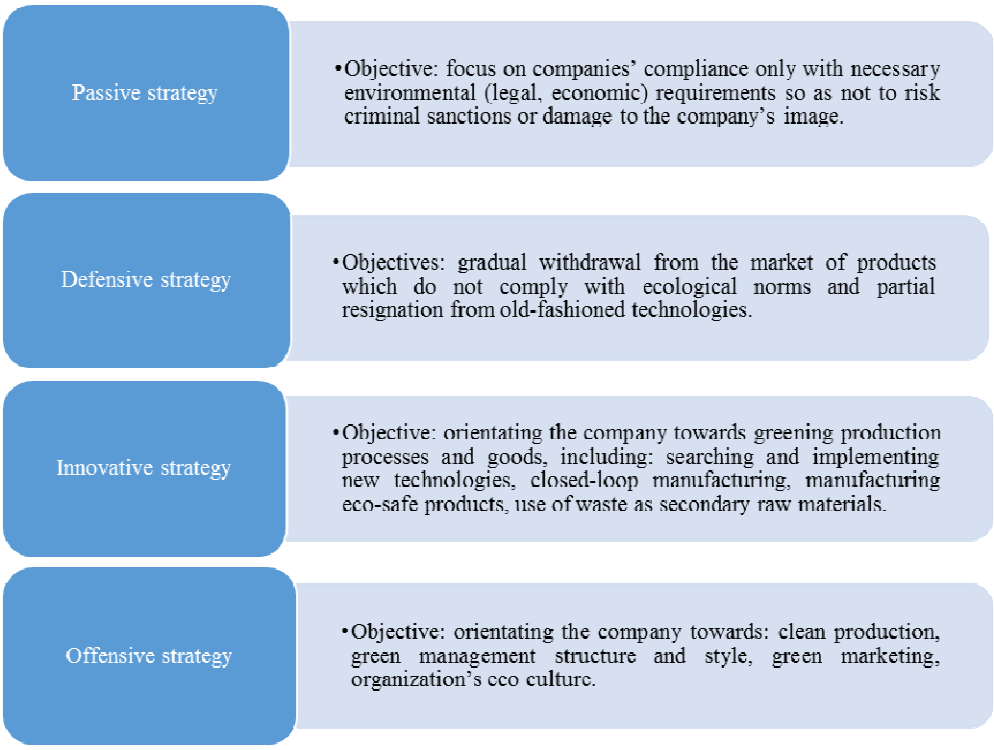

Fig. 2. Classification of environmental protection strategies in the market approach

Source: (Kulas, Kusztal, 2000).

The most desirable strategies in companies are those which ensure their development in the following areas: economic, social and environmental. An environmental strategy should be part of a company's general strategy.

CSR core subject – environment

The very concept of corporate social responsibility is widely described and discussed in the literature (mainly due to its multidimensional and interdisciplinary nature) (Dahlsrud 2008; Mazur-Wierzbicka, 2012; Wolak-Tuzimek, 2019; El Akremi, 2018). There is no single universal definition of the notion of "corporate social responsibility".

It can be assumed that corporate social responsibility means a long-term approach to operating a business activity which contributes to the achievement of the company's economic goals, at the same time taking care of the natural environment (limiting negative impact on the environment), taking into account social interests and consistently building lasting and positive relations with stakeholders, which involves observance of norms and requirements that are more restrictive than imposed regulations of the law and principles of ethics, and also taking full, conscious responsibility for all its actions.

The substance of CSR was also expressed in ISO 2600 where it reads that " that the essence of social responsibility is the organization's taking the responsibility for the impacts of its decisions and activities on society and the environment as well as ethical behaviour that contributes to sustainable development, the health and welfare of society, takes into account the expectations of stakeholders, is in compliance with applicable law and consistent with international norms of behavior, and is integrated throughout the organization (ISO, 2010).

ISO 2600 also clearly identifies sore subjects of corporate responsibility (Figure 3).

Fig. 3. Social responsibility: 7 core subjects

Source: (ISO, 2018).

One of the 7 sore subjects of CSR regulated in the norm is "The environment". As the norm reads "An organization should respect and promote the following environmental principles: environmental responsibility, the precautionary approach, environmental risk management, polluter pays" (ISO, 2010). The organization has a responsibility to reduce and eliminate unsustainable volumes and patterns of production and consumption and to ensure that resource consumption per person becomes sustainable.

The Environment core subject was assigned 4 basic issues: Prevention of pollution (6.5.3), Sustainable resource use (6.5.4), Climate change mitigation and adaptation (6.5.5), Protection of the environment, biodiversity, and restoration of natural habitats (6.5.6). Each of the issues was assigned specific actions (Table 1).

Table 1: Description of actions assigned to issues in the "Environment" core subject

Issue	Examples of actions
Prevention of pollution	Preventing pollution, including: emissions to air, discharges to water, waste management, use and disposal of toxic and hazardous chemicals other identifiable forms of pollution such as noise, odour, visual impressions, light pollution, vibration, electromagnetic emissions, radiation, infectious agents.
Sustainable resource use	Four key areas for improvement are: energy efficiency, water conservation, use and access to water, efficiency in the use of materials, minimized resource requirements of a product.
Climate change mitigation and adaptation	Each company to identify its negative impact on climate change. Striving to minimise the company's negative impact on climate change.
Protection of the environment, biodiversity, and restoration of natural habitats	Key aspects of this issue include: valuing and protecting biodiversity (including aspects related to animal welfare), valuing, protecting and restoring ecosystem services, using land and natural resource sustainably, advancing environmentally sound urban and rural development.

Source: (ISO, 2019).

Identification of a (silent) stakeholder, i.e. the natural environment, in the norm seems natural given that identification of CSR's core subjects, that is the economic area, the social area and the area relating to the natural environment (also defined as the environmental or ecological core subject) is a common practice. What is more, when one accepts such a classification, CSR is somehow directly associated with the concept of sustainable development where the said three dimensions are also identified. When it comes to sustainable development we are

considering the following: economic growth and equitable sharing of the benefits (economic dimension), protection of natural resources and the environment (environmental dimension) and social development (social dimension). Therefore, it is not surprising that corporate social responsibility is considered a tool for implementing sustainable development at the level of an organization. When approaching CSR in this way, the concept of sustainable development becomes understood and its principles are translated into a business practice.

Actions taken up by organizations which fall under the "environment" dimension should be adequately monitored and then reported on. This is done by various systems of indicators among which GRI standards are one of the most popular. For many organizations they are a model of sustainability reporting. The structure of GRI standards is presented in Figure 4.

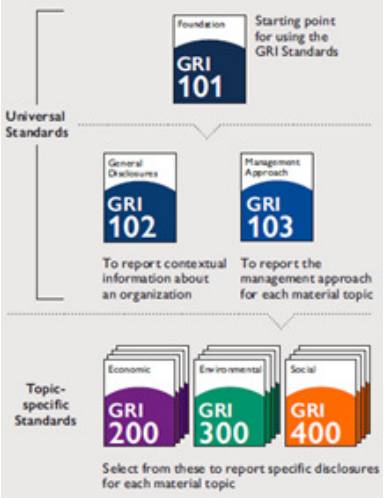

Fig. 4. Overview of the set of GRI Standards

Source: author's own compilation on the basis of (GRI, 2020).

As presented in Figure 3, indicators falling under Topic-specific standards were grouped into three groups, that is economic, social and environmental disclosures. Environmental standards are described in Table 2.

Table 2: Environmental standards

Aspekt	Disclosure	Description	
GRI 301: Materials	301-1	Materials used by weight or volume	
	301-2	Recycled input materials used	
	301-3	Reclaimed products and their packaging materials	
GRI 302: Energy	302-1	Energy consumption within the organization	
	302-2	Energy consumption outside of the organization	
	302-3	Energy intensity	
	302-4	Reduction of energy consumption	
	302-5	Reduction in energy requirements of products and services	
GRI 303: Water and effluents	Management approach disclosures		
		303-1	Interactions with water as a shared resource
		303-2	Management of water discharge-related impacts
	Topic-specific disclosures	303-3	Water withdrawal
		303-4	Water discharge
		303-5	Water consumption
GRI 304: Biodiversity	304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	
	304-2	Significant impacts of activities, products, and services on biodiversity	
	304-3	Habitats protected or restored	
	304-4	IUCN Red List species and national conservation list species with habitats in	

		areas affected by operations	
GRI 305: Emissions	305-1	Direct (Scope 1) GHG emissions	
	305-2	Energy indirect (Scope 2) GHG emissions	
	305-3	Other indirect (Scope 3) GHG emissions	
	305-4	GHG emissions intensity	
	305-5	Reduction of GHG emissions	
	305-6	Emissions of ozone-depleting substances (ODS)	
	305-7	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	
GRI 306: Waste	Management approach disclosures	306-1	Waste generation and significant waste-related impacts
		306-2	Management of significant waste-related impacts
	Topic-specific disclosures	306-3	Waste generated
		306-4	Waste diverted from disposal
		306-5	Waste directed to disposal
GRI 307: Environmental compliance	307-1	Non-compliance with environmental laws and regulations	
GRI 308: Supplier environmental assessment	308-1	New suppliers that were screened using environmental criteria	
	308-2	Negative environmental impacts in the supply chain and actions taken	

Source: author's own compilation on the basis of (GRI, 2020).

Due to the increasing obligation to report socially responsible actions by organizations, more and more of them use ready-made standards e.g. GRI or supplement them with their own indicators, relevant to the specific nature of their activity.

Manifestations of ecological responsibility of companies as part of CSR

Socially responsible companies undertake an array of initiatives falling under the natural environment dimension, which involve, i.a.:

- designing environmentally friendly products and production processes
- effective use of resources,
- reduced production of waste and pollution,
- "green evaluation" of suppliers in the context of their environmental standards,
- informing business partners, consumers and society about environmental protection issues.

Each of the organizations have, relevant to the portfolio of their activity, the possibility to expand their environmental profile, i.e. establish a set of actions it will undertake in the framework of protection of the natural environment. It may refer to one division or more. Examples of pro-environmental operation are presented in Table 3.

Table 3: Examples of pro-environmental actions undertaken by companies

Divisions	**Raw materials/waste**			
	Energy	**Water**	**Waste**	**Paper**
Marketing, communication	maximum use of daylight at work		reuse of raw materials	reduction of use of paper, use of eco-paper, publications/promotional materials issued in an electronic version
Logistics,	limited use of	using eco-car	recovering goods	introduction of

fleet	air-conditioning	washes (which consume less water)	damaged in transport, reuse of transport packaging	electronic waybills
HR, health and safety at work	promoting tele- and video-conferences, e-learning		implementation of electronic document circulation	use of e-documentation, double-sided printing, preparation of conference/training materials in an electronic form
Production, product, packaging	optimisation of energy use, replacing equipment for newer, more energy-efficient devices	optimisation of water use in the production process (e.g. washing bottles or jars not under running water)	waste segregation reuse of raw materials	limiting the use of paper in packaging production, reducing product packaging
Purchases, deliveries	use of renewable energy or energy produced in cogeneration	use of water-saving taps, using tap filters (instead of buying water)	manufacturing products without packaging/in returnable or recyclable packaging, choosing products made from recycled/biodegradable materials or processed/long-life products	use of eco-paper (certified, recycled, etc.), issuing e-invoices
IT	implementing global solutions optimising energy use by systems, communica-tion to employees and clients		obliging suppliers to collect packaging from their products	setting printers to double-sided printing as default and setting ppt presentations to the 2-slides-per page mode

Source: (Kowalska-Ocneanu, et al., 2009).

Implementation of the above initiatives is possible thanks to companies using various tools, norms and methods. Companies may implement e.g. standardized systems of environmental management compliant with ISO 14001 or the EMAS regulation. Due to mainly their documented, official character, they gain greater credibility among stakeholders. Organizations may also undertake other forms of operation that serve to protect the environment (e.g. implementation of the Cleaner Production programme or, in the case of chemical companies, the "Responsible Care" programme dedicated to them). Additionally, they may make use of other tools such as Ecomapping, introduce pro-environmental actions in their companies such as: appointing an "eco-team", undertaking actions to reduce their negative impact on the natural environment, reduction of use of raw materials (water, energy, paper, etc.), waste, shaping pro-environmental (green) awareness, laying down environmental requirements/transport recommendations for business partners.

The so-called good practices, shared by socially responsible organizations, are an important element of CSR. Some of them are included in reports titled "Responsible business in Poland. Good Practices" issued since 2003 by the Responsible Business Forum, an organization which has been shaping, analysing and promoting corporate social responsibility in Poland since 2000. The reports include examples of socially responsible practices form various areas (since 2011 classification of CSR areas has been based on the one adopted in ISO 26000) submitted by the organization. As seen in Figure 5, the greatest number of initiatives undertaken by companies under CSR was directed at the "Community involvement and development" area, initiatives concerning employee matters came second, while those concerning the natural environment came third.

Fig. 5: CSR practices according to the core subjects adopted in ISO 26000 included in reports "Responsible business in Poland. Good practices" in 2011- 2019

Source: author's own compilation on the basis of (FOB, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019).

Table 4 presents examples of actions - good practices undertaken by companies in the "environment" dimension.

Table 4: Examples of actions undertaken by companies in the environment dimension

Issue	Description of actions
Prevention of pollution	**wonga.pl -** a number of actions implemented as part of the zero waste practice: using filtered tap water instead of buying bottled water, plastic disposable dishes replaced by biodegradable products, certified Xerox paper with a low basis weight, i.e. 80G/m2, the company uses electronic documents (in the framework of e-invoice) wherever possible. **Lyreco Polska** – as part of the "Energy-efficient warehouse" practice lighting rails were lowered (down from 7.6 m to 4.5 m), number of light bulbs was limited and lighting of selected parts of the warehouse was made possible. These actions allowed a saving of more than 206,000 Kwh a year. **Kuehne + Nagel** (Święcice warehouse) **-** processes were standardized which resulted in reducing the level of waste to zero. Waste containers for foil, paper, wood, mixed waste and aluminium were places around the facility. Plastic water bottles were eliminated from all company locations. **MAKRO Polska** - dropping the use of Freon by 2030, striving to reduce carbon dioxide emission, innovations that aid reduced use of energy, heat recovery processes used to heat up premises and utility water.
Sustainable resource use	**Grupa Raben –** "E-invoice = higher culture" project - the company encourages clients to replace paper invoices with their electronic versions. Each consent for an e-invoice means one tree planted on behalf of the client. **Volkswagen Motor Polska -** zero CO_2 emission assumption implemented in summer months. Thanks to purchasing energy from hydroelectric power plants the company does not use natural gas or technical heat from an external power plant.

	PGE Polska Grupa Energetyczna – building an installation for thermal treatment with energy recovery, serves to dispose of municipal waste and allows recovery of energy from waste in its thermal treatment process.
Climate change mitigation and adaptation	**Kuehne + Nagel** – the Net Zero Carbon program: by combining efforts reducing and compensating CO_2 emissions, the company strives to achieve carbon neutrality by 2020. The company gets actively involved in the development of technical possibilities of eliminating greenhouse gases from the atmosphere. **Lyreco Polska -** aims to reduce its carbon footprint per 1 kg of delivery. The company is undertaking efforts that reduce emissions from main sources, i.e., freight, employee travels, fixed assets, energy sources, consumables and direct waste. Pharmaceutical Company **Polpharma** in Starogard Gdański - an analysis of carbon footprint has been carried out. Scope one was analysed - combustion and other activities in the production facility and Scope two - electricity and heat produced externally and purchased by the production facility. The first calculations and analyses covered 2016 and 2017.
Protection of the environment, biodiversity, and restoration of natural habitats	**SEGRO Poland** warehouse developer - beehives and insect hotels installed in logistics parks. More than half a million bees have moved in already. These insects can produce about 200 kg of honey per year. **Bank Pekao -** since 2004 has been supporting institutions that deal with protection of the Polish bison by allocating funds to the protection and improvement of the standard of living of this endangered species and to diversification and development of the population and also to financing educational and scientific projects. **CEETRUS Polska** - ensures biodiversity of areas around their commercial facilities. Implements tree, bush and grass planting programmes in collaboration with ecologists and gardeners in shopping centres which have or are applying for the Breeam-In-Use CEETRUS certificate. In areas surrounding its shopping centres - sets bird routes and hotels for insect pollinators.

Source: author's own compilation on the basis of (FOB, 2019).

The companies' undertaking socially responsible actions in the "environment" dimension may bring a number of benefits to them, e.g. savings resulting from a more efficient use of resources, lesser water use, lower waste disposal expenses, savings resulting from more efficient use and recovery of raw materials (lower material consumption and energy consumption), improved image (building a green image) in the eyes of local communities, increased trust in the company, better relations with the local community, customer retention and acquiring new recipients. In the longer perspective, organizations may arrive at a strategic increase of availability of raw materials and contribute to reducing negative impacts of climate change (reduction of CO_2 emission).

Conclusion

The issues of environmental protection increasingly determine the operation of a business activity. When planning long-term actions, companies more and more frequently take into account, next to economic circumstances, the circumstances relating to environmental protection. Some of them decide to implement the concept of corporate social responsibility. These actors, when taking up socially responsible efforts inscribed in the CSR concept, also undertake actions that carry responsibility towards another stakeholder - the natural environment. They take the form of activities included in the natural functioning of the organization (e.g. operating as an eco-office) or highly-formalised activities, e.g. by implementing ISO 14000 or EMAS norms. Taking into account environmental protection actions in companies, clean and eco-friendly technologies in particular, or implementing environmental management systems allows them to obtain a broad array of benefits, both economic and those examined in the social and ecological aspects.

As research shows, CSR is gaining popularity in Polish companies. 80% of managers, both male and female, notices the integration of the value of social responsibility and sustainable development with the company's business operation. 59% of them believe that CSR contributes to solving environmental problems (FOB, 2020). Therefore, a trend to give increasing focus to socially responsible functioning of companies is noticeable - also functioning that is responsible towards a silent stakeholder - the natural environment.

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Impact of COVID-19 on International Retail Company on Spanish Market: Case of "Carrefour"

Elena V. KOLGANOVA
PhD, Peoples' Friendship University of Russia (RUDN University), Moscow, Russia

Dmitry I. BABIY
MBA University of Valencia, Valencia, Spain

Alexander I. BABIY
MBA Hochschule Bremen City University of Applied Sciences, Germany

Abstract

The aim of the article is to analyze the impact of the COVID-19 on the operations of the retail company on Spanish market. The international retailer Carrefour was chosen as an object as it has a considerable effect on the Spanish retail market. This is one of the companies that managed to rebuild its activities and adapt in the shortest time to the situation. Despite the fact that in some countries the company had to temporarily close its non-food departments, it faced significant increase in the sphere of e-commerce and food sales as it could partnerships with transportation companies and meet the changing needs of the customers in the period of Pandemic. In the article authors pay special attention to the analysis of the company's environment (3C's analysis and SWOT-analysis) and to its distribution and logistics operations on the Spanish market.

Keywords: Pandemic COVID-19, Retail Company, Spanish Retail Market.

Introduction

Pandemic of COVID-19 is the force majeur that could hardly be forecasted. The countries all over the world suffered from this virus. It affected significantly social sphere of each country, but moreover the pandemic itself and the governmental actions like lockdown in many countries, designed to decrease growth rate of pandemic, led to economic difficulties as the national borders were closed, people had to stay at home and therefore the international trade and international production slowed down in many industries. The impact of COVID-19 crisis on the retail sphere is not unambiguous. On one hand, companies faced a slowdown in non-food sales and the amount of customers in stores decreased considerably. On the other hand, those companies that were ready to e-commerce and managed to adapt to new conditions showed enormous rase of food and essential goods sales.

During our research, the authors conducted several analyses that helped to look at the company from different points of view. The most systematic and successful analysis for any service company in general and a multichannel retailer in specific is Three C's analysis (Company, Competitor, Customers) in reference to the service company. By utilizing this structural analysis as well as others such as SWOT, we were able to apply these for better analysis and understanding of Carrefour. In order to implement these analyses, we have gathered data over the company and its competitors through the means of combining several sources of information.

The chosen company Carrefour also known and translated into 'crossroads', is a multinational French retailer that was founded in 1958 and opened their first physical location in 1960. Since then they have expanded the business to over 12,300 physical locations and accumulated to this day, net revenue of roughly 78 billion euros and an operating income of 760 million euros. Carrefour operates locations over 30 countries throughout Europe, the Americas, Asia, and Africa. Carrefour is a publicly traded company that can be found on 'Euro Stoxx 50'.

3C's framework was created by a Japanese management guru Kenichi Ohmae. According to Ohmae (2009), this framework considers three key elements which are the fundamentals of any competitive business structure. The three elements are as follows:

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- The customers: describes who the customers are and their needs;
- The company, more specifically: the current position and the internal situation;
- The competitors: describes who the competitors are;

The three elements produced what is now known as The Strategic Triangle, with a C in each corner of the triangle.

Carrefour activity in Spain analysis

We applied the 3C's model in order to research the business structure of Carrefour, the results are as follows:

C1: The Company "Carrefour"

The full name is "Carrefour S.A.". Carrefour is a French multinational retailer with headquarters in Boulogne Billancourt, France. It was Founded in 1959. Carrefour's core business is the provision of supermarkets and retail stores. Its activities include operation and management of hypermarkets; supermarkets; convenience stores; cash and carry stores; and both food and non-food e-commerce websites. According to Carrefour reports, right now, the company is Europe's largest retailer, the second largest retailer all over the world, and it is China's biggest foreign retailer, with nearly 80 stores. Carrefour manages over 12,300 stores and e-commerce sites in more than 30 countries. The number of employees is 316,631.

Products of Carrefour are Cash & Carry, warehouse club, discount store, hypermarket, supercenter, superstore, supermarket. We did not consider any further analysis of the C1-The Company- because our aim was to analyze the logistics strategies of Carrefour and the given data is sufficient. However, we analyzed the background information for Carrefour Spain (Current statistical, financial data and evolution in the last years.).

Carrefour considers Spain as the second most important country of the Carrefour group. And has the following different store location in Spain:

- The first store in Spain in 1973.
- 204 Carrefour hypermarkets.
- 131 supermarkets Carrefour Market.
- More than 680 Carrefour Express supermarkets.
- 114 Cash & Carry.
- 593 Convenience Stores.
- 123 Service stations.
- 426 Travel agencies.

Through reviewing Carrefour annual report 2019, we can summarize the following financial data:

- Carrefour Revenue as on December 31, 2019, was €74.366 billion.
- Operating income: €2,08 billion (2019).
- Net income, Group share growing to €1,31 billion.
- Total assets: €50.8 billion (2019).
- Total equity: €11.67 billion (2019).

Despite the fact that our research is devoted to the analysis of the international distribution and logistics of the company for 2019 it is worth mentioning how Carrefour manages the COVID-19 crisis. The company faced almost the same consumption behaviors in the process of the pandemic spread and later when the government implemented the lockdown. Before the lockdown Carrefour sales of dry groceries and products with long shelf lives increased significantly due to precautionary purchases of consumers. This increase was observed as in stores of all formats as in e-commerce. After the lockdown, the consumers as anticipated chose the closest supermarkets. They started to visit stores more rarely, while the amount of products bought increased significantly. Food e-commerce continued to show an increase. At the same time non-food categories of products sales dropped as for consumers they became not the first priority. In several countries the non-food departments were closed for the time being.

C2: The Customer

Due to a huge variety of different products and services, from food to garments, which are proposed by Carrefour by affordable prices, it is possible to conclude that its target group is 'Middle and low-income households', and the

Segment 'Price sensitive and middle class working population who wish to obtain maximum value at affordable prices'.

On the territory of Spain, customers of Carrefour are able to get a different customer experience, since Carrefour operates through four locations: hypermarkets, supermarkets, convenience stores, e-service. Hypermarkets are normally located outside the cities, the product lines include food, electronic devices, garments, chemical products, etc., in terms of variety of products, Carrefour hypermarkets propose more products, than supermarkets or the convenience stores. Supermarkets are normally located in the central streets inside the cities, the proposed product lines include fewer products than in hypermarkets, however, it is easier for customers to access supermarkets. As for the convenience stores, they have the least product lines, however, they are accessible almost everywhere inside the cities. On the official Carrefour website, customers are able to order products they need, moreover, only on the official website, Carrefour proposes such unique services as ticket order, which are not available in Hypermarkets or supermarkets.

C3: The Competitors

In order to identify the main competitors of Carrefour, online research was conducted. As it is possible to observe in Figure 1, which describes the retail market of Spain in 2019, the main competitors of Carrefour are: Mercadona, Carrefour, Grupo Dia, Grupo Eroski, Lidl and Grupo Auschan.

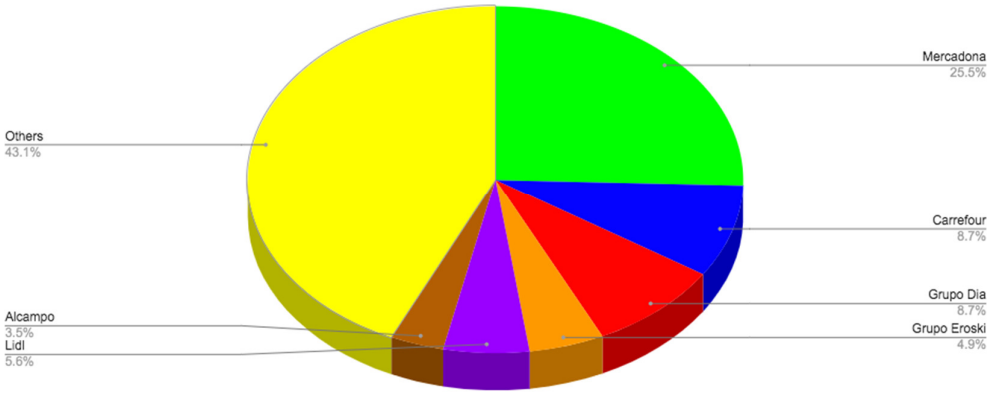

Figure 1 - The Market Share of Total Grocers in Spain

There is also a huge retailer called SuperCor with a similar business category as Carrefour. We also included to the list the online retailers operating in Spain, such as Amazon, eBay, and Aliexpress. El Corte Ingles was also added to the list. The positioning of Carrefour, in terms of price and quality, compared to the main competitors in food retail could be observed in Figure 2 - Carrefour positioning in Spain.

Figure 2 - Carrefour Positioning in Spain

The results are mentioned as follows and are broken down into the two segments online and department store.

Online Retailer competitors:

- Amazon, (https://www.amazon.es).
- eBay, (https://www.ebay.es).
- Aliexpress, (https://www.aliexpress.com).

Retailer competitors:

- Mercadona, (https://www.mercadona.es/).
- Lidl, (https://www.lidl.es/es/index.htm).
- Grupo Dia (https://www.dia.es/).
- Grupe Auschan (www.alcampo.es /).
- Aldi, (https://www.aldi.es/).
- Eroski, (Website: www.eroski.es).

Online Shopping:

- (www.compraonline.grupoeroski.com).
- SuperCor, (www.supercor.es).
- El Corte Inglés. (https://www.elcorteingles.es/).

During our research we also conducted the SWOT analysis of Carrefour, among main results of which the following can be mentioned:

- The fast-growing e-commerce & online shopping sector is a big area of opportunity for Carrefour and the situation with COVID-19 showed that this opportunity became vital for the company. Carrefour managed to overcome the previously poor e-commerce performance and reached great results.
- The analysis showed that there are not any threats for Carrefour that cannot be overcome with the current strengths.

International Distribution and Logistics Analysis

The conducted analyses showed that Carrefour is a strong company with great experience and stable financial and market position. Now we could move to the analysis of the logistics and international distribution, as its experience can be useful for different retail companies as in Spain as in other countries.

Within the entire Spanish territory Carrefour normally transports the goods on trucks through road transportation, the train or plane freight transportation is only used for perishable commodities or urgent deliveries. The sea freight transportation is combined with road transportation and is used to transport goods to such directions as the Canary Islands and Baleares. According to the Carrefour's report, on the territory of Spain, Carrefour accomplishes 70% of transportation by trucks, 20% by railway and 10% by maritime. Across the territory of Spain, Carrefour manages 17 logistics platforms (Table 1). Also, for high rotation products, some local warehouses are very common.

Table 1 - Carrefour Logistics platforms in Spain

No. of platforms	Description
1	Insular platform;
3	Three platforms are national which includes bazaar, apparel, electronics, and frozen products;
6	Six platforms are regional: consumer products and bazaar with high rotation;

5	Five platforms of fresh products. These logistics platforms belong to the Carrefour's subsidiary "Seidasa";
2	Two platforms are for frozen products;

The warehouses are managed differently since they are located in different regions and work only within specific areas. Some of the logistic processes are outsourced to one of the largest companies that operate in logistics, Kuehne+Nagel.

According to Kristi Rawlinson (2003), in order to deliver goods in time and in good condition, Carrefour developed a special network which is controlled by a computer system with a database that connects all agents related to Carrefour globally in order to make decisions related to the supply chain. The network is called ICAN - Integrated Composite Application Network.

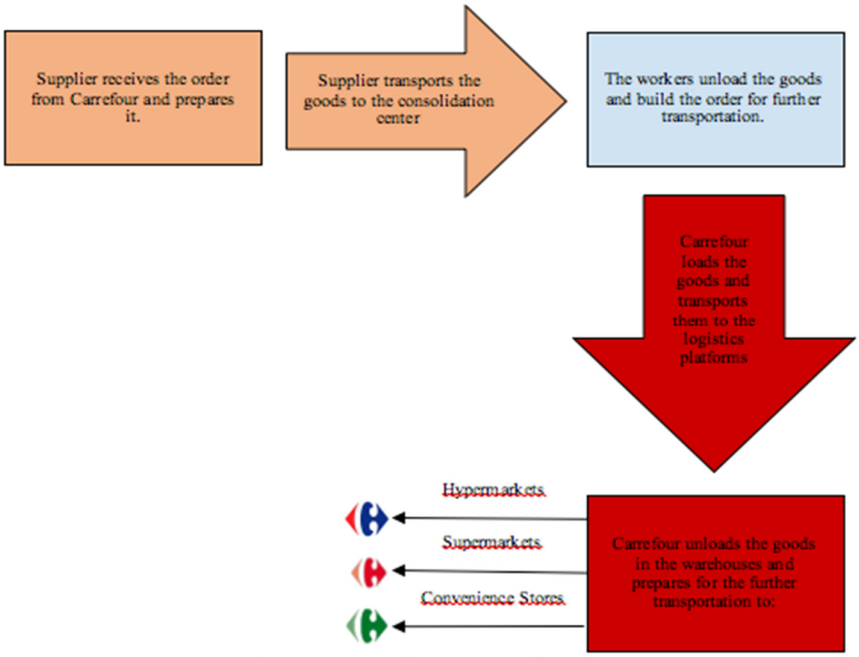

Figure 3 - Logistics Activities in Spain

The transportation process of Carrefour is accomplished in four legs (Cambra-Fierro, 2011). Firstly, Carrefour orders goods directly from the manufacturers, in about 90% of cases, Carrefour acquires goods from the local producers, this helps to maintain low prices by shortening the supply chain and decreasing costs for logistics (Figure 3).

The suppliers prepare the order and deliver it to the consolidation center, up to this point the suppliers are responsible for transportation. Then under the supervision of Carrefour, workers unload the products, put them to stock and start to build the order to distribute them to different Carrefour warehouses later. During the process, the responsible party for goods is the consolidation center.

Then, Carrefour trucks come, remove the ordered products, load them to the car and transport them to the Carrefour warehouses, starting from the loading process, the responsible party for the goods is Carrefour. Lastly, from the Carrefour warehouses, goods would be transported to three different directions, because Carrefour operates three core businesses on the territory of Spain, they are: Hypermarkets, supermarkets, and convenience stores. According to Carrefour web site, they generate around 51% of sales through the Hypermarkets so one half of the goods from the warehouses would be distributed between Carrefour hypermarkets. The other half would be distributed between the supermarkets and convenience stores, all transportation from the warehouses is accomplished on trucks and cars.

Carrefour also proposes to the customers the E-service, customers are able to make an order and collect it in the nearest Carrefour spot. Normally Carrefour proposes delivery only in case of an extra-large assortment. Before the COVID-19 sales through the e-platform used to account for only 1% of total sales. But during the COVID-19

Carrefour has mobilized all its resources and implemented several strategic moves in order to keep running the supply chain smoothly. Besides the creation of general norms for the staff, customers as well as measures for priority products, one of the primary things Carrefour did was the establishment of a special crisis unit that maintains the supply chain and communicates with suppliers in order to increase the direct flows. As it is stated in Carrefour report (2020), Carrefour's supply system is also supported by the partnership in the area of delivery with such companies as Uber Eats and Glovo.

In terms of e-commerce, during the epidemic situation, Carrefour reached a significant success. The following improvements were accomplished:

- Virtual queues
- Several order preparation points were created
- Automatisation of processes in warehouses
- Significant increase in speed of work
- Carrefour drive points are available
- Carrefour apps for essential food purchase were developed
- The staff increased in speed on the workplace

As a result of all these actions Carrefour has a stable balance sheet despite the pandemic. The company continues to show growth and even get the rewards for sanitizing operations.

Conclusion

The case of Carrefour allowed the authors to come to a conclusion that in the current situation the businesses should be ready for different unexpected situations. It is not really the news, that the world business environment is not stable for several decades, but the COVID-19 pandemic showed that it can hardly be forecasted at all. The best way for the companies to survive in any situation is to keep up with the newest business tendencies and to be flexible. The modern era of economic development is characterized by globalization, momental information transfer and deep country-into-country economic integration. That is why the crisis of one country almost instantly becomes the one in the others. To use any crisis for the benefit of the business is becoming the main goal in the modern economy.

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Social and Environmental Sustainability a Prerequisite for Company Profitability and Creation of Economic Value Added

Valentina VINSALEK STIPIC

Polytechnic "Nikola Tesla" in Gospić, Croatia
valentinavinsalek@gmail.com

Abstract

This research work conducted a study that sought to prove the connection between the implementation of social and environmental sustainability with the profitability of enterprises and the creation of economic added value. Expressing social and environmental sustainability as numerical indicators is quite undefined, because companies in Croatia do not have a legal obligation to state them in their business reports and notes. It is just a measure to improve and raise business and market ratings. Therefore, for this research, data on social and environmental sustainability as measurable variables were obtained after a survey conducted among employees and company management on a sample of 126 Croatian companies. The obtained measurable variables for environmental and social sustainability were ultimately put into comparative analysis with the company's profitability indicators and the created economic added value. This research obtained data that there is a connection between environmental and social sustainability with the profitability of the company and the creation of economic added value, but it is extremely small, social sustainability 0.212 and environmental sustainability 0.243.

Keywords: Ecological sustainability, social responsibility, economic added value

Introduction

Effective identification, pricing and risk management, more recently sustainable business, are essential features of efficient economic operators. By not implementing environmental care measures, not caring for the environment leads to a number of negative results and financial risks, which has major consequences for the global future. The activity of economic operators for environmental risk assessment has been ongoing for decades, but these have been sporadic cases, limited to certain sub-sectors, far from the main practice. Today, we distinguish between tools and methodologies that enable economic operators to integrate environmental data into the decision-making process from the perspective of risk management and resource allocation for long-term profit-making.

Environmental factors are increasingly recognized as one of the most important risk factors for the global economy. Examples from practice in world economies show that air pollution, water scarcity and degradation of natural capital can also serve as sources of credit, market and legal risks for economic operators.

Efforts by institutions to assess financial impacts affected by environmental risks have begun to increase given their analytical scope and sophistication. Including a wider range of environmental factors, as well as political and technological factors, considering the impact of events on the environment. In addition, a growing number of public institutions, including governments, regulators, supervisors and others, are recognizing that environmental factors can have an impact on the resilience and efficiency of economic operators, and potentially on the economic system. Finally, an analysis of environmental factors begins to reveal that potential financial effects can be nonlinear and disrupted, posing challenges for risk management.

For this paper, a study was conducted to try to prove the connection between the implementation of social and environmental sustainability with the creation of corporate profits and economic value added. The expression of social and environmental sustainability as numerical indicators is rather undefined, because companies in Croatia do not have a legal obligation to state them in their business reports and notes. It is just a measure to improve and raise business and market ratings. Therefore, for this research, social and environmental sustainability data as measurable variables were obtained after conducting a survey among employees and company management from the sample.

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The obtained measurable variables for environmental and social sustainability were ultimately put into a comparative analysis with profitability indicators and the created economic value added of the enterprise.

Development of social and environmental sustainability of enterprises

Corporate social and environmental responsibility has been discussed for decades, but clear guidelines on measuring and monitoring social and environmental sustainability benchmarks have never been adopted. The corporate social responsibility strategy started as a new way of doing business in large multinational companies, which were exposed to attacks due to their environmental policy and employees (Vrdoljak and Hazdovac, 2014). For many years, companies have been primarily focused on making a profit without paying much attention to the needs of society and the environment. However, the growing awareness of the harmful effects on the environment in which we live has caused a great deal of critical attitude towards companies that do not implement a strategy of social and environmental sustainability.

The research conducted so far on social and environmental sustainability is aimed at strengthening the long-term strategy of sustainable development. Therefore, social responsibility is beginning to be viewed as a separate management system in which companies develop a specific business policy aimed at the wider community (Orlitzky, 2014). Thus, the business strategy of sustainable development is viewed through three segments: environmental, social and economic sustainability. Through the current practice, the fact is observed that companies that implement a strategy of social sustainability have a better business and investment reputation (Cheng et al., 2011). In the business world, there is a strengthening of corporate reputation and improvement of managerial efficiency in companies that implement a sustainable development strategy (Orlitzky et al., 2003).

A review of previous research has shown that there are no clear guidelines for measuring and recording in business reports the implementation of the strategy of social and environmental sustainability of enterprises in the national economy. The research on Croatian companies shows descriptive reports on the implementation of the sustainable development strategy, mainly in larger national companies, while a high positive connection between creating added value of companies and socially responsible business was observed (Vinsalek Stipic, 2017). Therefore, a key question arises as to what extent the implementation of social and environmental sustainability contributes to profitability and the creation of economic value added of enterprises.

Social and environmental sustainability as a business model

In terms of environmental risk management, business organizations may react differently to the results of risk analysis and in different ways. It is possible to approach medium or long-term risk for the environment and the community, and to act proactively, which has consequences in relation to the strategy of preventive action in reducing the risk to the environment. Some companies engage in strategic macro-environmental actions and adjust their investment preferences to support orderly market operations, applying a low-impact economy, which could reduce risk and ensure profitability.

The scope of activities that can be applied to establish a green economy strategy in order to promote social and environmental sustainability are:

- analysis of short-term financial impacts at the company level through sophisticated techniques of environmental impact analysis
- incorporation of environmental impact analysis requiring active monitoring of environmental impact in all activities
- revision of risk management, ie change of business policies by introducing limits of action in accordance with the harmful impact on the environment and the social community
- establishing governance at the level of the environmental committee to achieve change at the top of the management chain downwards, thus reducing the risk to the environment at the enterprise level
- taking measures to implement the framework through risk functions, such as product innovation, including the development of green products and services
- reviewing and reallocating capital, giving up high-risk investments for the environment and looking for new green investment opportunities
- engaging all actors, including clients, investors, market intermediaries and policy makers, who often form partnerships for common interests, in this case social and environmental sustainability

In recent years, efforts to implement a sustainable development strategy have accelerated significantly given their analytical scope and sophistication, there is a greater impact on financial decision and market behavior. Looking across the financial sector, there is a growing interest in understanding how environmental factors can pose physical

and transitional risks to assets, economic operators and the economy as a whole, which in turn can pose risks to financial assets, institutions and sectors. An increasing number of public institutions in developed countries including governments, regulators, supervisors other public institutions recognize that environmental factors can affect the resilience and efficiency of economic institutions and systems as a whole.

Tools for assessing business risk and environmental impact

It is definitely the case that sustainability applies to present and future generations and requires that the needs of all humanity be met. When we talk about social and environmental needs, we mean eco-justice and eco-efficiency, and the assessment of the risk of environmental impact. Environmental risks can be effectively integrated into the company's decision-making process, using proven financial instruments that can be adjusted to take into account environmental factors. Companies should combine two types of approaches to environmental risk assessment (Gray and Bebbington, 2000):

1. Looking for environmental factors that may pose risks to the company's operations
2. Translating environmental risk factors into quantitative measures for comparison with the company's operations

However, it is necessary to point out time as an important variable for study for the purpose of planning the occurrence of risks and assessing the harmful effects of risks on the environment. It is necessary to observe how risks are evaluated over time. Then the risk of risk must not be neglected. For example, incorrect determination of liability for pollution or insurance against a natural disaster may pose a risk of liability, especially when the probability of an event is underestimated.

Environmental risk analysis tools

When market actors analyze the financial impacts of climate change and other environmental risks on a company's financial performance, it is necessary to combine two types of approaches, ie two elements for environmental risk analysis (GFSG, 2017):

- environmental factors and
- financial risk assessment tools

Environmental factors - the first step is trying to understand how environmental factors can pose risks to financial assets and how such risks can evolve over time. Such factors may include direct risks such as the physical impacts of climate change on the assets of the real economy or indirect risks arising from policies and market reactions to environmental factors. In this sense, we observe economic entities with a high level of risk to the environment, and therefore it is necessary to assess their impact on different sectors and the economic system. If companies are not ready for physical performance or for a transition with a low level of environmental impact, they may face credit, market, business and legal risks.

Financial risk analysis tools - environmental factors must be translated into quantitative financial risk measures that can inform about risk. For example, it may not be very helpful for an investor just to know that the area where the property is located is likely to suffer from drought. However, when this is expressed as a potential impact on the assessments of agricultural producers and water supply plants in that region, the investor may take it into account in their capital allocation decisions.
Therefore, it is difficult to define the types of tools and metrics for financial risks due to adverse environmental impacts.

The adequacy of risk analysis tools depends on the asset class and the types of risks to which firms are exposed in the course of their business, while the choice of approach depends on the type of direct and / or indirect exposure to the environmental risk factor. Different levels of analysis are likely to be conducted in a particular organization, such as at (GFSG, 2017):

- the level of individual valuation of assets
- portfolio level
- macroeconomic (systemic) level

Due to different views on business risk and environmental impact risk, we also notice differences in the study and application of different variables and tools for assessing business risk.

Use of financial tools for environmental impact analysis

The type of financial assets used to assess environmental risk depends on the needs and constraints of different economic operators, and may vary depending on the types of financial shares, the situation towards capital markets and the position of risk analysts in the capital distribution chain. Financial institutions and regulators may also seek to assess how the observed risks could affect the safety and stability of the observed and analyzed companies, as well as to explore the potential for environmental factors to pose systemic risks.

The risk instrument primarily depends on the different types of assets through which companies can be exposed to direct and indirect environmental risk factors. Different levels of analysis are likely to be conducted in a particular organization. Some analysts assess individual assets, while others perform risk analysis at the portfolio level or analyze it at the macroeconomic or systemic level.

Individual assessment of assets

Analysts who focus on market risk assessment use valuation tools, such as discounted cash flow (DCF) models, that take into account asset risk. Environmental factors may be taken into account by adjusting the expected future cash flow or adjusting the risk premium, taking into account future cash flows that affect the valuation of capital. Market risk assessment analysts could use assumption models to assess how earnings or risk premiums are affected by environmental risks.

Analysts considering bond credit risk focus on the issuer’s ability to repay borrowed funds and thus focus more on short-term finance than medium-term cash flows. These are key factors influencing the bond valuation decision. However, for long-term securities, the effects of environmental factors and the effects on future cash flow analyzes attract more attention, including valuation decisions.

Coverage risk when observing loans from banks, credit risk analysts use tools such as expected loss (based on timely coverage of overdue liabilities and possible loss realization). By studying other risks, insurers have the longest track record in developing and applying models for assessing financial losses arising from environmental hazards, primarily for the purpose of making insurance decisions. Disaster risk models are embedded in environmental information.

Portfolio Level Risk Analysis

In addition to assessing the risk of individual assets, environmental risk analysts, for financial risk analysis, perform assessment at the aggregate level of the portfolio. This can be based on an assessment of individual assets that is then aggregated or the assessment is initiated by some aggregate market risk factor affecting the industry, and their total exposure is measured. Also, the difference between the market and the loan is applied here, depending on the assets in the portfolio. And the interpretation of the metrics will depend on the approach used to obtain it. On the credit risk side, ratings for an entire industry or property in a particular country may be affected by environmental factors.

Observed from the point of view of coverage risk, the risk may be much higher than it seems at first glance. For example, on the side of the insurer's liability (insurance risk), physical risks can be applied to groups of policyholders who are in the same area of physical risk, so a higher level of coverage risk is observed.

Risk Analysis at The Systematic Level

Private sector actors and regulators have a common interest in environmental risk assessment, whether it is physical environmental risk and / or transition risk for better environmental protection, as they may affect the stability of the system as a whole. Systemic risk analysis involves assessing the company's financial system, including an assessment of the company's overall risk exposure, size and concentration in the industry, but also an analysis of whether there are deficiencies in the financial system in which social and environmental risks are concentrated.

Behind the direct financial impact on stability, system-level risk analysis can bring risk to the economy as a whole. Such an analysis of risk exposure goes beyond looking at exposure and assessing potential impacts on GDP, consumption and financial conditions under the assumption of risk realization. An analysis of environmental risks across the economy will require some kind of macroeconomic model that assesses the effects of feedback between sectors of the economy. Both approaches aim to quantify the social and environmental risks of the environment at a systematic level.

Method of the research

The company's focus on earning and profitability are considered key elements of a company's successful long-term business. Many business owners and managers analyze the business of the company by measuring the realization of profits and profitability, and based on the results obtained strategic plans of the company, of course in accordance with available resources. Profit maximization as the sole goal came into conflict with the strategy of responsible management. The globalization of the economy, which creates an unstable competitive environment, in the face of growing social expectations for the proper functioning of the corporation, has placed new demands, social and environmental sustainability on the management of the company. No matter to these environmental risk measurement tools the experience of financial institutions in environmental risk analysis, as currency variables, is still limited (GFSG, 2017). In the practical application of such methods to individual economic entities or national economies, there are ambiguities and inadequate application of defined tools.

Therefore, every day in practice, new opportunities appear that open the door to new approaches, but all for the purpose of achieving the ultimate goal, which is to operate according to the principles of social and environmental sustainability. First of all, social and environmental responsibility of companies contributes to the public reputation in the economic market, while on the other hand they prevent the occurrence of environmental disasters that can have major financial consequences for the company's operations.

In today's business world, all actors in the economic system are interested in achieving profitability and long-term value creation of companies, while new models of corporate governance based on the application of sustainable development strategy, and more recently management based on social and environmental sustainability. The subject of the research includes determining the importance of social and environmental sustainability of companies for long-term profitability and the creation of economic value added. The research starts from the assumption that corporate social and environmental responsibility is extremely important and necessary for successful long-term business.

The research described in this paper is based on empirical testing on a sample of 126 Croatian companies based on the financial statements as of December 31, 2019, from which profitability and EVA indicators were obtained. As most of the companies covered by the survey do not compile sustainability reports, which according to the GRI guidelines should cover economic, social and environmental aspects, an anonymous survey was conducted among employees and company management, covering only social and environmental aspects. The survey sought to obtain the maximum objectivity of the respondents by assigning a general score of 1 to 5 for each company and separately for both groups of questions individually social sustainability (DO) and environmental sustainability (EKO). The aim of the research is to obtain results on the relationship between the implementation of social and environmental sustainability with the profitability of enterprises using the indicators Return On Sales (ROS), Return On Equity (ROE), Fundamental earning power (FEP) and the creation of economic value added (EVA). Therefore, an analysis was performed using correlation and regression in the statistical program SPSS Statistics 17.0., and the obtained results are shown in the table below.

Hypotheses of the research

This paper seeks to explore the extent to which the social and environmental sustainability of enterprises contributes to the creation of profitability and economic value added. In accordance with the above, the scientific hypothesis was set:

H1: The social sustainability of companies is positively and significantly statistically related to the creation of the economic value added
H1-1: The social sustainability of companies is positively and significantly statistically related to the realization of return on sales indicator
H1-2: The social sustainability of companies is positively and significantly statistically related to the return on equity indicator
H1-3: The social sustainability of companies is positively and significantly statistically related to the indicator of the fundamental earning power
H2: The ecological sustainability of companies is positively and significantly statistically related to the creation of the economic value added
H2-1: The ecological sustainability of companies is positively and significantly statistically related to the realization of return on sales indicator
H2-2: The ecological sustainability of companies is positively and significantly statistically related to the return on equity indicator

H2-3: The ecological sustainability of companies is positively and significantly statistically related to the indicator of the fundamental earning power

The following variables have been defined in this research which we obtained from a survey on the implementation of social and environmental sustainability:

a) Predictors (Constant):
   - VAR X1 – social sustainability (DO)
   - VAR X2 – environmental sustainability (EKO)
b) Dependent Variable which we calculated from the financial statements of the company as of December 31, 2019.:
   - VAR Y1 – economic value added (EVA)
   - VAR Y2 – return on sales (ROS)
   - VAR Y3 – return on equity (ROE)
   - VAR Y4 – fundamental earning power (FEP)

Results of the research

The obtained research results are presented below. The observed companies from the sample according to the number of employees are classified into three groups: the first group, 57 of them, consists of companies from 1 to 10 employees, then 42 companies with 11 to 50 employees, and companies with more than 51 employees, 27 of them. In the observed sample of analyzed companies according to the activity they are engaged in, most of them belong to the retail and wholesale activities, followed by companies whose main activity is financial operations (bookkeeping services and financial consulting), then companies whose main activity is transport, and information technology and communications , in the last places are construction and other activities. Table I. and table II. presents the results of the statistical significance of the coefficient of correlation and regression of the VAR X1 – social sustainability (DO) and VAR X2 – environmental sustainability (EKO) with business performance indicators (VAR Y).

Table 1: Statistical presentation of correlation and regression coefficients VAR X1 and EVA, ROS, ROA, FEP

Model Summary[b]										
					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	,212[a]	,045	,013	,38924	,045	1,417	4	121	,232	2,101
a. Predictors: (Constant), DO										
b. Dependent Variable: EVA, ROS, ROA, FER										

Source: Author's work

From the presentation in Table 1 we see from the correlation coefficient R that the correlation between the variables exists but is very small. The coefficient of determination R2 is closer to zero than to one, so we cannot speak of a good linear correlation of the model. Regarding the F ratio, we can see that the empirical F ratio (1,417) is higher than the theoretical value (0,232), based on this with a given level of significance 0.05 and with the number of degrees of freedom (4,121) we notice greater variability, ie variation resulting from the influence treatment, suggests that the orientation of the company towards social sustainability does not affect the profitability of the company and the creation of economic value added, but there is little correlation (0.212). Durbin-Watson has a value of about 2 which indicates the absence of autocorrelation of relation errors.

Table 2: Statistical presentation of correlation and regression coefficients VAR X2 and EVA, ROS, ROA, FER

Model Summary[b]										
					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	,243[a]	,059	,028	,58767	,059	1,897	4	121	,115	2,074
a. Predictors: (Constant), EKO										
b. Dependent Variable: EVA, ROS, ROA, FER										

Source: Author's work

As shown in Table 2 by analyzing the correlation coefficient R we can see that the correlation between the variables exists, but the correlation is small (0.243). The coefficient of determination R2 is closer to zero than one, so we cannot talk about a good linear correlation of the model, which can be seen in Graph 1. When we look at the F ratio, we can see that the empirical F ratio (1,897) is greater than the theoretical value (0,115). Moreover, with a given level of significance of 0.05 and the number of degrees of freedom (4,121), we come to the conclusion that the company's business is oriented towards environmental sustainability to a small extent, ie partially related to the company's profitability and economic value added. The Durbin-Watson has a value of about 2 which indicates that there is no autocorrelation of relation errors.

Conclusion

The strategy of environmental and social sustainability is not sufficiently implemented in Croatian companies. This study found that 21.87% of the observed companies (with an average score of about 4.5) satisfactorily implement the strategy of environmental and social sustainability. Whether this is due to the inability to adapt to environmental and social requirements but also to the inadequate implementation of environmental control systems and the protection of social and social rights, should be determined by additional research. Most companies do not systematically implement the strategy of social and environmental sustainability, and this research provides data that there is a link between environmental and social sustainability with company profitability and the creation of economic value added, but it is extremely small (DO 0.212 and EKO 0.243). Consistency of all participants in the economic system in the implementation of social and environmental sustainability for the benefit of the entire community and future generations is necessary.

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Monetary Integration - Currency in The Euro Area And Economic Club Theory

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The article is an attempt by the authors to fit in with the discussion on the benefits and costs of joining the euro area, which focuses primarily on the differences between countries in real structures.
The thesis of the article is that full economic and monetary integration will increase costs among those countries whose broadly understood socio-economic structure differs from that of the most developed countries. Differences in GDP or asset structure (especially in periods of falling global demand) inevitably lead to the fact that the rising costs of competition (efforts) will be transferred to societies that generate their income from **internationally immobile resources**. The theory of clubs will be applied to verify the thesis. Countries integrated in the euro area are identified as members of a club that offers the club good - the common currency. The existence of differences that make the club heterogeneous through costs and benefits will determine the optimal size of the club.

Keywords: club theory, monetary-currency integration, eurozone, asymmetric demand shocks, nominal convergence, real divergence, not internationally mobile assets.

Introduction

The inclusion of more countries in the euro area makes this grouping more heterogeneous, which entails forcing the policies of the supervisory institution (European Central Bank - ECB) to develop mechanisms to deal with the growing conflicts between the economic objectives of individual countries, which, despite meeting the nominal convergence criteria, have different GDP structures, trade structures, potential, financial market barriers and social preferences (J. Ahrens, W.H. Herman, R. Ohr 2005). Failure to meet the criteria of real convergence imposes on the policy of the supervising institution the need to develop a consensus between the economic objectives of individual countries. The ECB is faced with a conflict of goals, as the share of individual countries in particular costs is not proportional.

This article is a key contribution to the discussion on the benefits and costs of joining the euro area.

Countries integrated in the euro area are identified as members of a club where the club's common currency is offered. The thesis of the article is that full economic and monetary integration will increase costs among those countries whose broadly understood socio-economic structure differs from that of the most developed countries. Differences in the structure of GDP or assets (especially in periods of falling global demand) inevitably lead to the fact that the rising costs of competition (efforts) will be transferred to societies that generate their income from **internationally non-mobile resources**. The theory of clubs will be applied to verify the thesis.

The first chapter will show the basics of the economic analysis of club theory in relation to monetary integration. In the following section the costs and benefits of membership (participation) in the monetary union will be outlined on the basis of the economic analysis of club theory. It will then show the conditions for full participation in the benefits of the single currency and the costs and scale of such participation.

Theoretical Basis, Methods, Results and Discussion

Integration in the euro area as club membership

The monetary union in the euro area is a grouping of countries - members of the European Union - which benefit from clubbing - monetary integration, which is inaccessible to non-attached countries. The good that is monetary integration (the common currency) is a non-rivalry good (the use of it by one member does not diminish the possibility of using it by other members, and countries that are not members of the euro area are excluded from using it.

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The grouping of euro area countries can be seen as a club that has emerged within the established institutional framework, regulations and guidelines for participation.

The actual formation of the euro club from the EU Member States since 1999, as well as the pursuit of instruments of closer institutional cooperation from 1979 (the European Monetary System became operational) (L. Oręziak 2003) to 1999, indicates the economic theory of clubs as an appropriate application tool for the analysis of economic and institutional and political mechanisms and conditions for both deepening and further expansion of the monetary union. The analysis conducted on the basis of club theory shows the benefits and costs resulting from monetary integration in relation to differences in real structures between the economies of the Member States. This is a theoretical approach, the foundations of which were developed by Samuelson P. A (conceptual distinction between purely private and purely public goods) (P.A. Samuelson 1954; 1955), Buchanan J. M. (development of economic club theory) (J.M. Buchanan 1965), Tiebout C. M. (introduction of an element of competition between countries through tax and public service packages) (C.M.A Tiebout 1956) It also sheds light on the political capacity to deal with current and future problems arising from the enlargement of the monetary union and the possibilities for institutional neutralization.

It is not the rivalry of the club good, which is monetary integration, that increases the usefulness of the club good as the number of members increases. The growing size of the club usually implies higher integration costs, which increase more than proportionally as the collection (club) becomes more and more heterogeneous and the implementation of the common monetary policy becomes more and more difficult.

Increasing the size of the club has positive marginal benefits for incumbent club members, but for countries that are still looking for closer cooperation and club membership, this marginal utility may decrease as the number of club members increases. or those that also reflect relatively similar interests in certain policy areas and show significant interdependencies, but are characterised by differences due to different production structures (countries have different patterns of change in the structure of the economy (G. Dosi, F. Riccio M.E. Virgillito 2020)) and assets.

The marginal utility of accession is low, with a tendency to weaken for countries that show great differences in economic structures and preferences compared to the incumbent Member States and which have only entered into loose economic ties with the incumbent countries (J. Ahrens, W.H. Herman, R. Ohr 2005).

Using the framework of the clubs' analysis, an attempt was made to simultaneously determine the optimal widening and deepening of the good that is monetary integration. Otherwise, in the first stage there will be a simultaneous determination of the optimal number of club members (club size, expansion scale) and the optimal level of supplied club goods (degree of intensity / depth of integration [common fixed exchange rate system with a wide band - system of fixed exchange rates - monetary union with a common currency]).

Assuming that all members have identical utility functions, all consume the club's goods to the same extent, there is no competition in consumption,

A representative member of the club (the government of a euro area member) seeks to maximise its utility functions, with a given budgetary constraint.

(1)Ui = Ui (Gi, X, n), where Ui - usefulness of a representative member of the club *i*, Gi - real public expenditure of the member *and* as an approximation of the provision of the public good in the country, X - degree of integration with regard to the club's good, n - number of members in the club
An increased number of members can produce economies of scale - increases in G^1 , X and n have a positive effect on U.

(2) pGi + (C(X, n))/n = Ti, where C - costs, Ti - taxes
Exogenous tax revenues 'i' must be equal to nominal government spending plus the ith share of the cost of providing club goods. The assumption is a positive relationship between the cost and the degree of integration of the club and the number of members (this assumption suggests that we adopt Krugman P.'s view based on Mundell's theory, contrary to the European Commission's proposals) (P. De Grauwe 2003).

It is possible that costs increase more than proportionally with enlargement, especially when the club becomes more heterogeneous (the cost burden on individual members increases with the number of members) - on the one hand, the cost of production of the club's goods increases with enlargement, on the other hand, this cost is shared by a larger number of members, but as the cost increases more than proportionally - increasing marginal costs - the individual cost burden will increase with increasing membership.

(3)Ux / UG = Cx / (P x n) > 0, where G - quasi-private state good

the traditional Samuelson's condition for providing an optimal amount of public goods
(4) $_{Un}$ / UG = (Cn - [(C(X, n)]/n) / (P x n) > 0, membership condition when it is advantageous to have further members

Figure 1

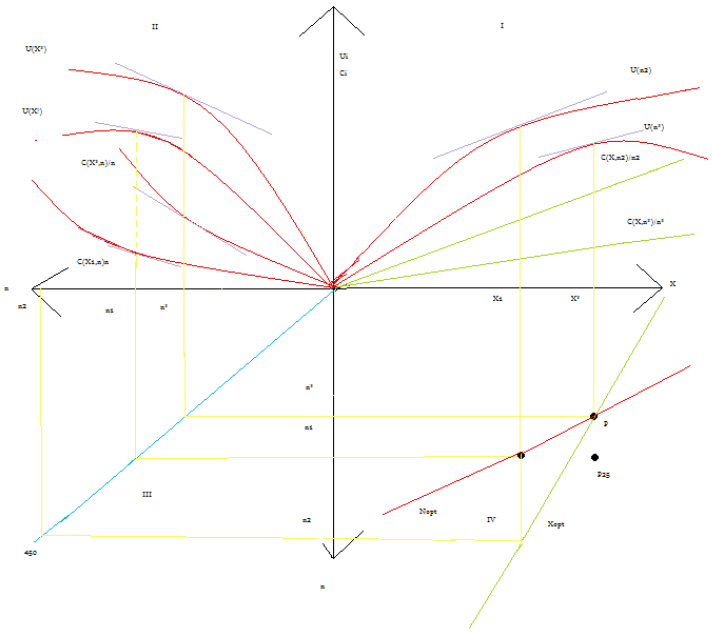

Source: Ahrens J., Herman W. H., Ohr R., Deepening Integration in an Enlarged EU: A Club-theoretical Perspective, European Integration, Vol. 27, No. 4, December 2005, s. 428

Figure 1 shows the simultaneous solution for X and n. In the first and second quarter, utility and cost functions are presented for levels X and n respectively.

The cost per club member increases in proportion to the degree of integration and depends positively on the size of the club (increasing marginal costs of an additional member).

Individual usefulness also increases with a higher degree of integration and is dependent on the size of membership, but in both cases with decreasing marginal usefulness.

Rising marginal costs and the decreasing marginal utility of the additional members are particularly credible / convincing if the new members differ strongly from the 'old' members in structural terms, hence the diversity of economic data and the divergence of political objectives, constraints and the need for adjustments is becoming increasingly clear.

Optimal sizes X and n are achieved when the difference between the costs and benefits of a representative member is maximised. Thus, an optimal degree of integration X* in the first quarter is achieved if the membership size is n*.
If the number of members is greater than n* (e.g. n2) the optimal degree of integration will be X1.

The second quarter shows that the optimum size of membership is n* for a given degree of integration X*. If the integration did not occur so deeply (e.g. up to X1), the optimal size of membership is n1.

In Quarter IV we construct Xopt charts and notes which correspond to equations (3) and (4).

The Xopt curve illustrates the maximisation of net usability from the degree of integration X for alternative membership sizes

The nopt curve illustrates the maximisation of net utility from the size of membership for alternative degrees of integration intensity.

The slope of both curves reflects the interchangeability between the degree of integration and enlargement (increasing the number of members). P is at the same time the optimal solution for X and n.

As the utility and cost functions will differ for different club goods (different levels of integration intensity: fixed exchange rates .... currency union), so the received functions for nopt and Xopt will also differ. It follows from the herds that the optimal size of a club will also vary for different club goods (different levels of integration) and that a single club that provides more than one club good for its members will be suboptimal from a theoretical point of view. If we assume that n* is equal to the number of the current euro group, then the enlargement of the union (n1> n*) would lead to a suboptimal size of the club (P25). This constellation will only meet the optimality criteria if the Xopt and nopt curves move down or to the right, respectively, and intersect at the X* and n1 coordinates. Such a shift would be the result of a decrease in the cost of delivering the club good, independent of the size of the membership and the degree of integration (J. Ahrens, W.H. Herman, R. Ohr 2005).

Benefits and costs of 'euro club' membership.

The benefits of monetary integration increase with the intensification of trade and financial relations between the countries of the zone, and this is broadened and deepened with stronger economic and monetary integration. Although for new members who are economically weakly linked to the Member States, participation in *the club* may mean less than proportional increases in benefits.

The most tangible and credible benefits of economic and monetary integration emerging from economists' analyses include lower transaction costs, reduced exchange rate risk and increased price transparency (S. Lis 2008).

Deeper monetary integration is expected to lead to positive changes in the welfare of the population as a result of the functioning of a single currency instead of a few, by intensifying the flow of goods, services, capital, labour through the elimination of transaction or exchange costs (gathering information on future exchange rate developments, savings on hedging costs' related to exchange rate risk). Additionally, the elimination of exchange rates will reduce the element related to exchange rate risk in direct investment decisions as an investment stimulator. Elimination of the risk premium will reduce currency speculation, often leading to distortions in the real economy.

More reliable and transparent prices mean better decisions on production, investment and consumption.

The benefits of participating in a common monetary area may be all the greater the more countries that are part of it. The elimination of transaction costs, including the reduction of price discrimination between markets in different countries, and the reduction of uncertainty in economic decisions, especially as regards the formation of a company's income, significantly stimulate multi-level cooperation between Member States (P. De Grauwe 2003).

The countries, i.e. Poland, should benefit most from stable monetary policy and stable prices, as well as low interest rates. They will also benefit from lower transaction and information costs (R.A. Mundell 2000).

Costs related to joining another country (marginal), resulting from institutional regulations, law, competition rules, etc. will be positive and will increase with the number of club members. Consensus building by club members becomes more difficult as the number of members and their heterogeneity increases, mainly due to the complexity of the club management process (e.g. voting procedures, monitoring/supervising activities etc.) (J. Ahrens, W.H. Herman, R. Ohr 2005).

The main cost of joining the euro club is the loss of opportunity to influence the business cycle by revaluing or devaluing the national currency (loss of national currency independence). Each successive country joining the euro area increases the difficulty of managing business cycles in individual member economies, and this difficulty increases with the diversity (heterogeneity) of countries joining the euro area.

Furthermore, the loss of ability to influence the interest rate and exchange rate exposes the economy to asymmetric shocks as a result of falling global demand.

However, in addition to the costs of adopting the euro, there are a number of costs of staying outside the euro area, i.e. an increase in permanent adverse exchange rate movements as a result of the collapse of global financial markets or an increase in central banks' vulnerability to the increasing mobility of capital flows (mainly in the property markets) (A. Sławiński 2008).

The optimal size of the club will be determined by equating marginal benefits with costs generated by joining another country's club (P.C. Padoan 1997; J. Ahrens, W.H. Herman, R. Ohr 2005).

Conditions for a beneficial monetary union - structural adjustments.

If the (politically preferred) enlargement illustrated in Figure 1 is to become economically optimal as well, economic policy measures must influence cost determinants. The application of club theory to monetary integration clearly shows that the main determinant of rising costs is a heterogeneous set of club members. It stems from the lack of real convergence (cohesion of the real structure).

Chart 2

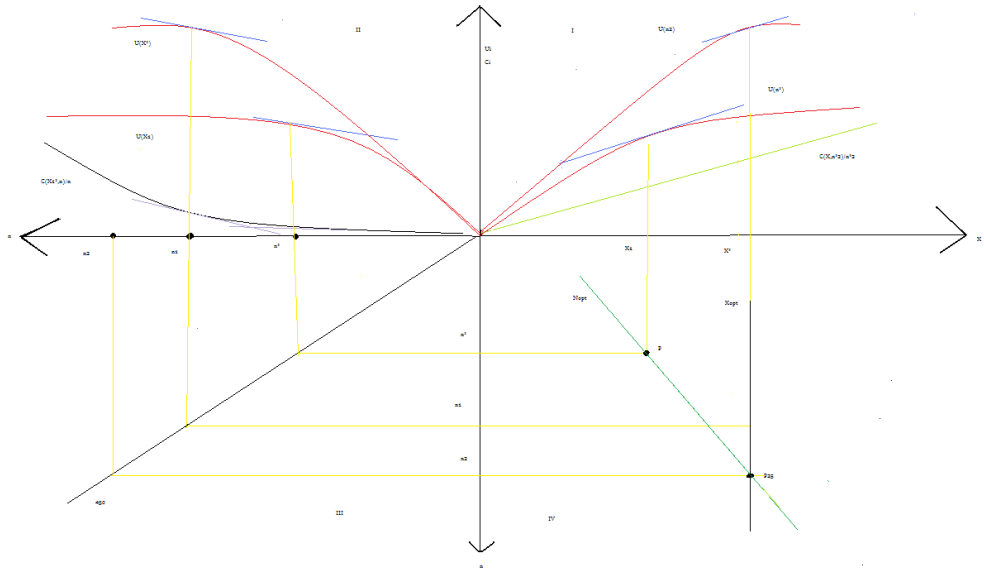

Source: Own study

The cost per club member increases in proportion to the degree of integration, and once it has been achieved, the introduction of the single currency will only depend on the size of the club (increasing marginal costs of the additional member). Individual utility also increases with a higher degree of integration and is dependent on the size of the membership, but in both cases marginal utility will depend on the degree of convergence of structures. The convergence of economies in structural terms may result in the elimination of rising marginal costs and lead to increased marginal utility. This will result, as shown in Figure 2, moving to its Quarter IV, in the optimal size of the club increasing with the degree of integration. On the other hand, the optimal size of a good club is full monetary integration, i.e. adoption of the common currency.

Summary

In presenting the prospects and proposals for economic and monetary integration, the Delors Report warned against the resulting significant trade imbalances. At the same time, it points to the need to increase the flexibility of prices and wages and the mobility of capital and workers as ways to eliminate these adverse effects of integration.

The key task in the further process of shaping the monetary union is therefore, alongside the development of the institutional framework or the political and economic method of operation, the structural adjustment of Member States' economic areas that is real convergence.

[1] real budgetary expenditure - bringing closer the provision of public goods and, in the theory of clubs, a quasi-private good that can only be used by the citizens of a country

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Theoretical Aspects of Deindustrialisation in Developed World Economies

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Abstract

The effects of deindustrialisation, which became apparent most strongly in the 1970s and 1980s in the United Kingdom and the United States, set strategic trends for the next decades of the world economy.
The content of this article deals with selected issues relating to the deindustrialisation process, particularly in the United Kingdom and the United States.
This article states that the emergence of deindustrialisation in such economic phenomena as investment, the collapse of old industries, the declining strength of trade unions, the relocation of industries and wage differentials are evidence of painful but desirable adjustments for further economic growth.
After presenting a theoretical view of changes in the structure of employment in the economy, the concept of deindustrialisation and its most important determinants, within the framework of selected issues, the problem of the decrease in the share of industry in total employment in the economies of the United States and the United Kingdom is presented, as well as its structural sources, i.e. the centralisation of wage negotiations in the United Kingdom, the British minimum wage policy, the effects of strong trade union traditions in the United Kingdom, the relocation of American companies to foreign economic areas, investment in the United States, the positive dimension of the strong wage differential in the United States.

Keywords: deindustrialisation, employment structure, collapse of industries, change in demand structure, increase in productivity, wage differentiation, relocation of enterprises.

Introduction

The effect of industrialisation first became apparent at the end of the 1960s in the UK and was triggered by an increase in the relative prices of raw materials, which caused supply shocks in the industrial product markets. As a result, the British economy of the 1970s began to show declines in the share of the industrial sector in employment and production and declines in the share of exports in world trade growth - the share of industrial production in total net production, measured in constant 1963 prices, has been falling since 1970, in current prices it fell by nearly 8% between 1950 and 1975, the share of industrial goods in world trade fell by almost 10% between 1955 and 1973, import penetration in industrial goods markets was increasing, the rate of investment was relatively low. In the 1970s, there was an absolute decline in the number of industrial businesses in the UK industrial sector, and, as a result, an absolute decline in production and employment in the sector (C.J.F. Brown, T.D. Sheriff 1979).

Between 1970 and 1980, the Northeastern Industrial *Belt (Manufacturing Belt*) in the United States recorded large, absolute declines in employment. The region recorded a loss of around 1 million jobs in the 1970s. (R.D. Norton 1996). The United States was the original manufacturing area, where the phenomenon of the relocation of mature industries to competitive foreign areas was observed (R. Vernon 1996). The economic decline of the industrial north was seen in a rapid repetition of the history of Great Britain in the last century (1870s-1970s), sometimes referred to as the 'climacterium' of Britain (the collapse of old and failed attempts at the successful operation of new industries, the decline of TFP, the decline of production) (R.D. Norton 1996).

Deindustrialisation has appeared in the light of such phenomena as: the declining share of employment in industrial companies in developed economies, the stagnation of average real wages and the increase in wage inequalities in the United States since 1973, the massive increase in unemployment in most developed European economies since the early 1970s (R.D. Norton 1996). These effects are intertwined with the phenomenon of rapid growth in trade cooperation and capital mobility between developed and developing countries. As a result, resources of production factors have been shifted in highly developed countries from industry to the service sector, and from highly developed countries to developing countries.

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It would seem unreasonable to pretend to understand the above phenomena and related problems in the economies of advanced countries without first realising the fundamental evolution of their structure (J. Fourastie 1972).

After presenting the basic elements of the evolution of the employment structure, the concept of deindustrialisation will be presented, and then the determinants of this phenomenon in developed economies will be identified. In the next part, a short description of the economies which were subject to the deindustrialisation process will be presented. The work will be completed with the emergence of implications resulting from deindustrialisation.

Theoretical Basis, Methods, Results and Discussion

Basic elements of the evolution of economies in the context of structural change.

The first industrial revolution caused economic conditions to evolve much faster, in a very surprising way from 1900 onwards, and then from 1930 onwards. Economic reality began to evolve so quickly that it becomes impossible to grasp its rights. Only economists will be able to grasp an important phenomenon when it is immediately replaced by another previously insignificant one (J. Fourastie 1972). This shows the profound structural changes that have caused rapidly changing economic conditions. Structural changes and the collapse of long-term economic trends were the subject of research long before the industrialisation processes in world economies actually came to light.

On the basis of his concept of the tri-sectoral division of the economy (agriculture - industry - services), Allan Fisher has identified the regularities of structural changes in economies that are based on economic progress (J. Fourastie 1972). He has identified the structure of the economy and structural changes in the economy as a share of individual sectors in the total stock of labour and capital. The regularities of changes in the economic structure that he observed can be reduced to the claim that the share of the agricultural sector in the labour and capital stock is decreasing in favour of the service sector as the economy progresses. In the industrial sector, its share of the factor inputs is initially increasing and then decreasing in favour of the service sector. Such shifts of input stocks between sectors reveal the nature of economic progress. As the role of individual sectors in the economy changes, there is a transfer of inputs from the first sector to the second and then to the third sector.

Around 1800, 80 to 90% of the world's population were farmers, and already around 1950, in developed countries, the agricultural population represented only 20% of the total population (J. Fourastie 1972).This phenomenon was introduced to the economic sciences by Colin Clark, showing the correlation between the high standard of living achieved by a country and the small percentage of people employed on the land (J. Fourastie 1972).In his research he focused on the amount of national income per capita and the relative importance of the three sectors of the economy, except that, unlike Fisher, he only captured the importance of individual sectors on the basis of their share in the labour force. On the basis of his research, he concluded that, as income per capita increases, the ratio of agricultural workers to industrial employment decreases and the ratio of service workers to industrial workers increases.

Based on the change in the relative importance of the three sectors, Clark specifies two phases of development. In the first phase, there is a decline in the relative importance of the agricultural sector and an increase in the importance of the industrial sector, and in the second phase, where, with adequate *per capita* income, the development of the industrial sector is slowed down, there is a relative decline in employment in the industrial sector in favour of the service sector (C. Clark 1957).

Jean Fourastie, like Fisher and Clark, has used the concept of a three-divisional structure of the economy to identify the regularities of structural transformation in the economy. In Fourastie's view, as the economy develops, the share of the agricultural sector in total employment is becoming smaller. The industrial sector shows an increase in its share of employment at a certain stage of development, followed by stabilisation and decline. As far as the services sector is concerned, it continues to show an increasing trend in its share of total employment, first at the expense of the agricultural sector and then the industrial sector. To illustrate the process of economic development, Fourastie distinguishes three phases of economic development - the primary civilisation, the transition period and the tertiary civilisation. With the first industrial revolution, there was an increase in productivity and living standards, which ended the period of primary civilisation and began the transition period. The transition period, due to the importance of technical progress and related changes in consumption structure, is divided by Fourastie into three stages - start, expansion and completion. In the start-up phase, there is a rapid increase in employment in the industrial sector and the industrialisation of the economy begins. This stage continued in the US and UK economies from 1800 to 1920. During the expansion stage, when labour productivity growth is accelerated by the strong acceleration of technological progress, employment in the industrial sector begins to stabilise. As technological progress has the greatest impact on productivity growth in the industrial sector, and at this stage its relative importance in the economy is greatest, economic growth is relatively high. The economies of the United States and the United Kingdom were at this level of development in the 1960s. In the last phase of the transition period - the complementing phase -

employment in the industrial sector started to fall and grow dynamically in the service sector. The share of employment in the services sector is increasing throughout the transition phase, but in its final phase, when labour productivity growth is much faster than the increase in demand for industrial goods, the share of employment in the services sector starts to increase significantly. In addition, the decline in employment in the industrial sector in the complement stage means that the service sector is absorbing all the labour released from both the agricultural and industrial sectors (J. Fourastie 1972).

The end of the transition period will start an era of servicing (the Fourastie stage of tertiary civilisation), in which the service sector will achieve its greatest relative importance in the economy and its share of employment will be close to the level of employment achieved in the primary civilisation stage by the agricultural sector.

The concept of deindustrialisation

Deindustrialisation is a feature of the economic development process that is inevitable. It occurs both before the emergence of wage inequalities and unemployment, with which it is very closely associated in debates on economic development in developed countries.

Deindustrialisation does not mean the collapse of the industrial sector, but the natural effect of economic development, resulting from the process of creative destruction inherent in the capitalist system (J.A. Schumpeter 1942). However, we cannot reject the claim that deindustrialisation can sometimes be combined with difficulties in the industrial sector or in the economy as a whole. A country may lose jobs as a result of a negative shock (i.e. a high appreciation of the real exchange rate), and the service sector may not be able to absorb the released labour force completely. Here, deindustrialisation may involve rising unemployment or slow growth or even a decline in living standards.

De-industrialisation can be classified in two categories - measured by the relative decline in industry's share of total production or measured by the relative decline in industry's share of total employment.

Deindustrialisation, understood as a long-term (secular) decline in the share of employment in industry, is analysed not as a negative phenomenon, but as a natural consequence of industrial dynamism in developed economies (R. Rowthorn, R. Ramaswamy 1997).

Using the gross job losses indicator, Bluestone and Harrison defined deindustrialisation as the destructive side of creative destruction (B. Bluestone, B. Harrison 1982).

Thurow deindustrialisation is described as the destruction of the industrial economy, which, in contrast to the destruction of the agricultural economy itself, is caused by identifiable human activities that can be controlled (L. Thurow 1980).

Controversy over the determinants of deindustrialisation

The key factors explaining the growing employment in industry during the period of industrialisation, which is largely a shift in employment from agriculture to industry, can be reduced to two factors. The first is the action of the Engel law (the proportion of income spent on food decreases with economic growth, leading to changes in the structure of demand - from agricultural products to manufactures and services), which is related to the profitable elasticity of demand (as a result of the increase in income, the structure of demand changes). It was also the basic criterion for dividing the economy into three sectors in Fisher's theory (A.G.B. Fisher 1952). The second determinant is the rapid productivity growth in agriculture caused by the introduction of automation. Rapid productivity growth is a measure of technical progress, which in his concept of the evolution of economies Fourastie considered to be the prevailing factor, and at the same time a criterion for distinguishing three sectors in the economy (J. Fourastie 1972). These combined effects, occurring on the demand and supply side, are the result of large-scale shifts in employment from agriculture to industry and services. These phenomena were responsible for the increasing share of employment in industry in the industrialisation phase.

The rapid changes in the rate of productivity, which are driven by changes in production technologies, take place much more in the industrial sector than in the service sector, which would mean that the impact of new technologies on productivity growth is much greater in industry than in services, which, in turn, is the prevailing factor in explaining the deindustrialisation processes, which are seen as changes in the structure of employment between the industrial and service sectors. The value of industrial products in the advanced countries at constant prices over the period 1970-1994 has more or less remained unchanged, calculated in current prices, but has decreased significantly. It follows that the share of the value added in GDP of manufacturing companies has decreased, not because of a fall in industrial production (its value in constant prices does not change significantly), but because of a fall in the prices

of industrial goods, as shown by the fall in the value of industrial output at current prices. Further, it can be concluded that shifts in the structure of domestic expenditure have not been the main cause of changes in the share of industry in value added (value added at constant prices has not changed significantly). The persistence in the analysis of long-term trends in services sector production at the level of manufacturing output, although productivity in industry is increasing much more than in services, indicates the indispensability of increasing the share of the services sector in the employment structure, as a result of labour force absorption pushed out of industry (R. Rowthorn, R. Ramaswamy 1997).

In the hypothesis of the '*industrial growth lag',* Kuznetz argued that the industrial revolution had initiated a seemingly unrestricted process of economic growth: individual nations and industries were growing and then collapsing. When asked about the reasons for the collapse of the so-called 'old industries', he answered that the opportunities for the use of new technologies, cost reduction and further growth in sales were diminishing in these industries. Kuznetz stresses that sustainable economic growth requires the creation of new industries which, by achieving high growth rates, will 'compensate' for the inevitable slowdown in the spread of inventions and innovations in the old industries. Therefore, the high growth rate of the entire economy is accompanied by significant shifts in relative importance between industries as old ones collapse and new ones emerge (S. Kuznetz 1959).

The law of industrial growth indicates that industries mature when the main benefits of technology end, slowing down cost reduction, market expansion and sales growth, and making ageing industries vulnerable to the competition of younger rivals with faster productivity growth (E.B. Alderfer, H.E. Michl 1942).

Schumpeter's vision of development is achieved through painful structural changes. Schumpeter rejects all economic reasons for the expiration of investment opportunities. He points to the capitalist growth system as the one that could be threatened by three factors. Firstly, the growth of large industries, which could result in the paralysis of capitalism. Secondly, excessive wealth growth, which could undermine the values and institutions legitimising capitalism. Thirdly, a possible decline in investment opportunities, which could result from the saturation of human needs, a reduction in the size of economic resources, the disappearance of technological innovation or a shift in investment projects towards public goods. Both Schumpeter and most economists at the end of the 20th century rejected each of these factors as a source of fading economic growth in industrialised countries. For Schumpeter, the real threshold for investment opportunities was Kondratiev's 50-55-year cycle or 'long wave'. With brutal optimism, Schumpeter saw the economic depressions as an essential element in clearing the economy of outdated practices and restoring efficiency. As a result, such a creative destruction would have conditioned the growth of new industries. New industries would initiate the next long wave, ensuring the achievement of capitalism's objective of a significant increase in living standards every 50 years. Schumpeter does not see economic restrictions on growth, but envisages political and cultural restrictions (a break with the main values of capitalism, a strongly regulated and inflexible mature economy, which in the long run, politically, means the end of the growth system).

Hansen shared Schumpeter's idea of long waves, although he strongly opposed his laissez-faire approach. Hansen introduced a kind of *natural law of industrial ageing*. This can be explained as the disappearance of industries after they have undergone a phase of strong growth in investment activity, maturity and decline, which causes deep stagnation in the economy and it can take a long time before a similarly strong economic force acting in the opposite direction appears (E.M. Hoover 1948).

Burns wrote in the *Growth Law* that the growth rates of individual industries tend to fall as the age of the industries increases. Unlike Hansen, Burns did not see the ageing of industries as a problem, but saw it as a natural part of the growth process (R.D. Norton 1996).

Wolf assumed the existence of four *growth retardation laws*, one of which specifically indicated that any technical modernisation by reducing costs and improving the use of raw materials and energy hinders further development. As a result, there is less and less room for improvement, and thus a narrowing of opportunities slows down or completely interrupts technical development (R.D. Norton 1996).

The ripening phase of the industry and its main production centres, when the growth rate of the market is slowing down, when fundamental issues related to product design have been solved and when the necessary machinery has been constructed, is transformed into a dispersion phase. The key to explaining this process is work. Over time, when technological progress makes work largely routine, when a concentrated and highly qualified workforce is no longer necessary to carry out the production process, industries move to areas where wages are relatively lower and production conditions are more flexible than in the home production areas. This does not mean, however, that the maturity of the industry, which is commonly combined with decentralisation, will or should cause the gradual spread of production. Indeed, at the same time, a permanent process of new industries is under way(E.M. Hoover 1948).

Baumol, Blackman and Wolf (W.J. Baumol, E.N. Blackman, E.N. Wolff, 1989) formulated and proved that productivity growth is higher in some (technologically progressive) activities than in others (technologically stagnant) (W.J. Baumol, E.N. Blackman, E.N. Wolff, 1989). Manufacturing is, in general, technologically progressive (which is the basis of deindustrialisation). Such characteristics of manufactures are connected with their internal attributes, i.e. ease of standardisation, possibility of formalizing information necessary for production into easily repeatable information packages. The services, on the other hand, are significantly different from manufactures in this respect. For example, *non-personal* (*impersonal)* services, such as telecommunications, have characteristics similar to manufactures and can be qualified as 'technologically progressive'. Personal services, however, such as medical care, for example, cannot easily be standardised, cannot be subject to mass production methods and are therefore called 'technologically stagnant' [1]. The general approach to ageing is the *maturity hypothesis* developed by Kindleberger and independently by Olson. Kindleberger's maturity hypothesis was aggregate, referring neither to the life cycle nor to the "S-shaped" growth of industry (*per capita* production tends to grow in the early stages of growth, then slow down as the economy reaches the economic maturity stage). Olson mainly points to the political side of economic maturity, highlighting the role of interest groups. He stresses that the older the roots of industrial development are, the more time is needed to work out the efforts of the various interest groups in order to develop a climate conducive to business growth (R.D. Norton 1996).

Characteristics of industrialising economies

The UK economy suffered a decline in exports and increased import penetration in increasing world trade between the 1970s and 1980s. This showed a decline in the competitiveness of British industrial goods in international markets. Improving international competitiveness depends on achieving higher domestic productivity growth than overseas. The decentralised structure of trade union negotiations in the United Kingdom has held back long-term planning and decision-making capabilities and acted against flexible responses to changes in the organisation of work and has generally held back productivity growth. Negotiations on working conditions delayed the adaptation and diffusion of new technologies and did not lead to high levels of labour utilisation. Negotiation disagreements resulted in production disruptions, unfulfilled orders, reduced product availability, and the resulting poor productivity usually meant poor quality and questionable product reliability (A. Kilpatrick, T. Lawson 1980).

The implementation of a new technological process in industry requires wage differentiation. This is because maintaining the operability of new technologies requires the employment of highly qualified workers, which requires higher wages. The trade union system of procedures and standards, on the other hand, ensures that workers with different qualifications receive equal status in terms of qualifications and pay (J.M. McLean 1978). The inability to change the organisation of work and the adaptation and diffusion of new technologies caused by resistance from workers has forced managers to close down, as a result of the loss of competitiveness, a large number of businesses, resulting in an absolute decline in the number of industrial businesses in the UK economy.

Without limiting the supply-side factors of the economy - mainly in the form of minimum wages and a relatively unskilled labour force with strong trade union traditions - industry is able to generate competitively priced industrial products, as has been the case in developing countries to which industrial production from the UK has been relocated. This has been made possible by the maturity of the industry, which has made production highly susceptible to migration to areas with low labour costs or to areas at home and abroad where there is a favourable location for production (E.M. Hoover 1948; R. Vernon 1996). This has resulted in an additional absolute decline in industry's share of employment. British domestic companies were more likely to seek profit through foreign investment and exports to partially protected regions than to restructure and modernise domestic businesses, where they had to confront workers at every attempt at large-scale modernisation or integration of domestic industry.

The loss of gross jobs in American industry was linked to the phenomenon of the relocation of mature industries to competitive foreign areas. This phenomenon was analysed by Vernon, who attributed different locations in the world to each of the three stylised stages of product development. In the first stage, a typical new product is developed and produced in large American cities, close to the necessary skilled workforce and market - customers. Such initial production centres will supply the product to domestic and foreign markets. At the second stage, the acceleration of production is observed, partly due to fear of taking over the domestic market by foreign (European) competition. This pushes American companies to establish their branches in Europe, which is helped by the gradual reduction of uncertainty as low-cost production technologies are invented and standardized. This stage is therefore marked by a decline in US exports. The third stage, the maturity stage, is characterised by the possibility of production everywhere and with the great benefits of low labour costs in the low developed countries (this is mainly marked in the production of textiles, small electronics, etc.). In this stage, the United States becomes a net importer (R. Vernon 1966).

So-called 'private investment' in US companies, known as 'corporate flight' (*corporate flight*) was considered to be the reason for the destruction of higher-paid, working places and activities through factory and factory closures. In

addition to the corporate flight phenomenon, B. Bluestone and B. Harisson also saw other sources of structural change taking place in the United States (B. Bluestone, B. Harrison 1982; R. Norton 1996). Lawrence lists at least five alternative sources of these changes. The first, in his opinion, is related to post-industrial effects, i.e. a fall in consumer spending, which is seen as the Americans' income increases. The second, also linked to the post-industrial effect, concerns the decline in the share of industry in total employment as a result of faster aggregate productivity growth in industry than in other sectors. The third, identified as cyclical effects, highlighted the stronger impact of slow demand growth on goods than on services. The fourth, which is identified as trade effects, indicates that the competitiveness of the United States may be reduced in the short term due to differences between the United States and other countries as regards the passage of particular phases of the business cycle and differences in the practice of monetary policy. As a fifth source and another trade effect, Lawrence mentions the possibility of comparative advantages shifting in the long term, as the production of mature products is transferred to underdeveloped countries. Lawrence combines the relocation of US production from the 1970s with the weak growth in global demand resulting from the supply shock and the fight against inflation. He attributes the net loss of jobs since 1979 to short-term effects with macro-economic roots. The loss of jobs in the manufactures since 1979, just like the United States' trade deficit, does not deserve, according to Lawrence, to be called industrialisation effects. This is because they do not reflect the long-term decline in the competitiveness of the United States and can be eliminated by appropriate fiscal and monetary policy measures (R.Z. Lawrence 1984; R.D. Norton 1996). Other empirical findings show that the increase in *North-South trade* has probably only had a small impact on the deindustrialisation process (R. Rowthorn, R. Ramaswamy 1997).
The greater effectiveness of the adaptation of the United States to the conditions of the new global economy than that of Europe was seen in the beneficial effect of the regional differentiation that took place in the United States. The strong interregional differences in the United States have forced the painful but helpful adaptations that were lacking in Europe (R. D. Norton 1996). The interregional disparities have largely prevented the centralisation of wage negotiations in the United States, which has made wage differentiation possible. Appropriate wage differentials are needed to compensate for the differences in skills and the intensity of work that this diversity attracts. In general, deciding on appropriate wage differentials in a rapidly changing environment is difficult with centralised trade unions. Wage differentials in US industrial companies have allowed the rapid adaptation and diffusion of new technologies, which has increased productivity throughout the sector (R. Rowthorn, R. Ramaswamy 1997).

The deindustrialisation processes in the EU-15 have been plagued by high levels of unemployment caused by a fall in the absolute number of people employed in industry, with a relatively small increase in total employment between 1970 and 1994. By contrast, in the United States, where the rise in unemployment as a result of a fall in industrial employment was cushioned by an increase in total employment, the negative features of deindustrialisation have been revealed in widening income inequalities and stagnating earnings.

Implications of deindustrialisation in developed economies.

According to the theory of sectoral employment structure A. Fisher and C. Clark's positive changes in the employment structure of the economy occur when the share of agriculture in labour demand is decreasing and the share of the service sector is increasing. By contrast, the share of industry and construction should increase at the expense of agriculture or decrease in favour of the service sector. The balance of changes in the share of these two sectors should be negative for highly developed regions and positive for developing regions (E. Kwiatkowski, L. Kucharski, T. Tokarski, 2003).

Changes in the relative weights of the three types of national production show strong links to the increase in economic prosperity: increasing levels of national income are always linked to a decreasing share of employment in the first economic sector (the agricultural sector). The relative weight of the second sector (the industrial sector) first increases as national income increases and then reaches its maximum and falls. Employment in the third sector (services sector) has not yet reached its maximum. Further increases in national income are seen in the reallocation of production factors from the first to the second, and especially to the third sector (C. Clark 19570).

On the basis of [2] Baumol, Blackman and Wolff's theory of 'asymptotic stagnation', which says that, in the long term, the average growth rate will be determined by the activities for which productivity growth is slowest, services can be identified as those for which productivity growth will be determined largely by average economic growth (R. Rowthorn, R. Ramaswamy 1997).

The theory of 'asymptotic stagnation' has important implications for understanding the relationship between competitiveness, productivity and living standards / welfare (P. Krugman 1994) and the existence of bottlenecks. Industrial productivity growth is likely to be less important than before for increasing overall productivity and living standards in advanced economies. As the process of deindustrialisation continues, productivity growth in the economy will increasingly depend not so much on industrial productivity growth as on productivity growth in the service sector.

In contrast, the evolution of productivity in the service sector will depend on the future development of areas such as information technologies and changes in the competitive structures of the sector. Technological development means that certain types of services will develop much faster than others, and therefore there will be significant structural changes in this sector over time. However, it should be noted that product innovation in industry will continue to play an important role because of *the spillovers to productivity growth in services* (R. Rowthorn, R. Ramaswamy 1997).

The dispersion effect of Kaldor's approach shows the importance of individual sectors of the economy for economic growth in a slightly different light. In Kaldor's opinion, the rate of productivity growth in the whole economy depends on the expansion of the industrial sector, which not only leads to faster productivity growth in industry (operation of Verdoorn's law[3]), but has a dispersal effect on the whole economy. The increase in productivity growth in the economy as a whole also depends on the disappearance of declining economies of scale, inefficient economic activities, i.e. agriculture or other non-industrial sectors. Freeing labour and other resources from inefficient activities (characterised by declining economies of scale) and shifting them to a dynamic industrial sector has a double benefit for productivity growth in the economy as a whole: it increases productivity by freeing up excess labour from non-dynamic sectors and by the expansion of dynamic sectors (S. Dasgupta, A. Singh 2006).

Deindustrialisation will most likely have important implications for industrial relations in advanced economies. Unification is less common, as it is usually more difficult to organise in the service sector (with the possible exception of public services) because of the wide and deep diversity in the nature of work and size of enterprises in service activities. The nature of work in services varies greatly depending on service activities (financial services, where relatively high qualifications are required, and retail services, where low qualifications are sufficient).

A centralised system of wage bargaining, where the main focus is on reducing wage differentials, will expose economies operating in such conditions to serious challenges as consequences of deindustrialisation.

Employment relationships will require the formation of strong incentive relationships, where incentive schemes are to induce proxies to work as if they were working in the company they own.

Industry remains important as a source of employment and structural change, at least in low and middle-income countries. Although the decline in industry's share of total employment is at a much lower level of national income *per capita* than in the currently economically advanced countries, this does not necessarily mean that a pathological phenomenon exists (S. Dasgupta, A. Singh 2006).

Summary

Deindustrialisation is a natural process of transfer of production factors, in particular the labour factor, at a certain stage of economic development from industry to services[4], dictated by the correctness of changes in economic structure if society is to benefit from the effects of economic progress.

The emergence of deindustrialisation in economic phenomena such as investment, the collapse of old industries, the declining strength of trade unions, the relocation of mature industries to developing countries, and wage differentials are evidence of painful but desirable adjustments for further economic growth.

However, deindustrialisation can be bought, as a result of slow adjustments, by socially undesirable phenomena such as unemployment, income inequalities, a slowdown in the growth of living standards and a reduction in the level of social security. The most important result of deindustrialisation, however, is the need to move away from workers' social security, which stiffens the labour market, towards greater flexibility with regard to employment, working time, wages and labour supply.

However, the symptoms of deindustrialisation, although their positive and negative effects could be balanced in theory, should be carefully analysed in relation to the various economic conditions.

The flexibility of the response to economic change at an increasingly rapid pace brought about by deindustrialisation made it a necessary process in a sequence of unavoidable changes in economies with high levels of economic development. Research carried out by Blackman, Baumol and Wolff has provided ample evidence that industry can no longer be a reliable engine for growth as it was in the past (W.J. Baumol, E.N. Blackman, E.N. Wolff, 1989).

[1] the concept of 'asymptotic stagnation' is not prescriptive, it does not mean that the rate of productivity growth will have to be low in absolute terms in the long term; Rowthorn R., Ramaswamy R., Deindustrialization: causes and implications, IMF Working Paper, No 42, 1997, p. 22

[2] the concept of 'asymptotic stagnation' is not prescriptive, it does not mean that the rate of productivity growth will have to be low in absolute terms in the long term

[3] faster production growth increases productivity due to increasing economies of scale

[4] capital as a production factor is relatively less important in the service sector than in the industrial sector - Fisher A. G. B., Capital and the growth of knowledge, The Economic Journal, 1933, p. 384, after Kwiatkowski E., Teoria trzech sektorów, PWN, Warsaw 1980, p. 93

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Application of Environmental Impact Assessment Methods for Construction

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Patrycja WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: patiw90@o2.pl

Abstract

Sustainable development has become a concept commonly used in terms of global spatial development, national and regional planning. In view of the fact that deposits of non-renewable energy resources are inevitably running out, it is particularly important to take a new look at the problems associated with energy-efficient and ecological construction. The definition of sustainable construction determines both the specific parameters to be met by a given building and a comprehensive approach to the problem, starting from the design stage of the building, through its construction and operation, to the demolition or other form of the final stage of its life cycle. Such buildings are characterised, on the one hand, by the use of modern technologies and materials and, on the other, by a return to rational architectural design. The concept of "green building" refers to the ecological, social and economic aspects of the whole life cycle of a building. The methodology for determining the environmental impact of a building is still under consideration. There are currently several methods for the assessment and certification of green and energy-efficient buildings. The most popular system for such assessment and certification of buildings is the BREEAM (Building Reaserch Estabilishment Environmental Assesment Method) system, which became popular in the UK in 1990. The purpose of this article is to carry out an LCA (Life Cycle Assessment) for a single-family building, at the design stage, and to identify the building materials used in terms of environmental loads during the entire building life cycle.

Keywords: BREEAM building certification system, building life cycle, sustainable "green building", LCA analysis in construction.

Introduction

Green building and BREEAM building certification system

The interest in ecology in the context of construction and functional operation of s emerged in the 1980s. However, the energy-saving and ecological solutions used at that time still existed to a small extent, mainly as partially experimental buildings. In 1992-2003, in Western Europe, energy-efficient construction started to develop on a larger scale, with ecological and passive houses gaining popularity (Przemycka, 2011). The BREEAM certification system includes building studies in various aspects, depending on the solutions adopted, using a point scale. A code is used to determine the degree of a building's environmental impact and its 'sustainability', which assigns a certain number of points for pro-energy and pro-ecological solutions. BREEAM environmental certification is a voluntary issue for informed investors who can demonstrate their concern for the environment, user comfort and health. The quality of project execution is confirmed by a proper certificate, which through its recognition has a direct impact on increasing the demand for space among tenants. In Western European countries, the interest of entrepreneurs and developers in having the appropriate certificate for an investment is constantly growing and a certified building translates into its material value. In 2011, a new certification system "BRE Global international Code for a Sustainable Built Environment" was introduced, containing guidelines, assumptions, objectives and requirements, the implementation of which will determine the approach to design, development, management and certification of the economic, environmental and social impact of an investment. The objectives of this document include: mitigating the environmental impact of the investment's life cycle, identifying and classifying buildings in relation to their environmental benefits, ensuring a credible level of environmental/environmental labelling for the investment, developing demand for sustainable construction. The BREEAM certification method is constantly being modified by

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BRE in order to adapt it to the assessment in a specific country or area. It can be used by both individual clients and project teams wishing to provide investors with data that certify the real environmental impact of an investment.

BREEAM certification enables the team of experts, designers involved in the project and supervision of construction works to have fuller and more conscious control over the proper implementation of the investment. Certificates are excellent assessment tools, but they are not design tools, it should be remembered that they are strongly linked to them but only indicate the right course of action. The need for integrated design is based on a close, multi-faceted relationship between all members of the investment process, starting from the programming phase (Juchimiuk, 2011). Poland is dominated by the model of a traditional design process, which omits the opinion of experts, specialists from various industries, in the conceptual design. In the integrated design process, a BREEAM assessor should be obligatorily involved in particular phases. Figure 1 shows the difference between an integrated and traditional design process.

Certification of green buildings in Poland. In 2016 and early 2017, Poland saw a dynamic growth in sustainable construction. Green buildings are filling the map of our country with increasing intensity. The construction industry has an increasingly accurate knowledge of the characteristics of sustainable buildings, and the circle of professionals who are able to design and erect such buildings is rapidly expanding, reaching a high global level (Kuczera, 2017). As reported in the PLGBC (Polish Green Building Association) report of 2017, we have 409 certified buildings in Poland and their total area exceeds 10 million ^{m2}. One of the four international multi-criteria certification systems is applied: BREEAM, LEED, DGNB and HQE. BREEAM is the leader in this list (Figure 2). 74.3% of facilities in Poland are certified in this system.

In the sector breakdown by function, the office sector dominates in Poland, a worldwide trend. The residential and hotel sector is only at the beginning of the certification process in our country. In 2017, a new category has appeared, which is schools, with one building so far. In the CEE region, Poland is an unquestionable leader in building certification. On the territory of 14 countries, out of 850 certified buildings, as much as 48% are located in Poland.

Essence and principles of sustainable construction . In May 2001, at its meeting in Gothenburg, the European Commission presented to the Council of Europe the concept of a 'European Union strategy for sustainable development'. It emphasised the need to introduce environmental issues into all sectoral policies and formulated the most important sentences concerning the implementation of sustainable development: reduction of progressing climate change and increase in the consumption of renewable energy, appropriate handling of public health risks, wise use of natural resources, improvement of communication systems and action to optimise space use. Therefore, construction which is to meet the requirements of sustainable development should, in all phases of its life cycle, aim to minimise the consumption of energy and natural resources, thus reducing its negative impact on the environment. The basis for this task is the identification of the main factors and their components which determine the relations with the building's environment both at the investment stage and during its operation (Adamczyk, 2005). The principles of sustainable building development concern mainly such aspects as: sustainability of the production and consumption system in relation to local (national, regional and sub-regional) environmental conditions, adaptation of legal regulations to the implementation of the sustainable development strategy in particular areas of economic and social life, development and broadening of knowledge on the relationship between the factors of sustainable development and demographic development, planning and management of land as a natural resource, by promoting sustainable use of land, promotion of an integrated system of securing environmental infrastructure, by adequate management of water, sewage and solid waste treatment, promotion of a sustainable energy management system and transport system in housing estates, encouraging the location of settlements in areas that are devastated and endangered from the point of view of biodiversity, promoting activities aimed at sustainable construction, making efficient use of market, economic and other instruments to promote sustainable development, developing systems to enable environmental and economic settlement, protecting the atmosphere through the appropriate management of energy sources and their use in transport, construction and industry, classifying and labelling chemical products and determining the degree of risk of their use, minimising waste and pollution, promoting 'clean production' systems, developing education in the field of improving knowledge relating to sustainable development.

The most important entities operating in the construction industry for sustainable development are manufacturers of building materials and products, designers, construction contractors and users of buildings. Manufacturers of building materials should pay particular attention to the rational management of raw materials, energy and obtaining environmental declarations for their products which confirm their high quality and 'environmental safety'. Designers, on the other hand, should know that it is their responsibility to choose the right choice of construction materials, with particular emphasis on the possibility of using recycled or recycled materials. Construction contractors, on the other hand, are responsible for the organisation of work on construction sites, the sustainable use of land and the application of modern technologies which make it possible to reduce energy consumption and minimise the negative impact on

the environment during the construction phase. Finally, the users of the buildings themselves influence the creation of sustainable development through conscious and ecological patterns of behaviour, as well as the implementation of a pro-environmental system of water, energy and waste management and care for maintaining the good technical condition of the buildings.

The construction industry is a sector of the economy that has a significant impact on the environment, alongside such industries as the energy, mining, chemical and steel industries. The environmental aspects of construction activities are linked, in particular, to the use of raw material resources, including energy carriers and space. Assuming that a single construction object does not have a large negative impact on the environment, the fact that the impact is emitted simultaneously and in the long term through a mass number of objects causes the accumulation of negative effects in the environment on a large scale and at different levels of construction activity and concerns (after Adamczyk, 2005): extraction of raw materials and production of construction materials, the course of construction, exploitation of the building, the process of demolition and recycling of construction materials.

Building materials are produced from raw materials extracted from the environment and then processed in production processes into final products with specific performance parameters that determine the quality of the building. During the production process of materials, energy carriers, water and many other raw materials and materials are used, and at the same time solid waste, technological sewage and harmful gaseous substances are released into the environment. The construction phase is burdening the environment through work on site preparation, the construction of access roads and temporary buildings, as well as the storage of products and materials, often hazardous, on site. In addition, during the construction phase there are nuisances such as vibrations, noise, disturbance of the groundwater table, distortion of the landscape, displacement of earth masses, etc. The construction work is also linked to the consumption of energy carriers.

The exploitation phase of a building has the greatest impact on the environmental load, for European conditions it can be as high as approx. It can be as long as 100 years. The energy consumption necessary to ensure adequate thermal comfort in our climate zone is much higher in the building's use phase than in the other phases, which is influenced by the long time horizon of the building's operation. The demolition phase of the building also has an environmental impact. During this phase energy is also consumed and in the environment, demolition materials that cannot be recycled are collected in landfills (Adamczyk, 2005).

LCA (Life Cycle Assessment) is a method of assessing environmental aspects. The advantage of this technique is that it seeks to take into account all factors that may potentially affect the environment and are related to a particular activity or product. The final definition of the LCA was adopted by the American Society for Environmental Toxicology (SETAC) in 1995. It defines an LCA as a technique to evaluate the environmental hazards of a product system or activity, both by identifying and quantifying the materials used, energy and waste introduced into the environment and evaluating the environmental impact of these materials, energy and waste. The assessment covers the entire life cycle of the product as presented in Figure 5, starting from the extraction and processing of mineral resources, through the production of the product, distribution, transport, exploitation, reuse, to recycling and final waste management.

Research Methodology

This stage is particularly important because it determines how the research is carried out and how detailed it is. The aim of the research is to assess the environmental impact of a residential building, a two-storey single-family building with a garage with a usable area of 153.76 ^{m2} (gross cubic capacity of 870 ^{m3}), as well as to identify the building materials used in terms of environmental nuisance at each stage of building use.

Setting an objective gives rise to the identification and definition of such relevant issues. Product system and its limits - defining all operations related to the building, i.e. the collection of material and energy-related processes. The system boundaries describe which processes should be included in the life cycle assessment and which can be omitted when drawing up a worksite balance sheet. The building system in this article covers: the manufacturing phase of construction materials and products, the construction phase, the use phase, the demolition phase. A 99-year building lifecycle is also adopted. Functional units - should correspond to the purpose and scope of research, must be clearly defined and measurable. When the LCA analysis is carried out for the overall environmental impact of a specific building, the area of the entire building (153.76 ^{m2}) with a specific function (single-family building) is taken as the main functional unit. The additional functional units for a building's LCA are mass (kg) and volume (^{m3}). Reference flux - the quantity of product needed to perform a function determined after the definition of the functional units. When carrying out the LCA analysis, the scope of the tests may be modified as the data is collected. It is also possible to extend the predefined limits of the system if it is found necessary at the data set analysis stage.

Research Results

Scope of life cycle analysis.

The assessment of the building's life cycle included the following stages:

- A1 - A3 - Construction materials. Production stage from cradle to grave. Determines the impact of a material or product ready to be sent to the construction site, including extraction of raw material, transport and emissions from production. If recycled or reused materials are used at this stage, their emissions can be accounted for as zero.
- A4 - Transport to the construction site. Includes the impact of transporting the product from the factory to the construction site. The transport chain may include intermediate stages, through a warehouse or warehouse.
- A5 - Construction process. It covers the entire construction process, including wasted materials (including production of the wasted part of materials), waste transfer and the necessary transport.
- B4 - B5 - Replacement and renewal of materials, maintenance and use.
- B6 - Energy consumption. Includes all energy imports from the building (including electricity, district heating, cooling and fuels). Any energy from renewable sources on site is excluded (excluding fuels or imported electricity needed for its use). Exported energy is not deducted.
- C1 - C4 Demolition. Includes the impact of materials after demolition of the site (reuse, recycling, disposal, landfill).

The life cycle assessment was carried out using the OneClickLCA programme. Table 1 shows the total impact of the life cycle of the building under investigation during its 99-year lifetime. As shown in the report generated by the OneClickLCA programme, a building will emit one and a half million kg $_{CO2e}$ and almost 8,000 kg $_{CO2e}$ bio during its entire life cycle. According to the Carbon Heroes benchmarking programme, the building under examination is classified as E on a seven-stage $_{CO2}$ emission (A-G) scale. In order for the building to be able to apply for the eco-certification of the project under examination, significant changes must be made, among other things by eliminating or reducing the "hot spots" that generate the most $_{CO2}$ to the environment.

Table 1: Complete building life cycle

Sector		**Global warming [kg $_{CO2e}$]**	**Storage of biogenic carbon [kg $_{CO2e}$ bio].**
A1-A3	Building materials	128 584,91	7 802,37
A4	Transportation to the site	3 648,43	
A5	Construction/installation process	8 757,13	
B4-B5	Exchange of materials and renewal	200 644,98	
B6	Energy consumption	1 146 106,53	
C1-C4	Deconstruction	6 630,02	
TOTAL		**1 490 000**	**7 600**

Own elaboration

The most carbon dioxide emitted to the environment (77%) occurs during the exploitation phase of the building, then (13%) during the replacement, renewal and maintenance of materials and during the production of construction materials (9%).

Storage of biogenic coal, occurs only at the stage of production of construction materials.

The greatest impact of a building on global warming occurs during its operation phase, then in the phase of replacement, renovation and maintenance and in the phase of production of construction materials. Biogenic carbon is stored only in the materials manufacturing phase.

Tables 2÷5 show the impact of the analysed building materials in particular phases of the building life cycle assessment. Minor fixings (screws, nails) were omitted from the calculations. The impact of materials at the stage of their transport, construction site operations and deconstruction was estimated in database scenarios for specific materials.

Table 2: Construction materials

N.B.	Building materials		Global warming [kg CO_{2e}]	Storage of biogenic carbon [kg CO_{2e} bio].
1.	*Foundations and substructures (foundations, basement and retaining walls)*			
	Concrete		84%	
	Bricks and bricks products		9%	
	Reinforcement steel		7%	
	PARTICIPATION OF SECTIONS		**27%**	
2.	*Vertical structures and facade (external walls and facade)*			
	Bricks and bricks products		62%	
	Treated wooden cladding		0%	100%
	ETICS with wool and mineral plasters		37%	
	Natural stone facade panel		1%	
	PARTICIPATION OF SECTIONS		**17%**	**1%**
3.	*Vertical structures and facade (internal walls and non-load-bearing structures)*			
	Gypsum plaster		96%	
	Plasterboard		0%	
	Wall bricks		4%	
	PARTICIPATION OF SECTIONS		**53%**	
4.	*Horizontal structures (beams, floors and roof)*			
	Wooden roof truss		100%	100%
	PARTICIPATION OF SECTIONS		**1%**	**97%**
5.	*Other structures and materials (windows and doors)*			
	Windows with PVC frame and transparent glass		92%	
	Exterior wooden doors		8%	100%
	PARTICIPATION OF SECTIONS		**2%**	**2%**

Own elaboration

Table 3: Transport to the construction site

N.B.	Building materials		Global warming [kg CO_{2e}]	Storage of biogenic carbon [kg CO_{2e} bio].
1.	*Foundations and substructures (foundations, basement and retaining walls)*			
	Concrete		97%	
	Bricks and bricks products		2%	
	Reinforcement steel		1%	
	PARTICIPATION OF SECTIONS		**45%**	
2.	*Vertical structures and facade (external walls and facade)*			
	Bricks and bricks products		95%	
	Treated wooden cladding		0%	
	ETICS with wool and mineral plasters		5%	
	Natural stone facade panel		0%	
	PARTICIPATION OF SECTIONS		**8%**	
3.	*Vertical structures and facade (internal walls and non-load-bearing structures)*			
	Gypsum plaster		98%	
	Plasterboard		0%	
	Wall bricks		2%	
	PARTICIPATION OF SECTIONS		**46%**	
4.	*Horizontal structures (beams, floors and roof)*			
	Wooden roof truss		100%	
	PARTICIPATION OF SECTIONS		**1%**	
5.	*Other structures and materials (windows and doors)*			
	Windows with PVC frame and transparent glass		92%	
	Exterior wooden doors		8%	
	PARTICIPATION OF SECTIONS		**0,1%**	

Own elaboration

Table 4: Exchange of materials and renewal

N.B.	Building materials		Global warming [kg CO_{2e}]	Storage of biogenic carbon [kg CO_{2e} bio].
1.	*Vertical structures and facade (internal walls and non-load-bearing structures)*			
	Gypsum plaster		100%	
	PARTICIPATION OF SECTIONS		**97%**	
2.	*Other structures and materials (windows and doors)*			
	Windows with PVC frame and transparent glass		92%	
	Exterior wooden doors		8%	
	PARTICIPATION OF SECTIONS		**3%**	

Own elaboration

Table 5: Deconstruction

N.B.	Building materials		Global warming [kg CO_{2e}]	Storage of biogenic carbon [kg CO_{2e} bio].
1.	*Foundations and substructures (foundations, basement and retaining walls)*			
	Concrete		91%	
	Bricks and bricks products		4%	
	Reinforcement steel		5%	
	PARTICIPATION OF SECTIONS		**9%**	
2.	*Vertical structures and facade (external walls and facade)*			
	Bricks and bricks products		47%	
	Treated wooden cladding		0%	
	ETICS with wool and mineral plasters		53%	
	Natural stone facade panel		0%	
	PARTICIPATION OF SECTIONS		**3%**	
3.	*Vertical structures and facade (internal walls and non-load-bearing structures)*			
	Gypsum plaster		99%	
	Plasterboard		0%	
	Wall bricks		0%	
	PARTICIPATION OF SECTIONS		**80%**	
4.	*Horizontal structures (beams, floors and roof)*			
	Wooden roof truss		100%	
	PARTICIPATION OF SECTIONS		**8%**	
5.	*Other structures and materials (windows and doors)*			
	Windows with PVC frame and transparent glass		78%	
	Exterior wooden doors		22%	
	PARTICIPATION OF SECTIONS		**0,1%**	

Own elaboration

Carbon dioxide emissions and storage of biogenic carbon at the production stage of construction materials. Figure 1 shows the building elements and building materials that generate the most carbon dioxide to the environment during their production phase, thus contributing to global warming. In the project under analysis, the elements most burdening the environment are vertical structures and the building's facade (internal walls and non-load-bearing structures) (70%) and foundations and substructures (27%).

In terms of materials, these are: gypsum materials, plaster and cement (51%), concrete (22%), bricks and ceramic materials (15%), building insulation installation (7%) and steel and other materials (2%).

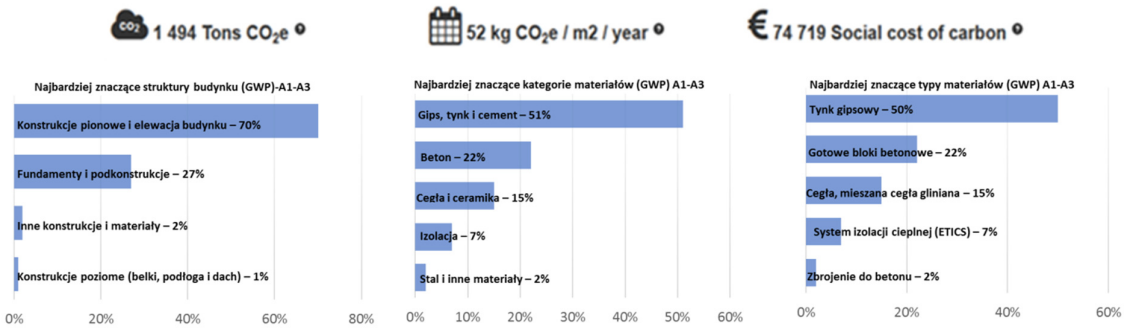

Figure 1: Impact of building materials used on global warming

Own elaboration

Figure 2 shows the building elements and construction materials that store biogenic carbon to the greatest extent. In the analyzed project these are wood materials used in horizontal structures (beams, floors and roof) - 97%.

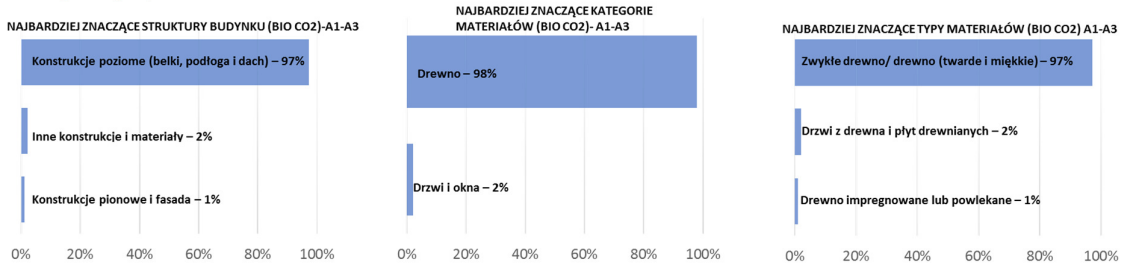

Figure 2: Structural materials for storing biogenic carbon

Own elaboration

Summary

The use of the LCA method to assess the environmental impact of the facility under investigation has helped to determine which elements and stages of the facility generate the most CO_2 to the environment, thus contributing to the deterioration of our climate. The calculations of the carbon footprint are a useful tool for design offices, in order to optimise it and thus obtain appropriate certificates.

When assessing a building for BREEAM certification, particular emphasis is placed on the lowest possible CO_2 emissions to the environment, both during the operation of the building and during the production of construction materials, their transport and disposal, promoting the 3R principle (recycling, reuse, restoration). According to the LCA analysis, the examined building is classified as E on a seven-stage CO_2 emission (A-G) such a result makes it impossible for the facility to obtain a BREEAM certificate without making significant changes in its design.

During its 99-year service life, the object under analysis will emit a charge equal to 1.49 -106 kg CO_{2e}, which is 52 kg $CO_{2e/m2/year}$ respectively. These values are much higher than those given in the literature, Lasvaux et al. (2017), which analyses 40 individual energy-efficient single-family houses, the average CO_{2e} emission over the entire life cycle of the buildings is 8.4 $CO_{2e/m2/year}$. The difference in the results of the analysis is mainly due to the lifetime of the buildings in France (50 years) and the energy consumption necessary for their proper functioning (most of the buildings below 50 kWh/m2/year). In terms of building materials, which have the most negative impact on the environment, in both cases it is concrete.

The following conclusions can be drawn from the analysis of the research results contained in this Article:

- The highest CO_2 emissions to the environment occur during the use of the building. It can be minimised by e.g. replacing a gas boiler with a biomass boiler, using RES in the building (solar collectors, photovoltaic panels, heat pump), better thermal insulation, etc.
- Structural materials contribute to significant CO_2 emissions. Thanks to LCA analysis, the design team can identify the most harmful materials and modify them. In the case of the object under study, such materials include cement, concrete and brick. Their environmental impact can be reduced by substituting ecological materials.

- Cement production is a very environmentally harmful technological process, but the construction market already has eco-cement to offer, which contains fly-ash from waste management plants. By choosing eco-cement and the concrete that contains it, we can significantly reduce the CO_2 emissions of construction materials. The bricks used in construction can also be eco-friendly - they come from demolition of other buildings.
- The market for building materials is constantly evolving, offering more and more environmentally friendly products, new technologies are also being implemented to reduce CO_2 emissions during their production, this should be borne in mind and, when selecting materials, suppliers offering building products containing recycled materials should be sought.

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Global Sharing of the Proceeds of Global Carbon Tax

Piotr WALĄG
University of Agriculture in Krakow, Mickiewicza Av. 21, 31-120 Krakow, Poland,
e-mail: piotr.walag@urk.edu.pl

Nicolaus TIDEMAN
Virginia Polytechnic Institute and State University, 3021 Pamplin Hall (0316), Blacksburg, VA 24061, United States
e-mail: ntideman@vt.edu

Abstract

Economists generally agree that the best way to achieve optimal control of carbon gasses is by globally uniform emission charges equal to the best available estimates of the global marginal social costs of emissions. Prices equal to global marginal social costs motivate efficient economizing, and global marginal social costs of emissions are globally uniform. Less attention has been paid to the question of how the proceeds of carbon gas taxes should be allocated. The simple answer would be that there is never any shortage of ways to use tax revenue. One can always reduce other taxes or pay for the most urgent unmet public needs. But it may be worth thinking about a system of global sharing of the revenue from carbon gasses. There are three reasons for this. 1) Some nations, such as low-lying island nations, are particularly hard-hit by global warming. They deserve compensation for the harm they experience from global warming. 2) It has been notably difficult to persuade less developed nations to participate to the extent that would be efficient in the global effort to slow global warming. It is possible that a system of sharing revenue, after compensation for special harms, would make full participation in the interest of less developed nations. 3) It may be possible to achieve a global resonance with the idea that all persons have equal rights to the atmosphere, so that if some persons wish to use it in ways that must be limited, we deserve to share equally in the revenue that results, after compensation for special harms. This paper traces the relationships across countries among population, carbon gas emissions, and per capita income, so that the consequences of global sharing of the proceeds of carbon gasses can be estimated and the prospect of achieving something close to global agreement can be assessed.

Keywords: Globally Uniform Tax, Carbon Tax.

Introduction

The effort to move of the concept of a carbon tax from the realm of theory to economic reality encounters a myriad of tough questions and too few actions that the theory calls for. This paper develops a path for more effective actions. The paper focuses not on the design of a carbon tax, but rather on how to make it valuable for countries at all levels of economic development.

A Globally Uniform Carbon Tax—Literature Review

Starting with the effect of greenhouse gas emissions on global warming and the economic costs of global warming and other changes in climate, Nordhaus (1991) paves the way for calculating the marginal social cost of greenhouse gases reductions and the potential benefits of various policy measures.

Climate control is a global public good, which mean that international cooperation is very important for achieving it. But international cooperation is difficult to achieve. To succeed, it is important to have some type of symmetry of effort as well as reliable monitoring (Bereby-Meyer, 2012; Ostrom, 1990). However, the review processes of COP (Conference of the Parties) do not provide a satisfactory level of comparability to effectively monitor, report and verify climate control actions. The chief obstacle in the contemporary emission reduction negotiations is the self-interests of countries. They all have incentives to be free riders. The key need is reliable cooperation. Therefore, reciprocity and uniform carbon pricing are the solution/*sine qua non* for international cooperation(Cooper et al, 2016).

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A carbon tax is a fee for emitting into the atmosphere a unit of carbon (or other greenhouse gas measured in carbon equivalents). Its purpose in to efficiently disincentivize emissions (Rose et al, 2020). The preponderance of economists agree that a carbon tax is the best mechanism for doing this.

The Framework Convention on Climate Change (signed in Rio de Janeiro, 1992), extended by the Kyoto Protocol (adopted in Kyoto, 1997 and entered into force in 2005) has been building consensus that global warming is a fact and that human-induced carbon dioxide emissions have made a substantial contribution to it. In these agreements, the signatories commit to reduce greenhouse gas concentration in the atmosphere to "a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2). Arguing that the allocation of greenhouse gas emissions rights among nations is impractical (especially for developing economies), R. N. Cooper highlights taxes on the offending activities as a much better solution than approaches focusing on control of quantities. His vision is for a uniform carbon emission tax specified by an international obligation (Cooper, 1998).

The scale of mitigation costs and their allocation to particular stakeholders is the core of the disagreement over how to achieve emission reductions (Mahapatra, Ratha 2017). Efforts to achieve voluntary agreement are challenged by the existence of a "tragedy of commons" (Clarke, Waschik 2012). Efforts to moderate emissions through artificial markets for carbon emissions, such as the European Trading Scheme (ETS, Richstein, Chappin, de Vries 2015) have yielded unsatisfactory results (Perdana, Tyers, 2020).

The fact that taxing is more effective than direct regulation in lowering carbon emission is confirmed by Nordhaus. A carbon tax is both a disincentive to use products that are intensive in carbon emissions and an inducement to search for alternatives to carbon-based products and technologies, thereby promoting lower carbon emissions. The more carbon taxes add to the prices of fossil fuels, the more protection there will be for the global climate. Since there is an incentive for free-riding by individual nations with respect to carbon emissions, enjoying the benefits of burning fossil fuels while relying on others to reduce emissions, the world needs a global incentive to reduce emissions, built into the price of emissions globally (Nordhaus, 2007). There remain issues of design and implementation, including the proper tax rate and the procedures for collecting the tax, which will not be developed herein.

Nordhaus proposes the combination of "target carbon pricing and trade sanctions" as the instruments for reducing the carbon emissions. He has also modeled 50 USD per ton at current income and emission levels as a viable price for making a stable coalition (Nordhaus, 2015). Complementing Nordhaus's (2015) research is the model by Saelen (2016) that includes population, GDP, emissions, and vulnerability to climate change in a stylized binary decision model. Saelen concludes that side payments could stabilize the coalition of countries to abate their greenhouse gas emission. Hovi et al. (2017) explore a regionally disaggregated version of Saelen's approach, pointing to a possible leading role for the USA and the EU.

Aldy and Stavins confirm the greater efficiency of market-based instruments, compared to the introduction of uniform performance standards and technology. They consider different forms of carbon pricing tools, such as carbon taxes, cap-and-trade, emission reduction credits, clean energy standards, and fossil fuel subsidy reduction, for making private firms take into account the external cost of greenhouse gas emissions. Carbon pricing not only incentivizes reductions in greenhouse gases emissions, it also promotes innovation and mitigates fiscal difficulties.

An efficient carbon tax would be globally uniform. This means that the level of carbon tax would be the same in all countries and (presumedly) that each country would retain revenue from the tax that it collected (Aldy, Stavins, 2012). Aldy and Stavins entertain the possibility that countries would agree to "fixed lump-sum payments from developed to developing countries". The proposal for the harmonized tax system, however, does not calculate the amounts to be transferred and offers a vague proposition for a commitment by developed countries to use the tax revenues in a globally beneficial way (for example, research and development programs). Developing countries would use the tax revenues in whatever ways suited them – for example, subsidizing petrol while developed countries taxed it (Aldy, Stavins, 2012).

Uniform carbon taxation is advocated for its transparency and its contribution to minimization of "carbon leakage" (Barrett, 2002; Cramton et al., 2015), as well as for dominating trading systems in terms of coordination simplicity (Avi-Yonah, Uhlmann 2009). It is also praised for providing new financial possibilities (Shiller1981; LeRoy 2005). Therefore a uniform carbon tax is seen to have a high potential for reducing emissions, despite having a high risk (McKibbin, Morris, Wilcoxen 2008).

Perdana, Tyers (2020) praise the simplicity and transparency of the negotiation target for a uniform carbon taxation, as well as its capacity to serve as an efficient policy measure for them to model. Similarly, Wietzman (2014, 2016a, 2016b) see carbon taxes as easier to administer transparently than a cap-and-trade system.

S. Dissanayake et al. (2020) acknowledge the simplicity and practicality of a carbon tax compared to ETS, in the short term and medium term. They make the case mainly for developing countries, with institutional constraints in energy and transport industries. They conclude that a carbon tax is an attractive and cost-effective market-based instrument in terms of revenue generation and its potential to provide revenue for compensating for losses (declines in wages and employment loss). Weitzman (1974), Pizer (1999), and Hoel and Karp (2002) all endorse a carbon taxes for yielding better results than tradable permits, in terms of transparency and administration.
Carbon taxation has also been explored as an instrument for stimulating renewable energy. When emission costs are built into market prices under a carbon tax, climate change is reduced as other energy sources are substituted for carbon-intensive fuels. Moreover, considerable revenue is created, which can be used for a broad range of purposes, including investing in less-carbon-intensive products and technologies. Nordhaus (2007) identified the tax approach (in contrast to quantitative approaches) as providing less opportunity for corruption and financial abuse, since no artificial scarcities emerge that would induce rent-seeking behaviors.

M. L. Weitzman suggests that a carbon tax (a uniform price on carbon[1]) obscured some favorable arguments because it is modeled in an abstract way. Quantity-based and price-based controls both have inherent uncertainties (between times of periodic review), as cap and trade result in the knowledge on total emission, but uncertainty about the price. Contrarily, a carbon tax provides certainty about the price of carbon emission, while there is uncertainty about the total emissions. It is assumed that citizens find quantity uncertainty much more acceptable than price uncertainty, which would imply fluctuations in the process of the energy products they buy.

The revenues from a uniform carbon tax is presumed to be retained within the country that collects the tax and can therefore offset other taxes in that country. But this retention is not necessary to achieve the benefits of a uniform carbon tax. What economic theory shows is that an appropriate uniform (negotiated) minimum tax/price for carbon ("*internationally harmonized but nationally retained*") internalizes the global warming externality. The price that nations agree to is important for efficiency, not the use of the revenue or the impacts on other prices. Furthermore, negotiating one binding price instead of multiple binding quantities has the virtue of simplicity from a political perspective ("the natural salience and relatively low transaction costs of negotiating one price against negotiating n quantities").

The Redistributive Aspect of a Carbon Tax

Implementing a carbon tax induces higher costs of energy consumption. In the case of energy-intensive manufacturing industries, their competitiveness can become endangered, and consequently, in the absence of a globally uniform carbon tax, the overall economic and environmental performance can deteriorate with the relocation of the companies to the jurisdictions without restrictive climate protection regulations, increasing the pollution in the less restrictive locations and causing "emission leakage" (Aldy, Pizer, 2009).

Additionally, a carbon tax can have a particularly adverse effect on lower income households, which spend more of their income on energy and other goods that are hit hard by a carbon tax. For this reason, some carbon tax proposals return some of the revenues back to the lowest income households.

Morris and Mather (2017) also highlight the fiscal benefits of a carbon tax. As the tax can be a considerable source of revenue, it can contribute to the reduction of budget deficits and public debt, together with targeting some lower-income households through subsidies or tax reduction.

Advocates of *Emissions Egalitarianism* (EE)[2] claim/demand that emission permits be allocated according to "an equal per capita share of the atmospheric absorptive capacity," as no person has greater right to emit greenhouse gas than any other person (the *per capita approach*). Therefore, EE requires that countries be allocates emission shares corresponding to their shares of population.

Methodology

To make a quantitative contribution to the scholarship on uniform carbon taxation, the authors assume that the tax levied by all countries on carbon emissions will be at the level of 50 USD per ton. That level is found in some of the literature that seeks to model a tax equal to the marginal social cost of carbon emissions. An adequate model must have a worldwide scope, since the harm is the same wherever emissions occur.

[1] The difference between carbon price and carbon tax is not clear
[2] Also called Equal per Capita View; principle saying that "every person should have the same right as everyone else to emit greenhouse gases; see more: E. A. Posner, D. Weisbach, 2010, Climate Change Justice, Princeton University Press; S. Caney, Just Emissions, Philosophy and Public Affairs 2012, vol. 40, issue 4.

This paper does not discuss the way that the tax is collected or the particular use of the revenue.
The empirical part of the paper is analysis of each country's share of the greenhouse gases emissions. We compare actual emissions with the levels emission that would be assigned by the (*per capita approach*). The calculated difference is priced at 50 USD per ton of CO2 equivalent. Finally, the numbers obtained are related to per capita income in the countries.

Results

The first graph presents Gross Domestic Product per capita (GDP pc) and the amounts of outflows/inflows stemming from carbon tax of 50 USD per ton.

Graph 1.

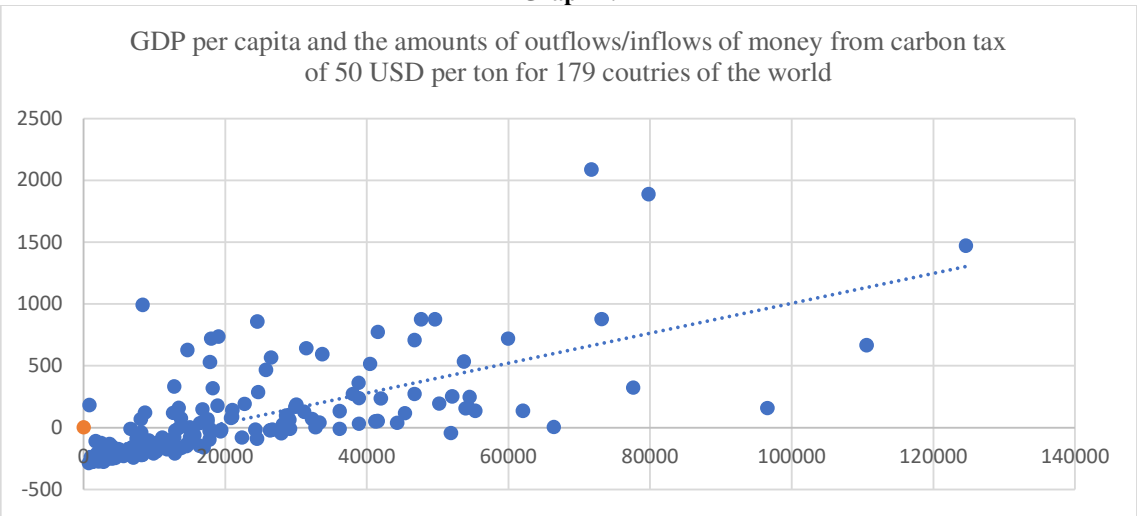

The trend line indicates that the higher the GDP, the greater the amount of money that a country pays as a result of the carbon emissions. This implies the carbon emissions per head are greater in richer, more industrialized countries. The lower the GDP per capita, the greater is the amount of money received as a results of uniform carbon tax payment. Correspondingly, the countries that are poorer and less industrialized, have lower emissions per capita.

Countries were divided ones that pay and ones that receive. There are 106 that received and 73 that paid. For those that received, the amount of the money received was generally significant as a share of GDP. Whereas the countries that paid transferred relatively tiny parts of their GDP to those that emitted less per capita.

Graph 2.

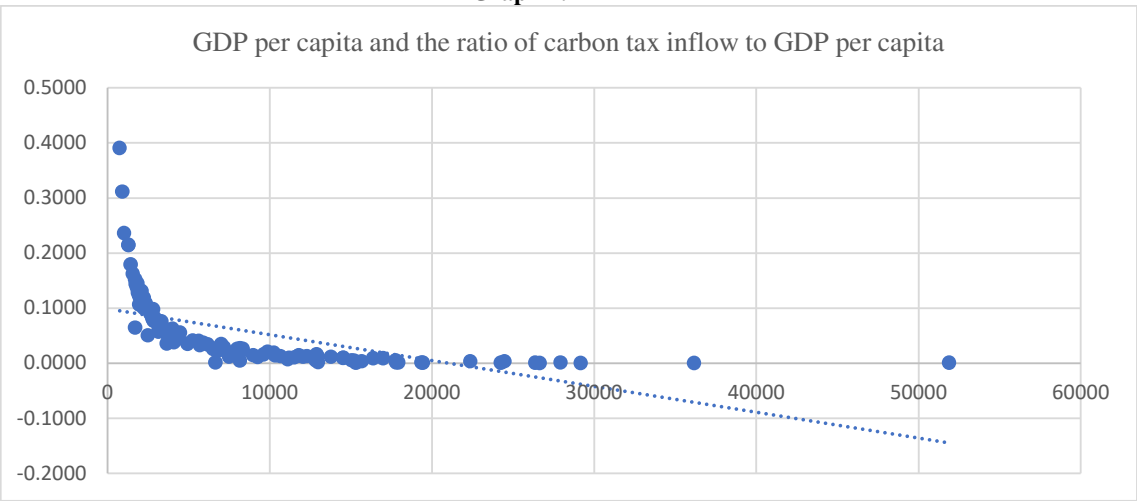

For receiving countries, the lower the GDP per capita, the higher the ratio of inflow to GDP per capita. This means that in low GDP per capita countries, the inflow of money assigned by a uniform carbon tax is a relatively large share of GDP per capita—a significant injection of money into the economy.

Graph 3.

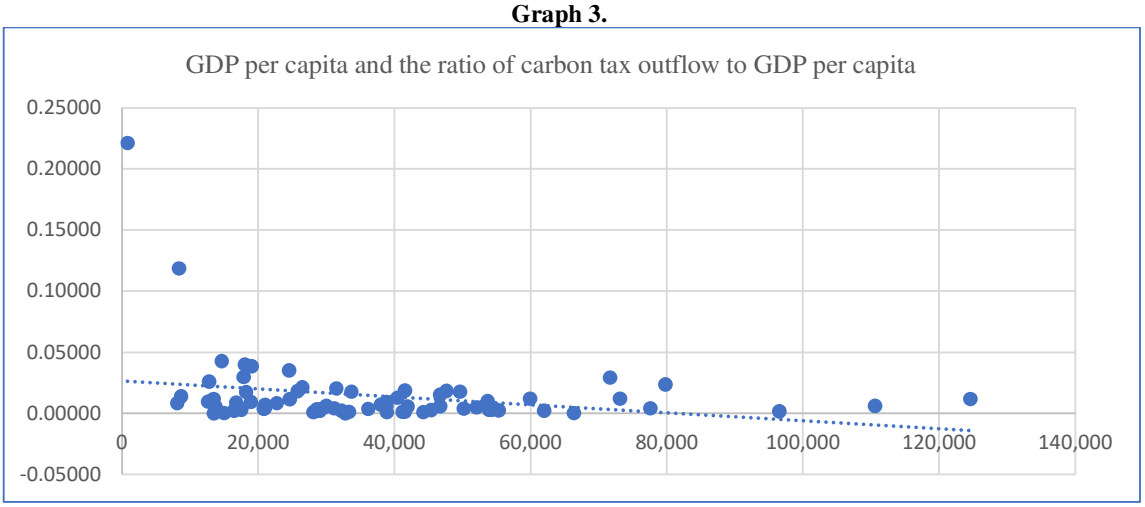

For the paying countries, the higher the level of GDP per capita, the lower the ratio of the outflow from a global uniform carbon tax to their GDP per capita. This means that as GDP per capita grows, the outflow from uniform tax as a share of GDP per capita generally falls.

Summary

For the majority of paying countries under a globally shared, globally uniform carbon tax, the share of the tax outflow in GDP per capita (typically about 1% and almost never more than 5%) is at levels significantly lower than the share of inflows in GDP per capita for the receiving countries (often as much as 18%).

Even though the amounts of money paid by the countries with higher GDP per capita can be quite significant, as shares of GDP per capita they are generally small. That means that the globally shared, globally uniform carbon would not be particularly onerous for an average-income country.

For the majority of receiving countries, the monetary inflows from the globally shared, globally uniform carbon tax are significant shares of their GDPs per capita. Contrarily, for the paying countries, the ratios of outflow per capita to GDP per capita are generally quite small.

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Fast-Food Industry Company in the context of pandemic COVID-19: Case of KFC on Spanish Market

Elena V. KOLGANOVA
PhD Peoples' Friendship University of Russia (RUDN University), Moscow, Russia

Dmitry I. BABIY
MBA University of Valencia, Valencia, Spain

Alexander I. BABIY
MBA Hochschule Bremen City University of Applied Sciences, Germany

Abstract

The pandemic COVID-19 has a great impact on different spheres of life in countries all over the world. In the current article the authors presented the results of the research devoted to the analysis of the fast-food company activity in Spain. KFC was chosen as an object of the research. This theme is very interesting and actual as the out-of-home dining culture is highly developed in Spain. At the same time, fast-food is not preferred by the Spaniards. They choose more healthy food and in case of fast-food they would prefer Spanish cafeteria instead of world-famous brand. That is why the authors suggested that the KFC company can suffer much more from the COVID-19 pandemic and lockdown and made various analyses to define the real situation.

Keywords: Pandemic COVID-19, Spain, Food Industry, Fast-Food Company, KFC

Introduction

The fast-food industry is one of most demanded of the restaurant business in a majority of countries. Nevertheless, Spain is out of the list. Despite the fact that every Spanish spends around 10% of the budget in cafeterias and restaurants (Bolsamia, 2018), according to Euro Weekly News Media (2016), each person in Spain eats in fast-food restaurants only several times a year and annually spends an average of €42.60 on fast-food. These challenges the managers in a fast-food industry, they permanently have to analyze the market, implement new strategies and think about how to attract new customers in order to compete with the other restaurants.

COVID-19 had a significant impact on the Spanish economy and especially on the restaurant business. The government monitors the situation daily and if needed introduces new norms that help to fight against the spread of the virus. However, these norms often complicate the business operations and the restaurant industry suffers significant losses.

Current conditions on the restaurant market require the restaurants to adapt and implement new strategies in order to survive during the pandemic and this in turn requires a proper analysis of the macro and micro environment.

Main Part

Profile of the company. "KFC Corporation: also known as Kentucky Fried Chicken" headquartered in Louisville, Kentucky, USA. It is the leading brand of fried chicken products, which owns the original recipe of Colonel Sanders. There are over 21,000 KFC restaurants in more than 130 countries and territories around the world.

KFC is recognized worldwide not only for its Chicken Original Recipe but also for its crunchy recipe, brazier, and burgers.

For the aim of macroenvironment analysis we decided to use *PEST analysis* and find out how the environment changed in the current situation with pandemic.

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Political factors. Food quality regulations - are controlled on different levels. The general food law and European Food Safety Authority introduce the norms and regulations for the food industry on the EU level. These norms cover feed production, primary production, food processing, storage, transport, and retail sale. Also, there is such an organization as Food and Agriculture organization which introduces norms that cover the territory of Spain: the conditions for the marketing, use, importation and exportation. Also, the food quality is controlled on the national level by Spanish Agency for Consumer Affairs, Food Safety and Nutrition. Basically, these organizations are interdependent and any change on the EU level can lead to the changes on the national level. That is why all players in the food industry should check the regulations and act according to them. The government checks this issue very strictly.

Packaging regulations - all restaurants in the fast-food industry should also follow these regulations. They include, which raw materials should be used in the packages, which materials are prohibited. These regulations are essential for fast-food since every meal has a package even if a customer eats inside the restaurant.

Nowadays, according to Instituto para la Calidad Turística Española (2020), (due to COVID-19, the restaurant business has several limitations: Restaurants must guarantee the distance between visitors, staff and tables. Every visitor and staff member has to be checked by means of a thermometer. All zones involved in the work processes must be disinfected regularly. On par with these rules, there are also several regulations that concern ventilation, changing rooms, disinfectors, uniform, face protection masks-on policy and team management.

Economic factors. As per statistical information (Trading Economics, 2020), about Spanish economy the following figures can be presented:

- Unemployment rate: 16.26%
- Minimum wage: €1050.00
- Average salary: €1804.00
- Each person in Spain spends an average of €42.60 a year on fast food

The unemployment rate, minimum levels of wages and average salary indicators would help to assess the overall economic and labour situation with workers. The other important indicator is the average amount spent by a person on fast-food every year. The amount of €42.60 is minimal. That means that the average person in Spain goes to a fast-food restaurant only 4-5 times a year.

The pandemic stroke Spain harder than the other European countries, since Spain is highly dependent on tourism, the measures applied in order to fight COVID-19 almost destroyed the touristic sector, this in turn, according to Dombey (2020), will increase the unemployment rate till 22.1% and already in 2022, the total debt will reach 128.7% as a percentage of GDP. This information indicates that the overall economic recovery will take a long time.

Social factors. Spanish people prefer Healthy Mediterranean diet rather than consumption of fast-food. The highest consumption of fast-food is in tourist destinations such as Mallorca due to a high flow of tourists.

COVID-19 pandemic led to the drop in the amount of tourists and consequently the demand for fast-food decreased. The customers' behavior and preferences changed. Previously many Spaniards used to eat at the restaurants and cafeterias permanently. Now to save the healthy lifestyle they move toward home cooking.

Technological factors. The level of technologies used by fast-food restaurants is almost the same as around the world. The only two recent inventions are:

- The usage of touch screens, which makes the order process very convenient for a customer.
- The possibility to order in applications and online, combined with delivery services

The latter can be considered as one of the major success factors in the fast-food industry within the pandemic and requires a certain amount of resources in order to maintain the whole system: organize relations with the distributors and delivery companies, maintain personal web pages and applications, build and manage personal delivery systems.

As per information above the fast-food industry in Spain is highly regulated by EU authorities and special independent organizations as well as by Spanish government. The Economic situation in the country and wages are significant factors for the fast-food market development. Spanish people have a passion to eat healthy food more than fast-food. Technologically Spanish fast-food industry is on the average level among European or Western countries.

For the analysis of the competition on the Spanish market we used the 5 Forces of Competition Analysis (Schermerhorn, 2020).

Rivalry on the Spanish market: All KFC's competitors can be divided into two groups (restaurants in both would have similar prices):

- The first group would consider KFC as a fast-food chain. This group would consist of such world-famous fast-food chains i.e., McDonald's, Burger King, Subway, Domino's, Five guys, etc.
- The second group would consider KFC's chicken-oriented feature. There are not that many restaurants that focus mostly on chicken meals.

However, many local restaurants propose meals with chicken. That is why, taking into consideration the price issue, this group would consist of: local Spanish restaurants that propose tapas, Burritos, Turkish Doners, and Asian woks.

The threat of new entrants: The cost of opening a new restaurant is relatively cheap. Any working adult can invest in a small cafeteria or a restaurant; that is why KFC has a large amount of competitors.

Bargaining power of suppliers: KFC is a franchise fast-food chain; all KFC restaurants have the same suppliers. The overall number of chicken suppliers is high that is why in case of any problem with suppliers, switching costs would be low. Therefore, the bargaining power of suppliers could be defined as low.

Bargaining power of buyers: Customers can influence the creation of new menus and changes in quality. However, they cannot influence such big issues as a significant change in prices or for instance creation of burgers with beef which would cross the KFC concept. Consequently, the bargaining power of buyers would be medium.

Threat of substitutes:

- Products offered by such competitors as McDonald's, Burger King (with no chicken).
- Products offered by local cafeterias and restaurants.

Spanish customers prefer local cafeterias and spend more money in these than in fast-food restaurants. Moreover, during the pandemic, people prefer to order online and eat at home, that is why the presence of local cafeterias on the online platforms increases the number of potential substitutes. This in sum causes the threat of substitutes to be high.

During the COVID-19 the competitive environment intensified due to the change in dining habits - people nowadays prefer to eat at home rather than in restaurants. That is why the online sales in both fast-food and restaurant industries soared. In terms of online platforms, Burger King and McDonald's are far ahead of KFC, around 49% of customers used at least once the Burger king application and delivery service during the last 12 months, whereas McDonalds used 10% of respondents (Diaz, 2020). However, it seems like the customers prefer such online platforms as Uber Eats and Glovo with a rich choice of restaurants and dishes. The competitive environment on the online platforms such as Uber Eats or Glovo is fierce since the potential customers are able to see all possible options to order. KFC in Spain does not have a personal delivery service and operates only via such online platforms as Uber Eats and Glovo, the absence of the KFC personal delivery system in Spain results in loss of customers.

Due to COVID-19 pandemic situation and quarantine, the global demand for restaurant-produced products reduced significantly, whereas the retail demand is up, since the government launched several limitations as a countermeasure against COVID-19. As a result, some of the restaurants were closed, some of them had two-weeks lockdown, others had limitations in terms of working hours and working area. All these factors influenced the suppliers significantly, it is hard to sell all products considering the reducing demand. Therefore, the bargaining power of suppliers during the COVID-19 is low.

We chose *SWOT-analysis* as a complex method for comparison of internal and external factors of the environment. Among the main outcomes from this analysis, we chose the following as most significant:

- KFC in comparison with its competitors did not manage to use the opportunity of using the online platform for e-commerce. Pandemic showed that this opportunity was vital for companies in the fast-food market to survive. Due to this fact this became one of the current main weaknesses of the company in Spain.
- The above-mentioned weakness led to demand decrease as lots of customers cannot visit restaurants in person and do not have a possibility to order online properly. Demand decrease consequently resulted in suppliers' problems as they had overproduction and had to switch to other restaurants and cafeterias or go bankrupt.

- The strong brand name and brand awareness will obviously help the company to overcome the difficulties of the pandemic period, but the market share of KFC will decrease due to the customers switching to the companies which were able to use the opportunities of e-commerce more efficiently.

Previously the process of choosing the place to eat in Spain included the following steps. The first thing the customers did before choosing KFC as a place where they could eat, they felt hunger or they made a plan for the nearest future, for instance where they would eat during the lunch time.

The next step was the information search, normally customers used Google or such applications as Yelp in order to find a restaurant, some customers just recalled the nearest places and went there. Normally in the case of KFC, it is not the place which the customers would reach on purpose from afar. That is why customers normally find the KFC places via Google or they already know where the nearest location is. The locals already know the restaurants around that is why when they compare the places, in order to choose KFC, they should feel that they want chicken or fast-food. Those who don't know the surroundings, use the applications, which make the comparison even easier.

After the customers walk in the restaurant, they are able to see the menu on the touch screen or on the screens above the counter. The prices are included to the menu, also the employees are able to answer all questions about the meals and give advice. So, the purchase decision process is not complicated.

Then, the customers have to pay for an order, using credit cards or cash. After that they receive the meals.

Lastly, in case the customer is not satisfied or has complaints, they can talk to the manager. In case everything is good, customers would leave, in some cases they would give a good evaluation.

During the COVID-19 pandemic the process of choosing the place to eat changed considerably. Currently fast-food - customers have only two options to get their favorite meal as follows: drive through or order the food online through delivery services. The drive through option is much safer rather than getting the food on a takeout desk as it is only necessary to drive by several takeout windows and pay in the end, usually by card. Irrespective of how safe the drive through process is, the majority of people stay at home and very few people could visit the restaurant on their way to work or anywhere else.

The main changes touched the place where the customers eat meals. After the lockdown, it became possible to do only at home and during the whole pandemic period the amount of clients that can be present in the restaurants decreased at least twice due to governmental measures. The market of e-commerce in the sphere of food and essential goods skyrocketed. So, the customers choose the meal they want and order using the most convenient online platform offering the loyalty program. One more factor for choosing that or this food supplier is the speed and quality of delivery.

Conclusion

KFC is one of the leading restaurants in a global fast-food arena competing for market share with other fast-food giants such as McDonald's, Burger King, Subway, Domino's. However, in Spain the significant market share is occupied by local cafeterias with much healthier food.

The fast-food industry in Spain is highly regulated by EU and Spanish authorities. Despite the average salary of €1804.00 (Trading Economics, 2020), annual expenditures on fast-food are on average €42.60 (Euro Weekly News Media, 2016). Spanish citizens have a passion to eat healthier food in local places and maximally avoid any fast-food restaurants even if those have any advantages and conveniences of service.

The above stated analyses revealed that KFC in Spain was not prepared for the sudden change of conditions on the market, caused by COVID-19 pandemic. Moreover, considering McDonald's and Burger King performance in the same conditions, KFC in Spain is one step behind its main competitors. As it was already stated above, the lack of personal online platform and delivery services resulted in the loss of customers.

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Corollary Impact of Corona on The Medical Tourism Industry: With Special Focus on India

Jyothsna P. KUNAPAREDDY

Krishna University, Machilipatnam, India

sathijyothsna@gmail.com

Abstract

Medical Tourism is a glamorous industry witnessing a tremendous growth. The global medical tourism market was valued at USD 16,761 million in 2018, USD 44.8 billion in 2019 and it is expected to reach USD 27,247.6 million by 2024. The Indian medical tourism market is expected to touch the $9 billion by 2020, according to Federation of Indian Chambers of Commerce and Industry (FICCI) and Ernst & Young. Since Feb 2020, the whole world is tumbled down by the Pandemic-Covid 19, Corona catastrophe. The Paper aims at assessing the impact of Corona pandemic on Indian Medical Tourism market, evaluates the impact of Corona pandemic on the industries directly or indirectly related to medical tourism industry. The manuscript is developed based on extensive literature review. The paper unravels the future scenario of the industries which are directly or indirectly related to Indian medical tourism industry. The paper alerts Indian business entrepreneurs and prepares them for the upcoming scenario, thereby helps them to make better strategies for the recoup.

Keywords: Medical Tourism, Corona, Pandemic.

Introduction

"Atithi Devo Bhava", (Guest is God) a verse of ancient Indian scriptures mirrors how India welcomes and values guests. India, a blend of ancient and modern heritage, basket of varied cultures, besmeared with glamorous destinations has been an attraction to international travellers. As per WTTC, the Indian tourism industry generated ₹16.91 lakh crore (US$240 billion) or 9.2% of India's GDP in 2018 generated 42.673 million jobs, 8.1% of total employment.

Tourism is a pleasure activity of travelling, but illness is a displeasure. Combining these two phenomena, Medical tourism (Also called as health tourism, medical travel, cross border healthcare), a niche sector evolved from healthcare and tourism. Indian Medical tourism industry has come a long way. According to the numbers of Indian Ministry of tourism, the Indian medical tourism industry could grow by 200% by 2020, touching $9 billion. The ease of Visa procedure for the tourists who come on medical grounds, launch of medical tourism website www.indiahealthcaretourism.com in three languages – Arabic, Russian, French etc. makes us believe that Indian government is taking steps promoting India as a preferred medical tourism destination. 10.5 million foreign tourists, more than five million visiting NRIs, 1.8 billion domestic tourists and over 26 million outbound travellers came to India during 2018-19 (money control 2020).

India, having the strengths of advanced medical facilities, highly skilled doctors, low-cost treatment, unique traditional practices such as yoga and Ayurveda will not let the efforts go in vain. India has a legacy as historic medical tourist destination. It was constantly visited by travellers for healing through Ayurveda. India occupies 5th position in MTI 2016 overall ranking. The tourism friendliness and the patient centric attitude of the Indian Medical tourism service providers is making the country more competitive. According to Health care, IBEF Jan 2019 Indian medical tourism market is growing at the rate of 22-25 per cent and is expected to reach US$ 6.0 billion by 2018 from US$ 3.0 billion in 2017. Medical tourism is slowly transforming into Medical Value Travel (MVT) as patients are looking for destinations which offer best quality healthcare services for lower price.

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Medical tourism aims at bringing patients from other countries. The aim of medical tourists is to get elective surgeries like Dental treatments, Spine surgery, Non-emergency By-pass surgery etc done in host countries. But due to pandemic / epidemic they might become a prey to the new disease in addition to the health problems they have or they might become vectors for spreading the disease in the host country. These epidemics / pandemics, so called travel related diseases cease people to cross borders. If the medical tourists move from their place, there is every chance to get caught up to the epidemic / pandemic. This leaves a big challenge for the medical tourism marketers to make moves for the survival. Pandemics / Epidemics show significant impact on tourism industry as travel restrictions are imposed by the governments as a part of disease control measures. The travel related diseases like Ebola, Zika virus, MERS, SARS have been showing great impact on tourism industry, and all tourism related industries. In 2003, during SARS chaos there was a drop of 68 % in Hongkong tourism industry, more than 70 % in Singapore etc. More than all the epidemics, COVID 19 pandemic is going to show dramatic impact on the global tourism industry.

Methodology

The paper was an outcome of the Secondary data analysis research method. An exhaustive study was conducted on vast range of data banks comprising of books, research articles, conference papers, newspaper articles, Indian government publications, websites of various stakeholders of medical tourism service players etc. An extensive literature review was conducted on the relevant articles retrieved from different journals available on Elsevier, Researchgate, ScienceDirect, PubMed, Biomedcentral, haworthpress etc. Bulletins released by World Tourism Organisation, World Health Organisation, World Bank, Reports released by the Government of India-Ministry Of Tourism, FICCI, Indian government website http://www.indiahealthcaretourism.com, Indian newspapers like The Economic times, The Business standard, The Hindu, Financial express, Deccan herald, Indian government policies, statistics of Immigration department. Doctoral thesis retrieved from Shodhganga is studied thoroughly. The websites of the hospitals offering healthcare services to the international patients, medical tour operators are studied thoroughly.

Objectives of The Paper

The Indian medical tourism industry is at a blossoming stage. Medical value travel is identified as one of the major growth drivers and a major source of Indian forex earning. During such a prosperous era, like all other countries India is also facing Corona pandemic. In this present scenario the paper unravels the impact of corona pandemic on the Indian medical tourism market, throws light on the corollary impact of Corona pandemic on the industries directly or indirectly related to medical tourism industry.

Significance of The Topic

At this outset of global terrifying unpredicted CORONA pandemic, the paper gives a glimpse of impact of the corona on the Medical tourism destination, India. Max Healthcare, a tycoon in Indian healthcare estimates that it is going to lose an income of US$5 million per month. Global Care, Indian medical travel agency said that they used to serve 500 international patients every month and it is completely dried up with corona pandemic. It also shared that it is chasing over US$1 million of outstanding payments from struggling Indian hospital providers. During this alarming situation, the paper is quite contemporary alerting the stakeholders for the overnight changes brought in the medical tourism industry, which occupies 18 % of the global medical tourism industry market share.

Review of Literature

What is Medical Tourism?

Medical tourism is a blend of two distinct top-notch service sectors ‘healthcare’ and ‘tourism’ with niche service features (Anu Rai et al 2014). Medical tourism refers to people travelling to other countries to obtain medical treatment (Horowitz, 2007). It is a provision of ‘Cost-effective’ high end medical care in amalgamation with the tourism industry for patients, in requirement of surgical or other forms of treatment. (Suresh. L. B 2013). OECD defines it as a significant new element of a growing trade in healthcare has involved the movement of patients across borders in the pursuit of medical treatment and health. Earlier people travelled from less-developed countries to highly developed countries for better medical treatments. Contrary to the older phenomena, now

people from highly developed countries are travelling to less developed countries owing to different advantages in the destination (Neil et al, OECD 2012).

The Robust Indian Medical tourism industry: -
The global medical tourism market is estimated to be $53,768 million in 2017 (Allied market research Jan 2019), USD 44.8 billion in 2019 (Grand view research March 2020). It is speculated to reach $143,461 million by 2025 (Allied Market research report Jan 2019), $162 billion by 2026 (Acumen research and consulting). The number of foreign medical tourists' arrival to India has been growing steadily by 233,918 in 2015, 427,014 in 2016, 4,95056 in 2017 (IMTJ 2018). During 2017, India engulfed around 18% of the global medical tourism market (IMTJ 2017). During 2019, foreign tourist arrivals (FTAs) in India stood at 10.89 million, achieving a growth rate of 3.2 per cent year-on-year. During January-February 2020, Foreign Tourist Arrivals (FTAs) were 21,33,782 (India brand equity foundation).

According to Global Medical Tourism Index (2016-17) given by Medical Tourism Association, the top 5 medical tourism destinations include Canada, UK, Israel, Singapore, India. India occupies 5th position in global ranking, 3rd position in terms of quality of facilities and services and 1st position in terms of medical tourism industry. India has robust demand as a medical tourist destination. Due to quality of adaptability with the changing world demand for healthcare and its greater competitiveness (Sultana 2014), India is able to gain leadership in medical tourism industry.

Medical Tourism is not a new idea to India (Sultana 2014). India has a long history of 5000 years with Yoga and Ayurvedic medicine. During the past times, spiritual students and medical travellers used to flock to India for pursuing the benefits of alternative-healing method (Tomislav 2018). For example: - Kerala, a state in India is a bizarre destination for its Ayurveda packages and natural scenic beauty. Having such a glory history, still India stands as one of the most preferred medical tourist destinations (Essays, UK. November 2018).
Factors favouring India as a top medical tourist destination:

- Internationally accredited (JCI) and NABH healthcare centres / hospitals
- Easy Visa processing (Tour my India 2019)
- Latest medical technology (FICCI 2019)
- Highly qualified medical professionals and para medical staff (Anand 2012)
- Extraordinary cost savings on medical treatment (60 – 80 % less than North America and UK prices)
- Availability of unique alternative medicine, AYUSH-Ayurvedic, Yoga, Unani, Siddha and Homeopathy (Tanmay 2018)
- Zero waiting time
- Fluent English-speaking staff (Naik 2013)
- Customised services in the hospitals like private room, translator, private chef, dedicated personal assistant during the stay
- India, a perfect destination for pleasure, spiritual tourism- worth watching after the medical treatment (TMI 2019).

Speed breakers for Tourism Industry

Albeit Medical tourism industry of India is growing, factors like War, Terrorism, Crime, disasters -Natural disasters (Tsunami/ earthquake/ Floods) man-made disasters (Terrorist attack / Pandemic / political unrest etc) become speed-breakers of the industry. Decline in FTA implies slump in foreign medical tourists. After 26/11 terror attacks, the FTA to India in 2009 fell by 3.3 % when compared to 2008.

Tourism has long been negatively affected by unpredictable events (Statista 2018). Unexpected events like epidemic diseases, natural disasters (Tsunamis / earthquakes / landslides / volcanic eruptions), political unrest and economic downturn show negative impact on international tourism (Maria 2020).

The Global air traffic declined by 5% in the wake of Gulf war in 1991. The terrorist attacks on tourists in Luxor in 1997 caused a drop in international tourist arrivals from 3.7 million in 1997 to 3.2 million in 1998 (WTO 2001). The tourism industry of Taiwan faced severe losses for 11 months due to earthquake devastation in September 1999 (Huang & Min, 2002).

The FTA to 2000 Fiji coup, the 1998–2000 Solomon Islands civil conflict, and the 2000 Papua New Guinea decreased by 28.3%, 67.0% and 13.4% respectively during civil turbulence (SPTO, 2003). The number of international tourists to USA declined from about 6.8 million in 2000 to about 5.7 million in 2001 as an aftermath effects of 9/11 attacks (The New York times, 3rd Nov 2017). The US travel agents' revenue in 2001 declined by $9.9 billion, down from $13.4 billion in 2000 (The American Society of Travel Agents estimate). 7.3%–13.8% decline in FTA was seen during 2001–2002, a cyclone caused in Vanuatu. After the 2002 Bali bombings, approximately 75% of hotels dropped their prices by approximately 37%. In 2017, there is decline in tourists to Caribbean due to series of hurricanes (Harvey, Irma and Maria). Mexico experienced severe losses due to earthquake in 2018.

According to the tourism ministry, in 2017, FTA to Kerala is around 1.09 million. But the Kerala Ayurvedic medical tourism, India dropped in 2nd quarter of 2018 due to severe floods in Kerala state, India (Financial Express, 2018).

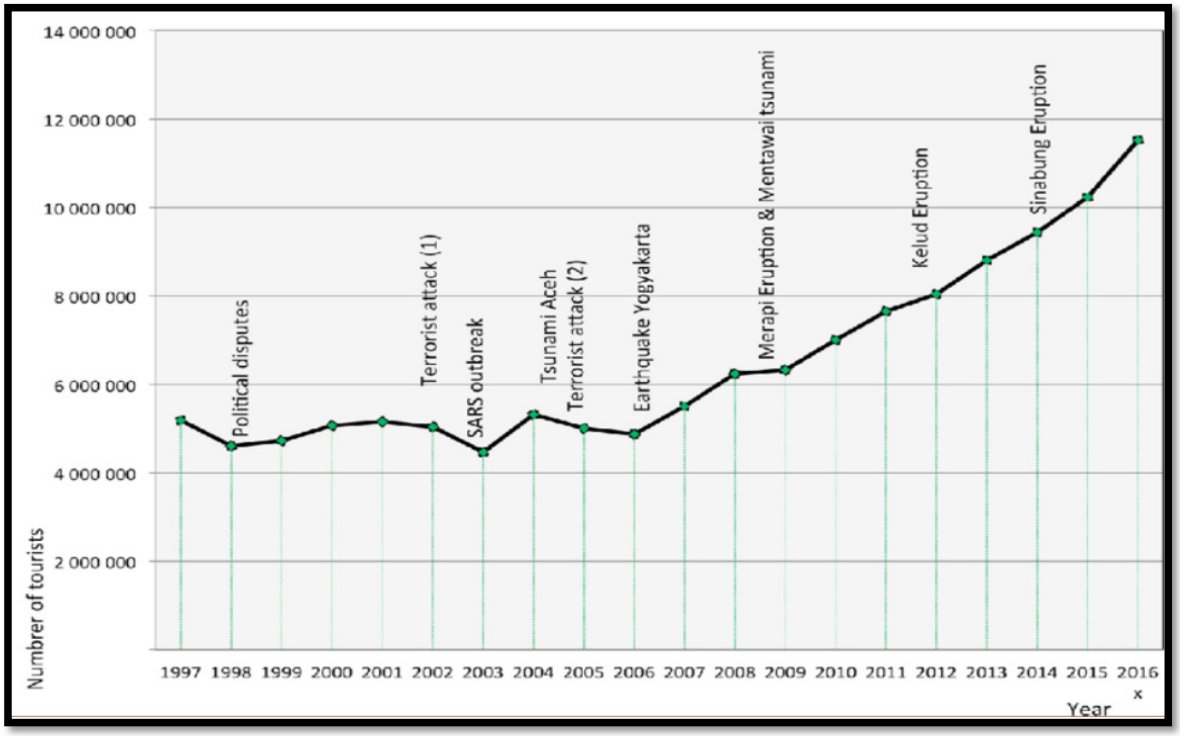

Figure 1: Fluctuation in the total number of tourists arriving at Indonesia's international airports in 1997-2016. Source : Statistics Indonesia, 2018

The tourism industry of Indonesia was badly affected by Tsunami. The below figure shows how the Indonesia tourism industry is affected by different speed breakers.

The Paradox

Contrary to this, there are instances when tourism industry kept growing even after mishaps. 2008, the year of Indian Mumbai terrorists attack (26/11/2008) experienced 5.28 million foreign tourists to India whereas 5.08 million in 2007 (Ministry of tourism, India). Even the number of FTA in India in December 2008 (522,000) slightly more than November 2008 (521,000). Despite the global meltdown and terrorist activities on famous Indian tourist spot like Delhi, Varanasi, Mumbai, Pune etc, during 2006 - 2012 there was continuous growth in share of India International Tourist Receipt (Mukhesh, Priyanka, 2014). According to UNWTO there is a growth of 5.6 % in Indian tourism industry during 2006- 2012. One year after Luxor attack ie in 1999, international tourism increased by 40 % and Egypt reached a total of 4.5 million tourists (WTO 2001).

Unnaturally, the natural disasters became a boon in tourism development of some places. For eg, Cornish village of Boscastle, was totally destroyed by heavy downpour of 200 mm rainfall. As a relief measure, the government dedicated millions of dollars and renovated the village beautifully. The natural disaster became a boon and tourism developed tremendously.
In lieu of the calamities, relief measures are established by the respective governmental authorities, federations, associations or stakeholders to revive the industry. Budget allocation for restructuring the dismantled infrastructure due to earthquakes/ tsunamis/ floods etc, redefined marketing programs to gain the confidence of tourists and care for health of tourists, steps to curb epidemics renovate the tumbling tourism industry. Varying from case to case, it takes months to years to regain the glory of tourism industry.

Impact of Travel Related Diseases on Tourism Industry:

"Pandemics have always had significant social and economic effect to humanity over centuries and hospitality, travel and tourism sector is worst hit in terms of severity as well as longer recovery period which will also have an impact on medical tourism to a large extent," said Piyush Tiwari, director (Commercial & Marketing), India Tourism Development Corporation (ITDC), under Indian Ministry of Tourism.

Travel is categorically central to epidemiology and disease surveillance (Hon, 2013; Khan et al., 2009). Travel and tourism is a contributor for disease blowout and its economic pay-out, but it is vividly affected by it because of NPIs (Nicolaides et al., 2019). Pandemics blast due to global transport system (shipping and railways) (Killingray, 2003 Taubenberger & Morens, 2006).

Even though pandemics show colossal impact, few research studies have been conducted on the worldwide economic effects of pandemics (Fan et al., 2018) and a few at national level (Keogh-Brown et al., 2010a, 2010b) Prager et al., 2017). The economic impact of influenza on high income OECD countries (Peasah et al., 2013) has been taken up researchers. The influenza pandemic resulted in 7,20,000 deaths and a cost of 0.6 % of global income (Fan et al. 2018)

A comparative analysis of the economic downturn created by three different pandemic catastrophes – Hong kong flu, Asian flu and Spanish flu (Burns et al., 2006; McKibbin & Sidorenko, 2006), is shown in this table.

Table 1: Pandemic scenarios and their human and economic consequences

	Hong Kong Flu	**Asian Flu**	**Spanish flu**	**Spanish flu**
	1968-69	**1957**	**1918-19**	**1918-19**
Global deaths in millions	1.4	14.2	71.1	142.2, 180-260
% change in GDP, 1st year				
World	-0.7	-2	-4.8 to - 6.7	-10.7
High-income	-0.7	-2	-4.7 to -8.4	-10.6
Developing	-0.6	-2.1	-5.3	-12.2
East Asia	-0.8	-3.5	-8.7	-21.7
Europe & central Asia	-2.1	-4.8	-9.9	
Middle East & North Africa	-0.7	-2.8	-7	-13.6
South Asia	-0.6	-2.1	-4.9	-9.3

Source: Stefan Gössling, Daniel Scott & C. Michael Hall (2020): Pandemics, tourism and global change: a rapid assessment of COVID-19, Journal of Sustainable Tourism, DOI: 10.1080/09669582.2020.1758708

Hong Kong Flu pandemic reduced global GDP by around US$2.4 trillion (McKibbin and Fernando (2020). 3 pandemics occurred during the 20th century. The 'Spanish' flu or influenza during 1918-19: the 'Asian' flu (H2N2) (1957), the 'Hong Kong' flu of 1968. 4 pandemics occurred during 21st century. The SARS (2002), the Bird flu (2009), MERS (2012) and Ebola (2013-14) etc.

SARS (2003), declared as epidemic by WHO, showed immense impact on the tourism industry of China, Hong Kong, Vietnam, Singapore, which is four or five times the impact of 9/11 in the USA (Rick Miller, WTTC). According to World Economic Forum, during SARS outbreak in 2003, the FTA to China dropped to 9.4 million and incurred losses between $30 billion and $50 billion. During 1st to 21st April 2003, tourist arrivals in east Asia fell by 41% that of 2002. The FTA to Malaysia fell by 1/5th (20.5%) in 2003 to 10.57 million compared to 13.31 million the year before (Tourism Malaysia). In 2003, Malaysia tourism receipts accounted for RM21.29 bil, 17.4% less compared to the RM 25.78 bil in 2002. Nevertheless, the tourism receipts again picked its pace in 2004 to RM29.65 bil. SARS had an approximate total global economic cost of US$100 billion, and US$48 billion in China alone (McKercher & Chon, 2004; Siu & Wong, 2004).

H1N1 influenza (Swine flu) pandemic in 2009 was relatively a less disastrous event. In the manuscript, Russy and Smith (2013) mentioning the effects of the pandemic on tourism in Mexico, stated that it lost approximately 1 million overseas visitors over a five-month period i.e approximately losses of around US$2.8 billion. It took 5 months to recover and take its original shape (Dunia 2013) Keogh-Brown et al. (2010a, p.453), opined that the current pandemic has not removed the threat of a more virulent avian flu pandemic in the near future.

During the birth of COVID -19, two other pandemics were existing in the world – MERS & Ebola. MERS was studied by many tourism researchers because it affected large number of tourists who were on Haj pilgrimage (Al-Tawfiqef et al., 2014). MERS 2015, outbreak the tourism industry of Republic Of Korea witnessed a loss of 37.4% between June and September 2015. (2.1 million tourists out of 5.7 million projected) (Heesoo 2019).

The relationships between pandemics and travel are the crux of understanding health security and global change (Burkle, 2006). Travel related diseases impose international, regional and local travel restrictions immediately. This affects international, national economies comprising tourism structures vis a vis international travel, domestic travel and the industrial components - air transport, cruises, public transport, accommodation, cafés and restaurants, conventions, festivals, meetings, sports events, tour guides, tour operators etc.

Table 2: Impact of Pandemics on the world in terms of economic, social and political angles.

STARTING YEAR	EVENT	GEOGRAPHIC EXTENT	ESTIMATED DIRECT MORBIDITY OR MORTALITY	ESTIMATED ECONOMIC, SOCIAL OR POLITICAL IMPACT
1347	Bubonic plague (Black death)	Eurasia	30-50 % mortality of the European population	Likely hastened end of the feudal system in Europe
Early 1500 s	Introduction of small pox	Americas	More than 50 % mortality in some communities	Destroyed native societies, facilitating the hegemony of European countries
1881	Fifth Cholera pandemic	Global	More than 1.5 million deaths (9.7 per 10000 persons)	Sparked attacks on Russian tsarist government and medical officials
1918	Spanish flu influenza pandemic	Global	20 million - 100 million deaths (111-555 deaths per 10,000 persons)	GDP loss of 3 % in Australia, 15 % in Canada, 17% in the United kingdom
1957	Asian flu influenza pandemic	Global	0.7 million - 1.5 million deaths (2.4 -5.1 deaths per 10,000 persons)	GDP loss of 3 % in Canada, Japan, the United kingdom and the USA
1968	Hong kong flu influenza pandemic	Global	1 million deaths, 2.8 deaths per 10,000 persons	$ 23 billion - $ 26 billion direct and indirect costs in the USA
1981	HIV / AIDS pandemic	Global	More than 70 million infections, 36.7 million deaths	2- 4 % annual loss of GDP growth in Africa
2003	SARS Pandemic	4 continents, 37 countries	8098 possible cases, 744 deaths	GDP loss of $ 4 billion in Hongkong, China, $ 3 billion - $ 6 billion in Canada and $ 5 billion in Singapore
2009	Swine flu influenza pandemic	Global	151700 - 575500 deaths, (0.2 - 0.8 per 10,000 persons)	GDP loss of $ 1 billion in the Republic of Korea
2012	MERS epidemic	22 countries	1879 symptomatic cases, 659 deaths	$ 2 billion loss in the Republic of Korea, triggering $ 14 billion in government stimulus in spending
2013	West Africa Ebola virus epidemic	10 countries	28646 cases, 659 deaths	$ 2 billion loss in Guinea, Liberia and Seria, Leone
2015	Zika virus pandemic	76 countries	2656 reported cases of microcephaly or CNS malformation	$ 7 billion - $ 18 billion loss in Latin America and the Carribbean

Adapted from: Patel, V, D. Chisholm, T Dua, R Laxminarayan, and ME Medina-Mora, editors. 2015. Mental, Neurological, and Substance Use Disorders. Disease Control Priorities, third edition, volume 4. Washington, DC: World Bank

The above table portrays how the pandemics affect the world in terms of economic, social and political angles. Non-OECD countries were economically affected by Spanish Flu. The global economic cost of Spanish flu pandemic was nearly 12.6 % of GDP (McKibbin and Sidorenko 2006). In 2001, Foot and Mouth Disease (FMD) epidemic outbreak (in farming industry) took UK tourism industry and its alliance industries into crisis in terms of financial losses (Elizabeth and David 2004). In UK, the loss of revenue was estimated to lose £125 million a week (The Economist, 2001b) i.e. 13% of normal weekly tourism expenditures (Blake et al., 2002). The same FMD outbreak occurred during 1967-68. The domestic holidays taken by the Great Britain declined slightly and effected the number of visitors (Elizabeth and David 2004).

Travellers are vectors of certain diseases (Annelies 2005). The spread of pandemics / epidemics is invariably associated to travel (Marion 2020). Over the past 15 years, the world has come face to face with a number of pandemics, ranging from SARS, MERS, Swine Flu, Ebola and the recent COVID 19. The disease originated in one part of the world is carried to the other end of the world through travellers. Coming to the aspect of Medical tourism, patient crosses borders with the hope of cure for his ailments. Nevertheless, they become carriers of certain epidemic diseases, make themselves sicker and put other country citizens into trouble. With the travel restrictions imposed, the medical tourism industries gets affected and finally land up in losses.

Brown et al.,(2016) opined that air travel plays an important role in catalysing propaganda of influenza and corona viruses. During the millennium, tourism industry has been affected by diseases outbreaks. Many research studies including tourism studies (Gössling, 2002; Hall, 2006, 2020; Page & Yeoman, 2007; Scott & Gössling, 2015), health researchers (Bloom & Cadarette, 2019; Fauci & Morens, 2012), government agencies (National Academies of Sciences, Engineering, and Medicine, 2017, 2018) and institutions (Jonas, 2014; World Bank, 2012) presaged that pandemics pose a major threat to society and tourism industry. Noted by Pongsiri et al., (2009) and Labonte et al., (2011) Due to a swiftly mounting population growth, mobile global citizens, urbanization trends, increased density in population, industrialized food production in global value chains, increased consumption of higher-order foods including meat, pork, beef; and finally the development of global transportation networks became vectors in the spread of pathogens. SARS, Ebola, Marburg, hantavirus, Zika and avian influenza are all upshots of anthropogenic impacts on ecosystems and biodiversity (Petersen et al., 2016; Schmidt, 2016; World Bank, 2012). Owing to changes across the globe, the rate at which major epidemics and pandemics occur has been increasing.

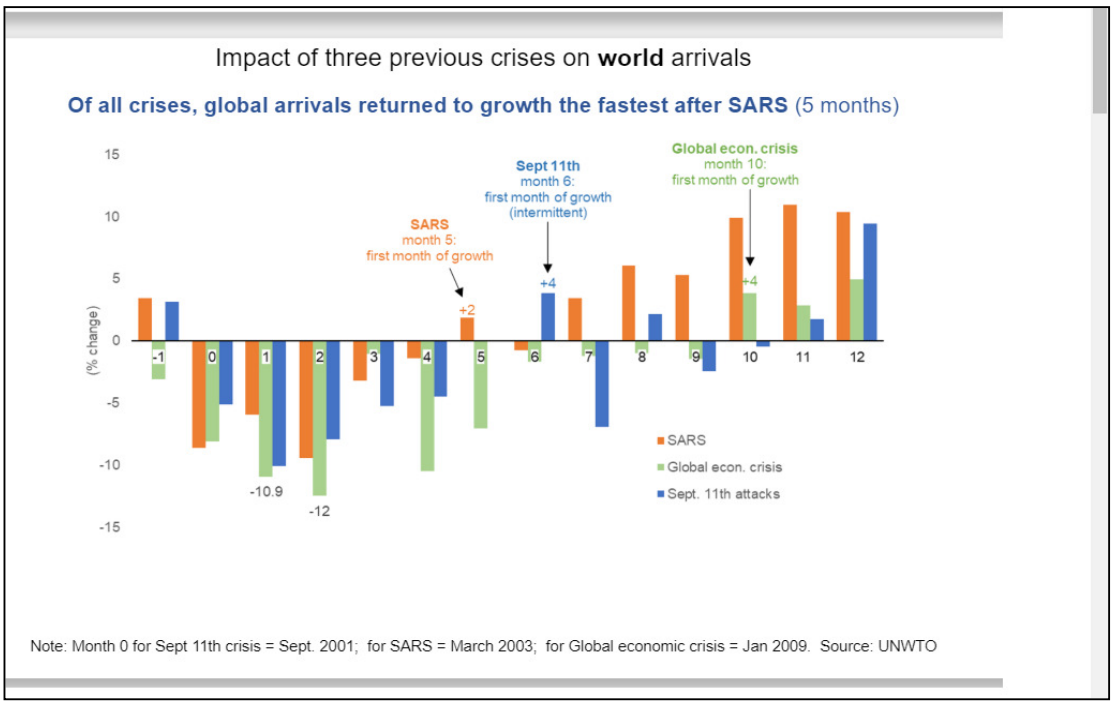

Figure 2: Impact of 3 previous crises on world arrivals

(Source: https://www.unwto.org/international-tourism-and-covid-19

Global tourism industry has been experiencing varieties of crises during 2000-15. The major catastrophes include the 9/11 terrorist attacks (2001), the SARS (2003), the global economic crisis (2008/2009), MERS (2015) outbreak. They showed short term decline and none of them showed longer-term decline in the global development of tourism. Some of them have not even shown significant impact. SARS showed (-0.4%) and the global economic crisis (-4.0%) decline in international arrivals (World Bank 2020a, 2020b). It is inferred that tourism system has been resistant to external shocks. But the impact and recovery from the COVID-19 pandemic is unpredictable.

Table 3: Estimates by the World Travel and Tourism Council show the average recovery time in months by type of crisis

Estimates by the World Travel and Tourism Council show the average recovery time in months by type of crisis	
Crisis category	**Average recovery time (Months)**
Political turmoil	26.7
Terrorism	13
Pandemic	21.3
Environmental Disaster	23.8

Covid 19 And World Tourism Industry

Pandemics and Economics are closely related. To condemn the spread of pandemic, all the international doors are closed. The air travel is blocked. The international tourist arrivals across the world touched 1, 00, 00 in Jan 2020, but with a steep decline it touched 0 by April 2020 because of Pandemic COVID 19. According to UNWTO, during the pandemic COVID 19 by 5th July 2020, the losses are estimated to be 850 million to 1.1 billon international tourists, US$ 910 billion to US$ 1.2 trillion in export revenues from tourism, 100 to 120 million jobs are at risk. According to the International Air Transport Association the airlines' passenger revenue is speculated to drop by $314 billion in total — or 55% — from 2019 levels,

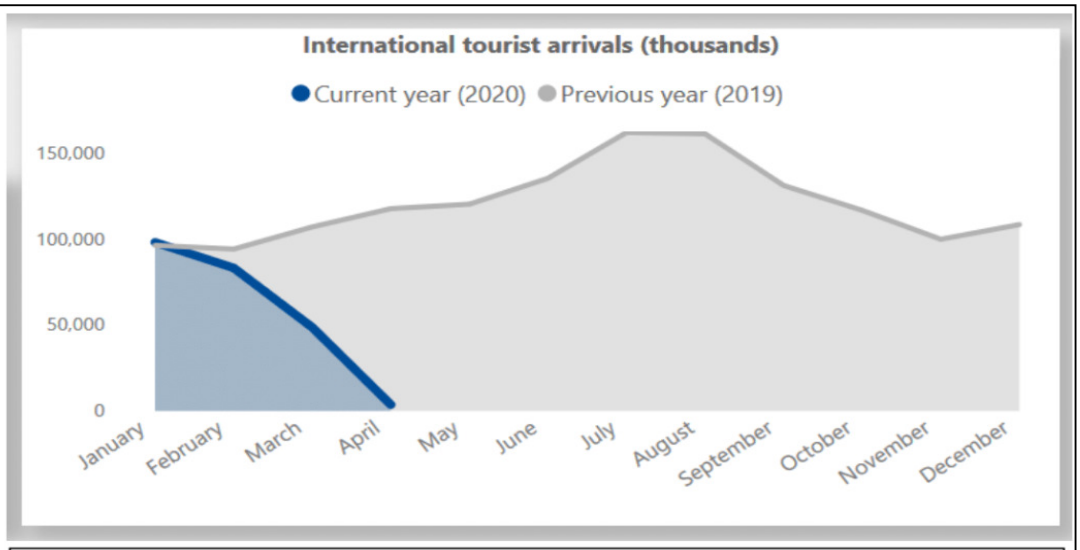

INTERNATIONAL TOURIST ARRIVALS ACROSS THE WORLD

SOURCE: https://www.unwto.org/international-tourism-and-covid-19 Retrieved on 05.07.2020

Figure 3: International tourist arrivals across the world

In the eve of Corona pandemic, the world-wide occupancy rate of hotel accommodation drastically slashed. By 21st March 2020, the hotels started experiencing negative sales. The below graphic representation shows world-wide decline in accommodation occupancy rate.

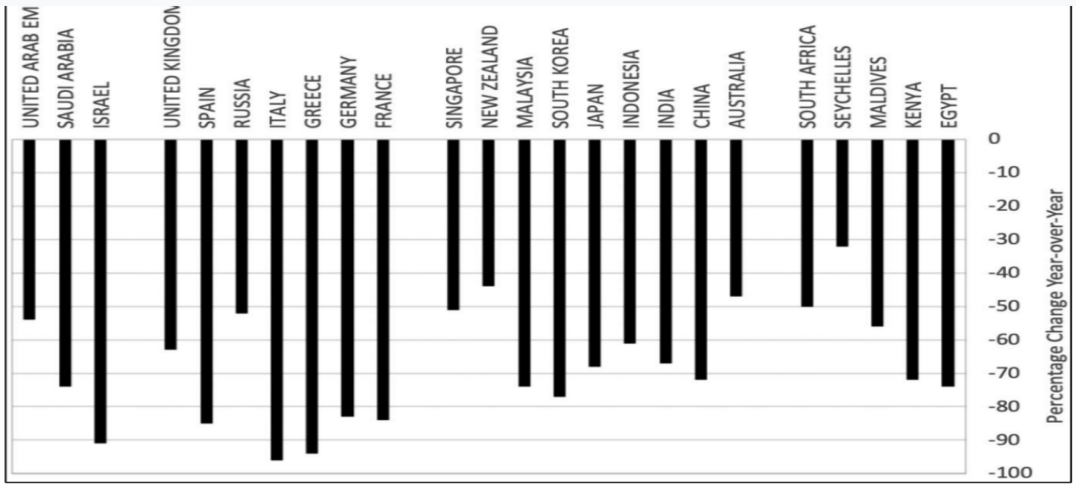

Accommodation occupancy rate change for the week of 21 March (year over year). *Data source:* STR (2020a)

Figure 4: Change in accommodation occupancy rate for the week of 21st March (year over year)

World Medical Tourism Industry: Post COVID Plight

The world medical tourism industry is hit worst by COVID 19 pandemic. The countries which are tourism dependant are upset by the COVID 19 border restrictions. For example: - Medical tourism is one of the main sectors driving the Thai economy. In 2018, Thailand received 302270 medical tourists from various parts of the world - Middle East including countries like UAE, Bahrain, Qatar, Oman, Iran, Jordan and Turkey (58%), Bangladesh, Myanmar, Cambodia, Vietnam and also contribute a huge amount of medical tourist i.e. 3%, 6%, 3% and 4% respectively. Bumrungrad International Hospital gets large proportion of their income from the more than 50% of patients who are overseas medical tourists. Such countries are tumbled down by the pandemic COVID 19.

Table 3: Challenges and opportunities of tourism industry during COVID 19 pandemic

CHALLENGES AND OPPORTUNITIES OF TOURISM INDUSTRY DURING COVID -19 PANDEMIC		
STRENGTHS	**WEAKNESSES**	
Proven resilience of tourism in past crises	Segments potentially affected are also high spenders: international, long haul, business travel and events	
Domestic tourism can be a buffer	Major disruption in airline failures and concentration	
Adaptation capacity: Safety and hygiene protocols, trips closer to home, value for money, responsible consumer behaviour	Lack of references in previous downturns	
Government support to the sector	Perception of travel as a risk	
	Low levels of demand when restarting tourism due to social distancing	**INTERNAL FACTORS**

OPPORTUNITIES	THREATS	
Re- think business model	Economic environment: World recession, rising unemployment and jobs at risk, closure of business mainly SMEs, disposable income, uncertainty weighing on consumer and business confidence	
Innovation and digitisation	Uncertain length of pandemic (including resurgence) and vaccine unavailability	
Sustainability and sustainable oriented segments (rural, nature, health)	Extent of lockdowns and travel restrictions	
De-escalation phases initiated by several countries toward the 'new normal'	Unknown form of the 'new normal'	
Progress in adaptation plans in destinations and companies		**EXTERNAL FACTORS**
POSITIVE	**NEGATIVE**	
Source: UNWTO World Tourism Barometer May 2020Special focus on the Impact of COVID-19		

Corollary Impact of Corona on Indian Medical Tourism:

Corona, indeed the calamity shaking the whole world is going to show a massive impact on the Indian medical tourism industry. The medical tourists from different parts of the world come to India in search of better health. They don't like to become ill-healthy while searching for healthy place.

Due to Corona (2019), The Indian tourism industry is estimated to incur a revenue loss of Rs 1.25 trillion in 2020, 40 % decline in revenue over 2019, 50 % during Jan, Feb 2020, 70 % in March 2020 (CARE rating 2020). During April-June, the Indian tourism industry is speculated to incur a financial loss of Rs 69,400 crore, indicating a year-on-year (y-o-y) loss of 30 per cent (Business standard April 28,2020). The Indian hotel, aviation and travel sector together may incur a loss of about 85 billion (IATO) in 2020. The Federation of Associations in Indian Tourism & Hospitality (FAITH) opined that more than 95% MSMEs of 53,000 travel agents, 115,000 tour operators, 15,000 adventure, 911,000 tourist transporters, 53,000 hospitality and five lakh restaurants are facing severe survival problems due to Corona 19 calamity (money control, 2020). The influx of tourists, including medical tourists will remain slow at least for a good part of this year (Anu 2020).

Fall in commercial flights hinder the movement of medical tourists from the home country to the destination countries. During COVID 19, Medical value travel industry of India (including modern medicines and AYUSH), a $3 bn market for India (Express healthcare, April 2020) came to standstill for the next few months in 2020. The fiscal damage could be $2.5 billion (Amit Sharma, Founder and CEO, eExpedise Healthcare 2020). Dr Anvar AM, chief physician, Raha Ayurveda Hospital said that they lost Rs. 1 crore during the 1st week of March 2020 with respect to the cancellations of the ayurvedic treatments booked by the foreigners (Times of India 12th March 2020). During the 1st week of March 2020, foreign medical tourists dropped by 75 % of the routine number due to Corona chaos. 25-30 % of the earnings in Kerala Ayurvedic hospitals is from Foreign Medical tourists. With the closure of doors of the airports, the foreign medical tourists' arrival to Kerala are clean swept.

With the decline in Medical tourism industry, the bed occupancy in the hospitals which are targeting the foreign medical tourists will decline, thereby total revenue. The Max healthcare, a big boy specialised in offering healthcare services to foreign medical tourists, who gets 10 % of the total revenue from foreign patients, treats 50,000 foreign patients / year hailing from the Middle East, central Asia and Africa. (Manveena, CNN 2018). With the decline in patients, the sales in pharmacies, medical consumables, patients to pathological laboratories, radiological test centres reduce. This results in losses of pharmaceutical industry, medical devices

industry, medical consumables industry. The business of hotel industry, taxi travels, restaurants, service apartments, tour operators – domestic and international, ticketing agents decline. The start-up players – hospitals, medical tour operators, cannot survive facing huge losses and they vanish from the market. If the corona calamity continues for a period of 6 months, the MVT industry would incur a financial loss of approximately $2.5 billion, which is equivalent to the revenue over 8 months, if the unpredicted event don't happen.

Post Corona scenario of Indian Medical Tourism industry: Prophecies

India is a land full of opportunities for players in the medical devices industry (IBEF). The industries dealing with personal protection equipment, face masks, cap masks, gloves, santisers started gaining demand and will result in profits during post-corona era. Demand for medical devices (ventilators, infrared thermometers) started growing swiftly.

India is the birthplace of Yoga, Ayurveda, Sidda, naturopathy etc. Yoga is a 5,000-year-old spiritual discipline, which is widely popularised in the West. Ayurveda is the Hindu system of medicine which is widely preferred by the west as a solution for many chronic ailments. These honoured ethnicities have become worldwide spectacles due to their efficacy in outbringing physical, mental, spiritual and emotional balance. The Indian government floated National Medical and Wellness Tourism Board to provide a devoted organized agenda to promote Medical and Wellness Tourism covered by Ayurveda, Yoga, Unani, Siddha and Homeopathy (AYUSH). These arenas have attracted many foreign tourists. 60 % of the medical tourists come to India on these purposes only. This will catalyse the revival of Medical tourism industry in this post pandemic era.

The Tele-medicine concept is going to take a novel shape in the industry. The Indian medical professionals are keen on developing tele-consultation phenomena. Countries other than India do not provide over-the-counter medication. So, the success of tele-medicine remains as a question mark.

In pre-corona, the Indian medical travel industry is included among "12 champion sectors" by NITI Aayog and Ministry of Commerce which is targeted for promoting under the services promotion council (The Economic times, 4th April 2020). So, the catastrophe will be accepted as a challenge for uplifting Indian medical value travel industry.

Seeing the job cuts, revenue slashes, huge losses, difficulty in survival, Foundation of Healthcare & Wellness Promotion, urged the Indian Government to take necessary steps to streamline the industry by recognising MVT as an independent industry, financial stimulus and support, involve COVID impact council along with FICCI to support the MVT industry, reduce restrictions on international patients coming to India as soon as possible not comprising at the epidemic rules and regulations. On 13th May 2020, The Prime minister of India Mr. Narendra Modi, said that he is keen in developing "Post-Corona tourism" which would attract the foreign tourists and there by the tourism industry regains its normalcy.

Once the vaccine is launched, the tourism resumes by modifying Visa policies. The new policies ask for vaccination certificate of the medical tourists. The trend of flying doctors to other countries and performing surgeries will pick-up. The international patients can meet these doctors in their home countries itself. In 2021, the patients with complex disorders travel to other countries for treatment.

The impact of COVID-19 in the Indian medical tourism sector appears to be catastrophic. In spite of it, Indian medical tourism industry tycoons are optimistic about the post pandemic recovery. Mr. Mihir, Vora, Founder and CEO of Mumbai-based Magnus Medi, says that there is a silver lining, and the future holds big. "India was at the forefront and has supplied hydroxychloroquine to other countries, and we have sent our medical teams to the Gulf countries. Thus, once the situation normalises, India will emerge as a bigger brand and patients from developed countries will be more willing to get their treatment done here". These two achievements of Indian healthcare industry boost up confidence among the foreign medical tourists and that will attract them more.

Harish Pillai, Chair-Federation of Indian Chambers of Commerce and Industry- Medical Value Travel (FICCI-MVT) Committee opined that "As soon as the international air travel restrictions are lifted, medical value travellers, after following due protocols including RT-PCR testing, will flock to India simply for its value proposition of outstanding value for money and excellent clinical outcomes,".

Shanay Shah, member, Confederation of Indian Industry (CII) and Director, Shalby Hospitals, Ahmedabad, said, the way India has handled the pandemic, keeping mortality rates low for a highly communicable disease like covid-19, despite the population density, has proven India's medical ingenuity once again. Industry experts also

said alternative medicines and telemedicine facilities will add value to the sector. “There is also a visible opportunity for the Indian healthcare industry in context to medical tourism. Post covid-19 Indian wellness system, Yoga and Naturopathy are likely to gain more popularity world over," said said Piyush Tiwari, director (commercial and marketing), India Tourism Development Corp. (ITDC), under the tourism ministry.

Conclusion

During and after every calamity the tourism industry slashes down, so as the Medical tourism industry. After gestation period, either slowly / quickly the tourism industry revives. So as Medical tourism sector. The Indian Medical tourism industry might slash by 40 % for the next 1 year of Corona. By witnessing the way India encountering Corona, the source countries for foreign medical tourists develop confidence in the Indian healthcare, Indian Pharmaceuticals, Indian medical professionals and likely to get attracted more than pre-corona era. Might take a longer time, but the industry is going to recover as it recovered in post swine-flu, SARS, MERS times. Shaken by the pandemic, people realised the importance of health and surely people don’t mind travelling to any long distances for the betterment of health.

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Simulation of Waqf Empowerment in Micro and Small Industry Financing

Sarah Eka Saputri [1*], Tika Arundina., Ph.D.[2*]

[1]Univesrsitas Indonesia, sarahekasaputri@gmail.com, Jl. Prof. Dr. Sumitro Djojohadikusumo, 16424, Depok, Indonesia
[2]Universitas Indonesia, tikarundina@gmail.com, Jl. Prof. Dr. Sumitro Djojohadikusumo, 16424, Depok, Indonesia

Abstract

Welfare among population in country are important for achieve sustainable economic growth. Fundamental theory from welfare economics are efficiency and equality. Welfare economics described by allocation of resources are equal and how the distribution of resources affects economic condition as a whole. Redistribution of income and wealth in economy enables the resources more accessible and furthermore preserve the income sustainability. Waqf effectively as tools for income redistribution because of large potential among Muslim majority in Indonesia. This research conduct simulation of waqf in financing small and micro industry in Indonesia. Sample used in this paper are obtained from Small and Micro Industry Survey 2014 (VIMK 2014). Method for this study used OLS regression to analyse association between capital and profit, while used arithmetic from coefficient OLS regression for microsimulation. The results of the study show that increased capital as increased factor of production can increases the profit. Furthermore, welfare among society increases because of increases income in small and micro industries.

Type of Paper: Empirical

JEL:

Keywords: Waqf Productive; Small And Micro Industry; Welfare; Equality.

Introduction

The contribution of the non-oil and gas manufacturing industry to GDP reaches 17-18% and become the highest contribution among another economic sector in Indonesia (BPS, 2018). The agricultural and trade sectors only earn 13% each. Small and Medium Enterprises (SMEs) in Indonesia are very large (BPS, 2016), large industries only consist of 0.77% from total enterprises. Those large industries only have employment rate of 9.63%, while medium, small and micro industries with a very high percentage respectively with total enterprises of 2.90%, 63.07% and 33.26% and employment rate of 6.17%, 21.45% and 62.76% respectively. The large number of SMEs has great opportunities and challenges, opportunities for what is called one of the conditions of economic development in the long run. However, revenues for small and micro industries are still dominated by Java Island as it has a high population compared to other islands. This creates income inequality between Java and Outer Islands.

Small and micro industries have not maximized their role due to various challenges, especially capital challenges. Small and micro industries have limited access to financial institutions that inhibit productivity. This has resulted in delays in the purchase of additional raw materials for production and investment of the latest technology to develop the business. More than 50% of poor households running micro businesses in Indonesia avoid risk and refuse to seek credit (Vos, Yeh, Carter, and Tagg, 2007). According to a survey of small and micro industries in 2014, 83.3% of micro businesses and 59.9% of small businesses rely on self-financing. While the proportion that borrows to banks is only 6.5% for micro businesses and 25.6% for small businesses.

[*] Corresponding author:
E-mail: sarahekasaputri@gmail.com
Affiliation: Faculty of Economic and Business, Universitas Indonesia

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In 2007, government introduced Kredit Usaha Rakyat (KUR) with a partial guarantee scheme by the credit guarantee institution. Until 2013, the largest sector receiving KUR loan is the trade sector, it is caused by lower risk compared to other economic sectors (TNP2K, 2013). Geographically, KUR is concentrated in Java Island which is the richest island in Indonesia. As of November 2014, 52.9% of the total KUR issued was allocated to six provinces in Java. A total of 12.3 million KUR borrowers reside in Java (Adam and Lestari, 2017). The government policy supports the policy of food security and downstream industry in Micro, Small and Medium Enterprises sector by increasing the distribution of KUR in the production sector, one of which is the manufacturing industry (Permenko 11, 2017). However, the realization of KUR by economic sector, the manufacturing industry only with 4.32% different from the trade sector which reached 56.15%.

In the contribution of economic growth, equitable access to land can improve the effects of poverty reduction by ensuring the benefits gained can be shared more widely. However, if access to land is concentrated it will cause an uneven profit distribution as the profits are controlled by those who have high income in income distribution that have access to land (Deininger and Squire, 1998). In rural populations, land and labor are the main factors in production with land as the main asset in increasing wealth (Vendryes, 2014). For this reason, African villages have a strong relationship between land access and household income (Jayne et al., 2003; Krishna et al., 2006), so land distribution is the main focus of efforts to reduce poverty (Wineman and Liverpool -Tasie, 2017). Johnston & Kilby (1975); Mellor (1976), Quan and Koo (1985) and Deininger and Squire (1998) suggest that egalitarian land distribution yields higher economic growth than concentrated land. For example, Ravallion and Datt (2002) found that the percentage of households without land significantly affects poverty elasticity of non-agricultural expenditure in India.

Indonesia with a percentage of Muslim population of 80% has the potential to contribute funding in the third sector such as through waqf land (BPS, 2018). Islam has various alternatives in reducing inequality such as zakat, infaq and sadaqa. Waqf itself is a part of infaq and sadaqa and is highly recommended in Islamic teachings so that the wealth of resources is not focused on just a few people. Waqf land can be used in the productive sector for the welfare of society. Waqf is a voluntary gift that is expected to provide a better economic impact for the needy. Chief Excecutive of Badan Wakaf Indonesia (BWI) Slamet Riyanto (2016) conveyed the potential of waqf land in Indonesia is very large, with total amount if capitalized reach Rp 2.000 trillion. Currently, there are recorded waqf land area of 430 million hectares throughout Indonesia. However, the use of waqf land in Indonesia is still largely aimed at non-productive sectors such as use for mosques or musola (75%), education (14%) and funerals (5%) (Wakaf Indonesia, 2018).

Productive waqf research in Indonesia previously referred to the independent institution of management waqf as the third sector in the economy. Waqf investment case study in Dompet Dhuafa Republika done through interview session by Candra and Rahman (2010). The commercial use of waqf land in Indonesia from the perspective of Islamic law and Indonesia's land law has been investigated by Sihombing and Sugiantoro (2016). Qualitative research on the use of waqf in financing social and development projects as a third sector other than the government and private sector by Shaikh, Ismail, and Shafiai (2017). Contribution of waqf in economic development is spelled out by Budiman (2014). The use of waqf in financing small projects through cash waqf schemes to reduce unemployment through literature studies and experiments from several countries by Alani, Algodah and Alshwaiyat (2016).

Previous research on the use of waqf land in the production sector is qualitative so in this case the researcher uses quantitative method with microsimulation. In this research, the researcher hopes that the specific target of the problem can increase the productivity of waqf land use so as to improve the welfare of the community. The use of waqf land rents is expected to increase capital for small and micro industries to further increase business profits. The objective of the research is to conduct a microsimulation of the utilization of unproductive land for financing small and micro industries as an alternative in the management of waqf asset.

Literature Review

Theory of Factor Production

The theory of the factors production undergoing development begins from only consisting of two factors, namely land and labor by Sir William Petty (Aspromourgos, 1996). Then in 1803, Jean-Baptise Say issued a book entitled A Treatise on Political Economy, in which he proved that the value of production relates to the function and the combination of labor, land and capital. In the theory of the three factors, Say mentions that labor generates wages, capital generates interest and land generates rent. Other economists like John Stuart Mill and Wilhelm Roscher share the same view. In addition, Wilhelm Roscher argues that natural factors such as land are a dominant factor in

the low cultural phase, labor becomes the dominant factor in the intermediate culture phase while capital becomes the dominant factor in the advanced cultural phase.

Pecking Order Theory

Empirical evidence supports the application of pecking order theory in financing small and micro enterprises (Chittenden et al., 1996; Michaelas et al., 1999; Berggren et al., 2000; Aybar-Arias and Lopez-Gracia, 2000; Sogorb-Mira 2005 ; Ou and Haynes, 2006). In the study, small and micro businesses use internal resources to finance and borrow from external parties to finance operations and increase growth, and only a small portion of capital use from investors through equity. Some studies also suggest that small and micro businesses operate on a limited scale and do not consider getting financing from investors (Holmes and Kent, 1991; Howorth, 2001). This causes a constant growth of business without any capital injection from investors. Small and micro businesses have high asset volatility (Barclay and Smith Jr, 1995) with a high proportion of short-term assets (Stohs and Mauer, 1996) and have more short-term loans.

Waqf

Waqf etymologically derived from the word waqafa synonym of the word habasa which means stop, silence (al-tamakkust), or hold (al-imsak) (Anshori, 2005: 7; Baalbaki, 1995: 1220). Ibnu Mandzur (1954: 276) adds al-hubus wa wuqifa (something to be given), such as habasa al-faras fi sabīlillah (he awards the horse in the way of Allah), or habasa al-dār fi sabllahahi (he dedicates his house in the way of Allah). Yusuf bin Hasan (1990: 548) explains that the word al-waqfu is a form of masdar (gerund) from the expression waqfu al-syai 'which means to hold something.

In general, there is no Qur'anic verse that explains the concept of waqf clearly. Because waqf includes infaq fi sabilillah, the basis used by scholars in explaining the concept of waqf is based on the promulgation of verses of the Quran that explain about infaq fi sabilillah. Among the verses include:

"O ye who believe! Spend (in the way of Allah) a part of the fruit of your good works, and a portion of what We expelled from the earth for you. "(Q.S. al-Baqarah (2): 267)

"You are not at all good (perfect) before you spend some of what you love." (Q.S. Ali Imran (3): 92)

In history, waqf provides public needs (roads, water and sewage), educational institutions and hospitals. Kuran (2001) asserts that waqf institutions provide public goods in the Muslim economy for long periods. Waqf institutions help build capacity and wealth creation through human, physical and financial capital development. By the end of the 18th century, revenues from 20,000 waqf in Ottoman operated equal to one-third of total revenues, including agricultural taxes from the Balkans, Turkey and Arabia (Yediyildlz 1984: 26). In the Ottoman period, Yediylldlz (1990: 5) writes:

“Thanks to the waqf institutions, human beings can be born in homes owned by waqf, sleep and eat from the management of waqf, receive instructions from books from waqf, become teachers in waqf schools, earn a salary from waqf income, and for their detah in a waqf cemetery.”

In the context of Indonesia, the practice of waqf has been implemented by Indonesian Muslim community since before independence. Therefore the government has stipulated a special law regulating waqf in Indonesia, namely Law number 41 of 2004 on Waqf. According to Law No. 41 of 2004, waqf is a wakif legal act to separate and / or hand over some of his property to be exploited forever or for a certain period in accordance with his or her interest for the purposes of worship and / or general welfare according to sharia. The purpose of waqf property according to Article 22 in achieving the purpose and function of waqf is for religious activities; education and health facilities; assistance to the poor, neglected children, orphans, scholarships; progress and improvement of the people's economy; and / or other general welfare progress that is not contrary to sharia and the laws and regulations.

Akta Ikrar Wakaf, abbreviated as AIW, is a proof of Wakif's intention to donate his property to be managed by Nazhir in accordance with the designation of waqf property which is poured in the form of deed. According to PP. 42 of 2006 Article 28, the creation of AIW of immovable property shall comply with the requirements by submitting the land title certificate or certificate of the respective flat unit or other proof of land ownership. After obtaining AIW, according to the Joint Decree of the Minister of Religious Affairs and Head of BPN No. 422 and

No. 3 / SKB / 2004, concerning Land Certificate of Waqf, nadzir or appointed person register wakaf land to the local BPN office to obtain a waqf land certificate in accordance with existing requirements.

Waqf land allocation according to the data of Directorate of Waqf Empowerment under the Ministry of Religious Affairs of the Republic of Indonesia is used for musola, mosques, schools, other social purposes, tombs and pesantren. In contrast to utilization of other waqf land such as musola, mosques, schools, tombs and pesantren, the allocation of waqf land as other social purposes in the amount of 8.37% can be used to improve the welfare of the community. The allocation of waqf land to the productive sector can improve the welfare of the community in the long term. Waqf land is divided between already certified and not yet certified. Waqf land already certified and not yet certified by 8.37% used for other social activities can be allocated in small and micro industries as capital injection.

Hypothesis

Empirical evidence supports the application of pecking order theory in financing small and Financing assistance can improve business performance and in the long term help small and medium enterprises get financing apart from government due to reduction of asymmetric information (Xiang and Worthington, 2017). This financing assistance can increase production factors such as raw materials so that it will increase business profits. The hypothesis formula used is:

H1: There is a positive association between capital injection and profit
H2: There is a negative association between tangibility and profit
H3: There is a positive association between productivity and profit
H4: There is a positive association between the age of the company and the profit
H5: There is a positive association between company size and profit

Research Methodology

Descriptive Analysis (OLS)

This descriptive analysis is used to describe variable data through mean value, standard deviation, maximum value, and minimum value of related variables. Regression model is used to analyze the relationship between log profit and log cost of raw material. In the regression model used ordinary least square regression (OLS). OLS is run by minimizing the sum of squares from the difference in predicted values and data values. The regression model will be done by following the following equation:

$$\text{logProfit} = \text{x0} + \text{x1 logRawMaterial} + \text{x2 Tang} + \text{x3 Prod} + \text{x4 Age} + \text{x5 Size} + \varepsilon \quad (1)$$

logProfit = Revenue minus cost
logRawMaterial = Cost of raw material
Tang = $\frac{Total\ Fixed\ Asset}{Total\ Asset}$
Prod = Productivity
Age = Age of the company
Size = Size of the company

Microsimulation Analysis

Company is an economic decision-making unit and has many dimensions such as location selection, demand factor, production process, supply of goods in certain price, portfolio investment and financing. The microsimulation model used should be able to explain the phenomenon so that if there is a change it can explain the variable changes that occur (Buslei, Bach, and Simmler, 2014). Development of a model of microsimulation for firms in analyzing the impact of government fiscal policy, specifically estimating for tax revenues and analyzing the impact of corporate earnings and the consequences of tax reform (Ahmed 2006) or corporate demography (Van Wissen, 2000). For Germany, Fossen & Bach (2007) built and applied a model of corporate tax microsimulation. In Italy, the model of microsimulation was established by the Office of Statistics and academia based on surveys of large companies and published financial statements, the model called DIECOFIS (Buslei, Bach, and Simmler, 2014).

The method of microsimulation consists of several steps (Ballas et al, 2005):

1. Making a set of microdata from the samples owned by the selection of variables that can describe the business in reality with the consideration of the theory of business financing. Models of data availability see the level of profitability as an independent variable. The level of profitability in this study is a variable that will be affected by the addition of capital. With this policy, it is expected that small and micro industries can increase profitability so that the business can absorb more resources with the use of additional profit as capital. Small and micro businesses therefore are able to absorb the workforce with the efficient use of resources so that the resulting production increases without reducing the scale of the economy. Independent variable is determinant that influence profitability in small and micro business that is cost of raw material, tangibility, productivity, company age and company size.

2. Creating micro-level populations for individuals that match existing data using OLS models. With the OLS regression, the associations of both variables are proved so that the model can be used as a what-if microsimulation model.

3. Do a static what-if simulation, where the impact of alternative policy scenarios in the population can be estimated. The additional capital from the waqf land rent is included in the microsimulation. The return of capital may be accompanied by a profit share in accordance with the agreement of both parties at the beginning of the agreement. Waqf land in the form of hectares is converted to nominal (Rupiah) in the average land rent price of each province. Those nominal is an additional capital that can be used by small and micro businesses. The addition of capital according to the model previously will increase the profitability of small and micro enterprises in Indonesia.

Results

Regression Results

Regression results of the determinants of profit in 2014 are presented in table 1. The overall independent variables significantly affect at the 5% level.

Tabel 1: Hasil Regresi

Pulau Sumatera

Provinsi	Biaya Bahan Baku	*Tangibility*	Produktivitas	Umur Perusahaan	Ukuran Perusahaan	Numb of Obv	F-stat	Prob>F	R^2
Aceh	.1515163	-.2344433	.0018018	.0122448	.2178645	30,290	449.70	0.0000	0.2291
Sumatera Utara	.3619987	-.2633086	.0012607	.0022075	.0657043	40,894	836.80	0.0000	0.3474
Sumatera Barat	.3005579	.172317	.0000568	.015106	.0844957	23,829	322.86	0.0000	0.2378
Riau	-.023551	-.7001673	.0008428	.0076498	.2232787	7,782	76.03	0.0000	0.1569
Jambi	.2327467	-.1859131	.0010568	-.0046046	.1622624	11,097	373.46	0.0000	0.3643
Sumatera Selatan	.1896456	-.3396485	.0023591	-.0053556	.1710628	27,926	867.35	0.0000	0.3457
Bengkulu	.1306006	-.843688	.0005749	-.0072193	.1774637	6,199	34.71	0.0000	0.0824
Lampung	.3192943	-.571988	.0012284	.0045809	.0736556	48,128	1009.43	0.0000	0.3158

Kep. Bangka Belitung	.5066147	-.2003348	-.0000979	-.0076536	-.0335804	3,542	66.50	0.0000	0.2205
Kep. Riau	.6697656	1,062205	.0009539	.01242	.1778367	3,911	142.51	0.0000	0.3693

Pulau Jawa dan Bali

Provinsi	Biaya Bahan Baku	*Tangibility*	Produktivitas	Umur Perusahaan	Ukuran Perusahaan	Numb of Obv	F-stat	Prob>F	R^2
Jakarta	.1583348	-.482601	.0004739	.004872	.0991399	24,662	606.67	0.0000	0.3408
Jawa Barat	.2433299	-.2219067	.0005172	-.0036646	.1187875	205,089	2469.98	0.0000	0.2454
Jawa Tengah	.2615305	-.3347081	.0003988	-.0002626	.1449556	248,164	2806.25	0.0000	0.2272
Yogyakarta	.259009	-.2926011	9.03e-06	-.0024396	.0980036	28,907	770.88	0.0000	0.3699
Jawa Timur	.1863343	-.3981492	.0000369	-.0068123	.174615	230,395	4813.89	0.0000	0.3520
Banten	.3643652	.0552797	.0000962	-.0104343	.1010823	23,600	1382.25	0.0000	0.5633
Bali	.4913696	-.0910996	.0012871	.0017376	.1008551	37,551	1690.91	0.0000	0.4862

Pulau Kalimantan

Provinsi	Biaya Bahan Baku	*Tangibility*	Produktivitas	Umur Perusahaan	Ukuran Perusahaan	Numb of Obv	F-stat	Prob>F	R^2
Kalimantan Barat	.1511208	.3804774	.0031883	-.0072041	.2621082	18,217	254.89	0.0000	0.2014
Kalimantan Tengah	.2507922	.3412454	.0017918	-.0140311	.0780078	9,707	228.71	0.0000	0.2741
Kalimantan Selatan	.1471301	-.3821132	.0006775	.0018685	.0988148	20,582	301.14	0.0000	0.2266
Kalimantan Timur	.208782	-.1577151	.0003686	.0021004	.1158538	9,190	140.18	0.0000	0.2062

Pulau Sulawesi

Provinsi	Biaya Bahan Baku	*Tangibility*	Produktivitas	Umur Perusahaan	Ukuran Perusahaan	Numb of Obv	F-stat	Prob>F	R^2
Sulawesi Utara	.4661181	-.5143463	.0025932	-.0081794	.2299564	17,587	401.19	0.0000	0.2551
Sulawesi Tengah	.285448	-.3161597	.0011284	.0063523	.1686279	18,330	582.38	0.0000	0.3888
Sulawesi Selatan	.3946629	.3827789	.0013845	-.0090898	.1482734	39,475	1981.29	0.0000	0.5011
Sulawesi Tenggara	.2523862	-.4201067	.0009576	-.0104652	.1506631	30,782	2164.08	0.0000	0.5295

Gorontalo	.1966659	-.5331845	-.0011	.0175952	.1981439	6,048	135.99	0.0000	0.2399
Sulawesi Barat	.6872105	-.6659415	.0005115	-.0119532	.0360623	10,830	1405.03	0.0000	0.6452

Pulau Nusa Tenggara, Maluku dan Papua

Provinsi	Biaya Bahan Baku	*Tangibility*	Produktivitas	Umur Perusahaan	Ukuran Perusahaan	Numb of Obv	F-stat	Prob>F	R^2
NTB	.3207628	-1,668862	.0001631	.0121191	.0771693	50,540	6754.59	0.0000	0.6814
NTT	.2691319	-.9096258	.0039714	-.010383	.1607444	27,717	966.36	0.0000	0.3435
Maluku	.6722403	.9029062	.0005394	.0130309	.1790537	8,721	983.15	0.0000	0.5948
Maluku Utara	.2130981	-.4058286	.0039986	-.0116771	.385827	2,196	175.04	0.0000	0.5291
Papua	.1977767	1,027891	.0183019	-.0203741	.0924982	6,359	427.22	0.0000	0.5026
Papua Barat	.4208741	-.2156508	.0032456	.0000153	.1944817	1,208	102.52	0.0000	0.5274

Cost of Raw Material

The regression model shows that positive associations occur between cost of raw material and profit. With the increase of factor production in raw and auxiliary materials by 1% it will increase the highest profit by West Sulawesi Province by 0.68%, Maluku Province by 0.67% and Riau Islands Province by 0.66%. Efficient use of production factors in raw and auxiliary materials proves to increase profits. According to Myers (1984) in pecking-order theory explain the importance of profit in operational financing. If the profit rate increase, then the business owner will increase the capital by way of loan. This capital will be used in the cost of raw and auxiliary materials. However, Riau Province has a negative association between raw materials with a profit of -0.02%. Negative associations suggest the use of loans requires higher costs such as large collateral availability and high borrowing costs due to the high risk that small and micro industries have (Gill & Biger, 2011).

Tangibility

The tangibility variable denotes a negative association with profit. With the increase of tangibility of 1 unit, it will decrease the biggest profit by West Nusa Tenggara Province by -1.66%, East Nusa Tenggara Province by -0.90% and Bengkulu by -0.84%. With investment in fixed assets, expectation of greater returns in the medium and long term, so tangibility has a negative association of profits in the short term (Vatavu, 2014). The negative association explains that high tangibility will lead to lower financial performance, but has a high leverage operation. The operation indicates that the company is able to use the fixed assets efficiently. This negative association describes in the short run, fixed assets reduce business performance because it is used for operations. In the long run, these fixed assets if invested can improve the performance of the company. If a fixed asset investment is used for a collateral loan it can reduce long-term profit if it is used for activities that are not profitable for the company.

The tangibility variables show positive associations with profit. With the increase of tangibility of 1 unit, it will increase the biggest profit by Riau Islands Province by 1.06%, Papua Province by 1.02% and Maluku Province by 0.90%. In accordance with Akintoye (2008) research that firms that have investments in tangible assets will have less financial fiscal costs than those that depend on intangible assets, thus having a positive association with company performance such as profit. In accordance with factor theory of production, the use of fixed assets in production and not to be guaranteed also affect the positive associations.

Tangibility

The productivity variables show positive associations with profits. With a productivity increase of 1 unit it will increase the most profit by Papua Province by 0,018%. Theoretically, a company that has the advantage of using all of its resources efficiently and uses it to maximize profits (Jovanovic, 1982). Profit companies are more productive companies and use cost effective in their operations and management (Demstez, 1973). Productivity also provides a comparative advantage and the potential for greater investment.

However, looking at the provincial tabulation, Papua Province has the second lowest average productivity value after the Bangka Belitung Islands Province. The average productivity value of Papua Province is only 22%. This is supported by the average Papua Province gap reaches 15 million rupiah, but in reality the welfare of the community is still far from the word prosperous. So it can be concluded that there are outliers in the data used so as not to describe the results according to the original condition of the province, especially Papua Province. The high average value of the difference can also be caused by the coal product industry and petroleum refining. For Gorontalo Province and Bangka Belitung Islands Province, with a productivity increase of 1 unit will decrease the profit by -0.0011% and -0.0009%. In this case, the industry in the province has not used the available resources effectively.

Firm Age

Regression results show a positive association between firm age and profit. With the increase of company age by 1 unit, it will increase the biggest profit by Gorontalo Province by 0,017%, West Sumatera Province 0,015% and Maluku Province 0,013%. In accordance with the theory of production factors, the older a company will be easier in meeting the needs of resources. This is because the age of the company has better association with experience, information, reputation and access to the business environment and financial institutions, thereby helping companies solve resource constraints problems and operate more efficiently (Curran et al., 1993).

Regression results show a negative association between firm age and profit. With the increase of company age by 1 unit, it will decrease the biggest profit by Papua Province by -0.020%, Central Kalimantan Province by -0.014%, and West Sulawesi Province by -0.011%. Negative associations supported by Gschwandtner (2005) and Nunes et al. (2009) indicates the age of the company has a negative association with profitability due to the older the company in fact will reduce profits because of the more inefficient in operations so no effort to develop the company because it has been using all existing production factors and do not have innovate.

Firm Size

Regression results show a positive association between firm size and profit, except Bangka Belitung Islands Province. In accordance with production factor theory, there is a positive association between firm size and profitability, as the larger the firm the access to resources and the opportunity to increase profits through product diversification. Gschwandtner (2005), Ito and Fukao (2006), Nunes et al. (2009) and Mac an Bhaird and Lucey (2010) show firm size significantly with positive associations affecting profitability. For the Province of Bangka Belitung Islands, with the increase of company size by 1 unit will decrease the profit by -0.033%. In this case, the industry in the province has not used the available resources effectively in the workforce.

Microsimulation Analysis

Provision of capital in reducing costs in the production of small and micro industries with the scheme of waqf land rental results. Costs in production for small and micro industries are in line with needs and aim to increase profits. The waqf land used in this scheme is 8.37% as waqf land use as another social activity purposes (BWI). The waqf land is not directly used by the industry, but through the scheme of waqf land rent in the empowerment of government-run waqf land. So that afterwards can be used as additional capital for small and micro industries to increase the cost of raw materials and auxiliary as a factor of production so as to increase profits.

A. Estimated Additional Capital Potential

Potential of waqf land with amount 8.37% is then multiplied by the price of land rent per square meter in each province. To facilitate the analysis then the price of land rent per square meter is the same if it is in one island. In the determination of the rental price of course only as a general description without regard to the location of soil and soil fertility such as the theory of land value in the factor of production. An overview of rental prices is obtained from online sites of sale and purchase and land rent, then the overall price is averaged so that the land rent price per square meter. Waqf land units are acres converted to square meters. The potential of waqf land in the form of square meters is then multiplied by the price of land rent per square meter in each province so as to generate potential capital for additional cost of raw materials to be used in the analysis of microsimulation. Microsimulation analysis excludes NTB, NTT, Maluku, North Maluku, Papua and West Papua provinces due to limited information on the general picture of land rent per square meter.

Target of additional capital based on regional province, looking at the condition of asset ownership in each province with different main industries. Besides the asset ownership condition, productivity level, company age and company size also explain the condition of small and micro industries in the province. The simulation of small and micro industries explains the cost and production income in 2014 so that the simulation used is static simulation and see the difference of condition of each province. In the microsimulation used is not compensated with taxes nor fiscal and monetary calculations.

B. What-if simulation

The role of government in empowering waqf land assets so that it can get a return that will be used as additional capital for small and micro industries. Capital increase can increase operational and investment expansion. In this microsimulation, the addition of this capital can be used as an addition factor of production in the form of main raw materials and auxiliary materials. In regression results, the cost of primary raw materials and auxiliary materials has positive associations with profit. The coefficient of raw and auxiliary raw materials is the formation of a population of synthesis enterprises in a microsimulation to be used for what-if simulation with prescribed assumptions. The cost of this raw material can be increased by the addition of capital so that the positive coefficient is multiplied by the addition of raw and auxiliary goods by the additional capital and this value is an advantage of the micro and small industries of each province with the record of other variables considered constant. Riau Province is not included in the microsimulation analysis because it is an anomaly in the data because it has a negative coefficient.

The result of microsimulation is influenced by raw material coefficient and potential value of waqf land used, according to the equation below. The potential value of waqf land is changed in log form so that it corresponds to the regression equation as a LogRawMaterial. The result of microsimulation has the same pattern with raw material coefficient so that the role of raw material coefficient is very big in the analysis.

$$logProfit = x1\ logRawMaterial \quad (2)$$

B. The result of microsimulation

The result of microsimulation analysis is shown in Figure 1. With the addition of capital can increase the biggest profit by West Sulawesi Province by 7.59% (Figure 1). Nevertheless, the raw material coefficient represents a considerable production cost so that if there is additional capital it will greatly assist small and micro industries so as to increase business profits. However, West Sulawesi province has the lowest productivity coefficient compared to other provinces in Sulawesi Island and the company's age has the third highest negative coefficient in Indonesia of -0.020%. In addition, Sulawesi Island only has a contribution of manufacturing industry to 2.7% national GDP

(BPS, 2016). The contribution of the largest manufacturing industry to the national GDP is still dominated by Java Island with a large 70.7% (BPS, 2016).

Furthermore, capital increase was able to increase the second largest profit by Riau Islands Province by 7.02% (Figure 1). Riau Islands Province has a raw material coefficient of 0.66. The positive coefficient of tangibility of Riau Islands is the largest with the value of 1.06. In accordance with Akintoye's (2008) research that firms that have investments in tangible assets will have less financial fiscal costs than those that depend on intangible assets, thus positively associated with firm performance such as profit. In accordance with factor theory of production, the use of fixed assets in production so as not to be guaranteed also affect the positive associations. With additional capital, the use of fixed assets in production can be increased so as to increase profits. Riau Islands Province is an agglomeration of rubber industry, rubber goods, and plastics and made national strategic project and priority program in March 2017 by the President of RI for the development of new industrial centers. The island of Sumatera has a second manufacturing industry contribution of 18.6% to the national GDP (BPS, 2016).

For the capital increase with the smallest percentage to increase profit is Bengkulu Province with a value of 1.4% (Figure 1). Bengkulu province has the third highest negative coefficient of tangibility with a large 0.84. With investment in fixed assets, expectation of greater returns on the medium and long term, so tangibility has a negative association of profits in the short term (Vatavu, 2014). The negative association explains that high tangibility will lead to lower financial performance, but has a high leverage operation. The operation indicates that the company is able to use its fixed assets efficiently for lending purposes. With the addition of capital, the more assets that can be used to meet the lending operations. Bengkulu Province is an agglomeration of pharmaceutical industry, medicinal products from chemicals and traditional medicine outside Java Island.

The potential of large waqf land does not directly increase profits if the business provided by the capital has no efficiency in production such as the use of raw materials, assets, productivity, length of business and the number of workers. While affecting the second smallest profit by South Kalimantan Province of 1.605%. South Kalimantan has the second lowest productivity coefficient on Borneo Island, with additional capital it is expected South Kalimantan can increase productivity in order to increase profit. Kalimantan Island has a third manufacturing industry contribution of 6.5% to the national GDP (BPS, 2016).

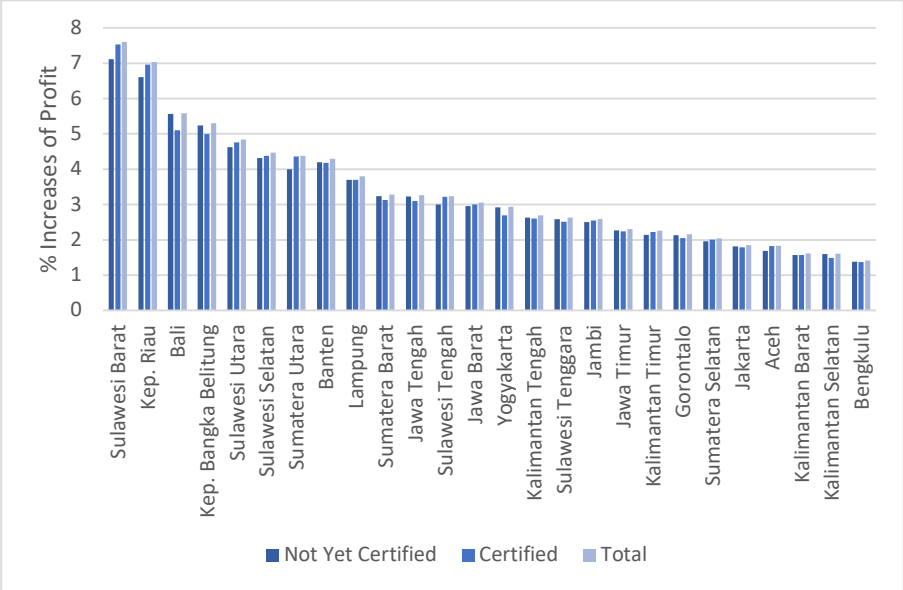

Figure 1: Microsimulation Results

Using SI index calculations, the micro agglomerated manufacturing industry in 12 provinces (BPS, 2016), namely Nanggroe Aceh Darussalam, Central Java, DI Yogyakarta, Bali, NTB, NTT, North Sulawesi, Central Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, and Maluku. However, according to the SI index categorization of Balassa, all of these provinces belong to a weak agglomeration group with an index value of one to two. As for the agglomeration of small-scale industries it is found only in six provinces, namely West Java, Central Java, DI Yogyakarta, East Java, West Nusa Tenggara, and Central Sulawesi (BPS, 2016).

Discussion

There are several suggestions for waqf management institutions, practitioners able to further develop waqf land empowerment program as one way to assist the government in improving equality and prosperity of the community. The results of this study can be used as the basis for planning the use of productive waqf land so as to provide additional capital to small and micro industries. While the suggestion for the government is expected to be one of the reference in making government policies related to the use of waqf assets to reduce poverty and improve the welfare of the community and can be an example of planning on the management of waqf assets so as to provide additional capital to small and micro industries. Waqf land management can be done with waqf-linked-sukuk scheme for unproductive waqf asset development with waqf asset scheme as underlying asset (Ismal et al., 2015).

Subsequent research in describing the characteristics of micro-populations in the microsimulation approach can be more specific so that if there is a policy related to capital increase it can better describe the resulting impact. This should be supported by data that further illustrates the business conditions that the policy will impose. Geographic data becomes important considering the location of waqf land is very scattered in various regions.

Conclusion

The use of waqf land rents in the productive sector can increase the profitability of small and micro industries. Waqf land potential can be utilized for productive activities such as for financing the capital of small and micro industries in Indonesia. This can increase business profits, maintain the sustainability of small and micro businesses and the management of waqf. Of course the management planning of waqf land should be well targeted both regionally and industry so that added value can increase people's income. With the increase in income society is expected to reduce the income gap that occurred.

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Tools for analyzing cash flows from investing activities in Ukraine

Anatolii DANYLENKO
Rector, academician of NAAS of Ukraine, Doctor of Economics,
Professor, Bila Tserkva National Agrarian University
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine,
o.mityay77@gmail.com

Tetyana ARBUZOVA
PhD in economics, Associate Professor,
Associate Professor of Department of Public
Management, Administration and International Economics,
Bila Tserkva National Agrarian University
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine,
Orcid .org/0000-0001-7806-8249
o.mityay77@gmail.com

Larisa SATYR
Head of the Department of entrepreneurship, trade and exchange activity, Doctor of Economics Science, Professor,
Bila Tserkva National Agrarian University
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine,
Orcid.org/0000-0003-0040-6863
o.mityay77@gmail.com

Victoria NOVIKOVA
PhD, Assistant prof., of Department of Information systems and technologies
Faculty of Economics, Bila Tserkva National Agrarian University
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine,
Orcid.org/0000-0001-7985-1489
o.mityay77@gmail.com

Viktoriia ZUBCHENKO

PhD in economics, docent of the Department of Finance, Banking and Insurance
Bila Tserkva National Agrarian University,
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine
orcid.org/ 0000-0002-1292-1726
o.mityay77@gmail.com

Olena VASYLENKO
Assistant of the Department of entrepreneurship, trade and exchange activity
Bila Tserkva National Agrarian University,
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine
Orcid.org/0000-0002-5076-4805

Oksana BANAR
Doctor of Economics Science, Professor of the Department of Public Management and Administration
Uman National University of Horticulture,
1 Institutska Str., Uman, 20305, Ukraine
Orcid.org/0000-0002-5331-2513
o.mityay77@gmail.com

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Abstract

The article deals with the improvement of tools for analyzing cash flows from investments made by a company, which is topical due to the required productivity and competitiveness of business. The research puts general description and provides improved steps for analyzing cash flows generated through investing activities. By analyzing cash flows from investing activities of a company, one should take into account the full set of indicators of variable industries highly impacting the company and its life cycle. The conducted research systemized tools for analyzing cash flows from investing activities, investigates them and developed improved stages included in the analysis procedure. It can be employed for assessing the efficiency of managing the cash flows from investing activities.

Keywords: Net cash flow, cash flow from investing activities of the enterprise, the efficiency of cash flow management, analysis, cash flow optimization, synchronization cash flow sensitivity of investment of the enterprise.

Introduction

Under current conditions of heavily restricted financial markets, Ukrainian companies suffer from the huge money deficit and no access to the financial resources. Foreign investors do not will to finance local projects through the invasion of the Russian Federation. Thus, the primary objective pursued by the top management of any company is to maintain the relative stability of the cash flow and provide operations based on investment and paying the debts.

There is a topical task of improving the conceptual framework for analyzing cash flows from investing activities, which will allow enhancing the company's competitiveness. There are several reasons for analyzing company's cash flows:

1) results gained through the cash flows analysis are used for assessment of investment projects;
2) company's competitiveness is achieved through reallocating cash to investment and financial activities as well as operations;
3) the investment strategy of a company is developed and changed on the basis of the cash flow analysis;
4) the effective cash flow regulation provides the company with speeding-up turnover of the working capital and release of additional financial resources for further investing activity.

Brief Literature Review

The tools of the cash flow analysis are investigated by many foreign and Ukrainian economists. Among them are J. C. Van Horne, V. Dickinson, Ye. Brihkhem, E. Nikkhbakht, T. Rays, V. V. Bocharov, L. N. Pavlova, H. V.Savyts'ka, I. A. Blank, F. F. Butynets, H. H. Kireytsev, O. Lihnenko, A. M. Podder'ohin, O. O. Tereshchenko, R. B. and other.

Most scientists argue that the cash flow analysis should include the following stages:

1. Analysis of the cash inflow (a pattern of cash inflows, changes in cash inflows, the ratio of the growth of cash inflow to the growth of output and sales);
2. Analysis of the cash outflow (a pattern of cash outflow, changes in cash outflow);
3. Analysis of the net cash flow (the balance between inflows and outflows, the quality of the net cash flow and the level of sufficiency of cash inflows);
4. Analysis of cash flows generated by different activities (historical analysis of the balance sheet with revealing cash flows from operations, investments and financial activity and defining the direct and indirect factors of cash flows changes);
5. Analysis of the gap between the net cash flow and net profit (assessment of available cash and the gap between the net cash flow and net profit);
6. Analysis of cash inflows sufficiency and cash outflows efficiency.

The Ukrainian economic contributions either do not entirely provide tools for the analysis of cash flows generated through investing activities or have a substantial imperfection, as well as foreign research works do, following the main focus on the total amount of cash flows and sometimes on operations cash flows. Thus, tools for the analysis of cash flows from investing activities require improvements towards expanding theoretical concepts and practices.

The purpose

The article aims at considering and improving tools for the analysis of cash flows from investing activities. During the research, we employed such general scientific methods as analysis, synthesis, logic chains and dialectic.

Results

The overviewed scientific works allowed clarifying and generalizing the common tools for the analysis of cash flows generated from investing activities based on financial reports. Main tools being considered more often than others are:

1. Horizontal analysis provides trends in cash flow in terms of the sources of its generation over a period and its growth rate.
2. Vertical analysis shows the pattern of cash inflows and outflows.
3. Benchmarking implies comparing the main indicators of a company with those of competitors within the industry and other close industries.
4. Ratio analysis provides a range of relative indicators showing competitiveness, liquidity etc.

We consider the primary goal of the analysis is the detection of:

1. Reserves for increasing company's efficiency;
2. Facts of managerial failures;
3. Better ways of financial resources allocation and negative factors impacting company's productivity and competitiveness.

For efficient analysis of cash flows generated from investing activities, we should outline the main principles of it. Among them are objectivity and correctness of the data, consistency and integrity of calculations as well as readable and scientific-based results.

By taking into account available tools for analysis of cash flows from investing activities [1, 2, 5, 6] and current political, economic and financial conditions in Ukraine, we consider it necessary to introduce the following stages of the analysis of cash flows from investments (Figure 1).

The first stage of the analysis of cash flows from investing activities of a company provides comparison of the actual cash flow and planned one generated from either a single investment project or the investment portfolio.

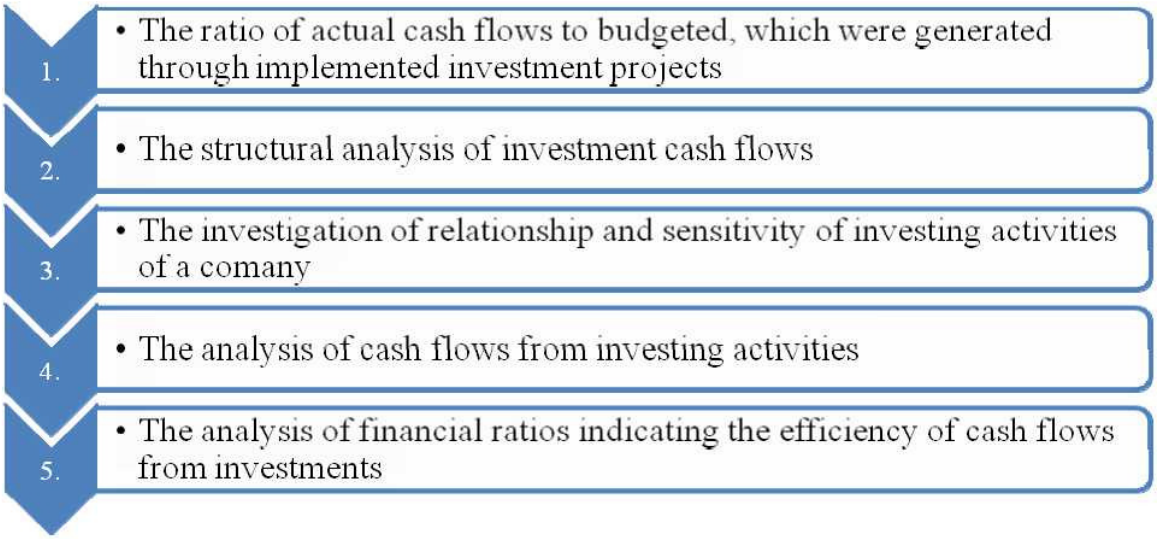

Figure 1: Basic Steps for the Analysis of Cash Flows from Investing Activities

So, the first stage of the analysis of cash flows is proposed to compare suggested and actual increase in the cash flow during the period. The analysis of investment cash flows involves the use of such absolute indicators of investment cash flows as:

1. Cash inflows and outflows;
2. Net cash flow from investing activities;
3. Cash outflows for uncompleted investment projects being conducted at the moment;
4. Budgeted cash flows including net cash flow from completed investment projects;
5. Amount of cash reserved on bank accounts and company's cash department [8-12].

The second stage of the analysis of the cash flows from investing activities involves determining the structure and dynamics of changes in investments cash flows as well as comparing these indicators. In the analysis, it is important to consider that the structure of the cash flow varies according to the stage of the life cycle of a company (Figure 2), as the misinterpretation of results gained through the cash flow analysis can negatively impact the further development of the company. Such scientists as Dickinson and Brikhem [3] identify the following stages of the company's life cycle and consistent to them cash flows:

Stage 1 - Startup. This period is characterized by the cash inflow from financing activities and cash outflow from investing and operating activities.

Stage 2 - Rapid Growth. This period faces high rates of profit growth and company's own investments into R&D.

Stage 3 - Maturity. This period is characterized by growing sales and revenues. Total cash inflows slow down despite growing cash flows from investing and operating activities.

Stage 4 - Stability. A company maintains profitability at an optimal level. Cash flows from all activities remain unchanged.

Stage 5 - Decline. Profitability and financial stability of a company are falling down. Cash flows from all activities are slowing down [13-16].

Dependently on the owners' and managers' decision, the last stage of the company's life cycle may bring either rebirth through reengineered business processes and involved investments in innovations or death through liquidation or acquisition.

Investing activities following the company's life cycle is expected to reduce cost of capital and improve financial flexibility. According to the contributions made by Ivashkovs'ka I. V., financial flexibility of a company is a growing financial stability through diversified capital involved from different groups of investors [7, c.163].

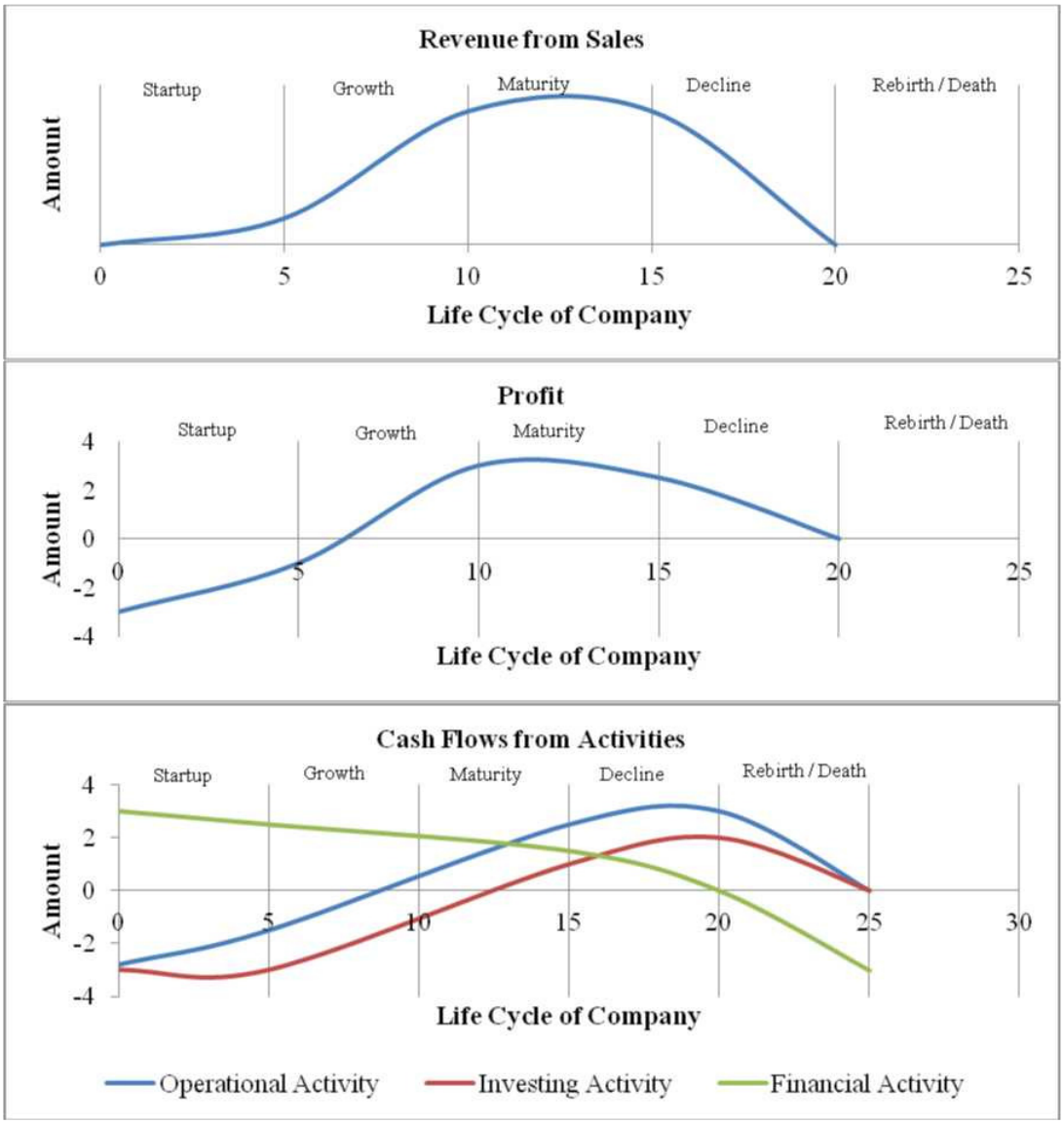

Figure 2: A Pattern of Cash Flows through Life Cycle of Company (7)

Analyzing cash flows generated from investing activities requires conditions of external environment to be taken into account and results to be matched to the macroeconomic indicators.

The third stage of analysis of cash flow generated from investing activities implies establishing relationship between investment amounts and current assets for evaluating the elasticity of investing activity of a company.

The importance of investigating the relationship between investing activities and variable cash flows can explained by the fact that investments are vital for business development and competitiveness in the marketplace though cash is a highly restricted resource underlying investment activity [4, 17].

Cash flows generated from operations are very often invested. Thus, it is advisable to match investments to the net operational cash flows. In the case of net operational cash flow exceeding investment amounts, then an investing policy of a company should be considered efficient with growing financial investments.

The fourth stage of the analysis of cash flows from investing activities covers changes in assets of a company resulted from investing activities. The analysis of investments' impact on cash flows allows managers to observe cash through accounts, assess liquidity of activities and conclude whether available cash fits investment goals of a company [18-19].

At the fifth stage of the analysis, financial ratios showing the efficiency of investing activities are calculated. As a

rule, scientists distinguish the following financial ratios for investing activities to be analyzed:

1. Ratio of cash flows from investing activities to net cash flow shows cash flow from investing activities per monetary unit (USD, EUR, UAH etc.) of net cash flow.
2. Coefficient of cash inflows from investing activities shows amounts of cash inflow per monetary unit of cash flows.
3. Ratio of long-term liabilities to net cash flow shows the extent to which short-term and long-term liabilities cover cash outflows from investing activities of a company.
4. Coefficient of cash outflows from investing activities shows cash outflow from investing activities per monetary unit of cash flows.
5. Ratio of cash inflows from investing activities to liabilities shows the amount of investments needed for purchasing a monetary unit of non-current assets.
6. Ratio of cash inflows from investing activities to non-current assets shows the amount of investments needed for purchasing a monetary unit of non-current assets.
7. Coefficient of liquidity of cash flow from investing activities shows cash inflow to cash outflow ratio.
8. Efficiency of cash flows from investing activities shows general net cash flow to cash outflow from investing activities.
9. Ratio of long-term liabilities to cash outflow from investing activities shows the amount of cash outflow from investing activities that can be compensated by long-term liabilities.
10. Ratio of short-term liabilities to cash outflows from investing activities shows the amount of short-term liabilities used for making investments as cash outflow from investing activities.
11. Coefficient of cash inflows from investing activities shows the share of cash inflows from investing activities in total cash inflow of a company.

The offered approach to the analysis of cash flows from investing activities is expected to match to companies (their legal status, industry) and macroeconomic conditions individually [18].

Conclusion and research perspectives

By analyzing cash flows from investing activities of a company, one should take into account the full set of indicators of variable industries highly impacting the company and its life cycle.

Thus, the conducted research systemized tools for analyzing cash flows from investing activities, investigates them and developed improved stages included in the analysis procedure. It can be employed for assessing the efficiency of managing the cash flows from investing activities.

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Modeling of The Innovative Level of Preventive Anti-Crisis Management of Strategic Changes of Enterprises

Victoria NOVIKOVA
PhD, Assistant prof., of Department of Information systems and technologies
Faculty of Economics, Bila Tserkva National Agrarian University
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine,
Orcid.org/0000-0001-7985-1489
o.mityay77@gmail.com

Andrii NEPOCHATENKO
PhD in economics, Associate Professor,
Associate Professor of Department of entrepreneurship, trade and exchange activity,
Bila Tserkva National Agrarian University
pl. 8/1 Soborna, Bila Tserkva, Kyivska oblast, 09117, Ukraine,
Orcid.org/ 0000-0002-0809-8482
o.mityay77@gmail.com

Mykola DIACHENKO
PhD (Agricultural), Assistant Professor of the Department of Public Management and Administration, Uman National University of Horticulture,
1 Institutska Str., Uman, 20305, Ukraine
Orcid.org/0000-0003-4997-5020
o.mityay77@gmail.com

Nataliya PETRENKO
Head of the Department of Public Management and Administration
Uman National University of Horticulture,
1 Institutska Str., Uman, 20305, Ukraine
Orcid.org/ 0000-0003-0922-8389
o.mityay77@gmail.com

Oksana BANAR
Doctor of Economics Science, Professor of the Department of Public Management and Administration
Uman National University of Horticulture,
1 Institutska Str., Uman, 20305, Ukraine
Orcid.org/0000-0002-5331-2513
o.mityay77@gmail.com

Vitalii KRAVCHENKO
PhD (Agrarian), Assistant Professor of the Department of Crop Production,
Uman National University of Horticulture,
1 Institutska Str., Uman, 20305, Ukraine
vitalii_12@ukr.net

Abstract

For implementing a quality crisis management framework in the enterprise PPRR-model (Prevention Preparedness Recovery Response-model) is proposed. For the early crisis identification and evaluation of the signal intensity of its beginning the main trends of the comprehensive scanning of the enterprise business environment have been determined. In article it is considered approaches to an assessment and the analysis of efficiency of carrying out changes at the enterprise. Recommendations about possible use of tools in activity of the domestic enterprises in modern conditions of managing are created. As a result of research the attention was focused on increasing value of carrying out systematic process of restructuring at the domestic enterprises.

Keywords: crisis, anti-crisis management, PPRR mode, factors, restructuring, tools, process of changes.

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Introduction

In modern unstable economic, financial and political situation in Ukraine, preventive crisis management is quite topical. A modern period of the domestic economic development is mainly characterized by instability, high dynamics and variability of the economic environment. Under the circumstances, most of the domestic enterprises refer their success mainly to their own activities, but failures to external factors. This approach prevents from developing and implementing effective conduct regulations in the market as well as forming an effective system of anti-crisis management. This attitude of the company management does not let timely identify crisis phenomena, track their progress at different stages of a crisis formation and development and impact their causes, as well as create mechanisms for monitoring risk activities and learn the methods of crisis management and how to exit the crisis (Z. Shershneva, 2004). In this case the enterprise ability to properly generate a range of necessary strategic changes at all stages of its anti-crisis development guarantees its survival and further success. This raises the importance of early diagnosis in providing detection and preventive treatment of the crisis as any crisis has a wide range of signs and shades. At the present stage of economic development of Ukraine, the management of industrial enterprises tries to consider all options for raising competitiveness and counteract negative factors external influences such high risk on the macroeconomic situation in the country, high inflation, reducing demand, problems with credit software and more for financial recovery of the company. Under such conditions it is restructuring is a critical factor in the successful restructuring of the companies, since it can significantly increase economic activity, increase market share and ensure the growth of the market value and more.

Brief Literature Review

The issues of anti-crisis diagnostics of the enterprise are quite widely covered in the scientific publications written by foreign and domestic authors. Thus, methodological approaches to the diagnosis of the crisis of business entities in the crisis management framework are investigated in the works of I. Buleev and N. Bryuhovetskaya, G. Gryaznovaya, A. Chernyavskiy, E. Korotkov, G. Kurashevaya, L. Ligonenko, G. Shvudanenko, Z. Shershneva , A. Yankovskiy and many others. However, the problem of searching innovative approaches to the prevention and timely threat detection of a crisis has not lost its relevance. Yet, no methodical approach has been found so far to meet the demands of practical applications. Most of the available anti-crisis diagnostics, offered by the scientists, focus on certain parameters of financial and economic activities (mainly financial) and are based on using only quantitative indicators. Practical experience of leading domestic and foreign companies confirms that the external instability of the functioning environment of the enterprises and high level of its aggressiveness requires a methodological approach used for assessing the crisis threat in a comprehensive and objective way. This necessitates a reassessment of the existing approaches to anti-crisis enterprise management in times of crisis and a focus on developing innovative models of crisis management. Issues of management process of restructuring of the company attracted the attention of many Ukrainian and foreign experts, as evidenced by a significant number of publications devoted to this topic. Yes, thanks to research M.D. Aistova, O. Vinogradov, V.V. Davydenko, I.I. Mazur, D.M. Lambert, O. Suharov, L.M. Taranyuk, A. Harrison, M. Hammer, J. Ciampi, V.D. Shapiro and others, it is possible to acquire this experience and use it on practice.

The analysis of foreign and domestic experience on the development of restructuring demonstrates the need for further research. Given the importance of this problem, the theoretical and practical questions of the formation of the restructuring will continue to remain relevant.

The purpose

of the article is:

- to study the features of the application of the PPRR model for improvement innovative level of preventive crisis management of strategic changes in the enterprise,
- to clarify the nature of the restructuring of enterprises,
- development of recommendations on the possible use of the useful experience in the current economic conditions.

Result

Modern approaches to enterprise anti-crisis management (L. Ligonenko, 2010) involve overcoming the crisis and detecting its first signs, as well as anticipating the beginning of the crisis. The earlier anti-crisis measures are developed and implemented, the higher their efficiency is and the lower losses of the enterprise are.

In practice, the formation of a crisis situation in the enterprise is effected by a whole range of factors. Therefore, a comprehensive model of enterprise crisis management is required for achieving an objective evaluation of the crisis threat and its prevention. Meanwhile, opportunities for the application of methods for diagnosing crisis management

in the theory and practice have not been exhausted so far. Quite often, crisis management involves only determining and predicting the insolvency based on financial performance analysis and accounting data, despite the fact that the crisis is a multidimensional phenomenon and its causes and first signs can occur in all spheres of functioning of the enterprise.

A theoretical study showed that most of the existing tools and technologies of anti-crisis management provide signal detecting required for the adoption and implementation of preventive anti-crisis measures. They either detect the current pre-crisis processes or take into account only specific aspects of enterprise development. Thus, in the economic literature (V. Dorofeev, 2012; K.Baldin, 2011), depending on the crisis phase there are a priori two types of crisis management: prevention (when the growth of the business entity is steady) and reaction (when the growth of the business entity is unsteady, during the crisis and bankruptcy procedure or in the post-crisis period).

We suppose that in times of cyclical instability in Ukrainian economy and politics, domestic enterprises need to focus on preventive anti-crisis management. For this purpose, it is strongly recommended to apply the PPRR risk management model proposed by the leading Australian emergency management agencies. The PPRR model contains four components (Fig. 1).

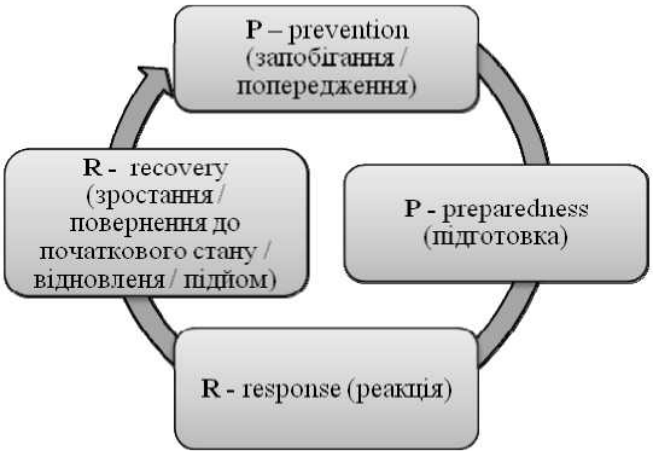

Fig.1: The PPRR risk management model

The key components of the PPRR model enable to promptly take and implement management decisions as well as effectively to prevent the possible beginning of the crisis in the enterprise.

The benefit of applying this model in anti-crisis strategy formation is that it helps in anticipating possible direct effects to business.

According to this model, in the first stage, the enterprise should take steps to reduce the risk of a crisis event occurring or minimize its adverse effects. The second phase involves carrying out preventive actions. Preparing for a crisis situation means including the element "preparedness" which identifies and defines the priority measures to eliminate any malfunctions during the crisis.

At the stage of "response" supervision is undertaken. This stage contains the element "answers" and determines direct management response to a specific crisis event with a view to deterring, controlling and minimizing its negative effects.

The last phase of enterprise crisis management is characterized by recovery (depending on the severity of the crisis) which describes a sequence of actions and aims at minimizing the violations of anti-crisis stability of the enterprise and its restoration.

One of the main tasks of anti-crisis management in times of crisis transformations is ensure effective management in the enterprise in crucial moments as well as solve the question of how to avoid negative effects of a crisis situation, to prevent it from occurring and treat it. This is because in the world of business any entity daily faces with different problems, but not every problem becomes a crisis. Anti-crisis actions should aim at creating the conditions for preventing current situations from becoming crises. Preventing the enterprise crisis from occurring requires its earlier identification in order to effectively respond to negative trends when the enterprise is still under

control. In this context, the early detection of the crisis is a case of particular urgency.

One of the approaches for the early detection of crises is a "scanning method" (continuous ordered, feature-based scanning of the environment or object) proposed by G. Kurosheva (G.Kurosheva, 2000). According to this method, a diagnostic object is considered to be a signal of a possible crisis - the initial economic phenomenon. The first signal indicates changes in the enterprise's behavior. The next step includes a quantitative evaluation of the intensity of the signals and enables to measure it on the basis of available information as well as select a real signal out of "background noise".

"Scanning" must be performed in the following way:

- making a list of a company's external and internal environmental parameters;
- quantitative and qualitative evaluation of external signals as to dynamics of economic, technological, environmental as well as demographic and legal situation in the national economy;
- quantitative and qualitative evaluation of internal signals as to dynamics of the strategic potential as well as evaluation of their impact on the competitive status of the company;
- defining the frequency of monitoring a company's external and internal environmental parameters;
- analyzing the possible consequences of the crisis identified during the monitoring process;
- defining "control points" in economic chains;
- conducting a comprehensive diagnosis of anti-crisis management;
- evaluating analysis results with a view to their impact on the ability to perform the initial mission of the enterprise;

The advantage of this technique is that it allows you to detect crises at the earliest stages.

Restructuring is a versatile management tool now, it is done in enterprises of different industries, became one of the most effective ways to improve not only the competitiveness of enterprises, but also of their ability to pay, which is due to a decrease in the amount of operating costs, the introduction of new technologies, equipment modernization and increased productivity labor.

Note that the process of restructuring the company can not be a one-off, because under these conditions will not be a subsoil, for which it is held. Therefore, the process of restructuring of the company should be held regularly and meet the current market conditions.

There are a number of external and internal factors that have an impact on the process of restructuring of the company (Table 1).

Table 1

Factors that stimulate the restructuring of the company

Internal factors	External factors
Organizational	Legislation
Technical	Economic policy
Financial and economic	The level of economic liberalization
Social	The competitive environment
Corporate	Financial and credit policy of the government
Internal corporate groups of interest	Investment policy
External groups of interest	Structural policy states
Politics corporation	Globalization of the economy
Availability of resources	Trends in Foreign Relations
Market activity	Resource policy of the State

In addition to that, the influence of the external factors is more active and dynamic. It is important to note that you must consider the fact that the environment changes every day and requires a different behavior on the market. Moreover the environment requires to use different methods and techniques, and resources in order to achieve positive results.

In addition, each process of restructuring of the company is unique and uses different instruments of restructuring. Figure 2 represents the basic classification of the instruments of restructuring.

So, taking into account all of the above we can make a conclusion that restructuring guarantees an opportune and flexible change of the company structure, its adaptation to the changed internal and external factors.

The research of national experience enables to select the following major disadvantages of restructuring of companies:

- the lack of necessary methodical grounds of effective models of restructuring;
- preferential use of approaches based on the distribution companies into separate parts, without proper consideration of alternative variants of restructuring;
- insufficient justification for the economic consequences of restructuring objects;
- the lack of mechanisms to attract investments in the restructuring process;
- the uncertainty of funding sources of restructuring;
- unresolved social issues in the development of restructuring plans.

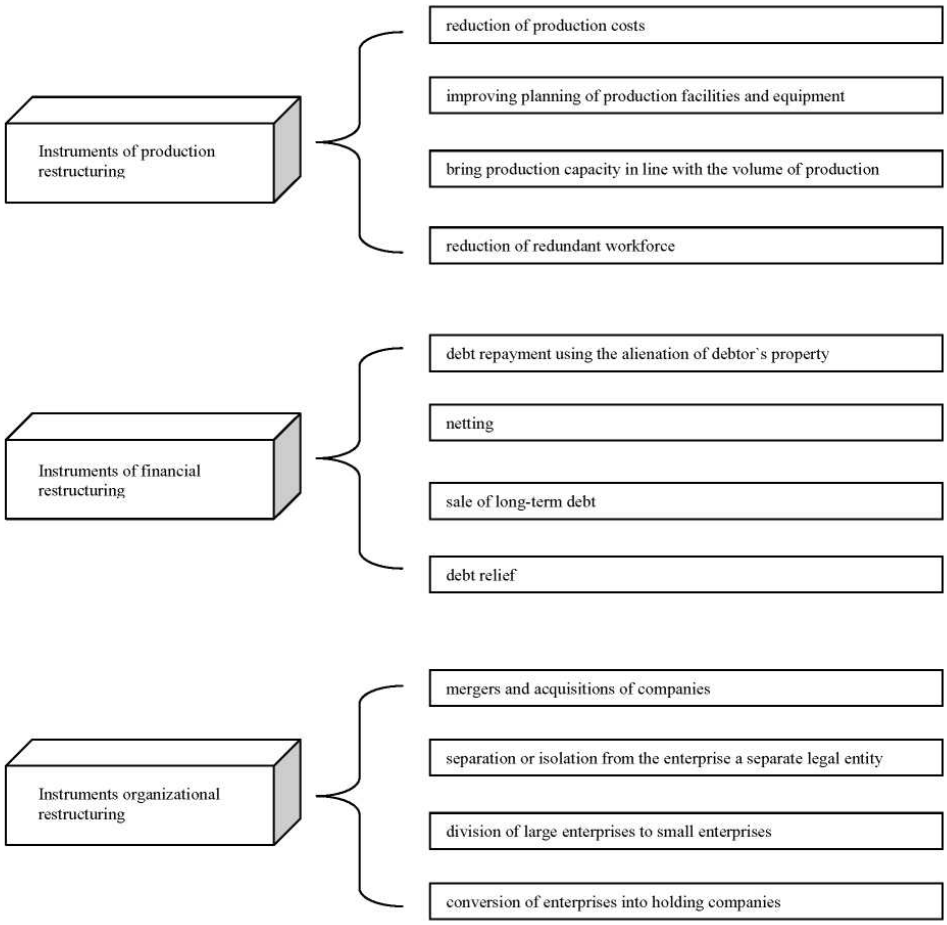

Fig 2: Classification of instruments of restructuring of the company

[based on the information 6-12]

One of the reasons of unsuccessful attempts of restructuring is insufficient a scientific approach to the solution of problems in Ukraine. Therefore, to solve this problem is necessary:

- define the features of restructuring in conditions of formation market environment. It is necessary to properly represent the environment of the enterprise in which restructuring process is done. The description of the environment from the standpoint of its interaction with the project must be accurate. Because it help to restructure the enterprise in a right way;
- to identify methodological approaches to assess the effectiveness of the restructuring and administrative actions against its implementation. Restructuring should have a clear goal, the achievement of which should be assessed at various stages and overall;
- to consider the problem which is relative to specific project of restructuring of the company. There is not common way to restructure the enterprise.

Conclusions of this study

The crisis situation is a turning point in the functioning of any business entity. Early diagnostics of the crisis phenomena is the key principle of anti-crisis management. To prevent a crisis situation from occurring in the company you need an efficient innovation system of crisis prevention management. The application of the PPRR model of enterprise crisis management helps you to timely detect a crisis situation and anticipate possible direct impacts to your business. Early diagnostics of the crisis situation of the company helps in avoiding bankruptcy and is important for the effective company operation and preserving competitiveness in the consumer market [13-15].

So domestic industrial enterprises should adopt international experience of restructuring, but they must select the methods and directions that effectively influence on economic recovery of the company and implement in order to adapt to changes in the external and internal environment.

So, we must emphasize that there is no single procedure of restructure for all companies. The experience of the restructuring of domestic and foreign enterprises demonstrates the diversity of areas and types of restructuring in general, proves the efficiency of restructuring measures under different economic conditions and for various businesses in today's environment.

In addition, the sequence of stages of restructuring and choice of instruments vary significantly that depends on the condition of the company, its potential position in the market, conduct of competitors, characteristics of goods and services produced by the company and many other factors.

However, domestic enterprises should consider the risk of incorrect implementation of restructuring of the company and learn from the mistakes of companies, which have experience of ineffective restructuring.

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Economic Role of Customs in The National Economy of Poland

Katarzyna SZMYD

Jesuit University Ignatianum in Krakow, Krakow, Poland
katarzyna.szmyd@ignatianum.edu.pl
https://orcid.org/0000-0002-6016-8564

Abstract

The article is devoted to the economic role of customs duties in the national economy of Poland. The study also refers to the basic economic doctrines in the theory of foreign trade, but only from the point of view of customs issues (the role of customs). Issues related to the customs union and basic concepts in the field of customs were also discussed.
Customs duties constitute one of the most important instruments of the state's economic policy, and have a significant impact on the structure of imports and its effectiveness, and constitute a source of budget revenues.

Keywords: customs, foreign trade, economy, European Union.

Introduction

The customs duty is one of the important legal instruments by which the economic and economic policy of the country is shaped. After Poland's accession to the structures of the European Union (EU), foreign trade acquired a new meaning. These conditions were mainly related to the change in the customs lawand tax. The opening of borders and the freedom of movement at the same time increased the interest of entrepreneurs in selling their goods and services to other countries, not only in the EU, but also outside its territory.

The article presents various definitions of the duty, its essence and meaning. The customs tariff that was in force in Poland until 1 May 2004, that is until Poland's accession to the European Union, and the Community Customs Tariff, which is applied after that date, are characterized, making comparisons between them. One of the consequences of Poland's accession to the EU in the field of customs was the disappearance of the concept of exports and imports and replacing them with the term intra-Community supply and acquisition of goods, duty free, of course. The aspect of VAT, which is used in trade with countries outside the European Union, was also dealt with. The article presents the elements of customs, their place in economic doctrines and theories of foreign trade, and the effects of the customs union.

This article tries to answer the following question: what is the role of customs in the modern economy? Does it still constitute one from significant state budget revenues and has it acquired a different meaning? For this purpose, the literature on the subject of the research was analyzed.

The concept of duty, its essence and role

Historically, the tariff is the oldest tool of trade policy. King Bolesław the Bold has already ordered customs duties to be collected on the Bug River. The oldest Polish document that deals with customs matters in Poland is the Bull of Gniezno, issued on July 7, 1136 in Pisa (Ex commisso nobis a Deo, April 8, 2018).

In the 17th century, collecting duties was one of the ways of getting rich in a given city and country. In the 19th century, the duty was additionally used as an instrument to protect domestic production, which could be seen mainly in the United States, Germany and France, which thus wanted to protect their markets against the import of British goods (Jura J., 2008, pp. 25-26).

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In economic literature, customs duty (French - dront de douane, German - Zoll) is most often defined as a levy imposed by the state on goods that cross the customs border of a given country (Klawe AJ, et al., 1987, p. 448). After joining the structures of the European Union, customs duties can be described as: “as our own source of income flowing into the EU today. They are no longer levied within the Community, but only towards third countries ”(Brzeziński W., et al., 2003, p. 24).

Customs duty is understood to mean charges levied by the state on goods crossing its frontier. The customs duty is the equivalent of a tax that increases state budget revenues (Broży J., et.al., 2002, p. 309), or as a fee charged by authorized factors on goods for crossing the customs line (Waschko S., 1971, p. 87), or a tax that is imposed on goods that pass through the customs border of a given country ”(Budzowski K., 2003, p. 92).

The duty is also considered to be the most common levy levied by the state on the import, export or transport of goods across the customs borders of a country or a customs union (Kaczurb J., Poland in GATT, 1998, p. 61), or a specific tax or duty on imported or exported goods. goods (Kamerschen DR, et al., 1991, p. 986), relatively the simplest of the instruments of trade policy, denoting the tax burden on the import of products (Krugman PR, et al., 1993, p. 127).

“A duty is a public levy, similar in nature to a tax. Its primary feature is its use in international trade in goods and services. The functions of the duty include: fiscal, socio-economic (protection of sectors sensitive to the economy, improvement of the balance of payments) ”(Felis p., 2010, p. 101).

As a result of Poland's accession to the structures of the European Union, the role of the customs duty was significantly weakened. “Currently, the amount of duty revenues is influenced by: the volume of performed imports, the average euro exchange rate and the effective duty rate” (Ibidem, p. 101).

Elements of the theory of customs. Effects of introducing and abolishing customs duties

According to Springer Gabler Wirtschaftslexikon, "the theory of customs is the theoretical basis for understanding customs policy" (https://wirtschaftslexikon.gabler.de, 8.04.2018). In this short German definition there is the simple observation that the theory of customs duties provides a theoretical explanation of why public authorities act in the field of customs in such a way thatand no other way and the economic effects of such conduct. According to this understanding, the theory of customs is a derivative of economic policy, but it is not a unique approach in economics. By way of example, we can mention the theory of state intervention, which was established after its initiation, not before.

By introducing duties, the state may pursue various economic policy goals. One of the main goals of introducing a duty by the state may be to protect domestic producers or to increase budget revenues. The effects of the duty will be felt by consumers, who will have to pay a higher price for the goods. The negative impact can also be seen in the economy, when the duty raises the prices of semi-finished products used by companies for further production.

The greatest possibilities for the state to influence the market situation existin the field of international exchange. The state's policy may aim not only at shaping the commodity and directional structure of imports and exports, but also at stimulating or inhibiting imports or exports.

“A customs duty is a form of excise duty levied only on the sale of imported goods. In the past, customs duties were an important source of budget revenues due to their easy collection. In the modern world, customs duties are more often aimed at limiting imports and protecting domestic producers competing with imports, than at being an important source of budget revenues ”(Krugman P., et al., 2012, pp. 376 - 378).
The departure from free trade and the introduction of tariffs leads to both transfers and and for pure losses. Money transfers are made in the direction: from consumers to the state budget, and to producers (Begg D., et al., p. 499).

Summarizing the effects of introducing the duty, it can be stated that the imposition of the duty is a kind of "wedge" between the foreign and domestic price, if we increase the domestic price, but by less than the amount of the duty rate. It should be noted here that if we are dealing with a small country that does not significantly affect foreign prices, in this country the duty will fully shift to domestic prices. Considering the costs and benefits from duty, it can be measured using the concepts of consumer surplus and producer surplus. If we take these two concepts into account, we show that domestic producers of a given good gain because the duty will raise the price they receive. In contrast, domestic consumers lose because of the same reasons. The state will also notice the benefitsin the form of revenues.

Taking into account the costs and benefits of introducing a duty, we note that the net effect on social welfare can be divided into two parts. On the one hand, there is a loss of efficiency, and on the other hand, there is an effect in the form of improved terms of trade, which reflects the duty effect of lowering the foreign export price.
In the case of a small country, which does not exert an influence on foreign prices, the second effect does not occur, so we are dealing with a simultaneous loss of prosperity (Grotowska G., 2017).

Without delving too much into the issues of microeconomic analysis in the form of graphical models, it is worth illustrating these observations with a few examples of empirical research, including also other, apart from those mentioned above, microeconomic issues concerning the effects of changes in customs or customs environment.

The first example concerns the estimation of the economic impact of time delays related to customs clearance, i.e. transaction costs. Authors from Inter American Development Bank conducted research on the impact of delays in customs clearance on the volume of Uruguay's foreign trade. They observed, among other things, that the increase in waiting time for customs clearance by an average of 10% reduced the country's exports by 1.8% on average (Volpe C., 2013). This meant an increase in transaction costs for enterprises and a decrease in their exports.
Ernst Verwaal and Bas Donkers from the Erasmus University in Rotterdam dealt with a similar issue. They investigated the relationship between the costs of transactions related to customs clearance with other variables, such as: the number of transactions, the size of the company, the number of customs transports, etc. The study was conducted on a sample of approximately 3,000 companies trading abroad in the Netherlands. They observed that the duty-related transaction costs significantly burden the economics of the surveyed companies, and that the reduction of these costs was influenced by factors such as economies of scale, simplified customs procedures and improved communication between companies and customs authorities (Verwaal E., et al., 2001). This study confirms that reducing the nuisance of the customs procedure has a positive effect on the economy of enterprises, reducing their transaction costs.

One of the most interesting studies devoted to the effects of the introduction of customs duties is the report prepared by the Directorate General of Internal Policy of the European Commission on the economic effects of Brexit. Study, discussing and compiling the results of a series of studies in this area reveals, inter alia, that when Great Britain leaves the Customs Union within the EU and introducing tariffs based on the WTO most-favored-nation rates, EU countries' exports to the UK may fall by 30%, with the overall decline in the volume of EU global exports going to be small, only 2% (Lawless M., et al., 2016) . The comparison of 6 different studies on the effects of leaving the customs union in this variant (MFN WTO) shows that the GDP of the EU27 may drop from 0.11% to 0.52% of GDP (by 2030), and the United Kingdom, in the same period - it may drop from 1.31% to 4.21% (An Assessment ..., 2017). This report also discloses the methodologies for calculating each of the estimates. This report is interesting because each of the estimates predicts higher Brexit costs for the UK than for the EU27.

In 2003, the World Bank Research Group conducted a study on the impact of trade facilitation in the APEC group of Asia-Pacific countries (including improvement of the customs environment in the field of industrial products) on the effect of trade creation in these countries. Specification of the econometric (gravity) model was developed, examining the impact of these factors on trade, and then simulated on the assumption that the weakest members of this group would improve the efficiency of ports, improve the customs environment, administrative procedures and use electronic business to an average level in the group. As a result, the intra-group trade flows were expected to increase by 21% and only on condition that the customs environment and port efficiency are improved (Wilson J.S., et al., 2003).

In summary, apart from the positive budgetary effect and the protection of domestic production, most quantitative studies predict a decline in trade and GDP due to tax increases or withdrawal from the EU. It is worth adding that these studies were based on a neoclassical perspective and do not take into account behavioral determinants and legal.

Customs issues in the theory of foreign trade and economic doctrines

Since customs is an important external regulator of economic processes in foreign trade, it would seem that customs issues should occupy a high place in the theory of foreign trade. This theory consists of a series of theoretical concepts trying to explain, sometimes better and worse, what the flows of trade result from, what benefits are achieved and by whom, where the sources of these benefits lie, and a number of other important issues for international exchange. Unfortunately, the problem of the impact of customs duties on the economy has been reduced in the theory of foreign trade to only a few individual issues (such as e.g. the customs union and optimal currency areas), which makes it necessary to look for justifications for the customs policy in economic doctrines of a political nature.

Mercantilism as a form of customs intervention

Referring to the pragmatic position of the German, according to which the theory of customs is an explanation of the foundations of the pursued customs policy, and thus is a derivative of economic policy, the first more serious references to customs in economic thought can be found in the doctrine of mercantilism, which appeared at the turn of the 16th and 17th centuries. This doctrine saw the sources of wealth in the resources of precious metals. Thomas Mun put it this way in 1664: "The usual means of increasing our wealth and our possession of precious metals results from foreign trade, and we must constantly obey the rules in order to sell abroad more value than we buy from it "(Thomas Mun, Rymarczyk J. 2010, p. 22).

Another follower of this doctrine, Abraham Lincoln, is credited with the statement: "I don't know much about customs. I know that when I buy an English coat I get my coat and England my money, and when I buy an American coat I have the coat and America has money.

Most economists of Lincoln's contemporaries have rejected the idea that raising tariffs to obtain a trade surplus would improve state welfare (Samuelson P.A., et al., 2012, p. 361). However, the firm application of this principle and the accumulation of gold enabled the newly established United States, by purchasing new areas, to expand its territory - Louisiana from France, Florida from Spain, Alaska from Russia, and finally compensating Mexico for the annexation of Texas and California. So the accumulation of assets allowed for the increase of assets and a systematic increase in the prosperity of the state.

According to the mercantilists, "… the basis of wealth is gold and all kinds of valuable resources; directing foreign trade in such a way as to ensure the inflow of gold and silver; promoting industry by encouraging the import of cheap raw materials; protective duties on the import of processed goods; stimulation of exports, especially of finished goods; emphasis on population growth while keeping wages low. The essence of mercantilism is, of course, the doctrine that a favorable trade balance is desirable because it somehow leads to the welfare of the nation" (Blaug M., 2000, pp. 32-33).

The doctrine of economic liberalism. Negation of the role of customs

The economic doctrine opposed to mercantilism was the doctrine of economic liberalism, which after 1815 was gradually implemented by three English treasury secretaries. England, exhausted by wars with France, decided to relieve taxpayers and gradually began to reduce duties and taxes. The theoretical "anchor" of this doctrine were the views of British economists that had been initiated several decades earlier. These new views were expressed in Adam Smith's Research on the Nature and Causes of the Wealth of Nations (cf. Smith A., 2007), published in 1776, which in the science of economics became the foundation of the classical school. They were continued by the classics of political economy, especially David Ricardo and John Stuart Mill "(Misala J., 2009, p. 48). Apart from denying the role of tariffs and promoting free trade, classical economists made little contribution to the theory of tariffs. However, their role in strengthening the political doctrine of economic liberalism was important.

Classical theories of exchange. Optimum duty concept

The late classics dealt with the problem of the influence of customs duties in a broader way and neoclassicals. R. Torrens was the first to see the possibility of a positive impact of the duty on the prosperity of a large country, while the benefits related to the improvement of terms of trade, as a result of the customs barrier, were described in 1906 by Ch. Bickerdike. R. Torrens stated that, unlike a small country, only a large country can gain benefits from the introduction of customs duty. This is due to the fact that a country with a large share of the international market may influence the price level in this market. A small country is, unfortunately, the recipient of the prices prevailing on the world market. A large country having a monopoly position may take advantage of it, e.g. by means of customs duties on exports, and thus limit the export of goods, which ultimately will increase the price of the goods sold, so in this case the large country will act as a monopolist. On the other hand, it will act as a monopolist on import markets, limiting imports and reducing the world price of the commodity.

The optimal duty for a large country will be a rate at which the marginal benefit from improving (terms of trade1) will be equal to the marginal loss of efficiency caused by excessive production growth and reduced consumption under the conditions of applying the duty (Krugman PR, et al., p. 314 -316). These are important economic arguments, but they raise serious reservations. Firstly, the relations of the imposing country with other countries are deteriorating (e.g. loss of trust). Such actions also result in the introduction of retaliatory measures, and this may destroy the benefits originally obtained by the imposition of the duty. Second, the imposition of tariffs by one country disrupts free trade and thus inhibits international specialization, reducing the welfare of the world. One

should also mention the benefits of introducing a duty - for the decisive most of the countries whose supply and demand have a slight impact on the world price, they are not available (Budnikowski A., 1998, pp. 220 - 221).

Resource Abundance Theory. Views on the customs union

One of the other theories that addressed the problem of the importance of customs was the resource abundance theory. The founders of the theory of resource abundance are Eli Heckscher, Bertil Ohlin and Paul A. Samuelson. They assumed that international trade is only a special case of trade between different regions, which could also be customs unions. They argue that the theory of international trade is merely a more general theory of interregional trade. "According to their views, the main elements of the customs union include:

- the effects of indirect equalization of prices of factors of production, e.g. by the development of international trade (theorem of Abby P. Lerner and Paul A. Samuelson);
- links between changes in product prices and changes in prices of inputs (Wolfgang F. Stolper and Paul A. Samuelson theorem);
- The relationship between trade-induced changes in resource equipment and the fields of specialization (theorem of Tadeusz M. Rybczyński) ”(Bożyk P., et al., 2003, p. 137).

The doctrine of educational protectionism (customs protectionism)

Another economic doctrine that began to shape customs policy was the doctrine of educational protectionism (German customs protectionism). It was formulated in the 19th century by the German economist Friedrich List. The letter had completely different views than those presented in the above-mentioned theories, which assumed that the condition of fully realizing the benefits of exchange was the policy of free trade. He believed that "the theory of comparative costs imposes on less developed countries the traditional agro-raw material specialization, realizing the production of processed goods for industrialized countries. (…) Under the conditions of free trade, the less developed countries would not have a chance of industrialization at all, because their production would be eliminated from the market by foreign competition in the seed stage. Therefore, the Letter called for temporary tariff protection for newly emerging industries. (...) It would last until the protected industry gains lasting international competitiveness - hence the name: educational protectionism ”(Rymarczyk J., 2012, p. 413).

“The wave of new protectionism, known as neoprotectionism, has been particularly intense in the last two to three decades. In a qualitative sense, the new forms of protection of economies differ from the previous ones mainly in terms of their selective nature. The instruments used within them are directed against individual countries or groups of countries and refer to specific sectors ”(Rymarzewski T., 2006, p. 355).

"Among the authors whose works played the most important role in formulating the theoretical foundations of new arguments for protectionism, mention should be made of James Brander, Barbara Spencer and Paul R. Krugman (cf., https://en.wikipedia.org/wiki/Brander%E2 % 80% 93Spencer_model, 2016). The result of their work is the initiation of several concepts justifying the application of protectionist measures. The most famous of them are:

- **strategic trade policy** (is a concept explaining under what conditions a country can, at the expense of a partner, obtain benefits by introducing subsidies); and the most commonly used
- **industrial policy** (it is a policy of countries aimed at the development of industries and industries considered modern; in order to achieve this goal, the state uses various measures: subsidies, tax breaks, subsidizing research and development works, cheap loans, loan guarantees and derogations from the application of certain provisions antitrust) ”(cf., Budnikowski A., 2001, p. 223,224,227).

In the literature, one can find numerous arguments for the introduction of protectionist measures by individual countries. There are many criteria for their classification, one of them is the division into economic and non-economic arguments. For the so-called significant economic arguments include:

1) the arguments of the educational duty;
2) arguments for market failures;
3) Optimum duty arguments;
4) arguments for strategic trade policy.

We consider them to be rational, that is, those which, by introducing barriers to international trade, can achieve benefits in the sphere of prosperity. The argument of the educational duty is one of the most famous and oldest. The

rationale behind its introduction is to protect industry in international trade. It was first formulated by A. Hamilton and F. List, and then supplemented by, among others, J.S. Milla.

The argument of the educational duty is also consistent with the theory of comparative advantages and does not question the idea of free trade, but the perception of comparative advantages as a phenomenon that does not change over time. Of course, the argument of the educational duty also has weaknesses, such as the inability to correctly select the industry that should be protected and which will be competitive in the future, because it is best verified by the market itself. Another disadvantage is the time when protection will be needed that is difficult to define. The weakness of this duty is also apparent from the fact that the enterprises that were established and operate thanks to it, or subsidies, will not be inclined to lower costs and maintain high-quality production, which will lead to increased international competitiveness.

The doctrine of state interventionism

The customs issue was also reflected in the doctrine of state interventionism. Interventionism was a reaction to the problem of the global economic crisis. John Maynard Keynes3, who gave this doctrine a finishing touch, saw foreign trade as a need for a full employment policy. “If the source of the crisis was insufficient effective demand on the domestic market, then the improvement of the situation should be brought by faster growth of exports than imports, because then foreign demand for domestic goods grows faster than domestic demand for foreign goods, and multiplier mechanisms are activated. Limiting imports and increasing exports improve the use of domestic resources ”(Rymarczyk J., 2006, p. 35).

For the first time, Keynes introduced a demand model of production and employment in his dissertation The General Theory of Employment, Interest and Money Publisher in 1936. This model explains the causes of high unemployment and low production levels during the Great Depression of the 1930s. He suggested also the idea of close economic cooperation within the institution established to perform such a function. Its task would be to ensure full employment and payment balance. The policy of supporting exports and limiting imports, in accordance with the doctrine of interventionism, resulted in the breaking of trade ties in the second half of the 1930s and serious disruptions in international trade.

The customs union as the basis for the functioning of the common market of the European Union

By definition, a customs union "is that the members of the union break down barriers in the movement of goods and establish a common customs tariff and unify the trade policy towards external partners "(Ibidem, p. 295), and" a free trade zone is defined as a grouping of several countries within which customs duties have been abolished and other quantitative restrictions in international trade, but each country retained the right to national tariffs and to pursue an autonomous trade policy towards third countries (Ibidem).

"The free trade zone and the customs union are sometimes called preferential trade agreements, because the subject of both is international trade" (Budnikowski A., 2001, p. 248).

The effects of introducing the customs union are:

1) trade shift - replacing imports from third countries with goods from the grouping;
2) trade creation - the emergence of new trade flows; is the result of production specialization and the replacement of less efficient domestic production with cheaper products produced in another member state of the customs union.

The above-mentioned effects of the introduction of the customs union are classified as static effects, while the dynamic effects include: economies of scale, development of intra-industry trade, increase in investment, increase in competitive pressure and reduction in price margins. The basic functions will be introduced in the above chapter and tasks of the customs union within the European Union.

According to Art. 3 of the Treaty on European Community of December 1, 2009, the customs union is an exclusive competence of the European Union. 'Title two sets out the rules governing the functioning of the customs union. The provision of art. 28 of the Treaty on the Functioning of the European Union states that the Union includes a customs union that covers all trade in goods "(Laszuk M., 2009, p. 9).

The creation of the customs union can be dated on July 1, 1968, when it was initiated by the then European Economic Community - EEC. There was a complete elimination of customs duties and equivalent charges between the member states, thus the Common Customs Tariff became applicable to third countries.
Export duties in the Community trade were abolished on December 31, 1961, while the last import duties in mutual trade were abolished on July 31, 1969 - they concerned forty agricultural products.

In 2008, a strategy for the customs union was developed by the European Commission, the strategy sets out common goals that should strengthen the role of customs services in ensuring the safe operation of the common market. The goals have been set in the following areas (COM (2008) 169,: //eur-lex.europa.eu/ legal-content / PL / TXT / PDF /? uri = CELEX: 52008DC0169 & from = PL.):

Protection: protecting the public and the financial interests of the Community by:

1) ensuring the correct and efficient collection of customs duties and taxes;
2) applying effective measures to prevent the movement of illegal goods and goods subject to import bans or restrictions;
3) the further development of effective risk assessments that contribute to the fight against terrorism and criminal activities, including drug trafficking, counterfeit goods and pirated goods;
4) preventing, detecting, and investigating and prosecuting fraud and abuses related to customs law at the national level;
5) using mutual administrative assistance to ensure the correct application of the law in customs and agricultural matters.

Competitiveness: contributing to the competitiveness of European enterprises by:

1) modernizing the environment and working methods of customs services (e.g. by taking into account system approaches, greater harmonization of working methods, etc.);
2) elimination of the paper form of customs documents (creation of an electronic customs service system); and
3) taking a proactive approach to standards through endorsement international standards as appropriate, such as those of the World Customs Organization, and by developing new EU standards that could serve as global model standards.

Facilitation: to further facilitate legal trade by:

1) design and improvement of control systems through which the interference the movement of goods and the administrative burden reach the minimum required to meet other policy objectives related to public order and security requirements and by
2) making it easier for legally operating business entities to reduce compliance costs.

Control: controlling and managing supply chains applied to international flows of goods by:

1) improving and strengthening effective controls at the optimal point in the supply chain (at the border or within the EU),
2) correct and consistent application of Community and national legislation in the field of goods control and movement,
3) improving the effective and systematic transfer of information about threats,
4) Consider sharing information with major trading partners to establish a comprehensive supply chain control and management system.

Cooperation: maintaining, developing and improving good cooperation between the customs authorities of the Member States, between customs and other state administration authorities, and between the customs service and the business sector by:

1) deepening the existing cooperation in the field of customs,
2) coordinating activities aimed at protecting the financial interests of the Community,
3) taking the initiative in developing mechanisms for close coordination with other border authorities (one-stop shop),
4) improving the methods of cooperation and consultation with the enterprise sector,
5) strengthening international cooperation or mutual administrative assistance in customs matters through appropriate agreements with third countries and greater participation in international forums responsible for international law and decisions of the international community (such as embargoes, environmental protection agreements,
6) contracts relating to intellectual property rights, etc.) (Ibidem).

When implementing tasks related to the customs union, the European Commission should be guided primarily by its rational development within the European Union, support and development of trade between Member States and third countries, comply with competition rules, provide access to raw materials and semi-finished products and avoid disturbances in the economy (Brodecki Z ., 2002, p. 168).

Customs Classification

Trade policy measures are divided into tariff and non-tariff measures. Non-tariff duties are divided into par-tariff and non-tariff duties - customs duties are tariff. Fees collected in the form of duties are the most important tool of tariff trade policy. “Customs are an instrument of a legal and economic nature. The customs duty is classified as financial law in the broad sense of the term and among economic instruments because it affects the economic zone ”(Jura J., 2008, p. 25).

The customs duty can be divided in various ways, depending on what classification criterion we choose.

When choosing the division related to the movement of goods across the customs border, import, export and transit duties are distinguished (they no longer apply). “Import duties are of the utmost importance and their purpose is to protect domestic production and the level of domestic prices, or to improve the trade and payment balance. Like other types of duties, they can also serve fiscal purposes, ie increasing state revenues ”(Rymarczyk J., 2012, p. 268). Revenues to the state budget are presented in Table 1.1, which collects statistical data for 12 years.

Customs duties are transferred to the budget of the European Union in the amount of 80% for imports with third countries. The remaining 20% remains in the country collecting the customs duty and is intended to cover the running costs of the customs administration. The amount of customs duties on goods imported to the EU is regulated by the Community Customs Tariff.

“The return to economic liberalism, which we have been observing for over a dozen years, indicates rather a general retreat from protectionist policies - organizations of countries are emerging that remove tariff barriers. An example is the countries of the European Union; countries that in 1947 they concluded the General Agreement on Tariffs and Trade (GATT) to liberalize world trade. With time, as a result of negotiations (eighth round of GATT), the process of lifting customs barriers progressed. In 1995, the GATT was incorporated into the World Trade Organization (WTO). Another example of lifting customs restrictions is the Central Europen Free Trade Agreement (CEFTA), functioning until the accession of Central and Eastern European countries to the EU ”(Owsiak S., 2005, p.187).

Currently, Donald Trump's policy shows a return to economic protectionism.

VAT in trade with countries outside the European Union

Activities subject to VAT (which is based on the EU Council's VAT Directive (Directive 2006/112 / EC of the EU Council on November 28, 2006) are specified in the Act of March 11, 2004.

"In order to assess the degree of protection of the domestic market by means of indirect measures, one should take into account - apart from customs duties - also taxes" (Dudziński J., 2010, p. 191).

The concept of tax and tax entity can be defined as follows: "A tax is a cash benefit for a public-law association, obligatory, determined unilaterally, free of charge, non-returnable and general.

Tax is a benefit defined, measured and paid in monetary units in a given country. (...) Tax revenues go to public-law unions at various levels. Most often it is their budget income. Taxes are the main source of revenues for the budgets of individual countries (in Poland, taxes account for over 85% of the state budget revenues) ”(Nykiek W., et al., 2011, p.11).

Table 1.1: Budgetary receipts in Poland in particular years - in the period from January to December of a given year

No.	Description	Budget revenues*)											
1	Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
2	Income tax from legal persons	18, 03 mln	20,79 mln	25,34 mln	32, 16 mln	34,63 mln	30,77 mln	27, 89 mln	31, 74 mln	31, 95 mln	29, 38 mln	29, 71 mln	32, 90 mln
3	Income tax from natural persons	36, 66 mln	42,18 mln	48, 70 mln	60, 96 mln	67, 19 mln	62, 74 mln	62,49 mln	67,50 mln	70, 62 mln	73, 75 mln	78, 13 mln	83,14 mln
4	Goods tax and services	62, 54 mln	75,40 mln	84, 44 mln	96, 35 mln	101, 78 mln	99, 45 mln	107, 88mln	120, 83mln	120, 00mln	113, 41mln	124,26mln	123,12mln
5	Excise tax	37, 97 mln	39, 48 mln	42, 08 mln	49, 02 mln	50,50 mln	53, 93 mln	55, 68 mln	57, 96 mln	60 ,45 mln	60, 65 mln	61, 57 mln	62,81 mln
6	Tax on games	0,77 mln	0,79 mln	0,89 mln	1,10 mln	1, 40 mln	1, 57 mln	1, 62 mln	1, 48 mln	1, 44 mln	1, 30 mln	1, 23 mln	1, 34 mln
7	Taxes Abolished **)	1 916 thou.	2 349 thou.	877 thou.	4 383 thou..	3 456 thou.	822 thou..	520 thou.	1 480 thou.	270 thou.	239 thou.	382 thou.	60 thou.
8	customs duties	**2, 29 mln**	**1, 27 mln**	**1, 38 mln**	**1, 75 mln**	**1, 73 mln**	**1,63 mln**	**1, 66 mln**	**1, 92 mln**	**1, 97 mln**	**2, 02 mln**	**2, 44 mln**	**2, 93 mln**
9	Overall	**158,26 mln**	**179,92 mln**	**202,83 mln**	**241,36 mln**	**257,23 mln**	**250,09 mln**	**257,22 mln**	**281,43 mln**	**286,43 mln**	**280,51 mln**	**297,34 mln**	**306,24 mln**

*) They are shown in full amounts, i.e. without deducting shares for local government units
The data is provided jointly from customs and tax chambers.
**) Proceeds in thousands due to low amounts.
Source: Own study based on the data provided, http://www.finanse.mf.gov.pl/budzet-panstwa/wplywy-budzetowe [access: 2.08.2016].

"The subjects of tax and legal relations are: a public law association which is a tax creditor, represented by a relevant authority, and a taxpayer who is the entity liable to pay the tax, ie a tax debtor" (Ibidem, p. 31).

Taxation with tax[2] on goods and services in Poland is regulated by the Act of March 11, 2004 on tax on goods and services (Journal of Laws of 2004, No. 54, item 535, as amended) - hereinafter referred to as the VAT Act. Taxable goods tax and services (VAT) are subject to (Ibidem, p. 370):

1) delivery of goods against payment and provision of services against payment in the territory of Poland;
2) export of goods;
3) import of goods;
4) intra-Community acquisition of goods for remuneration within the territory of the country,
5) intra-Community supply of goods.

"Within the meaning of the VAT Act, the export of goods is the export of goods from the territory of the country to a third country after the sale has been confirmed by the customs office. Due to the determination of the person affected by this mechanism, exports are divided into:

a) direct - the export is made by the supplier;
b) indirect - the export is made to a buyer established in another country ”(Stępień B., 2012, p. 399). The trade in goods in the act on tax on goods and services was defined as import and export of goods. The import of goods is the import of goods from the territory of a third country to the territory of the country. We have to note here that the area of impact of Directive 2006/112 / EU, i.e. defining the limit of intra-Community supplies and purchases, does not coincide with the customs territory. Due to this situation, trade in goods with third countries has a different territorial scope in the customs regulations and in indirect taxes.

From the date of Poland's accession to the EU structures, that is from May 1, 2004, customs borders between Poland and its other members were eliminated. The concepts of export and import of goods within the EU have disappeared and have been replaced by the term intra-community transactions: intra-community acquisitions of goods and intra-community supplies of goods. We continue to use the terms export and import of goods in dealing with non-EU countries. "Intra-Community acquisition of goods (CTS) takes place if the conditions for registration as a VAT-EU taxpayer are met, both on the part of the buyer and the supplier. This means the buyer and the supplier should be VAT - EU registered taxpayers in the respective Member State” (Ibidem, p. 375).
Of course, there are some exceptions, but that applies to other tax considerations.

Customs Tariff

Customs authorities are an indispensable element of almost every country and for the most ancient years they have been supervising the proper trade exchange. Customs duties were collected in Poland during the times of King Bolesław the Bold, as described above.

The literature covers customs tariffs from the turn of the 12th / 13th centuries, in particular the tariffs in Kołobrzeg from 1159, Płock from 1203, and Szczecin from 1257 (cf. Samsonowicz H., p. 705). -707).

By referring to historical materials from slightly less distant times, because of the end of World War I, you can find valuable information related to the establishment of the civil customs administration at the beginning of 1919. On August 1, 1919, the Government granted the ministers of the treasury, industry and trade the right to develop a customs tariff. The first customs tariff of the Second Polish Republic was issued on November 4, 1919, together with the ordinance and executive regulations. This event can be considered the beginning of modern customs administration in Poland (cf. http://www.sprawynauki.edu.pl/index.php?option=com_content&view=article&id=2953:co-a-ochrona-granic-ii-rp&catid= 317 & Itemid = 30, 11/19/2015).

The customs tariff in Poland was constantly changing, which was a consequence of changes taking place in the economy. The years 1998–2000 are significant for these changes. On January 1, 1998, at the same time as the customs tariff (Journal of Laws No. 158, item 1047), the Customs Code (Journal of Laws, No. 23, item 117) entered into force, and in 1999 and 2000 the customs rates were changed. The last version of the Polish customs tariff is dated January 1, 2003 and was valid until April 30, 2004.

Poland, becoming a member of the European Community, also adopted the Community Customs Tariff (Common Customs Tariff - WTC) (http://ksiegowosc.infor.pl/obrot-gospodarczy/clo/739164,Wspolna-Taryfa-Celna-i-klociągacja-towarow.html ; http: // www.psz.pl/index.php/slownik/W, access: 20/05/2016), which is valid in all Member States.

The basic legal instrument regulating trade with third countries is the Common Customs Tariff (CCT), adopted for the first time in 1968.

According to the definition, the customs tariff "is an ordered list of goods (nomenclature) containing a list of duties collected on goods crossing the customs border of a given country" (Budzowski K., 2003, p. 137).

"Customs tariff (t.c., English) - a systematic statement (classification) of goods and customs rates when goods pass through the customs border. The statement contains code numbers that allow for the assignment of individual goods to specific types, items and subheadings, a detailed description of the names of the goods to be dutiable, usually according to the degree of processing, and columns in which the amount of duty rates for individual goods is given. The columns are distinguished:

- autonomous, with the highest rates;
- conventional, most-favored-nation clause, or participation in an organization whose members benefit from reduced tariffs, such as the World Trade Organization or the European Free Trade Association;
- preferential, where the lowest duty rates are set (Universal System of Preferences). In countries belonging to the European Union, an external t.c. is used.

Integrated Tariff of the European Union (Intergrated Tariff of the European Community) including all the above-mentioned components (customs nomenclature) (Białecki K.P., 2007, p. 272).

When discussing the customs tariff, one should of course describe its most important element, which is the Combined Nomenclature (CN).

“The duty classification (n.c.) is the grouping of goods in customs tariffs based on certain criteria. Three categories of n.c. are used:

1) in alphabetical order;
2) according to the amount of customs duties;
3) according to the properties (characteristics) of the goods listed in the customs tariff (e.g. the production phase or the degree of finishing of the goods according to the content of specific ingredients).

The third criterion is now commonly used. According to the classification adopted therein, goods are divided into chapters, sections and items. There are 10 sections numbered from 0 to 9 (…). Only the US classification is different, which consists of 8 divisions divided into parts, groups and items.

Since January 1, 1988, the countries of the European Union have used the Harmonized Commodity Description and Coding System. The benefits of using this nomenclature consist in adopting a unified coding system, using an electronic data transmission system, using unambiguous statistical registration ”(Ibidem, pp. 186–187.).

The Community customs tariff of the European Union includes the resulting regulations from the obligations of the European Union towards the World Trade Organization.

Council Regulation (EEC) No 2658/87 of 23 July 1987 on the tariff and statistical nomenclature and on the Common Customs Tariff OJ L256 / 1987

(https://ec.europa.eu/neighbourhoodenlargement/sites/near/files/20161109_strategy_paper_en.pf, 2015) introduced:

1) The tariff nomenclature known as the Combined Nomenclature (CN), it includes:
  - **a)** the Harmonized System (HS) Nomenclature;
  - **b)** Community divisions to the HS nomenclature - the so-called CN subheadings where the duty rate is specified;
  - **c)** introductory provisions, additional notes to sections or chapters and footnotes relating to CN subheadings.

2) Common Customs Tariff;
3) TARIC Integrated Tariff of the European Communities;
4) the Customs Code Committee.

Integrated Customs Tariff of the European Community - TARIC (Union Customs Code, 28.07.2016) is a document adopted annually by the European Commissionand published in the Official Journal of the European Community, Series L TARIC, meets the requirements of:

1) the Community Customs Tariff;
2) external trade statistics;
3) trade policy;
4) agricultural policy;
5) other Community policies relating to the import or export of goods.

The TARIC database is open to everyone, both private economic operators and third country administrations. This database is updated daily. An electronic version is available on the website of the European Commission.

TARIC also publishes data on export and import bans, export restrictions and returns, as well as data supplementing the trade mechanism and export refunds.

On May 1, 2016, changes were made to the EU Customs Code, but the rules of the Common Customs Tariff did not change. The basis of import duties and exports is the Common Customs Tariff. Other measures, laid down in EU regulations governing specific areas of trade in goods, are applied in accordance with the tariff classification of the goods concerned (http://www.odprawacelna.pl/system-taric.html,.19.11.2015).

Summary

After Poland joined the structures of the European Union, the role of the customs duty was significantly weakened. The first chapter describes the elements of the theory of customs and the effects of introducing and canceling them. First of all, by introducing duties, the state may pursue various goals of economic policy, the theory of state interventionism should be mentioned here. Secondly, the greatest possibilities for the state to influence the market situation exist in the field of international exchange.

International trade - commodity exchange is constantly changing its shape, structure and directions. As for the theories of international trade, it can be said that they all agree that it brings additional income. As should be noted of the presented theories, there is no single theory that fully describes it. Of course, you can define some determinants - factors influencing trade - but there is never likely to be a theory of international trade that fully describes the phenomenon as international trade becomes increasingly complex.

The article also discusses the customs union, the introduction of which results in:

- trade shift - replacing imports from third countries with goods from the grouping;
- trade creation - the emergence of new trade flows.

When Poland became a member of the European Union, it had to adapt to the regulations that resulted from joining its structures, e.g. VAT in trade with non-EU countries or adopt the Community Customs Tariff, which includes regulations resulting from the EU's obligations to the World Trade Organization.

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- [1] Currently, terms of trade can be distinguished: - price - as the ratio of the prices of exported goods to imported goods; - quantitative, i.e. the quantity of goods that must be exported in order to be able to import a certain amount of other goods; - profitable, being the product of the terms of trade indexand an export volume index; - factorial, which can be univariate when price terms of trade are weighted with the productivity index of exported goods, or two-factorial when the price terms of trade are weighted by both the index of performance in the production of goods for export and in the production of goods that the country imports.
- [2] Taxes - Value Added Tax: The Union does not set taxes in the Member States. Each country determines for itself what taxes and in what amount its citizens must pay. The only exception to this rule is the adoption of the principle that the standard rate of VAT in the Member States may not be lower than 15% (currently it is 23% in Poland). The so-called the reduced rate of this tax may not be lower than 5% (currently 8% in Poland). Cf.: W. Brzeziński, A. Górczyński, *Encyklopedia Unii Europejskiej,*p. 128.
- [3] J.M.'s theory Keynes was founded in the 1930s. It tried to explain the causes of the Great Depression (1929–1933) and mass unemployment. The classical system was rejected because it was supposed to subordinate the state of economic activity and employment to the automatic mechanism of restoring the balance of payments. The main goal of his theory was to explain the causes of internal imbalance and to provide methods of its restoration. See: *Międzynarodowe stosunki gospodarcze*, (ed.) A. Budnikowski, E. Kawecka-Wyrzykowska, PWE, Warszawa 1996, p. 214.
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Pandemic Challenges for Bodies of Local Self-Government in Europe

Denis KRASIVSKY
PhD (Public Administration), Senior Researcher of the Problematic Research Laboratory of Social Studies of the Labor Market, of the Ukrainian State Employment Service Training Institute (USESTI), 17 Novokzalna street, Kyiv 03038, Ukraine, krasivskiy.denis@gmail.com;

Evgen KARTASHOV
Doctor of Public Administration, Head of Department of Project Management and General Professional Disciplines, Educational and Scientific Institute of Management and Psychology of State Higher Educational Institution «University of Educational Management» of National Academy of Educational Sciences of Ukraine, 52A, Sichovykh Striltsiv Str., Kyiv, 04053, Ukraine, email: yevgenkartashov@gmail.com

Viktor Kotygorenko
Doctor of Political Sciences, Professor, Head of the Department of National Minorities, I.F. Kuras Institute of Political and Ethnic Studies National Academy of Sciences of Ukraine, 8, General Almazova Str., Kyiv, 01011, Ukraine, email: vakgor@gmail.com

Abstract

The coronavirus pandemic in Europe has shown that moderately centralized unitary states, as well as small countries, have been able to deal with it most effectively, enabling the center to carry out its orders quickly on the ground. In addition, the need for large-scale state assistance to overcome the economic consequences of quarantine reinforces paternalistic sentiments among citizens and threatens to weaken decentralization trends. At the same time, regional differences in quarantine policies within one country have highlighted the importance of good local governance, which will make citizens more responsible in the selection of members of representative bodies at the local level.

Keywords: local self-government, public administration, decentralization, crisis management, epidemic.

Introduction

The catastrophic situation with the spread of COVID 19 coronavirus in the world and in Europe, in particular, showed the necessity for a single centralized approach to the concentration of resources and their adequate allocation, created the preconditions for strengthening paternalistic tendencies in society, and on the other clearly demonstrated save lives: through self-organization on the ground, without waiting for instructions from higher authorities, a number of municipalities in the most affected countries by the pandemic have demonstrated their ability to use available resources and powers effectively to minimize the negative consequences. In other words, the pandemic has become a challenge for local self-government: on the one hand, there are preconditions for curtailing decentralization processes, and on the other hand, it forces citizens to be more responsible in the choice of representative bodies on the ground.

Quite a lot of attention is paid by researchers to the problems of crisis management (Turpin, Neal (2016)) (for example, in floods (Steen, Riana and Morsut, Claudia (2019)), the peculiarities of the organizational structure (Christensen Tom, Lægreid Per, and Rykkja Lise H. (2016)), training of officials (Sinclair Helen, Doyle Emma E.H., Johnston David M., and Paton Douglas, (2012)), the role of leadership (Boin, A. and Hart, P. (2003)), the political consequences of crises (Albrecht Frederike, (2017)) and disaster management (Sanneke, Kuipers (2019)). Also in the literature the participation of bodies of local self-government in the prevention (Smith, S. (2013) 'Emergency preparedness: a challenge for rapidly urbanizing regions of the world', 141st American Public Health Association Annual Meeting, 2–6 November, 2013, Boston, MA), control and elimination of the consequences of emergencies, primarily natural or man-made (earthquakes, floods, accidents at work)(Sinclair, H., Doyle, E.E., Johnston, D.M. and Paton, D. (2013) 'The use of emergency operations centres in local government emergency management', International Journal of Emergency Management, Vol. 9, No. 3, pp.205–228.) is covered in detail. However, the role and importance of municipalities in preventing and counteracting epidemiological phenomena were not considered in the literature until recently. The COVID 19 coronavirus epidemic showed that despite the significant number of

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factors that contributed to the rate of disease spread and the effectiveness of pandemic response in each country, it revealed the importance of good governance not only nationally but also locally and regionally. This article is dedicated to the research of this aspect in the context of the experience of European countries and Ukraine.

Presenting Main Material

Significant differences between the rates of morbidity and the number of deaths are observed not only on the European continent, but also within the countries themselves. This suggests that not only the level of development of the health care system (medical infrastructure and its readiness for peak loads, the number of medical staff and their provision of personal protective equipment) but also a timely and balanced response to this played a significant role in the effectiveness of anti-epidemic policy. a threat from local and regional authorities, which has made it possible to slow down the rate of infection and prevent a sharp rise in mortality among the population.

Since the number of deaths per 1 million population indicates the quality of medical services, the age of the population, from a managerial point of view is more informative the number of infected per 1 million population, which primarily indicates the effectiveness of quarantine and public authorities at all levels.

Table 1: The number of cases of coronavirus COVID 19 infection per 1 million population as of 15.04.2020

Country	Number of cases of infection	Country	Number of cases of infection
Spain	3799	Sweden	1181
Switzerland	3043	Denmark	1153
Belgium	2897	Estonia	1055
Italy	2732	Slovenia	600
Ireland	2325	Finland	584
France	2195	Czech Republic	580
Portugal	1774	Lithuania	401
The Netherlands	1643	Romania	375
Austria	1591	Latvia	353
Germany	1584	Greece	210
Great Britain	1451	Poland	200
Norway	1243	Ukraine	86
Reference: https://www.worldometers.info/coronavirus/			

Thus, in Europe, the leaders in the number of infected are countries with a high degree of independence of territorial units (highly decentralized unitary countries with autonomous regions (Spain, Italy, and Great Britain), federations (Belgium, Germany), and confederations (Switzerland)). Small unitary countries with a high rate of centralization (Ukraine, Poland, Greece, Latvia, Romania, Lithuania, and the Czech Republic) best dealt with the pandemic.

A number of factors can explain differences in the course of the pandemic: the intensity of passenger traffic, especially international, cultural and climatic features of a particular country, quality and availability of medical services, readiness of medical infrastructure for peak loads and more. However, not the least role in this was played by the quality of public administration, in particular the degree of centralization, which affected the efficiency of response.

The peculiarity of the epidemic is the necessity for rapid detection and isolation of the first patient, checking all his contacts to curb the exponential growth of the disease. Accordingly, the sooner public authorities take measures to reduce contacts between citizens (closure of kindergartens, schools, entertainment venues, shops, etc.), the better the chances of patients receiving adequate medical care, as no health care system in the world is designed for large-scale peak loads at the hospital.

Political scientist T. Pappas identified three key factors in successfully counteracting the pandemic: 1) it is the determination and effectiveness of state leadership; 2) it is the capacity of states and their health care systems in times of crisis; 3) the willingness of society to comply with the rules established in an emergency (Papas T., (2020)). Comparing countries similar to Greece in mentality and climate, he concluded that the success of Athens in countering the pandemic is due to the quality of government. He notes that, unlike the European countries most affected by the

coronavirus, Spain and Italy, Greece is a unitary, centralized state, making government decisions quickly implemented at the regional and local levels.

The coronavirus in Italy was officially confirmed on January 31, and on February 22, it became known about the first death from the coronavirus. On March 5, when the death toll exceeded 100 (and the death toll reached 3,000), the government closed all schools. Since March 8, when confirmed cases approached 6,000, the prime minister has quarantined all of Lombardy and other northern provinces, which at the time was the most radical step in the fight against the virus anywhere outside China. On March 10, the quarantine was extended to the whole of Italy. As a result, 38 days (and 16 days from the first death) passed from the first confirmed case of the disease before a strict quarantine regime was imposed, and on March 19, Italy became the country with the highest number of confirmed deaths in the world.

The opposite situation occurred in Greece, where the first patient with coronavirus was recorded on February 26. On the same day, the country's health minister canceled all planned mass events across the country, and the government banned all study trips abroad. Thirteen days later, on March 10, when there were only 89 confirmed patients in the country and no deaths from COVID-19 were recorded, the government closed all kindergartens, schools and universities. On March 12, the first death from coronavirus was recorded in Greece. Over the next few days, the government closed theaters, cinemas, restaurants, bars, shopping malls, playgrounds, museums, cottages, parks, recreation areas, marinas, organized beaches and ski resorts; the only exceptions were supermarkets, pharmacies and food outlets. The rapid action of the Greek government has resulted in some of the lowest rates in Europe of the number of infected and dead per 1 million population.

In Ukraine, the first case of COVID-19 infection was confirmed on March 3, 2020, and on March 12 quarantine was introduced in educational institutions, on March 16 - entry of foreigners was banned and international traffic was closed, on March 18 transportation within Ukraine was stopped and traffic was restricted, public transport, only grocery stores and pharmacies are allowed to operate. On March 25, a state of emergency was declared throughout the country, and on April 6, a strict quarantine was introduced: a mandatory mask regime was introduced, no more than two people were allowed to walk on the street together, and no public places were allowed, and so on.

However, a number of local authorities without waiting for instructions has introduced most of these restrictions from public authorities. Part of the problem of countering the pandemic fell on the shoulders of mayors and bodies of local self-government, who had to resist the outbreak of the virus and at the same time ensure the functioning of cities in crisis.

It should be noted that according to the current legislation, the powers of local governments in the field of civil protection include (Article 19 of the Civil Protection Code of Ukraine): providing civil protection in the relevant territory and performing tasks created by them links of territorial subsystems; development and implementation of programs and action plans in the field of civil protection, in particular, aimed at protecting the population and territories from emergencies and preventing their occurrence, ensuring man-made and fire safety; organization and management of restoration works to eliminate the consequences of emergencies; organization and implementation of evacuation of the population, property to safe areas; development and implementation of measures aimed at ensuring the sustainable functioning of economic entities in a special period; creation and use of material reserves to prevent and eliminate the consequences of emergencies; providing social protection for victims of emergencies, including the payment of material assistance; creation of commissions on techno genic and ecological safety and emergency situations in cities, and in case of emergencies - special commissions for their liquidation (if necessary), ensuring their functioning. For coordination of activities of central and local executive bodies related to techno genic and environmental safety, protection of the population and territories, prevention and response to emergencies, regional and city state administrations establish regional commissions on techno genic and environmental safety and emergencies; and district state administrations, executive bodies of city councils, district in cities and settlement councils - local commissions on techno genic and ecological safety and emergencies (Article 6 of the Civil Protection Code of Ukraine).

In order to coordinate work for the elimination of a specific emergency and its consequences at the state, regional and local levels, special commissions for the elimination of an emergency are formed. Links of territorial subsystems of the unified state system of civil protection are created by district state administrations - in districts, and local governments - in regional centers, in cities of regional and district significance (Article 10 of the Civil Protection Code of Ukraine).

Aware of the potential threats, local authorities were forced to undertake measures that were unpopular with residents, either on their own initiative, before the relevant orders of the central government were issued, or after a relevant resolution of the Cabinet of Ministers of Ukraine. Thus, Kyiv was one of the first to impose strict restrictions, in

particular on the operation of public transport and wearing masks in public places. In Lviv, one of the first in the country to impose restrictions on the activities of trade establishments, and in early March, a headquarters was set up to combat the epidemic. In Odessa, an emergency commission and an expert council consisting of infectious disease specialists and anesthesiologists have been set up to develop recommendations and engage in strategic planning taking into account the specifics of the region. At the same time, Kharkiv tried to postpone the closure of kindergartens and schools, and the mayor insisted that local authorities were better aware of the epidemiological situation and, given true decentralization, such a situation could not happen in principle (Statement by Mr. Gennady Kernes on the situation with quarantine in schools, 2019).

Many cities have had to revise their budgets to allocate additional funds to tackle the epidemic. In particular - for the purchase of ventilators, tests and equipment for laboratories. In addition, as many medical facilities in the country lack medical equipment and personal protective equipment, cities have competed to purchase the necessary goods. In addition, in Kyiv, Lviv and Odesa, the authorities are going to pay monthly from their own budgets to doctors who are fighting coronavirus. However, later the Cabinet of Ministers of Ukraine allocated additional funds from the state budget for the payment of increased salaries to physicians. Also in these cities, it was decided to exempt from payment all enterprises that rent communal premises, but were forced to close for quarantine.

It can also be argued that it was thanks to the activities of mayors and heads of territorial communities that the outbreak of the epidemic was contained, as the country was quarantined without a third of the heads of district state administrations (DSAs). As of mid-April 2020, only 314 of the 490 required DSA heads had been appointed, and mainly deputies appointed under former President Poroshenko headed the rest of the districts. The largest staff shortages were experienced by Luhansk region (only 4 DSA heads appointed), Chernihiv region (3 DSA heads appointed out of 22), Ternopil region (5 out of 17), Kyiv region (10 out of 25), Volyn region (7 out of 16), Vinnytsia region (14 out 27) and Sumy region (0 out of 18). At the same time, only Ternopil region was among the top three in terms of the number of cases, and the fewest were recorded in Luhansk, Chernihiv, Donetsk and Sumy regions.

Bodies of local self-government have also shown a willingness to join forces to defend their rights. One example is the joint statement of 23 mayors - members of the Association of Ukrainian Cities (AUC) were against the adoption by parliament of an "anti-coronavirus" law (On Amendments to the Tax Code of Ukraine and Other Laws of Ukraine on Support of Taxpayers for the Period of Measures Aimed at Preventing the Occurrence and Spread of Coronavirus Disease (COVID-19)), which provided for the exemption of businesses from a number of taxes, including land fees and real estate tax, which go to local budgets without prior consultation with bodies of local self-government. Such tax benefits and other restrictions can cost local budgets about 12 billion UAH, which go to salaries for doctors, teachers, social workers and utilities, and so on. Subsequently, the Cabinet of Ministers allocated funds to compensate for the increased salaries of medical workers involved in the fight against coronavirus, but the proceeds from a number of abolished taxes will have a negative impact on the activities of local governments.

In addition, regular local elections are scheduled for October this year, forcing mayors and local deputies not only to think about fighting COVID-19, but also to consider the necessity to fight for re-election in the wake of growing dissatisfaction with the inevitable deterioration of the socio-economic situation after the epidemic. Therefore, in early May some regions began to weaken gradually the quarantine regime, not waiting for the appropriate order of the central government, not least for reasons of political expediency.

Conclusions

Thus, the negative consequences of the pandemic in European countries were minimized due to the prompt response to the threat, the compact size of the countries and the centralization of public administration, which facilitated the immediate implementation of central government orders. However, in addition to these obvious conclusions, it can make a number of less obvious, more fundamental ones.

This crisis has shown that the effective operation of local governments is not only the proper operation of public transport and utilities, a high level of socio-economic well-being of residents, but also saved lives. Accordingly, residents will pay less attention to the party affiliation of local politicians, focusing primarily on their managerial qualities; will more closely monitor their activities, because it depends on their survival. At the same time, this increase in public confidence in the local authorities that have effectively dealt with the pandemic is combined with another, contradictory trend - the growth of centralization and paternalistic expectations, as it turns out that only a strong state can implement and monitor strict quarantine measures of the epicenter of the crisis. Moreover, only the state can provide large-scale assistance to small and medium-sized businesses create temporary jobs until the economic crisis caused by quarantine.

The state is threatened no less by the outcome of the pandemic: against the background of serious economic problems, some territories may take advantage of the inefficiency of the central government in combating the coronavirus and insist on greater independence. Thus, one of Spain's most separatist regions, Catalonia, which was severely affected by the coronavirus and was ready to accept military aid from Madrid during its rapid spread, now says the center has taken anti-epidemic measures too late and the region could do much better on its own which he needs even more power.

The pandemic also pointed to the necessity to change management approaches to prevent and minimize the effects of pandemics. An outbreak of coronavirus in Europe has shown that the ability of local governments to respond and recover from a disaster depends largely on the actions taken in the run-up to the disaster. They must develop plans to respond to, rebuild and minimize the consequences of the disaster. They should define the role of the various organizations in the event of a disaster, the mechanisms for coordinating their activities to avoid duplication and inconsistencies. The community's ability to respond to an emergency begins with the development of a local emergency plan. Such a plan should include a list of available resources in case of various situations: floods, fires, earthquakes, etc. (for example, means and places for evacuation of the population).

Conclusion

If the city does not reach an agreement in advance on possible resources with private companies to provide transport, technical equipment, etc., it loses precious time trying to negotiate access to the resources already needed. In addition to agreeing with the private sector, the municipality may also negotiate with neighbors to join forces or provide assistance. At the same time, plans at all levels of government - local, district, and regional – have to be agreed in order to ensure effective action to combat natural disasters.

In addition to the contingency plan, special attention should be paid to emergency recovery and response projects, which should include the powers and responsibilities of public authorities, mechanisms and procedures that they will use at all levels of government in the short and long term periods of crisis recovery.

It is also worth paying special attention to the exchange of crisis and post-crisis experience between local governments, to create conditions for the dissemination of the most effective disaster management practices in the future.

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Analysis Impact of the Omnibus Law Job Creation Act on Hajj Pilgrimage Fund Management in Indonesia

Hendy D. MANDEGANI
Universitas Indonesia, Indonesia
hendymandegani@gmail.com

Siti NURYANAH[1]
Universitas Indonesia, Indonesia
siti.nuryanah@ui.ac.id

Abstract

The objective of this research is to analyze the impact of the Omnibus Law Job Creation Taxation Cluster enacted in 2020 on the management of Hajj pilgrimage fund in Indonesia by the Hajj Financial Management Agency (Badan Pengelolaan Keuangan Haji-BPKH). This research was conducted by studying the literature, especially the laws and regulations regarding hajj financial management and taxation. The results show that the tax exemptions in the Omnibus Law of the Taxation Cluster Job Creation Act can provide an increase in the allocation of benefit values to waiting hajj pilgrims. In addition, the tax exemption also potentially increases the economy of Indonesia through increasing the amount of Hajj Fund that can be invested.

Keywords: Omnibus law, Pilgrimage, Tax, Public Finance, Finance.

Introduction

In Indonesia, to be able to perform the hajj pilgrimage, prospective pilgrims must pay a certain amount of money to a bank appointed by the government and register for a portion number. This payment is commonly referred to as an initial deposit. The amount of initial deposits that must be paid by the pilgrim candidate from 1999 to 2019 has continued to increase (Sasongko 2015); as seen in the graphic below:

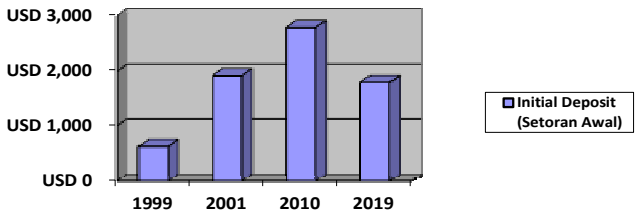

Figure 1: Initial Deposit by The Pilgrim Candidate
Source: Data processed by author based on Sasongko (2015)

Then after receiving notification to make Hajj repayment from the Ministry of Religion, the pilgrim candidate must pay another amount of money to the designated bank. This payment is known as a paid deposit. The amount of the deposit in full varies depending on each departure area. The amount of initial deposit and deposit paid in full by the pilgrim candidate is the hajj cost that is borne by the pilgrim candidate. The amount of Hajj costs borne by the pilgrim candidate has also continued to increase from 1999 to 2019 as shown in the graph below:

[1] Corresponding author.

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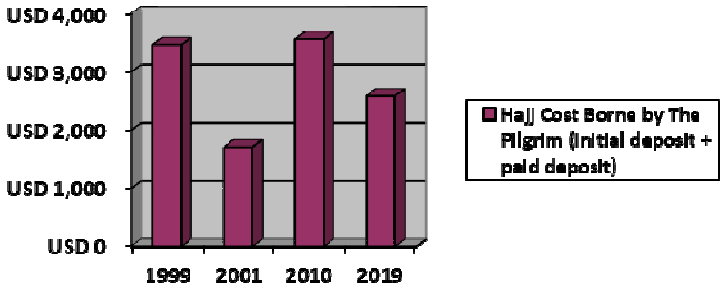

Figure 2. Hajj Cost Borne by the pilgrim candidate

Source: Data processed by author based on Gilas (2019)

Meanwhile, the real cost to carry out the hajj pilgrimage from Indonesia to Saudi Arabia and return to Indonesia per person is USD 4,558 in 2018 and USD 5.179 in 2019. This shows that there is a difference between the costs of Hajj borne by the pilgrims (initial deposit plus paid deposit) with real costs to carry out the pilgrimage.

Table 1. Difference Hajj Real Cost and The Cost of Hajj Borne by The Pilgrim

No	Description	2018	2019
1	Hajj real cost per person	USD 4,558	USD 5,179
2	The amount of initial deposits and deposits in full for the Hajj Candidates per person	USD 2,417	USD 2,518
3	Difference per person (1-2)	USD 2,141	USD 2,662
4	Number of pilgrims leaving	204,000 pilgrims	204,000 pilgrims
5	Total difference (3x4)	USD 436,710,172	USD 542,982,129

Source: Data processed by author based on Rachman (2019)

Table 1. shows the difference of USD 436,710,172 in 2018 and USD 542,982,129 in 2019. The very large difference between the real costs of Hajj and the costs of Hajj that is borne by the pilgrims (initial deposit plus payment in full) turns out to be covered by funds originating from yields or the so-called benefit value generated by the Hajj Financial Management Agency (BPKH) on investment management and placement of hajj funds.

BPKH is a public legal entity established under Law No. 34/2014 through Presidential Regulation No. 110/2017 on Hajj Financial Management Bodies. This institution has the task of carrying out corporate and non-profit hajj financial management with the aim of increasing the value of benefits or returns obtained from investing and placing pilgrimage funds that have accumulated due to the minimum haj quota per year of 221,000 prospective pilgrims compared to pilgrims whose waiting list reaches 4.2 million prospective pilgrims.

Quoted from bpkh.go.id in 2018 and 2019, according to a member of the BPKH Supervisory Board, almost all of the returns or value of benefits generated by BPKH are actually used to cover the difference between the real costs of haj and the haj costs borne by pilgrims (initial deposit plus full deposit). In other words, almost all of the returns or benefits generated by BPKH are given to the departing congregation. In fact, BPKH is also expected to provide returns to prospective pilgrims waiting (waiting list) according to the mandate of Law No. 34 of 2014.

From the explanation above, it can be concluded how important the role of BPKH is for the departing pilgrims and the waiting pilgrims. However, the fact is that currently the yield or benefit value generated by BPKH is only enough to be distributed to the departing pilgrims. Meanwhile, the waiting hajj pilgrims did not get the returns they deserved.

One of the things that causes the reduction in the value of benefits generated by BPKH is the income tax imposed on returns from investments and placement of Hajj funds. As a public legal entity in Indonesia, BPKH has the obligation to comply with the provisions in Indonesia. One of the provisions that must be obeyed by BPKH is regarding taxation. Based on Article 4 paragraph (1) of Law Number 36 Year 2008 Concerning the Fourth Amendment to Law Number 7 Year 1983 Concerning Income Tax, the object of the tax is income, which is any

additional economic capability received or obtained by the Taxpayer, whether originating from Indonesia and from outside Indonesia, which can be used for consumption or to increase the wealth of the Taxpayer concerned, under whatever name and form.

In 2018 the taxes paid by BPKH to the state reached USD 86,324,663 (Witjaksono,2019). The amount of tax is derived from income tax on investment returns on securities subject to income tax at a rate of 15% and returns from placement of hajj funds in Islamic banking products such as current accounts, savings, deposits subject to income tax at a rate of 20%.

Quoted from cnnindonesia.com, that according to BPKH Executive Board Member, the tax imposed on BPKH investment returns on Hajj funds creates problems because it contradicts the purpose of establishing BPKH to obtain optimal returns for prospective pilgrims.

On Monday, October 5, 2020, the House of Representatives (DPR) approved the Omnibus Law Job Creation Draft. One of the topics regulated in this bill is taxation. In article 111 of this bill, there is an amendment to Article 4 paragraph 3 of the Income Tax Law regarding the exemption of certain tax objects.

In relation to BPKH, the amendment is in the form of the addition of letter o, namely the tax exemption clause on funds deposited for Hajj Implementation Costs (BPIH) and/or a special BPIH, and income from the development of Hajj finance in certain financial fields or instruments, received by the Hajj Financial Management Agency (BPKH) whose provisions are regulated by or based on a Regulation of the Minister of Finance.

This clause provides the basis that the returns or benefits generated by BPKH from investments and financial placements for hajj are exempt from the imposition of income tax. However, what kind of income tax exemption model will be applied to BPKH is still not explained in detail in the bill. The mandate of the bill states that a derivative regulation is required in the form of a minister of finance regulation.

Institutionally BPKH is a unique institution because it is the only institution that manages hajj fund in Indonesia. In addition, based on Law Number 34 of 2014 concerning Hajj Financial Management, BPKH's hajj financial management is carried out in a corporate and non-profit manner. Therefor the objective of this study is to thoroughly analyze how the impact of tax exemptions in the omnibus law job creation act on the hajj fund management in Indonesia.

Having discussed the background and objective of the study, the literature review and research methodology are then presented, followed by acknowledgement and discussions. The conclusions and suggestions for future research are presented at the end of the paper.

Literature Review

Some of the regulations governing Hajj financial management, namely:

a. Law Number 34 of 2014 concerning Hajj Financial Management
   In article 24 letter a of the law, it is explained that BPKH has the authority to place and invest hajj finance in accordance with the principles of sharia, prudence, security, and value of benefits. The principle of benefit value means choosing an investment that provides the most optimal benefit value.

b. Law number 36 of 2008 concerning income tax
   The subject of Corporate Tax is an entity that is established or domiciled in Indonesia. BPKH as a public legal entity is the subject of corporate tax. Based on the explanation of article 2 paragraph 2 of the Income Tax Law, the subject of domestic corporate tax becomes a taxpayer from the time it is established or domiciled in Indonesia.

c. The Omnibus Law on Job Creation
   BPIH deposit funds (Initial deposit and paid deposit by pilgrim candidate) and income from the development of Hajj finance in certain fields or financial instruments, received by the Hajj Financial Management Agency (BPKH), the provisions of which are regulated by or based on a Regulation of the Minister of Finance.

d. Government Regulation Number 5 of 2018 concerning Hajj Financial Management
   In article 7 paragraph (2) of the government regulation, it is stated that BPKH is required to administer the financial management of Hajj and BPKH assets in accordance with the provisions of the laws and regulations.

One of the laws that BPKH must comply with is the Taxation Law. This means that the value of benefits generated by BPKH must be subject to income tax in accordance with existing taxation provisions. In addition, Article 26 paragraph (3) of the government regulation explains that the investment made by BPKH is carried out in accordance with the principle of benefit value. The principle of benefit value means choosing an investment that provides the most optimal benefit value. This regulation confirms the articles in Law No. 34/2014.

e. Presidential Regulation Number 110 of 2017 concerning Hajj Financial Management Agency
This regulation explains in more detail about the organs of the BPKH, namely the Implementing Body and the Supervisory Board which have the responsibility to carry out the management of Hajj finance which can provide optimal benefit value for BPKH.

Some of the previous studies used as a comparison and reference in this study are "Management of Hajj Funds In Indonesia" by Jumali (2018) which stated that BPKH is expected to be able to apply justice to the sharing of the benefit value (profit sharing) of hajj financial management to each pilgrim according to the waiting period.

Currently, the sharing of return given by BPKH to the departing and waiting pilgrims have not shown justice because almost all the return is given to the departing pilgrims. Meanwhile, the allocation of the waiting pilgrims is still very small. This happens partly because the return generated is still insufficient. One of the things that reduce the value of the benefits is taxes.

With the Omnibus Law Job Creation Act which has a tax exemption clause on the value of benefits generated by BPKH, it is hoped that the distribution of the value of benefits to the departing and waiting congregations will be much fairer. However, it must first be analyzed how the tax exemption model is right for BPKH.

The second research, namely the Optimization of Investment Portfolios at BPJS by Rahman (2016) states that the selection of BPJS investment instruments in addition to considering returns and risks as well as limits on applicable investment fund allocations, must also consider tax regulations. This research contradicts the Government Regulation Number 73 of 2016 concerning Income Tax on the Social Security Program by BPJS. In that regulation, tax facilities have been given on the returns received by BPJS so that BPJS should not have to consider tax regulations.

Meanwhile, for BPKH, the tax exemption clause has just been provided in the Omnibus Law Job Creation Act. This clause also does not yet regulate the technical details of the said exemption. Therefore, further analysis is needed as to what kind of tax exemption is right for BPKH.

Finally, a study entitled Optimization of BPIH Fund Investment in 2016 by the Directorate General of Hajj and Umrah Implementation of the Ministry of Religion of the Republic of Indonesia by Rahman (2017) states that the BPIH investment management system is divided into three instruments, namely SBSN (government bonds), SUN (government bonds), and time deposits. For information, the tax rate on deposits is currently at 20%, while for securities the tax rate is 15%. The rate is quite high, although the tax will flow to the state treasury, but of course it will reduce the amount of yield that should be given to pilgrims and prospective pilgrims.

With the Omnibus Law Job Creation Act, which has a tax exemption clause on the value of benefits generated by BPKH, it is hoped that the distribution of the value of benefits to the departing and waiting congregations will be fairer. However, it must first be analyzed what tax exemption model is right for BPKH.

Research Methodology

This section will describe the research methods used in this study. The method used in this research is case study and literature study. Based on Ellet (2007), a case study must have at least one of the benefits in the form of analysis, evaluation, problem solving, decision making and rule determination. The author hopes that the results of this study will be of direct use to BPKH as the only agency that manages haj funds in Indonesia.

Literature studies are carried out by collecting all relevant provisions and documents governing haj financial management, especially Hajj fund investment, such as Laws, Government Regulations, Presidential Regulations, Minister of Finance Regulations, Bank Indonesia Regulations, Financial Services Authority Regulations. The data and information obtained are used to answer questions on problem formulation

Analysis

In accordance with article 4 of Law Number 34 of 2014 concerning Hajj Financial Management, Hajj finance includes revenue, expenditure, and wealth. Furthermore, BPKH also has tax obligations in accordance with the Hajj financial business process which includes revenue, expenditure and wealth for. In summary, the BPKH's tax obligations for hajj financial revenue before the Omnibus Law on Job Creation can be seen in the Table 2 as follows:

Table 2. BPKH's Tax Obligations for Hajj Financial Revenue Before the Omnibus Law on Job Creation

No	Description		Corporate Income Tax Obligation	Witholding Tax Obligation
A	Revenues			
	1	Initial deposit and paid deposit by pilgrim candidate	Not Object through fiscal reconciliation	No Implication
	2	Yield/hajj financial development returns	Corporate income tax object/ final income tax object	Article 4 paragraph 2 Income Tax deducted (for the final income tax object)
	3	Hajj Efficiency Fund	Not Object via fiscal reconciliation	No Implication
	4	The endowment fund of the muslims	Corporate income tax object/ final income tax object	Article 4 paragraph 2 Income Tax deducted (for the final income tax object)

Source: Law number 34 of 2014, Law number 36 of 2008, self-managed

Table 3 shows the BPKH's tax obligations for hajj financial expenditures before the Omnibus Law on Job Creation In summary, as follows:

Table 3. BPKH's Tax Obligations for Hajj Financial ExpenditureBefore the Omnibus Law on Job Creation

No	**Description**		**Corporate Income Tax Obligation**	**Witholding Tax Obligation**
A	Expenditure			
	1	Costs for hajj (BPIH)	Non Deductible Expense	No Implication
	2	BPKH operational cost	Deductible Expense (if they meet the requirements)	Must deduct income tax 21/23/26 / 4a2 according to the type of transaction
	3	Placement / Financial Investment for Hajj	Non Deductible Expense	No Implication
	4	Refund of initial deposit and paid deposit	Non Deductible Expense	No Implication
	5	Special BPIH deposit balance payments to PIHK	Non Deductible Expense	No Implication
	6	Payment for Virtual Account	Non Deductible Expense	No Implication
	7	Activities for the benefit of Muslims	Non Deductible Expense	No Implication
	8	Returns the difference between BPIH and / or	Non Deductible Expense	No Implication

		BPIH deposits specifically from the determination of BPIH and / or Special BPIH for the current year		

Source: Law number 34 of 2014, Law number 36 of 2008, self-managed

Based on article 18 of Law Number 34 Year 2014, Hajj Financial Wealth includes money and goods that can be valued in cash which are managed by BPKH. In terms of taxation, hajj financial wealth is categorized as an asset that is reported in the Annual Corporate Income Tax Return. Meanwhile, from the point of view of withholding tax, there are no tax obligations that arise.

Furthermore, Article 111 of the Omnibus Law on Job Creation amends the clauses that are exempted as tax objects in article 4 paragraph 3 of the Income Tax Law. One of the amendments is the addition of letter o, namely the deposit fund for Hajj Administration Costs (BPIH) and / or a special BPIH, and income from the development of Hajj finance in certain financial fields or instruments, received by the Hajj Financial Management Agency (BPKH), the provisions of which are regulated by or based on Minister of Finance Regulation.

Finally, the tax exemption clause also has an influence on the hajj financial business process which includes revenue, expenditure and financial wealth for hajj. In summary, the BPKH's tax obligations for hajj financial revenue after the Omnibus Law on Job Creation can be seen in the table 4 as follows:

Table 4. Implications of the Omnibus Law on Job Creation on Taxation Obligations of Hajj Financial Revenue

No	Description		Before the Omnibus Law on Job Creation	After the Omnibus Law on Job Creation
A	Revenues			
	1	Initial deposit and paid deposit by pilgrim candidate	- Not Object through fiscal reconciliation - No Implication on withholding tax	- Not Object directly without fiscal reconciliation - No Implication on withholding tax
	2	Yield/hajj financial development returns	- Corporate income tax object/ final income tax object - Article 4 paragraph 2 Income Tax deducted (for the final income tax object)	- Not object on corporate income tax - Not object on final income tax - No Implication on withholding tax
	3	Hajj Efficiency Fund	- Not Object via fiscal reconciliation - No Implication on withholding tax	- Not Object directly without fiscal reconciliation - No Implication on withholding tax - Needs confirmation in the derivative regulations
	4	The endowment fund of the muslims	- Corporate income tax object/ final income tax object - Article 4 paragraph 2 Income Tax deducted (for the final income tax object)	- Not object on corporate income tax - Not object on final income tax - No Implication on withholding tax

Source: Law number 34 of 2014, Law number 36 of 2008, Omnibus Law on Job Creation, self-managed

Table 5 shows the BPKH's tax obligations for hajj financial expenditures after the Omnibus Law on Job Creation In summary, as follows:

No	Description		Before the Omnibus Law on Job Creation	After the Omnibus Law on Job Creation
A	Expenditures			
	1	Costs for hajj (BPIH)	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax
	2	BPKH operational cost	- Deductible Expense (if they meet the requirements) - Must deduct income tax 21/23/26 / 4a2 according to the type of transaction	- Deductible Expense (if they meet the requirements) - Must deduct income tax 21/23/26 / 4a2 according to the type of transaction - Needs confirmation in the derivative regulations
	3	Placement / Financial Investment for Hajj	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax
	4	Refund of initial deposit and paid deposit	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax
	5	Special BPIH deposit balance payments to PIHK	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax
	6	Payment for Virtual Account	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax - Needs confirmation in the derivative regulations
	7	Kegiatan untuk kemaslahatan umat Islam	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax - Needs confirmation in the derivative regulations
	8	pengembalian selisih saldo setoran BPIH dan/atau BPIH Khusus dari penetapan BPIH dan/atau BPIH Khusus tahun berjalan	- *Non Deductible Expense* - No Implication on withholding tax	- *Non Deductible Expense* - No Implication on withholding tax

Source: Law number 34 of 2014, Law number 36 of 2008, Omnibus Law on Job Creation, self-managed

Previously, hajj financial assets were categorized as assets reported in the Annual Corporate Income Tax Return. Meanwhile, from the point of view of withholding tax, there are no tax obligations that arise.

This clause is not regulated in the Omnibus Law on Job Creation. Substantially, there is no change in the process or tax implications of this expenditure so that the hajj financial assets are still categorized as assets reported in the Annual Corporate Income Tax Return. Meanwhile, from the point of view of withholding tax, there are no tax obligations that arise.

Discussions

The Omnibus Law on Taxation Cluster Job Creation Article 111 changes the clause that is exempted as a tax object in article 4 paragraph 3 of the Income Tax Law. One of the amendments is the addition of letter o, namely the deposit fund for Hajj Administration Costs (BPIH) and / or a special BPIH, and income from the development of Hajj finance in certain fields or financial instruments, received by the Hajj Financial Management Agency (BPKH), the provisions of which are regulated by or based on Minister of Finance Regulation.

In that tax exemption clause, there are several things that need further discussions, namely:

1. Regular and / or special BPIH deposits are exempted from tax objects
2. Income from hajj finance development in certain fields received by BPKH is exempted from the tax object
3. Income from hajj finance development in certain financial instruments received by BPKH is exempted from the tax object
4. Such tax exemptions are further regulated by or based on a Regulation of the Minister of Finance

Furthermore, the tax exemption clause also has an influence on the hajj financial business process which includes revenue, expenditure and hajj financial wealth as previously explained.

Conclusion and Suggestion for Future Studies

This research was conducted to analyze impact of the Omnibus Law Job Creation Taxation Cluster on the management of Hajj fund in Indonesia by the Hajj Financial Management Agency (BPKH). The tax exemption on then Omnibus Law Job Creation Taxation Cluster clause has an influence on the hajj financial business process which includes revenue, expenditure and financial wealth for hajj.

The results of this study indicate that the Omnibus Law Job Creation has several impacts on the management of Hajj finance, including income, expenditure and wealth, which have been previously mentioned, including:

a. Increasing the economy of Indonesia through increasing the amount of Hajj Fund that can be invested and/or placed

   The increase in managed funds comes from funds previously used to pay taxes on the results of financial development for hajj through tax exemption. After the enactment of the Omnibus Law on Job Creation, the results of hajj financial development are exempted from the income tax object so that BPKH will receive a higher return than before, namely the gross amount. This difference can Increasing the economy of Indonesia through increasing the amount of Hajj Fund that can be invested and/or placed.

b. Addition of benefit value allocation to the waiting hajj pilgrim

   The increase in the allocation of this benefit value comes from the funds previously used to pay taxes on the results of the financial development of the Hajj through tax cuts. After the enactment of the Omnibus Law on Employment Creation, the results of hajj financial development are exempted from the income tax object so that BPKH will receive a higher yield / value than before, namely the gross amount. BPKH can use this increase in returns to increase the allocation of benefit value sharing / virtual accounts to pilgrims.

c. Potential to reduce hajj costs paid by the pilgrims

   The amount of pilgrimage cost paid by pilgrims is discussed jointly by the government and the DPR. After the enactment of the Omnibus Law on Job Creation, the results of hajj financial development are exempted from the income tax object so that BPKH will receive a higher return than before, namely the gross amount. The increase in yields can be used as a consideration for the government and the DPR to reduce the amount of pilgrimage cost paid by pilgrims.

Further research, BPKH has several options for using additional funds under management as a result of the Omnibus Law on Job Creation. BPKH needs to conduct a more comprehensive study to determine how to use the additional managed funds.

Acknowledgement

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Analysis of Tax Court Appeal Verdict for Corporate Income Tax: Indonesian Case

Ahmad Deza PERDANA
Universitas Indonesia, Indonesia, ahmad.deza.p@gmail.com

Siti NURYANAH[1]
Universitas Indonesia, Indonesia, siti.nuryanah@ui.ac.id

Abstract

There are a huge percentage of Indonesia tax court appeal decisions that were won by taxpayers. This study aims to determine from the tax court appeal decision about the characteristics of taxpayers who file an appeal of their dispute with Directorate General of Tax to the Tax Court, the causes of the dispute, the methods and techniques used for auditing corporate income tax on the dispute, and how the relationship between these factors and the verdict of the tax court appeal decision especially in corporate income tax dispute. This research was conducted using content analysis and binomial logistic regression.. The results of the logistic regression test found two variables that had a significant direct effect on the outcome of the verdict, two of them are cause of the dispute due to legislation or regulations and the annulment of dispute plead due to the tax audit method used.

Keywords: Tax compliance, principles of tax, tax dispute, tax court, appeal.

Introduction

In Indonesia, Tax Court is a judicial body to exercise judicial power for taxpayers or tax bearers who seek justice for tax disputes. The tax court has special authority to exercise the judicial power over tax disputes and to issue legal decisions within the state administrative courts. Based on data obtained on the Tax Court website, the total disputes decided by the Tax Court during the period 2012 to 2017 can be determined as 55,519. Of this amount, as much as 56% was won by the taxpayer by "entirely granted" and "partially granted" verdict.

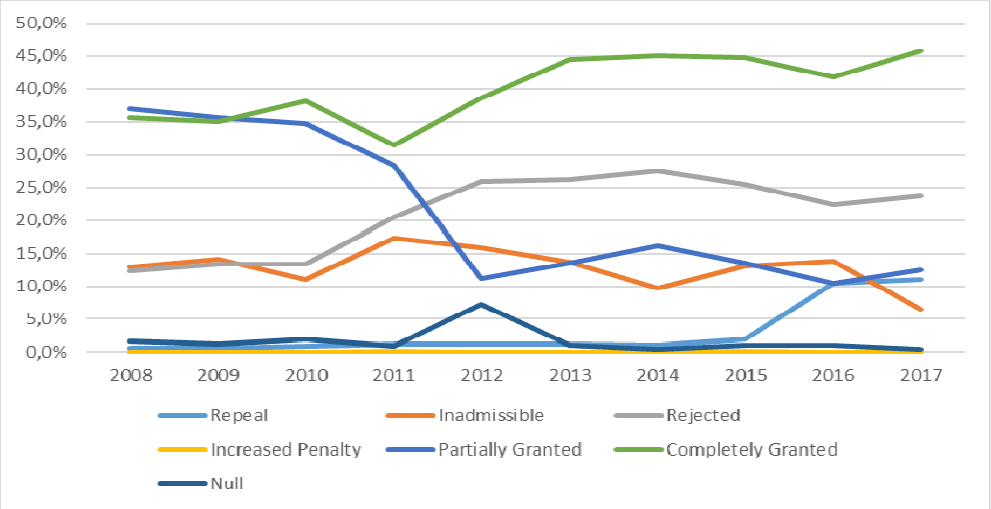

Figure 1: Change of Percentage of Every Types of Verdict Every Year from 2008 - 2017
Source: obtained and processed from Tax Court website (www.setpp.kemenkeu.go.id, accessed at 2018)

[1] Corresponding author.

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Based on the Central Government Financial Statements, during 2013 to 2017, Corporate Income Tax is type tax with the largest amount of revenue of all Non-Oil and Gas Income Taxes. In Table 1, it can be seen that the proportion and nominal value of the realization of corporate income tax revenue fluctuates every year. This phenomenon shows that there is a potential to increase the value of Corporate Income Tax revenue that is not yet realized. Therefore, the tax audit of Corporate Taxpayers is one form of exploring this potential. However, as described earlier, there is a phenomenon where the results of the tax audit submitted for appeal to the Tax Court tend to be won by the Taxpayer. With the quality of the human resources of the Directorate General of Taxes who are capable and standardized tax audits procedure, it is an interesting phenomenon why the results of the tax court verdicts are dominated by the decisions in favor of the Taxpayers.

This study aims to determine the causes of disputes, methods and tax audit techniques used for auditing corporate income tax on the tax court decision, as well as how the relationship between these factors and the results of the tax court appeal dispute on corporate income tax.

Literature Review

Tax Law Enforcement Theory

According to Braithwaite & Braithwaite (2001), along with the emergence of e-commerce and other technological developments, the increasing of large multinational companies ability to engage in financial engineering is an increasing threat for tax revenue from companies. In the book “Punish or Persuade”, Braithwaite (1985) states that regulatory compliance is more likely if government agencies denote and implement the rule enforcement pyramid, as shown in Figure 2.1 below.

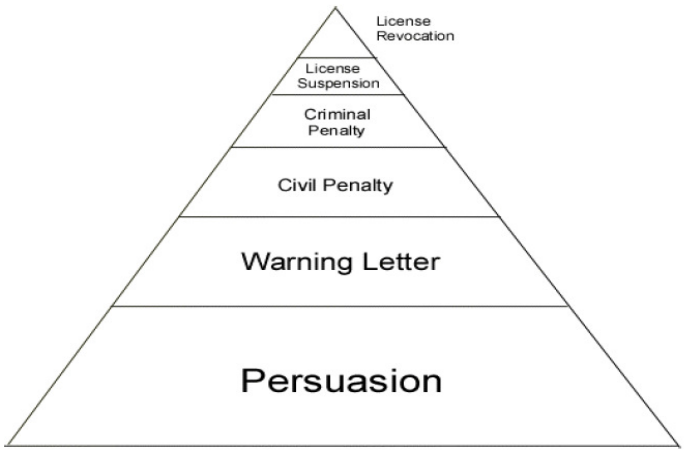

Figure 2: Rule Enforcement Pyramid

Source: Braithwaite& Braithwaite (2001)

Further explained by Ayres and Braithwaite (1992), at the base of the pyramid, the initial attempt by government agencies was to persuade subjects with persuasion to impose compliance. The next enforcement escalation phase is a warning letter; if doing so fails to ensure compliance, the imposition of penalties in the form of fines or monetary sanctions; if that fails, criminal prosecution; if it fails, the closure or temporary suspension of the license to operate; if that fails, permanent license revocation. Braithwaite & Braithwaite (2001) explain that one way to frame responsive regulatory aspirations is to make most taxpayers believe that tax officials believe the taxpayer's desire to comply, but are also ready to implement stricter enforcement of regulations when that trust is not appreciated.

Tax Dispute

According to Purwito and Komariah (2010), a tax dispute is an event that originates from differences in perceptions, understanding, application of tax laws, and calculation of tax payables, or which actually must be paid between taxpayers and as the results of authorized tax administration audit or written decision that is not admitted by the taxpayer, causing uncertainty. The definition of tax disputes is explained in the provisions of Article 1 point 5 of Law No. 14 of 2002 concerning the Tax Court (UU PP) which reads as follows: "A tax dispute is a dispute arising

in the field of taxation between a taxpayer or a tax bearer and a competent official as a result of the issuance of a decision that can be filed for an appeal or lawsuit to the tax court based on statutory taxation legislation, including litigation for the implementation of tax collection based on the Law on Tax Collection with Distress Warrant."

The basic reason that cause disputes between taxpayers and tax authorities according to Barata (2003, p. 4) are:

a. Differences in perceptions in understanding provisions and legislation.
b. Limited time for tax officers in interpreting the taxpayers' business patterns and accounting systems.
c. The limitation of officers in understanding terms of business activities and naming accounts in bookkeeping is because taxpayers do not communicate correctly.
d. Taxpayers' ignorance and inability to understand the prevailing laws and regulations.
e. Disagreements in recognition of supporting evidence / transaction documents.

Then Purnomo (2005), adds another two cause for the disputes as described by Barata. The two cause are:
a. Taxpayers' Ignorance and inability to distinguish commercial financial reports from fiscal financial reports.
b. The limit of tax provisions and regulations.

Tax Audit

Gunadi (1999) defines tax audit as an effort to assess the level of compliance with tax obligations, both the fulfillment of formal obligations and material obligations. Tax audit are carried out to test the correctness of taxation aspects, both juridical and material aspects. According to Mardiasmo (2009), the target of the tax audit is to look for incorrect interpretations of the Law, miscalculations, specific embezzlement of income, unreal deductions and deductions that are carried out by taxpayers in carrying out their tax obligations.

The tax audit in the general tax provisions flow is a continuation of the self-assessment process carried out by the taxpayer because it is in the form of an official assessment. After the taxpayer reports the annual tax form to the tax office, if the Account Representative or other authorized official finds a reason that is compatible with the purpose of the audit, the taxpayer will be proposed for audit.

Audit methods are techniques and procedures for examining books, records and documents as well as data, information and other information, consisting of direct methods and indirect methods. Both the Direct and Indirect Methods are used to obtain audit findings based on sufficient competent evidence and the provisions of tax laws and regulations. The Indirect Method is used where the Direct Method cannot be applied and is used to support the use of the Direct Method or to identify problems. The indirect method used by the Tax Auditor consists of the cash and bank transaction approach, the source and use of funds approach, the ratio calculation approach, the unit and/or volume approach, the net worth addition approach, and the cost of living approach.

Audit techniques are methods of collecting evidence, testing, and / or proving that are developed by the Tax Auditor to ensure the accuracy of the items being examined. Audit techniques that can be used by the Tax Auditor, include the use of internal and / or external information, document validity testing, evaluation, assessment of documents, activities, systems, and the likes based on certain criteria, analysis of numbers, tracing for numbers, tracing for evidence, examining evidence in support of a transaction that has been recorded or that should be recorded (vouching), linkage testing, equalization or reconciliation, written request of information or evidence from third parties who have a relationship with the Taxpayer, confirmation of activities to obtain affirmation of the correctness and completeness of data and / or information that has been owned by other parties related to a transaction carried out by the Taxpayer, inspection, physical examination, testing for the correctness of mathematical calculations, interviews, sampling tests, Computer Assisted Audit Techniques (CAAT), and/or other inspection techniques

Research Methodology

This study uses a combined method of qualitative and quantitative approach (mixed methods). Content analysis is conducted to determine the audit methods and techniques based on Circular Letter of General Director of Tax number SE-65/PJ/2014 concerning Guidelines for the Use of Audit Methods and Techniques, as well as the characteristics of taxpayers, the causes of disputes and the main reason for the panel of judge's refusal to the results of the audits. All decisions are then grouped based on the type of dispute, the method and technique of examination performed, and the reasons for refusal by the panel of judges to statistically determine the distribution. The results of the relationship analysis of the three criteria are explained in narrative form to answer the formulated problem.

Analysis of the factors, methods and techniques that influence the verdict "completely granted" and "partially granted" were carried out using the Logistic Regression Model. The purpose of using logistic regression research tools is to see the characteristics. This is done by discussing the value of the odds ratio in each independent variable (the value of the odds ratio is (*exp (coefficient)*) of each variable). The odds ratio describes the probability that the event will be worth 0 or 1 (according to the definition of the value of the dependent variable). The explanation of the odds ratio is different from the regression coefficient in general. The exp value (coefficient) in the logistic regression or known as the odds ratio describes the odds, and does not explain how much is "higher" than the variable X. The influencing factor can be seen from the high odds ratio value, which means that the independent variable has a high influence on the results / value of the dependent variable.

To see the relationship of the factors studied to the results of the Tax Court's decision, the proposed equation model is as follows:

$$\boldsymbol{PUTUSAN = \alpha_0 + \beta_1 JENIS\ USAHA_1 + \beta_2 POKOK\ SENGKETA_2 + \beta_3 PENYEBAB\ SENGKETA_3 + \beta_4 METODE\ PEMERIKSAAN_4 + + \beta_5 DASAR\ PEMBATALAN_5 + \beta_6 TRANSFER\ PRICING_6 + \varepsilon_0} \quad \textbf{(1.1)}$$

Where:

PUTUSAN	= Verdict of the Tax Court Decision
β_0	= Constant
β_i	= Model parameters
ε	= Error
$JENIS\ USAHA_1$	= Appellant fields of business
$POKOK\ SENGKETA_2$	= Subject of dispute
$PENYEBAB\ SENGKETA_3$	= Cause of dispute
$METODE\ PEMERIKSAAN_4$	= Audit method used during tax audit
$DASAR\ PEMBATALAN_5$	= Basis of cancellation of dispute arguments by the Panel of Judges
$TRANSFER\ PRICING_6$	= Transfer pricing dispute indicator

Hereinafter, the model parameter significance test is carried out, namely the constant and coefficient (βi where i = 0,1,2,3,4). This test is conducted to determine whether the estimated parameter obtained has a significant effect on the model or not, and how much influence each of these parameters has on the model. The significance test consists of two stages, namely the test of the significance of the model parameters together and the significance test of the model parameters separately. The significance test of the model parameters is carried out by using the likelihood ratio test. The model fit test (goodness-of-fit) is used to evaluate the suitability of the model with the data, the observed value obtained is the same or close to that expected in the model. The level of confidence established in this study was 95% (α = 5%).

Results

The number of legal business entity forms of appellants from the sample studied shows that limited liability companies are the most dominant form of business entity as the basis for corporate income tax revenue. The taxpayer's business sector that filed the most appeal disputes in the sample of decisions studied was Manufacturing, with a total of 262 disputes or 49% of the total sample. In Table 1, based from the verdicts, the manufacturing business sector has almost the same number, 129 disputes for "partially granted" verdicts and 133 disputes for "grant all" decisions. This figure shows that the Directorate General of Tax gives the manufacturing industry is a fairly high level of tax compliance inspection.

Table 1: Number of Appellant Legal Entity Form Grouped According Fields of Business in the Sample Studied

Legal Entity Form	Business Field				
	Agrarian-Mining	Service	Manufacture	Commerce	Total
Partially Granted					
Permanent Establishment	0	0	1	0	1
Limited Partnership	1	0	2	1	4
Government Owned Companies	0	1	0	0	1
Limited Liability Companies	48	54	126	28	256
Foundation	0	1	0	1	2
Completely Granted					
Permanent Establishment	2	1	0	0	3
Limited Partnership	0	0	0	4	4
Non-Profit Institution	0	1	0	0	1
Government Owned Companies	0	1	0	0	1
Limited Liability Companies	39	59	133	29	260
Foundation	0	1	0	0	1
Total	90	119	262	63	534
Percentage	16,9%	22,3%	49,0%	11,8	100%

For the causes of disputes, as explained by Purnomo (2005) whom adopting from Barata (2004), there are 7 causes of disputes over tax audit results, but only 6 causes of disputes can be examined from the Tax Court Decision data obtained. Of the six causes of disputes, the causes of disputes due to disagreements in recognition of supporting evidence/transaction documents were the causes of most disputes. In addition, it can be seen in Table 2 that the number of decisions with the words of "partially granted" and "completely granted" for each type of decision tend not to be much different. Even so, the decision "completely granted" has more total causes of the dispute than the “partially granted" verdict.

Table 2: Number of Cause of Dispute Grouped According The Verdicts in the Sample Studied

Cause of Dispute	Verdict		
	Partially Granted	Entirely Granted	Total
Differences in perception in understanding the provisions and legislation	149	129	**278**
The limitation of officers in understanding terms of business activities and naming accounts in bookkeeping is because taxpayers do not communicate correctly.	203	189	**392**
Taxpayers' ignorance and inability to understand the prevailing laws and regulations.	14	7	**21**
Taxpayers' ignorance and inability to distinguish commercial financial reports from fiscal financial reports.	79	71	**150**
Disagreements in the recognition of supporting evidence / transaction documents.	217	208	**425**
The limit of tax provisions and regulations	17	23	**40**
Total	600	627	**1227**

In the data of subjects of disputes, the two subjects of disputes with the largest number are corrections of operating costs and corrections of revenue. Partially granted verdict have higher correctons of operationg cost as subject of

dispute compared to completely granted verdict. Table 4 shows that completely granted verdict tend to have fewer subjects of dispute.

Table 3: Number of Subject of Disputes in the Sample Studied

Dispute Subject by Type of Verdict	Number of Dispute Subjects	Percentage
Partially Granted		
Correction of Operating Cost	204	30.96%
Correction of Book-Tax Gap	102	15.48%
Correction of COGS	119	18.06%
Correction of Non-Operating Activity	113	17.15%
Correction of Revenue	121	18.36%
Entirely Granted		
Correction of Operating Cost	102	23.89%
Correction of Book-Tax Gap	53	12.41%
Correction of COGS	76	17.80%
Correction of Non-Operating Activity	80	18.74%
Correction of Revenue	116	27.17%
Total	**1086**	

Tables 4 and 5 show the number of audit methods and techniques used in the studied sample. Table 5 shows that there is no distinct difference in the number of indirect methods used in audit for disputes with "completely granted" and "partially granted" verdict, thought the former tend to have lower number. As with the audit, there is no distinct difference in the number of audit techniques from studied sample, but there were several techniques that had quite striking differences in numbers, namely tracing and evidence tracking techniques.

Table 4: Number of Use Of Indirect Methods in the Studied Sample

Types of Indirect Methods	Verdict		
	Partially Granted	Completely Granted	Total
Cash and Bank Transactions	87	80	167
Sources of Used Fund	72	61	133
Ratio Calculation	76	75	151
Units and/or Volume Calculation	78	78	156

It can be seen in Table 5, that tracing for numbers and tracing for evidence are more widely used in "partially granted" decisions. The two tracing techniques are interrelated techniques, and could be linked to the accounts of revenue and operating cost that are often the subject of the dispute. Accounts for operating cost and revenue are accounts that relate to daily activities, therefore recognition and documentation of both accounts could involve a large amount of documents. Then there is also manufacturing as the field business with the most number of appellant. It can be argued that the frequent use of numbers and evidence tracking techniques could be related to the number of daily transactions that are carried out by companies in manufacturing.

Table 5: Number of Audit Techniques in the Studied Sample

Tax Audit Technique	Verdict		
	Partially Granted	Entirely Granted	Total
Use of information	264	270	534
Document validity testing	57	61	118
Evaluation	256	260	516
Analyze the numbers	216	189	405
Tracing for numbers	193	147	340
Tracing for evidence	180	122	302
Vouching	111	92	203
Linkage testing	39	43	82
Equalization or reconciliation	76	58	134
Confirmation from third parties	54	29	83
Inspection	13	12	25
Physical examination	15	15	30
Testing the correctness of mathematical calculations	90	75	165
Interview	6	8	14
Quotation test (sampling)	20	10	30
Computer Assisted Audit Techniques (CAAT).	30	10	40
Others	0	0	0

Simultaneous Significance Test

To test whether independent variables have significant simultant influence toward dependent variables or not, it could be done through Simultaneous Significance Test.

H0 : There is no significant simultant influence of independent varibles toward dependent variables
H1 : There is significant simultant influence of independent varibles toward dependent variables
α : 0,05
Criterion : Reject H0 if *p-value* < α, unable to reject H0 if *p-value* > α

Table 6. Simultaneous Significance Test Results

Omnibus Tests of Model Coefficients			
	Chi-square	Df	Sig.
Step	80,165	12	0,000
Block	80,165	12	0,000
Model	80,165	12	0,000

From Table 6, obtained *p-value* are 0,000, which mean reject H0, independen variables have significant simultaneous influence to dependent variable.

Partial Significance Test

To test whether whether independent variables have significant partial influence toward dependent variables or not, it could be done through Simultaneous Significance Test.

H0 : There is no significant partial influence of independent varibles toward dependent variables

H1 : There is significant partial influence of independent varibles toward dependent variables
α : 0,05
Criterion : Reject H0 if *p-value* < α, unable to reject H0 if *p-value* > α

Table 7: Partial Significance Test Results

Variable	B	S.E.	df	Sig.	Exp(B)
PROSES			3	0,992	
PROSES 1	-0,059	0,358	1	0,870	0,943
PROSES 2	0,017	0,341	1	0,960	1,017
PROSES 3	-0,050	0,308	1	0,872	0,951
Kel_Pokok			5	0,000	
Kel_Pokok 1	-1,809	0,291	1	0,000	0,164
Kel_Pokok 2	-1,460	0,340	1	0,000	0,232
Kel_Pokok 3	-1,544	0,272	1	0,000	0,213
Kel_Pokok 4	-1,312	0,286	1	0,000	0,269
Kel_Pokok 5	0,738	1,111	1	0,506	2,092
Penyebab_1_OPR	-0,180	0,195	1	0,356	0,836
MetodeTidakLangsung	-0,239	0,215	1	0,266	0,788
Metode	0,000	0,250	1	0,999	1,000
Transfer Pricing	0,345	0,274	1	0,207	1,412
Constant	1,035	0,330	1	0,002	2,814

Partial significance test results in Table 7 show the subject of dispute variable is a variable that partially has a significant effect on the model.

Conclusion and Suggestion

From the analysis and examination of 534 samples of studied verdicts, it can be concluded that the characteristics of the Taxpayers who file an appeal dispute over the Tax Court on the results of the Corporate Income Tax audit with the ruling "partially granted" and "completely granted" based on the legal entity form of the appellant are limited liability companies, non-profit institutions, foundations, government-owned companies, permanent establishment, and limited partnership. Meanwhile, the characteristics of the taxpayers who file an appeal to the tax court based on the fields of business of the appellant are services, manufacturing, trading and agrarian-mining. The form of legal entity with the highest number of appellants is a limited liability company, while manufacture is the field of business with the highest number of appellants.

The cause of the dispute in Tax Court appeal on the results of the Corporate Income Tax audit with the "partially granted" and "completely granted" verdict are the difference in perceptions in understanding provisions and legislation, limited time for tax officers in interpreting the taxpayer's business patterns and accounting system, the limitations of officers in understanding the terms of business activities and naming accounts in bookkeeping because taxpayers do not communicate correctly, taxpayers' ignorance and inability to understand the prevailing laws and regulations, taxpayers' ignorance and inability to distinguish commercial financial reports from fiscal financial reports, disagreements in the recognition of supporting evidence / transaction documents, and the limit of tax provisions and regulations.

The audit methods and techniques used for tax audits are regulated in the Directorate General of Taxes Circular Letter No. SE-65/PJ/2013 concerning Guidelines for the Use of Inspection Methods and Techniques. The Direct Examination Method is the use of examination techniques. There are 4 methods of indirect examination that can be examined, namely the Cash and Bank Transaction Approach, the Source of Used Fund Approach, the Ratio

Calculation Approach, the Unit and/or Volume Approach, with the cash and bank transaction approach methods are the most used for audit. The audit techniques used are the utilization of internal and/or external information, document validity testing, evaluation, analysis of numbers, tracing for numbers, tracing for evidence, vouching, linkage testing, equalization or reconciliation, confirmation of activities from third party, inspection, physical examination, testing for the correctness of mathematical calculations, interviews, sampling tests, Computer Assisted Audit Techniques (CAAT), and/or other inspection techniques.

The results of the research show the relationship between the characteristics of the Taxpayer of the Appellant, the subject and causes of tax disputes, the methods and techniques of audit with the Tax Court verdict of appeal on Corporate Income Tax with "partially granted" and "completely granted" verdict. The relationship the subject of the dispute has a partial effect on the outcome of the decision. Meanwhile, the field of business, audit methods and techniques used in tax audit did not affect the outcome of the verdict.

It is recommended that the Directorate General of Taxes establish a standard communication pattern during the audit process so that taxpayers can easily understand the intentions desired by the DGT and DGT can reduce the number of disputes that could have been avoided. This is in accordance with what has been explained by Wahyudi, Ludigdo, and Djamhuri (2017) that tax disputes from the perspective of a tax auditor, one of which is a form of communication failure which is also in line with the results of this study where the two most common causes of disputes are due to communication failures, namely the limitation of officers in understanding terms of business activities and naming accounts in bookkeeping is because taxpayers do not communicate correctly and disagreements in the recognition of supporting evidence / transaction documents.

The Directorate General of Taxes are also advised to make standards or regulations regarding the evidence that can be recognized at the level of tax audit, audit objection, and appeal. As well as establishing an understanding with the Tax Court regarding the standards and regulations of the evidence in question so that it can be applied while maintaining the independence and power of judges in determining decisions. In addition, it's advised to accelerate the digital transformation of tax documents so that tax evidence could easily be stored and searched for and to increase the awareness of taxpayers in tax administration orderliness, especially for taxpayers who are involved in certain business fields that have a large number of daily transactions.

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The Influence of Community Expectation and Corporate Governance on Corporate Community Involvement Disclosure (CCID)

Steven JOY
Universitas Indonesia, Depok, Indonesia

Siti NURYANAH[1]
Universitas Indonesia, Depok, Indonesia
(siti.nuryanah@ui.ac.id)

Abstract

This research aims to determine the influence of community expectation and corporate governance on Corporate Community Involvement Disclosure (CCID). The study examines companies listed in Indonesian Kompas100 index for August 2016-January 2017 period. The data used in this research is secondary data with a sample of 45 companies with years of observation from 2011-2016. The results of this study found that community expectations, meeting frequency of board of commissioners, and the existence of GCG committees significantly positive effect on the CCID volume.

Keyword: Corporate Community Involvement Disclosures, Community Expectation, Corporate Governance

Introduction

Corporate Social Responsibility (CSR) is one of the company's efforts to foster good relations with the community. It is a form of social responsibility undertaken by companies to provide attention and concern for the environment and society, both those that are directly related to company activities or those that are not directly related to company activities. This CSR concept departs from the expectations of the community regarding the company's role in overcoming environmental and social problems.

Previous studies discussed the level of honesty and integrity, the means and methods used to conduct environmental disclosure. However, aspects of CSR classifications which are still lacking in terms of both essence and disclosure are Corporate Community Involvement (CCI) activities. Rehbein and Schuler (2015) stated that CCI is a Corporate Community Program which is a business participation of a company that involves the community in an effort to meet the needs of the communities where the company operates (Moon dan Muthuri, 2006; Yekini et al., 2015).

Yekini et al. (2016) found that there is a significant positive effect between public expectations and CCI disclosure. This research was conducted to respond to the research of Yekini et al. (2016), by providing evidence of data from Indonesia. This study extends Yekini et al. (2016) by taking Indonesian case study. This study uses the Kompas100 Index for the period August 2016-January 2017 as the population of the research sample because the stocks included in the Kompas100 Index are estimated to represent around 70-80% of the total market capitalization value of all shares listed on the Indonesia Stock Exchange.

Literature Review and Hypothesis Development

CSR Activities and Tax Aggressiveness Behaviors

CSR activities are considered to have little to do with the companies' operations, so activities outside of the context are considered less important because they cannot maximize corporate profits (Friedman, 1962 in Lanis and Richardson, 2012). However, according to Williams (2007), CSR activities should be presented in the companies' main strategies and activities, as the fulfillment of its responsibilities to the community. Avi-Yonah (2006, in Lanis

[1] Corresponding author.

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and Richardson, 2012) explains that companies are "real word" entities that must endure the rigors of competition in business environment, so that CSR disclosures can succeed the companies' business through its acceptance in community. In addition, companies also has an indirect contribution to the community through the tax payments fulfillment. Based on this situation, CSR activities and tax payments fulfillment must run simultaneously as a strategy of corporate legitimacy to be accepted by various parties, especially the community.

Based on above explanation, legitimacy theory is considered as the most appropriate theory in explaining the relationship between CSR activities and tax aggressiveness. This theory views the importance of reputation as a legitimacy strategy (Lindblom, 1993 in Bebbington et al., 2008). Thus, companies are expected to provide information on CSR activities, as voluntary disclosure, to stakeholders to enhance legitimacy through the maintenance of its reputation (van der Laan, 2009). Thus, companies are expected to be more careful not to take tax aggressiveness (Lanis and Richardson, 2012). This is conducted to make companies have a good reputation according to the views of all related parties.

In fact, CSR activities and the tax payments fulfillment are still considered as a big expense for the companies, so many are carrying out CSR activities to take tax aggressive measures in order to minimize their tax payments (Rusydi and Siregar, 2014). This is considered socially irresponsible and unacceptable actions (Lanis and Richardson, 2012), so it should be noted the factors underlying the existence of CSR activities in companies. One of the main factors that should became the motivation of companies in carrying out CSR activities is its role in generating a positive reaction because it is seen as a form of corporate compliance with its obligations, including tax payments fulfillment.

Companies need a positive reaction to be considered as companies have ethics and responsibilities (Shafer and Simmons, 2008), so it can be seen as having a good reputation. Zeng (2012) explains further that the CSR activities undertaken by companies consistently can reduce tax aggressiveness level. This is in accordance with Hoi et al., (2013) which explains that companies with irresponsible CSR activities will be more aggressive over their tax obligations. Pradipta and Supriyadi (2015) and Tiarawati (2015) also asserted that CSR activities are considered to represent the level of companies' awareness, so that responsible CSR activities will make companies more compliance with the rules by not engaging in tax aggressiveness. Based on the discussion above, a hypothesis can be developed as follows.

H1. CSR activities have a negative effect on tax aggressiveness behaviors.

Risk Management System, CSR Activities, and Tax Aggressiveness Behaviors

Implementation of CSR activities and tax payments fulfillment are two burdens for companies. Consequently, an oversight mechanism on both is indispensable. Board of Commissioners (BoC) may represent this role in order that the implementation of CSR activities and the tax payments fulfillment may work as well and benefit the communities or key stakeholders of companies (Lanis and Richardson, 2016), whether directly or indirectly. Thus, the concept of stakeholder theory can illustrate the responsibility of board of commissioners regarding CSR activities and tax aggressiveness. Stakeholder theory basically emphasizes the importance of ethics (Phillips, 2003), so that CSR activities and tax payments fulfillment can be viewed as embodiments of corporate ethical actions that are expected to work for all stakeholders, especially key corporate stakeholders.

In carrying out its duties and authorities, BoC holds the ultimate control in establishing policies within companies. Implementation of a risk management systems is a main oversight mechanism that BoC can do best, since risk management systems is one way to assess the fairness of a methodology and assumptions in preparing accounting and taxation-related information (Richardson et al., 2013). Based on that, BoC have an important role to engage in risk management related to CSR and/or taxation, as an integral implementation of a comprehensive risk management system. Thus, the reporting of CSR activities and tax payments fulfillment is a benchmark for the qualify risk management systems successful implementation (Bebbington et al., 2008; Hoi et al., 2013).

Godfrey et al. (2009), Minor and Morgan (2011) specifically explains that good CSR activities can enhance the companies' reputation and maintain the possibility of various risks, one of which risks are viewed negatively by key corporate stakeholders. This opinion is also supported by Hoi et al. (2013), which explains that the implementation of a good risk management systems will avoid the possibility of possible negative outlook, so that it will increase responsible CSR activities implementation. In addition, Richardson et al. (2013) also explains that companies that implement effective risk management systems tend to be less involved in tax aggressiveness.

Companies with more effective risk management systems should tend not to engage in fraud and fraud in financial reporting, one of which for management not to be opportunistic by choosing CSR activities only on the basis of income tax deduction. In Indonesia, the terms related to CSR activities as an aspect of income tax deduction have

been specifically regulated in Government Regulation no. 93 of 2010 on the Reduced Contributions of Gross Income. Therefore, the influence of CSR activities in reducing tax aggressiveness can be strengthened by the implementation of an effective risk management system. Based on above discussion, the second hypothesis proposed in this study is:

H2. Effective risk management systems strengthen the effect of CSR activities on tax aggressiveness behaviors.

Research Methodology

Population and Sample

This study was conducted by taking sample from a developing country namely Indonesia due to its specific characteristics related to tax reform programs as for example tax amnesty programs in 1964, 1984 and currently in 2016, besides sunset policies and changing in tax rate. The sample of this study is all listed companies in Indonesia Stock Exchange (IDX) during 2013 – 2015 except companies in industries of mining, property, real estate and building construction, and finance. This study excludes the exception companies due to the presence of special setting mechanisms and the imposition of a final income tax. Data were obtained by hand-collected, completed with Thomson Reuters DataStream. Table 1 shows the selection of companies sampled in this study which is based on purposive sampling method

Table 1: Sample Description

Sampling Selection Criteria	Total
The number of listed companies on the Indonesia Stock Exchange	537
Less:	
– Companies that are in sector: Mining (43); Property, Real Estate and Building Construction (60); Finance (89)	(192)
– Companies that do not have data completeness for 2013 - 2015	(93)
– Companies that use reporting by currencies other than rupiah	(55)
– Companies that do not use financial report for period ended Dec, 31	(2)
– Companies that meet pre-tax loss	(92)
The number of companies that can be used as samples	103
The number of observations	**309**

Research Model and Variable Operationalization

This study uses panel data analysis, which is estimated using fixed effect (FE) model using Estimated Generalized Least Square (EGLS) method through Cross-section Weighted procedure to overcome the violation of classical assumption. To test the hypotheses, this study estimates the following regression model:

$$TAGG = \beta_0 + \beta_1 CSR + \beta_2 CSR^* RMS + \beta_3 RMS + \beta_4 SIZE + \beta_5 LEV + \beta_6 CINT + \beta_7 INVINT + \beta_8 MKTBK + \beta_9 ROA + e$$

Where:

TAGG: Corporate Tax Aggressiveness is measured by DTAX measurement, which is residuals of total regression result of permanent differences in variables which are nondiscretionary items are possible not as tax aggressiveness but are known to be reasonably capable of causing permanent differences (Frank et al., 2009), which is calculated based on model:

$$PERMDIFF = \beta_0 + \beta_1 INTANG + \beta_2 UNCON + \beta_3 MI + \beta_4 CTE + \beta_5 \Delta NOL + \beta_6 LAGPERM + e$$

CSR: Corporate Social Responsibilities index in reference to Clarkson et al. (2008) and Sutantoputra (2009), which break down to hard disclosure (verifiable) and soft disclosure (unverifiable), which is calculated by formula:

$$CSR = \frac{\sum \text{Hard Disclosure Items} + \sum \text{Soft Disclosure Items}}{\text{Maximum Score}}$$

RMS: Risk Managements Systems index modified based on Risk Oversight category in ASEAN CG Scorecard, which is calculated by formula:

$$RMS = \frac{\text{Total Disclosure Items}}{\text{Maximum Score}}$$

SIZE: Firms Size is measured by calculating natural logarithm of total asset;
LEV: Leverage is measured by dividing total liabilities to total assets;
CINT: Capital Intensity is measured by dividing total fixed assets to total assets;
INVINT: Inventory Intensity is measured by dividing inventory to total assets;
MKTBK: Market to Book Ratio is measured by dividing market value to book value;
ROA: Pre-Tax Return on Asset is measured by dividing income before taxes to total asset;
e: error term.

Results

Table 2 shows that there are 48.57% of samples who have reported CSR activities. This has not reached 50%, so it can be said that the level of CSR activities reporting in Indonesia is still not good enough, this is in accordance with some previous research in Indonesia (Vidia, 2014; Rusydi and Siregar, 2014; Pradipta and Supriyadi, 2015; Tiarawati, 2015; Wahyudi, 2015; and Wijayanti et al., 2016). However, when viewed by its character, soft disclosure items have a higher value than soft disclosure items, 44% vs 56%. So that, Indonesian companies, in general, have enough awareness of their responsibilities along with the rules which required all companies to address social and environmental issues, but apparently companies still emphasize their image related to their responsibilities to build good corporate image. Then, risk management systems implementation is excellent as a high mean value shown at 73.14%.

Table 2: Descriptive Statistics

		N	Mean	Median	Std. Dev.	Min.	Max.
TAGG		309	0.00175	-0.00169	0.05144	-0.22699	0.33552
CSR		309	0.48574	0.43023	0.14864	0.26744	0.86047
RMS		309	0.73139	0.66667	0.26342	0.33333	1.00000
SIZE		309	28.65550	28.55023	1.59102	25.40142	33.13405
LEV		309	0.44594	0.44024	0.20101	0.00069	0.94848
CINT		309	0.34058	0.29414	0.22102	0.00734	0.92517
INVINT		309	0.15726	0.14044	0.13327	0.00000	0.55706
MKTBK		309	2.74309	1.99000	2.56683	0.00000	10.44359
ROA		309	0.11149	0.08522	0.09832	0.00156	0.40646

where,
TAGG: Tax Aggressiveness Measurement (DTAX); CSR: CSR Index Scoring; RMS: Risk Management Systems Index Scoring; SIZE: Firms Size (*Ln. Total Asset*); LEV: *Leverage* (*Debt to Asset Ratio*); CINT: Capital Intensity (*Fixed Asset to Total Asset*); INVINT: Inventory Intensity (*Inventory to Total Asset*); MKTBK: *Market to Book Ratio*; ROA: *Pre-Tax Return on Asset*.

Tax aggressiveness value illustrates the value that is in the range -0.22699 to 0.33552. A positive value indicates companies commit tax aggressiveness behaviors by taxable income decreasing, and vice versa. The average rate of 0.00175 suggests that Indonesian companies generally decrease its taxable income to carry tax aggressiveness behaviors, this is in accordance with some previous research in Indonesia (Sari, 2010; Vidia, 2014; Zulma, 2015).

The results of hypothesis testing can be seen in Table 3 which presents the level of simultaneous significance (F-test) and the level of partial significance (t-test). Equation (1) is conducted to test hypothesis 1, which is the effect of CSR activities on tax aggressiveness, equation (2) is conducted to test hypothesis 2, that is the role of risk management systems in moderating the influence of CSR activities on tax aggressiveness, and equation (3) is conducted to test the character of the moderation variable, ie as a pure moderator or quasi moderator. Based on test results, intercept indicates that tax aggressiveness (TAGG) will have -0.21275 (1), -0.05313 (2), and -0.17908 (3) (in ratio) when other variables are zero.

Hypothesis 1 proposed in this study explains that CSR activities (CSR) have negative impact on tax aggressiveness behaviors (TAGG). H1 test results can be seen in equations (1) and (2) which show the regression coefficient for CSR is negative and significantly associated to tax aggressiveness behaviors (Prob <0.01), providing support for H1. In equation (1), CSR activities have a coefficient of -0.20202 indicating that any CSR activities increase of 1 point will reduce tax aggressiveness behaviors values to 0.20202. Then in equation (2), CSR activities have a coefficient of -0.59288 indicating that any CSR activities increase of 1 point will reduce tax aggressiveness behaviors values to 0.59288. These results are consistent with previous studies (e.g. Shafer and Simmons, 2008; Zeng, 2012; Hoi et al., 2013; Lanis and Richardson, 2012; Pradipta and Supriyadi, 2015; Tiarawati, 2015), whereby companies are socially responsible will become less aggressive towards taxes.

Table 3: Hypothesis Testing Results

Independent Variables	Predicted Sign	Dependent Variable: Tax Aggressiveness Behavior (TAGG)		
		(1)	(2)	(3)
Intercept		-0.21275** (-1.99602)	-0.05313 (-0.43663)	-0.17908* (-1.84197)
CSR	-	-0.20202*** (-4.20592)	-0.59288*** (-3.29450)	
CSR*RMS	-		0.59500*** (3.01495)	
RMS	-		-0.28507*** (-3.28325)	-0.05031*** (-5.10446)
SIZE	+	0.00948*** (2.63251)	0.00627* (1.96823)	0.00627** (1.97724)
LEV	+	0.01621** (2.40541)	0.01594*** (2.76962)	0.00893 (1.36240)
CINT	+	0.03384** (2.53340)	0.03622*** (2.76643)	0.03893*** (3.18924)
INVINT	-	-0.01878 (-0.65810)	-0.01321 (-0.48947)	-0.01808 (-0.67079)
MKTBK	+/-	0.00211*** (2.67144)	0.00250*** (3.07513)	0.00240*** (3.10644)
ROA	+/-	0.17331*** (6.06449)	0.16334*** (6.11096)	0.15215*** (5.54041)
Total Obs.		309	309	309
F-Statistic		7.51105	7.70171	7.91762
Prob(F-stat)		0.00000	0.00000	0.00000
Adjusted R^2		0.69298	0.69372	0.69323

where:
TAGG: Tax Aggressiveness Measurement (DTAX); CSR: CSR Index Scoring; DRMS: Dummy Risk Management Systems; SIZE: Firms Size (Ln. Total Asset); LEV: Leverage (Debt to Asset Ratio); CINT: Capital Intensity (Fixed Asset to Total Asset); INVINT: Inventory Intensity (Inventory to Total Asset); MKTBK: Market to Book Ratio; ROA: Pre-Tax Return on Asset.
Sign ***, **, and * shows a significance level of 0.01, 0.05, and 0.10 (one-tailed)

Source: Results of Data Processing with EViews 9.0, Re-Processed

Hypothesis 2 proposed in this study explains that the effect of CSR activities on tax aggressiveness becomes higher by existence of effective risk management systems (RMS), which is interacted with CSR activities (CSR), so it becomes moderating variable (CSR*RMS). This study is the first to formally test the importance of an effective risk management systems to maintain conformity of CSR activities and fulfillment of tax payments. H2 test results can be seen in equation (2) which shows the regression coefficient for CSR*RMS is positive and significantly associated to tax aggressiveness (Prob <0.01), with values of 0.59500, indicating H2 is rejected. Positive coefficient indicates that moderating effect of risk management systems can weaken the effect of CSR activities on tax aggressiveness, as implied by Hoi et al. (2013).

Besides hypotheses testing, regression results also show the role of risk management systems (RMS) on tax aggressiveness behaviors, either as moderating or independent variable. Based on regression results in in equations (2) and (3), it was found that RMS was negative and significantly associated to tax aggressiveness behaviors (Prob <0.01), with -0.28507 (2) and -0.05031 (3). This result is consistent with Richardson et al. (2013) who described that companies with stronger or more effective risk management systems are less likely to misstate or incorrectly report financial or taxable income, have reduced opportunities to engage in activities that are directed at benefiting executive management, and are less likely to engage in complex tax aggressiveness behaviors. Thus, it can be concluded that RMS is a quasi-moderator variable, which can be used as independent variable and moderator variable. Related to control variables, the regression results indicate that overall has been in accordance to the predicted sign as described by Lanis and Richardson (2012).

Discussions and Implications

The Effect of CSR Activities on Tax Aggressiveness Behaviors

H1 test results explain that the more socially responsible companies are expected to become less aggressive towards taxes. In other words, CSR activities is able to increase the companies' compliance in fulfilling its tax payments. Several previous studies (eg, Shafer and Simmons, 2008: Zeng, 2012, Hoi et al., 2013; Lanis and Richardson, 2012; Pradipta and Supriyadi, 2015; Tiarawati, 2015) also support H1 test results. This is due to the assumption that companies with little CSR activities will be considered socially irresponsible, thus becoming more aggressive in avoiding taxes. In addition, CSR activities and tax aggressiveness also affect the long-term companies' sustainability.

CSR activities and tax payments fulfillment are one form of corporate strategy in build legitimacy, as an effort to maintain its sustainability. In accordance with discussion in the previous section, companies still continue to promote reputation through CSR activities reporting. This fits perfectly to the legitimacy theory which views the importance of disclosure of CSR activities as legitimicy strategy (van der Laan, 2009). On the other hand, the tax payments fulfillment will also generate a positive reaction for companies, thus strengthening the companies' legitimacy strategy. As both are accomplished, companies are enabled to execute legitimacy strategy in two ways (Lindblom, 1993 in Bebbington et al., 2008). First, company changes its output, method, or objectives to conform to public expectations, and then informs the public of these changes. Second, companies do not change its output, method, or purpose, but demonstrates the suitability of its outputs, methods, or objectives through education/training and information.

Basically, tax aggressiveness behavior is considered unethical and irresponsible in public perception, so it is inconsistent with the meaning contained in CSR. Thus, even though CSR activities are included in the cost that can be deducted from taxable income and done to build a good corporate image (Rusydi and Siregar, 2014), it does not mean companies do CSR activities solely to reduce its income tax. The reduction of the tax burden can be seen as common in companies, as cost reduction is seen as application of efficiency that will enhance growth and performance of companies (Pradipta and Supriyadi, 2015). Based on this view, the reduction of tax burden is more emphasized through utilization of other gaps in accordance with the rules and carried out with full responsibility. Thus, the amount of reduction of tax burden is still within reasonable limits.

The Role of Risk Management Systems in Moderating the Effect of CSR Activities on Tax Aggressiveness Behaviors

H2 test results explain that risk management systems can weaken the negative impact of CSR activities on tax aggressiveness. In other words, oversight mechanism through effective implementation of risk management systems will encourage companies to further increase CSR activities, when indicated to tax aggressiveness. Conversely, when companies are more compliant with tax payments, CSR activities become less important. This is done by companies for maximizing its earnings in such a way. This study is the first to examine the importance of an effective risk management systems to maintain corporate reputation on CSR activities and tax payments, but the results have been implicitly supported by Hoi et al. (2013).

Based on descriptive statistics in Table 2, implementation of risk management systems in Indonesia have been effective. Basically, however, risk management systems effectiveness are determined from its achievement in reducing the likelihood of various risks. Risk management systems are important element in identifying risk, one of the companies' key risks related to reputation. Reputation-related risks can occur when companies do business by ignore its responsibilities, which can be realized from CSR activities and/or tax payments fulfillment.

The test results show that risk management systems are implemented through CSR activities reporting to maintain reputation, as the embodiment of legitimacy strategy. When companies are indicted for tax aggressiveness, companies will report CSR activities to maintain its legitimacy. So it can be concluded that CSR activities are carried out irresponsibly (Hoi et al., 2013). This situation can be explained through legitimacy theory that emphasizes the importance of information to related parties, although indicated as imaging.

The test results also show the possibility of how companies executes its legitimacy strategy (Lindblom, 1993 in Bebbington et al., 2008). First, companies tries to change public perception by associating itself with symbols that have high legal status. Second, companies tries to change people's expectations by aligning them with the outputs, goals, or methods that companies has adopted. In addition, Indonesia, which is research location, as a developing country also clarify companies motivation in engaging and reporting CSR activities (Omran, 2015), that is to show that companies have responsibility and good performance solely to maintain sustainability and improve its value (Godfrey et al., 2009; Minor and Morgan, 2011).

Discussions on Control Variables

This study used several control variables related to determinants of tax aggressiveness behaviors in accordance with Lanis and Richardson (2012), which were replicated in this study. Thus, all predictive signs for control variables are also similar with Lanis and Richardson (2012). Based on main regression results presented in Table 3, overall control variables have similar signs to the prediction.

SIZE has a positive sign, which means the larger its size, companies are estimated to have a tendency to become more aggressive towards taxes, and vice versa. This is due to the assumption that the size of companies is directly proportional to its experience which will improve its ability and knowledge in many ways, so that large companies will have more knowledge and ability to manage tax payments, than small companies.

LEV and CINT have a positive sign. LEV is related to corporate loans, so when companies debt ratio is high, companies try to minimize its tax payments to make it easier to settle its debts. Then, CINT explained that the higher capital intensity, which is manifested from fixed asset turnover, will indicate the higher tax aggressiveness, because tax regulations have slightly different regulation in calculation of depreciation that it can be a gap to engage tax aggressiveness. In addition, LEV and CINT also show its interest expense and depreciation expense which are classified as deductible expense on the calculation of taxable income.

This study also uses INVINT, where firms with high inventory turnover also tend to be non-aggressive, which is shown to have a negative sign. This reinforces the role of INVINT in substituting CINT. In addition, inventory turnover can be represented through inventory calculations, which already have the same regulation between accounting and taxation, making it increasingly difficult for companies to exploit loopholes to engage in tax aggressiveness. Thus, companies are expected to become compelled to be more compliant.

The growth control variable, as measured by the MKTBK calculation, and performance-related control variables, as measured by profitability through the calculation of pre-tax ROA, show a positive sign in relation to tax aggressiveness. This is in accordance with previously mentioned, that tax aggressiveness is exist and can be regarded as usual thing. In addition, it should be emphasized that tax aggressiveness is not a tax evasion. Thus, tax aggressiveness can be seen as a form of efficiency to maintain sustainability and increase companies value. So that, the higher MKTBK and ROA, tax aggressiveness also increases, but within reasonable limits in accordance with the meaning of tax aggressiveness itself.

Sensitivity Testing

Table 4: Sensitivity Test Result

Independent Variables	Predicted Sign	Dependent Variable: Tax Aggressiveness Behavior (TAGG) -- DTAX --					
				(1)			
Intercept				-0.10955 (-1.05158)			
CSR	-			-0.41131 (-6.26473)	***		
CSR*DRMS	-			0.42813 (5.30213)	***		
DRMS	-			-0.19537 (-5.36521)	***		
SIZE	+			0.00892 (2.51923)	**		
LEV	+			0.01024 (1.63675)			
CINT	+			0.03155 (2.51689)	**		
INVINT	-			-0.02446 (-0.89414)			
MKTBK	+/-			0.00221 (2.74773)	***		
ROA	+/-			0.15985 (5.94539)	***		
Total Obs.				309			
F-Statistic				9.47765			
Prob(F-stat)				0.00000			
Adjusted R^2				0.79056			

where:
TAGG: Tax Aggressiveness Measurement (DTAX); CSR: CSR Index Scoring; DRMS: Dummy Risk Management Systems; SIZE: Firms Size (Ln. Total Asset); LEV: Leverage (Debt to Asset Ratio); CINT: Capital Intensity (Fixed Asset to Total Asset); INVINT: Inventory Intensity (Inventory to Total Asset); MKTBK: Market to Book Ratio; ROA: Pre-Tax Return on Asset.
Sign ***, **, and * shows a significance level of 0.01, 0.05, and 0.10 (one-tailed)

Source: Results of Data Processing with EViews 9.0, Re-Processed

Sensitivity testing is used to determine the consistency (robustness) of the model used in the study. Sensitivity test results can be seen in Table 4 above, with details according to the changes made. This study applies sensitivity testing by making some changes to some variables, based on previous research. Some changes include changing the measurement of tax aggressiveness by proxy Permanent Difference (PERMDIFF), changing the measurement of tax aggressiveness measures by proxy Total BTD (BTD), and changing the measurement of risk management systems into the use of dummy variables (DRMS).

(Table 4. Cont.)

Independent Variables	Predicted Sign	Dependent Variable: Tax Aggressiveness Behavior (TAGG) -- PERMDIFF --		
		(2)	(3)	(4)
Intercept		-0.36950*** (-4.81538)	-0.15111 (-1.39131)	-0.17690* (-1.67832)
CSR	-	-0.08235* (-1.92965)	-0.51005*** (-2.98673)	-0.50446*** (-2.79562)
CSR*RMS	-		0.56710*** (3.15671)	
RMS	-		-0.25768*** (-3.40476)	
CSR*DRMS	-			0.47438*** (2.64025)
DRMS	-			-0.19021*** (-2.84436)
SIZE	+	0.01315*** (4.94651)	0.01168*** (4.14175)	0.01181*** (4.42123)
LEV	+	0.00080 (0.12657)	0.00120 (0.19201)	0.00022 (0.03395)
CINT	+	0.03804*** (3.52791)	0.04586*** (3.70517)	0.04770*** (3.93528)
INVINT	-	-0.02449 (-1.00006)	-0.01608 (-0.62127)	-0.00005 (-0.00194)
MKTBK	+/-	0.00275*** (4.90506)	0.00330*** (4.55265)	0.00335*** (5.13274)
ROA	+/-	0.22195*** (10.8388)	0.23114*** (10.99645)	0.21620*** (10.57013)
Total Obs.		309	309	309
F-Statistic		16.08111	16.26661	16.37079
Prob(F-stat)		0.00000	0.00000	0.00000
Adjusted R^2		0.84220	0.84620	0.84708

where:
TAGG: Tax Aggressiveness Measurement (PERMDIFF); CSR: CSR Index Scoring; RMS: Risk Management Systems Index Scoring; DRMS: Dummy Risk Management Systems; SIZE: Firms Size (Ln. Total Asset); LEV: Leverage (Debt to Asset Ratio); CINT: Capital Intensity (Fixed Asset to Total Asset); INVINT: Inventory Intensity (Inventory to Total Asset); MKTBK: Market to Book Ratio; ROA: Pre-Tax Return on Asset.
Sign ***, **, and * shows a significance level of 0.01, 0.05, and 0.10 (one-tailed)

Source: Results of Data Processing with EViews 9.0, Re-Processed

Sensitivity test in this study generate seven regression equations. Equation (1) looks at the sensitivity test results when using DRMS with the dependent variable DTAX. Then, equations (2) and (3) look at the sensitivity test results when the PERMDIFF dependent variable usage, equation (4) looks at the sensitivity test results when using DRMS with PERMDIFF dependent variable. Finally, equations (5) and (6) look at the sensitivity test results when the use of the BTD dependent variable, equation (7) looks at the sensitivity test results when using DRMS with the BTD dependent variable. Overall equations have been tested for model specifications and classical assumption testing.

Based on sensitivity testing results, overall equation is consistent to the main model test results, except the sensitivity equation (7), so that it can be concluded that the research model has been consistent (robust). These results also confirm that the level of corporate awareness is in line to the existence of CSR activities and tax payments fulfillment. Furthermore, risk management systems also shows its role in maintaining companies'

reputation through CSR activities or tax payments fulfillment. Thus, risk management systems will encourage CSR activities increase to form a positive image, while engaging in tax aggressiveness.

(Table 4. Cont.)

Independent Variables	Predicted Sign	Dependent Variable: Tax Aggressiveness Behavior (TAGG) -- BTD --		
		(5)	(6)	(7)
Intercept		-0.33743*** (-6.57919)	-0.19655*** (-3.17087)	-0.25806*** (-3.64692)
CSR	-	-0.09166*** (-4.66149)	-0.27815*** (-3.09412)	-0.05940* (-1.88959)
CSR*RMS	-		0.29995*** (3.18220)	
RMS	-		-0.14710*** (-3.75556)	
CSR*DRMS	-			0.00059 (0.01568)
DRMS	-			-0.04346 (-0.42587)
SIZE	+	0.01320*** (7.58986)	0.01108*** (7.35474)	0.01086*** (8.26408)
LEV	+	-0.00890** (-2.36622)	-0.01031*** (-2.77278)	-0.00937*** (-2.78414)
CINT	+	-0.04131*** (-4.93441)	-0.02339*** (-2.66144)	-0.02599*** (-3.12211)
INVINT	-	-0.04959*** (-3.44672)	-0.04314*** (-3.32863)	-0.05144*** (-4.27482)
MKTBK	+/-	0.00036 (1.56123)	0.00049** (1.99287)	0.00053** (2.16368)
ROA	+/-	0.27680*** (27.00969)	0.26493*** (23.90652)	0.26792*** (24.89959)
Total Obs.		309	309	309
F-Statistic		20.82884	22.27148	25.00571
Prob(F-stat)		0.00000	0.00000	0.00000
Adjusted R^2		0.85099	0.85922	0.86080

Where,
TAGG: Tax Aggressiveness Measurement (BTD); CSR: CSR Index Scoring; RMS: Risk Management Systems Index Scoring; DRMS: Dummy Risk Management Systems; SIZE: Firms Size (Ln. Total Asset); LEV: Leverage (Debt to Asset Ratio); CINT: Capital Intensity (Fixed Asset to Total Asset); INVINT: Inventory Intensity (Inventory to Total Asset); MKTBK: Market to Book Ratio; ROA: Pre-Tax Return on Asset.
Sign ***, **, and * shows a significance level of 0.01, 0.05, and 0.10 (one-tailed)

Source: Results of Data Processing with EViews 9.0, Re-Processed

Implications of the study

The results bring an implication on the importance of companies' reputation to be legitimate. Therefore, the role of regulators is very important. This study contributes to the literature by taking the risk management systems into account in the relationship between CSR activities and tax aggressiveness behaviors. The risk management systems are assessed based on CSR index improvement that reflects the current GRI G4 and risk management systems index improvement that relate to CSR and/or taxation based on Risk Oversight category in ASEAN CG Scorecard.

Conclusion and Suggestion for Future Studies

The purpose of this study is to analyze empirically the effect of CSR activities reporting on tax aggressiveness behaviors and evaluate the role of risk management systems in influencing the effect of CSR activities reporting on tax aggressiveness behaviors. Based on the test results, it can be concluded that CSR activities applied by companies have an influence in minimizing tax aggressiveness behaviors. This can happen because CSR activities are a manifestation of ethical and responsible behaviors (Shafer and Simmons, 2008), so that more companies engage in CSR activities, companies are seen to be more ethical and responsible, thus becoming more aware of its tax payments, then become non-aggressive against its tax payments (Lanis and Richardson, 2012). In addition, the implementation of risk management systems can weaken the influence. This weakening can occur because risk management is more emphasized to maintain companies' reputation (Minor and Morgan, 2011). By engaging risk management through the implementation and reporting of CSR activities, companies are expected to be more sustainable even though it is indicated to have committed violations, particularly related to the fulfillment of its tax payments (Hoi et al., 2013).

This research has some suggestions for future research. First, measurement of tax aggressiveness can be completed with Abnormal BTD, while still using better sensitivity testing. Second, enrichment of literature so that subjectivity in content analysis can be minimized. In addition, measurement of CSR activities will be better if done by survey directly to the field area in order to obtain the primary data, which can minimize the emergence of biases that occur when the use of secondary data. Third, the development of a risk management systems index needs to be based on prior research, theory, policy, and circumstances in order to be better, objective, and reliable in explaining its effective implementation.

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Detecting Earnings Management Trough Compliance of Audit Committee's Related Rules

Mohammad Taufiq JUDHANTO
Universitas Indonesia, Indonesia, mohammad.taufiq41@ui.ac.id

Siti NURYANAH[1]
Universitas Indonesia, Indonesia, siti.nuryanah@ui.ac.id

Abstract

This study primarily aims to investigate the determinant of company's compliance with audit committee rules. This study also examines the association of effectiveness components of audit committee, which are composition, authority, resources, and diligence with earnings management. Using 562 listed companies in Indonesia Stock Exchange (IDX) as a sample, the result shows that board of commissioner characteristics, company's size and listing age are found to be significant factors for company's compliance with audit committee rules. Additionally, the authority is positively associated, and the size of audit committee is negatively associated with earnings management. However, this study fails to find the association between audit committees' expertise and meeting frequencies with earnings management.

Keywords: audit committee effectiveness, expertise, authority, size, diligence, discretionary accruals, and company's compliance.

Introduction

The growth of Indonesian capital market is quite impressive. Based on Financial Services Authority's (OJK) data, Indonesian market succeed to rise the number of public companies up to 20% from 2007 until 2012. On the contrary, ASEAN Capital Market Forum (ACMF) issues a publication about poor rating of Indonesian public companies' governance scores compare to other public companies in South East Asia's countries in 2013. Indonesian companies only got 5th ranked out of 6th countries (http://www.investasi.kontan.co.id, 2015). At the same time, Organization for Economic Cooperation and Development's (OECD) research result states that the rating of company compliance for Indonesian companies is still low. The average scores of Indonesian company compliance are 54.55 in scale of 100 in 2013 (http://www.neraca.co.id, 2014). From both scores, it can be concluded that the implementation of good corporate governance in Indonesia is still low.

To ensure the compliances, therefore company needs an organ that can run supervision function, which is audit committee. On brief history, audit committee was designed to minimize the doubt of the independency of independent auditor's work. The presence of the committee was to recommend to management the appointment of independent auditor, therefor the result of audit work will be independent (Birkett, 1986). Nowadays, the role of audit committee has developed. Tasks and responsibilities of the committee currently have grown in supervising corporate activity. The widening of this role is to ensure the quality of financial report.

Indonesian Country's Act no. 40 (2007) about company states that one of the boards of commissioner task is in company's supervising. Concerning about this vital task, therefor the boards needs supporting structures. According to National Committee for Governance Policy (KNKG), one of structure that can support the board and needs to be established is audit committee. Moreover, Indonesian Capital Market Supervisory Body's (Bapepam dan LK) rules no. IX.I.5 (2012) poin 1.b. states that public company obliged to have an audit committee.

Based on those issues, the presence of audit committee is very critical especially for public company. Blue Ribbon Committee (1999) issued several recommendations for capital market, and its regulatory body. The concerns of the recommendations are: (a) audit committee independency, (b) the composition of audit committee, (c) audit committee charter, (d) audit result communication, (e) audit committee report, and (f) review of annual report. In accordance with BRC's recommendation, DeZoort et al. (2002) states the same concerns. DeZoort et al. concludes that an

[1] Corresponding Author.

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effective audit committee covering these aspects, which are: (a) composition, (b) authority, (c) resources, and (d) diligence.

Previous research discussed about the effectiveness of audit committee were more concentrated on general characteristics of audit committee. Those characteristics include member's independency, expertise presences, size of committee, and meeting frequency. These characteristics were used in previous studies because it can be easily quantified. Meanwhile in other characteristics, there are no standard measurements yet (DeZoort et al., 2002). However, those unmeasured characteristics play an important role to achieve an effective audit committee. A few literatures that discussed about the authority and diligence of audit committee was Carcello et al. (2002). Carcello et al. using IIA's guidance and SEC's disclosure rule to measure the authority and the diligence of audit committee proxies.

This study obejctives are to identify the factors that related to public companies' compliance with audit committee rules and to identify the effect of audit committee effectiveness in earnings management. The main concern to identify the determinant factors of company compliance was referring to the issues discussed above. It can be said that the poor rating issues in governance of Indonesian public companies related to low supervision of audit committee and the potensial issue in earnings management. By using four components of audit committee effectiveness proposed by DeZoort el al. (2002) which are independency, authority, and diligence, this study try to fill the research gap, whereas no research that combine all those aspects.

Literature Review and Hypothesis Development

Company's Compliance Studies

There were few studies that particularly discussed company's compliance specifically in their compliance with audit committee related rules. Turpin and DeZoort (1998) did a study of determinant factors that influence companies to comply with applied rules. Turpin and DeZoort (1998) uses company's characteristics such as stock ownership, leverage, boards of director composition, company's size, and listing status. Their research result shows that larger companies have more sources to comply.

Nuryanah (2004) studies the determintant factors that influence public companies to comply with board governance rules. She includes company size, age of listing, and type of industry as determinant factors. The result shows that type of industry was more comply with board governance related rules. No surprisingly the result shows that financial industry was more comply compare with other type of industry concerning the financial industry have more restricted rules.

Other studies related with public company compliance were Kelton and Yang (2008), Ettredge et al. (2011), Gao and Kling (2012), Puspitaningrum and Atmini (2012), Bazrafshan et al. (2015), Liu (2015). Those studies using the same proxies as determinant factors of company compliance such as: boards of commissioner's characteristics, management ownership, and company's characteristics.

Liu (2015) did a study on governance and disclosure on low information level business environment. His study reveals that the existence of independent commissioner on boards can raise the level of corporate disclosures. Other factor which is insider trading was also related with corporate's disclosure policy.

Audit Committee's Effectiveness and Earnings Management Studies

Previous studies that discussed on audit committee effectivity and earnings management were tend focused on earnings quality and issues related tofinancial reporting and audit committee characteristics. McMullen et al. (1996) states that audit committee with at least one member with CPA's background will make the committee more aware in financial reporting, accounting, and audit issues.

The frequency of committee meeting is also related to corporate issue. Abbott et al. (2004) explore the effect of Blue-Ribbon Committee (BRC) recommendations in mitigating financial misstatement. By using 83 companies with misstated financial report as sample in 1991-1999 period, it was found that the frequency of meeting and the independency of committee related to financial misstatement. Krishnamoorthy et al. (2002) on his survey study about the association of audit committee's effectiveness to financial reporting quality shows that the presence of expertise and strong commitment of committee were important attribute to audit committee effectiveness. Bedard's (2004) study reveals the association of audit committee's expertise, independency, and acitivity with earnings management aggressiveness.

Klein (2006) studies using sample from NYSE and NASDAQ to test on board of commissioner and audit committee's characteristics and its association with earnings management. His study shows that the independency of audit committee was associated with earnings manipulation. Meanwhile, Habbash's (2012) study shows different result. Habbash reveals that there is no association between audit committee characteristics and earnings management. He and Yang (2014) states that audit committee effectiveness in minimizing earnings management is affected by certain industry rules.

Hypothesis

In two tier board country, the supervision function is run by boards of commissioner. The function of boards of commissioner is to supervise the company's operation runs by management. Most of Indonesian companies' commissioner positions are engaged by the owner itself. Therefor there will be potensial agency issue if the board is not independent. The presence of independent commissioner was to minimize this agency issue. Bazrafshan et al. (2015) states that the presence of independent supervisory board will compliment the supervision function.

In Indonesian Financial Services Authority (OJK) rules no. 33 (2014) states that there is goodwill from boards of commissioner to fully responsible and due professional care over the company's management policy supervision. In other rule, Company Act no. 40 (2007) article 114 states the responsibilities of boards of commissioner and the possibilities of lawsuit if fail to notice issue that can caused company losses. The sentence of being not comply with certain rules is also become a company loss. Consequently, the boards especially independent board member will be more aware in supervising by complying with rules. Based on this analysis, the proposed hypothesis will be as follows:

H1a: Public company with independent commissioner served as a commissioner president tends to comply with audit committee related rules.

H1b: Public company with higher portion of independent commissioner on board tends to comply with audit committee related rules.

H1c: Size of board commissioner related with compliance of audit committee related rules.

The compliance of public company to enclose audit committee report in their annual report is one of good governance practices. Nuryanah (2004) states that company's size, company's age, and type of industry are the factors that affects company's governance structur. Applicable rules required public companies to have more sources. Bigger companies have more possibility to comply with rules because they have more sources. Therefor developed hypothesis is as follow:

H1d: Size of company is positively related with company compliance with audit committee related rules.

Public company that has been listed in capital market earlier, gained an experience about the situation and reaction of capital market and its effect for the company by following certain rules (Nuryanah, 2004). Therefor the obstacles of experienced public company to implement certain rules are smaller and the possibilities are bigger. The developed hypothesis is as follow:

H1e: Listing age of public company is positively related with company compliance with audit committee related rules.

This study defines the audit committee effectiveness as a board that consist of qualified members supported with authority and resources to protect stakeholders' interests by ensuring the reliability financial reporting, internal control, and risk manajemen through diligent monitoring effort (DeZoort et al., 2002). Based on this definition, therefor the component of audit committee wiil be used in this study are composition, authority, resources, and diligence.

Members with finance and or accounting expertise were expected makes the review of financial reporting became more effective because their ability to understand the reporting process and the content of the report. McMullen et al. (1996) on his survey report states that the committee which has at least one with public accountant certification will raise the awareness in financial reporting, accounting, and auditing issues. Krishnamoorthy et al. (2002) on his survey involves auditor as participant to test the effectiveness of audit committee in financial reporting quality. The result of the survey shows that financial and or accounting's expertise, independency, and strong commitment were important attributes in effective audit committee.

Kang et al. (2011) and Sun et al. (2014) states that the association between financial and or accounting expertise with accruals discretioner is negative. Meanwhile Nelson and Devi (2013) and Garven's (2015) studies shows insignificant result. In Indonesian capital market's rule states that audit committee members should understands the financial report and one of the members should have the expertise in accounting and or financial.

Earnings management is one of many issues in accounting and financial reporting. Although accrual discretioner is not forbidden in accounting policy, however it may mislead the reader of financial report on understanding the numbers. The presence of financial and or accounting expertise can assist the board of commissioner in supervising by understanding the motive of management using the opportunities in making discretion.

Based on statements above it can be concluded that there is association between the presences of accounting and or financial expertise with earnings management practice. Therefor the developed hypothesis is as follow:

H2: Audit committee expertise is negatively associated with earnings management.

Audit committee that aware of their roles and responsibilities can maximize their function. Effectiveness in supervising can be achieved if the legitimation of the existence and the function of audit committee were acknowledged by the company. Not so many previous studies focused on audit committee's roles and responsibilities (Kalbers and Fogarty, 1993; Rittenberg and Nair, 1993; Lin et al., 2008).

Kalbers and Fogarty (1993) assert that audit committee will become more effective if supported by given strength. The strength here was the authority of the audit committee. Rittenberg and Nair (1993) view that audit committee members' needs to understand their responsibilities more specifically in order to capture issue in the financial information. Lin et al. (2008) states that the positive effect of the elevation of the quality of the financial report could only be accomplished if there is a depth understanding of the audit committee's roles and responsibilities.

On one of Indonesian capital market's and stock exchange's rules, it mentioned that audit committee was responsible for issued financial information. One of many forms of financial information review was to understand the process of financial reporting and accounting policies that management taken. With the given roles and responsibilities, audit committee supposed to taken care the review of financial information very carefully, especially in detecting financial report's issues such as earnings management. If the financial report's users misinterpret the financial report content caused by earnings management practice, consequently it becomes the responsibles of the committee. Based on those arguments stated above, therefor the developed hyphotesis is as follow:

H3: Audit committee authority is negatively associated with earnings management.

In many studies, an audit committee resource was associated with the size or numbers of audit committee member. Several studies discuss the association of the audit committee's size with earnings management (Bedard *etal*, 2004; Kang et al., 2011; Nelson and Devi, 2013; Sun et al., 2014; Ramachandran et al., 2015; Garven, 2015). Bedard et al. (2004) study the association of expertise, independency, and activity of audit committee with earnings management. The activity on their study was proxy of audit committee size. Their judgment states that the committee size should not be excessive in order to maintain the effectiveness supervisory function. However, their study shows positive association but statistically insignificant.

In contrast, Garven (2015) and Sun et al. (2014) shows a negative association between audit committee's size and discretionary accrual. It means that the more member of audit committee, the lower the number of discretionary accruals. Sun et al. (2014) investigate the association of audit committee's characteristics with real earnings management in United States. One of tested variable was audit committee's size. Their judgment was by adding more members in committee, the knowledge of the committee will be becoming much better and minimizing the opportunities of management in influencing the committee. One of BRC (1999) recommendation was the audit committee consist of at least three persons. Indonesian capital market rules also follow it by obligate the public company to have an audit committee headed by independent commissioner and two independent others as a member. Based on disparities arguments and results as above, the development of the hypothesis is as follow:

H4: Audit committee size is associated with earnings management.

Previous studies use meeting frequency as audit committee's diligence proxy (McMullen, 1996; Kang et al., 2011; Garven, 2015). McMullen (1996) states that the companies with less frequent meeting have potential issue with financial reporting. Same studies conducted by Garven (2015) states that companies with less frequent audit committee meeting tend to ineffective in supervising management, especially on earnings management issue. Based on Kang et al. (2015) studies show that audit committee meeting frequency have negative association with earnings management. Companies with more frequent audit committee meeting will reduce the level of management aggresiveness in doing earnings management.

Earnings management practice is still the concerns in financial reporting issue. Considering the urgent of this issue, therefor the companies needs to discuss it among the supervisory board, independent auditor and the management

continuosly. These meetings are to ensure that the published financial report was free from management discretion. Based on those explanations above, the developed hypothesis is as follow:

H5: Audit committee diligence is negatively associated with earnings management.

Research Method

Population, Samples, and Data

The population of this study is public companies listed in Indonesian Stock Exchange. Purposive non-probability samplings were used to obtain the sample. The criteria sets are as follow: (1) the companies listed from 2012 until 2014; (2) financial sector is excluded because it's specific regulation and the different treatment to measure the discretionary accruals (Siregar & Utama, 2008); (3) the financial data for 2012, 2013, and 2014 are available in Eikon Thompson Reuters database; (4) the companies has audit committee since 2013; and (5) consist of 6 companies of each industry sector in each year in order to get an efficient model of estimated discretionary accrual (Subramanyam, 1996).

This study use published annual and financial report as source of the data. Financial data were taken from Eikon Thompson Reuters and annual reports were taken from Indonesian Capital Market Directory (ICMD), Indonesian Stock Exchange, and companies official worldwideweb sites. For statistical testing, this study use balance panel because to observe dynamic changes, it is more proper to use repeated numbers of cross section observation (Gujarati & Porter, 2009).

Research Model

This study develops two models to be tested on hypothesis testing. Model 1 was used to test determinant factors that associated with public company's compliance with audit committee related rules. Model 2 was used to test the association of audit committee effectiveness with earnings management.

$$ACCOMPit= \beta0+\beta1dBCCHAIRit+\beta2BCPROPit+\beta3BCSIZEit+\beta4LnASSTit+ \beta5\ AGEit+\beta6dINDUSTit+\varepsilon \quad \textbf{(Model 1)}$$

Where ACCOMP is the numbers of information that company's comply to compare to all information needs to be comply (ratio), dBCCHAIR is the independent commissioner whose also chief commissioner (dummy), BCPROP is the numbers of independent commissioner compare to numbers boards of commissioner (ratio), BCSIZE is the numbers of boards of commissioner (number), LnASST is natural logarithm of company's total asset (Ln), AGE is the numbers of years since company listed in stock exchange (number), dINDUST is the type of industry (dummy).

$$DACCit= \alpha0+\alpha1ACEXPit+\alpha2ACRESPit+\alpha3ACSIZEit+\alpha4ACMEETit+ \alpha5LnASSTit+\alpha6ROAit+\alpha7DERit+\alpha8dBIGit+\varepsilon it \quad \textbf{(Model 2)}$$

Where DACC is the absolut number of discretionary accruals, ACEXP is the numbers of accounting and or financial expertise on committee, ACRESP is the numbers of committee's responsibilities information that company's mention in committee's charter compare to all committee's responsibilities information according to rules, ACSIZE is the numbers of committee member (number) ACMEET is the numbers of committee meeting per year (number), LnASST is natural logarithm of company's total asset (Ln), ROA is return on asset (ratio), DER is company's leverage (rasio), dBIG is the category of accounting firm (dummy).

Variables

Variables used in this study are describes and measures as follows (Table 1).

Table 1 Variables

Code	Description	Measurement
DACC	Earnings Management	The absolut value of total residual of discretionary accrual
ACCOMP	Company's compliance with audit committee related rules	Scoring and ratio
ACEXP	The presence of audit committees' financial and or accounting expertise	Number
ACRESP	Number and percentage of audit committee responsibilities' items stated on company's annual report.	Scoring and ratio
ACSIZE	Number of committee's member	Number
ACMEET	Number of committee's meeting per year	Number
dBCCHAIR	Indepent commissioner as a chief of board of commissioner	*Dummy* (1; 0)
BCPROP	Percentage of independent commissioner on board	Ratio
BCSIZE	Number of board of committees' member	Number
LnASST	Company's size	Natural Logarithm
ROA	Profitability	Ratio
DER	Leverage	Ratio
AGE	Listing age (since IPO)	Number
dINDTYP	Industry Sectors (Manufactures or others)	*Dummy* (1; 0)
dBIG	Public Accounting Firm (Big 4 or non-Big 4)	*Dummy* (1; 0)

Results and Discussions

Based on available data in Eikon Thompson Reuters, there were 1.036 observation companies in 2013 and 2014. With the criteria given in part three, this study obtains 562 observation companies for samples. The samples were obtained described in Table 2.

Table 2 Samples

Sampel's Criteria	n
Numbers of listed companies in IDX in 2013 and 2014	1.036
Excluded: companies in financial sector	(194)
Excluded: missing data	(180)
Excluded: companies without audit committee	(2)
Excluded: industry sectors with less than two observation companies	(98)
Numbers of observation companies' samples	562

Statistics Descriptive

Table 3 shows that the Skewness number of DACC, BCPROP, ACSIZE, ACMEET, BCPROP, and DER are more than three. Therefor those variables will be treated with winsorizing method. The statistics descriptive of all variables that are used in this study are as follows:

Table 3 Descriptive Statistics

Variable	Mean	Minimum	Maximum	Skewness
ACCOMP	0,6500	0,1250	1,0000	-0,1856
DACC	**0,0000**	**-3,3937**	**5,7808**	**3,1048**
dBCCHAIR	0,1441	0,0000	1,0000	2,0319
BCPROP	**0,4053**	0,1667	**1,0000**	**3,7216**
BCSIZE	4,4021	2,0000	9,0000	0,7254
ACEXP	1,8968	1,0000	4,0000	0,2220
ACRESP	0,7329	0,1111	1,0000	-0,2405

ACSIZE	**3,0445**	**2,0000**	**6,0000**	**5,7540**
ACMEET	**5,7722**	**1,0000**	**79,0000**	**5,4453**
LnASST	28,8152	23,8666	33,0950	-0,1747
ROA	6,3665	-27,3875	86,8796	2,5314
DER	**0,8679**	-6,0802	**20,6289**	**5,8807**
dBIG	0,3665	0,0000	1,0000	0,5554
AGE	13,6461	0,4889	35,3528	0,1789
dINDUST	0,3487	0,0000	1,0000	0,6364

ACCOMP= compliance with audit committee related rules, DACC= discresionary accruals (Kazsnik's model), dBCCHAIR= independent commissioner as commissioner president (*dummy*), BCPROP= independent commissioner's proportion, BCSIZE= board of commissioner's size, ACEXP= audit committee member with accounting and or financial expertise, ACRESP= audit committee responsibilities, ACSIZE= audit committee's size, ACMEET= audit committee's meeting frequency, LnASST=natural logarithm of total asset, ROA= return on asset, DER= debt to equity ratio dBIG= public accounting firm (*dummy*), AGE= company's age of listing, dINDUST= type of industry (*dummy*)

Regression Results

Company's Compliance and Audit Committee Related Rules

Table 4 presents the panel data regression Model 1 results that test factors'that affect company's compliance with audit committee related rules. The table shows that five out of six hypotheses tested shows significant effects. Hypothesis H1a, H1b, H1c, H1d H1e are failed to be rejected. Only hypthesis H1f was rejected. The variable dINDUST is not a factor that affects the company's compliance with audit committee related rules.

Variables dBCCHAIR and AGE shows negative influence against compliance audit committee related rules. Commissioner who is not an independent commissioner of the company and its age of listing more obedient towards audit committee related rules. In contrast, BCPROP, BCSIZE, and LnASST shows positive association with audit committee related rules'compliance. These results in accordance with the prediction of the direction, which means companies with larger proportions of independent commissioners and larger number of Board members, and companies with larger total assets, has higher level of allegiance against the audit committee related rules.

Table 4 Regression Result Model 1

Variable	Hypothesis (Sign)	Coefisien	Prob. (t-Stat)	
C	(?)	4,2878	0,0000	
dBCCHAIR	H1a (+)	-0,2711	0,0000	*
BCPROP	H1b (+)	0,4347	0,0000	*
BCSIZE	H1c (+)	0,0362	0,0000	*
LnASST	H1d (+)	0,0430	0,0252	*
AGE	H1e (+/-)	-0,0058	0,0012	*
dINDUST	(+/-)	-0,0250	0,3682	
Adj. R2	0,1002			
Prob. (F-Stat)	0,0000			

*5% significant level

ACCOMP= company's compliance with audit committee-related rules, dBCCHAIR= the independent Commissioner who is the Chairman or the President Commissioner of the company (dummy), BCPROP = proportion of independent Commissioner in Council, BCSIZE = the number of members of the Board of Commissioners, LnASST = the natural logarithm of total assets, AGE = age of listing company, dINDUST = type of industrial companies (dummy)

The results of the factors that influence compliance rules related with audit committee shows that the position and the proportion of independent commissioners, the size of the board of commissioners, the company's size and the company's listing age (Hypothesis H5a, H5b, H5c, H5d, and H5e) are all factors that influence the company to abide by related audit committee. While only the kind of industrial companies (H5f Hypothesis) the only variables tested are not significant as a determinant factor for compliance related rules against issuers of the audit committee.

In contrast to Nuryanah (2004) that the industry type associates with compliance while the size and age of the listing has no effect. This could be due to the companies that were used as samples of her research include banking and finance. While in this research, companies specializing in the field of banking and finance were not included. As a note, that the oversight on the financial industry and banking in Indonesia are quite strict, so it is worth a thought to the type of banking and finance industry will affect compliance when included in the research.

Earnings Management and Audit Committee's Effectiveness

Table 5 presents the results of the regression of data panel Model 2 which test the influence of components of the audit committee's effectiveness against the earnings management. From the four hypotheses tested on the Model 2, Hypotheses H3 and H4 are failed to be rejected. Based on their significance value indicates that the information of the audit committee responsibility and the number of audit committee members are associated with earnings management but with a different direction. Audit committee's responsibilities show a positive effect towards the earnings management. This implies that companies with more audit committee responsibilities, the greater the occurrence of earnings management. While the number of audit committee members influential negatively with earnings management. This shows that the more the number of audit committee members in a company, the lesser practice of earnings management. Hypotheses H2 and H5 are rejected, although the predicition sign is in accordance with the results, but not significant enough. Hypotheses H2 and H4 indicates that there are no association between the presence of expertise in the audit committee members as well as the number of audit committee meetings with earnings management.

From the four control variables are used, only profitability (ROA) and leverage (DER) that associated with earnings management. These results are supported by the direction of predictions that show a positive result, which means that the greater the level of profits generated through investment of company assets, and the greater the level of debt compared to its capital, then the greater the earnings management. According to the result, the company's size and company's public accountant has no effect against the earnings management.

Table 5 Regression Result Model 2

Variable	Hypothesis (Sign)	Coef.	Prob. (t-Stat)	
C	(?)	0,0811	0,4917	
ACEXP	H2(-)	-0,0168	0,3738	
ACRESP	H3(-)	0,0214	0,0021	*
ACSIZE	H4(+/-)	-0,0171	0,0000	*
ACMEET	H5(-)	0,0052	0,1395	
LnASST	(+)	-0,0011	0,8046	
ROA	(+)	0,0187	0,0000	*
DER	(+)	0,0053	0,0506	*
dBIG	(-)	0,0090	0,4867	
Adj. R2	0,0138			
Prob. (F-Stat)	0,0468			

* 5%
DACC= discretionary accrual's model, ACEXP= audit committee member with finance and or accounting expertise, ACRESP= audit committee responsibilities, ACSIZE= size of audit committte, ACMEET= audit committee's meeting frequency, LnASST= natural logarithm of total asset, ROA= return of asset, DER= debt to equity ratio, dBIG= public accountant firm (*dummy*)

Hypothesis H1 results shows that existence of expertise in audit committee is not significant. This is finding quite interesting because logically member with expertise in accounting and or in finance should be able detects accrual discretioner made by manager, but in fact the result had not significant. These results corroborate the results of Bedard et al. (2004), Sun et al. (2014) and Garven (2015) whose states that there is no influence of the existence of the audit committee members with expertise or accounting and finance. In this study, the criteria used to define the expertise in accounting and or finance were not very specific. To be able to understand about accrual discretioner that have been made by the manager, it may need special qualification such as certified financial analys (CFA) or certified internal auditor (CIA), and so on, that can support the expertise of the members of the audit committee in analyzing financial statements. With more specific expertise of the audit committee may be able to minimise the accrual discretioner made by the Manager.

The result of hypothesis H3 testing indicates that the audit committee's responsibilities associated significantly positive with accrual discretioner who carried out by the management. But this result is contrast with the predictions sign. The test results indicate that higher compliance of the statement of the audit committee's responsibilities with the rules, higher the discretion made by the managers. The reasons that may explain this condition is that the roles of the audit committee to detect any discretion who conducted by the management are less specific. The number of the tasks set by the regulators will open the opportunities for management to distract the focus of the audit committee in detecting discretion. Therefor it will be more focus for audit committee to supervise if the specified task was clear.

The result of Hypotheses H4 shows association between the numbers of the audit committee member with accrual discretion. The number of members of the audit committee of has a negative impact on accrual discretioner made by manager. This result suggests that the more numbers of members of the audit committee, the less discretion made by the management. These results corroborate the results of the research of Sun et al. (2014) and Garven (2015). A logical opinion related with this result is when a greater numbers of audit committee members, the scope to oversee management activities will become wider. Many individu who supervise management, the chance to maximize the opportunistic behavior will be decrease. By adding more members in the audit committee will create a lot of thought and knowledge, therefor it became less likely the monitoring function influenced by the management.

The result of hypothesis H5 indicates that the frequency of meetings of the audit committee has no effect against the accrual discretioner made by management. The results of this research strengthen Bedard et al. (2004) and Habbash *et al*. (2013). They state that there is no association between audit committee's meeting frequencies with the aggressiveness of management discretion. These result shows that this is still inconclusive to determine wether audit committee's metting frequencies with earnings management caused by vary results among related studies.

The reason that may explain this result is, in Indonesia, dualism the Office a lot happening on this position. Many members of the audit committee from public listring company occupy similar positions or other position such as in board of commissioner, director, and other managerial position in another public listing company. Dualism position potentially might make the audit committee will be unfocused in doing the monitoring function. This condition becomes an opportunity that can be exploited by managers to conduct their opportunistic behavior.

Four control variables are used in this model, i.e., the company's size, the profitability level, the leverage level, and the external audit's quality. The profitability and the leverage level show significant association. While in contrast, the size of the company and the audit quality has no association. These results are in line with the concept of earnings management, which the accrual discretioner made to affect the reported earnings. This pupose of course affects the profitability (ROA) and leverage (DER) ratio.

Differ results show no significance of the company's size and public accountant's quality. In Indonesia the practice of earnings management is not influenced by the size of the company's total assets. The manager that made discretion came from companies with small to big total assets. They have the same rationality to maximize their opportunistic behavior. Earnings management is also not affected by the company's public accountant. The result shows no different between the big-4 or non-big 4 accounting firm. This is possible because the client is exposed to the uniformity of public accountant. In Indonesia large companies generally will be audited by big-4 audit firm, while small and medium sized companies audited by the non-big-4. It can be interpreted that the risk faced by the respective public accountant will follow its clients so that the quality of the audit provided could be no different.

The regression results show that the ability of independent variables in explaining the appropriate model for measuring the dependent variable is quite low. The value of Adjusted R^2 shows 0.0138, which means there are still 98.62% of other explanatory variables that are not included in the research model.

Simultaneously, the independent variables used in model are significantly associated with earnings management. The characteristics of board of commissioners, company's size, age and type of industry significant (95% level of confidence) indicated by the value of the Prob (LR = 0.0000 statistics ").

Table 6. Sensitivity Test of Model 2

Variable	Hypothesis (sign)	Kazsnik's Model			Jones's Model			Dechow's Model			Kothari's Model		
		Coef.	Prob (t-Stat)		Coef.	Prob (t-Stat)		Coef.	Prob (t-Stat)		Coef.	Prob (t-Stat)	
C	(?)	0,0811	0,4917		0,1971	0		0,2131	0		0,2233	0	
ACEXP	H2 (-)	-0,0168	0,3738		-0,0161	0,4121		-0,0061	0,7154		-0,02	0,1845	**
ACRESP	H3 (-)	0,0214	0,0021	*	0,0341	0	*	0,0121	0,1437	**	-0,0475	0,7305	
ACSIZE	H4 (+/-)	-0,0171	0	*	-0,0015	0,1281	**	-0,0571	0,1462	**	0,0147	0,0645	*
ACMEET	H5 (+/-)	0,0052	0,1395		0,0214	0,2961		0,0118	0,2497		-0,0033	0,1501	**
LnASST	(+)	-0,0011	0,8046		-0,0065	0	*	-0,0036	0,2317		0,0009	0,117	**
ROA	(+)	0,0187	0	*	0,0047	0	*	0,0026	0,0001	*	0,0056	0,3437	
DER	(+)	0,0053	0,0506	*	0,009	0,0099	*	0,0124	0,1471	**	0,0003	0,2416	
dBIG	(-)	0,009	0,4867		0,0083			0,0112	0,1096	**		0,9595	
Adj. R2			0,0132			0,0227			0,012			0,028	
Prob (F-Stat)			0,0521			0,0078			0,0658			0,029	

*, ** 5%, 10%

DACC= discretionary accrual's model, ACEXP= audit committee member with finance and or accounting expertise, ACRESP= audit committee responsibilities, ACSIZE= size of audit committte, ACMEET= audit committee's meeting frequency, LnASST= natural logarithm of total asset, ROA= return of asset, DER= debt to equity ratio, dBIG= public accountant firm (dummy)

Robustness Test

Robustness test was conducted to see the robust of association of audit committee effectiveness component with earnings management (Model 2). In this test, the estimation number of discretionary accruals from model Kasznik was replaced with other estimation models, which are Jones (1991), modified Jones (Dechow et al., 1995), and Kothari et al. (2005).

According to the test result in Table 6, it shows that ACRESP is relatively significantly consistent (three out of four model are significant) and ACEXP and ACMEET are relatively insignificantly consistent (four out of four). Meanwhile ACSIZE is inconclusive because two out of four models show significant but insignificant on the other two models.

Company's size is significant in Jones and Kothari Models. For ROA, consistent on three models which are Kazsnik, Jones, and Dechow. dBIG becomes the only variable which is consistently insignificant in all accrual discretioner models.

Conclussion and Future Studies

By using 562 samples of listed public companies from 2013 and 2014, regression results shows that five variables used in model one and four components of audit committee effectiveness that: (a) independent commissioner as a chairman, independent commissioner proportion on board, size of board of commissioner, company's size, and length of listing affecting company to comply with audit committee related rules; (b) there is no association between audit committee expertise and audit committee diligence as audit committee effectiveness components with earnings management; (c) Audit committee roles and responsibilities and audit committee size as audit committee effectiveness components associated with earnings management.

These research results theoretically imply that the presence of audit committee was to minimize the asymmetry information between owners and agents. In organizational structure, the founding of audit committee must consider its' proper component such as composition, authority, and resources. Therefor the effectiveness of audit committee will be achieved. The regulatory board must consider the lack of compliance and the low of governance score of the public companies as serious issues in order to make the Indonesian capital market can be competing globally.

Improvements in some cases are still needed for upcoming research. The sample and the periods used were limited to only certain public companies and two years of observation. Future research needs try to look an alternative measurement of accrual discretion for a better indication of earnings management. It is also needing to be more

specific in measuring audit committee expertise's criteria and try to find literatures that can be quantifying audit committee's role and responsibilities. The regression result shows that both models used in this research were not good enough. Therefor future research needs to include variables that were not used in models nor exclude it if it were not fit in the model. Speaking of quality, future research also needs to consider exploring qualitative method, because quality needs to be measured in both methods, quantitative and qualitative.

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Crossing the Chasm – from Business Models to Software Architecture

Jacek B. JAKIELA
Rzeszow University of Technology, Faculty of Mechanical Engineering and Aeronautics, Department of Computer Science, Rzeszow, Poland, jjakiela@prz.edu.pl

Marcin L. OLECH
Rzeszow University of Technology, Faculty of Mechanical Engineering and Aeronautics, Department of Computer Science, Rzeszow, Poland, molech@prz.edu.pl

Malgorzata A. RATAJ
University of Information Technologies and Management, Department of Cognitive Science and Mathematical Modeling, Rzeszow, Poland, mrataj@wsiz.edu.pl

Abstract

The paper presents an original agent-oriented methodology suitable for development process of management information systems for virtual organizations. It starts with description of emerging business structures and a semantic gap problem, which is quite common for software development projects supporting operations of modern enterprises. To eliminate this problem we have decided that system architecture source code will be generated directly from business models describing virtual organization strategy, structure, business processes, business rules and assets. The business models will be created with specific modeling methods and visual language created with UML extensions we have developed for our methodology. Using software agent and its basic characteristics as main implementation construct enabled us to provide close semantic proximity between business models and system's architecture components. Therefore it was possible to create the transformation templates that can be run in a CASE Tool environment (Enterprise Architect) with MDG Technology to generate, directly from visual models, runnable source code of the software solution that possesses high level of business value. In our opinion it is significant contribution because we have reduced the Business–IT Wall which is predominant in management information systems development projects. All modeling methods included in our approach have been based on international standards published by Object Management Group – Business Motivation Model (BMM), Business Process Model and Notation (BPMN), Unified Modeling Language (UML) and Software Process Engineering Metamodel (SPEM). This should shorten the adoption timeframe of our methodology when used by teams that are familiar with state-of-the-art business computing standards. For implementation discipline in our methodology we have adopted Belief-Desire-Intension architecture for Multi-Agent Systems that is widely used framework and its implementation – Jason environment with Agent Speak language. Before we have decided to develop brand new methodology, comparative analysis of several currently used approaches aimed at inter-organizational information systems modeling has been conducted. The analysis results, which summary is presented in the paper, have enabled us to formulate the motivations and assumptions for the approach taken. The paper also discusses the static and dynamic structure of the methodology and the example of its possible use case.

Keywords: business modeling, agent-oriented development methodology, agent-oriented-software engineering, virtual organization, semantic gap, agent-oriented management information systems.

Introduction

Nowadays business organizations are becoming increasingly complex systems. This complexity is well visible during the development process of information systems supporting modern organizations' activities. Companies are no longer monolithic structures with clear boundaries and areas of operations, well defined according to functional hierarchies. Modern business structures can take different forms. As Franke (2002) mentioned they can consist of distributed independent organizations with physical presence, that share resources to achieve common goals, or can be fully virtual and operate primarily via electronic means e.g. various forms of business webs what is described by Tapscott et al (2000). Therefore the structural and behavioral characteristics of business firms have profoundly changed. All these changes have to be taken into consideration during the process of management information systems development.

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Apart from the complexity of business domain there is also the problem of complexity of software, which is its essential property, not an accidental one. This inherent complexity derives – as Booch at al. (2007) and Brooks (1995) stated – from such elements as: the difficulty of managing the development process, the flexibility possible through software, and the problems of characterizing the behavior of discrete systems.

The third problem is that contemporary methodologies for software development are not equipped with modeling methods for preparing system specification including all characteristics of new business structures that have emerged. As a result a semantic gap arises between business models and software models used for implementation of management information system. This gap is the source of many problems during the process of transforming business requirements into the software architecture. The main problem is that many aspects of organization operations that should be supported by system under development are not taken into account during development process and therefore software does not support properly business goals of the enterprise. As there will be shown in the paper, the solution of this problem is to use appropriately selected modeling concepts for all of the stages of software development.

The concepts defined for every stage have to have high semantic proximity, and thanks to this, the process of transforming business model into software model is an intuitive and unambiguous mapping of specifications' artifacts.

The paper presents the original management information system development methodology that has two main goals. Firstly it improves the process of business and software complexity management. Secondly it helps to reduce the semantic gap between business requirements and system specifications prepared during software solution development process. The proposed methodology is based on the concept of software agent and its characteristics which are used as modeling constructs. The methodology enables to model and analyze the management information system with the use of CASE (Computer Aided Software Engineering) tool and finally generate source code of solution based on visual business models developed.

Emerging business models – virtual organizations

Business organizations often take a form of virtual organizations that are temporary, value-added partnerships of independent, autonomous actors, such as individuals, companies or research institutes that have established the relationships in order to work together for achieving common goals. As has been shown in Jakiela (2006) there is very close semantic proximity between basic characteristics of modern organizations and multi-agent system – it was the most important premise to use agent-oriented approach for our methodology development.

Virtual organization can be viewed as a hub of partner firms that are selected according to an actual need in order to carry out a given task on a temporary basis. They can be partnerships of independent firms with physical presence. In such case every partner delegates specific unit of organization which constitutes the part of the virtual organization structure. It can also be the whole organization that takes part in such alliance with all departments and resources it possesses. Organizations may also take fully virtual forms. With the development of the Internet and modern ICT, new ways of conducting business have evolved. Many firms without physical presence are conducting business on electronic marketplaces. Franke (2002) in his book has stated, that in such case, virtual organization is a business web platform which provides the environmental condition, such as trust, coordination mechanisms and tools, necessary for the dynamic configuration of market and customer-driven value chain constellations. Therefore the task of designing organization boils down to developing the software (in the form of business web) that will support all operations of e-business partners related to extended enterprise.

The challenge of business modeling

In order to better explain our original approach we would like to clarify the business model concept. It may be defined differently depending on the domain where it is used. Osterwalder and Pigneur (2010) define business model as "the rationale by which organization crates and delivers value to its customers and captures the value in return in a systematic, repeatable and sustainable way". They provide the modeling technique called Business Model Canvas, that supports the process of creating business models in informal way. The business model concept used in this paper is related to systems development methodologies (e.g. RUP – Rational Unified Process), where business modeling discipline is considered as a crucial part of engineering process what has been mentioned in Olech (2017). The main rationale of using business models in RUP methodology, the same as we have assumed in our approach, is to understand where systems are being deployed, who uses them, how they need to integrate with existing systems, and what specific business tasks they automate. This is a key to deploying a successful system. The business model in RUP methodology consists of several visual models that represent problem domain business processes as well as business entities/objects processed by enterprise. The modeling language used in RUP is Business Modeling Profile,

UML extensions for business models development. The main aim of Business Modeling discipline in RUP is to create the models that take into consideration all important characteristics of business domain and use them in the process of software architecture development. We have assumed that the set of business models recommended by RUP is not sufficient when developing management information systems for virtual organizations. Therefore we have focused on identification of inherent characteristics of modern business structures and then we have extended the set of business models defined in RUP with new ones, that are important for modeling virtual organizations.

Previous section presented possible forms of virtual organizations. In both cases it is possible to abstract the common characteristics of such business structures. The most important are the following:

- process oriented organization structure rather than functional hierarchy,
- dynamic nature of organization structure that can change during its lifecycle,
- high autonomy of business partners that constitute virtual organization,
- every business partner is self-contained what means that it has all needed competences and resources for conducting specific category of tasks,
- goal orientation, what means that all the tasks are organized toward achievement of common goals,
- physical distribution of partners.

All of the characteristics presented above have to be taken into account when developing the software supporting operations of virtual organizations. This is the responsibility of properly done business modeling stage. Therefore the challenge of business modeling is to find the proper modeling concepts that describe all important aspects of problem domain and then develop modeling language as well as modeling methods. What is more the business models developed should be easily transformed into software architecture that will support business organization.
If the modeling language constructs for business models does not fit the modeling language constructs for software models then semantic gap will arise that will result in software architecture that is not aligned with business requirements and the software solution will have very low level of business value or no business value at all.

Reducing semantic gap between business and software models

The semantic gap characterizes the difference between two descriptions of an object by different linguistic representations. In computer science, the concept is relevant whenever human activities, observations, and tasks are transferred into a computational representation. More precisely the gap means the difference between ambiguous formulation of knowledge related to the business domain and its computational representation in a formal language – at first system requirements specification (SRS) and then programming language used for solution implementation.
It is a fundamental task of software engineering to close the gap between application specific knowledge and technically doable formalization. For this purpose domain specific (high-level) knowledge must be transferred into algorithms and their parameters (low-level) as stated Dorai and Venkatesh(2003). When developing management information system there are two main analysis and design perspectives: business system perspective and software system perspective. In order to describe business domain, analyst with stakeholders prepare business model that formalizes all important aspects of organization's operations and structure. It typically includes organization chart, strategy related documents (vision, mission and goals statements), business processes models and data models. This constitutes the foundation for application domain analysis and requirements elicitation as well as specification. In the next stage the system specification is derived from business specification. It includes the software architecture and software features description. The main question here is "How to express business artifacts in terms of implementation constructs?" At this point the semantic gap problem usually arises because every perspective uses its own set of concepts – different for business and software modeling, and therefore there is no intuitive and unambiguous mapping between business and software mindsets. In the following sections there will be shown how to tackle this problem with original methodology developed by authors of this paper. The cornerstone of proposed solution is to base development methodology on an agent concept. Justification of such approach has widely been described in Jakiela (2006) and Olech (2017).

New methodology for new challenges

One can ask, if the new approach is needed when there are many methodologies for inter-organizational information systems development available? The answer is yes, because in most cases they do not fully meet the requirements for modeling virtual organizations. To prove this claim, the comparative analysis of available methodologies has been conducted. Detailed description and all the results of the analysis conducted may be found in Olech (2017). Next section presents only the summary of results.

Methodologies for Inter-Organizational Information Systems development – comparative analysis

The analysis takes into consideration only methodologies developed after year 2000. The approaches selected for analysis are: UN/CEFACT Modeling Methodology (UMM) designed by United Nations Economic Commission for Europe (2006), Commitment-based business modelling methodology (COMMA) proposed by Telang and Singh (2012), Tropos described by Giorgini et al. (2004) and Information-Decision Model of the Management Systems (MIDSZ) proposed by Zaborowski (2016). In the analysis conducted, the following criteria have been used:

- does the methodology fully support the business modeling discipline; as a reference model the Business Motivation Model (BMM) created by Object Management Group has been selected; in our opinion it is a best choice as BMM is an international standard for business modeling, its description can be found at Object Management Group (2015) website,
- what is the visual language of specific methodology; does the methodology use custom or standardized notation like Unified Modeling Language; the key point here is that, the approach that uses standardized visual language (e.g. UML) or its extensions can be easily adopted and used by development teams; the UML specification can be found at Object Management Group(2017) website,
- does the methodology support such disciplines as: business modeling, analysis and design as well as implementation.

The most important results of the analysis are presented in the table 1.

Table 1. Summary of methodologies comparative analysis

Methodology	Analysis results
UMM	only partial scope of reference business model (BMM) is addressed, no guidelines for implementation,
COMMA	only partial scope of reference business model (BMM) is addressed, no support for analysis & design and implementation, uses custom visual notation not standardized,
TROPOS	only partial scope of reference business model (BMM) is addressed, uses custom visual notation not standardized, uses agent oriented modeling approach (Belief-Desire-Intention Architecture) in business modeling discipline,
MIDSZ	only partial scope of reference business model (BMM) is addressed, all business models are stored in one perspective, what results in lack of clarity and problems with understanding what has been modeled, implementation of business model is in the form of simulation experiment not management information system, uses Enterprise Process Modeling Language (EPML) as a visual modeling language, which is based on UML.

Apart from the weak points listed in the table 1. one of the key problems in many available methodologies is that, they often do not offer any software support for system development activities (by software support we do understand the CASE Tool environment that can be used for developing visual models and generating the system source code according to software engineering best practices). It has significant influence on methodology adoption and its real applications. Without such support the methodology may be used in academic environment but not in real applications and management information systems development projects. Even if the software environment for specific methodology is available, it usually takes a form of modeling tool (drawing visual models – diagrams) without real support for the implementation discipline (e.g. code generation from models developed).

The methodology assumptions

The methodology has been developed according to the following assumptions:

- it is focused on business modeling discipline, what should lead to management information system with high level of business value,
- the methodology has been developed with software support for CASE tool environment what helps the users to create business models with visual modelling language based on UML extensions,
- business models may be automatically incorporated into the architecture of management information system under development, what ensures that all important business characteristics will be embedded in software solution;

- software support developed for the methodology helps the users to transform business models into agent-oriented programming language and finally generate runnable source code of the system; this has been done with the use of Model Driven Generation (MDG) Technology,
- the methodology comply with international standards like BMM, Business Process Modeling Notation (BPMN) which is presented on Object Management Group (2013) website and UML,
- the methodology process is defined with Software Process Engineering Meta-model (SPEM); its specification can be found on Object Management Group (2008) website.

The software support for the methodology in the form of CASE Tool extensions (UML Profiles) has been developed for the following reasons:

- creating visual models is relatively easy – user has to select modeling perspective and develop the specific diagram,
- all notation elements have been developed as the extensions to UML language,
- most CASE tools have built-in code generation mechanisms that transform visual models into source code of specific programming language (for example Enterprise Architect environment supports MDG Technology, what allows to write custom Code Generation Templates (CGT) that can be used to generate runnable source code directly from visual models).

Methodology structure

The methodology structure has two dimensions: static and dynamic. Static structure of the methodology describes software development process according to activities, input and output activities artifacts, roles and defined workflows. Dynamic structure presents software development process with regard to a time frame: cycles, milestones, phases and iterations.

Static structure

In the static structure of the methodology we have defined the following disciplines:

- business modeling which goals are to provide deep understanding of the business domain the management information system is being developed for and allow to build a set of models describing business requirements and domain characteristics,
- analysis and design that defines the way of business models are transformed into programing structures available in target implementation platform,
- implementation that is responsible for transforming the visual language structures into source code of selected implementation platform; in case of our methodology it is Agent Speak language with Jason Runtime Environment.

Completed visual models, which are the output of the business modeling discipline constitute input artifacts for analysis and design, as well as implementation disciplines. Business models are developed according to layered structure. Every layer defines its own perspective where specific characteristics of modeled organization are defined. The following layers have been designed:

- strategy layer – which is divided into two sections: ends – where vision, goals and objectives are modeled; means – where missions, strategies and tactics are described; this layer is based on BMM standard,
- business process layer – where business processes, sub-processes and activities are modeled as well as control flow between activities; this is based on BPMN standard,
- assets layer – it is responsible for storing information according to resources and fixed assets,
- business rules layer – where business policies, business rules and directives are defined,
- organization structure layer – which describes the division of the modeled enterprise (virtual organization) into business units.

Analysis and design discipline of our methodology includes transformation tables that specify how every element stored in business model will be converted into programming language constructs. All transformations are related to Belief-Desire-Intention (BDI) architecture of agent-oriented system (detailed description of BDI architecture can be found in Rao and Georgeff (1992)). However this is not obligatory and, in fact the transformations can be written to generate programming constructs for other programming languages, and then business models elements can be finally converted into other languages source code like: JAVA, C#, Python, etc. In the implementation discipline programming constructs generated during analysis and design, are finally transformed into source code of BDI agents what provide required functionality of management information system for specific organization.

The CASE tool environment (Enterprise Architect) we have used has built-in support for MDG Technology and therefore analysis and design as well as implementation disciplines activities could be integrated. This is significant advantage of our approach as it is possible to generate software source code directly from visual business models. In other methodologies activities in analysis and design discipline are used to develop additional models, which enable to reduce the semantic gap between business and system models. In our approach object diagrams allow for direct transformation of business models into runnable source code of management information system.

Dynamic structure

Dynamic structure of the methodology is based on Rational Unified Process developed by Rational Software Corporation (2002). The software development process has been divided into the following phases:

- inception – its goal is to ensure understanding of business domain and to formulate basic assumptions and business requirements of planned management information system,
- elaboration – main goal of that phase is to define stable architecture of solution, that can be used in construction phase,
- construction – main activities in that phase are connected to detailed design, implementation and testing of the software to develop final solution,
- transition – its goal is to deploy final software solution that meets the business requirements.

In every phase at least one iteration is needed and the number of iterations depends on complexity of the problem domain. Every iteration consists of set of activities which belong to specific discipline defined in the static structure of methodology. In every phase specific milestone has to be reached to move to the next phase of the software development process. Detailed description of methodology dynamic structure can be found in Olech (2017).

Application of Methodology

This section presents typical workflow of methodology usage which is supported by CASE Tool environment (Enterprise Architect). In the first step the business analyst has to select the type of diagram which is related to the specific modeling perspective of the organization – fig. 1.

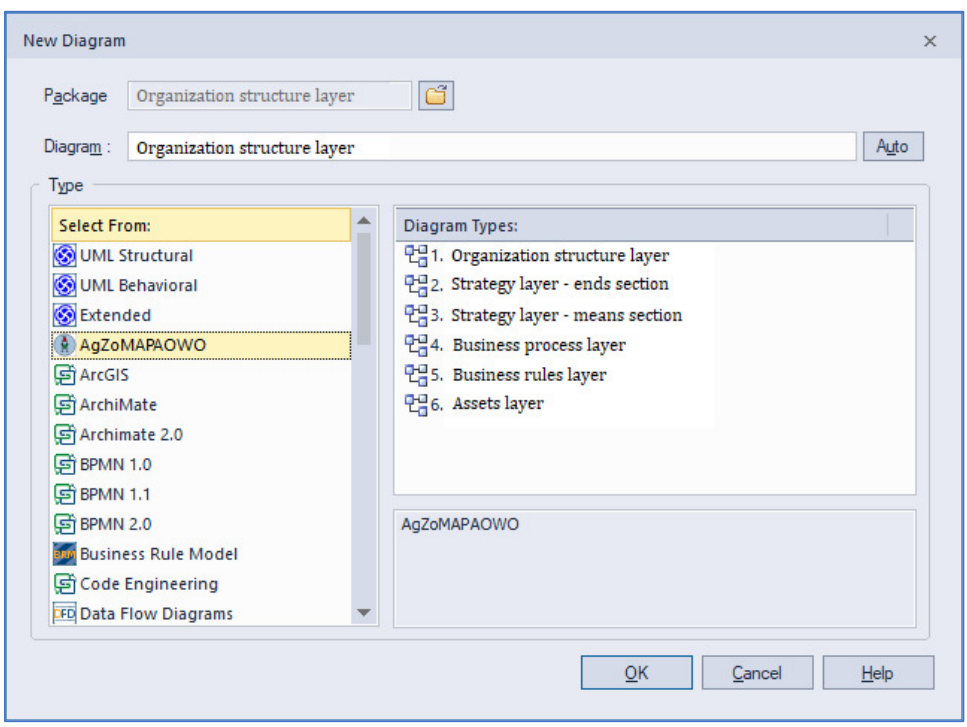

Figure 1. Choose business model perspective

Toolbox connected to selected perspective (figure 2.) allows the business analyst to create specific business model of the organization – sample results are presented in the figure 3 which shows defined visions, goals and objectives, as well as relations between them.

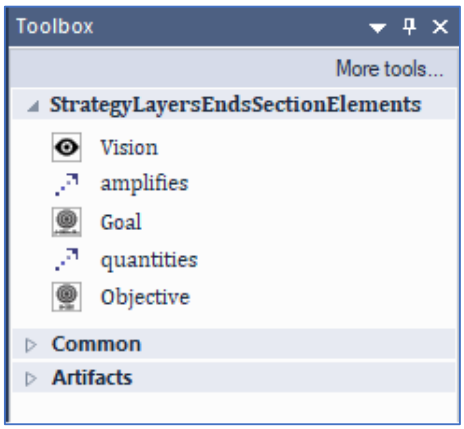

Figure 2. Toolbox connected to chosen perspective

Every element of visual notation enclosed in the diagram has its own characteristics defined with the use of tagged-value fields. In the figure 4. specification of "Objective1" has been shown.

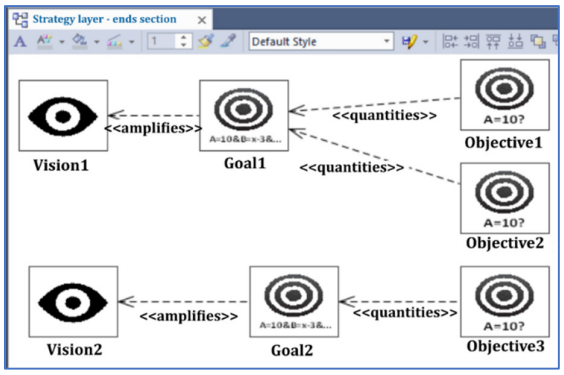

Figure 3. Part of the business model

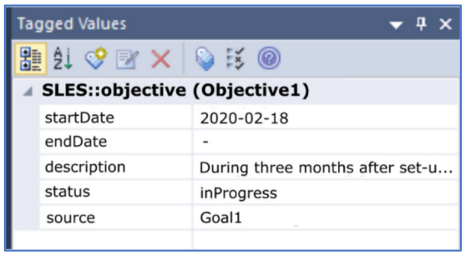

Figure 4. Description of elements using tagged values

After the business models selected for the specific iteration are fully developed, the transformation templates can be run using MDG Technology to generate runnable source code of the software solution. Sample transformation template is presented on the Figure 5. This template instructs the code generation engine to build the source code in Agent Speak language based on visual model elements, relations between them and additional characteristics defined in the tagged values.

Figure 5. Custom Code Generation Template

Generated source code can be executed in the runtime environment - Jason platform. The ready to use solution should be extended with graphical user interface, because the CASE tool generates from the visual models only specific data and the business logic. Figure 6. presents the screenshot from Jason platform which includes the characteristics of strategy layer with ends section details represented as software agent's beliefs.

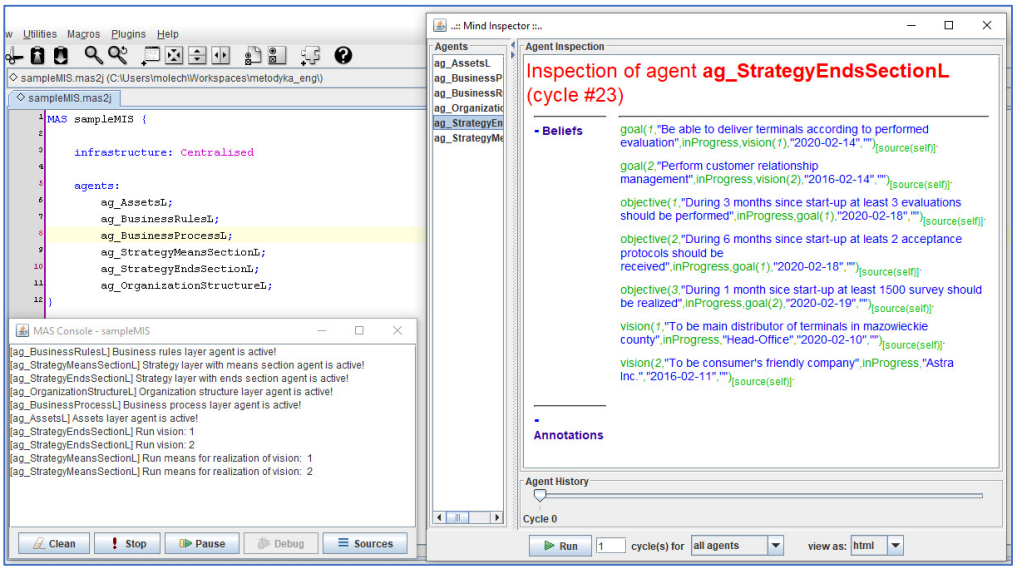

Figure 6. Sample source code generated directly from the visual business model

Conclusions

High complexity and newly emerged characteristics of contemporary business structures require new approach to management information systems development. This approach should address two main problems: enable to reduce sematic gap between business model of application domain and design model of the system under development as well as improve the process of complexity management. Paper presents the solution in the form of original agent-oriented development methodology for systems supporting virtual organizations' operations. Agent orientation is an effective way to capture and incorporate into the system architecture the structural and behavioral aspects of modern enterprises. It is possible because of very high semantic proximity of agent paradigm modeling constructs and contemporary organizations characteristics. Our methodology is generic what means that it can be used for development of systems for organizations of any specificity and industry sector. Thanks to modeling methods we have created on the basis of international standards our methodology can be fast adopted to business and engineering domains. What is more, because of very detailed business modeling discipline it is possible to model all important aspects of every organization and finally elicit the system features that will fully support virtual enterprises' business goals and objectives. As a next step in methodology development we have planned its adaptation to management

information systems supporting operations of enterprises that are under transformation towards Industry 4.0 model. From our perspective its application looks very promising.

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Analysis of The Impact of Mobile Applications for The Monitoring of Hospitalized Patients: A Review of The Scientific Literature From 2015-2020

Edson De la Cruz-Peña
Universidad Autónoma del Perú, Lima, Perú, edelalalacd@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

The document uses a review of the scientific literature from 2015-2020 to know the criteria, tools, architecture and definitions that this technology provides in this health sector, summarizes an architectural framework and methodology, and provides conclusions. The most popular journals included IEEE Xplore, Science Direct, SCIELO, ACM Digital Library. 75 related articles were produced from the search, then reviewed. The study concluded that there were four most used tools for the development of mobile tracking applications, three types of most used architectures. The analysis of mobile applications in the health sector is being promoted in a promising domain to provide information on the internment process.

Keywords: Mobile application, Patients monitoring, Systematic review of the literature.

Introduction

During the last 3 years according (C. Sales, 2020) se 50% of the time of cell phone use, is intended to use mobile applications since there are approximately 9 million of them, where usability has changed, the designs are now minimalist, functions, that bring value, easy navigation and added value, there are uses in different companies and entities where hospitals also benefit from this technology in the difficulties when providing the information of patients with diseases that urge isolation for indeterminate times, according to (PAHO) argue that: "The hospitalization service welcomes the hospitalized patients for long periods, who receive little social or family assistance, and those with obligation legal treatment in the hospital environment." The objective of the tracking, from where the data is taken and entered into the application installed on the patient's Smartphone, whose data will be transmitted to a web server, where they are processed and sent over the wireless network to the mobile device of the health specialist, which also has an application on Android, which will give relevant recommendations to the patient. (P.C. Orlando, D. R. Evert, and B. Gisella, 2015) Therefore, according to WHO (J. Alonso-arévalo and J. A. Mirón-canelo, 2017) it mentions that "health developments mainly include apps aimed directly or indirectly at maintaining or improving healthy behaviors, quality of life and the well-being of people. Some of these new mobile apps are specifically aimed at helping people in their own health and wellness management. Other mobile apps target health care providers as tools to improve and facilitate patient care delivery. In this article we review research on the use of mobile applications to have greater monitoring of patients in front of specialists and family members. This document is organized as follows. Section II details the methodology for reviewing study documents. Section III presents the results of the review. Finally, Section IV presents the conclusions.

Methodology

A. Research Questions

The review process was conducted on the basis of the following research question:

RQ1: What kind of most outstanding studies are given for the development of mobile applications, in hospitalized patients?

RQ2: What tools are most com only used for the development of mobile applications of patient follow-up?

RQ3: Which mobile application development architecture are most efficient? ?
RQ4: Which technologies are most commonly used in the development of mobile applications?

These aspects of the research question guided the review process by correctly identifying thematic areas, relevant studies, material sources, and inclusion and exclusion criteria. The review aimed to provide pragmatic solutions to the research question by capturing concrete and significant aspects with the support of empirical evidence.

(J. A. Arevalo, 2016). There vised articles show that the use of mobile applications is effective to improve health monitoring, encouraging self-management of patient care, and allowing the permanent training of professionals,

favoring multidisciplinary integration. (V. Donayre and E. Esmeralda, 2016)

B. Databases on selection paper

Our search was conducted in four databases: IEEE Xplore, ScienceDirect, SCIELO, ACM Digital Library.

C. Choosing research terms

The study carried out the search of the database combining the main keywords: "Mobile Applications", "Patient Tracking", identified and presented a total of 28 search chains of different sequences within Mobile Apps: "Mobile Applications", "App Types", "Features", "Versions", "Most Used Apps", "Usability", "Framework", "Development Tools", "Design of a Mobile App", "BD", "Development Layers" and “design of a mobile application”, "Encoding", "Tracking", "Telehealth".

D. Applying detection criteria

Articles that are not directly linked to research processes interests, such as processes, BD, Satisfaction, have been excluded. Research on Patient Tracking Apps has a search has within 20 to 2015 to 2020 where it was considered representative to opt for a decision in the conclusions.

E. Doing the review

Searches were limited to the abstract field. A total of 124 documents were downloaded and reviewed. Since the study focused on capturing the maximum number of views on Apps in patient follow-ups, a quality assessment was established regarding the clarity of the documents "contributions to research questions. At this stage, 75 documents were identified. To proceed with the analysis of the revision of the literature.

F. Synthesize the results

The general distribution of the literature was analyzed, discussed and summarized according to the areas of research: methods, techniques and applications.

Table 1 Data based log

N°	Database journal	Number of items
1	IEEE Xplore,	26
2	ScienceDirect,	33
3	Scielo	14
4	ACM Digital Library	11
		84

Results

The results of our systematic literature study were categorized in terms of concepts. Categorization of SLR results is highly recommended because it provides a valuable overview of the revised articles

A. Distribution of Publications by Year

Figure 2 shows the number of documents published during the period 2015 to 2020. Clearly, it is clear from the figure that the number of publications on applications for mobile applications in patient follow-up factor is in 2015, after which publications had a significant increase in the last 4 years. This growth denotes that technology is present in various areas of health and in the last year has been forced to conduct research due to the current context.

Figure1 Distribution of publications by year

B. Distribution of Publications by Language

In order to understand the distribution of mobile application roles according to the thematic area. Figure 3 reveals that warehouse operations are extensively examined by 83% of published items. They were in Spanish, 16% in English and also 1% in Portuguese.

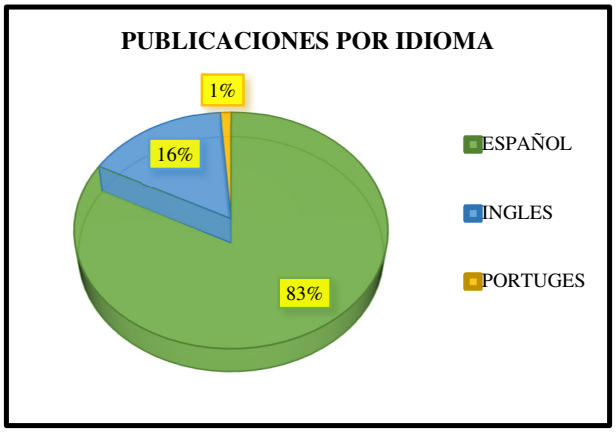

Figure2 Distribution of Publications by Language

C. Classification of selected documents based on publications by country.

It offers an overview of the publications of the various countries as such which stands out the most: Spain with 27% followed with 25% Colombia and Peru with the third place with 13% publications in the use of mobile applications for a patient follow-up.

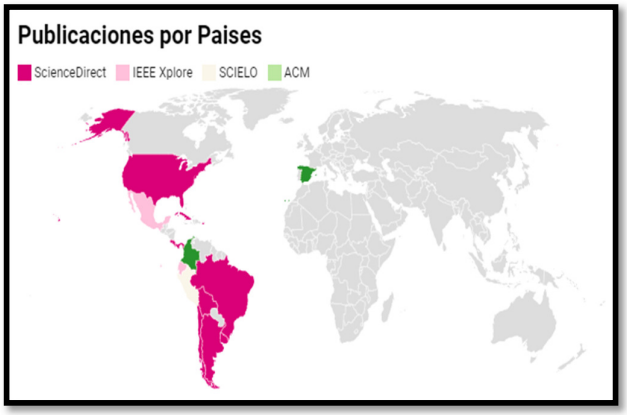

Figure3 Publications by Country

D. Models

This section describes different study models where it aims to classify the main ones: analysis models, where they were found as a descriptive model with 63%, qualitative with a range equal to 22%, then with 11% the quantitative model, the descriptive analysis models of descriptive analysis which aims to prepare and analyze historical data, as well as identify sample patterns to inform trends. While qualitative analysis relies on observation to collect non-numerical data, using tools such as interviews, survey discussion groups. And quantitative analysis predicts population behavior focuses on a cause and effect.

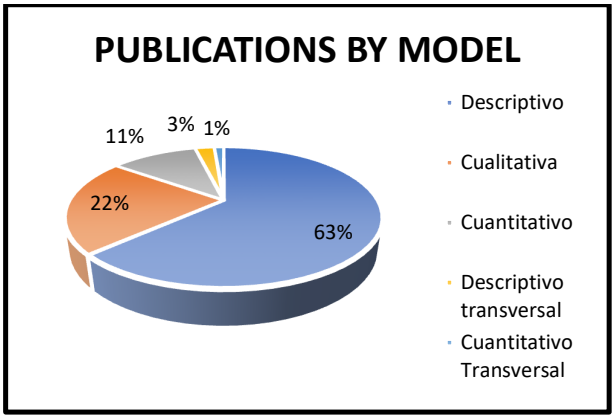

Figure4 Posts by Model

E. Methodology

In order to complement the analysis of obtaining that the most commonly used study methods are experimental consisting of 49% of all DBs found, with 17% the non-experimental study does not indicate that the researcher cannot control, manipulate the subjects but relies on interpretation or observations to reach a conclusion and with 11% the conceptual method is present in the BD of the research performed.

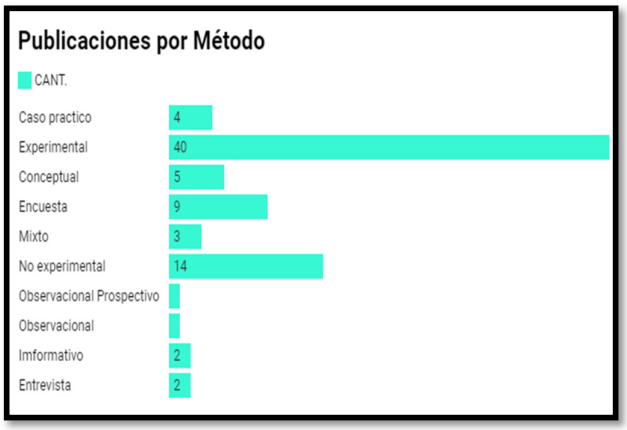

Figure5 Publications by method

F. Technology

This section shows different most commonly used technologies, where se mobile technology is presented with 59% usability in the study generated with the presence of mobile devices developed with a set of tools such as android, Patterns, frameworks,, similarly shown the most used M-Health technology with 19%, is a mobile technology clearly to manage the health and well-being of people, is commonly used under the support of mobile devices such as PDA, mobile phones, tablets or patient monitoring devices among others, also the most prominent was web technology with 10% in the general BD.

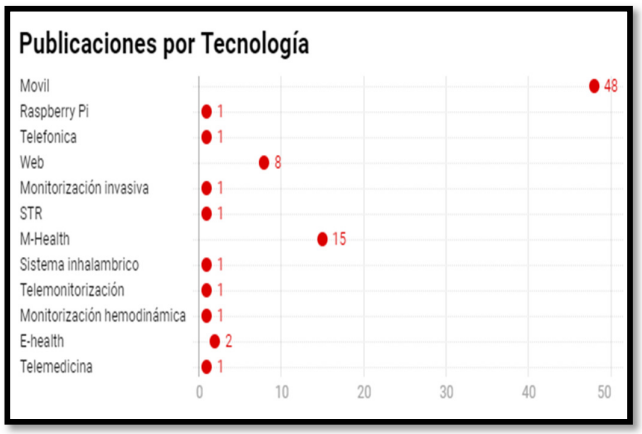

Figure6 Most Used Technology

G. Tool

This section shows different tools more used by programmers of studies conducted within the BD, where it can be shown that the use of virtual reality, biometric system, CDA is present with 2% usability, also appear tools such as Weka, Ionic, Raspberry Pi, Laravel, Arduino. The one that stands out with its modernity is the Raspberry Pi tool as it is a series of small board computers, unique and low cost, which has a favorable result when linked to a mobile application.

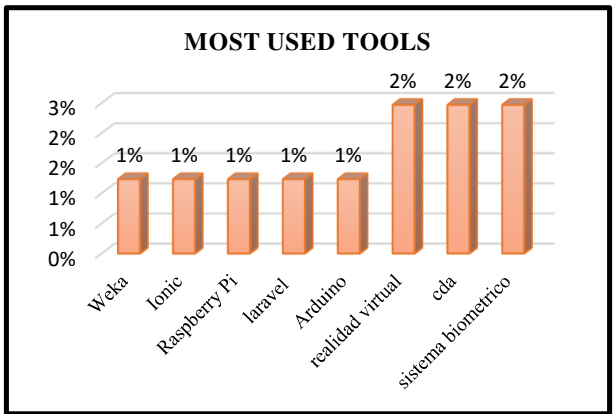

Figure7 Most Used Tool

H. Architecture

It shows the system designs or architectures most commonly used in the encoding of mobile applications in the studies found, where it is reflected with 40% the MVC architecture (Model-View -Controller) a pattern of software architecture that separates the data and mainly what is the business logic of an application of its representation and module responsible for managing events and communications. Then we have client-server with 37%, this architecture is a software design model in which tasks are divided between resource providers, called servers, and plaintiffs, called clients.

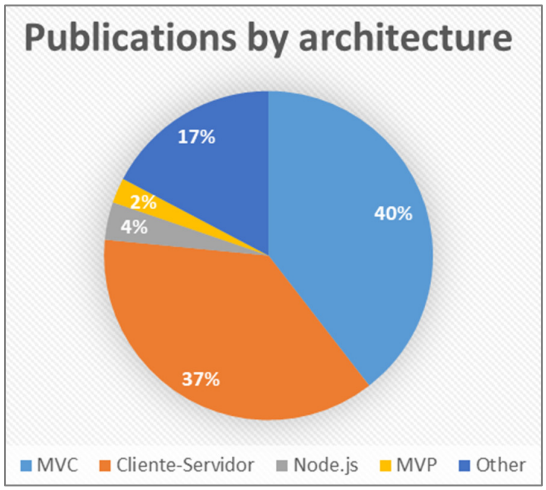

Figure8 Most Used Architecture

I. Techniques

In Table 1 you can find an overview of the techniques of analysis of mobile applications used in the literature studied.

Table 2 techniques

Technical	Amount papers	Reference
Mobile apps	8	(G. Acosta, 2017), (C. Guamán, 2020), (S. Sanabria, 2016), (M. Moyota, 2019), (F. Castro, 2019), (Carabali, 2018), (Garcia and Amaya 2019), (Palacio and Botero, 2018)
Tools	6	(Chavira-García and Arredondo-Lopez, 2017), (Ramirez, 2017), (Fuentes and Torres, 2020), (N. V. LG and L.B.C, 2020), (A. S. García and M. J.M. Homes, 2015), (C. King Iborra, 2019)
Traces	3	(D. E. G. Salazar, 2017), (B. Hernández, C. Mario, and M.C. Ferreira, 2018), (E. A. Salinas Jury, 2015)
Framework	3	(V. Villarreal, 2016), (A. Ghaouta, A. El Bouchti, and C. Okar, 2018), (Fuentes et al., 2020)
Raspberry Pi	1	(J. Alpaca Rendón, J. Esquicha Tejada, and K. Rosas Paredes, 2017)
E-health app	3	(L. A. F. Salazar, 2018), (C. Vélez Alvarez et al., 2016), (Macana et al., 2020)
MHealth app	12	(J. A. R. Palacio and J. F. Botero Vega, 2018), (Alonso-arévalo and Mirón-canelo, 2017), (N.C. Garcia, 2020), (A. Bisso-Andrade, 2019), (A. Jaramillo, 2017), (Q. Pautasso, M. Lisicki, and M. A. Bosio, 2016), (A. A. Flames, 2019), (D. A. Grilo,

		2015), (O.M. P. Ramírez, 2018), (Mr Martín Morales, 2017), (Espinoza Cárdenas and Ramírez, 2017), (G. G. G. Acosta, 2017)
Android mobile devices	4	(J. Alonso-Arévalo and J. A. Miróncanelo, 2017), (F. Ramírez Alvariño, 2017), (A. U. Garcia and R. R. V. Amaya, 2019), (J. Rey-Martinez and J. Manuel Espinosa-Sanchez, 2019)
Tracking System	2	(Cabello and Román, 2015), (J. Moreira, 2019)
Firebase	4	(A. A. Flames, 2019), (L. A. F. Salazar, 2018), G. Larrosa, I. L'olivier, M. Vignale, and S. Báez, 2018), (V. Villarreal Contreras and M. I. Nielsen Pimentel, 2018)
Android platform	1	(Romero, 2018)
Follow-up protocol	2	(Merchán, Gamba, and López, 2015), (Acosta, 2017)
Benefits	2	(L. A. F. Salazar, 2018), (A.M. Osuna, 2018)
MVP		(C. G. Amador, 2020)
MVC	7	(A. A. Flames, 2019), (Q. Pautasso, M. Lisicki, and M. A. Bosio, 2016), (J.S.M. Cabello and I. A. L. Román, 2015), (E. A. Salinas Jury, 2015), (V. Villarreal Contreras and M. I. Nielsen Pimentel, 2018), (J. V. S. S. A. E.C. Guamán, 2020), (J.M. S. Sanabria, 2016)
Risk levels	5	(M. A. Correa and M. J. O. Sanabria, 2020), (M. Arias, 2019), (Vila Córcoles, 2019), (L. R. Eva Cerezo et al., 2018)
Effectiveness of use	10	(V. Donayre and E. Esmeralda, 2016), (E. J. G. Aguilera, 2015), (S. Castillo Nograro, 2015), (P. Pérez Torre et al., 2019), (M. Hudson et al., 2018), (L.M. Yanicelli, 2019), (Olea, Vidal, and Hernández, 2019), (Rojas-De la Cruz, 2017), (M. Samudio and V. Villarreal, 2017), (C. F. R. Lopez, 2018)
Hospital patients	11	(J. R. Morales, 2020), (K. M. Wesley and P. J. Fizur, 2015), (E. J. M. Cordeiro, 2020), (M. S. J. Miguel, 2018), (G. Santamaria Puerto, 2015), (J.C. Peña García, J. H. Romero Borja, and J. Morales Garcés, 2016), (Q. Pautasso, M. Lisicki, and M. A. Bosio, 2016), (A. Ochagavía et al., 2015), (M. Martínez-García et al., 2020), (A.

		Lledó Viciano, 2017), (E. L. Llanos Mora, 2020)
Real-time	2	(S. Enrique et al., 2017), (F.B. Domingues et al., 2015)

Discussion

In the last 5 years mobile applications have been a tool that supports different business areas and society in facilitating the processes of the daily routine. So to better understand we ask each other questions as follows:

RQ1: What kind of most outstanding studies are given for the development of mobile applications, in hospitalized patients? According to Figure 5 it shows that the most commonly used study types are as the descriptive, qualitative, quantitative model, since these types of studies make a more detailed analysis with historical data.

RQ2: Which tools are most commonly used for the development of mobile applications of patient follow-up?

As Figure 8 shows the tools such as the use of virtual reality, biometric system, CDA, makes mobile applications have an added value and achieve the objectives of facilitating in communication, therefore it also shows the tools of use clearly of the coding environment such as Weka, Ionic, Raspberry Pi, Laravel, Arduino that give greater complexity with optimal results in the solutions mentioned in the different articles.

RQ3: Which mobile application development architecture are most efficient?

According to Figure 9 shows us that MVC architecture (Model-View -Controller) is a software architecture pattern that separates data and mainly what is the business logic of an application from its representation and module responsible for managing events and communications, it was the most used in the articles found as this makes it easier to create more reliable and more reliable mobile applications, as also with less margin a client-server architecture was used as this is a software design model in which tasks are divided among resource providers, giving the ease of programming in the developments of mobile applications.

RQ4: Which technologies are most commonly used in the development of mobile applications?

According to Figure 7 it represents the most used technologies according to the studies seen in the last 5 years coming to show that mobile technology has a greater utility since it comes with greater usability worldwide, then web technology became present in 2015, 2016 having not so favorable results since this technology was not efficient in daily tasks or activities in the environment that was useful.

Conclusion

In this article on patient monitoring applications, we have reviewed and analyzed the literature based on mobile applications, during the period of 5 years (2015 -202020): What type of studies are most prominent for the development of mobile applications, in hospitalized patients? We found that the quantitative model is descriptive with 63%, qualitative with a range equal to 22%, followed by 11% of the quantitative model, which reflects that the studies went mostly through 5 phases of analysis. What tools are most commonly used for the development of mobile patient monitoring applications? Figure 8 presents the virtual reality with 2% usability, as well as tools such as Weka, Ionic, Raspberry Pi, Laravel, Arduino. Which mobile application development architecture is more efficient? Figure 9 shows with 40% the MVC architecture (Model-View -Controller) and also the client-server architecture with 37%, where it can be concluded that they are the most used to date. Which technologies are the most used in development?, the most used technologies are mobile with 59% of the total, M-Health with 19% and web with 10% where this indicates that mobile applications are being of greater consideration in the health sector.

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The Effect of Corporate Ownership and Earning Management on Tax Avoidance with Corporate Governance as a Moderation

Bayu Bagus SETIANUGRAHA
Universitas Indonesia, Indonesia, byu.bagus.s@gmail.com

Siti NURYANAH[1]
Universitas Indonesia, Indonesia, siti.nuryanah@ui.ac.id

Abstract

This research aims to analyze the effect of corporate ownership, earnings management, and corporate governance on tax avoidance. This study also examines moderating effects of corporate governance on the impact of corporate ownership, and earnings management on tax avoidance. Sample used are 68 manufacturing companies listed in Indonesia Stock Exchange with total observation of 204 firms. The results of this research are: first, corporate ownership has no effect on tax avoidance. Second, earnings management have a positive effect on tax avoidance. Third, good corporate governance practice have a negative effect on tax avoidance. Fourth, there is a moderating effect of good corporate governance on the positive effect of earnings management on tax avoidance. And last, there is no moderating effect of good corporate governance on the positive effect of corporate ownership on tax avoidance.

Keywords: Corporate Ownership, Earning Management, Corporate Governance, Tax Avoidance

Introduction

Taxes paid by companies are a process of transferring wealth from the company to the state so that tax payments are a significant cost for both the company and the owner (Fatharani, 2012). Thus, the company will take various actions as an effort to save taxes so that the taxes paid are not too large. Aggressive tax action can lead to a reduction in the tax burden, both legally and illegally (Frank, Lynch, and Rego, 2009). Tax avoidance is a process to reduce the amount of tax owed by legally manipulating company income that is still in the corridor of tax laws. Meanwhile, tax evasion is a process to reduce the amount of tax owed by illegally manipulating company income (Gunadi, 2007).

Tax avoidance actions can provide marginal benefits and marginal costs (Fatharani, 2012). The possible marginal benefit is the existence of significant tax savings for the company and the marginal cost that may arise is the cost of possible tax fines or sanctions if found to violate tax regulations. Tax avoidance actions can be influenced by the nature and level of agency problems, because some of the costs incurred as a result of tax avoidance are not for tax-related matters, but costs arising from covert actions of managers (Fatharani, 2012). Family firms indicate a greater likelihood of agency conflicts between majority and minority shareholders. On the other hand, family firms indicate a lesser likelihood of agency conflicts between owners and managers (Chen et al., 2010). The factor that distinguishes the level of tax aggressiveness carried out by family firms and non-family firms is the extent of the impact of the marginal benefit or marginal cost that may arise from tax avoidance actions taken to the owners of the family owners. Or, how big is the impact of tax avoidance measures a manager might receive on non-family companies (Sari, 2010).

Chen et al. (2010) found that the level of tax aggressiveness in family firms is lower than non-family firms. The results of this study are different from the results of Martani and Sari (2010) that family companies in Indonesia had a higher level of tax aggressiveness than non-family companies. However, Fatharani (2012) using a sample of companies listed on the IDX for the period 2007 to 2010, shows that ownership structure is not proven to influence tax aggressive actions.

Researchers also examined how the company's profit management affects tax avoidance. Not many studies have been found that directly link earnings management with tax avoidance. The company's net income is usually used by stakeholders as the main indicator of the company's performance. Mulyadi and Anwar (2014) assume that company managers will carry out earnings management to minimize corporate tax obligations. One of the actions is by taking tax avoidance measures that allow legally reducing tax payments in accordance with applicable tax regulations.

[1] Corresponding author.

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Earnings management can be done by controlling accrual transactions, where accrual transactions have an effect on revenues and expenses but do not appear on cash flows. There are two accrual concepts, namely: discretionary accrual and non-discretionary accrual (Scott, 2012). It is still a matter of debate among researchers in the world to determine whether earnings management affects tax avoidance, or tax avoidance that affects earnings management. Frank, Lynch, and Rego (2009) found that there is a significant but causal effect between earnings management and tax avoidance. In contrast to company management who want to pay the lowest possible tax, the government wants to collect taxes from companies as high as possible because taxes are one of the primary sources of income for the state. This is a conflicting situation exists in a company. This potential conflict of interest can be minimized by corporate governance mechanisms. Corporate governance is a mechanism that controls the company so that it can run effectively in meeting the interests of stakeholders, both external and internal (Fatharani, 2012).

The interaction between tax avoidance and corporate governance has been widely studied by several researchers. Desai and Dharmapala (2006) state that companies that have good governance tend to have internal control mechanisms that can prevent managerial fraud, and state that there is a negative influence between managers' equity incentives and tax avoidance. Conversely, they argue that companies with poor governance cannot use equity incentives to encourage tax avoidance because they do not have internal control mechanisms to prevent managerial fraud.

Based on the description above, this study combines several literatures regarding tax avoidance measures, company ownership structure, earnings management, and corporate governance. The sample of this research is public companies in Indonesia. This is because Indonesia's tax rate can be said to be high (25%) when compared to Indonesia's neighboring countries. This allows Indonesian companies to evade tax by choosing a head office in a country that has a lower tax rate than Indonesia. The neighboring countries that have the same tax rate as Indonesia are only Malaysia 25%, while other neighboring countries have lower tax rates, such as Vietnam 22%, Thailand 20%, and Singapore 17%. In addition, there are also countries that are often referred to as Tax Haven Countries which have a 0% tax rate, such as Cayman Island, Bahamas, or Bermuda.

With the comprehensiveness of the literature as a reference, this study aims to 1) test the effect between corporate ownership structure and tax avoidance measures, 2) test the influence between earnings management and tax avoidance measures, 3) test the effect of corporate governance and tax avoidance measures, and 4) test the moderating effect of corporate governance on the effect of corporate ownership structure, and earnings management on tax avoidance.

Theoretical Framework

Company Ownership Structure

Chen et al. (2010) found that family firms are less aggressive in tax avoidance than non-family companies. The research also states the importance of non-tax costs as a result of tax avoidance. Family companies are considered less aggressive in tax avoidance than non-family companies because family companies consider the possibility of non-tax costs such as sanctions and penalties from tax officers, price discounts from non-family shareholders, and a decline in the company's reputation. Martani and Sari (2010) examining the influence between corporate ownership structure, corporate governance, and tax aggressive actions found that family firms in Indonesia are higher in the level of tax aggressiveness than non-family firms. Based Chen et al. (2010), and Martani and Sari (2010), it can be concluded that there is an effect of family ownership on tax avoidance.

Therefore, the authors attempt to examine the effect of family ownership on tax avoidance by proposing the first hypothesis as follows:

H1: Family ownership has a positive effect on tax avoidance.

Earnings Management

Management tends to intend to pay lower tax liabilities because taxes will significantly reduce the company's net income. The company's net income is usually used by stakeholders as the main indicator of the company's performance. Frank, Lynch, and Rego (2009) examined tax avoidance actions and corporate financial reporting found that there was a significant and causal effect between tax avoidance measures and earnings management. Frank, Lynch, and Rego (2009) found significant evidence of the effect of tax avoidance measures and earnings management. However, this study cannot draw conclusions about the direction of the significant influence, whether earnings management has a significant effect on avoidance actions or whether tax avoidance measures have a significant effect

on earnings management. Mulyadi and Anwar (2014) examined the effect of corporate governance, earnings management and tax management, assuming that company managers will carry out earnings management to minimize corporate tax liabilities found that consistent earnings management (both in GAAP ETR and Current ETR) shows a positive effect on tax avoidance. Martani, Anwar, and Fitriasari (2011) found that earnings management was the company has a positive effect on the company's book-tax gap, and shows that companies in Indonesia have a tendency to carry out earnings management by decreasing income.

Based on the description above, the authors formulate and propose a second hypothesis as follows:
H2: Earnings management carried out by the company has a positive effect on tax avoidance.

Good Corporate Governance

There are many ways to minimize the tax burden that the company must pay. Tax planning aims to reduce the tax burden to a minimum by manipulating the company's business and transactions while it is still in the corridor of tax regulations (Suandy, 2008). In regard to tax avoidance, the government has developed a tool that can reduce tax avoidance efforts by companies in the form of corporate governance regulations (Schön, 2008). Some of these corporate governance regulations are mandatory and some are voluntary. An example of taxation regulations in Indonesia that can affect corporate governance is the regulation for the using of book value for the transfer of assets in the context of mergers, consolidations, or business expansion. There are also examples of corporate governance regulations that can influence tax decisions such as principles of good corporate governance regarding to openness and transparency.

Friese, Link, and Mayer (2008) found that companies with good corporate governance can reduce tax avoidance by fulfilling the requirements of tax law. These results are similar to research conducted by Sartori (2009) which found that there is a positive influence between corporate governance and the level of corporate tax compliance, so that companies will try to avoid aggressive tax actions. Martani and Sari (2010) found that good corporate governance has a negative effect on tax aggressive actions.

In accordance with the description above, this study proposes a third hypothesis as follows:
H3: Good corporate governance has a negative effect on tax avoidance.

Moderating Effect of Good Governance on the Effect of Earnings Management on Tax Avoidance

According to classical agency theory, the main objective of a company operated by management (agents) is to maximize shareholder wealth (principal). However, because of their respective self-interests, management often does not align their interests with those of shareholders. This difference causes agency problems. Therefore, the role of corporate governance is very important, namely to reduce agency problems and reduce agency costs to create value for shareholders (Rezaee, 2009; Shleifer and Vishny, 1997). Shen and Chih (2007) examined the effect of corporate governance on earnings management in companies in developing countries in Asia. Larcker et al. (2007) found that companies with a company with a higher governance rating (index) would likely have better corporate performance than firms with a lower governance ranking (index). This is because companies with higher governance ratings (indexes) have been properly monitored, so that the likelihood of management taking actions that only benefit management, such as performing earnings management, is lower. In addition, many other studies have found companies with good corporate governance mechanisms have shown reduced earnings management (Garcia Osma, 2008; Sarkar et al., 2008; Duh et al., 2009). Martani, Anwar, and Fitriasari (2011) found that earnings management by companies has a positive effect on the company's book-tax gap, researchers argue that good corporate governance weakens the positive influence of earnings management on tax avoidance.

In accordance with the description above, the researchers propose the fourth hypothesis as follows:
H4: Good corporate governance weakens the positive influence of earnings management on tax avoidance**.**

Moderating Effect of Good Governance on the Effect of Family Ownership on Tax Avoidance
The tax policy of a company will be influenced by how big or small the concentration of the company's shareholders is (Khurana and Moser, 2009). Shareholder concentration is divided into two, namely short-term shareholder concentration and long-term shareholder concentration. Aggressive tax policies will increase when the concentration of short-term shareholders increases. However, an aggressive tax policy will decrease the greater the concentration of long-term shareholder ownership. This is because short-term shareholders will demand an increase in their welfare for a short period. So that management also justifies various ways, for example tax avoidance, to be able to improve

the short-term welfare of shareholders in a short time. This is different from long-term shareholders who think that tax avoidance will harm the company in the future, so that management will avoid tax avoidance.

Desai and Dharmapala (2006) found that management compensation/ incentives have different effects on corporate tax avoidance actions between companies that have good corporate governance practices and those with bad corporate governance practices. The study found that the positive influence between management compensation/ incentives and tax avoidance was found in companies that had good corporate governance. Conversely, the negative influence between management compensation/ incentives and tax avoidance measures is found in companies that have bad corporate governance. This negative effect may occur because in poor company management there is an opportunistic nature of managers who are thought to be the dominant factor in determining company policy. Martani and Sari (2010) found that corporate governance was not proven to have a moderating effect between family ownership and corporate tax aggressive actions.

Based ont the discussion above, this study argues that corporate governance weakens the positive effect of family ownership on tax avoidance. This is due to the fact that good governance can reduce agency problems between majority shareholders and minority shareholders because companies with good governance can suppress the domination of influence of majority shareholders in the company.

In accordance with the description above, the researchers propose the fifth hypothesis in an alternative form as follows:
H5: Good corporate governance weakens the positive influence of family ownership on tax avoidance.

Research Methodology

Data and Samples

The sample selection method used in this study was purposive sampling, with the following sample criteria: 1) Companies in the manufacturing industry listed on the IDX during 2011-2013 consecutively, 2) Companies that have published a complete annual report and have audited during the period 2011-2013, and 3) Companies that have all the data needed in this study.

Research Model

This study modifies Martani and Sari's (2010) research model, by adding an independent variable, namely earnings management proxied by discretionary accruals in accordance with the model developed in the study of Kothari et al. (2005). This is because the Performance Matched Model developed by Kothari et al. (2005) can provide information about earnings management better than other earnings management measurement models, such as the Jones Model or the Modified-Jones Model. In addition, this study also excludes the control variables for NOL and ΔNOL because the data is less and less varied. Thus, the following research model is obtained:

$$BTG_{it} = \alpha_i + \beta_1 Ownership_{it} + \beta_2 DACCS_{it} + \beta_3 CGIndex_{it} + \beta_4 Ownership_{it} * CGIndex_{it} + \beta_5 CGIndex_{it} * DACCS_{it} + \beta_6 SIZE_{it} + \beta_7 ROA_{it} + \beta_8 LEV_{it} + \beta_9 PPE_{it} + \beta_{10} MKTB_{it} + \varepsilon$$

where:

Book-Tax Gap$_{it}$	= Tax Avoidance Action of company *i* in year *t*.
Ownership$_{it}$	= Family ownership structure of company *i* in year *t*.
DACCS$_{it}$	= *Discretionary Accruals* of company *i* in year *t*.
CGIndex$_{it}$	= *Corporate Governanve Index* of company *i* in year *t*.
SIZE$_{it}$	= Size of company *i* in year *t*.
ROA$_{it}$	= *Return On Asset* of company *i* in year *t*.
LEV$_{it}$	= *Leverage Ratio* of company *i* in year *t*.
PPE$_{it}$	= *Properties, Plant, and Equipment Ratio* of company *i* in year *t*.
MKTB$_{it}$	= *Market-to-Book Ratio* of company *i* in year *t*.
ε	= *Error term*.

Results and Discussion

Descriptive Statistics

Table 1. Descriptive Statistics before *Winsorize*

Variable	Mean	Std. Dev.	Skewness	Min	Max
BTG	-0.097	0.122	-1.532	-0.524	0.199
Ownership	0.515	0.501	-0.059	0	1
CGIndex	0.343	0.476	0.666	0	1
DACCS	$2.28e^{-10}$	$4,6e^{-10}$	4.109	$4,0056e^{-13}$	$3,68e^{-9}$
SIZE	21.164	1.624	0.492	18.044	26.077
ROA	0.122	0.141	1.691	-0.190	0.719
LEV	0.067	0.101	1.701	0	0.393
PPE	0.728	0.742	3.047	0.023	2.981
MKTB	2.730	3.204	1.910	-0.41	12.42

Table 2. Frequency of *Dummy* Variable

Variable	Value= 0	Value=1
Ownership	99	108
CGIndex	135	73

Table 1 shows that the BTG average value is -0.097. This value means that, on average, Indonesian manufacturing companies have a higher fiscal profit (according to tax) than commercial profit (according to accounting). The smallest BTG value is owned by PT Unilever Indonesia with a value of -0.524. Meanwhile, the largest BTG value is owned by PT Primarindo Asia with a value of 0.199. Based on Table 1, it can be seen that the average value of ownership is 0.514, and based on Table 2 it can be seen that the value of 1 (family ownership) is more than the value of 0 (non-family ownership). Based on Table 1 it can be seen that the average CGIndex is 0.343, and based on Table 2 it can be seen that the value of 0 (bad governance) is more than the value of 1 (good governance). Based on Table 1, the average value of the DACCS variable is 2.28e-10. The minimum value of the DACCS variable is 4.01e-13. While the maximum value of the DACCS variable is 3.68e-9. The value of the DACCS variable cannot be explained because there are differences in policies regarding the income of each company, which causes the discretionary accrual value of each company to be different. Then, an outlier test is carried out so that there is no data on a variable that has unique characteristics compared to data on other variables. If there is outlier data, it will be Winsorize.

Table 3. Regression Results

$$CTA_{it} = \alpha_i + \beta_1 Ownership_{it} + \beta_2 DACCS_{it} + \beta_3 CGIndex_{it} + \beta_4 Ownership_{it} * CGIndex_{it} + \beta_5 CGIndex_{it} * DACCS_{it} + \beta_6 SIZE_{it} + \beta_7 ROA_{it} + \beta_8 LEV_{it} + \beta_{10} PPE_{it} + \beta_{10} MKTB_{it} + \varepsilon$$

Variable	Hypothesis	Coefficient	p-*value*	Description
Ownership	+	-0,0020	0,901	Not significant
DACCS	+	5,0676	0,058	Significant at α = 10%
CGIndex	-	-0,0420	0,029	Significant at α = 5%
Ownership*CGIndex	-	-0,0295	0,380	Not significant
CGIndex*DACCS	-	1,2588	0,000	Significant at α = 1%
SIZE	+	0,0076	0,084	Significant at α = 10%
ROA	-	-0,6375	0,000	Significant at α = 1%
LEV	-	-0,0595	0,308	Not significant
PPE	-	-0,0202	0,034	Significant at α = 5%
MKTB	-	-0,0055	0,002	Significant at α = 1%
N = 204				
R2 = 0,8222				
Prob F = 0,0000				

BTG = Book-Tax Gap (Manzon and Plesko, 2002); Ownership = Company Ownership Structure; DACCS = Discretionary Accrual (Kothari et al., 2005); CGIndex = Corporate Governance Index based on the Indonesian Institute for Corporate Directorship (IICD); Ownership * CGIndex = The interaction of the Ownership variable with the CGIndex variable; CGIndex * DACCS = Interaction of CGIndex variable with DACCS variable; SIZE = Company Size; ROA = Return on Asset; LEV = Funding Rate; PPE = Properties, Plant, and Equipment; MKTB = Market-to Book Ratio.

Based on the regression results of the research model (see Table 3), the F-stat value is less than 1%. This shows that the research model used in this study is good with a confidence level of 99%. R^2 value is 0.8222 meaning that the variables used in the model are able to explain 82.22% of the dependent variable, and the remaining 17.78% are explained by other factors not included in the research model.

The Effect of Company Ownership Structure on Tax Avoidance

Table 3 shows that ownership, which is a proxy for the company's ownership structure, has a negative effect on tax avoidance because the regression results show an ownership coefficient of -0.0020. However, the regression results showed a p-value of 0.901. This means that the negative influence has no significant evidence. Based on the regression results, it can be concluded that Hypothesis 1 in this study is rejected.

The Effect of Earnings Management on Tax Avoidance

Table 3 shows that DACCS, which is a proxy for earnings management, has a positive effect on tax avoidance because the regression results show a DACCS coefficient value of 5.0676. In addition, the regression results also show a p-value of 0.058. This shows that the positive effect is significant at the 10% level. Based on the results of the regression, it can be concluded that Hypothesis 2 in this study is accepted, namely earnings management by the company has a positive effect on tax avoidance.

The Effect of Good Corporate Governance on Tax Avoidance

Table 3 shows that CGIndex which is a proxy for corporate governance has a negative effect on tax avoidance as seen from the regression results which show a coefficient value of -0.0420. CGIndex also has a p-value of 0.029 which means that the negative effect is significant at the 5% level. Based on the results of the regression, it can be concluded that Hypothesis 3 in this study is accepted, namely good corporate governance has a negative effect on tax avoidance.

The Effect of the Role of Good Corporate Governance on the Relationship between Earnings Management and Tax Avoidance

Table 3 shows that there is a negative influence seen from the coefficient of -1.2520. Also obtained is the p-value of the CGIndex_DACCS interaction variable of 0,000. This value means that the role of good corporate governance in weakening the positive influence of earnings management on tax avoidance is significant at the 1% level. Based on the regression results, it can be concluded that Hypothesis 4 in this study is accepted, that is, good corporate governance weakens the positive effect of earnings management on tax avoidance.

The Effect of the Role of Good Corporate Governance on the Relationship between Ownership Structure and Tax Avoidance

Table 3 shows that there is a negative effect as seen from the coefficient of -0.0295. However, the p-value shows a value of 0.380 which means that there is no significant effect. Based on the regression results, it can be concluded that Hypothesis 5 in this study is rejected.

Conclusion

From the test results and analysis of the results, it can be concluded that there is no strong evidence that the company's ownership structure have a significant effect on tax avoidance. This is possible because the owners of family companies in Indonesia do not fully and maximally use the influence of their power in carrying out corporate tax planning. Earnings management is consistently proven to have a positive and significant effect on tax avoidance. This shows that companies that carry out earnings management will have the opportunity to take higher tax avoidance measures. Good corporate governance is proven to have a negative and significant effect on tax avoidance. This suggests further that the implementation of good corporate governance will prevent tax avoidance. Similarly, the moderate interaction of good corporate governance with earnings management on tax avoidance has been shown to have a positive and significant effect. This is because companies that implement good governance allow reduction of agency problems and reduce agency costs so that they have effective control and supervision. With effective control and supervision, the likelihood of management taking actions that only benefit management, such as performing earnings management or tax evasion, is lowered. However, in this study, the moderating interaction of good corporate governance with corporate ownership structure on tax avoidance is not proven to have a significant effect. This is probably due to the practice of good corporate governance in Indonesia which is still unable to reduce the influence of dominating family ownership. Companies with family ownership tend to ask management to satisfy the majority shareholder (family), so that it will harm the minority shareholders.

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The Effect of Tax Avoidance towards Firm Value with Politic Connection as Moderating Variable

Nurul FAJRIATI

Universitas Indonesia, Indonesia
nurulfajriati@ymail.com

Siti NURYANAH[1]
Universitas Indonesia, Indonesia
siti.nuryanah@ui.ac.id

Abstract

This study aims to examine the effect of tax avoidance towards firm value with politic connection as moderating variable. The sample consists of firms that are listed in Indonesia Stock Exchange for periods 2012-2014. The results show that, first, tax avoidance increases firm value. Second, tax avoidance decreases the agency cost. These results contrast to previous studies. The results indicate that in Indonesia tax avoidance is considered as an activity approved by the principal, so it will not cause the agency problem and agency cost. This research also shows a different result with previous studies, where political connection can weaken the effect of tax avoidance against firm value. This result indicates further that political connections will causing a lack of innovation and decrease the company's performance.

Keywords*:* Tax avoidance, politic connection, firm value and agency cost.

Introduction

Taxes are an obligation that must be carried out by taxpayers, because the revenue from taxes is used by the government to run the country's economy and development. However, there are different objectives in the implementation of taxation between the government and taxpayers (companies). Companies often carry out tax management with the aim of carrying out their tax obligations properly and minimizing tax payment burdens to maximize company profits without violating applicable laws. The question is whether tax avoidance can affect firm value? The available empirical evidence regarding the reactions of investors to tax avoidance is very mixed. Desai and Dharmapala (2009) state that the overall effect of tax avoidance activities carried out by companies on firm value has almost no effect. The effect will only be positive for companies with high levels of institutional ownership. Desai and Dharmapala also argue that there are two effects in the application of tax avoidance on firm value. Tax avoidance is the transfer of wealth from the government to shareholders, conflict within the agency between management and shareholders can increase the possibility of a managerial transfer minus the value of the company.

Tax avoidance can have a direct and indirect impact on a company's cash flow, both current and future cash flows. The impact of changes that is felt immediately is that tax avoidance can increase the company's cash flow through tax savings, which will lead to high agency costs. On the other hand, aggressive tax avoidance can complicate business transactions, which will lead to lower information transparency and indirectly lower company value. Chen et al. (2014) found that tax avoidance was negative and significant towards firm value. In addition, tax avoidance will also result in high agency costs, which can be measured using the selling expense ratio. Research by Chen et al. (2014) also found that tax avoidance would only increase the value of a more transparent firm. However, research conducted by Wang (2010) shows that tax avoidance can have a positive effect on firm value, especially in companies that have good transparency. Chasbiandani and Martani (2012) found that tax avoidance in the long term will have a positive effect on the value of the company, while tax avoidance in the short term does not significantly affect firm value.

[1] Corresponding Author.

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The operation of a company is closely related to politics. This is due to the success or failure of a company, one of which is influenced by the political conditions in which the business operates. Political economy literature shows that political relations are a valuable resource for individual companies, either in developing countries or in developed countries and are very important in influencing agreements that will impact the choice of corporate strategy. Chansog and Liandong (2014) argue that companies that have political relations are more tax aggressive because these companies have a lower detection risk, can get better information about changes in tax regulations or law enforcement in the future, lower pressure to carry out transparency , and lower political costs associated with aggressive taxes.

Nugroho (2011) found that companies with political connections would not have a significant effect on the effective tax rate. However, in the research of Mulyani et al. (2013) found that the political connection variable had a significant negative effect between the political connection variable on tax avoidance. The difference in the results of the study makes it interesting to re-examine to see whether the relationship between the two variables is negative or positive.

There are differences in this study with research conducted by Chen (2014) and Nugroho (2011). Chen (2014) examines tax avoidance with firm value and transparency as moderating variables. Meanwhile, research conducted by Nugroho (2010) looked at the influence of political relations and tax reform on the effective tax rate of companies listed on the Indonesia Stock Exchange in 2008-2009. This study examines the effect of tax avoidance on firm value and political connections as moderating variables.

Theoritical Framework

Tax avoidance, political connections, and corporate value

Lestari et al. (2014) found a positive relationship between firm value and tax planning activities. The better the company is in carrying out tax planning activities, the more it will increase company value. These results support the traditional theory which states that tax planning measures to transfer wealth from the state to shareholders Desai and Dharmapala (2006) in Lestari et al. (2014). Structured tax planning activities can reduce taxes by taking advantage of applicable tax regulations. Thus this will have an impact on increasing firm value, assuming that the benefits to be received are higher than the costs incurred by the company in tax planning activities.

Chasbiandani and Martani (2012) found that long run tax avoidance has a positive effect on firm value, while short run tax avoidance does not significantly affect firm value. This indicates that the lower the long-term ETR paid by the company, the higher the firm's value. However, Ilmiani and Sutrisno (2014) mentioned that tax avoidance has a significant and negative effect on firm value. Chen et al. (2014) stated that tax avoidance can lead to direct and indirect changes to current cash flows. An example of an immediate change could occur if tax avoidance could increase cash flow through tax storage which would also lead to increased agency costs. Kusumawati (2015) stated that political connections has an effect on company value. This positive impact reflects that directors who have political connections create value through knowledge and influence on legal development. In addition, companies with connections to the winner of the gubernatorial election will invest more than he previously did, improve operating performance, have more cash, and perform better long-term stock performance. Thus, the value of the company increases. Brogaard et al. (2015) stated that political connections increase the likelihood of winning contracts with the government, their findings give rise to the notion that political connections increase firm value by increasing firms' access to government contracts. However, they also found undesirable effects of political connections in the long run. They say that political connections weaken the incentives for innovation and reduce performance in the long run. Li and Xia (2013) stated that political connections have positive and negative effects on firm value. The net assets per share of politically connected companies have a positive impact on their value. However, the growth of companies with political connections does not have a significant impact on company value. After conducting an empirical study, they found that political connections were not significant in influencing the long-term growth of companies. After the crisis, political connections have a significant relationship and a positive impact on company value.

Hypotheses Development

There are still many discrepancies among the research results regarding the relationship between political connections and tax avoidance. Lestari et al. (2014) found a positive relationship between tax planning actions and firm value. Companies that do tax planning well, further increase the value of the company. This supports argument that tax planning measures to transfer wealth from the state to shareholders (Desai and Dharmapala (2006) in Lestari et al. (2014)). Structured tax planning activities can reduce taxes by taking advantage of applicable tax regulations. Thus this will have an impact on increasing firm value, assuming that the benefits to be received are higher than the costs incurred by the company in tax planning activities.

However, theoretically, tax avoidance behavior provides companies with more cash flow in both the short and long term, which directly increases firm value, and tax avoidance itself will shift cash flows indirectly with the influence of management decisions. Practically speaking, the complexity and ambiguity of tax avoidance makes managers choose to increase their own self-interest, which can reduce current and future cash flows. In addition, based on classical agency theory cash flow from tax evasion leads to the consumption of company payments and the building of a "personal empire", which will shrink future cash flows and reduce firm value. What's more, aggressive tax avoidance is associated with administrative penalties and loss of reputation, which can reduce future cash flows and corporate value (Chen et al, 2014).

Thus, companies that do tax avoidance will tend to reduce firm value. This is because there are risks that the company will face in the future that will cause the company's value to decrease, including the detection of corporate tax avoidance by the tax directorate general, payment of fines / penalties due to tax avoidance and loss of company reputation. Thus, the hypotheses formulated based on the above arguments are:

H1: Tax avoidance has a negative effect on firm value

Tax avoidance is the cause of agency conflicts between companies and shareholders. Company managers tend to take opportunistic actions in fulfilling the interests that must be achieved by the company, where this behavior can harm the company's investors. This agency conflict will result in agency costs incurred to be used to supervise shareholders on the performance and activities of managers (Jensen and Meckling, 1976 in Anggoro, 2015).

With companies that do tax avoidance, it will increase the company's agency costs. This is because based on Chen et al. (2012) with tax avoidance, companies must monitor management behavior that tries to build a "personal empire". So that the provision of appropriate compensation is needed so that managers continue to act in accordance with the interests of shareholders (Kusumawati, 2015).

H2: Tax avoidance behavior has a positive effect on agency costs.

Companies that do tax avoidance will have a lower corporate value in the future, this is because there will be risks that will reduce the company's current cash flow and future cash flows. However, Kusumawati (2015) states that directors who have political connections create value through knowledge and influence on legal development. His opinion is also supported by Brogaard et al. (2015) who say that political connections increase the likelihood of winning contracts with the government, their findings give rise to the notion that political connections increase firm value by increasing firms' access to government contracts.

In addition, companies connected to the winner of the gubernatorial election will invest more, improve their operational performance, have more cash, and enjoy better long-term stock performance. Thus, the value of the company increases (Kusumawati, 2015). Faccio (2006) also found that the largest officers or shareholders enter politics, or politicians join corporate boards. The study found that a significant increase occurred in firm value. Faccio (2007) found companies with political connections have high leverage (use preferential proxies to access credit), pay lower taxes (which use tax discount proxies) and have high market power (use proxies for monopolies, contract with government, and protection in general), but weak in accounting performance when compared to companies that have no connections.

H3: Political connections strengthen the effect of tax avoidance on firm value.

Research Methodology

<u>Regression Model</u>

The regression model that will be used to test the effect of tax avoidance on firm value (H1) is as follows:

$$\boldsymbol{q_{i,t} = \alpha_0 + \alpha_1 TaxAgg\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}}$$

The regression model that will be used to test the effect of tax avoidance on agency costs (H2) is used a regression model as follows:

$$\boldsymbol{Agencycost = \alpha_0 + \alpha_1 TaxAgg\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 GROWTH_{i,t} + \alpha_6 SIZE_{i,t} + \varepsilon_{i,t}}$$

The regression model that will be used to examine the effect of tax avoidance on firm value with political connections as a moderating variable (H3) is as follows:

$$\boldsymbol{Q_{it} = \alpha_0 + \alpha_1 TaxAgg\alpha_{i,t} + \alpha_2 Polcon_{i,t} + \alpha_3 (TaxAgg_{i,t} * Polcon_{i,t}) + \alpha_4 PPE_{i,t} + \alpha_5 DEBT_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 GROWTH_{i,t} + \alpha_8 NOL_{i,t} + \alpha_9 SIZE_{i,t}\, \varepsilon_{i,t}}$$

Operationalization of Variables

Table 1. Operasionalisasi Variabel

No.	Variables		Description
1	Dependent variables H1 and H3	Adjusted Tobin's Q	Firm value: $Adjusted\ Tobin's\ Q = \frac{MVE + D}{BME + D}$
2	Dependent variables H3	Agency Costs (STA)	$Sales\ to\ Total\ Assets\ (\text{STA}) = \frac{Sales}{Total\ Assets}$
3	Independent variables (H1, H2 and H3)	Penghindaran Pajak	Tax avoidance is measured using the level of corporate tax aggressiveness, namely the Book Tax Difference (BTD), Residual Book Tax Difference (TS), and Effective Tax Rate (ETR) $BTD = \frac{Pre\ Tax\ Income - Taxable\ Income}{Average\ Total\ Assets}$ $BTD_{i,t} = \beta_1 TA_{i,t} + \mu_i + \varepsilon_{i,t}$ $TS_{i,t} = \mu_i + \varepsilon_{i,t}$ $ETR = \frac{Income\ tax\ expense}{Pre\ tax\ income}$
4	Control variables (H1, H2, and H3)	*Fixed Asset* (PPE)	$PPE = \frac{Net\ PPE}{Average\ \ total\ assets}$
5	Control variables (H1, H2, and H3)	*Capital Structure* (*Debt*)	$DEBT = \frac{(Short\ term\ loans + Notes\ payable + long\ term\ liabilities)}{Average\ total\ assets}$
6	Control variables (H1, H2, and H3)	*Return On Assets* (ROA)	$ROA = \frac{Total\ profits}{Average\ total\ assets}$
7	Control variables (H1, H2, and H3)	*Firm Size* (Size)	$SIZE = LN\ (total\ assets)$
8	Control variables (H1, H2, and H3)	*Sales Growth Rate* (Growth)	$GROWTH = \frac{(Current\ operating\ revenue - prior\ operating\ revenue)}{beginning\ operating\ revenue}$
9	Control variables (H1 and H3)	*Loss Carryforwards* (NOL)	$NOL = \frac{Losses\ carry\ forwards}{Average\ total\ assets}$

Results and Discussion

The sample used in this study consisted of 507 samples from all industries, except the financial industry and the property, real estate and building construction industries from 2012 to 2014. Table 2 presents descriptive statistics of the data in this study. Adjusted Tobin's Q is a proxy of firm value. The Tobin's Q proxy used in this study follows the model of Rezaei et al (2014). Adjusted Tobin's Q has a mean value of 2.02385, which shows that the company average

has a high enough value compared to its book value. The highest value of Adjusted Tobin's Q is 17.93549 and the lowest value is 0.3328539.
BTD, TS and ETR are proxies of tax avoidance. BTD has an average value of -2.970418, the lowest value is -315.0494 and the highest value is 0.9555033. TS has an average value of -2.601729, the lowest value is -2.972474 and the highest value is 7.264747. ETR has an average value of 0.2750628, the lowest value is 0.0273665 and the highest value is 0.9476172.

STA is a proxy for agency costs which has an average value of 1.143939, the lowest value is 0.0318636 and the highest value is 7.264747. This shows that the company has a high sales to total asset ratio, which reflects the high productivity of the company. Polcon is a moderating variable for political connections. Political connections have an average of 0.3668639 where this shows that the political connections within the company that are observed are high, namely 36.69% of the total 507 observations.

Table 2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum Value	Maksimum Value
Adjusted Tobin's Q	2.02385	2.114825	0.3328539	17.93549
BTD	-2.970418	26.25106	-315.0494	0.9555033
TS	-2.601729	0.893823	-2.972474	7.264747
ETR	0.2750628	0.1243441	0.0273665	0.9476172
STA	1.143939	0.8243903	0.0318636	6.050928
Polcon	0.3612663	0.4808154	0	1
PPE	0.4069206	0.2484248	0.0082647	1.483171
DEBT	0.2623848	0.243813	0	1.129479
ROA	0.1263429	0.1208663	-0.558955	0.861559
SIZE	21.62607	1.565898	17.66138	26.1749
GROWTH	0.245478	1.527179	-0.7794864	34.33076
NOL	0.0128828	0.0661678	0	0.837367

Source: Stata 13 output, processed by authors (2016)

Results and Discussion for H1

Table 3: Results on Hypothesis 1 (Proxy BTD)

$$q_{i,t} = \alpha_0 + \alpha_1 BTD\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
BTD	-	-0.0112039	0.0505*
PPE	+	-0.0701752	0.4025
Debt	+/-	-0.0177879	0.465
ROA	+	-0.6346482	0.0945
NOL	+	-0.234031	0.321
Growth	+	0.2155956	0.013**
Size	+	-0.6705965	0.000***
R-sq within		0.1116	
Prob F		0.0000	

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

Table 4: Results on Hypothesis 1 (Proxy TS)

$$q_{i,t} = \alpha_0 + \alpha_1 TS\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
TS	-	0.3294607	0.06***
PPE	-	-0.0454614	0.4365
Debt	-	-0.010405	0.4795
ROA	+	-0.5769256	0.1175
NOL	+	-0.257586	0.3045
Growth	-	0.2338253	0.0075***
Size	-	-0.7275738	0.0000***
R-sq within		0.1112	
Prob F		0.000	

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

Table 5: Results on Hypothesis 1 (Proxy ETR)

$$q_{i,t} = \alpha_0 + \alpha_1 ETR\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
ETR	+	-0.3181138	0.0925***
PPE	-	-0.090118	0.3755
Debt	-	-0.0184028	0.4635
ROA	+	-0.6749247	0.0815***
NOL	+	-0.2586843	03035
Growth	-	0.2310268	0.0085***
Size	-	-0.6838392	0.000***
R-sq within		0.1100	
Prob F		0.0000	

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

Tables 3-5 show results of H1 testing Models 1, 2 and 3. H1 states that the company value will be lower for companies that do tax avoidance than companies that do not do tax avoidance. Results show BTD tax avoidance is negative, this is in accordance with initial expectations with a coefficient level of -0.0112039, indicating that the higher the company avoids tax, the lower the firm value. While TS is positive with a coefficient of 0.376876 indicating that the higher the company takes tax avoidance measures, the higher the firm value. This is also consistent with hypothesis testing on tax avoidance using the ETR proxy, the results show that using the ETR the relationship between tax avoidance and firm value is negative, in contrast to initial expectations with a negative coefficient of -0.3181138, this indicates that the more companies do tax avoidance, the more the value of the company will increase.

Results show that BTD had a significance level of 0.0505 and the regression results using the ETR for tax avoidance had a significance level of 0.06. However, the regression results using the TS for tax avoidance has a significance level at the 0.0925 level. So that the conclusion of hypothesis 1 is rejected because what is in accordance with the prediction is only the BTD, but the TS and ETR show that firm value will increase firm value.

Firm value is considered as one of the responses from investors to the activities carried out by the company (Anggoro et al., 2015). The results found that tax avoidance through tax planning would increase firm value. This is in line with Lestari et al. (2014) which found that there was a positive effect of tax planning activities on firm value. With the better the company in carrying out tax planning activities will further increase company value. These results support the traditional theoretical perspective which states that tax planning activities are used to transfer welfare from the state to shareholders (Desai and Dharmapala, 2006). By going through tax planning activities, namely taking structured actions so that the tax burden is as low as possible by utilizing existing regulations to obtain an increase in

profit after tax which will have an impact on increasing company value. With the assumption that the benefits obtained are higher than the costs incurred from the tax planning activities.

Results and Discussion for H2

Table 6: Results on Hypothesis 2 (Proxy BTD)

$$AgencyCost_{i,t} = \alpha_0 + \alpha_1 Taxagg\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
Tax Agg (BTD)	-	0.0035649	0.084*
PPE	-	-0.0463038	0.333
Debt	-	-0.0554215	0.2335
ROA	+	-0.3984059	0.0145
Growth	+	0.2537437	0.000***
SIZE	-	-0.3309728	0.000***
R-sq within	0.2112		
Prob F	0.0001		

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

Table 7: Results on Hypothesis 2 (Proxy TS)

$$AgencyCost_{i,t} = \alpha_0 + \alpha_1 Taxagg\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
Tax agg (TS)	-	0.0307709	0.3505
PPE	-	-0.0422036	03475
Debt	-	-0.0502092	0.2555
ROA	+	-0.3859784	0.018**
Growth	+	0.2483495	0.000***
SIZE	-	-0.32935	0.000***
R-sq within		0.2084	
Prob F		0.0000	

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

Table 8: Results on Hypothesis 2 (Proxy ETR)

$$AgencyCost_{i,t} = \alpha_0 + \alpha_1 Taxagg\alpha_{i,t} + \alpha_2 PPE_{i,t} + \alpha_3 DEBT_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 NOL_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 SIZE_{i,t} + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
Tax agg (ETR)	+	-0.0327418	0.359
PPE	-	-0.0465265	0.3325
Debt	-	-0.0508596	0.2525
ROA	+	-0.3953515	0.0155**
Growth	+	0.2480689	0.000***

SIZE	-	-0.3252267	0.000***
R-sq within		0.2084	
Prob F		0.0000	
*** Significant at the level 1% ** Significant at the level 5% * Significant at the level 10%			

Source: Stata 13 output, processed by authors (2016)

Results of testing of H2 Models 1, 2 and 3 are presented in Tables 6-8. H2 states that tax avoidance behavior will increase agency costs. Results show that BTD is positive, in contrast to initial expectations with a coefficient of 0.0035649, indicating that the higher the level of tax avoidance, the lower the company's agency costs. TS is positive with a coefficient level of 0.0307709. This is in line with the test using the BTD that companies with a high level of tax avoidance will reduce the company's agency costs. Meanwhile, the ETR test results with agency costs with a coefficient of -0.0327418 indicate that the higher the level of tax avoidance in a company, the lower the agency costs incurred by the company. Based these results H2 is rejected because the three proxies indicate that tax avoidance will reduce firm value. This indicates that the activities of tax avoidance carried out by management are actions that have been approved by the principal, so that there are no agency problems and do not cause agency costs.

Agency costs are costs incurred by the principal to oversee the behavior of the agent (manager behavior) in order to act in the interests of the principal. The ideal is according to Zeng and Zhang (2010) in Chen et al, (2014) stated that areas that have strong tax enforcement will have low agency costs, tunneling activity and transactions with related parties will be less for the majority shareholder, so it is argued that tax enforcement can function as an external corporate governance mechanism. However, this study argues that tax enforcement in Indonesia is still not strong, this is reinforced in the publication of the World Bank (2012) that the realization of tax revenues in Indonesia is around 12% (Amir, 2014). This figure is relatively low compared to other ASEAN countries such as Malaysia, Thailand and Singapore which have reached 16.1%, 16.5% and 14.5%.

Results and Discussion for H3

Table 9: Results on Hypothesis 3 (Proxy BTD)

$$q_{i,t} = \alpha_0 + \alpha_1 BTD_{i,t} + \alpha_2 Polcon_{i,t} + \alpha_3 Polcon * BTD_{i,t} + \alpha_4 PPE_{i,t} + \alpha_5 DEBT_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 NOL_{i,t} + \alpha_8 GROWTH_{i,t} + \alpha_9 SIZE_{i,t} + + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
BTD	-	0.4262169	0.159
Polcon	+	0.043498	0.322
Polcon*BTD	+	-0.4375412	0.153
PPE	-	-0.0427326	0.4405
Debt	-	-0.0320545	0.437
ROA	+	-0.8166674	0.057*
NOL	+	-0.2293275	0.342
Growth	-	0.2163816	0.013**
SIZE	-	-0.6759404	0.000***
R-sq within		0.1136	
Prob F		0.0000	
*** Significant at the level 1% ** Significant at the level 5% * Significant at the level 10%			

Source: Stata 13 output, processed by authors (2016)

Results of testing of H3 Models 1, 2 and 3 are presented in Tables 9-11. H3 in this study states that political connections strengthen the relationship between tax avoidance and firm value. BTD is negative with a coefficient of 0.4262169 shows that the higher the company's aggressiveness in tax avoidance, the higher the company's value. Meanwhile political connections have a positive relationship with adjusted Tobin's Q with a coefficient 0.043498, indicating that having political connections within the company will increase the value of the company. The BTD*Polcon coefficient has a negative relationship of -0.4375412, indicating that political connections weaken the relationship between BTD and adjusted Tobin's Q from -0.0112039 to -0.4375412.

It can be concluded that in companies that have political connections, weaken the relationship between corporate tax aggressiveness and firm value. According to Brogaard et al. (2015) this can be caused by political connections in the long-term causing weak innovation and reducing company performance in the long term so as to reduce firm value.

Table 10: Results on Hypothesis 3 (Proxy TS)

$$q_{i,t} = \alpha_0 + \alpha_1 TS_{i,t} + \alpha_2 Polcon_{i,t} + \alpha_3 Polcon * TS_{i,t} + \alpha_4 PPE_{i,t} + \alpha_5 DEBT_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 NOL_{i,t} + \alpha_8 GROWTH_{i,t} + \alpha_9 SIZE_{i,t} + + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
TS	-	0.2898118	0.0925*
Polcon	+	0.4378579	0.2355
Polcon*TS	+	0.1525817	0.2435
PPE	-	-0.0370692	0.448
Debt	-	-0.0133557	0.474
ROA	+	-0.5694395	0.1205
NOL	+	-0.2525887	0.308
Growth	-	0.2375491	0.007***
SIZE	-	-0.7242423	0.000***
R-sq within		0.0008	
Prob F		0.0000	

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

TS has a coefficient of 0.2898118, indicating that the higher the company's aggressiveness in tax avoidance, the company value will increase. Meanwhile, politics has a positive relationship with adjusted Tobin's Q, which is 0.4378579, indicating that companies with political connections will increase firm value. The TS*Polcon coefficient is 0.1525817, indicating that political connections weaken the relationship between TS and firm value, from a coefficient of 0.3294607 to 0.1525817.

Table 11: Results on Hypothesis 3 (Proxy ETR)

$$q_{i,t} = \alpha_0 + \alpha_1 ETR_{i,t} + \alpha_2 Polcon_{i,t} + \alpha_3 Polcon * ETR_{i,t} + \alpha_4 PPE_{i,t} + \alpha_5 DEBT_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 NOL_{i,t} + \alpha_8 GROWTH_{i,t} + \alpha_9 SIZE_{i,t} + + \varepsilon_{i,t}$$

Variables	Expected sign	Coefficient	Significant level
ETR	+	0.0526434	0.441
Polcon	+	0.1819982	0.1075
Polcon*ETR	+	-0.6694413	0.0805**
PPE	-	-0.0901836	0.3755
Debt	-	-0.0123502	0.4755
ROA	+	-0.7601556	0.0595*
NOL	+	-0.2865527	0.2845
Growth	-	0.2361447	0.007***
SIZE	-	-0.7025226	0.000***
R-sq within		0.1135	
Prob F		0.0000	

*** Significant at the level 1%
** Significant at the level 5%
* Significant at the level 10%

Source: Stata 13 output, processed by authors (2016)

ETR has a positive coefficient 0.0526434 and this is in accordance with the initial hypothesis, but the significance level is 0.441, indicating that the higher the company's aggressiveness in tax avoidance, the company's value will

decrease. Meanwhile, politics has a positive relationship with adjusted Tobin's Q, which is 0.1819982, indicating that companies with political connections will increase firm value. Polcon*ETR is -0.6694413 indicating that political connections weaken the relationship between ETR and firm value, from the coefficient of - 0.3181138 to -0.6694413. It can be concluded that tax avoidance will increase firm value. However, political connections weaken these relationships.

Conclusions and Suggestions

This study aims to determine the relationship between tax avoidance and firm value, agency costs and tax avoidance and the role of political connections on the effect of tax avoidance on firm value. Tax avoidance is measured by three proxies namely BTD, TS and ETR. Meanwhile, agency costs are measured using the STA proxy. Based on the results of hypothesis testing that has been done, it can be concluded that:

1. The results show that tax avoidance has a positive relationship with firm value, meaning that tax avoidance increases firm value. Hence, tax avoidance affects firm value. This is indicated through tax planning activities so that the tax burden is as low as possible by utilizing existing regulations, then an increase in profit after tax will have an impact on increasing company value.

2. This study found that agency costs have a negative effect on tax avoidance, this indicates that tax avoidance reduces agency costs. Hence, tax avoidance affects agency costs. This indicates that the activities of tax avoidance carried out by management are actions that have been approved by the principal, so that there are no agency problems and do not cause agency costs.

3. This study found that there is a moderating effect of political connections which weakens the marginal effect of tax avoidance on firm value. It is indicated that political connections in the long run cause weak innovation and reduce company performance in the long run so that it can reduce firm value.

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Open Innovation in Small and Medium Enterprises: A Review of The Literature

Ph.D Student Daniel RUSU

Bucharest University of Economic Studies, Bucharest, Romania, rusumdaniel@gmail.com

Ph.D Student Maria FRANGIEH

Bucharest University of Economic Studies, Bucharest, Romania, frangieh.m@gmail.com

Abstract

In recent years, studies on open innovation in small and medium-sized enterprises (SMEs) have seen a spectacular increase. However, even in this context, there is still no comprehensive analysis for this area of research. Through this study we will examine the current state of research in terms of open innovation in SMEs because we want to structure the empirical results and at the same time draw a future research agenda. To a large extent these studies are conducted in a European context, along with a number of studies in Korea and China, while in the North American context studies are rare. The overall innovation performance of SMEs is largely enhanced by open innovation (OI). Even in this context, the relevant models and theories of managers are not well established in the literature. As a matter of fact, it is essential to recognize the competitive advantage sources of the enterprise. When these resources are recognized, it becomes easier to draw a plan regarding goal attainment and competitive advantage realization. The company's leader plays a major role in deciding whether to venture into an open innovation strategy or to play it safe by adhering to a traditional closed innovation strategy. Consequently, it is up to the leader to outline the elements that profoundly impact the firm's innovation activity.

Keywords: Literature Review, Strategy, SMEs, Open Innovation (OI), Leadership

Introduction

Ever since the concept of open innovation was introduced by Chesbrough (2003), studies on open innovation have grown significantly. It defines open innovation as "the use of intentional knowledge flows and outflows to accelerate internal innovation and expand markets for external use of innovation" (Chesbrough et al. 2006, p.1). In many cases, and most recently, most of the studies conducted in terms of open innovation have been conducted on large firms (Van de Vrande et al. 2009; Bianchi et al. 2010; Ceptureanu EG et al., 2019a). They use open innovation in their strategies, successfully, a number of large companies such as Procter & Gamble, Philips, IBM (Chesbrough 2003). Regarding small and medium enterprises (SMEs) a series of studies regarding open innovation are carried out only in the initial phase, they are based in general on managerial, conceptual or secondary data.

SMEs lack, in most cases, both technical and managerial skills for their effectiveness (Rahman and Ramos 2010; Ceptureanu EG et al, 2017). In open innovation, compared to large companies, SMEs are much less active due to their specific characteristics, such as strategy, culture, organization. It uses the open innovation approach, actively, only a percentage of SMEs between 5-20%, according to an OECD study. Many studies on open innovation in SMEs are lacking in continuity, fragmented (Bianchi et al. 2010; Colombo et al. 2014). SMEs are able to obtain much more consistent benefits from open innovation (IB) than large firms due primarily to the faster ability of SMEs to react to changing environments, their increased desire to assume risks and a much lower bureaucracy, are the opinion of some researchers (Parida et al. 2012). Moreover, for SMEs, open innovation is an ambitious and promising means to increase their profitability and overcome their challenges (Gassmann et al., 2010). For SMEs to succeed in overcoming their limits but also the barriers that appear in the direction of successful implementation of open innovation, procedures and methods are needed that can certainly help. Given all these aspects, the need to integrate this fragmented state of literature is essential. The examination of current research on open innovation in SMEs in order to integrate empirical results and highlight a future research agenda is the objective of this study.

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Research Methodology

First, for this study, the selected articles were collected from the ISI Web of Science database because quality articles are included in this database. Researchers have widely regarded the ISI Web of Science recently as a rich source of significant research articles (Dahlander and Gann 2010). In peer-reviewed journal articles that were written in English, the search was limited for the period 2003–2019 in business discipline. Search results in the ISI Web of Science database retrieved 52 articles using the keywords "SMEs" and "open innovation". Given these issues, the number of articles on open innovation in SMEs, published in journals listed in the ISI Web of Science is low. In conclusion, to include as many articles as possible in this research, using the same search criteria, a second attempt was made using the Scopus database. In total, 64 articles were retrieved from the Scopus database. Double article entries were subsequently removed. Subsequently, the irrelevant articles were removed, after carefully estimating the results, both from the Scopus databases and from the ISI. In conclusion, only 74 articles were considered relevant. Finally, one last attempt is made to find more articles, the search being performed in Google Scholar, where six more articles were found. After carefully reading the main text of each article, 16 articles were excluded, given that these articles were outside the scope of this study.

To compare the summary of each article with others, the NVivo program was used to generate broad study topics (Macpherson and Holt 2007). From each article, the necessary information, based on the thematic categories, is tabulated in a spreadsheet. At the end, a thematic analysis is performed in order to identify the empirical evidence from the studies.

In order to pursue open innovation, the use of an efficient and appropriate search strategy is a particularly important step for SMEs. For this search strategy, exploitation and acquisition are crucial. The absorption of external technologies is included in the acquisition process and the exploitation refers to the technology marketing process. Brunswicker and Vanhaverbeke (2014) identified five strategies that SMEs adopt for search: (1) minimal search, (2) supply chain search, (3) technology-oriented search, (4) application-oriented search and (5) fully -field researchers. In relation to external sources of innovation, such as network partners, IPR experts, research organizations / universities, suppliers and customers, each strategy involves a mixture of interactions. Collaborations between open innovation partners and SMEs allow the latter to make strategic moves that cannot be feasible for closed innovation SMEs (Colombo et al. 2014). Comacchio et al. (2012) suggest that the endowment of social capital at organizational and individual level but also of human capital at individual level are the determining factors for SMEs in terms of coordinating the tasks involved in a limiting role. Through a partial disclosure of their internal development in the external environment, SMEs can identify an extremely valuable development from external sources (Henkel 2006). Together with external barriers to innovation, national and regional approaches are the main factors for SMEs to open up innovative activities (Idrissia et al. 2012).

Even under these conditions, in a certain industry, the open systems strategy initiates a phenomenon of induction of entry and in this way the adoption of open systems by new entrants is easier than incumbent operators. In terms of partner selection and practices, it is essential that SMEs focus significantly (Theyel 2013). For different activities, such as potential market, partners, innovative ideas, new knowledge, SMEs develop search strategies (Ceptureanu SI et al., 2015). Unfortunately, compared to large companies, these search strategies offer fewer advantages and benefits for SMEs.

The challenges of innovation management

In order to achieve innovation, SMEs face unique challenges. These challenges include, among others, access to up-to-date scientific excellence, coordination of the company's operational functions, the complexity of the scientific field but also the lack of resources (Abouzeedan et al., 2013). According to Andries and Faems (2013), even if it is beneficial for external parties to provide knowledge about SMEs, for short-term benefits it is not beneficial. According to Christensen et al. (2005), there is a complex interaction between the titular agents and the technological entrepreneurs. They point out that open innovation often involves high transaction costs. SMEs have weak connections with senior officials but also with other organizations. (Dodourova and Bevis, 2014). According to Pullen et al. (2012), despite the fact that they actually face a number of barriers while trying to apply open innovation, SMEs actively practice such open innovation activities.

To cope with increased external contacts, most SMEs face challenges related to cultural and organizational issues (Van de Vrande et al., 2009). Within these challenges we can list external participations, outsourcing research and development (R&D) activities, external networks, customer involvement, adventure. Moreover, SMEs in developed countries face different challenges compared to SMEs in developing countries. A government agency in a developing country that uses innovation hubs could help SMEs collaborate, communicate and connect with independent inventors and other parties to implement innovation practices (Vrgovic et al., 2012). In terms of international competitiveness, SMEs largely depend on two very important internal components - managerial skills and managerial structure but also on research and development capacity and two external factors, namely - the company's ability to

attract government subsidies for technological development but also for research and development and open innovation practices (Wynarczyk, 2013).

SME policy for open innovation

Following the provision to SMEs, as an alternative method, of outsourced development and research services, this concept of open innovation emerged, representing a strategically focused approach and conception (Albors-Garrigós et al. 2011). These companies are quite different from the influence of factors of nature and political involvement and from this point of view they are not supported by a series of public policies (Brown and Mason 2014), according to a UK study on SMEs that are technology-based (Brown and Mason 2014). If they want growth at an international level, it is essential for SMEs to adopt open innovation and from this point of view, to appreciate, encourage and develop throughout life the desire to study, knowledge and learning, self-motivation, self- discipline, criticism and creativity, cooperation and openness, no doubt need a strong educational system (Csath, 2012). Regarding the importance of different networks for SMEs, it is very possible that there is no awareness and accountability from decision makers (Hemert et al., 2013). According to Kamp and Bevis (2012), in connection with the direction and awareness of SMEs in the direction of developing specific open innovation activities, the necessary schemes and mechanisms for innovation are extremely useful from public factors and decision makers. Encouraging openness to the outside, the perception of uncertainty and also the size of the team are absolutely essential for the success of the open innovation policy (Kim et al., 2014). They argue that in order to obtain public support for collaboration and cooperation, an efficient dimension of the average team is appropriate. Even in the case of SMEs, more and more eco-innovation is becoming an integral part. According to Bocken et al (2014), in order to achieve eco-innovation, it is necessary for SMEs to adopt open, systematic and innovative informal approaches.

In order to encourage the initiation but also the development of such networks, it is necessary for SMEs to be integrated in certain programs to support these networks through public policies (McAdam et al., 2014, Ceptureanu SI et al, 2018). In order to act as a catalyst for open innovation, in many countries public funding is provided directly to the research and development centers of companies and universities, but this public funding is necessary to focus and focus primarily on the needs of SMEs (Roper and Hewitt-Dundas, 2013). In order to facilitate open innovation in service SMEs, public policy initiatives specialized in differentiating network strategy are more effective (Suh and Kim, 2012). In order to be able to effectively accelerate open innovation in SMEs, it is necessary to significantly improve existing public policy (Vega et al., 2012). To better meet all individual needs, a number of group and open innovation policies can encourage innovation, while, given the problems at regional level, society-led innovation needs to be encouraged through a number of programs. reform at national level, taking into account European challenges for innovation (Vigier, 2007). There is no significant impact on innovation performance for SMEs that have links and cooperate with government agencies (Zeng et al., 2010). To become active participants in the process of technological innovation, SMEs can be supported through a set of effective public policies, such as fiscal incentives (Yan and Yu, 2013).

Collaboration of SMEs

The collaboration of SMEs depends on what they intend to achieve. The chances of SMEs to launch new services and products are obviously increased by their collaboration with external agencies (Spithoven et al., 2013). Regarding SMEs, vertical collaboration is relevant for achieving radical innovation and horizontal collaboration is necessary and appropriate for incremental innovation, according to a study by Parida et al. (2012). According to Lecocq and Demil (2006), vertical specialization, achieved within an open system of an industry, can lead to a decrease in the size of SMEs. According to Spithoven et al. (2013) collaboration between SMEs includes value chain partnerships, which bring new knowledge bases that they can easily absorb even beyond technology and science. SMEs that carry out closed innovation tend to develop collaborations in order to implement the incremental changes of their already existing products, and within open innovation SMEs will tend to collaborate for product introduction (Wynarczyk, 2013). In agreement with Van de Vrande et al. (2009), Hemert et al. (2013), compared to the early stages of innovation, in the marketing stage, it is more important the collaboration between SMEs, according to studies reconfirmed many times. Obviously, the degree of collaboration is closely related to the emotional dimension of the company.

Dynamic capacities of SMEs

To a very large extent, SMEs are beneficiaries of knowledge-based, dynamic and labor-intensive industries, but at the same time have limited options in mature, capital-intensive industries (Dodourova and Bevis, 2014). In the innovation process, the critical dynamic capabilities of SMEs were explored by Grimaldi et al. (2013). They found that SMEs with strong configuration, confiscation and detection capabilities are much more likely to develop a range of open innovation approaches. According to Zeng et al. (2010), compared to horizontal cooperation with state agencies, academic institutes but also with research institutions, horizontal and vertical cooperation with suppliers, customers but also with other agencies have a much more distinct role in terms of innovation process of

SMEs. Following studies, Guräu and Lasch (2011) identified a number of factors that accelerate the capacity of SMEs through which they manage and develop open innovation systems. Among these factors we can list the company's ability to implement and manage open innovation systems, its ability to identify partner organizations with complementary resources, its ability to develop partnerships, the organizational stage and the size of the company. According to Heger and Boman (2014), SMEs are helped to approach the approach to dynamic capabilities through a wider knowledge base.

According to Teece (2007), we can define dynamic capabilities as the ability of the organization to transform, interact, learn and feel in close accordance with rapidly changing external environments. According to Peng and Lin (2017), so far, research on the link between dynamic capabilities and internationalization has been able to contribute to the robustness of the theory of dynamic capabilities. Through this theory we are able to highlight the importance of having the capacity to change in order to address, in an international business context, rapid environmental change. In order to learn from experience, it is necessary for organizations to be able to develop processes for detecting the international environment. The main factor that determines international success is the possibility and availability of an organization to transform its resources, processes and attitudes. According to Carlos and Pinho (2011), MacLean et al. (2015), Rothaermel and Hess (2007), these dynamic capabilities can be found in several levels, such as network level, company level or individual level and of course, between these levels there is an interaction. The researchers ignore the heterogeneity present at the individual level and highlight specific constructions such as capacities and resources, when analyzing the internationalization of companies. When the analysis of a single level is performed, this implicitly leads to the fact that heterogeneity is at the chosen level and the other levels remain homogeneous. However, according to Felicio et al. (2015), Fernandez-Mesa and Alegre (2015), there is previous research that has managed to verify an indissoluble link between corporate characteristics and individual characteristics.

According to Teece et al. (1997) dynamic capacities consist of two components: 1) dynamics is defined as the ability to remain constant in a process of business exchange in response to innovations; 2) the role of strategic management defines the capability, which intervenes in the process of integrating resources into a new group or reconfiguring or integrating resources. According to Schreyögg & Kliescheberl, (2007), meeting the needs of adaptation to change in a rapidly changing environment requires external and internal skills that consist of the following elements: the duration of the probability of trust, training and the process of solving complex problems. In expansion, the concept of dynamic capabilities plays a particularly important role given the long-term ability of an organization to improve and change its performance much better than their competitors (Schiuma, Lerro and Moustaghfir, 2008). creating new knowledge, we must always focus on the processes present in the organization. The creation and development of new levels of competence for self-development is a particularly important capacity that in any organization must be developed with priority. The increase of dynamic capacities is determined within the organizations by the change of capacities and resources mainly in the moments of market fluctuations (Teece et al., 1997).

The dynamic capacities present at individual level have a primordial predictive role in the development of dynamic capacities at international and organizational level. We also need to ask ourselves what are the capabilities that most closely resemble the dynamic capabilities present at the entrepreneurial level? Long before their rivals, entrepreneurs exploit, discover, define but also create opportunities. Dynamic capabilities are generated by entrepreneurial activities (Zahra et al., 2006). Consequently, the entrepreneurial orientation re-presents a main characteristic of the individual level and is able to measure the degree of entrepreneurial inclination of the founder / owner.

Patenting in SMEs

Of course, SMEs also benefit from patenting, as in the case of large companies. In their effort to license their knowledge to external parties, patenting activities significantly support SMEs (Andries and Faems, 2013). Apart from its main activity, for the technologies of a company, the timely recognition of licensing opportunities is quite difficult. In this context, SMEs present, for innovation activities, limited financial resources, a specialized knowledge base but also a concentrated business portfolio (Ceptureanu EG et al., 2019b). In this context, to demonstrate how SMEs can identify viable licensing opportunities, Bianchi et al. (2010) developed and developed a specific methodology. Also, Jeon et al. (2011), demonstrated a unitary approach to finding external partners through patent information. According to them, companies can find partners by performing three consecutive steps: data collection and preprocessing, transforming patent documents into coincidence vectors and deriving potential technology partners based on similarity indicators. According to Saguy and Sirotinskaya (2014), state organizations and universities, when dealing with the SME sector, are forced to consider adaptable and diverse IP management strategies. While large firms mainly benefit from their search strategies, the turnover of SMEs made from new products is mainly determined by patent protection (Spithoven et al., 2013). Suh and Kim (2012) demonstrate that technology acquisition is positively related to patenting for service SMEs. To fully benefit from their innovation activities, patenting is considered by SMEs as a particularly important strategy (Andries and Faems 2013).

In connection with the reasoning or advantages (reasons) behind the companies to patent, a series of studies have been conducted. Given that for economics patents have several functions, there are a number of reasons to patent. Among these we can list: allowing licenses, improving technological negotiation, rewarding researchers, avoiding disputes, preventing imitation. Recent studies include a number of additional reasons: attracting capital, improving reputation, blocking competitors present in certain technological fields. For companies that patent, another important reason would be related to protecting their freedom to operate. A patented invention makes an important contribution to the prior art. Therefore, the same actors cannot certainly patent the same invention and the one who is the owner of the respective invention cannot be removed from the use of his own invention.

The marketing and acquisition of technologies by companies can be achieved through production and research and internal development but also through internal marketing of services and products. Regarding the commercialization and internal acquisition of the technology, there are several alternatives. The licenses can be sold or bought by the companies or other variants of commercialization on the technological markets of the technologies can be identified, as well as through the patent auction. Within different organizational structures, with different degrees of organizational disintegration, the marketing and / or acquisition of technologies can be achieved through spin-offs, joint ventures or partnerships. In conclusion, in agreement with Enkel et al., (2009); Dahlander and Gann, (2010), all these different external technological strategies can sometimes be categorized as different forms of open innovation or more correctly different forms of open output or input innovation.

Networks

According to Lee et al., (2010), the most effective way to facilitate open innovation among SMEs is through the network. However, according to Heger and Boman (2014) it was found that the network partnership is made and used mainly for activities necessary for data collection and limitedly for fundamental activities such as decision making and strategy. For forecasting opportunities, these authors found that SMEs can benefit substantially from networking approaches. According to Hemert et al., (2013), SMEs considered innovative are more likely to network with institutions but also with other SMEs. The concept of horizontal collaborative networks is supported by social network constructions but also by open knowledge-based innovation (McAdam et al., 2014). According to Padilla-Meléndez et al. (2013), regarding open innovation, it is necessary for SMEs to pay attention to both informal and formal relationships with different actors. Under these conditions, according to Pullen et al. (2012), a relatively consistent, concentrated and closed network has higher innovation performance. According to these authors, in order to have a successful network profile, it must have a high level of trust, complementarity of resources and complementarity of objectives. According to Suh and Kim (2012), regarding service SMEs, the network may not be an efficient activity. According to Török and Tóth (2013) an important role in the success of SMEs is still played by personal networks. A real challenge for SMEs is the management of several networks. In conclusion, it is necessary for SMEs to exchange between large and intensive networks and to be careful about who should build the network (Hughes 2009). SMEs prefer, instead of suppliers, the network with customers in general (Theyel 2013).

The performance of open innovation in SMEs

According to Yun and Mohan (2012), largely in high-tech industries, open innovation is essential for the continued growth of SMEs. In agreement with Colombo et al. (2014), to a large extent SMEs depend, in order to implement their strategies, on the resources of their open innovation partners. Long-term incentives have a greater effect than short-term incentives, but significant positive effects on firms' innovation efficiency have both short-term and long-term incentives (Fu, 2012). It also found that innovative efficiency is present in the open innovation of SMEs achieved through external collaboration. According to Zeng et al., (2010). there is a significant relationship achieved through cooperation with research organizations, cooperation with intermediaries and between companies and the innovation performance of SMEs in Chinese SMEs. However, even in this context, the significant positive impact on the performance of innovation among SMEs is given by the organization between companies. A significant mediating effect on the relationship between business model innovation and organizational inertia but also the relationship between firm performance and organizational inertia has open innovation (Huang et al., 2013). Regarding SMEs in South Korea, development and external research have a significant positive effect on the production of innovation, external knowledge has no impact and external ideas have a negative effect (Kim and Park, 2010). In this way, not all open innovation activities have a positive effect on innovation efficiency.

The characteristics of the tasks and the team can affect the openness, at the project level (Kim et al., 2014). They include the relevance of the task for the main business, the uncertainty and technology of the market, the strategic importance, the learning distance, the size of the team. Technological research shows an incremental innovation performance while technological supply is directly linked to the radical performance of innovation (Parida et al. 2012). Deep and wide-ranging search is curvilinear (taking an inverted U-shape) in terms of performance for UK SMEs (Laursen and Salter, 2006). They claim that SMEs that are much more open to external channels or sources are more likely to achieve higher innovation performance. Creating innovations requires openness in most cases, but marketing innovations requires protection, which is a paradox of openness (Laursen and Salter, 2014). They

identified a concave relationship achieved between formal collaboration for innovation, the strength of firms 'adequacy strategies and the extent of firms' external search. Moreover, they showed that the concave relationship is stronger for the breadth of formal collaboration at the expense of external search. With strict reference to the development and research performance of service SMEs, within the internal development and research, collaboration in development and research but also technology acquisition are positively related to process innovation, patenting activity and service / product innovation Suh and Kim, 2012). Although for SMEs operating in emerging economies, involvement in open innovation can increase business performance, they do not necessarily depend on entrepreneurial behavior for business growth (Chaston and Scott, 2012).

The advantages of open innovation in SMEs

Especially for the initiatives present at the early stage, open innovation is not directly an attractive option because it is very possible that they do not have adequate capacities in terms of capital but also investments in research and development (Lee et al., 2009). Apparently, for SMEs, open innovation has a high potential (Lee et al. 2010). Given these issues, because development and research are most often long-term, always risky and costly, and require the necessary protection of results, Oakey (2013) criticizes Chesbrough for exaggerating the applicability of open innovation systems. He argues that closed innovation is still an effective way to invest in development and research. Even under these conditions, in terms of capitalizing on the external and internal capacities of SMEs, support tools, such as Web 2.0 and the Internet, are becoming increasingly important (Bell and Loane 2010).

In the opinion of many researchers, regarding the use of different open innovation practices in parallel, SMEs are much more efficient compared to large companies (Spithoven et al. 2013). However, most SMEs continue to pursue closed innovation versus open innovation (Lichtenthaler, 2008). It is more innovative products than non-suppliers that offer ideas to external parties (Török and Tóth, 2013). It is the reciprocal relationships that significantly increase the probability and possibility that SMEs will benefit from a substantial benefit from the contribution made to product development projects by other companies, rather than one-way exchange. To find the cost associated with various sources of innovation, Tranekjer and Søndergaard (2013) explored Danish SMEs. They found that collaborating with clients results in lower project costs, collaborating with similar knowledge base providers is related to market performance and science and market sources, and is related to low costs. Even in these conditions, for SMEs that are closely related to suppliers, the degree of novelty of new products is lower. In the opinion of Parida et al., (2012) for high-tech SMEs, technological research is a cost-effective option. As part of their business activities, as a whole, SMEs are increasingly adopting open innovation (Xiaobao et al. 2013; van de Vrande et al. 2009).

Marketing

Mainly, SMEs pursue open innovation for commercial activities, such as keeping pace with competitors and meeting customer demand, according to a study by Van de Vrande et al. (2009). It is especially important for SMEs to interact with innovation sources not only in the final stage of the innovation process for the successful commercialization of a service or product but also in the recognition phase of the innovation process, according to a study by Hemert et al. (2013). In terms of SMEs in South Korea, the degree of government support and the size of the company are factors with a significant impact on the trade activity of SMEs (Kang et al., 2013). In the same context, the investments made in external research and development as well as the innovative capacities generate a particularly strong positive impact on the commercial activities of SMEs. According to Lee et al. (2010), although SMEs do not have the necessary resources for marketing, they still claim that they are good at inventions. As a consequence, SMEs can be helped and supported in order to exceed the marketing limits by collaborating with intermediaries in the commercial stage but also with other partners. According to Van de Vrande et al. (2009), Hemert et al. (2013), Theyel (2013), regarding SMEs, in the commercialization stage, collaboration is much more important than other stages, such as development, research, idea. According to Chaston and Scott (2012), Spithoven et al. (2013), open innovation is less efficient for innovations than for sales, for SMEs. Given these aspects, in order to overcome the challenges faced by SMEs, it is necessary and very important to cooperate with economic agents in the industry.

Conclusions

Several particularly important aspects are reported on the subject of open innovation in SMEs. Unfortunately, in the top journals there are a rather limited number of studies on this subject. Researchers in the European Union have played a particularly important role in the literature. If we talk about Asian countries, such as Taiwan, South Korea or China, a number of articles have appeared in a wide range of magazines about open innovation in SMEs. In many studies, a series of simple statistical analyzes have been used. There is certainty that many highly sophisticated analysis techniques should be used in future studies. Panel data is used in most impact articles. Particularly intuitive results can be obtained with the help of studies based on primary data. In order to obtain in-depth knowledge in the direction of the relevance of open innovation in the field of SMEs, longitudinal studies can be especially useful. Compared to the activities in the early stages, such as development and research, for SMEs open innovation is much

more beneficial and useful in terms of marketing. Given that intellectual property (IP) is able to protect highly selective technologies, it is necessary for SMEs to be particularly careful in this regard, compared to large companies. In a collaboration it is especially important to have a balance between the protection and disclosure of intellectual property. Compared to large companies, SMEs do not have particular inclinations regarding the adoption of search strategies. Compared to incremental innovation, open innovation for new product innovation is more important and relevant for SMEs.

When it comes to adopting open innovation, new entrants are always faster than current ones. Along with many indirect benefits, some measurable effects are brought about by open innovation. The activities that are considered by SMEs are those activities that are closely related to development and research, represented by obtaining the competitive advantage but also by satisfying customer requirements. A long but expensive process is represented by the collaboration of SMEs with external parts (Ceptureanu EG et al, 2018). Consequently, it is always necessary for SMEs to assimilate a new management paradigm. High-tech SMEs are always taken into account when conducting studies on open innovation in SMEs. For future studies, in the field of open innovation in the field of SMEs, it is absolutely necessary to put more emphasis on those SMEs that are not found in high-tech industries.

Regarding studies that refer to very large geographical areas such as South America, Africa but also Asia, they are particularly necessary for the future. There are also very few studies on the effects of policy decisions on open innovation in SMEs. The help provided by state and other agencies to SMEs remains particularly important, compared to large companies. In conclusion, special attention is needed in future explorations regarding the evolutions of policy factors intervening in support of SMEs for the assimilation of open innovation. Regarding the advice of the factors involved in the decision-making process, the link between entrepreneurship and innovation must be developed by researchers. Disputes, trust and culture are some of the most diverse issues facing the innovation process. Given these aspects, these issues remain unexplored in the literature that currently exists. The existing culture within a location is strongly marked by open innovation. The respective cultural issues will have to be analyzed in a more diverse context. Stakeholder confidence directly leads to a number of activities related to open innovation. A number of extremely important legal issues are generated by the sharing of properties such as business models, technologies, ideas. Many networks are not supported by SMEs due to the limited resources present in SMEs. In conclusion, to support open innovation activities within SMEs, their ability to maintain these networks is particularly important. Predominantly for developing countries, the establishment of organizations such as Living Labs and venture capital is particularly necessary to stimulate many open innovation activities within SMEs. In the process of transforming SMEs into an open environment, it may be particularly useful to explore in future studies the role of intermediaries, public organizations and the state. Even if open innovation was mainly used in the commercialization stage, the studies carried out for this stage are still few.

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Scrum Maturity Model for Banking Sector

Ewa MARCHWICKA
Wroclaw University of Science and Technology, Wroclaw, Poland
ewa.marchwicka@pwr.edu.pl

Roksana WITIAK
Wroclaw University of Science and Technology, Wroclaw, Poland
roksana.witiak@pwr.edu.pl

Abstract

This work presents a Scrum maturity practice model for banks. The model allows to assess how mature the current Scrum implementation is. This assessment is done in two dimensions (functional and technical) and on two different levels of organizational structure. The model is based on a yes/no questionnaire.

Keywords: Maturity Model, Project Management, Scrum, Banking Sector.

Introduction

As complexity of projects grows and business requirements are changing fast, the usage of classical project management methods becomes less useful. The implementation of Agile methods is necessary to allow company to be competitive. Being Agile is about being able to cope with change. Scrum is one of the most popular Agile approaches that has been initially designed for software development (Lei et al., 2017). However, choosing Scrum does not guarantee success. It is important that Scrum implementation is done properly. When company has been using old project management methods for years, it is not a matter of days or even weeks to adapt to using the new method. It is a long-lasting process, that needs supervision.

To assess the degree of implementation of a given method or approach, maturity models are used (Brajer-Marczak, 2012). This work proposes a Scrum maturity model for banking sector. This sector has been using classical management for years, but recently more and more banks are transforming its management to be Agile (Kerr et al., 2018). Scrum, as popular Agile approach, is often the first choice.

Maturity models allow to quantitatively express qualitative assessments (Kosierdzka and Smagowicz, 2016). Besides helping to assess the current situation of the organization (descriptive function), the models also allow setting goals connected with achieving the given level of maturity (prescriptive function), because they give a possibility to plan and execute the improvements to existing practices and help to build a roadmap for future organizational changes. Maturity assessment can also be used to compare the methods to the methods used in different organizations (comparative function), e. g. (de Bruin et al., 2005), (Kalinowski, 2011), (Skrzypek, 2012). In relation to Scrum, the higher the level of maturity is, the more productivity is achieved. Mature Scrum organization should have the business processes that are efficient and effective and should use practices that are implemented based on Scrum Guide (Schwaber and Sutherland, 2017), fulfil the four basic principles of Agile Manifesto and the 12 principles of Agile. Attachment to traditional management methods, relying on the decisions of superiors, no taking responsibility for work are key barriers in the adaptation of Scrum approach.

The research methods used in this work are in-depth literature review, analysis of the bank documentation and interviews. The practical aspect of the article is a proposition of Scrum maturity model, that is based on questionnaire. Although interviews designed for the research process were conducted only in one bank, the model is meant to be general and can be applied in any bank that uses similar organizational structure (Figure 1). The structure of this work is as follows: first the existing maturity models for Agile project management approaches are reviewed and compared, then the Interviews are described, and a Scrum maturity model is proposed. Then we outline the validation of the model presented. Finally, conclusions and directions for further research are listed.

Maturity Models in The Literature

As far as literature review is concerned, we constrained our search to Agile maturity models. There already exist some approaches to Agile maturity assessment. The models that were found in the literature are: Agile Maturity Model – AMM (Patel and Ramachandran, 2009) and Scrum Maturity Model – SMM (Skomra and Kuchta, 2017). They both

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are based on questionnaires. The main features of the models found in the existing literature are summarized in Table 1.

Table 1: Project risks typology

Scrum Maturity Model	Agile Maturity Model
MAIN OBJECTIVES	
- to assess Scrum maturity in the examined organization, resulting from the way Scrum is used in individual project implemented in a selected period	- to tailor the software process improvements program for the Agile environments - to identify the level of the Agile practices and levels of improvement
FEATURES	
- has a form of a questionnaire - is divided into sections - maturity is determined from a perspective of particular project and the whole organization	- has a form of a questionnaire for each level - consists of 5 levels with certain goals - for each goal certain Agile practices have been either hinted or explicitly suggested - assessment questionnaires are based on the Agile software development practices, principles and values
ADVANTAGES	
- is easy to use - is adapted to the Scrum framework - allows assessment from two perspectives (project and whole organization)	- proposes a generic maturity model for Agile development - suggests Agile practices for each level - identifies the levels of improvements
DISADVANTAGES	
- has a lot of questions, is time-consuming - is not adapted to the needs of bank sector - is not able to check the maturity of specific team	- focuses only on Agile software development practices - is complicated in use - is not dedicated to Scrum only
POSSIBLE APPLICATIONS	
- can be use in all types of enterprises using Scrum framework	- is tailored to suit Agile software development environments

The main gap identified in the methods found in literature is the lack of approaches that are dedicated to the banking sector. The Scrum (SMM) and Agile (AMM) maturity models are suitable for software development companies, which Scrum originates from, but they are not adjusted to the needs of banks. Banking sector has many specifics, which makes it different from IT sector. Banks develop products and services for their clients, which are people and companies, but they don't communicate with their clients directly, as in case of many software development companies, but via digital channels. Direct collaboration with customer is impossible, because of the very large number of customers that are being served by banks (Yuonan and Mamedov, 2020). The most important characteristics of banking sector (Polish Financial Supervision Authority, 2019) in the context of this research are (1) regulations conducted by financial supervision authorities, (2) specific and strict procedures (make changes hard to be applied in this type of institutions), (3) the need to document all changes due to audits (in particular it is difficult to apply the Agile manifesto principle regarding the minimal documentation).

Research

The Scrum maturity model proposed in this article is suitable for banks that have recently started Agile transformation and adjusted their organizational structure based on the Spotify model. The ING was the first bank which introduced this kind of structure to their organization (Mahadevan, 2017). Agile organizational structure includes Squads, Tribes and Chapters. Squad is a cross-functional unit (of maximum 10 people) that can independently supply a product. Tribe is a collection of Squads with an interconnected purpose. Chapter is to develop and maintain expertise within Tribes, responsible for educating, providing workshops, hiring, evaluating, promoting, providing tools and methods (Kerr et al., 2018). The key roles in this model are Agile Coach, Product Owner, Tribe Lead and Chapter Lead. Chapter Lead takes responsibility for personal development, coaching and performance management. Agile Coach advices individuals and teams in the process of improving the performance (e.g. how to manage Product Backlog, how to provide transparency). Product Owner is responsible for the vision of the product and its functionality, servers as a communication channel between the Squad and its surroundings, works together with Agile Coach to improve productivity, manages Product Backlog and ensures that is visible and understandable to all interested parties. Tribe Lead is responsible for developing the right strategies and tactics to deliver desired business outcomes and to determine what work needs to be done and how to prioritize opportunities.

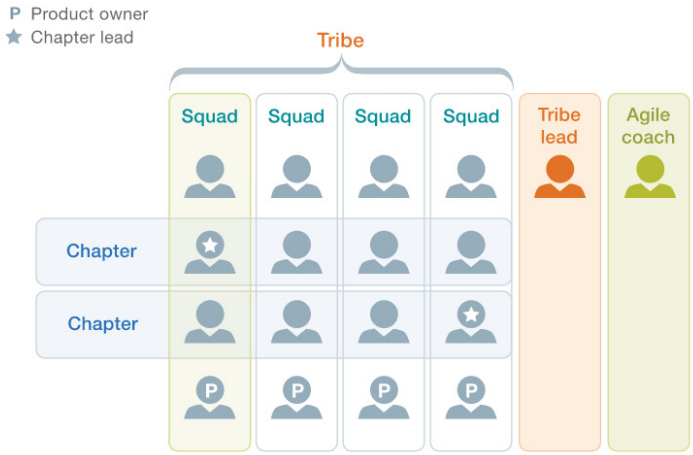

Fig. 1: Agile organization structure of a bank (Mahadevan, 2017).

The research was based on interviews. Interviews were informal, in a form of conversation. What is more, they were uncategorized, which means that the base set of questions may have been reordered, some questions may have been deepened, some omitted, and some new questions may have been added, depending on the course of conversation. The interviews were conducted with Agile Coaches, Product Owners and Tribe Leads. To keep short volume of this publication, we do not list questions that were used in the interviews. We only indicate that the base set of questions was different for different roles, but some common questions were used, like describing the responsibilities in the Agile context and listing the benefits of having a maturity model implemented in the organization. The interviews allowed us to identify the key elements of Scrum that are important from the banking sector point of view. All interviewees admitted that measuring maturity can provide benefits to the organization, because using maturity model will help to improve the work (e.g improving the productivity in introducing new technologies) and help to provide the wider view on the changes that are needed for better Scrum implementation. The researched bank has not applied any Scrum maturity model yet, in particular they haven't applied any maturity model adjusted to the needs of the banking sector.

The Scrum Maturity model described in this work is different from the existing models in the following aspects: (1) it is dedicated to banking sector specifics (in particular none of the models take into account the restrictions imposed on the banking sector by external supervision authorities and the fact that banks needs to be compliant with the regulations) (2) it has no divisions to levels of maturity and the model simply assesses Scrum's maturity in the scale from zero (no maturity) to one (full maturity) (Skomra and Kuchta, 2017), (3) it considers maturity on two different levels and in two dimensions, (4) it is much simpler than most of the maturity models found in the literature (e.g. a questionnaire is based only on yes/no questions), (5) its parameters are adjustable and are systematically updated, according to the voting procedure.

Model Proposal

The proposed Scrum practice maturity model is based on Yes/No questionnaire of 40 questions. Answers like: "partially" or "I don't know" are not possible. This simplifies the questionnaire and reduces to the time to give the answer. Each question assigned to a specific category: *Squad, Events, Artifacts*. The categories are designed in reference to the main Scrum elements. In *squad* category we can find questions regarding the whole squad and roles within it. In *event*, there are questions about Daily meetings, Sprint planning, Sprint realization, Sprint retrospective and Sprint review. In turn in *artifacts* there are questions about product backlog, Sprint backlog, DoD and increment. The vote of each members is equally important. The model considers the importance of the questions and allows to assess the maturity in two dimensions: functional dimension (Squad members and Squads within Tribe) and competence dimension (Tribe chapter members and Organization chapter members) at two levels: Team level (Squad or Tribe Chapter) and Organization level (Tribe and organization Chapter). The maturity of each level is determined as a weighted average. We give the formula used for calculating maturity in case of functional dimension. The formulas for competence dimension are analogous, but at the first level we iterate over Tribe chapter members (instead of Squad members) and at the second level we iterate over organization chapter members (instead of Tribe Squads). The first level functional maturity for Squad members defines the Squad maturity (formula 1).

$$S(t) = \frac{\sum_{j=1}^{N}\sum_{i=1}^{M} I_i(t)A_{ij}(t)}{N\sum_{i=1}^{M} I_i(t)} \cdot 100\% \qquad (1)$$

where importance is denoted as $I_i(t) \in$ R+, the i-th answer of a person j is denoted as $A_{ij}(t) \in \{0,1\}$, number of questions is $M = 40$ and number of Squad members is N. Yes answered question has a value of 1 and No answered question has a value of 0.

The second level functional maturity defines the Tribe maturity (formula 2).

$$T(t) = \frac{\sum_{k=1}^{K} S_k(t)}{K} \quad (2)$$

where $S_k(t), k = 1, \ldots, K$ and K is the total number of Squads within Tribe.

The symbol *t* illustrates that maturity is an iterative process that is calculated for a given time moment. What is more, $I_i(t)$ indicates that the parameters of the model (question's importance) are dynamic and are systematically updated. We describe the update process after presenting questionnaire questions. The questionnaire consists of forty questions and is presented in Table 2.

Table 2: Yes/No questionnaire that is used for assessing Scrum maturity for banking sector

Category	Initial Importance	Question
Squad	1	The goal of my squad is clear to me.
Squad	1	My squad has a dedicated Product Owner.
Squad	1	My Product Owner can make final decisions on the Product Backlog.
Squad	1	My squad has a dedicated Agile Coach.
Squad	1	Agile Coach supported my squad and Product Owner in achieving Sprint's goal.
Squad	1	Agile Coach supported my squad and Product Owner in the application of the Scrum approach.
Squad	1	In my squad I can openly express my opinion.
Squad	2	My squad is interdisciplinary, i.e. it has the competencies and knowledge about the banking policy necessary to perform end to end work with the Sprint Backlog.
Squad	1	My squad is able to execute its deliveries even when one of its members is temporarily absent.
Squad	2	My squad communicates with the client / end user to improve the products.
Squad	1	My squad has fewer than 10 people.
Squad	1	My squad decides who, when and how will do the work during the Sprint.
Squad	1	During the Sprint, my squad creates product value increment.
Squad	2	My squad independently analyses and makes necessary corrections to the Sprint Backlog taking into account the latest bank regulations and procedures.
Events	1	Each Sprint is preceded by the Sprint Planning.
Events	1	The goal of the Sprint is determined on the Sprint Planning meeting and is clear for everybody.
Events	2	The goal is consistent with the bank security policy and legal norms.
Events	1	Product Owner discuss the assumptions and elements selected to the Sprint Backlog.
Events	1	Our Sprint Backlog is available, actual, measured and prioritized.
Events	1	Each of the last two Sprints lasted less than one month.
Events	2	In the case of dependence with other teams, we are able to work effectively in a Sprint with compliance of bank's policy.
Events	1	My squad's speed was measured in the last Sprint.
Events	1	Each Sprint ends with a new increment.
Events	2	The new increment after each Sprint is finished and meets the requirements of banking policy.
Events	1	Sprint Review is held at the end of the Sprint.
Events	2	The result of the Sprint Review is revised Product Backlog including banking regulations.

Events	1	We start every day at work with Daily.
Events	1	Daily ends with a work plan for the next 24 hours.
Events	2	During Planning, my squad creates a Sprint Backlog in accordance with bank regulation containing the planned scope of work.
Events	1	Product Owner took into account the speed of the squad when planning work on Planning.
Events	1	During the Sprint, we improved my team's work process based on the findings from Retrospective.
Events	2	Our improvements are reviewed by a special reviewer for compliance with bank's policy.
Events	1	During Review Product Owner and / or stakeholders inspect the increment made.
Events	1	In Review Product Owner and / or stakeholders discuss further product development with my team.
Artifacts	1	My squad has an actual Product Backlog.
Artifacts	1	Our Product Backlog is prioritized based on business value.
Artifacts	1	Description of Product Backlog elements is prepared in the form of User Story.
Artifacts	1	Product Backlog in my squad contains estimated elements for at least the next 3 Sprints.
Artifacts	1	Each finished user story in the Sprint complies with the Definition of "Done".
Artifacts	2	Definition of "Done" include the request of reviewing the completed task by compliance experts.

There is one element of the model that is not depicted in the table. It is a question purpose. The purpose is given to avoid differences in understanding and interpretation. As part of the method being proposed, we suggest that the importance values assigned to questions are being updated within each Squad and Chapter in the process of voting procedure, each time after the questionnaire is filled in. Squad and/or Chapter members should vote on the model elements that mostly hindered compliance with bank regulations and those that mostly helped being compliant with regulations. The importance of the elements that helped with compliance should be multiplied by two and the importance of the elements that were compliance-problematic should be divided by two. Some of the elements in the initial questionnaire have already their initial importance multiplied by two, as they were designed to help with bank regulations compliance issues. The two main features of the model that distinguish it from standard Scrum maturity models and make it appropriate for bank organization are the updatable importance parameters to track the compliance with regulations as well as the consideration of two different dimensions (functional and competence) of the specific Agile organizational structure, that was primarily applied in the bank of ING and has been then followed by many other banks. Another important feature is that naming maturity levels is not considered in the model. The model offers quantitative assessment of the degree of maturity that ranges from 0% (no maturity) to 100% (full maturity), which makes it simple to be used.

Model validation

The model has been created in a form of questionnaire, so that it is relatively easy to be analyzed and it is easy maintainable. According to the research, introducing maturity model can bring many benefits to the organization. However, the model should be validated. In general, assessing a quality of the proposed model is not an easy task. There is lack of benchmark data that can be used to compare the given model to other models known from the literature. None Scrum maturity models related to banking sector were found in the literature. Comparison with standard Scrum maturity models (like SMM) is also difficult, as it is hard to measure how much the given model helps to improve Scrum productivity. For this reason, we suggest a questionnaire, which does not allow the organization to assess the quality of the model, but it gives the organization a possibility to improve it.

Table 3: Questionnaire used for maturity model improvement

No.	Question
1.	Do you think the choice of questions in the maturity model survey is appropriate? Explain why.
2.	Do you have the needed knowledge to answer all the questions? Which questions are difficult to answer?
3.	What should be the frequency of measuring the level of maturity?
4.	What is the current level of maturity in your squad?
5.	How the results of the assessment are used by squad members?
6.	What benefits give you the introduction of the model?
7.	Do you think the squad has become more mature in terms of Scrum since the introduction of the model? Explain why and present examples.

Conclusions

A Scrum maturity model for the banking sector has been proposed. Using this model, allows bank organization to see how mature the organization in terms of Scrum is and to plan the changes. It also gives the ability to compare the maturity results with other banks. The model is adjusted to the needs of banking sector, is adjustable (its parameters are systematically updated) and allows to measure the maturity in two dimensions and two levels. It also allows the identification of Scrum elements that are problematic and need to be removed or changed from the compliance with bank regulations point of view. The model is simple (it is based on Yes/No questions) and can be applied in any bank that has the structure of Squad, Tribes and Chapters. The idea of model improvement has also been presented in this work. Further research that is being planned should include more enterprises to increase the model universality. Despite this fact, the model is universal enough and easy enough to be applied in any bank organization with appropriate Agile organizational structure.

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Analysis of Indicators of Sustainable Development to Enhance Adaptation to Climate Change and The State of The Environment

Olga LUKINA, International Banking Institute named after Anatoliy Sobchak, Saint Petersburg, Russia, yui500@mail.ru

Anna KUROCHKINA, Russian State Hydrometeorological University, Saint Petersburg, Russia, kurochkinaanna@yandex.ru

Ekaterina PETROVA, Russian State Hydrometeorological University, Saint Petersburg, Russia, o.petrova@list.ru

Irina NIKITINA, International Banking Institute named after Anatoliy Sobchak, Saint Petersburg, Russia, sizn@mail.ru

Andrey PANARIN, International Banking Institute named after Anatoliy Sobchak, Saint Petersburg, Russia, panarinaa@list.ru

Abstract

The article conducted a study of the impact of climate change on the state of the environment. A comprehensive analysis of climate change indicators and environmental financing indicators in Russia was carried out. The object of the article is the dynamics of indicators of sustainable development to increase adaptation to climate change. The purpose of the article is to analyze the change in indicators of sustainable development and determine the contribution of Russia to climate conservation. Official data of Russian and international statistics on economic security indicators of Russia were used, for the processing of which dialectical methods were used (comparison and synthesis). The ways of environmental and economic transformation towards sustainable development of the country are outlined.

Keywords: Sustainable Development, Indicators, Climate Change, Environmental Protection, Pollution, Environmental Measures

Introduction

Environmental issues have long worried scientists. The history of the emergence of concepts related to nature protection begins in the 19th century and ends in the modern period. As you know, there are 17 goals of the concept of sustainable development. All goals are closely related. Environmental objectives play an important role among them. Goal 13 reflects the need to combat climate change.

Climate change affects the economy, the environment, and the social development of the country. Warming processes also have a detrimental effect on the reduction of biodiversity, leading to a decrease in forest areas. Efforts to combat climate change are aimed at developing cost-effective and efficient measures to stabilize the climate. This will reduce the number of emergencies. A big role is assigned to financing activities in this direction: both capital investments and current costs.

The importance of combating climate change is supported by scientists around the world. Our country is also taking measures to contain dangerous processes. The causes of negative environmental events lie in short-sighted economic policies. So, in many countries of the world, until recently, significant subsidies were made for the development of environmental exploitation sectors of the economy. These include agriculture (pesticide subsidies), extractive industries (oil spills, soil and soil destruction), forestry (deforestation, deforestation). The lack of consideration of environmental factors adversely affected the state of the environment and led to its pollution. To combat these phenomena, it is necessary to adhere to the principles ensuring environmental safety [1].

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Such principles should include the dissemination and expansion of knowledge about the laws of the development of environmental systems, taking into account the long-term effects of significant government programs. The delineation of ownership of natural resources between central and local authorities has an important role to play. One of the main tasks is to preserve the health of the population. Currently, the situation is complicated due to the epidemiological situation, which leads to a reduction in the income of enterprises, bankruptcy, and a tightening of the financial situation. As a result of these factors, significant savings in environmental costs are possible, which is highly undesirable.

Materials and methods

Analysis of climate change indicators in Russia

We will analyze indicators reflecting Russia's contribution to climate conservation. Note the positive developments in this area and the shortcomings that will have to be overcome. Russia pays considerable attention to sustainable development, including measures to reduce greenhouse gas emissions. High levels of greenhouse gas emissions lead to warming, an increase in average air temperature.

Consider the changes in the average air temperature in the Federal Districts of Russia in 2019 in table 1 [2].

Table 1: Analysis of the average air temperature change in the Federal Districts of Russia in 2019

	January			July		
	norm	in fact	aberration	norm	in fact	aberration
1	2	3	4	5	6	7
Central	-10,1	-7,8	2,3	18,0	16,7	-1,3
North-West	-14,5	-12,5	2,0	14,9	13,7	-1,2
South	-5,3	-2,3	3,0	23,1	23,0	-0,1
North Caucasian	-3,6	-0,3	3,3	21,6	21,7	0,1
Volga	-13,9	-11,7	2,2	19,0	18,0	-1,0
Ural	-21,7	-18,9	2,8	15,6	17,0	1,4
Siberian	-24,8	-22,8	2,0	15,0	15,6	0,6
Far East	-30,4	-27,6	2,8	14,0	14,8	0,8

It follows from the table that in 2019, the actual air temperature values in January (the coldest month of the year) exceeded the standard values in all 9 districts. Particularly high rates were observed in the North Caucasus Federal District (by 3.3 degrees) and in the Southern Federal District (by 3 degrees). Closer to the normative values are the indicators of the North-West and Siberian Federal Districts, where the temperature exceeded the normative values by 2 degrees.

However, when analyzing the air temperature indicators in July (the hottest month of the year), it is clear that in some districts the average monthly temperature was below normal. So, in the Central Federal District, it fell by -1.3 degrees, in the North-West - by -1.2 degrees, in the Volga region - by -1 degree. So it is premature to conclude that there is a significant warming of the air in Russia.

Consider the dynamics of precipitation in the Federal Districts of Russia in 2019 in table 2 [2].

Table 2: Rainfall dynamics in the Federal Districts of Russia in 2019

	January			July		
	norm, mm	in fact, mm	Aberration (growth rate)	norm, mm	in fact, mm	Aberration (growth rate)
1	2	3	4	5	6	7
Central	49	64	1,31	88	94	1,07
North-West	44	58	1,32	85	109	1,29
South	59	83	1,40	74	122	1,65
North Caucasian	26	26	1,01	87	115	1,32
Volga	46	62	1,34	62	58	0,93
Ural	23	21	0,92	62	59	0,94
Siberian	12	8	0,68	59	44	0,75
Far East	16	14	0,86	68	68	1,00

When analyzing the amount of precipitation, it is clear that in a number of regions of the Russian Federation there is an increase in the growth rate of precipitation, both in winter and in summer. This is characteristic of the Southern, North-Western, Central and North Caucasus Federal Districts. The remaining 4 districts have drier weather, that is, a decrease in precipitation in January and July. In general, it can be concluded that there are slight fluctuations in the dynamics of precipitation in Russia during the study period.
Consider the dynamics of the number of dangerous hydrometeorological phenomena in the territory of the Russian Federation during the period from 2017 to 2019 in Table 3 [2].

Table 3: Dynamics of the number of hazardous hydrometeorological phenomena in the territory of the Russian Federation

	2017		2018		2019	
	in fact	change from the previous year	in fact	change from the previous year	in fact	change from the previous year
1	2	3	4	5	6	7
Number of hazards - total	907	-81	1040	+133	903	-137
including hazards that caused significant damage	378	-2	465	+87	346	-119
of which the number of unintended hazards	22	+5	20	-2	17	-3
Proportion of hazards causing significant damage in the total number of hazards in%	41,7	+3,2	44,7	+3,0	38,3	-6,4
Proportion of unintended hazards in the total number of hazards in%	2,4	+0,7	1,9	-0,5	1,9	0

It follows from the table that the number of hazards has changed unevenly over 3 years. So, in 2018 it increased, and in 2019 it decreased. These changes concern both the number of all hazards and those that have caused significant damage to the economy and the population. However, the number of unintended hazards in the study period decreased, which positively characterizes the activities of the state. The share of dangerous phenomena that caused significant damage in the total number of phenomena is over 40%, although in 2019 there is a decrease in this indicator.

It should be concluded that more attention should be paid to the prevention of hazards that threaten lives and the destruction of the economy.

We will analyze the dynamics of the number of natural emergencies that occurred on the territory of the Russian Federation in table 4 [1].

Table 4: Analysis of the dynamics of the number of emergencies that occurred in the territory of the Russian Federation

	2017		2018		2019	
	in fact	change from the previous year	in fact	change from the previous year	in fact	change from the previous year
1	2	3	4	5	6	7
In total Including:	42	-12	44	+2	49	+5
- landslides, sat down, collapses, showers	2	0	0	-2	2	+2
- storms, hurricanes, tornadoes, squalls, heavy blizzards	3	-3	1	-2	2	+1
- avalanches	1	+1	0	-1	1	+1

- heavy rains, heavy snowfalls, large hail	14	-7	11	-3	9	-2
- frosts, drought	4	-3	14	+10	12	-2
- separation of coastal ices	0	-1	1	+1	0	-1
- dangerous hydrological phenomena	13	-2	12	-1	17	+5
- major natural fire	5	+3	5	0	6	+1

The analysis of the table shows that the number of emergencies has increased over 3 years. Among these situations, dangerous hydrological phenomena, frosts, drought and heavy rains, snowfall, large hail are distinguished. Their share in 2019 amounted to the total number of emergencies: 35% (dangerous hydrological phenomena), 25% (frosts and drought), 18% (heavy rains, snowfall, large hail).

The analysis of the table suggests an increase in tension in this area and the need to increase the cost of protecting against emergencies and pay more attention to civil defense.

Analysis of indicators of financing of environmental measures in Russia

As noted above, environmental finance has an important role to play in combating climate change.
We will analyze the dynamics of environmental expenditure in Russia in table 5 [1].

Table 5: Analysis of the dynamics of environmental protection expenditures in the Russian Federation in billion rubles

	2017		**2018**		**2019**	
	in fact	growth rate compared to the previous year of%%	in fact	growth rate compared to the previous year of%%	in fact	growth rate compared to the previous year of%%
1	2	3	4	5	6	7
In total Including:	658	111	720	109	871	121
- Protection of the air and prevention of climate change	123	121	131	107	139	106
- protection of water resources	239	101	247	103	257	104
- address with waste	79	118	92	116	112	122
- protection of lands	34	77	31	91	36	116
- preserving of a biodiversity	43	119	46	107	49	106
other	140	132	173	124	278	161

The table shows that the costs of environmental protection are increasing in all areas. Moreover, the highest growth rates are observed in the areas of waste management and in other measures. The share of costs for the protection of the atmospheric air and the prevention of climate change in 2019 of the total amount of costs amounted to 16%, while the share of costs for the protection of water resources was significantly higher - 30% and the share of other costs reached 32%.

Changes in the pattern of environmental costs may need to be made to increase the share and amount of mitigation costs, as climate change also affects the reduction of all environmental indicators.

Table 5 presents the total environmental costs, including capital investments and current (operating) costs.
We will analyze the current (operating) costs of environmental protection in Russia in billion rubles in Table 6 [1].

Table 6: Analysis of the dynamics of current costs for environmental protection in the Russian Federation in billion rubles

	2017		2018		2019	
	in fact	change from previous year in%%	in fact	change from previous year in%%	in fact	change from previous year in%%
1	2	3	4	5	6	7
In total Including:	321,0	105	345,0	107	374,0	108
- Protection of the air and prevention of climate change	57,0	100	61,0	107	64,0	105
- protection of water resources	163,0	106	174,0	107	175,0	101
- address with waste	70,0	109	80,0	114	102,0	128
- protection of lands	15,0	75	15,0	100	16,0	107
- protection against noise and other physical effects	0,3	75	0,4	133	0,4	100
- preserving of a biodiversity	0,4	100	0,5	125	0,6	120
- ensuring radiation safety	6,0	100	8,0	133	8,0	100
- research activity	0,5	83	0,2	40	0,2	100
- other	8,8	176	5,9	67	7,8	132

Table 6 provides a more detailed analysis of environmental costs than table 5. Table 6 identifies additional areas: protection against noise and other physical effects, radiation safety, research activities [3, 4].

The analysis of the table shows that recurrent expenditures have increased over 3 years. The highest growth rates are observed in waste management, other activities and biodiversity conservation.

The share of costs for the protection of the atmospheric air and the prevention of climate change in 2019 is 17% of the total cost, while the share of costs for the protection of water resources is 47%, the share of costs for waste management is 27%.

Similar calculations and conclusions were made in the analysis of Table 5.

Conclusion

The analysis showed that significant changes in climatic phenomena in the Russian Federation (changes in average air temperature, precipitation dynamics) have not yet been noted.

Our country has made progress in reducing the number of unintended hydrometeorological hazards. There are favourable trends in this area. However, the number of dangerous hydrometeorological phenomena, although decreasing in the study period, requires attention from the authorities. The dynamics of the number of emergencies in the Russian Federation is alarming and indicates tension in this area. A possible way to reduce tensions is through changes in fiscal policy towards increased spending on protection against these phenomena. Measures should also be taken to strengthen civil defence [5, 6].

In the analysis of environmental costs and current cost trends, positive changes towards these costs should be concluded. It should be noted that the role of environmental protection measures is great. However, the current focus is on the construction of treatment facilities, the use of filters, waste disposal, etc. But the listed measures are aimed at eliminating the consequences of anthropogenic impact on the environment. It is important to prevent and eliminate the causes of natural destruction. Investment is needed in alternative solutions to environmental problems. The solution of these problems is possible only with the help of the state, since this is associated with the structural restructuring of the economy, with the development and introduction of low-waste and resource-saving technologies, with the greening of the country's economic development.

The protection and restoration of ecosystems and sustainable forest management receive considerable attention from our State. Russia is the largest state in the world. In Russia, an array of natural ecosystems (8 million square kilometers) is preserved. It serves as a reserve for the stability of the Earth's biosphere. The concept of sustainable development emphasizes the need to assess the economic capacity of the country's local and regional ecosystems, as well as the obligation to monitor a number of indicators. Such indicators include, inter alia, the quality of natural and modified areas, the availability of forests, taking into account their productivity, degree of preservation and a number of others. However, attention should be paid to the development of measures to preserve and expand specially protected areas, state reserves, as well as to prevent the death of forest plantations in the country.

Overall, it can be concluded that environmental-economic change requires deeper efforts to achieve sustainable development goals. Financing, combining the potential of science, technology and innovation with an emphasis on digital transformation will give global sustainable development processes the right vector. It is necessary to switch to clean energy sources, to combat deforestation, to change production and consumption patterns.

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Management of the Internal Problems of NATO Countries: Threat to European Security

Professor Jerzy BĘDŹMIROWSKI

Naval Academy Heroes of Westerplatte
Department of Command and Naval Operations
Department of Safety Sciences
jbedzmirowski@amw.gdynia.pl

Miłosz GAC, PhD
Faculty of Finance and Management, WSB University in Gdańsk
Gdańsk, Poland, mgac@wsb.gda.pl

Abstract

This article points to the internal problem of nation states and the Warsaw Pact at the turn of the 1950s and 1920s. It also indicates the threats to European security. Events threatening destabilization in the Warsaw Pact countries took place in Poland (1967-1968) and Czechoslovakia in 1968. The events in Poland had a background in the Middle East events.

Keywords: Management**,** Internal Problems, NATO, Warsaw Pact, European Security.

Introduction

At the beginning of this article, a period of analysis was adopted, dated after the death of Joseph Vissarionovich Stalin, changes in foreign policy are taking place in the Soviet Union, in order to indicate the essence of managing internal problems of NATO countries and to identify threats to European security.

Following the death of Joseph Vissarionovich Stalin, changes in foreign policy are taking place in the Soviet Union. The media of the time have knocked it off as a time to relax, in relations between East and West. The new leader of the USSR, Nikita Khrushchev, was seen as the one who will guarantee international security. As it turned out over time, the changes made to the state leadership were only the proverbial 'smokescreen' to hide the true face of the new authorities. The United States, too, under the leadership of President Dwight D. Eisenhower (1953-1961), received positive signals from a powerful Eurasian power. It was then that the proposal was made to reduce the number of American soldiers stationed on European territory (Buchanan 2010, s. 130).

Management of relations between Western Europe and the USA. Has Western Europe found itself at the grace of the proverbial and not the grace of the United States?

Both the United Kingdom and France have been working towards the possession of nuclear weapons, as confirmed in 1952, when the first nuclear test was carried out by the United Kingdom and by France in 1960. This showed that these European countries (particularly France) wanted to pursue their own foreign and security policy on the European continent, without the restrictions imposed by the US. Unfortunately, economic considerations were the problem. In addition, France's military involvement in the war in Indochina and the so-called Algerian crisis (which led to the collapse of the Fourth Republic and the return of Charles de Gaulle to power), was not viewed positively by the French (Wegs and Ladresch 2008).

Management of Anglo-French policy

The failure of the common British-French policy was the Suez crisis. It was then, under pressure from the Soviet Union and the UN, that, in November 1956, US President Eisen-hower forced the British and French (partly Israel)

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to give up his attempt to take control of the Suez Canal away from Egyptian President Gamal Abdel Nasser (Guilmartin 2009, p. 439). Undoubtedly, it was the proverbial 'nose to nose' given to these two countries. It did not take too long for a quick response from France. In the spring of 1959, the French President decided to withdraw the fleet from the Mediterranean and refused to allow the US Government to deploy nuclear cargo on French territory. This was an unprecedented event, since the refusal of the 'main dealer' in NATO demonstrated the great political determination of its President. Was this a single French incident? No. Once again, it took advantage of the negative position of Konrad Adenauer, Chancellor of West Germany, against the US, because it was denied the opportunity to dispose of nuclear weapons on German territory. President de Gaulle was probably counting on Bonn to direct his loyalty towards Paris, thereby making it clear to both the US and the UK that all NATO members have the same rights as regards the possession of nuclear weapons (he did not take into account the fundamental difference that the UK and France were the manufacturers of these weapons and Germany was only a 'storehouse' for the US). To this end, he used the press conference held in January 1963, at which he expressed his support for Germany's possession of nuclear weapons. This was, undoubtedly, an unprecedented behaviour of France, especially considering its previous position towards Germany, including when voting on the issue of its accession to NATO, or the historical relations between these countries.

Germany - US relations

In spite of this heated support, the German side did not assume for a moment that relations with the US would be broken off in favour of cooperation with France. This situation was rightly assessed by Henry Kissinger, de Gaulle correctly analysed the international situation at the time, but overestimated France's ability to use it in its own interests. Germany was not prepared to turn its back on the USA, although some German politicians were interested in de Gaulle's vision (Kissinger 1966, p. 807).

A year later, once again, the French President 'stood up' against NATO's foreign policy by refusing to sign a no-trial agreement on nuclear weapons (this would mean shutting down his own production facilities), and in 1966 he decided to withdraw the French armed forces from NATO. This decision also resulted in NATO headquarters being moved from Paris to Brussels. We must agree with the words of Walter Laqueura, who said that the Americans treated France as one of the European countries, just like Germany and Italy, while in the eyes of de Gaulle, his country should be counted among the world powers . Could an event by France have made the Americans afraid that this would escalate to other NATO countries?

Political scenario by the United Kingdom

A certain signal that such a political scenario cannot be ruled out was the information coming from the United Kingdom. It was the second political loser after France, after the Suez conflict. It is worth stressing that most British politicians considered the events associated with this conflict to be a tactical political mistake, which led to Britain being placed on the opposite side of the US. This was confirmed by the events of the first 1960s, when France tried to persuade the United Kingdom to join the EEC, and thus to integrate it in the military sphere and with EEC countries.

After the meeting with Harold Macmillian, Prime Minister of the United Kingdom, in the autumn of 1962, President de Gaulle was almost convinced that this would be a reality. At that time, the US decided to stop the production of the Skybolt nuclear missiles ordered by the British party. In seeking a solution to this problem, the British Prime Minister decided to meet with US President John F. Kennedy. During the meeting it was agreed that the Skybolt missiles would be replaced by Polaris missiles for submarines.

This was undoubtedly a proverbial slap in the face for de Gaulle, who has been very much counting on the British Government to cooperate with France in the field of nuclear capacity-building. At a press conference in January 1963, the French President spoke out against the admission of Britain to the EEC (Calvocoressi 2002, p. 261-266).

France offers close cooperation to the most important countries in Europe, namely Great Britain, Germany and Italy

In 1969, France again took the initiative to the United Kingdom, which ended up with the de Gaulle compromise. It turned out that during secret talks, the French President offered close cooperation to the most important countries in Europe, i.e. Great Britain, Germany and Italy (creating something like the Directoire, or the Holy Alliance of 1815, or the 1933 Pact of Four promoted by Benita Mussolini), which was decisive for political, military and economic issues in Europe. This information was received by the other EEC countries as an attempt to dismantle this institution and limit NATO's role in Europe, which had a significant impact on de Gaulle's resignation from the presidency.

The United Kingdom, too, has been struggling with problems in its colonial estates. Almost in parallel, its colonial policy to date has found itself on the proverbial slope. All of this has led to some political turmoil within the country's government. Many politicians thought that the United Kingdom was losing its position in the international arena, particularly in Europe, when it was alongside the US. There was still a famous saying by many British dyplomats that Britain only has eternal interests. And these interests were shrinking year by year, losing their influence in the overseas colonies. This was a consequence of commitments by the British Government, back in the Second World War, when it sought the support of the US.

The consequences of the British Government's commitments, back in the Second World War, when it sought the support of the USA

Could this state of affairs have affected European security? Rather not, because, firstly, each of the member states had the opportunity to join or withdraw from the pact, without any consequences, and secondly, the Americans had the greatest military potential in NATO. This potential was built up over the years. Although figures and proportions talked about the military superiority of the US over the USSR, the events of 1957, some American politicians cooled their heads, among which was the head of a mine. John Foster Dulles, US Secretary of State. It was he who, in 1954, at the NATO Council meeting, said: the United States believes that, in view of the current threat to the possibility of using nuclear weapons, it is essential to defend the territory of the NA-TO countries. In short, it must be assumed that these weapons have in fact become conventional weapons (Gaddis 2007, p. 82).

These events were the first attempt at an intercontinental ballistic missile and, a few months later, the launch of 'Sputnik', which showed the US citizens of the AP that their level of security had been significantly changed. As it turned out, these concerns also arose among the British people, which was confirmed by the so-called private statement of the British Prime Minister Harold Macmillan: They [the Soviets] are no longer afraid of attack. They have at least as powerful a nuclear force as the West. They have internal [communication] lines. They have a thriving economy and will soon outstrip capitalist society in the race to material wealth (Wegs and Ladrech, op.cit., p. 112).

A time of political-military-economic consolidation of Western Europe under the US flag

The 1950s are described by many analysts of the international arena as a time of political-military-economic consolidation of Western Europe under the US flag. A particular role was played by economic consolidation (although some Western European countries did not join the emerging EEC), which in a relatively short period of time led to an economic boom, which was tantamount to an improvement in the mood of the people of this part of Europe. In the first half of this decade, there has been a very sharp rise in anti-communist sentiment in the West. The American people have added their voice, and they have demanded, as never before, effective action by the US Government to liberate Eastern European countries from communism. The events in Hungary in 1956 convinced them that the chances of achieving these demands are zero.

Unfortunately, the situation in the eastern part of the European continent was quite different. Although consolidation efforts in the area of the economy were carried out with the creation of the Council for Mutual Economic Assistance [GCC], the effects were not in line with the expectations of the societies of these countries. T. Buchanan rightly points out that the countries of Eastern Europe remained surprisingly unintegrated and the political lines of influence and diplomatic (as well as trade) continued to spread from the centre in Moscow. Eastern European leaders united sincerely only in the face of an ideological threat such as the Prague Spring or the West German "Ostpolitik". Stalin Konse- quently preferred bilateral - and exploitative - relations with the countries of Eastern Europe, so both institutions (Comecon and the University of Warsaw - note: J.B.) remained in a dormant state until the early 1960s, when Khrushchev called for closer military and economic ties (Buchanan, s. 183).

International confusion - Germany's integration into NATO

The incorporation of Germany into NATO has caused a great deal of confusion in the international arena, especially among the countries influenced by the USSR. Nikita Khrushchev has made perfect use of it, obliging all these countries to sign a joint document on friendship and mutual cooperation. These countries have already signed bilateral agreements with the Soviet Union. We must agree with David R. Marples' thesis that the Warsaw Pact could be regarded as the Soviet Union's belated response to the creation of NATO, or to the emergence of militarised West Germany, but it can also be seen, and this is probably closer to reality, as a guarantor of both Soviet hegemony in Eastern Europe and the maintenance of the Eastern European alliance. The agreement prevented Eastern European countries from freeing themselves from Soviet control to a greater extent than it opposed NATO's aggression (Marples, 2006, p. 235).

The block of Eastern European countries also faced many problems which, compared to the misunderstandings among NATO countries, were unfortunately bloody in some of them. The exception was Yugoslavia, which, in June 1948, took the path of so-called non-aligned countries. It was Josip Broz Tito and his partisans, not the Red Army, who liberated Yugoslavia. Unfortunately, Czechoslovakia, which at the beginning of 1948 was described as the only democratically governed state in Eastern Europe, was not so lucky.

The use of non-conventional measures to solve the problems of the countries under the Kremlin - the Berlin crisis

The Berlin crisis was an important political and military event which confirmed the use of non-conventional measures to solve the problems of the countries subordinated to the Kremlin. The significance of the crisis for the USSR is demonstrated by the following statement from 1958, the then leader of the USSR, Nikita Khrushchev, who said: Berlin is 'the eggs of the West', it is enough for him to 'squeeze' them for the opponent to raise his scream (Large,..., p. 39). According to American intelligence, there were 84 divisions of the Soviet Army in Germany and the Soviet Union, against which the countries of Western Europe (the domination of American forces) could only oppose 16 divisions. This situation was humorously, although it did not allow it, presented by the American Under-Secretary of State Robert Lovett: To get to the Rhine, the Russians only need shoes (Ibidem, s. 42).

The end of the Berlin crisis has shown, both on one side (the USA, France, Great Britain) and on the other (the USSR), that the problems of the inhabitants of any country cannot be solved in this way. The greatest surprise, for the USSR and the rest of Eastern Europe, was the proposal of the SED secretary, Walter Ulbricht, who had been planning since 1952 to build a wall separating West Berlin from the East and the rest of the GDR. This proposal did not find acceptance among the leaders of the USSR, nor among the other countries of so-called popular democracy. This was confirmed by a statement by the USSR Foreign Minister, Viacheslav Molotov: "This is caused by the bitterness and aversion of the Berliners to the GDR government and Soviet forces in Germany. Ulbricht would not have taken up this subject if it had not been for the fact that in the GDR, signs of disapproval of the government and the existing system were increasingly frequent. It was at that time that the people of Berlin were increasingly often passing on a speech to each other, one of their residents: It was enough to take the underground or the train [...] and go to another world. [...] In two minutes you could move from socialism [...] to capitalism (Carroll 2008, p.412-416).

Not only the GDR, it was a problem for the Soviet authorities. The threats that were the result of distillation began to 'get out of control' in Poland and Hungary. It can be assumed that what happened in the USSR had some impact on events of this kind. Both the so-called 'unbalancing' of power in the Kremlin, as a result of the struggle for Stalin's succession, and the controlled leaks from the secret paper 'On the cult of the individual and its consequences', delivered on 25 February 1956 at the 20th Congress of the Communist Party of the Soviet Union.

Poland - tackling the crisis

While in Poland the crisis was successfully contained (there were victims, although there was a great possibility that it could be drowned in a sea of blood) by means of political actions, in Hungary, there was a rise in society and the intervention of the Soviet Army (the actions of the army in Budapest were coordinated by Yuri Andropov, head of the KGB and later leader of the USSR). In Poland, changes were made at the highest levels of party and governmental authorities, and Marshal Konstantin Rokossovsky, the former Minister of the Republic of Poland, left Poland, along with many Soviet officers holding high positions in the Polish Army (Nalepa 2013). Poland has gained some control over the Soviet troops according to the signed agreements.

The events in Hungary were tragic, with more than 700 Soviet soldiers and more than 2 500 Hungarians killed in the fighting. All this undoubtedly intensified American rhetoric about 'liberating' the oppressed peoples of Eastern Europe. It is worth noting another important element, namely the lack of reaction from France and Great Britain to Soviet intervention. This was due to the fact that both countries were busy with activities in the Suez Canal area.

Another 'turmoil' in the international arena occurred in the autumn of 1958, when the so-called West Berlin problem arose. Although this crisis caused a significant increase in international tension, it did not have serious consequences. According to many political scientists, including Professor Zbigniew Brzeziński, it was not Berlin that was at stake, but the displacement of the United States from the European continent, which would allow the USSR to take control of Western Europe in a short time. The end of this event was the construction of the wall dividing Berlin (Feifer 2009, p. 217-235). And the shooting down of the US reconnaissance aircraft U-2 has led to a drastic 'cooling' of US-Soviet relations.

The events to date in the countries of Eastern and also Western Europe related to the Suez crisis, the arms race and the development of military (atomic) capabilities resulting from the new NATO strategy MC14/2 (Gaddis 2007), led the Soviet side to decide in 1958 to equip the Polish, Czechoslovak and East German armies, and later the Bulgarian, Hungarian and Romanian armies, i.e. the Warsaw Pact countries, with aircraft and rockets capable of carrying nuclear weapons. Of course, nuclear weapons were the responsibility of Moskva and these states did not have the right to decide on their use (a situation appropriate to the relationship between the USA and Germany in this matter).

The turn of the 1950s and 1960s was a time of many political and military events on the European continent and in its immediate vicinity. Both NATO and the Warsaw Pact led to an "increase in pressure" of the international community. The most serious of these were the events in Cuba, described by many analysts of the international arena as a test for the leaders of both nuclear powers - the USA and the USSR. It was then that the world came to the brink of nuclear war. It undoubtedly made many 'hot' politicians realise that the world is very close to self-destruction. There were signs that solutions were being sought to eliminate potential armed conflict, particularly with the use of nuclear weapons. At the same time, work continued on the installation of tactical nuclear-headed missiles in NATO and UW countries on the European continent. All of this was increasingly often viewed negatively by the inhabitants of Western European countries, and especially by young people, who are aware of the potential threat of nuclear conflict. In many countries, there has been a 'verification' of the governing parties, which has resulted in social democratic parties coming to power.

Let us come back to the problems that the Warsaw Pact countries had to face in the 1960s. The events that took place in Czechoslovakia, the GDR, Poland and Hungary at the turn of the 1940s and 1950s were not the last to worry about Moscow, but also Western Europe. Were they a threat to European security? Some probably did. Taking into account the Kremlin's operating principles, they could have led to the outbreak of social conflicts in these countries, and they would have escalated into conflicts in the Warsaw Pact, and this would already pose a huge threat to European security.

"A 'fire starter' was set in Moscow. It was there, at the beginning of October 1964, that the coup d'état began to be finalised. The initiator of these actions was Leonid Brezhnev. Can you believe the words of the head of the KGB, Gen. Semichastny, who said that Brezhnev proposed to eliminate Khrushchev several times. A car accident or a plane crash could have been arranged. [...] I rejected all these proposals (McCauley 2010, p. 386). Taking into account the political mechanisms of action which were part of the history of this country, it can be said that they did not deviate from the standards in force in many countries.

Power in the Kremlin is taken over by Leonid Brezhnev, who exercised power until his death, letting himself be known as a ruthless companion in Moscow, who knew who and what would play a part in socialism in the world. In 1966, Brezhnev becomes primusinterpares, and the apparitions in Czechoslovakia make him number one in the USSR.

A very unfavourable event for the former sphere of influence of the Soviet Union in the Mediterranean basin was the 1961 event concerning the loss of the Soviet naval base located on Albanian territory, on the Adriatic coast. As a result, diplomatic relations with Tirana broke off in late autumn 1961. In the following years, Albania withdrew from the Warsaw Pact. From this point of view, according to Tirana, the enemies of the world were the USA and the Soviet Union (like the Maoism). Within a few years, Albania underwent a cultural revolution, and in 1966, it established close cooperation with Beijing.

Another worrying signal came from Bulgaria. In June 1964 it was reported that there is an opposition group within the ranks of the Bulgarian Communist Party. In a relevant document prepared by Department I of the Ministry of Foreign Affairs for the head of the Foreign Department of the Central Committee of the Polish United Workers' Party (KC PZPR), Mr Józef Czesak, reads as follows In his speech, Teodor Żiwkow at the G.S.S. Rakowski Military Academy in Sofia and in the Sofia garrison, he spoke openly for the first time about the existence of the opposition group. "Currently, in the west, the enemies of socialism are waging a vicious campaign against our country and, above all, against the People's Army. Bourgeois propaganda is trying to oppose the Party Army and that a conspiracy is being organised. A group of lamentable troublemakers, career elements and people without any rules, no powers, who are in the hands of the investigating authorities, have indeed been detected and disposed of. Among them are also some of the military'. Among them was Colonel Sławomir Trymski, about whom the Western press has written extensively that he is being mixed up in this group1.

[1] Archive of New Files [hereinafter AAN] ref. 237 / XXII-1460, Central Committee of the Polish United Workers' Party Foreign Department Documentation and information sector Bulgaria 1964-1967, Note on the opposition group in the ranks of the Bulgarian Communist Party, prepared by the First Department of the Ministry of Foreign Affairs (deputy director J. Dryglas) of June 30, 1965. to the Head of the Foreign Department of the Central Committee of PZPR, comrade J. Czesak, pp. 44-46.

A group of oppositionists, including the commander of the Sofia garrison, General CvetkoAnew, attempted a coup d'état in March 1965. They probably identified themselves with an ideology described as Titoism, and the aim was to enter the path that Yugoslavia had already set out. The group was 'worked out' by the Bulgarian security service, some of its members committed suicide and some were brought to justice and received high prison sentences.

There is another problem with the GDR. It concerned the events that took place during the convention of the West German CDU party in Düsseldorf. It was at that time that the East German side of the GDR recognised that, alongside its economic and political frontal attack on the GDR, the West German government was increasingly bringing to the fore the concept of a flanking attack. The aim of this is to isolate the GDR from the socialist states and to cut it off from other socialist states.2. For the Soviet Union, this was an unmistakable signal that these statements are not isolated, and that they represent a larger area of NATO's future foreign policy, and that Germany is its relay. Later in this document, this theory is confirmed in a way: Comrade Rapacki informed us of the plan for two zones put forward by the Belgian Foreign Minister, Spaak. It seems to us that Spaak would like, by means of this project, to discuss with individual Member States of the University of Warsaw, leaving aside the GDR - matters relating to our sovereignty, territorial integrity and military security - and to distract attention from Western Germany's complicity in NATO armaments. From the known details of Spaak so far, it appears that he wants to come to terms with the participation of West Germany in the multilateral nuclear forces of the NATO countries. The Spaak Plan aims to demilitarise most of the territory of the GDR, while West German NATO units would still have most of the territory of the GDR as a site for stationing and developing troops against the GDR and as a base for further intensified military action, including nuclear weapons. It follows from all of this that the Spaak Plan would be conducive to the Bonn plans to absorb the GDR by means of a diversion war or an open military operation and to creating the facts of the past. As Rapacki informed us, Spaak also developed the idea that a group of NATO countries could hold talks on these matters with a group of UW countries, excluding the USSR. This shows that the unity of the UW is being undermined. According to all the proposals, under the Washington and Bonn concept, the GDR is not to be an entity, but only the subject of negotiations between NATO countries and the UW3.

When analysing this document, the Soviet side probably considered it to be the proverbial 'joyful work' of the Belgian Foreign Minister. How could it be assumed that such procedures, although minimal in number, are feasible. On the NATO side, the USA was the main 'dealer', and on the UW side, the USSR, and it was they who decided on all actions for the foreign and security policy of these two political and military blocs. It can be assumed that this was another so-called 'balloon' checking the effectiveness of action and consolidation of the UW countries. At this point, it would be worth asking the question: was it just a Belgian initiative or a joint NATO? We are unlikely to receive an answer to this question. Erhard and Schreder took the floor at the CDU meeting on political and economic relations between socialist countries and the EEC. They both stressed that the NRF's trade relations with the socialist countries are primarily intended to serve to push through its retaliatory objectives. Erhard made it clear that trade expansion depends on political compensation. Schroder pointed out openly that it was necessary to ensure "that the EEC takes account of the vital political interests of German reunification when shaping its foreign trade policy"4.

All these statements have become the subject of meetings between the leaders of the socialist countries, at which these and other statements, the main West German politicians, were analysed. Some of the statements were 'modified' and, in the following years, were indicative of a change in their tone and claims. They were evaluated during the meeting of the UW countries to discuss the foreign policy of the NRF towards the countries of Eastern Europe5.
These issues, i.e. the relations between the University of Warsaw and Germany, were highlighted during the meeting of the First Secretary of the Central Committee of the Polish United Workers' Party (KC PZPR) with the participants of the meeting of the Ministers of Foreign Affairs of the University's members, in Warsaw on 9 February 1967. During his speech, Wł. Gomułka said, among other things, that the issues of security in Europe can be resolved if the GDR government meets several conditions. The main, fundamental issue, which would show that the GDR government is entering a new political line, would be the GDR government's renunciation of the thesis about the exclusive representation of the whole Germany. This is a precondition without which the road to security in Europe

[2] AAN, ref. XIA / 247, Central Committee of the Polish United Workers' Party, Foreign Department, Materials Wł. Gomułka, letter from W. Ulbricht, First Secretary of the Central Committee of the NSPJ to Wł. Gomułki of April 22, 1965, p. 1. Some issues covering the above-mentioned issues were presented by W. Jarząbek, Ulbricht's Doctrine or Gomułka's Doctrine? Poland and the coordination of the policy of the Eastern bloc towards Ostpolitik in the years 1966-1967, "Dzieje Latest" 2005, no.

[3] AAN, ref. XIA / 247, Central Committee of the Polish United Workers' Party, Foreign Department, Materials Wł. Gomułki, Letter from W. Ulbricht, First Secretary of the Central Committee of the NSPJ ..., pp. 4-5.
[4]Ibidem, s. 6.
[5] AAN, ref. XIA / 539, Materials about the Warsaw Pact, Note of 24 January 1967 on the convening of a conference of the UW states to discuss the policy towards the German Federal Republic, pp. 4-5.

cannot be opened. Poland and other socialist countries are demanding recognition of the GDR. For its part, Poland, for its part, has recently particularly strongly emphasised the need for the GDR to meet three main conditions: recognition of borders, recognition of the GDR and renunciation of nuclear weapons[6].

Gomułka, when he talked about the change in the German Democratic Republic's foreign policy towards the countries of Eastern Europe, he meant the changes that had taken place in Bonn. However, when he talked about the recognition of the GDR, he was probably referring to the GDR's renunciation of its claims to represent the so-called whole of Germany on the international stage. Unfortunately, these problems remained unresolved until the turn of the 1980s and 1990s.

In the early 1960s, problems arose with Romania. Well, Romania, without consulting its diplomatic activities, established diplomatic relations from the NRF (31 January 1967, case -34th anniversary of Hitler's rise to power). It can be assumed that it did, and relatively quickly, what the Soviet Union allowed it to do. The Romanian side, it said, did not exceed the provisions of the Bucharest conference, that they were satisfied when, in 1955, the USSR established relations with Bonn, and the establishment of diplomatic relations with the GDR by Romania corresponded to the policy of relaxation and helped to create conditions conducive to further settlement of the German problem. Romania believed that the CSRR, Hungary, Bulgaria and, after a period of delay, Poland would sooner or later follow suit. This has brought Romania forward to a number of socialist countries.

However, the event associated with the visit of the Soviet delegation to Beijing was received negatively in Moscow. A neutral stance towards China, promoted by Romania, was known (the other countries held the Kremlin line), but Romanian diplomats were not expected to be as ostentatious as they were during the departure of the Radical De-plats and their families from Beijing. No one from the Romanian embassy in Beijing came to say goodbye. This was noticed by the press, which posted the text on the front pages of the most popular daily newspapers: Romania has a fundamental problem," writes the correspondent, "its key slogan in political orientation, which is 'independence'[7]. These were not isolated cases, demonstrating Romania's attempt to pursue its own independent policy, which was very badly perceived by the Soviet Union.

Another event confirming Romania's so-called 'own foreign policy' was the expression of disapproval of the idea of supporting the economies of well developing countries by the weaker ones, as part of the cooperation of socialist countries. Romania's negative stance on the Warsaw Pact states' provision to condemn Israel for its conflict with the Arab states (1967) has had a broad international impact. Romania's negative position on the Warsaw Pact's wide-ranging cooperation was highlighted by Vladislav Gomulka during the talks with the First Secretary in Budapest on 16 May 1968: Romania is not involved in military matters and not only are they not involved in military matters themselves, but they do not allow us to improve forms of cooperation in this episode. We must decide against the Romanians and without them, we will otherwise be at an impasse. The military issue of part of the Agreement has to do with the situation which may arise within socialist countries, specifically Czechoslovakia. The Czechoslovak army is spread out and incapable of any military action[8].

Once again, Romania has confirmed its political independence, in the summer of 1968, when the UW forces began operating in Czechoslovakia. It refused to participate
in these activities, and also in some way tried to support the Czechoslovak Government. The Romanian Parliament adopted a resolution, the content of which coincided with the previous statement made by the Albanian Prime Minister quoted earlier. The Romanian side, probably after the statements made by its representatives and the resolution of the parliament, was afraid of the Kremlin's military response and made preparations to defend the country. Fortunately, nothing like this has happened.

[6] AAN, ref. XIA / 14, Central Committee of the Polish United Workers 'Party, Foreign Department, Minutes of the meeting of Władysław Gomułka, the First Secretary of the Central Committee of the Polish United Workers' Party, with participants in the meeting of the Ministers of Foreign Affairs of the Warsaw Pact member states (Warsaw, February 9, 1967, p. 14.

[7]AAN, ref. XIA / 104, Materials on the Warsaw Pact - 1967, News by Reuters and AFP February 8, 1967 - conference of foreign ministers of the University of Warsaw, p. 7, and Information on the meeting of foreign ministers of the UW members on August 8, 1967 in Warsaw "Trybuna Ludu", 10 February 1967 Information on the conclusion of the meeting of the MFA of the members of the University of Warsaw, "Trybuna Ludu" 11 February 1967. The MFA of Bulgaria, the CSRS, the GDR, Poland, Hungary, the USSR and the deputy minister of Foreign Affairs of Romania participated.

[8] AAN, ref. 237 / XXII-1793, Central Committee of the PZPR, Foreign Department, contacts with fraternal parties, pp. 37-39. Minutes of the talks in Budapest on May 16, 1968 Gomułka, Cyrankiewicz, and Jaszczuk.

Conclusion

Undoubtedly the most serious events, threatening to destabilize in the Warsaw Pact countries, they took place in Poland (1967-1968) and Czechoslovakia in 1968. The events in Poland had a background in Middle Eastern events. There was a defeat of the Arab coalition troops, mostly equipped with military equipment and trained by the University of Warsaw and mainly the USSR9.

Many Polish military analysts and politicians have said that this was decided by the use of Soviet-made military equipment handed over to Egypt. In order to calm the very nervous atmosphere, including among the countries of the University of Warsaw, the Polish side, through the mouth of W. Gomułka, blamed the Egyptian side, accusing it of poorly trained soldiers. After the meeting of the leaders of the Warsaw University party, great activity in condemning Israel and providing aid to the Arab states was shown by the GDR leader Walter Ulbricht, who, in a letter addressed to Mr Gomułka, proposed convening a meeting of the Ministry of Foreign Affairs of the countries of the University of Warsaw, in order to show solidarity with the Arab states. He believed that it was necessary to provide comprehensive assistance to the Arab countries, as such assistance is already offered by NATO, EEC and GDR countries10.

In Poland, among the political and military elites, there were many of Jewish descent who enjoyed this state of affairs and pointed to the advantage of Western over Eastern armaments. Perhaps the most dangerous thing for them was to criticise the Kremlin's policy towards the Arab states. Such an attitude among its closest ally (Poland) was not expected in Moscow. The consequence of this was a sharp reprimand from L. Brezhnev for Vltai Gomulka. There was nothing else left for him to do but to start action to "purge" the ranks of the party and army from people of Jewish origin. The army was a sensitive environment, which is why the main 'strike' was directed there.

In June 1967 in Moscow there was a meeting between Polish Marshal Marian Spychalski and USSR Marshal Andrei Gretchka11.

It came about on the initiative of the Polish Ministry of Defence, and it can be assumed that it was intended to convince the Soviet side of the loyalty of the Polish armed forces. In the course of the conversation, Marshal A. Grechko informed his interlocutor of the Soviet side's priorities in building the defence capabilities of the Arab countries. In addition to the existing European and Far Eastern issues, the problem of the Middle East has grown on a large scale before the USSR Ministry of Defence, which has seriously changed the planned ways of resolving military issues. This is due to the fact that, in addition to the United Arab Republic and Syria, which are receiving extensive assistance in the form of equipment and organisation to rebuild the army, and Algeria, whose serious delegation is currently agreeing with the USSR Ministry of Defence the scope of increased military assistance. Other Arab countries, such as Sudan, have asked for help in building their armed forces. In this situation, the attention of Soviet comrades is focused mainly on the Middle East, where even the leaders of the USSR Ministry of Defence - the deputy ministers Marshal Zacharov and General Sokolov's army - are currently staying, helping to rebuild the USSR army and Syria on the ground12.

During this meeting, the two ministers exchanged views on the possibility that imperialism might be causing tensions or even provoking military provocations at different times and in different sequences in other regions of Europe, such as the GDR, Albania and other continents - the escalation of the war in Vietnam , the resumption by Israel of aggressive actions against Arab countries, another provocation against Cuba, with the possibility of transforming the local conflicts thus provoked into a war of increasing scope after a widespread nuclear war. Soviet comrades believe that another country threatened by imperialist aggression is Yugoslavia. Therefore, in the Armed Forces of the USSR, as stated by Marshal A. Grechko, appropriate steps are being taken in this regard: a number of meetings have been

[9] A.N. Batyrev, Pod cuzim flagsom, "Typhoon" 1999, no. 2, p. 32. J. Będzmirowski, Training of professional staff for the Polish Navy in 1946-1989, Gdynia 2001, p. 239 39.

[10] AAN, ref. XIA / 104, Materials on the Warsaw Pact, Letter from W. Ulbricht to W. Gomułka of June 14, 1967 on the meeting of the Ministry of Foreign Affairs of the University of Warsaw for the purpose of solidarity with Arab states, handed over by the ambassador extraordinary and plenipotentiary of the Polish People's Republic in Berlin - head of the Foreign Department of the Central Committee of the PZPR, pp. 36-37.

[11] AAN XIA / 104, Materials on the Warsaw Pact, Answer Wł. Gomułka on the letter of L. Brezhnev to Wł. Gomułka of April 14, 1967 on the dismissal of A. Greczka from the commander of the Army of the University of Warsaw and the appointment of Ivan Jakubowski on May 15, 1967, p. 134.

[12] Ibidem, p. 46. Information on the meeting of the Ministry of the People's Republic of Poland and the USSR on June 28, 1967, on the initiative of the Ministry of the People's Republic of Poland, Marshal of Poland Marian Spychalski, on June 26, 1967 in Moscow. Working meeting with the Ministry of National Defense of the USSR, Marshal A. Greczko.

held with senior commanders, the air-desant troops have been put on standby for immediate action (even with a change of deployment), and the readiness of special measures to the highest standards has been increased[13].

During this meeting, the Soviet side signalled threats to the unity of socialist countries, but did not mention Prague. Whether it was convinced that there was no threat to the most pro-Russian ally among the countries of the University of Warsaw, or deliberately, it did not inform the Polish side about the so-called 'turmoil' in the parties and authorities there. For the Greek woman, in accordance with the above quoted records of the meeting with Spychalski, and thus for the USSR, the priority was to take full political and military control in the Arab states. There, in the opinion of the USSR Marshal, political action should have been carried out effectively to convince the authorities of these countries to join the Soviet Union. He mentioned some of the threats that could threaten the consolidation of socialist countries in the future. This was initiated by imperialist countries. He made no mention of Czechoslovakia. As it turned out over time, these were only appearances, as the proverbial 'bomb' installed under the political scene in that country was ticking. There was a meeting of the leaders of the UW countries in Dresden (March 1968), at which the Czechoslovakian leader's attention was drawn to bad internal politics and thus sending out negative signals. Although Dubček tried to direct these concerns to Poland (the events of March 1968 in Poland), Gomułka gained greater understanding in Brezhnev's eyes. The fact that the reforming events in Czechoslovakia are a threat to the security of the UW (Yugoslavia and Romania supported Czechoslovakia), and that Moscow will not accept this state of affairs, was demonstrated by the actions of the military leadership of the countries - parties to the UW, under the leadership of the new commander of the UW USSR, Marshal Ivan Jakubowski. In addition, talks have been held at various political and military levels within the troops of the UW. More and more alarming signals were coming from units of the Czechoslovak army. What had hitherto included a 'civil society' began to infiltrate the armed forces of that country, and this was already very dangerous. They led to another meeting of the UW states (May 1968), without Romania and Czechoslovakia, where statements were made to the effect that if Czechoslovakia did not deviate from its previous 'course', which was dangerous for the cohesion of the UW, armed intervention on the territory of that country should be expected. It was there that the idea of carrying out long-lasting military exercises of the UW states on Czechoslovakian territory emerged. The so-called 'behind-the-scenes' talks between representatives of the army of the countries of the University of Warsaw's parties, and representatives of the Czechoslovak People's Army, have begun.

Unfortunately, these types of speeches, as well as the aforementioned meetings of the heads of counter-intelligence of the UW countries, were not convincing for Moscow. This was confirmed by the meeting in Warsaw, a meeting of representatives of the UW countries, without representatives of Romania and Czechoslovakia, which had the tangible effect of issuing an appropriate resolution, which had the characteristics of a warning to the Czechoslovak Government. The 'guidelines' it contained for Prague were not accepted, which must have affected the position of Moscow and the other UW countries.

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Segmenting the Generation Z Cohort Based on Online Booking Platform Users Behaviour

Irene (Eirini) KAMENIDOU
International Hellenic University, Thessaloniki, Greece, rkam@mst.ihu.gr

Aikaterini STAVRIANEA
National Kapodistrian University, Athens, Greece, aikstavria@media.uoa.gr

Aikaterini VASSILIKOPOULOU
Hellenic Open University, Patras, Greece, Vasilikopoulou.katerina@ac.eap.gr

Ifigeneia MILONA
International Hellenic University, Thessaloniki, Greece, imylona@mst.ihu.gr

Spyridon MAMALIS
International Hellenic University, Thessaloniki, Greece, mamalis@mst.ihu.gr

Abstract

This paper examines the perceived ease of use, perceived security control, behavioral intention, and intention to recommend an online accommodation booking platform by the Generation Z cohort. Additionally, it segments the Generation Z market based on these variables. A total of 632 consumers who belong to the Generation Z cohort participated in the online study. Data analysis included descriptive statistics, reliability, factor, and K-Means cluster analysis. Segmentation revealed three segments of Gen Zers, namely the Positives, the Neutrals, and the Negatives. Based on the results, the paper offers suggestions for more effectively targeting this generational cohort.

Keywords: Generation Z, Segmentation, Marketing communication, Online booking, Consumer behavior.

Introduction

Technological advancement greatly affects the tourism industry in various ways (Law, 2009; Inversini and Masiero, 2014; Buhalis, 2003), an example being the booking procedure. Preceding the web, accommodation reservation in the tourism sector involved a phone or an in-person visit to a tour operator or accommodation provider. Specifically, digital technologies advanced a swift from the traditional booking conditions, i.e., through tourist operators, to online booking channels (Berne et al., 2012; Amaro and Duarte, 2015). The actual or potential customer through online channels may make a thorough information search, such as reviews or prices, and make comparisons, in order to end up to the most profitable for him/her final purchase (Vermeulen and Seegers, 2009; Inversini and Buhalis, 2009). Thus, online booking technologies significantly influence the tourism industry. As to Lock (2020), the global digital (online) travel sales are 564.87 bn $ US, with a 15.4% growth. Also, according to the Online Travel Booking Platform Market (2020) report, the "online travel booking platform market is poised to grow by $ 204.81 bn during 2020-2024 progressing at a CAGR of 5% during the forecast period" (CAGR: Compound Annual Growth Rate).

Today, due to digital transformation in the tourism industry, online accommodation can be booked either directly from the accommodation provider website either through digital intermediaries, i.e., through online travel agencies, i.e., OTAs (Talwar et al., 2020). Hotel Tech Report (2020) assesses, "While OTAs are no longer considered new technology, they are a huge driver of hotel room sales and online bookings in the hotel industry." As Prieto (2020) states, for the year 2019, the leader in the OTA market is Booking.com (Booking Holdings (BKNG)), followed by Expedia (Expedia Group).

Moreover, consumers nowadays are technologically advanced and require their encounter with a corporate website to give them ease in use and security in their transactions. Perceived ease of use (PEU) is exceptionally significant for the customer. Davis (1989, p. 320) states that perceived ease of use "refers to the degree to which a person believes that using a particular system would be free of effort." Accordingly, the definition of "ease" could be the:

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"freedom from difficulty or great effort. Effort is a finite resource that a person may allocate to the various activities for which he or she is responsible". PEU directly or indirectly affects online purchases from a website (Cho and Sagynov, 2015; Cheng et al., 2006; Salisbury et al. 2001).

Additionally, equally, if not more important, is perceived security control (PSC) since consumers are increasingly interested in security (Lee and Lai 2007). Nasir et al. (2007) argue that consumer's concern about online trust was initially connected to internet privacy and security issues. According to Cheung and Lee (2001), perceived security (PS) is important for web transactions, which may also strengthen consumers' trust. It also may pose a threat that could have negative economic consequences (Kalakota and Whinston,1997). Security favorably influences consumers' belief that online technology will effectively work (Hoffman et al. 2006). The use of the latest security technology (O'Reilly and Finnegan, 2005) and advanced infrastructure (Bus, 2005) could ameliorate trust levels, and as a result, users could form a more favourable intention to make online purchases (Lian and Lin, 2008). Charney (2008) agrees that security aims at protecting, among others, confidentiality and integrity. There are consumers who do not trust purchases through the Internet due to perceived merchants' ineffectiveness and security issues (Lee and Turban, 2001). According to Cheung and Lee (2001, p.682). "perceived security control refers to the Internet users' perception on the Internet vendors' ability in fulfilling security requirements, such as authentication, integrity, encryption, and non-repudiation". As Ray et al. (2011) state PSC "is a measure of how users perceive risk at specific online situations" and is similarly described as "perceived security protection" (Kim et al., 2008). Concerns regarding PS could also be connected to the system level; for example, the number of credit cards or various personal information shared online (Gao, 2005). PSC is extremely significant for the web-based company, whereas consumers believe that it will ensure security protection applications (Connolly and Bannister, 2008). Previous studies have shown that PSC impacts consumer trust towards the provider and consequently impacts shopping behavior (Zhang et al., 2019; Inegbedion et al., 2016; Cheung and Lee, 2016; Koufaris & Hampton-Sosa, 2004). Cheung and Lee, 2006).

Taking the above into consideration and having in mind the changes due to technological advancement in accommodation distribution channels in the tourism industry, the following research questions (RQ)arose:

1. RQ1: What is the PEU of the online booking platform (OBP) that consumers use in accommodation (room- house) booking?
2. RQ2: What is their PSC towards the OBP?
3. RQ3: Do they have the intention to keep using this OBP in the future?
4. RQ4: Are they willing to recommend this OBP?
5. RQ5: Can users be grouped based on similar behaviour?
6. RQ6: If users can be grouped based on similar behaviour, what is the profile of each group?

These research questions were used as guidance for the aim and objectives of this study. Specifically, and accordingly, to the above research questions, the aim of this study was to investigate PEU, PSC, behavioral intention (BI), and intention to recommend (IR) the OBP they used for accommodation booking (answering RQ1-4). Additionally, the objectives formulated were to segment users based on the aforementioned variables and profile these segments (answering RQ5-6).

In order for the aim and objectives to be tested, a sample drawn from the Greek Generation Z cohort (Gen Zers) was examined. Gen Zers are born between 1995-2009 (Toth-Kaszas, 2018), are technologically knowledgeable since they have been "born in technology," while they constitute the youngest adult population (Kamenidou et al., 2020; 2019).

This research paper minimizes the following gaps in the literature:

1. It deals simultaneously with PEU, PSC, BI, and IR in an online booking setting.
2. It focuses on generational cohorts rather than age as a consumer characteristic, which is an understudied topic. Research suggests that generational cohorts are better demographic indicators than age since it incorporates situations that have affected the behaviour of the cohort (Meredith and Schewe,2002; Schewe and Meredith, 2004; Williams and Page, 2011; Eastman et al., 2013; Pitta et al., 2012; Kamenidou et al., 2019; 2020).
3. It focuses on the generation Z cohort (Gen Z), which is the youngest adult consumer segment, the cohort which will have families (if not already) in the future and thus its impact is worldwide (Stavrianea and Kamenidou, 2017). Additionally, this cohort is an emerging marketing topic since their behaviour is still being shaped (the youngest members of this cohort was ten years old when the research was undertaken)
4. It segments the Gen Z cohort, based simultaneously on PEU, PSC, BI, and IR, which to our knowledge has not previously been studied.

Literature Review

Perceived ease of use in online settings-behaviour has been studied mainly through the TAM model or its variations. Examples of such settings refer to online shopping, online banking, and online booking (Bhatt, 2016; Casaló et al., 2010; Castañeda, Frías, & Rodríguez, 2009; Faqih, 2013; Tong, 2010). It is proposed by Davis (1986) that people will accept the technology that is perceived as easy to use and requires the least effort to achieve a task. Researchers found that PEU influences directly or indirectly attitudes and technology adoption in the travel and tourism industry (Ayeh et al., 2013; Casaló et al., 2010). Singh and Srivastava (2019) found that PEU is an important predictor of social media usage by outbound travelers. Wibasuri et al. (2018) examined (amongst others) PEU influence on attitude toward e-tourism usage (N=216) and revealed that PEU significantly influences tourists' attitude. Peng et al. (2012) found that there are positive correlations between online shoppers' PEU and perceived usefulness and purchase intention (N=413 B2C customers). Yu et al. (2010) also found that perceived usefulness and PEU have a positive direct impact on purchase intention. Lin and Lu (2000), through applying the TAM model, investigated customer usage toward websites, and found that PEU is positively related to perceived usefulness, which is positively correlated to use willingness. Lastly, Mahmood et al. (2001), from their meta-analysis (N=57) regarding constructs of information technology usage in organizations, found a significant relation between PEU to the actual usage of technology.

Past studies have demonstrated that PSC is positively connected to trust in e-commerce (Koufaris and Hampton-Sosa, 2004; Suh and Han, 2003). Suh and Han (2003) named the key five dimensions of PSC, i.e., authentication, nonrepudiation, confidentiality, privacy protection, and data integrity. The authors proved a positive relation between the adoption of e-commerce and (a) nonrepudiation, (b) privacy protection, and (c) data integrity (Suh and Han, 2003). Suh and Han's (2003) studied Korean bank's customers and users (N=502) of internet banking services and found that three of the five dimensions of PSC had a significant impact on consumer trust. Hwang (2008) investigated if security and privacy signals have an effect on consumers' trust and on their subsequent behavior to purchase online and found that PSC both was associated. Koufaris and Hampton-Sosa (2004) found that PSC of the website affects consumers' acceptance of web-based companies since it is an important antecedent of initial trust towards the company. Moreover, Koufaris and Hampton-Sosa (2002) found that PSC was a substantial precursor to the perceived usefulness of a web site and important in defining customer perceptions of the company's trustworthiness. Zhang et al. (2008) in their study regarding internet online banking (IOB), found that PSC has a significant and positive effect on customer interactions with IOB.

Methodology

An online questionnaire was used to obtain data regarding PEU and PSC from online accommodation booking. The variables that referred to PEU were seven and were adopted from Palvia (2009) and Davies (1989). PSC variables were four and adopted from Cheung and Lee (2001) and Koufaris and Hampton-Sosa (2004). BI and IR are measured by one item and adopted from Stavrianea et al. (2019) and Zeithmal et al. (1996). All answers were rated on a 7-point Likert scale. The quantitative study took part from July 2019-December 2019, utilizing a non-probability sampling method and gathering data via the internet following Kamenidou et al.'s (2019) procedure and focusing on Gen Zers as a sample. Totally 632 valid questionnaires were gathered and analyzed. From the 632 participants, males were slightly overrepresented (52.5%) compared to females (47.5%), in their vast majority single (94.0%), university students (76.3%), residing in an urban area (74.1%), and with a net family monthly income up to 1500.00 € (71.2%). The analysis of the data encompassed descriptive statistics (frequencies, percentages, and mean scores), factor and reliability analysis, K-means cluster analysis, and chi-square tests (crosstabs). All tests were preset at a=0.05.

Results

Online booking platform used

Table 1 presents the online accommodation booking platform that participants usually used. The question was presented as "the last time that you booked online accommodation, the platform that you used was….." (twelve OBP were presented). Results showed that the OBP mostly used were Booking.com and Trivago.

Table 1: Online booking platforms used by participants

Online booking platforms	N	%
Booking. Com	274	43.4
Trivago	178	28.2
Airbnb	68	10.8
Accommodation's website	40	6.3
Other OTAs	72	11.3
Total	632	100.0

Perceived ease of use

Table 2 presents PEU of the online booking platform that the participants used. From Table 2, it is observed that no item has MS>5.50, with all items 4.8<MS<5.3, implying that participants somewhat agree with these statements. Moreover, the statement with the highest rating is "The online booking platform opens quickly and easily," and the one with the lowest rating is "This platform does not take much time for me to interact with it."

Table 2: Ease of use of booking

Perceived ease of use	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	MS
The online booking platform opens quickly and easily	3.5	2.8	8.2	13.6	16.1	32.0	23.7	5.27
The online booking platform is easy to use	3.5	4.7	7.0	12.0	17.1	32.0	23.7	5.25
It's easy to navigate through the website of the platform I use to book rooms	3.5	3.8	7.3	13.0	19.3	33.2	19.9	5.20
It is easy to access the website of the platform I use for booking rooms	2.8	4.1	7.9	13.6	21.8	29.7	19.9	5.17
The online booking platform is user friendly	4.1	4.1	6.3	11.4	23.7	31.6	18.7	5.16
My interaction with this platform does not require much mental effort to be perceived.	5.4	5.4	7.3	16.1	22.8	23.4	19.6	4.94
This platform does not take much time for me to interact with it	5.1	5.4	8.2	15.8	23.1	25.9	16.5	4.90

Perceived Security Control

Table 3 presents the results of PSC of the online booking platform that the participants usually use. From Table 3, it is observed that no item has MS>5.00, with all items 4.9<MS<5.0 implying that participants somewhat agree with these statements since the MS focus around 5.00 with a very small range of answers.

Table 3: PSC of the online booking platform

Perceived security control	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	MS
I feel secure about the electronic payment system of the web site	3.8	4.7	7.9	18.7	20.3	26.6	18.0	4.99
The web site implements security measures to protect its online shoppers	3.5	4.7	9.2	18.4	18.7	27.8	17.7	4.98
The web site usually ensures that transactional information is protected from being accidentally altered or destroyed during transmission on the Internet	3.8	5.4	8.5	17.7	20.9	26.3	17.4	4.95
The web site has the ability to verify online shoppers' identity for security purposes	3.8	5.7	7.3	19.9	20.6	26.6	16.1	4.92

Behavioral intention (BI) and intention to recommend (IR)

BI (intention to use the platform in the future) and IR were also rated on a 7-point Likert scale. Table 6 presents the results in percentages (line 1, 1-7) and mean scores (MS). Results revealed that IR is rated higher than BI. One possible reason could be that Greek individuals do not travel very often due to the economic crisis that the country is going through. Thus, they may not intend to book a room in the near future, although they would be willing to recommend the website.

Table 4: Behavioral intention and intention to recommend

BI and IR	1	2	3	4	5	6	7	MS
I am willing to use this online platform to book a room when I travel in the future (BI)	6.0	6.0	7.6	21.5	19.6	24.4	14.9	4.75
I'm willing to recommend the online platform I use to others (IR)	5.1	5.1	8.5	13.0	24.1	23.7	20.6	4.99

Factor analysis- cluster analysis

Factor analysis with varimax rotation on the seven variables consisting of the PEU produced one factor accounting for 79.9% of the total variance (KMO=0.946; BTS=4696,425; df=21; p=0.000), with mean factor score (MFS): MFS=5.127 and reliability (α) of the factor: α=0.957. Moreover, factor analysis with varimax of PSC (four items) also produced one factor, accounting for 80.20% of the total variance (KMO=0.858; BTS=1791,019; df=6; p=0.000), with MFS=4.961 and the reliability of the factor α=0.918.

The MFS of PEU and PSC with additional variables BI and IR were continuously used to segment Gen Zers in homogenous behaviour groups. K-Means cluster analysis was applied, which provided three groups with similar behaviour (Table 5). In Table 5, the 1st column refers to the segmentation variables, columns 2-4 refer to the final cluster centers (FCC) per variable (row) and per cluster (column 2-4), as well as the number of subjects per cluster (N). Lastly, Table 5 also incorporates the ANOVA results, which reveal that all variables contribute to cluster differentiation.

Table 5: Segments of Gen Zers

Segmentation Variables	1 N=330	2 N=224	3 N=78	F	Sig.
Perceived ease of use	6.04	4.67	2.57	590.651	.000
Perceived security control	5.77	4.59	2.58	364.456	.000
Behavioral intention	5.93	3.84	2.41	481.258	.000
Intention to recommend	6.08	4.46	1.92	642.183	.000

Source: The authors

Profile of clusters

Additionally, chi-square tests were employed in order to investigate if there were differences between clusters and participants' socioeconomic variables (sex, education, net monthly family income, and area of residence, i.e., rural vs. urban area). Data analysis revealed that for sex (χ_2^2=2.045, p=0.373), education (χ_4^2=1.710, p=0.789), and area of residence (χ_2^2=0.424, p=0.812), no statistical differences exist; while for family income (χ_8^2=20.790, p=0.008) statistical differences between clusters and participants net monthly family income, do exist.

Cluster I: This cluster is named the “Positives." It is comprised of 330 Gen Zers, accounting for 52.2% of the sample. In all cases, the FCCs were 5.51< FCC<6.50. They are the ones that have the most positive attitude towards the platform that they used. Male subjects are over-represented in this group. Compared to the other two segments, this group has the highest percentage of participants having secondary education and the lowest of those with high education (university +). It also contains the highest percentage of those residing in rural areas. Lastly, the Gen Zers net family monthly income ranges between 1000-1500€.

Cluster II: This cluster is named the "Neutrals." It is comprised of 224 Gen Zers, accounting for 35.4% of the sample. In all cases the FCCs were 3.51< FCC<5.00. They are the ones that have an indifferent attitude towards the OBP they used for accommodation booking. Males and female subjects are equally represented in this group of Gen Zers. Compared to the other two segments, this group has the highest percentage of participants having high education (university +education) and net family monthly income ranging between 1000-1500€ (middle-class families as regards income).
Cluster III: This cluster is named the "Negatives." It is comprised of 78 Gen Zers, accounting for 12.4% of the sample. In all cases, the FCC<3.00. They are the ones that have the most negative attitude towards the OBP that they used. Compared to the other two segments, females are over-represented. This segment has the highest percentage of participants having postsecondary education and residents in urban areas. Lastly, in this group, two opposite subgroups exist in the income category. They are considered as the low income since compared to the other groups, about one-third of its members have net family monthly income under 600.00€, while simultaneously, it has the largest percentage of Gen Zers with net monthly family income > 2500€.

Conclusions- Recommendations

The first cluster scores highly in the perceived ease of use and security control factors. Overall, these Gen Zers present a very positive attitude towards the website. They are more likely to use the platform in the future to book a hotel/holiday package and recommend it to others. Websites that target this cluster should try to keep these individuals (mainly men, low education level, living in rural areas) satisfied. For example, they could offer discounts or other rewards. They are the ones who are more likely to use the platform and spread positive WOM.

The second cluster, which mostly includes highly educated Gen Zers, score higher, in all factors, compared to the third cluster, but reveal an indifferent behaviour. These customers are not loyal to the OBP and will easily change to another one if the "deal is better." However, online platforms should still invest in creating more favourable ease of use and security control perception in order to spur favourable behaviour towards it.

The third cluster (i.e., the "Negatives") presents low PEU and PSC score. As the past literature demonstrates, these two factors significantly influence users' behaviour and e-services patronage (Koufaris and Hampton-Sosa, 2004). Although OBP, such as booking.com, offer nowadays advanced technologies to ensure security control, as proposed by the relevant literature (Connolly and Bannister, 2008), consumers who belong in this cluster still feel reluctant to use such websites. OBP should clearly inform their customers that their data is well protected, and all security measurements have been taken to ensure that customers are secure. The ease of use should also be emphasized, e.g., by writing that the booking procedure is extremely easy and just needs 2 minutes.

Limitations and directions for further research

This research study has specific constraints that could be considered in future research.

Non-probability sampling and the use of online data collection techniques are the main limitations of the current paper. Moreover, only Greek individuals participated in the research study, which could not permit the reliable generalization of the results. Moreover, the items and components incorporated in the study are adopted from Palvia (2009), Davies (1989), Cheung and Lee (2001), and Koufaris and Hampton-Sosa (2004). Hence, additional items could be existent that measure PEU and PSC towards online booking platforms, not incorporated into this study, and thus other segments would arise. Irrespective of the above-mentioned constraints, its impact is critical in delivering information on tourism-related behavior as it offers insight into an understudied issue, as well as to an understudied generational cohort.

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Eco-Innovation Measurement by the European Observatory on Eco-Innovation (EIO)

Pawel BARTOSZCZUK

Warsaw School of Economics
Al. Niepodleglosci 162 Warsaw, Poland
pbarto1@sgh.waw.pl

Abstract

To date no uniform proposal for measuring and analysing eco-innovation in the literature has been emerged. The main challenges in this regard are the need to establish indicators at micro level, taking into account the life cycle and the separation of eco-efficiency from the economic category of eco-innovation, the definition of levels of eco-innovation analysis and the careful development of data aggregation methods, in addition to understanding the effect of eco-innovation and the relationship of eco-innovation indicators to key indicators for measuring sustainable and sustainable socio-economic development. The effects of eco-innovation can be measured on a micro scale (for product or service, process, enterprise), meso (sector,) and macro. Despite the high investment of companies, eco-innovation activities are producing results in the longer term on a micro scale by reducing the negative impact of its activities on the environment, while at the same time leading to the impact of eco-innovation on the company's performance in the form of lower environmental pollution charges and lower energy costs.

Keywords: Eco-Innovation, Eco-Innovation Activities, Eco-Innovation Observatory.

JEL: Q50, Q55, Q59

Introduction

Eco-innovation contributes to the company's sustainability in reducing costs. In addition, consumers are more interested in purchasing environmentally friendly products supplied by companies using eco-innovative technologies. As entrepreneurs point out, employees engage in believing in company missions and the deeper meaning of their own work in ecoinnovative and modern tial organizations (Rutkowska and Kamińska, 2020). The European Commission members pay particular attention to the factors determining the success of eco-innovation, namely the acquisition of business benefits and environmental protection. One is to reduce energy efficiency to reduce carbon emissions in order to meet the commitments contained in the Kyoto protocol. Comprehensive solutions, including the Eco-IS methodology, as well as tools developed by the Community Innovation Survey (CIS) in the European Union and proprietary proposals for eco-innovation assessment, are noteworthy.

European eco-innovation research was carried out systematically, and was limited to sources of eco-innovation, determinant, barriers in selected industrial sectors in western European countries, mainly Germany, which in turn resulted in a large shortage of eco-innovation research introduced by companies operating in Central Europe, especially in Poland. Only selected aspects of the activity have so far been the subject of comprehensive analyses carried out m.in. by the Central Statistical Office, PSDB in cooperation with GfK Polonia on behalf of PARP (Kornecki et al., 2010), the Environmental Partnership Foundation, as well as the Gallup Institute as part of the Eurobarometer survey (Gallup, 2011).

Methodology and Goal

The main goal of the article is to prove the thesis that eco-innovation and allow countries economies to increase their performance in the longer time period, Another aim was to analyse ecoinnovation scoreboard data and to unveil the low index value reasons for Central Europe countries. To gain so declared goals, a research question was formulated as follow: do countries with less developed economies have lower eco-innovation performance? The performance measurement was based on secondary data analysis obtained from Eco-innovation observatory. These

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basic indicators and trends described European countries ec-oinnovations performance. The analysis is based on comparative research and available data. We identified a problem with the establishment of measures for the effects of eco-innovations. In the further part of article European countries were indicated with the highest, medium, lower eco-innovation performance. Hence, the research question was addressed describing the economy transformation towards the eco-innovation. The search in the main scientific databases and a review of the literature revealed an unfocused approach of the relationship between eco-innovations indicators performance, which shows a research gap regarding this subjectWe decided to analyze the data, by assuming that eco-innovations scoreboard' factors are capable of explaining the companies' slow and moderate performance.

Measuring the effect of ecoinnovation (CIS)

Measuring the effects of eco-innovation is very difficult to carry out throughout the innovation chain (including R&D, the dissemination of innovative products and the use of innovative processes or organisational methods). Furthermore, the value of these innovations makes it difficult for companies to access data due to companies not identifying such solutions as eco-innovation. It is also impossible to obtain them through the national accounts of the sector's production, as they occur in different areas of the economy. The main challenges in creating and operationalising eco-innovation concepts are: defining indicators at micro level, taking into account the life cycle and distinguishing eco-efficiency from the economic category of eco-innovation, naming eco-innovation analysis levels and establishing an operational approach to eco-innovation analysis in order to properly understand the effect of eco-innovation. The possible impact of eco-innovation on the competitiveness of the company is also highlighted. This, in turn, seeks to active information on the factors (the condition of competitors, the type of competing products or services) that will affect its activities over the next few years, which will enable it to survive in the longer term on the market (Woźniak, Strojny and Wojnicka, 2010; Tutaj, Rutkowska and Sulich, 2019). Considering the traditional theory of innovation, Wagner (2008) concluded that innovation affects companies' social performance.

Community Innovation Survey (CIS) is conducted in the European Union by Eurostat and based on the methodology described in Oslo Mananual (Development and Communities, 2005). From the perspective of this article, the 2008 CIS study, which introduced a module on eco-innovation, i.e. eco-innovation, is noteworthy. The off study covered innovations introduced between 2006 and 2008. The environmental benefits of implementing innovation are divided into:

1) environmental benefits that may arise during the period of manufacture of the product or service:
    1. reduction in material consumption per unit of product,
    2. reduction in energy consumption per unit of product,
    3. reduction of carbon dioxide emissions by the company,
    4. the use of less polluting or environmentally hazardous materials,
    - re-use (recycling) of waste, water or materials,
2) environmental benefits that may arise during the useful life of the purchased product or the use of the service by end-users:
    1. reducing energy consumption,
    2. reducing air, water, soil or noise pollution,
    3. improving the reusability (recycling) of the product after its useful life.

European Observatory on Eco-Innovation (EIO)

In this context, however, there is a problem with the establishment of measures for the effects of eco-innovation. The most well-known initiative to consider eco-innovation in the European Union is a study by the European Observatory on Eco-Innovation (EIO). On the basis of numerous data collected from European countries, a for individual countries eco-innovation scoreboard has been developed (O'Brien, 1999; O'Brien and Miedziński, 2012). This index consists of 16 indicators divided into 5 groups. Three of them directly relate to eco-innovation: expenditure on eco-innovation, eco-innovation activities and eco-innovation results. The other two groups of indicators are the effects resulting from the introduction of eco-innovation – environmental and socio-economic (development of the "eco-industry" of the economy). Their detailed description is given in the following list: (Eco Innovation Observatory - Annual Reports - Annual Reports, no date)

1. *inputs*– the share of government resources and expenditure spent on environmental and energy R&D in relation to GDP, the share of R&D participants in the number of all employees, the volume of green investments under PE/VC funds;
2. activities –*participation* of eco-innovation companies improving material and energy efficiency in the number of companies in the country in total, the number of organisations holding ISO14001 environmental management certificates (in relation to the number of citizens in a given country);
3. outputs –*number* of patents, scientific publications (in relation to the number of citizens in a given country), information in the media on eco-innovation (in relation to the number of electronic media available);
4. *environmental outcomes – efficiency* of energy, raw materials, water and greenhouse gas emission factors;
5. *socio-economics outcomes*– the share of environmental exports in general exports, the share of workers employed in the environmental sector in the total number of employees, the overall turnover generated by the environmental industry.

Results

The composite index relating to both eco-innovation and innovation in general reflects the disadvantage of Polish economy belonging to non-innovative and non-ecoinnovative European countries (Fig. 1). Poland is in the low eco-innovation performance group of countries, as are most Eastern European countries and some Western countries (such as Malta). Even against the background of these countries, there is a great distance of Poland to the New Member States eg. the Czech Republic and Estonia. The results of these indices indicate insufficient implementation of eco-innovation in enterprises in Poland. Currently available data presented by the European Ecoinnovation Observatory confirm a significantly insufficient degree of eco-innovation of the Polish economy (*Eco Innovation Observatory - Annual Reports - Annual Reports*, no date; *Eco-innovation Action Plan - European Commission*, no date; Bleischwitz *et al.*, 2009; Doranova and Roman, 2016).

The negative assessment covers almost every of the five sub-elements of the index, except for the socio-economic effects that have been positively assessed. The level of involvement of Polish companies in the implementation of eco-innovation meant that Poland, together with Bulgaria, took the last place in the 2011 ranking with an index of only 41 points (while in 2013 and 2015 it was the penultimate place and 22nd place with 59 points in the 2019 ranking). Other countries that joined the EU at the same time as Poland achieved much higher index values in 2011, e.g. The Netherlands. Czech Republic – 171 points (in 2019 – 96 points(Fig.1) and Slovenia – 119 points (in 2019 – 94 points). These results confirm that Poland is in a rather unfavourable climate and that the interest of companies in introducing eco-innovation is insufficient.

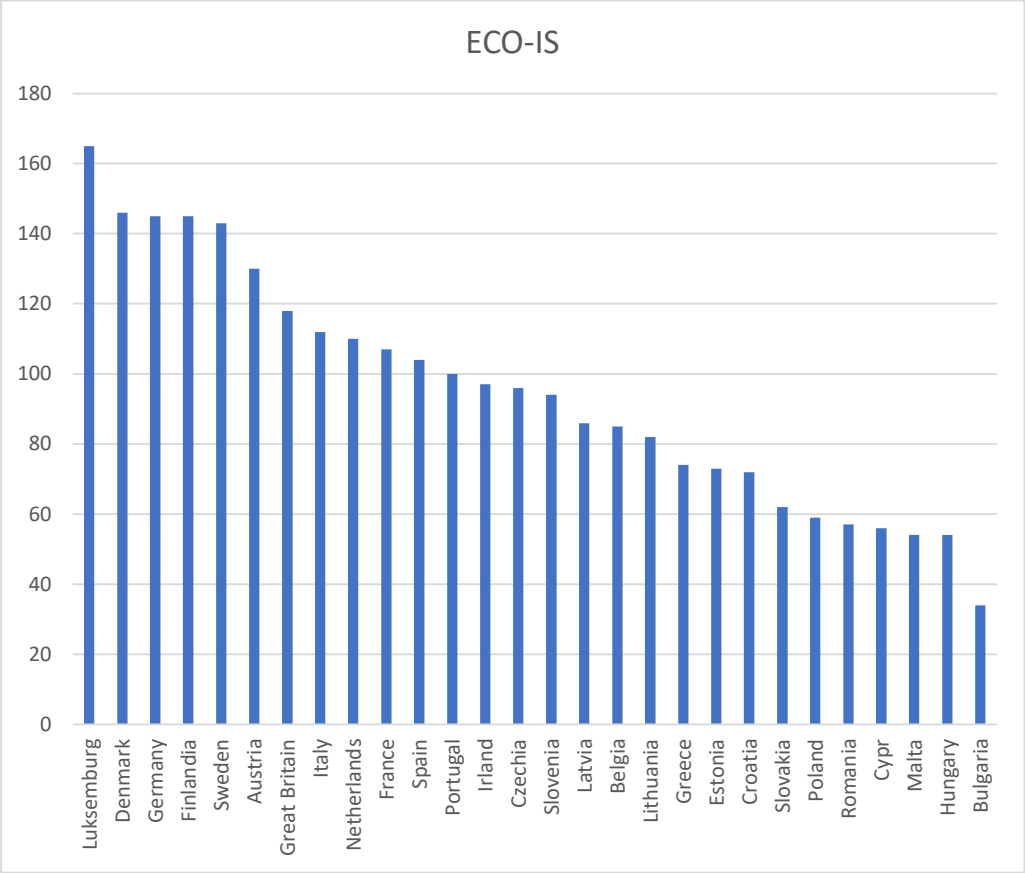

Fig. 1. EU eco-innovation ranking in 2019 (EU average-27=100)

Source: own study based on Eco-innovation at the heart of European policies, European Commission, 2020, https://ec.europa.eu/environment/ecoap/scoreboard_en (20.09.2020).

Compared to 2011, Poland moved from last to 6th last place in the eco-innovation ranking in 2019, which gave it a slightly higher score (59) than the one previously obtained (50). Poland is still ahead of countries such as the Czech Republic, with a much better result close to the EU average. Luxembourg came first in the latest eco-innovation ranking, with a score of 162 points, ahead of Denmark by 18 points. Bulgaria, on the other hand, came last in the ranking of European countries.

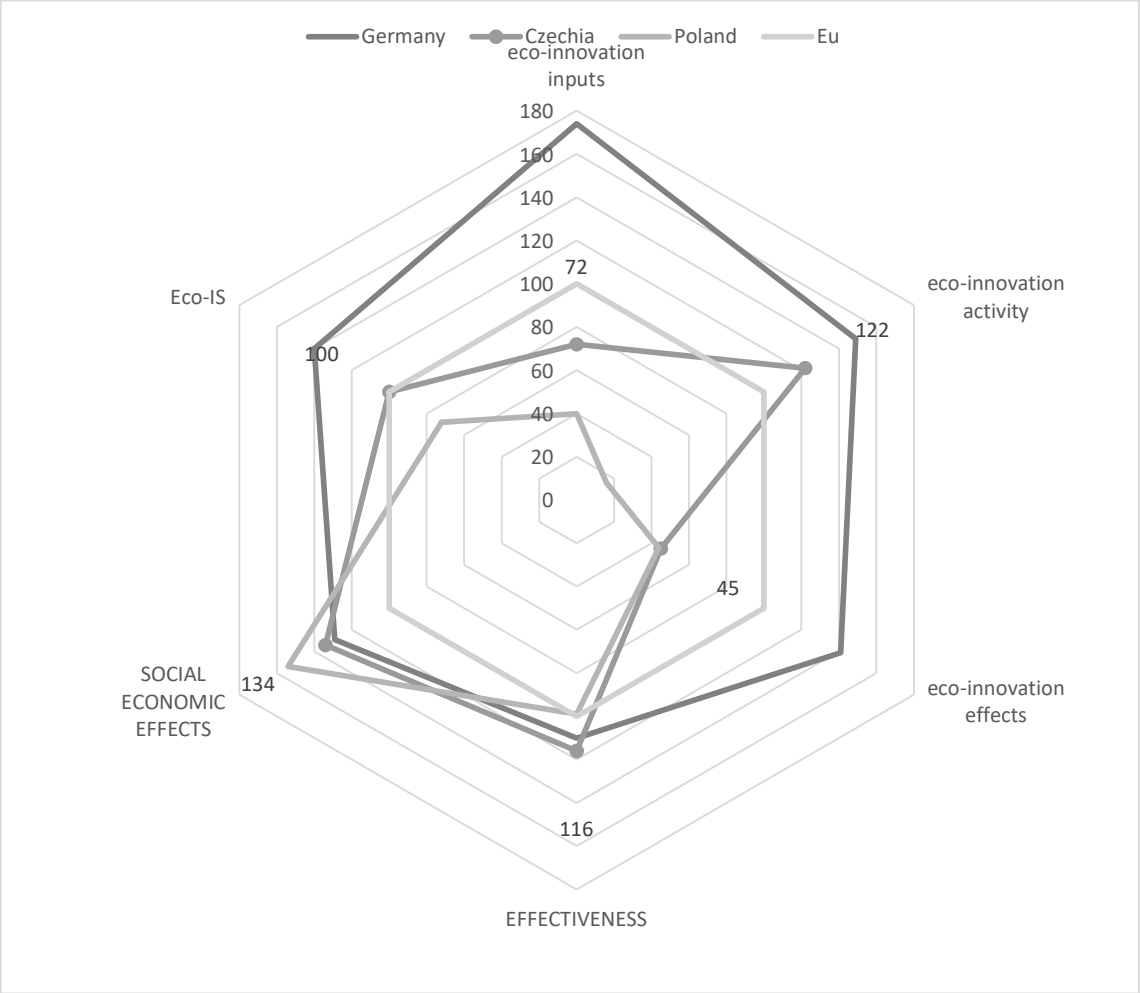

Fig. 2. Eco-innovation gap in five themes Polish (relative to the EU average between Poland and the Czechia and eco-innovation leader Germany, EU = 100)

Źródło: own study based on, Eco-innovation at the heart of European policies, European Commission, 2016, no other data were available,(The Eco-Innovation Scoreboard and the Eco-Innovation Index - Eco-innovation Action Plan - European Commission, no date) (Bleischwitz et al., 2009)
https://ec.europa.eu/environment/ecoap/scoreboard_en (20.09.2020).

In the Polish case, there is a considerable distance within the five groups of indicators of the complex eco-innovation index compared to the Germany and even the Czech Republic (Figure 2). Only in terms of socio-economic performance, Poland leads the ranking, but for all others it ranks below the EU average. These data should be treated with a degree of caution, as not always, for example, higher employment in eco-services contributes to greater eco-innovation and results. Three component indicators on socio-economic outcomes were highlighted:

1. export of products from the eco-industry (% of total exports – Eurostat),(*Database - Eurostat*, no date)[1]
2. employment in the eco-sector and circular economy (% of total employment in all enterprises – Orbis base),
3. profits in the eco-sector and circular economy (share % of total employment in all enterprises – Orbis base). (*International Company Information Database | Bureau van Dijk*, no date)

[1]The statistical office of the European Union, http://ec.europa.eu/eurostat/data/database (24.06.2020).

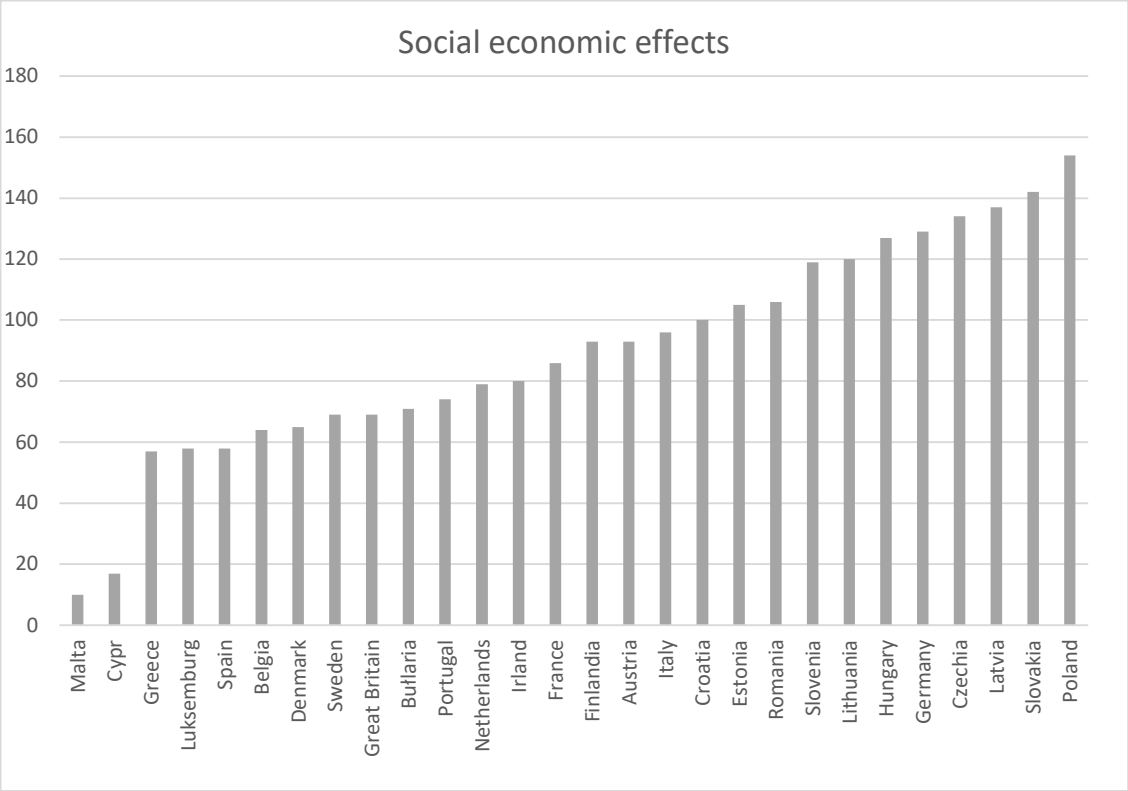

Fig. 3: Indicator for social economic results of eco-innovation for European Union countries

Source:own study on the basis of: Eco-innovation at the heart of European policies, European Commission, 2016, other data were not available https://ec.europa.eu/environment/ecoap/scoreboard_en (20.09.2020).

In terms of indicators reflecting expenditure on eco-innovation and performance, Poland did not even reach half the average value of European countries (as it scored only 40 points). Please note that the eco-innovation index has some drawbacks. For example, the definition of eco-industry adopted by Eurostat and Ecorys, on the basis of which socio-economic indicators were created, refers to a large range of green activities (e.g. recycling, wastewater treatment, the introduction of renewable energy sources), with competitiveness and employment levels in some of them not necessarily directly derived from eco-innovation (e.g. hydropower plants). At the same time, an important part of the economic impact of the implementation of eco-innovation is becoming apparent in many other sectors where companies that have introduced eco-innovation were not motivated by eco-innovation, but by the need to improve productivity and reduce costs. Therefore, performance indicators do not differ between the EU-27 countries to the same extent as those directly related to eco-innovation, as is also evident in the case of Polish. In addition, performance indicators are poorly correlated with indicators of the intensity of the development and implementation of eco-innovation. The environmental effects are measured by static indicators, which depend to a large extent on the historical development paths of economies and not necessarily on eco-innovation introduced in the last dozen years.(Park et al., 2017) (Bilsen, 2009).

Contrary to expectations, countries with a higher resource of scientific and technical staff do not necessarily achieve better results in the implementation of eco-innovation. Countries such as France, Italy, Spain and Poland have a high share of research staff in general, but it is much less efficient than countries that have achieved a lower eco-innovation rate (e.g. Denmark).

Table 3: Eco-innovation indicators for European countries by Ecoinnovation scoreboard

		Eco-innovation input	innovative capacity	Eco-innovation efects	Effectiveness	Social economic effects	Eco-IS
Leaders	Germany	174	149	141	110	129	140
	Luksemburg	116	131	233	165	58	139
	Finlandia	185	157	193	60	93	137
	Denmark	189	58	162	146	65	126
	Sweden	145	154	162	66	69	115
	Great Britain	110	101	64	169	69	110
Medium	Italy	62	101	123	151	96	105
	Austria	87	143	112	93	93	104
	Slovenia	72	116	148	85	119	104
	Czechia	72	122	45	116	134	100
	France	134	15	110	93	86	99
	Irland	112	45	72	141	80	98
	Spain	89	108	121	115	58	97
	Greece	59	93	148	138	57	96
	Portugal	94	130	63	103	74	95
	Netherlands	78	36	94	125	79	91
Moderate	Lithuania	41	98	75	97	120	86
	Latvia	46	49	131	82	137	85
	Slovakia	29	91	28	121	142	85
	Croatia	15	89	100	104	100	81
	Belgia	85	14	96	97	64	81
	Estonia	95	88	42	58	105	78
	Poland	40	16	44	99	154	72
	Cypr	0	76	126	131	17	70
	Romania	28	74	57	80	106	69
	Malta	15	45	58	164	10	65
	Hungary	38	43	9	74	127	60
	Bulgaria	15	31	23	60	71	41

Source: own study on the basis of:(Leitner, 2018) Eco-innovation at the heart of European policies, European Commission, 2016, https://ec.europa.eu/environment/ecoap/scoreboard_en (20.09.2020); Eco-innovation Action Plan…, op.cit.

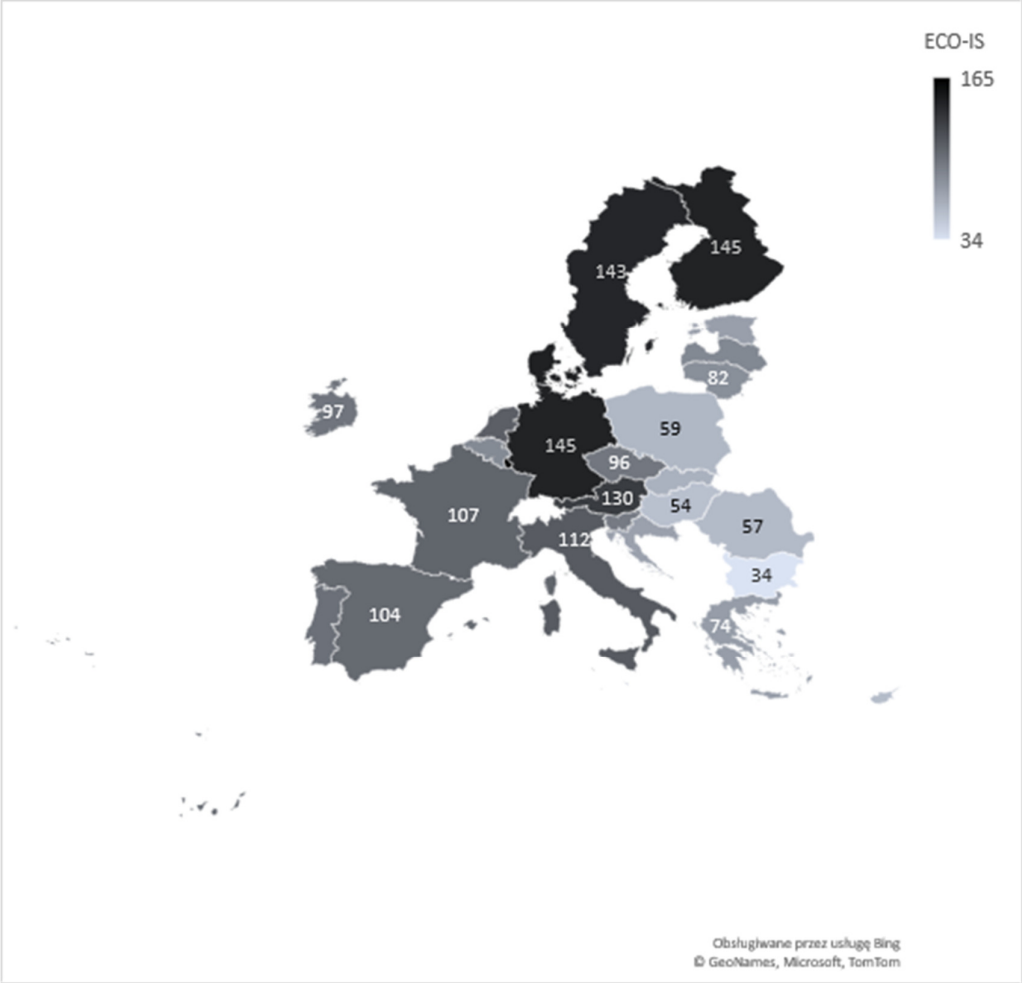

Fig. 4: Eco-innovation Scoreboard for European Union countries

Source. Own elaboration based on Ecoinnovation data 2019https://ec.europa.eu/environment/ecoap/indicators/index_en

Conclusion

The considerable concerns related to the development of eco-innovativeness are observed in some European countries, particularly Central European member countries, including Poland. First, politicians do not fully recognize the significance of eco-innovation effects, or generally – innovations. Strong lobby supports obsolete industries and it is not interested in development of eco-innovations. On the one hand, there is no pressure on research in new eco-innovative solutions. On the other, academic a R&D centers are unable to satisfy the demands of the industry. It is of key importance that eco-innovations are perceived as the driving factor of the third transformation in Poland and other EU new members (following system transformation and the EU accession).

This research have some caveats. For example, except for Eco-innovation scoreboard, other data were available only from the earlier periods. We observed shortcomings of the sub-indicators that are part of the index e.g. expenditure. This is particularly true under the heading government outlays and expenditure on research and development in the field of environment and energy. It only includes part of the expenditure and does not consider the expenditure incurred by organisations from their own resources or from bank loans, EU funds or other sources (e.g. in Poland most innovations are financed by non-governmental funds). In situation, when the structure of eco-innovation funding sources were similar in all EU countries, this would not affect the ranking. However, if this were not the case, it could turn out that the position of countries in terms of R&D expenditure is different from that of government expenditure only (Pakulska, 2020). It seems that more attention should be paid to this issue in further research.

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Proposed Model for The Introduction of Physical Activities During the Lockdown and Post Lockdown Period for Sedentary Workers in Industry 4.0

Mihai-Bogdan UMANSCHI

Politehnica University of Timisoara, Management Department,
Timisoara, Romania
umanschi_bogdan@yahoo.com

Gabriela PROSTEAN

Politehnica University of Timisoara, Management Department,
Timisoara, Romania
gabriela.prostean@upt.ro

Abstract

The paper contains an empirical demonstration of the beneficial effect, obtained by combining physical activity - which includes a program for the whole body - together with going out in nature, applied to sedentary people, who work in the office. The study presented in this paper was conducted during and after lockdown, by monitoring the effect of physical activity - at home, in the gym or in nature - on the following systems: cardio-respiratory system, musculoskeletal and neuro-muscular system, metabolic system and immune system. By using the questionnaire method, it was possible to demonstrate that the physical activities performed had a great impact on improving the mental state of the participants for the better.

Keywords: physical activities (PA), exercises, sedentarism, lockdown, diseases.

Introduction

Several studies (Diaz et all. 2017) show that prolonged sitting on the stool, contributes as a risk factor for deadly diseases, such as would be: diabetes, cardiovascular disease. Those who work in offices are part of the population with the highest degree of sedentary lifestyle (Parry et all. 2013)

Symptoms include: muscle pain, headaches, knee pain are associated with what we call "office syndrome", which is not a syndrome in itself but rather a combination of these symptoms. Due to the current situation, in which people are forced to work from home, the physical activities is even more restricted, making people move even less than they did before the pandemic, raising the rate of sedentarism. (Booth et all. 2017)

If in ancient times the physical work associated with gathering food, respectively the effort to build the shelter were the fundamental daily actions of our ancestors, the advent of modern technology has made PA only a lifestyle option for some people. As a result, inactivity and sedentary lifestyles have become a major risk of cardiovascular disease and diabetes for those who do not opt for PA, leading to mortality. Exercises promotes cardiometabolic health, improves cognitive performance, and effectively helps prevent and treat a variety of health conditions, including cardiovascular disease, diabetes and other metabolic disorders, neurological disease, sarcopenia, osteoporosis, and cancer. (Sonne et all. 2010)

The study process during the lockdown, must include a strategical approach, which contain exercises that impact the body systems responsible for maintaining health and quality of life: the cardio-respiratory system, the musculoskeletal and neuro-muscular system, the metabolic system and the immune system. (Trost SG et all. 2014) Also, the physical activity carried out had a great impact on improving the mental state of the participants for the better.

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Research Methodology

This study was conducted over a period of 7 months, more specifically during the lockdown period in Romania, ie March - May 2020 and respectively, after the lockdown in June-September 2020. The study followed the real performance of each subject in the following directions :

1. Carrying out PA at home, during the whole lockdown period. Once every two days, the participants received a set of exercises to perform at home.

2. Continuation of the physical exercise program in the gyms, after their reopening.

3. The participants took part in nature and mountain hikes between 2 and 3 weeks a month, during the weekend, after the lockdown.

The aim of the study consist of exercises designed to work the whole body, considering the increase of the body's capacity for effort, the hypertrophy of the muscle mass, the increase of the mobility. The program followed the principles of accessibility: from easy to difficult, from simple to compound, from known to unknown. Movements such as kneeling, jumping jackets, push-ups, abdomen, squats were used. The exercises were dosed for each participant. During the lockdown, each participant received an exercise program once every two days, being also advised to take a short walk near the house, during the break days. The program continues in the gym, after the reopening of the sports centers. Participants did 3 training sessions per week under the guidance of an instructor. After the lockdown, the study participants engaged in mountain trips for 3 months, 3 weekends per month.

A. Physical inactivity and the immune system

Immunosenescence, related the cellular& molecular alterations that affect the innate and adaptive immunity, resulting to a higher risk of morbidity and mortality all over life, appears to be an important part in the covid pandemic19. So , it is important to acknowledge that the immune system is not functioning in isolation, it is influenced by surroundings factors, such as physical activity. (Gleeson et all. 2011)

B. Physical inactivity and the musculoskeletal and neuromuscular system

The negative results of physical inactivity on the neuromuscular structure have been reported since 1920s by Cuthbertson (Cuthbertson, 1929), it is suggested that a long time without activity in healthy subjects leads to a loss of nitrogen, phosphorus and calcium due to lack of muscle use and bones. Recent results shows that inactivity also motive damage to the neuromuscular junction and muscle denervation, this show us that muscle atrophy occurs not just from reduced mechanical load but on the other way from neurodegenerative processes.

C. Physical inactivity and the metabolic system

The situation in this times will reduce activity to levels well under the daily recommendation of 7,500-10,000 steps a day, highlighting health problems resulting from physical inactivity. It is important to understand that the negative effects on health are observed quickly (4-15 days) when the decrease in activity is point up, as will be the case worldwide in this pandemic. (Narici et all. 2020)

Evidence provide that 7-10 days of bed rest or absence of physical activity in healthy people brings to a 10-35% decrease in insulin sensitivity in the body. (Stuart CA et all. 1988)

D. Physical incapacity and the cardio-respiratory system

The VO2max variable is the one based on which the maximum capacity of both the cardiorespiratory system and the skeletal muscles in the process of transporting and using oxygen (O2) is evaluated. This variable represents the maximum capacity of the lungs to take oxygen from the environment and to transport it in the blood and muscles of the body. (Myers et all. 2002)

For both healthy subjects and patients with cardiovascular disease, "exercise capacity is one of the strongest predictors of mortality, even more so than other established risk factors for cardiovascular disease." (Bassett et all. 2000).During a sudden decrease in activity, as was the lockdown situation for COVID-19 for a period of 2 months, a linear decrease of up to 30% of the VO2max variable was observed in all subjects studied.

A questionnaire was set up reviewing the 3 approaches, presented above, based on physical activities, offered to a sample of 40 people, who work in the office and who were forced to work from home during the pandemic. The 40 people participated in all three programs and gave their consent to participate in this study.

The objectives of the study were to analyze the effect of physical activity combined with going out in nature, on the health - physical and mental - perceived by those surveyed. Due to the fact that the only measuring instrument was the questionnaire, the study data are empirical but certainly they are supported by other studies in the field.
The study participants followed a program of various physical exercises, for the whole body, this being a new aspect brought by the study in this case. The exercise program included movements for the whole body, training all the kinetic chains and aimed at improving the functionality of the whole body. Methods of increasing body strength and mobility have been applied

Data collection

The questionnaire consisted of 13 questions, configured in 5 sections, as follows:

Section 1 - physical activity during lockdown
1. How much did your physical activity during the lockdown help you stay healthy from a muscle-joint point of view?
2. How much did your physical activity during the lockdown help you to stay healthy from a cardiovascular point of view?
3. How much did physical activity help you during the lockdown to maintain your physical capacity?

Section 2 - improving the quality of life in general
4. How much did physical activity help you during the lockdown to keep you physically and physically healthy?
5. How much did physical activity help you during the lockdown to alleviate your mental stress?

Section 3 - resumption of physical activities in the gym
6. Did you feel an evolution of your physical condition when you continued training in the gym from a muscular-articular point of view?
7. Did you feel an evolution of your physical condition when you continued training in the gym from a cardiovascular point of view?

Section 4 - Nature Hiking
8. Hiking in nature has increased my level of good mood.
9. Nature hiking has increased my professional performance.
10. Nature hiking has alleviated my mental stress.
11. Nature hiking has increased my physical capacity.

Section 5 - The combination of physical exercises with hiking in nature
12. Do physical exercises combined with going out in nature have a beneficial effect on physical health?
13. Do physical exercises combined with going out in nature have a beneficial effect on mental health?

The results of the survey were systematized in table 1.

Table 1 - Survey results

Section	Question number	NOT AT ALL # respondents	A LITTLE # respondents	A LOT # respondents	VERY MUCH # respondents
Section 1	1	10	20	10	-
	2	4	16	20	-
	3	3	17	10	10
Section 2	4	1	5	22	12
	5	2	4	22	12
Section 3	6	-	3	25	12
	7	-	2	25	13
Section 4	8	-	1	22	17
	9	-	2	20	18
	10	-	1	19	20
	11	-	1	21	18
Section 5	12	-	-	10	30
	13	-	-	11	29

Findings and Suggestions

Through a holistic approach to life we can conclude that each aspect influences the other. Through PA we increase the energy level which decreases the present and increases the ability to concentrate. PA helps to improve the immune system, which leads to a lower rate of illness. 22 subjects reported the improvement of mental quality which leads to increased concentration (Question 5 and Question 10 - figure 1; 2; 3; 4). Through physical activity in nature, referring to hiking in this text, stress relief is created, a statement made being "VERY MUCH" from 20 of the subjects interviewed for question 10 (50%) and respectively 29 of the subjects interviewed for question 13 (65%) (figure 4).

If we follow the trends of the answers of the four diagrams, it can be clearly noticed that the answers "NOT AT ALL" and "A LITTLE" have a decreasing trend, the answer "A LOT" has an average trend from 40% of respondents (figure 3) and the answer “VERY MUCH” has a clearly increasing tendency from 60% of the respondents, the conclusion being the obvious one of the benefit combinations of exercise and physical activity in the gym or at home with hiking in nature.

Subjects due to the fact that they did PA during the lockdown reported an easier passage through the isolation period, they stated that this aspect related them to the activity before isolation and that they felt mentally better after moving. During and after PA, endorphins are released, they are responsible for the perception of the feeling of happiness, which helps prevent burnout.

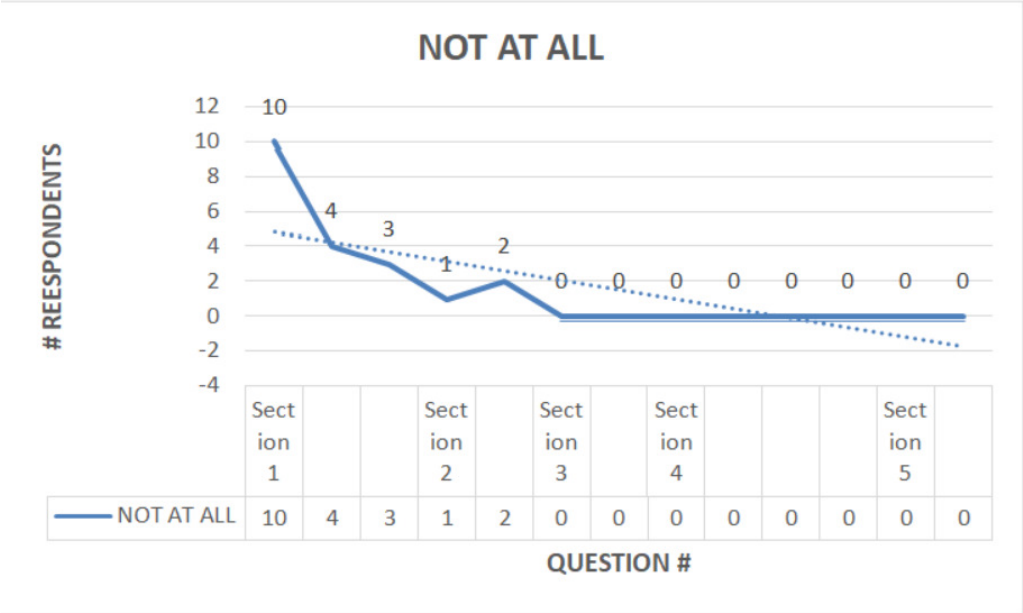

Figure 1 - Distribution of “NOT AT ALL” answers

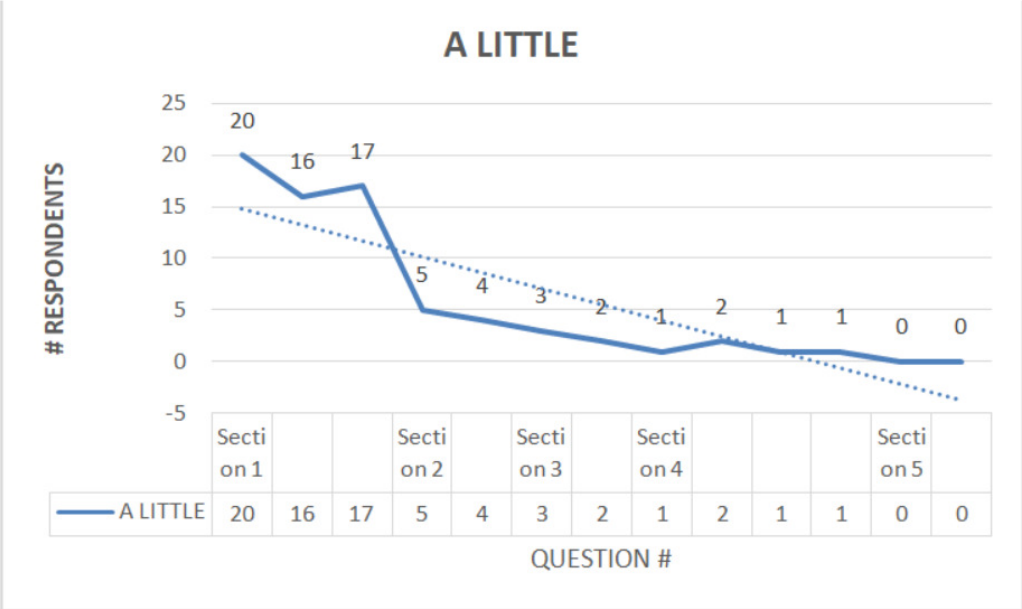

Figure 2 - Distribution of "A LITTLE" answers

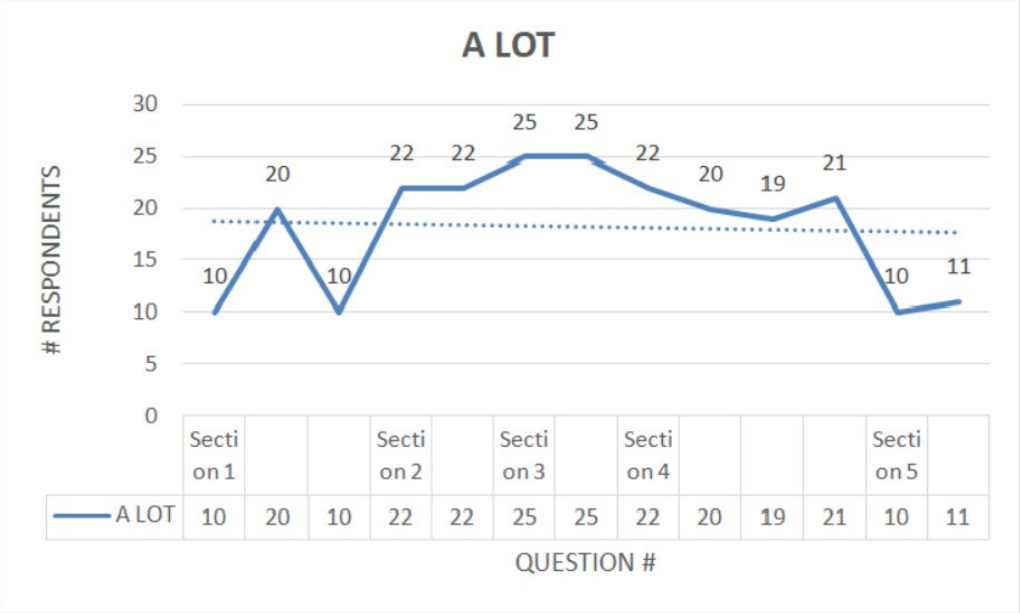

Figure 3 - Distribution of "A LITTLE" answers

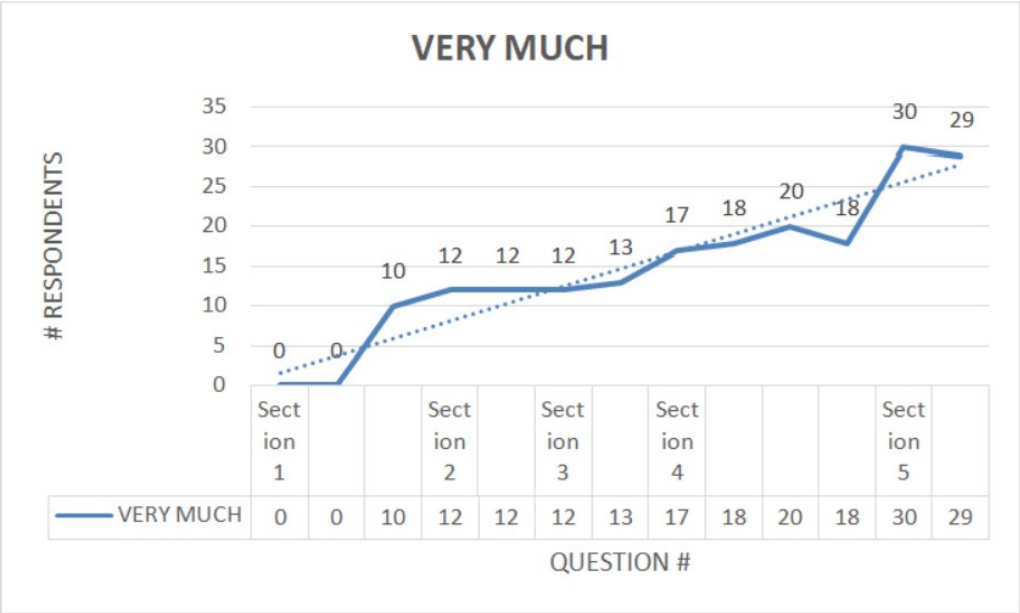

Figure 4 – Distribution of "VERY MUCH" answers

Conclusions

Although the data in this study are empirical, they are supported by studies done by BMC Public Health.

From the collected data, we deduce that the physical activity practiced regularly, together with the outings in nature have a synergistic effect, the combination of the two increasing the beneficial effects. I believe that the introduction of PA during the work schedule would increase the energy level of employees. It is necessary that the program stay focused on several components: cardio-respiratory, strength, mobility. These branches can be worked in the same time interval or in separate days.

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Les Médias Sociaux Comme Outil De Marketing De Destination : Examen De L'utilisation des Médias Sociaux Par l'Office National Marocain Du Tourisme

Asmahane TAHIRI
Laboratoire de Recherche en Management, Information et Gouvernances (LARMIG), Faculté des Sciences Juridiques, Économiques et Sociales Ain Sebaa, Université HASSAN II, B.P 5366 Maarif, Casablanca- Maroc
t.asmahane@gmail.com

Ez-zohra BELKADI
Laboratoire de Recherche en Management, Information et Gouvernances (LARMIG), Faculté des Sciences Juridiques, Économiques et Sociales Ain Sebaa, Université HASSAN II, B.P 5366 Maarif, Casablanca- Maroc
zo.belkadi@yahoo.fr

Résumé

Étant l'une des "tendances" qui ont eu un impact significatif sur le secteur touristique, le rôle et l'utilisation des médias sociaux dans les opérations de gestion et promotion des destinations ont été largement discutés dans les travaux de recherche sur le tourisme et l'hospitalité.

Cette étude a pour vocation l'exploration de la manière dont l'Office National Marocain du Tourisme utilise les médias sociaux pour promouvoir et commercialiser le Maroc comme destination pour les voyageurs. Ceci, en analysant les plateformes en ligne officielles du Maroc « Visit Morocco » (Facebook, Twitter, Instagram et YouTube) sur toute la période de l'année 2019. Les résultats suggèrent que l'Office National Marocain utilise les médias sociaux comme un outil de marketing traditionnel, plutôt que de les exploiter pour interagir avec les touristes afin d'atténuer les problèmes potentiels des touristes.

Mots clés : Médias sociaux, Destinations, OGD/DMO, Office National Marocain du Tourisme.

Introduction

L'émergence du Web 2.0 et des plateformes en ligne a profondément transformé le comportement des consommateurs ainsi que les approches marketing sur le Web.

Cette évolution a eu un réel impact sur l'hôtellerie et le tourisme d'au moins trois façons fondamentales: Premièrement, la prolifération de nombreuses communautés en ligne centrées sur les discussions de voyage telles que TripAdvisor, Virtual Tourist, Igo Ugo, Independent Traveler, et même les sites de réseautage social comme Facebook, Twitter et MySpace; deuxièmement, l'évolution des comportements des voyageurs en ce qui concerne la recherche d'informations et la planification de voyage ; et troisièmement, l'intégration des médias sociaux dans les stratégies marketing des organismes d'hôtellerie et de tourisme. Cette tendance a donné lieu à la popularité croissante des médias sociaux qui incarnent un large éventail d'applications Internet qui s'appuient sur les fondements idéologiques et technologiques du Web 2.0.

L'industrie de tourisme est considérée comme l'une des premières industries directement touchées par le Web, car sur le marché très concurrentiel du voyage d'aujourd'hui, les destinations commencent à ajouter des outils numériques à leurs pratiques commerciales traditionnelles pour attirer les visiteurs.

En effet, les médias sociaux en tant qu'outil marketing puissant et peu coûteux ayant une portée mondiale sont devenus les nouveaux intermédiaires entre les consommateurs et les destinations touristiques pour fournir des informations, leur permettant ainsi de connaître la destination et d'influencer leur processus de prise de décision (Simon Hudson & Karen Thal, 2013).

Bien que l'utilisation des plateformes de médias sociaux dans l'industrie du tourisme connait une réelle extension, les recherches scientifiques sur l'utilisation des médias sociaux dans le secteur touristique restent limitées (Chan & Denizci Guillet, 2011 ; Gretzel, Fesenmaier, Formica, & O'Leary, 2006 ; Xiang & Gretzel, 2010). Les recherches

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existantes se sont principalement concentrées sur le : (1) l'utilisation des médias sociaux par les touristes (contenu généré par les utilisateurs) et (2) l'adoption des médias sociaux par les entreprises touristiques. Par conséquent, l'utilisation des médias sociaux par les organismes de gestion de la destination (OGD), - connus par leur acronyme anglais DMO (*Destination Marketing Organization) -,* qui sont responsables de la gestion des destinations et leur promotion, restent largement inconnus (Munar, 2012).

L'une des peu nombreuses études pionnières dans ce domaine a été réalisée par Hays et al. (2013). Dans cette étude exploratoire, Hays et al. (2013) ont étudié l'utilisation des médias sociaux par les OGD des 10 pays les plus visités en analysant le contenu de leurs pages Facebook et comptes Twitter. Les résultats ont révélé que l'utilisation des médias sociaux par les OGD de ces pays était encore purement expérimentale et que des recherches supplémentaires, avec un échantillon plus important, étaient nécessaires.

Dans une optique de prolongement des recherches précédentes sur les OGD européens, la présente étude vise à analyser l'utilisation des médias sociaux par l'OGD d'un pays nord-africain qui est le Maroc. La présente étude vise à analyser l'utilisation des médias sociaux Facebook, Twitter par l'OGD au Maroc qui est représenté par l'Office National Marocain du Tourisme, ainsi que deux plateformes supplémentaires, notamment Instagram et YouTube sur une période d'une année complète (2019) afin d'assurer une analyse plus complète.

Adoption des médias sociaux dans le secteur touristique : implications pour les OGD

Les médias sociaux ont modifié de façon fondamentale la manière dont la société crée et diffuse l'information (Buhalis & Law, 2008 ; Xiang & Gretzel, 2010), entraînant ainsi un changement à la fois au niveau de la demande (c'est-à-dire le processus de prise de décision du consommateur) et l'offre (c'est-à-dire les pratiques marketing et gestion des entreprises et des organisations).

Litvin et al. (2008) ont considéré les médias sociaux comme une source importante d'informations stratégiques pouvant être utilisées pour le développement d'un certain nombre de stratégies commerciales, notamment l'amélioration de la satisfaction des visiteurs par l'amélioration des produits, la résolution des problèmes des visiteurs, la découverte de l'expérience des visiteurs, l'analyse des stratégies concurrentielles ainsi que le suivi de l'image et de la réputation d'une entreprise. De l'autre côté, Schegg, Liebrich, Scaglione et Ahmad (2008, p. 152) affirment que l'évolution du Web 1.0 - 2.0 marque un changement de cap, les utilisateurs aujourd'hui prennent les commandes d'Internet au lieu des organisations.

Auparavant, Internet ne fonctionnait que dans un seul sens, en mode « lecture seule » (Borges, 2009). Les informations publiées étaient statiques et l'interaction avec d'autres utilisateurs d'Internet et / ou éditeurs était pratiquement inexistante. Aujourd'hui, le Web 2.0 est alimenté en continu par du contenu généré par les utilisateurs via les médias sociaux (Brake & Safko 2009 ; Buhalis & Law, 2008).

En somme, les médias sociaux sont un phénomène actuel en constante évolution impliquant le partage en ligne de contenu généré en ligne soit par les consommateurs ou les organisations (Stankov, Lazic et Dragicevic, 2010 ; Xiang et Gretzel, 2010). Une définition proposée par Brake et Safko (2009) stipule que les médias sociaux font référence aux activités, aux pratiques et aux comportements des communautés de personnes qui se rassemblent en ligne pour partager des informations, des connaissances et des opinions à l'aide de médias conversationnels. Les médias conversationnels sont des applications Web qui permettent de créer et de transmettre facilement du contenu sous forme de mots, d'images, de vidéos et d'audios. (P. 6)

En ce qui concerne le secteur touristique « industrie à forte intensité d'information », on considère l'utilisation des médias sociaux comme particulièrement pertinente (Gretzel et al., 2000, p. 147 ; Wang, Quaehee, & Fesenmaier, 2002).

Pour les voyageurs, les médias sociaux sont devenus une source d'information essentielle (Amaro, Duarte, & Henriques, 2016 ; Hudson & Thal, 2013 ; Zeng & Gerritsen, 2014), pour les aider dans le processus de planification de voyage et pour prendre des décisions éclairées sur les destinations, l'hébergement, les restaurants, les visites et les attractions (Chung et Buhalis, 2008 ; Ruzic et Bilos, 2010 ; Thevenot, 2007 ; Xiang et Gretzel, 2010).

Etant donné que les expériences touristiques ne peuvent pas être évaluées avant la consommation car elles sont intangibles, les voyageurs comptent sur les informations et recommandations publiées sur les médias sociaux pour minimiser les risques de prendre de mauvaises décisions de voyage (Leung, Schuskert & Yeung, 2013), puisque les produits touristiques sont généralement considérés comme des achats très risqués (Kim, Qu, & Kim, 2009). C'est ainsi que les voyageurs ont de plus en plus tendance à utiliser les médias sociaux avant le voyage pour la recherche d'informations sur les destinations, pendant leur visite de la destination choisie, en publiant du contenu lié à leurs séjours (photos, vidéos par exemple), et aussi après leurs retours afin de partager leurs expériences de voyage avec d'autres personnes (Munar & Jacobsen, 2014).

Cela veut dire que la ligne de communication ne se limite plus au producteur à consommateur, mais peut être de consommateur à consommateur et de consommateur à producteur (Buhalis, 2003). C'est ainsi que l'utilisation des médias sociaux a deux conséquences, d'un côté ils peuvent être un outil précieux pour recueillir les réactions, qui seront utilisées pour attirer de nouveaux clients et garder les consommateurs actuels en créant une relation client forte et efficace qui renforce la fidélité, ou bien la détérioration de la confiance des consommateurs s'ils ne sont pas utilisées correctement d'un autre côté (Salkhordeh, 2009)

De ce fait, les OGD ont intérêt à utiliser les médias sociaux pour essayer de stimuler la conversation, encourager l'interaction et s'engager de la même manière que le marketing traditionnel (Tuten, 2008). En effet, parmi les avantages des médias sociaux on peut citer le fait que les OGD peuvent collaborer et rationaliser leurs informations, ce qui apporte une valeur ajoutée aux consommateurs, tout en renforçant l'image de destination par une interaction directe avec le consommateur et une réponse immédiate à ses questions et préoccupations. Cette implication peut être vitale pour fidéliser, générer des contenus intéressants et accroître la notoriété (Parise, Guinan, & Weinberg, 2008).
Munar (2010) dans son étude portant sur le contenu généré sur les médias sociaux par les OGD et les voyageurs en Europe, a identifié trois principales stratégies adoptés par les OGD : stratégie mimétique, stratégie publicitaire et stratégie analytique. La première stratégie consiste à reproduire le même concept et spécificités des médias sociaux pour créer les plateformes en ligne des destinations afin de permettre aux touristes de créer, partager et télécharger du contenu. Cet outil facile et peu couteux d'adoption de la technologie Web 2.0 permet aux OGD de garder le contrôle du contenu généré sur leurs plateformes en ligne.

La stratégie publicitaire se caractérise par l'utilisation des bannières et d'autres dispositifs par les OGD pour promouvoir et faire connaitre leurs destinations. Dans ce cas, les médias sociaux sont considérés comme de simples canaux publicitaires qui peuvent être utilisés pour accroitre la notoriété des destinations. Autrement dit, les OGD ne tirent pas profit de la masse d'informations fournies par les touristes en raison de l'absence d'interaction. En ce qui concerne la stratégie analytique, elle est utilisée par les OGD selon deux différents niveaux. Le premier niveau consiste à comprendre le développement du contenu généré par les utilisateurs/touristes par rapport à la destination. Si des contenus négatifs sont publiés par les touristes, les OGD prendront les mesures nécessaires afin de minimiser les dommages ou bien ils vont procéder à l'amélioration de leur démarche marketing. En ce qui concerne le deuxième niveau, il consiste à la conversion grâce à l'intelligence artificielle, des données issues du contenu généré par les utilisateurs des médias sociaux en connaissances stratégiques. La limite de cette stratégie réside dans l'importance de l'investissement financier nécessaire à la mise en œuvre de cette stratégie car elle implique un usage intensif des technologies de l'information.

Munar (2010) a conclu son travail en déclarant que la stratégie analytique pourrait apporter de nouvelles opportunités pour améliorer l'efficacité de la marque de destination.

D'autres recherches plus récentes ont révélé que les OGD utilisent le plus souvent les médias sociaux à des fins de marketing, étant donné que les médias traditionnels ne sont plus suffisants et en raison de la popularité de ces derniers auprès des consommateurs (Denizci Guillet et al., 2016, Hays et al., 2013 ; Kim, Koh, Cha & Lee, 2015 ; Kim, Lim, & Brymer, 2015). Toutefois, cette utilisation des médias sociaux comme outil marketing est encore au stade expérimental (Hays et al., 2013 ; Milwood, Marchiori, & Zach, 2013) puisque de nombreuses organisations se contentent de transférer leurs activités de marketing existantes sur les plateformes de médias sociaux, plutôt que d'exploiter le potentiel de ces derniers. En effet, des travaux indiquent que les organisations touristiques ont généralement de mauvais résultats en matière de développement de l'interaction et de la communication avec les touristes sur les médias sociaux (Chan & Denizci Guillet, 2011 ; Denizci Guillet et al., 2016 ; Hsu, 2012 ; Kim, Lim & Brymer, 2015 ; Phelan et al., 2013 ; Wattanacharoensil & Schuckert, 2015) malgré le fait que cette interaction avec les touristes représente une question cruciale dans le domaine touristique, car une réponse tardive ou inexistante aux préoccupations soulevées sur les médias sociaux indique que cet organisme touristique fait preuve d'une faible réactivité vis-à-vis de ses clients, contribuant ainsi à une perte potentielle d'activité (Chan & Denizci Guillet, 2011).

Donc, l'idée d'intégrer les médias sociaux dans la démarche marketing et communication n'est pas de remplacer les outils traditionnels, mais plutôt de les utiliser pour des activités de marketing plus poussées et plus sophistiquées, telles que la réalisation d'études de marché, la gestion des crises, le développement de l'interaction avec les internautes et l'analyse des contenus générés par les voyageurs afin d'utiliser ces informations pour éclairer la prise de décision.

Méthodologie

La présente étude a été menée pour développer une meilleure compréhension de l'utilisation des médias sociaux par l'organisme de gestion de la destination Maroc, qui est notamment l'Office National Marocain du Tourisme. Cette compréhension s'est basée sur une analyse du contenu pour évaluer les publications sur les plateformes officielles en ligne de la destination Maroc.

En ce qui concerne la sélection des plateformes de médias sociaux pour analyse, bien que Facebook et Twitter étaient considérés comme les plateformes de médias sociaux les plus courantes auxquelles les organisations touristiques participaient (Hays et al., 2013 ; Hsu, 2012 ; Jabreel, Moreno, & Huertas, 2016 ; Kwok & Yu, 2013 ; Mariani et al., 2016 ; Philander & Zhong, 2016 ; Stankov et al., 2010), d'autres plateformes de médias sociaux comme Instagram et YouTube doivent également être étudiées afin de contribuer au corps de recherche existant sur les médias sociaux (Usakli, A., 2017).

Au final, les plateformes en ligne qui ont été sélectionnés pour être analysés dans le cadre de cette étude sont les suivants :

Facebook : Site de réseautage social lancé en 2004, compte en moyenne moins de deux milliards (2,5 milliard au quatrième semestre de 2019) d'utilisateurs actifs par mois (Facebook, 2019), ce qui le place comme la plateforme de médias sociaux la plus utilisée au monde jusqu'à cette date.

Twitter : Site de microblogging lancé en 2006 qui permet aux utilisateurs de poster des messages ("tweets") ne dépassant pas 140 caractères (Jansen, Zhang, Sobel, & Chowdury, 2009), compte environ 330 millions d'utilisateurs actifs mensuels (Twitter, 2019).

Instagram : Lancé en 2010 et détenu par Facebook, Instagram est une plateforme de médias sociaux relativement nouvelle, qui permet aux utilisateurs de partager des photos ou des vidéos. Instagram revendique plus d'un milliard d'utilisateurs actifs mensuels avec plus de 50 milliards de photos partagées depuis son lancement et plus de 100 millions de photos et vidéos publiées quotidiennement (Instagram, 2019).

YouTube : Créé en 2005, YouTube est un site de partage de vidéos appartenant à Google. Parce que l'on peut utiliser YouTube pour regarder des vidéos sans avoir de compte, il est difficile de mesurer le nombre exact d'utilisateurs (Golbeck, 2015) ; cependant, la société recense plus de 2 milliards d'utilisateurs actifs par mois (YouTube, 2019).

En ce qui concerne la collecte de données, elle a commencé par une analyse initiale des plateformes en ligne de la destination Maroc en utilisant des mots clés comme site web officiel marocain du tourisme et des voyages, Office National Marocain du tourisme, site web officiel marocain du tourisme et des voyages…etc., afin d'obtenir des liens vers les comptes officiels des médias sociaux gérés par l'Office National Marocain du Tourisme et écarter les comptes non officiels administrés par d'autres entités.

Après avoir confirmé que « www.visitmorocco.com » était le site internet officiel géré par l'Office National Marocain du Tourisme, les liens des comptes de la destination Maroc sur les plateformes des différents médias sociaux (Facebook, Twitter, Instagram et YouTube) ont été obtenus à partir de la page d'accueil.

L'examen de l'utilisation des médias sociaux par l'Office National Marocain du Tourisme a été fait sur une période d'une année complète (2019) en utilisant des mesures d'analyse du contenu tirées des études de Usakli, A., (2017) et Hays et al. (2013).

À la suite cette démarche, un total de 155 publications sur les médias sociaux (63 sur Facebook, 62 sur Instagram, 22 sur Twitter, et 8 sur YouTube) ont été obtenues. Il est important de noter que plusieurs feuilles de calcul de Microsoft Excel ont été utilisées à la fois pour la collecte et l'analyse des données.

Résultats et discussion

Afin d'effectuer une analyse comparative, les résultats ont été illustrés et discuté sur la base des quatre plateformes de médias sociaux.

Statistiques de base des comptes officiels gérés par l'Office National Marocain sur les médias sociaux

Premièrement, les dates de création des plateformes « Visit Morocco » sur les différents médias sociaux vont de 2008 (compte YouTube), 2012 (compte Facebook) et 2015 (compte Instagram et Twitter). Il convient de mentionner qu'Instagram ne fournit pas explicitement la date d'adhésion pour les comptes ; par conséquent, la date d'adhésion pour le compte Instagram a été générés en utilisant la date de la première publication. Le tableau 1 présente les dates d'adoption de chaque plateforme de médias sociaux.

Tableau 1 : Création des plateformes « Visit Morocco » sur les différents médias sociaux

Facebook	Twitter	Instagram	YouTube
Novembre 2012	Décembre 2015	Décembre 2015*	Avril 2008

*Date de la première publication

La figure 1 montre la répartition du nombre total des publications sur les plateformes en ligne « Visit Morocco » pour chaque type de médias sociaux. Comme indiqué, Facebook était de loin la plateforme de médias sociaux la plus utilisée par l'Office National Marocain du Tourisme, indépendamment d'un certain nombre de facteurs susceptibles de fausser cette distribution (par exemple, la date de création de chaque plateforme de médias sociaux). Les publications sur Facebook ont représenté 54 % du total des publications sur les plateformes « Visit Morocco », Instagram (25%), Twitter (14%), et YouTube (7%), ce qui indique clairement que l'Office National Marocain du Tourisme a plus souvent eu recours à Facebook pour partager des publications sur la destination.

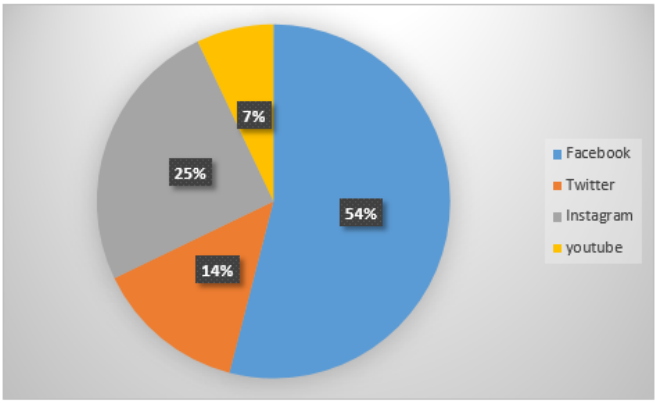

Fig. 1 : Répartition du nombre total de publications (à partir de la date d'adhésion au 31/12/2019).

Afin de mesurer la taille de l'audience, les variables suivantes ont été utilisées : nombre total de personnes abonnées sur les pages Facebook, Twitter et Instagram, et nombres d'abonnés (personnes ayant un compte) et de vues sur YouTube. La mesure nombre de vue a été utilisées pour avoir une idée du nombre de followers sur YouTube puisque les utilisateurs peuvent regarder des vidéos avec ou sans compte. Néanmoins, il faut garder à l'esprit que le nombre total de vues ne correspond pas directement au nombre de followers puisque YouTube peut prendre en compte chaque vue du même utilisateur comme si c'était un utilisateur différent.

Ainsi, les tailles d'audience jusqu'au premier semestre de 2020 sont les suivantes : **137 914** pour Facebook, **10,3K** pour Twitter, **73.8k** pour Instagram, et environ **4,41 k** pour YouTube (en termes d'abonnés). Compte tenu du fait que la chaîne YouTube a atteint plus de **1 518 678** vues, on s'attend à ce que la taille exacte de l'audience de YouTube est bien supérieure à **4,41 k** personnes.

Analyse du contenu des publications

Les résultats présentés ci-après ont été obtenus à partir de l'analyse des données (un total de 155 publications) pendant la période d'étude (1/1/2019-31/12/2019).

Contenu

L'analyse des publications de l'Office National Marocain du Tourisme sur les médias sociaux selon la catégorisation de contenu de Usakli, A., (2017) : personnes taguées, hashtags, photos, vidéos et liens vers des sites internet, a révélé les résultats suivants (Figure 2) :

- Aucune personne n'a été tagués au niveau des 8 vidéos postés sur YouTube durant l'année 2019.
- Le nombre moyen de personnes taguées était égal à 1 pour les trois autres plateformes (Twitter 2,1 ; Facebook 1,2 ; Instagram 0,5).
- Le nombre moyen de Hashtag par publication était de 3 pour les quatre plateformes. Les hashtags étaient le plus souvent utilisés sur Twitter (5), suivi de Facebook (4,3), YouTube (1,6) et Instagram en dernier lieu avec 1 hashtag en moyenne.
- Sur 155 publications, les photos représentaient 71%, les vidéos 37% et 12% pour les liens vers d'autre sites internet.

- Instagram était la plateforme avec le plus grand nombre de publications comportant des photos, puisqu'il s'agit principalement une plateforme de partage de photos (43 photos, 69% des publications sur Instagram), suivi de Facebook (39 photos, 62% des publications sur Facebook) et Twitter (15 photos, 68% des publications postées).
- Contrairement aux prévisions, YouTube avait le nombre inférieur des vidéos postés (8 vidéos seulement), tandis que sur Facebook et Instagram 19 vidéos ont été publiées (31% des publications sur Instagram et 30% des publications sur Facebook), suivi par Twitter avec 4 vidéos (18% des publications sur Twitter).
- En ce qui concerne les liens vers les autres sites internet, ils étaient présents surtout sur Facebook (5 liens, 8% des publications), suivi de Twitter (3 liens, 14% des publications), avec une absence de lien sur Instagram en vertu de ses conditions d'utilisation, pour éviter les spams et sur YouTube qui est un site de partage de vidéos.

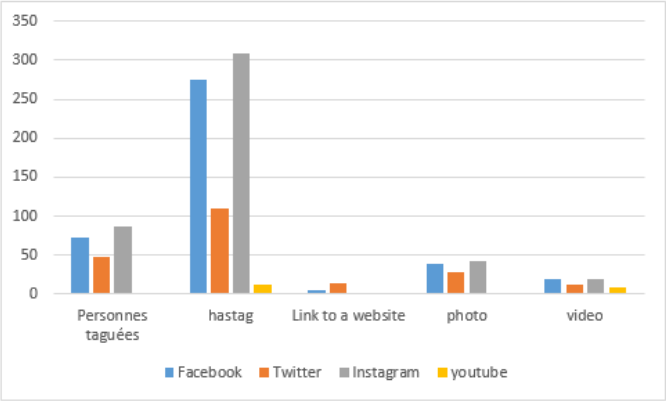

Fig. 2 : Distribution des types de contenu inclus dans les publications sur les médias sociaux en 2019.

Thèmes principaux des publications

Les études récentes soutiennent que les OGD utilisent les médias sociaux non seulement pour informer visiteurs mais aussi et surtout pour développer l'image de la destination. Etant donné que chaque publication sur une plateforme de médias sociaux contient un thème spécifique, chaque publication a été classée en utilisant des catégories d'attributs cognitifs de l'image (Tableau A1) dérivés d'études antérieures sur l'image des destinations (par exemple, Sönmez & Sirakaya, 2002 ; Beerli & Martín, 2004 ; Stepchenkova & Zhan, 2013). D'autres attributs ont été ajoutées notamment, catégorie "Général" pour les publications qui ne correspondaient à aucun attribut (Usakli, A., 2017) et une autre catégorie pour les événements marquants.

Tout le contenu textuel et visuel (les photos uniquement) a été évalué en utilisant une approche holistique pour son thème principal. Les vidéos n'ont pas été analysées car elles incluent simultanément plusieurs attributs d'image. Un total de 97 publications (43 sur Instagram, 39 sur Facebook et 15 sur Twitter,) a été analysé (Figure 3).

Les résultats indiquent que le thème principal le plus fréquent projeté par l'Office National Marocain du Tourisme dans ses publications sur les médias sociaux était les "Personnes : Touristes et habitants" (16 %), "Bâtiments et architectures" : 15% et "Paysages et nature" : 14% sur toutes les plateformes. Parmi les autres thèmes majeurs fréquents, on peut citer les sites historiques et les évènements (11 %), Les hôtels et infrastructures touristiques (10 %). Ces grands thèmes représentent plus de 79% de tous les publications analysées.

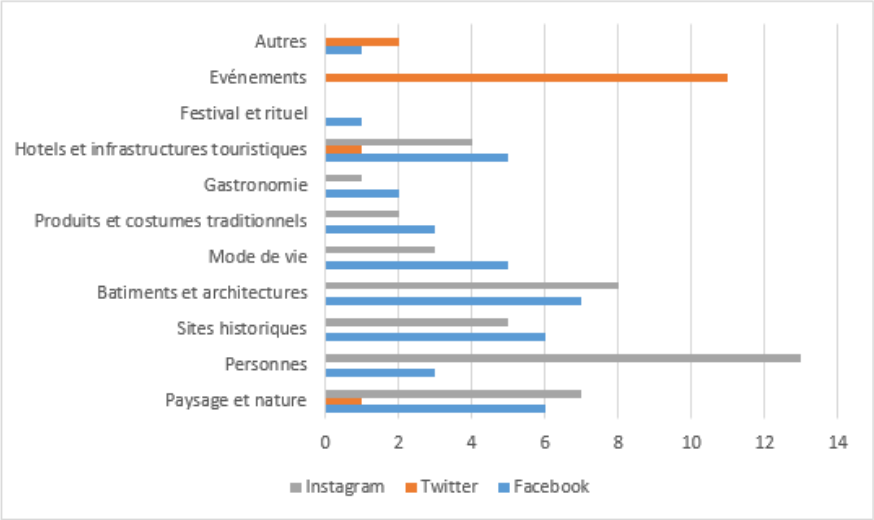

Fig3 : Diffusion des thèmes principaux des publications en 2019.

Engagement

L'engagement du client a été définit par Van Doorn et al. (2010, p. 254) comme étant "des comportements qui vont au-delà des simples transactions, et peuvent être spécifiquement définis comme des manifestations comportementales du client qui sont axées sur une marque ou une entreprise, au-delà de l'achat, résultant de facteurs de motivation". En ce qui concerne l'engagement des internautes sur les médias sociaux, il peut être négatif (par exemple, un commentaire négatif sur la destination) ou positif (par exemple, partage de post et recommandation de la destination à d'autres personnes). Ainsi, pour évaluer l'engagement des internautes/Touristes envers les plateformes "Visit Morocco", un certain nombre de mesures ont été calculées (le nombre moyen de mentions "J'aime/favoris", mentions "Je n'aime pas/ smiley en colère" de "partage/retweet", et commentaires/réponses). Le tableau 2 présente les principaux résultats de notre étude.

Tableau 2 : Nombre moyen de données d'engagement par poste en 2019

	Facebook	Twitter	Instagram	YouTube
Mentions j'aime/favori	136,9	16,4	3 311,4	26,9
Mentions je n'aime pas/ smiley "en colère" [a]	0,2	-	-	0,9
commentaire	12,2	1,5	24,5	1,8
Partage/retweets [b]	49,5	7,7	-	-

[a] La fonction "Je n'aime pas" n'est disponible que sur YouTube. Sur Facebook le smiley "En colère" remplace la fonction "Je n'aime pas"
[b] Nombre de partage n'est pas disponible à la fois sur Instagram et YouTube.

Comme indique le tableau, les publications de l'Office National Marocain de Tourisme sur Instagram a un nombre moyen de mention "j'aime" le plus élevé (3 311,4) suivi de Facebook (136,9), YouTube (26,9) et Twitter (16,4).

Le "Partage/retweets" représente le deuxième niveau d'engagement qui amène les internautes à partager les publications des OGD sur les médias sociaux. Dans la présente étude, les paramètres de partage ont été calculées uniquement pour les publications Facebook et Twitter, car le nombre de partage n'est pas disponible sur Instagram et YouTube malgré que cette option est activée. Les résultats étaient les suivants : une publication sur la page Facebook "Visit Morocco" a été partagé par 49,5 personnes en moyenne et un tweet a été retweeté par un nombre moyen de 7,7 internautes. En ce qui concerne les commentaires, qui représentent un niveau élevé d'engagement car il faut plus de temps pour écrire un commentaire que pour aimer ou partager une publication (Mariani et al.,2016). Les résultats indiquent qu'Instagram (avec un nombre moyen de commentaires de 24,5) offre le plus haut niveau d'engagement des touristes, suivi de Facebook (12,2) et au final YouTube et Twitter respectivement avec un nombre moyen de 1,8 et 1,5 commentaire. Ce qui nous laisse en dernier lieu la mention 'je n'aime pas' qui n'est disponible que sur YouTube et smiley "en colère" sur Facebook qui est considéré similaire à la mention 'je n'aime pas' dans cette étude. Les vidéos sur YouTube ont donné lieu à un nombre moyen de 0,9 de mention "je n'aime pas" et 0,2 smiley "en colère" en moyenne au niveau des publications Facebook.

Interactivité des OGD avec les internautes (Service client)

La dernière catégorie s'est concentrée sur les questions liées à l'interactivité avec les internautes afin de comprendre si les DMO utilisent ou non les médias sociaux pour fournir un service à la clientèle. À cette fin, les publications sur les plateformes "Visit Morocco" ont été analysées pour voir s'il y avait des réponses aux critiques, aux demandes de renseignements et aux compliments.

Les résultats ont montré que l'Office National Marocain du Tourisme n'utilise pas les médias sociaux comme outil de service client pour interagir avec les touristes. Cela se reflète dans l'absence de réponses par commentaire ou mention "j'aime" aux compliments écrits par les touristes, les demandes d'informations et commentaires négatifs sur l'ensemble des 155 publications postées en 2019

Conclusion

La présente étude explore la manière dont l'Office National Marocain du Tourisme utilise les médias sociaux pour promouvoir et commercialiser le Maroc comme destination touristique. Les résultats apportent d'importantes contributions à la compréhension de l'utilisation des médias sociaux dans le contexte touristique.

En analysant quatre plates-formes de médias sociaux, la présente étude contribue non seulement à une compréhension plus large de l'utilisation des médias sociaux, mais minimise également les défis méthodologiques associés aux études sur une seule plate-forme (Tufekci, 2014) en rendant les mesures compatibles sur toutes les plates-formes. Elle fournit également une vue d'ensemble de l'utilisation des médias sociaux en analysant le contenu des publications de l'Office National Marocain du Tourisme sur les quatre plateformes de médias sociaux populaires durant une année complète.

Il est intéressant de noter que l'adoption des médias sociaux par l'Office National Marocain à partir de l'année 2008, ce qui représente une période d'utilisation assez importante. En prenant en compte le nombre total de publications, Facebook s'est avéré être la plate-forme de médias sociaux la plus utilisée, tandis que YouTube était la moins utilisée. La popularité de Facebook s'explique par le nombre important d'utilisateurs actifs qui avoisine 2,5 milliard (Facebook, 2019). En ce qui concerne l'utilisation moins fréquente de YouTube, elle pourrait s'expliquer par le fait que la réalisation des vidéos promotionnelles nécessite plus de temps et de ressources.

En termes de contenu, les résultats indiquent que les OGD partagent moins souvent des vidéos que les photos et que les mentions "tags" sont moins utilisées que les hashtags.

En tenant compte du fait que les OGD utilisent les médias sociaux pour développer leur image de destination, la présente étude a classé le thème principal (c'est-à-dire l'image de destination projetée) de chaque publication sur les réseaux sociaux en utilisant un ensemble d'attributs d'image cognitive. Sur toutes les plateformes, le thème majeur le plus fréquemment projeté sur les plateformes "Visit Morocco" était les touristes et leurs bien-être, suivi par "les bâtiments et architectures, les paysages et nature, sites historiques et événements puis les hôtels (Riads) et infrastructures touristiques". Ce qui laisse "le mode de vie des habitants, produits et vêtements traditionnels et la cuisine marocaine en dernier lieu" malgré qu'ils font partie intégrante de l'image de la destination Maroc. De plus, les résultats montrent que les publications Instagram et Facebook créent des niveaux d'engagement client beaucoup plus élevés que les publications Twitter et YouTube.

En ce qui concerne le niveaux d'interaction avec les touristes sur les plateformes "Visit Morocco", il s'avère que l'Office National Marocain du Tourisme utilise toujours les médias sociaux comme un outil de marketing traditionnel, plutôt que de l'exploiter en tant qu'outil de service client afin de répondre aux compliments, demandes d'information ou commentaires négatifs pour atténuer les problèmes des touristes, ce qui présente des similarités avec les résultats de recherches antérieures sur les destinations européennes (exemple : Hays et al. (2013) ; Usakli, (2017).

Limites et Recherches Futures

Les résultats de cette étude sont spécifiques à un seul pays. Par conséquent, les futures recherches reproduisant cette étude avec des OGD d'autres pays arabes ou africains permettront d'améliorer notre compréhension de cet important domaine de recherche au niveau de cette zone géographique. Ainsi, l'extension de la période d'analyse à plusieurs années pourrait fournir des résultats plus généralisables.

Enfin, la présente étude a analysé uniquement les publications sur les réseaux sociaux, une approche plus qualitative impliquant des entretiens avec les responsables à l'Office National Marocain de Tourisme, offrirait un aperçu précieux pour comprendre pourquoi les OGD utilisent les médias sociaux dans un contexte de marketing.

Annexes

Tableau A1 : Description des thèmes d'images (Stepchenkova, S., & Zhan, F., 2013)

Catégories	Descriptions
Paysage et nature	Fait référence à la nature vierge avec des éléments mineurs liés à l'homme. Cette catégorie comprend les montagnes, les déserts, les forêts, les jungles, les rivières et les lacs, les plages, etc. Elle peut inclure des ruines/sites archéologiques et des attractions naturelles comme des grottes, des cavernes, etc.
Personnes	Comprend la population locale, les voyageurs, etc. Les personnes doivent raisonnablement se trouver au centre de l'image, ou dans un des foyers de l'image.
Sites historiques	Comprend les monuments historiques et sites archéologiques et éléments/designs de ces structures ou leurs éléments décoratifs.
Bâtiments et architectures	Fait référence à l'intérieur et à l'extérieur du style oriental/à l'architecture andalouse/moderne dans les zones urbaines et rurales. Cette catégorie comprend les Mosquées, églises, les monastères, les palais, les bâtiments publics (Non destinés à l'usage quotidien des résidents locaux), etc. Les images en gros plan d'éléments de bâtiments tels que les portes, les fenêtres ou les ornements sont incluses.
Mode de vie	Fait référence à la façon dont les populations locales vivent et reflète leurs conditions de vie, leur logement ou leurs activités quotidiennes. Elle peut inclure les maisons et architectures qui sont à l'usage des résidents et les activités traditionnelles comme le tissage et la fabrication d'objets d'art et d'artisanat. Et également les activités "modernes" comme la réparation d'une voiture, les travaux agricoles, la vente de marchandises et de souvenirs dans la rue, Cette catégorie est destinée à représenter les conditions de vie naturelles des populations locales. Si une image est "mise en scène", elle n'est pas incluse
Produits et vêtement traditionnels	Désigne les costumes traditionnels ou les costumes de fête qui reflètent la culture. Ainsi que les produits artisanaux.
Gastronomie	Comprend les plats marocains et les différentes spécialités culinaires
Hôtels et infrastructures touristiques	Désigne les hôtels, Riad, maisons d'hôtes, les restaurants, les stations balnéaires et les spas, les plages et piscines avec chaises et parasols, les terrains de golf, etc.

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Analysis of The Evolution And Impact of Teleworking With The Use of Technology: A Scientific Literature Review 2010-2020

Gregory Quiroz-Sandoval
Universidad Autónoma del Perú, Lima, Perú, gquirozs@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

In early 2020, a COVID-19 pandemic emerged, generating a totally atypical turn in the world business market. Currently the work environment is destabilized to some extent, seeking, and trying to create new methods of work as social distancing is an alternative to prevent the spread of this disease. This study is a systematic review that shows and analyzes the best alternatives, trends, and impact of teleworking worldwide. To execute this study and analysis a bibliographic and conceptual review was carried out in the Scopus, IEEE Xplore, ScienceDirect databases, identifying 49 articles from the databases, as a result it is obtained that the main aspects are the impact of teleworking, research on teleworking and the types of teleworking.

Keywords: "Teleworking", "social distancing", "digital platforms".

Introduction

The labor framework in recent times was changing according to the needs that originate in society, due to this change companies and businesses tend to reinvent themselves to achieve satisfaction with their products or services they provide to the customer (S. Zhang, R. Moeckel, A. T. Moreno, B. Shuai, and J. Gao, 2020). In recent times the market has changed more than usual, following the appearance of COVID-19 the business sectors most affected were hotels, restaurants, and the manufacturing industry, with private companies having better responses to this global problem and being better capitalized economically (K. G. Davis, S. E. Kotowski, D. Daniel, T. Gerding, J. Naylor, and M. Syck, 2020)

Teleworking is one of the work modalities in which the functions of the worker are carried out from a place other than the office where the company and operator are located, through the use of information and communication technologies (K. Wang and B. Ozbilen, 2020)

The digital platforms are a means of communication and development of activities that facilitate various processes that were done in person, the areas that already use this mode are the health sector, education, administration, telecommunications and more (A. P. Rudke, V. A. Sikora de Souza, 2020). After the declaration of the state of emergency, several companies have implemented teleworking, also called home office. This modality has forced us to quickly immerse ourselves in the digital and corporate world. With this, many technology companies created and improved certain software's that facilitate the development of activities in a virtual way, such as meetings and conferences (A. Hook, V. Court, B. K. Sovacool, and S. Sorrell, 2020).

Digitalization has been bringing positive and innovative results in large companies, so much so that all economic sectors are using digital platforms as an improvement to automate certain processes. With this change, personnel and collaborators are the participants in the use of this technology and work method (J. I. Dingel and B. Neiman, 2020).

Methodology

For the development of the following article, the methodology of search in scientific repositories and databases such as IEEE Xplore, SCOPUS and ScienceDirect was used. The search keywords were "telecommuting" O "impact of telework" O "remote work" O "technology in remote work" O "technological advance for teleworking"

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A. Research Questions

The research questions used were the following:

RQ1: What are the areas where teleworking has the greatest effect?
RQ2: What are the background studies and predictions on teleworking?
RQ3: What types of telework are more common in recent times?

B. Search Strategies and Processes

The research considered the field of action of the issues raised, taking into account the following key words and criteria of inclusion and exclusion.

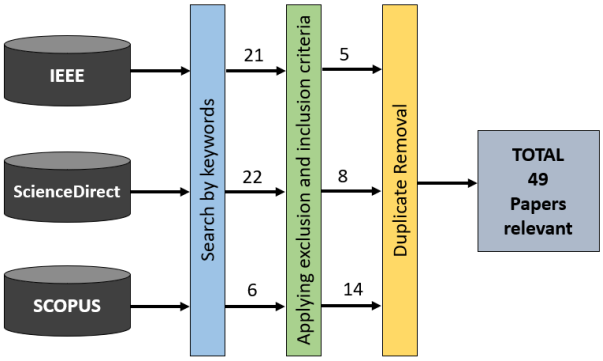

Fig 1. Prisma Diagram Methodology

C. Inclusion and Exclusion Criteria

For the study, the following exclusion and inclusion criteria were applied as shown in the following table.

TABLE I: EXCLUSION AND INCLUSION CRITERIA

Criteria's		
Inclusion	I01	Articles mentioning the impact of teleworking
	I02	Articles that reference the advance of technology in companies.
	I03	Articles mentioning remote work and its development.
Exclusion	E01	Items that are not related to the objective to be achieved.
	E02	Duplicate articles or articles with the same content.

Results

Research results are oriented to research findings. The process of analysis that was carried out was the following.

A. Extracted and Analyzed Articles

76 articles taken from the various databases and repositories were reviewed, discarding and excluding 27 articles that were not taken due to the parameters and the review that was given to the content of each one, 49 articles were obtained that do contribute to the analysis of the points to be achieved in this review.

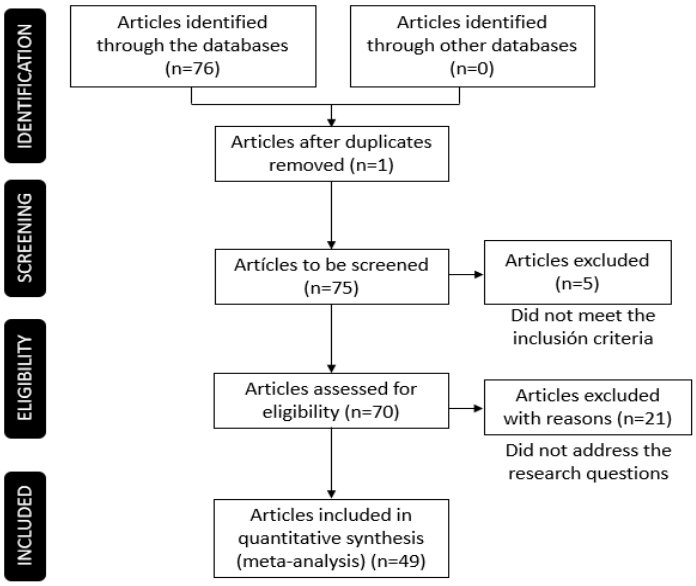

Fig 2. Item selection flowchart

As a result, 49 articles were obtained that meet the requirements for inclusion and, above all, that refer to the analysis of this work. The searches were carried out in 3 databases that have worldwide repositories.

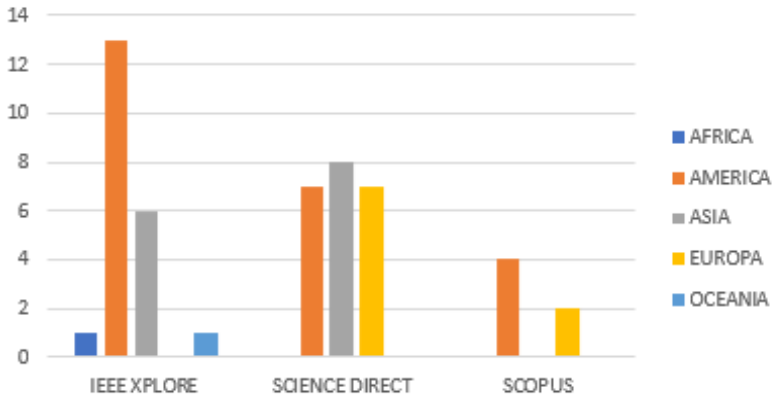

Fig 3. Representation of the repositories and continents of each article.

Within the 49 articles, the following classification of each one of them is made according to the content, it will be verified which is the impact of the Telework, the new advances and which are the types and headings where these practices of work are made more.

TABLE 2: ARTICLE CONTENT CATEGORIZATION

Article content categories	Article number	Count
Study of the Impact of Teleworking	(S. Zhang, R. Moeckel, 2020), (K. G. Davis, S. E. Kotowski, 2020), (K. Wang and B. Ozbilen, 2020), (A. P. Rudke, V. A. Sikora de Souza, 2020), (A. Hook, V. Court, B. K. Sovacool, 2020), (A. Ahmed, A. Ishaque, T. Nawaz, Y. Ali, and F. Hayat, 2014), (N. E. M. Elshaiekh, Y. A. A. Hassan, 2019), (T. Golden, 2010), (E. Clark, 2011), (T. D. Golden and K. A. Eddleston, 2019), (B. Fallon et al, 2020), (H. He and L. Harris, 2020), (A. Atalan, 2020), (M. M. Jaff and A. A. K. Hamsa, 2018), (Y. K. Dwivedi et al, 2020), (H. Asgari and X. Jin, 2018), (H. Budnitz, E. Tranos, and L. Chapman, 2020), (E. Glenn Dutcher, 2012), (S. Y. He and L. Hu, 2015), (P. O'Keefe, B. Caulfield, W. Brazil, and P. White, 2016), (H. Asgari, X. Jin, and M. B. Rojas, 2019), (J. I. Dingel and B. Neiman, 2020)	**22**
Background research and predictions on telework	(T. S. Ellis and R. L. Webster, 2011), (K. Keefe, Q. Mitchell, E. Rozier, 2011), (T. P. Caudell, A. L. Janin, 2012), (W. Lee, J. Kim, and H. Y. Kim, 2010), (H. Chen, L. Xiao, H. Jin, and Z. Wen, 2011), (G. Wasson and M. Humphrey, 2012), (H. B. Prajapati and V. A. Shah, 2014), (K. Subrahmanyam, S. Ibrahim, and R. A. A. De Lara, 2012), (E. Tamrat and J. Warren, 2015), (Y. P. Gupta, J. Karimi, and T. M. Somers, 2011), (S. J. Harrington and C. P. Ruppel, 2010), (S. M. Park, G. Wasson, and M. Humphrey, 2013), (D. T. Prystash, 2014), (V. Brugliera, 2010), (R. D. Wilton, A. Páez, and D. M. Scott, 2011), (T. Golden, 2012), (M. Babilon and K. O'Keefe, 2013), (F. D. Ismail, A. A. K. Hamsa, 2014), (S. N. Kim, S. Choo, and P. L. Mokhtarian, 2015), (L. Leung and R. Zhang, 2017), (L. Leung and R. Zhang, 2017), (R. De', N. Pandey, and A. Pal, 2020), (W. O'Brien and F. Yazdani Aliabadi, 2020), (T. Bayrak, 2012), (S. Chakrabarti, 2018), (B. De Borger and B. Wuyts, 2011), (R. Paleti, 2016), (A. Atalan, 2020), (J. I. Dingel and B. Neiman, 2020)	**29**
Analysis of the most common types of telework	(J. I. Dingel and B. Neiman, 2020), (F. D. Ismail, A. A. K. Hamsa, 2014), (S. N. Kim, S. Choo, and P. L. Mokhtarian, 2015), (L. Leung and R. Zhang, 2017), (K. G. Davis, S. E. Kotowski, 2020), (K. Wang and B. Ozbilen, 2020), (S. Chakrabarti, 2018), (B. De Borger and B. Wuyts, 2011), (R. Paleti, 2016)	**9**

Through the categorization of the articles, a specific analysis of the contents is made so that they can be related to each of the questions posed. The topics most touched in the articles according to the categorization are the following:

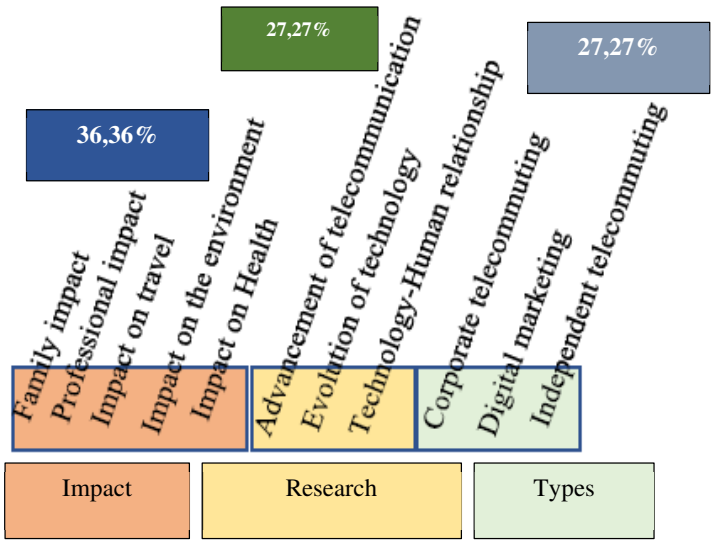

Fig. 4: Highlights of the articles.

Within the result the most outstanding points in the different articles are validated, in the category of the impact of teleworking 5 aspects were obtained, within the framework of the investigation on teleworking 3 important points were obtained and, on the types, also 3 important subjects were obtained each one of them shows us information on the relation that according to the antecedents and the present time the teleworking is developed in the world environment.

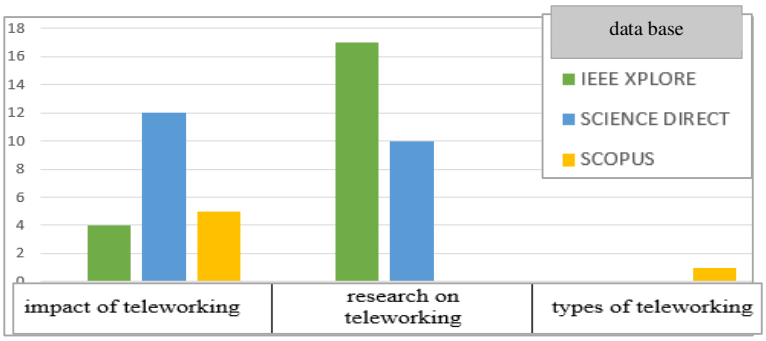

Fig. 5: Representation of article categories according to the databases.

Within the representation by categories, it is identified that, of the 49 articles, 21 mention and refer to the impact that causes the telework in the diverse scopes, 27 make reference and investigate the advance of the telework projecting itself forward and 1 article mentions the types of teleworking that exist and that are more common.

TABLE 3: CATEGORIZATION OF THE STUDY OF THE IMPACT OF TELEWORKING

Study of the Impact of Teleworking		Count
Impact of Teleworking on the Family	(S. Zhang, R. Moeckel, 2020), (K. Wang and B. Ozbilen, 2020), (A. Ahmed, A. Ishaque, T. Nawaz, Y. Ali, and F. Hayat, 2014), (N. E. M. Elshaiekh, Y. A. A. Hassan, 2019), (T. Golden, 2010), (B. Fallon et al, 2020), (M. M. Jaff and A. A. K. Hamsa, 2018), (Y. K. Dwivedi et al, 2020), (E. Glenn Dutcher, 2012), (S. Y. He and L. Hu, 2015), (P. O'Keefe, B. Caulfield, W. Brazil, and P. White, 2016), (H. Asgari, X. Jin, and M. B. Rojas, 2019)	**12**
Professional impact of teleworking	(S. Zhang, R. Moeckel, 2020), (K. G. Davis, S. E. Kotowski, 2020), (K. Wang and B. Ozbilen, 2020), (A. P. Rudke, V. A. Sikora de Souza, 2020), (A. Hook, V. Court, B. K. Sovacool, 2020), (A. Ahmed, A. Ishaque, T. Nawaz, Y. Ali, and F. Hayat, 2014), (N. E. M. Elshaiekh, Y. A. A. Hassan, 2019), (T. Golden, 2010), (E. Clark, 2011), (T. D. Golden and K. A. Eddleston, 2019), (H. He and L. Harris, 2020), (A. Atalan, 2020), (Y. K. Dwivedi et al, 2020), (E. Glenn Dutcher, 2012), (P. O'Keefe, B. Caulfield, W. Brazil, and P. White, 2016), (H. Asgari, X. Jin, and M. B. Rojas, 2019)	**16**
Impact of teleworking on travel	(M. M. Jaff and A. A. K. Hamsa, 2018), (H. Asgari and X. Jin, 2018), (H. Budnitz, E. Tranos, and L. Chapman, 2020)	**3**
Impact of teleworking on travel	(A. P. Rudke, V. A. Sikora de Souza, 2020), (A. Hook, V. Court, B. K. Sovacool, 2020), (A. Atalan, 2020), (H. Asgari, X. Jin, and M. B. Rojas, 2019)	**4**
Impact of Teleworking on Health	(S. Zhang, R. Moeckel, 2020), (K. G. Davis, S. E. Kotowski, 2020), (K. Wang and B. Ozbilen, 2020), (A. P. Rudke, V. A. Sikora de Souza, 2020), (A. Hook, V. Court, B. K. Sovacool, 2020), (A. Ahmed, A. Ishaque, T. Nawaz, Y. Ali, and F. Hayat, 2014), (P. O'Keefe, B. Caulfield, W. Brazil, and P. White, 2016)	**7**

Within the impact of teleworking, the various articles are classified according to the content referred to, 12 articles mention the family, 16 the professional environment, 3 the travel environment, 4 the environmental aspect and 7 the health environment, all related to the impact of teleworking.

TABLE 4. CATEGORIZATION OF TELEWORK BACKGROUND AND PREDICTIONS

Background research and predictions on telework		Cant.
Advancement of telecommunication for teleworking	(H. Chen, L. Xiao, H. Jin, and Z. Wen, 2011), (K. Subrahmanyam, S. Ibrahim, and R. A. A. De Lara, 2012), (Y. P. Gupta, J. Karimi, and T. M. Somers, 2011)	**3**
Evolution of technology in relation to telework	(T. S. Ellis and R. L. Webster, 2011), (S. J. Harrington and C. P. Ruppel, 2010), (S. M. Park, G. Wasson, and M. Humphrey, 2013), (T. Golden, 2012), (M. Babilon and K. O'Keefe, 2013), (F. D. Ismail, A. A. K. Hamsa, 2014), (S. N. Kim, S. Choo, and P. L. Mokhtarian, 2015), (H. J. Rhee, 2010), (R. De', N. Pandey, and A. Pal, 2020), (W. O'Brien and F. Yazdani Aliabadi, 2020), (S. Chakrabarti, 2018), (B. De Borger and B. Wuyts, 2011), (R. Paleti, 2016)	**13**
Relationship of the techniques and technological tools with the human being	(T. S. Ellis and R. L. Webster, 2011), (K. Keefe, Q. Mitchell, E. Rozier, 2011), (T. P. Caudell, A. L. Janin, 2012), (W. Lee, J. Kim, and H. Y. Kim, 2010), (G. Wasson and M. Humphrey, 2012), (H. B. Prajapati and V. A. Shah, 2014), (K. Subrahmanyam, S. Ibrahim, and R. A. A. De Lara, 2012), (E. Tamrat and J. Warren, 2015), (D. T. Prystash, 2014), (V. Brugliera, 2010), (R. D. Wilton, A. Páez, and D. M. Scott, 2011), (L. Leung and R. Zhang, 2017), (T. Bayrak, 2012)	**13**

In the second category the articles are classified as follows, 3 articles refer to telecommunication, 13 to the evolution of technology and 13 to the relationship of technological tools with the human being, all of them regarding the influence of teleworking in each of the identified categories

TABLE 5: CATEGORIZATION OF TYPES OF TELEWORK

Analysis of the most common types of telework		Cant.
Corporate teleworking	(J. I. Dingel and B. Neiman, 2020), (T. S. Ellis and R. L. Webster, 2011), (R. De', N. Pandey, and A. Pal, 2020), (R. Paleti, 2016)	**4**
Marketing techniques	(J. I. Dingel and B. Neiman, 2020), (T. S. Ellis and R. L. Webster, 2011), (S. M. Park, G. Wasson, and M. Humphrey, 2013), (F. D. Ismail, A. A. K. Hamsa, 2014), (H. J. Rhee, 2010)	**5**
Independent Teleworking	(J. I. Dingel and B. Neiman, 2020), (R. De', N. Pandey, and A. Pal, 2020), (S. Chakrabarti, 2018), (R. Paleti, 2016)	**4**

And in the last table of the category of telework types is categorized as follows, 4 articles make mention of corporate telework, 5 to marketing techniques and 4 to independent telework, all related to telework and its types.

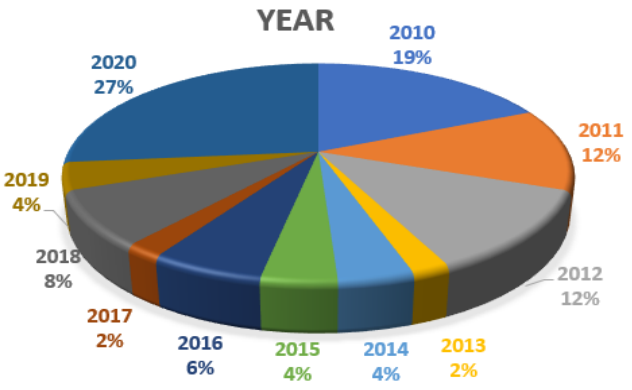

Fig. 6: Percentage representation of articles according to the year of publication of each one.

Discussion

In the present study and analysis of the various articles, the most popular aspects, and the influence that teleworking has were identified, being more common this method of work in these times of global pandemic. As shown in Table 2, of the 49 articles the most popular aspects of which studies relate to teleworking are 3, the study of the impacts left by teleworking, research on the background and predictions of teleworking and the types of teleworking most common in the last 10 years, these analyses contextualize the advance and growth of remote working worldwide.

RQ1: What are the areas where teleworking has the greatest effect?

In Table 3, the concepts that are most analyzed and studied in the articles are categorized, the mentioned points that generate more content are referring to the impact that teleworking causes in 5 main environments at a general level, family impact, professional, travel, environment and health, these studies allow to raise techniques that favor positively each of the approaches such as flexible schedules, training and motivation to the employee, saving resources for the environment and above all methods that do not affect the health of the human being who uses the modality of teleworking.

RQ2: ¿What are the background studies and predictions on teleworking?

In Table 4, we identify the studies of the advance of telecommunications, the evolution of 3G for the speed of connectivity and above all how this advance in favor of digital connection, generating more comfort and speed for the remote worker. It also identifies the advance of technologies such as software and hardware having greater effect today due to the capacity and performance that are gaining thanks to the innovative and futuristic idea of the manufacturer, finally it mentions the relationship of these technologies with the human being, going from the old tools to those that currently exist and especially as the human being has the ability to adapt immediately to changes in this area, being a fundamental ally for the evolution of man.

RQ3: What types of teleworking are more common in recent times?

Finally, in Table 5, the types of teleworking are mentioned. In recent years, the public and private corporate sector have been the ones that have used this modality the most, due to their resource capacity. On the other hand, the digital business has also been growing in these last 5 years, considered as a virtual work as well as the independent entrepreneurship, since, by using technology as a tool, they create new business items in the digital era. These approaches allow us to analyze various global aspects, even more so if we are currently experiencing a pandemic. The world had an exceptional growth in the sale of hardware and software, the technology manufacturer has more demand in recent years, since the new business idea of entrepreneurs and organizations is to develop and implement the technique of labor more common in this time making mention of the Telework.

Conclusion

The study carried out presents a systematic review of the literature on the evolution and impact of teleworking with the use of technology in the last 10 years, as a result it was found that the aspects where teleworking has more effect are in the family, in the professional, in the environment, in health and in travel. This allows us to analyze better alternatives regarding these 5 categories and thus generate positive results for people who use this modality of work. On the other hand, it was also analyzed the research and evolution of remote work, it was identified that since the emergence of the pandemic the world, businesses were forced to implement this modality, having better results the organizations with greater economic power. According to the current results, remote work is one of the most used modalities, due to the good response that it has in this last time. Future research can focus on some of the following questions: What impacts in the future will the modality of remote work have? What technological tools generate the best results to carry out teleworking? What positive and negative effects did the global pandemic leave on teleworking? With these questions it will be possible to analyze the various changes, evolution and impact that teleworking can have and thus generate ideas and techniques that contribute positively to organizations and to the collaborator who carries out the modality of digital work.

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Analysis of The Use of Biometrics as Access Authentication, A Review of Scientific Literature 2015-2020

Jorge Salcedo-Prado
Universidad Autónoma del Perú, Lima, Perú, jsalcedop@autonoma.edu.pe

Marielena Mamani-Campos
Universidad Autónoma del Perú, Lima, Perú, mmamani1@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

Security with respect to the platforms of companies or other institutions is a problem in these times, therefore, this article is a systematic review of the literature on the analysis of the use of biometrics as access authentication to different platforms. The present review has been based on published articles from 5 databases that are IEEE Xplore, Scopus, ScienceDirect, Scielo, EBSCOhost where 58 articles were found that will be included or excluded according to our own criteria. The collected articles talk about the use of biometrics and the most used types of biometrics. Where later it is concluded that biometric means for authentication cover many fields such as those of medicine, online payments, migration, user or human authentication.

Keywords: Use of Biometrics, Biometric Means, Access Authentication, Scientific Literature Review.

Introduction

In recent times, the demand for security in many applications or platforms has increased, making biometric recognition the most prominent authentication system. This is mentioned because user authentication through face and voice are biometric techniques to improve security (Debnath and Roy, 2020), but this does not mean that they are the only ones since there is fingerprint and iris authentication. It is worth mentioning that facial recognition modules have surpassed most traditional forms of access control (Rao *et al.*, 2020), such as the user - password, access card or record books.

Although the use of biometrics is expensive, this does not mean that everything is negative, since with the advance of technology these means of authentication have appeared, which not only save time, but also labor, so this makes the efficiency a hundred times(Rai *et al.*, 2020). In addition, the use of these means is fast, easy to use, defined, reliable and more profitable compared to traditional forms of access control being some of these forms obsolete, since they only consist of knowledge and cards (Conejar *et al.*, 2016).

A biometric system consists of a pattern recognition system that recognizes a person by determining the authenticity of one of his or her specific physiological and/or behavioral characteristics (Debnath and Roy, 2020), These characteristics are unique features of each person that no other person has so the biometric system determines if the person trying to enter certain platforms is authentically her and not someone else.

For all these reasons, this review will analyze the use of biometrics as access authentication.

Methodology

Type of study

The systematic review of scientific literature defined in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guide will be used for the elaboration of the article.

Research questions

For the development of the investigation, we ask ourselves the following questions:

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RQ1. What are the most used biometric means for authentication?

RQ2. What is the most commonly used biometric media category?

RQ3. What is the impact of using these biometric means in authentication?

Search strategies

In order to provide an evidence-based answer to each question posed for the development of the research, a search for scientific articles was carried out in the Scopus, IEEE Xplore, ScienceDirect, Scielo and EBSCOhost databases, finding a total of "58" articles, of which 43 are between the years 2015-2020. For the search of previously mentioned articles, the following keywords are considered, classifying them according to the database:

IEEE Xplore, EBSCOhost and Scielo: “biometric recognition”, “biometric authentication” and “systematic review”

Scopus and ScienceDirect: “biometric” or “use of biometrics” or “authentication” or “recognition” and “systematic review”.

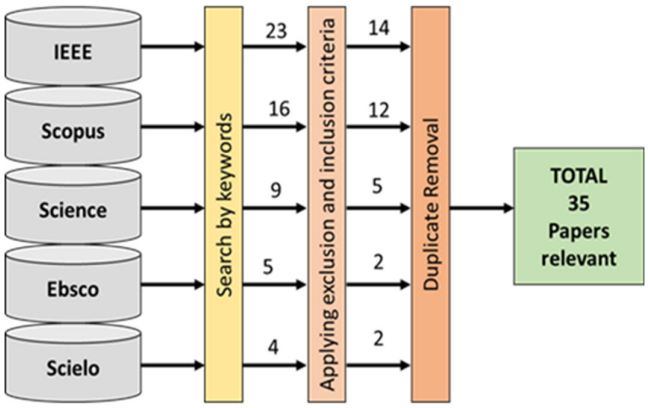

Fig 1. Search Strategies

Inclusion and exclusion criteria

For the review, 4 inclusion and exclusion criteria were taken in order to answer the questions posed above.

Table 1: Criteria

Criteria		
Inclusion	CI-1	Articles related to research.
	CI-2	Articles in the range of 2015 - 2020.
Exclusion	CE-1	Articles out of range (2015 - 2020)
	CE-2	Articles that do not answer the research questions.

Results

Extracted and analyzed articles

For this systematic review, 5 databases were taken in which 58 articles were found regarding the use of biometrics as access authentication. After compiling these articles, we selected 35 used for the development of the review, discarded 1 for duplication, and excluded 22 articles for not meeting the criteria defined in the inclusion and exclusion criteria stage.

The following details the process carried out for the selection of the articles based on the PRISMA methodology.

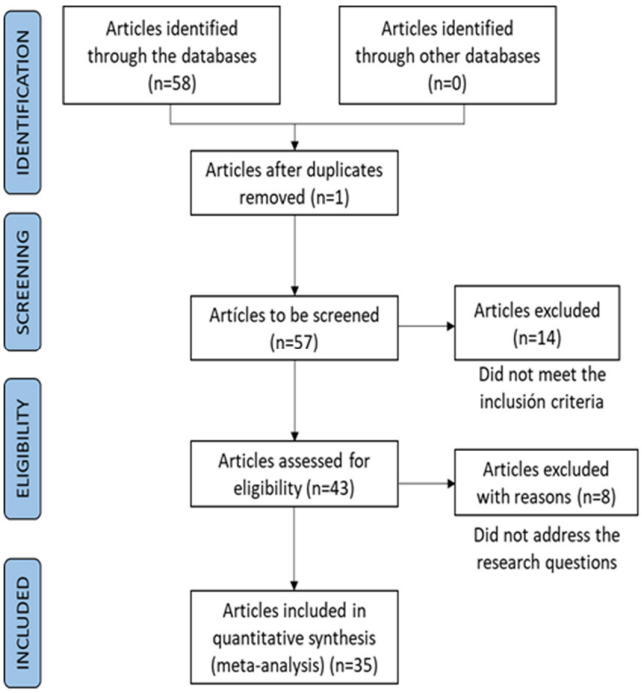

Fig 2. Selection process

Distribution of articles according to database

The 35 articles that were taken meet the criteria presented above, and among the articles that were chosen are 12 articles from Scopus, 14 from IEEE Xplore, 5 in ScienceDirect, 2 in EBSCOhost and 2 in the SCIELO database.

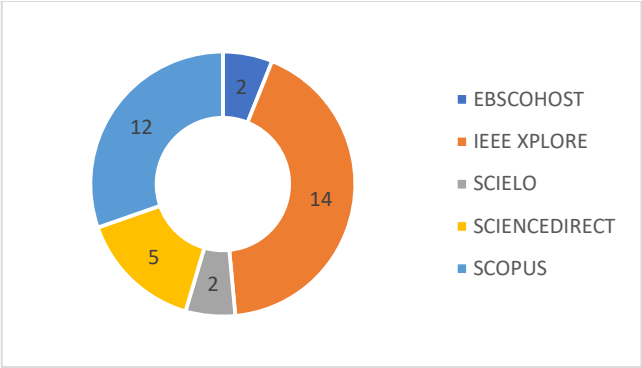

Fig 3. Articles by database

Distribution of articles according to year of publication

The figure 4 shows the distribution of the articles taken for the research with respect to the years 2015-2020. It is clear that research has been increasing over the years, evidencing the need for research in the field of biometrics.

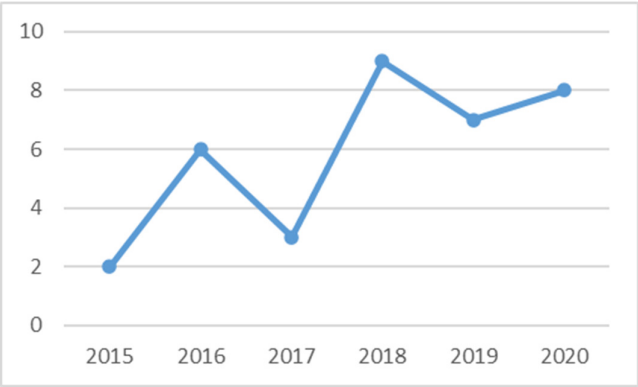

Fig 4. Articles by year of publication

Distribution of articles according to country of origin

The Figure 5 shows the cumulative number of items taken for research according to their country of origin. It can be seen that the country with the largest amount of research related to biometrics is India with 17 articles, followed by the United States with 4 articles, then Pakistan with 2 articles and a total of 12 articles from the different countries.

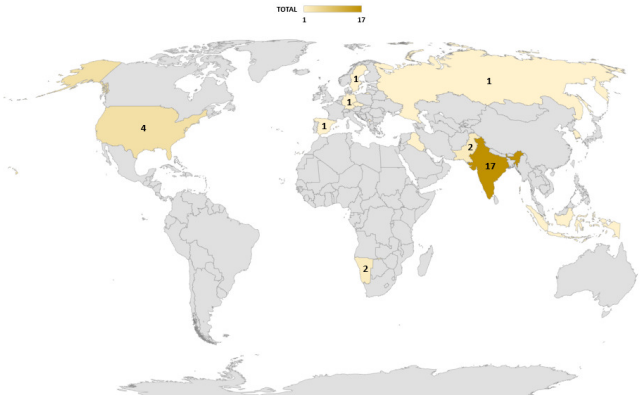

Fig 5. Articles by country of origin

Systematization of research

For this review, a synthesis of the selected articles was made in order to obtain the answers to the questions posed in the methodology stage of this document (II.B). This synthesis considers only 33 articles of the 35 taken, since 2 of them are used to contextualize the present review.

Biometric

The following table shows a summary of the different biometric means used in the different investigations.

Table 2: Biometric means

Biometrics	Articles	#
Behavior	(Eremin, Kogos and Filina, 2017),(Peng, Choo and Ashman, 2016)	2
Fingerprint	(Rao *et al.*, 2020), (Ogbanufe and Kim, 2018), (Abazi, Qeliaja and Hajrizi, 2019), (Gehrmann, Rodan and Jönsson, 2019), (Kaur and Sengupta, 2018), (Hemalatha, 2020), (Meena and Malarvizhi, 2016), (Razaque *et al.*, 2020), (Sapkale and Rajbhoj, 2016)	9
Face recognition	(Debnath and Roy, 2020), (Rao *et al.*, 2020), (Kanak, 2018), (Abazi, Qeliaja and Hajrizi, 2019), (Sati *et al.*, 2018), (Meena and	9

	Malarvizhi, 2016), (Carlos-Roca, Torres and Tena, 2018), (Shah *et al.*, 2015), (Kar *et al.*, 2006)	
Iris recognition	(Abazi, Qeliaja and Hajrizi, 2019), (Meena and Malarvizhi, 2016), (Vishwakarma and Patel, 2019), (Supriya and Manjunatha, 2016), (Noma-Osaghae *et al.*, 2018)	5
Hand recognition	(Roopa and Veluchamy, 2019), (Jemimah, Muthumeenakshi and Radha, 2018)	2
Retinal Vasculature	(Jiu, Noronha and Jayaswal, 2017)	1
A card with biometric	(Dharminder *et al.*, 2020), (Sudhakar and Natarajan, 2020), (Kathrine, 2018)	3
Labels based on biometrics	(James, Thomas and Alex, 2015)	1
Hair	(Kar *et al.*, 2006)	1
Speech	(Debnath and Roy, 2020), (Kaur and Sengupta, 2018)	2
Electrocardiogram	(Khan *et al.*, 2019), (Ingale *et al.*, 2020)	2
Fingernails	(Barros Barbosa, Theoharis and Abdallah, 2016)	1
Tactile keystrokes	(Alpar, 2018)	1
Human DNA	(Zahid *et al.*, 2019)	1

Categories of biometrics

The following table shows the systematization of the categories to which the biometric means used in the different articles belong.

Table 3: Categories of biometrics

Category	Articles	#
Behavioral biometrics	(Alpar, 2018), (Eremin, Kogos and Filina, 2017), (Peng, Choo and Ashman, 2016)	3
Physical Biometric	(Dharminder *et al.*, 2020), (Sudhakar and Natarajan, 2020), (James, Thomas and Alex, 2015)	3
Physiological Biometric	(Debnath and Roy, 2020), (Rao *et al.*, 2020), (Kanak, 2018), (Belkhouja *et al.*, 2019), (Ogbanufe and Kim, 2018), (Abazi, Qeliaja and Hajrizi, 2019),(Gehrmann, Rodan and Jönsson, 2019), (Sati *et al.*, 2018), (Khan *et al.*, 2019), (Kaur and Sengupta, 2018), (Ingale *et al.*, 2020), (Zahid *et al.*, 2019), (Kathrine, 2018), (Hemalatha, 2020), (Meena and Malarvizhi, 2016), (Vishwakarma and Patel, 2019), (Supriya and Manjunatha, 2016), (Carlos-Roca, Torres and Tena, 2018), (Roopa and Veluchamy, 2019), (Shah *et al.*, 2015), (Razaque *et al.*, 2020), (Jemimah, Muthumeenakshi and Radha, 2018), (Jiu, Noronha and Jayaswal, 2017), (Kar *et al.*, 2006), (Noma-Osaghae *et al.*, 2018), (Sapkale and Rajbhoj, 2016)	26
Transient biometrics	(Barros Barbosa, Theoharis and Abdallah, 2016)	1

Field of use

The table below shows the field of use of the different biometric means found in the different articles collected for the review.

Table 4: Field of use

Field of use	Articles	#
User authentication	(Debnath and Roy, 2020), (Barros Barbosa, Theoharis and Abdallah, 2016), (Alpar, 2018), (Abazi, Qeliaja and Hajrizi, 2019), (Gehrmann, Rodan and Jönsson, 2019), (Sati *et al.*, 2018), (Kaur and Sengupta, 2018), (Sudhakar and Natarajan, 2020), (Zahid *et al.*, 2019), (Eremin, Kogos and Filina, 2017), (Kathrine, 2018), (Hemalatha, 2020), (Supriya and Manjunatha, 2016), (Razaque *et al.*, 2020), (Jemimah, Muthumeenakshi and Radha, 2018), (Noma-Osaghae *et al.*, 2018), (Sapkale and Rajbhoj, 2016)	17
Access validation	(Kathrine, 2018), (Noma-Osaghae *et al.*, 2018), (Sapkale and Rajbhoj, 2016)	3
Human authentication	(Rao *et al.*, 2020), (Kanak, 2018), (Belkhouja *et al.*, 2019), (Khan *et al.*, 2019), (Ingale *et al.*, 2020), (James, Thomas and Alex, 2015), (Meena and Malarvizhi, 2016), (Vishwakarma and Patel, 2019), (Roopa and Veluchamy, 2019), (Shah *et al.*, 2015), (Jiu, Noronha and Jayaswal, 2017), (Kar *et al.*, 2006)	12
Border control processes	(Carlos-Roca, Torres and Tena, 2018)	1
Intrusion detection	(Peng, Choo and Ashman, 2016)	1
Authentication scheme	(Dharminder *et al.*, 2020)	1
Electronic payments	(Ogbanufe and Kim, 2018)	1

Discussion

The use of biometrics comes from some years ago and while every year advances its usefulness increases in different areas of our lives.

Therefore, at the beginning of the article we ask ourselves three questions, which are the following:

RQ1. What are the most commonly used biometrics for authentication?

Table 2 shows which biometrics are present in our life and how they influence it, according to the different articles taken for this review. Based on this, it can be said that these biometric means not only use parts of our body, but also use our behavior as a means of authentication. Therefore, the most used means according to the table are facial recognition and fingerprint.

RQ2. What is the most widely used category of biometrics today?

Table 3 helps us to have a better visibility of this categorization. Therefore, it can be seen that physiological biometry is one of the most used in the market since from the articles collected 26 of them fall into this category, where it covers the use of permanent features such as the face, the iris, the DNA, the hair, the fingerprint, among others, but there was something curious in this review since it gave us a different perspective with transitory biometry. This biometry is a good option for those who do not want to use their permanent features to authenticate themselves in different platforms, so transitory biometry proposes the use of human features that can change in 6 months.

RQ3. What is the impact of using these biometrics on authentication?

In Table 4 it is about the fields of use of biometrics, and which areas it covers in our lives. It has more impact on user authentication, since of the 35 articles, 17 are related to this field of use. This does not detract from the other fields, but rather shows what is currently being covered most. However, if we also notice that these biometric means are entering the fields of migration, such as the border control process field or the medical field, which use a patient authentication scheme.

Conclusion

It is concluded that the most used biometrics are those of fingerprint and facial recognition because in more than half of the articles they mention it. Therefore, physiological biometrics is the category with the greatest presence since the biometrics mentioned above fall into this category.

In addition, the impact that the use of biometrics has generated is evident, since we use it every day either to unlock the cell phone or to access an area of our work, so the use of biometrics is nothing new, but it has covered many areas of our lives as shown in the systematic review conducted. Likewise, biometrics has acquired a level of improvement because now not only parts of our body are used, but also our specific behaviors or functionalities of our body such as heart beats are used to authenticate our identity, as can be seen the use of biometrics in our lives has come so far.

Some authors mention that in the not-so-distant future the use of biometrics will become part of our lives so future research could focus on the following question What other parts of our body can be used as a means of access authentication?

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Analysis of The Use of Data Mining Techniques To Detect Low Academic Performance: A Review of The Scientific Literature From 2015-2020

Crhistian Hilario-Melo
Universidad Autónoma del Perú, Lima, Perú, chilario@autonoma.edu.pe

Christian Sanchez-Pantigoso
Universidad Autónoma del Perú, Lima, Perú, csanchez15@autonoma.edu.pe

Michael Cabanillas-Carbonell
Universidad Autónoma del Perú, Lima, Perú, mcabanillas@ieee.org

Abstract

Low academic performance is a problem that affects a large number of Latin American educational institutions, this being the main problem of university dropouts. Educational data mining is an essential part in the detection of low academic performance. The present document is a systematic literature review which obtained 220 documents collected from the BD Dialnet, IEEE_Xplore, IOP Science, ProQuest, Redalyc, Science Direct, Scopus. Managing to systematize 49 documents with the best data mining techniques, reflecting them in tables and illustrations, in which we determine that the impact generated by the use of data mining techniques is positive since more than 80% accuracy is obtained.

Keywords: Academic performance, data mining, student's performance, data mining techniques.

Introduction

Education is an important factor with respect to the academic performance of students, knowing that in Latin America they do not have a policy to improve the level of student learning, which results in a low percentage of student achievement, which affects in certain mode to the development of a country (Cacho, 2017).

Academic performance refers to the evaluation of the knowledge acquired in the student environment (school-university). Some Latin American universities design timely strategies to promote academic success and improve the academic experience of students. To achieve this, educational institutions are realizing the potential of studying educational data to improve the quality of their educational management decisions (Rico Páez and Sánchez Guzmán, 2018). One issue to consider is the poor academic performance of students, which can lead to poor academic performance or to the disapproval of their courses, this is one of the problems that Universities must face (Menacho Chiok, 2017) .

Data mining is primarily aimed at finding hidden information from a data set (Morales Carrillo *et al.*, 2019). The process involved in applying data mining is part of a massive analysis in large amounts of data with the purpose of extracting significant and relevant knowledge, as well as predictive models that provide knowledge patterns for decision making (Hidalgo Cajo, 2018).

The concept of Data Mining is applicable to the Educational Area, calling it EDM or Educational Data Mining (Lopez Guarin, Guzman and Gonzalez, 2015) which in the last decade has grown enormously because it allows Education Professionals to discover patterns or relevant knowledge that help to improve the quality of teaching and better understand the learning environment of students.

With respect to recent years, it has been shown that predicting student academic performance has become an important issue for educational institutions (Mutrofin *et al.*, 2020). However, there are many factors that influence academic performance, so it is easy to predict this issue, but with the application of EDM there is the possibility of overcoming this obstacle (Farissi, Dahlan and Samsuryadi, 2020). By carrying out these procedures to the set of data mining techniques, it could allow institutions to take more effective pedagogical actions for the advice of students who require them (Li *et al.*, 2019). Therefore, this research is intended to analyze the impact of the use of data mining techniques for the detection of low academic performance.

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Methodology

A. Type of study

The systematic review of the scientific literature defined in the PRISMA guide (Prefered Reporting Items for Systematic Review and Metaanlyses) will be used.

B. Research Question

The proposed Research question was the following:

RQ1. What is the impact generated by the use of data mining techniques in the detection of low academic performance?

.RQ2. What is the most effective technique to detect poor academic performance?

C. Search strategies

In order to provide an answer to our research question, a search was made for scientific articles from the following databases: Dialnet, IEEE_Xplore, IOP Science, ProQuest, Redalyc, Science Direct, Scopus where 49 documents were collected considering the period 2015 -2020.

At the time of conducting the searches for our research, the following keywords were considered: "academic performance" or "data mining" or "EDM" or "data mining" or "low academic performance" or "Predict low Academic Performance" and "Data Mining Techniques".

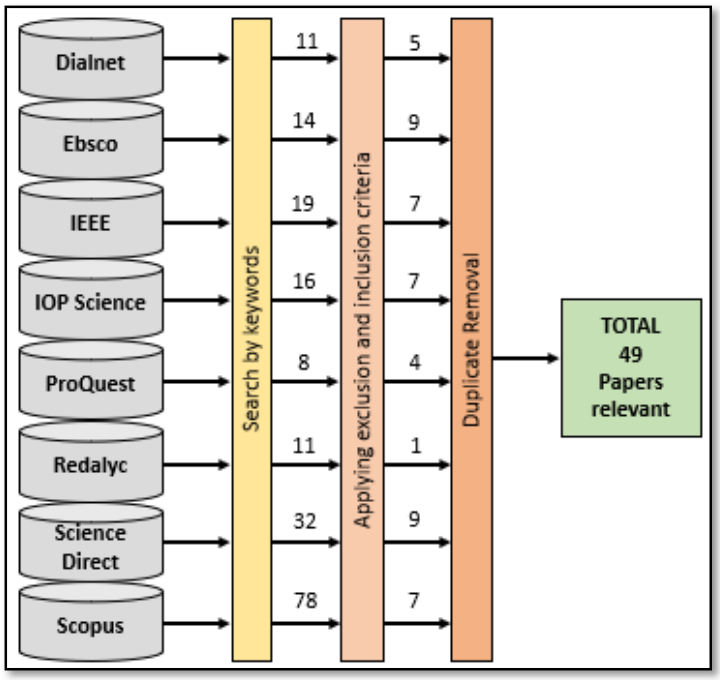

Fig 1. Study database.

D. Inclusion and exclusion criteria

The following inclusion and exclusion criteria shown in the following table were applied for this literature review.

Table 1: Inclusion and exclusion criteria

RESEARCH CRITERIA		
Inclusion	CI-1	Articles related to the study of student data mining techniques.
	CI-2	Years of publication between 2015-2020.
	CI-3	Articles written in English, Spanish.
	CI-4	Articles developed in the European and Latin American context.
Exclusion	CE-1	Some documents are not articles.
	CE-2	Some articles do not cover data mining techniques.
	CE-3	Some articles do not apply in the area of engineering and education.
	CE-4	Some articles are not associated with the study variable.

Results

A. *Articles extracted and analyzed*

The results of the investigations revolve around the findings of the investigation, the scientific journals and their stratification by names and year. The analysis process that was carried out was as follows.

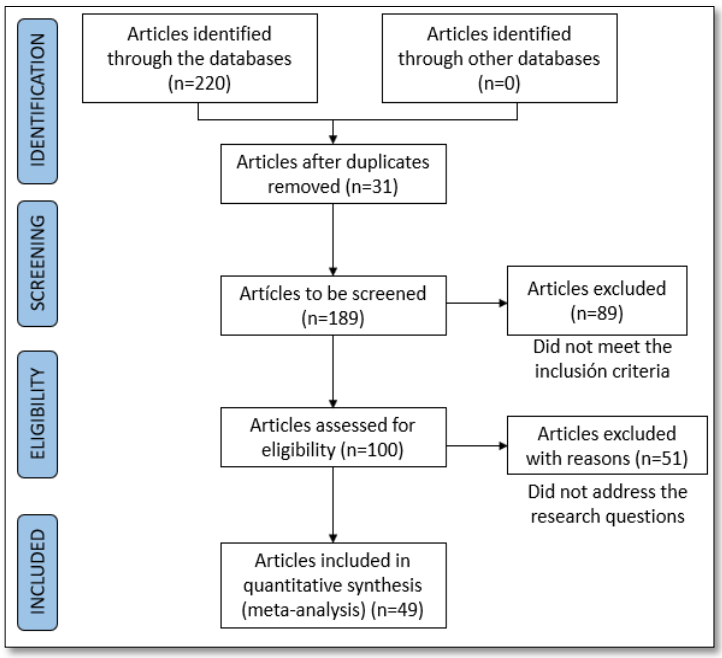

Fig 2. Items extracted

The 49 articles chosen contemplate the inclusion criteria identified above, finding: 5 articles from Dialnet, 9 articles from Ebsco, 7 from IEE_XPLORE, 7 from IOP Science, 4 from ProQuest, 1 from Redalyc, 9 from ScienceDirect and 7 from Scopus.

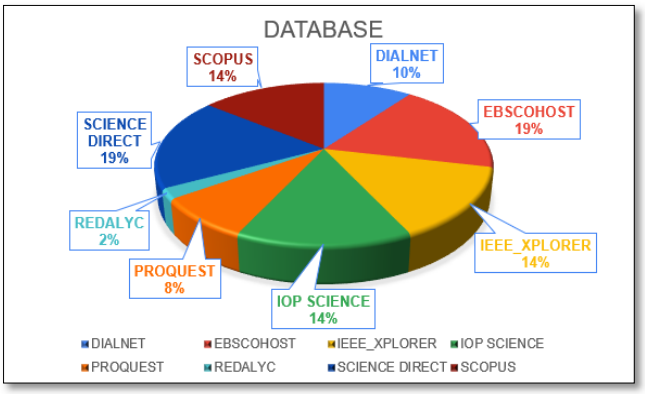

Fig 3. Database Quantity

*B. **Quantity and demographics of selected documents***

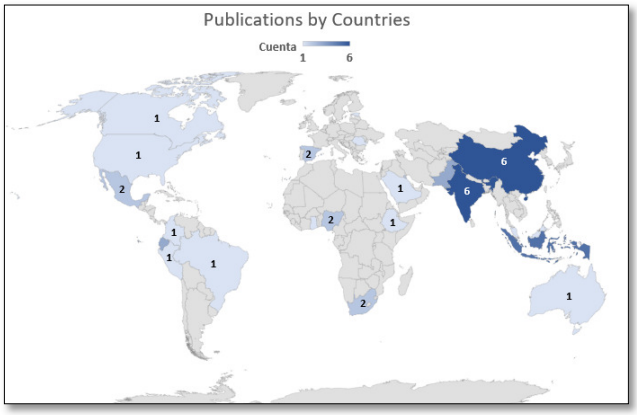

Fig 4. Number of Publications by Country

In this Graph it can be seen that the countries with the most publications selected within the year 2015-2020 are China with 6 and India also with 6.

*C. **Continental quantity and demographics of selected documents per year***

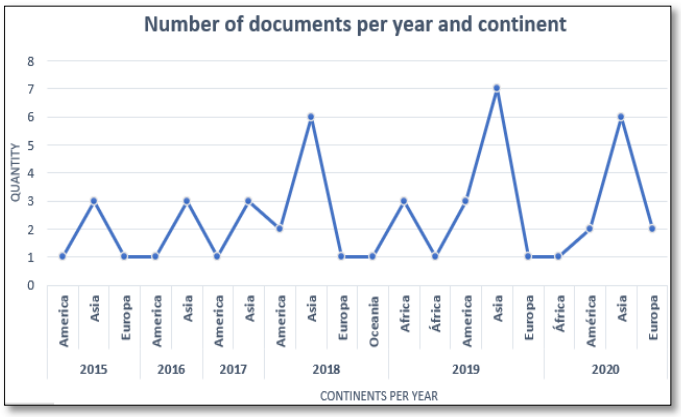

Fig 5. Number of documents per year and continents

In this graph it can be seen that the Asian Continent is the one that published the most documents in the 5 years followed by America and the one that was least found was Oceania.

*D. **Publication Languages Table***

Table 2: Language of the Articles

LANGUAGE	ARTICLES
English	(Lopez Guarin, Guzman and Gonzalez, 2015) (Mutrofin *et al.*, 2020) (Farissi, Dahlan and Samsuryadi, 2020) (Li *et al.*, 2019) (Miguéis *et al.*, 2018) (Rosado, Payne and Rebong, 2019) (Chanlekha and Niramitranon, 2018) (Farrah Siddiqui and Ali Arain, 2019) (Abdulazeez and Abdulwahab, 2019) (Injadat *et al.*, 2020) (Acosta-gonzaga and Ramirez-arellano, 2020) (Hooshyar, Pedaste and Yang, 2020) (Naicker, Adeliyi and Wing, 2020) (Conijn *et al.*, 2017)(Raga and Raga, 2019) (Burman and Som, 2019) (Gyimah and Dake, 2019)(Ekubo and Esiefarienrhe, 2019) (Chui *et al.*, 2020) (Talingdan, Trinidad and Palaoag, 2018) (Giap *et al.*, 2018) (Huang, 2020)(Kumar, Singh and Handa, 2017) (Oreski, Konecki and Pihir, 2019) (Namomsa and Prasad Sharma, 2019) (Helal *et al.*, 2018) (Shahiri, Husain and Rashid, 2015) (Badr *et al.*, 2016) (Asif *et al.*, 2017) (Yang and Li, 2018) (Adekitan and Salau, 2019) (Fernandes *et al.*, 2019) (Czibula, Mihai and Crivei, 2019) (Waheed *et al.*, 2020) (Anuradha and Velmurugan, 2015) (Mayilvaganan and Kalpanadevi, 2015) (Devasia, Vinushree and Hegde, 2016) (Marbouti, Diefes-Dux and Madhavan, 2016) (Burgos *et al.*, 2018) (Almayan and Al Mayyan, 2016) (Wati *et al.*, 2018) (Foster and Francis, 2020) (Ifenthaler and Yau, 2020)
Spanish	(Cacho, 2017) (Rico Páez and Sánchez Guzmán, 2018) (Menacho Chiok, 2017) (Morales Carrillo *et al.*, 2019) (Hidalgo Cajo, 2018) (Reyes *et al.*, 2019)

In this table it can be seen that more articles were found in English with a number of 43 and in Spanish only 6.

E. Category Publication Table by year

Table 3: Category of the Articles

CATEGORY	ARTICLES
Algorithm Application	(Farissi, Dahlan and Samsuryadi, 2020)
Data mining	(Chanlekha and Niramitranon, 2018) (Talingdan, Trinidad and Palaoag, 2018) (Giap *et al.*, 2018) (Huang, 2020) (Yang and Li, 2018) (Almayan and Al Mayyan, 2016) (Wati *et al.*, 2018)
Educational Data Mining	(Morales Carrillo *et al.*, 2019) (Hidalgo Cajo, 2018) (Mutrofin *et al.*, 2020) (Rosado, Payne and Rebong, 2019) (Farrah Siddiqui and Ali Arain, 2019) (Injadat *et al.*, 2020) (Hooshyar, Pedaste and Yang, 2020) (Adekitan and Salau, 2019) (Fernandes *et al.*, 2019) (Devasia, Vinushree and Hegde, 2016) (Foster and Francis, 2020) (Ifenthaler and Yau, 2020)
Model Classification	(Gyimah and Dake, 2019) (Ekubo and Esiefarienrhe, 2019) (Czibula, Mihai and Crivei, 2019) (Anuradha and Velmurugan, 2015) (Mayilvaganan and Kalpanadevi, 2015)
Predictive Model	(Rico Páez and Sánchez Guzmán, 2018) (Lopez Guarin, Guzman and Gonzalez, 2015) (Abdulazeez and Abdulwahab, 2019) (Naicker, Adeliyi and Wing, 2020) (Conijn *et al.*, 2017) (Raga and Raga, 2019) (Burman and Som, 2019) (Chui *et al.*, 2020) (Helal *et al.*, 2018) (Badr *et al.*, 2016) (Asif *et al.*, 2017) (Waheed *et al.*, 2020) (Reyes *et al.*, 2019) (Marbouti, Diefes-Dux and Madhavan, 2016) (Burgos *et al.*, 2018)
Data Mining Techniques	(Cacho, 2017) (Menacho Chiok, 2017) (Li *et al.*, 2019) (Miguéis *et al.*, 2018) (Acosta-gonzaga and Ramirez-arellano, 2020) (Kumar, Singh and Handa, 2017) (Oreski, Konecki and Pihir, 2019) (Namomsa and Prasad Sharma, 2019) (Shahiri, Husain and Rashid, 2015)

In this table it can be seen that the Predictive Model articles are the ones that were published the most in 2020.

F. Most Used Data Mining Techniques

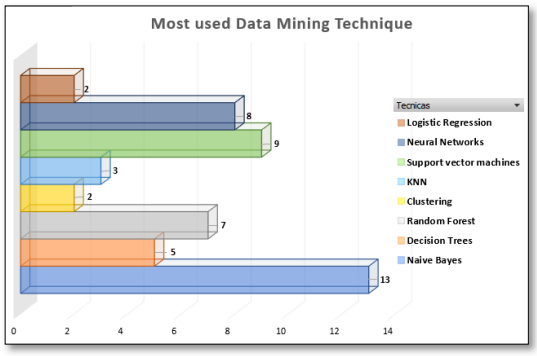

Fig 6. Most Used Data Mining Techniques by Year

In this graph it can be seen that the most used Data Mining technique is the Naive Bayes algorithm followed by Support Vector Machines.

*G. **Accuracy measurement in documents***

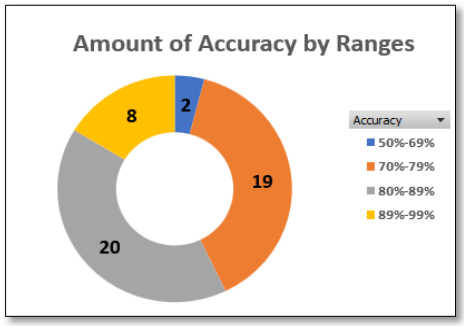

Fig 7. Accuracy Measurement in documents

In these graphs, we can see that the application of data mining techniques is highly effective in detecting poor academic performance.

*H. **Accuracy measurement in documents***

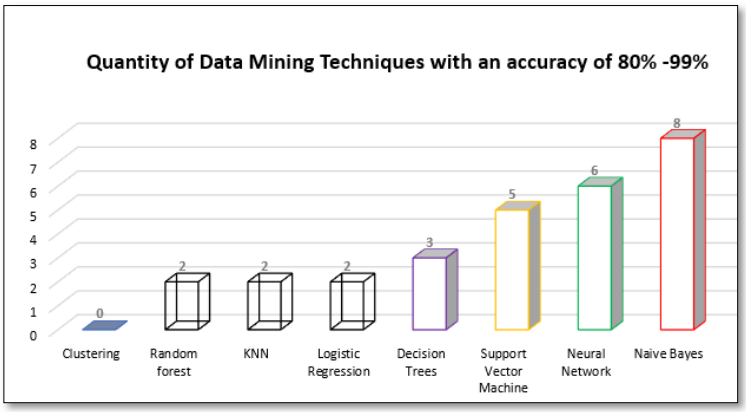

Fig 8. Data Mining Techniques that are 80% - 99% Accurate

In this graph it can be seen that the Naives Bayes algorithm has 8 documents with more than 80% accuracy followed by neural networks with 6 documents.

Discussion

Taking the aforementioned as a reference, an answer to the research question can be made.

a) RQ1: What is the impact of the use of data mining techniques in detecting low academic performance?

According to Fig 7, it can be seen that the application of data mining techniques has a high percentage of effectiveness in detecting low academic performance, with the highest result being ranges of 80% -90% accuracy (indicator of accuracy) which gives us as a result that the impact that would be generated by applying said data mining techniques would be positive since it guarantees a high population capacity to achieve the objective that is the detection of low academic performance.

b) RQ2: What is the most effective technique to detect poor academic performance?

According to Fig 6 it can be seen that the Naive bayes algorithm is one of the most preferred and used for the detection of poor academic performance followed by the technique of Support Vector Machines (VME) and Neural Networks, in addition, according to Fig 8 it is You can see that the Naive bayes algorithm is the data mining technique that has the most documents with 80% - 99% accuracy followed by neural networks with 6 documents.

Conclusion

The use of data mining techniques for the detection of low academic performance is feasible and would generate a positive change since most generate an accuracy (Accuracy) of more than 80% which would guarantee that the detection of low performance is optimal, thus Likewise, the use of the Naive Bayes algorithm in the different research works analyzed shows that it is one of the most used data mining techniques for detecting poor academic performance. The process of building a Bayes Naive RB is based on performing parametric learning that consists of building programs that automatically improve their performance with experience (Menacho Chiok, 2017).

Another important point that we can highlight is regarding the use of Neural Networks and why we decided not to use it for the study we are conducting. Thanks to the systematization that we were building according to studies carried out by other researchers, we learned about the different obstacles that the application of neural networks presents. We realized that the application or use of this data mining technique requires a high amount of data for training, the more flexible the neural network is required to be, the more information it will have to teach it to properly perform the identification. . On the other hand, with the application of the Naive Bayes algorithm, this small study of the data can be carried out and according to it choose the best characteristics that will be used to perform the classification,

Recommendations

Once the development of this research work is completed, it is considered relevant to investigate other aspects related to the mechanisms of study of educational data:

- Work on improving the classification model normally used in some application research to increase efficiency and improve the precision of results.
- Analyze in greater detail about possible alternatives in statistics that can be used to carry out this type of study or in relation to its application in the education sector to take better educational strategies.

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The Use of Selected PPS Sampling Methods in the Polish Non-Profit Sector Analyses

Sabina AUGUSTYN

Cracow University of Economics
Cracow, Poland
e-mail: sabina.augustyn@uek.krakow.pl

Abstract

The non-profit sector is also called the third sector and this term refers to the organizations operating independently of any government (NGOs), whose purpose is usually to conduct social, environmental or political activities. In Poland dedicated research methods have been developed solely for the purposes of analyzing this sector. These methods allow to take into account the diversity of the surveyed organizations and are typically based on the stratified sampling methods, however the purposive selection is also in use.
In this paper, a preliminary assessment of the applicability of the new method of researching the NGO sector in Poland is made. This method is based on selected PPS (Probability Proportional to Size) sampling plans such as sieve sampling and Lahiri sampling. A proposal of adapting these sampling schemes to the study of the NGO population is presented. A comparative analysis is also carried out in relation to the currently used method, including sample size and the population structure.

Keywords: NGO, sieve sampling, Lahiri sampling, survey sampling, PPS, estimation

JEL classification: C13, C15, C83, L31

Introduction

The NGO sector (non-governmental organizations, third sector) plays an increasingly important role in most modern economies. Non-profit institutions (NPIs) usually operate independently of national governments, and their main focus is social, environmental or political activities.

As with many analyzes of socio-economic phenomena, it is difficult or even impossible to fully research various aspects of NGOs' activity due to the large size of the population of interest. Therefore, sampling methods based on sampling theory are used. A number of research methods are proposed, which allow conducting sample surveys and estimating various parameters of the studied populations.
When conducting research for the analysis of the nonprofit sector, there is a problem of non-response, the consequence of which may be distortion of the results obtained, which will not sufficiently describe the actual condition of the entire third sector.

All this causes a constant need to search for appropriate research methods and tools that will allow obtaining valuable and reliable results.

The NGO sector in Poland

As mentioned before, the institutions in the third sector carry out many different activities. However, there is a set of certain characteristics of their activity. According to the definition of the United Nations (2018), a characteristic feature of NPI is the combination of three elements:

1) They are private (not controlled by government).
2) Their main purpose is to serve a social or public purpose rather than to maximize and distribute returns on invested capital.
3) Engagement in them is voluntary (done by free will and without coercion).

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The scope of activities of NPIs varies considerably from one country to another. The names and definitions associated with many types of activity also vary from country to country, which is a major challenge in international comparative analyzes.

In Poland, the third sector includes (Statistical Office Poland, 2018):

- foundations,
- associations and similar organizations:
    - typical associations,
    - sport clubs,
    - voluntary fire brigades,
    - hunting clubs,
- faith-based charities,
- business and professional associations:
    - farmers organizations,
    - other business associations,
    - other professional associations.

The official reports are issued every second year, and according to the latest one there were 91.8 thousand of NPIs in Poland in 2016 (it is the latest available data). Figures 1-3 present the structure of Polish third sector in 2016.

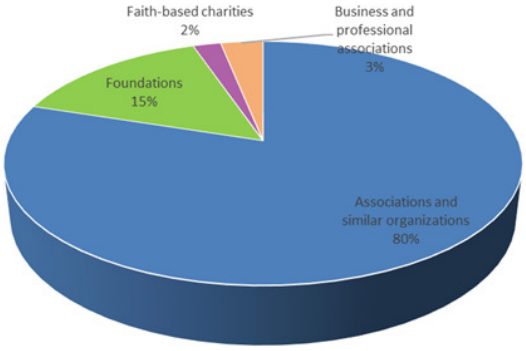

Fig.1. Polish third sector in 2016 by the type of organization
Source: own calculations based on (Statistical Office Krakow, 2018)

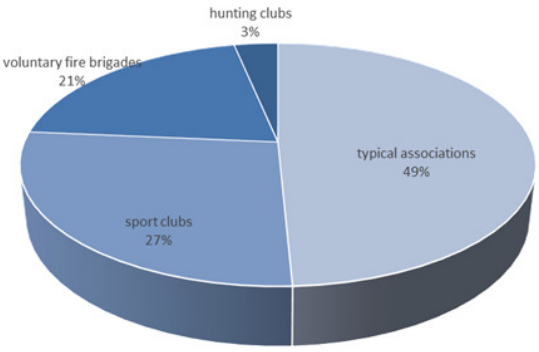

Fig.2. Polish associations and similar organizations in 2016 by type of organization
Source: own calculations based on (Statistical Office Krakow, 2018)

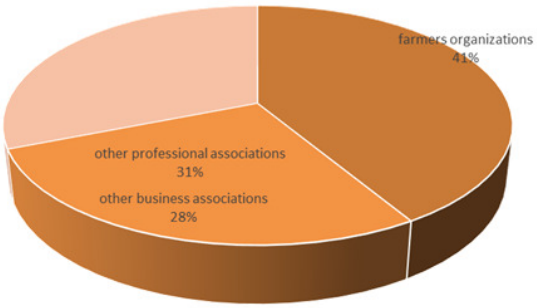

Fig.3. Polish business and professional associations and similar organizations in 2016 by type of organization
Source: own calculations based on (Statistical Office Krakow, 2018)

As long as the form of employment is considered, most of the NPIs in Poland do not have paid workers (see Fig.4).

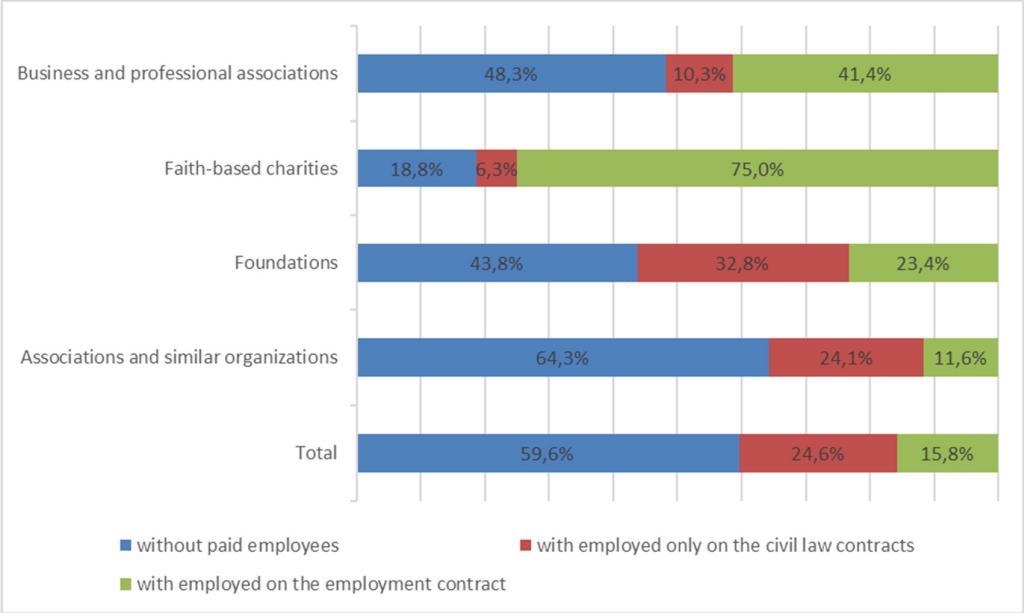

Fig.4. Polish third sector in 2016 by the form of employment
Source: own calculations based on (Statistical Office Krakow, 2018)

Due to the form of employment, the only exception (among other NGOs) are faith-based charities, 75% of which employ people on a regular employment contract.

Current NGO sector research methods in Poland

The methods of analyzing the non-profit sector vary from country to country. In Poland, a mixed method of purposive and random selection is in use (Statistical Office Cracow, 2018, pp.155-163). The basis for the study is the Statistical Units Database (SUD) from which non-profit organizations with legal personality, and having a legal form and economic activity defined in SUD as an active entity conducting business or an inactive entity that does not conduct business but is preparing to start it, were selected.

The study was carried out on the basis of SOF-1 and SOF-4 forms. SOF-1 form is based on a survey on typical associations and similar organizations, sport clubs, voluntary fire brigades, hunting clubs, foundations, and faith-based charities, while SOF-4 survey is a survey on farmers organizations, other business associations, and other professional associations (see also: Central Statistical Office, 2016, pp. 22-32). The SOF-1 based survey covered 28,92% of the population of interest. The survey sample was based on the purposive selection of 12 types of

organizations (which covered 14.59% of the study frame) and the random stratified sampling procedure, on the basis of which 14.33% of entities from the study frame were selected for the further analysis.

The stratified sampling procedure was carried out on the basis of 16 voivodships (provinces) with 9 largest urban areas (25 groups as a total), and then two different legal types of organizations were also considered: 1) foundations and 2) associations and similar organizations. As a result, 50 different groups were recognized, and the organizations were selected randomly from each of these groups with respect to the counties (powiats) population size. When the associations are considered, the following categories were defined: voluntary fire brigades, hunting clubs, sports associations and other organizations. The sample size was determined under the assumption that the maximum relative standard error of estimates is 5%. Moreover, as the 15% level of non-response was expected, the initial required sample size was deliberately increased by 20% before sampling.

The SOF-4 based survey was complete, therefore all the objects were included in the study.

Selected sampling plans – sieve sampling and Lahiri sampling

One of the common methods of sampling (i.e. drawing a sample from a population) is sampling with probability proportional to size (PPS) of the elements in the population (with or without replacement). In this sampling plan, the larger a given item is (in terms of the value of the variable of interest), the more likely it is to be selected. This procedure is widely presented in the statistical literature (Cochran, 1953), (Des Raj, 1954), (Kish 1965), (Zasępa, 1972), (Sudman 1976), (Stuart 1983), (Thompson 1992), (Steczkowski, 1995), or (Lohr 1999).

Many of these methods have been widely used in financial auditing, i.e. to detect possible errors in accounting book values. Sampling without replacement techniques (in which an object once selected does not return to the population and cannot be re-drawn) include, among others, *sieve sampling*, while sampling with replacement procedures (resulting in a possible selecting the same object more than once) include *Lahiri sampling* and other plans. It seems that implementing of both these methods in NGO sector study is possible.

Sieve sampling as a method of selecting a sample of the size of n was introduced to auditing by Rietveld (1978). Assume the accounting population consists of N book values, denoted by x_i each. Let $T_x = \sum_{i=1}^{N} x_i$ be the total book value of the accounting population. The purpose is to select a sample of the target size of n. According to Horgan (1997b, p.43) the steps of this methods are as follows:

1. For each book value separately a number r_i (i=1,..,N) is being randomly selected from between 0 and $\frac{T_x}{n}$ (both inclusive).
2. A book value is selected when its value (x_i) is at most equal to the corresponding random number r_i ($x_i \geq r_i$).
3. If any book value $x_i \geq \frac{T_x}{n}$, it is always being selected.

It's worth noting that all the book values are being "tested" in terms of being selected, no book value is selected more than once (which satisfies the „without replacement" requirement), and that the effective (achieved) sample size n_e can be different from the target sample size of n.

As Horgan (1997b, p.43) and Augustyn (2014, pp.127-128) mention, the probability of the inclusion of the *i-th* book value (x_i) in the sample is:

$$\pi_i = \frac{nx_i}{T_x}. \tag{4.1}$$

The expected value of the achieved sample size n_e can be found by (see also: (Horgan, 1997b, p.43) and Augustyn (2014, pp.127-128):

$$E(n_e) = \sum_{i \in U} \pi_i = \sum_{i \in U} \frac{nx_i}{T_x} = n \tag{4.2}$$

and its variance by:

$$V(n_e) = \sum_{i \in U} \pi_i (1 - \pi_i) = \sum_{i \in U} \frac{nx_i}{T_x} (1 - \frac{nx_i}{T_x}) \leq n. \tag{4.3}$$

The big advantage of this method is the ease of its use, however, the samples selected this way are characterized by a large variability in the number of elements included in it, so the actual (achieved) sample size n_e of the sieve sample

may be much higher or lower than initially planned one (n). This may result in an increase in the time and cost of the study (*when* $n_e > n$) or in drawing incorrect conclusions about the population due to the study of a sample that is too small (when $n_e < n$).

The modification of the sieve sampling plan – *stabilized sieve sampling* – enables two-stage sample selection with the achieved sample size equal to the target size. For this purpose, the initially selected sieve sample is modified (stabilized) by either increasing or decreasing its size. The procedures of augmenting and reducing the sieve sample size were introduced by Horgan (1997b). See also: (Augustyn, 2014, pp.129-130).

When the achieved sample size is greater then the target size ($n_e > n$), it can be reduced by selecting a simple random sample (s) of the size equal to the target size n. As Horgan (1997b, p.44-45) shows (see also: (Augustyn, 2014, p.129)) the inclusion probability in the second stage is equal to:

$$\pi_i^* = \frac{n^2 x_i}{n_e T_x}. \tag{4.4}$$

If the achieved sample size is less than the target size ($n_1 < n$), it can be augmented by additional selection of n-n_e book values carried out on the basis of the Lahiri sampling plan, first introduced in (Lahiri, 1951). It is another PPS procedure of determining sample of the target size of n. For the first time it was used in auditing by Horgan (1997a) according to the following procedure:

1. A random number i is being selected between 1 and N. It represents the book value that can be included in the sample.
2. Another random number (r) is being selected between 1 and the maximum book value (x_{max}).
3. For each $r \leq x_i$, the corresponding book value is being selected as a sample item.

This procedure is repeated until n book values are being selected. The inclusion probability of any book value in the sample is:

$$\frac{x_i}{N \cdot x_{max}}. \tag{4.5}$$

Lahiri sampling is a fixed-size sampling plan – but it is a procedure of sampling with replacement, therefore the achieved sample size may be different from the target one. Moreover, there are trials with no book values being selected. According to Horgan (1997a) the average number of trials for selecting one single book value is:

$$\frac{N x_{max}}{T_x}, \tag{4.6}$$

which may be quite large when the extreme maximum book value appears.

As mentioned before, the Lahiri sampling plan can be use to augment the sieve sample, when its achieved size is less then desired ($n_e < n$). In this stage additional n-n_e book values are being selected (Lahiri, 1951). The inclusion probability of the i-th book value in this two-stage sampling procedure is (Horgan, 1997a):

$$\frac{x_i}{T_x}. \tag{4.7}$$

One should note, that stabilizing the sieve sample with Lahiri procedure means that the sampling in the second stage is based on the entire population, which may result in reselection of the objects already selected in the first stage. It is also possible that an object will be selected more than one in the second stage, while augmenting the sieve sample, that is during the Lahiri sampling. However, Horgan (1997b, pp. 49-51) proves that the probability of multiple selection of any book value decreases with the increase of the target sample size (n) and is likely to be near 0 in large samples.

When stabilizing sieve sampling is considered, one should notice that, even if the sieve sampling plan is based on the PPS method of sampling without replacement, the second stage of the sampling procedure (augmenting or reducing the sample size) does not meet the conditions for the PPS methods without replacement, as the inclusion probabilities of the book values are not proportional to their size (value).

Application of the sampling procedures to NGO research study

As mentioned before, the sieve sampling and the Lahiri sampling both are procedures based on the probabilities proportional to size of the elements of the population. When adapting these procedures for financial auditing purposes, the total book value (T_x) of accounting population of the size of N is considered, that is based on the sum of all the book values of the population (x_i).

As the NGO sector represents objects other than the accounting book values, essential updates of the sampling procedures have to be introduced first. Let then assume that the analysis will be based on the counties (powiat) data. The number of counties will be denoted by N, and the number of the NGOs in a county will be x_i (i=1,…, N). However, the data such as the number of NGOs is available only for voivodships (of which there are only 16 in Poland), the simulation of the distribution of the number of NGOS per county will be based on data on the number of inhabitants in counties, as it was assumed that the number of NGOs in counties would be proportional to the number of inhabitants in counties.

Then $T_x = \sum_{i=1}^{N} x_i$ will be the total number of the NGOs in Poland. The next steps will be based on the sieve and Lahiri sampling respectively, i.e selecting random values ri, and electing the corresponding values of xi . When an object is selected, it is the corresponding county, and all the elements (NGOs) in this county will be included in the sample.

The evaluation of the results will be based on two approaches:

1) the comparison of the achieved sample size (official data vs. sieve/Lahiri sampling)
2) the comparison of the proportions of the main categories of NGO objects in the population under study and in the samples (same approach).

Database description

The simulation study was carried out on the basis of actual data provided by Statistics Poland (formerly known as Central Statistical Office). The population of interest was the population of counties (314 in 2016) and city counties – cities with county rights (66), which made the population size 380. As mentioned above, the data on the frequency distribution of the NGOs in counties is not available in Poland, and therefore was simulated on the basis of the distribution of the number of inhabitants per county. The population was also stratified on the basis of four categories (types of organizations), that is (see Fig.1):

1) foundations,
2) associations and similar organizations,
3) faith-based charities,
4) business and professional associations.

On this basis, three sample plans were applied: current official sampling plan (plan O), sieve sampling (stabilized – plan S) and Lahiri (L). As the official sampling plan is a mixed purposive selection and stratified sampling technique, it is impossible to identify the objects being selected on purpose. Therefore, the stratified sampling scheme was applied as the substitute of the official sampling plan, by replacing the purposively selected object with the objects randomly selected from the population. Moreover, the assumption of the non-response share in the population equal to 15% has been omitted.

On the basis of the sampling theory, the minimum required stratified sample size has been determined (sample target size, n). When selecting the samples, 1000 of iterations of each procedure have been carried out, and the results have been registered. The relative maximum tolerable error was 0.05.

Results of the simulation study

On the basis of the simulation study, the average achieved sample size (n_e) has been computed for three of the above mentioned procedures, as well as the average proportion (share) of each of the four categories (types of organizations) has been registered.

Achieved sample size

As mentioned before, 1000 iterations were carried out respectively according to the three sampling plans. Then the average achieved sample sizes have been calculated for these plans, along with their standard deviations. At the end,

the two sample tests for population means have been conducted at the 0.05 significance level respectively for any two of the sampling plans. Table 1 shows the results of the hypothesis testing procedures.

Table 1: The results of the testing the difference of population means

Comparison	Difference of the means
$\mu_O = \mu_S$	significant
$\mu_O = \mu_L$	significant
$\mu_S = \mu_L$	significant
$\mu_T = \mu_S$	not significant
$\mu_T = \mu_L$	significant
$\mu_T = \mu_O$	not significant

Source: own calculations
Note: μ_T *– the average target size of a sample*
μ_O *– the average achieved sample size in the "official" plan*
μ_S *– the average achieved size of the stabilized sieve sample*
μ_L *– the average achieved size of the Lahiri sample*

On the evidence of the sample data one may say that the average sample size is significantly different when comparing the results of any two of the sampling plans. This can be a proof that different sampling plans may affect the quality of the estimation procedure, in terms of accuracy of prediction. Also, the average achieved sample size was closest to the target sample size in case of the official sample and the stabilized sieve sample. This may suggest that the stabilized sieve sampling can be used as a sampling plan in the studies of the NGO sector research.

Moreover, the variability of the achieved sample sizes in each of the plans is the largest in the case of the Lahiri sampling, which may be a result of the nature of this plan, as sampling is carried out with replacement. This may then result in selecting some objects more than once, and, because of this, the sample sizes can be smaller than expected. This is a very big flaw of this plan.

The proportion of the categories in the samples

After 1000 of the samples of each type (official, stabilized sieve, Lahiri) had been selected, each time the proportion of the categories was determined in order to recognize the frequency distribution of the categories, and then, the average proportion of any of the following categories was calculated:

1) associations and similar organizations,
2) foundations,
3) faith-based charities,
4) business and professional associations.

In the population the proportion of the associations and organizations was 0,7995 (nearly 80%) of the total number of organizations, making this category the largest in a study, and the foundations with the share of 0,1481 (14,81%) constituted the second largest category.

The tests of the difference of the two means were conducted for any two of the sampling plans with reference to all of the categories of interest, respectively. The significance level was 0.05. The results show that the average share of the two largest categories (associations and similar organizations as well as foundations) are equal (or, to be more specific, there are no significant differences between any sampling plan result and the population, as well as between any two sampling plans respectively).

When considering the difference between the proportions of the two smallest categories in population (that is, faith-based charities and business and professional associations), the comparison of any different sampling plans and the

population, shows, that, on average, in Lahiri samples, the share of those categories is significantly different from the results based on the other plans (official and sieve), as well as in the population. Moreover, the results show that, when referring to the population results, the closest values of the proportion were found on the basis of the official plan and stabilized sieve sampling plan.

Conclusions

On the basis of the simulation study the following can be stated:

1) When sampling from a population, the achieved sample size may be different from the target sample size.
2) When comparing the average achieved sample size in each of the plans presented above, there is always a significant difference when comparing any two sampling plans, however the achieved sample size is different from the target sample size only when the Lahiri sampling is in use.
3) When analyzing the structure of the population and the samples based on the three sampling plans, the average proportion of any of the two largest categories in the population and the all of the samples, there's no significant difference detected among them. But when considering all of the four categories, the official plan is the best method of selecting the sample.
4) The stabilized sieve sample produces the results that are almost so close to the population results, as the official plan.
5) Stabilized sieve sampling can be considered as an alternative to the sampling plan, that is currently officially in use in the study of the NGO sector.
6) However, the stabilized sieve sampling may be more time consuming, as two stages of the sampling procedure are required, as the initial sample can be either larger than, or less than the required (target) sample size.
7) Moreover, one may not forget that as long as the results of the simulation study are considered, the results may be different when analyzing the true population of NGOs in Poland.
8) Finally, the actual results may be distorted by the non-response error, as it is estimated to be 15%.
9) The next steps in the analysis will be to measure the effect of the non-response, to extend the analysis by the estimation of selected population parameters, such as the average number of employees, to determine the actual structure of the NGO population in Poland on the county level.

Acknowledgment

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Exploring Relationship Between the Characteristics of a Region and The Effectiveness of Innovative Activities of The SME Sector in Poland

Tomasz NOREK

University of Szczecin, Poland
tomasz.norek@usz.edu.pl

Abstract

The main research objective of the article is to answer the question whether there is a interrelation between determinants of the region's innovativeness and the effectiveness of innovative activities carried out by the SMEs operating in the examined region. The author formulated the following hypothesis: (H1) *There is a positive correlation between the determinants of innovativeness of the region and the effectiveness of innovative activities implemented by the SMEs operating in the region.*
In the study, an exploratory-descriptive method was used, involving a statistical aggregation of obtained results in selected analytical sections. The survey covered 1920 enterprises from all regions of Poland. The data necessary to assess the effectiveness of innovation processes of the surveyed entities were collected by means of an online survey. The study was carried out in the period from June 2019 to September 2019. Moreover, the data published by EUROSTAT and the Polish Central Statistical Office concerning innovation in Polish regions were used.
The completed study confirmed the research hypothesis – regional determinants significantly influence the effects of innovative activities. The effectiveness of implemented innovation processes is higher in the surveyed SMEs operating in regions with greater innovative potential.

Keywords

Introduction

Innovation is recognized as a fundamental determinant of economic growth in individual countries. As the theory of economic growth shows, the long-term dynamics of GDP depends on three key factors: capital accumulation, population growth and technological progress. In the European Union's strategy, support for innovation is considered to be a condition for the dynamic development of the whole Community which allows it to be remain competitive with the economies of the USA, Japan or China. This position is reflected in the currently implemented Community strategy – Europe 2020 - and is widely discussed in literature (Kasperkiewicz, 2016; Janger et al., 2016; Camagni, Capello, 2013).

Currently, more and more emphasis is placed on the development of innovation at the regional level. The confirmation of such a policy is the creation of regional innovation systems, which include economic entities, research units and administrative institutions cooperating with each other in order to effectively create, support and diffuse innovation. Regional studies in recent years have strongly emphasised that innovation processes are territorial in nature. The fact that innovation is a local process is highlighted (Mitra, 2019). The region is no longer perceived as solely a physical space, a place where business activity is located (considered in classical economic theories in terms of transport, land or labour costs). Today, the region is interpreted as an incubator of knowledge and innovation processes and a basic level of organisation of innovation capacity of entities (Parrili er al., 2016).

Modern innovation processes are primarily based on endogenous resources, and as a consequence, innovation is considered as a geographically dependent process, significantly stimulated by regional potential (Giannakis, Bruggeman, 2017). In this context, regional conditions are conducive to reducing the risk of innovative activities for business entities operating on this territory. Similarly, regions without appropriate characteristics fail to support enterprises operating on their territory in undertaking innovative activities.

This situation is mainly due to the fact that the last dozen or so years have seen a radical revaluation of the importance of the socio-economic development factors. Today, the primary focus is on information and knowledge resources and the related innovations (the modern economy is referred to as the knowledge-based economy). Many socio-economic

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processes have been transferred from the national to the regional level. The region has become a key plane for development processes and economic policy-making and is viewed as a kind of knowledge and innovation incubator, an essential element for the creation, absorption and diffusion of innovation. According to Cappelo and Lenzi, the evolution of regional innovation support systems, resulting in new understanding of their role in the modern economy, determines the effectiveness of innovation processes undertaken by enterprises (2019).

Poland is a country with a low level of innovation compared to other European Union countries. The latest European Commission report entitled European Innovation Scoreboard places Poland on the 25th position (Hollanders et al., 2019). The low level in the national perspective is a direct result of low innovativeness of Polish regions. The highest rated Polish region – Małopolska is ranked 155 out of 239 examined regions. The Polish regions are classified as having a moderate or low level of innovation (Hollanders et al., 2019).

Due to the low level of innovativeness of the Polish regions, it is necessary to identify regional factors which enable initiation of effective innovation processes and the factors which inhibit the development of innovativeness at the regional level. Moreover, research in this area will particularly contribute to the creation of mechanisms for improving the innovativeness of regions with a lower development potential and, consequently, increasing their competitiveness (Asheim, 2019).

Determinants of regional innovativeness and effectiveness of innovative activities undertaken by SMEs

In today's generally accepted economic paradigm, innovation is considered to be a key factor determining development opportunities – both at the macro- and microeconomic level. In the macroeconomic perspective, innovation is a crucial factor of economic growth, and in the microeconomic perspective, innovation directly increases the competitiveness of economic entities (Farinha, Ferreira, Gouveia, 2016; Carayannis, Grigoroudis, 2013). The purpose, the role and the importance of innovation are described in detail in the literature. Review of the literature clearly indicates that the role of innovativeness is emphasised especially in the operation of SMEs. It results from the importance of SMEs in the contemporary economy (Dibrell, Davis, Craig 2008, pp. 203-218; Salvato, Lassini, Wiklund 2007, pp. 282-305; Low, Chapman 2007, pp. 878-891).

The innovative activity of an enterprise is carried out in specific conditions, constituting determinants for innovativeness, which may be divided into internal (endogenous), involving its internal resources and subject to the process of enterprise management, and external (exogenous), i.e. related to the environment in which the enterprise operates. In this context, the specific characteristics of the region in which the enterprises operate should be considered exogenous.

The literature provides different typologies to classify exogenous factors (Romao, Neuts, 2017). Considering the examined research area, the following division of regional innovation determinants should be applied:

1. economic factors;
2. social factors;
3. spatial factors,
4. environmental factors,
5. technical and technological factors.

The described features of the region may directly and indirectly stimulate regional development, however they may also inhibit development (Pytla, Wojnicka-Sycz, 2017). Considering the stimulating and inhibiting nature of the described features of the region, it is clearly evident that the determinants of innovativeness provide an opportunity for enhanced innovativeness of enterprises through the development of regional potential, however do not provide a guarantee that the undertaken innovative activity will be effective and efficient. In this context, it is necessary to identify the features of the region directly affecting the effectiveness of innovative activities undertaken by the local enterprises. This identification is the basis of the research hypothesis that will be examined in the research part.

The main aspect of all innovation processes is their economic effectiveness. The implementation of innovations always involves costs and capital expenditures related to their production. Profits resulting from effective implementation of new solutions are (possibly) generated only in the last phase of the process – after the implementation stage.

The concept of performance effectiveness is often applied in economic sciences, in which it assumes particular importance in the context of evaluation and rationalisation of activities. The literature usually defines effectiveness as the result of actions taken, determined by the relation between the obtained effects and the incurred outlays (Stoner

1994, pp. 29-30). The issue of effectiveness as an economic category is supported by many comprehensive theories. As the literature indicates (Foreman-Peck 2013), essentially the same methods are used to assess innovative activity as those used to assess investment projects (commonly known static and dynamic methods of investment project assessment, such as: NPV, IRR, MIRR or profitability index – PI).

In this publication, in order to precisely define the subject of the study, the definition of innovation effectiveness (effectiveness of innovative activity) proposed by Sukanlaya Sawang, Kerrie Unsworth and Tamma Sorbello was adopted: "innovation effectiveness is the overall result of the benefits of implementing innovation" (Sawang, Unsworth, Sorbello 2012).

In the literature, there is a common view that the main indicator assessing the effectiveness of innovative activities is ROI2 (Return on Innovation Investment) based on the calculation of the sum of profits obtained from the sale of innovative products and services over a certain period of time in relation to the expenditures incurred on innovative activities over a certain period of time.

The concept of evaluating effectiveness of innovative undertakings by means of ROI2 and the calculation methodology were described by Alexander Kandybin (Kandybin 2014), Miles Drake (Drake et al. 2006) and Thomas Kuczmarski (2000). The return on innovation (ROI2) may be calculated in several ways. In the article, the method proposed by Bernard Marr (2012) will be used:

$$ROI2 = \frac{\sum of net\ profits\ from\ innovations}{\sum of\ innovation\ implementation\ costs}$$

ROI2 indicator is generally used to assess the effectiveness of individual innovative undertakings (Bloom et al., 2013), however, it seems that in practice it may also be used to assess the innovativeness of groups of enterprises (industry, sector) and the results obtained may be aggregated at the regional level.

Hypothesis and research method

The issue of the relationship between innovation in regions and economic effects achieved by enterprises operating in these regions is discussed in a number of currently conducted scientific research (Martinze-Romano, Gamero, Delgado-Gonzalez & Tamayo, 2019; Capello & Lenzi, 2019). Based on empirical research carried out in European enterprises of the SME sector, the indicated authors showed:

1. Innovation and market extension show a positive and non-linear relationship.
2. Increasing innovation has no relevant effect on risk in market extension.
3. Greater influence of innovation and lower risk in Higher-tech industries.
4. Greater effect in developed countries, though with more decreasing performances.
5. Clear differences exist between Western countries and transition economies.

The main research objective of the article is to answer the question whether there is a interrelation between determinants of the region's innovativeness and the effectiveness of innovative activities carried out by the SMEs operating in the examined region.

The author formulated the following hypothesis: (H1) There is a positive correlation between the determinants of innovativeness of the region and the effectiveness of innovative activities implemented by the SMEs operating in the region.

In the study, an exploratory-descriptive method was used, involving a statistical aggregation of obtained results in selected analytical sections. The analysis was carried out in two stages:

1. Empirical research on the effectiveness of innovative activities of SMEs in particular regions of Poland.
2. Comparison of the assessed effectiveness of innovative activities carried out by SMEs operating in the examined regions with the published regional determinants of innovative processes.

In the research it was assumed that the research object defined as a region is equated with the administrative unit of Poland, i.e. province [voivodeship] – division according to the European NUTS 2 classification. The first part – an empirical research – was carried out by means of an online survey questionnaire containing 64 questions. The survey collected detailed descriptive data:

1. the number of successful and unsuccessful innovation implementations;

2. directions of implemented innovations (absorption/diffusion);
3. the type of innovation being implemented;
4. total expenditure on innovative activities;
5. total net revenues from innovative activities;
6. market assessment of acceptance of implemented innovations;
7. period of implementation of innovative activities;
8. sources of funding for innovation (use of EU funds or their unavailability).

The survey examined 1920 enterprises from each region of Poland. The survey was carried out in the period from June 2019 to September 2019. The enterprises to be surveyed were selected at random on the basis of data from the Central Registration and Information on Business and had to meet the criterion of belonging to the SME sector determined through the number of employees, i.e. enterprises employing up to 250 employees. The sample did not differentiate between enterprises according to the type of business, legal form or ownership.

The collected data enabled the calculation of ROI2 indicator for all surveyed enterprises – assuming that the cumulative stream of profits/expenditure for each of the surveyed enterprises was realised (documented) within at least one year. The results obtained were aggregated at the level of individual country regions.

In the second stage, the results of the innovation effectiveness indicator ROI2 were compared with the regional innovation determinants. The author used EUROSTAT data and data derived from the report "Millennium Index 2019 – Regional Innovation Potential" (Millennium, 2019), describing innovation in Polish regions, published by the Polish Central Statistical Office. The author selected the following determinants of regional innovation:

1. Labour productivity in the region, understood as gross value added generated by one employee (in thousand PLN);
2. Expenditure on research and development (R&D) in the region, understood as the relation of R&D expenditure to GDP (in %);
3. Number of persons working in R&D in the enterprise sector per 1,000 professionally active persons;
4. Higher education in the region – number of students per 10,000 inhabitants.
5. Number of patents, calculated as an arithmetic mean of the patents registered in the region over the last 3 years per 1 million inhabitants of the region.

For the purpose of the survey, all analysed categories were assigned the same weight and the results of individual provinces were evaluated on a scale from 1 to 100 (where 100 could be awarded to the best region in all categories). On this basis, the authors of the report calculated an average value of innovation potential, referred to as the Millennium index. The calculated index will be used to analyse the relation between the innovation effectiveness and determinants of the innovation potential of the examined regions.

Study Results

In order to test the formulated research hypothesis (H1), the author, in accordance with the adopted method, calculated the arithmetically averaged ROI2 indicator for all surveyed enterprises of the SME sector. The indicator demonstrates the effectiveness of innovative activities, i.e. the level of return on funds invested in innovative activities carried out by the surveyed enterprises. The obtained data, ordered from the highest to the lowest values and aggregated at the level of the region, are presented in Table 1 (the values of the first quartile, the values of the last quartile and the values above the average were marked in colour).

Table 1: Effectiveness of innovative activities of SMEs on the regional level

Region	ROI2 indicator	Average share of profits from innovations in total profits	Average share of innovation development costs in total costs
Małopolskie	2.481	0.382	0.154
Dolnośląskie	2.217	0.337	0.152
Mazowieckie	2.214	0.434	0.196
Wielkopolskie	2.198	0.378	0.172
Pomorskie	2.134	0.303	0.142
Śląskie	2.115	0.294	0.139

Lubelskie	2.044	0.325	0.159
Łódzkie	2.020	0.301	0.149
Podkarpackie	2.018	0.337	0.167
Zachodniopomorskie	2.007	0.299	0.149
Kujawsko-pomorskie	1.831	0.293	0.16
Opolskie	1.777	0.318	0.179
Warmińsko-mazurskie	1.454	0.189	0.13
Podlaskie	1.254	0.212	0.169
Lubuskie	0.980	0.149	0.152
Świętokrzyskie	0.950	0.115	0.121

Own work

The leaders in effectiveness of innovative activities measured by the ROI2 indicators are SMEs from the following regions: Małopolskie, Mazowieckie, Dolnośląskie and Wielkopolskie. The enterprises from these regions obtained results falling within the first quartile of normal distribution for the presented list.

The value of ROI indicator above the average was also obtained by the following regions: Pomorskie, Śląskie, Lubelskie, Łódzkie, Podkarpackie, Zachodniopomorskie.

The regions in which SMEs were characterised by the lowest effectiveness of innovative activities include: Podlaskie, Lubuskie, Świętokrzyskie. These regions obtained results falling within the last quartile of the normal distribution for the presented list. It should also be noted that the arithmetically averaged result for enterprises from the Lubuskie and Świętokrzyskie regions is less than 1. This means that the local enterprises are not efficient innovators – the profits from the sale of the innovations do not cover the expenses incurred for their development.

The relation of average shares of profits from innovations in total profits to average shares of innovation development costs is presented in Figure 1.

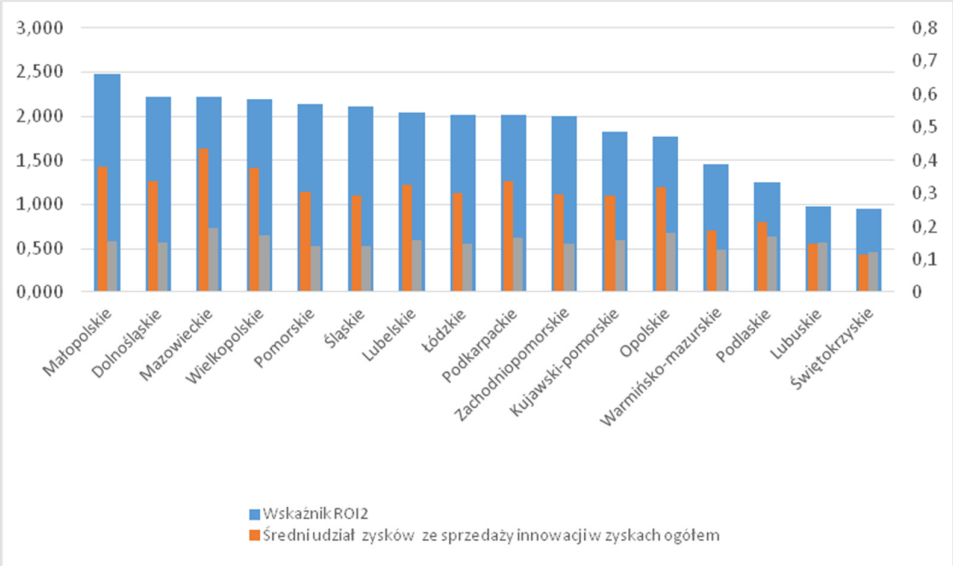

Figure 1: Relation of the ROI2 indicator to profits and outlays on innovations of the examined SMEs

The second step in the conducted research was the comparison of the obtained arithmetically averaged ROI2 indicator for the examined regions with the published data concerning the evaluation of determinants of regions' innovation potential. The list is presented in Table 2 (the values of the first quartile, the values of the last quartile and the values above the average were marked in colour).

Table 2: The effectiveness of innovative activities of SMEs in relation to the innovative potential of the examined regions.

Region	ROI2 indicator	Millennium Index	Labour productivity	R&D expenditure	Post-secondary education	Persons working in R&D	Number of patents
Małopolskie	2.481	82.6	66	100	97	73	77
Dolnośląskie	2.217	72	86	49	89	52	84
Mazowieckie	2.214	99.4	100	97	100	100	100
Wielkopolskie	2.198	53.6	75	34	73	31	55
Pomorskie	2.134	61.8	78	59	77	46	49
Śląskie	2.115	54.4	83	34	54	32	69
Lubelskie	2.044	54.4	53	48	71	30	70
Łódzkie	2.020	54	70	39	65	32	64
Podkarpackie	2.018	45.4	53	56	48	37	33
Zachodniopomorskie	2.007	46.6	77	24	51	21	60
Kujawsko-pomorskie	1.831	43.4	69	27	59	25	37
Opolskie	1.777	43.2	72	25	46	21	52
Warmińsko-mazurskie	1.454	36	68	27	42	19	24
Podlaskie	1.254	39.6	60	32	55	25	26
Lubuskie	0.980	31.4	73	20	29	16	19
Świętokrzyskie	0.950	30.4	56	17	42	10	27

Own work

The above ranking clearly indicates that in regions with high innovative potential – Małopolskie, Dolnośląskie, Mazowieckie – the surveyed SMEs achieve higher innovation effectiveness (the distribution of effectiveness of SMEs is very similar to the distribution of innovation potential of regions). The only difference observed concerns the Pomorskie region, whose innovative potential is high (the first quartile of the distribution) and the effectiveness of innovative activities of the surveyed SMEs is outside the first quartile of the sample.

The observation is also confirmed by the analysis of the regions with the lowest innovative potential in the ranking (regions: Warmińsko-mazurskie, Podlaskie, Lubuskie and Świętokrzyskie) – the surveyed SMEs in these regions achieve significantly lower effectiveness of innovative activities than other surveyed enterprises.

Figure 2 presents the relation of the calculated ROI2 indicator to the index of innovation potential of the analysed regions.

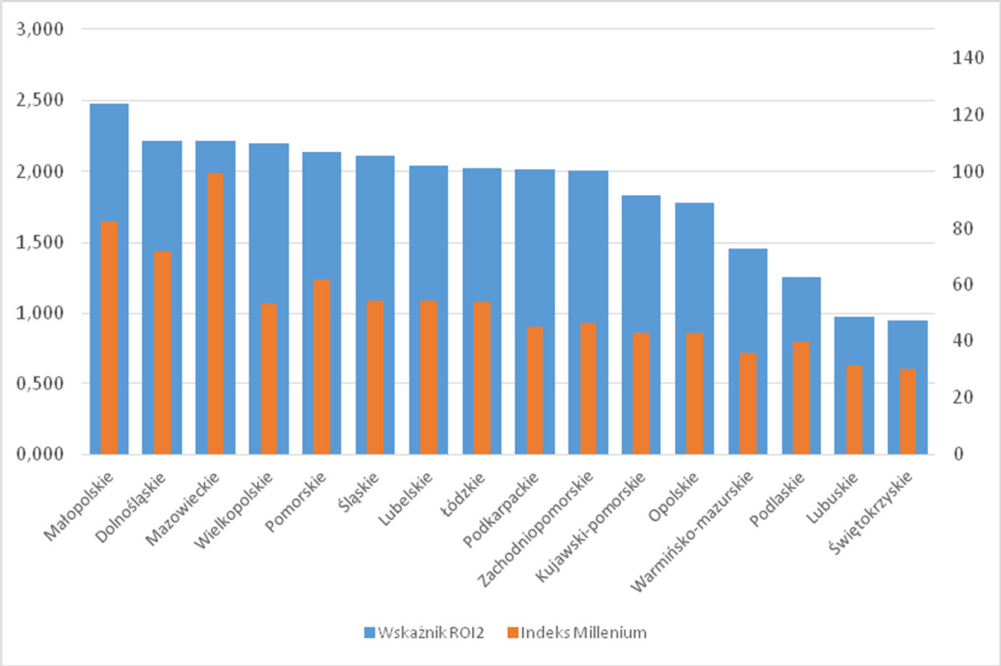

Figure 2: Relation of the ROI2 indicator of the examined SMEs to the index of innovative potential of regions

A detailed analysis of determinants of regional innovativeness indicates that the following factors have the greatest influence on the effectiveness of the examined SMEs: post-secondary education, i.e. highly qualified human capital available in the region, the number of R&D employees and the number of patents registered in the region. The data obtained reveal that the work productivity or R&D expenditures are less important.

Conclusions

The comparison of the effectiveness of innovative activities of the examined SMEs in relation to the innovative potential of the regions in which the examined enterprises operate leads to the confirmation of the research hypothesis (H1): enterprises operating in regions with a higher innovative potential achieve higher effectiveness of innovative activities. This is confirmed by the results obtained for the surveyed enterprises from the following regions: Małopolska, Dolnośląskie, Mazowieckie and Wielkopolskie. Similarly, enterprises operating in regions with a low innovative potential are clearly less effective in terms of innovative activities, which is illustrated by the enterprises from the following regions: Warmińsko-Mazurskie, Podlaskie, Lubuskie, Świętokrzyskie.

The main determinants affecting the effectiveness of innovative processes are the highly qualified human capital available in the region, the number of R&D employees and the number of patents registered in the region. Labour productivity and R&D expenditures incurred by the surveyed enterprises are of lesser importance.

It should be emphasised that, according to the adopted research method, the obtained results enable comparison of the empirically examined effectiveness of innovation processes implemented by the surveyed SMEs in relation to the innovative potential of regions where these enterprises operate. The aim of the author's work was not to determine the statistical correlation of cause-effect relations between the established effects of the innovative activity undertaken by the surveyed enterprises and specific features of regions.

It seems that the research on cause and effect relationships should be the next stage of research on the effectiveness of innovation processes in the regional context. Such research could result in the creation of a complete list of innovation determinants and the precise determination of their significance in terms of innovation processes.

Another area of research may involve a comparison of Polish SMEs' innovativeness determinants from the regional point of view with foreign enterprises – especially those that are leaders of innovativeness (e.g. the most innovative European Union countries). A comparative analysis in this respect would contribute to the development of a model of optimal regional innovativeness determinants and thus remove barriers to effective and efficient innovative activity conducted by Polish SMEs.

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Globalisation Processes as A Determinant of Economic Security

Mateusz ZIĘTARSKI
Security and Management Institute
Pomeranian Academy in Słupsk, Poland
Mateusz.zientarski@apsl.edu.pl

Miłosz GAC
Faculty of Finance and Management, WSB University in Gdańsk
Gdańsk, Poland, mgac@wsb.gda.pl

Henryk WOJTASZEK
Management Institute, Faculty of Management and Command,
War Studies University
Warsaw, Poland, h.wojtaszek@akademia.mil.pl

Abstract

The ongoing processes of globalisation are leading to transformations at many levels - national, regional and global. The answer to the challenges of the modern world is the interdisciplinary nature of sciences, visible in this article. By means of this criterion, the threats resulting from globalization movements affecting the area of economic security are presented in this article.

Keywords: Economic Security, Globalisation, Geoeconomics, Management, Economic Integration.

JEL classification: A11, A13, D31, E24, E32, L26, M12.

Introduction

Barry Buzan, who made the sectoral division of security, is the author of the thesis that economic security is the result of the relationship between economics and military capabilities or social identification (Buzan., 1991, p.124). In contrast, the Polish researcher Stanisław Michałowski proposes to interpret economic security as "[...] an idea of the actual or potential economic risks of a country, shaped by the general state of the country's economic dependence, which determines the degree of effectiveness of external economic integration into the internal economic development, defence capability and stability of the social and political system of a given country […]" (Michałowski, 1990, p. 176).The aspect of opening up to international cooperation, which Stanisław Michałowski describes as external economic integration, is the main determinant of economic security according to Elizabeth Kapstein (Kapstein 1992, p.188). The above observations lead to the conclusion that one of the main challenges and threats to economic security is the process of globalisation.

Globalisation As A Challenge and A Threat

Symptoms of globalization should be seen in the efforts of many ancient states: Egypt, Babylonia, Persia, Macedonia, Rome, Mongolia and many others. The assumptions of the globalization movements are visible in the later trade expeditions of the Greeks, Phoenicians and the great geographical discoveries of Christopher Columbus - the discovery of America - and Ferdinand Magellan - a global expedition (Gulczyński 2004, p. 418-419).

It is in the geographical discoveries that one should look for the beginning of globalization, which influenced the expansion of perception and social awareness that has become global (Foreman- Peck 1998, p. 14-15).

However, in the indicated periods, globalization still lacks some attributes. In antiquity there was a socio-economic system for which the phenomenon of slavery was of paramount importance (Cimek 2016, p. 163).

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The breach in the completeness of the attributes of globalization is being filled by the development and increasing universality of the capitalist system. The Encyclopedia Britannica contains the following description of the term: "[...] Capitalism is an economic system dominating in the Western world, after the fall of feudalism, which means that most of the means of production belong to private owners who run them, and their income is largely the result of market activities [...] " (The New Encyclopaedia Britannica, 2002, s. 831).

The features of capitalism that link this system with globalization are presented by Peter Berger, pointing to: • Free market • Rational technique based on business • Rational legal system • Free labor (as opposed to slave systems) • Increase in trade and trade (Berger, 1995, p. 53).

The capitalist system made it possible to create an integrated economic world, which is the overriding principle of globalization. Contributed to the generation of mobility of capital, information, goods, people Conditions, which should be defined as rudimentary determinants of globalization (Cimek 2016, p. 163).

The globalization paradigm based on these considerations began to emerge at the end of the 19th century. It mainly referred to the free movement of people, goods and services, the backbone of which is the transnational network, which is manifested in international corporations and organizations as well as transnational communities. The lack of an unambiguous, consistent definition of globalization should be pointed out. Roman Kuźniar writes about a specific ambiguity, referring to the descriptions of globalization in political science, international relations, but also in many analytical works, commentaries and in the rhetoric of political leaders (Kuźniar 2000, p. 6-7).

The source and inspiration for research on globalization is seen in the statement of Herbert McLuhan - the author of the term "global village". In fact, its definition perceives the crossing of time and space using modern mass media. Referring to McLuhan, it is indicated, inter alia, J. Orzeszyn, R. Borkowski, who defines globalization as a concept which means that regional phenomena, still remaining in a real geographical distance, have their counterparts in another part of the world (Kucharczyk, P. Łajca,2017, p. 117).
Roland Robertson describes globalization as "[...] shrinking the world and increasing the degree of understanding of the world as a whole […]" (Robertson, 1992, p. 65).

A. McGrew, claiming that "... globalization consists in the multiplicity of connections and reciprocity of interactions between states and societies that make up the present world system. Globalization is therefore characterized by two dimensions: scope (range) and intensity (depth) " (McGrew 1992, p. 28).

The paradigm of globalisation began to emerge in the late 19th century. It refers to the free movement of people, goods and services, at the heart of which is a transnational network. It manifests itself in international corporations and organisations and transnational communities. The core that determined the process of globalisation was economics, but over time, in addition to purely economic issues, a political process also emerged. The globalisation process changed global politics by moving away from structures representing the interests of the nation state to supranational institutions (Castles, 2011, p. 75-77). Globalisation therefore leads to nation states and their political and economic situation being dependent on global conditions. It is a kind of apogee for the internationalisation of trade at the level of markets, sectors and businesses (Fiszer 1998, p. 164-165). The interdependencies that form the body of connected vessels make the symptoms of growth or crisis felt globally. According to the definition of the International Monetary Fund, globalisation is a constantly evolving network of interdependencies between countries, particularly during the flow of goods, services and technologies (Księżopolski 2004, s. 31). Interdependence also means the implementation of solutions developed by Western experts as part of corporate effectiveness. An example is the process of improving the transport of Polish vans to distribution centres in Western European countries. Insufficient capacity resulted in too high distribution costs for an international corporation, which also included Polish logistics companies.

In order to improve and increase efficiency, a project developed in Western European countries based on the DMAIC method was introduced. Mapping and detailed analysis proved the relationship between the weight of goods and the packaging method. The implementation of the developed method resulted in the minimisation of costs by 10%, which translated into savings of up to EUR 500,000 per year and equalized the disproportions between individual branches of the corporation (Śliwka et al 2016, s. 27). The above example is part of the trend referred to as postfordism. In describing the above phenomenon, Gracjan Cimek refers to a situation in which "[...] the processes of deregulation and internationalisation of capital mean changes in terms of management, fragmentation of work, and limiting the role of trade unions, and, above all, undermine the function of the nation state as a regulator. There is a shift away from vertically integrated companies, where all elements of the production process of a given product were concentrated in one place […]" (Cimek, 2016, p. 149).

The Role of Multinational Corporations

The author writes the above trend into the broader trend of geoeconomics, which he gives as its creator - Edward Luttwak. According to Gracjan Cimek, the essence of geoeconomics is cooperation, which excludes rivalry and logic of the zero-sum game (Ibidem, p. 147). In the meantime, Krzysztof Księżopolski, while making the process of security economisation visible, believes that the above trend means competition in the economic sphere between countries. A view of the rivalry between countries is closer to the actual conditions. International corporations should be added to the entities mentioned by Krzysztof Księżopolski. The phenomenon of shaping the world structure by them is irreversible (Księżopolski, p. 22). A view of competition between countries is closer to the realities. International corporations should be added to the entities mentioned by Krzysztof Księżopolski. The phenomenon of shaping the world structure by them is irreversible (Toeplitz, 2006, s. 22).

The influence of transnational corporations is currently stronger than that of nation state governments, and corporate lobbying is an argument that undermines or changes the decisions made by national parliaments in the legislative process.

A global policy that focuses on the processes of globalization is indicated and criticized as a source of disproportions between countries and societies. An example of disapproval is the numerous protests and demonstrations that are organised at meeting places of representatives of institutions such as the International Monetary Fund, the World Bank and the World Trade Organisation. The large-scale protest movements that emerged with the protests in Seattle in 1999 have contributed to an escalation in action. They have resulted in a de facto war against globalisation. The death of an anti-globalist demonstrator in Genoa in 2001 is considered to be the beginning of the war, its casus belli (Stiglitz 2004, p. 21).

Competition in The Age of Globalisation

(PL) Mr President, international relations, which are today full of processes of globalisation and geoeconomics, are an arena in which there is a dispute and rivalry in the background of cooperation and collaboration. In line with Ryszard Zięba, four areas of economic rivalry should be identified. In accordance with the proposed classification, we can identify threats to economic security, which are the result of the rivalry focused around us:

- - Energy resources;
- - Water resources;
- - Food resources;
- - Strategic raw material resources (Ibidem, p. 19).

The economic interests of the Russian Federation run along the line drawn by the chief strategist and ideologist in the Kremlin, Alexander Dugin. At the energy and raw material level, this materialised in the contracts that linked Russia with Germany, bypassing the region of Central and Eastern Europe (Święchowicz, 2015, p.151).

On 29 August 2006 in Moscow, representatives of Gazprom, E.ON Ruhrgas and BASF signed an agreement on the construction of the Northern Gas Pipeline. It was to run on the bottom of the Baltic Sea and supply gas from Russia to Germany. The pipeline would strengthen cooperation on the Berlin-Moscow line, marginalising the role of Poland and Ukraine in the region of Central and Eastern Europe, because gas would reach Germany without both countries. According to Edward Lucas, this project is [...] the fruit of the most infamous diplomatic alliance in contemporary Europe [...]' . Radosław Sikorski, the then Polish Minister of Foreign Affairs, spoke in an even sharper tone about the Northern Gas Pipeline, using a comparison of the Nord Stream project with the Molotov-Ribbentrop Pact. Former German Chancellor Gerhard Schröder played an important role in the decision to build the gas pipeline. He was a great enthusiast of the project, which strongly lobbied for the construction of the Northern Gas Pipeline. After leaving the Chancellor's office, he sat in the consortium preparing the investment. In addition, a few days before the end of Schrödera, a secret transaction took place - a loan of EUR 1 billion was flown from Russia (Lucas, p. 215).

This fact casts a shadow over the integrity and honesty of the former Chancellor. In the face of these reports, it makes sense to ask about the determinants that guided the German authorities. Was concern for energy security in the foreground, or did the particular interests of the leaders of both countries prevail? Independent experts point to the second answer in the explanatory memorandum, arguing that this was due to the much higher cost of building underwater pipelines, the presence of numerous explosives on the bottom of the Baltic Sea and a number of environmental concerns. After the change of government in Germany, the new government's attitude to the gas

pipeline project was equally enthusiastic. Attention should be paid to the environment during the construction of the Northern Gas Pipeline.

In 2009, on the initiative of scientists from the University of Warsaw, work began on a vision of foreign policy based on rapprochement with Germany and Russia. This concept, called the Royal Triangle, indicated Poland's correct relations with its two powerful neighbours. However, the thaw in relations created by this forum did not change the behaviour of Russia and Germany. On 8 November 2011, the first line of the gas pipeline was put into operation, and on 8 October 2012, blue fuel flowed through the second line. In addition, Poland's position has been de-played, playing no role in the construction of the pipeline, and has not received any benefits, although it was the bottom of the Baltic Sea - the most important sea area in the context of Poland's maritime safety - where the pipeline ran. Criticism of the Nord Stream project should, however, point out the wrong strategy for the foreign policy of the Republic of Poland. The passive attitude, which is exemplified by the lack of debates in political and public spaces undertaking to include Poland in the project, and the erroneous perception of economic relations in contemporary international relations, are a burden on Polish diplomacy. The simplification of foreign policy to bilateral relations between states without taking into account supranational organisations and alliances is evident from the example of the above gas project (Rewizorski et al., 2013, s. 297).

Talks are currently under way on the launch of the Nord Stream II gas pipeline. The environment for this project is different from that of the Nord Stream project. There has been a clear cooling off of the Russian Federation from both Poland and Germany. Following Russia's aggression against Ukraine and its support for the separatists, it was decided to impose economic sanctions and isolate Russia in the international arena. The vision of the Royal Triangle was outdated, and the Polish position on foreign policy was almost identical to the German position in opposition to the Russian one (Lucas, p. 22).

The use of the modus vivendi strategy has also proved effective in this case and has brought Russia closer to the desired goal.

The attitude of the Russian Federation towards Ukraine, which was divergent and a hardly consensual issue, business and economic issues have been left out. In response to a question from Polish MEPs about the euro, Angela Merkel pointed out that the construction of the Nord Stream II [...] this is a purely commercial venture and most importantly, gas will flow into Europe [...]" (Skiweciński, 2015, p. 74-76).The arguments of the German Chancellor must be considered in two respects: the activities and principles followed by Gazprom, the main shareholder of the project, and the strategy for energy security taken by the European Union. Edward Lucas is the author of the thesis that "[...] Gazprom is the gas branch of the Kremlin Inc. and was directly involved in suppressing press freedom in Russia: it took control of the unruly media, such as NTV, and bent it at the will of the Kremlin [...]" (Lucas, p.. 213). In addition, it is a monopoly that excludes all competition, resorting to unworthy treatments. Western companies that have experience in dealing with Gazprom "[...] they say they do not accept thievery, censorship and attempts at intimidation [...]" (Ibidem, p. 213-216).

Mr President (PL), energy security is an issue frequently raised by European politicians and is on the agenda of talks at meetings of leaders of European Union and NATO countries. At the North Atlantic Alliance Summit in Warsaw, recommendations were coined to diversify oil supplies and natural gas. Its consequence is to be a process of strengthening resistance to political and economic energy blackmail (Turowski 2016, s. 153).

The result is an energy union project to ensure the energy security of Member States. Among the priorities of the energy union are: diversification of gas supply, elimination of the huge diversity of gas prices, greater market integration and ensuring security of supply. The German Chancellor is strongly involved in the energy union project. However, when you compare what Angela Merkel said about the energy union and the Nord Stream II project is born of cognitive dissonance. Support for one idea is contradictory with support for the second idea because they are incompatible with each other (Pratkanis and Aronson 2004, s. 41).

However, Russian President Vladimir Putin has reduced cognitive dissonance. The omission of the irritant issue - Russia's role as an aggressor in Ukraine - made it possible to reach agreement on a kind of contract, launching the Nord Stream II project (Łastawski, 2012, p. 162).

In the context of European Union solidarity, the Polish initiative should be cited from 2006, called the Musketeers' Pact, which was supposed to weaken the dictates of the Russian Federation and weaken the opportunities for energy blackmail. Poland called for the inclusion in the new EU Treaty of the issue of energy security, which was supposed to be the European Union's assistance to Member States which will be struggling with the supply of raw materials or which will be subject to price collusion or energy blackmail. The idea was lost among the numerous

business and economic links between the countries of the Community and the Russian Federation (Turczyński, 2016, p. 614).

Nowadays, the so-called Arctic Five are competing hard for raw materials, the riches of which the Arctic contains. Price diktat and rivalry between the powers can have a significant impact on our economic security. In addition, the main player In the race for the Arctic deposits, there is the Russian Federation, which is claiming to be a raw material superpower that will distribute and dictate access to energy resources.

Already today, the Arctic is becoming a militarised zone, and this is confirmed by the presence of the Northern Fleet in this region of the world - the strongest point of the Russian Navy . It should be pointed out that the Arctic and its riches of raw materials are also visible in the eyes of China and the European Union. This interest is confirmed by the European Commission document entitled 'The European Union and the Arctic region' (Rokiciński, 2012, p. 33). However, the Russian determination, which is reflected in the resources allocated and the broad and effective equipment, the creation of formations that operate in the Arctic region makes Russia a leader in the fight for the Arctic, which is part of the process of satisfying national interests. The above determination of Russia results from the provisions of its maritime doctrine, in which the Arctic is defined as one of its priorities (Kaszuba and Minkina 2016, s. 143).

The dominant role of Russia may lead to economic blackmail, which should be indicated as a threat to Polish economic security. An example of economic blackmail is the increase in the price of gas transmission for Ukraine after the annexation of Crimea to USD 485.5 per 1 000 m3 . It has been raised by around 80%, and Ukraine has thus become the country from which the highest rate for the transmission of this raw material is demanded (Ziętarski 2016, s. 116). Another demonstration of strength in the energy space was the cutting of Russian gas supplies to Ukraine (Roxburgh 2012, s. 249). Before the start of the Russian-Ukrainian conflict, the Russian Federation used economic blackmail - the Yamal II project, i.e. the construction of Line 2 of the Yamal pipeline, also known as Pieremychka, was to be a project to bypass Ukrainian territory. The countries participating in the project could count on a reduction of around 15% in the current gas price. The negotiations on Yamal II, which has become a priority project, as a result of the difficult talks on South Stream, have introduced discrepancies between the countries around the Visegrad Group. As the talks on the above matter were conducted without an official procedure - the memorandum was signed with EuRoPol Gaz, which consists of representatives of Poland and Russia - the Polish side did not let this investment go. The Slovak and Hungarian governments, on the other hand, were favourable to the Yamal pipeline extension project.

At a similar time to the so-called Pieremyczka talks, the then Hungarian Prime Minister Victor Orban led a further energy offensive. In August 2013, he held a meeting with Sergei Kirijenko, representative of Rosatom. As a result of the talks, a contract for a Russian nuclear power company to expand and modernise the Hungarian nuclear power plant in Paks was agreed. In exchange for this declaration, the Russian side agreed to provide a billion-dollar loan for this investment. The Russian-Hungarian negotiations were followed by declarations by the Hungarian Government to join the gas pipeline project: Nord Stream II and South Stream (Kacewicz, 2018, p. 46). Russia's rapprochement with Turkey, which is described in this chapter, makes the issue of building the South Stream gas pipeline a realistic political and energy project.These examples show the danger of economic blackmail. The above description of events also highlights the broad scope of Russia's energy policy. The Arctic's raw material wealth is therefore a key challenge for the Russian Federation. Russia's current advantage over the other countries of the so-called Arctic Five is linked to equipment that has been tested in the difficult terrain of Siberia.

- Another threat to economic security is the demographic crisis and its impact on social security.
- The connotation between economic security
- and social security is evident in the permanent deepening of social disparities. In terms of economic threats, the causes of the above process will be presented, and the effects will be described in the further part of the work, devoted to social issues. The main cause of the process is indicated as globalisation, which has become the starting point of this subsection. Jeffrey Garten, Riccardo Petrella and Robert Reich present the current of antiglobalism in economics, arguing that the main threat is global domination and global monopoly. Globalisation in the economy marginalises or excludes social ties, which leads to the possibility of the most qualified getting rich at the expense of unskilled groups, plunging them into poverty and deprivation. This process results in lesser phenomena such as these:

- - Weakening of human solidarity;
- - Pauperisation of certain social groups;
- - States' problems with solving social problems;
- - Difficulties in taxing citizens;
- - Increasing competition between citizens in the race for goods;

- - Unification of society, killing its traditions and culture (Księżopolski, p.. 154-155).

Conclusion

The dynamism that characterises the 21st century, driven by the processes of globalisation, has led to an escalation in social disparities. The enrichment has been laboriously pushed out by the computerisation of banking, stock exchange and finance. Transfers between companies on different continents, amounting to billions of euros, are carried out by means of autonomous computer programmes during milliseconds of financial transactions. As a result of the progressive enrichment of the most qualified and rich social influenza, 1% of the world's population has assets of 40% of all wealth. In addition, the richest 10% of the world's population owns 85% of the wealth of all households. The richer half of humanity owns 99% of the world's wealth, while the poorer half of the world has 1% of the world's wealth. It should be added that social inequalities caused by economic considerations affect all countries - poor, developing and developed countries alike (Popkiewicz 2013, s. 43-44).

The deepening of disparities leads to the serious threat of economic enslavement of many generations. Poor countries are being held hostage by economic giants. These threats are evident in contemporary international relations, where multinational corporations are playing an increasingly strong role. The governments of the nation states are often overwhelmed by the role and significance of their governments and are making great changes to the global economy.

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Contemporary Conditions of Digital Security Management in An Organization 4.0 (Selected Aspects)

Joanna GRUBICKA

Cyberspace Protection Faculty, Security and Management Department, Safety and Management Institute, Pomeranian University in Slupsk, Poland, ORCID: 0000-0001-7934-6044;
E-mail: joanna.grubicka@apsl.edu.pl

Abstract

The article takes up the subject of the determinants of digital security management in 4.0 organizations perceived through the prism of development and gaps in digital competences of work resources. It presents the distinctive features of the digital revolution technology and the competency challenges facing the 4.0 organization. The evolution of the conceptualization of the concept of digital competences in the strategic development documents of the European Union is outlined, taking into account the area of digital security. The progress of digital transformation of selected countries is analyzed on the basis of the Digital Economy and Society Index (DESI 2019-2020). The conclusions lead to recommendations in the area of directions for the development of digital competences of work resources.

Keywords: Digital Security, Organization 4.0.

Introduction

Recently, the number of studies devoted to the concept of "Industry 4.0", the so-called the fourth industrial revolution (German: *Industrie 4.0*) and its changes has increased significantly. The interest in this topic stems primarily from the belief that the industrial revolution 4.0 will bring about a jump in the efficiency of enterprises and the emergence of new business models, services and products, which will consequently determine the economic position in the world (See: Kagermann 2014: 607-609). The changing balance of power on the global market, as well as demographic trends and the deepening deficit of qualified workforce in highly developed countries of the world are also of no less importance. The concept of "Industry 4.0" developed in Germany is generally based on the use of the processes of automation and digitization of industry that have been taking place in the German industry for years to transform existing factories into self-steering and self-adapting social engineering systems (*Smart Factories*), allowing the creation of intelligent value chains. The above concept, despite the fact that it is only a general vision of changes in the industry, brings with it significant changes in the area of work. This applies in particular to the role of man in a smart factory and the necessary qualifications and competences related to it.

The digital economy, however, requires labor resources with appropriate competences, while one of the burning problems in the global economy is the shortage of modern professional competences of current and future employees (Deloitte, Global Human Capital Trends 2017). These include *digital competences* enabling the effective functioning of modern organizations, the so-called organization 4.0. These organizations make intensive use of the digital competences of their work resources, and their vital goal is the safe conduct of their activities. Since they actually operate in the digital economy, they must be provided with digital security. The aim of this article is to present the issues of digital security management through the prism of the analysis of needs and the state of digital competences of work resources necessary for the functioning of modern organizations, the so-called organization 4.0.

Organization 4.0 - competency aspects of digital security

The beginning of the current breakthrough - the so-called digital revolution dates back to 1989 - the popularization of the Internet, which opened a new era of technological applications not only in production or management, but also in social life (Kosieradzka 2018). Definitely, the fourth industrial revolution includes technologies that apply systematically: 1) cyber-physical modeling (cyber-physical systems); 2) Internet of things, Internet of services; 3) the possibility of cloud computing; 4) Internet of Everything (See: Furmanek 2018: 56–65). New technological solutions, such as advanced automation and robotisation of manufacturing processes, intensive processing and exchange of large

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amounts of data (big data), autonomous systems and additive manufacturing - are revolutionizing traditional ways of creating value (Hermann 2015). Technology implementation costs are falling, and international differences in labor costs are no longer the decisive factor in choosing a production location, which favors globalization and the rapid diffusion of new technology (Deloitte, Global Human Capital Trends 2017). It should be noted that the digital revolution fundamentally changes the paradigm of functioning not only of industrial organizations, but all types of organizations. It creates a general model of a *process-oriented organization* - the so-called organization 4.0 (Binner 2018), fundamentally different from the model of functional organization, anchored in the system paradigm (See: Koźmiński 2011: 9–37) strongly established in the sciences of organization and management.

A distinctive feature of the 4.0 organization is the systematic increase in the flexibility of products and processes through automation, extensive networks and decentralized control mechanisms, as well as data acquisition and integration through modern information and communication technologies and digital technologies: i.e. data storage in the cloud (cloud storage), data processing in the cloud (cloud computing), processing of large amounts of data (big data), mobile applications (mob apps), geolocation (global positioning system - GPS), Internet of things (IoT), robots and learning machines, artificial intelligence (AI) -augmented reality (AR), virtual reality (VR). Organization 4.0, using the integration of new information technologies, achieves a competitive advantage by building a strong customer orientation by providing it with an optimal and tailor-made value chain (Wodecki 2018).

Authors of the report of the global consulting company Deloitte entitled *Global Human Capital Trends 2017. Changing the rules in the digital age* note that intensive technological changes in companies are accompanied by a very slow increase in terms of efficiency (Deloitte, Global Human Capital Trends 2017). Thus, expensive technological investments, especially in the area of digital technologies, in the absence of full use of their power, may be ineffective, and in some cases - companies investing in them may even lose financial liquidity and disappear from the market. Therefore, before purchasing modern ICT technology, it is necessary to analyze the production and operational processes in terms of the currently created and possibly new value chain (Bogner 2016). Management specialists emphasize that digitization activities, which are usually performed by the so-called technical and IT departments of companies should not be treated as an isolated function or as an element only supporting corporate operations (back-up), but as an element of strategic management. Traditional "systemic" thinking about management functions makes it impossible to take full advantage of the process and network connections of digital technologies.

The rapidly growing number of sensors, embedded systems and connected devices, as well as the multi-level network of value chains in the 4.0 organization, first and foremost result in a huge and continuous flow of data. However, the constantly growing flow of information would only be a burden, not a value, without the use of appropriate analytical and security techniques. Using them requires specific skills - the so-called *advanced digital competences* (Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027, 2018) which are defined in strategic development policies as personal *sine qua non* conditions for the development of modern organizations.

Digital security (cybersecurity, security in the digital environment) is usually understood as information security, (...) "as an element of an IT system (...), as a synonym for computer, telecommunications or network security"(See: Więcaszek-Kuczyńska 2014: 212). Digital security aims to ensure the safe activity of various entities in the digital environment and to counteract threats related to the security of networks, servers, data on devices, etc. This general description of the scope of digital security, in fact, includes the postulate of having appropriate knowledge, skills and attitudes of device and computer, IT or network tools users. Therefore, digital security should be included in the broader perspective of the conceptual framework of digital competences of users. It is facilitated by a well-developed conceptual and operational system concerning the priority of development and promotion of modern digital competences of current and future employees, contained in strategic development documents of the policies of global, regional or national institutions.

In the policy of the European Union, the subject of digital security is included in the key strategic development documents concerning the promotion of the security of economic transactions and the development of the information society. The 2010 Digital Agenda for Europe is implemented within the Digital Single Market Strategy for Europe (2015), the New Skills Agenda for Europe (2016) and the Digital Education Action Plan (2018). In 2019, the Cybersecurity Act (CA) was adopted in Europe, strengthening the role of the European Union Agency for Cybersecurity (ENISA) and initiating the European certification of information and communication technology (ICT) products and services.

In line with the assumptions underlying the legal solutions proposed in CA, the consumer is able to choose devices and solutions that are tested and meet the relevant safety standards. Companies, on the other hand, have to apply for a certificate only in one member state, which is honored throughout the EU. It is intended to support the development

of the digital single market and facilitate rise in the level of security, as well as build the technological advantage of European companies.

The Act on Cybersecurity also covers the issue of the appropriate level of security of next-generation networks, the so-called 5G networks as the latest and fastest generation of mobile technology. The European Commission defined the 5G network as a set of network infrastructure elements for mobile and wireless communication, the main advantages of which are:

- very high data transmission speed and bandwidth,
- low latency communication,
- very high reliability,
- support for a large number of connected devices (Commission Recommendation of 26 March 2019 on Cybersecurity of 5G networks 2019).

In March 2019, the European Commission presented its recommendations on the cybersecurity of 5G networks, and in October of the same year - the EU coordinated cybersecurity risk assessment in fifth generation networks. It is estimated that 5G-related revenues will reach EUR 225 billion in 2025, therefore in Europe it is necessary to take appropriate action to be able to compete in the global market effectively. Ensuring an appropriate level of security for next-generation networks is necessary to be able to fully use its potential in the organization's operations (ABI Research projection 2016).

Digital security in the policy of the European Union

The development of digital competences is of key importance for the development of the current economy and determines the growth of innovation, employment and the competitiveness of the digital economy (See: Balcewicz-Majewska 2020: 121-122). The issue of facilitating the development of citizens and workers skills necessary in a modern society and economy is visible in the initiatives of global organizations such as the OECD (See: Ferrari 2019) is adapted to the expectations of the changing world and takes into account current trends such as globalization, digitization, migration and aging of the society, which define key skills in the near future both in social life and the economy.

Digital competences in strategic development documents of the European Union have been included since 2006 in the set of the so-called *key competences* (See. A Strategic Approach to Skills Policies 2012). The new OECD Skills Strategy 2019 (See: European Parliament and the Council, Recommendation of the European Parliament and the Council of 18 December 2006 on key competences for lifelong learning 2006) and many initiatives and projects have been dedicated to their promotion and development over the last several years. One of the most recent flagship initiatives is the Digital Europe Program in the 2021-2027 funding framework, which is at the heart of the European Commission's comprehensive confrontation with the current challenges of digital transformation. The program covers five development goals, namely: large-scale data processing, artificial intelligence, cybersecurity, advanced digital skills and ensuring their wide use in the economy and social life. A special category of organizations that are vitally interested in the supply of labor resources with "advanced digital skills" are enterprises that form the so-called industry sector 4.0, or more broadly - organizations 4.0.

Digital competences were recognized as one of the eight key competences of workers and citizens in 2006 in the European Commission document *Recommendation of Key Competences for Lifelong Learning* (See: European Parliament and the Council, Recommendation of the European Parliament and the Council of 18 December 2006 on key competences for lifelong learning 2006). This reflects the importance attributed to modern technical competences at the time of the so-called knowledge-based economy, in which various jobs: administrative, management, industrial, commonly require knowledge of at least the basics of information and communication technologies (computer literacy). In this sense, digital competences still meant *stricte* technical skills.

Along with socio-economic changes and the development of the digital economy, the content scope of the concept of digital competences systematically expanded, and most importantly, it exceeded the narrow scope of "technical skills" understood as operating computer hardware and using basic software programs. Since 2012, in EU studies, a wide scope of this concept has already appeared, in line with the understanding of the concept of "competence" as a set of knowledge, skills and attitudes appropriate for a given task area (Filipowicz 2004):

(…) "*Digital Competence is the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently,*

appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment "(See: Ferrari 2012).

Seven areas of digital competences were distinguished:

- *information management* - identifying, locating, accessing, retrieving, storing and organizing information;
- *collaboration* - linking with others, participating in online networks and communities interacting constructively;
- *communication and sharing*- communicating through online tools, taking into account privacy, safety and netiquette;
- creation of content and knowledge - integrating and re-elaborating previous knowledge and content, constructing new knowledge;
- *ethics and responsibility* - behaving in an ethical and responsible manner, awareness of the legal frames
- *evaluation and problem solving* - identification of digital needs, problem solving through digital means, assessment of retrieved information.
- *technical operations* - the use of technology and media, performing tasks through digital tools.

The analysis of the above approach shows that digital competences are much more than just a 'technical alphabet' of operating devices and basic computer programs. This aspect, as a competence entitled 'Technical operations' is in fact the least complex and most obvious component of all digital competences. The remaining elements are more important, that is:

- *Social competences*: Collaboration, Communication and Sharing,
- Ethics and Responsibility;
- *Cognitive competences*: Create content and knowledge, Assess and solve problems,
- *Managerial competences*: Information management.

A team of experts gathered at the Joint Research Center of the European Commission was perfecting the study entitled *The Digital Competence Framework for Citizens* (The Digital Competence Framework - DigComp), first publishing DigComp 1.0 (2012), then Dig Comp 2.0 (See: Vuorikari 2016) and most recently, in 2017 - Dig Comp 2.1 (See: Polish version of DigComp can be fund on the platform). From the point of view of cybersecurity issues, in DigComp 1.0 the safety area in digital competences was not distinguished and appears only in 2016 in the Dig Comp 2.0 concept, as one of the five competence areas. DigComp developed free-of-charge tools to improve citizens' digital competences in work and employment, learning, leisure, consumption and social participation DigComp can be successfully used to self-test digital competences and is included in the European Computer Driving License (ECDL) training program.

The full matrix of 21 digital competences currently defined in the European Union and covering the area of "security" in 2017 in terms of topics covers: protection of devices, personal data and privacy, protection of health and well-being of users, and protection of the environment (See: Carretero 2017) In the *Recommendation of the EU Council on Key Competences in the Lifelong Learning Process*" (European Parliament and the Council, *Recommendation of the European Parliament and the Council of 18 December 2006 on key competences for lifelong learning*), published on May 22, 2018, we find confirmation of the assumptions developed in the work on DigComp 2.1. The Annex to the Recommendation contains a list of eight areas of *key competences*, including: 1) competences in understanding and creating information; 2) multilingual competence; 3) mathematical and natural sciences, technology and engineering competences; 4) digital competences; 5) personal, social and self-learning competences; 6) civic competences; 7) competences in the field of entrepreneurship; 8) competences in the field of cultural awareness and expression.

The document explains that the current competency requirements have changed due to the growing number of jobs subject to automation and the increasingly important role of technology in all areas of work and life (revolution 4.0). Key competences, including digital ones, have the importance of *transversal competencies* - that is, those that are used in various contexts and roles of social and professional life. Therefore, they should constitute the basic guideline in building lifelong learning educational programs. Responsible education and development of key competences plays a strategic role in building the resilience and adaptability of community citizens and employees to the constant changes in the socio-economic environment. The last example of unexpected changes is the crisis caused by the COVID-19 pandemic and the fact that the digital model of remote work is popularized due to its pressure.

In this paper, digital competences, (…) *include the confident, critical and responsible use of interest in digital technologies for learning, working and participation in society. These include information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), security (including digital comfort and cybersecurity competency), intellectual property issues, problem solving and critical*

thinking (European Parliament and the Council, *Recommendation of the European Parliament and the Council of 18 December 2006 on key competences for lifelong learning*).

The above definition highlights:

- importance of the critical and responsible use of digital technologies;
- the fact that they are necessary to understand how digital technologies are used, to build awareness of opportunities, threats and benefits, as well as to understand the general principles and mechanisms underlying the development of modern technologies.

In the Council's Recommendations of 22 May 2018 on Key Competences in Lifelong Learning (Regulation of the European parliament and of the council establishing the digital europe programme for the period 2021-2027, 2018), we can also find a description of the necessary knowledge, skills and attitudes related to digital competences, namely:

- understanding of how digital technologies can help in communication, creativity and innovation, and awareness of the opportunities, limitations, impacts and risks associated with them.
- understanding of the general principles, mechanisms and logic underlying evolving digital technologies, and being familiar with the basic functions and use of different types of devices, software and networks;
- adopting a critical approach to the relevance, credibility and impact of information and data provided digitally, and awareness of the legal and ethical principles related to the use of digital technologies.

Another important document is the strategic development program of the European Community *Digital Europe* Learning (Regulation of the European parliament and of the council establishing the digital europe programme for the period 2021-2027, 2018) adopted in June 2018. It is part of the European Union's multiannual financial framework for 2021-2027 and its implementation is to take place from January 2021. The program is at the heart of the European Commission's comprehensive confrontation with the current challenges of digital transformation. It should be emphasized that the starting point of the program initiative was a diagnosis indicating significant security shortcomings of the digital economy in the EU, which reduce its global competitive position in comparison with other world economies, mainly - the United States, China and Japan. The signs of weakness in the EU digital economy relate largely to cybersecurity and include the following facts:

- fragmentation and low levels of public investment in cybersecurity;
- the strong fragmentation of the European cybersecurity industry and the difficulty of identifying entities with established market power;
- jobs in the EU that require highly specialized technical knowledge and skills in areas such as artificial intelligence, data analytics and cybersecurity - remain largely vacant. Learning (Regulation of the European parliament and of the council establishing the digital europe programme for the period 2021-2027, 2018)

The program covers five development goals for the coming years:

- large-scale data processing,
- artificial intelligence,
- cybersecurity,
- advanced digital skills and ensuring their wide use in the economy and in society.

Advanced digital skills are defined in Art. 7 in the *Digital Europe* program as: (…) "*skills especially regarding high performance computing, big data analytics, cybersecurity,(…) and artificial intelligence*" Learning (Regulation of the European parliament and of the council establishing the digital europe programme for the period 2021-2027, 2018).

Program activities are aimed at simultaneously supporting these areas in creating an efficient digital economy based on data. They should also contribute to promoting social inclusion and greater employability in a transforming economy.

In summary, digital competences are complex behaviors that include adequate cognitive, social and technical knowledge and skills related to the critical, ethical and responsible use of digital means and devices and, as cross-cutting competences, essential for the effective and personally satisfying human functioning in a digital state. However, their development and promotion requires systemic support through comprehensive program initiatives and aid projects. It is also important to monitor and evaluate the state of development of digital competences of citizens and employees systematically in order to respond to the identified competency gaps with increased assistance activities.

Status of development of digital competences in the light of research

In June 2020, the European Commission published the latest results of the DESI index, which presents the current state of the digital economy and society in EU countries. The index covers five areas: connectivity; human capital, the use of internet services, the use of digital technologies, digital public services. Data for all EU countries published in DESI 2020 (collected for 2019) are shown in Fig 1.

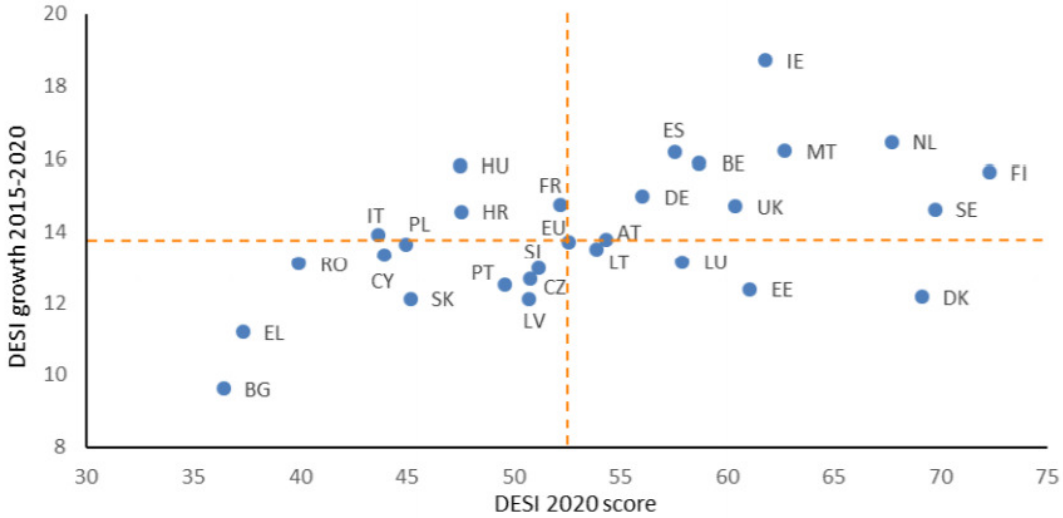

Fig 1. Digital Economy and Society Index – Member States' progress, 2015-2020.
Source: DESI 2020, European Commission.

Figure 1 shows the progress of Member States as regards the overall level of digitisation of the economy and society over the last 5 years. It is measured in terms of the progression of their DESI score over that period of time. The most significant progression is noted in Ireland, followed by the Netherlands, Malta and Spain. These countries also perform well above the EU average as measured by the DESI score. Common to these Member States are robust policies and targeted investment in all the areas measured by DESI. Finland and Sweden are amongst the leaders in overall performance in digital, but in terms of progression over the last five years they are just slightly above average, together with Belgium and Germany. Denmark, Estonia and Luxembourg show a relatively low progression in digitisation over the last five years, even though they remain amongst the well performing Member States in the overall DESI ranking. In Denmark, the largest challenge is to further improve on advanced digital skills whilst in Luxembourg the digitisation of businesses is relatively low. In Estonia, there is a relative weakness as regards connectivity and the digitisation of businesses. Significantly, the majority of the countries, which are below the EU average in the level of digitisation have not progressed much in the last five years. This is the case notably for Bulgaria, Greece and Romania. All these Member States, however, have recently launched several initiatives in the various areas monitored by the DESI and results may be visible in the coming years (Digital Economy and Society Index (DESI) 2020).

Summary - competency challenges for the 4.0 organization

According to the research, the shortage of employees with competences needed from the point of view of employers creating jobs in the 4.0 economy is systematically deepening and transforming into a long-term crisis, which may increasingly reduce the chances of economic growth (See: Deloitte, Global Human Capital Trends 2017). Organizations operating in a changeable and dynamic market must protect their unique and difficult to duplicate resources to remain competitive. That is why it is so crucial to organizational cybersecurity. When implementing an information security policy, companies first try to identify threats related to information loss. To do this, they need the right technology and advanced digital skills of workers. When investing in modern technology, companies need to monitor to what extent their employees understand it and are able to use its potential.

Research in the industrial sector shows that the biggest challenges in the field of digitization relate to internal issues such as culture, organization, leadership and workers' skills, rather than external issues such as whether the company has appropriate standards, infrastructure and security intellectual property or technical data or privacy security (Industry 4.0: Building the digital enterprise, PWC 2016). The lack of digital culture and appropriate training was considered the greatest challenge by the largest number of companies, regardless of industries and regions, including

companies that consider themselves to be advanced in digitization processes. An organization's digitization policy offers opportunities to build a competitive advantage, but it is also risky if it is not based on solid digital competences and digital security. However, in the face of the increasingly changing social and economic environment, the search for innovative, low-cost chains of creating value for customers seems inevitable. As the burden of struggling with the digital mismatch of work resources is still mostly placed on employers and employees themselves, further system solutions and support programs at the institutional level are necessary.

These conclusions are more relevant than ever in the light of the economic crisis initiated by the unexpected COVID-19 pandemic, in which forced lockdown intensifies the development of the e-commerce sector, intensive use of remote work and digital tools and solutions, but also intensifies tensions on the labor market in connection *with insufficient supply of advanced digital skills.*

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Perceptions of IT Employees Regarding the Use of Disruptive Technologies in The Organisations in Which They Work

Anamaria-Cătălina RADU, PhD

Romanian Academy, Institute of National Economy, Bucharest, Romania, anamaria_radu15@yahoo.com

Andra Ileana DOBRESCU (Neicu), PhD
The Bucharest University of Economic Studies, Bucharest, Romania, andra.dobrescu29@yahoo.com

Larisa Gabriela OFIȚERU
The Bucharest University of Economic Studies, Bucharest, Romania,
larisaofiteru@gmail.com

Ivona STOICA (RĂPAN), PhD (corresponding author)
Romanian Academy, Institute of National Economy, Bucharest, Romania, stradivonas@gmail.com

Abstract

Worldwide, there is a convergence of web services and mobile technology. Applications that initially existed only on computers have also been developed for smart equipment, such as tablets and mobile phones. The applications' need for portability led to the establishment of cloud services and cloud computing, which allow users to no longer invest in their own infrastructure, maintenance and upgrade, but merely lease from a certain data processing and storage services' provider. In this paper we conducted a qualitative study through which we aimed to identify the general opinion of IT employees on disruptive technologies, and how they use them in the organisations in which they work. The qualitative analysis was performed among 10 experts working in the IT field.

Keywords: disruptive technologies, cloud, qualitative study, IT&C.
JEL Classification: M31, O14, C10.

Introduction

The implementation costs of the wireless technology, as well as the costs of using 3G/4G data have significantly decreased in comparison with the 2000s. However, the infrastructure allows GSM signal coverage for most of the population, especially in the urban area, where many of the services and IoT product costumers are found (cisco.com). The limit between real, digital and virtual can be overcome, and technology can create intelligent environments that can manage transport, produce green energy, ultimately leading to the smart city.

IoT designates the network of smart objects (home appliances, sensors and other devices) which allow remote control (using the already existing network), and can be integrated in systems to have an increased efficiency, a greater accuracy or to be economically sound in terms of consumption. Each of these objects can be detected using a unique identifier, and can act alone or within an interconnected network. The purpose of IoT is to allow connecting from anywhere, at any time, with everyone and everything via a network (Internet) and a service. IoT represents the revolution of the Internet. Objects can recognise themselves and become smart by taking decisions based on the information received from this interaction.

The Internet of Things (IoT) is represented by the interconnection between smart objects, capable of exchanging information based on an initial established protocol. It is known that an increasing number of objects possess integrated sensors. As a result, the IoT era only has to interconnect these objects and collect the information coming from the sensors with the purpose of accomplishing the objectives of interest (Vermesan, Friess, 2013, p.8). Currently, the IoT era represents one of the most promising emerging technologies with an emphasis on integrating solutions that lead to the interoperability of various existing technologies.

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All smart objects collect data and automatically transmit them to the beneficiary via a network with an Internet connection. In the future, the processing power, data storing and communication services will be universal and distributed, the real-time bidirectional communication between humans, smart objects, machines and surrounding environment platforms with the help of sensors (wireless or not), M2M technology (machine-to-machine) or RFID labels (Radio Frequency Identification Labels) being allowed. In the IoT era, the objects have an active role due to the Internet connection, and a global network of objects, humans and computers interaction will be created.

The platform's use becomes increasingly easier due to cloud development, its infrastructure allowing the emergence of several applications and services that can be accessed worldwide. The result is accessibility to a network of objects at global level, in which users can meet developers, create businesses or contribute with content, i.e., participate in creating new services. The success of a network of objects is given by the large number of objects, information/ knowledge acquired about the objects, and the rapidity and stability of the Internet connection (Vermesan, Friess, 2013, p.9-10).

Technologies that are based on AI have the ability to diagnose faster and more accurately. Thus, by using these technologies, human error is eliminated. AI helps doctor's access knowledge existing in the medical system more easily. AI-based applications have the capacity to memorise a series of medical knowledge in various fields, and provide health professionals the relevant information for their cases by matching the existing databases in the system with a certain patient's medical case.

Augmented reality can be achieved with the help of several devices, which bring additions to the environment through a computer system (tablet, smartphone or a device specialised in this regard). Here are the following augmented reality variants (vr.google.com):

1. *Use of a smart device with camera (phone, tablet, laptop)* – this variant allows real-time modification of everything that is filmed, being used by a regular user of a smart device (e.g., IKEA's application that allows users to view furniture in the house in real time). Another application is Google Translate that translates in real time the information captured using the smart device's camera.
2. *The use of dedicated glasses* – digital reality elements, displayed by a minicomputer, are added over the field of view. This type of glasses can be used both as eyeglasses and as a screen (Sherman, Craig, 2003).
3. *Head-up display* – information such as speed, vehicle condition, fuel consumption, distance, or GPS information is displayed on the windscreen of a car.

Virtual reality is limited by the processing capabilities of the devices used, which are often small in size, and have limited processing power. Another limitation of the devices is given by the capacity of the batteries, the devices that allow the visualisation of the virtual reality not having very great autonomy. Virtual reality is a new and expanding technology, with multiple companies developing projects in this direction, but investments in technology must be intensified in order to have concrete results and useful applications in everyday life (Sherman, Craig, 2003).

Literature Review

An important aspect that we set out to study is the evolution of disruptive technologies globally. This aspect will help us understand better the impact that these technologies have both on the consumption of raw materials and materials and on the evolution of the labour force, but also on the general evolution of the economy. The new applications that are currently appearing on the market are meant to permanently convince us that they can change our lives but also that they have the ability to improve our standard of living. They offer both consumers and organisations a number of advantages, giving them the opportunity to help them permanently in all their activities.

On the other hand, these disruptive technologies have affected many industries, such as those related to car rentals (people can call a taxi online or rent cars through websites), robots replacing many employees, people being able to share large documents with others that are far away, etc. These new technologies have improved market activity but, on the other hand, have removed traditional producers.

Forbes (forbes.com) conducted a study which found that digital disruption is not just a concept that is studied in detail in the literature, but is a phenomenon that permanently affects the activity of organisations. In this research it was noted that more than 1/3 of the executives who participated in the study mentioned that they feel the impact that digital disruption has on the organisation. They said that the risks posed by the emergence of these disruptive technologies are quite high, their impact being felt in many organisations. More than half of them stated that, in the next 5 years, these technologies are expected to have a strong impact on market share as well as on their revenues.
As previously mentioned, the development of disruptive technologies will automatically lead to a decrease in traditional production. Specialists mentioned that, before observing the positive effects of using these technologies,

we will first feel their effect on the traditional market, due to the loss of jobs and the decline of various industries that will be technologized. The development of specialised applications will have a major impact on the middle and lower classes in the coming years (http://www3.weforum.org/).

The table below shows how disruptive technologies are predicted to impact the economy in 2025, per types of technology, with low and high estimates. Specialists consider that the Internet of Things will have an economic impact reaching up to 11.1 trillion U.S. dollars per year by 2025.

If we analyse comparatively these disruptive technologies, we can note that by 2025 the Internet of Things (IoT) technology will have the largest impact on the economy (high estimate – 11.1 trillion dollars), followed by mobile internet (high estimate – 10.8 trillion dollars), as well as automation of knowledge work (high estimate – 6.7 trillion dollars). In the coming years, cloud technologies as well as advanced robots are expected to have a fairly high impact on the economy (statista.com).

Table 1 – Forecasts on the evolution of disruptive technologies by 2025

Technologies	Estimate	Trillion U.S. dollars
Internet of things	High estimate	11.1
	Low estimate	3.9
Mobile internet	High estimate	10.8
	Low estimate	3.7
Automation of knowledge work	High estimate	6.7
	Low estimate	5.2
Cloud technology	High estimate	6.2
	Low estimate	1.7
Advanced robotics	High estimate	4.5
	Low estimate	1.7
Autonomous and near-autonomous vehicles	High estimate	1.9
	Low estimate	0.2
Next- generation genomics	High estimate	1.6
	Low estimate	0.7

Source: Adapted after: statista.com

Based on the data presented above, we considered it necessary to conduct a study to identify employees' views on disruptive technologies currently on the market, and how they are used in the companies in which they work.

Materials and Methods

In order to establish a more complete framework regarding the complexity of disruptive technologies and their evolution, we decided to develop a survey among specialists who integrate disruptive technologies in their professional activity. Looking from this perspective, an overview will be outlined in terms of the use of disruptive technologies, as well as the potential directions for their development. Moreover, the information will focus on the use of Web 3.0 technologies in their work and in mobile marketing, respectively. Another interesting aspect that will be delivered by experts is the outlining of the ideal web technology, considering the essential parameters used to describe a technology in general. Given that disruptive technologies have experienced an accelerated development trend and a high capacity for applicability in recent years, more and more companies choose to integrate them into their business. Thus, the centre of interest focuses on the people who use such technologies, as well as on the capacity with which experts manage to streamline their professional activity using disruptive technologies.

Figure 1: Objectives of the decision-making problem and the purpose of the research stated

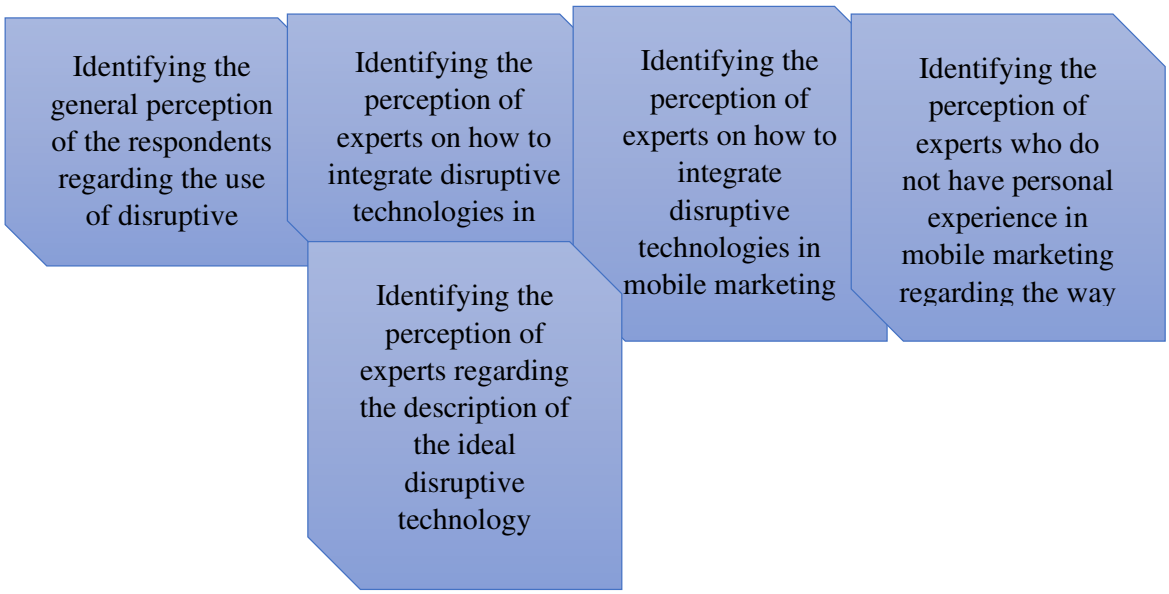

Source: Authors own research

Selection of information collection method

Given the large number of objectives to be achieved in this research, we decided to use the *semi-directed in-depth interview* to collect data from respondents. This method involves an in-depth discussion between the operator and the interviewee, which follows the interview guide to meet all the previously proposed objectives (Cătoiu et al, 2009, p.220). The interview guide was structured in five discussion topics, as follows: "Introduction", "Disruptive technologies in general", "Integration of disruptive technologies in the activity that employees carry out", "Integration of disruptive technologies in the activity of mobile marketing", and "Description of the ideal disruptive technology".

The discussion topic "Disruptive technologies in general" as well as the last topic include projective techniques to complete the sentence, experts being invited to formulate a definition for "disruptive technology", to compare current disruptive technologies with those that existed five years ago, and to describe the ideal disruptive technology, considering the main features of a disruptive technology in general. The use of *projective techniques* was selected because more accurate answers are given compared to asking a series of questions on the investigated subject (Cătoiu et al., 2009, p.232). The time allocated to each in-depth interview was about 90 minutes.

Conducting the research

In order to capture a detailed picture of the subject under investigation, 10 in-depth interviews were conducted with IT experts. They were male and female, aged between 30 and 50 years, the last form of education they graduated was a master's or doctorate program, and they work in companies in Bucharest. The sample was structured as follows: 1 expert in the field of cyber-intelligence, 2 experts in the field of network architecture, 1 expert in the field of social media, 1 expert in the field of online events, 4 experts in the field of online marketing: SEO (Search Engine Optimization) and online market research, 1 expert in the fields of web design. In the following, we will name the experts as follows: Expert 1, Expert 2, Expert 3, Expert 4, Expert 5, Expert 6, Expert 7, Expert 8, Expert 9, and Expert 10. The selection of experts in the field followed a selection questionnaire, composed of four questions. With it, we selected the eligible participants for this study.

The research was conducted among experts in the field between 2017 and 2020. The questions included in the interview guide were addressed to the respondents progressively, in order to obtain answers for each issue. Following the data collection, they were processed and analysed, and later interpreted.

Results

In terms of the analysis of the experts' lifestyle, most adopt **an unhealthy lifestyle (very stressed, workaholic, focused on the job the enterely day with no moments of realxation and wellbeing)**, specific to those in very

crowded cities. However, almost all experts are **receptive** when thinking about possible **changes** that may occur in their lives. Two of the experts consider **change to be beneficial to evolution**.

The most common **hobby** among experts is **the passion for technology** (Internet, web technologies, blogging, and integrated technologies in the automotive industry). Considering the experts' field of activity, they are up to date with the latest technologies, applicability methods, but also with the latest devices for their use.

Technology is constantly present in the lives of experts. **The passion for technology** exceeds the professional barrier, and manages to be successfully **integrated** into personal life.

Moreover, Experts 1 and 2 have integrated technology in their own homes, in order to ensure increased comfort, following the example of smart homes, which use **smart technologies**. They have chosen to adopt these facilities provided by modern technology to reduce utility expenses, to reduce environmental pollution (they use photovoltaic cells and wind power plants to produce green energy), and to ensure the remote control and security of the properties (cameras that stores images in the cloud, ambient temperature control sensors). Expert 1 said: *"I find everything technological and that can make my life easier useful. I even chose to make my own smart home, because I like to take care of the environment, and I like to have control over all my assets. I even have a GPS on my electric car."* Expert 2 is of the same opinion, saying: *"I can't live or imagine my life without technology. My watch, phone, tablet, car and home are smart. The air conditioning at home asks me what time I arrive, to start. I don't waste, I take care of the environment, and I'm fine. I intend to buy an electric car, but they don't have enough autonomy to move without worrying."*

The most common device used by experts is **the smartphone**. The respondents preferred more Apple and one of them, Samsung gadgets.

In general, experts **spontaneously associate** the term "disruptive technology" with aspects related to **the Internet and its use** (*"Internet", "websites", "web applications", "browser multimedia content", "social networks"*), but also the **hardware and software components** underlying the provision of these services (*"server", "programming language", "metadata", "HTML", "networking", "smart devices"*). Regarding **the definition** of the term **"web technology"**, experts believe that it is identified with the following:

Prior to 2010, **the Internet did not have the high speeds** that are currently available, and disruptive technologies **were not open to use by the general public**, but rather intended for IT&C specialists. Since 2010, disruptive technologies have been directed towards meeting the needs of **niche consumers**, by creating **customer-oriented applications** to meet their specific requirements. Moreover, disruptive technologies have facilitated the access to applications on various smart devices.

Starting in 2010, software developers began **to integrate cloud services into applications** because they noticed the customers' need to have a secure and cheaper storage space than investing in their own infrastructure. Experts 4 and 5 support the idea that cloud services will have a rapid development in the future because technology is becoming cheaper and cheaper, and cloud service providers have identified a high potential in their use.

Opinions are divided among experts on the ability of disruptive technologies to meet the needs of the Internet. On the one hand, existing **technologies** at the time **met the requirements of the general public**.

At present, disruptive technologies **have developed considerably and have applicability in vast fields** compared to those existing in 2010, and more, are continuously developing.

Experts also believe that **modern technologies simplify the user's life** because they cover a wide range of services, such as multimedia content sharing, cloud computing and online questionnaires, and *"wireless technology can be applied to any object (luggage that connects via Bluetooth to the phone, and "tracks" the user with the help of the phone without having to touch the object; moreover, it is not even necessary to weigh it because this information can be viewed directly on the phone",* disruptive technologies *"have evolved a lot and improved a lot. SIRI from Apple, 3D Maps (for example, Google Maps), artificial intelligence (for example, RankBrain from Google), there are even websites that allow you to make a phone application with drag and drop."*

Majority provides a more technical perspective on disruptive web technologies *"Online payments that are very diverse and are more trusted by customers/users than in the past."* Regarding the possible problems encountered by experts following **the use** of disruptive technologies, it was noted that most of them **had no difficulty** in this regard. The main reason stated by experts refers to the fact that they are constantly evolving, and are constantly updated to meet the needs of people as accurately as possible.

Disruptive technologies will continue their natural evolution in the future, **new ones will be developed**, and **current ones will mature and will be interconnected**. Expert 3 believes that, in the future, disruptive technologies *"will become interconnected. We will have applications that use modules written in various programming languages, but that will provide a similar user experience regardless of the device used to access the application."* In turn, **the activity in all areas will be carried out exclusively in the online environment**, as one of the experts mentions: *"Everything will be online! A relevant example is Chromebook, whose files are stored exclusively in the cloud, and are accessible via the Internet."* Expert 1 is of the same opinion: *"We will be witness a process of moving information to the cloud. There will be no more physical storage space, like an external HDD. All applications will run on online servers, all information will be stored there. It's cheaper for the public, because they no longer have to invest large sums of money on laptops, computers or high-capacity HDDs/SSDs. They only need a stable and fast Internet connection."* ***Government institutions will*** *also* ***move their services online****."*

Regarding the main areas of applicability of disruptive technologies, experts spontaneously responded with fields such as: *"Medicine", "Cloud", "Entertainment", "Social Networking", "Advertising", "Virtual Reality", and "Marketing"*. In the future, application developers will *"**focus much better on the niche**, and try to better serve certain homogeneous categories of people, so that their demands and needs are best met." "The focus lies more on niche segments, given that their application must be differentiated according to the audience and their needs."* Thus, it is noted that niche segments are a potential source of development in the future.

The third-generation Internet, Web 3.0, includes technologies that help streamline activities in the business environment. It can also support personal use.

In this context, one of the experts declared that "Disruptive *technologies (Web 3.0) are those that decode semantically, do more than just associate/search databases by certain characters/words, etc. Web 3.0 was also created to interconnect devices and everything related to the web pages that a user uses, without having to use each element (device or web page) separately. The browser should become a phone that encompasses all "applications", applications meaning everything related to the web pages they frequent, including online banking, social networks, etc. Until now, these things were done on different devices, and could not match information."*

Two experts believe that this new generation of disruptive technologies will be the one that **will transfer all professional and personal activity to the cloud**. When experts were asked to use their memory and think about the most representative disruptive technologies of the new generation that they integrate in their professional activity, they showed their willingness and provided a wide range of answers. However, **the most common** are programming languages used to develop the vast majority of web applications: HTML5, CSS3, Java, Go, Swift, PHP, along with cloud computing, IoT (Internet of Things), and artificial intelligence. Moreover, experts tend to use in their work services based on disruptive technologies such as: cloud, cloud computing, iGoogle, DBpedia, LifeStreaming, Wordpress.

The benefits of the projects that were observed by the experts refer to the efficiency of the working time, the improvement of communication, and the reduction of costs involved The most common barriers encountered by experts in projects based on various disruptive technologies are related to the degree of knowledge of the technologies involved in the process, allocated budgets, Internet connection, and the time allotted for projects. In this context, they are presented as follows:

Continuing with the weaknesses identified in the projects based on various disruptive technologies, most experts did not encounter any difficulties in this regard. Experts believe that there may be solutions to improve projects based on various disruptive technologies.

Another objective of this study was to identify how the interviewees use the mobile marketing activity within the company.

The next step in the discussion with the experts was an exercise to carry out the personal design of the ideal technology. Thus, the ideal was delimited taking into account the most representative parameters of a disruptive technology in general. However, given the speed with which technology is evolving, identifying the features of an ideal technology is difficult to achieve, because the areas of applicability are completely different, and have specific particularities.

In terms of **scope**, experts concluded that the ideal technology should be applicable in any field (mainly in areas such as e-commerce, banking, and customer relations), should be flexible, efficient and adaptable on any platform, and, last but not least, should be affordable. Experts say that **the architectural structures** of an ideal technology will be complex, but the user interface must be simple to be **easy to use**, even by an uninformed person. They will also be

based on the cloud infrastructure, to allow use on any platform, without the need to install complex software. **The content** must be strictly related to the topic, to allow the user to work efficiently, and, in terms of **communication**, the ideal technology must use and integrate multiple channels and ways of communication, so that, regardless of nationality or language spoken, the interlocutors have the ability to understand each other. In this context, a possible variant could be a real-time translator integrated directly into the new technology's platform. Regarding **the added value of an ideal technology** compared to a technology from previous generations, experts support the idea of integrating multiple technologies into a single search engine, in order to generate a complex answer (semantic query of a search engine).

Given the three main criteria that experts consider when thinking about the ideal technology, the vast majority believe that its benefits (usefulness) come first, followed by data security, and user-friendly interface. Criteria such as low cost, high response speed and the ability of the system to adapt to the devices used were also mentioned.

Conclusions

Following this research, the ***lifestyle*** of the experts was outlined as *disorganised*, *characteristic of large and crowded cities*, with *changes* encountered everywhere, and which they *easily accept*, out of the desire to *constantly evolve* and *get rid of the daily routine*. As expected, the experts' most common ***hobby***, which occupy their free time and more, is technology in general, the preferred device being *the smartphone*. Experts constantly keep up to date with emerging technologies, but also with their application, whether it is the technology present in the virtual environment, or in the automotive industry. Moreover, some experts choose to use smart technologies in order to have permanent control over the perimeter of their homes (home monitoring, security systems, ambient temperature control, etc.). Experts are also passionate about traveling and participating in various *sports and artistic activities*.

Spontaneously, "disruptive technology" is associated with aspects of the *Internet and its use* (websites, web applications, multimedia content using a browser, social networks), but also with certain *hardware* (server, networking, smart devices) and *software components* (programming language, metadata, HTML) that provide these services. Regarding ***the evolution of technologies since 2010***, it is noted that they are mainly aimed *at meeting the needs of niche consumers* using applications aimed at meeting the exact requirements of the customer. Starting with this period, an exponential increase of applications for smart devices could be also observed, mainly due to the hardware evolution and the decrease of the production costs of the devices. Also, since 2010, cloud services have been integrated into applications, giving users the ability to easily store information on the same platform they were working on.

The emergence of the HTML5 standard is worth mentioning, which has greatly improved the way we interact with data. Opinions are divided among experts on the ability of disruptive technologies to meet the needs of the Internet in 2010. On the one hand, some experts argue that they were sufficient for the general public because it does not use cloud services and the applications ran on personal computers, while for specialists, they made it much more difficult to carry out daily activities due to interruptions and interconnection problems.

Currently, **disruptive technologies are constantly evolving**, focusing on **cloud services developed for portable devices**, regardless of the operating system. ***Spontaneously***, "***modern*** disruptive ***technology***" is associated with terms such as *IoT (Internet of Things), AI (artificial intelligence), intelligent online search, graphical interface, virtual reality, wearables, cloud computing,* and *voice search*. Modern technologies simplify the user's life, covering a wide range of services such as multimedia content sharing and cloud computing, with applicability on a lot of smart devices (tablets, mobile phones, wearables, etc.). The emergence of the HTML5 standard is also notable.

It is also worth mentioning that most websites are agnostic devices, and can be viewed correctly, regardless of the device used, tablet or smartphone. We can also note the efforts made in terms of *security and integrity of data stored in the clouds*, but also the fact that *online payments* have increased exponentially, which indicates the confidence of users in online banking services, but also the online migration of many businesses. **In the future**, current technologies **will evolve, new ones will emerge, but most importantly, they will all interconnect**. Thus, *all programming languages will be compatible*, providing a better end-user experience. Experts believe that, in the future, there will be a **process of moving information to the cloud**. The applications will also run from the cloud on various devices, which no longer need high-capacity HDDs/SSDs, but only a *stable and high-speed Internet connection*. Some experts argue that disruptive technologies will serve *the specific needs of niche segments*, and certain homogeneous categories of people, as this is a segment that has not been sufficiently exploited. Others believe that they will serve mainly for the *mass-market*.

The main **field of application** of **future technologies** is *medicine*, according to the spontaneous answers of experts. Other areas in which future web technologies could be integrated are: *"Cloud", "Entertainment", "Social*

Networking", "Advertising", "Virtual Reality", and *"Marketing"*. Among the **benefits** identified in projects using disruptive technologies are aspects related to more efficient working time, improved communication, and reduced costs, while the main **barriers** mentioned refer to the degree of knowledge with respect to the technologies involved in the process, allocated budgets, Internet connection, as well as the time allotted for the implementation of projects. In contrast, most experts believe that there were no weaknesses in the projects they worked on, projects that had integrated disruptive technologies. However, experts are confident that technologies can be continuously improved and that there can be directions for their development. In terms of **integrating disruptive technologies in the mobile marketing activity**, experts believe that marketing through smartphones is *a source with high development potential*, the intention being to exploit it in the future. Experts strongly believe that, in the future, people will access information exclusively from smartphones.

Identifying an **ideal technology** is difficult, given the speed with which technology is evolving, and the many features that need to be considered. However, experts believe that it would be ideal for the technology to be applicable in any field, to be complex and flexible as an architectural structure, but easy to use, even by a non-specialist. Moreover, it should integrate multiple communication channels and be available in different versions, adapted and translated into as many foreign languages as possible.

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Physical and Digital Security in Schools and Educational Institutions Preliminary Study: Security Organisation in Schools and Educational Institutions

Ryszard SZYNOWSKI

WSB University, Dabrowa Gornicza, Poland
rszynowski@wsb.edu.pl
szynrys@interia.pl

Abstract

The proposed study topic is of significant cognitive and application importance. In recent years, the issue of ensuring security in the school environment has been the focus of attention of educational authorities, parents and students, as well as scholars, which is why the researchers of the WSB University in Dąbrowa Górnicza joined forces with the Department of Education of the Municipal Office in Jaworzno to jointly undertake the "Physical and digital security in schools and educational institutions" project, the main objective of which will be the development of solutions ensuring physical and digital security of children and youth in schools and educational institutions in Jaworzno. This paper outlines the preliminary results of the first stage of the survey conducted in the environment of school headmasters and headmistresses, as well as managers of educational institutions. The objective of this preliminary study was the diagnosis of the scale and types of threats concerning physical security of children and youth, as well as the analysis of the process of organising security in schools and educational institutions by heads and managers of these institutions.

Keywords: Schools and educational institutions, physical security, digital security, external threats, internal threats, digital threats, security organisation.

Introduction

Methodology and results of preliminary studies

The implementation of the project fills the observed research gap in contemporary academic and practical discourse on student security in schools and educational institutions. A cognitively valuable result of the study will be the analysis of the obtained results of a survey concerning threats occurring in the area of schools and educational institutions of the city of Jaworzno, and – in consequence – working out preventive measures. The study comprises three stages: a preliminary study stage, which involves all heads and managers of educational institutions, a fundamental study stage involving teachers, administration employees and staff, students and their parents, as well as the third stage, which involves working out the procedures and the transfer of practical knowledge on how to behave properly at school, in the public space and at home to students and youth.

The problem area of the preliminary stage of the study concerned finding answers to the following research questions: "What, according to the heads and managers, are the threats to physical and digital security dominant in schools and educational institutions"" and "How does security organised by heads and managers of schools and educational institutions work?"

The study was carried out on the basis of the "Educational institutions monitoring sheet concerning the identification of needs and resources for strengthening the security of children and youth in the city of Jaworzno" developed by the Department of Education and the Department of Crisis Management of the Jaworzno Municipal Office in cooperation with the heads of schools and educational institutions. Due to the nature and subject matter of the project, an anonymous community survey (Babbie 2007; Krok 2015) was chosen as the most appropriate study form, addressed to a small group of experts, namely heads and managers of schools and educational institutions. The self-guided questionnaire comprised 50 questions, including 48 semi-open questions, one open question and an exploratory question. In order to increase the study sample, an online survey was used, sent out to heads of schools and educational institutions. The study was carried out in the school year 2019/2020.

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Any school/institution can be looked at from the point of view of at least two aspects, as an educational institution and as the seat of this institution. In the first case, we will be considering an educational institution that deals with education and upbringing. The issue of upbringing itself encompasses a component of teaching, care and prevention. Care focuses on ensuring the child's safety and meeting their spiritual, mental and physical needs. In the latter case, the school/institution is understood as the building used by its students, teachers and staff. In this case, two factors are crucial from the standpoint of ensuring security, namely the material factor (the school building, its equipment and surroundings – the area adjacent to the building with the infrastructure belonging to the institution, limited by a fence or visible markings) and the human factor (heads and teachers who are responsible for the safety of students during the time they spent at school).

Heads of schools and educational institutions are workplace managers within the meaning of the provisions of the Labour Code and they carry out tasks related to ensuring the safety of students and teachers during classes organised by the school or institution (according to the Education System Act). As employers, they are held responsible for the state of workplace health and safety in the company, and as such they are bound by the obligation to protect the health and life of employees and to know the regulations on labour protection, including, but not limited to, regulations and rules of workplace health and safety. Heads of schools and educational institutions are also obliged to provide information concerning hazards in the workplace, protective and preventive measures and employees designated to provide first aid and perform fire-fighting and evacuation activities to its staff, according to the Labour Code Act.

These two provisions confirm that it is the heads who are responsible for the state of security, including risk analysis and the process of organising security management projects in schools and educational institutions.

Thus, the analysis concerning physical and digital security should start with an assessment of the organisation of this process by the heads of these institutions based on surveys. The following issues were taken into account in the conducted surveys:

- threat identification and assessment;
- formalisation of security issues;
- security in the school grounds;
- occupational safety and health;
- technical security in the workplace;
- employee training;
- security checks.

Analysis of preliminary study results

Threat identification and assessment

The term "threat" can be understood instinctively and it is commonly used; however, it can be interpreted in a variety of ways. The PWN dictionary of the Polish language offers the following definition: "a situation or condition that threatens someone, or in which someone feels threatened" as well as "someone who creates such a situation." Thus, the interpretation of the noun "threat" requires the verb "to threaten", which can have two meanings: 1) "to scare someone in order to force them to behave in a certain manner" or 2) "to become an actual danger to someone or something." Here, threat refers to a certain state of mind or consciousness caused by perceptions of phenomena that are assessed as unfavourable or dangerous (Zięba 2001; Hołyst 1997).

An adequate knowledge of the threats that may manifest themselves in schools/institutions helps to prevent or minimise their consequences. Thus, it is necessary to identify and define a number of present threats, as well as phenomena, which are not specified in the regulations but are noticed as a result of the survey. That is why the issue concerning physical and digital safety in schools and educational institutions is very broad and includes, among others, identifying threats, as well as material and human resources related to the neutralisation of the following threats:

a) external threats (intrusion of an attacker (terrorist), setting up an explosive, leaving a suspicious package, chemical or biological contamination incident);
b) internal threats (occurrence of aggressive behaviour at school, finding drugs at school, theft, cases of paedophilia, distribution of pornography at school, prostitution, disturbing sexual behaviour, accident at school, criminal acts);

c) cybersecurity threats (access to harmful content, cyberbullying, invasion of privacy, children's health risks stemming from Internet use, unsafe contacts on the Internet, sexting, copyright infringement, technical security of networks, computers and resources).

Threat analysis at schools schools/institutions concerned the following issues:
- the types of external threats involved;
- the types of internal threats that have occurred in the last three years and their rate;

In all 50 analysed schools/institutions, a total of 335 cases of risky behaviour of students were reported. The most frequently occurring incidents (more than 50 cases) in schools/institutions concerned verbal aggression and excessive use of Internet-enabled devices. Violent and brutal behaviours (verbal aggression) was reported in 74 cases in 36 schools/institutions. Another key dangerous behaviour of children and youth in terms of an absolute number of reports was excessive use of Internet-enabled devices, with 57 cases were reported in 26 schools/institutions. At the same time, when assessing the frequency of occurrence of risky behaviours in children and youth on a scale from 0 (no occurrence) to 4 (very frequent), the heads stated that verbal aggression occurs very often and often in 11 (22%) schools/institutions, with “rarely” and “very rarely” picked by 25 (50%) institutions, and “not at all” in 14 (21%) institutions. By contrast, excessive use of Internet-enabled devices occurs frequently and very often in 8 (16%) schools/institutions, rarely and very rarely in 18 (36%) institutions, while in 24 (48%) of institutions it does not occur at all.

The second largest group of events in terms of an absolute number of cases (varying between 20 and 50) includes physical aggression, smoking, destruction of property, cyberbullying and deliberate exclusion from peer groups, with a total of 167 cases in 116 schools/institutions.

In the case of physical aggression, 40 events of this kind were recorded in 31 schools/institutions. Another worrying phenomenon is smoking/vaping, with 37 cases reported in 20 schools/institutions. Respondents also pointed to 31 cases of destruction of property in 26 schools/institutions. At the same time, when assessing the prevalence of risky behaviours of children and youth, they stated that physical aggression does not occur in 19 (38%) institutions, and that in 31 (62%) of them it is either rare or very rare. According to the heads, smoking does not occur in 30 (60%) schools/institutions, while in 11 (22%) it is very rare, and rare in 3 (6%) of cases. In 6 (12%) institutions it occurs frequently or very frequently. The phenomenon of destruction of property does not occur in 25 (50%) institutions, while in the remaining 25 (50%) schools/institutions it occurs rarely or very rarely.

In the case of cyberbullying and deliberate exclusion from peer groups, a similar number of events were reported, with 24 events of cyberbullying and 28 cases of deliberate exclusion from peer groups in 20 schools/institutions. The heads assessed the prevalence of these events in a similar manner – cyberbullying and deliberate exclusion from peer groups occur very rarely and rarely in 20 (40%) cases, whereas in 30 (60%) institutions, according to their managers, these phenomena do not occur at all.

The smallest number of incidents (between 1 and 20) includes self-mutilation, theft, possession of dangerous objects, alcohol consumption, use of smarties and drugs. The most common issue reported by heads is self-mutilation (17 cases in 15 schools) and theft (16 cases in 15 schools). Another issue concerns the possession of dangerous objects: 10 cases in 10 schools/institutions, with additional 5 cases related to alcohol consumption in 4 schools/institutions. There were also a similar number of cases related to the use of drugs and smarties with 2 cases each, in 2 schools/institutions, respectively.

The analysis of the survey results shows the particularly low prevalence of the described phenomena. In the opinion of school/staff directors, self-mutilation and theft are rare and very rare in 15 (30%) schools/institutions, while in 35 (70%) schools they do not occur at all. Possession of dangerous objects is very rare in 10 (20%) institutions and does not occur at all in 40 (80%) schools. On the other hand, according to school/institution heads, issues such as alcohol consumption and the use of smarties and drugs occur, respectively: rarely 1 (2%) and very rarely 3 (6%), as well as in 2 (4%) schools each, and does not occur at all in 46 (92%) and 48 (96%) institutions, respectively.

As far as external threats are concerned, principals point out that over the course of the last three years, 15 schools/institutions had a Blue Card procedure (16 Blue Cards) (see the Regulation of the Council of Ministers on the Blue Card procedure) and during the secondary school graduation exams in 2018, e-mails informing about an explosive device being planted were sent to some schools. In the analysed period there was no case of an invasion of an assailant on the school grounds.

To conclude, it needs to be stated that in the opinion of heads, the overwhelming number of incidents that occurred in schools/institutions concerned internal threats, mainly risky behaviours of students; however, they were not particularly prevalent. On average, 65.1% of the respondents believe that there are no risky student behaviours in schools/institutions, while 30.9% consider these cases to be very rare and rare. Only 2.8% of respondents believe that negative behaviours of students in their school are frequent, with 1% considering them very frequent. Among the most frequently mentioned, the respondents indicated verbal aggression, excessive use of Internet-enabled devices, smoking/vaping Physical aggression and destruction of property, as well as exclusion from peer groups are very rare. The rarest issues at school include the possession of dangerous objects, the use of smarties and drugs and the consumption of alcohol.

The threats to digital security pointed out by heads and managers included excessive use of Internet-enabled devices by children and youth, as well as the relatively rare phenomenon of cyberbullying.

Evaluation of the process of organising safety measures in schools/educational institutions

The evaluation of security projects encompasses:

- formalisation of security process;
- materials and assets (passive protection, active protection, threat prevention systems);
- human factor (employment and competencies of teachers and staff);
- cooperation with the institutions responsible for security and public order in the city.

Formalisation is a process in which the goals and structure of the school/institution are regulated by means of legal acts and internal regulations, building patterns of conduct and dependencies, as well as procedures of their operations and functioning. For the proper functioning of schools/institutions, it is necessary to develop written regulations that define objectives and tasks of the institution and its organisational units, responsibilities and powers, and models of activities. Taking into account internal (endogenous) factors, which can be shaped by school/institution directors, security documents and procedures, such as statutes, rules, regulations, plans and procedures in force at schools and institutions were evaluated.

In all analysed cases, according to the principals, the statutes contain security provisions. Similarly, the workplace regulations of work in schools/institutions also contain security provisions in the cases of 48 schools/institutions, in the remaining 2 cases the respondents chose “not applicable”, while others pointed to the need to update the documents in question. In 45 schools/institutions, the Regulations of the Board of Teachers, in the opinion of the heads, contain provisions concerning the protection of personal data. In 22 cases, the schools/institutions have an updated Civil Defence Plan, in 28 cases the plan is being revised or needs to be updated, because as the respondents stated, the plans were drafted in 1987 or 2005. 90% of schools/institutions (45 cases), according to the respondents' answers, had an up-to-date fire safety manual, while 5 institutions need to update their documents.

In 30 schools/institutions, the educational and health prevention curriculum includes content on diagnosed risky behaviours. The diagnosis is carried out using a survey, observation and interviews.

One of the key elements aimed at ensuring security in the schools/institutions is a set schedule of duty teachers. The heads were asked a question on this issue: Does the teachers’ duty schedule cover all places, breaks and time before and after classes? In 40 schools/institutions, a duty schedule was drawn up, with teachers familiarised with the regulations and duty schedule. In 10 cases, however, no such plan has been drawn up, with 6 heads stating that such a plan does not concern their institution.

In addition, it should also be pointed out that in 47 cases there is a register of student group outings, which is usually maintained by the head or manager. In 49 schools/institutions there are trip regulations in force, which envision a trip sheet, list of trip participants, parents’ consent, settlement of trip costs, as well as the regulations of individual trips.

The timetable of didactic and educational activities took into account the need for a balanced educational load on particular days of the week in the case of 47 schools/institutions, which accounted for 97% of respondents’ answers. In the case of 3 institutions (6%), the answer was negative. In their comments, the heads pointed out that this was difficult to achieve due to many teachers being employed for part-time positions in at least two schools, and the timetable being adapted to the availability of teachers. Vacancies among pedagogical staff and insufficient resources were also posted as arguments justifying the difficulties in developing an optimal schedule of educational activities for students.

To sum up, it should be noted that in most schools/institutions, the security documentation is prepared on an ongoing basis. Nevertheless, the greatest shortcomings can be seen in the development of the civil defence plan, with slightly less concerning conclusions concerning educational and prevention programmes and duty schedules.

An important part of dealing with a threat is to develop appropriate response procedures. In 46 schools/institutions a procedure has been developed to deal with an accident involving a student, 43 schools/institutions have a procedure for dealing with an alert and evacuation. Similarly, procedures have been developed in 39 schools/institutions to deal with an entry of strange people on the school grounds. Other areas include procedures concerning theft, which are in force in 34 institutions, planting an explosive charge (in force in 33 institutions), a suspicious package (30 institutions), and discovering psychoactive substances at school (31 institutions). The procedure for dealing with the intrusion of an attacker (terrorist) into the building has been developed by 30 schools/institutions, and response procedures in the case of aggressive behaviours or bullying are in force in 28 schools/institutions. 27 institutions have a procedure for dealing with a student who commits a criminal offence and 22 institutions for dealing with a student who is the victim of a crime. Other procedures concern responding to breaches of privacy, which includes using personal data or image (25 schools/institutions), chemical or biological contamination (21 schools/institutions), threat to the technical security of networks, computers and online resources, (21 schools/institutions), cyber-bullying (19 schools/institutions), threat to children's health from excessive use of the Internet (14 schools/institutions).

In 13 institutions, procedures have been developed to respond in the event of students' access to harmful, undesirable, illegal content, and 11 institutions have procedures in the event of the distribution of pornography in school. Some schools also prepared procedures concerning paedophilia at school (11 institutions) and dangerous contacts on the Internet (9 institutions), disturbing sexual behaviour of students at school (9 institutions), as well as prostitution, sexting and sexual activity as a source of income (7 institutions). 7 schools/institutions have developed procedures concerning uncritical belief in online content and harmful advertising, while 8 schools/institutions have proper procedures for responding in the event of copyright infringement.

In terms of the security procedures in place, we can see a considerable variety of these documents, which concern both external and internal threats. According to the directors' responses, the procedures for dealing with emergencies such as: accident, evacuation, invasion of the school premises, or planting an explosive device or suspicious package, aggressive behaviour, criminal acts were developed in the vast majority of schools/institutions. Less than half of the schools/institutions have prepared procedures related to Internet security, cyberbullying, as well as threats to technical security on the network. The fewest number of procedures include risks concerning dangerous sexual behaviour, pornography, paedophilia, sexting, and prostitution.

Passive security measures

The security of the school premises involves both tangible and intangible factors. In the analysis of the tangible measures, the study covered both active and passive security measures, as well as measures counteracting threats.

During the analysis of passive security measures, the heads found that in 45 cases the school/institution area is fenced, with 5 schools stating otherwise. In 7 cases, however, the fence needs a comprehensive renovation, in two cases the pitch and the school front yard were not fenced. In their explanations, the heads pointed out the need to supplement these safeguards. In 43 cases, communication routes outside the school/institution are secured in such a way as to prevent direct access to the roadway, and in 7 cases they are not properly secured. Respondents pointed out that in two cases communication routes lead directly to the public road and there are no barriers or obstacles. In two further cases, the school operates in two buildings which are separated from each other, in other cases, the exit from the school grounds leads to a housing estate road. In most (44 cases) of the school/outbuilding site is properly illuminated, in 6 cases the directors chose “not applicable.” In one case the evacuation area and the pitch are not illuminated, and in the other case the lighting of the pitch is not working and needs to be renovated. In 31 schools/institutions, the surface of roads, passageways and pitches is level and does not pose a risk to users. In 19, on the other hand, it was stated to be dangerous for users. In their explanations, the heads pointed out that the surfaces of the school square, communication routes (pavement, stairs), sports pitch and asphalt access road require renovation. In all schools/institutions, manholes and other such places are properly secured.

Active security measures

In 34 cases, the school/institution area is covered by video surveillance, with 16 heads pointing out otherwise. In 11 explanations, the respondents pointed out that the video surveillance covers the exterior of the school, focusing on

individual areas – only the entrance to the school, school grounds, school pitch and playground. In one of the schools, an indoor video surveillance system was installed, with 9 cameras inside the building. In 44 cases the school/institution area hired an external security company. The security is provided at certain times, generally from 4.30 p.m. to 6 a.m.

Threat prevention (in terms of health and safety)

The school/institution health and safety policy applies to both students and staff. The school premises tend to offer students the possibility to leave some of their textbooks and school supplies. This was the case in the case of 31 institutions, or 62% of schools/institutions, whereas in 19 cases (38%) the heads responded with "not applicable" – this concerned kindergartens and clinics. In their explanation, they pointed out that they teach individual students and small children who come with their parents. Usually students had access to individual lockers or separate shelves. Workspaces and premises to which unauthorised access is prohibited in all schools/institutions are properly marked and secured. In all schools/institutions, the premises, in particular the teachers' lounge, laboratories, studios, common rooms, school workshops, the PE teachers' room, the dormitory manager and the kitchen are equipped with first-aid kits, containing first-aid equipment and instructions on how to provide first aid. The first-aid kits are not expired and are checked on an ongoing basis by the heads and the health and safety officer. In 32 cases chemicals are stored in closed rooms adapted for this purpose, in 1 school/institution, it is unfortunately not the case. 17 institutions are not concerned with this issue. As a rule, substances are stored in a separate room where only teachers have access or are secured in lockable metal cabinets. Similarly, in 31 cases, chemical substances and are stored in appropriate containers protected from their harmful effects and marked with labels including the names and dangers to health.

In 80% of cases (40 schools/institutions), classrooms and pitches, as well as places designated for PE, games and recreation have information boards, which outline the rules of safe use of sports equipment and devices. In 2 cases (4%) there were no such boards, while 8 cases (16%) were not concerned with this requirement. The heads pointed out that regardless of the information boards, the teachers reminded the children of the safety rules. The escape routes in the 49 schools/institutions are clearly and permanently marked and checked by the heads and the health and safety officer. Similarly, repair, renovation or installation work sites are protected against unauthorised access in 49 schools/institutions through the use of limiting tapes and warning signs. Larger repairs and maintenance work are carried out during winter holidays and summer breaks.

Employing and preparing staff for shaping security at school/educational institution

Ensuring security does not only refer to technical aspects, as the human factor is also of key importance due to individual characteristics of people, which encompass professional skills, knowledge and understanding of safety rules and regulations, rational work organisation, work and study discipline, as well as security procedures concerning the given school or educational institution. There is no doubt that teachers play a key role in ensuring security during classes, breaks, sports competitions, school events, as well as on trips outside the school premises.
In addition, the survey asked heads of schools about the employment of educators, psychologists and nurses – people who support the process of ensuring the security of children and youth by teachers. The employment of educators, psychologists and nurses in schools/institutions varies. 29 schools/institutions employ educators, 21 employ nurses, while 16 employ psychologists. On the other hand, as many as 17 schools/institutions do not employ any of the specialists mentioned above. Working hours also vary.

The assessment of the working hours of educators, psychologists and nurses shows the following:

- educators are generally employed on the basis of a full-time working contract;
- psychologists usually work part-time;
- nurses usually work several hours a week, on the basis of an agreement with the Outpatient Health Care Team.

A very important element in shaping the attitudes of the employees is the training courses that are conducted, which are aimed at:

- acquainting employees with methods of performing work safely;
- identifying threats to children and youth and defining the ways of dealing with them.

An analysis of the studies carried out to date shows that all 50 schools/institutions have trained their staff in first aid. Most of the trainings took place in 2019 and were attended by teachers, administration and service staff. In the area of physical and digital threats, in 2019, teachers from 43 schools/institutions participated in 107 training courses, lectures, talks and other forms of security classes. The training courses were organised by Crisis Intervention Centre (27 cases), the Police (33 cases), Psychological and Pedagogical Clinic (18 cases), Fire Brigade (17 cases), Municipal Guard (6 cases), Outpatient Health Care Clinic (16 cases) and Crisis Management Department of Jaworzno Municipal Office (7 cases). In addition, the teachers participated in 3 training courses organised by other institutions, not listed in the survey. In the case of the majority of training courses, meetings and talks, the topics covered included: workplace health and safety, fire protection, procedures for dealing with crisis situations, first aid, changes in the rules of school trips, safety of a child at home and in the kindergarten, addiction prevention, antisocial behaviour, safety in the network, cyberbullying, aggression, coping with difficult situations, dealing with the intrusion of an attacker into school and planting a suspicious package. The majority (41) of the schools/institutions took part in external prevention programmes in this area. These programmes cover various issues pertaining to the security of children and youth, such as healthy eating, the negative effects of smarties, nicotine and alcohol on the human body. In general, they can be divided into three groups: food safety, environmental safety, and personal safety.

School educators prepare and familiarise students with security issues and threats. In 47 schools/institutions security issues are promoted in the form of a bulletin and information boards. Similarly, in the case of 46 schools/institutions, their websites contain security content, with information submitted by relevant institutions (school superintendent, sanitary services) posted on a regular basis. In addition, 45 schools/institutions organised parental conferences concerning security issues. The subject matter of these meetings varies, but is related to the security of students and youth, concerning shaping healthy attitudes, safe breaks, cyberbullying and others.

Security audit

An audit is a set of activities aimed at checking the actual state or activities undertaken on behalf of an authorised body, consisting of examining and assessing the compliance of the inspected entity with the provisions of laws. The analysis of the statements presented shows that in all schools/institutions the head carries out an audit at least once a year to ensure safe and hygienic conditions and designates areas for improvement. Usually, the audits (checks) take place twice a year during summer and winter breaks, in the presence of the Social Labour Inspector and Health and Safety Inspector. A register of accidents is kept in 49 schools/institutions and the heads talk with staff to determine the causes and circumstances of accidents in order to identify the measures required to prevent them. In the past school year a trial evacuation was carried out in 41 schools/institutions. Most of the evacuations were carried out in the autumn (September, October, November) and spring (March, May) months.

Cooperation of the school with other institutions responsible for security and public order
In the assessment of the cooperation of schools/institutions with external entities in the scope of planned security and prevention activities, it turned out that the Police was the first-choice partner for cooperation in this regard.
In the analysed period of three years 47 schools/institutions (94%) cooperated with the Police. Within the framework of this cooperation, meetings, workshops, lectures on safe movement on the roads, proper behaviour in of a terrorist attack, legal responsibility of children and youth, consequences of illegal acts, cyberbullying, addiction prevention and peer violence were organised.

The Fire Brigade was the second go-to partner for 42 schools/institutions (84%) in the process of carrying out tasks concerning security. These included mainly training courses for children and teachers, trial fire alarms, contests on firefighting knowledge, presentation of firefighters' skills, preventive actions (concerning burning grass), trial evacuations, meetings, workshops, lectures, demonstrations, fire safety instructions, educational projects, reviews of firefighting equipment.

Other partners with whom schools cooperated included: Outpatient Health Care Clinic (ZLO), Psychological and Pedagogical Clinic and Crisis Intervention Centre, with 39 (78%) working with the former, primarily on issues concerning health and addiction prevention, providing health and dental care, organising trainings, workshops, lectures, conducting surveys and diagnostic studies at the school. 78% of schools/institutions (39) cooperated with the Psychological and Pedagogical Clinic, which organised training courses for children and youth, workshops, consultations, mediation, provided help to students with learning difficulties, issued opinions, as well as carried out psychological and pedagogical diagnoses for students. It also intervened in difficult situations, organised individual counselling for teachers, carried out preventive actions concerning aggression, violence and cyberbullying, conducted educational and preventive activities, classes for parents and parental education. 37 schools/institutions (74%) cooperated with the Crisis Intervention Centre. This cooperation concerned the organisation of training

courses, workshops, consultations, lectures, psychological assistance as part of crisis intervention, running prevention programmes, participation of teachers in training courses, individual counselling for parents, support for student families. 44% of schools/institutions (22) cooperated with the Crisis Management Department of the Jaworzno Municipal Office. The Department organised training courses for heads and teachers, participated in the organisation of school events, organised meetings, workshops and lectures. It also organised the annual Jaworzno Security Conferences, implemented the "Safe School" Programme and carried out training courses on terrorism. Only 30% (15) of all institutions cooperated with the Municipal Guard. This cooperation concerned the organisation of the Jaworzno Security Conference, additional patrols in the evening and on days off, intervention in case of improper behaviour of third parties entering the school grounds, organisation of interdisciplinary teams and meetings with children.

In addition, the schools/institutions have started to cooperate with 18 other institutions not listed in the survey to ensure the safety of children and youth. Respondents mentioned: District Sanitary and Epidemiological Station, Regional Sanitary and Epidemiological Station, Jaworzno Municipal Office, Municipal Social Welfare Centre, Municipal Commission for the Solving of Alcohol Problems, educational centres: WOM Regional Centre for the Improvement of Teachers, METIS Regional Methodological and Educational Centre.

Conclusions

The survey carried out among heads of schools/institutions operating in Jaworzno enabled the identification and assessment of threats occurring in this area. In 50 analysed schools/institutions in 2016-2019, 335 disturbing events posing a security risk were reported.

The respondents usually pointed out internal threats as having the most significant impact on security in the school/institution, including dangerous behaviour of students, in the form of verbal and physical aggression, smoking, destruction of property, exclusion from peer groups, self-mutilation, and possession of dangerous objects. Among the external threats, the directors pointed out domestic violence (16 Blue Card procedures), the threat of a terrorist attack (6 cases of false information about an explosive device planted at school), fire (1 case), and spraying a dangerous substance at school (1 case).

Threats to digital security identified by the respondents are: excessive use of Internet-enabled devices by students, cyberbullying, sexting (1 case).

In the opinion of the respondents, these phenomena are hardly prevalent. On average 65.1% of the respondents believe that students in their school/institution do not exhibit any dangerous behaviours, while 30.9% believe that these cases are rare and very rare. Only 2.8% of respondents believe that negative behaviour of students is frequent and 1% that it is very frequent.

Concerning the projects undertaken by the heads to ensure the security of students and teachers, it can be generally stated that they correctly implement safety projects in schools/institutions in the City of Jaworzno. The security audits in schools/institutions is at a very good level – regular audits are carried out; registers of accidents are maintained and trial evacuations take place in 93.4% of schools/institutions. The passive security of the area of the institutions should also be commended, especially the protection of manholes, fences and illumination of the school grounds, as well as ensuring the safety around communication routes (85.2% of schools/institutions). Similarly, the formalisation of the security process in the form of regulations, instructions, programmes and procedures also goes well (84% of schools/institutions). The activities aimed at preventing threats to occupational health and safety (79.32% of schools/institutions) as well as employing and preparing employees for shaping security in educational institutions (73.26% of schools/institutions) is on an average level. The schools' cooperation with other institutions responsible for security and public order in Jaworzno (60.58% of schools/institutions) and active protection of the institutions' grounds against external threats (52.6% of schools/institutions) remains less effective.

According to the study carried out among the heads of schools/institutions of the city of Jaworzno, they have a good opinion of the state of security in the institutions they manage. They recognise the threats arising from past events and take action to eliminate them.

What remains is the search for answers to the next two questions: "What is the extent of knowledge of security procedures in schools and educational institutions?" and "What are the rules of communication and cooperation between the heads, teachers, students and parents?"

To conclude, it is necessary to undertake further studies among teachers, administration and service staff, children and youth, as well as their parents.

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Preparation of Security Professionals or from Security Education To National Security Studies

Eugeniusz NOWAK

WSB University, Dąbrowa Górnicza, Poland
enowak@wsb.edu.pl

Abstract

Objective: To propose solutions ensuring continuity and effectiveness of teaching security at all stages of education, in order to properly prepare security professionals.
Security is becoming increasingly desirable asset, both from the individual and collective standpoint. Ensuring security is a fundamental duty of the state, which is by its very nature called upon to ensure national security. These expectations are met by the *National Security* Studies, preparing staff of bodies and organisations dealing with ensuring security in the case of threats of non-military nature. Despite this, even the best curriculum can fall victim to the so-called isolationism or siloisation of individual study topics, which leads to a number of unfavourable phenomena, including underestimation of didactic unitarianism, lack of educational content correlation between various subjects, redundant educational content, difficulties in implementing innovations, and many more. These problems with study curricula can and should be eliminated. The presented paper offers a number of proposal in this regard.
A professional is defined as a person who possesses great skills in a given job and who does their job as well as they can. Therefore, the process of *National Security* studies should be determined by shaping the professional skills of the graduates.
Methodology
The solutions proposed in the article are based on the results of studies presented by subject literature [1, 2]. Theoretical methods (analysis, synthesis and analogy) and empirical methods were used in the study process. Empirical methods were dominated by the survey method, mostly focusing on the interview technique.
Article type: academic paper.

Keywords: Security, State Security, Safety Education, National Security Studies.

Introduction

Security is becoming increasingly desirable asset, both from the individual and collective standpoint. Ensuring security is a fundamental duty of the state, which is by its very nature called upon to ensure national security.[1] Individual and social awareness in this area is increasing and the world expects systemic solutions.[2] These expectations are met by the National Security Studies, preparing staff of bodies and organisations dealing with ensuring security in the case of threats of non-military nature. Graduates of these studies are predisposed for working in managerial and expert positions in bodies dealing with the security of citizens and businesses, in public administration bodies (for example security and crisis management departments), as well as in education and academic institutions dealing with security issues. Nowadays, the universities offer bachelor's, master's and doctoral studies.

Focused and organised teaching of safety and security issues in Poland begins in the 8th grade of primary school with the Safety Education subject, which is continued in secondary schools. This education can be then continued

[1] According to the author [E.N.], national security in democratic countries can be conflated with state security, due to the fact that the governing bodies in these countries are appointed by way of general democratic elections, which means that they govern by the will of the general populace and serve their voters. Cf.: E. Nowak, M. Nowak, *Zarys teorii bezpieczeństwa narodowego*, Wyd. Difin, Warszawa 2015, s. 18.

[2] Cf.: J. Słoma, *Program nauczania edukacji dla bezpieczeństwa dla gimnazjum*, Wydawnictwo Nowa Era, Warszawa 2009, s. 3.

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with National Security studies. Since education encompasses all the experiences that make up an individual's knowledge and skills, the process of teaching security issues should be continuous, thus enabling a smooth transition to the next, higher levels. Despite this, even the best curriculum can fall victim to the so-called isolationism or siloisation of individual study topics, which leads to a number of unfavourable phenomena, including underestimation of didactic unitarianism, lack of educational content correlation between various subjects, redundant educational content, difficulties in implementing innovations, underappreciation for the Safety Education subject at universities and many more. These problems with study curricula can and should be eliminated. The presented paper offers a number of proposal in this regard.

A professional is defined as a person who possesses great skills in a given job and who does their job as well as they can. Therefore, the process of National Security studies should be determined by shaping the professional skills of the graduates. This is what should determine the outstanding quality of education at universities.[3]

Study Methodology

The objective of the study process was to obtain answers for two basic questions:

1) What are the expectations concerning security issues taught at different stages of youth education?
2) How can and should security professionals be prepared?

In order to answer the first question, theoretical and empirical methods were used in the study process. The key theoretical methods employed in the study included:

1) Analysis, which was used for critical analysis of the subject literature concerning the organisation of security education at different stages of youth education. The subject literature analysis focused on [1,2,3,4].
2) Analogy, which was used to formulate proposals relating to the expectations of teaching the *Safety Education* subject at different stages of youth education, as well as training security professionals.
3) Synthesis, which was used to formulate conclusions (proposals concerning the organisation of security education in the case of *National Security* studies) obtained through inductive reasoning and deductive reasoning, as well as by means of analogy.

The key empirical method, on the other hand, was the opinion polling method, in which the expert interview technique was employed. The interviews were conducted with experienced, long-serving academic teachers of National Security, as well as employees of public administration offices at provincial and district level responsible for crisis management

In order to answer the second question, namely how can and should safety professionals be prepared, the analogy and survey methods were used in the study process.
The former was used to come up with proposals for the organisation of the National Security education process. The model solutions used in this respect for this study, were previously used and verified in the former Academy of National Defence and the former Higher School of Management and Entrepreneurship (Warsaw Branch).

Study Results

Objectives and educational content of the Safety Education subject in schools and educational institutions

In Poland, the beginnings of *safety education* are connected with civil defence classes for youth, which have been a mainstay in education for many years. These classes taught young people knowledge shaping their patriotic feelings and attitudes as well as skills necessary to defend the independence of their homeland. The main educational objective was to prepare young people for group self-defence from the effects of threats of during peace and war time, as well as leading small civil defence teams.

In terms of etymology, the notion of *safety education* first emerged at the National Defence Academy in Warsaw as part of a research project on the Polish security system carried out in 1993-1995. At the time, the currently used definition of the concept of *safety education* did not exist yet. The then Ministry of Science and Higher Education

[3]Universities strive to build their image by offering high-quality education, which translates into the demand for their graduates on the labour market.

defined it as a *branch of national education, whose main objective is to prepare young people to face civilisation and military threats*[4]. The document of the Ministry of Interior and Administration released in September 2004[5] indicates that *the aim of safety education is to promote awareness and knowledge of the sources, nature and impact of everyday and emergent threats, as well as to teach the skills of recognising, preventing and combating these threats.*

The subject referred to as *Safety Education* was introduced to Polish schools on 1 September 2009.[6] It was taught in the third and fourth stage of general education, namely in middle and secondary schools (vocational schools, general high schools, specialised high schools and technical schools, except for students of adult schools). The process of teaching this subject was based on the curriculum implemented by the Ministry of Science and Higher Education.

Safety Education was aimed at preparing students (youth learning in middle schools and high schools) for proper behaviour and appropriate response in situations posing a threat to health and life. The subject covered varied educational content concerning state security, organisation of rescue operations, health education and first aid.

State security was perceived as a subject explaining the mechanisms for ensuring order, stability of human societies, as well as the accompanying concepts, methodologies and measures. In terms of preparation for conducting rescue operations in emergency situations, the education was interdisciplinary and aimed at effective action and responding to different types of threats.

The most important skill acquired at school was the ability to provide first aid by undertaking life-saving measures.

The educational reform carried out in the Republic of Poland in 2017[7], which removed middle schools from the educational system, resulted in – among other things – the introduction of *Safety Education* in the 8th grade of primary school. This required the development of new curricula for teaching this subject in primary and secondary schools.

In primary schools the objectives of *Safety Education* include:

I. Understanding the essence of state security.
II. Preparing students for emergency situations (disasters and mass accidents).
III. Developing basic first aid skills.
IV. Shaping healthy individual and social attitudes.

The teaching content of *Safety Education* in the 8th grade of primary school covers[8]:

I. State security – basic concepts pertaining to state security and understanding of the essence of security and its components; geopolitical conditions of security resulting from Poland's place in the world and the role of international organisations in ensuring Poland's security.
II. Responding to emergency situations (catastrophes and mass accidents) – examples of emergencies (natural and human-made); rules concerning alerting the population to risks; alert signals and emergency measures; rules of appropriate behaviour in the event of alerts; responsibilities of the population in situations requiring evacuation; roles of authorities and other rescue actors; rules of responding to fire, traffic accident, flood risk, intense snowstorm, release of dangerous chemicals and terrorist attack.

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[4] The definition of *safety education* was presented by a representative of the Ministry of Science and Higher Education at the international seminar *Safety Education in the Visegrad Group Countries* , which was held on 19-21 May 2004 in Warsaw. https://www.mswia.gov.pl/ftp/pdf/edukacja-dla-bezpieczenstwa.pdf. [1.06.2017].

[5] *Edukacja dla bezpieczeństwa. Informacja,* Wyd. MSWiA, Warszawa 2004, s. 3. https://www.mswia.gov.pl/ftp/pdf/edukacja-dla-bezpieczenstwa.pdf. [1.06.2017].

[6] *Rozporządzenie MEN z dnia 28 sierpnia 2009 r. w sprawie sposobu realizacji edukacji dla bezpieczeństwa,* Dz. U. Nr 39, poz. 1131.

[7] *Ustawa z dnia 14 grudnia 2016 r. – Prawo oświatowe*, Dz. U. z 2018r., poz. 996.

[8] *Rozporządzenie Ministra Edukacji Narodowej z dnia 14 lutego 2017r. w sprawie podstawy programowej wychowania przedszkolnego oraz podstawy programowej kształcenia ogólnego dla szkoły podstawowej, w tym uczniów z niepełnosprawnością intelektualną w stopniu umiarkowanym lub znacznym, kształcenia ogólnego dla branżowej szkoły I stopnia, kształcenia ogólnego dla szkoły specjalnej przysposabiającej do pracy oraz kształcenia ogólnego dla szkoły policealnej*. Dz.U. z 2017r., poz. 356.

III. Basics of first aid – first aid provided by eye witnesses; rules of safe conduct at the scene of the incident.
IV. Health education – individual and collective health; healthy behaviours; individual responsibility for health; rational nutrition; physical activity; impact of stress on health; availability of publicly funded health services; health problems in a collective dimension: environmental factors, culture, social norms and habits; social support concerning health.

In the process of teaching *Safety Education* in primary schools, in addition to basic classes in the classroom, other forms are recommended, such as:

– students' visits to state institutions: Crisis Management Centres, State Fire Brigade units, Emergency Medical Service facilities;
– specialised training and recreation camps during the summer breaks, courses in *Safety Education;*
– meetings, lectures, courses with police officers, municipal guard, emergency medical services, veterans, environmentalists, psychologists, etc.;
– participation in competitions on *Safety Education.*

In secondary schools, the objectives of *Safety Education* are[9]:
I. State security (knowledge of the state security structures).
II. Preparing for emergency situations (disasters and mass accidents).
III. Basics of first aid (mastering first aid).
IV. Health education – individual and collective health; Healthy behaviours.

Teaching content of *Safety education* in secondary schools includes[10]: knowledge of the state defence structures; civil protection and defence; sources of nuclear radiation and its effects; alerting the population about dangers and threats; first aid in emergency situations; lifestyle diseases; elements of mental health; physical activity; nutrition; addictions.

In the process of teaching *Safety Education* in secondary schools, in addition to classroom activities, other forms of education are recommended, including:

– students' visits to state institutions: Crisis Management Centres, State Fire Brigade units, Emergency Medical Service facilities;
– specialist training and recreation camps (connected with *Safety Education* issues);
– excursions (connected with *Safety Education* issues);
– outdoor activities (connected with *Safety Education* issues);
– exhibitions of individual, classroom and school works promoting a healthy lifestyle and proper behaviour in emergency situations;
– visiting exhibitions related to *Safety Education* issues;
– meetings (for example participation in classes), lectures, meetings with employees of key security institutions (Police, State Fire Service, Polish Armed Forces, Municipal Guard, Emergency Medical Services, veterans, environmentalists, psychologists;
– participation in competitions on *Safety Education.*
– cooperation with local units of the Police, State Fire Service, Polish Armed Forces, Volunteer Fire Service, Polish Red Cross, National Defence League etc.

Table 1: Comparison of the objectives of *Safety Education*

Learning objectives of SE Elementary School (8 grades)	Learning objectives of SE Secondary schools
I. Understanding the essence of state security.	I. State security (knowledge of state defence structures).
II. Preparing students for emergency situations (disasters and mass accidents).	II. Preparation for rescue activities in emergency situations (disasters and mass accidents).
III. Developing basic first aid skills.	III. Basics of first aid (mastering first aid).
IV. Shaping healthy individual and social attitudes.	IV. Health education – individual and collective health; healthy behaviours (knowledge of healthy individual and social attitudes).

Source: [5],[6]

[9] W. Jaszczur, *Współczesne wyzwania dla edukacji młodzieży na rzecz bezpieczeństwa na przykładzie szkół gimnazjalnych,* Rozprawa doktorska, Wyd. ASzWoj, Warszawa 2017, ss. 66 - 94.
[10] Ibidem.

The analysis of the objectives of *Safety Education* presented in the table clearly shows that the focus of the teaching effort is aimed at teaching practical skills needed in everyday life. However, in both primary and secondary school, they only concern first aid in emergency situations.[11] Moreover, a comparative analysis of the objectives of primary and secondary education shows that they are not only similar, but also identical. It can be assumed that education in secondary schools is aimed at improving students' knowledge and skills acquired in primary school; however, by the end of an 8-year primary school, the student already has some knowledge of security, which is the basis for not only consolidating this knowledge, but above all for building upon it. Taking into account the further education of secondary school graduates in the field of *National Security*, according to the opinion of the author [E.N.], the broadening of their knowledge should include some of the educational content previously taught as part of *Civil Defence* (such as *Terrain Studies, International Humanitarian Law*), as well as the *Basics of Security Management* and *Social Policy*.

Table 2: Comparison of the educational content of *Civil Defence* and *Safety Education*

Civil defence Secondary school	Safety education Primary school	Safety education Secondary school
	State security	Polish defence system
Threats to the people in the time of peace and war		Sources of nuclear radiation and its effects
Basic tasks of Civil Defence	Responding to emergency situations (disasters and mass accidents)	Civil defence
Selected issues of international humanitarian law		
Protection of people as part of universal self-defence	Responding to emergency situations (disasters and mass accidents)	Protection of people Alerting the public of threats
Emergency medical assistance	First aid basics Health education – individual and collective health; Healthy behaviours.	First aid in emergency situations. Lifestyle diseases; mental health elements; physical activity, nutrition, addictions.
Terrain studies		

Source: Own compilation.

When analysing the objectives and educational content of *Safety Education*, we cannot overlook post-graduate studies for teachers of this subject in schools and educational institutions, as well as *National Security* studies.

The aim of postgraduate studies for teachers of t *Safety Education*[12] is to teach interdisciplinary knowledge concerning the types and sources of contemporary threats, as well as ways to prevent them and the rules of providing assistance in situations of threat to life and health during peace and war. The knowledge and skills acquired by the students are to contribute to increasing professionalism and effective search for solutions to problems occurring in crisis situations. The post-graduate studies enable teachers to gain practical skills concerning independent teaching of *Safety Education*, as well as first aid courses in schools and educational establishments.

The educational content of post-graduate *Safety Education* studies usually comprises 5 modules:

1st module – state security (educational content: national security; social security policy; security management; state defence in the time of peace; economic security; sport and combat shooting; organisation and management).

2nd module – emergency situations (educational content: principles of Civil Defence; detection of contamination, infections, protection; alert and warning system; emergency situations, crisis management; logistics in emergency situations).

3rd module – first aid, resuscitation (educational content: emergency medical system in Poland; respiratory and cardiovascular system; basics of first aid; diagnosis and rescue activities in life-threatening situations).

[11] Gaining first aid skills, as well as health education, are among the most important topics covered during *Safety Education* classes, due to the highest probability of using them in real-life settings.

[12] Cf.:, Centrum Kształcenia Podyplomowego, Łódź, ul. Sterlinga 26.

4th module – health education (educational content: individual and collective dimension; personal communication for health and safety; activities, healthy behaviour; conditions, social and environmental factors impacting health).
5th module – apprenticeship/*Safety Education* teaching methodology (work experience in schools).

The above shows that the graduates of the post-graduate *Safety Education* studies are well-prepared to teach *Safety Education* in both primary and secondary schools.

The *Safety Education* subject as part of the *National Security* studies is offered at the master's level (bachelor's level in some cases). The educational objectives and content, in accordance with the principle of autonomy of universities, are left for the universities to decide, and thus based on original curricula prepared by teachers responsible for this subject.

Objectives and educational content of the National Security studies.

The studies in *National Security* are civil studies, preparing staff for the bodies dealing with security in situations of non-military threats. Graduates of these studies are predisposed for working in managerial and expert positions in bodies dealing with the security of citizens and businesses, in public administration bodies (for example security and crisis management departments), as well as in education and academic institutions dealing with security issues. Nowadays, the universities offer bachelor's, master's and doctoral studies.

Graduates of first cycle degree of *National Security* studies should have basic knowledge and skills in general security and crisis management issues, based on the foundations of the humanities. They should be able to take advantage of the knowledge and skills they have acquired in their professional work, while respecting legal and ethical principles, as security specialists working for the authorities, institutions and public bodies that ensure the security of citizens and businesses. According to the author [E.N.], a graduate should have the ability to solve professional problems, collect, process and share (written and oral) information related to the organisation and implementation of rescue and prevention tasks. Educational content on the bachelor's degree level[13] typically covers: scope, tasks and basic categories of crisis management; theoretical aspects of crisis management; legal aspects of crisis management; natural disasters and their consequences for the population, property, infrastructure and environment; tasks and competences of public authorities, state institutions and organisations in crisis situations; organisation and tasks of a crisis management centre in a municipality, district and region; establishing a municipal (district and regional) crisis management team; forces and resources of the municipal crisis management team; working methodology of the municipal crisis management team during a natural disaster, in some cases also elements of planning and managing the rescue action by the municipal crisis management team[14].

Graduates of second cycle degree of *National Security* studies should have extended knowledge and skills to creatively solve security and crisis management problems, including in non-standard situations, based on incomplete information, compared to first cycle degree graduates. They should be able to use the knowledge and skills they have acquired in their professional work in accordance with legal and ethical principles. According to the author [E.N.], a graduate of these studies should be able to competently and ethically manage teamwork, as well as organise rescue and prevention actions. What is more, they should be prepared to work in public administration structures in managerial positions, organisations preoccupied with national and international security, as well as research, educational and higher education institutions dealing with security issues.

The educational content on the master's degree level usually covers: organisation and functioning of the crisis management system at the state and regional level; tasks of institutions, authorities, inspectorates, guards and other organisational units at the district and regional levels in crisis situations; methodology of decision making process and working out the intentions of the crisis management authorities; principles and procedures of staff work in crisis management teams in the county and region; organisation and management of rescue and prevention actions by crisis management teams on the district and regional level; organisation and management of exercises (decision games) with members of crisis management teams, as well as with commanders who manage rescue or prevention actions.

Graduates of postgraduate *National Security* studies should have the required skills and competencies that enable them to become skilled researchers, capable of conducting independent research on the issues of national security. Some graduates of these studies are expected to continue their research in both public and private institutions, while

[13] In line with the principle of university autonomy, educational content is decided by individual universities.
[14] This is confirmed by the author's professional experience [E.N.].

other graduates are expected to use their competences in other professions. Post-graduate studies, in addition to scientific training, may also include the so-called "transferable skills" and expert optional courses.

Training "transferable skills" in PhD candidates may include research dissemination, teaching security issues at the university level, subject literature analysis and more, while optional courses may cover research project management, establishing national and international contacts, supervising the work of staff, etc.

The analysis of the objectives of students' education in the field of *National Security* , it is easy to see that they are and should be oriented primarily towards shaping professional skills. In the case of the bachelor's degree studies, these skills are related to the performance of tasks as a security expert
working for authorities, institutions and public bodies concerned with the security of citizens and businesses. On the other hand, in the case of master's degree, the professional skills of the graduate are mainly related to work in managerial positions in public administration structures and organisations dealing with the security of citizens and businesses.

The didactic success in shaping the professional skills of graduates of the *National Security* studies is determined primarily by two basic sets of elements: the first is related to the curriculum of the studies and involves the key subjects module, while the other covers the scope and manner of implementation of this module by academic teachers.

The subject module can be conventionally divided into key and supporting subjects. The key subjects in bachelor's degree studies usually include: *Crisis management* and *Basics of logistics in crisis situations,* while the supporting subjects are: *Introduction to security theory, Security policy, Security strategy* , etc.

On the other hand, the leading subjects in master's degree studies usually include: *Crisis management using staff games, Security management in public spaces, Logistics management in crisis situations, Safety education.* And the supporting subjects include: *Contemporary security threats, State security system, Social security, Protection of social infrastructure, Security of local communities, Protection of people, property and areas*, etc.

However, the professional experience of the author [E.N.] indicates a number of drawbacks related to the achievement of the main educational objectives, which is to shape the professional skills of graduates of *National Security*. These drawbacks primarily concern underestimation of didactic unitarianism, isolationism and underestimation of the role of *Safety Education,* in the process of shaping students' skills, as well as correlation[15] of the subjects.

The underestimation of didactic unitarianism[16] in the process of developing curricula is seen in, among other things, the equal treatment of all subjects which are given the same number of hours (usually 30 hours). This causes the key subjects to be limited to a few hours, which is hardly enough when it comes to their mission.

Isolationism is seen in the lack of correlation between the educational content of key subjects and supporting subjects, as well as the content of other courses. In this respect, there may be at least two detrimental phenomena – the first being the redundancy of some educational content, while the second being the lack of continuity and gradation of the knowledge and skills provided to students.

The *Safety Education* subject presented as a course during *National Security* studies should internalise – in the author's opinion [E.N.] – key subjects [17] in terms of shaping the professional skills of the graduates.

3. How to ensure the preparation of security professionals?

Professionalisation[18] is the acquisition of skills required to work in a given profession. Given this, the objectives of security education should be formulated in an operational manner[19], diverting students' attention to acquiring skills.

[15] Correlation – interdependence, interconnection.

[16] It should encourage consensus building – building bridges between academic teachers teaching key and supporting courses, as well as other courses coinciding with the key subjects.

[17] Internalisation – accepting values, norms, social principles, etc., which have been imposed from outside for some time, and recognising them as one's own. *Słownik języka polskiego*, tom pierwszy, Wyd. PWN, Warszawa 1978, s. 810.

[18] A professional - a specialist, an expert in a given field, a person who knows their profession well. *Słownik języka polskiego*, tom trzeci, Wyd. PWN, Warszawa 1978, s. 929.

Of course, in relation to the teaching of *Safety Education* in schools and educational institutions, it is difficult to talk about professionalisation. However, given the need to maintain continuity in teaching concerning security issues, there should be a progression in the transfer of basic safety knowledge and behaviours in secondary schools, as well as appropriate responses in situations that pose a threat to health and life. However, during the *National Security* studies, there are many areas where *"things can be done better."* According to the author's opinion [E.N.], these areas include:

– the process of creating (developing) study curricula;
– the process of selecting the educational content of the courses;
– correlation of educational content between courses;
– correlation of the content of the basic modules with the contents of the key courses;
– pragmatism of educational effort aimed at shaping professional skills;
– a "new approach" to the role of the *Safety Education* course presented during the *National Security* studies;
– expert preparation of academic teachers conducting major courses, including key courses.

The number of teaching hours is always fixed and limited, which makes it difficult to increase. Therefore, there is a need to move away from a static (equal) treatment of all major courses, allocating varying number of hours to each of them. Thus, we can see a need to renormalise the courses aimed at getting rid of inefficient solutions. Shaping professional skills is time-consuming. Therefore, while developing the curricula, major and key courses should be preferred when it comes to the allocation of the number of hours. How many hours should be assigned to individual subjects should be determined by original study curricula.[20]

The selection of the contents of the courses should serve to prepare a graduate of bachelor's degree studies to working as a security specialist for authorities, institutions and public bodies concerned with the security of citizens and businesses., while graduates of master's degree studies should be ready for working on managerial positions in public administration structures and organisations dealing with the security of citizens and businesses. It goes without saying that the most realistic situation, which can be encountered by *National Security* graduates in their future line of work involves crisis situations which are used as the backdrop for team exercises conducted with crisis management teams and commanders who lead rescue or prevention actions. Therefore, such exercises should have a special place in the process of teaching key and major courses. According to the author's opinion [E.N.], bachelor's degree studies should involve group exercises[21] and study exercises.[22] On the other hand, master's degree studies should include staff and command exercises.[23] However, the educational content of particular major courses should be determined by original curricula aimed at acquiring professional skills.

Correlation of the content of education between major subjects should prevent redundancy of educational content between courses, as well as determine the scope and order of the content taught to students, while ensuring the continuity and clarity[24] of acquiring skills.

The correlation between the content of basic modules with the contents of the key courses should make it possible to use the knowledge and skills acquired in the course of some basic module subjects in the process of developing professional skills. According to the author [E.N.], such subjects include primarily Organisation and management and Security geography.

The pragmatism[25] of the teaching effort should be expressed in the selection of educational content that serves shaping professional skills. According to the author [E.N.], in the case of bachelor's degree studies, this should concern knowledge and ability to develop plans and directives concerning rescue (prevention) operations and crisis management. On the other hand, in the master's degree studies, this should focus on assessment of a crisis situation,

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[19] Operational objective – a specific objective, presented in a precise manner.

[20] The universities compete with each other in terms of quality of education, among other aspects. Bespoke and original curricula can play a very useful role in this respect.

[21] Group exercises are the simplest form of exercises, during which all participants play the same role simultaneously.

[22] Study exercises are a special kind of a group exercise. They involve a small group of students who are prepared to perform specific functions in staff exercises.

[23] Staff exercises conducted with students of *National Security* are a form of team exercise, the aim of which is to prepare the participants for optimal response in non-military crisis situations.

[24] The author [E.N.] means vertical clarity, concerning the order of acquisition of skills.

[25] Pragmatism - an attitude envisioning a realistic assessment of reality and taking only actions that guarantee effectiveness.

analysis of a rescue (prevention) operation, decision making, working out an intention to carry out rescue (prevention) operations, organising the work of command and crisis management teams, setting tasks, checking performed tasks, reporting on operations, etc.

According to the author [E.N.], a "new approach" to the role of the *Safety Education* course presented during the *National Security* studies should encompass giving it a leading role in preparing students for staff exercises, as well as in teaching them an ability to prepare documents related to the preparation and running team exercises (group exercises, study exercises, staff exercises). Other desirable outcomes include preparing term papers and theses (bachelor's and master's theses) related to the preparation and running team exercises concerning security issues.

Expert preparation of academic teachers running major and key courses, including in particular courses involving staff training, should be carried out similar to post-graduate studies organised for *Safety Education* teachers in schools and educational institutions. The author's [E.N.] teaching experience shows that such subjects are currently entrusted to the most experienced academic teachers; however, it is not a perfect solution!

The above-mentioned areas which are conducive to the development of professional skills of *National Security* students are not fully exhaustive. In accordance with the study plans, apprenticeships are conducted. An old Polish proverb says, *"It's better to see something once than hear twice"*. The effectiveness of these apprenticeships depends to a large extent on the so-called circumstances, namely the synchronisation of the apprenticeship with training projects organised by institutions (authorities, public bodies) responsible for security, as well as random (crisis) events that may occur during the apprenticeship.

Conclusions

1. In primary and secondary school, the focus of teaching effort in the scope of the *Safety Education* subject is directed at teaching practical skills needed in everyday life. Unfortunately, they are not only similar, but also identical in primary and secondary school. Therefore, it is important to ensure that a student graduating an 8-year primary school has the opportunity to broaden their knowledge of security and safety issues in secondary education. This broadening should include the teaching content presented in the past as part of the *Civil Defence* classes (for example *Terrain Studies, International Humanitarian Law*), as well as the *Basics of Security Management* and *Social Policy*.
2. Graduates of first cycle degree of *National Security* studies should have basic knowledge and skills in general security and crisis management issues, based on the foundations of the humanities. They should be able to take advantage of the knowledge and skills they have acquired in their professional work, while respecting legal and ethical principles, as security specialists working for the authorities, institutions and public bodies that ensure the security of citizens and businesses. According to the author [E.N.], a graduate should have the ability to solve professional problems, collect, process and share (written and oral) information related to the organisation and implementation of rescue and prevention tasks.
3. Graduates of second cycle degree of *National Security* studies should have extended knowledge and skills to creatively solve security and crisis management problems, including in non-standard situations, based on incomplete information, compared to first cycle degree graduates. They should be able to use the knowledge and skills they have acquired in their professional work in accordance with legal and ethical principles. According to the author [E.N.], a graduate of these studies should be able to competently and ethically manage teamwork, as well as organise rescue and prevention actions. What is more, they should be prepared to work in public administration structures in managerial positions, organisations preoccupied with national and international security, as well as research, educational and higher education institutions dealing with security issues.
4. Graduates of postgraduate *National Security* studies should have the required skills and competencies that enable them to become skilled researchers, capable of conducting independent research on the issues of national security.
5. Teaching security professionals requires the formulation of training objectives in an operational manner, which should focus students' attention on acquiring the skills they need for future jobs in the bodies responsible for ensuring the security of citizens and businesses . Thus, a renormalisation of study curricula is required to get rid of the solutions that are not effective when it comes to the acquisition of professional skills. Since shaping these skills is time-consuming, the development of study curricula should put a strong emphasis on key subjects concerning security issues, and an appropriate number of hours should be allocated for their implementation.

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Sustainable Development of Project Management in Energy Companies: The Digital Economy Context

Grzegorz KINELSKI
WSB University, Dąbrowa Górnicza, Poland
grzegorz.kinelski@gmail.com

Abstract

Sustainable development is a concept that has recently appeared in economics. The question is what influences the sustainability of development? Can the systematization of project management have a positive impact on the sustainability of the development of a company, sector or economy? How is industry and digital economy influencing sustainable development? We now call Industry 4.0 the fourth industrial revolution. Like the previous ones, it also has the ability to transform economies, jobs and societies. Our expectations are changing to the speed of obtaining answers to the questions asked. This is done by introducing new technologies and processes. Nowadays, it is said that the Industry 4.0 the fourth industrial revolution. Like the previous ones, it as well has the ability to transform economies, jobs and societies. Our expectations are changing to the speed of obtaining answers to the questions asked. This is done by introducing new technologies and processes. This is an opportunity for Polish participants of local heat markets, or participants of the power or energy market. who are currently facing profound changes and investments forced, among others, by BAT conclusions. Such mega-processes as digitization, automation, artificial intelligence, IoT, machine learning is increasingly penetrating the world and business. More than 200 years have passed since the first industrial revolution, which was the use of the steam engine, and the requirements for testing the efficiency of enterprises have changed, which themselves are changing very quickly. The basic efficiency measures used in a given sector often result from the specifics of the sector and its degree of development on a macroeconomic scale. Therefore, it is worth placing the energy company in this environment and presenting its role to better match the instruments used. The above is also associated with increased reporting and the need to use additional evaluation measures, e.g. effectiveness of individual projects. It is therefore worth analyzing the available literature in this area, and the performance measures available and used in it, which will help in assessing the effectiveness of management, despite political and regulatory turmoil, and help us use the opportunities brought by the fourth industrial revolution.

Keywords: Energy management, Sustainable development, project management, economic efficiency, digital economy, energy efficiency.

Introduction

Recently, the concept of sustainable development often is discussed in economics. Therefore, questions are asked what makes development sustainable? Can the systematization of project management positively influence the fact that the development of enterprise, sector or economy is sustainable? How do industry and digital economy impact sustainable development? Project management, understood in terms of processes within energetic enterprises, impacts many areas crucial for a company. One of them is efficiency measurement. The measures of the efficiency of company's activities should be considered in the context of its goals, including those that it wants to achieve in short- and long-time perspective. Project management, in the understanding of processes taking place in energy enterprises, tackles many key issues for the company. One of them is the measurement of effectiveness. Business performance measures should be considered based on the company's goals. Among them, these goals which it intends to achieve in the short as well as in the long term. The above becomes dependent on the time of the analysis. These goals change depending on the environment, currently the digital economy or Industry 4.0 (Miśkiewicz 2017) is a very demanding one which forces the continuous adjustment of objectives, i.e. increased and continuous measurement of indices, including performance indicators. This is an opportunity for Polish participants of local heat markets, or participants of the power or energy market, who are currently facing deep changes and investments forced, among others, by opening markets, connecting markets, changes in the balancing market and BAT conclusions (Saługa and Szczepańska-Woszczyna and Miśkiewicz and Chłąd 2020). BAT conclusions are an element whose implementation in all energy or heat and energy generation installations, i.e. combined installations, is treated as a must-have project. The monitoring of emissions to air and also to water in these installations is an important element in preventing and

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reducing pollution from energy producing installations and in ensuring a full high level of environmental protection (Kamiński 2014). Consequently, the EU's established Industrial Emissions Directive (IED) [24, EU 2010] addresses the monitoring of emissions in many cases, including the following:
• The BAT conclusions contain the emission levels associated with the best available techniques (BAT) and associated monitoring (Article 3 (12) of the IED).
• The exchange of information on BAT for the preparation and review of BREFs concerns the techniques used and the associated monitoring (Article 13 (2) (b) of the IED).
• Permits should contain appropriate requirements for emission monitoring (Article 14 (1) (c) and (d) of the IED).
• The monitoring requirements in the permits, where applicable, should be based on the conclusions of the monitoring described in the BAT conclusions (IED Art. 16 (1)).
• The EU Competent Body makes the results of emission monitoring publicly available in line with the permit requirements and held by the Competent Body (Article 24 (3) (b) of the IED).

It also produces the JRC cyclical reference report on monitoring (ROM) that summarizes the information on the monitoring of emissions to air and water from IED installations, thus providing practical guidance on the application of BAT conclusions on monitoring to help competent authorities define monitoring requirements in permits. IED installation. In addition, the information and recommendations provided in this document can help the Technical Working Groups (TWGs) to draw conclusions on BAT when developing and reviewing BREFs (Kamiński 2010). Such mega-processes as digitization, automation, robotization and artificial intelligence supporting them, IoT (*Internet of Things*), machine learning is increasingly penetrating the business world and the power sub-sector. The production of heat or energy changes with technological progress (Kamiński and Saługa 2014). Production technologies as well as measurement technologies and accuracy are changing, including measurements of production efficiency indicators (Kinelski, G. 2020). The technological progress shows that the management of energy production or transmission management is changing more than the production technologies themselves (Zamasz 2019). It is also worth remembering that the current phase of innovation and inventiveness is taking place as part of sustainable development (Szczepańska-Woszczyna and Kurowska-Pysz 2016). To learn about these changes and choose the methodology for measuring effectiveness effectively in the current environment, it is worth exploring the next ranges of industrial revolutions. This is what we call industrial use of great inventions.

In this context the main aim of the paper is to analyze the possibilities, relationships, solutions and efficiency measures available and used in energy companies, which may be helpful to assess the effectiveness of management, despite political and regulatory turmoil, and also in order to better use the opportunities offered by the fourth industrial revolution (Wójcik-Jurkiewicz and Sadowska 2018).

The present time is the next, ongoing fourth industrial revolution. It is the use of communication and information technologies in industry. It is often referred to as the "Digital Economy" or "Industry 4.0" (Tarafdar et al. 2017). Fully computerized production systems are additionally equipped with network connections and their digital systems are created, real-time models, information is collected in the clouds. This enables communication with other objects and the transfer of information about the devices themselves, their condition, consumption, speed of work, necessary changes (Czarnecka 2018). Networking all systems leads to the creation of "smart" factories. These processes are controlled by cognitive technologies, commonly known as artificial intelligence, including neural networks, which will be discussed in the next chapter of the article.

Development of management practices in the field of measuring efficiency and development Industry 4.0

The literature on the subject in the area of efficiency does not present a unified position in determining the purpose of enterprises. One can even distinguish different approaches to this issue in the light of different theories (Skrzypek 2007).

For the owner of the enterprise, economic efficiency, increasing his profits, is the key. It is defined as the difference between the results and the expenses incurred to obtain them (Berniak-Woźny and Walotek-Ściańska and Wójcik-Jurkiewicz 2020). However, not only the owner or the main shareholder is interested in increasing profits. It is in the interest of all stakeholders related to the enterprise, including managers and employees, but also suppliers. Therefore, the measures and levels of economic efficiency of an enterprise are of interest to both internal and external stakeholders. Therefore, there is a reason to be guided by economic efficiency in making decisions in enterprises. This is a condition for their survival and development, and for maximizing the benefits for their owners (Wrzosek 2005). New technologies, and in principle the priority of their implementation, can also contribute to increasing profits. Digitization or robotization can give priority in implementing new products and market flexibility (Chudziński 2019).

These technologies in popular magazines are called artificial intelligence. Nowadays, basic needs in business operations still refer, among others to increase the efficiency of their functioning (Czarnecka 2013). This has a significant impact on the desire to maximize profitability in the short term and increase the value of the company in the long term (Pająk and Pająk 2016). The differences in the applied performance indicators in various sub-sectors of the economy often result from the specificity of the environment of the given sub-sector and its degree of development on a macroeconomic scale. The article discusses issues of efficiency and competitiveness management in the power subsector, in the environment of the digital economy. Currently, this era is called the Digital Economy or Industry 4.0. These concepts determine the modern directions of changes and opportunities for the economy (Gorynia and Mińska-Struzik 2018). Therefore, it is worth placing an energy company in this environment and presenting its role to better match the efficiency management instruments used. There are attempts in the literature to structure the implementation of artificial intelligence (Kasperski 2003). Among other things, it is believed that artificial intelligence has four recognizable implementation waves: Internet, business, perceptive and autonomous (Lee 2019). According to the author, the first two waves already surround us in our daily lives - mobility, digitization and facilitation of shopping, financial analyzes and medical diagnoses. The next wave, i.e. perceptive digitizes our current surrounding world. Artificial intelligence in this phase learns to recognize objects, as well as our faces, our emotions and our commands. The last of the phases, the autonomous, will appear last and will most affect our lives (Kinelski 2019) . Autonomous cars, drones and agricultural machinery will change our economy and the structure of our, as a human, participation in creating GDP (Sadowska and Lulek 2016).

Concepts such as artificial intelligence, artificial neuron or neural network are used interchangeably in cognitive technologies, and their origins date back to the first algorithm proposed by McCulloch and Pitts (Belda 2012) in the 1940s. An artificial neuron is just a reflection of this algorithm. These technologies, based on artificial neuron structures, are currently used in various sectors of the economy of leading countries of the world, mainly in the space, military and medicine sectors. Neural networks are special computational structures (Wójcik-Jurkiewicz and Karczewska 2019). They are modeled on biological neuron networks and in such models perceptrons are created, including the Adaline model discussed in this article (Kurzyński 2008).

For the considerations in this article, this means that if the stimulus, which is the sum of products and weights, results of decomposition of basic data, exceeds a certain threshold, then the neuron is activated (Rutkowski 2012). So we are looking for solutions always closer to the purpose of the search. This will maximize the quality of prediction of subsequent results, and by building a network based even on this type of simple neurons, we can expect results of sufficient quality (Kasperski 2003).

What is an artificial intelligence or, more generally, cognitive technology? Artificial intelligence (abbreviated AI) is defined by Webster's Dictionary as a "branch of computer science that simulates intelligent behavior in computers" (Merriam-Webster 2019). The Oxford Dictionary explains this basic definition by calling it "computer theory and development systems capable of performing tasks normally requiring human intelligence, such as visual perception, speech recognition, decision making and translation between languages" (Oxford Dictionaries 2019).

Artificial intelligence is mainly about increasing the ability of computers to match or transcend human intelligence in its various forms, by imitating the human ability to discover, reason, and conclude (Nowak-Nova 2018).

Until now, there was a close correlation between the tendency to computerization and automation, and the performance of simple, manual tasks. Such activities were most often replaced by IT systems and robots. It has been observed for several years that automation and algorithmizing increasingly penetrate mental activities. Until recently, such tasks were in the area of only human activities, such as reasoning, sensing and making decisions (Brynjolfsson and McAfee 2014).

The energy subsector is increasingly strategic for the national economy. It is regulated at the national and European level, specifically conditioned on the competitive market. Enterprises of this subsector are from the research point of view economic entities whose functioning and development is based on a number of complex exogenous and endogenous factors (Pająk et al. 2017). The former are economic, political and social. They are complemented by internal ones, such as: company security, organization of basic and ancillary activities, contacts with the environment, and finally exchange and provision of services within the organization, where the environment of the digital economy becomes important. It should be noted that the basic efficiency measures used in a given sector often result from its specificity and degree of development on a macroeconomic scale (Drożdż 2012).

The question becomes justified: What factors influence the competitiveness and efficiency of energy sector enterprises in the era of the digital economy? They should be considered in a comprehensive approach, also taking into account their interrelationships and interdependencies.

Technologies based on cognitive processes (Kasperski 2003) are currently considered as strategic investments in many enterprises. It can be assumed that they will soon become so common that they will affect most processes, not only in industrial enterprises (Rutkowski 2012). It is not excluded that this will start with the improvement of already existing processes, and then to their replacement with completely new, much more effective ones. A revolution is coming, where much higher efficiency will be expected, with less and less human resources involved. The surprising growth dynamics of these solutions can be found in the IBM report from 2017 (IBM Developer 2017), which shows that in 2014, the total value of the artificial intelligence market in the world is $ 2.5 billion, currently in 2019 the market for such solutions is worth $ 12.5 billion, and in 2025, it will be worth about $ 180 billion (IBM 2019a).

What is machine learning? Machine learning is the foundation of artificial intelligence and computer science. Machine learning has its roots in statistics and mathematical optimization. Machine learning includes both supervised and unsupervised learning techniques. We use them mainly for forecasting, as well as in data analysis and mining (Jones 2017). Machine learning can (and often is) be used independently of other AI or cognitive technologies. In fact, this is the most common type of artificial intelligence we can observe today. Many machine learning algorithms and techniques are already used in various solutions that look for patterns or anomalies in the data.

As a result of the development of "learning" or "learning further self-teaching" of computers or robots, they were given the ability to replicate and map human actions and almost feelings and behaviors. Therefore, automation processes can include not only repetitive, routine activities. Not only individual tasks are automated, but also entire processes, and often the variability of these processes is automatic and is not programmed in advance. In recent years, significant progress has been made in the development of Cognitive Systems (CS). This is not about semantics and logic, but about imitating human thinking in the strict sense. The result is that we extract the intelligent one from all automation. Such intelligent processes are not only subject to routine tasks requiring only physical activity, but more importantly, also tasks previously reserved for people, based on understanding. Mainly those tasks that have the character of intellectual work. The benefits we can achieve thanks to cognitive technologies depend mainly on the type of system we use (Kasperski 2003). This also applies to those activities in which activities can be performed quickly and efficiently by computers that are susceptible to intelligent algorithmizing, e.g. tasks related to supporting decision-making, expertise, forecasting, as well as administrative services, calculating, collecting and processing data. Currently, for purposes related to enterprise management, its processes, results, efficiency or competitiveness, we should use specialized multidimensional systems and simulation systems.

Deep machine learning (Rutkowski 2012) is a relatively new set of methods that fundamentally changes machine learning towards greater cognitive capabilities. Deep learning is not in itself an algorithm, but rather a family of algorithms. These algorithms couple wide networks (e.g. neural networks) with unattended learning, i.e. with unattended machine learning algorithms. Deep learning has significant potential for a certain class of problem solving, but it is not suitable for all situations, it is difficult, expensive and time consuming.

It can be seen in our environment that computers, which in some way register the surrounding reality, understand it better and better. This does not apply only to new types of sensors, sensitive to smell, and for example feelings. Based on these advanced analyzes, these intelligent machines draw new conclusions and learn (Trocki 2012). Cognitive solutions are different from other new technologies. They have a unique distinguishing feature. It is the execution of commands that until now could only be carried out by man (Koźmiński 2000).

Thanks to machine learning, as discussed above, computers have gained the ability to recognize images and interpret speech, and even mood or feelings. Currently, their efficiency is already high. However, we can expect that at the current pace of development, the gap between man and machine will soon decrease significantly.

An important element of artificial intelligence is cognitive processing. Cognitive computing is the basis of artificial intelligence, which is based on neural networks and deep learning. They use knowledge of cognitive science to build systems that simulate human thought processes. Instead of focusing on a single set of technologies, however, cognitive processing involves several disciplines, including machine learning, natural language processing, vision, and human-computer interaction. Cognitive processing currently focuses the most on processing natural language as well as the emotions contained in it. Cognitive computing is artificial intelligence technology, but there are other aspects of artificial intelligence that do not include cognitive function. Deep learning is a special type of machine learning. Cognitive computers use both of these elements.

Artificial intelligence in the form of functioning cognitive technologies is used in manufacturing companies. It currently plays an important role in the analysis of data provided by sensors, for example: the Internet of Things. Also, the use of special harmonic variable analyzers in power grids and the analysis of such a data stream gives broad possibilities in the detection and identification of specific faults in the field of energy parameters of the device. This can often be detected before the entire machine is damaged and the production process is halted (Lock 2003).

Cognitive technologies often disappear from our view and are treated as ordinary data processing. This is what happens, for example, with speech recognition. We use this solution on a daily basis, so we no longer consider it artificial intelligence. Learning networks, including: Markov models (Walsh 2018) and deep-learning networks, are something that we do not think about every day, but use.

Referring to the possibility of using cognitive technologies to assess indicators relating to enterprise products, the most often taken into account are such parameters as: offers in mobile technologies, quality of services, price, diversity of offered products and services, product and service compatibility, flexibility in adapting services to the needs of recipients. In addition, automation, computerization, higher frequency of introducing new services, good access to services, product range, advertising and sales promotion. Also in the scope of services: scope of pre-sales and after-sales services, prices of after-sales products and services, quality of after-sales services, conditions and warranty period, company image and brand (Kurowska-Pysz and Szczepańska-Woszczyna and Štverková and Kašík 2018).

Some researchers of cognitive technologies and artificial intelligence have adopted a set of basic definitions of the word 'pattern' that are fairly consistent with the definitions used by scientists in other fields (e.g. 'numerical taxonomy', 'behavioral psychology', 'theoretical linguistics') (Jackson 2019). Definitions are not very difficult to understand, although the word "pattern" is usually not defined in most current scientific considerations. It is worth discussing its use in Al research and discussing some of the general problems associated with "formulas".

New mega-processes in enterprises such as digitization, automation, artificial intelligence, IoT, machine learning is increasingly penetrating the world and business. Over 200 years have passed since the first industrial revolution, which was the use of a steam engine, and the requirements for testing the efficiency of enterprises have changed as well.

The above is also associated with accelerated reporting and the need to use additional evaluation measures, e.g. current efficiency or the effectiveness of individual projects. Therefore, it is worth analyzing available and used efficiency measures and competitiveness factors, taking into account the possibility of using cognitive technologies for their calculation.

Project management and success factors in making changes

The term 'Project' or 'Project Management' used in everyday corporate communication is a ubiquitous term. The project, in most definitions, is called, written down our intentions, plans, described technologies and solutions, and finally the project is an organized enterprise with a specific start, end, goal, budget and time frame. It happens that the ambiguity of this term causes inaccuracies and misinterpretation of the concept. For the purposes of this trend analysis, let us assume that the above is the most relevant, and in this context will be used later in the article.

Innovation and technology help energy companies in project management. They enter all its areas. The development of solutions such as Artificial Intelligence and cognitive science allows you to accelerate and simplify processes.

However, the more complicated we create machines, programs, processes, the more they are failing. The same happens in projects. The more stakeholders, the more differences of opinion and views. The more you create in the enterprise, project phases, steps, the more complicated our final product is, the more we are exposed to surprising events. This means that running projects, even with the use of modern technologies, will never become tedious. It will not become boring even in 10 or 20 years. Why? Is an energy company significantly different from average enterprises operating in other sectors of the economy?

The differences in the applied project management methodologies in various subsectors of the economy in relation to energy often result from the specificity of the environment of the given subsector and its degree of development on a macroeconomic scale. Therefore, it is worth considering the issues of future project management in the energy sector, in the environment of the digital economy. Currently, this era, popularly called Industry 4.0, defines modern trends of change and opportunities that the economy has thanks to the development of information technology. Therefore, it is worth placing an energy company in this environment and presenting its role to better match the applied project management instruments.

Project managers may encounter problems with meeting deadlines and thus reduce efficiency because they often try to assign tasks to team members rather than broader areas of responsibility. This is due to the belief that a highly structured form of management is preferred in project management, and they ignore the need to provide team members with a larger task.

Trends indicate that individual members and experts will need more freedom and independence in projects. This is due to the increasing scope and complexity of the projects discussed above.

These trends are also reinforced by new methodologies of project management, such as Agile. Agile methodology (PMI 2017) is an iterative approach, narrowing the goal along with work on achieving it. It is a total change in project management, also changing the way of thinking about an end in itself. It is not he who becomes the most important, time and costs, prototyping and quick introduction of even incomplete products to the market in order to improve them later. Many companies have believed that it is better to provide an incomplete prototype quickly than to implement the ideal solution in a controlled and slow manner.

In many cases hybrid solutions are used and will be used, thus combining Agile with a cascade approach. Probably the next step will be management with a smooth scope, a liquid budget and a consistent time, and the project agile periods will last one day or less.

Historically, mega-processes, processes, subprocesses, procedures for describing and measuring them are now the domain of the organization. The design era has now begun. The process will be just one cog in the organizational machine called the project. The project is quickly changing, but the environment in which it operates is slowly changing. The ability to find a compromise is mainly the communication skills of all participants in the project. A good project communication plan is also crucial.

Effectiveness and competitiveness as trend indicators in project management

As discussed above, Industry 4.0 includes using cloud solutions to manage organizations. It is an indication for the implementation of many changes in the field of: strategy changes, supply chain transformations, preparation of staff or investment-friendly factors. EU integration, having both an economic and political dimension, played a large role in the restructuring of the Polish energy sector. This process, above all, was determined by the adaptation of the Polish economy to EU requirements, harmonizing Polish legislation with European Union law and ensuring equal, compared to other Member States, pace of introduction of competition, e.g. in the energy sector (Kinelski and Pająk 2017).

Therefore, enterprises from the energy sector face a big challenge of improving the efficiency of their activities. This is directly related to the financial situation, impending lack of liquidity, exceeded covenants for loans, debt to income ratios higher than acceptable. There are many opportunities in this area related to their restructuring, consolidation and selection of investment areas. On the one hand, Industry 4.0 requires significant investment outlays to be in the main stream of changes in the digital economy, while on the other it allows significant cost reduction.

Enterprise performance measures should be considered based on the company's objectives. Performance management using the opportunities of the digital economy provides companies with the opportunity to develop and build a market position. Professional project management can greatly simplify the implementation of changes. Project management is a dynamic process, it requires the support of the entire organization, all participants, even if they do not participate as team members or experts. This environment, if it is open to new ideas, supports development, guarantees that projects will be successful.

Currently, cost reduction, a flexible need for human resources and access to unique competences at a specific moment leads to intensification of pressure and causes a flood of remote teams. On the other hand, the development of communication technologies will result in greater efficiency of these teams, and thus a decrease in communication costs over any geographical distance. Probably all the studies on the future of project management maintain the thesis about the very possible development of their remote management. The future definitely belongs to remote teams. It is a kind of cascade-agile hybrid, taking into account the fact of communication restrictions in a geographically dispersed team.

Energy efficiency measures and directions of development of these measures

Measures of effectiveness in the operation of enterprises are one of the key issues undertaken by researchers in the field of economics and management sciences. Efficiency provides companies with the opportunity to develop and build a market position, which is a key condition for achieving other goals such as capital appreciation, product development, innovation, maximizing managerial benefits and increasing market value so significantly.

Efficiency as a concept in economic terms is itself a subject of measurement. Of course, using indicator analysis methods. He systematized the indicators used in literature (Copeland et al. 1990), distinguishing three groups from them (Jaki 2012):

- accounting indicators, based on liabilities and assets,
- financial ratios based on cash flows,
- market indicators. based on changes in the environment.

Accounting indicators are the most common indicators used to measure effectiveness in ratio analysis (Wilczyński 2014). They treat efficiency directly as a relationship only between revenues and expenses. These indicators mainly measure profitability at various levels of the financial result. In addition, they can find the relationship between profitability and the size of capital employed in an enterprise and the value of its assets.

The next group of effectiveness measures are the financial indicators used. They are based on one main measurement parameter. It's financial flows. They eliminate imperfections of accounting indicators. This mainly applies to the application of different accounting principles. In addition, it also eliminates difficulties in the area of asset and liability valuation methods.

Described selected indicators, for example NPV, DCF, IRR type, are mainly used to assess investment profitability. They try to estimate the future, so the results of such an assessment are always risky. Energy companies also use these indicators to evaluate projects such as new energy investments, e.g. new wind sources, photovoltaics or distributed generation. To minimize the risk, professional paths are used to change ingredients such as Energy Prices, Property Rights Prices, Emission Rights Prices, and Fuel Prices. Such ready paths are provided by analysts, e.g. REDPOint from Baringa's Energy Advisory (BEA 2018).

The next group of indicators are market indicators. They also allow you to assess the company's effectiveness, mainly from the perspective of external stakeholders. The market valuation of equity, in this case, always takes into account past financial results. It also takes into account the current situation and predictions about the future of the company. The valuation of shares in an energy company may already be strongly influenced by the degree of computerization or process automation in a manufacturing company. Although, such a valuation can be considered the most objective, it should not be forgotten that the price of shares is not just based on the value of capital.

Market indicators are widely used to assess effectiveness. Thanks to the absolute ratios, which can be easily compared, the analysis becomes attractive for comparative studies in practical terms. In this assessment, there is a market background in the form of invested capital.

Expected changes resulting from the environment of the digital economy require the use of new varieties of performance indicators.

Surrounded by new communication and automation technologies, we can measure multiple parameters simultaneously and provide results in real time. It is worth giving examples that can be used for further scientific development:

- the production efficiency index per information unit, or its inverse.
- indicator of the efficiency of computing power involvement per unit of net energy produced
- failure efficiency ratio for communication networks and control systems
- indicator of the efficiency of the use of database resources per unit of produced or consumed energy.
- indicator of the effectiveness of decisions of automation systems and artificial intelligence
- indicator of the effectiveness of information acquisition in the field of machine learning
- the process efficiency indicator can also be defined in the future as the ratio of digital to analog technologies used.
- indicator of the efficiency of using cloud computing resources to produce energy units
- process and resource sharing efficiency indicator

Such considerations, of course, should be supported by the usefulness and need to analyze specific quantities, but it can be assumed that most of them in the near future will become important for the efficiency of manufacturing enterprises.

Summary and Conclusions

Negative changes in the economic situation may affect the deterioration of operating conditions for enterprises. The desire to make a profit, of course, still does not decrease, but digital technologies, including cognitive processes, are gaining more importance. Until recently, the basic goal of the company was survival, now it is development, which until now stood in second place. In addition to expanding markets, development is just new technologies.

The main condition for survival was to maintain financial liquidity, and the factor determining this liquidity is the efficiency of operating activities (Wilczyński 2014). However, currently the main condition for development is keeping up with changing technologies and skillful use of them.

Innovation and technology help energy companies to manage their projects. They are covering all areas of its functioning. The development of solutions such as Artificial Intelligence and cognitive science allow to accelerate and simplify processes. Thanks to this, projects can be carried out in accordance with the schedule, without exceeding the previously set budgets. Energy companies face also a major challenge related to the efficiency of their operations improvement. It can be directly connected with the financial situation of a particular company.

In the current research, the indicators for assessing efficiency cover only selected goals of the functioning of enterprises. They pay too little attention to operational efficiency, speed of processes, digitization, process efficiency and financial liquidity as key factors in the development of enterprises. In addition, they have a limited scope, because a significant number of indicators (accounting, financial, market) require information that is difficult to access or obtained in large periods of time. Data is obtained quarterly or annually. At the present time, the dynamic development of information technologies and the need to use more information to calculate indicators, the time to obtain results is also playing an increasingly important role. To analyze the present using cognitive technologies, we need access to online data. The same applies to future predictions. It is not excluded that we will soon be using quantum technology to measure process efficiency.

This specific combination of the analogue and digital world creates a digital enterprise. An enterprise that is not only connected to artificial intelligence, but also capable of more holistic, conscious decision making. Maybe even to make decisions or suggest solutions.

The impact of the digital economy on the energy market, power market and heat market is inevitable (Zamasz 2015). For a comprehensive analysis of the effectiveness of an enterprise, appropriate indicators should be selected depending on the degree of achievement of objectives, especially in the era of the digital economy. In addition, the adoption of modern relative indicators will allow comparability of results between different enterprises. The analysis of the huge amount of data from devices and sensors in real time gives us the key information needed to manage the company. Acquiring them online allows you to teach cognitive processes. In a digital enterprise, data collected from systems and machines are used to intelligently and more effectively manage the operation of an organization. As a result of these changes, new products and services, more attractive ways of customer service, new professions and completely new business models are developing, in a way.

Analytically desirable situation will include in the calculation of indicators of information not only included in the financial statements of enterprises, but also information received in real time from the inside of production and service processes. The challenge for the economy, including the energy sector, is to change the way of thinking and to learn how to use our exponential technology development to create value for our organization. Although today the hypothetical efficiency indicator, e.g. speed of access to information in the cloud per unit of heat energy produced, seems to be useless, it may soon prove to be a very helpful tool, e.g. in distributed generation networks or virtual power plants. We can therefore use cognitive technologies for fast-changing data that are basically obtained in all energy processes in the energy sector.

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Child Caring Roles and Job Performance of Female Employees: Evidence from North Central, Nigeria

Festus Femi ASAMU[a,d,f], Eyitayo Joseph OYEYIPO[a,b,c,d,e], Jemimah Habila AMOS[a], Chisaa IGBOLEKWU[a,d,g], Olubukoye Opeyemi OYE[a,c,d,h],

a. Department of Sociology, Landmark University, Omu Aran
b. Landmark University SDG 3 (Good Health and Well-being)
c. Landmark University SDG 16 (Peace and Justice, Strong Institution)
d. Landmark University SDG 10 (Reduced Inequality)
e. oyeyipo.eyitayo@lmu.edu.ng
f. asamu.festus@lmu.edu.ng
g. igbolekwu.chisaa@lmu.edu.ng
h. oye.bukoye@lmu.edu.ng

Abstract

The primary objective of this study was to explore the effect of child caring roles (CCR) on job performance of female employee in public sector of Nigeria. The present day study examines this issue, stressing on the level of job commitment and number of children as well as its effect on mother's job performance in north central, Nigeria. Raw data were collected from the civil servants across twenty-one (21) ministries in Kwara State, Nigeria through the use of questionnaire and interviews. A total of 422 employees (mothers) made up the respondents through simple random sampling (SRS) method. 420 questionnaire were administered with a breakdown of 20 respondents selected randomly from the 21 parent ministries which include the Governor's office and the office of the head of service. Two respondents from the ministry housing the entire staff in the state i.e the office of the head of service and the Governor's office were interviewed. Responses received were subjected to chi square analysis to determine child caring roles impact on job performance. The study revealed that Child caring role has significant impact on job performance and commitment. Coping strategies are suggested to help women balance the dual role.

Keywords: Child; Women employees; Job performance; job commitment.

Introduction

Over the years, men worked to be financially independent by making money, while women were responsible for household duties and fulfilled the mission of educating children (Abbott, Wallace, & Tyler, 2005). The pattern has changed, however. Customary sexual orientation jobs that saw male as a retailer of needs and female as a homebuilder are increasingly evolving from time to time and there has been an expansion of families led by two partners in working life (Perrone, Wright and Jackson, 2009) and support for this concept continues to grow (Gallup, 2009). In not many of the social orders because of people both working, men have begun adding to family unit errands (Lewis, 2012). Still in numerous social orders, because of their socially decided sexual orientation belief systems, the obligation of youngster care and other relatives stays with ladies (Barksdale, Reeves and Baden, 2000). They are confronted with shuffling the job of mother, accomplice and girl just as representative (Austen and Birch, 2000). Ladies' support in the workforce has expanded all around the globe, this expansion has fundamentally influenced families .Women's association in paid work added to the ascent of double worker family and has become the standard in numerous social orders. These progressions may force some noteworthy effect on ladies in executing their jobs at work place and in the family (Davidson and Burke, 2004).

The cleavage between the mentalities in modern and pre-mechanical nations towards the "double job of ladies" was self-evident, for example, at an ongoing congress held in Istanbul by the International Council of Women on the topic of "Ladies and the Family in a Changing World" The issues of wedded ladies with occupations outside the home ruled the enthusiasm of the Western designations, while the issue was of less worry to the delegates of the developing nations who acknowledged without question the way that ladies complete two employments, one at home and one in the fields. It is experimentally clear that working ladies pay double duty and just 7 % of ladies appeared to adjust their

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double jobs (Pillai and Sen, 1998). Doing paid employment and family unit exercises are difficult for hitched ladies having a place with every single social class (Davendran, 2008). Hitched working ladies need to pay second move at home (Hochschild, 1989). They were overburdened with family unit errands alongside occupations (Tripathi and Bhattacharjee, 2012).

Research has demonstrated that ladies experience more difficulties adjusting their work-life and family. Ladies with home and non-home work had conflicts when completing job applications (Begum and Tasneem, 1984). Because of accepting various careers, working moms are particularly vulnerable to work stressors. They face different job stressors in terms of quality and power (Vermeulen and Mustard, 2000). Work-family struggle is a type of burial job struggle in which job stresses from the workplace and family areas become a hindrance to representatives' activity execution. It was likewise discovered that ladies' encounters of work-family strife affected adversely on their degree of employment execution and profitability. (Ogbogu, 2013). Double obligation (at home and work environment) devours twofold vitality, comprises a period weight and difficulties which, some of the time, bring about weariness and affects their job performance in an organization. It is in this context that the present study set out to know how these women balance their dual roles and to consider the effect that this may have on their job performance in an organization.

1. Objectives of the Study

The central aim of this study is to examine the child caring roles of married women and its effects on the job performance among academic and non-academic staff in Landmark University. To achieve this aim, the following specific objectives are outlined for this study.

1. To examine the extent to which child caring affects the job performance of female workers in organizations.
2. To examine how child caring affects female level of commitment in paid employment.
3. To determine how the age group of children cared for affect the mothers job performance in an organisation.
4. Recommend possible coping strategies that can be adopted by female workers to balance child caring and job performance.

2. Research Hypotheses

The general hypothesis of this study is to examine the relationship between the child caring roles of married women and their job performance. The research hypotheses formulated are:

H_1. There is a significant relationship between the child caring and the job performance of female employees in an organization.

H_2 There is a significant relationship between child caring and workers commitment to job.

H_3 There is a significant relationship between ages (age group) of children cared for and mothers job performance.

3. Theoretical Framework

The Gender role theory is adopted for this study. Gender roles are shared cultural desires which are performed by people dependent on their socially-distinguished sexual orientation (Eagly and Karau, 1991; Kidder, 2002). Sexual orientation job hypothesis proposes that "people disguise social assumptions regarding their sex since social weights outer to the individual kindness conduct reliable with their recommended sex job" (Kidder, 2002). Individuals, regularly apply such desires to portray themselves as well as other people; in this manner, such factors lead people toward their own individual and progressively broad social characters. These orders have basic impact on people's lives and connections (Donaghue and Fallon, 2003; Williams, Consalvo, Caplan, and Yee, 2009). Sexual orientation job hypothesis recommends that ladies are urged to keep up connections and be social and mindful; henceforth society for the most part maintains a strategic distance from them to perform exercises characterized as manly (Williams, Consalvo, Caplan, and Yee, 2009)

The position of gender has a lot of cultural morals that guide what kinds of practices are generally considered fit for a person based on their actual or seen sex. These are typically based, despite the fact that there are heaps of special cases and types, on limiting the roots of femininity and manliness. As it varies generously between cultures, the specifics surrounding these gendered desires are varied, whereas different attributes across a variety of societies may

be regular. There is an on-going debate concerning what degree of sex jobs and their varieties are spontaneously determined, and to what degree they are socially established.

The definition of 'gender roles' applies to the exercises, based on their obvious contrasts, assigned to women and men. Sex jobs are collectively determined, change over time and space and are influenced by demographic, social and environmental components that define a particular community, network or chronicled age. In terms of both the general population and private spaces, sexual orientation jobs seek to establish boundaries between what is considered as proper for women and for men in the general public.

As a possible theoretical explanation for understanding how women offer meaning to their experiences of balancing motherhood and job performance, gender role theory was considered for this research. This is because it explains why parenting primarily falls into the motherhood realm, thus restricting their possibilities of discovering the world as they wish.

Socially distinguished as males and females will in general possess diverse credited jobs inside social structures and will in general be decided against different desires for how they should carry on. As an outcome, the hypothesis predicts guys and females will create various abilities and perspectives and that they will act in an unexpected way. Correspondence scientists have utilized sex job hypothesis to clarify and anticipate (a) the correspondence practices of females and guys and (b) the assessment of a similar correspondence conduct, when guys and females perform it. This exploration has prompted extensive discussion about whether the attention ought to be on gendered contrasts or similitudes. (Shimanoff, 2009).

Gender role theory was investigated as a potential hypothetical clarification for understanding the encounters of moms who work in associations. Ladies may accept a few jobs simultaneously, for example, mother, accomplice, representative and understudy. Job struggle may happen when ladies endeavor to satisfy different jobs. Googins (1991) presented the expression "job strain" to portray the subsequent strain that happens when an individual attempts to fulfil the needs of different jobs.

In applying the gender role theory to this study, there is a solid sign of job clashes in adjusting the family and work duties of ladies. In light of this hypothesis, it tends to be concluded that ladies have jobs which they are required to act in each general public. These jobs incorporate the conceptive, gainful and network administrations. This hypothesis clarifies why childcare prevalently falls into the space of parenthood, subsequently constraining their chances to seek after exercises outside mothering. In particular, men are required to be providers and ladies are relied upon to be guardians.

However, women’s roles are in conflict because they both require time and must be performed simultaneously for instance, the child caring roles of mothers require them to spend much time with their family thus affecting their job performance in an organization. Mothers are expected to take proper care of not just their children but also their husbands, the community and themselves at the expense of their presence in the public sphere, their personal achievements and job performance. It is very role-conflicting for mothers to be totally involved in both the public and private spheres. Also, these dual roles may have effects on their job performance and balancing their homework.

4. Materials and Methods

Both secondary and primary data were gathered for the study. The secondary data included published empirical studies related to child caring roles and job performance of female employees. While the primary data were derived from the survey of four hundred and twenty (422) female employees was randomly drawn from all the twenty-one (21) ministries including the office of the Head of Service and the Governor’s office of Kwara State, North Central of Nigeria. The choice of this institution is based on the large number of married women in the institution workforce and accessibility to researcher. Key informant interviews were used for some experienced married women.

A structured questionnaire was designed and distributed to a simple random sample of four hundred and twenty (420) married women with children drawn from all the twenty-one (21) ministries including the office of the Head of service and the Governor’s office of Kwara State, Nigeria.

The questionnaire included close and open-ended questions addressing the women demographic characteristic, knowledge of child caring roles and job performance / commitment of female employees. In conformity with ethical principles of the social sciences, the purpose of the study was communicated to the respondents for obtaining their voluntary assent.One respondent from the two parent Ministries which are Office of the Head of Service and the Governor’s office were involved in Key In-depth interview to draw information regarding the subject respectively. The data were processed using the SPSS software, while the results were presented in univariate and bivariate forms through percentages and chi-square tests to establish relationship among core variables and the interview was processed using content analysis.

5. Results/ Findings

Table 1. Socio-Demographic Characteristics of Respondents

Variable	Frequency	Percentage
Age		
25-29	68	16.1
30-34	109	26
35-39	132	31.4
40-44	57	13.6
45 and above	54	12.9
Marital status		
Married	269	64.1
Divorced	49	11.7
Separated	52	12.4
Widowed	50	11.9
No of Children		
0-2	148	35.2
3-5	194	46.2
6-8	52	12.4
Above 8	26	6.2
Age of Children		
0-5	103	24.5
6-10	180	42.9
11-15	62	14.8
16-20	35	8.3
21 and above	40	9.5
Education Attainment		
Secondary School	60	14.3
OND/NCE	74	17.6
HND	59	14.1
B.sc	58	13.8
M.sc	48	11.4
PhD	45	10.7
Others	76	18.1

Source: Survey, 2020

Table 4.1 reveal that 68 (16.1%) of the 420 respondents used in this study are within the age group 25-29, 109 (26%) are within the age group 30-34, 132 (31.4%) are within the age group 35-39, 57 (13.6%) are within the age group 40-44 while the remaining 54 (12.9%) are above 45 years of age. This shows that a larger percentage of respondents used for this study are within age group 30-34. Also, majority of the respondents being 269 (64.1%) are married, 49 (11.7%) are divorced and 52 (12.4%) are separated, while 50 (11.9%) are widowed. From this, it can be seen that majority of the respondents are married this is because married women are in a better position to discuss family-work conflicts. Few widowed, separated and divorced respondents were also covered; the researcher discovered that these women are the bread winner and care taker of their home.

In addition, 148 (35.2%) of the respondents have 0-2 children, 194 (46.2%) of the respondents have 3-5 children, 52 (12.4%) of the respondents have 6-8 children while just 26(6.2%) respondent has above 8 children. This depict that most of the respondents covered in this study have between 1 to 5 children. Very few have 6 and above. Also, the table above shows that 103 (24.5%) of the respondents have children between that ages of 0-5, 180 (42.9%) of the respondents have children between the ages 6-10, 62 (14.8%) of the respondents have children between that ages 11-15, 35 (8.3%) of the respondents have children between the ages 16-20 and the remaining 40(9.5%) of the respondents have children from ages 21 and above among others.

In terms of education, 60 (14.3%) of the respondents possesses secondary school education, 74 (17.6%) of the respondents had OND/NCE education, 59 (14.1%) had HND education, 58 (13.8%) had B.sc education, 48 (11.4%) had M.sc education, 45 (10.7%) had PhD education and the remaining 76 (18.1%) had other forms of educational attainment not mentioned above. From the conducted research, it was discovered that very few of the respondents have high educational attainment such as PhD and M.sc, few of the respondents have B.sc, while a large number of the respondents have secondary, OND, HND and other form of education when combined together. The lower level

of education can be explained by the fact that women are more likely to work in informal jobs and majority of the women are non-teaching staff who do not need higher education attainment or qualification.

Table 2: Cross Tabulation of Relationship between Child Caring and Job Performance.

Count

		Performance			Total
		high	average	low	
caringrole	Yes	28	65	128	221
	No	45	18	5	68
	Sometimes	18	77	36	131
Total		91	160	169	420

Source: Survey, 2020

DECISION RULE:

The number of the degree of freedom at (3-1) (3-1) =4. The chi square value =9.488 at df of 4 of 0.05 significance level, this means P value= 0.000< chi square value at 0.05 (P<0.05) this leads to rejection of the null hypothesis (H_0) which states that there is no significant relationship between child caring and job performance is REJECTED and the alternative hypothesis is ACCEPTED. This shows that there is a relationship between child caring and job performance. However, it was discovered that child caring roles affects the job performance of women in the lower class more than those in the upper class. Based on the findings and interview conducted, the women in the lower class do not have access to some coping strategies. Most of them cannot afford crèches; household appliances, gadgets and other technologies that help balance the dual roles.

This is corroborated by an interviewee thus:

> Child caring is not an easy task at all, but if you are blessed with a man who understands the roles involved in caring for a child or children he will always be available to give a helping hand. Also, there are so many things to ease the caring role of a child but it demands financial resources and when it is not in place it also makes the caring role less easy. In other words, the financial resources at ones disposal which is an indication of the social status of the woman or the family determines if caring role would be make less ease or loaded with stress (KII/ Female, Office of the Head of Service, Kwara State, January, 30, 2020)

Table 3: Cross Tabulation of Relationship between Child Caring and Commitment to Work
caringrole * commitment Crosstabulation

Count

		Commitment			Total
		high	average	Low	
Caringrole	Yes	22	63	136	221
	No	51	14	3	68
	Sometimes	15	69	47	131
Total		88	146	186	420

Source: Survey, 2020

DECISION RULE:

The number of the degree of freedom at (3-1) (3-1) =4. The chi square value =9.488 at df of 4 of 0.05 significance level, this means P value= 0.000< chi square value at 0.05 (P<0.05) this leads to rejection of the null hypothesis (H_0) which states that there is no significant relationship between child caring and job performance is REJECTED and the alternative hypothesis is ACCEPTED. This shows that there is a relationship between child caring and job commitment. The implication of this is that child caring consume the better part on the woman's time and therefore reduces the concentration at the work place. This to a length affects the commitment of women to work as commitment to the family is place a priority over the workplace.

Table 4: Cross Tabulation of age group of children and Age of Children

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	103	24.5	24.5	24.5
	6-10	180	42.9	42.9	67.4
	11-15	62	14.8	14.8	82.1
	16-20	35	8.3	8.3	90.5
	21 above	40	9.5	9.5	100.0
	Total	420	100.0	100.0	

Source : Survey, 2020

Table 4 above shows the age group of children as per how they are cared for. The table indicates that age group 0-5 represents 25.5% and age group 6-10 represents 42.9% of children are mostly cared for. This account for the effect it has on the performance of women at workplace. Where a woman is to cater for infants, it is more demanding and takes the better part of the woman.

This is corroborated by an interviewee:

> Caring for children is not an easy task especially where you have most of your children within the ages of 0-10. It is clear that most of what they do is highly influenced by the mother and it is important to bring them up in sound training. The age group of 0-10 is the best time to do so and it tells on the woman even at work. A good example of this is myself where I need to drop the children in school first thing in the morning before going to work, and all I think about is how not to make them stranded in school at the close of the day. To make the matter worse is even when the schools are on mid-term break, it is a huge of a task to imagine. (**KII/Female, Office of the Secretary to State Government, Governor's office, Ilorin Kwara state, January 30, 2020**)

6. Summary and Discussion

The results of the study are based on the effects of child caring roles on job performance of female employees in Kwara State, Nigeria. The first objective of this study is based on the extent to which child caring affects the job performance of female employees. The results showed that there is a significant relationship between child caring and job performance. Numerous studies have found similar results. This study therefore confirms the studies conducted by Ogbogu (2013) that the work-family dispute is a type of inter-role conflict in which job and family role pressures become an obstacle to the job performance of employees. It was also found that the work-family conflict experiences of women had a negative effect on their level of job performance and productivity.

It also corroborates with Ogbogu and Eroro (2009) findings that affirm Child care is a major source of stress that adversely affects the efficiency, well-being and relationships of employees. This study also supports Bryon (2005) research that demonstrates that conflicts between work and family roles are bi-directional, suggesting that work to family conflict can be experienced, whereas family to work conflict can be experienced at the same time. In the specific area in which interference is encountered, both disputes have been found to reduce efficiency and satisfaction.

The result of the second objective reveals that there is a significant relationship between child caring of female employees and their commitment to paid employment. However, during the interview it was indicated that it is safe to say that family duties has effect on the commitment of a large number of female employees to their jobs. It therefore means that while they are solely responsible for taking care of their children, their commitment to their jobs is affected. Some of the respondents were asked to what extent family duties affect their commitment to work.

The third result is to be determined by how number of children affects the mother's job performance. The result revealed it has a lot of effects. The result corroborates that of keith & Schafer (1980) that a source of work-family role strain among women with job and families was number of children. From this study, women with higher number of children experience more family-work conflict because they have more responsibilities than women with few

children. Also, the finding is in line with that of Fapohunda (2014) which revealed that women have been seen as caregivers, mothers and spouses, regardless of society, whose primary occupations are child rearing and taking care of domestic matters.. It is also evidence that the age group of children also have an effect on the job performance of female employees. This finding has given further usefulness of the gender role theory which explains why childcare predominantly falls into the domain of motherhood.

The study concludes that child caring roles has high level impact on their job performance. Coping strategies like dependable childcare crèches, gadgets and technology appliances and support from husband will help women balance the dual role.

Compliance with ethical standards:

Every operation involving human subjects in this study was consistent with the ethical approval received from the Ethical Review Committee of Landmark University. Prior to the commencement of data collection, oral permission was demanded from the Commissioners of Ministries.

Informed consent

Informed voluntary consent was gotten from all respondents with a reassurance of the anonymity and confidentiality of the research.

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Conflict of Interest

All the authors affirm to no conflict of interest in respect to this paper

Ethical Approval

Ethical approval obtained from Landmark University Ethical Review Committee. Oral permission was sought from the Commissioners of the ministries before commencement of data collection

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The Application of CVP Analysis in Companies from The Taxi Industry Based on Simulation Results: The Empirical Evidence from Poland

Kinga BAUER
Cracow University of Economics, Department of Accounting, Cracow, Poland
kinga.bauer@uek.krakow.pl

Marek BAUER
Cracow University of Technology, Department of Transportation Systems, Cracow, Poland
mbauer@pk.edu.pl

Abstract

The specificity of the work of taxi companies operating at airports has been presented in this paper. Attention was drawn to the importance of conducting the CVP analysis, which is aimed at increasing the efficiency of operations of this type of enterprises. In order to make this possible, it is necessary to precisely define in advance and under real conditions the scope of services provided, as well as various scenarios of the transport offer. It is, therefore, reasonable to use simulation methods that enable quick and reliable comparison of the potential effects of implementing individual solutions. The author's own simulation model is universal, it can be used to analyze the taxi service of any airport serving the city to which it belongs. The model makes it possible to determine the percentage of profitable trips (i.e. with a client) and to determine the duration of individual service processes, such as acquiring a client, the trip itself or operating activities when alighting and boarding. At the same time, the variability of duration of the above service processes has been taken into account, including the variability of the travel time resulting from changing traffic conditions. It is the stochastic nature of the model that enables a significant increase in the quality of CVP analyses. An example of using the model to determine the optimal division of the day into work shifts as one of many of its applications has been presented in this paper.

Keywords: CVP Analysis, Taxi Services, Simulation Model.

Introduction

The development of cities, agglomerations, regions and countries is closely related to the opportunities created by the transport system. It is essential for the mobility of people and the transport of goods. However, in order to perform these functions effectively, it must be organized at a high level. This is not easy because the transport system is characterized by immense complexity, and its functioning is influenced by many external factors, including those related to demography, spatial planning and economy. In turn, the transport system itself influences the changes in the living conditions of residents, including their transport needs and travel time, and is not without effects on the environment.

The essence of transport and its importance are reflected in scientific research. One of the many research areas is that concerning economic analyses in the transport industry. Research indicates, inter alia, that transport can bring significant losses and requires subsidies (Bąk (Ed.), 2010). The problem of high costs and the need to subsidize transport, the use of promotional ticket prices to encourage the use of the carrier's services applies to a large extent to public passenger transport (cf., inter alia, Matas, 2004; Buehler and Pucher, 2011; Redman, Friman, Gärling and Hartig 2013; Mouwen 2015). However, it should be remembered that among transport companies there are also those whose aim is to generate profits. These companies include the private taxi transport (Bauer and Bauer, 2018).

Companies from the taxi industry in Poland are profit-oriented entities. Therefore, earning income is a prerequisite for their survival. The income of enterprises, whose goal is to generate profits, is closely related to the pricing policy they adopt, which in turn affects the financial condition of the entity. The market conditions and the amount of costs incurred should be the basis for calculating the prices of taxi services. The proposed prices must cover the costs the business incurs, but at the same time must be acceptable for the customers. Pricing strategy decisions may depend on the reliability of information on costs, supply-demand relationship, and the level of competitiveness in

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comparison to other industry members (see, for example, Mattila and Choi, 2006; Noone and Mattila, 2009; Sadowska and Lulek, 2015). The problem of cost-benefit analyses becomes more significant when taxi companies operate under conditions of high uncertainty. This uncertainty is related not only to aspects such as the activities of competitors, seasonality of income, decisions of potential customers or fuel cost variability, but also results from the variability of traffic conditions or the condition of the road infrastructure. The COST-VOLUME-PROFIT (CVP) analysis may bring support to activities aimed at generating profits for companies in the taxi industry. As a rule, the use of management accounting tools may contribute to achieving the organization's goals in a more effective manner.

The aim of this article is to show that simulation modeling can be an effective tool that supports the planning of taxi services, also in terms of estimating customer income, depending on different traffic conditions. As the issue is very broad, the focus was on airport taxi services, where taxi services are of particular importance, resulting, inter alia, from the high standard of all air services. For this purpose, a universal, proprietary model of taxi service between the airport and the neighboring city center has been developed. The model takes into account all the important processes of the taxi service; it is also stochastic, as it takes into account the variability of the duration of these processes.

The essence of the COST-VOLUME-PROFIT analysis in the context of companies from the taxi industry

Despite a relatively long history, cost-volume-profit analysis (CVP) is still useful in business management. The starting point for the CVP analysis was the break-even concept. Over the years, the CVP analysis has been modified and improved in order to reduce its limitations and develop the possibility of its application in as many business situations as possible. It was created as a mathematical formula to calculate simple dependencies of costs, prices, production and profit in an enterprise producing and selling only one good. This limitation had caused criticism of this calculation method, and therefore it was developed to be applicable to various economic activities (Cafferky, 2010, pp. 1-3).

In the basic math formula for breakeven point, total costs for period equal total revenue for period. Where total costs are equal to the sum of fixed costs and variable costs. Total revenue is equal to the product of the unit selling price and quantity sold. The expanded formula includes the production of a variety of goods, as well as investment calculations (cf., inter alia, Drury, 1992; Garrison and Noreen, 1994; Dobija, 1999; Piosik, 2006). The formula in the basic version is expressed by:

Net profit = (unit sold * unit selling price) – (unit sold * unit variable cost) – total fixed costs

In CVP analysis, it is assumed that the relationships that occur between the categories are linear. In a given range, both the total fixed costs and unit variables are treated as immutable. Potential sales volumes are also determined. It is essential to define the maximum production capacity. Due to the variability of the parameters of the CVP analysis over time, the study covers a short time period (Drury, 1992).

The subject of research on CVP analysis pertains mainly to manufacturing companies. However, the need to make profits and be a competitive entity makes the use of CVP not only possible, but also recommended in the services sector. The difficulty in simulating the results in the CVP analysis in service providers is that the sale of services is highly volatile over time. Moreover, this type of activity is usually associated with high fixed costs, which may be difficult to cover in the case of income volatility (Cafferky, 2010, p. 16). Scientific research on the CVP method does not pertain to all enterprises, but only to particular industries (e.g. Greenberg, 1986; Basu and Conrad, 1994; Anderson, Fok and Scott, 2000; Cafferky, 2010). Therefore, it is necessary to explore the specifics of a given type of enterprise. In the context of the topic under discussion, it is the taxi industry that will be referred to.

The demand and supply of taxi services are related to economic parameters such as the price of the service and the cost of providing it. Setting the right price for a taxi service is a difficult task. It involves the analysis of the costs of the service provided, but also the quality of the services provided (Schaller, 1998). The problem of the balance of supply and demand for taxi services also depends on the specificity of this market in a given country. For example, in the regulated market of taxi services in Hong Kong, studies on the balance of supply and demand will deviate from classical economic analysis and will focus on the efficiency of the entire system (Yang, Wong and Wong, 2002). However, even in a monopoly market, it is advisable to create models of taxi services and conduct research

on changes in business behavior of drivers, influenced by the actions of potential passengers (Yang, Wong and Wong, 2010). For economic analyses, it is necessary to learn about central regulations or deregulation introduced in the taxi services market, as well as to develop models focused on market organization, operational organization and regulation issues (see, among others, Foerster and Gilbert, 1979; Morrison, 1997; Litman, 2005; Seibert, 2006; Moore and Balaker, 2006; Salanova, Estrada, Aifadopoulou and Mitsakis, 2011).

Pricing of taxi services has a particular specificity, which results from the non-linearity of service prices per unit of time. The specificity of the calculated profit requires not only the calculation of the travel time with the customer, but also the travel time to reach the customer, waiting time and duration of operational activities. Moreover, the extension of the travel route may affect the promotional travel rates. Therefore, in the case of taxi services, it is not possible to convert the number of services (and prices) easily into 1 km, as the average price of a kilometer of travel will vary depending on its length. (Yang, Fung, Wong and Wong, 2010). The imperfection of information on the deregulated taxi market is also problematic and requires searching for additional solutions that favor activities aimed at increasing competitiveness (Seibert, 2006).

The complexity of the issue discussed necessitates looking at economic analyses in taxi companies differently. The parameters for CVP analysis should be defined in relation to the situation on the market on which the companies operate. It is advisable, for example, to analyze studies of communication behavior, which will affect the reported demand and the offered supply, as well as the variability of traffic conditions.

Determining revenues from taxi transport is possible both, through research of the current condition, as well as using simulation analyses. The latter method makes it possible to find the best solutions and avoid unfavorable solutions - without incurring additional costs and the risk of losing customers in the case of implementing experimental solutions, which turn out not to be successful. The simulation approach facilitates, among others:

- determining the need for taxis at different times of the day,
- determining optimal working hours in multi-shift mode,
- adopting a strategy for dealing with return journeys (City-Airport),
- determining service prices,
- applying solutions conducive to the implementation of the city's transport policy,
- developing guidelines for improving the quality of the transport infrastructure.

Simulation Model

In order to enrich the CVP analyses, an original model was built, to be used for simulation analyses of the work of a taxi company, with particular emphasis on airport service. It is a specific form of the taxi business which is usually carried out by companies owned (or jointly owned) by airports and which offer high-quality services. These companies focus mainly on trips between the airport and the city in close proximity. It is characterized by repetitive trips along the same or very similar routes and a strong directional asymmetry: the vast majority of commercial trips are carried out from the airport, while the trips towards the airport are mostly without customers. A distinguishing feature of such taxi companies is also the assignment of drivers to particular vehicles - they are often the property of the drivers. It is an extended version of the model described in (Bauer and Bauer, 2018), enriched with additional service processes and the variability of the duration of individual service processes. The model represents the work of taxis during an average working day. Four types of processes occurring during standard passenger service have been distinguished:

- customer acquisition (including waiting for the customer resulting from a standstill in the taxi queue or / and the lack of waiting customers and the drive to a parking stand or drive to the customer),
- activities when boarding the vehicle (boarding customers, loading luggage, finding the address, information on travel conditions, including transport prices),
- trip between the airport and the destination in the city center or vice versa,
- activities when alighting the vehicle (disembarking customers, unloading luggage, paying the fare).

The occurrence of individual processes depends on whether a given trip is profitable - then all four processes occur. On the other hand, if the trip takes place without a passenger, the structure of the model simplifies to two (when the waiting is not successful) or even one process (when the driver immediately decides to go without a passenger. The list of possible scenarios is presented in Figure 1.

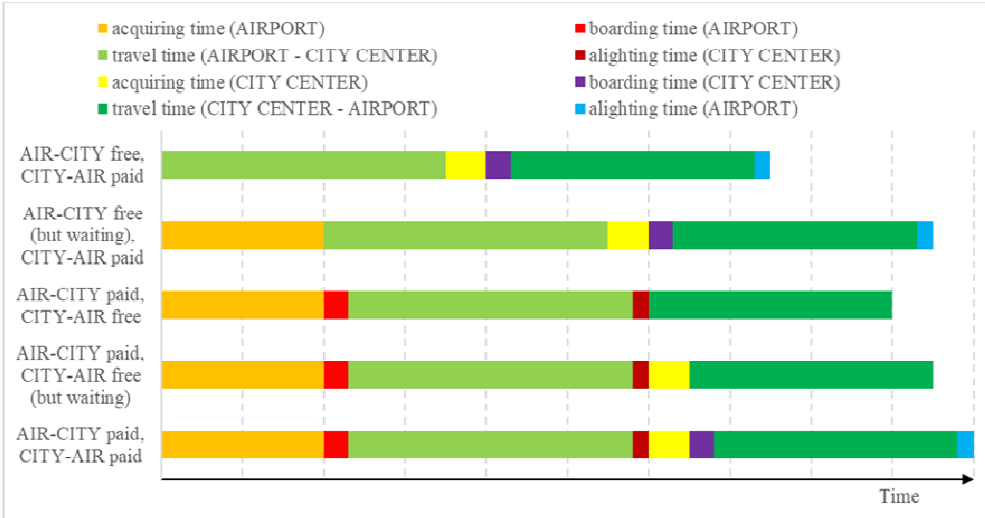

Fig. 1: Taxi service processes during the completion of a full cycle Airport - City Center – Airport

The probabilities of carrying out profitable trips (with clients) are therefore of key importance, hence their estimation should be based on real data about how the airport taxi service functions, taking into account a completely different specificity of the trips made to and from the airport. The scale of the probabilities depend, inter alia, on the actual time when air operations at the airport are performed (arrivals and departures), conditions of arrival to the airport by various means of transport (public transport offer, road conditions and parking conditions at the airport, taxi offer), as well as travel costs by various means transport.

There is an assumption in the model, as is the case of real conditions, that the duration of all taxi service processes is characterized by greater or lesser variability, therefore, apart from the average duration, the model also includes random components of a given service process. The presented model is therefore stochastic, enabling the mapping of the variability of the duration of service processes, similar to the variability observed under real conditions. Variability in customer acquisition times is due to the randomness of the process of a customer requesting a taxi service, and is slightly different in the case of the airport and the city center. In the first case, after aircraft arrival, there is an increased use of taxi services, which helps to shorten the waiting time in the taxi queue; more often it is passengers waiting in queues for vacant vehicles. However, during the break between arrivals, customer acquisition times are longer. The situation is slightly different in the case of return journeys (from the center to the airport) - depending on whether a potential passenger is reported or the trip is without a passenger, in which case the trip back to the airport is performed swiftly in order to pick up the next passenger.

In turn, the variability of the taxi travel time between the airport and the city center (and in the opposite direction) is mainly due to the variability of traffic conditions on the road network. Travel time is usually longer during the periods of communication peaks (most often: morning rush and afternoon rush), when most trips take place, also those unrelated to the airport. Travel time is usually the longest of the analyzed taxi service processes. Travel times during peak hours can be even more than twice the night travel times, when traffic volumes are usually the lowest. As a result, at peak hours, maintaining taxi service requires the engagement of more vehicles to provide the same level of transport offer as outside of peak communication periods.

The times passengers alight and board are relatively the least important. Usually, they are in the range of 2-3 minutes, and also in this case we are dealing with variability resulting from the different physical characteristics of customers, the level of communication (in different languages - which is the specificity of airport-related trips), type and size of luggage, and methods of payment for the trip.

The total duration of the trip in the direction Airport – City Center (TAC) and City Center – Airport (TCA) is the sum of the duration of individual service processes during the trip in this direction:

$$T^{AC} = t_w^{AC} + t_b^{AC} + t_{tr}^{AC} + t_a^{AC} \quad \text{and} \quad T^{CA} = t_w^{CA} + t_b^{CA} + t_{tr}^{CA} + t_a^{CA} \quad \text{[min]}$$

stand for:

t_w^{AC}, t_w^{CA} [min] – time of customer acquisition (including travel to queuing position and waiting for the customer),

t_b^{AC}, t_b^{CA} [min] – boarding time and accompanying activities,

t_{tr}^{AC}, t_{tr}^{CA} [min] – travel time on the road network,

t_a^{AC}, t_a^{CA} [min] – time of alighting and accompanying activities.

Then, the time of completing the full taxi cycle is the sum of the time of completing the trips (for profit or not) in both directions:

$$T^{ACA} = T^{AC} + T^{CA}$$

In the simulation model of completing a trip, the duration of all service processes are determined with the use of pseudorandom number generators, taking into account the probability of acquiring a customer. Then, the time of full cycle for a taxi (in minutes) can be determined with the formula:

$$\hat{T}^{ACA} = \hat{a}_w^{AC} \cdot \hat{t}_w^{AC} + \hat{a}_{ba}^{AC} \cdot \hat{t}_b^{AC} + \hat{t}_{tr}^{AC,k} + \hat{a}_{ba}^{AC} \cdot \hat{t}_a^{AC} + \hat{a}_w^{CA} \cdot \hat{t}_w^{CA} + \hat{a}_{ba}^{CA} \cdot \hat{t}_b^{CA} + \hat{t}_{tr}^{CA,l} + \hat{a}_{ba}^{CA} \cdot \hat{t}_a^{CA}$$

Stands for:

$\hat{t}_w^{AC}$, $\hat{t}_w^{CA}$ [min] – acquiring time from Normal distribution $N[\mu_w^{AC}, \sigma_w^{AC}]$ and $N[\mu_w^{CA}, \sigma_w^{CA}]$,

$\hat{t}_b^{AC}$, $\hat{t}_b^{CA}$ [min] – boarding time from Normal distribution $N[\mu_b^{AC}, \sigma_b^{AC}]$ and $N[\mu_b^{CA}, \sigma_b^{CA}]$,

$\hat{t}_{tr}^{AC,k}$, $\hat{t}_{tr}^{CA,l}$ [min] – travel time from Normal distribution $N[\mu_{tr}^{AC,k}, \sigma_{tr}^{AC,k}]$ and $N[\mu_{tr}^{CA,l}, \sigma_{tr}^{CA,l}]$ for a specified period of time k, l [-],

$\hat{t}_a^{AC}$, $\hat{t}_a^{CA}$ [min] – alighting time from Normal distribution $N[\mu_a^{AC}, \sigma_a^{AC}]$ and $N[\mu_a^{CA}, \sigma_a^{CA}]$,

$\hat{a}_w^{AC}$, $\hat{a}_w^{CA}$ [-] – coefficient from Binomial distribution $B[1, p^{AC}]$ and $B[1, p^{CA}]$,

$\hat{a}_{ba}^{AC}$, $\hat{a}_{ba}^{CA}$ [-] – coefficient from Binomial distribution $B[1, r^{AC}]$ and $B[1, r^{AC}]$.

The total time of a work day can be determined as the sum of the duration of consecutive trips:

$$T = \sum_i \hat{T}_i^{AC} + \sum_i \hat{T}_i^{CA} \text{ [min]}$$

with a limiting condition resulting from the maximum working time of the driver; usually it is 8 hours. If this time is exceeded, the driver stops working after the completion of the current trip with a passenger. However, if he is during a trip without a passenger, he no longer tries to acquire another client.

An Example of Applying the Simulation Model

Below is a presentation of one of the many possible examples of how to apply the model, such as using it to determine the best working hours of taxi drivers in handling passenger traffic between the airport and the city center. It is not an example of a particular airport and city, but the data selected is real. The model is universal – it enables simulation of such connections for any airport.

For the purposes of the calculations, it was assumed that the maximum working time of one driver is 8 hours, during which he strives to complete the largest possible number of paid trips, i.e. trips with a client. Therefore, in

order to ensure continuity of service throughout the day, three vehicles are theoretically needed for one service unit - assuming for the purpose of this paper that the demand for taxis is constant throughout the day. This means, of course, that it is need to engage many vehicles - for example, if we assume that a taxi leaves the airport regularly every 5 minutes, and the time of a full cycle (there and back) is 90 minutes - then you need 18 taxis at the same time, and there is a demand for 54 vehicles per day. In practice, the working times of a given vehicle are different than 8 hours - which results from the variability of the duration of individual processes. It is therefore possible that more vehicles are in operation at the same time than would result from theoretical calculations. It was also assumed that the fare - regardless of the direction – was 22 EUR. In this example, eight-hour work shifts starting every 2 hours, with the first starting at midnight, were chosen to determine the best time to rotate vehicles. Table 1 presents Data needed for the calculations is presented in table 1.

Table 1: Summary of input data for the simulation of taxi service on airport – city centre route

Variable		Direction: Airport – City Centre	Direction: City Centre – Airport
Distribution of probability of completing a paid trip [-]		B [1, 0.98]	B [1, 0.14]
Distribution of time to acquiring a client [min]		N [25, 5]	N [10, 3]
Distribution of boarding time [min]		N [3, 1]	N [3, 1]
Distribution of time of trip [min]	22:00-05:59	N [22, 3]	N [24, 3]
	6:00-07:59	N [28, 5]	N [28, 5]
	08:00-14:59	N [33, 6]	N [34, 7]
	15:00-18:59	N [37, 9]	N [36, 8]
	19:00-21:59	N [28, 6]	N [28, 4]
Distribution of alighting time [min]		N [2, 1]	N [2, 1]

The probabilities of completing trips with a passenger were strongly diversified, as is often the case with this type of service. Importantly, the day was divided into periods with different travel times, both in terms of the average value and in terms of the standard deviation. The duration of other service processes - also taking into account randomness - was assumed to be the same for the whole day. 100 simulation runs were performed for each starting hour of an 8-hour working day of a single taxi (00:00, 02:00, 04:00,…, 22:00). The average numbers of completed trips (including trips with clients) per one vehicle and average income for one 8-hour working day - are presented in Table 2.

Table 2: Summary of the simulation results - the number of completed trips and revenues from transport per 1 vehicle during an 8-hour working day

Period	Number of courses			Number of paid courses			Incomes [EUR/veh]
	Airport – City Centre	City Centre - Airport	Total	Airport – City Centre	City Centre - Airport	Total	
00:00-08:00	6.7	6.0	12.8	6.6	0.8	7.3	161.3
02:00-10:00	6.2	5.7	11.9	6.1	0.9	7.0	154.2
04:00-12:00	6.1	5.4	11.4	5.9	0.6	6.5	143.4
06:00-14:00	5.8	5.0	10.8	5.7	0.8	6.5	142.1
08:00-16:00	5.3	4.8	10.2	5.2	0.7	5.9	129.8
10:00-18:00	5.2	4.8	10.0	5.1	0.6	5.8	126.5
12:00-20:00	5.2	4.7	9.9	5.1	0.7	5.8	127.6
14:00-22:00	5.8	5.0	10.8	5.7	0.6	6.3	138.6
16:00-00:00	6.1	5.3	11.4	5.9	0.7	6.7	146.3
18:00-02:00	6.4	5.9	12.3	6.3	0.9	7.2	158.0
20:00-04:00	6.8	6.0	12.8	6.7	0.9	7.6	166.5
22:00-06:00	6.7	6.0	12.7	6.5	1.0	7.5	165.2
Average	6.0	5.4	11.4	5.9	0.8	6.7	146.6

As can be seen, the average total number of trips completed during different times of day varies significantly - from 9.9 to 12.8, in the case of trips with a passenger it ranges from 5.8 to 7.6. This translates into differences in incomes: from EUR 126.5 to as much as EUR 166.5 for just one 8-hour working day of one taxi. Table 3 presents the total income for four analyzed cases in which the day was divided into three work shifts.

Table 3: Summary of simulation results - total revenues from transport per 1 vehicle per day at different work shifts

Work shifts	**00:00-08:00 08:00-16:00 16:00-00:00**	**02:00-10:00 10:00-18:00 18:00-02:00**	**04:00-12:00 12:00-20:00 20:00-04:00**	**06:00-14:00 14:00-22:00 22:00-06:00**
Incomes [EUR/veh/ day]	437.4	438.7	437.6	**445.9**

The table above shows that, of the analyzed case, the best day distribution is into three shifts: 06:00-14:00, 14:00-22:00 and 22:00-06:00. With this division of the day into 8-hour periods, it is possible to obtain the highest incomes for transport (with an even distribution of the taxi offer throughout the day) - it gives a total of 445.9 [EUR/day]. In the case of multiple vehicles operations, differences in income should be considered significant. On the other hand, table 4 presents the duration of particular service processes.

Table 4: Summary of simulation results - average duration of particular service processes per 1 vehicle during an 8-hour work day

Shift time	**SUM acquiring time**	**SUM boarding time**	**SUM travel time**	**SUM alighting time**	**TOTAL TRAVEL TIME**
00:00-08:00	172	23	299	14	508
02:00-10:00	162	21	307	14	503
04:00-12:00	153	20	318	13	504
06:00-14:00	149	19	332	13	513
08:00-16:00	139	18	340	12	508
10:00-18:00	135	18	342	12	506
12:00-20:00	136	18	333	11	498
14:00-22:00	149	19	327	12	507
16:00-00:00	155	20	312	13	500
18:00-02:00	166	21	300	14	501
20:00-04:00	175	23	292	15	505
22:00-06:00	174	23	291	15	503
Average	155	20	316	13	505

Figure 2 shows a graphical comparison of the total duration of particular service processes and revenues from trips completed with customers for cases that were analyzed.

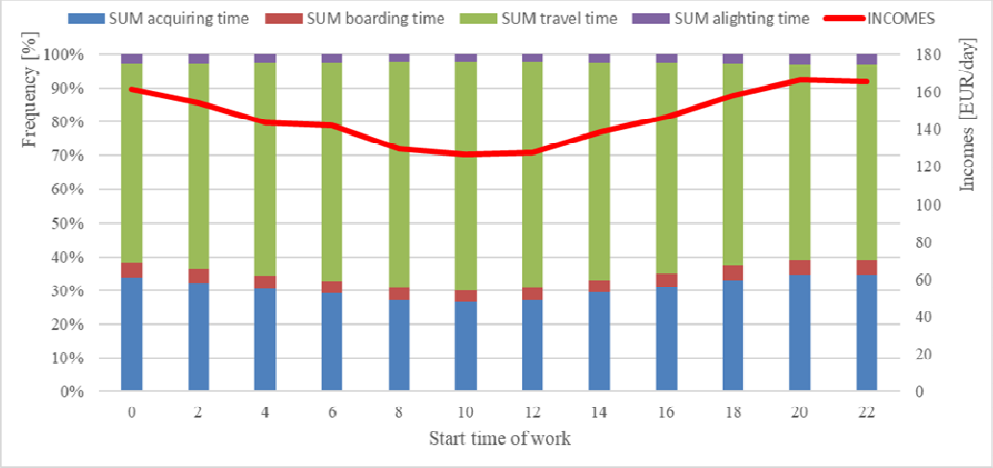

Fig. 2: Comparison of totaled shares of the duration of individual processes to incomes from transport - for one vehicle during an 8-hour work day

There is a strong diversification among the shares of travel time and time of acquiring customers. It can also be seen that the greater the share of travel time, the lower the incomes. It can be observed from the obtained results that traffic conditions are of fundamental importance in reference to income. It is possible to carry out a larger number of profitable trips by one driver during off-peak hours, and this has a positive effect on the efficiency of the entire taxi system servicing the airport.

Conclusions

Simulation methods are a very useful tool facilitating more efficient planning of taxi services. Thanks to this, it is possible to adjust the service to current needs, and at the same time to achieve the highest possible income, by using, among others, an optimal division of the day into work shifts. For this to be possible, the model must take into account the diversity of the service processes; it is also useful to use a stochastic approach, which makes it possible to obtain results similar to real observations. The presented model is universal and can be used for various connections between airports and city centers, provided that reliable information on the duration of individual processes is taken into account - obtained as a result of carrying out measurements under real conditions.

Future work will include surveys conducted among taxi drivers at Polish airports and determining detailed models of the time to acquire a client as well as boarding and alighting - at airports and city centers. Further expansion of the model is planned, towards the possibility of taking into account the diversification of trip destinations and the length of the routes served, and thus the differentiation of fares.

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Reorganisation of the Product Distribution Process as a Factor Increasing Security of Supply

Jarosław ZELKOWSKI
Military University of Technology, Faculty of Security, Logistics and Management, e-mail: jaroslaw.zelkowski@wat.edu.pl, ORCID Identifier: 0000-0002-6698-2938

Mariusz GONTARCZYK
Military University of Technology, e-mail: mariusz.gontarczyk@wat.edu.pl, ORCID Identifier: 0000-0003-1512-4092

Magdalena RYKAŁA
Military University of Technology, Faculty of Security, Logistics and Management, e-mail: magdalena.rykala@wat.edu.pl, ORCID Identifier: 0000-0002-2557-5287

Maciej RZEMPOŁUCH

Abstract

The article presents an approach to redesigning the existing way of distributing goods, which rely on introducing an intermediate link into the direct channel in the form of a distribution centre. The aim of the article is to reorganize the goods distribution process, taking into account the optimization of transport work, improving cooperation in the supply chain and maintaining an appropriate level of supply security. The proposed solution will rationalize the transport process related to the delivery of an appropriate number of pallets to end customers of the company and will contribute to the improvement of cooperation in this area. The use of IT tools to determine the location of the distribution centre allows to find quick solution to the problem, and also allows for appropriate adaptation in the event of emerging new collection points. The course of activities during the distribution process with the use of the centre developed by a logistics operator ensures the maintenance of an appropriate level of security of delivery.

Keywords: Reorganisation, Distribution, Security, Location Selection.

Introduction

Companies currently operating on the market, especially from the FMCG branch, must face serious challenges related to the complexity, volatility and uncertainty of the conditions that occur in market environment. The constant changes result in the emergence of previously unknown organizational forms and the creation of new elements in traditional organizations. Moreover, the reorientation of the economy from the "seller's market" to the "buyer's market" means that not only the product, price and quality is essential, but also the delivery method and the related logistic service (Ślaski, 2018). The above-mentioned conditions mean that the competition impels the continuous improvement of logistics processes. If there is no such possibility, companies, reducing operational costs, outsource some processes to external entities (Moreira, Leite, & Silva, 2019; Teoh, Kunze, Teo, & Wong, 2018).

The importance of logistics in the global economy is growing every year. The dynamic development of this field in its many aspects is dictated by more and more new requirements dictated by growing competition and consumer expectations (Yang, Ji, & Tan, 2020; Gopi, & Samat, 2020; Mathur, & Kumar, 2019; Clausen, 2013). This results in a fight for each customer through all possible ways that pursue one goal, which is the purchase of the product by the final recipient (El Ouardighi, & Shniderman, 2019). This generates new process optimization opportunities to meet the growing demands for product availability in terms of quantity, place and time. This is to the buyer as the most frequent interaction with the product, which affects the ease of purchase decision (Kijek, Brzeziński, & Zelkowski, 2016; Zhao, 2014). It also influences the development of new technologies (Prasanna, & Hemalatha, 2012; Rykała, Typiak, & Typiak, 2020; Sun, 2012; Wang, Yuan, Laur, & Lang, 2011; Yu-fang, & Qing-lu, 2009).

The article focuses on the analysis of the goods distribution process on the example of an FMCG company. As a result of the research, problems were observed in the existing direct sales channel. In order to rationalize transport

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work and improve cooperation in the supply chain, it was proposed to reorganize the currently existing distribution method, which consists in introducing an additional link - the distribution center. The article uses an IT tool (X-Cargo plugin for Ms Excel software) to solve the discussed problem. In addition, by using the above-mentioned software, special attention was paid to ensure the maintenance of an adequate level of security of delivery.

Identifying the problem

The appearance of many different factors in the company's environment causes it to look for alternative solutions that will improve its logistic processes. This applies in particular to the product distribution process.

In the analysed case, the production company operates in the FMCG industry and currently does not have a distribution centre, and all its orders are shipped from 3 factories located in Bydgoszcz, Zielona Góra and Radzymin. The manufacturer fulfils all orders through a permanent network of transport subcontractors, and all deliveries to customers are shipped individually, directly after their completion in the production plants (Fig. 1). This is due to the lack of warehouses near the production plants that could be used to consolidate orders. The manufacturer asked the logistics operator to optimize the manufacturer's distribution process through a distribution centre.

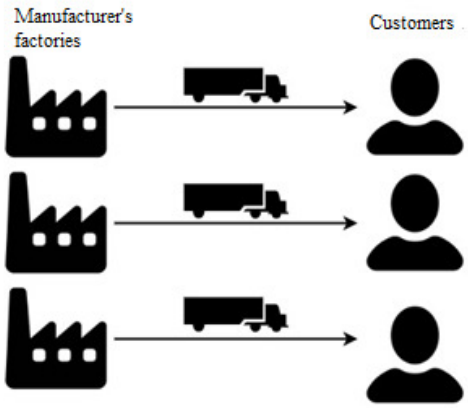

Fig. 1. The current distribution process of a manufacturing company

The selected logistics operator operates in the market for air, sea, road, rail shipping, contract logistics, project logistics and integrated logistics. This enables the customers of the logistics company to find a logistics offer tailored to their individual needs and thus optimise their supply chain.

Shipped deliveries are constantly protected by a dedicated, standardised network and continuous control of processes in the supply chain, which ensures an optimal level of shipment security. The logistics operator adapts its offer to individual customer's requirements, including companies from the pharmaceutical and medical industries, automotive, aerospace, high-tech and consumer goods industries.

According to the guidelines of the manufacturer, the task of the operator is to carry out the part of the distribution process which lasts from the collecting of the goods from the distribution centre until the order is delivered to the end customer (Fig. 2). Therefore, the operator carries out the "last mile" transport to the final customer through a group of subcontractors cooperating with the company, which realize transport orders using 13,6 m long and 7,8 m long semi-trailer vehicles.

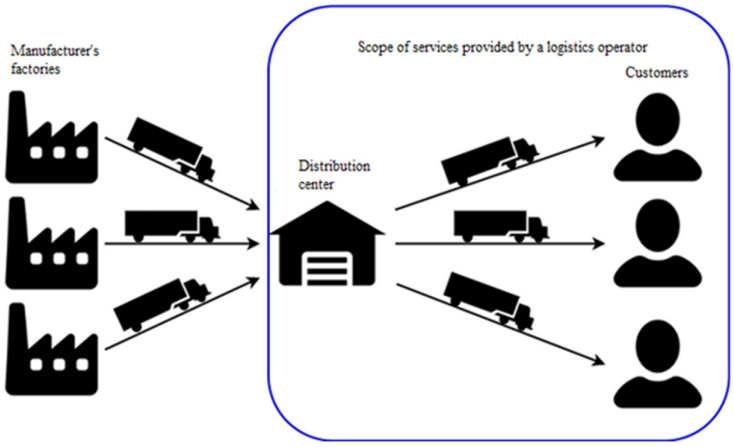

Fig. 2. Proposal for the distribution process

Proposal of the course of activities performed by the logistics operator within the distribution process

In the analyzed case, the operator's cooperation with a company from the FMCG industry consists in carrying out warehousing activities for a given company in a separate warehouse space in its own building or leased for a long-term from the developer. In addition, the logistics operator is obliged to organise the transport of cargo to the next customer after releasing from the warehouse. The contract is signed for a minimum of two years due to high costs of organisation, technical infrastructure of the warehouse and IT systems integration. This type of cooperation ensures the stabilisation of processes in the distribution centre in the long term.

The distribution process at the logistics operator's premises, offered to the analysed company, starts with the receiving of goods from the manufacturer at the respective distribution centre, upon information arrival from the manufacturer. Once the delivery specification is determined and a time window is reserved for the selected vehicle, unloading and a quality and quantity check take place. Depending on the outcome of the inspection, the goods may be withdrawn to the manufacturer or transferred to the storage area (Fig. 3).

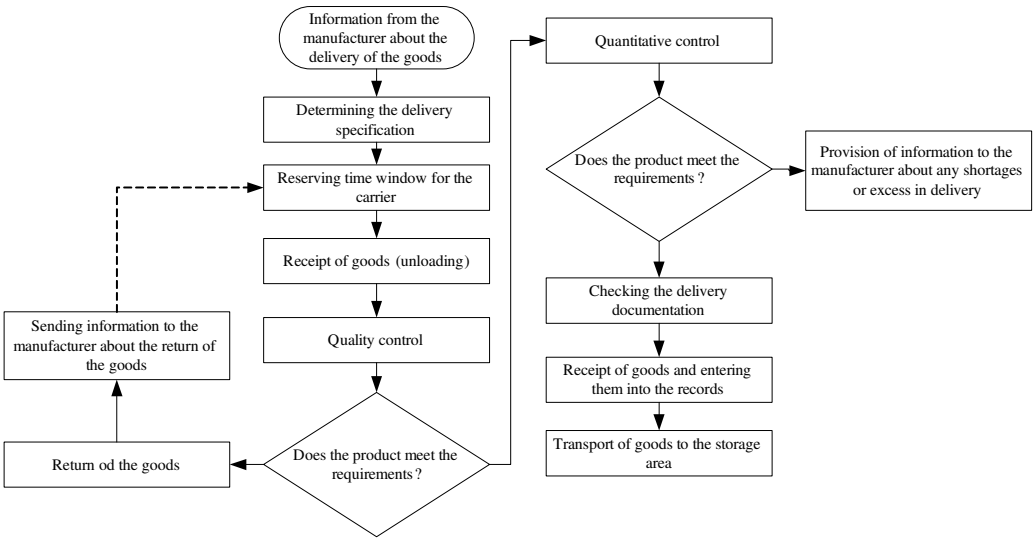

Fig. 3: Scheme of admission of the manufacturer's goods to the distribution centre managed by the logistics operator

The key stage of the distribution process on the part of the logistics operator is the execution of deliveries under individual customer orders. For this purpose, after the manufacturer initiates the order execution, the order is verified in the logistics operator's IT system in terms of the availability of goods on the racks (Fig. 4), and then route planning is carried out. Then the IT system allocates resources from among those currently available in the database (car, semi-trailer and driver). The next step is to calculate transport costs and confirm the planned routes, which results in the generation of transport documents. The goods are loaded onto the semi-trailer, the transport documents are handed

over and the driver starts the route. After the transport is completed and the relevant documents are collected, the shipping agent passes the information about the completed transport to the logistics operator by phone. In the end, the driver is obliged to return the documents, which the operator sending on to customer as a confirmation of order completion.

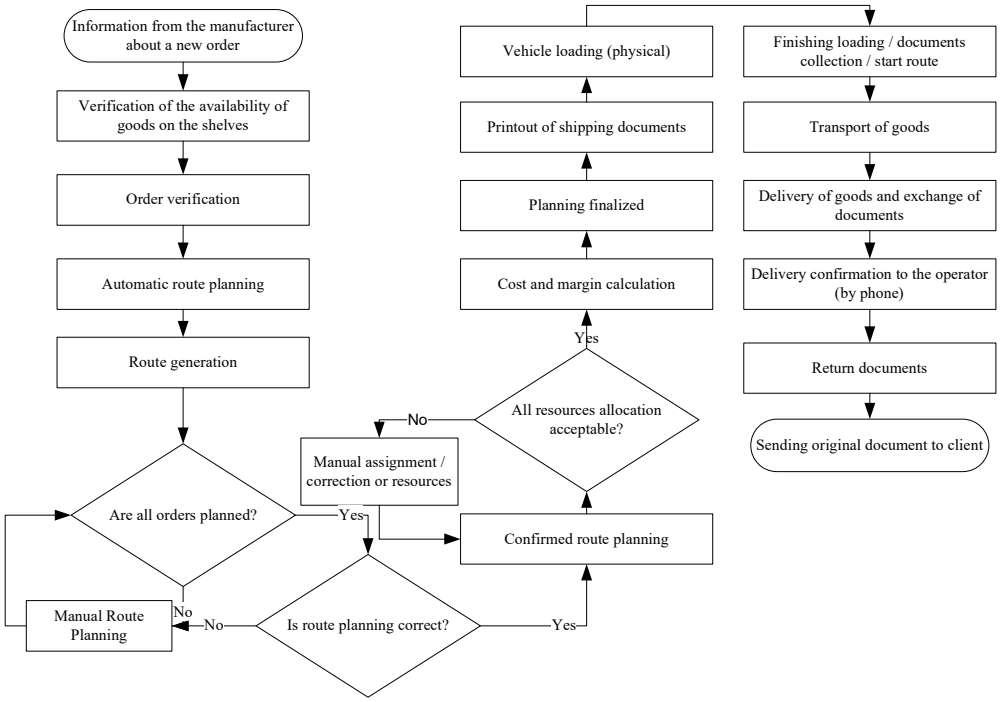

Fig. 4: Scheme of the distribution process implemented by a logistics operator using a distribution centre

Analysis of the manufacturer's order structure

The analysis was based on the annual list of completed orders from 2019 by a manufacturer who, without warehouses at its 3 factories located in Bydgoszcz, Zielona Góra and Radzymin, carries them out through a direct channel. All orders were carried out by the manufacturer through a permanent network of transport subcontractors, and deliveries were shipped individually immediately after completion in the production plants. The XCargo software was used to present a procedure for selecting the logistics centre during the calculations.

The data provided included information on the number of pallets, date and place of delivery of the order (city name and postcode). All end customer locations are located in Poland and each line in Excel corresponds to one order. The total annual number of pallets handled by the distribution centre is 388 837. Products in the warehouse are accepted on standard EUR pallets (1200x800), both at the warehouse entry and exit (regardless of the number of pallets for a given order).

Orders on an annual basis, as compared to a monthly basis, show a slight imbalance between them (Fig. 5). The highest number of pallets is in March and October (37 616 and 37 649 pallets respectively), while the month with the lowest number of pallets is April (26 992 pallets). This gives a difference of 10 705 pallets between the period with the highest number of pallets and the period with the lowest turnover.

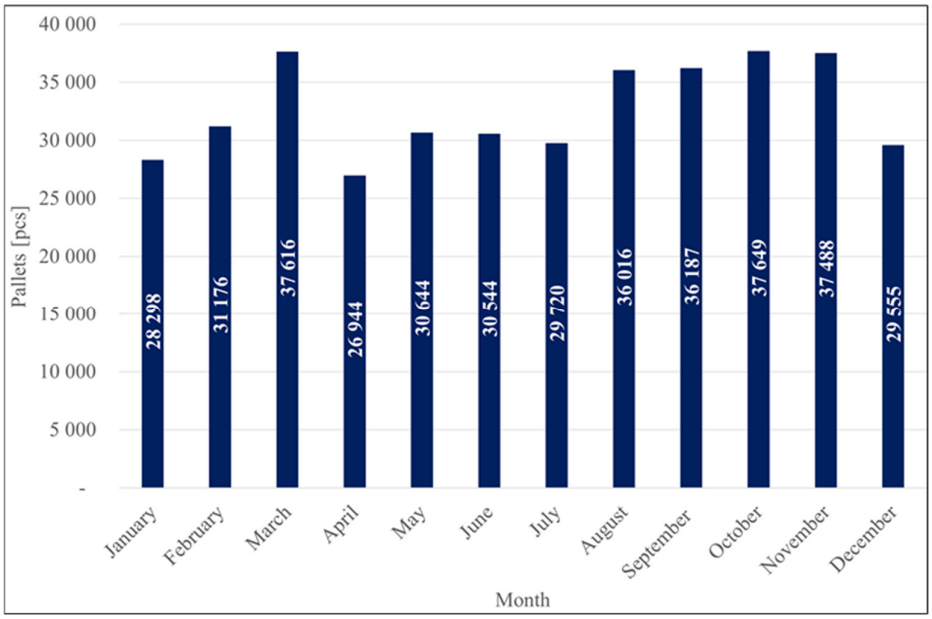

Fig. 5: Distribution of the number of pallets sent to the customer by month per year

Analysing the data on a weekly basis (Fig. 6), it can be observed that the smallest number of pallets was shipped on Sunday (9 491 pallets per year). Apart from Sunday, a relatively similar load during the week is shown on Monday and Saturday (11,7% and 10,6% turnover respectively). The remaining days present a similar structure of orders, with a slight advantage of Friday, during which 79 062 pallets are delivered annually, which corresponds to 20,3% of the total volume.

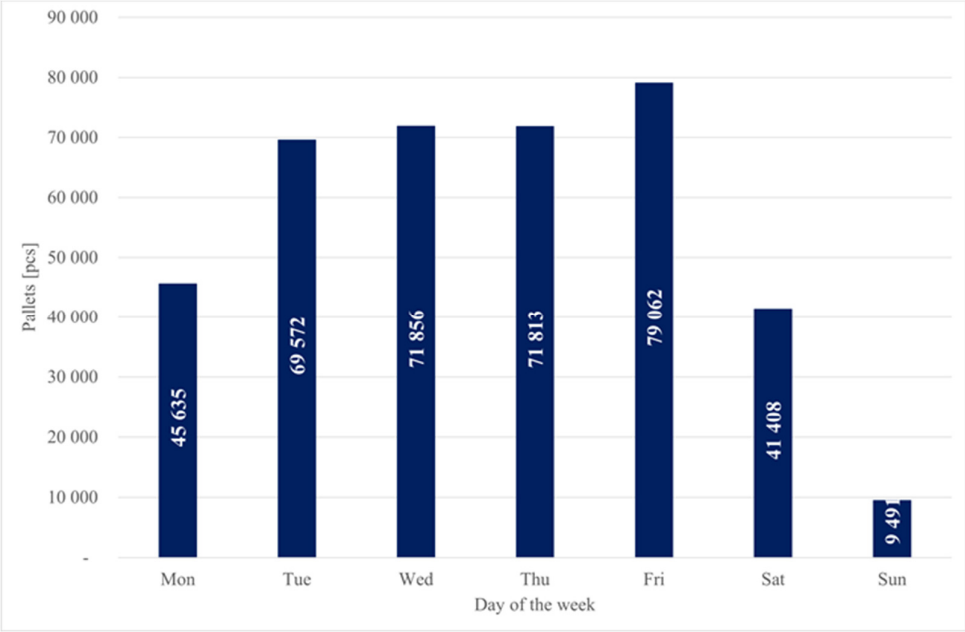

Fig. 6: Order structure in pallets with a breakdown by day of the week during the year

Figure 7 presents data showing that less than 50% of the orders comprise up to 5 pallets, which can potentially be consolidated with the orders on the right-hand side of the graph, in order to optimally fill the vehicle's semi-trailer. A relatively high percentage of orders are those of more than 29 pallets, which can be called FTL (Full Truck Load) orders due to the level of filling of the vehicle's loading space. Taking into account the total turnover during the year, we can see on average 10 pallets per order.

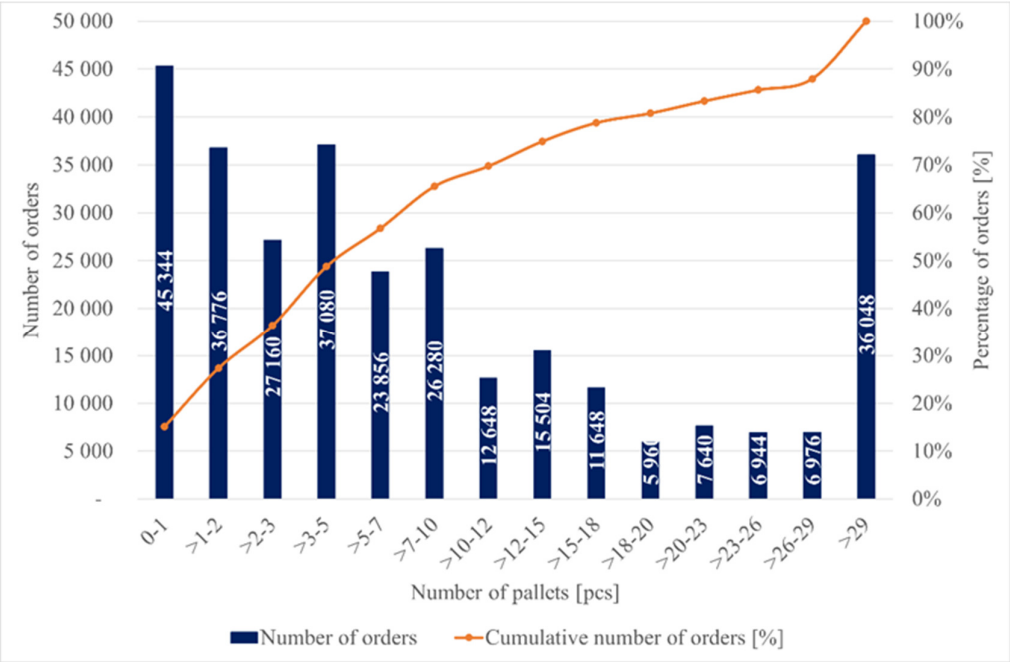

Fig. 7: Accumulated structure of orders per year

Methodology for determining the potential location of a manufacturer's distribution centre

All 388 837 pallets shipped during the year were delivered to 215 cities, represented by 331 postcodes throughout Poland, which corresponded to the respective end customers. Aggregated data is presented in Figure 8, where each location was marked with a separate symbol. The size of the location on the map corresponds to the number of pallets delivered to this place during the year, where the largest end customer corresponds to the largest symbol. It can be seen that the most of the volume is delivered to large Polish cities and distribution centres in their vicinity (e.g. Mszczonów and Teresin between Łódź and Warsaw).

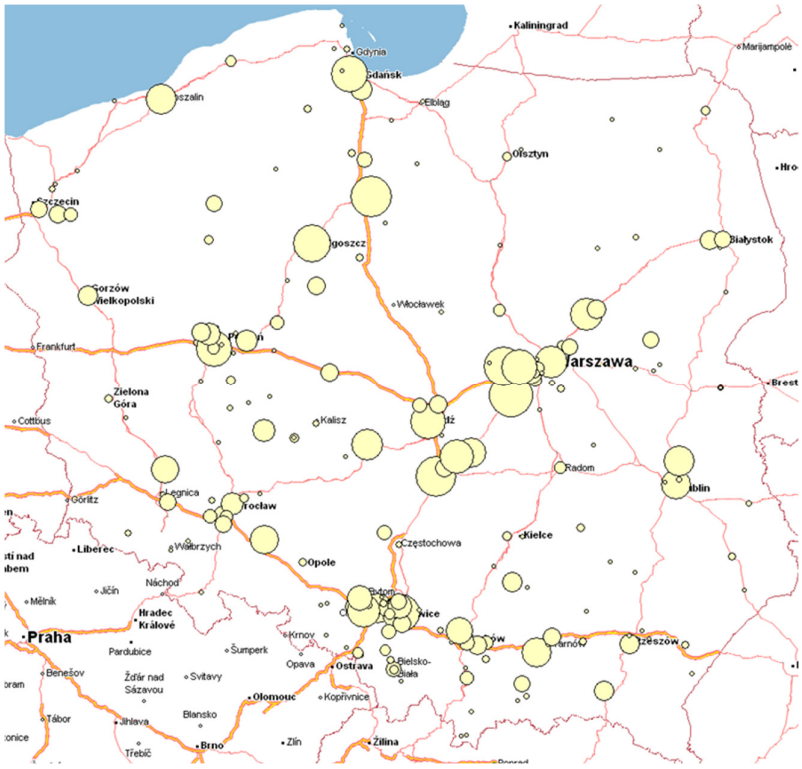

Fig. 8: Map showing the locations of end customers of the production company under analysis

Based on the size of the annual volume and the specification of the goods sold by the manufacturer, an analysis of the available warehouses owned by the operator was conducted. In addition, the developers and warehouse managers cooperating with the operator have made a survey and provided information on the locations that could be offered as a distribution centre for that particular manufacturing company. The data collected were sorted in alphabetical order and is presented in Table 1, which shows 50 potential distribution centre locations.

Table 1: Potential locations for a distribution centre

ID	Country	Zip	City	ID	Country	Zip	City
1	PL	97-400	Bełchatów	26	PL	64-900	Piła
2	PL	21-500	Biała Podlaska	27	PL	97-300	Piotrków Trybunalski
3	PL	15-023	Białystok	28	PL	09-400	Płock
4	PL	17-100	Bielsk Podlaski	29	PL	60-666	Poznań
5	PL	86-011	Bydgoszcz	30	PL	05-800	Pruszków
6	PL	22-100	Chełm	31	PL	37-700	Przemyśl
7	PL	06-400	Ciechanów	32	PL	26-600	Radom
8	PL	41-250	Czeladź	33	PL	97-500	Radomsko
9	PL	42-200	Częstochowa	34	PL	35-073	Rzeszów
10	PL	77-300	Człuchów	35	PL	08-100	Siedlce
11	PL	82-300	Elbląg	36	PL	96-500	Sochaczew
12	PL	80-151	Gdańsk	37	PL	37-450	Stalowa Wola
13	PL	67-200	Głogów	38	PL	58-160	Świebodzice
14	PL	66-410	Gorzów Wielkopolski	39	PL	86-100	Świecie
15	PL	58-500	Jelenia Góra	40	PL	70-664	Szczecin
16	PL	40-819	Katowice	41	PL	39-400	Tarnobrzeg
17	PL	25-525	Kielce	42	PL	33-100	Tarnów
18	PL	31-000	Kraków	43	PL	83-100	Tczew
19	PL	99-300	Kutno	44	PL	87-100	Toruń
20	PL	64-100	Leszno	45	PL	58-300	Wałbrzych
21	PL	90-001	Łódź	46	PL	00-002	Warszawa
22	PL	20-111	Lublin	47	PL	87-800	Włocławek
23	PL	42-700	Lubliniec	48	PL	50-301	Wrocław
24	PL	05-270	Marki	49	PL	41-800	Zabrze
25	PL	63-400	Ostrów Wielkopolski	50	PL	64-520	Zielona Góra

All data concerning completed deliveries have been consolidated based on the postal code and the city of delivery and put into a previously prepared Excel sheet, which operates on the basis of the XCargo software (Jlassi, Tamayo, & Gaudron, 2017; Teoh, Kunze, Teo, & Wong, 2018). The software is used to calculate the distances between individual towns and then multiply them by the annual number of pallets. Thanks to this, the locations with the largest number of delivered pallets will have an increased influence on the calculation result. The appropriate distance between the points is calculated by using the XC_DISTANCE formula which determines the number of kilometres between them based on the actual mileage a trailer would have to cover on the roads.

Table 2 shows an excerpt from the sheet used to calculate the centre of gravity based on data provided by the manufacturer. The cells showing potential locations as the distribution centre are marked in green. The consolidated historical data presented by the manufacturer consolidated by city and postcode are marked in grey. White cells are used to calculate the distance between potential distribution centre locations and historical delivery locations multiplied by the annual number of pallets per location.

The formula that was used to calculate the distance between the locations is:

$$=\text{XC_DISTANCE}\left(\begin{array}{c}\text{Gecoding Engine;Start Country;Start Zip;Start City;}\\ \text{Dest Country;Dest Zip;Dest City}\end{array}\right) \quad (1)$$

where:

- Gecoding Engine - geocoding engine, e.g. "mgeurope";
- Start Country - the country of initial location;
- Zip start - postal code of the starting location;
- Start City - the city of initial location;
- Dest Country - the country of destination;
- Dest Zip - the postcode of the destination;
- Dest City - the city of destination.

Cells with a red background are responsible for the annual sum of the product of pallets and kilometres for a given potential location, this sum is calculated using the formula:

$$Sum = \sum_{i=0}^{n}\sum_{j=0}^{m} p_{ij} \times d_{ij} \quad (2)$$

where:

- p_{ij} - number of pallets transported from the distribution centre (CD) to the final customer;
- d_{ij} - distance from the distribution centre to the end customer's target location;
- n - number of potential distribution centre locations (CD);
- m - number of locations to which goods have been delivered.

Table 2: Aggregated data for the determination of the product distribution centre from Excel, including the location of end customers

				Country	**PL**	**PL**	**PL**
				Zip	97-400	21-500	15-023
				City	Bełchatów	Biała Podlaska	Białystok
				Sum of Pallets*km	85 993 533	151 312 044	166 930 039
ID	**Ctry**	**Zip**	**City**	**No. of Pallets**	**Pallets*km**	**Pallets*km**	**Pallets*km**
1	PL	00-001	WARSZAWA	1	188	158	200
2	PL	01-303	WARSZAWA	518	89 937	86 722	106 666
3	PL	01-904	WARSZAWA	373	68 773	61 964	73 500
4	PL	02-231	WARSZAWA	151	27 108	24 671	30 985
5	PL	02-236	WARSZAWA	241	43 625	39 679	49 757
6	PL	02-238	WARSZAWA	158	28 698	25 816	32 769
7	PL	02-239	WARSZAWA	169	30 623	27 541	34 978
8	PL	02-293	WARSZAWA	33	5 903	5 429	7 114
9	PL	02-305	WARSZAWA	58	10 643	9 236	11 759
10	PL	02-495	WARSZAWA	3 408	600 888	569 480	710 953
11	PL	02-676	WARSZAWA	164	30 938	26 460	34 195
12	PL	02-777	WARSZAWA	331	62 652	52 940	69 303
13	PL	02-997	WARSZAWA	560	109 548	92 304	119 978
14	PL	03-153	WARSZAWA	517	99 742	87 790	102 550
15	PL	03-230	WARSZAWA	232	43 826	38 463	44 645
16	PL	03-236	WARSZAWA	18	3 390	2 974	3 454
17	PL	03-253	WARSZAWA	367	69 821	61 337	70 241
18	PL	03-876	WARSZAWA	684	132 983	105 171	132 554
19	PL	04-128	WARSZAWA	7	1 367	1 052	1 357
20	PL	04-242	WARSZAWA	239	48 834	35 936	45 186

Identical operations were done in relation to the data of deliveries to the distribution centre, i.e. sent by the manufacturer (Tab. 3). In this case, in the grey colour cells data on the share of individual factories in supplies (annual number of pallets) with their location (country, postcode, city) were entered.

Formula (1) was used to calculate the distance between the locations. In turn, the following relationship was used to calculate the sum of the product of pallets and kilometres for each potential distribution centre location:

$$Sum = \sum_{i=0}^{n} \sum_{j=0}^{m} z_{ij} \times g_{ij} \tag{3}$$

where:

- z_{ij} - number of pallets shipped from the manufacturer to potential distribution centre locations (CD);
- g_{ij} - distance from the manufacturer's factories to the potential location of the distribution centre (CD);
- n - number of manufacturers' factories;
- m - number of potential distribution centre locations (CD).

Table 3: Aggregated data for the determination of the distribution centre containing deliveries from production facilities

				Country	PL	PL	PL
				Zip	97-400	21-500	15-023
				City	Bełchatów	Biała Podlaska	Białystok
				Sum of Pallets*km	115 927 749	149 735 257	155 959 205
ID	Ctry	Zip	City	No. of Pallets	Pallets*km	Pallets*km	Pallets*km
1	PL	86-011	Bydgoszcz	77 767	21 710 291	36 458 414	38 779 370
2	PL	65-052	Zielona Góra	136 093	57 596 871	83 387 447	87 449 143
3	PL	05-250	Radzymin	174 977	36 620 586	29 889 396	29 730 692

The next sheet (Tab. 4) shows the potential locations for the centre of gravity together with the sum of the product of the pallets and kilometres. The values calculated in the previous two sheets for the product of pallets and kilometres for each location are marked in red. The data obtained in this way are summed up in the next column called "Sum". (marked in yellow), which lowest value after taking into account the previous calculations is the optimal location.

For each of the 50 locations, a position has been assigned which will row it in terms of optimal location, with 1 being the optimal location and 50 being the least favourable location for the calculation.

Table 4: Potential distribution centre locations

ID	City	Orders shipped	Orders received	Sum	Ranking position
1	Bełchatów	**85 993 533**	**115 927 749**	**201 921 281**	**10**
2	Biała Podlaska	**151 312 044**	**149 735 257**	**301 047 302**	**41**
3	Białystok	**166 930 039**	**155 959 205**	**322 889 244**	**45**
4	Bielsk Podlaski	**181 704 991**	**175 507 596**	**357 212 587**	**49**
5	Bydgoszcz	**119 531 377**	**96 527 108**	**216 058 485**	**14**
6	Chełm	**169 135 735**	**181 893 963**	**351 029 698**	**47**
7	Ciechanów	**121 341 850**	**111 978 271**	**233 320 121**	**22**
8	Czeladź	**104 855 283**	**139 825 993**	**244 681 276**	**26**
9	Częstochowa	**95 974 990**	**133 265 755**	**229 240 745**	**19**
10	Człuchów	**149 062 392**	**128 439 681**	**277 502 073**	**33**

ID	City	Orders shipped	Orders received	Sum	Ranking position
11	Elbląg	154 956 186	131 583 352	286 539 538	36
12	Gdańsk	159 783 088	152 243 249	312 026 337	42
13	Głogów	133 576 659	106 846 050	240 422 709	25
14	Gorzów Wielkopolski	158 679 817	122 592 063	281 271 880	35
15	Jelenia Góra	152 742 449	145 586 945	298 329 394	39
16	Katowice	105 711 793	140 188 777	245 900 569	27
17	Kielce	102 840 477	133 575 362	236 415 839	23
18	Kraków	120 497 832	154 825 470	275 323 302	32
19	Kutno	91 054 067	89 182 211	180 236 278	2
20	Leszno	121 020 431	102 312 643	223 333 074	16
21	Łódź	83 050 973	92 859 662	175 910 635	1
22	Lublin	141 643 397	154 407 523	296 050 920	38
23	Lubliniec	97 802 987	126 198 713	224 001 700	17
24	Marki	102 703 440	90 495 201	193 198 641	7
25	Ostrów Wielkopolski	105 653 874	108 716 947	214 370 822	13
26	Piła	140 439 174	114 780 354	255 219 528	30
27	Piotrków Trybunalski	83 467 962	108 873 857	192 341 819	6
28	Płock	100 887 270	95 126 563	196 013 833	8
29	Poznań	113 022 083	89 709 372	202 731 455	11
30	Pruszków	95 052 676	90 550 046	185 602 722	4
31	Przemyśl	194 576 569	221 896 763	416 473 332	50
32	Radom	104 342 943	120 879 107	225 222 050	18
33	Radomsko	91 749 720	124 447 167	216 196 887	15
34	Rzeszów	164 547 837	192 027 668	356 575 505	48
35	Siedlce	129 309 703	123 426 546	252 736 249	28
36	Sochaczew	92 232 770	90 665 730	182 898 500	3
37	Stalowa Wola	140 840 286	178 927 392	319 767 677	44
38	Świebodzice	138 940 635	131 462 087	270 402 723	31
39	Świecie	127 657 683	110 956 178	238 613 861	24
40	Szczecin	188 208 320	151 639 797	339 848 117	46
41	Tarnobrzeg	131 486 750	168 792 974	300 279 724	40
42	Tarnów	143 712 427	174 988 581	318 701 008	43
43	Tczew	151 648 580	141 037 745	292 686 325	37
44	Toruń	113 094 648	97 451 123	210 545 771	12
45	Wałbrzych	143 858 547	136 447 464	280 306 010	34
46	Warszawa	99 333 339	91 461 488	190 794 827	5
47	Włocławek	102 533 717	95 190 580	197 724 297	9
48	Wrocław	114 489 910	115 590 758	230 080 668	21
49	Zabrze	109 575 848	143 198 315	252 774 163	29
50	Zielona Góra	129 470 970	100 052 317	229 523 287	20

Table 5 shows in order ten optimal locations for the previous scoreboard. The best location among those accepted for the calculation is the one in Łódź with postal code 90-001, which has the lowest value for the analysed data. On its basis, the percentage difference of the remaining locations was determined according to the relationship:

$$R = \left(\frac{a}{b} - 1\right) \times 100\ \% \tag{4}$$

where:

- a - the sum of the product of the pallets and kilometres of the analysed location;
- b - the sum of the product of the pallets and kilometres of the centre of gravity.

Table 5: Top ten potential locations

Ranking position	Country	Zip	City	Sum of Pallets*km	Difference
1	PL	90-001	Łódź	175 910 635	0,0%
2	PL	99-300	Kutno	180 236 278	2,5%
3	PL	96-500	Sochaczew	182 898 500	4,0%
4	PL	05-800	Pruszków	185 602 722	5,5%
5	PL	00-002	Warszawa	190 794 827	8,5%
6	PL	97-300	Piotrków Trybunalski	192 341 819	9,3%
7	PL	05-270	Marki	193 198 641	9,8%
8	PL	09-400	Płock	196 013 833	11,4%
9	PL	87-800	Włocławek	197 724 297	12,4%
10	PL	97-400	Bełchatów	201 921 281	14,8%

All 50 considered locations are shown on the map (Fig. 9) using the XCargo software. The best location has been marked green and another 9 locations in the ranking are those shown in yellow, the remaining locations have been marked in orange and red.

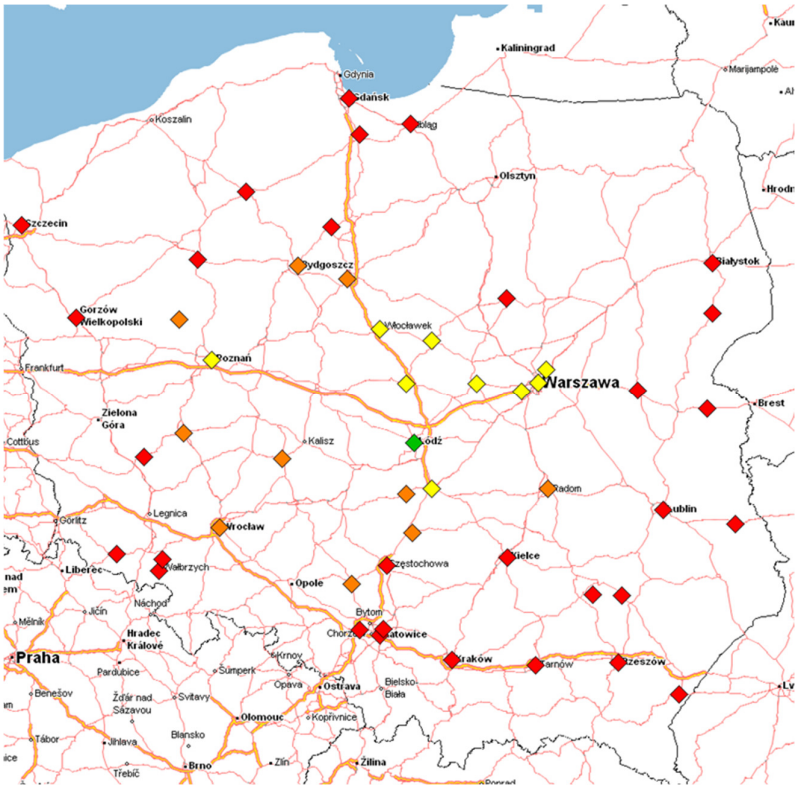

Fig. 9: Map with potential locations

Based on the calculations, the logistics operator proposed the manufacturer the location in Łódź with postal code 90-001 due to the lowest sum of the product of pallets and kilometres. The decision is also supported by the proximity

of the intersection of the A1 and A2 motorways, which in the long run would facilitate the transport of products to foreign markets.

Conclusions

Companies constantly strive to optimise their processes taking into account the current market situation. Distribution of the offered products is an important area in which process improvements can be made. The significant benefits can be achieved through appropriate shaping of distribution channels determined by the requirements set by the company, the tasks it performs and the number of entities participating in the channel. The proposed solution consisting of the introduction of an intermediate link in the form of a distribution centre may significantly improve the delivery performance. A large number of aggregated data indicates the need to use IT tools which will help to solve the problems of locating this type of logistics facilities. In the article, on the basis of the manufacturer's annual statement of activities, 50 potential locations that may constitute its distribution centre have been selected. After the calculation, based on 331 orders for end customers and the location of the manufacturer's factories, the lowest sum of the product of pallets and kilometres (optimal location) was obtained for the location in Łódź, which was chosen as the manufacturer's distribution centre. Therefore, the proposed approach indicates that the current distribution process of the manufacturer can be significantly improved by including an additional link in the distribution centre of the logistics operator. As a result of this re-modelling, the manufacturer can also ensures continuity of supply to its customers by eliminating the impact of production plant downtime on its operations.

To sum up, logistic processes require continuous optimisation, simulation and the search for new solutions in order to meet the requirements presented by the market. At the same time, with increasing demands and the complexity of factors in the logistics environment, new tools and methods are developed to improve those processes. Particularly large possibilities of the reorganisation of logistics processes are presented by IT tools due to the ease of their implementation and the possibility of application both on a micro and macro scale of a given enterprise.

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The Transformation of Consumers Behavior: A Study Realised on Romanian Consumers

Olivia Doina NEGOIȚĂ
University POLITEHNICA of Bucharest, Romania, negoita.olivia@gmail.com

Mirona Ana Maria POPESCU
University POLITEHNICA of Bucharest, Romania, mirona.popescu15@gmail.com

Ramona Mihaela BULBOACĂ
University POLITEHNICA of Bucharest, Romania, ramonabulboaca@yahoo.com

Abstract

Understanding consumer motivation in online shopping is essential for a successful digital business. In a global online marketplace, competition is no longer limited to physical stores during business hours. Increasing competition, combined with the need for consumers to have a richer shopping experience, inevitably induce the need for retailers to rethink their online strategy. For many retailers, creating an online experience, enhanced by technologies such as 3D or virtual reality, is becoming at least as important as providing easy and personalized ordering, payment and delivery solutions. In this context, the definition of the consumer in the digital age leads to the realization and adaptation of online marketing strategies. The authors aim to present the main types of consumers, the factors that influence their behavior in order to achieve basic patterns. Based on the onset of the COVID 19 pandemic, this behavior has undergone changes due to a reconfiguration of consumer types. This aspect was illustrated by the authors by conducting a quantitative research through the questionnaire at the Romanian level.

Keywords: consumer behavior, buying patterns, behavioral segmentation

Introduction

The impact of the Internet on companies and organizations made itself felt after 1990. In ten years, however, the evolution of technology was significant, and the major change was the transition from analog to digital communication. The Internet and digital technologies have created new ways to promote, sell and distribute products. The emergence of social networks created a favorable environment for the creation and aggregation of communities, Voramontri (2019), Kizgin (2018). The Internet and the multitude of associated technologies have generated many names and labels for terms related to performance and marketing practice in this new context, Mukherjee (2019). Often the terms overlap, although most practitioners and theorists agree that digital marketing is more comprehensive and covers a wider range of activities and processes. Ellis-Chadwick (2012) synthesizes the elements the key that should be considered in online marketing planning.

Consumer behavior refers to the study of consumers and the processes they use to choose, use (consume) and give up products and services, including their emotional, mental and behavioral responses, Hoyer (2020). Consumer behavior includes ideas derived from several sciences, including psychology, biology, chemistry, and economics. Studying consumer behavior is important because in this way marketers can understand what influences people's buying decisions, Sharma (2020). By understanding how consumers decide whether or not to buy a product, they can fill in the gaps in the market and identify products that are needed and products that are outdated, Katsikeas (2019). Studying consumer behavior helps marketers decide how to present their products in a way that generates maximum impact on consumers. Understanding consumers' buying behavior is the key secret to reaching and engaging your customers, converting their interest into purchases. An analysis of consumer behavior should reveal:

- what consumers believe and how they feel about various alternatives (brands, products, etc.)
- which determines consumers to choose between the various options
- consumer behavior while documenting and buying
- how the consumer environment (friends, family, media, etc.) influences their behavior

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Consumer behavior is often influenced by different factors. Marketers should study consumers' purchasing patterns and discover buying trends. In most cases, the brand influences consumer behavior only about the things they can control. The COVID-19 crisis has generated in a very short time a transformation of the way people buys and consume, whether it is products, services, media channels or social experiences.

This paper aims to present the main features of the consumer in the digital age. A quantitative research was conducted through Google Forms between September 15 and October 21, 2020, in Romania. The number of respondents was 492. Questions from the questionnaire address both consumer behavior before the pandemic breaks out and during social isolation, as well as questions about possible scenarios for their behavior in the near future - when social distancing measures will relax.

An overview regarding consumers behavior in digital era

The explanation of the consumer's behavior is based on the succession of acts through which it takes possession of the service, a succession that defines the decision - making process of purchase.

Today, the consumer no longer follows the pre-established scheme of the marketing funnel. The way he makes the purchase decision and makes the purchase has changed, Patro (2018). Consequently, marketers should also adopt a distinct approach, along with this change that has taken place in consumer behavior. The purpose of marketing is to get in the way of the consumer at the right time, in other words, when the decision can influence them.

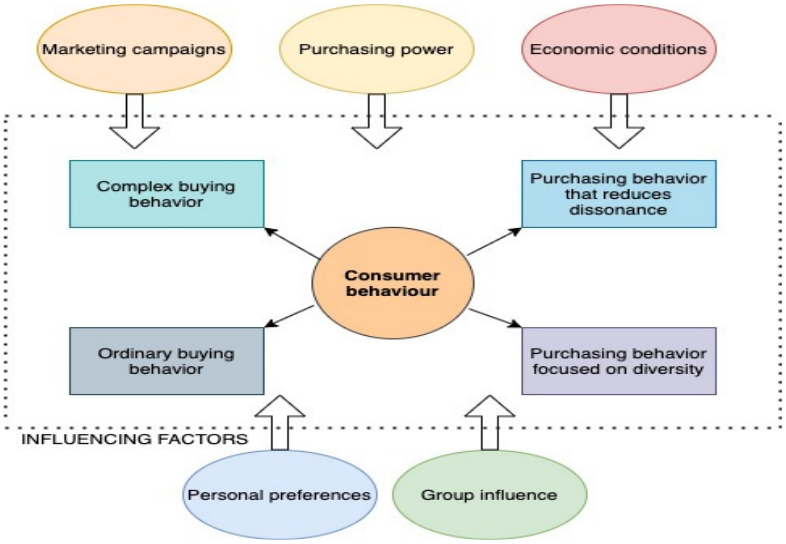

Fig. 1: Factors that influence the consumer behavior

When referring to the 4 main types of consumers behavior presented in Fig 1, there are different factors that influence their buying decision.

There are 4 main types of consumer behavior:

1. Complex buying behavior
This type of behavior is encountered when consumers buy an expensive product, rarely purchased. They are very involved in the acquisition process and in the documentation before committing to invest.
2. Purchasing behavior that reduces dissonance
The consumer is very involved in the acquisition process but has difficulties in determining the differences between brands. "Dissonance" can occur when the consumer worries that he will regret the choice made.
3. Ordinary buying behavior
Regular purchases are characterized by the fact that the person has very little involvement in the category of products or brands.
4. Purchasing behavior focused on diversity
In this situation, a consumer buys a different product not because he was not satisfied with the previous one, but because he is looking for variety.
Many things can affect consumer behavior, but the most common factors that influence it are:
1. Marketing campaigns

Marketing campaigns greatly influence purchasing decisions. If done correctly and regularly, with the right marketing message, they can even persuade consumers to change their brand or opt for more expensive alternatives. Marketing campaigns can even be used as reminders for products / services that need to be purchased on a regular basis, but they are not always in the minds of customers at all times (for example, insurance). A good marketing message can influence impulse buying.

2. Economic conditions
Especially in the case of expensive products (houses or cars), economic conditions play an important role. It is known that a positive economic environment makes consumers more confident and willing to shop, regardless of personal financial situation. Consumers make decisions over a longer period of time for expensive purchases, and at the same time, the buying process can be influenced by more personal factors.
3. Personal preferences
Consumer behavior can also be influenced by personal factors (what everyone likes / dislikes, priorities, morals and values). Of course, advertising can help, but in the end, consumers' choices are largely influenced by their preferences.
4. Group influence
The pressure of others also influences consumer behavior. Social psychology has an impact on consumer behavior. The level of education and social factors can have an impact.
5. Purchasing power
Consumer segmentation based on their purchasing power helps marketers determine eligible consumers and get better results, Galati (2020). Patterns of buying behavior are not synonymous with buying habits. Habits are developed as predispositions to action and become spontaneous over time, while patterns show a predictable mental design. Each customer has their own unique buying habits, while patterns of buying behavior are collective and offer marketers a unique characterization. Customers' buying behavior patterns can be grouped as in Table 1:

Table 1: Patterns of customers buying behavior

Pattern	Description
Buying place	When a customer has the opportunity and access to purchase the same products from different stores, he will not be loyal to any store, unless that store is the only one, he has access to. Studying customer behavior when choosing a place to shop helps marketers identify key store locations.
Purchased items	Factors to consider: the items that were purchased and how much of each item was purchased. Necessary items can be bought in bulk, while luxury items are rather purchased less often and in smaller quantities. The quantity of each item purchased is influenced by the perishability of the item, the purchasing power of the buyer, the unit of sale, the price, the number of consumers for which the object is intended, etc. Analyzing a shopping cart can give marketers a lot of information about consumers.
Time and frequency of purchase	Customers will shop according to their availability and expect to be served according to requirements. It is the responsibility of the store to meet these requirements by identifying a purchasing model and matching the services offered with the time and frequency of purchases.
The method of buying	A customer can either enter a store and buy a product on the spot or can order it online and pay by credit card or on delivery. The purchase method may also induce expenses on Tuesday from the customer (for online shopping, you may be charged a shipping fee, for example). The way a customer chooses to purchase an item also says a lot about what type of customer he is.

Customer segmentation, types of buyers have always been important, but now that customer customization and experience are factors that determine the success of a business, efficient segmentation is even more important. Traditionally, most marketers use the 6 main types of behavioral segmentation shown in Table 2. In addition to these traditional ways, another type of segmentation is the RFM model. RFM comes from the Latest Acquisition, Frequency and Monetary Value.

o Latest Acquisition = how recently a customer placed the last order on your site
o Frequency = how many times a customer bought something from your site, in the analyzed time period
o Monetary Value = how much each customer spent on your site, from the first order since

The analysis of the RFM model can be done in 2 ways:

o manual - manual export of your database in a spreadsheet and analysis of customers respecting the rules for RFM analysis

o Automatically - through certain tools that create RFM dashboards

From RFM segmentation and analysis it can be highlighted the most loyal and profitable customers, which are the least profitable customers, but also:

- Find out what brands and products are pulling a business down
- Create personalized recommendations for customers
- It solves certain problems related to the customer experience

Table 2: Types of behavioral segmentation

Type	Description
The benefits sought	When customers document a product / service, their behavior can reveal valuable information about what benefits, features, values, use cases or issues are the most important motivating factors that influence their purchasing decision. When a customer gives a much higher value to one / more benefits compared to the others, these primary benefits become the defining motivating factors that determine that customer's purchase decision.
The occasion or the moment	Behavior and moment-based behavioral segments refer to universal and personal occasions. o Universal occasions apply to most clients or target audience. For example, holidays and seasonal events when consumers are more prone to certain purchases. o Recurring personal occasions are buying patterns of an individual customer that are constantly repeated over a period of time. For example, birthdays, anniversaries or holidays, monthly shopping or even daily rituals. o Rare personal occasions are also related to individual clients but are more irregular and spontaneous (more difficult to predict).
Usage rate	Using the product / service is another common way to segment customers by behavior, based on how often they buy a product / service or how often they interact with a product / service. User behavior can be a strong predictive indicator of loyalty or lack thereof and therefore of value in life.
Brand loyalty status	Loyal customers are the most valuable assets of a business. They are cheaper to keep, usually have the highest life value and can become brand ambassadors. By analyzing behavioral data, customers can be segmented according to their level of loyalty, so that marketers understand their needs and make sure they meet them. Loyal customers are those who should receive special treatment and privileges (such as exclusive rewards programs) to nurture and strengthen the brand-customer relationship and to stimulate continued shopping in the future.
User status	There are many different user statuses, depending on the business: o non-users o potential users o first time buyers o regular customers o defectors (former customers who switched to a competitor)
The stages of the clientele journey	Segmenting the audience based on shopping availability allows marketers to align communication and personalize experiences to increase conversion at each stage of the shopping journey. Moreover, it helps them discover the stages in which customers do not progress, so that they can identify the biggest obstacles and opportunities for improvement, even about post-acquisition behaviors.

Consumer behavior in pandemic COVID 19

The research developed was a primary one, of quantitative type, carried out through the distribution of a questionnaire in the online environment, on the Romanian territory, Bucharest. The Google Forms platform was used to develop the questionnaire, which was then sent via a link to respondents. The development period was between 15 September and 21 October 2020.

The study is developed exclusively on Romanian consumers and identifies the emergence of 4 new types of consumers, as a direct result of the epidemic and measures instituted in the last months as in Figure 2.

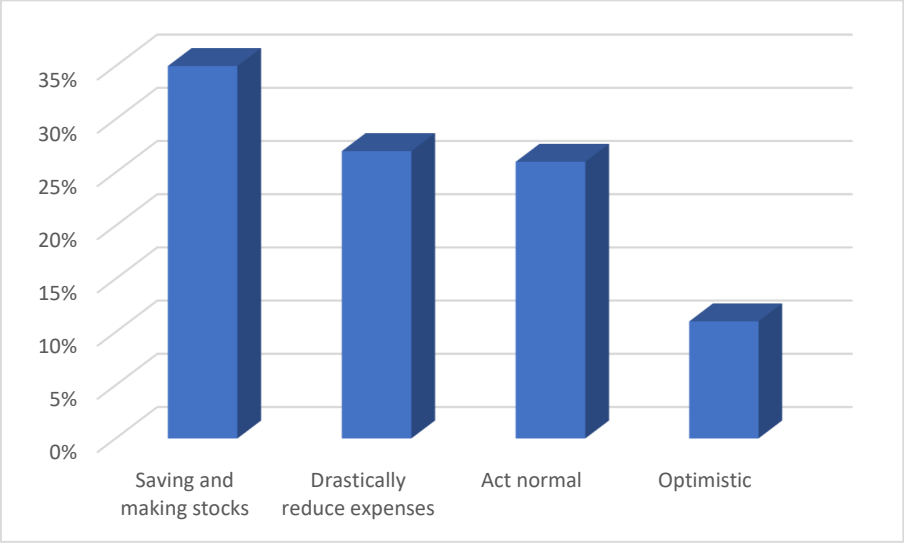

Figure 2: Type of consumers

A major trend among Romanian consumers has been the reduction of budgets for non-essential expenditures, which can become permanent for about a quarter of those interviewed. Another quarter of consumers believe that they will not fully return to the consumption habits of previous years. There are specific types of behavior that consumers have developed during the pandemic, Figure 3.

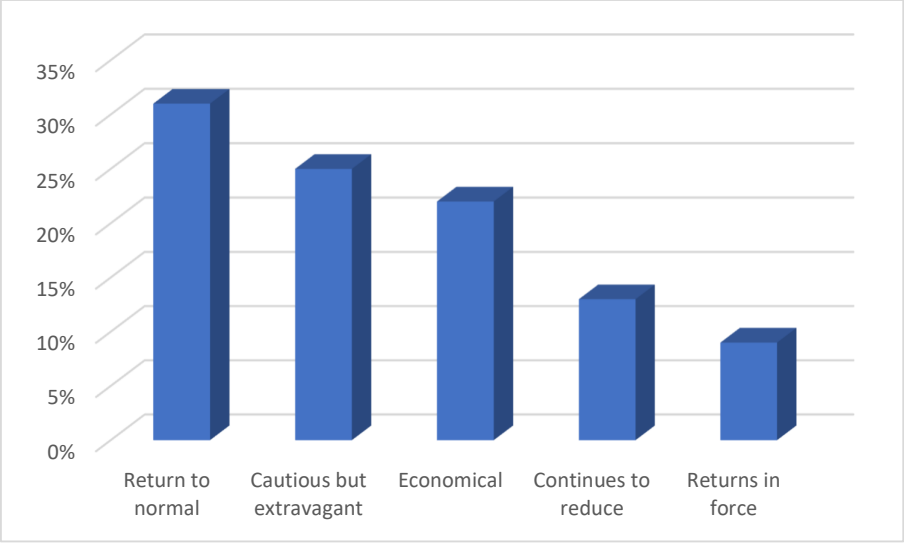

Figure 3: Types of behavior

Respondents are increasingly interested and concerned about the behavior adopted by companies in the COVID-19 crisis (store safety measures, disinfection of marketed products, etc.), as well as their overall business strategy. Consumers are more attracted to companies that invest and donate resources to public health infrastructure and also prioritize the care and protection offered to their employees as seen in Figure 4. Advertising plays a secondary role.

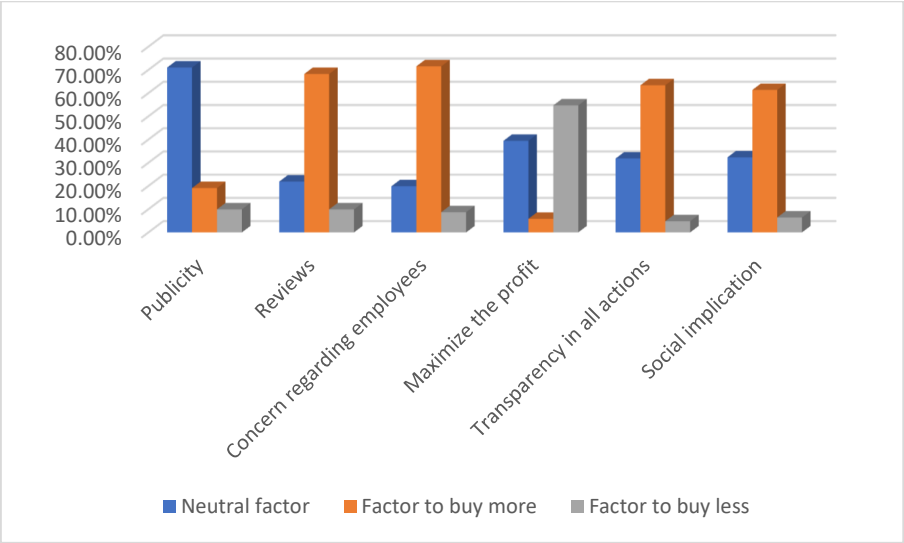

Figure 4. Consumers towards companies

Conclusion

The alignment of all marketing elements - strategy, budget, proper management of promotion channels and the message sent - and the consumer's journey when making a purchase decision, and the integration of all these elements in the structure of the entire organization becomes an important element. When marketers understand the consumer's journey and direct the budget and messages at key moments in this process, in order to have as much influence as possible on the purchase decision, the chances of them getting in the way of the consumer at the right time with the right message increase considerably.

First of all, a thorough understanding of how consumers make decisions is needed. In some cases, the direction of marketing efforts must be changed, for example, from brand advertising in the first phase of the decision-making process, to help consumers gain a better understanding of the brand when they actively evaluate it. Other marketers will need to change loyalty programs and focus primarily on loyal but active customers rather than loyal but passive ones. The growing complexity of the decision-making process will force virtually all companies to adopt new ways to measure and evaluate consumer attitudes, brand performance and the efficiency of marketing spending throughout the process.

In most companies, different departments of the organization deal with different activities that focus on customers: PR, loyalty programs, etc. Often, activities are not coordinated or communication between departments is lacking. All activities should be integrated and under proper management, so that the efforts of the different departments and the communication between them are as well synchronized as possible. In order to achieve a better marketing strategy for consumers today, it is important to segment them, as a result the authors highlighted the types of consumers before and after the COVID 19 pandemic. Due to the current context, their classification and behavior have changed.

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Statistical Analysis on Dimensions Associated to Environmentally Sustainable Main Vector – EMS

Ionuț Viorel HERGHILIGIU[1/2], Ioan-Bogdan ROBU [2a] and Anca Laura ASANDULUI [2b]

[1] "Gheorghe Asachi" Technical University of Iaşi, Romania, iherghelegiu@tuiasi.ro
[2] Alexandru Ioan Cuza University of Iaşi, Romania; [a] bogdan.robu@feaa.uaic.ro, [b] asand@uaic.ro

Abstract

Environmental awareness become a real variable in all today competitive scenarios. Thus, environmental management system (EMS) implementation could be considered as the main vector associated to organizational sustainable development. In the literature the "relation" analysis between specific factors associated to organization's orientation on environmental issue and the EMS implementation quality variables are debatable. Hence this paper has as main purpose to assess the "relation" between various representative organizational barriers (corporate environmental orientation) and EMS implementation quality.

Keywords: Statistical Analysis, Correlation, Environmental Management System (EMS), Organizational Barriers, Success Factors, EMS Implementation.

Introduction

The environmental management system (EMS) is a tool that identifies issues, but also contributes is solving these issues; according to continual improvement concept – this principle can be organizational implemented taking into account (i) the way in which it is perceived by the management and also (ii) the companies' activity sector (Perotto et al., 2008; Herghiligiu, 2013).

In the literature many scholars approach EMS considering: (i) various external factors that have an impact on the measures taken by the organization in order to modify the environmental strategy (Darnall, 2003), or (ii) various internal factors (Christmann, 2000; Darnall, 2003) that have a role in determining the management process quality concerning environmental issues, but that do not analyses the relation between the factors that influence / determine the EMS implementation quality (Herghiligiu, 2013).

The most important aspect for a EMS successful implementation is the organization support and commitment (Pun and Hui, 2001). This environmental commitment was also emphasized by Fernandez et al. (2003) in their studies; these authors state that the nature (positive or negative) of the human resource orientation to environmental actions can represent an obstacle or a successful factor on EMS. Hence a EMS successful implementation and an improvement in environmental performance are determined by environmental practices integration on human resource level. This approach includes top management support, environmental trainings, team work, motivation system, and so on (Daily and Huang, 2001; Herghiligiu, 2013).

Daily et al. (2007) studied the perception of human resource concerning the environmental performance. Thus, according to their analysis, these authors discovered that managerial involvement in environmental issues, environmental training, employee training, as well as various motivational benefits, are directly linked to the way as environmental performance is perceived (Herghiligiu, 2013).

Kaur (2011) supports the theoretical framework developed by Govindarajulu and Daily (2004) that shows that the managerial involvement in environmental issues, the monitoring, control and employee motivation, are crucial factors for EMA successful implementation; the author also states that relation between motivational benefits and environmental performance is very weak and cannot be supported (Herghiligiu, 2013).

The relation between the ISO 14001 certification, organizational investments concerning non-polluting technologies and the development of those products that have a low impact on the environment, also are identified in the literature. Likewise, is a link between EMS implementation and organizational economic performance. Hence, investments concerning new non-polluting technologies – and, implicitly, the pollution prevention have a direct impact on production process (stimulate productivity) (Radonjic and Tominc, 2006/ 2007; Herghiligiu, 2013).

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Bansal and Hunter (2003), Kaur (2011) also emphasize the fact that investments in technologies and processes generate changes at organizational production system.

Organizational pollution prevention may improve efficiency, may reduce costs associated to energy consumption, improve row material consumption, or avoid fines (Rondinelli and Vastag, 2000a/b; Herghiligiu, 2013).

Another scholar considered to be important for EMS integration the so-called environmental practices. According to Gonzalez-Benito and Gonzalez-Benito (2005) the environmental practices include: environmental planning and organizing, operational environmental practices, and communicative environmental practices (Herghiligiu, 2013).

Regarding these environmental practices, it could be noticed that these specific organizational practices are directly linked to the planning and organization process, and include: environmental policy, environmental objectives and targets, environmental liabilities, environmental information, human resource training and involvement, environmental performance analysis, contingency plans, and so on. Hence operational environmental practices are associated to goods production, ecological goods development, as well as long-term commitment to protect the environment (Sarkis and Gonzalez-Torre, 2010; Gonzalez-Benito and Gonzalez-Benito, 2005). Environmental operational practices include processes that have as a main objective the development and implementation of various environmental methods (Gonzalez-Benito and Gonzalez-Benito, 2005), And the environmental communicative practices are those practices that contribute to the organizational image improvement - cordial relations with all the parties involved in the process; these practices have a commercial objective, being associated in the scientific literature to organizational environmental commitment (Florida and Davison, 2001; Gonzalez-Benito and Gonzalez-Benito, 2005; Herghiligiu, 2013).

Research process structure and description

This research has as main purpose to assess the “relation” between various representative organizational barriers (corporate environmental orientation) and EMS implementation quality (Figure 1).

In order to achieve the paper purpose, it was conducted a research, based on survey method - questionnaire instrument, with a 70 organizations sample, from N-E area of Romania.

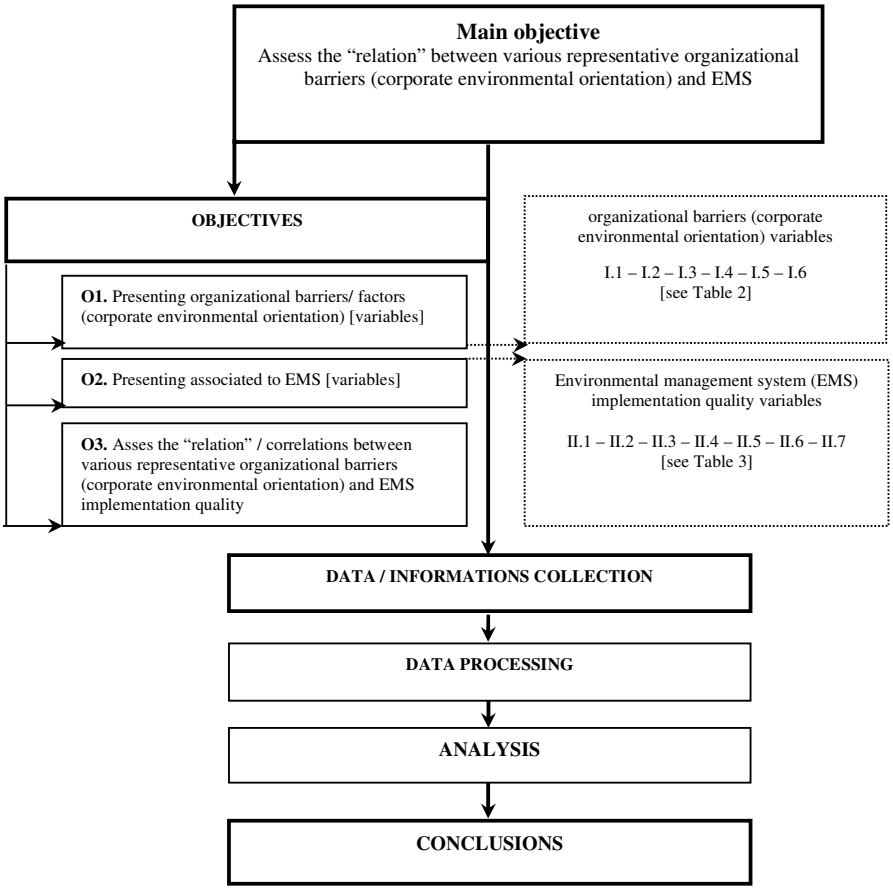

Fig 1. Research methodology

Source: adapted after Herghiligiu, 2013; Herghiligiu and Robu, 2019

In order to assess "relation" between corporate environmental orientation (CEO) and EMS implementation quality (EMSIQ) was considered various representative variables (CEO and EMSIQ), as follows (Figure 1, Table 1 and Table 2) (Herghiligiu, 2013; Herghiligiu and Robu, 2019):

(i) independent variables: 7 for CEO;
(ii) dependent variables: 6 for EMSIQ.
Internal consistency the constructs was tested; Cronbach Alpha index was applied (Jaba and Grama, 2004). Obtained Cronbach Alpha index values indicate a high internal consistency.

Table 1: Notation (Nt) and Cronbach Alpha values associated to research variables - EMS implementation quality variables

N_t	**EMS implementation quality variables** [dependent variables - EMSIQ]	**Selective literature**
I.1	**Implementation of environmental policies and programs**	Ionescu, 2000; Link and Naveh, 2006; Christman and Taylor, 2006; Naveh *and collab.*, 2006
I.2	**Compliance with environmental regulations**	Lupu *et al.*, 2006; Zobel and Burman, 2004
I.3	**Financial performance environment**	Lupu *et al.*, 2006
I.4	**Environmental operational performance**	González-Benito and González-Benito, 2005; Canon and Garcés, 2006; Menguc and Ozanne, 2005; Heras-Saizarbitoria *et al.*, 2010
I.5	**Relationship with various external entities**	
I.6	**Relationship between the activities of the organization and the environment**	Schoffman and Tordini, 2000

Source: adapted after Herghiligiu, 2013; Herghiligiu and Robu, 2019

Table 2: Notation (Nt) and Cronbach Alpha values associated to research variables - organizational barriers variables

N_t	**Organizational barriers variables (corporate environmental orientation)** [independent variables - CEO]	**Selective literature**
II.1.	**Environmental strategic leadership**	Daily *et al.*, 2007; Govindarajulu and Daily, 2004
II.2.	**Environmental management of financial resources**	Lupu, 2008; Herghiligiu *et al.*, 2012
II.3.	**Human resource management in environmental management**	Strachan *et al.*, 2003; Wee and Quazi, 2005
II.4.	**Environmental informational management**	Mori, 2010; Sigel *et al*., 2010; Zendehdel *et al*., 2010 Appelt *et al*., 2011
II.5.	**Systemic-technological "infrastructure" with impact on environmental management**	Angell and Klassen, 1999
II.6.	**Organization's orientation to the environmental innovation**	Wagner, 2008; Rehfeld *et al*., 2007; Ziegler and Nogareda, 2009
II.7.	**External environment with direct/ indirect implication in organization's environmental management**	Lupu *et al*., 2006; Zobel and Burman, 2004

Source: adapted after Herghiligiu, 2013; Herghiligiu and Robu, 2019

Research Results

In the following table (Table 3) it could be observed synthetically the correlation analysis between specific factors associated to organization's orientation on environmental issue and the variables which define the EMS implementation quality.

Table 3: Correlations between the research variables

Corelations	**I.1.**		**I.2.**		**I.3.**		**I.4.**		**I.5.**		**I.6.**	
	R	**R^2**	**R**	**R^2**	**R**	**R^2**	**R**	**R^2**	**R**	**R^2**	**R**	**R^2**
II.1.	0,460**	21.1%	0.508**	25.8%	0.561**	31.4%	0.396**	15.6%	0.452**	20.4%	**0.659****	43,4%
II.2.	0,722**	52.1%	0.378**	14.2%	**0.813****	66%	0.105	-	0.530**	28%	**0.841****	70,7%
II.3.	0,539**	29%	0.501**	25%	**0.593****	35%	0.097	-	**0.682****	46.5%	**0.636****	40,4%
II.4.	0,732**	53.5%	0.667**	44.4%	0.472**	22.2%	-0.006	-	0.567**	32.1%	**0.744****	55,3%
II.5.	0,216**	4.6%	0.302**	9%	0.221**	4.8%	0.399**	16%	0.501**	25.1%	0.009	-
II.6.	0,479**	23%	0.498**	24.8%	0.432**	18.6%	-0.124	-	0.294**	8.6%	**0.642****	41,2%
II.7.	0,030	-	-0.028	-	0.213**	4.5%	0.076	-	0.199**	3.9%	0.075	-

** - Confidence level of 99%
* - Confidence level of 95%
Source: Herghiligiu, 2013

(i) According to Table 3, regarding the link between the **Environmental strategic leadership** factor (II.1.) and the specific variable for the implementation/ integration quality of the EMS - *The relationship between the organization's activities and the state of the environment* (I.6.) it can be can observe a significant link to a confidence level of 99%, which is highly intense, indicating a positive linear relationship between the two variables (r = 0.659). Also, looking at the determination coefficient R^2 between the two variables above, we can conclude that the 43.4% of the variation in the quality aspect for *The relationship between the organization's activities and the state of the environment* is determined by the *Environmental strategic leadership* factor. The link between "Environmental strategic leadership" (II.1.) and the variable specific to the implementation/ integration quality of the EMS - *Environmental operational performance* can be characterized as being weak in intensity, but also indicating the positive linear relationship between the two variables (r = 0.396) (Herghiligiu, 2013).

In qualitative terms, for the first case, namely the relationship between the variable "Environmental strategic leadership" (the factor variable) and the "Environmental operational performance" variable it could be said that

synergistic combination of the elements that constitute the first variable (the organization's environmental vision, the organizational structure "flexibility", the environmental objectives and targets, and the evaluation and analysis of EMS) determine in a direct but relatively reduced level (15.6%) the organization's environmental operational performance quality (Herghiligiu, 2013).

In the second case of the relationship between the considerate factor represented by the variable "Environmental strategic leadership" and "The relationship between the organization's activities and the state of the environment" variable we can see that is a close relation of determination (43.49%) between the constituent elements of the factor, mentioned above, and the (a) noise monitoring, level of air pollutants emissions, and respectively the modernization possible measures - for air quality, the (b) monitoring level of pollutants in water, monitoring process of the water variables that is released into the environment, respectively the compliance process with the maximum permissible rates on levels of pollutants discharged into the environment – for water quality, (c) monitoring the emission levels of pollutants inside the soil, monitoring soil variables (e.g. levels of surface erosion at the site of the organization), and the compliance with environmental regulations concerning soil - soil quality, (d) monitoring the effects on human population as a result of the organization activities, (e) monitoring of the flora variables on the organization site, and (f) monitoring the fauna variables of the organization site. This phenomenon can be considered to be mainly a consequence of the level of environmental regulations that organizations are required to comply, taking into account the qualitative interpretation of the first relationship examined (Herghiligiu, 2013).

(ii) Regarding the relationship between the **Environmental management of financial resources** factor (II.2.) and specific variables of the implementation/ integration quality of the EMS, it can be see from the above table that there are statistically significant correlations for most couples of variables, except II.2. - I.4.. This enables us to conclude that between the *Environmental management of financial resources* factor (II.2.) and the *Environmental operational performance* (I.4.) its no exist a significant statistical link. The strongest connections occur between *Environmental management of financial resources* factors and the aspects of the implementation quality of an EMS - *Environmental financial performance* (I.3.) - R = 0.813, respectively the relationship with *The relationship between organizational activities and state of the environment* (I.6.) - r = 0.841. We thus conclude that among the variables mentioned above there is a very intense bond, direct and positive. By interpreting the determination coefficients, we can see from the above table that *Environmental management of financial resources* factor determines in approximately 66% the quality variation of the I.3. variable, and the quality variation of I.6. variable in 70.7% level (Herghiligiu, 2013).

Qualitatively speaking, for the first case, namely the relationship between the variable "Environmental management of financial resources" (factor) and the variable "Environmental financial performance" it could be said that the synergistic combination of elements that constitute the first variable (the allocation from organization's budget of financial resources for environmental issues, and fundraising by accessing various environmental projects) it can be notice a strong direct link of determination (66%). (Herghiligiu, 2013).

For the second relation between considered factor and variable "The relationship between organization activities and state of the environment" it can be specified that this connection and intensity are perfectly understandable. Increasing the quality factor mentioned above results an improvement of process quality related to: (a) monitoring the noise and air pollutant emissions, (b) modernization/ refurbishment, (c) monitoring the level of pollutants emissions in water, (d) monitoring of water variables released in the emissary, (e) monitoring the pollutants emissions level arrived inside the ground, (f) monitoring soil variables, (g) monitoring effects on human population/ flora variables/ fauna variables of the organization location due to activities carried out by it (Herghiligiu, 2013).

(iii) Regarding the relationship between the **Human resource management in environmental management** factor (II.3.) and the specific variables of the EMS implementation/ integration quality, it can be seen in Table 3 that there are statistically significant correlations for most couples of variables, except for II.3. - I.4.. Thus, between the *Human resource management in environmental management* factor and *Environmental operational performance* variable (I.4.) doesn't exist a significant statistical link. Between factor II.3. and the rest five variables that define the implementation/ integration quality of the EMS, significant links were obtained for a confidence level of 99%, positive and straightforward. Nevertheless the factor II.3. has the strongest influence on the aspects - *The relationship with various external entities* (I.5.) - r = 0.682, respectively with *The relationship between organizational activities and state of the environment* (I.6.) - r = 0.636. In other words, by analyzing the determination coefficient, the factor II.3. influences at a rate of 46.5% the quality variation of I.5., and in 40.4% the quality variation of I.6. variable. Another statistically significant influence of the factor II.3. is exerted on the quality aspect of I.3. - *Environmental management of financial resources,* by an average rate of 35% (Herghiligiu, 2013).
From the qualitative point of view, for the first case, namely the relationship between the variable "Human resource management in environmental management" (factor) and the variable "Environmental financial performance" we

might say that synergistic combination of the elements that constitute the variable factor (environmental training sessions, staff engagement in environmental issues, environmental responsibilities, relationship reward system - environmental performance, and the relationship between employee motivation - environmental performance) determine environmental financial performance (Herghiligiu, 2013).

Also it can be observed that an improvement of the elements that constitute the variable factor determines an improvement of (a) the relationship between organizations and state institutions that monitor the compliance with environmental regulations, (b) the relationship between the organization and the local community, and (c) the link between the organization and its stakeholders (internal/ external stakeholders) - for connection II.3 - I.5. This effect it could be observed also in the relationship between the considered variable factors (II.3) and the relationship between the organization activities and the state of the environment (the elements of this aspect is detailed above) (Herghiligiu, 2013).

(iv) The link between the factor **Environmental information management** (II.4.) and the variables that characterizes the EMS implementation/ integration quality is statistically significant for most qualitative aspects except for I.4 - *Environmental operational performance*. By analyzing the relationship between II.4. and all the other quality aspects of the EMS, we can conclude that they are positive, direct, of average and above average intensity. The strongest intensity occurs between the *Environmental information management* factor and the qualitative aspects of the *Implementation of environmental policies and programs* (I.1.) - R = 0.732, respectively with the *The relationship between organizational activities and state of the environment* (I.6.) - R = 0.744. Interpreting the determination coefficients, we can see in Table 3 that the influence of qualitative aspects I.1., respectively I.6. is achieved by the action of the II.4 factor in a proportion of 53.5% and respectily 55.3%. The influence of the *Environmental Information Management* (II.4.) factor it manifests also on the quality variation of *Compliance with environmental regulations* (I.2.) aspect at a rate of 44.4,% (Herghiligiu, 2013).

From the qualitative point of view, for the first case, namely the relationship between the variable "Environmental information management" (factor) and the variable "Compliance with environmental regulations" we might say that the synergistic combination of the elements constituting the variable factor (environmental decision making process, environmental informational systems, environmental knowledge management system and process monitoring and control) directly determine (a) the level of compliance with environmental regulations, (b) internal findings process regarding environmental issues, and (c) the quality level of the analyzes performed to quantify the environmental impact induced by the specific activities carried out of the organization (Herghiligiu, 2013).

For the second relation between considered factor and variable "The relationship between the organization activities and state of the environment" may indicate that the connection and intensity of these is perfectly explainable because improving aspects of the variable factor (mentioned above) leads to an improvement of environmental aspects associated with the organizations activities (considering the same logical reasoning as in the first relationship) (Herghiligiu, 2013).

(v) According to Table 3 a significant influence (with 99% confidence) of the factor **Systemic-technological "infrastructure" with impact on environmental management** (II.5.) is exerted on the qualitative aspects related to the EMS implementation/ integration, with the exception of the variable *External environment with direct/ indirect implication in organization's environmental management* (I.6.). Overall, the links are characterized by a direct direction, positive, but of low intensity. The highest intensity occurs between II.5. and I.5 - *The relationship with various external entities,* r = 0.501. Thus the variation of the I.5. quality aspect is determined in proportion of 25.1% by the influence of the factor II.5 (Herghiligiu, 2013).

From the qualitative point of view, for the first case, namely the relationship between the variable "Systemic-technological <infrastructure> with impact on the environmental management" (factor) and the variable "Environmental operational performance" it can be observed that the synergistic combination of the elements that constitute the variable factor (the technological level of the organizations and its orientation towards clean technologies, respectively the existence of other management systems implemented at the organizational level) does not have a significant impact on environment operational performance. This phenomenon is a result of the lack of available resources (financial/ logistical and human) at the N-E area of Romania organizations; also, this "situation" it can be generated also due to the lack of long-term vision, plus the lack of awareness regarding the environmental importance (Herghiligiu, 2013).

On the relationship level between considered factor (II.5) and the "Relationship with various external entities" variable it can be observed a low degree of determination (only 0.501) explained by the fact that organizations consider that: (a) relations with state institutions that monitor compliance with environmental regulations, (b) relationships with the local community, and (c) relationships with the stakeholders (internal/external stakeholders),

to be links mainly governed by environmental legislation and by the patrimonial interests. The characteristics of these investigated relationships (if are maintained) may have medium - and long-term negative effects on the EMS implementation and integration quality at the organizations level from N-E area of Romania, characterized by decreasing the level of environmental performance and even through various fines received from the institutions empowered to monitor compliance of environmental regulations (Herghiligiu, 2013).

(vi) The **Organization's orientation to the environmental innovation** factor (II.6.) is significantly correlated with most variables related to the EMS implementation/ integration quality, with the exception of *Environmental operational performance*. The *Organization's orientation to the environmental innovation* does not determine a significant impact on the *Environmental operational performance*. The II.6 factor is strongly correlated with the variable I.6. - *The relationship between organizational activities and state of the environment* (r = 0.642), respectively with I.2 - *Compliance with environmental regulations* (r = 0.498), and I.1. - *Implementation of environmental policies and programs* (r = 0.479). Therefore, with a 99% confidence it can be conclude that the *Organization's orientation to the environmental innovation* factor causes a significant influence I.2. (24.8%) I.1. (23%) and I.6. (quality determined in proportion of 41.2%) (Herghiligiu, 2013).

From the qualitative point of view, for the first case, namely the relationship between the variable "Organization's orientation to the environmental innovation" (factor) and the variable "Implementation of environmental policies and programs" we might say specifically that (a) modern techniques (e.g. brainstorming) used at organizations level to find new ideas to improve processes, and (b) working groups where it can be approach the possibility of improving environmental procedures, determined in a relative percentage (23%) the improvement in the development of the environmental objectives and targets, organizations environmental policy clarity, respectively the improvement of environmental management programs that are implemented at the organizational level. Taking into account the same aspects of the factor variable it can be also specify that in the case of this relationship between II.6 and I.2, these aspects determine the quality of compliance with environmental regulations of the organization, but still in a small percentage, 24.8 % (Herghiligiu, 2013).

On the relationship level between considered factor (II.6) with the variable "Relationship between the organization activities and state of the environment" it can be specified that it has a normal behavior; thus constituting issues of variable factor determine in a percentage of 41.2% the quality of relationships developed between organization and (a) state institutions that monitor compliance with environmental regulations, (b) the local community, and with the (c) stakeholders (internal/ external stakeholders), because the orientation towards innovation has always been a factor of progress (Herghiligiu, 2013).

Conclusions

Based on the statistical analysis operated and, on these results, presented previously it could be mentioned several remarks, that could be concluded as it follows.

Even if (a) would be improved and clarify the organization's environmental vision of North-Eastern Romania organizations, and/ or (b) their organizational structure would be more conductive to change associated with the EMS implementation, and/ or (c) the environmental objectives and targets should be clearly drafted and would not be confused with other management systems implemented goals, and/ or (d) the EMS internal audit would improved, it would result, in a small percentage, a positive change in the organizations environmental operational performance quality. Concretely it can be notice a formalism associated to EMS operation, as a result of a low level regarding the environmental awareness, or as a consequence of low resources allocation to EMS development.

An increased level of environmental issue funding, from organization's budget, or by accessing environmental projects, would lead to (a) an increased level associated to costs tolerability (operating and capital) - environmental activities and (b) an improved level associated legal liability regarding to specific financial environmental management, and also to (c) an increased level of environmental benefits (direct or indirect).

Any improvement associated to environmental human resource management will lead directly to increased level of environmental benefits and also to an improvement of legal liability process associated with environment financial management.

Great benefits in EMS implementation ca be generated by (a) use of specific techniques and methods of environmental management, (b) decentralization of environmental decision-making process in certain circumstances, (c) creation of a database that contains all environmental decisions, (d) increasing the environmental awareness level and making decisions that do not have only as main objective the environmental regulatory

compliance, (e) increasing the effectiveness associated to environmental information system, and (f) real implementation of an environmental knowledge management system.

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Taxonomy of Risks That Can Be Identified in the Financial Statements

Ewa W. BABUSKA

Cracow University of Economics, Cracow, Poland
babuskae@uek.krakow.pl

Abstract

The article presents the taxonomy of risks that can be identified in financial statements. The aim of the article is to systematize, characterize and interpret the risks that may be recognized in financial statements by their users, especially investors. The research method is to analyze the financial statements in terms of revealing potential risks. The research focuses on the possibility of identifying risks by analyzing the balance sheet, profit and loss account, cash flow statement, statement of changes in equity and additional information in notes. The analysis shows what types of risk are included in the financial statements and how to read them in order to identify the potential risks associated with them. The novelty of the article is an attempt to present a taxonomy of type of risks in the area of accounting based on financial statements analysis. The article confirms the informative and prospective function of financial statements in identifying possible types of risk in enterprises.

Keywords: Taxonomy of Risks, Risks Identification, Types of Risks, Analysis of Financial Statements.

JEL classification: G32, M41

Introduction

Risk accompanies every business activity. Currently, the COSO-ERM model is used in risk management in enterprises (Enterprise Risk Management - Integrated Framework, Summary, 2004). However, the article addresses the issue of disclosing information about risks in the accounting discipline. Risks are included in the financial statement data, but these data must be properly read by users to identify potential risks. Data presented in the financial statements must be useful, relevant and reliable according to the Conceptual Framework of International Financial Reporting Standards (IFRS). Financial statements are published and thus made available to a wide audience, including investors who expect a high rate of return on capital invested in a given venture. Financial statements allow for the identification of many risks related to running a business. The article systematizes, characterizes and interprets potential risks identified in the balance sheet, profit and loss account, notes, cash flow and statement of changes in equity. The use of these statement analysis as a method allowed to identify potential risks inherent in them. The article presents the taxonomy of risks that can be read from the information contained in the financial statements and it is the original value of the article. It confirms the informative function of financial statements in identifying possible risks in enterprises. Many authors have dealt with the issue of risk disclosure in financial reports. In 2003, Cabedo and Tired developed a risk typology, identifying all types of risk faced by companies, and proposed a quantitative model for each of them. These were non-financial risks such as business and strategic and financial risks such as market risk, credit risk, operational risk and liquidity risk. However, these financial risks did not include many other specific risks that can be identified from the data shown in the financial statements of companies. At the same time risk reporting practices are a subject of great interest from the accounting literature. The problem of the quality of risk reporting was raised by Ryan (2012) and in the ACCA report (2014). Some of the research concerned the impact of enterprise characteristics on risk disclosure. It was found that company size, leverage ratio, profitability and risk factor are positively associated with risk reporting (Khlif and Hussainey, 2014, 181-211). Also Demina and Dombrovskaya (2020) referred to the preparation of risk-based financial reports. The references are only a few examples of papers dealing with risk in financial statements.

Risks identifiable based on the financial statements

Based on the financial statements, you can disclose and identify a variety of risks associated with running a business. The types of risks that can be identified in the financial statements are presented in Table 1.

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Table 1 Risk that can be read from the financial statements

Balance sheet
Risk resulting from negative trends of change in structure of assets and liabilities and the balance sheet sum (dynamic measures)
Risk resulting from structure of fixed assets and its change as of a particular day (static measures)
Risk resulting from structure of current assets and its change as of a particular day
Risk resulting from structure of own equity and its change as of a particular day
Risk resulting from structure of external capital and its change as of a particular day
Reserve made for known risk, losses and effects of other events as of a particular day
Operational risk, associated with managing operational assets and liabilities (number and structure of stocks, system of monitoring and making settlements, securing payments, credit policy and level of maintained cash)
Risk of liquidity loss
Risk of working capital management
Risk of lower profitability of assets
Risk of lower profitability of capital
Profit and loss account
Risk of fluctuation of results in examined periods
Risk of not achieving results
Risk of result measurement
Risk related to the whole activity, influencing results and associated with:
the choice of a legal form of conducting activity
the concept of managing the enterprise and the concept of its development (including research and development work, new projects, technologies and products)
the concept of human resource management
the organization of the accounting system (including: company plan of accounts, accounting software, internal instructions)
the balance sheet and tax policy
the organization of a system of internal control and audit
the organization of controlling and budgeting
Risk connected with operational activity of an entity, concerning:
managing operational assets and liabilities and organization of operational activity
adopted: strategy for the company, marketing policy, method of creating and maintaining production capacities
Organization of logistics of the supply system and the sales system
Risk associated with investment activity and other, non-operational activity of the entity, combined with:
used practice of predicting effectiveness and assessment of investment ventures
adopted policy of acquiring own capital and external sources of financing
Additional information
Introduction to the report
Risk denoting threat to continuation of activity in the declaration of the management
Additional information and explanations (notes)
Description of uncertainty concerning the possibility of continuing activity and indication whether the financial report contains related corrections.
Description of undertaken or planned activities aimed at eliminating indicated uncertainties.
Market risk (including: risk of changing prices, currency exchange rates, interest rates).
Cash flow statement
Risk of losing solvency and liquidity, that is continuation of company activities
Risks concerning operational activity

Risks concerning financial activity, especially mistakes in managing sources of financing business activity
Risk concerning investment activity, especially related to investment policy of an entity
The statement of changes in own equity
Risk of mistakes in managing sources of financing business activity and obtaining basic capital
Risk resulting from structure of own capital
Risk to capital profitability of the entity
Risk of the entity bankruptcy
Risk of conservative attitude of owners
Risk of expansive dividend policy

Source: own elaboration based on Karmańska, (ed), (2008), 449-470.

Some risks listed in Table 1 that stakeholders can identify based on the data disclosed in the financial statements published by enterprises will be discussed below based on theoretical studies of several authors and the Polish Accounting Act (AA). These risks will be characterized in the order of their possible reading from financial statements.

Risks identifiable based on balance sheet data

Risks resulting from negative trends in the structure of assets and liabilities and the balance sheet sum are identifiable based on structure ratios and growth ratios. The structure of assets depends on the type of business. A large share of fixed assets may create risks, as fixed assets restrict cash flows and freeze capital for a long time. The reason is technical progress and high fixed costs (Waśniewski, Skoczylas, 2002, 348). Various authors have developed relevant ratios for this purpose, e.g.: assets tangibility (fixed assets to current assets) and assets productivity (tangible assets to financial assets). A higher growth rate of current assets needs to be ensured. The value and growth rate of assets is expressed by absolute differences and growth rates of total, tangible and current assets (with fixed and variable bases). A distorted relationship between equity and liabilities is an unwelcome trend. A correct structure and growth rate of equity ensures stability and liquidity. Change trends in equity structure show the scale of financial risks related to debt capital and the capability to continue operating. The respective values of equity capital and debt capital should correspond to the value of financed asset groups, i.e. equity should correspond to fixed assets and debt should correspond to current assets. Changes in equity and debt over time are demonstrated by growth rates of total capital as well as by respective growth rates of equity and debt. An industry-correct structure of assets and liabilities means correct trends and lower risks. Balance sheet amount changes reflect an increase or a decrease in assets which is a symptom of development and low risk, or stagnation and high risk, respectively. There is also the risk resulting from the structure of fixed and current assets and from its changes as of a particular date. Fixed assets are typically long-term and low-liquidity. Their prolonged use creates the risk of investment choices, high expenditures and financing sources. New fixed assets make it possible to manufacture high-quality products, but economically and physically depreciated assets generate risks. Such risks are reflected by the fixed assets to total assets ratio. Risks are also generated by the ongoing depreciation of fixed assets. An appropriate structure of fixed assets may reduce business risks. Skillful fixed asset risk management has an effect on operating risks. In their turn, current assets are short-term and fast movable. Their higher share in total assets improves liquidity; they can be quickly and easily sold or used for an alternative purpose (Gabrusewicz, 2014, 74-76). Current assets create various levels of risk. Both excessively high and too low inventories are risk factors. Outstanding receivables also generate risks. Too much cash means lack of investments and over-liquidity, cash shortages – imprudence and loss of liquidity. A sudden change in long-term trends in the current assets structure also involves risks (Bareja, Giedroyć, 2008, 450).

The next are the risks resulting from changes in the structure of equity and liabilities and from their changes as of a given date. Equity secures financial independence. The greater the value of equity, the easier access to long-term debt. The aggregated value of debt capital and equity capital corresponds to fixed capital which reduces debt risk (Sierpińska, Jachna, 2004, 75-76). The greatest risk is related to revaluation reserve and financial results. Changes in equity and debt involve revaluation of fixed assets and long-term investments (e.g. if their value does not grow as a result of unfavourable market price trends, mostly those of financial instrument). Losses, low profits and low profit-to-equity ratios reflect high business risks. In its turn, the structure of debt is formed by liabilities and provisions for liabilities. The proportion of debt to total capital is related to the scale of debt and debt limit, and the types of debt capital have an effect on risks affecting the capacity to pay. In accordance with article 35d of the AA provisions are created for certain or highly probable future liabilities, including those related to restructuring. These include liabilities of uncertain amounts or maturity dates, that can be estimated and match the definition of a liability. The need to make provisions follows from the principle of prudent valuation. The financial result includes

provisions for risks known to the entity, threatening losses and consequences of other adverse events (art.7 par.1 point 5 AA). Provisions safeguard the entity against known or expected risks of various costs, losses and liabilities that may occur in the future. Excessively high provisions may create a risk of reduced economic gains, whereas insufficient (or missing) create a risk of imprudent valuation. Operating risks are related to the management of operating assets and liabilities (amount and structure of inventories, system of monitoring and effecting payables and receivables, securing payments, credit policy and cash levels). An analysis of assets from the viewpoint of operating risks should involve the fixed to current assets ratio. Fixed assets increase overheads and operating risks. A similar effect is caused by a growth trend in investment assets that are contingent on speculative deposits of spare cash in relation to operating assets. Such a trend may indicate that the company is active in a high-risk area, with simultaneous reduction of its core business (Bareja, Giedroyć, 2008, 451-452). Operating risks are also generated by the level, structure and management of inventories. A high level of inventories involves added cost, while low inventories cause bottlenecks in production and/or sales, and increase the cost of supplies. As a rule, inventories should be reduced and their structure should be optimized depending on inventory groups and business types. Management of inventory is illustrated by turnover ratios, expressed in the number of cycles and cycle length measured in days (Gabrusewicz, 2014, 95-111). The value of inventories disclosed in the balance sheet may include the risk of changes in prices on commodity markets, especially in material-intensive production (Waśniewski, Skoczylas, 2002, 348).

Operating risks also affect trade accounts with suppliers and customers in the balance sheet. Accounts receivable are seen as positive, as long as debtors pay them on time and in full. Delays in payment mean greater risk. Regularly incoming receivables create liquidity and are necessary for on-time payment of accounts payable. In addition, they improve the structure of assets. Foreign exchange risks may occur if purchase and sale transactions are made in foreign currencies, and accounts receivable and payable in the balance sheet are expressed in the national currency. This transactional risk (of revaluation of trade accounts due to exchange rate fluctuations) is illustrated by the scale of payable / receivable currency differences and by the possibility to adjust sale prices accordingly. Conversion and long-term foreign exchange risks also exist. Businesses are also exposed to interest rate change risks, as long as they possess variable-interest debt capital (Waśniewski, Skoczylas, 2002, pp. 349-350). Interest rate risks cannot be fully determined on the basis of the balance sheet, because fixed-interest loans cannot be differentiated from variable-interest loans. Susceptibility to exchange rate changes is observed with regard to long and short-term loans, financial leasing and debt securities (Bareja, Giedroyć, 2008, 456-457). On the basis of balance sheet information, stakeholders can also identify:

- risk of liquidity loss,
- risk of lower return on assets,
- risk of lower return on capital

Determining financial liquidity is a priority in risk assessment and may exhaust management issues. High liquidity compensates for cash flow waves caused by endo- and exogenous factors, reducing the entity's profitability [Waśniewski, Skoczylas, 2002, 349]. Liquidity expresses the ability to pay current liabilities on time [Sierpińska, Jachna, 2004, 145]. The risk of liquidity loss follows from the ratio of current assets to current liabilities. It is defined by the degree of assets liquidity and capital maturity. Timely debt repayment depends on the availability of liquid assets and the capability of obtaining third-party financing. Theorists propose static and dynamic analysis of liquidity loss. The static analysis uses current, quick and cash liquidity that reflects the ability to repay current liabilities from current assets, current assets excluding inventories and cash. In the dynamic analysis, ratios are based on the balance sheet and the cash flow statement and these are primarily indicators of cash efficiency and cash sufficiency (Bareja, Giedroyć, 2008, 452; Gabrusewicz, 2014, 329-340). It should be added here that excess cash in companies does not have to be perceived negatively by investors, as proved Huang and Mazouz (2018, 275-291). They assessed the costs and benefits of surplus cash and showed that it improved trade continuity and liquidity risk.

Return on assets means their profit generating potential. As a ratio, ROA shows the amount of net profit per one unit of assets employed, as well as the efficiency of their management. The greater the ROA, the better the financial condition. The lower the ROA, the worse the condition and the greater the risk of decreased return on assets. The ROA formula is modified by using various forms of profit (gross, gross incl. interest) and assets groups (fixed, current, net). Different ratios may show diverse levels and trend directions; by elaborating on the general formula, they can also extend the scope of the examined business, thus disclosing detailed risks. High return on sales is accompanied by low assets turnover, which has an effect on the choice of risk mitigation strategies. Theorists suggest two such strategies: 1) high prices and high profits accompanied by adequately low assets turnover, 2) low prices and low profits accompanied by relatively high sales. The choice of the strategy reflects the type of and conditions affecting the company's business (Gabrusewicz, 2014, 311-316). ROE means return on equity. A higher ROE shows a more favourable financial condition and greater development potential. ROE measures the efficiency of invested equity. It is

important for owners who consider alternative forms of using equity (Bareja, Giedroyć, 2008, 454). Return on equity allows investors to set the rate of return on investment in the company's stock (shares). A higher ROE ensures higher dividends, growing stock prices and lower investment risks. Assets are also financed using debt capital. To increase sales and profits, debt may sometimes be more efficient than equity. The financial leverage effect (growing rate of return on equity) will be observed if the loan interest rate is lower than return on total capital, as long as its structure has been optimized (Sierpińska, Jachna, 2004, 203-206).

Risk identifiable based on profit and loss account data

Examples of business risks that can be identified based on the income statement data are presented below according to the study by Wachowicz and Klimczak, 2008, 460–470. The risk of results variability in examined periods manifests itself in the volatility of results and periodical fluctuations of revenues and costs. Risk mitigation involves separation of revenues and costs with a high likelihood of repeatability from those that are more incidental and relate to such events as sale of assets, penalties, fines, compensation for damages, donations or force majeure. When analyzing this risk, it is necessary to differentiate between costs that are controlled by the company in a long term from those that cannot be controlled by it. Uncontrollable costs follow from applicable laws and public liabilities.
The risk of not achieving the assumed results is associated with the so-called alleged costs and revenues, which should be distinguished from actual costs and revenues. The risk of results measurement is related to the fact that management estimates the value of revenues and costs. Such estimates can be biased and can thus create the risk of results measurement.

Risks on business activity as a whole and affecting the company's results are linked with: 1) the concept of managing the company and the concept of its development (including: research and development, new projects, technologies and products) – management of the company and its development cannot be spontaneous, but should rather follow a project reflecting the company's needs and its specific nature. The risk of a mistaken management idea has a bearing on the company's operations and manifests itself in increasing costs and decreasing revenues. The risk of research and development, implementation of new projects, technologies and products is high, and setbacks in this regard involve an unwarranted increase in overheads; 2) the concept of human resources management cost – cost of labour in Polish companies is very high (amounts actually received by employees are increased by over 40% in taxes and obligatory social security paid by the employer). The risk of human resources management manifests itself in growing cost of employment; 3) balance sheet and tax policy – the balance sheet policy is part of the economic policy in company management and differs from the accounting policy. The results of changes in estimated values that accompany changes in accounting rules are shown in the profit and loss account. The company's tax policy allows it to optimize the amount of taxes paid by choosing a more profitable form of taxation. Such decision are risky and must be preceded by a tax simulation.

Risks connected with the company's operations are related to the management of operating assets and liabilities and to how operations are organized. Risk factors may be linked to how operations are organized, how technological processes are implemented, how product quality is monitored, or how complaints and product returns are handled. The consequences will be included in operating results presented in the profit and loss account. Risks related to financial and investment activity are connected with:

1) the company's financial assets management strategy; it may involve risks related to: inappropriate investment strategy, financial assets structure or value change, portfolio design (diversification), collaterals policy, interest and foreign exchange rate fluctuations. In the profit and loss account the results of these risks are charged to financial costs and revenues;
2) the policy of securing equity and debt capital. The choice of financing sources depends on how realistic it is to obtain capital from a given source as well as on the cost and structure of capital. The risk of procuring capital and shaping its structure has a bearing on financial costs and revenues and may be related to: inappropriate equity capital ownership structure, defective debt capital structure and overall capital structure, choice of external sources of capital injections, issue of securities (with the choice of the issuing entity), preparation of the prospectus, fixing nominal and issue prices, emission and redemption of debt securities;
3) the practice of investment project efficiency assessment. Investment project assessment requires an analysis of incurred cost and gains that can be achieved through the investment. The risk of investment project assessment is not easily reflected in the profit and loss account because implementation commenced after selecting a given project involves actual costs and revenues presented in the account. Actual economic results of the project may differ from forecasts. Projects are assessed on the basis of informed forecasts of investment outlays, future revenues and macroeconomic parameters related to foreign exchange rates, inflation, interest rate, taxes. Risk results are visible when actual effects are compared against forecasts.

Risk identifiable based on cash flow statement data

Business activity risks, identifiable on the basis of the cash flow statement, are related to three types of activity: operating, investment and financial. They will be presented below.

1. Operational risk results from the fact that operating activities may also create a risk of loss of payment capacity and solvency. It is possible to determine whether the structure of operating revenues and expenditures is typical or untypical for a given industry. The assessment of operating cash flows in terms of risk must take into account the scope of business and the current stage in the market lifecycle (Karmańska, 2008, 473).

2. Investment activity risks, including chiefly those related to the company's investment policy. By analyzing investment activity cash flows it is possible to define the company's investment policy risk. The risk of a change in the company's economic preferences may be shown by financial investments accompanied by incurring new debt and by weakening operating activities. If this option is not available, risks can be assessed based on investment revenues and expenditures grouped by investment instruments. Knowing the external motives for investing in various instruments helps investors to assess a company's investment strategy. The risk of default and insolvency may be shown by negative cash flows from investments. To assess whether the risk results from increased investments or inappropriate management, it is also necessary to analyze other activities in the CF statement. All circumstances have a bearing on the assessment of risk investing faced by the firm (Karmańska, 2008, 472-474).

3. Financial activity risks result *inter alia* from mistakes in the management of business financing sources. The risk groups discussed above are inter-related. For instance, the risk of default may be caused by inappropriate management of business activity financing sources. Such risk can be detected by analyzing cash flows. Mistakes in the management of business financing sources and the related risks are hinted by: taking a loan accompanied by bond redemption, similar timing of bond issue on the one hand and loan or financial leasing repayment on the other (Karmańska, 2008, 473).

Risk identifiable based on statement of changes in equity data

The statement of changes in equity contains data that supplements the balance sheet. It informs on the structure and changes in equity. It informs on the structure and extent of changes in equity. The balance sheet and the statement of changes in equity present seven items in the equity structure. Changes can be observed by analyzing the following aspects: opening balance, increase / decrease by titles, closing balance (Annex 1 to the AA). In this way, each component can be tracked in terms of risks. If the reasons for increasing or decreasing equity and its components are known, equity can be properly managed. Some risks identifiable based on of the statement of changes in equity data are presented below.

1. Risks caused by the structure of equity are related to such items as revaluation reserve and net profit or loss. Revaluation reserve is often adjusted downwards in the face of unfavourable changes in market prices and fair value valuation. Low net profits or losses indicate a high level of risk. Reduced net profit to equity ratios indicate lower return on equity and higher risk, although this also depends on income taxes paid (Bareja, Giedroyć, 2008, 451) An increase of this ratio does not necessarily denote greater operating efficiency and lower risk (Nowak, 2017, 165-174).

2. The risk of return on capital can be inferred by assessing the efficiency of contributed capital measured with the financial result to capital ratio (i.e. profit per unit of capital employed). Such ratios come in a variety of configurations, depending on the type of profit used in the nominator and capital used in the denominator. What matters from the risk perspective is the return on equity capital, as owners expect high returns on capital employed by the company (Wędzki, 2015, 462-466). The statement of changes in equity makes it possible to track changes in return on equity and its components throughout the reporting period. A detailed analysis of the statement reveals information on the causes of such changes

3. A realistic risk of bankruptcy is a high risk. A negative value of equity indicates high risk, as it shows that balance sheet losses have accumulated and owners have failed to intervene. This statement of changes in equity contains information on the coverage of losses and division of profits. An analysis of previous years' statements makes it possible to evaluate the owners' risk response, i.e. whether they took attempts at improving the situation or did nothing to minimize risks (Karmańska, 2008, 474; Nowak, 2017, 286-290).

4. The risk of a conservative attitude of the owners (low risk appetite) should be expected if shares are not contributed to the company over lengthy periods, if new stock is not issued, if dividends are paid, or when losses are not covered (or are covered in fractional amounts). In a young company, such an attitude may be attributed to

lack of faith in success due to the lack of vision and action strategy, or to the shortage of funds necessary to finance further operations. A strategic investor could thus introduce changes in such a company in line with his own vision and plans; alternatively, he could provide capital in return for a high profit share. This risk is easier to diagnose and respond to if changes in equity are monitored, as the statement of changes in equity explains the causes of equity increases and decreases across all equity components (Karmańska, 2008, 474-475).

5. The risk of expansive dividend policy results from the company's preference for payment of excessive dividends, using not only previous years' profits, but also advances towards profits expected in the current year. A radical dividend policy may be due to owners' pressure (as owners may be impatient having waited for return on invested funds), even in the face of unfavourable forecasts of future results. General (rather than detailed) interpretations may suggest that the company's financial condition is sound, while in fact it is poor. The aim may be to attract new capital by publishing information on allegedly appropriate management. This risk can be detected from the analysis of changes in the previous years' results and the write-offs of the current year's result made during several consecutive reporting periods (Karmańska, 2008, 475).

Risk identifiable based on additional information and explanations (notes)

Other risks can be identified by stakeholders on the basis of notes to the financial statements. For instance, operating risks faced by companies may be attributable to:

1) how operating assets / liabilities are managed and how operating activity is organized – operating assets are used for core business purposes and for the administrative activities;
2) the company's strategy – the risk of strategy involves questions about whether or not the management board has formulated a mission / vision or developed a company development strategy in the form of an official document (and whether strategic controls are in place). Lack of strategy or neglect for its objectives in regular operations (or lack of strategic controls) may lead to stop-gap measures that fail to address the long-time perspective and are generally chaotic and increase operating overheads;
3) the company's marketing policy – a description of the marketing policy risk may include solutions used in such domains as advertising, product promotions, rebates available, bonuses, discounts, choice of customer segments, product portfolio structure, etc. The costs of or gains from the marketing policy are part of the company's core operations;
4) the method of building and maintaining production capacity - creating and maintaining material business potential is determined by the company's production capacity plan. Such capacity should not be too high or too low. Overcapacity runs the risk of under-utilization, and the shortage of capacity prevents the generation of potentially available revenues. Material resources should be kept in good condition by ensuring regular technical inspections, thus eliminating equipment disruptions and failures resulting in downtime and product shortages or defects. This risk has an impact on operating costs and revenues;
5) supply and sales logistics – the use of logistic solutions in supply and sales processes must be appropriately organized. Necessary resources must be ensured, including vehicles, storage facilities and IT systems for supply management. What matters apart from transport and logistics potential is the choice of supply sources and the development of distribution channels. The consequences of this risk may adversely affect the company's operating results (Wachowicz, Klimczak, 2008, 467-468).

As the selected risks described above show, each of the financial statements enables the detection and identification of many types of business risk. However, the above-mentioned financial statements do not allow to detect by stakeholders many significant risks and risk factors related to, *inter alia*, the business environment, the operations of the enterprise and its capital group as well as the capital market and secondary trading in shares (Karmańska, 2008, pp. 475-476). Financial statements also do not allow to disclose the risks associated with the management and measurement of intangible assets, i.e. intellectual capital or corporate social responsibility activities These sample risks require separate reporting.

Conclusions

The article emphasizes the usefulness and importance of financial statements in identifying potential risks contained therein. It presents a classification of risks recognizable on the basis of data included in the financial statements as well as a description and interpretation of these risks. The risks that can be read from the disclosed figures and items in the financial statements are characterized in detail. The applied research method was the analysis of financial statements. The analysis related to the risks that can be identified in the balance sheet, profit and loss account, cash flow statement, statement of changes in equity and in the additional information (in the notes). The performed analytical studies made it possible to present the taxonomy of types of risks that can be recognized in the financial statements and to comment them in depth. The article confirms the information function of financial statements in

risk identification and assessment, which supports the risk management process in enterprises. At the same time, the prospective function of financial statements in terms of the possibility of risk prediction was indicated. However, on the basis of financial statements, it is not possible to identify non-financial risks, e.g. in the field of corporate social responsibility, including environmental protection. Such risks should be presented in separate reports, e.g. in CSR or integrated reports, and this issue can be indicated as the direction of further research.

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Machine Learning methods for solving Vehicle Routing Problems

Przemysław CZUBA

Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, przemyslaw.czuba@wat.edu.pl

Dariusz PIERZCHALA

Faculty of Cybernetics, Military University of Technology, Warsaw, Poland, dariusz.pierzchala@wat.edu.pl

Abstract

The global conception of sustainable development includes a mechanism for achieving the economic goal by which all fundamental human needs are met by the use of technology with simultaneously taking care of our natural environment. To reduce air pollution and traffic we need to begin with optimizing the supply chain processes that occur on our globe every day and night. This purpose also serves every citizen by reducing everyday traffic congestions. Even minor savings produced by optimizing transportation problems are significant from the cost point of view. This paper shows recent advancements in solving the Vehicle Routing Problem (VRP) which has direct applicability in the industry. We present state-of-art machine learning and deep learning algorithms for solving VRP and Dynamic VRP where the latter makes use of simulation techniques to bring the problem near to real-world like scenarios. In the end, we propose future directions that can be further explored: a generalization of methods for arbitrary input network and the problem of multi-agent setting in non-stationary environments.

Keywords: vehicle routing problem, machine learning, deep learning, multi-agent reinforcement learning

Introduction

Logistics plays a crucial role in the sustainable development of the competitive world economy. At the same time transporting massive amounts of people and goods takes its toll on the natural environment negatively affecting pollution, noise, and traffic congestion. Hence supply chain processes have such an impact on the environment, optimization of such processes is crucial.

Intelligent transportation systems (ITS) are a collection of technologies whose goal is to increase the security of road traffic participants, the effectiveness of transportation systems, and preserving natural resources. The following paper presents problems related to processes involving delivering products to customers. Supply chain optimization is one of the toughest challenges among all enterprise applications of data science and machine learning. Solutions for Vehicle Routing Problems (VRP) minimize the time and costs of transportation processes. The VRP is one of the most popular problems in the Operation Research domain due to its practical applications. Unfortunately, most real-world problems are far more complex than the classical formulations of VRP. Hence for these methods to be used by industry, they need to be augmented by the number of constraints.

Mańdziuk (2018) groups VRP variants into two dimensions: static or dynamic and deterministic or stochastic. Behind them hides the possible applicability of specific VRP formulation and the inherent difficulty of the VRP variant. The first one is static VRP problems, where a partial solution that is forming during the algorithm run does not change after construction. The second group consists of dynamic VRP formulations. Partial solutions can change after construction (removal or addition of customer to already constructed route) due to unknown dynamic factors. The penultimate group includes deterministic VRP problems where all variables are deterministic while stochastic formulations assume that some parameters are random variables (for example customer demands or time of travel between customers). The latter one assumes also the use of some kind of simulation technique. Usually, it is a Discrete Event Simulation (DES). The hardest VRP formulation consists of dynamic and stochastic versions. Such problems need appropriate methods to be solved with.

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VRP is an NP-hard type of problem. Due to that fact, all exact approaches to solve VRP-type problems are computationally expensive. They can tackle only up to a hundred customers, therefore they are not applicable in real-world settings. Nevertheless have been designed exact and heuristic methods to solve the VRP problem, although there is still a need to improve the results for tasks with large network sizes. Toth and Vigo (2002) propose a set of exact and heuristic methods. Mentioned researchers classify algorithms in three approaches: Branch and Cut and Price, Branch, and Cut, and reduced set partitioning. Additional information about the exact methods of solving VRPTW extension of classical problem reader can find in Baldacci, Mingozzi, and Roberti (2012).

Real-world complex problems need complex algorithms. Making such methods with hand-engineered reasoning is inherently complex or even unfeasible. Machine learning methods have a lot of potential in solving complex problems without the neediness to construct complex algorithms that take into consideration multiple constraints and huge solution space. In this area with success were applied various machine learning techniques starting from pointer networks, graph neural networks, recurrent neural networks (RNN), deep reinforcement learning (DRL) methods, and ending on methods that incorporate heuristic search algorithms like Monte Carlo tree search (MCTS). A more detailed description of the mentioned approaches will be presented in the upcoming sections of this paper.

The natural extension of any single agent algorithms is a multi-agent setting. This allows for agents placed inside the environment to cooperate to accomplish a common goal which in our case is optimal routes between customers. Arising problem is that with simultaneous acting agents inside the environment (VRP network) the problem becomes non-stationary because we cannot predict how independent agents will behave. Moreover, to construct algorithms that produce solutions for arbitrary graphs we need to use better methods for training data generation. These directions will be raised at the end of the article.

Vehicle Routing Problem

The classical version of the Vehicle Routing Problem (VRP) is used to find a set of optimal routes for a fleet of homogenous vehicles (carriers) that need to serve a set of customers with routes beginning and ending at a specified depot. Each vehicle route must start and end in the depot.

The optimization goal is to find an optimal solution according to a condition, which could be the total length of routes or total traveling time. Known combinatorial optimization problem - Traveling Salesman Problem (TSP) is a special case of VRP. The problem can be extended by a set of constraints so there are several variants of VRP. The most popular constraint is a capacity limit that is imposed on a set of vehicles which leads to a Capacitated VRP Problem. Another version is Vehicle Routing Problem with Time Windows (VRPTW) which adds for every customer a time window in which the carrier needs to deliver the demanded products. Furthermore, we can apply a set of supplementary constraints like time windows (each customer must be served in the specified period), multiple depots, or homogenous vehicles (with varying travel speed). With each added constraint we receive more similar to the real-world representation of the problem.

VRP can be modeled as an undirected graph $G = (V, E)$, where $V = \{v_{0,} v_1, \dots, v_n\}$ is a set of vertices which represents customers and $E = \{(v_{i,} v_j) : v_i, v_j \in V, i < j\}$ - set of edges that correspond to the connection between customers. One of the vertices (v_0) is a depot and the problem is solved for a fleet of m vehicles. Each edge has associated a cost (time or length between customers or customer and depot) that is represented by weight c_{ij}. Additionally each customer has associated demand d_i which must be fulfilled by a single-vehicle.

In the next sections will be provided methodologies and related works examples. All methods presented in this section are based on static and deterministic environments (easier environment version).

Neural Networks

There are not many deep neural networks methods being proposed in the literature. It looks like neural networks in their classical architecture are not suited to the dynamic and stochastic type of problems due to the problem with capturing the changing structure of the underlying network or graph. It means that the goal function also evolves with time.

Vinyals et al. (2015) propose a method based on the sequence to sequence models. Sequence to sequence models map one sequence to another. The general architecture is based on two recurrent neural networks: encoder and decoder. The main goal is to map fixed-length input with a fixed-length output but input and output lengths do not have to be the same. Encoder network reads input sequence and then preserves knowledge about it in a vector representation.

The decoder takes encoded information and converts it back to the output sequence. Mentioned researchers introduced a Pointer Network model which finds near-optimal solutions for Traveling Salesman Problem (TSP) in a supervised setting. The presented algorithm has a big limitation connected to supervision. It prevents the Pointer Network from finding better solutions than presented in the training data.
Nazari et al. (2018) propose a method based on the Pointer Network model. Their neural network was trained with the use of the deep reinforcement learning technique. They propose to get rid of the encoder network from the Pointer Network model. They argue that there is no meaningful order in the input set for combinatorial optimization problems. They use RNN to model the decoder network with dynamic elements added to the attention layer. Computational experiment was performed on synthetic data generated from following set up: node locations and demands were randomly generated from uniform distribution in the unit square $[0, 1] \times [0, 1]$. Authors claim that their framework has the potential to be extended to multiple depots or multiple vehicle problems. Adding competition or collaboration among the vehicles (agents) would be an extension in the multi-agent reinforcement learning direction.

Graph Neural Networks

The use of Graph Neural Networks (GNN) for solving Vehicle Routing Problem is a relatively fresh and emerging direction of research. There is increasing interest in GNN, one of the firsts papers concerning this area emerged in 2019. From there only a few tried to apply such models to combinatorial problems (Lemos et al. (2019)).

Prates et al. (2019) show, that GNN can be used with little supervision to solve TSP. The idea behind GNN is the following: network assigns to each vertex a multidimensional embedding and then performs message passing task from embeddings to their adjacencies. Vertices aggregate incoming messages and pass them to RNN. After many message passing interactions, the model is asked to decide whether a specific route with cost $< C$ exists. The maximum number of cities used in the training dataset was 40. Model degenerates for graphs with many cities $n \approx 75$.

The most recent paper concerns merging an idea of GNN with Monte Carlo Tree Search (GNN-MCTS). MCTS is recently very popular since it uses in AlphaGo (Silver et al. (2016)) and other DeepMind algorithms related to decision problems. The core idea of Xing et al. (2020) is to convert classical TSP to a tree search problem. Authors claim that this is the first use of GNN and MCTS in one model for solving TSP. The synthetic instances generator used by researchers was from DIMACS TSP Challenge (Johnson et al. (2001)). This method produces "random" instance of n cities uniformly distributed in the $[10^6, 10^6]$ square and "clustered" instances that include n cities clustered into $\frac{n}{100}$ clusters. Their method produces shorter routes than other machine learning methods.

Reinforcement Learning

VRP type problems can be view as choosing the optimal sequence of decisions for the given graph. This approach is the most popular among the machine learning techniques for solving VRP. From the reinforcement learning perspective usually, the state of the environment is seen as a partial solution of the instance and each node features, the action is seen as a choice of next customer to visit, the reward is the negative route length and the overall policy corresponds to strategy given by the neural network. Attention models (AM) are increasingly more popular in routing-type of problems. Because VRP can be seen as a sequential decision making problem, an effecting framework to apply in this kind of setting will be encoder-decoder architecture. Peng et al. (2020) propose a Dynamic Attention Model (AM-D). The solution is gradually built by the decoder. Because the state of the network changes with each algorithm step hence feature embedding of all vertices should be changed dynamically. At each algorithm step new instance is being constructed from the remaining customer nodes. Proposed by researchers method has good generalization performance. This is related to solving subproblems at each step of learning.

Multi-agent Reinforcement Learning

All formerly presented papers focus on machine learning single-agent setting where the environment is stationary (which means what in every step agent knows what was the previous state of the environment). There are not many research articles regarding multi-vehicle VRP or generally speaking multi-agent setting. In history, there were many attempts to challenge this problem but there is still a need for better and reliable solutions. Deep reinforcement learning provides a great framework for solving decision problems in dynamic environments.

Zhang et al. (2020) undertook the task of solving multi-vehicle VRP with soft time windows. Introducing multiple vehicles into the problem creates few difficulties: coordination of multiple agents inside a time-dependent environment, incorporating soft time windows into the framework, the algorithm should be scalable and should reach

good results with acceptable computational effort. They propose a multi-agent attention model (MAAM) to solve MVRPSTW. In the beginning, they build an encoder-decoder system with multi-head attention layers to compute routes for vehicles iteratively. Agent state consists of vehicle location and remaining capacity and environment state – from unvisited customer and depot location. Agents observe state from the environment and other vehicles. Next, their method proposes to handle communication between agents and customers. Test data is generated from a uniform distribution $[0, 10] \times [0, 10]$ where instances have from 20 up to 150 customers. MAAM outperforms Google OR-Tools and known heuristics for MVRPSTW. Researches state at the end of the paper, that a more challenging task will be to generalize the framework into online problems, to address real-time requests (like adding or removing a customer during the process) as well as stochastic traffic conditions.

Vera and Abad (2019) proposed an actor-critic (A2C) model which takes into account multiple vehicles with heterogenous capacities. Their trained model, unfortunately, falls short of Google OR-Tools. In their VRP definition vehicles cooperate to satisfy the customers. All agents have an independent internal policy and state with the use of shared information between all agents. This means that in each time step state of the environment is the same for all vehicles. Because agents consecutively take action, the environment is stationary for all vehicles. This makes the problem simpler because the agent only needs the last environment state and can omit other agent actions. Authors say that interesting research could be conducted to explore the non-stationary environment setting, where agents take simultaneous actions at each timestep. Then environment state is not preserving all information, because the state will be different immediately after the agent acts (because another agent will act at the same time). This kind of formulation needs a communication framework for agents to prevent the situation when multiple vehicles go to the same customer. Hernandez-Leal et al. (2017) provide an exhaustive overview of modeling non-stationary environments in multiagent reinforcement settings.

Other related papers with multi-agent settings include Silva et al. (2019) which uses a multi-agent framework with metaheuristics for VRPTW. In their formulation agents are cooperative and communicative. Carriers between each other can share a solution for the rest of the agents in the system. In their setting agent is independent and share information with others to learn via interaction. Authors propose a novel and flexible solution for combinatorial optimization problems called Multi-Agent Architecture for Metaheuristics. Results show that agents learn from interaction and that behavior directly impacts the quality of the solutions. Results are very promising and deserve a closer look. Authors share their interest in applying such methods in the non-stationary environment.

Dynamic and stochastic settings for VRP will be discussed in the following section.

Dynamic Vehicle Routing Problem

Dynamic Vehicle Routing Problem (DVRP) is a stochastic transportation problem. Kucharska (2019) states that Dynamic VRP is one of the most important problems in the transportation domain. DVRP is focused on representing more real-world system behavior by introducing dynamicity and stochasticity to the problem. The dynamic appearance of new customers, stochastic travel times, or event-based vehicle availability are bringing problem formulation closed to real-world. The most popular aspect of DVRP is the changing availability of the customers. Kucharska states that we can distinguish following dynamic parts of DVRP:

- dynamic consumers - the information about customers is revealed gradually and concurrently with actual route execution. In particular, the changes regarding consumers are related to dynamic requests, dynamic localization, dynamic demands, dynamic customers' availability,
- dynamic order time - including changes in required by the customer serving or delivery time (customers usually speed up the serving or delivery deadline),
- dynamic travel - travel times can be time or environment-dependent, e.g., weather or traffic conditions delay arrival at the given customer,
- dynamic service times - the planned repair time may change depending on the problems identified on the site.
- dynamic vehicle availability, including unexpected events like vehicle breakdowns;

DVRP is closely related to simulation. To apply random changes to the environment some kind of simulation method must be used. DVRP is well suited for Discrete Event Simulation as changes show up according to discrete time steps.

There are not many papers regarding the application of machine learning techniques to DVRP. Waldy and Hoong (2020) wrote an article about the dynamic addition of new customers while the agent is already on the route. Their idea was to combine the Simulated Annealing (SA) method with reinforcement learning. During training, the model is learning based on historical data to which were applied dynamic changes (removing and adding orders) to simulate additions or removals of customers. Learned neural network approximates value function which is used by SA to update the routes on the fly.

Świechowski and Mańdziuk (2016) proposed a novel method with the use of MCTS for dynamic CVRP problem. Baseline CVRP was extended with random events that correspond to traffic jams on the road. Traffic jams can be applied to a single connection in the network between customers or depot and the customer. The occurrence of such an event causes a temporal increase in driving time via this edge. Traffic jams can occur at any given timestep with a certain probability. The author's approach is similar to the human way of thinking while solving such problems. Using the predefined set of actions whose purpose is to alter routes and based on the idea of checking possible scenarios that emerge from applying those actions agents behave 'human-like'. Their paper is the first attempt to use Upper Confidence Bounds applied to Trees (UCT, the extension of MCTS method) in the domain of dynamic transportation problems. UTC performs multiple simulations to check which action will produce the best payoff. Results are confronted with a fine-tuned Ant Colony Optimization algorithm and the static solution and their solution is better in 22 out of 30 cases. Experiments were conducted on test instances consisting of up to 150 customers. Researchers conclude that method gives promising results for further research in other types of stochastic transportation problems and beyond.

Table 1 presents a summary of surveyed recent papers that address different VRP variants with methods that were used to solve a particular version of the problem.

Table 1: VRP variants and machine learning methods

Variant	Methods
Static	• Pointer Network - Vinyals et al. (2015) • Pointer Network with DRL - Nazari et al. (2018) • Graph Neural Network - Prates et al. (2019) • Actor-Critic Model - Vera and Abad (2019) • Multi-Agent Architecture for Metaheuristics - Silva et al. (2019) • GNN with Monte Carlo Tree Search - Xing et al. (2020) • Dynamic Attention Model - Peng et al. (2020) • Multi-agent Attention Model – Zhang et al. (2020)
Dynamic	• UCT, the extension of MCTS method - Świechowski and Mańdziuk (2016) • Simulated Annealing with RL - Waldy and Hoong (2020)

Future Directions

Having in mind previous considerations and analysis of existing works we can say that Dynamic VRP is very important from the perspective of bringing better supply chain routes to the industry. We have found that the integration of deep learning into vehicle problems can bring this research area to a new level. It looks like the most promising research direction would be a multi-agent setting with nonstationary environments and collaboration. It would give us some more insights on what agents can do while sharing information about changing environment and cooperate to collectively solve the task the best possible way. Pierzchała and Czuba (2020) proposed a framework for using reinforcement learning in a multi-agent setting. One of the most promising directions could be to implement a solution that combines both worlds – multi-agent, stochastic, and dynamic VRP. This direction is promising from the real-world application point of view. Additionally, since applying DVRP in practice is an inherently hard problem in its very nature, simulation frameworks (like Discrete Event Simulation framework, Pierzchała, and Najgebauer (2016)) should be an almost integral part of future developed methods to achieve consistent applicability of stochasticity in transportation problems. That will ensure the stochastic element in the system. A further step forward, the prospective application of the above methods will be an area of research on autonomous vehicles. We think, an open and expandable framework dedicated to teaching, research and testing via simulation should enable comprehensive investigation of agent-based autonomous systems. Key features of the framework might be: the ability to learn and change agent behavior during simulation and the extensibility of the algorithms for agents. On the basis of experiments in such environment, some behaviors and characteristics of autonomous systems might be assessed as correct and accepted to implementation, while other should be modified or removed.

Conclusion

We presented in this paper a review of the use of Machine Learning methods in transportation problems. We looked at the problem from multiple angles (static, deterministic vs dynamic, stochastic formulations) and techniques. Machine Learning methods are becoming increasingly popular and are used in complex scenarios, where the implementation of hand-crafted algorithms is very hard or even unfeasible. They give a unique way of creating

algorithms to solve complex problems without explicit hand-engineered reasoning. ML methods have great applicability and give very promising results in transportation problems, even in dynamic ones. The authors of this paper will continue research to improve the mentioned problems.
Table 1 shows that there is a strong interest in static and deterministic versions of the VRP problem. Although dynamic variant is more useful from the applicability point of view it is under-explored by the researchers in the field. The main focus should be directed to dynamic and stochastic routing problems as they give the premises to be used in real-world applications and make a difference from the sustainable development point of view.

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Stereotypes and Values Related to Gender in Business

Monika RÓŻYCKA
Faculty of Economic in Szczecin, WSB University in Poznań
Szczecin, Poland, monika.rozycka@wsb.szczecin.pl - corresponding author

Ireneusz MICIUŁA
Department of Sustainable Finance and Capital Markets, Faculty of Economics, Finance and Management, University of Szczecin
Szczecin, Poland, ireneusz.miciula@usz.edu.pl

Abstract

The aim of this article is to analyze and discuss the socio-cultural barriers related to entrepreneurship. At the same time, an attempt was made to show the connections between gender stereotypes and values. The article distinguishes female values against male values and determines their significance for functioning in the business world.

Keywords: Stereotypes, Values, The Concept of Female Values in Business, Entrepreneurship, Economy.

JEL classification: A13, D1, D61, G41, J7, K38.

Introduction

Women often do things differently and for different reasons than men, and for different reasons than men (Carter et al., 2006). It would be difficult to agree that the gender criterion does not cause enlargement and does not enrich the field of business and economic considerations. It is a determinant which should be given increasing importance in business analyzes. There are at least a few premises that may constitute the basis for the conclusion that gender differences will also translate into differences in the approach to the economy-management-entrepreneurship triad. Research shows that the same behavior of men and women can be treated in completely different ways and assessed according to a different, subjective scale. “The subtle influence of gender on our perception may be different for everyone, and gender may influence our actions both consciously and unconsciously” (Wojciszke, 2002). Undesirable or irritating behaviors of a person of a different sex in a group of men are perceived much more negatively than similar behaviors that characterize members of the same group. In other words, in the case of people outside the group, there is the so-called the polarization effect or the effect of a homogeneous foreign group, with which the tendency to judge these people to an extreme correlate usually. Bogdan Wojciszke formulates the view that an employer who opposes the so-called aggressiveness in women, in a situation where their occupational position requires them to have such a feature, places them in a situation with no solution. They face the risk of losing their job both when they behave aggressively and when they do not show such aggression. The perception of women through gender-related characteristics and skills is known as "paragraph 22". It is also known as a vicious circle or a double dilemma, which means that in the area related to professional activity, women can be punished for displaying typically feminine features. The backslash effect, however, is based on the fact that when displaying typically male features, women are also assessed poorly because these features do not match their stereotypical image (Różycka, 2019).

Literature Review

The word "stereotype" was first used by Walter Lippmann (1889–1974), an American writer, journalist and political commentator, who in his book Public Opinion (1922) described stereotypes as persistent and resistant to change thought patterns. Shared by a large number of people, they result from prejudices and, according to Lippman, are negatively evaluating, false and emotionally tinged (Lisowska, 2011). Both Lippmann and Gordon Allport (in 1954), who advocated a similar view of the stereotype, concluded that, as a result of a strong emotional tinge, beliefs about others would persist even in the presence of data that contradicted them.

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Stereotypes associated with mis-generalization, schematisation of thinking or unjustified categorization will sustain prejudices and be a factor that inhibits change. On the other hand, considered to be part of common human beliefs derived from cognitive processes, stereotypes are currently considered not only as more or less negative generalizations, mental images, mental constructions, unsupported by experience or deeper knowledge, but also as a lesser or lesser phenomenon. or more positive. Human cognitive abilities are limited, and multiple empirical studies have confirmed Gordon Allport's hypothesis that "the human mind must think in terms" (Wojciszke, 2002). The heterogeneous and chaotic amounts of information that constantly bombard us make it necessary to simplify it (Kadłubek & Miciuła, 2019). According to the "cognitive miser" approach, in everyday relationships with others, stereotypes relieve the cognitive system and facilitate orientation in a complicated reality. Thus, it is indicated that stereotypes play an adaptive role, justifying the individual behavior, social system or behavior of the group with which we identify. By enabling faster processing of information and classification of phenomena, they fulfill the function of integrating a given community and contribute to positive changes. Thus, stereotypes can be used not only to depreciate, but also to affirm the characteristics of a given group or community. Schemas or stereotypes facilitate contacts, speed up the concretization of conclusions, and help to remember patterns of social interactions. This type of activation occurs quickly, automatically and spontaneously. Today, there is a mosaic of cultural and social stereotypes, many unconscious assumptions that are unknowingly made about gender. They are indicated as barriers to the professional development of women.

Heidi Rozen – case study

No one will ever admit - as Sheryl Sandberg believes - to stereotyping based on gender, but that's what we do. Francis Flynn, Cameron Anderson and Sebastian Brion conducted an experiment to check how men and women are seen in the workplace. The study involved MBA students from New York University, who were provided with a case study material - a description of the career of a businesswoman Heidi Roizen. Some students got a success story with a female name Heidi, others the same story with a male name, Howard. The participants of the study were to assess the impressions that Heidi or Howard evoke in them, and such features as kindness, good-naturedness, ambition, tendency to manipulate, caring and others, stereotypically considered feminine or masculine. The group of respondents - having exactly the same information about Heidi and Howard - perceived Heidi as "a selfish, less polite and benevolent person" than Howard, but "more assertive, power-hungry and prone to manipulation", with whom " you'd rather not work and you'd rather not hire her "(Sandberg, 2016). Both women and men found Heidi competent, less predictable, and more Howard, in turn, was assessed as "an equal guy with whom you can get a beer" (Brzezinski, 2012). The evaluating men were more critical of a woman than a man. In turn, women criticized both women and Interestingly, although the group of respondents previously firmly declared that they certainly do not treat women differently, the confrontation with their own subconscious prejudices was also a big surprise for them.

The above case of Heidi Roizen exemplifies that women - unlike men - experience the challenge of their professional competences much more often than men with the same responsibilities. The same actions, when the only difference was gender, may evoke completely different impressions, feelings and emotions in the respondents. Not only employers and students are subject to stereotypes, but also from the point of view of clients or consumers, women can be treated through the prism of gender. A business e-mail sent to one of the clients by Martin R. Schneider, who signed himself as a friend named Nicole, was treated very differently than if it had been sent by a signed named Martin. The experiment, which was continued for two weeks, showed that the client - convinced of exchanging correspondence with a woman - constantly challenged her competence, was rude and had higher expectations than usually for a sender who was a man.

Stereotypes can be misguided, for example, when we attribute too little or too much trait to a given group, or when we underestimate the group's variability in terms of a given trait. Misconceptions about valence are common, where the incidence of negative traits is overestimated and positive traits are underestimated, or vice versa. With regard to femininity, the problem may be related to the low - as until recently - value ascribed to female features, and higher to male features. One can also focus on different types of group misconceptions when individuals are assigned group traits that they do not really have.

The concept of cultural gender roles

The concept of cultural gender roles assumes that strong definition of gender begins at birth by differentiating and grouping children by gender, reinforcing gender expectations, and treating boys and girls differently by parents, teachers or other people. The results of the research show that men behave differently towards their daughters, to whom they pay more attention and react faster to their crying and calls. In contact with them, they use a more emotional language. With their sons, on the other hand, they more often engage in dexterity games and use

statements focused on strength and achievement (Mascaro et al., 2017). On the other hand, there are studies that show that girls in infancy are more interested in looking at other people's faces than at moving objects and are more likely to make eye contact, which is considered a sign of the beginning of empathy. For thirty years, the phenomenon of a little girl affectionately comforting another person has been observed (Pinker, 2009). Stereotypes of the social roles of women and men and professions to which representatives of a given gender are predestined, may have sources e.g. in beliefs about their cognitive abilities (Miciuła & Miluniec, 2019). In particular, in the field of the so-called the triad of differences - linguistic, mathematical and spatial, the linguistic differences between the sexes are manifested in the neurological background of earlier and faster speech development, the range of vocabulary and memory of girls. Their advantage in this area also applies to less frequent or lower degree of verbal disorders (Lisowska, 2011). Empirical studies show that women are actually better at verbal fluency, articulation, memory and better remember landmarks in the field. Men have an advantage in spatial rotation, i.e. imagining the rotation of a shape or object in two-dimensional and three-dimensional space, and orientation in the field, in particular through a mental description of a route, e.g. drive five kilometers north, then a kilometer to the east. However, it has been shown that training by playing computer games can alter the level of gender differences in this regard. A woman who practices spatial orientation is not inferior to men in these abilities and vice versa in relation to men, who may find it easier than acquiring social signals to master complicated spatial systems. By the same token, it is believed that women have more agile hands and a faster metabolism, allowing them to recover from exercise. Despite this, there are, after all, many men who can outperform women in this respect (Hofstede and Hofstede, 2007).

The differences between women and men are visible in the nature of the workplace. Nearly one-third (32.4%) of women work in the public sector, while among men it is less than 17% (GUS, 2016). It is still the case - despite many equality efforts - that more women continue to work in professions such as nurses, teachers, kindergartens and social workers. Sociologists and psychologists have long observed among women a desire for mutual altruism. Behavioral studies have shown that when it comes to sharing a certain amount of money with others, women tend to be more generous than men. Scientists from the University of Zurich explain that when women decide to do something good for other people, the striatum, the part of the brain related to the reward system, is more stimulated. This means, they claim, that women enjoy pro-social behavior. In men, the striatum is more strongly stimulated at the time of making selfish decisions. Blocking the reward system with drugs makes women selfish and men pro-social (Soutschek et al., 2017). It is indicated that women prefer such activity because they are not indifferent to the welfare of people and the general public. Some researchers also believe that men are altruistic when it comes to heroism or risk and there is a need to bring about a final solution, especially in public situations (Pinker, 2009; Sandberg, 2016).

Polish managers participating in the survey conducted by Price -waterhouseCoopers considered mining, defense and energy industries the least attractive for them - due to their specificity. On the other hand, as many as 40% of women indicated that they are open to a career in companies regardless of the sector they represent (PwC, 2015). On the other hand, according to a survey conducted among millennial adults, women less often than men agree with the statement that they aspire to a managerial position, regardless of the field in which they work (Goux, 2012). The interest of women in this professional activity, which requires frequent business trips, seems to be much lower. Subconscious beliefs in this regard manifest regardless of gender. In other words, both a woman and a male manager will hesitate to entrust a woman with a job that requires numerous journeys, and they have no such doubts in the case of a man. All the above-mentioned variables, combined with the tendency that men work full-time more often and show readiness to work overtime, combined with a greater desire to earn money - strengthen men's professional careers. In Europe, especially in the Scandinavian countries, which are pioneering policies to help women find employment outside the home, women tend to focus more on traditionally female rather than male professions (Wolf, 2015).

Career in business and gender

The concept of career seems universal today. However, the results of the Implicit project carried out by scientists from Harvard University, which consists in examining subconscious prejudices using verbal associations, show that the words "career" and "power" are still most often associated with the male attribute while "family" with a woman. This type of association applies equally to both women and men. Representatives of both sexes consider men to be more valuable employees (Implicit Association Test) (Brzezinski, 2012). In the absence of professional experience, a man is chosen as an exemplification of power, and only the acquisition of experience can verify this type of view (Delloite, 2012). Research on preferences in choosing a job indicates that more men than women prefer work characterized not only as full of challenges, giving power and influence over others, but also involving high responsibility, risk, opportunities for promotion and achievement, and high prestige. Women, in turn, tend to work that helps other people, develop their skills and abilities, and at the same time allows them to spend more time with their families. they are in power in the sense of prestige and social position. They often define their masculinity

themselves through power and money, which requires putting the professional work first. Career and professional development are more important for men between the ages of 30 and 50. During this time, the man has to prove to himself that he has been successful. An analysis of highly qualified women in the US showed that only 15% of them chose an influential position as an important goal in their careers. Some educated women now choose a compromise that allows them to combine three priorities: work, being faithful to their own values and time for the family. Therefore, it happens that they are more interested in achieving satisfaction from being guided by individual preferences and fulfilling the role of a mother. They do not want to put a career above the family and pay less attention than men to the characteristics of high-level jobs, such as high salaries, power and prestige. Moreover, although times change, there is still some pressure from society that women should think about marriage and marriage from an early age (Sandberg, 2016).

Women more often than men emphasize the importance of health (about 91% of respondents), family, family happiness (about 85%) and love (21%), the level of qualifications achieved, while men usually pay more attention to well-being, friendship and patriotism. (GUS, 2016). Education indicators inform that women - unlike men - attach more importance to education and raising the level of education, which is confirmed by earlier data on the percentage of university graduates.

Research Results

The analysis of literature and empirical research makes it possible to identify the catalog of women's values, i.e. values chosen by women as their priorities and preferences, on the basis of which they function and which they present in external relations. It is a set of areas and spheres of activity that the average woman considers and considers valuable, i.e. desirable and good, and will give them a positive value. These are women's choices and decisions made based on their inclinations and preferences. These values are not related to race, age, social class, place of residence, or other such variables. They embrace the range of traditionally and stereotypically understood interests towards which women, in the public opinion, as well as women themselves - provided that their interests are correlated with the general public perception - are particularly inclined to understand the choices they make in Than the choices made by the male gender in economic, economic, social, educational and social terms. These are the things that the average woman values, prefers and considers more important - chooses before others. According to Sandra L. Bem, they contain a stereotypical network of associations and beliefs directly related to gender, concerning, for example, division of labor (Kuczyńska, 1992).

These values are not constant and may be temporally changeable, susceptible to cultural changes in the history of history, although the process is evolutionary. The values of women on the professional ground depend on external conditions - more or less favorable to the possibility of taking up professional activity, which has significantly accelerated in the last century. Women's values constitute a catalog of things to which a statistical woman assigns a positive value (good value), among them are the values listed in table 1.

Table 1: Catalog of stereotypical values of women

Number	Catalog of stereotypical values of women
1	Family, home and children - understood in the context of starting and having a family, feeling emotional comfort and maintaining family warmth
2	Help, care and health - understood as caring, helping and caring for the family, especially for children, the sick and the elderly
3	Security and altruism - in relation to the so-called sense of security in professional and personal life and greater selflessness, understood as the choices of those areas with which women can identify themselves in terms of family, moral and humanitarian aspects important to them
4	Education - that is the emphasis on continuous improvement of the level of education

Source: own study.

In turn, the areas particularly desirable, considered to be things that men give positive (good) value, are in particular the values identified in table 2.

Table 2: Catalog of stereotypical male values

Number	Men values catalog
1	Career and power - understood as the pursuit of a career in the context of striving for professional advancement and the company's success on the market, and power in the sense of holding, exercising leadership and prestige
2	Material status - that is, taking care of its appropriate level, achieving prosperity, luxury, in connection with the above-mentioned social domination
3	Winning and risking - understood as winning, defeating others, feats or success
4	Higher self-esteem - for men, greater care and concentration on a positive self-image and belief in their knowledge and values

Source: own study.

There are values that can be seen as common to women and men. These include social justice, understood as respect for the rights of social minorities, i.e. the poor, the excluded, the disabled, protection of animal rights, ecology and environmental protection, or others, related to the pursuit of more or less sustainable development, balance and harmony in life personal and professional (work-life balance). Research shows, however, that the above-mentioned categories are still considered less neutral, and more typically feminine - especially those related to work-life balance, preventing social exclusion or discrimination (Gerzema & D'Antonio, 2014). Although every human being tends to be guided by stereotypes, not everyone will succumb to them. The increased likelihood of prejudice against other people is associated with cognitive rigidity, the inability to change the established order, and the tendency to primitive and rigid structuring of perceptual areas, and has also been observed in people intolerant to ambiguity.

Gender stereotypes at the individual level among men may be determined by aversion to women, which is usually associated with alleged admiration for them. These types of negative emotions are often learned during early childhood socialization and can therefore be so ingrained that they are not very susceptible to change. The motivation of men consists of three determinants that permeate and reveal to a greater or lesser degree: first, paternalism, which includes elements of protectionism and domination; second, the identified own gender identity and the related desire for complementarity and, at the same time, competition with a woman; third, the power of heterosexual attraction and its two faces - the pursuit of intimacy and the intensification of hostility.

Today, people still feel less anxious and defend themselves less against the label of sexist than that of the racist. It is not uncommon to find statements that express opposition to affirmative actions in favor of women. Arguments are used that women receive a disproportionate amount, that they are trespassing places where they are undesirable, or are too violently seeking change. Due to the prevailing social climate, which to some extent prohibits the expression of sexism, the need for cognitive consistency may lead modern neo-sexists to adapt negative emotions to the egalitarian behavior they are forced to do. In the long run, therefore, there is a basis for moderate optimism in this regard, provided that there is a favorable political ambivalence, primarily racist, paraphrased norm: "A good man cannot be sexist, and a sexist cannot be a decent person" (Macrae et al., 1999).

Theories and research on stereotypes indicate that the processes associated with them can be controlled and stereotypes can change. Currently, we are participants in the process of wide transformation, as there are profound changes in the gender roles of women and men. For example, the strictly patriarchal family model in which the traditional roles of the middle class were simple - the woman took care of the house and the man earned his living - is a thing of the past. Thus, the historically and culturally determined position of women in the labor market and in business is changing. Unlike women - organizing in response to patriarchy and androcentrism - no movement has yet emerged to update the role of men in society. With men today considered less educated than their fathers, women make up the majority of university graduates - all their possible new roles seem to threaten the traditional view of masculinity. A man who according to Philip Zimbardo takes all possible alternative roles, is less respected by other men, has fewer opportunities to develop relationships with women. Especially in the situation of the emergence of a new category of women, who, however young, are more mature, and at the same time attractive, well-educated, focused on achieving their goals, and in addition financially independent. These women - as Zim¬bardo argues - have more than men overworked with clearly defined goals or awareness of basic social skills, and men simply find it difficult to get along with these women. Previously award-winning traditional male role models: the ability not to express emotions, to be tough, strong and dominant, no longer work. The ongoing changes mean that we can deal with a certain crisis of masculinity, which culturally tends towards recognizing that a man is no longer an icon of versatile agency - after all, men are told that you can and even know how to cry, but at the same time mass culture does not allows them to do so (Zimbardo & Coulombe, 2015). Attributing traditional masculinity to a wider set of feminine traits is intended to defend and enhance the feminine subject. Excessive glorification of femininity carries the risk of generalizing stereotyping, which may give the impression of strengthening the stereotype, but in a broader perspective, it should contribute to increasing the strength and appreciation of women.

Summary

The doctrine proposes many solutions for stereotyped people, and in this case, women themselves are undoubtedly the most influential in shaping the image of women. Scientists have shown that in both individual and group situations, women should emphasize the positive aspects of their gender identity. It is important to emphasize the functions performed as a manager, leader or acquired education. Moreover, repeated contact with people who deny the characteristics considered stereotypical, may lead to the disappearance of the stereotype. Changes occur when the observed outcomes, such as the success of a woman in a male-dominated occupation, are attributed to the characteristics of the perceived person or group - in this case it may be a learning mindset, skill improvement or multitasking, which is then generalized. on the entire population. Importantly, however, if any external reasons for the observed result are available or emphasized, such a generalization does not occur. If, therefore, the success of women is attributed to the implementation or assistance of special programs, traditional beliefs about them, rather than changing, will be reinforced.

An effective method of fighting negative stereotypes is associating them with socially recognized values, such as team work, building empathy and trust. In this case, the values symbolize the generalized notion of other, undefined third parties who may or may not approve of certain behaviors. Stereotyped people should try to evoke the clarity of those values that most people recognize, even if they do not always act accordingly. The expressiveness of commonly recognized values is conducive to radical changes in social norms that determine the appropriate manner of expressing gender attitudes (Macrae et al., 1999). There is no doubt that people who have activated positive values try harder to act in harmony with them. It is therefore worthwhile for stereotyped groups to remind others more of these common values, even during interviews or at meetings. This should trigger the best instincts in others, since referring to values is correlated with a greater willingness to conform to them. In connection with the above, another method may bring great effectiveness, namely assigning features related to the female gender to the qualitative, good categories, which should force the verification of negative and simplified stereotypes. An important role in this respect can be played by institutions, media and organizations, including professional ones, which, by including gender exposure in their messages, should avoid negative stereotypes and promote the values represented by a given gender, targeted at a wide audience.

In conclusion, it is difficult to make unequivocal conclusions regarding the determinants of differences between the sexes: to what extent they are inborn, and to what extent they result from the socio-cultural environment and are a consequence of upbringing, different expectations towards both genders and stereotypes. Cultural and social patterns and stereotypes have a strong influence on the gender sets of traits. We are not biologically programmed or designed to travel through the air or under water, yet we overcome the limitations of biology and explore different kinds of space, or at least try to do so. Since in many areas - despite the existence of evolutionary grounds for a different behavior - we manage to change these biological determinants, we can, thanks to greater awareness, try to change knowledge in the field of socio-cultural expectations towards women and men so that both one and the other and the other sex could easily pursue the goals they chose.

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Actions and Strategies on Hotel Websites: Case Study Of 4- And 5-Star Hotels in Porto And Northern Portugal

Elga COSTA[1], Fernanda A. FERREIRA[2], Joaquim RIBEIRO[3] and Daniela MENESES[4]

[1] Polytechnic Institute of Porto, School of Hospitality and Tourism (ESHT), CiTUR researcher (Centre for Tourism Research, Development, and Innovation), Vila do Conde, Portugal, elgacosta@esht.ipp.pt jribeiro@esht.ipp.pt

[2] Polytechnic Institute of Porto, School of Hospitality and Tourism, Applied Management Research Unit (UNIAG), Vila do Conde, Portugal, faf@esht.ipp.pt

[3] Polytechnic Institute of Porto, School of Hospitality and Tourism (ESHT), CiTUR researcher (Centre for Tourism Research, Development, and Innovation), Vila do Conde, Portugal, jribeiro@esht.ipp.pt

[4] Polytechnic Institute of Porto, School of Hospitality and Tourism (ESHT), Vila do Conde, Portugal, dbm@esht.ipp.pt

Abstract

The investigation focuses on the identification of actions and strategies that hoteliers apply on their websites, to capture direct bookings versus their dependence on the OTA, to evaluate the importance and function of the websites of the 4- and 5-star hotels in Porto and Northern Portugal. Online distribution is a necessity for a hotel, either to reach the largest number of customers or to give visibility to the brand. Hotel websites, however, allow greater proximity and communication with the customer, potentiating hotels' possibility to increase direct bookings. It is therefore necessary to understand which actions and strategies hoteliers must consider for capturing direct bookings.
Thus, the main objective of the study is to identify the hoteliers' dependence on the OTA and the consequent actions and strategies they apply on their websites to capture direct bookings.
In the present investigation, the quantitative methodology was chosen, and the data collection instrument was a questionnaire survey, applied in a total universe of 150 hotels, 4- and 5-star hotels in the Region of Porto and Northern Portugal, where 55 responses were obtained. The data obtained were treated and analysed using the SPSS software.
The results obtained confirm the existence of actions and strategies in hotels to capture direct reservations; hotels consider these strategies as an essential condition for increasing direct bookings.
Limitations have arisen in the collection of questionnaires due to the Covid-19 pandemic. Most hotels closed due to lack of customers and consequently, the sample for the present study is limited in the diversity of the typology of respondents. It is intended with this work to understand what actions and strategies hotels apply on the website, as well as to understand if hotels follow the new technological trends, in what the contact and communication with the client concerns.

Keywords: online distribution, hotel website, 4- and 5-star hotels.

Introduction

With the technological evolution and sales of hotel rooms to be made mostly through the internet, it is necessary that the hotel units are present in the different distribution channels and that they have a website with the possibility of direct bookings. The internet thus presents itself as an innovative and high-reach marketing tool, enabling one-to-one marketing, requiring greater creativity in the approach of customers and potential customers.

The distribution and online presence are an important and essential component for the commercial success of the hotels and aim to get the product to the end customer, so that the end customer makes a reservation and, when arriving at the hotel, this reservation turns into a real sale.

The internet has revolutionized hotel distribution (Chatterjee and Wang, 2012) and hotels have had to adapt to each of these new paradigms, as well as customers, who today plan and share information more easily.

Hotel websites can be especially important marketing tools and an effective distribution channel, as all content is controlled by the hotel (Hayes and Miller, 2011). They are also important sources of information for electronic

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marketing, namely about the number of people searching the website, their area of residence, their search time on the page and where the search ended. In a way, they are important providers of customer information because they provide important data for the customization of offers (Toh, Raven and DeKay, 2011).

Online distribution channels, such as OTA and GDS, are in some cases important media outlets for reaching a particular customer (Hayes and Miller, 2011). Many customers search the distribution channels for information about the hotels and later look for the hotels' websites to make reservations, if they find advantages, free parking, movies, or breakfast, end up making their reservation via the hotel's website or call centre (Toh, Raven and DeKay, 2011). It is therefore important to understand whether hotels implement different actions and strategies on their websites to attract customers and increase direct bookings.

This research is organized by different sections: Section 2. Literature Review; Section 3. Methodology followed by Section 4. Analysis of results. Finally, in Section 5. Conclusions, limitations of the study and guidelines for future investigations.

Literature review

Today, most hotel units have an online presence, providing the client with a website with information about the hotel, location area and points of interest, hotel images, rooms, services provided, prices for different times or days of the year, contacts (telephone and email), offers and special promotions and online reservations.

According to Lindon (2008), online presence presupposes four dimensions: traditional presence, through informative websites; the presence on websites, for interaction in communication with users, being collected information and opinion of potential users; forms of e-commerce, including websites; and the application of virtual distribution, applied to intangible products and goods, enhancing the speed of delivery of products or services.

Technological innovations are an indispensable tool in the hospitality sector to succeed, according to Zafiropoulos, Vrana and Paschaloudis (2006) (Cit. by Inversini and Masiero, 2014). Online distribution has been changing from traditional channels to online channels, stimulating disintermediation. However, Christodoulidou Brewer, Feinstein and Bai (2007) identify the five major problems and challenges for hotel distribution: i) Control of rates; ii) Staff training; iii) Customer loyalty; iv) Interface of the hotel's website; v) Control of the hotel's image and brand.

According to a study by Deutsh Bank Securities (Cit. by Cunha and Abrantes, 2019), it is estimated that by 2020 mobile hotel reservations will triple worldwide. The European Commission study (Cit. by Cunha and Abrantes, 2019) states that "Europeans, when deciding to make a trip, 58% organize it and book individually, 21% buy a group trip, and only 23% use travel agencies to organize their trip".

In order for the conversion rate of direct bookings to be increasingly effective and for the communication strategy to be factual, hotel units on their websites must take into account key points to facilitate this process, such as: quality website design (Wang, Law, Guillet, Hung and Fong, 2015), with the production of quality content, text, photos, videos or mixed formats (Costa, 2017); intuitive mobile platforms – user-friendly (Costa, 2017); optimization and facilitation of the purchase process on the website (Costa, 2017); offer the best rate (Toh, Raven and DeKay, 2011); offer discounts or promotions to customers who make reservations on the site (Toh, Raven and DeKay, 2011); offering return-to-guest incentives (Christou, 2011; Toh, Raven and DeKay, 2011) or loyalty program (Liu and Zhang, 2014). The presence of these key points may be added value in customer relationships, as loyal customers will typically have repeat purchases and consequently attract new customers, according to Vinod (2011) (Cit. by Liu and Zhang, 2014).

The website of a hotel, according to Majó, Vall-Llosera and Moya (2020) should provide up-to-date information, reservation policies and explicit cancellations, as well as contacts to clarify questions and option for direct reservation. In a research study, Aljukhadar and Senecal (2015) mentioned site aesthetics, information quality, site interactivity and site trust, the main features that drive the attitude and purchase intentions of users on online booking.

A website, when it allows the collection of information about the customer and the execution of the reservation in a safe and reliable way, guarantees, before the OTAs, a different service and added value: the customization of reservations and offers (Toh, Raven and DeKay, 2011; Majó, Vall-Llosera and Moya, 2020).

Nevertheless, as mentioned by Kang, Brewer and Baloglu (2007), for an effective interorganizational management, it is important for hoteliers to know the mix of the chosen channels and the dependence on certain channels, since the use of multiple channels maximizes the possibilities of customer reach (Abou-Shouk, Megicks and Lim, 2013), and, at the same time, a greater number of channels increases distribution management (Kracht and Wang, 2010).

OTA emerged in the 1960s and adapted to customer needs and requirements. Today, they are powerful online distribution companies, and some cases determine that the hotelier sells most of its inventory through its channels and third-party channels at lower prices (Carrol and Siguaw, 2003). These major distributors have adapted to customer needs, offering them a user-friendly experience or mobile apps (Law, Lo, Leung and Leung, 2015; Camilleri, 2018). For their part, online booking systems have seen a significant increase in home users, who, from home, access online hotel reservations, search for local restaurants and attractions. Anyone who has a device with internet access, computer, tablet or smartphone, has access to the online services of public electronic networks. According to a study by e-Marketer (2017) (Cit. by Camilleri, 2018) 40% of the U.S. market makes purchases by mobile phones. In their study, Kracht and Wang (2010) report that when a customer does not know the hotel's website, they will use a search engine, for example Google, to find that same website.

Xiang and Gretzel (2010) mentioned the consumers are strongly influenced by the information they have collected from the internet. Hotel website quality profoundly and positively influence the consumers to booking room online (Wang, Law, Guillet, Hung and Fong, 2015).

The trust, mentioned for Ling, Daud, Piew, Keoy and Hassan (2011), is an important determinant, directly influencing the user's behavioural intentions to purchase online. Hotels must establish trust relationship with their online consumers (Wang, Law, Guillet, Hung and Fong, 2015), influencing the consumers to book online.
In a research study, Chang (2017) identified a clear link between promotions and purchase intention. Christou (2011) reveals the consumers' preferences for reward points and prices discounts, with largest impact on client decision booking intentions and Ip, Law and Lee (2012) in their study, considered reservation information as the most important criterion of the hotel website functionality.

Methodology

For the present investigation, the descriptive quantitative investigation method was applied, responses were described using means and coefficient variation. The questionnaire survey was used as data collection instrument and sent to 150 hotel units (the population of this study), from which 55 responses are obtained (the sample study). The resulting data were treated and analysed using the SPSS software. The questionnaire was divided into four parts: first part, sociodemographic characterization; second part, hotel features; third party, performance of the hotel website; and finally, the fourth part, actions, and strategies.

Descriptive analysis was used to analyse the profile of the respondents, which will show the absolute and relative frequencies. The first part of questions is related to each respondent's profile.

The sample of questionnaires collected shows that 50.9% are male and 49.1% are female. It is verified that the age groups with the highest representativeness are between 25-34 years, with 34.5%; 35-44 years, with 34.5%; 45-54 years old, with 14.5%; followed by the age group of 18-24 years, with 9.1%; and, finally, with less representativeness, the age group of 55-64 years, with 7.3%.

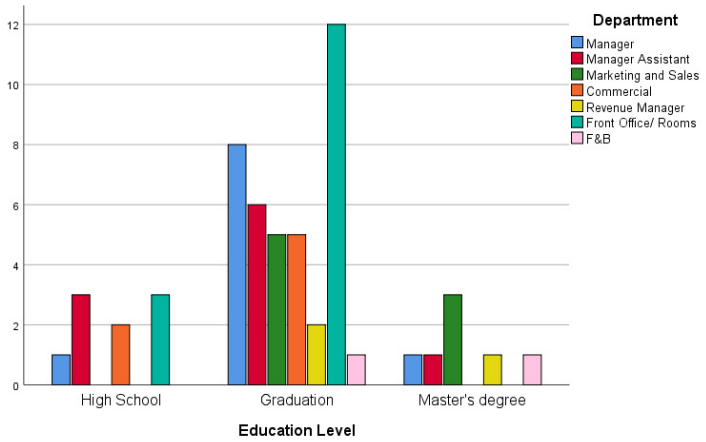

Figure 1: Department and Education level

Regarding educational qualifications (figure 1), it was found that most respondents have a higher education level: 70.9% have a degree, 16.4% have qualifications from 3rd cycle (7th to 12th grade) and 12.7% have a master's degree. Regarding the work area, it was found that most respondents belong to the front-office/rooms department (27.3%), administrator/manager (18.2%), assistant director (18.2%), marketing and sales (14.5%), commercial (12.7%), revenue manager (5.5%) and finally, F&B – food and drink (3.6%).

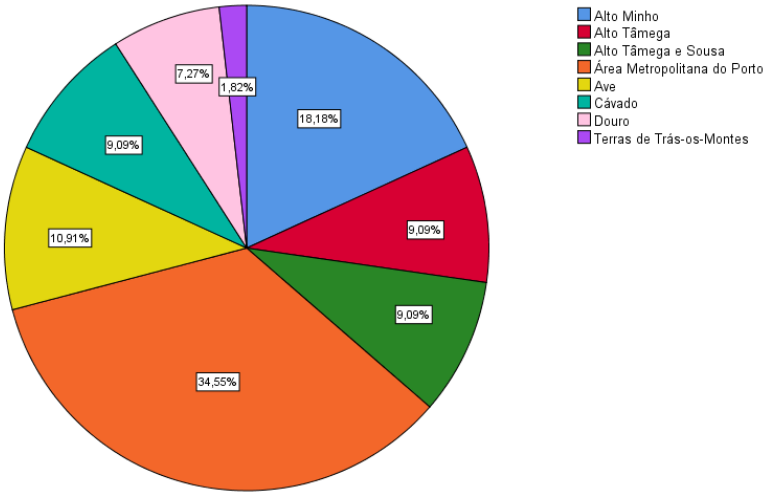

Figure 2 - Location

Regarding the location of the hotel units, according to NUT-II, Porto and Northern Portugal, it was concluded that most respondents belong to the Metropolitan Area of Porto (34.5%), followed by Alto Minho (18.2%), Ave (10.9%), Alto Tâmega (9.1%), Alto Tâmega and Sousa (9.1%), Cávado (9.1%), Douro (7.3%) and, with less representativeness, Trás-os-Montes Lands (1.8%).

The second part of questions relates to the hotel's characteristic, classification, size, core business and whether it belongs to a hotel group. Table 1 shows the frequencies for this question group.

Table 1 : Table of frequencies hotel characterization section

Classification		**N**	**%**
	4 Stars	49	89.1%
	5 Stars	6	10.9%
Hotel Dimension		**N**	**%**
	Less than 26 rooms	4	7.3%
	Between 26 to 50 rooms	16	29.1%
	Between 51 to 164 rooms	30	54.5%
	More than 165 rooms	5	9.1%
Hotel Core Business		**N**	**%**
	Individuals	35	63.6%
	Groups	9	16.4%
	Groups and Corporate	11	20.0%
Do you belong to a hotel group?		**N**	**%**
	Yes	29	52.7%
	No	26	47.3%

Regarding the classification of the hotel unit, these are mostly units of 4 stars (89.1%) and, with lower representativeness, the units of 5 stars (10.9%). Regarding the size of the hotel unit, most of the units surveyed are medium-sized - between 51 and 164 rooms (54.5%), followed by small units - between 26 and 50 rooms (29.1%) and

large hotel units - more than 165 rooms (9.1%). With less representation are the hotel microunits – less than 26 rooms (87.3%).

Regarding the core business of the hotel units, 63.6% of respondents answered that their target customer is individual customers, 20% answered that the target customer of the hotel unit is the groups and corporate, while 16.4% of respondents have as target customer only groups. Regarding belonging to a hotel group, 52.7% of respondents answered that they belong to a hotel group, while 47.3% of respondents answered that they did not belong to a hotel group.

Finally, we tried to understand if all hotels of the sample under study have a website and if it is possible to make reservations through the websites.

Table 2 : Hotel website (n=55)

	4 Stars		5 Stars	
Hotel has website?	**N**	**%**	**N**	**%**
Yes	49	100%	6	100%
No	0	0%	0	0%
Hotel website is user-friendly?	**N**	**%**	**N**	**%**
Yes	45	91.8%	6	100%
No	4	8.2%	0	0%
Do you have full access to the hotel's website backoffice?	**N**	**%**	**N**	**%**
Yes	31	63.3%	3	50.0%
No	18	36.7%	3	50.0%
Is it possible to book through the hotel's website?	**N**	**%**	**N**	**%**
Yes	48	98.0%	6	100%
No	1	2.0%	0	0%

Analysing the data (table 2), we conclude that 54 units have their own website with booking engine and that only one hotel unit has only website available. Also, Brewer, Feinstein and Bai (2006) in their study confirm the importance of websites for hotels. In the same study, the authors identify as the greatest challenges of hoteliers: i) the control of rates; ii) the formation of the team; iii) customer loyalty; iv) the control of the hotel's brand/image.

Regarding the adaptation to the website to be user-friendly, adapted for mobile devices, all 5-star hotels claimed to have the offer of this functionality available to the customer; however, in the 4-star units, 45 of the hotels in 49 respondents said they had this same functionality available. According to the study by Ip, Law and Lee (2011) it was predicted that a user-friendly site would increase the probability of selling products directly to the customer, since it allows access to the backoffice of websites, making it possible to change information whenever necessary, not being dependent on third parties. Not accessing the backoffice of websites can, in many cases, make it difficult to promote and disseminate campaigns whenever necessary.

According to the answers obtained, 31 respondents from 4-star units said they had access, while 18 said they did not have access to the backoffice. In the 5-star units, 3 respondents answered affirmatively to the question and 3 others answered that they did not have access to the backoffice.

Regarding the possibility of bookings through the site, 54 have this functionality available to the client and only one 4-star hotel does not have this functionality.

Results

The performance of the website was analysed for the present investigation, so in relation to the booking window, 32.7% of the hotel units are in the 10 days before check-in, while for 29.1% the time in advance of bookings is between 2 and 3 days before check-in. It is understood, therefore, that customers, regarding the reservations made on

the website, do not allow to define a standard time, which may vary for reasons of the client's trip, or the fact that the hotel units, in need of increased occupancy, make available on their websites "last-call" or "last-minute" campaigns to captivate more customers.
According to a study by Chen and Schwartz (2013), some customers make their reservation a week before check-in, while others make their reservation a few days before check-in with the expectation of getting better conditions (prices).

In relation to the average stay and according to the results, 69.1% of bookings are 2 nights or less and only 29.1% of bookings are from 3 to 7 nights.

According to the data of the National Institute of Statistics (INE, 2020), the average stay for the region of Porto and Northern Portugal is 1.84 nights, so the data presented are close to the official statistical results.

Analysing the results of the website online bookings it is concluded that the average rate of direct bookings with greater representativeness (54.5%) is from 51 to 100€ room/night, then followed by the value of 101 to 150€ (25.5%). The average rate of accommodation, according to INE (2020), is 87.70€ for 4-star hotels and 163.90€ for 5-star hotels. We can conclude from the data presented that the values are close to the official statistical results.

Regarding the cancellation fee for bookings from the hotel website, 70.9% of the respondents point between to 0 and 10% of cancellation rate for bookings from the website and only 23.6% point to a rate of 11 and 20%.

Table 3: Cancellations fee for bookings from hotel website

	N	%
From 0 to 10%	39	70.9%
From 11 to 20%	13	23.6%
From 31 to 40%	1	1.8%
From 41 to 50%	1	1.8%

The following group corresponds to the actions and strategies adopted on the website to attract direct bookings. In the table below the frequency table for each answered question is represented, according to the Likert Scale, in which 1 corresponds to totally disagree, 2 corresponds to partially agree, 3 neither agree nor disagree, 4 partially agree, and 5 totally agree.

Table 4: Strategies and actions for direct reserves

	1	2	3	4	5	Mean	Coefficient of Variation
There are rates only for the hotel's website.	8 (14.5%)	1 (1.8%)	2 (3.6%)	13 (23.6%)	30 (54.5%)	4.04	35%
The availability of the number of rooms is the same for OTA and for the hotel website.	7 (12.7%)	5 (9.1%)	5 (9.1%)	15 (27.3%)	22 (40.0%)	3.74	38%
The hotel's website has exclusive promotions for those who book directly.	-	1 (1.8%)	1 (1.8%)	15 (27.3%)	37 (67.3%)	4.63	13%
There is a Loyalty Program at the hotel.	6 (10.9%)	3 (5.5%)	11 (20.0%)	10 (18.2%)	24 (43.6%)	3.8	36%

Analysing the results from the table, regarding actions and strategies adopted on the websites for attracting direct reservations, it is verified that 67.3% of the hotels offer exclusive promotions for direct reservations, representing an average value of 4.63, followed by the availability of rates only (exclusive) for websites with 54.5% and average value of 4.04. With lower relevance is the loyalty program, with 43.6% and average value of 3.8, and the availability of equal inventory for OTA and website, with 40% and average value of 3.74.

These results are in accordance with different studies and authors who mention some of these analysed results. As a reference, Toh, Raven and DeKay (2011) mentioned in their study the offering of the best rate on the website or the offering of discounts or promotions to customers who make a reservation from the website as some of the actions and strategies hoteliers should follow; also, as mentioned by Liu and Zhang (2014) the presence of a loyalty program is equally seen as a good strategy for hotels.

Other authors recommend as incentives for direct reservations offering return-to-guest incentives (Christou, 2011; Toh, Raven and DeKay, 2011). The consumers prefer reward points and prices discounts, representing a large impact on the client decision for booking intentions (Christou, 2011). In a research study by Aljukhadar and Senecal (2015) site aesthetics, information quality, interactivity and site trust are considered the main features that drive the purchase intentions of customers to use online booking.

Conclusions

According to the objectives of this investigation, to identify the actions and strategies that hoteliers apply on websites to communicate with their clients and to enhance direct bookings, different considerations were observed. First, most of the studied hotels have their own website and only four hotels do not have the website adapted to the different online platforms – user-friendly. At the same time, it is also possible to note that only one hotel does not offer the option of direct reservations in the hotel website.

From this point on, it is possible to conclude that most of the studied hotels have the major requisite for facing real actions and strategies able to increase direct bookings: the existence of a website able to offer direct reservations, which increases the possibility of a variety of coadjacent offers, services, and access to clients' information, according to the set of actions and strategies the hotels decide to implement in their communication with the clients.

For Majó, Vall-Llosera and Moya (2020), a website allows the reservation to be made safely and reliably, and guarantees, in view of the OTA, a different service and added value: the customization of reservations.

It turns out that there is an effort on the part of the hotels of higher segments, 4 and 5 stars, to offer on their website better conditions to communicate with their clients and to attract customers. This fact is also confirmed by Chan and Law (2006) (Cit. by Inversini and Masiero, 2014), who argue that the website is the core of communication and business of a hotel. A hotel unit, when communicating directly with the customer, through direct sales through the website, allows anticipating and reducing distribution costs, as well as customizing their offers.

Therefore, having access to the back-office of the website, which, according to Majó, Vall-Llosera and Moya (2020), provides hotels with up-to-date information, reservations policies, explicit cancellations, as well as contacts to clarify questions and option for direct reservation, must be considered as a priority for hotels to balance their dependence on the OTA, on what concerns the possibility of enhancing the customization of a client's reservation.

From this point of view, on what concerns the access to the back office of the website, 34 respondents claim to have access, while 21 of them claim that they do not have access to the back office of the website.

Having this into consideration, we addressed the performance of the hotels websites' direct bookings and found the following results: on what concerns the booking window, 32.7% of the respondents mention 10 days before the check-in; regarding the average stay, 69.1% of the respondents refer between two days or less; on what refers to the average rate for bookings from the hotel's website, 54.5% of the respondents mention a rate between 51€ and 100€ per night; finally, regarding the cancellation rate, 70.9% of respondents refer a 10% rate.

Observing the data results and the actions and strategies that the studied hotels apply on their websites to enhance customer communication and capture direct bookings, it was possible to conclude that most hotels already face their communication with the client as a priority, as an effort not only to customize their relationship with their customers but also, at the same time, to enlarge their direct bookings. As mentioned by Liu and Zhang (2014), as personalized services, hotels can make available exclusively on their websites the top-end typologies, and, as recommended by Toh, Raven and DeKay (2011), premium rooms only available on the hotel's website, creating the idea of an exclusive product, only accessible on the hotel's website, or even to grant access to different services provided at more accessible values.

There are many actions and strategies hotels can adapt to improve their direct communication with the customer. Through the present study it was possible to observe that Hotels centre their online offers' attractiveness in creating specific rates for the hotel's websites, because clients' preferences go for lowest prices and price discounts, as well as developing exclusive promotions for direct booking, as a direct attempt of adding value for the costumers' relationship, and offering the customer a Loyalty Program to create a trustful relationship with online consumers.

The work developed for the present study coincided with a worldwide state of pandemic that led, compulsively, to the closure of numerous accommodation units, due to the lack of clients, specifically those geographically located in large centres.

Florida (2020) refers Covid-19 led different services to stop, planes were parked, and hotels closed, paralyzing the entire tourism and travel industry (Niewiadomski, 2020; Wen, Wang, Kozak, Liu and Hou, 2020). In hospitality, one of the sectors that suffered the most from the pandemic, the consequences for employment are catastrophic (Gössling, Scott and Hall, 2020), some countries' traveling ban is still enforced (Yeh, 2020) and there is no movement of tourists.

The pandemic situation prevented hotels from developing these actions and strategies to capture direct reservations and greater possibility of customization their services and products because costumers do not exist now. In a post-Covid era, the customer will value customized communication much more, which should therefore lead hotels to invest, more than ever, in the development of increasingly better websites to allow some important independence from the OTA, enhancing the possibility to offer a different service and an added value: the customization of the hotel reservation and its offers (Toh, Raven and DeKay, 2011; Majó, Vall-Llosera and Moya, 2020).

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Corporate Dividend Policy in The Context of The SARS-Cov-2 Pandemic

Konrad SZYDLOWSKI

University of Warmia and Mazury in Olsztyn, Olsztyn, Poland
szydlowski.k@uwm.edu.pl

Karol WOJTOWICZ

University of Warmia and Mazury in Olsztyn, Olsztyn, Poland
karolw@uwm.edu.pl

Abstract

The article presents a problem of corporate dividend policy. The research goal was to present the corporate dividend policy in the context of economic conditions related to the SARS-CoV-2 pandemic.
The research has shown a significant impact of the pandemic on dividend policy. Most of the analyzed companies reduced the amounts of dividends or froze dividends payouts. One of the reasons was the deterioration in the financial performance of some companies. It was reflected in the profitability, financial liquidity and financial leverage. The reduction of dividends payouts also took place in companies in good financial condition. It indicates a conservative dividend policy aimed at mitigating the negative economic effects of the pandemic.

Keywords: Corporate Dividend Policy, SARS-Cov-2 Pandemic.

Introduction

The stock market allows investors to invest financial assets in companies that will allow them to generate profits. The source of the investor's profits is not only the increase in the value of shares but also the share in the income generated by the company. The dividend policy means the strategy adopted by the issuer to distribute profits and pay them out as dividends or to keep and reinvest them in the company. One of the most important tasks of the dividend policy is to provide current and potential investors with information about the benefits they can expect by investing their capital in the shares of a given company. In this way, the management board builds the long-term trust of stock market participants, trying to present the company as well-managed, stable, and profitable. Many theories emphasize the relationship between the dividend policy and the value of the company, what is more, there are also company valuation models based on current and future dividends (e.g. the Gordon model).

Therefore, dividend policy seems to be an important area of corporate management. Based on research, economists suggest that dividend payments depend on the financial life cycle of the enterprise. According to this theory, large companies are more likely to pay dividends, while small companies with limited resources are more likely to retain earnings. Periods of turbulence on financial markets and socio-economic crises are a particularly big challenge for managers. The following questions arise: should the dividend policy be modified and to what extent? How will investors react to a possible change?

The year 2020 will go down in history as one of the world's biggest health, social, and economic crises. The epidemiological situation caused by SARS-CoV-2 and its impact on the global economy and financial markets is unprecedented. Stock market investors faced tremendous uncertainty over the economic and financial impact of the pandemic. As indicated by Gorsmen and Koijen (2020), the capital markets of the European Union, Japan, and the United States recorded over 30% declines. Baek, Mohanty and Glambosky (2020) noted that, with the first wave of the pandemic and the need to pause the economy, there was uncertainty about its economic and financial

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consequences. As a result, households, entrepreneurs, the financial sector as well as policymakers have had great difficulties in predicting future effects. The boards of listed companies also faced an attempt to estimate the long-term effects of the pandemic and the possible need to adjust the dividend policy. The economic problems that are currently observed did not affect the companies' results in 2019, but they should be expected in 2020, possibly as well in the following years.
The main aim of this paper is to present the dividend policy of companies in the context of economic conditions related to the SARS-CoV-2 pandemic. The subject of the research were the amounts of dividends paid out, dividend per share, and dividend yield. The financial performance of the companies was also analyzed taking into account profitability, financial liquidity, and financial leverage.

Literature Review

The decisions of financial managers focus on two areas - investments and sources of financing. The investment area relates to the selection of specific assets, while the financial area relates to the sources of financing. Al-Malkawi, Rafferty and Pillai (2010) mentioned, that in a situation where the company generates a profit, the financial manager faces another dilemma – a possible division and payment of dividends to shareholders. Decisions regarding the payment of dividends depend on many external and internal factors, and their results may affect the company's valuation. According to Czapiewski and Kubiak (2016) the dividend policy implemented by a listed company affects not only the investment attractiveness of the entity but also the shape of the structure and the cost of capital. Economists cite several theories that describe and explain the impact of the dividend policy on the value of the enterprise.

The dividend policy is the subject of numerous studies, as a result of which various theories were developed describing the impact of the adopted strategy on the enterprise. However, no coherent position has been developed, and the theories presented differently characterize the significance of dividend decisions. Some studies prove the positive impact of dividends on the value of the company (pro-dividend theories), there are also opinions suggesting no relationship between these categories (neutral theories), while some economists indicate that dividend payment has a negative impact on the company's value (anti-dividend theories).

In one of the most cited papers, Miller and Modigliani (1961) argue that the dividend policy has no impact on the company's value. The authors in their article titled "Dividend Policy, Growth, and the Valuation of Shares", show that from the investor's point of view, dividends and capital gains are equivalent, and the only factor affecting the company's valuation is profits. Miller and Modigliani's dividend irrelevance theory is based on the assumption of a perfect capital market where there are no transaction costs and taxes on dividends and capital gains are equal or absent. Shareholders are primarily interested in the investment policy of the company, which is the source of profit, therefore the investment activity, not the dividend policy, influences their decisions.

The representatives of the anti-dividend theories point to the fact that the dividends distribution has a negative impact on the company's value. One of the main reasons for this is the tax aspect. Investors are interested in the net return, so differentiation of the taxation of dividends and capital gains may affect their level of expectation concerning dividends. According to tax theories, a low dividend payout ratio lowers the cost of capital and increases the share price (company value). Moreover, dividends are to immediate taxation, while capital gains taxation occurs when shares are sold. Research on the tax aspects of asset valuation was conducted by Brennan (1970). To verify the relationship between the rate of return adjusted for tax risk and dividend income, he modified the CAPM. Brennan showed that the profitability of shares before taxation correlated with its dividend rate and systematic risk. A similar stance was presented by Litzenberg and Ramaswamy (1979). They extended the Brennan model to account for income constraints on borrowing that can be used to deduct from the dividend income generated by their portfolios. Moreover, in subsequent studies on common stocks, the authors (1982) showed that although there is a positive, non-linear relationship between the rates of return on ordinary shares and dividend income, it is not possible to clearly explain profitability based on information regarding the forecast dividend. Another argument for limiting or resigning from dividend payments is the poor financial situation and the possibility of bankruptcy.

However, unlike the theories of irrelevance or anti-dividend theories, many investors believe that according to the popular proverb "bird in the hand", dividends paid by a company are reflected in its valuation. The inherent feature of capital markets is a risk, and the natural propensity of investors is risk aversion. Receiving dividends is, therefore, more valuable than the promise of future capital gains. Gordon (1959) draws attention to three reasons why investors buy shares of certain companies: (1) they expect a dividend, (2) they count on a dividend and an increase in the value

of shares, (3) they want to profit from the increase in the value of shares. In his opinion, dividends have a greater impact on the value of the company than retained earnings. Lintner's research (1956) also proved that paid dividends have more value for shareholders than retained earnings. Moreover, he emphasizes the importance of dividend yield stability. Whereas DeAngelo and DeAngelo (2006), questioning the arguments of Miller and Modigliani, emphasize that the dividend payment policy is not without significance, and the investment policy is not the only determinant of value, even in perfect markets. The signaling theory also provides arguments for the pro-dividend policy. Its assumptions are related to information asymmetry. Proponents of signaling theories believe that the dividend policy is a tool that provides information on the potential condition of an enterprise to the market. The dividend policy adopted by the company is a qualitative signal for current and potential investors. quality has a lower cost than other alternatives.

The dividend policy can also be a tool for controlling and supervising the activities of the management board. Managers of companies are agents of shareholders, and there are conflicting interests in the relations between the two groups. The goals and motivations of management and shareholders are contradictory on issues such as the optimal size of the company and the payment of cash to shareholders. As emphasized by Wrońska(2008) in public companies, shareholders expect the management board to generate certain benefits. The agency's costs are related to the fact that due to the information asymmetry, the management board may take actions that do not bring value to shareholders. Also Jensen (1986) mentioned that dividends paid to shareholders reduce the resources under the control of managers, thus limiting the freedom of action of managers and increasing the likelihood of making effective decisions.

The impact of dividend policy on investor behavior is also justified in terms of behavioral finance. Due to the lack of control and delayed gratification, market participants prefer dividends to capital gains even without taking into account transaction costs and taxes. Thaler (1980) points out that, the payment of dividends is valued by market participants more than potential future capital gains, because it allows investors to control the level of expenses. Also, Kahneman and Tversky (1982) drew attention to the phenomenon of loss aversion. In their opinion, receiving a dividend is more advantageous than capital gains, because selling shares involves more regret and anxiety than spending cash from paying a dividend. Moreover, the subsequent increase in the prices of the shares sold further intensifies the grief of the shareholders.

The issue of dividend policy is of particular importance in the event of turbulence in the financial markets. As Lintner emphasizes (1956), the most important determinant of the dividend amount is the amount of the company's net profit. Numerous studies show that there is a correlation between the amount of profit and dividend policy. DeAngelo, DeAngelo, and Skinner (2004), among others, mentioned that despite a lower dividend propensity among industrial companies, most high-income companies do pay dividends. Moreover, they pointed out that the lack of dividend payments applies to those industrial companies that had poor financial results or losses. Also, Kumar and Lee (2001), analyzing the determinants of dividend smoothing, focused on income volatility, financial difficulties, and the risk of bankruptcy. They showed that the dividend policy is conditioned by the aforementioned factors that influence the function of investors' demand for the company's shares.

Unexpected economic events, crises, and geopolitical instability are factors that may contribute to the modification of the principles of profit distribution adopted by the company. The effects of unfavorable events may translate into both a decrease in production and an increase in costs as well as reduce revenues and profits.

The year 2020 will go down in history as one of the biggest crises, the effects of which are observed both in the social and economic spheres. The epidemiological situation caused by the COVID-s pandemic has led to the need to lockdown most countries in the world. Starting from mid-March 2020, the economic activity of most enterprises has been significantly reduced, and in extreme cases completely suspended. The most disadvantaged sectors include tourism, services, catering, and broadly understood entertainment. The crisis also affected financial markets, including stock exchanges. The high level of risk aversion, which was mainly related to the uncertainty about the impact of the SARS-CoV-2 on the global economy, caused a sharp decline in many asset classes and indices in mid-March. The situation on the Warsaw Stock Exchange mirrored the trends in global markets. Investor uncertainty contributed to the increase in supply, which in turn translated into a fall in equity valuation across all sectors.

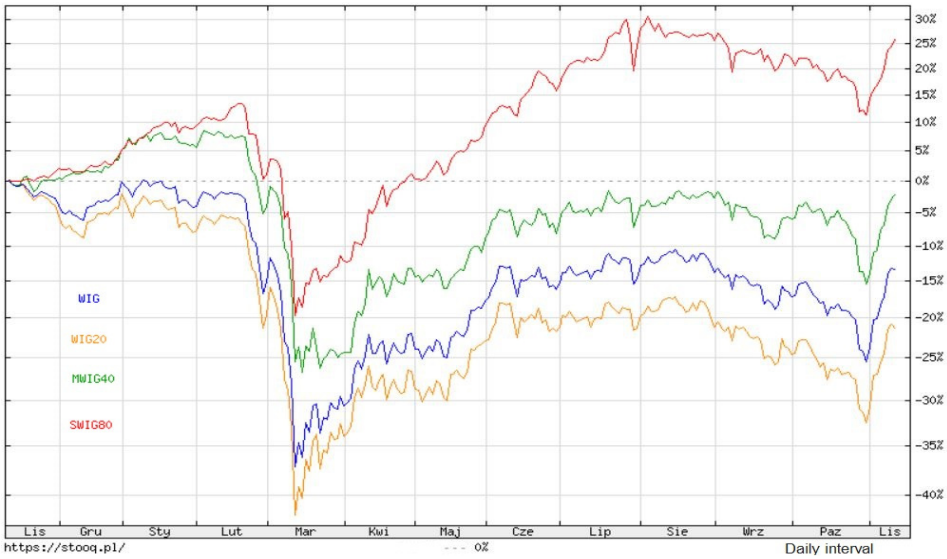

Fig. 1: Main Warsaw Stock Exchange (WSE) indices (November 2019 – November 2020)

Source: the Authors, based on stooq.pl

According to the Report on the Stability of the Financial System (by the Financial Stability Department of the NBP), some of the declines resulted from the operation of industry-specific factors. In particular, factors specific to energy sector companies were a significant drop in global oil prices, while large drops in banks' share prices were the result of expectations for a decline in their profitability amid the expected economic slowdown, increased credit risk, and the expected suspension of dividend payments by banks[1].

Research Goal and Methods

The research goal is to present the corporate dividend policy in the context of economic conditions related to the SARS-CoV-2 pandemic. The subject of the research was the amounts of dividends payouts, the amounts of dividends per share, and the dividend yield. The financial condition of the companies was also analyzed taking into account profitability, financial liquidity and financial leverage.

The following research hypothesis was formulated: „due to the SARS-CoV-2 pandemic, enterprises change the current dividend policy, which results in a decrease in the amounts of dividend payouts and dividend yield". The justification for such a hypothesis is the deterioration of the financial performance of enterprises as an effect of the pandemic. As a result, enterprises' ability to pay dividends decreases. An important argument is also the increase in risk and economic uncertainty inducing shareholders to reduce dividend payouts and accumulate profit by the company.

Thirty-four companies listed on the Warsaw Stock Exchange were analyzed. All enterprises belonged to the WIGdiv index, which represents companies that have regularly paid dividends for the last five years. The three out of thirty-four analyzed companies were the largest listed enterprises in Poland. These are companies listed on the WIG20 index. Another group (13 companies) were medium-sized enterprises, belonged to the mWIG40 index. The group of small companies was the most numerous (19 entities). These are companies listed on the sWIG80 index. The analyzed enterprises represented various industries and economic sectors, including construction, fuel production, food production, chemical industry, media, IT, automotive industry.

The analysis was carried out for the period 2015-2019. The source of the data was: the Thomson Reuters database, financial reports issued by the analyzed companies, internet portals on economic issues - stockwatch.pl, biznesradar.pl, stooq.pl.

[1] Financial Stability Report. Special Issue: Effects of the COVID-19 Pandemic. Financial Stability Department, National Bank of Poland, Warsaw 2020.

Empirical results

One of the most measurable effects of the corporate dividend policy is the amount of dividend payout. Thus, the first research problem was the amount of dividend paid out by the analyzed enterprises. The data is presented in table 1.

Table 1: Amounts of dividends payouts by the analyzed companies in 2015-2019 (in thousand PLN)

Company name	*Year*				
	2015	**2016**	**2017**	**2018**	**2019**
CCC	86 016	101 341	94 677	19 761	0
LPP	60 562	65 531	73 342	110 065	0
PKN ORLEN	855 418	1 283 127	1 283 127	1 496 982	427 709
Amica	31 101	42 764	23 326	30 101	22 576
Asseco Poland	249 831	249 831	249 831	254 811	249 831
Asseco South Eastern Europe	21 796	24 909	26 985	26 985	38 402
Budimex	207 815	382 696	449 585	160 840	116 417
Dom Development	80 543	125 586	189 000	226 869	239 575
Eurocash	139 096	101 551	101 589	139 163	0
Grupa Kęty	170 166	284 699	228 518	229 091	335 807
Inter Cars	10 059	10 059	10 059	10 059	0
Kernel Holding	75 699	80 701	65 553	77 025	86 038
Kruk	35 488	35 488	94 040	94 434	0
LiveChat Software	27 810	36 308	45 578	50 213	63 860
NEUCA	22 211	26 296	29 937	33 111	38 704
AC	48 457	26 236	24 293	38 597	18 436
Alumental	39 216	44 907	45 200	63 156	0
Ambra	13 107	15 124	17 141	17 645	17 645
Apator	33 107	36 418	39 728	42 805	36 220
Asseco Business Solution	33 418	42 441	43 444	50 127	60 153
ATM Grupa	18 546	18 546	18 546	19 389	6 744
Dębica	39 476	32 436	89 718	67 357	56 315
Fabryka Farb i Lakierów Śnieżka	39 746	40 377	27 759	32 806	32 806
Ferro	15 932	25 491	7 435	23 792	8 497
Kruszwica	47 813	254 695	30 573	58 847	64 363
Mennica Polska	25 669	35 797	51 138	51 138	25 569
Oponeo.pl	1 394	2 787	4 878	5 574	1 394
PCC Rokita	88 943	150 091	164 981	164 981	67 700
Pekabex	2 179	2 663	3 899	7 620	3 933
Polski Holding Nieruchomości	19 624	12 164	12 640	19 200	27 582
Sanok Rubber Company	26 882	96 775	80 646	26 882	0
Stalprodukt	16 741	16 741	16 741	27 901	0
Wawel	29 995	29 995	37 494	37 494	44 993
Wielton	9 660	15 094	15 094	19 924	0
The total value	**2 623 516**	**3 749 665**	**3 696 495**	**3 734 745**	**2 091 269**

Source: the Authors, based on biznesradar.pl.

The total amount of dividends paid by all companies for 2015-2019 was PLN 15.9 billion. A characteristic is a significant decrease in this amount in 2019 – it amounted to PLN 2.1 billion and was more than 44% lower than in 2018. Thirteen analyzed companies reduced the amount of dividend, and nine entities froze dividend payouts. It means that the problem of dividends reduction concerned as many as 64.7% of the analyzed enterprises. These were both large companies (3 entities), medium-sized companies (6), and small enterprises (13). The rest of the entities increased the amounts of dividends (10 entities) or kept them at the level from 2018 (2).

The next research problem was the dividend per share. The research results are comprised in table 2.

Table 2: Dividend per share ratio for the analyzed companies in 2015-2019 (in PLN)

Company name	***Year***				
	2015	**2016**	**2017**	**2018**	**2019**
CCC	2.24	2.59	2.30	0.48	0.00
LPP	33.00	35.74	40.00	60.00	0.00
PKN ORLEN	2.00	3.00	3.00	3.50	1.00
Amica	4.00	5.50	3.00	4.00	3.00
Asseco Poland	3.01	3.01	3.01	3.07	3.01
Asseco South Eastern Europe	0.42	0.48	0.52	0.52	0.74
Budimex	8.14	14.99	17.61	6.30	4.56
Dom Development	3.25	5.05	7.60	9.05	9.50
Eurocash	1.00	0.73	0.73	1.00	0.00
Grupa Kęty	18.00	30.00	23.94	24.00	35.00
Inter Cars	0.71	0.71	0.71	0.71	0.00
Kernel Holding	0.99	1.05	0.91	0.94	0.96
Kruk	2.00	2.00	5.00	5.00	0.00
LiveChat Software	1.08	1.41	1.33	1.95	2.48
NEUCA	5.00	5.75	6.40	7.40	8.65
AC	5.00	2.70	2.50	3.94	1.85
Alumental	2.55	2.92	2.92	4.08	0.00
Ambra	0.52	0.60	0.68	0.70	0.70
Apator	1.00	1.10	1.20	1.30	1.10
Asseco Business Solution	1.00	1.27	1.30	1.50	1.80
ATM Grupa	0.22	0.22	0.22	0.23	0.08
Dębica	2.86	2.35	6.50	4.88	4.08
Fabryka Farb i Lakierów Śnieżka	3.15	3.20	2.20	2.60	2.60
Ferro	0.75	1.20	0.35	1.12	0.40
Kruszwica	2.08	11.08	1.33	2.56	2.80
Mennica Polska	0.50	0.70	1.00	1.00	5.00
Oponeo.pl	0.10	0.20	0.35	0.40	0.10
PCC Rokita	4.48	7.56	8.31	8.31	3.41
Pekabex	0.09	0.11	0.16	0.31	0.16
Polski Holding Nieruchomości	0.42	0.26	0.27	0.41	0.54
Sanok Rubber Company	1.00	3.60	3.00	1.00	0.00
Stalprodukt	3.00	3.00	3.00	5.00	0.00
Wawel	20.00	20.00	25.00	25.00	30.00
Wielton	0.16	0.25	0.25	0.33	0.00
The average ratio	**3.93**	**5.13**	**5.19**	**5.66**	**3.50**

Source: the Authors, based on stockwatch.pl.

The figures confirm the observed decrease in the amount of dividends payouts for 2019. In twenty-two cases, the dividend per share fell. It should also be emphasized that the average ratio decreased significantly in 2019. Compared to 2018, this it decreased by as much as 38.2%.

The above data is supplemented by the analysis of the dividend yield ratio. The data is shown in Figure 1.

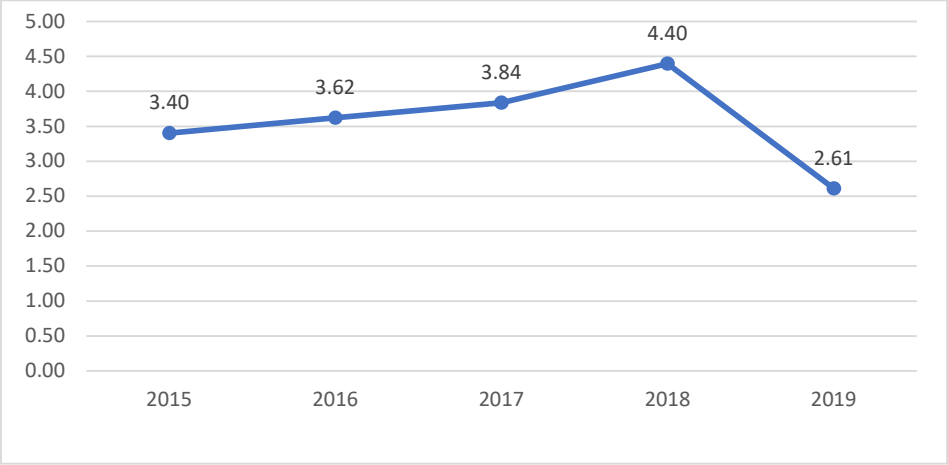

Fig. 2: The average dividend yield ratio in the period 2015-2019 (in %)

Source: the Authors, based on stockwatch.pl.

The data very clearly confirm the observed phenomenon. In 2019, the average ratio significantly decreased and was at the lowest level in the entire analyzed period. It was observed for as many as twenty-eight companies. In the rest of the enterprises, the ratio increased.

The observed phenomenon is also reflected in the WIGdiv index. It is an index based on stock prices of companies, dividend income and subscription rights. The data is shown in Figure 2.

Fig. 3: WIGdiv index in the period 2015-2020

Source: Thomson Reuters.

In the first quarter of 2020, the index decreased significantly. At the beginning of March 2020, it dropped to 654.22 points. It was the lowest level in the entire analyzed period. This decrease indicates a strong negative investors' sentiment on the expected reduction in dividends.

As indicated in the theoretical part of the article, one of the main factors determining the amount of dividend paid is the financial condition of enterprises. Therefore, another research problem was the financial condition of the analyzed companies. Table 3 shows the average ratios of profitability, financial liquidity and financial leverage.

Table 3: The financial condition of the analyzed companies in 2015-2019

Ratios	*Year*									
	2015	**2016**	**2017**	**2018**	**2019**				**2020**	
					Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**
ROE (w %)	19.0	20.5	19.4	1.2	3.2	4.3	4.3	4.8	1.3	2.4
Current Ratio	2.3	2.1	2.0	1.8	1.8	1.7	1.6	1.8	1.8	2.0
Quick Ratio	1.6	1.5	1.4	1.1	1.1	1.1	1.0	1.2	1.2	1.3
Assets/Equity	2.1	2.1	2.2	2.4	2.5	2.7	2.7	2.6	2.9	2.8
Debt/Equity	0.3	0.3	0.3	0.4	0.6	0.7	0.6	0.6	0.7	0.7

Source: the authors, based on the Thomson Reuters database.

The results of the analysis indicate various trends in the volatility of each ratio. In 2015-2019, the companies generated a relatively high level of return on equity (ROE). A significant decrease was observed in the first quarter of 2020. It is important that as many as 10 companies generated a net loss in this period. However, special attention should be paid to the second quarter of 2020. It was a time when the initial effects of the pandemic were reflected in companies financial performance. In this period, a significant decrease in the average ROE ratio was noticed compared to the individual quarters of 2019 (including the quarter 2). However, the situation varied concerning individual companies. In seventeen enterprises, the ratio decreased compared to the second quarter of 2019. Five of them generated a negative value of the ratio, which means that these companies generated a net loss. In the rest of enterprises, the ratio increased or remained at the previous level.

Another step of the research was the analysis of financial liquidity. In every period the average current ratio was at the generally acceptable level (1.2 - 2.0). This also refers to the second quarter of 2020. However, it should be noted that in eleven companies the ratio was too low, which may signal emerging problems with financial liquidity. The situation is slightly different concerning the quick ratio. In the second quarter of 2020, its average value was at an acceptable level (1 or more). However, in as many as twenty companies this value was at a lower level. In fifteen companies, the ratio was below 0.8, which indicates a possible problems with financial liquidity.

The leverage ratios were also analyzed – debt to equity ratio, and assets to equity ratio. In the analyzed period, the average values of both ratios increased, which indicates the growing indebtedness of each company. The second quarter of 2020 is the period in which the highest ratio was also observed. In this period twelve companies generated the increase in the assets to equity ratio (compared to the end of 2019.). In the rest of the companies, the ratio decreased or remained unchanged.

The results of the analyzes indicate, that for some companies their current financial condition could be a factor influencing the dividend policy. Special attention should be paid to the second quarter of 2020. This is the period when the financial effects of the pandemic are already visible, but it is also the time when most companies made decisions on dividends payouts. Eleven out of twenty-two enterprises which reduced or froze dividend payments generated a decrease in the return on equity (ROE). The deterioration of profitability could therefore be an impulse to decide on dividend reduction and accumulate this capital in the enterprise. It is worth noting that five companies generated a net loss in this period, which significantly limited their ability to dividend payouts.

The dividend policy also depends on financial liquidity. Problems in this field may induce shareholders to reduce dividends. The funds accumulated in this way can be used to the repayment of liabilities or to create cash reserves in the event of problems with financial liquidity. This thesis is confirmed by a significant percentage of companies with a relatively low level of liquidity ratios. It was observed in the second quarter of 2020. The research indicates that in thirteen out of twenty-two companies that reduced the amount of dividend (or ceased the payouts), the quick ratio was below the acceptable level. The percentage (51.9%) was therefore significant. The observed phenomenon, similar to the previously indicated decrease in profitability, could be an impulse to reduce the dividends payouts.

The research also indicates that in the group of companies limiting the amount of dividend, ten of them (45.5%) generated an increase in the debt-to-equity ratio, and eight of them (36.4%) generated an increase in the assets to equity ratio. Thus, the increase in risk resulting from the increased level of financial leverage could be another impulse to reduce the amounts of dividends.

However, it should be emphasized that the financial condition is not the only factor determining a corporate dividend policy. This is confirmed by the results of the analysis. It was observed that the reduction of dividend payouts also took place in enterprises in good financial condition[2]. This group includes eleven companies that generated an increase in profitability. Quite a significant percentage were companies with acceptable levels of financial liquidity and financial leverage. It indicates a conservative dividend policy, which is fully justified given the significant economic risk caused by the SARS-CoV-2 pandemic.

Conclusions

Dividend policy is one of the key areas of corporate financial management. It determines the distribution of the profit into the part remaining in the enterprise and the part paid to shareholders. Decisions in this regard have a significant impact on the company's market value as well as its attractiveness for investors.

The research goal was to present the dividend policy of companies in the context of economic conditions related to the SARS-CoV-2 pandemic. The analysis indicates that the pandemic deteriorated the economic conditions of doing business. It was reflected in the financial performance of enterprises, including profitability, indebtedness and financial liquidity.

The economic situation also influenced the dividend policy of enterprises. A significant number of companies reduced the amounts of dividends or froze dividend payouts. These were both, companies whose financial performance had deteriorated, as well as entities in good financial condition. It indicates that enterprises pursued a conservative dividend policy, which is related to the economic uncertainty caused by the pandemic.

The analysis indicates a significant negative impact of the pandemic on the corporate dividend policy. It confirms that due to the pandemic, enterprises change the current dividend policy, which results in a decrease in the amounts of dividend payouts and dividend yield. This confirms the research hypothesis.

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[2] This applies to the second quarter of 2020, which was the dividend decision period.

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Revitalization Management Models – A Comparative Analysis And the Revitalization Operator Model Framework

Lilla KNOP
Silesian University of Technology, Gliwice, Poland, lilla.knop@polsl.pl

Agnieszka JANIK
Silesian University of Technology, Gliwice, Poland, agnieszka.janik@polsl.pl

Marek KRANNICH
Silesian University of Technology, Gliwice, Poland, marek.krannich@polsl.pl

Adam RYSZKO
Silesian University of Technology, Gliwice, Poland, adam.ryszko@polsl.pl

Abstract

The paper presents a comparative analysis of revitalization management models based on the European experiences and framework of the revitalization operator model in Poland, in particular in the Silesian Voivodeship. Four European countries (i.e. France, Germany, Great Britain and Poland) have been selected for the research where revitalization processes are conducted on a large scale. Strategic approach proposed by the first three countries were benchmarks for the Revitalization Operator Model framework in Poland. The analysis of revitalization management models was conducted in five areas (based on the Business Model Canvas, the New Age of Innovation and Balanced Scorecard conceptions): ownership, organizational, market, resource and financial.

Keywords: Revitalization, Revitalization Management Models, Revitalization Operator

Introduction

The process of deep restructuring of industry in Poland has caused considerable changes in revitalization processes. Restoring and giving new economic, spatial, ecological and social functions to the degraded areas became a challenge but encountered a number of problems: starting from the lack of necessary regulations through the lack of necessary technologies and financing and ending up with social resistance. Those problems have been partly overcome by introducing the Act on Revitalization (Ustawa o rewitalizacji, 2015) and through allocation of EU funds to revitalization and also by indicating in domestic strategic documents that revitalization activities are an important element of shaping the spatial governance. All of those factors have contributed to the increasing intensity of revitalization in Poland which could have been observed over the last few years. However, there is a necessity to apply effective revitalization management in order to accelerate and take more widespread, multi-sector and more integrated effort to take the degraded areas out from their crisis situation (Nijkamp et al., 2002; Vejre et al., 2012).

Revitalization management focused on post-industrial areas does not mean just finding a solution to the problem but rather creation of specific economic, market or social values (Acioly Jr., 2001). This requires innovation challenges, creation of value in a competitive, global economy and new methods and instruments concerning design and application of new or modified business models. The problem of developing a model of a revitalization operator, discussed in this paper, for the purpose of creating a broadly understood value with the use of innovation is relatively weakly represented in the Polish management literature and in academic and research projects and studies.

The purpose of this paper is to carry out a comparative analysis of revitalization management models and to present the assumptions for the Revitalization Operator Model proposed for application in Poland, in particular in the Silesian Voivodeship. The research methodology is based on structural and comparative analysis of revitalization

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management models implemented in selected European countries in which revitalization processes have been taking place for several decades.

The comparative analysis covers five key areas: ownership, organization, market, resources and finances.

Business model and revitalization process – focus on value creation

The problem of business models has recently become very popular both among management theorists and practitioners. There are very diversified approaches and understanding of business modeling. However, the opinion that there is a necessity to create a common academic platform allowing a better and more effective study of business models is increasingly often expressed (Zott et al., 2010). Cognitive difficulties result from the fact of a multidimensional and interdisciplinary character of the business model which has been studied from different perspectives, in different scopes and levels of detail. Theoretical deliberations on business models are usually based on choice, activity and normative perspectives (Kalinowski and Vives, 2013; Afuah, 2004). Regardless of the approach, the category of value, its creation, transfer of ownership and recipients is always one of the elements of relevant perspective.

The research on business models has delivered many different definitions and concepts of business models (Zott et al., 2010; Chesbrough, 2010; Teece, 2010). The definitions and concepts which are crucial in the context of this study are those which apply to value creation and the importance of innovation in business modeling. A business model can be treated as a system of configurations of resources and actions focused on value creation. The architecture and configuration of such activities and resources and network of values, allowing to carry out such activities in cooperation with partners or clients, depends on the adopted business model (Boulton et al., 2000; Jelonek, 2015; Zott and Amit, 2010). Concepts of a business model focus mainly on its two major aspects. The first one answers the question: how is customer value created, and in particular which elements of the business model play the substantial role and how will that value be provided (Osterwalder and Pigneur, 2010; Prahalad and Krishnan, 2008; Zott and Amit, 2010). The second important aspect of a business model is seizing the value for the enterprise which is the source of its income (Brzóska, 2014; Zott and Amit, 2010).

The problem of revitalization is related to implementation of a various social, economic and ecological goals and values (Xian and Chen, 2015). The term "revitalization" has been used in various meanings depending on the discipline (architecture, social sciences, economics etc.). Revitalization is a process of "taking brownfields out of their critical condition, carried out in a complex way, through integrated activities for the benefit of the local community, space and economy, territorially concentrated and carried out by revitalization stakeholders on the basis of a commune revitalization program" (Ustawa o rewitalizacji, 2015). A broader scope of revitalization assumes "intervention activities the main purpose of which is to reverse unfavorable trends in problematic areas" (Lechman, 2007), and more specifically revitalization means „intentional and structural changes in spatial development as a reaction of various entities to degradation effects posing a threat to private and public interests" (Zuziak, 1998). Revitalization is also treated as a tool of stimulating sustainable development through planned, mutually integrated and complex activities of various entities in order to stop degeneration and create the conditions required for the growth while maintaining cultural, social and environmental quality.

Combining the problem of business modeling with revitalization processes is a challenge involving many different entities: local and regional authorities, investors and local communities. Creation of unique value and competitive advantage based on comprehensive management of revitalization process requires to a large extent a number of innovative solutions delivered by appropriate business model.

This paper presents an original concept of the Revitalization Operator Model, using the assumptions of the concept of the Business Model Canvas (Osterwalder and Pigneur, 2010), the New Age of Innovation (Prahalad and Krishnan, 2008) and Balanced Scorecard (Kaplan and Norton, 1992).

Research Methodology

Revitalization management processes implemented in various organizational configurations with the use of many sources of financing require development of new business models which take into account operators of those processes, business partners, public organizations (including local government entities) and academic entities. Business models based on extensive cooperation require working out key principles of functioning of revitalization operators. Examples of successful development and application of such models can already be found in Europe.

Therefore, based on these experiences, a comparison has been made of the European regions which undertook complex (operator-based) revitalization management of post-industrial areas.

Comparative analysis of revitalization management models was carried out based on the implemented and functioning models of restructuring degraded areas and restoring them to social and economic use. The analysis was performed in five areas of revitalization operators' functioning: ownership, organizational, market, resources and financial. Such a representation combines the Balanced Scorecard and the New Age of Innovation concept (Olko and Brzóska, 2017). It comprises elements of technical, social and informational architecture and prospects for development, processes and customer as well as financial prospects. Comparison of areas had been preceded with a short description of the main problems and values (in accordance with the Business Model Canvas) which are formed through the process of revitalization management.

The research covered three countries in which revitalization management processes are deemed to be exemplary, i.e. France, Germany, Great Britain. The identified managerial approaches constituted benchmarks for the proposal of revitalization model in Poland. The scope of the research included:

- in France – the Nord-Pas-de-Calais (NPdC) region, including in particular the Public Agency for Land Policy of the Nord-Pas de Calais (EPF-NPdC) Region;
- in Germany – the Ruhr region in North Rhine-Westphalia, including in particular NRW.URBAN GmbH & Co.KG as an entity managing the Real Property Fund;
- in Great Britain – National Coalfields Programme, including the National Regeneration Agency – English Partnerships (currently Homes and Communities Agency) and Land Restoration Trust;
- in Poland – the Revitalization Operator Model (national and regional level).

Results of comparative analysis of revitalization management models in selected European countries

Revitalization processes have been implemented in many European countries already for several years. These experiences are valuable sources of a broad knowledge about managerial implications and implementation of the operator-based system of revitalization as an effective practice for stopping degradation and restoring the economic and social value of post-industrial areas. The experience of France and Germany shows application of the operator-based revitalization management model on a regional level, whereas the experience of Great Britain is related to the implementation of the revitalization management operator on the national level.

Results of comparative analysis of the revitalization management models functioning in France, Germany and Great Britain are presented in Table 1.

Table 1: Comparative analysis of revitalization management models

France	Germany	United Kingdom
Object of revitalization		
• Post-industrial areas, previously used by coal mining, steelworks or textile industry, occupying 10 thousand hectares.	• Industrial territories dominated by the mining and steelwork industries; areas characterized by high unemployment.	• Over 23.5 thousand hectares of land included in the National Land Use Database of Previously Developed Land.
Values and goals		
• Ensuring a possibility of competitive development. • Environmental protection and management of natural resources. • Guaranteeing social cohesion and fairness.	• Complex social, economic and ecological activities. • Transformation of the most industrialized area in Europe into the region of business and culture while retaining its mining and steelwork identity.	• Creation of new jobs; • Improvement of life quality; • Adapting wastelands to the needs of a public space; • Improvement of the quality of environment.
Ownership area		
• Public Agency for Land Policy of the Nord-Pas de Calais Region (EPF-NPdC) as commercial regional industrial agency and operator of revitalization possess the title to the land and is in its possession.	• NRW.URBAN as the main trustee of cities purchases post-industrial areas and then carries out its reclamation process. After that it sells the area to the buyer (in compliance with the decision of local authorities).	• English Partnerships – the National Regeneration Agency was responsible for land acquisition. • Over 70% of all degraded areas were private.
Organizational area		

Regional operator • EPF-NPdC as an operator for local governments managed by the Director appointed by the Minister for Town Planning upon the request of the Regional Prefect after consulting the Board of Governors.	**Regional operator** • The Real Property Fund managed by NRW.URBAN as operator of the most effective model of development of post-industrial areas in Germany.	**National operator** • The Land Restoration Trust as revitalization operator responsible for long-term management of the areas. • Urban Regeneration Companies – private companies most usually incorporated as partnerships.
Market area		
• Clients include communes or commercial entities appointed by the communes.	• Local authorities, private investors – buyers of regenerated post-industrial areas and commune residents.	• Local authorities, local community of coalfields and land owners.
Resources area		
• Knowledge and competence in provision of specific services within the revitalization process. • Unique competences related to land diagnosis, acquisition and transformation methods, and optimization of land repurchase. • Broad cooperation with state, regional and local authorities, investors, academic units and clusters.	• Complementary use of knowledge and competence in wide range of specialist services (i.e. project management, preparation of development strategies, spatial planning). • Synergistic use of key operations: land purchase, revitalization, development, management and selling. • Broad cooperation with state, regional and local authorities and investors.	• Complementary use of knowledge and involvement of individual partners. • Close cooperation with local community and directing financing to the locations with greatest needs. • Systematic development of specific abilities, knowledge and innovative solutions. • Partnership and cooperation with key stakeholders of revitalization.
Financial area		
• Diversified financing of revitalization projects (i.e. special local tax, income from the sale of land and buildings, grants from the government and local authorities, EU Structural Funds and loans).	• Revitalization projects financed by Real Property Fund (mainly subsidized by the land and federal government); part of funds obtained from the sale of regenerated lands.	• Diversified financing of revitalization projects (i.e. funds from the state's central and EU budget, private investors, public programs, non-profit organizations and pension funds).

Source: Own elaboration based on (Ostręga, 2013; Skalski, 2009; Neill and Schlapp, 2016; BRINGUp Project, 2010; Bryx and Jadach-Sepioło ed., 2009; Guzik ed., 2009).

The European experience in revitalization management processes allowed to formulate main conclusions and recommendations for the Revitalization Operator Model in Poland. These findings point out:

- the importance of a systematized law and formal procedures of revitalization,
- the possibility to obtain a public status (public purpose) for the operations which are important for the development of a region or commune,
- the usefulness of the functioning in post-industrial areas of an institution (operator) responsible for complex revitalization management (carrying out revitalization processes or participating in them and bearing the consequences of such activities) on a national or regional level,
- that activity of such an operator might not have a competitive character and therefore it stays outside the reach of stringent European directives,
- the importance of complementary use of unique knowledge and competence in provision of specific outputs within the revitalization management process,
- diversified financing of revitalization projects,
- a partnership model, as a key organizational solution, which can be forced by the regulations on competition-based financing of revitalization – existence of a partnership is a prerequisite.

Framework of the Revitalization Operator Model in Poland

Revitalization in Poland, particularly in the Silesian Voivodeship, is a specific challenge due to the scale and complexity of that issue. It has been classified, apart from reindustrialization and metropolization, to the group of subjects forming an integrated policy for development of the Silesian Voivodeship. A large number of post-industrial areas requiring an urgent and economically reasonable and socially responsible revitalization is a particularly complex issue of that region. For many years a large part of this region has been dominated by the polluting industries, including, in particular, the mining and metallurgy (Szmal, 2013). The process of revitalization management of post-industrial areas in the Silesian Voivodeship is facing a large number of problems, including socioeconomic (e.g. complexity and scale of post-industrial areas, necessity to stop degradation and restore the economic and social value of post-industrial areas), formal and legal (e.g. lack of institutionalized, operator-based model of revitalization, diversified structure of brownfield owners and entities in their possession, inconsistency in the provisions of the Act on Revitalization, lack of procedures for revitalization and certification of restored post-industrial areas), organizational

(e.g. lack of consistent revitalization policy and action plans, lack of strategic roadmaps of integrated revitalization actions) and technological (e.g. insufficient and incomplete data on post-industrial areas, considerable variability of occurrence of heavy metal contamination in the brownfields, difficulties with the surface revitalization process) issues. It should be noted that these problems also constitute challenges related to region's potential (Knop and Krannich, 2017).

The identified problems, challenges and potential of the Silesian Voivodeship as well as the knowledge derived from revitalization management experience of other European countries allow to develop a proposal for the managerial implications which apply not only to one of the most degraded areas in Poland (i.e. the Silesian Voivodeship), but may also become the first, exemplary Revitalization Operator Model in Poland. Frameworks of this model, on the national and regional level, are presented in Figure 1 and Figure 2.
The proposal for the revitalization management model in Poland is characterized by the following features:

- Object of revitalization: approximately 7. thousand hectares of brownfields and post-industrial areas surveyed in the Silesian Voivodeship.
- Values and goals: providing an opportunity for competitive development of the region on the basis of sustainable development of economic, social and ecological values based on the concept of circular economy. The success of a revitalization operator depends on managing the strategic portfolio of complementary revitalization projects, scale and synergy effect and dynamic development and innovations.
- Ownership area: over 36% of brownfields in the Silesian Voivodeship is in possession of enterprises (mostly state-owned), over 26% belongs to communes and districts. In the case of more than 25% of areas their possessor could not been recorded in the inventory. Most of the areas in possession of enterprises belongs to coal companies. At the moment no revitalization operator has been established.
- Organizational area: the proposed management model assumes establishment of a regional operator with a substantial support on the governmental level (combination of regional and national operators – example of France and UK). It is suggested to appoint a Government's Representative for Revitalization (based on British experiences). On the regional level a Regional Revitalization Council (as an Organizer – based on French and German models) would be established, assembling regional authorities, owners of brownfields and Government's Representative. The organizer initiates the steps leading to the transfer (by way of brownfield acquisition or a trust deed for brownfields as well as sale or handing over of revitalized areas) of land and supports financing of the project. The Operator performs, in the operator-based system, operating functions, including planning and implementation of revitalization project packages (in accordance with the algorithm of standard revitalization procedures), updates brownfield databases, cooperates with investors and supporting entities. On the national level a Team for Brownfields was established in 2016 year and further supporting entities might be established (suggested as an optional solution): National Social Committee for Revitalization, Inter-ministerial Committee for Revitalization and National Revitalization Fund. On the regional level a network would be established of cooperation between R&D and certification bodies, cooperation between the Operator and Regional Directorate for Environmental Protection and Voivodeship Inspectorate for Environmental Protection and, optionally, establishment of a Regional Social Committee for Revitalization.
- Market area: Beneficiaries of revitalization include: local authorities of the communes in which post-industrial areas were situated (during the entire process of revitalization communes cooperate closely with one another) and private investors – purchasers of reclaimed real property and commune residents. Developing the projects which combine the values of many stakeholders seem to be of key importance. Synergic and complementary actions are crucial to produce suitable economic, ecological and social effects.
- Resources area: according to the proposed model the Regional Operator might be established on the basis of an existing company (majority owned by the state) which runs its business in the area of waste-processing in hard coal mines. It continuously leads to minimizing the quantity of generated waste both by way of looking for innovative ways of its management and through continued use of existing technologies. Existed experience and competence, gained also in cooperation, allow to efficiently implement the Revitalization Operator Model in the Silesian Voivodeship.
- The scope of financing of the Revitalization Operator Model assumes that:
  - internal sources of financing include the funds gained by the Operator during its functioning, mainly from implementation of revitalization projects,
  - external sources of financing include borrowed capital (aid funds, loans, leasing) and shareholders' equity obtained through issuance of bonds,
  - effective use of EU funds and funds from R&D sources.

More details related to the structure and explicit assumptions of the Revitalization Operator Model in Poland can be found in (Strategia, 2017).

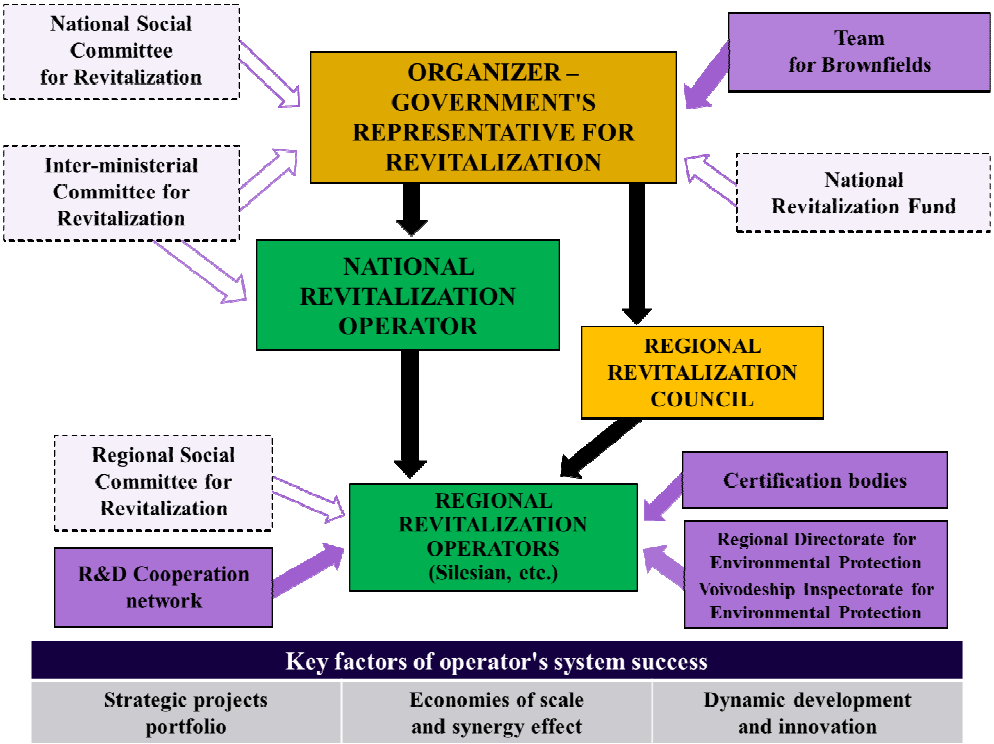

Figure 1. The Revitalization Operator Model – national level (own elaboration)

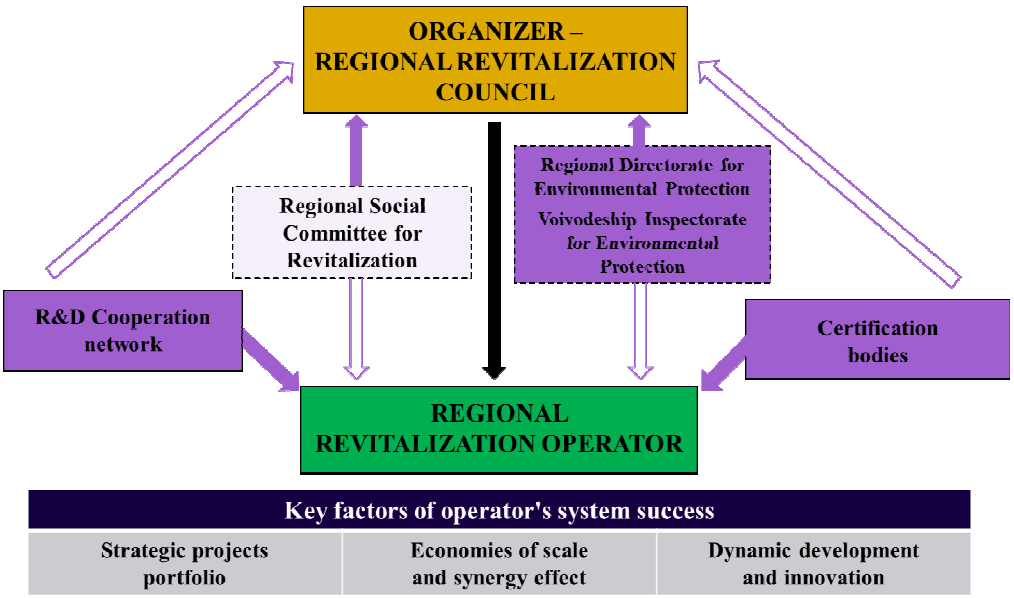

Figure 2. The Revitalization Operator Model – regional level (own elaboration)

Conclusion

Revitalization management processes have already been implemented in many European countries for several years. These experiences constitute sources of a broad knowledge about solutions and implementation of the operator-based system of revitalization management as an effective practice for stopping degradation and restoring the economic and social value of post-industrial areas. The experience of France and Germany shows application of the operator-based revitalization management model on a regional level, whereas the experience of Great Britain is related to implementation of the revitalization management operator on the national level. The presented revitalization management models established in France, Germany and Great Britain are deemed to be an exemplary models of involvement and effective alignment of public and private interests based on civil society, community awareness and trust. In the case of Poland the Revitalization Operator Model is proposed especially at regional level, but with substantial support and monitoring on the national level.

The proposed Revitalization Operator Model is under consultation on the regional and national level. Undertaking revitalization measures is intended to be strongly connected with management of stakeholders' values and complex project management, because the scope of actions necessary for the effective revitalization management can be seriously different in the case of every type of brownfield.

Project management constitutes for a Revitalization Operator the crucial element of business model implementation which allows to establish market relations and gain competitive advantage combined with the quality of performance. The projects realized by the Revitalization Operator should be classified into groups and managed on portfolio basis in a coordinated way in order to gain optimal benefits. For that reason the priority tasks of the Revitalization Operator should include determination of the directions of required actions, including indication of complex activities involving a synergic revitalization management of various types of land.

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Sustainability Reporting and Organizational Impression Management – An Analysis of Selected Issues Based on Case Studies from the Energy Sector Companies

Agnieszka JANIK
Silesian University of Technology, Gliwice, Poland, agnieszka.janik@polsl.pl

Adam RYSZKO
Silesian University of Technology, Gliwice, Poland, adam.ryszko@polsl.pl

Marek SZAFRANIEC
Silesian University of Technology, Gliwice, Poland, marek.szafraniec@polsl.pl

Abstract

This paper presents the results of an analysis of selected issues related to organizational impression management in the context of sustainability reporting. The research was based on eight case studies of sustainability reports from the energy sector companies and, in particular, it concerned issues related to greenhouse gas emissions and circular economy (GHG and CE issues). The analysis focused on the disclosures which refer directly to GHG and CE issues in the statements from senior decision-makers. These statements were confronted with the occurrence of GHG and CE issues in the list of material topics, the scope of information and indicators related to GHG and CE issues, the accuracy of information related to GHG and CE issues, as well as the clarity and comparability of relevant information.

Keywords: sustainability reporting, impression management, energy sector, case study

Introduction

Impression management is an important organizational phenomenon because it has broad implications for individuals and organizations (Bolino et al. 2008). Gardner and Martinko (1988) defined organizational impression management as a process through which organizational members create and maintain desired impressions. Therefore, organizational impression management refers to behavior that organizations use to actively shape the impressions that others hold of them (Sandberg and Holmlund, 2015). Based on comprehensive organizational taxonomy, Bolino at al. (2016) identified the following impression management behaviors: (1) Ingratiation, self-promotion, exemplification, intimidation, supplication, (2) Tactical-assertive tactics, tactical-defensive tactics, strategic-assertive tactics, strategic-defensive tactics, and (3) Supervisor-focused tactics, self-focused tactics, and job-focused tactics.

Various impression management strategies have been identified in the literature. For example, according to taxonomy proposed by Merkl-Davies and Brennan (2007), seven main impression management strategies are used in corporate narrative documents (i.e. annual reports). Six strategies are used for concealment. Two of these obfuscate bad news by manipulating verbal information either by (1) reading ease manipulation (e.g. making text more difficult to read) or (2) rhetorical manipulation (e.g. using persuasive language). Four strategies emphasize good news by manipulating verbal and/or numerical information: (3) thematic manipulation (e.g. emphasizing positive words and themes, or emphasizing positive financial performance), (4) visual and structural effects (e.g. manipulation involves the way in which verbal/numerical information is presented), (5) performance comparisons (e.g. choosing benchmarks that portray current financial performance in the best possible light), and (6) choice of earnings number (e.g. selecting one of a number of earnings amounts for disclosure to favorably portray current financial performance). The seventh impression management strategy in this taxonomy is the attribution of organizational outcomes.

There is also the notion of organizational impression management tactics defined as different ways in which companies can use impression management, that is, specific types of behavior designed to create a desired image. (Bolino et al., 2008). According to Sandberg and Holmlund (2015) impression management tactics aim to shape the

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impressions that stakeholders hold or tactics that more neutrally inform stakeholders about corporate actions. Therefore, companies need to make a choice between the two, considering expectations of stakeholders regarding sustainability reporting (Sandberg and Holmlund, 2015). Mohamed et al. (1999) developed a taxonomy of organizational impression management tactics and suggested the following categorization: direct tactics (i.e. discussing the company itself) or indirect tactics (i.e. discussing third parties to which the company is associated) and assertive tactics (i.e. the company actively trying to change its image) or defensive tactics (i.e. used by the company to respond to a threat to its image).

Sandberg and Holmlund (2015) identified eight organizational impression management tactics used in sustainability reporting. These tactics embrace two groups: (1) describing how companies present specific actions, and (2) characterizing the writing styles that companies use. Presenting actions include: (1) description (i.e. giving information about company's actions, (2) praise (i.e. presenting company's actions in a way that is overly favorable, (3) admission (i.e. admitting to instances that do not support the favorable impression company attempts to convey, and (4) defense (i.e. attempting to justify instances that do not support the favorable impression company attempts to convey). Writing styles comprise: (1) subjective style (i.e. discussing matters only from company's own point of view, the account being colored by company's opinions and/or one-sided arguments in one's favor), (2) positive style (i.e. overly emphasizing favorable aspects over unfavorable aspects, thus giving an unbalanced account of events), (3) vague style (i.e. giving unspecific information that gives no clear account of events, and (4) emotional style (i.e. making the text personal and feeling-evoking).

Moreover, Hooghiemstra (2000) analyzed sustainability disclosure of the Shell company and indicated two distinctive tactics: acclaiming (i.e. presenting a favorable event in a manner that maximizes positive impacts on the company) and accounting (i.e. presenting an unfavorable event in a manner that minimizes negative impacts on the company). Based on the study of environmental reporting practices Bansal and Kistruck (2006) distinguished two characteristic tactics: demonstrative (i.e. a company gives detailed explanations of its operations by providing extensive information, quantitative data, examples and graphs), and illustrative (i.e. a company gives verbal and pictorial images that are simple and lack detail). In order to investigate persuasion in social/environmental reports, Higgins and Walker (2012) adopted the classic focus on Aristotle's rhetorical 'proofs' (strategies): *ethos* (i.e. credibility described by similitude, ingratiation, deference, expertise, self-criticism, inclination to succeed, and consistency), *logos* (i.e. reason characterized by argumentation, logic, warrants/justifications, claims, data, and evidence/examples), and *pathos* (i.e. emotion – metaphors and identification).

Talbot and Boiral (2018) observed three interdependent and non-exclusive issues affecting the credibility and transparency of corporate environmental statements, i.e. (1) disclosure of non-compliant information, (2) legitimation of negative aspects through neutralization techniques, and (3) obfuscation of negative aspects and enhancement of positive aspects. Disclosure of non-compliant information include: (1a) uncertainties concerning measurement methods and emission calculations, (1b) incomplete or unrepresentative information on performance indicators, and (1c) lack of information. Legitimation of negative aspects through neutralization techniques comprises: (2a) minimizing the impact of non-measured emissions and (2b) excuses and future commitments. Obfuscation of negative aspects and enhancement of positive aspects embrace: (3a) strategic omission and (3b) manipulation of numbers. The same authors identified six main tactics that industrial emitters use to rationalize their impacts: self-proclaimed excellence, promotion of a systemic view, denial and minimization, denouncing unfair treatment and deceptive appearances, economic and technological blackmail, and blaming others. It should be noted that these solutions might be applied simultaneously to better influence the perceptions of stakeholders and to justify negative impacts (Talbot and Boiral, 2015).

Merkl-Davies and Brennan (2007) argue that corporate reporting can be viewed in two different ways, either as the company giving incremental information to support stakeholders' decision-making or as organizational impression management and opportunistic behavior designed to benefit the company. It must be noted that GRI Standard emphasizes the role of sustainability reporting in giving incremental information to stakeholders. However, some researchers (Onkila, 2009; Sandberg and Holmlund, 2015; Talbot and Boiral, 2015; Talbot and Boiral, 2018) criticize that sustainability reporting is used to manipulate stakeholders and create favorable impressions of companies' operations that may not accurately reflect reality.

Although the importance of the manner in which information is presented and disclosed in sustainability reports is more and more emphasized, there is still the scarcity of the research exploring the organizational impression management concept to analyze this issue. Therefore, there is the need to further understand and explore the manner in which impression management is used in sustainability reporting. This also concerns current research on the greenhouse gases (GHG) emissions and circular economy (CE) issues reporting which is still insufficient. Moreover, the GHG and CE issues are crucial areas to achieve climate neutrality in the EU by 2050.

Therefore, the aim of this paper was to analyze selected issues related to organizational impression management in the context of sustainability reporting. The research was based on eight case studies of sustainability reports from the energy sector companies and, in particular, it concerned issues and specific organizational impression management tactics related to greenhouse gas emissions and circular economy (GHG and CE issues). The analysis focused on the disclosures which referred directly to GHG and CE issues in the statements from senior decision-makers. These statements were confronted with the occurrence of GHG and CE issues in the list of material topics, the scope of information and indicators related to GHG and CE issues, as well as the accuracy and comparability of information related to GHG and CE issues.

Materials and Methods

In order to determine whether and to what extent companies use organizational impression management tactics in sustainability reports it was decided to indicate disclosures which refer directly to GHG and CE issues in the statements from senior decision-maker. Then, it was to confront with the occurrence of GHG and CE issues in the list of material topics, the scope of information related to GHG and CE issues, as well as the accuracy and comparability of information related to GHG and CE issues. The analysis was carried out using selected case studies (Knop and Olko, 2018) based on the sustainability reports published by companies representing the energy sector in the European Union. The GHG and CE issues were selected because these areas are crucial to achieve climate neutrality in the EU by 2050. The energy sector, in turn, was analyzed due to the fact that this sector generates the most GHG of all sectors (European Commission, 2018; Jonek-Kowalska, 2019).

It was assumed that the research sample will consist of the reports that are: prepared by companies from the energy sector whose headquarters are located in the EU countries; prepared based on the up to date GRI Standards guidelines; available in an English version; and available in PDF format or online version on the company's website or on websites where information on sustainability reports is collected. Moreover, it was decided that two databases (i.e. GRI's Sustainability Disclosure Database (SDD) and Corporate Register (CR)) would be used to achieve a suitable sample of sustainability reports. Due to the fact that GRI guidelines published in 2016 became effective for reports published on or after 1 July 2018, it was decided that only reports published after that date would be selected for analysis. In addition, it was assumed that the latest report disclosed by companies during this period would be considered for further investigation.

The selection of the research sample took place in January 2020. The exploration of the GRI SDD resulted in identification of 260 organizations representing the energy sector or energy utilities sector that have published at least one sustainability report. The examination of CR database made it possible to achieve 152 companies from the electricity sector. To remove duplicated organizations from the research sample data from the SDD and CR databases were combined. Consequently, the research sample was limited to 326 organizations. Taking into account availability of reports in an English version and in PDF format or online version on the company's website as well as elaboration of reports based on the GRI guidelines published in 2016, it was determined that 61 organizations from the energy sector in the EU publishing sustainability reports could be included in the final research sample. Next, the latest available sustainability report was found for each organization from the research sample. The collection of reports took place between February and April 2020. As a result, 61 reports were collected (Janik et al., 2020). After initial content analysis of these disclosures, 8 sustainability reports were found to include both GHG and CE issues directly mentioned in the statements from senior decision-maker. The identified reports were prepared by the following companies: ENI SpA, A2A SpA, ENEL SpA, Hera Group, Iren SpA from Italy, Naturgy Energy Group and REPSOL Group from Spain as well as ALTEO Group representing Hungary.

In the next step, the qualitative content analysis of each of the identified reports was carried out (Mayring, 2000; Guthrie and Abeysekera, 2006). This approach makes it possible to assess what is disclosed and how it is done by analyzing the content using and scoring specific criteria (Helfaya and Whittington, 2019). In this study, to determine scope and specificity of organizational impression management tactics qualitative content analysis was focused on the selected general and topic-specific disclosures included in GRI Standards identified as potentially related to GHG and CE issues. The following issues were analyzed:

- The direct reference to GHG and CE issues in the statement from senior decision-maker.
- The occurrence of GHG and CE issues in the list of material topics.
- The scope of information related to GHG issues, determined by inclusion of indicators concerning direct GHG emissions (Disclosure 305-1), energy indirect GHG emissions (Disclosure 305-2), other indirect GHG emissions (Disclosure 305-3), GHG emissions intensity (Disclosure 305-4), and reduction of GHG emissions (Disclosure 305-5).

- The scope of information related to CE issues, defined by indicators concerning materials used by weight or volume (Disclosure 301-1), recycled input materials used (Disclosure 301-2), energy consumption within the organization (Disclosure 302-1), energy consumption outside of the organization (Disclosure 302-2), energy intensity (Disclosure 302-3), reduction of energy consumption (Disclosure 302-4), and waste by type and disposal method (Disclosure 306-2).
- The accuracy of information related to GHG issues, based on description of the specific methods used to gather, compile, and analyze information related to disclosures on emissions (Disclosure 305-1, 305-2, 305-3, 305-4 and 305-5).
- The accuracy of information related to CE issues, based on description of the methods used to gather, compile, and analyze information related to disclosures on materials (Disclosure 301-1 and 301-1), energy (Disclosure 302-1, 302-2, 302-3 and 302-4) and waste (Disclosure 306-2).
- Comparability of relevant information, based on the assessment of the consistency of reported information and presentation of this information in a manner that empowers stakeholders to analyze changes over time, analytical comparisons on a year-to-year basis, including total numbers as well as ratios (e.g., normalized data per unit of production), and supporting analyses relative to other organizations.

In order to identify specific organizational impression management tactics the taxonomies proposed by Bansal and Kistruck (2006), Mohamed et al. (1999), and (Talbot and Boiral, 2015) were applied.

Results and Discussion

The analysis of the information reported by all analyzed companies begins with a description of main parameters of their activity, including: the area of activity, the type of business activity, the type of sustainability reporting, external assurance and the report option. Next, the manner in which GHG and CE issues are taken into consideration in the statement from senior decision-makers and material topics as well as information on quality of reporting GHG and CE issues (i.e. scope, accuracy and comparability) are presented. Moreover, the specific impression management tactics are determined for each analyzed company.

Case study of ENI SpA

ENI SpA is an Italian multinational company headquartered in Rome operating internationally with a diversified business activity including the energy sector. The company has prepared stand-alone sustainability report that was externally assured and is prepared according to GRI Core option. The statement made by a senior decision maker included a direct reference to the GHG and CE issues. The management board of ENI SpA was aware of the need for continuous improvement and transformation of the organization in the context of GHG and CE issues, with such phrases as *climate change*, *decarbonized energy product* and *circular economy* directly stated in the report. The company's authorities had the ambition to become a leader in supplying *the decarbonized energy product*. These declarations were reflected in the determined material topics. Among the identified material topics there was one which is directly related to GHG issues: *Climate change and energy efficiency* and one directly related to CE issues: *Circular economy*. All indicators pertaining to GHG-related issues were very well documented, and the range of indicators for CE was quite modest. However, the analyzed organization reported only a few of them in the partial scope. The methodology of calculation of indicators was described partially, but only with regard to GHG issues. The organization reported the amount of its carbon footprint and provided information about the methodology used to calculate it. The values for the last three years were reported and some of them were related to the production volume, which allowed to compare the results with other organizations. Considering identification of specific impression management solutions, the analysis revealed that ENI SpA used, in particular, assertive as well as demonstrative or illustrative tactics. In addition, the company focused on self-proclaimed excellence and promotion of a systemic view. Table 1 provides a synthetic overview of the results achieved for ENI SpA.

Table 1: A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by ENI SpA

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"The commitments we have made to continue our transformation process (…) remain intact, as our determination to fight climate change and our efforts towards a just energy transition (…) we want to be leaders in supplying decarbonized energy products, by combining economic and environmental sustainability."	GHG issues mentioned directly	Indicators compliant with the disclosure requirements: 305-1; 305-2; 305-3; 305-4; 305-5	Methods partially described	Indicators enable determination of the trend of changes in ratios on a year-to-year basis	Assertive tactic Demonstrative tactic Self-proclaimed excellence Promotion of a systemic view
CE Issues					
"We often talk about long-term vision, circular economy, about the need to find a new development model fit for human beings."	CE issues mentioned directly	Indicators partially compliant with the disclosure requirements: 302-1; 302-3; 302-4; 306-2 Lack of specific indicators: 301-1; 301-2; 302-2; 306-4	Methods not described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Illustrative tactic Self-proclaimed excellence Promotion of a systemic view

Source: Own elaboration based on the analysis of "Eni for 2019. A just transition" and "Eni for 2019 – Sustainability performance.

Case study of A2A SpA

A2A SpA is an Italian company that has significant presence in Italy and Greece with a diversified business activity, including the energy sector. The company prepared an integrated report that had been externally assured and prepared according to the GRI Core option. The statement made by a senior decision maker included a direct reference to the GHG and CE issues. In the context of GHG-related issues, the management board of A2A SpA used such phrases as *climate change* and *reduction of CO_2 emissions* and in the CE context – *360° circular economy*. These declarations were reflected in the determined material topics. Among the identified material topics there was one directly related to GHG issues: *Fight against climate change and containment of atmospheric emissions* and one related to CE issues: *Circular economy and responsible use of resources*. The organization reported almost all indicators related to GHG and CE issue, including the carbon footprint. Only one group was missing: 301-2. The values of some indicators are difficult to determine and are deeply rooted in the content. The methodology of calculation of indicator values was provided in a very general way and there was a lack of precise information in this respect. Some information was provided in the form of footnotes. The values of indicators were provided for the last three years and many of them were related to the production volume. Their comparability to other organizations had a high potential with regards to GHG issues and an average potential for CE issues. Taking into account specific impression management solutions, the analysis showed that A2A SpA applied assertive and demonstrative tactics. Moreover, the promotion of a systemic view was emphasized in relation to GHG and CE issues and self-proclaimed excellence with regard to GHG issues. Table 2 provides a synthetic overview of the results achieved for A2A SpA.

Table 2: A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by A2A SpA

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"Renewable sources, district heating and energy efficiency for the fight against climate change: (…) In 2018, we reduced CO_2 emissions per kilowatt hour produced by 10% compared to 2017."	GHG issues mentioned directly	Indicators compliant with the disclosure requirements: 305-1; 305-2; 305-3; 305-4 Indicators partially compliant with the disclosure requirements: 305-5	Methods partially described	Indicators enable determination of the trend of changes in ratios on a year-to-year basis	Assertive tactic Demonstrative tactic Promotion of a systemic view
CE Issues					
"360° circular economy – more resources with less resources: We maximize the recovery of material and energy from waste, in full compliance with the objectives of the European Union."	CE issues mentioned directly	Indicators compliant with the disclosure requirements: 301-1; 302-1; 302-2; 302-3; 306-2; 306-4 Indicators partially compliant with the disclosure requirements: 302-4 Lack of specific indicators: 301-2	Methods partially described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Demonstrative tactic Self-proclaimed excellence Promotion of a systemic view

Source: Own elaboration based on the analysis of "A2A 2018 Integrated report. Shaping the future today, A2A SpA" and "2018 Integrated report – supplement, A2A, SpA"

Case study of ENEL SpA

ENEL SpA is an Italian multinational company headquartered in Rome operating internationally in the energy sector. The company published a stand-alone sustainability report that had been externally assured and is prepared according to the GRI Core option. The statement made by a senior decision maker included a reference to GHG and CE issues. In the context of GHG issues, the management board of ENEL SpA used the following phrases: *specific CO_2 emissions*; *climate change*; *circular development* and *circular economy* directly in the report. The company's authorities showed their burning ambition declaring that the issue in which: *Enel wants to play a leading role is undoubtedly the fight against climate change*. These declarations were reflected in the established material topics. Among the determined material topics there was one directly referring to GHG issues: *Decarbonization of the energy mix*. There was also one indirect reference to a CE issue, namely *Environmental compliance and management*. The GHG indicators were very well documented, in terms of CE the range of indicators is smaller – several of which were not featured in the report at all, while several others were not covered in full. The methodology for calculating indicators was partially described for both GHG and CE issues and was included in the description of the general reporting methodology. Only a part of the indicators were related to production volumes and their values were almost always provided for the last three years. Considering specific impression management solutions, the analysis revealed that ENEL SpA used, in particular, assertive as well as illustrative or demonstrative tactics. In addition, the analyzed company focused mostly promotion of a systemic view. Table 3 provides a synthetic overview of the results achieved for ENEL SpA.

Table 3. A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by ENEL SpA

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"A commitment that Enel has strengthened and expanded, revitalising the targets for reducing specific CO_2 emissions (…). An issue of primary importance in which Enel wants to play a leading role is undoubtedly the fight against climate change."	GHG issues mentioned directly	Indicators compliant with the disclosure requirements: 305-1; 305-2; 305-3; 305-4 Indicators partially compliant with the disclosure requirements: 305-5	Methods partially described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Demonstrative tactic Promotion of a systemic view
CE Issues					
"Envisioning a sustainable and circular development model for	CE issues mentioned	Indicators compliant with the disclosure	Methods partially	Indicators include total and absolute	Assertive tactic Illustrative tactic

cities means envisioning it for the entire planet (…). Enel has made the circular economy a driver of its strategy, setting out a global vision and developing concrete actions for its Business Lines in various countries."	indirectly	requirements: 301-1; 302-1; 306-2 Indicators partially compliant with the disclosure requirements: 301-2; 302-3; 302-4 Lack of specific indicators: 302-2; 306-4	described	numbers at least per two years or ratio per one year	Promotion of a systemic view

Source: Own elaboration based on the analysis of "Sustainability report 2018, Enel"

Case study of Hera Group

Hera Group is a multiutility company based in Bologna (Italy) operating on the domestic market with a diversified business activity, including the energy sector. The company prepared stand-alone sustainability report that had been externally assured and prepared according to the GRI Related option. The statement made by a senior decision maker included a reference to GHG and CE issues. In the context of GHG issues, the management board of the Hera Group used the following phrases: *impact on the climate*; *circular economy* and *circularity* directly in the report. These declarations were reflected in the determined material topics. Among the identified material topics there was one directly referring to GHG issues: *Reduction of greenhouse gas emissions (climate change)* and one directly related to CE issues: *Transition towards a circular economy* and one indirectly related to CE issues: *Promotion of energy efficiency and spreading renewable energy*. The description of the latter also mentioned issues characteristic for the circular economy concept. The GHG indicators were very well documented, the range of reported indicators in the CE area is smaller, while some of them were not covered in the report at all. The methodology of calculation of indicators was very well described for GHG and partially described for CE issues. Indicator values were often related to production volumes, and sometimes even were compared to the values found in the Eurostat database. Their values were almost always provided for the last three years. The analysis revealed that Hera Group applied assertive as well as illustrative or demonstrative impression management tactics. The company was also focused on promotion of a systemic view (GHG and CE issues), and self-proclaimed excellence (CE issues). Table 4 provides a synthetic overview of the results achieved for Hera Group.

Table 4. A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by Hera Group

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"Decarbonisation has become a signature part of our commercial offer (…) we are committed to reducing our impact on the climate by acquiring renewable electricity for all the Group's main companies."	GHG issues mentioned directly	Indicators compliant with the disclosure requirements: 305-1; 305-2; 305-3; 305-4 Indicators partially compliant with the disclosure requirements: 305-5	Full description of relevant methods	Indicators enable determination of the trend of changes in ratios on a year-to-year basis	Assertive tactic Demonstrative tactic Promotion of a systemic view
CE Issues					
"Hera is almost 20 years ahead of the EU's circular economy goal and ranks at the same level as the most advanced European countries. (...) important initiatives intended to improve the "circularity" of our operating activities were introduced in 2019.	CE issues mentioned directly	Indicators compliant with the disclosure requirements: 302-1; 302-3; 302-4; 306-2 Lack of specific indicators: 301-1; 301-2; 302-2; 306-4	Methods partially described	Indicators enable determination of the trend of changes in ratios on a year-to-year basis	Assertive tactic Illustrative tactic Self-proclaimed excellence Promotion of a systemic view

Source: Own elaboration based on the analysis of "Sustainability report 2019, Hera Gruppo"

Case study of Iren SpA

Iren SpA is an Italian company operating on the domestic market with a diversified business activity, including the energy sector. The company disclosed a stand-alone sustainability report that had been externally assured and prepared according to the GRI Comprehensive option. The statement made by a senior decision maker included a reference to GHG and CE issues. In the context of GHG issues, the management board of Iren SpA used the following phrases: *climate-changing emissions* and *circular economy* directly in the main text. These declarations were reflected in the determined material topics. Among the identified material topics there was one which indirectly refers to GHG issues: *Emission*. Three topics referred to CE issues, including one making a direct reference: *Circular economy: management, separated waste collection and reuse of waste* and two making indirect

references: *Sustainable use of water resources* and *Use of energy resources (produced from renewable and non-renewable sources)*. The indicators were very well described with regard to GHG issues. In case of CE issues, the reported indicators were smaller in scope and two of the indicators were absent. However, there was information that these indicators were not related to the organization's activities. The methodology of calculation of indicators was clear and very well described both before each presented section of indicators and in footnotes. Their values were provided for the last three years with few exceptions, and some of them were related to the production volume. Considering specific impression management solutions, the analysis revealed that Iren SpA applied assertive as well as demonstrative or illustrative tactics. Moreover, the self-proclaimed excellence and promotion of a systemic view were emphasized. Table 5 provides a synthetic overview of the results achieved for Iren SpA.

Table 5. A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by Iren SpA

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"The reduction of climate-changing emissions saw us involved in many initiatives in 2018."	GHG issues mentioned indirectly	Indicators compliant with the disclosure requirements:305-1; 305-2; 305-3; 305-5 Indicators partially compliant with the disclosure requirements 305-4;	Full description of relevant methods	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Demonstrative tactic Self-proclaimed excellence Promotion of a systemic view
CE Issues					
"Circular economy: For Iren Group, the cornerstones include the increase in separated waste collection, the extension of the exact pricing system, the increase in material recovery and energy from non-recyclable waste."	CE issues mentioned directly	Indicators compliant with the disclosure requirements: 302-4; Indicators partially compliant with the disclosure requirements: 301-1; 302-1; 302-2; 302-3; 306-2 Lack of specific indicators: 301-2; 306-4	Full description of relevant methods	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Illustrative tactic Self-proclaimed excellence Promotion of a systemic view

Source: Own elaboration based on the analysis of "Sustainability report 2018, Iren SpA"

Case study of Naturgy Energy Group

Naturgy Energy Group is a Spanish multinational company with administrative headquarter in Barcelona (while legally registered in Madrid) operating internationally with a diversified business activity, including the energy sector. The company prepared a stand-alone sustainability report that had been externally assured and prepared according to the GRI Comprehensive option. The statement made by a senior decision maker included a reference to GHG and CE issues. In the context of GHG issues, the management board of Naturgy Energy Group used the following phrases: *fight against climate change*; *emissions of greenhouse gases* and *circular economy* directly in the report. These declarations were reflected in the determined material topics. Among the identified material topics there was one which directly refers to GHG issues: *Emissions and climate change* and one referring indirectly to CE issues: *Energy efficiency and energy consumption*, the description of which included typical CE issues. The GHG indicators were very well documented. In terms of CE, the indicators described had a smaller range and the values of two indicators were not provided at all. However, the report lacks the description of the methodology of their calculation. The values of the indicators were provided for the last three years in most cases. Some of them were also related to the production volume, but often, these values were only provide for the past year. The analysis showed that Naturgy Energy Group used assertive as well as demonstrative or illustrative tactics. This company mainly focused on promotion of a systemic view. Table 6 provides a synthetic overview of the results achieved for Naturgy Energy Group.

Table 6. A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by Naturgy Energy Group

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"Within the context of the fight against climate change and technological transformation, our Strategic Plan is focused on renewable energies and natural gas (…). Emissions of greenhouse gases were reduced by about 11%."	GHG issues mentioned directly	Indicators compliant with the disclosure requirements: 305-1; 305-2; 305-3; 305-4; 305-5	Methods not described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Demonstrative tactic Promotion of a systemic view
CE Issues					
"Naturgy has continued to introduce measures in 2018, which have enabled the business to reduce its externalities in the three company-defined strategic axes: climate and air quality, circular economy and natural capital and biodiversity."	CE issues mentioned indirectly	Indicators compliant with the disclosure requirements: 302-1; 302-3 302-4 Indicators partially compliant with the disclosure requirements: 301-1; 302-2; 306-2 Lack of specific indicators: 301-2; 306-4	Methods not described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Illustrative tactic Promotion of a systemic view

Source: Own elaboration based on the analysis of "2018 Corporate Responsibility Report. Energy for the future, Naturgy"

Case study of REPSOL Group

REPSOL Group is a Spanish company based in Madrid operating internationally with a diversified business activity, including the energy sector. The company disclosed integrated report comprising sustainability issues that had been externally assured and prepared according to the GRI Comprehensive option. The statement made by a senior decision maker included a reference to GHG and CE issues. In the context of GHG issues, the management board of the REPSOL Group used the following phrases: *climate solutions to achieve net zero emissions* and *circular economy*. These declarations were reflected in the determined material topics. Among the identified material topics there were three which directly refered to GHG issues: *GHG emissions and strategies for the energy transition*; *Future technologies for mitigating climate change* and *Energy and climate policies and regulation* as well as one directly referring to CE issues: *Circular economy and waste management*. The indicators in the GHG range were very well documented, while the indicators related to CE were documented in a narrower scope and the values of two of them were not provided at all. The calculation methodology of their values was partially described. The calculation methodology for indicators from the disclosure group GRI301 was absent. The values of the indicators were provided for the last three years in most cases. A part of them was also referred to the production volume. Considering specific impression management solutions, it was revealed that REPSOL Group applied assertive as well as demonstrative or illustrative tactics. Moreover, the emphasis was placed on the promotion of a systemic view. Table 7 provides a synthetic overview of the results achieved for REPSOL Group.

Table 7. A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by REPSOL Group

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"With the technological advances of today, we envisage that we can achieve, at least, a 70% net emissions reduction by 2050, and we are committed to applying the best technologies to raise this figure (…). If this should prove not to be enough, we shall offset emissions through reforestation and other natural climate solutions to achieve net zero emissions by 2050."	GHG issues mentioned directly	Indicators compliant with the disclosure requirements: 305-1; 305-2; 305-3; 305-4; 305-5	Methods partially described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Demonstrative tactic Promotion of a systemic view
CE Issues					
"The circular economy is at the heart	CE issues	Indicators compliant	Methods	Indicators include	Assertive tactic

of our strategy for both businesses."	mentioned directly	with the disclosure requirements: 302-3 Indicators partially compliant with the disclosure requirements: 301-1; 302-1; 302-2; 302-4; 306-2; Lack of specific indicators: 301-2; 306-4	partially described	total and absolute numbers at least per two years or ratio per one year	Illustrative tactic Promotion of a systemic view.

Source: Own elaboration based on the analysis of "2019 Integrated Management Report, REPSOL Group"

Case study of ALTEO Group

ALTEO Group is an Hungarian company operating internationally with a diversified business activity, including the energy sector. The company prepared integrated report comprising sustainability issues that had been externally assured and prepared according to the GRI Core option. The statement made by a senior decision maker included a reference to GHG and CE issues. In the context of GHG issues, the management board of the ALTEO Group used the following phrases: *Energy and climate goals* and *Circular Economy Platform*. These declarations were reflected in the determined material topics, but were only indirectly covered within them, among which are: *environmental effects of products and services*; *environmental compliance* and *energy consumption*. The report contained only a few indicators relating to GHG and CE issues, with only three of them being documented in full. As many as eight groups of indicators were absent from the report. There were differences in the description of the methodology for calculating their values. In case of GHG issues the report featured full descriptions of relevant methods, while for CE issues only partial ones. The values of the indicators were provided for the last four years. A part of them was referred to the production volume. Considering specific impression management solutions, the analysis revealed that ALTEO Group applied assertive and illustrative tactics. In addition, the promotion of a systemic view was emphasized in relation to GHG and CE issues and self-proclaimed excellence was demonstrated considering GHG issues. Table 8 provides a synthetic overview of the results achieved for ALTEO Group.

Table 8. A synthetic overview of the reported GHG and CE issues and specific organizational impression management tactics applied by ALTEO Group

Specific statements from senior decision-maker	Occurrence in material topics	Scope of information	Accuracy of information	Comparability of information	Impression management tactics
GHG Issues					
"ALTEO has reached a stage where it is able to substantially contribute to accomplishing energy and climate goals and - in respect of its activities and mission – it is able to serve as an example for other companies."	GHG issues mentioned indirectly	Indicators compliant with the disclosure requirements: 305-4 Indicators partially compliant with the disclosure requirements: 305-1; 305-2 Lack of specific indicators: 305-3; 305-5	Full description of relevant methods	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Illustrative tactic Self-proclaimed excellence Promotion of a systemic view
CE Issues					
"ALTEO was actively involved in sustainability-related knowledge sharing in 2018 (...) I find the establishment of the Circular Economy Platform to be a very forward thinking initiative."	CE issues mentioned indirectly	Indicators compliant with the disclosure requirements: 302-1; 306-2 Lack of specific indicators: 301-1; 301-2; 302-2; 302-3; 302-4; 306-4	Methods partially described	Indicators include total and absolute numbers at least per two years or ratio per one year	Assertive tactic Illustrative tactic Promotion of a systemic view

Source: Own elaboration based on the analysis of "Integrated report 2018. With energy in mind, ALTEO Group"

Conclusion

The performed analysis based on case studies from the energy sector companies revealed that disclosures on GHG and CE issues in the sustainability reports varied considering their scope, accuracy and comparability. In general, the scope and accuracy of reported GHG issues was relatively better compared to CE issues. However, the declared importance of GHG and CE issues at the strategic level was not consistently reflected in providing high-quality and more detailed information at the operational level. Therefore, it was often the case that the declarations included in

the statements from senior decision-makers, which were to show the importance of GHG and CE issues in the organization activity, were not always reflected in specific priorities and adequately described indicators.

It must be noted that this research comprised sustainability reports which included both GHG and CE issues directly mentioned in the statements from senior decision-maker. Nevertheless, the in-depth analysis showed that GHG and CE issues were not always included in material topics directly. Companies reported various indicators which were characteristic of GHG and CE issues, but it was made to a different extent. In addition, relevant descriptions often were missing of the methods used to determine the values of disclosed indicators. Moreover, the values of the disclosed indicators were showed in a way which prevented comparisons with other organizations. There was a wide variety of presented methods of determination of the value of individual indicators. However, some companies hardly ever presented the methods or presented them only for selected groups of indicators. Others presented them in fair detail but in different ways, using solutions such as: inserting a general description constituting a separate paragraph of the report, inserting descriptions before each thematic section, using footnotes to values mentioned in the text or to tables gathering values of indicators, etc.

Considering specific organizational impression management solutions, the research results showed that the analyzed companies from energy sector applied most often assertive (i.e. designed to actively improve or change image) as well as demonstrative (i.e. giving detailed explanations of operations by providing extensive information, quantitative data, examples and graphs) or illustrative (i.e. giving verbal and pictorial images that are simple and lack detail) impression management tactics. Demonstrative impression management tactics were specific for GHG issues while illustrative impression management tactics concerned mainly disclosures on CE issues. In addition, the analyzed companies mainly focused on promotion of a systemic view (i.e. extended vision of the life cycle of the product, emphasis on economic, social and environmental benefits of the company's activities; emphasizing the importance of company's products and its contributions to society in a comprehensive and systemic manner) and self-proclaimed excellence (i.e. promoting an idealized green image, focus on commitments and awards received, and exemplification of the company; claiming to be the best in the field of activity).

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Public Disclosures on Sustainability Performance and Organizational Impression Management – An Analysis of Greenhouse Gases and Circular Economy Issues in Sustainability Reports from the Energy Sector in the European Union

Agnieszka JANIK
Silesian University of Technology, Gliwice, Poland, agnieszka.janik@polsl.pl

Adam RYSZKO
Silesian University of Technology, Gliwice, Poland, adam.ryszko@polsl.pl

Marek SZAFRANIEC
Silesian University of Technology, Gliwice, Poland, marek.szafraniec@polsl.pl

Abstract

This paper presents the results of a qualitative content analysis of sustainability reports published by companies representing the energy sector in the European Union. In order to determine the specificity of organizational impression management used in the reports based on the latest GRI Standards, it was decided to explore the inclusion of issues related to greenhouse gas emissions and circular economy (GHG and CE issues) in the analyzed disclosures. In particular, the relationships between the occurrence of GHG and CE issues at the strategic level and the scope, accuracy, clarity and comparability of information related to GHG and CE issues were investigated and determined.

Keywords: Public Disclosures, Sustainability Performance, Impression Management, Energy Sector

Introduction

The notion of impression management was originally developed in social psychology in relation to behavioral strategies used by individuals to create desired social image (Tetlock and Manstead, 1985), and has been mainly applied to explain the behaviors of individuals in organizations (Bolino et al., 2008). Tedeschi & Melburg (1984) suggested that impression management can be either tactical (short term) or strategic (long term) and assertive (initiated by the individual person) or defensive (used by the individual person to respond to an undesired image). However, Elsbach et al. (1998) suggested that impression management strategies concern any action purposefully designed and carried out to influence an audience's perceptions of an organization. Therefore, in recent years, this concept has gained greater attention at organizational level in corporate narratives, including strategies to influence stakeholder perceptions (Bansal and Clelland, 2004;, Patelli and Pedrini, 2013; Talbot and Boiral, 2015; Talbot and Boiral, 2018).

Bansal and Kistruck (2006) conceptualized organizational impression management as a discrepancy between a company's substantive actions (i.e. real change in the company's operations) and the symbolic representations of the substantive actions (i.e. the ways in which the company presents its actions to others). This means that organizational impression management concerns the shaping of those representations in order to influence stakeholder perceptions, by controlling what is disclosed and how (Bansal and Kistruck, 2006). Various impression management strategies have been identified in the literature. However, it should be noted that these strategies can also be used to hide or manipulate the manner in which information is presented and disclosed (Talbot and Boiral, 2018). Therefore, for some researchers impression management means that senior decision-makers select the information to display and present that information in a manner intended to distort readers' perceptions of corporate achievement (Godfrey et al., 2003). Merkl-Davies and Brennan (2007) argue that corporate reporting can be viewed in two different ways, either as the company giving incremental information to support stakeholders' decision-making or as organizational impression management and opportunistic behavior designed to benefit the company.

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According to taxonomy proposed by these authors, we can distinguish strategies aimed at obfuscating the under-performance of the company (i.e. reading ease manipulation, and rhetorical manipulation), strategies intended to emphasize good news by manipulating verbal or digital information (i.e. thematic manipulation, visual and structural effects, performance comparisons, choice of earnings number), and attribution of organizational outcomes (Merkl-Davies and Brennan, 2007).

The organizational impression management can be applied to a variety of contexts, including sustainability reports (Boiral, 2016; Talbot and Boiral, 2015). In addition, there are various strategies that can be used to respond external pressures regarding information disclosures related to sustainability or environmental performance. However, research shows that in order to meet the expectations of stakeholders concerning complex environmental issues some organizations tend to show a symbolic rather than substantial engagement in this area (Bansal and Kistruck 2006). In particular, this is the case when stakeholders are not able to verify the validity and credibility of relevant information. Therefore, companies may use assertive impression management strategies designed to improve their image or defensive impression management strategies to protect or repair their image, including justification of behaviors and practices deserving condemnation (Ogden and Clarke, 2005; Talbot and Boiral, 2018). The defensive strategies (i.e. apologies, excuses and justifications) are related to specific neutralization techniques designed to protect or repair companies image as well as are used to deny responsibility or to rationalize ethically questionable behaviors (Bolino et al., 2008).

In this line of research, the literature on environmental disclosure also highlights that companies tend to present an idealized image of reality and to hide negative aspects of their activity (Boiral, 2013; Cho et al., 2010). Moreover, Cho et al. (2012) indicated that companies may intentionally present misleading information to improve their image. Based on a counter accounting approach in assessing the quality of sustainability reports, Boiral (2013) identified several types of simulacra in this area demonstrating that the use of impression management strategies in sustainability reports may be described as a simulacrum manifested by the reporting of unreliable, misleading or non-transparent information and images that tend to highlight and artificially inflate the corporate commitment to sustainable development. (Boiral, 2013).

Considering the neutralization impression management techniques, Talbot and Boiral (2015) identified six main solutions that industrial emitters use to rationalize their impacts. These neutralization techniques embrace: self-proclaimed excellence (i.e. promoting an idealized green image, focus on commitments and awards received, and exemplification of the company; claiming to be the best in the field of activity), promotion of a systemic view (i.e. extended vision of the life cycle of the product, emphasis on economic, social and environmental benefits of the company's activities; emphasizing the importance of company's products and its contributions to society in a comprehensive and systemic manner), denial and minimization (i.e. trivialization of the potential impact of global warming and minimizing corporate responsibility; denial or minimization of significant environmental impacts of the company), denouncing unfair treatment and deceptive appearances (i.e. criticism of simplistic interpretations of the environmental impacts of businesses, need to provide context information on the subject; the negative image of the industry is simplistic one that relies on deceptive appearances that do not reflect the complex reality of organizations and their real environmental commitments), economic and technological blackmail (i.e. emphasis on economic and technological constraints of environmental commitments, which may threaten the survival of businesses; presentation of the organization as vulnerable and threatened by government action to reduce environmental impact), and blaming others (i.e. search for scapegoats, relativization of the company's impacts and focus on organizations or sectors considered to be more polluting; concealment of the negative image associated with the impact of a company by focusing on the situation of other companies or sectors). Moreover, companies tend to apply these techniques simultaneously to better influence the perceptions of stakeholders and to justify environmental impacts (Talbot and Boiral, 2015).

The GRI Standards emphasize the role of sustainability reporting in giving incremental information to stakeholders. However, it should be noted that literature on sustainable reporting highlights the lack of transparency and problems concerning the quality and validity of the information disclosed. Moreover, some researchers (Coupland, 2006; Onkila, 2009; Sandberg and Holmlund, 2015; Talbot and Boiral, 2015; Talbot and Boiral, 2018) criticize that sustainability reporting is used to manipulate stakeholders and create favorable impressions of companies' operations that may not accurately reflect reality. Therefore, there is the need to understand sustainability reporting from the viewpoint of organizational impression management. This also concerns current research on the reporting greenhouse gases (GHG) emissions and circular economy (CE) issues which is still insufficient. However, the GHG and CE issues are crucial areas to achieve climate neutrality in the EU by 2050 (European Commission, 2018; Jonek-Kowalska, 2019).

Therefore, the aim of this paper was to determine the specificity of organizational impression management used in the sustainability reports based on the latest GRI Standards, It was based on a qualitative content analysis of sustainability reports published by companies representing the energy sector in the European Union. The exploration covered the inclusion of issues related to greenhouse gas emissions and circular economy (GHG and CE issues) in the analyzed disclosures. In particular, the relationships between the occurrence of GHG and CE issues at the strategic level and the scope and accuracy of information related to GHG and CE issues as well as clarity and comparability of relevant information.

Materials and Methods

It was assumed that the research sample will consist of the reports that are: prepared by companies from the energy sector whose headquarters are located in the EU countries; prepared based on the up to date GRI Standards guidelines; available in an English version; and available in PDF format or online version on the company's website or on websites where information on sustainability reports is collected. Moreover, it was decided that two databases (i.e. GRI's Sustainability Disclosure Database (SDD) and Corporate Register (CR)) would be used to achieve a suitable sample of sustainability reports. Due to the fact that GRI guidelines published in 2016 became effective for reports published on or after 1 July 2018, it was decided that only reports published after that date would be selected for analysis. In addition, it was assumed that the latest report disclosed by companies during this period would be considered for further investigation. Three main types of reports were analyzed: sustainability/CSR reports, integrated reports, and annual reports.

The selection of the research sample took place in January 2020. The exploration of the GRI SDD resulted in identification of 260 organizations representing the energy sector or energy utilities sector that have published at least one sustainability report. The examination of CR database made it possible to achieve 152 companies from the electricity sector. To remove duplicated organizations from the research sample data from the SDD and CR databases were combined. Consequently, the research sample was limited to 326 organizations. Taking into account availability of reports in an English version and in PDF format or online version on the company's website as well as elaboration of reports based on the GRI guidelines published in 2016, it was determined that 61 organizations from the energy sector in the EU publishing sustainability reports could be included in the final research sample. Next, the latest available sustainability report was found for each organization from the research sample. The collection of reports took place between February and April 2020 (Janik et al., 2020). As a result, 61 reports were collected. All reports were prepared based on the GRI Standards, of which 45 in core option, 9 in comprehensive option, and 7 as GRI-related.

In the next step, the qualitative content analysis of each of the identified reports in the final sample was carried out (Mayring, 2000; Guthrie and Abeysekera, 2006). This approach makes it possible to assess what is disclosed and how it is done by analyzing the content using and scoring specific criteria (Helfaya and Whittington, 2019). In this study, qualitative content analysis was focused on the selected general and topic-specific disclosures included in GRI Standards identified as potentially related to GHG and CE issues. In order to assess the quality of the analyzed sustainability reports a measurement system was adopted. The following assessment criteria and relevant variables were established:

- The occurrence of GHG issues at the strategic level (OSL_{GHG}), defined by their occurrence in the statement from senior decision-maker ($OSL_{GHG\text{-}SDM}$ – Disclosure 102-14), key impacts, risks, and opportunities ($OSL_{GHG\text{-}IRO}$ – Disclosure 102-15), list of material topics ($OSL_{GHG\text{-}LMT}$ – Disclosure 102-47), explanation of the material topic and its boundary and the management approach and its components ($OSL_{GHG\text{-}BMA}$ – Disclosure 103-1 and 103-2).
- The scope of information related to GHG issues (SI_{GHG}), measured by indicators concerning direct GHG emissions ($SI_{GHG\text{-}DE}$ – Disclosure 305-1), energy indirect GHG emissions ($SI_{GHG\text{-}IE}$ – Disclosure 305-2), other indirect GHG emissions ($SI_{GHG\text{-}OE}$ – Disclosure 305-3), GHG emissions intensity ($SI_{GHG\text{-}EI}$ – Disclosure 305-4), and reduction of GHG emissions ($SI_{GHG\text{-}RE}$ – Disclosure 305-5).
- The accuracy of information related to GHG issues (A_{GHG}), based on description of the specific methods used to gather, compile, and analyze information related to disclosures on emissions ($A_{GHG\text{-}E}$ – Disclosure 305-1, 305-2, 305-3, 305-4 and 305-5).
- The occurrence of CE issues at the strategic level (OSL_{CE}), described by their occurrence in the statement from senior decision-maker ($OSL_{CE\text{-}SDM}$ – Disclosure 102-14), key impacts, risks, and opportunities ($OSL_{CE\text{-}IRO}$ – Disclosure 102-15), list of material topics ($OSL_{CE\text{-}LMT}$ – Disclosure 102-47), explanation of the material topic and its boundary, and the management approach and its components ($OSL_{CE\text{-}BMA}$ - Disclosure 103-1 and 103-2).
- The scope of information related to CE issues (SI_{CE}), defined by indicators concerning materials used by weight or volume ($SI_{CE\text{-}MU}$ – Disclosure 301-1), recycled input materials used ($SI_{CE\text{-}RM}$ – Disclosure 301-2), energy consumption within the organization ($SI_{CE\text{-}ECW}$ – Disclosure 302-1), energy consumption outside of the

organization (SI_{CE-ECO} – Disclosure 302-2), energy intensity (SI_{CE-EI} – Disclosure 302-3), reduction of energy consumption (SI_{CE-RE} – Disclosure 302-4), and waste by type and disposal method (SI_{CE-WD} – Disclosure 306-2).

- The accuracy of information related to CE issues (A_{CE}), based on description of the methods used to gather, compile, and analyze information related to disclosures on materials (A_{CE-M} – Disclosure 301-1 and 301-1), energy (A_{CE-E} – Disclosure 302-1, 302-2, 302-3 and 302-4) and waste (A_{CE-W} – Disclosure 306-2).
- Clarity of relevant information (CLR), based on the assessment of their content with regard to information available and required by stakeholders, the avoidance of excessive and unnecessary detail, possibilities of finding the specific information without unreasonable effort, the avoidance of technical terms or other content which may be unfamiliar to stakeholders, and the inclusion of relevant explanations.
- Comparability of relevant information (CMP), based on the assessment of the consistency of reported information and presentation of this information in a manner that empowers stakeholders to analyze changes over time, analytical comparisons on a year-to-year basis, including total numbers as well as ratios (e.g., normalized data per unit of production), and supporting analyses relative to other organizations.

A 3-point scoring system similar to the scales applied in previous studies was used (Morhardt et al., 2002; Tsalis et al., 2020). In general, the scale was as follows: 0 – when relevant information for a specific disclosure topic was not mentioned or described, 1 – when relevant information was partially provided or partially compliant with the specific disclosure requirements, and 2 – when relevant information was compliant with the specific disclosure requirements.

The statistical analysis of collected data was carried out in two steps. The first step was to calculate the descriptive statistics for all variables (e.g. mean values). In the second step an analysis of relationships between the analyzed variables was carried out using the Spearman's rank correlation coefficient. In particular, this analysis concerned determination of links between the occurrence of GHG and CE issues at the strategic level and the scope and accuracy of information related to GHG and CE issues as well as clarity and comparability of relevant information.

Results and Discussion

The first step of the results analysis was presentation of the descriptive statistics obtained for all analyzed variables.

The analysis revealed that the occurrence of GHG issues at the strategic level (OSL_{GHG}) is by far the most advanced – its mean reached the highest value (1.66). The scope of information related to GHG issues (SI_{GHG}) was assessed at the level of 1.19, and the mean for accuracy of information related to GHG issues (A_{GHG}) totaled 1.07. With respect to detailed variables describing OSL_{GHG}, the highest mean (1.79) was obtained for the explanation of the material topic and its boundary and the management approach and its components ($OSL_{GHG-BMA}$), while the lowest mean (1.56) was achieved for key impacts, risks, and opportunities ($OSL_{GHG-IRO}$). All variables in this case reached relatively high values. Considering detailed variables characterizing SI_{GHG}, the direct GHG emissions (SI_{GHG-DE}) achieved far the highest mean of 1.62, and the lowest mean was obtained for the reduction of GHG emissions (SI_{GHG-RE}).

With respect to variables characterizing the reporting CE issues the achieved mean values were lower compared to the same variables adopted for GHG issues. The occurrence of CE issues at the strategic level (OSL_{CE}) was the most developed, but the mean obtained for it was still relatively low – 1.16. Scope of information related to CE issues (SI_{CE}) was assessed at the level of 0.74, and the mean value for accuracy of information related to CE issues (A_{CE}) totaled 0.47. Considering detailed variables describing OSL_{CE}, the lowest mean value (0.92) was achieved for statement from a senior decision-maker (OSL_{CE-SDM}), and the highest mean value (1.39) was found for the explanation of the material topic and its boundary and the management approach and its components (OSL_{CE-BMA}). In the case of detailed variables characterizing SI_{CE}, the decidedly highest mean of 1.39 was obtained for energy consumption within the organization (SI_{CE-ECW}), while the decidedly lowest mean of 0.13 was obtained for recycled input materials used (SI_{CE-RM}). With respect to specific variables describing A_{CE}, disclosure on energy (A_{CE-E}) achieved the highest mean of 0.64, and the lowest mean of 0.28 was obtained for disclosure on materials (A_{CE-M}).

Comparing the values of descriptive statistics obtained for variables concerning the reporting GHG and CE issues, it can be noticed that the means of all variables related to GHG issues were higher than those obtained for the CE issues. The biggest difference of 0.60 was found for A_{GHG} and A_{CE}. For OSL_{GHG} and OSL_{CE}, the difference totaled 0.50 and the smallest difference of 0.45 was observed between SI_{GHG} and SI_{CE}. The research results also revealed that the analyzed reports were characterized by a relatively high value of clarity (CLR) – the obtained mean totaled 1.56, and rather low level of comparability (CMP) (1.08).

Figure 1 shows the mean values obtained for the main variables characterizing the reporting GHG and CE issues. In addition, Figure 2 shows the mean values achieved for the detailed variables describing the main analyzed variables.

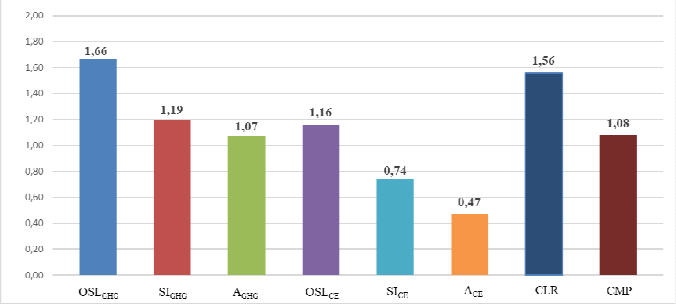

Figure 1. Mean values of the main variables characterizing the reporting GHG and CE issues

Figure 2. Mean values of the detailed variables describing the main analyzed variables characterizing the reporting GHG and CE issues

In order to determine the existence and specificity of organizational impression management used in the sustainability reports, the second step of the analysis comprised the investigation of relationships between the analyzed variables characterizing the reporting GHG and CE issues. It was carried out using the Spearman's rank correlation coefficient. In particular, this analysis included determination of links between:

- detailed variables describing the occurrence of GHG issues at the strategic level,

- detailed variables describing the occurrence of CE issues at the strategic level,
- main and detailed variables describing the occurrence of GHG issues at the strategic level and other variables characterizing the reporting GHG issues (i.e. the scope, accuracy, clarity and comparability of relevant information),
- main and detailed variables describing the occurrence of CE issues at the strategic level and other variables characterizing the reporting CE issues (i.e. the scope, accuracy, clarity and comparability of relevant information).

Table 1 presents correlations (i.e. Spearman's rank correlation coefficients) between the detailed variables describing the occurrence of GHG issues at the strategic level. The results of the analysis indicated that there were statistically significant correlations in three cases (i.e. $OSL_{GHG\text{-}SDM}$ & $OSL_{GHG\text{-}LMT}$; $OSL_{GHG\text{-}SDM}$ & $OSL_{GHG\text{-}BMA}$; $OSL_{GHG\text{-}BMA}$ & $OSL_{GHG\text{-}LMT}$). However, the obtained values of the correlation coefficients proved that these relationships were low or moderate. These results indicated that making declarations about GHG issues in the statements from senior decision-makers had a relatively weak association to their inclusion in the explanation of the material topic and its boundary and the management approach and its components, in the list of material topics, and, in particular, in the key impacts, risks, and opportunities.

Table 1. Correlations between variables describing the occurrence of GHG issues at the strategic level

Variable	$OSL_{GHG\text{-}SDM}$	$OSL_{GHG\text{-}IRO}$	$OSL_{GHG\text{-}LMT}$	$OSL_{GHG\text{-}BMA}$
$OSL_{GHG\text{-}SDM}$	1,00			
$OSL_{GHG\text{-}IRO}$	0,12	1,00		
$OSL_{GHG\text{-}LMT}$	0,31*	0,15	1,00	
$OSL_{GHG\text{-}BMA}$	0,42*	0,22	0,50*	1,00

** Correlation coefficients significant at the 0.05 level*

Table 2 presents correlations (i.e. Spearman's rank correlation coefficients) between the detailed variables describing the occurrence of CE issues at the strategic level. In the case of CE issues, there were statistically significant correlations in four cases (i.e. $OSL_{CE\text{-}SDM}$ & $OSL_{CE\text{-}IRO}$; $OSL_{CE\text{-}SDM}$ & $OSL_{CE\text{-}BMA}$; $OSL_{CE\text{-}SDM}$ & $OSL_{CE\text{-}LMT}$; $OSL_{CE\text{-}BMA}$ & $OSL_{CE\text{-}LMT}$). However, the values of the correlation coefficients were even lower than those achieved for GHG issues. This showed that the declarations concerning the importance of CE issues in the statements from senior decision-makers had relatively weak influence on explanation of the material topic and its boundary and the management approach and its components, presentation of key impacts, risks, and opportunities, and, in particular, explanation of the material topic and its boundary and the management approach and its components.

Table 2. Correlations between variables describing the occurrence of CE issues at the strategic level

Variable	$OSL_{CE\text{-}SDM}$	$OSL_{CE\text{-}IRO}$	$OSL_{CE\text{-}LMT}$	$OSL_{CE\text{-}BMA}$
$OSL_{CE\text{-}SDM}$	1,00			
$OSL_{CE\text{-}IRO}$	0,30*	1,00		
$OSL_{CE\text{-}LMT}$	0,26*	0,10	1,00	
$OSL_{CE\text{-}BMA}$	0,31*	0,20	0,49*	1,00

* Correlation coefficients significant at the 0.05 level

Tables 3 presents correlations (i.e. Spearman's rank correlation coefficients) between the main and detailed variables describing the occurrence of GHG issues at the strategic level and other variables characterizing the reporting GHG issues (i.e. the scope, accuracy, clarity and comparability of relevant information). The analysis of obtained results showed the existence of statistically significant correlations between some variables describing OSL_{GHG} and other specific variables characterizing reporting GHG issues. The highest correlation coefficients values were indicated for the following relationships: $OSL_{GHG\text{-}LMT}$ & $SI_{GHG\text{-}OE}$; OSL_{GHG} & $SI_{GHG\text{-}OE}$; OSL_{GHG} & SI_{GHG}; $OSL_{GHG\text{-}LMT}$ & SI_{GHG}. However, it should be noted that these relationships were at most moderate.

Table 3. Correlations between variables describing the occurrence of GHG issues at strategic level and variables describing the scope, accuracy, clarity and comparability of relevant information

Variable	SI_{GHG}	SI_{GHG-DE}	SI_{GHG-IE}	SI_{GHG-OE}	SI_{GHG-EI}	SI_{GHG-RE}	A_{GHG}	A_{GHG-E}	CLR	CMP
OSL_{GHG}	0,48*	0,33*	0,32*	0,49*	0,25	0,34*	0,08	0,08	0,32*	0,30*
$OSL_{GHG-SDM}$	0,24	0,12	0,19	0,26*	0,23	0,01	0,06	0,06	0,18	0,21
$OSL_{GHG-IRO}$	0,24	0,10	0,14	0,29*	-0,01	0,29*	0,10	0,10	0,07	0,11
$OSL_{GHG-LMT}$	0,48*	0,43*	0,34*	0,51*	0,30*	0,19	0,11	0,11	0,27*	0,30*
$OSL_{GHG-BMA}$	0,29*	0,13	0,09	0,24	0,31*	0,24	-0,12	-0,12	0,35*	0,38*

** Correlation coefficients significant at the 0.05 level*

Tables 4 presents correlations (i.e. Spearman's rank correlation coefficients) between the main and detailed variables describing the occurrence of CE issues at the strategic level and other variables characterizing the reporting CE issues. The analysis of obtained results showed the existence of statistically significant correlations between very small number of variables describing OSL_{CE} and other specific variables characterizing reporting CE issues. Moreover, the values of the correlation coefficients were lower than those indicated for GHG issues. The highest correlation coefficient value was observed for the link between OSL_{CE-SDM} & SI_{CE} and this relationship was moderate. The other relationships were weak or insignificant.

Table 4. Correlations between variables describing the occurrence of CE issues at strategic level and variables describing the scope, accuracy, clarity and comparability of relevant information

Variable	SI_{CE}	SI_{CE-MU}	SI_{CE-RM}	SI_{CE-ECW}	SI_{CE-ECO}	SI_{CE-EI}	SI_{CE-RE}	SI_{CE-WD}	A_{CE}	A_{CE-M}	A_{CE-E}	A_{CE-W}	CLR	CMP
OSL_{CE}	0,32*	0,25	0,28*	0,02	0,11	0,32*	0,15	0,31*	0,11	0,19	0,02	0,26*	0,02	0,31*
OSL_{CE-SDM}	0,43*	0,32*	0,35*	0,23	0,11	0,37*	0,19	0,22	0,27*	0,29*	0,21	0,25*	0,06	0,30*
OSL_{CE-IRO}	0,20	0,19	0,20	0,12	0,00	0,15	0,13	0,13	0,14	0,16	0,10	0,14	0,10	0,19
OSL_{CE-LMT}	0,04	0,05	0,15	-0,19	0,06	0,11	0,00	0,12	-0,12	0,00	-0,17	0,07	-0,10	0,09
OSL_{CE-BMA}	0,18	0,08	0,18	-0,21	0,14	0,24	0,14	0,32*	-0,14	0,02	-0,23	0,10	-0,09	0,28*

** Correlation coefficients significant at the 0.05 level*

Conclusion

The research results indicated that companies from the energy sector in the European Union tend to focus more on GHG issues than CE issues. Comparing values obtained for variables characterizing the reporting GHG and CE issues, the means of all variables related to GHG issues were higher than those achieved for the CE issues. This means that the analyzed companies declared importance of GHG issues more often than of CE issues at strategic level in sustainability reports. However, the biggest difference was found for the accuracy and the smallest was observed between the scope of information related to GHG and CE issues. Moreover, the results revealed that the analyzed reports were characterized by a relatively high clarity and rather low level of comparability.

The obtained results showed that making declarations about GHG and CE issues in the statements from senior decision-makers had a relatively weak relationships with presentation of the relevant key impacts, risks, and opportunities, the list of material topics as well as the explanation of the material topic and its boundary and the management approach and its components. It should be also emphasized that declarations from the analyzed companies as to their intentions related to GHG and CE issues at the strategic level found a rather poor reflection in the description of specific actions in this area or in demonstrating appropriate indicators at the operational level. In addition, the analyzed companies insufficiently described the methods they used to gather, compile and analyze information on the effectiveness of actions taken to address GHG and, in particular, CE issues. Considering the values of Spearman's rank correlation coefficients for variables describing the occurrence of GHG and CE issues at

strategic level and variables characterizing the scope, accuracy, clarity and comparability of relevant information these correlations were in the vast majority weak or insignificant. There was, for example, significant correlation between the occurrence of CE issues in the statement from senior decision-maker and the scope of information related to CE issues but this relationship was only moderate.

In general, taking into account mean values obtained for variables describing the scope, accuracy and comparability of reported information on GHG and CE issues, it was indicated that analyzed companies tend to use demonstrative and illustrative impression management strategies. However, demonstrative impression management strategies (e.g. explanations of operations by providing extensive information, quantitative data, examples and graphs) were specific for GHG issues, while illustrative impression management strategies (e.g. verbal and pictorial images that are simple and lack detail) concerned mainly disclosures on CE issues. Nevertheless, it must be noted that declarations about GHG and CE issues in the statements from senior decision-makers were not sufficiently reflected in the appropriate actions and accurate indicators at the operational level.

It is suggested that the future studies should be focused on the exploration of sustainability reporting practices development and evolution. This would make it possible to better understand impression management strategies applied by companies to conceal specific information and to reveal reasons demonstrated by companies to justify the failure to prepare and disclose transparent and reliable information (Talbot and Boiral, 2018).

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Trends and Prospects for the Development of Small and Medium Sized Enterprises through Innovative Strategies in the Republic of Moldova

Lica ERHAN
Academy of Economic Studies of Moldova, Chisinau, Republic of Moldova
lica.erhan@ase.md

Tatiana GAUGAS
Academy of Economic Studies of Moldova, Chisinau, Republic of Moldova
t_gaugas@yahoo.com

Abstract

The primary aim of this study is to demonstrate the role of innovative strategies as an important element of SMEs performance and long-run development. A secondary purpose of the research is to identify the best practices of innovative strategies used by European SMEs, which could be adapted by local SMEs from Republic of Moldova.
In order to meet the goal of the research an analysis of secondary data resources has been carried out, using scientific methods, in particular logical methods, such as comparative analysis, synthesis, induction and deduction. International comparisons used statistical survey CIS, provided by EUROSTAT and designed for monitoring the progress on innovation activities in SMEs sector. The current study has been drawn up, using the official data offered by the National Bureau of Statistics (NBS), Organization for Small and Medium-Sized Enterprises Sector Development (ODIMM), the Ministry of Economy from Republic of Moldova, the most recent data and references in this field of research and own reflections of the authors. As a result, of the made analyses we state that SMEs as a social economic phenomenon has not become yet a key link in the development of the national economy. This conclusion is based on the fact that the largest share of SMEs sector from Moldova is still in the wholesale and retail trade. The innovation capacity of SMEs in the Republic of Moldova is low, as a result of lack of public funds to innovate. Development of innovative small business companies involves comprehensive solutions. The future prospects for encouraging SMEs in Moldova in accordance with the best European practices are as follows: development of innovation infrastructure; supporting public-private partnerships in research; adopting the framework on innovation and venture funds. Small business from Moldova also, miss new business practices for organizing procedures (supply chain management, business re-engineering, knowledge management, quality management), thus limiting the development of organization innovative enterprises. The majority of the studies concerning SMEs, analyses the small business sector as a whole, without pointing out the huge potential that small business companies that applies innovation strategies have. This study reveals the importance of innovative strategies for SMEs, such as the innovation of products and /or processes of the enterprise, implementing significant changes to the design or packaging of a good or service, a new media or techniques for product promotion, new methods for product placement or sales channels and introduction of innovations in logistics for developing and improving the performance of SMEs. From the best practices of European SMEs, innovative strategies may become an effective tool in the creation of competitive advantage of national SMEs and the key success for their development.

Keywords: SMES, Innovation, Strategies, Development.

Introduction

Small and medium sized enterprises (SMEs) have become one of the most important sectors of economy in many countries over the last decades. SMEs are characterized by flexibility, low cost of management, ability to foster scientific and technical progress, innovation, and the social role of this sector. At the same time, SMEs are characterized by weaknesses like excessive dependence on the external environment, lack of resources and difficulties in terms of marketing their production. Evidence shows that small businesses that are aware that they have to continually create, evaluate and successfully exploit their new ideas are more likely to survive and prosper in the competitive global economy. The development of the SMEs sector in the Republic of Moldova in terms of innovations will increase the competitiveness of the small business and, consequently, will promote the intensification of growth rates, market expansion, export development, increasing sales and thus profit.

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Competitiveness based on innovation must become a priority for national SMEs. This means that, in addition to the legal framework that encourages them, entrepreneurs also need knowledge in the field of innovation, the development of their capacity to absorb technologies and to adapt these technologies to the needs of the markets.
In the last years, a number of public-private projects and international financing have been launched in the Republic of Moldova, meant to contribute to the increase of the innovation and competitiveness capacities of SMEs. Several business incubators have been opened and the process has been extended to creating a network of business incubators. Industrial parks were opened and feasibility studies were carried out for their regional expansion. This support infrastructure is extremely important for SMEs, as it contributes to their efficient activity, offering them opportunities to launch and expand their business. However, it is the innovation activity of SMEs that is a decisive factor in the competitiveness and development of this sector. Economic reality shows that businesses that are aware of the need to successfully create, evaluate and exploit new ideas are more likely to survive in the competitive global economy.

Starting from this reality, the current research is dedicated to the topic of evolutionary development of SMEs sector in the Republic of Moldova, pointing out trends and future prospects for SMEs development through innovative strategies. The current study has been drawn up, using the official data offered by the National Bureau of Statistics (NBS), Organization for Small and Medium-Sized Enterprises Sector Development (ODIMM), the Ministry of Economy from Republic of Moldova, the most recent data and references in this field of research and own reflections of the authors. Statistical survey CIS, provided by EUROSTAT and designed for monitoring the progress on innovation activities in SMEs sector was also used in this study. In order to meet the goal of the research an analysis of secondary data resources has been carried out, using scientific methods, in particular logical methods, such as comparative analysis, synthesis, induction and deduction.

Analysis

Thus, to achieve the goal of this research, first off all we started an analysis of the current situation in the field of SMEs from the Republic of Moldova, in order to identify the most acute challenges from this sector and suggest solutions and recommendation that will help to overpass pointed out problems. Small and medium enterprises (SMEs) sector in the Republic of Moldova during the last 30 years of independence has developed qualitatively and quantitatively. In 2019 SMEs: constitute 98.6% of the total number of enterprises (from them 84.7% was micro enterprises, 11.4% small enterprises and only 2.4% medium-sized enterprises); assures 61.6% of all employed persons; contribute with 39.5% from total number of sales.

Beginning with 2006 in the Republic of Moldova according to the recommendation of the European Commission and present legislation were adjusted criteria used in the classification of SMEs (table 1).

Table 1: criteria used in the Republic of Moldova to define SMEs sector

Firm size	Headcount (persons)	Turnover and balance sheet total (mil. lei)
micro	1-9	≤ 3
small	10-49	≤ 25
medium-sized	50 - 249	≤ 50

We mention that in Republic of Moldova an enterprise must meet all these three criteria at the same time in order to be one of SMEs. During the last years in the Republic of Moldova there have been made considerable efforts by the Government to renew the legislative framework in the activity of SMEs.

As a result of these actions, a legislative framework has been created. Still, we do not have any specific framework that will encourage and support the activity of innovative SMEs.

The most attractive domains in the activity of SME_s in the Republic of Moldova are: whole sale and retail trade, real estate business, agriculture and processing industry (table 2).

Table 2: share of SMEs by major types of activity over the years 2015-2019, %

Types of activity	2015	2016	2017	2018	2019
Total	100.00	100.00	100.00	100.00	100.00
agriculture, hunting and forestry	6.2	6.6	7.1	7.5	7.9
processing industry	8.5	8.5	8.4	8.4	8.4
electric energy, gas and water	0.2	0.2	0.1	0.2	0.2
water distribution, sanitation	0.7	0.7	0.8	0.8	0.8
constructions	5.8	5.8	5.7	5.7	5.9
whole sale and retail trade	39.7	39.3	38.4	37.5	36.3
transport and stoking	5.3	5.2	5.2	5.2	5.3
public alimentation	3.5	3.5	3.6	3.6	3.7
communication	3.9	3.9	4.1	4.2	4.4
real estate business	6.9	6.5	6.3	6.4	6.6
scientific and professional activity	8.3	8.6	8.8	8.9	8.7
other types of activity	11.1	11.2	11.4	11.6	11.9

The activities that produce most of the revenues from sales for the national SMEs during 2015-2019, are presented in table 3. The revenues from sales of SMEs in 2019 were 157 335.6 million lei, or 39.5% per economy. The revenues of small and medium-sized enterprises increased in all areas.

Table 3: evolution of SMEs revenues from sales in dynamics, according to sector over the years 2015-2019 (million lei)

Types of activity	2015	2016	2017	2018	2019
Total	119 566.1	124 954.4	137 506.1	144 159.9	157 335.6
agriculture, hunting and forestry	9 019.1	10 366.8	12 194.5	12 431.7	13 937.0
processing industry	13 694.5	13 787.6	14 820.9	15 215.7	15 843.8
electric energy, gas and water	147.4	195.9	292.2	215.1	466.8
water distribution, sanitation	571.4	622.1	737.30	766.0	860.1
constructions	9 451.6	8 675.1	9 573.8	11 222.0	11 915.2
whole sale and retail trade	57 700.5	60 750.7	67 235.6	67 881.0	73 529.2
transport and stoking	8 861.5	9 338.0	10 072.2	10 978.5	11 629.1
public alimentation	1 903.3	2 130.4	2 389.1	2 856.7	3 544.0
communication	3 048.1	3 469.7	3 516.3	3 767.4	4 897.2
real estate business	3 017.4	3 474.9	3 354.9	3 813.9	3 864.7
scientific and professional activity	3 665.0	3 749.6	4 041.9	4 110.0	4 140.9
other types of activity	8 486.4	8 393.6	9 277.4	10 901.9	12 705.5

Taking into consideration the social function of SMEs that is expressed through creating places of work, we can mention the number of the persons who are engaged in small and medium enterprises in 2019 was – 335.8 thousand persons, which constitute 61.6% from the total number of employees (table 4).

Table 4: share of the numbers of workers occupied in SMEs over the years 2015-2019, thousand persons

Enterprise size	2015	2016	2017	2018	2019
Total	281.4	313.5	323.3	328.0	335.8
medium-sized	82.4	101.5	103.5	99.3	102.9
small	115.1	107.2	112.0	117.0	118.6
micro	83.9	104.8	107.8	111.7	114.2

Competitiveness describes the ability of SMEs to generate income/output and maintain employment levels in the face of domestic and global competition. Literature recognizes that small companies cannot compete using economies of scale; therefore, their competitive advantage lies on the development of innovative products or processes. Innovation may be seen as a critical drive of economic performance for small and medium businesses. According to Salazar (2012), an innovation may be the introduction of a new or significantly improved product, process, organisational method, or marketing method by the enterprise.

- A product innovation is the market introduction of a new or significantly improved good or service or a good or service with respect to its capabilities, user friendliness, components or subsystems.
- A process innovation is the implementation of a new or significantly improved production process, distribution method, or support activity for your goods or services. Exclude purely organisational innovations.
- An organisational innovation is the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations. Exclude mergers or acquisitions, even if for the first time.
- A marketing innovation is the implementation of a new marketing concept or strategy that differs significantly from the enterprise's existing marketing methods and which has not been used before. It requires significant changes in product design or packaging, product placement, product promotion or pricing.
- Innovation in logistics - logistics is a set of services including the planning, organisation, management, execution and monitoring of an enterprise's entire material, goods and related information flows (flows from purchasing, production and warehousing, to added value services, distribution and reverse logistics).

The first two are traditionally more closely related to technological innovation. The SMEs are considered innovative if they have implemented an innovation during the reporting period.

Researchers state that organisational learning and knowledge management directly influenced organisational innovation, whereas organisational learning and organisational innovation directly influenced organisational performance. According to Tidd et al. (2006), innovation contributes to achieving a competitive advantage in several aspects. The most important characteristics of innovations include:

1. A strong relationship between market performance and new products.
2. New products help maintain market shares and improve profitability.
3. Growth also by means of non-price factors (design, quality, individualisation, etc.).
4. Ability to substitute outdated products (shortening product lifecycles).
5. Innovation of processes that lead to production time shortening and speed up new product development in comparison to competitors.

Less formal organisational structures, such as those of SMEs, have been identified as innovation-friendly, as they may encourage a corporate culture that allows participation, flexibility, networking, inclusion and experimentation across the organisation. Challenges of the external environment faced by SMEs could lead to an innovative response to establish a competitive advantage. Small firms can innovate in response to two factors: appropriate business environment and limited growth conditions. The more diverse and compromised the environment faced by SMEs, the higher the level of proactive innovative behaviors. However, experts found that in cases where small businesses do not have the resources, innovation could suffer.

A comprehensive study on business innovation was conducted and completed in 2014-2016 by the EU through the "Community Innovation Survey", published in 2019 it contains detailed data on innovation activity indicators in 28 European countries. The statistical research is based on the Community Innovation Survey, abbreviated as the CIS, provided by the European Commission through EUROSTAT. This questionnaire is used by all State Members of the European Union, but also by other European countries and aims to monitor the progress of innovative activity in Europe. It allows a better understanding of the innovation process and analyses the link between innovation and economic areas such as: competitiveness, employees, growth. The survey showed that approximately 51% of enterprises with 10 or more employees reported innovative activity in the period 2014-2016, compared to 49% in 2012-2014. The share of innovative companies has increased or remained at the same level in 20 states EU member and fell in eight countries. The highest progress was reported by Estonia, Portugal, Finland and Croatia, with an increase from 54% to 67% in Portugal and from 55% to 65% in Finland, which climbed to the top five. The highest share of innovative enterprises was registered in Belgium (68% of all companies), Portugal (67%), Finland (65%), Luxembourg (64%) and Germany (64%). At the other extreme of the top are Romania with only 10%, Poland with 22% and Bulgaria with 27%.

If to compare with the European average, then the innovative enterprises of products and / or processes had a share of 36.8%, and the innovative ones of organization and / or marketing methods a share of 35.9%. Most public funds received innovative product and / or process enterprises from Hungary 32.5%, Latvia 25.3%, Bulgaria 24.8% and Poland 21.4%. In Romania, only 8.3% of enterprises with innovative products and / or processes received a public fund to innovate.

In Republic of Moldova, the main problem of innovations for SMEs is lack of state funding, specialists observed that the smaller is the size of the company, the fewer innovative companies in the total number of enterprises are found, mainly because of limited financial resources. The other barriers in developing innovations are: the low market demand for innovations, the existence of previous innovations, the lack of good ideas for innovations (5.2%) and the low competitiveness on the business market.

Discussion

As a result, of the made analyses we state that SMEs sector as o social economic phenomenon has not become yet a key link in the development of national economy. This conclusion is based on the fact that micro enterprises represents the largest share of companies in the SMEs sector (84.7%), however, their contribution to employment, and to turnover is quite modest. In addition, the largest share of SME_s sector from Moldova is still in the wholesale and retail trade. The innovation capacity of SMEs in the Republic of Moldova is low. As a result, innovation impact on national economy is reduced as well. Moldova has a low share of staff engaged in high technological intensity production. The following reasons determine the low innovative potential of SMEs in the Republic of Moldova: the existing legal framework does not sufficiently encourage innovation activity. There is not any well-established system of direct and indirect financial incentives (for instance tax incentives) aiming to encourage research and development activities of firms and state's low financial capacity to support SMEs.

The legal framework does not require more responsibility from enterprises and costs within the enterprise for achieving the objectives in terms of innovative activities. Thus, the introduction in the legislative acts or regulations of product safety, operational and work safety, environmental protection, and intellectual property right enforcement, provisions on taxes, employment or social affairs led to effects such as stimulating innovation.

In addition, although the Code on science and innovation stipulates that research and development funding should be at least 1% of GDP annually, this provision is not respected and budgetary funding is below this amount. The current legal framework does not stimulate enough innovation activity. Innovation capacity of economic entities in Moldova is very low. Subsequently, the innovation impact on national economy is rather small. Both economic theory and empirical evidence support the idea that innovation plays a vital role in increasing productivity on a sustainable basis. For these reasons, in many countries, there is an active policy on encouraging innovation. Among innovation-targeted policy instruments – patent law regulations, funds for research and development and education, we have to emphasize fiscal policy tools that include tax incentives. In table 5, we present the main problems that SMEs sector is facing and try to identify the best ways for improving them.

Table 5: the main challenges of SMEs sector and ways of improving

Challenges of SMEs sector	Ways of improving
Low efficiency implementation of legislative framework	**In order to create a favorable business environment we recommend**
▪ numerous administrative barriers; ▪ frequent inspections and controls of business sector and high level of taxes; ▪ lack of a consolidated register that would make it possible to analyze activity of all SMEs as well as of patent holders working in the country; ▪ lack of tax facilities exclusively for SMEs. ▪ The legislation requires more responsibility from enterprises and costs within the enterprise for achieving the objectives in terms of innovative activities. Thus, the introduction in the legislative acts or regulations of product safety, operational and work safety,	▪ adjustment of the normative and regulatory framework to meet SMEs needs; ▪ reduction of the number of mandatory documents at starting and closing a business; ▪ set-up tax-control complexity and tax facilities in legislative framework; ▪ reduction of the informational barriers and regulation costs for SMEs.

environmental protection, intellectual property right enforcement, provisions on taxes, employment or social affairs led to effects such as stimulating innovation.	
Limited financial access	**In order to improve SMEs access to finance we recommend**
▪ only 31% from all the credits offered by the bank sector belong to SMEs sector; ▪ about 85% from the total number of the financial application rejected by the bank, were caused by lack of guarantee; ▪ lack of innovative instruments of finance, such as: venture capital or business angels. ▪ lack of state funding for SMEs innovations	▪ support of the national net-work of guaranteed funds for SMEs; ▪ financing start-up in priority sectors; ▪ development of innovative financial schemes for SMEs; ▪ extension and support of Loans Bureau activity.
Low developed competitiveness of SMEs	**In order to develop competitiveness of SMEs we recommend:**
▪ low level of adaption of SMEs to European standards of quality; ▪ low level of elaboration and absorption of innovation; ▪ underdeveloped infrastructure for supporting business.	▪ innovation support and improvement of SMEs access to new technologies; ▪ support to the introduction of quality standards and systems of quality management; ▪ extension and development of business incubators and industrial parks. ▪ apply product, process or marketing innovation strategies
Lack of informative-consulting assistance and the development of the potential activity of entrepreneur	**In order to promote entrepreneurial culture and consolidating managerial performance**
▪ insufficient qualification of personnel, low level of skills and culture of SMEs entrepreneurial spirit; ▪ lack of an informational system dealing with programs of continuing education; ▪ lack of an efficient consulting system in the domain of education and developing business in SMEs sector; ▪ lack of a program about the competitive evaluation in the domain of entrepreneurial activity.	▪ elaboration of a strategy/plan at the national level in the domain of economic education; ▪ formation and development the infrastructure of educational support; ▪ development and consolidation of partnership between educational institutions and business sector; ▪ implementations of the modern methods of education, especially e-learning to promote excess for education in this domain.
Necessity of developing partnership in business	**Development of partnership in business**
▪ the development of partnership in business is at a starting stage, it is focused on ,,public-private" partnership and ,,business to business" partnership.	▪ creation and regulation of activity for business association; ▪ informing the government about the most important problems needs in SMEs sector (organizing round/tables, seminars, work-shops, conferences); ▪ creation and development of clusters, as a base of entrepreneurial partnership.

Conclusions

Small and medium sized enterprises play an extremely important role in modern economies. They create job, enhance competition, contribute to technological change, increase the use of domestic resources and products and are a source of innovation. The importance of small business development involves a comprehensive solution of the following problems:

- activity coordination of all structures of the state support for small business, including at the regional level;

- providing financial support for small business, appropriate to its needs in terms of affordability, volume and timing, which would be achievable by combining efforts of state, banking sector and small businesses alike;
- implementation of a selective approach in provision of state support for small businesses depending on its area of activity by applying appropriate tax, financial measures and public contract system as a priority;
- creation of "growth poles" on the basis of free economic zones, industrial and infrastructure

The innovation activity of companies is a key driver of competitiveness and economic growth. Although the process takes place at a company level through a skilful management, the innovation potential of a firm can be enhanced by appropriate policy measures carried out in a business-friendly environment. Therefore, the identification of the policy options and instruments available to enhance the innovative capabilities of firms is an important component of any strategy to support increased living standards. The innovative activity of SMEs is influenced by the following groups of factors:

- institutions (political environment, regulatory environment, business environment);
- human capital and research (education, tertiary education, research and development);
- infrastructure (ICTs, general infrastructure, ecological sustainability);
- market sophistication (credit, investment, trade and competition);
- business sophistication (knowledge workers, innovation linkages, knowledge absorption).

The future prospects to overcome the lack of an efficient incentive system for encouraging of innovative SMEs in the Republic of Moldova in accordance with the best international practices are as follows:

- adopt the laws on venture funds and create a national venture fund, that might be an alternative source of finance for innovative SMEs;
- develop innovation infrastructure and establish innovation brokerage centres and connect them to specialized international networks, market intellectual property through them.
- develop partnerships between research organizations, universities and economic operators; encourage hiring by firms of researchers in different areas of activity;
- develop public-private partnerships in research;
- focus more on product or process innovation;
- use innovations in logistics such as: the introduction of automated inventory management systems, the digital management of the chain of suppliers, the introduction of electronic public procurement, the unique and automatic identification of the products of the entire chain of suppliers, the reverse logistics concerning all the operations relating to the re-use and return of products and materials, new delivery models, including the use of alternative power vehicles or of multi-modal logistics, the improvement of delivery by re-designing the aspects related to the packaging, weight or density of products.

Today's innovative methods of marketing should incorporate the model of integrated business strategy. Innovative enterprises may introduce or implement innovations that are related to the organization of the enterprise or to marketing its products. These strategies implemented can enable the SMEs to compete and to develop. The advancement in technology has left no option for the SMEs but to adapt to these new innovative practices for prompt and accurate decision-making. If small business wish to survive and grow in today's turbulent environment, they have to make every effort to introduce an innovative approach and creativity.

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Specific Issues of Legal Responsibility For Corruption Offenses in Ukraine

Inna KULCHII, Ph.D. in Public administration, Associate Professor
National University «Yuri Kondratyuk Poltava Polytechnic»
Poltava, Ukraine
e-mail: nafusail@gmail.com

Iryna PASICHNA, Ph.D. in Law
National University «Yuri Kondratyuk Poltava Polytechnic»
Poltava, Ukraine
e-mail: irinaalex1417@gmail.com

Volodymyr ZADOROZHNYY, Doctor of Public Administration, Associate Professor
National University «Yuri Kondratyuk Poltava Polytechnic»
Poltava, Ukraine
e-mail: volodumur_zadorognuy@ukr.net

Abstract

The purpose of the article is to study the problems of legal responsibility for corruption offenses in Ukraine, the distinction between corruption crimes and corruption offenses and the application of appropriate disciplinary liability for their commission in order to improve the anti-corruption legislation of Ukraine. General dialectical method and special theoretical research methods are used in the article. In particular, the dialectical method is used to understand the nature of the types of legal responsibility for corruption offenses; scientific abstraction – defining signs and characteristics of corruption crime as a type of offenses; system analysis – establishing the systemic nature of anti-corruption activities; comparative analysis – determining the correlation between corruption crimes and corruption offenses; statistical methods - used in the analysis of the level of corruption in Ukraine according to the Corruption Perceptions Index. The analysis of the status of corruption and anti-corruption activities in Ukraine showed that the main problems of legal responsibility for corruption offenses are related to insufficient judicial practice, lack of prudent regulatory policy, disadvantages of Ukrainian anti-corruption laws, which needs improvement. Solving these problems is to establish tougher measures of responsibility for corruption, and to predict the criminal responsibility for persons who submit false information in their declarations and the application of disciplinary liability in the form of dismissal for committing a corruption crime and a corruption offense under administrative law. It will reduce the number of offenses related to the submission of declarations with false information and in general reduce the level of corruption in Ukraine.

Keywords: Ukraine, corruption, offense, legal responsibility.

Introduction

Preventing corruption is one of the most current social problems nowadays. Solving this problem is extremely important and difficult for many countries. This fully applies to Ukraine, the countries of the European Union and other countries, where corruption has become a factor that really threatens the national security and constitutional order of states. Corruption negatively affects all spheres of societal life: governance, economics and politics, legal and social. This is one of the main challenges on the way to building a democratic, social and legal state.

The Preamble to the Constitution of Ukraine (Verkhovna Rada of Ukraine, 2014) confirms the European identity of the Ukrainian people and the irreversibility of Ukraine's European and Euro-Atlantic course. Choosing a course on European integration, Ukraine must comply with the requirements of the European Union in the framework of the "Visa Liberalisation Action Plan". Among the demands made by the European Union to Ukraine in the framework of the "Visa Liberalisation Action Plan ", the key issue is fighting against corruption. The Commission through regular progress reports, transmitted to the European Parliament and the Council, has closely monitored the implementation of the Action Plans which are publicly available. Moreover, the progress has been monitored

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through regular meetings of senior ranking officials from the European Commission and the partner countries (European Commission, 2017).

Literature Review

Corruption has adverse consequences on income distribution, consumption patterns, investment, the government budget and on economic reforms (Rose-Ackerman, 1997). In the research by Mauro (1998) it was founded that corruption negatively affects all spheres of human life: governance, economics, social and legal spheres and international relations. Corruption is most prevalent where other forms of institutional inefficiency exist, such as political instability, bureaucratic red tape, and weak legislative and judicial systems.

The level of corruption is growing in Ukraine despite the fact that have been implemented in Ukraine in the last few years – a special anti-corruption law has been adopted, public authorities have been established, including the National Anti-Corruption Bureau of Ukraine, the State Bureau of Investigation, High Anti-Corruption Court, the National Agency of Ukraine for Detection, Investigation and Management of Assets Obtained from Corruption and Other Crimes, and other authorities.

Ukraine is perceived by other countries as a corrupt state with an unfavorable investment climate, where corruption has penetrated most relations between the citizens and the government, and has generated a deep public distrust in the state's ability to ensure constitutionally guaranteed human rights and freedoms. According to Transparency International datas, Ukraine ranks 126 out of 180 places in terms of corruption, 30 points out of 100. Since 1995, the Corruption Perceptions Index, (Transparency International's flagship research tool), has become the leading global indicator of corruption in the public sector (Transparency International, 2019).

Table 1: Corruption Perceptions Index of Ukraine, 2012-2019

year	2012	2013	2014	2015	2016	2017	2018	2019
CPI	26	25	26	27	29	30	32	30

Source: Corruption Perceptions Index of Ukraine 2012-2019 by Transparency International

Transparency International believes that the ruling of the Constitutional Court's of Ukraine makes the entire e-declarations system useless, undermines the system of corruption prevention, and threw back Ukraine's anti-corruption reforms by decades. We think that Delia Ferreira Rubio, head of Transparency International, fairly said that the asset declarations registry must be available to the public. Access to information is the key of democracy and an essential step in the fight against corruption. Ukrainians deserve to know how public funds are being spent and have the tools to hold officials accountable" (Transparency International, 2020).

In a research by Gray and Kaufman (1998) the reform of government institutions may include civil service reform; improved budgeting, financial management, and tax administration; and strengthened legal and judicial systems. Such reforms should involve changing government structures and procedures, to put more attention on competition and incentives in the public sector, and strengthening internal and external systems of incentives and counter weights. As a complement to these broader reforms, the transparent implementation of enforcement measures, such as prosecuting some prominent corrupt figures, can also have an impact.

The current stage of development of anti-corruption laws in Ukraine is characterized by radical changes and transformations. Thus, according to the Decision of the Constitutional Court of Ukraine (CCU) №13-r/2020 adopted on October 27, 2020, certain provisions on legal liability for corruption offenses were declared unconstitutional (Constitutional Court of Ukraine, 2020).

Research Results

According to Article 1 of the Law of Ukraine "On Prevention of Corruption" (Verkhovna Rada of Ukraine, 2014) the corruption offense is an act containing signs of corruption, to which, in particular, includes the illegal misuse of authority in order to obtain undue benefits (bribe). The following types of legal responsibility for corruption offenses are applied to guilty persons: criminal, disciplinary, administrative and civil responsibilities.

One of Preventive Measures for the purposes of Inter-American Convention against corruption (United States Congress, 1996) are systems for registering the income, assets and liabilities of those persons who perform public functions in certain posts as specified by law and, where appropriate, for publication of such registrations.

In accordance with the Article 8 of United Nations Convention against corruption (United Nations, 2003) each State Party shall endeavour, where appropriate and in accordance with the fundamental principles of its domestic law, to establish measures and systems requiring public officials to make declarations to appropriate authorities, in particular, regarding, their outside activities, employment, investments, assets and substantial gifts or benefits which may give rise to a conflict of interest with respect to their public official's functions.

According to Article 45 of the Law of Ukraine “On Prevention of Corruption” (Verkhovna Rada of Ukraine, 2014) provides for the submission of declarations of persons authorized to perform the functions of the state government or local self-government. This is one of the measures to prevent violations of financial control requirements by the National Agency for the Prevention of Corruption.

In the research of Messick (2009), mandating that officials divulge information about their finances may reduce corruption in several ways. Disclosure allows a public employee’s wealth to be monitored. If periodic disclosures show an unusual increase in assets or unfamiliar expenditures, the employee can be asked for an explanation. It can strengthen confidence in government by reassuring citizens that conflicts of interests are being policed and public employees’ finances scrutinized.

Nowadays, as analyzed by Tytko and Stepanova (2019), the declaration of assets is a part of the system of financial control since this procedure can be considered as an administrative and legal means of preventing corruption. Foreign experience shows that a declaration can include not only the obligation to declare incomes and expenditures but also the fixing of personal and family members’ private interests.
In the study of OECD (2011) it was determined that corrupt officials often hide their assets under the names of their relatives, their spouses and other individuals. Therefore, it should be possible to monitor the wealth not only of a public official, but also close relatives and household members. This can be achieved through the public officials’ declarations system or through the tax system, or by law enforcement authorities.

The Constitutional Court of Ukraine has the opposite conclusion. Its Decision № 13-r / 2020 declared unconstitutional Article 366-1 of the Criminal Code of Ukraine on bringing a person to criminal responsibility for submitting knowingly false information (Constitutional Court of Ukraine, 2020).

According to Article 366-1 of the Criminal Code of Ukraine (Verkhovna Rada of Ukraine, 2001), the submission of knowingly false information in the declaration is punishable by a fine or imprisonment. Criminal responsibility arises if such information differs from reliable data in the amount of more than 250 subsistence minimums for able-bodied persons.

The decision of the Constitutional Court of Ukraine was based on the Decision №15-rp/2004 adopted on November 2, 2004, according to which the issue of compliance of the punishment with the committed crime is a separate manifestation of justice. The category of justice implies that the punishment for the crime should be commensurate with the crime and the punishment should be in fair proportion to the gravity and circumstances of the crime. That is, the state should use not excessive, but necessary measures for the crime (Constitutional Court of Ukraine, 2004).
It was necessary for the legislature to adopt a law establishing legal responsibility for false declarations. This is because the court must decide to prosecute such a crime. In our opinion, the legislature had two options for behavior. In the first case, a new article had to be added to the Criminal Code of Ukraine, which establishes criminal liability for false declarations. Another alternative way to solve this problem was to establish administrative responsibility in the form of a high penalty for a corruption offense. The Verkhovna Rada of Ukraine adopted a law supplementing with new articles the Code of Ukraine on Administrative Offenses and the Criminal Code of Ukraine on administrative and criminal responsibility for false declaration. If the information in the declaration differs from the reliable ones in the amount of 100 to 500 subsistence minimums, administrative responsibility will be applied. If in the amount of 500 to 4000 subsistence minimums for able-bodied persons - criminal responsibility will be applied. That is, the higher limit has been set for the application of criminal liability in case of false declaration.

In many cases, corruption crimes are separated from non-criminal corruption offenses by an extremely thin line. The boundaries of the corruption offense are very mobile. In some circumstances, a corruption offense may be recognized as an administrative or disciplinary offense, in others - a crime under the Criminal Code of Ukraine.

Lapteakru (1998) mentioned that corruption manifests itself not only as a criminal act, as there are less dangerous types of bribery. He pointed out that the components of corruption are immoral, disciplinary, administrative offenses, civil torts and crimes; but he did not specify which acts each of these types of offenses covers.

The issue of distinguishing between "corruption" and "crime" is important. Shalgunova (1999) believes that corruption is a component of official crime. We partially agree with this wording, but in addition to corruption crimes, there are other crimes for which criminal liability is applied. Most domestic and foreign scientists do not equate these concepts. On the one hand, corruption is a narrower concept than “crime” and covers only a part of crimes related to corruption. On the other hand, corruption is a broader concept than crime, as it covers not only crimes but also administrative and disciplinary offenses.

Thus, individuals will in some cases be held administratively liable and in others prosecuted for the same illegal act, which in turn may serve as a basis for abuse by law enforcement officials. The distinction between these acts in this case is the cost of compensation or the amount of damage caused by unlawful actions of individuals.

In the research by Kolpakov (2003) the importance is in distinguishing between corruption crimes and administrative offenses is to determine the public danger of acts that have indications of corruption. Corruption offenses are socially harmful, and corruption crimes are socially dangerous. However, in the Criminal Code of Ukraine, illegal acts are called corruption offenses. In addition, in the Code of Ukraine on Administrative Offenses, socially harmful acts of corruption are called offenses related to corruption. This situation leads to confusion in the conceptual and categorical apparatus used in the field of corruption. The basic concepts and categories used in the anti-corruption legislation of Ukraine need to be improved.

It is also important to note that in the legislation of Ukraine the problems of labor relations in connection with the commission of a corruption offense remain unresolved. In most cases, a person who has been prosecuted administratively and civilly continues to work for a public authority. Research of legislation on disciplinary responsibility, indicates, that in case of criminal prosecution the employment contract with the guilty person is terminated. This requirement is enshrined in Article 36 of the Labor Code of Ukraine (Verkhovna Rada of Ukraine, 1971). Verdict which comes to the force sentencing an employee to imprisonment a reason for the termination of the employment contract and excludes the possibility of continuing his work.

But bringing to administrative responsibility usually is not a reason for termination of an employment contract. The only exception is if a member of the Commission on Senior Civil Service is brought to administrative responsibility for committing an offense related to corruption (Article 14 of the Law of Ukraine "On Civil Service") (Verkhovna Rada of Ukraine, 2015). Besides, the law stipulates that a person who has been subject to an administrative penalty for an offense related to corruption may not enter the civil service, – within three years from the date a court decision force.

Termination of civil service is possible if a person got a penalty of deprivation of the right to occupy certain positions or engage in certain activities related to the performance of state functions or local government.

In our opinion, changes should be made to the current legislation of Ukraine. It is necessary to establish that the reasons for termination of the employment contract are the entry into force of a court decision to bring a civil servant to administrative or criminal liability for a corruption offense. A civil servant who has committed a corruption offense is not entitled to work in a public authority. This requirement should also apply to local government officials.

Today, there is a problem when a person who is brought to administrative responsibility for a corruption-related offense continues to work in a position in a public authority. Analysis of the reasons for termination of the employment contract related to untimely submission of the declaration of income gives grounds to assert that such a reason is not entirely justified. Which offense has more harmful consequences: submission of a declaration with reliable information a few days later or timely submission of a declaration containing false information? In Article 6 of the Law of Ukraine "On the National Anti-Corruption Bureau of Ukraine», (Verkhovna Rada of Ukraine, 2014) untimely submission of the declaration is a ground for dismissal of the Director of the National Bureau. We believe that filing a declaration that contains false information causes greater social harm than filing a true declaration with a delay. Consequently, the submission of a declaration containing false information causes greater public harm than the late submission of a declaration.

Conclusions and Further Research

Corruption should be considered not only as a legal, but also as a social, political and economical problem of the society and the state. Without a significant reduction in the level of corruption, there can be no significant progress in the economical and political development of the state, the implementation of the rule of law, ensuring the constitutional rights and freedoms of human and citizen.

Corruption includes a set of various offenses, in particular crimes, administrative and disciplinary offenses, which together pose a threat to national security and, - violate fundamental rights and freedoms.

In our opinion, the fight against corruption has two important components: law-making and law-enforcement. The law-making component of the fight against corruption is to improve the legislation, in particular the establishment of criminal liability for submission a false declaration, regardless of the amount of aberration from reliable information; establishment of disciplinary responsibility in the form of firing from a job not only for committing a corruption crime, but also a corruption offense under administrative law; improvement of the conceptual and categorical apparatus used in the legislation of Ukraine.

The law-enforcement component of the fight against corruption is to improve the functioning of the courts. Most corruption cases are closed due to expiration; persons are not prosecuted because the prosecutor has no right to appeal the court decision in an administrative case. Acquittals in criminal cases and widespread use of mitigating circumstances in sentencing are widespread in Ukraine. Only a minority of cases end in criminal prosecution. That is, in addition to eliminating gaps and overcoming conflicts in the legislation of Ukraine, it is necessary to ensure the real functioning of the judicial system. Of course, these components of the fight against corruption and other unresolved problems in the area of prevention of corruption should be the subject of further research.

Therefore, fighting corruption is one of the main problems of our country, which should consider certain courses of European integration, based on international regulations and requirements of the European Union. All public authorities in Ukraine need to act in concert in one direction. The different approach to the application of responsibility for corruption offenses and the understanding of the responsibilities of civil servants to society and the state lead to the fact that Ukraine can go back in the development of the fight against corruption and cancel everything that has been achieved in recent years.

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Implementing The 2030 Sustainability Agenda: Decent Work and Economic Growth (SDG 8) In Romania From 2008 To the Present

Beatrice A. ALEXANDRESCU
University Politehnica of Bucharest, Romania, beatrice.alexandrescu@gmail.com

Dana C. DESELNICU
University Politehnica of Bucharest, Romania, dana.deselnicu@upb.ro

Dan DUMITRIU
University Politehnica of Bucharest, Romania, dan.dumitriu@upb.ro

Abstract

Sustainable development aims for a better future for us and future generations. To follow it, the 2030 Agenda for Sustainable Development was elaborated, which proposes, through the 17 objectives, the intervention directions. The 2030 Agenda was adopted by both Romania and the EU, each objective being consenting of a set of indicators. The objective of this paper is the comparative analysis of the most important indicators of SDG 8 Objective Decent work and economic growth in the EU and Romania. They were analyzed in three essential moments of the development of Romania: 2008, the year of accession to the EU, 2013, and present. The research used secondary data. Romania's stated goal is to be a regional leader in implementing sustainable development goals. Based on the results obtained from data available in 2020, a set of recommendations was developed to achieve the proposed target for 2030. The paper also analyzed the sustainable development indicators for the EU and Romania about the new EU 2030 Agenda. Its main indicators are compared with values at the EU level, resulting in relevant recommendations that can be implemented to meet the objectives of the EU 2030 Agenda.

Keywords: sustainable development, EU 2030 Agenda, economic growth

Introduction

The first definition of sustainable development was developed in 1987 through the Brundtland Report. Sustainable development is a way for people to use resources without the planet being left without resources for decades, centuries, or even millennia. This means growing without damaging or harming the environment. The term used by the Brundtland Commission is sustainable development that "meets the needs of the present and also compromises the ability of future generations to meet their own needs" (Brundtland, 1987).

Sustainable development is based on three pillars (Ukaga et al., 2019):

1. Environmental sustainability refers to the ecological component that must be found in every initiative by protecting biodiversity;
2. Economic sustainability or sustainable development in economic terms involves methods of economic diversification. These can be, access to services and environmental protection that are necessary to ensure the success and sustainability of development;
3. Socio-political sustainability presupposes, on the one hand, healthy socio-political relations that allow the development of all states, based on partnership and mutual support.

The principle behind sustainable development is the systematic integration of environmental, social, and economic issues into all aspects of decision-making over generations. The 17 Global Sustainable Development Goals (SDGs) reflect a balanced agenda of economic, social, and environmental goals and objectives. To achieve the SDGs,

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countries will need to recognize and appreciate the existence of potential trade-offs and develop ways to manage them.

In 2015, at a meeting of the United Nations General Assembly in New York, a historic document was adopted: the 2030 Agenda for Sustainable Development. Through its 17 goals, this document seeks to achieve a better future not only for us but also for the next generation. Built on the three pillars of sustainable development – economic, social, and environmental – the 2030 Agenda was also adopted by Romania and the European Union. This strategy translates the Agenda to the realities of Romania today.

The Romanian Perspective on Sustainable Development from 2008 to 2018

In Romania, as a member state of the European Union, in 1997 the National Center for Sustainable Development was created, under the auspices of the Romanian Academy, which over time managed to become the most authorized voice in civil society in the field of developing proposals and strategies for development. The purpose of the National Center for Sustainable Development is to identify Romania's sustainable development priorities and achieve them through concrete projects at national and local levels.

The Government of Romania, meeting on November 12, 2008, debated and approved the National Strategy for Sustainable Development for the years 2013–2020–2030. The elaboration of the Strategy is the result of the obligation assumed by Romania as a member state of the European Union according to the objectives agreed at the community level, especially those established in the Accession Treaty, in the Lisbon Strategy for growth and jobs, and the renewed EU Strategy for Sustainable Development since 2006. Following the debate of the project at the national and regional level, with the active involvement of stakeholders and with the conceptual support of the Romanian Academy, the Strategy proposes a vision of Romania's development in the perspective of the next two decades:

- Horizon 2013: Organic incorporation of the principles and practices of sustainable development in all public programs and policies of Romania as a member state of the European Union;
- Horizon 2020: Reaching the current average level of European Union countries at the main indicators of sustainable development;
- Horizon 2030: The significant approximation of Romania to the average level of that year of the member countries of the European Union in terms of sustainable development.

To achieve sustainable development in Romania, and, by extension, to meet the goals of the 2030 Agenda, together with the European Union's commitments regarding the 2030 Agenda, this Strategy is built around the citizen and the needs of future generations. Romania's Sustainable Development Strategy has based on the premise that sustainable development requires a mindset which, once adopted by the citizen, will help create a more equitable society defined by balance and solidarity, and the ability to cope with the changes brought about by current global, regional and national challenges, including a declining population (Deselnicu et al. 2018). The state's concern for its citizens, and the citizens' respect for public institutions, for their peers, for moral values, and cultural and ethnic diversity will lead to a sustainable society.

The 2030 Agenda includes a set of 17 Sustainable Development Goals (SDGs) and an action plan for the next 15 years, to eradicate extreme poverty, combat inequality, injustice and protect the planet by 2030. The 17 Sustainable Development Goals (SDGs) and their related 169 targets, which are at the heart of the UN's 2030 Agenda for Sustainable Development, provide a new policy framework worldwide towards ending all forms of poverty, fighting inequalities, and tackling climate change while ensuring that no one is left behind.

The European Union Perspective on Sustainable Development

The concept of sustainable development in the European Union was introduced into the Strategy for an Enlarged Europe 2006. This strategy was part of a unified and coherent strategic vision with the general objective of continuously improving the quality of life for present and future generations. Its goal was to create sustainable communities capable of managing and using resources efficiently and of exploiting the ecological and social potential of the economy to ensure prosperity, environmental protection, and social cohesion (Freeman, 2010).

On 22 November 2016, the European Commission published “Next Steps for a Sustainable European Future.” This document presents the European Union’s response to the 2030 Agenda, confirming the need to integrate the Sustainable Development Goals into the European policy framework while highlighting the European Commission’s current priorities. The document also presents an evaluation of the Union’s current situation and identifies the most

relevant concerns regarding sustainability (Deselnicu et al., 2017). The European Union declared itself in favor of a sustainable development that will ensure "a life of dignity for all within the Planet's limits that reconciles economic prosperity and efficiency, peaceful societies, social inclusion, and environmental responsibility (Mohieldin, 2017). "The EU Council's conclusions in "A sustainable future for Europe: the EU response to the 2030 Agenda for Sustainable Development," adopted on 20 June 2017, represents the political document adopted by the member states of the EU regarding the implementation of the 2030 Agenda for Sustainable Development. The EU response to the 2030 Agenda is to integrate the 17 SDGs into its public policies to support the global effort to build a sustainable future.

Comparative analysis of Sustainable Development Indicators

In this paper, one of the 17 objectives of sustainable development has been chosen. Romania's progress was analyzed, in relation to the EU average from 2008, the year of Romania's accession to the EU, and 2018.

Decent work and economic growth (SDG 8) recognizes the importance of sustained economic growth and high levels of economic productivity for the creation of well-paid quality jobs and the achievement of global prosperity. SDG 8 calls for providing opportunities for full and productive employment and decent work for all while eradicating forced labor, human trafficking, and child labor and promoting labor rights and safe and secure working environments. The indicator is part of the EU Sustainable Development Goals (SDG) indicator set. It is used to monitor progress towards SDG 8 on decent work and economic growth. SDG 8, among other things, calls for providing opportunities for full and productive employment and decent work for all.

This objective consists of nine indicators grouped in three important directions: sustainable economic growth, employment, decent work. When discussing sustainable economic growth we consider the following indicators:

- Real GDP;
- Investment of GDP;
- Resource Productivity.

Employment is defined by the four indicators that represent the situation and the level of achievement of SDG 8, the indicators that define it are:

- The young people neither in employment nor in education or training (NEET);
- Employment rate;
- Long-term unemployment rate;
- Inactive population due to caring responsibilities.

Decent work, the third pillar on which SDG8 is consolidated, consists of two sustainability indicators:

- People killed in accidents at work;
- In work at-risk-of-poverty rate.

SDG 8 evolution from 2008 to 2018, in Romania & EU level

Economic growth	RO 2008	EU 2008	RO 2013	EU 2013	RO 2018	EU 2018
Real GDP	6.730	25.580	6.760	25.750	8.740	28.280
Investment of GDP	37,29	23,57	24,8	19,5	21,0	20,9
Resource Productivity	0,30	1,50	0,38	1,98	0,40	2,04
Employment						
The young people neither in employment nor in education or training (NEET)	13,2	12,3	19,6	15,9	17,0	12,9
Employment rate	64,4	69,8	64,7	68,4	69,9	73,2

Long-term unemployment rate	2,4	2,8	3,2	5,1	1,8	2,9
Inactive population due to caring responsibilities	16,5	19	28,7	25,5	31,7	27,1
Decent work						
People killed in accidents at work	-	-	5,78	1,91	4,49	1,65
In work at-risk-of-poverty rate	17,4	8,6	14,4	9	15,3	9,5

Authors own work compliant with Eurostat 2020

In recent years, Romania has made progress in this regard, according to the indicators related to SDG 8. However, the data show that most indicators still have a deficit that needs to be recovered. The long-term unemployment rate is declining and is below the European average. This means that fewer unemployed people in Romania cannot find a job for more than 12 months. This indicator reached historic highs in 2018, according to data provided by Eurostat (2020). Romania has also reached a historic percentage. The difference between the EU 27 average and Romania is 3%. These results are very important, being a relevant economic indicator for analysis. As in the case of other indicators, there can be observed large differences between countries. Romania has the highest percentage, followed by Sweden (82.6%), while the lowest percentage is held by Greece (59.7%).

Also, in terms of employment, the rate of young people (aged 15-29) who are not employed and do not attend courses (NEETs) is 17%, 5 percent above the European average. Dual-school vocational training programs, focusing on training young people in line with labor market requirements, could be an extremely useful tool for solving this problem. The transition of young people from education to work is hampered by specific difficulties. As a result, there are relatively low employment rates, a high unemployment rate, and high rates of young people who are not employed and do not attend any education or training (NEET) program. It can be noticed that Romania has a higher percentage within this indicator than the EU 27 average. According to the data, the percentage is decreasing starting with 2015, when a maximum of 21% of the total population analyzed was reached, although, in 2019, the difference between the EU27 and Romania average is 5 percent.

There has been a sharp increase in sustainable economic growth, where both per capita GDP and resource productivity have improved. However, the values of these indicators remain below the European average. There is a major difference in the level of the average indicator in the 27 EU states and Romania's level. Resource productivity varies greatly from one Member State to another. It depends to a large extent on the structure of national economies and the size and structure of their international trade. Usually, open industrial economies consume more resources because they import large quantities of raw materials, which are then exported as finished products. Service-based economies, on the other hand, tend to generate GDP from activities that consume fewer raw materials, such as financial services, tourism, the arts and recreation, healthcare, and public administration. Therefore, service-based savings appear to be more efficient because they consume fewer material resources per euro of production.

Another encouraging aspect is the fact that the percentage of GDP for investments is higher in Romania than the European average. However, an increase is needed to catch up with the West. The government's economic recovery plan is based on a high degree of public investment.

Recommendations to Reach the Proposed Target for 2030

The following set of recommendations was suggested for Romania to reach its proposed target in terms of sustainable development for the year 2030:

- Development of public-private partnership by increasing the number of education classes in the dual system;
- Initiation of basic vocational training programs in correlation with the requirements of the labor market, focusing on young or socially vulnerable segments of the population;
- Elaboration and implementation of a coherent program for the development of tourism, including agrotourism, generator of jobs and considerable income in areas where the employment rate is low;
- The transition to the circular economy by changing the mentality through education, changing consumer behavior, and developing financial mechanisms to support the transition period;

• Reduction of food waste along the entire production-transport-processing-marketing-consumption route, from farm harvesting to final waste disposal;

• Popularization and promotion of sustainable production and consumption models through information campaigns for the general public and efforts to expand these good practices in school and extracurricular educational programs;

• Encourage companies, especially large and transnational companies, to adopt sustainable practices and integrate sustainability information into the reporting cycle.

Decent Work and Economic Growth (SDG 8) in the Context of the Pandemic

If in recent years there is a labor shortage in Romania, the economic crisis generated by the pandemic has led to rising unemployment. The labor market is affected, but the negative effects can be combated by investing in training and retraining. Also, the digital revolution, but also the technological needs to mitigate the effects of climate change will certainly have an impact on the labor market.

National challenges for 2030 include:

• maintaining the pace of economic growth to reduce the gap with other EU countries;

• achieving higher levels of productivity through diversification, technological modernization, and innovation;

• strengthening the capacity of domestic financial institutions to encourage and expand access to banking services.

Results

In this paper, we analyzed the evolution of Romania from the moment of accession to the EU, 2008, until now from the point of view of the sustainability objective Decent work and economic growth (SDG 8), implicitly what new sustainability indicators form it. Following the analysis, it was found that Romania is following a positive trend and continuous improvement of indicators, as is the case at the EU level. The year 2008 shows a very low level compared to the EU average but a sustained increase was observed. The low level of resource productivity and domestic consumption of materials is an effect of the type of Romanian economy, in which the service industry has a much lower share than the European average. In parallel, the positive results and sustained growth are observed in all the sustainability indicators analyzed. Growth is a constant that can be observed in the analyzed decade.

Conclusion

In this paper, following the analysis, it was found that Romania makes sustained progress in each period analyzed, five-year cycle, in terms of the objective of Decent work and economic growth (SDG 8) and each of its indicators. It is observed that the EU trend follows and has a real chance to become a regional leader in the implementation of the 2030 Sustainability Agenda. To become a regional leader in the implementation of the 2030 Sustainability Agenda, it is necessary to involve all actors in achieving the objectives, in this direction adds pandemic context in which solutions. The involvement of every citizen is imperative in the realization of this strategy. It is necessary to form the critical mass, the moment when these principles will be learned by the majority of citizens, to achieve the desired change. This way we can be optimistic in terms of achieving the proposed objectives.

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Implementation of Telework in the European Union

Radu MARIN

National University of Political Studies and Public Administration, Bucharest, Romania,
radumarin62@gmail.com

Abstract

The paper aims to analyse, at European level, the evolution of telework implementation over the last two decades. The paper will present documents which are underlying the implementation of telework and which have led, in some of these states, to the insertion in the national laws of the concepts of telework, tele-worker, as well as the regulations governing the conduct of work in this form. The research was conducted only for a few Member States of the European Union, which we considered to be relevant either in terms of economic development, geographical position, cultural values or the population number (Austria, Denmark, France, Germany, Greece, Italy, Poland). We consider this study to be useful for analysing how different states have understood to implement telework, especially in the current conditions created by the COVID-19 pandemic, which has led certain states to reconsider the beneficial effects that telework can bring to the survival and/or development of enterprises in the current economy.

Keywords: Telework, Teleworkers, Labour Agreements

JEL Classification: J41, J81, M54

Introduction

The problem of telework has been the subject of research in numerous empirical studies, has been addressed in numerous papers and has been the theme of many books. Also, the terms telework, teleworkers, as well as the principles that must govern telework, were long topics of discussion between trade unions and employers' organisations. The provisions of some of the framework agreements signed by them were the basis for changes in national legislation on these topics. The high level of interest that telework topic has gained is due to the fact that it can be an important factor in increasing the attraction, motivation and retention of employees, given the decisive contribution it can make to increasing work-life efficiency, flexibility of working hours, reducing costs and commute time. In fact, work-from-home is introduced, from a long time and by many organizations, in the category of employees' rewards. Widespread use of telework in an economy can avoid congestion in large urban centers and reducing pollution. It can be considered a way of working meant to give eased access to the labour market for people belonging to vulnerable social groups, people living in isolated places, to whom such access would be otherwise difficult. On the other hand, as the current pandemic has demonstrated, it can be a means of protecting the health of employees, without causing total disruption of organisations' activity. The reasons that have led to the long hesitations that have existed in the implementation of telework in certain states are based on certain negative effects that it can generate. From the employees' point of view, it may lead to the limitation of professional interactions, isolation in relation to customers, lack of an adequate place to carry out the activity (if it takes place in the home office system). From employers' point of view of, it can be mentioned that they feel that they are losing control of their own employees, they fear that leaks of confidential data and information could occur.

Telework is a form of work that fits very well into the current economy, based on globalisation, digitalisation and the growing need for access to and sharing information. However, it can be said that, at present, there is still no very clear scientific and legislative demarcation between telework and related concepts, such as remote work or telecommuting.

Research Outline

The idea that the goals set at the European Council meeting held in Lisbon on March 23rd-24th 2000 are at the basis of the European legislation regarding telework, it is widely accepted. These objectives also include the implementation of

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eEurope Action Plan, considering that the transition to a digital, knowledge-based economy, will be an important factor in terms of growth, competitiveness and job market. Following the objectives set out at this meeting, the European Commission prepared eEurope 2002 Action Plan for the European Council held in Feira on June 19th – 20th 2000. The Action Plan identified the modernisation of the work organisation as one of the challenges that EU is facing. The eEurope 2002 Action Plan for the European Council emphasized that greater flexibility will lead to the technological advantages offered by a flexible work time and work place and that the social partners were urged, for the benefit of both employees and employers, to support flexible work arrangements. (eEurope 2002, p. 15).

One response to this challenge identified in the plan was for the social partners from the Member States to reach to agreements that would, where possible, support greater flexibility in jobs, agreements to be supported by the Member States as well. Telework was given as an example for such flexibility (eEurope 2002, p.16). In order to support this initiative, the social partners signed the Framework Agreement regarding telework in Brussels on July 16th 2002. The signatories were: European Trade Union Confederation (ETUC), Union of Industrial and Employers' Confederations of Europe / European Union of Crafts and Small-Size Enterprises (UNICE/UEAPME) and Centre of Enterprises with Public Participation (ECPE). The agreement defined the concept of telework as being "that form of organising or/and performing work using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis", and the tele-worker was defined as "any person carrying out telework in the context of such a contract". The key points to be addressed were defined given the specific nature of telework: its voluntary nature, employments' conditions, data protection, privacy, equipment, occupational health and security, work organising, teleworkers' training and the collective rights of the teleworkers. It should be noted that the signatories did not considered that it is necessary to transpose the agreement into an European directive. Due to the fact that the agreement had mentioned that the implementation of telework should be carried out within three years of the signing of the agreement, in 2006 the signatory parties issued the report named "Implementation of the European framework agreement on telework" in order to analyze the state of implementation of telework. To the agreement had been invited to join the 15 countries already members at the time of the signing of the agreement, those submitted by the ten countries that had joined in 2004, and those submitted by the countries invited to join, namely Romania and Bulgaria, Bulgaria noting, at the time of the report, that the implementation process had not yet begun and that social actors were debating how to join it.

Findings

Austria

Austria adopted the first collective agreement containing provisions related to telework in the oil and gas industry in the late 1990s. With regard to the European framework agreement, Österreichischer Gewerkschaftsbund (Austrian Trade Union Federation) argued that Austrian regulations cannot be questioned, given that they have a higher level than the minimum standards contained in the European framework agreement (Georg, 2007). However, the provisions of the European framework agreement have been implemented in Austria by introducing telework clauses in the majority of sectorial and industry-wide collective agreements. It should be noted that there are no provisions regarding telework in the Austrians' labour law, since, according to government declarations, teleworkers fully enjoy the rights granted by labour law (voluntary character, equal rights, guaranteeing working conditions, ensuring health and safety at work). The "Report on the implementation of the European social partners' Framework Agreement on Telework" states that, unlike in other countries, in Austria access to the teleworker's home of labour inspectors, health and safety services and the employer can only be made at the request of the teleworker (Commission of the European Communities, Report on the implementation of the European social partners' Framework Agreement on Telework. 2008, p.9). We can note the fact that this last provision brings an addition in relation to European framework agreement.

The Commission of the European Communities report mentioned that the concluded sectorial collective agreements (many of them being concluded before the signing of the European framework agreement) are either of a general nature and refer only to clauses relating to the voluntary nature, the need for a written agreement, or contain more detailed provisions on working time, labour rights, reversibility, training, data protection, prevention of isolation, equipment and costs (Committee of the European Communities, 2008, p.9-10). Telework in the European Union (2010) mentions that the attempt made to amend the Labour Constitution Act for the full implementation of the provisions of the framework agreement failed in 2005 by the opposition of the Austrian Federal Economic Chamber (Wirtschaftskammer Österreich).

Denmark

Larsen (2008) found that, although telework provisions existed in Denmark as early as the 1990s, the European framework agreement was implemented quite slowly in that country. The author considered that this slowness is explained precisely by the fact that there were still collective agreements with their own rules and procedures on telework before 2002. The report "Telework in the European Union", published in 2010 by the European Foundation for the Improvement of living and working conditions, found that in Denmark the implementation of the European framework agreement was done only at sectoral and cross-sectoral level, often these framework agreements being not always able to implement the provisions of the European Framework Agreement. Batina (2012) found that in 2005 the social partners made changes to the existing collective agreement. An explanation of the fact that a framework agreement has not been reached at national level may be that there are several definitions of telework adopted by the social partners (Larsen, 2008):

Danish Employers' Association for the Financial Sector and the Financial Services' Union considered, in 2003, that telework is understood as being work which, after an agreement with the company, is carried out outside the company's premises, such as the employee's home. The agreement does not include work performed at a remote posting and business-related travelling. Telework does not include mobile work such as that carried out by, for instance, sales workers and others who perform work at shifting locations. Potential agreements with these types of employees regarding work at home are, however, included in the agreement (Larsen, 2008).

Ministry of Finance considered, in 2005, that teleworking is work that can be performed remotely from the normal workplace using a personal computer (PC), an electronic communication form or some other similar equipment provided by the employer. The type of work that can be performed by teleworking must be of a repetitive nature in order to be covered by the agreement and can only be undertaken within a proportion of the agreed working hours. The agreement does not include work performed at a remote posting or during business travel. Teleworking does not include mobile work, that is, work performed at shifting locations (Larsen, 2008).

Association of Local Government Employees' Organisations considered, in 1997 and 2005, that teleworking and home-based work are a type of work that is performed remotely from the normal workplace by the use of a PC, an electronic communication form or other form of material which is made available by the employer. Work which is performed as telework and home-based work has to have a regular recurring character to be included by the agreement and can only be used as part of the agreed working hours (Larsen, 2008).

France

On 19 July 2005, the Inter-professional National Agreement - Telework (ASET0551387M) was signed in France. The signatories of the agreement highlight the advantages offered by the application of telework: organisations have the opportunity to modernize their work organisation, and employees gain greater autonomy in the performance of their work tasks and can better integrate their working life with their personal life; telework can ensure the combination of flexibility and job security through the optimal use of information and communication technologies; telework can ensure increased job quality and provide additional opportunities for access and retention of jobs for people with disabilities; telework is a factor of economic development, favor the provision of the right to work and contributes to the fight against leaving certain territories (ASET0551387M, 2005, p.91-92). Telework was defined by the agreement as: "a form of organisation and/or performance of work by the use of information technology in the context of an employment contract and in which work that could also have been carried out in the employer's premises is carried out outside those premises on a regular basis". The teleworker was defined as "any employee of the company who carries out, either from employment or subsequently, telework, as defined, either as defined in the agreement or under conditions adapted to the field, established by an agreement at branch or enterprise level, specifying the categories of employees to whom it applies" (ASET0551387M, 2005, p.92). The agreement stipulated the principles which were to characterise the telework contract: the voluntary nature of the contract, reversibility and insertion, equal rights for the teleworkers in respect with the rights of the employees working within employers' premises, the obligation of teleworkers to take the necessary measures for data protection, the right of the teleworker to have it's personal life with no intrusion from the employer, the employer obligation to provide, install and maintain the work equipment and the teleworker obligation to protect it, the employers' assumption of costs directly related to telework, the obligation of the teleworker to comply with the employers' provisions regarding work related health and safety measures, the right of the teleworker to manage his work schedule, the right of the teleworker to benefit from the same rights related to work training and the same career development opportunities as any other colleague working within the employers' premises and also to have the same collective rights as them.

The provisions of the Inter-professional National Agreement - Telework were subsequently reflected in the provisions of Law No. 387 of 22 March 2012, which supplements the Labour Code.

Germany

The Bundesvereinigung der Deutschen Arbeitgeberverbände (Conference of Employees' Associations of Germany) and Deutscher Gewerkschaftsbund (German Trade Union Federation) adopted, as early as 16 July 2002, a joint declaration, welcoming the signing of the European framework agreement and urging the social partners to design, at sectorial and enterprise level, the needed rules required for the implementation of the principles of the European framework agreement on the German labour market. The social partners attempted to disseminate information from the European framework agreement through a series of communication means (circulars, newsletters) and, in 2003, the German Employees' Association Federation and the German Trade Union Federation organised a transnational conference, which, in addition to presenting information regarding the European framework agreement, had proposed and exchanged views on the application of labour in enterprises.

It should be noted that in the opinion of both German social partners and the German Government, teleworkers were protected by the general legislative framework applicable to all German employees, which is why they did not considered the adoption of legislation regarding telework to be necessary. On the other hand, the social partners considered it is desirable that the approach towards telework issues should be done at the most decentralised level. These were the reasons which led to the fact that, since the signing of the joint declaration and up until now, the issue of telework has generally been regulated only at enterprise level (Commission of the European Communities, 2008, p.16-17).
It should be noted that in the documentary study we undertook we did not identify legislative references to telework in Germany. All the materials we have found in the research undertaken refer to work at home. However, in 1998, Gleiss Lutz Hootz Hirsch, in the article called "Germany: Telework under the German Labour Code", published on the site mondaq.com, considered that "In 2000, more than 5 million Germans will work under conditions considered as telework". The author stated that there is a provision in the Labour Code relating to a specific form of employment, namely that of a home worker (heimarbeiter).

Kraemer (2014), citing a study by Karl Brenke, found that Germany followed the growing trend in home work recorded by European countries in the 1990s and early years of this century. In 2004-2008, however, Germany began to register a negative trend. The author found that in 2012 Germany had returned to the same percentage of workers working from home, i.e. 1.6% who carried out this work predominantly and 4% who carried it out occasionally. The percentage was identical to that recorded by Germany in 1992 and was below the average recorded by E28, Iceland and Switzerland (Kraemer, 2014).

An article published by Economy & Business on 20 October 2020 mentioned that Germany intends to introduce a legal framework for telework. The article also mentions that there are criticisms of the bill, fearing that the introduction of this form of work could lead to a restriction of the collective bargaining power of workers and allow businesses to outsource jobs.

Greece

The first mention of telework appears in Greeks' legislation in the 1st article of Act no. 2369 of 1998, which mentioned telework among the accepted forms of work.

Stamati (2006) and Lampousaki (2008) show that in Greece the implementation of the provisions of the European framework agreement was done by introducing them into the National General Collective Contract (2006-2007). With regard to the 3rd article of the framework agreement, conditions were introduced concerning the written information of the employee on the conditions governing the telework contract, relating to the additional information to be made in writing in relation to the employee's arrondation within the organization, but those conditions were expressed in vague terms (Lampousaki, 2008). The 4th article of the framework agreement stated that teleworkers have the same rights, guaranteed by national law and collective agreements, as workers working at the employer's premises. The document agreed in Greece stipulated that, taking into account the special conditions imposed by telework, there could be additional special collective or individual contracts. The Greek trade unions agreement did not make it compulsory to negotiate with trade unions if the employer wanted to introduce telework. The expression in the document was "to seek opinion". As regards occupational health and safety, it was stipulated that those who are generally required to verify compliance with

national provisions (employer, employees, trade unions, health and safety officers) have the same obligation in the case of telework. The agreement also implemented other provisions of the European framework agreement: non-discrimination, respect for privacy, data protection.

The government appreciated this initiative, seeing it as an opportunity for persons that were part of vulnerable social groups and also for the inhabitants of the Greek islands. Employers' organisations were somehow reticent, due to the fear of decreased possibility of control over employees, the additional investments that will have to be made for the purchase of equipment, possible leaks of confidential data and possible problems related to the provision of training for teleworkers. The trade union organizations, although they had a positive position regarding telework, had questions about the nature of the employment contract. Both trade unions and employers' organisations agreed to introduce a more specific regulatory framework (Lampousaki, 2008).

Law 3846/2010 regulates telework for employers in Greece under the 5th article**,** referring to: the timeframe within which the employer was required to communicate to the employee information relating to the telework contract, the period during which the contract could be requested (claimed of either party), the employer's obligation to bear the costs involved in the telework, the period during which the employer was obliged to draw up the telework contract.

The Legislative Decree of 11 March 2020, issued in order to define the urgent measures that should be undertaken in order to counter the negative effects of the occurrence of the COVID-19 coronavirus and to limit its spread, allowed employers to unilaterally impose the use of telework (using the term of remote work) and “to organise problems arising in connection with it".

Italy

In Italy, the national interconfederal agreement was signed on 9 June 2004 with the aim of implementing the provisions of the European framework agreement. The agreement was signed by the main trade union confederations (Confederazione Generale Italiana del Lavoro, Confederazione Italiana Sindacati Lavoratori and Unione Italiana del Lavoro), as well as by 21 workers' associations from all the sectors. (Maddaloni & Pedersini, 2008). The agreement concerned issues that must regulate telework, thus taking over the principles stipulated in European framework agreement, with some changes (Maddaloni & Pedersini, 2008): voluntary nature, conditions of employment, provision of work equipment, privacy, health and safety, work organisation, provision of training.

It can be noted that, unlike European framework agreement, there was no reference to data protection. In Italy, in the private sector, there were a number of collective agreements at national level which sought to regulate telework, either before the European framework agreement or subsequently, in the light of the rules laid down therein. Thus, the agreement on commercial workers (IT0407108F), workers active in the textile sector, clothing and fashion (IT0405102N), employees of professionals (IT0605029I), employees in the medical field, employees in telecommunications (IT0512305F), in local public transport (IT0412101N) and air transport (Coletto, D., 2008).

Poland

On 30 June 2005, following negotiations, representatives of Poland's largest employers' and trade union organisations agreed on a draft agreement, under which the provisions of the 2002 European framework agreement would be implemented in Polish organisations. Although the agreement contained most of the provisions of the European framework agreement and even had additional provisions and provided detailed explanations on certain issues, it was never formally ratified. This was due to the fact that the signatory parties did not reach agreement on the list of amendments to be requested from the Government in order to transpose it into legislation.

The next step was taken in 2006, when the Ministry of Labour and Social Policy proposed an act to amend the Labour Code, which, after discussions with the social partners, in October 2006, was incorporated into the Labour Code in August 2007. Thus, a new chapter was added to him, comprising 13 articles, under the name "Employment in the form of telework". The definitions of telework and teleworkers were taken in full from the 2002 European framework agreement. Its provisions were also taken over.

The Labour Code has a provision that made telework difficult to apply under the conditions arising from the CoVID-19 pandemic. The following were stipulated: the conditions of an employer applying telework must be determined by an

agreement with the trade union or trade unions to which the employees are affiliated. It was noted that if an agreement with trade unions could not be reached within 30 days, the employer would be able to define the conditions of telework in accordance with the conditions at work, taking into account the conditions already established during the negotiation with the trade unions. It was that provision that produced the introduction into Polish law of the concept of remote work.

On 23 June 2020 the new version of the government act on the anti-crisis measures (Shield 4.0) was signed. In this act, clarifications were made and a number of provisions on remote work were regulated. This act was based on the provisions of the package of laws known as the Anti-Crisis Shield, signed on 31 March 2020. The following aspects were regulated in order to supplement the provisions already covered by the Labour Code: 1. equipment and materials used for remote work were generally provided by the employer, and there was also the possibility for the employee to use his own equipment, but only if the confidentiality and security of the protected information could be ensured; 2. the employee, on the basis of the regulations carried out by the employer, was obliged to keep records of the working time; 3. the employer had the right to give up work at any time in the form of remote work

Spain

The report of the Commission of the European Communities (2008, p.30) found that, in an attempt to align with-the provisions of the European framework agreement, the social partners introduced its essential principles into the Inter-confederal Agreements on Collective Bargaining signed by the main trade unions on 30 January 2003. The signatories stated that they supported the content of the European framework agreement and undertook to support its application by attaching to this end a Spanish translation of the document. The Inter-confederal Agreements on Collective Bargaining signed later in 2005 and 2007 again ruled on the essential principles of telework (voluntary and reversible character, equal rights for teleworkers) and showed the need for the social partners to manage to regulate the issue related to privacy, confidentiality, training, prevention and equipment. These agreements, which are not binding, can only be considered important in the light of the fact that they provided guidance on the signing of sectoral, regional or company-level collective agreements for members of the signatory trade unions.

Compulsory agreements, both based on the text of the European framework agreement, were signed for the chemical industry (2004) and for the daily press sector (2005) in order to regulate telework issues. A number of agreements of a regional and enterprise level were also signed, which signaled the aspects of telework, some of which referred to European framework agreement.

On 22 September 2020 the Royal Decree-Law No.28/2020 on remote working was issued. Within the Royal Decree-Law were defined three types of work (Rodriguez-Escudero, Ruiz de Salazar & Martínez de Luco Ybarra (2020, p.1): distance work, telework ("remote work carried out solely or mostly through computer and telecommunications systems ") and onsite work.

It should be noted that, although it recognised telework as one of the possible types of work, the law referred, in its entirety, only to provisions relating to remote work (in fact, the Royal Decree-Law was issued for the purpose of regulating remote work).

However, we can note that Royal Decree-Law takes over the provisions of the European framework agreement (Aspra & Alonso, 2020). The Decree-Law referred to equal opportunities, equal treatment and non-discrimination for employees who worked in this form, the voluntary and reversible nature of the contract for this form of work organisation, the minimum clauses to be laid down in such a contract, the support of the costs of equipment and the associated operating costs by the employer, the measurement of working time and the possibility of its 'flexibility', recognition of the right to health and safety at work for employees working in this form, recognition of the right to privacy, including recognition of the right of digital disconnection (Rodriguez-Escudero, Ruiz de Salazar & Martínez de Luco Ybarra (2020, p.4), recognition of collective rights.

It should be noted that, prior to this legislative act, in Spains' legislative system, only the provisions of the 13th article, relating to homework contracts, under the Law on the Status of Workers existed. Commission of the European Communities, in the framework of the Report on the Implementation of the Framework Agreement on Telework (2008, p. 31) considered that, by that act, the Spanish governors wanted to implement it solely for the purpose of regulating manual work, which is why it does not align with the realities imposed by telework, although certain elements could have been taken over (the written form to be given to the contract, the salary had to be at least equal to that of a worker in the same occupational category, the determination of the volume of activity, the right of collective representation).

It was necessary the issuance of Royal Decree-Law No.28/2020 for the implementation of one of the provisions of Royal Decree-Law No.8/2020 of 17 March 2020, issued with the aim of taking extraordinary and urgent measures to limit the impact produced by COVID-19. What is noteworthy is that one of the measures deemed necessary by Royal Decree-Law No. 8/2020 was to encourage telework, in this respect considering to be necessary to "establish systems of organisation to enable the continuation of work through alternative mechanisms, in particular telework and companies will have to take appropriate measures, if this is technically possible and reasonable and the effort required for adaptation is proportionate". It was considered that the adoption of these measures should be a priority in relation to the temporary cessation or reduction of activity. Even though in it's content the Royal Decree-Law No.28/2020 make reference only to remote work, it is mentioned the obligation of the employer to provide the equipment and its maintenance. It is also mentioned the right of the employee to digital disconnection. These two provisions, as well as the definition given by the legislative act to teleworking as being "work ----carried out solely or mostly through computer and telecommunications systems", we can consider this act as legislating telework. In support of our interpretation, it is also the fact that the Royal Decree-Law No. 8/2020, which inspired the issuance of this decree-law, spoke of "encouraging telework".

Aaranz Díaz (2008) and the Commission of the European Communities, in the framework of the Report on the Implementation of the Framework Agreement on Telework (2008, p.30) considered that the signing of the Royal Decree on the Regulation of Telework in the General State Administration was an important step in the implementation of telework in Spain. Following the discussion of the draft decree within the Spanish Economic and Social Committee, the draft decree, sketched in the spirit of the European framework agreement, was agreed by the main trade unions (Confedaración Syndicale de Commissiones Obreras, Unión General de Trabajadores, Central Trade Union Independiente y de Funciarios, Confederación Intertradeunionista) in May 2007. The decree did not apply to all public sector workers, which is applicable to civil servants and public employees in the central government system.

Although, until the Royal Decree-Law No.28/2020, telework was regulated in Spain only for the public sector, Batina (2012, p. 3) identifies an increase in the percentage of teleworkers in the total labour force, from 2.81% in 1999 to 8.4% in 2005 (of which 6.9% at least a quarter of working time and 1.5% almost all working time). Meanwhile a permanent increase was recorded, given that in 2002 it was at a value of around 5%, similar values being recorded in Germany and France (Implementation of the European framework agreement on telework, p. 4). However, in the last decade telework has seen a slower growth rate in Spain compared with the European average. Anghel, Cozzolino & Aitor (2020, p. 3), using information provided by Eurostat (Labour Force Survey, 2018), pointed out that, at the moment of the report, Spain was 6% below the European average, recording a telework value of 7.5%, while France reached 20.8% and Germany 11.6%. On the other hand, considering the figures for 2005 reported by Batina (2012, p. 3), figures also found in the report Telework in the European Union published in 2010 by the European Foundation for the Improvement of Living and Working Conditions and the figures relating to 2009 reported by Anghel, Cozzolino & Aitor (2020, p. 4), we can conclude that between 2005-2009 the percentage of teleworkers in Spain decreased from 8.4% to less than 6%.

Discussions

In the research carried out, we identified the specificities of each country with regard to the national implementation of telework and teleworker concepts, the way in which the principles of the European framework agreement, signed on 16 July 2002, in Brussels, were taken over.

We have been able to find that a number of states have taken over the provisions of the European framework agreement in nationals' law, some of which consider that including those provisions the text of a law is sufficient and others amending the Labour Code.

Other states considered that it was not necessary to implement these principles within the framework of national legislation, the principles being taken up and applied on the basis of agreements signed by trade unions at national level, or even on the basis of agreements signed at sectoral, regional or even enterprise level.

There are still states which use only the terms of remote work or even that of work-from- home, considering that employees who carry out this form of work benefit from all the rights granted by nationals' law to the employees who usually work in the employer's premises. That is why it does not consider it necessary to introduce references to telework in national law.

On the other hand, there are states which, although they had implemented the term of telework in national law, decided, following the situation created by the COVID-19 pandemic, that there was the possibility of returning to the title of remote work, considering it more flexible in terms of the possibility of application.

Conclusions

We note that at present there are a multitude of variants in which different EU states have understood to implement the provisions of the European Framework Agreement on Telework, signed on 16 July 2002, in Brussels. This situation can affect the human resources activity and policy of companies operating in several European countries, not being able to adopt a uniform practice regarding telework.

We consider that in this moment it is still necessary to clarify the notions of telework, remote work, work-from-home and adopting a unitary title, given that, in some states, although they have implemented the provisions of the European framework agreement, they have done so under the title of remote work. Work-from home should remain only what was initially, a benefit in the salary package of employees who work in a normal working regime.

The legislation on telework should be a very flexible one, so as to allow the very operative transition from a normal work regime to telework, in order to avoid situations arising in some states at the onset of the COVID-19 pandemic, states where companies have been prevented by national legislation from moving urgently to the telework regime.

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Public Financing of Long-Term Care in Poland For the Erderly

Anna KONIECZNA

Department of Finance and Banking, Faculty of Economics, Finance and Management,
University of Szczecin
Szczecin, Poland, anna.konieczna@usz.edu.pl

Abstract

The aim of the article is to analyze the solutions of the Polish system of financing long-term care for the elderly. As part of the literature review, a short summary of the definitions of long-term care is presented, thus introduce its main essence. The diversity of the organization of long-term care services and their financing in Poland is the subject of a broader analysis of the financing of selected services in the scope of the entire health care system and life of society as a nation. The main focus was on the description of the Polish long-term care system, its organizational structure as well as the main principles and sources of financing. On the basis of the analysis of the Polish long-term care system, the issues concerning mainly the provision of benefits, their financing and availability were considered. The main difficulties in the functioning of the system were indicated, such as the lack of systemic legal regulations for all participants of the system, lack of coordination of activities, as well as dispersion of many sources of financing or the tasks of various benefits providers. As a summary was indicated the need for changes in the system, in particular towards the unification of rules and cooperation between entities and participants on many levels. The article presents the directions of changes in long-term care in Poland.

Keywords: Economy, Finance, Healthcare Management, Public Finance, Long-Term Care, Care Benefits.

JEL classification: H51, H53, H55, H75, I13, I18, I38, J11, J14.

Introduction

As a result of demographic processes, caring for an elderly person increases its importance, expanding the group of recipients. Intensively progressing changes in society determine the emerging problem of ensuring appropriate care and access to services. This state of affairs is greatly influenced by the aging of the society, as well as other social changes related to the family model or the departure from the common life of extended families.

Merely providing adequate care for the elderly is a difficult challenge with many problems. Especially when it is to a large extent carried out by the state, which, apart from other important tasks, should provide the widest possible range of services and care for citizens. The multitude of tasks, their multi-aspect nature, as well as the organization of the system itself, make the management of these services complicated, often dispersed between authorities and entities. In Poland, the provision of benefits is divided into three systems, each of which has its own rules of organization and financing.

The diversity of the organization of long-term care services and their financing in Poland is the subject of a broader analysis of the financing of selected services in this area. The aim of the article is to review the solutions of the Polish long-term care financing system and to analyze the difficulties that result from its functioning.

The paper mainly uses the analysis of available data from the most important institutions related to providing long-term care benefits, i.e. The National Health Fund (NFZ), The Social Insurance Institution (ZUS) and Social Assistance Institutions. The studied material mainly focuses on the period 2010-2018 of the analysis (unless newer data was available or was based on data from the author's research work)

The progressive aging of the society increases the concerns about ensuring worthy living conditions for relatives in the elderly age. The growing importance of providing long-term care, often for close family such as parents or grandparents, and the resulting problems became the main motivation to choose this topic for detailed analysis. It is a very actual theme focusing on an important social problem, also in economic and financial terms.

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Literature Review

The term long-term care in the literature on the subject quite generally refers, mainly, to the provision of care services to chronically ill people. This is true, despite the cursory description of the basic task of long-term care. Depending on the countries and their systems, there are differences in defining the scope of services provided. The definitions are generally based on similar assumptions and objectives of long-term care and their wording may therefore be comparable. In the literature, interpretations of the concept of long-term care are different, often extensive, but all have the same goal.

The most comprehensive definition is provided by the World Health Organization (WHO), according to which long-term care includes activities designed for people who are unable to provide themselves with long-term care. This also applies to support in the form of informal care by family, friends, and formal care by professional workers in the social and health systems, as well as by volunteers (WHO, 2002). The scope of services includes assistance in maintaining personal hygiene, assistance in everyday life activities, in maintaining the house and its adaptation to the needs of a dependent person. These services can be provided at home, in the local community or in care institutions so as to minimize the effects of loss of independence (both physical and mental) and enable a return to the greatest possible fitness. This definition covers many aspects of this type of benefits, partially overlapping with the one proposed by the OECD. Its extensive form comprehensively covers many issues specifying the nature of the services, which will be the starting point for this work.

Organization of public long-term care in Poland

In Poland, the task of providing long-term care for the elderly rests primarily with the family, but only in certain cases this obligation is taken over by special institutions operating within various systems (Błędowski & Maciejasz, 2008). The task of providing specialized nursing and caring services and services is divided between three social systems:

a) the healthcare system,

b) the social assistance system,

c) the social security system.

Long-term care can be provided as institutional care, by people dealing with professional care (i.e. doctors, nurses, social workers and employees of long-term care facilities) or in the form of home care, by family members, friends, relatives (Kozierkiewicz & Szczerbińska, 2007). Among public entities, each of the above-mentioned social systems provides care benefits, offering their various forms, intended for the elderly, which will be presented below. The health care system provides benefits classified as long-term care on the basis of contracts signed with the National Health Fund (NFZ). The Ministry of Health (MZ) is also responsible for services in this area, of course in cooperation with the National Health Fund. As part of this system, inpatient care is provided in specialized care facilities, such as a nursing and care facility (ZPO) or a care and treatment facility (ZOL), and to some extent also in hospital departments for chronically ill people or geriatric departments. There is a possibility of providing home care by community and family nurses, home nurses, long-term care or palliative care teams. Home care is provided systematically in collaboration with the Primary Healthcare physician (POZ). In the social welfare system, care in the form of stationary benefits is provided in nursing homes (DPS) and day nursing homes (DDPS) mainly to people in a difficult social situation. This task, as well as support in the form of cash benefits, is performed in cooperation with the Social Assistance Centers (OPS), operating at each commune. Thus, these are tasks strictly dependent on the policy of local self-government. The other entities providing support in the field of long-term care include the Social Insurance Institution (ZUS). This entity provides benefits only in cash, in the form of a supplement to old-age and disability pensions.

The number of entities providing residential care services is increasing, which is the result of the increased demand for this type of services (Figure 1). In 2010, there were 827 DPS centers in Poland, while in 2018 there were 876 of them. There are the most of them, because they are located locally, in almost every commune, and provide a wide range of social services, not only for the elderly. In the case of the health care system, the number of ZOL and ZPO entities was gradually increasing. There were more than twice as many geriatric departments in 8 years, to 52 units in 2018. The last three entities are more of a therapeutic profile, hence there are fewer of them than DPS. Their main goal is to provide medical care, which is associated with a more specialized approach.

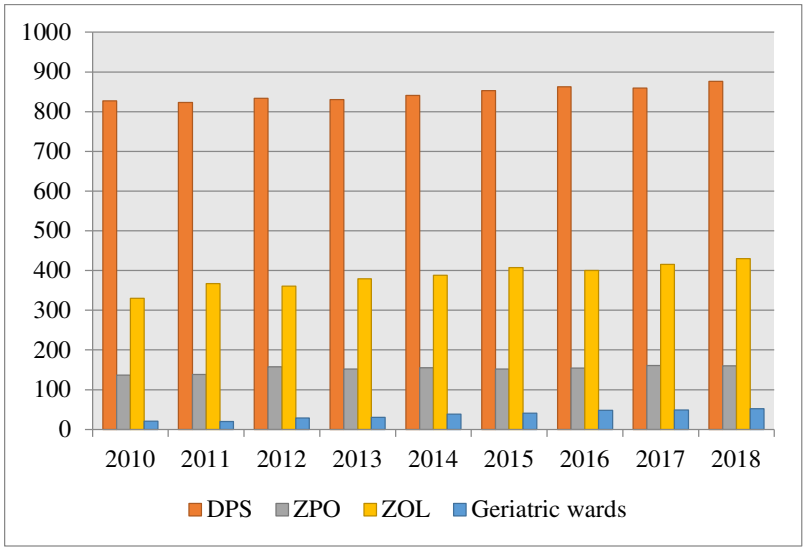

Fig. 1. Number of entities providing long-term care benefits in Poland in 2010 – 2018

Source: (Central Statistical Office, 2020)

This tendency of increased demand for care services is related to the general aging of the society, which in particular is the result of two factors: the elongation of life and a low fertility rate. The significant influence of social and health factors should also be mentioned. As a result, some medical facilities change their profiles or expand the scope of their services with these services.

Forms of long-term care benefits provided

Within the framework of the three presented social systems, benefits are offered in two forms: in cash or in kind (Table 1) (Więckowska, 2010).

Table 1. Types of long-term care benefits in Poland broken down into individual tasks of social systems

System type	Social insurance system	Social welfare system		Health care system
Benefit	care supplement	• care allowance • special carer's allowance	• care services • specialized care services • benefits in nursing homes (DDP and DDPS)	• benefits at special nursing homes (ZPO and ZOL) • long-term care team • long-term nursing care
Form of aid	**cash benefits**		**benefits in kind**	

Source: own study.

Cash benefits are available under the system:

1. social insurance system, which is paid mainly by ZUS as a care supplement. It is a supplement to old-age and disability benefits. It is granted to a person who has been declared completely incapable of work and independent existence, or has reached 75 years of age.

2. social welfare system, which are provided under the tasks of municipalities by local social welfare centers (OPS) in the form of nursing allowances, or special allowances for carers of adults with disabilities.

a) The nursing allowance is granted to partially cover the expenses resulting from the need to provide care and assistance to another person in connection with their inability to live independently. It is granted to the caregivers of people over 75 and / or severely disabled.

b) special care allowance is granted to the caregivers of persons whose disability arose in adulthood, if they do not take up or resign from employment or other gainful work for the purpose of providing care.

In contrast, non-cash benefits are available in two systems, presented below:

1) social welfare system - they are provided in the form of care services or specialist care services, as well as in-house 24-hour care at the DPS. These types of care benefits are due to a single person who often, due to their age and / or illness, requires the help of other people, and also when the family or relatives are unable to provide such help on their own.

a) care services include physical assistance of home caregivers in meeting everyday life needs, hygienic care, nursing prescribed by a doctor and, if possible, ensuring contacts with the environment;

b) specialized care services are adapted to the specific needs resulting from the type of illness or disability, provided by persons with specialist professional preparation.

c) care services in places of stay, such as Nursing Home (DPS) or Daily Nursing Home (DDPS), provided 24 hours a day or for part of the day. Such assistance applies to people who require care due to age, illness or disability, who are unable to function independently in everyday life, and who cannot be provided with the necessary assistance in the form of semi-stationary care services.

2) health care system - long-term care benefits are provided only in kind. They are usually provided in three forms, which can be provided:

a) in a nursing and care facility (ZPO) or a care and treatment facility (ZOL), most often taking the form of organizational units of Healthcare Institutions or separate, independent entities. They are intended for bedridden and chronically ill people who do not require hospitalization in a hospital, but mainly continuation of treatment and professional care.

b) by a long-term care team - intended mainly for people with respiratory failure. It is a form of care that takes into account specific cases, requiring very specialized support and help from specialists.

c) as part of nursing home long-term care - this assistance is provided individually by a nurse to a patient who does not require inpatient care.

Sources of public funding for long-term care

The principles of publicly financed long-term care in Poland depend on the organizational structure, also broken down into three systems. A budget and insurance model is used, which consists in financing benefits from collected contributions, deducted from the insured's remuneration and supplemented with budget financing. The main sources of financing the public long-term care system in Poland are contributions from health insurance, social insurance and taxes (Figure 2).

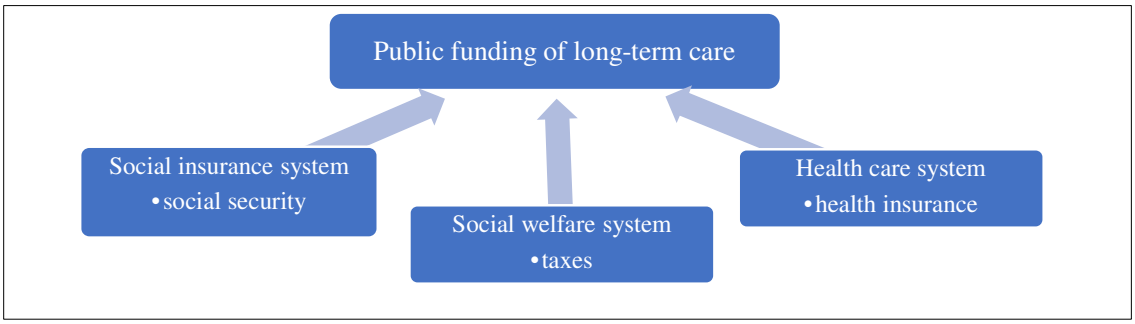

Fig. 2. Sources of public funding for long-term care

Source: own study.

In the financing of benefits, each system determines different rules for the payment of benefits. In this respect, and taking into account the criterion of access to services, the healthcare system is the most diverse. The other systems provide cash and in-kind benefits specified in terms of amount, scope and form.

Financing long-term care in the health care system

In the health care system, compulsory health insurance contributions are the main source of financing services contracted by the National Health Fund, i.e. basic health care, hospital treatment, but also nursing and care services. Access to selected long-term care services in the health care system depends on the criterion of having health insurance. Also, this part of financing depends on the patient's income situation, including the disability pensions paid, thus making it dependent on the social insurance system. Health insurance aims to provide benefits to the same extent for all insured persons, regardless of the material status or the type of disease.

The health care system provides services in three forms, presented earlier. They differ in the method of financing on a micro scale, from the perspective of the recipient, mainly in terms of fees charged, their amount and rules. However, as a rule, these benefits are still provided under the existing general health insurance.

In the case of care benefits at ZPO / ZOL, the determination of the costs of nursing and care services provided depends on the distribution of the beneficiaries themselves, based on the health insurance, as well as the rights to retirement and disability benefits. This division is presented in table 2, presenting the principles of financing residential care services in the healthcare system, divided into two parts.

Table 2. Scheme of financing residential care services under the health care system

<table>
<tr><th colspan="4">Financing of in kind benefits at special nursing homes (ZPO and ZOL)</th></tr>
<tr><td rowspan="2">First part</td><td colspan="2">insured patient</td><td>uninsured patient</td></tr>
<tr><td colspan="2">The NFZ finances some of the costs of services</td><td rowspan="5">the costs of the service are borne entirely by the patient</td></tr>
<tr><td rowspan="3">Second part</td><td colspan="2">food and accommodation costs</td></tr>
<tr><td>the right to retirement and disability benefits</td><td>no entitlement to old-age and disability pensions</td></tr>
<tr><td>an amount corresponding to 250% of the lowest pension, but not more than 70% of monthly income</td><td>financing from own funds</td></tr>
</table>

Source: own study based on: (National Health Fund, 2020).

Having health insurance determines the provision of care services at ZPO / ZOL. Its absence is tantamount to the need to finance these services on one's own, from the private funds of the patient or family. The costs for the insured person are covered in two parts, one of which depends on the entitlement to health insurance and the other on the entitlement to old-age and disability pensions. The price of the service consists of the following parts:

a) Part I, taking into account the financing of direct nursing and care services. It is financed by the National Health Fund, and its amount depends on the contracts concluded by individual entities (service providers). There are also rate adjustments, depending on the level of care required.

b) Part II (the so-called hotel) covering mainly the costs of accommodation and meals. It is financed entirely by the patient's side, but depends on the patient's financial situation. The monthly fee is set at the amount corresponding to 250% of the lowest old-age pension, but the fee may not be higher than the amount corresponding to 70% of the monthly income of the recipient within the meaning of the provisions on social assistance.

On the other hand, services provided at home by a long-term care team (especially for mechanically ventilated patients) or a nurse in the health care system are also billed at rates per person per day, taking into account correction factors or variable tariffs. When contracting the above-mentioned services, the NFZ differentiates the prices for individual services depending on the region, the NFZ branch, but also the service provider himself. On the basis of annual reports on the implementation of the NFZ financial plans, it is possible to analyze the amount of financing of this type of services within the healthcare system. A collective summary of the costs of nursing and caring benefits against the total cost of healthcare services is presented in figure number 3.

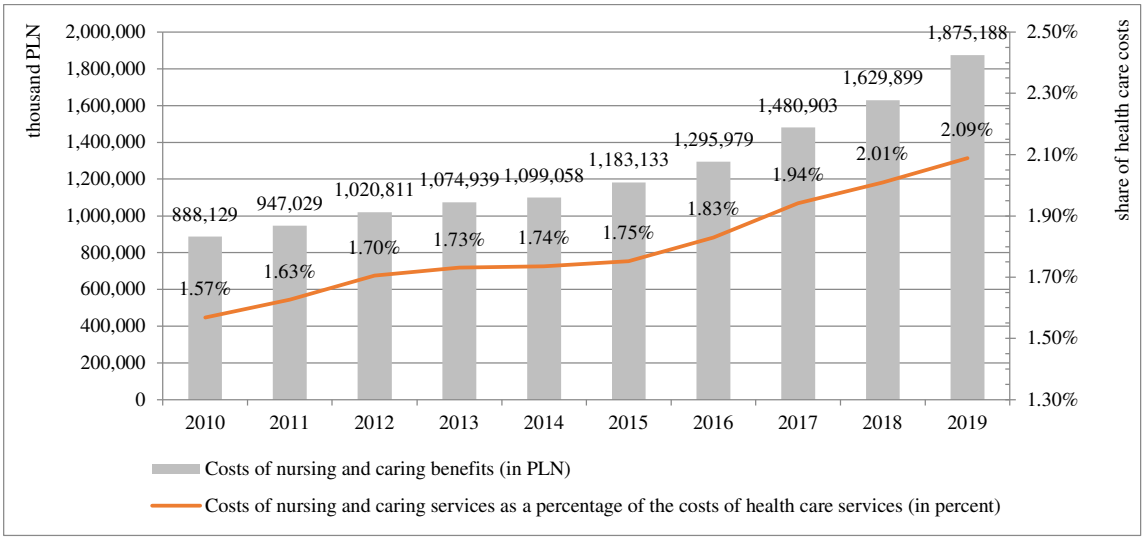

Fig. 3. Costs of long-term care benefits financed by the National Health Fund (NFZ) in 2010-2019 (in PLN thousand)

Source: (National Health Fund, 2020).

In 2019, PLN 1.88 billion was allocated to nursing and care services under long-term care, which represents 2.09% of the total costs of healthcare services. During the analyzed 9 years, these expenses increased from PLN 0.89 billion in 2010, with the share of 1.57% of the costs of health services, which constitutes an increase by 211.14% (i.e. by PLN 987.1 billion). Systematically since 2010, the costs of the NFZ for long-term care services have been increasing, especially since 2016, there has been an intensive increase in costs year on year, i.e. by 9.54% in 2016, to 15.05% in 2019. Earlier years of analysis were not characterized by such a significant cost increase. This increase, especially in recent years, further emphasizes the increased demand for long-term care and thus determines the greater development of the market for long-term care services. The intensive increase in the share of the cost of care services compared to healthcare services confirms that these types of benefits increase their importance and may also play a greater role in the structure of costs of NFZ services in the future.

Financing long-term care in the social welfare system

Mainly, the financing of benefits in social welfare system is carried out at the local level, directly from the budgets of local government units, often with the support of OPS, which manage local, mainly at the municipal level, social assistance tasks. Granting financial support in the form of specific and periodic benefits, as well as the organization and provision of care services is the responsibility of the municipalities, hence the financing of these forms of care rests with individual municipal governments. The stay in nursing homes is payable and the cost is determined by the local government units (commune, poviat or voivodeship) that manage the entity. First, the obligation to pay the payment for stay lies with the resident (the beneficiary), and it is a maximum of 70% of his income. The amount of the fee that the close family is obliged to pay is specified in detail in the act. On the other hand, the commune should cover the difference between the average cost of living in nursing home (DPS) and the fees paid by the resident and his family.

In total, PLN 412.4 million was allocated to cash benefits in 2015. In 2015, nursing benefits were awarded to people aged 75 and over, in the total amount of approximately PLN 50.5 million. On the other hand, PLN 361.9 million was allocated to the carer's allowance in 2015, which is the result of a much higher benefit, but also a larger number of beneficiaries (more than twice the number of benefits granted). Benefits in kind, due to the need for direct contact with the needy and the physical nature of care services, are more costly. The amount of expenditure incurred for this purpose in comparison with cash benefits suggests that it was one of the main forms of assistance in this system. Nationally, the largest part of funds was spent on financing care in nursing homes, amounting to PLN 3.3 billion in 2015. In turn, in 2015, a total of PLN 488.7 million was spent on care services and specialist care services.

Financing long-term care in the social insurance system

The most common payer of benefits in the retirement and disability pension system is ZUS (paying 84% of all payers (GUS, 2016). The only long-term care benefit in the social insurance system is the care supplement, which is an addition to old-age and disability pension. According to data obtained from the headquarters of the Social Insurance Institution, the Department of Statistics and Actuarial Forecasts in Warsaw, expenditure on the payment of nursing supplements varied between voivodeships, and their summary is presented in Table 3.

Table 3. Number of people receiving the care supplement to pensions and the estimated value of their payments by ZUS in 2015

	Number of people downloading the care supplement		Value of the care supplement payments (in PLN)	
	Total	People aged 75 and over	Total	People aged 75 and over
TOTAL	**2 272 420**	**2 062 713**	**5 676 596 057**	**5 152 739 583**

Source: own study based on: (The Social Insurance Institution (ZUS), 2018).

Older people, aged at least 75 years old, accounted for the vast majority of people, ie 90%, to whom the nursing supplement was paid by ZUS. In 2015, it amounted to PLN 208.17 and was paid to approximately 2 million people of this age. Based on the estimated calculations made, the total disbursements could amount to PLN 5.7 billion, of which over PLN 5.1 billion could have been allocated to target recipients at least 75 years old. These are data taking into account the payment of allowances for pensions in general, without distinguishing their breakdowns in detail, but in a collective manner they present information broken down by age.

Research Result

The structure, organization and financing of the Polish long-term care system are elements closely related to the effectiveness of its tasks, which are guided by the overarching goal of satisfying the needs of dependent people. The fact of the existence and functioning of the long-term care system in Poland is a positive aspect, which of course is undeniable. The good side of the system is, above all, providing help and carrying out tasks in this area, but not always to the right, most needy people. Unfortunately, also in this structure of the system there are a number of obstacles, both for beneficiaries and for service providers.

One of the obstacles to the efficient functioning of long-term care in Poland is the lack of systemic regulations and legal obligations for the state, local governments, other public-law institutions, as well as the insured persons and their families to secure the care needs of the future beneficiary. There are no regulations regarding possible penalties and sanctions for persons who do not comply with the obligation. Carrying out the duties towards relatives should be overridingly respected. Unfortunately, it is not practiced because there are no coercive measures, no clear system rules for public entities, service providers and insured persons. Thus, the issue of financing social welfare benefits belongs to local authorities and their limited budget is quite a significant obstacle in ensuring financial resources for this purpose.

Another obstacle is the multitude of possible sources of financing long-term care and other similar services, not only for the elderly. This makes the allocated funds dependent on the decisions of decision-makers. Such freedom in managing resources may be disadvantageous, because it will not take into account the needs of all people equally, but favor only the chosen ones, on undefined terms. The result is that the less important needs, e.g. care for the elderly, may be pushed to the sidelines, as there will always be other, more priority tasks to be financed

In addition, the financing of long-term care, based on several entities and financing sources, introduces chaos and confusion among the multitude of information regarding the various principles of receiving and providing services of a similar nature. This variety and dispersion of financing is additionally made more difficult by the situation of individual dispatchers, which especially concerns expensive stationary services. Depending on the type of benefit, there are various financing problems, which can be caused by:

a) the beneficiary's own resources - are necessary and required to provide assistance. The minimum level of own contribution is indicated in the health care system (contribution depends on the level of income). On the other hand, as part of social assistance in DPS, it is desirable to cover the costs in full, depending on the available financial possibilities, involving mainly private funds.

b) the resources of the family, relatives - partially supplement the financing of long-term care, and sometimes its main source of income. The situation of a person needing help determines the extent to which it is necessary to support relatives, and the lack of it severely limits access to services. Another problem is the family's lack of knowledge and information about the rules and possibilities of receiving long-term care assistance, as well as the lack of awareness of their own rights and obligations.

c) budgets of municipal self-governments - it is a complementary link in the financing of services, which should be the last resort for people with a financial situation that does not allow for the provision of full benefits. Local governments are guided by a certain freedom in managing funds for this purpose, which means that they may or may not often finance benefits. This voluntary nature causes that communes allocate funds to subsidize the stays of poorer residents without rules, without selection criteria, regardless of their other current needs. More populist needs will always be competitive and more important to finance than the problems of elderly and dependent people. This is the main problem of allocating resources and setting priorities. There is also the problem of disproportions between municipalities and their differences in income.

d) NFZ resources, based on the health insurance held, constitute the basic source of financing services in the health system, which are partially supplemented by the patient's own contribution. The amount of funds allocated to long-term care, also for individual service providers, is determined on the basis of autonomous decisions of the payer among many urgent needs. Again, setting priorities makes things more difficult.

e) ZUS resources - supplement the long-term care system, only in the form of cash benefits, which may indirectly affect the receipt of the benefit.

There is also a problem with the financing of long-term care in precisely defining the recipients of services. Just as there are different kinds of benefits and administrators of funds, so are the criteria for the recipients of services themselves. As a rule, they include elderly people, but access to benefits should not be limited by age. The aim of long-term care is to provide assistance to dependent people not only due to their age, but also to those returning after severe injuries or operations requiring convalescence. Thus, the group of recipients is heterogeneous, differentiated depending on the benefit, but nevertheless with a predominant share of older people as beneficiaries. Thus, there are different sources of financing services, different dispatchers, and the addressees may be the same or similar people. The result is that benefits are often overlapping for the same people and ignoring other needy people. The benefit may therefore go to the wrong people, thereby excluding those in real need of support. It is a more complex problem because it results from many reasons, including a person's personal life situation, contact with family, dispersion of beneficiaries in a given area, as well as simple ignorance. A significant problem is also the lack of coordination of the flow of information on the services provided. Inpatient care providers are not required to contact you regarding exchange or patient flow, but often do so on a voluntary basis. There is also no coordination of activities related to the selection of appropriate types of services adapted to the health condition of people. Each of the schemes offers its benefits independently of each other, and the potential beneficiary must determine the type of assistance himself. There is no institution or entity that would verify the demand for services and, on this basis, classify and assign to different types of long-term care. Then, it would be possible to monitor the situation of beneficiaries, their flow and health. This is especially important as long-term care benefits are offered through three systems that should work together for the benefit of those needing assistance.

The lack of coordination also affects cash flow to service providers as well as to their beneficiaries. Tasks in the field of long-term care are assigned to various units (including ministries, local governments, the National Health Fund, the Social Insurance Institution), usually without systemic provision of financial resources that would be specially secured and allocated for this purpose. This means that the increasing needs of an aging society are not always matched by higher expenditures for specific individuals. The aforementioned broadly understood coordination of activities and financing of long-term care would avoid the duplication of benefits. Benefits should be adjusted to the diagnosed needs so that they are best suited to the people applying for them, without the simultaneous overlapping of those that are similar. Harmonizing the operation of long-term care will also enable the necessary action strategies in the field of care services to be identified.

Summary

The review of the system of functioning and financing care needs for elderly people in Poland confirms their rapid growth with the simultaneous organizational dispersion, both institutional and the sources of financing. In addition to the increasing demand for this type of services, the expenditure incurred on long-term care benefits in the health care, social assistance and social security systems is also increasing. Their level is significant. Financing long-term

care requires systemic changes and the introduction of targeted solutions that could guarantee a certain and dedicated source of financing for specifically defined services. Additionally, it seems reasonable to organize and standardize the system of care services for people of senior age.

The main problem of financing and providing long-term care benefits results from the lack of legal regulations and unification of the organizational and institutional side (as is the case, for example, in Germany, although this system is not ideal) or financial (dedicated source of financing) and the lack of coordination of broadly understood long-term care activities. The analysis of the Polish long-term care system shows its insufficiency and inefficiency, as well as the resulting threats in the coming years. Self-financing of self-care by retirees and care for themselves and by their immediate family becomes less and less possible, therefore building an integrated system of financing this sphere of social needs is necessary and should be a challenge in the long run.

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Gender Involvement and Productivity in ICT Sector on Economic Development in Some EU Countries

Nicoleta Daniela IGNAT
University POLITEHNICA of Bucharest, Bucharest, Romania, nicoleta_ignat@yahoo.com

Anamaria VARTOLOMEI,
University POLITEHNICA of Bucharest, Bucharest, Romania, anamaria111@gmail.com

Abstract

The Information and Communication Technology (ICT) sector has a significant impact in most European Union (EU) member states on their economic development. The aim of this paper is to analyze the impact of the ICT sector in the economic development of some EU member states and the degree of involvement of women in the development of this sector. In the first part of the paper, the productivity of employees in the ICT sector was determined and analyzed. In the second part of the paper, an analysis was made that aimed to determine the degree of women's involvement in the development of the ICT sector. This analysis focused on both the economic and the social side in terms of the accessibility of the ICT sector among women. The investigation shows that the share of women employed in the ICT sector is relatively low in all EU Member States included in the analysis. The results of this paper provide a tool that can be used by decision makers in the ICT sector by capitalizing on the creative potential of women who can work in this sector. As a perspective, the observance of the provisions of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) by ensuring equal opportunities in the ICT sector among women should be considered.

Keywords: labor productivity, ICT sector, women's employability.

Introduction

Studies conducted so far show that decisions and the ability to attract women to the labor market are determined by factors that depend on demand and supply. The demand on the labor market is determined by various factors, among which we mention: economic development (Lincove, 2008) and changes in industrial sectors (Kucera and Tejani, 2014) that play an essential role.

Also, the demand is determined by other factors such as: job requirements, the type of activity that the future employee must perform (physical or intellectual work) (Rendall, 2013) , the level of education required for the job, the necessary skills, remuneration (Rendall, 2013, Engelhardt and Prskawetz, 2004).

In 1998 employability was defined as a person's ability to hold a job in accordance with his or her skills, to maintain, to develop a person's professional entrepreneurial ability and to change his or her job (Hillage and Pollard 1998). The Confederation of Business Industries defined the term of employability in 2009 a set of attributes, knowledge and skills that labor market participants should possess to be effective in the workplace. This efficiency will benefit the employer, the employee but also the economy as a whole. ”(Confederation of Business Industries (CBI) 2009). As Frankham concluded in 2016, the notion of employability is constantly changing.

According to the 2004 OECD study, “ICT specialists are defined as persons who have the ability to develop, operate and maintain ICT systems and for whom ICTs constitute the main part of their job” (OECD, 2004). The ICT sector covers a wide range of areas related to computers and digital information. As leading companies in all industries adopt digital technologies, IT professionals have become some of the most in-demand members of the workforce today. Employment in the ICT sector includes professionals from various areas, such as technology production, telecommunications and internet services, software editing and much more.

According to the analyzes carried out in 2015 by the European Commission, a total of 228.7 million employees were registered in the EU. The occupancy rate being 65.6 percent this year. Germany is the EU country with the highest number of employed women (17.9 million) in 2015.

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The largest share of employees in the ICT sector is staffed by technical support. Of these in 2019, 82.1% were men compared to only 17.9% women.

ICT brings changes in people's daily lives. The development of this sector has led to people's dependence on ICT, and these effects are visible both socially and economically. Roztocki and Weistroffer (2016).

ICT is increasingly contributing to increasing the quality of life by changing people's behavior and contributing to the development of knowledge. This topic has been addressed in several studies (Lwoga and Sangeda, 2019; Mbuyisa and Leonard, 2017; Thapa and Sæbø, 2014; Zaremohzzabich et al., 2014). that the impact of ICT is particularly critical in developing countries. Other studies have focused on the relationship between ICT and social inclusion, and research shows that certain social groups may be marginalized because they do not have access to the opportunities offered by ICT (Castells,1999).

Thus, access to ICT is a sign of technological progress, which facilitates social welfare (Kenny, 2002; Madon, 2000).

The goal of this paper is to analyze the employability in the information and communication technologies sector, comparing the situation in 5 different EU countries. Throughout this study we can better appreciate the differences and similarities that exist between developed EU countries (Germany and France) and less developed member states (Romania, Bulgaria, Croatia).

The Methodology of The Research

The introduction of new technologies and digitalization, also known like the 'fourth industrial revolution' impacts society by changing the way that people live, work and interact with one another. ICTs has a very important role in the changes arise in methods of production and patterns of employment within the European Union (EU).

In this paper is determined and analyzed the productivity of employees in the ICT sector. The analysis was performed on a group of EU member states. The criteria taken into account in the selection of the 5 EU member states was the level of their development. Thus, two EU member states that are part of the category of developed countries and 3 less developed EU member states were selected (the last three member states that joined the EU): Croatia, Romania and Bulgaria.

The paper also contains an analysis that aimed to determine the degree of women's involvement in the development of the ICT sector.

According to Eurostat data, in 2019, the number of specialists employed in the ICT sector was 7.8 million people, which represents 3.9% of the total workforce. The country with the highest number of experts employed in the ICT sector is Germany with a share of 21.5% of all EU specialists.
In second place is France with 1.1 million specialists employed in ICT, respectively 14.4% of the total.

The analysis was performed starting from the raw data taken from the Eurostat site. Thus, Total employment (resident population concept - LFS), the active population from the 5 EU member states, the total number of people working in the ICT sector were analyzed. Subsequently, the share of women working in the ICT sector was calculated in relation to both the total number of people working in ICT and the total number of the employed population in the 5 EU member states. Based on these analyzes, it was possible to highlight the contribution of women to the development of the ICT sector, respectively their contribution to the economic development of each EU member state analyzed.

Table 1: Percentage of the ICT sector in GDP

GEO/TIME	2014	2015	2016	2017	2018
Bulgaria	4.89	5.05	5.38	5.72	6.1
Germany	4.17	4.23	4.13	4.19	4.4
France	3.83	3.89	4	4.33	4.31
Croatia	4.08	4.2	4.23	4.38	4.45
Romania	3.31	3.36	3.56	3.53	3.74

Data source: Eurostat

As showed in table 1, in the developed countries of the EU the share of the ICT sector in Gross domestic product (GDP), is about 4% (Germany and France) and is relatively constant in the last 5 years. In the former communist countries (Romania, Bulgaria and Croatia) there is an increase in the share of ICT of approximative 12% in the last 5 years. Bulgaria is a leader in this sector. The table shows that on average developed countries have considerably higher per capita GDP and larger populations (see table 5) than less developed countries.

The value added, gross obtained in ICT sector from 2015 to 2018 is presented in table 2.

Table 2: Value added, gross obtaind in the ICT sector (million Euro)

GEO/TIME	2015	2016	2017	2018
Bulgaria	1,991.4	2,252.5	2,584.5	2,966.7
Germany	115,141.4	116,566.9	123,047.9	133,074.6
France	76,534.4	79,871.6	88,597.4	90,480.7
Croatia	1,552.0	1,633.9	1,782.2	1,899.7
Romania	4,726.1	5,429.8	6,000.6	6,911.8

Data source: Eurostat

Germany leads this sector with a value-added gross of 133,074 million Euro in 2018. This value increased with 13% in the past 4 years. Germany is followed by France with 90,000 million Euro. The former communist countries Bulgaria and Croatia have a smaller value added, gross obtained in the ITC sector, of 2966 and 1900 million Euro, respectively. Romania had an astonishing increase in this sector, from 4700 million Euro in 2015, to almost 7000 million Euro in 2018.

The contribution of the ICT sector in gross value added was calculated based on the data provided by Eurostat. Comparing the values in table 2 to the number of people employed in the ICT sector, the productivity of this staff in different countries is obtained. These values are presented in table no.3

Table 3: Labor productivity in the ICT sector (Euro/ person)

GEO/TIME	2015	2016	2017	2018
Bulgaria	22,995.5	24,972.6	27,147.9	29,057.0
Germany	78,557.3	75,638.8	79,084.7	82,013.2
France	84,409.9	82,443.8	87,030.8	85,238.5
Croatia	35,034.3	31,062.0	32,641.7	31,296.4
Romania	29,318.3	32,378.2	32,365.5	36,282.6

From the analysis of these values, it can be seen there is a large discrepancy between productivity in developed EU countries (France, Germany) and former communist countries (Romania, Bulgaria). In the latter, however, there is an important growth rate. Germany and France have a far higher productivity, of approximative 80,000 Euro/person, and this value was kept almost constant from 2015 to 2018. In Bulgaria and Romania, the Value added, gross obtained in ICT/ person in 2015 was 22,000 and 29,000 Euro/person respectively, but by 2018, this value increased by approximative 25%. Croatia on the other hand, had a decrease of 4000 Euro/person from 2015 to 2018.

The number of employees in Central and Eastern Europe has shrunk slightly over the past 25 years. This region now makes up 6.4 per cent of the global employees number.

The data from table no. 4 shows the evolution of the active population in the 5 EU member states subject to analysis. The active population includes both the employed and the number of unemployed.These data were extracted to highlight the share of the employed population in the EU Member States.

Table 4: The evolution of active population aged 15-64 in the analyzed EU member countries (Thousand persons)

GEO/TIME	2015	2016	2017	2018	2019
European Union - 27 countries	206,099	206,987	207,629	207,897	208,458
Bulgaria	3,276	3,200	3,278	3,240	3,276
Germany	41,117	41,932	42,094	42,094	42,427

France	28,435	28,471	28,496	28,628	28,529
Croatia	1,865	1,806	1,807	1,783	1,768
Romania	8,858	8,696	8,812	8,761	8,761

Data source: Eurostat

In 2018 the total number of active citizen in EU was 208,458,000 persons. The number of active citizens per country was fairly constant from 2015 to 2019.

The number of citizens employed in the EU and in the countries studied can be found in table 5. In the European Union, from 208 million active citizen, only 194 million are employed. In Germany, only 2.4% of active population is unemployed, compared with Romania where 3.44% of the active population is unemployed.

Table 5: The evolution of the total number of employees aged 15-64 in the analyzed EU member countries. (Thousand persons)

GEO/TIME	2015	2016	2017	2018	2019
European Union - 27 countries	185,183	187,895	190,542	192,613	194,314
Bulgaria	2,974	2,954	3,073	3,069	3,136
Germany	39,176	40,165	40,482	40,636	41,065
France	25,556	25,671	25,881	26,114	26,177
Croatia	1,559	1,567	1,603	1,630	1,650
Romania	8,235	8,166	8,363	8,382	8,408

Data source: Eurostat

Table 6: Percentage of female employees aged 15-64 of the total employment the analyzed EU member countries.

GEO/TIME	**2015**	**2016**	**2017**	**2018**	**2019**
European Union - 27 countries	45.97	45.97	45.97	46.01	46.08
Bulgaria	47.14	46.89	46.70	46.66	46.62
Germany	46.89	46.78	46.76	46.83	46.90
France	48.44	48.42	48.24	48.35	48.62
Croatia	46.12	46.01	45.85	46.07	45.94
Romania	42.88	42.85	43.29	42.83	42.60

Table 6 shows that in the five EU Member States the percentage of employed women is over 40%. The percentage of employed women did not vary significantly from one year to another in the five countries analyzed. The lowest employment rate among women is in Romania.

The number of employees aged 15-64 in the ICT sector in the analyzed EU member countries is analyses in table 7.

Table 7: The evolution of the total number of employees aged 15-64 in the ICT sector in the analyzed EU member countries. (Thousand persons)

GEO/TIME	2015	2016	2017	2018	2019
European Union - 27 countries	6,553.7	6,914.9	7,179.5	7,580.4	7,858.5
Bulgaria	86.6	90.2	95.2	102.1	101.3
Germany	1,465.7	1,541.1	1,555.9	1,622.6	1,686.9
France	906.7	968.8	1,018.0	1,061.5	1,129.6
Croatia	44.3	52.6	54.6	60.7	55.7
Romania	161.2	167.7	185.4	190.5	197.9

Data source: Eurostat

Analyzing the evolution of the number of specialists employed in the ICT sector, it results that

- in Bugaria, the specialists employed in the ICT sector increased in 2019 by 0.17 percent compared to 2015.
- in Germany, the specialists employed in the ICT sector increased in 2019 by 0.15 percent compared to 2015.
- in France, the specialists employed in the ICT sector increased in 2019 by 0.25 percent compared to 2015.
- in Croatia, the specialists employed in the ICT sector increased in 2019 by 0.26 percent compared to 2015.
- in Romania, the specialists employed in the ICT sector increased in 2019 by 0.23 percent compared to 2015.

The most representative increase in the number of specialists employed in the ICT sector was in Croatia, followed by France and Romania.

Developed Europe has the lowest female representatives in the ITC sector with just 3 per cent of women in this category economically active. Two major trends are clear from tables 7 and 8. First, male labor force participation increased, but at a moderate pace in each of the 5 countries. Second, female labor force participation decreased over the past 5 years despite all the regulations and norms adopted by the UE in order to support women employability across Europe.

Table 8: Percentage of female employees aged 15-64 in the ICT Sector for the analyzed EU member countries.

GEO/TIME	2015	2016	2017	2018	2019
Bulgaria	30.7	28.9	29.0	29.9	28.1
Germany	16.3	16.6	16.6	16.8	16.8
France	15.8	17.6	18.5	19.3	19.6
Croatia	17.2	13.8	14.5	18.2	20.5
Romania	27.3	26.3	25.7	23.7	23.5

In 2019, the percentage of females working in the ICT sector increased in Croatia by 2.3% and in France by 0.3% compared to the previous year. In Germany the percentage of women employed in ICT remained constant and in Romania and Bulgaria it decreased.

Conclusions

Labor productivity in the ICT sector in the last three EU member states that have joined the EU is lower compared to that obtained in other EU member states. This is justified by the fact that these countries are developing.

The share of women working in the ICT sector is low compared to the share of women in the total number of employees.

The results of this paper provide a tool that can be used by decision makers in the ICT sector by capitalizing on the creative potential of women who can work in this sector.

According to the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the elimination of forms of discrimination against women must be ensured at the level of each country, ensuring their equal access to the labor market.

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Overcoming the Crisis Caused By COVID-19 And Its Post-Crisis Impact by Tourism in Portugal

Fernanda FERREIRA
Polytechnic Institute of Porto, School of Hospitality and Tourism (ESHT), Applied Management Research Unit (UNIAG), Vila do Conde, Portugal faf@esht.ipp.pt

Mónica OLIVEIRA
Polytechnic Institute of Porto, School of Hospitality and Tourism (ESHT), CiTUR researcher (Centre for Tourism Research, Development, and Innovation), Vila do Conde, Portugal monicaoliveira@esht.ipp.pt

Mariana MIRANDA
Polytechnic Institute of Porto, School of Hospitality and Tourism (ESHT), Vila do Conde, Portugal 41190177@esht.ipp.pt

Abstract

***Purpose* -** Tourism in Portugal has been growing exponentially in recent years, with a significant impact on the national economy. However, this growth was restricted by the current health crisis, caused by COVID-19. The pandemic has resulted in the confinement of a large part of the world's population; the cancellation of travel; the closure of most establishments, including those involved in the tourism sector; the increase in the unemployment rate; and other tragic repercussions.The objective of the study is to understand the changes made by the sector to defeat this crisis and predict the most significant modifications in the sector and its impact.

***Design/methodology* -** Quantitative research based on a questionnaire survey, which target was the population of employees of tourism enterprises in Portugal. Qualitative research based on data collected in official governments websites, *Turismo de Portugal I.P.* website and national statistical data websites.

***Findings* -** This paper studies the measures implemented by the Portuguese Government and the tourist impact in the economy during the pandemic. It also examines the advantages and disadvantages of the implementation of those measures and how economic recovery is being achieved. From the results of the investigation, it was possible to conclude tourism enterprises generally suffered a considerable impact from the crisis caused by COVID-19. For this reason, they have taken various measures to ensure security conditions for all guests and staff. From the respondents' answers it is possible to perceive the discontent of the workers with the lack of help from the Portuguese Government.

Keywords: Tourism, COVID-19, Crisis, Economic Impact

Introduction

Until 2020, Portugal was in a very favourable position regarding tourism, having a major impact on the Portuguese economy. However, the COVID-19 pandemic has shaken this whole structure, which is now struggling to get back on its feet.

According to Stynes (1997, *as cited in* Ardahaey, 2011, p. 208), tourism has its economic impacts. This way, the most evident are the repercussions in the base areas of this phenomenon: accommodation, catering, transportation, leisure, and commerce. Therefore, the analyse of the tourist activity impact focus, typically, on its benefits, such as intensification of sales, profits, and tax revenues, as well as the development of new jobs.

Analysing the specific case of Portugal, according to Tourism of Portugal IP (2017), the profits achieved in 2016 reassure that this is the largest export activity in the country, being a strategic investment target, since it contributes to economic and social development. Consequently, it is possible to demonstrate the relevance of tourism in the country, through data of World Travel & Tourism Council (WTTC): "In Portugal, where Travel & Tourism accounted for 16.5% of total economy, the sector's GDP grew by 4.2%, outperforming the overall economy GDP growth almost threefold in 2019" (WTTC, 2020).

Although the results, published by Banco de Portugal - consulted in Statistics Portugal (the national institute of statistics in Portugal) - , concerning the Balance Payments in the balance of Travel and Tourism in 2019 (+5.3%)

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were less prominent than in 2018 and 2017 (+8.4% and +24.2%, respectively), it is possible to observe that the sector has a great impact on the national economy (INE, 2019).

Over the years, Portugal has been recognized internationally for its quality in tourism. Among the prizes received are: World Travel Awards 2020 – Europe Edition (Portugal was elected, for the fourth consecutive year, the Best Destination in Europe in the 2020 edition of the World Travel Awards); WTTC 2020 (Portugal is the first European country to receive the World Travel & Tourism Council's Safe Travels Label); Recognition SR PRACTICES AND SUSTAINABILITY 2019 (Turismo de Portugal I.P- wins the Community category of the 5th Edition - 2019 of the prize promoted by the Portuguese Association of Business Ethics, with the project "Educating for responsibility" recognizing the actions of social responsibility and sustainability promoted by the network of Tourism Schools of Portugal); World Travel Awards 2019 (Turismo de Portugal I.P.- Best Official Tourism Organisation in the World, for the third consecutive year); 14th Editions of the awards UNWTO 2017 (1st place in the Innovation and Public Policies category with the Tourism Training Talent training project of the Tourism Schools of Portugal); World Golf Awards 2017 (Portugal World and European Golf Destination). (Turismo de Portugal I.P., 2020d)

Thus, with the improvement of transport and the emergence of new emerging markets, tourism remains one of the largest, rapidly growing industries globally. However, its evolution faces several challenges, such as crises and disastrous occurrences, as states Gurtner (2016, as cited in Jurdana et al., 2020).

Considering all the importance of Tourism for Portuguese economy, and the negative impact of COVID-19 pandemic that changed all the optimistic scenario, this article initiates with the state of art about COVID-19 disease, how the Tourism Sector answered to previous pandemics, and predicts the future of tourism, considering different authors and forecasts, that guesses that this pandemic crisis will bring new concepts and strategies and safer experiences. This paper is organized in four main sections: *Introduction* (where is presented the background of the study), *Methodology*, *Results* (divided in *Quantitative Results* and *Qualitative Results*), *Discussion and Conclusion*. In *Discussion and Conclusion*, it is planned to develop an analysis of the strengths and weaknesses of the response to the crisis experienced in the tourism sector and anticipate some of the possible changes that the sector will experience in the coming years. There may be more weaknesses as regards the response from the Portuguese Government than there are strong ones, as we are going through an atypical and never before experienced situation. Thus, the actions taken may not respond so effectively to the problems experienced by the tourism sector.

In this way, it is expected to reach conclusions regarding the changes implemented by tourism enterprises to overcome COVID-19 crisis and to recognize the fluctuations made by the sector to reverse this crisis and forecast the most significant modifications in the sector and its results.

COVID-19 Pandemic

In January 2020, COVID-19 was declared by World Health Organization (WHO) as "Public Health Emergency of international Concern". Between months, the spread of the disease became a pandemic, creating a global sanitary crisis (Khan, 2020). COVID-19 is the infectious disease caused by the coronavirus, SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). WHO first learned of this new virus from cases in Wuhan, People's Republic of China on 31 December 2019. According to the report of the World Health Organization (WHO as of November 19 2020), the current outbreak of COVID-19, has affected over 55659785 and killed more than 1338769 people in more than 220 countries throughout the world. "The time from exposure to COVID-19 to the moment when symptoms begin is, on average, 5-6 days and can range from 1-14 days. Most people (about 80%) recover from the disease without needing hospital treatment. About 20% of those who get COVID-19 become seriously ill and require oxygen, with 5% becoming critically ill and needing intensive care." (WHO, 2020).

Therefore, people who have been exposed to the virus are advised to stay home, apart from others, for 14 days, in order to prevent the spread of the virus, especially where testing is not easily available. This need for people to be trapped at home and not to move freely, has caused an economic crisis caused by the lack of consumption and travelling.

Since World War II there was never a health calamity with such global impact as COVID-19 pandemic, this is probably the biggest challenge that humankind confronted since then. It has rapidly proliferated across the globe, causing enormous health, economic, environmental, and social challenges to every nation.

The coronavirus outbreak is harshly disturbing the global economy. In general, countries are fighting to slow down the spread of the disease by testing & treating patients, quarantining suspected persons through contact tracing, restricting large gatherings, maintaining complete or partial lock down etc. (Chakraborty and Maity, 2020).

Sequent, Baldwin (2020), argues that both consumers and businesses – in other words, the distinct economic agents – have embraced a mindset of "wait and see". The author states that this is a common behaviour during periods of

uncertainty, as there is less confidence in markets and take risk on economic transactions. This phenomenon is clearly observed by the drastic fall in the number of trips and overnight stays.

Farzanegan et al. (2020) have studied the relationship with the previous records of intercontinental tourism and the number of confirmed cases and deaths related to COVID-19, and they were able to establish a strong connection between these two factors. Although it has be proven that border closure implies an economic recession, the authors affirm that it is an accurate approach to reduce the number of cases. Besides that, in countries that have not suffered a major pandemic impact, this is also a good prevention method, combined with stricter safety and hygiene rules. Political measures have been taken considering the harmful effects of international travel, mainly in destinations with lots of tourist attraction.

Significantly in the tourism and commerce sectors, countries have chosen to sacrifice GDP growth as a method to contain the spread of the disease (Barro, Ursúa and Weng, 2020).

Economy and response to previous pandemics

Analysing the global economic impact to COVID – 19, Céspedes et al. (2020) created a minimalist model of the macroeconomics of a pandemic in which the coronavirus disease drive to a loss of productivity. They defend that the collapse of COVID-19 will be aggravated via an asset price recession and unemployment destruction cycle. According to International Monetary Fund (2020), as surviving businesses start to establish its safe and hygiene systems, their productivity will increase continuously, resulting in the economical emerging. Cheer & Lew (2017, *as cited in* Lew et al., 2020) proposed the model of "the resilience adaptative cycle" which includes four phases of a revolution event: Phase 1: (Re-)Organization (innovation and creativity), Phase 2: Growth (exploiting opportunities that arise from phase 1), Phase 3: Consolidation (establishing fixed institutions and rules for phase 2), Phase 4: Collapse (failure of fixed institutions in phase 3 to adapt to context changes), which results in a return to the Re-organization (phase 1) or, alternatively, the complete dissolution of the system. We are now in Phase 1, where governments are trying to return to the past (this phase will last for two to five (or more) years.

Significantly, Carlsson-Szlezak et al. (2020b, *as cited in* Brodeur et al., 2020), argues that after the past pandemics, such as the 1918 Spanish Influenza, the 1958 Asian Influenza, the 1968 Hong Kong influenza, and the 2002 SARS outbreak, economies adopted a 'V-shaped' readjustment. Nonetheless, the model of economic recovery of COVID-19 is not likely to be this linear. This "V-shaped" economic recovery is a return to what was before the crisis. Other recovery options are "U-shaped", where the economy does not go back to its pre-crisis course, or even "L-shaped", where the economy undergoes a recession, and its recovery is very challenging. The authors stand up for innovation as the way of preventing a developed U-shape. Thus, it may be possible to keep the impact's path as close as possible to the V-shape.

As reported by International Monetary Fund (IMF) in June 2020, global growth is expected at -4.9 percent in 2020, 1.9 percent beneath the World Economic Outlook (WEO) projection released in April 2020. In 2021, global prosperity is estimated at 5.4 percentage points which stands below pre-COVID-19 forecast of January 2020. These costs are much superior than those of past epidemics and also than those of Great Financial Crisis in 2008-09, when the average GDP loss pear year of OECD countries was 3% (Boissay and Rungcharoenkitkul, 2020).

According to Hall & Prayag (2020, *as cited in* Hall et al., 2020), the responsiveness to a pandemic by a destination was classified by disaster levels, what can be related to the analyses of the previous pandemics or disasters, from which it is possible to draw ideas for solving the problem and adapt to the reality experienced.

After analysing different studies about past pandemics, such as Influenza pandemics, SARS, Ebola, H5N1 avian pandemics, Boissay & Rungcharoenkitkul (2020) came to the conclusion that when epidemic have a high percentage of deaths, in a global scale, the economic loss can be directly proportional.

Recalling the economic impact by the Spanish flu, in 1918, (Valle, 2020) states that it may be surpassed by the ongoing crisis, owing to the globalization effect.

The previous epidemic in 2003 – SARS – had a death rate of 9.6% as documented by WHO. So far, SARS outbreak had a greater impact than the actual pandemic.

However, when we examine tourism itself, the previous epidemic in 2003 (SARS) it had a disastrous outcome for tourism industry, being the second worst decline in international tourist arrivals (2.0% in 2003) since WWII just after the Great Recession of 2008-2009. This impact was eased by the independence of Chinese consumers by the tourism industry, unlike the current case (Valle, 2020). Honk Kong, for instance, suffered of a short-term decadency in visits and, consequently, travel, tourism, and trades markets experienced damages. At the time of the recovery of the SARS outbreak, the type of tourists which number increased faster was business travellers and those visiting friends or relatives (VFR tourism). Hong Kong' hotels occupancy rates suffered a decline of 61%, from March to May. However, two months later (July 2003) these rates had return to its normality (71%) (Siu and Wong, 2004).

Additionally, as analysed by the author, with the global financial crisis in 2009, tourist arrivals fell by 4%. However, Chinese consumers started to empower themselves, ending up saving, in a certain way, the Western world. Also, in 2009, emerges the H1N1 influenza virus. Rassy & Smith (2013, *as cited in* Gössling et al., 2020) studied its impacts on tourism in Mexico. In a period of five months, the country lost million worldwide visitors - especially the ones coming out of Europe, which markets took much long to return – ending up losing around US$2.8 billion.

Speakman & Sharpley (2012) affirm that in their research, they came to the conclusion that in Mexican public and private tourism, during the AH1N1 influenza crisis in 2009, these organizations did not have a health crisis management plan to solve the problem.

The impact of a sanitary crisis in tourism growth is visible in the example of Ebola virus outbreak: in 2019, three years after the end of the epidemic, Africa still welcome less than 10% of global tourism receipts. This kind of disasters crashes the competitiveness of tourism region and destination (Maphanga and Henama, 2019).

As underlined by the Secretary-General of the United Nations World Tourism Organization (UNWTO), tourism is within the economic sectors that have been damaged the most (UNWTO, 2020). The tourist activity, known as a very vulnerable industry, has suffered a direct impact from this crisis.

Both Khan (2020) and Ghose (2020) defend that without supply chain regains proper transactions, the tourism sector will not carry on in an accurate approach, once the sector is very "dependent" on different industries.

Moreover, Cahyanto et al. (2016) defend that pandemics can demolish completely the tourist activity, for lack of supply and demand. In the coronavirus crisis it is very remarkable, tourists stop travelling and the supply chain has been broken.

According to McKercher (1999, *as cited in* Speakman & Sharpley, 2012), even though there is some strategic plans for crisis, that companies apply in case it happens, tourism destinations and related organisations don't even make that planning. In addition, theories of risk and crisis management within business organisation are based in a linear perspective that runs through the pre-crisis, during and post-crisis. However, as they are a universally applicable responses, they may succeed in each context, as they may not: each disaster has its variations (in terms of causes, behaviour and consequences) and because of that a "one size fits all" model may not be the appropriate template to answer for "differences in the scale, intensity and impacts of crises, or in the availability skills and resources necessary to respond to them". These complex variations are embraced by a "step-by-step" plan, once tourism outbreaks, most of the times, do not progress as expected. Besides, as said by Speakman & Sharpley (2012), the occurrence can vary in a sudden way and carry a different outcomes in several regions within the same country. That is why "tourism has more generally been described as an inherently non-linear, complex and dynamic system that is well described within the chaos paradigm".

Forecasts for the future of tourism

Further, Lew et al. (2020) e Gössling et al. (2020), believe that 2020's pandemic is contributing to a substantially possible transformation, with a significant and positive impact on the planet in general and on tourism specifically.

Therefore, Khan (2020) states that by taking into account the impact of this unprecedented crisis, on tourism, the sector seems to be lost. It is difficult to foresee "when" and "how" the activity will emerge again and what path it should take. However, according to the author, it is certain that this pandemic is revealing the tourism sector a new direction, as a way of self-innovation, giving priority to "health and safety".

It is believed that, by 2022, the COVID-19 pandemic will be outdated. People will feel safer to travel and the tourist ecosystem will recover, which will make it possible to achieve results close to those recorded in 2018 and 2019. After 2021 is marked by the return of international tourism, it will be 2022 to confirm this trend, registering the values achieved in 2018 and 2019 (IPDT, 2020).

Even though a revolution in the tourism sector is highly difficult to happen, travellers may demand different conditions in tourist complexes and other tourist establishments because of COVID-19. As defended by Gossling et al. (2016, *as cited in* Hall et al., 2020), aftershocks, tourism tends to be resilient and it is necessary that in future collapses (such as the actual pandemic) the tourism industry give importance to environmental factors, like the biodiversity conservation and climate change concerns.

As the past 2008-09 recession shows that the industry went back to its "business as usual" after the crisis, the probability of it happening again, in the present moment, is high. Nepal (2020) argues that "There is a fundamental disconnect between what the UNWTO preaches (sustainability), and what it practices (growth expansion)". There is a necessity of fixing this first and then begin to think about the future of tourism in a global scale. On the other hand, there is the urgency of changing once we will not be able to overcome a crisis like this one in the future.

Nepal (2020), by focusing on adventure tourism industry, affirms that it may have an opportunity to reset and rethink its development in a sustainable and mindful way. This picture can be transposed to global tourism: it should revoke an exponential and disorderly development and invest in a self-sustaining activity that restores itself. Thus, we can value quality over quantity and provide better life quality for communities living off tourism. According to the author, the next generation of tourists is more mindful, environmentally friendly, and sustainability-oriented (as we begin to see in Western Europe, North America, and East Asia).

The slow tourism will mark the future of tourism, which will help the average stay not suffer major decreases. Visitors will seek the opportunity to become part of the destinations, at a pace of travel that allows them to be in contact with the resident community and learn the local culture. As predicted by the Secretary General of WTO, "Mass tourism can come to an end". There will now be a greater demand for experiences that allow the traveller to immerse himself in the local culture. The less massified sites allow you to meet the need to visit and meet new cultures, gastronomies, and traditions, at a slower pace. According to Euromonitor International (Aug'20), 87% of consumers believe it is important to experience other cultures and 94% value real experiences (IPDT, 2020).

Galvani et al. (2020) reveal that COVID-19 may be a consequence of neoliberal globalization and time-space compression, with economic policies sustained by the improvements in telecommunications and transport technologies that have brought humanity closer together. The authors suggest a global consciousness to rethink the post-COVID-19 and the way it may affect tourism activity: “travel and tourism could be a good thing if it intentionally and directly addressed the goal of enabling people to become more aware of, and sensitive to, the planet as a whole entity”.

Ghose (2020) defends the “idea of cleanliness and safety” will be what draws the most attention for tourists, while choosing a place to visit. In addition, Europe’s clean green destinations will be favoured, because nature and the good care of it arouses confidence in the target audience. The author states that contactless booking, less approach with staff members and rigor of cleanliness will be much present in tourism enterprises.
(Valle, 2020) states that ethics will have the same importance as beauty of destinations. Following the thought of Ghose (2020), travellers will benefit places that make environmentally friendly choices and have low-pollution levels. Therefore, governments will have to reinforce environmental measures and social governance.

In agreement with Adam Blake (professor of economics and head of research in the Department of Tourism and hospitality at Bournemouth University in the United Kingdom), population still wants to travel and won’t stop doing it because of the disease; however, people will be much more careful with destination and accommodation choice, they will need to have substantial proof of its the cleanliness and safety (CNN, 2020).

The study of the tourist profile and the market analysis may highlight important behavioural trends for destinations and businesses. The future of tourism will bring or confirm new concepts, namely sustainability. This could be the ideal time to review tourism strategies, preparing for the challenges of the coming years. In the short term, tourists will prioritize safety by choosing slightly more expensive destinations and deals if they can enjoy safer experiences. Moreover, tourists are increasingly seeking to contribute actively to local commerce. Additionally, the truth is that tourism has contributed to the creation and maintenance of jobs, to the preservation and enhancement of resident communities, with emphasis on the discovery of gastronomy, agriculture, handicraft, and culture. Faced with this reality more than ever, destinations must stand alongside local businesses and producers, legislate and support to promote them. Furthermore, the social and environmental awareness of travellers, especially at the level of ecological activism based on the "less is more" philosophy, has been changing patterns of behaviour, particularly at the level of the choice of mode of transport. This will make the travel of tourists focus on alternatives to the plane, which may also increase the average travel stay (IPDT, 2020).

Besides, to engage travellers, governments must be prepared to take advantage of the media to deliver a positive image and get those to feel clean and safe (Ghose, 2020; Martens, Feldesz and Merten, 2016).

According to Ghose (2020), tourism will be one of the first activities to get back up once there is a vaccine to COVID-19. As we already witness, in Europe are emerging travel corridors between “safe” countries – countries that have a lower number of cases – which leads to a development of a giant “travel bubble” in European Union. As a result of these free travel zones, the trade ties between neighbouring countries will be re-established and sectors such as travel, and tourism will be reborn.

Countries will feel severe tension from politics and industry to reopen establishments and kick-start the economy as soon as possible in order to reduce the unemployment rate (the International Monetary Fund (2020b) expects the international economy to suffer a recession of -3 percent in 2020, dreadfuller than the 2008-09 financial crisis). Also to create new jobs and to boost visitor numbers, when it comes to tourism, some destinations will implement low cost operations, neglecting a possible new wave (Hall, Scott and Gössling, 2020).

Liu et al. (2020) argue that the first types of tourism that will begin to be practiced will be VFR tourism (a.k.a. visiting friend and relatives), business tourism and nature tourism. Nonetheless, sports and events tourism and senior tourism will probably be constrained until there is a vaccine. The tourist activity in most countries will be domestically, in such way that are being developed domestic tourism promotion campaigns in order to persuade people to travel locally and promote the economy, while feeling safe and guarded during COVID-19 era.

Methodology

To carry out the investigation, it will be used a mixed methodology.

On one hand, it will be qualitative, being the data obtained from the study of the measures implemented by the Portuguese government, in economy and tourism, consulting official government websites and the Turismo de Portugal I.P. website. On the other hand, it will be quantitative, in that a questionnaire survey is applied to understand the changes made in different tourism enterprises - this will target a sample of the population of employees of tourism enterprises in Portugal. The questionnaire was applied in the summer of 2020 to 138 persons, but only 69 respondents worked in the sector, and were considered valid.

Additionally, to understand the impact of the crisis on tourism in Portugal, websites with statistical data will be consulted, such as INE (Portugal Statistic Institute) and TravelBI by Turismo de Portugal I.P. (knowledge management platform in tourism Portugal). In this way, a comparison will be made between the data presented before, that is, the economic impact of tourism before the pandemic and the data collected during the pandemic.

Results

Quantitative data extracted from Portuguese statistics

To understand the impact of the crisis on tourism in Portugal, sites with statistical data were consulted, as INE (Portugal Statistics Institute) and TravelBI by Turismo de Portugal I.P. (knowledge management platform in tourism Portugal). The data collected were as follows:

Table 1: Guests

		September		August	July	June	May	April	March
		Value	%	%	%	%	%	%	%
Guests		1.4 million	-52,7%	-43,6%	-64,0%	-82,0%	-94,2%	-97,4%	-62,3%
Overnight Stays		3.6 million	-53,4%	-47,1%	-68,1%	-85,2%	-95,3%	-97,0%	-58,7%
	Residents	2.0 million	-8,5%	-68,1%	-64,0%	-85,2%	-85,9%	-93,0%	-57,6%
	Non-residents	1.5 million	-71,9%	-72,4%	-84,5%	-96,2%	-98,4%	-98,6%	-59,2%
Closed Establishments		-	24,0%	22,8%	27,8%	46,3%	70,4%	83,1%	-
Average Stay		2.59 nights	-1,6%	-6,3%	-11,3%	-17,6%	-18,2%	13,7%	10,5%
	Residents	-	8,2%	2,6%	1,6%	1,4%	4,5%	35,5%	11,4%
	Non-residents	-	7,4%	-6,6%	-6,6%	-14,6%	-6,4%	31,3%	9,2%

According to *Table 1*, in September 2020, the tourist accommodation sector is expected to have registered 1.4 million guests and 3.6 million overnight stays, corresponding to variations of -52.7% and -53.4% respectively. The nights spent by residents will have decreased 8.5% reaching 2.0 million, representing 57.2% of the total, while those of non-residents will have decreased 71.9%, standing at 1.5 million. In September, 24.0% of tourist accommodation establishments have been closed or have not registered a movement of guests.

In September, the average stay in tourist accommodation establishments (2.59 nights) was reduced by 1.6%. The average stay of residents increased 8.2% and that of non-residents increased 7.4%.

Table 2: Overnight Stays

		September	August	July	June	May	April
Overnights Stays							
Hotel		-54,9%	-48,9%	-70,4%	-87,6%	-96,8%	-98,1%
	% of the total	79,8%	79,3%	75,9%	69,5%	56,6%	54,6%
Local Accomodation Establishments		-52,5%	-46,6%	-65,5%	-79,2%	-87,7%	-91,4%
	% of the total	14,9%	14,9%	16,0%	20,4%	36,4%	40,4%
Tourism in Rural Areas and Housing		-16,2%	-13,9%	-22,7%	-49,6%	-86,2%	-94,2%
	% of the total	5,4%	6,8%	8,1%	10,1%	7,1%	5,0%
Hostels		-62,0%	-57,4%	-73,1%	-86,8%	-89,9%	-92,7%
	% Local Accomodation	17,8%	17,6%	17,3%	14,9%	1,4%	19,9%
	% Tourist Accomodation Establishments	2,6%	2,6%	2,8%	3,0%	7,1%	8,0%

As stated in *Table 2*, in September, hotel nights (79.8% of the total) decreased 54.9%. Overnight stays in local accommodation establishments (weight of 14.9% of the total) decreased 52.5% and tourism in rural areas and housing (share of 5.4%) fell 16.2. Overnight stays in hostels fell by 62.0% in September, accounting for 17.8% of overnight stays in local accommodation and 2.6% of total overnight stays in tourist accommodation establishments.

Table 3: Regions

		September	August	July	June	May	April	March
Regions		-	-	-	> -70%	> -80%	> -90%	-
Variations in Overnight Stays								
	Alentejo	-20,9%	-15,3%	-26,2%	-48,9%	-84,3%	-92,6%	-
	Centre	-40,5%	-27,7%	-49,6%	-	-	-	-63,6%
	Archipelago of Madeira	-66,2%	-72,2%	-86,9%	-97,7%	-99,5%	-99,7%	-
	Archipelago of Azores	-66,3%	-69,1%	-84,7%	-96,9%	-99,7%	-99,9%	-
	Metropolitan Area of Lisbon	-71,8%	-68,6%	-82,5%	-	-	-	-63,7%
Overnight Stays								
	Algarve	40,0%	41,1%	39,1%	31,5%	15,1%	-	-
	North	15,9%	16,4%	17,8%	17,0%	15,2%	-	-
	Centre	13,0%	15,3%	14,9%	17,0%	15,2%	-	-
Residents	Algarve	10,1%	9,9%	-24,5%	-55,6%	-19,4%	-	-
	Alentejo	3,9%	3,9%	-7,1%	-31,6%	-7,6%	-	-
	Centre	-8,3%	1,1%	-24,9%	-	-	-	-61,4%
	North	-13,3%	-1,8%	-25,3%	-	-	-	-59,4%
Non-residents	Alentejo	-62,9%	-57,7%	-63,5%	-85,1%	-	-	-
	Other Regions	> -70%	> -65%	> -75%	> -90%	-	-	-

In *Table 3*, is clear that in September, all regions experienced decreases in overnight stays, with the lowest decreases in Alentejo and Centre. The largest reductions occurred in archipelago of Madeira, archipelago of the Azores and Metropolitan Area of Lisbon. Algarve concentrated 40.0% of overnight stays, followed by the North and the Centre. In September, there have been increases in the number of overnight stays of residents in Algarve, followed by Alentejo, Centre, and North. This month, in terms of nights spent by non-residents, Alentejo experienced a decrease of -62.9%, while the remaining regions showed decreases of more than 70%. In March, also the overnight stays of non-residents decreased in all regions, especially the decreases registered in the Centre, AM Lisbon and North.

Table 4: Tourist Accomodation Establishments

		September		August		July	
		Value	%	Value	%	Value	%
Tourist Accomodation Establishments							
Guests		1.4 million	-52,7%	1.9 million	-43,6%	1.0 million	-64,0%
Overnight Stays		3.6 million	-53,4%	5.1 million	-47,1%	2.6 million	-68,1%
	Domestic Market	2.0 million	-85,0%	-	-1,5%	-	-30,8%
	Foreign Markets	1.5 million	-71,9%	1.7 million	-72,4%	889.2 thousand	-84,5%
Average Stay		2.59 nights	-1,6%	2.56 nights	-6,8%	2.56 nights	-11,3%
Campsites							
Guests		167.4 thousand	-31,7%	347.0 thousand	-39,2%	192.3 thousand	-41,1%
Overnight Stays		565.5 thousand	-25,5%	1.2 million	-41,4%	679.3 thousand	-42,2%
	Domestic Market	-	-13,4%	-	-35,2%	-	-35,7%
	% of the total	-	80,0%	-	84,2%	-	82,6%
	Foreign Markets	-	-52,2%	-	-61,2%	-	-64,9%
	% of the total	-	-	-	-	-	-
Average Stay		3.38 nights	9,2%	3.55 nights	-3,6%	3.53 nights	-0,7%
Summer Camps and Youth Lodges							
Guests		14.4 million	-58,2%	26.7 million	-49,8%	10.1 million	-75,6%
Overnight Stays		30.9 million	-55,0%	68.1 million	-45,7%	28.3 million	-74,4%
	Residents	-	-47,8%	-	-35,5%	-	-68,6%
	% of the total	-	81,8%	-	88,4%	-	89,3%
	Non-residents	-	-72,2%	-	-75,3%	-	-89,9%
Average Stay		2.14 nights	7,5%	2.55 nights	8,2%	2.82 nights	5,0%

June		May		April		March		February	
Value	%	Value	%	Value	%	Value	%	Value	%
493.5 thousand	-82,0%	-	-94,8%	-	-	697.7 thousand	-62,3%	-	15,2%
1.1 million	-85,2%	-	-95,8%	-	-	1.9 million	-58,7%	-	14,8%
-	-59,7%	-	-86,6%	-	-	-	-57,6%	-	-
190.2 thousand	-96,2%	-	-98,8%	-	-	1.3 million	-59,2%	-	9,5%
2.15 nights	-17,9%	-	-	-	-	2.72 nights	9,6%	-	-
90.4 thousand	-56,9%	-	-	-	-	41.7 thousand	-45,6%	-	25,8%
319.3 thousand	-48,0%	-	-	-	-	198.9 thousand	-28,5%	-	22,2%
-	-30,8%	-	-	-	-	-	-42,5%	-	-
-	90,2%	-	-	-	-	-	-	-	-
-	-96,7%	-	-	-	-	-	-16,0%	-	-
-	-	-	-	-	-	-	61,9%	-	-
3.53 nights	20,8%	-	-	-	-	4.77 nights	31,3%	-	-
1.9 million	-94,8%	-	-	-	-	6.700 thousand	-75,4%	-	20,6%
4.0 million	-94,5%	-	-	-	-	14.700 thousand	-70,1%	-	14,2%
-	-93,4%	-	-	-	-	-	-73,7%	-	-
-	93,3%	-	-	-	-	-	66,1%	-	-
-	-98,4%	-	-	-	-	-	-59,4%	-	-
2.12 nights	4,9%	-	-	-	-	2.19 nights	21,4%	-	-

According to *Table 4*, in September 2020, tourist accommodation establishments registered 1.4 million guests, which provided 3.6 million overnight stays, reflected in variations of -52.7% and -53.4%, respectively. The domestic market contributed with 2.0 million overnight stays and overnight stays in foreign markets decreased 71.9%, reaching 1.5million. The average stay (2.59 nights) decreased by 1.6%.

In September 2020, the campsites registered 167.4 thousand campers and 565.5 thousand nights, which translated into evolutions of -31.7% and -25.5%, respectively. Both the internal market and the external markets contributed to the decrease in overnight stays. In September residents' nights predominated, representing 80.0% of the total. On the contrary, the nights of non-residents predominated in March, representing 61.9% of the total. The average stay (3.38 nights) increased 9.2% in September.
The summer camps and youth lodges received 14.4 million guests, which provided 30.9 million overnights stays in September, which corresponded to variations of -58.2% and -55.0%, respectively. The nights spent by residents (share of 81.8%) decreased 47.8% and those of non-residents decreased 72.2%. The average stay (2.14 nights) increased 7.5%.

In the first quarter of the year, there was a decrease of 18.0% in total overnight stays, resulting from variations of -11.7% in residents and -20.8% in non-residents. In the first half of the year, there was a decrease of 65.9% in total overnight stays, resulting from variations of -53.0% in residents and -71.1% in non-residents.

Qualitative data obtained from the survey

Hereby we present the results subtracted by the questionnaires replies. From the answers given, the following data were established: Of the 138 respondents, 69 are employed in a tourism enterprise. It was found that 80.9% work in hotel establishments, 7.4% in tourist apartments, 4.4% in housing tourism enterprises, 2.9% in holiday villages, 2.9% in a tourism enterprise in rural areas, and 1.5% in tourist complexes, as presented below.

Table 5: Percentage of employers in the different types of establishments

Types of Establishments	Percentage
Hotel Establishments	80,9%
Tourist Apartments	7,4%
Housing Tourism Enterprises	4,4%
Holiday Villages	2,9%
Tourist Enterprises in Rural Areas	2,9%
Tourist Complexes	1,5%
Total	100%

Of which 33.8% are located in the north of the country, 25.0% in Área Metropolitana de Lisboa, 17.6% in Algarve, 11.8% in the Centre, 4.4% in Alentejo, 4.4% in Região Autónoma da Madeira, and 2.9% in Região Autónoma dos Açores, as we can see in table 6.

Table 6: Percentage of employers per location

Location	Percentage
North of Portugal	33,8%
Centre	11,8%
Lisbon	25,0%
Alentejo	4,4%
Algarve	17,6%
Madeira	4,4%
Açores	2,9%
Total	100%

Of all the 69 tourism enterprises 54.4% are fully operational, 29.4% are partially operational, 11.8% are closed, and 4.4% are operating as an isolation facility.

Table 7: Percentage of employers per activity

Activity	Percentage
Fully Operational	54,4%
Partially Operational	29,4%
Closed	11,8%
Isolation Facility	4,4%
Total	100%

Additionally, when asked about how COVID-19 affected their activity, 79.4% of the enterprises have been severely affected by COVID-19, 14.7% moderately affected, 4.4% slightly affected and 1.5% not affected.

Table 8: Percentage of employers whose activity was affected by Covid-19

How COVID-19 affected the activity	Percentage
Severely Affected	79,4%
Moderately Affected	14,7%
Slightly Affected	4,4%
Not Affected	1,5%
Total	100%

As regards of employment, most enterprises resorted to lay off (51.8%), 17.0% dismissed staff, 16.1% began teleworking, 10.7% reduced salaries, and 4.5% have not been affected.

Table 9: Percentage of employers whose employement was affected by Covid-19

Employment	Percentage
Lay-off	51,8%
Dismissed staff	17,0%
Telework	16,1%
Reduced Salaries	10,7%
Not affected	4,5%
Total	100%

Inside the tourism enterprises, measures implemented, in addition to the measures imposed by DGS (Directorate General for Health), reduction of items (such as decorative pillows, minibar items, magazines, pamphlets) was the most popular actions among the enterprises with 25.5% of the total, the following is the acrylic screen in reception spaces (24.8%), 20.1% eliminated buffets, 14.8% limited occupancy rates, 12.8% used electrostatic sprayers, and only 2.0% of the enterprises (only hotel establishments) requested the presentation of the COVID-19 test.

Table 10: Percentage of measures implemented in the enterprises, concerning the guests

Measures (for the guests)	Percentage
Reduction of items	25,5%
Acrylic screen	24,8%
Eliminated buffets	20,1%
Limited occupancy	14,8%
Eletrostatic sprayer	12,8%
Requested the COVID-19 test	2,0%
Total	100%

Other measures were implemented, such as ozone disinfection, usage of PPE (Personal Protective Equipment), temperature measure and health questionnaires and traceability of all guests, passers-by, and suppliers.

As a consequence of the crisis caused by COVID-19, 41.9% of the respondents affirm that the tourism enterprise employing them applied cost reduction, 34.3% resorted to vouchers for future stays, 18.1% implemented special rates for certain market segments (this measure was mainly adopted by tourist apartments), and 5.7% did not make any change. In addition to these, the following were applied: promotion in long stays, refund of reservation value, partnerships with local market, and policy of room upgrades.

Table 11: Percentage of measures implemented in the enterprises, considering finantial solutions

Measures (finacial response)	Percentage
Cost Reduction	41,90%
Resorted vouchers for future stays	34,30%
Special rates for certain market segments	18,10%
No changes	5,70%
Total	100%

In terms of use of technology, 47.5% used menus via QR Code, 37.5% made virtual check-in (popular measures between tourist apartments, and also the deposit of access keys in wall vault), 10.0% used smart keys (via app), 5.0% resorted to robots for space disinfection.

Table 12: Percentage of measures implemented in the enterprises, considering technology

Measures (techonology)	Percentage
Menus via QR Code	47,5%
Virtual check-in	37,5%
Smart keys	10,0%
Robots for space disinfection	5,0%
Total	100%

55.9% of the workers believe that the operational performance of the enterprise they work for will be influenced by the crisis caused by COVID-19 for 1 to 2 years; 23.5% for 2 to 5 years; 16.2% for 6 to 12 months; 2.9% for 3 to 6 months; and 1.5% for 5 to 10 years.

Table 13: Percentage of employers that believe that COVID 19 will affect the operational performance per period of time

Operational Performance Affected	Percentage
3 to 6 months	2,9%
6 to 12 months	16,2%
1 to 2 years	55,9%
2 to 5 years	23,5%
5 to 10 years	1,5%
Total	100%

Considering the economic situation of the enterprise, 80% affirm that is not good, 80% are not satisfied with governments assistance, and most of the respondents feel the need of more support from the government.

Political Measures

In Portugal, to foster economic recovery, the Government implemented tax and contribution measures, and labour and employment measures, which are part of the Economic and Social Stabilisation Programme. These include the following: deferral of tax obligations - flexible Value Added Tax (VAT) and Personal Income Tax (IRS) and Corporate Income Tax (IRC) payments scheme to be completed in the second quarter of 2020; beneficiaries IRC obligations, VAT payments and IRS withholding taxes; deferred payment scheme for social contributions - the Government has approved a deferred payment scheme for social contributions payable by employers and self-employed persons; simplified lay-off access regime; under the simplified system of access to the lay-off, employers may have social security support for workers working for them during the period of the containment measures. (Turismo de Portugal I.P., 2020b, 2020c)

The Portuguese Government in conjunction with Turismo de Portugal I.P. provided measures to support employment and business in the field of tourism. These are divided into three major groups:

- Economic and Social Stabilisation Programme: additional measure to support businesses

This is a programme with a time horizon until the end of 2020, which is based on four axes: maintenance of employment and the progressive resumption of economic activity; social support and support for people's income; support for businesses; and institutional adaptation.
The plan covers a COVID-19 economic support line: enterprises (micro and small enterprises with SME certification) and entrepreneurs in individual name without organized accountability. In monetary terms, the aid will be maxim per company: €50 000 (micro-enterprises); €250 000 (small enterprises) - with a guarantee of up to 90% of the outstanding principal.
The OpenCall202020 of Turismo Fundos is also part of this programme: Turismo Fundos makes available to companies the liquidity available in the real estate investment funds it manages, allowing access to a financial instrument characterised by the sale and subsequent long-term lease of a property, with respect to the right to repurchase it.

- Finance: Lines of credit for companies and measures for start-ups

The programme covers:
- a Tourism Micro-Business Support Line COVID-19, which is a financing line aimed at tourism micro-enterprises that demonstrate a reduced capacity to react to the strong contraction in demand that has taken place. The loan value is €750 per month for each existing job in the company on 29 February 2020, multiplied by a three-month period of up to €20 000.
- an Economic Support Line COVID-19, which is divided into Catering and similar support (Suspended) – total budget of €600 million; Support Tourism Enterprises (including tourism enterprises and tourist accommodation) (Suspended) – total budget of €900 million; Support for Travel Agencies, Tourist Entertainment, Event Organisation and similar (Closes) – total allocation of €200 million.
- Start-ups will be supported primarily with liquidity injections by the government, given their importance as a driver of innovation and job creation.

Be more flexible: obligation vis-à-vis Turismo de Portugal I.P., CSF III, NSRF, Portugal 2020, moratoriums on credits, specific scheme for the relationship between companies in the sector concerning reservations of

accommodation services located in Portugal. Flexibility measures have been implemented concerning:
- Fulfilment of obligations towards Turismo de Portugal I.P.- in all support schemes financed by Turismo de Portugal's own revenues (General Financing Scheme, Supply Qualification Support Line, Value Programme).

- Fulfilment of obligations under the CSF III, NSRF and Portugal 2020
- Credit moratoria – the Government establishes a moratorium on lending to financial institutions; this measure is intended to support families and businesses in an adverse context of a sharp drop in income.
- Relations between travel agencies and tourism, tour operators and tourism enterprises and local accommodation establishments – booking of accommodation services situated in Portugal, in the form of non-repayment of amounts paid, made by travel agencies and tourism or tour operators, Portuguese or international operating in Portugal, which are not carried out or are cancelled as a matter of fact in connection with the declaration of a state of emergency issued in the country of origin or in Portugal or the closure of borders attributable to the COVID-19 pandemic, confer on those operators, exceptionally and temporarily, the credit claim of the unused amount.

All these forms of support have certain conditions which must be met if they are to be granted (Turismo de Portugal I.P., 2020a)**.**

Turismo de Portugal I.P. also implemented a programme to encourage consumption Visit Portugal: The "Visit Portugal" Consumer Incentive Programme translates into an incentive to consumption, through the application of a discount in the marketing of tourism products and services, in equal shares, in a shared public/private commitment model. The Program is an initiative of the Government, coordinated by Tourism of Portugal, and developed in conjunction with the internal tourism campaign managed by Tourism of Portugal, which aims to contribute to enhance its reach (with an endowment of € 50 million) (Turismo de Portugal I.P., 2020e).

Discussion and Conclusion

Concerning the analysis of the statistical data, it is possible to compare the data relating to the pre-COVID-19 with those during to the economic crisis.

With the pandemic, the number of guests, the average stay, the number of overnights stays and the regions with the highest number of tourists, for example, have decreased dramatically and will certainly take a long time to return to the numbers of 2018 and 2019. As foreseen by IPDT (2020), only in 2022 will it be possible to achieve these figures again.

Consequently, Portugal's economy is suffering a great shake-up, also due to the crisis that tourism is currently overcoming - as this sector had a great weight in the national GDP.

When analysing the measures implemented by the Portuguese government, we can verify that they all culminate in a "V-shaped" economic recovery, since it is clear the attempt to return to the situation before COVID-19. This recovery represents an acute rise back to a prior point after an abrupt decline. It is probably too early to be sure, but it seems that the government is doing everything in its power to ensure that this kind of economic recovery is achieved. It will only be clear a year or two after the end of the economic crisis caused by COVID-19. Although the government is doing its utmost to ensure that economic recovery proceeds in a "V-shaped" recovery, the emergence of new waves can affect this recovery in a negative way, delaying the resumption of the number of tourists from 2018 and 2019.

Regarding the aid to the tourism sector, the effort made by the Portuguese Government is remarkable. However, all the measures implemented, with the aim of supporting businesses and families dependent on this industry, have many conditions that must be put in place to provide this support. Many companies, for example, did not have access to the support measures because they did not have their tax status regularised or because they did not apply for aid within the stipulated deadlines. Having, thus, many tourism enterprises resorted to the reduction of wages and the dismissal of staff.

Considering the analysis of questionnaire replies, it is possible to conclude that the tourism enterprises employing the respondents have taken precautions regarding the hygiene and safety of the establishment, implementing measures other than those imposed by the government. Besides that, it is possible to confirm that most of the companies have been affected by this crisis.

Despite the response of the Portuguese government to the crisis caused by COVID-19, the discontent of the workers is evident. The idea is reinforced by the information taken from the survey: 80% of employees are unhappy with this assistance. Several respondents suggested the injection of money into the non-refundable ventures by the government to ensure their functioning and avoid high unemployment rates.

Workers believe that the future of tourist will be based on technological innovation and sustainability. Some think this crisis will lead to the rupture of the sector and to the precariousness in the sector, to redirect market segments (business professionals and students from other countries and regions), to empower the luxury tourism and rural tourism, to invest on quality over quantity, to promote local consumption, to restructure the method of management of the enterprises.

It is possible that tourism enterprises will feel the impact of the pandemic much more (in fact, a partial breakdown of the sector may occur), since, with the emergence of new waves and the imposition of new measures by the Portuguese government, the numbers of tourists and overnight stays will remain stagnant at low levels.

Therefore, given that the future is uncertain, we are facing a second wave (but possibly a third or fourth wave will arrive), it is rather difficult to predict what might happen to the economy and the tourism sector. The predictions are that in 2022 we will resume the 2018 and 2019 numbers, however with the emergence of a new wave these may change. It is true that tourism is undergoing a great change, with the aim of adapting to the new reality, a change that will most likely remain in the tourist reality. Tourism in Portugal will hardly have the same impact as before the pandemic, at least not in the way it was practiced before the crisis.

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Tax Potential in The Pandemic: Myths and Reality

Lidiya MAZUR
Orel Branch of Financial University under the Government
of the Russian Federation, Russian Federation
E-mail: lidi.mazur@yandex.ru

Irina TRUBINA
Orel State University named after I.S. Turgenev, Russian Federation
E-mail: i-j-i@yandex.ru

Olga RUDAKOVA
Central Russian Institute of Management – Branch of The Russian Presidential Academy
of National Economy and Public Administration, Russian Federation
e-mail: rudakova71@yandex.ru

Nataliya LYSENKO
Orel State Agrarian University named after N.V. Parahin, Russian Federation
e-mail: n.lysenko@inbox.ru

Abstract

Tax potential for any state is the source of its revenues as well as expenditures. In the global pandemic there is a trend in reduction of state revenues with a significant increase in expenditure obligations, both in the social sphere and in the real sector of the economy in order to support business. The issues related to solving medical problems, which also require substantial funding come to the foreground. This determines the urgency of the problem of stimulating the tax potential.
The purpose of the study is to assess the sources of formation of tax potential in the pandemic. Based on the analysis of official statistical information, trends in the dynamics of tax potential were identified, and a comparative assessment of monthly tax revenues over several years was carried out. The trend of reduction of the real volume of tax revenues for each tax is revealed.

Keywords: Budget System, Tax Potential, Revenues, Taxes, Economic Instability, Pandemic

Introduction

Certainly the main source of state budget revenues is tax revenues. Tax potential plays a key role in it. Despite the fact that there are a lot of scientific publications about tax potential of both Russian and foreign authors, there is still no single interpretation of this concept.

Moreover, in the context of a global pandemic, when government expenditures increase significantly, the problem of finding sources of income for the budgets of all states becomes most urgent. This is due to the fact that a large amount of funding is allocated to medical and social services for the population, pharmaceutical research and the introduction of medical technologies. Business support programs in the most affected and related industries also require significant expenditures.

Accordingly, solving the problem of budget deficit comes to the fore in theoretical and practical research in the context of the new reality. Thus, the analysis of the sources of the formation of tax potential, the possibilities of its expansion becomes a priority task for any state. At the same time there is a dilemma to keep the business while creating a stable tax base for the budgetary system.

Existing approaches to the analysis of tax potential contribute to the formation of certain myths associated with the sources of its growth. The external factors often have a negative impact that can change the structure of the tax potential. The article considers this problem.

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Literature Review

Tax potential as an economic category is considered in the writings of the Russian and foreign authors. There are many approaches to its definition. In the Russian Federation the tax potential at the legislative level was indicated in 2004 in the Budget Code in Article 138 in order to determine the level of estimated fiscal capacity of municipal districts. At the same time the peculiar feature is that the tax potential at the legislative level is synonymous with the tax base of the corresponding territory: a region, a municipal district, a rural settlement, etc.

Well-known studies of such authors as J. Stamp (1922), L. Alfirman (2003), H. Rao (1993), C. Pessino and R. Fenochietto (2010) investigate the issues of tax potential in various aspects. In the scientific literature tax potential is usually considered both in the broad and narrow sense. Such authors as Gorskiy I.V. (1999), Roshchupkina V.V. (2007), Saakyan R.A. (2007), Mayburov I.A. (2013), Shemyakina M.S. (2013) define tax potential as the total amount of taxable resources of territories, i.e. give an expanded interpretation of this economic category. In the narrow, practical sense tax potential is considered in the writings of Vasilieva M.V. (2004), Prokopenko R.A. (2007), Simonov V.V., Sulakshin S.S., Podporina I.V., Pogorelko M.U. (2008) and others.

In the broad sense “tax potential” is the total amount of taxable resources of the territory. In the narrow, practical sense "tax potential" is the maximum possible amount of taxes and levies calculated in the current legislation (2004).

Tax potential is considered from different aspects: according to qualitative and quantitative characteristics, according to temporal and territorial characteristics, based on various approaches (institutional, resource, reproduction and effective ones). All this shows how alternative the methods for the quantitative determination of tax potential are.

At the same time in our study we consider tax potential as tax revenues of the state going into the budget system under the current legislation and under the current economic conditions.

Research Question

As the tax potential is the main source of income for the budgetary system it is necessary to take into account the specifics of its formation on the territory of the Russian Federation. The specifics is formed on the basis of sources of income which in general can be represented as oil and gas and non-oil and gas ones. This is due to the specifics of the economic potential of the Russian Federation and the focus on the sale of natural resources as income sources.

However in recent years the issues related to the need to focus on the increasing role of specifically non-oil and gas revenues have been actively discussed. This is confirmed by statistical data, which clearly illustrate that since 2015 the situation has changed and the role of non-oil and gas revenues has increased (Figure 1).

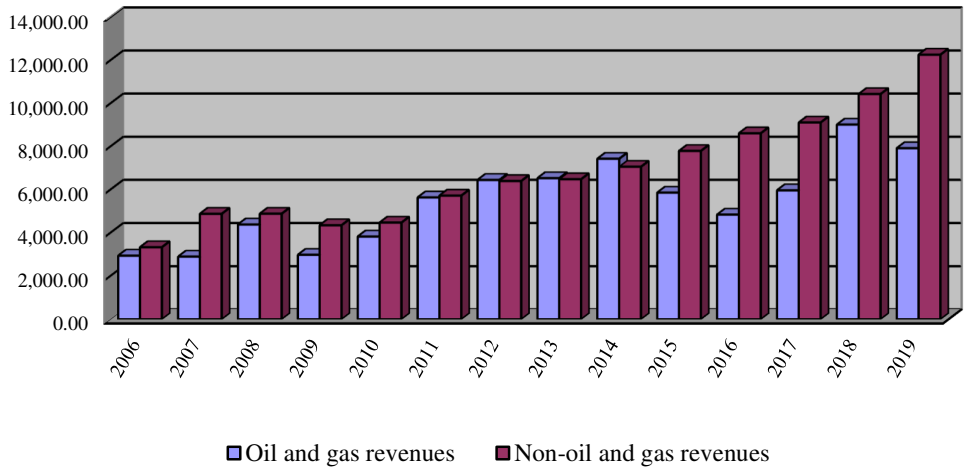

Figure 1: The structure of oil and gas and non-oil and gas revenues of the Russian Federation, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

At the same we suppose that this circumstance is to a greater extent associated with economic turbulence caused by political processes, which is also confirmed by the actual data on the dynamics of Russia's foreign trade (Figure 2). In parallel with these processes there is also a significant drop in oil prices, which also does not contribute to the growth of oil and gas revenues.

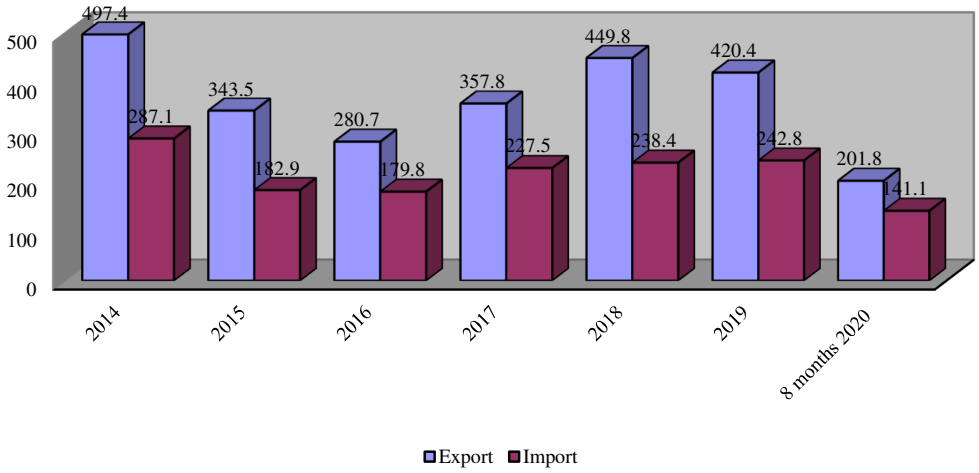

Figure 2: Dynamics of Russia's foreign trade, billion of dollars (Ru-Stat, 2020)

Proceeding from the fact that mineral products occupy the first place in the structure of foreign trade (Figure 3), the decrease in oil and gas revenues was primarily influenced by the fall in demand due to the ongoing geopolitical processes.

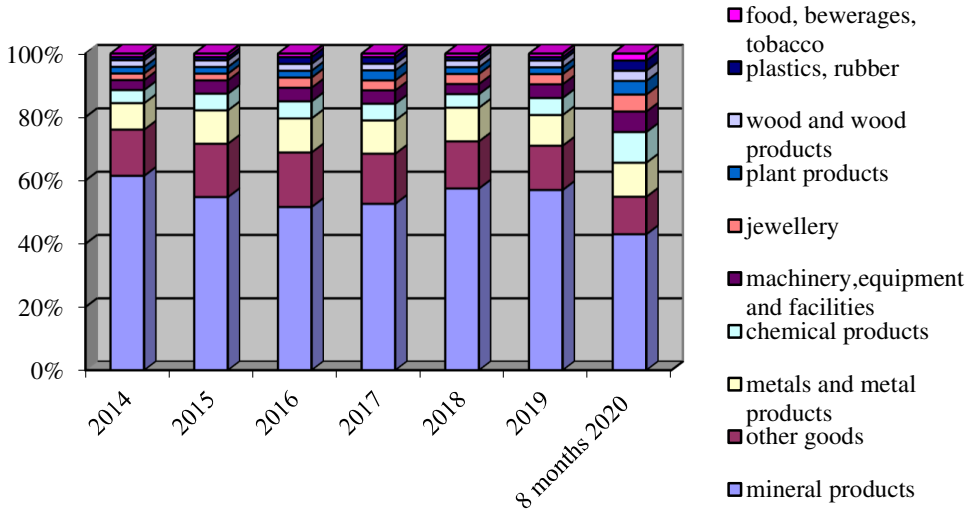

Figure 3: Structure of the Russian export, % (Ru-Stat, 2020)

The statistical data clearly show that during the period under consideration there is a reduction in the share of mineral products in the total structure of export. Moreover, if we compare the data for August 2019 and August 2020, we can see that there was a decrease of almost 50% in the export of mineral products from 18.6 to 9.25 billion dollars. These processes also have an impact on tax potential.

It is obvious that in context of the global pandemic there was a fall in demand for oil, since the volume of cargo and passenger traffic decreased. The main sources of tax potential associated with the import of goods are: VAT (value

added tax), excise taxes and import duties. Moreover, the main source of tax potential is VAT primarily because of the size of the tax rate (Figure 4).

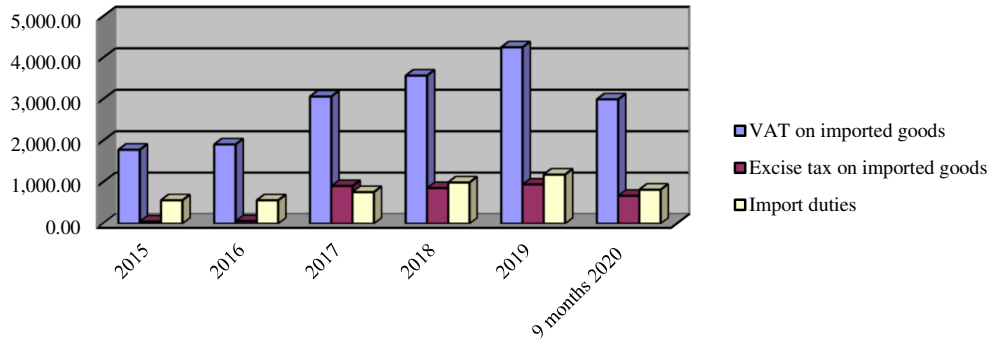

Figure 4: Dynamics and structure of tax potential for imported goods, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

Despite the annual increase in tax rates on excise taxes, their receipts only since 2017 are significant for the revenues of the federal budget of the Russian Federation. However, they are still significantly lower than VAT which also shows an insignificant import of excisable goods. The monthly dynamics of VAT collection for 2015 - 9 months in 2020 is shown in Figure 5.

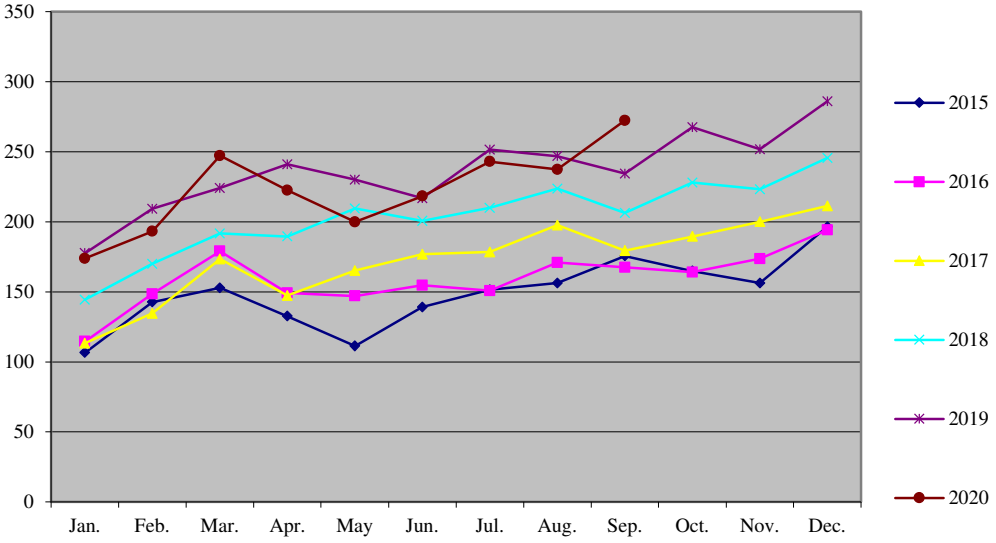

Figure 5: Monthly dynamics of VAT collection on imported goods, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

The closure of borders in 2020 directly influenced VAT receipts in the budgetary system of the Russian Federation. If in 2015–2019 there was an increase in VAT collection, then in 2020 the situation is changing. The VAT receipts from imported goods in January, February, April, July and August are below the level of the same period in 2019, and in May 2020, the collection rate fell below the level of the same period in 2018.

In 2020 "Machinery, equipment and facilities" (31%), "Chemical products" (13%) were mainly imported. In the structure of imports by country China is in first place (22%), Germany is in second place (11%). Moreover, 43.4% of goods were supplied in 2020 to Moscow, 11.7% - to the Moscow region, 9.5% - to St. Petersburg, the rest of the

subjects of the Russian Federation accounted for 49.7% of imported goods, the largest receipts were carried out in the Kaliningrad (3%), Kaluga (2.5%) regions and Krasnodar Territory (2%). This is due to the structure of the economic potential of these regions.

The main taxes associated with domestic production at the federal level are VAT, corporate income tax and excise taxes (Figure 6). Despite the fact that the corporate income tax rate is 20%, its role in the federal budget is less significant as only 2% goes to the federal level, and 18% remains in the regional budgets. A substantial growth in income tax revenues in 2017 was due to the fact that contributions to the federal budget were increased by 1% and amounted to 3% however this is a temporary measure due to economic turbulence.

A peculiar feature of the tax potential for excise taxes is that the annual increase in tax rates does not lead to an increase in budget system revenues, but on the contrary reduces the demand for excisable goods sold through retail chains, while the role of the shadow sector of the economy increases (for example, the production of alcohol-containing products in home conditions).

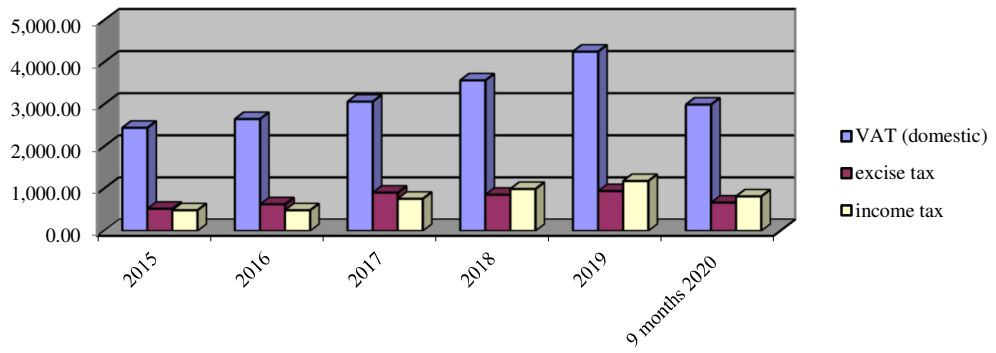

Figure 6: Dynamics and structure of tax potential for domestic production, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

The most significant value in the structure of tax potential for domestic production at the federal level belongs to VAT (the entire amount collected is fully transferred to the federal budget). A significant increase in its collection rate in 2019 was due to an increase in the tax rate from 18 to 20%. At the same time, the monthly dynamics of its collection has the same trends (Figure 7).

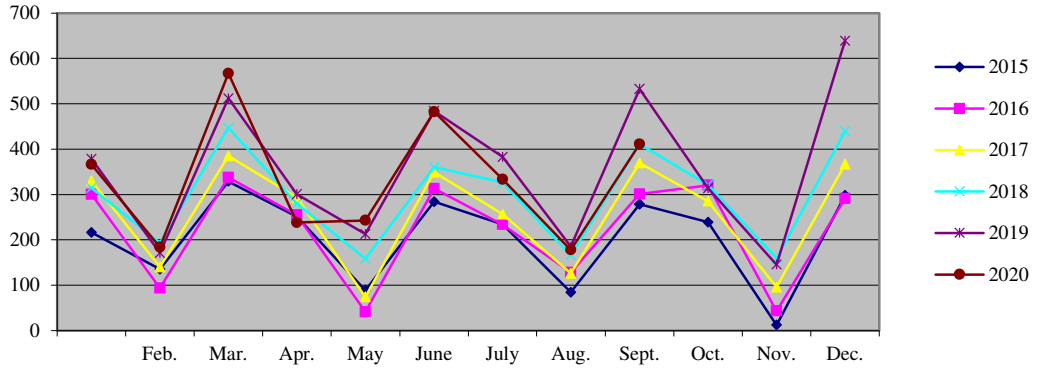

Figure 7: Monthly dynamics of VAT collection, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

The global pandemic has shown significant impact for VAT receipts to the federal budget from domestic production since April 2020, this fact is due to a decrease in demand in the domestic market caused by a significant drop in household income, an increase in unemployment and the restriction in the activities of economic entities. The global pandemic has directly or indirectly affected almost all industries. This also naturally affected the tax potential of the budget system.

All enterprises and organizations are forced to increase their costs significantly for compliance with preventive measures and disinfection of premises. A number of enterprises in the real sector of the economy were forced to suspend their activities in the conditions of self-isolation, the onset of the second wave of the pandemic also limits the sources of profit for economic entities significantly. Consequently, on the one hand, a decrease in the volume of profits of economic entities in a pandemic, and on the other hand, an increase in the volume of expenditures contributes to a decrease in tax revenues to the budgetary system on corporate income tax. Also, tax incentives provided to enterprises, for example, in the form of a tax deferral, naturally minimize the collection of corporate income tax (Figure 8).

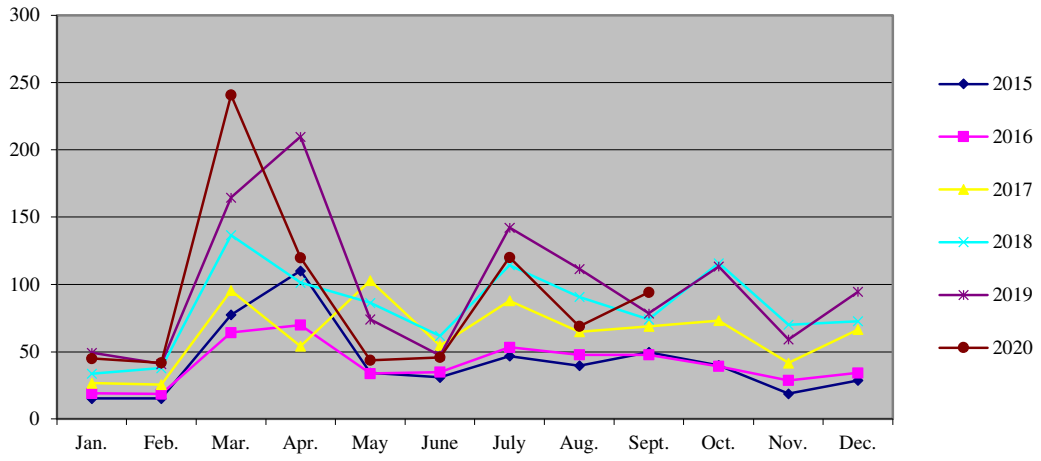

Figure 8: Monthly dynamics of corporate income tax collection, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

The peak of collection of corporate income tax, as well as VAT, fell on March 2020, as it was partly due to the rush demand of the population for essential goods and the desire to spend making purchases planned for the future in anticipation of inflationary processes. The population's fear of losing their savings led to an increase in demand for durable goods, including real estate. As noted above, the annual increase in tax rates on excise taxes does not lead to an increase in their collection (Figure 9).

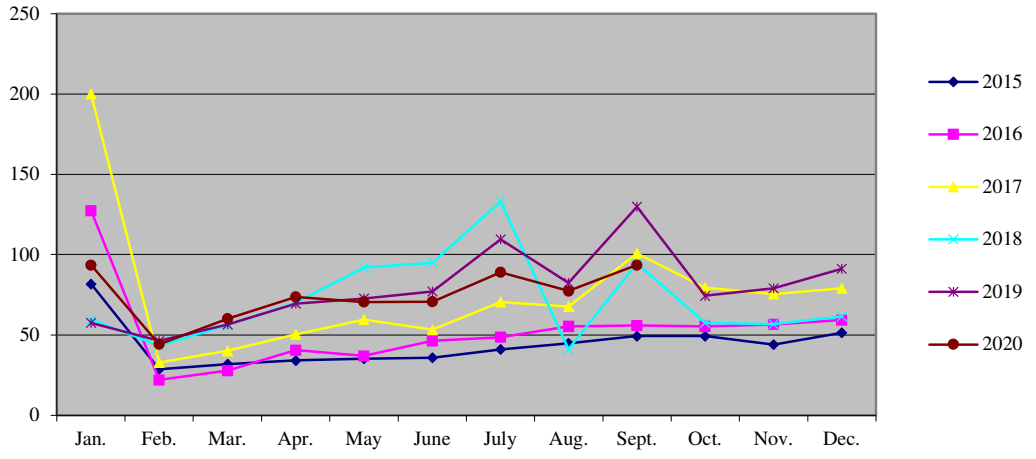

Figure 9: Monthly dynamics of collection of excise taxes, billion of roubles (Ministry of Finance of the Russian Federation, 2020)

Even an increase in demand in the pandemic for alcohol-based disinfectant products does not contribute to an increase in revenues from this revenue source. The statistical data given above indicate that the tax potential in the context of the pandemic received a negative impetus as a result of the March – April lockout, however, the trend of its formation in the future indicates a recovery.

Discussion and Results

Consequently the first myth associated with the fact that non-oil and gas revenues are increasing solely due to the growth of the national economy is not confirmed by the statistical data since there is no significant increase in tax potential, rather the growth of its indicators is influenced by inflationary factors that cause the increase in price, and as a result the increase in tax revenues to the budget system. The second myth associated with the fact that in the context of the global pandemic there is a significant drop in tax potential is not confirmed by the statistical data as well.

Tax incentives provided to enterprises from the most affected sectors, at the time of their operation reduce the tax potential but in general this is not so critical for the revenues of the budget system. The decrease in the collection of tax revenues is often more negatively affected by the annual increase in tax rates.

The development of any branch of the economy in the context of the “new reality” requires a revision of the existing economic mechanisms. The situation is aggravated by the presence of the interregional differentiation, the significant volume of the “shadow sector of the economy” and a large territory of the Russian Federation.

In order to mitigate the impact of the crisis on the regions, the federal support alone will not be enough. Some thoughtful actions of the regional authorities (especially their interest) are needed to support the economy, to create jobs, to launch new industries, and provide real support for businesses, especially small businesses as well. It is necessary to resolve the issues related to the reduction of the shadow sector of the economy, and specifically at the regional level, to think over the tools for its legalization, taking into account the regional specific features of its conduct.

In fact it is necessary to look for individual growth points for each region that will make it possible to level out the impact of the coronavirus pandemic. And this can be done only on the basis of the economic potential of each constituent entity of the Russian Federation, there cannot be one universal recipe for all regions, as their interregional differentiation is too strong.

The issue to be discussed is one for each region: the interest of regional authorities, the adequacy of the decisions made, trust in the authorities and the desire of the population to help in overcoming the consequences of the pandemic, the activity of citizens. The solution to this problem is possible only from the comprehensive perspective. The consequences are too serious, both for each region and for the whole country as a whole.

It is necessary to understand that the crisis will not end immediately, business will gradually and very slowly gain momentum, and the fulfillment of the state's social obligations to the population cannot be postponed until later. Pensions, benefits, scholarships must be paid on time, schools and kindergartens, clinics and hospitals must work. This requires tax revenues. But any inept actions of the authorities may not increase but on the contrary reduce them.

Therefore, before launching any program to eliminate and overcome the consequences of the coronavirus pandemic it is necessary to assess its consequences, both for the budget and for business and the population, forecasting must be quite accurate (unlike the practice of recent decades). Of course an adjustment in implementation process is possible but it does not have to be global. It is necessary to clearly understand the final results and the ways to achieve them otherwise a positive result is hardly possible.

Thus, the structure of tax potential directly depends on the structure of economic potential. Considering that the Russian Federation consists of 85 subjects, and the interregional differentiation of their economic potential is quite significant it is the economic potential that affects the formation of both the tax base and the tax potential, the need to stimulate the development of economic potential in the regions is a priority task of the state at the present time.

The incentive mechanism in a pandemic should not include only the financial support for business, it is necessary to use the full range of direct and indirect tools, including consideration of the possibility of transforming the legislative framework for functioning of business, not in terms of tightening it, but in order to stimulate the formation of growth points capable to take the national economy out of the crisis.

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Extractive Text Summarization Using Neural Network

Nadeen M ABDELALEEM[1] , Hatem M ABDAL KADER[2] , Rashed K SALEM[2] and Diaa SALAMA ABD ELMINAAM[3,4]

[1]Higher Technological Institute,10th Of Ramadan City, Egypt, eng_nadeen@hotmail.com

[2]Faculty Of Computers And Informatics,Menufyia University, Egypt { hatem6803@yahoo.com , rdkhalil@yahoo.com }

[3] Misr International University, Faculty of Computers and Informatics, Cairo, Egypt , diaa.salama@miuegypt.edu.eg

[4] Benha University, Faculty of Computers and Artificial Intelligence, Benha, Egypt , diaa.salama@fci.bu.edu.eg

Abstract

Lately, with the availability of huge amounts of data over the internet, it becomes difficult and necessary need to get information vastly and accurately in order to extract the related information . we need a good mechanism automatic text summarization becomes a useful technique for generating the summary from single or multiple documents related to the users query the operation of text summarization is condensing the original text into a shorter form this paper focus on extractive text summarization for summarizing text using neural networks which is trained on a set of features extracted from sentences that should be included in the summary of the text.

Keywords: Automatic text summarization – extractive text summarization**-** Features-neural network.

Introduction

Automatic summarization is the process of shortening a set of data computationally to create a subset that represents the most important or relevant information within the original content. In addition to text, images and videos can as well be summarized [Allahyari, M., Pouriyeh, S., Assefi, M., Safaei, S., Trippe, E.D., Gutierrez, J.B. and Kochut, K., 2017]. Here we focus on Text summarization which is the process of locating the most informative sentences in a document. There are two common methods to automatic summarization: extraction and abstraction. Firstly extraction-based summarization here, content is extracted from the original data, but the extracted content is not modified in any way. Examples of extracted signification involve key-phrases that can be used to "tag" or index a text document, or key sentences (including headings) that collectively cover an abstract, and representative images or video segments, as stated above. [Shimpikar, S. and Govilkar, S., 2017]For text, extraction is hassling to the method of skimming, where the summary (if available), headings and subheadings, figures, the first and last paragraphs of a section, and optionally the first and last sentences in a paragraph are read before one chooses to read the entire document in detail. Secondly abstraction-based summarization this has been applied mainly for text. [Abdelaleem, N.M., Kader, H.A. and Salem, R., 2019]Abstractive methods build an inner semantic impersonation of the main content [Bhargava, R., Sharma, Y. and Sharma, G., 2016], and then use this representation to make a summary that is nearer to what a human may express. Abstraction can convert the extracted text by paraphrasing partition of the original document, in order to intensify a text more robustly than extraction [Nallapati, R., Zhou, B., Gulcehre, C. and Xiang, B., 2016]. However, such conversion is computationally much more challenging than extraction, including both natural language processing and often a deep understanding of the area of the main text in states where the main document relates to a specific field of knowledge.[García-Hernández, R.A. and Ledeneva, Y., 2009] "Paraphrasing" is even more complicated to apply to image and video, which is why most summarization systems are extractive. Approaches aimed at higher summarization goodness depend on joint software and human endeavor.[Allahyari, M. and Kochut, K., 2015] In Machine Aided Human Summarization, extractive techniques highlight elect crypt for implication (to which the human adds or removes text). In Human Aided Machine Summarization, a human post-processes software output, in the same way that one formulate the output of automatic translation by Google Translate. There are two types of extractive summarization tasks count on

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what the summarization program concentrate on. The first one is generic summarization, which focuses on gaining of a generic summary or abstract of the collection (whatever these are documents, or sets of images, or videos etc.). The second is query relevant summarization, sometimes called query-based summarization, which summarizes objects particular to a query. Summarization systems are qualified for creating jointly query relevant text summaries and generic machine-generated summaries depending on user requirements. An example of a summarization issue is document summarization that try to automatically produce an abstract from a given document. Occasionally one might be interested in generating a summary from an individual source document, while others can utilize several source documents (for example, a collection of articles on the same topic)[Allahyari, M. and Kochut, K., 2016]. This problem is called multi-document summarization. A related application is summarizing news articles. Imagine a system, which automatically pulls with each other news articles on a given topic (from the web), [Allahyari, M. and Kochut, K., 2016] and briefly represents the latest news as a summary. Summarization algorithms trying to locate subsets of objects like set of sentences [Allahyari, M. and Kochut, K., 2016], or a set of images, that include information of the whole collection. This is also called the core-set. These algorithms paradigm notions like variety, coverage, information and representativeness of the summary. Query based summarization mechanisms, additionally model for relevance of the summary with the query [Meena, Y.K. and Gopalani, D., 2015].Artificial neural networks (ANN) or connectionist systems are computing systems ambiguously inspired by the biological neural networks that comprise animal brains. Such systems "learn" to comprise tasks by considering examples, generally without being programmed with task-specific rules. For example, in image recognition, they might impart to recognize images that include cats by analyzing example images that have been manually labeled as "cat" or "no cat" and utilizing the results to identify cats in other images. They do this without any prior knowledge of cats, for example, that they have fur, tails, whiskers and cat-like faces. Instead, they automatically produce recognizing characteristics from the examples that they process. An ANN is based on a group of linked units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transfer a signal to other neurons. An artificial neuron that receives a signal then processes it and can signal neurons connected to it [Allahyari, M., Pouriyeh, S., Assefi, M., Safaei, S., Trippe, E.D., Gutierrez, J.B. and Kochut, K., 2017] .In ANN implementations, the "signal" at a connection is a real number, and the output of each neuron is calculated by some nonlinear function of the sum of its inputs. The connections are called edges .Neurons and edges usually have a weight that adjusts as learning proceeds. The weight increases or decreases the intensity of the signal at a connection. Neurons may have a threshold such that a signal is sent only if the aggregate signal passes that threshold. Typically, neurons are aggregated into layers. Various layers can carry out various transformations on their inputs. Signals move from the first layer (the input layer), to the latter layer (the output layer), probably after traversing the layers several times.

The ANN way's primary purpose was to resolve problems in the same way that a human brain would. However, over time, attention moved to implementing particular tasks, leading to deviations from biology. ANNs have been used on a diversity of tasks, involving computer vision, speech recognition, machine translation , social network filtering, playing board and video games, medical diagnosis and even in activities that have traditionally been considered as reserved to humans, like painting [Sarda, A.T. and Kulkarni, A.R., 2015].

Supervised learning utilized a set of paired inputs and desired outputs. The learning task is to produce the desired output for each input. In this case, the cost function is related to eliminating incorrect deductions. A commonly used cost is the mean-squared error, which tries to minimize the average squared error between the network's output and the desired output. Tasks proper for supervised learning are pattern recognition (also known as classification) and regression (also recognized as to function approximation). Supervised learning is also usable for sequential data (e.g., handwriting, speech, and gesture recognition). This can be considered learning with a "teacher", in the form of a function that supplies continuous feedback on the quality of solutions obtained thus far [Fang, C., Mu, D., Deng, Z. and Wu, Z., 2017]. In unsupervised learning, input data is presented along with the cost function, some function of the data {\displaystyle \textstyle x} and the network's output. The cost function is linked with the task (the model domain) and any a priori suppositions (the implicit characteristic of the model, its parameters, and the spotted variables). As a petty example, suppose the model {\displaystyle \textstyle f(x)=a} where {\displaystyle \textstyle a}a constant is and the cost{\displaystyle \textstyle C=E[(x-f(x))^{2}]}. Reducing this cost produces a value of {\displaystyle \textstyle a} that is equal to the mean of the data. The cost function can be much more complicated. Its form depends on the application: for example, in compression, it could be related to the mutual information between {\displaystyle \textstyle x} and {\displaystyle \textstyle f(x)}, whereas in statistical modeling, it could be related to the posterior probability of the model that present the data (note that in both of those examples those quantities would be maximized rather than minimized). Tasks that fall within the

pattern of unsupervised learning are in public estimation issues, the applications include clustering, the estimation of statistical distributions, compression and filtering.

Related work

Machine learning techniques have been widely used for text summarization such as in **as [Abd Elminaam, D.S.(2020)], [Elminaam, D.S.A.(2018)], [Elminaam, D.S.A . (2018)], [El-Ashmawi, W.H.(2019)] ,[Abd Elminaam, D.S.(2019)], and [El-Ashmawi, W.H.(2020)] , [**Salama AbdELminaam, D (2020)**] , [**Abd Elminaam, D.S (2019)**] .** Automatic summarizers typically identify the most critical sentences from an input document. fundamental approaches show extractive query-oriented single-document summarization methods using a deep auto-encoder to calculate a feature space from the term-frequency input in [Yousefi-Azar, M. and Hamey, L., 2017] "Text Summarization Using Unsupervised Deep Learning novel technique for summarizing news articles using neural networks is presented.[Kaikhah, K., 2004]" Automatic Text Summarization with Neural Networks" presented by Khosrow Kaikhah. This work is relative to our work that using features for extractive text summarization. Recurrent Neural Network (RNN) based sequence paradigm for extractive summarization of documents and presentations realizes performance superior or comparable to state-of-the-art.[Nallapati, R., Zhai, F. and Zhou, B., 2016.] "SummaRuNNer: A Recurrent Neural Network Based Sequence Model for Extractive Summarization of Documents" .propose an extractive technique for text summarization by using feature terms for calculating the relevance measure of sentences and extract the sentences of highest ranks[Gowri, K. and Chezian, R.M., 2018] "Optimization of Text Summarization Based on Feature Selection and Classification". Ramesh Nallapati introduced a model for abstractive text summarization using Attentional Encoder-Decoder Recurrent Neural Networks and show that they achieve state-of-the-art performance on two different corpora.[Nallapati, R., Zhou, B., Gulcehre, C. and Xiang, B., 2016] "Abstractive Text Summarization using Sequence-to-sequence RNNs and Beyond". another approach for extractive, query-focused, single document summarization of medical text. The research utilizes an aggregation of target-sentence-specific and target-sentence-independent statistics drawn from a bulk specialized for summarization in the medical domain [Sarker, A., Mollá, D. and P Also Ramesh Nallapati aris, C., 2013].Also, Ramesh Nallapati cast text summarization as a sequence-to-sequence problem and Apply the attentional encoder-decoder RNN that has been shown to be successful For Machine Translation [Nallapati, R., Xiang, B. and Zhou, B., 2016.] "Sequence-To-Sequence RNNs For Text Summarization. "

Abstractive Sentence Summarization produces a shorter edition of a given sentence while seeking to preserve its concepts. We introduce a conditional recurrent neural network (RNN), which generates a summary of an input sentence.[Chopra, S., Auli, M. and Rush, A.M., 2016] "Abstractive Sentence Summarization with Attentive Recurrent Neural Networks".

The paper covers a review of the growth and improvement in Automatic Text Summarization techniques on implementing Evolutionary Algorithms techniques. We propose a broad set of features that considers additional features in the fitness function.[Meena, Y.K. and Gopalani, D., 2015] Evolutionary Algorithms for Extractive Automatic Text Summarization Yogesh Kumar Meenaa,*, Dinesh Gopalanib. S.A.Babara and Pallavi D.Patilb.focuses on the Fuzzy logic Extraction technique for text summarization and the semantic method of text summarization using Latent Semantic Analysis [Babar, S.A. and Patil, P.D., 2015][Allahyari, M. and Kochut, K., 2016,].

Neural Network

Multilayer Perceptron (MLP)

It is a class of feedforward artificial neural network (ANN). Multilayer Perceptron (MLP) is used obscure, sometimes widely to refer to any feedforward ANN, occasionally precisely to refer to networks composed of multiple layers of perceptrons (with threshold activation); Multilayer perceptrons are sometimes colloquially called "vanilla" neural networks, especially when they have a single hidden layer. An MLP composed of at least three layers of nodes: an input layer, a hidden layer, and an output layer. Unless the input nodes, each node is a neuron that utilizes a nonlinear activation function. MLP utilizes a supervised learning technique called backpropagation for training. Its multiple layers and nonlinear activation differentiate MLP from a linear perceptron. It can distinguish data that is not linearly separable. The MLP consists of three or more layers (an input and an output layer with one or more hidden layers) of nonlinearly-activating nodes. Since MLPs are connected, every node in one layer connects with a particular weight {\displaystyle w_{ij}} to each node in the next layer.

The term "multilayer perceptron" does not mention an individual perception that has multiple layers. Instead, it includes many perceptrons that are orderly into layers. An alternative is the "multilayer perceptron network". Furthermore, MLP "perceptrons" are not perceptrons in the strictest possible sense. True perceptrons are officially

an unusual case of artificial neurons that use a threshold activation function such as the Heaviside step function. MLP perceptrons can employ arbitrary activation functions. A true perceptron carries out binary classification (either this or that), an MLP neuron is loose to either execute classification or regression, depending on its activation function. The expression of "multilayer perceptron" later was applied regardless of the nature of the nodes/layers, consisting of arbitrarily known artificial neurons, not perceptrons particularly. This translation averts the loosening of the definition of "perceptron" to mean an artificial neuron in general. MLPs are valuable in research to resolve issues stochastically, which often permits approximate solutions for too complex problems like fitness approximation.

MLPs are universal function approximators, so they can be used to create mathematical models by regression analysis. As classification is a specific case of regression when the response variable is categorical, MLPs create perfect classifier algorithms. MLPs were a widespread machine learning solution in the 1980s, discovering applications in several domains such as speech recognition, image recognition, and machine translation software, but subsequently faced robust opposition from much simpler support vector machines. Concerned in backpropagation networks returned due to the victories of deep learning.

Probabilistic Neural Network (PNN)

Is a feedforward neural network, which is vastly used in classification and pattern recognition problems . In a PNN, the operations are organized into a multilayered feedforward network with four layers: An input layer, Pattern layer, Summation layer, and Output layer **Input layer,** every neuron in the input layer symbolize a predictor variable. In categorical variables, *N-1* neurons are used when there is *N* number of categories. It measures the extent of the values by subtracting the median and dividing by the interquartile range. Then the input neurons feed the values to all neurons in the hidden layer **Pattern layer** this layer includes single neuron for each case in the training data set. It keeps the values of the predictor variables for the case along with the goal value. A hidden neuron counts the Euclidean distance of the test case from the neuron's center point and then stratify the radial basis function kernel function using the sigma values. **Summation layer** For PNN there is one pattern neuron for each category of the goal variable. The factual target category for all the training cases is kept with each hidden neuron; the weighted value coming out of a hidden neuron is fed only to the pattern neuron equivalent to the hidden neuron's category. The pattern neurons collect the values for the class they represent. **Output layer** the output layer compares the weighted votes for each target category cumulated in the pattern layer and utilizes the largest vote to prophesy the target category.

Some Advantages of PNN rather than MLP. Its much faster and more precise, relatively insensitive to outliers, producing accurately predicted target probability scores, and PNNs approach Bayes optimal classification.

The main drawbacks of PNN are slower than multilayer perceptron networks at classifying new cases. And need more memory space to store the model.

Applications based on PNN

- In modelling structural deterioration of storm water pipes.
- Is method to gastric endoscope samples diagnosis based on FTIR spectroscopy .
- Used in resolving Different Pattern Classification Problems.
- Implement of PNN to population pharmacokinetics.
- Probabilistic Neural Networks to the Class Prediction of Leukemia and Embryonal Tumor of Central Nervous System.
- Ship Identification Using Probabilistic Neural Networks.
- Based sensor configuration management in a wireless *ad hoc* network.
- Probabilistic Neural Network in character recognizing.
- Remote-sensing Image Classification.

a. *Time Delay Neural Network (TDNN)*

is a multilayer artificial neural network architecture that aims to firstly classify patterns with shift-invariance, and secondly model context at each layer of the network .The Time Delay Neural Network, like other neural networks, operates with multiple interconnected layers of perceptrons , and is implemented as a feedforward neural network. All neurons (at each layer) of a TDNN receive inputs from the outputs of neurons at the layer below but with two differences:

1. Unlike regular Multilayer perceptrons, all units in a TDNN, at each layer, obtain inputs from a contextual window of outputs from the layer below.. Higher layers have more expansive context windows than lower layers and thus generally model coarser levels of abstraction.

2. Shift-invariance is achieved by explicitly removing position dependence during backpropagation training. This is done by making a time-shifted replica of a network across the dimension of invariance.

Applications based on TDNN

1. Speech recognition
2. Large vocabulary speech recognition
3. Speaker independence
4. Video analysis
5. Image recognition
6. Common libraries (s.a.) Matlab: The neural network toolbox has explicit functionality designed to produce a time delay neural network give the step size of time delays and an optional training function.

Features

Each document is converted into a list of sentences. Each sentence is represented **as** a vector [f1, f2,…, f8] composed of 8 features. Table 1: eight features of a document [Sarda, A.T. and Kulkarni, A.R., 2015].

Table 1: list of features and corresponding description

Feature	Description
F1	Paragraph follows title
F2	Paragraph location in document
F3	Sentence location in paragraph
F4	First sentence in paragraph
F5	Sentence length
F6	Number of thematic words in the sentence
F7	Number of title words in the sentence
F8	Numerical data feature

The proposed algorithm extract eight features represented as follow: Feature *f1* Paragraph follows title, which detect location of paragraph herein first paragraph that follows title. Feature *f2* Paragraph location in document, which finds location of paragraph among all paragraph present in document. Feature *f3* Sentence location in paragraph, which finds sentence location among all sentences from paragraph and decides rank for sentences as per their position. Feature *f4* first sentence in paragraph which decide sentence score and rank by its position in paragraph in this case first sentence in paragraph. Feature *f5,* sentence length, is useful for finding out long and short sentences such as dateline and names commonly found in different articles. We also anticipate that short sentences are unlikely to be included in summaries. Feature *f 6*, the number of thematic words, which point out the number of thematic words in the sentence, relative to the maximum possible words According to the theme of article. Feature *f7* Number of title words in the sentences, which indicates the number of title words in the sentence, relative to the maximum possible. Feature *f8* Numerical data feature is used find numerical data in sentences to find more feasible sentence for summary.

Data set

first dataset with eight features

Our data set about 80000 row which is divided into about 60% used for the training the data set on classification of MLP multilayer perceptron ,about 15% taken for cross validation which is another set-aside data set that is used during the training process to help prevent the neural network model from overspecializing on the training data. So while the neural network is training, and about 25% for the testing the neural network .the software also uses the cross validation data to test the network simultaneously to stop the neural network training before it starts becoming too specialized on the training data.

if_follows	p_locatio	s_locatior	if_first_s	s_length	thematic_	title_wor	if_numeri	if_in_summary
0	5	6	0	45	3	1	0	0
0	5	7	0	17	2	1	0	0
0	5	8	0	27	1	1	0	1
0	5	9	0	24	4	1	0	1
0	5	10	0	28	2	1	1	1
0	6	0	0	27	3	1	1	0
0	6	1	1	46	5	1	1	1
0	6	2	0	70	6	2	1	1
0	6	3	0	18	1	0	1	0
0	6	4	0	25	2	1	1	0
0	6	5	0	21	1	1	1	0
0	7	0	0	0	0	0	0	0
0	8	0	0	40	5	2	1	0
0	9	0	0	0	0	0	0	0
0	10	0	0	0	0	0	0	0
0	11	0	0	0	0	0	0	0
0	12	0	0	0	0	0	0	0
0	14	0	0	0	0	0	0	0
0	15	0	0	18	2	4	1	0
1	0	0	0	17	5	5	1	1
1	0	1	1	20	3	1	0	0
1	0	11	0	47	3	3	1	0
1	0	12	0	20	2	0	1	0
1	0	13	0	16	1	0	1	0

Fig 1: Sample of data set with 8 features

a. second dataset with 5 features

f1	f2	f3	f4	f5	if_in_summary
17.99	10.38	122.8	1001	0.1184	0
20.57	17.77	132.9	1326	0.08474	0
19.69	21.25	130	1203	0.1096	0
11.42	20.38	77.58	386.1	0.1425	0
20.29	14.34	135.1	1297	0.1003	0
12.45	15.7	82.57	477.1	0.1278	0
18.25	19.98	119.6	1040	0.09463	0
13.71	20.83	90.2	577.9	0.1189	0
13	21.82	87.5	519.8	0.1273	0
12.46	24.04	83.97	475.9	0.1186	0
16.02	23.24	102.7	797.8	0.08206	0
15.78	17.89	103.6	781	0.0971	0
19.17	24.8	132.4	1123	0.0974	0
15.85	23.95	103.7	782.7	0.08401	0
13.73	22.61	93.6	578.3	0.1131	0
14.54	27.54	96.73	658.8	0.1139	0
14.68	20.13	94.74	684.5	0.09867	0
16.13	20.68	108.1	798.8	0.117	0
19.81	22.15	130	1260	0.09831	0
13.54	14.36	87.46	566.3	0.09779	1
13.08	15.71	85.63	520	0.1075	1
9.504	12.44	60.34	273.9	0.1024	1

Fig. 2: Sample of data set with 5 features

Neural Network Training

First Dataset

The first phase of the process involves training the neural networks to learn the types of sentences that should be included in the summary. This is accomplished by training the network with sentences in several test paragraphs where each sentence is identified as to whether it should be included in the summary or not. This is done by a human reader. The **neural** network learns the patterns inherent in sentences that should be included in the summary and those that should not be included. This training done by using three methods MLP , PNN and TDNN that discussed previously

We use a three-layered feed forward neural network, number of epochs is 1000 epochs and the cross validation termination after 100 epochs .the following figure show the relation between no of epoch vs the MSE

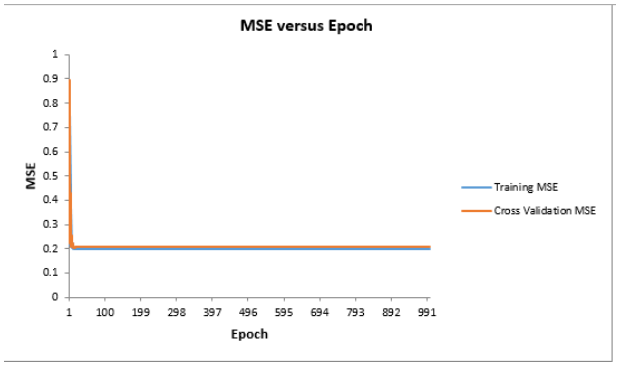

Fig. 3: MSE vs. Epoch using MLP classification

The chart at the top shows the progression of the Mean Squared Error for the 1000 epochs of the training run. also fig 3 shows the minimum MSE and the final MSE for the training neural network

Best Networks	Training	Cross Validation
Epoch #	32	13
Minimum MSE	0.197374166	0.205239679
Final MSE	0.197555398	0.208927279

Fig. 4: minimum MSE and the final MSE of MLP

This process repeated two times with the following PNN and TDNN classification methods which is shown in the following figures.

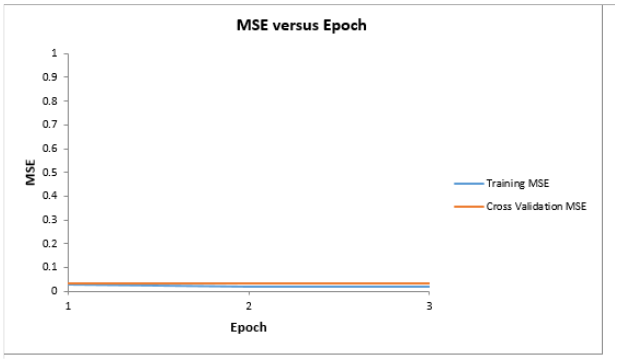

Fig 5. MSE vs. Epoch using PNN classification

Best Networks	Training	Cross Validation
Epoch #	32	13
Minimum MSE	0.197374166	0.205239679
Final MSE	0.197555398	0.208927279

Fig 6. Minimum MSE and the final MSE of PNN

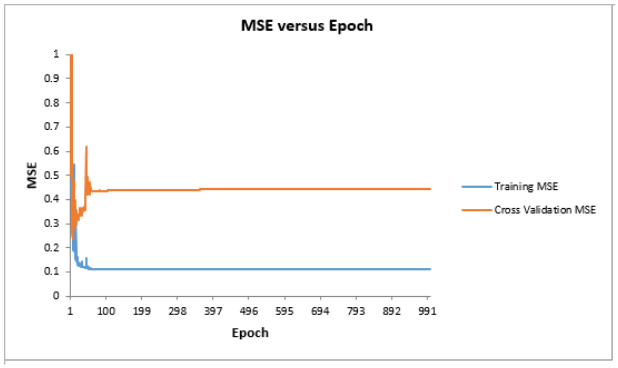

Fig 7. MSE vs. Epoch using TDNN classification

Best Networks	Training	Cross Validation
Epoch #	82	8
Minimum MSE	0.110750346	0.234450002
Final MSE	0.110965129	0.4440421

Fig 8. Minimum MSE and the final MSE of TDNN

a. *second dataset:*

Training Dataset with MLP, PNN AND TDNN

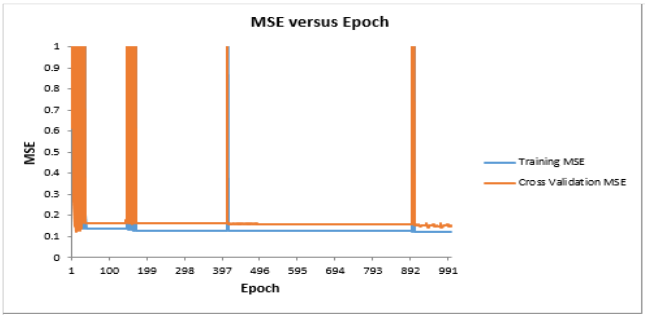

Fig 9. MSE vs. Epoch using MLP classification

Best Networks	*Training*	*Cross Validation*
Epoch #	968	12
Minimum MSE	0.121670383	0.120226472
Final MSE	0.121686736	0.150185619

Fig 10. Minimum MSE and the final MSE of MLP

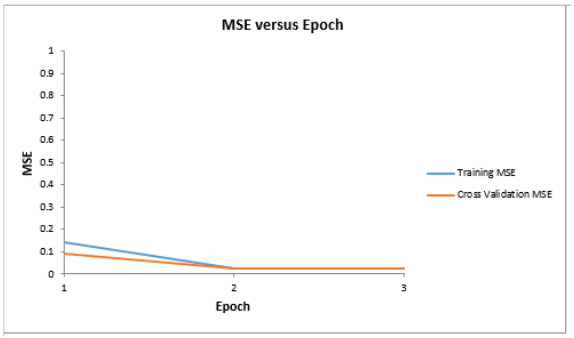

Fig 11. MSE vs. Epoch using PNN classification

Best Networks	*Training*	*Cross Validation*
Epoch #	2	2
Minimum MSE	0.023821498	0.023134842
Final MSE	0.023821498	0.023134842

Fig 12. Minimum MSE and the final MSE of PNN

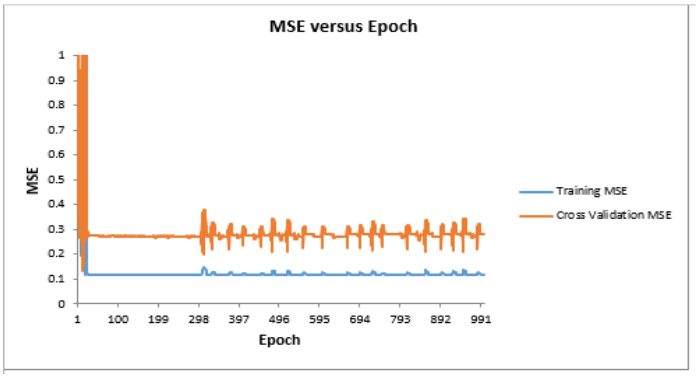

Fig 13. MSE vs. Epoch using TDNN classification

Best Networks	Training	Cross Validation
Epoch #	319	15
Minimum MSE	0.116654578	0.132949026
Final MSE	0.117720903	0.281020019

Fig 14. Minimum MSE and the final MSE of TDNN

Results

first dataset

The end results is an easy to understand report displaying a confusion matrix of the results as well as some general statistics about the performance of the model on the out of sample data. The confusion matrix is read from the top left and goes diagonally to the right displaying the correct predictions. So for this particular training run we classified 600 in summary and 5 not in summary correctly with 22 not in summary and 11 in summary misclassified.

Threshold = 0.5		
Output / Desired	*if_in_summary(1)*	*if_in_summary(0)*
if_in_summary(1)	608	21
if_in_summary(0)	3	6

Fig 15. Analyzing Test Data Results Using MLP

Performance	if_in_summary(1)	if_in_summary(0)
RMSE	0.109007208	0.808123244
NRMSE	0.109007208	0.808123244
MAE	0.05757925	0.778661255
NMAE	0.05757925	0.778661255
Min Abs Error	0.000673418	0.298578781
Max Abs Error	0.61464129	0.998591539
r	0.310547004	0.310547004
Percent Correct	99.50900164	22.22222222

Fig 16. Shows the Results of Performance Measures of MLP

Threshold = 0.5		
Output / Desired	if_in_summary(1)	if_in_summary(0)
if_in_summary(1)	600	22
if_in_summary(0)	11	5

Fig 17. Analyzing Test Data Results Using PNN

Performance	if_in_summary(1)	if_in_summary(0)
RMSE	0.129535293	0.835501507
NRMSE	0.129535293	0.835501507
MAE	0.063375085	0.792194797
NMAE	0.063375085	0.792194797
Min Abs Error	1.66498E-07	0.136410382
Max Abs Error	0.809256839	0.999998764
r	0.229500057	0.229500057
Percent Correct	98.19967267	18.51851852

Fig 18. Shows the Results of Performance Measures of PNN

Threshold = 0.5		
Output / Desired	if_in_summary(1)	if_in_summary(0)
if_in_summary(1)	587	20
if_in_summary(0)	24	7

Fig 19. Analyzing Test Data Results Using TDNN

Performance	if_in_summary(1)	if_in_summary(0)
RMSE	0.187431222	0.739666208
NRMSE	0.187431222	0.739666208
MAE	0.111421703	0.692477188
NMAE	0.111421703	0.692477188
Min Abs Error	0.000259323	0.217943658
Max Abs Error	0.804118874	0.993752004
r	0.244025739	0.244025739
Percent Correct	96.07201309	25.92592593

Fig 20. Shows the Results of Performance Measures of TDNN

a. Second dataset

results with MLP,PNN,TDNN

Threshold = 0.5		
Output / Desired	if_in_summary(0)	if_in_summary(1)
if_in_summary(0)	34	10
if_in_summary(1)	1	97

Fig 21. Analyzing Test Data Results Using MLP

Performance	if_in_summary(0)	if_in_summary(1)
RMSE	0.143352541	0.267521821
NRMSE	0.143352541	0.267521821
MAE	0.056574037	0.154597755
NMAE	0.056574037	0.154597755
Min Abs Error	2.40053E-07	6.71616E-05
Max Abs Error	0.530818946	0.913732262
r	0.86136536	0.86136536
Percent Correct	97.14285714	90.65420561

Fig 22. Shows the Results of Performance Measures of MLP

Threshold = 0.5		
Output / Desired	if_in_summary(0)	if_in_summary(1)
if_in_summary(0)	35	12
if_in_summary(1)	0	95

Fig 23. Analyzing Test Data Results Using PNN

Performance	if_in_summary(0)	if_in_summary(1)
RMSE	0.146788581	0.301500564
NRMSE	0.146788581	0.301500564
MAE	0.068426309	0.212526106
NMAE	0.068426309	0.212526106
Min Abs Error	5.58855E-29	1.38503E-05
Max Abs Error	0.447249539	0.998030196
r	0.844498902	0.844498902
Percent Correct	84.56789174	88.78504673

Fig 24. Shows the Results of Performance Measures of PNN

Threshold = 0.5		
Output / Desired	if_in_summary(0)	if_in_summary(1)
if_in_summary(0)	31	5
if_in_summary(1)	4	102

Fig 25. Analyzing Test Data Results Using TDNN

Performance	if_in_summary(0)	if_in_summary(1)
RMSE	0.267519216	0.188022931
NRMSE	0.267519216	0.188022931
MAE	0.119890527	0.081494585
NMAE	0.119890527	0.081494585
Min Abs Error	5.08819E-06	0.000179597
Max Abs Error	0.946135545	0.903267744
r	0.876502845	0.876502845
Percent Correct	88.57142857	95.3271028

Fig 26. Analyzing Test Data Results Using TDNN

Conclusion

In this paper we presented a technique for summarizing text exactly extractive text summarization by training supervised neural networks to determine the features that should be included in the text and so the sentences that will be taken in the summary depending on the results of training and the performance each network in training, as previously shown we use two different data set with different number of features and training both of them on MLP,PNN ,TDNN .and then we concluded that the dataset with eight features gives results better than the other one especially with MLP technique. the future work will depend on developing a new technique that combine the selected sentences to give a meaningful text for human reader also developing a new technique for extracting more features from the text.

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Ensuring the Quality and Safety of Food Products as A Necessary Element of Public Health Protection and A Condition for Ensuring National Security of The Country

Elena V. VORONTSOVA

Department of Financial Law, Constitutional, Civil and Administrative Proceedings
FSBEI HE «South-West State University», Kursk, Russia, proskyrinae@mail.ru

Andrey L. VORONTSOV

Department of Administrative and Labor Law
FSBEI HE «South-West State University», Kursk, Russia, vorontsov.a.l@mail.ru

Abstract

The article deals with the problematic issues of legal assurance of food quality and safety from the point of view of its significance for ensuring the right of citizens to health protection. The authors note that the quality and safety of food products and the legal mechanism for ensuring them is a necessary element of protecting the health of citizens and a condition for achieving food security in the country. Analyzing the regulatory framework in the field of food quality and safety, the authors conclude that it does not fully protect the interests of public health, and therefore does not adequately contribute to ensuring food and national security of the country. Among the shortcomings of the current legal mechanism for ensuring the quality and safety of food products, the authors highlight: the half-hearted nature of this mechanism (legal regulation focuses on ensuring product safety), the content uncertainty of the basic concepts («food quality», «food safety»), declarative provisions in the field of food quality assurance and the lack of clear quality criteria.

Keywords: right to health protection, quality and safety of food products, national security, health, legal assurance of quality and safety, legal regulation, food security, public health.

Introduction

It is obvious that the well-being and sustainable development of a state directly depends on the quality of the human potential of its citizens. In recent years, the concept of «human potential» has become firmly established in economic and legal science and is defined by a whole set of characteristics, such as the level of education of the population, indicators of public health and demography, features of mentality, etc.

It is the human potential of the country's population that ultimately determines the level and prospects of its socio-economic and technological development, the ability of a nation to resist external influences in the form of military aggression, natural disasters, etc.

Despite the breadth of the concept of «human potential» and its multidimensional nature as a phenomenon, its basis in any case is the health of citizens, since it is health that creates the necessary physical opportunities for employment, it is a necessary prerequisite for the realization of creative and educational abilities of a person, etc. Nothing else but health primarily determines the quality of life, the improvement of which is declared a strategic national priority in the Russian Federation (Decree of the President of the Russian Federation of 21.01.2020 №20), which is important for ensuring the national security of the country.

The food security Doctrine is intended to improve the quality of life of Russian citizens by providing sufficient food supplies, as well as by ensuring the quality and safety of food products. This seems natural, given the huge importance of the quality characteristics of food products for the health of citizens and in General for ensuring food security, which in turn is one of the main directions of ensuring national security of the country. It should be noted that the Russian legal doctrine has long considered the quality and safety of food as an integral part of food security.

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It is in this aspect that it appears in the works of N. M. Aliyeva (Alieva N. M., 2018), H. U. Belkharoev (Belkharoev H. U., 2018), E.V. Vorontsova, A.L.Vorontsov (Vorontsov, A.L., Vorontsova E.V,2016) (Vorontsova E.V., Vorontsov A.L.,2018), M. L. Makarevich (Makarevich M. L., 2015), O. V. Rakhmatullina, T. S. Chernovol (Rakhmatullina O. V., Chernovol T. S., 2017), O. A. Semenova (Semenova O. A., 2020) and O. V. Tarkhanov (Tarkhanov O. V., 2016). This position was also accepted by the leadership of the Russian state, which found its legal confirmation in the fact that providing the population with high-quality and safe food products is declared the national interest of the state in the field of food security. At the same time existing in Russia a real legal mechanisms to ensure the quality and safety of food products, in our opinion, far from perfect and is unable to adequately protect the interests of citizens in the field of health and do not achieve the status of food security as one of the goals of state policy in the sphere of ensuring the national security of the country.

All this actualizes our scientific analysis of the issues of legal regulation of food quality and safety.

Materials and Methods

The author's research was based on the General principles of science, objectivity, and the principle of taking into account different points of view. The method of analysis, logical reasoning, comparison, and the formal legal method were used as specific research methods.

Results and Discussion

In a modern democratic society, a person has a certain set of rights that determine, on the one hand, his belonging to this society, and, on the other hand, his autonomous position. The most important of these rights acquire an integral character and are enshrined in the Constitution of the country, which imposes on the state the obligation to unconditionally observe and protect them. However, not all constitutional rights are equivalent in their impact on human life. The right to health protection occupies a special place in the system of constitutional rights. This is because of the great value of this subjective right to preserve key social benefits, what is health, and the specifics of the legal mechanism of ensuring the right to health, involving regulation of a very wide range of social relations. Of course, such broad legal regulation cannot be carried out only within the framework of constitutional law. In the field of health protection, legal regulation is cross-sectoral, but this is also due to the constitutional status of the right to health protection, which a priori required its detail in industry legislation.

The most important prerequisite for human health is high-quality and safe food. It is estimated that 85% of harmful substances a person receives together with food and water (The decree of the RF Government from 29.06.2016 №1364-R), which determines the development of a number of chronic diseases that significantly affect public health indicators. In addition, food can be a source and carrier of deadly infections, which is confirmed by periodic outbreaks of various kinds of epidemics, the epicenter of which was the sphere of food turnover. Thus, the quality and safety of food products is a practical tool for preserving and strengthening the health of citizens. Accordingly, legal assurance of food quality and safety is an integral part of the integral mechanism for ensuring the constitutional right to health protection. At the same time, the quality and safety of food consumed by Russian citizens raises reasonable concerns. Moreover, basic government document on national security – national security Strategy of the Russian Federation – the decline in the quality of consumer goods (and food are the main ones) called the threat to strategic national priority – improvement of the quality of life of Russian citizens (The decree of the President of the Russian Federation from 31.12.2015 №683), which suggests that human health is a crucial component of quality of life, because it (the condition) largely determines the possibility of realization of his aspirations, rights and freedoms etc.

The importance of quality characteristics of food is also indicated in Federal law №323-FZ of 21.11.2011 «On the basics of public health protection in the Russian Federation»: health protection is provided through the production and sale of high-quality and safe food products (Federal law №323-FZ of 21.11.2011). However, according to the authors of this article, it is in terms of implementing the constitutional right to health protection that the legally established mechanism for ensuring the quality and safety of food products is the least perfect.

In support of this thesis, let us first turn to the Doctrine of food security of the Russian Federation (Decree of the President of the Russian Federation of 21.01.2020 №20), since providing the population with high-quality and safe food products is generally considered to be a necessary condition for achieving food security in the country. The definition of food security enshrined in the Doctrine guarantees physical and economic accessibility for every citizen of food products that meet mandatory requirements (this is its main characteristic-author's note) in turn, mandatory requirements are contained in technical regulations for a particular product and are regulated by legislation on technical regulation, primarily Federal law №184-FZ of 27.12.2002 «On technical regulation» (Federal law №184-FZ of 27.12.2002). However, the fact is that only requirements for product safety became mandatory with the adoption of the above-mentioned law. As for product quality indicators, any standards, state

standards, etc. have become voluntary. Currently, no one can oblige the manufacturer (except himself) to adhere to any specific components in the product and their quantitative ratio. Thus, the current mechanism for ensuring the quality and safety of food in Russia is based on unconditional compliance with the only legal criterion – the food product in circulation must be safe under normal conditions of its use, i.e. its use under the necessary conditions of storage, processing, etc. should not pose a danger to human life and health. And this is the root of a huge problem, because a safe product does not mean a healthy product, and it is the usefulness of a particular product that very often determines the need for its use as food.

For example, let's take baby food produced by food concerns, the consumption of which is determined exclusively by the quality characteristics of these products, which a priori must contain a certain amount of substances necessary for the child's body. Let's assume that certain baby food products do not contain the declared vitamins and trace elements in their composition, or contain them in insufficient quantities. This in itself does not make them dangerous, but it does not mean that these baby food products are not capable of harming the child's health. Moreover, the harm of such products is obvious, since, while consuming them, the child does not receive the proper amount of substances necessary for him in the first months of life, which can cause a delay in his physical and mental development.

The situation may become even more threatening when using safe, but also useless medications, as well as when eating foods that do not meet the declared characteristics - people suffering from certain chronic diseases (pancreatitis, diabetes, etc.).

At the level of legal regulation, the emergence of such threats to the health of citizens contributes, among other things, to the content uncertainty of some fundamental concepts, including the concepts of quality and safety contained in Russian legislation. Thus, in Federal law №29-FZ of 02.01.2000 «On the quality and safety of food products» (Federal law №29-FZ of 02.01.2000), the concept of food quality is formulated as «a set of characteristics of food products that can meet human needs for food under normal conditions of their use». As you can see, the meaning of this definition boils down to the fact that any food product that can satisfy the feeling of hunger can (should) be recognized as a quality product. Otherwise, how can we interpret the expression «able to meet human needs in food»?

In our opinion, the above definition is very general, it does not contain any indication of the usefulness of food products, the significance of their characteristics for human health. In a situation of such conceptual uncertainty, it is quite natural that it is in the field of food quality assurance that the legal mechanism is the least specific, and therefore the least effective.

As for the definition of food safety, in our opinion, it is also not entirely successful. In the Federal law «On the quality and safety of food products» (Federal law №29-FZ of 02.01.2000) mentioned above, the definition of safety is as follows: «a state of reasonable confidence that food products under normal conditions of use are not harmful and do not pose a risk to the health of present and future generations». The problem is that the «state of reasonable confidence» is a very subjective concept, due to the peculiarities of personal perception. In turn, our perception of something can be affected by a variety of factors-advertising, lack of necessary information, etc.

A better definition of food safety is contained in the technical regulations of the Customs Union (The decision of the Customs Union Commission on 09.12.2011 №880), where the main safety criterion is "the absence of unacceptable health risks". It seems to us that this criterion is much more suitable for the purposes of law enforcement practice in the field of ensuring the quality and safety of food products.

Returning to the last question, we note once again that the main problem on the way to realizing the right of Russian citizens to quality food is the non-mandatory nature of the requirements for their quality. Nothing in this sense has changed with the adoption of the new Federal law №162-FZ of 29.06.2015«On standardization in the Russian Federation» (Federal law №162-FZ of 29.06.2015). Within the framework of the current legal regulation system, the application of standards remains strictly voluntary. For the sake of objectivity, we note that the Strategy adopted in 2016 to improve the quality of food products in the Russian Federation until 2030 (The decree of the RF Government from 29.06.2016 №1364-R) provides for the establishment of mandatory requirements for the quality of food products. But this is only a long-term (program) goal of the legislative activity of the Russian state, which requires a large amount of work to achieve it.

Thus, the current system of legal (technical) regulation of food quality and safety issues does not allow citizens to properly exercise their rights in relation to the quality of consumed products, including those declared in the Law of the Russian Federation of 07.02.1992 №2300-1 «On consumer protection» (Law of the Russian Federation of 07.02.1992 №2300-1) and the Federal law of 02.01.2000 №9-FZ «On the quality and safety of food products» (Federal law of 02.01.2000 №9-FZ), etc. However, the main problem, in our opinion, is that imperfect legal

regulation in this area of relations hinders the implementation of the constitutional right to health protection, which is a fundamental right of every person and citizen, providing one of the most significant social benefits. In this regard, the national security of the Russian Federation is also under threat.

Conclusion

Our brief analysis of the problems of legal assurance of food quality and safety in the Russian Federation allowed us to draw the following conclusions:

- the problem of ensuring the quality and safety of food products is perceived in Russia in the context of ensuring the country's food security, i.e. as a problem of significant importance for national development and national security. The strategic program documents of the Russian state indicate the importance of high-quality and safe food products for improving the quality of life of the population, strengthening their health and increasing their life expectancy. At the same time, it is in the aspect of implementing the right of citizens to health protection that the practical mechanism for ensuring the quality and safety of food products is the least perfect. This was largely due to the need to unify and harmonize national food safety standards with international standards in this area, as well as the membership of the Russian Federation in the EAEU and the WTO, whose regulatory rules are mandatory only for product safety requirements;

- the current system of legal regulation in Russia in the field of ensuring the quality and safety of food products, in fact, ignores the issues of ensuring its quality, focusing entirely on ensuring the safety of products. This situation creates significant threats to the health of citizens, since even a safe food product, as shown in the article, can cause harm to human health if it is systematically consumed. According to the authors, the current legal mechanism for ensuring the quality and safety of food products is not able to fully ensure the interests of citizens in the field of their health, and also does not adequately contribute to ensuring food and national security of the country;

- the Russian legislator needs to step up work on creating effective industry mechanisms for ensuring the quality of food products, since at present everything is limited to declarative statements and software installations that do not lead to the creation of a regulatory framework that guarantees the quality of food products. But if there are no legal guarantees of the quality of food consumed, then there are no guarantees for the health of citizens.

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Organizational and Legal Counteraction to The Production and Entry into Circulation of Low-Quality, Including Counterfeit and Falsified Food Products: Analysis of The Practice of State Control and Supervision Bodies

Elena V. VORONTSOVA

Department of Financial Law, Constitutional, Civil and Administrative Proceedings
FSBEI HE «South-West State University», Kursk, Russia, proskyrinae@mail.ru

Andrey L. VORONTSOV

Department of Administrative and Labor Law
FSBEI HE «South-West State University», Kursk, Russia, vorontsov.a.l@mail.ru

Abstract

The article examines the activities of the control and supervisory bodies of the Russian Federation to ensure the quality and safety of food products and to prevent the production and circulation of counterfeit and counterfeit products. Analyzing the available data, including those presented in the official reports of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, the authors conclude that food safety monitoring carried out by this federal service underlies the optimization of the nutrition structure, which, according to According to Russian experts, it is necessary to increase the expected healthy life expectancy of the population and reduce its mortality. In general, it is noted that the control and supervisory activities of state bodies in the field of ensuring the quality and safety of food products are characterized by a noticeable increase in the number of laboratory and instrumental studies with the involvement of third-party experts and expert organizations. The article indicates the most falsified types of food products on the Russian consumer market, highlights the most relevant directions in the structure of laboratory tests of food products for their compliance with safety requirements carried out by state control and supervision authorities.

Keywords: quality and safety of food products, control and supervision activities of state bodies, national security, public health, counterfeit, counterfeit, monitoring of food safety.

Introduction

The widespread distribution of low-quality, including falsified and counterfeit food products is, perhaps, the main harmful factor in the Russian consumer market. In terms of its negative impact, this factor poses the greatest threat, since it affects the fundamental good for each of us - our health. Given this circumstance, counteraction to the production and circulation of low-quality, including counterfeit and falsified food products takes on the character of an important state task, on the successful implementation of which the welfare of society and the possibility of its successful (sustainable) development depend.

The problem of the presence of counterfeit and counterfeit products on the food market occurs in many countries of the world, but in the Russian Federation this problem has become truly enormous, which at certain stages of development of our state began to pose a real threat to national security, taking into account the specifics and traditions of food consumption, as well as peculiarities of food supply of some regions (for example, regions of the Far North).

The problem of the spread of food counterfeit and counterfeit products in our country began to acquire negative dynamics since the beginning of the 90s. XX century, when the ongoing socio-economic reforms opened the way for the development of private entrepreneurship in the field of food production, which in the absence of proper control by state bodies and total disregard for compliance with legal norms led to the emergence of large "shadow" structures engaged in the production of counterfeit products and fake of famous brands. It should be noted that the

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Russian consumer of those years, brought up in the traditions of the Soviet period, was very inexperienced in choosing a product. This greatly facilitated the circulation of counterfeit and counterfeit food products, especially under the trademarks of foreign brands, which poured into the Russian food market after decades of food shortages. In addition, the impoverishment of a significant part of the population and the deterioration of the financial situation of enterprises have become a powerful incentive for the development of the production of counterfeit and counterfeit products in Russia. The low solvency of Russian citizens forced them to purchase the cheapest foodstuffs, in turn, the lack of working capital from enterprises pushed them to replace certain ingredients in their products with cheaper ones, which entailed the widespread use of various kinds of additives, substitutes, etc.

The above food production practice has become persistent. Even the change in the general socio-economic situation in the country by the second half of the 2000s. did not change this negative trend in the food market - the production of falsified and counterfeit products remained steadily high. The main reasons that contributed to this development of events were the huge profits of food manufacturers, for whom the production of counterfeit was very profitable in the conditions of the "softness" of Russian legislation and the lack of the necessary material and technical base for state control and supervision bodies to identify technological tricks (life hacks) of enterprises - manufacturers, including their use in unlimited quantities of agricultural chemistry, antibiotics, etc. This actualized the need to improve the management mechanism of the national food supply system, which has been repeatedly insisted on by leading Russian experts. (Ananiev M.A. (2015), Ananiev M.A. (2016), Ananiev M.A. (2019)).

As for counterfeit products, in the last 6 years the volume of products recognized as counterfeit has increased due to the ban on the import of food products from the EU and the USA introduced by the Russian Federation. Not wanting to comply with the ban, some European suppliers and their partners in Russia have established the supply of counterfeit products under the brand name of goods produced in the Republic of Belarus.

Realizing the threat to public health, and therefore the threat to national security, which arose in connection with the widespread distribution of counterfeit and counterfeit products, the Russian Federation was forced to start developing and implementing comprehensive measures aimed at improving the quality of food products in order to ensure adequate nutrition of the population and increase quality and duration of his life. As part of the measures implemented by the state, great importance was attached to monitoring food safety, carried out by the bodies of the Federal Service for Supervision of Consumer Rights Protection and Human Welfare (Rospotrebnadzor).

An analysis of the practical activities of these bodies allowed us to identify trends in the food market related to its quality and safety.

Materials and Methods

The author's research was based on the General principles of science, objectivity, and the principle of taking into account different points of view. The method of analysis, logical reasoning, comparison, and the formal legal method were used as specific research methods.

Results and Discussion

In a number of program documents of the Russian state, in particular, in the Order of the Government of the Russian Federation dated June 29, 2016 No. 1364-r "On approval of the Strategy for improving the quality of food products in the Russian Federation until 2030" (Order of the Government of the Russian Federation of June 29, 2016 No. 1364-r) and the Decree of the President of the Russian Federation dated May 7, 2018 No. 204 "On national goals and strategic objectives of the development of the Russian Federation for the period up to 2024" (Decree of the President of the Russian Federation of May 7, 2018 No. 204), the tasks were set to increase the expected healthy life expectancy of the population and reduce its mortality. Obviously, setting such tasks, the Russian Federation sought to improve the main indicators characterizing the level of social well-being of citizens, among which public health indicators play a leading role.

One of the mechanisms for the implementation of the tasks is based on the optimization of the nutritional structure, which, according to Russian experts, can reduce the risks caused by an insufficient amount of essential microelements in the diet of Russians, as well as an excess of carbohydrates and saturated fats. In addition, in the professional community, it is with the change in the structure of the population's nutrition that they associate the possibilities of reducing the consumption of nutrients that are critical for health and have a negative impact.

In order to identify the most risky groups of goods that pose the greatest threat to the health of Russian citizens, the Russian Federation is constantly monitoring the safety of food products and food raw materials. First of all, products and raw materials are tested for compliance with sanitary and epidemiological requirements for sanitary-chemical and microbiological indicators. This type of state control and supervisory activity is of a large-scale

nature. So, in 2019, 2.165 million samples of food products from Russian and foreign manufacturers were taken for the above studies. At the same time, 332840 samples were examined for compliance of food products with safety requirements in terms of sanitary and chemical indicators, and 1259836 samples were examined for its compliance with microbiological indicators (On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2019: State report). As you can see, the main attention in carrying out these monitoring studies was paid to microbiological safety indicators, which is natural, since these indicators have long been a weak point ("weak link") in the system of safety indicators of the Russian food market.

If we analyze the data obtained in the course of these studies, then we can state that in 2019, compared to the previous year, the share of food samples that do not meet safety requirements for microbiological indicators decreased in a number of food groups that were previously the object of close attention of controllers. organs. Among them: confectionery, soft drinks, juices, alcoholic beverages, culinary products, fish and fish products. At the same time, for some groups of goods, an increase in the percentage of samples that do not meet safety requirements according to the specified criterion can be noted. These groups of goods include: meat and meat products, milk and dairy products. Moreover, an increase in the number of samples that do not meet safety requirements (sanitary and epidemiological requirements) in terms of microbiological indicators can be recorded both in Russian-made products and in imported food products (On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2019: State report). However, the greatest concern is caused by the increase in non-compliance with sanitary and epidemiological requirements for products, noted in baby food products - from 1.09% in 2018 to 1.30% in 2019. It should be noted that this negative growth was recorded in products for baby food produced exclusively at Russian enterprises. In our opinion, this indicates the need to strengthen control over the quality of products for baby food at the stage of its production.

A separate area of monitoring food products and raw materials for their production is the study of samples for the presence of nitrates. In this regard, it should be noted that in 2019 only 8% of samples of fruits and vegetables, fruit, wine, grain, meat and fat and oil products were identified undeclared pesticides (the rest of the identified pesticides belonged to the category of standardized and their content did not exceed the established requirements). This may indicate the effectiveness of measures taken by the state to control the use of pesticides and other agrochemistry in agriculture.

A very urgent problem for the Russian food market is the uncontrolled use of antibiotics in food production. For a long time, this problem was aggravated by the lack of sufficient equipment in the Russian Federation to detect antibiotic residues in manufactured food products. This led to the fact that, for example, 18 antibiotics approved for use in production were controlled only according to their manufacturer's declaration.

Realizing the threats to the health of citizens arising from this, especially in connection with the actualization of the issues of the formation of resistance to antibiotics, the Russian state in 2018-2019. additionally equipped 11 testing laboratories of hygiene and epidemiology centers in the constituent entities of the Russian Federation (as part of the creation of a network of reference laboratory bases) with modern high-tech and highly informative equipment, which makes it possible to analyze for the presence of antibiotic residues in food, including undeclared. This made it possible to carry out the most reliable laboratory studies in this area in all constituent entities of the Russian Federation.

Among antibiotics and antimicrobial drugs, traces of which are most often found in food, the first place is occupied by chloramphenicol - 40.8% of the identified samples; the second place belongs to tetracycline and its derivatives - 28.6%; in third place - bacitracin - 16.7%. It is noteworthy that most often antibiotics were found in products belonging to the category of "essential products" - these are meat and meat products, as well as milk and products based on it (with the exception of cheese). Unfortunately, residual amounts of antibiotics used in the production were found in baby food products (On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2019: State report). The number of such products, according to official data, is minimal - 0.50% of the number of samples examined (On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2019: State report), nevertheless, the detection of such cases, in our opinion, should alert the regulatory authorities, since it indicates the absence of food production areas that are completely "closed" from threats associated with use of antibiotics.

Equipping specialized laboratory centers with the latest equipment made it possible to carry out examinations of food products that were not previously used in the practice of state control and supervision bodies. Thus, in the Russian Federation, for the first time, the method of enzyme immunoassay began to be widely used, as well as methods of gas and liquid chromatography-mass spectrometry based on a triple quadrupole, which significantly increased the possibilities of detecting substances undeclared by the manufacturer, including antibiotics, antimicrobial drugs, pesticides, environmental pollutants. and others. As a result of the modernization of the equipment of Russian laboratories, it became possible to identify about 100 names of antibiotics and antimicrobial

drugs, the residual amount of which may be in food products entering the Russian market. In addition, the latest equipment supplied to the laboratories of the Russian centers of hygiene and epidemiology makes it possible to identify potentially hazardous organic compounds in food products in a very wide range (the library of mass spectra is currently about 350 thousand organic compounds).

An independent direction of research in the field of food quality and safety is the isolation of antibiotic-resistant bacteria. Russian laboratories during 2017-2019. 119 antibiotic-resistant bacterial isolates isolated from food products were examined (On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2019: State report). Thorough genomic studies of the isolated bacteria were carried out, as well as an analysis of antibiotic-resistant bacterial pathogens. The main task was to identify isolates, their typing, identification of antibiotic resistance genes and phylogenetic analysis.

According to the Rospotrebnadzor of the Russian Federation, the data obtained as a result of the conducted studies on the molecular genetic characteristics of food isolates, the genetic determinants of their resistance to antibiotics, as well as their virulence, can serve as predictors of the evolution of resistance. The presence of one or another resistance gene is also important for epidemiological studies and the compilation of a general pool of resistance genes circulating in the population (On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2019: State report). On our own behalf, we add that in the Russian Federation these studies will continue until 2022 in accordance with the Order of the Government of the Russian Federation dated December 21, 2019 No. 3116-r (Order of the Government of the Russian Federation of December 21, 2019 No. 3116-R).

In general, it should be noted that a noticeable increase in the number of laboratory and instrumental studies is characteristic of the control and supervisory activities of state bodies in the field of food quality and safety. In addition, government agencies began to involve outside experts and expert organizations much more often in their control activities. This practice made it possible to raise the level of objectivity of conducted research and increased the effectiveness of the control and supervisory activities of state bodies.

As for countering the circulation of counterfeit food products, an analysis of the data provided by Rospotrebnadzor of the Russian Federation allows us to conclude that counterfeit products are most often found in dairy products and cheeses, as well as in alcoholic beverages. These food groups have been problematic for many years. And although the situation on the markets of dairy and alcoholic products in terms of their compliance with the mandatory requirements has noticeably improved recently, nevertheless, control over these groups of goods is a subject of special attention of state bodies. Measures aimed at not suppressing the turnover of counterfeit dairy products, as well as measures to control the turnover of “cheese-like type” products, were given special attention in the List of Orders of the President of the Russian Federation No. Pr-529 dated March 30, 2018 (The list of instructions of the President of the Russian Federation dated March 30, 2018 No. PR-529). As part of the implementation of these measures, the Federal Service for Supervision of Consumer Rights Protection and Human Welfare is currently carrying out large-scale monitoring of the wholesale and retail trade of "cheese-like" products, including chain enterprises, using laboratory research. In order to exchange information on the supply of these products to the territory of Russia, including the exchange of information about its consignees, interagency interaction with the Federal Customs Service of Russia and Rosselkhoznadzor is carried out.

Note that 5.9% of all the samples taken did not meet the established requirements (in 2018 - 9%) (Consumer Rights Protection in the Russian Federation in 2019: State Report). In terms of identification indicators, the percentage of samples that do not meet the established requirements is slightly higher - 9.2%.

As for counterfeit dairy products, 346 tons of such products were withdrawn from sale in 2019. In a number of cases, government agencies were forced to suspend or withdraw declarations of conformity. The total amount of fines imposed was 105 million rubles (quite a lot for Russia, taking into account the relatively low size of the fine for such violations). It should be noted that an important role in the fight against counterfeiting of dairy products is played by citizens' appeals to state bodies with claims for their quality. According to a sociological survey conducted by us in the Kursk region, 36 out of 100 interviewed respondents expressed certain complaints about the quality of dairy (milk-containing) products.

It should be noted that in the Russian Federation, since 2019, certain types of dairy products are marked with identification means. Such a measure is being carried out as an experiment and, in the opinion of the Russian authorities, it can contribute to the suppression of illegal circulation of products of these commodity groups.

As for alcoholic counterfeit and counterfeit products, one of the most effective measures allowing the Russian authorities (competent authorities) to successfully counteract its production and circulation is the pre-trial seizure of illegal technological equipment, the products themselves, raw materials, and vehicles. At the same time, the volume

of counterfeit alcohol withdrawn from circulation amounted to 23.2 million liters in 2019 (Consumer Rights Protection in the Russian Federation in 2019: State Report).

In order to improve state regulation of the alcoholic beverages market, the Russian Federation adopted a number of regulatory legal acts in 2019, including the Federal Law of December 27, 2019 No. 481-FZ "On Amendments to Certain Legislative Acts of the Russian Federation" (Federal Law of December 27, 2019 No. 481-FZ), which strengthened control for the production and use of a pharmaceutical substance of ethyl alcohol (ethanol) and alcohol-containing medicines.

In the field of counteracting the import and circulation of food products on the territory of the Russian Federation prohibited for import in accordance with the decree of the President of the Russian Federation on counter-sanction economic measures (Decree of the President of the Russian Federation of August 6, 2014 No. 560), Rospotrebnadzor sanitary and quarantine control was strengthened at checkpoints across the state border of the Russian Federation. For the entire period of the establishment of bans and restrictions on the import of products from the EU countries and others (since 2014), the employees of Rospotrebnadzor, according to official data, were not allowed to import into the Russian Federation about 2.9 thousand tons of counterfeit products (Consumer Rights Protection in the Russian Federation in 2019: State Report). At the same time, on the territory of the Russian Federation during the same period, more than a thousand tons of products prohibited for import were withdrawn from circulation. A simple comparison of these figures suggests that a significant part of the sanctioned food products still ends up on the Russian consumer market.

Conclusion

Our study of the practical activities of state control and supervision bodies in the field of ensuring the quality and safety of food products and countering the spread of counterfeit and counterfeit products in the Russian food market allowed us to draw the following conclusions:

- optimization of the dietary structure is recognized in the Russian Federation as the most important direction in the implementation of tasks to increase the expected healthy life expectancy and reduce the mortality rate of the population, proclaimed in the program documents of the Russian state. This optimization assumes a system of measures aimed, among other things, at improving the quality and safety of food products;

- one of the main tools for ensuring the quality and safety of food products and the main evidence in the detection, prevention and suppression of offenses in this area is currently laboratory control, along with the involvement of experts and expert organizations. This laboratory control is carried out in the Russian Federation within the framework of continuous monitoring of the quality and safety of food products and food raw materials;

- in the structure of laboratory tests of food products carried out by the state control and supervision authorities for their compliance with safety requirements for sanitary-chemical and microbiological indicators, the most relevant areas can be distinguished: the study of samples for the presence of nitrates (this is due to the vigorous activity of the state to control the use of pesticides and other agricultural chemistry in agriculture), the identification of residual amounts of antibiotics and antimicrobial drugs (this is due to the uncontrolled, and therefore - excessive use of these substances in the production of food raw materials and products), the isolation of antibiotic-resistant bacterial isolates (which is extremely important in conditions of the formation of population resistance to antibiotics against the background of emerging global pandemics), identification of falsified and counterfeit food products;

- Analysis of data from Russian state control and supervision authorities suggests that the most falsified groups of food products are milk and dairy products, including cheeses, and alcohol. However, the measures taken by the state to prevent the production and circulation of counterfeit and counterfeit products, including measures aimed at identifying such products by laboratory analysis, lead to a decrease in the amount of counterfeit and counterfeit products on the Russian food market. In recent years, in the Russian Federation, there has been a steady trend towards a decrease in potentially dangerous food products, both domestic and imported, detected in circulation.

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Improving Military Supply Chains in Polish Contingents Carrying Tasks Abroad

Dariusz GRALA

War Studies University, Faculty of Management and Command, Warsaw, Poland,
d.grala@akademia.mil.pl

Abstract

The article concerns the issue of logistic support organization regarding military and civilian contingents taking part in modern multinational crisis response operations carried out outside the country. The author's comments are focused on supplying the contingent directed to perform tasks outside the country's borders within the framework of crisis response operations, peace mission or humanitarian aid.

The aim of the publication is to identify the disruptions that may occur in the process of supplying contingents carrying out tasks outside the country and to propose solutions that can limit the effects of their occurrence.

The article contains the results of own research and the author's experience from participation in multinational operations.

Keywords: Management, Risk, Logistics, Supply Chain.

Introduction

In the age of globalisation, each country is responsible for shaping the global security system. In order to preserve world peace and provide humanitarian aid to countries in need, states participate in the initiatives of the United Nations, the European Union and the North Atlantic Treaty Organisation. One of them is military and civil-military operations within the framework of broadly understood crisis response or peace missions.

In order to carry out missions (operations), contingents are created, consisting of various civil and military personnel: specialists, doctors, emergency services, logistics. To ensure the security of mission personnel, these are usually military contingents, with combat and logistical capabilities adequate to the conditions of operation. For example, the Polish Armed Forces currently maintain several military contingents in various parts of the world. They operate at a considerable distance from national supply bases, in different organizational, geographic and military conditions. The proper organization of the logistic system, especially the supply subsystem, is to ensure an effective supply chain of the means of supply to the contingent in order to ensure its functioning and the execution of its mandate tasks. Continuity of supply is also one of the basic factors determining the security of soldiers and civilian employees of the contingent. There is a potential risk of disruption in the process of supplying the contingent, which should be assessed and solutions need to be developed to ensure supply.

The purpose of this publication is to identify disruptions that may occur in the process of providing supply to the contingents carrying out tasks outside the country and to propose solutions aimed at minimising the consequences of their occurrence.

The first part of the article presents the general characteristics of the system of supplying the military contingent carrying out tasks outside the country. Next, possible disruptions to the supply provided to the military contingent, which occurred in the previous military operations, were identified. The final part of the publication presents the procedure of risk planning in the supplying process and a proposal of minimising the disruptions when providing supplies to the military contingent.

General characteristics of the military contingent supply system

A military contingent is a military unit separated from the armed forces, which performs tasks outside the country.

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According to the doctrinal documents, the state sending the military contingent to take part in an operation is responsible for its comprehensive equipment and preparation as well as for organising its logistic support during the operation. Tasks in this area can be executed with the use of: national support system, host nation support, support by the leading state in the field of logistics (Lgistic lead nation), support by a state with an expertise in the field of logistics (Logistic role specialist nation), support by multinational logistics, support by external contractors, support by NATO agencies responsible for supporting the activities of the allied forces, support by other states in the implementation of international agreements, combination of several of the above mentioned methods (Doktryna 2019, p. 34, AJP-4B 2018, p. 1-3). The experience so far shows that in practice Polish military contingents were usually provided with supplies on the basis of three basic channels, i.e.: the national supply system, the multinational supply system and civil contractors.

The national supply system consists in organised deliveries of means of supply from the home country (sending troops to operations). The basic body supplying subunits of the contingent, i.e. military units, is the logistic unit known as the National Support Element, commonly known as National Support Element (NSE). This element is separated from one of the logistic units in the country and then relocated, along with a certain amount of supply reserves to the operation area (Zasady 2010, p. 5). The contingent subdivisions report their needs to the NSE, which sends them further in the form of aggregate needs to the logistics unit in the country responsible for supplying the contingent. The logistic unit in the country is supplied by the military supply base or engages in purchases on the domestic market. There is also a possibility of local purchases by the NSE in the area of operations. Deliveries from the country are usually made by air bridge cyclically or on ad hoc basis in case of urgent needs. At the beginning of the new contingent, due to the large amount of equipment and materials, sea transport is used. The national channel is in most cases the primary channel for providing supply to the contingent. Depending on the conditions of a particular contingent, it includes supplies of: food, military rations, medical supplies, individual soldier's equipment, spare parts for state-owned equipment, specialised propellants and lubricants, ammunition.

The multinational supply system consists in receiving supplies from other countries' contingents within the framework of signed bilateral and multilateral agreements, support provided by logistics agencies, e.g. NSPA (NATO Support and Procurement Agency) or contractors for civil operations, e.g. those working for the UN. If a multinational logistic unit (e.g. JLSG – Joint Logistics Support Group) operates in the area of operations, then it has joint multinational resources, which can be used by contingents (AJP-4.6 (C), 2018). In many cases, properly organised multinational logistics support can be an effective and economically more advantageous solution compared to the national channel (AJP 4 (B), 2018, p. 1-4). Depending on the nature of the operation and the international organisations participating in it, as part of multinational support, the Polish Military Contingent (PMC, PL: PKW) received water for consumption purposes (bottled), water for sanitation, food, MRE (Meal Ready to Eat) food rations, leased technical equipment and spare parts, individual equipment of soldiers, personal hygiene equipment, fuel, construction and fortification materials, housing containers with equipment, explosives.

Civilian contractors are both large corporations providing services to the benefit of the forces participating in the operation under a long-term contract, supplying food, construction materials, food and sanitary water, as well as small local companies and stores where the supplies are provided to the contingent on an ad hoc basis in the event of disruption of national supplies or suddenly emerging needs. Often local contractors were able to deliver faster than a national or coalition (multinational) system. Contractors supplied water, food, consumables and even fuel. Medicines were also purchased on the local market in exceptional situations (e.g. for parasites in Chad) [Grala 2011].

These three channels were used in almost each of the contingents under investigation to varying degrees and levels of services provided, depending on the operational and economic conditions in the area. The organization of the supply system is a contingent-specific choice from among the available sources of supply, taking into account not only the economic benefits, but also the risk of disturbing the continuity of supply to the contingent.

Methodology and sample

The article uses research conducted by means of a diagnostic survey using a questionnaire sheet and an expert interview sheet. The survey was conducted among the personnel of units and institutions that were involved in the processes of logistic support of Polish military contingents taking part in multinational missions and operations abroad. A total of 145 people took part in the survey, of which 109 sheets were qualified for the research. A very important criterion for the selection of respondents, from the perspective of the conducted research, was participation in missions abroad (Fig. 1).

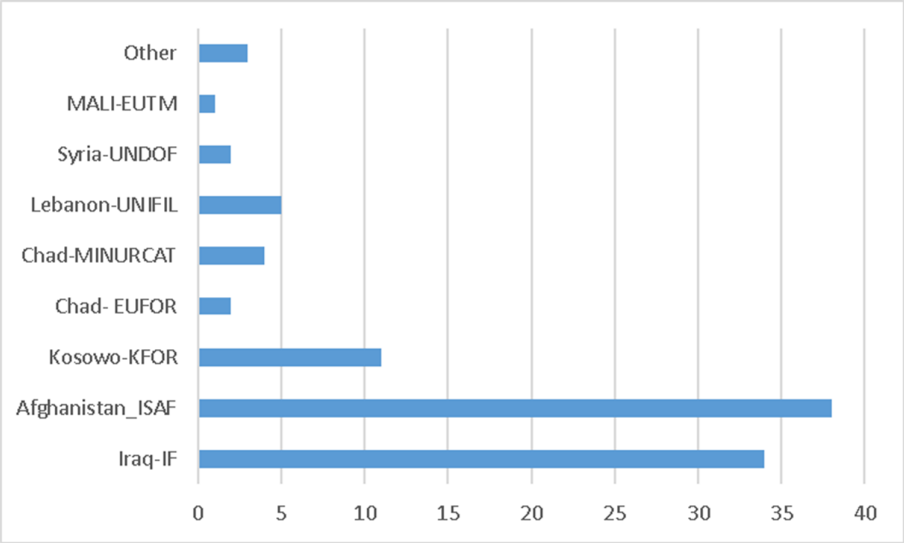

Fig. 1: Characteristics of respondents in terms of participation in particular missions abroad

Source: Own study.

Among the respondents there were people who implemented logistic support and those who used it. The large variety of missions in which the respondents took part made it possible to gather opinions on the implementation of supply tasks in specific operational, organisational and geographical conditions.

In order to collect opinions and verify the surveys, expert interviews were conducted among people who were involved in planning and implementing the supplies delivered to the contingents. These persons had experience in logistical management positions in national and international structures.

In order to enrich the article, reference was also made to the results of P. Bentkowski, who conducted a survey in another period and on a different research sample.

Identification of Disruptions in The Continuity of Providing Supplies to Contingents

Disruptions to the continuity of supply provided to the contingent result from the risks that accompany each activity and are inherent in the functioning of any system. The threat to the functioning of the system (in the described case of the supply system) is potentially all human actions or their omissions and actions of higher forces, which directly affect this system and may cause significant losses as a result of the disruptions (Dębicka, Jałowiec 2016, p. 38).

The studies carried out so far indicate that there were supply disruptions in the existing contingents. In a nutshell, supply disruptions can be divided into two groups. The first one is internal disruptions, which include all the risks associated with logistics activities, which we can identify, calculate and to some extent influence through appropriate organisational solutions, development of operating procedures and training of personnel. Supply disruptions in this group are mainly due to human errors, inaccurate information about resource data, quantity or assortment errors in demand, misinterpreted needs, and late suppliers. Limiting internal disruptions will mainly consist in applying good practices, selecting qualified and experienced personnel, increasing supervision and control, organising additional training.

When analysing the results of research in the field of supplying PMC, it should be recognised that the experience gained during the organisation of subsequent contingents resulted in good preparation of procedures and personnel for executing logistic tasks. Table 1. presents the results of the research on the difficulties arising in the process of supplying the VIIth change in the Polish military contingent in Afghanistan (PKW ISAF) (Bentkowski 2016, p. 106). It should be stated that there are few threats affecting its proper course. The defined problems concern mainly the extended time of delivery of supplies. This problem is conditioned by many factors, including the limited transport capacity of the armed forces of the country sending the contingent.

Table 1: Summary results of the RSC method of research on the issues related to the supply provided to subdivisions and PKW ISAF cells

Problem under investigation	Research result
Non-compliance of the demand with the received goods	69
Supply not delivered on time	- 5
Order waiting time is too long	- 38
Failure to receive the ordered assortment	40
Receiving too few goods	56
Delivery of supplies to the wrong place	147
Low quality of the received assortment	86
Goods are defective or damaged	104
Destroyed packaging and part of the required assortment	88
Goods expired or with too short a shelf life	125
Transport difficulties in moving supplies	37
Non-compliance of the goods with the transport documentation	124
Doubling the ordered demand	130
Receiving a substitute for the ordered goods of low quality, unsuitable for use	131
Too long storage of goods in warehouses	35
Difficulties in the exchange of information with the Economy Branch or other supply unit	98

Source: study on the basis of P. Bentkowski, System zaopatrywania polskiego kontyngentu wojskowego w operacji International Security Assistance Force, PhD thesis, ASzWoj, Warsaw 2016, p. 107.

The remaining problems listed in the table did not constitute a serious obstacle to proper functioning of the examined contingent. In the case of organising the system of supplying subsequent contingents, they should be considered as factors that may occur and disrupt the supply chain.

The second group of disruptions to the continuity of supply of the contingent is related to external factors, independent of the organiser of the supply system (contingent logistic security system). Such factors are difficult to predict and thus present a challenge when it comes to prevention. In this case the focus should be on minimising the effects of the disruption. External factors that may occur in the process of providing supplies the contingent may be related to the impact of the opponent (attacks on logistic convoys or supply depots), atmospheric factors (very high or very low temperature, storms, gales, floods), economic or political factors (currency fluctuations, economic sanctions, strikes), thefts, terrorist attacks and many others. These disruptions should be taken into account when organising supplies to the contingent.

The research conducted so far (Grala 2015, Bendkowski 2016) and personal experience from service in the Polish military contingents show that external disruptions in the process of providing supplies to the contingent occurred quite often.

Table 2: External disruptions in the process of providing supplies to the contingent

Type of disruptions	Description	Reasons	Actions taken
Water shortages	The local contractor supplying water for sanitary purposes to PMC Chad supplied half of the water in comparison to the quota agreed in the contract, and sometimes failed to deliver it.	Water shortages in wells.	During the rainy season, the water is produced by the contingent using a filtering device and its storage.
	Damage to water storage tanks in the base in Iraq	Artillery attack	Water from other bases was transported for the time of fault removal.
	The contractors did not deliver bottled water on time. The deliveries were incomplete.	Technical condition of the contractor's vehicles. Difficult road conditions in rainy weather.	Arrangement of water supply from the home country.
Food shortages	Local contractors in Chad have delivered defrosted food to PMC from UN warehouses several times	Poor technical condition of refrigeration equipment on contractor's cars	Nutrition with individual rations of MREs (Meal Ready to Eat). Change of a contractor.
	Lack of meat supply, for about 2 months	European company supplying food to the UN mission in Chad did not deliver for 2 months due to lack of quality certificate	Nutrition with individual rations of MRE
	Food transported by ship in a refrigerated container has defrosted	Failure of the electrical installation of the refrigerated container	Food was delivered by air transport.
	Fresh food deliveries were stopped	Increased threat of attacks on supply convoys	Frozen and canned products were used to prepare meals;
Shortages of medical supplies	In PMC Chad, there were no appropriate medications due to mass infections with gastrointestinal parasites	No such parasite infections were expected to occur.	Medicines were therefore purchased on the local market.
Shortages of technical equipment	No ammunition for the newly introduced rifles was delivered.	Delay in domestic purchases	Ammunition was obtained from the allies

Source: Own study

The most frequent supply disruptions concerned cooperation with civil contractors, especially the local ones. The reasons were very different: strikes, an attempt to raise service rates, technical problems of the means of transport, the rainy season, threats of enemy actions, corruption. In addition, it should be emphasised that the possibilities of the contingent to supervise the execution of the contract by the contractors were very limited. Some of the disruptions directly affected the functioning of the contingent and the implementation of the mandate tasks, as well as the safety and health of personnel. Lack of water in desert conditions swiftly affected the sanitary and hygienic condition of the

contingent, while food restrictions resulted in the inability to diversify meals and maintain a balanced diet. The logistics services had to look for alternative sources of supply, make purchases, organise air transport. Many of these activities were associated with additional costs.

Risk Planning Procedure in The Supply Process

Since it is difficult to predict what external factors may disrupt the continuity of the supplies provision to the contingent, and what is the probability of their occurrence and their consequences, it can be assumed that there is a risk of disruption. According to the theory, risk management consists in recognising the risk, its evaluation in terms of probability of occurrence and its impact on logistic activity, and then introducing actions reducing the probability of the problem occurrence and minimising losses related to the negative event in case of its occurrence (Kasperek. 2006, p. 117). After determining the main risk factors, managers have the opportunity to determine risk management mechanisms, e.g. the use of preventive tools and solutions targeted at the identified ones the risk factors through which a potential release of risk is prevented or their consequences the edition is limited (Khachaturyan 2020, p. 143). Building a risk knowledge base is also of great importance, especially for subsequent logistic projects (subsequent contingents or subsequent changes of operations). The effect of proper risk management is to minimise the risk of disruptions or limit the effects of a given event.

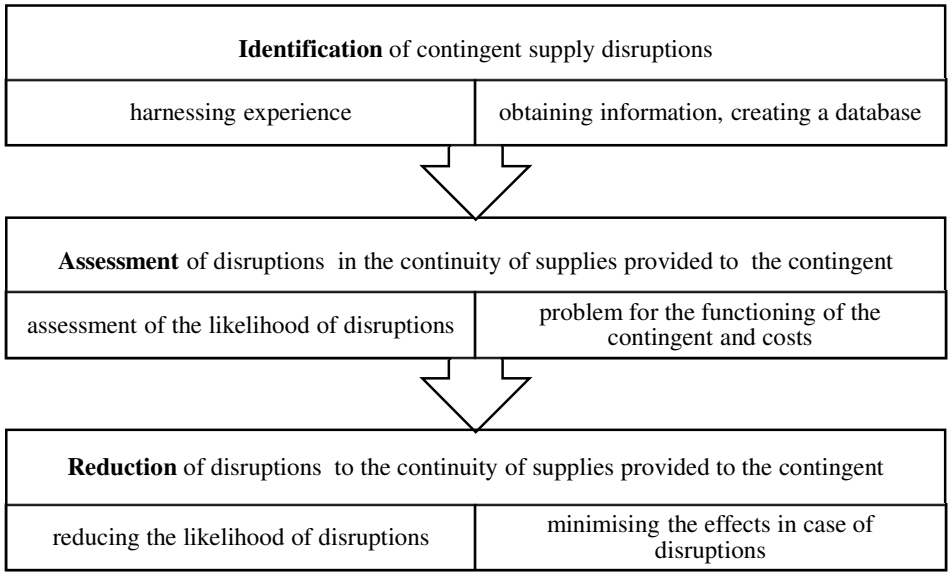

Fig. 2: Planning procedure for the reduction of disruptions to PMC supply continuity

Source: own study based on M. Kasperek, Planowanie i organizacja projektów logistycznych, Wyd. Akademii Ekonomicznej w Katowicach, Katowice 2006, p. 117.

The presented planning procedure for reducing supply disruptions (Fig. 2) (Kasperek 2008, p. 117). should be applied separately for each newly organised contingent. It should take into account political, organisational, operational, geographical, field and atmospheric conditions, and even cultural and religious ones. It should be noted that planning to reduce supply disruptions concerns not only new contingents, but also subsequent changes to the same operation (mission), where existing conditions may change, especially when the operation concerns a politically unstable region. Moreover, often in tropical conditions, due to the rainy season, there is a completely different weather occurring in the individual changes, affecting the pass ability of roads and thus the time of supply or availability of water. When planning to reduce supply disruptions, it is very important to use the experience and lessons learned from previous operations, as well as to obtain information from other countries or international organisations that have previously sent contingents to a given region of the world.

Suggestions for Minimising the Impact of Disruptions in Provisions of Supplies to The Contingents

According to the collected opinions, there were quite frequent disruptions in the process of supplying the contingents. Logistics services repeatedly had to react very quickly to the disruptions and to reach for alternative sources of supply.

If the contractor failed, the national channels were used to meet the immediate needs. At other times, shortages of supplies from the country were compensated by purchases on the local market. The services of the allies were also used many times. Problems with water supplies in Chad were solved by collecting, during the rainy season, purified water obtained from natural reservoirs. The experience gained and the lessons learned from the operations to date are an extremely important source of knowledge to be used in planning the system for supplying future contingents.

While organising the contingent supply system, one should first of all remember the principle of flexibility of logistic support, which says that the logistic system must be able to react quickly to dynamic changes in the operational situation (*Bi-SC Joint Operational Guidelines for Logistics*, 2013, s. 2-1). At the same time the system should be effective. The key factors influencing the efficiency of the contingent supply system are (Jałowiec, 2020, p. 108):

- level of training of logistic staff;
- determination of the volume of stocks held in the area of contingent operation and in the home country or in the unit responsible for multinational logistic support of operations;
- developing forecasts for the consumption of supplies and plans for their replenishment;
- availability of alternative sources of supply.

It should be emphasised that the efficiency, i.e. the degree of achievement of the target in relation to the incurred expenditures, cannot be expressed only in the economic dimension, but should refer to the operational, allies-related and even economic dimension (Jałowiec, Grala, 2020 p. 975).

Referring to the previously presented disruptions of the supply processes, when planning the logistic support of the contingent, it is necessary to identify alternative sources of supply, such as:

- host state aid;
- purchases on the local market;
- contract with a civil contractor;
- maintaining increased stocks in the contingent;
- maintaining stocks in the home country;
- use of multinational logistics options.

It will not always be possible to use all the listed options. In the missions covered by the research, the support of the host country was very limited. Purchases on the local market and cooperation with contractors often did not meet quality expectations. Therefore, it is always necessary to determine the amount of resources, separately for a given assortment, which should be maintained for a certain period of time, ensuring self-sufficiency of the contingent.

In a modern multinational operation, an important issue in organising a contingent supply system is to determine the scope of national responsibility in relation to the multinational logistics option. The research shows that the respondents have great confidence in multinational logistics, which can be entrusted with the implementation of supply tasks (Fig. 3).

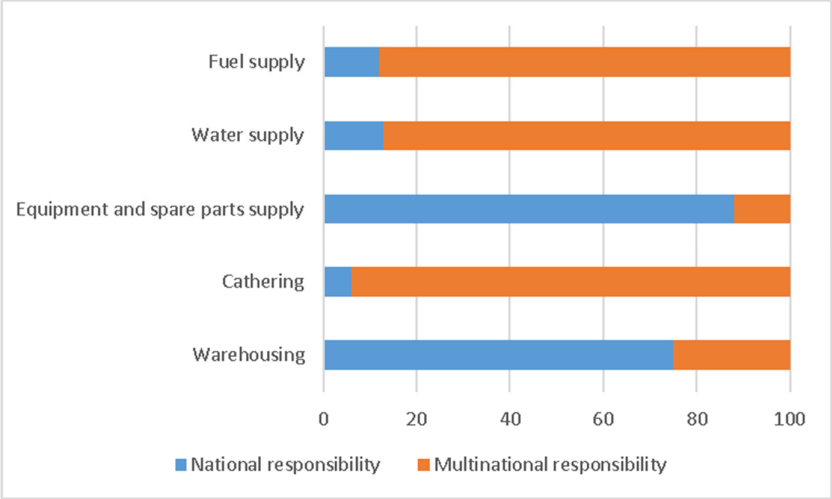

Fig. 3: Results of research on the division of supply tasks between national and multinational logistics

Source: Own study.

The stocks specified for a given assortment can be kept in the national warehouses of the contingent or, if possible, in multinational logistics databases (Fig. 4).

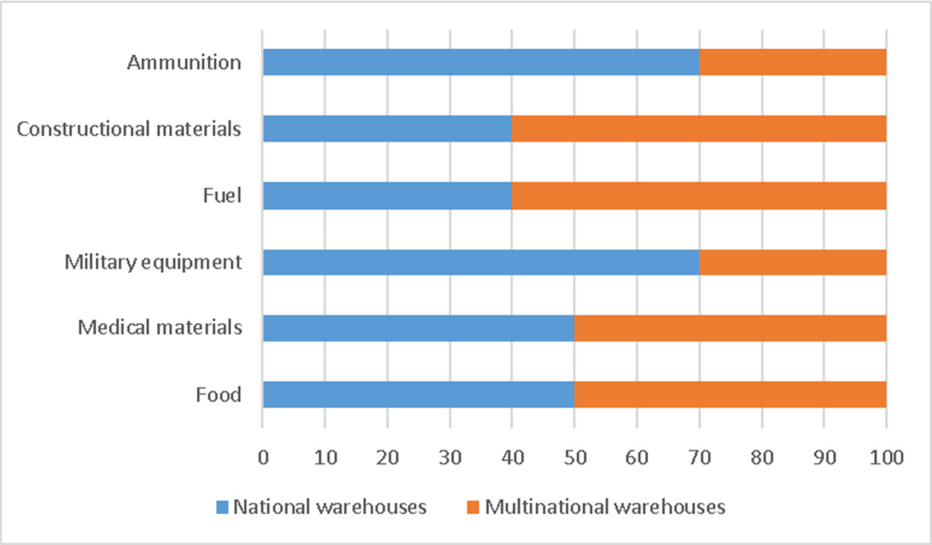

Fig. 4: Proposal of dividing stocks– of supply means between national and multinational logistics

Source: Own study.

Since maintaining stocks in the mission area is associated with high costs and it is not always possible deliveries from the home country must be assumed in predictions. To this end, it is necessary to define the standards and gather stocks or sign contracts with suppliers. The rapid movement of materials into the contingent also requires prior planning of the air bridge.

Conclusions

Providing supplies to the contingent carrying out tasks abroad is a big challenge for the logistic system of operations both on a national and multinational scale. Due to long distances strategic air or sea transport is required. Because of the limited transport capacity, the Polish Armed Forces use civilian contractors and utilise the allies' transport aviation on the basis of signed agreements. Such solution is economically advantageous for our country, however, it is connected with the risk of disruptions in supplies provided to the contingents, occurring independently of the logistic system of the Polish Armed Forces.

When organising the logistic support of the contingent, the available supply options should be considered, taking into account NATO logistic principles, in particular the principle of efficiency and flexibility. Regardless of the choice of national, multinational or civilian sources, the possibility of supply continuity disruption should be taken into account. Proper planning of the associated risks allows for maintaining the continuity of the supply chain, which will ensure the functioning of the contingent and the fulfilment of the mandate tasks.

The aim of the publication was to identify the disruptions that may occur in the process of supplying contingents carrying out tasks outside the country and to propose solutions that could minimise the effects of their occurrence.

Due to the adopted restrictions in the material, reference was made only to those areas of supply that were most frequent in the Polish military contingents assigned to the operations conducted so far. The research to date shows that the rich experience from the participation in missions and operations conducted so far outside the country may be a source of knowledge about the risk of disruptions in the continuity of supplies provided to the contingents. To solve the research problem and achieve the goal of the research the risk planning procedure modified for the needs of the supply process was applied. According to the author, the proposed procedure of planning the risk of disruption of the continuity of supply could be helpful in the planning process of supply system of contingents in future multinational operations.

This publication does not exhaust the issues of improving supply chains in military contingents contingents. Further research should aim to develop a complete database on the risk of continuity disruptions of supplies provided to the contingents and then to develop risk assessment sheet for a given supply option with alternatives.

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Dignity Based Approach to Idea of Human Rights And Human Security Concept

Daria Bieńkowska
Ph.D; Chairman of the Board of Pomeranian Center of Human Rights (Gdańsk, Poland); Institute of National Defence, Pomeranian University Słupsk, Poland
Email:tittke@wp.pl

Nataliia SERYOGINA
Ukrainian State Employment Service Training Institute, Kyiv, Ukraine
Email:nataliseryogina79@gmail.com

Abstract

Tthe idea of human rights and the concept of human security is essential to human dignity. Human dignity is a complex notion involving philosophers, lawyers, anthropologists who operate within different social and political contexts, and who pursue diverse, often conflicting, interests and goals.
The idea of human dignity and the concept of human security has played an key role in several social and political movements in the past century. Currently one can notice that human dignity plays a vital role in the development of human rights and human security adjudication. When analyzing human dignity used in judicial interpretations, we can find several definitions of it. One the one hand, some judges use human dignity as the basis for human rights. On the other hand, dignity is used to express the idea of a collection of human rights and human security.

Keywords: Human Dignity, Human Rights, Human Security, Dignity, Human Rights Adjudication

Introduction

Dignity referred to in both international and regional documents indicates the critical role it plays in human rights policy and arouses interest in various environments. It has always been a thought-provoking element that animated, united, and stimulated the minds. Dignity is a space of unity, equality, and an assembly. In a sense, it is a linguistic symbol that represents different viewpoints, justifying a specific agreement, both social and political, on a seemingly typical area of human rights.

While dignity1 plays a key role in human rights systems, it is yet to be completely defined and agreed upon its fundamental precepts. Without engaging the historical aspect of interpolation of dignity regarding documents related to human rights, it can be stated that since World War II, dignity has become a central axis of discussion between law and politics, and law and society. 'Dignity revolution' as indicated by J. Thot, began after World War II by the announcement of the Universal Declaration of Human Rights, and it was based on the fact that all rights that belong to man are derived from dignity. In the Preamble we read that:

'recognizing the inherent dignity and the equal and inalienable rights of all members of the human community is the foundation of freedom, justice, and world peace'.2

The turn of the 20th and 21st century initiated a kind of dignity revolution in the perspective of bioethical issues related to the topic of reproductive rights, the legal subjectivity of nasciturus, euthanasia laws as well as genetic

[1] Krystian Complak (eds), *Godność człowieka jako kategoria prawa, (Studia i materiały)* (Wrocław 2001) 6–7. Compare Daria Bieńkowska and Ryszard Kozłowski, 'Nienaruszalność i niezbywalność godności jako fundament normatywnego porządku prawnego' in Irena Figurska, Daria Bieńkowska, Ryszard Kozłowski (eds), *Spotkać Drugiego. Prawo-Etyka-Praktyka* (Wydawnictwo Naukowe Akademii Pomorskiej 2017) 12–26.
[2] Universal Declaration of Human Rights; The Third Session of the UN General Assembly, which met in Paris adopted the Universal Declaration of Human Rights on December 10, 1948. The document is undoubtedly one of the most significant and most enduring achievements of the United Nations.

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manipulations.3 Dignity aspires to the axiological and normative center of the human rights protection system and is used by lawyers around the world as an element of legal argumentation.

The Philosophical Context

The inspiration for reflection round dignity derives from philosophy. Jean-Paul Sartre claimed that true human dignity could only be adequately captured within existentialism.4 In his work, J.P. Sartre pointed to freedom as a kind of human absoluteness – the freedom to which one is destined.5 In Sartre's view, this means that freedom – paradoxically – is a necessary choice. Man must choose freedom, but also everything else, which is not freedom. Such a way of thinking about the man and the world develops ethical reflection not so much in the direction of freedom, as freedom makes this primary prism through which he looks at the world. As a result, freedom somehow forces people to make endless choices, those of oneself and others. In this light, man is also considered to be the creator of dignity – dignity being the essence of his existence.6

In turn, Jacques Maritain recognized the distinction between the individual and the personality. By identifying the two dimensions of human existence, he pointed out that the human being functions in two considerably different spaces that complent each other. In the text Human Person and Society,7 he mentions ancient, medieval and modern philosophers, and concludes convincingly that a human being is suspended between the two spheres: a material one that does not actually refer to an authentic personality, but rather material conditions and a type of shadow of personality, as well as a spiritual sphere that refers to the personality itself. So, if a human as an individual may be considered interpreted as a material being, then a human as a person becomes oneself himself only when he turns to the spiritual dimension of his being, which consequently gives him the possibility of transcending himself. Maritain notes that the complete human being enters a given society and somehow blends with others, but he always remains one individual and remains oneself himself. What follows is that, for instance, the good of the whole (society) is something superior to the good of a particular person, to the private good. However, these 'common goods' must be equitably distributed among each member of the community. In other words, the good of the whole must be beneficial to individuals and should be divided between them due to their rights and dignity.8 In conclusion, Jacques Maritain and Jean Paul Sartre, who seemingly represented opposite philosophical spectrums, agreed that and also revealed to the contemporary human rights researchers the fact that human dignity is the right means of creating authentic social relations.

In the light of the above reflections, one can ask to what extent, what we call 'dignity' is responsible for the process to what extent dignity is responsible for human development? From a psychological point of view, we know that low self-esteem means a low level of personal growth. To the contrary, a poorly developed sense of personal dignity keeps an individual at a primitive level of development. Many psychological tests prove it. In Poland, Polish profesor Kazimierz Dąbrowski, among others, examined this issue in his theory of positive disintegration.9 According to him, the sense of dignity stimulates the development of a person and contributes to his learning and becoming, and gives specific developmental power to every sphere of a personal being. It can also be a measure of personal development.When dignity is examined from this point of view, the source of dignity crisis is revealed to us.

Nowadays, more and more is being said and written about dignity. However, dignity is less protected, and as a consequences there is no space to fully and adequately experience it.10 Psychologists and philosophers indicate that the contemporary human loses the primary sense of dignity, because he has lost the sense of his self, the sense of development and the sense of reaching a higher level of his experiences. Although he desires greatness and holiness, he remains at the level of primitive impulses and desires. Dignity, as a concept which is commonly used,

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Karolina Cynk and Andrzej Bobko (eds), *Genetyczna przyszłość człowieka* (Wydawnictwo Uniwersytetu Rzeszowskiego 2016) 111–128; Compare Ryszard Kozłowski, 'Aksjologiczne podstawy doświadczenia godności osoby ludzkiej w kontekście dyskusji bioetycznej', ibid 90–110.

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[5] Jean Paul Sartre, *Being and Nothingness: An Essay on Phenomenological Ontology* (Kraków 2007) 590; Compare R. Kozłowski, *Męstwo jako sposób spełniania się osoby. Studium antropologiczne* (Wydawnictwo Naukowe Akademii Pomorskiej 2011) 110.

[6] Ryszard Kozłowski, 'Personalne konteksty kryzysu poczucia godności' in *Primum philosophari. Opuscula Antonio Siemianowski dedicata* (Poznań 2016) 401–411.

[7] Jacques Maritain, 'The Person and the Common Good' in Jacques Maritain, *Philosophical works* (Kraków 1988) 327–345.

[8] Compare ibid 341.

[9] Kazimierz Dąbrowski, *Dezintegracja pozytywna* (Warszawa 1979).

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and as a philosophical and ethical category of the 21st century, occupies a relatively high position. It is applied in life, especially in situations where ethical and moral dilemmas are present, and also in legal cases. For these reasons, a systematic reflection on the question of dignity seems necessary. As Ryszard Kozłowski points out, 'when observing and analyzing the functioning of a particular person in social life, and especially in uncertain and difficult situations in the moral, ideological and religious sense, one notices a clear crisis of experience of dignity. On the one hand, a while a lot has been done for a human being , on the other hand, there is a dramatic divergence from a human being; people remain deaf to his call for basic material and cultural goods. That is why a topic defining the philosophical and cultural contexts of the crisis of human dignity was raised'.11

Systemic philosophical reflection toward human dignity offers a number of precise tools to diagnose contemporary culture. Following the original concepts of man and defining the axiological environment of his existence, one can notice these sensitive points in which the man betrays himself and betrays others and therefore betrays his dignity. Cultural contexts of the dignity crisis are much more difficult to overcome. The cultural backgrounds of the crisis of dignity are more challenging to study. The problem is that even the researcher is immersed in a specific culture or a particular style of thinking. Nevertheless, humans are not doomed to failure. We assume that posing a question about dignity, the greatness of the human, the value of his life, death and illness is a brave move, even if it does not bring ready-made solutions. If this approach to some extent has stimulated the minds, it has already fulfilled its role.12

Despite the above ruminations, however, we are aware that it is still up to the researchers to specify the term of dignity, which is referenced by numerous documents relating to human rights. An even more significant discrepancy arises between dignity presented in research papers and their jurisdictional interpretation. Jurisdiction is the space that reflects the directions of perception of human dignity, thereby demonstrating how firmly it is present in social and political debates.

Today, we are witnessing some 'cult of dignity'. One can risk the claim that the concept of human dignity has never been so ubiquitous in everyday speech, or so deeply rooted in political, social and legal discourse. The idea of dignity, as already indicated in the beginning, is a feature of contemporary legal argumentation. When examining the problem of dignity from this perspective, one can ask what role human dignity plays in human rights. Is dignity the foundation of human rights or is it one of his rights? A few more questions inspire this reflection: Does dignity belong to anyone and is it inseparably connected with us, or is it granted based on some distinction or exclusivity? Do other rights or even attitudes, such as empathy and concern, result from dignity? Or perhaps is dignity just an empty slogan, motivating to heroic positions, deprived of the rationality of actions carried out on the moral, ethical and discretionary level? 13 Is dignity a right that everyone is entitled to, or is it an individual value that requires protection? Is placing dignity in the center of the human's axiological system the same as putting it on the pedestal of legal systems?

Although it is impossible to delineate all the areas and a manner of the judicial interpretation of dignity (because an in-depth analysis would significantly exceed the scope of this article), this rich and extremely valuable judicature allows outlining the problem synthetically.

Dignity As The Foundation Of Human Rights And The Ground Of Human Security

Dignity as a human right means that all people have specific rights because of their dignity. In fact, there is not enough space for the debate here about what rights matter and what dignity is. This trend took shape in the 80s of the last century, mainly, under the influence of the teachings of the philosopher Joel Feinberg and was spread out primarily in the jurisdictions of the universal law system. The judicature was based on the principle: 'Dignity for people can simply be expressed in respecting their rights. [...] Dignity neither explains nor complicates things, it tends to coincide with human rights, and therefore there is little debate about what it is, what its laws are or how they should be interpreted'.14

Dignity as a fundamental human right finds application in the interpretation of ethical and moral principles related, among others, to the issues of respecting dignity and autonomy of the patient, on which grounds even the principle of informed consent in the USA has appeared. It did not concern only people applying for medical experiments but referred to Human Rights informed consent also included all types of therapy. Judicature invoked the Patient's Bill

[11] Ryszard Kozłowski, 'Personalne konteksty kryzysu poczucia godności' in *Primum philosophari. Opuscula Antonio Siemianowski dedicata* (Poznań 2016) 403.
[12] Compare ibid.
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[14] Joel Feinberg, 'The Nature, and Value of Right' (1970) 243, Journal Value Inquiry 252.

of Rights, citing natural laws and inherent dignity, proclaiming that the patient, due to his dignity and autonomy, has the right 'to obtain from his doctor the information necessary to give informed consent before initiating any procedure or treatment, [...] and to refuse the treatment to the extent permitted by law and to obtain information about the medical consequences of the treatment'.15 For instance, one can recall Salgo vs. Leland Stanford Jr. University Board of Trustees. In this case, the court ruled that, apart from the formal nature of the consent of the patient, there was also an aspect of the patient's awareness and dignity, who consented to the treatment. Such a position is also noticeable in Poland. As for the right to respect for dignity, the Supreme Court stated that personal dignity 'relates to the sphere of personality that is embodied in self-esteem as a human being and the expectation of respect from other people'.16 Such attitudes result precisely from the recognition of dignity as the foundation of human rights. Therefore, the doctor's relationship with the patient should be filled with care, empathy, trust and the recognition of the patient as the subject of the healing process, not the object. For instance, the ruling of the Supreme Court in a judgment of June 21, 1976 stated that 'causing the personality threat condition in a minor by a doctor’s diagnosis regarding patient’s illness due to a conduct contrary to the principles of social coexistence, relating to the protection of human personality, his dignity, and the position in the society, can be considered as a causal relationship of the minor’s suicide, if there are no convincing grounds for combining suicide with the victim's psychological abnormalities'.17

The principle of respecting the dignity and recognizing it as the fundamental human right is reflected in Polish legislation under Art. 30 of the Constitution of the Republic of Poland,18 which reads: 'The inherent and inalienable dignity of man is the source of freedom and human and civil rights. It is inviolable, and its respect and protection is the responsibility of public authorities'.19 The language interpretation of the regulation mentioned above is expressed in the legal obligation to respect and protect dignity. The basis of such values is the recognition of dignity as a human right.

Dignity as The Synonym of Human Rights

The International Court of Justice expressed the above statement. Initially, the judges of the Tribunal applied the word dignity to the dignity of the function rather than to dignity in the prism of human rights. However, in the 1960s, along with racist conflicts in South Africa, the process of displaying dignity in the justification for respect for humanity and equality of all people began. For instance, Judge Tanak's opinion on matters related to South Africa South Africa Cases, i.e., Ethiopia v. South Africa; Liberia v. South Africa. Judge Tanaka stated that 'all people are equal before the law and have equal opportunities regardless of religion, race, language, gender, social groups, etc. As people, they have dignity, which should be recognized equally for all people. It is the principle of equality which is one of the fundamental human rights and freedoms that are universal. [...] disregarding fundamental rights is expressed as the humiliation of personalitie’s dignity'.20

Also, the advisory opinion to the above case of 21 June 197121, ICJ Rep 16, in § 77 states that 'it is not a coincidence that Article 1 of the Universal Declaration of Human Rights is a fundamental principle or a maxim saying that ‘all people are born free and equal in dignity and rights. ’The majority of rights and freedoms derive from this first principle. Of all human rights, the right to equality is by far the most important. It is also a law that has been recognized for the longest time as a natural law'22.

Today, dignity as a synonym of human rights is reflected in many disputes regarding the rights of sexual minorities. Freedom and equality in dignity resonate especially in the judicial interpretation of cases regarding disrespect for

[15] Paweł Łuków and Tomasz Pasierski, *Etyka medyczna* (Warszawa 2014) 145.
[16] Judgment of the Supreme Court of 25 April 1989, ICR 143/89, TSO 1990, item 9, item 330.
[17] The judgment of the Supreme Court of 21 June 1976, IV CR 193/76, OSP 1977, item 106, with the voice of A. Koch.
[18] Constitution of the Republic of Poland of 2 April 1997, Journal of Laws of 1997, No. 78 item 483.
[19] Ibid.
[20] Judge’s Tanaka Verdict, South West Africa Cases (*Ethiopia v. South Africa; Liberia v. South Africa*, Judgment of 18 July 1966, [1966] ICJ Rep 6, at 308, 312) < http://opil.ouplaw.com/view/10.1093/law:icgj/158icj66.case.1/law-icgj-158icj66.pdf> accessed 15 June 2017.
[21] Separate Advisory Opinion of 21 June 1971, [1971] ICJ Rep 16, at 77. (Separate Opinion of Vice-President Ammoun (translation) in Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276, Advisory Opinion of 21 June 1971, [1971] ICJ Rep 16, at 77) <http://www.icj-cij.org/docket/files/53/5597.pdf> accessed 15 June 2017.
[22] Ibid 77.

homosexual relationships and non-discrimination against people with different sexual orientation in the workplace.23 Such case-law practices are common both internationally and in the strictly regional sphere.24

Interpretation Through The Prism of Dignity

The presented method of analysis corresponds to the recognition of dignity as the foundation of human rights; nevertheless, in this case, dignity is interpreted rather as an expression of the unique value in itself, on which human rights are built. Dignity's primary role in the first place is to help define a list of specifications of laws. However, this list is not closed, and the general rule may change. In other words, the general principle creates a minimum interpretation to help further present the catalog of rights generated by the principle. All laws should be interpreted through the prism of dignity. This approach is initially visible in the interpretations of the European Commission and the Court of Auditors, where cases were examined regarding, in particular, the prohibition of torture and inhuman treatment under Art. 3 of the European Convention for the Protection of Human Rights (ECHR)25 through the prism of dignity. The foundation of issued decisions was human dignity.

In turn, the European Court of Human Rights for the first time referred to human dignity in the case of Tyrer v. the United Kingdom26, in which corporal punishment was questioned. In this case, it was argued that corporal punishment contradicts humanity and cannot be subject to justice. The ECtHR stated that the verdict, adjudging a corporal punishment, is contrary to art. 3 of ECHR, and above all, violated all the principles and purposes on which the article was based which is, 'to protect, namely the dignity of the person and the physical integrity'.27

This verdict has become a reference to all matters relating to the right to a fair trial. It was considered an ethical and moral imperative not use corporal punishment under any circumstances, not only in case of using torture28 (such as Bock v. Germany29). Also, through the prism of dignity, the European Court of Justice considered cases of racial discrimination, establishing a position that all its manifestations interfere with human dignity.30

Dignity As The Foundation For All Rights Protected By Legal Acts

Since 1993, after the Treaty of Lisbon, such trend has been present in the judicature of the European Court of Human Rights. The court recognizes human dignity as the foundation for all the rights protected by the Convention for the Protection of Human Rights and Fundamental Freedoms. Human dignity is the cornerstone of the European integration and has become the foundation of the axiological order of united Europe. The European Union which so far has been focused on the community of material goods, points out to the dignity of the human, which above all material values, is the priority on which the entire community will be based.

Human dignity in the Court's judicature has also been included as a general principle of the European Community law, resulting simultaneously from the common constitutional traditions of the Member States. Member States accept the rule that the individual country must respect not only physical well-being, welfare, but above all, the dignity of its citizens, moral integrity and sense of identity. The legal order of the Member States is undeniable; it strives to ensure respect for human dignity as a general rule of law. As L. Bosek notes, the ECtHR's case judicature does not analyze the general concept of human dignity; it only examines its violation in the context of specific cases.31

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[23] Compare Case C–13/94 *P v S and Cornwall County Council*, ECR:1996:I:2143, para 22 <http://www.equalrightstrust.org/content/ert-case-summary-p-v-s-and-cornwall-county-council.pdf> accessed 15 June 2017.

[24] Compare Supreme Court Judgment of Fiji in case *Nadan & McCoskar v State* <http://www.humandignitytrust.org/uploaded/Library/Case_Law/Nadan__McCoskar_v_State.pdf > accessed 15 June 2017.

[25] Convention for the Protection of Human Rights and Fundamental Freedoms, Rome, 4 November 1950.

[26] Judgment of the ECtHR of 25 April 1978 in *Tyrer v the United Kingdom*, complaint No. 5857/72.

[27] Ibid 33.

[28] Judgment of the ECtHR of 22 November 1995 in *S W v. the UK; CR v. the UK*, complaint No. 20166/92.

[29] Judgment of the ECtHR of 29 March 1989 in *Bock v. Germany*.

[30] Compare ECtHR Judgment of 5 February 2005 *in Moldovan and Others v Romania*, complaint No. 41138/98; cf.; Compare The judgment of the ECtHR of 28 February 1999 in *Selmouni v. France*, complaint No. 25803/94.

[31] Por. Lech Bosek, *Gwarancje godności ludzkiej i ich wpływ na polskie prawo cywilne* (Warszawa 2012); Human rights outline the way of thinking about a human. A human who, regardless of his limitations, is always the subject and not the object of his rights. A human, whose life is the highest good, and who is a subject to proper legal protection. Unfortunately, on a daily basis, reality gives us many examples relating to injustice, iniquities, disrespect for the highest goods and values lived by a human.

This approach to dignity is shown in the case of Pretty v. the United Kingdom32, in which the appellant objected to a violation of Article 2, art. 3 and art. 8 of the Convention for the Protection of Human Rights and Fundamental Freedoms.33 The Court did not find any violation of any of the provisions of the Convention referred to by the appellant. It stated, however, that art. 2 para. 1 sentence 1 obliges the state not only to refrain from the intentional and unlawful elimination of life, but also is committed to take all the steps to protect the lives of individuals who remain under its jurisdiction. The court often stressed that the state is obliged to protect life, while emphasizing that there was no room for another interpretation of art. 2, which could indicate a different right from the protected one, i.e., the right to euthanasia. The Court indicated that a right to die and a right to assisted suicide respected by public authorities could not be derived from art. 2.34 This opinion was also reflected in the recommendation of the Parliamentary Assembly of the Council of Europe on Protection of human rights and dignity of dying in the terminal state.35

The Court further stressed that the complaint Pretty v. the United Kingdom indicates that art. 3 and with art. 2 of the Convention is a guarantee of the most fundamental values of a democratic society. Nevertheless, what is relevant to the article, is that the Court confirmed that all choices related to the survival of the appellant's last days should belong to her, as indicated by the very essence of the Convention. Respect for human dignity and freedom is the foundation on which the document is based. Thus, in the Court's opinion, interference could have occurred in the applicant's private life, and therefore in the whole area protected by the Convention. Such statements, however, did not become grounds for finding that there had been a violation of Art. 8 of the Convention.

Dignity can be also seen as a right or an obligation with specific content, not just as a foundation for human rights, or a collection of human rights specifications. The European Court of Justice (ECJ) has ruled in this direction, pointing to dignity as an autonomy while respecting the right to privacy. In the Coleman v. Attridge law case, the court stated that the right to dignity includes the right to personal freedom, in which free, intimate human choices are expressed, without any interference of the state. 'Dignity plays an important role in recognizing and respecting the autonomous choices of a person, and in recognizing that people can control and regulate their actions unless they harm others'.36

The ECJ stated that personal autonomy has been and still is an inseparable, distinct and vital part of dignity.37 It pointed out that human choices may differ, but they are always rooted in dignity as a real law, which also includes other values. This statement shows that every human being is an autonomous entity, and that dignity enables him to develop personally.38

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[32] Judgement of the ECtHR of 29 July 2002 in *Pretty v. the United Kingdom*, complaint No. 2346/02.

[33] Convention on the Protection of Human Rights and Fundamental Freedoms (Journal of Laws of 1993, No. 61, item 284, as amended).

[34] The right to life resulting from art. 2 of the European Convention on Human Rights is a special provision. The right to life is first and foremost an integral part of the fundamental human rights and systems. It provides for legal protection of life, which cannot be waived. Although it is not absolute, manslaughter is within the limits provided for in the article, if it occurs as a result of the absolutely necessary use of force in the cases foreseen in art. 2 paragraph 2 of the Convention. It should be mentioned that it is a closed catalog and it is subject to strict interpretation. The Court stressed many times that the scope of art. 2 of the Convention primarily serves the protection of life, which means that the scope of this protection is not only that the state does not deliberately deprive the state of life, but the state's duty is to take appropriate action to protect the lives of individuals under its jurisdiction. Compare the judgment of the ECHR of 27 September 1995, No. 18984/91, *McCann and others v. The United Kingdom*; Taking one's life will not be considered contrary to Article 2 of the ECHR.
The above provisions are aimed at preventing situations in which unregulated and arbitrary actions of state officials cause deprivation of human life. The privileges that the relevant public services have under national legislation, must be compatible with a system of adequate and effective safeguards to protect against the abuse of power and, consequently, against life-threatening events that could have been avoided'. See more Tomasz Kalita, 'Kontratypy prawa do życia w Europejskiej Konwencji Praw Człowieka' (2014) 27 Przegląd Prawno-Ekonomiczny; Compare *Jasinskis przeciwko. Łotwie,* No. 45744/08, § 50, 21 December 2010. *Nencheva and others v. Bulgaria* (judgment of 18 June 2013, Chamber (Section IV), complaint No. 48609/06).

[35] Recommendation of the Parliamentary Assembly of the Council of Europe 1418 (1999) *Protection of the human rights and dignity of the terminally ill and dying* <http://assembly.coe.int/nw/xml/XRef/X2H-Xref ViewHTML.asp?FileID=9684&lang=EN> accessed 15 June 2017.

[36] The judgment of the European Court of Justice of 17 July 2008 in *Coleman v Attridge Law*, Case C-303/06 <http://curia.europa.eu/juris/recherche.jsf?language=pl> accessed 15 June 2017.

[37] Ibid.

[38] In a similar manner, the Supreme Court of Canada spoke in the case of the *Canadian Society Law v Canada* (Minister of Employment and Immigration); The decision of the Supreme Court of Canada of 25 March 1999,

Dignity as a right to subjective treatment is used by courts for the death penalty. In the complaint of *Gregg v. Georgia* [39], the US court stated that it is not possible to divide people who, although are human, are treated as non-human, 'as objects that we play with and then throw away. [...] even the worst offender remains a human with common human dignity'.[40]

Conclusion

The concept of dignity was initially present in theology and philosophy. In philosophy, there are many known and analyzed ideas, thanks to which we learn more about a human and his life; his life as a person, as an individual, as a member of the human community, nation and a state. Homer, Plato, and Aristotle have already analyzed Human's phenomenon; it was studied by medieval and modern philosophers, and nowadays, it is one of the leading topics of social and political discourse. In the literature of the subject, there are many valuable answers to the fundamental question of 'who the human being is'; at the same time, we note that the categories such as dignity are included in the reflection on the essence of human and his nature. It must be stated that today, it is impossible to speak about a human acceptably, bypassing the social and axiological dimension of his existence. We also will not get a full answer to the question “who I am” when we dismiss a profound reflection on the essence of dignity. Every human feels unique and special; he thinks that he has his dignity. In modern times, the interest in dignity has found its place as an element of legal argumentation. Laws are derived from dignity which indicates that a human is autonomous, and should be treated with respect, has the right to freedom, and to humane treatment. This approach collerate with the dogmatic reflection of the concept of human security, as the Z. Brodecki said "that concept the new concept of human security should assume that the concept of (internal and external) security is a legal phenomenon that requires analysis: an interdisciplinary approach in the "market-culture-law" system on a "country-continent-world" scale; developing an optimal decision due to for the purpose of the action, taking into account the relationship between purposefulness, security and justice; building decision alternatives based on the examination of the facts; the use of pragmatic patterns that are not a manifestation of conformism"

The outline of the problem based on juridical interpretation of dignity shows that 'human beings constantly demand that others recognize their dignity as individuals or other religious, ethnic or racial groups. The struggle for recognition is not an economic struggle – we do not covet money here, but we only want other people to show us respect, which we believe we deserve'.41 Dignity is, therefore, inseparably connected with every human being, regardless of his social, material or national status. It is deeply rooted 'in the entelechy of perfect humanity. The dignity of the human constitutes an ontological quality and a constitutive quality of being'.42 Judges have repeatedly shown that dignity of every human being is a special type of dignity because it stems from life.

Judicial interpretation of dignity shows that dignity stems from life, and thus a person as a human is, first of all, turned towards other people, towards the world, and participates in the lives of other people and things. Because all beings engage in the same experience, they are all equal and have their dignity so that no one can be a tool, or a means for anyone. But since human is a person, and someone special, who enjoys his dignity, position towards others, and who can serve others, he then may be a gift for another person. Being a gift does not annihilate either his dignity or the dignity of the other person, as long as everyone enjoys their way of loving life. In this way, dignity has become a specific criterion in the implementation and protection of human rights and human security concept. Judicature indicates that it is a critical category, both axiological and practical, which has its source in fundamental values and rights. Dignity has become the cornerstone of intercultural agreement on fundamental values, rights, and freedoms in the regional and international arena. It is a principle for determining whether a particular law is fair because a fair law protects the dignity, and its any violation is contrary to the inherent dignity.43

The notion of dignity appears in the transnational44 and transcultural space, reaching a minimal consensus which is used as a specific 'endowment of human existence; every human being in a significant, equal and inseparable way,

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Canadian Society Law v Canada (Minister of Employment and Immigration) 1 SCR 497 at para. 51. The court stated that human dignity means a sense of self-worth as an individual, which is inseparable from respect.

[39] Judgment of the Supreme Court of the United States of America of 2 July 1976, in *Gregg v. Georgia* 428 US 153 (1976) <https://supreme.justia.com/cases/federal/us/428/153/case.html> accessed 15 June 2017.

[40] Ibid 230.

[41] Francis Fukuyama, *Our Posthuman Future: Consequences of the Biotechnology Revolution* (London: Profile Books, 2003) 109.

[42] Bartosz Wojciechowski, *Interkulturowe prawo karne. Filozoficzne podstawy karania w wielokulturowych społeczeństwach demokratycznych* (Toruń 2009) 98.

[43] Human Dignity and the futre of global Institutions, ed. M. P. Lagon, A. C. Arend, 2014, Washington

[44] See Roger Waldinger, David Fitzgerald, 'Transnational in question' (2004) 109, American Journal of Sociology (University of California, Los Angeles); Compare Benedict Anderson, Imagined *communities: reflection on the origin and spread of nationalism* (London 1983); Carlos Dore, Jose Itzigson, et all., *Cartografía del*

regardless of race, religion, age, nationality and other special attributes is entitled to dignity. It is not obtained based on individual achievements or qualifications, nor is it lost as a result of disqualifying circumstances, such as a crime. Therefore, the justice system [...] is obliged to respect human dignity (also in the case of a criminal) and to avoid (for example, by imposing a prison sentence) the measures that may humiliate him or violate his physical or psychological integrity and consequently violate his human dignity'.45 At the same time, there is a considerable discrepancy in the perception of dignity itself, and there is still no answer to why some rights derive from dignity (e.g., inclusion, gender based violance). The reason for it may be sought in situations and circumstances in which we refer to the concept of dignity. Dignity along with its attributes of inviolability and inalienability is a permanent and unchangeable element of legal, social, political as well as axiological order.46

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[45] Arno Anzenbacher, 'Co oznacza godność człowieka?' (2006) Horyzonty wychowania 55.

[46] See Marek Piechowiak, 'W sprawie stosowalności klauzuli limitacyjnej z art. 31 ust. 3 Konstytucji RP do art. 38 dotyczącego ochrony życia' in Jacek Sobaczak and Teresa Gardocka (eds), *Dylematy praw człowieka* (Toruń 2008); Krystian Complak, 'O prawidłowe pojmowanie godności osoby ludzkiej w porządku RP' in Bogusław Banaszak and Artur Preisner (eds) *Prawa i wolności obywatela w Konstytucji RP* (Warszawa 2002) 66; Jerzy Zajadło, 'Godność jednostki w aktach międzynarodowej ochrony praw człowieka' (1989) 2 Ruch Prawniczy, Ekonomiczny i Socjologiczny 111.

Las Tic En La Educacion

Juan Carlos Chancusig Chisag
Universidad Técnica de Cotopaxi, Latacunga – Ecuador
juan.chancusig@utc.edu.ec

Augusto Hidalgo Sánchez
Universidad Nacional Mayor San Marcos, Lima – Perú
ahidalgos@unmsm.edu.pe

Julio Castañeda Carranza
Universidad Nacional de Trujillo, Perú
acastañeda@unitru.edu.pe

Ricardo Gómez Arce
Universidad Nacional de Trujillo, Perú
rgomez@unitru.edu.pe

Javier Gamboa Cruzado
Universidad Autónoma del Perú, Perú
jgamboa65@hotmail.com

Luís Soto Soto
Universidad Nacional Mayor San Marcos, Lima – Perú
lssotos@hotmail.com

Resumen

La ilusión de que las TIC podían ser la llave para resolver gran parte de los problemas educativos y para dar un rápido impulso a la calidad de la enseñanza se ha ido desvaneciendo ante los grandes retos pendientes y la dificultad de modificar la organización de las escuelas y la forma de enseñar de los profesores. Sin embargo, nuevas reflexiones, modelos e iniciativas están surgiendo y permiten albergar renovadas expectativas.
En la actualidad el uso de la TIC en el aula es el objetivo de estudio de la presente investigación es un aspecto importante para la enseñanza aprendizaje ya que esto nos facilita para que los estudiantes puedan tener un aprendizaje significativo, siempre y cuando esté de acuerdo a una planificación adecuada para las diferentes áreas que se van a dar, la metodología de estudio es la de campo ya que se evidencio los problemas que tiene la educación en las instituciones educativas. Los resultados que se obtuvieron es que la incorporación de las TIC a la educación exige pensar previamente cuáles son los objetivos y los retos de la educación y determinar posteriormente de qué manera y en qué condiciones la presencia de las TIC en las escuelas contribuye a ellos. Lo primero y más importante es determinar el sentido de las TIC en la educación y cuál es el modelo pedagógico con el que se puede contribuir de forma más directa a mejorar la calidad y la equidad educativa. Por ello se concluye que es imprescindible establecer la relación de las TIC con el desarrollo en los alumnos de su capacidad para aprender a aprender, para buscar información de forma selectiva, para tener una posición crítica ante la información disponible en la red.

Palabras claves: Capacidades cognoscitivas, fuentes de enseñanza, profesores, alumnos, tecnología, nuevas metodologías de enseñanza.

Abstract

The illusion that ICT could be the key to solving a large part of educational problems and to give a quick boost to the quality of education has been fading in the face of the great pending challenges and the difficulty of modifying the organization of schools and schools.
The teachers' way of teaching. However, new reflections, models, and initiatives are emerging and allow for renewed expectations.
At present, the use of ICT in the classroom is the study objective of this research, it is an important aspect for teaching-learning since this facilitates us so that students can have meaningful learning, as long as it is in accordance with

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adequate planning for the different areas that are going to be given, the study methodology is that of the field since the problems that education has in educational institutions were evidenced. The results obtained are that the incorporation of ICTs into education requires thinking in advance about the objectives and challenges of education and subsequently determining how and under what conditions the presence of ICTs in schools contributes to them. The first and most important thing is to determine the meaning of ICT in education and what is the pedagogical model with which it can contribute more directly to improve educational quality and equity. For this reason, it is concluded that it is essential to establish the relationship of ICT with the development in students of their ability to learn, to search for information selectively, to have a critical position before the information available on the Internet.

Keywords: Cognitive abilities, teaching sources, teachers, students, Technology, new teaching methodologies.

Introducción

En el presente trabajo se trata de buscar todas las habilidades valoradas a través de los diferentes ítems que forman parte de una tic para poder fomentar en cada una de las aulas con los alumnos y así tener una educación que pueden agruparse en torno a cuatro apartados generales con el uso y conocimiento del ordenador y sus periféricos, la instalación y configuración de programas; el segundo grupo de competencias hace alusión a aspectos relacionados con Internet comunicación, información, colaboración en tercer lugar, nos encontramos un grupo de ítems que miden competencias referidas al trabajo con documentos de texto, el tratamiento de la información mediante bases de datos y hojas de cálculo, la creación y edición de imágenes, sonido, multimedia; y por último, en el cuarto grupo se recogen una serie de ítems relacionados con el uso de las diferentes herramientas disponibles en la de este estudio se contó con una muestra invitada correspondiente a los alumnos de tercer curso de cuatro de las seis especialidades de Educación Primaria, de Lenguas Extranjeras, de Educación especial y de Educación Musical

La educación, debe adaptarse a cada individuo, pues presenta diversas habilidades, destrezas y capacidades cognoscitivas para aprender, las TIC han transformado los parámetros de obtención de información por medio de las tecnologías de la comunicación como son Diario, Radio y Televisión. Las TIC en la educación ayudan a solventar la brecha generacional entre alumnos y profesores utilizando recursos como pizarras interactivas, aulas virtuales en tiempo real, salas de discusión, foros, cuestionarios, esquemas, recursos audiovisuales, bibliografía digitalizada, documentos colaborativos en línea, portafolios, juegos didácticos, entre otros.

En la actualidad las TIC es una nueva metodología que los docentes pueden utilizar para el desarrollo de la enseñanza aprendizaje de los alumnos dejando así atrás la educación tradicional, con el paso del tiempo los docentes tienen que capacitarse para utilizar de una manera correcta las TIC. Para tener una mejor utilización de las TIC en educación debemos tener una planificación para evitar la improvisación, obtener Objetivos Específicos y alcanzables, así podremos tener mejores resultados.

Las TIC en la educación nos permite la creación de ambientes educativos cómodos pero desafiantes, en los que el alumno debe asumir un mayor grado de responsabilidad, su participación debe ser activa, fomenta la interdisciplinariedad y el trabajo en equipo, así como la alfabetización por medios digitales y audiovisuales. Al docente le ayuda a tener una mayor disponibilidad de recursos y fuentes para la enseñanza, además de dar una mayor posibilidad para abarcar diferentes estilos de enseñanza e innovación en el ámbito educativo, que llevan a un proceso de actualización profesional.

(Barrio, 2018)La innovación de la tecnología es una estrategia que a facilitado que los docentes conviertan las clases tradicionales en clases donde el estudiante se sienta motivado y pueda expresar sus ideas sin problemas, como docentes, debemos pensar en el futuro de nuestros alumnos y prepararlos. De esta forma, podrán dar respuesta a todas aquellas nuevas exigencias y demandas del entorno laboral.

Objetivo General De La Investigación

Identificar de qué manera los docentes se capacitan para el manejo de las Tic, la utilización, la innovación, y la integración de las Tic en el proceso de enseñanza aprendizaje, mediante encuestas realizadas para los docentes, obteniendo datos nuevos de investigaciones ya elaboradas por otros autores.

Objetivo Esécifico

- Despegar y fortalecer hábitos de valores de la responsabilidad, tolerancia y respeto al uso adecuado de los medios tecnológicos.
- Disminuir el mal uso de los medios tecnológicos creando espacios de participación en las instituciones con el acceso a una información clara y precisa dando beneficio a docentes y alumnos.

- Analizar los datos obtenidos de las encuestas realizadas en los centros de desarrollo infantil.

Contenido Científico

Historia De Las Tic En La Educación

Los avances de las telecomunicaciones ayudaron a la innovación del tic con la creación de nuevos materiales audiovisuales y multimedia cada vez más integrados.

> (unesco)Para la UNESCO la nueva tecnología cumple un papel muy importante, ya que puede facilitar el acceso universal a la educación, apoya en un mejor desarrollo a la vida profesional del docente, mejora la calidad de la enseñanza aprendizaje en las instituciones educativas siempre y cuando se la utilice de una manera adecuada para poder lograr resultados exitosos.

La sociedad industrial ha descrito y desarrollo un modelo de educación basado en las necesidades laborales y en la estructura de la industria, la sociedad del conocimiento requiere nuevos modelos para adecuar la formación a las necesidades de la sociedad que gracias a las Tic presentan un panorama distinto a la manera de actuar, de relacionarse y de aprender que conocíamos hasta ahora.

En los años 70s los avances de la informática permiten la utilización de computadoras en la educación, en los 80s se estableció una fusión de computación y comunicaciones creando el origen de las Tic, siendo así en la actualidad una parte fundamental para la educación.

¿Que Son Las Tic En La Educación?

Las TIC son parte de los cambios a nivel económico, social y tecnológico que se están produciendo en la sociedad actual, y las instituciones educativas no pueden mantenerse al margen. Deben adaptarse a las características individuales y a las necesidades propias del alumnado, para así aportar mayor flexibilización en las trayectorias académicas y facilitar al máximo el desarrollo de sus potencialidades.

El aprendizaje significativo surge cuando el alumno, como constructor de su propio conocimiento, relaciona los conceptos a aprender y les da un sentido a partir de la estructura conceptual que ya posee. Dicho de otro modo, construye nuevos conocimientos a partir de los conocimientos que ha adquirido anteriormente. Este puede ser por descubrimiento especialmente cuando trabajamos con las TICs, o receptivo. Pero además construye su propio conocimiento porque quiere y está interesado en ello.

El aprendizaje significativo a veces se construye al relacionar los conceptos nuevos con los conceptos que ya posee y otras al relacionar los conceptos nuevos con la experiencia que ya se tiene. El aprendizaje significativo se da cuando las tareas están relacionadas de manera congruente y el sujeto decide aprenderlas. Las metodologías activas constituyen una forma interesante de presentación del conocimiento y una respuesta a las preguntas de qué, cómo, cuándo y dónde enseñar.

> La sociedad vive un proceso de cambio acelerado que está afectando no solo a la forma en que la comunidad se ha organizado hasta ahora, sino también al sistema educativo. En pocos años se producen transformaciones que, en épocas pretéritas, requirieron varios años, incluso siglos. Un gran cambio que afectó a la historia de la humanidad fue la aparición de la lectoescritura, que significó aprender a vivir de acuerdo con las exigencias del proceso de alfabetización: “aprender a leer”, “leer para aprender”, “leer para estudiar e investigar”; en consecuencia, “leer para vivir” (J, 2014)

Particularidades del uso de las TIC

En la actualidad, muchos maestros y maestras solicitan y quieren contar con recursos informáticos y con Internet para su docencia, dando respuesta a los retos que les plantean estos nuevos canales de información. Sin embargo, la incorporación de las TIC a la enseñanza no sólo supone la dotación de ordenadores e infraestructuras de acceso a Internet, sino que su objetivo fundamental es: integrar las TIC en los procesos de enseñanza-aprendizaje, en la gestión de los centros y en las relaciones de participación de la comunidad educativa, para mejorar la calidad de la enseñanza. Los profesores tienen la posibilidad de generar contenidos educativos en línea con los intereses o las particularidades de cada alumno, pudiendo adaptarse a grupos reducidos o incluso a un estudiante individual. Además, el docente ha de adquirir un nuevo rol y nuevos conocimientos, desde conocer adecuadamente la red y sus posibilidades hasta como utilizarla en el aula y enseñar a sus alumnos sus beneficios y desventajas.

El profesorado manifiesta que el uso de las TIC tiene beneficios muy positivos para la comunidad escolar, su alta implicación con las TIC ha mejorado su satisfacción personal, el rendimiento en su trabajo y la relación con el alumnado, debido a la amplia gama de posibilidades que ofrecen. Adaptarse a estas nuevas tecnologías es un proceso que se está llevando a cabo lentamente, pero que está permitiendo a muchos docentes mejorar la calidad de la enseñanza.

> (González, 2017) La formación del docente es muy fundamental para la nueva generación ya que al pasar el tiempo nuevas cosas surgen y el docente debe conocer un poco de todo por otro lado debemos comprender que existe un solo mundo, dos generaciones con el propósito de desarrollar un mundo más armonioso y de sobrevivencia, donde la tecnología sea un instrumento de desarrollo y no de destrucción, pero esto se puede solucionar reconociendo que este espacio de vida es para que los conocimientos de las dos generaciones se complementen.

Son muchos los usos que se les pueden dar a las TIC en el aula, por ejemplo los docentes tienen la posibilidad de crear contenidos en línea, actualizados y acordes a los intereses de cada momento y de cada alumno, siendo estos totalmente adaptables a cada grupo o a cada alumno en particular.

Las TIC están ayudando a mejorar la interacción del alumno con las clases, pasando de tener un rol pasivo a uno mucho más dinámico, activo y responsable.

Pero no sólo está cambiando el medio con el que se imparten las enseñanzas, también se están viendo modificados los procedimientos y métodos para impartir clases. Se desarrollan nuevos modelos de enseñanza/aprendizaje como el aula invertida, el aprendizaje basado en proyectos, entre otros.

También facilita que las familias se involucren en la educación de sus hijos, ofreciendo la posibilidad, a los centros educativos, de tener un contacto más directo con ellas.

En el ámbito educativo el uso de las TIC no se debe limitar a transmitir sólo conocimientos, aunque estos sean necesarios; además, debe procurar capacitar en determinadas destrezas la necesidad de formar en una actitud sanamente crítica ante las TIC. Con esto, queremos saber distinguir en qué nos ayudan y en qué nos limitan, para poder actuar en consecuencia. Este proceso debe estar presente y darse de manera integrada en la familia, en la escuela y en la sociedad.

Alumnado y TIC

En nuestra sociedad los niños/as asumen con total normalidad la presencia de las tecnologías en la sociedad. Conviven con ellas y las adoptan sin dificultad para su uso cotidiano. En este sentido los docentes debemos propiciar una educación acorde con nuestro tiempo realizando nuevas propuestas didácticas e introduciendo las herramientas necesarias para este fin.

Actualmente el uso de las tecnologías de la información y la comunicación constituye un objeto de preocupación, debate y reflexión para muchos autores, tanto a nivel nacional como internacional. Pero dicha preocupación aún no se ha traducido en un intento sistemático y organizado de realizar actividades pertinentes en favor de un uso adecuado de las tecnologías.

> (José A. Ferreyra) Por tanto las tic son una herramienta de apoyo, uno de los retos más importantes de los profesionales de la educación debe centrarse, sin lugar a duda, en el estudio de la relación que los alumnos/as establecen con las TIC.

Es necesario conocer y comprender en profundidad cómo las utilizan, para qué y con qué frecuencia lo hacen, así como la importancia que tienen en su vida cotidiana. También es interesante conocer cómo estás tecnologías mediatizan sus relaciones interpersonales con padres, madres, profesorado, etcétera.

Dentro del contexto social, los alumnos/as mantienen una estrecha relación con las tecnologías de la información y la comunicación debido a que se han convertido en una poderosa herramienta que les facilita información, comunicación y potencia el desarrollo de habilidades y nuevas formas de construcción del conocimiento.

Las TIC como el ordenador, Internet y el teléfono móvil, han propiciado acelerados e innovadores cambios en nuestra sociedad, principalmente, porque poseen un carácter de interactividad. Las personas, a través de su uso, pueden interactuar con otras personas o medios mientras nos ofrecen posibilidades que anteriormente eran desconocidas.

De lo que se trata con el uso de estas tecnologías dentro del aula, no es, transmitir una información determinada, sino de enseñar a aprender a lo largo de toda la vida. Los centros educativos tienen que preparar a sus alumnos/as para, no solo acceder a la información, sino también saber “crear” conocimiento basado en dicha información. Deben saber

seleccionar, valorar, criticar, desechar y utilizar adecuadamente dicha información a la que tienen acceso desde sus puestos escolares.

Las TIC se pueden analizar y clasificar en distintitos tipos. Desde nuestra perspectiva consideramos tres tipos de usos esenciales:

- Lúdico y de Ocio.
- Comunicación e Información.
- Educativo

Características de las Tic en la educación

- permiten reducir costos
- reducir tiempos
- mayor expansión en cuanto a ubicación geográfica
- variabilidad en los modelos educativos virtuales
- mayor acceso a la información.
- aprendizaje sincrónico y asincrónico
- Son de carácter innovador y creativo, pues dan acceso ha nuevas formas de comunicación.
- Tienen mayor influencia y beneficia en mayor proporción al área educativa ya que la hace más accesible y dinámica.
- Son considerados temas de debate público y político, pues su utilización implica un futuro prometedor.
- Se relacionan con mayor frecuencia con el uso de la Internet y la informática.
- Afectan a numerosos ámbitos de las ciencias humanas como la sociología, la teoría de las organizaciones o la gestión.

Herramientas de las Tic en la educación

- **Flexibilidad:** tanto el alumno como el profesor pueden decidir el uso del material informático o dispositivo electrónico que se adapta a sus necesidades para realizar una tarea en concreto.
- **Versatilidad:** con las herramientas digitales te permite realizar diferentes tareas o actividades en diferentes formatos, como por ejemplo, la producción, edición o transformación de un vídeo.
- **Interactividad:** con el uso de las herramientas digitales, los alumnos pueden interactuar y descubrir una serie de contenidos que les facilite el logro en la consecución de las tareas.
- **Conectividad:** los alumnos pueden comunicarse, compartir e intercambiar información por medio del uso de redes sociales o de plataformas virtuales en las cuales pueden aportar y ofrecer sus puntos de vista referidos a un tema en específico.

> (Sanchez, 2014) Según María de Rus Guerrero Sánchez el desarrollo del alumno es muy fundamental, y con la ayuda de las Tic podemos de una manera más factible enseñar a los alumnos, mientras que a los docentes nos ayuda a que el trabajo sea más eficiente al momento de enseñar.

¿Qué tipos de TIC existen?

- **Redes:** la telefonía fija, la banda ancha, la telefonía móvil, las redes de televisión o las redes en el hogar son algunas de las redes de TIC.
- **Terminales:** existen varios dispositivos o terminales que forman parte de las TIC. Estos son el ordenador, el navegador de Internet, los sistemas operativos para ordenadores, los teléfonos móviles, los televisores, los reproductores portátiles de audio y video o las consolas de juego.
- **Servicios en las TIC:** las TIC ofrecen varios servicios a los consumidores. Los más importantes son el correo electrónico, la búsqueda de información, la banca online, el audio y música, la televisión y el cine, el comercio electrónico, e-administración y e-gobierno, la e-sanidad, la educación, los videojuegos y los servicios móviles.

Ventajas de las Tic

- **Motivación.** el alumno/a se encontrará más motivado utilizando las herramientas tics puesto que le permite aprender la materia de forma más atractiva, amena, divertida, investigando de una forma sencilla.
- **Interés.** el interés por la materia es algo que a los docentes nos puede costar más de la cuenta dependiendo simplemente por el título de la misma, y a través de las tic aumenta el interés del alumnado indiferentemente de la materia.

- **Interactividad.** el alumno puede interactuar, se puede comunicar, puede intercambiar experiencias con otros compañeros del aula, del centro o bien de otros centros educativos enriqueciendo en gran medida su aprendizaje. los estudios revelan que la interactividad favorece un proceso de enseñanza y aprendizaje más dinámico y didáctico. la actitud del usuario frente a la interactividad estimula la reflexión, el cálculo de consecuencias y provoca una mayor actividad cognitiva.
- **Cooperación.** los tics posibilitan la realización de experiencias, trabajos o proyectos en común. es más fácil trabajar juntos, aprender juntos, e incluso enseñar juntos, si hablamos del papel de los docentes. no nos referimos sólo al alumnado, también el docente puede colaborar con otros docentes, utilizar recursos que han funcionado bien en determinadas áreas de las que el alumno/a será el principal beneficiario. se genera un mayor compañerismo y colaboración entre los alumnos/as.
- **Iniciativa y creatividad.** el desarrollo de la iniciativa del alumno, el desarrollo de su imaginación y el aprendizaje por sí mismo.
- **Comunicación.** se fomenta la relación entre alumnos/as y profesores, lejos de la educación tradicional en la cual el alumno/a tenía un papel pasivo. la comunicación ya no es tan formal, tan directa sino mucho más abierta y naturalmente muy necesaria. mayor comunicación entre profesores y alumnos/as (a través de correo electrónico, chats, foros) en donde se pueden compartir ideas, resolver dudas, etc.
- **Autonomía.** con la llegada de las TIC´s y la ayuda de internet el alumno/a dispone de infinito número de canales y de gran cantidad de información. puede ser más autónomo para buscar dicha información, aunque en principio necesite aprender a utilizarla y seleccionarla. esta labor es muy importante y la deberá enseñar el docente. los alumnos aprenden a tomar decisiones por sí mismos.
- **Continúa actividad intelectual**. con el uso del tic el alumno/a tiene que estar pensando continuamente.
- **Alfabetización digital y audiovisual.** se favorece el proceso de adquisición de los conocimientos necesarios para conocer y utilizar adecuadamente las tic

Las TIC se utilizan como herramientas e instrumentos del proceso de enseñanza aprendizaje, tanto por parte del profesor como por el alumnado, sobre todo en lo que atañe a la búsqueda y presentación de información, pero las TIC pueden aportar algo más al sistema educativo.

Uno de los colectivos que se ve especialmente beneficiado por la aplicación de las TIC en la educación es el de las personas con discapacidad y es que, si el desarrollo tecnológico no tiene en cuenta las necesidades de este sector, se pueden dar nuevas formas de exclusión social.

Las personas ciegas o deficientes visuales tienen, como es obvio, serios problemas de accesibilidad a las TIC. Dicha dificultad se suple con los llamados «revisores de pantalla» que permiten interpretar la pantalla a través de una línea Braille añadida al teclado y un sistema de voz.

En caso de que no haya ceguera sino deficiencia visual, la solución radica en el tamaño de las fuentes, colores, contrastes, resolución de pantalla, etc.

El caso de los sordos es algo distinto, aunque si bien podría pensarse que al tener facultades visuales no deberían tener problemas para leer y escribir de forma correcta, la realidad es que muchos de ellos presentan problemas de lectura y escritura. El remedio en este caso consiste en establecer un vocabulario y una estructura de navegación sencilla. Adicionalmente, es necesario que los contenidos en audio vayan acompañados de subtítulos o descripciones textuales.

Además, la disponibilidad de las TIC en la escuela es una valiosa herramienta y constituye un componente esencial para evitar que los grupos económicamente desfavorecidos y las minorías se encuentren cada vez más aislados y alineados con respecto a las familias que tienen acceso a las TIC en sus hogares. Un acceso restringido a las nuevas tecnologías supondría un riesgo de exclusión social.

(Sunkel, 2010) la perspectiva del desarrollo con las tic concibe la tecnología como un medio a favor de un desarrollo humano y social más inclusivo y pone como elementos centrales de la transición hacia las sociedad de información.
En definitiva, podemos señalar que: las TIC aplicadas al proceso de enseñanza-aprendizaje aportan un carácter innovador y creativo, ya que dan acceso a nuevas formas de comunicación; tienen una mayor influencia y beneficia en mayor proporción al área educativa, ya que la hace más dinámica y accesible; se relacionan con el uso de Internet y la informática; está abierta a todas las personas (ricos, pobres, discapacitados,) y afectan a diversos ámbitos de las ciencias humanas.

Algunas de las principales funciones que cumplen las TIC en la educación:

- Como medio de expresión: para realizar presentaciones, dibujos, escribir, etc.

- Canal de comunicación presencial. Los alumnos/as pueden participar más en clase. Pero, también es un canal de comunicación virtual, en el caso de mensajería, foros, web log, wikis, etc. que facilita los trabajos en colaboración, intercambios, tutorías, etc.
- Instrumento para procesar información.
- Fuente abierta de información.
- Instrumento para la gestión administrativa o tutorial facilitando el trabajo de los tutores y gestores del centro.
- Herramienta de diagnóstico, evaluación, rehabilitación…
- Medio didáctico: guía el aprendizaje, informa, entrena, motiva.
- Generador de nuevos escenarios formativos donde se multiplican los entornos y las oportunidades de aprendizaje.
- Medio lúdico para el desarrollo cognitivo.
- Suelen resultar motivadoras, ya que utilizan recursos multimedia como videos, imágenes, sonido, interactividad… Y la motivación es uno de los motores del aprendizaje.
- Pueden facilitar la labor docente con más recursos para el tratamiento de la diversidad y mayores facilidades para el seguimiento y evaluación.
- Permiten la realización de nuevas actividades de aprendizaje de alto potencial didáctico.

(Torres, 2017)" La educación a distancia se combina con la tecnología ayudando en si a docentes y alumnos a trabajar de una mejor manera, incrementando la motivación del alumno para que pueda realizar investigaciones por medio de bibliotecas virtuales.

Desventajas

- **Generan mayores distracciones:** En el mundo de las TIC tienes tal cantidad de información y de alternativas que es muy fácil distraerse, aumenta por tanto el grado de dispersión
- **Altos niveles de adicción:** Cuando hablábamos antes de aprender a utilizar las TIC y de concienciarse sobre ellas, nos referíamos entre otros a aprender a controlar nivel de adicción que estas generan, sobre todo en los perfiles más jóvenes
- **Mayor pérdida de tiempo:** Muy relacionada con el primer punto de atención de este listado
- **Genera aislamiento:** El uso abusivo de las TIC genera un menor contacto, en el mundo físico, entre personas, lo cual supone un hándicap para el crecimiento de la persona. También conlleva la no realización de otras actividades necesarias, como por ejemplo el deporte
- **Filtrado de la información:** Mucha de la información que encuentras en los medios digitales es falsa o incompleta. Hay que saber contrastar el contenido y buscar fuentes de información fiables
- **Ciberbullying o acoso a través de las redes**: Sin duda un tema muy controvertido y de rabiosa actualidad y uno de los mayores riesgos que suponen las TIC. La falta de contacto físico con otras personas provoca la pérdida de asertividad y puede derivar en este tipo de actuaciones. Igualmente, la posibilidad de crear perfiles falsos y ocultar la identidad en las redes, pueden provocar situaciones de riesgo para las personas en las redes
- **Falta de privacidad**: Este tema está también muy relacionado con el anterior, estamos muy expuestos debido a la cantidad de información personal que compartimos en las redes, esto puede derivar en convertirnos en el blanco de persecución de acosadores. Por suerte, cada vez más se trabaja en mejorar la privacidad en las herramientas, pero sin duda, también es necesaria una tarea de concienciación de que no es necesario, es más, puede llegar a ser contraproducente, compartir cierto tipo de información a través de las redes.

Metodologia

Para la siguiente investigación se utilizó la metodología de investigación de campo por lo que implica una combinación del método de observación del estudiante, encuestas y análisis. A través de las prácticas pre-profesionales que se efectúo en los CDI se pudo realizar las encuestas y la observación, con esto se pudo obtener datos nuevos al mismo tiempo se procedió a realizar el análisis crítico de cada pregunta respondida por los docentes del centro de desarrollo infantil obteniendo resultados satisfactorios.

Técnica: Encuesta y Observación

Población: 8 docentes

Resultados de investigación aplicadas por medio de encuestas a las docentes del centro de desarrollo infantil "Ignacio Flores".

1.- ¿Se ha capacitado en el manejo de las TIC para laborar como docentes?

Tabla N° 1: Se ha capacitado en el manejo de las TIC

Alternativas	frecuencia	Porcentaje %
si	2	25%
no	6	75%
TOTAL	8	100%

***Fuente**: Centro de desarrollo infantil "Ignacio Flores"*

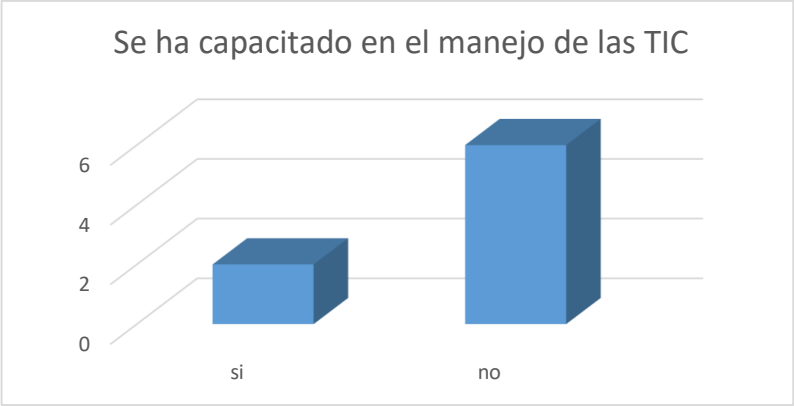

Grafico N°1: Se ha capacitado en el manejo de las TIC

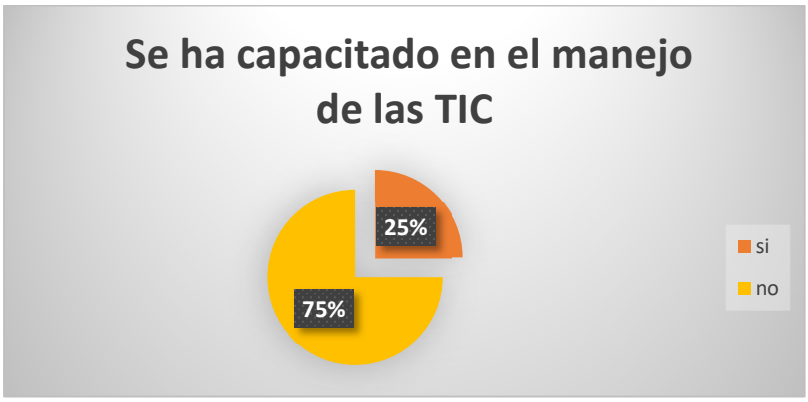

Grafica N°2: Se ha capacitado en el manejo de las TIC

***Fuente:** CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta un 75% de las docentes encuestadas respondieron que no se han capacitado en el manejo de las tic, mientras que un 25% respondieron que si se han capacitado para el manejo de las Tic.

Interpretación

La inclusión de las Tic en la educación es una preocupación inminente en cualquier institución, puesto que requiere que los alumnos estén preparados para usar medios tecnológicos durante el proceso de enseñanza aprendizaje.

¿Usted ha asistido a talleres de actualización de conocimientos de manejo de aulas virtuales?

Tabla N°2: Talleres de actualización de conocimientos

Alternativas	Número	Porcentaje %
Si	2	25%
No	6	75%
TOTAL	8	100%

***Fuente**: Centro de desarrollo infantil "Ignacio Flores"*

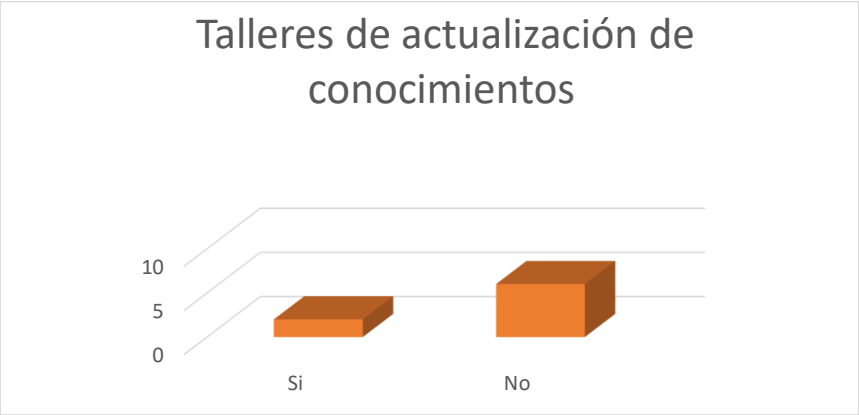

Grafico N°1: Talleres de actualización de conocimientos

Grafico N°2: Talleres de actualización de conocimientos

***Fuente:** CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta, el 25% de los docentes encuestados respondieron que si han asistido a talleres de actualización de conocimientos y un 75% de los docentes encuestados respondieron que no han asistido a los talleres para la actualización de conocimientos.

Interpretación

Los talleres de las Tic son muy importantes para poder apoyar los objetivos que tiene el docente al momento de enseñar a los estudiantes, una manera de mejorar como docentes es tomar conciencia de nuestro rol, en este siglo tomar conciencia de nuestro ser, sentir, pensar y hacer.

¿Qué herramientas tecnológicas utiliza en el proceso de enseñanza aprendizaje?

Tabla N° 3: qué herramientas tecnológicas utiliza

Alternativas	Número	Porcentaje %
Laptop	1	13%
Celular	5	63%
Tablet	0	0%
Televisión	2	25%
Proyector de datos	0	0%
Smart	0	0%
Ninguna	0	0%
TOTAL	8	100%

***Fuente**: Centro de desarrollo infantil "Ignacio Flores"*

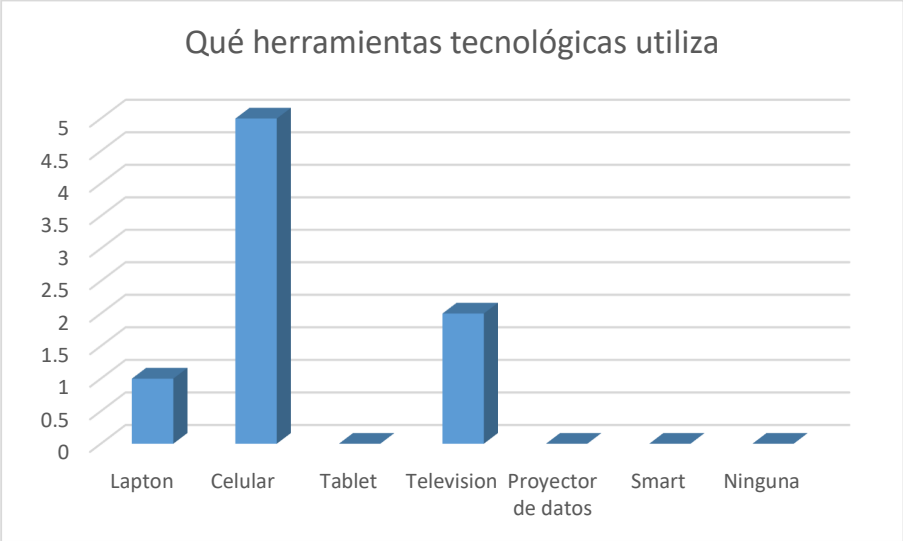

Grafico N°1: qué herramientas tecnológicas utiliza

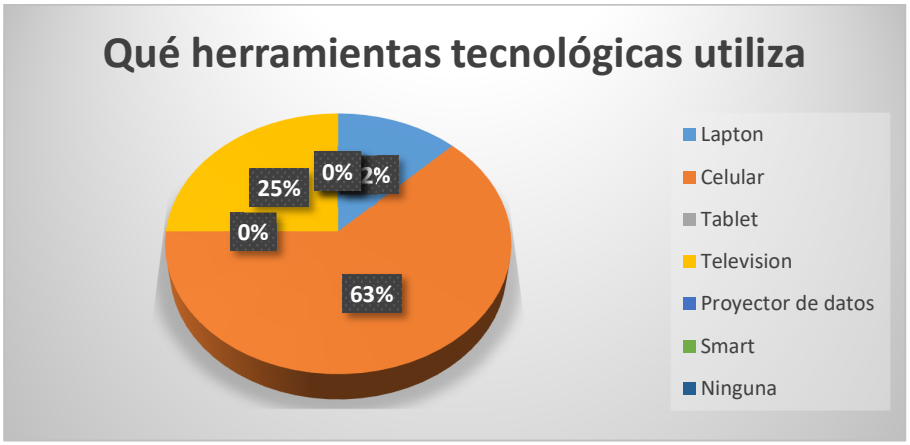

Grafico N°2: qué herramientas tecnológicas utiliza

***Fuente:** CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta un 13% de docentes respondieron que utilizan como herramienta la laptop, un 63% de docentes utiliza como herramienta el celular, un 25% de docentes utilizan como herramienta la televisión mientras que un 0% no utiliza la Tablet, Smart, proyector de datos.

Interpretación

El uso de las herramientas tecnológicas en el aula permite agregar valor a los procesos educativos, lo que implica conocer que se está haciendo bien y mal, estas herramientas nos permiten que los estudiantes tengan un aprendizaje colaborativo y significativo, además de ayudarnos en el ahorro de tiempo durante el proceso de enseñanza aprendizaje.

¿Conoce Usted Si En Ministerio De Educación Ha Implementado En La Institución Educativa O CDI Computadoras Para El Proceso De Enseñanza Aprendizaje?

Tabla N° 4: Implementa en la institución educativa o CDI computadoras

implementa en la institución educativa o CDI computadoras		
Alternativas	Número	Porcentaje %
Si	0	0%
No	8	100%
TOTAL	8	100%

***Fuente**: Centro de desarrollo infantil "Ignacio Flores"*

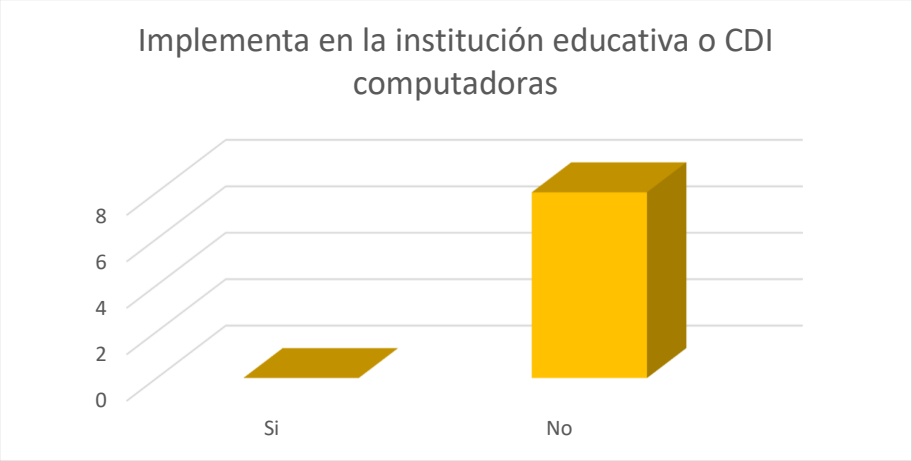

Grafico N°1: Implementa en la institución educativa o CDI computadoras

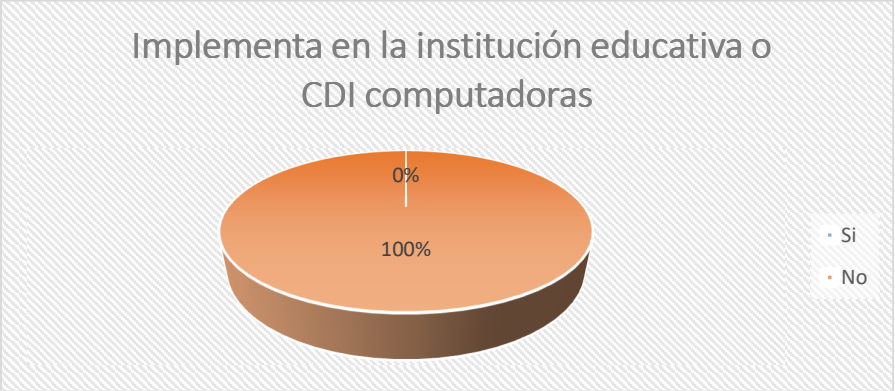

Grafico N°2: Implementa en la institución educativa o CDI computadoras

Fuente: *CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta un 100% de docentes responden que no implementan el uso de la computadora en el proceso de enseñanza aprendizaje.

Interpretación

El implemento de computadoras en las instituciones son muy importantes ya que el alfabetismo en la computación es una habilidad esencial en el mundo moderno , donde las actitudes tecnológicas son más vitales para tener éxitos en la vida, los niños expuestos a computadoras en las escuelas primarias tienen la oportunidad de obtener aptitudes tempranas en la vida.

¿Para Enseñar A Sus Estudiantes Utiliza Las TIC Como Recurso Tecnológico?

Tabla N° 5: Utilización de las Tic como recurso tecnológico

Alternativas	**Número**	**Porcentaje %**
Si	0	0%
No	8	100%
TOTAL	8	100%

Fuente*: Centro de desarrollo infantil "Ignacio Flores"*

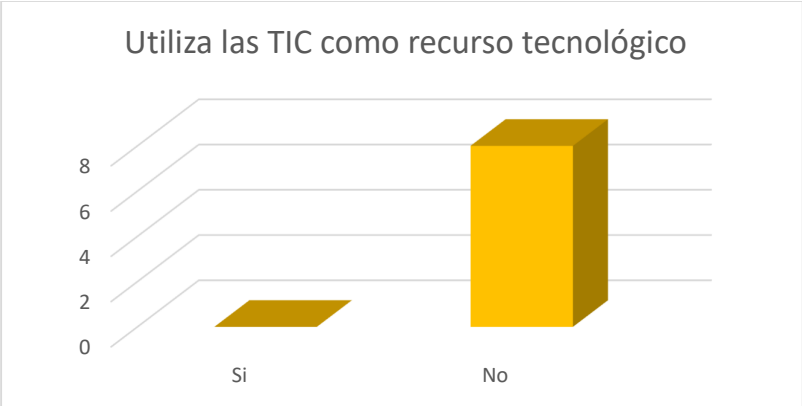

Grafico N°1: Utilización de las Tic como recurso tecnológico

Grafica N°2: Utilización de las Tic como recurso tecnológico

Fuente: *CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta el 100% de docentes no utiliza las Tic como un recurso tecnológico al momento de enseñar.

Interpretación

La utilización de las tic favorecen la interacción docentes- estudiantes, es de gran importancia porque a través de la interacción entre docente- alumno se convierte en una educación virtual y adecuada permitiendo que los estudiantes tengan una flexibilidad en el acceso y manejo de la información.

¿Usted Está Interesado En Innovar Sus Clases Utilizando Recursos Tecnológicos?

Tabla N°6: Innovar sus clases utilizando recursos tecnológicos

Alternativas	Número	Porcentaje %
Si	2	25%
No	6	75%
TOTAL	8	100%

Fuente*: Centro de desarrollo infantil "Ignacio Flores"*

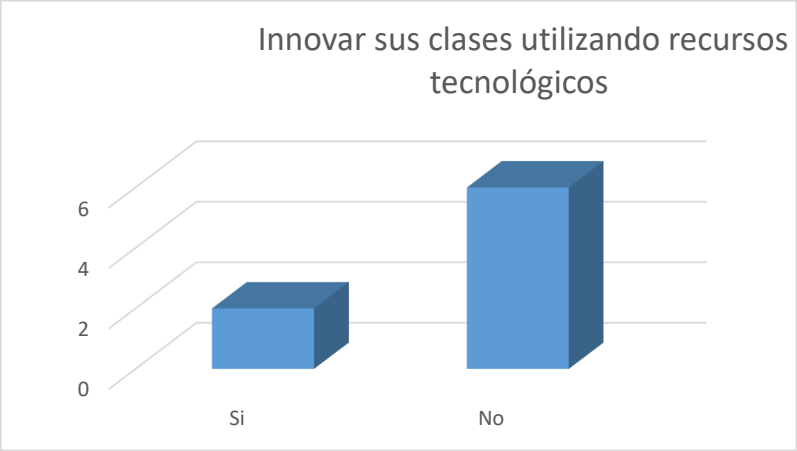

Grafico N°1: Innovar sus clases utilizando recursos tecnológicos

Grafico N°2: Innovar sus clases utilizando recursos tecnológicos

Fuente: *CDI" Ignacio Flores"*

Análisis Y Discusión

De acuerdo a esta pregunta el 75% de docentes no utiliza los recursos tecnológicos para innovar su clase y el 25% de docentes si utilizan los recursos tecnológicos para innovar sus clases.

Interpretación

Utilizar las TIC en el aula implica adaptar el sistema educativo a una sociedad cambiante y a unas necesidades específicas, los docentes deben ser capaces de manejar de forma adecuada y pedagógica las tics y combinar las metodologías tradicionales con formas innovadoras de enseñanza.

¿Hace Que Tiempo Ha Asistido A Clases De Capacitación Sobre Las TIC?

Tabla N° 7: Asistido a clases de capacitación sobre las TIC

Alternativas	Número	Porcentaje %
1 a 3	8	100%
3 a 5	0	0%
5 a 7	0	0%
7 a 9	0	0%
TOTAL	8	100%

Elaborado por: *Estudiantes de la carrera de educación inicial de la Universidad Técnica de Cotopaxi*
Fuente*: Centro de desarrollo infantil "Ignacio Flores"*

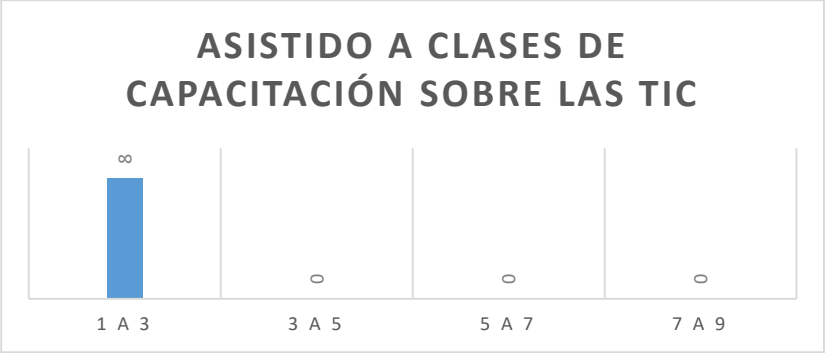

Grafico N°1: Asistido a clases de capacitación sobre las TIC

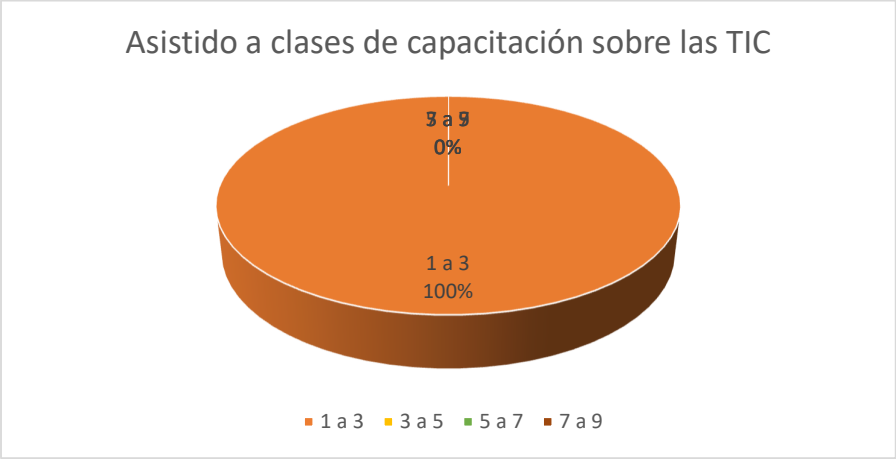

Grafico N°2: Asistido a clases de capacitación sobre las TIC

Fuente: *CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta, de 1 a 3 años el 100% de docentes han asistido a clases de capacitación de las TIC, mientras que de 3 a 9 años no han asistido

Interpretación

Las tic, son la innovación educativa del momento y permiten a los docentes y alumnos cambios determinantes en el quehacer diario del aula y en el proceso de enseñanza aprendizaje de los mismos.

¿Las TIC Pueden Ser Utilizadas Por Los Docentes En Las Diferentes Áreas De Estudio?

Tabla N° 8: Las TIC pueden ser utilizadas por los docentes

Alternativas	Número	Porcentaje %
Si	8	100%
No	0	0%
TOTAL	8	100%

Fuente*: Centro de desarrollo infantil "Ignacio Flores"*

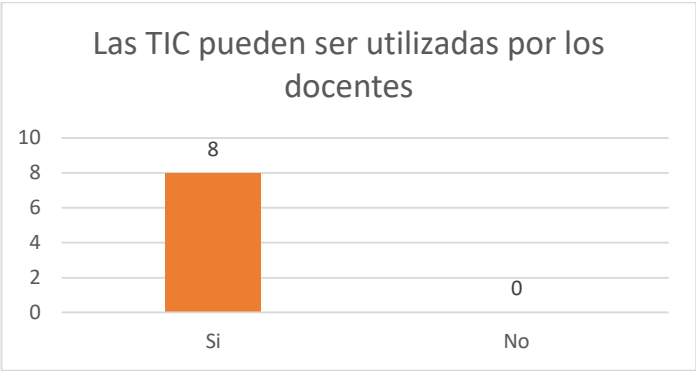

Grafico N°1: Las TIC pueden ser utilizadas por los docentes

Grafica N°2: Las TIC pueden ser utilizadas por los docentes

Fuente: *CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta un 100% de docentes responden que las Tic si pueden utilizar los docentes.

Interpretación

La incorporación de las TIC en la sociedad y en especial en el ámbito de la educación ha ido adquiriendo una creciente importancia y ha ido evolucionando a lo largo de estos últimos años, tanto que la utilización de estas tecnologías en el aula pasará de ser una posibilidad a erigirse como una necesidad y como una herramienta de trabajo básica para el profesorado y el alumnado.

Los Recursos Tecnológicos Los Utiliza Para:

Tabla N° 9: Los recursos tecnológicos los utiliza para

Alternativas	Número	Porcentaje %
Investigar	3	38%
Realizar las actividades laborales	1	13%
Realizar actividades personales	4	50%
TOTAL	8	100%

Fuente*: Centro de desarrollo infantil "Ignacio Flores"*

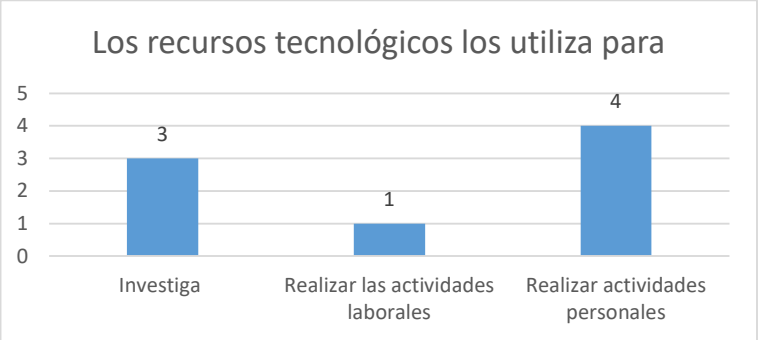

Grafico N°1: Las TIC pueden ser utilizadas por los docentes

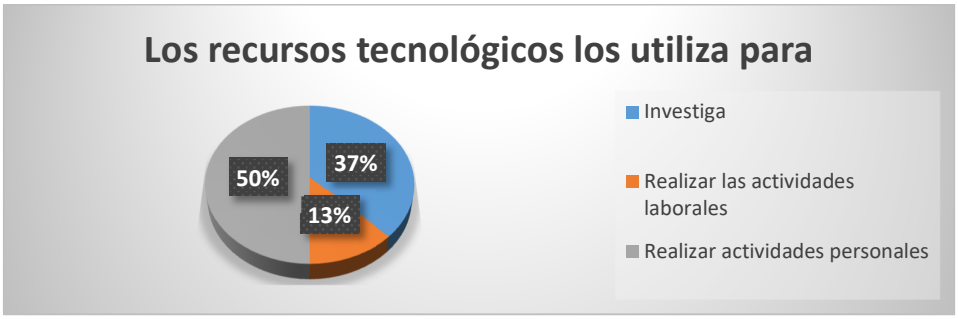

Grafica N°2: Las TIC pueden ser utilizadas por los docentes

Fuente: *CDI" Ignacio Flores"*

Análisis

De acuerdo a esta pregunta el 50% de docentes utilizan los recursos tecnológicos para actividades personales, el 38% de docentes utilizan los recursos tecnológicos para investigar, y el 13% lo utilizan para actividades laborales

Interpretación

Un recurso tecnológico es un medio que se vale de la tecnología para cumplir con su propósito. Pueden ser tangibles o intangibles. Los recursos tecnológicos sirven para optimizar procesos, tiempos, recursos humanos, agilizando el trabajo y tiempos de respuesta

¿las dificultades para incorporar las tic en su trabajo se debe a?

Tabla N° 10: Las dificultades para incorporar las TIC

Alternativas	Número	Porcentaje %
Falta de preparación	1	13%
Falta de tiempo	4	50%
Falta de herramientas tecnología en la institución	3	38%
Ninguno	0	0%
TOTAL	8	100%

Fuente*: Centro de desarrollo infantil "Ignacio Flores"*

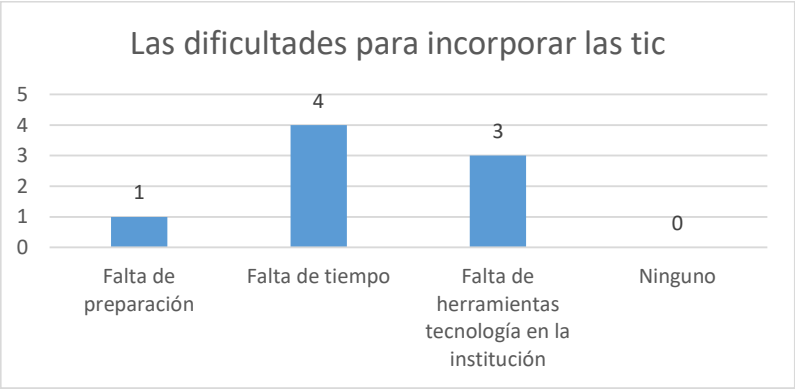

Grafico N° 1: Las dificultades para incorporar las TIC

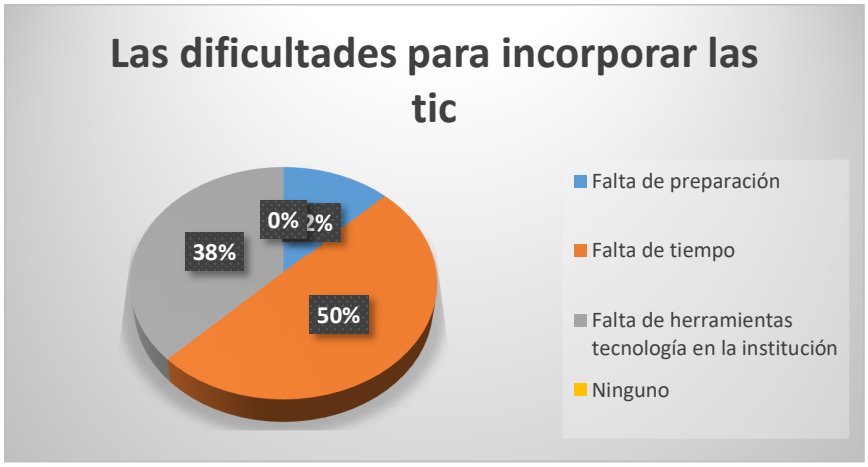

Grafica N°2: Las dificultades para incorporar las TIC

Fuente: CDI" Ignacio Flores"

Análisis

De acuerdo a esta pregunta el 50% de docentes tienen una dificultad para incorporar las TIC por falta tiempo, el 38% de docentes tienen dificultad para incorporar las TIC por falta de herramientas y el 13% tienen dificultad por falta de preparación.

Interpretación

La utilización de las TIC se dificulta por el bajo nivel de preparación del profesor utilizando las nuevas tecnologías y el material de información disponible, la mala planificación y la falta de espacio y tiempo dificultan la utilización de estas herramientas.

Conclusiones

- Como hemos podido ver a lo largo de este artículo es evidente que las TIC han tenido, tienen y seguirán teniendo una enorme repercusión en la sociedad y en el ámbito educativo.
- Las ventajas que han tenido las TIC en el proceso educativo es que la gran mayoría de docentes aplican las TIC en la secundaria la cual queremos fomentar el uso adecuado de las TIC desde la primaria.
- En el centro de desarrollo infantil" Ignacio Flores" no se aplica los medios tecnológicos en el ámbito educativo correctamente.

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The Determining Factors for Establishing the Structure of Agricultural Crops in Small Farms in Romania

Marius Daniel NICULA
”Dunărea de Jos" University of Galaţi, Romania, marius_nicula89@yahoo.com.

Dumitrache Bogdan BRATOVEANU
”Dunărea de Jos" University of Galaţi, Romania, bbratoveanu@ugal.ro

Petre Adrian LIPTAC
”Dunărea de Jos" University of Galaţi, Romania,
adrianliptac@yahoo.com

Raluca Beatrice COSTEA (VOINEA)
”Dunărea de Jos" University of Galaţi, Romania,
office@go-smart.ro

Iuliana Manuela DUMITRIU (ION)
"Dunărea de Jos" University of Galaţi, Romania, iuliana.ion12@yahoo.com.

Cristina STOICA (DINCĂ)
"Dunărea de Jos" University of Galaţi, Galați, Romania
dincacristina2007@yahoo.com

Silvius STANCIU
"Dunărea de Jos" University of Galaţi, Romania
sstanciu@ugal.ro.

Abstract

The crop structure of a farm designates its field of activity and, in the case of developing a strategy, it is a component of it, influencing in many aspects the results that will be obtained. Due to its complexity, determined by the multitude of components, the relationships between it and the impact it generates on the economy of agricultural holdings, the culture structure has a special decision charge. In this context, the structure can be viewed as a combination of options, of ways in which the unit is to function. It is absolutely necessary for the process of establishing a culture structure to take into account the relationships of biological, technological and economic nature, whose contents can lead to either a complex structure of production (diversification) or the imposition of narrowing the profile of the production activity (specialization). The following indicators are followed in research: structure of cultures (2015-2018); cultivated area (2015-2018) and total production, prices and total revenues (2015-2018). The conclusion of the research is that choosing an optimal crop structure, it starts from the soil and climate conditions that characterize the agricultural unit, following on one hand, putting them into value, and on the other hand satisfying the requirements of the plants towards these factors, which influences the level of production. Extensive and intensive agriculture determines the organization of different production structures, with particularities that influence the economic results on the farm level.
Practicing culture structure is a natural consequence of the plant biology, especially population’s need for food (population growth and product demand).

Keywords: Agriculture, Culture Structure, Culture Share.

Introduction

The rural development of Romania experienced a complex evolution after the change of the political regime in 1990, being influenced by the national policies regarding the field of land funds and the retrocession by the former

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owners. The fragmentation of agricultural lands, due to the wrong system of reallocation of the Romanian farmers' lands, affected the performance of the national agricultural production and favoured the sale of the Romanian land to foreign investors (Iancu and Stanciu, 2017).

Direct payment schemes to be granted as support mechanisms for agricultural producers, are the following in Romania: Single payment scheme on the agricultural area; Transitional national aid - ANT; Redistributive payment; Payment for climate-friendly agricultural practices; Payment for young farmers; Coupled support scheme; Simplified scheme for small farmers. Payment schemes should be revealed in the impact study.

Since, in general, crops have varied production cycles and that environmental factors know a certain distribution over time, some of the crops, respectively, the varieties, "catch" better conditions. For example, given that, in certain areas, rainfall is concentrated during May-June and early July, early varieties of maize give better results than late ones, which, although having higher efficiency, are affected by drought at the end of the period, production per hectare being decreased (Stanciu, 2017a, b).

The same can be done in the case of field vegetables, in order to counteract the negative effects of late spring frosts and mists that come too early in the fall. In principle, the determination of the production structure of the agricultural holding must take into account the criteria of the technical and economic optimum (Florea et al, 2019). In connection with the transition to the market economy, it is deeply necessary to investigate the economic efficiency of the production and to introduce corrections in the modification of the specialization of enterprises. Schin, Virlanuta and Stanciu (2017), showed that the association of agricultural producers, in various forms, can be a solution for the improvement of technological flows for the agricultural feedstock production, for the processing and selling of food products. As far as agricultural associations from Romania are concerned, there are significant discrepancies between counties and between the crop and animal production sectors. At a national level, there is a moderate concentration degree of producer organisations.

This is done through structural changes in the production process, as well as in the potential of resources for which large investments are usually required. The selection of crops must be made according to the profitability ensured by selling the products that depend on the level of the resources of the companies. Selecting the most profitable crops and determining the profit obtained by combining them is a relatively slow process and a specific research problem.

An analysis of the structure of the main agricultural crops in Romania (table 1), in 2018 compared to the year 2014, shows that:

- grains decreased by 4.14%, from 5,484 thousand ha in 2014 to 5257.20 thousand ha in 2018;
- legumes registered an increase of 170.59% in 2018 compared to the year 2014, especially due to the increase of the cultivated areas with pea beans, an increase with 233.89% in 2018 compared to the year 2014;
- oilseed plants registered an increase with 18.40%, influenced by the growth with 92.25% in the culture of rapeseed.

Regarding the share of the crop groups from the total cultivated area it can be observed the following:

- cereals registered a decrease in share, from 66.44% in 2014 to 62.09% in 2018, decrease influenced by the share decrease of the areas cultivated with maize from 32.66% to 28.82%;
- legumes registered an increase in share, from 0.60% in 2014 to 1.58% in 2018, influenced by the share increase of cultivated areas with peas from 0.44% to 1.42%;
- the oilseed plants registered an increase of the share, from 18.57% in 2014 to 21.44% in 2018, growth influenced by the increase of the surfaces of all crops. (table 1).

Table 1: Share of the main crops from the total agricultural area in Romania (2014 – 2018)

Culture groups / Culture	years		(+/-) compared to 2014 (%)	% (compared to the total cultivated area)	
	2014	2018		2014	2018
Total cultivated area (Thousands of ha), of which:	**8254.40**	**8466.70**	**2.57**		**100.00**
● Grains	**5484.00**	**5257.2**	**- 4.14**	**66.44**	**62.09**
- Wheat	2100.30	2116.2	0.76	25.44	24.99
- Rye	9.00	10.30	14.44	0.11	0.12
- Barley	421.00	423.50	0.59	5.10	5.00
- Oats	165.10	161.5	-2.18	2.00	1.91
- Maize	2696.20	2439.8	-9.51	32.66	28.82
● Legumes	**49.30**	**133.4**	**170.59**	**0.60**	**1.58**
- Peas beans	36.00	120.2	233.89	0.44	1.42
- Beans	12.90	11.4	-11.63	0.16	0.13
● Oilseed plants	**1532.90**	**1815.0**	**18.40**	**18.57**	**21.44**
- Sunflower	1022.00	1007.0	-1.47	12.38	11.89
- Soy	176.30	169.4	-3.91	2.14	2.00
- Rapeseeds	329.10	632.7	92.25	3.99	7.47
● Beetroot	**21.90**	**25.7**	**17.35**	**0.27**	**0.30**
● Tobacco plant	**0.50**	**0.9**	**80.00**	**0.01**	**0.01**

Source: data processed according to the Statistical Yearbook of Romania 2014 and 2018.

Analysing the data presented in Table 2 it is noted that, regarding the structure of the main agricultural crops in Galati County, in 2018 the evolution was different from the evolution to the national level, thus:

- cereals showed a decrease of 16.82%, from 283,976 ha in 2014 to 269,848 ha in 2018;
- legumes registered an increase of 446,47% in 2018 compared to 2014, being influenced by the growth of the cultivated areas with peas with 798.09%;
- oilseed plants showed an increase of 14,43%, growth influenced by the increase with 6,39% of the sunflower culture.

Table 2: Share of main crops from the total agricultural area in Galati County (2014 – 2018)

Culture groups / Culture	**Years**		**(+/-)comp. to 2014%**	**% compared to total agr. area 2014**	**%compared to total cultivated area 2018**
	2014	**2018**			
Total cultivated area, ha	**283,976**	**269,848**	**- 4.98**		
● Grains	**190,589**	**158,524**	**-16.82**	**67.11**	**58.75**
- Wheat and rye	54,882	44,555	-18.82	19.33	16.51
- Maize	112,674	96,914	-13.99	39.68	35.91
● Leguminous	**1,829**	**9,995**	**446.47**	**0.64**	**3.7**
- Peas beas	1,048	9,412	798.09	0.37	3.49
- Beans	751	583	-22.37	0.26	0.22
● Oilseed plants	**68,828**	**78,760**	**14.43**	**24.24**	**29.19**
- Sunflower	49,918	53,108	6.39	17.58	19.68
● Potatoes - total	**1,436**	**1,047**	**-27.09**	**0.51**	**0.39**
● Vegetables - total	**11,540**	**10,331**	**-10.48**	**4.06**	**3.83**

Source: data processed according to the Reports of Statistical Office of Galati County,

Regarding the share of the crop groups from the total cultivated area, in Galati County, it can be observed that:

- grains have decreased in share, from 67,11% in 2014 to 58,75% in 2018, being influenced by the decrease of the share of the wheat cultivated areas from 19,33% to 16,15%;
- leguminous showed an increase of the share, from 0,64% in 2014 to 3,70% in 2018 influenced by the increase of the peas cultivated area from 0,37% to 3,49%;

- oilseed plants registered an increase of the share, from 24,24% in 2014 to 29,19% in 2019.

Considering the structure of the main crops in the total agricultural area used in Galati County, it is required an analysis of it viewed in a rational rotation, recommended for the South Eastern part of Romania (table 3).

Table 3: The share of main crops from the total agricultural area within a rational rotation, in the plain area

Culture groups/Culture	Crop system	
	Irrigated (%)	**Not irrigated (%)**
Maize	33 - 35	25 - 27
Wheat	10 - 12	12 - 16
Barley	6 - 8	11 - 14
Grains - total	**49 - 55**	**48 - 57**
Soybean	8 - 9	5 - 7
Sunflower	5 - 6	8 - 10
Oilseed plants - total	**13 - 15**	**13 - 17**
Beetroot	4 - 5	3 - 4
Other plants for industrialization - total	**4-5**	**3-4**
Fodder plants	**14-15**	**15-18**

Source: CEEX PROJECT no, 732 " The technical-economic and management practical guide - Vegetable production"

From the data presented in Table 2 and Table 3, the following conclusions can be formulated:

In Galati County:

- the share of cereals in the crop structure represented 67,11% in 2014 and 58,75% in 2018, which shows a structure above the recommended share;
- the share of leguminous plants in crop structure represented 0,64% in 2014 and 3,70% in the 2018;
- the share of oilseed plants in crop structure represented 24,24% in 2014 and 29,19% in 2018, a structure above the recommended share.

Case study on PFA Pecheanu Cornel

The Authorized Physical Person (PFA) is the form of organization of the economic activity performed by an entrepreneur in Romania equivalent to a self-employed individual in UK or USA.

The Authorized Physical Person (PFA) PECHEANU CORNEL was founded in 2006 and operates on the basis of the Romanian commercial law, with headquarters in Namoloasa village, Galați County, having an agricultural area of 908,69 ha in 2018, located on the territory of the same locality. The area of arable land owned and used by PFA PECHEANU CORNEL between 2015-2018 has shown a structure of crops presented in table 4 in which it is noticed that cultures of wheat, barley, maize and sunflower are predominant. The land is leased from the rightful owners, based on lease agreements, according to Law no. 16/1994.

The land area currently used has low agricultural potential, the area being disadvantaged due to specific natural conditions, as provided by the National Rural Development Plan 2014-2020, allowing moderate agricultural productions.

The agricultural holding has no possibilities to irrigate the crops, even if in that area has been conducted, before 1989, a project for an irrigation system, abandoned in 1991. From the data presented in table 4 it is noticed that the land area of the agricultural holding, all arable land, has increased during the years 2016, 2017 and 2018, towards the year 2015, with 199.74ha, 223.94 ha and 62.84ha, reaching from 422.17ha in 2015 to 908.69ha in 2018.

Table 4: Crop structure for PFA PECHEANU CORNEL, between 2015 and 2018

Nr. crt.	Culture	2015	2016	2017	2018	Average	(+/-) Towards 2015 (%)
		Area (ha)					
1	Wheat	103.42	305.21	299.15	236.36	236.04	128.54
2	Spring barley	80.44	78.04	195.28	270.42	156.05	236.18
3	Barley (autumn)	-	-	-	38.50	9.63	-
4	Oat	-	31.00	237.16	98.67	91.71	-
5	Maize	54.75	17.91	41.11	30.20	35.99	-44.84
6	Sunflower	56.35	71.05	53.60	128.10	77.28	127.33
7	Soybean	2.70	-	-	-	0.68	-
8	Rapeseed	-	37.56	-	-	9.39	-
9	Fodder plants	44.14	60.84	5	50.70	40.17	14.86
10	Peas beans	-	-	4	-	1.00	-
11	Sorghum	-	20.30	10.55	28.36	14.80	-
12	Uncultivated land	80.37	-	-	27.38	26.94	-65.93
TOTAL		**422.17**	**621.91**	**845.85**	**908.69**	**699.66**	**115.24**

Source: data processed according to PFA PECHEANU CORNEL's records.

The analysis highlights the fact that, during the period 2015-2018, the culture structure has modified, in the sense that certain crops (soybean, rapeseed, peas) are no longer cultivated, but new crops appeared (barley, oats, sorghum). Surface increases are recorded for the autumn wheat crops, maize, sunflower and fodder plants (between 236% for barley and 14,87% for fodder plants). Considering that in the structure of crops a predominant place is occupied by cereals, it can be concluded that the farm is a "cereal type" farm. The following indicators are followed in research: Structure of cultures (2015-2018); The cultivated area, 2015-2018; Total production, prices and total revenues 2015-2018.

The results for the economic activity of agricultural holding PFA PECHEANU CORNEL are presented in tables 5, 6, 7 and 8. The total amount of the obtained products has increased from one year to another as a result of the increase of the cultivated area, but the average production per hectare depended on the climatic conditions.

Table 5: Total production, prices and total income, on crops, realized by PFA PECHEANU CORNEL in 2015

Culture	Area (ha)	Average production (kg/ha)	Quantity (tons)	Average price (RON/ha)	Total revenue (thousand RON)	Income (RON/ha)
Wheat	103.42	1232	127.41	0.57	72.63	702.24
Wheat straw	103.42	369	38.16	0.18	6.87	66.42
Barley	80.44	1134	91.22	0.51	46.52	578.34
Barley straw	80.44	340	27.35	0.18	4.92	61.20
Maize	54.75	876	47.96	0.65	31.17	569.4
Sunflower	56.35	436	24.57	0.8	19.65	348.8
Soybean	2.7	654	1.77	0.8	1.41	523.2
Fodder plants	44.14	3682	162.52	0.2	32.5	736.4
Uncultivatedland	80.37	-	-	-	-	-
TOTAL	**422.17**	**-**	**-**	**-**	**215.67**	**510.87**

Source: *data processed according to PFA PECHEANU CORNEL's records.*

Table 6: Total production, prices and total income, on crops, realized by PFA PECHEANU CORNEL in 2016

Culture	Area (Ha)	Average production (kg/ha)	Quantity (tons)	Price environment (Euro/kg)	Total revenue (thousand RON)	Income (RON/ha)
Wheat	305.21	1578	481.62	0.6	288.97	946.80
Wheat straw	305.21	473	144.36	0.2	28.87	94.60
Barley	78.04	1145	143.98	0.5	44.68	572.50
Barley straw	78.04	343	26.77	0.2	5.35	68.60
Oat	31	946	29.33	0.4	17.60	567.60
Oat straw	31	283	8.77	0.2	1.75	56.60
Maize	17.91	3120	55.88	0.65	36.32	569.4
Sunflower	71.05	1246	88.53	1	88.53	1246.00
Rapeseed	37.56	1127	42.33	0.7	29.63	788.90
Fodder plants	60.84	5682	345.69	0.3	103.71	1704.60
Sorghum	20.3	893	18.13	0.5	9.06	446.50
TOTAL	**621.91**	-	-	-	**654.48**	**1052.37**

Source: data processed according to PFA PECHEANU CORNEL's records.

In 2015, due to drought, yields obtained have been far below the average of the years 2015-2018, and the total income has been influenced by the average sales price, which has been above the average price for the years 2015-2018. In 2016, by comparison to the year 2017, the total income realized by the farm were with 48,54% higher, due to the influence of the average productions as well as the average selling price.

Table 7: Total production, prices and total income, on crops, realized by PFA PECHEANU CORNEL in 2017

Culture	Area (Ha)	Average production (kg/ha)	Quantity (tons)	Average price (RON/ha)	Total revenue (thousand RON)	Income (RON/ha)
Wheat	299.15	1765	528.00	0.45	237.60	794.25
Wheat straw	299.15	529.5	158.40	0.2	31.68	105.90
Barley	195.28	1478	288.62	0.35	101.02	517.30
Barley straw	195.28	443.4	86.59	0.2	17.32	88.68
Oat	237.16	1145	271.55	0.5	135.77	572.50
Oat straw	237.16	343.5	81.46	0.2	16.29	68.70
Maize	41.11	2784	114.45	0.4	45.78	1113.60
Sunflower	53.6	1134	60.78	0.8	48.63	907.20
Fodder plants	5	7342	36.71	0.4	14.68	2936.80
Peas	4	854	3.42	0.8	2.73	683.20
Peas (haulm)	4	213.5	0.85	0.1	0.09	21.35
Sorghum	10.55	935	9.86	0.6	5.92	561.00
TOTAL	**845.85**	**-**	**-**	**-**	**657.51**	**777.34**

Source: data processed according to PFA PECHEANU CORNEL's records.

For some crops, the income per hectare had a significant increase, as it is the case of the sunflower crop, where the income increased by 257.22%, compared to the year 2015 and the case of fodder plants, which increased by 131.47% towards the year 2015. In 2017 compared to the year 2018, the total income registered a decrease by 26.13%, as a result of the change of the crop structure, of the sale prices and of the lower yields compared to the year 2018. In 2018, compared to the year 2017, the total income on the farm increased by 37.75%, as a result of the increase of the used area, but also as an effect of changing the structure of crops, the average selling price and the higher yields.

Table 8: Total production, prices and total income, on crops, realized by PFA PECHEANU CORNEL in 2018

Culture	Area (ha)	Average production (kg/ha)	Quantity (tons)	Average price (RON / ha)	Total revenue (thousands lei)	Income (RON / ha)
Wheat	236.36	1869	441.76	0.55	242.97	1027.95
Wheat straw	236.36	560.7	132.53	0.25	33.13	140.18
Barley (spring)	270.42	1327	358.85	0.4	143.54	530.80
Barley straw	270.42	398.1	107.65	0.25	26.91	99.53
Barley (autumn)	38.5	1156	44.51	0.5	22.25	578.00
Barley straw	38.5	346.8	13.35	0.25	3.34	86.70
Oat	98.67	1138	112.29	0.5	56.14	569.00
Oat straw	98.67	318.64	31.44	0.25	7.86	79.66
Maize	30.2	2938	88.73	0.5	44.36	1469.00
Sunflower	128.1	1259	161.28	1.1	177.41	1384.90
Fodder plants	50.7	7987	404.94	0.5	202.47	3993.50
Sorghum	28.36	895	25.38	0.5	12.69	447.50
Uncultivated land	27.38	-	-	-	-	-
TOTAL	**908.69**	**-**	**-**	**-**	**973.08**	**1070.86**

Source: data processed according to PFA PECHEANU CORNEL records

Conclusions

The structure of cultures, which has a very important role in how it is manifested and in terms of the results it generates, is influenced by natural, economic, technical and technological factors, etc. Taking into account this role, it is necessary to choose and to optimally proportion the different cultures that enter the structure and, implicitly, in the production system.

An optimal culture structure must satisfy several demands in a simultaneous relationship:

- to offer products that, from a quantitative and qualitative point of view, respond to the demand, highlight and protect the natural conditions and other factors of production;
- to allow the organization of culture rotation and to ensure maximum profit for the entrepreneur.

As a result, the option for one structure of cultures or another structure of cultures is a complex process, which is required to be grounded considering both technical and economic knowledge and appropriate methods.
It is rightly appreciated that these conditions manifest themselves as major restrictions, which almost certainly limits the choice of structure, also with a restrictive role intervenes the market of the respective products.

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BotTROP: A Botnets Detection Method Based on Identification of Synchronous Actions

Hubert OSTAP
Military University of Technology, Warsaw, Poland, hubert.ostap@wat.edu.pl

Ryszard ANTKIEWICZ
Military University of Technology, Warsaw, Poland, ryszard.antkiewicz@wat.edu.pl

Abstract

The aim of this paper is to present a method of detecting botnets based on identification of their synchronous actions. There are a lot of botnets implementations and there are a lot of methods of their detection. Usually, those methods are only effective against specific groups of botnets which are using for example IRC, HTTP or P2P protocols to communicate with their Command&Control. Presented method, called BotTROP, utilizes clustering and classification methods to detect synchronous action among corporate network traffic to detect malicious activity such as a botnet of any type. Furthermore, the effectiveness of the presented method was verified in numerous experiments where simulated and real-life network traffic was used.

Keywords: Botnet, Security, Detection, Botnet Detection, Botnet Mitigation.

Introduction

Nowadays, there are a lot of different types of Internet threats such as DOS (Denial of Service), ransomware, phishing campaigns. Some of them are more dangerous, others are better organized but most of them are profit-oriented which makes them difficult to detect and mitigate. One of the biggest Internet threats are botntes (Plohmann et al. 2011) (Gralla 2019) and RATs (Harel 2019). They consist of infected machines controlled from a C2 (Command&Control). Rightful owners don't realize that their devices are infected and used to conduct malicious actions. The number of different types of botnets that have been implemented is truly impressive (Garcia et al. 2014). They use different infection and communication methods. The most popular are based on P2P, HTTP/HTTPS and IRC protocols. They are used for sending and receiving commands from their owner called a botmaster. Another difference between botnets is their architecture. Most of them are centralized with only one C2, more sophisticated are decentralized with a group of C2 based on P2P protocol (Silva et al. 2013). Another type of botnet is based on hybrid architecture. This specific model is used only by few known botnets where decentralized architecture is used to spread domain addresses of the C2s and centralized is used to receive reverse-tcp connections (Chanda 2014) (Wang et al. 2010). During the last several years one has been able to observe an increasing number of new kind of botnets which are based on social networks.

Due to a huge number of described internets threats, there are also a lot of methods of their detection. Unfortunately, most of them are bound by a specific protocol or architecture and are useful only against specific botnets. Others are effective only when a monitoring agent is installed on every host. This approach is also problematic especially for an organization that possess a huge number of devices that should be secured.

This paper presents an improved and developed method for botnet detection which is based on previous research (Ostap et. al 2017). Furthermore, it includes a description of its implementation and extensive research on its effectiveness and quality. It is able to detect botnets that use any kind of architecture, protocol or social networks for communication (Ostap et al. 2018) purpose with their C2. Moreover, to mitigate botnet activity it is not necessary to install any monitoring agent on every host in the monitored network. Network traffic is analysed at the interface between the internal and the public network.

The article is organized as follows. Section 2 contains a description of the novel classification approach for botnet detection methods and an overview of some research works in this field. Section 3 contains a detailed description and

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the main concept of the BotTROP algorithm. In the next section we present a case study including the methodology to reach our objectives, description of the dataset and an interpretation of the results. Section 5 presents performance, evaluation and comparison of some previous solutions. The final section contains a conclusion of our paper and some future work.

An overview of botnet detection methods

Over the years an impressive number of different botnets have been discovered in the wild. It was the root cause of implementing a huge number of defense method by researchers all over the world. So far, few authors have also proposed a classification of botnet detection methods (Feily et al. 2009) (Nallanthighal et al. 2012) (Strayer et al. 2007) (Garcia et al. 2014) (Silva et al. 2013). The first mentioned publication presented by Maryam Feily, Alireza Shahrestani and Sureswaran Ramadass is based on well known and clearly defined classification criteria. The second classification contains a wide spectrum of botnet detection methods based on their architecture. Next publication proposed by Tim Strayer, David Lapsely, Robert Walsh and Carl Livadas contains information about detection method based on botnet network behavior. From our perspective the most valuable classifications are presented by Garcia et al. (2014) and Silva et al. (2013). Taking those two propositions into consideration, we create a scheme that contains attributes of detecting method on which classification may be based and present it in the following subsection.

A Novel Classification Method

Figure no.1 presents a classification of the criteria/attributes based on which botnets detection methods could be described. It is necessary to point out that not all criteria have to be linked with each method but only some of them. The main reason why a new approach to classifying botnet detection methods was taken is the complexity of current methods. Today it is not sufficient to operate only with a classification of detection methods because now they have to implement more than one technique to be effective. Furthermore, the presented classification of attributes is also helpful to describe even the first botnet detection methods which used very simple techniques. Using the presented classification approach, it is possible to compare different botnets detection methods using well known comparison algorithms.

First attribute is called *Data Extraction and Analysis* and contains two values *Host-Based Analysis* and *Network-based Analysis*. The first one requires monitoring agent on every device in a network (at least those used by users). The main goal is to localize malicious files or actions (registry modification, file extraction etc.) After a successful identification of the malicious software different approaches could be taken. One of the most common is to create a signature of such a file and upgrade *Host and Network Based Intrusion Prevention* and *Detection Systems*. Another one is to start the reverse-engineering (RE) process to find out more details about the implementation and techniques used by particular malware. This process is very time-consuming and not every organization is able to implement it. One of the methods based on this criterion was proposed by Stinson et al. (2007). The approach implemented by the authors is to monitor individual machines to find any suspicious and unusual behaviour such as larger CPU usage or interaction with suspicious files. Another method from this group was proposed by Liu et al. (2008). Their method called BotTracer monitors system-level activities to detect unusual actions. Mehedy Masud proposed a method where the main approach is to monitor multiple logs in the host file system. He assumes that bots respond faster than users and this feature could be spotted and compared in log time stamps (Masud et al. 2008).

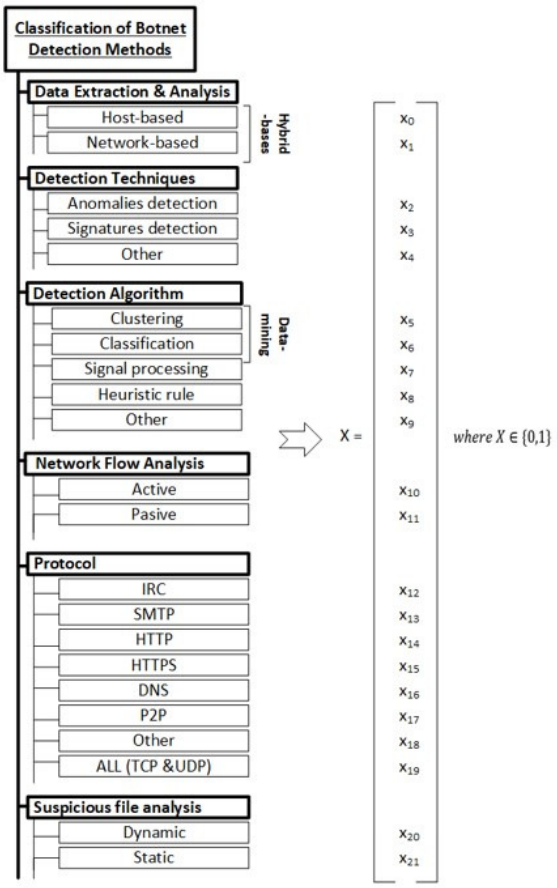

Fig. 1: An overview of the classificaton criteria for botnet detection method.

There are also situations where methods with implemented *Host-based Analysis* value of *Data Extraction & Analysis* attribute are used only when a malicious action is identified by methods with implemented *Network-Based Analysis*. In this approach a monitoring agent is not necessary, a detailed analysis of the infected machine is conducted after identifying its malicious network traffic to the C2.

The second value of the first attribute is called *Network-based Analysis* and is the most commonly implemented approach by the researchers so far. Methods with this value only need access to the analysed network without any necessity of installing a monitoring agent on every device in it. This is the main reason why they are mostly used nowadays (Silva et al. 2013). They owe their popularity to the simplicity of use. Most of them do not require any additional hardware; furthermore, no modification in the network structure is needed. *Network-based* method could be used in any part of the botnet life cycle. Their main advantage is the possibility to mitigate even unknown botnets, which have not been used for any malicious action so far.

The second attribute *Detection Techniques* contains values such as: *Anomalies detection, Signatures Detection and Others*. Methods with implemented one or more values that belong to this attribute are focused on characterization of the network flow. Next attribute is *Detection Algorithms*. Its values are used in each botnet detection method. For the needs of the presented classification, they are grouped based on their main approach. The next attribute *Network Flow Analysis* consists of two values: *Passive Network Flow Analysis* which allows only to observe network flow to localize potential bots and *Active Network Flow Analysis* which also provides methods to modify the network flow. It allows to localize infected devices by changing the content of the captured packet and send it to the suspicious destination or source IP address. The fifth attribute is linked with the protocol being analysed. The last attribute *Suspicious file analysis* represents the methods which are focused on the suspicious file identification and analysis. The values from this group are linked with the final approach how the method make the final decision. The first value describes a

Dynamic method which includes opening and running potentially malicious file in a secure environment and Static which allows only to identify different attributes without running the files.

Nowadays most of the newly implemented methods are network based with modern data-mining algorithms to discover anomalies in the network flow (Silva et al. 2013) using passive network flow analysis algorithm against one or more protocols. According to this we are mostly focused on the research based on methods that have implemented such values of presented attributes.

For the sake of clarity below we classify some botnets detection methods based on scheme described above. The method proposed by Gu et al. (2008) called BotSniffer has implemented *Network Based Analysis* to detect *Anomalies using Clustering* methods. This algorithm, due to *Passive Network Analysis* does not require any interaction with the network or devices. Another representative with the same features was proposed by Binkley et al. (2006). Their approach is to detect bots by analysing an IRC commands and messages. The only difference between those two methods is the protocol, the first one is tcp-based and the second one is effective only against botnets based on IRC communication.

Another presented group consist of attributes as follows: Network-Based Analysis, Signature Analysis, Clustering, Passive Network Flow Analysis and Multiprotocol. The method called BotMiner is one of the representatives (Gu et al. 2008). This approach combines results from two monitors; the first one utilizes Snort (Roesch 1999) to identify malicious actions and the second one is responsible for network monitoring.

Method proposed by Gu et al. (2009) is also based on the attribute Network-Based Analysis Method which ties to identify Anomalies using Classification with the Active Network Flow Analysis approach against only IRC based botnets. The idea behind this method is to inject modified packets that will probe the internal devices if a bot or a human is managing the other side of the communication channel.

Another method strictly correlated with the clustering approach is called BotGAD (Choi et al. 2009; 2012). It is also based on Network-Based Analysis and Analysis of the Anomalies using only Passive interaction with the network flow. The main goal of BotGAD is to detect group activity which may denote the communication process between infected machines and a C2. The group activity (synchronous activity) is a widespread phenomenon widespread among bots, crawlers, and other tools developed to conduct actions simultaneously and automatically. Such tools, unlike humans, tend to communicate with the target in a highly synchronized fashion. BotGAD focuses on finding such actions by analyzing Domain Name System queries in the network flow.

The algorithm implemented by Göbel et al. (2007) is a representative of the group with attributes as follows Network-Based Analysis, Analysis of Signature, Classification and Passive Network Flow Analysis and is only effective against IRC network flow. This method tries to localize suspicious IRC servers, unusual ports for IRC communication and suspicious usernames by inspecting network traffic. A detection method that utilizes Heuristic approach was proposed by Barthakur et al. (2012). It also linked with Network-Based Analysis for spotting any anomalies in P2P protocol by passively monitoring the network flow. For the network classification Support Vector Machine (SVM) is used. The method is based on the observation that legal P2P traffic has significant differences in comparison with malicious P2P network traffic.

The representative of the Hybrid-Based Analysis was proposed by Almutairi et al. (2020). Authors utilize techniques from Host-Based Analysis such as a monitoring agent and Network-Based Analysis in one approach. Their algorithm called HANABot works at the host level and network level and focuses on HTTP, IRC, IP fluxing and P2P network traffic to detect infected machines.

Table 1 contains all the methods described above, classified using the proposed scheme of the classification criteria. It is possible to describe every botnet detection method using a previously described vector of attributes values.

Table 1: The novel classification method.

Attribute value.	BotTROP - Ostap et al. 2018	BotSniffer - Gu et al. 2008	Binkley et al. 2006	BotMiner - Gu et al. 2008	Gu et al. 2009	BotGAD - Choi et al. 2009	Rishi - Gobel et al. 2007	Barthakur et al. 2012	Almutairi et al. 2020
Host-b.	0	0	0	0	0	0	0	0	1
Network-b.	1	1	1	1	1	1	1	1	1
Anom.	1	1	1	0	1	1	0	1	1
Sign.	0	0	0	1	0	0	1	0	0
Other Tech.	0	0	0	0	0	0	0	0	0
Clust.	1	1	1	1	0	1	0	0	0
Classif.	1	0	0	0	1	1	1	1	1
Signal	0	0	0	0	0	0	0	0	0
Heuristic	0	0	1	0	0	0	0	1	0
Other Alg.	0	0	0	0	0	0	0	0	0
Active	0	0	0	0	1	0	0	0	0
Pasive	1	1	1	1	0	1	1	1	1
IRC	0	0	1	1	1	0	1	0	1
SMTP	0	0	0	0	0	0	0	0	0
HTTP	0	0	0	1	0	0	0	0	1
HTTPS	0	0	0	0	0	0	0	0	0
DNS	0	0	0	0	0	1	0	0	0
P2P	0	0	0	1	0	0	0	1	1
Other Prot.	0	1	0	1	0	0	0	0	0
TCP&UDP	1	0	0	0	0	0	0	0	0
Dynamic	0	0	0	0	0	0	0	0	0
Static	0	0	0	0	0	0	0	0	1

Summary of botnet detection methods review

Nowadays, the biggest group of detection methods is Passive Net- work Analysis and in general data mining. They are easy to implement in a specified network. The process of analysing does not require Deep Packet Inspection (DPI) and any additional physical access to the potentially infected devices. This is the main reason why they are most frequently implemented nowadays. They owe their popularity to the simplicity of use. In most cases they do not require any additional hardware; Furthermore, no modification in the structure of the network is needed. After suspicious communication, as well as the identification of the devise that generated that traffic, analysis commences where host-based methods are used to discover for example other C2 servers. They could also be adopted in any part of a botnet life cycle, but their main advantage is the possibility to detect even unknown botnets in creation or maintenance phases, which have not been used for any attack so far. There is a subgroup of especially effective methods which are based on detecting synchronous action. High efficiency of such methods is based on the assumption that botnets must work synchronously in order to achieve their goals. To conduct a successful SPAM campaign or a DDoS attack, it requires the Botmaster to use as many bots as possible. During the research, it was observed that synchronous activity occurs not only during the attack phase but also during the creation and management phases of the Botnet. This fact allows us to detect the threat before the first attack, which is a big improvement compared to the already known methods. BotGAD (Choi et al. 2009; 2012) is a representative of this group. It is an interesting method but has a few disadvantages. First of all, it allows to analyse only the DNS protocol while looking for malicious activity. It is also vital to specify a proper time-window parameter, which is very problematic especially when we are dealing with an unknown botnet. This paper presents the method called BotTROP which is based on BotGAD and it is free of its disadvantages and restrictions.

BotTROP: A Method for Detecting Botnets

The main goal of this section is to describe the BotTROP algorithm and its main concept. To improve the description a graphical representation was also prepared.

The main concept of the method

BotTROP is able to identify infected PCs called bots in a network infrastructure of any organization. We assume, that bots communicate with C2 servers outside the organization in similar moments. This feature of botnet is named synchronous activity or group activity (Choi et al. 2012). BotTROP at first, records all public IP addresses (destination IP), which were destination of the connections generated by nodes (source IPs) using specified protocols. Next, for a fixed destination IP and communication protocol, BotTROP uses a clustering method for grouping all the moments, when packets from source IPs were sent to the analysed destination IP. During the next step similarity of identified groups of moments is calculated. High value of similarity factor means that the groups being analysed contain very similar source IPs and they are connecting with a destination IP in a similar moment (i.e. in a synchronous way). This fact indicates that an identified group of source IPs (internal nodes of organization) could be bots of some botnet, and destination IP is the C2 server of that botnet.

To make a decision if analysed network traffic is synchronized it is possible to calculate average cosine similarity for every cluster, but it is very time-consuming. To increase the speed of the calculation the Sequential Probability Ratio Test (SPRT) is used (Gu et al. 2008) (Jung et al. 2004). All the steps described above are done for all recorded public IP addresses (destination IP) and all analysed protocols separately. The exception are those destination IPs which belong to the same organization for example: Twitter, Facebook, Amazon AWS etc. They could be used by the same botmaster for the communication purposes with infected PCs. In such a situation the destination IP is changed because those organizations use a load balancer for network optimization. This method is used by botnets based on social networks. To use BotTROP it is necessary to collect all the public addresses of the services because they could be changed during the monitoring time. For example, clients can connect to different IPs in the Twitter range during every communication process. Missing one of them could lead to false positives. Furthermore, separate Twitter IP addresses could be used by different source IPs. Only by combining them into one group (owner of IP range like Twitter) could lead to the detection of malicious activity. It is not possible to detect synchronous activity only with one source IP, in such situation this traffic would be admitted as legal. Presented method is effective against all of the protocols used during network connectivity of any type. Details of BotTROP method are presented in the next section.

The algorithm

To simplify the presentation, it is assumed that the following form of algorithm is a study of the existence of a botnet for a fixed address or group of destination addresses and a fixed communication protocol. In order to describe the method, we define the following denotations:

- $SIP = \{1,2, \dots, I_s\}$ – the set of IP source ordered numbers.
- $T(i) = \left(t_r(i)_{r \in ST(i)}\right)$ for $i \in SIP$, where $t_r(i)$ – the moment, when computer with i-th IP source address was connected with the destination address in r-th session.
- $ST(i) = \{1,2, \dots, I_T(i)\}$ – set of the ordered numbers of moments, when i-th IP source address was connected to the destination address.
- IC_{max} – the number of connections generated by the most active source IP address.
- $\bar{C} = \{1,2, \dots, I_T(i)\}$ – set of ordered numbers of subsequent connections of the most active source IP address.
- Cl – the set of ordered numbers of IP source, which take part in synchronous action.

To increase the speed of the BotTROP algorithm, clusters with only one moment of communication are removed (cluster filtering). Furthermore, source IPs that are exhibiting low activity are also removed (source IP filtering). Test shows that cleaned data sets help to reduce the number of false positives and false negatives classifications. Cluster and source IP filtering are separate algorithms that are also included in the final BotTROP implementation.

For the needs of the Sequential Probability Ratio Testing (SPRT) method we determine values for the parameters: *thr,* θ_0, θ_1, *a, b.* Detailed discussion of this problem is presented by Ostap et al. (2018). Shortly speaking we assume that:

- thr - threshold of similarity between following clusters, where analysed source IPs were connecting to the same destination IP. From research presented by Ostap et al. (2017) results that thr could take value not less than 0.5.
- we consider the hypotheses:
  - H_0 – the analysed source IPs do not belong to the botnet,
  - H_1 – the analysed source IPs belong to the botnet.

$IC_{max} := \max_{i \in SIP} I_T(i)$ and $I_{max} = arg \max_{i \in SIP} I_T(i)$
$SourceIPFiltering()$
forall $c \in \overline{C}$ **do**
  $CreateSet(cluster) : C(c)$;
  $C(c) := \{I_{max}\}$;
end
; /* Source IP Clustering process */
forall $i \in SIP$ **do**
  forall $r \in ST(i)$ **do**
    $C(m) := C(m) \cup \{i\}$ where:
    $m : \left|t_r(i) - t_m(I_{max})\right| = \min_{n \in Cl} \left|t_r(i) - t_n(I_{max})\right|$
  end
end
$ClusterFiltering()$
; /* The process of verification if analyzed network flow is synchronous */
$Cl := \{I_{max}\}$;
$\overline{S}_{cos} = 0$;
forall $c \in \overline{C} \setminus \{IC_{max}\}$ **do**
  $S_{cos}(c) = \frac{\left|C(c) \cap C(c+1)\right|}{\sqrt{\left|C(c)\right|} \cdot \sqrt{\left|C(c+1)\right|}}$
  $\overline{S}_{cos} := \overline{S}_{cos} + S_{cos}(c)$;
  $Cl := Cl \cup C\{c\}$;
  $\overline{S}_{cos} := \frac{\overline{S}_{cos}}{IC_{max}-1}$;
  $Y_c = \begin{cases} 1 & \text{if } S_{cos}(c) \geq thr \\ 0 & \text{if } S_{cos}(c) < thr \end{cases}$
  $\Lambda_c := \frac{\theta_1^{K_c} \cdot (1-\theta_1)^{c-K_c}}{\theta_0^{K_c} \cdot (1-\theta_0)^{c-K_c}}$, where:
  $K_c = \sum_{n=1}^{c} Y_n$
  if $\Lambda_c > b$ **then**
    $break$; /* Traffic is synchronous */
  end
  else if $\Lambda_c < a$ **then**
    $break$; /* Traffic is not synchronous */
  end
  else
    $continue$
  end
end
if *(SPRT was not able to take a decision)* **then**
  $\overline{S}_{cos} := \frac{\overline{S}_{cos}}{IC_{max}-1}$;
  if $\overline{S}_{cos} \geq thr$ **then**
    $break$; /* Traffic is synchronous */
  end
  else if $\overline{S}_{cos} < thr$ **then**
    $break$; /* Traffic is not synchronous */
  end
  else
    $continue$
  end
end

- We are using following notations:
  - $\theta_0 = P\{Y_r = 1|H_0\}$
  - $\theta_1 = P\{Y_r = 1|H_1\}$
- α - the maximal value of false positive rate (the type I error rate or significance level)

- β - the maximal value of false negative rate (the rate of the type II error)

It means:

- $P\{rejection\ H_0|\theta_0\} \leq \alpha$
- $P\{rejection\ H_0|\theta_1\} \leq \beta$

Values of α and β are determined by the analyst. In our analysis we assume that α = 0.05 and β = 0.1. Furthermore, parameters a and b of SPRT method are determined as follows:

$$\alpha = \frac{\beta}{1-\alpha}\,;\, \beta = \frac{1-\beta}{\alpha}$$

The interpretation of the algorithm steps

The Figures below present the preparation for the clustering process of the one destination IP (organization IP range). All the source IPs which were connecting to the analysed destination IP are on the vertical axis and moments when the connection took place are on the horizontal axis. The crosses represent the moments when every source IP sent an initialization packet (SYN) to the analysed destination IP.

All information necessary for the clustering process can be gathered with any kind of network sniffer such as tcpdump or wireshark. At first initial number of clusters is calculated (IC_{max}). It is equal to the highest number of connections from source IPs to the analyzed destination IP. The most active source IP denoted as I_{max}. Figure 2 presents the process of the calculation of the initial number of clusters.

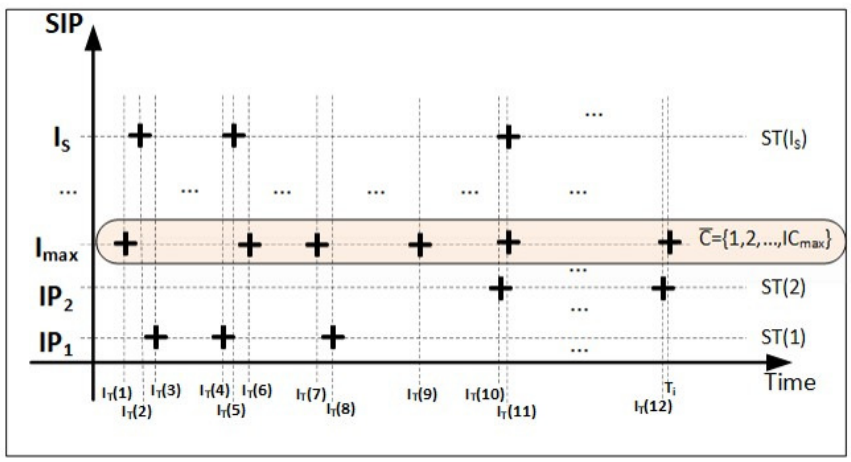

Fig. 2: The calculation process of the initial number of clusters.

The most active IP is denoted with an oval and based on its connection number the same number of clusters will be created. During the next step, all connection moments of every source IP are compared with the connection time of the IP on which clusters were created and assigned to the cluster whose connection time is most similar.

To increase the speed of the algorithm we delete low active source IPs (source IP filtering) and clusters with only one moment of communication (clusters filtering) to reduce the data bulk. They also improve results and decrease false

positives and false-negatives classifications. The source IPs filtering method distinguishes xlegal and malicious traffic by using the K-means clustering method. Figure [3] presents the filtering process.

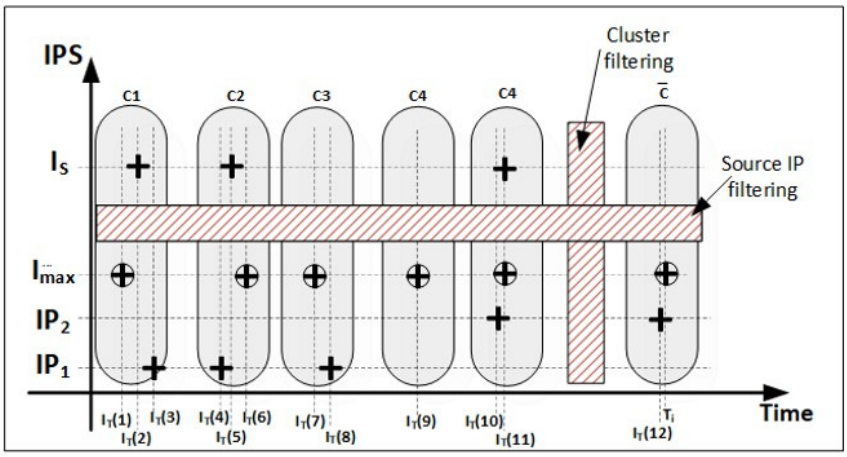

Fig. 3. Cluster filtering process.

When clusters are prepared, Sequential Probability Ratio Test (SPRT) is used to determine if the analysed traffic is synchronous or asynchronous. Based on groups activity, presented method can detect even an unknown botnet and it is able to identify not only communication between C2 and an infected host but also working activity such as SPAM and DOS attacks.

Case Study

In order to verify the properties of the BoTROP method, extensive research was conducted. Its aim was to verify the ability to detect new, previously unknown botnets and to compare the quality of the method with other methods in this category (Network-based, Passive analysis, detection of anomalies with implemented clustering/clustering techniques). The comparison also took into account the limitations of the methods due to the communication protocols used by botnets.

The Measurement Method

The tests were performed using two groups of data:

- Real-life network data such as:
  - Computer networks traffic of the Military University of Technology in Warsaw, Poland.
  - Traffic generated by real-life malware and registered in the Czech Technical University in Prague during a project The Malware Capture Facility Project (MCFP).
  - Network traffic generated by Powershell Empire and Twit-terBot.
  - Network traffic generated by a botnet simulator and legal network traffic simulator.
- Network-traffic generated by legal and botnet traffic simulators.

The first group of data was used to verify BotTROP's ability to detect previously unknown botnets. The second group was used to verify the quality of the BotTROP method and to compare this method with the method of the same category - BotGAD. In both cases BotTROP correctly classified mentioned traffic as malicious and was able to distinguish it from legal network flow. The figure 4 presents the simplified scheme of the experiment. The results gathered from the test with MCFP project were presented by Ostap et al. (2018) as well as the experiment with Powershell Empire and TwitterBots. Furthermore, the implementation and the environment of the TwitterBot and Powershell Empire was also included in the mentioned publication.

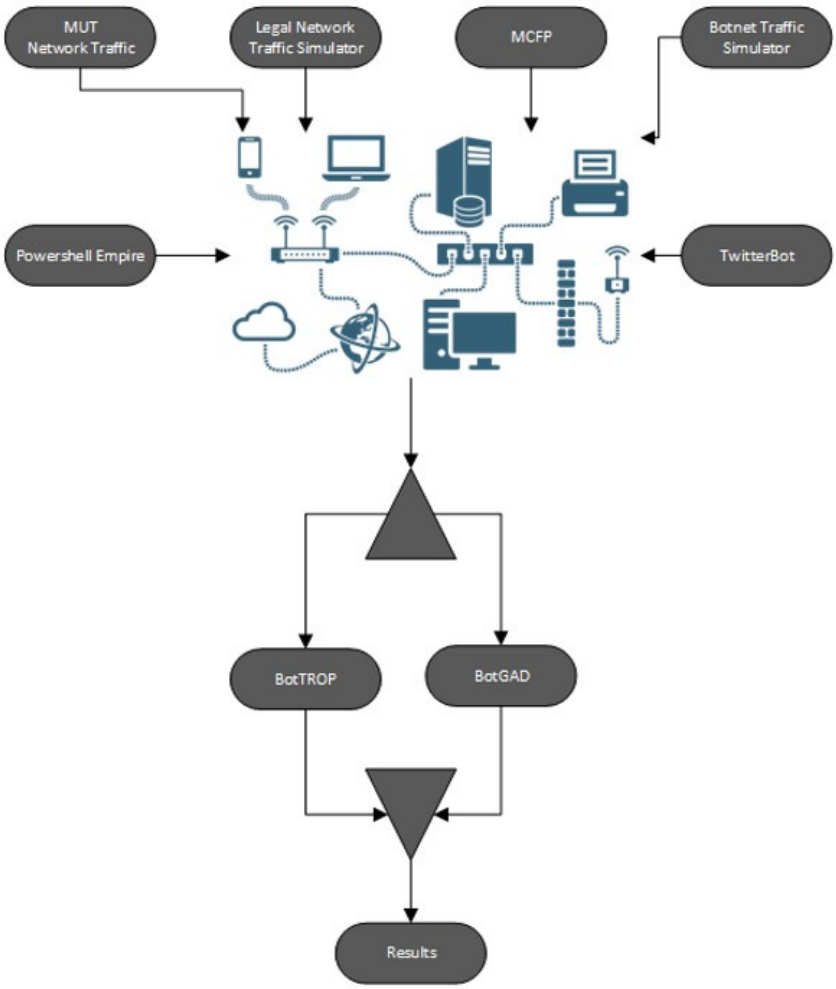

Fig. 4. The simplified scheme of the experiment.

All data sets, listed above, were mixed together and examined by BotTROP and BotGAD simultaneously as shown in the picture below. To compare the results with third party mitigation techniques, all results were verified using services listed below:

- VirusTotal - an internet service that allows you to scan in- dividual files and present the results of finding out possible infections with malware.
- HybridAnalysis – free malware analysis services established by Payload Security. These services allow to submit potentially malicious files and analyse them using static and dynamic methods. All results are presented to the user.
- Google Safe Browsing – it is a blacklist service powered by Google that contains information about malware or phishing content. Browsers such as Firefox, Chrome, Safari use this service for checking pages against potential threats before displaying malicious content to the user.

The dissertation of Ostap (2020) presents a full description of the experiment and its results. Due to the limited number of pages, this paper contains only the most important results of the studies.

Description of the dataset

The data set used for this research was captured from the real life network used in previously mentioned Polish university. It contains only all outgoing SYN-packets from the internal network to the destination IPs. This type of packets represent the willingness of the source IP to connect to the destination IP and according to the Mohammadi et al. (2019) and Khurum et al. (2019), SYN packets are sufficient to make a final decision if connections are made synchronously or not. By limiting the number of captured network traffic, the algorithm is able to serve final results much faster.

The packets were captured using port mirroring on the last router before the router of the ISP (Internet Service Provider). Due to security reasons packets were also captured before the main firewall. The process of monitoring and gathering network traffic took 2 weeks. During this period of time, we also launched Powershell Empire commonly used by Red Teams and APT actors like FIN7, APT10, APT29 (Cimpanu 2019). The C2 of this project was established on the VPS with public IP outside the private network and client software was installed on the several PCs in one of the classrooms. One of the most valuable features of PSE is the opportunity to choose jitter - the parameter that allows to randomize connection delays between the client and PSE C2. The main goal of including Powershell Empire in this research was to present that even changing the jitter parameter BotTROP is still able to detect synchronous action. The captured network traffic contains also all packets generated for the need of the Powershell Empire botnet. This open-source project was used only for 2 days due to security reasons. Table [2] describes captured network traffic in more details.

Table 2: The details about the network traffic from MUT.

Parameter	Value
Number of all packets	135 M
Number of PSE packets	58 437
File size	11 GB
No. of unique destination IP	98 117

Results of the experiment and interpretation thereof

Final results contains 49 (including PSE C2) destination IP addresses that where used by source IPs in a synchronous manner which was pointed by the SPRT method and their cosine similarity factor was greater than 0.5. Results are presented in table [3]. The thir- teen destination IPs were also labeled as malicious by third-party vendors (VirusTotal, HybridAnalysis and GoogleSafeBrosing). To avoid legal consequences only those IP are publicly accessible, oth- ers, not detected by other malware detection system, are presented with labels.

The columns of the table [3] with final results have the following meaning:

- IP - destination IP address that was used in a synchronous manner
- BotTROP ACS - contains Average Cosine Similarity. This factor is calculated as follows: cosine similarity factor is measured for each day separately, then the value is averaged after all days.
- SPRT - the number of days when the network flow was iden- tified as synchronous by the SPRT method (network was monitored for 14 days. It is typical for universities that the number of working PC is smaller during the weekends, more- over the number is also smaller during the nights. This is the main reason why synchronous activity is equal 0 during weekends.
- BotGAD - for comparing purposes, this column contains average cosine similarity calculated by the BotGAD method.
- Third-party vendors - the number of identified unique malicious software/campaigns linked to the analyzed des- tination IP. Rows where IP is labeled as "MS" means that it was used to host malicious site.

Table 3: The final results

No	IP	BotTROP (ACS)	SPRT per day	BotGAD	Third party vendors
1	Hidden-IP-1	0.98737	14/14	0.00047	0
2	192.229.220.142	0.97523	14/14	0.00510	24
3	Hidden-IP-2	0.97395	14/14	0.00597	0
4	Hidden-IP-3	0.94961	14/14	0.22230	0
5	Hidden-IP-4	0.94898	14/14	0.94583	0
6	176.9.34.43	0.89684	14/14	0.01217	9
7	Hidden-IP-5	0.81693	10/14	0.38067	0
8	Hidden-IP-6	0.78324	12/14	0.03215	0
9	Hidden-IP-7	0.78154	13/14	0.00080	0
10	Hidden-IP-8	0.73888	10/14	0.07508	0
11	Hidden-IP-9	0.72888	12/14	0.00101	0
12	Hidden-IP-10	0.72450	11/14	0.07207	0
13	Hidden-IP-11	0.71249	13/14	0	0
14	Hidden-IP-12	0.69978	10/14	0.35544	0
15	Hidden-IP-13	0.68198	13/14	0.00376	0
16	Hidden-IP-14	0.67787	14/14	0.00357	0
17	Hidden-IP-15	0.66199	10/14	0.00298	0
18	Hidden-IP-16	0.65748	11/14	0.00093	0
19	52.232.106.174	0.65499	12/14	0.00089	75
20	Hidden-IP-17	0.64972	9/14	0.25668	0
21	65.55.50.157	0.63483	11/14	0.08763	40
22	Hidden-IP-no18	0.62802	10/14	0.00010	0
23	172.217.16.46	0.62157	10/14	0.00116	185
24	Hidden-IP-no19	0.61858	10/14	0.02929	0
25	Hidden-IP-no20	0.61006	13/14	0.00700	0
26	111.111.111.111	0.60180	10/14	0.244153	9
27	188.92.40.78	0.60046	5/14	0.066036	7
28	Hidden-IP-no21	0.59850	9/14	0.00067	0
29	134.170.58.221	0.59463	11/14	0.09249	7
30	74.80.130.230	0.59033	9/14	0.25832	5
31	Hidden-IP-no22	0.58154	10/14	0.07891	0
32	Hidden-IP-no23	0.57999	10/14	0.31258	0
33	Hidden-IP-no24	0.57642	10/14	0.08646	0
34	Hidden-IP-no25	0.57104	8/14	0.96279	0
35	157.55.240.94	0.54955	9/14	0.09119	3
36	Hidden-IP-no26	0.54100	11/14	0.00092	0
37	8.18.216.151	0.54080	8/14	0.00083	10
38	Hidden-IP-no27	0.53954	12/14	0.00095	0

39	Hidden-IP-no28	0.53384	10/14	0.00013	0
40	165.227.63.195	0.53355	11/14	0.00128	MS
41	Hidden-IP-no29	0.52779	10/14	0.00740	0
42	Hidden-IP-no30	0.52238	7/14	0.51098	0
43	Hidden-IP-no31	0.51422	7/14	0.00149	0
44	Hidden-IP-no32	0.50693	9/14	0.21741	0
45	Hidden-IP-no33	0.50661	8/14	0.36822	0
46	165.227.63.195	0.5	7/14	0	MS
47	Hidden-IP-no34	0.5	7/14	0	0
48	Hidden-IP-no35	0.5	7/14	0	0
49	PowershellEmpire	0.814589	2/14	0.0925379	0

All 49 destination IPs were labeled by BotTROP due to synchronous communication pattern. PCs with source IPs sending packets to them in a synchronous manner. The protocol used for communication purpose in most cases was HTTP(port 80) and HTTPS (port 443). There were also 3 IPs (165.227.63.195, Hidden- IP-28, Hidden-IP-27) where an unknown protocol was used on port 81. HTTP(80) and HTTP(443) are commonly used by attackers due to the fact that administrators don't block this port as it is needed to connect with the Internet. Moreover, visual representation of the analyzed network traffic in Figures [7][8][9] reveals equal delays between clusters and malicious symptoms such as network flow grouping. The thirteen destination IPs addresses presented in Table [3] (rows:2,6,19,21,23,26,27,29,30,35,37,40,46) are also recognized as malicious by third party services mentioned above and two of them are labeled as phishing sites. What is worth underlining is the fact that only about 30% of all identified IPs are detected as malicious by third-party services(HybridAnalysis, VirusTotal, GoogleSafeBrowsing). The SPRT method was able to identify the whole PSE traffic for all 2 days (because of the security reason Powershell Empire was running only for 2 days).

BotGAD was able to identify only 3 destination IPs which are used in a synchronous maner under the same circumstances as BotTROP. It is also worth underlining that BotGAD was not able to detect Powershell Empire C2. It may be caused by a wrong time-window parameter setting. Based on the presented results we can tell that the effectiveness of the BotTROP method does not depend on the time-window parameter.

Due to the fact that BotTROP was able to identify synchronous network communication to 13 well known malicious IPs and 36 (including PSE C2) to unknown destination IPs, it could be con- firmed that the presented method has the ability to detect unknown synchronous communication. It is also worth mentioning that some of the detected IPs could belong to well known vendors for example as a download center of updates for Windows or a new Antivirus signatures center. Communication for such purposes could be also synchronous. To avoid such false-positives it is necessary to include a kind of white-list that will be fitted to the needs of a particular internal network. From our point of view it is necessary to treat IPs detected by BotTROP as potentially malicious and require fur- ther action if they belong to well know organizations. There are examples where a botnet was using Twitter servers as its C2. In the future also Youtube or Instagram could be used in malicious ways. Due to this reason all IPs that belong to services where users are able to add some content in it should be treated as potential threats, of course if network traffic generated to them is synchronous.

To compare the functionality of BotTROP and BotGAD, accu- racy function and false-positive rate function have been calculated based on the false-positives, false-negatives, true-positives and true- negatives indicators. The comparison was prepared for BotTROP and BotGAD with four different time-window parameters.

The diagram presented in Figure [5] compares accuracy for the value of threshold between 0 and 1. Threshold means a minimal value of cosine similarity factor, above which compared methods treat analyzed traffic as synchronous (BotTROP and BotGAD with different Time Window parameters).

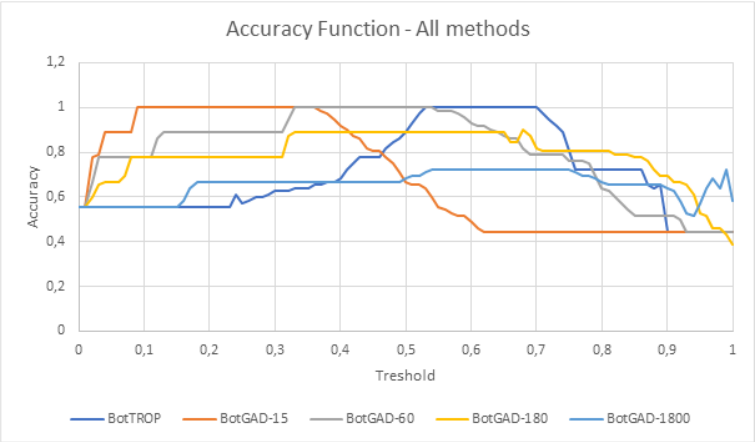

Fig. 5: Accuracy function for all the analyzed methods.

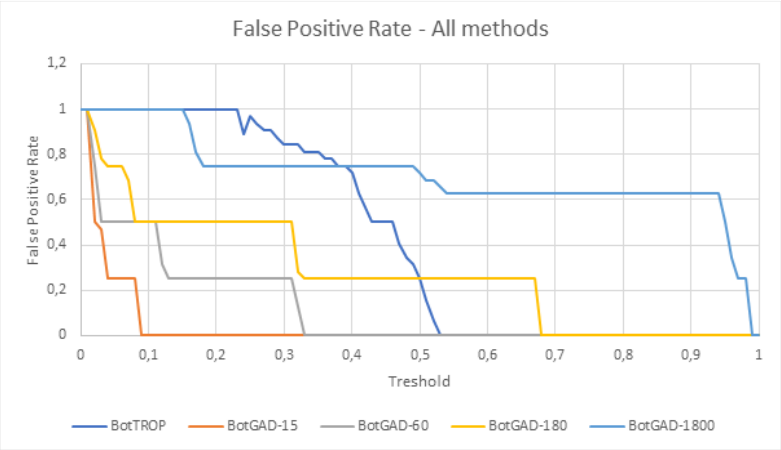

Fig. 6: The false-positive rate for all the analyzed methods.

It is shown that the BotTROP method is the most accurate method for botnet detection from all the tested methods. Its accuracy is equal to 1 for thresholds from 0.53 to 0.73. The minimal value of threshold where FPR and FNR are equal to 0 for BotTROP is also an optimal solution. BotGAD with a 60s. time window is also very accurate but only when the threshold is between 0 and 0.57. Because of this threshold this method is unusable in real life. Based on the picture below, one can say that accuracy of the BotGAD-1800 is efficient, however its accuracy comes from the very long Time Window parameter where a lot of traffic is combined. All of the above makes the BotGAD method very vulnerable to FPR.

False-positive rate presented in Figure [6] reveals that high values for BotGAD (especially for time-window =1800) in the whole range of threshold variability, reduce the prognostic capabilities of this method. Moreover, this figure also proves that the BotTROP method has very low false-positive rate when threshold is above 0.5.

Detailed view of the one of the malicious IPs

The following subsection contains a detailed presentation of one of the malicious IPs identified by BotTROP. During the survey Author- sPublications software implementation of the BotTROP algorithm was made. The implementation include the following functionali- ties:

- analysis of accumulated traffic using BoTROP method,
- additionally, for the comparison purpose, method BotGAD was also implemented,
- graphical representation of the results obtained,
- comparison of the results with three commercial solutions for malicious motion detection.

Presentation is made using the BotTROP software used during experiment. The public IP 172.217.16.46 was also identified by third- party software as malicious. Hybrid-Analysis lists 185 different malicious activities that were linked with this public IP. This address was also used as a malicious site and the drop zone for trojans based on JAVA. BotTROP identified synchronous activity for 11 days out of 14 days of monitoring time. Cosine similarity was quite high, it was equal 0.62157. The number of internal devices that were connecting to this C2 amounted to 240. All graphics comes from the software implemented for the needs of the BotTROP algorithm. Figure [7] presents a graphical representation of the network traffic to this domain, this graph is also helpful for an analyst in making a final decision because it is easy to spot group activity in similar moments.

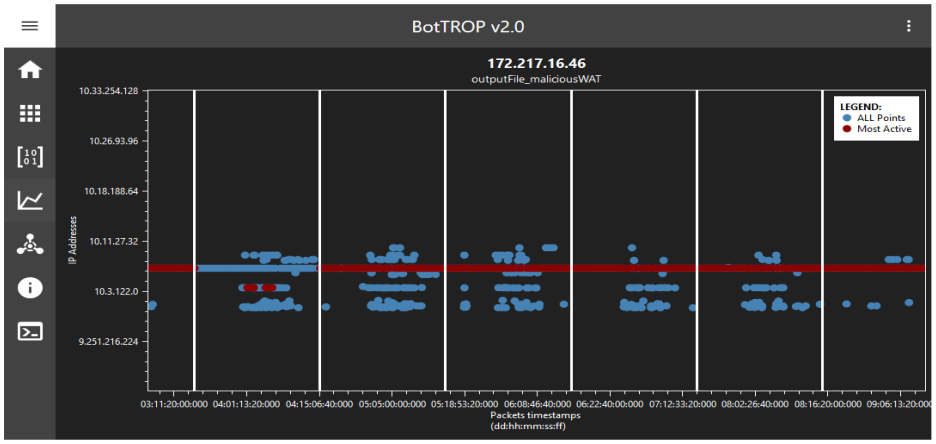

Fig. 7: The network flow directed to the IP 172.217.16.464.

The horizontal axis denotes times of connection and the verti- cal one contains the source IP addresses. Red dots represent the connection time that belongs to the most active source IP. Blue dots denote a connection to the selected destination IP from an IP addresses that belongs to the analyzed network. The white lines represent borders between subsequent days.

Cosine similarity factor for each day separately is shown in Figure [8]. The horizontal axis shows days and the vertical axis average cosine similarity. Blue dots denote that network traffic was labeled as legal by the SPRT algorithm, the red one means that the traffic was synchronous that day.

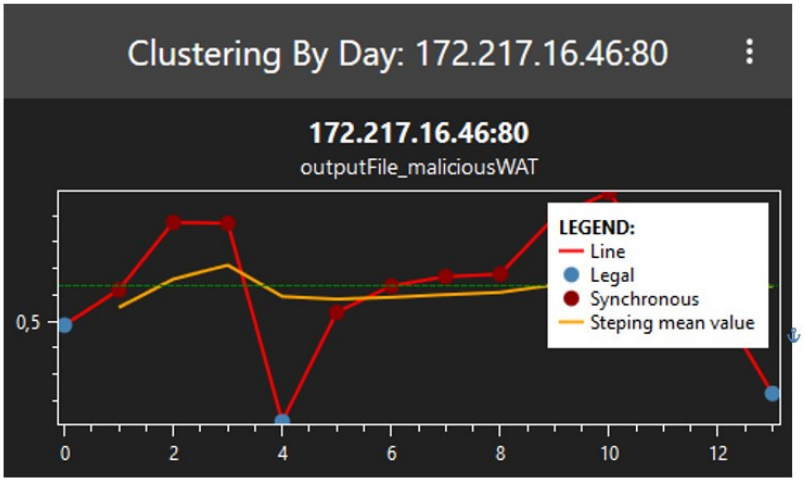

Fig. 8: The cosine Similarity factor per day for 172.217.16.46.

Average cosine similarity stays on a high level most of days in- cluding the SPRT results. This graph underlines that this particular destination IP was used in a synchronous manner.

A graphical representation for the cosine similarity factor be- tween the following clusters is presented in Figure [9]. There are situations where neighboring clusters differ a lot between each other. The horizontal axis denotes subsequent clusters and vertical one value between them. It can be spotted that most of similarities' values are higher than 0.7, which may indicate malicious activity. As we can seen a high level of cosine similarity is mostly equal for the whole monitoring time. Those three graphical representations prove that this public IP was also used in a synchronous manner.

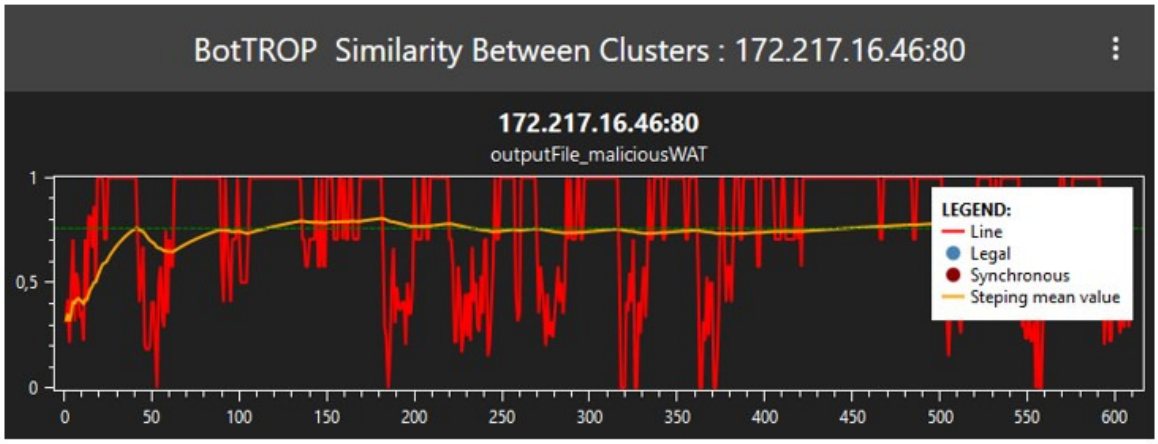

Fig. 9: The cosine Similarity for the following clusters for IP 172.217.16.46.

The summary

There a lot of different botnet detection methods but most of them are not efficient against unknown threats, moreover most of them are able to detect a botnet based only on a specified protocol. The algorithm described in this dissertation is an attempt to change this situation and make networks more secure. BotTROP, just like BotGAD, identifies not only well-known botnets (which was proved in experiments with Powershell Empire, Neris and others) but also unknown threats (for example TwitterBot based on social networks, which was implemented for the needs of the survey [AuthorsPub-lication]). It also improves detection of synchronous activity via different protocol.

The aim of the presented experiment was to verify the ability of the BotTROP method to detect known and unknown botnets and to analyze any communication protocol. We also evaluate the quality of the BotTROP method and compare it with the quality of the BotGAD method – the results are presented in table [3]. All the results prove that BotTROP is a very efficient method for botnet detection of any kind, no matter the protocol or architec- ture. It is very important to underline that the role of the BotTROP method is to identify synchronous activity which in most cases takes place in malicious network flow. Implementing a white list where synchronous activity is also spotted, for example during system upgrades can help to decrease the number of false nega- tives and false positives rate. Presented results also reveal that the BotGAD method is very dependent on the time window parameter, which is one of its biggest disadvantages. This makes the method unusable against unknown botnets because it is necessary to set up a relevant parameter for communication sessions with its C2. The BotTROP method is independent of Time Window parameters and can be used efficiently even against unknown - malicious or legal - network traffic, which in turn makes it possible to identify an unknown botnet. It is possible to use the BotTROP method in a production environment without any modification but there are a lot of improvements that are going to be made in the nearest future, for example on-line monitoring with graphical representation.

In order to use BotTROP in a working network, it is only neces- sary to provide its traffic for analysis. Currently work is underway on the possibility of an on-line analysis without the need to collect the analyzed network traffic. Afterwards, all the collected network traffic is analyzed by the BotTROP algorithm, and the administrator has the possibility to verify the cosine similarity for each destina- tion address and a preview of which hypothesis was adopted by the SPRT method.

The experiment helps us to observe that there are situations in which legal users generate synchronous traffic, for example to Facebook or Twitter servers during very important events such as football world championships or significant political events. All posts and comments written during such events are generated with high intensity, therefore this kind of network traffic is recognized as a synchronous action. Despite this, even in such situations cosine similarity factor never exceeds level of 0.5. During the research even more intense legal network traffic never exceeded 0.5.

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The Metter of Human Rights in The Contemporary Health Care Pandemic Crisis: Council of Europe's Human Rights Standards

Daria Bieńkowska

Chairman of the Board of Pomeranian Center of Human Rights (Gdańsk, Poland)
Institute of Security and Manegment, Pomeranian Academy of Słupsk, Poland
Krzysztofa Arciszewskiego 22A, 76-200 Słupsk
email: tittke@wp.pl
tel. +48784638591

Abstract

The public health crisis is also a socio-economic crisis, showing deep inequalities between people in different areas of life. It particularly highlighted the weakness of health and social security systems. What's more, the COVID-19 pandemic has shown that the virus is cross-border and we are all treated equally regardless of gender, race or religion. The priority is global, international solidarity as a sine qua non for an effective response to the threats generated by the pandemic. The COVID-19 pandemic has shown that the Council Of Europe (CE) goes far beyond the area of merely providing an abstract European constitutional identity and alerting when Member States seem to depart from it significantly. The activities of the CE also include promoting the convergence of legal systems relating to respect for human rights, which at the same time set another key goal, namely, the direction towards the implementation of human rights standards e.g. in medicine and other sphere.

Keywords: Human Rights, Council Of Europe, Health Care Crisis, European Convention On Human Rights, WHO

Introduction

The public health crisis is also a socio-economic crisis, showing deep inequalities between people in different areas of life. It particularly highlighted the weakness of health and social security systems. What's more, the COVID-19 pandemic has shown that the virus is cross-border and we are all treated equally regardless of gender, race or religion. The priority is global, international solidarity as a sine qua non for an effective response to the threats generated by the pandemic.

As we note, health care systems relating to both the public and private sectors have found themselves in an unprecedented situation since the emergence of the epidemiological threat related to the Covid-19 coronavirus in Europe. The situation is so specific that although the discussions on medical ethics, public health ethics, medical law and health protection law differed in many respects, they have recently faced similar problems. In the aforementioned areas, not only is the problem of maintaining public confidence in one's actions and implemented policies noticeable, but also strictly systemic aspects of legal inconsistency in a given matter have been exposed, which makes the health care system highly unstable.

The crisis has become global in this context. The inefficiency of the health service intensifies growing fears and increased suspicion of patients towards actions in the field of state health policy.

Losses of public confidence generating the fears and concerns of the "risk society" have traditionally focused in particular on the threats of medicine and genetic technologies in the bioethical sphere. In the current situation with which we are dealing, anxiety relates to the possibility of losing control over access to health care, obtaining certain medical services, and even complete lack of access for patients belonging to the so-called difficult cases.

Moreover, fear is generated from both sides, including doctors who point out that in an epidemiological emergency there may be more cases of medical errors and adverse events. On the part of patients, in the face of

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the paralysis of not only the health care system, but also the justice system, postponing court hearings (in this case concerning medical errors), difficulties arise in asserting the protection of their rights. It is right to ask questions about solutions to critical issues that will be shown by the tools to break the deadlock.

The Importance of Human Rights

Human rights in this context are of key importance as they place man, his life and dignity in the center of attention. They become an effective tool for shaping appropriate solutions in the fight against the crisis, based on respect for the most important rights and values for human beings, while respecting the principle of sustainable society, development and respect for peace. The international community of ius commune of human rights in the fight against the crisis is based on three objectives: ie 1. to strengthen the dynamic effect of the response to an immediate global threat to health; 2. to mitigate the impact of the crisis on people's lives; 3 avoid escalation and not aggravate existing problems[1].

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When observing the pandemic situation in which one can notice human rights disregard (such as those relating to the Covid-19 pandemic), there is a well-founded fear that the nation-state is not a space for the protection of human rights. Of course, at the level of assumptions and positive law, it can be assumed that nation-states with exposed democratic principles respect human rights in their assumptions. At the same time, we are aware that positive law does not keep pace with the changing reality and the most important in terms of respect for human rights, policy of application and enforcement of human rights law are the institutions that apply the law, developing certain standards in the field of human rights in the medical sphere of interest to us.

The COVID-19 pandemic has shown that the Council Of Europe (CE) goes far beyond the area of merely providing an abstract European constitutional identity and alerting when Member States seem to depart from it significantly. The activities of the CE also include promoting the convergence of legal systems relating to respect for human rights, which at the same time set another key goal, namely, the direction towards the implementation of human rights standards in medicine, and in other sphere. The CE as the largest pan-European Human Rights Organization with its human rights standard laid down in the ECHR.

On April 7, 2020, the Secretary General of the CE (hereinafter referred to as SGRE), Marija Pejčinović Burić, handed over to all 47 Member States an information document on respect for human rights, democracy and the rule of law during the pandemic COVID-192. The SGRE document indicated that the specified in Article 2, 3, of the ECHR - The right to life and the prohibition of torture and inhuman or degrading treatment or punishment are among the most fundamental provisions of the European Convention on Human Rights. Importantly, the articulated rights and freedoms are not derogatory. In other words, the rights and freedoms are protected at all times and in any situation, even in the event of a threat such as the COVID-19 pandemic. The Council of Europe recalls that under all circumstances, Strasbourg's fundamental standards for the protection of human rights and freedoms must be kept in mind.

The right to life, resulting from Art. 2 of the European Convention on Human Rights is a provision of special importance. The right to life is first and foremost an integral part of fundamental human rights and the systems upon which they stand. It provides for the legal protection of life, which cannot be waived. Although it is not absolute, the deprivation of life falls within the limits provided for in the article, if it occurs as a result of the absolutely necessary use of force in the cases provided for in article 2 clause 2 of the Convention. It should be noted that this is a closed catalog and it is subject to strict interpretation. the state's obligation to protect life. According to Art. 2 of the Convention, in connection with the general obligation of the state under Art. 1 of the Convention „to ensure to everyone subject to [his] jurisdiction the rights and freedoms set out in (...) the Convention”3 implicitly lays down requirements relating to the right to a fair trial, the right to an effective and official investigation in whenever there is a reasonable suspicion that the person died as a result of doubtful circumstances. By undertaking the exegesis of Art. 2 of the Convention indicates premises which quantify the effectiveness of an investigation. The basic principle in this respect is to entrust the investigation to persons who demonstrate responsibility, independence and impartiality with regard to law and practice (Schabas, 2015).

Another principle is the measure of the effectiveness of an ongoing investigation. Successful in this case means that the investigations in question led to the identification and punishment of the guilty. „It is the authorities that must take the reasonable steps at their disposal to preserve evidence relating to the incident, including, but not limited to, eyewitness and forensic evidence. The conclusions of the investigation must be based on a thorough, objective and impartial analysis of all relevant elements. Any deficiency in the investigation that undermines its ability to ascertain the circumstances of the case or the person responsible compromises the required measure of effectiveness”4.

Moreover, the Tribunal points out that whenever the state fails to provide its citizens with proper protection of the right to life under Art. 2 of the Convention, it can be said that the protection granted by national law to citizens is only a theoretical declaration. The state under Art. 2 of the Convention, the obligation is to take effective action immediately, in order to quickly recognize and consider the case without undue delay. In the issue under consideration, it draws attention to the fact that, by interpreting individual judicata, the Tribunal indicates that the procedural obligation imposed on the state with regard to the effectiveness of the investigation and resulting from 2 of the Convention became an independent obligation.

In the light of the analyzed matter, it is necessary to focus on the wording of the first sentence of Article 2 § 1 of the Convention, according to which the state is bound by an order not only to refrain from deliberately and unlawfully taking life, but also to take all appropriate steps to protect the lives of people within their jurisdiction. Thus, both Article 2 of the Convention and the Court's case-law underline the fundamental obligations of the State to safeguard the fundamental right to life by establishing effective criminal provisions to stop the commission of crimes against the person. The practical dimension of these obligations boils down to organizing appropriate judicial institutions to prevent, fight and punish perpetrators who have violated the above provisions. It also extends to identifying the circumstances in which public officials will be required to take preventive operational measures to protect a person whose life is threatened by the criminal acts of another (Schabas, 2015).

Moreover, in its jurisprudence, the European Court of Human Rights has repeatedly emphasized that the state has a positive obligation to protect persons covered by state care against terminal diseases and the suffering resulting from tchem5. For example, reference should be made to the judgment of the ECHR of October 23, 2018, in which the Court ruled on the complaint of Turkish citizen Elvan Alkan, pointing out that medical negligence constitutes a violation of human rights, in this case Art. 8 of the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR). This ruling confirms that the ECHR is a living instrument primarily used to implement the pursuit of one's rights by an individual, which is part of the process of judging human rights, which means that „the possibility of pursuing an individual's rights in court has become their constitutive element" (Bodnar, 2019). The judgment draws attention to the constantly expanding scope of Art. 8 of the Convention.

By analyzing the jurisprudence practice in the context of medical negligence in the most complaints in this scope were assessed by Tribunal, in the regime of Art. 2 of the Convention (i.e. the right to life) or Art. 3 of the Convention (i.e. prohibition of torture and degrading treatment). The ruling in question is against this peculiar novelty, as the jurisprudence of the Tribunal indicates that violations art. 8 of the Convention referred mainly to the situation of obligations states to introduce regulations imposing an obligation on doctors informing patients about the effects of the medical intervention they had enable patients to make informed consent to the proposed service medical. When examining the present complaint, the Court decided that it had at its disposal Art. 8 of the Convention includes the length of proceedings in a situation where the applicant subjected to unjustified physical and existential suffering (Bieńkowska, 2020; Alwan, Burges, Ashworth, Beale, Bhadelia, Bogaert et al).

At the same time, the Tribunal indicated that, in accordance with settled case law, it was physical the integrity of the person undoubtedly falls within the concept of "private life"

within the meaning of Art. 8 § 1 of the Convention. Private life is the broadest and most

diversified sphere subject to protection in the context of the analyzed Art. 8 of the Convention. It is understood as the freedom of the individual to shape his life relating to independence in one's choices and autonomy in making decision14. In turn, personal autonomy is the cornerstone „The grounds for interpreting the guarantees contained in Art. 8 of the Convention" (Nowicki, 2005, p. 160), which results in the recognition of independence by right. Undoubtedly, this is an imperative to respect human dignity, it was binding the institutional and source guarantee of human subjectivity. It is peculiar the legal and ethical imperative that every human being is someone, not something. Such a broad understanding by the Strasbourg jurisprudence of "private life" it involves providing the individual with some basic sphere of privacy (autonomy), protected - as far as possible in modern society - against public or private outside interference (Schabas, 2015). At the same time it returns attention to the fact that the Tribunal reiterates that the obligations arising from Art. 8 in the large to a degree coincide with the obligations contained in Art. 2 of the convention.

Prohibition of torture and inhuman treatment

In the context of the prohibition of torture and inhuman treatment, it should be noted that each of the Member States bound by the obligations arising from the Convention is obliged to treat persons deprived of their liberty with dignity, which is also related to the fact that individual states must provide persons deprived of their liberty an appropriate level of medical care. It should be noted that in accordance with Art. 3 of the ECHR, the prohibition of torture is contrary to human nature and the above-mentioned human dignity. This article is absolute, which means that actions by state authorities that may be perceived as torture and inhuman treatment are not justified under the Convention.

For this reason, due to the pandemic situation, the European Committee for the Prevention of Torture (CPT), on March 20, 2020, issued a Declaration on the principles relating to the treatment of persons deprived of their liberty in the context of the COVID-19pandemic[6].

The CPT reads that currently, in the COVID-19 pandemic situation, the CE and individual Member States face the challenges of creating appropriate conditions based on human rights standards in detention facilities. Consequently, the CPT of the Declaration has outlined guidelines that apply to the relevant authorities responsible for persons deprived of their liberty.

In these guidelines, it was indicated above all that the focus should be on ensuring the highest level of safety for inmates by taking all possible measures to protect health. In addition, it is recommended that you follow the WHO guidelines to combat the COVID-19 pandemic. WHO among others, highlights the importance of integrating a human rights based approach in response to COVID-19. It provides key considerations in relation to addressing stigma and discrimination, prevention of violence against women, support for vulnerable populations; and restrictive measures and shortages of supplies and equipment. It also highlights human rights obligations with regards to global cooperation to address COVID-197. Thus, the recommendations issued by specific health care institutions in a given country should be followed, which should be in line with international standards.

In addition, the CPT Guidelines state that staff who deal with detainees should be provided with adequate support, both mentally and physically, in relation to health care provided by Covid -19. The Committee further concluded that it must be ensured that any restrictive measures taken to prevent the spread of COVID-19 to persons deprived of their liberty have a legal basis and are necessary, proportionate, guaranteeing human dignity and of a limited duration; provide such persons, in a language they understand, with comprehensive information on the procedures undertaken, and make concerted efforts to extend the use of alternative measures to imprisonment - especially in overpopulation situations; make greater use of alternatives to pre-trial detention, conversion, early release and suspended sentence; verifying the need for patients in psychiatric hospitals located there without their consent; dismissal of residents of social welfare homes and refrain, as far as possible, from detaining migrants[8].

It should be noted that among those deprived of liberty there are also vulnerable groups or risk groups. Such groups include, first of all, the elderly and people with pre-existing diseases, therefore they should be provided with increased protection and attention due to their health condition. Correlations of these guidelines can be found in the WHO recommendations mentioned above, which read as follows „The threat and experience of COVID-19 occurs differently for different groups. According to current guidance, the health risk from COVID-19 to older adults and people with certain pre-existing conditions is considered to be greater than that of the general population. Nowadays even within these vulnerable groups there are differences that would benefit from a human rights lens. People of all ages, however may have greater vulnerabilities to COVID-19 depending on their living arrangements, financial instability and lack of specific safeguards impacting their risk of infection, such as persons with disabilities, people who are homeless, refugees, migrants, and prisoners. COVID-19 has revealed a unique ecology of sickness based on social determinants of health, which requires attention. These groups are among the world's most marginalized and stigmatized. The Universal Declaration of Human Rights states, <<All human beings are born free and equal in dignity and rights>>, and it is the dignity and rights of those most vulnerable that requires additional attention in COVID-19 response"[9].

Above all, it is recommended that all states of the Council of Europe respect the fundamental rights of those who are deprived of their liberty during a pandemic. At the same time, it should be remembered that people deprived of their liberty must be properly treated, as these are groups exposed to all kinds of violence. Consequently, CPT points out that always and under all circumstances fully comply with the basic safeguards against mistreatment of persons under the supervision of law enforcement officers (access to a lawyer, access to a doctor, notification

of arrest), with the necessary additional precautions, such as, for example, mandatory protective masks, and guarantee uninterrupted access to independent monitoring bodies (national preventive mechanisms, CPT) all places of detention, including places where people under quarantine are present[10].

Conclusions

The COVID-19 pandemic has highlighted the problems with respecting human rights not only in Europe but also around the world. For this reason, the initiatives taken in the form of the Guidelines of the Council of Europe remind us that only in the spirit of solidarity and sensitivity to other people is it possible to secure fundamental human rights. Human rights standards can serve as a tool to meet the challenges, opportunities and needs in the fight against COVID-19. First of all, in the spirit of respect for life and dignity for every human being, the actions of decision-makers in the prevention and fight against the virus should be aimed at reconstructing human relationships, mutual trust, and ultimately achieving global stability.

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[1] Cf. COVID-19 and its human rights dimensions (https://www.ohchr.org/EN/NewsEvents/Pages/COVID-19.aspx; dostęp: 1.08.2020 r.).

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[3] Art. 1 EHCR- Council of Europe, European Convention for the Protection of Human Rights and Fundamental Freedoms, as amended by Protocols Nos. 11 and 14, 4 November 1950, ETS 5, available at: https://www.refworld.org/docid/3ae6b3b04.html [accessed 20 October 2020]

[4] *Elvan Alkan et. Others v. Turkey*, 22.10.2018., Case No 43185/11, https://hudoc.echr.coe.int/eng#{%22itemid%22:[%22001-187247%22]} [accessed 20 October 2020])

[5] COVID-19: Council of Europe anti-torture Committee issues "Statement of principles relating to the treatment of persons deprived of their liberty" , https://www.coe.int/en/web/cpt/- / covid-19-council-of-europe-anti-torture-committee-issues-statement-of-principles-relating-to-the-treatment-of-persons-deprived-of-their-liberty [accessed 20 October 2020]

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[7] Addressing Human Rights as Key to the COVID-19 Response; https://www.who.int/publications/i/item/addressing-human-rights-as-key-to-the-covid-19-response [accessed 20 October 2020]

[8] Cf. Statement of principles relating to the treatment of persons deprived of their liberty in the context of the coronavirus disease (COVID-19) pandemic, European Committee for the Prevention of Torture and Inhuman or Degrading Treatment or Punishment (CPT), March 20, 2020, Council of Europe

[9] Addressing Human Rights as Key to the COVID-19 Response, WHO, 21 April 2020, pp. 2.

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What Should Smart Cities Learn from The Experiences of The Covid-19 Pandemic?

Izabela JONEK-KOWALSKA

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland izabela.jonek-kowalska@polsl.pl

Jan KAŹMIERCZAK

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland jan.kazmierczak@polsl.pl

Abstract

In the article, the authors made an attempt to confront the prevailing in the scientific debate view on the shape and functions of the so-called smart urban space, or Smart CITY, with experiences resulting – especially for city residents and management – from the Covid-19 pandemic. After a short introduction, the initial part of the article briefly presents the current shape of the Smart City concept, treated in terms of a paradigm (proposed by Kuhn). Based on such an SC paradigm, the next part of the article presents an outline of the methodology and an attempt to identify areas that fall within the above paradigm, that has been most frequently undertaken in research to date and most often described in available publications. Then, an overview of the problems of an SC – undervalued, according to the authors of the article, in the research carried out so far – is presented. The next part of the article presents the results of extensive surveys of Polish cities on the implementation of the Smart City paradigm. The surveys were conducted in the period immediately preceding the pandemic. After analysing the results of these studies, an attempt was made to determine the level of openness to new challenges in the thinking of city management to new problems and challenges, "absent" in the current paradigm. The final part of the article presents the proprietary list of new needs of a Smart City and its stakeholders, identified as a result of the pandemic experience, as well as the proprietary list of new solutions and a rough analysis of the possibilities of their implementation in the areas of "smart cities".

Keywords: Smart City, Covid-19 pandemic.

Introduction

From the moment when craftsmanship, as an area of producing goods, entered into an alliance with science, understood as a source of not only abstract and cognitive knowledge, but also utilitarian, offering means and methods of production, societies of the following centuries benefited from such an alliance. From the age of industrial-scale steam, coal and steel production, to the age of wide-scale use of electricity, and then to the automation of production processes, we, as a society, have come to the point where the modern economy is based on knowledge. The age of steam and electricity required newer and more technologically advanced sources of energy to power factories and industrial installations. In view of the increasing availability and decreasing cost intensity, the usage of energy has also extended to places used by all of the society, not related to production, such as homes and housing estates, social infrastructure (hospitals, schools and other similar institutions), public transport and others.

Another breakthrough in the economic development was knowledge-based economy, which also forced the rapid development of supplying such an economy with the necessary "fuel", which is broadly understood information. We have learned to obtain, collect, process and share such information on a previously unprecedented scale. Again, the growing supply made it possible to use information resources to satisfy social needs in the above-mentioned non-productive areas. A special place in these areas is occupied by the space where people live, especially in urbanised areas.

In recent years, many scientific communities have conducted – and continue to conduct – multi-topic discussions on the directions, rules and basic conditions for the development of urbanised space in the conditions of the growing supply of information and tools for using such information for the needs of city residents or – more broadly – urbanised areas. The key concept in this discussion is the concept of a "Smart City" (SC).

Bearing in mind the function of smart cities in creating technological progress and enhancing the development of civilisation, the authors of this article decided to identify the main directions of transformations and the functioning of smart cities, resulting from the experiences of the Covid-19 pandemic. For this purpose, they used a review of previous publications on Smart Cities, the results of their own research documenting the practical interest in the implementation of this concept by municipal authorities in Poland and observations of city life over the last several months. Conclusions resulting from the considerations are a contribution to in-depth research and detailed analyses on the impact of health threats on the development of smart cities and the prioritisation of their development priorities.

Literature Studies

Subjective representation of the "Smart City" paradigm

The concept of a "Smart City" (SC) can be considered as a specific development of the previously formulated idea of a "digital city" (van Bastelaer and Lobet-Maris, 1998; Ishida, 2000; Partridge et al., 2005; Hollands, 2008), "creative city" (Hall, 2000), "knowledge city" (Carrillo, 2006) or "intelligent city" (Komninos, 2009), which appeared in publications from the last decade of the 20th century. Proposing the Smart City model (and concept), related to the similarity of digital/smart urban space elements to human sensory/nervous system components, most often dates back to 2007 and is usually attributed to the research team from the Massachusetts Institute of Technology, although the idea for (and even the term) "Smart City" appears in studies from a similar period, coming from other research centres (Coe, Paquet and Roy, 2001), (Bertinelli and Black, 2004), (Lindskog, 2004), (Carrillo, 2006), (Hollands, 2008), (Giffinger, Haindlmaier and Kramar, 2010).

In the rich – despite the relatively short time that has passed since the publication of the initial studies – literature on the subject, we encounter general considerations, for example, looking for an answer to the question whether a "smart city" is another utopia (Mora and Deakin, 2019) or looking for references to political trends, such as neoliberalism (Storper, 2016). In research on smart urban space, references are also made to research related to "classic" areas of science, such as architecture and urban planning, construction, urban engineering, applied computer science, logistics and transport, or environmental engineering. On the other hand, in publications containing in the title a reference to a smart urbanised space, juxtaposed with the presence of its residents (or – more generally – users) in this space, there are many references to "soft" sciences, such as sociology, psychology or management and quality sciences.

Previous research has shaped a certain paradigm of a Smart City, as in the view introduced by Thomas Kuhn in the book The Structure of Scientific Revolutions (De Guimarães et al., 2020). According to this view, a paradigm is a set of concepts and theories that form the basis of a given science. The "Smart City" paradigm, in its current shape, results from the experience and research results, especially on the shape of urban space (architectural and urban approach), on its information and IT infrastructure (ICT approach (Beltrán-Ramírez et al., 2015), on technical and logistical infrastructure (transport systems, media management: energy, water and sewage, waste management), on the behaviour of residents and groups of city residents (sociological and psychological approach), and on other groups of problems essential for the functioning of urban spaces.

Among the authors of studies on Smart Cities, there was also – and still is – a lively discussion on whether – for example – for the shape of smart urban space, the most important thing is to take into account the concept of Sustainability (Sampria et al., 2016), implement solutions in the field of Green and/or Reverse Economy, or maybe the participation of the "last mile" stakeholders, i.e. city residents, in shaping its "smart-ness" in accordance with the participatory approach? The authors of this study believe that previous work has failed to attempt to prioritise the tasks carried out by smart urban space. Certainly, one should – firstly – ask what would become the basis for such a "hierarchisation of needs". Another obvious question is the question of the advisability of such a hierarchy. And – last but not least – the question of the authorship (source?) of the proposed Smart City task hierarchy.

Establishing a ranking of the directions of increasing the "smart level" of a given urban space may be related, for example, to the identification of decision-makers. In an interesting study (Engelbert, van Zoonen and Hirzalla, 2019), the authors refer to a situation, in which projects related to the creation of smart urban space are submitted for co-financing from EU funds. The authors of such projects (as a rule: city/local decision-makers) are, on the one hand, guided by their own conviction, and on the other – by their assumptions about not whether the substantive area of the project is a real priority for the residents of a given area, but whether it has a reasonable chance in the assessment of experts representing the potential donor.

However, the experience of recent months shows, that the deep conviction of decision-makers about their own rightness, and even a solid initial recognition of the residents' expectations, may not be a sufficient premise for

decisions in the discussed area. Let us consider to what extent the previously accepted Smart City paradigm will prove successful in a situation, where it turns out that sudden and unexpected, and – at the same time – extremely important premises turned the hierarchy of needs "upside down" in Smart City projects.

The authors of this study intend to discuss the following thesis: the present shape of the Smart City paradigm must be at least expanded, if not completely rebuilt, in connection with the experiences of urban communities resulting from the current Covid-19 pandemic. For example, it is worth asking the question: have the current leaders of Smart City rankings proved to be the most effective in fighting the pandemic with urban organisms?

In the next part of this study, an attempt was made to conduct a targeted review of previous research in search of task areas that were somewhat "neglected" by scientists active in Smart City research and by decision-makers implementing specific solutions, which may be of key importance for smart cities in the "post-pandemic" period. Such areas can be identified not only by reading available publications. A dozen or so months ago, the authors of this study were on a working visit to a significant university, located in one of the largest countries of the European Union. The aim of the talks conducted during this visit was to get to know each other's general approach to Smart City issues, as well as the research and implementation works carried out. One of our partner's colleagues, a doctor, also participated in the talks, but the content of the discussion showed that other participants of the talks were not entirely convinced that the issues of broadly understood health care are included in the considerations regarding Smart Cities. One can jokingly say here that, if a Smart City is a city offering a high level of quality of life to young, happy, environmentally-conscious and physically active people, then – in order not to disrupt such an ideal image – poor health should be the basis for relegating someone from smart urban space.

It was assumed, that the starting point for the intended exploration will be the identification of problem areas related to the Smart City paradigm, most often described in the available literature. The methodology of such explorations is described in the next part of this study. On the other hand, the authors decided to create a list of such areas, that have not been appreciated by researchers and decision-makers so far, and from the perspective of the pandemic experience, they should be very high on the list of criteria for assessing whether, in 2020 (and in later years), a given urban space can actually be considered "smart".

Problem areas undervalued in previous research on Smart Cities Subjective representation of the "Smart City" paradigm

The term "smart city" appeared in literature and economic practice in the last decade of the twentieth century, along with the intensive development of information and communication technologies, and was initially defined and interpreted mainly in the context of their use and development in urban infrastructure (Kumar et al., 2019; Hui et al., 2017). However, with time, it began to be noticed that such an understanding of a smart city mainly serves the suppliers of solutions from the IT and ICT sector, who treat the city as an attractive market, and the products and services they sell are not always a response to the needs of municipal authorities and residents (Lom and Pribyl, 2020; Šurdonja et al., 2020; Barba-Sánchez et al., 2019; Kummitha, 2019; Albino, 2015; Jucevičius et al., 2014). It was an impulse to redefine the notion and concept of a smart city.

In the new terminology version, representatives of the urban community began to be included in the process of planning, creating and developing intelligent solutions (Chamoso et al., 2020; Simonofski et al., 2019; Moustaka et al., 2019). This made it possible to humanise the understanding of a smart city and supplement it with a social aspect. As a result, the implementation of modern urban technologies was focused on meeting the needs of residents and improving the quality of their life in the city (Yigitcanlar et al., 2019; Chen et al., 2017; McNeill, 2015; Moser, 2015; Castells, 1996).

The progressive degradation of the natural environment, especially intense in the last decade, and the popularisation of the concept of sustainable development, resulted in the further evolution of the notion and concept of a smart city. In addition to technological, economic and social aspects, the definition of a smart city also includes issues related to environmental protection and ecological education (Sepasgozar et al., 2019; Yu et al., 2019). In this way, a smart city has also become a sustainable city (De Guimarães et al., 2020; Mattoni et al., 2019; Patel and Doshi, 2019; Kobza and Hermanowicz, 2018; Ahvenniemi et al., 2017).

The systematic increase in interest in research in the field of smart cities in the period when this concept was constituted is perfectly illustrated by the growing number of research articles devoted to this issue published in one of the world's largest publishing houses – Elsevier (Fig. 1). In 2012, their number exceeded 1,000, and over the next 7 years it increased almost fivefold.

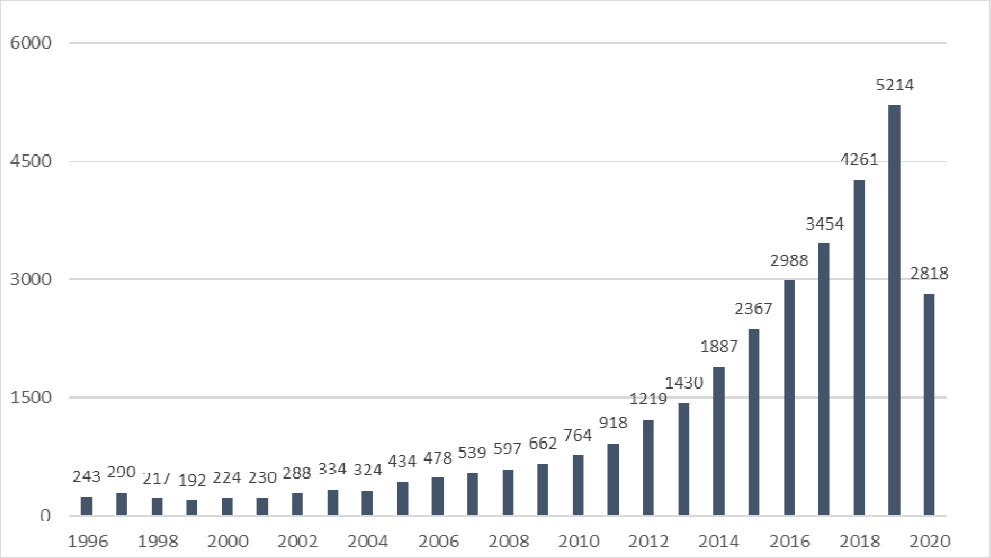

Fig. 1: Number of research articles devoted to the topic of Smart Cities and published in journals of the Elsevier publishing house in 1996-2020* (in 2020 – until April). Source: own study based on the Elsevier database.

Despite the development of research on the essence and functioning of smart cities, issues related to the development of urban information, telecommunications and energy systems still dominate among the publications mentioned. Much less attention is paid to ecological and social aspects (Table 1).

Table 1: A list of ten journals from the Elsevier publishing house with the largest number of articles devoted to the topic of Smart Cities in 1996-2020

No.	Journal title	Number of articles	The main areas covered by the journal
1.	Procedia Computer Science	775	computer science, mathematics, telecommunications
2.	Journal of Cleaner Production	745	environmental engineering, transport, materials science
3.	Energy Procedia	695	energy, environmental engineering
4.	Future Generation Computer Systems	636	computer science, mathematics, telecommunications
5.	Sustainable Cities and Society	576	architecture and urban planning, spatial management, environmental protection, sociology, management
6.	Applied Energy	554	energy, automatics, electronics, electrical engineering
7.	Energy Policy	550	energy, architecture and urban planning, environmental engineering
8.	Procedia - Social and Behavioral Sciences	536	sociology, psychology, pedagogy, management, economics, finance

No.	Journal title	Number of articles	The main areas covered by the journal
9.	Energy	517	energy, architecture and urban planning, environmental engineering
10.	Energy and Buildings	454	energy, architecture and urban planning, environmental engineering

Source: own study based on the Elsevier database.

The issues related to the health condition of the residents of smart cities are discussed even less frequently than social or environmental issues. An extensive literature review, carried out by Portuguese scientists in 2019, indicates (Rocha et al., 2019) that, out of 8,130 articles from the Web of Science and Scopus database, referring to the topic Smart Health or Public Health in Smart Cities, only 19 were devoted to disease prevention, development of health care in cities or health promotion, i.e. public health. Most of the publications concerned a healthy lifestyle, including its aspects, such as tourism, mobility, sports activity or a healthy diet. Therefore, the authors primarily focused on improving the quality of life (Trencher and Karvonen, 2017; Casino et al., 2017), adopting the idealistic assumption of full risk control and a high standard of health care in smart cities. Issues related to diseases, health problems, potential threats to the health and life of residents and the functioning of the health care system have been marginalised. This approach can be considered – according to the authors of this study – as ignoring difficult and inconvenient topics, such as: illness, old age, disability or exclusion. Such an assessment is additionally confirmed by the fact that, among the 19 mentioned publications, only two concerned the living conditions of the elderly (Paolini et al., 2017; Urosevic et al., 2017), and two were devoted to epidemic threats (Patsakis et al., 2014; Beltrán-Ramírez et al., 2015).

Few authors also decide to describe early warning systems against health threats in smart cities, although the simplest of them, based on the analysis of data available on the Internet, are easy and practically cost-free to use and interpret. An example of such a solution is Google Trends, which can be successfully used to integrate network traffic data and, on this basis, identify areas of individual health threats and needs for the development of health systems in smart cities (Sampria et al., 2016).

However, It is worth adding that descriptions of smart pro-health solutions appear quite often in practice and literature in the field of smart cities in the ICT context, including that related to the Internet of Things (Zhang et al., 2018; Mshali et al., 2018). They are used to monitor the health of people with chronic diseases and take the form of applications or devices (Sicari et al., 2017; Chatrati et al., 2020). Such solutions have been adopted for the purposes of fighting the coronavirus epidemic to identify the whereabouts of people who are periodically quarantined or infected with Covid-19, but treated at home or in isolation.

The described view of smart cities proves their utopian perception, in which the priority is the continuous improvement of the quality of life of residents, but mainly of those who have already achieved a very high standard of living in terms of civilisation, economy, health and society. As a result, a smart city becomes a space where there is no room for unpleasant, complicated existential problems, that obviously cannot be eliminated. The consequences of such an approach and ignoring health threats are very serious, as confirmed by the coronavirus pandemic, which is most severely experienced by smart cities, which are the centres of largest populations of humans.

Methodology

Three research perspectives were used to identify patterns and consequences of the transformation of mining regions and cities. The first of these relates to the national level (Poland) and the three main mining basins: Lubelskie, Górnośląskie and Dolnośląskie. The second concerns the region, which is the Śląskie Province - the area of operation of the Górnośląskie Coal Basin, and the third is local and covers 19 Śląsk cities with poviat rights. This approach allows one to look at the process of changes and their consequences both synthetically and analytically.
The research is looking for answers to the following research problems:

1. At what stage is hard coal mining in three main mining regions in Poland?
2. What mining regions transformation paths have been implemented in each of the studied regions?
3. Were the cities located in the same mining region transformed in a similar or different way?
4. What influenced possible differences in urban transformation paths and their consequences?
5. What were the socio-economic consequences of selected transformation paths at regional and local level?

The analysis covered a 15-year research period - 2003-2017. In the course of the research, the following parameters were used to identify the socio-economic consequences of the transformation of regions and cities: population, budget revenues per capita, budget expenditure per capita, divided into current and investment expenditure, level of budget deficit/surplus, relation of total liabilities to total income.

For the data characterising the above parameters in the years 2003-2017, the average annual rate of change and arithmetic means were calculated, and based on them, a comparative analysis was carried out in the above mentioned research perspectives. At the end of the article, in order to group the 19 studied cities and formulate uniform management recommendations for them, Principal Components Analysis (PCA) was used to simplify the description of the studied cities from five parameters to two dimensions (Statistica Package), thus obtaining a description of the socio-economic consequences caused by choosing a specific transformation path.

A subjective and detailed analysis of the literature allowed to identify an important and current research gap in the area of research and analysis regarding Smart Cities. It is undoubtedly the area of protection of the health and life of residents, which has – so far – been treated as an undisputed and permanent component of urban existence, that does not require additional attention and improvement. Meanwhile, the unpredictability and uncertainty of the modern world in the last dozen or so months have completely negated this approach, which has become a direct premise for undertaking the considerations presented in this article.

Before identifying the directions of changes in the Smart City concept, an attempt was made to assess the interest in this concept in practice, using a survey conducted on a representative sample of Polish cities several months before the outbreak of the pandemic. The purpose of this analysis was to establish the legitimacy of dealing with the SC problem and to establish the role that health care has played in Polish cities so far.

The results of these studies, together with the conclusions resulting from the literature studies and the authors' observations, became the basis for indicating the directions of modification and improvement of the SC concept.
The research algorithm used in the article includes three stages:

1. literature studies in the field of research on the "smart-ness" of urbanised space, conducted in chapter 2,
2. conducting research on a group of Polish cities in terms of experiences related to the implementation of "smart" solutions and an analysis of the results of these studies focused on areas important in light of the experience of the pandemic,
3. indicating the necessary additions to the concept of creating and developing smart cities.

As part of the above-mentioned stages of research, answers were sought to the following questions:

1. What areas of a smart city have been considered the most important in the literature so far? Was research on smart cities sufficiently multifaceted (actually sustainable)? Did they refer to issues related to threats to human health and life – and to what extent?
2. Was the current concept of a smart city recognisable in practice in Polish cities and were the surveyed entities interested in its implementation? How did they assess the role of health protection in shaping the quality of life of city residents?
3. Which areas of the smart city concept can and should be strengthened and supplemented? How to improve the operation of smart cities in practice in the context of identified imperfections and conceptual deficiencies?

The research methodology used by the authors was adapted to the above-mentioned stages and research problems. In the first stage, literature studies covering the entire period of "constituting" the Smart City paradigm, that is the years 1996-2020, were used. The results of this stage are presented in chapter 2 of this study.

The second stage was carried out on the basis of a survey conducted in October 2019 on a representative group of 280 (out of 930) Polish cities, assuming a 95% confidence level and a maximum error of 5%. The selection of the sample was random. Such selected research parameters allowed for the formulation of conclusions in relation to the entire population of cities in Poland. The main objective of the research was to assess the level of development of smart cities in Poland, taking into account the interdisciplinary nature of smart city solutions. A side topic, covering several out of eighty-five survey questions, concerned the interest in the concept of SC in practice and was used in this article to emphasise the legitimacy of research and considerations regarding SC. In addition, the study uses a question about the state of health care in Polish cities, diagnosing the need and scope for introducing modifications and improvements in this area of functioning of Polish cities.

The survey questions were directed to people responsible for the creation and implementation of the city's development strategy, and the answers provided were validated in the form of conclusive answers ("yes", "no" or "I do not know") or on a five-point Likert scale.

The third stage of the research was conceptual and was based on the results of the two previous stages. The formulated observations related to the scope of additions and modifications to the current concept of a smart city, and related to practical solutions allowing them to be applied in the realities of an average city in Poland.

Research Results

Does anybody care about a Smart City? Assessment of interest in the SC concept in Polish cities

In accordance with the methodological algorithm presented above, the next research stage, after the literature studies, included surveying 280 Polish cities in October 2019. The main and primary goal of these studies was to identify the degree of implementation of smart solutions in classically defined development areas of a smart city, that is, taking into account the aspects of:

- technology and IT, including mobility and databases,
- economy and management,
- society,
- environment.

In the last part of the survey, the respondents were asked about their knowledge of the concept of a smart city defined in this way, evaluation of development in the context of area distinguishing features and smart city rankings, as well as the will to include the concept of a smart city in the development strategy of the area. In the current conditions, the questions asked allow to determine the degree of interest, knowledge and identification of Polish cities with the current vision of creating and developing smart cities.

The results obtained in this part of the survey were confronted with questions about the importance of the accessibility of health care in shaping the quality of life of the urban community and the difficulty of improving this accessibility. It made it possible to look at the health protection issues from the perspective of the current epidemic problems and to indicate the necessity and potential directions of redefining the smart city concept.

Figure 2 shows the distribution of answers to the survey question regarding the knowledge of the current concept of a smart city, which shows that over 65% of Polish cities surveyed know about the idea of a smart city, and only a few percent have never encountered it. Therefore, it is a recognizable concept, not only described in the literature on the subject, but also popularized in practice.

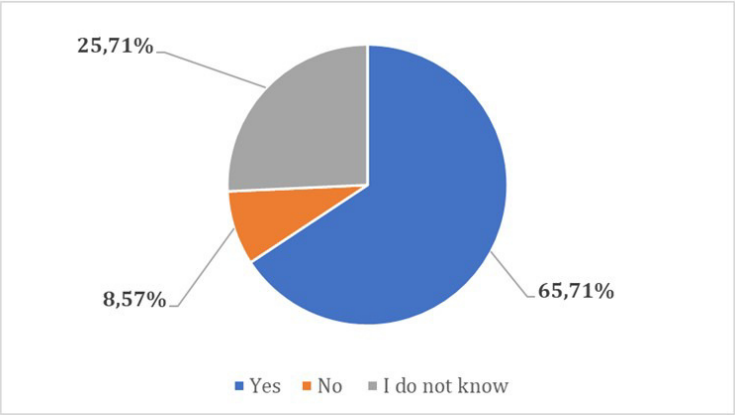

Fig. 2. Distribution of answers to the survey question regarding the knowledge of the current concept of a smart city.

Source: own study based on survey research.

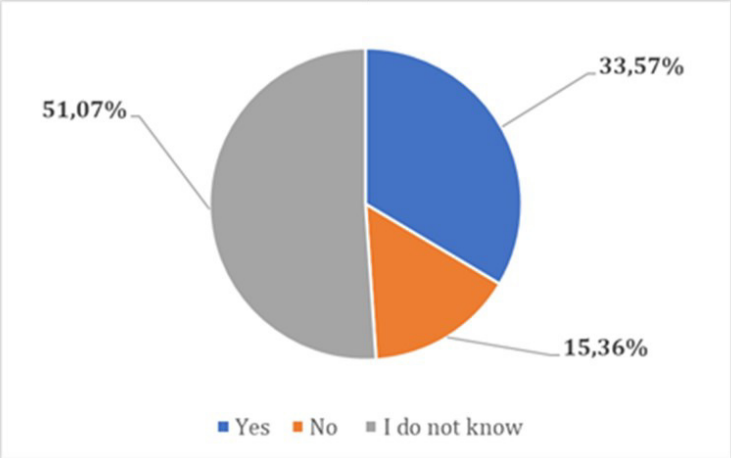

Fig. 3: Distribution of answers to the survey question regarding the interest in obtaining the status of a smart city in the currently emerging and disseminated international rankings
Source: own study based on survey research.

Despite the declared knowledge of the concept of a smart city, only 1/3 of the surveyed entities are interested in obtaining the status of a smart city in the currently emerging and widely disseminated international rankings (Figure 3).

These are usually large cities that are striving to gain recognition, both domestically and abroad. A prominent place in the international ranking, the results of which are widely disseminated, would undoubtedly be a form of improving their image and attractiveness. However, ultimately only about 9% of the surveyed areas assess the degree of city development in the context of the current concept of a smart city, i.e. taking into account the following areas: technology and IT, including mobility and database, economy and management, society and environment (Figure 4). Cities are, therefore, aware of the existence of the smart city concept, to a large extent they are interested in obtaining the status of a smart city on an international scale, but they do not conduct or are unable to conduct a comprehensive assessment of the level of advancement in the implementation of smart city solutions. Nevertheless, over 27% declare that the smart city concept has been included in their development strategy (Figure 5), which clearly underlines the awareness of its importance in practice and the real interest in its implementation.

The obtained results were confronted with the answers regarding the importance of health care in cities, the distribution of which is presented in Figure 6. Over 87% of respondents consider the issue of accessibility of health care as very important or important for the quality of life in urban communities. Cities are, therefore, fully aware of the impact of health safety on the satisfaction of residents.

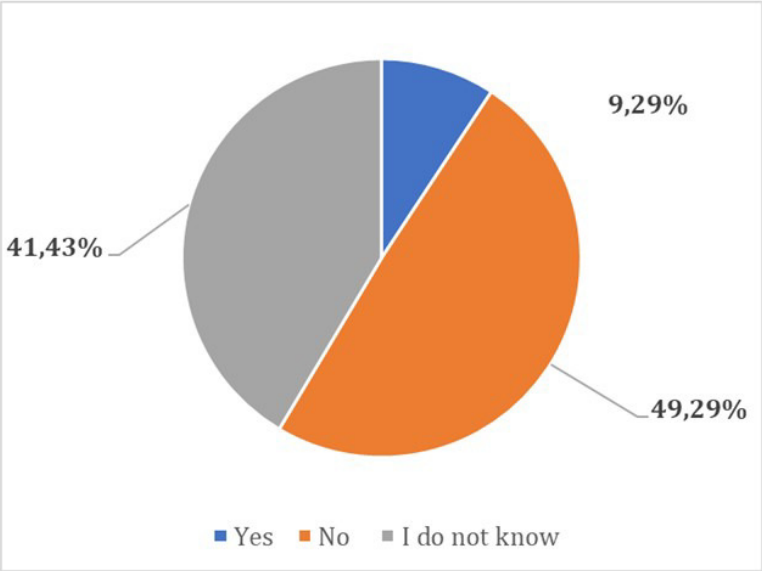

Fig. 4: Distribution of answers to the survey question regarding the overall assessment of the degree of city development in the context of the smart city concept so far

Source: own study based on survey research.

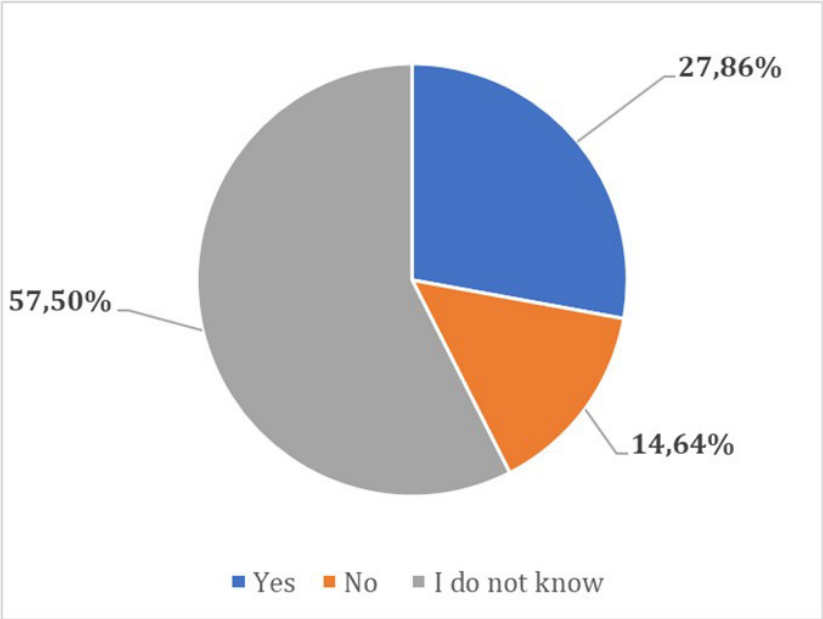

Fig. 5: Distribution of answers to the survey question regarding the inclusion of the smart city concept in the strategy of the area

Source: own study based on survey research.

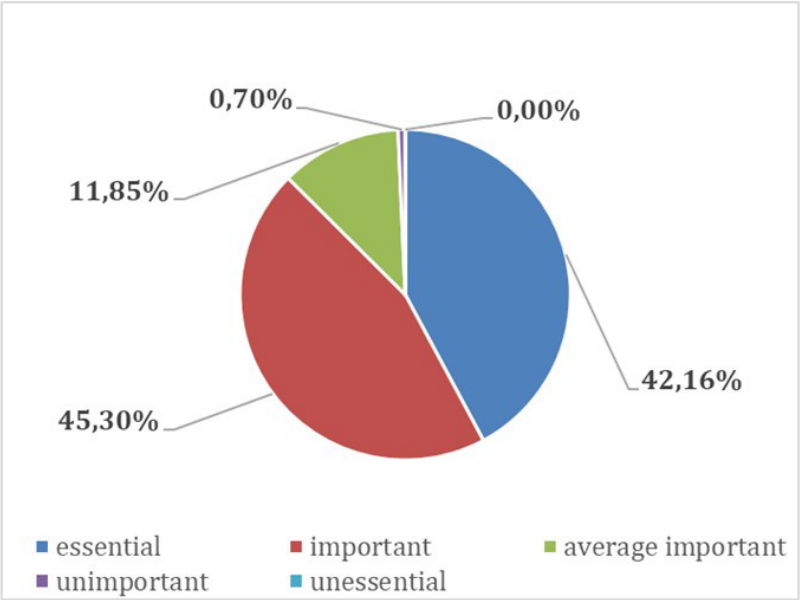

Fig. 6: Distribution of answers to the survey question regarding the importance of accessibility to health care in cities.

Source: own study based on survey research.

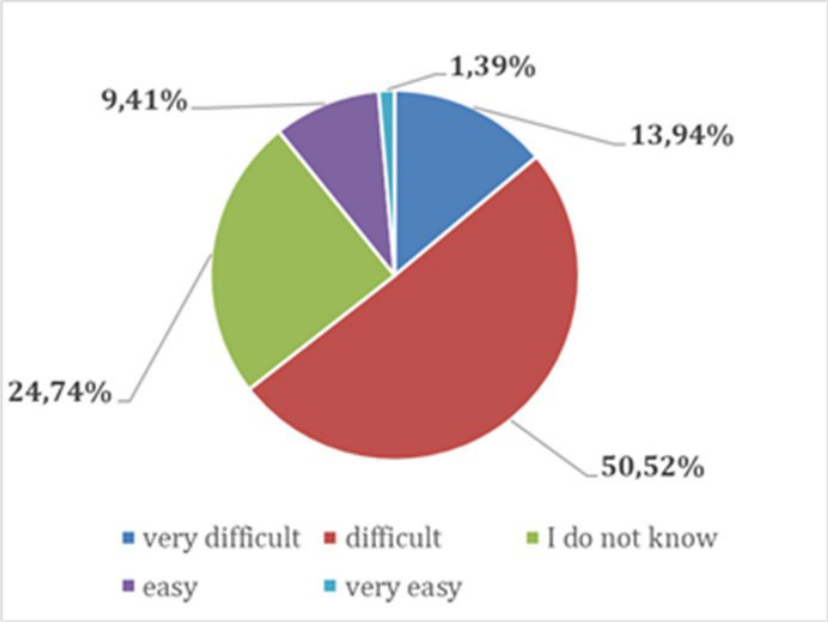

Fig. 7: Distribution of answers to the survey question regarding difficulties in improving the accessibility of health care in cities.

Source: own study based on survey research.

Unfortunately, they consider the tasks related to the improvement of accessibility of health care in cities as very difficult and difficult (over 64%). Only less than 10% of the respondents believe that they can be easy or very easy. This perception of health care in cities is probably one of the key reasons for ignoring public health issues in the smart city concept. The effects of improving accessibility and the level of health protection are difficult to achieve, costly and often require a wait for several or more years. It is also difficult to use them in an image strategy, because they relate to non-representative issues, such as: diseases, disability, old age or death. In addition, their guarantee and systematic improvement should theoretically be the primary, and not extra, element of the city's development.

The conducted research shows that Polish cities know the concept of a smart city, and some of them are interested in its practical implementation. Therefore, the issue of responsible definition and formulation of management recommendations for its implementation should be approached with great care. The overlooking and denial of the health problems of urban communities in the smart city concept may have catastrophic consequences, as evidenced by the currently spreading Covid-19 epidemic. Representatives of city authorities are aware of the importance of health issues, but – in practice – they indicate significant difficulties related to improving the scope and level of health care in cities. Including and exposing these issues to the concept of a smart city would make people aware of the fundamental nature of health protection in the existence and development of smart cities. It would also allow to create and promote good practices in this field on an international scale.

Proposals of new solutions and an analysis of the possibility of their implementation in areas of "smart cities"

The considerations presented above, based on the analysis of available literature sources, as well as the results of the conducted research, clearly indicate that the idea of smart urban space is still far from perfect. In the opinion of the authors of this article, the above statement is an obvious premise for the search for new and the improvement or supplementation of technical, organisational and managerial solutions that bring us closer to the state, in which the "smart city" retains the value of intelligence after the emergence of sudden, unexpected situations, as well as those causing a real threat not only for the classically understood well-being of residents, but also for their lives.

The following is a collection of ideas from the authors of this work, drawn from the experiences of the Covid-19 pandemic in cities. These ideas were organised into three groups:

A. a group of information and technical solutions,
B. a group of organisational and management solutions,
C. a group of "mixed" solutions (combining solutions from groups A and B).

In particular, in the opinion of the authors of this paper, solutions that fall into these three groups are:

A.1. Equipping the Smart City space with remote (automatic?) medical diagnostics systems, the structure of such a system to consider is: e.g. simple connections in each flat, connections in commercial premises, for a specific area (groups of premises, a point equipped with more extensive equipment and technical capabilities (e.g. operated daily and at least by a trained medical technician). A system with features similar to alarm and fire access control systems, with records, in flats: points for automatic measurement of body temperature. For privacy reasons: "arming" of the system should be done with the consent of the tenant/owner of the premises.

A.2. Establishing a network of local "emergency" warehouses with appropriate infrastructure (e.g. a solution similar to flood prevention equipment warehouses): first aid equipment, gloves, masks, water, food rations etc. in the event of quarantine.

A.3. Adaptation of IT infrastructure to increased (and changed) needs in emergency situations (Home Office, Home School).

B.1. Conducting an inventory of adapted facilities/rooms isolated from the rest of the SC space and development of plans for making rooms available in the event of a situation requiring access to the rooms.

B.2. Development of a map of roads (streets) and an initial record of transport systems to perform tasks resulting from the need to evacuate sick or quarantined people from the SC area.

B.3. Development of the existing infrastructure and management systems in the area of epidemiological and sanitary tasks.

B.4. Preparation of action plans aimed at maintaining the quality of life of SC residents in material, psychological and social terms during and after the end of threat.

B.5. Conducting epidemiological preventive and educational training that allows to reduce the scale of threats and strengthen social and professional responsibility during the emergence and escalation of threats.

C.1. Designing methods and preparing an appropriate technical infrastructure to enable universal and effective notification to residents about threats and the implemented mandatory emergency procedures.

C.2. Designing methods and preparing an appropriate technical and organisational infrastructure to support socially and economically excluded people (seniors, disabled, homeless, unemployed), especially in emergency situations.

C.3. Refining the existing procedures and preparing the appropriate technical and organisational infrastructure for the purposes of maintaining law and order, as well as preparing appropriate changes in such procedures for application (implementation) during natural or epidemic threats.

C.4. Development of the existing epidemiological and sanitary infrastructure and systems, including municipal infrastructure and systems, such as providing water to residents, sewage disposal and waste management, enabling the effective implementation of their tasks in emergency situations.

Summarising the above list, it is definitely not closed. Such a list must include all solutions ensuring that smart urban space not only retains its postulated value of providing residents with an appropriate level of quality of life, but guarantees maintaining (or perhaps improving?) this level. The more items this list contains, the greater the possibility of ensuring the implementation of the above-mentioned postulate.

It is worth noting that the problems indicated on the above list have already been taken up by researchers and described in publications (e.g. the "Smart Ambulance Service System" proposal, presented in (Sondur et al., 2015) or "Automatic Ambulance Rescue System" (Sangeetha, 2014)). However, the proposed solutions are "autonomously intelligent" in nature and were not considered to be a potentially integral part of the SC project.

In the opinion of the authors of this study, it is also impossible to ignore the real inclusion of the residents of smart urban space in both the process of shaping it and managing this space. The fact that this problem is important and has not been resolved so far (even without taking into account the effects of the pandemic) is evidenced by the extensive discussion of the scientific community, in which not only the issue of including, but even excluding citizens from the structure of a smart city (Engelbert, van Zoonen and Hirzalla, 2019) appears.

The design and implementation of the above proposed solutions also requires the development of efficient financing models at the level of operating (one-year) and strategic (multi-year) budgets. This task is very difficult, due to the following circumstances:

- the scope of necessary preventive actions covering many aspects of urban life,
- the scale of planned projects, which should cover the entire area of the city and all its residents,
- a drastic decrease in revenues in the city's budgets caused by a deep recession in the economy,
- limiting co-financing of municipal investments from private entrepreneurs, due to a sharp reduction in their income,
- no direct economic gains or image improvements resulting from the actions taken.

The development of a model for financing projects related to an epidemic threat – in accordance with the theory of public finance – should begin with clearly defining their nature and assigning them to one of the three categories of goods:

1. public goods that meet collective needs – by definition provided and financed under the public finance system (e.g. national defence, public safety, sanitary protection, road infrastructure, public administration),
2. social goods that partially satisfy collective needs and partially individual ones, the financing of which depends on the adopted political and social doctrine and the degree of economic development, and may be in the hands of the state or local government authorities, or be partially or completely in the hands of the citizens, in this case the residents of smart cities (e.g. education, health and culture),
3. private goods that only meet individual needs, the financing of which is provided by private households or enterprises.

Discussion

Most of the proposed projects are public goods and are directly related to the necessity to guarantee sanitary protection for residents, which guarantees that their physiological needs and the need for safety are met. Their financing should, therefore, take place in the sphere of public and local finances. However, the implementation of such an assumption in the current situation will certainly result in a long-term increase in public and local government debt, due to the mentioned reduction of budget revenues and the necessity to use debt instruments in the form of bank loans and treasury and/or municipal bonds.

Some of the above-mentioned activities can be treated in the category of social goods co-financed by city residents. This, in particular, applies to preventive education and individual pro-health activities. Some of them can also certainly be treated by residents as private goods, which, in order to increase their own safety, they will be willing to finance from their own resources, which will relieve the public and local government budgets.

It seems that, in this situation, the best models of financing will be hybrid models, in which funds from central and local budgets are combined with private funds from enterprises and residents. In this regard, you can use the already developed experience of sponsoring, public-private partnerships and the more and more popular idea of crowdfunding. At the same time, taking into account the nature of sanitary protection and public health, under which collective needs are financed, in the process of obtaining financing, the purpose of the actions taken and the individual benefits resulting from them should be highlighted. This is because the collective need for security is felt most strongly when the threat materializes and if the threat ends very quickly, it ceases to be important.

It should also be optimistically assumed, that taking far-reaching measures to strengthen sanitary safety and public health, generated as a result of the emergence of new individual and collective needs, will contribute to stimulating local entrepreneurship and economic life, which – in line with the Keynesian idea – will also enable the funding of local budgets and the gradual restoration of their financial potential.

In the existing concept of a smart city, the quality of life of its residents has been treated quite differently ((Macke et al., 2018), (Shapiro, 2006), (Vanolo, 2016)). Among other things, available works include a concept that identifies the quality of life in a smart urbanised area with satisfying higher "levels" in the hierarchy of needs (Tahir and Abdul Malek, 2016), (Goyal, Sahni and Garg, 2018), such as:

- the need to belong to an elite of the urban community,
- the need to be acknowledged as a citizen of the world, confirmed by the appropriate position of the place of residence in international rankings of smart cities,
- the need for self-realisation in any area of the functioning of a "smart" urban metropolis.

The Covid-19 pandemic has pushed the inhabitants of smart cities to the "lowest level" of the pyramid of needs (according to A. Maslov, these are physiological needs), focusing their attention on meeting their primary physiological needs (the need for health and the need to survive), at the same time depriving them of a sense of security. The state of epidemic threat triggered new needs (Lester et al., 1983), (Nicklowitz and Choi, 1994), the satisfaction of which would allow us to return to the current lifestyle in the future, provided a better health safety system was created.

The new needs, brought about by Covid-19, can be identified in the near future from the perspective of several key operational and preventive issues. Operational issues relate to all matters that need to be resolved during an epidemic threat and provide answers to the following ongoing questions:

- Are there any systems for monitoring epidemic threats and warning residents before their occurrence in a smart city?
- Do the smart city management principles allow for an effective policy of researching residents and equipping them with protection measures?
- Does a Smart City facilitate life in quarantine or facilitate the isolation of selected spaces?
- Do SC managers have developed procedures for systematic restoration of specific areas of socio-economic life?

Preventive issues relate to the principles of epidemic prevention and the functioning of the municipal health care system and answer the following strategic questions:

- Does the current Smart City provide better / more effective medical care?
- Does a Smart City ensure early detection of disease threats?
- Is the health care system in an SC effective and efficient in terms of medicine and finance?

The existing literature review shows that research on the above-mentioned issues has not yet been conducted in the context of SC considerations. Protecting the health and life of urban residents did not attract the attention of researchers, nor was it a priority in the hierarchy of needs. The leading places were occupied by technological and IT issues, which, on the one hand, were to improve the quality of life of the residents, and on the other to improve the financial performance of enterprises offering new infrastructure solutions. The needs of local communities, which were able to formulate, negotiate and implement them, also turned out to be important, although not the most important. The environmental needs turned out to be the least important, due to the weak and non-commercial voice of the communities representing them. However, in the present conditions, it would be advisable to build a pyramid of needs from scratch, i.e. starting from ecology, health and life protection, which can be subordinated to the functioning of urban communities, and the use of smart technological solutions.

Undoubtedly, it is a difficult task, if not impossible, because there are already attempts to return to the "old" habits and customs, as well as urban prosperity. Hence, according to the authors, there are strong reasons to redefine the SC paradigm and change the hierarchy of urban needs. Scientists and researchers can play the role of conscious informers and creators of the new reality in this process.

Conclusions

The current smart city concept has been systematically developed and improved in way of its sustainability and taking into account not only infrastructural, but also social and environmental aspects. In spite of that, very little attention and research was devoted to issues related to threats to human health and life, including epidemic threats.
The above observations are also confirmed by the results of surveys conducted in a group of 280 Polish cities, which prove the high recognition of the smart city concept, its importance in local development and the will to systematically implement technological, social and ecological activities displayed in it. These results also justify the conclusion that the issue of effective health protection is a priority in shaping the quality of life of the residents of smart cities. Nevertheless, improving the level of health protection in cities is a difficult and complex challenge, which is most likely one of the reasons for disregarding the inclusion of health issues in the conceptual area of improvement and development in smart cities.

Limited definition and implementation of smart city solutions has become the cause of activating the currently observed weaknesses of smart cities in the sphere of their real functioning and in the conceptual area, which – in turn – resulted in the need to redefine the idea of a smart city and supplement it with issues related to public health, including the assurance of effective sanitary and epidemic protection. Therefore, the authors of this study postulate that the role of public health in the concept of a smart city should be included and emphasised, as well as a number of practical solutions regarding epidemic threats, enabling the implementation of such a postulate divided into three groups: A. A group of information and technical solutions, B. A group of organisational and management solutions and a group of "mixed" solutions (combining solutions from groups A and B). The financing of these and other solutions could be most efficiently carried out using hybrid sources of capital, allowing to combine budgetary resources, investors' funds and the private involvement of smart city residents.

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A Bibliometric Study of Renewable Energy and Circular Economy: Revealing Links and Dynamics

Nicolae PINTILIE

The Bucharest University of Economic Studies, Bucharest, Romania
pintilienicolae15@stud.ase.ro

Abstract

This paper aims to create an image of the relationship between circular economy and renewable energy through specialized papers published between 2000 and 2019. In this way, this paper is based on the study and analysis of the literature published on this topic in the last 2 decades. The paper also discusses how policies and measures towards circular economy can be integrated into the European body, with a positive effect on the society and environment. After the presentation of the methodology, the paper develops an analysis in time and space of the selected scientific papers, then an analysis of the keywords with their grouping on clusters, creating a map of them and highlighting the existing relationships. Moreover, the paper also presents a density map regarding the most important keywords used in the literature to develop the link between ”renewable energy” and ”circular economy”. Among the most interesting results are: (1) a massive concentration of works in the last three years of the period considered in the analysis; (2) Europe is one of the regions with the largest contribution in terms of authors; (3) The keyword map is particularly useful in revealing the link between keywords in the analysed context: the relationship between circular economy and renewable energy. Finally, the paper presents possible limits of the research, but also future directions of its development.

Keywords: renewable energy, circular economy, sustainability, waste management

Introduction

The circular economy is a concept that took off a few decades ago and is evolving day by day with articles and books published worldwide. Environmental factors that have put pressure on the environment are the main determinants that have contributed to the growing concerns for the circular economy as humanity manifests a growing demand for products, a demand that can be supported by a high consumption of resources.

Global warming and the rapid consumption of natural resources, respectively the desire to generate sustainable and competitive benefits determine us to oppose linear thinking (produce, consume, throw), moving towards a circular approach in which most of the materials used have another purpose at the end of the life cycle. In other words, making various investments in renewable energy involves a long process to analyze the most appropriate investment option, respectively to choose the best technologies, a process that involves re-engineering industrial entities and moreover, increasing environmental competitiveness for global and regional industry.

Climate developments in recent years have led people to adopt measures characterized by concepts such as sustainability or environmental protection. The traditional way of life has started to be “affected” by various factors, both climatic and social or economic, so that new ways of carrying out activities appear from one period to another.

Since ancient times, people have adapted to the conditions offered by the environment, using existing resources depending on where they were. It was later discovered that resources can be combined, the effect being much greater than their individual use. In this way, people began to form specialized communities depending on the resources in the area where they were located, having as object of activity resource processing. With the passage of

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time and the diversification of activities, resources have started to begun increasingly scarce, so that in everyday activities began to feel the "limited nature of resources". At the same time, the processing methods have led to the appearance of effects that are felt over time, with an impact on the entire planet, effects that have begun to be felt by various phenomena, considered abnormal. Warming of the Earth's atmosphere, the occurrence of strong storms and landslides, illness for unjustified reasons, all these are effects that sum up the way resources in various territories have been exploited and processed through organized activities, without taking into account (consciously or unconsciously) the impact on the whole world.

The current economic activity is based on the linear model of production and consumption: in this sense, the main industrial and commercial activities are characterized by the phrases “to extract / produce”, respectively “to consume / throw away”. Moreover, with the passing of each year, natural resources are increasingly depleted and the amounts of garbage generated are more and more consistent, so that in the traditional economic model is truncated reference to optimizing materials through recycling, reuse or recovery. If, in addition to all these elements, we also discuss the fact that energy is needed to carry out the activities of companies (industry, trade, etc.), which is usually based on fossil fuels, then we can consider that the transition from the traditional economy to the circular economy can also be based on the transition from conventional to renewable energy, produced by environmentally friendly means. Renewable energy is an energy of the future due to the very limited nature of traditional resources, but there can be no conversion of energy production globally without highlighting the need to fundamentally change the entire flow of production and handling of products and services transmitted to the market.

Literature Review

Several literature review have been carried out in the field of circular economy. Most research have focused on the desire to define the concept of circular economy and also outline how to implement it in business models and new technologies (Geisdoerfer, et al., 2017; Kirchherr et al., 2017; Pan, et al., 2015; Tukker, 2015). However, given the novelty of the concept, the socio-economic potential and the impact on the environment following the conversion of the traditional economy to the circular economy is not yet understood at the macro level (on national, multinational and global scale) (Wiebe et al., 2019; McDowall, et al., 2017).

Nowadays, more and more resources are considered critical, and their depletion is becoming more and more rapid over the years. Global economic activities are represented by the linear model of production and consumption (produce - consume - throw), and these concepts in combination with the production factors mentioned in the literature (labor, nature, capital) lead to the generation of goods and services within a single life cycle. (Rodriguez et al., 2020). In the linear consumption model presented above, the end user has the responsibility to take care of the disposal of the product, which leads to products accessible to all consumers, but at the same time to waste resources and significant amounts of garbage (Ellen MacArthur Foundation, 2015).

Given the implications and effects of the circular economy, decision-makers or other stakeholders in all countries have been attracted to this concept, which is increasingly being transposed into true national policies. The circular economy is an innovative concept that has the power to develop new business opportunities and economic growth while respecting the environment, being an alternative to the current model of production and consumption. In this way, through the transition to the circular economy, waste could be seen as the new resource of the economy, which can lead to the reduction of pressure on critical resources and also the reduction of garbage quantities. (Rodriguez et al., 2020).

The premise that the use of fossil fuels (coal, natural gas, oil) leads to economic growth has been widely debated in various papers. However, a significant amount of carbon dioxide is released into the atmosphere due to the high use of non-renewable resources, with severe implications for the greenhouse effect. The economic development that mankind has known in recent years has been based on the use of polluting energy sources, this statement being supported by data from the World Resource Institute, which shows that more than a third of greenhouse gas emissions are generated by traditional energy sources (Shahbaz et al., 2020). This has led to negative effects on society as a whole and on the environment, air pollution being an important cause for various health problems. Nowadays, any country must rely on renewable energy sources (hydropower, geothermal energy, solar energy, wind energy, biomass, etc.), and it is necessary to develop these alternatives in a sustainable way, which will ultimately lead to pollution reduction.

In 2013, renewable energy accounted for 19.1% of global final energy consumption. According to the data, the electricity sector is fueled by both increases in renewable energy production (solar panels, hydropower, and wind energy) and increases in energy production resulting from the use of oil, coal and natural gas. At this point, specialists around the world need to lay the groundwork for a system that increases the share of renewable energy

use to replace traditional energy consumption, with notable effects for sustainable economic growth (Shahbaz et al., 2020).

If we are to discuss the concept of circular economy, the first appearances were at the end of the last century, in the ’80s works were written about this notion (Bassi & Dias, 2019). In fact, according to Bassi & Dias (2019) the key of the circular economy concept is the harmonization between economic growth and environmental protection, although many definitions have been noted in the literature. In this way, we can highlight the work of Kirchherr et. al (2017) who conceptualized the notion of circular economy, analyzing 114 definitions. According to Ellen MacArthur Foundation (2015), the circular economy is an industrial economy that is established or regenerated by intention and design. Taking this affirmation into account, we can say that the transition to a circular economy for the world industry does not mean reducing the means of production or limiting production, but rather the reconfiguration of production processes taking into account aspects related to environmental protection.

Homrich et al. (2018), and Reike et al. (2018) define the circular economy as an economic system that develops to oppose the traditional system (produce, consume, throw), in order to achieve sustainable development, with significant effects on environmental quality, economic prosperity, social equity. In this context, the concept of the circular economy is of great importance given that the European Commission itself is making significant efforts to support the transition to a more sustainable, low-carbon, resource-efficient and competitive economy. In this spirit, at European level we can remark Scottish Institute for Remanufacture (Great Britain) and also Institut de l’Economie Circulaire (France) whose purpose is to provide assistance to industrial actors wishing to adopt this concept in their production and supply chains (Suzanne et al., 2020).

According to Forbes Romania, there is great potential for Central and Eastern European countries in terms of renewable energy. In fact, it is stated that "renewable energy is the cheapest source of mass electricity production for Poland, the Czech Republic, Romania and Bulgaria" (Forbes Romania, 2020). Under these conditions, the study of existing investment opportunities for Europe and the world on renewable energy and the circular economy, respectively highlighting the number of jobs that could be created, are factors of major importance that deserve to be studied, given the effects such as economic recovery, lower carbon emissions, increasing the competitiveness of industrial activities.

Circular economy in Europe: how to increase developing through environment care

The circular economy is a growing concept worldwide, specialists currently analyzing the implications that this type of economy can have on human activities. The main advantage of the circular economy is the attention to the energy system, energy sources being an important component in the process of the circular economy.

At European level, the most comprehensive document attesting to the European Union's orientation towards the requirements of the circular economy is the EU Circular Economy Action Plan, launched in 2015. Moreover, at EU level there is a tendency to accelerate the conversion to a sustainable development model, in which resource consumption is closely monitored, reducing anthropogenic footprints on the environment. In addition to environmental issues, the EU is also set to create a framework for the business environment, designed to bring sustainable products to market, and also to assure new oportunities. According to the European Commission (2015) the potential for GDP growth for the EU economy is 0.5% by 2030, with the possibility of creating over 700,000 new jobs.

The circular economy is a concept that includes several areas, of similar importance, which can be seen in Figure 1.

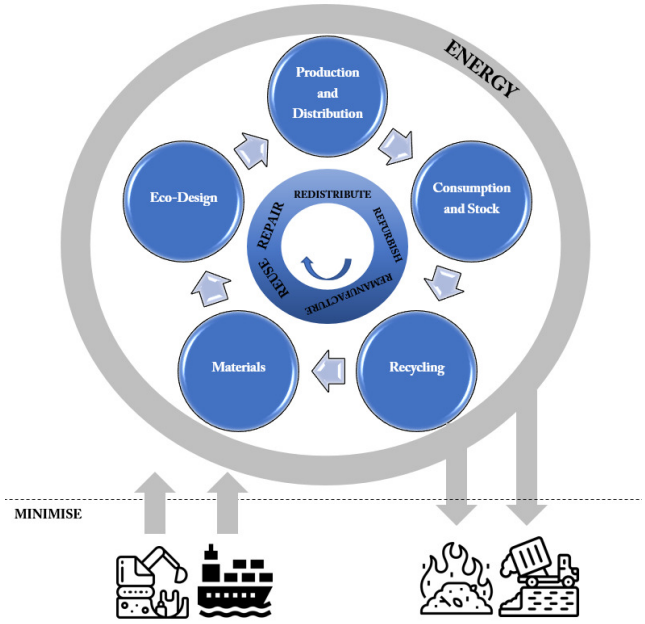

Fig. 1: A simplified model of the circular economy for materials and energy

One of the main aspects highlighted by Figure 1 is the reduction of waste quantities, but also of raw materials through activities such as eco-design, recycling, reusing.

All this can contribute to increasing economic and environmental benefits, provided that the dependence on imports and resource extraction is reduced in close connection with the reduction of emissions from resource extraction, resource processing, waste incineration.

No activity can be performed without access to an energy source. For this reason, all the activities in Figure 1 are included in a sphere called „Energy". In other words, the conversion of the traditional economy to the circular economy cannot be achieved without increasing the efficiency of the energy system and increasing the share of renewable energy (European Environment Agency, 2016).

In fact, at the level of the European Union there is a similar evolution of the share of energy from renewable sources and private investment, jobs and gross value added related to circular economy sectors, the trend being highlighted in Figure 2.

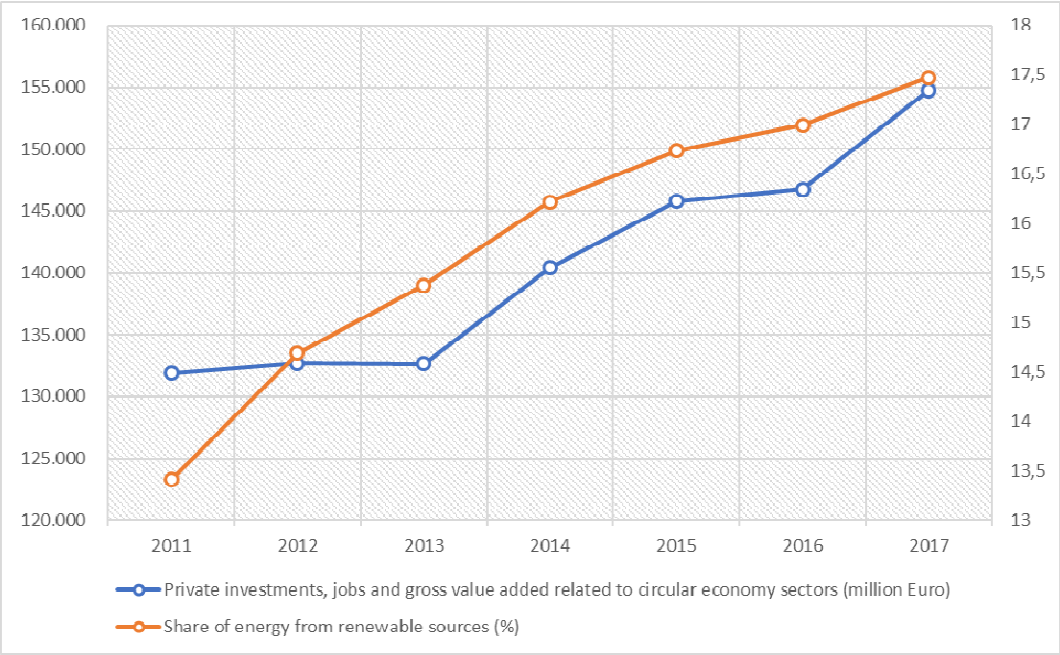

Fig. 2: Evolution of share of energy from renewable sources and activities related to circular economy sectors

At the European Union level (28 states) from one period to another the share of energy used from renewable sources increased from 13.41% in 2011 to 17.47% in 2017, which indicates the concern of decision makers and the socio-economic environment to replace traditional energy means by using alternative, more environmentally friendly sources. At the same time, value added from activities related to the sectors of the circular economy at EU level increased by over 17% from 2011 to 2017, from EUR 131.905 million to EUR 154.790 million, this fact being explained by the change of the paradigm at European level regarding the assimilation of the concept of circular economy, with advantages on various levels: economic, social, environmental.

Although the trend of the two indicators exemplified by figure 2 is similar, in their analysis we went through the stage of determining the correlation coefficient using the Microsoft Excel computer system, Correl function.

Period	Private investments, jobs and gross value added related to circular economy sectors (million Euro)	Share of energy from renewable sources (%)
2011	131.905	13,411
2012	132.707	14,69
2013	132.669	15,378
2014	140.429	16,219
2015	145.797	16,732
2016	146.743	16,995
2017	154.790	17,474
Correlation coefficient		**0,904**

Fig. 3: Correlation coefficient

The correlation coefficient determined based on data from 2011 to 2017 between Private investments, jobs and gross value added related to circular economy sectors and Share of energy from renewable sources is positive and very close to 1, which expresses a direct correlation, so we can affirm that the two indicators values evolve in the same direction. Thus, based on the data we can emphasize that an increase in the use of energy from renewable

sources will increase the value added in activities related to the circular economy, in other words at EU level renewable energy can be seen as a pillar of support in view of the transition of economic activities to the circular economy.

In other words, the circular economy brings into question at least 4 benefits, shown graphically in Figure 4, benefits that can be achieved according to availability to pay some costs:

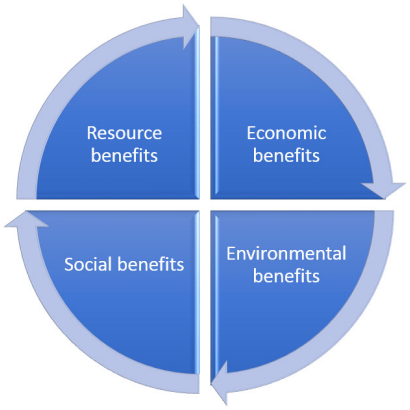

Fig. 4: The circular economy benefits

a) Resource benefits – resource efficiency is a key step in adopting the circular economy. An eloquent example of this is the improvement of waste management, which can be secondary raw materials for economic activities, thus reducing the pressure on global resources characterized by the limited nature. At EU level, improving waste management can have an immediate effect on reducing import dependence, which can help increase the protection of the European business environment from price volatility in international goods markets or reduce uncertainty about the possibility of delivering a certain resource, located at a considerable geographical distance (European Environment Agency, 2016). According to Meyer (2011), streamlining the use of resources through innovations could reduce material consumption at EU level by around 24% by 2030, given that it is currently estimated that between 6 and 12% from the consumption of materials is avoided after recycling, waste management;

b) Economic benefits – The circular economy is largely based on innovation, both in the field of technology and in the field of business models, generating competitiveness and added value superior to the traditional economy in which various opportunities are not considered for economic reasons. Investments in elements that shape the circular economy involve a consumption of monetary resources, but ensure an increase in competitiveness by reducing the consumption of resources, with long-term sustainable effects. According to Amec Environment & Infrastructure and Bio Intelligence Service (2014) at the level of EU member states, net benefits are estimated between EUR 245 billion to EUR 604 billion, representing an average of 3 - 8% of annual turnover following the adoption of measures such as waste prevention, material recovery, modification of procurement activities, modification of products;

c) Social benefits – circular economy involves changing traditional thinking, in order to increase the sustainability of consumer behavior by improving health and safety. In other words, the adoption of the circular economy is estimated to create more than 178,000 new direct jobs by 2030, with a significant impact on the welfare of the population (European Environment Agency, 2016). Depending on the field of activity, the circular economy implies the emergence of new trades, both for white-collar and blue-collar, given that the circular economy is based on innovation through the development of technology and research, but also through the redesign of daily activities related to construction, manufacturing, waste management, etc.;

d) Environmental benefits – reconfiguring traditional energy production systems and rethinking waste management can make a significant contribution to reducing greenhouse gas emissions, with a direct effect on the environment and the population. Moreover, according to Amec Environment & Infrastructure and Bio Intelligence Service (2014), increasing the efficiency of resource use through appropriate measures in areas such as food and drink, fabricated metals, hospitality and food services sectors can avoid about 100-200 million tons of emissions CO2 equivalents, which means about 5% of EU emissions in 2018 (Eurostat, Greenhouse gas emission statistics - emission inventories, 2020).

Materials and Methodology

In order to ensure the methodological transparency of this bibliometric analysis focused on the relationship between circular economy and renewable energy, the authors applied a systematic review process in close accordance with other publications of this type (Popa & Gora, 2020; Cicea et al., 2019; Gora, 2019; Marinescu & Cicea, 2018).

The first step of this article was to define the problem that would be studied, that is „What are the links between circular economy and renewable energy taking into account the worldwide literature in the field"? After establishing the purpose of the study, the next step was to select the database with publications based on which we can develop a data set suitable for bibliometric analysis. For this purpose, the WoS (Web of Science) database was chosen and used, to select the scientific papers that contain the two terms to be analysed, our arguments being the compatibility with the analysis software, but also the exhaustiveness of the data set.

After choosing the database, the third step involved the documents selection taking into account the English language. In this way, 286 documents were identified in the mentioned database, which simultaneously deal with the phrases "circular economy" and "renewable energy". The year 2020 was removed from the analysis because it is not a full year, and the analysis interval was 2000-2019; subsequently, only "article", "conference paper", "book chapter" and "review" documents were considered. As a result, 282 documents remained to be analysed in order to perform the bibliometric analysis.

Finally, the analysis that are to be performed following the stated methodology:

- STAGE 1 – Analysis of the geographical and temporal distribution of scientific production in the field - on the one hand, through this analysis we want to observe how the publications in the field have evolved taking into account the regional measures adopted by the authorities, and on the other hand we wanted to see which are the geographical areas of interest in order to implement the circular economy.;

- STAGE 2 - Semantic analysis of keywords - this stage aims to identify the correlations between circular economy and renewable energy in terms of words derived from the two concepts, respectively which are those subdomains that are influenced by publications and how close this influence is;

- STAGE 3 – Identifying significant clusters based on keywords - through this stage we are trying to see the areas of interest for research aimed at achieving circular economy in correlation with renewable energy. Moreover, this analyse is very important to understand what implications there are regarding transition to circular economy through renewable energy taking into account that these two concepts include a lot of other subdomaines.

To carry out the research, documents were downloaded from the WoS database containing the following characteristics: title, year of publication, authors, abstract, keywords; all this information was used in the VOSviewer program.

In order to be able to visualize the bibliometric analysis, the VOS Viewer software was chosen and used, in which the distance between two nodes indicates their correlation and moreover taking into account the number of citations the words have, the bigger the nodes are (Waltman & van Eck, 2014).

Results and Discussion

In accordance with the phases above outlined, we will first analyse the temporal and the geographical spread of the scientific production. Thus, using the WoS database, we obtained the following annual distribution of documents, graphically represented in Figure 5. Despite the fact the we selected the documents between 2000 and 2019, we found out that database containing the mentioned key words have publications starting with 2009. This first analyse shows us that the relation between circular economy and renewable energy is just at the beginning. The 2009-2014 period of time reflects a relatively hesitating and long beginning of the research regarding circular economy and renewable energy. However, since 2015 till 2019, the number of papers included in the main flow of publications grew semnificatively, showing the growing interest for the concerned theme. What is more, the last two years of the analysed period account for almost 64% of the total number of the articles considered in this study.

Fig. 5: Timeline of the scientific production

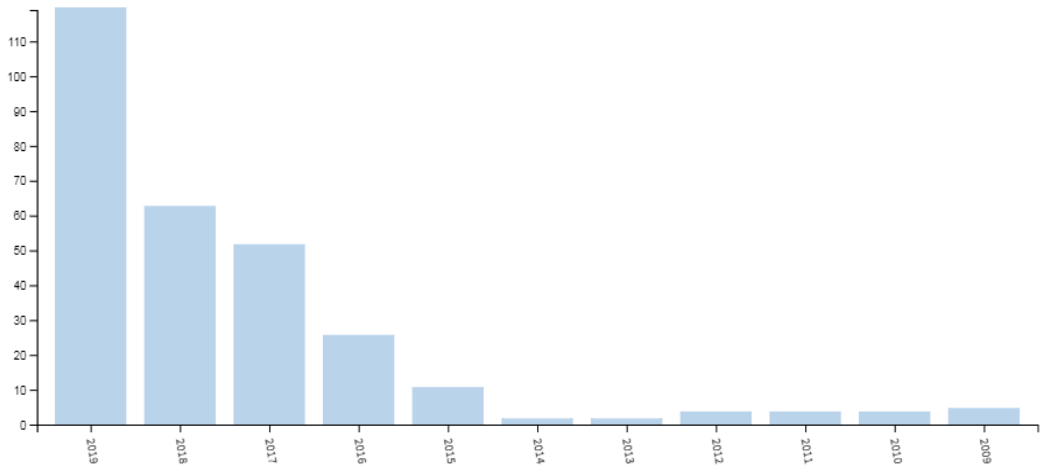

Looking closer at the graphical representation within Figure 5, we can observe one turning point in the literature specific to circular economy and renewable enegy. This milestone is at the level of 2015, the point reflecting an increase in the scientific production, which is directly connected to the researchers interest for this theme and indirectly related to national, regional and global policies that promote environmental protection.

Going further, the geographical distribution of the scientific production will be analysed, by studying the affiliation of the first author or, by the case, of the corresponding author. Figure 6 is designed as a tree-map. Each branch contains the number of authors affiliated to an institution or organization from a specific country, so the size of a "leaf node" (the rectangle) is proportional to this number.

As the tree-map confirms, the main source of the scientific production is Italy, accounting for more than 19% of the analysed documents with 56 authors. It is followed by The People's Republic of China with 32 and Germany 44 authors. What is more, this first four countries are home for around 41% of the total number of authors (343).

In terms of keywords analysis, this was undertaken with help of VOSViewer software. In order to obtain valid results, the authors removed from the analysis the two collocations after which the Web of Science database was queried: "circular economy" and "renewable energy". The keywords occurrences for the 282 articles subject to this analysis are presented in the table 1.

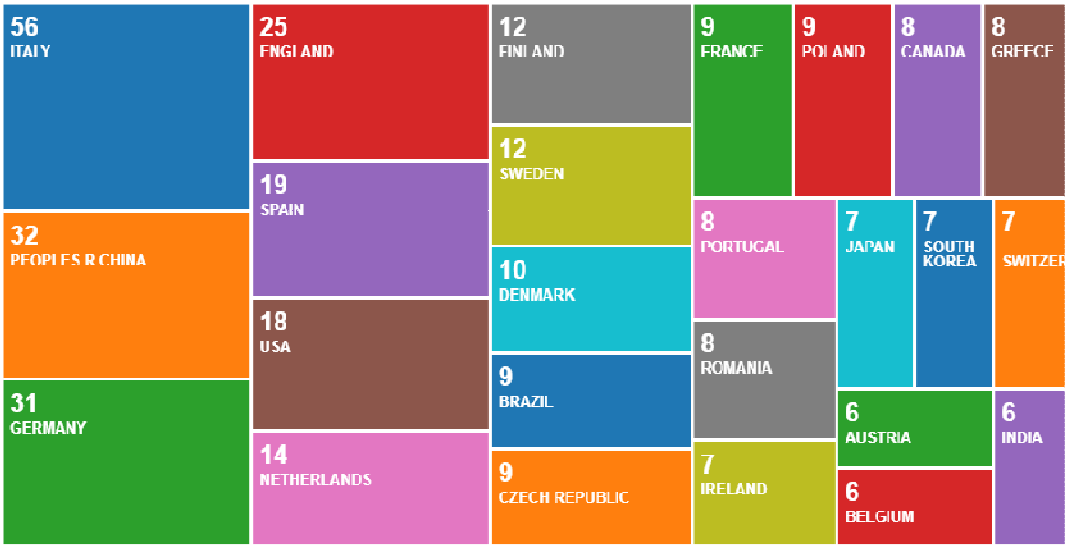

Fig 6. First author or corresponding author's affiliation by country

Table 1: Top 20 keywords ranked after occurrences

Nr. crt.	*Keyword*	*Occurrences*	*Total link strength*
1	Sustainability	46	156
2	Life-cycle assessment	41	155
3	Energy	38	125
4	Biogas	23	102
5	Anaerobic-digestion	26	101
6	Bioenergy	22	96
7	Biomass	26	92
8	Anaerobic digestion	20	80
9	Management	22	71
10	Systems	18	70
11	System	17	67
12	Municipal solid-waste	14	64
13	Waste management	17	64
14	Biogas production	11	59
15	Co-digestion	10	53
16	Performance	19	53
17	Recycling	15	68
18	Food waste	11	65
19	Water	13	65
20	Bioeconomy	12	64

Table 1 also reveals the total link strength for each keyword, showing in this way the keywords power to connect to other identified keyword. For instance, "Sustainability" appears 46 times within the articles and creates 156 links with other keywords, while "Life-cycle assessment" appears 41 times and manages to connect as it reports 155 links. The least connected keywords are "Co-digestion" and "performance".

An even more suggestive situation was generated in VOSViewer based on the grouping of keywords in clusters (from the total number of keywords, only those that have a frequency of occurrence of at least 5 times, were

considered). This grouping is visually designed as a map which includes each cluster, the nodes and the branches linking the nodes.

The largest cluster is the red one, composed out of 17 keywords, followed by the green one with 9 nodes and by the blue one with 7 nodes. The size of each node is given by the number of occurrences of that keyword, so larger a bubble, greater the number of keyword's occurrences. The position of each keyword within the network represented in Figure 7, shows how likely it is to find two keywords in the same context. For instance, "bioeconomy" is positioned as a keyword in the upper half of the network, while „recycling" appears in the lower half of the map, so their connection within articles is very low or perhaps never found together in the discussed context.

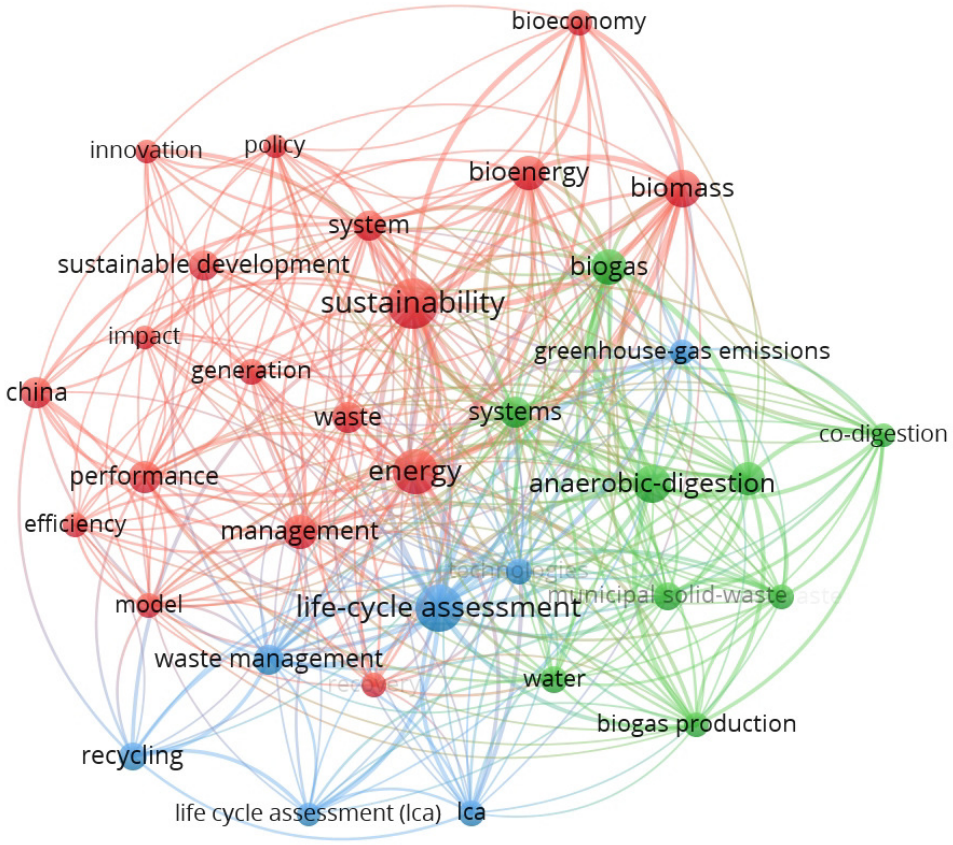

Fig. 7: Grouping keywords in clusters

Looking once again at the network shown in Figure 7, we can observe the most used words in three areas of focus; "Sustainability", "Energy" and "Life-cycle assessment" are bigger nodes than other ones, meaning that the importance of these three keywords within the research field of circular economy and renewable energy, is high. "China" is the single keyword from the map (at the left part of the red cluster) referring to a country, while "biomass" and "biogas" are bringing into attention well-knows ways in order to produce green energy.

If we examine the keywords assigned to each cluster, we can observe that they tend to highlight specific features or related meaningful concepts related to the relationship between circular economy and renewable energy. The blue cluster refers mainly to environmental issues and ways to reduce the negative impact on environment, while the green cluster focuses on processes through waste can be converted into energy. The red cluster is more complex as it seems to include methods to act in a sustainable manner, taking into account management implications and also existing policies regarding environmental protection.

Another important VOSViewer analysis regards density visualization (see Figure 8). Each node in the density visualization map has a color that relies on the density of items at the node. In other word, if the number of items in the neighborhood of the node is big, than the colour of a node is more bright. For our situation, the keywords in yellow colour area appear more frequently in the research area; on the other hand, the keywords in green colour area appear less frequently. Figure 8 is very important for our bibliometric analysis because we understand the overall structure of Figure 7; the reseach realized in the field of "circular economy" and "renewable energy"

focuses on “Sustainability”, “Energy”, “Life-cycle assessment”, these keywords being core keywords in most of the 282 papers selected.

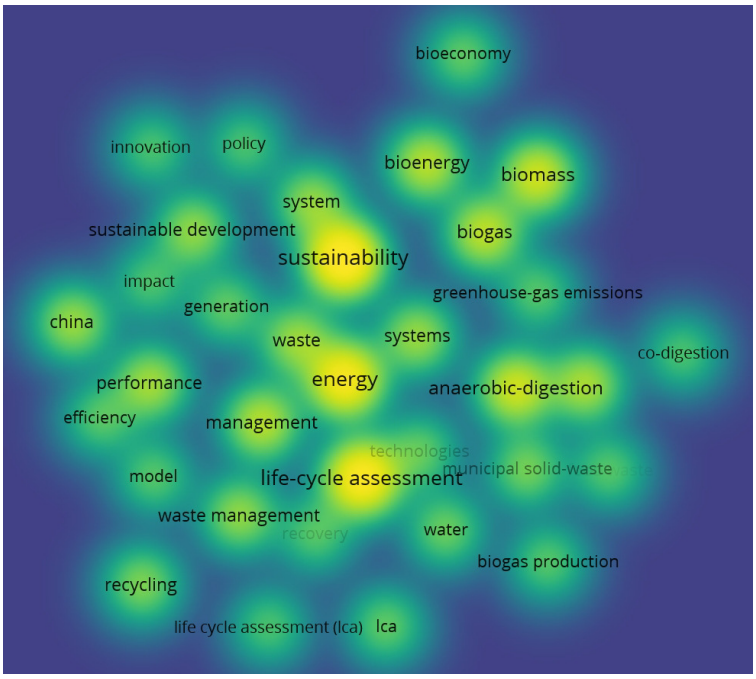

Fig. 8: Keywords density visualization map

Conclusions

The current study has a contribution in understanding the role of renewable energy in the circular economy practices as it was seen through the publications between 2000 and 2019. Within this paper, the construction of the graphs has revealed salient features of renewable energy – circular economy research in time. By grouping keywords in clusters we were able to see the links between different terms existing in the same context, revealing that it is a big possibility to have a lower correlation between a modern concept such as „bioeconomy” and a way to deal with waste management such as “recycling” word. Taking this situation into account, a further paper can take into consideration the role of recycling in the transition to bioeconomy. Moreover, based on the Figure 7, there are three types of concepts that can have an influence on the relationship between renewable energy and circular economy: the methods used by the society to produce green energy, the framework in which the society acts in order to assure the conversion to circular economy and the environmental problems which can be solved only by giving up the traditional way of doing things (produce – consume – throw).

Taking into account Figure 5, we can say that the topic of the paper is at the beginning stage, so there is enough room to bring about tremendous improvements of the research in the field, between 2018 and 2019 being published almost 64% of the total number of the articles considered in the present paper. It is also important to mention that from one period to another this topic is brought to people's attention through a scientific form, in last years the activity being intense. Moving at the Figure 6, there is clear for us that the topic of our paper is a central one in Europe, but also in China, this regions representing the main source of the scientific production. On the other hand, we can highlight that there are also countries from all around the world which are interested in studying this topic, mentioning here USA (18), Brazil (9), or India (6), etc.

Even though the authors explained in detail the methodology used within this paper, the study has some limitations. First of all, only WoS database was used in order to obtain articles. A similar analysis could be conducted using other databases, such as Scopus, which may influence the number of selected articles and provide other query options. Second, each tool used to arrange results in a specific way (see keywords map or tree-map) has its own configuration. It depends only on the ability of authors to learn how to use other software tool too. Third, the relationship between renewable energy and circular economy is just at the beginning, specific issues about these concepts will be in the light of researchers attention, so this may constitute a future research direction revealing ways of transition through circular economy.

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Model and Algorithm for Hub Location Problem in Selected Courier Company

Zbigniew TARAPATA
Military University of Technology, Faculty of Cybernetics, Warsaw, Poland
zbigniew.tarapata@wat.edu.pl

Ryszard ANTKIEWICZ
Military University of Technology, Faculty of Cybernetics, Warsaw, Poland
ryszard.antkiewicz@wat.edu.pl

Abstract

The paper includes a description, formulation, and method of the solution to a certain problem related to the optimization of the structure of parcel distribution system in a chosen logistics company. It was assumed that the parcels should be generated in the zip code areas (more precisely - we know the shipment volume between each pair of zip codes in a time profile (day/week/month/year)). The issue of the system structure optimization is decomposed into two sub-issues: (1) location and dimensioning of the company's branches by optimizing the number, location, capacity of the branches and allocating zip code points to be serviced by the branches. The optimization criterion is the total cost of establishment and maintenance of the branches as well as the cost of transporting of the parcels from zip code points to the branch and vice versa; (2) location and dimensioning of the sorting plant and determination of the transport plan. The issue number (1) was solved using a modified randomized method for k-means clustering on the current data on the structure and volume of shipments from a certain courier company. The results of the research based on the real data have been described.

Keywords: optimization of the distribution system structure, k-means clustering, regionalization, hub location problem.

Introduction

The issues related to the so-called regionalization and optimization of the parcel distribution system are typical for, among other things, courier companies and require cyclical problem-solving (Barreto et al (2007)). To formulate and solve such issues, advanced methods of operational and artificial intelligence research are used. The scale of the problem and many limitations that need to be considered make researchers apply methods of data mining and IT technologies for the processing of Big Data (Chowdhury et al (2017).

The issue tackled in the article may be classified as the *Hub Location Problem* (HLP) (Farahani et al (2013)). The hubs are devices operating as points of consolidation, connection and switching of transfers between specific transfer sources and final destinations. The aforesaid transfers may refer to travelers, objects, or information (in case of ICT networks). The hubs are used to reduce the number of direct connections between the sources and final destinations. The reduction process leads to a decrease of the resource consumption and hence reduction of the transfer system costs. The HLP already has a long history. It seems that the ICT industry was the first one to implement the concept of hubs (Farahani et al (2013)). Currently, it is widely used in the logistics systems, passenger air travel, postal and courier companies. The HLP is reflected in many ways due to different conditions. In addition, many scientific papers devoted to the optimization of hub location were written. Therefore, many overview studies have been carried out to give a clearer and more logical order to the achievements in this area. Papers by Alumur & Kara (2008), Farahani et al (2013), O'Kelly & Miller (2004) are some of the most insightful studies in the field. The HLPs may be classified according to a number of different aspects:

- space where the hubs are allocated. Three possible cases are taken into consideration: discrete - network nodes (the only locations are nodes of the known network for the transfer of goods); limited discrete - a set of predefined transfer network nodes; continuous - the hubs may be allocated to any place on the surface or in space;
- method of taking account of costs: minimization of costs related to the transportation of goods from their sources to final destinations; minimization of the total system costs, including transportation expenses and the cost of establishment and maintenance of hubs;

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- number of hubs: the systems with one hub; the locations of the predefined number of hubs are analyzed; the number of hubs is a decision variable, whose value is determined in such a manner so that the system costs are reduced;
- hub capacity limitation: in case of theoretical issues, hubs with unlimited capacity are analyzed, whereas all application studies assume that all hubs have limited capacity. The hub capacity may be determined as the decision variable as part of the optimization problem;
- allocation of nodes other than hubs to hubs. Two cases are considered: each node allocated to one hub; each node may be allocated (processed) by more than one hub.

  An important element of the HLPs are methods for solving the analyzed optimization problems. Due to a multitude of formulations of the HLPs, there is a wide diversity of algorithms for their solution. A list of problems and an overview of the applied algorithms may be found in the overview studies: (Alumur & Kara (2008), Farahani et al (2013)). The information on the selected methods of clusterization and optimization of transport is also included in Tarapata (2011). Generally, the methods may be divided into the following categories:
- precise – producing optimum solutions, including linear and non-linear programming methods, integer linear programming methods, Benders' decomposition methods, stochastic programming methods;
- approximate/heuristic – simulated annealing (Yu et al (2010)), Tabu search, ant colony optimization algorithm, genetic algorithms, Monte Carlo simulation, others (Yu & Maghfiroh (2014)).

The problem discussed in the article is a part of larger solution (Tarapata et al (2020)) and may be classified as a hierarchic HLP, with continuous space of hub location and minimization of the total cost of the system implementation, including the transportation expenses and the cost of establishment and maintenance of hubs, where the number of hubs is determined during the optimization process, while allocating each node not being a hub to one hub, with the consideration of the limited hub throughput. While talking about the hierarchic problem, it is assumed that there are two levels of hub hierarchy: sorting plants – connect hub-branches and hub-branches that process direct nodes not being hubs. An example of the model and optimization process of the hierarchic system is in (Gendron & Semet (2009)). It seems that the problem formulated in such a broad manner has not been analyzed in the literature known by the authors. What is more, the applied method of solution consisting in the decomposition of the problem and use of the modified clustering algorithm for allocating the nodes – zip codes to the hubs-branches constitutes a new element in the field of HLP.

The article is organized in the following manner. In next chapter, the authors described the decision problem and formulated the optimization problem related thereto. Further chapter contains a description of the method of problem solution and some results of the analysis, using the implemented method. Finally, the authors presented their conclusions and a summary.

Description and Formulation of the Problem

The problem defined in the article occurs while designing the hierarchic structure of the parcel distribution system composed of: sorting plant, branches and customers (pick-up/delivery point). The system allows to pick up parcels from customers-senders, deliver it to regional branches, where it is grouped and sent directly to the branch-recipient or sorting plant, where it is sorted and then sent to the recipient's branch, where the parcels are eventually dispatched to the customer-recipient. It was assumed that the shipment should be generated in the zip code areas (more precisely - we know the shipment volume between each pair of zip codes within the time frame (day/week/month/year)). The issue of optimization of the hierarchic system structure is decomposed into two sub-issues: (I) location and dimensioning of the company's branches by optimizing of the number, location, capacity of the branches and allocating code points to be serviced by the branches. The optimization criterion is the total cost of establishment and maintenance of the branches as well as the cost of transporting shipments from code points to the branch and vice versa; (II) location and dimensioning of the sorting plant and determination of the transport plan including: generation of potential location of sorting plants for the set structure of the branches (e.g. set in sub-issue (I)), optimization of the location and dimensioning of the capacity of the sorting plant for the volume set between the branches and sorting plant as well as the choice of an optimum location of the sorting plant and transportation plan. In the subsequent part of the article, the authors discussed in detail sub-issue (I).

The following notations shall be used:
M – the number of zip code points;
$wspX_i$, $wspY_i$ – the location (coordinates) of the center of the i-th zip code point, i=1,…,M;

a_{ij} – the volume sent from the *i*-th to the *j*-th code point; on the basis of such data, it is possible to calculate the volume "entering" ($b_j^{in} = \sum_{i=1}^{M} a_{ij},\ j = 1,...,M$) the *j*-th zip code point, "leaving" it ($b_j^{out} = \sum_{i=1}^{M} a_{ji},\ j = 1,...,M$) and total volume "passing through" the *j*-th zip code point ($b_j = \max\left\{b_j^{in}, b_j^{out}\right\},\ \ j = 1,...,M$);

w^{in}, w^{out} - coefficients of proportionality related to the cost of delivery (*in*) to and from the branch (*out*) (delivery to customers);

c_k – the unit cost (per work time unit) of operation of the *k*-th type of vehicle, k=1,…K, where K designates the number of types of vehicles;

cu_n – the unit cost (per capacity unit) related to the construction/maintenance of the *n*-th branch, n=1,…,N, where N designates the number of branches; the cost may be also presented in the form of a function.

The decision variables in the formulated optimization problem are the following:

N – the number of branches;

x_{nj} – the binary variable meaning allocation of the *j*-th zip code point to the *n*-th branch, n=1,…,N, j=1,…,M;

y_{nj} – the binary variable meaning location of the *n*-th branch in the *j*-th zip code point, n=1,…,N, j=1,…,M;

The cost of construction and maintenance of the *n*-th branch (warehouse and sorting plant) may be set in the following manner:

$$g(n,x,y) = cu_n z_n = cu_n \sum_{j=1}^{M} y_{nj} \sum_{k=1}^{M} b_k \cdot x_{nk}, \quad n = 1,...,N \tag{1}$$

where: $x = \left[x_{nj}\right]_{NxM}$; $y = \left[y_{nj}\right]_{NxM}$

and z_n designates the capacity of the *n*-th branch:

$$z_n = \sum_{j=1}^{M} y_{nj} \sum_{k=1}^{M} b_k \cdot x_{nk}, \quad n = 1,...,N \tag{2}$$

In case of all branches, the total cost of their construction and maintenance equals:

$$\sum_{n=1}^{N} g(n,x,y) = \sum_{n=1}^{N} cu_n z_n = \sum_{n=1}^{N} cu_n \sum_{j=1}^{M} y_{nj} \sum_{k=1}^{M} b_k \cdot x_{nk} \tag{3}$$

The cost of transport from all code points allocated to the *n*-th branch if the *n*-th branch located in the *i*-th zip code point is:

$$f^{in}(n,i,x,y) = y_{ni} \cdot \sum_{j=1}^{M} c_1 w^{in} d_{ji} \cdot \frac{b_j^{out}}{q_1} \cdot x_{nj} \tag{4}$$

where d_{ij} designates the distance between zip code points *i* and *j*, i=1,…,M, j=1,…,M,

$d_{ij} = \sqrt{(wspX_i - wspX_j)^2 + (wspY_i - wspY_j)^2}$. On the basis of formulation (4), it is evident that in case of a single branch, it is the total cost, based on all zip code points, related to the selected vehicle (the smallest, index 1, hence c_1 or other selected) that covered the distance between the zip code point and the branch and the number of vehicles (b_j/q_1) of such capacity intended for the transport (q_1 designates the capacity measured by the amount of the transported volume in case of the selected vehicle with index 1).

The cost of transport to the *n*-th branch is equal to:

$$f^{in}(n,x,y) = \sum_{i=1}^{M} f^{in}(n,i,x,y) = \sum_{i=1}^{M} y_{ni} \cdot \sum_{j=1}^{M} c_1 w^{in} d_{ji} \cdot \frac{b_j^{out}}{q_1} \cdot x_{nj} \tag{5}$$

The cost of transport from the *n*-th branch to all allocated zip code points if the *n*-th branch in the *i*-th zip code point (6) and the cost of transport from the *n*-th branch (7):

$$f^{out}(n,i,x,y) = y_{ni} \cdot \sum_{j=1}^{M} c_1 w^{out} d_{ij} \cdot \frac{b_j^{in}}{q_1} \cdot x_{nj} \tag{6}$$

$$f^{out}(n,x,y)=\sum_{i=1}^{M} f^{out}(n,i,x,y)=\sum_{i=1}^{M} y_{ni}\cdot\sum_{j=1}^{M} c_1 w^{out} d_{ij}\cdot\frac{b_j^{in}}{q_1}\cdot x_{nj} \tag{7}$$

The cost of service in the n-th branch is calculated in the following manner:

$$f^{serv}(n,x,y)=w^{serv}\cdot\left(f^{in}(n,x,y)+f^{out}(n,x,y)\right) \tag{8}$$

where w^{serv} is a coefficient of the service cost in the branch.

The total cost of transport to all branches shall be as follows:

$$\begin{aligned}
&\sum_{n=1}^{N}\left(f^{in}(n,x,y)+f^{out}(n,x,y)+f^{serv}(n,x,y)\right)=\\
&=\sum_{n=1}^{N}\left(f^{in}(n,x,y)+f^{out}(n,x,y)+w^{serv}\cdot\left(f^{in}(n,x,y)+f^{out}(n,x,y)\right)\right)=\\
&=\left(1+w^{serv}\right)\sum_{n=1}^{N}\left(f^{in}(n,x,y)+f^{out}(n,x,y)\right)=\\
&=\left(1+w^{serv}\right)\sum_{n=1}^{N}\left(\sum_{i=1}^{M} y_{ni}\frac{c_1}{q_1}\sum_{j=1}^{M} d_{ij}\cdot x_{nj}\left(w^{in}\cdot b_j^{out}+w^{out}\cdot b_j^{in}\right)\right)
\end{aligned} \tag{9}$$

The optimization problem related to the choice of the number of branches, their location and allocation of zip code points to be serviced by the branches for the purpose of reduction of the total costs of transport from zip code points to the branches as well as the costs of construction and maintenance of the branches shall be as follows (sum of (3) and (9)):

$$\begin{aligned}
&FK(x,y,N)=\left(1+w^{serv}\right)\sum_{n=1}^{N}\left(\sum_{i=1}^{M} y_{ni}\frac{c_1}{q_1}\sum_{j=1}^{M} d_{ij}\cdot x_{nj}\left(w^{in}\cdot b_j^{out}+w^{out}\cdot b_j^{in}\right)\right)+\\
&+\sum_{n=1}^{N} cu_n\sum_{j=1}^{M} y_{nj}\sum_{k=1}^{M} b_k\cdot x_{nk}\rightarrow\min
\end{aligned} \tag{10}$$

with the following limitations:

- each zip code point must be allocated to exactly one branch:

$$\sum_{n=1}^{N} x_{nj}=1,\quad j=1,\dots,M \tag{11}$$

- each zip code point allocated to the branch may not be located at a distance (within a radius) greater than the set boundary value R:

$$\sum_{n=1}^{N} dd_{nj}x_{nj}\le R,\quad j=1,\dots,M \tag{12}$$

where $dd_{nj}=\sum_{i=1}^{M} d_{ij}y_{ni},\quad n=1,\dots,N,\ j=1,\dots,M$.

- the location of every potential branch must be determined in exactly one zip code point:

$$\sum_{j=1}^{M} y_{nj}=1,\quad n=1,\dots,N \tag{13}$$

- maximum one branch must be allocated to each zip code point:

$$\sum_{n=1}^{N} y_{nj}\le 1,\quad j=1,\dots,M \tag{14}$$

$$y_{nj}, x_{nj} \in \{0,1\}, \quad n = 1,...,N, j = 1,...,M \tag{15}$$

It should be noted that the so formulated optimization problem is a non-linear problem (due to the form of a goal function), with binary variables. The number of decision variables is $2MN$, the number of constraints is equals $3M+N$. The method for solving the formulated problem is presented in the next chapter.

Description of the Method of Problem Solution

The proposed algorithm for setting the location of the branches and allocation of zip code points to the branches for the pre-set number of N branches is a modified, randomized algorithm of k-means, where the distance used for clustering is defined in different ways. The optimum number of branches is chosen by initiating the algorithm for various N values and the target function (9) assumes the lowest value for such a solution.

The algorithm has been described below.

0. Determination of the number of N branches.

In case of the predefined number of repetitions (i.e. epochs), the following activities should be undertaken:

1. determination of initial centers of clusters (branches).

The centers of clusters (i.e. centroids) are selected in several ways. The cluster center referred to the center of the geographic zip code region (after zip code twos or threes, see Fig. 1). The manner of setting this region (whose center was the cluster center) depended on the epoch.

- 1.1. In case of the first epoch:
  - 1.1.1. generation using distribution of the probable proportionate volume:
    - 1.1.1.1. according to code twos
    - 1.1.1.2. according to code threes
  - 1.1.2. Generation with equal probability distribution (independent of the volume)
    - 1.1.2.1. according to code twos
    - 1.1.2.2. according to code threes
- 1.2. For the next epoch:
  - 1.2.1. generation using distribution of the probable proportionate volume:
    - 1.2.1.1. according to code twos
    - 1.2.1.2. according to code threes
  - 1.2.2. Generation with equal probability distribution (independent of the volume)
    - 1.2.2.1. according to code twos
    - 1.2.2.2. according to code threes
  - 1.2.3. Random modification of the region locations (coordinates) used in the first epoch (*delta_x, delta_y*)

2. Calculation of the distances of code points from the cluster centers.

The choice of metrics is a very important element of the algorithm. Two metrics (distances) between code point i and cluster center j were used:

- 2.1. the Euclidean distance d_{ij}
- 2.2. the volume-weighted d_{ij}^{weight} distance: $d_{ij}^{weight} = d_{ij} \cdot \frac{c_1}{q_1} \cdot \left(w^{in} \cdot b_j^{out} + w^{out} \cdot b_j^{in} \right)$, see (4) and (6)

3. allocation of zip code points to clusters.

In case of each zip code point, the distances from all clusters (calculated in point 2) are compared and allocated to zip code points, i.e. to the closest center.

4. Determination of new cluster centers.

The new cluster centers are calculated in two ways:

- 4.1. Arithmetical mean of coordinates of the points allocated to the cluster
- 4.2. Volume-weighted mean of coordinates of the points allocated to the cluster

5. Performances of steps 2, 3, 4 until the stop condition for the epoch is fulfilled.

The stop condition for the epoch requires to meet one of the following requirements: achievement of the predefined number of iterations (usually N), i.e. repetitions of steps 2, 3, 4, or no movement of zip code points between the clusters and subsequent iterations.

The best allocation of zip code points to the clusters after all iterations should be saved.

6. If the last epoch is reached, that means the end – the best saved allocation to the clusters constitutes the solution to the problem; otherwise, the user should go to point 1.

Fig. 1 shows a map of zip codes in Poland, divided into “twos” and “threes”.

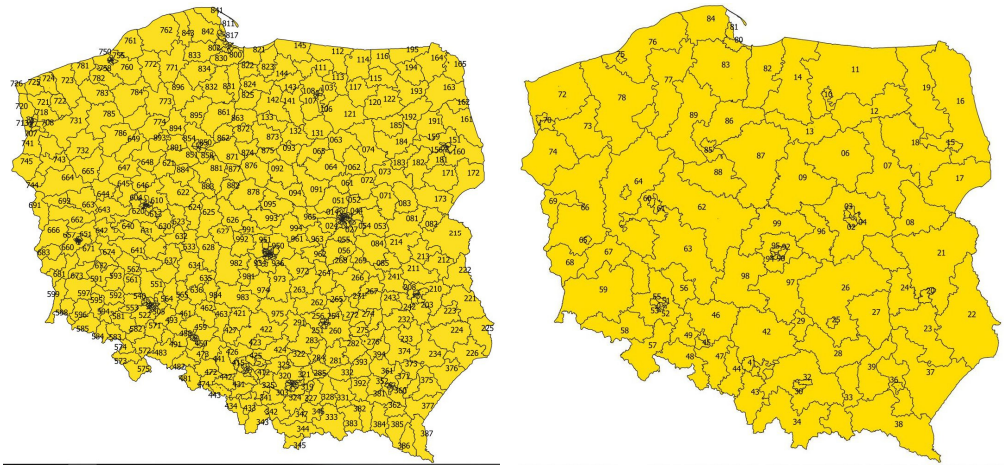

(a) (b)

Fig. 1: Map of regions for zip codes in Poland: (a) code “threes” (b) code “twos”. In the area of Warsaw, the following code twos are used: 00, 01, 02, 03, 04, 05.

Source: own elaboration

Analysis of Results

The studies were conducted using the data from one of the courier companies. Because the authors of the article did not obtain the consent to make available the actual data and obtained results, the presented results were derived from the modified data.

Fig. 2 shows a map of code threes, including the input and output data volumes (parcels) aggregated therefor (based on the provided values: a_{ij}). The total data volume (input and output) used for the purpose of analysis was approx. 800 000. The number of all zip codes, between which the paired volume was used, (a_{ij}) equaled to M=20153 in a given period. Such number of zip codes were then allocated to the branches. The analyses were conducted for number N of the branches presented in the left column of Table 1. Therefore, the optimization problem had from 2·20153·30 to 2·20153·80 binary decision variables and from 3·20153·30 to 3·20153·80 limitations. On the basis of historic data analysis, it was calculated that the correlation between the coefficients w^{in} and w^{out} in formulas (4)-(7) was: w^{in}/w^{out} = 1/3, and w^{serv}=0,47 (formula (8)). It was assumed that the capacity q_1 of the vehicle equaled to 600, and the cost coefficient was c_1=1,13. The parameter R, present in formula (12), was calculated in the following manner: $R=(v_{sr}\cdot T_{max})/2$, where v_{sr}=50 km/h (average speed of delivery vehicles), T_{max}=8h (maximum working time of a vehicle driver). While calculating R, the product $v_{sr}\cdot T_{max}$ was divided by 2, since when the driver leaves the branch for servicing code points, the driver must also come back to such branch during their working hours.

Table 1 contains the results of the algorithm for setting locations of the branches and allocation of zip code points to the branches in the form of the total cost of transport from/to the zip code points from/to the branches for the representative day in the month. The number of epochs was equal to 50, whereas the number of iterations in every epoch – 20. While generating the first epoch in accordance with the probability distribution depending on the volume (point 1.1.1. of the algorithm), point 1.2.3 of the algorithm was implemented, i.e. random change of coordinates of the cluster generated in the first epoch - *delta_x*=100km and *delta_y*=100km. The calculation time on a standard PC took from a few seconds to several tens of minutes.

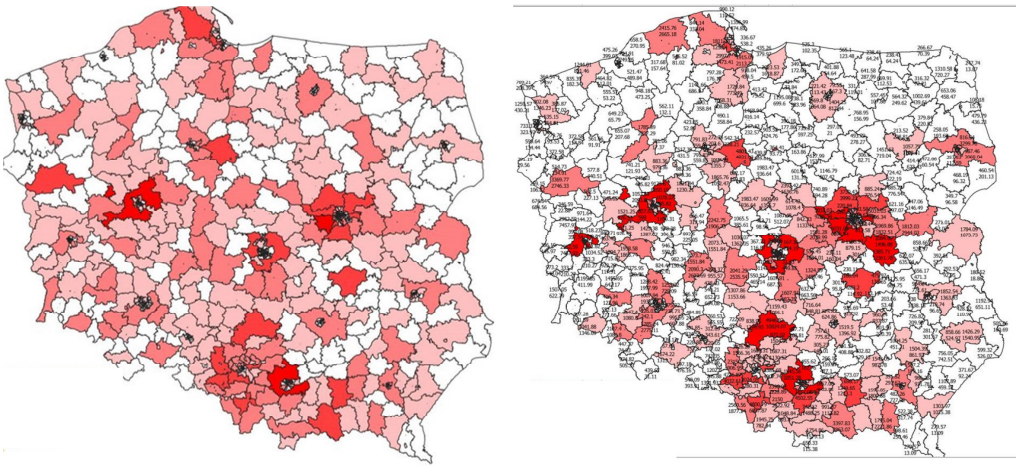

(a) (b)

Fig. 2: Map of regions for the zip code threes in Poland, including analyzed *in* b_j^{in} (a) and *out* b_j^{out} (b) volumes to/from each of the *j*-th region. The darker the color, the greater the volume. The total *in* and *out* volumes were approx. 800 000.

Source: own elaboration

As shown in Table 1, the determination of locations of the branches based on the volume-weighted distance function allowed for better allocation than in case of the simple Euclidean distance (total cost of delivery lower several times). On the other hand, the generation of cluster coordinates in all epochs according to the distribution depending on the volume improved the cost function by around 10% in comparison with the generation of only the first epoch with the distribution depending on the volume.

Fig. 3 illustrates locations of the branches, their capacity and allocation to the zip code points to be serviced by 65 branches from Table 1, set based on all epochs generated in accordance with the probability distribution depending on the volume.

Fig. 4 shows functions of the monthly costs of transport to/from the branches and maintenance costs of the branches estimated based on data and results obtained from the algorithm. The values in the last column of Table 1 were multiplied by 25 (number of working days in a month, from Monday to Saturday) to obtain the estimation of function (9) in the form of $4 \cdot 10^7 \cdot N^{-0,559}$. The function related to the costs of construction and monthly maintenance of the branches (3) was proposed by cost experts specializing in maintenance of logistics infrastructure and has the following form: $758\,777 \cdot N^{0,4697}$. Both functions are shown in Fig. 4a. Fig. 4b shows the total costs from Fig. 4a. The function assumes the minimum value for the number of branches, which is equal to 55, hence, based on the presented analyses - the optimum number of branches is 55.

Table 1: The results of the algorithm for setting locations of the branches and allocation of zip code points to the branches – the total cost of transport from/to the zip code points from/to the branches for the representative day in the month.

Number of branches	The first epoch generated with the probability distribution depending on the volume according to code twos (point 1.1.1 of the algorithm)		All epochs generated with the probability distribution depending on the volume according to code twos (point 1.2.1 of the algorithm)	
	The Euclidean distance (point 2.1 of the algorithm)	The volume-weighted distance (point 2.2 of the algorithm)	The Euclidean distance (point 2.1 of the algorithm)	The volume-weighted distance (point 2.2 of the algorithm)
30	1 019 551	208 438	1 117 056	220 270
40	1 323 632	220 412	1 186 443	193 834
50	171 756	173 615	1 080 765	168 540
55	1 152 098	177 076	162 333	158 430
60	1 174 685	169 115	874 568	150 473

65	158 677	161 165	738 880	144 188
70	893 761	173 376	698 789	137 366
80	149 767	153 710	180 789	129 712

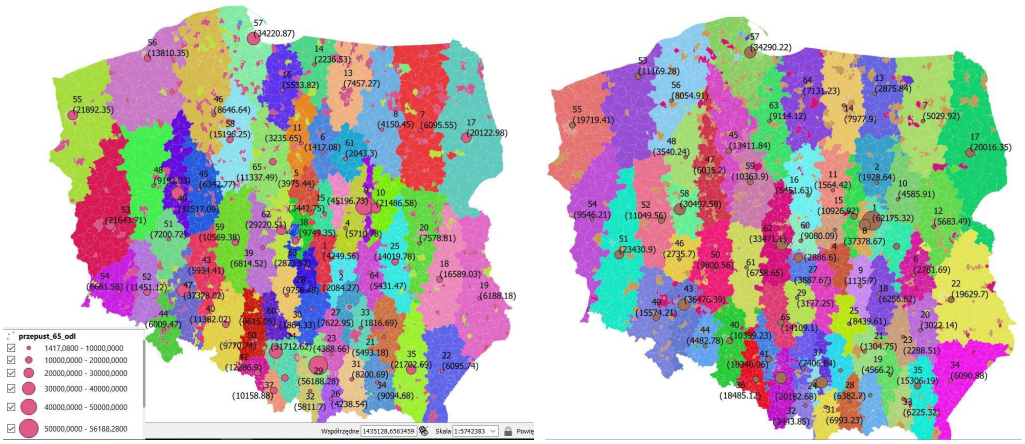

(a) (b)

Fig. 3: Locations and capacities of 65 branches, including allocation of code points to be serviced: (a) according to the Euclidean distance, (b) according to the volume-weighted distance.

Source: own elaboration

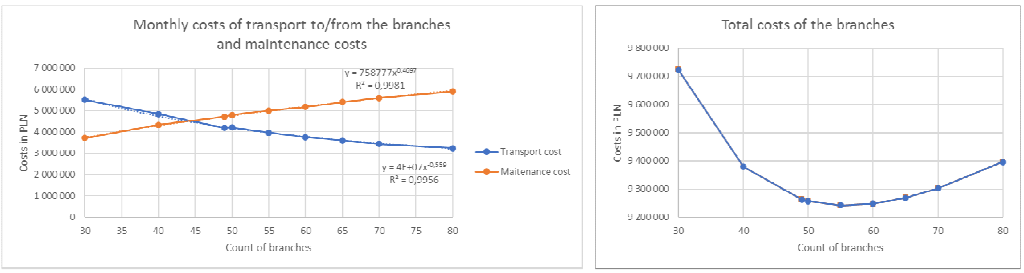

(a) (b)

Fig. 4: (a) Monthly costs of transport to/from the branches and maintenance costs; (b) Total costs of the branches (costs in polish zloty PLN)

Summary

While formulating and solving the problem described in the article and after discussions with the experts specializing in the logistics organization, certain conclusions and observations were made. First, to make informed decisions about the future of the system structure, it is essential - in our opinion - to have data allowing to forecast changes in the distribution of volumes between particular zip code points (code areas, voivodeships).

In case of optimization of the number of branches, it is also important to include the transportation costs for the locations of the branches: without considering courier routing, the numbers are merely estimating. It is crucial to have a matrix of road distances between the zip code points and average speed of movement (the authors used the following estimation: road distance = geographic distance *1.3 and average speed from the parameter vśr=50 km/h) or a matrix of average duration of the transit between the zip code points. Therefore, the approach considering both issues is often found in the literature (Barreto et al (2007)). The cost of the branch construction and maintenance (as the capacity function or, potentially, the location function) is also an important factor, which the companies may estimate based on historical data. Minimum and maximum throughput limits in the branch, e.g. due to limited space available in the locations, should be also considered. Similar remarks refer to the sorting plant (the issue of location and dimensioning of the sorting plant may be solved in a similar manner to the issue of location and dimensioning of the branches).

Acknowledgments

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How Tax Capital Group May Influence on Tax Aggressiveness: Polish Perspective

Alicja BRODZKA
Wroclaw University of Economics, ul. Komandorska 118/120, 53-345 Wrocław, Poland,
alicja.brodzka@ue.wroc.pl

Krzysztof BIERNACKI
Wroclaw University of Economics, ul. Komandorska 118/120, 53-345 Wrocław, Poland,
krzysztof.biernacki@ue.wroc.pl

Damian STASZAK
Certified Tax Adviser, damian-staszak91@wp.pl;

Abstract

In the paper we look at the issue of tax aggressiveness from the perspective of enterprises that, in accordance with the provisions of Polish tax law, may establish a tax capital group (TCG). Focusing on companies from banking sector we study, to what extent such an entity can reduce its tax liability and how profitable a creation of TCG vehicle can be. In order to answer the question we use individual tax data provided by companies with annual turnover above EUR 50 million and all Polish tax capital groups. For years 2012–2019, we calculate the annual effective tax rates achieved by the largest taxpayers from the banking sector. In the next step, we compare the tax rates achieved by single entities with those reported within banking tax capital groups. In order to deepen the research, we additionally calculate the average annual effective tax rates of both groups: single companies and banking TCGs. The results of the study show that the vehicle of tax capital group is rarely used by Polish companies operating in the banking sector, nor leads to the reduction of their tax liabilities.

Keywords: Tax Aggressiveness, Tax Group, Group Taxation, Tax Risk, Tax Avoidance.

Introduction

The sources of instruments that enable the reduction of tax burden can be divided into two categories. The first category groups the decisions of taxpayers aimed at reducing or shifting the tax burdens. Such optimization activities take place within the solutions permitted by law. The second category groups the actions of the legislator who, by appropriate drafting of legal regulations, makes the use of specific tax preferences possible. As a consequence, the legislator shapes the economic reality: through the proper implementation of tax policy, it leads to the achievement of previously set goals.

One of the tools implemented by Polish legislator is the possibility of joint taxation of companies, organized into the tax group. Legal tools enabling the consolidation of several separate enterprises' tax results are allowed in many jurisdictions. In such construction the economic benefits are typically ensured by the application of domestic group taxation regimes (also referred to as fiscal unity, tax grouping, group tax relief or joint taxation) through which losses/costs of one company can be offset against the taxable profit of other company belonging to the group. As a rule, the joint taxation is a critical factor for the tax benefit of the structure (European Commission, 2015).

So far, the studies on the use of Polish tax groups in the tax optimization process were undertaken to a very limited extent. The launch of official publication of data on income and tax paid by the largest domestic taxpayers (including tax capital groups), made it possible to investigate, to what extent the Polish group taxation regime can lead to the reduction in tax liabilities. For the purposes of our study, we have chosen the banking sector, as it is characterized by the largest representation of taxpayers whose individual tax data has been made public.

Tax groups in Polish Tax Regime

In Poland, the group taxation regime is regulated by art. 1a of the Corporate Income Tax Act (CIT Act). It introduces the construction of tax capital group (TCG), where a group of companies, after meeting certain conditions, can be treated as a single taxpayer for the purposes of corporate income tax. Tax capital groups may only be established by

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companies with the registered office in Poland and with an average share capital of at least PLN 500,000. The parent company must hold 75% of the shares in the subsidiaries, and subsidiaries may not hold shares in other members of the group. None of the companies may be exempt from corporate income tax. The tax capital group must be established for at least three tax years and it is not possible to extend the TCG's agreement to include other companies in the group. Additionally, group members must not have any tax arrears. During the entire period of existence of the tax capital group, the minimum share of income in the revenues of the tax group should be 2%. What is worth mentioning, in case of breach of certain conditions, the tax capital group loses the status of taxpayer retroactively (from the date of registration as a tax group) and companies forming the tax group are obligated to reconcile for CIT purposes as independent taxpayers retroactively for prior years (*Corporate - Group Taxatio*n, 2020).

As mentioned above, Polish TCG offers companies a possibility of consolidating financial results for income tax purposes within a group. However, due to the stringent requirements of the applicable laws, tax capital groups are not a very popular means of consolidation for tax purposes in Poland. Consequently, studies on tax capital groups, concluded in Poland, are rather of a general nature.

Furman (2015) in his work presents legal requirements to be fulfilled in order to exclude individual companies from the tax subjectivity. He also studies the historical changes in the number of registered TCGs and in income tax amounts, paid in 1996–2013. In the same time Wierzejska (2015) investigates the motives for creating tax capital groups. She shows that non-tax benefits (in the area of cash flows, movement of assets or acquisition costs between companies) may support the decision to form a group. In the research Wierzejska confirms a relatively poor use of TCG structures in Poland. She points out that this may result from both a number of shortcomings in Polish regulations and significant consequences in the event of failure to meet the conditions during the existence of the TCG.

The tax effectiveness of Polish TCGs has not yet been the subject of in-depth research. Kondrakiewicz (2010), focusing on the municipal sector, investigates one case of Tax Capital Group of the Kraków Municipal Enterprises. She finds out that the joint settlement of corporate income tax can actually bring significant benefits, as in twelve years of operation the analysed Group have recorded over PLN 92.5 million of tax savings.

Małecka-Ziembińska (2014) in her research presents the evolution of Polish TCG regulations and next examines the fiscal impact of the introduced modifications. She proves that changes in the conditions for the establishment and operation of tax capital groups affect the number of active TCGs, and thus the amounts of income tax that they pay. Małecka-Ziembińska concludes that despite the severe TCG's requirements, the possibility of offsetting individual profits and losses and the neutrality of transactions concluded between companies may constitute the basis for tax optimization.

The use of tax capital groups for the purposes of aggressive tax planning did not go unnoticed also at the political level. On June 26, 2017, the Ministry of Finance issued a warning about corporate income tax optimization practices, done within Polish tax capital groups. According to the ministry, transactions carried out with the use of such regimes included assets worth many billions of zlotys (Polish Ministry of Finance, 2017).

The growing role of tax optimization practices result in anti-tax avoidance measures, implemented by (mostly) developed countries to their national legal systems. Poland has also adopted some solutions, aimed at increasing tax transparency. One of them is the obligation to publish individual data of largest taxpayers (with revenues exceeding EUR 50 million) and all tax capital groups. The Amendment to the Polish CIT Act introduced a new art. 27b providing the publication of individual tax data of 4,500 CIT taxpayers with the highest revenues and all TCG (regardless of the amount of revenues), which are formally recognized groups of wholly or majority-owned companies consolidating their taxes under a single Polish entity. The individual tax data to be published by the Ministry of Finance includes information on: taxpayer's name, tax identification number (NIP), revenues, tax deductible costs, income or incurred loss, tax base and tax due. In addition, the published information may be extended with data on the effective tax rate. The provisions apply to taxpayers' data from January 1, 2012. Publication of these data to the public first took place on September 30, 2018.

Better access to information of large taxpayers draw out attention to Polish tax capital groups. We have decided to use methods applied in previous research on tax aggressiveness of Polish companies as a basis for further analyses (Brodzka, Biernacki, Chodorek, 2017; Brodzka, Biernacki, 2018). In the present study we define the tax aggressiveness of enterprises that, in accordance with the provisions of Polish tax law, may establish a tax capital group, and next we examine the impact of introducing the vehicle on overall income tax burdens.

The individual data of largest taxpayers available on the website of the Ministry of Finance allows for comparing a homogeneous group of taxpayers. Consequently, for further analyses we select companies from banking sector, which play significant role in the whole group of those entities, whose fiscal dates are being published. Our purpose was to answer a research question: to what extent such an entity can reduce its tax liability by establishing a tax capital group? In order to answer the question we calculate the effective tax rates achieved by banks that report within single taxpayers group and next, we compare these results with effective tax rates reported by tax capital groups operating in banking sector.

Methodology and Data

Polish CIT Act provides for an annual publication by the Ministry of Finance of individual tax data of both CIT taxpayers with the revenues exceeding EUR 50 million and all tax capital groups. Data from individual taxpayers' returns refer to 2,801 entities, whereas the TCG' ones deal with 65 tax groups.

As a measure of tax efficiency we choose the effective tax rate, developed previously by Guenther, Matsunaga and Williams (2013). Researchers, in order to study a relation between the tax policy of the enterprise, affecting the amount of regulated fiscal burdens and the tax risks taken, use the concepts of tax avoidance and aggressive tax practices, which afterward are compared to the accompanying risk of dispute with tax authorities. Guenther, Matsunaga and Williams adopt a cash effective tax rate (Cash ETR) received by comparing the amount of the tax paid in a given period with the income before taxes and special items as a measure of tax avoidance. They point out that low effective tax rates mean the ability of the company, in the long term, to reduce the amount of the tax due from each cash-generating unit, before taxation. As such the results show the level of tax avoidance, succinctly defined as taking solutions within the applicable law, intended to lead to a reduction of the income tax paid by the company. Cash ETR may be estimated on an annual basis, but earlier studies of Dyreng, Hanlon and Maydew (2008) recommend the use of five-year-period data for the comparison in order to obtain a better picture of tax policies applied by the business entities. Also in our study the methodology is based, in the wake of the work of Guenther, Matsunaga and Williams, on a comparison of the current amount of tax paid in a given fiscal year with the annual income reported for tax purposes.

For the purposes of our research the tax amount is recognized as the total tax liability paid in a given year, regardless if its source. The choice of annual income and not the tax base allows for avoiding possible discrepancies related to reliefs or exemptions, as the amounts and principles of deductions may differ from one taxpayer to another. This solution also minimizes the impact on the current result, resulting from offsetting tax losses from previous years.

We take into account a relatively long, eight-year research period of reporting the individual tax results (2012–2019). From the group of the largest single taxpayers, we select entities from the banking sector and – for each consecutive year – we compute their ratios of tax paid to the value of the income showed in annual tax declarations. Next we do similar calculations for banking groups reporting within TCG regime. Such a long period adopted for the purposes of our analyses allows for excluding both fluctuations related to business cycles and minimizing the effects of deferred taxation and tax loss settlements.

The choice of the banking sector for research purposes is justified by a large number of banks that report individual tax data in both groups: single taxpayers and tax capital groups. Among 2,801 single entities, the banking sector is represented by as many as 72 taxpayers. In case of TCGs, there are seven banking groups out of 65 taxpayers.

In case of the first group, of single taxpayers, we excluded those enterprises that did not provide tax data for at least two tax years. We also did not take into account companies in the liquidation and bankruptcy process. Additionally, we excluded Bank Gospodarstwa Krajowego from the further analyses. The bank carries out tasks commissioned by public authorities, hence its tax data does not come only from economic activity. As a result, in the first group we conducted analyses on 54 entities.

While studying the second group, TCGs, we excluded two banking groups that reported losses throughout the entire research period. Thus, we analysed the results of five tax capital groups.

Results

As mentioned above, for the analyses in the group of single companies reporting the individual tax data we chose 54 entities operating in the banking sector. The effective income tax rates achieved by largest banks are presented in the Table 1. In the table, the years of reported losses are marked with the value '0'; no data provided in the given period has been marked with (–). The list of entities presented in this table is arranged by their tax identification numbers (NIP), however, for the clarity of the data, the NIP numbers are not shown in its content. The exception is Deutsche Bank Polska, which operates in Poland both as a bank and as a branch of the parent company (thus, we have left NIP numbers with each of Deutsche Banks).

Table 1: The effective tax rates of single bank companies in years 2012–2019

	Company	2012	2013	2014	2015	2016	2017	2018	2019
1	Bank Polska Kasa Opieki S.A.	18.44%	18.49%	18.81%	18.05%	18.89%	18.92%	18.91%	18.90%
2	Bank Handlowy W Warszawie S.A.	18.88%	17.94%	18.91%	18.91%	18.92%	18.93%	18.94%	18.94%
3	Santander Bank Polska S.A.	–	18.79%	18.90%	18.65%	18.95%	18.95%	18.97%	18.96%
4	Alior Bank S.A.	12.30%	16.47%	18.41%	19.00%	18.17%	19.25%	19.07%	18.07%
5	mBank S.A.	18.82%	18.50%	18.93%	18.93%	18.94%	18.94%	18.89%	18.93%
6	Bank Spółdzielczy w Bydgoszczy	–	–	18.98%	18.99%	18.97%	18.98%	18.99%	18.99%
7	Getin Noble Bank S.A.	13.37%	1.87%	16.45%	0	4.33%	0	1.64%	0
8	Bank BGŻ BNP Paribas S.A.	8.16%	10.62%	18.91%	18.87%	18.26%	18.13%	17.81%	17.87%
9	ING Bank Śląski S.A.	18.99%	18.97%	18.96%	18.99%	18.97%	18.95%	18.98%	18.97%
10	Idea Bank S.A.	14.17%	17.47%	–	–	–	–	0	0
11	Santander Consumer Bank S.A.	18.54%	18.87%	18.98%	18.98%	19.00%	19.00%	19.00%	19.00%
12	Poznański Bank Spółdzielczy	–	–	–	–	–	–	19.00%	19.00%
13	Bank Spółdzielczy w Krapkowicach	–	–	–	–	–	18.93%	18.94%	18.92%
14	Bank Spółdzielczy w Zawadzkiem	–	–	–	–	–	18.97%	18.96%	18.98%
15	Powiatowy Bank Spółdzielczy w Kędzierzynie-Koźlu	–	–	–	–	–	18.99%	18.98%	18.98%
16	Credit Agricole Bank Polska S.A.	11.38%	18.77%	18.96%	16.72%	19.00%	19.00%	0	18.30%
17	Bank Spółdzielczy w Głubczycach	–	–	–	–	–	18.93%	18.97%	18.93%
18	Bank Spółdzielczy w Świdnicy	–	–	–	–	–	19.00%	19.00%	19.00%
19	Bank Spółdzielczy w Łaskarzewie	–	–	–	–	–	–	19.00%	19.00%
20	Bank Spółdzielczy w Namysłowie	–	–	–	18.95%	19.00%	18.99%	19.00%	18.99%
21	Bank Spółdzielczy w Białej	–	–	–	–	18.96%	18.94%	18.95%	18.97%
22	Bank Spółdzielczy w Legnicy	–	–	–	–	–	19.00%	19.00%	19.00%
23	Bank Spółdzielczy w Głogówku	–	–	–	–	–	18.98%	19.00%	19.00%
24	Bank Ochrony Środowiska S.A.	9.06%	15.24%	15.65%	0	0	17.02%	18.51%	18.67%
25	Bank Polskiej Spółdzielczości S.A.	18.91%	18.99%	–	0	4.77%	11.85%	18.92%	18.84%
26	Nest Bank S.A.	0	8.39%	13.39%	0	15.70%	18.70%	18.72%	18.86%
27	Nordea Bank ABP S.A.	–	–	–	–	–	–	18.99%	18.99%
28	Industrial and Commercial Bank of China (Europe) S.A.	–	13.48%	–	–	–	16.37%	18.06%	17.81%
29	mBank Hipoteczny S.A.	19.00%	19.00%	18.25%	17.47%	19.00%	19.00%	19.00%	19.00%
30	Bank Pocztowy S.A.	18.04%	17.06%	18.34%	17.90%	18.90%	18.97%	0	9.35%
31	SGB-Bank S.A.	18.38%	18.92%	19.00%	18.99%	18.97%	18.93%	18.59%	18.88%
32	Société Générale S.A. Oddział w Polsce	–	19.00%	19.00%	19.00%	19.00%	19.00%	19.00%	19.00%
33	Bank Spółdzielczy w Baborowie	–	–	–	–	–	–	19.00%	19.00%
34	Deutsche Bank Polska S.A. (NIP 6760107416)	17.50%	17.16%	18.91%	18.44%	18.93%	18.99%	18.99%	0
35	DNB Bank Polska S.A.	18.28%	19.00%	15.79%	0	18.54%	18.82%	18.89%	18.89%
36	Bank Spółdzielczy w Sobieniach Jeziorach	–	–	–	–	–	–	19.00%	19.00%
37	Pekao Bank Hipoteczny S.A.	19.00%	–	–	–	–	–	–	19.00%

38	Volkswagen Bank GmbH	–	–	–	–	–	–	–	17.70%
39	Caixabank, Oddział w Polsce (Branch in Poland)	0	0	14.34%	17.96%	–	–	–	19.00%
40	Euroclear Bank SA/Nv	–	–	–	–	–	–	18.95%	19.00%
41	Powszechna Kasa Oszczędności Bank Polski S.A.	18.73%	18.26%	18.64%	16.93%	18.88%	18.90%	18.90%	–
42	Bank Spółdzielczy w Ostrowi Mazowieckiej	–	–	–	–	19.00%	19.00%	19.00%	–
43	PKO Bank Hipoteczny S.A.	–	–	–	–	0	15.80%	17.75%	–
44	HSBC Bank Polska S.A.	0	0	0	0	0	18.99%	18.99%	–
45	Euro Bank S.A.	0	0	0	0	6.02%	17.38%	18.99%	–
46	Volkswagen Bank Polska S.A.	18.99%	19.00%	–	–	19.00%	19.00%	19.00%	–
47	Bank BPH S.A.	11.20%	15.11%	17.23%	17.96%	17.67%	19.00%	19.00%	–
48	Raiffeisen Bank Polska S.A.	18.07%	0.02%	0	0	11.48%	12.17%	–	–
49	Nordea Bank AB S.A.	–	–	–	–	18.99%	19.00%	–	–
50	Nordea Bank Polska S.A.	18.99%	18.98%	19.00%	–	–	–	–	–
51	BNP Paribas Bank Polska S.A.	0	7.46%	15.49%	–	–	–	–	–
51	BNP Paribas Oddział w Polsce (Branch in Poland)	19.00%	18.99%	18.95%	–	–	–	–	–
52	Kredyt Bank S.A.	13.07%	2.91%	–	–	–	–	–	–
53	Rabobank Polska S.A.	18.99%	18.99%	–	–	–	–	–	–
54	Deutsche Bank Polska S.A. (NIP 5261029815)	18.99%	18.97%	–	–	–	–	–	–

Source: Authors' own research based on the data published by Polish Ministry of Finance

The data presented in the table above show that the effective tax rates in the group of single taxpayers stay close to the nominal tax rate of 19%. Even if in the initial years of the study a specific company reports s a significantly lower effective tax rates, in subsequent years its effective rates practically coincide with the nominal one. Apart from the years when some taxpayers report a loss, the lowest effective tax rates achieved by some banks are close to zero (e.g. Raiffeisen Bank Polska S.A. in 2013). Moreover, in the entire research group there are no entities whose effective tax rate would exceed the nominal rate. It can bring us to a preliminary conclusion that the national legislation allows banks for reducing the tax burdens without the need to establish a TCG.

While examining the single taxpayers' group we noticed that some banks (IDEA BANK S.A. and Powszechna Kasa Oszczędności Bank Polski S.A.), first reported the tax information as single taxpayers, and next, after some years, decided to establish a tax capital group. In the further part of our study, we examine whether a decision of using the TCG vehicle for tax settlements brings some tax benefits. The effective tax rates, reported by tax capital groups operating in banking sector in years 2012–2019, are presented in the Table 2.

Table 2: The effective income tax rates of tax capital groups from banking sector in years 2012–2019

	Tax Group	2012	2013	2014	2015	2016	2017	2018	2019
1	Podatkowa Grupa Kapitałowa Powszechnej Kasy Oszczędności Banku Polskiego S.A.	–	–	–	–	–	–	–	18.94%
2	Podatkowa Grupa Kapitałowa Bank Millennium S.A.	18.99%	18.99%	18.99%	19.13%	19.00%	–	–	–
3	Podatkowa Grupa Kapitałowa Bank Millennium S.A.	–	–	–	–	–	18.99%	18.92%	18.92%
4	Podatkowa Grupa Kapitałowa Idea Bank S.A.	–	–	19.00%	19.18%	19.56%	–	–	–
5	Podatkowa Grupa Kapitałowa Idea Bank S.A.	–	–	–	–	–	22.10%	–	–

Source: Authors' own research based on the data published by Polish Ministry of Finance

The analysis of the aforementioned data shows that the group taxation is not a very popular solution among banking enterprises. In the analysed period, only three banks decided to establish the TCG. As indicated earlier, in the initial period, two entities first reportedtax information as single taxpayers and next decided to establish the TCG (IDEA

BANK S.A. and Powszechna Kasa Oszczędności Bank Polski S.A.). One enterprise operated as a tax capital group during the whole research period (Bank Millennium S.A).

Due to the national regulations, which allow the establishment of TCG only for a maximum period of three years, we present each banking group in the table as a separate TCG. Such step is justified by the fact that individual groups are identified by separate tax identification numbers and – more importantly – the next TCG of the same bank may consist of different entities. Thus, for the sake of the study, we cannot present groups established by the same bank, but in different periods, as one tax capital group.

After analysing the results of groups one and two we cannot confirm that introducing the tax capital group has a positive impact on overall income tax burdens. Among TCGs, most entities achieve the effective tax rates below, but very close to the nominal rate of 19%. However, one TCG pays tax according to effective tax rate higher than the nominal one. In this case, it is questionable to what extent establishing such a vehicle is economically justified, if it ultimately leads to an increase in the effective tax rate.

The small number of entities that decided to establish the TCG encourages for an in-depth analysis of their results. The only bank consistently operating in the form of a tax capital group is the Bank Millennium S.A. Its TCG achieves annual effective tax rates at a very similar (although lower) level than the nominal tax rate. The only exceptions are years 2015 and 2016, when the group ended up with tax rates of 19.13% and 19.00%, respectively. The lack of visible tax benefits did not prevent Bank Millennium from the decision to create another tax group and next, from achieving the effective tax rates slightly below the level of 19%.

The analyses of next two cases question even more the possibility of optimizing the tax burden with the use of tax capital groups. In years 2012 and 2013, IDEA BANK S.A. provided for tax information as an individual taxpayer and achieved relatively low effective income tax rates (14.17% and 17.47%, respectively). Since the establishment of TCG in 2014, the effective tax rates for the entire IDEA BANK group started to increase significantly, reaching values higher than the nominal tax rate. The next tax capital group established by IDEA BANK S.A. in 2017, achieved an effective tax rate of 22.1% and was dissolved in the following year.

The bank Powszechna Kasa Oszczędności Bank Polski S.A., in the years of reporting the tax data as a single taxpayer (2012–2018), achieved effective tax rates at the level between 16.93% and 18.90%. In its first year of operating as the tax capital group (2019), the average tax rate increased to 18.94%. We assume that to the newly formed TCG a profitable individual enterprises was included, in order to offset its tax revenues in the account of the entire group.

The in-depth investigation of all TCG cases leads to the conclusion that for entities operating in banking sector the establishment of a tax capital group does not bring significant tax benefits. In order to confirm this assumption we additionally study the overall ability of banks to reduce the amount of the tax due by using the TCG mechanism. For each consecutive year we determine the average effective tax rates for all entities in the group one (single taxpayers) and in the group two (tax capital groups). The results of the analyses are presented in the Table 3.

Table 3: The effective income tax rates in banking sector–values for single taxpayers and tax capital groups

Year	Single taxpayers	Tax capital groups
2019	18.77%	18.93%
2018	18.87%	18.92%
2017	18.66%	19.16%
2016	18.36%	19.14%
2015	18.10%	19.14%
2014	18.58%	19.00%
2013	17.68%	18.99%
2012	17.55%	18.99%
AVERAGE	**18.39%**	**18.99%**

Source: Authors' own research based on the data published by Polish Ministry of Finance

The analyses show that during the whole research period the average effective tax rates achieved in the group of single taxpayers were lower than in the case of tax groups. What is worth mentioning, the effective tax rates in the group of single taxpayers were gradually increasing, while in the case of TCG a reverse tendency is visible.

It should be emphasized that the data in Table 3 does not include loss settlements, previously presented in Table 1 with the value of '0'. This is a deliberate action, resulting from efforts to maintain the comparability of the calculations presented in Tables 1 and 3.

The results presented in Table 3 provide additional confirmation of our initial conclusions resulting from the analyses presented in Tables 1 and 2. Despite the fact that the differences in the average effective tax rates between single taxpayers and tax capital groups are very minor (they do not exceed 1,5 percentage point), the direction of these differences is surprising: the average effective TCG's tax rates are higher than the rates reported by single taxpayers operating in the banking sector.

Although the number of banking tax capital groups in the analysed period is very small compared to the group single taxpayers, the comparison presented in Table 3 shows a continuing tendency, that confirms the lack of economic rationale for the use of Polish tax capital groups.

Discussion and Conclusion

The results of the study show that the option of establishing a tax capital group in Poland does not lead to a reduction in the tax burden – at least not in the banking sector. The conducted analyses prove that the difference between the average effective taxation of single taxpayers and of entities forming TCG is negligible. Moreover, the average rates of effective taxation are higher in case of banks operating in the form of tax capital groups.

Such results pose an obvious question about the sense of creating TCG for enterprises from banking sector. Consolidation of results of various entities for the purpose of the joint taxation is reasonable only when some taxpayers forming the TCG bring a loss in financial terms. In such a case the income of other units allows for the current and effective use of losses. In case of banks, analysed in the group of single taxpayers, another trend is apparent: despite losses reported by individual entities, they is no interest in establishing tax capital groups. Moreover, the TCGs already operating on the Polish market, do not report any reductions in total corporate income tax burdens, in comparison to the single taxpayers.

The lack of the effect of reducing the tax burden by establishing the TCG results in a little use of this form of tax optimization. It can be illustrated by a comparison of the number of taxpayers from the banking sector who settle their accounts independently, with the number of tax capital groups. Consequently, we can assume that Polish regulations enabling for group taxation, do not result in increased interest in the consolidation of several separate enterprises' tax results.

From the perspective of the state budget, the existence of TCGs does not reduce the flows of tax revenues. Thus, a conclusion can be drawn that Polish provisions on group taxation are fictitious: this instrument, used in many jurisdictions, is admittedly legally allowed in Poland, but the strict conditions of its use do not bring significant tax reductions for taxpayers.

In order to generalize the conclusion that tax capital groups do not have any influence on Polish strategies of minimizing tax burdens, it is necessary to analyse other areas of the economic activity. Nevertheless, in the banking sector, the legal possibility of establishing the tax capital group is not perceived as the effective solution, that can lead to a significant reduction of the income tax paid by the company.

[1] The Amendment to the Polish CIT Act introduced a new art. 27b providing the publication of individual tax data of 4,500 CIT taxpayers with the highest revenues and all TCG (regardless of the amount of revenues), which are formally recognized groups of wholly or majority-owned companies consolidating their taxes under a single Polish entity.

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AePS – A Step Forward: Indian Perspective

Abhimanyu Sasi Pavoor
Department of Commerce and Management, Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Kochi-682024, Kerala, India
Email: abhimanyusasipavoor@gmail.com

N. Ajithkumar
Department of Commerce and Management, Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Kochi-682024, Kerala, India
Corresponding author: najithkumar3000@gmail.com

Abstract

Aadhaar Enabled Payment System (AePS) is a payment method that is widely used in India. This paper assesses and evaluates AePS payment system. It was introduced and established by National Payments Corporation of India(NPCI). This payment method helps in performing electronic transactions using Micro ATMs. It crosschecks the Aadhaar numbers and biometrics of the respective customer. The focal point of this paper is to acquaint public, the impact of AePS on digital payments in India. This is done by examining various literatures in Indian scenario. AePS has developed a powerful digital payment network. Real time verification of biometrics and Aadhaar number is done in this payment network. The main aim of this system is to promote financial inclusion. Now AePS is currently in a developmental stage. RBI and NPCI have made significant steps in discovering new areas to improve the payment system networks. AePS has helped in preventing illicit payments and also helped in blocking unauthorized direct benefit transfers.

Keywords: Digital payments, National Payments Corporation of India, Aadhaar Enabled Payment System, Biometric, Micro ATM

Introduction

According to International Monetary Fund's report on India, Indian Economy is the fastest growing economy in the world (International Monetary Fund Report, 2019). As per World Bank report on India, India's GDP stood at 2.5 trillion. In India, 66% of the people live in rural areas (World Bank U.N. Rural Population report, 2019). Here more transactions are done in cash. So India is cash driven economy. There is more dependency on cash. It leads to many problems like fake currency, tax evasion etc and management of cash is difficult.

Reserve Bank of India is the central bank. It has taken steps to avoid these sorts of problems. For cashless payments and digitalization of payments, National payments Corporation of India was formed in 2008. National Payments Corporation of India(NPCI) is an organization which operates digital payments and it provides infrastructure for overall banking systems in India. Aadhaar Enabled Payment System (AePS) was introduced by NPCI in November 2010. It is a payment System which uses Aadhaar authentication and biometrics for payments transactions at Micro-ATMs through the Business Correspondent (BC) of any bank. First step is to identify the beneficiary that is related to the respective account and biometric verification is done using the Aadhaar. We need to link our Aadhaar and bank account for doing transactions. AePS is made inorder to do ONUS based transactions and OFFUS based transactions.

According to reports of NPCI, AePS has crossed 220.18 million transactions in July 2019. RBI has taken many steps to promote digital payments. As per the Mary Meeker's report of Internet Trends 2019 India's share of internet users is 12 %.(Mary Meeker's report on Internet Trends,2019)

The purpose of this paper is to analyse the technological advancement of AePS. AePS has shown tremendous growth in recent years. The AePS provides services like withdrawing cash, balance enquiry, depositing cash, funds transfer, mini Statement etc.

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Background

The payment system in India has made significant changes due to advancement in technology. Indian economy is growing at a faster rate. Now we are living in a digital world. Everything is going online. India is basically cash driven economy. Several services are offered by many financial institutions to promote digital payments. The main services offered by NPCI are RuPay, IMPS(Immediate Payment Service), BHIM(Bharat Interface for Money), AePS(Aadhaar Enabled Payment System), UPI(Unified Payments Interface), NETC(National Electronic Toll Collection), NACH(National Automated Clearing House), CTS(Cheque Truncation System), Bharat QR, BHIM Aadhaar, NACH(National Automated Clearing House), * 99# etc. After demonetization many reforms came into existence in Indian economy. Now people are more concerned about speedy and secured settlement of transactions. Cashless mode of payment is now popular among common man. Due to introduction of smart phones and new technological innovations, people use such phones for faster payments. The apps in smart phones help in faster settlement of transactions. Aadhaar has proved to reduce corruption to a certain extent in India. The leakage in tax and other unparalled economy can be controlled by enrolling in Aadhaar. Schemes like NREGA and public distribution system became more effective. Recently Aadhaar bill was introduced. Reserve Bank of India established 2 working groups. One working group was made on Micro ATM standards and the other was on Central Infrastructure Connectivity. Reports were submitted to RBI by these working groups. AePS Steering committee includes 21 banks. The banks that are included in steering committee are Yes Bank, Union Bank of India, United Bank of India, State Bank Of India, Syndicate Bank, Saraswat Co-Operative Bank, Ratnakar Bank Limited, Punjab National Bank, Oriental Bank of Commerce, Indusind Bank, IDFC Bank, ICICI Bank, Fino Payments Bank, Central Bank Of India, Canara Bank, Bank Of Maharashtra, Bank Of India, Bank of Baroda, Axis Bank, Allahabad Bank, Andhra Bank etc. NPCI is giving instructions to participating banks for daily reconciliation of AePS transactions. NPCI audits the AePS of the related banks which are members of AePS and the related business correspondents.

Review of literature

Bhakti et al. (2017). This article discusses about Aadhaar pay. Initially people were more familiar with BHIM. Hence inorder to make Aadhaar Pay popular government named 'BHIM Aadhaar Pay' before its launch. Business people need a smartphone with Aadhaar pay app installed and a bank account. Sellers have to pay at merchant discount rate for these transactions. The aim of this app is to help people who are not comfortable with digital transactions and use Aadhaar to authenticate biometrics.

Bhatti, B. (2012). In the article Aadhaar enabled payments are portrayed with special concentration on NREGA labourers. Biometrics is used in AePS. It has helped to prevent corruption.

Ashwin Manikandan (2019). In this Article he opined that AePS transactions have increased. Micro ATM is the system which is more used in rural India. 100 million people are using their biometrics for doing transactions in local kirana stores. AePS Growth rate has increased to 150% annually. It has crossed UPI. NPCI report points out that almost Rs 9000 crore worth transactions are done using Micro ATMs. 800 Million customers are using AePS. This is just because the government linked Direct Benefit Transfer (DBT) through AePS. Private sector banks are more concentrating on AePS in different states namely West Bengal, Madhya Pradesh and Uttar Pradesh, Rajasthan, Bihar and Odisha.

Sharmin, K. I. (2020). In this research paper the author elaborated about AePS and its innovations. This paper also discusses about different mechanisms of AePS and its effects on digital payments.

Objectives of the Study

1. To assess the effectiveness of Aadhaar payment System.
2. To analyse the impact of AePS on Cashless payments.
3. To review the safety concerns of AePS.

Research Methodology

The study was according to the objectives stated above. Based on the objectives data was collected from secondary sources and analysis was done based on that. The data was collected from various journals and different websites of govt. and other organizations. Reports and Circulars of Reserve bank of India and circulars and orders of National Payments Corporation of India helped in scrutinizing and interpreting the data.

Types of Transactions in AePS

ON-US transactions

ONUS transaction is done at the ATM of the bank that issues the card. In these types of transactions, the transactions can be completely prepared within the bank which is an acquiring bank as well as an issuing bank. Banks may utilize their very own validation method if biometrics are accessible with the bank, or use Aadhaar confirmation as a fallback.

OFF-US Transactions

This transaction is done at the ATM of other banks not from the bank where the card is issued. In these types of transactions, the transaction is done by a client through the agent that is linked with the bank other than the clients own bank, to process the transaction the clients Aadhaar number will not be adequate. All clients are given a BIN number which is 6 digits long which prefixes the Aadhaar number in these types of transactions.

Objectives of AePS

1. **To promote financial inclusion**
   AePS helps in proper accounting of transactions. Every transaction done online leaves a documentary proof. So it can reduce black money. It is helpful for the customer as well as the seller.
2. **To promote digitalization of payments**
   AePS helps in doing more transactions through electronic means. It also helps in reducing the problems of cash transactions by enabling digital transactions.
3. **Ease of payments**
   Aadhaar system in AePS helps in making payments easier. Technological innovations always help to improve the payments scenario.
4. **Cashless Payments**
   AePS promotes cashless payments. Cashless payments provide convenience to customers and businesses to pay and receive money.
5. **Helps in collecting government initiated fund transfers**
   AePS helps in providing people social security pension, subsidies and other direct benefit transfers.

Basic requirements for AEPS

1. **IIN(Issuer Identification Number) of Bank**
   IIN is the Identifcation number of a bank. This is a unique 6 digit number. It is used by NPCI to verify the transactions.
2. **Aadhaar Number**
   Aadhaar number is the unique number given by Unique Identification Authority of India. It is a 12 digit number provided to people who have registered for Aadhaar Card.
3. **Fingerprint**
   Fingerprint should match with the Aadhaar at the time of enrollment with UIDAI. This biometric is unique and it is verified for making transactions using AePS.

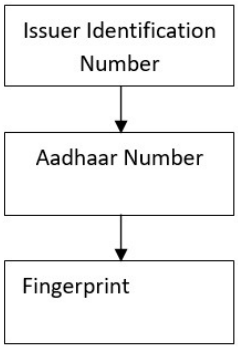

Fig. 1: Requirements of AEPS

Working of AePS

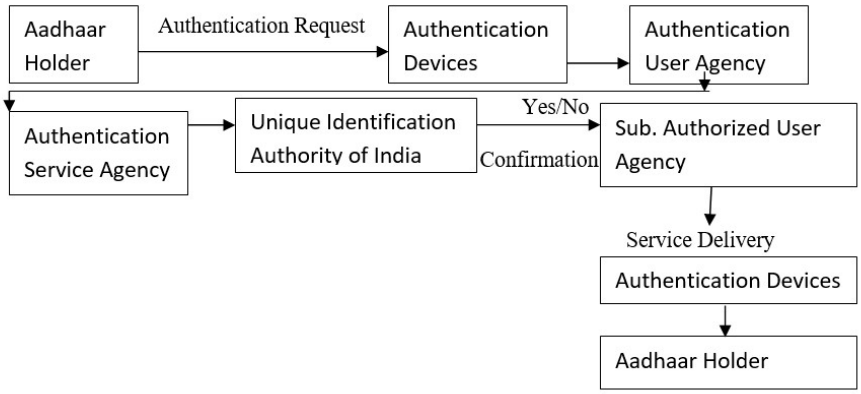

Fig. 2: Working mechanism of AePS

For using AePS facility the Customer should link Aadhaar with the bank account. Let us know how AePS works. The Aadhaar holder initiates an authentication request by providing Aadhaar number to the authentication user agency using mobile phones, PCs or such other devices. Then Authentication agency transfers that to authentication service agency. Then the authentication service agency transfers that information to unique identification authority of india . This authority checks the data and transfers to Sub. Authorized user agency and they gives confirmation to authentication devices by verifying the customers fingerprint. After that the required service for customers is rendered. This is how the AePS works.

Membership of AePS

1. UIDAI has to duly approve the member bank to use authentication services.
2. Criteria for banks to join AePS :
   i) The bank which is the applicant should be a member of Type-A of Gross settlement system of RBI.
   ii) The bank which is the applicant should be eager to allocate to the NPCI's Settlement Guarantee Fund.
3. Sub-membership model of AePS can be utilised through:
   i) Banks who have Authentication User Agency's license but not RTGS membership
   ii) Banks who do not have Authentication User Agency's license.

Steps in AePS transactions

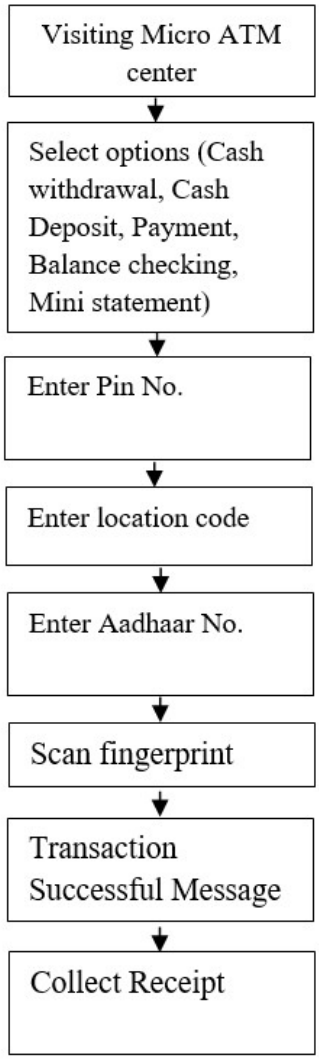

Fig. 3: Steps in AePS

Areas where AePS is used?

1. **India Post Payments bank(IPPB)**
   IPPB provides AePS enabled banking services like withdrawal of cash, depositing cash, Mini statement, Funds transfer using Aadhaar and other AePS facilities by NPCI.
2. **Banks**
   Banks provide AePS services for customers for doing various banking transactions.
3. **Insurance Companies**
   Insurance companies use AePS for providing insurance services.
4. **Stock Trading**
   Stock trading companies provide Stock trading services using AePS.
5. **Income Tax Return Filing**
   At present, for filing income tax returns it is mandatory to use AePS system.
6. **BHIM Aadhaar pay**
   BHIM Aadhaar Pay is the payment app used for doing commercial transactions in mobile phones for AePS transactions. It was launched on 14th April 2017. In the first phase the transaction limit was Rs. 2000 and now it has increased to Rs. 10000.

Merits of AePS

1. **Easier Payment of transactions**
   AePS helps in faster payments. Only thing we require is Banks IIN, Aadhaar number and fingerprint.
2. **Secured payment**
   AePS helps in making secured payment using biometrics scans. Biometric scanning verifies fingerprint. Frauds can be reduced by these types of verification.
3. **Promotes Financial Inclusion**
   Every transaction that is done in AePS keeps evidence in the form of transaction registry. So it helps in promoting financial inclusion.
4. **Safe disbursal of government schemes and direct benefit transfers(DBT)**
   It helps in safe and secured disbursal of all government schemes and DBTs.
5. **Cashless Payments**
   AePS provides cashless mode of payments. So it promotes cashless society.

Demerits of AePS

1. **Problems of biometric system**
   The main problem of this system is that it involves these types of failures. They are:
   (i) Denial of Service(DoS)
   DoS occurs when the system is not able to recognize the authorized user. This attack occurs when a hacker attacks this payment network.
   (ii) Intrusion
   It occurs when the system incorrectly recognizes a wrong user as the authorized user. This attack also occurs when a hacker hacks the network and breaks the loopholes in this network.
   (iii) Adversary Attack
   It is an attack where an adversary manipulates the biometrics. The adversary is an insider which directly handles the networks.

Role of different participants in Micro ATM Network

1. **Issuing Bank**
   This bank maintains the customer's record and all the details related to the customer in a Core banking system. The Aadhaar can be mapped for all transactions involving AePS.

2. **Acquiring Bank**
   This bank maintains relationship with business correspondents. It works as a facilitator for AePS transactions.
3. **Business Correspondent(BC)**
   He is designated by the bank, and gives access to fundamental banking services by utilizing the Micro ATM.
4. **Technology Service Provider(TSP)**
   It provides support to business correspondents by providing technology.
5. **Multilateral switch**
   It is used in OFF- US transactions which gives interoperability.
6. **UIDAI**
   It is the organisation which provides Aadhaar Card. It provides a 12 digit unique number. This is the Aadhaar number.
7. **IBA, IDRBT, NPCI, UIDAI**
   These bodies are the watchdog of Micro ATM standards.
8. **RBI**
   It controls over all payment systems in India including Micro ATM networks.

According to RBI's Report on High level Committee on Deepening of Digital Payments, there is rapid growth in the AePS from 2015 to 2019. Transactions size in 2014-15 was just 1.4 thousand. It has increased to 2.7 thousand in 2018-19. These innovations help users who belong to remote areas to access bank accounts easily. At present the transactions in AePS rose to 80 million users.

New Policies by RBI for AePS

Banks should pay penalty for failed transactions

Recently in Reserve Bank of India 's Monetary Policy statement which was published on April 4, 2019, RBI has proposed to make a structure on Turn Around Time (TAT) which was made on the basis of consumer complaints regarding failed transactions . As per RBI, the failed transactions include various factors which may not be directly related to the consumer. It might be on account of various aspects that are not directly related to the consumers like interruption of links in communication, lack of money in ATMs, break in sessions, non-credit to recipient's record because of different causes etc. Rectify / Compensate the amount that is paid to the customer for these failed transactions isn't uniform.

According to Retail Payments Statistics by NPCI on September 2019, AePS transactions have increased rapidly in the financial year 2019-2020. Doing transactions in AePS is easy. Transactions are done on the basis of biometrics. It is highly secured. So people are more interested to do transactions using AePS.

Recent AePS enabled Apps

1. **Paisa Nikaal App**
This app uses AePS system to withdraw, deposit and transfer cash. It can also be used to check bank statements without visiting any branch. IMPS method is used to transfer money to bank account.
2. **eDigital AePS**
This app uses multiple platforms for payment. It uses AePS , Immediate Payment Service, Bharat Bill Payment System etc.

Criticisms against AePS

1. **AePS needs only fingerprint and Aadhaar number to withdraw money**
Many experts are of the view that AePS authentication is vulnerable to attacks. Biometric authentication should be modified from fingerprints and Aadhaar number to face recognition and retina scans.
2. **OTP or PIN is not required for AePS transactions**
One Time Password(OTP) or Personal Identification Number(PIN) is used in all card based transactions. But in AePS transactions these type of authentications are not required. So it becomes a serious threat to people who are using AePS mode of payments.
3. **Two factor authentication should be maintained**
Two factor authentications should be made for AePS transactions. Bypassing of two factor authentication becomes very difficult.

Covid-19's Impact on AePS

According to World Health Organization" Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes." This virus emerged in China and started spreading in India at the end of January 2020. India was under lockdown for around 2.5 months. Business organisations, educational institutions, tourism, manufacturing firms, private companies and some of the government institutions were under lockdown. This pandemic has created significant impact on digitization of payments. ATM counters were avoided by majority of people to avoid contacts with infected persons. Contactless payment method got more importance. AePS showed 20 to 25 % growth in transactions. Postal department is also providing AePS services to their customers. So customers can use their accounts using AePS while staying at home. Direct Benefit Transfers were given to people using AePS. According to the finance ministry, AePS transactions were doubled to 11.3 million during this pandemic period. (Hindustan Times, May 2020)

Conclusion

AePS has helped to make Aadhaar as a primary identification and helped in making payments and accepting payments. Compared to other services offered by NPCI, AePS is easier and secured because of IIN, Aadhaar number and fingerprint. After demonetization, BHIM (Bharat Interface for Money) has been launched. BHIM is also an online payment method which uses Unified Payment Interface for doing different kinds of transactions. The difference comes in the process of authentication. BHIM uses UPI and Aadhaar Pay uses biometric verification. It is highly secured. Government has launched Aadhaar Pay to avoid the problems of BHIM. As per the current statistics given by NPCI for the year 2019-20 AePS transactions have increased tremendously compared to BHIM.

This payment mode will be used more in coming years. Now people are more interested in faster payments due to the technological developments. The merchants are trying to provide AePS because they will get additional benefits. For bankers AePS based mode of transactions is very cheap and it will also help the people who are under banked. Public Sector banks like SBI and other private banks are also promoting AePS in rural areas. In rural areas, the number of banks and ATMs are very few in number. DBT is done by the government through Aadhaar. Only Aadhaar card and bank account is needed to do this. So these all things will promote AePS in rural areas.

Day by day AePS based transactions is getting more popular. With further innovations and developments in technologies AePS will be used in all modes of payments. This may compete with other modes of payment and may be widely accepted internationally. AePS based transactions may become the first priority among the common man in the years to come.

Author Contributions

Conceptualization, A.S.P and N.A.; Methodology, A.S.P. ; Formal Analysis, A.S.P.; Investigation, A.S.P. and N.A. ; Resources, A.S.P. and N.A ; Data Curation, A.S.P; Writing – Original Draft Preparation, A.S.P and N.A.; Writing – Review & Editing, A.S.P and N.A.; Project Administration, A.S.P. Both Authors working on this paper have read and agreed to the published version of manuscript.

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Novel Graph-Based Approach for Creating and Comparing Music Arrangements

Szymon MUSZYNSKI

Military University of Technology in Warsaw, Poland
S. Kaliskiego Str. 2, 00-908 Warsaw, Poland
szymon.muszynski@wat.edu.pl

Abstract

This article provides a brief summary on graph and network-based models of melody. It describes how to use these models for arrangement generation and how to compare results obtained with different generation methods. The comparison may be based on characteristics of a graph representing an original piece and graphs of generated arrangements.

Two main goals of this article are: to provide a formal description of existing models and generation methods in terms of stochastic processes and to introduce the new methods of comparing musical tracks using their graph representation.

Keywords: graph theory, Markov chains, automated music arrangement, musical pieces comparison

Introduction

Computer Science has already made a significant impact on almost any other branch of science. It also changes the contemporary styles in music. Development of mathematical models and computer software inevitably impacts musician's life – not only in terms of listening to music. People use mobile devices to tune instruments. Many composers prefer computer-pluggable instruments combined with score writing software to traditional instruments and paper scores to create new arrangements. Moreover, computer-generated music arrangement is also a rapidly growing field of research.

Many computer-driven arrangement methods have been developed so far. For instance, there are models using neural networks (Liu, H. and Yang, Y. (2018), 'Lead sheet generation and arrangement by conditional generative adversarial network,' International Conference on Machine Learning and Applications, ISBN: 978-1-5386-6805-4, 17-20 December 2018, Orlando, USA, 722-727.), genetic algorithms (Daylamani, Z., Araabi, B. N. and Lucas, C. (2006), 'A novel approach to automatic music composing: using genetic algorithm,' *International Computer Music Conference Proceedings (ICMC),* 2006, 551-555.) and many others (e.g. Huang, J.-L., Chiu, S.-C. and Shan, M.-K. (2012), 'Towards an automatic music arrangement framework using score reduction,' *ACM Transactions on Multimedia Computing*, *Communications*, *and Applications,* 8, 8:1-8:23. or Smith, R., Dennis, A. and Ventura, D. (2012), 'Automatic composition from non-musical inspiration sources,' Proceedings of the Third International Conference on Computational Creativity (ICCC), ISBN 978-1-905254668, 30 May-1 June 2012, Dublin, Ireland, 160-164.).

Among others, graph-based music arrangement also gives good results in terms of generated music *hearability* (this term is used in the article of Yang, C., Tse, C. K. and Liu, X. (2009), 'Analyzing and composing music from network motifs,' International Symposium on Nonlinear Theory and Its Applications (NOLTA), ISBN: 978-4-88552-241-3, 19-21 October 2009, Sapporo, Japan, 407-410.). Arrangement is created using an original song.

The main purpose of this article is to summarize common methods of creating graph-based representation of sheet music and arrangements – with formalization of methods that were previously described only in a descriptive way. The article also proposes new methods of music comparison.

The article consists of seven chapters. The first one is an introduction. Chapter two is a summary of how to present notes as a graph vertices. Chapter three describes differences between graph and network models of melody. Chapter four provides a description of methods of generating an arrangement from graph/network structures in terms of

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Markov chains. Chapters five and six describe different approaches to measure track similarity: graph-structure-based and text-based accordingly. Chapter seven is a summary of the article with ideas for further research.

Mapping notes to vertices

Music used for arrangement generation methods described in this article is restricted to note frequencies having an exact representation in the equal temperament (so that they can be written in the sheet music) and being hearable by human ear. Also, it is restricted to monophony – there is only one tone played in every single moment of time. In fact, many instruments do not have possibility to play more tones at a time (e.g. human voice, most wind and brass instruments). For all the chord instruments, we may split notes from existing chords into separate tracks – so that we do not lose any information from the original piece.

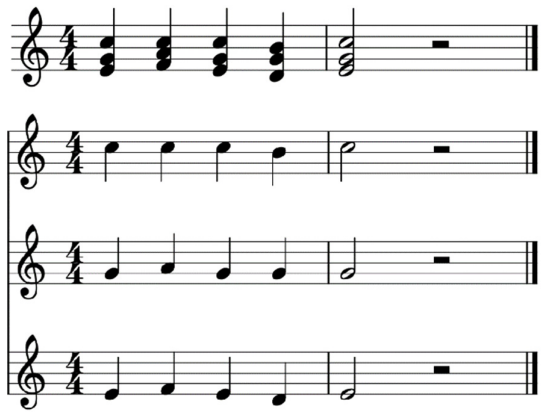

Figure 1: Example of splitting polyphony to multiple monophonic tracks

In Figure 1 we can see that every note in the resulting piece is preceded by exactly one note (except the first one) and precedes exactly one note (except the last one). This assumption allows to use graph/network models.

Consider the following formal representation of the graph (described similarly to Korzan, B. (1978), Elementy teorii grafów i sieci. Metody i zastosowania, Wydawnictwo Naukowo-Techniczne, Warsaw.):

$$G = \langle V, E, P \rangle \tag{0.1}$$

where:
V – set of graph vertices,
E – set of graph edges,
$P \subset V \times E \times V$ – relation such that:

1) $\forall e \in E \, \exists v_1, v_2 \in V : \langle v_1, e, v_2 \rangle \in P$

2) $\left[\langle v_1, e, v_2 \rangle \in P \wedge \langle x_1, e, x_2 \rangle \in P \right] \Rightarrow \left[(v_1 = x_1 \wedge v_2 = x_2) \vee (v_1 = x_2 \wedge v_2 = x_1) \right]$

Let $N = \{N_1, \cdots, N_L\}$ be a set of all notes in a track.
Consider the following formal representation of a single note:

$$\mathrm{N}_i = \langle \mathrm{freq}_i, \ \mathrm{m}_i, \ \mathrm{t}_i \rangle, \quad i = 1, \ldots, L \tag{0.2}$$

where:
freq_i – frequency of the i-th note ($\mathrm{freq}_i \in [16{,}16000] \cup \{-1\}$ – -1 is used as a representation of a rest),
m_i – duration of the i-th note (e.g. in seconds or as note length: half, quarter etc.),
t_i – moment in the track in which the i-th note starts (seconds from the beginning of a track or a measure number).

Notes from a single track may be represented as graph's vertices. There are a few ways for representing notes from the original piece and transform them to graph nodes. They will be further defined formally as functions:

$$f : N \to V \tag{0.3}$$

First, we may create one vertex for each "identical" note – i.e. having the same frequency and duration. Vertex name consists of three parts: note frequency, underscore sign, note duration. Alternatively, frequency may be replaced by note name for readability. This note representation is called full representation.

This method results in relatively big graphs: using all possible 121 note frequencies (12 notes in each of 10 octaves, 1 artificial frequency for rests) combined with 18 note lengths that are used commonly (whole, half, quarter, eighth, sixteenth, thirty-second – each can also be dotted and double-dotted) results in graph having up to 2178 vertices. The main advantage is preserving all important information in the graph – as shown in Figure 2.

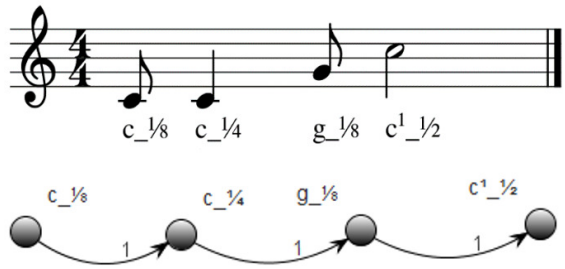

Figure 2: Example of a network representing the track above with full representation of notes

Alternatively, each note having the same frequency (regardless of its duration) may be mapped to the same edge. This representation is called simplified representation.

Formula to calculate vertex' index in simplified notation is shown below.

$$f(freq_i) = \begin{cases} 121 & \text{freq}_i \le 0 \\ 12 * \log_2\left(\dfrac{\text{freq}_i}{440\,Hz}\right) + 58 & \text{freq}_i > 0 \end{cases} \tag{0.4}$$

Values below 0 are used as rest representation. Values above 0 are other notes' frequencies (with $A_4 = 440$ Hz being 58th human-hearable note in the equal temperament).

Such a graph is much smaller (with a maximum of 121 vertices) but some vital piece of an information from the original song is being lost - as shown in Figure 3.

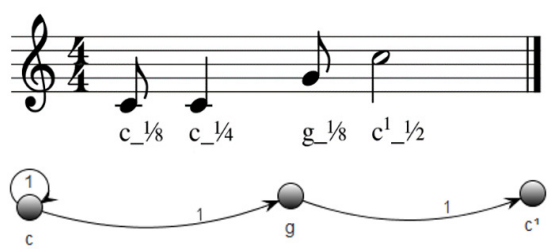

Figure 3. Example of a network representing the track above with simplified representation of notes

We may also "flatten" notes just to their key signature (without an octave name). Thus, this representation is called simple representation. Formula to calculate vertex index in simple representation is shown below:

$$f(freq_i) = \begin{cases} 12 & \text{freq}_i \le 0 \\ \left[12 * \log_2\left(\dfrac{\text{freq}_i}{440\,Hz}\right) + 58\right] mod\, 12 & \text{freq}_i > 0 \end{cases} \tag{0.5}$$

Usage of this representation causes losing an information about notes' frequency and length. However, this type of mapping is more human-readable as graphs are relatively small (there are maximum 13 vertices). An example of such a graph is shown in Figure 4.

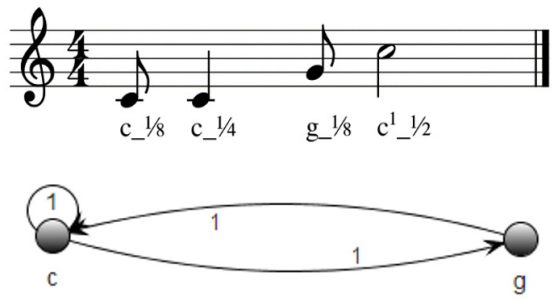

Figure 4. Example of a network representing the track above with simple representation of notes

The next topic – creating edges in a music graph is covered in the next chapter.

1. Reflecting note precedence as edges

The second important part of creating graph or network from the sheet music is: how to reflect "connections" between notes.

Important part of modelling sheet music as a graph is a precedence relation. It can be described formally as:

$$R = \{\langle N_1,\ N_2\rangle \in N \times N : t_1 \le t_2\} \tag{3.1}$$

where:

$N_i,\ t_i$ – as defined in (0.2)

N – set of all notes in a track.

Relation between notes in the track defined as above is:

1. connex:

$$\langle N_1, N_2\rangle \in R \vee \langle N_1, N_2\rangle \in R \tag{3.2}$$

2. reflexive:

$$\langle N_1, N_1\rangle \in R \tag{3.3}$$

3. transitive:

$$[\langle N_1, N_2\rangle \in R \wedge \langle N_2, N_3\rangle \in R] \Rightarrow \langle N_1, N_3\rangle \in R \tag{3.4}$$

4. antisymmetric:

$$[\langle N_1, N_2\rangle \in R \wedge \langle N_2, N_1\rangle \in R] \Rightarrow N_1 = N_2 \tag{3.5}$$

Thus, such a relation is a linear order on the set of notes.

If we create a rank over this set of notes with its linear order (as described by Ameljańczyk, A. (2013), 'Metoda podziału zbioru obiektów na wielokryterialne klastry jakościowe,' *Biuletyn Instytutu Systemów Informatycznych WAT,* 12, 1-7.), we may start modelling connections between pairs of notes according to their "immediate precedence". Such pairs may be described formally as:

$$I = \{\langle N_1, N_2\rangle \in R : t_2 = t_1 + m_1\} \tag{3.6}$$

where N_i, t_i, m_i are described in (0.2) and $R \subset N \times N$ is described in (3.1).

Several possibilities exist to model the precedence relation in a graph or network. The following section will summarize ways to create edge structure from the track.

The first one is to create an edge for each unique precedence between notes corresponding to vertices. This means that we create an edge for the first occurrence of that precedence – but every subsequent precedence of notes mapped to these vertices will not change the graph structure. Thus, we create an *unigraph* (a.k.a. simple graph – where multiple edges between a pair of nodes are not allowed).

This method simplifies the structure and produces a summary of connections between notes from the track. Of course, an information about a cardinality of each vertex pair's precedence is lost – as shown in Figure 5.

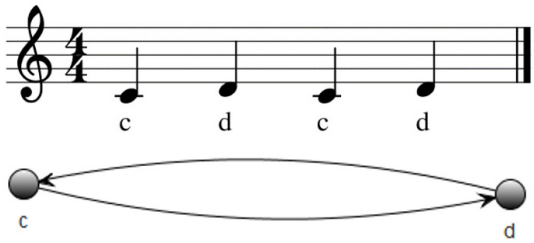

Figure 5. Example of an unigraph representing the track above. Multiple occurrence of the precedence between notes c and d is ignored

The second way of modelling the precedence is to use a *multigraph* (where multiple edges between a pair of nodes are allowed). Therefore we may restore the cardinality of precedence between notes from a track by counting all the edges between nodes corresponding to these notes – as shown in Figure 6. Unfortunately, this method results in graphs with many edges for long pieces (i.e. having many notes). Therefore, many publications (such as Liu, X., Tse, C. K. and Small, M. (2009), 'Composing music with complex networks,' International Conference on Complex Sciences: Theory and Applications (COMPLEX2009), ISBN: 978-3-642-02466-5, 23-25 February 2009, Shanghai, China, 2196-2205.) ignore this method as there exists less memory-exhaustive approach: using the network.

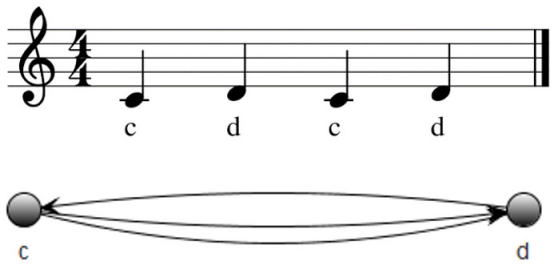

Figure 6. Example of a multigraph representing a track above. Multiple occurrence of the precedence of notes c before d results in two edges between the corresponding vertices

The third method of modelling the precedence relation is to use a network (weighted graph). Just as in the previous method, we don't ignore multiple occurrence of a precedence between the notes but, unlike multigraph, we increment a weight of an edge instead of creating a new one – as shown in Figure 7.

This method allows to restore the cardinality of precedence between each pair of nodes and produces more readable and more concise structure.

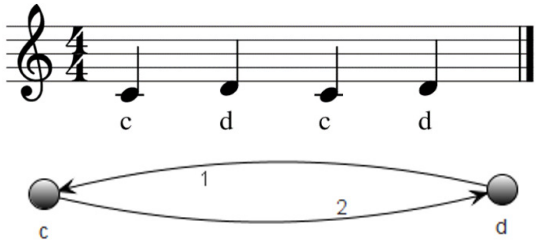

Figure 7. Example of a network representing a track above. Multiple occurrence of the precedence of notes c before d results in a single edge with a weight of 2 between corresponding vertices

The last decision to be made is: should we use directed edges (arcs) or undirected (lines)?

In the first method we create an arc from the first note from pair. Therefore, resulting *digraph* (directed graph) shown in Figure 8 contain arcs only in such directions that exist in the original piece. We do not ignore the order in each pair from the precedence relation.

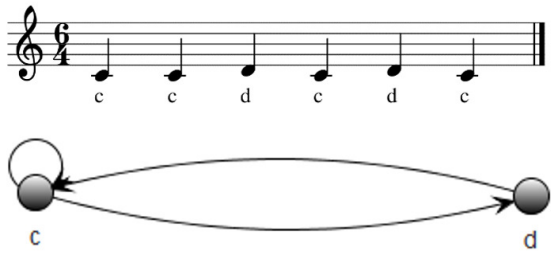

Figure 8. Example of a digraph representing a track above. Occurrence of the precedence between notes c and d (and back) results in two arcs between vertices – one in both directions

When we use arcs with network, we can calculate weight for an arc from v_k to v_l as cardinality of an immediate precedence of note N_i before N_j such that:

$$\langle N_i, N_j \rangle \in I \tag{3.7}$$

$$\langle f(N_i), e, f(N_j) \rangle = \langle v_k, e, v_l \rangle \in P \tag{3.8}$$

where I is defined in (3.6), v, e, P are defined in (0.1) and $f(N_i) = v_k$ was described in (0.3).

The second approach is to use an undirected graph. In this scenario we create a line between edges regardless of which note from pair occurs first in the track. When there is a precedence between two notes corresponding to vertices A and B and then two another notes corresponding to vertices B and A (i.e. there should be two arcs between them in a digraph), we use a single line instead. Thus, the graph in Figure 9 informs only about "notes' neighborhood" in the track but not strictly about the precedence.

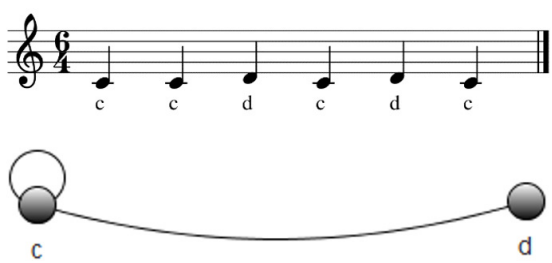

Figure 9. Example of an undirected graph representing a track above. Occurrence of the precedence between notes c and d (and back) results in a single edge between vertices corresponding to them

When we use this approach for networks, then the weight of each line between vertices v_k and v_l is a cardinality of an immediate precedence of a note N_i before N_j or vice versa such that:

$$\langle N_i, N_j \rangle \in I \vee \langle N_j, N_i \rangle \in I \tag{3.9}$$

and

$$\langle f(N_i), e, f(N_j) \rangle \in P \vee \langle f(N_j), e, f(N_i) \rangle \in P \tag{3.10}$$

where all symbols have the same meaning as in (3.8).

For both formulae (3.8) and (3.10) we may calculate a weight of each vertex as an aggregate weight of each outgoing arc or an incident line.

Both approaches described above must allow creating loops as there may occur multiple identical notes (with the same frequency and duration) one after another – as shown in figures 8 and 9.

Combination of all these aspects (type of chosen representation of notes, type of graph structure, type of used edges) affects resulting arrangement generated from the graph.

Creating arrangements from the graph

As graph model of an original piece is constructed, we may start generating arrangements.

To do so, we will use a random walk (or controlled random walk) algorithm on the graph. It is an example of a stochastic process – or strictly speaking: a Markov chain. In this case the set of graph nodes is the state space and the indices of arrangement notes are an index set. Both of them, of course, are discrete.

To fully characterize the process, we need to provide: the vector of initial distribution and the transition matrix. We may interpret the former as choosing the first note of an arrangement and the latter as choosing the following notes of the recomposed work. There are multiple methods of constructing them from the original song and the aim of this chapter is to provide a description of these methods.

We may construct an initial distribution vector in a multiple ways. First of them is to start the arrangement using a randomly chosen note from the prototype (vertices having a non-zero degree). Therefore, the initial probability for each vertex will be calculated from the following formula:

$$p_i(0) = \begin{cases} \dfrac{1}{\left|\left\{v_j \in V : \deg\left(v_j\right) > 0\right\}\right|}, & deg\left(v_i\right) > 0 \\ 0, & deg\left(v_i\right) = 0 \end{cases} \tag{3.11}$$

where $deg\left(v_i\right)$ is a degree of v_i vertex.

A non-zero degree condition is used to eliminate isolated vertices (corresponding to notes that aren't used in the original piece – as depicted in Figure 10).

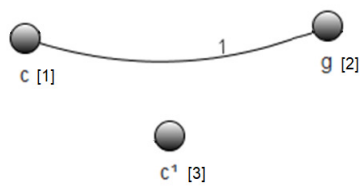

$$p_0(1) = \frac{1}{2}$$
$$p_0(2) = \frac{1}{2}$$
$$p_0(3) = 0$$

Figure 10. A sample graph with the initial distribution calculated using the formula (3.11). Vertex indices are provided in square brackets

The second approach is to start an arrangement with the same note as in the original piece. In this scenario the following formula is used:

$$p_i(0) = \begin{cases} 1, & f(N_1) = v_i \\ 0, & f(N_1) \neq v_i \end{cases} \tag{3.12}$$

where $f(N_1)$ is defined in (0.3).

The third method is to begin the recomposed work with the most frequently used note from the original song (as depicted in Figure 11). If there is more than one such a note, we choose one of them randomly. The following formula applies:

$$p_i(0) = \begin{cases} \dfrac{1}{\left|\left\{v_j \in V : \deg\left(v_j\right) = \Delta(G)\right\}\right|}, & deg\left(v_i\right) = \Delta(G) \\ 0, & deg\left(v_i\right) < \Delta(G) \end{cases} \tag{3.13}$$

where $\Delta\left(G\right) = \max\limits_{v \in V} deg\left(v\right)$ is a graph's degree.

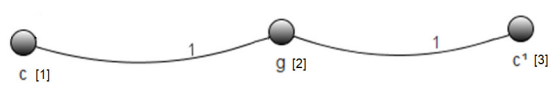

$$\Delta\left(G\right) = 2 \qquad p_0(1) = 0 \quad p_0(2) = 1 \quad p_0(3) = 0$$

Figure 11. A sample graph with the initial distribution calculated using the formula (3.13). Vertex indices are provided in square brackets

The fourth method is to draw an initial vertex with a probability according to its degree in the graph. The following formula is used in this case:

$$p_i(0) = \frac{\deg(v_i)}{\sum_{v_j \in V} \deg(v_j)} \tag{3.14}$$

Therefore, the more frequent was the note used in the original piece, the bigger is the probability to draw it as the first note of an arrangement.

Two additional methods may be used for networks. First of them is to choose the vertex corresponding to the most frequently used note from the prototype (or, if there are more of them, a randomly chosen one). The weight of a vertex $\xi(v_i)$ is used in the formula:

$$p_i(0) = \begin{cases} \dfrac{1}{\left|\{v_j \in V : \xi(v_j) = \max \xi(v)\}\right|}, & \xi(v_i) = \max\limits_{v \in V} \xi(v) \\ 0, & \xi(v_i) < \max\limits_{v \in V} \xi(v) \end{cases} \tag{3.15}$$

where $\xi(v_i)$ is calculated as described under (3.10).

The second additional approach for networks is to draw a starting vertex accordingly to degrees of all vertices. The following formula is used in this case:

$$p_i(0) = \frac{\xi(v_i)}{\sum_{v_j \in V} \xi(v_j)} \tag{3.16}$$

where $\xi(v_i)$ is described as before.

In this approach a note which is used more frequently in an original part has also a bigger probability to begin the arrangement (just as in the fourth method described in this section).

The second part of the random walk is a method of choosing the following vertices. It is similar to choosing the first vertex, although the main difference is considering only successors of the current vertex (instead of all the vertices of the graph).

Due to this similarity, formulae to calculate values in the transition matrix are also somewhat similar – each row of this matrix is calculated just as described above with the main difference: $v_j \in V$ is replaced with $v_j \in \Gamma(v_x)$, where $\Gamma(v) = \{u \in V : \exists e \in E \langle v, e, u \rangle \in P\}$ is a set of successors of the vertex v (current vertex).

The first method of choosing the next vertex is to choose the neighbour of the current vertex v_x having maximum degree (or, when there are many such vertices, one of them randomly). This leads to the following formula:

$$p_{xj} = \begin{cases} \dfrac{1}{\left|\left\{v_i \in \Gamma(v_x) : deg(v_i) = \max\limits_{v \in \Gamma(v_x)} deg(v)\right\}\right|}, & v_j \in \Gamma(v_x) \wedge deg(v_i) = \max\limits_{v \in \Gamma(v_x)} deg(v) \\ 0 & otherwise \end{cases} \tag{3.17}$$

In this scenario we eliminate notes poorly connected with other notes. This may be considered a disadvantage since notes having a low degree may still appear frequently.

The second method of choosing the next vertex is to simply draw it from the neighbours of the current vertex. This may be expressed with a formula as follows:

$$p_{xj} = \begin{cases} \dfrac{1}{\left|\{v_i \in \Gamma(v_x)\}\right|}, & v_j \in \Gamma(v_x), \left|\Gamma(v_x)\right| > 0 \\ 0 & otherwise \end{cases} \tag{3.18}$$

This leads to a *pure random walk*. Its obvious consequence is that connections between notes may occur more frequently than in the original piece.

Two additional approaches are possible when walking the network. First of them is drawing the vertices proportionally to their weights ($\xi(v)$ – vertex weights describe how many times this note appeared in the original piece). The more often it was used in the track, the bigger is the probability of choosing it as the next visited vertex. This may be described formally as:

$$p_{xj} = \begin{cases} \dfrac{\xi(v_j)}{\sum_{v_i \in \Gamma(v_x)} \xi(v_i)}, & v_j \in \Gamma(v_x), \left|\Gamma(v_x)\right| > 0, \xi(v_i) > 0 \\ 0 & otherwise \end{cases} \tag{3.19}$$

Normally, this leads to the note distribution more similar to the original piece than in previously described methods.

The last method described in this article is strongly inspired by connections from the prototype. This is achieved by choosing the vertices accordingly to weights on their edges (ψ) which results in the following formula:

$$p_{xj} = \begin{cases} \dfrac{\psi(e_k)}{\sum_{e_i \in E'(x)} \psi(e_i)}, & \langle v_x, e_k, v_j \rangle \in P \\ 0 & otherwise \end{cases} \tag{3.20}$$

where v_i, e_j, P - described in (0.1).

The biggest advantage of this method is preserving an overall style of the original piece. Since this method uses *controlled random walk*, it produces results with greater similarity to the prototype than the other methods. The comparison of results produced by a selection of these methods is described by Liu, X., Tse, C. K. and Small, M. (2009), 'Composing music with complex networks,' International Conference on Complex Sciences: Theory and Applications (COMPLEX2009), ISBN: 978-3-642-02466-5, 23-25 February 2009, Shanghai, China, 2196-2205..

In addition to methods described in this chapter there is a variety of other methods of walking the graph. Due to article length limitations they will not be described here – but most of them result in a *hearability* better than achieved with *pure random walk* and worse than the *controlled random walk* methods described above.

It should be mentioned that there is an issue with generating the note from the vertex (i.e. applying the inverse function $f^{-1}: V \to N$ – see (0.3)) when simple or simplified note representation was used in the graph. In such cases we need to determine: the octave and duration or just a duration, respectively. The easiest way is to simply draw them – but this may lead to poor *hearability* of the generated arrangement and lower similarity of the graph representations of both pieces.

Last but not least, one more issue needs to be mentioned. Although the stochastic process' realizations may be of infinite length, the generated arrangements must be finite (in terms of note count and duration). Intuitively it is a common practice to generate a recomposed work similar to the prototype – i.e. having the same note count or the same duration (same count of bars). The former arrangement tends to be easily compared with the original piece – networks representing both pieces have the same accumulated edge weight. The latter leads to obtaining a more similar sheet music.

Comparing arrangements and different musical pieces: structure-based approach

In addition to the music generation itself, we can also compare generated arrangements using created graphs. Music comparison can depend on multiple metrics of the network or may use path representation of melody.

Having the graph structure built with any method described in the previous chapters, we can compare pieces using graph/network metrics instead of comparing tracks themselves. Therefore, we can define a vector of graph metrics consisting of values as follows:

- vertex count,
- edge count,
- graph density,
- graph diameter,
- assortativity,
- global clustering coefficient,

- mean vertex degree,
- mean vertex distance,
- mean vertex betweenness,
- other values (whenever applicable).

We can measure the similarity of arrangements or different musical pieces by comparing values of this vector. Such a comparison in a smaller space (i.e. vectors having less dimensions) was proposed by Liu, X., Tse, C. K. and Small, M. (2009), 'Composing music with complex networks,' International Conference on Complex Sciences: Theory and Applications (COMPLEX2009), ISBN: 978-3-642-02466-5, 23-25 February 2009, Shanghai, China, 2196-2205.. Unfortunately, such an approach is not precise; we have to compare dimensions one by one. At the same time, we must keep in mind the possible range of each of these dimensions (since, for example, the domains of vertex count and graph density differ significantly).

The aforementioned comparison method has many practical disadvantages. It would be better to compare one single value describing a distance between musical pieces instead of vectors. This leads to an improved method of comparison involving calculation of the vector norm:

$$\|x - y\|_p = \left(\sum_{n=1}^{N} \left(|x_n - y_n|\right)^p\right)^{1/p}, p \geq 1 \qquad (3.21)$$

where x_n and y_n is the n-th dimension of the vector describing the graph representation of the compared pieces x and y accordingly.

Such a measure of similarity is much easier to comprehend, interpret and use. Especially when all values of the input vectors are normalized (this is possible since all the values, including vertex and edge count are bounded by the definition of the problem), the distance between musical pieces may vary only from 0 to $\sqrt{2}$. Using a single, bounded value for measuring a distance between musical pieces results in easier comparison.

Such a comparison can be made both on arrangements coming from the same original song and on separate musical pieces. Comparing two tracks having the same origin can be also made using concepts from multi-objective optimization, especially a definition of the ideal point.

Instead of comparing musical pieces by measuring the distance between them (as we do for separate pieces), we can define the original piece as an ideal point. Then arrangements may be compared by calculating their distance to this ideal point (their "innovativeness"):

$$R_p^{\overset{*}{y}}(y) = \left\|\overset{*}{y} - y\right\|_p = \left(\sum_{n=1}^{N} \left(\left|\overset{*}{y}_n - y_n\right|\right)^p\right)^{1/p}, p \geq 1 \qquad (3.22)$$

where $\overset{*}{y}_n$ is the n-th dimension of the vector describing the graph representation of the original piece (being an ideal point) and y_n is the n-th dimension of the vector describing the graph representation of the compared arrangement.

What needs to be mentioned is: despite the fact that we use a concept from the multi-objective optimization, our goal is not to optimize the resulting arrangement. The ideal point is always an acceptable solution – so no optimization is necessary.
It is also worth mentioning that none of these methods allow to measure an aesthetic feeling associated with generated arrangements. This may be an additional area of research.

Comparing arrangements and different musical pieces: text-based approach

Alternatively, we can compare musical pieces as if they were two texts. Every note (represented as three to five symbols: mandatory note name consisting of a letter and optional flat/sharp sign, optional octave number, mandatory underscore for readability, mandatory duration – as in Figure 2 should be considered a single character. Then we may compare tracks using distance metrics just as defined for strings (e.g. Hamming, Levenshtein or Damerau-Levenshtein distance).

The important difference between measuring an edit distance between "plain" strings and "note strings" is that each single note should be considered a single symbol (regardless of how many characters it is internally composed). Formally the "note-Hamming" distance may be described as:

$$DH(a,b)=\sum_{i=1}^{L}\left[N_i \neq N_j\right] \tag{3.23}$$

where a,b – tracks of length L and $\left[N_i \neq N_j\right]$ is the "Iverson bracket" returning 0 if notes N_i, N_j (defined in (0.2)) are equal and 1 otherwise.

Similarly, "note-Levenshtein" distance may be calculated as $DL_{a,b}(|a|,|b|)$ with the following formula:

$$DL_{a,b}(i,j)=\begin{cases} \max(i,j), & \min(i,j)=0 \\ \min\begin{cases} DL_{a,b}(i-1,j)+1 \\ DL_{a,b}(i,j-1)+1 \\ DL_{a,b}(i-1,j-1)+\left[N_i \neq N_j\right] \end{cases} & otherwise \end{cases} \tag{3.24}$$

where $a,b,\left[N_i \neq N_j\right]$ described as in (3.23) but tracks may differ in length.

Therefore, the "note-Levenshtein" distance between c^1_⅛ and c^2_¼ is 1 – as they are single different notes. The "classical" Levenshtein or Hamming distance between strings mentioned above would be 2 – as there are 2 substitutions to be made. This difference is illustrated in Figure 12. All further references to these metrics mean their "note-oriented" interpretations (unless explicitly stated otherwise).

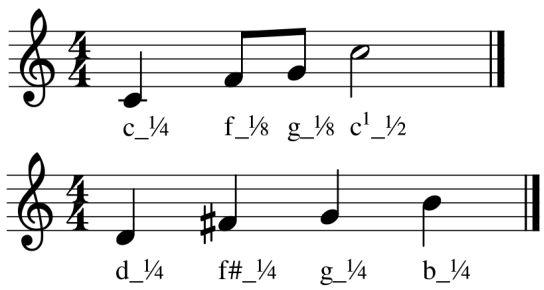

Hamming/Levenshtein (note-oriented):

Track1	c ¼	f ⅛	g ⅛	c^1 ½
Track2	d ¼	f# ¼	g ¼	b ¼
Change type	edit (different tone)	edit (different tone and duration)	edit (different duration)	edit (different tone and duration)

Overall distance: 4 (4 edits)

Hamming (classical):

Track1	c	_	¼	f		⅛	g		⅛	c	1	_	½
Track2	d	_	¼	f	#	_	¼	g	_	¼	b	_	¼
Type	e				e	e	e	e	e	e	e		e

Overall distance: 9 (9 edits)

Levenshtein (classical):

Track1	c	_	¼	f		_	⅛	g	_	⅛	c	1	_	½
Track2	d	_	¼	f	#	_	¼	g	_	¼	b		_	¼
Type	e				a		e			e	e	d		e

Overall distance: 7 (5 edits, 1 addition, 1 deletion)

Figure 12: Comparison between "note-oriented" definitions of Hamming or Levenshtein distance and their "classical" equivalents

Usage of Hamming distance to calculate the distance between tracks is very limited as it can be used only for strings of the same length. Tracks with identical count of participating notes occur rarely in the real-world examples, so this metric can only be used for short samples (comparison of a few bars from the original part – as in Figure 13) or when we generate arrangements having the same note count as the prototype.

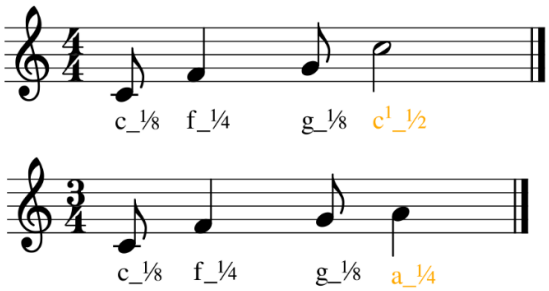

Figure 13: Two same-length tracks compared with Hamming and Levenshtein distance = 1

It is worth mentioning that some operations which are allowed for "plain" strings are treated differently for their music equivalents according to the rules of the music theory. For example, deleting a single character (without modifying its neighbourhood) is allowed in text strings but we cannot simply delete a note existing in the middle of the track. Instead we must either replace it with a pause of the same length (which turns it to a modification instead of a deletion) or additionally adjust the duration of the preceding/following note (which increments the distance value by 2). The aforementioned examples are shown in Figure 14.

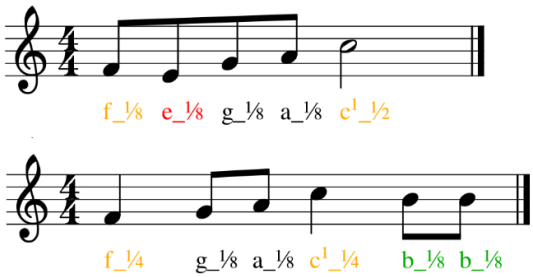

Figure 14: Two tracks compared with Levenshtein distance = 5. Hamming distance cannot be measured as tracks differ in length

Alternatively, we may use Damerau-Levenshtein distance which treats swapping elements as a single operation (as shown in Figure 15). Additionally, we can make further extension for these metrics and add separate weights for different operations. For example, changing a note duration may be considered a smaller change in the track than changing its octave (which in turn is smaller than changing its note name). The latter change may result in more chaotic track (or may break the harmony rules) – so such changes should be treated in a different manner and thus result in a greater distance.

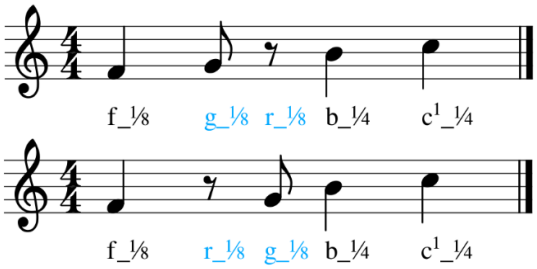

Figure 15. Two same-length tracks compared with Damerau-Levenshtein distance = 1 (swapping of note g and rest is considered a single change)

Such methods may be used as described above for comparing multiple arrangements of the same musical piece. Whenever we create tracks similar to an original piece (i.e. tracks being compared are created using the same graph), we can use the aforementioned methods as-is, without additional changes.

If there is a need to compare different musical pieces, these methods need some additional improvements to be more sensitive. First of all, we should first standardize both compared pieces to the same key – or at least transpose one of them so they both use the same note name for a node with the highest degree. This pre-processing is necessary when we want to detect plagiarism. Otherwise of someone just changed the pitch, the resulting piece would not be considered a copy at all – as shown in Figure 16. In this case, the "Iverson bracket" used in (3.23) and (3.24) returns 1 since notes being compared are different $\left(freq_i \neq freq_j \right)$.

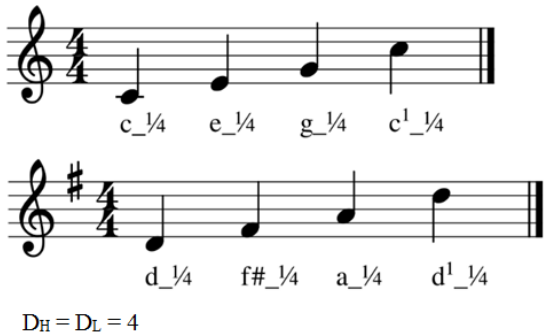

Figure 16. Two tracks using the same scale steps yet different pitches. The transposed track is considered a completely different piece without a standardization

Further pre-processing should be made for note durations. As long as we treat different note durations as being different symbols in the comparison (formally, the "Iverson bracket" used in (3.23) and (3.24) returns 1 since notes differ: $m_i \neq m_j$), the change of all notes' durations (e.g. dividing them by two: changing halves to quarters, quarters to eights etc.) will cause an algorithm to fail finding the plagiarism – though it would still be quite easy to see by a human - Figure 17 being an example. Therefore, we need to standardize note durations – for example we can change the longest duration existing in the piece to a full note (and multiply all the other durations consequently).

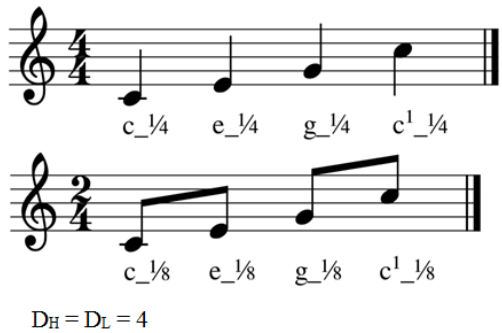

Figure 17. Two tracks using the same scale steps and pitches yet different note durations. The shortened track is considered a completely different piece without a standardization

Moreover, we can combine these text-based methods with simpler methods of note representation. Using them for the arrangement generation may indeed result in worse *hearability* of the resulting pieces – but on this particular field of application it may lead to more general comparisons (i.e. just comparing a tonal similarity without considering rhythmical motives used in both tracks). Such a generalization also results in a simpler preprocessing (note duration is not persisted in this representation so this part can be omitted causing no differences in the result).

Alternatively, we may also use other text metrics to describe a similarity of two tracks. Returning the length of the longest common substring (the longest motif existing in both pieces or copied from one piece to another one) is an example of such a measure.

Such a family of methods of measuring musical pieces distance may have a wide range of applications. First of all, it can be used for plagiarism control purposes – as an auxiliary method combined with currently used methods or an independent one. Alternatively, we can compare musical pieces from different genres or different authors to find the common part between them.

Summary

In this article the author described the current state-of-the-art in graph-based automatic music generation. He provided more formal description of previously existing methods of graph creation and music arrangement generation. He also proposed new methods of music comparison.

Generating an arrangement from the graph or network representing an original piece has many benefits. First of all, the recomposed work is somehow similar to the prototype since it is based on harmony used in an original. Therefore,

listener may easily recognize motifs from the original work. On the other hand, each arrangement differs a lot from the prototype since it uses connections between notes without the "context" of the whole motif.

Such a method of generating music may have various applications. For example, the music for movies or TV series may be easily created from a few motifs. Also, the polynomial complexity of proposed algorithms allows using them in real-time systems such as video games. Arrangements may be generated *a vista*, during the game.

One of the biggest limitations of existing graph-based generation methods is the requirement to have a maximum of one note at a time. This narrows the possibility of practical use of the current methods.

For now, we can use these methods for creating new motifs from the original piece (as well as a corpus of motifs) – but all the harmonization or orchestration must be made by an arranger in a traditional way.

Certainly, this is still poorly explored area of research. At least the following things need to be made: comparison of the described methods (using the graph representation of sheet music), improving *hearability* of arrangements generated with these methods. An attempt to generate music from polyphonic tracks must also be made to improve application possibilities.

This article provides some various attempts to define methods of comparing musical pieces by comparing a single value attached to them. This results in simplifying comparisons – as they no longer need to be made directly on sheet music or vectors of network characteristics. This also simplifies an interpretation of the outcome and gives a possibility to use them as auxiliary methods in different set of problems.

Simplification of the graph structure obtained with mapping music notes to graph vertices leads to worse *hearability* but it may result in better recognition of common musical motifs – as it allows to abstract from the details that are not significant in this comparison. Therefore, creating graphs either using full or simple note representation may be justified – depending on the purpose.

Methods of track comparison can be used for comparing different pieces as well as different arrangements of the same piece. After some pre-processing (which is necessary to standardize the compared tracks) they can even be used for automated plagiarism control.

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Formal Model for Routing of Passengers under Rigid Health and Safety Regulations in a Railway Station

Maciej HOJDA
Faculty of Computer Science and Management, Wrocław University of Science and Technology,
Wyb. Wyspianskiego 27, 50-370 Wrocław, Poland,
maciej.hojda@pwr.edu.pl
ORCID: 0000-0003-3195-4862

Grzegorz POPEK
Faculty of Computer Science and Management, Wrocław University of Science and Technology,
Wyb. Wyspianskiego 27, 50-370 Wrocław, Poland
grzegorz.popek@pwr.edu.pl
ORCID: 0000-0002-3186-507X

Abstract

Recent and upcoming changes in health and safety regulations in railway networking affect railway transportation in ways previously unexplored. The need to maintain social distance, compulsory temperature checks, use of disinfectants and other safety measures, all introduce new hurdles for station management. It is in such cases when mindful interference in passenger movement across the station can increase the throughput and reduce delay-generated costs. In this paper we propose a way for modelling organized routing of passengers within a train station. The goal is to optimize trains' departure delays. We prove a crucial property of the model that greatly decreases its complexity and we show the connection of the passenger routing problem to the multi-flow commodity problem.

Keywords: Traffic Management, Social Distancing, Railway Station, Passenger Routing

Introduction

It has been made clear by Limin (2020), that the COVID-19 pandemic impacts public transportation in a severe and a negative way. Among others, Tardivo et al (2020) and Eurex report (2020) suggest that use of railway transportation could become more widespread as a viable alternative to other modes of public transportation should the latter fail to sufficiently adapt. Certain recommendations to increase the viability of railway passenger transportation have already been made. These include social distancing, hand hygiene, temperature testing and passenger screening (see Tirachini and Cats (2020), ECDC recommendations (2020)). These additional motions require time and effort to perform (and to enforce) which puts additional strain on the passenger routing infrastructure within a railway station. Additional effort has to be made to ensure that passenger movement within a railway station (especially in large railway stations) does not become the bottleneck of the railway infrastructure. This requires introducing new methods of coordinating passenger movement within railway stations.

Passenger movement prediction and routing within a train railway network is, following Qiao (2013) and Limin (2020), typically understood as routing between stations, trains and other modes of transportation. The routing is usually performed from the passengers' point of view, as in Dou (2013) or Yang (2013), but such personal preferences, while still observed and analysed (Kumar (2020)), need to be at least partially disregarded in times of crisis. Although there are also papers like Daamen (2005), Ahn (2017) that deal with the analysis and prediction of passenger movement inside of railway stations, none of them are aimed at passenger routing in a pandemic situation.

We postulate, that to battle the influence of the COVID-19 pandemic or any other widespread and contagious health hazard of the future, additional control tools have to be introduced. Like other public services, the railway applies suitable countermeasures listed by Yin (2020). In this paper we propose a method of coordinating passenger movement in a way that permits keeping social distance in movement between intermediate areas of the train station and the trains themselves. We propose that a series of gates, signs and human coordinators be used to guide

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passenger movement in a way that ensures quick and safe boarding of a train and getting off of it. We formulate a decision making problem by modelling the movement within the station. The goal is to minimize train departure delays. We prove a crucial property of the formulation, one that greatly limits the number of decision variables and makes the problem significantly easier to solve.

Passenger Routing Model

We consider a flow network given as a directed graph **G**=(**V**,**E**) where **V**={1, 2, ..., V} is the set of (indexes of) nodes and **E**={1, 2, ..., E} is the set of (indexes of) arcs. The network represents the structure of the station, with nodes corresponding to passenger waiting areas, platforms and intermediate areas. Let the set of (indexes of) train runs served at the station be denoted as **R**={1, 2, …, R} where each train has $p_r \geq 0$ embarking passengers and $p_{r+R} \geq 0$ disembarking passengers. We assume that expected train arrival times are known and given as $t_r \geq 0$ while departure times $s_r \geq t_r$ are unknown and depend on how fast passengers embark and disembark. Projected arrival times t_r can differ from real ones w_r due to congestion. However we assume that $w_r \geq t_r$. We also assume that routes for embarking and disembarking passengers are separate (no upstream and downstream intermingling) to ensure that social distance is well maintained.

We model passenger movement as flows between nodes, where a_r, d_r are the arrival and destination nodes for passengers embarking train r while a_{r+R}, b_{r+R} are analogous for disembarking ones. Note, that it is easy to model multiple arrival nodes by making a_r a virtual node with outgoing high-capacity connections (likewise for destination nodes). We assume that trains with the same destination node (the same platform) have different projected arrival times $d_r = d_q \Rightarrow t_r \neq t_q$ and that they are served in order of projected arrivals. Flow capacity of each arc e, which is its ability to contain passengers in a single unit of time (ex. a minute), is constant, denoted as $c^e \geq 0$. We assume, that decisions about flow distribution are made with regards to specific time moments $z_h \geq 0$ where $h \in$ **H**={0, 1, 2, …, H}. We later show that the choice of H and z_h can be strictly limited without affecting the optimality of the solution. For simplicity of the notation we assume that $z_0=0$.

For each time period $m \in$ **M**={1, 2, …, M}, which is between two consecutive time moments z_{m-1}, z_m, a flow on arc e corresponding to train run r is given as $f_r^e(m) \geq 0$ for embarking passengers and as $f_{r+R}^e(m) \geq 0$ for disembarking ones. Furthermore, we denote as $p_r(m) \geq 0$ the portion of passengers that are served during time period m (embarking or disembarking, depending on the value of $r \in \tilde{\mathbf{R}}$={1, 2, …, 2R}). Let $b_r(m)=(p_r(m))/(z_m-z_{m-1})$ be the number of passengers embarking train r (or disembarking train R-r for r>R) in a single time unit.

This gives us the following constraints for the passenger routing problem.

$$\forall m \in \mathbf{M},\ \forall r \in \tilde{\mathbf{R}},\ \forall i \in \mathbf{V} \quad \sum_{j \in \mathbf{V}} f_r^{e=(i,j)}(m) - \sum_{j \in \mathbf{V}} f_r^{e=(j,i)}(m) = \begin{cases} 0 & a_r \neq i \neq d_r \\ 1 & i = a_r \\ -1 & i = d_r \end{cases}, \tag{1}$$

$$\forall m \in \mathbf{M}, \forall e \in \mathbf{E} \quad \sum_{r \in \tilde{\mathbf{R}}} f_r^e(m) b_r(m) \leq c^e, \tag{2}$$

$$\forall r \in \tilde{\mathbf{R}} \quad \sum_{m \in \mathbf{M}} p_r(m) = p_r, \tag{3}$$

$$\forall m \in \mathbf{M}, \forall r \in \tilde{\mathbf{R}}, \forall e \in \mathbf{E} \quad f_r^e(m) \geq 0, \tag{4}$$

$$\forall m \in \mathbf{M}, \forall r \in \tilde{\mathbf{R}} \quad p_r(m) \geq 0, \tag{5}$$

$$\forall r \in \mathbf{R}, \forall m \in \mathbf{M} \quad z_m < w_r \Rightarrow (p_r(m) = 0 \wedge p_{r+R}(m) = 0, \tag{6}$$

We calculate the departure times s_r the following way

$$\forall r \in \mathbf{R} \quad s_r = \min_{m \in \mathbf{M}: \sum_{n=1}^{m} p_r(n) = p_r \wedge \sum_{n=1}^{m} p_{r+R}(n) = p_{r+R}} z_m \tag{7}$$

and the real arrival times w_r the following way

$$\forall r \in \mathbf{R} \quad w_r = \max\{\max_{q \in \mathbf{R}: d_q = d_r, t_q < t_r} s_q, t_r\}. \tag{8}$$

For simplicity of notation, we define $s=\{s_1, s_2, \ldots, s_R\}$, $f = [f_r^e(m)]_{r\in\tilde{\mathbf{R}}, e\in\mathbf{E}, m\in\mathbf{M}}$ and $p = [p_r(m)]_{r\in\tilde{\mathbf{R}}, m\in\mathbf{M}}$. We optimize a nondecreasing function $Q(s)$ which represents the impact of delays on the quality of provided service and incurred costs. As such, assuming that $\mathbf{D}=\{(s, f, p) : (1)–(8)\}$, the optimization problem considered here can be defined as follows:

$$\min_{(s,f,p)\in\mathbf{D}} Q(s) \tag{9}$$

Model Analysis

First we note, that under fixed values of time moments z_h and fixed $p_r(m)$ the problem is reduced to a series of multi-flow commodity problems. Factually, the choice of z_h (and H) could vary, but we show that it can be limited to those time moments when trains arrive and trains depart. No additional time moments are going to improve the quality (or feasibility) of the solution. Consider two instances of the problem (9): Ω and $\tilde{\Omega}$. Let w_r, s_r be arrival and departure times for Ω and let $\tilde{w}_r, \tilde{s}_r$ be arrival and departure times for $\tilde{\Omega}$. $\mathbf{Z}=\{w_r: r\in\mathbf{R}\}\cup\{s_r: r\in\mathbf{R}\}$ and $\tilde{\mathbf{Z}}=\{\tilde{w}_r: r\in\mathbf{R}\}\cup\{\tilde{s}_r: r\in\mathbf{R}\}\cup\{\hat{z}_1, \hat{z}_2, \ldots, \hat{z}_N\}$ be the time moments for Ω and $\tilde{\Omega}$ respectively (we assume that $\hat{z}_i$ are different from one another and from $\tilde{w}_r$, $\tilde{s}_r$). Similarly, we denote feasible solution sets as $\mathbf{D}$ and $\tilde{\mathbf{D}}$ and solutions as (s^*, f^*, p^*) and $(\tilde{s}^*, \tilde{f}^*, \tilde{p}^*)$.

Theorem 1. If a feasible solution $(\tilde{s}, \tilde{f}, \tilde{p})$ to $\tilde{\Omega}$ exists, then a solution (s, f, p) to Ω also exists.

Proof. Let us construct (s, f, p). First we set $w_r=\tilde{w}_r$, $s_r=\tilde{s}_r$. This satisfies (8). We order $\tilde{w}_r$, $\tilde{s}_r$ in ascending order and denote them as $\hat{z}_h$. We order w_r, s_r in ascending order and denote them as z_h.

For each consecutive time period m of $[z_{m-1},z_m]$ we select $\tilde{m}$ so that $z_{m-1}=\hat{z}_{\tilde{m}-1}$. We consider each period m separately. If no $\hat{z}_i\in[z_{m-1}, z_m]$ then we take $f_r^e(m) = \tilde{f}_r^e(\tilde{m})$ and $p_r^e(m) = \tilde{p}_e^r(\tilde{m})$. Then constraints (1), (2), (4), (5) in Ω are satisfied directly from corresponding constraints in $\tilde{\Omega}$.

If some $\hat{z}_i\in[z_{m-1}, z_m]$ then, assuming there are $n+1$ of those they are as follows $\tilde{z}_{\tilde{m}} < \tilde{z}_{\tilde{m}+1} < \ldots < \tilde{z}_{\tilde{m}+n}$. We also know that $z_m = \tilde{z}_{\tilde{m}+n+1}$. Then we take $f_r^e(m) = \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \tilde{f}_r^e(\tilde{n})\frac{\tilde{p}_r(\tilde{n})}{p_r(m)}$ and $p_r(m) = \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \tilde{p}_r(\tilde{n})$.

Constraints (4), (5) are satisfied directly. For (1) from Ω we have

$$\forall r \in \tilde{\mathbf{R}}, \forall i \in \mathbf{V} \quad \sum_{j\in\mathbf{V}} f_r^{e=(i,j)}(m) - \sum_{j\in\mathbf{V}} f_r^{e=(j,i)}(m) = \sum_{j\in\mathbf{V}} \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \tilde{f}_r^{e=(i,j)}(\tilde{n})\frac{\tilde{p}_r(\tilde{n})}{p_r(m)} - \sum_{j\in\mathbf{V}} \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \tilde{f}_r^{e=(j,i)}(\tilde{n})\frac{\tilde{p}_r(\tilde{n})}{p_r(m)} =$$
$$= \sum_{j\in\mathbf{V}} \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \frac{\tilde{p}_r(\tilde{n})}{p_r(m)}[\tilde{f}_r^{e=(i,j)}(\tilde{n}) - \tilde{f}_r^{e=(j,i)}(\tilde{n})] = \begin{cases} 0 & a_r \neq i \neq d_r \\ 1 & i = a_r \\ -1 & i = d_r \end{cases}. \tag{10}$$

From (2) for $\tilde{\Omega}$ let us note that

$$\forall e \in \mathbf{E} \quad \sum_{r\in\mathbf{R}} \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \tilde{f}_r^e(\tilde{n})\tilde{p}_r(\tilde{n}) \leq c^e(z_m - z_{m-1}). \tag{11}$$

Then for constraint (2) from Ω we have $b_r(m)=p_r(m)/(z_m-z_{m-1})$ so

$$\forall e \in \mathbf{E} \quad \sum_{r\in\mathbf{R}} f_r^e(m)b_r(m) = \sum_{r\in\mathbf{R}} \sum_{\tilde{n}=\tilde{m}}^{\tilde{m}+n+1} \tilde{f}_r^e(\tilde{n})\frac{\tilde{p}_r(\tilde{n})}{p_r(m)}\frac{p_r(m)}{z_m - z_{m-1}} \leq c^e. \tag{12}$$

From our choice of $p_r(m)$, constraints (3), (6) and (7) are also satisfied.

Corollary 1. We also notice, that for a solution $(\tilde{s}^*, \tilde{f}^*, \tilde{p}^*)$ to $\tilde{\Omega}$ exists, then a solution (s^*, f^*, p^*) to Ω that satisfies $s^* = \tilde{s}^*$ also exists. In consequence $Q(s^*) = Q(\tilde{s}^*)$.

Presented properties of the problem make its size independent of the number of time units contained within the planning horizon, which in turn limits the number of decision variables as they are now bounded by $O(ER^2)$.

Conclusions and Further Work

In this paper we formulate a model for routing passengers within a railway station under rigid health and safety regulations aimed at limiting the progress of a pandemic. Formulated decision making problem consists of a series of interconnected multi-commodity flow problems but we show that the number of such problems to solve is limited by the number of trains. This property can be used in designing of a solution algorithm, as the relatively low number of decision variables makes the use of a solver a viable option for small-instanced problems. For larger instances of the problem, the possibility to use heuristic approach with the use of a genetic algorithm should be explored.

The modelling is done under the assumption of passenger rationality but irrational behaviours, not-unexpected under conditions of heightened stress, could be included in an expanded model. As could be train runs without a full passenger complement.

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The Quality Management System of The State Language Proficiency Examination For Civil Servants: Baltic States Experience

Volodymyr STRELTSOV
Management Department, Pomeranian University, ul. Arcziszewskiego 22a, Slupsk, 76200, Poland
volodymyr.streltsov@apsl.edu.pl
https://orcid.org/0000-0002-6647-8678

Olena STAROVA
Language Training Department, the National University of Civil Protection of Ukraine, 94 Chernyshevska Str., Kharkiv 61023, Ukraine
iverra@ukr.net
https://orcid.org/0000-0003-2418-6551

Aleksandr KUCZABSKIi
Geography of Regional Development Chair, University of Gdansk, ul. Bażyńskiego 4, Gdansk, 80952, Poland
Gdansk, 80952, Poland
kuczabski@gmail.com
https://orcid.org/0000-0003-1271-0782

Abstract

Use of the official state language in the public sector and in the civil service in particular became one of the main requirements in the Baltic states after gaining their independence. The present paper argues that the further development of language policy within the civil service domain is a rational response to the existing language challenges. This argument is supported by the comparative analysis within the Baltic states experience. In this article, we reflect upon the role of world language practices and assessments on the detailed requirements to the language proficiency level of civil servants and discuss standards' design, implementation, and appropriation issues that will challenge the field over the next few decades.

Keywords*:* Baltic states, civil servants, communicative competence, standards-based assessment, titular language, language proficiency.

Introduction

This paper studies the evolution of the various levels of the quality assurance in the civil service and attempt to build language certification institutional system from the perspective of the existing opportunities for constructing its internal coherence, thus enhancing also its international dimension.

The objectives aim in this study consist in identifying the quality policies of the state language proficiency examination for civil servants and their implementation. We are attempting to offer an overview regarding the introduction and use of the language quality management instruments in public administration, as well as their convergence in Baltic states. The article argues that the language quality management can evolve due to using best language certification practices, which defines the overall direction of the process of building an elite corps of civil service. Being against the reluctance of the governmental institutions to alter the current format of the language certification, this process will inevitably lead to further convergence with approaches of international language certification centres. In this sense, internationalisation remains, perhaps, the only rational choice to meet the practical needs of the language policy in Baltic states.

The article consists of four parts accompanied by introduction and conclusion. Part 1 deal with language quality management in public administration. Part 2 provides the background on the study, focusing on the synergy of current language certification challenges and dominance of linguistic Russification. Part 3 provides insights into the policy formation and implementation process, revealing the drawbacks of the formal policy mode. Part 4 is devoted to the Baltic states experience, putting the need for synergy between the government and higher educational institutions at the core of the discussion. This part also provides case studies of practices within the language certification, implying that internationalisation is already an on-going process.

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Quality assurance and language certification in public administration: theoretical approach

Spolsky (2009) defines language management as: "conscious and explicit efforts by language managers to control [language]choices" (p. 1) and as: "the explicit and observable effort by someone or some group that has or claims authority over the participants in the domain to modify their practices or beliefs" (p. 4). But in his book the terms "language management," "language policy" and "language planning" are used interchangeably.

Practice-oriented studies within the global organisation has focused on the communicative practices of language clustering and thin communication in relation to trans-organisational knowledge sharing and networks (Charles, 2006; Marschan-Piekkari et al., 1999a). From this point of view language management means that new speech varieties and repertoires are adopted to fulfil certain “lingua franca functions” (Blommaert, 2003, p. 609), which has implications for language users whose organisational position and influences will be determined by their awareness of such codes (Tange, 2009, p. 222).

It should be noted that language management changes organisational information and communication systems, and that improving to internal knowledge flows, enhancing public employees to use discretionary power for maximasing exchanges that request their use of official language.

The current study advances this stream of research by concentrating on managing language diversity and how diversity and dissimilarity measures affect public employees' attachment to employment in a multicultural public administration (Binderkrantz, 2011; Ritz, 2018)

Trying to incorporate the concept of Quality Management in our research it’s useful to concentrate on it features (Zurga, 2008; Matei, 2011, p. 69): main goal is to acquire customer satisfaction; quality is defined by the customer; influence on all activities of the organization; customers are external; it closes the activities of control, but primarily involves the management of the entire organization; all are involved in its application; the participation is determined by conviction; methodology is particularly directed toward prevention; it aims to do the right things “from the beginning”; the responsibility and the involvement of everyone from organization.

But the use of excellence models and quality norms are only recommended and used on voluntary basis in many public administration systems, especially in Central and Eastern European countries. As far as the measuring of language certification quality is concerned, the current systems should be analyzed trough the self-evaluation of test center based on the EFQM model, and the evaluation of stakeholders and examinee satisfaction should based on various surveys organized at a national level, in order to know their needs better. But scholar pointed out that the introduction of self-assessment methodology and the organizational quality management systems have progressed to a certain extent, but the self-evaluation just begun to develop (Matei, 2011, p. 94). Therefore, the introduction of elements of quality management system in the case of state language proficiency examination for civil servants is determined by internal factors and, in general, closely related to administrative practices.

In search of solutions to language certification challenges: discrepancies between idea and implementation

The role and impact of the administration are not always taken into account when analysing language policy. Most researchers explore the peculiarities of national identity, some shed a light on a mixture of language and ethnicity questions.

The situation with the use of the state language in the public sector in Baltic states on the eve of the collapse of the USSR was quite similar to that which developed in other soviet republics (see table 1).

Table 1: Population of Baltic states according to the 1989 All-Union Census of Population (3 main ethnic groups dimension), Demoscope, own calculations

Country	Etnnic group	Numbers	%
Lithuania	Lithuanians	2,924,251	79,6
	Russians	344,455	9,4
	Poles	257,994	7
Latvia	Latvians	1,387,757	52
	Russians	905,515	34
	Belarussians	119,702	4,5
Estonia	Estonians	963,281	61,5

	Russians	474,834	30,3
	Ukrainians	48,271	3,1

At the same time, the Russian language was considered to be the mother tongue for most Ukrainians and Belorussians (Kotyhorenko 2005, 51) in view of the consistent policy of Russification in the former soviet socialistic republics, in the framework of the Soviet course for "the rapprochement, and in fact the merger of socialist nations" (Dzuba 2011, 460) the Russian language dominated in all spheres of social life.

Moreover, Russian aggression in 2014 raised up the value of Ukrainian as the national language and created internal motives not only for civil society, but for the state institutions. Although this movement didn't lead to a drastic change in language practice, all the more so because the state did not insist on the use of Ukrainian even in the public sector (Kulyk 2016).

However, we can see the opposite approach in the Baltic states. Estonia, Latvia and Lithuania built their governmental bodies and security services almost from scratch. They chose to set up their own civil services, national armies and security services. At least, this guarantees that their civil servants, military forces and security agencies will not turn into the branches of similar Russian services, stuffed with the agents of the Kremlin's influence. Obviously, the process was not easy as some recruited servants of the new governmental bodies lacked professionalism. Moreover, the linguistic situation differed in the attitudes of titular elites and masses toward their national language which was much more positive in the Baltic states, thus enabling more resolute and supportive policies. Similarity of the linguistic situations in the Baltic states at the end of the Soviet rule is much based not on the share of people declaring the titular language as native in censuses, but on the gap between linguistic and ethnonational identification resulting from the Soviet combination of ethnic primordialism and linguistic Russification (Onuch and Hale 2018, 101; Kulyk 2014).

Formation and implementation of language quality management system in civil service

The issue of using the state language in the civil service became especially acute in the Baltic states after restitution of their independence in 1991. That was predetermined both by total russification of the public sector during the Soviet occupation and by the ethnic composition of the population (Hogan-Brun et. al. 2008: 67). Accordingly, the use of the state language in the public sector and in the civil service in particular turned into one of the main requirements in the Baltic states after gaining their independence because they "saw themselves as unitary states that were indeed multilingual (as they had always been) but as states in which the national language would be the language in which all essential social functions were to be conducted" (p. 81). Consequently, "knowledge of the state language became an important factor for the integration of ethnic minorities into a changing society" (p. 132). As a result, it was quite natural that the experience of implementation of the state language and the modern language policy in the field of the civil service in these states are extremely similar.

A QMS is based on processes (what should be done), procedures (how the process should be done) and working instructions (how procedures should be performed). When applied to the state language proficiency examination, the QMS will have to meet all ISO 9001 requirements, including documentation conditions. Some of the key components of a QMS include:

- a system that is repeatable, quantifiable and constantly improving
- documented information (such as procedures, working instructions, forms) in order to achieve the pre-defined quality
- external or internal revision to ensure compliance with requirements

One of the best-known standards which was implemented by many public bodies is ISO 9001:2015, Quality management systems – Requirements, which defines the set of requirements for a QMS to help institutions to be more efficient and improve their relations with business, civil societies and citizens.

The development of the Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR) is based on several objectives which are similar to quality management goals (Bärenfänger, O. 2008).

Both, and even more bodies of language learning standards, are certainly needed because standards must to a certain extent be customized for and calibrated to the local (i.e., national- or regional-level) language learning environment. From a practical perspective, standards may be used to regulate learning, and people and educators most certainly may want any language learning regulation to be at a more national or regional level (Cox, 2018).

First of all, the language issue was raised in the Baltic states laws on citizenship. Only Lithuania, where the majority of the population were ethnic Lithuanians, adopted a so-called zero option immediately after the collapse of the USSR in 1991 proclaiming all legitimate residents, excluding military, Committee for State Security (KGB) and other temporary units as citizens. However, in two next years the Government of the Republic of Lithuania passed a Resolution No. 314 "Concerning the qualification categories of the knowledge of the national language" (1992) and a Resolution No. 145 "Concerning article 12 on the citizenship of the Republic of Lithuania and the Lithuanian language and Lithuanian Constitution fundamentals examinations" (1993), introducing an examination in the Lithuanian language and the fundamentals of the Lithuanian Constitution as an mandatory condition for getting citizenship and language categorical examination for those who wanted to hold a particular job. Estonia and Latvia also proclaimed basic competence in Estonian and Latvian as one of the main requirements for the naturalization (Alien law of 1993, revised into the current version in 1995, in Estonia and Alien law of 1994 in Latvia). Accordingly, applicants for citizenship had to demonstrate "basic writing, reading and speaking level of competence" (p. 83).

Simultaneously the language legislation which had existed in times of USSR occupation was substantially revised, and new principles for language policy, which are relevant nowadays, were developed in the Baltic states. The main objective of the national language policy in the states, which was enunciated in each constitution and detailed in the language laws, is "to guarantee the status of Estonian, Latvian and Lithuanian as the only official language in each republic. Estonia's was passed in 1995, Latvia's in 1999 and Lithuania's in 1995" (p. 103).

Introduction of a "systematic language certification for employment purposes" became an important provision of these laws and the accompanying legislative acts. The examinations procedures had "a common core: all those people who had not undergone an education in the respective national language (Estonian, Latvian or Lithuanian), and who were employed in defined occupations, needed to demonstrate a level of knowledge of the national language appropriate to their level of employment. In Lithuania, this requirement targeted only those in the public sector; in Estonia and Latvia this requirement extended to all personnel in employment, public or private, who had contact with the public" (p. 85). In order to ensure state control over this certification state language offices were established in all the states. Researches admit that "the need to gain language certification was the most significant reason for those who had no proficiency in the national language to learn that language" (p. 85).

With the aim of evaluating a linguistic competence of civil servants all the states initially developed their own scales, which eventually proved to be quite similar. In Estonia before 2008 there was a three-level system of evaluation: beginner, intermediate and advanced. In Latvia from 1992 to 2000 a system of three levels of state language proficiency existed: the first (the lowest), the second and the third (the highest), which were divided into sublevels 1A and 1B, 2A and 2B, 3A and 3B from 2000 to 2009. In Lithuania three categories from the first (the lowest) to the third (the highest) were established in 1992, and they are still actual there. Various positions in the public sector required specific levels of knowledge of the state language. However, in November 2001 a European Union Council resolution recommended using the CEFR to set up systems of validation of language ability, and the Baltic states governments takes it as a base for their own systems of language proficiency assessment.

Nowadays the requirements for the Baltic states language proficiency as well as its assessment and testing are established by Estonian Language act of 23 February 2011, Latvian State language law of 21 December 1999 and the Republic of Lithuania Law on the state language No. I-779 of 31 January 1995, which proclaim an official status of the national language of each republic.

Therefore, in section 10 (1) of Estonian Language act it is determined that "the language of public administration in state agencies and local government authorities is Estonian", and, according to section 23 (1), "officials and employees of state agencies and of local government authorities, as well as employees of legal people in public law and agencies thereof, members of legal people in public law, notaries, bailiffs ‹…› shall be able to understand and use Estonian at the level which is necessary to perform their service or employment duties" (Language act 2011). Almost the same provision can be met in section 6 of the Latvian State language law: "Employees of state and local government institutions, courts and institutions constituting the judicial system, state and local government undertakings" should be "fluent in and use the official language to the extent necessary for performance of their professional duties and duties of office" (State language law 1999). Article 6 of the Republic of Lithuania Law on the state language proclaims that among other institutions "heads, employees and officers of state and local government institutions providing services to the population ‹…› must know the state language according to the language knowledge categories, established by the Government of the Republic of Lithuania" (Law on the state language No. I-779, 1995).

The same requirements can be found in section 14 of the Estonian Public service act of 25 January 1995, in section 7 of the Latvian Law on the state civil service of 22 September 2000 and in article 9 of the Republic of Lithuania Law on public service No. VIII-1316 of 8 July 1999.

Furthermore, sections 24–27 of Estonian Language act also set out some basic requirements for the Estonian language proficiency examination and proclaim that the primary responsibility for its organization (providing preparation for the exam, developing tasks and forming their bank, issuing certificates of language proficiency, approving of examination commissions) is entrusted to Ministry of Education and Research and directly to its head, whereas in Latvian and Lithuanian legislation these aspects are established in a number of governmental regulations and resolutions.

The detailed requirements to the language proficiency level of civil servants, description of the structure and the procedure of the state language proficiency examination are established by regulation of the Ministry of Education and Research in Estonia, regulations of the Cabinet of Ministers in Latvia and resolutions of the Government in the Republic of Lithuania (see Table 2).

Table 2 : The procedure of the state language proficiency examination in the Baltic states

	Estonia	**Latvia**	**Lithuania**
Title of the exam	Estonian language proficiency examination	State language proficiency testing (examination)	State language proficiency examination
Main legal acts	1. Language act of 23 February 2011. 2. Public service act of 25 January 1995. 3. Regulation of the Government of the Republic No. 105 "Estonian language and use requirements for civil servants, employees and sole proprietors" of 26 June 2008. 4. Ministry of Education and Research Regulation No. 24 "Organization and execution of Estonian language proficiency examinations" of 13 June 2011	1. State Language law of 21 December 1999. 2. Law on the state civil service of 22 September 2000. 3. Cabinet of Ministers regulation No. 733 "The amount of state language knowledge and the procedure for testing the state language proficiency for performing professional and official duties, obtaining a permanent residence permit and obtaining the status of a long-term resident of the European Union, and a state fee for examining the state language proficiency" of 7 July 2009. 4. Cabinet of Ministers regulation No. 289 "The state fee for the certification of the state language proficiency for professional and professional duties" of 22 August 2000	1. The Republic of Lithuania law on the state language No. I-779 of 31 January 1995. 2. The Republic of Lithuania law on public service No. VIII-1316 of 8 July 1999. 3. The Government of the Republic of Lithuania Resolution No. 1687 "On the approval of the procedure for the issuance of the state language and the Constitution of the Republic of Lithuania basis examinations and certificates" of 24 December 2003. 4. The Government of the Republic of Lithuania resolution No. 1688 "Concerning the approbation and implementation of the categories of the state language knowledge" of 24 December 2003. 5. The Minister of Education and Science of the Republic of Lithuania order No. ISAK-286 "On the organization and implementation of the examinations of the state language examination and the Constitutional basis of the republic of Lithuania" of 1 March 2004
Subjects	Language proficiency commissions of the Innove Foundation centers in Tallinn, Narva, Jõhvi and Tartu on the base of schools, gymnasiums, universities or education	State language skill examination commission of the National Centre for Education (Riga)	State language proficiency commissions of town or district municipalities, working in adult education centers, adult schools or other comprehensive schools

	centers		
Form of ownership	State	State	State
Financing	State	State	State
Control	National Examination and Qualification Centre (NEQC) of the Innove Foundation of the Ministry of Education and Research; Minister of Education and Research	The State Language Proficiency Testing Department of the National Centre for Education; Ministry of Education and Science	The State Language Department of the Teachers Professional Development Centre, National Centre of Examination subordinated to the Minister of Education and Science
Quality control	Language Inspectorate of the Ministry of Education and Research, representatives of the Ministry of Education and Research, official conducting state or administrative supervision	National Centre for Education	Ministry of Education and Science, the state education supervision departments of county governors' administrations, education departments of municipal administrations, National Centre of Examination, the State Language Department of the Teachers Professional Development Centre,
Compliance with the requirements of the Association of Language Testers in Europe (ALTE Quality Label)	+ Foundation INNOVE (A2-C1)	-	+/- The Department of Lithuanian Studies at Vilnius University ALTE Full Member, but don't have the Q-Mark
Existing exceptions	Candidates, who acquired basic, upper secondary, vocational secondary, secondary specialized or higher education in Estonian (at least 60 % of the studies must be in Estonian)	Candidates, who have completed basic, secondary or higher education in accredited programs in the Latvian language; who have acquired an accredited minority education program and have passed the centralized examination in the Latvian language (minority education programs for the 9th grade) or the centralized examination in the Latvian language for the 12th grade, certified by the basic education certificate or the general secondary education certificate; who have state of health related functional restrictions or diagnoses mentioned in Annex 3 to the Cabinet of Ministers regulation No. 733 of 7 July 2009	Candidates, who have completed basic, secondary, higher education in the Lithuanian language; who have acquired secondary education in the Republic of Lithuania in the non-Lithuanian language in 1991 or later; graduated from Lithuanian gymnasiums or secondary schools; who passed the school / state examination of the mother tongue or the state language of Lithuania. Those, who, in accordance with the procedure established by the Republic of Lithuania law on the legal status of occupations (Official Gazette No. 66-1609, 1997), were victims of occupations from 1939–1990, as victims of occupations, do not apply the state language category for one year after their return to the Republic of Lithuania
Coast of examination session	Free	State fee	State fee

All the Baltic states language legislation proclaims the only state form of the language proficiency examination and provides state funding for institutions that deal with the development of tasks and recommendations for the preparation, as well as with organization, carrying out and assessment of testing. Furthermore, passing the examination is free in Estonia, while there is a minor state fee with a number of privileges in Latvia and Lithuania. Also in Estonia individuals who have passed the Estonian language proficiency examination and have been issued the certificate are reimbursed for the costs of language learning to the extent established by the Government of the Republic (see http://www.innove.ee/en/language-examination).

In all the states the subjects directly involved in taking the exam and verifying its results are state language proficiency commissions which work on the basis either of special educational and testing centers (Estonia, Latvia) or secondary and higher educational institutions (Lithuania). The commissions include employees of these institutions who are required to have a higher philological or pedagogical education, and their candidacies are approved by the Minister of Education and Research in Estonia, the head of the National Centre for Education in Latvia and the head of the National Centre of Examination in Lithuania.

Control over the activities of these commissions is carried out by the National Examination and Qualification Centre of the Foundation Innove in Estonia, the State Language Proficiency Testing Department of the National Centre for Education and the Ministry of Education and Science in Latvia and the State Language Department of the Teachers Professional Development Centre and the National Centre of Examination in Lithuania. The whole information on the official language examinations organized by the institutions and tests sample are available on their web-sites. The duties and powers of all the organizations are similar, and they all work under the guidance of the Ministry of Education and Science of each country. Representatives of these organizations can attend the exam without prior warning, checking the competence of both the examinees and the examiners. Moreover, the Lithuanian Teachers Professional Development Centre organizes qualification improvement events for the members of the state language proficiency commissions.

It is also noteworthy that all the controlling bodies are members of the Association of Language Testers in Europe (ALTE), and they conduct the development of examinations tasks and requirements for linguistic competence according to its recommendations. But only Estonian testing institution became ALTE Members. Foundation Innove undergo a strict ALTE audit of A2-C1 qualifications and success in an audit results in a Q-Mark being awarded for those qualifications. Thus, in Estonia language proficiency examination is available on four levels, which correspond to the CEFR (A2, B1, B2, C1) (section 5 of the Amendment act to the Language act of 8 February 2007). In Latvia according to the Cabinet of Ministers regulation No. 733 of 7 July 2009 the scope of the official language knowledge is divided into three proficiency levels: A, B and C, and each of them has two degrees—the lowest first and the highest second. In Lithuania three state language knowledge qualification categories have been confirmed in the Government of the Republic of Lithuania resolution No. 1687 of 24 December 2003. According to it these categories correspond to A2, B1 and B2 levels of the CEFR. The C-level in Lithuanian state language proficiency examination does not exist.

A certain level of the Baltic languages is required to get a job in different civil services. In Estonia these requirements for various civil servants are described in the Regulation of the Government of the Republic No. 105 of 26 June 2008. According to it, language proficiency at B1 and B2 levels is required of civil servants, whose duties may be related to administration and management of subunits or the compiling of documents, and C1-level is required of civil servants, whose duties are management of departments, planning and coordination of their activities or providing consultation and the preparation of public speeches and text of official correspondence. As for C2, in Estonia positions requiring the linguistic competence at this level are not legally defined.

In Latvia the requirements to the language proficiency of civil servants are higher than in Estonia. According to the Cabinet of Ministers regulation No. 733 of 7 July 2009, C1 is compulsory for members of the municipal governments, deputies of the municipal government of the region, the governors / presidents of the councils, membership of the councils, budget unit managers, employment departments managers, etc., and C2 is necessary for the representatives of the highest public administration authorities and their units.

In Lithuania according to the Government of the Republic of Lithuania resolution No. 1688 of 24 December 2003 those state servants "whose posts are classified in grades B and C need to have the second category if they are required to communicate with the people on a regular basis and / or fill in papers" (Resolution No. 1688, 2003). And "the third category of the state language shall be applied to heads of state and municipal institutions, bodies, enterprises and organizations, civil servants whose posts are assigned to A-grade1" (Resolution No. 1688, 2003).

[1] According to The Government of the Republic of Lithuania resolution No. 693A "The approval of the description and assessment methodology of state civil service representatives and on the functions of the state

The list of categories of citizens who do not need to pass the language proficiency examinations is also almost identical in the Baltic states (see Table 1). The main general requirement is completed basic, secondary or higher education in accredited programs in the state and passing the centralized examination in it.

The main requirements to the structure of the language proficiency examination in the Baltic states are slightly different and quite similar to the patterns of Cambridge examinations, IELTS and TOEFL. The examination indicates abilities of examinees to understand the information they read or listen to, to write texts of different styles and genres, to be fluent in different communicative situations. The tasks aim to reflect everyday professional situations as close as possible. Their detailed description is given in the Estonian Ministry of Education and Research regulation No. 24 of 13 June 2011, Latvian Cabinet of Ministers regulation No. 733 of 7 July 2009, The Government of the Republic of Lithuania resolution No. 1688 of 24 December 2003 and The Minister of Education and Science of the Republic of Lithuania order No. ISAK-286 of 1 March 2004.

The examinations are divided into two parts – written and oral. In Estonia and Latvia written part consists of reading, listening and writing sections, and in Lithuania there are also use of the language tasks added, as well as in some Cambridge examinations. Accordingly, in Estonian and Latvian versions of the examination each part gives a maximum of 25 % of the final result, while in Lithuanian it is 20 %, and any part must not be 0 points. The test is passed if at least 60 % of total points is achieved in Estonia, 50 % in Latvia and 55 % (with at least 50 % of each part) in Lithuania. Furthermore, in Estonia candidates who fail to meet the minimum threshold of 35 % of maximum points cannot retake the test until 6 months after their last test.

In Latvia, if a person does not pass the examination, his or her higher level of proficiency in the state language may be reviewed no earlier than 3 months after the last check. And if it is determined that during the inspection a person has performed unlawful acts within the meaning of the Code of administrative offenses, the National Centre for Education shall not issue a state language proficiency certificate to the examinee and cancel the results of the testing. In this case, the person may repeat the test no earlier than 6 months after the inspection. If a candidate refuses to take some part of the examination (listening, reading, writing or speaking skills) or performs unlawful acts, his or her state language proficiency is not assessed.
In each state types of the tasks, their amount, complexity and duration of carrying out vary according to the different levels. Typical tasks for B1–C2 levels are:

1. *Writing* — 1) private or official letter, e-mail, summary, based on the source data (e.g. diagrams, photographs, maps, schemes, etc.); 2) essay, review, article, report.

2. *Listening* — monologues and dialogues with multiple choice, true/false, gap-filling, cloze, matching and open questions.

3. *Reading* — multiple choice (complete the sentence or choose the right answer to the question), matching (paragraphs to headings, texts to their annotations or topics), gap-filling, true/false, cloze and open questions.

4. *Use of Language* (only for Lithuania) — gap-filling with right personal / impersonal verb forms, words buildings and transformation tasks.

5. *Speaking* — 1) general introductory interview; 2) short presentation on a topic related to the field of work or conducting a conversation with the examiner according to the given plan; 3) discussion on some topic using topic and argument cards; describing pictures and answering related questions. Speaking section is a conversation between an examiner and one (Latvia, Lithuania) or two (Estonia) examinees. The examiner takes the examination, strictly basing on instructions. The conversation is recorded, and each examination is assessed independently by two evaluators.

The highest levels of the testing require knowledge of the specific vocabulary because reading tasks base on public information about institutions and enterprises, texts of manuals, information about services or products, reviews, fiction, newspapers and magazines articles or popular science articles, listening section needs understanding lectures, presentations, business conversations, and speaking tasks include topics related to the examinee's field of work.

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service management" of 19 June 2000, there are three grades of civil servants: A, in which the necessary obligations of the position require a higher university or equivalent education, B, in which the necessary obligations of the position require a higher education or equivalent (specialized secondary education — technical schools) and C, in which the necessary obligations require at least secondary education and vocational qualification.

Results of the examinations shall be announced to the candidates not later than within 3 working days after the testing in Lithuania, within 15 working days in Latvia and within 30 working days in Estonia, and can be appealed if a person is not satisfied with them. The received certificate has no limitations on its validity period. Furthermore, language proficiency certificates issued before each state brought the national assessment system into conformity with CEFR are not replaced, nor it is required to re-take the examination.

A notable peculiarity of the Baltic states language legislation is that their state language proficiency examinations perform a dual function: they do not only testify the level of an employee's linguistic competence but also allow to confirm the level of language proficiency which is necessary to apply for citizenship. In Estonia a minimum level of B1 is required for the naturalization procedure, in Latvia and Lithuania it is A2 (first category).

In all the Baltic states "the period of most extensive testing occurred from the early to the mid-1990s when over 200,000 tests were taken and passed in Estonia, more than twice as many in Latvia and about 25,000 in Lithuania" (Hogan-Brun *et. al.* 2008: 128). In the 2000s this number~~s~~ has decreased significantly. For instance, in 2016 only 5,200 people in Estonia and only 4,790 people in Latvia took the state language proficiency examination (see statistics of the Innove Foundation at http://www.innove.ee/et/eesti-keele-tasemeeksamid/tasemeeksamite-statistika-ja-analyysid and of the Latvian National Centre for Education at http://visc.gov.lv/valval/dokumenti/2016_statistika.pdf). In our opinion, these data confirm the effectiveness of language policy and coverage of a great number of people wishing to apply for citizenship and employees by language proficiency testing in the Baltic states.

Conclusions and suggestions for further research

The Baltic countries restoration of independence and the historic separation from the Soviet Union have found logical imprint on the language legislation which was substantially revised during the first years of rebirth, and new principles for language policy such as "systematic language certification for employment purposes" were incorporated. The Baltic states societies considered the "Russification" program as an instrument of introducing official "language of occupation", which would hinder the possible process of reconciliation.

Period of soviet occupation gave a "Carte Blanche" for Baltic state governments for used more hard ("sticks") than soft ("carrots") language policies by setting requirements, practicing control and letting the solutions come from the civil society organisations. Ruling elites and citizens were mostly agreed on the language policy balance between minority rights and the ensuring of social stability. Attitudes of titular elites and civic activists toward their national language were positive, thus enabling more complex language certification policies in civil service.

Regarding theoretical background the QMS of the state language proficiency examination is intended to an be integrative element which brings together aspects of the public institution, the civil society and customer language identification, integrating civil servants (skills, roles and responsibilities), processes (workflow, interactions), state regulatory requirements, technology, risks and opportunities, with the main purpose of delivering the best language proficiency.

It is necessary that the process of planning certification and control are carried out in a centralized fashion by a single state institution. As a minimum, such a center must take care of the tasks preparation and the development of clear criteria for their evaluation, send tasks through secure communications to the licensed higher educational institutions that carry out only representative and organizational functions, and verify the work performed. In some cases trying to implement a strict language policy, it was useful to open additional positions of special language inspectors with authority to demand administrative fines.

Regarding the improvement and unification of the certification evaluation methodology: the authors of the international IELTS, TOEFL and Cambridge examinations (BEC, FCE, CAE, etc.) offer a qualitative solution to this issue, in which the evaluation method clearly specifies the language competencies for each level of English language proficiency. In general, the basis for ranking the language and communicative competence of civil servants has been taken from the CEFR. Nowdays only Estonian testing institution has received the ALTE Q-mark which show that their exams have meet all the core requirements of ALTE's 17 quality standards. But those standards are not fully cover the evaluation of stakeholders and examinee satisfaction. It was found that communication procedures haven't enough feedback instruments and mostly build on providing information to stakeholders and examinee.

Also, convergence of the certification evaluation methodology implies the existence of common structures or similar structures to implement language certification in Baltic states public institutions and implicitly in implementing the elements of quality management, but self-evaluation practices are only starting to be implemented.

Suggestions for future research include a study of implementation the quality management tools in all central and local institutions of public administration, an examination of communication between native- and second-language speakers. One might also consider a sociolinguistic mapping of an public institutions, identifying relevant speech communities and assessing to what extent social interaction and knowledge-sharing are affected by the use of a second language.

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Identificando Distribuciones Condicionales Del Ingreso Personal A Través De Técnicas De Agrupamiento

PIZARRO Vicky
Universidad Católica del Norte, Chile, vicky.pizarro@ucn.cl

GALLARDO Mauricio
Escuela de Ciencias Empresariales, Universidad Católica del Norte, Chile, megallardo@ucn.cl

LEGER Paul
Escuela de Ingeniería, Universidad Católica del Norte, Chile, pleger@ucn.cl

Resumen

En la mayoría de los estudios sobre distribución de ingresos personales se analizan las distribuciones no condicionales de toda la población. Tal tipo de análisis es relevante para las políticas públicas. Sin embargo, existe una brecha importante de falta de conocimiento acerca de las distribuciones de los ingresos personales condicionales a las características socio-demográficas y de comportamiento de ingresos por tipo de individuos. Este conocimiento además es de gran relevancia práctica para el diseño mejor focalizado de políticas públicas. Este trabajo presenta una contribución exploratoria en la dirección de utilizar técnicas estadísticas no supervisadas de análisis de agrupamiento con datos longitudinales para identificar tales distribuciones condicionales de los ingresos personales por tipos de individuos. Para realizar este análisis, usamos la Encuesta Nacional de Hogares (ENAHO) del Perú entre los años 2015-2018. Encontramos que, en lugar de una sola distribución no condicional de ingresos personales, se logran identificar cuatro distribuciones de ingresos condicionales distintas de acuerdo a las características socio-demográficas de los individuos y del comportamiento inter-temporal de sus ingresos. La aplicación se realiza evaluando varios modelos de agrupamiento bajo diversos criterios de validez interna, estabilidad, y número de grupos óptimo.

Palabras clave: Análisis de Clúster, Distribución de Ingreso Condicional, Ingreso personal.

Introducción

La forma en que se distribuyen los ingresos entre los hogares e individuos que componen una población ha sido un tema de interés recurrente en economía y otras ciencias sociales (Cowell, 2007). El análisis distributivo permite evaluar que tan igualitaria o desigual es la repartición de los recursos que se generan a lo interno de un país, región o comunidad. Lo cual no solamente es de interés para la economía, sino también para otras disciplinas de las ciencias sociales, puesto que la distribución de ingresos tiene efectos sociales, demográficos y políticos muy importantes (Roine & Waldenström, 2015; Rözer & Kraaykamp, 2013). La distribución de ingresos puede ser estudiada desde dos perspectivas, funcional y personal, las cuales se encuentran estrechamente relacionadas (Perotti, 1993). La distribución funcional del ingreso se define como la asignación de los recursos en los factores de producción. Mientras que, la distribución personal del ingreso considera como unidad de análisis a los hogares o individuos (Atkinson, 1997).

En la actualidad existe evidencia empírica que respalda el hallazgo estilizado de que las *distribuciones de ingresos* de los individuos dentro de una población tienen una forma asimétrica positiva y que en general pueden ser representadas mediante algunas distribuciones teóricas conocidas, tales como la *Pareto* (Champernowne, 1953) y la *Log-normal* (Souma, 2001; Dagum, 2014). Algunos autores, han investigado también el ajuste de la distribución de ingresos a otros modelos de probabilidad (Colombi, 1990; McDonald, 2008; Richmond, Hutzler, Coelho, & Repetowicz, 2006). Si bien, la distribución del ingreso personal es afectada por variables macroeconómicas, tales como el producto interno bruto, la tasa de ocupación (García, Prieto-Alaiz, & Simón, 2013), y la inversión en capital humano (Galor & Zeira, 1993), dicha distribución también varía de acuerdo a las características de los individuos. Por ejemplo, según su oficio o profesión (Mohun, 2016), nivel de escolaridad (Becker, 1964), grupo etario, sexo, y etnia (Atkinson & Bourguignon, 2000).

La distribución de ingresos de los individuos según sus características es llamada *distribución condicional del ingreso* y ha sido estudiada previamente usando diversas variables condicionales (Biewen & Jenkins, 2005; Pudney, 1999;

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Quintano & D'Agostino, 2006). Conocer que los individuos tienen distintas distribuciones de ingresos de acuerdo a sus características nos permite evaluar que individuos con un conjunto de características similares puedan tener distribuciones que no se adhieran a las características generales de toda la población.

En la práctica, el tomar decisiones de política pública no estaría suficientemente justificado cuando se adopta el supuesto de que todas las distribuciones de ingresos de los individuos condicionales a sus características socio-demográficas, siguen el mismo modelo de probabilidad. Ello, porque tanto las fuentes de ingresos, como las circunstancias bajo las cuáles las personas generan dichos ingresos son heterogéneas. Por otra parte, tanto las características, como las necesidades que suplen las personas de una población según los ingresos que perciben, son distintas (Deaton, 1997). Asimismo, se debe tener en cuenta que los individuos experimentan cambios en su proceso generador de ingresos a través del tiempo, ya sea por la típica dinámica del ciclo de vida (Ando & Modigliani, 1963), o porque los procesos de acumulación de capital humano, emprendimiento, innovación, o el cambio en sus preferencias, generan, a su vez, cambios estructurales en las funciones de producción de tales ingresos a lo largo de la vida (Eckstein et al., 2016).

En el estado actual del conocimiento en economía, aún se ha avanzado poco en el desarrollo de algoritmos que permitan identificar las distribuciones de ingreso por tipos de individuos según sus características. En nuestro mejor conocimiento, los pocos esfuerzos en esta dirección se han focalizado en generar tipologías de hogar para construir *Matrices de Contabilidad Social* en el marco de los *Modelos de Equilibrio General Computable* (véase, por ejemplo: Thorbecke & Jung, 1996; Decaluwe et al., 1999). Sin embargo, existe una brecha importante no explorada en la aplicación de técnicas de aprendizaje estadístico no supervisado para este propósito. En este trabajo realizamos una contribución en esta dirección, al explorar en la aplicación de una técnica de aprendizaje estadístico no supervisado, como es, el análisis de clúster, para generar grupos de individuos adultos con similares características socio-demográficas y distribucionales. En la aplicación se usan variables de agrupamiento que provienen de tanto de una estimación econométrica de la conocida ecuación de Mincer (1974), así como, de algunos parámetros de la distribución temporal de ingresos individual, tales como la dispersión medida por el rango y la asimetría medida conforme el índice propuesto por Groeneveld & Meeden (1984).

Partimos del supuesto de que en una población existen tipologías de individuos que comparten entre sí su propio modelo de distribución de ingresos condicional dentro de una ventana de tiempo acotada, en que su proceso generador de ingresos no experimenta cambios estructurales. Es decir, suponemos, razonablemente, que el proceso generador de ingresos es fuertemente estacionario solamente entre ciertos tipos de individuos que comparten un conjunto de características socio-demográficas y en el marco de ventanas de tiempo acotadas. Suponemos, además, que estas distribuciones estacionarias por tipos de individuos y ventanas temporales pueden ser observables a través de datos de paneles cortos con alrededor de cuatro olas anuales, ya que solamente en un lapso de tiempo razonablemente acotado se puede esperar que las personas no experimenten cambios estructurales importantes en su proceso generador de ingresos.

La pertinencia del estudio en términos de su utilidad práctica es que la identificación de tales grupos permitiría aplicar políticas públicas mejor informadas y con una focalización más efectiva, al contar con información más detallada de cómo son las distribuciones de ingresos condicionales por tipos de individuos (Ravallion & Chao, 1989). Ello permitiría un mayor impacto social en lograr objetivos de política que contribuyan a mejorar el nivel y la estabilidad de los ingresos de los individuos y de los hogares, especialmente entre los más vulnerables.

El artículo está organizado como se indica a continuación. La sección Metodología presenta los datos y técnicas a utilizar, en la sección Resultados y Discusión se muestran tablas y gráficos relativos al proceso y al producto final del estudio junto a un análisis del mismo. Cerrando con la sección Conclusiones que incluye las observaciones finales y presenta los trabajos futuros.

Metodología

Esta sección se describen los datos y las variables generadas para realizar el agrupamiento. Seguidamente se detallan las técnicas de agrupamiento utilizadas, así como los criterios para definir el número de grupos. Finalmente, se enuncian las hipótesis a evaluar.

Datos Utilizados

Los datos utilizados provienen de la Encuesta Nacional de Hogares (ENAHO) de Perú, en su modalidad de panel, para el período 2015-2018. Se trata de una encuesta longitudinal con cuatro olas anuales. Esta encuesta contiene información detallada de personas y hogares de zonas urbanas y rurales, incluyendo datos vivienda, características de los miembros del hogar, datos de salud, así como ingresos y gastos de los hogares y de los individuos.

El tipo de datos seleccionado para el estudio es apropiado por tres razones. Primero, porque que contiene la información necesaria para el estudio en términos de variables socio-demográficas de los individuos. Segundo, porque al ser un panel, permite aprovechar la dimensión temporal para obtener algunos parámetros básicos de las distribuciones individuales de ingresos, tales como la dispersión de ingresos del período y su asimetría. Tercero, porque comprende justamente una ventana de tiempo de cuatro años, período que se considera óptimo para acotar la temporalidad a una fase en que se minimicen los cambios estructurales del proceso generador de ingresos. La elección de ventanas temporales de cuatro años, es apropiada porque tal longitud representa un período que cumpliría tres requisitos relevantes: (i) *información mínima*, en el sentido que en ventanas más cortas, el número de observaciones temporales (menos de cuatro) sería críticamente poco informativo; (ii) *estacionariedad fuerte en el proceso estocástico,* en el sentido de que es una ventana en que es razonable asumir que las distribuciones permanecen constantes, porque haría falta un lapso de más de cuatro años, para que los individuos adultos experimenten cambios estructurales relevantes; y (iii) *evasión del desgaste de panel*, ya que se trata de una ventana temporal en que empíricamente el desgaste de panel aún no se ha vuelto crítico.

El panel ENAHO del Perú para los años 2015-2018 contiene 3,783 hogares comparables, de los cuales 1,299 individuos informan su ingreso autónomo en todos los periodos. La variable de referencia para determinar las distribuciones de ingresos es el logaritmo natural del ingreso autónomo de las personas ajustado por inflación. Esta variable no se toma como instrumento para agrupar, sino solamente como referencia para validar el agrupamiento, una vez obtenidos los resultados.

Para implementar el análisis de clúster se utilizaron cuatro variables de agrupamiento que reflejarían parámetros claves de las distribuciones de ingresos individuales. Dos de estas variables provienen de la estimación econométrica de la media condicional a través de una ecuación de Mincer (1974). Esta ecuación se estima por el procedimiento de Amemiya & MaCurdy (1986), el cual permite explotar las ventajas que ofrecen los datos longitudinales al brindar estimadores insesgados y consistentes de los parámetros del modelo de regresión. Este tipo de modelo permite además utilizar como regresores tanto variables métricas que cambian sus valores a través del tiempo, como variables categóricas que son invariantes a través del tiempo (ej., el género, la condición étnica y la ubicación de residencia rural/urbana). La ecuación estimada es la siguiente:

$$\ln w_{it} = \mathrm{x}_{it}'\beta + \mathrm{z}_i'\gamma + \phi_i + \varepsilon_{it} \tag{1}$$

donde $\ln w_{it}$ es el logaritmo natural del ingreso de la persona i en el período t; x_{it} y z_i son vectores de variables que son variantes e invariantes en el tiempo respectivamente, algunas de las cuales son endógenas y otras exógenas; ϕ_i es un efecto individual de la persona i; ε_{it} es un efecto aleatorio, mientras que β y γ son vectores. de parámetros a estimar. Como variables explicativas del modelo se incluyeron los años de escolaridad de la persona, los años de escolaridad al cuadrado, los años de experiencia (aproximados como la edad, menos los años de escolaridad, menos 6), los años de experiencia al cuadrado, así como variables dicotómicas para el género, la pertenencia a una etnia indígena, la localización de residencia en zona rural y el laborar como trabajador independiente. Dentro de este conjunto de variables explicativas, las que se consideraron endógenas fueron las siguientes: los años de escolaridad de la persona, los años de escolaridad al cuadrado, los años de experiencia y los años de experiencia al cuadrado. Como es conocido en la literatura desde los trabajos de Becker (1964) y la ecuación de salarios de Mincer (1974), los ingresos laborales de las personas están fuertemente determinados por la escolaridad y la experiencia, así como por el resto de variables incluidas en el modelo, las cuales afectan los ingresos a través de mecanismos de discriminación (género y etnia indígena) y de las estructuras productivas locales (ruralidad. y trabajo independiente) (De Janvry & Sadoulet, 2000, Mason, 2012).

A partir de los resultados de dicha estimación econométrica se obtuvieron las siguientes variables de agrupamiento: (i) el promedio del logaritmo del ingreso determinado por las variables explicativas x_{it} y z_i, el cual se determinó conforme el siguiente componente de la ecuación de Mincer: $\mathrm{x}_{it}'\hat{\beta} + \mathrm{z}_i'\hat{\gamma}$, donde $\hat{\beta}$ y $\hat{\gamma}$ son los estimadores de los parámetros correspondientes; y (ii) el efecto individual ϕ_i. La intuición que está detrás de la definición de estas variables de agrupamiento es que la media de la variable de referencia se descompone en un elemento determinístico dado por las características observables contenidas en los vectores x_{it} y z_i, así como por un efecto idiosincrático inobservable capturado por el componente de efecto individual ϕ_i. Este componente individual se debe entre otros a factores como la habilidad intelectual, las redes y contactos sociales que posee la persona, sus habilidades blandas,

sus antecedentes familiares, etcétera; todos los cuales son inobservables en los datos. Las otras dos variables de agrupamiento utilizadas corresponden a una medida de dispersión y una medida de asimetría. Como medida de dispersión se utilizó el rango en lugar de la varianza, debido a que el número de datos es muy reducido para calcular la varianza (cuatro observaciones temporales). Con respecto a la asimetría, se tomó la medida propuesta por Groeneveld & Meeden (1984), la cual está basada en las distancias de los extremos del rango y la mediana. Esta medida se define tal como se indica a continuación:

$$A_{GM} = \frac{r\left(y \middle| y \geq y_m\right) - r\left(y \middle| y \leq y_m\right)}{r\left(y \middle| y \geq y_m\right) + r\left(y \middle| y \leq y_m\right)} \tag{2}$$

donde $r\left(y \middle| c\right)$ es el rango de la variable de interés y (en nuestro caso el logaritmo natural del ingreso autónomo de la persona) dada la condición c, y donde y_m es el valor de la mediana para dicha variable.

La Tabla 1 presenta tanto las estadísticas descriptivas de la variable de referencia como de las variables de agrupamiento con sus correspondientes correlaciones. Se puede observar que las correlaciones entre las variables de agrupamiento no son tan altas como para afectar los resultados del análisis de clúster.

Tabla 1: Estadísticas descriptivas del logaritmo del ingreso y de las variables de agrupamiento.

Variable	***Media***	***Desvío Estándar***	**1**	**2**	**3**	**4**
1. Promedio del logaritmo del ingreso autónomo del individuo	9.54	0.76				
2. Promedio del estimado del logaritmo del ingreso autónomo del individuo a partir de determinantes observables del ingreso	9.52	0.65	.51**			
			[.47, .55]			
3. Rango del logaritmo del ingreso autónomo del individuo	0.76	0.69	-.44**	-.26**		
			[-.48, -.40]	[-.31, -.21]		
4. Medida de asimetría del ingreso autónomo del individuo	-0.05	0.47	.09**	.11**	-.20**	
			[.04, .14]	[.06, .16]	[-.25, -.14]	
5. Efecto individual del ingreso autónomo del individuo	0.02	0.66	.61**	-.37**	-.23**	-.00
			[.57, .64]	[-.42, -.32]	[-.29, -.18]	[-.06, .05]

*Nota. Los valores entre corchetes indican intervalos de confianza al 95% para cada correlación. Mientras que los asteriscos indican la significancia estadística para los siguientes valores p: * indica p < .05, ** indica p < .01.*

Técnicas de agrupamiento utilizadas

Las técnicas de agrupamiento, conocidas también como técnicas de análisis de *clúster* por su origen lingüístico del inglés, comprenden una serie de métodos de aprendizaje estadístico *no supervisados* que permiten agrupar

observaciones en conjuntos homogéneos distintos entre sí (Milligan & Cooper, 1987). Existen diferentes métodos de agrupamiento, entre los cuáles, los más usados en la investigación aplicada son los procedimientos jerárquicos aglomerativos y los modelos no jerárquicos de las *k*-medias y las *k*-medianas (Jain, 2010). En el primer tipo de modelos se debe tomar la decisión de en qué etapa detener el algoritmo de generación de agrupamientos, es decir, en que momento cortar el árbol de agrupamiento conocido como *dendograma*. En los modelos no jerárquicos, en cambio, el investigador debe definir el número de grupos *k*, antes de aplicar el algoritmo correspondiente (*k*-medias o *k*-medianas). En ambos tipos de agrupamientos no jerárquicos existen algoritmos disponibles para determinar el número óptimo de grupos (véase: Charrad et al., 2014).

Para determinar el método de agrupamiento a utilizar, evaluamos la pertinencia de los tres algoritmos de agrupamiento indicados arriba, tanto a través de criterios de validación interna como de criterios de estabilidad y de número de grupos óptimo. Como criterios de validación interna se utilizaron: conectividad (Brock et al, 2008), silueta promedio (Rousseeuw, 1987), e índice de Dunn (1974). Mientras que, como criterios de estabilidad se usaron: la proporción media de no superposición (APN), la distancia promedio (AD), la distancia promedio entre medias (ADM), y la figura del mérito (FOM) (Datta & Datta, 2003; Yeung et al., 2001).

El criterio de la silueta (Rousseeuw, 1987) se basa en maximizar el promedio de la siguiente medida de silueta individual:

$$S(i) = \frac{b_i - a_i}{\max\{a_i, b_i\}} \tag{3}$$

donde a_i es la distancia promedio entre la observación i y todas las demás observaciones pertenecientes a su mismo grupo, mientras que b_i es la distancia promedio entre la observación i y las observaciones del grupo vecino más cercano. La silueta promedio se encuentra en el rango entre -1 y 1. Siendo mayor el agrupamiento cuyo número de clúster es el de mayor silueta promedio.

Para confirmar finalmente el número de grupos se realizó un análisis con múltiples estadísticas para este propósito (27 en total), utilizando el paquete NbClust disponible en el lenguaje de programación R (Charrad et al., 2014).

Hipótesis

El problema de investigación planteado es el de encontrar posibles distribuciones condicionales de ingresos bien diferenciadas entre sí para tipos de individuos adultos en una población. De acuerdo con este problema de investigación, se plantearon las siguientes hipótesis:

H_1.- Es posible identificar distribuciones condicionales de ingresos bien diferenciadas según las características socio-demográficas de los individuos y los parámetros básicos de sus ingresos en un panel corto de datos usando técnicas de agrupamiento.

H_2.- Las distribuciones condicionales de ingresos por tipos de individuos según sus características no se ajustan a las distribuciones no condicionales de ingresos asociadas a la población.

Para comprobar las hipótesis planteadas se aplicaron pruebas de Kolmogorov-Smirnov-Lilliefors (Lilliefors, 1969) de comparación entre pares distribuciones, bajo la hipótesis nula de que las distribuciones son iguales.

Resultados y discusión

La Tabla 2 presenta el resumen de resultados para la evaluación de la técnica de clúster más apropiada y del número de grupos óptimo según los criterios de validez interna y estabilidad. Vemos que dos de los tres criterios de validez interna: la conectividad y la silueta promedio, coinciden en que el número de grupos óptimo es cuatro. Sin embargo, ambos criterios difieren en el método de agrupamiento óptimo. De acuerdo con la conectividad el método jerárquico genera mayor cohesión interna dentro de los grupos y mayor separación con respecto a los grupos vecinos. Mientras que el criterio de la silueta promedio se inclina por el método de las *k*-medias. En cuanto a los criterios de estabilidad, vemos que en dos de ellos (APN y ADM) el método óptimo es *k*-medias, con cuatro grupos también.

Tabla 2. Número óptimo de grupos de acuerdo a criterios de validación interna y de estabilidad.

		Score	Método	Número grupos
Validación interna	Connectivity	275.112	hierarchical	4
	Dunn	0.027	hierarchical	9
	Silhouette	0.245	kmeans	4
Validación de estabilidad	APN	0.349	kmeans	4
	AD	1.739	kmeans	12
	ADM	0.770	kmeans	4
	FOM	0.896	kmeans	10

Al aplicar el análisis de número de grupos óptimo con el paquete de R NbClust para *k*-medias y distancia euclídea con las variables estandarizadas (ver Figura 1), el número de grupos con más adherencia entre los 27 criterios es también de cuatro grupos (8 de los 27 criterios seleccionan tal opción). Por lo cual, se decidió finalmente aplicar el análisis de clúster con *k*-medias y cuatro grupos.

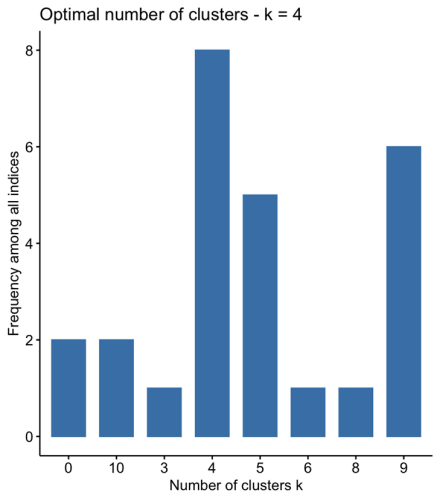

Figura 1: Selección óptima del número de grupos con el método de K-medias basado en múltiples estadísticas.

En la Figura 2 se presenta el resultado del gráfico de agrupamiento en dos dimensiones, generado con el paquete Rtsne de R (Krijthe, J., et al., 2018). En el resultado se observa claramente una separación adecuada entre los grupos.

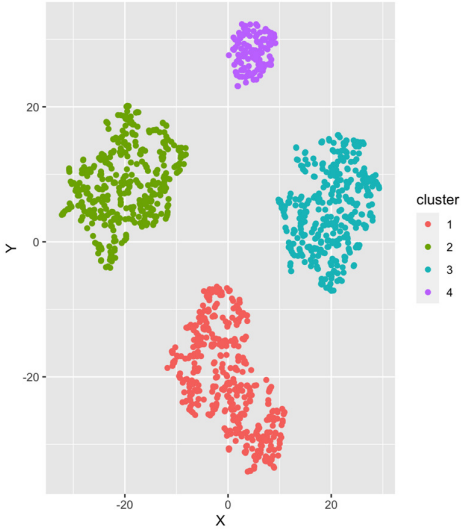

Figura 2: Representación gráfica en dos dimensiones de los datos agrupados usando t-SNE.

Los resultados de las pruebas MANOVA que se presentan en la Tabla 3, apuntan también a una adecuada separación de los grupos en términos de sus centroides. De acuerdo con los valores *p* correspondientes a los resultados de dichos contrastes estadísticos, en todos los casos se rechaza la hipótesis nula de igualdad de centroides entre los grupos conformados. De modo que existe evidencia para inclinarse en favor de la hipótesis alternativa, según la cual, hay diferencias estadísticamente significativas entre los centroides de los grupos.

Tabla 3: Análisis multivariado de varianza (MANOVA).

H0: Igualdad de centroides	Prov>F
Lambda de Wilks	0.000
Traza de Lawley-Hotelling	0.000
Traza de Pillai	0.000
Mayor raíz característica de Roy	0.000

Con la finalidad de observar las distribuciones obtenidas para los cuatro grupos conformados, la Figura 2 muestra las densidades del logaritmo del ingreso de cada grupo, generadas con la técnica Kernel (Silverman, 1986). Se puede observar que existen diferencias en las curvas generadas para cada grupo, tanto en su media, como en varianza, asimetría, y apuntalamiento. El grupo de menores ingresos (grupo 4 de color fucsia) es el de mayor varianza, lo cual estaría indicando que las personas. de menores recursos monetarios son también los que enfrentan un mayor riesgo. Este grupo muestra también la menor asimetría en su distribución de ingresos, lo cual, estaría denotando un mayor riesgo a la baja. Por su parte, el grupo de mayores ingresos (grupo 3 coloreado en celeste) es uno de los de menor varianza y mayor apuntalamiento. Este grupo por lo tanto sería uno de los que enfrenta un menor riesgo. Nótese, así mismo, que los dos grupos de mayor tamaño (grupos 1 y 2 coloreados en rosa y verde) corresponden a las personas de ingresos medios.

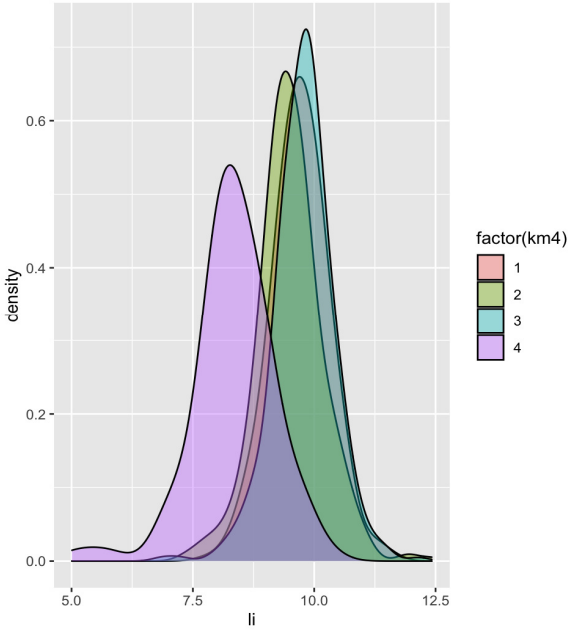

Figura 2: Distribuciones por grupo.

La Tabla 4 presenta las estadísticas resúmenes de cada distribución por grupo, mientras que en la Tabla 5 se muestran los centroides de los cuatro grupos conformados.

Tabla 4: Medidas resúmenes de las distribuciones condicionales encontradas.

Cluster	1	2	3	4
Media del logaritmo del ingreso	9.705	9.503	9.778	8.334
Varianza del logaritmo del ingreso	0.353	0.441	0.372	0.678
Asimetría del logaritmo del ingreso	0.016	0.256	-0.368	-0.866
Curtosis del logaritmo del ingreso	3.491	4.737	5.466	5.798

Tabla 5: Tamaños y centroides de los grupos conformados.

Cluster	1	2	3	4
Tamaño	415	395	370	119
Logaritmo del ingreso determinado por factores observables	9.854	8.846	9.958	9.221
Rango	0.52	0.763	0.501	2.352
Asimetría	-0.372	-0.083	0.435	-0.317
Efecto individual	-0.14	0.618	-0.17	-0.834

Finalmente, la Tabla 6 presenta los valores *p* correspondientes a los resultados de las pruebas de Kolmogorov-Smirnov-Lilliefors de comparaciones de distribuciones del logaritmo del ingreso de los individuos por pares de grupos, así como en su comparación con la distribución correspondiente para toda la población. De acuerdo con estos resultados, se encuentran diferencias estadísticamente significativas tanto entre las distribuciones de los grupos, como entre las distribuciones condicionales de cada grupo, comparadas con la distribución no condicional de la población. Se concluye entonces que todos los resultados están a favor de las hipótesis H_1 y H_2.

Tabla 6: Matriz de resultados de la prueba de Kolmogorov-Smirnov-Lilliefors (*p*-values).

Grupo	**1**	**2**	**3**	**4**
2	0.000			
3	0.047	0.000		
4	0.000	0.000	0.000	
Población	0.000	0.000	0.000	0.000

Conclusiones

Los resultados presentados en este trabajo avalan la necesidad de elaborar políticas públicas que superen la visión de una distribución de ingresos única y que se empiece a actuar considerando que en una misma población coexisten varias distribuciones de ingresos a la vez.

Los resultados del análisis exploratorio realizado en este estudio indican que es posible aplicar técnicas de agrupamiento con datos longitudinales para identificar distribuciones condicionales de los ingresos personales en una población. Al aplicar la técnica a datos de panel de la Encuesta Nacional de Hogares (ENAHO) del Perú entre los años 2015-2018, se encontró que es posible distinguir cuatro distribuciones condicionales de ingresos claramente distintas, tanto en sus centroides como en los parámetros definitorios de media, varianza, asimetría y curtosis. En todos los casos, se encontraron diferencias entre las distribuciones condicionales y también con respecto a la distribución no condicional de ingresos de toda la población.

Como futuros desarrollos que podrían surgir a partir de los resultados de este estudio exploratorio están, por un lado, el de encontrar nueva evidencia empírica con datos longitudinales de otros países que apoyen este tipo de resultados. Mientras que, por otro lado, para futuras investigaciones queda pendiente identificar los sectores productivos y ocupaciones a las que estarían ligadas cada una de estas distribuciones de ingresos.

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Land Fund Structure and Land Improvement works In Galati County

Marius Daniel NICULA
”Dunărea de Jos" University of Galaţi, Romania
marius_nicula89@yahoo.com.

Dumitrache Bogdan BRATOVEANU
”Dunărea de Jos" University of Galaţi, Romania
bbratoveanu@ugal.ro

Petre Adrian LIPTAC
”Dunărea de Jos" University of Galaţi, Romania,
adrianliptac@yahoo.com

Silvius STANCIU
"Dunărea de Jos" University of Galaţi, Romania
sstanciu@ugal.ro.

Abstract

There is great pressure on farmers worldwide to maximize their economic and social benefits from the land they own, while facing land degradation and desertification. Sustainable land management is the key answer to these challenges and is land management through which human society aims to improve agricultural production, living conditions and ecosystems. In order to integrate irrigation and drainage works in an integrated management of natural resources, it is necessary to establish a set of measures to coordinate and support the factors involved in this field, especially end users (farmers, organizations of water users for irrigation, specialists in the field of land improvements). The structure of agricultural land exploitation in Romania has not changed significantly during the last decade, maintaining the same fragmentation and the same extreme polarity, major impediments to increasing the competitiveness of the agricultural sector. Romania suffers from the most acute problem of fragmentation of agricultural property among all the countries of the European Union and has an average size of exploitation similar to Malta or Cyprus, island countries with much smaller agricultural areas than Romania.
The use of agricultural land is determined by the overall evolution of human society, mainly by the demand-supply ratio of agricultural products that manifests itself on the market. The demand for agricultural products is determined by the needs of final consumer or industrial consumption. These needs are directly related to the number of population, its purchasing power and the degree of integration and development of agricultural raw materials processing industries. The supply of agricultural products is determined by the area in the agricultural circuit and the level of yields per hectare. The use of agricultural land is influenced by the agro-climatic conditions, as well as by the economic, financial, demographic, technical and technological conditions existing in a country at a given time. An analysis of the evolution of land use categories in Galati County shows that the agricultural area of Galati County is 351779 ha, of which 289581 ha of arable, 40914 ha of natural pastures, 700 ha of natural finesse, 19521 ha of vineyards and 1763 ha of orchards and fruit nurseries.
Globally, the effects of desertification are increasingly being observed as a consequence of long periods of drought and the reduction of fertile areas that have led to a decrease in crop production. In Galati County, the phenomena of excessive drought affected large areas of agricultural land in 2015 and 2020. Irrigation facilities in Galati County represent 41.4% of the arable land of the county, of which 33,171 ha were rehabilitated, which represents 22.8 % of the arranged surface and 9.4% of the arable surface of Galati County.

Keywords: Land Fund, Land Improvements, Irrigation

Introduction

In Romania, rural areas occupy almost 90% of the territory and count about 50% of the total population. To achieve a real picture of the agricultural development, it is necessary to analyze the evolution of the land fund structure and especially the structure of arable land, in order to identify trends and their medium and long-term effects.

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The change in the type of ownership of agricultural land and the formation of a new organization structure of agricultural producers, have generated excessive fragmentation of agricultural land, the formation of a large number of individual subsistence farms, a restriction of productive services for agriculture (irrigation, fertilization , mechanization, etc.) and a significant depreciation of the productive quality of the land.

Romania has an important land wealth, 63.3% of the country's surface has an agricultural destination and is structured by categories of use (arable, natural pastures and hayfields, vineyards and orchards), but but also under the influence of natural factors and economic and social-historical facts (people's needs and concerns, tradition, etc.).

The evolution of agricultural productions is closely related to the changes that have taken place in the ownership structure of the land fund and of the other means of production, as well as of the climatic variability. The predominantly cereal character of the production structure represents a negative aspect of Romanian agriculture. The share of cereals in the region is high, even if the crop does not have favorable land and climatic conditions for the development of those species.

The ultimate goal of irrigation and drainage development is to improve agricultural production, increase rural incomes and minimize the risks posed by periods of drought. Irrigated agro-ecosystems tend to maximize production in the areas they occupy, but with proper management, they can provide other services such as erosion control by terracing, flood retention, sediment retention. The economic value of these services may in some cases exceed the value of the crops served by land improvement systems and the improvement of ecosystems.

Materials and Methods

The materials that formed the basis of this paper are information obtained through the usual means, respectively: newsletters, statistical yearbooks, statistical briefs. The research methods used in this study are: basic research (pure or basic) and evaluative research.

The preliminary documentation aimed to identify and study the general information sources and, subsequently, the specific information sources, in order to determine the characteristics of the researched area. For this purpose, the databases and statistical bulletins of the National Institute of Statistics of Romania were consulted, in order to observe the time series of some indicators relevant for research, as well as data provided by the County Directorate of Statistics.

Results and Discussion

Land fund structure

The way in which Law 54/1998 was implemented and especially the delay with which it was achieved, generated a series of effects (disturbing factors), respectively:

- fragmentation of agricultural land;
- the non-correlation of the application of the Land Fund Law with the appearance of the land market, this appearing late, in 1998 (Law 54/1998 on the legal circulation of lands);
- failure to ensure, together with the right of ownership over the lands, the adequate means for carrying out the agricultural works.

The agricultural surface of Galați County is 351779 ha, of which 289581 ha are arable, natural pastures 40914 ha, vineyards 19521 ha and orchards and fruit nurseries 1763 ha. The agricultural area of Galati County is structured by categories of use as follows:

Table 1: The structure of agricultural field of Galati County

Specification	ha	%
Agricultural area	**351779**	**100**
Arable land	289581	82,3
Natural pastures	40914	11,6
Vineyards	19521	5,6
Orchards and fruit nurseries	1763	0,5

Source: data processed according to the records of the Galati County Department of Agriculture

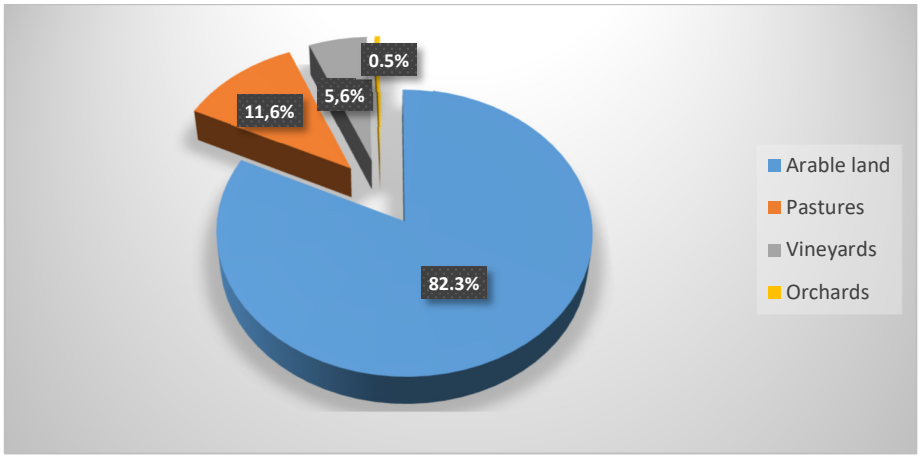

Figure 1: The structure of the land fund in Galati County

From table 1 and figure 1 it results that compared to the agricultural area, the arable land represents 82.3%, the vineyards and trees plantations 6.1% and the pastures and hayfields 11.6%.

The main crops that occupy large areas in the county are: grain cereals (wheat, rye, barley, barley, oats, corn grains), technical plants (soybean, sunflower, rapeseed, mustard, sugar beet, tobacco, broom sorghum), legumes (beans, peas), potatoes, vegetables (tomatoes, onions, cabbage, peppers, roots), melons and fodder plants.

At the level of Galati County, viticulture occupies 19521 ha, and fruit growing 1763 ha. Vegetable growing is one of the representative agricultural sectors for Galati County, given the existing tradition and the potential that must be capitalized more. Considering that in Galati County there is one of the largest vegetable basins in the country, vegetable growing can become a key point for the development of Galati County in the regional context.

Land Improvement Works

Facilities for irrigation in the complex (irrigation, drainage, combating soil erosion) represent 41.4% of the arable land of the county, of which 33171 ha were rehabilitated, which represents 22.8% of the developed area and 9.4% of the arable area of Galati County.

Table2: The situation of irrigation arrangements in Galati County

Specification	Developed surface 2015-2020 -ha-	Rehabilitated surface 2015-2020 -ha-	Land area proposed for utility in 2021 -ha-	from which	
				for OUAI	other beneficiaries
1.Developing plant "Câmpia Covurlui"	115318	25954	109364	97566	11798
2.Developing plant "Terasa Tecuci Nicoreşti"	16589	2666	16336	16336	-
3.The system "Brateşul de Sus"	7664	2632	7664	7664	-
4. OUAI: Namoloasa, Bratesul de Sus	6083	1918	6083	2840	3243
Total	**145654**	**33171**	**139447**	**124406**	**15091**

Source: data processed according to the records of the Territorial Branch of Land Improvements Galați

The areas arranged for irrigation, proposed for public utility in 2021 are presented in table 2.

The rehabilitation actions of the irrigation systems "Câmpia Covurlui", "Terasa Tecuci Nicoreşti" and "Brateşul de Sus" were carried out in the period 2015-2020 by the National Company for Land Improvements, Galati Territorial Branch. In parallel with these activities, the Associations of Water Users for Irrigation were set up, which took over the patrimony for free use of irrigation arrangements for use in irrigation campaigns, a situation that was reflected in the average and total productions of irrigated crops and to which watering was applied during the growing season.

Globally, the effects of desertification are increasingly being observed as a consequence of long periods of drought and the reduction of fertile areas that have led to a decrease in crop production.
In Galati County, the phenomena of excessive drought affected large areas of agricultural land in 2015 and 2020. In 2015, a state aid scheme was established by OUG 45/2015 to compensate for the damages caused by the meteorological phenomenon of severe drought during April-September 2015. In 2020, a state aid scheme was established by OUG 148/2020, granted to agricultural producers who set up crops in the autumn of 2019, affected by the pedological drought.

In accordance with the National Strategy for reducing the effects of drought in the short, medium and long term, the strategy at the level of Galati County has as main objectives the following:

- rehabilitation of the existing irrigation arrangements and realization of new arrangements through investments of rehabilitation of the arrangements from the ANIF administration and extension of the irrigation surfaces in the meadow areas (Prut and Siret) which involve low electricity consumption;
- restoration of anti-erosion plantations that have the role of fixing and defending the lands affected by surface erosion and of limiting soil losses in case of torrential rains.

For Galati county, the arrangements for irrigation, drainage and combating soil erosion are presented in table 3.

The need to carry out the proposed rehabilitation works is imposed by the fact that the irrigation facilities in the complex were put into operation until 1990 and were subject to destruction due to both climatic factors and bad intentioned people.

Table 3 : The situation of arrangements for irrigation, drainage and combating soil erosion in Galati County

Developing plant	Irrigations – net surface (ha)	Dreinage (ha)	CES (ha)
1. Brateşul de Sus, from which :	**7664**	**12.097**	**-**
8 OUAI	7664	-	-
ANIF	-	12.097	-
2. Câmpia Covurlui, from which:	**115318**	**39.161**	**146.348**
35 OUAI	97556	-	-
ANIF	17752	39.161	146.348
3, Terasa Tecuci – Nicoresti from which:	**16589**	**7960**	**14872**
10 OUAI	16336	-	-
ANIF	253	7960	14872
4. Nămoloasa – Măxineni from which:	**6083**	**-**	**-**
3 OUAI	2840	-	-
ANIF	3243	-	-

Source: data processed according to the records of the Territorial Branch of Land Improvements Galaţi

The expected economic effects as a result of the proposed investments are:

- reduction of water losses on canals and plots, as well as reduction of electricity consumption for pumping irrigation water to hydrants;
- waterproofing and reduction of water losses by infiltration;
- rehabilitation of the network of buried pipes, supply channels and pumping stations;
- extension of irrigation areas in meadow areas (Prut and Siret), which involve low electricity consumption (only one pumping stage).

The role of anti-erosion plantations is to fix and protect the lands affected by surface erosion, to regulate surface runoff, to limit soil losses in case of torrential rains.

The favorable effects of anti-erosion plantations are:

- reduction of water evaporation from the protected surface;

- more vigorous development of neighboring agricultural crops;
- acceleration of infiltrations and stopping the phenomena of soil transport by water.

Excessive drought and persistence over time, accompanied by high temperatures cause crop losses to non-irrigated crops.

Agricultural producers, legal entities or natural persons do not have at the beginning of the agricultural year information or warnings on the forecast of drought phenomena (pedological and atmospheric) so that they can make appropriate decisions regarding the use of seeds of drought-resistant varieties or the application of specific technologies.

Some agro - meteorological information is brought to the attention of agricultural producers only by radio - TV means, but it is not accompanied by technical measures and actions to be applied by agricultural producers in the crop program.

In very dry areas, where the water deficit in the soil is permanent, it is necessary to apply specific technologies. Thus, the soil works are performed differently, as follows:

For autumn crops:

- plowing is performed at depths of 20 - 25 cm, or the hard disk is used;
- the preparation of the germination bed and the sowing is done in maximum 2-3 days to avoid water losses from the soil.

For spring crops:

- the works of plowing or discussing with the hard disk must be executed since autumn or in the winter windows;
- if the land has remained uncultivated since autumn, it is indicated, in the spring, to carry out the discussion at 15 - 20 cm and immediately, the preparation of the germination bed and the sowing.

Given that agricultural producers have high-capacity tractors and specific equipment, these works can be carried out (plowing, prepared germination bed, basic fertilizer, pre-emergent herbicide and sowing) in the **"minimum tillage"** system.

To avoid water loss from the soil, other mechanical works are required:

- weeds or herbicides to control weeds and destroy the crust that appeared on the soil surface;
- for the protection and sustainable use of soils, in Galati county are required annually soil quality monitoring studies carried out by the Office of Pedological and Agrochemical Studies - a specialized institution in the field.

Execution of mechanical works on very dry lands, requires the renewal of the fleet of tractors and agricultural machines with high-performance equipment to perform mechanical works of the soil with few passes on the same surface.

Compared to those presented above, it is proposed the elaboration of pedological studies to substantiate projects for the realization of pedo-ameliorating works of the soils, with execution until the end of 2021 (table 4).

Table 4: Pedo-ameliorating works of the lands on the cadastral territory of Galaţi

Works category	Arable -ha	Pastures - ha	Total - ha
Dreinage	48653,57	401,43	49055
Irrigations	145167,01	486,99	145654

Source: data processed according to the records of the Territorial Branch of Land Improvements Galaţi

Conclusions

The phenomenon of pedological drought seems to intensify in the coming years due to geographical position and major climate change. Romania will need firm strategies in terms of mitigating the destructive effects of this meteorological phenomenon. These strategies can materialize in practice through close collaboration between decision makers and the population that has become aware that the declines in animal and plant production resulting from excessive drought not only affect their own households, but lead to lower living standards and well-being of

the whole society. A clear vision of the strategy for land improvement on agricultural land could help prevent serious problems with the emergence of the phenomenon of pedological drought.

The developing plan of the Galati County territory, elaborated in 2011 by the Galati County Council, provides the following objectives regarding the land fund and the arrangements for irrigation:

- capitalization of uncultivated lands that have pedological potential for at least one of the types of crops (agriculture, viticulture, fruit growing or vegetable growing).
- rehabilitation of irrigation systems, drying and combating soil erosion.
- ecological reconstruction of soils,
- arranging and maintaining buffer zones cultivated with grass, grass corridors or ponds and erosion dams.

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A Study on Behavioural Intention to Use Mobile Wallet with Special Reference to Citizens in Shah Alam, Selangor, Malaysia

Natasha MUZALDIN
Postgraduate Student, Faculty of Information Management, Universiti Teknologi MARA, Selangor Campus, 40150 Shah Alam, Selangor, Malaysia. Email: natashamuzaldin94@gmail.com

[1]Safawi ABDUL RAHMAN
Assoc. Prof., Faculty of Information Management, Universiti Teknologi MARA, Selangor Campus, 40150 Shah Alam, Selangor, Malaysia. Email: safawi@uitm.edu.my

Shamsul Anuar SARIFUDIN
IZSTech Sdn Bhd, C-03-02, iTech Tower, Jalan Impact, 63000 Cyberjaya, Malaysia. Email: shamsul@izstech.com

Muhamad Khairulnizam ZAINI
Senior Lecturer, Faculty of Information Management, Universiti Teknologi MARA, Selangor Campus, 40150 Shah Alam, Selangor, Malaysia. Email: nizam0374@uitm.edu.my

Abstract

Mobile wallet, along with debit/credit cards and internet banking, are technologies and mean widely used for digital payment. While neighboring countries advanced in the adoption of mobile wallet for digital payment, Malaysian is considerably "infant" as this technology is not extensively used. This paper reports the outcome of the research that investigated the users' behavioral intention and the determinant to adopt mobile wallets as digital payment platform in a selected locality in Malaysia. In establishing the study, a research model built upon three basic constructs of Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2) and previous relevant research models on factors influencing behavioral intention on mobile wallet was proposed. Adopting the convenience sampling technique, the online questionnaire had been administered to 384 respondents. The 327 returned questionnaire had been examined and the 315 valid questionnaire were brought into analysis. Both SPSS and SmartPLS were used for descriptive analysis, internal consistency reliability analysis, indicator reliability analysis, convergent validity analysis, discriminant validity analysis, coefficient of determination (R2) analysis, path coefficients analysis and hypotheses testing where appropriate. The results revealed that Hedonic Motivation is the strongest and most crucial factor influencing the intention to use mobile wallet. The Perceived Risk, Perceived Security and Perceived Trust have significant influence on behavioral intention on mobile wallet usage.

Keywords: Behavioural intention, effort expectancy, facilitating condition, hedonic motivation, perceived risk, perceived security, perceived trust, mobile wallet

Introduction

As information technology infrastructure become mature, businesses nowadays are conducted online and in digitally manner. Businesses adopted online payments methods such as internet banking, electronic cards (debit and credit), mobile banking and also mobile payment such as mobile wallet (Sarika and Vasantha, 2019; Bezhovski, 2016; Wang et al., 2019; Pandy and Crowe, 2017). With such online payment facilities, businesses may reach users 24/7 without border.

The mobile wallet technology allows users to perform the transaction virtually and easily in both in-store and remote place (Liébana- Cabanillas et al., 2018). Since the first day of its establishment, mobile wallet technology was widely used by people worldwide for digital payment. It is reported that countries like China and India (PwC Malaysia, 2018)

[1] *Corresponding Author*

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have an extensive use of mobile wallet for performing online transaction and digital payment. The use of mobile wallet for making online payment is growing for its easy to use feature.

In Malaysia, a variety of mobile wallet types are available for the users. The four mobile wallet types are open, semi-open, semi-closed as well as a closed wallet (Kumar and Sharma, 2019; Rao, 2015). In Malaysia, despite the existence of providers of mobile wallets such as AEON wallet, Maybank Pay, Grabpay and Gift voucher (Farhan Gazi, 2020), the use of mobile payment is considerably new and is not frequently being applied (Yeow et al., 2017). People prefers former methods and reluctant to exchange their credit or debit cards' role with the use of mobile wallet in making payment (Aydin and Burnaz, 2019). The Star (2019) reported that only 8% of Malaysia citizens are currently using mobile wallet to make online payment whereas Muller (2020) stated that 67% of Malaysians conducted their transaction using credit card and online banking.

It is learnt from the reports Malaysians prefer online transaction but less prefer to use mobile wallet. This issue is hypothesized to be related to the behaviour of the consumers. Triggered by this hypothesized issue, the study investigates users' behavioural intention and the determinant in adoption of mobile wallets as digital payment platform. The two research questions devised for the study are the main factors that determine behavioural intention towards mobile wallets among users and the extent of effort expectancy, facilitation condition, hedonic motivation, perceived security, perceived risk and perceived trust influence the use of mobile wallet behavioural intention.

The remaining sections of this paper are arranged as follows. The literature review comes to discuss the background that surround the issue tackled in the study. Section #3, i.e. the hypotheses development and research model justifies the formulated hypotheses for the study. The methodology that the research adopt is justified in section #4. Next section presents the finding of the research and section #6 follows to discuss the finding. Section #7 concludes the paper.

Literature Review

Digital economy built upon digital computing technologies. The digital economy lets businesses transformed into e-commerce and e-business. Digital economy stands as part of economic output that derived solely or primarily from digital technologies with a business model (Bukht and Heek, 2017). As digital economy grows rapidly since beginning of this century, the way the business is conducted transforms significantly in which technological-based means are adopted in many business dimensions.

One of the business area where computing technologies is widely adopted is payment system. In digital economy, the cash transactions were not preferred and the transaction is made using electronic money (Mohanad Faeq Ali et. al. 2019). The use of electronic payment system is the main strength of e-commerce and the most vital aspect of digital business (Bezhovski, 2016; Maurya, 2019). Due to advantages such as adequate payment infrastructure and practical use, electronic payment become the preferred mean for making payment for goods and products purchased.

There are various kind of digital payment methods available for consumers to choose from. One of the among earliest method was debit/credit cards (Xiao, Hedman and Runnemark 2015). Currently, internet banking system (Zheng et. al. 2009) is widely used. As mobile technology advances, the contactless cards and mobile payment (Chae and Hedman, 2015; Ozcan and Santos, 2014) quickly adopted by consumers for the purposes making payment. The variety of methods and instruments offer consumers with flexibility in enabling the electronic payment.

Mobile wallet is one of the mobile payment instruments that is used for purchasing goods and services in easier and more convenient manner. Mobile wallet originates from the digital wallet (Doan, 2014) in which it stores credit information on the cloud. Bosamia (2017) and Singh et al. (2017) stated that mobile wallet is a virtual wallet that exists in the smartphone where the money is stored in virtual form. Mobile wallet as an application software on smartphone serves as a digital container to store information like payment and loyalty cards, tickets, receipts and vouchers (GSMA 2012). With mobile wallet, cashless and/or cardless transaction can be established. Mobile wallet has both software and hardware enable the use of credit or debit transaction with smartphones.

Mobile wallet is preferred by smartphone users for many reasons. It enables mobile users to be more accessible to financial services. It also facilitates the users in using their credit or debit cards virtually for financial transactions like paying bills, shopping, booking tickets, fund transfer and etc. (Singh et al., 2017). With pre-installed application or program and tap-to-pay procedures, mobile wallet enables fast monetary transaction for practical usage.

With respect to the extent of usage, literature indicates the classification for mobile wallet. Generally, mobile wallet is classified into four classes namely open, semi-open, semi-closed and closed wallets (Sardar, 2016; Rana 2017; Alaeddin et al., 2018). These four types can be either based on the ability to reload, connected with the bank or having the option where money can be withdrawn (Wadhera et al., 2017). The open wallet enables transactions at any in-store and online purchase. Example of open wallet are Paypal and Maybank Pay (MAE wallet) (Oh, 2018; Farhan Gazi, 2020). The semi-closed wallet enables consumers to purchase goods and services from registered stores. Grabpay and *Touch 'n Go* are examples for semi-closed wallet (Farhan Gazi, 2020; Chew, 2019; Birruntha, 2019). Lastly, the closed wallet is used exclusively for the purchases in the merchant's premise or company such as Golden

Screen Cinema and Gift vouchers (Alaeddin et al., 2017). More examples for closed, semi-closed, semi-opened and open wallets are available both in the published literature and internet for references.

Studies on mobile wallet are extensive as the researchers studied mobile wallet from diverse perspectives. Far earlier, Shin (2009) validated a comprehensive model of consumer acceptance in the context of mobile payment. Amaroso and Magnier-Watanabe (2012) proposed a comprehensive model integrating eleven key consumer-related variables affecting the adoption of mobile and identified the case of the successful adoption mobile wallet in Japan. Seetharam et al (2017) investigated the key factors that influence the acceptance of mobile wallet in Singapore. Zhang et al, (2018) examines the factors that influence both the technology acceptance and actual usage aspects of mobile payment adoption from the perspective of the general systems theory. Chawla and Joshi (2019) examined the factors that influence a consumer's attitude and intention to use mobile wallets using a sample representative of Indian users. In addition to this, Husnil et al (2019) had examined the factors of hedonic motivation and social influence on intention to use e-money in Indonesia in which they found that both factors are crucial in accelerating the intention on e-money usage. Singh and Sinha (2020) measured merchant's intention to use a mobile wallet technology. A latest one examines the effect of perceived risk, government support, and perceived usefulness on customers' intention to use e-wallet during COVID-19 outbreak (Aji, Berakon and Md Husin, 2020). The huge studies on mobile wallets were reported in the literature reflecting a huge variety of related dimensions of mobile payment.

The studies reported above have been conducted in several countries including Malaysia. In Malaysia, the use of mobile wallets is growing as PwC Malaysia (2018) found that only 22% of people tend to adopt e-wallet services and most cases that use e-wallet are mainly in e-commerce. Therefore, it is acknowledged that if compared to Indonesia, e-wallet adoption in Malaysia is still in its infancy (Aji, Berakon, Md Husin 2020; PWC, 2018). Following Chwah, et al. (2018), even though most people own smartphone and the mobile wallet has preliminary existed, the use of cash and card payment are still in a higher demand in making purchase especially in the physical store such as mall, groceries or stalls.

The less usage of mobile wallet facility to make payment compared to its neighbouring countries as reported invites a research effort. In establishing this research, the combination of perceived trust, perceived security and perceived risk with three constructs that initially exist in UTAUT2's structure (effort expectancy, facilitating condition hedonic motivation) is made. The goal of the combination is to allow a research that is comprehensive in nature with expectation to yield a strong justification in its finding.

Hypotheses Development and Research Model

The construct of hypotheses for the research reported in this paper are as follows.

Behavioural Intention

Behavioural intention is a degree in which an individual has conveyed a mindful plan regarding the decision of whether or not to perform a definite future behaviour (Venkatesh et al., 2012). Many studies have used this construct to study the intention towards adopting the technology like mobile payment (Thakur and Srivastava, 2013; Phontanukitithaworn et al., 2015; Mehdi et al., 2018) and for mobile wallet (Patel, 2016; Hanudin Amin, 2009; Kafsh, 2015; Singh et al., 2017). Behavioural intention is important in order to identify the users' intention to use something new since in Malaysia, mobile wallet is considered new and still at the growing stage of usage as compared to other advanced countries. This is to measure the level of users' intention to use mobile wallets as part of mobile payment in making the purchase to become easier and convenient.

Effort Expectancy

Venkatesh et al. (2003) defined effort expectancy as the level of easiness when using any related systems. Users will show more inclination to use the mobile wallet only if it is easy to be used. This is because, if the system is using user-friendly technology, it can surely gain high acceptance, thus, being adopted by users as they will not feel any hassles or putting a lot of effort in using this mobile wallet (Park and Ohm, 2014). Recent studies by Megadewandanu et. al. (2016) and Singh et. al. (2019) have been shown that effort expectancy has a significant or positive influence on the intention in the use of mobile wallet. This study proposes the following hypothesis for effort expectancy.

H1: Effort expectancy has positives influence on users' intention to use mobile wallet

Facilitating Condition

According to Venkatesh et al. (2003), facilitating condition is the degree in which an individual knows and believes that both organizational and technical infrastructure exist to support them in using the system. When users have insight about technologies or a mobile wallet which is able to give them support in using the application, they will become more willing to use the mobile wallet and feel not afraid if they will misuse it. Previous studies found that facilitating condition has positive effect towards the behavioural intention in using mobile wallet (Chawla and Joshi, 2019;

Megadewandanu et al., 2016; Patel, 2016; Madan and Yadav, 2016). In this study, the following hypothesis related to facilitating condition is proposed.

H2: Facilitating condition has positive influence on users' intention to use mobile wallet

Hedonic Motivation

Venkatesh et. al. (2012) defines hedonic motivation as a feeling of excited or pleasure which resulted from the use of technology. It is one of the important roles that is needed in order to identify whether users will accept and use it or not (Brown and Venkatesh, 2005). The technology will not be useful if users are not feeling interested or excited about the device. When they have an interest and feel excited, it will increase their intention to use mobile wallet. The studies by Megadewandanu et al. (2016) and Morosan and Defranco (2016), found that this determinant has a positive influence on behavioural intention to use mobile wallet. Relating to this determinant, this study hypothesise that;

H3: Hedonic motivation has positive influence on users' intention to use mobile wallet

Perceived Risk

Risk can be defined as the uncertainty such as the severity of certain occasions as well as the consequences from the outcome of action conducted due to respect to human value (Aven and Renn, 2009). As the behavioural intention of the mobile wallet involves some degree of uncertainty, it is believed that perceived risk is fused as a direct determinant of behavioural intention to adopt the technologies. According to a study by Singh et. al. (2019) and Madan and Yadav (2016), when perceived risk is decreasing, the intention to adopt a mobile wallet is increasing simultaneously. This study adopts the perceived risk and the construct the following hypothesis.

H4: Perceived risk has negative influence on users' intention to use mobile wallet

Perceived Security

Perceived security is defined as the level of confidence that the users have regarding the security system (Law, 2007). The mobile wallet had opened up many different and new risks on security such as the risk of smartphones which might be stolen, damaged or even lost (Chari, et al., 2001). When this happens, the security of information stored in the mobile wallet is crucial to be protected. Studies show that perceived security consist of a positive influence on behavioural intention to use a mobile wallet to make a purchase (Chawla and Joshi, 2019; Kafsh, 2015; Shin, 2009; Seetharaman et al., 2017). When the users are confident that mobile wallet is able to secure their personal data and information, many will be willing to use mobile wallet. On perceived security, the following hypothesis is proposed.

H5: Perceived security has positive influence on users' intention to use mobile wallet

Perceived Trust

Trust refers to the concept of willingness to be taken from the actions of other persons or a third party (Redhwan Mohammed Abdullah Al-Amri et. al., 2016). The trust factor has been found to be useful and was included in previous studies related to mobile wallet (Shaw, 2014; Chawla and Joshi, 2019; Shin, 2009). Following Yan and Yang (2014), trust on mobile payment allows positive expectation regarding its system. When users doubt that this mobile wallet has a high security of their information, it will be difficult for them to increase their intention in using the mobile wallets. Studies by Chawla and Joshi (2014) show that trust really plays an important role in influencing the behavioural intention of mobile wallet in India. That is why, trust is important to be included in this study. In this study, the following hypothesis is proposed pertaining to trust.

H6: Perceived trust has positive influence on users' intention to use mobile wallet

The six variables with their respective hypothesis is gathered into theoretical model depicted in Figure 1. It is noted that these main variables were adopted from previous studies (Venkatesh et al., 2012; Megadewandanu et al., 2016; Singh et al., 2019; Aydin and Sebnem Burnaz, 2016; Chawla and Joshi, 2019) for better understanding of the users' behavioural intention on mobile wallet. It is expected that this model may help in clarifying the issue on users' behavioural intention on the technology in this research context.

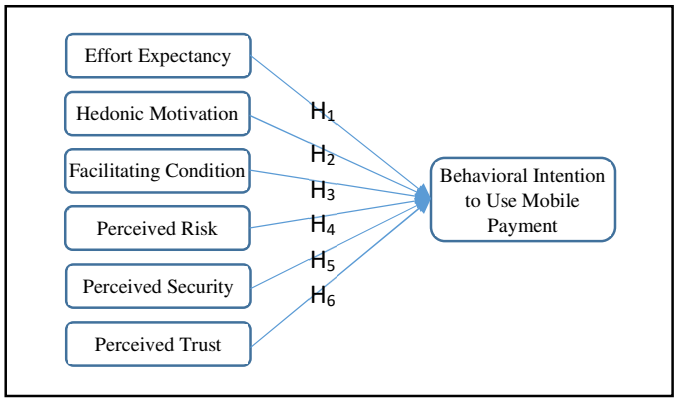

Fig 1. Theoretical Model for Behavioral Intention to Use Mobile Payment System

Methodology

This research adopts the quantitative approach in order to identify users' behavioural intention on mobile wallet. The study setting was Shah Alam, the capital city of Selangor, Malaysia with 650,000 populations (Shah Alam City Council, 2019). The research instrument was questionnaire with eight (8) sections namely Demographic Profile, Behaviour Intention, Effort Expectancy, Facilitating Condition, Hedonic Motivation, Perceived Risk, Perceived Security and Perceived Trust and five (5) scales of Likert measurement. Upon pilot testing, the questionnaire was administered online to 384 respondents following convenience (non-probability) sampling. A total of 327 questionnaires were returned and 315 set of questionnaire were valid for analysis. Applying both SPSS Statistics Version 22 and also SmartPLS Version 3.0, the analysis techniques applied were descriptive, common method variance and structural equation modelling (SEM) with two steps modelling approach namely Confirmatory Factor Analysis (CFA) and structural model to examine the relationship between independent and dependent variables.

Result and Discussion

The result of statistical analysis using SPSS Version 22 and SmartPLS Version 3.0 includes the brief demographic profiles, internal consistency reliability, indicator reliability, convergent validity, discriminant validity, coefficient of determination (R2), path coefficients and hypotheses testing.

Demographic Profiles

Table 1 shows the simplified and brief characteristics of the respondents on mobile wallet. The survey had been responded by working professional (54.6%), student (34.6%), entrepreneur (2.5%), unemployed citizen (3.8%) and self-employed personnel (1.9%). With regard to mobile wallet usage, it is found that 182 (57.8%) respondents have never used mobile wallet to make payment and remaining 133 (42.2%) used it in store. On the choice of payment method, the descriptive analysis indicated that respondents less prefer mobile wallet or digital wallet as only 14 (4.4%) of respondent opted this option. The online banking is at higher preference among respondents with 68.9% (217) while use of credit/debit card for payment is preferred by 84 (26.7%) respondents. On the reason for using mobile wallet, respondents intended to use it mostly for shopping (199:63%), paying bills (95:30.2%), movie tickets (14:4.4%), booking for services and products (5:1.6%) and other purposes (2:0.8%)

Table 1: Demographic Result

Demographics	Options	Frequency	Percentage (%)
Occupation	Student	109	34.6
	Working Professional	172	54.6
	Entrepreneur	8	2.5
	Self-employed	6	1.9
	Unemployed	12	3.8
Mobile wallet usage in store	Yes	133	42.2
	No	182	57.8
Choice of payment method	Credit or Debit Card	84	26.7
	Online Banking	217	68.9

	Digital Wallet	14	4.4
Main reason	Shopping	199	63.0
	Paying Bills	95	30.2
	Movie tickets	14	4.4
	Booking	5	1.6
	Others	2	0.8

Internal Consistency Reliability

For testing the reliability and validity of the model used in the study, Confirmatory Factor Analysis (CFA) was used using SmartPLS software. All constructs under Effort Expectancy (EE), Facilitating Condition (FC), Hedonic Motivation (HM), Perceived Risk (PR), Perceived Security (PS), Perceived Trust (PT) and Behavioural intention (BI) were included. As depicted on Table 2, the measurement model was considered reliable as all item loadings (FC4, PerRisk1, PerRisk2, PerRIsk3, PerSec3, BI3 and BI4) below the arbitrary value of 0.7 were excluded. As for Average Variance Extracted (AVE) of each available construct were found to have acceptable range from 0.566 to 1.000 in which the value gained is more than the recommended AVE value that is 0.5. Lastly, the Composite Reliability (CR) of the study was also found to be in good range from 0.839 until 1.000.

Table 2: Item Loading, AVE and CR.

Factor	Items	Loadings	AVE	CR
Effort Expectancy (EE)	EE1	0.884	0.715	0.909
	EE2	0.807		
	EE3	0.861		
	EE4	0.827		
Facilitating Condition (FC)	FC1	0.875	0.664	0.855
	FC2	0.773		
	FC3	0.794		
Hedonic Motivation (HM)	HM1	0.874	0.751	0.900
	HM2	0.875		
	HM3	0.851		
Perceived Risk (PR),	PerRisk4	1.000	1.000	1.000
Perceived Security (PS)	PerSec1	0.825	0.596	0.815
	PerSec2	0.756		
	PerSec4	0.732		
Perceived Trust (PT)	PerTrust1	0.779	0.611	0.917
	PerTrust2	0.740		
	PerTrust3	0.751		
	PerTrust4	0.784		
	PerTrust5	0.785		
	PerTrust6	0.822		
	PerTrust7	0.809		
Behavioural intention (BI)	BI1	0.733	0.566	0.839
	BI2	0.718		
	BI5	0.748		
	BI6	0.808		

Discriminant Validity

The assessment of discriminant validity is established upon two well-known measures i.e. Fornell and Larcker's criterion (1981) and cross loading. As for first assessment, each AVE construct is generated and processed using SmartPLS built in algorithm. In Table 4, the bold element represents the square root of AVE results and the non-bold represents the inter-correlation value between each construct. It is noted that all the square root of AVE elements are higher than the other element construct. It implies that the result gained for discriminant validity meets the Fornell and Larker's criterion.

Table Error! No text of specified style in document.**: Inter-correlation Matrix (Fornell and Larker's criterion).**

	Behavioral Intention (BI)	Effort Expectancy (EE)	Facilitating Condition (FC)	Hedonic Motivation (HM)	Per Risk (PR)	Per Security (PS)	Per Trust (PT)
Behavioral Intention (BI)	**0.753**						
Effort Expectancy (EE)	0.427	**0.845**					
Facilitating Condition (FC)	0.315	0.55	**0.815**				
Hedonic Motivation (HM)	0.474	0.37	0.4	**0.867**			
PerRisk (PR)	-0.134	0.037	0.09	0.013	**1.000**		
PerSecurity (PS)	0.446	0.476	0.271	0.31	-0.044	**0.772**	
PerTrust (PT)	0.469	0.39	0.216	0.418	-0.123	0.627	**0.782**

Once the first assessment is established, the following assessment examines the indicators' loading of all construct correlations. The result for cross loadings also produced from SmartPLS algorithm process. Table 5 shows the result of cross loading that exists between the construct and indicators. Identical to Fornell and Larcker's criterion, the indicators loading must have higher value against their respective intended variables as compared to other variables. As indicated in Table 5, the loading of each block is higher than any other block within the same rows and columns. Therefore, this output confirms the cross loading measurement. Both reliability and validity tests that have been conducted on the measurement model achieve the satisfactory level. The result from the tests confirmed the indicators' validity to be used in the structural model.

Table 5: Cross Loading Output by Smart PLS

	Behavioral Intention (BI)	Effort Expectancy (EE)	Facilitating Condition (FC)	Hedonic Motivation (HM)	Per Risk (PR)	Per Security (PS)	Per Trust (PT)
BI1	**0.733**	0.280	0.241	0.360	-0.109	0.332	0.396
BI2	**0.720**	0.290	0.197	0.345	-0.126	0.336	0.347
BI5	**0.747**	0.316	0.239	0.376	-0.105	0.340	0.348
BI6	**0.808**	0.396	0.269	0.344	-0.066	0.335	0.320
EE1	0.373	**0.884**	0.471	0.307	0.055	0.378	0.302
EE2	0.342	**0.807**	0.497	0.275	0.076	0.393	0.280
EE3	0.339	**0.861**	0.421	0.305	0.023	0.408	0.322
EE4	0.385	**0.827**	0.468	0.357	-0.023	0.430	0.406
FC1	0.313	0.434	**0.875**	0.348	0.071	0.295	0.203
FC2	0.198	0.469	**0.773**	0.263	0.088	0.108	0.047
FC3	0.238	0.462	**0.794**	0.358	0.066	0.222	0.252
HM1	0.427	0.306	0.344	**0.874**	-0.022	0.271	0.411
HM2	0.406	0.303	0.304	**0.875**	0.001	0.203	0.322
HM3	0.398	0.354	0.393	**0.851**	0.057	0.333	0.352
PerRisk4	-0.134	0.037	0.090	0.013	**1.000**	-0.044	-0.123
PerSec1	0.428	0.455	0.321	0.330	-0.031	**0.826**	0.502
PerSec2	0.255	0.338	0.137	0.130	-0.054	**0.756**	0.449
PerSec4	0.312	0.282	0.119	0.209	-0.022	**0.732**	0.502
PerTrust1	0.377	0.346	0.206	0.353	-0.116	0.544	**0.779**
PerTrust2	0.315	0.252	0.104	0.319	-0.066	0.449	**0.740**

PerTrust3	0.324	0.231	0.160	0.284	-0.067	0.446	**0.751**
PerTrust4	0.325	0.292	0.162	0.333	-0.062	0.496	**0.784**
PerTrust5	0.400	0.312	0.136	0.332	-0.160	0.460	**0.785**
PerTrust6	0.403	0.312	0.183	0.348	-0.076	0.490	**0.822**
PerTrust7	0.402	0.367	0.216	0.318	-0.109	0.543	**0.809**

Coefficient of Determination (R2)

The R2 value indicates that the amount of variance that contains in the dependent variable required to be explained by the independent variables. It implies that, when R2 has larger a value, it will increase the predictive ability of structural model. SmartPLS's algorithm is used to obtain the R2 value in this study. The SmartPLS's bootstrapping is used to help in generating the t-statistic as well as path coefficient value of the model. The bootstrapping had generated 500 samples from 315 cases. The result of structural model is presented in Figure 2 in which it displays Effort Expectancy, Facilitating Condition, Hedonic Motivation, Perceived Risk, Perceived Security and Perceived Trust are able to explain 38.1% of the variance in Behavioural Intention. The value of 0.381 makes the R2 for this study as average.

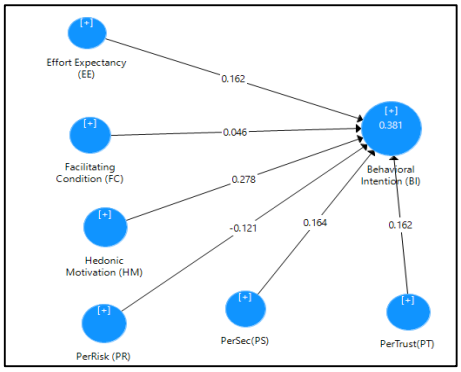

Figure 2: Result of Structural Model from SmartPLS's Bootstrapping

Path Coefficients

For the structural model used in this study, each path that connects six latent variables represent its own hypothesis. Therefore, based on the analysis on the structural model, it gives the researcher the ability to confirm or disconfirm each hypothesis made as well as to gain insight about the strength of the relationship that has existed between both dependent and independent variables in this study. Using the output gained from smartPLS algorithm and bootstrapping, the relationship between independent and dependent variables as well as their significant value were examined. Table 6 shows the path coefficient, t-statistics and significance levels for all hypothesis path used. The result of the hypotheses testing is discussed in the next subsection.

Table 6: Path Coefficient

Relationship	Standardized Coefficient	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Effort Expectancy (EE) -> Behavioral Intention	**0.162**	**0.088**	**1.829**	**0.068**
Facilitating Condition (FC) -> Behavioral Intention	**0.046**	**0.066**	**0.703**	**0.483**
Hedonic Motivation (HM) -> Behavioral Intention	0.278	0.060	4.662	0.000
PerRisk -> Behavioral Intention	-0.121	0.044	2.751	0.006
PerSecurity -> Behavioral Intention	0.164	0.076	2.140	0.033
PerTrust -> Behavioral Intention	0.162	0.068	2.370	0.018

Hypotheses Testing

Assessment of path coefficient, t-statistics and significant levels is critical to reject or accept the proposed hypotheses. As indicated in Table 6, it is learnt that Behavioural Intention is influenced directly by Hedonic Motivation (β=278, t=4.662, $p<0.05$), Perceived Risk (β=-0.121, t=2.751, $p<0.05$), Perceived Security (β=164, t=2.140, $p<0.05$) and

Perceived Trust (β=162, t=2.370, p<0.05). As a result, hypotheses H3, H4, H5 and H6 are supported. Among these four variables, Hedonic Motivation is found to be the most crucial and significant factor in influencing the behavioural intention on mobile wallet in the context of this study. The behavioural intention is not influenced directly by Effort Expectancy (β=0.144, t=1.829) and Facilitating Condition (β=0.047, t=0.703) since the p-value is more than 0.05 while t value is less than 1.967. The insignificant p-value and t value lead to rejection of hypothesis H_1 and H_2

Table 4.14: Hypothesis results

#	Hypothesis Statement	Result
H1	Effort expectancy has positives influence on users' intention to use mobile wallet	Not Supported
H2	Facilitating condition has positive influence on users' intention to use mobile wallet	Not Supported
H3	Hedonic motivation has positive influence on users' intention to use mobile wallet	Supported
H4	Perceived risk has negative influence on users' intention to use mobile wallet	Supported
H5	Perceived security has positive influence on users' intention to use mobile wallet	Supported
H6	Perceived trust has positive influence on users' intention to use mobile wallet	Supported

Findings

Based on the result produced from statistical analysis and discussion that follows, it is learnt that Hedonic Motivation is a critical factor influencing behavioural intention to use mobile wallet by its solid merit. Other three factors i.e. Perceived Risk, Perceived Trust, and Perceived Security accompanied Hedonic Motivation as crucial in influencing behavioural intention on mobile wallet. This finding is aligned with Wong and Mo (2019), Madan and Yadav (2016), Fatimah et al (2019), Megadewandanu et al., (2016), Verkijika (2018) and Patil, Dwivedi and Rana (2017) and Sardar (2016) where they earlier found that Hedonic Motivation, Perceived Risk, Perceived Security and Perceived Trust as crucial factors for people's intention to use mobile wallet. Among the four variables, this study found that Hedonic Motivation stands as strongest and most significant factor. This finding matches Fadzil's (2017) study who had produced similar finding. Both Fadzil (2017) and this study are conducted in Malaysia. Therefore, up to this point of time, it can be reasoned that Malaysian people take HM as critical factor for their engagement in mobile wallet. The implication would be that service provider shall increase the entertainment in mobile wallet application to make it more appealing. Not only that, it also crucial to make sure a high security provided in the mobile wallet, thus, minimizing any potential risk. The service provider also might need to increase and build close relationship with consumer in order to increase their trust.

As hypothesized, Hedonic Motivation, Perceived Security and Perceived Trust have positive influence on behavioural intention while Perceived Risk has negative influence on behavioural intention to adopt mobile wallet. The result affirmed these four hypotheses. As a result, it is learnt that when all these first three factors increase, the users' intention to use mobile wallet would also increase. And, when the perceived risk decreases, the intention is increasing. As for Effort Expectancy and Facilitating Condition, the result of study contrasts with Singh et al. (2019), Dong (2018), Morosan and Defranco (2016), Patel (2009) and Slade et al. (2013) in which they found the significant relationship between these two variables and behaviour intention to use mobile wallet. In response to this discrepancy, it might be said that users will have high intention to use mobile wallet when the level of Hedonic Motivation, Perceived Security, and Trust are high due to its significant and positive relationship, and low Perceived Risk as it has negative influence on the intention on mobile wallet usage.

Conclusion and Future Research

This research aims at determining the state of consumers' intention to use mobile wallet as previous literature informed that in Malaysia, the level and rate of mobile usage is at infancy. Being triggered from this issue, this study attempt at examining the determinants or factor may influence the adoption of mobile wallet service. The theoretical framework consisting of six determinants (Behavioural Intention, Effort Expectancy, Facilitating Condition, Hedonic Motivation, Perceived Risk, Perceived Security, Perceived Trust) gathered from established literature was proposed. Upon the analysis, it is found that the Hedonic Motivation, Perceived Risk, Perceived Security and Perceived Trust are the main factors positively affect users' behavioural intention on mobile wallet with Hedonic Motivation as the

strongest predictor. The other two predictors i.e. Effort Expectancy and Facilitating Condition have negative affect and thus rejected as they insignificant predictors.

Despite the intended objectives had been achieved, this study has some limitations in its locality and sampling in particular. Enhancement in future research can be made in the locality to include wider areas or all capitals in Malaysia at once or individually. Definitely this will involve larger sampling. By remaining its flavour, another potential research on this topic is examination about the intention of different the groups of citizen such as M40 and T20 in adopting the mobile wallet facility. The individual research effort can be accumulated to allow the pattern analysis of consumers' intention to use mobile wallet in Malaysia.

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Development Scenarios of Foreign Economic Activity of Large Russian Industrial Regions (On the Example of The South Urals)

Irina Y. OKOLNISHNIKOVA
Institute of Control Sciences V.A. Trapeznikov of Russian Academy of Sciences, State University of Management, Moscow, Russia, okolnishnikova.i@mail.ru

Antonina I. UKHOVA
South Ural State University, Chelyabinsk, Russia, antonina.ukhova@gmail.com

Margarita D. OKOLNISHNIKOVA
St. Petersburg state University of Economics, St. Petersburg, Russia, okolnishnikova@yandex.ru

Mark S. ANASTASOV
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia, anastasov.m.s@madi.ru

Abstract

The article is devoted to the study of ways to improve the foreign economic activity of large industrial regions of Russia. The authors describe the main factors hindering the development of export potential and reveal the tools for solving this problem. The article presents the forecast of the development of foreign economic activity of the Chelyabinsk region for the period up to 2035, compiled by the authors, using the methods of expert assessments and economic and mathematical modeling, in three versions - conservative, basic and target. This forecast was compiled by the authors taking into account the main scenarios of the socio-economic development of Russia and fully takes into account the specific features of the development of the Russian and regional economies. The authors propose sectors of the economy that are promising for the expansion of foreign trade and give forecasts for the development of the region's export potential.

Keywords: Regional Economy, Foreign Economic Activity, Export Operations, Marketing Strategies for The Development of The Region.

Introduction

The development of foreign economic activity of the regions of Russia has a positive effect on the rates of their economic growth, overcoming narrow product specialization and forming the prerequisites for the formation of new export industries. The stated topic is especially relevant for the economies of large industrial regions of Russia of the raw material type, experiencing serious crisis and post-crisis trends. The foregoing determined the relevance of the research topic and the choice as a subject of study of the foreign economic activity of the Chelyabinsk region as one of the large industrial regions of Russia, which is in dire need of the development of the export of its goods and services.

Results and Discussion

Currently, in the commodity structure of the region's exports, the priority remains the export of ferrous and non-ferrous metals, accounting for more than 85% of total exports, as well as mechanical engineering products - more than 6%, fuel and energy products - slightly less than 2%, chemical products - 1.7 %, food products and agricultural raw materials - 1.5% (Foreign trade statistics, 2020).

As shown by the study, the main factors constraining the development of the region's foreign economic activity in recent years are:

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- weakening of the competitive positions of enterprises due to the raw materials orientation of exports;
- insufficient government regulation of foreign trade.

According to the authors, the tool for solving this problem is an effective state policy in relation to foreign economic activity, based on:

- strengthening the regulation of foreign trade;
- tightening control over the quality and quantity of goods crossing the border;
- attracting foreign investment;
- creation of optimal conditions for domestic exporters;
- support for export-oriented high-tech industries.

Based on these factors, the authors have compiled a forecast for the development of foreign economic activity of the Chelyabinsk region for the period up to 2035 in three options:

1. Conservative option - developed on the basis of a conservative assessment of economic growth rates, taking into account the continuation of sanctions by the US and the EU, which means maintaining limited access to the world capital market and the presence of counter-sanctions from Russia.
2. Basic option is based on conservative trajectories of changes in external and internal factors of economic development while maintaining the existing efficiency of resource use.
3. Target option - based on the achievement of target indicators of socio-economic development under conservative external economic conditions.

The main forecasting methods were the methods of expert assessments and economic and mathematical modeling. When forming forecasts for the development of foreign economic activity of the Chelyabinsk region, the main scenarios of the socio-economic development of Russia were taken into account, presented in table 1 (Russia has been offered three scenarios of socio-economic development in the long term - conservative, innovative and targeted (forced), 2020; Federal State Statistics Service, 2020).

The scenarios for the development of foreign economic activity developed by the authors take into account the following features of the development of the Russian and regional economies:

1. Moderate growth rates of GDP and industrial production in all scenarios of Russia's economic development, except for the accelerated one, with the modernization of the energy resource complex, the introduction of energy and resource saving technologies, the development of transport infrastructure, which will ensure the preservation of the traditional fuel and raw materials export potential.

2. Formation of a competitive sector of civil high-tech industries and the knowledge economy (including through increased funding for scientific research from non-state sources and technology transfer) in the case of moderately optimistic or forced scenarios, which will increase the weight in the structure of exports of high-tech products, science-intensive and intellectual services.

3. Increasing the export potential of the transport infrastructure serving international transport, the tourism industry.

4. Development of the knowledge economy.

5. Expansion of domestic investment and consumer demand, growing faster than GDP, which increases the priority of solving the problems of import substitution.

6. Increasing the competitiveness of industry, agriculture, services, as well as the implementation of the National Entrepreneurial Initiative, simplifying the business environment, facilitating the existing export procedures, which will cause an increase in the number of exporters while diversifying the export structure.

7. Formation of a national export support system based on financial, organizational, marketing, information, foreign trade and political and diplomatic tools to strengthen Russia's position in world markets.

Table 1. Russian GDP growth rate per year, %

Development scenario name	2021-2025	2026-2030	2031-2035
Conservative	2,7	2,9	2,6
Basic	2,6	2,9	3,4
Target	2,9	3,6	4,0

Taking into account the current state and expected dynamics of the listed factors of competitiveness, the sectors of the Russian economy that are promising for the expansion of foreign trade are:

- the fuel and energy complex (62% of total exports, 34.5% of non-primary exports), where Russia is the leader in reserves, production, and export of mineral fuel (oil, gas, coal) and products of its processing;
- metallurgical complex (7.5% of total exports, over 12% of non-resource exports) with a high supply of raw materials (nickel production, lead mining), affordable cost of energy resources (aluminum production) and unique technologies (titanium production);
- agro-industrial complex (4.5% of total exports, 8% of non-primary exports), characterized by an increase in the production of primary agricultural products due to a variety of natural and climatic zones, supply of fresh water, large areas of agricultural land and a rich raw material base for the production of mineral fertilizers;
- transport complex (3.5% of total exports, 6.5% of non-primary exports), which is an important element of international transport corridors; in addition, certain Russian technologies in this area are also competitive - space technologies, large-size air transportation, icebreaking operations, etc.;
- production and processing of precious metals and stones (over 2.5% of total exports, 3.5% of non-resource exports), characterized by their large reserves and rich traditions of jewelry;
- the military-industrial complex (2.5% of total exports, 4.5% of non-resource exports), where Russia ranks second in terms of arms exports;
- petroleum and gas chemistry (over 2% of total exports, 4% of non-resource exports), characterized by high production rates (1st place), moderate prices for energy resources and low environmental costs;
- the tourism sector (2% of total exports, 4% of non-resource exports), based on a variety of natural and climatic conditions and cultural and historical monuments;
- transport engineering, including the production of components (1.5% of total exports, about 3% of non-resource exports), where Russia is successful in the production of helicopters, rocket and space technology and jet engines;
- timber industry complex (about 2% of total exports, over 2.5% of non-resource exports), which has the largest reserves of industrial wood, moderate prices for energy and material resources, low environmental costs;
- nuclear complex - from uranium mining to the production of equipment for nuclear power plants and services for their operation (over 1.5% of total exports, more than 2% of non-resource exports) with a developed scientific and production base, unique technologies and developments, as well as extensive experience in successful implementation projects;
- IT technologies (1% of total exports, 2% of non-primary exports) with high dynamics of growth in the world market, the presence of highly qualified personnel in Russia and successful developments;

– power engineering, including the construction and operation of electric power facilities (0.3% of total exports, 0.6% of non-resource exports), characterized by the growing capacity of the world market, in which Russia is the leader in terms of facilities commissioned abroad.

The forecasts of foreign trade turnover, export and import of goods and services developed by the authors are presented in Figures 1-3.

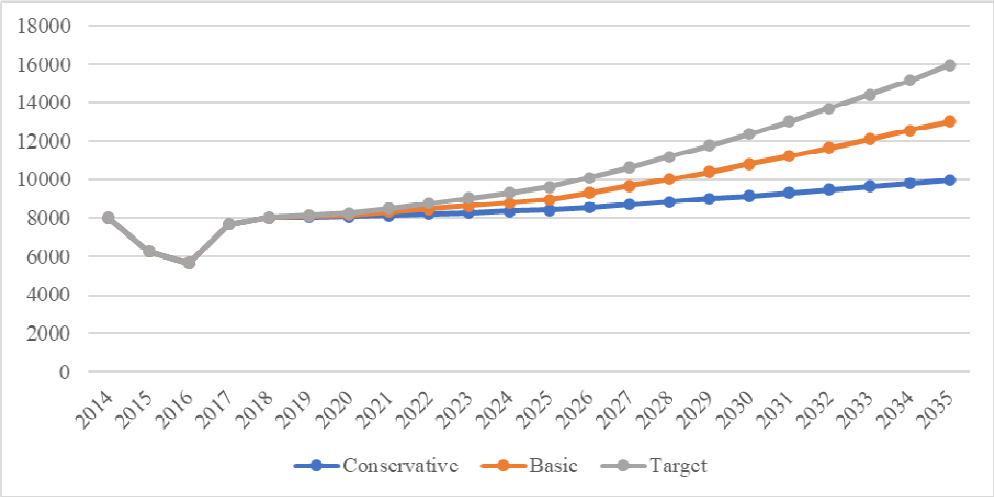

Fig. 1. Scenarios for the development of the foreign trade turnover of the Chelyabinsk region until 2035, million dollars

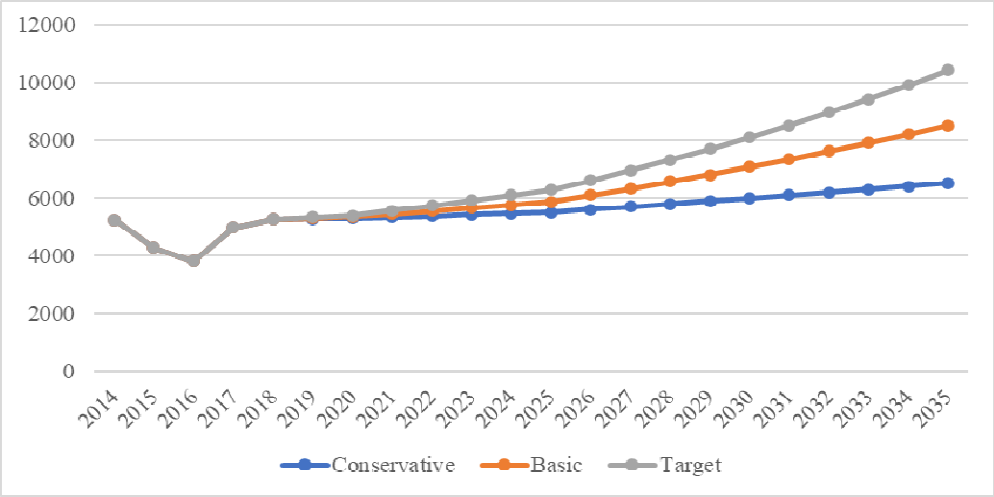

Fig. 2. Scenarios for the development of export of goods and services of the Chelyabinsk region until 2035, million dollars

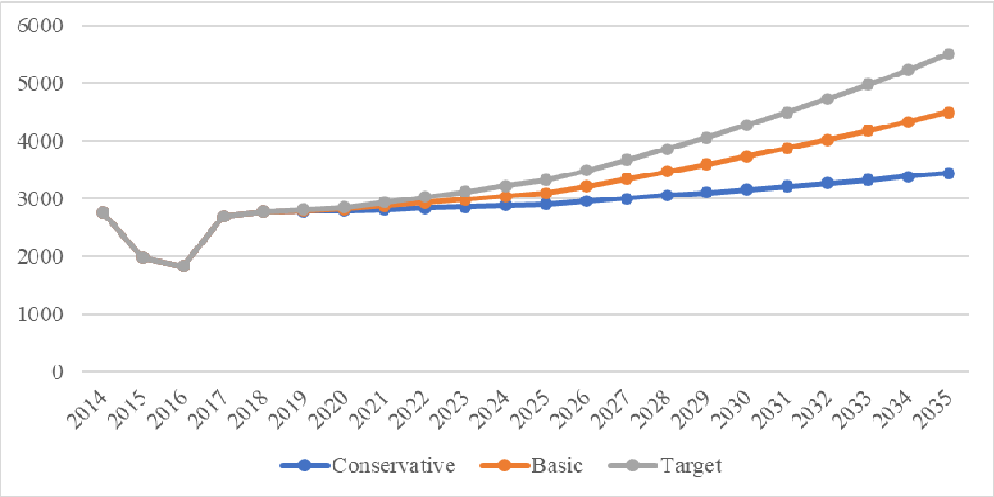

Fig. 3. Scenarios for the development of imports of goods and services of the Chelyabinsk region until 2035, million dollars

The main parameters of the baseline scenario for the development of the region's foreign economic activity until 2035 are:

- an increase in the value of exports by 2.2-2.4 times;
- a reversal of the trend towards a decrease in the share of machinery, equipment and vehicles in the export of goods and a steady annual increase in supplies;
- increasing the coefficient of export commodity diversification;
- growth of the share of services in exports by 1.7 times with an increase in the share of knowledge-intensive and intellectual services up to 20% (currently 14-15%);
- increase in the number of exporters by 3 times.

The main parameters of the target scenario for the development of the region's foreign economic activity by 2035:

- an increase in the value of exports of goods and services by 2.7-2.9 times;
- increase in the share of machinery, equipment and vehicles in the export of goods to 9-10%;
- increasing the coefficient of export commodity diversification by 1-2 points;
- doubling the region's share in world exports of high-tech goods;
- increasing the share of services in total exports by 1.8-1.9 times to 20%, with an increase in the share of science-intensive and intellectual services in the export structure up to 25%;
- 4 times increase in the number of exporters of goods.

The expected increase in the region's foreign trade turnover is presented in table 2.

Table 2. Growth rates of foreign trade turnover of the Chelyabinsk region per year, %

Development scenario name	2019-2020	2021-2025	2026-2035
Conservative	0,3	0,8	1,7
Basic	0,8	1,9	3,8
Target	1,3	3,1	5,2

Based on the foregoing, it is possible to predict the preservation of the export potential of metallurgical enterprises in the region, since most of them have modernized their production assets. Food producers are highly likely to increase their export potential. Higher dynamics is expected in the market of transport, tourism, telecommunications and computer services.

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Participation as A Key Element of Smart Governance: Empirical Analysis of Selected Polish Cities

Joanna DROBIAZGIEWICZ, PhD

University of Szczecin; Faculty of Economics, Finance and Management; Institute of Management, Poland
University of Szczecin; Faculty of Economics, Finance and Management; Institute of Management;
Department of Logistics ul. Cukrowa 8, 71-004 Szczecin, Poland
E-mail: joanna.drobiazgiewicz@usz.edu.pl
ORCID: 0000-0001-6726-8579

Abstract

The role of smart governance is currently increasing, with public participation as an important element. However, practices of participation in city management are still too limited and solutions are constantly being sought that can increase citizens' activity in the life of local communities. Showing various forms of public participation and its practical examples may influence the extension of the scope of existing activities towards participation in governance by local authorities and its residents. The aim of the article is to present the essence of public participation and to analyze the degree and areas of its application in leading Polish cities. In the theoretical part of the article, based on literature studies, a model of public participation in local self-governments was created, which was then used for the analysis carried out later in the discussion. Empirical research using the case study method was conducted on the basis of selected Polish cities, the most advanced in terms of implementing the idea of smart governance and thus the implementation of participatory practices. Research results indicate that participation has an impact on the development of local self-governments and is an increasingly important element of smart governance. Various participation tools are used, but some of them are not as important yet. In addition, the mere possibility of participation does not prejudge its effectiveness, as a large proportion of residents do not show interest in this area. ICT technologies are widely used to communicate with stakeholders, which may give the possibility of quick and effective consultations available to many social groups. The most popular tool for participation are the participatory budget and consultation, whose visible effects motivate city dwellers to use this form of participation in local management.

Keywords: Participation, Smart Governance, Smart City, Local Government, Public Management.

Introduction

Literature research as well as applied practices indicate that with the introduction of modern management concepts in the public sector, there is a need to change the approach to the existing relations between public administration and its stakeholders. The changes introduced were aimed at ensuring transparency of the activities of public entities, treating the existing petitioners as clients and introducing participatory actions. NICT - new information and communication technologies play an important role in achieving the adopted objectives of these changes (Nam, Pardo, 2011; Ruhlandt, 2018). Initially, they were the basic tool of the new method of administration functioning called e-government. It was mainly meant to improve the functioning of internal processes in the administration, to improve its efficiency, as well as to improve access to public information and increase the quality of public administration services. The introduction of this concept initiated further transformations towards smart governance, where public participation plays an important role and civil society becomes a policy maker (Michels, De Graff, 2010). The participation of the local community allows for a real recognition and consideration of the needs and expectations of the inhabitants in shaping their immediate environment in accordance with the sustainable development policy (Steinert et al, 2011; Meijer et al, 2016; Castelnovo et al, 2016). The aim of this article is to present a theoretical model of the public participation process in local government units and then to indicate its selected practical aspects on the example of the best developed smart cities in Poland. The first theoretical part of the article defines the place of the participation process in smart city management and then presents a model approach to this process. Then, on the basis of the indicated approach in the further, empirical part of the considerations, an analysis of activities indicating the main directions of development of participatory processes was made. The last part of the article presents conclusions from the research.

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State of the Art

The Role of Smart Governance in City Management

Smart governance is especially important in city management (Tomor et al, 2019). Smart governance means that various groups of stakeholders can participate in making public decisions as well as use modern forms of public services. The use of New Information and Communication Technologies allows to tighten cooperation between citizens and city government (Alawadhi, Scholl, 2016; Pereira et al, 2018). Moreover it shapes new forms of relations, opportunities for dialogue and building consensus between citizens, institutions and organizations. Therefore, "intelligent co-management" does not mean the independent provision of services by public authorities, but creates space for the activity of citizens and entrepreneurs, entrusting a significant part of its tasks to private partners and non-governmental organizations. Public administration communicates and consults with residents both when establishing development priorities and when determining the goals of spending funds from the budget of a local government unit.

Thus, it can be stated that smart governance in relation to cities is a creative way of governing a city, in which the society, through the use of information, communication and technology integration, is involved in the process of planning, managing and implementing activities in various areas of city functioning in order to create sustainable public values, which is in accordance with the principle of sustainable development.

The characteristics of smart governance are:

- integration of undertaken activities (Chourabi et al, 2012),

- aiming at constant improvement of management quality,

- openness and transparency of activities (Baud et al 2015; Kim et al, 2005; Scholl &Scholl, 2014a),

- striving to improve the quality of public services provided, well-implemented e-government (Giffinger et al, 2007),

- social participation (Kim et al, 2005),

- the use of ICT (smart administration, the possibility of providing integrated services and using various electronic ways of communication (Odendaal, 2003; Picazo-Vela et al, 2012; Kavanaugh et al, 2012).

Smart government implementation must also prioritize digitization in any government action in favour of social services (Scholl &Scholl, 2014b; Bernardo, 2017).

Participation - definition and model approach

Public participation is a process of deliberation in which interested citizens, institutions and non-governmental organizations are involved in creating public policy before a political decision is made. (Council of Europe, 2019). In the participation process, the elements of entry are participants in the process, specific conditions of the participation process, including opportunities in the field of information and communication systems. However, the elements of the exit are conscious participation in the life of society, co-creation of public policy as well as its measurable effects. The model of the participation process is presented in Figure 1.

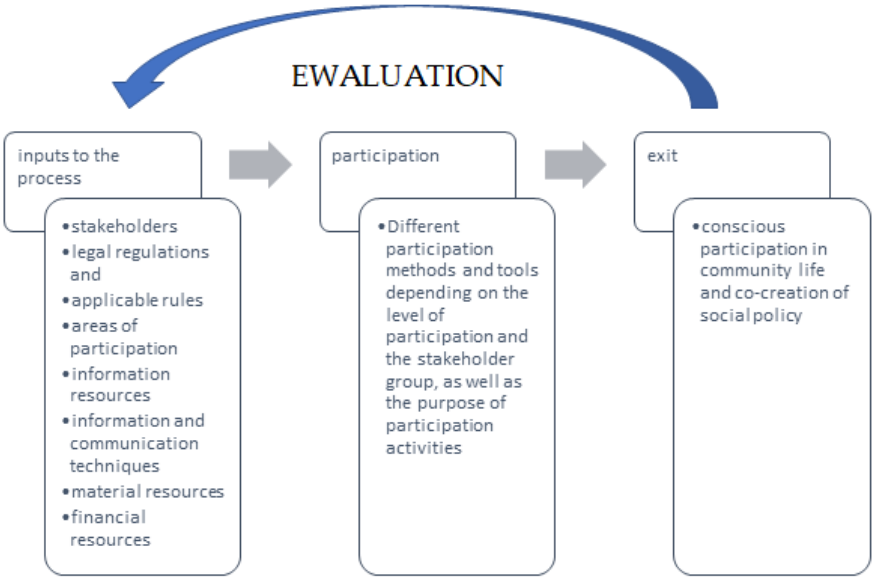

Figure 1: Model of the participation process.

Source: own study.

Stakeholders in the process of participation in local governments are their inhabitants, institutions, organizations, economic entities as well as the local administration itself. In order to undertake participatory activities, it is necessary to have access to information resources as well as other resources which are necessary in specific forms of participation, such as financial resources in participatory budgets. It is important that there are also adequate regulations with regard to opportunity of community participation in local policy making. Participation can be related to its various areas, both in terms of the thematic scope and the nature (or level) of participatory activities. The main thematic areas of citizen participation are:

- electoral participation - participation in elections and referenda, elections of local authorities, dismissal of the authorities, participation in the election campaign (Rallings et al, 1996; Frandsen, 2002).
- transparent information flows (Kim et al, 2005),
- vision, strategy and future of the local community and the city (Meschede, Mainka, 2020; Berry et al, 2019),
- spatial development (Kikosicka, 2014; Meilvang et al, 2018; Wójcicki, 2013),
- transport and communication (Niemeier et al, 2015; Kauf, 2018),
- ecology, environment (Kauf, 2018),
- safety (Ombler et al 2016; Alibegović, Slijepčević, 2018),
- local budget,
- social problems (e.g. poverty, unemployment, homelessness) (Kauf, 2018),
- culture,
- consultations on documents adopted by the local government,
- standards of public and social services (quality of administrative services, standards of senior care services) (Alibegović, Slijepčević, 2018),
- participation in the creation of civil dialogue units and other auxiliary units.

Participatory activities can take various forms depending on the area and level of participation, stakeholder group, the purpose of the participatory activities and the resources available.

The hierarchy of participatory actions according to the level of their advancement was presented by Arnstein (1969), who defined eight levels, from the least to the most advanced. Arnstein distinguished: manipulation, therapy, informing, consultation, placation, partnership, delegated power, and lastly citizen control. The first two levels do not allow for participation, and up to the fifth degree there is no certainty that a change will be made, as the final decision rests with the rulers. We can talk about proper participation from the stage of informing the inhabitants to co-governance.

Public participation used in city management also has disadvantages. The undesirable effects of participation are, for example:

- improperly planned or improperly conducted public consultations, which may have negative consequences such as the feeling of losing time or disregarding their participants.

- poorly organized participatory activities, which may discourage the local community, reduce trust in local authorities as well as in the entire democratic state system. They may also exacerbate existing disputes rather than lead to cooperation between residents.

- social participation may also lead to forcing one's own interests rather than the interests of sustainable development of local communities.

Moreover, according to the conducted research, more affluent and educated inhabitants, less educated and excluded from society, participate in civic activity. Thus, the projects support those social groups whose situation is relatively good. They often do not contribute to the reduction of poverty and social inequalities, and often lead to deepening differences. Social activity alone will not overcome the weaknesses of civil society, such as the lack of effective cooperation of the local community in achieving the set goals. Therefore, effective state control seems to be essential. Participation requires a strong state and civil society should develop in a strong symbiosis with the state and not next to it (Mansuri, Rao, 2013).

Field of Empirical Research

The paper was prepared using the method of critical analysis in the literature (Cottrell, 2017). This analysis made it possible to create a proposal for a model of public participation process of local government residents. Due to the scope of the issue, only some important aspects indicating the directions of changes in the participatory processes of the studied cities were examined. Two Polish cities were subjected to empirical research - Warsaw and Wrocław, which were included in the top 100 of the smart cities ranking around the world "IESE Cities in Motion Index 2020" and thus were recognized as the smartest cities in Poland (Berrone, Ricart, 2020). Warsaw was placed on 54th position, while Wrocław took 88th place. Warsaw is the capital and the largest city in Poland situated in its central part, it covers an area of about 517 km2 and is inhabited by over 1.79 million people. Wrocław, on the other hand, is the fourth largest city in Poland, located in the south-western part of the country. Its area is approximately 292 km2 and the number of inhabitants exceeds 642,000. Case studies were conducted on the basis of materials provided by city offices, as well as through the own observation of citizens' participation possibilities in the local politics of the examined cities.

Results

Possibilities of participation defined by local legal regulations

An extremely important issue in the topic of public participation is to define the foundations of its functioning and to define the directions of its development that enable interested parties to participate in such a process. Basic local legal regulations and documents relating to participatory activities are the city charter (Public Information Bulletin of City Hall of Warsaw 2019 , Public Information Bulletin of City Hall of Wrocław 2018)(, ordinances of city authorities, resolutions of the city council, including the city's strategy. They concern such issues as:

1. Possibility of a local referendum in resolving important matters.
2. Possibility of cooperation of the City with other local government units, as well as with other entities, including non-governmental organizations.
3. Transparency of activities of the City authorities:
- citizens' right to obtain information,
- access to sessions of the Council and meetings of its Committee,
- access to documents resulting from the performance of public tasks.
4. Elections to the City Council.
5. Social consultations in various areas.
6. Establishing advisory and consultative bodies in the form of youth councils and senior councils.
7. Rules and procedures for a group of persons having active electoral rights to take the initiative to adopt a resolution or position by the Council.

In addition to local legal acts, civic participation in cities is also regulated by national regulations on access to public information (BIP), the functioning of local government units, public finances and election law.

Communication and providing access to information

One of the basic elements of civic participation and a condition for its operation is to provide access to public information. This information can be made available on a voluntary basis and can be of a general, informative nature related to the life of the community, e.g. cultural events. Another type is obligatory information resulting from the statutory obligation to publish public information. This type of public information should meet certain requirements specified in the Act (The act of 6 September 2001). It includes e.g. information concerning the regulations in force, the structure of public administration bodies, the procedures in force, as well as contact details of individual units. The third type of public information is that which is made available at the request of a citizen. Dialogue and the nature of information influence the development of civic attitudes and the decisions made by the authorities (Krakowiak-Drzewiecka, 2015). Moreover, transparent information and good communication builds the trust necessary to undertake civic activity (Castells, 1983; Putnam, 1995, Fukuyama, 1997). Citizens should be able to use different forms of information and communication with the office, where modern information and communication technologies play an important role (Wieczorkowski, Paweloszek, 2018). The opportunities to engage in public life without leaving home and on an anonymous basis represent a significant qualitative change in the building of civil society today (Sobol, 2018).

The cities surveyed, which apply participatory practices, publish information in electronic form to a large extent. Their most advanced form is the publication of open data, i.e. data available to any interested party, which has been created by or on behalf of the authority. They are publicly available and ensure transparency of the local administration's operations, and are updated on an ongoing basis. They relate to many areas, the most popular are: urban transport, spatial data, local government budgets, education. According to the form of its availability, they have been divided into five categories, in order from the least to the most advanced ones in the pursuit of open connected data (Berners-Lee, 2006):

1. Providing data on the website in any format,
2. Data in a structured form, e.g. an Excel file instead of a table scan (xls),
3. Information available in a structured form with an open structure, e.g. (CSV) or XML,
4. The use of URI and RDF links to describe data,
5. Use of contextual URI links to other sources (open linked data).

The studies carried out show that information are made available in different forms depending on the type. Information on public transport deserves special mention, where it is updated on an ongoing basis and is available in various formats, also via a mobile application. The introduction of open data is a relatively new concept introduced in the last few years and still being developed in the cities surveyed. The characteristics of the area and forms of open data provided by the surveyed cities and the main modern forms of communication are presented in the table 1.

Table 1: The area and forms of open data provided by the surveyed cities and the main modern forms of communication

	Warsaw	**Wroclaw**
open data areas	Culture Urban transport Education Ecology Properties Spatial data Security Official data	Transport Spatial data Town Hall Education Sport and recreation Weather data Events Other
Format of the shared data	JSON, CSV	CSV, XLS, SHP, HTML, XLSX, WMS, ZIP, WFS, DOC, CSW
Modern forms of communication	Online chat Instagram Facebook The City Hall's website Warsaw Portal Warsaw 19115 - Municipal Contact Centre for residents (24 h/7 days a week) Mobile application Warsaw Notification System	Online chat Instagram Facebook The official website of Wrocław Residents' notification system

Source: own study.

In the largest city in Poland, the format of shared data is unified and it can be determined that according to the Berners-Lee model it is in the third phase of data sharing. The scope of available data is quite large and its extension is planned.

An example of good practice in the city of Warsaw is the use of modern forms of communication with its residents, including the portal Warszawa 19115, dedicated to the residents, which enables 24-hour contact in such matters as:

- obtaining full information on services provided by the City Hall and municipal units (information),
- reporting a problem that should be dealt with by municipal services (intervention, e.g. damaged traffic lights),
- to give your own idea of how to improve the city (initiative/free application),
- possibility of constant monitoring of the implementation of the reported case (report status).

In addition, it is also available in a mobile version as an application. Based on this solution, the Warsaw Notification System was created, i.e. a free information system. It is supposed to simplify their everyday life in the capital city. It provides information from various areas of city life on an ongoing basis. An inhabitant can choose the categories and locations they are interested in - districts to be notified about. The system will also automatically send messages about local threats.

Consultations

Another level of advancement of citizens' participatory activities is a form of public consultation, usually initiated by the city authorities. A characteristic feature of consultations is a two-way information flow, which can occur at any stage of management, from the identification of the problem to the assessment of the changes introduced. It can be a one-stage process or, as is increasingly common, a continuous dialogue (OECD, 2020). Among the activities related to it, we can distinguish consultation meetings, public forums, public hearings, public opinion polling, meetings with the city mayor and a citizens' panel. Public consultations should meet the following principles (Ombler et al, 2016):

- those affected by the decision of local authorities should have adequate access to information and be encouraged to express their views,

- residents should be clearly informed of the purpose of the consultation and the scope of the decisions to be taken,

- should be given an adequate opportunity to present their opinions,

- local authorities should be open to innovative ideas,

- participants should have access to reports related to the implementation of decisions taken jointly.

Citizens' panel

The Citizen's panel is a relatively new solution and has only just been introduced in the examined cities. At the local level, a group of inhabitants is randomly selected to participate in the Citizens' panel, taking into account demographic criteria such as gender or age. This group constitutes a "city in a nutshell". The role of the citizens' panel is to analyse a specific subject in detail, discuss various solutions, listen to the arguments for and against, and then make conscious and thoughtful decisions. In Wrocław, a civic panel was established on the problem of improvements in the movement around Wrocław, including the improvement of quality of life and climate protection (Ordinance of the mayor of the City of Wrocław, 2020). In Warsaw, on the initiative of young people, a civic climate panelis to be created (Ordinance of the mayor of the City of Warsaw, 2020). In Wrocław, the citizens' panel is composed of 75 people drawn, with an additional 10 taking part as participants and reserve participants. According to the declaration of the President of the City of Wrocław, the recommendations which will be supported by at least 80 percent of the panel will be treated by him as binding, i.e. will be indicated for implementation. The rules of functioning of the citizens' panel are specified in the regulations. They contain a description of the panel's standards, its thematic scope, the panel's schedule, definition of the coordinating and monitoring team, the method of appointing panelists and the rules of its functioning (Rules of the first Wrocław citizens' panel).

Public Consultations

Public consultations are a popular form of citizens' participation in creating the policy of local communities of the examined cities. It is a formal, phased process that follows the methodology and aims to provide reliable information to agree on a project, plan or strategy. Public consultations take place in accordance with a specific methodology and are mainly aimed at presenting doubts, questions and proposals of stakeholders on matters which they can directly influence. Social consultations generally address similar issues such as environmental protection, land use, social problems, public transport problems and culture. The table 2 shows the areas of social consultations conducted in Wrocław and Warsaw.

Table 2: The areas of social consultations conducted in Wrocław and Warsaw.

	Warsaw	Wroclaw
Public consultation areas	Digital transformation of the city Electromobility Zoning plan Solving social problems Environmental Protection Municipal greenery Urban transport Culture Parking of vehicles Development of tourism in the city of Warsaw Climate change Changes in the statutes of city districts Organization of city events Establishment of a secondary school Settlement matters	Consultation of the civic budget City revitalization Ecology Parking of vehicles Improving participatory processes City transport Municipal greenery Culture Spatial development Wrocław's strategy Social policy strategy Settlement matters Create streets, street names Climate change Recreation and playgrounds for children Electromobility
Number of completed consultations from 2016 to 07.2020	271	53

Source: own study.

All consultations conducted can be divided into obligatory and non-obligatory. Those of an obligatory nature may include, for example, consultations on changing the boundaries of city districts, spatial development, creation and abolition of auxiliary units, development projects or consultations on additional names in the minority language (The act 1990, The act 2003a, The act 2003b, The act 2004, The act 2005, The act 2006). The need for such consultations results from national legislation. Noteworthy are the consultations on climate change and its prevention, as well as electromobility. In addition, the cities surveyed conducted consultations, which aimed to develop practices that increase the participation of residents in participatory processes.

In order for the consultations to be effective it is necessary to maintain appropriate rules such as: listening to each other and trying to understand different arguments, universal and transparent consultations, responsiveness, coordination, creating clear rules and defining the planned course of consultations, respect for the general interest (OECD, 2001). The efficiency of the course of public consultations should be ensured by the regulations created for these purposes.

It is particularly important that information about planned consultations is generally available to interested parties. An important role is played here by the information portals of cities, as they clearly present information on consultations that have been conducted and completed so far, as well as those that are ongoing or planned.

Codecision

Codecision is the highest level of public participation, where the initiators of change are the citizens themselves, who participate in all stages of the decision-making process related to public policy-making. The most advanced forms of public participation include: legislative initiatives and active participation in the preparation of the legislative process, participatory budget and local initiatives.

Since 2018, in Polish law, there has been a possibility for residents of local government units to submit a civic initiative to decision-making bodies. It enables a group of people to submit a draft act of a local law, which will be considered during the City Council. A local initiative may concern the entire city or each of its districts. The group must have the right to vote and live in the same district or city and its number depends on the number of people living in a given local government unit. This solution has been used many times in the largest city in Poland. In Wrocław, on the other hand, since 2019, three such initiatives have been undertaken, two of which concerned recycling.

Another form of participation in the examined cities is a local initiative. According to the adopted rules in Warsaw, it has to be represented by at least two people or a non-governmental organization. To ensure the efficiency of this form of public participation, coordinators were appointed in each district. The submitted projects should relate to activities supporting the development of local and charitable communities; activities for the benefit of culture, art, protection of cultural assets and national heritage; revitalization; promotion and organization of volunteer work; education and upbringing; activities in the sphere of physical culture; tourism or nature protection. Residents engage in the implementation of the local initiative primarily in the form of social work, but also material and financial contributions. Within the framework of the local initiative, the municipal office does not transfer money directly, but may pay for the purchase of materials specified in the project or the commissioned work. In Wrocław, a program to support local grassroots initiatives was also defined and divided into three types: microgrants for individuals and informal groups, microgrants for non-governmental organizations and microgrants for informal groups of young people.

Participatory Budget

Another advanced participation tool is the participatory budget, which enables citizens to actually co-decide on how to spend part of the local budget (Rachwał, 2013). It encourages residents to look at the mechanisms of constructing and spending local budgets, and forces them to make decisions on spending priorities, as well as to consider the vision of the development of a given locality. A participatory budget must follow certain rules, such as (Sintomer et al, 2008; Sintomer et al 2012):

- transfer of a certain amount from local government funds to the participatory budget,

- the opportunity for every citizen to participate ,

- the need to hold public meetings and debates,

- implementation of projects selected by citizens' vote,

- reporting on budget implementation,

- it has to be a long-term action, not a one-off.

In the examined cities this tool has been used for several years - in Wrocław since 2013 and in Warsaw since 2015. Figures 2-3 show the number of positively assessed project proposals allowed to vote, as well as those selected by citizens for implementation in Warsaw and Wrocław in 2015-2019 .

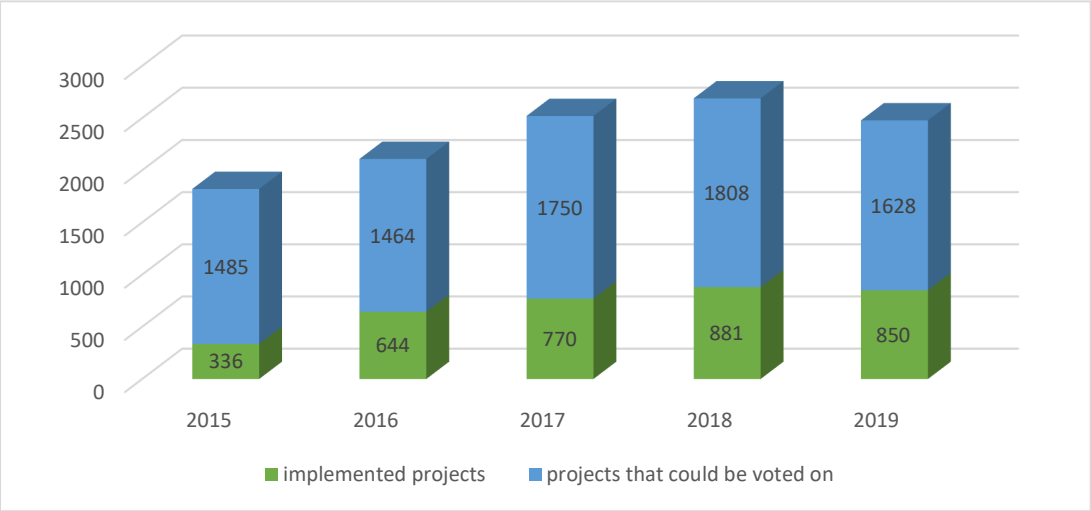

Figure 2: The number of positively assessed project proposals allowed to vote, as well as those selected by citizens for implementation in Warsaw in 2015-2019. Source: own study.

In Warsaw, the number of projects underway shows an increasing trend (Reports on the evaluation of warsaw's participating budget in 2015-2019). Inhabitants show great initiative by presenting as many as 5,000 projects in the

last three years, which were allowed to vote. Out of these, 48% have been implemented, which indicates that there is great potential for influencing local initiatives within the framework of the civic budget.

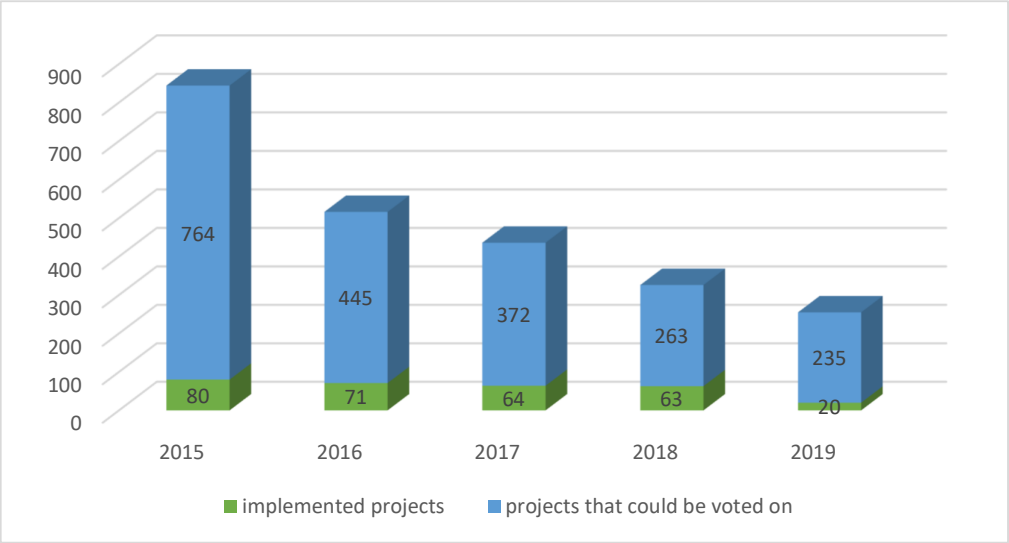

Figure 3: The number of positively assessed project proposals allowed to vote, as well as those selected by citizens for implementation in Wrocław in 2015-2019.

Source: own study.

The number of projects implemented in Wrocław is systematically falling (Reports on the evaluation of wrocław's participating budget in 2015-2019). However, this does not result from the reduction of funds allocated to the annual civic budgets. Fewer projects are being implemented, but they are more cost-intensive and require more money. In 2017, an additional edition of the citizens' budget took place in Wrocław, the purpose of which was to invest in urban greenery. An additional 8 projects were implemented. So in 2017, 72 projects were completed.

The scale of participation in the civic budget can also be proved by the number of people who expressed their opinion by voting for selected projects. The number of persons voting in the surveyed cities is presented in Figure 4.

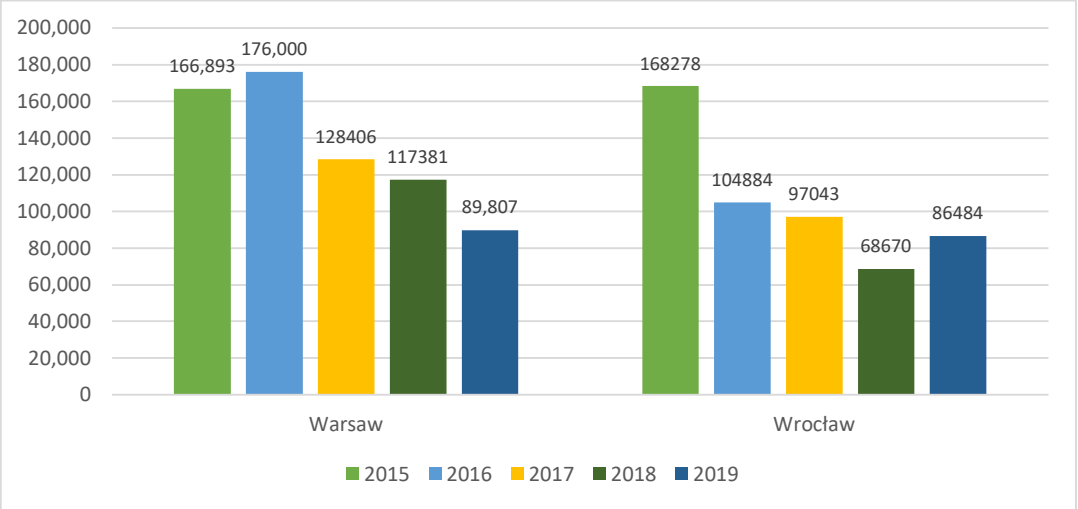

Figure 4: The number of people voting in the surveyed cities.

Source: own study.

As the two cities differ significantly in terms of the number of inhabitants, Figure 5 shows the percentage of inhabitants who took part in the vote on the civic budget in both cities.

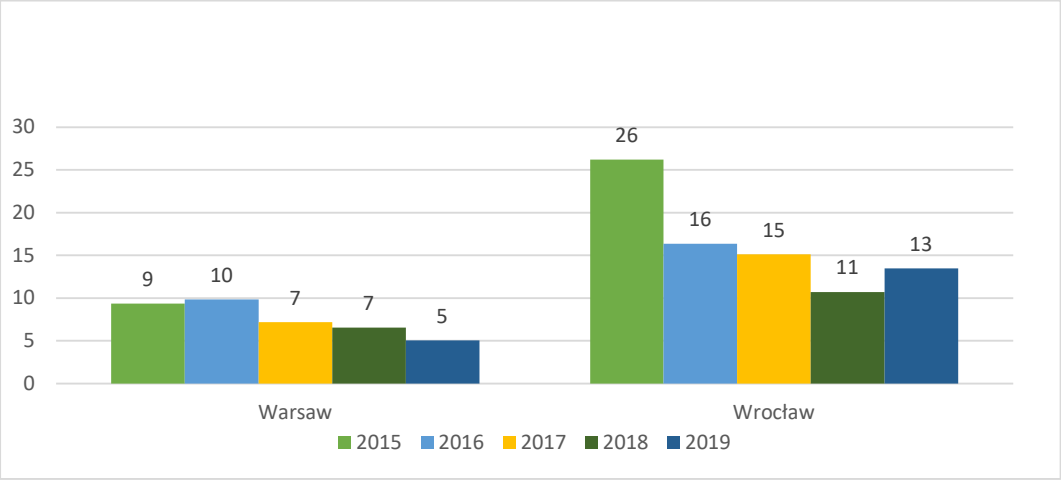

Figure 5: The percentage of inhabitants who took part in the vote on the civic budget.

Source: own study.

It can be seen that in the smaller city (Wrocław) relatively more people are interested in the civic budget. At the same time, a decreasing trend can be indicated in relation to the number of people interested in this form of participation in both cities. This phenomenon is also observed in other cities.

Participatory budgeting can be implemented on a city scale, but also in smaller units. An example of such a budget is the first civic budget of a community centre in Poland. The residents worked out programme proposals for the activities of the community centre using the form of individual interviews, workshops and working groups. Then these proposals were implemented.

Discussion and Conclusions

In order to develop the process of participation, it is necessary to ensure its proper foundations, such as good quality public information and various forms of communication, appropriate regulations enabling the inhabitants to influence the city's activities, appropriate well-designed participation tools and the willingness of the local community to get involved. Civic participation is essential for the directions of city development. A wide response from citizens requires the use of many different participation tools and encouragement to use them.

So far, the main forms of co-decision in the examined cities have been social consultations and citizen budgets. In recent years, there has been a development of local initiatives, including the resolution initiatives that have been possible for two years. Adequate access to information on the possibilities of participatory activities, along with instructions on how to proceed and the possibility of direct contact, makes it easier for residents to participate in the life of the local community. ICT plays an important role in providing access to information. The best solution in this case are dedicated internet portals such as Warsaw 19115. It is important to provide an appropriate, user-friendly interface and simple website navigation. The possibility of using such portals requires access to the Internet. It is also necessary to use various media to disseminate information and communicate with the inhabitants. such as social media. A good solution introduced in the surveyed cities was also to consult with the inhabitants on the possibilities of increasing their participation in local policy-making. Another measure introduced by the surveyed cities was the creation of advisory bodies such as the Youth City Council or the City Senior Council. It is also a good practice to create organisational units within the administration itself, designed specifically for the purpose of undertaking dialogue with the public. Participatory activities in cities can also be supported centrally by the state. An example is the Human Smart Cities programme run by the Ministry of Investment and Development. This programme assumes support for projects selected in a competition submitted by small, medium and large cities. Under this programme, 8 small towns, 15 medium-sized and 2 large cities were supported in 2019.

The basis for participation in smart cities is the residents' trust in the city authorities, as well as the awareness of the benefits that result from hearing residents by the authorities. However, it is not easy to achieve and requires long-term work and, above all, consistency in action. The lack of willingness to involve the residents in the development policy of the local community, and merely informing them about various types of projects, often leads to objections from the residents. Sometimes it also happens that the planned actions of the city authorities are consulted with the inhabitants, but their opinion is not taken into account (Laurian, Shaw, 2009). As a result, residents do not feel co-decision makers and do not consciously get involved in the city's affairs (Rowe, Frewer, 2000).

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Technology Platforms as a Core Element of Innovation Infrastructure and a Model of Interaction Between Government, Industry, Science and Education

Victor F. STUKACH (0000-0002-9911-6286)[1], Yelena V. SHEVCHENKO (0000-0002-0201-441X)[2]

[1]Federal State Educational Institution of the Omsk State Agrarian University, Omsk, Russia
vic.econ@mail.ru
[2]QazInnovations, JSC, Nur-Sultan, Republic of Kazakhstan
yelenashevchenko@gmail.com

Abstract

The paper explores the development of technology platforms to ensure smart, sustainable and inclusive economy. Technology platforms are considered as the basis for elaboration of the common vision of scientific and technological development based on government-industry-science collaboration. Technology platforms are core element of innovative infrastructure and a way of implementing public-private partnerships. Technology platforms development requires identifying and selecting key sectors or areas of the future economy. The potential for technology platforms development on the country level should be based on special analytical technics including foresight technics and methods, considering the country's position and progress in STI development and existing opportunities for international collaboration.
Comprehensive multivariate analysis can be also applied for identification of new trends and opportunities for high-tech industrial development. Important attributes of progress are new high-tech services, start-ups in breakthrough technological areas where there are competitive advantages.

Keywords: Technology platforms, identification of promising technology areas, industry-science collaboration

Introduction

Technology platforms development is a methodological and resource basis to link government, business, science and education to implement a common vision of scientific and technological development and common approaches to the development of appropriate technologies. Technological platforms allow mobilize efforts, competences and resources of all stakeholders for the development of innovative technologies in certain strategic areas. Technology platforms are the core element of innovative infrastructure that is based on a mechanism of public-private partnerships.

Among the prerequisites for the efficient development of technology platforms, the authors highlighted: strategic technological challenges; the necessity of improving collaboration between core actors of innovation ecosystem; low efficiency and poor coordination of state support instruments for R&D and innovation development; fragmentation of scientific activities and low level of science – industry collaboration.

Digital economy requires implementation of digital solutions for technology platforms development. Stimulating demand for innovation and increasing the efficiency of commercialization processes, introducing innovative ideas into the real sector of the economy is significant for innovative economy development.

In Kazakhstan technology platforms are viewed as a methodological basis for connecting representatives of the government, business, science and education to implement a shared vision of scientific and technological development and common approaches for advanced technological development. Technology platforms allow mobilize efforts, competences and resources of all stakeholders to develop innovative technologies in certain strategic areas.

Countries with developed science and technology are using technology platforms (hereinafter - TP) as a tool for the developing a competitive and high-tech economy. According to the internationally accepted definition of TP are objects of innovative infrastructure that allow effective communication and development of advanced technologies,

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high-tech, innovative and competitive products based on the participation of all actors (government, industry, science, education, public organizations). In the EU, technology platforms are a demand-driven innovation policy tool (Rudnik, 2011)

One of the problems hindering the technological development of Kazakhstan is a low level of collaboration between government, industry, research and education, which lowering technological and innovative development. The process of identification of key areas for the development of technology platforms, as well as the further implementation of TPs requires appropriate methodological support. In this regard, it is necessary to develop a methodology for evaluation and selecting priority areas for the National TPs development.

TPs are considered as:

1) an object of innovation infrastructure;
2) a way to mobilize efforts and resources of all interested parties - various ministries and agencies, business, scientific community to create innovative technologies in certain strategic areas;
3) a mechanism for coordination activities of all stakeholders, involved in the process of the national scientific and technological policy implementation;
4) the way to develop public-private partnership.

At the same time multisectoral development of TPs has critical importance for the development of network structures that represent a characteristic feature of the new economy (Akberdina, Smirnova, 2018).

In this regard authors focus on theoretical and methodological foundations of the formation of technological platforms as a tool for integration of interests of all groups of stakeholders (government, industry, science and education) on the implementation of common vision and strategy for technological development.

The main feature of TPs is that they are developing in the areas with high technical complexity and high export orientation.

An important issue that needs to be resolved within the framework of this work is the development of a methodology for assessing the prospects and selection of priority areas for the development of technological platforms.

EU, Russia, Great Britain, Singapore are designing of TPs as a complex instrument of science, technology and innovation policy (further – STI) implementation that require a strong methodological support at the stages of TPs designing and implementation.

At the same time, many researchers believe that TPs could be developed based on the positive experience of the EU countries. Zlyvko O.V. and Lisitsyn E.M. (Zlyvko, Lisitsyn, 2012) based on the experience of Russia in the implementation of TPs highlighted importance of methodological support for TPs development.

Foresight on the national level (foresight research) is a multi-stage interactive process that includes a set of various methods, such as expert methods, economic and mathematical forecasting models (trend extrapolation, econometric modeling). However, mathematical forecasting methods have a rather significant limitation for application in complex systems - they are most effective for systems with a stable development trend, not for the situations of high volatility and uncertainty.

In turbulent times, the pace of change accelerates, global competition intensifies in many sectors and new players come to force. To avoid the disorientation associated with the pace of economic globalization, governments should concentrate on the long-term development of the most important sectors of the national economy (International Labor Office, 2014).

An important advantage of econometric modeling is the ability to consider the influence of external economic factors. Econometric models allow solving a wide range of research tasks: analysis of cause-and-effect relationships between economic variables; forecasting the values of economic variables; scenarios elaboration based on simulation experiments with the model. Modeling and forecasting macroeconomic processes are undoubtedly an urgent problem of the economy.

However, among the weaknesses of econometric modeling is that the method requires comprehensive databases (statistical, economic, sectoral data, etc.) and is more suitable for extrapolating existing trends than for recognizing weak signals of change.

The objective of the paper is to explore methodological approaches to the development of TPs, based on the STI development priorities.

The scientific novelty and significance of the paper consists of the development of a approaches for TPs designing and implementation based on a combination of several advanced techniques that make it possible to implement the basic criteria for assessing and selecting priority areas, including the use of foresight in combination with multifactorial analysis and mathematical modeling.

Materials and Methods

Among the methods for identification of priority sectors for TPs development that can significantly influence the development of the whole industry, can be mentioned such methods as patent and bibliometric analysis, analysis of "weak signals", horizon scanning, etc. The above methods allow early detection of technological trends in the development of groups of technologies within certain areas that have the potential for explosive development in the future. These methods should be considered in developing methodology for assessing priorities for TPs development. To collect the data different data sources should be used, such as statistical databases, results of foresight exercises, analytical reviews, etc. It is important to combine datasets from different data sources to increase objectivity and credibility.

Development of a methodology for identification of priorities for the development of TPs on the national level should be based on a set of tools and techniques described below.

Basic methods of foresight can be applied on the stage of identification priority areas and key sectors for TPs development, such as horizon scanning, emerging trends analysis, weak signals, wild card, STEEPV, BMO analysis, etc. In order to effectively anticipate or scan possible futures, it is important to clearly understand key parameters and basic elements to define future priorities in situations of uncertainty and volatility.

Horizon scanning allows capturing weak signals as an indicator of a potentially emerging issue, that may become significant in the future. Such approaches as traditional planning based on trends extrapolation can be successfully used under relatively stable external conditions. However, given the acceleration of historical time, these techniques lose their effectiveness and can provide misleading results. The same time horizon scanning allows to identify possible threats or emerging opportunities at an early stage and to use this information as a competitive advantage.
In identifying global technological trends, the patent analysis plays a significant role in exploring new trends and emerging market niches.

Foresight plays an important role at the stage TPs designing by providing instruments for priority areas identification. Foresight provides mechanisms for mobilizing all stakeholders on the initial stage of TPs development. On this stage a common strategic vision is formed with further gradual detailing by involving expert groups, conducting in-depth interviews, developing roadmaps and identifying multisectoral intersections, in order to identify tasks that can be most effectively solved by combining efforts, resources and technologies of all actors to ensure synergistic effect.

Foresight results will provide understanding which areas (sectors) will have a leading position on a global scale and which countries can be at the forefront of their development and what competencies should be developed to ensure a qualitative breakthrough in the selected priority sectors of the future.

Results

TPs can be formed on a basis of foresight results, considering the importance of the economic sector in terms of implementing the priorities of the country's socio-economic development, for solving such problems as:

1) Linking needs of business and society for implementation of the most important areas of scientific and technological development;
2) Identification of new scientific and technological achievements for the modernization of existing sectors and the formation of new sectors of the economy;
3) Determination of the principal directions for improving industry regulation for the rapid spread of promising technologies;
4) Stimulation of innovation, support of scientific and technical activities and processes of modernization of enterprises, considering the specifics and prospects for the development of industries and sectors of the economy;
5) Expansion of scientific and industrial collaboration and the formation of public-partnerships in the innovation sphere;
6) Improvement of legal regulation in the field of scientific, scientific-technical and innovative development.

In EU countries TPs are considered as a tool for cooperation and coordination of the implementation of innovation policy, increasing openness and interaction of all participants to achieve a common goal. In this regard TP are viewed as a tool for increasing industry-science collaboration (Zhogova, 2019).

Discussion

In the process of priority sectors identification for the development of TPs fulfillment of the following conditions is important: 1) the formation of platforms should be based on implementation of digital technologies, 2) scalability from the standpoint of economic effect and 3) the development of an innovative component, the development of multisectoral cooperation and obtaining a synergistic effect.

In the context of a new technological paradigm and the transition to a digital industry that caused transformation in production, sales, logistic chains, natural resources are no longer a competitive advantage and country's competitiveness is increasingly dependent on the introduction of science-intensive technologies, formation of creative economy and development of advanced competencies. Currently we can observe trend of arising technologies of the Industry 5.0 that focus on the interaction between humans and machines. This trend is developing in parallel with the Industry 4.0 (Golov, Mylnik, Palamarchuk, 2018). Society is moving to a new stage of reindustrialization, the development of production in a qualitatively new environment based on networking technologies. In this direction, the development of technological platforms is seen as a promising tool for ensuring sustainable development based on the principles of openness, involvement, collaboration and a wide application of the achievements of digitalization and project management.

In the EU countries development of TPs was carried out using complex schemes for supporting scientific and technological sphere, using the possibilities of such large research funding programs as "Horizon 2020". It aims to improve conditions and access to finance for research and innovation in Europe, to ensure that innovative ideas can be turned into products and services that create growth and jobs. TPs aims to involve all actors and all regions in the innovation cycle by revolutionizing the way of public and private sectors collaboration.

However, in the circumstances of Kazakhstan, elements innovation ecosystem as well as instruments of state support of science, technology and innovation development require more efficient inter-ministerial coordination. In this regard targeted long-term mechanisms to support the country's innovative development should be implemented on the national level, including implementation of technology platforms.

In the Russian Federation, the implementation of TPs is aimed at bridging the gap between science and business, as well as forcing big national companies with state participation to increase R&D collaboration and to implement advanced technologies into production process through participation in TPs. TPs should help to introduce long-term interaction mechanisms and consolidated STI policy of all participants in relation to the prospects for scientific and technological development, forming (Protocol of the State Commission of the Russian Federation, 2010).

Analyzing the experience of Russia and the EU countries in the development of technological platforms, we can conclude that the basis of their formation lies in solving the strategic tasks of scientific, technological and innovative development, and they are considered as one of the mechanisms for the effective promotion of priority scientific and technological areas identified within the framework of long-term scientific and technological forecast using the foresight method.

Conclusion

1. Among the main methods for priority areas identification that can have a decisive influence on the development of the industry, should be highlighted such methods as patent and bibliometric analysis, weak signals, horizon scanning, etc. These methods allow early detection of emerging technological trends within certain areas that have the potential for explosive development in the future. The assessment of national technology platforms should be carried out on a competitive basis within the framework of national priorities identified based on technology foresight methods.

2. In the process of selection priority areas for technology platforms development, it is necessary to identify key technologies based on attractiveness and feasibility criteria. Identification of priority areas of TPs development will allow concentration of limited resources on strategic fields and key technologies (Shevchenko, Stukach, 2019).

3. It is advisable to analyze the multiplicative effect on the development of related sectors and fields. In addition, internal competency level that include technological readiness, technology life cycle, the country's position in STI development in comparison to the leading countries, as well as potential for international collaboration should be

evaluated. This comprehensive multivariate analysis will become the basis for determining strategies for high-tech industrial development, as well as the development of startups in promising technological fields in which the country has competitive advantages.
4. The following main stages for TPs priority areas identification are proposed:
- assessment of strategic prospects based on the selection and analysis of complex full cycle projects;
- analysis of value-chains inside TPs based on intersectoral approach;
- identification of the prospects for the development of the scientific and innovative component by linking needs of business with competences of research.
- assessment of the needs for digitalization of the technology platforms to enhance the overall effect of TPs development. 4. Technology platforms facilitating performance of the priority sectors based on a network structure that supports an innovation activity of all actors of the national innovation ecosystem. At the same time, in the digital economy, digital platforms provide solutions that become a basis for the formation of business ecosystems with high level of communication among all stakeholders and accumulation of limited resources for production of technologically advanced products and services (Boyev, Ponomaryeva, Haibullin 2019).

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Applying VaR on a Bank's Currency Portfolio in The Context of Increased Volatility of Financial Markets

Ionuț Costinel NICA
Bucharest University of Economic Studies, Bucharest, Romania, ionut.nica@csie.ase.ro

Nora CHIRIȚĂ
Bucharest University of Economic Studies, Bucharest, Romania, nora.chirita@csie.ase.ro

Andrei VIȘAN
Bucharest University of Economic Studies, Bucharest, Romania, visanandrei17@stud.ase.ro

Ștefan-Andrei IONESCU
Bucharest University of Economic Studies, Bucharest, Romania, stefion09@gmail.com

Abstract

Value at risk (VaR) is an attempt to represent by a single number the total risk in a portfolio of financial assets. This measure was introduced by J. P. Morgan in 1994 and is now widely used by both financial institutions and corporate treasuries and investment funds. The Banking Supervisory Committee of the Bank for International Settlements also uses it to calculate capital requirements for banks. The advantages that risk-value estimation offers lie in its ability to express quantitatively, numerically, the level of risk of a portfolio at a given time as well as that of a certain open position (in capital market securities, loans granted , investments in currencies, etc.) by an economic agent, in this case a financial-banking institution. In this research, the VaR was calculated for a portfolio of currencies held by a bank in order for an investor to be able to find out what is the maximum loss expected from this investment. Considering the unpredictable changes coming from the external environment, we consider that it is important for any financial or investment actor, to be able to predict the maximum loss expected after an investment.

Keywords: Value at Risk, financial markets, investment decision-making, behavioral economics.

Introduction

The environment is constantly changing and the effects it can have on all activities undertaken by investment or financial actors. Among the economic systems that have aroused a special interest to specialists in the field of complexity sciences, the financial market occupies a privileged place. The classical theory of the financial market, developed on the basis of Alfred Marshal's conception of the formation of market equilibria, starts from the idea that a probabilistic connection between cause and effect can be determined and that this connection is predictable. When a financial market is subjected to an exogenous shock, such as, for example, the news regarding the evolution of the economy, the market can absorb this shock and return, after a finite time, to a new state of equilibrium. Although many of the theories that inspired this mechanistic conception have changed in the meantime, such as the emergence of Heisenberg's indeterminate principle, which today underlies quantum physics, in economics this progress has not occurred so quickly. Many of the conceptions that dominate financial market theory today have their origins in scientific ideas and methods based on determinism and the predictability of cause-and-effect relationships.

In recent years, conceptions of financial markets have developed on the same basis, so that today they are still dependent on questionable or even erroneous assumptions, such as market efficiency and investor rationality.

One possibility to avoid false assumptions is to consider the financial market as a complex adaptive system. Financial markets, in particular capital markets, can be considered complex adaptive systems, they are composed of a lot of interdependent and connected agents, which show emerging group behaviors, acquired as a result of the aggregation of their individual behaviors.

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Agents in a complex adaptive system collect information from the environment, combine it with their own interactions with the environment, and hence their own decisions and decision-making procedures. Of course, these decisions and procedures will compete with each other, being compared to a fitness and only the most effective decision strategies will survive. This makes the system adapt to changes in the environment over time and respond appropriately to anomalies.

The VaR methodology represents an area that all these actors must know and understand, considering the unpredictability and sensitivity created by the uncertainty of the evolution of external factors. This research presented how a variation of the VaR methodology can be applied to estimate the maximum potential loss if an investment decision is to be made. Moreover, it can contribute to the choice to make the investment or not.

The data used in the article are real, taken from the public database from the National Bank of Romania and refer to the exchange rates. The calculation method can be extended to a much wider period.

An important lesson from the 2007-2008 financial crisis is that banking regulation should be based on macro-prudential rather than individual financial institutions. The financial distress has spread at a disastrous pace from the banking system to the real economy and has affected global financial stability.

Most banks use the internal model approach, due to the efficient and appropriate analyzes they offer. These models are based on variations of the VaR methodology and are performed using econometric models. In the first place, in terms of the degree of use in banks, the VaR methodology presents an efficient quantification of banking risk according to the fluctuations of the financial markets.

Literature review

Historically, the method of Value at risk has emerged since 1994 with the decision of Dennis Weatherstone, president of J.P. Morgan., To prescribe to employees the need to make a daily report on bank risk, to which to attach an appropriate risk measure. In this way, the RiskMetrics department was set up at the internal level of the investment bank, meant to analyze, estimate and evaluate the banking risk. (Phelan, 1997)

This activity gained momentum and led to the establishment of a methodology that was later spread under the title of Value-at-Risk (VaR). (Jorion P., 1996)

Currently this methodology is applied by economic agents and financial institutions, on top of that even by some non-financial ones. The pioneers of this measure, VaR, are Jorion (1997), followed by Dowd (1998), and finally Saunders (1999).

This paper is structured on the following sections: methodology, results and discussion and conclusions. The following chapter describes one of the statistical methods for calculating VaR. In the discussion and results section, we present step by step, in a way applied on a currency portfolio, how to calculate VaR. From the definition of VaR it is observed the fact that it specifies only a property that var should have, but it doesn't indicate a punctual way to calculate it. For this reason, the definition has a wide set of interpretations, which determined the separation of 2 different types of VaR, one of them regarding risk management and another regarding risk measurement.

From the point of view of a risk manager, VaR it is not just a number but a system rather. The system runs at a certain set period (usually one day) and the resulting number to be published is compared with the calculated price fluctuation in the opening positions over the time horizon.

To achieve success on the stock market, there is a set of features that an investor must acquire such as understanding the internal mechanisms, the ability to anticipate the meaning of a trend, but also keeping temperance to the influence of emotions in trading.

Another very important topic to analyze in the case of the investment decision-making process is the economic behavior of investors. Depending on this, they may decide to invest in a certain currency position, or not, in a more risky or less risky action. Although most economic theories consider that all investors are rational and that they base their investments on the use of all sources of information in the market, studies over time have shown that an individual investor most often enjoys small gains over long periods of time. Despite the fact that investment experience, specialized studies and the size of the capital involved are basic aspects characteristic of a successful player, the psychological factor that is often ignored proves to be very important, especially in situations where it is necessary to take setback decisions. So, there are a number of relevant psychological factors that need to be considered because they can affect success in the investment market:

- herd effect;
- overestimation of own investment skills;
- fear of investing larger amounts;
- market preconceptions.

The herd effect can be described as the lack of an own investment plan, and the decision to copy the behavior of close investors out of the desire not to miss the chance of a good transaction. The investor takes over the thinking of other investors so that he does not gain any experience but can also create imbalances in the market, because the massive increase in sales of a stock without having previously researched considerations can lead to a decrease in value. the whole market is losing ground, this phenomenon being based on a simple economic principle by which the increase of supply will gradually lead to the loss of value. The reason for the herd effect is the alignment with the group's trend, investors preferring the security of belonging to a group to the risk of owning. This reasoning is based on the hypothesis that the majority cannot be wrong, even if sometimes objective decisions are made that are irrational. The herd effect is the behavior specific to individuals who are new to the market and therefore do not have the necessary experience to make decisions based on their own ideas.

On the other hand, we can say that in small cases the adoption of this strategy may prove to be the path to success but we must mention two aspects that differentiate between success and failure, namely: maintaining long-term trust and motivation because profit does not come most cases quickly or in the way it was predicted. Such a herd investor will invest in a security that is currently profitable, but if the rate of increase in its value decreases over time and he observes new investment trends in other economic goods that are more profitable, he will reorient himself to those who fail to enjoy the fruits of his first investment. The second aspect to be analyzed is choosing the right time to invest, which is very difficult in practice, because once a trend becomes known by most investors, it becomes a trap, because new players will start investing after that economic good has already reached the peak of capitalization so that it will enter a downward trend that will affect the capitals of those who invested their money late. The best example of the deficiency of this psychological factor was the dotcom bubble.

Overestimation of own investment skills. This psychological aspect is very common for investors to make them more confident that their decisions will perfectly anticipate changes in the financial market, tending to establish models based on historical evolution, ignoring the reasons that led to that development and the chances of recurrence. just. The causes of this behavior are a wrong self-assessment, often investors after making a profit learn an overconfidence that does not really correlate with their skill level and looking for evidence to confirm the hypothesis that other players act instinctively while their actions are taken based on thorough research and rational thinking. Other mistakes that come with this psychological factor are: niche on a single type of assets that are considered to be well documented and easier to predict and the purchase of risky shares in order to obtain high profits.

Fear of investing larger amounts and greed: An unwritten law of investment success is to raise awareness and limit the influence of emotions in making investment plans. Successful investors when preparing for an investment know how to balance both pros and cons, overcoming the natural tendency to be fearful or greedy. This psychological factor can cause investors problems more quickly in situations where the market is declining and they choose to sell for fear of limiting losses, than if the market is growing slowly, being satisfied with lower gains. A very good example of the greed of investors is the "Internet Boom" of the last decade of the last century, when the shares of Internet companies peaked due to the greed of stock market players who wanted to get rich overnight, but in the long run, it was not possible to sustain the gains. Fear can also act in this way, many investors wanting not to lose capital by investing in stable securities that have a low risk but also a low return.

Market preconceptions. Prejudices are a human tendency that manifests itself by creating preconceived ideas about a hypothesis that are based only on instinct and not on concrete facts. The most common types of bias among investors are: confirmation bias, cognitive dissonance, familiarity bias, and stock-based bias.

- The prejudice of confirmation is a behavior by which a person who is about to make a wrong investment decision based only on their own opinions will analyze only those sources of information that further strengthen their drive to make this decision, not contrary ideas, thus creating a distorted image of reality, being very difficult to change. For example, an investor who is unsure of a company's bankruptcy will look for information only in those rumors that match his opinion.

- Cognitive dissonance is a state of discomfort felt when the person does not fully agree with the decisions made, in his mind there are simultaneously contradictory ideas. Underlying this type of behavior is the fear of regret in the future. Out of a desire to reduce the risk of regrets, shareholders will be reluctant to sell them, as their price could later rise. It was discovered after research that after the completion of an investment transaction, investors tend to critically overestimate the decision, which is assigned a higher degree of performance retrospectively than at the time of taking it to avoid regret. These actions are consequences of cognitive dissonance in the capital market.

- The prejudice based on familiarity represents the affinity of investors for shares in a certain sphere that is familiar to them. They are prejudiced towards their domestic markets, being optimistic about their evolution, while they have pessimistic expectations towards other markets, being indifferent to the opportunities they could offer.

- Retrospective bias is a characteristic of investors that manifests itself in a tendency to base their investment plan on past events, thus simplifying the analysis and acceptance of additional risks because it does not analyze the causes that influenced the trend to a certain point.

Methodology

Value at risk is the methodology used to estimate the market risk to which a bank is exposed and also to determine the minimum capital required for banks to cover this risk. (Jorion P., 2001) This measures the maximum potential damage that is possible to occur in a portfolio, in a certain period and related to a confidence interval.

Value at risk is the latest step in the evolution of risk management tools, combining the relationship between price and performance with the likelihood of unexpected market movements.

It takes into account the correlations between the portfolio's financial assets and the benefit effect, having a dual role, both in measuring market risk on an integrated basis and in determining the minimum capital required to cover banks' market risk.

The standard capital market risk, according to the Basel Committee, should provide for the daily calculation of VaR on a daily basis and the capital requirements related to market risk must be met on a daily basis.

Capital requirements are expressed as the maximum value of the previous day's VaR value and as an average of the daily VaR indicators for the last 60 working days. It is then multiplied by an additional multiplier k (whose minimum value is 3) designated by the national supervisory authorities according to the quality of risk management related to the banks' equity portfolio.

From a statistical perspective, VaR is a measure of the quantile of the distribution of returns, with the percentage probability that the portfolio damage [ε] is less than –VaR over a certain time span [T]:

$$P_{VAR} = P(\varepsilon < -VaR) = \int_{-\infty}^{-VaR} P_T \cdot \varepsilon \cdot d\varepsilon$$

where P_T represents the probability, distribution related to the profitability on a temporary stretch with T units.
To calculate VaR it is necessary to determine two parameters:

- Temporal extent or time horizon of the measured risk [t]: if it is calculated for the risk, it is suggested to take into account a reduced temporal extent to obtain a result as relevant as possible, and if it is determined in order to establish capital it is proposed to use an extended time interval.
- It is suggested that the confidence probability [p] be within the range of 95-99%, otherwise the relevance of VaR will be altered.

With the evolution of statistical modeling, among the banking institutions it was noticed the increase of the use of econometric models in order to quantify the market risk. In order to identify through the VaR method the possible loss related to a portfolio, it is necessary to fulfill the following aspects:

- Determining the risk elements that can alter the bank's portfolio
- Realization of risk scenarios in order to simulate them both in the hypothesis of normal market conditions and in the hypothesis of extreme conditions
- Determining the time frame for holding the assets related to the portfolio
- Determining the degree of confidence in measuring the damage
- Loss distribution measurement
- Identification of VaR distribution through various econometric models and techniques

VaR represents the value resulting from differentiating the expected value of the portfolio at the selected time span [t] with the respective probability [p], and the minimum value of the portfolio that is offered by the distribution quantile, for the same [t], respectively the same [p], thus:

$$\mathrm{VaR} = V_m - V_q = V_0(1 + R_m) - V_0(1 + R_q) = V_0(R_m - R_q)$$

$V_0 \leftrightarrow$ the value of the portfolio at present
$V_m \leftrightarrow$ the average expected value of the portfolio over time t
$V_q \leftrightarrow$ the minimum possible value to be recorded (quantile) by the portfolio over the selected time frame, corresponding to the confidence interval
$R_m \leftrightarrow$ average return on the portfolio over time t
$R_q \leftrightarrow$ quantile yield

Minimum return on portfolio for the selected time frame [t] with probability [p] is established starting with the distribution function:

$$1 - p = P(x < R_q) = \int_{-\infty}^{Rq} f(x)dx$$

We admit that profitability is characterized by the law of normal distribution, so the probability density function is:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{(x-\mu)^2}{2\sigma^2}} \quad ; \quad x \in (-\infty, +\infty)$$

The distribution function is: $F(r) = \int_{-\infty}^{r} f(x)dx$, estimating the possibility of a value less than r for the random variable. A standard distribution is characterized by:

- Zero average ($\mu = 0$)
- Unitary variance ($\sigma = 1$)
- Distribution density function: $\varphi(x) = \frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{x^2}{2}}$

The standard distribution is created by transforming the normal one using $= (z - \mu)/\sigma$, with z random variable of normal distribution[$x \approx N(0,1)$]

Portfolio yields will comply with the normal distribution law:

$$1 - p = P(x < R_q) = \int_{-\infty}^{R_q} f(x)dx = \int_{-\infty}^{\alpha} \varphi(z)dz$$

$\alpha = \varphi^{-1} \cdot (1 - p)$, α the maximum permissible value of the tolerance threshold

$$\alpha = \frac{R_q - R_m}{\sigma} \quad => \quad R_q = \alpha \cdot \sigma + R_m$$

We return to the initial VaR formula and by replacing the above relations in the expression we will obtain:

$$\mathrm{VaR} = V_m - V_q = V_0(R_m - R_q) = V_0[R_m - (\alpha \cdot \sigma + R_m)] = -V_0 \cdot \alpha \cdot \sigma$$

- σ = portfolio volatility

At first view, we notice how increasing the volatility of the portfolio will generate a higher value for VaR. If the horizon of ownership is limited, changes in average returns will not significantly influence VaR results, however if the horizon of ownership is long the changes in average returns are considerable. We also notice how the increase in VaR is directly related to the increase in confidence.

Results and Discussions

The increased volatility of financial markets over the past decade has led researchers and regulators to design and develop more sophisticated risk management tools.

The basic measure currently used by financial analysts to quantify market risk is to apply the value at risk methodology. Value at Risk is defined as the maximum potential loss of a portfolio's value, for a given probability, caused by adverse behaviors that may occur in the market.

The calculation method reduces the market risk associated with any portfolio to a single number, the loss associated with a given probability.

The VaR methodology can have many applications and is used both for risk management and for regulatory purposes.

For example, the Basel Committee on Banking Supervision requires financial institutions to meet capital requirements based on VaR estimates. If the underlying risk is not estimated correctly, this can lead to a sub-optimal capital allocation, leading to consequences on the profitability or financial stability of institutions.

The approach of this case study will be made in the context of the Basel III Agreement and involves, in the first part, the estimation of market risk in the analysis of the currency positions of a portfolio. The following two aspects need to be clarified: “long” and “short” positioning. These are two terms used by investors when they want to define their position in the market when they want to trade an asset.

When you position as a long-term investor, you buy the asset and expect it to increase in value and then make a profit from the sale of this asset. For example, consider the USD-EURO parity with the ratio 1 USD = 0.907 Euro (according to the exchange rate from November 23, 2019), i.e. we say that we trade $ 1 on the market, on November 23, against the euro at a ratio of 0.907. If position as a long-term investor, this means that we expect the dollar to rise against the euro and then, let's assume that I will buy 2000 USD at the price of 0.907 euro / dollar. So, we invest the amount of 1814 euros to buy the amount of $ 2000.

If the prediction was correct, after a certain period of time, let's say that after 1 month, the ratio between the dollar and the euro will reach 1 euro = 1 dollar. So, the $ 2,000 I bought 30 days ago is now worth the equivalent of $ 2,000 and I decide to sell it. Now the 2000 dollars are no longer worth 1814 euros, but 2000 euros, thus, by assuming the long position of the dollar against the euro we won 186 euros (2000 euros - 1814 euros).

If you position as a short-term investor, stock will be for sale and will expect the value of my assets to decrease in an assumed time frame. I will use the example above, but adapted to the short position. Therefore, sell the amount of 2000 dollars at the price of November 23, 2019 and buy with them the amount of 1814 euros. If our forecast was correct, then after the period of 1 month the dollar will decrease against the euro and our assume that it will reach the ratio of $ 1 = 0.807 euro. Therefore, the 1814-euro bought with 2000 dollars I will sell to buy dollars with the amount obtained. Thus, will buy back the amount of 2248 dollars, so we get a profit of 248 dollars.

The VaR methodology has the role of assessing and determining the total risk of a portfolio of financial assets. The value at risk measures the maximum potential loss, likely, to be obtained at a certain position or for a certain portfolio of positions, for a certain period of time and with a certain confidence interval (99% or 95%).

Therefore, we propose the following case study. It is considered that it is desired to make an investment in a portfolio of currencies described in the table below. The first steps regarding this methodology are the identification of short and long positions and the construction of the database by identifying the exchange rates, for the analyzed period.

Table 1: Database with value position, long position, short position, net position and exchange rate

01.12.2019					
Currency	Exchange rate	Value position	Long position (LP) (RON)	Short position (SP) (RON)	Net position (NP) RON
EUR	4.7781	1000	0	4778.1	29503
USD	4.3425	2000	0	8685	
CHF	4.3443	3000	0	13032.9	
GBP	5.5999	10000	55999	0	

The investor is positioning long for GBP and short for EUR, USD and CHF. The table above describes the values of the exchange rate relative to the national currency of Romania for a period of 9 days.

As you can see, the net position is RON 29.503.

In the table below we have described the net foreign exchange positions calculated as value according to the following formula:

$$NP = \sum LP - \sum SP$$

Table 2: Database with currencies for analyzed period

Currency	19.11	20.11	21.11	22.11	25.11	26.11	27.11	28.11	29.11
EUR	4.7759	4.7776	4.7808	4.7729	4.7722	4.7765	4.7792	4.7788	4.7781
USD	4.3145	4.3172	4.3144	4.316	4.3325	4.3356	4.3422	4.3394	4.3425
CHF	4.3759	4.3776	4.3808	4.3729	4.3722	4.3765	4.3792	4.3788	4.3781
GBP	5.581	5.5732	5.585	5.558	5.5805	5.5735	5.593	5.6119	5.5999

Based on the above information, the next step in the VaR calculation algorithm for this portfolio is to calculate the daily returns for each currency in the portfolio. They can be calculated either discretely or continuously, according to the following formulas:

$$Profitability_{i,t} = \frac{Price_{i,t} - Price_{i,t-1}}{Price_{i,t-1}} * 100$$

The above formula is used for discrete time calculation, where i represents the analyzed currency and t represents the time, the analyzed period, in my case expressed in days.
The following formula is used continuously:

$$Profitability_{i,t} = ln\frac{Price_{i,t}}{Price_{i,t-1}}$$

It will also be used in this case study.

Table 3: Daily returns calculation

	EUR	USD	CHF	GBP
Data	Daily return	Daily return	Daily return	Daily return
19.11	N/A	N/A	N/A	N/A
20.11	**0.000355891**	**0.0006256**	**0.000388416**	**-0.00139858**
21.11	**0.000669568**	**-0.0006488**	**0.000730727**	**0.00211504**
22.11	**-0.00165381**	**0.0003708**	**-0.00180495**	**-0.0048461**
25.11	**-0.000146672**	**0.0038157**	**-0.00016009**	**0.00404005**
26.11	**0.000900646**	**0.0007153**	**0.000983003**	**-0.00125516**
27.11	**0.000565108**	**0.0015211**	**0.000616741**	**0.00349259**
28.11	**-8.36995E-05**	**-0.000645**	**-9.1345E-05**	**0.00337353**
29.11	**-0.000146491**	**0.0007141**	**-0.00015987**	**-0.0021406**
Average R	5.11711E-05	0.0007188	5.58475E-05	0.00037564

In table 3 we calculated the daily returns, in continuous time, for each currency. The next chronological steps are the calculation of the net position and currency positions. These are presented in table 1 Long currency positions are usually marked with "+" and short ones with "-". Given that the only currency in which the agent positions itself for a long time is GBP, the investor / bank will buy this currency and expect its value to increase in the next period.

Next, will calculate the volatility for each currency in the portfolio, expressed as a square deviation.

$$\sigma_i = \sqrt{\frac{\sum_{t=1}^{T}(Profitability_{i,t} - Average\ Profitability_i)^2}{T-1}}$$

Where,

$$Average\ profitability_i = \frac{\sum_{t=1}^{T} Profitability_{i,t}}{T}$$

Table 4: Volatility calculation

	EUR	USD	CHF	GBP
Date	Volatility	Volatility	Volatility	Volatility
19.11	N/A	N/A	N/A	N/A
20.11	9.2854E-08	-9.315E-05	0.0003326	-0.0017742
21.11	3.8241E-07	-0.0013675	0.0006749	0.0017394
22.11	2.907E-06	-0.000348	-0.001861	-0.0052217
25.11	3.9142E-08	0.0030969	-0.000216	0.0036644
26.11	7.2161E-07	-3.487E-06	0.0009272	-0.0016308
27.11	2.6413E-07	0.0008024	0.0005609	0.003117
28.11	1.819E-08	-0.0013638	-0.000147	0.0029979
29.11	3.907E-08	-4.623E-06	-0.000216	-0.0025162
sum/9	4.9604E-07	7.986E-05	6.205E-06	4.174E-05
Final Volatility	**0.0007043**	**0.0089365**	**0.002491**	**0.0064605**

The next step is to calculate the correlation coefficients for each two currencies in the portfolio and then build the matrix of correlation coefficients for all currencies in the portfolio. Thus, the correlation matrix will have the following form.

Table 5: Matrix of correlation coefficients

Correlation matrix				
	EUR	USD	CHF	GBP
EUR	1	0.0050248	0.0011	0.00324
USD	0.0050248	1	-0.00048	0.02382
CHF	0.0010995	-0.0004815	1	0.077461
GBP	0.0032401	0.0238199	0.077461	1

For the next step, we need to determine the probability with which we want to calculate the maximum expected loss related to the analyzed currency portfolio, i.e. to establish the probability with which we want to calculate Value at Risk. For the probability I use, i.e. 99%, a confidence factor of 2,326 is given.

$\mathrm{VaR}_{\mathrm{Euro}} = -0{,}078$

$\mathrm{VaR}_{\mathrm{USD}} = -1{,}805$

$\mathrm{VaR}_{\mathrm{CHF}} = -0{,}755$

$\mathrm{VaR}_{\mathrm{GBP}} = 8{,}41$

The VaR is calculated for 1 day using the risk formula for a certain portfolio according to the formula:

$$Value_at_Risk_p = VaR_daily^t * \omega * VaR_daily$$

Where ω represents the matrix of correlation coefficients and has the form:

$$\omega = \begin{pmatrix} \rho_{11} & \rho_{12} & \cdots & \rho_{1n} \\ \rho_{21} & \rho_{22} & \cdots & \rho_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \rho_{n1} & \rho_{n2} & \cdots & \rho_{nn} \end{pmatrix}$$

In the case of the analysis performed, applying the last two formulas above we obtain the following results:

$$VaR_daily^t = (-0{,}078;\ -1{,}805; -0{,}755;\ 8{,}41)$$

$$VaR_{daily} = \begin{pmatrix} -0.078 \\ -1.805 \\ -0.755 \\ 8.41 \end{pmatrix}$$

$$\omega = \begin{pmatrix} 1 & 0.005 & 0.001 & 0.003 \\ 0.005 & 1 & -0.0004 & 0.023 \\ 0.001 & -0.0004 & 1 & 0.077 \\ 0.003 & 0.023 & 0.077 & 1 \end{pmatrix}$$

So,

$$\mathrm{Value}_{\mathrm{at}_{\mathrm{Risk}_\mathrm{p}}} =$$

$$= (-0{,}078;\ -1{,}805; -0{,}755;\ 8{,}41) * \begin{pmatrix} 1 & 0.005 & 0.001 & 0.003 \\ 0.005 & 1 & -0.0004 & 0.023 \\ 0.001 & -0.0004 & 1 & 0.077 \\ 0.003 & 0.023 & 0.077 & 1 \end{pmatrix} * \begin{pmatrix} -0.078 \\ -1.805 \\ -0.755 \\ 8.41 \end{pmatrix}$$

$$\mathrm{Value}_{\mathrm{at}_{\mathrm{Risk}_\mathrm{p}}} = 72.93 \text{ RON}$$

The last step in the VaR calculation methodology for a currency portfolio is the calculation of the VaR for the portfolio consisting of the four currencies, over the analyzed time horizon, of 9 days. It is calculated according to the following formula:

$$\mathrm{VaR}_{\mathrm{p,T}} = \mathrm{Value_at_risk}_\mathrm{p} * \sqrt{\mathrm{T}}$$

$$\mathrm{VaR}_{\mathrm{p,9}} = \mathrm{Value_at_risk}_\mathrm{p} * \sqrt{9} = 72{,}93 * 3 = 218{,}80 \text{ RON}$$

Table 6: Value at Risk of entire portfolio

Value at Risk	
VaR for 1 day	72.9358192
T	9
Probability	99%
Confidence factor	2.326
VaR for portfolio	218.807457

The result of the analysis was summarized in the table above. In the analysis performed, it was forecast with a probability of 99% that will be the maximum loss of the value of the portfolio generated by a possible appreciation of the national currency, on 01.12.2019. The VaR was calculated for each currency held in the portfolio and then the matrix of the correlation coefficients between the daily returns of the currencies held in the portfolio. We can conclude that if the currency will appreciate at the above date, the maximum value of the portfolio loss will be 218.8 RON.

The correct interpretation and implementation of the methodology in a clear and well-structured way makes these analyzes beneficial in analyzing the performance of an asset portfolio. Any predicted shock that could exist on the market can be predicted a value of the expected loss. Depending on this value, an agent or a bank can identify certain methods of adjustment and self-regulation so that the loss is reduced or even avoided. Any change can create a systemic risk in the network of financial markets and can have negative effects on banking institutions. As a method of regulation and self-regulation at the level of financial institutions, respecting the BASEL regulatory framework, banks use certain tests that introduce certain shocks. One of these tests is the stress test VaR with the help of which certain scenarios are made. The GARCH model and Monte Carlo simulation are used to build the stressed portfolio.

Conclusions

Financial stability is one of the most important means of reducing economic uncertainty that influences decision-makers in their establishment and investors on long-term investment funds. Financial resilience needs to be assessed in terms of its ability to absorb shocks, protecting countries from making costly short-term adjustments in the real economy through employment or inflation adjustment. Finding a balance between financial stability and the resilience of the financial system, two competing objectives, is a critical path for decision makers.

This paper highlights the importance of estimating potential loss through the VaR methodology which is a means of representing, where appropriate, an alarm signal. Extending the thinking on this application, we must look from the perspective that this alarm signal can be identified as a systemic event that can spread to an entire financial network. In an uncertain environment, surrounded by a lot of information, the evaluation of systemic events and the measurement of the severity of a network is an extremely sensitive subject and must be approached with great care from all perspectives.

The economic system at national or global level can be seen as a complex network characterized by all the activities that are undertaken by the agencies and the economic units that make it up.

The stock market, as an important component in an economic system, plays a very important role because it is a trading environment that is closest to the model of a perfectly competitive market respecting the following specific features: atomicity, homogeneity, transparency of information, entry and free exit from the market and mobility of factors of production.

This research proposes an analysis of the market risk approached through the VaR methodology applied on a currency portfolio in order to analyze its performance. A high value of VaR can be an alarm signal because it can be identified as a systemic event that can spread to a banking network.

It is important to study and understand the dynamic and adaptive behavior of the financial market because two players or actors of this system may have different behaviors regarding investment decisions and this behavior may affect the evolution of the market.
Behavioral economics provides an ideal framework for understanding when and how agents make mistakes and how they or systematic biases predictably occur under certain conditions or circumstances. The concepts offered by this field can be used to build environments that encourage people to make wise decisions, taking into account the dynamic environment in which their actions are performed.

After investigating these elements presented above, a correct risk management on the investment market is a current topic, of interest both for specialists in the field and for potential investors.

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Actions Taken by Public Companies in Favor of Corporate Social Responsibility – a Polish Case

Anna MATUSZEWSKA

Calisia University-Kalisz, Poland
a.matuszewska@akademiakaliska.edu.pl

Abstract

In the publication by Bowen called Social Responsibilities of the Businessman, which became the first complex discussion about business ethics and social responsibility, a need to run a company taking into account needs of a given company's surroundings, was mentioned for the first time. [Bowen 1953]. According to the concept of corporate social responsibility, an entrepreneur who functions in a certain social and natural environment, cannot disregard its needs and interests. As Bowen notices, decisions made by entrepreneurs have a direct influence on the life of people in a society. The main aim of this article is to give an answer to the question if endeavours made by public companies fall into the category of corporate social responsibility. The more detailed aim is an endeavour to answer the question if taking this type of actions is treated like a sense of responsibility or a need? The article concentrates on giving an overview of critical activities of a selected company in recent years paying special attention to the period of COVID 19 epidemic. In order to achieve the aforementioned goal, a thorough analysis of special literature was carried out as well as unstandardized techniques of direct interviewing were applied. In addition to the above, both monographic method and the method of studying source documents were used in the article.

Keywords: Corporate Social Responsibility; Quality Management, Prosocial Actions, Ecology, The Health Of The Local Community, COVID 19.

Introduction

One of the most fundamental spheres of human activity and society activity is business activity, and running a business is possible, mainly thanks to cooperation with other people. That is why the functioning of companies in societies means that they should not behave in a discretionary way, it is their duty to follow proper norms of conduct, which is inseparably linked with responsibility [Rogowski 2016]. In the opinion of Drucker „…each business organization takes full responsibility for its influence on local community and societies, in which they function" [Drucker 1999]. CSR can support the financial side of running a company over the long term, so it can bring in not only social but also financial profits by strengthening a company's reputation, building up organizational culture based on ethical conduct [Windsor 2001].

Therefore, it seems justified to carry out an analysis in this scope, because apart from economic aspects, companies function in the specific legal, ethical and even esthetical aspect. Research on public companies activity within the scope of CSR was done on the example of Waterworks and Sewage System Company PLC in Kalisz (in Polish the company is called Przedsiębiorstwo Wodociągów i Kanalizacji w Kaliszu spółka z o.o.). For the needs of this article the author decided to use the abbreviation for the full name of the company, which goes as follows: PWiK or PWiK Kalisz). The main sources of information were the analysis of source documents and getting information during direct interviews with the board and employees.

The subject under study determined and effectively carries out the mission depending on delivering waterworks and sewage system services to the citizens of the town and surrounding districts, out of concern for the high standard of their life and a good condition of the natural environment, based on modern company model orientated to the needs of its clients. [Source documents PWiK Kalisz].

For more than 70 years of functioning, the company located in Kalisz have adopted various organizational form, changing its scope and range of actions. In 1938, Waterworks and Sewage System Company and local Gas Company merged to form one, united company. In 1952 Town's Public Utilities were set up. Its activity covered cleaning services of the town, squares, hotels, public communication, production and delivery of gas and waterworks and sewage systems. Since 1st January 1954, following the separation, Town's Public Utilities No 2 were set up. Gas

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Company and Waterworks and Sewage System were included in the above public utilities. The given solution remained unchanged until the end of 1963. In January 1964 there was a separation of Gas Company and Town's Public Utilities No 2, as a result of which Waterworks and Sewage System Company in Kalisz was set up. Next years saw organizational changes, and as a result of the Town Council Resolution in Kalisz that was passed on 3rd December 1991 and as a result of the notary deed of 3 December 1991, Waterworks and Sewage System Company PLC in Kalisz was founded. The company adopted this organizational form on 1st January 1992, and organizational changes, as well as the investment strategy that was adopted, resulted in the dynamic development of the company. Actions aimed at improving water quality and its efficient distribution, organization of sewage management and professional customer service have been the fundamental goals of the company's management and employees for the last decade and they remain a priority. Four water treatment stations that were built at that time enable production according to all domestic and the EU norms, and all water that is produced and delivered to customers undergoes treatment process. In order to ensure the effectiveness of water delivery by improving pressure parameters in the waterworks system, all water pumps were modernized. The use of automated systems regulating pressure enabled pressure stabilization in the system. Parallel with the above, starting a monitoring system of the water treatment station and the pumping house, created the possibility of full control over all those objects. PWiK Kalisz extracts and treats almost 5 millions cubic meters of water, providing its services in the area of 132 ha, where six water intakes, four treatment stations, 12 tanks for pure water, 8 mains pump houses and sewage pump houses are located: the main pump house on Złota Street, and over 90 local pump houses, two administrative objects and many kilometres of underground infrastructure. The company employs 145 people, who everyday care for water delivery to each flat and sewage outflow to water purification plant without any obstacles. In order to ensure water delivery with proper pressure and quantity, 70 water pumps and about 100 sewage pumps work every day.

The main goal of this article is to point out and carry out analysis and evaluation of actions taken by the company under study in order to promote corporate social responsibility. On the grounds of the range of this issue, a decision was made not to take into consideration issues regarding the company's employees, however it should be pointed out that creating very good and safe working conditions for the staff was appreciated many times in the form of awards and distinctions.

One research question remains, namely to what extent actions taken by PWiK influence the quality of services, clients' satisfaction, health of the local community and the company's image? Additionally, there is a question if actions that are taken to promote corporate social responsibility are treated as a responsibility or a need?

Literature Overview

Roots of corporate social responsibility date back to ancient times, when great philosophers such as Aristotle were differentiating between the condemned „art of making money" and „the art of managing" [Arystoteles 2001]. However, referring to descriptive definitions, the literature usually shows the 1950s, where Bowen (1953) - who is said to be „founding father" of CSR - determined corporate social responsibility as an entrepreneurs responsibility to adopt such policy and take such decisions, which are desirable by a given society on account of goals and values. [Bowen 1953]. It was C. Walton (1967), who claimed that the concept of social responsibility articulated by the close relationship between society and companies. By contrast, G. Steiner (1971) took the view that business is and must remain a basic economic institution but also takes an obligation to help society in reaching its basic goals [Rojek-Nowosielska 2017]. Freedom to realize prosocial actions is one of the critical aspects presented by H. Manne and H. Wallisch (1972). The very idea of the above attitude is that none of the actions is legally imposed on entrepreneurs [Manne and Wallisch 2020].

World Business Council For Sustainable Development defines corporate social responsibility as „ continuous responsibility of business regarding ethical behaviour and contribution to economic development while improving the standard of living of workforce and their families and local society and the whole of society at the same time" or as „responsibility of a business to contribute to sustainable economic development, cooperation with employees, their families, local community and the whole of society in order to improve the standard of their lives"[The World Business Council for Sustainable Development 1998]. It is worth quoting a definition formulated by R. Lea (2002), in which the author touches upon the aspects of caring for the natural environment. „Corporate social responsibility of businesses regards business and other organizations that are beyond scope of responsibilities resulting from legal regulations, in order to manage the influence those businesses and organizations have on environment and society. It especially concerns the way of interactions with employees, suppliers, clients, local community, and the range of actions, which are taken to protect the environment" [Rojek-Nowosielska 2017].

Managing company should take into consideration aspects of environmental protection, which are crucial from the social perspective. It should be stressed that environmental protection is not an aim in itself - the goal is a better standard of living, which can be influenced by environmental cleanliness, health conditions, the beauty of the scenery,

access to natural resources. It is the quality of life as the most important good that requires being included among social aims of environmental protection [Adamczyk 2009]. The presented overview shows only certain literature definitions and is not complete, according to Rok, there are at least several hundred definitions of CSR in the specialist literature [Rok 2013]. The emphasis was put on selected basics of relations and scopes of interest. The notion of corporate social responsibility is continuously evolving, and together with this evolution change the determinants influencing and shaping this notion. For the needs of this monograph, the author claimed the regulations included in ISO 26000 standards to be the prominent ones, the regulations that are the result of consultations that were carried out in the environment of clients, representing 300 institutions from 66 countries and allowed to determine the status of this standard, which acts as a guide containing directives and recommendations and within the scope of social responsibility. According to ISO 26000: „Responsibility for making decisions and taking actions that have an influence on society and environment, realized by transparent and ethical behaviour, in conformity with sustainable development and social wellbeing, including the needs of clients, in conformity with the law and international norms of behaviours, integrated by an organization and used in actions, is called social responsibility [ISO 2020].

The analysis of actions taken by PWiK Kalisz

PWiK in its current actions spares no efforts to be a good employer, a customer-friendly company and a good neighbour. The company takes actions in favour of corporate social responsibility by functioning in an ethical and responsible way towards various interested groups, above all towards the employees, local society and the natural environment - the so-called „silent interested party" [Source documents PWiK Kalisz]. Being socially responsible means investing in human resources, environmental protection, relations with the company's surroundings and informing about those actions. All the aforementioned aspects lead to the company's increase in competitiveness and to shape conditions for sustainable social and economical development [PARP 2020].

Constant actions to the continuous improvement of water quality from the health aspect

The citizens of Kalisz are supplied with water coming from deep-well, Quaternary and Jurassic sources. Quaternary waters are characterized by a low mineralization, medium hardness, increased content of iron compounds and manganese. The reaction of the water solution is slightly neutral. On the other hand, Jurassic waters belong to medium-hard category waters with a neutral or an alkaline reaction of the water solution, and are characterized by natural smell, medium mineralization, and often contain unstandardized levels of iron and manganese compounds [Source documents PWiK Kalisz]. PWiK has underground water intakes called „LIS", 42 Quaternary infiltrating drilled wells, underground Jurassic water intake located on Fabryczna Street 1 drilled well, underground Jurassic water intake located on Poznańska Street 1 drilled well, underground Jurassic water intake located on Warszawska Street 1 drilled well, underground Jurassic water intake located in Szeroka Street 1 drilled well, underground Quaternary water intake 1 drilled well.

Water like food should deliver valuable nutrients. Drinking water has a positive influence on an organism by delivering valuable micro and macro elements, it also supports good metabolism. Water from drilled wells that is available in Kalisz belongs to the category of waters characterized by low or medium mineralization. Thanks to drilled intakes (Tertiary and Quaternary layers) water purification process is obtained in a natural way without using chemical substances. Only the excess of iron and manganese compounds is removed from water during the treatment process. It is also worth noticing that water is disinfected with UV rays. Thanks to that no chemical compounds containing chlorine are used, water is free of bad smell and taste [Interview with Production Manager at PWiK Kalisz]. Safety and quality of water have fundamental meaning for the development of well being in people. World Health Organization makes global endeavours to prevent transmission of diseases in water [WHO 2020]. The quality of water in Kalisz is controlled by the accredited laboratory. The water must satisfy quality requirements in the bacteriolytic and physicochemical range, which are included in Health Minister Order on 7 December 2017, position No 2294 „On water quality to be consumed by people". Table 1 shows the results of water quality measurement in the second half year of 2019. All water parameters under research are within the limits that are acceptable by the regulations.

Table 1. The quality of the produced water in the second half year of 2019

Indicator	Methodology	Unit	Para-metric value	Average values in given water treatment stations			
				Lis	Fabryczna	Warszawska	Poznańska
Cloudiness	PN-EN ISO 7027-1:2016-09 nephelometric method A	NTU	1[1]	0,14 ± 0,03**	0,275± 0,05**	0,23 ± 0,05**	0,69 ± 0,14**
Color	PN-EN ISO 7887:2012 method C A spectrophotometric method	mg/dm^3 Pt	15[2]	5,6 ± 1,0**	11 ± 2**	10 ± 1,7**	9,5 ± 1,6**
Taste	PN-EN 1622:2006 attachment C organoleptic method	TFN	acceptable	acceptable	acceptable	acceptable	acceptable
Smell when water is cold	PN-EN 1622:2006 attachment C organoleptic method	TON	acceptable	acceptable	acceptable	acceptable	acceptable
Concentration of hydrogen ions	PN-EN ISO 10523:2012 potentiometric method A	pH	6,5 - 9,5	7,4 ± 0,2**	7,3 ± 0,2**	7,3 ± 0,2**	7,3 ± 0,2**
Ammonium Ions	PN-ISO 7150-1:2002 spectrophotometric method A	mg/dm^3 NH_4^+	0,50	<0,20	<0,20	<0,20	<0,20
Nitrates	PN-EN ISO 10304-1:2009 + AC:2012 method of ion chromatographA	mg/dm^3 NO_3	50	4,2 ± 0,6**	1,1 ± 0,1**	1,5 ± 0,2**	2,2 ± 0,3**
Nitrite	PN-EN 26777:1999 spectrophotometric method A	mg/dm^3 NO_2	0,10	<0,020	0,024 ± 0,003**	<0,020	<0,020
Oxidability $KMnO_4$	PN-EN ISO 8467:2001 titrimetric method A, R	mg/dm^3 O_2	5,0	1,2 ± 0,3**	1,8 ± 0,5**	1,5 ± 0,4**	2,1± 0,5**
Chlorides	PN-EN ISO 10304-1:2009 + AC:2012 method of ion chromatograph A	mg/dm^3 Cl	250	25 ± 2**	45 ± 4**	40 ± 3**	57 ± 5**
General Hardness	PN-ISO 6059:1999 titrimetric method A	mg/dm^3 $CaCO_3$	60-500	253 ± 20**	264 ± 21**	284 ± 23**	385 ± 31**
Fluorides	PN-EN ISO 10304-1:2009 + AC:2012 method of ion chromatographA	mg/dm^3 F	1,5	0,17 ± 0,03**	0,97 ± 0,15**	0,91 ± 0,14**	0,50 ± 0,08**
Free Chlorine	Metodyka firmy HACH nr 8021 (zgodna z PN-EN ISO 7393-2:2018-04) photometry method	mg/dm^3 Cl_2	0,3	<0,10	<0,10	<0,10	<0,10
Electrical Conductivity	PN-EN 27888:1999 conductometric method A	µS/cm w 25°C	2500	643 ± 18**	667 ± 18**	679 ± 19**	918 ± 26**
Sulphates	PN-EN ISO 10304-	mg/dm^3	250	84 ± 10**	14 ± 2**	27 ± 3**	139 ± 16**

	1:2009 + AC:2012 method of ion chromatography A	SO_4					
Iron	PN-92/C-04570/01 flame absorption spectrometry A	µg/dm^3 Fe	200	27 ± 4**	<20	40 ± 5**	22 ± 3**
Manganese	PN-92/C-04570/01 flame absorption spectrometry A	µg/dm^3 Mn	50	<20	<20	<20	<20
Copper	PN-ISO 8288:2002 flame absorption spectrometry A	mg/dm^3 Cu	2,0	<0,10	<0,10	<0,10	<0,10
Sodium	PN-ISO 9964-1:1994+Ap1:2009 fame absorption spectrometry A	mg/dm^3 Na	200	12 ± 2**	38 ± 5**	33 ± 5**	45 ± 6**
Potassium	PN-ISO 9964-2:1994 flame absorption spectrometry	mg/dm^{3}K	-	1,8 ± 0,2**	3,2 ± 0,4**	3,4 ± 0,2**	12,1± 2,4**
coli bacterium count in 100 ml of water	PN-EN ISO 9308-1:2014-12+A1:2017-04 membrane filter method A, R	j.t.k./100ml	0	0	0	0	0
Escherichia Coli count in 100 ml of water	PN-EN ISO 9308-1:2014-12+A1:2017-04 membrane filter method A, R	j.t.k./100ml	0	0	0	0	0
Presence and count of fecal enterococci bacterium *in* 100 ml of water	PN-EN ISO 7899-2:2004 membrane filter method A, R	j.t.k./100ml	0	0	0	0	0
General count of micro-organisms in 22±2ºC	PN-EN ISO 6222:2004 plate method A, R	j.t.k./1ml	100[3]	5 (3,10)**	11 (7; 18)**	7 (4; 12)**	78 (63; 96)**

** Health Minister Order on 7 December 2017, position No 2294 „On water quality to be consumed by people",*
R – methodology of reference mentioned in HMO on 7 December 2017, pos. 2294,
A - method of accreditation, accreditation No AB 795, System of quality of examinations that are carried out was approved by District Sanitary and Epidemiological Station in the City of Kalisz on 8 August 2019
*** uncertainty of measurement calculated on confidence level of 95% and rate of spread k=2 with each sample taken, value< below marking range*
j.t.k. – units of formed colonies,
[1] accepted by consumers, free of non-standard changes
[2] accepted by customers, free of non-standard changes. Requested value of this parameter in tap water at customer's flat is up to15 mg/dm3,
[3]it is recommended that the general number of micro-organism should not exceed 100 units of formed colonies/1 ml in water that is pumped into waterworks.
Source: [PWiK Kalisz].

Access to safe potable water is necessary for health, basic human right and it is an element of effective health protection policy. In some regions, it was indicated that water supply investments and sanitary devices can bring net economical benefit. It results from the fact that the reduction of unfavorable health complications and costs of health care outnumbers the costs of investments that were made or actions that were taken [WHO 2017].

Promoting drinking tap water and prosocial actions

Water that is available in Kalisz is characterized by good quality, and because of that PWiK continuously encourages citizens to drink tap water and promotes a healthy lifestyle by organizing the action called „Healthy water from the waterworks in Kalisz". This action has been organized for a couple of years now and involves taking a lot of actions. Tap water is present during numerous meetings, conferences and other events, encouraging people to drink it. The participants of the night half marathon called „Bursztynowa Helena", XVII military picnic and Triathlon Kalisz organized in September 2019, were given tap water by PWiK employees. The company supports the organization of sports events in a town and at work (cycle races, shooting competitions, angling competitions) and promotes a healthy lifestyle and continuously encourages to drink water, which is necessary for our organisms.

On a daily basis, the company runs educational campaigns. The campaign, which is worth noticing and which has been run by the company for a few years and enjoys real popularity especially among primary school students and high school students is called „Where do the citizens of the City of Kalisz get water from?" In 2015, 314 people participated in this form of education, in 2016 - 281 people, in 2017 - 387 people, in 2018 - 312 people, in 2019 - 262 people. During the meetings, the participants get to know about a lot of interesting information, for instance about disinfecting water with UV rays. Each of the four water treatment stations in Kalisz and the pump house, is equipped with UV lamp. Thanks to UV technology, which is based on a purely physical process with ultraviolet radiation (UV), with a wavelength of 254 mm - 99,99% of all bacteria are killed. During educational meetings, one call follows the whole cycle of water production. Also, the company organizes „Open Days at PWiK Kalisz". In the opinion of the author of the monograph, a proper attitude to corporate social responsibility is a strategy of activity and understanding that actions that are taken within the range od CSR are the result of high social awareness of entrepreneur (the water board). This awareness is also connected with the process of local integration. PWiK organizes Christmas and Easter fair on its premises, invites children from schools located in Kalisz so that they can decorate Christmas tree together. It is worth noticing that among other things, the company published the winning pictures from plastic arts competition in the company calendar that is given to clients, business partners and employees. This way, the company integrates local community, informs about its actions, integrates the youngest by playing and building up awareness of drinking water. Each year on 22 March, World Water Day is celebrated, which is the most valuable liquid on Earth. Without water, there would not be any form of human existence or any other form of existence. Every year PWiK Kalisz joins the organization of conferences, symposiums, meetings, which are an occasion to pay attention to the issues regarding this area, especially climate changes. Each year UN-Water, the agency coordinating works of The United Nations regarding water and sanitary conditions, determines the topic of World Water Day answering and meeting the current and future challenges. According the definition of social responsibility understood as economic, legal, ethical and philanthropic responsibilities of a company towards inner and outer social groups (and entities), presented by A. Sokołowska, PWiK participated in the organization of the event called „Noble Christmas Box", the company handed over rehabilitation bed and other gifts for needful people. In addition to the above, PWiK also handed over cleaning and hygiene articles to Association „Beautiful Angels", Children's Commissioner for Poland and Social Welfare Center in Kalisz, the organizers of the action called „Clean Little Angel",

Pro-ecological actions

Corporate social responsibility defined in „The Green Book" as:

„the concept according to which, companies include social and environmental aspects voluntarily in their trade activities and when contacting clients and other interested parties", clearly accentuates freedom as well as social and environmental aspects [Green Paper of The European Commission on corporate social responsibility 2001].

In 2016 the board made a decision to include the installation of photovoltaic panels in the technical and economical task. The task was scheduled for completion in 2018-2019, which was in line with Development Strategy of the City of Kalisz for the years 2014-2024, where one of the strategic goals was supporting energy efficiency by increasing the percentage of green energy sources in the overall energy production. One of the ways to reach this goal is to increase investment in renewable energy sources, because both the EU policy and the domestic policy, strongly postulate diversification of those sources [Development Strategy of the City of Kalisz for the years 2014-2024 2014]. The problem of growing energy consumption coming from conventional sources and the pollution of the natural environment, which is the result of the above, is a point of departure for paying attention to the importance of renewable sources including economy and ecology [Jastrzębska 2017].

In November 2017, a contract for the realization of photovoltaic installation was signed with ML System PLC from Rzeszów. Photovoltaic panels with the power of 398 kWp were installed on three buildings belonging to the company:

- Water Treatment Station „Lis" - 182 kWp,
- Pump House on Smolna Street – 40 kWp,
- Roof of administration buildings on Faryczna Street Dachy – 76 kWp.

Acquiring electric energy from the sun requires substantial initial financial outlays. However, with growing energy prices and by taking into account ecological aspects (reduction of energy consumption from conventional sources by 500 MWh/year, a decision was made, based on the above arguments, to put this idea into practice. The photovoltaic installation started in July 2019, and since the start, it has produced 180 MWh. In the half-yearly scale, energy coming from renewable sources constituted 7.2% of all energy. Within the period of six months, taking into account financial aspect, the company managed to save up PLN 65.000 on energy bills.

The Constitution of the Republic of Poland defines the natural environment as value, which should be protected in absolute terms. Under article 86 of The Constitution, there is a direct obligation to care for the condition of the natural environment, and anyone whose actions and behaviours can lead to deterioration of its condition shall be held responsible for them [The Constitution of The Republic of Poland on 2 April 1997]. The doctrine underlines that this responsibility rests not only with an individual but also or maybe above all with companies whose actions can threaten the natural environment and cause its degradation [Skrzydło 2002]. Out of concern for „the silent interested party", the company increases the percentage of hybrid and electric cars in its car park successively. Since 2017 PWiK purchases hybrid cars with petrol engines (PB95), electric cars and cars with petrol engines that are gas-powered (CNG). The reason for those actions is growing awareness of care for the natural environment but also requirements given by the law regulations, society and the owner [The Act on Electromobility and alternative fuels on 11 January 2018]. International Organization for Standardization ISO, launched norm regarding social responsibility called ISO 2600, according to which the fundamental feature of social responsibility is the readiness of an organization to include social and environmental issues during decision-making process [PKN 2020]. PWiK as the first company in Poland, used basaltiform lining in tanks for purified water. Between 2014 and the end of 2015, four tanks for purified water with a total capacity of 12.000 m3 located on Smolna Street, were renovated this way.

Later the company built and opened a tank at water treatment station LIS, which has a capacity of 1400 m3 and was also coated with basaltiform lining. Because of great properties and long durability, basalt is widely used in sewage systems. Using this technology in tanks to store purified water is undoubtedly seen as an innovative attitude [Interview with the President of Board 2020]. Observation of tanks' use coated with basaltiform lining, allows to observe the improvement of stability of water quality, mainly because such type of lining is extremely resistant to abrasion and high-pressure cleaning. Additionally, thanks to chemical resistance, which causes self-cleaning of tanks, it is possible to avoid excess deposits of manganese and iron on the walls and on the bottom of tanks. Thanks to the above actions, water that is stored in the tanks for citizens of Kalisz is of better quality [Anczykowski 2019].

COVID 19

The strategy adopted by WHO for the years 2018-2025 comprises regulations regarding monitoring access to safely managed potable water services [WHO 2017]. It is an incredibly important action, especially in the face of a pandemic, which unexpectedly covered the whole world.

PWiK Kalisz operates within the scope of the legally binding regulations, and all the actions taken by the company that were presented in the article, allow to state that PWiK strives for continuous improvement of water quality as well as properly manages the process of its production. The company has implemented the systems, drawn up the procedures, instructions and programs monitoring the functioning of objects and the waterworks system and has drawn up the so-called Water Safety Plan. The subject plan determines threats and potentially dangerous events, which can affect water quality and it also contains risk assessment in case of contamination of water intakes or purification plants. Additionally, the company has the plans called Protection Plan of Objects, which includes guidelines regarding technical protection of wells, tanks or technological buildings. This plan is consulted with and approved by the Province Chief of Police in the City of Poznań. It contains accurate and detailed procedures in case of sabotage, contamination or trespassing the promises of PWiK. The company has a list of prepared plans, procedures, institutions and protective measures in order to prevent loss of health and life in case of failure, flood, blackout, contamination, sabotage or epidemic. Thanks to the above plans, among other things, it was possible to react dynamically to COVID 19. In subjects with such strategic meaning for the local community, it is necessary to assess the risk and the scale of risk immediately.

The risk assessment showed that there is very little likelihood of contaminating water with a virus, the technology is protected with UV disinfection, which kills viruses, bacterium, pathogens and fungus with almost 100% effectiveness. As a prophylactic measure during the epidemic, the tanks storing water are disinfected with chlorine. The distribution system is closed and tight, all works regarding interference in the inside of pipelines have been called off.

Currently, the company hires 145 people, 16 people are directly in charge of water production and 4 supervisory staff who do shift work 24/7. Altogether there are 20 staff members, who constitute the so-called critical staff, necessary to ensure continuity of water production. Additionally, there is a brigade dedicated to works on a network of sewage pipes and water pipes in case of failure consisting of 16 people (14 + 2 members of supervisory staff). The teams have been divided in such a way to minimize contact between employees. Special safety procedures have been implemented on the company's premises, and employees have been equipped with protective equipment. The service staff of technological objects has been divided, and sanitation of uniform, clothes, shoes, hands, objects and surfaces which employees have contact with has been implemented. Technological facilities have closed to visitors and unauthorized employees. A group of employees has been isolated, which will take over responsibilities and will be placed at water purification plants, for instance in case of a quarantine. The biggest challenge is ensuring continuity of water production, sewage management and water purification [Interview with Production Manager at PWiK 2020].

Water has to be delivered 24 hours a day to customers, it is just a basic factor next to soap, which prevents virus spread. The biggest enemy of a virus is hygiene. As research shows, washing hands with soap and water for about 30 seconds reduces the number of micro-organisms by about 90%, another 20 seconds of washing hands eliminated them altogether. Keeping any sanitary regime without water is just impossible. That is why PWiK bears a heavy responsibility in this area.

One should pay special attention to the fact that in the face of such a serious threat, which COVID 19 is, and in the face of numerous tasks, which are connected with the proper functioning of the company, the company still contributes to social actions. In order to support the realization of online studying, the company gave tablets and headsets to Special Needs Primary School No 19 in Kalisz.

Discussion

Milton Friedman - Noble prizewinner in the economy - is strongly against business participation in solving social problems. Prizewinner holds that imposing an obligation on business to fulfil social responsibilities is generally harmful to the business itself but also the economy [Rybak 2011]. However, in relation to companies providing water, the specialist literature includes opinions, which say that they should bear a special responsibility, because their actions are directly connected with using natural resources and pollution of the natural environment and also with public health. With reference to such type of activity, CSR cannot be an option but a responsibility [Zickiene, Potelis, Juozaitiene and Poteliene 2011; Brei and Böhm 2011].

Among employees (also in Poland) one can observe an increased interest in issues from the area of corporate social responsibility [Żemigała 2007]. Analyzing the results of reports by (Responsible Business Forum) Responsible business in Poland. Good practices, it can be seen that management staff more and more often and in wider scope engages in socially responsible actions, declaring that such actions are put down in the frames of strategic actions [FOB 2020].

Partnership imperative between business and society is becoming one of the most important inspirations of the concept of social responsibility. Not only are entrepreneurs expected just to deliver goods and services but also to run business activity in such a way that society deems responsible. It can be stated that since the 1930s one can observe ongoing discussions around corporate social responsibility, where questions were posed if businesses can be socially responsible in general? Does social responsibility bring business benefits? Are the limits of CSR? In the 1970s another questions were posed, for instance: Should businesses prevent pollution of the environment to a degree that is higher than the one that is required by the law? On the other hand, recent years bring questions about how to realize strategic priorities within the scope of social responsibility, at the same time maximizing benefits for business and society and how to train managers and employees so that they can adequately react to the emerging changes of social and ecological requirements? [Gasparski 2012].

The analysis of actions that were conducted in the company under research allows to state that CSR has become an inseparable part of the company's strategy. There is an open question about the realization level of the company's CSR in comparison with other companies specializing in delivering such good and services in Poland. The author is going to conduct questionnaire in the second half of 2020, which will allow to determine CSR level in waterworks companies in Poland, and then (on this basis) will recommend possible directions of development and changes.

Conclusions

The aim of this article was reached because the presented actions that were taken by Waterworks and Sewage System Company PLC fall into the category of actions aimed at promoting corporate social responsibility. The above actions

are not only perceived from marketing and economic perspective, beneficiaries are both natural persons and legal persons, who establish different types of contacts with the company. One should pay special attention to educational actions that are taken and increasing awareness of the local community regarding favorable properties of drinking water. Water quality is subject to systematic research and examination by District Sanitary Inspectorate. It allows to encourage employees to drink water directly from the tap, by presenting advantages and qualities of water in comparison with bottled water. One should give the company special credit for all actions aimed at the youngest citizens, whose aim is to increase awareness by educating and encouraging to participle in common initiatives. By initiating ecological competitions and by installing springs in schools located in Kalisz, the company shows high maturity and cares for the health of the young generation. The answer to the research question is for sure positive, without any doubt the involvement in the area of CSR influences the quality of services that are provided, client's satisfaction, the health of the local community and the company's image. PWiK Kalisz put forward a proposal of offering water to people during numerous events organized in town. It is worth outlining that PWiK participated in World Conference on Family Health, which was held on 9-11 June 2019 and gathered guests from all around the world.

The citizens of Kalisz notice and appreciate the company's endeavours and actions in favour of the local community. A good example can be water curtains installed on the Market Square where one can cool down during heat waves, fountain and springs which have become an inherent part of the cityscape. However, because of COVID 19, the start of the fountain and springs have been cancelled until further notice.

PWiK is the company that engaged in help for the needy people during COVID epidemic with great responsibility and commitment. The company reacts to needs coming from the inside and the outside of the organization, taking dynamic actions in favour of corporate social responsibility and sustainable development. On the basis of direct interviews, it seems that those actions were taken because of need and not because of obligation. It is well reflected in blood donor actions when blood is given by PWiK employees or when planting trees on the premises of Social Welfare Home in Kalisz.

Continuous strive for ensuring a high level of services that are provided and care of building up proper relations between the owner, employees, the company's clients and the town's society resulted in gaining recognition in the competition called „Fair Play Entrepreneurship". In 2001 the company received a Fair Play Statuette - the highest recognition in this domestic competition.

The pride of the company is commonly recognized position in this business line, where PWiK is classified on the in the ranking of the best waterworks and sewage systems companies in Poland.

Proper perception of CSR depends on treating it like the concept of business activity whose elements are voluntarily and consciously incorporated into the company's strategy, enriching organizational culture at the same time.

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The Causality Relationship Between Electricity Consumption and Economic Growth: A Case Study of Pakistan

Ali JAN*
School of Economics and Management, North China Electric Power University, Beijing 102206, China (brohiali45@gmail.com)

ZHAO Xin-gang *
School of Economics and Management, North China Electric Power University, Beijing 102206, China (rainman319@sina.com)

Munir AHMAD
School of Economics, Zhejiang University, Hangzhou 310058, China (munirahmad@zju.edu.cn)

Shahid ALI
School of Economics and Management, North China Electric Power University, Beijing 102206, China (Nice.shahidsiddiqui@gmail.com)

Cem IŞIK
Faculty of Tourism, Anadolu University, Eskişehir, Turkey(cemisik@anadolu.edu.tr)
Muhammad IRFAN *, School of Management and Economics, Beijing Institute of Technology, Beijing 100081, China (irfan@ncepu.edu.cn)

Corresponding Authors

Abstract

This paper introduces the causal associations between electricity consumption and economic growth for Pakistan based on time series of annual data from 1980 up to 2016 by utilizing Johansen Cointegration testing and Granger Causality approaches. The Johansen Cointegration Testing findings proved that the cointegrating and long-run associations exist between selected variables and empirical evidence found that the relationship between electricity consumption and economic growth exist in one-way causality direction. Renewable and nuclear energy projects should be encouraged by approving the favorable energy policies. Besides, the Pakistani government needs to establish solar energy projects for electricity generation to meet the rising energy demand in the country.

Keywords: Electricity consumption; GDP growth; Granger Causality, Pakistan

Introduction

Energy has a basic and essential key function of a country for all economic sectors around the globe (Irfan et al., 2019a). The widely studied to explore the dynamic association between energy usage and economy growth in the literature for developed and underdeveloped economies around the global economy. The empirical results of previous studies varied and seem to be contradicting with the utilization of various methodologies for different countries. Thus, our research focuses on Pakistan's electricity consumption and its growth because the country is facing enormous challenges for electrification deficit and always have the problem of load shedding around the country. Consequently, the economic productivity is crippled by energy infrastructure.

CIA estimates that Pakistan is currently suffering from an immense energy shortage due to an enormous and rising population of about 49.5 M people living without electricity. 27% of the overall population has no access to electricity, from which 9% relate to people living in urban areas and 38% to people living in the rural area who have no accesses to electricity. The mounting gap between demand and supply of electricity poses huge threats to the energy sector in Pakistan.

The country is facing worst energy issues in the history and it is expected that the energy needs will double in the coming years in Pakistan. Economic growth increases with the industrialization and thus energy demand increases with the urbanization and industrialization. Pakistan has Ideal environment in aspects of temperature and humidity. Wind is the prominent renewable energy source and its industry is growing rapidly (Irfan et al. 2019b,c). Pakistan

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has sufficient wind energy sources around the long coastal belt as well as in northern areas. Various techniques are being used to enhance the output power (Iqbal et al. 2019) that are very beneficial to fulfill the energy requirements. Economic sustainability can be a helpful appliance for economic growth productivity and reducing energy consumption.

The aim of the research is to identify the connection between electricity consumption and economic growth in favor of Pakistan as a developing country by employing Johansen cointegrations and Granger Causality methods for a period of 1980 to 2016. The remainder of the paper is as follows: Section 2 provides a review of the literature. Section 3 discusses the data and methodology. Section 4 discussions the research results and finally, section 5 concludes the study and offer policy recommendations.

Literature Review

The literature review suggested the connection between energy usage and economic growth related to this research. Stern (1993) examined the causality connection between energy consumption and economic growth by employing multivariate techniques in the USA. The author found that changes in energy consumptions drive to changes in the economic growth. Yoo (2006) has determined the dynamic connection between electricity consumption and per capita income in four economies, including Malaysia, Singapore, Thailand, and Indonesia over a time period of 1971 to 2002. The estimated findings indicate causality relationships of income growth and electricity consumption is uni-variate for Indonesia and Thailand while a bi-variate causality exist for Malaysia and Singapore.

Ciarreta & Zarraga (2010) have employed the Panel cointegration tests for Denmark and Finland to investigate the panel causal association for GDP growth and electricity access form periods of 1971 to 2001 and estimated direction of causation running from electricity access to GDP growth in nations. Oh and Lee (2004) have conducted to verify the association between uses of energy and GDP growths from 1970 to 1999 in South Korea and findings denote that two-way causations occur among the use of energy and GDP growths in a long-term period, whereas for the short-term period, there is one-way causation occurs for both variables. Shahbaz & Lean (2012) have concluded the dynamic link among electricity use, economic factors with a factor of production by applying cointegration causality tests for Pakistan. The estimated outcomes expressed that two-way causality directions found amidst electricity use and GDP growth in Pakistan.

Baranzini et al. (2013) have utilized the ARDL bounding testing approach to identify the cointegrating association amidst electricity consumption and GDP growths for Switzerland for a time period of 1950 to 2010. The results denote long-run relationships amidst electricity consumption and per capita GDP in Switzerland. Apergis & Payne (2009) have demonstrated to examine panel causal association for electricity consumption and economic growth in Commonwealth nations from a period of 1991 to 2005 by applying panel cointegrating approach and empirical evidence denote the causality of cointegration relationships of electricity use and economic growth is in one-way direction for both said variables. Karanfil & Li (2015) have employed Pedroni Panel Cointegration method to demonstrate the connection among electricity consumption, urbanization and economics factor for 160 developing and developed nations from the period 1980 up to 2010 and empirical outcomes represent the mixed results among variables in 160 nations.

Methodology and Data

This study examined the association between electricity consumption (LELC) and economic growth (LECG) in the form of logarithm in favor of Pakistan with time series annual data from a period of 1980 to 2016. Electricity consumption is measured in KWh, while economic growth is measured in GDP per capita (US$). All the data obtained from World Bank Indicators (WDI, 2018). Firstly, we have employed the Augmented Dicky-Fuller (ADF) method of unit root tests to verify the integrated order of one I(1) or zero I(0) between these research variables. Secondly, we have employed the Johansen Cointegrations framework to examine cointegration relationships among research variables and finally, we have utilized Granger Causality technique to investigate the direction of causality for said variables. The equation of the log-linear model expresses as:

$$lnELC = \delta + \rho_1(lnECG) + \mu \qquad (1)$$

Here,

- ln: indicates the natural logarithm
- ELC: indicates the electricity consumption
- ECG: indicates the annual GDP growth rate
- μ: indicates error term

Results and Discussion

The purpose of this research is to determine the associations between electricity consumption and economic growths over the periods of 1980-2016 in Pakistan. Times series data are typically strived not to be stationary, so spurious results may be implied by the estimated regression results.

In addition, to evaluate the order of integrations for these variables, unit roots tests are applicable to solve the stationary problem. Still, we employed the ADF test at first differences and level. The estimated findings of ADF denotes that the selected variables are not stationarity at level, but all selected variables are stationarity at first differences; it means that our model is stationary at integration orders of one I(1) which is described in Table 1

Table 1: ADF results of unit roots test.

Variables	**Level**		**First difference**	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LELC	-1.68524	-0.65849	-6.41763***	-6.36514***
LECG	-4.87284	-4.76248	-6.97463***	-6.86235***

**** denotes the Significant at first difference level, respectively.*

Having the research variables in the model are stationarity in the integrating order one I(1), we can apply (Johansen, 1988) Cointegration model to evaluate the long-run association among electricity consumption and economic growth rate. The estimated outcomes of Johansen's cointegration conferred into trace statistic and maximum eigenvalues. The Johansen cointegrating approaches represent that these variables LENC and LECG are more than two cointegrating equations and rejected null hypotheses at 5% significant level described in Table 2 and Table 3. Therefore, we concluded that the cointegrated and long-run association's existence in selected variables. We have also used the VAR method to calculate the optimum lag lengths for Johansen cointegration approaches proceeding from AIC and SC criteria to support lag 1 interval for both series at first differences.

Table 2: Johansen Cointegration results trace statistics.

Null hypothesis	**Eigenvalue**	**Trace statistic**	**Critical value (0.05)**	**Prob.****
None *	0.519	32.397	29.797	0.005
At most 1*	0.434	21.681	15.494	0.036
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

The cointegrating associations occurred between research variables. Then, we can be applied Granger causality test to check the causal direction between selected variables expressed in Table 4. The analytical results indicate that there is uni-variate causal direction between economic growth and electricity consumption and outcomes indicate the direction of causality running from electricity consumption to economic growth.

Table 3: Johansen Cointegration results for max eigenvalue

Null Hypothesis	**Eigenvalue**	**Max eigenvalue**	**Critical value (0.05)**	**Prob.****
None *	0.519	25.716	21.131	0.004
At most 1*	0.434	21.681	15.494	0.051
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 4: Results of Granger Causality

Null hypothesis	Obs	F statistic	Prob.
LELC does not Granger Cause LEG	35	8.01785	0.0027
LEG does not Granger Cause LELC	35	0.95388	0.4596

Conclusion and Policy Recommendation

The paper determined the causality association between electricity consumption and economic growth from 1980 to 2016 in Pakistan. In this study, we have applied unit root test i-e Augmented Dicky-Fuller technique (ADF) to scrutinize the stationarity between selected variables, applied Johansen cointegration technique to determine cointegration association between the research variables and used Granger causality test to investigate the causality direction among the selected variables. The estimated consequence of ADF test shows that the selected variables are stationary at first differences which mean that we can apply the Johansen cointegration test. The outcomes of the Johansen Cointegration method indicate that relationships of cointegration existing among the selected variable. Finally, the Granger causality reveals that the relationships between electricity consumption and economic growth occur the one-way causality direction, which means that the direction of causality running from electricity consumption to economic growth, it confirms that there is electricity consumption and economic growth, are strongly correlated in Pakistan.

The policy implication of the paper is that Pakistan will also need to invest more heavily in the sectors of energy; including coal, gas and hydroelectric power, thus further increasing its current account to reduce the import pressure (Irfan et al., 2020,2021). The government needs to develop solar energy projects to produce electricity to meet the rising energy demand in the country. Even though, the Government of Pakistan should implement new nuclear power plants to fulfill energy demand in the country.

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The Impact of Different Types of Innovation on Sustainable Development: An Empirical Study of Industrial Companies

A.V. Trachuk

Dr. Econ. Professor, head of the Faculty the Higher school of management, of the Financial University under the Government of the Russian Federation, General Director of Goznak JSC. E-mail: ATrachuk@fa.ru

N.V. Linder

Ph.D. Professor, deputy head of the Faculty the Higher school of management of the Financial University under the Government of the Russian Federation. E - mail: NVLinder@fa.ru

Annotation

The article is devoted to the study of the impact of various types of innovations on sustainable development of industrial companies. The empirical analysis is based on data from 123 industrial companies (167 respondents). For the analysis, factorial and regression methods were used, which makes it possible to assess the dependence of various types of innovations on the enterprise efficiency. Within the framework of this study, three resultant indicators of industrial companies sustainable development have been distinguished: the share of sustainable products in the total output, the level of reduction in resource consumption, and the development of qualified employees.
This approach made it possible to conduct a comprehensive analysis of innovation activities and analyze the impact of each type of innovation on the industrial enterprises sustainable development indicators.
The obtained results showed: (1) all types of innovations at enterprises are interconnected: product and technological innovations are positively interconnected with management innovations, and the intensity of management innovations leads to organizational innovations, (2) the increase in the sustainable products share is more influenced by product and technological innovations, resource consumption reduction - with technological and organizational, and qualified employees development – with managerial innovations.
The conclusions made will allow industrial enterprises, depending on their strategic goals, to combine investments in certain types of innovative activities and thereby achieve the goals of sustainable development. Understanding the complex nature of innovation will enable businesses to build long-term competitive advantages.

Keywords: Innovation, Product Innovation, Technological Innovation, Organizational Innovation, Managerial Innovation, Sustainable Development, Industry

Introduction

In recent years, an increasing number of companies around the world have voluntarily adopted and implemented a wide range of sustainable development practices in response to emerging environmental, social and governance stakeholder expectations and concerns. At the same time, they are trying to integrate the principles of sustainable development into their strategy, business models and business processes (Lisovsky A. L., 2019).

There are discussions in the literature whether the implementation of the principles of sustainable development serves the achievement of strategic goals and can lead to high financial performance or is it a necessity that will ensure the survival of the company, but will not become a source of sustainable competitive advantage?

Some studies claim that the principles of sustainable development are being implemented in companies as “business as usual” and may not be a sufficient condition for creating a competitive advantage. For example, some companies use environmental, water or waste management systems to lower costs and thus improve their efficiency. But it is unlikely that this allows companies to achieve sustainable competitive advantage, since competitors can easily implement similar systems (for example, Bakkari M., Khatory A., 2017; Posen and Martignoni, 2018). Thus, when the imitator copies the practice of a company, their profitability converges (Posen and Martignoni, 2018) and is likely to decline.

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Other studies, by contrast, claim that sustainability principles can provide a unique competitive advantage and therefore lead to better company performance. However, in order for the sustainable development strategy to create a unique competitive advantage, it is necessary to introduce innovations. At the same time, different types of innovations affect the companies performance in different ways. In this regard, the purpose of this article is to study the impact of different types of innovations of industrial enterprises on performance, expressed in terms of sustainable development.

As part of the study, 16 in-depth interviews were conducted with industrial companies representatives, and then a direct empirical test was carried out on a sample of 123 industrial enterprises (167 respondents).

The article is structured as follows. The first section describes the types of innovations and studies of their impact on the performance of companies. The second section describes the research methodology, data collection and econometric models used for analysis. The third section describes the research results obtained and formulates recommendations for their application in practice. In conclusion, the obtained results are summarized.

Theoretical Foundations and Research Hypotheses

Types of innovations and approaches to their classification

According to many researchers, innovation is a source of sustainable competitive advantage and growth for organizations (see, for example, Abdikeev N.M., Bogachev Yu.S., Losev A.A., Tolkachev S.A., 2019; Faiazova S.I., 2020, etc.). The classic typology of innovation is the classification proposed by the OECD. According to this typology, there are five types of innovations[1].

The first type is product innovation, which is understood as goods or services that have fundamentally new or significantly improved properties associated with technical specifications, materials used, consumer value or other functional features. The main trends in the field of product innovation research, discussed by researchers in the last 2-3 years, are: the introduction of new technologies (Internet of Things, Big Data analytics, 3D printing) to create innovations consistent with the concept of Sustainable Development; the use of open innovation tools to create value together with consumers; product innovation in emerging economies.

The second type of innovation is technological (process) innovation, which are new elements introduced into production, organizational or service improvements, improved materials, production process and equipment, as well as improved IT products in order to achieve lower prices and / or higher quality of product. Basically, technological innovation is considered as a source of product, and vice versa, product innovation creates a need for technological improvements in product production. Recent works investigate the possibilities and benefits of implementing lean manufacturing methods in order to increase value for customers [Arsenova E.A., Nikolaeva T.Yu., 2018].

The third type of innovation is marketing innovation, defined as the development of new methods for promoting a product, a new way of pricing, and a new packaging or type of product. They also include new methods of logistics and transportation of goods.

The fourth type, organizational innovation, represents "the introduction of a new organizational method in the company's business practice, workplace organization, or external relations." [2]

The fifth type - managerial innovations, consists in the development of new approaches and methods for motivating and rewarding employees, changing the organization's management processes, approaches to strategy formation, planning, etc.

In the work [Trachuk A.V., Linder N.V., 2019], was carried out an analysis of more than 50 works that determine the types of innovations and their classification. The authors distinguish three types of classifications of innovations: innovation classification by type or area of application; innovation classification according to the degree of novelty and the level of changes; classification by the innovation features, and a fourth approach is proposed for classifying innovations - if possible, managing them.

[1] OECD Oslo manual, 3-rd edition (2005)
[2] OECD Oslo manual, 3-rd edition (2005)

Research on relationship and impact of different types of innovation on performance

In the first works (for example, Milgrom and Roberts's, 1995), researchers showed that the sum of innovations has a greater impact on the company's performance than each of the types separately.

Subsequent studies have focused on two types of relationships: one area is devoted to researching the relationship between different types of innovation, the other studies the impact of different types of innovation on the company productivity.

The works of the first group of authors focus on the relationship between product, technological and management innovations. The authors of [Roper, Du, & Love, 2008] conclude that product and technological innovations are always interconnected with managerial and organizational innovations, since the complication of a product or technology requires new management methods to successfully introduce new technologies, as well as bringing new products to the market. ...

The work [Mol & Birkinshaw, 2009] reveals the relationship between product, process and organizational innovation. The authors argue that the creation and introduction of new products to the market requires a new operational organization for more effective creation and exchange of knowledge, which entails the introduction of organizational and even managerial innovation.

Authors [Martínez-Ros & Labeaga, 2009] investigate the relationship between product, technological, managerial and marketing innovation. Based on data from 1,275 French and 3,028 Spanish firms, the authors conclude that technological and managerial innovation is not related to the intensity of marketing innovation. At the same time, product innovation is interconnected and stimulates marketing innovation. Authors also argue that marketing innovations have a significant impact on the efficiency of the firm.

Thus, the first hypothesis can be formulated:

Hypothesis 1a: The intensity of product and technological innovation has a positive effect on the intensity of managerial innovation;

Hypothesis 1b: The intensity of managerial innovation leads to an increase in the intensity of organizational innovation.

[Colombo, Grilli, & Piva, 2006; Mol & Birkinshaw, 2009] also investigates the relationship between product, process, and organizational innovation, but the authors conclude that the relationships between different forms of innovation are not identical among companies. These relationships depend on the country of company origin, company size, and access to resources. But for all companies, the most successful was the combination of product and process innovations, and the least successful was the product, process and organizational innovations, which is associated with the high cost and labor intensity of this strategy.

In the works of other authors (for example, Garcia and Calantone, 2002), on the contrary, it is claimed that, despite the high costs, companies should focus on product, technological, marketing, managerial and organizational innovations simultaneously and implement different types of innovations in an integrated manner. This strategy allows companies to succeed and be effective.

At the same time, [Damanpour, F., Evan, W.M., 1984] indicate that companies engaged only in product innovation and neglecting organizational and managerial ones have lower productivity than companies implementing them. So technological and non-technological innovations are equally important to achieve high productivity.

Lin, C.Y., Chen, M.Y. (2007) pointing out the interconnectedness of innovations, come to a conclusion that it is organizational, and not technological, innovations that influence the company efficiency, expressed as annual sales.

However, [Chandler, G.N., Hanks, S.H., 1994] note a negative relationship between innovation and productivity, or do not confirm it at all.

Thus, the second hypothesis of the study can be formulated:

Hypothesis 2a: Product innovation is positively associated with indicators of sustainable development, expressed in:

(a) an increase in the share of sustainable products in total output; (b) reducing resource consumption; (c) development of qualified employees, expressed as the ratio of employee training costs to sales revenue;
Hypothesis 2b: Technological innovations are positively associated with indicators of sustainable development, expressed in: (a) an increase in the share of sustainable products in total output; (b) reducing resource consumption; (c) development of qualified employees, expressed as the ratio of employee training costs to sales revenue;
Hypothesis 2c: Management innovations are positively associated with indicators of sustainable development, expressed in: (a) an increase in the share of sustainable products in total output; (b) reducing resource consumption; (c) development of qualified employees, expressed as the ratio of employee training costs to sales revenue;
Hypothesis 2d: Organizational innovations are positively associated with indicators of sustainable development, expressed in: (a) an increase in the share of sustainable products in total output; (b) reducing resource consumption; (c) development of qualified employees, expressed as the ratio of employee training costs to sales revenue.

Research Methodology

Sample Description

Empirical testing of the hypotheses was carried out based on the analysis of data collected from January 2020 to April 2020.

For the analysis, 254 industrial enterprises with more than 250 employees were randomly selected. The questionnaire questions were preliminarily tested during in-depth interviews with representatives of 16 Russian industrial enterprises, in order to clarify the ambiguous interpretation of the questions. The collection of data was carried out by combining online questionnaires and telephone conversations, which made it possible to make the questionnaire questions clear.

Further, the selected 254 enterprises were sent an electronic mailout of questionnaires. The respondents were senior management and those in charge of innovation in companies. A total of 167 respondents from 123 companies answered.

The companies included in the sample belong to the industrial production, average revenue of the companies represented in the sample is 5280 million rubles. More than half of the companies surveyed have been operating in the market for more than 15 years, the age of the companies in the sample varies from 13 to 83 years and averages 34.

Research Variables

The indicators of company sustainable development, expressed by three indicators, were used as a dependent variable: (a) the share of sustainable products in the total output; (b) reducing resource consumption; (c) development of qualified employees, calculated as the ratio of employee training costs to sales revenue.

To measure product innovation, a three-question scale was used that assessed the ability of an industrial enterprise to create and commercialize new products and thus compete in the market.

Technological innovation was measured using four questions aimed at measuring the company's ability to use new technologies to optimize business processes, reduce costs, introduce new products and attract new customers.

Management innovation was measured using three questions aimed at assessing company's ability to innovate in management processes, including the ability to implement the concept of "open innovation" in building corporate innovation systems.

Organizational innovation is measured by questions about the company's ability to innovate in the company's organizational design, adapting to new markets and the production of new products (Table 1).

Table 1: Frequency of mentioning answers to questions about innovation activity by industrial enterprises

	Questions about company's innovation	Mentioning percentage
	Product innovation	
1	Company regularly introduces new products to the market	74,1
2	Company develops and creates new products	87,3
3	Company's new products comply with the principles of sustainable development	64,8
	Technological innovation	
1	Company uses existing technologies in a new way	34,8
2	Company implements new production technologies	86,9
3	Company aims at technological leadership in the market	76,9
4	New technologies reduce company's costs	47,9
	Management innovation	
1	Company has significantly expanded the number of partnerships to improve the effectiveness of research activities	19,7
2	Company employs third-party research teams for specific purposes using its own infrastructure	24,9
3	Company applies various forms of risk - investment, shares (reduces) the risks of "breakthrough" projects with co-innovators	12,8
	Organizational innovation	
1	Company has partners to achieve the goal of sustainable development	27,9
2	Company has its own R&D departments	69,4
3	Company is restructuring its organizational structure in order to better meet the conditions for development of new markets or release of new products that comply with the principles of sustainable development	38,1

As expected, the issues related to product and technological innovation are the most frequently mentioned. At the same time, when answering questions about managerial and organizational innovations, enterprises demonstrated a low ability to form partnerships, to implement the concept of open innovation in building corporate innovation systems.

The measurement of the main resulting indicators was based on three questions, for measuring each aspect of the company, laid down by the strategy of sustainable development: share of sustainable products in the total output; reducing resource consumption; development of qualified employees, calculated as the ratio of employee training costs to sales revenue.

The performance of industrial enterprises can vary significantly depending on the size, affiliation to a particular industry and the intensity of competition in the market, therefore, indicators of company size, a certain number of full-time employees, were used as control variables. To meet the assumption of normal distribution, the indicator was transformed using the natural logarithm. To account for differences in belonging, binary variables were used that indicate the belonging of an enterprise to a particular sector (1 - belongs; 0 - does not).

Competition intensity was measured as the combined market share of the three largest competitors in the company's largest market.

Data Analysis Procedure

To assess reliability, the Alpha - Cronbach coefficients were calculated, which corresponded to the recommended level - not less than 0.75 (Table 2). Further, a factor analysis was carried out using the principal component analysis (varimax) for 13 questions describing four types of innovations: product, technological, organizational and management. The analysis confirmed the presence of four factors with values above one in accordance with the Kaiser criterion.

In general, four types of innovations explain 73.6% of the variation in the answers to the questions (this result corresponds to the recommended value of at least 70% [27]) (Table 2). Factor analysis by the method of principal components (varimax) was used in a similar way for indicators of the enterprises' activity efficiency: increasing the

share of sustainable products in the total output; reduction in resource consumption; development of qualified employees, calculated as the ratio of employee training costs to sales revenue.

The analysis confirmed the named three types of sustainable development indicators, which generally described 72.6% variation in questions (Table 2).

Table 2: Factor analysis: questionnaire questions, load factors and reliability check (Alpha - Cronbach coefficient)

	Questions	Sum of squares of factor loads	Model1 for the factor "product innovations"	Model 2 for the factor "technological innovations "	Model 3 for the factor "organizational innovations "	Model 4 for the factor "management innovations "
	Innovation type					
1	*Product innovation (Cronbach's Alpha coefficient = 0.87)*					
1.1	Our company annually introduces products with new properties to the market	0,628	0,824	0,311	0,276	0,258
1.2	Our company develops and creates products that have no analogues on the market	0,534	0,728	0,254	0,196	0,221
1.3	New products of our company comply with the principles of sustainable development	0,664	0,733	0,329	0,247	0,253
2	*Technological innovation (Cronbach's Alpha coefficient = 0.82)*					
2.1	Our company uses existing technologies in a new way to create new products	0,718	0,221	0,741	0,346	0,258
2.2	Our company is constantly introducing new technologies	0,639	0,198	0,824	0,298	0,221
2.3	Our company's technologies can significantly save resources	0,784	0,237	0,889	0,307	0,253
2.4	New technologies introduced at our company can significantly reduce the cost of new products introduced	0,639	0,273	0,914	0,193	0,242
3	Management innovation (Cronbach's Alpha = 0.79)					
3.1	Our business has changed the role of R&D partners in order to improve performance	0,548	0,414	0,271	0,761	0,398
3.2	Our company has third-party research groups that engage in the implementation of specific sustainable development goals	0,671	0,363	0,259	0,695	0,401
3.3	Our company has created new methods of risk - investment, in order to share (reduce) the risks of "breakthrough" projects with co-innovators	0,528	0,423	0,164	0,727	0,314

4	*Organizational innovation (Cronbach's Alpha = 0.81)*					
4.1	Our company has partners to achieve sustainable development goals	0,618	0,184	0,241	0,406	0,831
4.2	Our company has its own R&D departments	0,432	0,195	0,163	0,321	0,779
4.3	Our company is restructuring its organizational structure in order to better meet the conditions for development of new markets or release of new products in accordance with the sustainable development principles	0,563	0,173	0,309	0,307	0,693
	Sustainable development indicators					
5	*Proportion of products that meet the sustainable development principles (Cronbach's Alpha coefficient = 0.85)*					
5.1	Growth in the relative level of the share of sustainable products compared to the industry average	0,768	0,804	0,451	0,166	0,632
5.2	Improving the return on sales of sustainable products	0,534	0,722	0,369	0,191	0,587
5.3	Growing market share through sustainable products	0,664	0,463	0,581	0,287	0,713
6	*Reducing resource consumption (Cronbach's Alpha coefficient = 0.83)*					
6.1	Reducing energy consumption	0,829	0,804	0,251	0,478	0,726
6.2	Reducing water consumption	0,793	0,621	0,239	0,564	0,783
6.3	Reducing the consumption of other natural resources	0,814	0,793	0,303	0,383	0,732
7	*Motivation and development of qualified employees (Alpha Cronbach coefficient = 0.88)*					
7.1	Increase in the share of expenses in revenue aimed at employee training	0,748	0,824	0,311	0,676	0,258
7.2	Optimization of staff work	0,884	0,728	0,254	0,896	0,221
7.3	Improving employee motivation	0,821	0,733	0,329	0,747	0,253

Values of the obtained factors of the types of innovation activity and the factors of sustainable development of industrial enterprises were used in the future in the regression analysis carried out using the mathematical model:

$$Y_i = \beta_0 + \beta_1 PROD_i + \beta_2 TECHN_i + \beta_3 ORG_i + \beta_4 UPR_i + \beta_5 COMP_i + \beta_6 SIZE + \beta_7 IND_i + \varepsilon_i$$
(1),

where $PROD_i$- product innovations; $TECHN_i$ - technological innovation; ORG_i- organizational innovation; UPR_i - management innovation; $COMP_i$ - the level of competition in the industry; SIZE is the size of the company; ; IND_i- industrial sector. Indicators of the competition level in the industry, company size, and the industry sector were introduced to monitor characteristics that can affect the sustainability of industrial companies.

Standardized and non-standardized coefficients were obtained using the maximum likelihood method, while standardized coefficients were used to determine the factor influence strength on the resulting indicator, and non-standardized ones were used to test the hypotheses of the study.

Research Results

Tables 3-5 show the results of the regression analysis that reflects the impact of various types of innovations (product, technological, organizational and managerial) on the industrial enterprises sustainable development indicators. In general, the results of the regression analysis confirmed the hypotheses of the study. Models based on equation (1) were able to explain 28% of the variation in the sustainable products share in total output; 17% - in reducing resource consumption; 24% - in employee development.

When analyzing the growth of sustainable products share (Table 3), it turned out that product innovations (β = 0.437; p <0.01), technological innovations (β = 0.192; p <0.05) and managerial innovations (β = 0.123; p <0.01) have the most significant positive influence. At the same time, organizational (β = 0.06; p <0.10) do not have a significant effect on this indicator. The variables of the industry sector (β = 0.061; p <0.05) and company size (β = 0.073; p <0.05) also do not affect this indicator. At the same time, the indicator of the competition level (β = 0.248; p <0.05) has a negative impact on the share of sustainable products. Thus, product, technological and managerial innovations are key factors in increasing the share of sustainable products in the studied sample.

Table 3: Influence of different types of innovations on the share of sustainable products in the total output

Independent indicators	Non-standardized ratios	Standardized ratios
Constanta - (β_0)	0,227 (0,117)	
Product innovation – ($PROD_i$)	0,437*** (0,094)	0,444***
Technological innovation – ($TECHN_i$)	0,192** (0,107)	0,198**
Organizational innovation - (ORG_i)	0,060* (0,047)	0,069*
Management innovation – (UPR_i)	0,123*** (0,019)	0,143***
Industry competition level – ($COMP_i$)	- 0,248** (0,069)	- 0,235**
Company size – ($SIZE$)	0,073** (0,029)	0,082**
Industry sector – (IND_i)	0,061** (0,053)	0,058**
Corrected R^2	0,28	
Number of observations	167	

** p < 0,10; ** p < 0,05; *** p < 0,01. Standard errors are given in parentheses.*

Analysis of the reduction in resource consumption by industrial enterprises (Table 4) showed that technological innovations (β = 0.274; p <0.05), product innovations (β = 0.192; p <0.05) and managerial innovations (β = 0.171 ; p <0.05) have the most influence. Organizational (β = 0.038; p <0.05) innovations do not affect the reduction of resource consumption by companies. The indicator of the competition level (β = 0.125; p <0.05) has a negative effect on the level of resource consumption, while the company size (β = 0.119; p <0.05), on the contrary, has a positive effect. The industrial production sector (β = 0.038; p <0.05) does not significantly affect the level of resource consumption.

Table 4: Impact of different types of innovations on the reduction of resource consumption by industrial enterprises

Independent indicators	**Non-standardized ratios**	**Standardized ratios**
Constanta - (β_0)	0,384 (0,093)	
Product innovation – ($PROD_i$)	0,192** (0,011)	0,198**
Technological innovation – ($TECHN_i$)	0,274** (0,028)	0,283**
Organizational innovation - (ORG_i)	0,038** (0,051)	0,049**
Management innovation – (UPR_i)	0,171**	0,179**

	(0,072)	
Industry competition level – ($COMP_i$)	- 0,125** (0,069)	0,131**
Company size – ($SIZE$)	0,119** (0,039)	0,122**
Industry sector – (IND_i)	0,033** (0,067)	0,038**
Corrected R^2	0,17	
Number of observations	167	

** p < 0,10; ** p < 0,05; *** p < 0,01. Standard errors are given in parentheses.*

And finally, the analysis of personnel motivation and development (Table 5) showed that managerial innovations (β = 0.284; p <0.05), product innovations (β = 0.118; p <0.01), technological (β = 0.182; p <0.01) have a positive effect on the level of motivation and development of industrial companies staff. At the same time, organizational innovation (β = 0.065; p <0.10), the level of competition in the industry (β = 0.063; p <0.05), the industrial production sector (β = 0.071; p <0.05) and company size (β = 0.055; p <0.05) do not have a significant impact on this indicator of sustainable development of industrial enterprises.

Table 5 - Impact of different types of innovations on the motivation and development of qualified employees

Independent indicators	Non-standardized ratios	Standardized ratios
Constanta - (β_0)	- 0,424* (0,066)	
Product innovation – ($PROD_i$)	0,118*** (0, 171)	0,124***
Technological innovation – ($TECHN_i$)	0,182*** (0,127)	0,188***
Organizational innovation - (ORG_i)	0,065*** (0,048)	0,079***
Management innovation – (UPR_i)	0,284** (0,064)	0,279**
Industry competition level – ($COMP_i$)	- 0,063** (0,009)	0,067**
Company size – ($SIZE$)	0,055** (0,013)	0,052**
Industry sector – (IND_i)	0,071** (0,067)	0,068**
Corrected R^2	0,24	
Number of observations	167	

** p < 0,10; ** p < 0,05; *** p < 0,01. Standard errors are given in parentheses.*

Hypothesis Testing Results

To test the first hypothesis regarding the relationship between different types of innovations, were calculated Spearman's nonparametric correlation coefficients; to recognize the relationship between individual indicators, the value of this coefficient should exceed 0.5.

Correlation analysis showed that product innovations are associated with changes in existing technologies (ρs = 0.62) and additional management innovations associated with the search for partners, consumers, suppliers, etc. (ρs = 0.54). Technological innovation is also correlated with managerial innovation (ρs = 0.59), as it is associated with customer solutions, the choice of technological solutions and their suppliers, and the role of partners in research and development. In general, hypothesis 1a is confirmed, the intensity of product and technological innovations has a positive effect on the intensity of managerial innovations.

Interviews with representatives of Russian industrial enterprises also showed an associative relationship (associations) between managerial and organizational innovations (ρs = 0.57) and provided a rationale for confirming hypothesis 1b that the intensity of managerial innovation leads to an increase in the intensity of organizational innovation.

Testing the second hypothesis describing the impact of various types of innovations on the industrial enterprises sustainable development is fully confirmed for product innovations (hypothesis 2a) - they have a positive effect both on the industrial enterprises sustainable products share ($\beta = 0.444$; $p < 0.01$) and on the reduction resource consumption ($\beta = 0.198$; $p < 0.01$) and employee motivation and development ($\beta = 0.324$; $p < 0.01$).

The impact of technological innovation (hypothesis 2b) is also confirmed: technological innovation has a significant impact on the share of sustainable products ($\beta = 0.198$; $p < 0.05$), resource reduction ($\beta = 0.183$; $p < 0.05$) and staff motivation and development ($\beta = 0.288$; $p < 0.05$).

Management innovations (hypothesis 2c) also have a significant impact on the share of sustainable products ($\beta = 0.143$; $p < 0.01$), reduction in resource consumption ($\beta = 0.139$; $p < 0.01$) and staff motivation and development ($\beta = 0.179$; $p < 0.01$).

Finally, the hypothesis regarding the impact of organizational innovation (hypothesis 2d) has not been confirmed. Organizational innovations do not have a significant impact on any of the industrial enterprise sustainable development indicators.

Thus, we have shown the significance of the constructed model describing the influence of various types of innovations and confirmed the influence of various types of innovations in industrial enterprises on the sustainable development indicators, expressed by indicators of an increase in the sustainable products share in the total output; reduction in resource consumption; motivation and development of qualified employees.

Conclusion

The work carried out a comprehensive multifactorial study of the impact of various types of innovations on the industrial enterprises sustainable development indicators.

Within the framework of this study, four types of innovative activities of industrial enterprises were identified: product, technological, organizational and managerial, which were measured as a result of a survey of a sample of 123 enterprises (167 respondents) and used to analyze sustainable development. The survey confirmed that the majority of the surveyed companies associate the improvement in the sustainable development level with product and technological innovations, while organizational and management innovations are significantly underestimated by the respondents. At the same time, within the framework of product innovations, respondents more often noted the importance of developing, creating and launching new products on the market than describing them as a product that meets the sustainable development principles. The respondents most often associated technological innovations with the introduction of new production technologies and the achievement of technological leadership in the market. The problem of reducing costs and using existing technologies in a new way turned out to be irrelevant for the majority of respondents.

Also, low scores were obtained when answering questions about the impact of managerial and organizational innovation.

The results of the quantitative analysis confirmed most of the hypotheses put forward. Thus, the first hypothesis about the relationship of innovations was confirmed, it was found that product and technological innovations are positively interconnected with managerial innovations, and the intensity of managerial innovations leads to organizational innovations. We also succeeded in identifying separate profiles of different types of innovations of the companies in the sample. Thus, the share of sustainable products of industrial enterprises is more influenced by product, technological and managerial innovations, as well as by the reduction of consumed resources, and the staff motivation and development. The influence of product and technological innovations on staff development is interesting, which can probably be explained by the influence of spillover effects of knowledge.

When analyzing the impact of control variables, only the negative impact of industry competition on the development of sustainable products was significant.

Thus, depending on the goals that an industrial enterprise sets for itself, it is possible to combine investments in certain types of innovative activities and thereby achieve the goals set in the field of sustainable development. Understanding the complex nature of innovation will enable businesses to build long-term, non-replicable competitive advantages.

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Laundry Processes and their Impact on Sustainability in the Aspect of Consumers Behaviors

Renata SALERNO-KOCHAN

Department of Non-food Product Quality and Safety, Institute of Quality Science and Product Management, Cracow University of Economics, Cracow, Poland, e-mail: salernor@uek.krakow.pl

Abstract

Laundry processes are treatments inherent in the use phase of textiles. The way they are conducted by consumers, including the type of equipment they use, washing, drying and ironing frequency, the choice of washing temperature, and size of load have a significant impact on the amount of carbon footprint associated with energy and water consumption. Taking this into account, the research purpose was to find out consumer habits and practices regarding laundry processes as an important phase in the life cycle of clothing products that affect the assessment of their environmental impact. The article deals with the problem regarding the level of carbon dioxide emissions in individual washing processes depending on the composition of clothing and the type and frequency of care treatments. Based on the performed surveys among Polish consumers, it was found that their approach to these processes is rational. Their households are equipped with high energy class washing machines, washing is carried out with moderate frequency, trying to make the washing drum as full as possible, they apply optimal bath temperatures and make little use of clothes dryers. Their attitudes significantly affect water and electricity savings.

Keywords: consumer behavior, clothing, laundry processes, sustainable development

Introduction

The population growth, the improvement of living conditions, as well as the development of materials and technologies, caused a high increase in consumer goods production and consumption. The consequence of this is an excessive carbon dioxide emission and environmental imbalance manifested in ecosystem pollution, waste generation, and climate change. The textile and clothing industries contribute significantly to these negative changes. They are classified among most polluting industries in the world (Choudhury 2014, Athalye 2012). In 2015, they emitted 1.2 billion tons of greenhouse gases (as CO_2 emission) as a result of energy use (A New Textiles Economy… 2017). Apart from high energy consumption, water usage, estimated at 79 billion cubic meters annually, and waste generation, amounting to 92 million tons, is a huge problem.

Research indicates that not only manufacturing processes of these industries contribute to environmental degradation (Muthu 2015). For a large share of this degradation the post-production sphere, connected with consumer behavior regarding clothing purchasing, their usage, maintaining and waste disposal practices, is responsible. Most of the available literature sources focus on consumer purchasing behavior while little research takes into account their habits during laundering processes. Especially such parameters as:

- washing temperatures, class of washing machines, washing cycles and washing frequencies, kind and amount of detergent used;
- drying timings, temperatures, frequencies, drying methods;
- ironing timings and temperatures,

were found to be the most important, requiring special attention concerning the environmental impact of clothes.

As sustainability is a topic of high importance nowadays and the washing, drying and ironing processes are an important phase in the life cycle of clothing products that affect the assessment of their environmental impact, therefore, the purpose of the article was to present laundry processes in terms of their impact on greenhouse gas emissions, taking into account various parameters of carrying out of them (e.g. temperature, frequency) and to show how they can be influenced by consumer habits and practices.

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Background of the study

According to Muthu (2015) the harmfulness of the post-production sphere of the clothing industry, measured by the amount of greenhouse gas emitted, is largely due to clothing care processes that are highly energy- and water-consuming. For example, the energy consumption for these processes is estimated at around 24.2 TWh per year (Pakula and Stamminger 2010). Bertoldi, Hirl and Labanca (2012) report that these processes consume about 7.2% of the electricity used by households in Europe.

Ironing is by far the most cumbersome process of garment care. It emits from 510 to even 1070 g of CO2 for every hour of ironing (*The Guardian* 2019). Its share in the carbon footprint, taking into account the entire life cycle of a given item of clothing, can reach up to 17% (Fig 1). It absorbs significant amounts of energy, especially in terms of linen, cotton and viscose products, compared to products made of synthetic fibers or wool.

The process of clothes laundering comes in second in terms of carbon dioxide emissions, with approx. 0.21 kWh per 1 kg of laundry load washed at 40°C. The use of 60°C wash setting instead of 40°C may result in an increase in the carbon footprint by up to 45%, while lowering the temperature from 40°C to 30°C may contribute to a reduction of the carbon footprint by even 40% (Jungmitchel 2010). According to Josephy et al. (2013), washing at max. 20°C temperatures uses even 70% less electricity compared to a 60°C cycle. The environmental burden of this process is also associated with the use of water and detergents.

Drying clothes in the washing machine requires up to 3-4 times more energy than the laundering process. Consequently, the use of both of these processes can lead to the consumption of much more than 4 kWh per washing cycle (Table 1). Drying clothes in tumble dryers is therefore an economically unprofitable practice; and most importantly, it is highly environmentally unfavorable (Apparel Industry…2009).

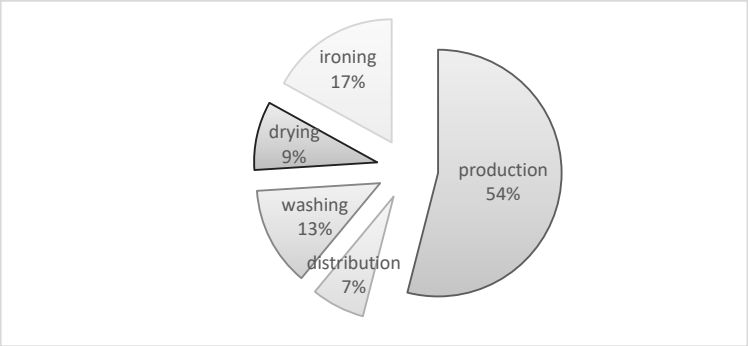

Fig. 1: The impact of clothing production and usage on environment (CO_2 emission)

Table 1: Energy consumption during washing and drying processes

	Washing machine	Dryer
Mass per loading	3.65 kg	4.5 kg
Use of loading volume (average)	60%	75%
Use per wash cycle	100%	17%
Average energy consumption	0.8 kWh	3.33 kWh

Source: Jungchmitel N. (2010), The Carbon Footprint of Textiles, http://www.ci-romero.de/fileadmin/media/informierenthemen/gruene_mode/Jungmichel._Systain.pdf.

The amount of CO_2 emissions depends on the frequency of garment care processes, especially of drying and ironing. According to Jungmitchel (2010), undertaking these activities after each washing cycle would increase the carbon footprint by up to 300%. Yet, it should be noted that the amount of carbon dioxide emissions resulting from the washing processes strongly depends on the type of raw material from which the item of clothing is made. In this respect, synthetic fabrics perform better. It is relatively easier to remove dirt from them and it can be achieved at lower temperatures. They also dry much faster compared to cotton. On the other hand, studies have shown that one load of washing of polyester clothes (as well as nylon and acrylic) can issue up to 700,000 microfibers that release toxins into the environment, and thus can enter the food chain of humans and other organisms (Choudhury 2015).

With the production systems currently in use, the amount of microfiber in the oceans can increase up to 22 million tons by 2050.

The degree of the negative impact of clothing care processes on the environment depends to a large extent on consumer practices. Therefore, the research was undertaken to learn more about consumer habits concerning washing processes.

Method Description and Characteristic of Respondents

Taking into account performed literature study some research questions were defined. They related to the types of equipment they use, regarding energy efficiency rating, the frequency of washing, ironing, drying treatments they perform, the type and amount of detergents, the temperature of washing and ironing they use, etc. that have a significant impact on the quantity of carbon footprint they create.

The research goal was to find out Polish consumer habits and practices concerning washing processes and to compare with attitudes towards clothing maintenance of other nationalities.

The data for this research were gathered in 2019 through an online enquiry posted on Google Docs. A targeted sample selection was used. A self-administered online questionnaire has been distributed to household representatives through social networks. The questionnaire contained single and multiple-choice questions, as well as scaled questions. The use of an ordinal scale (a quasi-quantitative) was connected with the possibility to utilize methods developed for numerical data, such as the arithmetic mean and standard deviation (Medhi, 1992; Zeliaś, 2000).

The survey questions concerned consumer attitudes towards clothing maintenance, including washing, ironing or drying processes. The survey was attended by 150 respondents, 63% of whom were women and 37% were men. The age of respondents was divided into three compartments – 18-25 years; 26-35 years and over 36 years. The number of respondents by age and gender is set out in Table 2.

Table 2: Structure of respondents

	Female	**%**	**Male**	**%**	**Sum**	**%**
All	95	63	55	37	150	100
Age						
18-25	40	27	18	12	58	39
26-35	18	12	20	13	38	25
above 36	37	25	17	11	54	36
Education level						
Primary	1	0.3	2	0.7	3	2
Secondary	35	23	20	13	55	36.7
Bachelor and above	59	39	33	22	92	61.3
Economic status						
High	7	4,7	5	3.3	12	8
Good	55	36.7	29	19.3	83	56
Above average	16	10.7	15	10.7	32	21.3
Below average	15	10	6	4	21	14
Bad	2	2.7	0	0	2	2.7
Place of residence						
Village	32	21.3	9	6	41	27.3
Town < 50 thous. of inhab.	14	9.3	5	3.3	19	12.7
Town 50 - 100 thous. of inhabit.	4	2.7	5	3.3	9	6.0
Town 100 – 500 thous. of inhabit.	3	2	7	4.7	10	6.7
City >500 thous. of inhabit.	42	28	29	19.3	71	47.3

Results and Discussion

From among the 150 subjects who took part in the survey, 133 respondents maintain their clothes on their own, including 131 of them most often using a washing machine, and 2 individuals declaring manual washing. None of the respondents declared that they regularly use dry cleaning or self-service laundries.

The research results show that 77% of respondents have an energy class A+ washing machine or higher, and 22% own class A washing machines. This is a very positive finding, indicating that consumers consciously choose such household appliances, and thus contribute to lower electricity and water consumption. Washing machines of energy class B and lower attract very little interest with only 1% of respondents declaring the use of them. Almost 81% of respondents admitted that they do not have automatic dryers in their households, which confirms a persistently low interest in these appliances among Polish consumers compared to consumers from other countries. As shown by research carried out in 2016 (Gwozdz, Steensen Nielsen and Müller, 2017), only about 12% of households in Poland were equipped with tumble dryers or in 2018 even only about 3% (GUS 2019), while in Germany and Sweden these figures were at 20% and in the USA at 80%. In turn, the findings of the present study suggest that among the individuals who have such appliances in their houses, only 4% use them regularly, 8% often, 1% sometimes and 6% rarely. The study also shows (Fig 2) that in the case of the frequency of washing, the respondents most often perform such chores once or twice a week (about 35%). Laundry done 3 to 5 times a week was indicated by 24% of the subjects surveyed, whereas only few of the respondents declared that they do the washing daily (2.6%) or less often than once a week (4%).

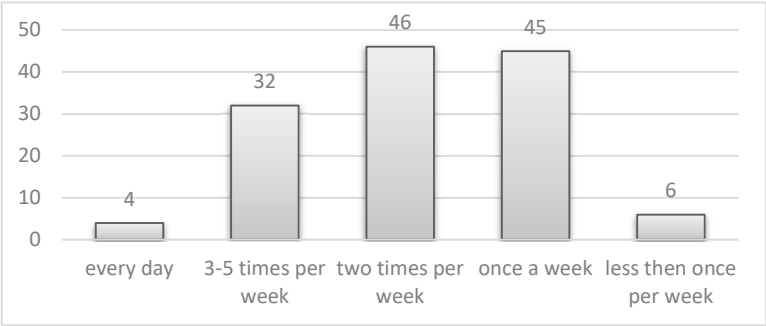

Fig. 2: The number of responses regarding the frequency of clothing washing performed by Polish consumers per week

The results of this study have indicated similar behaviors in this area of household activities among Polish and Finnish consumers. Research by Miilunpalo and Räisänen (2018) shows that more than 95% of Finnish residents use washing machines, more than half of them wash their clothes several times a week, fewer than 13% daily, and a third - once a week. Another survey question concerned the washing process itself, including drum fullness and the selection of wash and rinse cycles. The research results have shown that respondents make sure that the washing machine drum is full or three-quarters full - around 80% of respondents make such declarations. As many as 8% of those surveyed, fill the washing machine drum half, and the rest, i.e. 12%, do the laundry with smaller loads. None of the respondents admitted that they wash individual items of clothing. Finnish consumers, on the other hand, declare that they more often carry out the washing process without a full drum load (43% of respondents - almost always, 37% - often). Only 23% admit that their washing machine drum is full every time, and 26% - often (Miilunpalo and Räisänen 2018). This is also true for German consumers. The research conducted in 2014 revealed that in most cases they do not completely fill the drum, which, according to the author of the study, significantly increases the number of washing cycles, and thus translates into greater energy and water consumption (Kruschwitz et al. 2014).

The results of this study suggest that respondents generally choose such wash settings which are dedicated to the particular type of fiber from which the clothes are made, and so - 32% of respondents indicated the choice of the washing cycle for cotton products, 19% - for washing synthetic materials, while the least frequently chosen setting (3% of responses) is the program for washing wool. The ECO washing cycle, indicated by only 24% of respondents, is not an obvious choice for washing machine users. But this result shows an upward trend compared to the results presented by Alborzi et al (2017), who indicated 17% share of the ECO program in the total number of washing programs declared by the respondents. The setting selected by Polish consumers most often (53% of responses) is a short washing cycle. However, it is worth noting that among them, 33% of such indications came from individuals with higher education. Almost a third of respondents (32%) most often choose their own washing parameters without consulting the manual, of which 22% of the subjects had a higher education. Over 75% of respondents most often

choose temperatures ranging from 30°C to 40°C, 18% - from 50°C to 60°C, and 5% - up to 30°C. For comparison purposes, according to research conducted among Finnish consumers, most subjects wash their clothes at 60°C (45% of respondents), and 15% at 40°C. Some of the respondents also wash their clothes at higher temperatures, up to 90°C. The study has shown that many Finnish consumers do not believe in the information on the labels and often wash their clothes at higher temperatures than recommended. These people tend to believe that the washing instructions provided by the manufacturers are too cautious, or that temperatures below 60°C do not fully remove dirt, such as sweat or fat (Alborzi et al 2017, Miilunpalo and Räisänen 2018).

The next item in the questionnaire was designed to check consumer practices in relation to ironing. The average percentages of respondents' answers to this question, taking into account their gender, are presented in Fig 3. On an ordinal scale - from 5 to 1, where 5 stands for “always” and 1 – “never”, respondents defined their typical behavior.

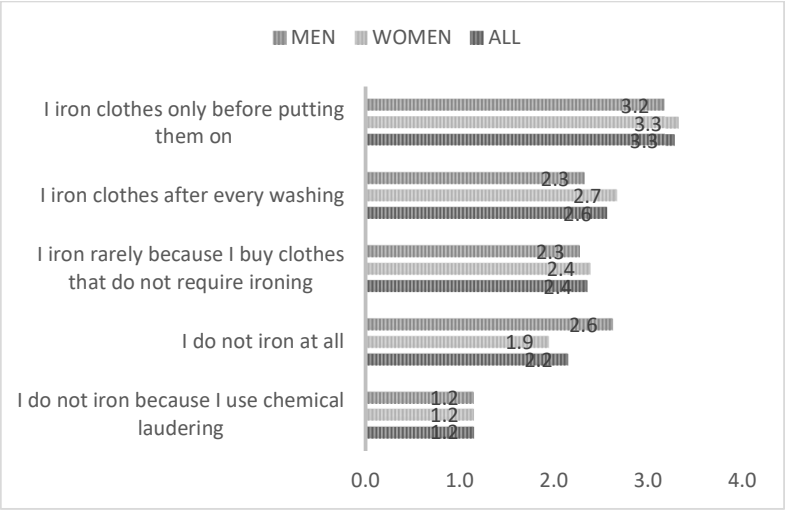

Fig. 3: The respondents' habits with respect to the ironing of clothes

Based on the obtained responses, both male and female subjects most often iron the clothes before putting them on. This practice obtained the highest average rating among the respondents (3.27 pts). The statement "I iron clothes after each wash" came in second, with an average answer rating of 2.56 points. Such approach to ironing is more common among female subjects (2.66 pts) rather than male ones (2.33 pts). Standard deviation values were at the level of 1.5 points, suggesting a large dispersion of responses in relation to this practice. In the third place, with an average rating of 2.35 points, respondents indicated the statement "I do not iron very often because I try to buy clothes that do not require ironing" - in this case the share among the responses of female and male subjects was very similar. A large difference between the responses among men and women was noted in relation to the statement "I do not iron clothes at all". Such approach is much more common among men (2.63 pts) compared to women (1.95 pts). The results of respondents' answers, at the level of 1.15 points, also indicate a very seldom use of dry cleaning.

Conclusions

Considering theoretical and empirical studies on the impact of washing, drying, and ironing on the environment and the results of own research, it can be stated that Polish consumers exhibit a rational approach to garment care methods. As shown by the respondents’ declarations, consumers generally do their laundry at home (99% of respondents), performing one or two washing cycles per week (68% of respondents), using high energy class washing machines (99% of respondents declare having a min. A energy class washing machine, and 77% - a min. A+). Fewer than 20% of respondents declare that they have automatic dryers, but only 4% use them regularly. Almost 80% declare full drum loading before starting the washing machine, 75% declare washing at 30-40°C, and approx. 53% of respondents use short washing cycles. Unfortunately, ECO wash settings, which are selected by 24% of respondents, boast little popularity. It was also found that individuals with higher education normally use less energy and water-consuming settings. Positive behaviors have been found with regard to ironing as well and are related to the respondents' declarations that they perform this activity just before putting on their clothes (3.27 pts on a 5-point scale). On the other hand, the declaration of ironing after each wash (average rating 2.66 pts), as well as a low rating (2.35 pts) regarding the attitudes aimed at eliminating the ironing process, especially among women, indicate that there are still some areas of possible habit change that may contribute to the reduction of energy consumption.

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Emprendimiento E Innovación En Las Universidades

Sussy BAYONA-ORÉ

Universidad Autónoma del Perú, Lima, Perú
Sbayona@hotmail.com

Abstract

The days of COVID-19 have exposed the limitations of many small businesses to reinvent their businesses, in many cases the breadwinner. Innovation, research and entrepreneurship are all related concepts. The survival of many businesses will involve a range of skills and knowledge on the part of the entrepreneur. Universities are educational centers in which future entrepreneurs are formed and there resides the importance of providing courses related to the formation of companies. This article presents the presence of entrepreneurship, innovation, technology and research in the vision and mission that universities and ICT-related careers have defined. The results show that there is a low percentage of the presence of the terms Innovation, Entrepreneurship, Technology in the Vision and Mission of the Universities. Few ICT-related careers have incorporated innovation entrepreneurship courses. The careers that have incorporated the courses, these are located in the different cycles of the career.

Keywords: entrepreneurship, businesses, innovation, universities.

Introducción

La propagación del SARCS-CoV-2 ha impactado a nivel global y local la economía en el contento mundial, regional y local. El distanciamiento necesario para evitar la propagación del virus y las oleadas ha traído consigo el cierre de negocios. Muchos emprendedores se han visto en la necesidad de reinventar el modelo de negocio bajo el cual operaba su empresa, haciendo uso de la tecnología e innovando para ofrecer nuevos productos y servicios. Con más de 86.3 millones de casos y más de 1.8 millones de muertos en todo el mundo (RTVE, 2021), los países se han visto obligados a tomar medidas cada vez más restrictivas que al inicio de la pandemia.

Por ello, la importancia de promover el emprendimiento, en especial en épocas de crisis (Martínez & Bañon, 2020), como es el caso del confinamiento y distanciamiento social, originada por la COVID-19, considerando que el emprendimiento esta relacionado con la creación de empleo y la introducción de nuevos productos y servicios. El emprendimiento está relacionado con un conjunto de características individuales, tales como tener autoconfianza, ser perseverante, tener coraje, ser creativo y asertivo (Martínez & Bañon, 2020), características que facilitan el emprendimiento. Además de propiciar la investigación en emprendimiento (Muñoz Palacios, 2017). Al respecto Robayo (2016) sostiene que hay una escasez de investigaciones que exploran la creatividad y la innovación.

Uno de los retos del emprendimiento es la digitalización para impulsar el desarrollo de nuevos procesos, productos y servicios. La digitalización ha hecho posible proveer de productos y servicios de manera diferente en un periodo de confinamiento vivido (Haeffele et al., 2020). La digitalización está relacionada con los programas de formación relacionadas con Tecnologías de Información y Comunicaciones (TIC) que ofrecen las universidades. Por un lado, la formación universitaria determinan positivamente el grado en el que las empresas han utilizado las TIC (Martínez & Bañon, 2020). Por otro lado, desarrollar emprendedores calificados y profesionales capaces de generar empleos es una función de las universidades. Al respecto, Saldarriaga & Guzmán (2018) afirman que "la mayoría de las universidades tienen en cuenta guías o estrategias para la formación de emprendedores", pero pocas han desarrollado modelos propios para la enseñanza del emprendimiento y la generación de ideas de negocio.

Implementar cursos de emprendimiento, en el proceso formativo de los universitarios, tienen como propósito promover que los estudiantes y futuros egresados tengan los conocimientos y las habilidades para ser emprendedores y puedan formar sus propias empresas. En especial, por que la gente joven son especialmente capaces de producir grandes ideas, tanto en investigación científica, invención o emprendimiento (Jones et al.,

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2014, Azoulay et al., 2020). Por un lado, los emprendedores jóvenes son más propensos a iniciar un negocio motivados por una oportunidad al inicio de su carrera que es menos fuerte en la mediana edad (Molina, 2020). Por otro lado, la educación está relacionada positivamente con las motivaciones de oportunidades y desafíos y los emprendedores con un alto nivel que dependiendo de las características individuales una persona educación universitaria pueda decidir por un trabajo asalariado (Molina, 2020).

De lo anterior, el entorno universitario puede fortalecer el nivel de emprendurismo de los estudiantes a través de cursos de formación y/o talleres. Proveer personas con habilidades para el emprendimiento puede ser una contribución relevante a la sociedad de parte de las universidades (Audretsch 2014). La educación para el emprendimiento a menudo mejora la actitud de los estudiantes hacia el emprendimiento (Xingjian, Liu andJian, 2019). Algunas universidades buscan generar programas para apoyarlos con recursos para poner en marcha sus ideas de negocio (Saldarriaga & Guzmán, 2018). En un estudio realizado sobre la intención emprendedora que mostraban los estudiantes que llevaron un curso de emprendimiento, se concluyó que estaban más interesados en emprender un negocio a diferencia de los que no llevaron el curso (Bui et al., 2020).

En este artículo se presenta un estudio sobre la presencia de términos relacionados al emprendimiento, la innovación y la tecnología en la visión, misión y valores de las universidades licenciadas, que cuentan con carreras de Tecnologías de Información y Comunicaciones, así como los cursos que se ofrecen para propiciar el emprendimiento de los universitarios.

Marco Teórico

Emprendimiento

El concepto de emprendimiento difiere según los autores. Peter Drucker definió “entrepreneurship” como la actividad creativa que implica tomar ventaja de los recursos disponibles para crear en riqueza de una manera nueva (Drucker, 1985). Otra definición de emprendimiento se refiere a la capacidad de crear a partir de cero un proyecto, una iniciativa o un negocio (OBS, 2019). El emprendimiento puede definirse como el proceso que “requiere de creatividad e innovación para crear y aprovechar oportunidades para aportar valor a la sociedad” (Bui,2020). A la persona que organiza u opera un negocio se denomina emprendedor y la intención de emprendimiento indica la tendencia de una persona para iniciar un negocio en el futuro. El emprendimiento es un factor clave en la formación de empresas y la innovación es una palabra que está presente en su definición.

Universidades y el Emprendimiento

La universidad juega un rol importante en la creación de una sociedad emprendedora y una cultura empresarial. Según Etzkowitz (2007) en el modelo de la triple hélice las universidades juegan un rol importante en la generación de conocimiento y tecnologías que pueden tener aplicación en la industria. A nivel mundial los programas de formación sobre espíritu empresarial siguen en crecimiento. Estos programas tienen el propósito de dotar de conocimientos y desarrollar las habilidades de los participantes para iniciar y mantener empresas (Kadir et al., 2012). Diversas universidades en su programas de estudios de las diferentes carreras implementan programas educativos orientados a la formación de futuros emprendedores. Aunque pueda existir una diferencia de la estructura, de los contenidos, de la metodología y las técnicas educativas son creadas con un propósito y temas similares, como es el estimular el desarrollo económico del entorno (Peterka et al., 2015).

En el proceso de transformación digital que se vive, las especialidades relacionadas a TIC juegan un importante rol en la formación de emprendedores que aporten valor y apoyen el proceso de digitalización para impulsar el desarrollo de nuevos productos, servicios y/o procesos. Las TIC permiten procesar administrar y compartir la información haciendo uso de diferentes soportes tecnológicos (Colegio de Ciencias y Humanidades, 2019). La Tecnología ha permitido crear nuevos productos y servicios (Publissoft, 2019). De lo expuesto, se resalta la importancia de las carreras universitarias relacionadas con TIC por su importancia para el desarrollo tecnológico. Es así, que en diferentes universidades se han realizado modificaciones en las metodologías de enseñanza o se ha mejorado las mallas curriculares con un enfoque en la formación de personas emprendedoras.

Fundamentos de Administración

Un elemento principal del proceso administrativo es la planeación, fase en la que se establece las bases de toda institución. En esta fase se detalla la misión, visión y los valores de la organización, los cuales constituyen el proceso de planeamiento estratégico. La misión y visión es la razón de ser de las empresas y la cual debe estar fundamentada por valores y principios (Louffat, 2010). La visión es prolongación hacia el futuro de una misión, el

cual se basa en seguir el desarrollo institucional (p. 16). Por otro lado, los valores institucionales son los principios, ideas y creencias que respaldan a la misión, dándole un perfil a la cultura organizacional.

Metodología

Este estudio es de tipo descriptivo, cuantitativo y transversal, que se realiza en el sector educativo. La población estuvo constituida por las universidades peruanas que han sido licenciadas por la Superintendencia Nacional de Educación Superior Universitaria – SUNEDU (SUNEDU, 2020), que ofrecen carreras relacionadas con las TIC, del nivel de pregrado. La muestra estuvo constituida por las carreras relacionadas a TIC con paginas web disponibles. Se ubicaron las paginas oficiales de la universidades, para extraer la información relacionada a visión, misión, valores, y el perfil del egresado tanto a nivel de universidades y a nivel de las carreras. Así mismo se identificaron aquellas especialidades que ofrecían cursos relacionados con Innovación, emprendimiento, formación de empresas. La información recolectada fue registrada en hojas electrónicas. Datos como la visión misión, valores y la presencia de las variables de estudio: innovación, emprendimiento, tecnología y creatividad. Así mismo se identificaron las sumillas de los cursos que formaban parte de la malla curricular de las carreras

Resultados

Universidades y las Carreras Relacionadas a TIC

De un total de 92 universidades licenciadas por la SUNEDU, el 74% (68) cuentan con carreras relacionadas a TIC. Del total de las universidades que cuentan con carreras relacionadas a TIC, el 54% son privadas y el 54% son públicas. La carrera universitaria que ofrecen las universidades es Ingeniería de Sistemas. Le siguen en orden de frecuencia las carreras de Ingeniería de Sistemas e Informática, Ingeniería Informática, Ciencias de la computación, Ingeniería de Software e Ingeniería de Sistemas y Computación.

Emprendimiento Innovación y Creatividad

La visión, misión y valores de las universidades forman parte del plan estratégico de las universidades. Las carreras alinean su plan estratégico a los lineamiento estratégicos que define la Universidad. En este estudio, la visión misión y valores de las universidades y de las carreras relacionadas con TIC fueron analizadas. Este análisis se realizó con el propósito de identificar si habían sido considerados aspectos relacionados a la Innovación, Emprendimiento, Creatividad y Tecnología. Se identificaron dichos términos en la misión, en la visión y en los valores.

En la Visión, los términos que más utilizados son Desarrollo, Académica, Social, Calidad, País entre otros (véase Figura 1 A). Mientras que en la Misión de las universidades los términos más utilizados son Desarrollo, Formación, Responsabilidad social, Investigación, Científica, Profesionales entre otros (véase Figura 1 B). Del análisis de los términos más utilizados en la Visión establecida por las carreras TIC, los más frecuentes fueron Desarrollo, Profesional, Internacional, Formación, Calidad, País entre otros (véase Figura 2 A).

A) B)

Fig. 1: Nube de palabras de la Visión (A) y la Misión (B)de las universidades

Mientras que en la Misión establecidas por las carreras TIC, los términos más utilizados fueron Desarrollo, Sistemas, Ingeniería, Investigación, Tecnología, Formación, Sociedad entre otros. Así mismo, se aprecia la presencia de términos Innovación e Innovador (véase Figura 2 B).

A) B)

Fig. 2: Nube de palabras de la Misión (A) y la Visión de las especialidades relacionadas con TIC (B)

Los resultados muestran que en la visión y misión de las universidades, así como de las carreras relacionadas con TIC, no se realiza una enunciando declarativo sobre las actividades de emprendimiento. En la misión de las carreras TIC si están presentes términos relacionados con Investigación, Innovación, Tecnología e Ingeniería. Se aprecia alineamiento en la definición de la misión de las Universidades y la misión de las carreras relacionadas a TIC, en cuanto a la Investigación.

Cursos relacionados al emprendimiento que ofrecen las universidades

Para conocer como las carreras relacionadas a TIC de las diversas universidades promueven la formación de futuros emprendedores se ubicaron las mallas curriculares. En las mallas curriculares se identificaron los cursos que estaban relacionados con la formación de empresas, que se aproximen al menos a las dimensiones de emprendimiento e innovación. Los resultados muestran que un 63% de las universidades tienen cursos vinculados a Innovación Tecnología y Emprendimiento (ITE) un 10% no los tiene y un 27% no estaban disponibles en sus páginas web.

En la Tabla 2 se presenta un resumen de los nombres de los cursos que ofrecen las especialidades TI (que se presentan con una frecuencia mayor a 2) que estaban disponibles en las páginas web. Los cursos relacionados con el emprendimiento y/o formación de empresas cuentan con diferentes denominaciones.

Tabla 2: Cursos que ofrecen las diferentes especialidades

Nro 1	Cursos	Cantidad	Sumilla
1	Emprendimiento de negocios sostenibles	3	Si
2	Gestión Empresarial	3	No
3	Innovación y Emprendimiento	3	No
4	Administración para los Negocios	2	No
5	Emprendedurismo	2	No
6	Emprendimiento e Innovación	2	No
8	Seminario de Tecnología e Innovación	2	No

La formación de emprendimientos empresariales auspiciados por las universidades en los programas vinculados a las TIC es insuficiente. Si bien se muestra la presencia de cursos orientados al emprendimiento y/o formación de empresas, que ofrecen las carreras relacionadas con TIC se hace necesario que las carreras que no los ofrecen, lo

incorporen en sus mallas curriculares. De tal forma que se formen profesionales capaces de crear empresa y generar empleo.

En la Figura 3 se presenta una nube de palabras de los cursos que se dictan en las diferentes carreras identificadas. Se observa que en la mayoría de los cursos están orientados al emprendimiento. El emprendimiento esta relacionado con la Innovación y la creatividad. La creatividad es una característica deseada de los emprendedores. Así mismo, la tecnología está presente. En los diferentes cursos el Plan de negocio es un aspecto importante que debe ser considerado.

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Fig. 3: Nube de palabras con la lista de los cursos que ofrecen las universidades con carreras relacionadas a TIC

De las carreras que ofrecen los cursos sobre emprendimiento, se observa que estos están distribuidos en los diferentes ciclos. Al analizar la información recolectada se observa que la mayoría de los cursos están distribuidos entre el octavo ciclo con 29%, en el sexto ciclo un 16%, el quinto ciclo con un 14% y el noveno ciclo con un 13%. En general los tópicos de los cursos de formación están orientados a Emprendimiento, los modelos de emprendimiento, la innovación, las características del emprendedor, el innovador, plan de negocio, proyecto, tecnología, valor, empresas entre otros.

La formación de emprendedores se puede analizar desde el punto de vista académico, analizando los cursos que se ofrecen y las prácticas con el mercado. Se ve un interés creciente en la formación de emprendedores. Razón por lo que las universidades deben incorporar en las diferentes carreras, cursos orientados a dotar de conocimientos y desarrollar las habilidades para el emprendimiento. La Tecnología e Innovación juegan un papel importante para contar con productos y/o servicios que agregan valor diferenciado a los clientes.

Conclusiones

En este estudio se analizó la visión, misión y valores que fueron definidas por las universidades y las respectivas carreras relacionadas con TIC. Los términos más frecuentes que han sido utilizados son Investigación, Innovación, Tecnología e Ingeniería. En cuanto a la formación en emprendimiento en las universidades y las carreras relacionadas con TIC se observa que se ofrecen diversos cursos sobre emprendimiento, formación de empresas, administración para los negocios, innovación y emprendimiento entre otros. Los cursos que se ofrecen tienen diferentes denominaciones, sin embargo están presentes aspectos relacionados con el Emprendimiento, Innovación, Investigación, Tecnología y formación.

Se observa un porcentaje bajo de universidades con carreras relacionadas a TIC, cuyas mallas curriculares están disponibles en las páginas web institucionales. No todas las carreras relacionadas a TIC, han incorporado en sus mallas curriculares cursos sobre emprendimiento. Es importante que las diferentes carreras incorporen cursos de innovación y emprendimiento para dotar de conocimientos y desarrollar las habilidades a los estudiantes hacia el emprendimiento.

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The Use of Scanning it Tools in The Analysis of Tendencies to Take Risk

Radoslaw MILEWSKI, phd

Assistant professor at the Department of Logistics, head of the RFID laboratory, The General Tadeusz Kosciuszko Military University of Land Forces, Faculty of Management, Wroclaw, Poland,

E-mail:radoslaw.milewski@awl.edu.pl

Piotr PIETRAKOWSKI, phd

Assistant professor at the Leadership Institute, head of the STRD laboratory The General Tadeusz Kosciuszko Military University of Land Forces, Faculty of Management, Wroclaw, Poland,

E-mail: piotr.pietrakowski@awl.edu.pl

Beata Zysiak-Christ phd

Head of the education and training affairs in the field of rescue, Faculty of Safety Sciences, The General Tadeusz Kosciuszko Military University of Land Forces, Wroclaw, Poland
E-mail :beata.zysiak-christ@awl.edu.pl

Keywords*:* thermoactive scanning, IT in medicine, stress, motor activities

Introduction

The relationship between stress and human functioning in an organization has been the subject of research all over the world for years. Most of the studies in this area are focused on medical and psychological aspects. In the era of the development of ICT support tools, it is possible to implement the thermoactive scanning instruments in the methodology of assessing the relationship of stress factors (stressors) with the distribution of selected neurotransmitters. A derivative of this type of research is the ability to assess management / command styles, which is extremely useful in assessing the suitability of employees for positions held in the organization.

Stress as a dynamic adaptive relationship

Stress as a type of mental tension is defined in psychology as a dynamic adaptive relations between the possibilities of an individual and the requirements of the situation (stressor, aversive stimulus), characterized by a mental and physical imbalance. In medical terminology, stress is a disruption of homeostasis caused by a physical or psychological factor. Factors that cause stress can be mental, physiological, anatomical or physical. The concept of stress was introduced to use by H. H. Selye, who was the first to hypothesize that a number of somatic diseases are the result of human inability to cope with stress. This phenomenon is called the so-called failure general adaptation syndrome. There are 3 types of stress in typology [1]:

Stress as a stimulus - situations in our environment that have the natural ability to cause tension and strong emotions. The theories associated with this type of definition include: the theory of G.R. Elliott and C. Eisdorfer, the concept of I.L. Janis and the concept of life changes by T. Holmes and R. Rahe.

Stress as a reaction - both physiological and psychological being a response to the effects of stressors (stress-inducing situations). The theories associated with this type of definition include: W. Cannon's homeostatic theory or Seley's concept [2].

Stress as a process or transaction - a relations between an individual and the environment: R. Lazarus' transactional model, A. Antonovsky's concept, S.E. Hobfoll, T. Tomaszewski's concept of difficult situations, J. Reykowski's regulatory and information theory of stress.

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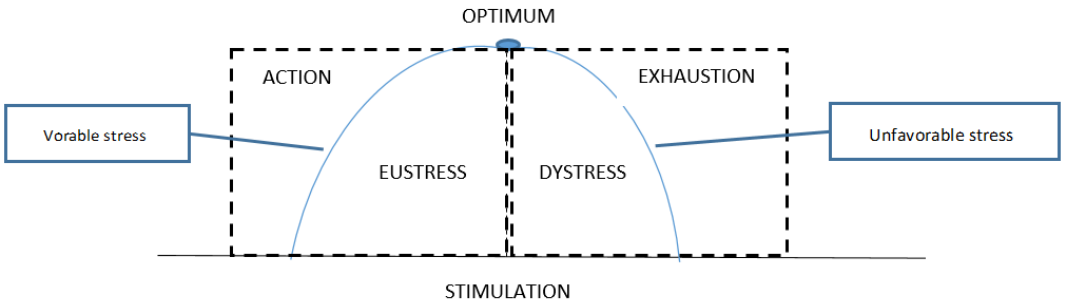

Fig. 1 : Stimulating (beneficial) and negative impact of stress on an individual
Source: personal study based on: I. Heszen, H. Sęk (2007), Psychology of health, Warsaw: PWN

There are also three types of stress reactions [3]: distress is the body's reaction to a threat, difficulty or inability to achieve important goals and tasks of a person, it occurs when a stimulus is triggered, i.e. a stressor; eustress is stress that positively mobilizes to action and neustress as a stimulus neutral in action for a given person, although for others it can be eustressive or distressing. Managing stress is cognitive and behavioral efforts to manage, reduce, or tolerate external or internal demands. Fig. 1 shows the stimulating (beneficial) and negative impact of stress on an individual (person).

Scanning Thermoregulatory Diagnostics as a tool of IEMSS

Scanning Thermoregulatory Diagnostics STRD is an examination that uses the variability of infrared radiation. It is standardized and can be an indicator of the overall activity of the nervous system. It is an excellent tool for determining the stress response and attitudes of the examined person. It allows to look at the team as one organism, diagnosing the organization's bottlenecks. Recent versions of the software are "intelligent in nature" and allow you to direct conclusions in the field of management (command) style on the basis of several trials at appropriate intervals relating to the trend.

During the research, a comprehensive program for assessing the natural potential and current capabilities of potential commanders or managers was used - IEMSS - (Integrated Enterprise Management Support System) based on the neuroleader concept. This system allows you to examine not only attitudes, but also the cause of stress or reduced work efficiency. Analysis of managerial attitudes with the use of the IEMSS system, which uses the instruments of thermoactive scanning and significantly supports personnel management, which translates into work results (efficiency) and increases the efficiency of the team.

Regulatory thermography according to the Heidelberg model has undergone many modifications, from its inception to today's scanning method. The history of TRD, as it was originally called (thermoregulation diagnostics), begins in the 1950s. Thanks to E. Schwam and Reehe, the first fundamental principles of thermoregulatory diagnostics were created at that time - subsequent changes in the temperature value in the infrared range are regulation, i.e. the reaction of a living organism to stimulation.

At Heidelberg University, a group of scientists around G. Heim and M. Blomhke developed scientific standards and procedures for measuring with a non-contact infrared sensor. However, this method has developed mainly as a contact method in many countries alongside the classically known medical thermography.

The Essence Of The Method Of Subcutaneous Micro-Radiation Scanning

The method consists in a non-contact measurement, with an infrared sensor, of the human body, which is subjected to a stress stimulus, which in this case is the cooling of the body, which is achieved by undressing the subject.

The method of examination can be compared to an ultrasound examination, where a probe, in this case an infrared analyzer, moves along the human body according to a specific procedure, collecting data, i.e. specific temperature values in the infrared range. In contrast to ultrasound, the probe does not come into contact with the body in this method. Three consecutive measurements are made in a fixed order and time. After the organism has reached a state of homeostatic equilibrium, according to W. Cannon's theory, the fourth measurement is carried out, which determines the biological "trend" of the organism, which is a fixed result vector of the basic group of

neurotransmitters. A series of values is then obtained, which are subjected to mathematical analysis in order to find a correlation between all the measurements (Fig. 2).

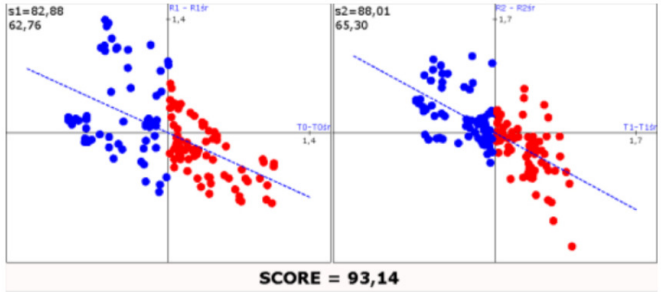

Fig. 2: A graphic image of the values resulting from the radiation, which were subjected to mathematical analysis to find a correlation between all measurements

Source: own study based on: K. Krupka (2018), Fundamentals of neuropsychosomatics, The basic set of information needed to work with the neuropsychosomatic process in the Leadership project, training materials (unpublished), Krakow

In the STRD study, not only the value of the infrared temperature itself is important, but also the trend and its fluctuations in a specific time unit. We call these changes the regulatory value or plasticity. Each measurement point on the subject's body has a specific value. As a result of stimuli (stressors - in this case, they are cooling the body down by undressing the patient and acting in contact with blood), a reaction takes place in the form of a change in the value of a given point.

Regulatory stiffness and limitations of tested plasticity

From the point of view of physics, each stimulus (stressor) causes an energetic reaction of the system, in this case the human body. Each point on the skin subjected to the stimulus can react in three ways. The value, that is, the temperature, may increase, which means that the point is warming up; the temperature may drop, i.e. the point cools down and the last possibility the temperature does not change. If all the tested points are sorted by value, from the lowest to the highest, and each of them is given a specific number, and then the observation is made as in time, i.e. during the next two measurements, they behave, then information will be obtained, which is called regulation. Regulation is the most important parameter of energy changes [4].

If the points with the highest values in subsequent measurements, i.e. the second and third, will have a lower value, we call it positive hyperegulation, if the same points heat up, we call it negative hyperegulation. This is due to the known fundamental laws of physics - no correct value can increase because such a situation becomes incorrect and suggests a pathology of a given function. Similarly, if the points with the lowest value in subsequent measurements, i.e. the second and third, will have a higher value, we will call it positive hyporegulation, and if the same points lower their value, we will call it negative hyporegulation. The same situation occurs in the case of hot spots, but it is a reverse reaction, i.e. a continuous drop in temperature is an incorrect reaction and also suggests a pathology of the function. There is still a third possibility, i.e. there is no change in the point temperature value as a result of the stimulus (stressor). Such a situation is called regulatory stiffness, the lack or a significant limitation of plasticity of the tested system [5].

Regulatory rigidity is the most disadvantageous regulatory situation. Failure to respond to the stimulus indicates information chaos. This state of affairs cannot last long. Therefore, there is always an attempt to explain this kind of reaction. It should be remembered that stiffness, in common understanding, is associated with something dead. In fact, it is so - because if the system does not respond to a stimulus, it is dead from the point of view of energy processes, i.e. it does not react with the environment [6].

The skin plays a decisive role in regulating body temperature. It consists of three layers: epidermis, corium and subkutis. Corium is the place in the skin responsible for creating and expelling skin heat.

Based on the segmental division of the body by the spinal nerve, the temperature and the skin's ability to react to stimuli become indicators of deeper localized disturbances in the functioning of the whole organism or its individual organs.

Human infrared radiation as an aspect of the surrounding thermal field is an excellent tool that is used to show the internal state of the human body. Changes in infrared radiation correspond to changes in microcirculation on the skin.

It has been proven that cutaneous microcirculation is a potential representative of the entire vascular bed and reflects its structural and functional mechanisms as well as general vascular disorders.

Elements of tactical medicine and motor activities of the examined

The battlefield is the stressful place. In addition to the primary tasks of each soldier in combat conditions, an important element is also tactical combat care for the wounded on the battlefield (Tactical Combat Casualty Care) [7]. According to TCCC guidelines, there are three main preventable causes of death of a soldier on the battlefield. The main ones are massive bleeding. The mere sight of blood causes shock and is a strong stressor. Therefore, for every soldier and battlefield rescuer, it is important to locate the hemorrhage correctly and stop it as quickly as possible [8]. As part of his activities, the battlefield rescuer has a number of activities to perform. Their order depends on both having knowledge and skills, the consent of the commander and making the right decisions [9]. The correct implementation of the algorithm is important for the effectiveness of actions. It is he who allows you to systematize activities and not make a mistake.

Methodology and stages of research

The activity profile of the laboratories at the Military University of Land Forces is focused on studying and monitoring stress among students. COVID-19-induced change and limitations in the research environment resulted in limitations in the study population. The aim of the study was to assess the reaction of a military academy candidate operating under the influence of stressors and their relationship with the radiation emission of selected neurotransmitters. The research methodology takes into account operation in conditions similar to natural (battlefield).

The aim of the study was to assess the correctness of the task performance according to a given algorithm (providing help on the battlefield) under conditions of strong stress and monitoring the concentration of selected neurotransmitters under stress and after reaching homeostasis. The study was divided into several stages.

In the first stage, training was conducted for the entire pilot group, in which each of the respondents carried out manual activities related to giving the first one on the battlefield under the supervision of an instructor. The first part was completed by checking the correctness of the exercise.

In the second stage, each participant covered a distance of 0.5 km with a weapon and ran into the room where the phantom was located, and followed the exercise algorithm. The temperature in the room (unknown before) was low (outside 32ºC, inside 9ºC), the sounds of the battlefield and the screams of the wounded were simulated. **At this stage**, the correctness of the activities leading to the placement of a tactical tourniquet on the bleeding limb (phantom) by the subject was assessed according to the algorithm assumed in the Tactical Fire Care phase, and the effectiveness and accuracy of the exercise in conditions similar to real ones was assessed.

In the next stage, the subject was tested using thermoactive scanning - STRD and the level of 4 essential neurotransmitters having a direct impact on personality was assessed. In the next stage (240 sec. pause), the subject completed a test assessing the type of stress to which he or she was subject (stimulating or instrumental). Figure 3 shows propensity to take a risk in the studied pilot group.

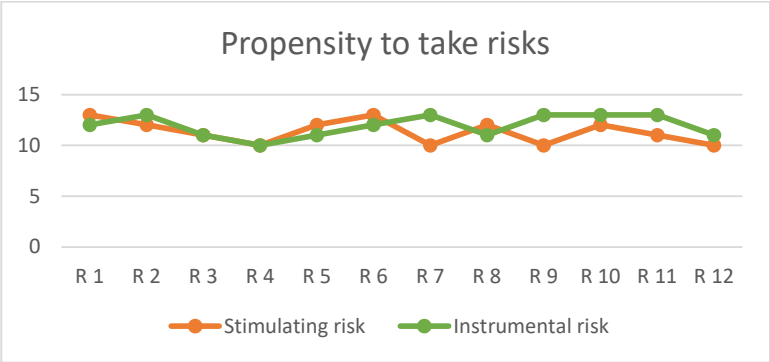

Fig. 3: Propensity to take a risk in the studied pilot group

Source: personal study

The research shows that half of the surveyed population shows a tendency to take risks, known as stimulation risk. It is seen as a way to provide yourself with stimulation by increasing physiological arousal. Profit, „win or loss" is not important here, because activity is supposed to cause a pleasant state of excitement, which is an end in itself.

The other half of the respondents showed a tendency to take instrumental risk, which is perceived as an opportunity to achieve a positive result. It is the future win that makes people look for such instruments to increase the probability of success.

Group selection, purpose and course of the study

The study involved 12 cadets, the first year of five-year military studies at the Military Academy of Land Forces. The respondents were subjected to training in the field of CLS (Combat Live Support), which included familiarizing them with the main assumptions of the TC3 committee and the algorithm of actions in the Care Under Fire phase.

The criterion for including students in the research was to complete a shortened training course in the field of CLS, including the assumptions of the TCCC Committee, activities in the Tactical Under Fire phase, where the main assumption is to find massive bleeding, put on a tactical tourniquet, and evacuate to the Tactical Fire Care Phase. The research tool to assess the quality of the algorithm's execution was the previously prepared evaluation sheet, containing all the elements of the algorithm included in the activities of the combat field rescuer in the Care Under Fire phase. The effectiveness of the stasis placement was assessed by the examiner by the lack of a pulse on the artery of that limb on which he had placed the tactical tourniquet (after locating the hemorrhage). Resting heart rate and heart rate after exercise were examined. The heart rate of each participant was measured using a Sanitas brand heart rate monitor. The first part of the research was carried out in a room where training in manual activities was previously held. The participants of the study were to perform activities according to the algorithm in accordance with the scope of activities in the Care Under Fire phase (without the introduced stress element).

After the training, analogous measurements were carried out on the same group of students. They were performed in a room equipped with devices simulating the battlefield. Each subject, wearing a backpack, a helmet and a tactical vest with a rubber weapon, was to perform a quick run around the building (500 m distance) before entering the room, after which, before entering the room, he was introduced into a tactical situation. In the room there was a helper, an injured-unconscious man, who had bleeding marked with artificial blood on his uniform on one of his limbs. As part of the cadet tasks, as in the preliminary study, he was to perform activities involving the Care Under Fire phase.

After the patient's hemorrhage on the limb was properly secured, using the CAT tactical tourniquet, checked in the meantime by the evaluating examiner, the cadet proceeded to the next element of the algorithm. The study ended with a command from the examiner. It was issued when the cadet decided to evacuate the casualty to the Tactical Fire Care phase. During the execution of the algorithm, the examiner entered individual elements made or not on the evaluation card, marking performed or not made.

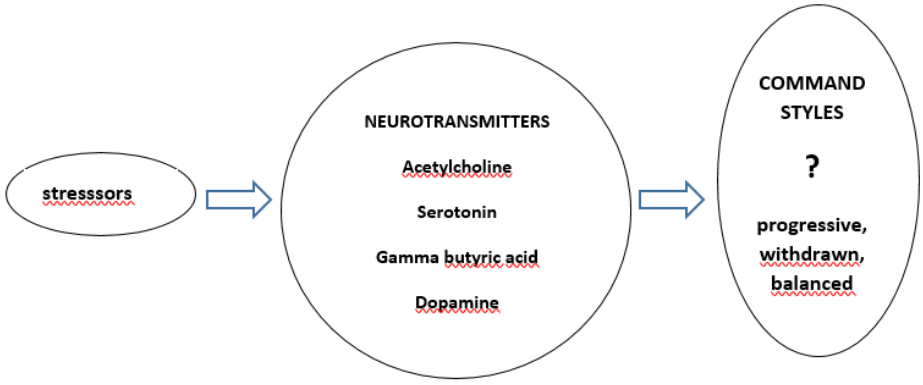

Fig. 4 : The question was: Is there a relationship between the intensity of certain neurotransmitters and the style of command?
Source: personal study

The last element of the study was the measurement of neurotransmitter emissions using a non-invasive thermoactive scanning method - STRD. Each cadet was tested three times with 10-second intervals, which is in line with the methodology of such a study. Then, after 240 seconds, another (fourth measurement) was made to determine the trend in the style of command. The question was: Is there a relationship between the intensity of certain neurotransmitters and the style of command? - did not give clear answers. It therefore remains the subject of separate studies of command styles. Fig. 4 shows the above thesis and the intention to verify it in further research.

Summary

The pilot studies indicated that in the study population, four subjects did not make any errors in the algorithm. Five out of twelve respondents (i.e. 41.6%) did not correctly complete the task according to the assigned algorithm after putting on the tactical tourniquet (they did not check the rest of the limbs for massive hemorrhages). Three subjects made mistakes under the influence of a stress factor (they used their tourniquet, not the injured person, to stop the bleeding from the limbs).

Research has confirmed the thesis that distress is the body's response to a threat and it does occur when the stimulus, i.e. the stressor, is triggered. Moreover, the research showed the influence of eustress on the respondents as positive and mobilizing to action, and the influence of neustress as a stimulus for a given person who was neutral in action, which for others was an eustress or distress stimulus. Managing stress as cognitive and behavioral efforts to manage, reduce, or tolerate external or internal demands has taken a stimulating or instrumental form. In the risk trend study, the population distribution was 50/50. Elevated dopamine levels were observed among four students, and acetylcholine among two. This can prove a lack of concentration and an escape from making decisions under conditions of high stress. In one of the subjects, the concentration of gamma-butyric acid (GABA) was above the mean for the studied population.

To sum up, many years of research on stress confirm its variable role depending on the intensity, number and type of stressors. This is consistent with the research carried out on the student population of the Military University of Land Forces. Operation in conditions similar to natural (battlefield) supported by IT devices for stress assessment correlated with the radiation of neurotransmitters (dopamine, acetylcholine, GABA and serotonin) indicates the need for further studies on a larger population to assess and reduce stress in students through regular scanning using devices STRD.

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Implementation of an Integrated Management System in a Production Company

Dominika JAGODA-SOBALAK
University of Bielsko-Biala, Bielsko-Biała, Poland, aczerwinska@ath.bielsko.pl

Agnieszka CZERWIŃSKA-LUBSZCZYK
University of Bielsko-Biala, Bielsko-Biała, Poland, aczerwinska@ath.bielsko.pl

Abstract

Integrated Management Systems (IMS) facilitate the achievement of objectives by organizations. However, their effectiveness depends on many variables: their degree of use, type of activity, expertise of employees, etc. They can become a basis for innovation, reducing costs, increasing production, improving quality and relations with stakeholders. On the other hand, errors at the stage of selecting a specific solution and its implementation may make them look like unjustified expenditure. The aim of this work is to present the process of selection and implementation of an IMS on the example of a manufacturing company. The authors used case study method. The article presents a pre-implementation analysis, the process of selection and implementation of an IMS.

Keywords: Integrated Management Systems, Implementation.

Introduction

The processes of acquiring, collecting, processing and using information can determine not only the growth but also the survival of a modern organization. It is essential to have a resource of information about the developments on the market, possible partners, the ways in which competitive companies operate, customer needs, suppliers, demand for a particular commodity, etc. This data is obtained from various sources, but in order for it to be valuable, it must be appropriately processed. This is supported by a computer, which is widely used today, from simple office work to production support and management of the entire company (Amrani et al, 2020; Lopez et al, 2020).

For this most important (from a strategic point of view) task, computer-integrated management systems (IMS) are being developed. Such a step will help, among other things, to improve the process of information flow and, consequently, to carry out tasks more effectively. It is a big step forward because companies suffer significant losses due to repetition of the same activities, which results in poor performance, uninformed employees, managers and customers (Tsesmelis et al, 2020; Zaloga et al, 2020). The key to success is the selection and then implementation of an IMS.

Matching the right IMS to the company's needs is a complex process. The right choice will result in improved management, simplified business process flow and increased revenue. However, in case of a mistake, the company will be exposed to errors in the processes being improved and deterioration of relations with stakeholders (including customers), which will result in financial losses (Amrani et al, 2020; Dellagi et al, 2020).

The first thing to do is to become familiar with the nature, objectives and functioning of the company. The pre-implementation analysis, or more precisely its result will lead to the preparation of the project of implementation of the IMS in the company. The analysis will provide an opportunity to take a closer look at business processes and, if necessary, improve their functionality by means of re-engineering. In addition, it is possible to gain knowledge about the expectations of the new system, goals, scope and critical points of its implementation. Collecting the aforementioned information will allow to define the criteria and proceed to the selection of the system for the analysed company.

The aim of this work is to present the process of selection and implementation of an integrated management system on the example of a manufacturing company. The authors used case study method.

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Company Analysis

The analysed company is a manufacturer of special machine tools for the railway industry and belongs to global companies in this sector. It also produces specialist equipment for customers in the steel, paper and energy industries, using an extensive network of dealers around the world. The company works on modernizing and expanding its assortment by means of its own designing capabilities, as well as with the participation of foreign investors, who become its partners by introducing their own designs of machine tools that were not manufactured by the company before. This particularly applies to American and French companies, which provided the organization with access to the market of gantry milling machines, lathes, drilling and milling machines, modular machining centers for the automotive industry, etc.

The selection and implementation of an appropriate IT system for the company in question is a strategic decision which has a significant impact on the way the company operates and its development opportunities.

Pre-Implementation Analysis

The pre-implementation analysis is a series of activities leading to the preparation of the IMS implementation project in a company. It aims at determining the functional and technological guidelines which are the basis for selecting the system, taking into account the functional scope, development possibilities and price. Thanks to it, the objectives of the implementation project, implementation strategies, its process and organizational scope, as well as technical factors necessary for the project implementation are developed (Moś, 2012; Wieczorkowski, 2016).

Benefits of a pre-implementation analysis (Korzyści płynące …):

- defining implementation objectives,
- defining the scope of implementation (departments, persons, business processes and decision-making schemes),
- adapting the implementation strategy to the requirements of the company,
- defining the data to be exported or imported into the IT systems in place,
- highlighting critical areas of the implementation,
- calculation of implementation costs.

The scope of the pre-implementation analysis (Flasiński, 2006) may vary depending on the methodology adopted, but regardless of the choice, it involves the following steps (fig.1):

1. Description of business processes.
2. User requirements analysis.
3. Analysis of the organization's IT infrastructure.
4. Scheme of project definition.

Fig.1. Stages of the pre-implementation analysis

Description of Business Processes

Business process modelling is designed to provide answers to the following questions: How does the organization work? What processes are implemented by the company? Are the implemented processes effective and efficient enough? Is it possible to improve the processes being implemented? Are the processes implemented by the company compliant with strategic objectives? (Flasiński, 2006).

The main purpose of modelling is to understand how a company operates, to analyses its operations and to suggest possible improvements. Process modelling allows us to move away from "manual" management of the company, which is undoubtedly not conducive to the company's growth, creative environment and commitment of employees. The transition to process management allows companies to gradually activate their employees (by assigning them the roles of process owners) and to use their potential to the maximum.

The main benefits of process modelling for organization include for example (Korzyści płynące…):

- a uniform description of the company's operations,
- strong focus of the whole company on achieving customer satisfaction,
- identification of the best (in terms of time, resources and costs) way of operating a company,
- improved communication and cooperation within the company as well as the organizational culture and working atmosphere,
- preparation for the development and easier implementation of the Quality Management System,
- preparation for the implementation of a workflow-type system and management of electronic company resources (including documents),
- identification and classification of areas for improvement, allowing for continuous development of company's operations,
- arrangement of the processes implemented by the organization, improvement of the processes implemented in terms of time and money.

An example of modeling the process of selling goods and suggested process improvements are presented in Figures 2 and 3.

For the purpose of the pre-implementation analysis, all main and auxiliary processes taking place in the company are presented in a graphic form.

The suggestion is to create an additional customer database in which, in addition to basic personal data, information on concluded transactions will be recorded. On the basis of the data, it will be possible to determine whether a given customer is a debtor to the company (if they have not settled all payments to the company). Thanks to this, it will be clear whether to cooperate with a given customer or refuse to carry out an order until they have settled all payments. In the case of a customer not included in the database (new customer), the solvency will be checked using the available methods.

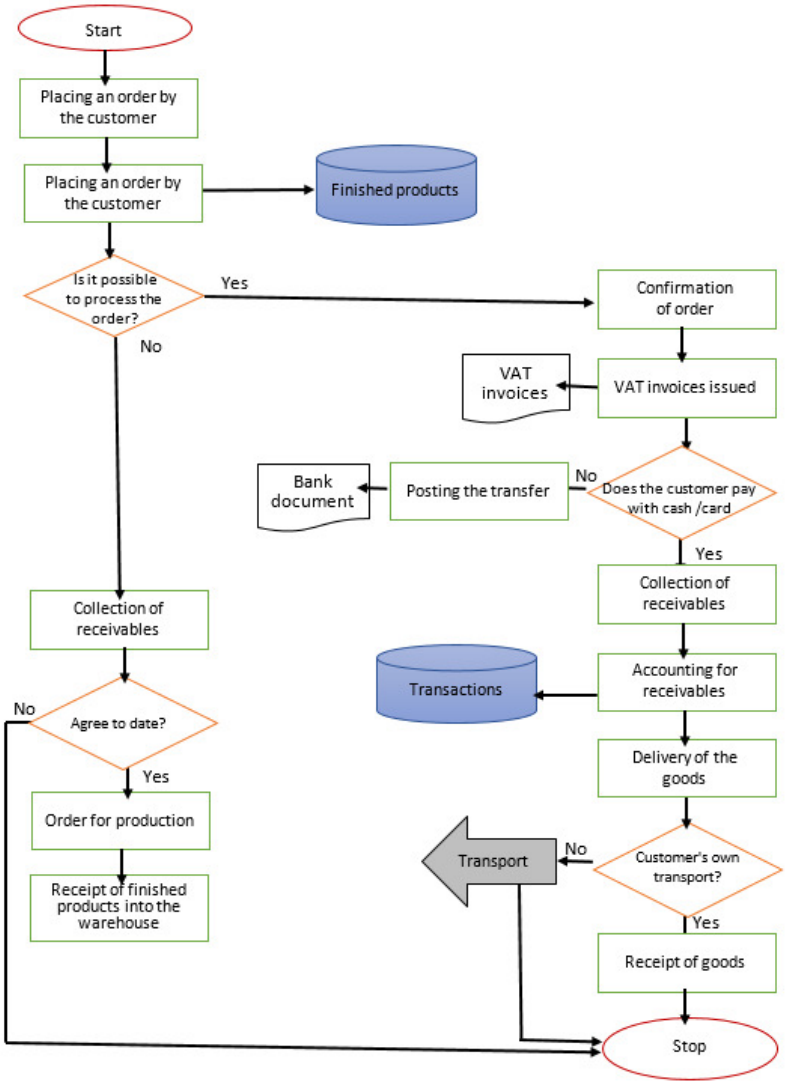

Fig. 2: The process of selling goods

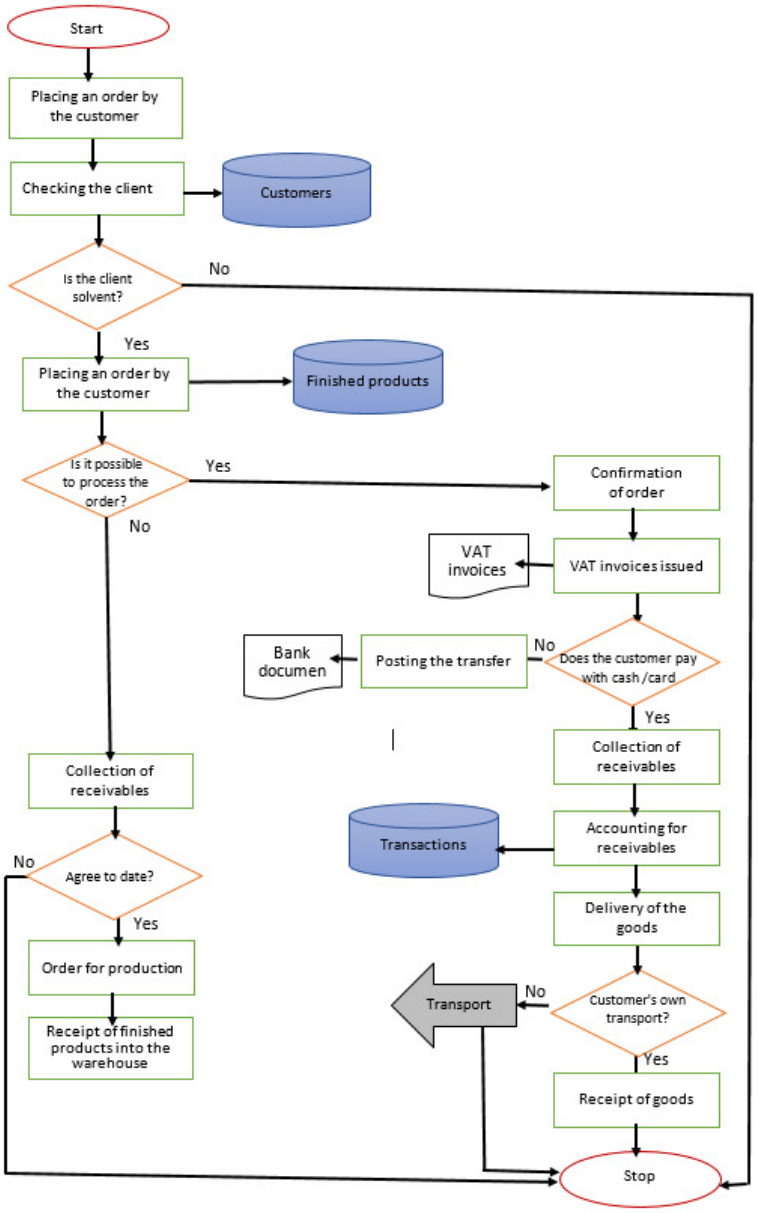

Fig. 3: Suggested changes in the process of selling goods

Analysis of the organization's IT infrastructure

The next step is to review the organization's IT base. Knowing its current status will be essential for the selection and implementation of the new system.

- Servers - a database server, a server with IMS and network division, and a server with a backup copy of the system and database.
- Workstations - there are about 150 PCs in stock, including laptops.
- Intranet service - the company has its own Intranet network. All employees of the company have access to this network. They can use websites, electronic mail, as well as two extensive areas: Quality Management System ISO 9001:2000 (quality manual, quality manual - archive, organization chart, list of procedures and instructions, list of procedures and instructions - archive, process flow diagram, quality policy and current affairs: (news, company website, employee periodic evaluation system, SIMPLE, company phonebook).

Software supporting designing:

- EdgeCAM - a tool for programming the CNAC machine tools (EdgeCAM),
- SolidEdge - Solid Edge is one of the leading systems for 3D computer-aided design. The application enables to create three-dimensional models of whole elements and individual components (Kisielnicki, 2008; Solid Edge).

Office software:

Microsoft Office software package. Basic and additional programmes**:**

- Excel,
- PowerPoint,
- OneNote,
- Access,
- Outlook,
- Project (managing the project schedule),
- Project Server (project management at the organization level).

Selection of the IMS

Choosing the right IMS will result in improved management, simplified business process flow and increased revenue. However, in case of a mistake, the company will be exposed to confusion in accounting, worsening of relations with customers, which will result in financial losses. Knowing the great benefits as well as the serious consequences, it is worthwhile to approach the considerations on this subject professionally and allocate the appropriate amount of time and resources to them.

System Selection Procedure

Depending on the type of enterprise, situational factors are considered (including development plans and initial preparation of the organization for change) and the plan and scope of activities is adapted to needs (Adamczewski, 1998; Adamczewski, 2003; Grudzewski and Hejduk, 2004).

Basically, the entire selection process involves the following activities: feasibility study of the project, development of requirements for the IT system, bidder selection, contract negotiations and implementation (Fig. 4).

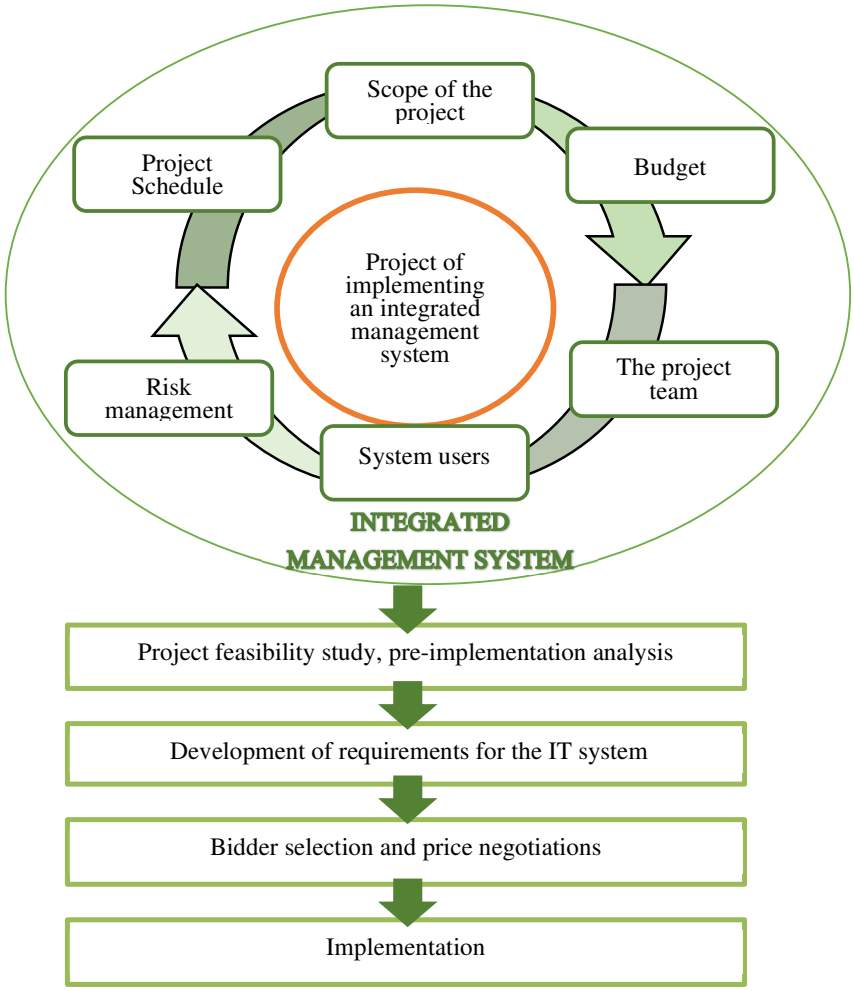

Fig. 4: System selection procedure

Feasibility Study

A feasibility study is an analysis of the possibilities of investment activities by assessing and identifying possible limitations. It comprises two main elements (Olszak and Sroka, 2001):

- strategic analysis - an analysis of the strategic business objectives and the resulting goals set before the implementation,
- the assumptions and definition of the constraints in terms of technical, financial, organisational, time constraints of all parties involved, the knowledge, skills and attitudes of the management and employees, the possibilities of using external funding.

The selected system will be implemented for several (up to a dozen or so) months, and only after that time its operation will begin. Sometimes it happens that various restrictions may lengthen this process even to 2 - 3 years. The company's activities during this period will be continued and the planned organizational changes will be implemented earlier. These changes should be taken into account during the selection process in order to be guided not only by the current needs of supporting the organization but also by future needs.

At the end of this stage, the summary report should provide the company's management with the information concerning: objectives, assumptions, constraints, initial schedule and framework budget of the project. This result presents the internal and external conditions of the organization and possible scenarios for action. On its basis, decisions can be taken to start preparatory work for the investment.

The start of the project and introduction of new tasks requires the company's management to appoint the sponsor and manager of the project. Their task will be to make decisions preparing for the implementation, so they will become part of the team responsible for implementation. One person should not perform both functions, as these tasks will be significantly different and, at the same time, valid for the entire duration of the project.

IT system requirements and system selection based on the requirements

Preparation for the evaluation of numerous offers requires commencing works, the result of which will be an appropriate definition of the selection context.

Defining the requirements for the new system and the selection process are carried out according to the following steps:

1. Analyzing the current and defining the target support needs - implemented as a functional or process analysis - it should cover the company's activities as a whole, regardless of the planned scope of support for the new system. It should show the current condition of the company, then take into account future needs and in this form be the basis for the evaluation of the suggested solutions.
2. Appointing and substantive preparation of an internal team – this team together with the project manager will make a detailed evaluation of the received offers in terms of their substantive compliance. It is usually recommended that the team is composed of representatives of the functional areas covered by the system, who have an important role to play in these areas, provided that they are not the persons leading these teams. The main task of the group is to work out, on behalf of future users, which of the considered applications could best support operational activities. It is advisable to prepare the team for further work through training that covers such issues as (Knosala, 2007):

- project and project management vs. current company objectives,
- integrated IT systems,
- evaluation of IT solutions and the process of solution selection within the company,
- multi-factorial evaluation of offers - methodology of the procedure.

The internal team develops and comes up with a proposal for approval: criteria for evaluation of offers, requirements for presentation of applications, a detailed analysis of the possibilities of individual applications and conclusions from completed stages. Next the team, through its manager, decides on the most advantageous offer. After the selection and start of the implementation, the group usually transforms into an implementation team of the investor cooperating with the consultants of the implementing company.

System Selection Criteria

Currently, there are plenty of ready-made solutions for IMS on the market, which gives a good choice but also increases the probability of making a mistake. The most popular solutions on the Polish market have been considered. The information collected on the group of applications under consideration should provide answers to the following questions (Adamczewski, 2003; Bojarski, 2003):

- industry - the basic aspect determining the selection of a system is its substantive compliance with the nature, mission and needs of the company. In addition, in the case of a production company (this is what we are considering), it will be important to analyses the types of production systems taken into account by the integrated system's production organization and control module. A system that is only adapted to discreet manufacturing should not be implemented in a company with continuous production and vice versa,
- system advancement - this is particularly important when selecting the systems to be considered as well as in subsequent consideration which one to choose,
- hardware and software requirements - check and collect information about currently used software and hardware,
- scope of the system (supported business processes) – when considering the choice, one should take into account whether the implementation of the entire system or only the most needed modules is considered. In order to establish this, the areas indicated as optional as well as necessary to be served should be selected. The result of the pre-implementation analysis, showing the specificity of the activity of the company in question and the main process flow, will prove helpful,
- flexibility, communication - is an important issue and should allow for its expansion in case of increasing the amount of data and adding a new module (compatible with the rest of the modules),

- functionality - it should be closely examined because without it, it is impossible to save the working time of personnel, which is one of the reasons for acquiring this system. It follows that the fundamental, and even the most important, criterion should be the relation between the effective functionality of the solution and its price,
- access to updates - access to upgrades and new versions,
- implementation history - attention should be paid to the number of successful implementations of a given system in previous system users,
- price - plays a significant role during the selection,
- terms and conditions of the contract - the terms and conditions of the licence agreement and those concerning the course of implementation and warranty and post-warranty service should be taken into account. Another important issue is the possibility of contacting the service, as rapid intervention is necessary in the event of problems with the system.

Review of the considered IMS

So far, the procedure has been presented and the criteria have been established, so we can move on to the right part - choosing an IMS. Before starting to consider, a list of companies proposing their solutions should be created. If all the companies currently available on the market were taken into account, it would be impossible to take a closer look at them. This would result in an unreliable selection of applications. Five, which according to the rankings are the best and most popular, have been taken into account. In each item, categories have been created according to which we will evaluate the compared applications:

- IFS Polska,
- REKORD,
- SAP Polska,
- SYMFONIA,
- TETA.

Comparison of the systems

The list of properties of the solutions under consideration provides answers to certain questions and may even indicate a leader, but it is not the only or the most important indicator of choice. We select the application for a particular company, which invests huge amounts of money, devotes the time of many employees and even risks its market standing. It does not care about being able to boast about having the best system, but about the profits it is supposed to make in the near and distant future. To succeed in this, the characteristics of the organisation, its objectives and needs must be taken into account when considering a choice:

1.It is a medium-sized manufacturing company, a global manufacturer of machine tools, lathes and milling machines.
2.The aim of the organisation is:

- to expand its activities mainly to Western European countries and to sell products and services of a quality that meets the expectations of customers; the company intends to gain new partners who would support it in activities involving the improvement of technology and research projects,
- to change the production process, work organisation and human resources management,
- to develop new technologies,
- to attract investors and apply for funding.

The chosen philosophy of selection presented by the relevant criteria is shown in a table. Such visualisation will be appropriate for the sake of transparency and ease of implementation of possible changes.

The content of the table is made up of individual applications and subsequent selection indicators. They have been prioritised and weighted in order to further distinguish their value. The scale of the weight as well as the scoring of each item is from 1 to 5. This solution allows for the use of values from the whole range of the scale, and does not exclude the candidate in case of obtaining even a very low score from one criterion.

The final score is calculated as follows:

(SCORE_1 * WEIGHT_CRITERION_1) + SCORE_1 * WEIGHT_CRITERION_2) + (SCORE_3 * WEIGHT_CRITERION_3) + … + SCORE_n * WEIGHT_CRITERION_n)

The system with the highest number of points will be highlighted and taken into account for further consideration (tab. 1).

Table 1: Comparison and evaluation of systems

Evaluation criterion	Weight	Ifs Polska	Rekord	Sap Polska	Symfonia	Teta
Industry and company size	5	4	5	4	3	4
System scope	4	4	4	5	4	4
Functionality	4	4	5	4	3	4
Equipment and system requirements	3	0	2	5	4	4
Access to updates	3	2	2	3	3	0
Implementation history	2	5	4	5	4	5
Total points	-	69	81	91	72	74

Source: Own work based on: Adamczewski P. (2003) Zintegrowane systemy informacyjne w praktyce, Wydanie III, Mikom, Warszawa; Bojarski R. (2003) Systemy informatyczne w zarządzaniu przedsiębiorstwem. Funkcje, procesy, standard., Wydawnictwo Politechniki Śląskiej, Gliwice; https://www.ifs.com/pl/; https://www.rekord.com.pl; https://www.sap.com/poland/index.html; https://www.sage.com/pl-pl/; https://teta.unit4.com.

Implementation Strategies

An IMS, although it is very expensive, in many cases brings great benefits to the company deciding on it. A prerequisite for the success of the process of improving management in a company is good planning - from the idea for the system to the last day of its implementation. One of its most important points, and even a milestone, is the selection of the implementation strategy. We can choose between the following:

- a radical implementation - a complete and simultaneous replacement of the existing system. It is characterised by the shortest implementation time and the lowest costs, but high risk. If it fails, it will cause very large losses,
- gradual and complete implementation - a complete introduction of a new system, in parallel, for a specified period of time, to using the existing system. Compared to the previous strategy, the time is longer, the costs are higher, but the negative effects of failure are reduced,
- gradual and modular implementation - introduction of a new system, one module at a time, with the new module replacing the analogous module of the previous system. The time is longer and the costs associated with the implementation are greater than in the other two strategies, but the possibility of failure of the project decreases.

An analysis of previous operations and knowledge of the current IT situation, which is its consequence, will make it possible to detect errors and avoid them in the future. The rapid transfer of existing tasks to a new application has resulted in: a change in the existing order, innovative problem solving, confusion among the employees, taking many man-hours to master the "smart" software. When implementing the system, the company's and employees' nature should be taken into account. It is a state-owned company (over 50% of shares) with "aged" staff. This means that the majority of employees have not previously had to deal with computerisation, and thus information technology. Only a long-term further education could bring the acquaintance and familiarity with the new solution, which is IMS.

A "gradual and modular" implementation was chosen as the most appropriate strategy for the selected company. The advantages of this solution:

- bad company experience with the competing options,
- employees requiring training,
- low risk of failure

The downsides are:

- long implementation time,
- higher costs than in the case of the other options.

The next stage is to establish the order in which the modules will be implemented and to estimate the dates of subsequent stages and the entire implementation process. There are six modules to be implemented (fig. 5): finances and accountancy, fixed assets, production process, turnover of goods, HR, customer service (this is about functionality, in a specific solution the above names may have equivalents). It is suggested to begin with the worst performing area in the company - turnover of goods, then the production process and the next would be customer service.

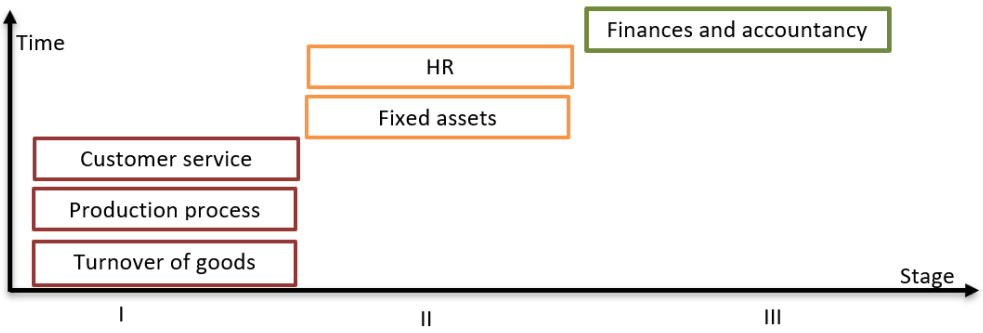

Fig. 5: Order of implementation of the modules

After proper implementation and training of staff, the costs are paid back and, over time, profits are made. However, this is not certain, and that is why the important and necessary issue that the management of a company has to do is to ask the question: is it worth carrying out such a serious investment process, or is it better to give up the idea of carrying it out? (Werner, 2004).

The foundation of any investment activity is considered to be the acquisition of specific profits, which are documented by economic accounting and correspond to the target set by the company at the beginning of the project.

SAP All – In – One – implementation

A decision has been made to implement the SAP All - In - One solution. The SAP solution for the electrical machinery industry contributes to the optimisation of key processes within the company, ensuring the quality of the design, production and assembly processes, timely delivery of products configured in accordance with customer requirements and improving the quality of maintenance services. It enables a high level of customer and maintenance services (SAP…).

Business benefits for the managing director:

- support in the customer service and sales process,
- improvement of business processes,
- information on current financial status and budget control,
- control over the company's development strategy.

Benefits for the financial director:

- fast preparation of necessary reports (possibility to export them to MS Word and MS Excel),
- monitoring of the company's financial situation,
- control of the budget.

Benefits for the chief accountant:

- possibility to book documents according to European standards,
- saving up to 80% of time (most functions are performed automatically by the application), less risk of error,
- easier reporting.

The key arguments in favour of implementing the system in the company:

- employees will be able to make more accurate and quicker decisions,
- the efficiency of work will be increased, which will translate into greater profits for the company,
- the company will become more "competitive in the European market" - the system works according to European standards, business transactions can be concluded and reported in multiple currencies,
- reduction of production costs, reduction of stocks,
- improving the efficiency of the logical system,
- a clear division of tasks,
- improving the quality management system.

Summary

The development of technology in the second half of the 20th century, which initiated the era of computerisation, has radically changed the way businesses operate. It brought many innovative solutions that improve the efficiency, profitability and relieve the burden on employees (Kosiński, 2001). It resulted in many benefits and created new standards. Companies that want to dominate the market, or at least survive, cannot be indifferent and must keep up with new solutions and technologies. This is not easy, because technology is moving forward at a frantic pace. What is good today may turn out to be useless tomorrow. Keeping up requires more and more human and financial resources, and sometimes this is not enough.

A perfect example is the change in the way a company is managed. This area is the "brain" and "senses" of the company, which makes it crucial. It all relied on observation, analysis and transmission of information by one or several people. This function was taken over by computers with different types of software, depending on the department. Currently all tasks are performed by one comprehensive application called an IMS (Carvalho et al, 2020; Zaloga et al, 2019).

The systems in question are a tool facilitating and accelerating work. But their effectiveness depends on the degree of their use, type of activity and employees' knowledge (Skuza and Prusak, 2018). They can become a basis for innovation, reduction of costs, increase of production as well as improvement of quality and relations with customers (Cieśla and Gunia, 2019; Marta and Rastislav, 2018). However, when they are not used in the company, they are become unjustified expenses.

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Cost Management as The Most Important Tool of Anti-crisis Plans

Jana KAJANOVA
Faculty of Management of The Comenius University
Department of Economics and Finance, Bratislava, Slovakia, jana.kajanova@fm.uniba.sk

Lukas VETESKA
Faculty of Management of The Comenius University
Department of Economics and Finance, Bratislava, Slovakia, veteska1@uniba.sk

Abstract

The crisis caused by Covid in 2020 has shown how suddenly the market situation and society can change. Many managers did not expect such a sharp and rapid crisis after a decade of economic growth. Some businesses crisis has caught unprepared. The sharp decline in turnover due to government restrictive measures has caused an acute shortage of liquid assets in most companies. The company can go through a similar crisis by creating an anti-crisis plan, which describes the reactions to individual adverse market situations that may occur. This gives managers the advantage of pre-built sets of measures that they can apply immediately, making their responses more flexible. The most important and most used tool is cost reduction. When identifying possible savings, cost controlling is important, which gives us important information about the cost structure in the company. Modern cost management methods such as ABC identify activities in the company that can be limited or eliminated altogether.

Keywords: Cost Controlling, Anti-Crisis Plan, Cost Management.

Introduction

At a time when the whole world is struggling in an economic crisis and competition is stronger than ever before, proper and effective cost management is essential, even in the smallest business. The period of crisis is a huge test of the stability of all businesses across the economy. It is during this period that it is necessary to adapt to the current situation from day to day, from hour to hour. The crisis in 2020 caused by the spread of the virus from China to the whole world came very suddenly and unexpectedly. While ordinary economic crises can be predicted as various macroeconomic indicators often indicate an overheating of the economy, a crisis caused by a virus is almost impossible to predict as it spreads very rapidly across continents. During such period it is essential for every company to have emergency plans and strategies in place, which will help the management to make decisions in a certain line and not succumb to panic. As the health crisis is characterized by strict government intervention in the functioning of the economy, it is necessary to adapt flexibly with the greatest possible effort to reduce unnecessary costs. Competition forces entrepreneurs to constantly look for new ways to make a profit, but in the event of a crisis, reducing losses can quickly become the main motivation for entrepreneurs, especially if the state has ordered them to close down or restrict operations.

Objective

The objective of this article is to determine the role of controlling costs in the implementation of anti-crisis strategy for enterprises, identify sectors of enterprises most affected by a sudden crisis, identify opportunities to mobilize cost reduction reserves through newer cost control methods, including process-based planning and cost control methods.

Methodology

Several scientific methods were used to achieve the objectives of the work. Based on a literature review, suitable domestic and foreign publications were used. Data, used in the processing of this article, were obtained from relevant official sources. These data were processed using several scientific methods, first analysis was performed, then cross-sectoral comparison and time comparison were used. Based on the resulting data, synthesis and deduction were used.

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Government Restrictive Measures

In addition to the restriction of forced closures of the most common types of business, most often service companies and the retail sector, where the largest number of people met, the state imposed new obligations on companies not affected by the restraint measures. For example, in the Slovak Republic, the state, through the Public Health Authority of the Slovak Republic, ordered establishments that did not have to interrupt their activities, providing, for example, disinfection or gloves on entry, limiting the number of customers per square meter of operation, ensuring regular disinfection of facilities, wet floor cleaning every day, etc. These measures, especially at the beginning of the crisis, caused an enormous demand for disinfectants, gloves and other protective equipment. The market response to this change in demand was a dramatic increase in the price of these products. Thus, there was an unpredictable situation where state intervention forced companies to increase their hygiene costs, which the cost strategies of the companies did not envisage. In the European environment, companies have not yet encountered this form of crisis. The last time they were severely tested by the economic crisis in 2008, when they were not forced to limit their operation from day to day, or to limit the capacity of customers etc.

During the strictest measures during April were forced to close for example, restaurants, accommodation services, small shops, services such as fitness centres, wellness and spa, ... due to restrictions issued by the Public Health Authority of the Slovak Republic (hereinafter referred to as the ÚVZSR). (Úrad verejného zdravotníctva SR, 2020) The effect of this measure was almost liquidating for many companies, as their sales immediately fell to zero, and only a few of these companies were prepared for such a situation. In times of a positive economic situation on the world market, many companies have invested their free funds in new areas, projects, development, etc. and did not hold sufficient liquid financial assets. The sectors most affected were mainly small and medium-sized enterprises, which had great problems obtaining funds to cover costs such as rent, energy, wages, etc.

Analysis of the impacts of the Covid crisis on the affected sectors in the Slovak Republic

According to government regulations, the most affected companies were service companies, namely accommodation, restaurants, bars, and companies providing sports activities. These companies were completely banned from any activity. These restrictions were reflected in a great loss of turnover in these sectors.

Fig. 1: Turnover of selected sectors in 2020

In the accommodation sector, turnover decreased by a staggering 84.7% compared to the same period of the previous year. In the food and beverages sector, turnover also fell very significantly by 42.1%. According to the data of the Statistical Office of the Slovak Republic, a total of 98.3 thousand people were employed in these sectors of the economy before the crisis. The decline in turnover also affected the labour market and employment in the individual sectors affected fell. The drop in accommodation is more significant compared to restaurant services, as government allowed the operation of restaurant services to be at least partially resumed after a few weeks of lockdown.

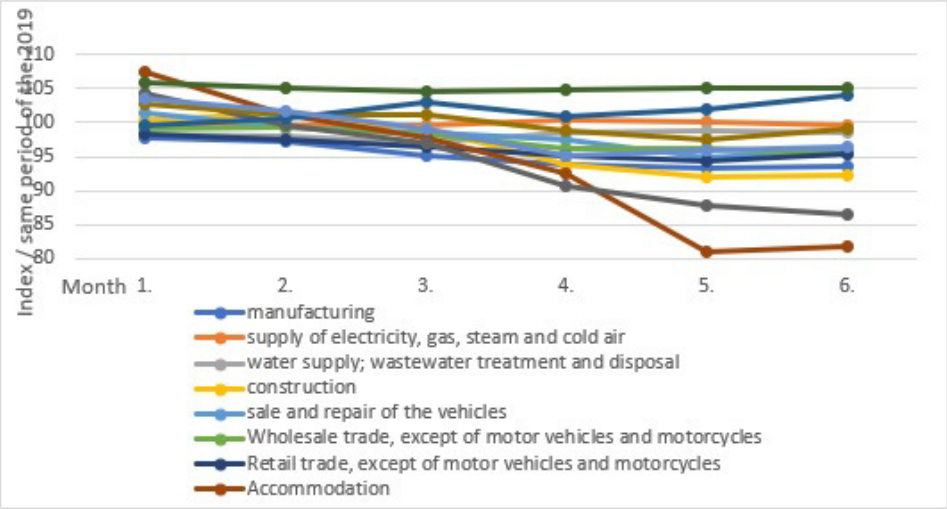

Fig. 2: Employment indices in selected industries by months

As we can see in the graph, the largest drop in employment was recorded in the accommodation services sector, where employment fell by 18.9% year on year. The restaurant services sector also recorded a decrease of 13.4%. This decline would probably be greater, but during April, restaurants were allowed to at least dispense food through the counter and offer food delivery. Other sectors of the economy recorded only a slight decline of about 5 percentage points. However, the crisis has also brought opportunities in the postal and courier services sector and in the information and communication sector, as the government's measures were aimed at restricting the movement of the population as much as possible, a so-called lockdown occurred. Thus, consumers had to meet their demand through online stores, which experienced a huge increase in orders during the lockdown. For this reason, companies involved in the online sales chain had to increase their human resources capacity as well.

However, global unemployment has risen as companies prepare for declining demand in uncertain times and one of the first measures is to limit the recruitment of new employees or re-evaluate already concluded contracts.

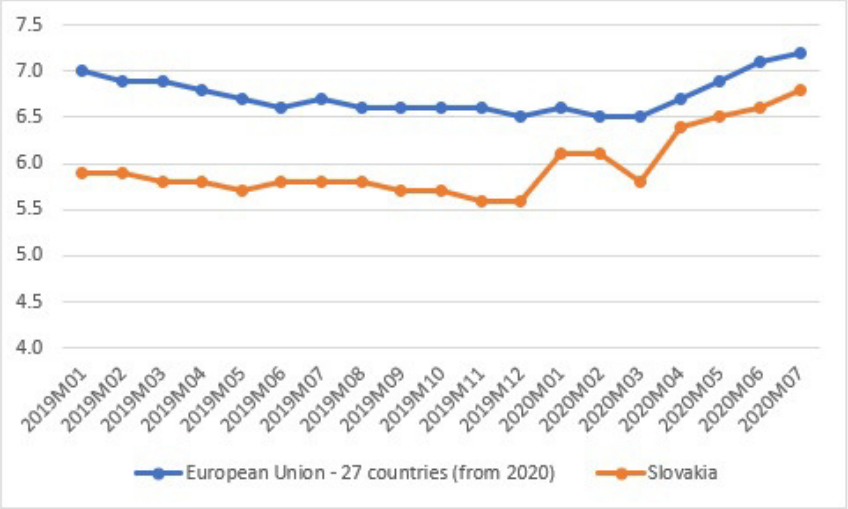

Fig. 3: Unemployment, % of active population

The data show that the increase in e-commerce activity in the sector could not cover the decrease in services and other sectors concerned. Before the start of the Covid crisis, the Slovak Republic reached the historically lowest unemployment rate. As we can see from the graph, the rise in unemployment is still just as sharp, so for now we can only predict where it will stop.

Due to the extent of the pandemic, which broke out worldwide, in addition to domestic demand decrease caused by regulations of the Slovak government, foreign demand also decreased, which is very unfavourable for the Slovak economy due to the fact that it is based mainly on exports.

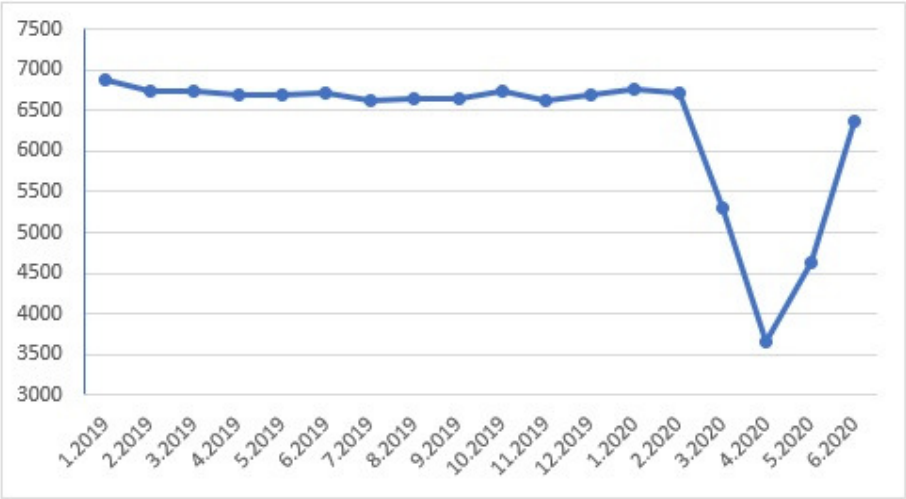

Fig. 4: Total export, mil Eur

According to the data of the National Bank of Slovakia, in April, when government measures were the strictest, exports fell by 45.9% compared to the period before the measures were introduced. We can see from the graph that this decline was caused mainly by artificial factors (restrictions) and not by natural economic phenomena, as immediately after the release, export restored almost to it's original values.

The biggest problem: lack of liquidity

Businesses need to have financial reserves in case of adverse circumstances, but many entrepreneurs underestimate these reserves, especially in times of economic growth, they do not anticipate such a massive crisis that would come so quickly. (Briciu and Sas, 2009) During an economically favourable period, many companies invested in business expansion or new technologies, often financed by loans, which were extremely cheap due to the ECB's strategy to maintain economic growth in euro area countries with an inflation target of 2%. (Rostagno *et al.*, 2019) Shortly after the start of the Covid crisis, caused by the introduction of restrictive measures by the state, many companies struggled with negative cash flow. While sales were significantly reduced, often to zero, costs such as rents, wages, energy, etc. had to be paid in the usual amount. Due to these circumstances, many companies that underestimated the creation of reserves soon ran out of liquid assets.

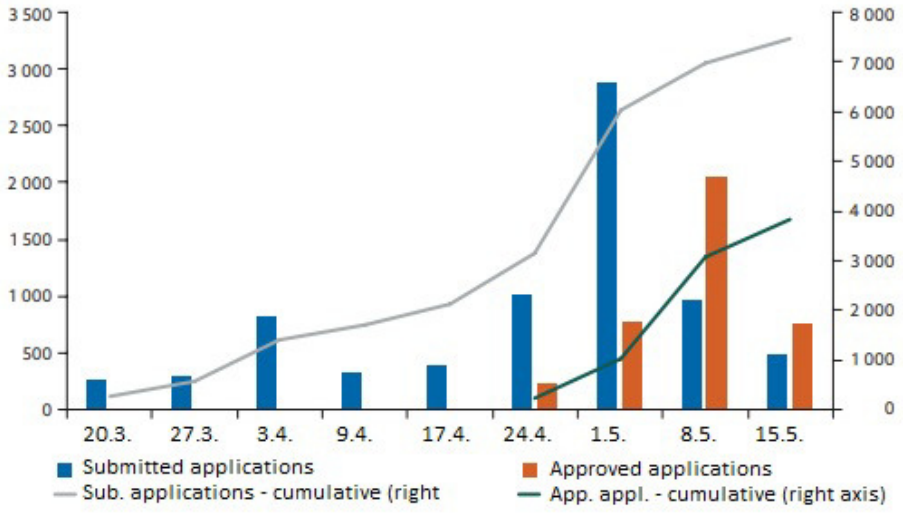

Fig. 5: Number of requests for deferral of corporate loan repayments (number)

(Národná banka Slovenska, 2020)

The end of April brought a more significant increase in the number of requests for deferral of payments. By mid-May, almost a fifth of the applications had been approved. Applications began at a slow pace in the second half of March. The end of April and the beginning of May have already brought a significant increase in the number of

applications submitted, the total number of which reached almost 7.5 thousand in mid-May. So far, almost 14% of companies financed by the domestic banking sector are interested in deferring payments. In the second half of April, the banks began approving these applications, and by mid-May, half of them had been approved.

However, the situation may be even worse, as it takes time to reflect negative results in companies' financial reports. According to Saxunová and Chorvatovičová (2016), timing and management of expense recognition might influence company's profit and hide possible warning signals in the company financial statements. Financial markets would then negatively react towards these warning signs like decreasing trend in profitability. However, according to Papík and Papíková (2020), such management interventions must not lead to the use of incorrect accounting procedures, which could lead to a financial restatement due to accounting errors. In addition to the costs of removing these errors, adjustments to the financial statements also have an impact on the company's reputation and, in the case of publicly-listed companies, on their market value.

If an enterprise has accumulated short-term financial resources, whether in the form of cash, bank accounts, or other short-term assets, those resources may be used to cover operating costs. However, if it does not have short-term financial assets, it becomes insolvent. According to available data, before the outbreak of the pandemic, there were approximately 7% of companies in Slovakia that had a negative operating margin and at the same time were not able to cover their fixed costs with short-term financial resources.

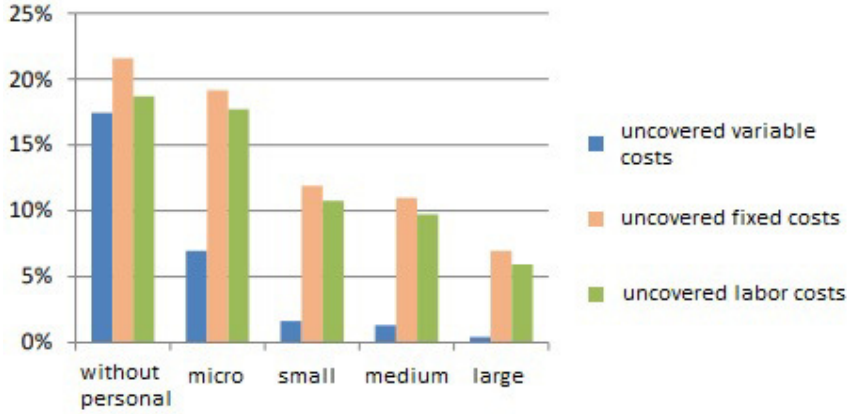

Fig. 6: Enterprises with revenues not covering costs (% of the total number of enterprises, year 2018) (Štefan Buchta, Lalinský and Radoslav, 2020)

From the above data, we can conclude that the fastest liquidity problems will affect small businesses that do not have sufficient current assets to cover the no-revenue period. These data suggest that these companies will also have major difficulties in obtaining potential loans from banks to bridge the crisis.

Anti-Crisis Management

In good times, every company should also remember the risk of a crisis coming, which could negatively affect its economic results. Crises can have different causes and different effects with different strengths. The economy is a functioning cycle, where times of recession regularly appear, for which companies must prepare. An important part is to identify crisis plans and strategies so that management can respond flexibly to a rapidly changing situation. The speed of response can be a decisive factor that significantly affects the course and effects of the crisis on a company. As the crisis is due to external factors beyond the company's control, it is not possible to prevent a crisis, but it is necessary to apply appropriate measures to minimize its negative effects. Anti-crisis management is a process that focuses on applying measures before, during and after a crisis in order to minimize the impact on society.

It consists of 4 consecutive phases:

1. Crisis prevention - the company seeks to prevent crises, at least to the extent that it is able to influence ongoing market fluctuations. In the case of large multinational companies, they can to some extent affect the situation if the crisis is only within the industry.

2. Crisis preparation - at this stage, the company is preparing anti-crisis plans, strategies and measures to reduce the negative impacts.

3. Implementation of anti-crisis actions - the company applies and implements the plans it prepared in the previous step. It is important to implement the measures in a coordinated and gradual manner at the most appropriate time.

4. Evaluation - in the final phase, the company evaluates and verifies the implemented measures and their effectiveness and gathers new acquired knowledge and experience for future use.(Starosta, 2014)

It is also important to correctly and timely recognize the coming crisis, as this can give the company important time to prepare and implement austerity measures, which can give it a competitive advantage over other companies. This phase of crisis management is often the most challenging: to realize that a crisis does exist. Executives who refuse to face reality can significantly exacerbate the effects of this crisis. Managers sometimes misjudge the nature of the problem and focus on the technical aspects ignoring the issue of perception. But often the reason for the beginning of the crisis is the public's perception of the situation. (Augustine, 1995)

Cost reduction as the most important tool of anti-crisis plans

Cost management is having priority importance for all business entities, as profits increase mainly by reducing costs. Based on a study by Anna Starosta from 2014, which researched anti-crisis measures and strategies of companies during the last major economic crisis in 2008, we can conclude that cost reduction was the most used tool for companies in combating the economic downturn. The study was conducted in the V4 region on 60 Polish companies with more than 249 employees. The study shows that financial management is generally the strongest tool for companies. It involves more precise management of costs and expenses, a change in their structure and a systematic reduction. There is also great potential for cost reduction in the area of human resources. Up to 28.3% of entities started to reduce wage expenditures, the further reduction of expenditures was caused by a change in the organizational structure, which led to the abolition of some less necessary job positions and the subsequent dismissal of employees. As many as 51.7% of companies have taken this radical step. Companies had to proceed with an in-depth analysis of the expense structure in order to gain effectivity and reduce it.

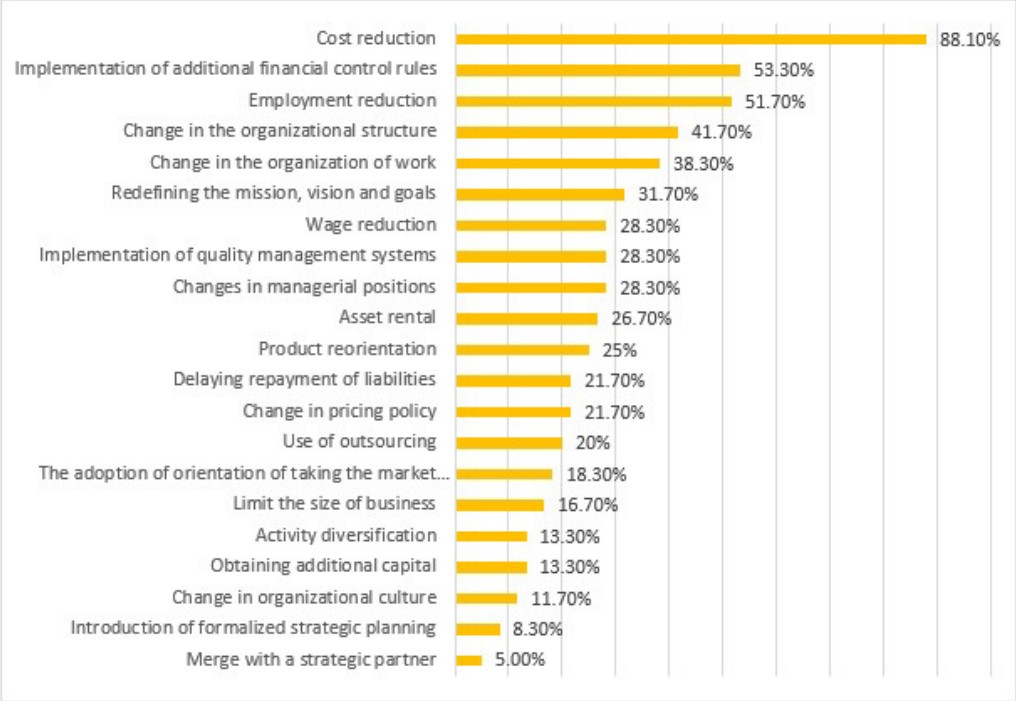

Fig. 6: Analysis of taken anti-crisis measures during 2008 economic crisis (Anna Starosta, 2014)

Most companies take advantage of cost reductions for simplicity and speed. Finding reserves in the cost structure is easier for companies and especially faster than other measures. While, for example, increasing revenue is a longer-term process and, moreover, is not fully in the hands of the company, cost reduction is immediate and depends only on the decision of managers. To identify cost reduction reserves, as part of crisis management, the current accounting system must be reviewed. The anti-crisis strategy should implement cost control system. A scientific and practical problem is the need to set up the key components of these systems, which would take into account the specific features of activities in crisis situations. (Starosta, 2014)

Savings in wage costs must be made possible by an organizational structure that is sufficiently flexible. Flexible organizational structures are considered to be those that are less formal and flatter. Employees are a living part of society, flexibility lies in the fact that often employees find more efficient ways of doing work activities that go beyond formal regulations. (Natalya, 2014)

Modern Tools of Cost Management

To ensure the management of the rationalization of business costs, it is necessary to introduce cost control tools as part of crisis management. Cost management generally includes a set of targeted measures to influence the structure of costs, their dynamics and behaviour in order to reduce their level. Cost controlling is an important part of cost management. In order for costs to be used as a tool for business management, we must first know their nature, origin, dependence of costs on production, as well as their structure and composition. The occurrence of costs is monitored as the emergence of an economic category and the occurrence of costs of a particular product in the company.(Amir, Auzair and Amiruddin, 2016) The manager should know what costs were incurred, where they were incurred, what they were incurred for and who will pay them. Various cost control methods and tools provide answers to these questions. It is important to know the structure of costs, their division into individual internal business units, processes and outputs. A significant impact on the level of costs will usually be achieved after a certain period after the introduction of appropriate control tools. (Bogyová, 2011) Controlling is understood as a subsystem of the management system, which helps to achieve the goals, prevents possible dangers in time, requires effective management measures to be eliminated. We can characterize it as a specific form of working with information, where the task is not to manage real processes in the organization, but to manage the entire organization through information about real processes. Without controlling, constantly monitoring actual and planned costs and input and output costs, we cannot talk about effective financial management of the company. (Foltínová, 2007)

Preliminary calculations are the basic tool of cost management. There are many different types of calculations and cost calculation methods used in cost management. Cost management information systems can be divided into two categories:

a) functional based,

b) activity based.

Modern approaches to cost management and costing include Activity Based Costing (ABC), Life Cycle Costing, Target Costing and Just-in-Time.

Activity Based Costing (ABC) is a cost management method based on assigning costs to individual activities. It is one of the most accurate methods, but it is more resource intensive. It gives us the answer as to which activities consume the most resources. ABC system tends to be tracing-intensive.

Life-cycle costing focuses on monitoring costs during the various phases of the product life cycle. Costs are different at each stage of the life cycle. About 90% of the costs are incurred in the first phase - development.

Target costing focuses on determining the total life-cycle cost of a product, with the target cost being the difference between the selling price, which will ensure a sufficient market share, and the required profit. If the target cost is lower than the real achievable costs, the task of management is to find ways to reduce costs, while maintaining the same functionality for the customer, so that the current costs move closer to the target cost. (Cooper and Slagmulder, 1997)

According to accounting standards, the object of costs is a product, work, service or type activities of the enterprise that need to be determined costs associated with their production or performance. Cost accounting can also be done in the context places of their origin, centres of responsibility structural units. The problematic part is the correct transformation of costs according to the place of their occurrence to certain products. Various non-productive unit processes and operations are often carried out, which have an impact on ensuring the quality and competitiveness of the final product, which can entail significant indirect costs for non-production units that cause loss of profitability for certain types of products or the company as a whole. A necessary precondition for the correct distribution of costs for certain types of products is their accounting and grouping according to individual types and places of occurrence. Improper distribution of costs to individual entities leads to misallocation of resources, mispricing, reduction in the cost of producing cost-effective products, and vice versa. (Hansen, Mowen and Guan, 2007)

The ever-increasing competition in the market puts pressure on cost and cash flow management. This pressure continues to increase the need for effective cost management so that measures can be constantly adapted in response to an ever-changing external environment. (Hopwood, 2009)

In the company's anti-crisis plan, scenarios must be prepared using cost reduction tools, which will be applied in the case of various phases of negative development. In good times, the company has enough time to carry out efficiency analyzes on the basis of which it can evaluate individual tools so the resulting anti-crisis plan is effective. It is important to identify individual activities as cost bearers that are not vital to the main economic activity of the company. There is a difference in a company that had to be completely closed (such as hotels, fitness centers) and a company that could partially open their business (such as restaurants that could deliver food). In the case of a closed

business, all costs that can be reduced or eliminated must be identified. The company must go into a hibernation stage and the responsible financial manager must not miss any costs that can be eliminated. However, the crisis will have a significant impact on the whole economy, as increased unemployment will also reduce the purchasing power of the population, there is a lack of demand for products in the market, so companies in other sectors must respond too to the situation and introduce measures to increase financial stability. Identifying suitable points where costs can be saved is key. For example, ongoing investments to increase production capacity need to be suspended in a situation where there is uncertain market demand. However, the crisis has also brought opportunities in some sectors for rapid and massive revenue growth. In the case of online stores, for example, companies saw an enormous increase, which was also reflected in increased employment in this segment. Therefore, it is necessary to correctly identify whether it is an investment that makes sense in the current situation or not. The situation needs to be constantly assessed, as it can change from day to day and in the case of new opportunities for revenue growth, it is necessary to respond by investing so that all the potential is used.

Recommendations

Based on the literature review and analysis of the above data, we have developed recommendations for companies from the sectors most affected by the sudden crisis, which should be applied by the managers of the companies concerned in order to avoid a major impact on the company.

1. Managers must first develop an anti-crisis plan, based on analyzes of a specific company and industry, which will take into account the financial situation, the market situation, the organizational structure and the transformation process.

2. Using modern activity-based cost control systems, they must identify the most important activities that are fixed cost generators.

3. Analyze which of these activities can be reorganized, streamlined, limited, or totally eliminated.

4. Reduce inventory and proceed with inventory management Just in time, to reduce the funds tied up in the stock of material.

5. To simplify the organizational structure, at a time of reduced demand, there may be a decrease in the volume of work in individual job positions, which opens up space to assign more work tasks to individual employees.

6. Prefer a flat organizational structure, which is characterized by greater flexibility and will allow the company to respond more quickly to changes in the environment.

7. In uncertain times, enter into short-term employment contracts that allow for quick termination in the event of a sudden change in the environment.

8. Analyze the company's assets and the possibility of replacing ownership of assets with its lease. This measure can immediately increase the company's liquidity, and the cost of renting the property is much lower than the funds that the company raises by selling it. In this case, the short-term effect should be preferred, as the crisis period usually lasts only a few months.

9. Consider outsource activities that are not related to the core business.

Conclusion

The crisis caused by Covid has hit businesses around the world, but each country has its own specificities and therefore the issue cannot be viewed from a global perspective. This article dealt with possible solutions to the effects of the crisis in terms of the authority of the financial manager, who can, with the right and quick decisions, prevent the significant economic damage that the company may suffer. Due to the impossibility of assessing the crisis globally, data from the authors' home country, the Slovak Republic, were used.

We found that the crisis hit companies in the services sector the most, namely the accommodation and food and beverage services sector as we found out on the basis of turnover data. From the employment data in individual sectors, we found that the largest decline occurred in these two sectors, which recorded the largest drop in turnover. It confirms that reducing employees costs is an important tool for reducing costs in times of crisis. The biggest problem in times of crisis is the lack of liquid assets, we found that with a suitable cost management system we can identify activities in the company that the company can temporarily reduce or cancel in order to reduce costs quickly and effectively. We also found that in times of crisis, companies are trying to address this lack of liquidity by delaying the repayment of liabilities, as evidenced by data on the number of requests to defer loan repayments.

Acknowledgment

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The Opportunities and Challenges for Digital Transformation in Egypt

Sherif KAMEL

The American University in Cairo, Cairo, Egypt
skamel@aucegypt.edu

Abstract

Emerging and innovative information and communication technologies have been gradually transforming societies for decades. The impact on individuals and organizations have been immense, especially in emerging markets, offering a solid prospect to make them more agile and competitive and enabling them a platform for economic growth and prosperity. This article demonstrates the opportunities and challenges enabled through innovative technologies in Egypt, emphasizing the developments that took place during the Covid-19 pandemic and its repercussions that led to the acceleration of digital transformation across different businesses, industries, and society. Furthermore, the article highlights the importance of establishing a nationwide entrepreneurial ecosystem that promotes a tech-startup culture that can effectively transform the economy by enabling inclusion, universal connectivity, re-skilling, and up-skilling human capital and a conducive environment to support creativity, innovation, and discovery.

Keywords: Innovation, Entrepreneurship, Digital Transformation, Shared Economy, Emerging Economies, Egypt.

Introduction

Through its ancient history that extends over 5000 years, Egypt has witnessed massive information flows from the Rosetta stone and papyrus papers to the establishment of the Library of Alexandrina. During the middle ages, Arabic manuscripts became one of the most common means of information dissemination. In the early 19th century, Egypt witnessed the publishing of the first journal and the establishment of the first national archive system (Kamel, 1998a). However, until 1985, Egypt was perceived as rich in data but poor in information. Within the government and the private sector, computers were viewed as ends and not means. In addition, accumulated bureaucracy through red tape were coupled with islands of innovation with no connecting bridges restrained information production (Kamel, 1998b). All represented opportunities for development that could help transform the economy with its diversified nature and untapped potentials.

Today, more than ever, information and communication technologies (ICTs) are transforming societies around the world into becoming more competitive, agile, dynamic, and able to adopt different models that allow them to compete both locally and globally using a variety of value chains. The continuous emergence of ICTs has changed how people think, work, study, shop, communicate, get entertained, and in many ways, live. Consequently, these technologies offer an invaluable vehicle for business and socioeconomic development and growth (Allan, 2020; Kamel and Rizk, 2019). Egypt, as an emerging economy, has strived to achieve the potentials of ICT since the 1960s and has continuously been investing in building and upgrading its infostructure and infrastructure to reposition the country as a strategic stakeholder in the endlessly changing regional and global marketplaces (Petrazzini, and Harindranath, 1996). Besides, with the growing and impactful influence of the millennials and their tech-savvy, passionate, connected, and engaged generation, the prospects of digital transformation and consequently the impact on the economy in specific and the society at large continues to represent an invaluable opportunity for Egypt (Rizk and Kamel, 2013).

In the early days of introducing computing to Egypt, the government and the private sector focus was on technical issues and not on decision outcomes; multi-sector coordination was poor, and synergy between information and socioeconomic development strategies was lacking. Given how important and useful ICTs have proven to be to socioeconomic development, especially for emerging markets, Egypt included, building the necessary information infrastructure was a necessity, and innovative tools and applications presented an excellent opportunity for inclusion and equality as well as to improve the lives and livelihoods of the society (Kamel, 2020a).

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Building the ICT Infrastructure

Since the early 1980s, Egypt has heavily invested in its technology infrastructure and national infostructure to become a platform and an enabler for the economy's development and growth. An evolving process by design that is iterative and regularly changing to be able to keep pace with the continuous developments and changes taking place in various technology applications and platforms, including relatively more recently the evolution of the fourth industrial revolution and the prospects enabled through the power and reach of artificial intelligence, the Internet of Things, data analytics, drones, blockchains, cloud computing, and robotics to mention a few (Schwab, 2018; Faixó, 2018; Schwab, 2016).

Four decades ago, Egypt launched a nationwide strategy towards its socioeconomic developmental objectives to address different challenges such as debt, a high illiteracy rate, inadequate infrastructure, and structural reform. Over the years, the strategy was amended and adjusted several times to accommodate the changes taking place locally and globally, with ICT continually perceived as a catalyst for the strategy design, development, and implementation (Rizk and Kamel, 2013). Consequently, in 1985, the government of Egypt established the Information and Decision Support Center (IDSC), a think-tank affiliated to the Cabinet of Egypt. The objective was to develop and implement, using a supply-push strategy, large nationwide informatics projects to support socioeconomic development using state-of-the-art ICT (Azab et al., 2009).

The focus on the infostructure was demonstrating the power of information as a factor in manipulating the discourse about socioeconomic reform (Stiglitz, 2002). It is important to note that before the 1980s, the government has dominated the supply of information. However, the number of entities generating information started to expand, and their service quality was improving. Today, social media plays a significant role in that domain as part of the growing global trends in the access and democratization of knowledge (Von Hippel, 2005). During the period 1985-1995, a government-private sector partnership had a remarkable impact on Egypt's infostructure's build-up by establishing hundreds of informatics projects and centers in different public and private sector organizations targeting socioeconomic development and growth. Such projects were considered major building blocks necessary to establish a full-fledged infostructure capable of keeping pace with global sectoral, business, and industry developments.

In 1999, ICT was identified as a priority at the highest policy level, and consequently, a new cabinet office was established; the Ministry of Communication and Information Technology (MCIT). During that period, the ICT sector was perceived as having transformed itself from an industry looking for support and subsidies to an industry contributing tangibly and intangibly to the economy with a total of 5.2 billion U.S. dollars received by the treasury in 2006 through the introduction of a portfolio of telecommunication services including expanding the universal Internet services access across Egypt's different governorates, and other mobile services as well as upgrading the infrastructure of the fixed-line (Ismail et al., 2018).

These technologies offered the global community endless opportunities for job creation, economic development, growth, communication, and collaboration irrespective of time and distance barriers signaling with the invention of both the Internet and mobility, the early signs of acceleration, and digital transformation (Allan, 2020; Friedman, 2016). These technologies have also been a source of regular disruption that prompted innovation, creativity, and discovery and massive implications on society (Kane et al, 2014). Accordingly, since the 1980s, disruption in the way societies operate has been coming in different shapes and forms but predominantly affected by the power and opportunities enabled by these emerging innovative technologies. However, when people talked about disruption, they usually meant the impact that information and communications technologies had on individuals, organizations, and society (Kamel, 2020a).

The Age of Disruption

Since November 2019, the world has been hit with a perfect storm in the form of a disruptive pandemic that has affected both developed and emerging economies alike with no discrimination. The disruption caused by Covid-19 was invisible and resembled a stealth attack. It started in Wuhan, China, and in no time, it spread all over the world. The pandemic has caused a global shock that has led to a slowdown in economies, affected financial markets, and disrupted supply and value chains, requiring immediate worldwide coordination and the development of collective measures to combat it. Meanwhile, the precautionary health and safety measures, including physical distancing and the economic repercussions, have led to millions around the world being forced to work remotely or losing their jobs. The rapid change in how society operates led people to observe the changes that the pandemic has caused in a few months compared to the efforts conducted and the accomplishments realized by chief information and technology officers, experts and professionals in the ICT industry for decades.

It is worth noting that before the pandemic hit, globally, the world was living in an age of pervasive and unprecedented uncertainty. However, it is nothing compared to what we have seen since the outbreak of the pandemic. The current disruption is impacting societies around the world politically, economically, and socially. It is still too early to tell, but the world will most probably witness a U-shaped recession with a potential recovery that will take around one and a half to two years –pending the availability of a timely, tested, affordable, and globally accessible vaccine– and that will hopefully be followed by an upswing in the global economy, which will vary from one country to another. In the meantime, countries are being hit by multiple rapid developments, including falling oil prices, disruptions to trade, volatile stock markets, and severe hits to businesses have forced governments to pass comprehensive and extraordinary policies aimed at stimulating their economies and preventing mass layoffs and business shutdowns, especially among small and medium-sized enterprises (SMEs).

Is Egypt ready to be digitally transformed?

There is nothing remotely good about societies being affected by a pandemic, the magnitude of which has rallied countries around the world to coordinate their efforts to work against a common enemy. However, can the coronavirus have some collateral positives? Are there opportunities that can be created through digital transformation? Is it an opportunity to autocorrect? How can an innovative and entrepreneurial tech-startup contribute to the development of the society of the future? What are the human capital requirements needed as an integral element in developing a nationwide entrepreneurial ecosystem that can transform the economy? What skillsets are required to enable the community to be ready for a digital society connected and driven by innovation and creativity?

These are so many questions with no answers that address how the future will look like, especially with the acceleration of digital transformation over the last decade and more so since the outbreak of Covid-19. One thing that became clear is that people can change; they can adapt if given limited alternatives. For starters, it became evident that the current crisis is already forcing people around the world to adapt and use different technology platforms much more than ever before, even the ones that they are not used to (Sharma, 2020; Faixó, 2018). Furthermore, the merger of infotech and biotech is proving that there are no boundaries to the prospects for what lies ahead and that it will take a brand-new leadership style across different economic sectors as well as innovative approaches to navigate the emerging realities of the fourth industrial revolution, become more resilient, agile and competitive in a continuously changing global marketplace (Sharma, 2020; Kazim, 2019).

When it comes to Egypt, the recent developments since the pandemic outbreak have demonstrated the importance of assessing its ability to adopt digital transformation in government practices, business transactions, and across society to mitigate the impact of disruptions such as that caused by Covid-19 (Wamda and Arabnet, 2020). Consequently, developing and regularly enhancing the required infostructure and infrastructure to support and enable digital transformation in Egypt will be indispensable for individuals, organizations, and societies and more importantly for the second tier of economic reforms following the ones that were successfully implemented during the period 2016-2019 (Kamel, 2020b). This will allow them to stay relevant, competitive, and agile, as well as support society by remaining healthy and surviving the repercussions for the economy and staying safe and thriving in a post-pandemic world.

The disruption caused by the pandemic should push Egypt collectively as a nation –including the government as an enabler, the private sector as a driver, and the civil society as a supporter– to further coordinate its efforts and to think more creatively and ambitiously (Kamel, 2020a). This could include intensifying investments in infrastructure, such as education, healthcare, pharmaceuticals, and ICT, and upskilling the technology-related capacities of one of the country's most precious assets, its human capital, to meet the requirements of digital transformation. This would, in turn, help to accelerate the development of several key sectors such as agriculture, manufacturing, financial inclusion, trade, retail, transportation, and logistics, to mention a few, all of which have enormous potential to thrive (Kamel, 2020c). There is also an urgent need to support micro-enterprises and SMEs and integrate the informal sector into the economy (Kamel and Abou Seif, 2015). As society moves forward while visualizing and projecting the new normal, the policies formulated the and decisions taken should be thoughtful and purpose-driven to support a more robust and competitive private sector, improved productivity, resilient businesses and industries, and a digitally driven government.

It is worth noting that before the pandemic hit, Egypt was on the right track and was doing well from an economic perspective. Economic growth was at 5.6 percent during the fiscal year 2018/2019 and was projected to reach 6 percent in 2019/2020. The economy was among the best performing in emerging markets, and the macroeconomic indicators were all heading in a positive direction following a series of macroeconomic and structural reforms. Despite the pandemic's impact, Egypt is the only economy in the Middle East that showed positive growth during the fiscal year 2019/2020, reaching 3.6 percent. The government is determined to continue its progress in accelerating structural

reforms. On that note, judging by the developments of the first quarter of 2020, digital transformation could play a significant role in the government's future reform plans as it navigates the current crisis while keeping an eye on launching another wave of reforms that would not only build on the hard-won macroeconomic stability achieved over the past few years but also address the longstanding impediments to a competitive private sector-led economic transformation (Morgan, 2019).

Consequently, the next reforms should focus on reducing bureaucracy, red tape, and non-tariff barriers; making finance more accessible; and facilitating private sector access to critical economic building blocks; all can benefit from a well-thought and well-integrated digital transformation strategy and execution. Such access will allow the private sector to expand given the diversified nature of Egypt's economy, which could also lead to more job opportunities, inclusion, economic development, and growth that could improve society's prosperity and reduce poverty levels.

It is worth noting that Egypt's population is growing at an annual rate of 1.9 percent or over 2 million people, and technology access has been rapidly increasing across the country, with 59 percent and 99 percent internet and mobile penetration rates including 39.5 million people who are smartphone users. No less than 60 percent of the population is under the age of 30, reflecting a young society in a nation that is home to more than 100 million citizens. Both elements provide a unique opening for change and improvement. With its energy, ambition, and passion, the intersection of youth with innovation, technology dissemination, and utilization, and a growing interest in self-employment could help create a platform for a tech-based and tech-enabled entrepreneurial space. Furthermore, the universal access to ICT across Egypt's 27 governorates could be an influential contributor and enabler for digital transformation by providing unlimited access to knowledge, opportunities, ideas, and the world at large for Egyptians, regardless of time differences distance.

The Prospects of Digital transformation for Egypt

Digital transformation offers ample opportunities for Egypt. However, innovation in general, and ICT in particular, cannot solve all the problems or answer all the economic and societal challenges that have developed over many decades (Al-Aees, 2019). While digital transformation represents an enabling environment that can make a difference, it should be supported by the required infrastructure and skilled human capital and the proper legal, regulatory, investment, governance, educational, security, and other support environments to an integrated ecosystem. The name of the game is to invest in creating a pool of tech-savvy entrepreneurs and scale-up the number of innovative tech-based and tech-enabled startups through the establishment of incubators across Egypt's universities and higher education institutions. In these incubators, the role of youth, practitioners, academics, industry experts, policymakers, business leaders, mentors, investors, innovators, educators, and trainers can never be discounted (Ismail et al., 2018). It is a collective effort in which everyone should be effectively engaged and empowered.

Digital transformation can help reshape economies and societies and improve their competitiveness by stimulating creativity and innovation, generating greater efficiencies, enhancing various services, and offering a platform for inclusive and sustainable development and growth (Berman and Marshall, 2014; Matt et al., 2015). Accordingly, Egypt has an opportunity to capitalize on digital transformation and realize the goals of its vision 2030 development strategy by (a) unleashing the potential of the private sector; (b) digitizing various government services, which can have the positive effects of facilitating access to services for citizens, improving efficiency, reducing bureaucracy, and assisting the government in combating corruption; and (c) leveraging human capital capacities, with a focus on emerging technologies and investing methodically in building Egypt's innovation capital (Kamel, 2020a). Besides, digitization can offer a seamless platform for customs and tax processes that can remove the impediments facing investors and businesses and help attract more foreign direct investment; the latter has proven relatively difficult to achieve in recent years, especially when compared to pre-2011 levels. It is important to note that while digital transformation will result in many jobs being replaced by machines in the future, new technology-related jobs will be created (Matt et al., 2016). Therefore, policies must be in place to provide sufficient training, human capital development, and social welfare to enable the labor force to embrace and adapt to the continuous changes taking place and have the capacities and skillset to understand and make the most of the prospects enabled through emerging innovative technology platforms.

Building a Startup Ecosystem

The growing crowd of innovative and talented tech entrepreneurs in Egypt could be influential and participate in the country's digital transformation. The following is a sample of promising tech-based and tech-enabled startups that address critical issues of primary importance to society, such as transportation, financial technology (fintech), healthcare, logistics, and distribution.

In transportation, Swvl –established in 2017 and known as the Uber of buses– is a premium alternative to public transport in Egypt. Through a mobile app, customers can book fixed-rate and affordable bus rides on existing routes; this is an effective solution that is much needed, given the traffic and transportation challenges in Egypt's major cities. Swvl is now operating in Egypt, Kenya, and Pakistan.

In fintech, Paymob is an electronic payment enabler established in 2013 that offers integrated infrastructure solutions empowering the masses with instruments that increase financial inclusion, which can be a crucial pillar of economic growth. Fintech can help SMEs –which make up around 80 percent of the country's firms– bridge financial inclusion gaps, move into the formal economy, and effectively improve their capacity to grow and compete. In Egypt, cash is king and therefore represents one of the most attractive markets for fintech. The population's size– which includes a substantial unbanked segment, with no more than 15 percent of the adult population having a bank account, one of the lowest penetration rates in the world– demonstrates the growth potential. Fintech started growing in Egypt in 2008, providing solutions including electronic payments for peer-to-peer transfers and bills, payroll, and pension and social security payments; merchant and online purchases; and the proliferation of smart wallets (Abdel Meguid, 2020). Moreover, fintech can offer the unbanked segment valuable social services such as paying back their loans and transferring money through kiosks across the country. It is expected that Covid-19 will accelerate the move toward mobile services, which will have positive implications, including gradually integrating large segments of the informal economy.

In healthcare, Vezeeta, launched in 2012, is a digital booking and practice management platform for physicians, clinics, and hospitals in the Middle East and North Africa region. In logistics, MaxAB, established in 2018, is an e-commerce wholesale food and grocery marketplace using data-driven technologies and innovative supply chains to serve its customers best. Finally, in distribution, Brimore, established in 2017, is a social commerce and parallel distribution platform that allows local suppliers to have nationwide coverage through a network of individual distributors, mainly housewives, selling products in their circles using omnichannel.

Egypt is a consumer of imported digital products and services and an exporter of digital services, recording total exports of 3.67 billion U.S. dollars in FY2018/19. However, post-pandemic, there will be a clear opportunity to reap the digital dividends and increase the contribution and expand the sector's role with concerted, coordinated actions by society at large, including the government, the private sector, and individuals. Innovative technologies are driving digital transformation and opening a broad spectrum of inclusive development opportunities that narrow the divide between the haves and the have nots (Kamel, 2020a; Matt et al., 2016).

The biggest challenge for digital transformation in general and fintech is indeed culture. There are other challenges, including the unclear legal and regulatory environment, interoperability issues among different systems, and the minimal understanding among many entrepreneurs of the advantages of digital financial services (Abdel Meguid, 2020). Realizing the value of financial inclusion for socioeconomic development and growth, multiple government and private sector institutions are taking steps to help the financial sector advance and overcome these challenges. There are many recently introduced initiatives and projects that support the digital transformation of financial services through increasing access to the required technological infrastructure, encouraging the development and use of innovative digital financial solutions, and increasing awareness of the benefits of fintech, among other digital platforms. Given the size of the population, the prospects are great to transform Egypt into a cashless economy, migrate many of the informal sector transactions to the formal economy, reduce unemployment and poverty levels, and offer various financing options for micro, small and medium-sized enterprises.

Furthermore, there is no doubt that people's habits, attitudes, and behaviors will change as well. There are already early signs of a general shift to digital platforms by both individuals and businesses. Since the outbreak of Covid-19, Egyptians have been using digital platforms to work, study, and shop like never before, and this trend is expected to gain momentum in the future. During the period April-August 2020, statistics from Egypt's National Telecommunications Regulatory Authority (NTRA) show a significant surge in internet usage, including 87 percent and 18 percent increases in-home and mobile internet consumption, respectively. This is in addition to a 131 percent rise in web browsing and significant growth in the use of mobile applications, with a 376 percent increase in accessing educational portals and websites. On this note, the government has already signaled that it will continue to invest heavily in ICT infrastructure to accommodate the proliferation in digital transformation and help stimulate the economy, including the volume of investments in Internet speed– which is expected to increase to 40 Mbps– which have reached 1.6 billion U.S. dollars. Besides, the government targets increasing Internet access for both mobile and fixed Internet to 75 percent of the population. The ICT sector is a growing contributor to Egypt's economy, accounting for 4 percent of GDP in FY2018/19, an increase of 14.3 percent from FY2017/18 (Kamel, 2020a).

The impact of digital transformation is intended to go beyond connectivity to include economic empowerment and growth while also increasing competitiveness (Berman and Marshall, 2014). This consists of the digital transformation of services through a state-of-the-art infrastructure supported by a robust legislative framework that enables electronic commerce, proper governance, data security, and buyer and seller rights preservation. For example, some of the initial digitally transformed services nationwide will include notarizations, driving license renewals, and utility payments. The services will be available through various channels, including the government portal and a portfolio of mobile applications. Furthermore, Egypt Post can take advantage of the trust it has built up in society for more than 150+ years, coupled with its proximity to citizens across the country through its 4,000 premises, to support micro-enterprises and SMEs by offering a variety of digital services. Other digital services in the pipeline include (a) a comprehensive health insurance system; (b) a farmers' card to ensure the delivery of subsidies to their rightful beneficiaries, verify land acquisitions and cultivated areas to develop an integrated agricultural map, help measure the amount of water needed for agriculture, and clarify the gaps between production and consumption; and (c) a restructuring of the national tax system aiming to achieve justice and order.

Conclusion

The role of innovative technologies undoubtedly impacts society, making it more accessible, knowledgeable, agile, resilient, and competitive. This article attempted to share Egypt's experience in building its infrastructure and infostructure as a building block for digital transformation. It emphasized the importance of a well-established, innovation-driven, government-enabled, and private sector-led digital transformation strategy in realizing inclusive economic development and sustainability.

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Vision of The Internet of Everything in Everyday Human Existence

Leszek Kiełtyka

Czestochowa University of Technology, Management Faculty, Poland

leszek.kieltyka@pcz.pl

Abstract

The Internet of Things is a natural consequence of technological development and evolution towards automation of processes that do not require human participation, processes which are indispensable for the functioning of contemporary world or contribute to relieving human beings form their duties. The growing technological capacities result in a constant growth of the area where the concept of the Internet of Things can be applied. This occurs through installation of sensors that enable data transfer in a great number of areas. Information maximisation leads to simplified decision-making process. The final customer will be provided to the receiver (e.g. smartphone) specific, resulting information, which will allow for making effective, on-the-spot decisions. Presently, the number of devices that communicate with the use of the Internet in order to gather data, process particular functions as well as supporting man in implementing particular social or business processes is tremendous. This concerns in particular the basic areas of everyday human life (Kryśkiewicz, 2016).
The research goal of the paper is to present the awareness and expectations regarding application of the Internet of Everything in two selected groups of people coming from different countries and continents. The research tool constituted a survey and survey questionnaires. The research was conducted between January and April 2019 using direct interviews and correspondence. The survey was conducted on two groups including several hundred people, which are characterised by a similar working profile and living in Poland and Kenya. The persons who expressed their consent to participate in the research live and work in Czestochowa and Nairobis.

Keywords: IoT, IoE, ICT, process automation.

Introduction

It depends on us whether we will be able to benefit from the blessing of communication technology that is being implemented, among other things, based on the concept of the Internet of Things (objects), Internet of Everything or Industrial Internet of Things. The Internet is no longer limited to computers that allow humans to exchange information. Now it includes devices that until recently were not related by any means to information exchange. In a number of cases these are devices or systems linked with the current functioning of human life. this situation provides abundant possibilities of creating so called "information world", which utilises technology to communicate not only among people but also among people and objects or objects themselves. This is how the so-called Internet of Everything (IoE) is being developed, which is a term that defines a network of humans, processes, data and things connected to the Internet. This term originated initially at CISCO. Also, a counter has been created that summarises the approximate number of the elements of the Internet of Everything. It has been estimated that in 2020 there will be from 25 billion to 50 billion of devices connected the network. In 2019 the value of the IoT market is estimated to amount to USD 1.3 trillion (Kotowski, 2015).

The Internet of Things is a natural consequence of technological development and striving to automate processes that do not require human participation, processes that are indispensable for the functioning of the contemporary world or contribute to reducing the human burden. Growing technological capabilities result in a constant development of the area where the concept of the Internet of Things can be applied (Ghosh, 2015). This occurs through installation of sensors that enable data transmission in a wide range of areas. Information maximisation leads to a simplified decision-making process. Final customers will receive on their receiver (e.g. a smartphone) specific resulting information, which will allow for making effective, ad-hoc decisions.

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Presently, the number of devices that communicate using the Internet in order to collect data, processing particular functions, as well as assist humans in performing particular social or business processes is tremendous. This concerns in particular basic areas of everyday human life (Kryśkiewicz, 2016).

The research goal of the present paper is to present the awareness and expectations regarding the utilisation the Internet of Everything of two different groups of people from different countries and continents. The survey was conducted on two groups, including several hundred people each, characterised by a similar working profile and living in Poland and Kenya. The persons who accepted the invitation to participate in the survey dwell and operate in Czestochowa (former capital of the province) and the richest district of Kenya's capital – Nairobi.

Motivation to Research Regarding the IoT

Currently, the most exposed area where the information and informatic technologies are being applied is the Internet of Things (IoT) and the Internet of Everything (IoE). The Internet of Everything as it is presently perceived has not been born upon a single ingenious idea. This is an arbitrary set, which utilises electronic and digital forms of communication that have been developing over a longer period of time. The IoT makes use of the existent and developing communication technologies. It utilises the technology of savings and reliability, especially for the operations of data gathering, transfer and security, which are embedded in the utilised system. It also uses data gathered in cloud computing, ICT technologies, software agent technology (Kiełtyka, Niedbał, 2013), semantic networks technology, multimedia techniques and technologies (Kiełtyka, 2009, 2017), virtual technology of organising operations (Kierzkowski, 2013), etc.

Contrary to the adopted name the Internet of Everything (IoE) is not the Internet of „all things", but a set of more or less structured data utilised during a particular communication (Born, 2018). But for the data, which constitutes the primary product for the IoE, it would simply be a generator of electro-waste. The Internet of Everything is not what it seems at first sight. A giant anthill of smart-objects and sensors that communicate one with another, having had a closer look at them turn out to be primarily a world of drastically new data (Kiełtyka, Zygoń (2018).

Regardless of the fact whether we as homo sapiens like the dynamic development of this technology or not, we are unable to oversee it and not utilising it will lead to a gradual alienation from the information society. Therefore, the author of the present paper, having proper access to a relatively numerous population of persons working in distant countries (Poland and Kenya), and employed in similar areas of professional activities, conducted a research that comprised a general analysis of use and awareness regarding the application of solutions related to the vision of the Internet of Everything development.

The applied research methods included surveys and survey questionnaires. The research was conducted between January and April 2019 with the use of direct meetings and correspondence.

Discussion Regarding Research Results

The research results have been presented, among others, in the form of charts that analyse the responses, suggestions and explanations of the survey respondents, who addressed 38 issues presented in the form of questions and selection of options related to the application of the IoT. Conclusions have been drawn from all the issues and situational actions have been described. The underlying objective of the paper was to present the basic factors and forms of communication between the elements of "things" and "all things" and the environment, human beings present in this environment in particular, with regard to their operation, with a special stress on a possibility of utilising them in ecosystems. The selected situational solutions shall allow the readers to familiarise with the possibility of choosing basic, commonly used products, which applied in ecosystem structures are supposed to improve their everyday life (Kiełtyka, 2019). The surveyed groups in both countries included approximately 180 persons each. It should be mentioned here that they were concentrated in enclaves of over 200 thousand of inhabitants. The anonymous responses of the survey respondents were dominated by such professional groups as: managers of various professions, teachers of primary and secondary schools with a small share of academic teachers, healthcare employees – nurses, and a large part of persons who did not specify their profession. Out of the issues that were supposed to be addressed unambiguously by the respondents the author present in the paper five, in his opinion most important areas related to knowledge and application of the Internet of Things and the Internet of Everything.
However, first the author has conducted a brief analysis aimed to compare the level of "digital saturation" in both compared countries. The analysis has shown that in Poland in 2019 at least one computer at home was owned by 83.1% of households with at least one person aged 16–74 years old. Internet access in 2019 could boast 86.7% of

households and this was up by 2.5% than a year before. Within one year the share of households accessing the Internet through broadband connection increased by 4%. Both the type of internet access as well as type of owned connection was diversified with regard to the type of household, place of residence and urbanisation level. Internet access was more frequently owned by households with children than the ones without them. The share of household with internet access was higher in cities than in the country. It was the highest in highly-urbanised areas. The same was true for utilisation broadband Internet connections (www 1).

In case of Kenya the statistics can be at times misleading. According to the Statista portal in 2019 it was estimated that the number of Internet users in Kenya was 46,870,422 people, which corresponded to a penetration rate of 89.7%. In 2019 there were 72 licensed ISPs of which about half were operational. Currently the Communications Commission of Kenya (CCK) is considering conducting a comprehensive Internet Usage Study to confirm the latest number of users in Kenya (www 2).

At the same time the result of another study show that Kenyans have much less access to ICT services than it was previously claimed. According to the report by the Kenya National Bureau of Statistics (KNBS) the number of mobile users stands at 20 million, with the majority of them being women. At the same time, just 20% of Kenyans have access to the internet and only 3.7% of the country's population engages in e-commerce. Only 22.6% of individuals aged 3 years and above used the internet while 10.4% used a computer (www 3).

As one can conclude based on the presented analysis Poland is the country which can boast much more developed digital infrastructure, both related to the number of computers as well as the share of the population that access the Internet using broadband connections. In a way the observed differences regarding the internet infrastructure in both compared countries make the analysis pertaining to the application of the Internet of Everything in both environments even more interesting. This analysis can present what other studies might lack, how important is the IoE for a digitally well-developed country and the one where the internet infrastructure is still at a relatively low level.

Figure 1 presents an analysis of the responses of the survey participants to the question: Have you been familiar with the terms the Internet of Things/Everything before filling in the questionnaire?

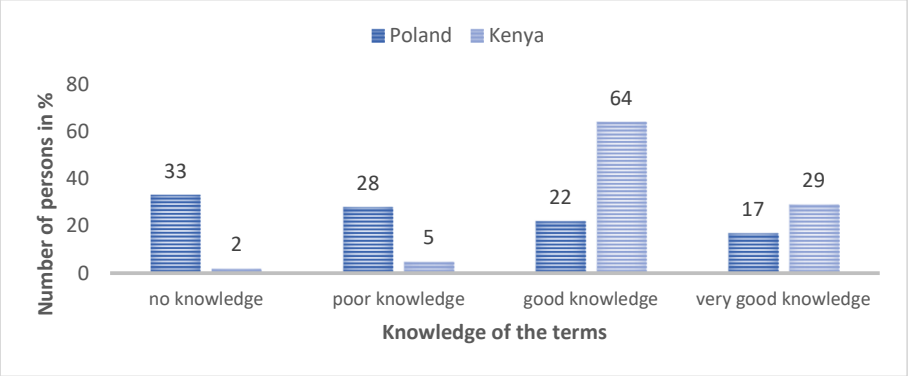

Fig. 1: Answers of the respondents to the question: Have you been familiar with the terms the Internet of Things/Everything before filling in the questionnaire?

Source: own elaboration

The received answers allow for drawing the following conclusions:

- the surveyed group of persons from Kenya definitely knows the terms the IoT and IoE,
- poor knowledge of the terms the IoT and IoE was demonstrated by the Polish group of respondents.

In the opinion of the author the situation in the period of conducting the survey may be explained by the fact that since 1989 and the transition towards the market economy Poles in very short time intervals gained access to modern information technologies and techniques applied or introduced in the member states of the European Union (Kiełtyka, 2011). So, a systematic influx of modern communication forms to the Polish market has resulted in a less dynamic interest in introduction of new communication forms, in this case the solutions of the IoT and IoE than in the countries that were previously deprived of such a possibility. The young generation of Kenyan respondents lacked an opportunity to use on a large scale communication technologies that had been developed

and introduced in stages in the developed countries. Presently, their interests have focused on the latest achievements of communication technologies, which include, among others, the technologies utilised in application of the IoT and IoE.

Figure 2 presents a chart, which in a percentage grasp illustrates answers of the respondents to the question: Are you in favour of applying the IoT and IoE in various areas of your life functioning?

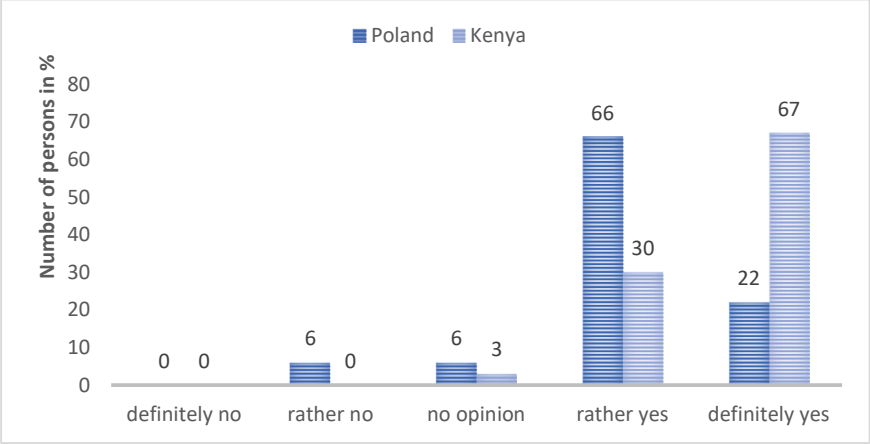

Fig. 2: Answers of the respondents to the question: Are you in favour of applying the IoT and IoE in various areas of your life functioning?

Source: own elaboration

It can be observed that the consequence of the analysis of answers presented in Figure 1 is continuation of the presented in Figure 2 responses of the survey participants. The orientation of the Kenyan respondents to utilise the latest communication technologies results from the lack of the burden resulting from the application of previous communication forms. While analysing the responses of the Polish survey participants one may notice that generally in the human nature there is no will the eliminate the previously purchased objects that proved to be reliable. To do so, a strong economic stimulus or a necessity of change driven by the nature of undertaken work must occur. Therefore, the chart in Figure 2 illustrates very clearly the influence of new forms of communication on the expectations and necessity to apply solutions that provide for a possibility to utilise the IoT and IoE in the lives of the survey respondents.

In Figure 3 the author present the chart illustrating the respondent answers to the question: Is the utilisation of products and services that use the concept of the IoT and IoE your own decision or rather a necessity?

While analysing the charts in Figure 3 one can draw a general conclusion that regardless of the fact whether the survey respondents have had access to communication technologies and techniques in a longer or shorter time period, presently both the necessity as well as free will to utilise the concept of the IoT and IoE are high and similar. The distribution of the remaining answers confirms the conclusions drawn while analysing Figure 1. In case of the Polish respondents the necessity to utilise the IoE is over twice lower. The Kenyan respondents in turn demonstrate over five times higher necessity to utilise the concept of the IoT and IoE in their existence.

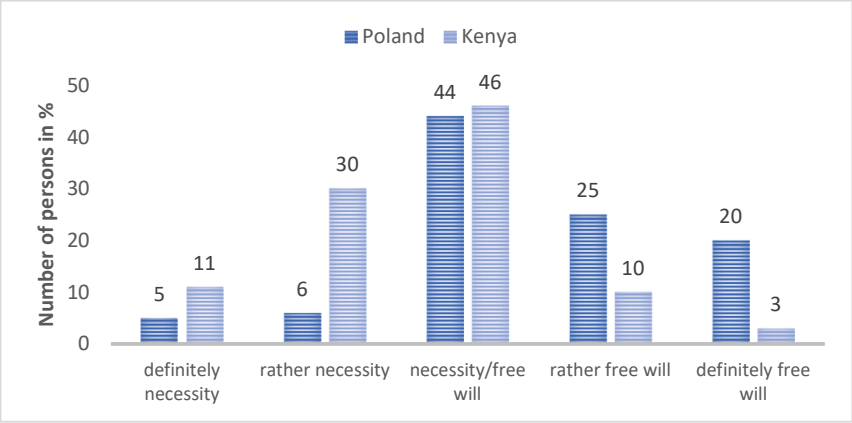

Fig. 3: Answers of the respondents to the question: Is the utilisation of products and services that use the concept of the IoT and IoE your own decision or rather a necessity?

Source: own elaboration

Figure 4 presents the answers of the respondents to the question: Would you like to participate in the proces of testing new solutions related to application of the IoT and IoE?

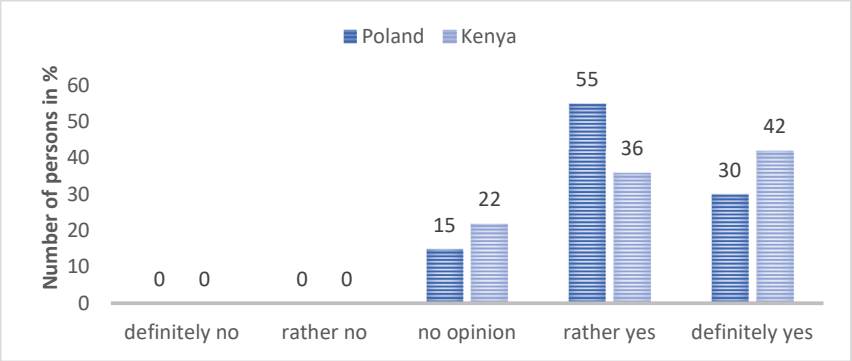

Fig. 4: Answers of the respondents to the question: Would you like to participate in the proces of testing new solutions related to application of the IoT and IoE?

Source: own elaboration

The conclusions that can be drawn based on this survey question indicate that the Polish respondents demonstrate a moderate interest in the notion of testing the new solutions in the scope of utilising the IoT and IoE. This does not mean that they are less interested than their Kenyan counterparts. While analysing this chart one can have an impression that access to a number of systems of communication, even interpersonal one, which has been made available over a longer period of time results in a lower expansion to utilise the latest telecommunication achievements.

In Figure 5 the author present the chart that illustrates the percentage share of the respondents in the answer to the question: To what extent the development of the IoT and IoE may influence your activeness in the private and professional area?

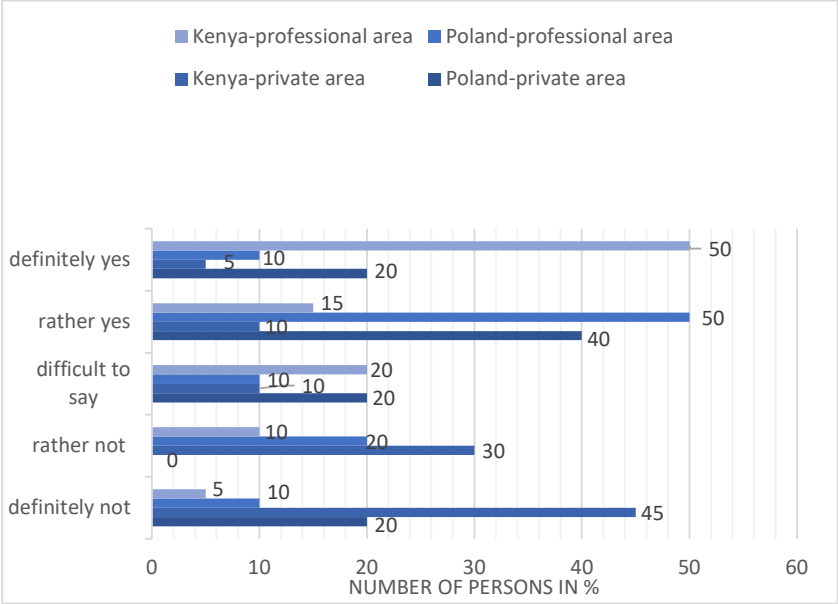

Fig. 5. Chart of the answers to the question: To what extent the development of the IoT and IoE may influence your activeness in the private and professional area?

Source: own elaboration

Fifty percent of the Kenyan survey respondents declared that the development of the IoE has a critical influence on their professional life. In the private area this influence is ten times lower. The analysis of these answers allows for a statement that for the surveyed group in Kenya utilisation of the solutions applied through the IoT or IoE is too expensive. For the survey respondents in Poland the influence of the IoT and IoE is significant, however, not as critical as in case of the Kenyan respondents. Still, is significantly influences both their professional as well as private area in the proportions respectively 50% and 40%. Such a result may stem from the fact that the surveyed group in Poland is more open to accepting solutions that improve their private and professional lives.

The surveyed groups were also asked questions and presented issues related to application of the IoE where more than one answer was possible. Out of the extensive data that was collected the author will present the most interesting in their opinion issues. One of the questions of the survey was as follows: What areas of the application of the IoT and IoE do you notice or utilise in your everyday life? In both groups the answers to this questions included mostly the following: home appliances, multimedia equipment, ongoing analysis of physical activeness, health – through monitoring physical effort, blood pressure analysis, current calorie consumption and sleep analysis. In addition, the Polish group of the respondents attached significant importance to: environment monitoring, smart network application (remote meters of water, electricity, gas consumption), issues related to smart buildings, residential districts, housing estates, municipalities and towns. The surveyed group of Kenyan respondents attached great importance to: trade and marketing (monitoring customers, customer segmentation) analysis of plant breeding, infrastructure management (integrated rescue systems, toll systems), automation (automated logistic processes, automated factories and work posts, unmanned vehicles). However, this group cannot be identified as representatives of Kenya or even Nairobi. As it has been already mentioned that surveyed group included the inhabitants of the richest district in Nairobi.

For the issue regarding the level of benefits resulting from the utilisation of the IoT and IoE the convergence of the respondents' answers concerned: development of self-diagnostics of machines and devices, improved monitoring and control of processes and facilities, more common access to information, relatively fast change of lifestyle and higher level of healthcare for the respondents and their families.

The survey respondents from Kenya have also included into the group of benefits of IoE application the following: increased employee productivity, a possibility of country's faster development, better control over devices and processes. In the surveyed group in Poland, apart from the abovemetioned common benefits, its members emphasised: time saving, reduced energy consumption, increased employee safety, better purchase planning and stronger integration between the virtual and real world.

Another issue concerned the level of threats that may occur while utilising the IoT and IoE. Both groups of the respondents almost unanimously stated that: humans are becoming increasingly dependent on the informatic equipment, aggressive advertising sent to individual e-mail address is being used too extensively, there is a growing feeling of threats caused by hackers, probability of infringement to privacy is on the increase, a growing invigilation of people can also be observed through the use of their portable devices (smartwatch, smartband, smartphone, iPhone). The survey respondents from Kenya also pointed out to a possibility of exerting pressure on persons and organisations by global corporations and a possibility of taking unauthorised control over the devices. The Polish survey respondents also emphasised a possibility of confidential data leak occurrence, which concerns them and their relatives, as well as using unmanned objects, for example, terrorist attacks. A number of other threats were also signalled by some of the surveyed.

limitation of the IoT and IoE Application

While discussing the application of the IoT and IoE several significant factors shall be taken into consideration. First of all the ongoing miniaturisation which enables incorporating microcontrollers in virtually all devices and objects. Microcontrollers are designed to cooperate directly with various external devices, including ones the control of which would require the traditional microprocessor to use additional peripherals (Xia, 2012). Another issue of key importance is the development of mobile communication technology (wireless in particular) which would make common utilisation of communication among devices and objects impossible, especially the area of everyday human life (HBR Polska, 2015).

The significant limitations include the following:

- power supply problem. Despite being equipped with ever more powerful batteries the devices will sooner or later require to be plugged into electric charging systems or replaced with new ones. Although ever more advanced technologies of wireless energy acquisition are being utilised, the scope of their dissemination is not satisfactory.
- optimum miniaturisation. The shape and form should allow to incorporate sensors in virtually all devices and objects.
- technical infrastructure. It translates into a limited number of IP addresses. A solution to this problem is the protocol in the sixth version which introduces the IPy6 standard.
- lack of uniform standards. They concern in particular data security, as well as privacy (Krejtz, 2015).
- personal data security. This human factor may constitute a serious obstacle for the dissemination of the assumptions of the IoT and IoE concept.
- data availability. The issue of communication that utilises the Internet results in a feeling of being threatened by entities or persons potentially interested in intercepting data.
- human conviction of being absolutely secure. Documenting that application of technology for communication between objects and computer devices is secure and desirable.

The world of technology is facing a great challenge. Security needs to be ensured and people need to be persuaded that information that is incessantly collected by devices, i s protected. Considering the business potential of the IoT utilisation one can expect that this problem will be solved. Although this goal cannot be easily achieved, it can be accomplished, the example of which may be banks and virtual currency. Nowadays it is rare for people to wonder whether their resources in the bank account are protected. If the data transmitted among devices is secured similarly and the technology develops, the IoE will become reality (Porter i in., 2015).

Conclusions

Things, systems, objects, structures, elements operated based on ecosystems are equipped with sensors that facilitate contact with the environment, which can be used in a free and unlimited manner by every person (Kiełtyka, 2019). In the present paper its author also attempted to present an outline of applying the Internet of Things and Internet of Everything concept in potential areas of its utility. The presented analyses of the opinions of survey participants provide insights regarding the awareness of developing interactions with things and through things with communication systems.

Based on the responses of the survey participants one can conclude that the IoT and IoE make it necessary to abandon the previous practices where the prediction model was built based on the collected data and then applied in operations as long as it retained required qualitative parameters. Tools should ensure effortless integration of new data and incorporating it into the analyses.

The conclusions that have been drawn allow to recognise the intensity of human utilisation of contemporary communication technologies, depending on commonly introduced to the given country's market, consumer electronics devices. Similar research conducted in other countries will allow for creation of a utility map regarding the devices that make use of the IoE and retrofitting these areas with proper informatic tools.

The presented brief analysis of two groups of various social structure and relatively homogenous professions, whose representatives participated in the conducted survey, one can state that humans strive for the existence that will allow them to contact the world, and most importantly one another, without any interference.

It needs to be stressed that the surveyed group of Kenyan respondents does not reflect the intellectual potential of even a minimum part of its inhabitants. The group of persons from Nairobi, dwelling in the richest district of the Kenyan capital, were mostly employed to provide widely understood services at the modern airport near Nairobi. Therefore, the paper analyses the vision of utilising the IoT and IoE in everyday life of these persons. The Polish group of respondents in turn may be treated as representatives of a vast majority of Polish citizens.

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Portfolio Choice Under Crisis – Evidence from The Polish Stock Market

Anna RUTKOWSKA-ZIARKO

University of Warmia and Mazury in Olsztyn
ul. Michała Oczapowskiego 2, 10-719 Olsztyn, Poland
E-mail: aniarziarko@gmail.com

Paweł KLIBER

Poznań University of Economics and Business
Al. Niepodleglosci 10, 60-725 Poznan, Poland
E-mail: p.kliber@ue.poznan.pl

Abstract

The classical models for construction of investment portfolio takes into account only two criteria for assessing investment opportunities: expected return and risk measured with a variance This approach can be criticized for several reasons. Firstly, it takes into account only information that is revealed in the market prices of the stock. However a more detailed analysis of the situation of a company, based on some fundamental indicators, can provide more clues about possible risks and opportunities connected with investing in its stocks. Secondly, the variance can be a poor measure of risk in the situation of big jumps in stock prices, when the distribution of returns differs much from the normal distribution. Thirdly, the disadvantage of the variance is that it treats in the same way negative and positive deviations from the expected return. In the paper we consider some extension of classical portfolio theory and try to evaluate them in the situation of the crisis. We consider some additional criteria for portfolio selection, based on the market multiples representing overall situation of companies. Additionally, we consider semi-variance as an alternative measure of risk. We construct a range of portfolios which were build using different criterion for risk and fundamental values of companies from the Polish stock market. Then we compare their returns in the situation of crisis after outburst of Covid-19 pandemic. The results from empirical research for the major companies traded on the Warsaw Stock Exchange reveals that investors can receive better investment results by augmenting standard Markowitz model with an additional criterion connected with a fundamental standing of companies such as book to market or earnings to market. The second result is that using nonclassical risk measures, such as semi-variance instead of variance, gives better results and this method of measuring risk is especially essential in in the period of collapse on the capital market.

Keywords Portfolio Analysis, Fundamental Value, Multicriterial Choice, Market Multiple, Downside Risk.

Introduction

Classical methods for selecting an investment portfolio, developed by Markowitz (1952, 1959) and Sharpe (1963), take into account only the market performance of companies, measured with changes in their prices. In the classical model, potential portfolios of investment are evaluated according to two criteria: expected return (which describes the potential level of profitability from an investment) and risk. The first criterion is measured with the expected rate of return and the second one - with the variance or standard deviation of returns. No other criteria are considered that might give some additional information about the financial standing and prospects of a company that could influence prices of its shares.

In recent years, however, there has been a growing interest in portfolio analysis methods with alternative ways of constructing portfolios. The article by Kolm, Tütüncü and Fabozzi (2014) contains a review of major developments in the portfolio theory since it its origin, and the book by Doumpos and Zopounidis (2014) draws attention to multicriteria methods used in this field. Most innovations depend on using some criteria of risk other than variance or standard deviation of returns, for example semi-variance or conditional value at risk. The article by Fabozzi, Focardi and Jonas (2007) presents a variety of risk measures that are currently used in the practice of portfolio

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investments. In other approaches, some characteristics of the distribution of returns on assets are used as additional criteria for evaluating portfolio performance. Examples of such characteristics can be skewness or kurtosis. Expanded portfolio analysis is presented by Briec, Kerstens and Jokund (2007) or Rodríguez, Luque and González (2011).

There are several studies which include criteria not based on returns on assets. There is a branch of the literature which takes into account ethical, social or environmental criteria in portfolio construction, for example the so-called socially responsible investments approach described in Steuer, Qi and Hirschberger (2007). The articles by Ballestero et al. (2012) and Bilbao-Terol et al. (2013) are a few more examples illustrating this approach.

Lo, Petrov and Wierzbicki (2003) considered liquidity of stocks as an additional criterion in the portfolio construction process. There are only a few papers which also take into consideration fundamental values of companies. Xidonas, Mavrotas and Psarras (2010) considered the sum of dividends paid by companies. Jacobs and Levy (2013) took into account the risk associated with leverage. The utility function of an investor includes the costs of margin calls, which can force borrowers to liquidate securities at adverse prices due to their illiquidity, losses exceeding the capital invested, and the possibility of bankruptcy.

In accordance with the theoretical concept and empirical research (Fama and French 1992, 2015, 2017; Lam 2002; Zaremba, Czapkiewicz 2017), fundamental factors are important in shaping returns on capital markets. Therefore, it seems rational to include them in a stock portfolio model. The current extensive research on the main financial markets of Eastern Europe has corroborated significant impact of fundamental information concerning companies on their rates of returns. This has also been found to hold true for the book to market ratio as an indicator of the financial standing of companies. The research sample included five countries: the Czech Republic, Hungary, Poland, Russia, and Turkey (Zaremba, Czapkiewicz 2017).

There have been several attempts to combine a portfolio analysis with the fundamental analysis of companies from the Polish stock markets. Tarczyński (2002) developed a synthetic measure to evaluate the economic and financial standing of a company, which he called the taxonomic measure of attractiveness of investment (TMAI), and to apply this measure as an additional criterion in the evaluation of possible portfolios. The portfolio constructed with the use of TMAI was called a fundamental portfolio. This model has been modified in recent years, for example by substituting variance with semi-variance as a risk measure (Rutkowska-Ziarko and Garsztka 2014). In Rutkowska-Ziarko (2013), the Mahalanobis distance was used to determine the TMAI due to possible correlation between diagnostic financial variables. Another method was proposed by Pośpiech (2019) in the research on financial ratios, and market indicators were applied to guide the initial selection of companies.

In the work apart from the classic measure of risk (variance), we also used semi-variance. The use of the downside risk measure in choosing an investment portfolio seems to be particularly useful in times of strong declines in the financial markets, such as in February and March 2020. They were caused by the decline in investor optimism caused by the development of the Covid-19 pandemic. In the calculation of semi-variance one takes into account only negative deviations below a certain level. Upward deviations, which are connected with returns higher than expected, are not taken into account in determining this measure. The advantage of semi-variance is also that there is no need to make any assumptions about the distribution of rates of return and investor's utility function (Harlow, Rao 1989). The quadratic utility function has some undesirable properties, and therefore misrepresents the actual behavior of investors. First of all, it reaches a maximum for a certain rate of return and then its value decreases with the increase in returns, which is in direct contradiction with the preferences of investors who always prefer to have more than less. Building an effective portfolio for semi-variance is more complicated comparing to the approach that uses variance as a risk measure. It is impossible to use the standard solver software to find a minimum semi-variance portfolio. In the calculations of semi-covariances one has to know in which periods the rate of return of the entire portfolio was lower than the target value and this depends on the composition of the portfolio.

The article is organized as follows. After this introduction, in section 2 we present a brief description of commonly used market multiples and give some reasons why they could be used as an additional criterion for portfolio choice. Section 3 gives a description of downside risk measures. Section 4 contains a mathematical formulation of portfolio optimization problems and about algorithms that was used to solve them. Section 5 presents results of empirical research concerning Polish stock market during the crisis of the Covid-19 pandemic.

Market Multiples

Market multiples provide information on how the market values a publicly traded company. To calculate values of these multiples market data and financial results of a company are used. Breen (1968) and Basu (1977) analyzed the impact of market multiples on future profitability of companies. The results indicate that portfolios formed from companies with lower P/E multiples had a higher annual rate of return in the following year than portfolios formed

from companies with higher P/E multiples. The article of Basu (1977) is frequently claimed to be the first publication which analyze the impact of market multiples on future profitability of companies. However, similar research was conducted even earlier, for instance by William Breen (1968). He investigated companies from index S&P500 in the period from 1953 to 1966, using the COMPUSTAT database. It is a source of fundamental and market information on active and inactive companies and covers about 99% of the world's total market capitalization. For particular years, equally weighted portfolios were formed (with 10 and 50 companies) using shares of companies with the lowest and the highest *P/E* multiple values. The results indicate that portfolios build with the shares of companies with lower *P/E* multiples had higher annual rate of return in the following year than portfolios build using companies with higher P/E multiples.

Barbee, Jeong and Mukherji (2008) investigated the impact of market multiples values on future prices of stocks. They analyzed profitability of equally weighted portfolios created using the shares of companies with various values of particular market multiples.

The most popular indicator of firm evaluation by the market is P/E multiple, which relates earnings per one ordinary share to its market price:

$$P/E = \frac{market\ price\ per\ share}{profit\ per\ share},$$

In the study four different measures of the ability of a company to generate profit were considered. It was net profit (EAT), gross profit (GP) and earnings before interest, taxes, depreciation, and amortization (EBITDA), operating profit (EBIT).

Net profit is the last position in the Profit and Loss Account, it is calculated as follow:

$$EAT = net\ sales - cost\ of\ goods\ sold - operating\ expense - taxes - interest.$$

Gross profit is earnings before taxation. EBITDA is earnings before interest, taxes, depreciation, and amortization. EBITDA can be used to describe a company's financial performance without accounting for its capital structure. Operating profit is an accounting metric measuring the profits that a company generates from its operating activity. The interest and taxes are not considered here.

One can relate a share price not only to various profit categories but also to other characteristics describing the economic situation of the company. It can be important for an investor to relate the market valuation of the company's share capital to the net value of its assets. As for P/BV multiple, the price of one ordinary share is related to the company's book value, estimated per one ordinary share. This multiple outlines the company's market value in relation to its book value:

$$P/BV = \frac{market\ value\ per\ share}{book\ value\ per\ share}$$

where:

$$book\ value\ per\ share = \frac{assets - liabilities}{number\ of\ shares}.$$

This value refers to the total amount a company would be worth if it liquidated its assets and paid back all its liabilities. Book value is also the net asset value of a company.

A positive relationship between book to market ratio and average returns was described by Rosenberg, Reid and Lanstein (1985). This phenomenon was also observed for Japanese stocks (Chan, Hamao, and Lakonishok 1991). Based on this research Fama and French (1992) supposed that book to market would be a important risk factor explaining the variability of stock rate of returns.

In this paper we instead of using classical market multiples we use their reciprocals, i.e. values of financial indicators (expressed per one share) divided by current market price of a share. The reason is the additivity of such indicators. The value of such indicator for the whole portfolio is a weighted average of the values of indicators of individual companies. Thus P/BV is replaced by a book to market ratio (BV/M):

$$BV/M = \frac{book\ value\ of\ the\ company}{market\ value\ of\ the\ company} = \frac{book\ value\ per\ share}{price\ of\ the\ share}.$$

The same was used for P/E multiple – in fact for the whole group of market multiples based on various methods for calculating company's profits. Instead of price to equity earnings to price ratio (E/M) was used, calculated as in equation below:

$$E/M = \frac{profit\ per\ share}{market\ price\ of\ a\ share}.$$

Downside risk in portfolio choice

In the portfolio theory, since its very beginning till the present day, variance has been a commonly used risk measure in capital market analysis (Markowitz 1952). At the same time, for almost so long there were doubts concerning the validity of using this risk measure (Markowitz 1959). The main disadvantage of variance as a risk measure is the fact that it treats in the same way negative and positive deviations from a mean rate of return. In fact, negative deviations are undesirable and positive deviations create a possibility of greater profit. To measure only negative deviations, Markowitz (1959) proposed a semi-variance, which is a mean of deviations below a certain level. The semi-variance and lower partial moments take into account only the variability on the left side of a distribution. The reference point may be the mean as in the case of the variance, but one can also take a different value as a reference point. Using semi-variance as the measure of risk is consistent with the intuitive perception of investors' risk (Boasson, Boasson, Zhou 2011).

Variance is assumed to be an appropriate risk measure when the distribution of returns is normal, or at least symmetric, or when investor has a quadratic utility function. Classical Markowitz's model is ineffective in selecting portfolios that comprise assets with skewed returns (Foo, Eng; 2000). The traditional mean-variance model, which treats deviations above and below target returns equally, tends to overestimate risk and imposes unnecessary conditions that rule out portfolios that are downside efficient.

Pla-Santamaria & Bravo (2013) constructed portfolios of stocks of blue chips companies from Dow Jones Industrial Average. Their results show significant differences between the portfolios obtained by mean-semi-variance efficient frontier model and those portfolios of equal expected returns obtained by classical Markowitz mean-variance efficient frontier model.

An investor who does not wish the return of his portfolio to fail below the target rate of return would tend to compose portfolios minimizing downside risk measures (Klebaner, Landsman, 2017).

It is believed that with symmetrical distributions, variance as a risk measure is no worse than semi-variance (Estrada, Serra, 2005; Galagedera, Brooks, 2007). However research on capital markets shows that the distributions of rates of return of many companies are not normal or at least symmetrical (Adcock, Shutes, 2005; Estrada, Serra 2005; Markowski 2001, Post, van Viet, 2006; Sun Q., Yan 2003). Then the use of lower risk measures becomes important. In the case of right-skewed distributions of returns the main part of the variance is made up of the upper deviations, which mean the achievement of high returns. The impact of lower deviations is relatively small. For this reason, investors are looking for companies with right-skewed distributions of returns (Galagedera, Brooks 2007; Peiro, 1999), which suggests that the issue of skewness cannot be ignored in the risk analysis, even if distribution of returns of some companies are symmetrical. Also, according to the perspective theory (Kahneman, Tversky 1979), it is more appropriate to use semi-variance instead of variance as a risk measure.

The arguments presented before speak in favor of lower risk measures if one compares them with their classic counterparts. Lower risk measures, such as for example a semi-variance, allow for a universal approach to risk analysis and stock portfolio construction, regardless of the empirical distribution of returns; One also does not have to assume a specific analytical form of the utility function. It is sufficient to make an obvious assumption that an investor prefers to gain more than less, and therefore that higher rates of return are better than lower rates of return.

A semi-variance, defined by Markowitz (1959), is a lower counterpart of a variance. This lower risk measure is a sum of squared of lower deviations from the target rate of return γ. It is calculated with the following formula:

$$dS^2(\gamma) = \frac{\sum_{t=1}^{m} d_t{}^2(\gamma)}{m-1}, \quad t = (1,2,\ldots,m),$$

where

$$d_t(\gamma) = \begin{cases} 0 & for\ z_t \geq \gamma \\ z_t - \gamma & for\ z_t < \gamma \end{cases}$$

z_t – rate of return of the company i in the period t

$dS^2(\gamma)$ – a semi-variance for the company i

m - the number of time periods
γ - mean rete of return or any target rate of return chosen by an investor

Extensions of the semi-variance as a risk measure are lower partial moments, introduced by Bawa (1975) and Fishburn (1977). According to these authors the lower partial moment of order n is given by:

$$LPM_i^n = \frac{1}{m-1}\sum_{t=1}^{m} lpm_{it}^n,$$

Where

$$lpm_{it} = \begin{cases} 0 & for\ z_t \geq \gamma \\ z_t - \gamma & for\ \ z_t < \gamma \end{cases}.$$

Notice that for $n = 2$ lower partial moment is equal to semi-variance.

The semi-variance of an investment portfolio $dS_P^2(\gamma)$ is given by:

$$dS_P^2(\gamma) = \sum_{i=1}^{k}\sum_{j=1}^{k} x_i x_j d_{ij}(\gamma)$$

where x_i is the share of the stock i in the portfolio and $d_{ij}(\gamma)$ is the semi-covariance of the rate of return for the *i*-th and the *j*-th share, which is defined by

$$d_{ij}(\gamma) = \frac{1}{m-1}\sum_{t=1}^{m} d_{ijt}(\gamma), \tag{1}$$

where:

$$d_{ijt}(\gamma) = \begin{cases} 0 & for\ z_{pt} \geq \gamma \\ (z_{it} - \gamma)(z_{jt} - \gamma) & for\ z_{pt} < \gamma \end{cases},$$
$$z_{pt} = \sum_{i=1}^{k} x_i z_{it},\ \ t = (1,2,\ldots,m).$$

It should be noted that the semi-variance of a portfolio depends on the assumed rate γ and it should be recalculated with each change of the parameter γ, which depends on the structure of the portfolio.

Problems for portfolio choice

We consider a portfolio of k different assets. Let μ_i be a mean return of an asset i, estimated from the last m observations of:

$$\mu_i = \frac{\sum_{t=1}^{m} z_{it}}{m}.$$

By σ_{ij} we denote a covariance between returns of asset i and that of asset j:

$$\sigma_{ij} = \frac{1}{m-1}\sum_{t=1}^{m}(z_{it} - \mu_i)(z_{jt} - \mu_j).$$

By x_i we denote the proportion of wealth invested in asset i. The mean return of the portfolio is then given by the formula

$$\mu_P = \sum_{i=1}^{k} x_i \mu_i$$

and the variance of portfolio's rate of return is given by

$$S_P^2 = \sum_{i=1}^{k}\sum_{j=1}^{k} x_i x_j \sigma_{ij}.$$

Semi-variance of the portfolio form given by

$$dS_P^2(\gamma) = \sum_{i=1}^{k}\sum_{j=1}^{k} x_i x_j d_{ij}(\gamma),$$

where semi-covariances of assets' returns are given by (1).

We assume that we also consider some market multiple. It can be connected with book to market value per share or with earnings to price ratio of a share. By β_i we denote the value of this criterion for the asset i. The value of this multiple for the whole portfolio is given by

$$\beta_P = \sum_{i=1}^{k} x_i \beta_i.$$

In the empirical part of the work we consider portfolios which are the solutions of the following optimization problems:

a) Portfolio minimizing the variance, i.e. a portfolio than is the solution of

$$\min_{x_1,\dots,x_k} S_P^2 = \sum_{i=1}^{k} \sum_{j=1}^{k} x_i x_j \sigma_{ij} \quad (2)$$

with the restriction that

$$\sum_{i=1}^{k} x_i = 1, \quad (3)$$

$$x_1, x_2, \dots x_k \geq 0. \quad (4)$$

b) Portfolio which minimizes variance with a restriction on mean return. In this case we assume that mean return of portfolio should be no smaller than the required rate of return μ_0. The optimization problem is given by (2)-(4) with an additional restriction

$$\mu_P = \sum_{i=1}^{k} x_i \mu_i \geq \mu_0 \quad (5)$$

c) Portfolio which minimizes variance with a restriction on mean return and on its fundamental value. We assume that fundamental value of a portfolio (measured with one of market multiples) should be no lower than its required value β_0. This gives a problem (2)-(5) with an additional restriction

$$\beta_P = \sum_{i=1}^{k} x_i \beta_i \geq \beta_0 \quad (6)$$

From mathematical point of view problems a-c are problems of quadratic optimization with linear restrictions (given by equations and inequalities). They can be solved using standard algorithms. We have solved them using Goldfarb and Idnani (1983) method implemented in the R package *quadprog*.

The second set of portfolios are those that was optimized with the usage of semi-variance as a measure of risk. The optimization problems were defined as follows.

d) Portfolio minimizing unconditional semi-variance, i.e. a portfolio than is the solution of

$$\min_{x_1,\dots,x_k} dS_P^2(\gamma) = \sum_{i=1}^{k} \sum_{j=1}^{k} x_i x_j d_{ij}(\gamma), \quad (7)$$

with the restrictions (3)-(4).

e) Portfolio minimizing semi-variance with a restriction on mean return, which should be no lower then μ_0. The optimization problem is given by the set of conditions (x6) and (3)-(5).

f) Portfolio which minimizes semi-variance with a restriction on mean return and on its fundamental value. The optimization problem is given by the set of conditions (7) and (3)-(6).

The problems d-f are not standard optimization problems, because semi-covariances $d_{ij}(\gamma)$ in (7) change with the changes in the portfolio structure x_1, …, x_k (which changes mean return γ). Using semi-variance to determine effective portfolios creates considerable problems because in the calculations of semi-covariances $d_{ij}(\gamma)$ one has to know in which periods the rate of return of the entire portfolio was lower than the target value γ, and this depends on the composition of the portfolio. This makes calculations of effective portfolios with semi-variance as a risk measure more complicated than is in the case when variance is used. When a portfolio with the minimum semi-variance is determined, each time the composition of the portfolio or the target `rate of return γ changes. Thus the semi-covariances $d_{ij}(\gamma)$ should be re-estimated.

To solve these problem the following numerical algorithm was used. We have started with some initial portfolio (in this case it was a portfolio minimizing variance). Then we solve each of the problems d-e as a problems of quadratic programming, using Goldfarb and Idnani (1983) method. After each iteration we refreshed a value of γ based on the new solution. Then we re-estimated semi-covariances $d_{ij}(\gamma)$ and solve the problems with the new input data. We repeated this process until convergence, i.e. until changes in portfolio structure between each iterations was sufficiently small. In the calculations we used procedures written in R and the R package quadprog.

Data and Empirical Results

The studies covered 20 largest and most liquid companies listed at Warsaw Stock Exchange excluding financial companies. Close share prices from the period 1.4.2016–4.9.2020 were taken for analysis. In the estimation we considered portfolios assessed by their monthly rate of returns. The parameters (mean returns, variances and semi-variances) used in constructing for the portfolios build in the research were estimated using three years' period before the starting moment of an investment. Figures from financial statement such as: *net profit* (EAT), *gross profit* (GP) and *earnings before interest, taxes, depreciation, and amortization* (EBITDA), *operating profit* (EBIT) and *book value* (BV). They changed with the publication of the companies' quarterly financial statements. We have calculated the appropriate indicators for each company according to its financial statement. For the calculation of financial indicators we always used the latest available data, according to the date of publication. The article uses the financial statements for the period from Q3 2019 to Q2 2020. Information on financial results is usually published with a delay of 60 to 120 calendar days. It was assumed that portfolios purchased on a given day were sold after a month (four weeks). The data has been taken from Thomson Reuters database – Refinitiv Eikon.

In the case of economics, It is not possible to carry out repetitive experiments, as is the case, for example, in physics or chemistry. The article uses the Covid-19 epidemic as a natural experiment. During the epidemic, there was a sharp collapse on the stock exchanges, which allows to test the usefulness of various risk diversification methods in times of sharp drops in prices in financial markets.

In the paper we consider 15 types of portfolios. Table 1 contains descriptions of these types and symbols used to refer to them.

Table 1: The list of kinds of constructed portfolios

Portfolio	Description
Equally weigted	A portfolio with equal share of each asset
MinV	A portfolio minimizing variance (unconditionally)
MinV-E	A portfolio minimizing variance with a restriction on mean return
MinV-E-EBIT	A portfolio minimizing variance with a restriction on mean return and EBIT/M
MinV-E-GP	A portfolio minimizing variance with a restriction on mean return and GP/M
MinV-E-EBITA	A portfolio minimizing variance with a restriction on mean return and EBITDA/M
MinV-E-EAT	A portfolio minimizing variance with a restriction on mean return and EAT/M
MinV-E-B	A portfolio minimizing variance with a restriction on mean return and B/M
MinSV	A portfolio minimizing semi-variance (unconditionally)
MinSV-E	A portfolio minimizing semi-variance with a restriction on mean return
MinSV-E-EBIT	A portfolio minimizing semi-variance with a restriction on mean return and EBIT/M
MinSV-E-GP	A portfolio minimizing semi-variance with a restriction on mean return and GP/M
MinSV-E-EBITA	A portfolio minimizing semi-variance with a restriction on mean return and EBITDA/M
MinSV-E-EAT	A portfolio minimizing semi-variance with a restriction on mean return and EAT/M
MinSV-E-BV	A portfolio minimizing semi-variance with a restriction on mean return and BV/M

We created altogether 2655 portfolios during 177 trading days.

During the research period, four research sub-periods of different length were specified. The division criterion was the changes in the situation on the capital market, which was reflected in the changes in the values of the WIG Index, which is the main index on the Warsaw Stock Exchange. The key aspect for identifying sub-periods was a situation on the market during buying a portfolio and selling it. Table 2 contains descriptions of sub-periods.

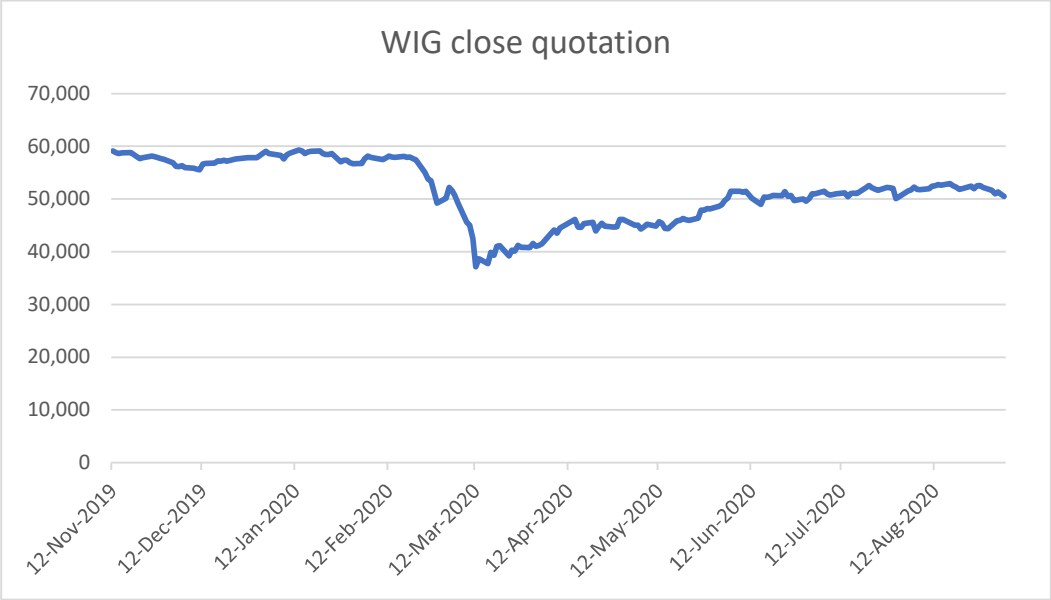

Fig. 1: WIG closing price

Table 2: Research periods

The time of buying a portfolio	The situation on the capital market
21.11.2019-29.01.2020	buying and selling before the collapse of the market
30.01.2020-10.03.2020	selling in the collapse of the market
11.03.2020-13.05.2020	buying and selling in the growth of the market
14.05.2020-07.08.2020	buying and selling during stabilization on the market

Due to the very large number of considered portfolios (2655), in the paper we omit the structure of these portfolios and other elements of ex-ante analysis, such as the expected portfolio risk, average rate of return or the average market ratio. All the characteristics of the distribution of return presented in Tables 3-7 refer to realized returns. That is, they describe the actual returns of investors, as well as the risk they bear. For the individual sub-periods and the entire research period, the following were characteristics were calculated: mean rate of return, minimal rate of return, Value-at-Risk (VaR), semi-deviation, standard deviation and skewness.

Table 3: Summary statistics of the realized rates of return for the portfolios bought in the time between 21.11.2019-29.01.2020 – I period (44 trade days), before collapse of the market

Portfolios	Mean	Min	VaR 0.1	VaR 0.05	Semi-dev.	Std. Dev.	Skewness
Equally weigted	0.034	-0.018	0.006	-0.011	0.003	0.021	-0.335
MinV	0.044	-0.018	0.011	-0.005	0.072	0.027	-0.117
MinV-E	0.034	-0.013	-0.003	-0.011	0.064	0.029	0.307
MinV-E-EBIT	0.035	-0.015	-0.003	-0.011	0.062	0.030	0.341
MinV-E-GP	0.040	-0.009	0.002	-0.007	0.062	0.029	0.292
MinV-E-EBITA	0.041	-0.013	0.004	-0.002	0.061	0.029	0.237
MinV-E-EAT	0.046	-0.009	0.010	0.007	0.060	0.029	0.221
MinV-E-BV	0.044	-0.015	0.004	0.001	0.061	0.029	-0.019
MinSV	0.033	-0.037	-0.004	-0.025	0.067	0.034	0.037
MinSV-E	0.040	-0.006	0.004	-0.004	0.060	0.028	0.383
MinSV-E-EBIT	0.041	-0.006	0.003	-0.003	0.058	0.029	0.393
MinSV-E-GP	0.043	-0.003	0.006	-0.001	0.058	0.028	0.372
MinSV-E-EBITA	0.045	-0.006	0.010	0.006	0.056	0.029	0.348
MinSV-E-EAT	0.051	-0.005	0.016	0.013	0.056	0.030	0.295
MinSV-E-BV	0.050	-0.009	0.011	0.009	0.056	0.029	0.144

In the first research sub-period, the negative effects of the Covid-19 pandemic have not yet affected the Polish stock market. We can observe that all the portfolios minimizing the semi-variance have right-skewed distributions of rates. Returns of equally weighted and portfolios minimizing variance were left-skewed. The highest average rate of return occurs for portfolios minimizing semi-variance and with a fundamental criterion. However, it is difficult to say unequivocally which type of diversification was the most effective in reducing the risk during this period.

Table 4: Summary statistics of the realized rates of return for the portfolios bought in the time between 30.01.2020-10.03.2020 – II period (29 trade days), the collapse of the market

Portfolios	Mean	Min	VaR 0.1	VaR 0.05	Semi-dev.	Std. Dev.	Skewness
Equally weighted	-0.169	-0.321	-0.287	-0.313	0.194	0.090	0.145
MinV	-0.158	-0.296	-0.265	-0.292	0.180	0.082	-0.008
MinV-E	-0.132	-0.298	-0.247	-0.277	0.160	0.089	0.142
MinV-E-EBIT	-0.127	-0.293	-0.241	-0.270	0.155	0.088	0.180
MinV-E-GP	-0.127	-0.292	-0.240	-0.269	0.155	0.087	0.141
MinV-E-EBITA	-0.121	-0.294	-0.239	-0.269	0.152	0.092	0.192
MinV-E-EAT	-0.121	-0.292	-0.236	-0.267	0.150	0.087	0.090
MinV-E-BV	-0.119	-0.296	-0.240	-0.269	0.151	0.094	0.197
MinSV	-0.146	-0.284	-0.250	-0.275	0.167	0.078	0.039
MinSV-E	-0.120	-0.289	-0.235	-0.267	0.150	0.089	0.133
MinSV-E-EBIT	-0.115	-0.282	-0.228	-0.259	0.145	0.087	0.156
MinSV-E-GP	-0.115	-0.281	-0.227	-0.259	0.145	0.086	0.137
MinSV-E-EBITA	-0.109	-0.283	-0.227	-0.257	0.141	0.089	0.134
MinSV-E-EAT	-0.108	-0.282	-0.225	-0.256	0.139	0.087	0.053
MinSV-E-BV	-0.106	-0.280	-0.223	-0.253	0.138	0.089	0.113

At the end of January 2020, the financial markets collapsed and this situation lasted until mid-March. It affected not only Poland but practically all the most important world exchanges. During this period, all average rates of return were negative. The least effective strategy in this time was to select an equally weighted portfolio. It was the least

profitable and the most risky one, taking into account, among others, VaR 0.1, VaR 0.05 and semi-deviation. It can be seen that the most secure and at the same time the most profitable were the fundamental portfolios that minimize semi-variance. The distributions of realized returns were right-skewed (with only one exception for the portfolio minimizing variance), but the strength of this asymmetry was small.

Table 5: Summary statistics of the realized rates of return for the portfolios bought in the time between 11.03.2020-13.05.2020 – III period (43 trade days), the growth after the collapse of the market

Portfolios	Mean	Min	VaR 0.1	VaR 0.05	Semi-dev.	Std. Dev.	Skewness
Equally weighted	0.123	0.017	0.021	0.018	0.005	0.090	0.370
MinV	0.077	-0.020	-0.007	-0.013	0.007	0.073	0.202
MinV-E	0.104	0.000	0.013	0.003	0.006	0.082	0.301
MinV-E-EBIT	0.104	0.000	0.013	0.003	0.006	0.082	0.301
MinV-E-GP	0.104	0.000	0.013	0.003	0.006	0.082	0.301
MinV-E-EBITA	0.110	0.000	0.012	0.003	0.006	0.086	0.358
MinV-E-EAT	0.104	0.000	0.013	0.003	0.006	0.082	0.301
MinV-E-BV	0.122	0.006	0.024	0.013	0.008	0.085	0.340
MinSV	0.117	0.014	0.032	0.022	0.007	0.068	0.227
MinSV-E	0.124	0.014	0.032	0.022	0.007	0.071	0.170
MinSV-E-EBIT	0.124	0.014	0.032	0.022	0.007	0.071	0.170
MinSV-E-GP	0.124	0.014	0.032	0.022	0.007	0.071	0.170
MinSV-E-EBITA	0.116	0.014	0.028	0.021	0.008	0.072	0.395
MinSV-E-EAT	0.124	0.014	0.032	0.022	0.007	0.071	0.170
MinSV-E-BV	0.120	0.018	0.036	0.030	0.012	0.069	0.472

In the third sub-period, the quotations of the WIG index slowly began to rise. During this period, purchasing an equally weighted portfolio proved to be a fairly effective method of risk diversification. The highest average rates of return, as in the second sub-period, were achieved by fundamental portfolios minimizing semi-variance. It is worth noting that the portfolios minimizing semi-variance had higher values of this risk measure compared to the portfolios minimizing the variance. At the same time, portfolios minimizing the variance had higher realized variances. However, taking into account the extreme values such as minimal return, VaR 0.05, VaR 0.01, there is a clear advantage of portfolios with minimized semi-variance. In the third sub-period, all portfolios are characterized by right-hand asymmetry and it is stronger than in the second sub-period.

Table 6: Summary statistics of the realized rates of return for the portfolios bought in the time between 14.05.2020-07.08.2020 – IV period (61 trade days), stabilization on the market

Portfolios	Mean	Min	VaR 0.1	VaR 0.05	Semi-dev.	Std. dev.	Skewness
Equally weighted	0.044	-0.028	0.011	-0.002	0.004	0.025	-0.457
MinV	0.059	-0.039	0.008	-0.013	0.006	0.042	0.044
MinV-E	0.040	-0.036	0.013	-0.007	0.005	0.024	-0.419
MinV-E-EBIT	0.040	-0.036	0.013	-0.007	0.005	0.024	-0.419
MinV-E-GP	0.040	-0.036	0.013	-0.007	0.005	0.024	-0.419
MinV-E-EBITA	0.040	-0.036	0.013	-0.007	0.005	0.024	-0.434
MinV-E-EAT	0.040	-0.036	0.013	-0.007	0.005	0.024	-0.419
MinV-E-BV	0.028	-0.041	0.000	-0.022	0.007	0.026	0.326
MinSV	0.018	-0.023	-0.011	-0.020	0.006	0.022	0.178
MinSV-E	0.018	-0.023	-0.011	-0.020	0.006	0.022	0.178
MinSV-E-EBIT	0.018	-0.023	-0.011	-0.020	0.006	0.022	0.178
MinSV-E-GP	0.018	-0.023	-0.011	-0.020	0.006	0.022	0.178
MinSV-E-EBITA	0.017	-0.025	-0.012	-0.020	0.006	0.022	0.161
MinSV-E-EAT	0.018	-0.023	-0.011	-0.020	0.006	0.022	0.178
MinSV-E-BV	0.016	-0.035	-0.020	-0.026	0.010	0.026	-0.025

In the fourth sub-period there was a stabilization on the Warsaw Stock Exchange, the price increases were small, as it is shown at Figure 1. The realized rates of return for the equally weighted portfolios and those with minimum semi-variance were generally characterized by left asymmetry, and those with minimum variance - with right asymmetry. During this period, for many fundamental portfolios, the condition imposed on the given market ratio for the portfolio was not active, especially for market ratios based on various measures of the company's profitability.

In this period the most profitable were portfolios selected in accordance with the minimum variance criterion. The average rate of return for the equally weighted portfolios was quite high and the risk was lower than for Markowitz portfolios. In the fourth sub-period, advanced models of building the stock portfolio had similar usefulness for stock exchange investors as the simple method of selecting an equally portfolio.

In the entire research period (Table 7) portfolios with three criteria (mean return, risk and a fundamental criterion) allow for achieving higher realized returns compared to the equally weighted portfolio, portfolios minimizing risk (measure either with variance or semi-variance), or average return-risk portfolios. Additionally, it can be seen that the introduction of a fundamental criterion reduces the risk borne by an investor, measured both with standard deviation and semi-deviation. The analysis of extreme values (minimal return, VaR 0.1, VaR 0.05) also shows the advantage of fundamental portfolios. As one can see the whole group of portfolios minimizing semi-variance is characterized by a lower ex-post risk, compared to those minimizing variance. Fundamental portfolios have lower left asymmetry, especially for portfolios which was designed to minimalize semi-variance. It should be emphasized that lower left asymmetry is beneficial for investors, it means they are less exposed to very low rates of return.

Table 7: Summary statistics of the realized rates of return for the portfolio bought in the time between 21.11.2019-07.08.2020 – whole research period (177 trade days)

Portfolios	Mean	Min	VaR 0.1	VaR 0.05	Semi-dev.	Std. dev.	Skewness
Equally weighted	0.026	-0.321	-0.142	-0.227	0.077	0.111	-0.814
MinV	0.024	-0.296	-0.139	-0.224	0.072	0.099	-1.289
MinV-E	0.026	-0.298	-0.100	-0.210	0.064	0.095	-0.814
MinV-E-EBIT	0.027	-0.293	-0.094	-0.200	0.062	0.093	-0.777
MinV-E-GP	0.028	-0.292	-0.098	-0.200	0.062	0.093	-0.802
MinV-E-EBITA	0.031	-0.294	-0.085	-0.195	0.061	0.094	-0.681
MinV-E-EAT	0.031	-0.292	-0.089	-0.195	0.060	0.092	-0.808
MinV-E-BV	0.031	-0.296	-0.083	-0.196	0.061	0.097	-0.501
MinSV	0.019	-0.284	-0.110	-0.202	0.067	0.097	-0.702
MinSV-E	0.026	-0.289	-0.082	-0.193	0.060	0.093	-0.562
MinSV-E-EBIT	0.028	-0.282	-0.080	-0.185	0.058	0.092	-0.509
MinSV-E-GP	0.028	-0.281	-0.080	-0.184	0.058	0.092	-0.516
MinSV-E-EBITA	0.028	-0.283	-0.071	-0.179	0.056	0.089	-0.544
MinSV-E-EAT	0.031	-0.282	-0.073	-0.176	0.056	0.091	-0.523
MinSV-E-BV	0.029	-0.280	-0.069	-0.177	0.056	0.090	-0.539

Conclusions

In the paper fundamental portfolios both for variance and semi-variance approach was built. The iterative algorithm written in R- software was used for constructing portfolios in semi-variance framework.

For fundamental portfolios three criteria is considered: profitability (measured with expected return), risk (measured with variance or semi-variance of returns) and a market ratio of companies in the portfolio. Five different market ratios were used in the study. The usefulness of portfolio selection models during the Covid-19 epidemic was analyzed. This period has been divided into four sub-periods due to the changing situation on the Warsaw Stock Exchange.

During this period of the collapse on financial markets The worse strategy was to select an equally weighted portfolio. It was the least profitable and the most risky one, taking into account, Value-at-Risk and semi-deviation. It can be noticed that the most safe and at the same time the most profitable were the fundamental portfolios that minimize semi-variance.

In the entire research period portfolios with three criteria (mean return, risk and a fundamental criterion) allow for achieving higher realized returns compared to the equally weighted portfolio, portfolios minimizing risk (measure either with variance or semi-variance), or average return-risk portfolios. Additionally, it can be seen that the introduction of the fundamental criterion reduces the risk borne by an investor, measured both with standard deviation and semi-deviation. The analysis of Value-at-Risk also shows the advantage of fundamental portfolios. It can be noticed that the whole group of portfolios minimizing semi-variance is characterized by a lower ex-post risk, compared to those minimizing the variance.

The results from empirical research for the major companies traded on the Warsaw Stock Exchange reveals that:

- investors can received better investment results by adding to the Markowitz model, the additional criterion connected with market ratio such as book to market or earnings to market;
- using semi-variance instead of variance gives better results for investors, it is clear seen in the period of collapse on the capital market;
- fundamental portfolios with the minimum semi-variance seem to be the useful tool of choosing investment strategy during the Covid-19 pandemic.

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The Use of Volunteering as An Indirect Source of Financing for Public Benefit Activity on The Example of Polish Foundations and Associations

Anna STASZEL

Cracow University of Economics, Krakow, Poland
staszela@uek.krakow.pl

Pawel ZIENIUK

Cracow University of Economics, Krakow, Poland
zieniukp@uek.krakow.pl

Abstract

Public benefit organisations are increasingly using volunteers, i.e. people who provide services voluntarily and without remuneration. Simultaneously, an increase in interest can be observed in problems such as the need for legal regulation of volunteering, elimination of tax barriers or ensuring the reimbursement of necessary costs incurred by volunteers in connection with the provision of services for the organisation. In Poland, there are detailed legal regulations on volunteering, compliant with EU requirements, which were presented in this study. It also presents the results of the authors' own research, carried out on a sample of 100 randomly selected public benefit organisations operating in the form of foundations and associations, conducting their activities in Poland. The aim of the research was to present the interrelationships between the number of volunteers involved in the organisation's activities and factors specific to the organisation, such as: territorial range, number of beneficiaries, duration of public benefit activities, number of employees employed and the amount of operating costs incurred and income generated. The research was performed on the basis of data from financial and substantive statements of the selected organisations. The following statistical methods were used to verify the formulated hypotheses: t test for independent samples and ANOVA variance analysis. The results of the research allow for a statistically significant correlation between the number of volunteers and the territorial range of activities carried out by the organisations and the amount of income generated. Thus, it can be said that voluntary activity is more prevalent in organisations with lower incomes which, without the help of volunteers, would not be able to carry out the current range of public benefit activities, due to a lack of resources to recruit staff and finance salaries.

Keywords: volunteering, public benefit organizations, foundations, associations, sources of financing for public benefit activities

Introduction

Voluntary and unpaid charity work is one of the factors enabling the development of public benefit organisations. It is characteristic of these entities to be able to benefit from volunteer services which correspond to work but are not paid. Therefore, there can be two groups of service providers - employees and volunteers - in non-profit organisations. For organisations, this means a reduction in the costs associated with payment of salaries.

Dynamic development of volunteering is an evidence of the realisation of the idea of civil society. However, it is very difficult to measure actual voluntary activity, due to the fact of frequent use of the results of surveys in which volunteers themselves determine the extent of their involvement in the organisation's activities, without giving a specific number of hours of work for the benefit of the organisation. In view of the above, the empirical research used a method of analysing the content of financial and substantive statements, in which data on volunteer activity in individual organisations accepted for the research sample were provided by organisations using volunteers.

The aim of the research, carried out on a sample of 100 randomly selected public benefit organisations, was to show the interrelationships between the number of volunteers and factors specific to the organisation. The following hypotheses have been verified:

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- H1: "Public benefit organisations in which there are no volunteers are organisations with a significantly shorter period of operation than organisations involving volunteers"
- H2: "Public benefit organisations with more volunteers help more beneficiaries".
- H3: "Public benefit organisations with a larger number of volunteers carry out activities with a larger territorial range".
- H4: "Organisations where there are no volunteers incur significantly higher operating costs than those where there are volunteers".
- H5: "Organisations where there are no volunteers employ significantly more staff than organisations where there are volunteers".
- H6: "Organisations where there are no volunteers have a significantly higher income than organisations where there are volunteers".

The t-test for independent samples and the ANOVA variance analysis were used to confirm or deny the statistical significance of the relationship between the variables. According to the intention of the authors, the verification of the formulated hypotheses was to allow the basic conclusions to be drawn, leading to an assessment of the use of volunteering as an indirect source of financing for public benefit organisations.

Theoretical Background and Literature Review

Volunteering as an indirect source of funding for public benefit activities in European Union countries

In European countries, there is a wide variety of sources of funding for the activities of public benefit organisations. The results of the conducted research (Davister, Defourny, Gregoire, 2008) distinguish three basic groups of financing: domination of market sources (e.g. Belgium, Spain, Finland), public subsidies (e.g. Germany, Great Britain) and donations and volunteering (Great Britain, Spain). In the case of Poland, public sources of funding for public benefit activities are still dominant (Mamcarczyk, Zieniuk, 2020). However, the financing of these activities by organisations from their business activities and the "1% personal income tax mechanism", which has been in place since 2003, according to which Polish taxpayers may decide to transfer part of their income tax to a selected organisation for statutory purposes, are becoming increasingly important. Similar legal solutions have so far been introduced in other European countries, too, such as: Hungary (1%), Slovakia (0.5-2%), Lithuania (2%), Romania (3.5%), Slovenia (2%) and Moldova (2%).

The structure of the sources of financing of public benefit organisations is influenced by the country in which they operate. In the Rhine model, which exists, among others, in Belgium and France, NGOs are the main provider of public services contracted by the state. In the Scandinavian model (Sweden, Norway), organisations report the existence of social problems, but the state is the implementer of social policy. The Mediterranean model (e.g. Portugal) is characterised by a low level of independence and autonomy of organisations. In the Anglo-Saxon model (Great Britain) there is a high degree of professionalism and marketisation of the organisation. In the case of countries such as Poland or the Czech Republic, there is a model of a transition period characterised by dynamic development of organisations resulting from formation of civil society.

All European legal systems in which charitable organisations operate are characterised by the possibility for organisations to benefit from unpaid voluntary services. Unlike the typical sources of direct public and private funding of organisations, such as grants and donations, volunteering is considered a form of indirect funding. In this case, the organisation does not receive the funds it can use to carry out its statutory tasks. Funding of activities by volunteering should be seen in the context of the resources saved, as volunteers do not have to be paid for their services to the organisation. Therefore, the use of volunteer services gives organisations the opportunity to reduce costs of their activities. To illustrate the scale of these savings, it would be necessary to calculate the value of remuneration that would have to be granted to employees carrying out the same activities that volunteers do free of charge.

Volunteers carry out targeted assistance activities that extend over time and have been freely chosen by them. They do not expect an award for them and they carry out these activities through formal organisations, for people who need support (Kartika Dewi, Manochin, Belal, 2018). The reasons for undertaking voluntary activity include the desire to gain professional experience, increase personal competences, pass the internship, fulfil one's own needs in terms of values, search for space for self-fulfilment or gain professional contacts (Frączak, 2009). Young volunteers may be motivated by a desire for adventure, to make new contacts and friendships, to integrate into society, or to carry out social work as a punishment. For older people, however, involvement in voluntary work can help to maintain physical, intellectual and social fitness (Sznajder, Konopocka, Siorek, 2010). Young people have more

time and energy to use effectively for social activities (European Volunteer Centre, 2012). It has also been confirmed that it is more attractive for volunteers to provide services to specialist organisations that provide limited services with which they identify themselves to a greater extent (Lorente-Aayala, Vila-Lopez, Kuster-Boluda, 2020).

In countries characterised by a higher level of social capital, civic activity or trust, there is usually more developed volunteering (Pazderski, Sobesiak-Penszko, 2012). A Eurobarometer survey (2011) shows that in the Scandinavian countries, where around 56% of people are involved in volunteering, older people predominate. In southern European countries such as Greece and Portugal, only 4% of volunteers are elderly. In Poland, the percentage of people under 25 years of age devoting time to volunteering is twice as high as among people over 55 years of age. A similar situation persists in countries such as Lithuania, Latvia, Bulgaria and Romania.

Research on Polish NGOs is conducted by Klon/Jawor Association (2012). Their results indicate that about 44% of Polish NGOs use the work of volunteers, but only half of them cooperate with over 10 volunteers. Since 2002, more than half of Polish citizens have declared that they have been socially active. Similar involvement in social activity has been observed among men and women. The majority of volunteers are those with higher or secondary education.

Legal status of volunteering in Poland

The issue of volunteering was not explicitly regulated by EU regulations, only recommendations concerning social protection of volunteers and the movement of volunteers were introduced (Kołodziej, 2011). These recommendations include the obligation for the Member States of the European Union to prepare biennial reports on actions taken and problems relating to volunteering and to forward them to the European Commission. The recommendation covering volunteers with the right of free movement within the Community recommends that the members of the Union should take action to remove legal and administrative obstacles to voluntary activity. Other regulations on volunteering are shaped solely by domestic law.

The Polish legal system is governed by the Act on Public Benefit Activity and Volunteering (2003), according to which a volunteer is a person who provides services voluntarily and without remuneration under the terms of the Act. The legal relationship between an organisation and a volunteer is not an employment relationship, but a civil law relationship. The Act on Public Benefit Activity and Volunteering, which is in force in Poland, introduces the possibility of providing services by volunteers, corresponding to the provision of work, in the statutory activity of non-governmental organisations. The exact scope and modalities of the volunteer services and other detailed arrangements are determined in agreement with the beneficiary.

The introduction of the possibility of concluding agreements with volunteers in the Act on Public Benefit Activity and Volunteering has initially raised some doubts about the application of labour law to these people. However, neither the Act nor the Labour Code allows these provisions to apply to volunteering. On the other hand, defining volunteer services as "corresponding to the provision of work" is intended only to determine the essence of the activities covered by volunteer services, i.e. the performance of a specific type of work for the beneficiary, under the beneficiary's direction and at a fixed place and time (Gola, 2005). A volunteer who has made an agreement with an organisation may have the status of an unemployed person. Voluntary activity does not result in the loss of unemployment status or entitlement to allowance. There is also no obstacle to the volunteer becoming a working person, a retired person or a pensioner. Minors under 18 years of age must present the written consent of their legal representative when signing the agreement. Foreigners legally residing on the territory of the Republic of Poland can also become volunteers.

It should also be noted that in order to determine the rights and obligations of the parties, apart from the provisions of the Act on Public Benefit Activity and Volunteering, the provisions on the mandate contract and not on mutual agreements are applicable, as the volunteer does not receive for his or her services an equivalent of adequate financial value (Gola, 2005).

Volunteers have the opportunity to be reimbursed for expenses incurred in providing services to the organisation. In particular, the volunteer can be reimbursed for medical examinations, personal protective equipment, protective clothing, meals, business trips, telephone calls and training. This directory is open and reimbursement is conditional on a direct link to the volunteer's services to the organisation. In turn, the Act allows public benefit organisations to include the above costs in the costs of conducting public benefit activities.

A public benefit organisation may carry out unremunerated, unpaid activities as well as remunerated activities. In both cases, the organisation can benefit from the support of volunteers. The organisation may also register a

business activity, provided that profits from that activity are transferred to carry out its statutory tasks. It should be pointed out at this point that it is not permissible to use volunteer services in connection with the business activity. Therefore, an organisation conducting business activity may use volunteers' assistance only in carrying out its statutory tasks (public benefit activity), and the costs related to volunteers' services may not be included in the costs of conducting business activity.

Volunteers are not paid for their work, but there are no regulations prohibiting organisations from awarding them bonuses and cash prizes. It is not a pay for specific work done in a given period, but only an additional benefit component (Kasprzak, 2008).

Empirical Research

The research covered organisations with the status of public benefit organisations, operating in Poland and publishing financial and substantive statements in the Database of Financial and Substantive Statements of Public Benefit Organisations, run by the National Freedom Institute. The research sample included 100 organisations operating as foundations or associations, selected randomly, subject to constant selection interval. Selection of organisations to the sample meets the conditions of random selection.

The research was performed on the basis of data from financial and substantive statements published for 2019. The research used the content analysis method. Each of the sampled organisations has published the detailed information contained in the section of the "Volunteering during the reporting period" substantive statement. It is worth pointing out that all the organisations included into the survey sample fulfil their reporting obligations in a timely manner, making their financial and substantive statements public by publishing them in a database.

The data from the published financial and substantive statements were aggregated using a spreadsheet and then became the basis for statistical analyses. The following statistical methods have been used:

- t test for independent samples, the purpose of which is to compare averages from two independent groups,
- ANOVA variance analysis, the purpose of which is to explain with what probability the isolated factors may cause differences between the observed group averages.

The number of volunteers providing services to organisations included in the sample was recalculated. It is assumed that the number of volunteers who have worked with the organisation for less than 30 days, as shown in the content report, is primarily an action commitment. In determining the recalculated number of volunteers, a formula used in empirical research was used to determine the indicators of saved personnel costs (comp. Dyczkowski, 2015):

Recalculated number of volunteers = volunteers up to 30 days / 52 + volunteers over 30 days / 4

In order to verify the relationship between the number of volunteers working in public benefit organisations and the duration of the organisations' activities, the H1 hypothesis was verified, according to which: "Public benefit organisations in which there are no volunteers are organisations with a significantly shorter period of operation than those involving volunteers". Out of 100 analysed entities, 3 organisations operated the shortest (2 years), and 19 organisations operated the longest (over 15 years).

The average period of operation of organisations not involving volunteers is 11.2 years, while the average period of operation of PBOs in which voluntary activity occurs is 10.5 years. It can therefore be concluded that there are no significant differences between the period of operation of organisations that use volunteer assistance and those that do not. In order to verify the H1 hypothesis, a t-test for independent samples was used, the result of which is shown in Table 1.

Table 1: Result of the t-test to verify whether the average operation time of an organisation depends on whether the organisation uses volunteers.

Independent t tests for averages	
Group 1: Organizations using the help of volunteers vs Group 2: Organizations that do not use volunteers	
Mean: Group 1	10,52941
Mean: Group 2	11,26000
t	-1,00370
df	99
p	0,317972
Valid N: Group 1	51
Valid N: Group 2	50
Std. dev: Group 1	3,770161
Std. dev : Group 2	3,538765
F-ratio variance	1,135054
p-value variance	0,658368

Source: own elaboration based on data obtained from the conducted research

The results of the test show that the use of volunteer assistance by organisations is not differentiated by the duration of an entity's operation. Therefore, the H1 hypothesis stating that: "Public benefit organisations in which there are no volunteers are organisations with a significantly shorter lifespan than those involving volunteers", has not been confirmed.
In order to verify the relationship between the number of volunteers working in public benefit organisations and the number of beneficiaries of the organisation, the H2 hypothesis was verified: "Public benefit organisations with more volunteers help more beneficiaries".

The ANOVA test was used to verify whether there are significant differences in the number of beneficiaries in the separate groups of organisations A,B,C,D. In order to verify the hypothesis, a one-factor analysis of ANOVA variance was used to check whether the number of volunteers working in PBO significantly differentiates the number of people that the PBO helps.

Table 2 shows the average number of beneficiaries of organisations, depending on the number of volunteers in the organisation. Organisations of the survey sample were divided into four groups. On the other hand, Table 3 presents the results of the single-factor ANOVA variance analysis .

Table 2: Average number of beneficiaries of PBO assistance depending on the number of volunteers working in the PBO

Group	Average number of beneficiaries
Group A (Organisations in which there are no volunteers)	5429,455
Group B (less than 1 volunteer per year on average)	2075,000
Group C (more than 1 but less than 10 volunteers per year on average)	3217,593
Group D (more than 10 volunteers per year on average)	5254,750

Source: own elaboration based on data obtained from the conducted research

The data presented in Table 2 shows that the largest number of people are assisted by organisations with no volunteers, as well as those with more than 10 volunteers. Interestingly, the lowest average number of beneficiaries is in organisations with between 1 and 10 volunteers.

Table 3: The results of the single-factor ANOVA variance analysis

Variable: Number of beneficiaries of PBO assistance	
SS efekt	199668392
df efekt	3
MS efekt	66556131
SS error	2,271207E+10
df error	97
MS error	234145085
F	0,284252
p	0,836660

Source: own elaboration based on data obtained from the conducted research

From the relationship shown in Table 3, it can be seen that the number of volunteers is not a factor that significantly differentiates the number of people that the foundation helps. Therefore, the H2 hypothesis stating that: "Public benefit organisations with more volunteers help more beneficiaries" has not been confirmed.

In order to verify the relationship between the number of volunteers working in public benefit organisations and the organisation's operational range, the H3 hypothesis was verified: "Public benefit organisations with a larger number of volunteers carry out activities with a larger territorial range".

In order to verify the hypothesis, a one-factor ANOVA variance analysis was used, which makes it possible to check whether the number of volunteers working in the PBO significantly differentiates the territorial range of the organisation. Table 4 compares the average numbers of volunteers in organisations carrying out activities of different territorial range. For each of the organisations included into the survey sample, its scope was marked, classifying the organisations into groups.

Table 4: Average number of volunteers according to the territorial range of the organisation.

Group	Average number of volunteers
Group 1 – closest vicinity	0,23352
Group 2 – municipality	0,49126
Group 3 – poviat	5,75801
Group 4 – voivodship	14,12500
Group 5 – whole country	2,54615

Source: own elaboration based on data obtained from the conducted research

The data presented in Table 4 shows that most volunteers operate in organisations with a voivodship range, followed by organisations with poviat range. Whether the observed differences between the average numbers of volunteers are statistically significant can be determined by means of the ANOVA variance analysis, the results of which are shown in Table 5.

Table 5: Results of one-factor of ANOVA variance analysis for the number of volunteers according to the territorial range of the organisation.

Variable: Average number of volunteers	
SS efekt	1509,311
df efekt	4
MS efekt	377,3278
SS error	13848,49
df error	96
MS error	144,2551
F	2,615698
p	0,039876

Source: own elaboration based on data obtained from the conducted research

The results of the test, presented in Table 5, show that the territorial scope of the organisation's activities is a factor that significantly differentiates the number of volunteers, thus confirming the H3 hypothesis: "Public benefit organisations with a larger number of volunteers carry out activities with a larger territorial range".

In order to verify the relationship between the use of volunteers and the recorded costs of the organisation's activities, the H4 hypothesis was verified, according to which: "Organisations where there are no volunteers incur significantly higher operating costs than those where there are volunteers".

The average cost of conducting activity in organisations of the survey sample with no volunteers amounted to PLN 885642.7, while the average cost in organisations using voluntary activity was PLN 836432.4. In the second group of organisations these costs are lower. To verify whether the differences observed are statistically significant, a t-test for independent samples was used, the result of which is shown in Table 6.

Table 6: Result of the t-test to verify whether the average costs borne by PBO depend on whether PBO uses volunteers.

Independent t tests for averages	
Group 1: Organizations that do not use volunteers vs Group 2: Organizations using the help of volunteers	
Mean: Group 1	885642,7
Mean: Group 2	836432,4
t	0,145415
df	100
p	0,884676
Valid N: Group 1	50
Valid N: Group 2	52
Std. dev: Group 1	1843300
Std. dev : Group 2	1568254
F-ratio variance	1,381527
p-value variance	0,255379

Source: own elaboration based on data obtained from the conducted research

The test results presented in Table 6 show that whether or not an organisation uses volunteers is not a factor that significantly differentiates the operating costs of the organisation. Therefore, the H4 hypothesis, stating that: "Organisations where there are no volunteers incur significantly higher operating costs than those where there are volunteers" has not been confirmed.

The relationship between the use of volunteers by organisations and the number of staff employed in the organisations was also verified. The verification covered the hypothesis H5, stating that: "Organisations where there are no volunteers employ significantly more staff than organisations where there are volunteers".

The average number of people employed in organisations with no volunteers is 23, while the average number of people employed in organisations with volunteers is 18. The employment has been converted into full-time equivalents, including both the persons employed in the organisations and those cooperating under a mandate contract and a contract for specific work. To verify whether the differences observed are significant, a t-test for independent samples was used, the result of which is shown in Table 7.

Table 7: The result of the t-test to verify whether the average number of employees in an organisation depends on whether the organisation uses volunteers

Independent t tests for averages	
Group 1: Organizations that do not use volunteers vs Group 2: Organizations using the help of volunteers	
Mean: Group 1	23,35962
Mean: Group 2	18,41020
t	0,583780
df	99
p	0,560696
Valid N: Group 1	52
Valid N: Group 2	49
Std. dev: Group 1	44,94647
Std. dev : Group 2	39,92038
F-ratio variance	1,267658
p-value variance	0,409425

Source: own elaboration based on data obtained from the conducted research

The results of the test, presented in Table 7, show that whether an organisation uses volunteers or not, is not a factor that significantly differentiates the number of people employed in the organisations. Therefore, the H5 hypothesis, stating that: "Organisations where there are no volunteers employ significantly more staff than organisations where there are volunteers" has not been confirmed.

It was also verified whether organisations that use volunteers have lower incomes than those that do not use volunteering. A positive verification would allow for the conclusion that organisations whose economic situation is worse, i.e. those with lower incomes, use volunteers' help.

The verification covered the H6 hypothesis, stating that: "Organisations where there are no volunteers have a significantly higher income than organisations where there are volunteers".

The average income in organisations with no volunteers amounts to PLN 501 thousand, while the average income in organisations with volunteers amounts to PLN 125 thousand, about four times less. To verify whether the differences observed are statistically significant, a t-test for independent samples was used, the result of which is shown in Table 8.

Table 8: Result of the t-test to verify whether the average income achieved by an organisation depends on whether the organisation uses volunteer assistance

Independent t tests for averages	
Group 1: Organizations that do not use volunteers vs Group 2: Organizations using the help of volunteers	
Mean: Group 1	1248031
Mean: Group 2	501315,5
t	2,064543
df	95
p	0,041692
Valid N: Group 1	49
Valid N: Group 2	48
Std. dev: Group 1	2453638
Std. dev : Group 2	512820,0
F-ratio variance	22,89238
p-value variance	0,000000

Source: own elaboration based on data obtained from the conducted research

The test results presented in Table 8 show that whether an organisation uses volunteers or not is a factor that significantly differentiates its income. Therefore, the H6 hypothesis, stating that: "Organisations where there are no volunteers have a significantly higher income than organisations where there are volunteers" has been confirmed.

Conclusion

Volunteering is a form of cooperation that benefits both parties to the agreement. The organisation obtains help with its activities, the volunteer gains experience which can be used in later professional work. Due to growing importance of the phenomenon of volunteering, there is an increasing number of operations in the activities of an organisation, concerning the services provided by volunteers, which need to be appropriately included in the accounting system. The specific nature of public benefit organisations should impose the need for reliable and transparent bookkeeping, which is particularly related to the fact that these organisations use public funds and carry out commissioned tasks. Proper implementation of the organisations' reporting obligations also allows for providing a wide range of recipients with detailed information on the statutory objectives pursued by the organisations and the resources used, including information on the number of employees and the scale of use of volunteering.

The specific nature of the activities carried out by public benefit purpose organisations, and in particular the purposes for which they are established, justify the possibility of using assistance from persons who provide services voluntarily and without remuneration. The legal regulations in force in Poland, concerning public benefit activities and volunteer services, should be considered to be in line with EU guidelines. Simultaneously, tax preferences, linked to the lack of taxation of voluntary activity, are the legislator's incentive to establish organisations and carry out voluntary work.

The theoretical considerations carried out in this study and the results of the empirical research presented here confirm that the possibility for public benefit organisations to use voluntary activities is a source of indirect funding for their activities. In particular, the statistically significant relationship between the number of volunteers working for the organisation and the amount of income generated by the organisation should be highlighted. The scale of using volunteers is greater in organisations with lower annual revenues. If, therefore, it were not possible for these organisations to use volunteer services unpaid, they would have to reduce the scope of their public benefit tasks, as

it is not possible to finance the salaries of employees carrying out tasks to the same extent as current volunteers. There was also a statistically significant correlation between the number of volunteers and the territorial coverage of the organisation. This relationship seems understandable, since organisations operating in a larger area of the country are usually entities which carry out more statutory tasks. However, in the adopted sample, no statistically significant relationships were found between the number of volunteers and the number of beneficiaries of the organisations, the duration of the organisations' activities, the number of employees employed and the level of costs incurred by the organisations.

Acknowledgment

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Determination of Perspective Directions for The Foreign Economic Activity Development in Large Russian Industrial Regions (On the Example of The Chelyabinsk Region)

Irina Y. OKOLNISHNIKOVA,
Institute of Control Sciences V.A. Trapeznikov of Russian Academy of Sciences, State University of Management, Moscow, Russia, okolnishnikova.i@mail.ru

Antonina I. UKHOVA,
South Ural State University, Chelyabinsk, Russia, antonina.ukhova@gmail.com

Alexey D. OKOLNISHNIKOV,
South Ural State University, Russia, alex_2000let@mail.ru

Mark S. ANASTASOV,
Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia, anastasov.m.s@madi.ru

Abstract

The article is devoted to the study of the ways of development of foreign economic activity of large Russian industrial regions. The authors substantiated the key guidelines for the diversification of national exports and showed that its successful development is based on the interaction of the federal center and regions. On the example of a large industrial region - the Chelyabinsk region, promising geographical directions for the development of regional exports are identified and ways of developing each of the directions are proposed. The authors have proposed branches of the regional economy that are promising in terms of export development - metallurgical, agro-industrial, transport and nuclear complexes, mechanical engineering, tourism, education and science. Based on the study, the article identifies the key directions of export development - strengthening the image of the region, international product promotion and attracting foreign capital.

Keywords: Regional Economy, Foreign Economic Activity, Export Activities, Export Support.

Introduction

The development of foreign economic activity has a positive impact on the rates of economic growth of the subjects of the Russian Federation. This topic is especially relevant for large industrial regions of Russia of the raw material type, experiencing crisis and post-crisis trends. This determines the relevance of the research topic and the choice of the foreign economic activity of the Chelyabinsk region as its subject.

Currently, the key documents setting specific tasks in the field of foreign economic activity are the Russian state program "Development of foreign economic activity" and the Action Plan "Support for access to foreign markets and export support". The goals of the Program are to strengthen positions in the global economy and increase the contribution of foreign economic activity to the country's socio-economic development. The objectives of the Program are to strengthen international cooperation, develop a system of state regulation, institutions and mechanisms of foreign economic activity and customs administration, increase the efficiency of checkpoints across the state border.

The listed goals and objectives are guidelines for the development of foreign economic activity of Russian regions and key guidelines for export diversification:

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- natural production diversification - consolidation of existing advantages, as well as expanding the processing of primary resources and moving up the value chain;

- innovative diversification - modernization of the export assortment on the basis of strengthening the system of competitive advantages, the formation of competitive industries, concentrating on the final stages of the technological cycle and ensuring high dynamics of innovation.

At the same time, the national export development system can function effectively only if the efforts of the federal center and the subjects of the Russian Federation are consolidated. At the same time, most of the Russian regions are poorly oriented towards foreign markets and their products are not competitive enough. Let us consider the situation using the example of one of the typical regions of Russia in this regard - the Chelyabinsk region.

Results and Discussion

From an institutional point of view, a number of export support institutions operate in the region. The concept of a "single window" has been implemented as the main element of interaction between government and business. There is an Export Support Center that provides consulting and analytical assistance to increase the number of exporters and revenue from export deliveries. The Industry Support Fund is functioning, support for innovative enterprises is provided by the Center for Cluster Development.

Geographically, promising directions for the development of the region's foreign economic activity can, according to the authors, be divided into the following areas:

1. Interaction with the SCO, including:
- SCO members - China, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, India, Pakistan;
- SCO observers - Belarus, Afghanistan, Iran, Mongolia;
- candidates for SCO membership - Syria, Bangladesh, Egypt.

To organize cooperation in this market segment, it is advisable, from our point of view, to establish long-term interaction between economic entities, expand the use of transit corridors and logistics complexes in the region, support investment projects of regional business abroad; interaction in the field of tourism and attraction of direct foreign investments to the region.

2. Cooperation with China in the scientific and technical sphere and the creation of joint production zones.
3. Interaction with the BRICS countries - Brazil, India, China, South Africa in the following areas:
- development of long-term cooperation between business entities;
- participation of regional enterprises in infrastructure projects of the BRICS countries;
- expansion of transport and infrastructure cooperation, etc.
4. Deepening interaction with the EAEU countries - Armenia, Belarus, Kazakhstan and Kyrgyzstan.
5. Interaction with the EU countries in the following areas:
- establishment of cooperation between business entities;
- use of transport and logistics corridors for the movement of transit cargo in the region;
- interaction in the field of tourism;
- attracting investments and technologies to the region;
- support of investment projects of regional business abroad;
6. Cooperation with other regions - Iran, Kuwait, Turkey, Egypt, Vietnam, Japan, South Korea, etc. in the following areas:
- building up trade and economic cooperation and expanding bilateral trade in the agro-industrial sector, supporting investment projects of regional business abroad (South Korea);
- introduction of environmentally friendly technologies, waste processing, development of consulting, organization of joint ventures in instrument making, machine and machine tool building (Japan);

- attracting investments and technologies to the region (Canada, South Africa);

- expanding bilateral trade, attracting investment and expanding technological cooperation (North America);

- cooperation in science, technology and trade, support for regional investment projects in mechanical engineering, metallurgy, IT-sphere, pharmacy (India);

- participation of regional enterprises in foreign infrastructure projects, promotion of products of regional enterprises in the field of mechanical engineering, metallurgy, industrial equipment, construction industry, energy, military-industrial complex, as well as development of investment cooperation (Middle East).

According to the authors, it is expedient to include the following as promising sectoral directions for the development of the region's foreign economic activity:

1. Metallurgical complex.
2. Agro-industrial complex.
3. Mechanical engineering.
4. Transport complex, primarily international transit services across the region.
5. Tourism sector.
6. Education and science.
7. Atomic complex.
8. The field of information technology and telecommunications, including software development services and mobile radio services.

Let's consider these directions in more detail.

The metallurgical complex of the region provides more than 12% of Russia's non-resource exports and is capable of providing 11% of its growth. The largest part of exports is related to steel in the form of semi-finished products and rolled products. A significant part is accounted for by aluminum, copper, nickel, ferrous metal products and steel pipes. Titanium, ferroalloys, products of direct reduction of iron ore, small and rare metals are promising in terms of increasing exports. The export structure consists of:

- ferrous metals (and products from them) - more than 80% of the export of metals;
- non-ferrous metals (and products made from them) - about 20% of metal exports;
- copper (and products made from it) - about 87% of the export of non-ferrous metals;
- nickel (and products from it) - about 8% of the export of non-ferrous metals.

The foregoing allows us to assert that the metallurgical complex is one of the priority directions of the region's foreign economic activity.

The agro-industrial complex of the region provides about 8% of Russia's non-primary exports, and the greatest potential for its increase is associated, according to the authors, with fertilizers and grain. It is significant for fish and seafood, vegetable oils and feed. In addition, meat, confectionery, alcoholic beverages, tobacco products, fruits and vegetables, sugar, flour, agricultural machinery and agrochemicals have a significant export potential to the markets of neighboring countries. The agro-industrial complex of the region provides for the export of vegetable processing products, fat-and-oil and flour-and-cereal products, flour and confectionery products, cereals, meat and meat offal, as well as dairy products. At present, supplies of food products and raw materials for their production account for just over 2.5% of regional exports. It can be argued that the level of development of the agro-industrial complex, the quality and competitiveness of products, as well as production volumes allow us to consider this direction as promising for the development of the region's exports.

Mechanical engineering is one of the priority industries for the region. Machine-building enterprises produce over 12% of the region's industrial products, including:

- machinery and equipment - mechanical, rolling, blast furnace and steel-making equipment, cranes, loaders, machine tools, tractors, bulldozers, road machinery, agricultural machinery and equipment;
- vehicles and equipment - cars, car trailers and semi-trailers, locomotives, tram cars, etc.

The transport complex of the region has a great export potential. Possessing a geographically advantageous location, the Chelyabinsk Region demonstrates significant opportunities in the provision of transit services, which, according to the authors, will increase with the development of transit transport infrastructure and the organization of transport corridors: high-speed railways and highways.

Tourism is one of the points of growth of the foreign economic activity of the regional economy, which may become system-forming in the future. This is due to the following reasons:

- rich recreational resources of the western part of the region: a large number of lakes and national parks;
- numerous historical monuments presented by the Arkaim Museum-Reserve, unique monuments of ancient metallurgical production, etc.;
- developed tourist infrastructure, which is actively developing and reconstructing in recent years.

Educational and research services currently provide small volumes of export, but are important for attracting personnel to the region and creating an environment for the development of business cooperation with foreign countries. According to the authors, the export of education should be understood as attracting foreign students, increasing foreign students of online courses and foreign schoolchildren receiving additional education in the region. The Chelyabinsk Region belongs to the developed industrial regions of the country and has rich scientific and educational resources.

The significant export potential of the region is associated with the nuclear complex and, first of all, with services for decommissioning nuclear power plants, processing spent nuclear fuel, and supplies of nuclear fuel and isotopes. The largest increase in exports can be expected, according to the authors, to Southeast Asia, Eastern Europe, the Middle East and North Africa.

The region is home to the centers of the nuclear industry. The accumulated experience and unique competencies allow us to consider international cooperation in the atomic sphere as one of the promising directions for the development of foreign economic activity. The competitiveness of the nuclear complex is due to the developed scientific, technical and production base, the expansion of state investments in this area and the modernization of the fixed assets of science-intensive industries.

Another point of growth of the region's foreign economic activity is the IT and telecommunications sector, including software development and mobile radio communication services. At the same time, the development of this area requires government support due to the high capital intensity and long-term payback of projects. The key tools in this area are the development of a network of technoparks, innovation and technology centers, the formation of a system of state support for start-up innovative IT companies and the development of institutions for the protection of intellectual property.

Thus, it is advisable to group the promising directions of development of the region's foreign economic activity in the following areas:

- development of international relations and strengthening of the region's image in the world market;
- international promotion of products of regional enterprises;
- increasing the investment attractiveness of the region, raising capital and setting up joint ventures.

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Human Resource Management in The Field of Competence-Based Education

Elena SEMYONOVA
Orel State University named after I.S. Turgenev, Russian Federation
e-mail: EM_Semenova@mail.ru

Irina TRUBINA
Orel State University named after I.S. Turgenev, Russian Federation
e-mail: i-j-i@yandex.ru

Olga RUDAKOVA
Orel State Institute of Culture, Russian Federation
e-mail: rudakova71@yandex.ru

Alexander TRUBIN
Orel State University named after I.S. Turgenev, Russian Federation
e-mail: niburt@yandex.ru

Lyudmila KUZNETSOVA
Orel State University of Economics and Trade, Russian Federation
e-mail: gambeeva-1969@mail.ru

Abstract

The article is devoted to the study of human resource management in the field of education based on the competence approach. The purpose of the research is to identify modern problems of teaching staff management, as well as to identify the composition of the teacher's competencies that determine the success of his professional activity. The authors present the structure of the human resource management system in the field of education. The specificity of the competence approach in education as an instrument for solving life problems based on the development of various competencies is revealed. The article gives the analysis of approaches to the definition of "competence" and "competency" from the perspective of domestic and foreign researchers. On this basis, the author's definition for the concept «competence"is formulated. The main problems that arise in the process of managing human resources in education are identified, as well as the main requirements to compose the professional competence of a modern teacher. The model of teacher's professional competence has been developed. It is proposed to use individually differentiated educational routes as a way to improve the professional competence of a teacher.

Keywords: Human Resource, Education, Competence Approach, Management.

Introduction

The progressive development of modern society is accompanied by the formation of new economic relations based on horizontal and vertical links between economic entities. Under such conditions, a large role is assigned to the qualitative characteristics of knowledge, skills, abilities, and other parameters that are combined in the category of "human resources".

In the post-industrial economy, the leading force is the knowledge base, which is formed in the field of education based on the competence approach. Thus, an important characteristic of human resources is professional competence as a set of competencies developed by each specialist.

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Literature Review

Research in the field of human resource management based on the competence approach in the field of education is of considerable interest to both domestic and foreign scientists. The expediency of using the competence approach and the close relationship between the concepts of "competence" and" competency" are evidenced by the works of V.L. Akapyev, M.A. Akopyan, A.P. Akimova, V.N. Vvedensky, V.R. Vesnin, V.I. Volynkin, B.S. Gershunsky, V.Yu. Krichevsky, A.K. Markova, D.J. Raven, D.S. Savelyev, M.A. Choshanov, O.V. Yadryshnikova, and others. Analyzing the works of Russian scientists, we can note a steady tendency for the analyzed concepts to be understood differently in content, although some scientists, such as N.D. Nikandrov, V.S. Lednev, M.V. Ryzhakov, N.D. Galskova, Z.I. Klychnikova, E.N. Solovova, and others, identify these concepts. The works of G.E. Belitskaya, L.I. Berestova, E.V. Bondarevskaya, A.S. Guseva, O.I. Denisov, A.A. Derkach, I.N. Drozdov, S.A. Druzhilov, I.V. Elshina, N.N. Yershov, T.V. Krotova, N.N. Lobanova, V.N. Makarova, V.N. Markin, V.G. Pervutinsky, A.P. Sitnikov, V.D. Shadrikov, E.N. Yurina and others are devoted to the essence of the competence approach in education.

In the context of the categorical apparatus for the competence approach, it is necessary to dwell in more detail on the definition of the concept "competence" by a number of Russian scientists. Revealing the essence of professional competence, V.N. Vvedensky (2004) notes that this category cannot be reduced to a set of knowledge, skills and abilities. Its conceptual characteristic is "effective application of the individual capabilitiescomplex in solving professional problems". According to A.M. Aronov (2010), the criterion for the effectiveness of competence formation is the ability and readiness of an individual to be engaged in specific activities. Researchers V.S. Bezrukova, S.M. Vishnyakova, and V. Shepel emphasize the professional component of competence and focus on its operational activity and cognitive components (Kostrova, 2011). Nechaev's approach is based on the understanding of competence as an individual's possession of special professionally significant knowledge, understanding the specifics of labor activity in the relationship of its phenomena and processes, and possession of ways and means to achieve the intended goals (Nechaev and Reznitskaya, 2014). A.K. Markova notes the individuality of competence, which is expressed in the compliance degree of the individual with the requirements of the profession, in his ability to act independently and responsibly performing his work functions. Competence, as defined by M.P. Lapchik, is a formed stock of knowledge, skills and methods of activity set in relation to a specific range of subjects and processes that are necessary for high-quality productive activity. The personal component of competence is mentioned in the works of N.V. Kuzmina, where the author emphasizes the ability of an individual to form personal qualities in the process of mastering his specialty (Kuzmina and Rean, 1993).

Research Question

Drawing attention to the quality side of human resources allows a deeper study of professional competence, taking into account global trends. Among them are the following ones:

- changing demographic situation, when population growth in some countries is accompanied by a shortage of human resources in other countries;
- overflow of human resources between countries can lead to 2050, growth in developing economies of the E7 (China, India, Brazil, Russia, Indonesia, Mexico, Turkey) more than 6 times the level of global competition;
- accelerating urban growth, which will improve the quality of life and enrich human resources;
- climate change and resource scarcity, which is an increasingly significant threat to the economy;
- a breakthrough in the field of technology, which requires the development of new competencies by employees.

Assessing the impact of all these trends, we note that Russian and international companies have different assessments of their influence on human resource quality management. While they agree that demographic problems are dominant, they grade the other components differently (figure 1).

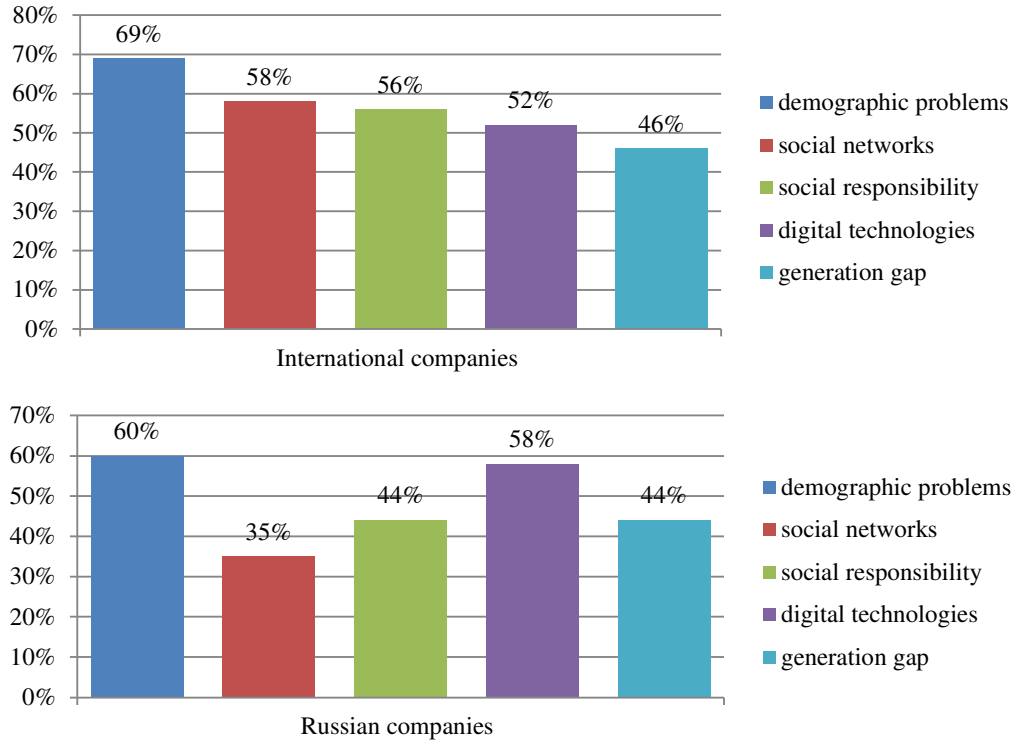

Figure 1- The impact of the driving economic forces on the quality of human resources from the perspective of Russian and international companies (PwC, 2014)

These trends affect changes in the requirements for both professional competence and understanding of its composition. Research by PricewaterhouseCoopers LLP has shown that it is necessary to use the available human resources more effectively for the progressive development of the economy. Creativity was recognized as the most significant quality of human resources that will contribute to the stabilization of the world economy. The presence of creative elements is the result of scientific and technological progress in society. This quality of human resources leads to the formation of a creative employee who is able to generate new ideas. For example, P. Florida considers human creativity to be the most important driving force of the new economy (Florida, 2007). Creativity is mainly expressed in the employee's ability to create images of future products, which makes it a necessary component of an innovative economy.

Under such conditions, the effectiveness of human resource development is determined by the existing management system. According to Professor B.V. Salikhov, it is a process of purposeful impact on the integrity and interrelated unity of the object, process, project and environment subsystems that determine the direction and content of human capital development (Salikhov, 2008). Figure 2 shows the proposed scheme to organize the human resource management system in the field of education.

The development of human resources takes place through the development of key competencies in the process of continuing education and professional development. According to UNESCO, the traditional content of the concept "qualification" is giving way to the concept "competence" in many areas of human life. In this context, J. Raven indicates evolutionary competence and adaptability (Raven, 2002).

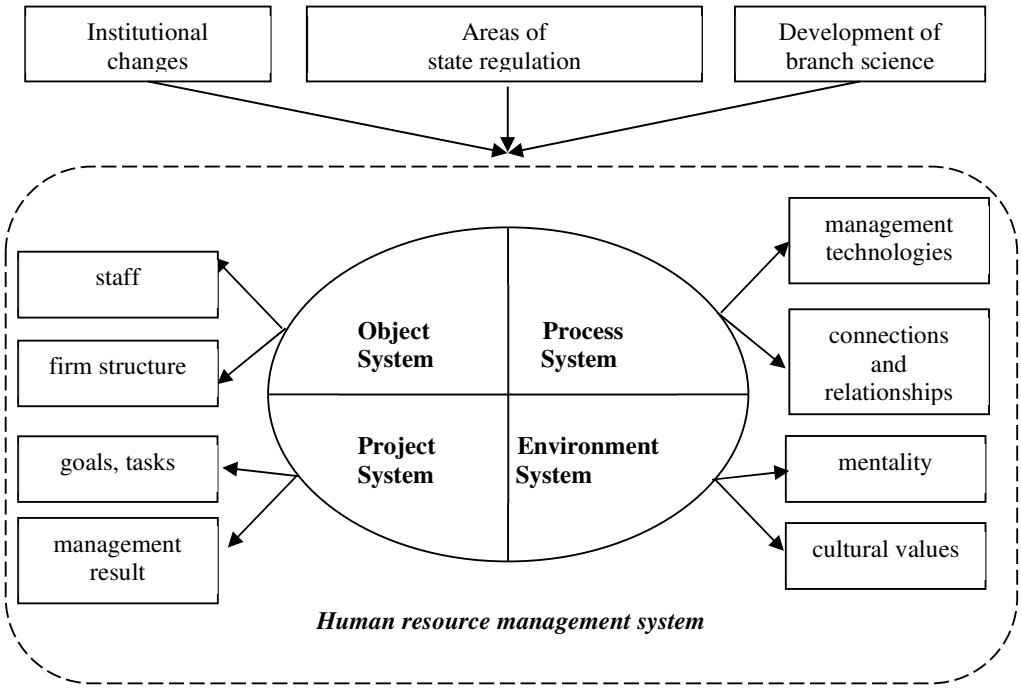

Figure 2- Human resource management system in the field of education

The transition from the accumulation of knowledge and skills to the formation of professional competencies has occurred relatively recently. With the introduction of the third-generation FSES in the field of education, there has been an essential change in approaches to education. Training of specialists has become competently oriented. The competence approach accumulates general principles for all levels of the education system in determining:

- educational goals;
- content of educational programs and modules;
- ways to organize the educational process;
- evaluation of the educational processresults.

The purpose of the educational process from the position of this approach is to form and develop the ability of students to solve various problems based on their own experience. The content of education is an adapted social experience of solving life problems (cognitive, ideological, moral, political, etc.). In the process of organizing educational activities, conditions are created that contribute to the formation of students' ability to solve such life problemsindependently. Evaluation of the educational process results is to determine the education level of the student at each stage of training.

This approach is based on the understanding of competence and competency as an integral social, personal and behavioral phenomenon, as a result of the educational process. At the same time, the definition of this approach does not have unambiguous characteristics, although in the most general form, the positions of many researchers coincide.

The competence approach is humanitarian in its core, since it is directly related to the idea of comprehensive training and education of an individual not only as a specialist, professional in this or that sphere, but also as a person and a member of the team and society. After all, the goal of humanitarian education is to form humanistic values, personal worldview of a person, develop his horizons, ability to make individual creative decisions, and self-study, and not just to transfer and interpret the system of knowledge about the world, as in pragmatic training. All this reflects the specifics of the competence approach (Makarova (ed), 2013).

In general, the competence approach in education is reduced to getting students experience in solving life problems based on the development of various kinds of competencies. It is based on such basic concepts as "competence"and "competency". There is no consensus on the relationship between these concepts in the scientific world, although active work is underway to identify the essence and content for each of them. Currently, according to I. A. Zimnaya, there are two possible ways to interpret the relationship between these concepts: "they are either identified or differentiated" (Leskina, 2012). At the same time, the collective monograph edited by Professor V.N. Makarova identifies 10 approaches to solving the problem of the relationship between the concepts of "competence" and "competency" (Makarova (ed), 2013), which reflects the views of many Russian and foreign researchers. An analysis of the works of Russian scientists to understand the concepts of "competence" and "competency" is given in table 1.

Table 1-Approaches to defining the concepts of "competence" and "competency"

Author	Content of the concept	
	competency	competence
V.I. Dal	did not examine	full rights
S.I. Ozhegov N.Yu. Shvedova	range of issues which someone is well aware of	possession of knowledge, awareness, authority in some sphere
A.S. Melnichuk E.V. Selezneva	competence is considered as a set of competencies	
A.V. Khutorskoy	given social requirement (norm) to the educational preparation	possession of the relevant competency, including the personal attitude to it and the subject of activity
I.A. Zimnaya	internal, potential, hidden psychological neoplasms (knowledge, ideas, programs (algorithms))	actual, active manifestations
A.K. Markova	objective characteristics (scope of duties and rights of a responsible person)	subjective characteristics of social, personal, spiritual, professional qualities as an integrative characteristic of a person
V.I. Zagvyazinskiy	generalized methods of actions that ensure the productive performance of professional and other activities in a particular sphere	internal psychological neoplasms of the individual: systems of values and relationships, knowledge, experience, ideas, programs (algorithms) of activity, creative abilities that allow to implement competencies
A.G. Bermus	a set of interrelated personality traits given in relation to a certain range of objects and processes	possession of the relevant competency, including the personal attitude to it and the subject of activity
G.K. Selevko	the result expressed in the graduate readiness for the real possession of methods and means of activity	an integral quality of the individual that manifests itself in the general ability and readiness for activities based on knowledge and experience
A.I. Surygin	the content of the relevant competence in the form of a system of knowledge, skills, experience and the degree of satisfactory mastery of certain norms of communication, behavior as a result of learning	the ability of the individual to perform any activity or actions, the ability to establish and maintain the necessary contacts between people
T.Yu. Bazarov	requirements for successful performance, formulated in terms of the integral qualities of a collective or individual subject	the set of personal characteristics, including abilities, motives and goals that a specialist should have within a given range of competencies required for a particular job.

In the research of foreign scientists, the concept of "competency" is rarely used. We can talk about the predominant use of the concept "competence" to denote the ability or readiness of an individual to mobilize individual resources (as a set of knowledge, skills and mental qualities of the individual) necessary to perform tasks at a high level in accordance with a specific life situation. Thus, in the Glossary of terms of the European Education Foundation, the following definition of the concept of "competence" is given (Lakhova, 2020):

- it is an ability to do something well or effectively;
- it is a compliance with the requirements for employment;
- it is an ability to perform specific labor functions.

In European society, the concept of "key competences" is quite widespread, which are universal skills and abilities of an individual, thanks to which they are able to consciously make decisions and achieve final results in a certain area of their activity (Spravochnick, 2020). The European Commission's recommendations on key competences for lifelong learning, developed in 2018, contain eight key personal competences that meet the needs of European society for sustainable economic growth, social cohesion and the development of a democratic culture. Key competences are developed from early childhood throughout life through formal, non-formal and informal education. Key competences, according to the recommendations of the European Commission, are (European Commission, 2020):

- literacy competence;
- language competence;
- mathematical competence, as well as competence in the field of science, technology, engineering;
- digital competence;
- personal, social and learning competence;
- civil competence;
- entrepreneurship competence;
- cultural awareness and expression competence.

The main idea of the competence approach is that each individual should independently, based on their life experience and accumulated knowledge, organize them, develop their own ways of obtaining new knowledge, methods for solving emerging problems, and adapt to changing conditions of social life. Professional competence includes the following components:

- operational and technological (cognitive);
- social;
- motivational and value-based;
- emotional;
- activity.

The level of a personal competence finds real expression in his personal achievements in specific areas of life. Thus, competence can be defined as an integral characteristic of an individual's personality. The constituent elements of competence in different conditions will be a different set of competencies that an individual has. The main link of any competence is a specific action.

Modern research suggests that there are many types of competence. The application of each specific set of them on the whole will be determined by the nature of the individual's professional activity. However, despite this, it is necessary to distinguish a number of components that are "universal" and mandatory for each profession in the field of education (Figure 3).

PROFESSIONAL COMPETENCE

Emotional and volitional component	personal attitude of the specialist to the problem, his feelings, emotions, priorities, his ability to adequate self-esteem, self-regulation of behavior
Motivational and value componen	the readiness of a specialist to carry out professional activities independently that are not strictly set from the outside (subjective side) and the presence of alternatives for solving problem situations (objective side)
Cognitive component	cognitive abilities of specialists: the ability to perceive educational and informational material and the presence of a certain "baggage" of knowledge (intellectual involvement, interest in science, openness to the acquisition of new knowledge, professional knowledge, skills)
Communication component	features of a specialist interaction with the social environment under conditions of personal freedom (ability to build a dialogue; construction of potential social requests based on the existing database of situations)
Creative and activity component	applying a creative approach to work, thereby forming the ability to choose a set of methods and technologies of work consciously (designing prospects for development and results of professional activity; creative independence in solving professional problems; "correct" problem statement, the ability to anticipate the occurrence of a problem situation and build a system of preventive measures on this basis)

Figure 3 - Components of professional competence (Baryshnikova, 2012)

Among the trends in the development of modern education, we note the following:

- introduction of Federal state educational standards of a new generation;
- implementation of inclusive education;
- development of regional systems for assessing the quality of education, etc.
- complication of teachers' professional activities, accompanied by high intellectual and emotional stress, as well as overcoming professional difficulties.

At the same time, the implementation of educational activities is accompanied with an update of the organizational and methodological support of the teacher's activity, since all innovations in the field of education affect the performance of their professional tasks. It is the teacher, in the final analysis, who is the executor of all innovations in the field of education. According to the practice, to implement a given pace of updating the educational process, a teacher must have an appropriate set of professional competences, which is not always observed.

In this regard, the problem of improving the professional competence of a teacher has become particularly relevant. It is important not to contrast the need for regular improvement of professional competence with the processes of creative self-development, activation and stimulation of teacher's self-education in everyday activities. While improving their competences in the course of education and self-education, a teacher should still be guided by the standards and norms accepted in society, and strive to master relevant and innovative professional competences. After all, it is the combination of competence and qualification that ultimately determines the vector of personal and professional development of a teacher. In its turn, it is possible to form and develop professional competence only if the teacher has a certain level of accumulated knowledge, skills, personal and professional qualities and attitudes.

Current regulatory documents (for example, the Federal Law "on education in the Russian Federation", Federal state educational standards, professional standards) regulate professional competences a modern teacher needs to develop. However, they do not answer the question "How should a specific teacher improve his level of professional competence?". This contradiction is the main problem of human resource management in education. The regulatory documents clearly specify which competences need to be developed, but the way of its achievement is not defined in any of the regulatory documents. Under such circumstances, it is necessary to develop and formulate methods for improving the professional competence of teachers.

Each teacher has the right to choose his own way of development, his own individual educational route. But very often it becomes another problem of human resource management in education. Due to the large professional employment and document load, it is easier for a modern teacher to follow the do-path, when instructions are offered, according to which he can achieve a certain goal, which is expressed in increasing the level of professional competence.

Modern Federal state educational standards set requirements for the level of qualification of employees in an educational organization: for each position held, he/she must meet the requirements specified in the qualification reference books and/or professional standards. In addition, these standards establish the need for continuous professional development through the system of additional education in the profile of pedagogical activity at least once every three years.

The synthesis of modern developments in the research on the content of teachers' professional competence and the provisions of regulatory documents allowed us to determine the main requirements for the components of educational workers' professional competence:

- pedagogical competence in the field of design and implementation of the educational process in educational organizations;
- pedagogical competence in the design and implementation of basic educational programs and their components.

On the basis of general requirements to the content of a teacher's professional activity, four directions of professional activity are identified:
- general pedagogical (training) activities;
- educational activities;
- development activities;
- pedagogical activities for the implementation of programs at all levels of education.

In our view, pedagogical competence is a complex symbiosis of social experience, theoretical knowledge, practical skills, and personal qualities. All of them makes it possible to perform pedagogical functions in accordance with the standards and norms of the educational process organization accepted in the society.

It can be argued that the educational process and professional competence of the teacher are inextricably linked. They have a direct effect on each other. As a result, the structural components of pedagogical competence should coincide with the components of pedagogical activity. Therefore, the structural and content model of a teacher's professional competence acts as a unity of his theoretical and practical readiness for action in the course of the educational process.

Based on the analysis of regulatory documents and previously created models of professional competence, we have compiled a general structural and content model that serves as the basis for further design of professional development programs. It is shown schematically in figure 4.

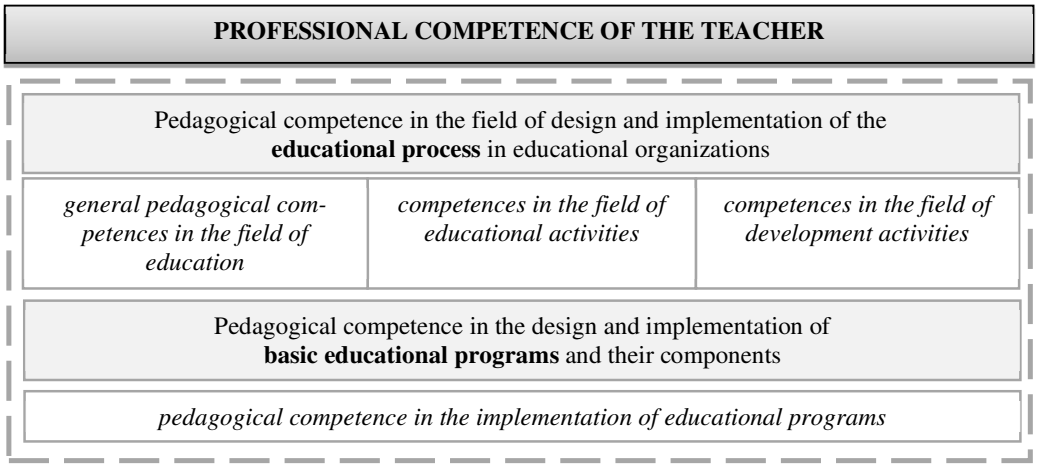

Figure 4 - Model of a teacher's professional competence

Thus, the starting point of building a theoretical model of a teacher's professional competence was the analysis of professional activities that this teacher should be well prepared to perform. The solution of problems in the field of human resource management in the field of education is possible through the system of additional professional education. To determine the areas of teachers' professional development it is necessary to identify individual and typical difficulties in their professional activities and, on this basis, develop an individual-differentiated educational route. It is an educational program that allows each teacher to choose areas of professional development, presented in the form of educational modules. This makes it possible to take into account requests from the education sector.

Individual blocks of an individually differentiated route are:

- professional development in the system of additional professional education;
- activities in the professional community;
- participation in methodological work;
- self-education and self-development.

The value of individually differentiated routes is that they are based on the reflectionprinciple and are accompanied by a constant adjustment to the content of educational modules. This approach to improve the teachers' professional competence allows not only to realize creative potential, but also to develop value orientations, develop individual technologies of pedagogical activity. In conclusion, we note that the composition of the competences mastered by teachers will determine the effectiveness of the Russian education sector and its competitiveness in the world market of educational services.

Discussion and Results

The success for achieving the goals of educational activity and its organizational and methodological support is largely determined by the level of teachers' professional competence as the main performers of the requirements by regulatory legal acts in the field of education.

Accumulating within an educational institution, human resources must be subordinated to a certain system that requires timely and clear management. We propose a block diagram of human resource management consisting of four subsystems-object, process, environment, and project. Building such a system requires careful work to determine the composition of teachers' competences that will improve the effectiveness of their activities.

The analysis of scientific works allowed us to state that the concept of "competence"is broader and more capacious than the concept of "competency": the first one "absorbs" the second one, which, in its turn, is the content of the educational process and forms the competence of the student. Competence is the final result of the education process, which is expressed in the student mastering skills of activity in various life situations.

Nowadays, not only employers, but also the academic community and the public are involved in forming the list of competences necessary for teachers to master. In turn, the development of a certain competenceset becomes the main goal and result for the success of the learning process. At the same time, the quality of the educational process is determined by the student's ability to apply the received information making decisions in standard and changing conditions.

Specialists and researchers in the field of management are trying to analyze comprehensivelythe problem of professional competence in the field of education. Their attention is drawn not only to the process of professional training, but also to the personal factors that determine the individual components ofteachers' professional competence.

Analysis of foreign and Russian sources has shown that at present a single semantic field for the emerging concept of professional competence has been developed. In general, we note that professional competence:

- refers to the personality of its bearer;
- it is not limited only to knowledge, skills and abilities, although it is manifested in them;
- it can develop and, accordingly, be diagnosed in the course of specially organized educational activities that imitate professional activity.

Having studied the existing theoretical and practical base, we can conclude that professional competence is understood as a combination of a teacher's professional competences, forming its level at a specific time. In turn, professional competence is a requirement for the teachers' educational training, which allows them to perform their labor functions effectively.

Individual elements of a teacher's professional competence can be found in various areas of their professional activity, such as:

- training;
- conflict prevention and resolution;
- communication;
- realization of action;
- analysis of problems;
- professional development.

A teacher having these competences conducts pedagogical researcheffectively and is able to build a program of his own professional development, identify difficulties that hinder this development, and learns constantlyby himself. Improving pedagogical competence is designed not only to help teachers overcome emerging professional difficulties. Its main goal is to form the professional readiness of teachers to implement Federal state educational standards in the educational process.

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Natural Language and Gettering of Information

Aleksandra KUZIOR
Silesian University of Technology - Faculty of Organization and Management (Department of Applied Social Sciences), Zabrze, Poland, Aleksandra.Kuzior@polsl.pl

Katarzyna POSTRZEDNIK-LOTKO
Silesian University of Technology - Faculty of Organization and Management (Department of Applied Social Sciences), Zabrze, Poland, Katarzyna.Postrzednik-Lotko@polsl.pl

Abstract

The purpose of this article is to present the issues related to obtaining the information from available databases, to provide a definition of natural language (NL) and to identify the main tasks and challenges of NL processing (NLP), based on the available literature of artificial intelligence (AI). The following part of the article presents a short history of NLP, also points to existing basic methods by NL generation (NLG) systems and problems of the NL understanding system. Then, the methods of visualization and data mining techniques were indicated, and the summary gave the areas of application (including machine translation).

Keywords: Natural Language, Artificial Intelligence, Cognitive Science, Data Mining

Introduction

Artificial intelligence it is no longer science fiction for us. It is present every day and everywhere - starting from applications such as marking photos on FB or converting speech to text, machine translation through online fraud detection, to breakthrough solutions in medicine, such as predicting injuries or the most modern autonomous cars.

More and more common data storage in the so-called "Cloud", decreasing costs of data processing and ubiquitous access to the Internet - this causes the generation of millions of terabytes of data every day, possibility of analyzing and drawing conclusions, creates opportunities for development. Cognitive technologies play a huge role as tools helping to extract information on the basis of analysis with the use of algorithms.

Cognitive systems (CS) make it possible to organize and manage this huge amount of information/data. These systems can be programmed for the so-called "Independent learning and prediction" which information may be of interest to a recipient.

CS include following data processing methods: data analysis, NL processing, machine learning. One of the main tasks of cognitive software is to support interpersonal communication and decision-making processes by ensuring greater accuracy and speed. By processing data from various sources and reports, CS support decision-making in management[1], support process management through "Workflow".
The most dynamically developing machine learning techniques, used in business, shows that AI has settled in our lives for good.

Machine learning (ML), including one of its varieties - deep learning is a key method of extending the area of artificial intelligence applications. ML is creating such programs that make inference, planning, prediction, and remembering based on algorithms managing series of big data, so the system is able to make the most optimal/rational decision.

It should be remembered that the role of man does not remain eliminated, he should supervise the course of the process and prevent it in non-standard situations.

The use of CS is basis of the Industry 4.0, which involves introducing innovation[2] by creating of a new product first in virtual reality, then in the real world, so it can be modeled, configured, tested and checked in accordance with the customer needs. It is possible to produce products in single quantities while remaining cost effective. It is not possible

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without the use of integrated IT systems. Advanced cognitive technologies can process them. For data management is needed an infrastructure that mimics the operation of human brain, artificial neural networks (ANN).

Research on ANN began in neurophysiological and biocybernetic research. The first DNA model of a neuron was officially made by Warren McCulloch and Walter H. Pitts (1943). This description inspired later research into ANN.

Currently, ANNs are used in cognitive science to recognize images, patterns, sounds, speech, writing, data processing, forecasting and modeling various phenomena and processes. The universality of ANN allows to be effectively used in management, economy, finance, technology, medicine, geology, mathematics and computer science.

ANN are defined as combinations of elements called artificial neurons that make up at least three layers: input, hidden and output, with multiple hidden layers.

An important feature of the ANN model is its ability to learn and to generalize the acquired knowledge. Two basic types of learning can be distinguished:
- supervised learning ("teacher learning") consists of comparing the network output signal with the known correct answers. In this case, the human presents the correct answers and the ANN creates the structure of the neurons;
- unsupervised learning ("teacherless learning"): the network has to create its own categories based on dependencies in its input data in order to recognize the input signals.

"Training" of the ANN is a key element of its functioning. An excessively trained network may generalize the results too much, which means that its operation will be similar to classical algorithms. However an insufficiently trained network will make too many mistakes, making its usefulness negligible.[3]

Definition of NL

NL is understood in two ways. First, the concept of NL is used as a term to describe a language developed through the historical development of ethnic, national groups, as opposed to artificial languages.[4] Second, it is the language people use to communicate interpersonal, and the term is used in mathematical and technical disciplines, unlike formal languages (programming languages).[5]

NLP is an interdisciplinary field that combines the issues of artificial intelligence and linguistics. It deals with the automation of analysis, understanding, translation and NLG by the computer. NLP consists in transforming the information stored in a database into a language that is easy to read and understand by a human. In turn, a system that understands NL transforms it into formal symbols that are easier for computer programs to process.

NLP problems relate to language generation and comprehension. The morphological model of a sentence that a computer should build is necessary for the sentence to be understandable and grammatically correct. NLP overlaps with the field of computational linguistics and is considered a sub-division of AI. On the other hand, the term NL is used to distinguish human languages (English, German, Polish) from the formal language (computer language: C ++, Java et al.). While NL analysis (NLA) can deal with text and pronunciation, work on speech synthesis has developed as a separate section.

History of NLP

The history of computer understanding of text goes back to H. P. Luhn and concerns the automatic creation of literature summaries by IBM.[6]

Next, a project called 'Parseval / GEIG' compared the grammars of different languages with a phrase structure.[7] However, in the next project, "Tipster", series focused on tasks such as summarizing, translating and searching.[8] In 1994, the German markers were compared in the "Morpholympics" project in Germany. Then, the Senseval and Romanseval campaigns aimed at semantic clarification of meanings. In 1996, Sparkle's evaluation compared parsers in four languages (English, German, French, Italian).

A year later in France, the Grace project compared collections of 21 tags for the French language.[9] In 2004, during the project "Technolangue / Easy" 13 French parsers were compared.

Large-scale evaluation of dependent parsers took place in 2006 and 2007 on the occasion of joint assignments at the Conference on Computational Natural Language Learning. In 2007, an campaign was launched in Italy to compare

different tools for an Italian website of the same name. In France, during the ANR-Passage project (at the end of 2007), 10 French parsers were compared on the website (http://atoll.inria.fr/passage/)[11].

Depending on the assessment procedures, there are types of NLP assessment: internal/external; automatic/manual; assessment based on the principle of black box and glass box.

Internal evaluation examines a single NLP system and determines its performance based on standard scores which are predefined by the evaluators. External evaluation (in-use evaluation) examines the NLP system with complex settings, either as built-in or to perform functions for the user. External performance of the system is determined based on usability, taking into account the overall task assigned by the complex system/user.

Considering a parser that is based on the results of new part-of-speech tags, on internal evaluation, the part-of-speech tag is triggered with respect to the data and compares the system data obtained by the tag to the standard data. During external evaluation, the analyzer is started with a different part-of-speech tag, then a new tag, and then the accuracy of the analysis must be compared.

Automated procedures can be defined to evaluate the NLP system by comparing the results to a standard. The costs associated with the development of the standard itself can be quite high, the automatic evaluation can be repeated as often as needed without significant additional costs (with the same input). For many problems with NLP, setting a standard is a difficult task and may not be feasible when internal tag agreement is insufficient. Thus, manual assessment is performed by assessors responsible for the quality of system or the quality of the results generated by the system based on the criteria. The assessors may be regarded as a source of information on many tasks related to linguistic analysis due to their linguistic competence, there may also be discrepancies among their assessments. This is why automatic evaluation is considered an objective evaluation as people tend to be subjective.

Black box assessment involves running a NLP system on a database and measuring parameters related to the quality of the process: speed, reliability, resource use, quality of the result (accuracy of data determination, translation fidelity). Glass-based assessment involves checking the system design, introduced algorithms, used language resources (word count, etc.). Given the complexity of NLP-related problems, it is difficult to predict the performance of a system on the glass-based assessment box. This type of assessment provides information regarding the analysis of errors or the future direction of the system.

Existing basic methods in NLG

Since 2009, companies have been founded to build systems that transform data into narrative using NLG and AI techniques. These include Arria NLG, Automated Insights, Narrative Science, Wordsmith and Yseop, which are discussed in the article "Natural Language Generation in Artificial Intelligence" by Ilyas Khan.[12] The process of generating text through a sophisticated NLG system needs planning and information steps to enable the generation of text that looks natural and does not become repetitive. Common steps in generating a NL by NLG systems: from historical data; data comparison and making choices; content definition (deciding what information to include in the text); text structuring (organization of the information provided); aggregation (combining a sentence to improve legibility and naturalness); lexical choice (appropriate words and concepts); generating referencing phrases (making decisions about pronouns and other anaphora languages); execution (creating a new text that should be correct according to the syntax, morphology and spelling).

Tasks and challenges of NLP

NLA is way of "communicating with the computer". Initially, the world of scientists was overwhelmed with enthusiasm due to the work on simple word juxtapositions and in terms of limited language. However, enthusiasm quickly faded as the system collided with real situations, complexity and ambiguity of words or phrases.

The definition of understanding is a problem in NLA. Recognition of a NL requires a broad knowledge of the world and the ability to transform it. For this reason, understanding NL is called the AI-complete problem, which is that in order to understand the human world and language, AI should perceive it in the same way as humans.

In most spoken languages, sounds are presented as consecutive and juxtaposed letters. Converting an analog signal to symbols is a complicated process. In natural speech, there are few gaps between consecutive words. Where a break occurs depends on semantics and grammar of language, and context of a sentence.

Some languages (Japanese, Chinese, Thai) do not have word boundaries in the written language. Each syntactic analysis requires the marking of boundaries, which is a complicated challenge.

Many words have more than one meaning. In such situations is needed to choose the word or phrase that best fits the context.

The grammar of NL is ambiguous. There are many possibilities to parse a sentence. Choosing the best option requires information about the context, or semantics (meaning).

An obstacle may be a foreign/regional accent, a speech defect, errors in the text: typos and incorrect grammar, optical character recognition (OCR).

The interlocutor may perceive a sentence as stimulus for a reaction. The sentence structure may not contain information to identify this reaction. A question may be the sender's request for action by the recipient. This answer can be expressed verbally and through facial expressions or as mixture of both.
Question "Can you give me your name?" requires an answer (name). Instead, the question: "Can you pass me the flour?" it is a request for physical activity. The answer "Yes, I can" without the accompanying activity is not appropriate (although the answer "No" or "No, because it is finished" fully explains the lack of any activity).

When we consider longer sentences within the grammar of a NL, it turns out that most of them will not be unambiguous and will be able to be analyzed in many ways. To overcome such problems, statistical analysis of NL uses stochastic, probability and statistical methods. In such situations, use is made of language corpora (sets of texts for linguistic research: determining the frequency of occurrence of word forms, syntactic constructions, contexts in which words appear), or Markov chains (sequences of events in which the probability of an event depends on the outcome of the previous event)[13].

NLP uses available means to automate linguistic analysis, including probability models (n-gram model[14]), information theories and linear algebra. This technology is derived from machine learning and data analysis, which are branches of AI.

Programs supporting NLP, working with texts, information collections:

Anaphora Resolution (finds what an anaphora refers to in the text);
Automatic summarization (summarizes the text containing the most important information);
Foreign language reading aid (helps in reading foreign language);
Foreign language writing aid (supports writing in foreign language);
Information Extraction (IE) (analyzes unstructured text in order to extract information, facts from documents and the user analyzes them);
Information Retrieval (IR) (collects/retrieves information)[15];
Named Entity Recognition (NER) (is part of IE, it indicates which words in the text are proper names; in some languages not only proper names are written in capital letters, but also all nouns, such as in German);
Natural language generation (NLG) (translates data from computer language into NL);
Natural language understanding (deals with the understanding of NL by computer);
OCR (software for recognizing graphic characters from scanned text);
Question answering (answers questions using NL: questions with one answer, such as "What city is the capital of Poland?" or with many such as "What is the meaning of life?");
Speech recognition (can save the text of a conversation from an audio file, it is the inverse of text-to-speech processing, the inverse of speech synthesis, an operation consisting in processing text into speech);
Spoken dialogue system (recognizes speech and has a speech synthesis module);
Text simplification (software that simplifies grammar and structure of the text).

We should mention various types of computer translators-programs that automatically (machine) translate text from one language to another, as well as commonly used software that corrects the text, that is, marks errors in written text.

Problems of the NL understanding system

It is impossible to transcribe a spoken language completely without human intervention. This takes place, during the preparation of transcripts of conversations, discussions, when, people speak simultaneously. In such situations, programs "get lost" and are not able to reflect the meaning of the dialogue. Of course, people who deal with this type

of translation use the software, but they have to correct the written text to convey the meaning for example, when translating conversations shared on YouTube channels.

Sentences like "They gave the animals fruit because they were hungry" and "They gave the animals fruit because they were old" have the same grammatical structure. The verb "were" is used in first sentence to refer to animals and the other to fruit. Without knowledge of a situation, it is impossible to say in which case the verb "were" refers to which noun. Such a string of words can be interpreted differently.

The known English phrase "Time flies like an arrow" can be understood in several ways: First, it may be the traditional comparison that time flies so fast like an arrow. The word "flies" in English also means flying insects, and the noun "time" can also be a verb. The meaning of the expression above can be interpreted: "(You should) time flies as you would (time) an arrow" (the expression is read in the imperative). With this assumption regarding the meaning of the words "time" and "flies", the analyzed statement can be understood as "Time flies in the same way that an arrow would (time them)".

Another meaning relates to the comparison of flies and arrows: "Time those flies that are like arrows".
"Time-flies" can be read as kinds of flying insects, which in the sentence above would mean that all insects of this kind like a single arrow an apple or fruit flies like an apple).

"Time-flies" in the above sense can also mean that each type of flying insect likes a different arrow separately.

Another meaning may be that a specific object, such as a Time magazine, flies through the air in a manner similar to an arrow.

Analytical NLs, as modern English, which have practically no inflectional morphology to help distinguish between parts of speech, are demanding in this regard. In English and in some other languages, there is no indication of which word the adjective refers to. An example would be the phrase "cute little guinea pigs cage”.

Does "little" refer to "guinea pigs"?
Does "little" refer to "cage"?
Does "cute" refer to "guinea pigs"?
Does "cute" refer to "cage"?

In spoken language, information is suggested by accentuating individual words. Sentence "They never said he stole their money" shows how important the role of stress in a sentence is and how important the NL analyzer has to deal with when performing parsing. Depending on what word is stressed by the speaker, this sentence can have several different meanings:

"They never said he stole their money." They just didn't say it.
"They never said he stole their money." They just said that he probably only borrowed the money.
"They never said he stole their money." They might have suggested it in a different way, but they never said it directly.
"They never said he stole their money." They said he stole someone's money.
"They never said he stole their money." They said he stole something but not their money.
"They never said he stole their money." They said someone took their money, but they didn't say it was he.
"They never said he stole their money." Someone else said it, but not they.

The purpose of the efficient functioning of NLP is to measure one or more features of a given algorithm or system to determine whether and to what extent this system meets the assumptions of its creators and whether it meets the needs of its users. Research on the evaluation of NLP is currently popular, because determining the evaluation criterion remains the way to precisely define contemporary NLP problems beyond the general nature of tasks defined as understanding or generating language without additional human intervention. The set of evaluation criteria, which includes its data and metrics, allows to compare the solutions for a NLP analysis problem.

Information retrieval and data mining techniques

Information retrieval may be understood as finding in a large collection of unstructured documents (expressed as NL text) that meet a information need. There are a number of applications of search systems: searching for legal acts, searching for books in a library, searching for websites.[16]

Data mining, data acquisition, data extraction, data mining is one of the steps in the process of obtaining knowledge from databases. The idea of data mining is to use the speed of a computer to find hidden (because of the limited time possibilities) regularities in the data stored in databases.

There are many data mining techniques that come from well-established fields of science: statistics (statistical multivariate analysis), machine learning.

Techniques, methods for data mining derive from the field of AI research. The examples of applied solutions: evolutionary methods, fuzzy logic, machine learning methods, neural networks, rough sets, statistical methods, visualizations on charts.

In data mining, processing methods are developed, plants are tabulated, using banded algorithms, and the results presentation mode: classification, grouping, qualitative data analysis, quantitative data analysis, searching for associations, summaries.

There are areas of data mining application, where information systems are used to collect the obtained data in the form of databases. Due to the simplicity of database construction and acceptable prices, data collection systems are used in all areas of life. Wherever a database exists, there is a need to analyze this data in order to discover unknown knowledge. Fields in which data mining is widely used are astronomy, economics, medicine, technology, business etc.

„Knowledge Discovery in Databases (KDD) refers to the broad process of finding knowledge in data, and emphasizes the "high-level" application of particular data mining methods. It is of interest to researchers in machine learning, pattern recognition, databases, statistics, AI, knowledge acquisition for expert systems, data visualization.

[...G]oal of the KDD process is to extract knowledge from data in the context of large databases.

It does this by using data mining methods (algorithms) to extract (identify) what is deemed knowledge, according to the specifications of measures and thresholds, using a database along with any required preprocessing, subsampling and transformations of that database."[17]

KDD is used for: analysis of banking operations, creating targeted advertisements, credit risk assessment, customer segmentation, designing a data warehouse, fraud detection, genetic research, internet traffic data mining, recognition of image, speech and handwriting signals, sales forecasting, supporting medical diagnostics.

An example is extraction of a dependency in the sales data of a product, consisting in the fact that customers who have purchased a product usually buy other specific products.

Examples of data visualization: box plots, the aim of which is to visualize the properties of features in order to select variables that are characterized by the greatest shifts in quantiles, maximum and minimum values and medians; charts of empirical distributions for selected variables; histograms for selected predictive variables.

Following data can be read from the charts: density, feature value, frequency, maximum, median, minimum, mutual correlation of variables, number, quartile.

Summary

Today's translations are promoted by modern programs to support the translation process. Machine translation systems are applications or online services that use machine learning technologies to translate large amounts of text from and into one of their supported languages. The service translates a "source" text from one language into another "target language".

Concepts behind machine translation technology and the interfaces to use it are simple, the science and technology behind them are extremely complex and bring together several cutting-edge technologies: deep learning (AI), big data, linguistics, cloud computing and web APIs.

Since the early 2010s AI technology, deep neural networks (deep learning) has enabled speech recognition technology to achieve a level of quality that has enabled the Microsoft Translator team to introduce speech recognition with its text translation technology language translation technology.

Historically, the machine learning technique used in the industry has been statistical machine translation (SMT). SMT uses advanced statistical analysis to estimate the best possible translations for word that is in the context of a few words. SMT has been used by all major translation service providers, including Microsoft, since the mid-2000s.

The advent of neural machine translation (NMT) led to a radical change in translation technology, which led to a higher quality of translation. This translation technology started for users and developers in 2016.

Both SMT and NMT translation technologies have two common elements: Require large amounts by human translated content (up to millions of translated sentences) to train the systems; they do not act as bilingual dictionaries, but translate words based on a list of potential translations based on the context of word used in a sentence.

In conclusion, because artificial intelligence is a very important topic, especially in the time of the COVID-19 pandemic, it should be said that the article is the basis for further considerations and research in subsequent publications.

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Feature Inspection and Elimination in The Context of Breast Cancer Prediction

Arpad Kerestely

Transilvania University, Mathematics and Informatics Faculty, Brasov, Romania
arpad.kerestely@unitbv.ro

Abstract

Breast cancer is one of the world's most notorious cancer types for women, and together with the rest of the cancer types it forms the world's second most lethal disease for humans (Siegel, et al., 2020). Much research effort has been put into predicting and even preventing it. While the field of cancer prediction greatly benefited from machine learning in the past decades as many research papers addressed the problem of cancer prediction, there is still space for improvement. This paper aims to review some of the existent researches from the field of breast cancer, gather a set of useful methods and processes, and finally apply them on a publicly available breast cancer dataset, with a focus on understanding how different features, or their absence, can influence the outcome of a prediction.

Keywords: machine learning, feature extraction, breast cancer, classification.

Introduction

A big part of the research in healthcare focuses on cancer prevention, prediction and prognosis as stated by the authors in (Kerestely, et al., 2018). According to (Siegel, et al., 2020), "cancer is a major public health problem worldwide and is the second leading cause of death in the United States ... in 2020, 1,806,590 new cancer cases and 606,520 cancer deaths are projected to occur in the United States". The same research also states that the four leading cancers are: lung, colorectal, breast and prostate, split per gender as follows. 43% of the cancer cases in men are prostate, lung and colorectal, with prostate cancer accounting for more than one fifth of the new diagnoses. For women, breast cancer alone accounts for 30% of all the cases, followed by lung and colorectal cancers, totaling 50% of all the new diagnoses. "The lifetime probability of being diagnosed with invasive cancer is slightly higher for men (40.%) than for women (38.7\%)" (Siegel, et al., 2020). A study from (GLOBOCAN (Global Cancer Observatory), 2019) reported that in 2018 in Romania 83,461 new cases were detected, the most common cancers (listed in descending order) being: lung, colorectal, breast, prostate and bladder cancer. For men the most common being lung, colorectal and prostate cancer, while for women, breast with 25.1% followed by colorectal and cervix uteri cancers.

Having an obvious need for more research and understanding in the field of cancer prediction, the rest of this paper aims to: examine some of the related work regarding breast cancer datasets in section 2, followed by experimental results and discussions on the Netherlands Cancer Institute (NKI) Breast Cancer dataset (Ramanan, 2017) in section 3, and finally drawing the conclusions in section 4.

Summary of recent breast cancer researches

Breast cancer is one of the most invasive and dangerous cancers among women as it can be seen in (Siegel, et al., 2020) and (GLOBOCAN (Global Cancer Observatory), 2019), thus it draws the attention of many researchers. In the past few decades, it has been a topic that has seen improvements partially because of the newer machine learning algorithms. Still there is space for improving even more. As machine learning requires data to learn from, the speed at which this improvement is progressing is strongly dependent on the amount of publicly available datasets. Unluckily, and mostly because of the recent data privacy concerns, not much data is publicly available, and even less of it is new, so a researcher either uses what is publicly available, or teams up with a medical institute. In the case of this paper, the focus will be on researches that are done on publicly available data, so that the reported results can be verified and in a case-by-case scenario, improved.

A recent study of the breast cancer by the authors of (Al-Shargabi & Al-Shami, 2019) reports that on the Wisconsin Diagnostic Breast Cancer (WDBC) they achieved nearly perfect accuracy with the K-Nearest Neighbor (KNN), Random Forest (RF) and Multilayer Perceptron (MLP) algorithms. Besides accuracy, they also measured precision, recall, f-measure and ROC Area. While not mentioned by the authors, after trying to reproduce the results, it was

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discovered that in their experiments, the validation of the results was most probably done on the same dataset as the training, hence the very high accuracy. Still, this means that the mentioned algorithms were able perfectly learn the training set. It is worth mentioning that because the WDBC dataset is not balanced, the accuracy metric is not the best choice to measure the performance of different algorithms, still, the authors provided other, more relevant types of measurements for unbalanced datasets to support their results. An interesting preprocessing step that the authors made was an automatic feature selection, provided by Weka, with which they selected only four features out of the 31 existing ones, thus reducing dimensionality while preserving the prediction quality. The four selected features were: texture_mean, concave points_mean, Radius_worst, Smoothness_worst.

In (Agarap, 2018) the author studied multiple ML algorithms: GRU-SVM, Linear Regression, Multilayer Perceptron (MLP), K-Nearest Neighbor (KNN) search, Softmax Regression, and Support Vector Machine (SVM) on the same WDBC dataset. Prior to running the ML algorithms, they did a preprocessing step to standardize the dataset, namely the StandardScaler from scikit-learn (Pedregosa, et al., 2011). The initial dataset was partitioned in 70% training and 30% testing sets, and every tested algorithm performed with over 90% accuracy on the test set, with MLP reaching an accuracy of 99.04%. The author of (Agarap, 2018) noted that the success of these algorithms is based on the fact that the dataset is linearly separable, showing that the features are also linearly separable when inspecting them visually, one by one, on a 2D plot. This explains why algorithms like Linear Regression or SVM achieved good scores. Finally, the author points out that the results could be made more accurate if some sort of cross validation were to be applied, and the model's performance could be pushed even further if the optimal hyper-parameters were to be found. The author did not report any other metric besides accuracy, although the dataset is unbalanced.

Often cancer is a recurring disease but few dataset or even research papers address this issue, as stated by the authors of (Abreu, et al., 2016). Their study also gathers a list of used breast cancer datasets, out of which only four are publicly available (two from the UCI Repository). Furthermore, the authors collected data cleaning and preprocessing methods: normalization/standardization of data and missing data handling. Moreover, they gathered, described and grouped 16 of the ML algorithms in two categories, white-boxed and black-boxed ones, which are essential when trying to describe to a doctor, why and how did an algorithm find a particular result. They note that for small datasets the Leave-One-Out (LOO) is the best sampling strategy, providing small bias at the cost of higher variance. From evaluation metrics point of view, they note that for imbalanced datasets the accuracy metric may not be the best choice, while F-measure (if we are interested in the true positives mostly) or Cohen's kappa (if we are interested in the true negatives also) may be a better choice. Many of the papers reviewed by the authors of (Abreu, et al., 2016) used the help of medical experts to determine the relevant features of their dataset. This manual labor can be acceptable until some extent (if available) but can also prevent the ML algorithms to bring contribution to the medical field, as sometimes important information may be hidden in features not considered by the doctors.

The authors of (Lum, et al., 2013) took a somewhat different approach than the already mentioned papers. They used topological data analysis (TDA) on the Netherlands Cancer Institute (NKI) Breast Cancer dataset, to gather information from more than 1500 gene expression features. Their research provided interesting insights about the data by visually inspecting the resulting graphs. They report that the visual representations contain the same characteristics even if the dataset changes. Moreover, they reported finding some of the most important features that could determine the survivability of a patient, one of which they reported to be the ESR1 gene.

Experiments and Discussions

From the studied papers and from the careful searching on various public dataset repositories (UCI, n.d.) (data.world, n.d.) (opendatasoft, n.d.) (kaggle, n.d.) it was discovered that there are few publicly available datasets about breast cancer. Among these, the WDBC dataset is the most commonly used, providing 32 features of 569 patients. Published in 1995, it's a reasonably small dataset. Unfortunately, the other datasets are not too large either, some also have missing values. One particular dataset, compiled by the Netherlands Cancer Institute (NKI), while containing only 272 breast cancer patient records, has an impressive amount of 1570 features. This section aims to experiment on, and discover interesting knowledge in the afore mentioned dataset, by using the acquired knowledge from the reviewed papers. This knowledge mainly consists of: exploratory analysis, clustering, preprocessing, feature selection, partitioning, classification, evaluation of learning models and cross validation.

The Netherlands Cancer Institute (NKI) Breast Cancer Data was downloaded from (Ramanan, 2017). It contains demographic and clinical data about the patients and gene expression (genomic) data from breast tumors, that add up to 1570 features. The "eventdeath" feature gives information on which cancer cases were fatal. As it can be seen in Figure 1, the class distribution is unbalanced, which requires carefully choosing the scoring metric later on.

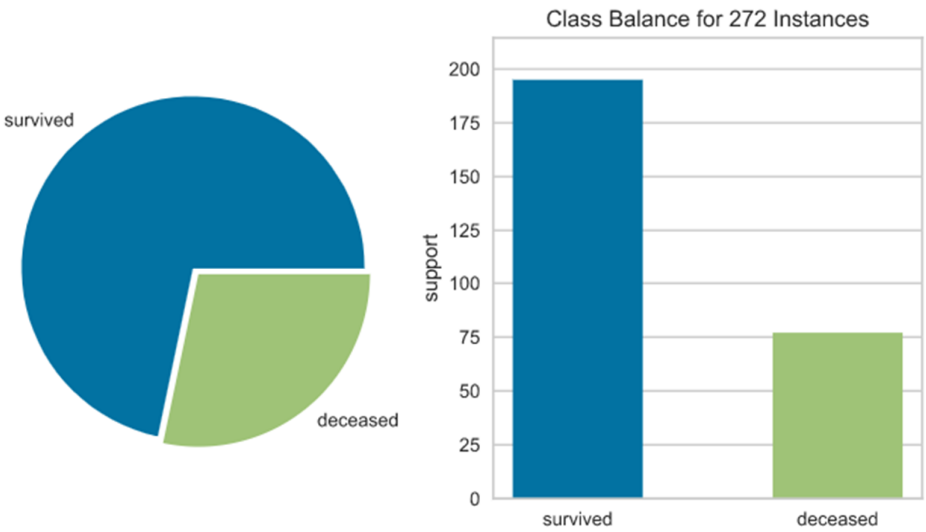

Figure 1*:* Mortality rate in the NKI Breast Cancer Dataset.

As a starting point, the "eventdeath" feature was extracted as the dependent variable. Next, the first two features, "Patient" and "ID" were manually removed, as those clearly represented irrelevant patient information (see Figure 2).

	Patient	ID
0	s122	18
1	s123	19
2	s124	20
3	s125	21
4	s126	22

Figure 2: Irrelevant patient information

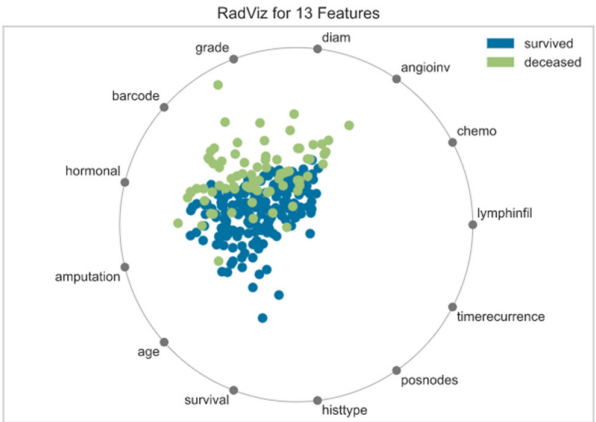

Figure 2: Class separability of 13 features.

With the next 13 features which looked like clinical data, a class separability was visually checked, reducing the 13 dimension to a two dimensional space using RadViz (Daniels, et al., 2012) (see Figure 2). It turned out that there is an existing separation between the classes, which raised the curiosity whether a linear classifier could already perform well on just this small subset of data.

Therefore, the data was randomly subsampled, while keeping the class distribution: 70% for training and 30% for testing. A logistic regression classifier was trained on the learning sample, while the evaluation of the classifier was done on the testing sample, resulting in a 90% accuracy and 0.81 f1 score. From the confusion matrix (see Figure 3) it can be observed that there is a small number of False Negatives (FN) and False Positives (FP), 5 and 3 respectively. Although the number of FNs is low, in the cancer prediction domain the tendency should be to eliminate them all.

By having pretty good results with the current classifier, it is interesting to see how the features correlate to each other and to the dependent variable. The Pearson correlation score was computed between pairs of features, and the results

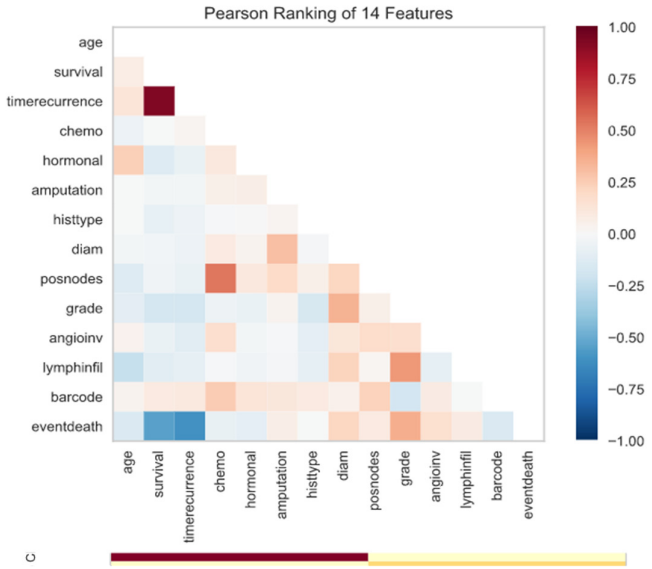

Figure 4: Pearson correlation between 14 features.

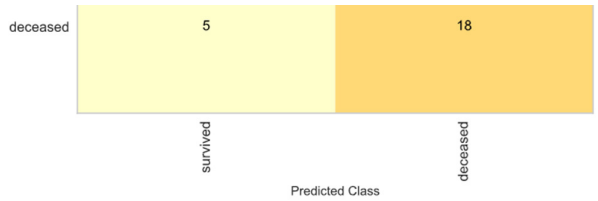

Figure 3: Confusion matrix for logistic regression classifier on the 13-feature dataset.

were color coded in order to be able to better visualize which two features correlate the most. In Figure 4 dark blue and dark red mean strong correlation, while light colors and white mean loose, or no correlation at all. Thus, it can be said that "timerecurrence" and "survival" have a strong positive correlation, while it can also be said that the "eventdeath" of a patient is influenced negatively to some extent by the "timerecurrence".

Looking at the whole dataset, it sounded interesting to automatically select the most n correlated features to the dependent variable. After a few tests it turned out that n was not easy to determine, and that the classifier's performance hardly improved. It was clear that another method of automatic feature selection was needed in lack of medical experts, who could have otherwise helped in determining the important features. Running the logistic regression on the full dataset, resulted in an accuracy of 86.58% and an f1 score of 0.75.

Scikit-learn (Pedregosa, et al., 2011) provides multiple ways of eliminating features. Among them, "Recursive feature elimination with cross-validation" provided a nice solution for determining the optimal number of features that would give the highest possible score. It can be seen in Figure 6, that the accuracy and f1 scores increases with the addition of every new feature until a number of 70 features is reached. After that it fluctuates, but never reaches a higher score. Running a logistic regression classification on a dataset containing only the 70 best features results in an accuracy of 96.34% and an f1 score of 0.93. Thus selecting 70 of the 1569 features results in both a faster and a more precise classification.

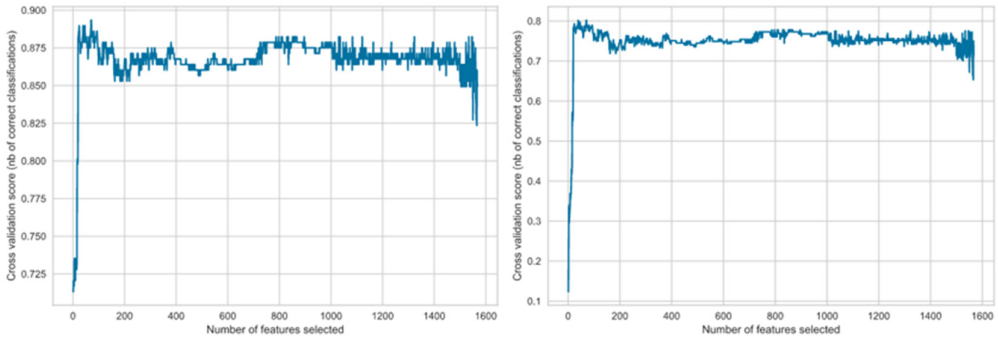

Figure 6: Logistic regression accuracy and f1 score with regards to the number of features.

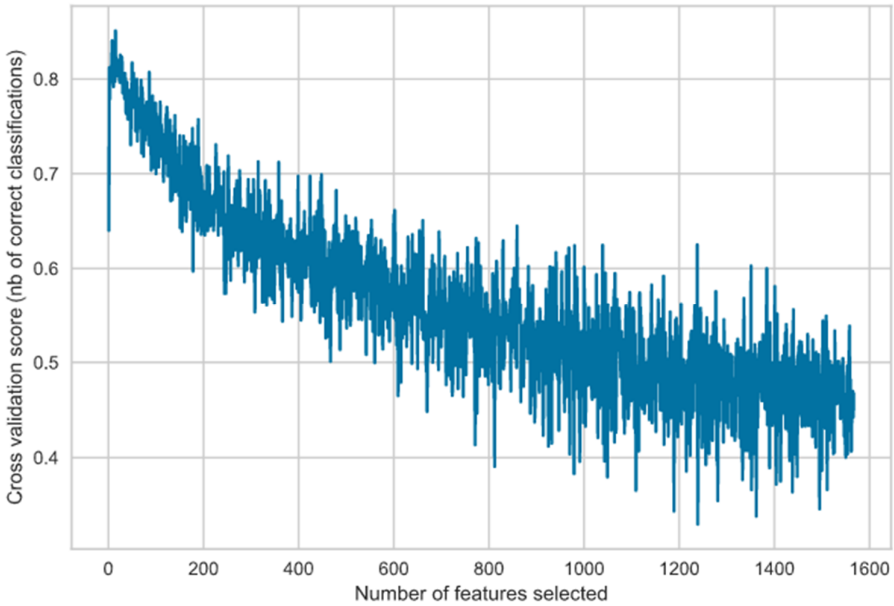

Figure 5: Random Forest f1 score with regards to the number of features.

Running the same recursive feature elimination using a Random Forest classifier provides yet more interesting knowledge about the data and the different kinds of classifiers. Running the RF classifier on the whole dataset provides on average an f1 score of 0.4. Although the RF classifier already has an internal feature selection mechanism, after the feature elimination step used above for the Logistic Regression, the Random Forest classifier stops improving after the 15th most important feature (as it can be seen in Figure 5), even more, it keeps getting lower precision as the number of features grow. With the 15 most important features, it reports an f1 score of 0.87.

Conclusions

The experiments conducted in this research paper show the importance of analyzing and extracting every piece of information a dataset has to offer. Often something as trivial as visualizing the data in a two-dimensional space or examining the correlation between multiple features can uncover interesting facts about a dataset. Other time, eliminating some features or selecting ones over the others, using dedicated algorithms, can shorten the training time

or even improve the prediction score of a classifier. While the chosen classifier does matter, it proved, that a careful preprocessing can greatly influence the tides in the favor of better results.

Considering the reviewed research papers and the different issues encountered during the experiments, the following aspects should also be considered when engaging in a cancer prediction problem. Often, we want to know the malign and benign cases, or recurrence or no recurrence, so generally speaking, most of the time we will have a binary classification. The accuracy should only be used as a metric if the dataset is balanced. Furthermore, the accuracy can mean two things: the patient is either detected as having cancer so a treatment can be administered as soon as possible, or the patient is free of cancer, meaning that no further investigations or administration of treatment is necessary. If the dataset is unbalanced as it is usually in cancer prediction datasets, the f1 score, precision and recall should be used instead. Most often it is best to tune the algorithm so to fully avoid false negatives, because if not done so, it will lead to bad consequences. On the other hand, false positives should be minimized in order to reduce the costs of medical investigations and treatment. In cancer prediction data is often noisy, because of some points that were badly input so these need to be detected and sometimes even manually removed. Finally, algorithms which cannot be easily interpreted or explained to a doctor, could be rejected, so if possible, simpler, white-boxed algorithms should be chosen.

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Top Management Teams and Human Resource Management Effectiveness

Magdalena MAJOWSKA

University of Economics, Katowice, Poland, magdalena.majowska@uekat.pl

Abstract

Attempts at solving the mystery of organizational success have resulted in many studies combining the concept of effectiveness and human resources management (HRM) perspective. It is showed in the literature that gaining a competitive advantage by the organization becomes possible through effective management of human resources. Moreover, the research also indicates that top managers believes and values affect effective HRM system designing and implementation in the organization. Taking into consideration the important role of top managers in making strategic HR decisions and the significance of HRM effectiveness for organizational outcomes, this theoretical paper has two main goals. First goal is to discuss two top management team characteristics: (1) an emphasis on strategic HRM and (2) the capability to manage resource vulnerability as being essential for improving HRM effectiveness. Second goal is to describe the concept of human resource management effectiveness as an antecedents for achieving organizational performance. All theoretical considerations are embedded in resource-based theory and upper echelon perspective which are then referred to the strategic HRM field. In consequence, some theoretical propositions that need to be empirically tested are presented. With these propositions should be possible to stimulate empirical research on HRM effectiveness by answering the question: Do the demographics and characteristics of top management teams matter for HRM effectiveness and, consequently, for organizational performance?

Keywords: Strategic Human Resource Management, Top Management Teams, HRM Effectiveness.

Introduction

Organizational performance, although widely discussed, remains one of the ambiguous issues of management studies. There have been numerous perspectives and various research approaches explaining the organizational success dilemma. This paper assumes that explaining the difference between firms that achieve or not achieve sustainable performance can be done by focusing on the effects of top management teams (TMT) on human resource management (HRM) effectiveness, which in turn influence organizational outcomes. Thus, this article aims to answer the following question: how important are TMT characteristics for HRM effectiveness and consequently for the organizational performance?

On the one hand, a significant amount of studies show that top managers play a fundamental role in influencing firm performance. As noted by Pitcher and Smith (2001, p. 1), '[t]here are few more important subjects to strategy scholars, or for that matter to practitioners, than the link between the people at the strategic apex of the organization and that organization's performance. 'This reasoning is consistent with the literature that is largely based on upper echelons theory (UET) and examines the individuals responsible for the organization, focusing on what they do, and how they do it (Hambrick, 1989; Hambrick & Mason, 1984). The specific attributes of TMT as central decision makers, will influence their individual problem framing, values and biases and, in turn, affect the decision-making processes (Carpenter & Reilly, 2006), including HRM decisions.

On the other hand, support from top management can facilitate the designing and implementation of various HRM policies and practices (Chadwick, Super, & Kwon, 2015; Fenton-O'Creevy, 2001; Hutchinson & Purcell, 2010; Stanton, Young, Bartram, & Leggat, 2010). As the main decision-maker in an organization, top management's beliefs and attitudes towards the HRM activities may also shape HRM effectiveness (Boada-Cuerva, Trullen, & Valverde, 2019). However, empirical research related to TMT and HRM are limited (Steffensen, Ellen III, Wang, Ferris, 2019). Many of these studies considered TMT as the targets of HRM activities (e.g., with executive-focused HRM systems), rather than focused on the roles that TMT played in shaping HRM policies and practices. Research about the role of

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top management in managing people is relatively scarce. Therefore, there is great potential in addressing the effects of TMT on HRM field (Beer, Boselie, & Brewster, 2015).
Moreover, research on HRM should focus on the notion of „HRM effectiveness". The literature shows that it is not the quantity but the quality of the HRM policies and practices that matters. A simple number of best practices does not show whether these activities make sense in terms of the organization's policy and strategy or whether the resources have been used in an effective manner. This is the reason why Huselid et al. (1997) state that future research should go beyond the presence of HRM policies and practices to examining the effectiveness of these activities compared to the desired outcome. Guest and Conway (2011) confirmed that the effectiveness of HR practices is more important than the presence of practices in determining outcomes, suggesting that future studies should focus on the issue of HRM effectiveness.

To summarize, the notion of HRM effectiveness is discussed in this theoretical paper in context of maximizing organizational performance. Two TMT characteristics are indicated as being essential for achieving high HRM effectiveness: (1) TMT emphasis on SHRM and (2) capability of managing resource vulnerability. Presented propositions are embedded in RBT and UET and will serve as a starting point for planned empirical research.

The concept of HRM effectiveness and the possible ways of measure it

The SHRM perspective is focused on the importance of HRM function for organizational performance. The fundamental assumption in this field of research is to treat human resources as a critical resource in the strategic management process. However, to provide a source of competitive advantage organizations should manage their human resources effectively (Barney & Wright, 1998). Effective HRM can be described as an important catalyst in accomplishing strategic goals because can help attract and retain qualified human resources, motivate people for better work, develop the skills and competencies of employees, and create firm value through the selection, development and use of human capital (Lepak & Snell, 1999).

HRM effectiveness is a broad construct, described in different ways. Generally, this notion demonstrates HRM effectiveness as being a level of 'human resource management satisfaction with various human resource activities ' (Huselid et al., 1997). It refers to 'the value of what HR professionals do for the rest of the organization, and how HRM practices are linked to desired organizational outcomes '(Rule, Bondarouk, & Van der Velde, 2007). More specifically, HRM effectiveness may be characterized 'as the extent to which the operations manager felt that the department performed well, met his or her expectations, and was a value added/bottom line contributor to the business ' (Wright, McMahan, McCormick, & Sherman, 1998).

This notion has been operationalized in the literature in different ways. To indicate HRM effectiveness, HRM literature uses different performance measures, like financial measures, employee satisfaction, turnover and absence rates, and commitment (Obeidat, 2016). The operationalization of HRM effectiveness can be focused both on the effectiveness of HR policies as well as the effectiveness of HR practices. Some researchers (e.g. Tsui, 1987) measuring HRM effectiveness incorporate ideas from the organizational effectiveness literature, while others emphasize the evaluation of personnel management activities (e.g. Cascio, 1991; Teo, 2002). Most of them agree that measuring HRM effectiveness differs from traditional assessments that imply ask respondents to indicate the existence or non-existence of specific HRM policies and practices and move towards asking managers whether they believe that these activities are performing effectively. From that perspective HRM effectiveness can be measured by „the degree of fit between HR systems and the firm's business intentions with the ultimate criterion of the extent to which the firm has met its business objectives" (Tsui, 1987, p. 36). For the HRM system to be effective, it should meet also the needs and demands of its different groups of stakeholders.

Widely known questionnaire for evaluation of HRM effectiveness was prepared by Huselid et al. (1997). This tool examines perceptions of how well the HRM function is performing and includes two types of effectiveness: (1) technical HRM effectiveness which involves using traditional HRM practices such as recruiting, training, performance appraisal, compensation, employee relationships, and health and safety, efficiently, (2) strategic HRM effectiveness, which involves building human resource complexities through innovations such as team-based job designs, career management, flexible workforces and employee empowerment. In other words, technical HRM effectiveness describes 'how well the operational HR activities are performed', whereas strategic one describes 'perceptions of how well the HRM function developed a fírm's employees to support its business needs '(Huselid et al., 1997:175). In contrast to technical, strategic HRM activities are considered as HRM innovations by companies.

Cited classification introduced by Huselid et al. (1997) has been applied in further research on HRM effectiveness (e.g. Richard & Johnson, 2001, 2004; Wang & Shyu, 2008, 2009; Ryu & Kim, 2013). In many of these studies the

quality of HRM is measured by assessing the HRM policies and practices that an organization has in place (Chang, 2005; Huselid et al., 1997; Wright, Mcmahon, Snell, & Gerhart, 2001) rather than the effectiveness of their implementation (Bos-Nehles, Van Riemsdijk, & Looise, 2013). The presence of effective HRM policies and practices constitute a first and essential prerequisite to their effective implementation, it does not mean that HRM effectiveness depends only on the presence of good or ideal HRM activity. The context in which these HRM policies and practices are applied also plays an important role (Han, Chou, Chao, & Wright, 2006). Even if the intended HRM policies and practices are well designed, they can be ineffective if they are not properly and successfully implemented (Bos-Nehles, Van Riemsdijk, & Looise, 2013).

Thus, some researchers (e.g. Khilji & Wang, 2006) have distinguished between intended and implemented HRM policies and practices while describing the effectiveness of them. This differentiation lead to the conclusion that there are three major components of HRM effectiveness (Guest & Conway, 2011): (1) the existence of HRM policies and practices - they must be present in the organization; (2) the assessment of HRM policies and practices - they must be evaluated as effective and satisfactory; (3) the implementation of HRM policies and practices - they must be effectively implemented in the organization.

Successful implementation of HRM policies and practices remains a difficult process. Many organizations may adopt HRM policy or practice for institutional reasons, in contrast to those which are implemented competently to provide a dominant organizational force. Some managers may implement a given policy or practice simply because it represents the latest fashion or a fad rather than because the policy or practice is believed to work within the organizational context to achieve strategic goals. Research shows that the measure of HRM effectiveness gets at 'whether 'firms successfully implement HRM practices in a manner that actively affects firm performance (Arthur, Herdman, & Yang, 2016). The increase of HRM effectiveness is attributable to successful implementation of HRM policies and practices. However, there is little shared understanding as to how to achieve this effective implementation. Scholars proclaimed that when addressing the black box in SHRM research, it is especially critical to identify those capabilities that can facilitate strategy implementation (Becker & Huselid, 2006; Lin & Shih, 2008).

To sum up, organizations are still struggling with designing, implementing and using HRM policies and practices in an effective manner. Generally speaking, there is no broad understanding regarding the process that might enable firms to achieve higher levels of HRM effectiveness. The knowledge about the antecedents of the effective HRM policies and practices and the mechanisms which shape them remains relatively under-researched, leaving a number of issues unresolved. The presented logical arguments clearly make us pay attention to characteristics of top managers viewed as the context in which these HRM policies and practices are designed and implemented.

Two TMT characteristics that can be crucial for HRM activities

Some scholars have discussed the influence of top managers on the implementation of HRM policies and practices (e.g., Chadwick et al. 2015; Fenton-O'Creevy, 2001; Hutchinson & Purcell, 2010; Stanton et al., 2010). Top managers as organizational decision makers are usually discussed in paradigm of upper echelons (UE) which suggests positive relationships between a variety of TMT demographic indicators and firm outcomes (Finkelstein & Hambrick, 1996; Hambrick, 1989). Such demographics as 'age, functional background, and educational experiences are taken as observable proxies for the psychological constructs that shape the team's interpretation of the internal and external situation and facilitate formulation of appropriate strategic alternatives '(Carpenter, Sanders, & Geletkanycz, 2004). Popularity of TMT demographics is owed to – relatively easy – accessibility and measurability of demographic data. While TMT demographic variables are likely to remain an important part of upper echelons perspective research, it has already been pointed out in the literature that demographics have received substantial conceptual and empirical attention (Certo, Lester, Dalton, & Dalton, 2006).

Except from TMT demographics, there are some other additional attributes of a TMT that may be important factors in the determination of organizational outcomes. Carpenter et al., (2004) identified such attributes as: skills and orientations, social cognitions, behavioral propensities, access to resources and information, human and social capital and social status as being among the most important and significant characteristics of top managers. Unfortunately, these attributes have not been frequently analyzed in the UE research. It is the result of difficulties in collecting data from top managers. However, by measuring these features of TMT directly, rather than using demography-based proxies, it is possible to provide a glimpse inside the causal black box of UEP (Roh, H., Chun, K., Ryou, Y., & Son, J. 2019).

Two characteristics of TMT may in particular influence HRM effectiveness. They are: (1) TMT emphasis on SHRM and (2) TMT capability of managing resource vulnerability. Both of these notions refer to UE theory in their focus

on TMT and they stem from RBT, treating employees as the source of sustained competitive advantage. The empirical results suggest that the way an organization manages its human resources has a significant relationship with the organization's results (De Saá-Pérez & García-Falcón, 2002).

First characteristic - TMT emphasis on SHRM - results from the assumption that TMT having the appropriate perspective and attitude towards human resources increases likelihood of effective HRM (Arthur, Herdman, & Yang, 2014). The issue of managers' beliefs about the importance of HRM for an organization, although does not constitute a uniform and coherent structure, was discussed in the literature with to e.g.: management philosophy (Lepak, Taylor, Tekleab, Marrone, & Cohen, 2007, pp. 223-246), management logic (Chattopadhyay, Glick, Miller, & Huber, 1999, pp. 763-789) and values and beliefs (Bae & Lawler 2000, pp. 502-517). In many studies, this issue is identified with the selection of optimal criteria of action strongly correlated with the system of values professed by managers in the organization. Scarce research indicate that the top management emphasis on SHRM is a relatively capacious construct. Although not precisely defined, this concept has been operationalized by Chadwick, Super, and Kwon (2015), who propose to consider CEO's actions in the following areas: (1) praising employees for achieved challenging goals, (2), use fair procedures in HR practices, (3) adaptation of different kinds of HR practices that contribute to organizational performance; (4) spending much time on HR activities, (5) regarding the human resource department as a strategic partner; (6) viewing employees as a source of competitive advantage; and (7) putting much value in employees 'growth and well-being.

Second characteristic - TMT capability of managing resource vulnerability - results from the qualities of some resources that are purported on the one hand to generate rents, but on the other hand also may make them and their rents less sustainable, that is more vulnerable. Le Breton-Miller and Miller (2015) present three categories of manager's challenges. The first one is erosion manifested in three ways: (1) the superior value of a human resource which can give rise to rent appropriation, exit opportunities, or hubris; (2) the superior value of a sub-unit, which can skew attention and rewards too narrowly and cause neglect of complementary units; and (3) path dependence in intangible resources such as brands and reputation that render them fragile to managerial missteps and difficult to resurrect. The second is the result of ambiguity which increases with: (1) the ambivalence of a resource due to its early stages of development or obvious drawbacks that can lead to its neglect; (2) the causal ambiguity of a resource whose source of value is difficult to comprehend and thus is difficult to replicate; (3) the tacitness of an intangible resource, which makes it difficult to codify, share, and manage. And finally, the third challenge comes from misalignment, which relates to (1) the context dependency of a resource that makes it vulnerable to changes in its environment; (2) the systemic complexity of a resource that makes it vulnerable to its weakest link. In consequence, top managers need to manage resource vulnerability (i.e. to focus on the possibilities to sustain these strategic human resources) in context of: (1) protecting them from erosion, (2) coping with their ambiguity, and (3) preserving their required alignment. Le Breton-Miller and Miller (2015) propose several objectives to accomplish these goals: fostering loyalty, promoting equity, investing generously, identifying resources, parsing resources, codifying and sharing wisdom, matching resources and focusing and broadening capabilities. These initiatives are deeply rooted in the characteristics of strategic HRM and result from the necessity of helping an organization to ensure that its human resources are not easily imitated. Although the concept of Le Breton-Miller and Miller (2015) does not focus merely on human resources, it is assumed in this paper that their approach may be applicable *in extenso* to SHRM field.

Considering the above, it is proposed to treat (1) TMT emphasis on SHRM and (2) TMT capabilities of managing resource vulnerability as dimensions of TMT characteristics. Moreover, these two TMT characteristics are linked to each other in this way that the higher TMT emphasis on SHRM, the stronger should be the probability that TMT will have capabilities of managing vulnerability of human resources. Thus, it is supposed that:

Proposition 1: There is a relationship between TMT emphasis on SHRM and TMT capabilities of managing resource vulnerability

Two TMT characteristics as antecedents of HRM effectiveness

Two above-mentioned characteristics of TMT may influence HRM effectiveness. First characteristics of TMT - TMT emphasis on SHRM - can be crucial for HRM effectiveness for several reasons. First, some research indicated that the extent to which top managers view employees as strategic resources is positively related to the level of integration between the human resource function and strategic decision making (Bennett, Ketchen, & Schultz, 1998). Further, works by Noe, Hollenbeck, Gerhart, and Wright (1997), Butler, Ferris, and Napier (1991), Lado and Wilson (1994), and Bae and Lawler (2000) examined different types of links between HR managers and the firms' top executives, showing that top management making strategic decisions should consider human capital as a source of competitive advantage. Moreover, the notion of management values also reemerged in the discussion of the "architectural" perspective (Becker & Gerhart, 1996; Lepak & Snell, 1999), according to which the defining characteristic of an

HRM system is not the specific HRM policies and practices that are used, but rather the extent to which HRM policies and practices are consistent with an underlying philosophy or logic for managing people in organizations. Osterman (1994) confirmed that various factors, such as management values, explain variation in the adoption of "innovative work practices". In turn, Lepak et al. (2007) investigated the extent to which "high investment work practices" applied to employees were contingent on an "employee-centered HR philosophy." This philosophy variable reflected managers" 'general beliefs of high regard for employee welfare and treatment" (Lepak et al., 2007, p. 229). These authors found strong support for the hypothesis that HR philosophy predicted variation in the use of HR practices. Additionally, Chadwick's et al. (2015) study demonstrated that CEO emphasis on strategic HRM is a significant antecedent to commitment-based HR systems, and influences a firm's performance. Some empirical research linking the values or philosophy of top managers and the use of HRM policies and practices exists, but has been quite limited. It emphasizes not only the complexity of managerial emphasis on SHRM as a construct, but also the importance of its notion for both UEP literature and SHRM field, and thereby its relevance for strategic decision making in an organization. As a consequence, applying the issue of managers' beliefs about the importance of HRM for an organization to the UEP, i.e. referring this emphasis on SHRM to the whole TMT, it is supposed that:

Proposition 2: TMT emphasis on SHRM will positively influence HRM effectiveness

Second characteristics of TMT - capability of managing resource vulnerability - can also be crucial for HRM effectiveness. It is related to the fact that 'the social complexity and causal ambiguity inherent in strategic HRM practices such as team-based designs, empowerment, and the development of talent for the long term, competitors can neither easily copy these practices nor readily replicate the unique pool of human capital that such practices help to create '(Huselid et al., 1997, p. 173). In this situation, human resources become difficult to substitute, to add to getting features of being value and rare. Thus, top managers should possess some competences and capabilities that are linked to the knowledge of how to manage such resources which are able to generate rents, but also may make them and their rents more vulnerable. There is no research that relate to link between managing resource vulnerability and HRM effectiveness, yet there is some evidence that HR competences of executives and HR managers are a strong predictor of perceived HRM effectiveness (Han et al., 2006). Additionally, Huselid et. al., (1997) also evaluated the impact of HR managers' capabilities on HRM effectiveness and the latter's impact on corporate financial performance. Their results have showed that professional HRM capabilities and business-related capabilities increase the effectiveness of strategic HRM activities. Moreover, it can be expected that actions oriented toward providing resources characteristics mentioned by RBT (Barney, 1991) and described in the context of managing resource vulnerability by Le Breton-Miller and Miller (2015), give an organization the opportunity to achieve sustainable rents in the face of competition and may be treated as the value which is connected with HRM. Thus, it is proposed that:

Proposition 3: TMT capability of managing resource vulnerability will positively influence HRM effectiveness

Consequences of TMT characteristics and HRM effectiveness for organizational performance

The influence of TMT on organizational performance remains one of the most widely examined relationships in strategic management literature. On the one hand, most research reflects the importance ascribed by the academic community and in the business press to TMT demographics and characteristics (Certo et al., 2006). The theory of UE suggests positive relationships between a variety of TMT indicators and firm outcomes (Finkelstein & Hambrick, 1996; Hambrick, 1989). On the other hand, SHRM researchers have also reached an agreement on the importance of HRM effectiveness to organizational outcomes. The issue of how effective HRM policies and practices are linked to desired organizational outcomes is addressed in a great number of research (Boxall, 1996; Huselid, 1995; Ruel, Bondarouk, & Van der Velde, 2007; Wright et al., 2001). The empirical results confirm an association between more extensive use of HRM policies and practices and various indicators of organizational performance, such as productivity, employee turnover and financial performance (Teo, 2002). Overall, reviews of the human resource – performance relationship support the argument that firms with higher levels of HRM effectiveness experience performance gains (Boselie, Dietz, & Boon, 2005; Combs, Ketchen, Hall, & Liu, 2006).

Taking into consideration the influence of TMT demographics and characteristics (in UE theory) and HRM effectiveness (in SHRM field) on organizational outcomes it is assumed their reciprocal impact on organizational performance. However, it is posited that HRM effectiveness will acts as a mediator in this relation i.e. between TMT characteristics (TMT emphasis on SHRM and TMT capability of managing resource vulnerability) and organizational performance. Thus, it is proposed that:

Proposition 4: HRM effectiveness will mediate the influence of TMT emphasis on SHRM on organizational performance

Proposition 5: HRM effectiveness will mediate the influence of TMT capabilities of managing resource vulnerability on organizational performance

Conclusions

This article aims to answer the following question: how important are TMT characteristics for HRM effectiveness and consequently for the organizational performance? By answering the question this paper describes the nature of TMT itself as well as the influence of specific TMT characteristics on decision making processes represented by HRM effectiveness. Although these previous studies on TMT, HRM and organizational performance are very extensive and useful, they are limited because they rarely related to other attributes than TMT demographics that can explain HRM effectiveness; and, finally, did not evaluate the impact of TMT characteristics on HRM effectiveness and the latter's impact on organizational performance. Specifically, in this paper two elements of TMT members have been identified as important: (1) TMT emphasis on SHRM and (2) TMT capability of managing resource vulnerability. These TMT conceptual elements shall constitute a multidimensional construct referring to top management's attributes.

However, all proposals presented in this article are entirely theoretical and require empirical verification. It is intended by author to develop new measurement scale for TMT capabilities of managing resource vulnerability and adapt measurement scales of TMT emphasis on SHRM, HRM effectiveness and organizational performance. Within each company, it is planned to collect (1) one detailed HR questionnaire to measure HRM policies and practices from HR managers, (2) one detailed TMT questionnaire to measure TMT characteristics and firm perceived performance, and – if available - (3) secondary source records to measure financial performance. If possible, the number of questionnaires obtained from TMT will be increased to two. Thus, data from both multiple informants and sufficiently different TMT's increase applicable insights and statistical power for analyses (Lin & Shih, 2008). Behavioral analysis of the TMT meets its limits when it comes to the practical issues of conducting research. For instance, members of executive supervisory boards are usually hard-to reach respondents. Moreover, they are often reluctant to spend their time to participate in a survey bringing results which, they fear, might be used against them. In consequence, verification of any hypothesis regarding societal functioning of executive and supervisory boards becomes a challenge. Moreover, operationalization of the proposed concepts may be challenging. In particular developing new measurement scale for TMT capabilities of managing resource vulnerability and adapt measurement scales of TMT emphasis on SHRM is necessary. In addition, although the HRM effectiveness tool already exists in the SHRM literature, the conceptualization and measurement of HRM constructs is still a challenge. This is indicated by a literature review made by Boon et al (2019) which showed that „the increasingly broad conceptualization and measurement of HR systems and the lack of clarity on the HR systems construct at different levels have hampered research progress". Moreover, an analysis of measures of perceived HR practices showed that various problems and issues can be identified when critically reviewing these measures.

The intent of this paper is to reframe discussion concerning greater appreciation of organizational and environmental contingencies in which HRM effectiveness is embedded. Specifically, this paper and planned empirical research contains a set of objectives: (1) building knowledge about the nature and consequences of TMT conceptual attributes (demographics and characteristics); (2) adding TMT emphasis on SHRM and TMT capability of managing resource vulnerability as new constructs to SHRM toolbox; (3) contextualizing HRM effectiveness in regards to internal (TMT demographics and characteristics) and external environment.

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Influence of Public Aid Coming from Self-Government Sector on Economic Development (Concept of The Research)

Magdalena KOGUT-JAWORSKA, PhD

University of Szczecin, Poland
magdalena.kogut-jaworska@usz.edu.pl

Introduction

Expectation concerning the public sector role are steadily growing. They concentrate not only on the traditional regulatory and stabilizing role of the state, but on the active participation as well. The expectations are aimed at creating proper conditions for economic development. Public aid is one of the tools applied in order to meet the goals set for public policies. Effectiveness of public aid application is a crucial issue, having in mind a high level of pressure on more economical expenditure of the means available. Secondly, public aid is always targeted at the chosen subjects, which has influence on the competition and on the market. However, it may also have negative impact on the market. Research on public aid effectiveness includes some elements of balancing the negative and positive elements of the aid application.

Keywords: Public Aid, Public Finance, Self-Government Finance Economic Development, Regional Policy

The goal of Research

Public aid can have at least three basic sources of financing; foreign means, public budget (e.g. state budget or self – government budget) and mixed sources. Public aid from self-government sector can have positive influence on economic development if it is targeted precisely at production growth, but it can have neutral (or even negative) impact if the aid is not connected with the economy. Although there exist some examples of ineffective public aid, it can be concluded that the aid targeted properly, will influence positively economic growth in the both, micro- and macro environment.

A broad research study on effects of public aid granted by the self-government sector will enable to verify the two following hypotheses:
H1 Public aid given by the self-government sector brings about positive and long – lasting effects for economic development.
H2 Public aid given by the self-government sector might be an infective tool of stimulating economic development.
Results of this research will enable to test auxiliary hypotheses which are as follows:
H1 Investment with participation of EU funds distributed by territorial governments improves economic efficiency of companies.
H2 Investment with participation of public funds from territorial self-government, not only influences positively competitiveness, but ensures long-lasting development of companies.

The main scientific aims of the research are to estimate the influence of public aid coming from the self-government sector on economic development, and to introduce and describe the prospects for proper functioning of public aid in the context of economic changes. Within the analysis of the impact of public aid transferred by the self-government sector, there will be made an attempt to define both: the well-developed and the underdeveloped (marginalized) areas, with particular reference to efficiency improvement dynamics of economic growth and unemployment reduction.

The particular research objectives are:

- formulating assessment methods in order to measure effectiveness of public aid coming from the self-government sector in Poland, with adequate attention paid to the conditioning of the process and having in mind potentially varying approaches to (the question) of effectiveness from the viewpoint of the public budget and on goals of economic development,

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- formulating application procedures for particular instruments of public aid by units of self-government and creating complete solutions (model and procedures) related to an integrated mechanism of influencing economic decisions of the existing companies, as well as decision of potential investors (including the external ones),
- identification and assessment of the self-governmental support system within public aid, which will finally enable to create model solution of economic development at the local and regional levels.

Research Method

The following research methods will be applied to accomplish the above objectives: critical analysis of domestic and foreign literature, desk research method, scoring method (scoring applied and processed for the needs of this research), prediction method (based on time series with application of statistical methods.

Empiric research will be conducted to enable identification and assessment of influence of public aid coming from the self-government sub-sector on overall economic development. The main goal of the empiric analyses will be to identify the actual influence of public aid supplied by the territorial self-government on conditions in the economic sector. Empiric research (mainly surveys) will be conducted among representatives of self-governments and entrepreneurs in some chosen regions ("voivodships") in Poland.

Different levels of social and economic development of the regions will be indicated with the application of taxonomic methods, i.a. synthetic indicator of Z. Hellwig method, (the indicator will include such variables as unemployment rate, investment expenditure in companies, also in statistical subjects of the national economy registered in the REGON, an indicator of demographic load and gross value of fixed assets).

Influence of economic changes on application of public aid from the self-government sub-sector will be defined by application of probity models. The applied methodology will enable to assess statistical salience, as well as chances of occurrence of the phenomena in question according to changing phases of business cycle. The characteristic feature of probity regression is a possibility of precise assessment of parameters and the assessment of their salience for changeable variables expressed by binary.

When concentrating on the analysis of the two dimensions of effectiveness, i.e. the level of realization of economic objectives and the possibility of application of support instruments, there will appear a necessity to access information concerning public aid (data from the consumer and competition Protection Agency) and other information about companies, which is processed by the Main Statistical Office within its annual survey, as well as financial data from the Ministry of Finance and the regional tax offices. Data accessibility does condition to a large extent possibilities to recognize effectiveness of public aid. Moreover, accessibility of company financial data is also required in particular, the information about financial results taxes paid and public aid received.

Effects of study

It must be indicated that until now, there have not been defined theoretical and pragmatic bases which concentrate on the subject of public aid within territorial self-government.

Foregoing research concerns the broad concept of nationwide public aid (it needs to be mentioned that such approach to the subject concerns approximately three thousand of various institutions). Other studies are fragmentary and concentrate usually on a selected aspect of the local economy, e.g. local taxes. The literature lacks comprehensive studies concentrating on the level of territorial self-government. Such comprehensive approach to the subject of public aid should refer to the whole self-governmental budget policies, including instruments of both- active and passive character.

Its needs to be said that the necessity to prepare a study concerning public aid in the self-government sector is stressed by representatives of self-government practice. They indicate the necessity to conduct up-to-date analyses describing possibilities of influencing the sphere of economy through local forms of public aid. The analyses will also make it possible to formulate particular conclusions and recommendations within the scope mentioned. On the other hand, a study describing a system for stimulating local entrepreneurship would be a complete source of knowledge for business people who seek various forms of financial support for their companies.

Having considered the needs of self-government policies and having in mind some theoretical considerations, it has been concluded that the final stage of this research should work out effective forms of public aid application by self-government units, aimed at stimulating economic development and comprising both, the existing instruments as well as the potential ones – those expected by the business community. Moreover, the project should verify the existing

amount of knowledge about public aid in Poland and it should analyse comparatively the forms of public aid in Poland and abroad (in selected EU countries, featuring the structure of territorial self-government similar to the Polish model. The project will also assess the impact of various forms of public aid applied by the territorial self-government and it will analyse and verify the present solutions.

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Bilateral Investment Treaty and Foreign Direct Investment: Game Analysis Based on The Signal Model

Svitlana LUKASH
Sumy National Agrarian University, Ukraine
E-mail: svitlana.lukash@gmail.com

Sen HU
Sumy National Agrarian University, Ukraine
E-mail: bykhovets@latifundistmedia.com

Nataliia MASLAK
Sumy National Agrarian University, Ukraine
E-mail: n.maslak@ukr.net

Abstract

The bilateral investment treaties (Bilateral Investment Treaty, BIT) are a signal delivered to investors by the host country. The effective condition of the signal lies in the difference of BIT compliance cost, so investors have the basis to distinguish different types of host countries. Based on Jan Peter Sasse analysis, the signal effect mechanism of the bilateral investment treaty is analyzed by using the signal model under incomplete information. The game between host country and investor is the signal transmission game of incomplete information. For both types of host countries, it is advantageous to sign a BIT. The host country adopts the strategy of "signing BIT" and makes a credible commitment of property right protection to investors through BIT. BIT gives the host country a competitive reputation advantage in attracting capital. Under the constraints of the investment agreement, investors can anticipate the behavior of the host country, and foreign investors are more inclined to invest in the signed or effective BIT countries. For investors, on the premise that the expected return of investors is positive, if the host country signs BIT, it will form a positive investment incentive for investors. When the expected return of the investor is zero, the investor can be considered as a potential investor (the investor may or may not invest). In this case, whether the host country "signs BIT" is more sensitive to the influence of the investor in judging the type of the host country.

Keywords: bilateral investment treaty, foreign direct investment, incomplete information, pooling equilibrium, separating equilibrium.

Introduction

Under the analysis framework of Sasse, its model assumptions were further relaxed. Based on the non-negative expected investment return of investors, this paper finds out the conditions for the bilateral investment treaty to be an effective signal. Due to the differences in BIT compliance costs, different types of host countries have different costs of sending BIT signals. Only host countries with superior investment environment will face smaller compliance costs, which provides investors with the basis to distinguish different types of host countries, and thus alleviates the time inconsistency problem to some extent.

Investors' investment activities in the host country have the characteristics of "time inconsistency (dynamic inconsistency)". Before and after the establishment of the investment project, the status between the investor and the host country is a reciprocal relationship. The fundamental reason for the status change between the investor and the host country before and after investment is that the information between the two parties is not fully and completely symmetrical. Based on the perspective of investors, investors are not sure which countries are "credible" of the host country (these countries actively "attracting foreign investment" and "cooperation" attitude, provide investors with a stable, predictable investment environment), which countries is "not reliable" of the host country (the country in various direct or indirect way erosion in the interests of the foreign investment in the project duration, not take the

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attitude of "cooperation"), investors do not determine the real investment environment of host country, and the situation of the host country only its own has the most complete enough information.

In the process of summarizing and sorting out the literature on the relationship between bilateral investment agreements and foreign direct investment, it is found that many literatures put forward signal theory to explain the regulating effect of BIT on foreign direct investment in order to deal with the above time inconsistency problem. According to the signal theory, the signing of BIT between the host country and the home country to attract foreign capital to promote economic development is in essence to send a signal to the investors in the home country to promise stronger protection for investors, and at the same time to convey to other potential investors the real intention of restricting the government's improper intervention in foreign investment. According to the BIT signed by the host country, the investor weighs the country's willingness to protect the investor. According to the logic of signal theory, host governments that attract foreign investment formally communicate to investors the message of protecting domestic investment through BIT negotiation, signing and revision [2;3;4;5]. To send a credible and effective signal, the signatory countries need to pay the cost or have enough information support to identify the information of the host country providing investment protection and realizing investment liberalization commitment [6;7]. The more agreements signed by the host country, the stronger the positive signal will be, and the accumulated investment agreements will convey a stronger commitment signal of the host country, that is, to protect the investment environment of all foreign investment and to do a good job by themselves [8].

Formulation of the goals of the article

Sasse in signal model [10] and reputation model [11;12; 13], based on incomplete information game model, analyzed the signal effect mechanism of BIT. In the premise of Sasse [9] analysis, it is assumed that investors' expected return is negative before the host country sends a BIT signal. On this basis, this paper relaxes this condition to non-negative expected return of investors (that is, investors judge that the expected return of investments in different host countries is non-negative according to prior probability).This set because: first, for investors, if the investment is the key to whether the expected return is positive, if the expected return on investment is negative, which means investors prior probability is very low, that the situation is not very bullish on untrusted host countries, investment is not high, host by sending a BIT signal to attract investors investment motivation is not strong. Only when the expected return of investors is positive, investors will invest in the host country, and the host country will consider the issue of sending signals to attract investors. At this time, investors will further determine which are the real "Reliable" host countries and which are the imitation strategies of "Unreliable" host countries in the short term. Whether or not a BIT is signed by a host country does affect investors' judgment of the expected return on investment (investors regard "signing BIT" as a signal to judge the type of host country). Therefore, on the premise that the expected return of investors is positive, if the host country signs BIT, it will be more conducive for investors to make investment decisions. Second, the investors according to Bayesian rule updates its type of judgment for the host country or take a mixed strategy in the process of game, here is the premise of potential investors for at least two rounds of investment, which is regarded as the first round of investment investors expected investment strategy, only the expected return on investment is positive, investors would begin the next round of investment.

Results of the research

Reference Sasse analysis framework [9]: setting is "Reliable" Host Country (Hereinafter referred to as R) and "Unreliable" Host Country (Hereinafter referred to as U) and Multinational Enterprise investors (Hereinafter referred to as M) three rational participants represent.

Different types of host countries have complete information about their types." Credible" host countries actively "attract foreign investment" and adopt a "cooperative" attitude to provide a stable and predictable investment environment for investors; However, the "unreliable" host country does not attach importance to the long-term economic benefits and contributions of "attracting foreign investment" and undermines the interests of foreign investment in all kinds of direct or indirect ways based on short-term purposes or under the influence of external environment. During the duration of the project, it does not adopt the attitude of "cooperation". The situation of the host country is most complete only with information available to it. Some host countries also adopt the attitude of "cooperation" in order to actively invest foreign capital but conceal some imperfect investment environment in order to compete for foreign capital resources with other countries that "attract foreign investment".

Investors have incomplete information. Investors do not know the real type of the host country, investors are not sure about the real investment environment in the host country, and the situation of the host country is only the most complete information it has. Investors can only judge the type of host country according to Bayes' law based on whether the host country "signs BIT". The logic of adopting this criterion lies in that BIT, as a tool for information

provision and reputation construction, can enhance the credit of the host country. The positive impact of BIT on foreign investment is not spontaneous but depends on the host country's continuous compliance with the treaty and avoidance of international investment disputes [14]. For a credible host country, its real motive is "cooperation", so it is more willing to sign BIT to attract investors.
For both types of host countries, it is advantageous to sign a BIT. The host country adopts the strategy of "signing BIT" and makes a credible commitment of property right protection to investors through BIT. BIT gives the host country a competitive reputation advantage in attracting capital [15;16]. Under the constraints of the investment agreement, investors can anticipate the behavior of the host country, and foreign investors are more inclined to invest in the signed or effective BIT countries [17;18]. Among the factors influencing investors' expectations, whether the host country signs BIT is not decisive, but whether the host country signs BIT does affect investors' judgment on the expected return of investment. Assuming that the expected return of investors is positive, if the host country signs a BIT, it will be more conducive for investors to adopt investment strategies.

There are costs associated with a bilateral investment treaty. This includes two types of costs: the first type is the cost incurred by "negotiating and signing BIT", that is, the cost paid by the signatory countries during the negotiation process of the BIT and during the period from the signing of the BIT to the entry into force. There is no significant difference between "credible" and "untrustworthy" host countries in this category. Second, after the entry into force of a BIT, the performance cost of the host country's compliance with BIT and the reputational cost generated after the default, which is the key to distinguish "Reliable" host country from "Unreliable" host country. Given the different motivations of the two types of host countries, "Reliable" host countries have lower performance costs than "Unreliable" host countries. Considering the costs and benefits of "signing BIT" strategy, whether the host country adopts this strategy depends on whether the benefits brought by the strategy after the host country adopts it exceed its costs [19; 20; 21]. For two classes of the host country, if both take "signing BIT" strategy (in the case of incomplete information, not trusted host state imitate trusted host country strategy of motivation, the purpose is to attract investors to invest), then the "trusted" is a cost advantage of host country ("Reliable" host country "signing BIT" cost is lower than "Unreliable" host country).Therefore, if the cost of "Reliable" host country adopting " signing BIT" strategy is greater than its benefits, the "Reliable" host country will give up the strategy. Based on the rational assumption, the "Unreliable" host country will definitely give up the strategy (the reason is that the cost of "Unreliable" host country signing BIT is greater than that of "Reliable" host country).

For investors, on the premise that the expected return of investors is positive, if the host country signs BIT, it will form a positive investment incentive for investors. When the expected return of the investor is zero, the investor can be considered as a potential investor (the investor may or may not invest). In this case, whether the host country "signing BIT" is more sensitive to the influence of the investor in judging the type of the host country.

To sum up, the game between host country and investor is the signal transmission game of incomplete information. In the signal transmission game of BIT, the host country is the sender of the signal and the investor is the receiver of the signal. The specific game process is:

1) There is a "natural person" randomly assigned host country type with probability "θ", in which "Reliable" host country is assigned with probability "θ", and "Unreliable" host country is assigned with probability "$1-\theta$".

2) The host country chooses its own action strategy according to the allocation of "natural persons", that is, whether to adopt the strategy of "signing BIT". " Reliable" host countries attract investors by "signing BIT", or "not signing BIT", and have been protecting investors' interests in a cooperative way. At the stage when investors decide whether to invest, host countries adopt two strategies (The strategy of "signing BIT" or "not signing BIT" is adopted) to confuse investors with incomplete information, so as to attract their investment, and obtain investment benefits through non-cooperation after investors establish investment projects.

3) According to the action strategies of the observed host country and according to Bayes' rule, investors constantly make Bayesian correction for the posterior probability of the judgment of different types of host country and select their own action strategies accordingly. Investors have two strategies: First, investors adopt the "investment" strategy; Second, investors adopt a "don't invest" strategy.

Now take two stages as an example, where the host country takes the strategy first, the investor act again according to the strategy of the host country.

1) Collection of host country types.

Suppose there are two types of host countries, and the set of host countries is:

$H = \{h_1 = R$ (Reliable host country); $h_2 = U$ (Unreliable host country)$\}$.

2) Collection of actions of the host country.
The two types of host country "R" and "U" first send signals, and the signal set is:
G = {g_1 = Y (signed BIT); g_2 = N (no BIT signed)}.

The costs incurred by the two types of host countries in negotiating and signing BIT are recorded as "BC"; In view of the different motivations of the two types of host countries, after the entry into force of a bilateral investment treaty, the performance cost of host country R is lower than that of host country U. "BR" is recorded as the performance cost of host country R, "BU" is the performance cost of host country U, then there is "BR < BU", and further, there is "BC +BR < BC +BU".

3) Collection of actions of investor
Investor M act again according to the received signal G, and investor M's strategy set is:
A = {a_1 = I (Investment); a_2 = DI (Don′t investment)}.
The prior probability of investor M to "Reliable" host country R is: P (R) = θ (0 < θ < 1);
The prior probability of investor M to the "Unreliable" host country U is: P (U) = 1−θ;

Whether investors M based on the host country to send "signing BIT" signals, according to the Bayesian rule, to determine whether the host country as "Reliable" the probability of the host country, in order: "P (R | Y)", "P (R | N)", "P (U | Y)", "P (U | N)", and based on the modified Bayesian probability, to choose their own strategy.

4) Benefits of rational participants:

I. In the case that the action strategy of the host country H is "N" : if the strategy of the investor M in the host country R is "I", then the benefit of the investor is "YM" and the benefit of the host country R is "YH"; If the strategy of investor M in the host country U is "I", the benefit of investor is "EM" and the benefit of host country U is "EH". If investor M adopts strategy "DI", the returns of both host countries and investors are "0".

II. In the case that the action strategy of the host country H is "Y" : if the strategy of investor M in the host country R is "I", the benefit of the investor is "Y'M" and the benefit of the host country R is" Y′H−BC−BR "; If the strategy of investor M in the host country U is "I", the profit of investor is "E′M" and that of the host country U is " E′H−BC−BR "; If investor M adopts the strategy "DI", the investor's return is "0", and the return of the two types of host countries is "−BC".

III. For the host country H, if the strategy is "Y", because the expected return of investor M is positive, M will increase its investment, and then the return of H will also increase accordingly. Therefore, for the host country R there is "Y′H > YH > 0", for the host country U there is "E′H > EM > 0"; For investor M, if M invests in R, there is "Y′M > YM > 0"; but if M invests in U, there is "E′M < EM < 0" (EM < 0 means that the investor may suffer from the direct expropriation of the host country, or the indirect expropriation of the host country has a large enough erosion degree, and its effect is equivalent to the direct expropriation, resulting in the termination of the investment project. On the premise that the expected return of investors is positive, when M increases investment after receiving the signal of "signing BIT", "E′M < EM" will occur due to U's motivation of non-cooperation).

IV. Set the revenue function of host country R as: VR (gj , ak , R) , j = 1,2; k = 1,2;
The revenue function of the host country U is: VU (gj , ak , U) , j = 1,2; k = 1,2;
Returns for investors: VM (gj , ak , hi) , I = 1,2; j = 1,2; k = 1,2;
Under different strategies, the specific benefits of each party are shown in Table 1.
When the two host countries adopt strategy "Y" at the same time, then:

$$P_{(R|Y)} = P_{(R|N)} = P_{(R)} = \theta;$$

$$P_{(U|Y)} = P_{(U|N)} = P_{(U)} = 1 - \theta;$$

$$a^*_{(Y)} = \underset{a \in A}{\arg\max}\left[P_{(R)} \cdot V_M(Y, a, R) + P_{(U)} \cdot V_M(Y, a, U)\right] = a_1 \ ;$$

$$a^*_{(N)} = \underset{a \in A}{\arg\max}\left[P_{(R)} \cdot V_M(N, a, R) + P_{(U)} \cdot V_M(N, a, U)\right] = a_1.$$

Table 1: Benefits of all parties under different strategies

Revenue to reliable host country R	Revenue to unreliable host country U	Investor M returns
$V_R(g_1, a_1, R) = Y'_H - B_C - B_R$	$V_U(g_1, a_1, U) = E'_H - B_C - B_R$	$V_M(g_1, a_1, R) = Y'_M$ $V_M(g_1, a_1, U) = E'_M$
$V_R(g_1, a_2, R) = -B_C$	$V_U(g_1, a_2, U) = -B_C$	$V_M(g_1, a_2, R) = 0$ $V_M(g_1, a_2, U) = 0$
$V_R(g_2, a_1, R) = Y_H$	$V_U(g_2, a_1, U) = E_H$	$V_M(g_2, a_1, R) = Y_M$ $V_M(g_2, a_1, U) = E_M$
$V_R(g_2, a_2, R) = 0$	$V_U(g_2, a_2, U) = 0$	$V_M(g_2, a_2, R) = 0$ $V_M(g_2, a_2, U) = 0$

Source: calculated by authors.

If "Y′H−YH > BC +BR and E′H−EH > BC +BU" (this is the sufficient condition for the two types of host country to sign BIT: "BC +BR" is the cost of host country R after signing BIT, "Y′H−YH" is the increase of investor M after signing BIT of host country R, and the increase of income gained by host country R accordingly; Similarly, "BC +BU" is the cost generated after the host country U signs BIT, and "E′H−EH" is its corresponding increment of revenue), then:

$$V_R\left(Y, a^*_{(Y)}, R\right) > V_R\left(N, a^*_{(N)}, R\right);$$

$$V_U\left(Y, a^*_{(Y)}, U\right) > V_U\left(N, a^*_{(N)}, U\right).$$

At this point, a pooling equilibrium occurs, and the equilibrium strategy is: (Y, Y), (I, I).

Similarly, all kinds of equilibrium solutions under the signal transmission game can be found, as shown in Table 2.

Pooling equilibrium under the situation I: Two types of the host country after signing BIT yields were greater than the cost ("Y′H−YH > BC +BR", "E′H−EH > BC +BU"), so the two kinds of the host country will compete against each other to sign BIT, attract investors to invest in competition, two kinds of the host country of the strategy "Y" is adopted, at this time, investors can′t effectively distinguish types of host country, as investors expected return is positive ("θ · Y′M + (1−θ · E′M > 0"), investors will continue to invest, Increase the size of your investment in different types of host countries ("Y′M" for the return on investment in host country R and " E′M" for the return on investment in host country U).

Table 2: Signal model equilibrium solutions

The premise condition	Type	Equilibrium	Investor optimal strategy	Host country optimal strategy	Situation
$\theta \cdot Y'_M + (1-\theta) \cdot E'_M > 0$ $Y'_H - Y_H > B_C + B_R$ $E'_H - E_H > B_C + B_U$	Pooling equilibrium	(Y, Y) (I, I)	$a^*_{(Y)} = a_1$ $a^*_{(N)} = a_1$	$V_{h_l}(Y, a^*, h_l) > V_{h_l}(N, a^*, h_l)$	I
$\theta \cdot Y'_M + (1-\theta) \cdot E'_M > 0$ $Y'_H - Y_H < B_C + B_R$ $E'_H - E_H < B_C + B_U$	Pooling equilibrium	(N, N) (I, I)	$a^*_{(Y)} = a_1$ $a^*_{(N)} = a_1$	$V_{h_l}(N, a^*, h_l) > V_{h_l}(Y, a^*, h_l)$	II
$\theta \cdot Y'_M + (1-\theta) \cdot E'_M <$	Pooling equilibrium	(N, N) (DI, I)	$a^*_{(Y)} = a_2$	$V_{h_l}(N, a^*, h_l) > V_{h_l}(Y, a^*, h_l)$	III

0 $Y_H > 0$ $E_H > 0$			$a^*_{(N)} = a_1$		
$E_M < 0$ $Y'_H - B_C - B_R > Y_H > 0$ $E'_H - B_C - B_U < 0 < E_H$	Separating equilibrium	(Y, N) (I, DI)	$a^*_{(Y)} = a_1$ $a^*_{(N)} = a_2$	$V_R(Y, a^*, R) > V_R(N, a^*, R)$ $V_U(N, a^*, R) > V_U(Y, a^*, U)$	IV

Source: calculated by authors.

Pooling equilibrium under the situation I: Two types of the host country after signing BIT yields were greater than the cost ("Y′H−YH > BC +BR", "E′H−EH > BC +BU"), so the two kinds of the host country will compete against each other to sign BIT, attract investors to invest in competition, two kinds of the host country of the strategy "Y" is adopted, at this time, investors can′t effectively distinguish types of host country, as investors expected return is positive ("θ · Y′M + (1−θ · E′M > 0"), investors will continue to invest, Increase the size of your investment in different types of host countries ("Y′M" for the return on investment in host country R and " E′M" for the return on investment in host country U).

Pooling equilibrium under the situation II: the two types of host country sign BIT costs were greater than the benefits, so the two kinds of the host country of the strategy "N" is adopted, at this point, investors still can′t effectively distinguish host type, but given the expected earnings of the current investors are ("θ · Y′M + (1−θ) · E′M > 0"), so the investors to invest, but doesn′t increase the existing investment scale.

Pooling equilibrium under the situation III: the investor expects that after receiving the "signing BIT" signal from different types of host countries, the expected return to increase the investment scale in different types of host countries is negative ("θ · Y′M + (1−θ) · E′M < 0"), and the investor will not increase the investment scale again on the basis of the original expected investment. The host country also doesn′t send a "signing BIT" signal to avoid the cost of signing a BIT.

Separating equilibrium under the circumstances IV: when the host country R sign BIT cost ("BC + BR") is less than its gains after the sign BIT ("Y′H - YH"), and the host country after U sign BIT earnings are insufficient to cover the cost of the sign BIT (" E′H−BC−BU < 0"), "Signing BIT" is an effective signal for investors to distinguish "untrusted" host country from "trusted" host country.

Conclusions

Under the analysis framework of Sasse, the model assumptions were further relaxed, and the conditions for the bilateral investment agreement as an effective signal ("Y′H−BC−BR > YH","E′H−BC−BU < 0") were found based on the non-negative expected investment return of investors. In essence, due to the differences in BIT compliance costs, different types of host countries have different costs of sending BIT signals. Only host countries with superior investment environment will face smaller compliance costs, which provides investors with the basis to distinguish different types of host countries, thus alleviating the time inconsistency problem to a certain extent.

The signaling power of the BIT is limited. For investors, a positive expected investment return is a sufficient condition for them to adopt an investment strategy. Even with incomplete information, investors may face the risk of "Unreliable" host country "non-cooperation". Of course, BIT signaling can improve investors' expected returns to some extent, especially if BIT is used as a valid signal.

Signing up to a BIT costs money, especially when the high standard BIT is constantly being upgraded. If under the premise that the existing BIT, two types of the host country in confusion is balanced, investors cannot identify the two, the competition of attracting foreign capital in the relationship between the host country, encourages each other constantly upgrade BIT version and content, until the poor investment environment of host countries abide by the high cost to cannot cover the benefits brought by the signing BIT, this for the host country in the capital competition, need to bear the cost of a larger especially poor that one party to the environment. Under the premise that global investment rules are not yet unified, BIT is still the bearer of international investment rules. For host countries, BIT versions and contents should be signed selectively according to their own needs to introduce foreign capital, to balance the relationship between investment interests and domestic economic sovereignty.

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Knowledge and Innovation as Key Drivers of Craster-Network Development of The Regions and Countries in The Conditions of Digitalization

Natalya N. MASYUK
Vladivostok State University of Economics and Service, Vladivostok, Russia
masyukn@gmail.com orcid.org/0000-0001-8055-8597/ E-3887-2016

Marina A. BUSHUEVA
Plekhanov Russian University of Economics (Ivanovo branch), Ivanovo, Russia
bush.mar@yandex.ru orcid.org/0000-0002-2512-4769/ E-4006-2016

Vitaly N. Suprunenko
Vladivostok State University of Economics and Service, Vladivostok, Russia
suprunenkovn@gmail.com

Abstract

World processes associated with the transition to a new stage of economic development called the "new economy", "knowledge economy", are characterized by a high level of innovative activity, which is manifested in the introduction of new knowledge and innovative technologies. Regional economies in the context of cluster-network development and the emergence of digital technologies impose new requirements on people who must possess digital competencies and improve their knowledge continuously, throughout their lives. In this regard, the role of educational technologies offered on the market is increasing and making it possible to continuously study on a distance basis using e-learning opportunities. The article substantiates the thesis that innovations and knowledge affect the cluster-network development of regions and countries; for the constant replenishment and renewal of knowledge, the expediency of using e-learning opportunities throughout life is substantiated. The statistical data of the TOP-25 developed countries according to the level of the Global Innovative Index (GII) (2018) are presented, as well as some other indicators related to it, namely: knowledge absorption, the state of cluster development, and knowledge technology output.

Keywords: Innovation, Knowledge Management, Clusters, Cluster-Network Structures, Digitalization, E-Learning, Global Innovation Index.

Introduction

Today, almost all world economies are interested in moving to an innovative path of development. This is due to the increased demand for innovations - new knowledge and original technological solutions [1,21,29]. The objective needs to take into account the innovation factor is becoming a decisive condition for the further development of the modern economy. A long-term statement of the fact that economic growth in the region can be achieved only on an innovative basis with the active use of modern scientific and innovative developments, should move on to real action.

However, the arrival of new technologies is not supported by the creation of new, progressive paradigms in education. Technologies make it possible to access new information, but, on the other hand, exacerbate the problem of specialized and regional-sectoral imbalance in the training of highly qualified specialists. Moreover, this problem is aggravating at a very fast pace [26].

Knowledge management is not only database management, not administrative regulation, it is, first of all, the management of people who are united by a common regional economic problem, generate ideas, develop development models, and are able to effectively act towards the progressive implementation of changes [14,15,19]. The driver of development, the source of growth and prosperity, as well as the factor determining the competitiveness of enterprises, countries, and regions, is the creation, use, and effective exchange of knowledge. The knowledge

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economy is a type of economic development in which the development of science and education, as well as other knowledge-intensive industries and services, is predominant.

An important condition for building an innovative economy is the modernization of the educational system. To ensure innovative growth, a transition to a “knowledge society” and a knowledge-based economy is necessary [18,26]. In addition, global competition is now intensifying, including the competition of education systems, which encourages continuous improvement of technologies, the introduction of innovations, and rapid adaptation to the dynamically changing conditions of our time [22]. In addition, there is another serious problem that is relevant for Russia as well - the inconsistency of the level of professional training of specialists with the social order and the requirements of employers [16]. Also, getting a quality education is included in the range of value orientations of citizens. All these, in some places not related to each other, problems caused by digital transformations [12], modern scientists have found the most optimal solution - the creation of educational clusters and cluster-network associations [13].

Method and Methodology

The main research method is the comparative method, which makes it possible to provide a reasoned substantiation of the author's thesis about the interrelation and mutual influence of knowledge and innovation on the clustered development of regions and countries.

Results

The functioning of the cluster-network model of the region depends on many factors: the creation of an intersectoral, intersectoral, and interdepartmental system of public administration and business structures; development of multichannel resource supply; creation of a unified information system; training of professional leaders with knowledge of strategic management, etc. According to N. Smorodinskaya, firstly, the drivers of economic growth of clusters are the effects of knowledge overflow or externalities that arise not only within industries (Marshall externalities inherent in traditional agglomerations) but also between related industries (Jacobian externalities, generating diversification of production), represented in clusters [30]. At the same time, the effects of the overflow of tacit knowledge (tacit knowledge) circulating within the partnership network, in particular between the cluster members (what Marshall called a "special atmosphere"), are of particular importance. Secondly, innovations require a systematic approach, that is, the presence of a system of network connections of agents for the joint creation and distribution of innovations [30].

The intellectualization of the economy through the creation, use, and distribution of new knowledge becomes the basis for the development of society, since “unlike traditional resources, information and knowledge are not depleted in the process of use and, included in the production system, have a much greater value than outside it” [8]. Under these conditions, clustering processes play a significant role [32], as evidenced by the data given in Table 1.

Many modern researchers agree that knowledge plays an important role in generating innovations, which, in turn, are the drivers of cluster-network development of regions and countries in general [4,5,9,10,25,31]. At the same time, knowledge management acquires not only regional but also national significance [22]. The data in Table 1 show that there is a certain (albeit indirect) relationship between the innovativeness of a region (country), and the development of clusters, although without conducting a special study that goes beyond the scope of this article, it is impossible to accurately establish the nature and closeness of this relationship.

As I. Nonaka and H. Takeuchi argue, when organizations innovate, they do more than simply process information from external sources to solve existing problems and adapt to a changing environment; organizations on their own create new knowledge and information necessary to develop a new approach to both problems and their solution, and as a result - to change the organizational environment [2] and, ultimately, create a favorable educational environment.

Table 1 - Indices of innovativeness and clustering (2018)

Country	Global Innovative Index (2018)		State of Cluster Development		Knowledge absorption		Knowledge Technology Output	
Switzerland	68.4	1	68.6	11	53.3	9	74.9	1
Netherlands	63.3	2	73.4	4	77.9	1	63.7	2
Sweden	63.1	3	67.4	15	49.4	14	60.1	3
UK	60.1	4	72.6	5	42.4	24	48.2	13
Singapore	59.8	5	69.6	9	72.4	2	51.3	11
USA	59.8	6	78.4	1	53.8	7	55.6	6
Finland	59.6	7	67.0	16	48.8	15	53.5	8
Denmark	58.4	8	61.3	22	41.0	26	46.9	15
Germany	58.0	9	73.9	3	42.6	22	52.2	10
Ireland	57.2	10	62.7	19	53.8	6	56.6	4
Israel	56.8	11	57.0	31	52.9	10	54.8	7
Korea (Rep)	56.6	12	59.6	27	48.2	16	53.3	9
Japan	55.0	13	69.1	10	53.3	8	48.6	12
Hong Kong (China)	54.6	14	72.4	6	56.7	3	36.7	26
Luxembourg	54.5	15	67.5	13	51.8	11	47.9	14
France	54.4	16	61.4	20	47.0	17	41.6	19
China	53.1	17	59.6	26	51.7	12	56.5	5
Canada	53.0	18	60.4	23	42.5	23	39.5	22
Norway	52.6	19	67.4	14	36.3	38	37.6	25
Australia	52.0	20	49.7	49	33.8	46	31.9	38
Austria	51.3	21	65.7	17	42.8	21	34.3	32
New Zealand	51.3	22	51.4	43	37.5	36	32.1	37
Island	51.2	23	51.6	42	34.6	42	35.2	30
Estonia	50.5	24	45.5	68	35.6	39	35.9	29
Belgium	50.5	25	63.7	18	39.1	30	40.2	20
…	…	…	…	…	…	…	…	…
Russian Federation	37.9	46	42.3	79	38.1	35	28.9	47

Source: Global Innovation Index 2018.
https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018-appendix1.pdf

The educational environment as a system arises remains and develops where there is a need for the exchange of knowledge between its subjects. Under the influence of objectively forming environmental factors that require updating existing knowledge, an imbalance of the educational environment arises, which inevitably leads to an asymmetry of all its components, the formation of new goals, educational

content, methods, and forms of education, predicted results of educational activities and the resources available for this: human resources. , financial, scientific, informational, and others.

The result of the mismatch is the search for new educational technologies, resources, reserves of innovative development, which, in turn, lead to the discovery of new ways to radically change the educational environment. There is a public need for new knowledge, competencies, skills to act for all subjects of the educational environment [6], as well as the need for educational programs of lifelong education for adults ("lifelong learning") using e-learning [17,23].

An important component of the process of generation, use, reproduction, and distribution of new knowledge is knowledge transfer, the essence of which is the transfer between various organizational structures and knowledge processes, which are not only the initial data, but also the end result of the innovation process, where external knowledge is combined with internal ones. accumulated in the course of previous innovation processes, including technologies, experience, and skills, are transferred from one side to the other, leading to innovations in the economy and social sphere [24].

The above processes of creation, use, reproduction, and transfer of knowledge, aimed at increasing the level of socio-economic and innovative development of regions, can be defined as knowledge management. At the same time,

collective knowledge is based on individual knowledge, therefore, the knowledge management process should affect each person, because it is the person who is the main value, because thanks to his knowledge and interaction in the team he can provide the competitive advantages of any enterprise [27]. Thus, the management of innovative knowledge is the basis for the development of business entities, regions, and the country [22]. The new knowledge gained at the regional level is transformed into competencies, which are manifested in the creation of innovative products, processes, and technologies, thereby ensuring an increase in the competitiveness of these entities. In the context of the above, the cluster approach is viewed as a promising direction for the innovative development of the regional economy [3, 7, 11, 20].

Conclusion

Knowledge, as a resource, in the knowledge economy, is an endless source. The main bearer of knowledge is an educated person. Therefore, the information environment should provide a significant increase in the aggregate knowledge in society, the development of human capital. This predetermines the free exchange of knowledge and active consumption of knowledge, especially in the educational environment]. The knowledge economy is inextricably linked with a constant cycle of innovative development. The ability to create new knowledge, technologies, processes, the ability to access new knowledge, and the possibility of its effective commercial use are all fundamental elements of competitiveness, both at the regional and global levels. Innovation is the main form of translating knowledge into wealth and is a key characteristic of the knowledge economy. As studies by economists show, innovation today is the main source of economic growth and the most important factor in the competitiveness of enterprises, regions, and national economies. The development and implementation of innovations are closely linked with the creation, assimilation, and application of knowledge, that is, innovation and knowledge are a single whole, which cannot be divided in principle. The ability to perceive knowledge is, first of all, the ability and ability to learn, and, therefore, to assimilate and use the acquired knowledge in practice.

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Economic and Social Influences of The Equestrian Sector Development in Romania

Oana Daniela LUPOAE
"Dunarea de Jos" University of Galati, Galati, Romania, oana.lupoae@yahoo.com

Andrei-Mirel FLOREA
"Dunarea de Jos" University of Galati, Galati, Romania, floreaandreim@yahoo.com

Riana Iren RADU
"Dunarea de Jos" University of Galati, Galati, Romania, raduriana@gmail.com

Dumitrache Bogdan BRATOVEANU
"Dunarea de Jos" University of Galati, Galati, Romania, bogdan.bratoveanu@ugal.ro

Silvius STANCIU
"Dunarea de Jos" University of Galati, Galati, Romania, silvius.stanciu@ugal.ro

Abstract

The equestrian sector has an important role in protecting the environment, social welfare and economic growth. Currently this sector is in the development stage both internationally and nationally. The horse remains on a competitive market regardless of the form of tourism, management or marketing, because it respects the natural, social and economic integrity of the environment, ensuring the exploitation of natural and cultural resources for future generations. Sustainable tourism development is not just a concept when it comes to horses but it is a starting point for meeting the needs of the tourists and of the local population.

In Romania, equestrian sports are not as developed as in other states, whether they are sports events or recreational activities.

The aim of the study is to provide a broader perspective for the future management of the equestrian industry, as well as for the development capacity of this market.

Keywords: Equestrian sports, economy, tourism, management, sustainable development.

Introduction

The equestrian sector underwent a huge transformation mainly in the second half of the last century (Baldacchino et al., 2015). The role of horses in agriculture has been taken over by tractors and machinery, while animals have been increasingly kept for recreation and sports (Fine, 2010), the equestrian activities being among the few growing industries (Helgadóttir and Sigurðardóttir, 2008). Unlike the main heavily subsidized agricultural sectors, the current equestrian sector is market-driven with minimal government intervention.

To develop a harmonious society, the equestrian sport provides a favourable development environment for the sports industry, but also for the economy (Newsome et. al, 2008). Equestrian sport as an emerging industry has a critical impact on the Romanian economy, but it has still been facing opportunities and challenges (Plesoianu, 2017). So far, the tourism that can be developed due to equestrian sports has received minimal attention. In any case, it has been found that the segment offers significant opportunities especially for regions and rural communities that strive to expand and develop their tourism product (Lane, 2009).

Little research has been done on the small-scale event sport tourism (Ritchie, 2004), especially when organized in regional areas. Events based on equestrian sports encourage participants and spectators to stay at least one night away from their place of residence, so this has increasingly developed the leisure industry, as well as tourism (Kotze, 2006). These sport-based events, whatever there is a serious competition structured at international level or

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of a recreational and non-competitive kind, can make a positive contribution to the economic mix of cities and regions (Burgan and Mules, 2001) by improving sports facilities (French and Disher, 1997), by strengthening a target image (Brown et. Al., 2002) and by supporting demand management (Hingham and Hinch, 2002). The objectives of the present paper are represented by the analysis of the theoretical and empirical aspects of the importance of equine rearing, but also by the analysis of the economic and sustainable impact of the equines on society.

Methodology

In what concerns the research methods, the method most frequently used in the paper is the comparative method, and the arguments justifying the use of this method are that the similarities and dissimilarities between different countries regarding equestrian sports have been identified. The approach and the way of carrying out the work are impartial, able to answer punctually to the following questions:

Q1: Can the equestrian sector be an important part of a country's economy and ensure the development of tourism?
Q2: Can the equines play a sustainable role in sustainable development?

The information was collected by literature review as scientific databases (Clarivate Analytics, Elsevier, ResearchGate), international databases (FAOSTAT, EUROSTAT) and national statistics (National Institute of Statistics NIS). The results of research showed the importance of this system in the context of sustainable rural development through agro-tourism and equitation.

Results of the study

The economic and social impact on the equestrian sector

The turnover generated by the equine animal sector represents an important subject in research. The equines play an important role in the national economy and agriculture for many European countries. The stud farms are part of the traditional agricultural enterprises which have managed to develop in the last years both on social and economic levels. The social and economic activities focused on equines involve many sectors, as it is presented in Table no. 1.

Table 1: Impact of equine activities in various activity sectors

Activity	Impact		Explanations
	economic	social	
Services			
Equitation	✓	✓	Equitation is one of the healthiest sports. A group of researchers from Tokyo University of Agriculture conducted a study, proving that the children who participated to the equitation session showed improvements in cognitive skills, the horse-riding courses supporting and perfecting the memory, learning and problem solving (Ohtani et al., 2017).
Hippotherapy	✓	✓	The use of horse-based therapy leads mainly to neurological and sensorial improvements (Corraland and Fernández, 2011). Therefore, this discipline is especially indicated for certain physical and intellectual disabilities and for some psychological disorders, being quite effective in assisting paralyzed or autistic people (Cuypers et. Al, 2011). Hippotherapy is practiced by the Riding for the Disabled Association and by Donkey Sanctuary organization in the United Kingdom. One or many organizations or individual members of the Federation of Horses in Education and Therapy International AISBL (HETI) is/are registered in 21 EU Member States.
Sport contests	✓	✓	The largest turnover is found in the horse racing industry, the most popular being the jump racing, France being one of the countries with the highest number of races (Liljenstolpe, 2009; Craig, 1982)
Sports betting	✓	✓	The end of the 19th century was marked by the appearance of "pari-mutuel" bets. Modern bettors owe the emergence of this system to the Frenchman Pierre Oller. Currently, "pari-mutuel" betting is considered to be one of the most widespread betting systems on the market. People bet certain amounts of money on a certain result, and the money is placed in a prize pool. Once

Activity	Impact		Explanations
	economic	social	
			the result becomes known, the prize pool is divided between the winning bettors. Betting has always given this sport a certain charm, probably this is the reason why horse racing has managed to maintain its professional sports status over the years. After the First World War, the racetracks have begun to attract a larger audience eager to take a look at the great and incomparable horse Man o 'War. It has become a legend among bettors because no other horse has achieved such incredible results - 20 races won out of 21 starts and winnings of $ 249,465 (Drager, 2020) The betting turnover varies in different European countries, the highest betting turnover being in the United Kingdom, France, Ireland, Italy and Sweden. The race betting is an important source of income for the equestrian sector in France (Liljenstolpe, 2009).
Tourism	✓	✓	Unfortunately, the equestrian tourism is very poorly promoted in Romania, as compared to other countries, although the potential is much higher - a developed infrastructure, captivating routes, a tourist guide with training in the field and an attractive guesthouse can make it occupy an important position in the economy. Also, equestrian competitions can be organized in order to develop the equestrian tourism (Sigurðardóttir, 2018).
Energy capacity	✓	X	The Romanian horses have always been appreciated for their special qualities (energy capacity, tensile strength), managing in the past to contribute a lot to the development of agriculture.
Horse parades	✓	✓	An activity often encountered at various social and cultural events.
Products			
Equestrian trade	✓	X	Several criteria are taken into considering when establishing the price of a horse, out of which the most important is the "professional" skill of the animal. A race horse must have excellent speed, a regular and strong jump, the natural beauty of the movements being the result of an adequate training. The origin (pedigree) of the horses plays an important role. The zoo-technical principle "obtain the best from the best" has not been canceled, as champion parents often produce talented offspring (in any sport). The most expensive horse in the world costs $ 70 million, being the record holder-Fusaichi Pegasus (Mostfamouslist, 2019). The Frankel stallion has a national value of $ 200 million, but it is not for sale. Frankel is the winner of many prestigious races, the experts observing the uniqueness of the stallion, claiming that it has incredible power. The champion has ended its racing career and is famous for being the best producer of purebred horses in the world. 1974 was a landmark for tractors, because the first pedigree book of the Trakehner breed was created in that year (Trakenen horse breed is the national pride of Germany) (Exceltur, 2018).
Medicine	✓		Obtaining vaccines and serums
Human food	✓	X	o Horse meat The value of total horse meat imports was about $ 557 million in 2011, at a traded amount of 133.6 thousand tons. Global exports were about $ 568 million, at a quantity of 140.6 thousand tons of meat (Stanciu, 2015). According to the Observatory of Economic Complexity (OEC) in 2018, Italy was the largest consumer of horse meat, with a share of 24.7% of total imports worldwide. In Romania, as well as in the areas of Anglo-Saxon influence, the horse is not a traditional source of meat, but there is evidence of horse meat human consumption since ancient times. (Stanciu et all, 2013)
	✓	X	o Mare milk Mare milk is consumed fresh or as dairy products, the most known being CUMIS fermented dairy product ("water of life" in Kazakh) recommended in traditional medicine for various illnesses (tuberculosis, digestive diseases, tetanus etc.). Specialized herds are used for obtaining the kumis in some former Soviet Republics (the mares produce 15-20 l milk/day and 2000-3000 l milk /year).

Activity	Impact		Explanations
	economic	social	
	✓	X	○ Garments and leather goods The horse skin is used in garment, footwear and leather industry.
Artistic activities	✓	X	The protective hair (mane, tail) is used to make violin bows or brushes.
Obtaining fodder	✓	X	Blood, bones, hooves - production of protein meal, glues, special oils, gelatin (blood volume is 10-15% of the animal's weight)
Breeding Artificial reproduction (semen)	✓	X	Artificial insemination was quickly adopted as the main breeding technology in several countries. The development of artificial insemination has provided an opportunity in several farms in Europe, including Romania, this technology calling for greater transparency in different countries regarding the genetic quality of marketed stallions - in the world of horse breeders, "genetics is king". Big Star is one of the most valuable horses with the most spectacular shows of all time; one can pay $ 1,200 for a single sequin, and maybe in three or four years the resulting foal can be sold for few $ 100,000. One gallon (4 liters) of this horse's semen is worth $ 4.7 million. Once collected, the semen can be separated and sold in small tubes called sequins (BI, 2017).
Farmyard manure	✓	X	It is used in agriculture as fertilizer or in producing bio fuels.

Source: Issued by the authors

According to information provided by the International Equestrian Federation, the equine sector is worth over € 100 billion annually (Girling, 2017).

According National Economic Impact Study of the American Horse Council Foundation (2017), the horse industry contributes about $ 50 billion to the direct economic impact on the U.S. economy and has a direct impact on employment of 988,394 jobs (EBA, 2018). In addition, the industry itself contributes with $ 38 billion in direct wages, salaries and benefits. From these direct effects, the contribution of the horse industry spreads to other sectors of the economy. The addition of these corrugation effects results in an estimate of the horse industry's total contribution to the US economy of $ 122 billion and a total employment impact of 1.7 million jobs.

According to a study performed by Kusch (2013), the horse population in Germany is about 1.2 million means an increase in the last 40 years and the provision of a workforce for about 300,000 people, generating a turnover of over Euro 5 billion in 2012. Therefore, we will further analyse the link between the turnover generated by this sector, the number of employees in the field and the horse population in different countries, on the one hand, and the link between costs and revenues, on the other hand.

❖ *The turnover generated by the equestrian sector, the number of employees in the area and the horse population in various countries*

The Food and Agriculture Organization of the United Nations (FAOSTAT) estimated in 2018 that the number of horses in the world is 57,780,233, Romania, the United Kingdom (Great Britain) and Germany having the largest number of horses among the countries in the inveterate strong countries of the European Union (Nils-Gerrit Wunsch, 2020). Based on the data provided by Eurostat, a higher horse population density occurs in regions with a higher level of consumption, a higher level of education and low unemployment rates.

Figure no.1 showed the population of horses in regions that give a special importance to equestrian sports.

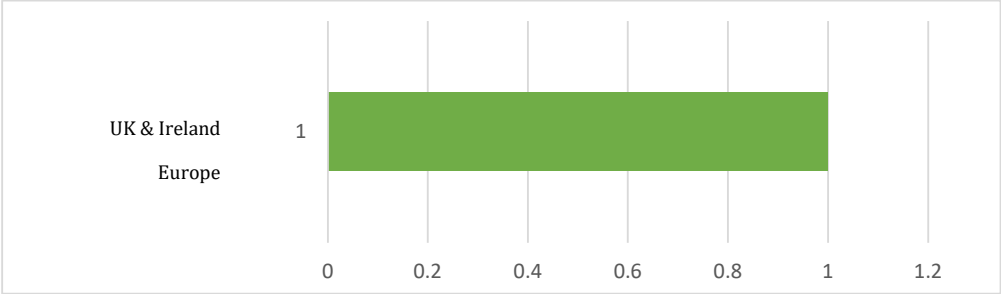

Figure 1: World horse population

Source: Authors, based on EBA data (2017)

As we can observe, the largest share in the number of horses is held by Europe and USA; accordingly, a comparative study on these two regions on horses and employees in this area will be performed (Figure no. 2).

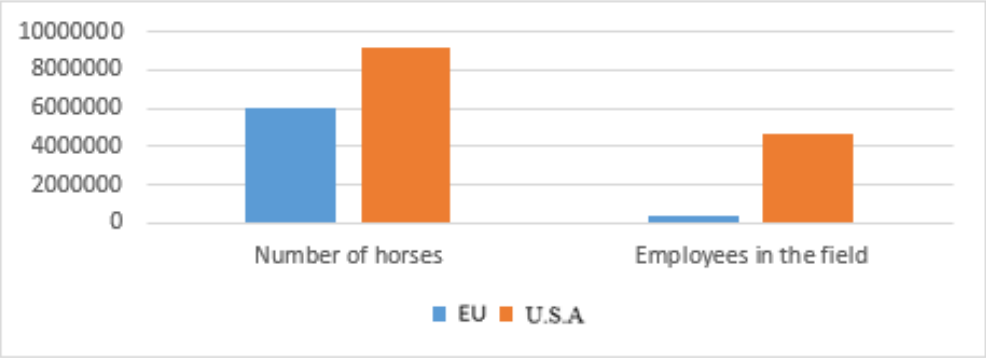

Figure 2: Comparative statement between Europe and the USA

Source: Authors, based on EBA data (2017)

Approximately 4.6 million employees are directly involved in this sector in the USA, which has a direct economic impact of $ 50 billion. The USA has global herds assessed at 9.2 million horses, being above the level of Europe. According to the Report on the responsible ownership and care of equidae (INI, 2016/2017) prepared by the European Commission, the Directorate for Agriculture and Rural Development, the estimated population of equidae in Europe is 6-7 million, using for rearing over 2.6 million hectares of land, being generated a job for every 6-7 animals raised.

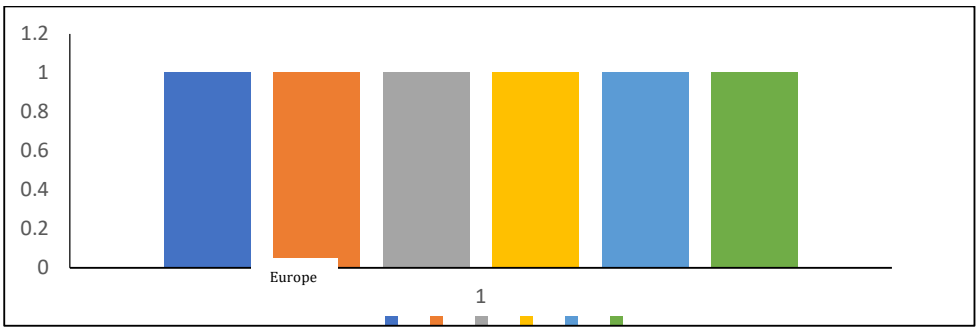

Figure 3: Status of income obtained from the equestrian sector.

Source: Authors, based on EBA data (2017)

The European equine sector is worth over € 100 billion a year, with an additional € 27.3 billion in 2013 due to the betting sector. The taxes related to this sector at European level amounted in 2016 to over Euro 1.1 billion (EP, 2017). According to the data presented in Figure no. 3, Europe occupies the first position at world level in the statistics of the income obtained after the exploitation of the equine rearing sector. France and the United Kingdom are very close what concerns the number of animals and of jobs created, being also the countries in Europe with the most developed sports competitions and horse sales. From a value point of view, the largest turnover of the sector is held by France.

In Europe, the horse population amounts to about 6-7 million, with the largest numbers in Romania, Germany and Great Britain, followed by France (Table no. 2).

Table 2: Status of equines per 1000 inhabitants and 1000 ha field- average 2017-2019

	Total number of equines				
Countries	**Number of equines**	**Population**	**Land area in ha**	**Horses /1000 people**	**Horses / 1000 ha**
Germany	442,000	82,437,995	35,738,600	5.4	12.4
Spain	307,441	43,886,000	50,599,000	7.0	6.1
Finland	74,400	5,266,000	33,844,000	14.1	2.2
France	370,881	62,998,773	64,380,100	5.9	5.8
Great Britain	418,856	60,393,044	24,249,500	6.9	17.3
Lithuania	16,324	2,289,000	6,530,000	7.1	2.5
Sweden	102,318	9,047,752	45,029,500	11.3	2.3
Romania	447,791	19,950,000	23,839,700	22.4	18.8

Source: Eurostat; the Romanian National Institute of Statistics (NIS), FAOstat

According to the National Institute of Statistics NIS, Romania held in the year 1961 a number of 1,000,000 of horses, number reduced almost to half at present (NIS, 2020).

According to studies in the UK and Sweden, the equestrian sector generates a direct turnover from € 1,100 to € 2,800 / year / horse (Häggblom et. Al., 2012; EBA, 2017). Considering an example in which 6-7 horses generate full-time employment, it can be estimated that the equine sector contributes between 15 and 20 million full-time jobs globally. This both vibrant and valuable industry contributes with £ 8 billion a year to the Great Britain economy. Direct employment in the equestrian sector in Great Britain amounts to 50,000 people, and employment due to the indirect effects of industry is estimated at 150,000-200,000, figures corresponding to 5-7 horses on a full-time job (BETA, 2019).

In a study issued in Pennsylvania, the results showed that each job in the equine industry indicates a return of 0.36 jobs in the rest of the economy and every dollar spent on horses creates production outputs and added value of $ 0.75 and $ 0.86 in the rest of the economy (Liljenstolpe, 2009). According to Alltech's Steve Elliot, the industry's annual economic impact is significant - involving about $ 300 billion and 1.6 million full-time jobs (EBA, 2017).

❖ *Income and costs for equine handling*

The equine rearing cost varies greatly depending on the Member State and the region concerned, the purpose for which the animal is used and how it is reared. However, given that it is difficult to find a new owner, especially to sell it to a contracted market, some owners choose to slaughter or euthanize the animals (where it is allowed by law and reasonable in price). Sadly, often those who take responsibility for rearing a horse do not know the costs involved or the time involved in handling this animal.

On the other hand, the equestrian consumption for Romanian per capita income is large, as only those with high economic power can develop such a sport - although through its noble temperament and unique charm the equestrian sport attracts more and more enthusiasts, it means an investment and large capital consumption.

The horse handling cost can range between 250 and 700 euro / month, according to the data presented in Table no. 3, the expenses depending on the food used, the number of employees, horse training, and the cost of training.

Table 3: Monthly cost for horse handling

Countries	Average value of a horse (euro)	Monthly cost of handling (euro)
Germany	-	500
Spain	7500	400-600
Finland	5000	400-750
France	7500	300-350
Great Britain	7000	500-700
Poland	5000	250
Sweden	7000	250-600
Austria	8-10000	250-400
Romania	6000	250-300

Source: Eurostat, (2020)

The total annual expenses from the equestrian sector are around € 2.6 billion in Germany, and total sales reach to € 5 billion. Moreover, 3-4 horses in Germany create a full-time job (Liljenstolpe, 2009). British horse racing alone generated direct, indirect and induced expenditure of £ 3.45 billion, and this industry contributed with a tax of £ 276 million in 2012.

The market for equestrian sports and equestrian activities in Europe is the most important in the world. 21% of the world's thoroughbred horses come from the European Union. 93% of the 2013 obstacle races took place in the European Union, in addition to another 21,000 gallop races and 43,000 trot races. Also, most of the events in 2014 organized under the auspices of the FEI (jumping, training, mixed and para-training competitions) took place in the EU.

In China, the state of the economy determines the equestrian industry to gradually attract more attention, as the development and progress of the equestrian industry has laid a solid economic foundation. For example, in recent years, the city of Wuhan - Hubei Province has become the only city that has researched and developed the preparation of racing sports and games, estimating a major propulsion of the economy. This has led to regional economic development through the national tax, solving part of the problem of the agriculture by improving animal husbandry, aquaculture, tourism and other related industrial chains, and the academic training in the field having a promoting effect. The number of horse clubs in China has increased by 1500% in recent years, from 90 in 2010 to 1400 in 2017 (EBA, 2017).

Accordingly, we can say that a careful, responsible and specialized management can lead the equestrian sector to a competitive economic binder and by organizing sports competitions, sports betting and equitation camps, we can develop equestrian tourism, and by obtaining valuable products (foals), the investment in this field could become profitable.

Can the equines have a durable role in sustainable development?

The equine rearing has also positive effects on the environment, not only on biodiversity and alternative land use, as a horse produces 20 kg of manure / day, which can contribute to a concentration of nutrients (especially nitrogen and phosphorus), and the droppings from horses in Europe reach almost 100,000 tons, the manure being used as fertilizer.

The disposal of manure generates significant amounts of organic material, depending on the management of the stands and the chosen bed material. The equines generate huge quantities of organic waste. Possible management situations and concepts vary depending on different regions, depending on manure applications such as fertilizer or disposal costs, availability and costs for bedding, stand management, economic viability of the energy generated.

The manure is a valuable resource for the application as an organic soil modification and for the generation of renewable energy. Due to the use of different bedding materials and different managements, the manure produced by horses varies greatly depending on the quantities and contents generated. Bioenergy production is still poorly adopted in Romania and should be encouraged through development programs.

The intensity of CO2 emissions of the current energy mix in Romania exceeds the average level of EU countries; this can be replaced by the supply of energy from renewable sources and low carbon dioxide emissions, economically and technologically viable.

Conclusions

Due to the diverting, healthy and noble characteristics of the equestrian sports, the number of private owners in Romania has grown continuously in recent years, so the demand for quality breeds and related products has begun to grow. An increasing number of enthusiasts are beginning to access the equine sector, especially in economically developed areas, which could favour the development of this sector.

Long term, the development perspective of the equestrian industry in Romania, based on a strategic and efficient management, has high potential. For stable economic development, the funds allocated to equestrian sports should be increased through political support, and through the passion of the public for horse racing and the cultivation of more professionals, a new point of economic growth can be formed.

This theme is a topical issue, in full development, being a field of research less exploited and debated in the literature at national level, but with significant importance for society. The problems faced by the Romanian economy start from the existing inconsistencies in the legislative framework and in the regional and global development strategies.

The horses represent the cultural heritage, social connections, economic stake, environmental issues and traditional rural development actors in the history of the Romanian people. Recently, complex researches (with zoo technical, socio-economic and environmental impact) on the equine rearing sector have started, but it is necessary to increase the number of information and statistical data at national level.

The research can be also developed at a multidisciplinary level for a complete analysis of the complex opportunities offered by the equine sector at European and global level.

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Market Efficiency of Alternative Investments

Karol WOJTOWICZ

University of Warmia and Mazury in Olsztyn, Poland
karolw@uwm.edu.pl

Abstract

Market efficiency theory, introduced by E.Fama, is not only the most popular but also the most discussed theory of modern finance. According to the theory, security prices immediately and fully reflect all relevant information. The empirical research has focused primarily on financial instruments and stock exchange indices. Investors, striving to reduce risk by diversifying their portfolio, increasingly use alternative investment including commodity market instruments. From the beginning of the XXIst century, there is a relevant increase in commodity derivatives. According to the Futures Industry Association, the number of futures and options traded worldwide in 2018 amounted to over 30 billion contracts.

The main aim of the article is to verify the weak form of efficiency based on the selected alternative investment. The subject of the study was the most popular commodity derivates – crude oil, gold, copper, silver, corn, cocoa, and cotton. The analysis was carried out in the years 2000-2019.

Research has shown that alternative investments involving financial commodity instruments met the conditions of the weak form of market efficiency. Both the runs tests and auto-correlation tests proved random price formation. There were also no seasonal anomalies.

Keywords: market efficiency, alternative investments, commodities

Introduction

The increase in investment risk as well as the relatively low profitability of classic financial instruments encourage investors to look for new assets to build an optimal portfolio. The most popular alternative investments include real estate, hedge funds, private equity as well as products classified as emotional investments – art, alcohol (mainly wine, whiskey), noble elements, collectors' items. Investments in the commodity futures market are also an important group. The growing popularity of financial instruments based on commodities prices is related primarily to risk diversification. According to the Futures Industry Association, in 2018 over 30 billion futures and options were traded on the global financial markets. The growing number of investors, the way the market is organized, and the homogeneity of instruments are factors contributing to the efficiency of this asset. The main aim of the article is to verify the weak form of efficiency based on selected commodities market derivates. I included the most popular products - crude oil, gold, copper, silver, corn, cocoa, and cotton. The analysis was carried out in the years 2000-2019.

Literature Review - Information Efficiency

Efficiency is one of the most important terms in economics. As indicated by Dimson and Mussavian (2000), economists use the word in relation to operational efficiency, emphasizing the way resources are used to improve the functioning of the market. According to Samuelson and Nordhaus (2012), efficiency means the most optimal organization of production processes with given resources and technologies. It is a complex and multidimensional concept. As emphasized by Skrzypek (2012), efficiency can be defined using many terms, including efficiency, profitability, efficiency, productivity, effectiveness, purposefulness, rationality, as well as usefulness.

From a financial market perspective, the term efficiency is used to describe the market where the relevant information is reflected in the prices of financial assets. The scope and time in which the data will be included in the valuation of financial instruments determine the level of efficiency. The verification of the price formation process has been the subject of research for many years, but the genesis of information efficiency is seen in the paper of L. Bachelier – Theorie de la Speculation (1900). He pointed out that both past and present events are expressed in market prices, but often show no obvious relationship to their changes. The development of the contemporary

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concept of information efficiency took place in the mid-twentieth century when quantitative methods began to play an increasingly important role in the science of finance[1]. In 1965, Fama presented that in a perfect capital market, prices provide precise signals regarding capital allocation. In the article, Fama (1970) defined aperfect market as a one where companies can make investment and production decisions, and investors can choose securities that are owned by the companies, assuming that the prices of the securities at any time "fully reflect" all available information. Also, Malkiel (1992) emphasizes in his definition that in the efficient market, significant information is fully and correctly taken into account in the process of financial instruments' price formation. Janicka (2008) drew attention that, the definition of market efficiency has been modified, even its author, E. Fama, has clarified the meaning of the term over the years.

Fama (1991) distinguished three forms of market efficiency – weak, medium (or semi-strong), and strong – depending on the scope of information included in the prices of the securities. The weak form assumes that the market prices contain all relevant information from the past, while the semi-strong form increases the scope of information with all current data. According to the third, a most controversial form of efficiency, the prices of financial instruments also include non-public data, available only to some investors.

Shleifer (2000) mentioned that one of the basic assumptions of market efficiency is the rationality of their participants. Investors making rational choices correctly evaluate assets. Even that irrational investors are observed in the market, their decisions will not be reflected in prices, as they will eliminate each other at an aggregate level. For that matter, possible systematic irrational behavior will be eliminated by arbitrage and thus will not affect the prices of financial instruments.

The most important consequence of the market efficiency hypothesis is the inability to systematically achieve above-average profits. New information is immediately taken into account in investor decisions and thus in the price of the securities. Therefore, neither the technical analysis, which forecasts stock prices based on historical data nor the fundamental analysis based on the current information contained in the financial statements, make it possible to identify undervalued stocks, allowing for higher-than-average returns. The efficient market means that financial assets are always correctly valued by investors, adequately to the set of available data. At the same time, the most advantageous investment strategy seems to be a passive strategy, which allows you to achieve a market rate of return with minimal transaction costs. Haugen (1996) noted that a highly efficient market means that financial instruments are priced on the basis of all the information, so each stock has a return that is consistent with its own risk and CAPM model. The relationship between the rate of return and risk is fully transparent concerning all available information.

Research verifying the process of financial assets valuation initially concerned mainly the stock markets and stock exchange indices. Along with the growing interest in commodity markets, papers devoted to this segment began to appear. However, it should be emphasized, that they focused primarily on the oil market, selected popular agricultural products, and indices of commodity markets. One of the first article devoted to information efficiency of commodities was published by Roll (1972), who verified the commodity price index. The author showed that the market is ineffective due to a significant level of correlation of rates of return. Market efficiency studies of selected commodities were also conducted by Bigman et al. (1983), Gjolberg (1985), Kaminsky and Kumar (1989), Panas (1991) Charles and Darné (2009), Paschke and Prokopczuk (2012), Kristoufek and Vosvrda (2014). In Polish literature, it is worth mentioning K. Borowski's publications on calendar anomalies on the market of commodity contracts and commodities indices. The results of research on the agro market and soft commodities were presented by K. Borowski and M. Łukasik (2015), as well as A. Górska and M. Krawiec (2017).

The Commodities Market Derivates As Alternative Investments

Alternative investments are systematically growing in popularity among investors. As emphasized by Borowski (2012) the most important factors influencing the dynamic development of this segment of finance include the increased diversification of investment portfolios (as a result of the 2007 subprime crisis), as well as investment profitability, especially in the period of the market downturn. It is difficult to provide an unambiguous definition of alternative investments, due to the wide range of instruments that can be included in this category. Aspadarec (2013) draws attention to the division into four categories of funds, popular in the world literature: hedge funds, commodity funds, private equity/venture capital, and real estate funds. Another classification is proposed by Kasprzak-Czelej (2013), who distinguishes three groups of alternative investments:

[1] The turning point was the introduction portfolio theory by H. Markowitz (1952) and its development by: Sharpe, Lintner, Mossin, Ross, Fisher, Jensen, Black, Scholes and others.

- classic alternative investments (e.g. real estate, ETFs, PE / VC funds),
- modern financial instruments (e.g. hedge funds, derivatives, structured products)
- emotional investments involving collector's items (e.g. art, noble elements, collector's coins, stamps, wines, whiskey, cognacs, and even autographs of famous personalities, old books and comics, vinyl records, and many others).

One of the most important areas of alternative investments is financial instruments based on commodities. According to Portykus (2016) portfolios containing commodities allow investors not only to diversify the risk but also to limit the negative effects of inflation (monetary and also resulting from the low supply). Sierakowska (2015) underline in her book that the specificity of the commodity market is related to the fact that it connects two worlds – it can be considered both from the point of view of spot transactions and from the perspective of the financial market of goods. The first area concerns direct transactions in certain raw materials and goods. The second "world" consists mainly of commodity exchanges dealing with trading in financial instruments based on the commodities prices.

The first organized market for commodity futures trading was the Chicago Board of Trade, founded in 1848. Other commodity exchanges appeared in the second half of the 19th century. In the past, commodity markets were perceived as completely or partially independent of financial markets due to the low degree of correlation of instrument prices [Gorton, Rouwenhorst, 2006].

Financial commodities instruments appeared in the seventies of the XX century. The growing popularity of commodity derivatives was so great that three decades later, turnover exceeded traditional commodity contracts. The interest in financial instruments based on commodities was also observed in developing countries - since 2003 the volume growth rate was more than twice as high as compared to more developed OECD countries[2].

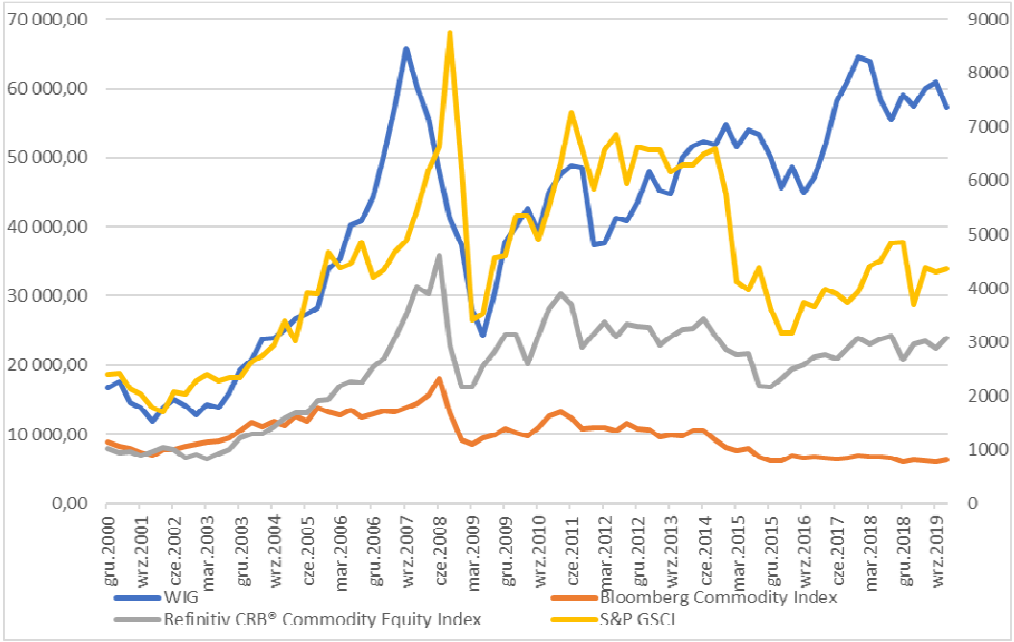

Fig. 1: Commodity markets indices (2000 – 2019)

Source: own study, based on Thomson Reuters Eikon

Figure 1 presents three most popular commodity market indices against the main Warsaw Stock Exchange (WIG) index of the: (a) CRB index – the oldest global index of commodity prices in the world; (b) S&P GSCI (Goldman Sachs Commodity Index) – one of the most recognizable benchmarks for investments in commodity markets and (c) Bloomberg Commodity Index – formerly Dow Jones-AIG Commodity Index (DJ-AIGCI), introduced in 1998 based on energy, seeds, industrial materials, metals, "soft" commodities, and meat. Since 2000, the dynamic growth of all indices has been observed, ending with a temporary slump related to the global financial crisis. After 2008, the trend is reversed and the interest of investors in the commodity futures market has increased again. The growing share in raw material derivative portfolios, the purpose of which was to diversify risk, contributed to an increase in

[2] Data based on United Nations Conference on Trade and Development - Overview of the world's commodity exchanges.

commodity spot prices. The growing share in commodities derivative portfolios, aiming to diversify risk, contributed to an increase in commodity spot prices. As Tomaszewski (2016) points out, this phenomenon, called financialization, means a significant increase in the importance of the financial sector (institutions, investors) on the functioning of commodity markets, primarily the impact on the prices of goods and raw materials. On the other hand, the inflow of capital to the commodities market, and increased investor activity, causes an increasing correlation of price volatility in the commodity and equity markets, thus reducing the effectiveness of strategies related to minimizing investment risk. Daskalaki and Skiadopoulos (2011) showed that in the vast majority of cases the optimal portfolios were built of traditional asset classes, and the inclusion of commodities instruments reduced the benefits of diversification.

The significant importance of the commodities market in the global economy, the connection with financial markets, the increase in the share of financial investors contribute to a greater interest in mechanisms and regularities related to the functioning of this market segment. The process of valuation of commodities and raw materials, and consequently derivatives based on these assets, is a particularly important issue for both market participants and regulators.

Research Methodology & Results

Information efficiency in a weak form means that all historical data is included in the prices of financial assets. The implication of poor market efficiency is the inability to gain above-average profits using analysis based on historical prices.

Research verifying the weak form of market efficiency is based on the assumption of random walk of securities prices. In line with the information-efficient market hypothesis, stock prices should react randomly to the emerging data. As indicated, among others Malkiel (1998), changes in share prices are aleatory, and their movement follow the random walk process. By proving that there are no significant dependencies between the asset price (rates of return), it indirectly confirms a weak form of information efficiency. The tests also include the identification of market anomalies like calendar effects. Jajuga (2000) underline that according to weak form assumptions, price (rates of return) formation should not depend on time. Thus, the return on assets cannot be determined by a specific day of the week, week of the month, or month of the year, etc.

The weak-form efficiency study was based on selected commodity futures instruments. The research included the most popular commodities from various groups: crude oil, gold, copper, silver, corn, cocoa, and cotton. Daily and monthly (logarithmic) rates of return were used, calculated on the basis of closing prices in the period from 2000 to 2019.

The following methods were used to test the weak-form efficiency:

- series tests,
- autocorrelation tests,
- analysis of daily rates of return,
- analysis of monthly returns.

In the methodology proposed by Fama (1965) the runs tests enable the identification of possible relationships between the directions of successive price changes of financial instruments, based on the observation of specific sequences or the reverse of the directions of price movements of securities. In the study, the actual number of runs was determined and then compared with the expected runs number calculated according to the following formula:

$$E(s) = \frac{N \times (N+1) - \sum_{i=1}^{3} n_i^2}{N},$$

where:
E(s) – expected runs number,
N – total number of price changes,
n_i – number of price changes of each sign.

The study identified three directions of price changes: increase, decrease, and no change, while the run is price changes in the same direction. It was assumed that deviations of the expected runs number and actual runs number less than 10% prove that there is no significant relationship between price changes. A detailed summary of the results is presented in Table 1.

Table 1: Actual and expected series number

Commodities	*s*	*E(s)*	*dev(%)*
Oil	2582	2439,75	-5,83%
Gold	2587	2450,23	-5,58%
Copper	2616	2461,20	-6,29%
Silver	2563	2471,81	-3,69%
Corn	2542	2523,28	-0,74%
Cocoa	2518	2444,79	-2,99%
Cotton	2475	2416,07	-2,44%

In the years 2000 – 2019, the analyzed assets recorded approx. 2.5 thousand runs, with the recorded values slightly higher than expected. The deviations were at a low, negative level, ranging from -0.74% to -6.26%. In each case, the obtained results were within the error margin and did not exceed the 10% deviation. The results of the runs tests indicate that the pricing process (rates of return) of the analyzed alternative investments was consistent with the random walk process.

The second method of verifying the weak-form market efficiency was the autocorrelation tests, which allow for the identification of possible relationships between the volatility of asset prices in subsequent periods. To determine the autocorrelation coefficients, the following regression equation was used:

$$r_t = A + \beta \cdot r_{t-n} + e_t ,$$

where:

r_t – a rate of return in period t,
r_{t-n} – a rate of return in period t-n,
A – an intercept, which is the expected rate of return not related to the rate of return in the period n,
β – correlation coefficient (reaction strength) between rates of return over the period t-n,
e_t – random component.

For the statistical significance of the results, the t-Student's test was used, in which the zero hypothesis means no relationship between the rates of return H0: = 0, while the alternative hypothesis H1: ≠ 0 means the existence of a relationship between the rates of return.

$$t = \frac{\beta}{\sqrt{1-\beta^2}} \sqrt{n-2},$$

where:

t – test of significance,
β – correlation coefficient (reaction strength),
n – number of observations.

To identify the possible relationships between the rates of return in subsequent periods, the β coefficients of the analyzed instruments were calculated. When the value of the coefficient is significantly different from zero, it can be presumed that there is a relationship between the evolution of prices (rates of return). It may suggest a lack of randomness in the price formation process. The study verified the relationship between daily rates of return and rates of return realized with a delay of 1 to 5 sessions (t-1, t-2, t-3, t-4, t-5). The test results are presented in the table below.

Table 2: Rates of return correlation in subsequent sub-periods

Commodities	*t-1*	*t-2*	*t-3*	*t-4*	*t-5*
Oil	**-0,06363**	0,008106	0,024402	0,01141	-0,02763
Gold	-0,0073	-0,0068	-0,00622	0,016351	0,009836
Copper	**-0,0732**	0,007375	0,000283	0,013616	-0,02097
Silver	-0,00268	0,010319	0,003865	-0,00974	0,014901
Corn	0,015463	-0,00058	0,010133	0,000385	-0,01928
Cocoa	0,00304	-0,00824	**0,029462**	-0,01537	0,007261
Cotton	0,024421	-0,01178	-0,00373	**0,028836**	-0,00509

As with the runs tests, the test results show random price volatility. For most of the commodities, β coefficients did not show statistically significant relationships. The analysis of the autocorrelation of gold, silver, and corn confirms the absence of any correlation in the pricing process. On the other hand, a rare, slight correlation was observed in the case of oil and gold for the one-session delay, and also for cocoa for the third session and cotton – for the fourth session. No significant correlation was found for the remaining delays. The test results suggest that there is no correlation between the prices of commodities derivates. Although statistically significant coefficients were recorded, these are individual cases, and the majority of observations in the analyzed period indicated a random nature of the rates of return.

Another research method used is the analysis of the distribution of rates of return over time. The assumption of the rationality of market participants determines the inability to achieve above-average profits based on investment strategies implemented at a specific moment or time interval. The rates of return of the analyzed commodities were tested in two-time intervals – the distribution of daily rates of return and the distribution of monthly rates of return. To determine the distribution of monthly and daily rates of return, logarithmic measures were used following the formula below:

$$r = \ln\left(\frac{P_n}{P_{n-1}}\right),$$

where:

r – a logarithmic rate of return for the period from n-1 to n,
P_n – price in the period n,
P_{n-1} – price in the period n-1.

Table 3: Daily rates of return

Commodities	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
Oil	-0,2370%	-0,0159%	0,0721%	0,1399%	0,1110%
Gold	-0,0056%	-0,0126%	0,0216%	-0,0035%	0,1398%
Copper	0,0176%	-0,0329%	0,0065%	-0,0229%	0,1340%
Silver	-0,0411%	0,0089%	0,0758%	-0,0841%	0,1324%
Corn	-0,0206%	-0,0100%	0,0742%	-0,0127%	0,0223%
Cocoa	-0,1407%	0,1299%	0,1187%	0,1073%	-0,1319%
Cotton	-0,0476%	-0,0406%	0,1170%	-0,0233%	0,0146%
mean	-0,0679%	0,0038%	0,0694%	0,0144%	0,0603%
standard deviation	0,0899%	0,0579%	0,0428%	0,0795%	0,1000%

As can be seen in Table 3, the rates of return on individual days of the week did not show systematic deviations that could be described as an anomaly. Relatively low returns can be observed in the case of investments made on Monday – almost all commodities (except for copper) achieved negative results. On the other hand, positive returns were recorded on Wednesday and Friday. However, it should be emphasized, that the level of profitability was so small that it did not allow to gain extra (above average market) profits. The dispersion also indicates the lack of systematic regularity in the distribution of returns of the analyzed investments.

Table 4: Monthly rates of return

Commodities	*Oil*	*Gold*	*Copper*	*Silver*	*Corn*	*Cocoa*	*Cotton*	*mean*	*standard deviation*
January	1,033%	2,730%	1,354%	3,405%	0,589%	3,227%	1,265%	1,943%	1,06%
February	4,804%	1,284%	2,331%	2,895%	4,365%	2,195%	1,915%	2,827%	1,20%
March	1,065%	-0,704%	1,420%	0,432%	-0,963%	-1,029%	0,233%	0,065%	0,91%
April	3,356%	0,536%	1,716%	-0,306%	1,335%	1,222%	-1,366%	0,928%	1,40%
May	1,521%	-0,038%	-0,545%	-0,966%	-0,841%	-2,520%	-1,886%	-0,754%	1,21%
June	1,496%	-0,494%	-0,245%	-2,787%	-2,560%	2,945%	-1,786%	-0,490%	1,97%
July	-0,685%	0,518%	2,253%	2,080%	-2,277%	-0,140%	0,133%	0,269%	1,46%
August	2,260%	1,838%	-0,970%	0,382%	0,737%	1,080%	-0,117%	0,744%	1,03%
September	-1,890%	0,822%	-0,572%	-0,772%	-3,693%	-0,362%	-2,012%	-1,211%	1,35%
October	-3,033%	-0,850%	-1,601%	-0,684%	2,689%	-3,274%	0,545%	-0,887%	1,92%
November	-3,323%	1,578%	1,029%	1,394%	1,789%	1,227%	1,192%	0,698%	1,66%
December	-2,585%	0,608%	-0,303%	0,439%	2,021%	1,009%	3,742%	0,705%	1,81%

The results of the research on the seasonality of monthly rates of return are presented in Table 4. The highest level of profitability was observed in February – the average profitability was over 2.8%. This month, a record high – over 4% rate of return was surveyed for oil and corn. However, it should be noted, that the „February effect" was characterized by a relatively high level of variability (standard deviation was 1.2%). On the other hand, in September the lowest rates of return were recorded (the average was at the level of -1.2%), although, as in February, they were not systematic – the standard deviation was 1.35%. It is worth noting that the pricing of commodities market instruments in individual months of the year differs from the trends observed in the stock markets. Popular seasonal anomalies such as the „January effect" or above-average rates of return in April (Great Britain) and July (Australia) did not occur in the analyzed investments. Positive rates of return in February and negative rates of return in September were both, relatively low, and at the same time with an increased level of dispersion. Applying the observed price regularities in practice did not provide investors with the opportunity to generate systematic above-average profits. Thus, the obtained research results do not provide evidence questioning the information efficiency in a weak form.

Conclusions

The market efficiency hypothesis is one of the most important theories of finance, it allows you to better understand the rules and mechanisms that follow financial markets. The scale and scope of changes in financial markets – including globalization, technological innovations, as well as the growing number of instruments increase the complexity of financial processes [Jajuga, 2010]. The aim of the study was to evaluate the market efficiency in a weak form on the example of selected commodities.

The research results show that the analyzed assets met the conditions of the weak form of market efficiency. The runs tests and rates of return autocorrelation tests prove that the commodity pricing process was random. What is more, there were no systematic regularities in the financial instrument price distribution. The prices of commodities did not show any significant seasonal anomalies, both daily and monthly. This means that investors did not have the opportunity to make additional returns from their investment on specific days of the week or in a specific month.

The results of the research allow the conclusion that alternative investments, which were selected commodity derivates, met the assumptions of the weak form of market efficiency. In future research on the information efficiency of the commodities market, it is worth considering instruments with lower liquidity. The scope of future research should also include an analysis of pre and post SARS-CoV-2 conditions on commodities market efficiency.

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Divestments In Enterprises on The Example of Listed Companies In Poland

Konrad SZYDLOWSKI

University of Warmia and Mazury in Olsztyn, Olsztyn, Poland
szydlowski.k@uwm.edu.pl

Abstract

The article presents the problem of divestment in enterprises. The purpose of the research was to determine the scale and character of the divestment operations undertaken by companies in Poland. The subjects of the research were companies listed on the Warsaw Stock Exchange as part of the WIG-clothing sector index.

The results of the research indicated the limited activity of enterprises in the field of divestment. The subject of the divestment were mainly tangible fixed assets. To a much lesser extent, this process included intangible assets and long-term investments. The economic growth and good financial performance of the majority of analysed companies were important for making divestment decision. Companies were more willing to undertake investment projects than to limit their assets. The leading form of the divestment was the sale of assets, that enabled enterprises to obtain an additional source of financing.

Keywords: Divestment, Corporate Assets Management.

Introduction

Asset management is one of the key areas of enterprise activity. This issue referes to both – current assets that are directly related to operating activities, as well as fixed assets created through investments.

In the literature, a lot of attention is paid to issues related to the investment activities of enterprises. Each research problems concern the issues of capital needs, sources of financing, risk and profitability of investments, as well as investment timing. Investment activity is treated as a form of optimization of the value and structure of assets that are necessary to achieve the economic goals of the enterprise.

Optimizing the value and structure of assets is an extremely complex process. It is not only the issue of investment in new assets, but also divestment activities. The main goal of this process is to reduce assets resources and adapt them to current and future specifics and scale of operations.

There are many factors that prompt managers to take this kind of action. These include changing the profile or location of the business, adapting the company's activities to changing legal regulations, too high costs of assets maintaining, improving the company's image before the planned merger or acquisition. A fairly common impulse is the poor economic and financial condition of the enterprise and the need for restructuring measures. Besides, there are some macroeconomic determinants, such as GDP growth rate, dynamics of sales of goods and services, inflation and other factors. The problem is also related to the condition of the sector or industry in which the company operates.

The Nature, Determinants And Significance of Divestment In Business Operations

Considering the problem of divestment first requires defining this area of business activity. In the literature, the terms "divestment" or “deinvestment” are used interchangeably, but this is not always approved by individual experts. As indicated by G. Osberg-Pociecha, divestment is the activity of reducing or ceasing the current scale of the company's operations. It may be optional or forced, and the effect is to limit the resources held by their withdrawal, liquidation or sale (Osbert-Pociecha, 1998). A similar point of view is presented by Wojewodzic (2010), who identifies divestment with limiting the scale and scope of the company's operations or reducing its resources, which results in the improvement of the company's financial performance. On the other hand, Sobolewski and Wojtkowiak (2014) relate divestment to the scope of the company's activity. This is a broader concept that includes divestment measures,

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consisting of limiting fixed assets, long-term investments, intangible and financial assets. In turn, according to Różański (2002), divestments are the opposite of the company's investment activities. The primary goal of both of these operations is to maximize value for shareholders.
Divestment may relate to various areas of the company's operation, including production, research and development and marketing. However, regardless of the area to which they relate, divestment goals are mainly to improve the financial condition of the enterprise in a broad sense, as well as to raise funds necessary to implement development projects.

There are many reasons why companies undertake divestment operations. They result from both – internal conditions of the company's operations, as well as external factors over which the company has no influence or this influence is significantly limited. Mishra (2016), as one of the main reasons for divestment, indicates the negative impact of sold assets on other areas of the company's operations. The Author also indicates such aspects as the need to pay off debt, increase working capital, lack of human resources potential, as well as negative market trends.

Accorging to Szydłowski (2018) the reasons for the divestment are also the possibility of selling assets at an attractive price, limiting the scope or changing the location of the business and the need to change the production profile. Also, these are too high costs of maintaining particular assets, striving to change contracts with contractors, employees and managers, as well as improving the attractiveness of the company in the perspective of planned acquisitions, mergers or sales of the firm.

The financial condition of enterprises is also one of the key factors. It refers in particular to companies whose financial condition is deteriorating. It is reflected, i.a, in problems with financial liquidity, excessive debt, low profitability or generating losses. From this perspective, divestment is treated as a tool for restructuring a company threatened with bankruptcy. The capital obtained from divestments enables the reduction of debt, accumulation of financial liquidity, as well as investments enabling the company's development. Some methods of divestment are indicated, including sell-off, spin-off, spin-out or buy-out transactions. According to Moschieri and Mair (2005) the sale of useless (often unprofitable) assets or the separation of organized parts of the company, makes it possible to improve the financial situation and further development of the enterprise. As indocated by Djordjević and Djukić (2008) these kinds of activities also relate to the problem of downsizing, understood as a set of operations aimed at improving the competitiveness and economic performance of the company.

Divestments are also undertaken by enterprises in good financial condition. These group of companies undertake investment activities which result in the assets reproduction. The effect of these actions is the liquidation of worn-out machines, devices, production lines and other assets.

Another group of factors are macroeconomic conditions such as GDP growth rate, unemployment rate, inflation and interest rates. Poor economic conditions force enterprises to reduce the current scale of activity or business re-profiling. Disposal of assets is a result of such activities. On the other hand, good economic conditions make it possible to undertake reproductive investments which result in the sale of used assets.

Useful information on the reasons for divestment is provided by a report published by the consulting company Ernst & Young, entitled „Global Corporate Divestment Study 2019" (2019). The research presented in the document shows that the main motive prompting the managerial staff to undertake divestment was the low competitiveness of the company on the market and the need to improve the current business model. Among other factors, the need to raise funds for investments in new technologies, a convergence of the sector in which the company operates, as well as geopolitical uncertainty and macroeconomic situation were pointed out.

The above considerations show that divestments are very important for the proper functioning and development of the enterprise. The possibility of effective restructuring and recovering from the crisis, optimization of assets, adaptation of the business to changing market conditions, are only some reasons for undertaking such operations. According to Dębski (2005) an additional aspect that is worth paying attention to, is the fact that these activities are an alternative source of financing. The funds obtained in this way are included in internal financing instruments. They can be used for both - operational and investment activities, but due to their irregular nature, they should not be a leading form of raising capital.

Research problems and data

The purpose of the research was to determine the scale and character of the divestment operations undertaken by companies in Poland.

Nine companies listed on the Warsaw Stock Exchange were analyzed as part of the WIG-clothing sector index. The subject of the analyzes was the value and structure of assets divested, as well as the financial performance of companies, taking into account financial liquidity, indebtedness and profitability. The analysis also concerned the economic situation in Poland as well as the condition and prospects for the development of the clothing sector. The analysis was made from 2012 to 2018.

The source of data were annual reports of the analyzed companies, Statistics Poland, as well as a report prepared by PKO Bank Polski – one of the largest banks in Poland.

Empirical results

One of the key factors determining the extent of divestments is the current and forecast economic condition. Each figure is presented in Table 1.

Table 1: The economic condition of Poland in 2012-2018

Category	Year						
	2012	2013	2014	2015	2016	2017	2018
GDP growth rate	101.3	101.1	103.3	103.8	103.1	104.9	105.1
Dynamics of retail sales of consumer goods	103.4	102.7	104.7	106.2	107.0	107.1	X
Gross investment in fixed assets (mld PLN)	322.5	311.7	339.4	361.5	335.0	352.3	384.7
Unemployment rate (%)	13.4	13.4	11.5	9.7	8.2	6.6	5.8
Price index of goods and services	103.7	100.9	100.0	99.1	99.4	102.0	101.6
Profitability of corporate sector	3.6	3.7	3.7	3.2	4.1	4.4	3.7

Source: the Author, based on Statistics Poland.

In the analyzed period, various trends in the economic situation of Poland were noted. Until 2013, the economic downturn took place, which was reflected in the weakening dynamics of gross domestic product and investment in fixed assets. The unemployment rate also remained at a relatively high level, which resulted in a decrease in the dynamics of retail sales of consumer goods. The situation improved in subsequent periods. A much higher rate of economic growth resulted in an improvement in the labour market and, consequently, in an increase in consumer demand. A clear symptom of improvement was also a general increase in investment outlays and a relatively high profitability of enterprises.

The current condition and development perspectives of the sector or industry in which the enterprise operates are also important in the context of divestment decisions. The Polish clothing sector is one of the largest in Europe and its size is systematically growing. According to Statistics Poland (2018), the number of enterprises engaged in the production of clothing amounted to 20.3 thousand entities in 2017. The largest and most recognizable producers include Bytom, LPP, Warmia, GETEX, Telimena, DCG, Vistula Group (Question Mark Biuro Badań Społecznych).

Considering the economic performance of the clothing companies, the growing volume of production deserves attention. In 2017, it amounted to PLN 11.4 billion, which means an increase of over 23% compared to 2012 (Statistics Poland, 2018). This increased sales revenues and profitability of enterprises. It is also worth emphasizing the increase in the value of fixed assets, which is the result of investment.

Growth prospects for the analyzed sector (in Poland as well as globally) are also important. It is forecasted that the total value of global retail clothing will amount to USD 1.660 billion in 2021, which seems to be crucial for the export of Polish products. According to PKO Bank Polski (2017) the main growth factors include rapidly changing consumer preferences, the development of online distribution channels, fashion for an ecological lifestyle, as well as an increase in the demand for sportswear.

The development of the Polish clothing sector is reflected in the financial condition of enterprises, on which the scale and extent of divestments depend largely. The analysis of the financial performance of companies was made using liquidity, debt and profitability ratios. The results of the analysis are presented in Table 2.

Table 2: The financial performance of the analyzed companies in 2012-2018

Company name	Ratios*	Year						
		2012	2013	2014	2015	2016	2017	2018
CCC	CR	1.30	1.55	1.92	3.97	1.95	3.61	1.10
	DR	60.62	61.47	53.04	36.91	39.17	28.31	54.15
	ROA	24.84	28.44	25.55	62.71	8.08	4.63	-2.37
Global Cosmed	CR	1.60	1.98	1.62	1.54	1.28	0.74	0.65
	DR	54.33	43.81	51.47	54.65	25.50	36.38	34.28
	ROA	0.00	34.70	17.38	5.54	-1.75	-20.73	-1.86
Intersport	CR	0.68	0.77	0.68	0.70	0.54	0.61	0.74
	DR	79.68	80.66	82.48	83.72	89.02	83.23	75.81
	ROA	-14.35	-2.26	-3.29	-5.90	-12.26	-13.59	-8.60
Interma Trade	CR	2.21	3.30	1.40	1.40	3.03	0.13	0.00
	DR	41.51	26.38	63.71	69.97	6.04	70.59	166.17
	ROA	80.84	5.32	40.06	1.55	21.27	-23.20	-98.98
LPP	CR	2.01	1.94	1.25	1.25	1.21	1.23	1.13
	DR	36.05	39.63	43.78	45.73	40.10	38.29	40.21
	ROA	30.32	42.87	18.64	18.46	13.36	20.39	16.47
Lubawa	CR	1.71	1.65	1.71	1.61	1.53	1.02	1.23
	DR	12.79	11.92	11.04	11.90	13.07	15.11	20.00
	ROA	-2.04	-2.49	1.80	1.78	2.09	-1.74	0.79
Solar Company	CR	17.41	20.65	16.09	14.47	15.30	9.14	9.13
	DR	4.13	4.04	4.93	7.75	7.26	11.53	11.76
	ROA	0.00	11.67	4.77	-21.52	-9.85	-321.47	1.96
VRG	CR	1.50	2.44	2.37	2.34	2.61	2.89	2.56
	DR	47.51	33.16	32.01	25.00	17.72	17.94	23.33
	ROA	-0.23	11.41	5.40	5.06	3.98	4.56	3.55
Wojas	CR	1.57	2.04	1.89	1.51	1.49	1.67	1.89
	DR	67.52	52.95	52.00	55.25	50.08	51.40	45.43
	ROA	0.79	18.60	11.92	4.03	5.38	26.65	10.95

** CR – current ratio; DR – debt ratio; ROA – return on assets.*
Source: the Author, based on the financial statements of the analyzed companies.

The analysis indicates the varied financial condition of the companies. In most cases, the analyzed ratios were at acceptable levels. This situation also took place in 2012-2013, i.e. in a period with a relatively low economic growth. However, attention should be paid to the negative value of profitability ratios of some entities. This means that these companies generated losses. This is confirmed by the low level of financial liquidity ratio. This phenomenon was particularly evident in the case of Intersport company. This may indicate its difficult financial situation and be an impulse to take divestment actions.

Another research problem was the volume of divestments operations. The analysis was conducted using the gross value of long-term assets divested, including fixed assets, intangible assets, and long-term investments (tangible and financial). Additionally, the amounts of inflows from the disposal of the indicated assets have been analysed.

Table 3: Divestments in the analyzed companies in 2012-2018 (in PLN million)

Company name	Category	Year						
		2012	2013	2014	2015	2016	2017	2018
CCC	Gross value of divestment	15.8	30.2	30.3	24.3	29.6	29.1	52.5
	Inflows from the disposal of long-term assets	1.5	5.5	8.3	9.4	17.0	20.0	49.2
Global Cosmed	Gross value of divestment	1.1	0.5	0.4	0.9	0.8	20.3	41.0
	Inflows from the disposal of long-term assets	1.0	0.01	0.05	0.3	0.4	41.0	0.2
Intersport	Gross value of divestment	0.8	2.3	0.5	1.2	3.5	5.0	x
	Inflows from the disposal of long-term assets	0.5	0.9	0.4	0.9	0.1	0.05	0.002
Interma Trade	Gross value of divestment	0.4	0.06	0.2	0.1	0.03	19.3	0.6
	Inflows from the disposal of long-term assets	0.2	0.0	0.02	0.001	0.02	5.7	0.3
LPP	Gross value of divestment	169.1	285.9	297.7	471.4	193.4	294.9	129.3
	Inflows from the disposal of long-term assets	26.4	42.2	66.8	74.9	79.3	58.0	87.6
Lubawa	Gross value of divestment	0.9	1.6	3.9	0.8	0.2	0.1	0.5
	Inflows from the disposal of long-term assets	0.5	2.3	6.3	2.0	0.2	1.6	0.2
Solar Company	Gross value of divestment	2.2	2.9	4.6	4.8	2.2	3.7	2.4
	Inflows from the disposal of long-term assets	0.002	0.06	0.03	0.01	0.4	0.3	0.001
VRG	Gross value of divestment	19.6	17.5	24.9	19.2	9.6	18.9	6.9
	Inflows from the disposal of long-term assets	16.8	0.7	0.8	2.1	6.2	3.9	0.1
Wojas	Gross value of divestment	0.4	2.4	0.2	0.06	0.4	11.3	0.4
	Inflows from the disposal of long-term assets	19.3	10.0	2.3	0.01	0.3	25.4	0.2

Source: the Author, based on the financial statements of the analyzed companies.

In the analyzed period, a different level of divestment activity of each company was noted. The highest value of assets divested took place in 2015 (PLN 552.6 million), which was the result of significant divestments made by LPP company. The intensity of divestment was also different. The upward trend took place in 2012-2015 and 2017. In contrast, declining in 2016 and 2018. The object of divestment were mainly fixed assets. To a much lesser extent, the process involved intangible assets and long-term investments (tangible and financial). The fact that fixed assets constituted the dominant share in the fixed assets structure of the analyzed companies was of significant importance. The sale of assets was the dominant form of divestment. Total revenues obtained in this way amounted to slightly

over PLN 700 million, of which over 62% were divestments of the aforementioned LPP company. To a lesser extent, the analyzed companies liquidated or transferred individual assets to subsidiaries.

The data contained in table 3 were supplemented by an analysis of the divestment activity of the companies. The following ratios were used:

- the gross value of divestment to total value of long-term assets,
- the gross value of divestment to net revenues from sales,
- inflows from the disposal of long-term assets to negative cash flow from investment activities.

Table 4: Divestment ratios for the analyzed companies in 2012-2018 (%)

Company name	Ratios**	Year						
		2012	2013	2014	2015	2016	2017	2018
CCC	GVD/L-TA	4.49	8.73	6.67	5.28	4.09	3.61	3.09
	GVD/S	1.26	2.00	1.78	1.45	1.70	1.39	2.46
	IDA/NCFI	2.55	7.92	4.11	6.17	4.64	7.27	7.67
Global Cosmed	GVD/L-TA	6.87	2.23	0.78	1.22	0.27	7.18	14.59
	GVD/S	0.80	0.29	0.23	0.44	0.37	10.20	22.62
	IDA/NCFI	1379.73	0.22	0.35	1.25	3.12	827.31	3.72
Intersport	GVD/L-TA	0.97	2.72	0.65	1.54	5.08	7.54	x
	GVD/S	0.36	1.03	0.24	0.54	1.73	2.72	x
	IDA/NCFI	35.08	54.26	8.38	18.55	3.58	1.84	1.98
Interma Trade	GVD/L-TA	10.94	0.88	1.58	0.52	0.15	34.88	1.07
	GVD/S	0.18	0.02	0.04	0.02	0.00	72.17	118.44
	IDA/NCFI	3.53	0.00	6.07	0.01	0.59	7337.50	1358.62
LPP	GVD/L-TA	21.82	31.06	19.55	25.27	9.23	12.19	4.21
	GVD/S	6.11	8.18	7.44	10.87	4.08	5.24	1.61
	IDA/NCFI	14.23	12.45	15.59	16.28	33.04	14.33	7.43
Lubawa	GVD/L-TA	0.61	1.06	2.33	0.47	0.14	0.07	0.26
	GVD/S	3.03	5.20	9.41	1.50	0.37	0.29	0.87
	IDA/NCFI	91.85	135.33	125.56	70.33	1.63	25.14	1.30
Solar Company	GVD/L-TA	2.74	3.64	5.77	25.05	12.10	26.17	21.20
	GVD/S	1.94	2.42	3.94	3.53	1.70	3.00	1.93
	IDA/NCFI	0.07	1.83	0.82	0.31	12,04	15.63	0.04
VRG	GVD/L-TA	4.55	4.18	5.89	4.57	2.29	4.58	1.08
	GVD/S	5.63	4.97	6.39	7.25	3.06	5.15	1.61
	IDA/NCFI	248.29	7.40	5.68	22.16	72.11	40.75	1.26
Wojas	GVD/L-TA	0.77	4.64	0.31	0.10	0.59	23.47	0.90
	GVD/S	0.39	1.85	0.12	0.04	0.25	4.92	0.18
	IDA/NCFI	47.34	125.60	15.20	0.13	7.69	278.43	1.13

*** GVD/L-TA – the gross value of divestment / total value of long-term assets; GVD/S – the gross value of divestment / net revenues from sales; IDA/NCFI – inflows from the disposal of long-term assets / negative cash flow from investment activities*

Source: the Author, based on the financial statements of the analyzed companies.

The analysis shows that a relatively small part of assets was divested. The level of the first ratio did not usually exceed 10%, which indicates a limited activity of enterprises in this field. The exceptions were LPP and Solar Company, which maintained the analyzed indicators at a fairly high level. The observed trends were also reflected in the results of the analysis of the next ratio. The value of fixed assets divested was small in relation to the sales revenues.

The subject of the analysis was also the degree of coverage of investment expenditure with cash obtained from divestment. In this way, the issue of divestment was considered as a source of financing the investment activities of the enterprise. Particularly noteworthy are the companies Intersport, Lubawa, Solar, VRG, and Wojas companies, which are characterized by a fairly high value of the analyzed ratio. This proves the importance of divestment as a source of investment financing in the analysed companies. It should be emphasized that the vast majority of companies were characterized by high investment activity. This is indicated by an increase in the value of long-term assets and negative net cash flow on investing activities. Thus, the theorem that divestment is an operation accompanying the implementation of investment projects is confirmed.

The high volatility of individual ratios as well as the value of divestments and the inflows obtained in this way are noteworthy. It seems to confirm the lack of regularity of actions taken in the indicated area of business activity, described in the theoretical part of the article.

Conclusions

Long-term assets management is one of the key areas of corporate finance. It is reflected in the effectiveness of the use of assets and optimization of their value and structure, taking into account the specificity and scope of business operations. One of the possible actions taken in this field is the divestment.

The purpose of the research was to determine the scale and character of the divestment operations undertaken by companies in Poland. The research indicated a diversified activity of the analyzed companies in this field. Assets disposed of usually constituted a small percentage of long-term resources so that divestments did not have a significant impact on the value and structure of assets in each company. It is also important that the analyzed period was characterized by good economic conditions, conducive to run business. This concerned both – the general economic situation of Poland and the situation in the clothing sector. This was reflected in the good financial condition of most of the analyzed companies. Favourable economic conditions strongly encouraged companies to undertake investments rather than reducing their assets. In this situation, divestments were mainly the result of the reproduction of used assets than the reaction of companies to the difficult economic situation.

The object of divestment operations were mainly fixed assets. A much smaller percentage was constituted by intangible assets and long-term investments - tangible and financial. Undoubtedly, this is due to the specific assets structure of companies operating in the clothing sector. These are production enterprises, and therefore units in which fixed assets are a fundamental resource the operations.

The basic form of divestment was the sale of assets, thus being an additional source of capital for companies. In this context, divestments were widely described in the literature form of financing the enterprise's activities. To a much smaller extent, divestments were made by the liquidation of assets or transfer to subsidiaries.

A review of the literature and the results of the conducted research indicated the multifaceted nature of divestment. This problem is reflected in key management areas, such as optimization of the size and structure of assets, company restructuring under bankruptcy threat, business financing and enterprise capital structure management in a broad sense. The effectiveness of divestment significantly contributes to the achievement of the primary goal of financial management, which is the increase in company value.

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Energy Transformation in Poland In Comparison to The Selected European Union and World Countries

Paweł KORYTKO
General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland,
pawel.korytko@awl.edu.pl

Józef LEDZIANOWSKI
General Tadeusz Kosciuszko Military University of Land Forces Faculty of Management, Wroclaw, Poland,
jozef.ledzianowski@awl.edu.pl

Abstract

The article reviews the energy situation in Poland and the selected world and the European Union countries in times of dynamically growing energy demand. The conducted analysis indicates the short-term sufficiency of fossil energy sources and the negative impact of the extraction and use of fossil energy resources on the quality of air. In order to counteract global warming and climate change caused by high emissions from the energy sector, in line with the international agreement, referred to as the Kyoto Protocol (2005), many countries have obligated to reduce greenhouse gases, which are the main cause of the global warming of the Earth's atmosphere and serious climate anomalies. The European Union has become an advocate of a low-carbon economy. In the energy and climate package (adopted in 2008), it obliges the Member States to adapt their energy policy which entails reducing greenhouse gas emissions by 20%, increasing the share of energy produced from RES by 20%, and reducing energy consumption by 20%. The European Union has taken decisive steps to work on sustainability, namely by diversification of energy deposits at risk of exhaustion, economical management, climate protection, gradual independence from a single supplier and building a common internal energy market. The priority of the EU energy policy is to ensure the energy security for the Member States by diversifying supplies and decarbonising energy production. It is believed that renewable sources have become a perfect alternative to coal energy, therefore in the near future we can expect the energy transformation in many European and world countries.

Keywords: Energy, Electricity, Demand, Energy Production, Energy Consumption, Fossil Energy Sources, Renewable Energy Sources, Diversification of Energy Sources, Energy Security, Energy Transformation.

Introduction

In the second half of the twentieth century electricity became a universal form of energy. Thanks to its numerous advantages it not only radically changed industry, transport and construction but also facilitated running households. Noticeably, modern civilization uses an increasing amount of electricity. It is caused by the growing number of population and also the economic growth. Accordingly, the United Nations has forecast that in 2056 the population of the world will rise up to 10 billion (for 2020 it is 7.8 billion). It has been also claimed that the increasing demand and the growing consumption of electricity have become the reasons for diversification of energy resources. The World Energy Council has informed that our generation has already used more energy than all former generations in the past all together. Consequently, in order to provide energy security and climate neutrality for future generations, the new trends in energy policy have emerged.

Main part

1. The world energy situation

In the report "World Energy Outlook 2016," the International Energy Agency (IEA) forecasts the increase in energy demand in all regions of the world. The largest increase at the level of 90% of the projected increase in world demand will come from non-OECD countries, and 60% of this growth will come from China, India and the Middle

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East. Until 2035, the demand for energy from all sources will grow with an average annual growth of 1.3%. Fossil fuels (oil, gas, coal) will remain the main source of energy (IEA, 2016).

After three consecutive years of decline in the global demand for coal, since 2017 the demand for this raw material has increased and in 2018 amounted to 1.1%. In other words, production of electricity from coal reached the highest level in history in 2018. Coal remained in the first position as a raw material from which 38% of electricity is produced on a global scale. In 2018, we could observe a significant increase in coal production (by 3% compared to 2017). Four of the six largest coal producers in the world have increased production, and three of them India, Indonesia and Russia have achieved their highest levels of coal production in history. Two of them, Russia and Indonesia recorded the historically highest rate of raw material exports to third markets. In India and Southeast Asia, the demand for coal is projected to grow by around 5% per year (mainly in Vietnam and Indonesia) (IEA, 2017).

In the world, over the next five years, the demand for coal will remain at a stable level, as the declines observed in the USA and the European Union will be offset by the growing demand in India and other Asian countries.

In China, which is the largest producer and consumer of coal in the world, demand for this raw material will peak in 2022. This growth is forecasted to be mild and only domestic policy (the place of renewable energy and nuclear energy in the Five-Year Plan) will determine the future demand for coal. The consistent shift of the coal industry from Europe, and even from the USA, to Asian countries: China, India, Indonesia is associated primarily with the increase in population and the large economic development expected in those parts of the world (A. Strupczewski, 2017).

In the US the future of the mining sector depends on the further development of the shale gas sector. The high level of natural gas supply in the internal market together with the adopted environmental protection policy will contribute to a decline in demand for coal at the level of 4% annually by 2024. The share of electricity production from coal will drop to 21% in 2024. Australia and South Africa will maintain the current level of coal exports to foreign markets, while Russia will gradually redirect its production also to Asian markets.

It is forecast that the demand for natural gas will increase by 1.7% per year, for energy obtained from water 2.1% per year, and for energy obtained from other renewable energy sources by 7.8% per year. The agency estimates that by 2040 the global demand for electricity will increase by 40%. The pace of overall consumption growth will be gradually curbed by high prices and new energy policies, potentially leading to a stabilization of this demand. Almost 60% of global energy generated in 2040 will come from renewable energy sources, half of it will come from wind and sun. The increase in the share of renewable energy sources may mean the end of the demand for coal (M. Bartosik, 2015).

The International Energy Agency (IEA) in its “World Energy Outlook 2016” forecasts a rising significance of the position of natural gas in world energy production. Due to the large supply, low prices and low emissions of CO_2, gas will reach the 25% share in meeting the demand for energy and will become the second (after crude oil) most important fuel in the global energy balance. The demand for this fuel will increase by more than half, the fastest rate of all fossil fuels. On the other hand, unconventional gas, despite criticism regarding the environmental consequences of drilling processes, will account for almost 60% of global production growth. According to WEO (World Energy Outlook) forecasts, Russia and China will be the largest producers of GAS by 2035 and Europe will remain the largest importer on the global gas market until 2035, with a demand of 540 billion m^3 in 2035 (IEA, 2016).

Almost 90% of the expected increase in long-distance gas trade will be provided by liquefied natural gas (LNG) by 2040. New liquefaction capacities will be developed mainly in the USA and Australia and in Russia, Qatar, Mozambique and Canada.

According to the report “World Energy Outlook 2017” it is predicted that in 2040 electricity generation will be almost completely decarbonised. It will be based on renewable energy sources (over 60%), nuclear energy (15%) and the contribution from CCS technology (6%), which will play an equally important role in reducing emissions from the industrial sector. Low-emission sources will double their share in the energy balance – to 40% in 2040 (IEA, 2017).

It is expected that despite the fact that some countries will withdraw from nuclear energy, the nuclear sector will increase the energy production. Globally, the installed capacity in nuclear power plants will increase to 630 GW (in 2035) mainly in China, India and Russia which plan to turn on about 200 GW of new capacity.

Based on data obtained by International Energy Agency, we observe a systematic increase in the importance of renewable energy. It is predicted that in 2035 global wind power production in onshore locations will increase to almost 590 TWh (mainly in China), and in offshore locations energy production will increase to 670 TWh (mainly in China, the US and the EU).
A significant increase in solar electricity production is also forecast, with an average annual increase of 15% (mainly in China, Japan and India). There has also been a sharp increase in the hydropower sector in countries outside the OECD.

According to the report "Electricity for Generations" in 2016, alternative energy sources in the form of renewable energy sources (RES), with their almost 14% share in meeting the global energy demand, are not yet able to replace fossil fuels, both from technical and technological, as well as economic reasons. However, the decline in the prices of renewable energy and the subsidies introduced by many countries mean that global investments in renewable energy sources have been systematically growing since the beginning of the 21st century (II Congress of Polish Electrical Engineering, 2015/16).

Energy production and consumption are responsible for two-thirds of the world's greenhouse gas emissions. In order to counteract climate change caused by harmful emissions, many countries have made commitments to reduce their CO_2 emission to meet the previously set goal of keeping the global average temperature increase below 2 Celsius degrees in relations to pre-industrial level. In the opinion of the IEA, in order to counteract serious climate anomalies, keeping the global temperature increase below 2 °C requires investing USD 300 billion in renewable energy and USD 1,000 billion in energy efficiency, as well as the global reduction of CO_2 emissions by a quarter.

According to the UN indications, reducing the current level of global carbon dioxide emissions to the atmosphere by at least 50% by 2050 requires the implementation of new technologies limiting its emission, reducing energy consumption by improving the efficiency of its use and looking for alternative energy sources. According to the Agency's data, last year the increase in emissions in a number of countries was offset by their decline in the most developed economies. The US recorded the largest decrease in CO_2 emissions in history – by 2.9%. In the EU, emissions decreased by 5%. In Japan, emissions decreased by around 4%, it was the fastest decline since 2009. The main reason for this decline is the increase in nuclear electricity generation. Overall, economically developed countries have observed the 15% reduction in CO_2 emissions (IEA, 2017).

The most rational strategy which may support economic growth and the protection of the environment, in a global context, in particular by reducing greenhouse gas emissions contributing to climate change, is based on the following actions:

- diversification of energy sources,
- increasing the efficiency of energy consumption in industry, buildings and transport; - gradual reduction in the use of the least efficient coal-fired power plants and ban on their construction.
- increasing investments in electrical energy technologies (electricity generation and processing) based on renewable energy sources in 2030;
- phasing out of fossil fuel subsidies to end-users by 2030;
- reduction of methane emissions from oil and gas extraction,
- development of energy-saving technologies for the use of all types of energy.

The World Economic Forum (WEF) published the report ("Fostering Effective Energy Transition") which evaluated the current state of the energy sector and the readiness of 115 countries for the energy transformation, understood as "transition to a safe, sustainable, affordable and inclusive energy system," which in practice, means moving away from non-renewable sources (such as oil, gas and uranium), saving energy and increasing energy efficiency (World Economic Forum, 2019).

The main conclusions of the research are not optimistic since the pace of energy transformation in the world is slowing down and currently it is the lowest in five years. In the ranking made by the WEF, Poland was placed on 75th position next to Ghana, Bulgaria and Russia, due to the lowest diversification of energy sources in the European Union.

The top ten in the ranking was dominated by Western and Northern European countries with Sweden, Switzerland and Norway at the fore. Countries at the top of the ranking owe their results to various energy sources (including their own natural resources) and the structure of the energy system. Moreover, their prospects for the future were highly rated, namely the strong institutional and regulatory framework, an innovative business environment, and a high level of political commitment to the energy transition.

Zimbabwe, South Africa and Haiti close the WHO ranking. In the evaluation the strong involvement of energy sectors in consumption, large exports of solid fuels (oil and coal), the lack of an effective regulatory framework enabling transformation, as well as political instability were emphasized.
In 2025, RES will become the world's largest energy source. Global production of electricity from renewable sources, including hydropower, will outperform coal production. It is predicted that in 2025, renewable energy sources will provide about one third of the world's electricity production, half of this amount will be generated in hydro power plants, and the rest mainly in wind and solar power plants. The total installed capacity of solar sources is to exceed the capacity of gas sources in 2023, and coal sources a year later. (Renewables 2020 Report IEA).

The IEA expects that the climate neutrality targets announced by an increasing number of new EU and Asian countries will result in accelerating the use of renewable energy. The agency reminds that Japan and South Korea want to achieve net zero emissions in 2050, and China in 2060.

2. Energy situation in the European Union

All European Union member states conduct their own energy policy, its main goal is to ensure energy security. This policy is influenced not only by solutions adopted in the energy sector at the Community level, but also by each country's energy resources, access to fossil fuels, as well as geographic and social conditions.

Ecological aspects, supported by political decisions, play an important role in shaping the consumption structure of primary energy carriers in the EU countries. The European Union, being a fervent supporter of the ratification of the Kyoto Protocol to reduce greenhouse gas emissions and stop the process of Earth's climate change, consistently strives to reduce the share of carbon in the consumption structure of primary energy carriers and to increase the share of renewable and low-emission energy carriers – biomass, hydropower, wind energy, nuclear energy, as well as the relatively low carbon fossil fuel natural gas.

The demand for electricity from coal in Europe is significantly decreasing. The reasons for this are the rise of CO2 limits prices and the decrease in the prices of gas. The share of hard coal in the EU mix fell by as much as one third. Renewable energy sources and natural gas are gradually replacing coal. In 2019, 35% of energy in the European Union countries came from RES. The EU energy mix in 2019 was as follows: RES 34.6%, nuclear 25.5%, gas 21.7%, lignite 7.8%, hard coal 6.8%, other raw materials 3.6%. 2019 was a record year for new RES capacities: wind 13.4%, water 10.8%, biomass 6.2, sun 4.2 (IEA, 2020).

By 2030 European Union countries are expected to increase the consumption of natural gas by 8% and the low-emission carriers – renewable sources by 5%. In the next 10-15 years, natural gas has to become the main primary energy carrier used for electricity production. At the same time, the consumption of coal is going to decrease by 4%, crude oil consumption will drop by 1% and nuclear energy will decrease by 7% (P. Kwiatkiewicz, R Szczebrowski, 2015).

The dominant energy sources in the EU economy are natural gas and crude oil (predominant in transport). In total, these sources account for over 60% of primary energy consumption. Unfortunately, due to the scarce resources of these energy sources, the European Union is becoming dependent on the import of these raw materials from other regions of the world. Remarkably, LNG is also strengthening its role. The largest gas exporters to the EU are Qatar, Russia and the USA. For ecological and climatic reasons, coal is becoming a fuel of declining importance, and its former status can be restored only by clean coal combustion technologies.

The European Union has set ambitious climate targets for the economies of the Member States in the field of renewable energy development, reduction of greenhouse gas emissions and improvement of energy efficiency. The EU is to become a climate neutral economy. In ambitious plans until 2050. 80% of electricity in the EU will come from renewable sources. Noticeably, extensive support was provided for the development of RES. The member states have developed financial support systems for the development of renewable energy sources (i.e the system of certificates in force in Poland or the system of guaranteed electricity prices in force in Germany). The intensive development of renewable sources and their preference in the power system resulted in permanent changes on the energy market.

The promotion of renewable sources has significantly influenced the development of prosumer energy. One could observe the dynamic increase in the power installed in distributed micro-sources (mainly photovoltaic). The development of microgeneration and the increase in the number of prosumers resulted in the displacement of energy based on fossil fuels from the system and a reduction in the demand for electricity. It is claimed that the lower demand for energy resulted from the fact that majority of prosumers have covered their needs on their own.

In 2016 the European Commission presented a proposal to reform the energy market in the EU in the form of a "winter package" or a "clean energy" package. For Poland, it is an opportunity to reform the market and modernize the sector in line with global trends in reducing emissions, greater care for the environment and providing consumers with high-quality services, due to the real competition on the market. The European Union is moving towards 3D energy, i.e. decentralized, digitized and decarbonised. It is planned to release prices for individual consumers in 2021. Facilitations for the development of prosumers in single- and multi-family houses and prosumers-entrepreneurs will be created. By 2025, the target of 70% of transmission capacity on power interconnectors made available for cross-border exchange will have to be achieved. The role of DSOs will change radically; distributors will be responsible for integrating local resources (RES, storage facilities, DSR) into the energy system. An EU institution will be established to coordinate the work of the DSO (Distribution System Operator).

The main goal of the proposed changes is to accelerate the development of renewable energy sources with the planned 27% share of RES in EU energy production and to improve energy efficiency by 27% by 2030. Furthermore, the EU climate and energy policy obliges Member States to introduce a new ETS system leading to gradual reduction of CO_2 emission.

In accordance with the provisions of the Winter Package, in 2030 the power market support for power plants emitting over 550 g of CO_2 per kWh will end, which in practice means the elimination of public support for coal-based energy. The European Commission decided also to set a goal for transport; in this field a renewable energy share should be at the level of 14% for each country.

What distinguishes European Union countries is a large share of imports to meet the needs of most fossil fuels. Forecasts indicate that in 2030 the dependence of EU countries on the supply of raw materials and energy fuels may increase up to 70%. The reason for this is the continuous increase in the energy demand.

In order to ensure the highest possible level of energy security of the Member States, the EU is trying to introduce a number of legal regulations to prevent crises in the energy sector. The most important legal act concerning security of supply is Council Directive 2006/67 / EC of 24 July 2006. It obliges Member States to maintain minimum stocks of crude oil or petroleum products.

An important factor enabling the stabilization of supplies to the EU countries is the marketization of European energy exchange and the creation of a single energy market, protecting individual countries against pressure from third countries. Liquefied natural gas (LNG) imported into the EU by a new supplier from the USA is gaining importance.

The current principles and objectives of energy policy are based on the Maastricht Treaty (signed by the member states in 1992). It introduced provisions on the creation of a single energy market as part of a single internal market that would ensure the free movement of goods, people, services and capital.

The most important energy priorities of European Union are development of the common energy market, counteracting climate change and solving other key environmental problems, diversification of energy sources, promoting energy efficiency, increasing competitiveness of renewable and alternative energy sources and working on sustainability (N. Wojtowicz, 2014).

The common EU energy policy is to ensure that all member states achieve three main goals, which are:

- energy security
- minimizing the risk and the impact of a possible collapse of energy supply on the economy and society of the European Union,
- competitive energy systems
- ensuring low energy costs for producers and users from the point of view of industrial competition and the implementation of broadly understood social goals,
- protection of the natural environment integrated with both the production and use of energy to maintain the ecological and geophysical balance of nature.

The most important mega trends in the European energy sector include falling costs of energy generation from renewable sources, reducing the impact of energy on health and climate (reducing emissions), the changing role of coal, improving energy efficiency and emerging new business models in the energy sector (new possibilities in generating and distribution of energy, development of distributed energy, development of competition not only in production and trading, but also in transmission and distribution of energy) (IEA, 2020).

3. The energy situation in Poland

Two main fuels play a significant role in the structure of electricity production in Poland – hard coal and lignite, which together are responsible for the production of nearly 73,6% of electricity (in 2019). The share of other fuels is very small; for gas and biomass, water and wind energy it amounts 3%. The generation side of the Polish energy system is the least diversified in the entire European Union.

According to the data of the European Coal and Brown Coal Association, in 2017 as much as 27% of European coal was mined in Poland. This country is not only the largest producer (second to Russia in Europe) of hard coal in the European Union (65,5 mil tons) but also consumer of coal (73,8 mil tons). In 2014 proven coal reserves accounted for 0.6% of world reserves, annual coal production was 1.4% of world production, and annual coal consumption accounted for 1.4% of world consumption.

The sufficiency of the currently available hard coal resources in Poland was estimated at 40 years, and with the use of new technologies in the extraction of coal from deeper and deeper deposits (not yet developed), it was estimated at approximately 100 years (data of the Polish Geological Institute of 2014). The statistical sufficiency of lignite at the current level of extraction was estimated at approximately 200 years.

It is estimated that by 2030 hard coal and lignite will remain the basis of the Polish energy mix, although their share will gradually decrease (R. Macuk, J Maćkowiak-Pandera, A. Rubczyński, 2018). Surprisingly, one can observe a certain paradox of the domestic energy market; despite the constant high demand for this raw material (an increase in 2007-2017 by 12%), its extraction in mines is decreasing (high extraction costs). At the same time, some of the coal extracted in Poland is not directed to its recipients, but it is stored on dumps since domestic coal is more expensive and often of lower quality than imported coal. Hence, almost 20% of domestic production is supplemented with coal imported from Russia (50% of supplies), Colombia, the USA and Kazakhstan.

Most likely, in 2030 Poland will produce 60% of electricity from coal (in 2017 it is 86%), and among other raw materials in the energy generation structure, there will be gas and renewable energy sources, which will be largely provided by wind farms built on the sea (A. Strupczewski, 2017).

The total documented gas reserves in Poland in 2014 were estimated at 0.1 Tm^3 (which represents 0.1% of world reserves), annual gas production at 4.2 Gm^3 (which constitutes 0.1% of world production), and its sufficiency for 23.6 years. The annual gas consumption was estimated at 16.3 Gm^3 (which constitutes 0.5% of world consumption).

According to the data obtained by the Ministry of Economy, the share of gas in the Polish energy mix approached 9%. On average about 30% of gas consumption in Poland is satisfied from domestic deposits, about 50% the annual consumption comes from Russia. The rest is mainly imported from Germany and the Czech Republic. 2016 brought a particularly important event on the Polish natural gas market – the LNG terminal for liquefied gas in Świnoujście started operating. Two storage tanks accommodate 320. 000 m^3 of gas imported from the United States. In 2016, the share of gas imported to Poland increased to 84%.

Polish new energy policy to 2030 assumes acceleration of the development of renewable energy sources, so that by introducing low-emission energy sources we can achieve a decrease in the average emissivity of energy production and meet the standards presented by the European Commission in the draft Winter Package (planned 27% share of RES in energy production to 2030, end of capacity market support for power plants emitting more than 550 g CO_2 per kWh). The limit of carbon dioxide emission defined in the project actually means the end of public support for coal-based energy.

Poland has made substantial progress in developing RES. The share of renewable energy sources in electricity production in 2019 was the highest in history and amounted to 15.4%, but it is still too low to meet EU obligations (over 43% share in the energy mix in 2030). Much in this regard may depend on political decisions, funding strategies and appropriate regulations (G. Maśloch, 2018).

In 2017, according to the ERO data, wind farms dominated the RES structure in Poland in terms of installed capacity and it is nearly 68.5%. Biomass sources were in second place with a share of almost 16%, and hydropower plants in the third place with a share of almost 11.6% (ERO, 2017).

The report “8 ways to integrate RES. System security against the growth of variable sources," made for the Energy Forum by experts from the international consulting company called Ecofys is aimed at presenting the main fields that may facilitate further integration of variable energy sources in the context of the changing energy system of Poland. They are as follows:

1. modernization of transmission networks and generation assets;
2. increasing the flexibility of the energy system (quick response to changes in supply and demand);
3. increased flexibility of conventional power plants;
4. linking the energy sectors (electricity, heat and transport);
5. energy storage as a future partner for renewable energy;
6. optimal distribution of RES installations;
7. network expansion and integration with neighboring markets; 8. development of short-term markets.

Until 2030 The European Commission has set a 55% greenhouse gas reduction target for its member states. Poland's contribution to achieving this goal should amount between 44 and 51% reduction of greenhouse gases (compared to 1990). By 2050, the Polish energy sector should become climate neutral.

Over the last ten years Polish power industry has changed considerably. The changes that affected Polish and in the past European energy sector mainly concern new trends in the conventional generation, distribution and the sale of energy. It appears that the transition from conventional, centralized energy to decentralized energy based on renewable sources (photovoltaics and wind energy) is inevitable due to decline of fossil resources and high financial outlays which have to be incurred for the modernization of power units and the need to purchase CO_2 emission allowances. It was estimated that nuclear energy would emerge after 2022 – the Ministry of Economy in the fourth stage of the "Polish Nuclear Power Program" project (01/01/2016 - 31/12/2022), planned the construction of the first unit of the first nuclear power plant in Żarnowiec. Unfortunately, according to recent data, the next (included in the Polish Energy Policy until 2040) date for commissioning the first nuclear unit in 2033 seems less and less realistic.

Poland's energy policy to 2030

The document “Energy Policy of Poland to 2030” includes a forecast of final energy demand in 2006-2030. It is expected that the final consumption of electricity will increase by 55%, gas by 29%, district heat by 55%, petroleum products by 27%, renewable energy by 60%. Such high increase in the consumption of renewable energy results from the need to meet the requirements of the European Union's Energy and Climate Package, adopted in December 2008 (Ministry of Economy, 2009).

As part of the package, the European Union has set quantitative targets for 2020, the so-called 3 x 20%, *i.e.* the 20% reduction in greenhouse gas emissions compared to 1990, the 20% reduction in energy consumption compared to the EU's forecasts for 2020, increasing the share of renewable energy sources to 20% of total energy consumption in the EU, including increasing the use of biofuels in transport to 10%. Meeting the energy policy target of 15% share of renewable energy in the gross final energy structure in 2020 will be possible as a result of the accelerated development of the use of all types of renewable energy sources especially the wind energy.

The demand for final electricity will increase until 2030 with an average rate of 1.6% per year. The highest increase in demand for final electricity among economy sectors is forecasted in services (by 62%) and households (by 48%). The demand in industry will increase by 35%, while in agriculture it will remain virtually unchanged. In the structure of primary energy carriers, a decrease in the consumption of hard coal by approximately 16.5% and lignite by 23% is expected, with a simultaneous increase in gas consumption by approximately 40%.

Achieving EU renewable energy targets will require gross electricity production from RES in 2030 at approximately 18.2% of total production. The largest share of energy from wind farms will be about 8.2% of the estimated gross total production. Net electricity production is projected to gradually increase by around 41% by 2030.

The Polish energy sector is currently facing serious challenges. The constantly growing demand for energy, depletion of natural resources, increasing dependence on imported raw materials, fluctuations in the prices of energy resources and increasing environmental pollution require a new approach to energy policy. The fundamental goal of this policy is to improve and develop exhaustion and consumption renewable energy. Due to the small share of renewable sources in electricity production in Poland, it is the responsibility of the national authorities to support the development of renewable energy sources.

The main goals of the state's energy policy, which are part of the strategy for the development of renewable sources in Poland are included in Annex 2 to the Polish Energy Policy to 2030. They are as follows:

1) an increase in the share of renewable energy sources in final energy consumption to at least 15% in 2020 and a further increase in this indicator in the following years;

2) achieving a 10% share of biofuels in the transport fuel market in 2020 and increasing the use of second-generation biofuels;

3) protection of forests against overexploitation in order to obtain biomass and sustainable use of agricultural land for renewable energy purposes, including biofuels, so as not to lead to competition between renewable energy and agriculture and to preserve bio-diversity;

4) increasing the degree of diversification of supply sources and creating optimal conditions for the development of distributed energy based on locally available raw materials.

The adopted goals are supposed to be achieved through the implementation of the following activities:

1) obtaining the 15% share of renewable energy sources in the final energy consumption in a sustainable manner, divided into individual types of energy;
2) maintaining support mechanisms for producers of electricity from renewable sources (*e.g.* through certificates of origin);
3) maintaining the obligation to gradually increase the share of biocomponents in transport fuels;
4) construction of agricultural biogas plants, assuming the creation of an average of one biogas plant in each commune by 2020;
5) maintaining the principle of exemption from excise duty on energy from renewable sources;
6) support for the construction of new renewable energy units and power grids;
7) development of the industry producing devices for renewable energy;
8) development of new technologies and construction of installations for obtaining renewable energy.

Summary

The Polish energy policy which has implemented the main objectives of the European Union energy policy, promotes activities aimed at increasing the production of energy from renewable sources, and it also involves the more rational use of electricity, as well as protection of climate and environment. The use of renewable energy sources will create conditions for the development of energy based on locally available raw materials, it will reduce the emission of pollutants, it will limit the destructive effects of energy on the environment, it will cause a greater degree of independence from imported energy supplies and it will also increase Polish energy security. Building the internal energy market in the European Union and implementing a common energy policy is going to reduce the risk of collapsing energy supplies and to remove the threat of an energy crisis.

Transformation in the energy sector in Poland, similarly to other European Union and world countries is already a fact. In the ongoing transformations, the most important issue is the transition from centralized energy, based on conventional energy, towards distributed energy, using mainly renewable energy sources from local and regional resources. Noticeably, electricity demand and consumption continue to rise, especially in developing countries. Demand for coal has shifted from Europe and the US to Asian countries. In order to counteract dangerous climate anomalies, a increasing number of countries declare their will to achieve the climate neutrality. It might be stated that for the Polish and EU energy sectors it will be 2050.

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Análisis De Los Costos De La Atención Médica Del Embarazo En Colombia

Salomé del Pilar LÓPEZ-PEÑA
Corporación Universitaria Minuto de Dios UNIMINUTO, Bogotá, Colombia, splopezp@unal.edu.co

Diana Marcela PRIETO ROMERO
Universidad Nacional de Colombia, Bogotá, Colombia, dimprietoro@unal.edu.co

July Paola JIMÉNEZ CALVO
Universidad Nacional de Colombia, Bogotá, Colombia, jpjimenezca@unal.edu.co

Resumen

Identificar los costos de la atención médica es un paso esencial para la planeación estratégica en la administración y prestación de servicios de salud. En esta investigación se busca identificar y analizar los costos sociales y de la atención en salud del embarazo en Colombia tomando como caso tipo a una mujer saludable en edad media sin complicaciones a lo largo del embarazo y hasta el alumbramiento, comparando al mismo tiempo lo que cuesta en ciudades grandes y en ciudades intermedias y zonas desprotegidas socialmente como Putumayo, Nariño, Cauca, Guaviare, Sur de Bolívar, Sur de Tolima, Bajo Cauca Antioqueño y el Catatumbo.

Esta investigación toma relevancia una vez se evidencia la gran cantidad de embarazos que llegan a término Colombia, año a año, esto a pesar de la visible disminución de la tasa de natalidad general en el país. Evidenciar los costos de la atención médica del embarazo puede incitar a las Administradoras de Planes de Beneficios (APB) e Instituciones Prestadoras de Salud (IPS) a general planes para promoción de la planificación adecuada del embarazo, además de encontrar bases académicas para realizar la negociación de tarifas correspondientes al pago de la atención médica del embarazo.

La metodología a utilizar es de tipo mixto y transversal, que permitirá identificar los costos directos e indirectos del embarazo en Colombia, asumiendo, para este caso, que los costos directos se relacionan con los costos de atención del embarazo y que los costos indirectos son los costos sociales asociados al embarazo. Se espera identificar los costos de la atención médica del embarazo y determinar los costos sociales del embarazo y analizar la relación que existe entre ambos costos.

Palabras clave: Embarazo, costos en salud, análisis de costos

Planteamiento Del Problema

Colombia actualmente enfrenta diversos de problemas de Salud Pública. Algunos se han mantenido a lo largo de las últimas décadas, y han tomado relevancia gracias a los acuerdos internacionales que velan por la defensa de los derechos humanos, entre estos cabe mencionar los Objetivos de desarrollo del milenio y los actuales Objetivos de Desarrollo Sostenible. Uno de estos objetivos está relacionado con mejorar la salud materna e infantil, para lo cual, es necesario mejorar la cobertura y el seguimiento, desde la concepción hasta el alumbramiento, de todas las mujeres que se embarazan en el país.

Diversas políticas públicas abordan la natalidad en el país y sus resultados se pueden observar en la notable disminución de la tasa de fertilidad del país, pasando de 6,7 nacimiento por mujer en 1960 a 1,8 nacimientos por mujer en 2017 (World Bank Group, 2019). Por su parte, la razón entre tasa de natalidad de mujeres de entre los 15 y los 19 años y tasa de natalidad general, ha aumentado de 3 a 4,4 (World Bank Group, 2019), es decir que por cada hijo de mujeres adultas se espera 4,4 nacimientos de adolescentes.

Uno de los vacíos existentes dentro del actual sistema de salud de Colombia es la ausencia de ejercicios de costeo que permitan determinar los costos reales de las atenciones de salud. Esto, dado que la contratación que se realiza en el

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país entre ABS e IPS está fundamentada en los dos manuales tarifarios autorizados para la realización de negociaciones y acuerdos entre estos dos agentes del mercado, siendo estos, el Manual ISS (Instituto de Seguros Sociales, 2004) y el Manual SOAT (Presidente de la República de Colombia, 2006).

Cuantificar adecuadamente los costos del embarazo en Colombia de la mano con los protocolos establecidos por la normatividad colombiana y de los manuales tarifarios a las entidades de salud permitiría realizar presupuestos más acertados frente a la atención de los servicios de salud relacionados con mujeres embarazadas en Colombia.

Por último, el cálculo adecuado de los costos unitarios de la atención médica y los costos sociales del embarazo en Colombia puede evidenciar los gastos que implican dicha atención con los niveles actuales de natalidad del país y que se podrían disminuir significativamente si se aplicaran políticas públicas más fuertes en términos planificación de la reproducción.

De este contexto surge la pregunta: ¿Cuáles son los costos administrativos y de la atención médica del embarazo en Colombia?

Antecedentes

Los costos encuentran diversas definiciones que buscan diferenciarlos de los gastos a la vez que caracterizarlos y clasificarlos de diversas maneras. Una definición administrativa afirma que "el costo de un objetivo perseguido estará dado por el valor, medido en términos monetarios, de los otros usos que se podrían haber dado a los recursos económicos utilizados para conseguirlo" (Corrales, Frías, & Lobo, 2014). Otra perspectiva menciona que "El costo corresponde al valor del consumo de recursos en que se incurre para generar un servicio, el cual puede ser económico o financiero" (Lenz-Alcayaga, 2010).

El proceso general para realizar un ejercicio de costeo es "a) identificar todos los recursos utilizados para obtener el producto o servicio; b) analizar qué otros usos pueden tener; c) identificar sus valores en términos monetarios; y, luego; d) sumar todos estos valores para encontrar, de esta forma, el costo del producto" (Corrales, Frías, & Lobo, 2014).

Algunas de las clasificaciones que presenta la bibliografía sobre los costos presenta los costos de producción, distribución y administrativos, directos e indirectos, fijos y variables, totales y unitarios, históricos y predeterminados, controlables y no controlables, relevantes y no relevantes, desembolsables y de oportunidad, entre otros (Castrillón, 2010). Los costos directos son descritos como aquellos que son directamente asociados a la prestación de un servicio, un producto o una división, mientras que los costos indirectos están asociados a una división, pero son indirectos al producto o servicio (Castrillón, 2010). En el caso de los estudios que analizan costos por fuera de una institución en salud, se suelen analizar los costos directos e indirectos, asumiendo los costos indirectos como los costos sociales.

En el caso de los costos en salud, "los costos directos se asocian con los recursos propios del sistema de salud, mientras que los costos indirectos se relacionan con el valor del tiempo que tiene que invertir el paciente en una intervención (traslado, espera, recuperación, etc.), asociado al salario y a su productividad. La economía, recomienda adoptar una perspectiva más amplia: la perspectiva social. El costo social se refiere a los costos que afectan a todos y cada uno de los miembros de la sociedad" (Lenz-Alcayaga, 2010). A pesar de la importancia que toma la cuantificación de los costos para la buena administración de una empresa, en el caso de la salud las "organizaciones no han tomado conciencia de los costos en los que deben incurrir para el tratamiento; siempre asumen que debe ser costeado por las EPS obviando sus responsabilidades" (Monsalve, y otros, 2018).

Por otro lado, el sistema de Salud en Colombia tiene como base fundamental la Ley 100 de 1993, que junto con el Decreto Único Reglamentario de Sector Salud y Protección Social (Ministerio de Salud y Protección Social, 2016), conforman una extensa normatividad para el sector, siendo fundamental la afiliación al Sistema General de Seguridad Social en Salud para la adquisición de derechos y obligaciones derivadas. Por su parte, la constitución política de Colombia establece que las mujeres "durante el embarazo y después del parto gozará[n] de especial asistencia y protección del Estado" (Pueblo de Colombia, 1991) lo que implica una cobertura obligatoria a esta población por parte del Estado, principalmente del sistema de salud.

La atención materno infantil incluye una cobertura a "los servicios de salud en el control prenatal, la atención del parto, el control del posparto y la atención de las afecciones relacionadas directamente con la lactancia" (Congreso de la República de Colombia, 1993). Por su parte, las guías de práctica clínica para la prevención, detección temprana y tratamiento de las complicaciones del embarazo, parto o puerperio, muestran la cobertura, tratamientos y procedimientos indicados para las mujeres en Colombia (Ministerio de Protección Social - Colciencias, 2013). Otros

documentos, como la guía de Control prenatal y factores de riesgo, realizada por la secretaría de salud e Bogotá (S.F.) muestran, por su parte, atenciones y cursos de acción indicados para el cuidado prenatal.

En relación al manejo de los costos en salud, la normatividad colombiana indica que las entidades de salud deben manejar un presupuesto y un sistema de costos a través de centros de costos [falta citar]. La investigación realizada por Duque, Gómez y Osorio (2009), muestra que buena parte de las entidades presentadoras de servicios de salud no cuentan con un sistema de costos ni reconocen la importancia de este para el buen manejo de los recursos.

Para el establecimiento de tarifas de pago de la presentación de servicios de salud, se utilizan dos manuales tarifarios, siendo estos el manual ISS y el manual SOAT. El primero de estos, como su nombre lo indica, fue creado para la negociación con el liquidado Instituto de Seguros Sociales, y a pesar de que su última actualización fue realizada en el año 2001, su uso está más asociado y es recurrente en las negociaciones que se realizan con entidades de salud del sector público. Su falta de actualización responde a la desaparición del ISS y obliga a las entidades que realizan acuerdos basados en este manual a aumentar un porcentaje arbitrario sobre los costos asignados en el manual, de dente el 20 y el 40%, sin tener ninguna relación directa con los costos reales de las atenciones prestadas.

Por el otro lado, el Manual Tarifario SOAT, fue creado para responder a la creciente necesidad de tener unas tarifas estandarizadas para atender los accidentes de tráfico recobrados al Seguro Obligatorio de Accidentes de Tránsito. Así, creado bajo otro objetivo, es utilizado en negociaciones entre entidades de salud dada su actualización anual. Es de aclarar que esta actualización anual se da principalmente porque sus tarifas están ligadas al SMLV, por lo que anualmente suben en la misma medida en la que aumenta el salario mínimo. En este caso, las tarifas disminuyen porcentualmente entendiendo que las tarifas que presenta el manual están por encima de los costos reales de la atención.

En ambos casos, hay una diferencia entre los objetivos por los que se desarrollaron los manuales y el uso que se les da en la actualidad. A su vez, existe un vacío en la inclusión de nuevas tecnologías, tratamientos y procedimientos en salud, que no están incluidos en estos manuales a pesar de hacer parte el paquete de cobertura del POS, o de los paquetes, alto costo, controlados y no pos.

Objetivos

Objetivo General

Analizar los costos directos e indirectos de la atención médica del embarazo en Colombia para evaluar el impacto monetario que generan los embarazos tanto en el sistema de salud como en las mujeres embarazadas y sus familias en diferentes zonas urbanas y rurales.

Objetivos Específicos

1. Determinar los principales factores que inciden en los costos sociales como costos indirectos del embarazo en Colombia
2. Identificar los factores que permiten calcular los costos de la atención médica del embarazo como costos directos para el sistema de salud colombiano
3. Comparar los costos asociados al embarazo en los dos manuales tarifarios de salud existentes en Colombia para evidenciar las diferencias de costos que ponen en desventaja a entidades en salud de acuerdo con el manual tarifario que utilicen para la negociación de tarifas
4. Identificar las acciones propuestas en guías de práctica clínica, protocolos de atención y lineamientos de política pública en relación a la atención del embarazo con miras a fortalecer los procesos de atención

Metodología

Estudio de tipo mixto transversal para la medición de costos directos e indirectos del embarazo en Colombia. Se plantean cuatro etapas:

Etapa 1: Revisión documental de metodologías de costeo desarrollados para la construcción de análisis de costos parciales y totales en salud, cálculos realizados sobre embarazo y cuidado prenatal, y documentos de práctica clínica, guías, protocolos y reglamentación relacionada. El proceso de revisión documental está compuesto por las siguientes fases: Búsqueda en bases de datos; Construcción de matriz bibliográfica; Construcción de RAES.

Etapa 2: Cuantificación de los costos indirectos (se asumen como los costos sociales del embarazo). El proceso de cuantificación de costos indirectos está compuesto de tres fases, siendo estas: Construcción de instrumento entrevista semiestructurada; Identificación de una población y muestra; Aplicación de entrevistas a la muestra seleccionada; Sistematización de la información y generación de resultados.

Etapa 3: Cuantificación de los costos directos (se asumen como los costos de la atención médica y administrativa relacionados directamente con el embarazo). El proceso de cuantificación de costos directos está compuesto de tres fases, siendo estas: La caracterización de tratamientos médicos del caso tipo; La determinación del uso de recursos; El cálculo de costos unitarios y costos totales.

Etapa 4: Consolidación de la información y construcción de resultados. Se plantea realizar la consolidación de los resultados encontrados en la Etapa 2 y 3 para cuantificar los costos del embarazo en Colombia como costos unitarios y costos globales.

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Inclusion of Pregnant Women in The Colombian Labor Market

Salomé del Pilar LÓPEZ-PEÑA

Corporación Universitaria Minuto de Dios – UNIMINUTO, Bogotá, Colombia
splopezp@unal.edu.co

July Paola JIMÉNEZ CALVO

Universidad: Universidad Nacional de Colombia, Bogotá, Colombia
jpjimenezca@unal.edu.co

The labor market in Colombia has been growing steadily since the economic opening that began in the 1990s, thanks to various initiatives and orientations such as the Washington Concession. This change in the labor market has meant, in addition to the well-known displacement of people from the rural sector to the urban sector, a significant increase in the country's economically active population along with women's access to the labor market. A large number of people have entered the labor market, and, with time, educational conditions have adapted to the needs of the market, allowing some of these people to study, improve their working level and consequently improve their standard of living.

However, access to the labor market has been more evident among men than women, even though the population of women is slightly larger than that of men, a trend that has increased over the years. This situation has several consequences for the country, among them, a higher rate of unemployment among women, wage inequality, wage discrimination, discrimination when in the gestation state, among others.

The indicator of unemployment of men and women as a percentage of the respective labor force shows that women have a higher level of unemployment than men, higher by 4% according to the latest data recorded by the World Bank (2018). Graph 1 shows the trend of this indicator.

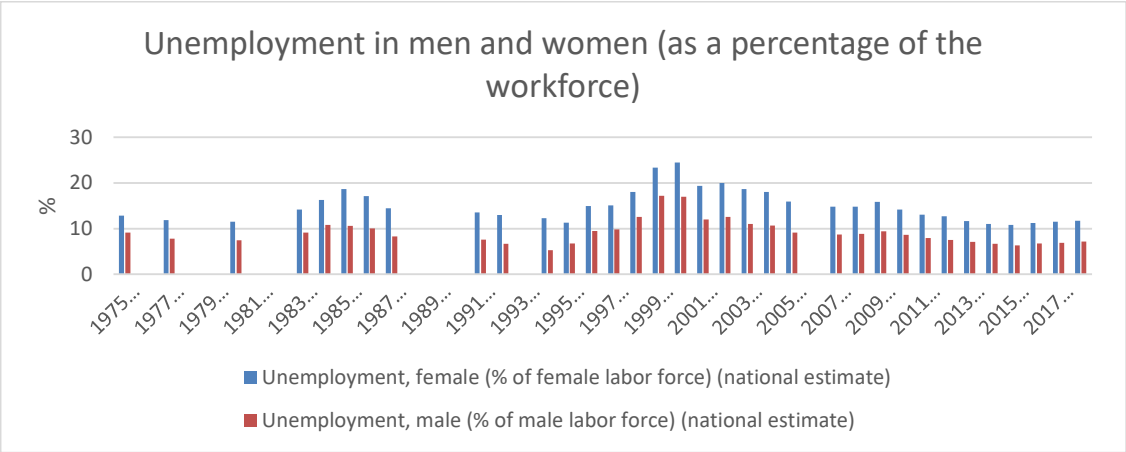

Fig.1: Unemployment in men and women (as a percentage of the workforce)

Own making. Source (Banco Mudial, 2018)

The actions that have been implemented in Colombia to modify this situation are, in turn, diverse. Authors such as Buchely, propose, in addition to the traditional ways, "to adopt alternative policies such as community centers, which are the programs oriented to the social redistribution of domestic work as a way to promote the participation of women in the formal labor market with the social support of the members of their own community" (2013). The actions

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carried out must take into account relevant or not relevant aspects in the labor world, such as social class, if one has children if one is married if one is a single mother, among others.

In research carried out on a sample of pregnant women in Bogotá, it was found that all of them identified pregnancy as a situation that placed them at a disadvantage in terms of work compared to other people. Some of them felt that they were relieved of some of their duties without any cause and identified as probable the loss of their jobs after completing their maternity leave. A symbiotic relationship was identified between these effects and the salary level of the participating women.

Gender equality can increase economic efficiency and improve other development outcomes such as removing barriers that prevent women from having the same access as men to education, economic opportunities, and productive inputs, which in turn can lead to widespread productivity increases that are all the more important in an increasingly competitive and globalized world (World Bank, 2011). In short, although not all actions imply a significant change, especially because there are aspects that are rooted in Colombian culture, this can lead to social and labor changes generating very significant contributions to Colombian society and the large population of economically active women of reproductive age in the country.

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Socio-Demographic and Clinical Determinants of Hospital Costs: Evidence from European Countries

Malgorzata CYGANSKA
University of Warmia and Mazury in Olsztyn, Olsztyn, Poland, m.cyganska@uwm.edu.pl and E-

Magdalena KLUDACZ-ALESSANDRI
Warsaw University of Technology, Plock, Poland, magdalena.kludacz@pw.edu.pl

Chris PYKE
Lancashire School of Business and Enterprise, University of Central Lancashire, UK, cpyke2@uclan.ac.uk

Abstract

Research motivation: Limited financial resources allocated for hospitalized older patients represent a significant economic problem both on public health systems and their families. This study addresses an empirical gap in the literature concerning the determinants of hospital costs in the group of older patients using the SHARE database. **Methodology:** Socio-demographic and clinical variables as the possible factors that may influence the hospital high cost were considered. The analysis included 9,671 patients, who were hospitalized in 2015. **Main findings:** On the studied population, 873 patients were identified as CO (cost outliers). The highest share of CO was in Switzerland (12,65%) and the lowest in Italy (5,80%). We found that individuals permanently sick or disabled, who suffered from cancer, diabetes, heart attack or chronic lung disease were associated with being hospital cost outliers. Individuals who reported difficulties with walking 100 m are more often cost outliers. The risk of being a cost outlier increased by 20% with each day spend in hospital. We did not find age and gender to be associated with being high cost outliers. **Implications:** Action is needed to improve the efficiency of hospitals and community services and improve the coordination of care, especially for older people with comorbidities. A clear understanding of the drivers of high inpatient costs of older patients is essential for developing and implementing policies aimed at improving the efficiency of public expenditure. Interventions aimed at promoting disease prevention and physical activity are also needed.

Keywords: Hospital Costs, Cost Outliers, Older People, Inpatient Costs.

Introduction

The substantial increases in healthcare costs over recent years are associated with a rapid increases in the older age population, greater longevity and the illness burden of older patients who represent the fastest-growing age group in the majority of the developed countries (Mody *et al.*, 2008). Throughout the developed European countries, life expectancy, together with the share of older people in society is continuously increasing. The reason for this can be attributed to the success of both preventive and curative medicine, combined with widespread technological advances, and declining fertility rates (Lehnert *et al.*, 2011). It is widely known that older people generally use more health services than other age groups, that they are at higher risk of more expensive long-term institutional care, and that they consume majority of health care expenditure. An aging population, together with the increasing cost of medical technologies, has been indicated as a major cause of the increase in healthcare expenditures and place a particular burden on hospital medical services. It was observed that average per-capita total health care expenditure is higher for older patients, mainly due to inpatient hospital-related spending. Older patients represent a large number of hospital admissions, consuming a substantial share of hospital resources. They will often increase the demand for acute beds and have a prolonged hospital stay (Liotta *et al.*, 2012). Limited financial resources allocated for hospitalized older patients represent a significant economic problem both on public health systems and their families. A high proportion of hospital costs incurred at the end of life is associated with the management of terminal illness (Round *et al.*, 2015) and the type of care received at these time (Sato and Fushimi, 2009).

Hospital services are the most expensive component of health systems and hospital inpatient care represents the largest single component of healthcare expenditures (Hay, 2014). Hospital costs have been subject to many studies

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and traditionally used as a surrogate to evaluate healthcare efficiency, as well as hospital resource utilization. A better understanding of cost outliers is essential to the improvement of management and financing of hospitals, as well as the whole health care system. An outlier is defined as data object that does not comply with the general behaviour of data, very different and inconsistent with the remaining data (Freitas *et al.*, 2012). It can be a result of an error or the natural variability of data. The high cost outliers are of great interest to hospital managers who have a goal to reduce the cost of hospital stays using a rational management strategy and to find clinical justification for funding these outliers on the basis of their real costs in order to moderate the consequences of a case mix financing system (Pirson, 2006). According to a study conducted in Spanish hospitals cost outliers account for almost 18% of hospital costs (Cots *et al.*, 2000). A knowledge of cost outliers is also important for the protection of more expensive patients and for the appropriate financing treatment of uncommon cases (Lee *et al.*, 1998). In an era of increasing budget restrictions, economic analysis of cost outliers and an identification of the factors affecting high health costs outliers could help define a strategy to reduce costs or use existing resources more efficiently.

Information on the determinants of hospital expenditures amongst older people is one of the most important issues in health policy. Despite the financial burden, research on the factors that impact hospital high cost outliers of an aging population is scarce. This study addresses an empirical gap in the literature concerning the determinants of hospital costs outliers in older patients using SHARE database. The identification of factors associated with cost outliers among aging adults may result in the development of effective interventions for healthcare policy across Europe. The strength of our analyses is the use of a large and representative dataset in Europe. We believe this is the first study to examine the impact factors of the hospital cost outliers among older people.

Methods

Sample and Data

We used cross-sectional data from the 6th wave (2015) of the Survey of Health, Aging and Retirement in Europe (SHARE) (Börsch-Supan, 2019). It is a multidisciplinary, cross-national micro data base containing information on health, social networks and socioeconomic status of over 60,000 Continental Europeans, aged 50+, from the following countries: Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Greece, Italy, Luxembourg, Poland Portugal, Slovenia, Spain, Sweden, Switzerland. We examined data relating to individuals who were hospitalized in 2015.

Variables

We considered socio-demographic and clinical variables as the possible factors that may influence the hospital high cost outliers. Socio-demographic variables included gender, age and job situation. Clinical variables covered length of stay per hospitalization (LOS), number of nights spent in hospital in 2015 as well as health risk factors, health status and functional ability. Health risk factors included BMI, high blood cholesterol, hypertension, physical activity and previous heart attack. Functional ability factors considered physical and mental condition including difficulties with walking 100 m and memory abilities. Health status factors regarded number of chronic diseases and the medical diagnoses and comorbidities, such as stroke, cerebral vascular disease, cancer, chronic lung disease, diabetes and high blood sugar.

Hospital costs outliers

We calculated the individuals' costs of hospitalization by multiplying total number of nights spent in hospital in 2015 for each patient with average inpatient cost per day for the country. The inpatient cost per day was calculated by dividing hospital expenditure (inpatient curative and rehabilitative care costs in 2015) in evaluated countries by number of inpatient curative bed-days in each country based on information from OECD database. All costs in current prices were converted to Euro on the basis of exchange rate provided by SHARE database.

Statistical Analysis

To select the outliers, we used the interquartile method using the median and the interquartile distance (Stanisz, 2007). The high outliers were identified as the 75th percentile + 1.5*interquartile range. To identify the low cost outliers, we used the corresponding rule: 25th percentile – 1.5* interquartile range. Because the rule 25th percentile – 1.5* interquartile range detected a negative trim-point in further analysis, we considered only high cost outliers. The analysis of contingency tables was executed with the Pearson's $\chi 2$-test. Continuous variables without normal distribution were analysed with the Mann-Whitney test. Univariate and multivariable logistic regression analysis

were used to determine the determinants of CO. A p-value of 0.005 was considered significant. Statistical analysis was carried out using StatSoft Statistica software version 13.3.

Results

The analysis included 9,671 patients, who were hospitalized in 2015. The patients included in the analysis were more likely to be retired (67.9%). Majority of them were female (53.9%). The average age was 58 years. Overall average LOS was 7.23 days. The average number of chronic diseases per patient was 2.65. The most frequently found chronic diseases (hypertension) affected more than 50.5% of patients, followed by diabetes (20.1%) and chronic lung disease (12.3%). 25% of patients had difficulty walking 100 metres and 23% of patients had suffered from a heart attack.

On the studied population, 873 patients were identified as cost outliers (tab. 1). The highest share of CO was in Switzerland (12.7%) and the lowest in Italy (5.8%). The highest treatment costs of CO were in Switzerland (9,652.30 €/person) and the lowest in Estonia (1,758.92 €/person). In Portugal the hospitalization costs of CO were more than 14 times higher than CI and it was the highest difference among studied countries. In Greece this difference was the lowest (6 times).

Table 1: Hospital cost outliers (CO) and inliers (CI) by country

Country	CI n=8800	CO n=873	CI n=8800	CO n=873	p-Value
	n (%)		Inpatient costs median [Q1-Q3] [€/person]		
Austria	749 (92.58)	60 (7.41)	926.94 [463.47 – 1,853.88]	6,643.07 [6,025.11 – 9,269.40]	<0.001
Belgium	892 (90.19)	97 (9.81)	571.56 [142.89–1,143.12]	5,144.04 [4,286.70-8,573.40]	<0.001
Czech Republic	867 (91.45)	81 (8.54)	211.68 [120.96 – 393.12]	1,814.40 [1,209.60 – 2,540.16]	<0.001
Denmark	441 (91.87)	39 (8.12)	756.15 [252.05 – 1,512.30]	7,561.50 [6,049.20-11,342.25]	<0.001
Estonia	762 (92.25)	64 (7.74)	183.54 [91.77 – 305.90]	1,758.92 [1,223.60 – 2,753.10]	<0.001
France	484 (88.64)	62 (11.35)	417.20 [208.60 – 834.40]	4,484.90 [3,129.00-6,779.50]	<0.001
Germany	827 (92.71)	65 (7.29)	749.22 [374.61-1,373.57]	6,118.63 [4,994.80-8,241.42]	<0.001
Greece	356 (91.75)	32 (8.25)	371.05 [222.63-742.10]	2,226.30 [2,226.30-3,710.50]	<0.001
Italy	552 (91.20)	34 (5.80)	848.52 [282.84-1,555.62]	6,929.58 [5,373.96 – 8,626.62]	<0.001
Luxembourg	230 (88.80)	29 (11.19)	848.52 [282.84-1,555.62]	6,929.58 [5,273.96-8,626.62]	<0.001
Poland	297 (88.39)	39 (11.61)	241.36 [137.92 – 448.24]	1,586.08 [1,413.68 – 2,413.60]	<0.001
Portugal	197 (89.14)	24 (10.86)	118.04 [59.02 – 236.08]	1,711.58 [885.30-2,434.57]	<0.001
Slovenia	610 (91.18)	59 (8.81)	384.30 [192.15-640.50]	3,202.50 [2,690.10-3,843.00]	<0.001
Spain	639 (90.00)	71 (10.00)	351.80 [140.72 – 703.60]	3166.20 [2,110.80-4,925.20]	<0.001
Sweden	496 (89.37)	59 (10.63)	546.27 [273.14-1,092.54]	4,370.16 [3,459.71-6,373.15]	<0.001
Switzerland	401 (87.36)	58 (12.65)	1378.90 [551.56–2,206.24]	9,652.30 [7,721.84–15,443.68]	<0.001

n (%), number and percentage, Q1, first quartile, Q3, third quartile

The difference for LOS and number of nights spent in hospital between CI and CO was statistically significant for all analysed countries (tab. 2). The mean LOS per hospitalization for cost outliers was 28.77 nights and was almost

6 times higher than in case of CI. CO spent on average 58.59 nights in hospital in 2015 and it was 8 times more days than in case of CI. In most of the evaluated countries CO differed from CI by physical activity (Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Greece, Luxembourg, Poland, Slovenia, Sweden, Switzerland,) health condition, measured by number of chronic diseases (Austria, Belgium, Czech Republic, Germany, Denmark, France, Italy, Slovenia, Switzerland) and reporting difficulties with walking 100 m (Czech Republic, Estonia, Slovenia, Spain, Greece, Italy, France, Germany, Switzerland, Sweden, Luxembourg, Denmark, Belgium, Austria). In most of the countries extreme high costs of hospital treatment was observed in case of patients reporting cancer (Austria, Czech Republic, Germany, Denmark, Spain, Greece, Italy, Poland, Sweden).

Table 2: Characteristics of cost outliers (CO) and inliers (CI) by variables

Patient characteristics	CI	CO	Countries with p-Value < 0.005
	Mean (SD)		
Age [years]	57.69 (22.44)	58.99 (20.66)	Switzerland, Germany, Denmark, Italy
LOS per hospitalization [days]	5.09 (4.67)	28.77 (31.55)	All countries
BMI	26.71 (6.71)	25.63 (7.99)	Portugal, Sweden
Nights stayed in hospital [per year]	7.09 (6.40)	58.59 (47.33)	All countries
Number of chronic diseases	2.59 (1.81)	3.19 (2.00)	Austria, Belgium, Switzerland, Czech Republic, Germany, Denmark, France, Italy, Slovenia
Difficulties with walking 100 m	**n (%)**		Czech Republic, Estonia, Slovenia, Spain, Greece, Italy, France, Germany, Switzerland, Sweden, Luxembourg, Denmark, Belgium, Austria
Present	1977 (82.24)	427 (17.76)	
Absent	6823 (93.88)	445 (6.12)	
Sport vigorous			Switzerland, Sweden, Slovenia, Poland, Luxembourg, Greece, Germany, France, Estonia, Denmark, Czech Republic, Belgium, Austria
More than once a week	2071 (95.35)	101 (4.65)	
Once a week	914 (96.62)	32 (3.38)	
One to three times a month	655 (95.34)	32 (4.66)	
Hardly ever, or never	5160 (87.93)	708 (12.07)	
Gender			Portugal
Male	4069 (91.21)	392 (8.79)	
Female	4731 (90.77)	481 (9.23)	
Current job situation			Switzerland, Slovenia, Germany, France, Belgium
Retired	5954 (90.60)	618 (9.40)	
Employed or self-employed	1289 (97.28)	36 (2.72)	
Unemployed	180 (95.74)	8 (4.26)	
Homemaker	583 (84.62)	106 (15.38)	
Permanently sick or disabled	452 (84.17)	85 (15.83)	
Other	171	20	
Number of words learning test			Czech Republic, Italy, France, Luxemburg, Belgium, Austria
0-2	677 (85.05)	119 (14.94)	
3-6	5680 (91.96)	496 (8.03)	
7-9	677 (95.76)	30 (4.24)	
Heart attack			Austria, Belgium, Germany, France
Present	1988 (88.20)	266 (11.80)	
Absent	6810 (91.82)	607 (8.18)	
Hypertension			-

Present	4434 (91.01)	438 (8.99)	
Absent	4364 (90.94)	435 (9.06)	
High blood cholesterol			Belgium
Present	2526 (91.39)	238 (8.61)	
Absent	6272 (90.81)	635 (9.19)	
Stroke			Austria, Belgium, Germany, Estonia, Spain, France, Italy
Present	697 (83.08)	142 (16.92)	
Absent	8101 (91.72)	731 (8.28)	
Diabetes			Switzerland, Germany, Denmark, Luxembourg, Slovenia
Present	1705 (87.84)	236 (12.16)	
Absent	7093 (91.76)	637 (8.24)	
Chronic lung disease			Austria, Switzerland, Sweden
Present	1037 (87.44)	149 (12.56)	
Absent	7761 (91.47)	724 (8.53)	
Cancer			Austria, Czech Republic, Germany, Denmark, Spain, Greece, Italy, Poland, Sweden
Present	852 (84.52)	156 (15.48)	
Absent	7946 (91.72)	717 (8.28)	

We analysed all countries together by using univariate and multivariate linear regression model. All independent variables that were proved significant in the univariate analysis were included in the multivariate model (tab.3). We found that individuals permanently sick or disabled (OR = 1.654, [95% CI, 1.173-2.330]), who suffered from cancer (OR = 2.869 [95% CI, 2.232-3.688]), diabetes (OR = 1.353, [95% CI, 1.062-1.724]), heart attack (OR = 1.261, [95% CI, 1.003-1.586]) or chronic lung disease (OR = 1.540, [95% CI, 1.276-1.859]) were associated with being hospital cost outliers. Also, individuals who reported difficulties with walking 100 m (OR = 1.771, [95% CI, 1.433-2.190]) are more often cost outliers. Moreover, the risk of being cost outlier increase of 20% with each day spend in hospital (OR = 1,219, [95% CI, 1.205-1.234]).

Table 3: Multivariate analysis of factors associated with cost outliers

Explanatory variables	β-coefficient	Adjusted		
		OR	(95% CI)	p-Value
LOS [days]	0.198	1.219	(1.205-1.234)	<0.001
Employed or self-employed	-0.688	0.502	(0.313-0.806)	0.004
Permanently sick or disabled	0.503	1.654	(1.173-2.330)	0.004
Difficulties with walking 100 m Present	0.572	1.771	(1.433-2.190)	<0.001
Heart attack Present	0.232	1.261	(1.003-1.586)	0.004
Diabetes Present	0.302	1.353	(1.062-1.724)	0.001
Chronic lung disease Present	0.176	1.540	(1.276-1.859)	<0.001
Cancer Present	1.054	2.869	(2.232-3.688)	<0.001

CI, confidence interval, OR, odds ratio, LOS, length of stay.

Discussion

Social and clinical factors were statistically significant predictors of health cost in many other studies, but they were not analysed using large international data of aging population. There is a lack of population-based empirical studies on the complex relationships between high hospital costs outliers, socio-demographic characteristics and health status of the senior. Our study is the first using SHARE database that presents significant new data from a comprehensive healthcare perspective on the complex association between the hospital cost outliers and their potential determinants, in a very under-researched and rapidly growing group of elderly in Europe.. We found that one of the most important determinant of hospital cost outliers of older people is disability (permanently sick or disabled, with difficulties with walking 100 m.). The conclusion that functional disabilities are strong determinant of health cost among older people was confirmed by Wagner *et al.* (2006), who found that Functional Independence Measure (FIM) scores were significantly associated with health costs. They explained that FIM affects discharge costs mostly through its association with LOS. They also found strong relationship between LOS and inpatient rehabilitation costs. According to them LOS explained approximately 80% of the variance in cost of inpatient specialized rehabilitation stays because such costs are fixed or recurring. Also the study conducted on the patients

with stroke showed that the patients with greater disabilities at discharge and longer LOS are more likely to face higher costs of medical care (Wei *et al.*, 2010).

Our study revealed the relationship between the cost outliers and the number and kind of chronic diseases and impairments. Our findings are confirmed by Lenhert *et al.* (2011) based on 35 studies concerning relationship between multiply chronic diseases and health expenditure for aging populations, found a positive association between multiply chronic diseases and health expenditure. They noticed that health expenditure significantly increased with each additional chronic disease and several of them observed a curvilinear (near exponential) relationship, in which expenditure roughly doubled with each additional chronic disease (Schneider *et al.*, 2009; Wolff *et al.*, 2002). Generally, the more diseases a patient had, the higher the costs of an additional disease. According to our analysis the older people with health problems such as heart attack, diabetes, chronic lung disease or cancer generate the highest costs in the hospitals. According to an American study two thirds of older Medicare beneficiaries had 2 or more types of chronic conditions and accounted for 99% of health expenditures, but the reason for such situation is a higher risk of hospital complications that increase the costs (Lochner *et al.*, 2011). The study regarding older patients with pneumonia showed that neither the patient's age nor comorbidities were independently associated with high costs if they had no associated complications (Cases *et al.*, 2008). Likewise Kaplan *et al.* (2002) also found patients with complications require longer hospital stays, resulting in increased costs. The other authors found that complications increase the costs up to six times, due to the need for more tests and treatments especially, due to the extension of the LOS (Cases *et al.*, 2008). Older people with multiply chronic conditions are high users of hospital care; in particular emergency department services mainly because of higher LOS caused by high rates of hospital admissions for adverse events (Shah *et al.*, 2001).

Similar to other studies, we did not find age and gender to be associated with being high cost outliers (Wei *et al.*, 2010). On the other hand, some other researchers reported that women were more likely to face higher costs than men (Evers *et al.*, 2002). Our findings suggest that, although women had a higher level of use of health services, they accounted for less of the hospital expenditure. This may be because women are more health conscious than men and take better care of themselves (Dean, 1989). Furthermore, they visit physicians more often than men, which results in earlier detection of health problems (Cockerham, 1998).

A clear understanding of the drivers of high inpatient costs of older patients is essential for developing and implementing policies having an aim to improve the efficiency of public spending (Alhashmi and Campus, 2008). Our study showed that such factors as disability, comorbidities and high LOS can contribute to an important portion of hospital costs and therefore should be considered by hospital managers and health policy makers. We presume that the individuals reported as high cost outliers are significantly less active because they are permanently sick or disabled, have problems with walking, suffered from heart attack, have more chronic diseases, like cancer, diabetes, chronic lung diseases. It is because of these problems they are more often admitted to hospitals and spend more time there.

In conclusion, we suggest that reductions in hospital costs could result from effective policies that enable them to introduce new models of care to reduce LOS. Given the projected rapid aging of the population, efforts to improve the efficiency of hospitals and community services and improving the coordination of care especially for disable patients with comorbidities are needed. Integration between inpatient, outpatient and social care could result in global economic savings for the public health system and could be clinically advantageous for the patients. We advocate for interventions aimed at promoting disease prevention and physical activity.

Key points

- Rates of hospital cost outliers among older people varied from 5.80 to 12.65% across Europe.
- Factors associated with extreme high inpatient costs include the length of stay in hospital, poor health and comorbidities.
- Older people reporting heart attack, diabetes, chronic lung disease or cancer are more often cost outliers.
- Interventions aimed at promoting disease prevention and physical activity among older people are strongly needed.

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Cross-Functional Integration and The Success of Servitization Production of Manufacturers - Examination of The Necessary Conditions

Mirosław MATUSEK

Silesian University of Technology, Zabrze, Poland
mmatusek@polsl.pl

Abstract

The aim of the article was to examine the level of necessity of the condition of inter-functional integration in the organization to achieve different levels of revenues from the sale of services of production enterprises depending on the type of service orientation of the product offer (i.e. product support services (SSP) and customer support services (SSC). Servicing is now becoming an important factor contributing to the competitiveness of producers. This phenomenon, understood as the adoption of a service-oriented business strategy, in line with the theory of organizational fit, requires changes, e.g., in the organizational structure. Producers may separate an autonomous service unit or strive to integrate a service organization with a product. There are arguments for one or the other in the results of empirical research and in theory. Unfortunately, the results currently achieved show a contradiction. On the basis of a survey conducted on a sample of 186 manufacturers, the necessary conditions were tested using one of the non-parametric methods, i.e., Necessary Condition Analysis (NCA). The study showed that cross-functional cooperation determines the achievement of different levels of revenues from the provision of product and service solutions. This condition severely limits the revenues generated when the manufacturer provides the SSC category offer.

Keywords: Servitization, Service Orientation, Industry 4.0, Organizational Ties, Necessary Condition Analysis (NCA).

Introduction

In the last decade, manufacturing companies have experienced many transformations that radically change the concepts of building a competitive advantage, relationships with customers, suppliers or ways of developing, producing and delivering a product offer (Gersch and Goeke, 2007). Currently, the two observed macro-trends, i.e., the phenomenon of servitization and the Industry 4.0 initiative, are perceived as particular challenges faced by manufacturing companies.

Servitization is a phenomenon (process) observed at the level of national economies and at the level of manufacturers themselves. At the manufacture level, servitization is manifested by the gradual integration of the product offer with the service component (Raddats et al., 2019). Other authors define the phenomenon of servitization as an innovative way of organizing capabilities and processes in order to better create common (customer and supplier/s) value by moving from selling products to providing integrated solutions consisting of products, services and knowledge (Kowalkowski et al., 2017; Martinez et al., 2017; Szmal, 2015) Such a transformation is rooted in the value architecture of the solutions offered to customers, composed of the mechanisms of creating value, its delivery, capturing and their complementarity (Teece, 2010). Industry 4.0, in turn, is considered to be a new industrial development scenario with the convergence of various new technologies supported by the Internet of Things (IoT). (Reischauer, 2018)

These issues have long been treated as separate research areas, the first of which focuses on customer value, and the second on the value of internal business processes (Coreynen et al., 2017). In fact, both trends are closely related and their common ground are digital technologies on which, in turn, are based intelligent products, digital services, mass personalization of the product offer or other innovative value proposition models (e.g., Coreynen et al., 2017). Technologies and solutions that make up Industry 4.0, such as IoT, Big Data, Cloud computing, analytics or cybersecurity, are currently becoming the basis of an increasingly complex and integrated product and service offer. (Frank et al., 2019) Product and service solutions (PSS) are defined differently (e.g., Kowalkowski et al., 2017).

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The article assumes that the PSS is an individualized offer responding to the (complex) needs of service users (clients), which is designed and delivered interactively with the recipient and whose components offer synergistic added value by combining products and/or services so that its value is something more than the sum of the offered value of its individual components. PSSs integrate components such as product, service and knowledge into unique combinations to meet customer requirements and needs. In extreme cases, the inputs incurred by the supplier are compensated by the recipient on the basis of value in use.

The development and delivery of services or product-service solutions are more complex tasks than the production of products, although as such they may not be perceived in this way (at least initially) by managers of manufacturing companies. Alghisi and Saccani (2015) found that the development of advanced services without properly aligning the internal components of an organization (e.g., service orientation of the strategy and portfolio of a service-oriented product offer) with external aspects (customers and other participants in the service delivery network) may prove very difficult. The development of production companies by increasing the role of services in their product offer creates huge (new, unknown to production companies) strategic, operational and financial risks. Although recent quantitative research (e.g., Böhm et al., 2017) indicate that services can have a positive impact on the results of manufacturing companies, however, according to the concept of organizational adjustment (Mintzberg, 1993), it depends on factors inside the organization and in its environment. This article focuses on the match between the service offer and organizational relations. Gremyr et al. (2014) indicate in their research that manufacturing companies that start developing new business focused on services experience an imbalance between strategy and practice or everyday activities undertaken in the enterprise. Authors (e.g., Gebauer, 2008; Raddats et al., 2019) quite commonly agree that the sources of this mismatch should first of all be seen in the inconsistency between the adopted business strategy (here expressed through the product and service offer) and the service-oriented organizational structure.

Although researchers generally agree that inter-functional and inter-organizational cooperation are important aspects of the integration of services and products in the form of product-service solutions, knowing whether these factors are necessary conditions at the same level with a different degree of product offer orientation service has so far not been explored. Moreover, most of the research on the preconditions for the success of servitization, except for a few cases, e.g., Antioco et al. (2006), was exploratory, qualitative research based on case studies. (Raddats et al., 2019)

Hence, the presented research results try to answer the question whether, and if so, how the organizational ties determine the levels of revenue from the sale of product and service solutions achieved by manufacturing companies, depending on their type?

Data analysis was performed using the Necessary Condition Analysis (NCA) tool (Dul, 2016). The next part of the article presents the state of knowledge on the impact of the criteria of internal structuring of an organization and organizational cooperation depending on the type of product offer orientation towards services (SSP, SSC). Then the research method, the course of the research and their results are presented. The article ends with conclusions indicating future research directions.

Research Review

The type of product offer orientation towards services and the internal structuring of the organization

In research on the conditions for the success of servitization of production companies, one of the most frequently mentioned factors is the organizational structure oriented at providing integrated product and service solutions. (Fliess et al., 2017; Raddats et al., 2019) The organizational structure is, along with people, technology and goals, one of the elements of the organizational system. Its essence lies in the appropriate combination of the goals and tasks of the organization, resulting from the strategy and technology of executive processes, with people and the ways of influencing them in the work process. (Chandler, 1962) It defines the arrangement of the company's elements and the relations between them. The way of dividing work into different tasks, i.e., integration and/or separation of tasks and responsibilities, is reflected in the organizational distinctiveness of activities related to the offered products and services. The distinctiveness of these activities represents the degree to which tasks and responsibilities related to service activities are integrated as a separate unit in the organizational structure or strategic business unit. (Oliva et al., 2012). A production company adopting a service orientation changes its product offer towards an increase in the share of services or integrated product-service solutions. Thus, the level of

diversification of the organization's businesses increases. It is one of the factors influencing the greater degree of organizational structure (by creating divisions, facilities). Therefore, it can be assumed that with the increase in the level of service orientation, with the increase in the maturity of the servitization of production manufacturers, they will try to separate units responsible for the development and provision of services from those responsible for the delivery of products.

Indeed, some authors (e.g., Gebauer, 2008) indicates that the organizational distinctiveness of the service business is positively related to the service orientation of manufacturing enterprises. The authors argue that manufacturing companies, which from the beginning of their activity based their business model on the sale of products, while integrating tasks related to services in the same organizational unit, are not able to focus sufficiently on services or understand their unique requirements. (Gebauer et al., 2009, p. 109) According to the authors, the integration of tasks related to products and services in one organizational structure is proof that managers do not notice the fundamental differences between the business of products and services. This is conducive to a low level of service orientation in organizational structures, which in turn leads to the achievement of unsatisfactory results related to the sale of the service offer. The separation of a unit responsible for the service business supports the service orientation of the enterprise and helps to avoid the service paradox. (Matusek et al., 2018) The separation of the service unit allows for fully autonomous management of customer relations, developing the service offer, setting its price and choosing the methods of providing services (Auguste et al., 2006; Gebauer, 2008). The separation of a service organization emphasizes the strategic involvement of a manufacturing company in service activities (e.g., Gebauer et al., 2009), moreover, as shown by the authors (Oliva et al., 2012), an independent service unit in the organizational structure positively influences the results achieved by the enterprise on the sale of services.

On the other hand, Neu (2005) posits quite the opposite. According to the author, the creation of an autonomous service unit in the organizational structure limits the development of service activities. Consequently, the separation of the service unit may limit the benefits achieved by the enterprise. The reason for this in marketing is explained by the increase in the moments (points) of contact with the client, which can harm the relationship with them. Thus, the separation of a service unit in a manufacturing company can significantly increase the coordination efforts between the company and customers (Raja et al., 2018). Separating product and service activities can lead to internal conflicts. In addition, unbundling of service activities create a risk to product activities, which means that companies face internal resistance from product activities, and managers have to deal with conflicts at the interface between service and product activities (Gebauer et al., 2009). In their subsequent studies, Neu and Brown (2008) confirm that in the case of integration of a service unit with a product unit, it is possible to obtain a synergy effect in the form of product and service solutions and improvement of knowledge transfer in the process of developing and delivering such solutions.

With such contradictions, research was conducted on the impact of the separation of an autonomous service unit on the achieved results depending on the service orientation of the product offer (on the type of services in the product offer). The services are not homogeneous and the authors classify them according to various criteria. (more e.g., in: Raddats et al., 2019) However, the most frequently used classification of services in servitization research is that proposed by Mathieu (2001). The author divides the services into those that ensure the proper functioning of the product (SSP) (related to the delivered product, e.g., service activities) and those that support the customer's activities (SSC) (e.g. consulting, services aimed at improving business or operational processes at the customer). The product offer, which consists of services supporting the customer's activities, is characterized by a greater degree of service orientation. Antioco et al., 2008) Fliess et al. (2017) argue that the more service-oriented the product offer, the more appropriate a structure with a separate service unit. Kowalkowski et al., (2017), Gebauer et al. (2009) and Oliva et al. (2012), on the contrary, state that an autonomous organizational unit is appropriate with a low level of service orientation in the product offer. In turn, in the aforementioned works by Neu (2005) or Neu and Brown (2008), the authors conducted research on a sample of manufacturing companies with a product offer characterized by a high level of service orientation, such as SSC (their product offer was dominated by services supporting customer activities). The authors confirmed the correctness of the integration of organizational units responsible for the development and delivery of products and services.

Type of product offer orientation towards services and organizational ties

Organizational structure is not only a way to integrate or divide tasks, but it is also an element that determines cooperation inside and outside the organization. Hence, the problem of distinguishing a service unit in the organizational structure of production companies entering the path of servitization is related to the discussion on the impact of inter-functional and inter-organizational cooperation on the service orientation of enterprises. (Raddats et al., 2019; Gebauer, et al. 2009) Organizational ties are relations of interdependence, having the nature of

interactions of material and information resources within the enterprise (Swink et al., 2015). Inter-organizational ties are similarly defined as such interactions between organizations in which information, material or energy exchange takes place. The parties to the inter-organizational exchange (here, the production company and end customers and/or intermediate customers) must show mutual commitment. This research was limited to presenting the results of research on organizational constraints.

While there is widespread agreement among researchers about the positive impact of both collaboration between departments (e.g., Edvardsson et al. 2014) or between organizations (Edvardsson et al. 2014) on the results achieved by enterprises or competitive advantage, the authors also try to define the necessary conditions for achieving such results. It is similar among authors who study the phenomenon of servitization (e.g. Fliess et al., 2017; Gebauer et al. 2009; Antioco et al., 2008), who include the criterion of distinguishing basic organizational units or the orientation of the product offer towards services. Fliess et al. (2017) based on the literature review, hypothesise that regardless of whether the service activity is integrated or separated from the product activity, the factors contributing to the success of servitization are the exchange of information within the company and between customers. At the same time, the authors assume that the effect will be greater with a greater degree of service-oriented product offer. In the case of having a product offer characterized by a high degree of service orientation, producers are forced to integrate such organizational units. Neu and Brown (2008) At the same time, they must support collaboration within the company in order to meet customer requirements effectively and efficiently. Storbacka (2011, p. 709) states that integrated product-service solutions with a high level of service orientation are inherently cross-functional. Antioco et al. (2006) examined the relationship between the relationship of cooperation within the company and the service orientation of the product offer. The authors, as few in their research, took into account the heterogeneity of services, i.e., two categories of product and service offer were distinguished. The first category of the product offer (less service-oriented) in which services that ensure the proper functioning of the product dominate, and the second (highly service-oriented) in which services supporting the activities and business processes of customers dominate. The results of the research showed that there is no direct relationship between inter-functional cooperation and the types of service orientation of the product offer. However, the authors noticed that the relationship between services supporting the customer's activities (an offer with a higher degree of service orientation) and the achieved sales volume of products becomes stronger with the increase in inter-functional cooperation.

Summing up, it can be concluded that researchers disagree as to whether (and if so, under what conditions) the integration or separation of service activities from product-related activities contributes to the success of the servitization of producers. Secondly, there is generally agreement that inter-functional and inter-organizational cooperation are important aspects of integrating services and products in the form of an integrated product-service offering. However, our knowledge of whether these factors are necessary conditions at the same level with varying degrees of service orientation in the product offering has not yet been explored. Thirdly, in research on the conditions necessary for the success of servitization, apart from a few cases, e.g., Antioco et al. (2006), there is a lack of studies that would prove the truth of the hypotheses made by statistical generalization on a larger sample than a few examined cases. Most of the research conducted in this topic was exploratory, qualitative, based on case studies. (Raddats et al., 2019)

Research Method

NCA Method

In order to find out about the conditions necessary for the production companies to achieve a given level of revenues from the sale of product and service solutions, which may be 1. the separation or integration of organizational units responsible for providing the product and service component of the product offer, 2. interfunctional ties, the NCA method was used (Dul, 2016). The method belongs to the group of non-parametric methods which use the linear programming procedure, but the influence of the random factor on the features of the objects is not taken into account. The advantage of NCA resulting from the non-parametric nature of the method is that it does not require the presentation of a functional relationship between the analyzed variables. The NCA helps researchers determine the necessary level of condition necessary (but not sufficient) to achieve the desired level of effect (outcome). In that case, it allows you to answer, among others, the question of the type "what minimum level of the value of the independent variable X is necessary for a given level of the value of the dependent variable Y (understood as the desired result, effect, result)?". In order to identify the necessary value of a given variable for the desired effect to occur, in the NCA method, the so-called ceiling line. In the Cartesian coordinate system, the ceiling line is the boundary line separating the zone without registered observations (points) from the zone in which these observations are located. The ceiling line takes the form of a non-decreasing (linear) function with intervals (Dul, 2016). There are many ways to determine such a line. The NCA adapted, inter alia, solutions from the

previously developed method of boundary data analysis (Data Envelopment Analysis - DEA) and free envelope determination methods (Free Disposal Hull - FDH). (Dul, 2016) The "empty" zone (usually above the ceiling line) is proof of the existence of a necessary condition. It will vary in size, thus determining the measure of the necessity effect (d), but not the sufficiency condition. In NCA, the magnitude of the precondition effect is expressed as the size of the zone above the ceiling line ("empty" zone) to the entire area of recorded observations. (Dul, 2016) The effect is stronger with increasing the zone above the ceiling line. As with other measures of effect size, such as the correlation coefficient r, in NCA the value of the necessary condition effect ranges from 0 to 1. (Dul, 2016)

Measures

The constructs used in the study were generated using the positions of the scales already used in previous studies. In order to measure the service orientation of the product offer, the aforementioned classification of services according to Mathieu (2001) was used, thus dividing the product offer into one in which services that ensure the proper functioning of the product (SSP) dominate and one in which services supporting business activities and processes of clients dominate (SSC). The respondents indicated from the presented list of services which type of services the company has in its product offer. The list of SSP (n = 11) and SSC (n = 8) services was taken from previous research (Eggert et al., 2015). For each of the 19 services presented, the variable was dichotomous (0 = "we do not offer", 1 = "we offer"). As the number of services was different for each of the two groups, the obtained values were normalized. Depending on which standardized SSP or SSC value was higher, it was assumed that the manufacturer has a product offer more oriented towards SSP or SSC, respectively. On this basis, enterprises were divided into two groups, which were the basis for the search for necessary conditions depending on the type of services offered. The first group (SSP) included 112, and the second group (SSC) 72 enterprises.

Based on a proposal by Antioco et al. (2008) the results achieved by enterprises were obtained from the respondents by declaring the percentage share of the revenues obtained from the sale of services in the total revenues from sales. A subjective measure is used here because, as stated by Homburg et al. (2002), in the case of an integrated product and service offer, an objective measure, e.g., in terms of amount, is in many cases very difficult (if not impossible) to obtain. This situation takes place mainly when the enterprise has not separated an organizational unit with assigned full responsibility for the costs and profits incurred from service activities. (Gebauer et al., 2009)

Organizational cooperation was operationalized on the basis of Storback (2011) and Langerak et al. (2004). Ultimately, the respondents rated the 4 statements relating to the interactions of teams of employees participating in service-related tasks (service development, marketing, sales of services) with other functions in the company (product development, production, marketing). The scale consisted of the following items: 1. employees of individual organizational units (departments) coordinate their activities related to the services provided to our clients; 2. individual organizational units (departments) jointly meet the needs of customers; 3. individual organizational units (departments) are jointly responsible for relations with customers; 4. employees of various organizational units (departments) jointly participate in working visits to clients; 5. employees of various organizational units (departments) jointly make decisions that affect customer relations. The rating was made on a 5-point Likert scale from 1 "disagree" to 5 "completely agree" and 3 "neither agree nor disagree"). In order to determine the reliability of the scale, the Cronbach's a-coefficient was used, i.e. a measure determining the consistency of items present in a given scale (in other words stating to what extent the questions included in a given factor determine the same theoretical construct). The obtained value of the Cronbach's a-coefficient at the level of 0.69 was achieved after removing statement No. 5. With a cut-off value of 0.6 on a 5-point Likert scale (Hair et al., 2006), the final 4-item measurement tool has sufficient reliability to measure inter-functional relationships.

Research sample and data collection method

The surveyed entities were production companies based in Poland, which declared to have services in their product offer, and employing at least 10 employees. The research sample was selected on purpose based on the Central Statistical Office data from the REGON register, 2017. Moreover, the selection of enterprises was based on a quota, trying to comply with the data of the Central Statistical Office in such dimensions as the percentage share of enterprises from a given section and division of the Polish Classification of Activities and according to the employment structure. To collect the data, the CATI method of direct interview (computer-assisted telephone interview) was used. The interviews were conducted by one of the largest companies in Poland conducting this type of research. Ultimately, the research sample consisted of 320 companies. The respondents were employees of higher and middle management level, i.e. owners, presidents, managing directors, sales and marketing directors, service department managers and new product development managers. The respondents represented companies from seven different industries: production of machinery and equipment (41%), production of electrical equipment (16%), activities related to software and IT consultancy and related activities (13%), production of motor vehicles,

trailers and semi-trailers trailers (10%), manufacture of other transport equipment (9%), manufacture of computers (8%), telecommunications (3%). The surveyed companies employed: 10-49 employees (51%), 50-249 employees (41%), 250 employees and more (9%).

Results from the NCA analysis

The research included determining the ceiling line for the necessary condition of inter-functional cooperation (*IntraFirm*) depending on the type of service orientation of the product offer (i.e. *SSP* and *SSC*) (Fig. 1). Of the two implemented methods of determining the ceiling line, i.e. CE-FDH and CR-FDH, with discrete data, a better line fit is obtained by the CE-FDH method. (Dul, 2016) Secondly, the necessary conditions effect sizes were determined (Table 1). Based on experience (Dul, 2016, p. 271), the effect is assessed as "medium" when the value is between 0.1 and 0.3, above 0.3 to 0.5 as "large" and above 0.5 as "very large". Third, a table of the degree of limitation of the achieved effect levels (*UPU*) by the type of offer (*SSP* and *SSC*) was generated (Table 2).

Table 1: The results of the analysis of the necessary conditions: values of the effects *d*

Dimension/value of the effect of the necessary condition *d* (Method of determining the ceiling line)	$d_{(CE_FDH)}$	$d_{(CR_FDH)}$
IntraFirm (SSP)	0.266	0.206
IntraFirm (SSC)	0.525	0.350

Source: own elaboration

Table 2: Table of constraints: required minimum levels of a precondition for the various desired performance levels (broken down by type of service offer)

UPU %	0	10	20	30	40	50	60	70	80	90	100
IntraFirm (SSP)	NN	NN	NN	2.20	9.90	17.70	25.50	33.30	41.00	48.80	56.60
IntraFirm (SSC)	5.00	11.00	17.00	23.00	29.00	35.00	41.00	47.00	53.00	59.00	65.00

Source: own elaboration NN - condition is not necessary

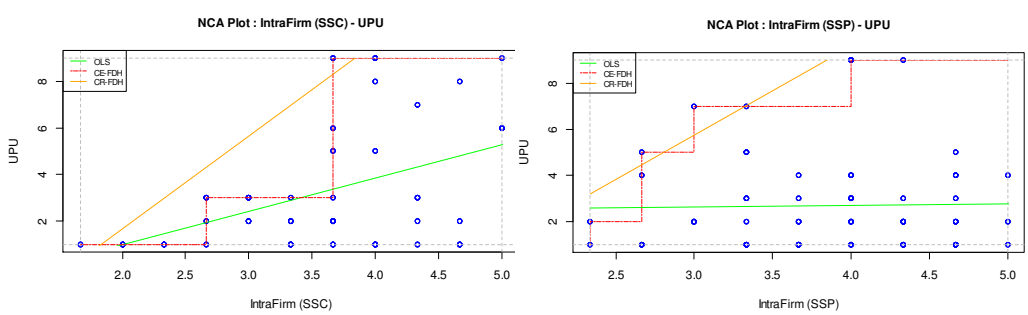

Fig.1 : Ceiling (limit) lines for the necessary condition of cross-functional cooperation -"IntraFirm" depending on the type of product offer service orientation (*SSP* and *SSC*). *UPU* - achieved level of the share of revenues from sales of services

The obtained results of the necessity effects (*d*) (Table 1) by the CE-FDH method (as mentioned above, providing a better fit for discrete variables), indicate that both in the case of the product offer dominated by *SSP* services and in the case of *SSC*, the values of the necessary condition of inter-functional cooperation (*IntraFirm*) between product and service functions are greater than zero($d_{(CE_FDH)} > 0$). The value of $d_{(CE_FDH)}$ is smaller for *IntraFirm* (*SSP*) where $d_{(CE_FDH)}$= 0.266 (average effect according to the adopted scale) than for *IntraFirm* (*SSC*) where $d_{(CE_FDH)}$ = 0.525 (very large effect). This means that the inter-functional ties between tasks related to products and services are a necessary condition for achieving specific revenues from the sale of services, both in the case of the offer of services aimed at the proper functioning of the product (SSP) and directed at the client's business and operational processes (*SSC*). However, the effect (*d*) is stronger for *SCC*. Thus, it means that organizational ties strongly limit revenues from the sale of *SSC*. Additional knowledge is provided by the table of constraints (Table 2) built on the basis of the designated ceiling line. (Dul, 2016) The values of the dependent variable (here the share of *UPU* sales

revenues) are expressed as a percentage of the range of (observed) values (0% = lowest observed value, 100% is the highest observed, 50% is in the middle of the lowest and highest observed value). The lowest observed value of *UPU* was "up to 10% share of revenues from sales of services in total revenues from sales". The highest observed value was the achievement of "over 80%" of revenues from sales of services. The remaining lines are the corresponding values of the independent variables according to the ceiling (also expressed as a percentage of the range). On this basis, the results from Table 2 indicate that in the case of an SSC-oriented product offer, the necessary condition for achieving "up to 10%" of revenues from sales of services is to have a bond between product and service functions at the level of 5% (of course, the scale adopted in the research). In the case of a product offer dominated by SSP services, cross-functional ties become a necessary condition in order to achieve a level of revenues from services higher than 20%.

Conclusion

The aim of the research was to identify the necessary conditions for generating revenues from the sale of services by manufacturing companies entering the path of servitization. Two conditions were examined, i.e. the separation of a service organizational unit and inter-functional cooperation with various types of the adopted orientation of the product offer towards services. The Necessary Condition Analysis (NCA) method was used to identify the necessary conditions.

The obtained research results showed that the revenues from the sale of services are not conditioned by the criterion of internal structuring of the organization. In the studied sample, both enterprises that distinguished organizational units on the basis of the similarity of activities and tasks (units responsible for the product and services) and with the object-oriented criterion, where the basis for structuring is the similarity of a specific business object (integration of product and service activities) achieved good and bad results from the sale of services. (Table 1) Such a result was obtained in both of the analysed groups of services offered. This means that there is no optimal organization design for producers following different servitization trajectories. Producers have to adapt the project to the adopted service strategy, and this with the rapid development of new technologies (including those that make up Industry 4.0) changes with the increasing "maturity" of producers' servitization.

The second conclusion that can be drawn from the conducted research concerns the role of organizational ties in the development and delivery of services 1. accompanying the products sold (SSP) and 2. the customer's business and operational processes (SSC). Organizational ties are a necessary condition for the achieved sales revenues, both in the first and the second category of services. The table of constraints (Table 2), additionally showed that inter-functional ties limit the revenues from the sale of services to a greater extent when SSC services dominate the enterprise. This means that companies that extend their offer with more complex services (SSC services are considered such), wishing to achieve greater revenues from the sale of services, should pay special attention to the development of organizational ties. SSC services are oriented towards the client's processes, and cross-functional collaboration allows for a more "holistic" approach to meeting their needs. This "holistic approach" is a cross-functional commitment to specific activities that include finance, manufacturing, delivery, development of personalized product and service solutions, and customer service.

This research, like others, has its limitations. The method that was used is relatively new and despite its wider use, it is still being developed as a research tool. Furthermore, the NCA method is complementary to, rather than competitive, to traditional quantitative methods. Therefore, the collected data in subsequent stages of the research will also be analysed using more scientifically established statistical methods in order to compare the achieved results. It will also allow, in addition to confirming/negating the results obtained here, for another verification of the reliability of the NCA method.

In the research, revenues from sales, subjectively indicated by the respondents, were used as a measure of the servitization effect. In subsequent studies, it is proposed to adopt more objective measures and other dimensions of the effects of servitization, e.g. the competitive advantage achieved.

Edvardsson et al. (2014) indicate that inter-organizational cooperation may have a positive impact on the internal coordination of development activities and the provision of product and service solutions. Therefore, in the future, it is also interesting to examine the necessary level of organizational ties in achieving specific results by manufacturing companies, broken down by type of product and service solutions provided.

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Corporate Resultative Innovativeness Assessment On the Example of Polish IT Companies

Tomasz L. NAWROCKI

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland,
E-mail address: tomasz.nawrocki@polsl.pl

Abstract

The paper aims to present an empirical application of an originally developed solution for corporate resultative innovativeness assessment and comparison. The proposed solution provides a framework for resultative innovativeness assessment of enterprises based on the methodology used in multivariate comparative analysis. Within the proposed method of assessing corporate resultative innovativeness, the focus is on its general qualitative dimension as defined in the Oslo manual and it is assumed that the individual assessment criteria are based on generally available data published by enterprises in their periodic reports (mainly annual, due to greater completeness of data and verification by external auditors). In this context, selected companies from the information technology sector listed on the Warsaw Stock Exchange were examined. The need for corporate innovativeness measurement and evaluation for management purposes arises from its growing importance in building enterprise value and achieving long-term competitive advantage. The proposed solution enables a fairly current and good orientation in the area of the results of innovation activity carried out by the assessed enterprises. This can be the basis for various comparison analysis and managerial decisions regarding e.g. innovation management as well as managing corporate image and reputation.

Keywords: Corporate Innovativeness, Results of Innovation Activity, Innovativeness Assessment, Multivariate Comparative Analysis.

Introduction

In the literature, innovation and innovativeness have been for many years seen as the driving forces of economic development, which was first pointed out by Joseph A. Schumpeter in his vision of creative destruction referring to the mechanism of changes in a capitalist economy (Schumpeter 1950). Although the theory of innovation proposed by Schumpeter refers to the economy in the first half of the 20th century, the importance of this phenomenon has not devalued over time, but on the contrary, it has become one of the main determinants of competitiveness (Prahalad and Hamel 1990; Drucker 1992; Porter 1998), revenue growth (Patterson 1998) and organizational survival (Hurley and Hult 1998).

At the same time, despite the great interest of the scientific community in innovation and the innovativeness phenomenon over the years, it is hard to talk about some generally accepted definitions. Understanding innovativeness, as well as innovation itself, has been considered by particular researchers in many different contexts. The term innovation is on the one hand related only to significantly changed or new solutions (OECD and European Communities 2018), and on the other, identified with all changes recognized by people as a novelty in relation to the previous state (Kotler 1994). Innovations are also considered in terms of the subject – as a result (here there is an additional distinction between product, process, marketing and organizational innovations), or in functional terms – as a process (Goldsmith and Foxall 2003).

A similar diversification of perception concerns the issue of corporate innovativeness. Most often it is emphasized that innovativeness is a specific ability or skill of an enterprise to search for, implement and disseminate innovations continuously (Pomykalski 2001). Consequently, possessing it allows the enterprise to implement new products, processes, or ideas (Hult et al. 2004). More extended definitions depict innovativeness as an organization's inclination to seek, create, and implement new products, technologies, services, markets, and management methods; to undertake actions in uncertain situations; to monitor the market and competition, forecast market situations and react quickly to changes by breaking routines, changing ways of communicating, and developing new ways of organizing (Francik 2003). It should also be noted that many definitions of innovativeness

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go beyond merely exposing the same abilities or skills, emphasizing the results of its possession and use. In this way, innovativeness is the ability of an organization to control and maintain high dynamics of value creation, which manifests itself in using the occasion to generate change and to process, as well as implement, new ideas in practice (Jin et al. 2004) earlier than other enterprises (Rogers 1995). Innovativeness as an ability should also enable the effective allocation of resources, aiming at creating the optimal configuration of competitive advantage (Morgan and Berthon 2008).

Therefore, innovativeness can be seen in the context of the widely understood potential for creating innovation and continuous engagement in its development, the so-called potential innovativeness or innovative potential as well as innovation capabilities, and in the context of specific effects of undertaken innovative activities as well as their impact on the enterprise's financial results – the so-called resultative innovativeness (Nawrocki 2012; Yeung et al. 2007). Differentiation between these two types of organizational innovativeness is very important, as high innovative potential does not necessarily translate into high results of innovative activity (Simpson et al. 2006) which, among others, refers to the issue of innovation management.

The pressure on innovation and innovativeness in recent years is particularly strong and visible in a variety of contexts. It can be said that everyone wants to be perceived as 'innovative'. Unfortunately, due to the width and complexity, and therefore ambiguity, of the innovation and innovativeness concept, in recent years it can be seen that different entities, especially companies, very easily identify themselves as innovative. The reasons for such actions arise from the fact that innovativeness, regardless of the documented positive impact on the development of economies or corporate results, is associated with a certain prestige and inspires respect, which even with very limited, or even pretended, innovative activities can easily be used in marketing operations. Therefore, particular importance should be given to the quick and possible objective assessment of corporate innovativeness, which should allow for their reliable differentiation. Such an assessment could also be useful in the intercompany innovation management process, as well as its image and reputation management (Szwajca 2014).

In the literature we can find various approaches to the corporate innovativeness measurement, which can be gathered in several groups. The first one consists of methods used by different international and national institutions (e.g. Eurostat) to investigate periodic innovative phenomena: the Frascati Manual – recommendations regarding the evaluation of companies' engagement in research and development (OECD 2015), and the Oslo Manual – recommendations regarding collecting and analysing data in reference to widely understood innovative activity (OECD/Eurostat 2005 and 2018). The second group involves methods based on the resource approach, which includes the concept of strategic management with the focus on investigating an organization's resources and skills (e.g. Shum & Lin 2010). The third group consists of methods focusing on the time factor, specifically emphasizing the moment of implementing an innovation in relation to the competition – historical, cross-sectional and complex methods (e.g. Rogers 1995). Clearly, apart from the abovementioned methods, there are many others that can be traced in the literature, but they are merely some modifications or compilations of them.

However, at the same time, it is quite often stated that most of the innovation and innovativeness studies are generally quite radically affected by various kinds of drawbacks such as: very narrow perception of innovativeness, problematic data updating, lack of synthetic innovativeness measure/assessment or generalization of final results (e.g. Lev 2001; Mazzucato 2006). Therefore, to fill the gap in this area, the author conducts research on developing a corporate innovativeness assessment model based on publicly available sources of data. The aim of this paper is to present a practical application of the designed so far version of the model focused on corporate resultative innovativeness based on the example of selected IT companies – IT systems – listed on the Warsaw Stock Exchange (WSE). Proposed model provides comprehensive understanding of enterprise's innovative activity results, and subsequently enables conducting more in-depth research, in particular comparative analysis on corporate innovativeness and its management.

Possibilities in the area of resultative corporate innovativeness assessment

From the viewpoint of the newest version of Oslo methodology (4th edition), which is generally accepted basis for research on innovation activity of enterprises, the assessment of innovative activities results/outcomes focuses on two basic dimensions (OECD/Eurostat 2018):\

- qualitative measures, that are grouped by areas of influence:
  - markets (e.g.: upgrade goods or services, expand the range of goods and services, create new markets, increase the reputation, brand awareness, or visibility of goods and services),

  - production and delivery (e.g.: upgrade outdated process technology or methods, improve quality of goods and services, improve flexibility for producing goods and services, increase speed of producing goods or delivering services, reduce labour, material or energy costs),
  - firm organisation (e.g.: improve capabilities for absorbing, processing and analysing knowledge, improve sharing or transfer of knowledge with other organisations, improve the efficiency of function of the firm's value chain and communication within the firm, improve working conditions, health or safety of the firm's personnel, implement a new business model),
  - environment and society (e.g.: reduce negative environmental impacts/deliver environmental benefits, improve public health, safety or security, improve quality of life or well-being).
- quantitative measures, that concentrates mainly on:

  - product innovations (e.g.: number of introduced innovations during the observation period, share of sales accounted for by product innovations),
  - business process innovations (e.g.: the percentage of a firm's personnel who were directly affected by business process innovations during the observations across an organisation, the change in sales that can be attributed to business process innovation).

Moreover, in the initial versions of the Oslo manual (OECD/Eurostat/European Union 1997), in the context of assessing the results of innovative activities of enterprises, attention was also paid to:

- impact of company's innovation activity on its financial performance (e.g.: sales revenue growth rate, operating margin growth rate).
- evaluation of introduced innovations from the viewpoint of their general and specific characteristics e.g.: level of novelty, complexity, diffusion capabilities, quality, usefulness, … – LBIO Methodology.

In addition to the abovementioned Oslo methodology, authors of numerous studies on corporate innovativeness or innovation activity also point to other possible criteria for evaluation its results:

- patents or patent applications (Jung et al. 2008),
- patent citations (Makri and Scandura 2010),
- ratio of sales of new products to R&D expenditures (Gumusluoglu and Ilsev 2009).

As it can be seen, the current research in the area of measuring the results of innovative activity of enterprises provides a wide range of criteria for assessing this phenomenon. At the same time, the question arises as to how such an assessment should be carried out, which generally relate to the issue of collecting adequately detailed, complete and comparable data. Taking into account the high popularity of the issue of innovativeness nowadays (everyone wants to be perceived as innovative) and disclosure of information in this area, two possibilities can be distinguished here:

- assessment based on data collected through a questionnaire survey addressed to the assessed enterprises (Survey Data Approach – SDA),
- assessment based on publicly available data, in particular those disclosed by enterprises in periodic reports and corporate websites (Public Data Approach – PDA).

Obviously each of mentioned approaches has its advantages and disadvantages. In the case of the first one, the assessment is based admittedly on a much more detailed and complete data, that are consistent with the guidelines of the Oslo methodology, but also there is no guarantee of their credibility and receiving (the two main threats associated with data collection through surveys), and carrying out regular assessments is much more burdensome than in the second approach. It should be also noted, that in the Oslo manual itself it is pointed out that in statistical surveys on innovation it is difficult to ask respondents to provide detailed quantitative measures, especially those relating to the impact of innovation, even only to a very close approximation, because making appropriate calculations often requires extensive analysis (OECD/Eurostat 2018).

On the other hand, in the case of the second approach, the undoubted advantages are the velocity, ease of performing the assessment (assuming data availability there is no need to develop and conduct a survey research) and its repeatability, but the crucial disadvantage – dependence on the quality of information policy in enterprises in the field of innovation, which in mostly cases translates into an approximate nature of received assessments, arising from gaps and shortcomings in disclosed by companies' public information (Nawrocki and Żabka 2011).

From the presented list of advantages and disadvantages of both approaches to the resultative innovativeness assessment, it can be concluded that due to the large variety of the information policy of enterprises in the field of innovativeness, the approach based on public data practically has no sense in scientific research. Indeed, due to the difficulties in accessing detailed and comparable data on innovations implemented and disseminated by enterprises, in relation to quantitative data such a statement may be considered true. At the same time, however, taking into account the translation of innovative solutions into the results and economic performance of enterprises, indicated in the Oslo manual (OECD/Eurostat 2018) and confirmed in numerous studies (e.g.: Laursen and Salter 2006, Camisón and Villar-López 2014, Chae et al. 2018, Jin and Choi 2019), the approach based on public data can be applied in relation to the assessment of result-oriented innovativeness in the overall qualitative dimension. In this case, as the basic criteria for assessing corporate resultative innovativeness can be used in particular: sales growth rate in a given period, market share, productivity of assets, work efficiency and business profitability.

Obviously, the scope of resultative corporate innovativeness assessment, limited to the abovementioned issues, is not complete in the understanding of the Oslo manual, but taking into account the credibility of the financial data that constitute the basis for such an assessment, as well as easy access to them and their repeatability (periodic financial statements), the obtained assessment nevertheless has significant cognitive value. It is also worth noting here that although the information about the number of innovations implemented or disseminated by the enterprise, including their characteristics, is important, its actual innovativeness, including the efficiency of innovative activity, is mainly determined by economic and broadly understand market. Only the acceptance of new solutions by the market and the community gives the company a chance to return outlays on innovative activities, improve its results and competitive position. Without this acceptance and the subsequent dissemination of innovative solutions, even the most technologically advanced innovations may turn out to be misfires, which, instead of improving, will cause a deterioration of the company's competitiveness and its financial results, and ultimately even threatening its market existence

Research Methodology

Within the proposed method of assessing corporate resultative innovativeness, the focus is on its general qualitative dimension as defined in the Oslo manual and it is assumed that the individual assessment criteria are based on generally available data published by enterprises in their periodic reports (mainly annual, due to greater completeness of data and verification by external auditors). It should be noted that, on the one hand, the adopted assumptions make the final grades received comprehensive, and on the other, they enable easy generation and updating of these assessments. By comparing the key issues proposed in the literature in the context of the impact of implemented and disseminated innovations on enterprises business and the informative value of periodic reports published by them, the proposed partial evaluation criteria along with the assumptions relating to them are listed below:

- Sales Growth Rate in 3 years period, which informs about changes in the company's sales over a period of 3 years (it is assumed that a shorter period of the indicator might not be sufficient for the effect of the innovative solutions implemented and popularized by the company to be fully revealed):

$$Sales\ Growth\ Rate\ in\ 3\ years\ period = \left(\frac{Sales\ Revenues\ in\ the\ year\ t}{Sales\ Revenues\ in\ the\ year\ t-3} - 1\right) \cdot 100\% \qquad (1)$$

- Market Share, which informs about the share of a single company in the total sales of the sector; due to the difficult access to information on full sales in a given sector, it is assumed that the indicator is calculated on the basis of the total sales revenues of the assessed entities from a given sector:

$$Market\ Share\ = \frac{Sales\ Revenues\ of\ the\ j-th\ enterprise}{Sales\ Revenues\ of\ all\ investigated\ enterprises\ from\ j=1\ to\ n} \cdot 100\% \qquad (2)$$

- Productivity of Assets, which, by indicating how much sales revenues fall per unit of capital engaged in assets, informs about the efficiency of using them by the company:

$$Productivity\ of\ Assets = \frac{Sales\ Revenues}{Average\ Assets\ Level} \qquad (3)$$

- Work Efficiency, which, by indicating how much sales revenues fall per one employee, informs about the efficiency of the workforce involved in the enterprise:

$$Work\ Efficiency = \frac{Sales\ Revenues}{Average\ Number\ of\ Employees} \tag{4}$$

- Gross margin on sales, which, indicating how much profit / loss falls per unit of sales revenue after deducting own costs, informs about the profitability of the company's core business:

$$Gross\ Margin\ on\ Sales\ = \frac{Gross\ Profit\ on\ Sales}{Sales\ Revenues} \cdot 100\% \tag{5}$$

- Net margin on sales, which, by indicating how much profit / loss is attributable to a unit of sales revenue after deducting own costs increased by selling and general administrative costs, informs about the profitability of the company's operating activity, excluding other net operating costs, which are often burdened with the results of one-off events (e.g. impairment losses on assets , profit / loss from the sale of assets, creation and release of reserves):

$$Net\ Margin\ on\ Sales\ = \frac{Net\ Profit\ on\ Sales}{Sales\ Revenues} \cdot 100\% \tag{6}$$

It should be noted that all the assessment criteria listed above are stimulant (the higher the value, the better). However, their connection with activities related to specific types of innovation (product, process, organizational and marketing) is difficult due to the interpenetration and overlapping of the impact of various innovative solutions, as well as the occurrence of certain synergies between them (product with marketing innovations and process with organizational innovations), then taking into account the list of factors relating to different objectives and effects for all four types of innovation presented in the third version of the Oslo manual (OECD/Eurostat, 2005), it can be concluded that the first two assessment criteria concern the impact of more product and marketing innovations and the other four impact more process and organizational innovations.

The final synthetic assessment of the resultative corporate innovativeness of a given entity in the proposed solution is assumed to be obtained as a result of the implementation of subsequent steps in accordance with the diagram presented in the Fig. 1 – generally a typical one for solutions based on the methods of multivariate comparative analysis.

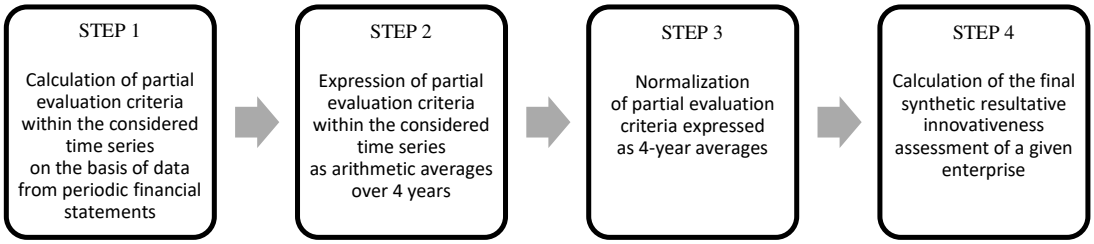

Fig. 1: Diagram of the process of obtaining a synthetic resultative innovativeness of a given enterprise

Source: Own work.

First, it is assumed that, within the adopted time series, the partial evaluation criteria will be calculated on the basis of data from periodic financial statements. In the case of a quarterly time series, the data for calculations should be transformed to the annual form due to elimination the influence of seasonality on the values of individual indicators.

Then, in order to reduce the possible impact on the indicated criteria of evaluation of factors other than innovative activity (e.g.: changes in exchange rates, prices of commodities, materials and energy, as well as wages and employee benefits, merger and acquisition operations), their values were averaged for a period of 4 years.

Subsequently, due to the fact that the separated partial criteria differ in terms of measurement units and ranges of values, for the purpose of their unification and at the same time facilitating the calculation of the overall resultative corporate innovativeness assessment, their normalization should be performed. In this context, as well as in terms of calculating the synthetic measure, it was decided to apply the methodology proposed by D. Strahl (1978). Thus, out of many different methods, normalization was selected using the quotient transformation formula, based on the maximum value of individual variables in a given research period:

$$z_{tj} = \frac{x_{tj}}{\max\limits_{t} x_{tj}}, \quad \max_{t} x_{tj} \neq 0 \tag{7}$$

where:

x_{tj} – value of the *j*-th evaluation criterion in the *t*-th research period,
z_{tj} – normalized value of the *j*-th evaluation criterion in the *t*-th research period (from 0 to 1).

In the case of criteria with negative values, due to their unambiguously negative meaning and the lack of significance in the scale of "negativity", it was decided to adopt their normalized value at the level of zero. On the other hand, in order to avoid distortion caused by too high readings of the individual partial criteria values, it was decided to establish their highest reference level (max x_{tj}) based on the upper limit of the typical range of variation:

$$\max_{t} x_{tj} = \bar{x}_j + s, \tag{8}$$

where:

$\bar{x}_j$ – average value of the *j*-th evaluation criterion from the point of view of all analyzed entities and the entire research period,
s – standard deviation of the *j*-th evaluation criterion from the point of view of all analyzed entities and the entire research period.

Finally, in accordance with the methodology of D. Strahl, the formula of the arithmetic mean of normalized partial measures z_{tj} was adopted as the basis for the calculation of final resultative corporate innovativeness assessment:

$$MS_t = \frac{1}{K}\sum_{j=1}^{K} z_{tj}, \tag{9}$$

where:

MS_t – a synthetic measure of resultative corporate innovativeness assessment in the *t*-th research period.

The indicated structure of the synthetic measure assumes the equal weight of individual evaluation criteria and the range of the adopted values from 0 to 1. Values closer to 0 meana low level of resultative corporate innovativeness, and values closer to 1 a high one.

Research Results

The practical application of the proposed method of resultative corporate innovativeness assessment was carried out on the example of eight IT companies listed on the Warsaw Stock Exchange (WSE), listed as part of the IT sector (IT systems, No. 822): Asseco Poland, Atende, Comarch, Quantum Software (Quantum), Sygnity, Talex, Unima 2000 Teleinformatics Systems (Unima) and Wasko.

The calculations were made on the basis of the annual reports for the years 2011-2019 published by the aforementioned companies. In the case of Talex, these were individual reports, and for other entities, due to the fact that they operate as capital groups, consolidated reports.

Following the diagram presented earlier (Fig. 1), the relevant data was first collected, and then, on their basis, the partial criteria for the resultative corporate innovativeness assessment in the years 2011–2019 were calculated (formulas 1-6). Subsequently, this way obtained time series of annual variables was recalculated using a 4-period arithmetic average, shortening its scope to years 2014-2019, and then normalized (formulas 7 and 8) and the final

assessments of the resultative corporate innovativeness of the studied entities were calculated (formula 9). The values of partial evaluation criteria for investigated enterprises expressed as 4-year averages, their averages and the values of max x_{tj} needed to their normalization, are presented in the Fig. 2-7, and final assessments of resultative innovativeness for investigated enterprises in the research period in the Fig. 8.

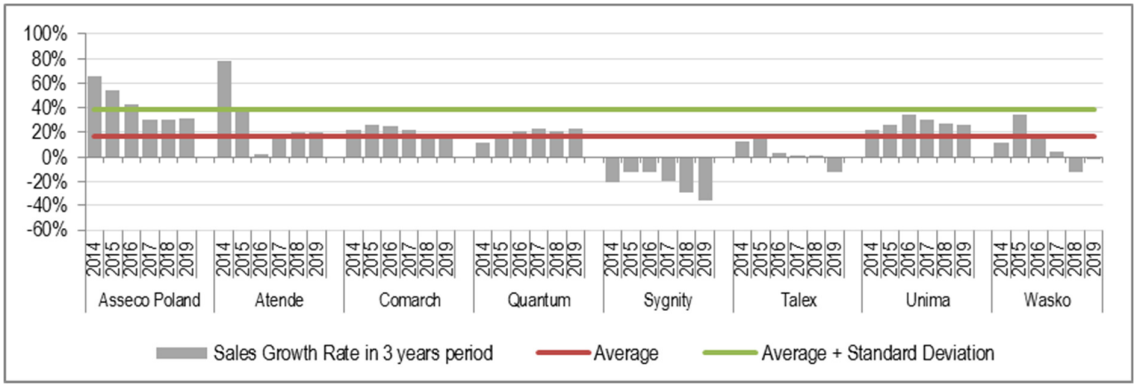

Fig. 2: The values of Sales Growth Rate in 3 years period for investigated enterprises expressed as 4-year averages, their average and the value of max x_{tj}

Source: Own calculations based on annual reports of investigated enterprises.

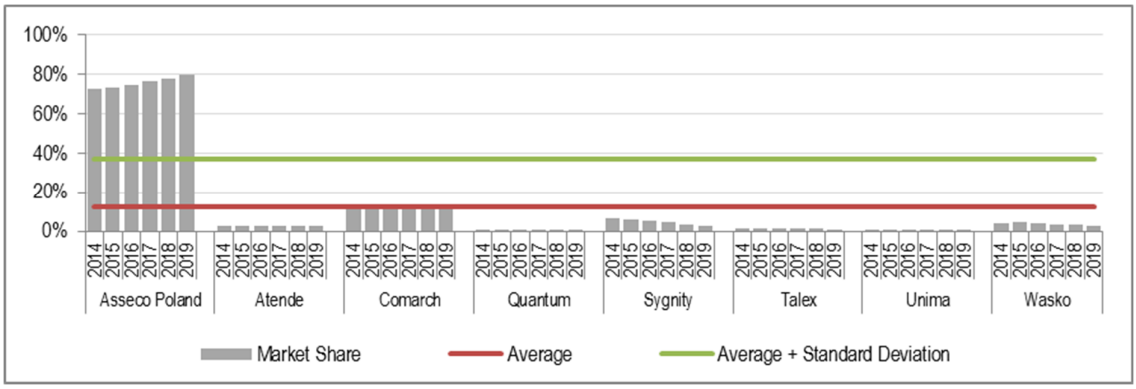

Fig. 3: The values of Market Share for investigated enterprises expressed as 4-year averages, their average and the value of max x_{tj}

Source: Own calculations based on annual reports of investigated enterprises.

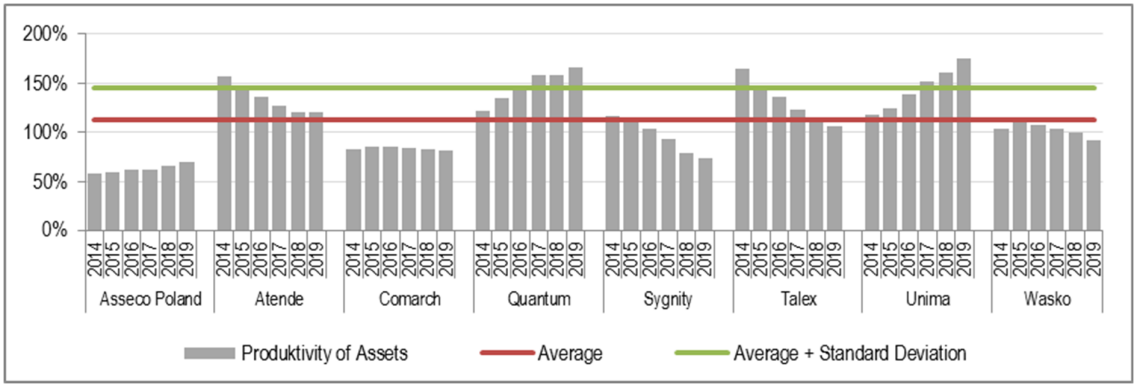

Fig. 4: The values of Productivity of Assets for investigated enterprises expressed as 4-year averages, their average and the value of max x_{tj}

Source: Own calculations based on annual reports of investigated enterprises.

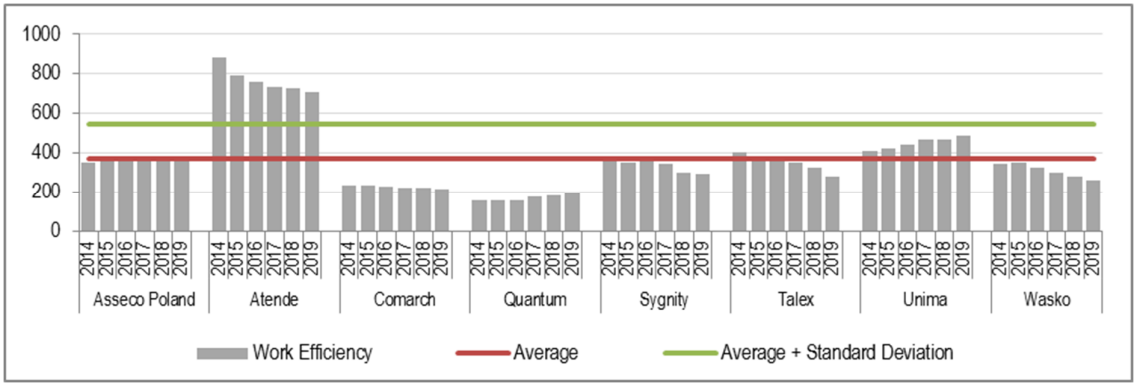

Fig. 5: The values of Work Efficiency for investigated enterprises expressed as 4-year averages, their average and the value of max x_{tj}

Source: Own calculations based on annual reports of investigated enterprises.

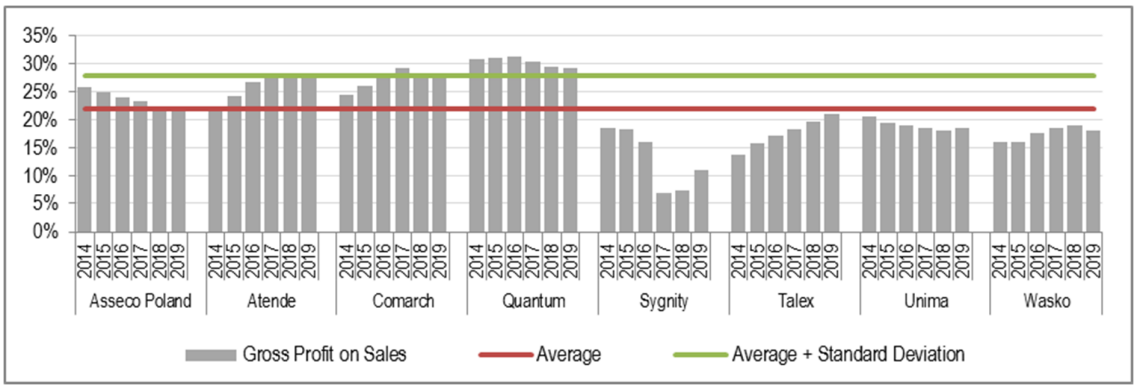

Fig. 6: The values of Gross Profit on Sales for investigated enterprises expressed as 4-year averages, their average and the value of max x_{tj}

Source: Own calculations based on annual reports of investigated enterprises.

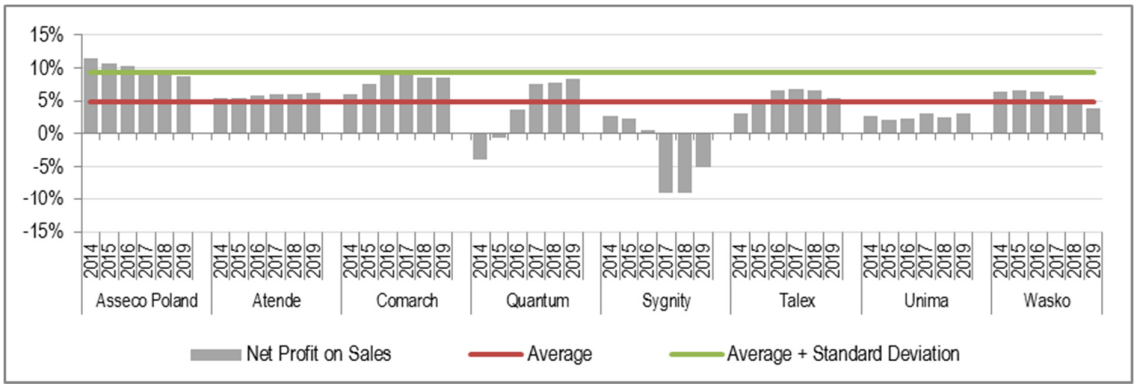

Fig. 7: The values of Net Profit on Sales for investigated enterprises expressed as 4-year averages, their average and the value of max x_{tj}

Source: Own calculations based on annual reports of investigated enterprises.

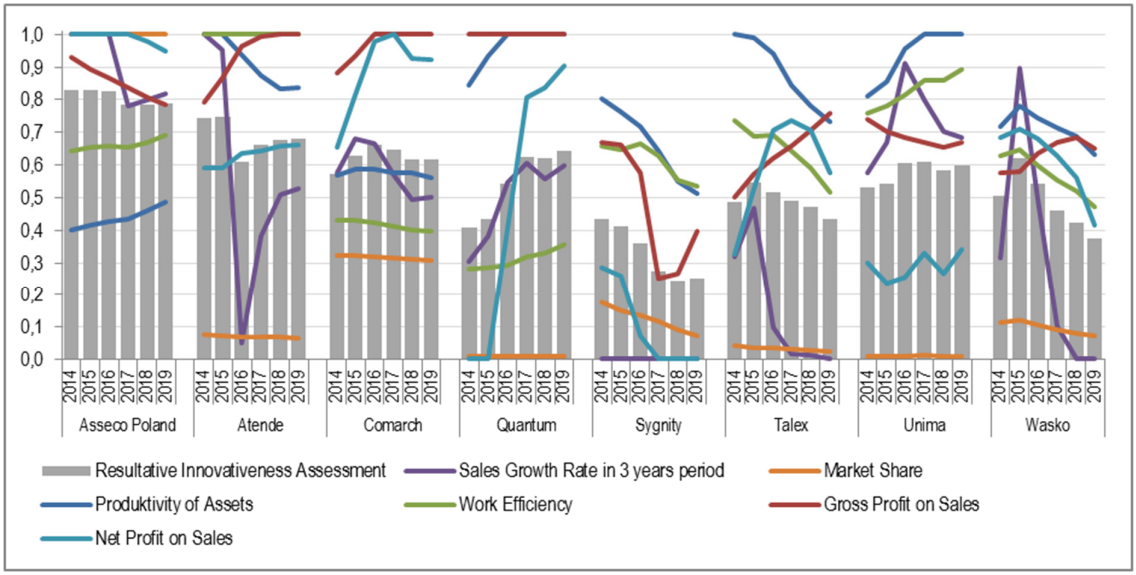

Fig. 8: The values of partial criteria and final resultative innovativeness assessment for investigated enterprises in the research period from 2014 to 2019

Source: Own calculations based on annual reports of investigated enterprises.

Taking into account the obtained results, it can be concluded that in terms of resultative innovativeness the clear leader among the studied IT entities is Asseco Poland, with the highest assessments in each year of research period at stable level about 0.8. Taking into account the partial evaluation criteria of Asseco Poland, it can be concluded that this company has generally no weaknesses. It is distinguished by high ratings for Market Share and Net Profit on Sales. In addition, it is characterized by relatively high ratings for Sales Growth and Gross Profit on Sales (here recently systematically decreasing) and above average Work Efficiency (here – systematic improvement). Asseco is the worst in terms of Productivity of Assets, but at the same time it should be noted that this is an average rating, not a low one.

Subsequently, in terms of the assessments of resultative innovativeness, one can point to Atende, Comrach and Quantum, for which the latest assessment readings are between the levels of 0.6 and 0.7. These entities in some respects lag behind Asseco Poland (especially Market Share and Sales Growth), but at the same time they can also boast high readings in terms of certain partial evaluation criteria. In the case of Atende, these are Work Efficiency and Gross Profit on Sales, in the case of Comarch – Gross and Net Profit on Sales, and in the case of Quantum – Gross Profit on Sales and Productivity of Assets.

Among the remaining entities, only in relation to the Unima company we can talk about the resultative innovativeness at an above average level – readings at the level between 0.5 and 0.6. Sygnity, Talex and Wasko have recently recorded readings clearly below the average level of 0.5, the worst of which is the first one of them.

Summary

Proposed model of resultative corporate innovativeness assessment, whose practical application has been shown in this paper using the example of eight IT companies listed on WSE, can be an interesting alternative or a complement to the so far commonly used methods that are mostly based on survey research. One of its biggest advantages is the possibility of obtaining one final resultative innovativeness assessment with the use of data from public sources, which additionally are periodic. This enables the fairly current and good orientation in both the general and more in-depth resultative innovativeness level of the assessed enterprises, which can be the basis for various comparison analysis and managerial decisions regarding e.g. innovation management, as well as managing corporate image and reputation.

Although the presented solution requires further refinement taking into account the ongoing changes in the increasing information openness of enterprises, in particular in the field of non-financial information (Vukić et al. 2017), it should be noted that there are great opportunities ahead of it both in the development dimension as well as the practical application for scientific and managerial purposes.

Acknowledgment

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Challenges before the Competence Centre in the Area of Materials Production and Processing in the Silesian Province

Jan Brzóska

Silesian University of Technology, Gliwice, Poland, jan.brzoska@polsl.pl
orcid: 0000-0002-0753-6444

Arkadiusz Szmal

Silesian University of Technology, Gliwice, Poland, arkadiusz.szmal@polsl.pl
orcid: 0000-0001-6395-618X

Abstract

The regions constantly look for optimum forms of innovation development. However, current experience show the problem in the flow of knowledge. The aforementioned observations are the basis for the review of the technological observatories network partners activity within the area of materials production and processing within the Silesian Province. More and more efficient solutions are searched for thus the paper is related to the functional and attribute review of the competence centre (including living lab) in the area of materials production and processing. The objective of the paper is the analysis of the competence centre functioning as a solution supporting the technological development process within the area of materials production and processing. The developed case study confronts the actual operations of the engaged entities with these necessary for the competence centre functioning. The study analyses the offer and activity of the companies engaged in running a technological observatory according to the situation at the end of 2019. The process continuously evolves and improves the technological observatory members offer. However, the analysis of current state has disclosed some gaps representing the space to overcome along the path to full development of a competence centre. The performed analyses and studies were used to review the readiness for implementation of the innovation management model using the Competence Centre concept in the technological area of materials production and processing. It seems possible within the 2 - 3 year-long time perspective while standing up to the challenge of filling the competence gaps and assuming self-funding of own operations. The method this will be performed is the key. Cooperation competences are necessary: relation and network competences with consideration of their basic components and outlining the network approach assumptions provides the space for effective operations.

Keywords: Competence Centre, Innovative Operations, Innovation Conditions.

Introduction

At the age of knowledge-based economy, building a competitive economy is difficult to imagine without involving scientific achievements perceived as the sources of new knowledge into this process. At the same time, proper innovative processes management within the European regions is recognized as the key element for good standing of the European economy in the world. Innovative processes are affected first and foremost by the regional innovation strategies. Thus, the regional innovation system providing rational flow of network in the region is a critical challenge. Innovativeness depends on relationships of entities generating knowledge and these absorbing it. The process is still far from optimum therefore the need to search for more efficient solutions. Basically, the regional innovation system is created by two main types of actors and relations between them. The first one is companies that consume innovations and finally develop value. The other is organizations creating the innovativeness infrastructure that supports innovative processes in the region due the possessed key competences. Current experience show the problems in the flow of knowledge despite the emergence of knowledge intermediaries. The above observations were the basis to review the forms of cooperation in favour of innovations within the scope of innovation ecosystem in the Silesian Province. The Network of Observatories MATERIALS also looks for new efficient forms of cooperation between entities operating within the area of materials production and processing (Knop L., Olko S., 2018).. Thus, the paper relates to the functional and attribute review of the competence centre (including living lab) in the area of materials

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production and processing. The objective of the paper is the analysis of the competence centre functioning as a solution that should support the technological development process within the area of materials production and processing.

Literature Review – Competence Centre, Living Lab – Functional and Attribute Characteristic.

The competence centre term is commonly used in European countries. This state is the first indicator of an effectiveness of this tool of supporting the pro-innovative activities. International acclaim results from relatively low sensitivity to the legal, economic, or cultural context. This concept is heavily used for the development of clusters, but it also has entered the world of corporations that create their own competence centres to support their business entities. Despite the presence of the competence centre concept in the instrumentation of innovation support tools, these are not the beings of standard functionality, attributes, role, or organisation and management form. Their compliance with the needs of specific economic industry or region decides about their effectiveness. The adaptation imperative is justified by four most common roles of the competence centres, that is: training, technology transfer, research and development, and increasing the competitiveness of enterprises. Potential benefits of coordinated activity of a community of specialised enterprises consist of achieving the synergy, thanks to, among others:

- development of the participants' competences (specialisation)
- strengthening the complementarity of these competences (co-specialisation)
- fostering a long-term advantage over non-network entities.

Studies on management agree that the basic component of competences are the processes of creating a value, that is what the enterprise implements in order to provide their clients the value expected by them (Matusek, Wolny, 2018).. The second component of the competences are the skills, both on the individual and collective level. The third component of the competences consists of the resources allocated to the processes of creating value and to the skills, since it is not possible to implement them without an adequate material, financial, or human resources (Fig.1). (Czakon, 2008)

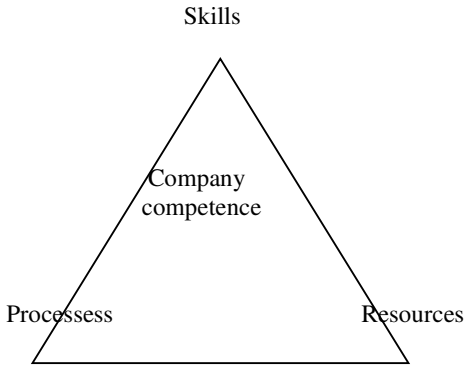

Fig. 1: Semantic elements of the enterprise competences

Source: W. Czakon, Istota i przejawy kompetencji relacyjnej, [In] Zarządzanie strategiczne w badaniach teoretycznych i w praktyce, A. Kaleta, K. Moszkowicz (red), Prace Naukowe Uniwersytetu we Wrocławiu nr 20, 2008, p. 58

Therefore, the competences lead toward the configuration of knowledge, processes and resources into a possibly effective totality that can emerge within the limits of a single enterprise and can lead to the creation of closely related strategic network. In case of potential competence centre in the field of production and material processing, both of the dimensions may have a significant meaning.

In the management studies, the competence term is present since 1971, when K. Andrews has defined it as "what the organisation does particularly well". Defining the competences is focused on (Ray, Ramakrishnan, 2006):

- Knowledge - where the competence means „*collective learning of an organisation, particularly how to coordinate various production skills and integrate various technology trends*“,
- Resources - definition of the competence as „*an ability to sustain a coordinated exploitation of the resources in order to achieve the goals of the company* “,

- Complexity - where the competence is „*a set of skills, complementary resources and organisational routines that together allow the organisation to coordinate a specific set of activities in a way that leads to achieving the competitive advantage on specific markets*".

As stated in the strategic goal 2.1 of the current Regional Innovation Strategy of the Silesian Province, for the years 2013-2020 (RIS 2013), an establishment of key competence centres was assumed, such as:

- science and research competence centres (SRCC),
- functional and operational competence centres (FOCC).

SRCC is defined as an organisational entity, or the network of entities (universities, science entities etc.) that consists of the scientists, analysts, field experts, who by becoming the key link between the science, business and local government authorities, will be responsible for performing such tasks as: the world trends analysis in terms of implemented specialisations, preparation of the innovative projects, obtaining and developing competences, searching for talents in the studied fields; coordination of the key projects.

FOCC are the organisational entities, or the networks of entities (such as, among others, science, technological parks, transfer centres) that bring together the field specialists responsible for implementation and coordination of the innovative projects, performed for the development of smart markets. The feature of these centres is focusing on: commercialisation of technology, financing innovation, supporting cross-linking activities, observation and analysis of the smart market development in specialisations.

It was assumed that the centres have a high level of autonomy in defining their own strategies and activities, however, the level of supporting their activities will depend on the influence on the region's development. Development of a demand-driven strategy, that is the strategy of making a better use of the research results, is expected from the centres. As the global examples show, the main goals of the competence centres include:
for the SRCC:

- increasing the ability of enterprises to implement innovations through financing the research conducted in close cooperation between the companies conducting the research and established research groups
- conducting the research in order to increase the attractiveness of the region as a place oriented on smart markets
- supporting the research clusters (knowledge clusters) that are at the forefront of international research for the development of smart markets
- strengthening the education of scientists in the fields important for the development of smart markets

for the FOCC:

- supporting the commercialisation processes and innovation implementation processes by enterprises and networks of enterprises
- supporting the development of cooperation networks and technology clusters developed in the field of smart markets

Performing the overview of the competence centre term, it is necessary to pay attention to the Living Lab concept that is considered as a new model of introducing innovations and means interdisciplinary approach to the creation of innovations, in which the user of innovative solutions constitutes the main reference point. In the Regional Innovation Strategy of the Silesian Province, the following definition was adopted: Living lab is a laboratory which main task is to make available the space and resources for the research organised by enterprises (in B2B model), or by enterprises with participation of the users (in B2C model) (RIS, 2013). There is a rapid increase in the awareness of the role of consumers in the value creation processes. The benefits resulting from the demand-driven approach to the innovations are increasingly noticed. Thus, the User-Driven Innovation concept becomes an important method of implementing the innovation. Engagement of the users of innovative products or services may appear on various stages (Wojnicka) :

- joint creation, that is collaborative designing by the users and producers;
- exploration, that is finding emerging applications, behaviours and market opportunities;
- experimenting, that is implementing living scenarios among the users community;
- evaluation, that is assessing the concept, products and services in accordance with socio-ergonomic, socio-cognitive and socio-economic criteria.

The literature describes living lab as a user-centric research methodology for creating, prototyping, and refining complex solutions in multiple and evolving real life contexts (Eriksson, Niitamo, Kulkki, 2005). In the literature, we also find attempts to define this term while referring to the systemic approach to innovations, as well as directly to

creating and testing the technology. The first of these approaches (Feurstein, Hesmer, Hribernik, Schumacher, 2008) describes living lab as a systemic approach to the innovation in which the stakeholders, all the most important participants of creating the value of products or services, are the direct participants of the development process. The second optics defines living lab (Ballon, Pierson, Delaere, 2005) as an experimental environment where technology is created and tested in everyday life conditions, while the users testing new solutions are being their co-creators. Living labs can be understood as both the environment and the method of implementing and developing innovation. Three approaches to the living lab concept are functioning in the subject literature, treating them as (Macełko, Mendel) :

1. methodology of conducting research and implementation activities in the reality of economy based on the knowledge and information society; new ideas are developed and tested in real conditions and their users/consumers may participate at all stages of creating the new product (lgd-tur_org_pl),
2. environment - a place where innovations (of various kind) are created, where needs of the users are the most important criterion. Such process of creating innovations is characterised by openness - open innovation and democratic nature,
3. merging the two concepts.

A.Stahlbröst presented the most important goals of the living lab activity that consist of (Stahlbröst, 2008):

1. inciting and stimulating cooperation and European innovativeness in the research activity and local and regional development,
2. making it easier for the users to participate in innovation development processes,
3. focusing the innovation development processes on social perspective, not only the technological one,
4. participation of the users in innovation development processes at all their stages, not only at certain times, who continuously make attempts and express their opinions.

Referring to such defined competence centre term, including living lab, it is worth to take a look at the knowledge intermediary term, which in the subjective aspect and in the material activity will remain in certain complementarity with the competence centres concept. However, wanting to answer the question of who can be considered a knowledge intermediary, the conclusions made on the basis of the analyses conducted on the basis of various cognitive perspectives should be examined. It can be noticed that this subject is covered by two traditions in the literature, the sociological one and the one related to managing the technology that, despite being characterised by similarity of the research questions, were developing with relatively little interaction between them (Fleming, Waguespack, 2007). On the one hand, it is possible to point to Burt and his theory of structural gaps that shows the intermediary as an entity connecting directly unrelated actors, but in such way that the intermediary can use his/her position, for example, to obtain further promotions faster. On the other hand, Allen and Tushman described how the intermediary, often on a managerial position (boundary spanner), contributes to obtaining the best results of the entity by identifying, performing translations and forwarding information inside and between the companies. Therefore, we have two distinct pictures of the intermediary, that is, on the one hand, a broker as calculating and political operator, and on the other hand, a boundary spanner as respected attendant that directs important information inside and outside the organisation. In the regional system, the translation of these relationships can be found in Kauffeld-Monz and Fritsch (Kauffeld-Monz, Fritsch, 2013) that have studied the brokers of regional innovation system in terms of their concentration on social benefits (knowledge passed on to others) and private benefits (knowledge received from others). By systematic review of the literature, Long, Cunningham and Braithwaite (Long, Cunningham, Braithwaite, 2013) have distinguished several types of the intermediaries that differ on the basis of characteristic features and factors deciding about their motivation. Therefore, it can be said that an intermediary is:

a. broker - acts as an intermediary between unrelated actors/clusters, aims to make some transactions easier, resolve the conflict, but also to increase personal power or social capital; loyalty to the two groups can be problematic,

b. consultant/cosmopolitan/itinerant broker - connects two unrelated actors in external cluster/clusters, trying to make the negotiations between them easier, but also to use their lack of relation,

c. coordinator - connects directly unrelated entities inside of their cluster, aiming to improve the coordination efforts, or to centralise the knowledge exchange,

d. liaison - connects two unrelated groupings without taking any particular approach to either of them, i.e. by helping in negotiations in commercial transaction,

e. representative, connects the gap between the actor of the same grouping with the actor from a different grouping, so as to make the external contact easier,

f. gatekeeper - connects the grouping to which he belongs to with the other one, thus controlling the incoming and outgoing information, often negatively connected with the phenomenon of keeping the information, or positively as the one bringing useful information or filtering the useless ones,

g. go-between - occurs between two unrelated actors offering certain services, i.e. facilitating an access to advice, resources; in case of too much information flow, it can become a bottleneck,

h. information/knowledge broker - keeps two unrelated groups informed and makes them coordinate actions with each other, its action prevents fragmentation;

i. peripheral specialist, holder of specialised knowledge that shows tendencies to occupy a peripheral position, so as to take care of his specialisation on the one hand, and be available for consultations on the other,

j. mediator/conflict resolver that tries to increase an understanding between the two sides separated by different expectations in the field of knowledge, is often well-versed in two sides;

k. tertius gaudens and/or tertius iungens, which will be discussed later in the study.

In the Silesian province, the configuration of actors of the innovation ecosystem of the Silesian province was adopted, as presented in RIS, among which the authors of the research (Szmal, Janiszewski, 2018) identified the activities of knowledge intermediaries in the regional innovation system. This approach could be useful in defining the activities of knowledge intermediaries of the competence centres in the field of production and material processing.

Materials and Methods

Competence centre within the area of materials production and processing in the Silesian Province - case study

The paper is a result of the research procedure based on the review of scientific literature concerning management and the case study of a consortium established to implement the project "Network of Regional Specialist Observatories in the Entrepreneurial Process of Discovery" (NO RIS in EPD). The case study makes a review of the technological observatory operational situation in the area of materials production and processing in the Silesian Province. It confronts the actual processes taking place in the case in question with the competence centre functioning requirements. The study analyses the offer and activity of the companies engaged in running a technological observatory according to the situation at the end of 2019. The content related scope of the area MATERIALS PRODUCTION AND PROCESSING has been defined in the "Program for Technology Development of the Silesian Province within 2019 - 2030". It covers the following issues:

- metallic materials
- polymer materials
- ceramic materials

To complement information on the research environment, it should be emphasized that the Project "Network of Regional Specialist Observatories in the Entrepreneurial Process of Discovery" (NO RIS in PED) lasted from January 2017 to March 2019 and was co-funded from the European Regional Development Fund. Project value: 4 756 146.11 PLN including the leader and project partners' own resources. The objective of the project was the support and enhancement of the regional development management within the scope of the regional scientific and technological potential and the increase of number of Specialist Observatories according to technological areas indicated in PTD as well as R&D sector entities and companies. Moreover, the objective of the project was to disseminate efficient business models among companies, disseminate specialist reports developed by technological observatories concerning available technologies and R&D&I cooperation options. The project was mostly directed to companies to increase their knowledge on technologies and market trends which would allow to take actions in order to raise competitiveness and innovativeness both at the regional and national level, through adapting the support tools at the regional level (PED) (Janik A., Ryszko A., Szafraniec M. 2018).

The study itself performed for the needs of this paper is related to a consortium established for the purposes of implementation of the technological observatory in the area of materials production and processing in the Silesian Province. The consortium composition: Silesian University of Technology, Organization and Management Faculty and Non-Ferrous Metals Institute. The objective of the observatory within the technological area of Materials Production and Processing was ongoing monitoring of development of the technologies applied in the Silesian Province economy sectors, related to materials production and processing: metallic polymer, ceramic and composite.

The basic activities of the model competence centres include:

1. Operations within the scope of pro-innovative services, especially:

    1.1. Technology watch in the area of materials production and processing,
    1.2. Intellectual property protection strategies,

1.3. Support within the scope of technology transfer and commercialization,
1.4. Creating and testing business models for start-up projects,
1.5. Professional ideas incubating centre,
1.6. Business advisory, appraisal of technology and support during contact with VC.

Competences of this type serve the following role: training, knowledge dissemination and innovativeness support.

2. Operations within research and development scope, i.e.:

   2.1. Formulating research challenges that correspond with market and technological trends within the area of materials production and processing,
   2.2. Creating research consortia in the area of materials production and processing,
   2.3. Analyses in favour of the emerging sectors and horizontal relations,
   2.4. Good practices base,
   2.5. Technological road maps.

3. Activities within the scope of training and communication, i.e.:

   3.1. Organization of conferences, seminars and workshops on the subject,
   3.2. Analyses of the needs and personnel competences development options, including managerial personnel in the area of materials production and processing,
   3.3. Organization of training and post-graduate studies within the scope of technology, internationalization and intellectual property, etc.
   3.4. Active participation in key assemblies that shape the development conditions in the area of materials production and processing,
   3.5. Development of inter-organizational communication system, using modern information tools.

4. Activities within the scope of internationalization;
   4.1. Building a relationship capital to international scale,
   4.2. Searching for partnerships, preparing and coordinating regional, national and international projects,
   4.3. Organization of study trips,
   4.4. Good practices base,
   4.5. Support for networking activities.

Hereinbelow, the authors made an attempt to analyse and then to evaluate how the activities of the consortium members fill the activities of the model competence centre with contents in the area of materials production and processing.
Results of the review are presented in table 1.

Table 1: Comparison of basic activities of the model competence centre with the activities of entities implementing the technology observatory in the area of materials production and processing in 2019.

Data according to above description	Non-Ferrous Metals Institute	Silesian University of Technology Organization and Management Faculty
1.1.	Yes	In partnership with other university entities
1.2.	Yes	Partially
1.3.	Yes	In partnership with other university entities
1.4.	No	No
1.5	No	In partnership
1.6	No	No
2.1.	Yes	No
2.2.	Yes	No
2.3.	No	Partially
2.4	No data	No data
2.5	No data	No
3.1.	Yes	Yes
3.2.	Yes	No

3.3.	No	Partially
3.4	No data	No data
3.5	Partially	Partially
4.1.	Partially	Partially
4.2.	Yes	No
4.3.	Yes	No
4.4.	No data	No
4.5.	Yes	Yes

Within 2017 - 2019, activities of the observatory were financed from public resources to high extent. In 2020, the project is continued however, the basis for the observatories network functioning is the already existing efficient cooperation of the key institutions and regional companies ready to engage their own resources for the purpose of transfer of regional information and knowledge between science, industry and self-government. The process continuously evolves and improves the technological observatory members offer. However, the analysis of current state has disclosed some gaps representing the space to overcome along the path to full development of a competence centre.

Summary

The performed analyses and studies were used to review the readiness for implementation of the innovation management model using the Competence Centre concept in the technological area of materials production and processing. It seems possible within the 2 - 3 year-long time perspective while standing up to the challenge of filling the competence gaps and assuming self-funding of own operations. The method this will be performed is the key. The fact that organizations build their advantage, including competitive edge, more often based on the created networks is a valuable inspiration. Cooperation competences are necessary in this case. Outlining the network approach assumption in the management sciences, presentation of traditional definitions and competences typology, defining cooperation competences: actual and network competences with consideration of their basic components provides the space for efficient operations.

The centre should be a valuable source of knowledge about cooperation options and potential partners that are to deliver new knowledge (Szmal A., 2016), support companies innovativeness through creating close relationship between research institutions and companies. The living labs plane is an important cooperation component, perceived as an experimental environment where the technology is created and tested under everyday life conditions, however the participants testing the new solutions are their co-creators. Living labs become an environment on the one hand and on the other a method for implementing and developing innovations. One of the milestones of the living labs development may be the accession to ENoLL - European Network of Living Labs (Open Living Labs). The network can be accessed by all organizations that use user-driven open innovations in their operations. Cooperation within Living Labs may be beneficial for a wide spectrum of innovative processes stakeholders in the region. Creating efficient living labs seems difficult, however in the Silesian Province there are many institutions that by engaging their own resources and capabilities or using the public support might organize effective living labs. Their creation is experimenting with the methods of using the infrastructure especially within the scope of principles of access to laboratories and determining the rates for using the infrastructure. Creating the living labs is therefore an evolving task wherein the optimum model of running operations and testing the solutions is achieved gradually.

Companies must look for innovations from different sources that would allow for developing their business model. When the absorption of ideas and new technologies is the integral element of a company business model, it creates an additional leverage for development of other business areas. When it is missing, other necessary elements allowing for converting the idea into a market value are missing too. Companies should be much more open to co-sharing the innovations or their licensing if they do not match their model. It is especially difficult to break the mental attitude barrier that consists in closing inside own structure. As proven by experience, attempts to cross this threshold is difficult but possible with participation of a professional intermediary. The intermediary can be innovation broker who is able to integrate the environments (triple helix) in the area of works related to innovation development, build a cooperation network, transfer technology, stimulate creativity and entrepreneurship. The main idea that should be used by the innovation brokers is the creation of innovation development on the supply and demand side. Exemplary tasks the knowledge brokers should implement within the scope of the basic objective:

1. Analysis of information needs within the scope of innovation development. (demand analysis: companies, business-related institutions)

2. Analysis of information within the scope of innovation development generated by universities, R&D entities, authorities (supply analysis);
3. Study of the development needs (creating new, improving the existing), competences related to creating, implementing and managing innovations. (supply and demand analysis);
4. Evaluation of system of information flow related to creating and implementing innovations; (demand, supply, institutional analysis).

These activities would correspond well with the increase of readiness for full-fledged application of the competence centre concept in the area of materials production and processing.

The innovation management model in the form of the networked Competence Centre would satisfy the basic task and would be able to utilize the resources of all its participants. However, this cannot be done without strengthening the mechanism of operations coordination by a competent leader. Openness to cooperation, innovations, openness to stakeholders interested in similar projects increases the chance for market success of commonly initiated, performed and implemented research and development projects.

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Innovations as the Source of Creating the Value in Business Models

Jan BRZÓSKA
Silesian University of Technology, Gliwice, Poland, jan.brzoska@polsl.pl
orcid: 0000-0002-0753-6444

Arkadiusz SZMAL
Silesian University of Technology, Gliwice, Poland, arkadiusz.szmal@polsl.pl
orcid: 0000-0001-6395-618X

Abstract

Dynamically changing environment influences the application of business models that use various types of innovations in the enterprises. They constitute one of the most important sources of creating the value, which is the condition for achieving competitive advantage and sustainable development of the organisation. Absorption and generation of various innovations often decide about the increase of the value for the client and stakeholders. The role of innovations in the increase of the value obtained by business models in chosen enterprises was studied in the paper. In particular the business models structure and their changes allowing for application of the product, process, marketing and organisational innovations were presented. The structural research on the marketing and organisational business models were conducted on the basis of the concept and rules of the so called New Era of Innovation. The ability of the enterprise implementing innovations for creating the increase and expansion of the value for the client in terms of using the right business model was evaluated. The objects of the case study were three enterprises, one of them being a service and trade company, the remaining ones the industrial companies. For the measurement of the value for the client and stakeholders obtained by studied organisations, the Balanced Scorecard standards were used.

Keywords: Business Model, Innovations, Value, Balanced Scorecard, Business Processes

Introduction

The basis of market success and development of the enterprise is its clearly defined business model. It constitutes a unique concept that defines the system of connections between the resources and the processes adequate for a given organisation, as well as its relationship with environment in creating the value. Design and application of new or modified business models, which component and attribute is the concept of generating the value, is more often based on innovations. It is innovation that is perceived as the source of various kinds of values important for the client. The strategy of sustainable development in three dimensions, that is economic, social and ecological, and the development of the Knowledge Economy (including Digital Economy) result in creating values strongly related and based on innovations.. Successfully applied, adequate innovation business models capable of absorption, creation and innovation diffusion are to make it possible. Obtained value decides to a large extent whether a given business model came out to be effective in implementation of the organisation's goals and achieving economic, market and social effects obtained by them. It also indicates its ability to implement various kinds of innovations that co-create both the value for the client and the increase of the economical value added (EVA, resources). The goal of this paper is to evaluate the dynamics of values obtained by business models, the sources of which are various kinds of innovations implemented by enterprises. Two research questions correspond with it. 1. What kind of changes in business models are caused by applied innovations? How does the value of a company applying innovations in its business models change? In the context of the set goal and research questions, for the assessment of the value generated by the business models, developed research methodology, which the most important elements were structural and comparative analysis of the business model conducted in the aspect of implemented innovation and the measurement method based on Strategic Scorecard, were used. In the paper, the research results were presented in the form of multiple case study. The first of the studied objects was a service and trade company, the second one was the producer of tie down straps and slings, the third one was the steel rolling mill.

Literature Review

The issues of business models bring a lot of attention of both theorists and practitioners of management. This interest is accompanied by various approaches and understanding of the business modelling (multitude of definitions

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and concepts), hence the appearing postulates to create a common scientific platform for better and more effective research of the business models (Zott-et al.,2010).. Cognitive difficulties (definitions, structure) result from the fact of multi-dimensional and interdisciplinary nature of the business model. In relation to that, the research on it will be conducted from various perspectives, in different aspects, scope and depth of the research. Theoretical research on the business models (Kalinowski and Vives, 2013) is most often conducted in three perspectives: choices (strategic aspect), activity (organisation level), normative (operational level). Regardless of the approach to the conducted research, one of its elements is always the value category, its creation, transfer of ownership and recipients. Theoretical research on the business models should lead to its use in practice. Development of the research on business models has resulted in many of their definitions and concepts (Chesbrough, 2010, Dahan -et al., 2010, Teece, 2010, Zott-et al., 2010). In the context of presented research subject, the concepts related to the creation of the value and the meaning of innovation in business modelling are significant. Business model can be perceived as a system of configuration of the resources and mutually dependent actions concentrated on creating the value. The combination of such activities, resources, way of their organisation, and connections between the activities, resources , and the network of values, allowing for conducting these activities in cooperation with partners or clients, depends on the adopted business model. (Svejnova -et al., 2010, Zott- et al., 2010, Boulton- et al. 2000). Many considerations emphasise close relations between the business model and creation of the value for the clients and an enterprise, indicate the role of configuration of material and immaterial factors and the possibility to capture a portion of the income from the value delivered to the customers (Newth, 2012, Jabłoński, 2013, Boulton- et al. 2000). In the concepts of the business model, its two main dimensions are being exposed. The first one is the way of creating the value for the client, in particular which elements of the business model play the significant role and how this value will be implemented (Osterwalder and Pigneur, 2010, Gołębiowski-et.al. 2008, Chesbrough and; Rosenbloom, 2002). The second important business model is capturing the values for the enterprise that will give it an income (Afuah, 2004) . Its size depends to a large extent on the level of innovation, architecture, character and harmonisation of the resources and activities included in the business model (Zott and Amitt, 2010, Brzóska, 2014). A higher level of harmonisation between the elements of the system influences the increase of created value, and thus the possibility of its greater appropriation. Relationship between the value for the client and capturing the value is related to the networks of value and strategic choices being the components of the business model. Perceiving the business model as specific combination of resources makes it to generate the value through the transactions for both the clients and organisation (Chesbrough, and Rosenbloom 2002, Osterwalder and Pigneur, 2010). Stakeholders are being indicated as the recipients of the value, a term of creating and capturing the value in the network of values has also been introduced (Shafer – et al. Knop, 2015, Dahan -et al., 2010). Creating a unique value and competitive advantage is related to innovations carried by a business model (Hamel, 2002, Prahalad and Krishnan, 2008, Brzóska 2014). Innovations that are more often applied (Casadesus-Masanell and Ricard, 2011) allow to create the value for the clients (new products, new kinds of values, new methods of customer service) and the value for the stakeholders, e.g. environment protection, new technologies, new chains of values, or increase of the effectiveness (Dohn, 2014, Szmal and Jodkowski, 2015, Baran –et.al. 2015) Innovation, effectiveness, customer loyalty, complementarity (Zott and Amitt, 2010), as well as the processes and resources using innovations (Brzóska, Szmal 2015) can be perceived as the factors of creating the value in the business model. Implementing innovations is also supposed to prevent threats of imitation (Obłój 2002). The business models themselves may also constitute the organisational innovation important for the competitiveness (Hamel, 2002). Models of the Industry 4.0. can be the examples (Dobrowolska and Knop, 2020, Brzóska and Knop, 2020). In conclusion, the value based on innovation is a central dimension of the modern business model. The business model itself is a certain concept of logic of the company's functioning, capable of creating the value for the clients and the stakeholders, the sources of which are various innovations applied.

Methodology of the Study

For the assessment of the value created as a result of applied innovations and changes of the business models, the methodology of the study based on four basic components was used. It is presented in the Figure 1.

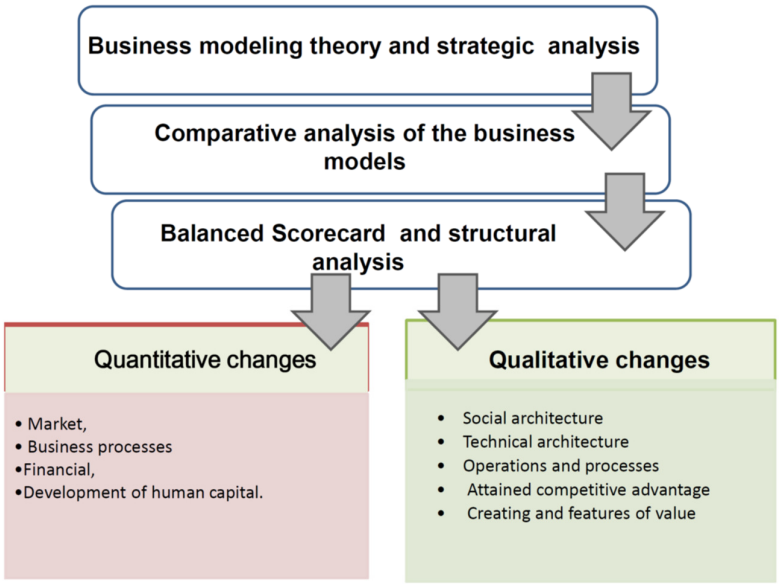

Fig.1. Research model

The analysis of the common environment and literature studies include: elements of modelling theory, innovation ecosystem, business environment, relations with partners, macroeconomic situation. The concept of the business model, the so called new era of innovation, was used in the structural and comparative analysis. (Prahalad and Krishnan, 2008)Apart from such elements of the model as: social architecture, technical architecture and business processes, creation of the value and type of the competitive advantage were included in the structural characteristics of the business model. The elements of the Balanced Scorecard were used for the quantitative measurement of the values obtained with the use of innovations (Kaplan, Norton, 1996, Blacha, Brzóska, 2016, Oslo Manual, 2005). The value created by innovations was represented by the results obtained in the following perspectives: financial, customer (market), business processes and development of human capital.

Analysis of Business Model Changes - Case Study

Company manufacturing belt slings (Company A)

The studied company (257 employees , sale amounts 10. 5million EURO) is a manufacturer of systems for securing and lifting loads. It operates in Poland since 1992. International company, operating in since 1935, is a shareholder. The production company manufactures belt slings, hose slings, single string rope slings, grippers, belts and chains fixing loads, provides advisory services within the scope of securing loads (over 23 thousand different product variants). Changes in the business model are presented in table 1.

Table 1: Characteristics of of the business model elements (Company A)

Social architecture		
	Period of the study: 2008-2012	Period of the study: **2013-2019**
Employment	Dynamic increase of employment to 216 (2012) employees Slow increase of engineering and economists share in the employment structure to 11%. Trainings within limited scope.	Systematic increase of employment to 257 (2019) employees Stable share of engineers and economists in the employment structure (ca. 16%). Wider scope and specialization of trainings comparing to previous period
Strategic competences	Trading competences: sale of fixing slings and belts, understanding of transport, construction and repair market, customer service.	Engineering and trading competences of production of slings , CRM, competences by design and advisory tasks, financial and risk management competences.

Knowledge resources	Limited scope of formal information and knowledge. Information and knowledge gained individually by employees (relatively narrow scope).	Information and knowledge gained individually by employees. Significantly increased range of formal information and knowledge (trainings, developed IT systems).
Technical architecture		
Material resources	Logistic and production infrastructure used to manufacture fixing slings and belts. Low level of equity. Good location of the company	Increase in equity. Purchase of modern equipment for belt slings production. Well organized procurement system.
ICT resources	Basic ICT. Information about clients and competition used in hidden knowledge	Controlling IT system, CRM system, ERP system production, digitization of business processes (industrial scanners),
Processes and creating the value		
Business processes	Purchase, production, sales , marketing, HR (basic). Outsourcing of transportation services.	Service, trainings for clients, purchase, production, lean manufacturing. Sales and CRM. Designing and advisory, HR, risk management.
Attained competitive advantage and its sources.	1. Competitive advantage in the quality of offered products attained by means of the implemented quality standards. 2. Competitive advantage resulting from location.	1. Competitive advantage resulting from professional service and design 2. Competitive advantage resulting from availability. 3. Competitive advantage resulting from innovations.
Creating and features of the value	High quality products securing the loads. Competitive prices. Well-known brand, a simple value chain - based on effective production and wholesale trade	Developed value chain. High quality and safety, flexible forms of purchase. Short lead times, professional advice. Competitive prices of a wide range of products.

The studies show that different types of innovations (process, product, organizational, marketing) are used in the change of business processes. Innovations improve business processes, which use and develop many elements of social and technical architecture In the investigated company, development of human resources is noticeable. Employment dynamics is accompanied by beneficial changes of its structure and growth of competences, especially marketing and engineering. The number of business processes increased, because of the EU funding, new technology and production devices were implemented. Table 2 shows the results obtained from the BSC perspectives.

Table 2: Results attained in the BSC - companies: A.

Financial perspective					
Result	**Measure**	**2008**	**2012**	**2015**	2019
Economic value added (EVA)	Million EURO	0.58	0.39	1.12	1.32
Return on sales	Net profit /sales (%)	12.1	17.4	22.1	20.7)
Return on assets	Net profit /asets (%)	22.4	14.2	23.2	21.2
Net income dynamics	Previous period = 100	100	112	162	128
Client's perspective					
Level of customer satisfaction	Percentage of satisfied customers	no data	86.5	93.2	94.5
Level of customer loyalty	Number of regular customers	19	18	54	68
Strategic customer value	Average sales/ Number of	6.1	8.1	15.2	19.3

	strategic customers (thousand EURO				
Sales dynamics	Previous period = 100	100	112	134	128
Processes and technical resources perspective					
New product offers	quantity	no data	10	35	44
Services quality increase	Decreased number of complaints (%)	0.8	0.6	0.6	0.2
Increase in the number of new processes	quantity	0	1	4	3
Increase of the value of machines and equipment	Increase (%)	2.4	3.2	189.3	72.2
Human capital development perspective					
Innovativeness of employees	Number of registered innovative solutions	0	2	5	4
Increase in employees productivity	Value of sales per 1 employee (thousand EURO)	20.3	22.4	36.6	40.8
Personnel qualifications	Number of engineers and economists	17	23	32	40
Employees satisfaction	Percentage of satisfied employees	no data	72	72	74

Growth of effectiveness is noticed and confirmed by EVA, dynamics of growth and sales profitability. Very good results obtained in 2015 must be noticed, which is a result of full implementation of product, marketing, process and organizational innovations. In this case, one can say about achieving synergy effect of the applied innovations. One must notice high dynamics of sales attained within the last years. The company maintains high level of clients satisfaction, number of regular clients increased together with the value of sale per 1 strategic client. . Implementation of innovations caused rapid increase of product offer. Quality improved slightly, number of new processes and value of technical equipment increased, which fact is related to product and process innovations. In this case, one can say about achieving synergy effect of the applied innovations.. Significant increase of productivity is a major achievement for the company..Despite the progress of innovativeness, it is difficult to consider the number of innovations reported by employees as achievement. The level of employees satisfaction is stable and can be considered as satisfactory.

Trading and service company of metallurgical products (Company B)

The company has been operating for 15 years and employs 118 people. In 2019, it achieved the level of sales around 7.8 million EUR. Since 2012, innovations have been implemented, the company changed its business model, and in addition to trading, it opened service centres. Implementation of innovative processes allowed for introducing new products on the market and changing the relations with clients. Elements of business model given in the Table 3 allow for comparing and assessing changes made as a result of innovations.

Table 3: Characteristics of the business model elements - Company B

Social architecture		
	Period of the study: 2008-2012	Period of the study: **2013-2019**
Employment	Reduction of employment to 75 employees. Trainings within limited scope.	Stable employment at the level ca. 120 employees. More employees with university education, both economic and technical.
Strategic competences	Sales of metallurgical products and construction materials, customer service: Competences of cooperation with metallurgical products manufacturers.	Engineering and trading competences: service of metallurgical products. CRM, designing and advisory competences, financial and risk management competences. Construction of prosumer contacts.
Knowledge resources	Limited scope of formal information and knowledge. Significant meaning of hidden knowledge application.	Significantly increased range of formal information and knowledge (trainings, developed IT systems and CRM).
Technical architecture		
Material resources	Logistics and property resources used during retail and wholesale sale. Relatively low level of equity. Well organized supplies system. Good location of trading warehouses.	Increase in equity. Modern devices for plastic working, metal working and production of steel structures.
ICT resources	Basic IT solutions within the scope of accountancy and sales. Information about customers and competition used in hidden knowledge (narrow scope)	IT systems (industrial scanners, cloud computing), controlling, CRM, engineering designing and modelling systems, metal working control systems, service platform
Processes and creating the value		
Business processes	Sales of metallurgical products, marketing on the metallurgical products. HR (basic). Outsourcing of transport services.	Metallurgical products service, procurement, production of metallurgical products, designing and advisory. Insourcing of transportation services. HR (professional). Controlling, risk management process
Attained competitive advantage and its sources	1. Cost competitive advantage in obtained because of relatively low fixed costs and competences while purchasing metallurgical products. 2. Competitive advantage resulting from location.	1. Competitive advantage resulting from a wide range of services and competences. 2. Quality advantage
Creating and features of the value	Standard quality and competitive prices for metal and construction products	High quality and wide range of services. Professional advisory and design. Fast order processing and delivery to the customer.

Observed dynamics of the business model shows significant changes in its structure. The structure and competences of employees changed, new processes, resources and products were introduced. This was related to application of many innovation types. They allowed for creating new values for the client and competitive advantage.

The results presented in BSC (table 4) show that the implemented innovations improved profitability, a growth in net profit was noticed, the company achieves satisfactory economic value added (EVA), meaning that

Table 4: Results attained in the BSC – Company B.

Financial perspective					
Result	**Measure**	**2008**	**2012**	**2015**	2019
Economic value added (EVA)	Million EURO	*-0.19*	*0.11*	*0.35*	0.41
Return on sales	Net profit /sales (%)	*3.3*	8.4	18.2	14.2

Return on assets	Net profit /asets (%)	*2.4*	7.2	13.1	10.2
Net income dynamics	Previous period = 100	*100*	112	172	146
Client's perspective					
Level of customer satisfaction	Percentage of satisfied customers	75.5	*80.0*	*86.2*	92.2
Level of customer loyalty	Number of regular customers	*98*	*92*	*142*	168
Strategic customer value	Average sales/ Number of strategic customers (thousand EURO)	*7.2*	*8.2*	*14.6*	13.8
Sales dynamics	Previous period = 100	*100*	118	*194*	176
Processes and technical resources perspective					
New product offers	quantity	*18*	*24*	*66*	54
Services quality increase	Decreased number of complaints (%)	*1.4*	0.8	*1.0*	0.7
Increase in the number of new processes	quantity	2	2	7	5
Increase of the value of machines and equipment	Increase (%)	*11.2*	21.3	272.2	76.4
Human capital development perspective					
Innovativeness of employees	Number of registered innovative solutions	*0*	*3*	4	3
Increase in employees productivity	Value of sales per 1 employee (thousand EURO)	*31.1*	*38.4*	50.2	66.1
Personnel qualifications	Number of engineers and economists	*34*	*36*	65	67
Employees satisfaction	Percentage of satisfied employees	no data	78	*79*	84

its value increases. The profitability of the assets slightly reduced due to investments (supported mostly with EU funds) in to new innovative processes. They allowed for introducing new products leading to significant growth of sales and twice increase in productivity. Marketing and organization innovations and the created value contributed to maintaining clients and considerable increase of their satisfaction. The number of educated employees increased, however their innovativeness is still low meaning that the company uses open innovations.

Hot rolled steel products rolling mill - Company C

The metallurgical company is a manufacturer of long steel products and employs ca. 200 employees with the level of income about 48 million EUR. For many years the business model was based on production of a narrow spectrum of long steel hot rolled products. The business model changed in 2014 after introduction of new technologies (process innovations) allowing for production of new products (product innovations). Table 5 presents characteristics of the business model elements.

Table 5: Characteristics of the business model elements (Company C)

Social architecture		
	Period of the study: 2008-2013	Period of the study: **2014-2019**
Employment	Stable employment (approximately 250) and its structure. Low share of university education employees.	Stable employment (230-240). Increase of engineers and economists number.
Strategic competences	Production of metallurgical long rolled products. Cooperation with domestic suppliers and wholesalers	Purchase of the charge on global markets Marketing, CRM, designing and producing steel structures, controlling (including BSC)
Knowledge resources	Limited scope of formal knowledge and information. Narrow range of technical and commercial knowledge.	Increased scope of formal information and knowledge (training). Increase of technical and managerial knowledge resource
Technical architecture		
Material resources	Property resources at average technical level used for production of typical long products. External logistics of purchase and sales. Good location.	Utilization of the capital mix to purchase modern technologies and production of perforated sections and service of metallurgical products.
ICT resources	Basic IT solutions within the scope of production control, accountancy and sales.	Using cloud computing. Using digital platform for trading and service
Processes and creating the value		
Business processes	Production and wholesale of metallurgical products, purchase of the charge. HR - limited trainings.	Production of innovative long products, service of metallurgical product, HR-motivation system related to effects, more trainings, CRM, ISO, controlling, risk management.
Attained competitive advantage and its sources.	The competitive advantage is based on price / standard quality ratio concerning manufactured steel products .	The competitive advantage is based on differentiation (new products) and flexibility of services.
Creating and features of the value	Value resulting from the quality standard / price ratio. Fast completion of orders and good location.	Creating the value based on effective production of wide assortment of long steel products Competitive prices of steel products assortment.

Using equity, credit and EU funds to invest in new technologies and products (perforated sections). Modern technical devices for servicing metallurgical products (cutting, machining, bending). Introduction of ISO, CRM and BSC, developing of HR..

The results presented in table 6 in the form of BSC show that the company shows financial stability. Implementation of innovations did not significantly improve the financial results, but controbuted to their maintenance. The number of regular clients slightly changed and the level of client satisfaction improved. Sales and productivity grows systematically, the number of new processes and products grows since 2015. The company corrects the employment structure, there is a growth in satisfaction from work, however alike in company A and company B, the level of employees innovativeness is low.

Table 6: Results attained in the BSC – Company C

Financial perspective					
Result	**Measure**	**2008**	**2012**	**2015**	2019
Economic value added (EVA)	Million EURO	2.2	1.7	1.02	2.6
Return on sales	Net profit /sales (%)	8.2	5.4	7.8	9.9

Return on assets	Net profit /asets (%)	17.8	16.5	10.2	17.3
Net income dynamics	Previous period = 100	100	107	131	147
Client's perspective					
Level of customer satisfaction	Percentage of satisfied customers	(no data)	80.1	88.3	93.0
Level of customer loyalty	Number of regular customers	(no data)	22	28	26
Strategic customer value	Average sales/ Number of strategic customers	28	31	38	41
Sales dynamics	Previous period = 100	100	109	116	122
Processes and technical resources perspective					
New product offers	quantity	2	4	9	17
Services quality increase	Decreased number of complaints (%)	0.8	0.5	0.4	0.4
Increase in the number of new processes	quantity	0	1	3	5
Increase of the value of machines and equipment	Increase (%)	-0.8	6.6	27.1	16.4
Human capital development perspective					
Innovativeness of employees	Number of registered innovative solutions	0	3	4	3
Increase in employees productivity	Value of sales per 1 employee (thousand EURO)	148	164	186	204
Personnel qualifications	Number of engineers and economists	7	11	16	21
Employees satisfaction	Percentage of satisfied employees	no data	83	86	89

Conclusions

In the context of the first research question, it is clear that the innovations applied by the studied companies have changed the resources (mostly material) and processes within the business models which fact allowed for creating new value for clients expressed in the sales of new products. Management changes focused on improvement of clients service (CRM) and development of knowledge management (HR and ICT). Based on innovations, the companies augmented the value chain by better adapting it to clients' needs. Quantitative measurement of value show multidirectional impact of innovations on the results within all perspectives. The financial and client perspectives were mostly affected by marketing and product innovations and the business processes and technical resources - by the process innovations In turn, the organization and process innovations had the strongest impact on the results obtained in the human capital development perspective. Comparative analysis of the obtained results representing the created value in the business models shows similarities of the innovation impact on the improvement of economic and market situation. The innovations contributed both to the increase in sales and profitability. To answer the second research question, based on the obtained results, the innovations led to an increase (or stabilization in worse case) in EVA and assets (mostly equipment) that represent value of the company. The result of the business

model application is the creation of multidimensional value that translates to the achieved company's results. Their measurement represents an important instrument that allows for evaluating effectiveness, competitiveness and efficiency of the implemented new business models or changes in the functioning models. According to the paper objective, the performed studies showed that application of the method that uses the structural analysis and BSC to evaluate dynamics of the value achieved by the business models based on various innovations is justified. The presented methodology can be used to wider extent to study the relationships between implementation of innovations and creating value by the changing business models. Such a research approach provides multi-aspect evaluation of the innovation role in creating the value by business models of companies, which might play a significant role, especially in modern business models, e.g. Economy 4.0.

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User Analytics as The Novel Approach Towards Personalization and Adaptation: Rudiments for User-Tailored Design

Gracja NIESLER [0000-0003-3309-7219]

Wroclaw University of Economics and Business, Wroclaw, Poland
gracja.niesler@ue.wroc.pl

Abstract

Dictum "*Scientia potentia est*", credited commonly with the sixteenth century philosopher Francis Bacon, in the modern world of information seems to be even more true than ever. Humans as the information consumers and producers have created the market, where even sensitive, personal data can be trade objects. Every web application keeps track of our activities, every browser saves searching history and every social platform collects information about our relations and interests. That kind of knowledge can serve many purposes. The least of the users per se. The main beneficiaries are marketing and sales activities targeting potential customers. Nevertheless, if we look into health informatics or e-learning, a new potential of data usage emerges. The great amount of information can give more comprehensive scope on patient condition in order to recommend more adequate treatment. As in the learner's case the innate predispositions and learning curve indicate suitable teaching methods. Although intelligent solutions are applicable practically in every aspect of life, for many systems, still the benefits are not tangible, therefore developers and business owners do not find them profitable enough. It requires consecutive change in the way of thinking in terms of designing information systems in the user-centred paradigm. While we experience dynamic growth with ubiquitous expansion of the intelligent solutions and technologies, the new paradigm of user analytics for user-tailored design, and the areas that it can contribute to, is still yet to come.

Keywords: User Analytics, HCI, UX, personalization, adaptation, adaptive systems, intelligent systems, user-centred design, user-tailored design, Kansei, inclusive design, big data, psychometrics

Introduction

The advances in Human-Computer Interaction deliver many means targeted into facilitating user's functioning both in virtual reality and in the outside world. The issue of interaction includes activities related to a constant improvement of the dialogue between human and a machine. It has been striving to ensure that both software features and hardware devices be receptively directed to satisfying the needs of the user, and the computer be a legitimate partner in the joint effective acting. In a far-term perspective, the machine is supposed to be functioning like a human, and interaction should take on the features of natural communication. In recent decades we have stepped into the era when emotions crucially matter. The expansion of social media allows introducing the affective human factor into interactions between users and systems. Hence the users differ on psychological and cognitive level it is crucial to provide adaptability that particularly answers to users' individual, personal needs.

The aim of this paper is to introduce the scaffold of **User Analytics** (**UA**) concept as the approach to more flexible adjustment to user's needs in user-tailored systems. The paper consists of following sections: introduction, background and interpretation, user nature and levels of analytics, personalization and adaptation for interaction design, user-tailored design, discussion and further research, and conclusion. The background section presents the definition of User Analytics and related work context, on the basis of interdisciplinary approach in the domain of Human-Computer Interaction.

The next section presents human nature elements used for the analytical process, especially mental model building and analysing personality as the attitude towards outer world, information processing, learning, problem solving, decision making and organizing the environment. The analytics as the process of gathering, clustering, transforming and presenting data, discovering models and patterns, predicting behaviours can be conducted on the level of simple interactions, complex action sequences, preferences discovery and organization, psychometrics and social context. The results of comprehensive analytics of user data delivers the basis for personalization and adaptation, which is presented in the next section of the paper.

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User nature should be the main field of study for designing systems in the user-centred paradigm. Whereas the user-tailored design provides "perfect-fit" for the individual user, according to a wider range of needs than just functional and visual preferences. That indicates the necessity of the aspects of user experience design to be transposed into the act of quantifying the user for interaction adaptability purposes. The adaptation in user-tailored systems can be active or passive. Both require defining user archetype, model and profile to predict the behaviours and expectations in order to provide optimal flexibility. The system should stay alert and the analysis results should be under constant process of fidelity verification.

In the user-tailored design section the rudiments and requirements are to be presented. The user should be able to use any information processed by the system and its presentation in a way that supports perception, awareness and perception of the situation as well as understanding. The basis for user-tailored systems is highly advanced adaptation of its interactions to not only explicit but also to the tacit needs. In that case the persona design in user modelling seems to be insufficient, therefore further research towards user analytics is required. It is connected with practical and ethical issues being discussed in the final sections of the paper. The most important message is not to harvest users but serve them.

Background and interpretation

Recently, along with the massive flow of information and its accessibility, the new paradigms and techniques of processing have emerged. The term big data does not simply refer to large amounts of information, but the usage of technology of processing and delivering to the users in exact form in order to help them solve real life problems. The significant issue with the big data concept is the analytics. There can be different kinds of analytics: descriptive, diagnostic, predictive and prescriptive, according to its purpose. Descriptive analytics provides probabilities and trends based on existing patterns; diagnostic is used for searching the root cause of a problem; predictive uses artificial intelligence to forecast scenarios about possible outcomes and prescriptive analytics uses the retrieved parameters to propose best solutions (Riahi i Riahi, 2018).

The data about humans using information systems are substantially heterogeneous, due to the complex and fuzzy nature. Therefore, the big data concept is the most relevant. In that context we can say that User Analytics refers to gathering, organizing, processing, visualizing and using data about the user, as in any analytical approach. Nevertheless, the data and its relationships do not represent the true reality, lacking very often the aspect of causation and "nuanced human narrative that underlies a dataset" (Applen i Stephens, 2018). The focus is being put, withal, on particular purpose and data category, which is all about user quantifying and user data mining.UA thus provides the human-side aspect and can be used for detecting patterns, predicting actions, making decisions (by the system) about interactions and personalization and adaptation. However, it highly requires the artificial intelligence solutions application.

The User Analytics domain is set within an interdisciplinary area (see Fig.1) and benefits from the achievements of the following research fields: human-computer interaction, user-centred design and user experience, artificial intelligence, psychology (including sociology) and psychometrics, big data and predictive analytics.

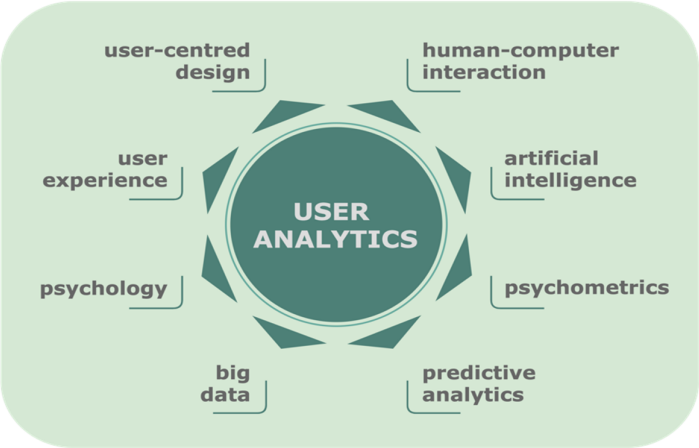

Fig.1. User Analytics domain as an interdisciplinary research area

Human-computer interaction (HCI) is the base area, because it includes concepts, methodology, techniques and tools providing the communication between user and the machine. For the UA perspective it includes both analysing the user interactions and providing the adjusted responses from the system. From the software engineering point of view, the user-centred design (UCD) provides the human-oriented perspective, especially including the aspects of User Experience, which supplements the design process with the awareness of subjective, complex and dynamic issues of usage of technology (Harutyunyan i Riehle, 2019). In terms of User Analytics user experience design (UXD) should be focused not only on delivering a positive experience to the users, but also retrieving crucial information about the user's reactions for analysis purposes, in order to improve interaction.

The potential of analysing the users' behaviour has increased in the recent years. For example, in marketing and advertising in the last decade the click-through rates (CTRs) as an information from potential customers have appeared to be not sufficient, and the data from social platforms such as reviews, tweets, followers, clicks and likes became an abundant territory to (Prabhu, Chivukula, Mogadala, Ghosh, & Livingston, 2019). In the nearest future probably other application areas will benefit willingly from the extended analytics. Therefore, a human being as the main field of study requires a psychological approach, and transposing the profile into the psychometric characteristics.

User nature and levels of analytics

Despite many business companies or developers are not much interested in deep user analytics, apart from the information for sales and marketing purposes, now there is a time of very competitive market, especially of mobile applications, and therefore that is the user engagement, which determines the application's success. The fundamental aspect of analytics is its causality, and thus the answer to the question: why and for what purpose people use the applications? Technology provides support and facilitation of human's functioning in the real world. That means that computers need to adapt the functionality to the user's natural environment. Therefore, the primary research area in user-centred design is the user nature, especially connected with reality experience and coping with the real-life problems.

Applications became very personal due to ubiquitous computing and its support in everyday life. Therefore, we focus especially on UX design, according to fulfilling the goals of usability. Analytics can retrieve information from both aspects – if it is usable for particular user and what kind of experience they are having.

The usability and UX present different aspects of use-centred design. Usability is part of objective quality in design, and UX is related to the objective and subjective quality in use. It is crucial then to understand the factors influencing the degree of satisfaction in the real context of the product usage. Therefore, the evaluation methods for usability should be used during the design, and for the UX – during usage (Kurosu, 2017). The proposed concept of analytics can help with the UX evaluation.

We ought to have in mind that users crucially differ, according to plethora of characteristics located in abilities, preferences, predispositions, difficulties, impairments, personality, affections and emotions. Mainly, the user's goals are: learning, problem solving and decision making, as the elements of cognitive reality experiencing, and they determine the objective quality in design for usability (Fig.2). The personality is described as the composition of the three factors: thoughts, feelings and behaviour, which affect the User Experience. Thoughts are responsible for the attention and engagement, and behaviour influences the way of organizing life and tasks. It all represent the objective quality in use. The subjective value in user is represented by impressions, judgement and affective response, derived from feelings and related behaviour.

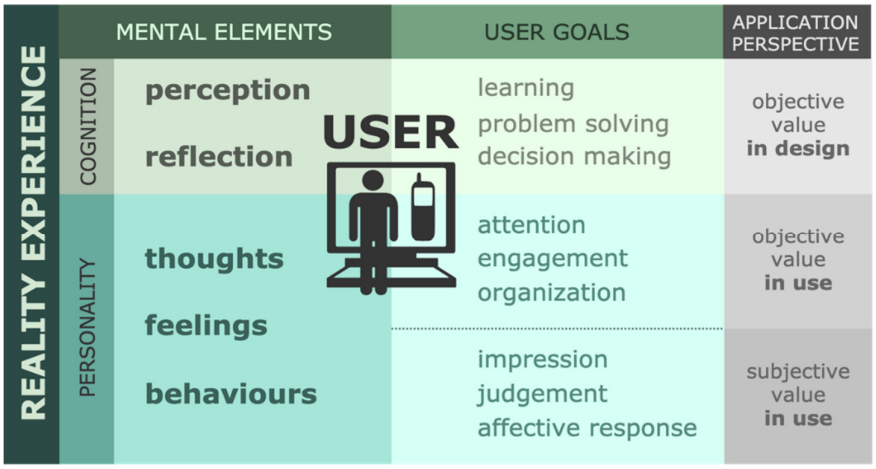

Fig. 2. Application of user nature elements in design and in use

For defining predispositions, which determine the cognitive process, as innate ability to percept and process the information, we can use the combination of learning determinants (memorizing, understanding and content association) and types of intelligence (which represent brain's tendency to particular patterns of problems) (Niesler & Wydmuch, 2008).

The personality identification is not easy, and many wrong diagnosing results may occur while conducting analytical process. Therefore, it has to be interpreted very carefully. Moreover, there are more than one theoretical background for identifying personality. For our previous studies we have used Myers-Briggs Type Indicator, based on Jung's type, which helps describing preferences as mental functions connected with attitude toward outer world, perceiving and processing information and organizing life (Niesler i Wydmuch, 2009).

For affective aspects the deeper analysis is required. Using, for example, the Big Five traits (such as extraversion, neuroticism, openness, conscientiousness, and agreeableness) it is easier to predict the user's reaction and behaviour, even the negative one, like in case of the neuroticism. Nevertheless, there are some exceptions linked to personality disorders, for example according to the Dark Triad traits (narcissism, psychopathy, and Machiavellianism), which can impede and falsify the results by the deceptive behaviour (Furnham, Richards i Paulhu, 2013).

For gaining relevant data the analytics should be conducted on different levels, according to the purpose. For the system adaptability we use different kind of data. According to the typical user characteristics (age, sex, location/ethnicity, disability, culture, etc.) we can use simple predictions of requirements and needs. In the cognitive aspect the basis is the learning curve analytics, especially analysing the results and choices. The personality aspect is more complex, because we need to perform the data extraction from the interaction analysis. It can be conducted on the following levels:

- simple interactions,
- complex action sequences,
- preferences discovery,
- psychometrics,
- social context.

In the health industry we have problem with the indirect user (e.g., a doctor), who is the receiver of the information, but the data, which are being processed, concern a patient. In that case the adaptation is not based on indirect user's preferences, because the health monitoring feedback is general. In case of *mHealth* the possibility of personalization is more open, because "the individuality is not limited to the sensor data, but also to the user who is using it" (Siddiqui, Koch, Rabie i Handmann, 2014).

In every aspect of user data analytics, the privacy and sensitive data protection is crucial. We have to remember that data misuse can bring serious harm, especially while "the UX industry lacks ethical guidelines and standards or even a governing body that enforces any kind of universal framework of ethics" (Fong, Waycott, Kadir, Gispen i Nacke,

2020). Therefore, the User Analytics should, in particular, include principles, standards and guidelines for the use of personal data.

Personalization and adaptation for interaction design

The way system acts and responds to user behaviour lays in the interaction design. The personalized and adaptive interaction design requires complex user data analytics. The analytics is a cycle process, including following steps: capturing, reporting, model prediction, acting and model refining. The result of comprehensive user data analytics delivers the basis for personalization and adaptation. We define adaptability as the application's ability to react to user's behaviour and to adjust the actions accordingly to the user's expectations and individual needs. The system can adapt the functionality, presentation of information or behaviour.

The way of executing adaptation process inclines different modes: passive and active. The active adaptation is based on constant monitoring the user's interactions, and redefining patterns and predicting user's further behaviour. The passive adaptation is being executed mainly on demand of a user or prerequisites and pre-set conditions (Niesler & Niesler, 2020). The patterns depend on the analysed characteristics (for cognitive or psychological aspects). The objective and subjective values determine the assessment in design or in use. It is connected with the process of adaptation, which exhibits behaviour when is in use (run-time), which is a result of the decision made in design-time (Niesler A. , 2020). The personalization provides the models that are analysed.

User Analytics process plays crucial role for interaction design based on personalization and adaptation (see Fig. 3). The personalization part is responsible for defining the domain of a user for analytics, and the adaptation is the system's response for the results of the analysis. The capturing stage selects and organize data into models and patterns. The most basic is the user archetype, which represents elemental characteristics and innate predispositions. The archetype is a model which is rather static and does not change for a long time. Nevertheless, it should also be a subject of periodic verification. It is related to the objective value in design, and the adaptation is usually passive, on the functionality level defined in the design-time.

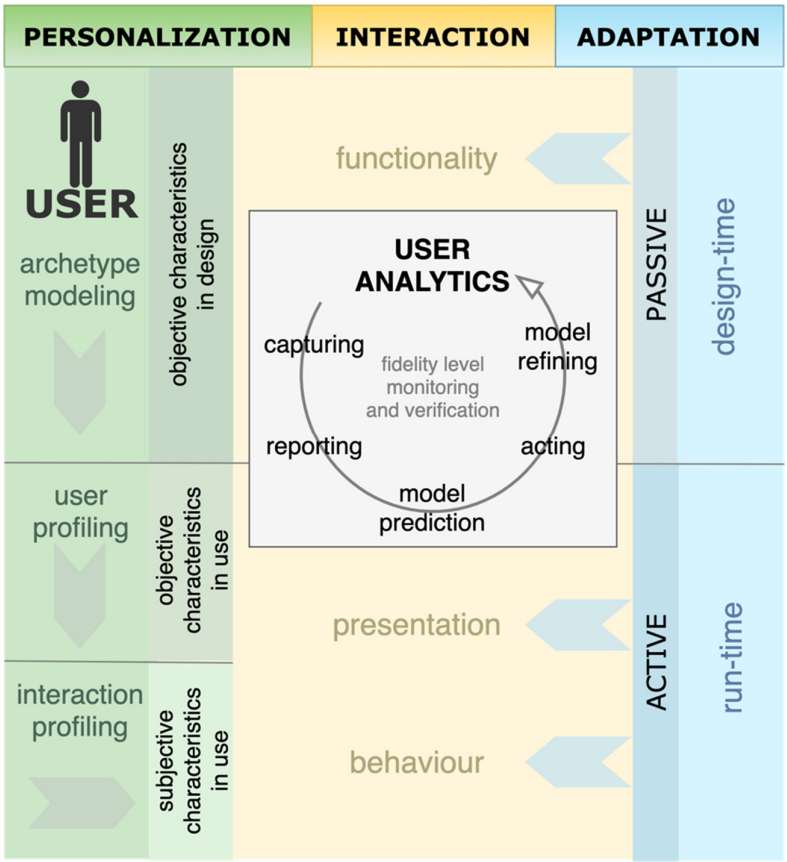

Fig.3. The model of UA process for interaction personalization and adaptation

The user profiling refers to the objective characteristics in use. The analytics should be conducted in the real-time and the patterns need to be constantly verified. The application analytics uses historical or real-time data to adjust its behaviour in order to offer the best-known recommendations, tailored to the current situation of a particular user (Niesler i Niesler, 2019). The next stage of analytics is reporting on extracted and verified patterns, trends, and especially exceptions. The user can follow or reject recommendation. It requires the ability for a user to explicitly influence the system's adaptive behaviour, which can be done by observing common interface elements like undo button or hotkey (Schmidmaier, Han, Weber, Liu, & Hußmann, 2019).

For the presentation and behaviour adaptation, based on the results of statistical regression data for trends and machine learning, the UA provides models and patterns prediction. Especially for the interaction profiling, which determines subjective characteristics in use. The adaptive system behaviour can be a recommendation to a user or the automated changes in the interaction (the acting stage of UA), then the user's reaction is being analysed, and further actions can be predicted. The analysis is the most dynamic at this stage, because many errors and miscalculations may occur and frequent models and patterns assessment is required. Moreover, the subjective parameters are difficult to identify, because of the external interferences, which may disrupt the true value. The area of the interaction patterns mostly depends on the affective factors and it's hard to predict. There is a necessity of collecting a large amount of data for proper patterns creating and further predictions of possible behaviour. It leads to the models and patterns refining for the next round of analysis.

The crucial element of the analytical process, which is different from the traditional data analytics cycle, is the module for fidelity level monitoring and verification. It is being conducted on every step in the analytical process. It checks the probability of natural pattern change, as a part of evolution, based on similarity to previous instances and the deviation from the potential growth curve. In case of intelligent tutoring systems, it would be a learning curve for the particular learner in the specific area in the learning course or program. It means that a system has to be alert to any changes in the model variables, and user's behaviour. Each model needs to be validated for credibility, before moving to the next stage of analytics.

The main problem is satisfying and fulfilling user's emotional needs (according to *Kansei* design), and especially translating it into the product design variables, for the neural network algorithmic (Guo, Qing-Xing Qu, Chen, Ding i Liu, 2015). Apart from many issues on the cognitive and technological level to solve, there are still the organizational and conceptual problems in the approach to the adaptive design. Therefore, we need to take a closer look to the user-centred design paradigm.

User-tailored design

User-centred design has given plethora of guidelines and techniques to focus on user's needs in creating usable products. The appearance of User Experience concept has extended usability to satisfaction and positive reception. Nevertheless, the advancement in technology and its coexistence with humans in everyday life induced the necessity of the products to be more personalized and adaptive. Hence the design paradigm needs revaluation and extension both in the approach and methodology into user-tailored design (UTD).

The most common technique for representing user's preferences in UX design is creating personas. "Persona" derived from Latin, and also from the Greek word "prosopon", meaning theatrical mask, understood as an object not 'necessarily modelled on truth, but being a form of presentation and performance for certain effect' (Marshall i Barbour, 2015). Following that lead, personas represent the vision of the developer or designer, but not the actual, individual preferences and characteristics of particular user. By using User Analytics, we should provide the user-tailored interaction, which operates on a living organism of the user, in the real-time analysis and adaptation.

The basis for user-tailored systems is highly advanced adaptation. In contrast to UCD, user-tailored approach is rather a design on meta-level, not for a particular customer, but rather focused on problem domain and purpose of an application. It is more suitable for wider range of recipients, just like mobile applications. So the design process should be conducted that way. However it does not exclude the UCD agile techniques, but needs focusing on pre-design research, and then on the creating patterns, by analysing data just as they occur. Nevertheless, the foundation of UCD is crucial and sets the direction for further research. The user-centred design is set by the following general principles (Case, 2013) (Gulliksen, et al., 2010):

- Focus on a user and their goals of the activity should guide the early development;
- The involvement of representative users throughout the product lifecycle;
- Evolutionary systems development – iterative and incremental product development;

- Simple design representations dedicated to users and stakeholders;
- Prototyping – early and continuous prototyping in cooperation with end users;
- Usability goals and design criteria to control development;
- Explicit and conscious design activities – design directly related to user interface;
- Multidisciplinary design teams;
- Usability experts should be involved throughout the design process;
- Holistic, inclusive design – all future use aspects to be developed in parallel;
- Processes customization – adaptation UCD to local conditions;
- Establishing a user-centred attitude throughout the project team and client.

The main elements of the user-centred design include observation, including creating personas and scenarios, prototyping and testing. Fig. 4 presents comparison for the UCD and user-tailored design approach.

Standard elements of user-centred design	USER-CENTRED DESIGN (UCD)	USER-TAILORED DESIGN (UTD)
FOCUS	impact put on the interface (interaction) design	impact put on analytics and adaptation
OBSERVATION	analysing user's task as a part of design process	pre-design research (interdisciplinary approach)
PERSONAS	examples of potential users; applied objective characteristics in design and in use	mental models and patterns of personality types; applied subjective characteristics in use
SCENARIOS	scenarios related to personas	scenarios related to analytical adaptation process
PROTOTYPING	usually low fidelity prototyping for receiving the feedback from potential or dedicated end-user (cheaper, agile approach); dedicated to the users and takeholders	required high fidelity prototyping in order to to validate and verify the analytical process (expensive, rewearch approach) dedicated to designers and researchers
TESTING	iterative, engaging end-users in the design process	requirement of big data analytics to verify the patterns learning and prediction

Fig. 4: The comparison of UCD and UTD approach

There are some approaches that go beyond the standard UCD guidelines, especially since practicing UX design. Enriching the personas modelling with refining and validating persona and scenario assumptions, based on quantitative and qualitative user data (Coorevits, Shuurman, Oelbrandt, & Logghe, 2016), digital human modelling, manikin characters, inclusive design and human behaviour modelling (Case, 2013), is a significant support on different level of interaction design.

The user-tailored design requires advanced analytics, because it is mainly focused on identifying user's tacit needs. It means that the user themselves does not have sufficient knowledge about the human nature to propose the solutions by themselves. We can formulate main guidelines for the scope of user-tailored design for adaptive systems:

1. The foundation for design is human nature – trying not to guess who the user might be, but using experiential approach;
2. Being opened for every possibility in design, even the least probable, to design exceptions for machine learning;
3. Impact not put in the interface design, but on data processing design;

4. The interaction is a result of personalization and adaptation
5. The prototyping should rather be of high fidelity – not focused on display but correctness of predictions; checking the user's reactions to the aesthetics and layout is a secondary issue, and rather should be available for the passive adaptation – users can adjust the display freely, as they incline;
6. Testing, especially in the early stage of design process – for possible behaviours, on a very large group of users (to learn the system the probable patterns), and verifying accuracy of adaptation process – focused especially on the objective and subjective characteristics in use;
7. Mainly focus on active adaptation – probable situations not from scenarios and personas, but from the activity of a user (on research stage);
8. The designer cannot predict all the situations – the intelligent system adaptation should 'learn the user nature';
9. Necessity of AI application;
10. Providing the automated fidelity level verification.

There is a necessity of combining tools and methods for more comprehensive outcome. The level and complexity of applying analytics depends on the purpose of the application.

Discussion and further research

Applying User Analytics requires comprehensive approach and inclusive design in the user-tailored paradigm. The concept of inclusive design is based on the convincement that humans are naturally very diverse. That wide scope brings some restrictions to the UCD products, such as the lack of awareness of universal design and especially the lack of knowledge about user needs among the designers. (Abascal & Azevedo, 2007). Nevertheless, providing universal, comprehensive analysis for the inclusive design may bring ethical and social risks issue.

The subject of User Analytics, and the concept of UTD require solving many problems connected with ethical and practical issues, adaptation to direct and indirect users, and especially the problems concerning data acquiring, which correspond with tacit needs and subjective characteristics in use.

Many of the technological advancement may work to the advantage of solving some problems in the UA area. For example the eye tracking technology can be used to collect objective data for user experience on smartphone application, which should reduce the bias in subjective questionnaire-based measure of user experience and could be used to detect weights for design variables for user interface design (Qu QX, Zhang, Chao WY i Duffy, 2019).

Conclusion

In the presented paper the theoretical concept of a practical problem has been proposed. In current times of technology development we can see the necessity of more adaptable products. It cannot be done without advanced analytics and the paradigm change to the user-tailored design. The comprehensive approach requires wider, interdisciplinary research for inclusive design.

There are still some barriers on business and technological level. For now the application of UA for application adaptability is possible in health and education. *MHealth* may apply advanced analytics for adapting the monitoring and treatment for special user's needs, and even a consideration of empathy throughout the re-design process, enabled through a contextual understanding of users, their needs, and their environment (Farao, et al., 2020).The application of UA in intelligent predisposition-based tutoring systems derives from the differences in human nature, character and individual predisposition for learning, which imply what sort of teaching method should be applied towards a particular human being. Leveraging the adaptation to user's needs, the meta-learning analytics with predisposition-oriented approach, can be more effective than the traditional tutoring (Niesler & Wydmuch, 2008) (Niesler & Niesler, 2020).

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The Future of Big Data Storage with Synthetic DNA

Manar SAIS
Laboratory of Computer Science Research, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
E-mail: manar.sais1996@gmail.com

Najat RAFALIA
Laboratory of Computer Science Research, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
E-mail : arafalia@yahoo.com

Jaafar ABOUCHABAKA
Laboratory of Computer Science Research, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco
E-mail: abouchabaka3@yahoo.fr

Abstract

The total amount of data produced in the world is growing at a very fast rate, however, the increase in data storage capacity and the revolution in storage support is much slower than that of data generation. How to store, archive and process such a large amount of data becomes a critical and difficult challenge. Researchers believe that they have found a solution to this problem by analyzing the chemical processes that occur in the body of animals and also in plants. Among these processes, animal and plant cells can store or exchange data from one cell to another systematically, and the storage process happens in each cell using a molecule called deoxyribonucleic acid (DNA). The storage capacity of synthetic deoxyribonucleic acid (DNA) make it one of the promising candidates for archival storage systems. In addition, the high density, large capacity and long-term stability of DNA molecules make them an emerging storage medium particularly suitable for long-term storage of large data sets. In this paper we present the technology of DNA storage which aims to optimize the storage of masses of data or what we call Big data. We study its storage capacity when it comes to a huge amount of data as well as its operating principle and its added values compared to available technologies.

Keywords: Storage, Big Data, Chemical processes, DNA

Introduction

The World Wide Web presented by (Berners-Lee, et al., 1994) has transformed the way of creating and sharing information between human beings and breaking down all cultural barriers. Several emerging communication technologies (e.g. 5G and Internet of Things) have enabled seamless connectivity and new applications. As a result, the increase and explosion in the amount of data generated and stored has led to new challenges in data storage technologies. Currently, all of this generated data is stored in large data centers, which has resulted in significant investments in cloud services and infrastructure (Miller, 2013). In addition, traditional storage methods face major challenges in storing and processing massive amounts of data. In order to solve these problems and satisfy the demand for storing massive amounts of data, a promising approach has emerged which consists of storing the data in deoxyribonucleic acid (DNA). DNA as a storage medium has become an attractive choice due to its high spatial density and long durability.

(Davis, 1996) mentioned that the idea of storing data in synthetic DNA strands (sequences) has been around since 1988 and research into DNA-based data storage has grown rapidly in recent years with the development of technology. of DNA synthesis and sequencing. DNA storage has some competing advantages such as long durability, extremely high density and low power consumption.

Deoxyribonucleic acid (DNA) naturally contains the genetic program for the biological development of life. Fundamentally, DNA can also be used as a compact storage medium for petabytes of encoded information. The potential benefits of DNA storage include: stability at moderate temperatures, biological replication, research and biological indexing, and extremely high density beyond the order of terabytes in 1 gram of DNA.

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The article is organized as follows; we first briefly present DNA storage technology as a future solution to Big Data storage problems. The second part is intended to describe the important steps in the storage process that allow the conversion of digital data into genetic data, i.e. synthesis and sequencing operations. The last part is devoted to the benefits of DNA storage technology, which demonstrates the incredible storage capacity of thousands of gigabytes in a totally reliable way and can be a solution to store as much data as possible in a minimal space. Without forgetting the important challenges that prevent the spread of DNA technology, namely the high cost of DNA synthesis and the problem of rapid access.

Overview and research history of DNA storage

In 1974, (Watson & Crick, 1974) published one of the most fundamental articles in the history of biology in Nature, revealing the structure of DNA molecules as a carrier of genetic information. Since then, people have realized that biological genetic information is stored in a linear sequence of four bases in DNA. In just a decade, (Dong, et al., 2020) have proposed the concept of storing specific information in DNA. However, the concept was not realized because DNA synthesis and sequencing technology is still in its infancy.

In 1988, the artist (Davis, 1996) made the first tried to build a real DNA storage. He converted the pixel information from a "Microvenus" image into a 0-1 sequence arranged in 5 × 7 matrixes, where 1 represents a dark pixel and 0 represents a bright pixel. This information is then encoded in a DNA molecule of 28 pairs of bases (bp) long and inserted into E. coli. After restoration by DNA sequencing, the original image was successfully restored. In 1999, (Clelland, 1999) proposed to use a method based on "DNA micro-points," such as steganography, to store information in DNA molecules .Two years later, and in a similar way to coding amino acid sequences in DNA, (Bancroft, et al., 2001) proposed using DNA bases to directly encode English letters. (Dong, et al., 2020)

Church et al. managed to store up to 659KB of data in the DNA molecule, and the maximum amount of data stored before this work was less than 1KB. Goldman Sachs et al. are able to store even more, reaching 739KB. It should be noted that the data stored in both studies contain not only text, but also images, sounds, PDF files, etc., confirming that DNA can store a variety of data types.

The miracle solution to the data storage problem: synthetic DNA

(Vladek, 2019) mentioned that the production of data exceeds our current storage capacities, this is indeed a problem. So, in an effort to find a solution to this problem, researchers are experimenting with alternative storage methods such as DNA. It turns out that storing data in the form of DNA is something that has been known to do for several years. The problem was how to do it. Indeed, until now, the task was done by hand. But that's where Microsoft and the University of Washington come in. The American firm reveals to us that it has succeeded in automating the process.

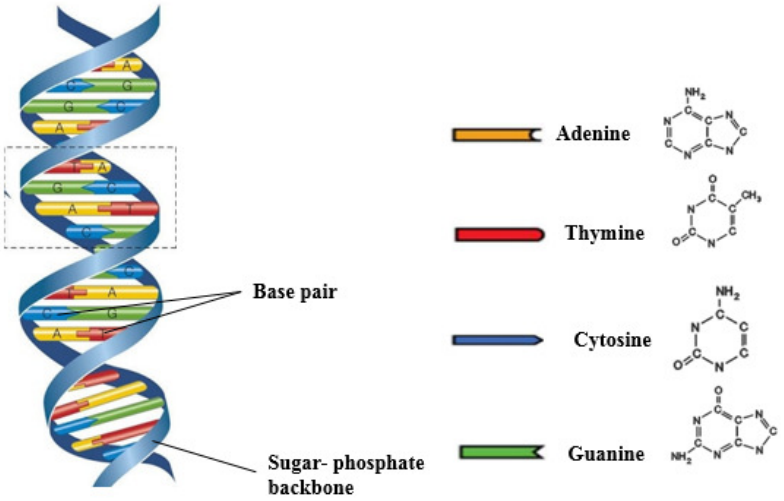

Fig. 1: Nucleotides of DNA

The DNA Data Storage Technology in a Nutshell

(Bastien, 2019) presented the acronym DNA stands for Deoxyribonucleic Acid. It is a substance molecule found in the cells of all the living beings and which stores all genetic information. DNA contains tens of thousands of genes

designed to determine each of our characteristics, from our physical appearance to our personality. Thus, DNA is the natural equivalent of hard drives and other storage media. This is the reason why several researchers plan to store digital data there.

The principle of DNA storage is to encode binary data in DNA. For this, the individual bits (binary digits) are converted from 1 and 0 to the letters A, C, G and T. These letters represent the four main components of DNA: adenine, cytosine, guanine and thymine.

Modern DNA synthesizers can concatenate the four DNA-based nucleotides to form arbitrary-chain molecules of molecules. Each nucleotide (nt) in such a chain called oligo is considered to represent in principle 2 bits of digital data. Thus, the digital data can be stored in oligos, and even the stored data can be retrieved by reading the data representing oligos with DNA sequencers (Takahashi, et al., 2019)

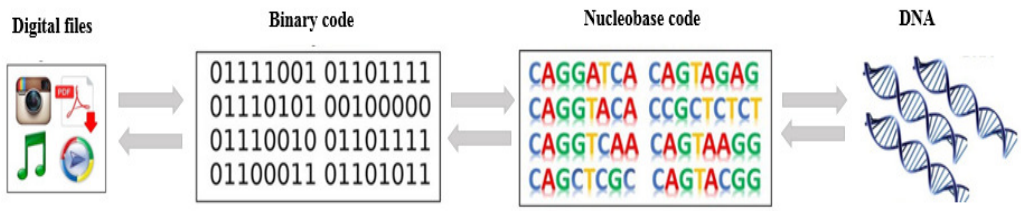

Fig 2. DNA-based data storage

Steps of DNA storage

In this section, we present the basic steps to store and retrieve digital data to and from DNA storage.

In DNA, nucleotides are the small molecules that are fundamental building blocks of DNA. There are four types of nucleotides: adenine (A), cytosine (C), guanine (G) and thymine (T). The DNA strand is a DNA sequence of several nucleotides. Each DNA nucleotide (nt) refers to a 'base pair (bp)'. (Malithi, et al., 2020) presented the process of storing digital data in DNA is normally stored in binary forms. This means that we store the data with zeros and ones. The data on the hard drive is one and zeros, but DNA is made up of four basic components (A, C, G, T) instead of binary. Data can store in pairs instead of storing each 0 or 1 individually. As examples:

00 -> A

01 -> G

10 -> C

11 -> T

Once you have it, you can encrypt the data with artificial DNA.

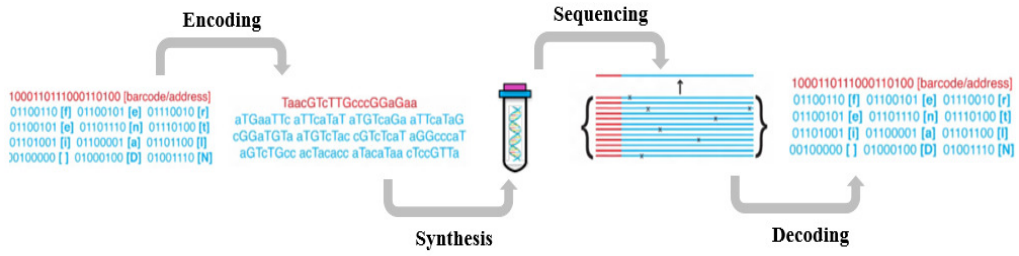

Figure 3: Basic steps of DNA storage

DNA synthesis (writing)

The first step in storing digital data in DNA is called encoding, it consists of transforming digital data into DNA sequences. A program matches binary data to bases A, T, C, and G of DNA. Then this information travels to a machine

that synthesizes the DNA. When DNA is synthesized, it attaches to the surface of a solid support, so the next step is to use a solvent to rinse that surface. The solvent picks up the DNA and it ends up in a bottle containing a special liquid. (Vladek, 2019)

Theoretically, we can encode two digital bits per one nucleotide by the Quaternary system. We refer to the number of bits per base pair as encoding density. Due to the biochemical limitation and internal indexing overhead (i.e., offset and length), most existing works have the encoding densities smaller than 2.

Synthetic DNA strands can be stored in a single isolated pool, and the pool contains many different strands of DNA. In order to obtain random access from different strands of DNA in the pool, each strand of DNA must begin and end with primers to achieve the goal of Polymerase Chain Reaction (PCR (Bartlett & Stirling, 2003)). Use this pair of primers to copy the target DNA strand. The primers are short sequences of nucleic acids that provide a starting point and a final point for DNA synthesis. Usually, the length of the primer is between 18 and 25 bps.

DNA sequencing (reading)

We assume that the data has been synthesized and stored in a single pool/isolated DNA tube, which means that millions of different DNA strands are mixed into a single tube. The figure below shows the detailed process of sequencing DNA storage. To read the targeted DNA strands (the DNA strands synthesized with the same pair of primers), the first step is to extract a droplet from the DNA tube to amplify the target DNA strand by PCR. During PCR, a specific pair of primers is required as input, and the pair of primers is used to replicate the DNA strand. Usually, the PCR process takes several cycles to accumulate enough target DNA strands. After that, the DNA strand samples are sent to the sequencer for the sequencing process.

These sequenced DNA strands are then decoded in the original numerical data. During decoding, ECC (Error Correction Codes) codes are essential to ensure data integrity, as the sequencing process is also prone to errors. Finally, the internal index in the DNA strands will help identify the targeted DNA strands. In general, in ECC, the more redundancy there is, the more tolerant it will be to error. In a research study by (Li, et al., 2020) there are two approaches to adding redundancy for error correction purposes. One is to add ECC to a strand of DNA, and the other is, like the Redundant Array of Independent Disks (RAID) system, to store redundant data on DNA strands. Both achieve the same goal of recovering from errors in DNA strands.

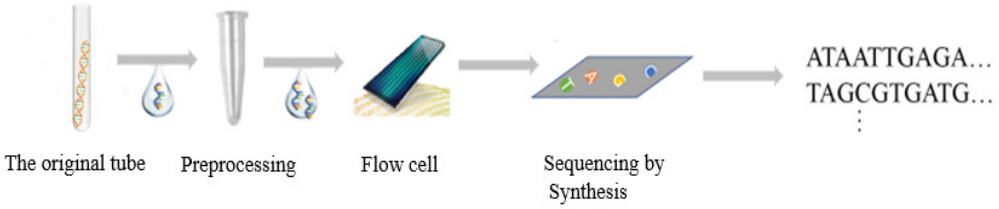

Fig. 4: Detailed sequencing process.

A system design for DNA storage

The end-to-end system for DNA storage begins with bits of information (such as video files), which are coded, synthesized and stored in several strands of DNA oligonucleotides. The DNA strand must be sequenced, assembled and decoded to reconstruct the original source reliably. Figure 5 shows the full storage cycle. (Goela & Bolot, 2016) presented the system design for DNA storage includes the following components:

1. Data sources in pieces;
2. Encoding mechanism including all error correction codes and modulation from bits to nucleotides;
3. Synthesis of DNA from several strands of DNA;
4. PCR amplification of DNA pools;
5. DNA archival storage;
6. DNA sequencing;
7. Merging and assembling multiple DNA strands;
8. Demodulation and decoding of all codes for reliable recovery.

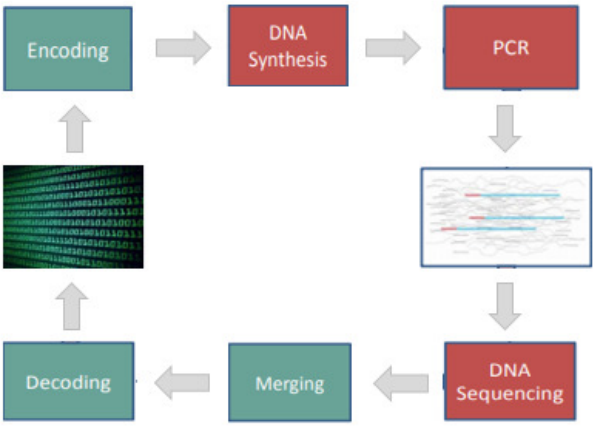

Fig 5. Block diagram of a DNA storage system

1. The advantages and challenges of DNA data storage medium

As mentioned above, global data is increasing exponentially. Traditional media cannot fully respond to Big Data's storage demand (De Silva & Ganegoda, 2016). DNA has potential benefits such as high density, high replication efficiency, long-term durability and long-term stability, so it can be used as a medium for digital data storage.

DNA at its theoretical maximum capacity, each nucleotide can encode about 2 bits. The entire data center created by IBM in 2011 has a data storage capacity of about 100 Po. However, because of its high density, DNA used as a data storage medium can store a large amount of data in a small size. The theoretical maximum of one gram of DNA can store about 200 Po of data, almost double that of the entire IBM data center (Akram, et al., 2018). In other words, (Sun, et al., 2019) are discovered that all the information stored in the world can be stored with a few kilograms of DNA, which is equivalent to a shoebox compared to the requirement of millions of large data storage centers for traditional media.

(Carroll, 2020) confirm that Digital storage media will soon become obsolete. The various storage media we know: floppy disks, CDs, DVDs, portable hard drives, USB sticks and cloud storage all have a limited lifespan. However, as long as there is biology and biologists, there will be people who will read genetic data.

The data-coded DNA medium is capable of long-term storage because of its high stability. DNA can survive for thousands of years in cold, dry and dark places. Even in a poorer environment, DNA has a half-life of up to a hundred years. DNA can remain stable at low or high temperatures, over a wide range of -800 to 800 degrees Celsius. DNA support can also protect data to a greater extent than traditional digital storage media. Although the amount of new data is increasing exponentially, most of it is archived for long-term preservation. This cold data will not be retrieved immediately or used frequently. Therefore, storing them on DNA media is simple, convenient and free (Sun, et al., 2019). Another advantage is that DNA is highly preserved. Natural DNA can replicate accurately with great efficiency and always with the basic principle of pairing (A with T, C with G). In this way, DNA support can strongly maintain data fidelity for a long time.

However, at present, the following disadvantages prevent widespread DNA implementation:

Based on its unique characteristics and compared to traditional media, DNA can be a potential and promising medium for digital data storage. However, there is still a long way to go before DNA is commercially available. The challenges we face exist in a variety of ways, including high cost, low throughput, limited access to data storage, DNA fragments of short synthetic trace, error rate in synthesis and sequencing.

(Monique, 2017) noted that the main disadvantage of DNA storage is that reading and writing DNA are fairly slow processes compared to other forms of data storage, and may not be appropriate when information is needed quickly. DNA storage can work best for archiving purposes. Storing genetic data is also more expensive than storing it on hard drives. The more you want your DNA to exist, the higher the cost.

Conclusion

Over the past ten years, technology has greatly developed and revolutionized society. Sometimes technological advances trigger the need to update existing tools. For Big Data, one of the obvious consequences is the need for new storage devices to adapt to data trends.

Synthetic DNA is an excellent choice for solving big data storage problems and becoming an urgent long-term storage medium for valuable digital data. If DNA molecules are stored in a dry, cold and dark environment, they must be strong enough to maintain integrity for at least thousands of years without the high cost of data migration such as data technology. In addition, DNA is tolerant of failures, it can keep two copies of the data to use one of the copies after the data is lost. In addition, DNA is a small and secure storage medium, it can store masses of data in a very small size and use secure methods to keep data away from unauthorized parts. Therefore, using these policies, the data can be provided as secure packaged data. Similarly, DNA can read files in parallel and at the same time. When encoding the data, and in all cases of error, the error is limited to this file and will not affect the remaining files. Therefore, this technique can be used for all types of files by making minor changes tailored to file types. In addition, these technologies can be used to store large amounts of data in a very small space with computational overload. Other strong arguments in favor of using DNA molecules to store digital data are that the possible storage density is about 5 PB per gram, DNA molecules can be easily copied at any time, and that there is in fact no risk of format obsolescence.

In this paper, we discussed DNA storage technology, namely the coding and decoding steps, its large storage capacity compared to traditional technologies, and the advantages and challenges of this biological storage model.

Discussion Topics

We have arrived at the end of this work but we cannot conclude without giving a glimpse of the future and an idea about new research. Researchers in chemistry, biochemistry and computer science at the University of Ghent, Belgium, have developed a revolutionary new data storage technique inspired by the idea of genetic storage of information. Powdered data storage could become a viable alternative and a more environmentally friendly technology.

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The Impact of International Rankings on Students' Decision To Choose A University

Roxana - Adriana PUIU (MECHNO)

University POLITEHNICA of Bucharest, Bucharest, Romania, mechnoroxana@yahoo.com

Gabriel PETREA

University POLITEHNICA of Bucharest, Bucharest, Romania, gabriel.petrea@upb.ro

Diana SCURTU

University POLITEHNICA of Bucharest, Romania, diana_scurtu@yahoo.com

Maria – Nicoleta CRISTEA

University POLITEHNICA of Bucharest, Romania, maria.cristea@upb.ro

Remus – Andrei DOBRINOIU

University POLITEHNICA of Bucharest, Romania,

Abstract

Rankings play an important role for any potential student who chooses a university. Given that, more and more young people are interested in investing in their education, wanting to pursue a rigorous specialization, being important to consider how students choose which university they will attend. Thus, not only students use international rankings, universities are showing a greater dependence on them. Thereby, in recent years there has been an increase in the interest of higher education institutions around the world, to be classified in international rankings.
Through this paper we aim to identify the impact that international rankings have on students' decision to choose a university. At the same time, we aim to identify the ways in which universities try to differentiate themselves in order to be as attractive as possible among students. Withal, we will detail the factors that influence the choice made by students. Finally, we will focus on the future perspective of performing a mathematical modelling to identify the share of influence of these factors on students' decisions for choosing the university.

Keywords: ranking, international, higher education, research, students

Introduction

Worldwide, interest for university rankings emerged in 2013, with the publication of the first editions of ARWU (Academic Ranking of World Universities) by Prof. Nian Cai Liu (Shanghai Jiao Tong University). This ranking is the result of the policy initiated by Jian Zemin in 1998, with the aim of propelling China among the major research players globally, by creating "world class universities" comparable to the best Western universities. The larger interest for this ranking has led to new global rankings, as well as the initiation in some countries (France, South Korea, Taiwan, India, etc.) of funding programs to stimulate the positioning of some universities among those of "world class" type.

A consequence of growing interest for university rankings at global level, is also given by the attention shown, including at government level, but also by the debate on the objectives to be pursued by education and research policies. Two visions can be identified here: "world class universities" or "word class systems"? Globally, it is noted that some negative effects generated by the concentration in some countries of the first option policies (the decline for the interest of academics in teaching, the encouragement of layering in university systems – generating social inequalities, the lower interest for social sciences and humanities, etc.). Simon Marginson, from Oxford University, notes that the transition in the second plan of teaching - learning process leads to an increase in the mass of those who form a low-quality academic system. For this reason, the UK government has created a „teaching excellence framework" which aims to improve the quality of education. The stratification of universities, with some being accepted in rankings as "world class universities", is stimulated by competition in the allocation of research funds.

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In Romania, as of mid-2017, the ARUT Consortium (Romanian Alliance of Technical Universities) has been established, which aims the following aspects:

- Most of the rankings monitor a relatively small number of universities, those in Romania due to their presence in them especially by their size, the productivity per capita of our top 10 universities being relatively close;
- Critics of ranking systems argue, both in terms of content (unidimensionality, neglect of input-output structures of universities, etc.), and in terms of methodology (statistical robustness, elitism, dependence on the size of the institution, an attempt to impose a certain view of the role of universities, etc.);
- The allocation of resources on the basic of these is at least questionable decision, the priorities of the development are not automatically resolved by such a policy.

International Rankings

Currently, there are more than 20 international rankings worldwide. In order to have a comprehensive picture of university academic performance, we considered that a complex analysis of the most relevant such rankings is needed. Below we will present a list of the 11 international rankings that will be analysed below:

1. ARWU (Academic Ranking of World Universities - http://www.shanghairanking.com);
2. NTU Ranking (National Taiwan University Ranking – http://nturanking.lis.ntu.edu.tw);
3. THE (Times Higher Education World University Rankings - https://www.timeshighereducation.com/, UK);
4. CWTS Leiden Ranking (www.leidenranking.com, Holland, CWTS also involved in U-Multirank);
5. QS World University Rankings (https://www.topuniversities.com/university-rankings, UK);
6. URAP (University Ranking by Academic Performance, http://www.urapcenter.org/2018/, Turkey);
7. SIR (SCImago Institutions Rankings, https://www.scimagoir.com/, Spain);
8. CWUR (Center for World University Rankings, https://cwur.org/, Emirates);
9. US News Best Global University Ranking (https://www.usnews.com/education/best-global-universities);
10. U-MULTIRANK (https://www.umultirank.org/, UE);
11. Google Scholar Citations (https://scholar.google.com/).

The indicators used to make the rankings and their weighting in the total score, differ from one ranking to another. Overall, they can be grouped in 4 fields of analysis: Learning environment, Quality of research, Transfer of knowledge and International orientation (including societal impact). Another important aspect to consider, as regards the assessment of the relevance of rankings, is related to the weight of indicators that depend on the size of the university, relative to those that are oriented at the performances per capita (per total academic staff, per number of students, etc.).

Table 1 presents the main performance indicators and their weighting over the fields of analysis, for the 11 rankings mentioned above.

Table 1: Performance indicators

Ranking	Learning environment	%	Research	%	Knowledge transfer	%	International orientation and societal impact	%
ARWU (Shanghai ranking)	- Nobel Prizes and equivalent; medals obtained by graduates; - Academic performance per capita;	**20**	- Teachers/researchers with Nobel prizes or equivalent medals by field; - Researchers with large numbers of citation; - Production of research;	**80**	-		-	
NTU (Taiwan)	-		- Research productivity; - Research impact; - Research excellence;	**100**	-		-	
CWTS Leiden (Holland)	-		- Publications in the most cited journals;	**25**	- The number and proportion of articles produced in collaboration with industry;	**25**	- International collaboration; - Gender diversity;	**50**
QS (GB)	- Reputation of graduates; - Total students/teachers' ratio; - Employer reputation;	**70**	- Research productivity; - Total number of citations; - Impact of the publications;	**20**	-		- International student ratio;	**10**
SCImago IR (Spain)	-		- Normalized impact; - High quality publications; - Excellence with leadership; - International collaboration; - Open access;	**50**	- Innovative knowledge; - Patents; - Technological impact;	**30**	- Altmetrics; - Inbound links; - Web size;	**20**
URAP (Turkey)	-		- Total number of articles; - Total citations of the articles published in a period of 4 years; - Total impact of articles; - Total impact of citations;	**85**	-		- International collaboration;	**15**
US News (USA)	-		- Global research reputation; - Normalized citation impact; - Conferences; - Books and publications; - Number of publications that are among the 10% most cited; - Percentage of total publications that are among the 10% most cited;	**90**	-		- International collaboration – relative to country; - International collaboration;	**10**
THE (GB)	- Reputation survey; - Staff-to-student ratio; - Doctorate-to-bachelor's ratio; - Doctorates-awarded-to-academic-staff ratio; - Institutional income;	**30**	- Reputation survey; - Research income; - Research productivity; - Citation (research influence);	**60**	- Industry income;	**5**	- Proportion of international students; - Proportion of international staff; - International collaboration;	**7,5**
UMultirank (EU)	- BA and MA graduation rate - Graduates in normative time - Relative BA and MA graduate unemployment - Innovative forms of teaching and assessment; - Student / staff ratio;	**25**	- External research income; - Research publications (absolute numbers); - Citation rate; - Top cited papers; - Interdisciplinary publications;	**25**	- Income from private sources; - Co-publications with industrial partners; - Publications cited in patents;	**25**	- Opportunities to study abroad; - Student mobility; - International joint publications; - International orientation of bachelor and master programmes;	**25**
CWUR (Emirates)	- Quality of education (awards, distinctions, international medals); - Alumni employment (executive positions); - Faculty members with academic distinctions;	**60**	- Total number of research papers; - Highly-quality publications; - Highly-cited research papers; - Influence of research;	**40**	-		-	
Google Scholar (USA)	-		- Highly-cited research papers of institution; - Performance of the top 10 ranked public profiles;	**100**	-		-	

The question is, in fact, why do we need these rankings? Why do most universities want to join as many such rankings as possible and get the best position in it?

The answer is a very simple one, namely, to increase the prestige of the university. What does this mean? The prestige of the university attracts as many high school students as possible, those who are the future students of the university.

What are universities doing to attract future students?

One of the priorities of any university, in line with its objectives, is to promote the educational offer among the general public, in order to attract as many talented high school students (future students) as possible, including from abroad. The aim is to increase the prestige, visibility and attractiveness of a higher education institution. Among the actions taken by universities to attract future students, the following can be listed:

1. Diversification of specializations

From the exact sciences, such as mathematics, physics, chemistry, to humanities, letters, history, sociology, etc., universities are increasingly seeking to expand their portfolio. The information is often found on university websites or on websites specifically dedicated to them.

2. Weekly newsletters

Another way to attract students is by making weekly newsletters. Therefore, universities transmit everything that happens within all faculties, both internally and internationally. They can include information on conferences, special events for students and high school students, admission, scientific communication sessions, special scholarships, competitions and conditions for participation, opportunities, workshops, etc.

3. Career fairs and internships

One of the most common ways to attract students is to organize career fairs and internships frequently. Their aim is to help students to fit more easily into the labour market. Each faculty has partnerships with different companies, which offer internship programs to all those interested, but at the same time also offers the freedom to choose from the existing offer on the market, as long as the specific of the studies program is respected.

4. Scholarships for exchanges of experience

They are found in most higher education institutions and offer students the opportunity to attend abroad courses, similar to those of the university they attend in the country, for a certain period of time. Thus, they gain international experience, practice a different education system and develop additional skills.

5. Attracting foreign students

Similar to students of the country who have the possibility to study abroad, for a certain period of time, foreign students can benefit from the same opportunity in our country. In addition to the Erasmus programs, they can also choose full study at a university as long as they take training courses in the language of that country, which take place before the actual studies begins. Therefore, foreign students are helped to integrate more easily, and the participation at courses will be facilitated.

6. The prestige of the university

As mentioned above, one of the most important criteria for increasing the prestige of a university, can be to occupy the highest position in the international rankings.
But is it enough that only the university should take certain steps to attract its future students?
In the following, the main factors influencing the student's decision will be presented as regards the choice of the university to follow.

How do students choose the faculty they want to follow?

In October 2020, the Romanian Centre for Urban and Regional Sociology (CURS) conducted a national opinion poll, in which it tried to identify the main decision-makers in choosing a university.

The sampling universe of the survey was based on stakeholders from pre-university education, namely: students, high-school students and teachers. The sample volume was 1.068 respondents. The sample type was probabilistic, multistage and stratified. The maximum margin of error across the entire sample was +/- 3%, at a 95% confidence level. The sample was validated based on the latest data from the National Institute of Statistics (INS) and the Education and Research Ministry (MEC) from Romania.

As shown in Figure 1, on the question „What are the main reasons why you would choose or recommend a form of study”, almost half of the respondents (42%) mentioned that "they have heard from others/knowns". Weighted by 36%, the following answer was "I studied/study there". "The quality", or as we call it in this article, the prestige of the institution, is the response provided by only 29% of respondents. At the opposite side, 10% and 9% are „good teachers” and „good students/graduates” respectively.

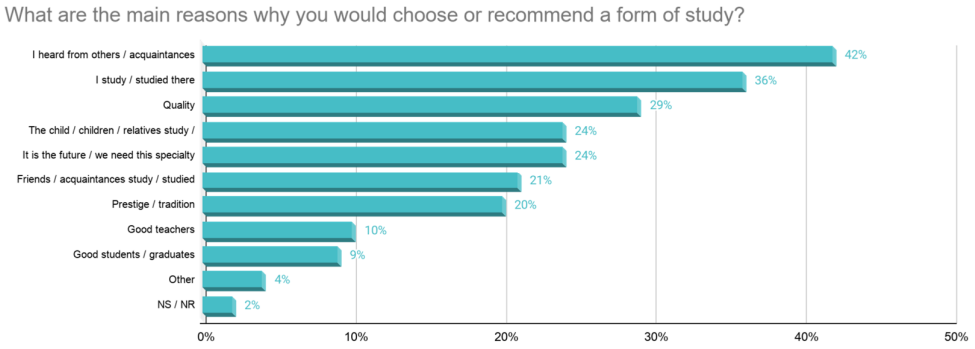

Figure 1

Another question answered by the 1,068 respondents was „Which people would you ask for advice on how to choose a form of education?". With almost similar weights of 38% and respectively 35%, responses were chosen, such as „knowns" and „friends". Other answers provided by survey participants were: „No one, I would choose what I want" – 26%, „teachers" – 24% and „parents" – 21%, and only 3% of respondents chose not to answer this question (Figure 2).

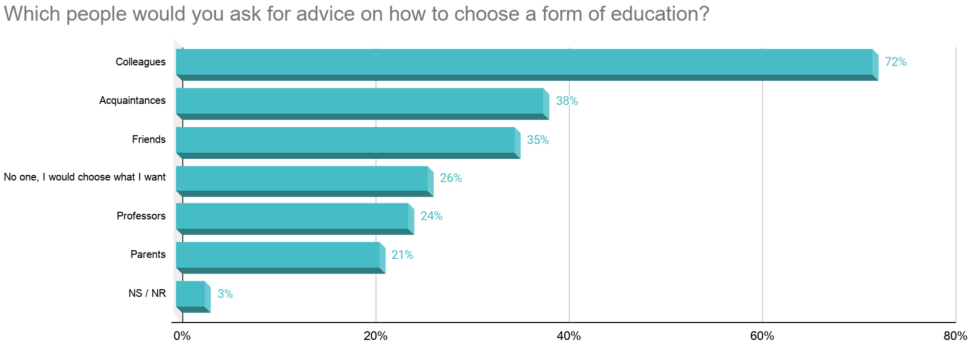

Figure 2

As can be seen from the images presented above, it is to be noted that there are several influence factors in the choice of a university, each of which has its weight. However, none of these factors must be excluded.

Factors that may influence the student in choosing the university

Looking at the above, a number of factors can be drawn which may influence, to a greater or lesser extent, the choice of an educational establishment by a high-school student:

Influence of colleagues

Most of the time, colleagues are one of the most important factors that can influence the choice of a university by a high school student. Often, they tend to follow the same studies that their older colleagues have followed.

Influence of parents

Another quite important factor in influencing the student's decision to choose a certain university is represented by parents. Most of the time, parents are thinking about the future that the child will have after completing his studies. They can also influence the profile that the young man can follow: technical, human, etc. The influence can also refer to the fact that in some cases, parents can make the decision in place of the student as regards the chosen university. It is also parents who can direct their children to study abroad or in the country.

Influence of teachers

Teachers can be another factor of influence for high school students. The problem is when looking at the studies that teachers in the school environment have followed, which are often humanists. Here, the decision can only be influenced in one way.

Influence of friends

Sometimes, in the student's decision, they weigh a lot the opinions of those close to us, as well as are the information taken from the social media. It is natural for prospective students to listen to the views of others, but it is important that the decision is made, individually, by each person, because this decision will greatly influence their career.

The prestige of the university

The prestige of the university is a quite important factor by which a student's decision can be influenced when choosing the university, he wants to follow. The academic, scientific and professional prestige of a university should be an emblematic of higher education. The students pursue the outstanding professionalism of the teaching staff, in the professional quality of many graduates; in the recognition of that school as being included in the elite echelon of international academic education through international rankings.

The opportunities after completion of studies

The opportunities that universities offer to students, both during and after their studies, can be important when a student chooses the university they want to follow. In this case, the examples can be numerous, ranging from the endowment of the university, the accommodation of the students and the employment opportunities after the completion of their studies, through the partnerships that the universities have with the representatives of the economic environment.

The Own Persuasions

The most important decisions are their own decisions. Even if these decisions can have a certain impact on high school students, both positive and negative, they also give them a certain responsibility. The more indecisive a teenager is about choosing the field of study, the more tempted those around them are to intervene with suggestions. Most of the time, students are wondering if the decision taken is the right one. The answer is simple: When they choose correctly for themselves, they feel clarified, motivated, determined, and doubts disappear.

The strategy of universities to attract students.

So, for universities to attract as many students as possible, the solution proposed by this study is to develop a strategy in this regard, namely, a "Promotion Strategy among students":

- the university to present its educational offer, updated with new trends and connected to the increasingly technological future;
- the university must maintain a permanent link with the local, national and even international press, through which it can communicate scientific achievements and research;
- the university must maintain a permanent connection with high school teachers, both by involving them in the various events organized by the university, and by constantly sending newsletters on the achievements of the university;
- universities must ensure that students' parents know the opportunities that are offered to graduates: scholarships, good conditions for courses, research opportunities, partnerships with businesses, finding a stable and well-paid job after graduation education;
- perhaps the most important aspect, the university must get in touch with the student, from the beginning of the pre-university cycle by: involvement in various events for them, sending newsletters on the achievements of the university, guidance to a profession that he likes, in line with what happens in everyday life: programming, robot development, medical device development, artificial intelligence.

At the same time, universities should take account the prospects for the future of education. In a study conducted by the Competitiveness Initiative Company (INACO) in 2018, the following were stated: there are still over 750 million illiterates in the world (10% of the Earth's population does not know how to write, read, calculate) ; only 6.7% of the population graduated from a university; the global learning market is huge ($ 107 billion in 2016); 20% of the planet's workforce (mostly women) work in Education; in the basic education of reading, writing and arithmetic are added to

programming languages; the determination of the European Union to give free access to all scientific papers and patents is important; virtual reality becomes a school technology; Open University, from the famous Massachusetts Institute of Technology (MIT) offers 2300 different Internet courses (STEM); great professors (like Abshok Goel of the Georgia Institute of Technology) use robots as assistants; education is personalized, a curriculum for each student; 60% of the children of the current generation will have professions and trades that do not yet exist; 60% of Earth's children also have a computer in the classroom where they study.

An agenda for the future of education was also proposed, presented in Figure 3:

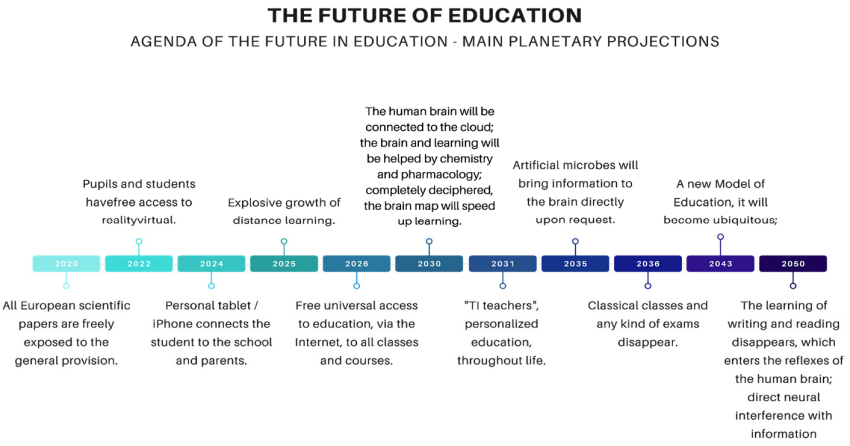

Figure 3: The agenda of the future in education

Future Perspectives

In the future, we aim to make a mathematical modelling to identify the share of influence of these factors on students' decisions in choosing the university. Basically, there will be a mathematical formula that will return a percentage, for each decision factor. Mathematical modelling will be useful to any university in implementing the "Strategy to promote the educational offer among students".

Conclusions

Based on the analysed data in this paper, the rankings significantly help to maintain and build the institutional position and reputation. The fact that a certain higher education institution ranks as well as possible improves the chances of representing a potential choice of students.

At the same time, rankings - whether national or international - clearly have an impact on public opinion, institutional decision-making and individual choices.

Given the importance of higher education for the development of human capital, its cost for public funding and for individuals and their families, and the needs of business and industry; more and more young people are focusing on higher education, while universities provide a greater importance to national and international rankings.

However, universities consider that a good positioning in these rankings implies a better visibility and a greater impact, but also allows the possibility to identify the institution status, the level of development in compared to other universities around the world. Thus, universities choose to take a series of measures to promote among students, as well as promoting the educational offer to the general public in order to increase the prestige, visibility and attractiveness. In this sense, they diversify their specializations, make weekly newsletters, organize career fairs and internships, offer scholarships for exchanges of experience, pay extra attention to foreign students and focus on improving the prestige of the university.

Regarding the students, their decision is influenced by colleagues, parents, professors, friends, the prestige of the university, the opportunities after graduation and, last but not least, by their own beliefs.

Therefore, this study proposes the development of a strategy in order to attract students, by promoting among them the educational offer, updated with new trends. However, universities should maintain a continuous contact with the press and high school teachers, both through their involvement in various events, and communicating scientific achievements and research conducted. Finally, universities should ensure that students' parents know the opportunities that it offers to graduates (study scholarships, good conditions for courses, research opportunities, etc.). They also should keep close contact with students, since the beginning of the pre-university cycle, by getting involved in various events for them, taking account the perspectives of the educational future.

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An Entrepreneurial Approach to Government Employee Family Welfare in Developing Countries
KPK (Pakistan) Police Employee Wellbeing
Gratifying the Distinguished Services of Police Employees

Rahatullah Muhammad Khan

Effat University – Jeddah – Saudi Arabia
mkhan@effatuniversity.edu.sa

Abstract

Developing countries like Pakistan face challenges of payment of sufficient benefits at the superannuation to their government employees. Anticipating this the employees resort to unfair practices in an endeavour to safeguard own and family's future post retirement. This paper identifies the problem and proposes a solution whereby the government has minimal resource investment and yet their employees and families can generate revenues on continual basis through productive family concept. The model is proposed for Khyber Pukhtoon Khwa (KPK) province police department initially and can be replicated for other government departments and countries. The concept can generate a number of jobs and raise the economic conditions at micro levels thus contributing nationally.

Keywords: Police Employee Wellbeing; Family Welfare; Entrepreneurship; Productive Families

Introduction

Homo sapiens are constantly involved in a struggle to achieve personal wellbeing. However, as the times passed the wellbeing landscape evolved as well and realizing the personal wellbeing became dependent on a number of factors. The economic wellbeing cannot be achieved unless the humans are physically and biological strong and able to perform tasks that can produce wealth. Moreover, the protection and security are required in order to achieve the social and psychological comfort and realize the personal comfort and wellbeing.

Every year hundreds of police force personnel die performing their routine daily life to protect, help and shield society from known and unknown dangers. More than 1400 brave police employees have laid their lives in last 10 years in KPK (Geo News 2018). This requires huge recognition and all steps should be taken to offer gratitude for their efforts and services rendered. Humans can act deviously when their wellbeing is not taken care of and yet it is expected of them to perform in scrupulous and dedicated manner.

The police forces around the world enjoy economic wellbeing and security during and after superannuation and can be related to people working in other fields and jobs (Sulaiman 2018). How can they are expected to work longer hours, earn comparatively less money, have huge powers and yet continually ponder on his/her family future during and post retirement. The police image is unjustifiably tarnished, efforts and services ignored and blamed for the debauched corrupt economic practices.

A department and its personnel can be held responsible and accountable if the welfare of the employee and his/her family, during service, post retirement and upon demise is ensured and secured. However, if the employee is unsure of their economic future, they will act opportunistically. Therefore, it is the responsibility of the state. Though, Pakistan which ranks 171 among 200 countries in GDP, PPP per person; according to ciafactbook (2020); its government may not be able to provide an answer.

A strategy is proposed to be implemented at the KPK police department through entrepreneurial initiatives for long term sustainable welfare.

Police Force of KPK and its Employee Welfare

The KPK province employs more than 83, 000 people. According to Pakistan Bureau of Statistics (2020) average household size in KPK is 6.31 persons. It will make more than 0.523 million people associated and requiring welfare programs every year. Similarly, if 3% of the employees retire; on same ratio it would mean 2490 retiring personnel *

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6.31 and that means more than 15,700 people looking for a means of income every year with very little regular income coming to the household. These are daunting numbers for an economically frail country and then even more for a shoddier province. The retirement benefits including the gratuity, provident fund etc. and the pension are also not enough to run a household with current inflation rates. This means a denial to a decent living.

Therefore, it warrants and requires an innovative approach to help the department realize welfare schemes for employees post retirement in particular and during the service in general. This will help release the stress and motivate the employees work more productively, transparently in just and fair manner because economic woes lead the humans to act unethically and compromise fairness.

Mehsud (2018) KPK police Recruitment Strategic & Implementation Plan 2018-2023 reveals core values but does not identify that it values "Employee welfare post retirement". The SWOT analysis in the plan reveals the threat of losing donors exist. This means the additional restraints and burdens may fall on the department in future. The department also has developed a commendable strategy in recent years for employees who embrace martyrdom. These welfare plans include Shuhada package and priority in recruitment at all ranks on basis of their qualification and age. However, it is evident that the plan falls short of developing and implementing a comprehensive employee welfare plan post superannuation.

Proposal, its Aims and objectives

It seems pertinent to devise and implement a project which can help eradicate the social pressures and economic insecurities from the police department employees. This would help them realize their potential and perform optimally in the best interest of the country, the masses and the province.

In order for the project to catalyse the financial security, develop productive families and release social and economic pressures from its employees two models based on entrepreneurial philosophy and principles is being presented.

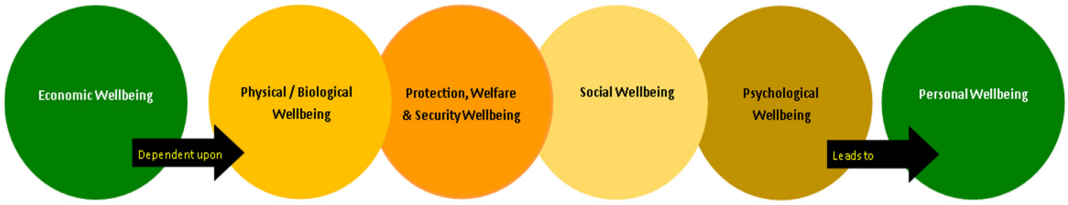

Factors determining quality of life and wellbeing

The project would:

- Assist the employees achieve financial security for the employees during and after their service.
- Create jobs for family members of the police department employees in particular and others in general.
- Develop new sustainable tiers in the economic fabric and social of the province
- Release social and economic pressures from the employees and their families.
- Bring sustainability to welfare schemes of the police department.
- Help raise the performance bar of the employees through its outcomes and
- Raise the confidence of the general public in the department.

It is the opportune time for this police welfare program grounded in surface realities, requiring little or no governmental funding with least involvement of police personnel yet help the department achieve social and economic wellbeing for its employees, achieve its targets of candid work environment, raise the public confidence and raise performance bar.

The proposed models of KPK Police Employee Welfare

There could be two models built upon entrepreneurship, i.e. Entrepreneurial and Skill Training Model and Hybrid Entrepreneurial Business Model to nurturing KPK police productive families. Both are discussed below. These proposals once implemented would allay the economic woes and fears of the police department employees and they would be able to work and perform better.

For both models the department / provincial government will provide legal and protective umbrella by taking the policy decision to implement the police employee family welfare initiative and ensure all such necessary support.

Both the models recommend development through accelerator / incubator which could be established at each district level or the province districts could be divided in 10-11 zones of 3 or 4 districts depending upon the population size of the police force employees, market size and others.

Entrepreneurial and Skill Development – Productive Families

This model of productive KPK police employees' welfare hinges upon entrepreneurial and skills development of eligible employee family members. There would be two options available, first will be through the entrepreneurship accelerator and second through standalone registered entrepreneurs (employee family members who already possess necessary skills and experience). This documents identifies two strategies. Either one or both could be implemented concurrently. These plans are based on development of local ecosystems and support infrastructure at little or no cost to police department / provincial government.

The accelerator / incubator at each district level will provide holistic assistance and would identify the eligible members of the employee family and develop their entrepreneurial, business and other skills. These skills will aim to enhance the potential entrepreneur's ability to understand the latest concepts in the business, understand the importance of customer satisfaction, and develop skills to maintain the accounting books, advance and implement marketing and promotion strategies at district, provincial and or the national levels. These trained family members with the help of revolving fund, investments or funding, a business plan (based on the individual education, experience, market size for proposed product and or service and aptitude) would be established. Such developed entrepreneur would be assisted in developing business plan, feasibility study, business, operations and marketing training etc. The accelerator/incubator owners will share profits and losses with family member entrepreneurs.

Nurturing KPK Police Productive Families—Entrepreneurial and Skill Training Model

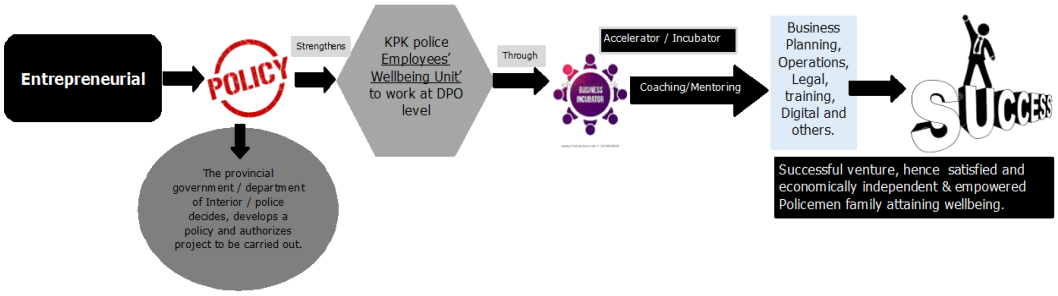

The police department would help secure suitable outlets at provincial headquarters and in major cities to sell the products of productive families. These outlets would be called "Police Employee Family Welfare Shops" The profits would be shared between the entrepreneurs, police welfare unit and the shops owners.

Hybrid Entrepreneurial Business Model - Productive Families

The program will be carried out at district level through identified and purposefully enlisted entrepreneurs and a musharaka company would be established. This will help the groomed / mentored and coached entrepreneurs sell their produce in the market and reap monthly salaries to produce products / services for the musharaka company.

The district based entrepreneurship unit performs the tasks through entrepreneurs and a musharaka company that benefits from the services of an accelerator / incubator. The selection of potential entrepreneur for accelerator or incubator would depend upon the applicant personality characteristics, aptitude and business requirements. In order to make the arrangement economically and financially attractive the unit may seek collaboration with an existing musharaka company or establish a new and bring sustainability and revenue.

Fostering KPK Police Productive Families—Hybrid Entrepreneurial Business Model

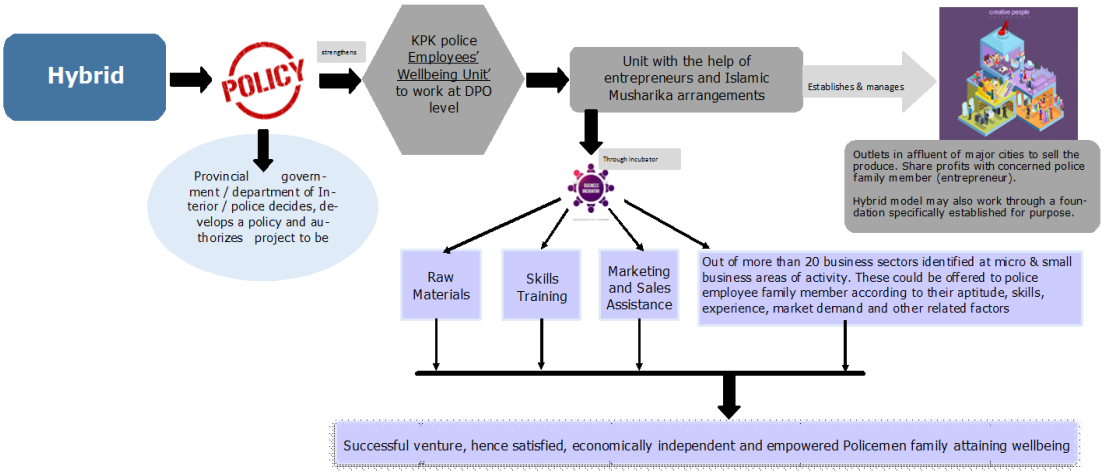

In this arrangement the accelerator / incubator would provide skill training to the potential entrepreneur. Upon completion of the training the unit would provide the raw materials to the entrepreneurs to produce the product / service at a predetermined price per unit. In order to provide increased benefit to the family members / entrepreneurs the accelerator / incubator would provide extra raw materials. For example, if 100 units of a product requires 10 kilograms of raw materials, the entrepreneur would be provided with 13 kilograms of the raw materials. This would give the entrepreneur ability to produce extra and sell that to either the "Police Employee Family Welfare Shops" or in the market or to the musharaka company / welfare unit. The unit would also pay a certain amount to the entrepreneur for producing the number of units they do.

Funding Options

Funding would be required for these start-ups / entrepreneurs start the project with minimal stress. Commonly start-ups are compelled to pay interest, equity / shareholding, be at the mercy of institutions or wealthy investors for financial resources. They also at times face massive difficulties of the bureaucratic and banking restrictions and delays.

Funding requirement could also be served through crowdfunding. A platform for such funding could be established at provincial level.

Second alternative is that depending upon the funding available an endowment fund in the name of "Police Employee Family Welfare Fund" could be established. This fund would be managed at the provincial level and each district unit would be eligible for a certain amount based on the number of potential entrepreneurs from employee families, size of business (investment size) and total number of beneficiaries in the district. Part of the revenues would be distributed to the needy families and remaining inducted back in the fund for future use and sustainability.

Conclusions

The implementation of the plan would provide numerous economic, social and financial benefits as identified below.

- Community – social impact
- Stakeholder impact
- Relief to the employees from economic woes
- A new approach to development and acquiring welfare at no or little cost
- Women empowerment
- Productive families development
- Contribution to overall police employee welfare
- Assistance in long term economic and financial sustainability of the department
- Reduction in overall provincial unemployment rates
- Economic uplift of financially weaker section of society
- Peace of mind for the police department employees
- Security of financial future of the police department employees

With little or no income this project can play a vital role in the police department welfare which can be replicated in other provinces of the country. The plans will require a suitable space provided by the department at the district police facilities and properties.

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Maternity and Parental Leave: Rights and Obligations of Female Employees According to the Slovak Legislation

Marian Hortváth JUDR., PHDR., PHD.

JANKO JESENSKY FACULTY OF LAW DANUBIUS UNIVERSITY, RICHTEROVA SQ. 1171
925 21 SLÁDKOVIČOVO, SLOVAK REPUBLIC
E-MAIL: MARIAN.HORVATH@VSDANUBIUS.SK

Abstract

Maternity and parental leave are two separate legal concepts of the Slovak legislation. The labour law as well as the social security law establish the legal framework in this area. With this regards Labour Code (Act no. 311/2001 Coll.) grants an employee - a woman the right to maternity leave and parental leave in connection with the childcare; whereas an employee - a man has the right to parental leave in connection with the childcare. Both institutes are linked not only to rights but to obligations as well. This article focuses on the rights and obligations of female employees rooting from these two legal concepts.

Keywords*:* maternity leave, parental leave, employee, woman, care of the child.

Introduction

Maternity and parental leave are two separate legal concepts of the Slovak legislation. The labour law as well as the social security law establish the legislation in this area. De lege lata grants the female employee (mother) the right to maternity leave and parental leave in connection with the child care; whereas the male employee (father) has the right to parental leave in connection with the child care. Both institutes are linked not only to rights but to obligations as well. Our article focuses on the rights and obligations rooting out from these two legal concepts.

Legal framework of maternity and parental leave

The legal framework of maternity leave and parental leave is set mainly by the Act no. 311/2001 Coll. – Labour Code (hereinafter referred to as the Labour Code). The legal definition of maternity and parental leave is provided in provisions in § 166 - 169 of the Labour Code. According to § 166 (1) in connection with the childbirth and care for a new born child, the woman shall be entitled to maternity leave for the duration of 34 weeks. A lone woman shall be entitled to maternity leave for the duration of 37 weeks, and a woman who gave birth to two or more children simultaneously shall be entitled to maternity leave for the duration of 43 weeks. In connection with the care for a new born child, the man shall also be entitled to parental leave from the birth of the child, in the same scope, provided he cares for the new born child.

The above mentioned indicates that the Labour Code provides different lengths of maternity leave depending on the social status of the mother (married vs. single) as well as on the number of new born children. Treľová and Matlák (2018) advocate the prolonged maternity for both groups of mothers and with regards to lone mothers they state "we assume that prolonged maternity leave for lone mothers is legitimate. Respecting the fact that loneliness is a social and psychological phenomena, as far as social security in concerned single mothers shall treated with an increased attention."

The Labour Code does not involve any specific definition of neither the mother nor the father; therefore, the legal definition from the civil law shall be applied. According to § 82 (1) of the Act no. 36/2005 Coll. on family and on amendment of some other acts (hereinafter referred to as the Family Act) mother is defined as the woman that gave birth to a child (*mater semper certa est)*. The legal definition of fatherhood is set in § 84 of the Family Act. Since a woman commences its maternity leave before becoming a mother i.e. prior she gives birth to a child, it is important to mention that the § 40 (6) Labour Code provides the legal definition of a pregnant employee as an employee who has informed her employer in writing about her condition and has provided medical confirmation about it. Regarding

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this Treľova and Procházková (2019) draws attention that "the status of a pregnant employee can only be obtained if the woman informs the employer about her condition in writing and her pregnancy is confirmed by a specialist. The pregnancy certificate (booklet) is normally used as medical confirmation. It is issued for the pregnant woman by the doctor usually between the tenth and twelfth week of pregnancy. If these conditions are not met the employee is not seen as pregnant and such woman has the status of a "regular" employee."

Slovak legislation grants parents the right to take care of their children and raise them as well as children have the right to parental upbringing and care. Parental rights concerning the care and upbringing of children are reflected in the labour law in the concept of maternity and parental leave granted for the mother and parental leave granted for the father. "The aim of the legal concept of maternity and parental leave is to guarantee increased protection for the woman (mother) and man (father) in employment relationship established by employment contract. With this regards the Labour Code obliges the employer to respect the personal obstacle to work on the side of the employee (giving birth and taking care of the new born child." (Treľová 2019)

In comparison the author states that regarding the right of employee – man (father) that though Slovakia has no official "paternity leave", its legislation allows men to stay home with their child for 28 weeks until the child reaches three years old, while receiving the maternity benefit.

Rights of mother during maternity and parental leave

Maternity and parental leave as legal concepts of the Slovak legislation aim on one hand to protect the female employee (mother) in employment relationships established by employment contract during an explicitly set period of time before and after the birth of her child (according with Szarková and Krásna, 2016) and on the other hand provide special allowances i.e. childbirth allowances, maternity benefit and child allowances.

With regards to the beginning of maternity leave one must note that at least one month prior to taking the maternity leave, the woman shall notify the employer in writing of the expected date of taking the maternity leave, the expected date of interrupting, terminating the maternity leave and any change concerning the commencement, interruption and termination of the maternity leave.

In Slovakia generally, a woman usually starts her maternity leave at the beginning of the sixth week prior to the expected day of childbirth, however, at the beginning of the eighth week prior to such a day at the earliest. On the other hand, paternity leave as the analogical right guaranteed for employee - man (father) is not granted before the birth of the child.

From the perspective of employee protection, the mother is subject to protective period during maternity leave, during which she may not be dismissed, and her employer may not terminate her employment immediately. At the same time, the maternity leave is considered to be a period of work and therefore it gives the mother entitlement to regular leave, which she can draw after returning to work.

A woman shall commence her maternity leave in the eighth week at the earliest, however, in the sixth week as the latest prior to the expected day of the childbirth. If a woman is registered with the Office for Labour, Social Affairs and Family (hereinafter referred to as the "Labour Office"), she shall submit a form certified by the physician to the Labour Office before taking her maternity leave. If the woman is employed, she shall hand over the form confirmed by the physician to the employer. In accordance with the provisions in §231, para 1 d) of Act no. 461/2003 Coll. of laws concerning the social insurance (herein after referred to as the "Social Insurance Act") the employer shall subsequently notify the branch office of the Social Insurance Agency of the commencement of the maternity leave within 8 days from the beginning of the maternity leave. The woman shall also notify the health insurance company of the maternity leave. If the woman is employed, the employer shall carry out this obligation; in other cases she shall do it herself.

The childbirth gives mother the entitlement to childbirth allowance. The Act no. 383/2001 Coll. of laws concerning the childbirth allowance and multiple birth allowance regulates provision of this allowance. Entitlement to this allowance shall arise for the child's mother or the child's father if the child has been taken into his custody by a court or if the mother died. The condition for entitlement is the birth of a child and the permanent residence of the entitled person in the territory of Slovakia. It is important to underline that *de lege lata* grants different amount of childbirth allowances depending in case of multiple birth as well as different amount of childbirth allowances for the fourth or higher child that is born. The amount of childbirth allowances is set on § 4 (1) of the Act no. 383/2001 Coll. of laws concerning the childbirth allowance and multiple birth allowance regulates provision of this allowance; whereas the allowance shall:

- amount to €829.86 for the single birth of the first to third child where such child survives at least 28 days;
- amount to €151.37 for every fourth or higher child that is born or for the first to the third child if such a child does not survive for at least 28 days;
- for birth of two or more children if at least two of them survived 28 days the sum of €829.86 shall increase by € 75.69 per each child who survived 28 days or
- amount to € 110.36 in case of multiple birth.

It is important to state that childbirth allowance is not preconditioned by any existing or previously existed employment relationship the only relevant precondition is the permanent residence of the entitled person in the territory of the Slovak republic.

In addition to aforementioned allowance a parent is entitled to child allowance pursuant to Act no. 600/2003 Coll. of laws concerning the child allowance amounting to € 23.52 or possibly the supplement to the child allowance amounting to € 11.02. A parent caring for a dependent child is primarily entitled to child allowance. The sum of the parent´s income is irrelevant. Should the child be not cared for by the parent, the law stipulates exactly who is entitled to. The first condition, however, is that a parent or other person shall take care of the child. Both the parent and the child shall have a permanent or at least temporary residence in Slovakia. The following conditions shall also be met in order to request the supplement:

- to be an old-age pensioner, beneficiary of the early old-age pension, invalidity pension due to reduced capacity to perform economic activity by 70%, service pensioner or any other beneficiary of the pension defined by law,
- not to be gainfully employed nor any other physical person who could claim the tax bonus for the child,
- in case of claiming the allowance and requesting the supplement, it is not possible to grant the tax bonus for the child.

Furthermore, the Slovak social security entitles mothers for a maternity benefit in case the mother fulfils the obligatory conditions set by the Social Insurance Act. The provisions in § 48-53 of the Social Insurance Act regulates mother´s entitlement to the maternity benefit during the maternity leave. The mother is entitled to maternity benefit if she is insured against sickness at the time when the right arises and she had sickness insurance for at least 270 days during last two years before giving birth. Entitlement to maternity benefit arises from the beginning of the sixth week before the expected date of birth designated by the doctor, at the earliest from the beginning of the eighth week before that day and, if she gave birth earlier, then from the date of birth. The mother is entitled to maternity benefit for the period of 34 weeks; in case of taking care for two or more children it will be for 43 weeks or in case of a single mother it shall be for 37 weeks. The amount of maternity benefits depends from her previous income; it is defined as 65% of the assessment basis laid down in §55 or §57 of the Social Insurance This amount. The amount of maternity benefit is calculated from the mother's income in the calendar year preceding the year in which the right to maternity benefit arose. Act. It is important to note that legislation caps the level of maternity benefit. The maximum daily assessment basis shall be € 39.6987. With regards to maternity benefit one shall bear in mind that unless the mother is entitled to maternity benefit, she shall be entitled to parental allowance.

The Slovak legislation also recognizes that there is a group of mothers which returns to the work before the maternity leave ends. Mother that decides to work during her maternity leave is entitled to childcare allowance. The provisions of this allowances is laid down in Act no. 561/2008 Coll. of laws concerning the childcare allowance define the aforementioned allowance. The allowance is paid up to the age of three of a child or up to the age of six of a child with a long-term unfavourable health condition. If the mother proves the expenses for childcare, she will be provided with a contribution amounting to expenses, up to the amount of € 230; unless she proves the amount of expenses, the amount shall be € 41.10.

Situation of the mother after maternity leave

Once the maternity leave terminates mother has basically two option; indeed the mother may return to work or draw the parental leave. The provisions of parental leave are set in § 166 - 169 of the Labour Code. The parental leave belongs to mother until the day when the child reaches the age of three. If this concerns a child with long-term serious health disability requiring exceptional care, the employer shall provide a woman with the parental leave until the child is six. The aforementioned leave shall be granted to the extent requested by parent, however 1 month being the minimum period. An application addressed to the employer shall be the condition for granting parental leave. The law does not stipulate that the application must be in writing; however, for reasons of legal certainty in any subsequent disputes, it is appropriate to submit the application in writing.

It is worthwhile to note that the parent shall notify the employer in writing at least one month before the start of the parental leave of the expected date of the commencement of the parental leave, the expected date of interruption and end of the parental leave and any change concerning the commencement, interruption and end of the parental leave (similar to maternity leave). Since the respective Office for Labour, Social Affairs and Family pays the parental benefit, the mother shall fill in the relevant forms before the end of the maternity leave and shall have them confirmed at the branch office of the Social Insurance Agency and then shall deliver them together with the copy of the child´s birth certificate to the Office for Labour, Social Affairs and Family. In addition, the mother shall also notify the health insurance company of the change related to the commencement of the parental leave. During parental leave, the mother is entitled to a parental allowance of EUR 270 (EUR 370 if she previously received maternity leave); if the mother cares for two or more children born at the same time, the parental allowance is increased by 25% for each child born at the same time. When receiving parental allowance, "participation in social insurance relationships is not examined and income is not tested. At the same time, the fact whether the entitled person is or is not economically active is not decisive either" (Treľová 2016).

Regarding the rights of mother, one must emphasize that during parental leave the mother is subject to protective period, during which she may not be dismissed and her employer may not terminate her employment immediately. The parental leave is also considered to be a period of work therefore it gives the mother entitlement to holidays, which she can draw after returning to work.

Situation of the mother after parental leave

After parental leave, three or six years after childbirth, mother can take various decisions concerning work; indeed she can return to work; she can agree with the employer on unpaid leave; she can remain unemployed, or she can become a self-employed person. In the first case, the mother shall notify the employer of the end of the parental leave, and also report the change to the Social Insurance Agency and the health insurance company. If the mother agrees with the employer on unpaid leave, she must reckon with the fact that she will not receive any social benefits. If she decides to terminate her employment with the employer, she shall register with the relevant Office for Labour, Social Affairs and Family within 7 days. If she becomes the self-employed person, she shall notify the Social Insurance Agency and the health insurance company of such a change.

Special situation occurs where the mother becomes pregnant during parental leave and goes on maternity leave after the end of the parental leave. In such a case she is entitled to maternity benefit only if she had her sickness insurance for at least 270 days during last two years before giving birth. For the purposes of calculating maternity benefit, the period of the maternity leave and parental leave are also considered to be the period during which mother has sickness insurance therefore the mother is entitled to maternity benefit. The mother shall notify the employer of the transition to the maternal leave.

Conclusions

Slovak legislation grants parents the right to take care of their children and raise them as well as children have the right to parental upbringing and care (Gabrhelová and Čepelová, 2019). Treľova and Kulhánek (2019) came to the general conclusion that "it is essential to ensure effective support for reconciling work and family life for parents of young children, especially for mothers who are more often associated with childcare."

With regards to childbirth and upbringing of children the Slovak legislation provides specific rights to female employees; indeed there are to specific legal concepts: maternity and parental leave. Maternity and parental leave as legal concepts of the Slovak legislation aim on one hand to protect the female employee (mother) in employment relationships established by employment contract during an explicitly set period of time before and after the birth of her child and on the other hand provide special allowances i.e. childbirth allowances, maternity benefit and child allowances.

The Labour Code provides different lengths of maternity leave (34, 37, 43 weeks) depending on the social status of the mother (married vs. single) as well as on the number of new born children. After maternity leave de lege late entitles mother for parental leave. Once the parental leave is terminated, three or six years after childbirth, mother can take various decisions concerning work; indeed she can return to work; she can agree with the employer on unpaid leave; she can remain unemployed, or she can become a self-employed person.

During maternity leave mother is entitled, after compelling with legal conditions, for maternity benefit; unless the mother is entitled to maternity benefit, she shall be entitled to parental allowance. During parental leave the mother is entitled to the parental allowance.

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Analysis of The Impact of Telemedicine on Health Care: A Review of The Scientific Literature From 2015-2020

Michael Castillon-Herrera

Universidad Autónoma del Perú, Lima, Perú
mcastillonh@autonoma.edu.pe

Michael Cabanillas-Carbonell

Universidad Autónoma del Perú, Lima, Perú
mcabanillas@ieee.org

Abstract

Currently, people with reduced mobility, with some physical disability or people who are in remote areas, as well as in a situation of confinement, cannot receive medical attention in person. These problems can be solved through telemedicine. This research is a systematic review of the scientific literature and aims to determine the criteria to be considered for the analysis of the impact of telemedicine in medical care. For which 50 articles were systematized, collected from the databases of the IEEE Xplore, Scopus, Science Direct, Scielo. Having very favorable results about the impact of telemedicine in medical care and in the different fields related to medicine.

Keywords: "impact of telemedicine", "medical assistance", "telemedicine system".

Introduction

Currently the severe acute respiratory syndrome coronavirus (SARS-CoV-2) and the disease it causes, (COVID-19), are causing a rapid and tragic emergency worldwide. This is leading to a restructuring of health systems in several countries around the world, due to the need to devote significant medical resources to the care of critically ill patients with, which also has important implications for other medical disciplines not related to the virus.(Novara *et al.*, 2020). At a global level, telemedicine continues to be imposed both in the first level countries, as well as in countries that are progressively improving their development. Therefore, experts agree that telemedicine will improve medical care in these countries(Fong, Fong and Hong, 2005). But what is telemedicine? telemedicine is defined as the provision of health care services in which distance is a critical factor, carried out by professionals who use information and communication technologies to exchange diagnostic data in order to improve the health of individuals and the communities in which they live, according to the OMS (1998)(Shojaei *et al.*, 2020).

The origin of telemedicine is linked to the origin of telecommunications in the late nineteenth century, with the invention of the telegraph, where it was first used in the U.S. Civil War, which served to report on wounded, killed in combat, even exchanging information with a doctor to save the life of a wounded. And with the advent of the Internet in 1990 the term telemedicine progressively evolved into what we know today(Suh et al., 2012). In the United Kingdom, the Queen Victoria Hospital, in 1988, used wireless technology via satellite and fiber optics, for telemedicine applications. As in the United States, one of the factors that have most influenced the development of these systems is the high cost of health care for its inhabitants(Setiawan, Syamsudin and Ruhiyat, 2018). In Peru, out of the 11,000 health facilities in the country, only 3% are part of the network of the Ministry of Health, for telemedicine the goal is to achieve 10% each year end, in addition Essalud has the national center of telemedicine for its network of services. However, in the sub public sector very few have these services while, in the private sector, there are advances in several clinics(Vidal-Alaball et al., 2019).

Advances in wireless bandwidth and now also access networks that are intercepted by a variety of technological devices, this makes it possible to implement telemedicine applications in any country (Fong, Fong and Hong, 2005). According to a study by Global Market Insight, the 19.2% annual growth rate will be driven by the development of telecommunications, government initiatives to provide health services to the population that has limited or no access to health services, and the increasing integration of the health and IT sectors(Mohammed *et al.*, 2014). This makes it even more relevant considering that the current situation, with a decreasing level of emergency, will probably affect

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our activities for several months and will modify the organization of our hospitals, making telehealth more recognized and used in the very near future (Koesoema *et al.*, 2017).

Methodology

For the present document, a process of systematic revision of literature was carried out, which was consulted in different databases, where it was possible to discard articles that did not fulfill the requirements for this study. The search was obtained with key words, which were explained in section B, according to the determined scientific orientation.

A. Research Questions

The research questions used were the following:

RQ1. What are the best techniques and strategies for the implementation of telemedicine?
RQ2. Which are the medical specialties most benefited by telemedicine?

Figure1: Prisma Diagram Methodology

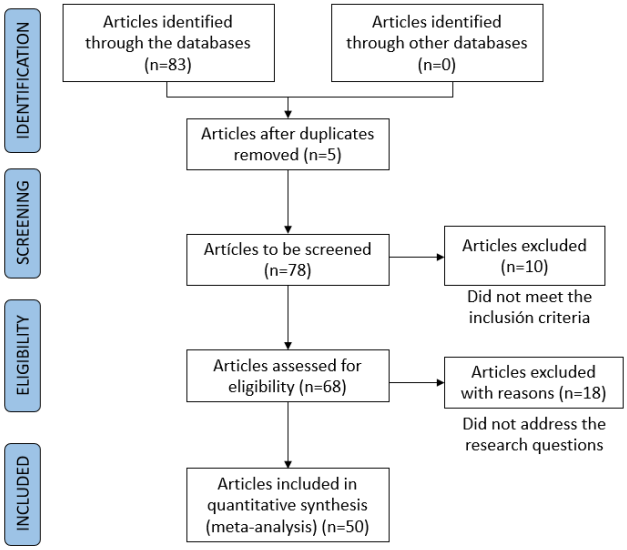

B. Search Strategies and Processes

The research considered the field of action of the issues raised, taking into account the following key words: "impact of telemedicine" or "medical assistance" or "telemedicine system". In addition, in order to answer the research questions, a systematization of articles published in the following databases was carried out: IEEE Xplore, Science Direct, Scopus and Scielo. In the end we were left with 50 articles, considering from 2015-2020

C. Inclusion and Exclusion Criteria

For the study, the following exclusion and inclusion criteria were applied as shown in the following table.

TABLE 1: TABLE OF CRITERIA

CRITERIA		
Inclusion	I1	Articles were found in English.
	I2	The publication years are 2015-2020.
	I3	Articles with the purpose of answering research questions.

Exclusion	E1	Some items do not apply to engineering or medical areas.
	E2	There were articles whose publication year was prior to 2015.
	E3	Some articles that are not very related to telemedicine.
	E4	Those articles whose conclusions do not provide relevant evidence for the present study.

Results

Research results are oriented to research findings. The process of analysis that was carried out was the following.

A. *Extracted and Analyzed Articles*

We analyzed 83 articles found in the databases related to the topic, of which we discarded 5 articles that were repeated or had very similar topics. After reading the articles, 78 articles were selected, excluding 28 according to the exclusion criteria and that did not contribute to the answers to the research questions. Obtaining 50 articles for the systematic review

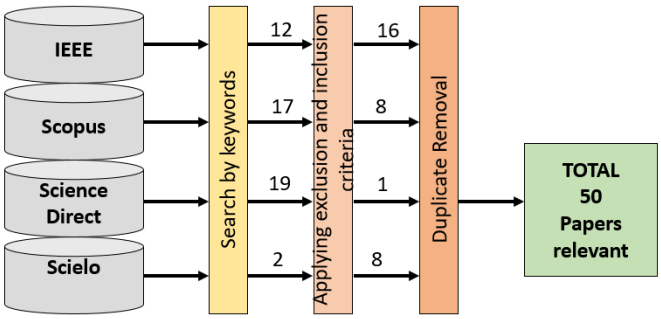

Figure2: Article selection flowchart

The 50 selected articles met the established inclusion criteria. Now we will make the final count of articles per database: IEEE Xplore, 12 articles; Science Direct, 19 articles; Scopus, 17 articles and Scielo, 2 articles.

B. *Chloropletic Mapping of Databases*

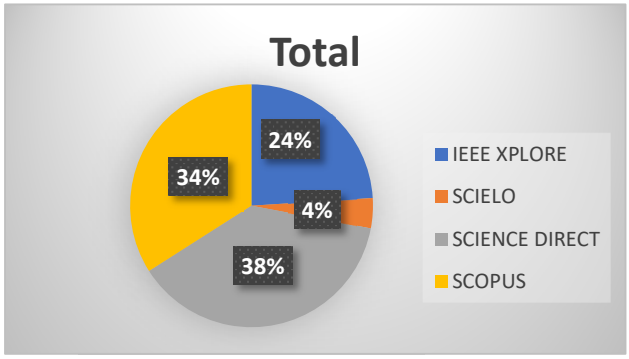

Figure3: Coropletic map of the databases

The coropletic map is used to compare values and display categories in various geographical regions worldwide. In this graph we can appreciate the geographical location of the countries of origin of the databases found.

C. *Distribution of the quantity of BD found*

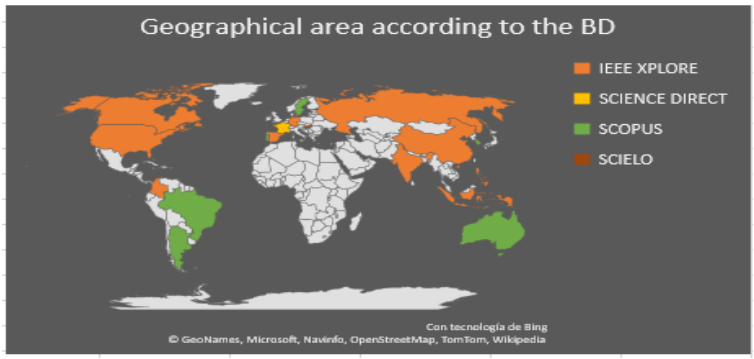

Figure 4: Distribution of total databases

In the following graph you can see the distribution of the total amount of the databases, where the largest amount of articles that were left for systematization belong to Science Direct, with 38% of the total and the smallest amount is 4% belonging to the Scielo database.

D. *Number of Items per Year*

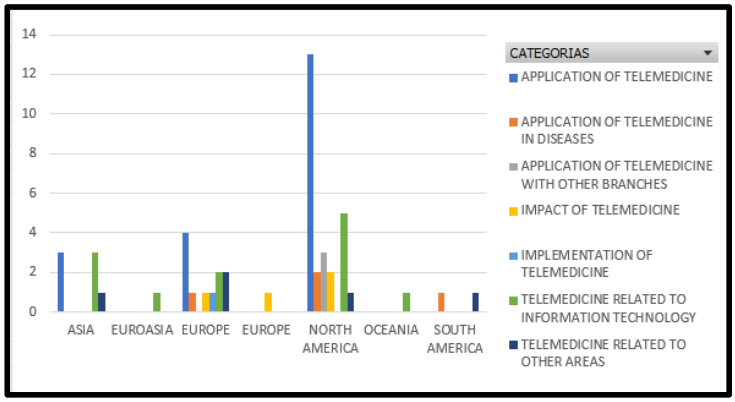

Figure 5: Number of items per year

Clearly it could be seen that the year with the most publications was 2019 with 20, and 2016 was the year with the least number of publications with only 3.

E. *Number of Items per Year and Continent*

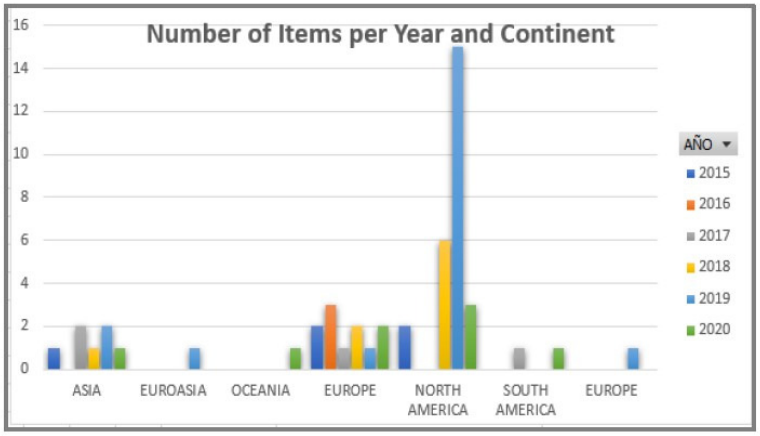

Figure 6: Number of items per year and continent

In the present graph you can appreciate the amount of articles published per year and to the continent that correspond. It is clear that the continent that obtained more publications was North America, besides being in 2019, the year with more publications corresponding to that continent.

F. Number of Articles by Continent and Categories

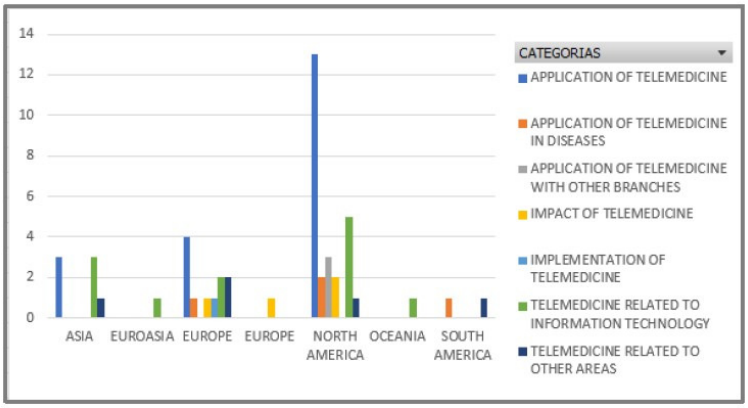

Figure7: Number of items per continent and category

In this graph you can see that we have a large number of articles in the category: Application of telemedicine, which belong to North America and is also the continent with the largest number of articles.

Table 2: Article Classification

CATEGORIES	ARTICLES
Impact of Telemedicine	(Garichev *et al.*, 2019); (Chen *et al.*, 2017); (Setiawan, Syamsudin and Ruhiyat, 2018); (Vidal-Alaball *et al.*, 2019).
IT-related telemedicine	(Nadar *et al.*, 2019); (Wolff *et al.*, 2020); (Notario *et al.*, 2019); (Lim, Norman and Robinson, 2020); (Chinchole *et al.*, 2018); (Chuo and Webster, 2019); (Zakaria *et al.*, 2019); (Lim, Norman and Robinson, 2020); (Hajebrahimi *et al.*, 2019); (Thelen *et al.*, 2015); (Weinstein, Krupinski and Doarn, 2018); (Chinchole *et al.*, 2018).
Application of telemedicine with other branches	(Lenney, 2018); (Kindle *et al.*, 2019); (Kim *et al.*, 2020).
Application of telemedicine with other areas	(Binder *et al.*, 2018); (Avanesova and Shamliyan, 2019); (Lieng *et al.*, 2019); (Farmer, 2019); (Setiawan, Syamsudin and Ruhiyat, 2018).
Implementation of Telemedicine	(Adamko, Garai and Pentek, 2016).
Application of Telemedicine	(Tasneem *et al.*, 2019); (Rodriguez-Martinez *et al.*, 2016); (Sikka *et al.*, 2019); (Binder *et al.*, 2018); (Uscher-Pines *et al.*, 2020); (Lim, Vy and Choi, 2019); (Zakaria *et al.*, 2019); (Ambrosino *et al.*, 2016); (Galea, 2019); (Gras, 2018); (Miller *et al.*, 2018); (Marciano *et al.*, 2017); (Whitchurch, Abraham and Varadan, 2007); (Maurya and Bade, 2014); (Benaissa *et al.*, 2012); (Truong *et al.*, 2010); (Alwan *et al.*, 2006); (Ivanov *et al.*, 2010); (Rantz, Skubic and Miller, 2009); (Ambrosino *et al.*, 2016).
Application of telemedicine in diseases	(Adamko, Garai and Pentek, 2016); (Alshurafa *et al.*, 2015); (Patil and Ahmed, 2015);(Marciano *et al.*, 2017).

Table 3: Classification of Categories According to Technologies

ARTICLES	TECHNOLOGIES
(Nadar *et al.*, 2019); (Chuo and Webster, 2019); (Weinstein, Krupinski and Doarn, 2018); (Zakaria *et al.*, 2019).	Networking and Connectivity
(Cj and Ume, 2002); (Campbell and Cheng, 2000); (Wolff *et al.*, 2020); (Notario *et al.*, 2019); (Lim, Norman and Robinson, 2020); (Ivanov *et al.*, 2010).	Internet of Things
(Kim *et al.*, 2020); (Sikka *et al.*, 2019); (Lieng *et al.*, 2019); (Lim, Vy and Choi, 2019).	Artificial intelligence / Machine Learning
(Castaneda and Ellimoottil, 2020); (Tasneem *et al.*, 2019); (Zakaria *et al.*, 2019); (Chinchole *et al.*, 2018).	Cloud Technology

Graph answering the research questions

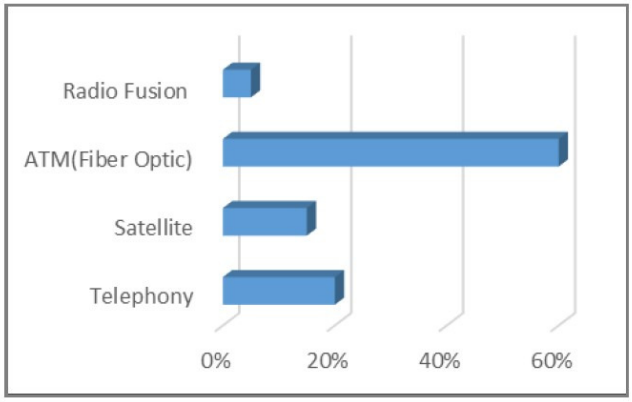

Figure 8: Number of key items per continent

In the present graph you can see the categories: "application of telemedicine with other branches" and "implementation of telemedicine", which contain relevant information to answer our research questions.

More effective channels for the implementation of telemedicine

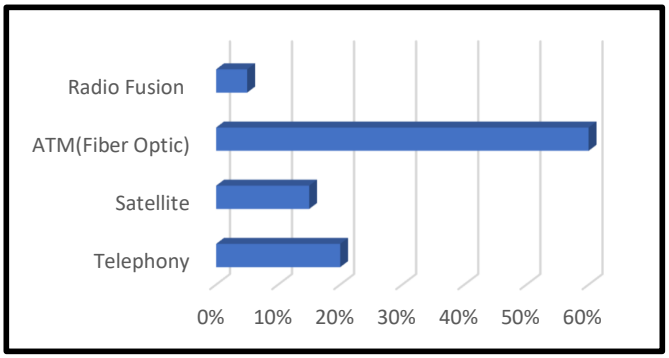

Figure 9: More effective channels for the implementation of telemedicine

Table 4: Classification of Articles According to Research Questions

ARTICLES	RESULTS
(Vidal-Alaball *et al.*, 2019); (Garichev *et al.*, 2019); (Nadar *et al.*, 2019).	These articles argue that to implement telemedicine requires, apart from having the necessary technological requirements, is to have a structured and solid project planning as a fundamental basis for making telemedicine a reality.
(Binder *et al.*, 2018); (Setiawan, Syamsudin and Ruhiyat, 2018).	These articles tell us that, through a broadband program of the Ministry of Communications and Information Technology, they managed to implement telemedicine in Latin American countries.
(Lenney, 2018); (Kindle *et al.*, 2019); (Castaneda and Ellimoottil, 2020).	Medical specialties most benefited by telemedicine

In the table shown you can see the classification of articles, according to the two research questions, thus answering the first question, which will be detailed in the discussion section.

Medical specialties most benefited and with greatest application in telemedicine

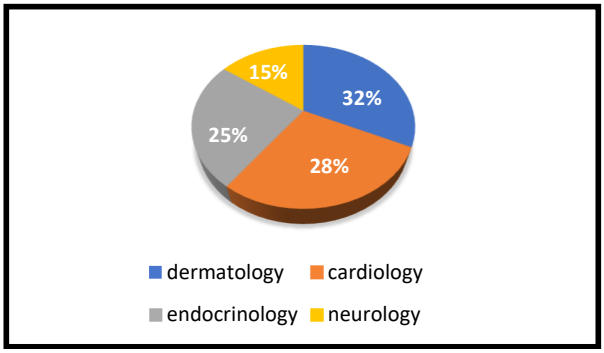

Figure 10: Medical specialties most benefited by telemedicine

In the following graph we can clearly see which are the medical specialties most benefited by telemedicine, highlighting dermatology.

Discussion

In this systematic review research, the study of which would be the best techniques and strategies to implement telemedicine was determined, as well as knowing which medical specialties would benefit most from the use of this technology. As indicated in Figure 8, we can appreciate a greater presence of results in the continents of Europe and North America, which in a certain way shows us that in these continents they have more technology and better management to implement telemedicine, as well as applications and research with other medical specialties, compared to the majority of South American countries. Taking as a reference what has been mentioned, we will go on to answer the research questions.

RQ1. What are the best techniques and strategies for the implementation of telemedicine?

To answer the first question, it is necessary to review Table 4 where a classification of articles was made in order to answer that question. The first is to have a solid project plan as a fundamental basis for implementation, beyond complying with a political regime, for countries that are just beginning to incorporate telemedicine. The next section, and as a second option, is to have an alliance with the Ministry of Communications and Information Technology, which most Latin American countries have. As an implementation channel, it is necessary to analyze Figure 9, where the greatest evidence of having carried out a greater number of tests was found. The ATM (Asynchronous Transfer Mode) network technology by optical fiber is the most effective channel with 60% effectiveness for the implementation of telemedicine due to its high stability in connection, compared to the other implementation channels.

RQ2. Which are the medical specialties most benefited by telemedicine?

To answer the second question, it is necessary to review Figure 10, which shows the four medical specialties that have benefited most from telemedicine: dermatology, cardiology, endocrinology, and neurology. Dermatology is the most benefited specialty with a 28% of application currently due to its multiple uses, thanks to the sending of images of lesions or skin eruptions in the most prone areas where they can appear, even these diagnoses also serve to classify and detect urgent cases of diseases such as skin cancer. But when the case is very serious, it is clear that on-site care will be essential.

Conclusion

In this article, a systematic review of the literature on the impact of telemedicine in medical care has been presented, considering from 2015 to 2020. For this purpose, 50 articles were systematized, showing that the best strategy to implement telemedicine is to have a solid and integrated policy, and thus be able to implement successful health projects, among them telemedicine. Also, it is recommended to use the ATM network technology by optical fiber which evidences a high stability for an optimal connection. Finally, we clearly concluded which would be the medical specialties most benefited by telemedicine where dermatology is leading in implementation during the last years, therefore, it is recommended a greater application towards this specialty since currently there are many practices with favorable achievements. The results of this systematic review can be used for future research by researchers and professionals. In addition, significant methods derived from our study of systematic literature in the BD.

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The Problem of Thin Capitalization for Financial Security of An Enterprise in Polish Financial System

Mariusz TOMCZYK
War Studies University, Warsaw, Poland, m.tomczyk@akademia,mil.pl

Tomasz KOSCIELECKI
Military University of Technology, Warsaw, Poland, t.koscielecki@wat.edu.pl

Abstract

The functioning of an enterprise, its essence and, above all, the purpose for which it was established (the profit of its owners) means that in each period of its functioning it is forced to search for sources of financing for its activities. The basic source of financing for any enterprise should be money generated by the enterprise itself. Business entities strive for the largest possible retention of capital in their hands apply tax optimization measures, including thin capitalization. The existing restrictions on thin capitalization introduce a mechanism to limit debt financing costs included in tax costs. This article characterizes the mechanism of insufficient capitalization and the changes that have taken place in it. The purpose of this article is an attempt to assess the importance of this mechanism for the financial security of the enterprise.

Keywords: thin capitalisation, financial security, income tax, enterprise.

Introduction

The functioning of an enterprise, its essence and, above all, the purpose for which it was established (the profit of its owners) means that in each period of its functioning it is forced to search for sources of financing for its activities. Due to constrained level of capital held and the need for financial resources (e.g. for development) this field is crucial for continuous existence of an enterprise. Ensuring the financial security of an enterprise is determined by stable financing of assets necessary to undertake short-term activities as well as strategic activities - implemented over a long period of time. The company's financial needs can be met from two sources - external and internal. Internal sources developed by the enterprise include, first and foremost, retained earnings, depreciation, issue of shares, increasing shares and decreasing the company's assets. On the other hand, external sources come from the financial resources of other entities like bank loans and borrowings, issue of debt securities, financial leasing, etc. (Kościelecki 2014). These are various forms of increasing the company's liabilities. This article characterizes the mechanism of insufficient (thin) capitalization and the changes that have occurred in its mechanism. The purpose of the article is an attempt to assess the importance of thin cap mechanism for the financial security of an enterprise.

Enterprise Financial Security

The goal of any business entity, regardless of its type, size or type of business, is to survive and to grow. Therefore, ensuring financial security is one of the basic conditions for the continuation and development of the company's operations on a competitive market. Without it, a given enterprise cannot survive or grow. Despite the widespread use of the concept of financial security of an enterprise, this issue is not clearly defined and raises a lot of controversy. There are many reasons for this situation, but undoubtedly one of the most important is the willingness of the entity to take risks. The term "security" is extremely often used and addressed to a wide variety of problems of human activity, natural phenomena, health, political and social situations and others. In general, security is most often associated with a non-threatening state for those values that are valuable. Enterprise security is such a field of its activity that guarantees its survival and the freedom to realize its interests (e.g. profit) (Koziej 2011). The financial security of an enterprise should be understood as a state that gives a sense of certainty of its existence and guarantees its permamence as well as development opportunities. It is defined as the company's ability to preserve the ability to settle current liabilities and high action efficiency (Franc-Dąbrowska 2006). Financial security means no threats to public finances, corporate finances, insurance, banking, or personal finances for households. It is important to emphasize that financial security is a major component of economic security.

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Considering financial security in the context of an enterprise, it is related to the entity's financial liquidity - the ability to pay its liabilities (Jachna 2016). Financial security is a process of continuous reduction and elimination of monetary risk in order to secure capital adequacy that will be tailored to the risk profile and preferences of a given entity (Płaczek 2014). One of the main determinants of financial security of an enterprise is its capital stock, or rather its amount, its adequacy to the entity's liabilities. The enterprise itself decides about the amount of liabilities of the business entity (loans, credits, etc.). The situation is different in case of the company's revenues and profits. The company's revenues will depend on the attractiveness of the product, the service it offers as well as the financial resources of its clients, their tastes, preferences, seasonality and, above all, the price of the product offered (market competitiveness). The company's profit is determined by the company's revenues and costs. The range of costs that can be taken into account in calculating the company's profit is defined by law. The wider the range of costs that can be taken into account when calculating the company's profit, the lower profit (gross) and lower income tax paid by the enterprise. That is why strict control of costs in the enterprise and the possibility of their qualification in tax sense is so important (both from the point of view of the state - tax recipient and enterprise - tax payer).

What is thin capitalization ?

In recent years, law provisions relating to thin capitalization have been amended many times, which changed some criteria, including entities providing financing, calculation of interest not included in tax costs or the degree of relation between the lender and the borrower.

In the legal status binding until the end of 2014, law restrictions in including tax costs related to financing granted by entities directly related to the borrower, having at least 25% stocks/shares if the value of debt exceeded three times the share capital of the recapitalized entity. Interest on such financing in the part exceeding the above limit (calculated at the time of their repayment) did not constitute tax costs for the borrower. However, in the years 2015 - 2017 the above provisions were amended, including the list of lenders who was expanded to include indirectly related entities. The method of setting limits on the cost of debt financing was changed from three times the borrower's share capital to the value of its borrower's equity, determined on the last day of the month preceding the month of interest payment.

Implementation into the Polish legal order of the regulations contained in the EU Council Directive 2016/1164 of 12 July 2016 and EU Council Directive 2017/952 of 29 May 2017 amending Directive 2016/1164 regarding discrepancies in the qualifications of hybrid structures regarding third countries (known as the ATAD Directive) establishing provisions aimed at counteracting tax avoidance practices that have a direct impact on the functioning of the internal market has caused changes in the mechanism of insufficient capitalization in Polish legislation.

Insufficient (thin) capitalization means a situation in which the owners equip the company with share capital (i.e. equity financing) to a minimal extent, while the company's operations are financed with return capital (loans, credits). In other words, insufficient capitalization is a kind of abuse by the shareholders (shareholders) of the repayable financing method, which consists in disrupting the ratio between the company's debt and its share capital (debt to equity ratio).

Current law restrictions on thin capitalization introduce a mechanism to limit debt financing costs included in tax costs. Pursuant to the Corporate Income Tax Act, enterprises that have their registered office or management board on the territory of the Republic of Poland are obliged to exclude from debt tax deductible costs the part in which the excess of debt financing costs exceeds 30% of the amount corresponding to the excess of the sum of revenues from all sources of income less interest income over the sum of tax deductible costs less the value of depreciation write-offs and debt financing costs included in the tax year and debt financing costs not included in the initial value of the fixed asset or intangible asset (CIT Act). This mechanism is based on two basic indicators - a limit of PLN 3 MM in excess of debt financing costs and a limit on excess of debt financing costs based on 30% EBITDA. Due to the content of the new provisions, it is justified to state that the thin capitalization mechanism in force so far, consisting in limiting the possibility of including part of interest paid to related entities (or owners) as tax deductible costs, has been replaced by a general exclusion from tax deductible costs debt financing costs, regardless of whether the costs indicated are related to transactions concluded by taxpayers with related entities or with unrelated entities. This means that taxpayers who do not receive any loans from related parties but finance themselves, e.g. through a bank, will also be required to exclude part of interest paid from tax deductible costs. The mechanism of the operation of insufficient (thin) capitalization is presented in the figure below.

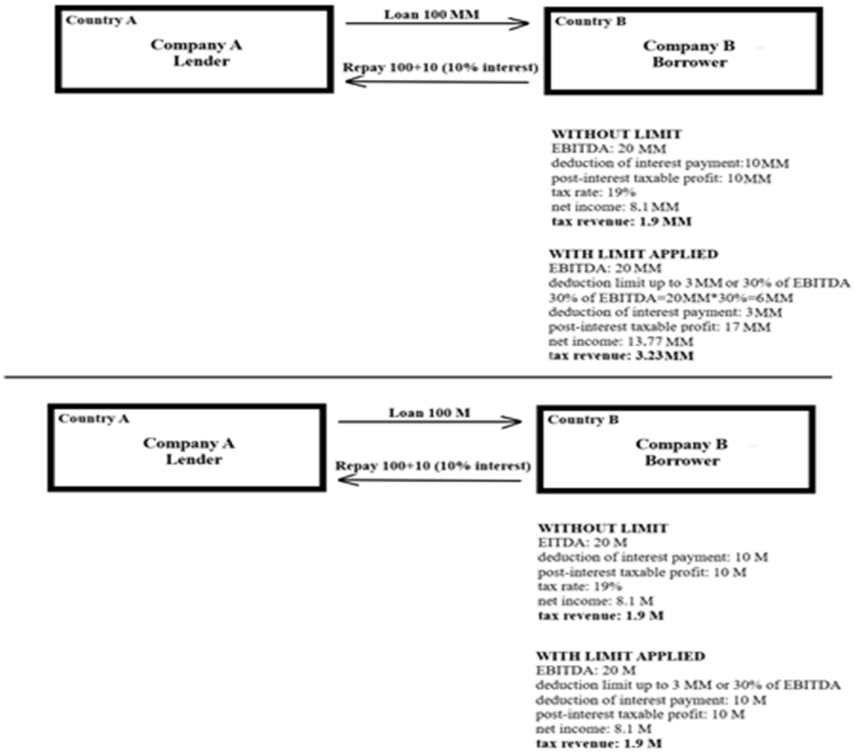

Fig. 1 : Practical example of how thin capitalization works

Source: own study based on: (OECD, 2012)

The above figure shows that company B benefited from a loan from company A. It is important that under the current rules it does not matter whether the entities are related or not. In the first case the loan was 100 MM. The loan interest rate is 10%. Company B generates 20MM EBITDA. Debt financing costs are 10 MM. At the 19% income tax rate and assuming that there are no restrictions on deducting costs, the enterprise will pay an income tax of 1.9 MM in the annual tax settlement. With the existing restrictions on the calculation of debt financing costs and 20MM EBITDA, the annual income tax paid to the state budget will be 2.66 MM. The increase in the budget impact is caused by the limitation of eligibility of debt financing costs in the annual tax settlement. Debt financing costs include no more than 3 MM or (in the case of higher costs generated) up to 30% EBITDA. In this example, the cost of debt financing is 10 MM. The eligible costs in this example are 6 MM (30% EBITDA). The result of this limitation is the fact that the deduction of interest payment is 4 MM smaller in the annual settlement and thus the income is more taxable. Debt financing costs excluded from tax deductible costs in a given year, subject to meeting certain conditions, can be accounted for in tax costs in the next 5 tax years (CIT Act). It should be emphasized that the 30% EBITDA limitation works only if the costs of debt financing are higher than 3MM. For debt financing costs less than 3 MM, this amount is fully taken into account in calculating post-interest taxable profit. Example 2 in Fig. 1 shows this situation. In order to better present the importance of thin capitalization for the financial security of an enterprise, Figure 2 presents a model of the distribution of the company's tax liabilities.

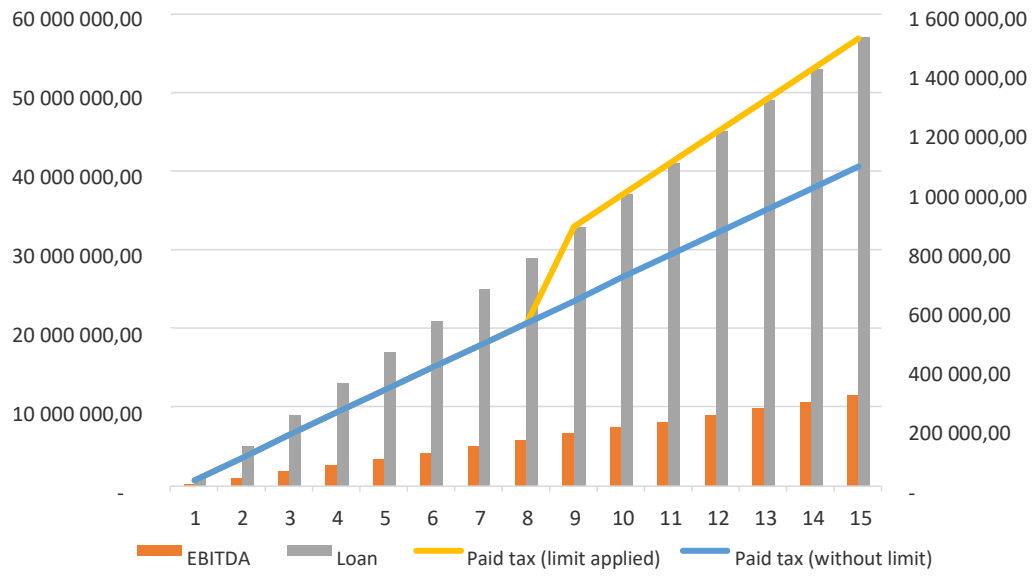

Fig. 2: Distribution model of enterprise tax liabilities - graphic approach

Source: own study

The model assumes the following assumptions:

- the income tax rate is 19%;
- interest rate is 10%;
- there are no costs related to depreciation (EBITDA = EBIT); loan to EBITDA rate is 5.

Table 1 presents numerical values for the discussed model.

Table 1: Numerical values of the discussed tax model (Fig. 2)

	EBITDA	Loan	Paid tax (without limit)	Paid tax (limit applied)	Enterprise net income (without limit)	Enterprise net income (limit applied)	Additional contribution for enterprise/income for budget
1	200 000	1 000 000	19 000	9 000	81 000	81 000	-
2	1 000 000	5 000 000	95 000	95 000	405 000	405 000	-
3	1 800 000	9 000 000	171 000	171 000	729 000	729 000	-
4	2 600 000	13 000 000	247 000	247 000	1 053 000	1 053 000	-
5	3 400 000	17 000 000	323 000	323 000	1 377 000	1 377 000	-
6	4 200 000	21 000 000	399 000	399 000	1 701 000	1 701 000	-
7	5 000 000	25 000 000	475 000	475 000	2 025 000	2 025 000	-
8	5 800 000	29 000 000	551 000	551 000	2 349 000	2 349 000	-
9	6 000 000	30 000 000	570 000	570 000	2 430 000	2 430 000	-
	6 200 000	31 000 000	589 000	824 600	2 511 000	2 275 400	235 600
	6 400 000	32 000 000	608 000	851 200	2 592 000	2 348 800	243 200
	6 600 000	33 000 000	627 000	877 800	2 673 000	2 422 200	250 800
10	7 400 000	37 000 000	703 000	984 200	2 997 000	2 715 800	281 200
11	8 200 000	41 000 000	779 000	1 090 600	3 321 000	3 009 400	311 600
12	9 000 000	45 000 000	855 000	1 197 000	3 645 000	3 303 000	342 000

13	9 800 000	49 000 000	931 000	1 303 400	3 969 000	3 596 600	372 400
14	10 600 000	53 000 000	1 007 000	1 409 800	4 293 000	3 890 200	402 800
15	11 400 000	57 000 000	1 083 000	1 516 200	4 617 000	4 183 800	433 200

Source: own study.

Under the adopted model assumptions, the operation of the insufficient capitalization (thin cap) mechanism causes, that above 30 MM of loan (deduction of interest payment is 3 MM=30MM*10%), the company's tax liabilities increase in comparison to the situation when no limit is set to include debt financing costs to the company's costs. The last column in Table 1 shows the amount of additional budget income/expenditure that the company must incur due to the mentioned limit. It is worth noting that the assumptions made in the model cause a linear increase of this amount.

Insufficient (thin) capitalization is therefore a source of more favorable interest treatment than dividends based on income tax. This phenomenon occurs when the company is financed by debt - through loans. The applicable regulations do not introduce a difference between debt financing in the form of a bank loan and loans granted by the shareholders of a given enterprise. In this case, loans granted by the shareholders are in fact hidden contributions to capital, and their purpose is to replace the company's share capital with loans/credits only to achieve measurable tax benefits (Fordońska, Partyka 2009) Financing a company's activity through credit is an attractive form of financing mainly due to tax benefits consisting in the possibility of including interest on the loan received as tax deductible costs, which reduces the tax base and thus the tax. Different tax effects occur in the case of final financing, which is the company's own funds, which may come from the shareholders' funds or from the company's own funds. **Thin capitalisation – is it still profitable?**

The previous part of the article showed that the introduced limit of including the costs of debt financing by an enterprise in its costs resulted in an additional cash inflow to the state budget and higher taxes for the enterprise. But how does the introduction of this limit affect the profits of the partners / shareholders of a capital company? Is crediting your business still profitable? In order to find an answer for this question and based on the model presented above, it was extended with further assumptions. The model considered below consists of the following assumptions:

- the income tax rate is 19%;
- the interest rate is 10%;
- there are no costs related to depreciation (EBITDA = EBIT);
- loan to EBITDA rate is 5;
- the company's profit is fully paid to its shareholders shareholders are the only loan providers.

Figure 3 presents a graphical model of the profit distribution of the company's shareholders.

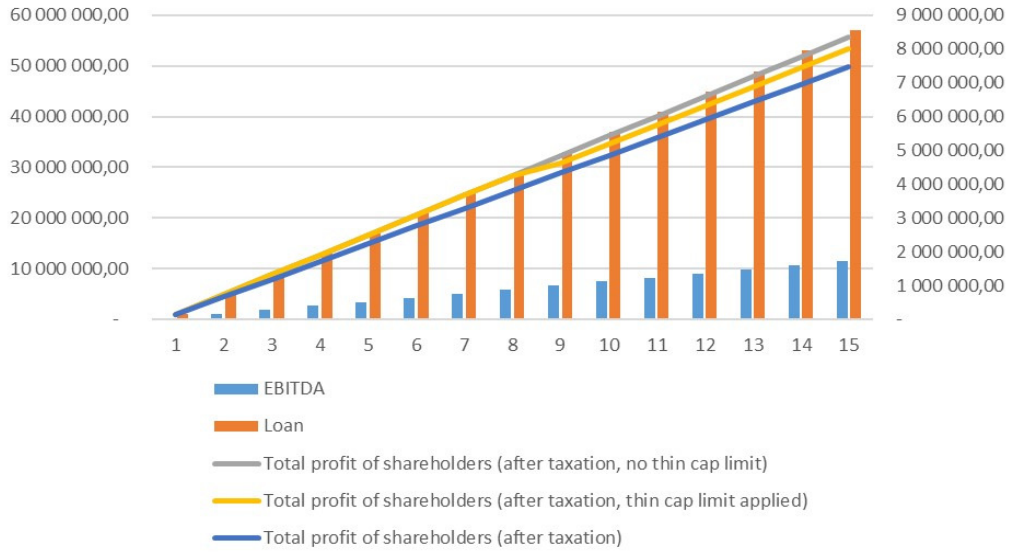

Source: own study.

The presented model of shareholder profit distribution (maintaining the adopted model assumptions) shows that thin capitalization financing is still more advantageous compared to financing an enterprise wi-thout a loan. The chart clearly shows that the solution that brings the lowest income to shareholders is to finance the enterprise without borrowing from its shareholders. Using thin capitalization and taking into account the adopted income tax rate, the model shows a decrease in shareholders' income above 30MM of the value of loan. The table below shows exactly the differences in shareholders' profit depending on the adopted financial model of the enterprise.

Table 2: Numerical data presenting the distribution of shareholders' profits when using thin capitalisation and in the absence of it (Fig. 3).

			Calculations assuming that the shareholders provide a loan to the company					Calculations assuming that the company does not use the loan at all	
	EBITDA	Loan	Shareholders profit on the loan granted to the enterprise (after taxation)	Dividend paid to shareholders (after taxation, no thin cap limit)	Dividend paid to shareholders (after taxation, thin cap limit applied)	Total profit of shareholders (after taxation, no thin cap limit)	Total profit of shareholders (after taxation, thin cap limit applied)	Total profit of shareholders (after taxation)	Difference in shareholders profit (in favor of the credit model)
1	200 000	1 000 000	81 000	65 610	65 610	146 610	146 610	131 220	+15 390
2	1 000 000	5 000 000	405 000	328 050	328 050	733 050	733 050	656 100	+76 950
3	1 800 000	9 000 000	729 000	590 490	590 490	1 319 490	1 319 490	1 180 980	+138 510
4	2 600 000	13 000 000	1 053 000	852 930	852 930	1 905 930	1 905 930	1 705 860	+200 070
5	3 400 000	17 000 000	1 377 000	1 115 370	1 115 370	2 492 370	2 492 370	2 230 740	+261 630
6	4 200 000	21 000 000	1 701 000	1 377 810	1 377 810	3 078 810	3 078 810	2 755 620	+323 190
7	5 000 000	25 000 000	2 025 000	1 640 250	1 640 250	3 665 250	3 665 250	3 280 500	+384 750
8	5 800 000	29 000 000	2 349 000	1 902 690	1 902 690	4 251 690	4 251 690	3 805 380	+446 310
9	6 600 000	33 000 000	2 673 000	2 165 130	1 961 982	4 838 130	4 634 982	4 330 260	+304 722
10	7 400 000	37 000 000	2 997 000	2 427 570	2 199 798	5 424 570	5 196 798	4 855 140	+341 658
11	8 200 000	41 000 000	3 321 000	2 690 010	2 437 614	6 011 010	5 758 614	5 380 020	+378 594
12	9 000 000	45 000 000	3 645 000	2 952 450	2 675 430	6 597 450	6 320 430	5 904 900	+415 530
13	9 800 000	49 000 000	3 969 000	3 214 890	2 913 246	7 183 890	6 882 246	6 429 780	+452 466
14	10 600 000	53 000 000	4 293 000	3 477 330	3 151 062	7 770 330	7 444 062	6 954 660	+489 402
15	11 400 000	57 000 000	4 617 000	3 739 770	3 388 878	8 356 770	8 005 878	7 479 540	+526 338

Source: own study

The data presented in the table explain numerically the information contained in Fig. 3. The analysis of the model shows that despite the thin capitalization mechanism, this method of financing is still more profitable for shareholders. The data shows the measurable benefits of such a financial model. Assuming EBITDA = 200 000 and loan 1 000 000, the shareholders gain 15,390 in the tax settlement. With the extreme values in the model (EBITDA 11 400 000 and loan 57 000 000), the difference between the discussed methods of financing the enterprise is 526 338.

Conclusion

The current legal solutions mean that loan financing (while maintaining the established limitations) is still more favorable in the tax aspect due to the tax benefits consisting in the possibility of recognizing interest as tax deductible costs, which reduces the tax base and thus the tax. Different tax effects occur in the case of financial

costs higher than the established limits. In the presented model, up to EBITDA = 6 000 000 and loan = 30 000 000, the company's tax liabilities are of the same value (thin cap or without). Above these values, the company will pay more taxes on thin capitalization financing. Shareholders, on the other hand, feel the difference in the adopted model of financing the enterprise from the very beginning (in favor of loan financing). In the case of definitive financing, such as the company's own funds, which may come from the shareholders' funds or the company's own funds, the shareholder remuneration for the capital contributed to the company is a dividend. However, unlike interest, it cannot be accounted for as tax deductible costs. Moreover, the dividend is taxed twice - once as income at the company level, and the second time - as a dividend at the shareholder level (Tomczyk 2019). In the case of interest, double economic taxation does not occur. The payment of interest does not create a tax obligation as it is considered in the cost category. The presented benefits are the main reason for replacing equity capital with debt to a shareholder.

The mechanisms introduced to limit the inclusion of debt financing costs to enterprise costs are aimed at increasing the state budget revenues (as shown in the discussed model). It is worth to emphasize, that the current formula of the mechanism of insufficient capitalization (PLN 3 MM or 30% EBITDA) will have an impact on tax settlements mostly for relatively large enterprises. It seems that the change in regulations is dictated by trends that occur in this field internationally.

From the point of view of the state budget, the discussed issue is important because when the repayable financing is initiated (loans), the tax base is reduced by interest on loans (credits). Moreover, with regard to loans from foreign entities, this is disadvantageous to the Treasury if, according to the agreement on avoiding double taxation, interest is not taxed with withholding tax in Poland. In addition, the company's use of repayable financing, with a minimum shareholding, complicates the situation of the company's creditors, since it is much easier to return the loans granted by shareholders than the return of their capital contributions, and therefore in the first case there is a threat of depletion of the company's assets, from which the creditors they could potentially satisfy themselves. That is why most countries, including Poland, fight against thin capitalization using tax regulations. These laws take similiar forms in different countries.

Regardless of the adopted model, their application boils down to eliminating part of interest from tax deductible costs, which results in a higher tax base. The practice of creating tax law shows, that forms of tax optimization, especially those involving the use of loopholes in the law and inaccuracies, along with any amendment to tax laws are fought by the legislator.

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A Fuzzy Set Analysis of Resources, Capabilities and University Spin-off Performance

Anna KWIOTKOWSKA

Silesian University of Technology, Gliwice, Poland
akwiotkowska@polsl.pl

Abstract

Prior literature does not sufficiently explain how different types of resources and capabilities contribute to perfomance of university spin-offs (USOs) nor does it clarify how these firms can combine different resources and capabilities to achieve superior performance outcomes. In addition, capturing performance outcomes of complex systems of interdependencies using commonly employed methods, such as regression models, is often difficult. Thus, this study employs a configurational approach, using fuzzy set Qualitative Comparative Analysis (fs/QCA), to analyze the resource and capability configurations of USOs that yield superior performance. The study finds no evidence of high-performing configurations without highly qualified human resources and shows that highly performing firms configure their resourecs and capabilities in three different ways. The results have implications for theory in the area of the initiation and growth of university spin-offs (USOs) as well as for configurational strategy research in general.

Keywords: Resources, Capabilities, University Spin-Off, Fuzzy Set Qualitative Comparative Analysis.

Introduction

Research related to university spin-offs (USOs) is attracting increasing attention, as they are now acknowledged as an important source of innovation that provides an impetus to regional and national competitiveness and economic growth (e.g. Shane 2004, Nicolaou, Birley 2003; Goldstein 2010; Newbert et al. 2008; Rothaermel et al. 2007; Stephan 2014). An USO can be defined as "a new company that is formed by a faculty, staff member, or doctoral student who left the university or research organization to found the company or start the company while still affiliated with the university, and/or a core technology (or idea) that is transferred from the parent organization" (Clarysse et al. 2011).

Many researchers claim that it is essential to recognize the heterogeneity and the context of USOs, because not all USOs are able, or required, to achieve high growth (Grimaldi et al., 2011), while high-growth USOs do play a particularly important role in university technology transfer and economic return. As a result, a couple of frameworks have been developed to assist research into USOs, while recognizing their heterogeneity, and empirical studies have identified a range of factors facilitating or hindering the initiation and growth of USOs (e.g. Colombo, Piva 2012; Iacobucci, Micozzi 2014; Knockaert et al. 2011, Scholten et al. 2015; Visintin, Pittino 2014).

Resource heterogeneity has been emphasized as one of the major themes besides institutional diversity and business model differences, however, a limited number of attempts have been focused on the configurations of resources and capabilities and their performance implications in the area of USOs. What is more, one of the major challenges that new ventures face with is to identify and acquire the appropriate resource base. The main focus of the literature is, however, on the effects that are contributed to the venture's success by individual resources. This approach enables the identification of the basic, most significant resources necessary for a new venture to develop; however, it does not explain the iterations and relationships existing between resources in the context of this so complex business phenomenon. Moreover, in line with the approach of the resource-based theory, resource bundles and competitive advantage underlie resource-based configurations (Heirman, Clarysse, 2004). These configurations are built by

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managers using the capabilities of the organization. It is also essential to determine how the resources interact and how resources and capabilities contribute to performance. In this context, the overall view is provided by the configurational approach that enables the full understanding of the connections between the resources and capabilities and their performance implications.

A configurational approach comes, with several challenges. Theoretically, researchers have to take a novel approach because different factors may lead tomultiple configurations with comparable outcomes. In configurational analysis, therefore, the focus shifts from the net effect of a single characteristic on performance to the analysis of multiple configurations associated with high performance. Empirically, configurational arguments also face the methodological challenges of modelingmultiple, complex relationships between the elements of a configuration (Fiss 2007, 2011). To overcome the methodological challenges of testing the configurations of resources and capabilities, the current research uses fuzzy set qualitative comparative analysis (fs/QCA), a set-theoretic configurational approach with the ability to handle high degrees of complexity in how different causal conditions combine to bring about an outcome (Ragin, 2000, 2008). This research attempts to develop an analytical framework based on fs/QCA in order to answer the following research questions: How are bundles of resources and capabilities configured in the area of the initiation and growth of USOs?; and How are these configurations associated with high performance outcomes? This research attempts to construct a framework for analyzing USOs in general by gaining a better understanding of the initiation and growth process of USOs in emerging economies. On the other hand, this paper seeks to improve the understanding of the resource-performance link by demonstrating how resources and capabilities contribute to USOs performance and what different resource and capability configurations lead to high performance outcomes.

The remainder of this paper is structured as follows. First, a brief literature review of research related to the configurational approach and resource-capability configurations in USOs is provided and the conceptual framework is introduced. Next, method and data is described and the results of empirical analyses is presented. The concluding section discusses the implications of findings for the development of USOs and also for theory and practice.

Theoretical background

Many researchers have claimed that it is essential to recognize the heterogeneity and context of USOs (e.g. Colombo, Piva 2012; Grandi, Grimaldi 2003; Grimaldi et al. 2011; Knockaert et al. 2011, Rasmussen et al. 2011, Scholten et al. 2015; Wright et al. 2008; Visintin, Pittino 2014) before addressing their growth potential, rather than to negate the value of USOs in haste. The heterogeneity of USOs has been studied from different theoretical perspectives. The first stream of research uses the resources-based approach. Further, there exists research that considers the diversity of resources within USOs, including the nature of the technology, the source of the resources, the company's financial resources, their social networks, their initial resource and other resources. Another area of research reported in the literature distinguishes the types of USOs based on their business model. Studies conducted in this area encompass the characterization of activities associated with the growth of USOs, distinguishing the sectors in which those firms are located and indicating to the key indicators that make them different from other start-ups. The third perspective of conducted studies is related to the links of USOs with their parent organization and the research conducted within the institutional environment, from which those firms originate. Thus, resource heterogeneity has been emphasized as one of the major themes besides institutional diversity and business model differences; however, limited attempts have been focused on the bundles of resources and capabilities, which lead to high performance, and much less, on determining whether alternative resource and capability confirgurations exist, which will equally lead to high performance (the equifinality concept), while enabling USOs to grow and survive in the market.

The configurational approach represents one of the main directions of research on the subject of strategic organization and management found in the literature (Fiss, 2007). This approach is of particular interest due to the multidimensional nature of an organization, where the competitive advantage relies not on a single attribute, but instead on mutually complementary, complex and diverse characteristic features. As Fiss (2007: 1188) argues, the configurational approach emphasizes that organizations are best understood as the associations of interrelated structures and practices rather than modular or loosely connected wholes, whose components could be understood separately. Importantly, aside from offering a more holistic perspective to the understanding of organizational activities, configurational approaches facilitate insights into the equifinality of different configurations (Fiss, 2007). What is more, configurations are an important means of capturing the complexity of an organization and understanding the relationship between the

organizations and their performance outcomes. It can therefore be assumed that if resources and capabilities are really related, one should be able to distinguish between different types of resource and capability configurations.

This research is embedded in the resource- based view of the firm literature (Barney, 1991; Teece et al., 1997), which considers the resources and capabilities of a firm as a predictor of competitive advantage and growth. The goal is to bring out the differences in the resources and capabilities of USOs and identify the common patterns of relationships between resources and capabilities and their performance implications. Although extant research has revealed little about the configurations of resources and capabilities, there is some body of work that has investigated the role of resources and capabilities in the creation and development of USOs, and that can serve as a guideline for identifying the relevant resources and capabilities in this area. While one might be tempted to include a long list of resources and capabilities in a conceptual model, prior studies have warned that such a procedure can result in spurious variables that impede the detection of configurational cluster structures in empirical data. Therefore, the number of resources and capabilities considered has been limited by focusing on a set of core constructs that are literature-based to ensure their theoretical and empirical relevance.

The literature on entrepreneurship shows that start-up business ventures differ significantly mainly in financial resources, technological resources and human capital (e.g. Delmar et al., 2013; Druilhe and Garnsey, 2004; Heirman, Clarysse 2004; Lundqvist, 2014; Miozzo, DiVito, 2016; Wennberg et al., 2011; Wright et al., 2012, Vohora et al., 2004). It should be emphasized that, in turn, organizational cannot be easily acquired by new ventures as they are built over time. Thus, at the beginning, that is when a new venture starts operation, organizational resources are not developed. Hence, organizational resources were not included in the research concept.

From a capabilities perspective, a few studies have focused on the creation and survival of USOs, e.g. (i) the knowledge and complementary capabilities of USOs (Colombo, Piva, 2012); (ii) the capabilities of the entrepreneurial team (Clarysse, Moray, 2004); (iii) the capability to obtain financial resources (Wright et al., 2012); and (vi) the innovation capability (Zhou, Minshall, Hampden-Turner, 2010) however, research that investigates capabilities together with resources needed for achieving high performance outcomes in a configurational approach remains sparse.

Importantly, one of the methods of using the configurational logic to entrepreneurial organizations, which undoubtedly USOs are, is to consider the cognitive patterns of entrepreneurial thinking, and especially entrepreneurial capabilities. The identification of leading entrepreneurial capabilities will cast more light on the relationships between entrepreneurial thinking and outcomes, such as the performance of organizations. For example, some configurations of organizations may have high intensity of innovativeness and low intensity of the other components, while some patterns can be better adjusted to given situations than others. Entrepreneurial capability is considered to be a latent multidimensional construct (Covin, Slevin, 1989). According to Covin and Slevin (1989), innovativeness, proactiveness, and risk-taking are the central aspects of the entrepreneurial behaviour of entrepreneurial firm.

A growing body of literature has considered the importance of networks and networking capability for the initiation and growth of new entrepreneurial ventures (Zheng et al, 2020). Start-up can enhance its early performance by establishing broad networks to overcome the limitations of newness at reduced cost. Moreover, network relations act as a bridge to gain access to information and resources that supplement the entrepreneurs' or nascent firms' own assets (Delmar, Shane, 2004). There is general support for the notion that entrepreneurs with a more developed network, in terms of the quality and number of ties, are more likely to succeed and reach high performance than those having a less developed network.

Therefore, in terms of capabilities, the research approach in this paper has been based on the understanding of innovation capabilities and entrepreneurial capabilities. So, in accordance with the previous assumptions, by simplifying the construct to core constructs and taking into consideration the determinants of the establishment and growth of USOs, the following capabilities have been included in the framework: networking capability and innovative and risk-taking capability. The theoretical framework is shown in Figure 1. It is worth reiterating that the present study seeks to advance the knowledge of the resource-performance link by exploring bundles or configurations of resources and capabilities. To investigate these issues, the fs/QCA was used as discussed in the next section.

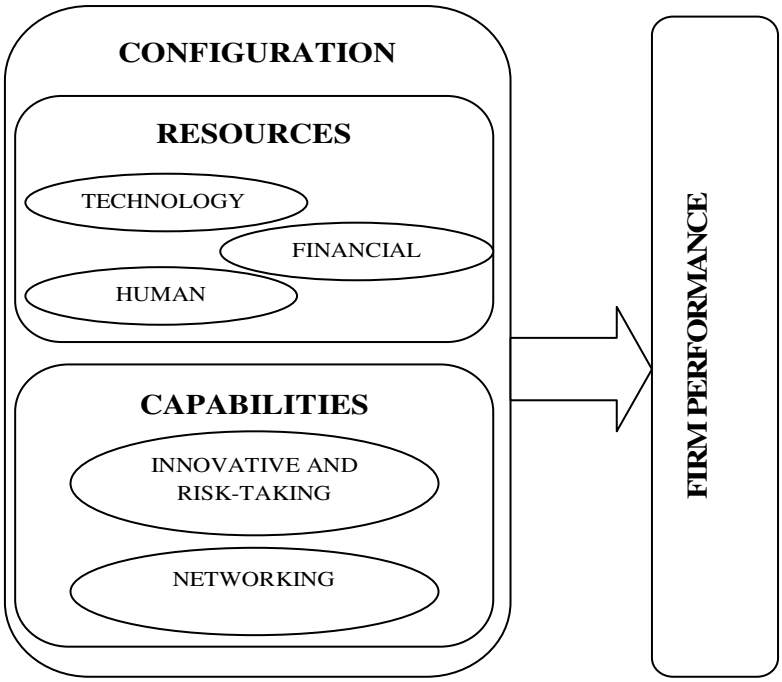

Fig.1. Theoretical framework

Source: own study

Method and data

The type of research selected by the author was the multiple case study, in which several cases were studied simultaneously within a single research undertaking. A consequence of the selected research method was the non-random, intentional choice of a sample from Polish USOs. The selection of enterprises was guided by the following criteria: the selected enterprises are relatively new, developing business ventures relying on the transfer of knowledge (as seen from the aspect of the transfer of intellectual assets, and not only technologies), set up by young persons being final-project students, doctoral students, or academics. The research was conducted in the form of interviews with the founders or management representatives of 53 USOs, in the period from April to November 2019.

Information collected from the surveys and from other sources (e.g. the internal documentation of the enterprises, archival data, websites) was used for carrying out an analytical procedure using fuzzy set Qualitative Comparative Analysis (fs/QCA) - set-theoretic analysis technique. The aim of fs/QCA is not to prove the existence of causal relationships but rather to reveal patterns that support the existence of causal relationships (Schneider, Wagemann, 2010). Set-theoretic analysis examines causal patterns, focusing on relationships among subsets. This study uses fs/QCA to identify configurations of resources and capabilities that contribute towards high performance in 53 Polish USOs. In theoretical and empirical terms, it is a novel context in which to use fs/QCA. What is more, the USOs, as relatively young firms, are typically less complex than more established firms, so they provide a comparatively clean setting for an empirical exploration of the effect of resources and capabilities. Thus, by using fs/QCA in this context, it is possible to illustrate the value of this nascent approach while addressing an important gap in the current scientific literature on the management of entrepreneurial organizations.

To explore the ways in which resources and capabilities might influence the performance outcomes of USOs, fs/QCA treats each possible configuration of key variables as a single case and identifies the necessary and sufficient causal

conditions associated with each configuration. Through comparison, these cases are reduced to the minimum combinations of causal factors (e.g. resources, capabilities) necessary for an outcome to occur (e.g. performance outcome). The analysis also uses consistency and coverage as two key parameters for assessing the fitting of the fs/QCA results to the underlying data.

Consistent with prior research, the perceived measurement of firm performance was used, where the respondents rate their performance in relation to their competitors. According to Chandler and Hanks (1994), asking firms to evaluate their performance by comparing themselves with their competitors leads to a higher level of reliability and validity. To illustrate the performance outcomes a tool invented by Antoncic and Hisrich (2001), were used (alpha = .95). The items used to measure financial, technological and human resources came from the study by Heirman and Clarysse (2004). The operationalisation of networking capability is based on a refined version of Walter, Auer, and Ritter (2006) research (alpha = .87). From these studies, three items were selected that measure each of the four dimensions (coordination activities, relationship skills, partner knowledge and internal communication). Innovative and risk-seeking capability refers to a firm's overall innovativeness and proactiveness. Innovative capability refers to a firm's ability to espouse new and creative ideas, products, or processes designed to service markets (Lumpkin, Dess 1996). Risk-seeking capability refers to firms' ability to undertake significant and risky resource commitments in markets. The measures of innovativeness and risk taking (alpha = .83) were taken from the work of Covin and Slevin's (1989). The study uses 10 interviews in various companies to evaluate the questionnaire on interpretability and ease to complete. Several items had slightmodifications based on managers' answers.

The condition and outcome variables differed in their underlying forms and were recoded for inclusion in the analysis on a continuous scale from 0 to 1 (Ragin, 2008). Subsequently, a direct coding method was utilized to code individual case data points (as explained in Ragin, 2008). The direct method focuses on the three qualitative anchors that structure the degree of membership to the focus set. These are: (1) the threshold for full non-membership; (2) the threshold for full membership and; (3) the cross-over point, where there is some ambiguity about membership.

The next analytic step is the consideration of causal configurations of conditions and the outcome, here elucidated through truth tables. The truth table represents logically possible combinations of included conditions and is the key tool of set-theoretic analysis (Ragin 2008). The important point is that the rows in each truth table are not specifically representing individual cases, but the logical configurations for which they were strongly associated at each one case (with five conditions considered there are 25 = 32 logical configurations).

Next, the causal conditions most strongly linked with the perfrmance outcome was considered. This fundamentally comes down to seeing what combinations of causes discern those configurations. Prior to this, consideration has to be given to those configurations which are not included in the respective truth table. These are configurations that are theoretically plausible, but not empirically present. The inclusion of the remainders in the analysis, by considering their association with the absence of the outcome, leads to what is called the 'complex' solution. An alternative is to exclude the remainders from the analysis. This is termed the parsimonious solution. Between these there is a solution 'guided by theory', which attempts to assign the outcome to logical remainders, termed the intermediate solution (see Ragin, 2008). Importantly, the different treatments of these logical remainders lead to different solution formulas. However, all formulas are logically true because they do not contradict the available empirical information contained in the truth table. The fs/QCA 2.5 software was used in the analysis, which provided results consisting of a complex solution, a parsimonious solution and an intermediate solution.

Results

In this research the parsimonious and intermediate solutions are presented and analyzed. The results from the parsimonious and intermediate solutions can be summarized using a configuration chart – Table 1. Utilizing the notation system from Ragin and Fiss (2008), each column in Table 1 represents a configuration of conditions linked to the respective outcomes. Full circles (●) indicate the presence of a condition while blank spaces indicate "don't care". Each panel represents the alternative causal combinations or recipes for the outcome (Ragin, 2008). These are consecutively numbered S1a, S1b, S2.

Table 1: Configurations for high USOs performance

Configuration	Solution		
	S1a	**S1b**	**S2**
Conditions			
Financial resources	●	●	
Technological resources			●
Human resources	●	●	●
Networking capability	•		•
Innovative and risk-seeking capability		•	•
Consistency	0.91	0.92	0.98
Raw Coverage	0.53	0.64	0.61
Unique Coverage	0.01	0.12	0.06
Solution Consistency	0.92		
Solution Coverage	0.75		
Note: ● = core causal condition present; • = peripheral causal condition present.			

Source: own study

In brief, consistency measures the degree to which cases sharing a given condition agree in displaying an outcome. Raw coverage measures the overall coverage of a combination that may overlap with other combinations. Unique coverage refers to coverage uniquely due to a combination. Solution consistency measures the degree to which membership in the solution (the set of solution terms) is a subset of membership in the outcome. Lastly, solution coverage refers to the combined coverage of all combinations leading to the outcome (see also Ragin, 2008).

Table 1 indicates that there are three core conditions associated with high performance, namely the presence of human resources in all three solutions, financial resources in solutions S1a and S1b and technological resources in solution S2. Regarding overall coverage, the solution accounts for 75% of membership in the outcome and, thus, presents acceptable fit. Further, all three configurations show high consistency values from 0.91 to 0.98,with the overall solution consistency at 0.92. The overall solution for high performance implies first-order (or across-type) equifinality of solutions. The neutral permutations within solution 1 (1a and 1b) imply second-order (or within-type) equifinality.

As for the peripheral conditions related to high performane, the analysis indicates that in solution S1a the core conditions are complemented by networking capability. So, this group includes USOs in which the scientific mastery combines with the managerial talent, being grounded not only on considerable, broad experience (in the market, in management, and in a given scientific discipline), but also on numerous contacts and network links with the shareholders, industrial partners or support units. These firms have obtained considerable capital support, coming mainly from investors, less often from venture funds. For solution S1b, the core conditions are complemented by innovative and risk-seeking capability. This group includes enterprises, which are additionally characterized by high proactiveness and innovativeness. So, the primary motivation for establishing a firm of this group was the self-employment, self-direction in recognizing, taking and using opportunities, and the willingness to act independently. Moreover, emphasis is laid in these firms on research and development, innovations, and the employees are encouraged

to think and act in an original and novel way. Solution S2 indicates that technological resources and human resources as a core conditions with networking capability and innovative and risk-seeking capability as a peripheral conditions leads to high perfomance of USOs. These firms have innovative technologies, manufacture technologically advanced products, chiefly on their own, and have substantial market share, not only in the domestic but also the world's market. Interestingly they have high networking and innovative and risk-seeking capabilities. This type of USOs have the ability to coordinate relationships, build knowledge about partners, as well as relational skills. They are operating in dynamic environments where proactive distance search efforts are often necessary to drive innovation and performance. This firms strongly emphasize the need to drive innovation

Discussion and Conclusions

This study, through the use of fs/QCA, sought to improve our understanding of the resource-performance link by investigating the following main issues. First, it demonstrates how bundles of resources and capabilities are configured in the area of the initiation and growth of USOs. Second, it enables one to examine how these configurations are associated with high performance outcome. This study confirms that different combinations of resources and capabilities can lead to the same outcomes - high USOs performance. The analysis has identified three alternative causal combinations of resource and capabilities. This finding provides many interesting insights for entrepreneurship research, especially with regard to the initiation and growth of USOs. Importantly, the results suggest that the presence of innovative and risk-seeking capability or networking capability with human resources are strongly associated with high performance in the case of surveyed population of Polish USOs. It's also interesting to discover configurations of innovative and risk-seeking capability and networking capability with human and technological resources.

Despite the strengths of the results presented here, the findings do raise many questions about the nature of resource and capability configurations and their impact on the performance of USOs, which are worth further research. One of the many advantages of fuzzy analysis over crisp set-theoretic analyses is that it can accommodate gradations in the focal outcome variable. Subsequent work could therefore follow Greckhamer's et al. (2018) example and go beyond the binary outcomes of high or low performance to investigate multiple gradations of performance from very low, low, quite low, neither low nor high, right through to very high. This would vividly illustrate the singularity of individual causal configurations and allow the full range of causal asymmetry across possible configurations to be explored in the greatest detail.

At the same time, it might happen that attributes other than those considered in this analysis are equally able to distinguish between high performance outcome in the case of USOs. Moreover, another measure may be used to illustrate the performance results. Variables such as social capital, customer orientation and cognitive diversity are all identified as critical intangible resources in the strategic management literature. Set-theoretic analyses that brought together the measures of these variables with those that are identified as core conditions in this analysis, would cast valuable new light on the nature of USOs. For now, it is safe to say that fs/QCA offers a powerful means to theorize and test for the presence of complex attribute configurations in entrepreneurial organizations.

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Organizational Pride, Work - Life Balance, Leadership Style, Rewards and Job Satisfaction in SMES. QCA

Magdalena GEBCZYNSKA

Silesian University of Technology, Gliwice, Poland, Magdalena.Gebczynsk@polsl.pl

Abstract

Lack of attention to job satisfaction as basic human needs leads to some organizational abnormalities and insufficient reactions at workplace. The purpose of this article is to examine how different factors, such as: organizational pride, work - life balance, leadership style and rewards simultaneously affect the employee job satisfaction in SMEs. The fuzzy-set Qualitative Comparative Analysis was used. The paper is structured as follows. First, the four factors connected to employee job satisfaction were analysed. Then the sample used was described together with the measures used for each variable involved. Finally, the main results obtained were shown and discussed, and conclusions were drawn regarding future research directions.

Keywords: job satisfaction, SME, QCA

Introduction

The small and medium enterprises (SMEs) are significantly important to the Polish economy, and like in other countries, SMEs are driving force of growth and development. Nowadays, attracting and retaining of reliable and competent employees is the big challenge to the organization in the competitive business labour market. An unsatisfied employee is the first enemy of the organization. A satisfied employee will be an asset to the organization. When employees are satisfied with the work they do, they become happy and produce better results than when they are unhappy, that's why motivating and retaining qualified employees is very important in ensuring the success of organizations (Sohail and Jang, 2017). One of the main items that improves human resource is job satisfaction and should be support by managers of organizations (Wegge et al., 2007).

Job satisfaction is the Holy Grail of organizational psychology (Mitchell et al., 2017). The presence of job satisfaction among staff assumed as positive factor that improve and increase level of organization outcome (Tazekand, Nafar and Keramati, 2013). Job satisfaction affects a person's general wellbeing for the reason that people spend a good part of the day at work. Consequently, if a person is dissatisfied with his work, this could lead to dissatisfaction in other areas of his life.

One of the most widely used definitions in organizational research is that of Locke (1976), who defined job satisfaction as a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences. Employee job satisfaction according to Gu, Zhen, Song, and Xu (2019) is a measure of people's contentedness with their job and an assessment of their work experience. The presence of job satisfaction can increase personal efforts, communications, staff abilities, the amount of personnel tendency toward their job and totally helps to growth of an organization (Aziri, 2011). Belias and Koustelios (2014) elaborate job satisfaction as the employees' perceptions of their working environment, relations among colleagues, earnings and promotion opportunities. Satisfied employees are adherence towards their work which lead to improve their performance, and the success of an organisation is highly depends on the performance of the employees. The purpose of this article is to identify and indicate the constellation of factors simultaneously affecting employee job satisfaction in small and medium enterprises. With this aim, the main theoretical and empirical studies on this subject have been revised.

Based on literature review and on previous research conducted by author, to analyse in this research four factors were chosen: organizational pride, work - life balance, leadership style and rewards. Previous research, resulted in partial view on job satisfaction and shows that numerous, single factors or phenomena have effects on employee job satisfaction. These research are devoid of a global view to indicate how different factors simultaneously affect job satisfaction. Using fuzzy- set qualitative comparative analysis (fs/QCA), this study examines the complex ways to achieve employee job satisfaction. A set-theoretic configurational approach, with the ability to handle high degrees of complexity in how different causal conditions combine to bring about an outcome. QCA explicitly allows for

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equifinality of different combinations of causal conditions. Equifinality means that different configurations of causal conditions (factors) can lead to the same outcome - employee job satisfaction.

Theoretical Framework

Based on a broad and critical analysis of the literature and on previous research conducted by author, chosen factors influencing employee job satisfaction will be characterized below. Organizational pride is essentially a psychological structure examined in psychology studies with a particular focus on the relationship of employees with their organizations (Haslam, 2004). In general, pride is a positive emotion that signals success and nurtures an individual's self-perception, a central human need (Kraemer et al., 2017). Organizational pride consists of feelings of admiration, importance, and value based on evaluations of status made by staff (Todd, and Kent, 2009). Pride is a positive, self-conscious emotion that is based on success (Tracy et al. 2009).

Organizational pride has been the subject of research and interest of both management practitioners and scientists as a key factor of enterprise success and due to its impact on positive employee behaviour (Katzenbach, 2003). Research on organizational pride suggests a significant and positive relationship between pride and job satisfaction (Gunter and Furnham, 1996). Organizational pride is referred to as an encouraging constructive work environment that needs high social recognition with the organization (Kraemer and Gouthier, 2014) and it is an important factor for business success (Gouthier and Rhein, 2011). Appleberg (2005) states that organizational pride influences the decision to stay in a company and stimulates employee commitment.

Research on organizational pride has shown the impact of pride on job satisfaction (Gunter and Furnham 1996; Arnett et al., 2002). Employees who are identified with their work and who are proud to work in a enterprise are also satisfied in their jobs (Van Dick et al., 2004). Furthermore, organizational pride is considered as an antecedent of job satisfaction when it is referred to employee's emotional attachment to, identification with and involvement in the organization (Lok and Crawford, 2001).

Organizational pride involves high appreciation for and a strong emotional attachment to the organization. Kraemer and Gouthier (2014) divided organizational pride into two types, the first is emotional pride and the second is attitudinal pride. Emotional pride is pride which is strong but discrete contrast to emotional pride, organizational pride in attitudes is collective, resulting from the staff desiring to belong to the company (Fisher and Ashkanasy, 2000).

Work-life balance is a term refers to maintaining an optimum balance amidst work roles, life roles and personal responsibilities and therefore becomes a crucial concern that demands attention (Haar et al., 2014).

There are different views on how work-life balance should be defined, measured and researched (Grzywacz and Carlson, 2007). A healthy work-life balance assumes great significance for employees particularly in the current context in which both, the family and the workplace have posed several challenges and problems. Work-life balance is multi-disciplined consisting of labour economics, human development, organizational behaviour, psychology, sociology, women studies, demography, management and industrial relations (Drago and Kashian, 2003). Kalliath and Brough (2008) proposed a definition of work–life balance drawn from the occupational stress theoretical framework, i.e. work–life balance as the individual's perception that work and non-work activities are compatible and promote growth in accordance with an individual's current life priorities (Kalliath and Brough (2008). Swami (2007) defined work-life balance as a practice that is concerned with providing scope for employees to balance their work with the responsibilities and interests they have outside work.

A work-life balance is all about people having a control over the work when, where and how they do (Kamau et al., 2013). An effective work-life balance assists a person in achieving both personal and professional goals (Oludayo et al., 2015). Schermerhorn (2013) revealed that work-life balance is the ability of a person to balance the demands of work with their personal and family needs. Based on earlier research and findings (e.g. Ojo et al., 2014; Oludayo, et al., 2015), there is relationship between work-life balance and different variables. The last findings (Pathak, Dubey, and Singh, 2019) directly indicate that work life balance has a deep impact on individuals/employee job satisfaction in industries. The higher the level of balance in the work life of an individual employee the higher will be his commitment to his work and more will be the satisfaction in his job. Kasbuntoro et al.(2020) state similarly, namely work-life balance have a significant influence on job satisfaction.

Research of the management and organizational behaviour fields shows that the leadership style of managers influences employees' job satisfaction (Judge et al., 2001). Leadership has deep relevance and influence on the human resources of a firm in terms of attracting people to achieve the goals of organizations (Skansi, 2000) and it is critical for organizational success (Bryant, 2003). Employee's satisfaction is linked to a lot of external factors such as leadership styles which effect on staff's feeling and change their attitudes about job (Bahadori, 2012; Khera and

Gulati, 2012). Leadership is the ability of a manager to influence, motivate, and enable employees to contribute to organizational success (Having, 2011). Leadership as a management function is mostly related to human resources and social interaction. It is the process of influencing a group of people towards achieving organizational goals (Skansi, 2000). Leadership styles vary from situation to situation (Lok and Crawford, 2004). Most leaders adapt their leadership style in accordance with the demand and working environment of an organization (Zahari and Shurbagi, 2012). There is no universal leadership style, and different leadership styles are needed for different situations. An effective leader must know when to exhibit a particular approach. Rowold et al. (2014) propose that the leadership style of an employee's supervisor positively affects the employee's organizational commitment and job satisfaction. Leadership behaviour of managers plays a critical role in employees 'job satisfaction and commitment (Wu et.al.,2006). The leadership style always directly or indirectly affects the job satisfaction of the employees in their organization. Research indicate that transactional leadership style and transformational leadership style have a positive relationship with employee's job satisfaction in small and medium enterprises (Sakiru et. al, 2013).

Rewards aim to motivate employees to work better so they can improve their performance. Awarding is one of the ways that companies can do to improve the performance of their employees. Edwards et al. (2006) explained that rewards were received as an exchange of services between employee and employer. The reward can affect job satisfaction and employee performance (Riasat et al., 2016). Employee reward is about how people are rewarded in accordance with their value to an organisation and includes both monetary and non-monetary rewards. Gerald and Dorothee (2004) indicate that job rewards are strong determinant of job satisfaction and also rewards are significantly related to professionalism and job satisfaction and that employees' job satisfaction is affected by both financial and non-financial rewards.

Delineation between intrinsic and extrinsic rewards was recognised for the first time during 1950s by Herzberg ,who suggested two types of rewards:(a) intrinsic or job content factors (related to the job itself) such as achievement, recognition, and advancement (so-called motivators), and (b) extrinsic or job context factors (factors around the job, settled within the working environment) such as pay, job security, and working conditions (so-called hygiene factors). Rehman et al. (2010) found that extrinsic rewards are strong relationship with job satisfaction as compared to intrinsic rewards. Researchers suggested that intrinsic factors has a significant impact on job satisfaction of employees. Putra et al. (2018) mentioned that an intrinsic reward is a form of self-satisfaction what has an influence on job satisfaction.

Methodology of Research

This study identified which constellations of chosen factors are conducive to the employee job satisfaction in small and medium enterprises. The chosen factors consisted of: organizational pride, work - life balance, leadership style and rewards. This study used the survey technique to better understand the determinants of job satisfaction in Polish SMEs. Data were collected from SMEs in Poland during the first quarter 2019 and the fieldwork contains information from 97 surveys. After the exclusion of incomplete questionnaires, data for the analysis comprises 81 valid surveys, representing a response rate of 83,50%. All questions were presented in the form of 5- point Likert scales, where respondents indicate their level of agreement/disagreement All item loadings are higher than 0.7. An extensive review of the relevant literature supports the validity of the scales (Table 1). From a psychometric perspective, one single-item overall measure captures job satisfaction was used. The use of single-item measures to operationalize this construct (Cronbach Alpha = 0.929) compares favourably with the use of multiple-item measures (Dolbier et al., 2005). Research model is presented in a Figure 1 and it is verified in the process of scientific research.

Table 1: Scales measurement

Factors	Adapted from	Cronbach Alpha
Organizational pride	Construct was measured by 3-items from Gouthier and Rhein (2011)	0.89
Work-life balance	Construct was measured by 4 items from Brough et al. (2014)	0.93
Leadership style	Construct was measured by 20-item Leadership Style Questionnaire, developed by Northouse (1997)	0.92
Rewards	Rewards practices were measured using a 6-item proposed by Tessema and Soeters (2006)	0.82

Source: own study.

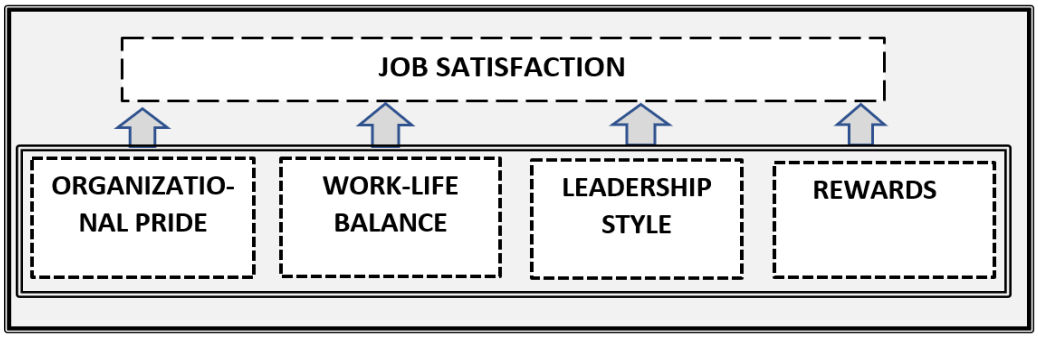

Figure 1: Conceptual model

Source: own study.

To analyse the data a set-theoretic approach was chosen, specifically fuzzy set Qualitative Comparative Analysis (fs/QCA). The fs/QCA 2.5 software developed by Ragin and Fiss (2008) used to analyse the data. According to Ragin and Fiss (2008), fs/QCA is suitable for samples of 10–50 cases. Unlike the reliance of symmetric (correlation-based) methods on matrix algebra, fuzzy-set QCA uses Boolean algebra to specify and test recipes (Ragin and Fiss, 2008; Woodside, 2015). The process of QCA starts with defining the property space which comprises all configurations of conditions leading to an outcome. Given that "the property space delimits potential explanations of the outcome, the (conditions) should be chosen carefully and anchored in extant theoretical knowledge" (Ordanini, et al., 2014). In fuzzy-set QCA, both the causal conditions (the four chosen factors) and the outcome (job satisfaction) are represented using fuzzy membership scores (Ragin and Fiss, 2008), which requires calibrating all variable scales to range from 0.00 for full non-membership to 1.00 for full membership. To perform fuzzy-set calibration, criteria are necessary for three breakpoints, set at 0.05 for the full non-membership threshold; 0.50 for the crossover point; and 0.95 for the full membership threshold (Ragin and Fiss, 2008).While the continuum between these two extremes reflects varying degrees of membership, the crossover point represents cases that are neither in nor out of the set (Schneider et al., 2010). Table 2 shows the calibration process and indicates the transformation of both the outcome and the antecedent conditions into fuzzy terms.

Table 2: distribution of each variable and its corresponding set

Variable	Full non-membership (0.05)	Crossover point (0.5)	Full membership (0.95)
Organizational pride	0.180	1.610	3.814
Work-life balance	0.237	2476	5.220
Leadership style	0.253	3.012	5.632
Rewards	0.336	3.029	5.742
Job satisfaction	0.339	2.591	4.612

Source: own study

The analysis of sufficient conditions involves three steps (Ragin and Fiss, 2008): construction, preparation, and analysis of the truth table. Reduction of the truth table shows several useful statistics. Overall solution consistency indicates the degree to which the sub-set relationship holds for sufficiency. The overall solution coverage refers to the joint importance of all causal paths. Unique coverage of causal conditions is similar to unique R-square calculations in regression analysis in that it illustrates the relative weight of each path by measuring the degree of

empirical relevance of a certain cause or causal combination to explain the outcome. Reduction of the truth table is carried out by the Quine-McCluskey algorithm which provides a logical reduction of statements (Ragin and Fiss, 2008). A necessity test was executed to examine whether there is a single condition in all configurations to job satisfaction. A condition is necessary when its consistency is above 0.9 (Skaaning, 2011), which indicates the degree to which a condition is present in all cases with the same outcome. In this study no necessary conditions were found.

Results

Based on the conceptual model presented above, a questionnaire was developed and series of surveys was carried out to collect data on job satisfaction in SMEs. The research model links the causal conditions (organizational pride, work - life balance, leadership style and rewards) to the outcome (job satisfaction). Two constellation were found to lead to high job satisfaction. The first constellation (C1) combines work-life balance, leadership styles and rewards. The second constellation combines the presence of organizational pride and leadership styles. The results of empirical research was presented in Table 3.

Table 3: constellation of factors lead to high job satisfaction

Factors	Constellations	
	C1	C2
Organizational pride		●
Work-life balance	●	
Leadership style	⬤	⬤
Rewards	●	
Consistency	0,91	0,89
Raw coverage	0,40	0,31
Unique coverage	0,04	0,03
Solution consistency	0,87	
Solution coverage	0,59	

Source: own study

Raw coverage refers to the total percentage of cases with the associated outcome that is represented by a solution term. Raw coverage refers to the total percentage of cases with the associated outcome that is represented by a solution term. 40 % of the cases that represented the job satisfaction in SMEs are represented by constellation C1, 31% by C2. Unique coverage refers to the percentage of cases that is only represented by the regarding constellation and not simultaneously by another constellation. Consistency refers to the percentage of cases of a configuration that result in the associated outcome. The overall solution consistency of the constellations of factors of complex causal recipes that can lead to the job satisfaction in Polish SMEs is 87%. The overall coverage of 59 % indicates that the three solution terms jointly cover 59% of the cases. Utilizing the notation system from Ragin and Fiss (2008), each column in the Table 3 (C1, C2) represents a constellation of conditions linked to the respective outcome. Full circles (●) indicate the presence of a condition, while blank spaces indicate "don't care". Further, core and complementary conditions are distinguished by the symbols' size: larger circles indicate core conditions that are part of parsimonious solutions. Smaller circles indicate complementary conditions that only occur in intermediate solutions. Each panel represents the alternative causal combinations or paths for the outcome (Ragin and Fiss, 2008).

Discussion and Conclusion

The first constellation of the factors (C1) combines work-life balance, leadership style and rewards. Table 3 indicates that there are one core condition associated with job satisfaction, namely leadership style, which is complemented by peripheral conditions associated with job satisfaction – work-life balance and rewards. This constellation indicate that the ability of a manager to influence, motivate, and enable employees to contribute to organizational success, and providing scope for employees to balance their work with the responsibilities and interests they have outside work, and with job content factors such as achievement, recognition, and advancement and with job context factors such as pay, job security, and working conditions lead to job satisfaction.

The second constellation of factors (C2) combines leadership style and organizational pride. Interestingly, as in the previous solution, the results show that there is one core condition associated with job satisfaction, namely leadership style. In terms of peripheral conditions associated with job satisfaction, the QCA suggest, that the core condition must be complemented by organizational pride. This constellation indicate that the process of influencing a group of people towards achieving organizational goals, and high appreciation for and a strong emotional attachment to the organization lead to job satisfaction.

It is worth noting that in these two constellations, the leadership style is an important and core factor by which employees achieve a high level of job satisfaction, so leadership behaviour of managers affect employee job satisfaction. Thus, the leadership style is a necessary (but insufficient) condition for high level of job satisfaction. High level of job satisfaction require the peripheral conditions associated with job satisfaction, namely work-life balance, rewards and organizational pride. The presence of satisfied employees as human resources in enterprises play great role and is very vital, that should be considered by managers of organizations. The success in achieving the organizational goals depends on the quality of human resources. Human resources in an organization occupy a critical position because it acts as the motor or driving force of an organization.

The results of research have practical implications for managers of SMEs, because they may provide them with a more holistic understanding of the factors that lead to job satisfaction. Use of fs/QCA is an original contribution to the wide range of research on job satisfaction, by studying the effect of all of selected conditions simultaneously and provide managers two constellations of conditions, affecting employee job satisfaction. Future research could replicate this study in other companies and countries or regions.

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Improvisation as The Enhancer of Corporate Entrepreneurship

Przemysław ZBIEROWSKI
University of Economics in Katowice, Katowice, Poland, przemek@zbierowski.com

Milena GOJNY-ZBIEROWSKA
University of Economics in Katowice, Katowice,Poland,
1 Maja 50, 40-287 Katowice, Poland, milena.gojny@ue.katowice.pl

Abstract

The paper aims at investigating the influence of improvisation on corporate entrepreneurship, understood as entrepreneurial orientation. Intuitively improvisation is closely connected to EO, surprisingly, there is very little theoretical and empirical evidence on that relation. The paper aims at closing that gap by empirically investigating the role that improvisation plays in enhancing corporate entrepreneurship.
There is some empirical evidence on role of improvising in individual entrepreneurship (Hmieleski & Corbett, 2003; Baker, Miner & Eesley, 2003; Best & Gooderham, 2015). We use Hmieleski and Corbett's (2006) framework of improvisation as three-dimensional construct (creativity-bricolage, pressure-stress, action-persistence) and entrepreneurial orientation as three-dimensional (innovativeness, proactiveness, risk taking) construct to investigate the impact of improvisation on individual components of EO. The research has been carried out on a sample of 406 senior managers from medium and large organisations.
Improvisation has proven to have a moderate impact on entrepreneurial orientation. Moreover, different dimensions of improvisation influence components of EO in different way: creativity and bricolage have positive impact on innovativeness and proactiveness and pressure-stress has impact on propensity to take risk.
The study has implications for the theory of corporate entrepreneurship by highlighting possible antecedents of EO. Moreover, the results are significant for business practice as they provide useful ways of promoting corporate entrepreneurship.

Keywords: improvisation, corporate entrepreneurship, entrepreneurial orientation

Introduction

There are many ways in which entrepreneurs emerge from the society and start doing business. Some of them have a clear recognition of the opportunity and pursue it, some others are 'pushed' into entrepreneurship by external conditions. Some of them, however, have a special ability to create things out of existing limited resources – to improvise. That ability allows them to do things in a way that is different from the others – and sometimes that difference is sufficient to form a venture. Improvisation than has been proven to have a positive effect on the intention to become an entrepreneur (Hmieleski & Corbett, 2006). However, entrepreneurship is not limited to starting a business on one's own – corporate entrepreneurs can be as successful and in some settings more effective. What about them then – do they use improvising in their way to form a venture? are improvising employees and improvising companies more entrepreneurial? In this study I aim at answering those questions. The paper then aims at investigating the influence of improvisation on corporate entrepreneurship, understood as entrepreneurial orientation. Intuitively improvisation is closely connected to EO, surprisingly, there is very little theoretical and empirical evidence on that relation. My paper aims at closing that gap by empirically investigating the role that improvisation plays in enhancing corporate entrepreneurship.

Additionally, the paper concerns the role of environment in the relation between three dimensional construct of improvisation (creativity and bricolage, ability to function and excel under pressure-filled and stressful environments and spontaneity and persistence) and entrepreneurial orientation. I argue that the impact of the shape of environment (dynamism, hostility and complexity) is significant and the influence of improvisation on corporate entrepreneurship is even stronger in turbulent, resource-limited, complex and uncertain environments. The research was carried out within research project 2014/13/B/HS4/01618 funded by National Science Centre, Poland.

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The nature of improvisation

Improvisation is defined as the creative and spontaneous process of attempting to achieve an objective in a new way (Vera & Crossan, 2003). Improvisation is by some authors used as an opposite for radical innovation (Ozgen & Minsky, 2016). I follow the view on improvisation presented by Hmieleski and Corbett (2006) and widely accepted in entrepreneurship research. According to them improvisation is a multi-stage process, in which at first an individual is presented with a problem Next, the individual compares the problem to others that he or she has previously faced and based on a past experience selects a referent – a plan or strategy for reacting to the problem. After identifying the referent, the individual considers its feasibility given the constraints that characterize the problem. If the referent is feasible and has a high probability of success, then it should be followed. Otherwise, the individual improvises by either extending or reconfiguring the referent to construct a novel course of action. This entire process occurs simultaneously, such that the individual is assessing probabilities and formulating strategy while acting out the solution.

Hmieleski and Corbett (2006) also present a coherent framework of improvisation composed of three dimensions: creativity and bricolage, ability to function and excel under pressure-filled and stressful environments and spontaneity and persistence. Creativity and bricolage represents the extent to which individuals are able to produce novel solutions under constrained conditions by recombining available resources. Individuals high in this dimension are likely to seek out opportunities to display their ingenuity. Ability to function and excel under pressure-filled and stressful environments represents the ability of individuals to excel in uncertain and rapidly changing environments. Individuals who are high in this dimension tend to rise to the occasion and perform best under pressure. Spontaneity and persistence represents the action orientation and determination of individuals toward achieving goals and solving problems in the moment. Individuals who are high in this dimension tend to prefer action rather than analysis and are highly focused on the problem at hand. These individuals are opportunistic and act with an instinct.

Hmieleski and Corbett (2006) confirmed the three-dimensional nature of improvisation using principal components confirmatory factor analysis. They also propose an aggregation of results in separate dimension to form a total score representing an individual's overall proclivity for improvisation. However, due to the differences in meaning of creativity and bricolage, ability to function and excel under pressure-filled and stressful environments and spontaneity and persistence I argue that they might be measured separately as components of multi-dimensional construct to provide more insight into the impact of improvisation on corporate entrepreneurship.

Improvisation as part of individual entrepreneurship

There is no evidence on the impact of improvisation on organisational level on entrepreneurial orientation. There is, however, some empirical evidence on role of improvising in individual entrepreneurship. Hmieleski and Corbett (2003) in their study of individual entrepreneurs challenge the paradigm of entrepreneurship research that considers the entrepreneurial process to be volitional, rational and linear. They argue that, due to various environmental constraints and cognitive limitations, the entrepreneurial process is often unplanned, non-rational, and circuitous and consider the role of improvisation in research focusing on entrepreneurial action. Later Hmieleski and Corbett (2006) claimed that improvisation can extend entrepreneurship theory by providing a framework for explaining how entrepreneurs deviate from both strategic plans and cognitive biases and heuristics in order to exploit opportunities in the moment, as they arise. They have proven that entrepreneurial intentions are significantly associated with measures of personality, motivation, cognitive style, social models, and improvisation, however, the strongest relationship is found between entrepreneurial intentions and improvisation.

Hmieleski and Corbett (2006) propose a framework of entrepreneurial action depending on the novelty of the situation and resource constraints of the individual or firm (Figure 1). When information and time are abundant, strategic planning is likely to be the choice. When time and information are both limited, but the entrepreneur has moderate knowledge of the problem or opportunity, then cognitive heuristics and biases are likely to be used. When resources are abundant, but the novelty of the situation is very high, the entrepreneur can afford to take a trial-and-error approach. When resource constraints are high and the entrepreneur is faced with a novel problem or opportunity, then improvisation appears to be the most best course of action. Constraints on time and resources do not allow for planning or trial-and-error, and the extreme novelty makes the use of heuristics and biases untenable.

		Resource constraints	
		Low	High
Novelty	High	Trial-and-error	Improvisation
	Low	Strategic planning	Heuristics and biases

Figure 1: Entrepreneurial action under varying degrees of novelty and resource constraints (Hmieleski & Corbett, 2006).

Hmieleski and Corbett (2008) conducted the study on moderating effect of entrepreneurial self-efficacy on the relationship of founders improvisational behaviour with performance of their start-ups and individual level of work satisfaction empirically. They prove that improvisational behaviour has a positive relationship with new venture performance (i.e., sales growth) when exhibited by founders who were high in entrepreneurial self-efficacy, but negative effect on new venture performance when exhibited by founders who were low in entrepreneurial self-efficacy. They also discovered that entrepreneurial self-efficacy has a negative moderating effect on the relationship between entrepreneur improvisational behaviour and work satisfaction.

Baker, Miner, and Eesley (2003) demonstrate that improvisation is often an elemental factor in the founding of new firms and that it is also useful in the exploitation of opportunity. The authors note, however, that their study was exploratory, inductive, and designed to focus only on generating hypotheses about improvisation and firm founding. Best and Gooderham (2015) on the other hand investigate improvisation as part of entrepreneurial behaviour.

Jahanmir (2016) in her study on the decision making styles of entrepreneurs, where she sets apart trade-off and paradoxical thinking, states that sometimes entrepreneurs are able to reconcile a contradiction of improvisation against planning, especially at later stages of venture creation. Some scholars also use improvisation as procedural trait of actions undertaken by entrepreneurs. Evers and O"Gorman (2011) claim that internationalization process is strongly influenced by two 'resources to hand': the entrepreneurs' idiosyncratic prior knowledge and their prior social and business ties and observed an effectuation logic and extensive improvisation in the internationalization process of new ventures.

The critical part of improvisation is bricolage which often is used by many authors as an independent variable, not being a part of a wider concept of improvisation. The concept of bricolage is also used referring to social bricolage to research entrepreneurship in specific forms and contexts, such as social entrepreneurship (Di Domenico, Haugh & Tracey, 2010) and arts entrepreneurship (Preece, 2014). The latter paper highlights the importance of six key elements for the success of bricolage, including: making do, a refusal to be constrained by limitations, improvisation, social value creation, stakeholder participation, and persuasion.

Improvisation on organisational level

Apart from the importance for entrepreneurs in forming new ventures, many scholars stress its role in organizational life. Davis, Eisenhardt and Bigham (2009) in their study exploring the tension between too little and too much structure that is shaped by the core trade-off between efficiency and flexibility in dynamic environments claim that a strategy of simple rules, which combines improvisation with low-to-moderately structured rules to execute a variety of opportunities, is viable in many environments but essential in some. They find that entrepreneurial organizations should quickly add structure in all environments, while established organizations are better off seeking predictable environments unless they can devote sufficient attention to managing a dissipative equilibrium of structure (i.e., edge of chaos) in unpredictable environments.

Linna (2013) in her study on significance of bricolage especially as a way to mobilize resources recognizes three different types of bricolage: a social mindset combined with resourcefulness; making do with resources at hand; and improvisation as way of proceeding. She argues that improvisation is an effective way of introducing innovation. Also Smets, Morris and Greenwood (2012) state that improvisations at work can generate institutional change by shifting field-level logic to focus on innovations.

Miner, Bassoff and Moorman (2001) indicate that improvisation can be accepted and incorporated into formal organizational activities, such that organizations may be able to plan for improvisation by creating opportunities for

improvisation and supporting the improvisation process. That view reconciles a contradiction between improvisational innovation and planned innovation that is suggested by some authors. Improvisation therefore might be use alongside other approaches of innovation to provide wider set of ideas for various circumstances.

All of the above views treat improvisation as an organizational activity. It means that improvisational activities are shared among employees and become a part of organisational culture and are further reinforced by the recruitment and selection of employees. Therefore, there arises the question on the impact of improvisation on some other organisational-level phenomena, such as corporate entrepreneurship and entrepreneurial orientation. To research this we treat entrepreneurial orientation as a three-dimensional construct (innovativeness, proactiveness and risk taking) as opposed to other forms of the construct with four or five dimensions (autonomy, aggressiveness). We also treat entrepreneurial orientation as multi-dimensional construct as opposed to uni-dimensional one. It means that we investigate each dimension separately instead of aggregating the results to a single score, although of course the dimensions are closely related.
The impact of improvisation on innovativeness is clearly apparent in above evidence – improvisation is a way to achieve innovations, so I hypothesise that:

H1. Improvisation has positive influence on innovativeness.

The relation between improvisation and proactiveness is less obvious and has not been a matter of empirical investigation and theorising. Proactiveness is opposed to reacting to competitors moves and is connected with gaining first-mover advantage. I argue that proactiveness is at the heart of improvisation. Although improvisation is by some authors used as an opposite for radical innovation (Ozgen & Minsky, 2016) which may result with higher proactiveness of radical innovators I argue that improvisation leads to outcomes that are different from those of radical innovation, but not necessarily less advanced. Therefore I hypothesise:

H2. Improvisation has positive influence on proactiveness.

Similarly to the above arguments, improvisation might be perceived as less risky than radical innovation. Moreover, there is evidence that improvisation demands less investments in risky activities than other forms of innovation. In that view, improvisation is a good way of balancing risk and innovating with low to medium level of risk. However, I argue that improvising organisations take more risk than those that neither improvise nor apply radical and other forms of innovation. Therefore I hypothesise:

H3. Improvisation has positive influence on risk taking.

Improvisation in unstable and resource-scarce environment

Existing literature on improvisation within organizations suggests that the critical element for the need and success of bricolage and improvising is the shape of the environment. More specifically, improvisation makes much more sense in unstable and resource-scarce environments than in stable and abundant ones. Hmieleski and Corbett (2006) criticise the view that entrepreneurship research should be centered around the process through which individuals identify and exploit opportunities to create future goods and services (Venkataraman, 1997) as a strategically planned sequence of opportunity identification followed by evaluation and execution. They claim that this model fails to fully elucidate how entrepreneurs behave within the highly uncertain, novel, and turbulent environments in which they often operate (Baron, 1998) and they support the notion of Baker, Miner and Eesley (2003) that those conditions are common throughout the entrepreneurial process. Linna (2013) argues that bricolage is especially effective as a method of innovation in a resource-scarce context. Smith and Blundel (2014) draw attention to the difference between established, big corporations and smaller entrepreneurial companies operating in unfriendly environments, especially in periods of economic crisis and instability. Authors argue that the typical strategy in those conditions is retrenchment and rationalisation designed to cut costs. Some firms adopt a more entrepreneurial approach, in which the key features are strategic reappraisal and various forms of product, process and organisational innovation. However, the differences in responses of big and small companies is in the nature of innovation. Big companies invest more money in risky activities while smaller companies use improvisation closely related to entrepreneurial bricolage as a means of accessing the resources required. As a result entrepreneurial companies are able to identify opportunities associated with new and expanding markets with scope for innovation. Those results are analogical to Linna's (2013) findings, but taken to organisational level. The importance of improvisation in uncertain and resource constrained environments is also highlighted by Häkkinen, Kannampuzha, Baker, Hmieleski, Honig, Miner, Powell & Sarasvathy (2016). They state that in the contemporary turbulent and constantly changing economic environments, it is difficult to predict the outcomes of an action and thus plan the societal, organizational end entrepreneurial goals beforehand. Also Vera and Crossan (2003) suggest six factors enhancing the effectiveness of improvisation: environmental turbulence,

experimental culture, real-time information and communication, memory, expertise, and teamwork skills, and Vera and Kachra (2004) develop a theoretical model of improvisational decision making as a new paradigm of how top management teams make decisions in fast-changing contexts.

Taking the above into consideration we formulate hypotheses on the combined impact on entrepreneurial orientation by improvisation and the environment that is turbulent, resource-limited and complex and uncertain:

H4: Environmental dynamism, hostility and complexity strengthen the impact of improvisation on entrepreneurial orientation.

Method, sample, variables and measures

To empirically test the above hypotheses I conducted a cross-sectional research on a random sample of 406 firms using CAPI technique by contracted research firm. In each of the firm senior manager was asked to answer the questions. The average time of one interview was 25,5 minutes. The methods of statistical analysis include reliability analysis, correlation analysis and regression analysis. Statistical analysis was carried out using SPSS software. For each of the dimensions of entrepreneurial orientation (innovativeness, proactiveness and risk taking) four regression models were tested. In the first one only control variables (size and age of the company) were placed as independent variables. In the second model only dimensions of improvisation (creativity and bricolage, ability to function and excel under pressure-filled and stressful environments and spontaneity and persistence) were placed as independent variables. In third model both control variables and dimensions of improvisation were independent variables and in the fourth model they were also supplemented with dimensions of external environment (dynamism, hostility and complexity).

As control variables were characterised by high skewness I decided to use natural logarithms of age (in years) and size (in number of employees) as control variables. Improvisation was measured by modified measure adapted from Hmieleski and Corbett (2006). Three items were used to measure each of the dimensions of improvisation: creativity and bricolage (α=.728), ability to function and excel under pressure-filled and stressful environments (α=.768) and spontaneity and persistence (α=.741). Entrepreneurial orientation was measured by eight-item Kreiser, Marino and Weaver (2002) scale. Three items measure innovativeness (α=.751), three measure proactiveness (α=.786) and two items measure propensity to take risk (α=.738). Environment dynamics was measured by two items (Naman & Slevin, 1993), environment hostility by two items (Green, Covin & Slevin, 2008) and environment complexity by one item (Miller, 1987).

Research results

The table below presents the means, standard deviations and correlations among the researched variables (Table 1).

Table 1: Means, standard deviations and correlations among the researched variables.

	Natural logarithm of age	Natural logarithm of size	Environment: complexity	Environment: hostility	Environment: dynamism	EO: risk taking	EO: proactiveness	EO: innovativeness	Improvisation: action-persistence	Improvisation: pressure-stress	Improvisation: creativity-bricolage
Mean	2.66	3.51	4.94	4.45	3.65	4.20	4.34	3.92	5.11	4.64	4.98
SD	.69	.88	1.35	1.30	.99	1.71	1.58	1.79	.80	.91	.92
Improvisation: creativity-bricolage	.019 .643	-.032 .445	**.183**** **.000**	.050 .233	.074 .075	**.228**** **.000**	**.240**** **.000**	**.236**** **.000**	**.529**** **.000**	**.513**** **.000**	
Improvisation: pressure-stress	-.021 .620	.072 .085	.036 .388	**.129**** **.002**	.064 .124	**.274**** **.000**	**.121**** **.004**	**.101*** **.015**	**.437**** **.000**		
Improvisation: action-persistence	-.068 .104	-.024 .574	**.097*** **.020**	.009 .827	.010 .814	**.191**** **.000**	**.178**** **.000**	**.159**** **.000**			
EO: innovativeness	-.055 .187	.045 .284	**.156**** **.000**	**-.092*** **.027**	**.122**** **.003**	**.206**** **.000**	**.438**** **.000**				
EO: proactiveness	-.048 .253	.079 .060	.107* .010	**-.139**** **.001**	-.019 .655	**.331**** **.000**					
EO: risk taking	-.025 .548	**.114**** **.007**	.043 .298	.014 .735	.071 .087						
Environment: dynamism	-.053 .205	.058 .165	**.123**** **.003**	.100* .016							
Environment: hostility	.045 .276	**-.094*** **.024**	**.297**** **.000**								
Environment: complexity	.056 .182	-.065 .121									
Natural logarithm of size	**.154**** **.000**										

The analysis of correlation suggests some very strong relations between all dimensions of improvisation and all dimensions of entrepreneurial orientation. Those results may be partly due to common method bias, nevertheless should be taken into consideration and confirmed in regression analysis. Individual dimensions of improvisation are also correlated to some of the variables concerning environment: creativity and bricolage with complexity, ability to function and excel under pressure-filled and stressful environments with hostility and spontaneity and persistence with complexity.

Table 2: Regression models with innovativeness as dependent variable.

	Innovativeness			
	Model 1	Model 2	Model 3	Model 4
Stable	3.965 .000	1.442 .005	1.448 .026	.914 .209
Natural logarithm of size	.110 .201		.136 .109	.110 .190
Natural logarithm of age	-.161 .143		-.169 .115	-.156 .140
Environment: dynamism				**.167** **.023**
Environment: hostility				**-.205** **.001**
Environment: complexity				**.209** **.000**

Improvisation: creativity-bricolage		**.440** **.000**	**.439** **.000**	**.371** **.000**
Improvisation: pressure-stress		-.078 .414	-.088 .362	-.031 .749
Improvisation: action-persistence		.127 .248	.132 .235	.117 .285
R^2	.006	.059	.064	.105
Adj. R^2	.002	.054	.055	.092
p	1.79	1.74	1.75	1.71

The explanatory power of all of the models of regression with innovativeness as dependent variable is rather low and below .1. The only dimension of improvisation that influences innovativeness is creativity and bricolage and the relation is highly statistically significant. Therefore, hypothesis H1 is partly supported. The last model achieves the adjusted R^2 much higher than other models. This proves that the shape of the environment plays an important role in the processes of improvisational innovation. However, the influence of environmental hostility is negative, so higher innovativeness is achieved with improvising in munificent environments, but at the same time complex and dyamic.

Table 3. Regression models with proactiveness as dependent variable

	Proactiveness			
	Model 1	Model 2	Model 3	Model 4
Stable	4.16 .000	1.94 .000	1.68 .003	2.20 .001
Natural logarithm of size	**.159** **.036**		**.183** **.014**	**.159** **.031**
Natural logarithm of age	-.146 .129		-.152 .105	-.150 .107
Environment: dynamism				-.051 .423
Environment: hostility				**-.224** **.000**
Environment: complexity				**.171** **.001**
Improvisation: creativity-bricolage		**.360** **.000**	**.399** **.000**	**.347** **.000**
Improvisation: pressure-stress		-.037 .660	-.083 .322	-.006 .942
Improvisation: action-persistence		.150 .120	.157 .104	.118 .217
R^2	.010	.062	.078	.113
Adj. R^2	.007	.057	.070	.101
p	1.57	1.53	1.52	1.50

Again, the only dimension of improvisation that influences proactiveness is creativity and bricolage and the relationship is highly statistically significant. Therefore, hypothesis H2 is partly supported. Similarly, the last model achieves explanatory power higher than the previous models (.101) which proves that the influence of environment is significant. In case of proactiveness as dependent variable two dimensions of environment are significant: hostility (negative effect) and complexity (positive effect). So similarly to innovativeness, improvisation has stronger effect on proactiveness in munificent but complex environments.

Table 4: Regression models with risk taking as dependent variable

	Risk taking			
	Model 1	Model 2	Model 3	Model 4
Stable	3.66 .000	.999 .039	.503 .408	.216 .756
Natural logarithm of size	**.233** **.004**		**.214** **.007**	**.211** **.009**
Natural logarithm of age	-.107 .305		-.089 .376	-.086 .396
Environment: dynamism				.068 .333
Environment: hostility				-.023 .690
Environment: complexity				.023 .670
Improvisation: creativity-bricolage		.178 .057	.191 .044	.185 .056
Improvisation: pressure-stress		**.378** **.000**	**.350** **.000**	**.351** **.000**
Improvisation: action-persistence		.109 .289	.118 .253	.127 .227
R^2	.015	.087	.099	.102
Adj. R^2	.011	.082	.091	.090
p	1.70	1.63	1.63	1.64

Results of regression analysis with risk taking as dependent variable are different from the other two dimensions of entrepreneurial orientation. First of all, the only dimension of improvisation that has impact on risk taking is the ability to function and excel under pressure-filled and stressful environments. Therefore, hypothesis H3 is partly supported. Secondly, the environment has no influence on the processes of improvisation and risk taking – the explanatory power of the fourth regression model is even lower than of the third model and none of the environment variables achieves statistical significance. Despite no impact of environment on improvisation-risk taking relation, it is significant with two other relationships, therefore, hypothesis H4 is partly supported.

Discussion

The conducted analyses bring some interesting results. First of all, there is a positive impact of improvisation on entrepreneurial orientation. That impact is manifested differently when it comes to individual dimensions of improvisation and entrepreneurial orientation, but is moderately strong and statistically significant. As assumed, creativity and bricolage has a strong effect on two dimensions of entrepreneurial orientation: innovativeness and proactiveness. That supports the theorising and empirical evidence of other authors stressing the role of improvisation in the process of innovation. What is important, the measure of creativity and bricolage focuses more on the process and the measure of innovation focuses more on the result. Therefore, bricolage really results in new products, services and processes being introduced. Moreover, it allows the companies that are improvising to be ahead of their competitors – pursue them aggressively and gain first-mover advantage. It shows that innovations created by improvising are not qualitatively lower than those created by radical innovation.

The dimension of improvisation that influences risk taking is ability to function and excel under pressure-filled and stressful environments. It is quite meaningful relationship – different aspect of improvisation results in higher willingness to take risk. It seems that even though regression analysis does not show universal relationships among all dimensions of improvisation and entrepreneurial orientation, those that exist point to individual components of improvisation resulting in individual components of entrepreneurial orientation, which supports the thesis that both constructs are multi-dimensional instead of uni-dimensional.

Finally, the significance of environment is quite apparent. Surprisingly, environmental hostility (related to resource scarcity) is negatively related to presented relationships. It means that improvisation creates higher results (in terms of innovativeness and proactiveness) in munificent environments and is contrary to previous findings. The component of environment that has positive effect on the relationship between improvisation and entrepreneurial orientation is environmental complexity. Uncertain conditions seem to favour improvisation as a way of introducing innovations. The component of entrepreneurial orientation that is not related to environment is risk taking.

Practical recommendations, contribution, limitations and future research directions

Research results provide a couple of recommendations for business practice. As Miner, Bassoff and Moorman (2001) suggest, improvisation can be incorporated and become a part of the formal structure of the organisation. It might also be planned and work alongside other forms of innovation to support them. Therefore, some activities should be undertaken by companies to foster improvising. Scarcity of resources could work as a trigger for those processes. Companies using improvising are able to achieve advantage, especially in a specific context. It should be considered though that improvising can be achieved at its highest level with a specific organizational structure and leadership style.

The study contributes to the discussion on the role of improvising in organisational processes, especially concerning innovations and corporate entrepreneurship despite having some limitations. One of them is simplified research model that is due to scarcity of empirical evidence in that regard. The study might be also laden with some bias, especially common method bias, therefore, future researchers in the field might consider using more fine-tuned measures and multi-source approach. It could be also fruitful to research some possible mediation/moderation with other variables, for instance leadership style or the effects of leadership style and organizational structure and culture, such as psychological empowerment (Spreitzer, 1995, 1996). Those kind of extended research models might yield some more interesting results. To gain even more insight into complex relationship between improvisation and entrepreneurial orientation it could be considered in future research to use a mixed method approach and enrich the empirical investigation with some qualitative techniques.

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Psychological Capital Cross-Over Effect

Milena GOJNY-ZBIEROWSKA

University of Economics in Katowice, Katowice, Poland
milena.gojny@ue.katowice.pl

Abstract

Psychological capital has proven to be a critical resource for employees desirable attitudes like satisfaction, commitment or well-being, desirable behaviours and performance. Furthermore, the PsyCap of followers benefits from PsyCap of leaders, however, despite some evidence, the conditions of that cross-over are largely unknown. This study explores the importance of three factors: age difference between leader and employee, leaders' age and organizational justice as moderators of the effect of leaders' PsyCap on followers' PsyCap. Using the data from random sample of 406 senior manager-direct subordinate dyads I confirm the PsyCap cross-over effect. Moreover, I find that the effect is stronger for older leaders and when the organizational justice is lower. The article concludes with practical implications and limitations of these findings and directions for future research.

Keywords: Psychological Capital, Organizational Justice, Leader, Age

Introduction

Psychological capital, or simply PsyCap, is known as predictor of desirable behaviours and attitudes. Previous research has proven that organizations benefit from high level of PsyCap of their leaders and followers. PsyCap is a useful predictor of important employee outcomes in the workplace like high productivity, low absenteeism, organizational citizenship behaviours, wellbeing etc. (e.g., Avey, Luthans & Jensen, 2009; Avey, Luthans & Mhatre, 2008; Luthans et al., 2007; Luthans et al., 2013; Avey, et al. 2011; Peterson et al. 2011; Youseff-Morgan & Luthans 2015). Investigations proved positive correlation of PsyCap with creative and innovative performance, innovation behaviour (Rego et al. 2012; Huang & Luthans, 2015; Özsungur 2020), performance (Baykal & Zehir, 2018; Peterson et al. 2011), then happiness (Williams, Kern & Waters, 2015). PsyCap is also negatively related to undesirable factors like turnover intention or stress (Avey, Luthans & Jensen 2009), cynicism, anxiety and deviance (Avey et al. 2011). Some studies exposes that PsyCap moderates and mediates relationships between others variables like authentic leadership and work engagement (Du Plessis & Boshoff, 2018), conveyed leader PsyCap and creative task performance (Avey, Richmond & Nixon, 2012) etc. PsyCap of workforce is crucial for organization because, as we know so far, crucial are the outcomes of it (Luthans & Youseff-Morgan, 2017). That is why recognising PsyCaps' antecedents, identifying causal processes related with PsyCap and boundary conditions for them is so important.

Some research has suggested that leadership may play a key role in developing follower PsyCap (Avey, Avolio & Luthans 2011). There is not much known about boundary conditions of this link. In literature was found just a couple investigations discussing this connection.

Extending existing studies, in current paper, drawn on social theories, is argued that between leader PsyCap and employee PsyCap exists significant relationship. In order to close the gaps mentioned above is further hypothesised that the linkage between leader PsyCap and employee PsyCap is moderated by age differences in leader and follower dyads, leader age and organizational justice. Research presented here makes a contribution to positive organizational behaviour by exploring PsyCap boundary conditions. This study has three objectives: (1) to re-examine the relationship between leaders' and followers' PsyCap; (2) to investigate how this relationship is moderated by organizational justice; and (3) to examine if the relationship between followers' and leaders' PsyCap is stronger when manager is older.

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Psychological Capital and its cross-over effect

It has been almost 15 years since PsyCap was introduced, defined and first measured in 2007 (Luthans et al. 2007). Since then there has been growing body of research on the field of PsyCap and much has been learned about it nevertheless still a lot remains unknown. Most of studies is focused on PsyCaps' outcomes. Leaders' PsyCap has been found to increase followers' PsyCap (Walumbwa et al. 2010; Chen, 2015). It has been also found that this relationship is mediated by the leader-member exchange (Story et.al. 2013; Chen et al.. 2019), followers' organizational (team) identification (Chen et al. 2017). Initial research indicated that this is trickle-down relationship and is moderated by follower self-esteem, the relationship is stronger for those with lower self-esteem (Avey, Richmond & Nixon, 2012). Second found study revealed that collectivism moderates the relationship between leader PsyCap and employee PsyCap such that the positive relationship becomes stronger when there is lower team collectivism and weaker when there is higher team collectivism (Xu, Liu & Chung, 2017). Meta-analysis indicated that job type, industry type and country culture may be moderators. Leaders' PsyCap influences their teams' PsyCap and followers' PsyCap can influence leaders' PsyCap (Haar et al. 2014).

The mechanism underlying correlation between PsyCap in dyads may be explained throughout a couples of theories. The most common concept evoking in the PsyCap literature is social learning theory. According to this theory employees learn from the role models by observing them (Bandura, 1977). In organization the role model is someone who has higher status than follower, someone who is respectful and also is influential source of knowledge to employees regarding what behaviour is appropriate, usually it is supervisor. Process of modelling explains the mechanism of seizing PsyCap from leader but is not exhaustive. In order to have more comprehensive view of the problem social identity theory and social exchange theory are often employed. According to classical meaning of identification (Kelman, 1961, p. 63) identification is based on the wish to gain the qualities of the other (e.g., Bandura & Walters, 1963). As identification very likely engender internalization of values and norms of group or other person, also attitudes and behaviour (Ashforth & Mael, 1989), employees' identity may absorb PsyCap of their leader. The social exchange approach assumes that benefits that employee derives from leader and organization through leader as the organizations' agent (Blau, 1964) may be the matter of trade in reciprocity chain or make this relationship stronger. Therefore in here social processes included social exchange theory, social identity theory and social learning theory are main justification for the process of transit PsyCap from leader to follower. This possibility is examined in this study and proposed is the following hypothesis:

Hypothesis 1: Leader psychological capital positively influences follower psychological capital.

Age has become an important factor in organisational research due to demographic changes in majority of countries. The analysis of the role of age in organizational studies revealed that age as a specific demographic trait variable might be significant. Age moderates some relationships within organizational behaviours for instance between procedural justice and turnover (Bal et a 2011) or between perception of procedural justice and long sickness absences (Tenhiala et al. 2013). It has been found also very strong moderation of an age on relationship between wage ratios and work valence, relative intrinsic value orientation, and relative autonomous regulation style (Stynen, Forrier, & Sels, 2014). Age as well moderates conditional indirect effect of HRM on work engagement via competence need satisfaction. This relationship is weaker for older employees while the conditional indirect effect of HRM on patient orientation via relatedness need satisfaction is stronger for older employees in hospitals (Gostautaite, Buciuniene & Milasauskiene, 2019). Age moderates the relationship between congruency in implicit and explicit motives and job satisfaction such that the relationship between i-e-congruency and job satisfaction is stronger for older as compared to younger workers (Thielgen et al. 2015). Another example of the age moderating role is its impact on relationship between task-specific self-efficacy beliefs and effort expenditure in organizational teamwork.

Leader older is often perceived as more experienced, wiser, more responsible and dependable then younger one (Spisak et al. 2014). That is why older leader should be better role model in a process of PsyCap modelling, and is also more likely a person that employee is willing to identify with. Moreover leaders' age should have positive impact on the transfer of PsyCap in a light of the reciprocity mechanism and social exchange theory. Research has shown that the age is positively related to the leader-member exchange (Gellert & Schalk, 2011). Leader might be more aware of their resources and trade process with an employee. Therefore exchange that creates rise of employees' PsyCap is stimulated by a leader more intense. All that lead to the second hypothesis:

Hypothesis 2: Leaders' age moderates relationship between leaders' and followers' PsyCap such that relationship will be stronger for dyads with older leaders.

In case of older follower age difference may be a reason to see the supervisor throughout father/mother lenses and treat them more paternalistic and forgiving and playing a bit of mentor role. Then for young leader it would be an

occasion to humbly derive from older follower expertize and wisdom. Leader may reciprocate with knowledge and psychological competences in which follower is lacking. In safe and accepting climate subordinate would be more willing to learn from younger. In such exchange PsyCap will be a part of the values and knowledge trade. This exchange is probable possible in dyads with significant age difference, where disparity is obvious and matches life roles. Similar, the bigger is age difference between leader and follower the strongest is impact of transformational leadership on teams' outcome [Kearney, 2008]. All that suggest that in dyads with older follower and younger leader the bigger age difference the better in terms of learning from each other and the impact leaders' PsyCap on followers' is collinear. Therefore third hypothesis assumes as following.

Hypothesis 3: The greater the age difference between leader and follower, the stronger the relationship between PsyCap of leader and follower.

Considering social exchange as the basis of the relationship between leaders' and followers' PsyCap we may expect that there are some organizational features that moderate this exchange. People compare their investment with pay-offs and its ratio to what get others (Festinger, 1954). In case of inequity followers are motivated to reduce what they provide and likely they lower their engagement. Perception of organizational justice is a key consequence of this assessment. Perceived organizational justice (POJ thereafter) refers to employees' perception of fairness in the workplace (Colquitt 2001; Moorman, 1991). POJ has been found to be associated with job satisfaction, organizational citizenship behaviour (Moorman, 1991; Cohen-Charash & Spector 2001), organizational commitment, performance and other positive organizational outcomes, employees' behaviours and job attitudes (Cohen-Charash & Spector 2001). POJ is also negatively related to retaliation behaviour like theft and sabotage, turnover and turnover intentions. (Skarlicki & Folger 1997). Perceived justice is one of the settings, boundary condition of relationship between despotic leadership, and narcissism and follower's sense of meaningful work (Kayani et al. 2020), between psychological empowerment and voice behaviour (Wei, Hisrich & Peng, 2020) and also between political skill and career success in the Chinese public sector (Lu & Guy, 2018). It has been also empirically demonstrated that POJ positively moderates the relationship between the human factor (which comprises of moral capital, human capital, and human capabilities) and perception of organizational effectiveness (Acquaah & Tukamushaba 2015). POJ also moderates the effect of learning stocks on organizational performance through feed-forward learning flows (Oh, 2019) and the strength of the relationship of abusive supervision with knowledge sharing mediated by emotional exhaustion, such that the mediated relationship is stronger under low POJ than under high (Lee, Kimb & Yunc 2018).

Follower feeling that is treated in a fairly way will appreciate it thus stronger will identify with leader and will be more engage in learning process, more eager to pay back in an exchange. Consequently the fourth hypothesis is:

Hypothesis 4: The relationship between psychological capital of leader and follower will be greater when the POJ is low then high.

Method: design, sample, variables and measures

To test the hypotheses and conceptual framework I carried out cross-sectional study on randomly selected sample of 406 enterprises and 812 respondents (dyads of leader-follower, one per organization). The data collection was carried out by using CAPI technique in Poland in April 2018. The approached organizations were of various industry and size, excluding micro-enterprises (up to 10 employees). The average age of the leader was 44.5 years and of the follower – 35.5 years. 50.7% or leaders and 49.8% or followers in the sample were women.

PsyCap was measured using Luthans, Youssef & Avolio (2007) measure consisting of 24 items. Cronbach's coefficients were at .946 for leaders and .952 for followers. POJ was measured using Colquitt's (2001) scale with 18 items (alpha at .973). As control variables I used leader's age, leader's and follower's tenure (in years), leader's and follower's gender, age and size of the enterprise. I have conducted separate regression analysis with follower's age as independent variable which showed that is has no relation to follower's PsyCap. The situation is similar for squared follower's age, which was taken into consideration to rule out the non-linear relationship between age and PsyCap.

Research Results

The results of correlation analysis (table 1) points to the possibility of existence of relationships between variables, especially between leader's PsyCap and follower's PsyCap. The correlation coefficients also suggest the multicollinearity between variables. The highest values for Variance Inflation Factor (VIF) were observed for leader's age, age difference and follower's tenure. However, the highest values are at the level of 2.8, it can be said therefore that multicollinearity is not inflating the results of regression analysis.

Table 1: Descriptive statistics and correlations between variables

		Mean	SD	1	2	3	4
Follower's PsyCap	1	5.24	.79				
Leader's PsyCap	2	5.51	.76	.719**			
Age difference	3	9.05	9.87	-.031	-.026		
Leader's age	4	44.5	9.35	.030	.020	.574**	
Justice	5	5.14	.92	.584**	.438**	-.033	-.002
Leader female	6	.507	.50	.033	.051	.061	.037
Follwer female	7	.498	.50	-.003	-.018	.039	-.060
Company's age (ln)	8	2.85	.65	.012	.068	.025	.211**
Company's size (ln)	9	4.73	.99	.061	.066	-.090	-.086
Leader's tenure	10	12.16	7.94	.086	.082	.285**	.592**
Follower's tenure	11	6.40	6.20	.062	.096	-.323**	.325**
		5	6	7	8	9	10
Leader female	6	.041					
Follwer female	7	-.113*	.310**				
Company's age (ln)	8	-.047	.040	.008			
Company's size (ln)	9	.030	-.029	.015	.196**		
Leader's tenure	10	.056	.046	-.072	.395**	-.079	
Follower's tenure	11	.047	.042	-.041	.314**	.021	.454**

** p<0.01*

In order to test the formulated hypotheses the hierarchical linear regression analysis was carried out. I tested three regression models with follower's PsyCap as dependent variable. In the first model (1) only the control variables were taken into account. In the second model (2) independent variable was added. Finally, in the third model (3) was tested the moderation effect by age difference between leader and follower, leader's age and POJ. For all of the models I have conducted the analysis of R^2 and adjusted R^2 coefficients, for models (2) and (3) I have also conducted the likelihood ration test comparing them to previous models (1) and (2) respectively. The results of regression analyses are presented in table 2.

Table 2: The results of regression analyses.

	(1)	(2)	(3)
	Follower's PsyCap	Follower's PsyCap	Follower's PsyCap
Leader's PsyCap		0.752***	0.999***
		(0.0367)	(0.245)
Age difference			-0.0105
			(0.0234)
Leader's PsyCap x Age difference			0.000485
			(0.00414)
Leader's age			-0.0496**
			(0.0244)
Leader's PsyCap x Leader's age			0.0104**
			(0.00427)
Justice			1.348***
			(0.220)
Leader's PsyCap x Justice			-0.181***
			(0.0373)
Leader female	0.0528	-0.0117	-0.0352
	(0.0832)	(0.0582)	(0.0507)
Follower female	-0.00884	0.0257	0.119**
	(0.0833)	(0.0582)	(0.0515)
Age of company (ln)	-0.0653	-0.0771	-0.0383

	(0.0694)	(0.0484)	(0.0424)
Size of company (ln)	0.0634	0.0246	0.0303
	(0.0412)	(0.0288)	(0.0252)
Leader's tenure	0.00969	0.00627	0.00507
	(0.00595)	(0.00415)	(0.00430)
Follower's tenure	0.00406	-0.00189	-0.0113*
	(0.00725)	(0.00507)	(0.00604)
Constant	4.961***	1.135***	-2.344
	(0.243)	(0.252)	(1.434)
Observations	406	406	406
R-squared	0.016	0.521	0.645
Adj. R-squared	0.001	0.513	0.633
LR test		292.77*** (1)	120.82*** (2)

Standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

The decision to accept or reject certain hypotheses was based on the analysis of the levels of adjusted R^2 coefficient and results of likelihood ratio test. The regression analysis points to the fact that the effect of control variables is marginal and statistically non-significant. Conversely, there is very strong positive relationship between leader's and follower's PsyCap. Moreover, the adjusted R^2 coefficient for model 2 is at the level of 0.513 which shows high explanatory power of the model and strong effect of leader's PsyCap on follwer's PsyCap (confirmed by the likelihood ration test result). Therefore, the hypothesis 1 can be accepted.

The analysis of the third regression model brings results on the moderation of the relationship between leader's and follower's PsyCap by age difference, leader's age and POJ. The analysis of adjusted R^2 coefficient and likelihood ratio test shows that the third model achieves better model fit than the second model. Therefore, adding possible moderators to the model increases its explanatory power.

Research results show that age difference between the leader and the follower does not moderate the relationship between leader's and follower's PsyCap. Therefore, hypothesis 3 has to be rejected. There are, however, arguments to accept hypothesis 2 - the coefficient of the interaction between the age of the leader and leader's PsyCap is statistically significant. Figure 1 shows the graphical presentation of the moderation effect.

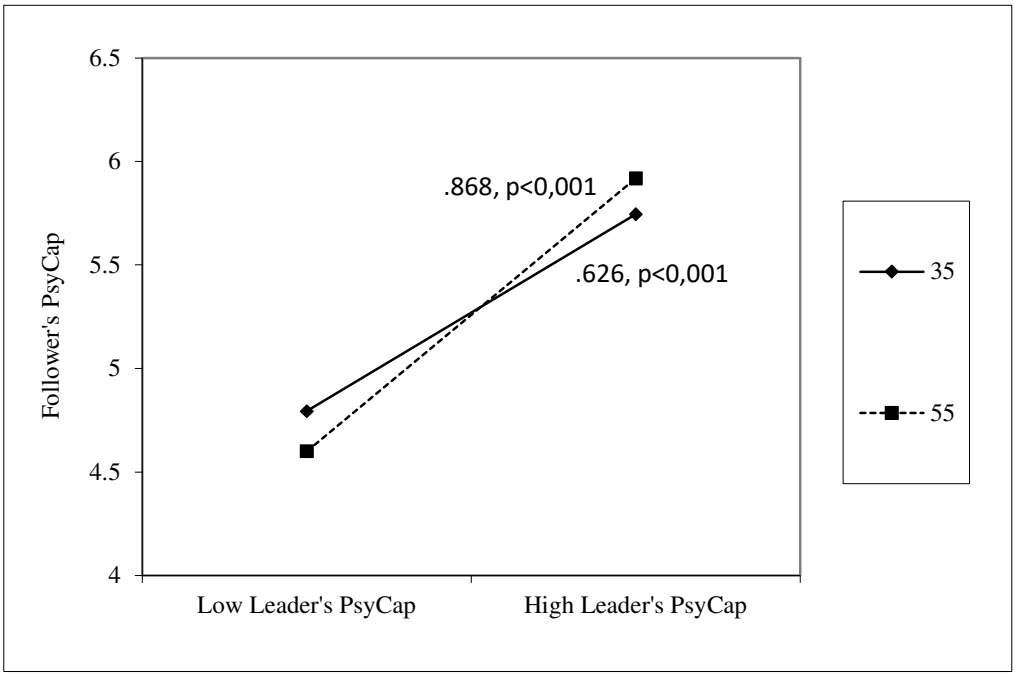

Figure 1: Moderation of the relationship between leader's PsyCap and follower's PsyCap by leader's age.

In the graphical presentation two values of the leader's age are shown – 35 and 55 years. There were taken as meaningful values that are the closest to the values set by the difference of 1 standard deviation from the mean value of leader's age (35.15; 53.85). Taking those values does not have an effect on the moderation results. For leader's PsyCap there are values taken according to established convention (+/- 1SD: 4.74; 6.26).

The moderation analysis shows that leader's age moderates the relationship between leader's and follower's PsyCap. The relationship is stronger for older leaders. The simple slope test shows that for the leaders at the age of 35 years the estimated value of the regression coefficient for leader's PsyCap is at the level of 0.626 and for the leaders at the age of 55 years is at the level of 0.868. Therefore, the relationship is significant for all leaders, however, for older leaders it is stronger than for the younger leaders.

The results of the third model of regression also point to the existence of the moderation effect by POJ. The statistical significance of the coefficient of the interaction between leader's PsyCap and POJ allows to accept hypothesis 4. Figure 1 shows the graphical presentation of this moderation effect.

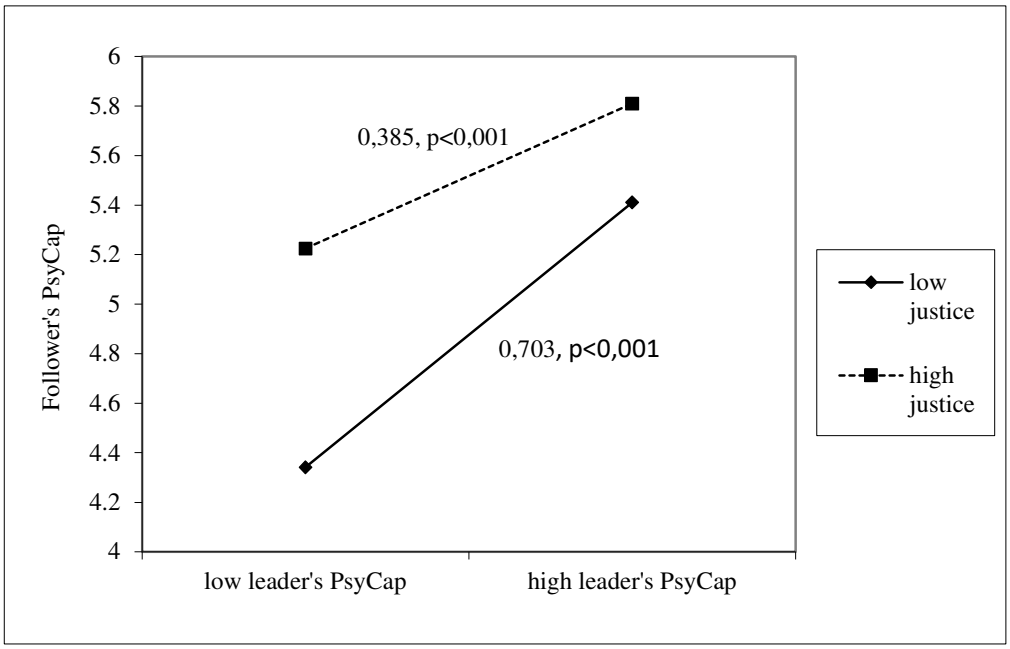

Figure 2: Moderation of the relationship between leader's PsyCap and follower's PsyCap by POJ.

The graphical presentation of the moderation reveals the effect of justice that is also apparent in the regression results. In general, POJ supports the PsyCap of the follower. Moreover, it moderates the effect of PsyCap of the leader in a way that in low-perceived-justice conditions the effect is stronger. This means that the leader with high PsyCap is especially beneficial for the follower in organizations with low POJ. Simple slope test shows that in low justice (-1SD) the value of the estimated coefficient of leader's PsyCap is at the level of 0.703 and in high justice environment it is at the level of 0.385. It has to be said though that PsyCap of the follower reaches high levels in high justice conditions, and combination of high justice and high leader's PsyCap boosts follower's PsyCap to very high level.

Discussion

In reviewing literature there is an obvious lack of research of PsyCap boundary conditions, very little is known about what, how and why regulates relationship of PsyCap in leader-follower dyads. To address this gap, this study investigates three possible moderators. Statistical analysis supported hypothesis 1, confirming that leader PsyCap was positively related to follower PsyCap. PsyCap cross-over effect has been exposed in previous studies but this is the first research of this relationship in this cultural context, first in Poland. The strength of this relationship is high comparing to prior results. Coefficient was 0,75 comparing to 0,52 (Walumbwa et al. 2010), 0,45 (Story, 2013), 0,17 (Chen, 2015), 0,55 (Chen, 2017), 0,15 (Xu, Liu & Chung 2017) and 0,54 (Chen, 2019). It is only a brief matching of the coefficient factor without statistical analysis but it may signal that cultural context play a role since the less significant strength is in Asian cultures.

Second hypothesis was also confirmed. Leaders' age moderated relationship between leaders' and followers' PsyCap such that relationship was stronger for dyads with older leaders. It is consistent with previous research on older leader and carrier timetable theory. Older supervisor is more accepted as leader and is perceived as role model. PsyCap of older leader might be seen as more attractive and valuable and perceived as associated with wisdom. Apparently older supervisor has stronger impact on employees PsyCap with no regard to age difference between leader and employee. Thus third hypothesis is no supported. There is no evidence that with increase age difference the strength of the relationship between leaders' and followers' PsyCap will grow.

The last hypothesis assuming that POJ moderates the investigated relationship is supported. In prior studies POJ was found to enhance relationship of positive organisational factors with positive outcomes and weaken impact of negative features. Present research confirms positive role of perceived justice. The relationship between PsyCap of leader and follower is greater when POJ is low then high.

Earlier investigations have proofed follower self-esteem (Avey, Richmond & Nixon, 2012) then team collectivism (Xu, Liu & Chung 2017) to moderate the relationship between leaders and followers PsyCap. This research add to this short list also leaders age and POJ. All together gives the idea that the boundary conditions may be attached to organization, comes from supervisor or be an employee characteristic.

Limitations and future research

There are also some limitations that can be found in this study. The weakness that should be noted, is research design which is the cross-sectional data. That cannot provide evidence for causation and is subject of common method biases. The direction of the impact is assumed and it is based on prior investigations within the field. Thus longitudinal studies are recommended for the possible causal inference.

Following two weaknesses are associated with moderators. Perceived organizational justice is analysed as one variable. It would add much to the discussion if we analysed POJ effect through its dimensions. Furthermore, followers' age which was measured to verify the third hypothesis was applied without reflection on specific generational features and differences. Ones' own age perspective may be linked to the wider generational context.

As noticed for instance Luthans and Youssef-Morgan (2017) future research needs to take into consideration also cultural differences for a better understanding of how PsyCap may be transferred from leader to employee across cultures. Future research on psychological capital should aim to extend our knowledge about still missing boundary conditions and antecedents such as personality traits, perceived organizational support, trust, calling or thriving.

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Optimal Allocation of Renewable Distributed Generation in Medium and Low Voltage Distribution Systems using a Modified Honey Bee Optimization Algorithm

Yassine MALIARI[1#], Ahed ABBOU[2]

[1,2] Equipe de recherche en énergie électrique et commande (EREE&C), Mohammadia School of Engineers, Mohammed V University, Rabat, Morocco
[1]maliari.elec@gmail.com abbou@emi.ac.ma

Abstract

Optimal allocation of distributed generations (DGs) is a well-known research area, being widely investigated in the last twenty-five years. In this paper, a modified honey bee optimization algorithm is considered to contribute to this research field area. Artificial Bee Colony (ABC) optimization is a recent metaheuristic based on the natural model of honey bee behavior in foraging for food. This algorithm is used in this to optimally allocate the cost required to connect a generation unit to a public distribution network. A case study, with two meshed IEEE 15-bus feeders and a new DG to connect, geographical dispersed, are used to simulate the performance of the proposed approach. The obtained results prove the effectiveness of the proposed approach to reduce the required charges for connecting new renewable generation units to electrical public systems. The result obtained show the efficient of the approach compared to PSO algorithm and sensitivity analysis based methods.

Keywords: Distributed generation, Connection cost, Optimal allocation.

Introduction

Distribution systems are usually designed as mesh networks, but operate as radial networks, it consists of two THE, Optimal allocation of distributed generations (DG) is a well-known area of research, widely studied over the past twenty-five years [1-2]. The problem of DG placement has attracted a great deal of attention [3], a wide range of solution methodologies for the location and sizing of active and reactive energy sources, and the detection of potential location and point of Optimal access for hosting DG sources has been presented in the literature.

Studies have shown that improper DG placement can increase total power losses [4], voltage deviation [5], operating costs [6], average system downtime [7] and can also have an impact on voltage stability [8], grid reliability [9] and almost any expected benefit from the installation of distributed generation in distribution networks.

Several methodologies have been presented in the literature with unique and multiple objectives for optimally distributing DGs in distribution networks.

Several objectives had been set to evaluate and optimize: location with specific capacity [10], size with defined location [11], combined location and size [12], type of DG [13], as well as the number of DGs [14]. The main objectives of the literature are the minimization of power losses [15], the improvement of the voltage profile [16], the improvement of the voltage stability [17], the minimization of costs [18], the maximization of profit [19], improvement of reliability [20], maximization of social welfare. [21], improvement of the index of average duration of interruption of the SAIDI system [22] and maximization of the distributed production capacity [23].

The mathematical formulation for the optimization of the site and the size of the DG in the literature is developed by modeling the electrical infrastructure and fixing the shape of the loads and the constraints of the network. The load model, distributed along the line [24] or concentrated on the network buses [25], the multiple load level [26], the variable load over time [27], the probabilistic loads [28] and fuzzy [29] are the types of load models presented in the literature. Bus voltage limits and infrastructure load limits, including lines and transformers, are the main constraints on the network.

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In this paper, a modified honey bee optimization algorithm is considered to contribute to this research field area. Artificial Bee Colony (ABC) [30] optimization is a recent metaheuristic based on the natural model of honey bee behavior in foraging for food. The foraging process in bees is based on a very efficient movement mechanism. It allows them to draw the attention of other bees in the colony to the food sources found in order to collect various resources. In fact, bees use a set of wriggling dances as a means of communication between them. These dances allow bees to share information about the direction, distance, and amount of nectar with their fellows. Collaboration and collective knowledge of bees from the same colony is based on the exchange of information about the amount of nectar in the food source found by different members

A case study, with two meshed IEEE 15-bus feeders and a new DG to connect, geographical dispersed, are used to simulate the performance of the proposed approach.

The main-contributions of this paper:

1- First use of modified Honey Bee Optimization Algorithm in an optimal allocation of renewable distributed generation problem
2- Consideration of real cases of public distribution systems
3- Consideration of new optimization objective: connection cost reduction

The rest of this paper is organized as fellow: Section II presentation of Honey Bee Optimization Algorithm. Next in section III, presentation of the optimization problem. Section IV, the mathematic formulation of the problem. Section V, presents the case study with two meshed IEEE 15-bus feeders system. The result obtained are discussed in section VI. Section VII conclude this paper.

Honey Bee Optimization Algorithm:

In nature, several species are characterized by social behavior. Schools of fish, flocks of birds, and flocks of land animals are the result of the biological need that drives them to live in groups.

This behavior is also one of the main characteristics of social insects (bees, termites, ants…). From these principles, the researchers were inspired to develop methods based on the behaviors of these animals, and gave birth to what is called by Metaheuristics.

This word relates to all methods which model the interaction of agents (animals) which are able to self-organize. They represent combinatorial problem solving methods that consist of repeating certain processes until the optimal solution is obtained [32].

One of the most organized and rigorous insects in their work is the bee. Bees have a great capacity for communication. And thanks to his intelligence, a method called the bee method was developed. In this method, artificial bees represent agents which, by collaborating with each other, solve complex problems of combinatorial optimization.

Artificial Bee Colony (ABC)] optimization is a recent metaheuristic based on the natural model of honey bee behavior in foraging for food.

The foraging process in bees is based on a very efficient movement mechanism. It allows them to draw the attention of other bees in the colony to the food sources found in order to collect various resources. In fact, bees use a set of wriggling dances as a means of communication between them. These dances allow bees to share information about the direction, distance, and amount of nectar with their fellows. Collaboration and collective knowledge of bees from the same colony is based on the exchange of information about the amount of nectar in the food source found by different members.

In a bee colony optimization algorithm, a source of nectar corresponds to a possible solution to the problem at hand. The colony of artificial bees is made up of three types of bees: workers, spectators and scouts:

- The worker is exploiting the food source found. She bases herself on her memory and tries to make changes to her current position (solution) to discover a new position (i.e. food source).
- The spectator waits for the workers to return to the dance floor to observe their dances and gather information on the sources of nectar they have found.
- The Scout Bee exploits the research space by initiating a random search for a new food source.

In this algorithm, the location of the food source represents the possible solution to the problem, and the amount of nectar from that source corresponds to an objective value known as fitness.

Foragers are assigned to different food sources to maximize the total supply of nectar. The colony must optimize the overall efficiency of the collection. The distribution of bees is therefore a function of many factors such as the amount of nectar and the distance between the food source and the hive. This problem is similar to the distribution of web hosting servers, which was actually one of the first problems solved using bee algorithms by NAKRANI and TOVEY in 2004.

The number of active or inactive foragers represents the number of solutions in this population.

In the first step, the algorithm generates an initial population of randomly distributed SN solutions. Each solution x_ (i) (i = 1,2, ..., SN) that is initialized by the Girl Scouts, and represents a solution vector to the optimization problem. The variables that each vector contains must be optimized.

The active foragers search in the vicinity of the previous source x_ (i) for new sources v_ (i) having more nectar. They then calculate their fitness. In order to produce a new source of food from the old one, we use the expression opposite:

$$v_{ij} = x_{ij} + \phi_{ij}(x_{ij} - x_{kj}) \quad (1)$$

Where k∈ {1,2,…, BN} (BN is the number of active foragers) and j∈ {1,2,…, SN} are indices chosen at random. Although k is determined randomly, it must be different from i. ϕ_ij is a random number belonging to the interval [-1, 1], it controls the production of a food source in the neighborhood of x_ij.

After the discovery of each new food source v_ (ij), a greedy selection mechanism is adopted, i.e. this source is evaluated by the artificial bees, its performance is compared with that of 〖x〗 _ij. if the nectar of this source is equal or better than that of the previous source, this one is replaced by the new one. Otherwise the old one is kept [33].
For a minimization problem, Fitness is calculated according to this formula:

$$fit_i(\overrightarrow{x_i}) = \begin{cases} \frac{1}{1+f_i(\overrightarrow{x_i})} & si\ f_i(\overrightarrow{x_i}) \geq 0 \\ 1 + abs\left(f_i(\overrightarrow{x_i})\right) & si\ f_i(\overrightarrow{x_i}) > 0 \end{cases} \quad (2)$$

Such that $f_i(\overrightarrow{x_i})$is the value of the objective function of the solution $\overrightarrow{x_i}$

At this point, the inactive foragers and the scouts who are waiting within the hive. At the end of the search process, the active foragers share information about the nectar of food sources as well as their locations with the other bees via the wriggling dance. The latter evaluate this information taken from all the active foragers, and choose the food sources according to the probability value P_i associated with this source, and calculated by the following formula:

$$P_i = \frac{fit_i}{\sum_{n=1}^{SN} fit_n} \quad (3)$$

Where fit_i is the fitness of solution i, which is proportional to the amount of nectar from the food source in position i).

The food source whose nectar is abandoned by the bees, the Girl Scouts replace it with a new source. If during a predetermined number of cycles called a "limit" a position cannot be improved, then that food source is supposed to be abandoned.

All of these steps are summarized in the algorithm bellow:

Entry: S, W, O
Exit: the best solution

1- Initialize the population with S + W random solutions
2- Evaluate the fitness of the population
3- As long as the stop criterion is not satisfied, do
4- Recruit O inactive foragers and assign
5- each to a member of the population
6- For each inactive forager assigned to a member

7- n of the population do
8- Perform an iteration of the algorithm
9- search for new source
10- End for
11- Evaluate the fitness of the population
12- If a member of the population has not improved
13- during the iterations do
14- Save the solution and replace it with a
15- random solution
16- Find S random solutions and replace the S
17- members of the population who have poor fitness
18- End While
19- Return the best solution

Where S: number of scout foragers.
W: number of active foragers.
O: number of inactive foragers.

Distributed generation and connection costs

Several types of distributed production can be distinguished, depending on the technology, the type of generators used, and according to the primary energy they use, generally 2 main types of distributed production can be differentiated: conventional or traditional generators based on motors combustion, and Unconventional generator as: Storage devices, electrochemical devices and renewable device.

The distribution service is carrying out an orientation study to verify the feasibility of integrating the new DG, identifying and evaluating all possible options.

However, the efforts presented in the literature, to identify the optimal access point, are based on previous work in optimal seating and sizing of conventional generators and capacitor

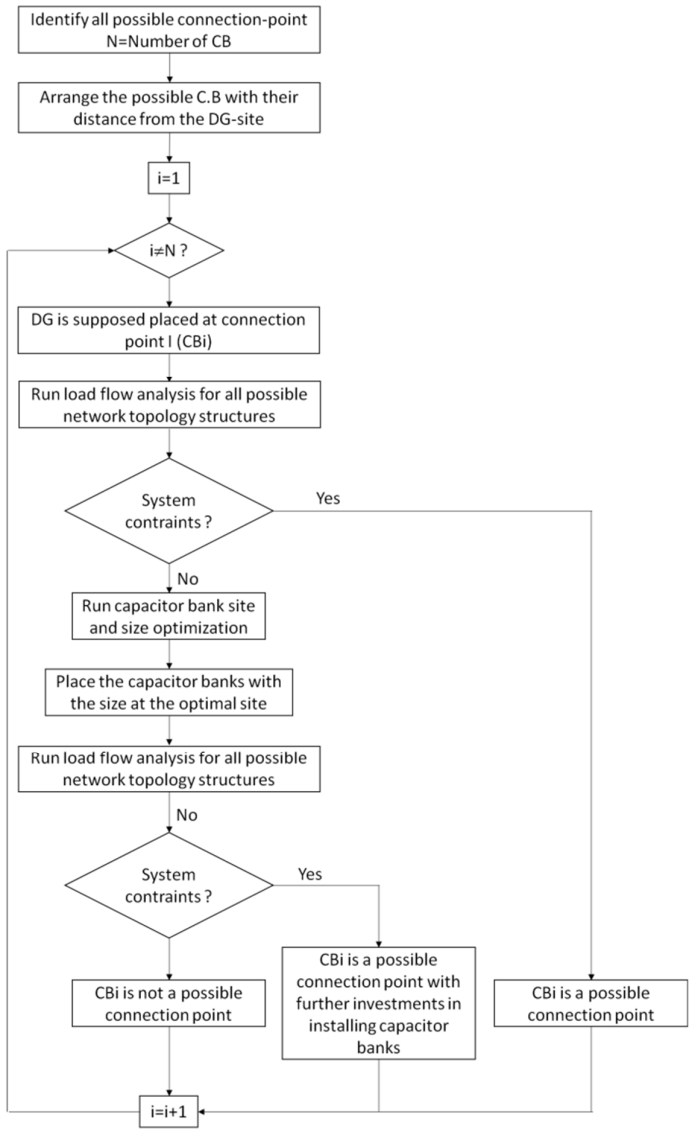

Fig. 1: Flow chart of the proposed approach

banks, without taking into account that renewable DGs are different from others. devices, renewable generations are not presented in a compact form, with ease of installation and ease of transfer from one network substation to another network node. As in the case of photovoltaic generations, wind turbines or biomass units, DGs are developed over large areas, and the choice of DG site is influenced by several economic, climatic and geographic conditions. Surprisingly, no work had taken into account the geographic information of the network infrastructure and the DG site. However, changing the connection point, with a fixed DG site, means extending or shortening the total length of the electrical connection, which is paid for by DG owners, and which will clearly have an impact on their DG's total connection cost. to the network

Problem Formulation

$$F = \min(\mathrm{Cost}_{\mathrm{DG\ connection}}) \tag{4}$$

Subject to:
Voltage limits:

$$V_{L-\min} \leq V_x \leq V_{L-\max} \tag{5}$$

The bus voltage magnitudes are to be kept within acceptable operating limits throughout the optimization process. Thermal limits of lines and transformers:

$$J_{ij} \leq I_{Limit-max} \tag{6}$$

Power losses degradation:

$$P^{Before}_{total-Loss} - P^{after}_{Total-\ Loss} \geq 0 \tag{7}$$

Proposed Algorithm

The flow chart of the possible algorithm is given in figure 1.

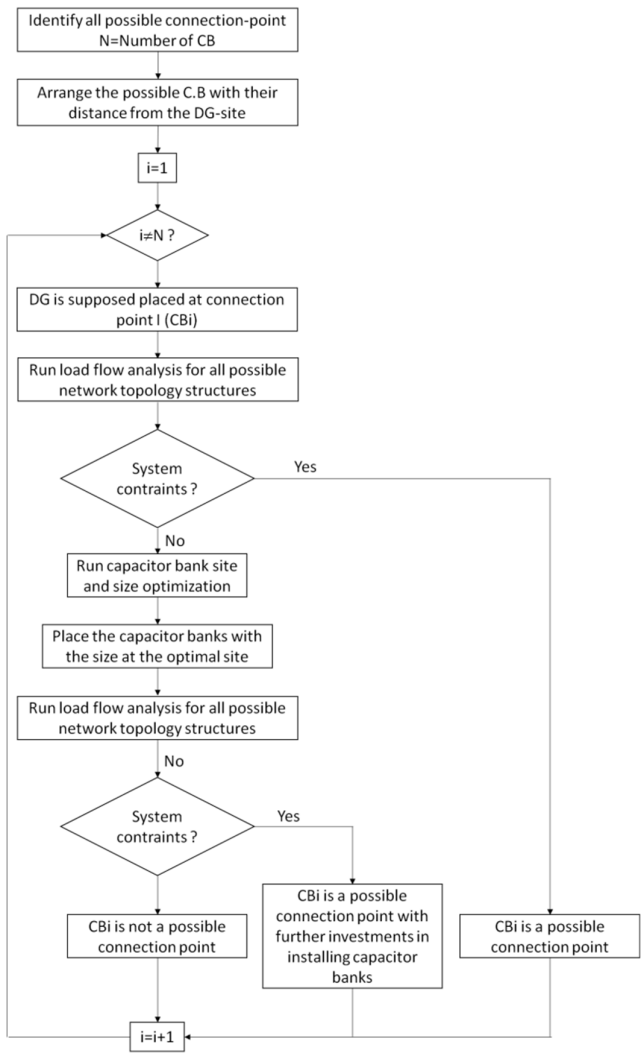

Fig. 1: Flow chart of the proposed approach

Case study

The proposed analytical approach had been applied to the electrical system, presented in figure 2, composed of two meshed feeders of 15-buses, driven from two separate substations X and Y, and a new DG of 7600 kW to connect. The line data and load data of the electrical system are given in table 1, and distance from the DG unit seven possible connection-points are given in table 2.

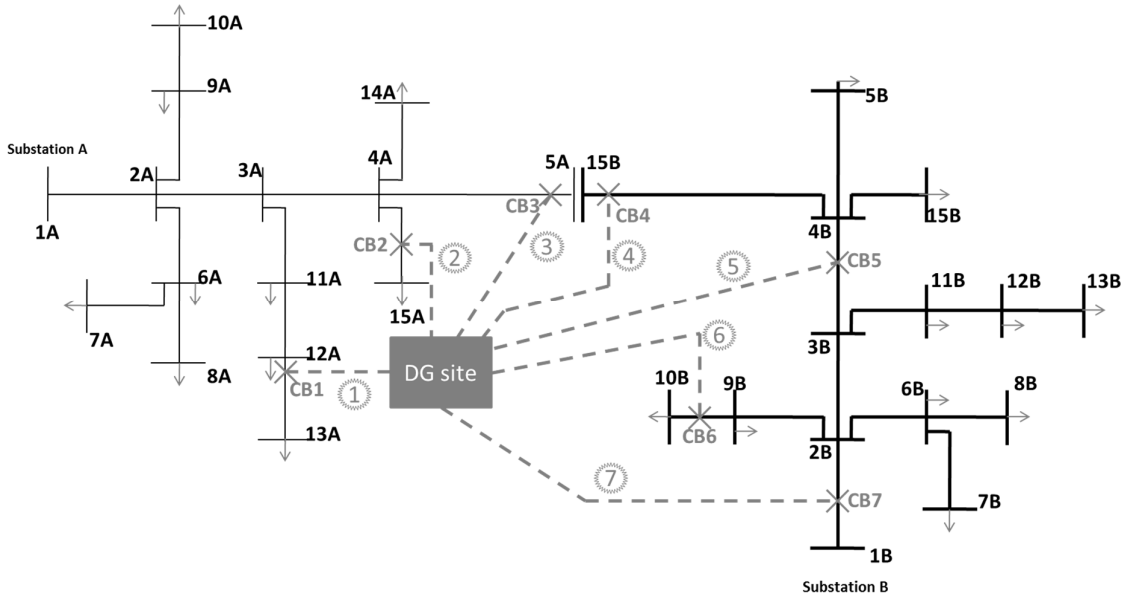

Fig. 2: Single line diagram of the case study (Topology structure N°1)

Table 1: Load Data and Line Data of the two meshed feeders X and Y (feeder X and feeder Y are identical)

Sending node	Receiving node	Sending node	Receiving node	R Ohm	X Ohm	kVA	kVAr
1X	2X	1Y	2Y	0,01519419	0,01485729	0,495243	0,5052377
2X	3X	2Y	3Y	0,0131391	0,01284712	0,225723	0,1284712
3X	4X	3Y	4Y	0,00944443	0,00923106	0,4492	1,603644
4X	5X	4Y	5Y	0,01710329	0,01153321	0,495243	0,5052377
2X	9X	2Y	9Y	0,02260599	0,01490221	0,1123	0,0541286
9X	10X	9Y	10Y	0,01893378	0,01276851	0,1123	0,0541286
2X	6X	2Y	6Y	0,02871511	0,01936052	0,2246	0,2404343
6X	7X	6Y	7Y	0,01221824	0,00824282	0,2246	0,2407712
6X	8X	6Y	8Y	0,01404873	0,00947812	0,158343	0,10107
3X	11X	3Y	11Y	0,02015785	0,01359953	0,3369	0,1215086
11X	12X	11Y	12Y	0,02749104	0,01854073	0,2246	0,1281343
12X	13X	12Y	13Y	0,02260599	0,01523911	0,495243	0,5052377
4X	14X	4Y	14Y	0,0250429	0,01688992	0,7861	0,8019343
4X	15X	4Y	15Y	0,0221231	0,00906261	0,4492	0,4808686

Table 2: Distance between possible connection-point and DG-site:

CB1	CB2	CB3	CB4	CB5	CB6	CB7
1471m	2501m	2156m	1550m	2155m	3016m	3188m

The proposed approach has been tested under the network topology reconfiguration. Figure 3 and figure 4 present the topology change.

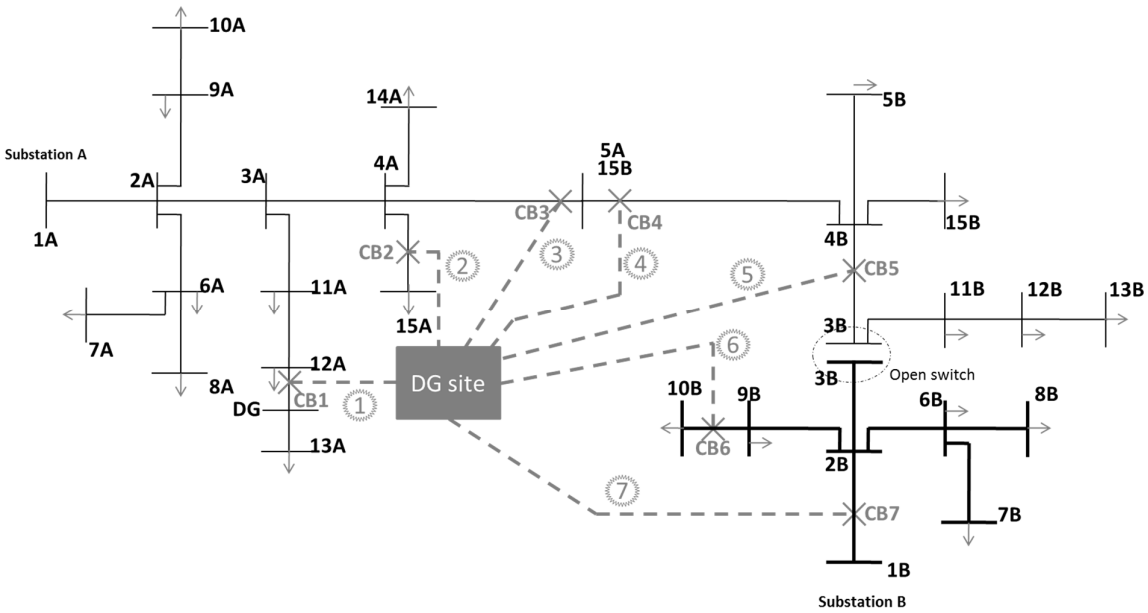

Fig. 3: Single line diagram of topology N°2

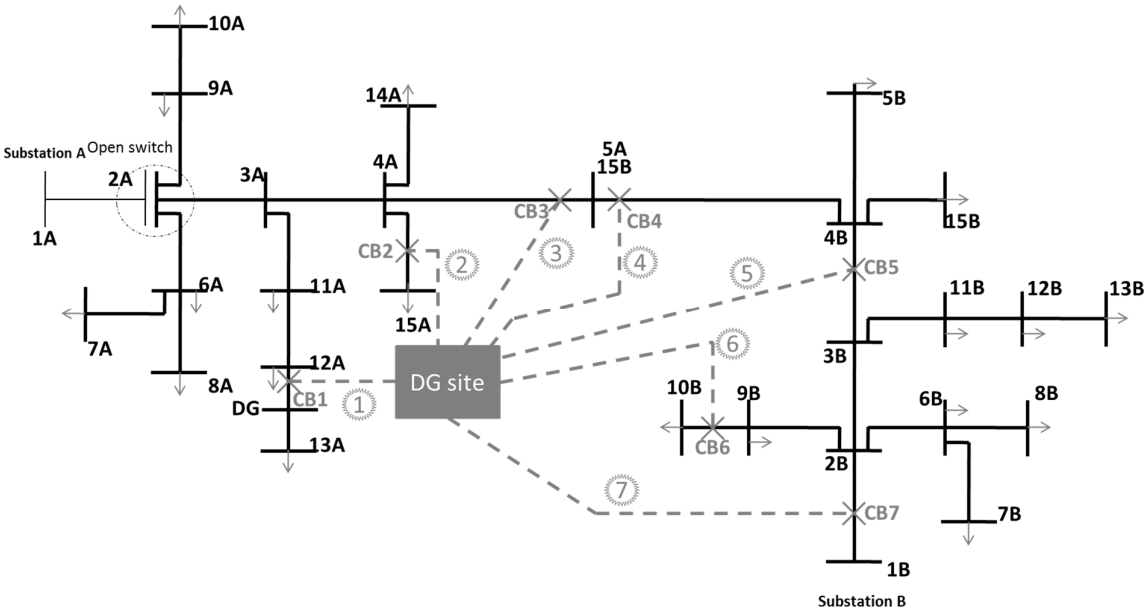

Fig. 4: Single line diagram of topology N°3

The first step is the evaluation of the possible location of the DG unit. The results of the maximum and the minimum voltage magnitude for the three different topology structures are resumed in table 3.

Table 3: Evaluation of the seven connection-points with respect to the voltage profile under three different topology structures:

		Before DG	CB1	CB2	CB3	CB4	CB5	CB6	CB7
Fig 1	V_{max}	0.93	1.07	1.05	1.06	1.01	1.02	1.02	1.01
	V_{min}	0.92	1.01	1.01	1.01	0.99	1.04	0.98	0.97
Fig 2	V_{max}	0.98	1.04	1.04	1.03	1.04	1.02	1.07	1.04
	V_{min}	0.96	0.97	0.98	0.98	0.98	0.98	0.97	0.98
Fig 3	V_{max}	0.96	**1.11**	0.99	0.99	1.01	1.10	1.03	0.98
	V_{min}	0.93	0.98	0.98	0.97	0.97	0.96	0.93	0.95

By applying the proposed approach, the optimal size of D-FACTS is 135 kVAr at nodes “12X” and “13X”. The system performance after the connection of the renewable generation at connection point N°1, and the installation of the two D-Facts is given in table 4.

Table 4: Voltage profile before the connection of the new DG, after the connection at CB1, with and without the proposed method:

		Before the renewable generation	After the renewable generation at CB1	
			Without the proposed method	With the proposed method
Fig1	V_{max}	0,99	1,07	1,06
	V_{min}	0,98	1,01	1,02
Fig2	V_{max}	0,98	1,06	1,04
	V_{min}	0,93	0,97	0,98
Fig3	V_{max}	0,98	1,11	1,07
	V_{min}	0,93	1,00	1,00

By the application of the proposed approach the renewable generation could be installed at the connection pint N°1, with additional charges of installing and exploring two capacitors banks of 130 kVAr

Conclusion

In this paper heuristic optimization approach have been presented, based on the use a modified honey bee optimization algorithm. The results obtained prove the ability of the approach to reduce the cost required for the connection of generation unit in public medium voltage distribution systems.

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Implementation Model of the Multimodal Freight Transport Development Strategy in the TRITIA Cross-border Area

Edyta PRZYBYLSKA
Silesian University of Technology, Gliwice, Poland, edyta.przybylska@polsl.pl

Katarzyna DOHN
Silesian University of Technology, Gliwice, Poland, katarzyna.dohn@polsl.pl

Lilla KNOP
Silesian University of Technology, Gliwice, Poland, lilla.knop@polsl.pl

Marzena KRAMARZ
Silesian University of Technology, Gliwice, Poland, marzena.kramarz@polsl.pl

Abstract

This paper proposes the implementation model of the multimodal freight transport development strategy in the TRITIA cross-border area. In the theoretical part the method of analysis and critical review of the literature was used. The literature researches confirmed that in the practice of the strategy implementation remains a huge gap between the process of formulating the strategy and its implementation. While there are undoubtedly many reasons behind the strategy's application gap, particular attention has been paid to the increasingly clear new challenges related to changes taking place in cross-border regions. Therefore, in the research part of the article, the authors made an attempt to develop a model for the implementation of the multimodal transport development strategy under the TRANS TRITIA project, hoping that the implementation of the project and recommended solutions will allow for better communication of the studied regions, the cross-border transport system will be unified and integrated, and it will also be possible to implementation of European recommendations contained in the White Paper on Transport in the area of alternative forms of freight transport.

Keywords: Model of Strategy Implementation, Multimodal Freight Transport, Cross-Border Area

Introduction

The dynamic development of international trade and the development of freight transport related to it, especially the road transport, prompts to seek the solutions that will counteract the negative effects of conducted transport activity. One of the solutions, promoted by the policy of the EU, is the multimodal transport. However, its popularisation requires developing and implementing a range of policies, strategies and activities conducted on the international, national and regional level. A special attention should be paid to the cross-border areas, located at the meeting points of various countries, often omitted in the analysis, at the same time generating a range of barriers that limit the development of formerly mentioned concept of transport. In relation to that, the authors undertook the problem of multimodal freight transport of Polish-Czech-Slovak cross-border areas (referred to as TRITIA) with the use of qualitative research. The goal of the paper is to present the implementation model of the multimodal freight transport development strategy in the indicated cross-border area. This strategy was created as a part of the work in international project entitled: "TRANS TRITIA – Improvement of coordination and planning of the freight transport in the region of the Trans Tritia project". It was implemented on the territory of four Central Europe regions: in the Silesia province, Opolskie province (Poland), in the Moravian-Silesian country (Czech Republic), and in the self-governing country of Žilina (Slovak Republic). The territory of the project covers over 34 thousand km2 and is inhabited by over 7 million people. Roads and transport corridors of the fundamental importance, including the Baltic-Adriatic transport corridor, run through the region of the project. The region of the project is closely related to the territory of the TRITIA European Grouping of Territorial Cooperation. It was established in order to improve and popularise international and interregional cross-border cooperation, between its participants, that aims at improving the economic and social cohesion, especially through the implementation of the territorial cooperation

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projects. The developed strategy includes solutions that emerged in response to the identified problems and needs of the cross-border areas in terms of the multimodal transport development. It presents strategic and infrastructural projects necessary for the development of the cross-border freight transport and for the most effective switching from the road transport to the rail and inland waterway transport. That is why its implementation will allow to normalise and integrate the cross-border transport system and it will enable the implementation of European recommendations included in the White Paper of the Transport in the area of alternative branches of freight transport.

Strategy Implementation Models - Theoretical Background

Many authors share the opinion that there is a big discrepancy between the process of formulating the strategy and its implementation (Wołczek and Ignacy, 2017; Aleksander, 1991; Cândido and Morris, 2001; Hrebiniak, 2006). It is hard to assess the extent of this problem, however, according to the various sources, the implementation process ends in failure in 50-90% of the cases (Zook and Allen, 2001; Kaplan and Norton, 2005; Gendron, 1997; Carlopio and Harvey, 2012; Speculand, 2006; Desroches and Hatch, Lawson, 2014). The reasons for this state of things can be searched for due to the fact that the entities responsible for the implementation of the strategy do not have practical, but also theoretically strong models that would direct their activities during the implementation (Aleksander, 1991). The literature on the strategic management in the past years was concentrated mostly on the search for new ideas and tools for creating the strategy, at the same time neglecting the area of its implementation (Wołczek and Ignacy, 2017). Building the strategy implementation model is a hard and complex task due to the need to precisely capture the essence and the holistic context of the organisational implementation. Many managers think formulating and implementing a strategy are two distinct issues (Hrebiniak, 2006). Erica (2007) defines that the implementation is the process that turns strategies and plans into actions in order to accomplish strategic objectives and goals. Implementing the strategic plan is as important, or even more important, than the strategy. As Oskooee (2017) mentioned it, while strategies are most often developed by the board and stakeholders with great thought and care, implementation is often left to chance due to (Oskooee, 2017):

- leaders and managers feeling more comfortable with planning than implementation,
- leaders feeling that implementation is best left to someone else and that it is not their responsibility,
- implementation taking longer to accomplish and requiring adjustments as unforeseen circumstances occur and
- implementation requiring more people to be involved and continued communication over time.

G. Noga (2009) proposes characteristics of the strategy implementation models divided into three groups:

(1) the models concentrated only on naming and describing the implementation factors – in which the implementation consists of introducing change in all significant aspects of the organisation which need to be identified first. One of the models representing this group is the proposal of Peters, the so called model 7S. It indicates seven elements that are mutually related and a change in any of them results in change in the remaining ones. These elements are: strategy, systems, style, staff, value system, skills (Peters et al., 1980);
(2) the models of rational, sequential implementation process that take place in stages - they indicate the stages, more or less precisely, that should be followed in order to successfully implement the strategy, significantly changing the present situation of the organisation;
(3) the models which focus on the context and the process – they allow to understand and assess the complex transformational processes. In practical terms, the models as such help the managing staff and the managers of middle level to understand broader consequences of the change processes for the organisation, making them to concentrate not only on the specific part of the company, but also on the remaining functional areas, customers and competitors. One of the interesting models in this group is the the approach of F. Okumus. He proposed the implementation model (Fig. 1) consisting of four components: strategy content, strategy context, the process and the result (Okumus, 2003).

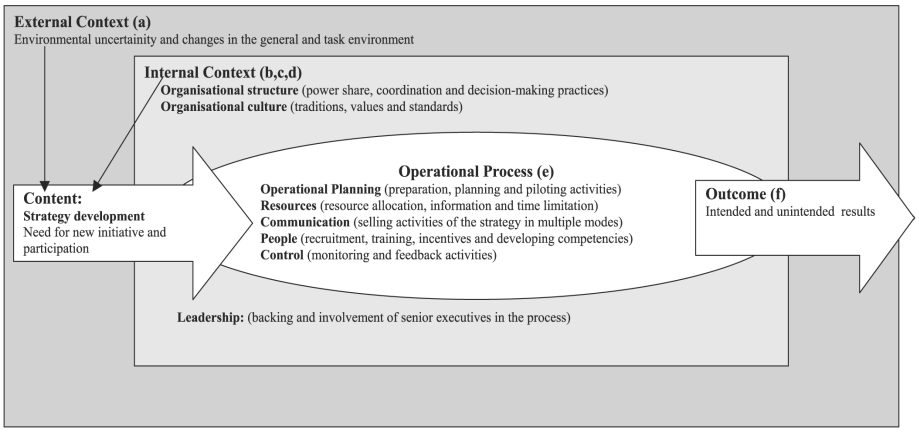

Key

a Changes in the external environment influence the strategic context and force organizations to deploy new initiatives.
b Problems and inconsistencies in the internal context require new initiatives.
c The strategy is implemented in the internal context, and the characteristics of organizational structure, culture and leadership influence the process factors.
d Having an organizational context that is receptive to change is essential for the successful implementation of strategy.
e The process factors are primarily used on a continuous basis to implement the strategy and manipulate the internal context.
f The characteristics of the context and process factors and how they are used directly influence the outcomes.

Fig. 1: Strategy implementation framework (Okumus 2003, p. 876)

Another approach to the classification of the strategy implementation models represent Cândido and Morris (2001), who make the division to:

(1) the static models that concern organisation in a given moment, identify, define and combine basic organisational dimensions for the effective implementation of the strategy. The authors propose twenty basic dimensions of the model presented as overlapping ellipses, highlighting this way the variety of dimensions which can be engaged in implementation of the strategy (Fig. 2);

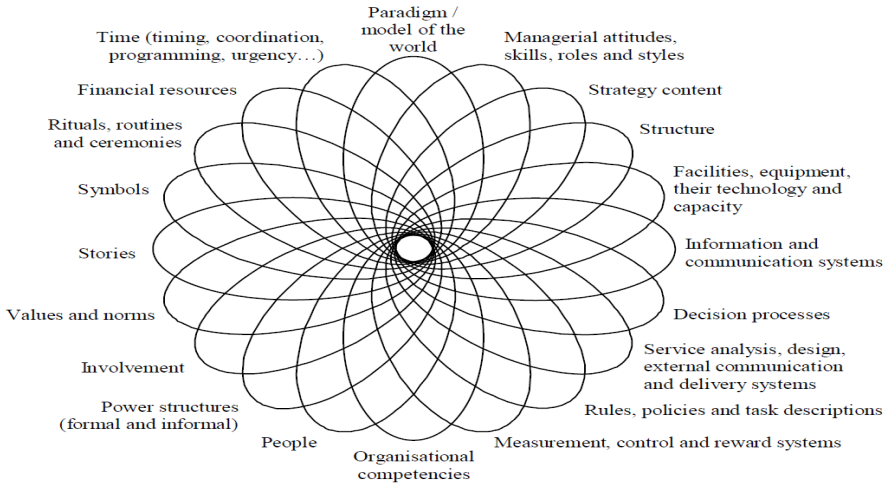

Fig. 2: Synthesised static model – fundamental dimensions of strategy implementation (Cândido and Morris, 2001, p. 826)

(2) the dynamic models, sensitive to the resistance to changes, according to which the strategy implementation is performed along with sixteen isolated stages, however, some of them may be interrupted and continued later, or may appear several times in the iterative cycle, and some may overlap with others;
(3) the mixed models, integrated, including the assumptions of the static and dynamic models.

Another approach concerning the strategy implementation process is proposed by van Buul (2010) who divides the strategy implementation process to three phases: prepare, execute, assess. The prepare phase is initiated by the input from the strategy formulation process. After conducting the strategic analyses, which are the input to formulation of

the mission, vision, values and goals, the organisation is ready to start the preparation to an actual strategy implementation. Preparation of the strategy implementation is the key part of the implementation process, which mostly consists of developing the implementation plan, while its major parts include planning the implementation, mobilisation of the implementation team, assessment of the risk and creation of the emergency plans. After developing the implementation plan, the executive phase begins, which is the design and implementation of a new business model. After the implementation of the strategy, the new business model is being assessed in order to define whether it is compliant with the mission, vision, values, goals and strategic choices resulting from it. The necessary activity in the entire process of implementation is communication, the goal of which is to allow the employers to understand the new strategy and changes which they will have to deal with, as well as the coordination of the process that is needed in the entire implementation process, as to ensure that everyone does what is required for the effective implementation.

The proposed classification of the strategy implementation models was necessary to develop the multimodal freight transport development strategy model in the cross-border areas. It has to be emphasised that the developed model does not reflect the direct adopting of the specifically described model, rather, it is a combination of the presented ones.

Implementation Model of the Multimodal Transport Development Strategy in the Cross-Border Area

In accordance with the Strategy of Sustainable Transport Development (SZRT) by 2030 (SZRT by 2030) developed in Poland, the main goal of the national transport policy is to increase the territorial availability, to improve the safety of the traffic participants and the effectiveness of the transport sector by creating a cohesive, sustainable and participant friendly transport system in national (local), European and global dimension. The goal of the intermodal transport development strategy in cross-border areas developed as a part of the TRANS TRITIA project was not only the identification of the possibilities of developing a cohesive, sustainable, innovative and environmentally friendly transport system, but also the identification of the possibilities of increasing the transport availability by using the alternative, environmentally friendly transport in the border regions with simultaneous improvement of the efficiency and effectiveness of the transport processes.

Development of the multimodal transport development strategy in the cross-border TRITIA region first required the identification of the challenges faced by the entire analysed region, particularly in the context of the freight transport. Afterwards, the range of strategic analysis was conducted (including environmental and stakeholder analysis, SWOT analysis), that allowed to develop the vision, mission and to identify the main strategic goals for the multimodal transport development in the TRITIA region. Defining the main strategic assumptions became the basis for the development of the strategy implementation model, consisting of three main stages: prepare, execute and assess (Fig. 3).

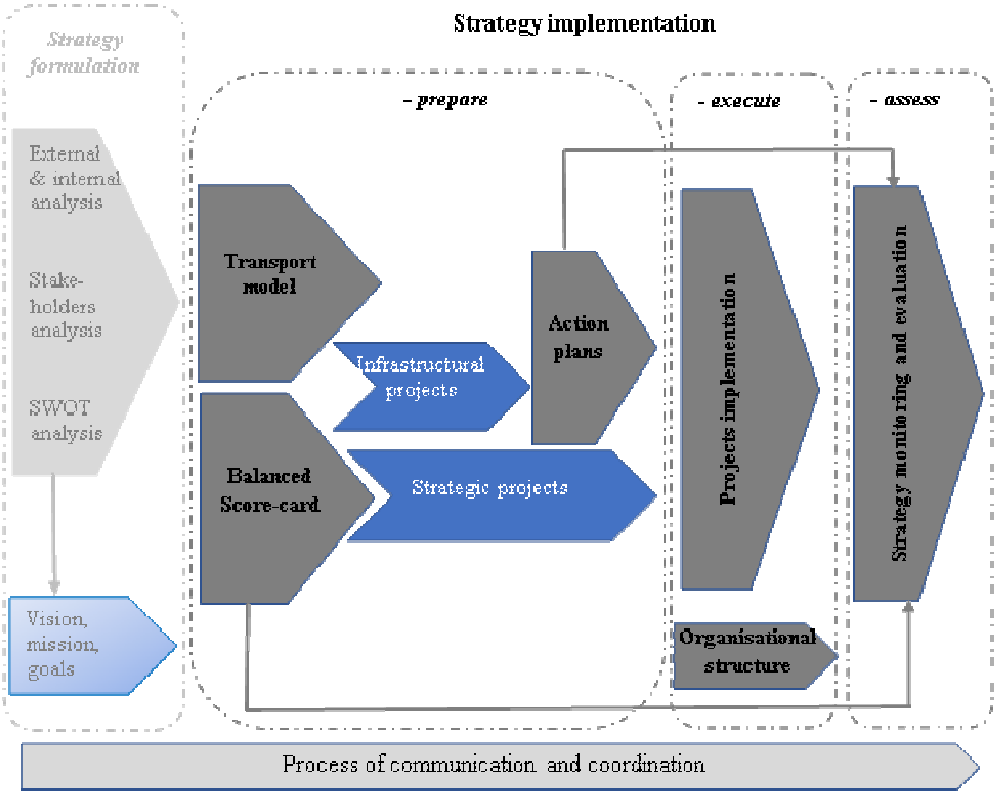

Fig. 3: Implementation model of the multimodal transport development strategy in the cross-border TRITIA area (own study)

A fundamental stage of constructed implementation model is the preparation for implementation. This stage required defining the tools that will allow to implement in the next stages the implementation itself and to monitor and assess the level of implementation of the adopted strategy. To this end, it was proposed: Transport model for the TRITIA region, Balanced Scorecard and Action plans. Strategic scorecard allowed to develop the strategy map which includes specific goals allowing to implement the vision, mission and adopted main strategic goals. The second tool is the Transport model. In this model, an existing linear infrastructure (rail, road and inland) was mapped and current freight flows in TRITIA region were presented. The model was also used to present the predicted infrastructure state, including planned infrastructural investments on the transport network in perspective of the 2030. In compliance with the strategic goal of the White Paper of transport (2011) concerning shifting of the 30% of the freight transport on distances over 300 km from the road transport to other branches of transport, predicted volumes of the freight flows were presented in the model. Such mapping of the present and proposed state allowed to indicate the bottlenecks of the multimodal transport networks in perspective of 2030. On the basis of the transport model and strategy map, the projects of infrastructural nature, important for the multimodal transport development, were created. At the same time, apart from the infrastructural projects, it was necessary to indicate the projects of strategic nature that will allow for the implementation of the non-infrastructural strategic goals. This type of projects, concerning mostly the coordination of the processes and information flows between the stakeholders, are a very important factor of the multimodal transport development. At the next stage, the Action plans were developed for the infrastructural projects. They include a few pieces of information related to the implementation of the projects assumed in practice (mainly: owners of the projects, budget of the projects, time horizons of the project implementation). Indicated strategic projects, infrastructural ones and prepared Action plans, are subjected to implementation at the second stage of the strategy implementation (execute). At this stage, it is also necessary to finally clarify the information proposed in the former phase, included in the Action plans. Moreover, it is also crucial to constitute a developed organisational structure that both initiates implementation of the strategy and also participates in its monitoring process. As a part of the last stage (assess), the works related to the monitoring and assessment of the strategy implementation will be conducted. The assessment will mainly cover: the level of implementation assumed in the goal strategy map and information assumed at the stage of acceptance for implementation of the Action plans (mainly: project implementation schedule and planned budgets). The indicators proposed as a part of the BSC will be used in conducting the monitoring activities. Their results will constitute the feedback for both the entities implementing the strategy, as well as for the stakeholders of the multimodal transport.

It has to be emphasised, that implementation of the formulated strategy in accordance with presented model is of design and process nature. Implementation, as well as the former process of formulating the strategy, requires an adequate communication and coordination of the activities. The purpose of communication is to inform about the goals of the multimodal transport development in the cross-border area, implemented projects and results that are being obtained. Appropriate communication (meetings, workshops, information system etc.) will allow to develop good relationships with the stakeholders, create proper attitudes and behaviours, or build favourable image. Good communication is the basis for developing the coordination system based on the proposed organisational structure.

Adopted implementation model of the multimodal transport development strategy in the cross-border TRITIA region is currently at the last stage of the preparation phase. Some of the infrastructural projects are presently being implemented, the remaining adopted strategic assumptions are possible to implement in accordance with the developed model in the coming years.

Results and Discussion

Preparation of the strategy implementation

Conducted analyses in the cross-border TRITIA region led to formulation of the vision, mission and the strategic goals of the multimodal transport development in the indicated region. They are cohesive with the strong and weak sides indicated in the SWAT analysis, as well as with the opportunities and threats identified in the TRITIA region, and are fully compliant with the strategic assumptions of transport policy of the EU and specific countries (Slovakia, Czech Republic and Poland). These activities became the beginning of the implementation works of the developed strategic assumptions, in accordance with the model adopted in the point three of the paper.

The first stage of implementing the strategies in accordance with developed model is the preparation for implementation. In this phase, the strategy map created as a part of the Balance Scorecard (Blacha and Brzóska, 2016) was proposed. It allowed to transpose the formulated strategic assumptions to the measurable specific goals. As a part of the strategy map, the 24 goals were adopted which were included in six perspectives: development, infrastructure, process, safety and sustainable development, financial, stakeholders. In relation to the four classic perspectives indicated by Kaplan and Norton (1993), the adopted perspectives have been modified, considering the character of the region for which the strategy has been built. The perspective of the development has been modified, or rather clarified to safety and sustainable development perspective due to the meaning that is being assigned to the sustainable development in modern transport policy. This way, the meaning of the mentioned conception was emphasised and the adopted strategy has been entered into the assumptions of the White Paper. The second modified perspective concerns the clients. It has been modified into the stakeholders perspective. A change results from the big number and variety of the entities engaged in freight flows in cross-border multimodal transport. Due to that, it is impossible to narrow this group only to direct customers, however, it is necessary to consider other important groups that are related to this transport in a varying degree. Apart from the two changes in the perspectives, an additional infrastructure perspective has been formulated. It was the result of paying special attention to the technical aspects of the multimodal freight transport functioning, for which a very significant meaning have both the linear infrastructure in multi-branch approach, as well as the multimodal transshipment points. Two remaining perspectives did not require changes.

Considering the goals included in the strategy map and information about bottlenecks in the TRITIA region being the result of the works within the transport model, the projects concerning extension and modernisation of the transport infrastructure have been indicated. They were supplemented with projects of strategic nature that were the response to a part of the goals written in the strategy map, implementation of which requires not only the infrastructural activities, but also the organisational ones.

As a part of the projects of strategic nature, three projects (Table 1) have been proposed, for which a high priority for the multimodal transport development has been indicated. The meaning of these projects is visible, among others, by their strong relation with the goals written in the strategy map.

Table 1: Identified strategic projects

Name of the project	Goal of the project
Observatory of multimodal transport in the cross-border area (acronym: Observatory)	Constituting a specialised observatory which superior goal will be the identification and analysis of emerging technological and market trends related to the multimodal transport development in the TRITIA region.
Coordinator of the multimodal transport network (acronym: Coordinator)	Development of the multimodal transport network coordination model in the TRITIA region.
Competence centre for sustainable freight flows in the TRITIA region (acronym: Competence centre).	Designing the innovative service centres in the TRITIA regions, supporting the sustainable freight flows based on ecological transport branches and alternative sources of power,

Source: based on: Dohn et al. (2020)

The Observatory and Coordinator are the projects of key meaning for the implementation of the entire strategy. They were included in the monitoring processes, but they are also the organisations necessary for the synchronisation of the flows and unification of the multimodal transport system in the cross-border area, as well as for the future launching of the next projects that aim at the multimodal transport development. The Competence centre should provide support, which goal is to focus the activities on the research and development works in the area of alternative power sources and on the design of innovative centres network enabling supplying with alternative power sources. Each of the three indicated strategic projects includes several proposed detailed projects: The Observatory includes seven such projects, Coordinator – two projects, and the Competence centre three projects. It is important to bring attention to the relation between the first and second project. For an adequate implementation of the goals and indicated projects, it is necessary to implement the Observatory project first, and then the works in the Coordinator project should begin (it is not necessary for the first project to be finished before the second one starts). It results from the fact that the Observatory will be providing the results of the conducted observations to the Coordinator of the network. The third project is independent of the first two ones, thus, it can be implemented simultaneously with other projects.

Apart from the strategic projects, the projects of infrastructural nature have been identified as a part of the conducted research. They consist of commenced and not completed investments and planned (or predicted) investments that were included in the strategic documents and national infrastructure development programmes. Moreover, as a result of identification of the bottlenecks being the outcome of the works conducted in the Transport model, the projects have been proposed, that at the moment are not included in the strategic documents and their implementation is important for the multimodal transport development in the TRITIA region. All identified projects have been grouped according to: the transport branch (road, rail, inland waterway), cross-border area (Poland-Czech, Poland-Slovakia, Slovakia-Czech), priority (low, medium, high) and implementation time perspectives (short-term - by 2022, medium-term - by 2025, long-term - by 2030).

In first cross-border area Poland-Czech, a total number of 42 infrastructural projects has been identified. Their number, with consideration of the three main criteria, has been included in Table 2. It is worth noticing, that the highest priority has been assigned to 28 projects (66.67%) and the lowest priority has not been assigned to any implemented or planned to be implemented infrastructural projects. At the same time, it should be highlighted that all six projects indicated in the inland waterway transport have been considered as very important for the multimodal transport development (the highest priority). Considering the meaning of the inland waterway transport in the EU transport policy and the present low quality level of the waterways in Poland, it is a fully understood matter. Among the rail projects, the highest priority has been assigned to 19 projects (out of 23), and in relation to the road transport only three projects were given the highest priority. The small number of road projects of the highest priority results from the fact that according to the multimodal transport assumptions, the road transport is to implement only the delivery tasks from and to the transshipment terminals. It should be noticed, that 15 projects out of all the identified ones constitute the projects that aim to eliminate or limit occurring bottlenecks indicated at the stage of the linear infrastructure analysis and its implemented freight flows. 13 projects among them were given the highest priority. In case of the projects of medium priority, four ones were related to the rail transport, where two of them directly influence the bottleneck problem. The remaining ten projects were constituted by the projects that aim at the improvement of the road transport infrastructure. 15 projects (35.7%) were indicated as the projects of the shortest predicted implementation time, out of which 9 projects are the ones of the highest priority. The projects of medium predicted implementation time included 13 projects (31%) with 8 projects of the highest priority. The longest predicted implementation time concerns long-term projects. Their number totals 14 (33.3%), where 11 is of the highest priority.

Table 2: Consolidated view of the infrastructural projects in the cross-border area Poland-Czech Republic

Poland-Czech Republic cross-border area			
Number of projects in branch depiction	Rail transport	Inland waterway transport	Road transport
	23`	6`	13`
Number of projects according to the assigned priority	The highest priority	Medium priority	The lowest priority
	28`	14`	0`
Number of projects according the predicted implementation time	Short-term	Medium-term	Long-term
	15`	13`	14`

Source: own study.

In the second cross-border area Poland-Slovakia, the number of projects is significantly smaller and totals 25 projects. Their number, taking into account the three main criteria, is presented in Table 3. 14 projects (56%) is of the highest priority among all identified projects. Those are all rail projects and one road project. Only four rail projects were indicated as the ones that eliminate or limit the existing bottlenecks. 4 projects (16%) were indicated as the projects of the shortest predicted implementation time, out of which only one project was of the highest priority. 9 (36%) projects were indicated as the projects of medium implementation time and seven of them were given the highest priority. 12 projects (48%) were indicated as the projects of the longest predicted implementation time, out of which 6 projects are the ones of the highest priority.

Table 3: Consolidated view of the infrastructural projects in cross-border area Poland-Slovakia

Poland-Slovakia cross-border area			
Number of projects in branch approach	Rail transport	Inland waterway transport	Road transport
	13`	0`	12`
Number of projects according to the assigned priority	The highest priority	Medium priority	The lowest priority
	14`	11`	0`
Number of projects according the the predicted implementation time	Short-term	Medium-term	Long-term
	4`	9`	12`

Source: own study.

In the third cross-border area Czech-Slovakia, the number of projects is significantly smaller and totals 11 projects. Their number, with consideration of the three main criteria, has been included in Table 4. It is typical that all the rail projects have the highest priority and the road projects a medium priority. The projects of the shortest implementation time included four projects (36.4%) and only two of them were of the highest priority. All the projects of a medium implementation time are characterised by the highest priority. The projects of the longest predicted implementation time mostly concern the projects of a medium priority (three projects).

Table 4: Consolidated view of the infrastructural projects in cross-border area Czech Republic-Slovakia

Czech Republic-Slovakia cross-border area			
Number of projects in branch approach	Rail transport	Inland waterway transport	Road transport
	6`	0`	5`
Number of projects according to the assigned priority	The highest priority	Medium priority	The lowest priority
	6`	5`	0`
Number of projects according to the predicted implementation time	Short-term	Medium-term	Long-term
	4`	3`	4`

Source: own study.

Identified infrastructural projects were detailed as a part of the Action plans. For each of the project, the owner responsible for its implementation was proposed, predicted funding sources were determined and estimative budgets were presented. The directors of the transport infrastructure (rail, road, inland waterway) were indicated as the main infrastructural projects owners in specific countries. Among the 9 main owners, the following can be indicated: PKP PLK SA, Železnice Slovenskej Republiky (Railways of the Slovak Republic), Správa železnic, s.o. (Czech railway infrastructure manager), Generalna Dyrekcja Dróg Krajowych i Autostrad (General Director for National Roads and Motorway), Ředitelství silnic a dálnic, Národná diaľničná spločnosť, Ministry of Marine Economy and Inland Navigation, Polish Waters Holding, ŘVC and Moravskoslezský kraj. In case of strategic projects, the EGTC TRITIA was proposed as the entity responsible for their implementation, along with the partnership of the business environment institutions (GAPR Sp. z o.o.) and science centres (Silesian University of Technology, research and development institutes from the Czech Republic and Slovakia). In the Action plan it was also attempted to define the projects budgets and to indicate their financing sources. Basic sources of funds for the investments consist of the rail programmes. However, the anticipated scale of expenditure is so large that it can be assumed that the EU funds will need to participate.

Strategy Implementation – Execute and Assess

The projects adopted at the stage of preparation to implementation and the Action plans will be implemented at the second stage of the strategy implementation. It is important that at this stage the final information assumed in the Action plans is clarified. Moreover, it is necessary to constitute and approve the organisational structure (Fig. 4) that includes the most important entities influencing the success of the implementation process. Organisational structure not only initiates the strategy implementation process, but it also has a key meaning in the process of monitoring and assessing the level of implementation.

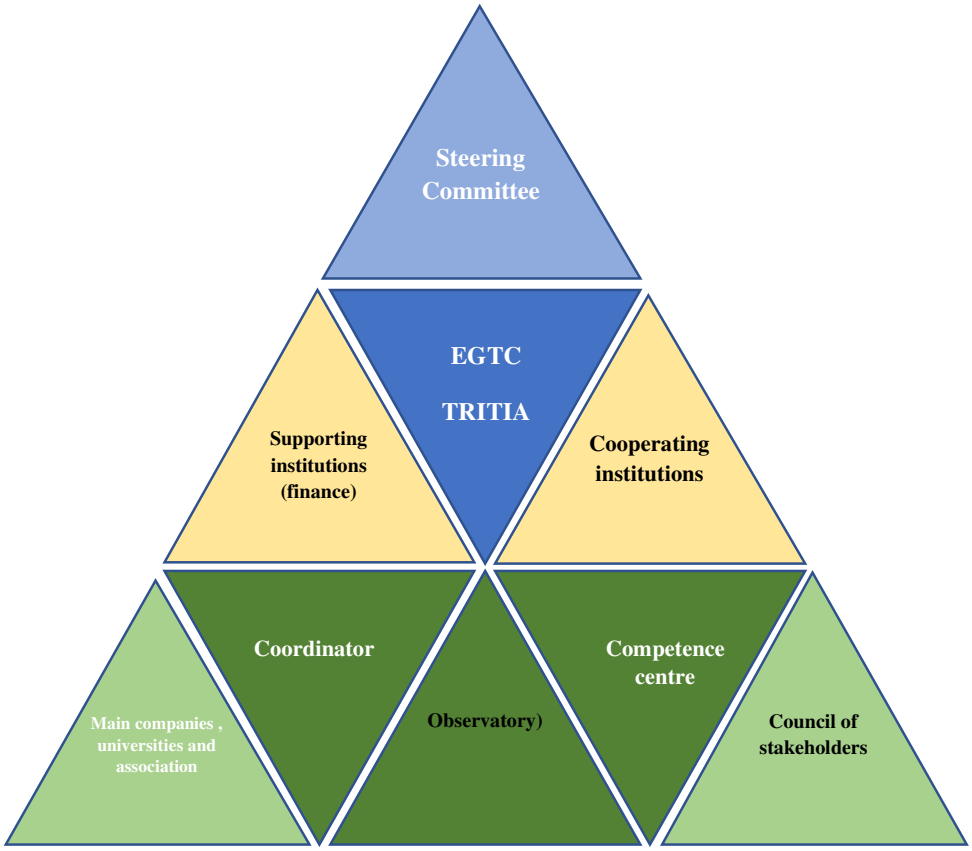

Fig. 4: Organisational structure of the implementation strategy of the multimodal transport development (Dohn et al., 2020).

The organ responsible for the implementation of the strategy will be the EGTC TRITIA. Most of all, this responsibility will concern building and development of the multimodal transport ecosystem in the TRITIA region, as well as reporting in terms of the level of implemented actions. The key element of the structure is the assumption

of implementation of three strategic projects (Observatory, Coordinator, Competence centre), within which the indicators of the strategy will be reported and monitored. The decision-making and advisory organ for the matters related to strategy implementation and programming, coordination, implementation, monitoring and evaluation of the multimodal transport development policy in the TRITIA region will be the Steering Committee, bringing together the key governmental and self-governmental organisations of the Czech Republic, Poland and Slovakia. The activities of the Steering Committee will be supported by the Stakeholder Council which goal is to undertake substantive works on the main tasks resulting from the present needs of the TRITIA in terms of the multimodal transport development. Presentation of the expertises and reports at the Steering Committee meeting will be the result of its works. Relationships between main entities (investors), universities and associations that have the key impact on the multimodal transport development, have a significant meaning in terms of cooperation between the CoS and the EGTC TRITIA, and constituted Observatory, Coordinator and Competence centre. Implementation of the tasks in terms of monitoring and evaluation will be based on the present EGTC TRITIA structure, with the support of the Steering Committee for the multimodal transport development. Monitoring will include implementation of the projects in the TRITIA region and indicators that will allow to verify the implementation level of the goals adopted within the strategy map. The indicators were adopted separately for each goal as a part of the six perspectives of the strategy map. In the paper, only an exemplary ones will be included, presented in a consolidated way for each of the perspective separately.

Table 5: Examples of the strategy implementation monitoring indicators

Perspective	Number of indicators	Examples of indicators
Stakeholders	9`	- Average delay time in multimodal transport - Percentage share of the multimodal transport in the total structure of freight flows in the TRITIA area - Number of programs aimed at strengthening cooperation in networks and supply chains - Number and scope of agreements between countries (Poland, the Czech Republic, Slovakia) aimed at unifying policies in the implementation of material flows in the TRITIA area - The level of subsidy of tax reliefs for the use of multimodal transport
Financial	6`	- Number of projects acquired in the field of multimodal transport development in the TRITIA area - Number of investors in the development of multimodal transport - Number of initiatives undertaken to raise funds for the development of multimodal transport
Safety and sustainable development	4`	- Number of projects aimed at increasing the safety of multimodal freight transport in the TRITIA area - The level of external costs in freight transport
Process	12`	- Number of multimodal transport support programs for enterprises from the TSL industry - Number of standardised procedures in multimodal transport in the TRITIA area - Number of implemented modern organisational solutions in multimodal transport - Number of participants in the multimodal transport chain supported
Infrastructure	16`	- Degree of sharing of the transport infrastructure - Number of available IT systems supporting multimodal transport - Density of multimodal transshipment terminals - Number of modernised track kilometres in rail transport
Development	11`	- Number of competence centres - Number of training courses and courses of study

Source: own study.

In the strategy, 58 indicators were proposed for monitoring and evaluation of the strategy implementation. However, the list remains open. There is a possibility of supplementing the list with additional important indicators.

Moreover, in order to conduct monitoring and evaluation activities, the sources of acquiring information for determining the indicators were presented. It should be noticed, that presently there are deficiencies in terms of gathering some information required for conducting an effective monitoring. Due to this, there is a necessity of building a complete system of acquiring and gathering information. It is a necessary condition for conducting monitoring activities.

Conclusions

The developed model of implementing the multimodal freight transport development strategy is the tool that supports the activities aiming at the dynamic increase of the multimodal transport in the cross-border areas of Poland, Czech Republic and Slovakia. In order for this to happen, it is necessary to engage all participants of the process, that is all mentioned countries and various groups of stakeholders. It is necessary to create favourable conditions for cooperation and common implementation of the projects in the infrastructure development region and organisational support. A challenge for implementation of the developed strategy is to eliminate the delays in development, modernisation and revitalisation of the transport infrastructure, as well as connecting the most important nodes of the European transport network, including TEN-T base corridors. A cohesive network of highways, expressways and railway of high standard, as well as created network of inland waterways, will allow to fully use the economic potential of the three analysed countries. It has to be remembered that creation of the cohesive multimodal transport ecosystem requires both dynamic development of lacking elements of the transport infrastructure, improvement of its quality and technical standards, as well as introducing the solutions that integrate transport networks.

A success of the strategy implementation is strongly dependent on constituting the Observatory and Coordinator as entities proposed within the strategic projects. At the same time, it is also a characteristic that distinguishes this approach and creates its authenticity, however, it should be also perceived as the main risk. If it will not be possible to constitute the Observatory and Coordinator in assumed time, the designed organisational structure will not be able to effectively perform the entire strategy implementation process. Strategy implementation is based on the design and process approach. The key role, next to the mentioned strategic and infrastructural projects, belongs to the communication and coordination process that not only influences the implementation of strategic goals, but also the creation of appropriate attitudes that facilitate cooperation necessary for the implementation of assumed activities, characteristic for the multimodal transport.

The authors of this strategy are convinced that the implementation of its assumptions will contribute to the development of modern transport system on the cross-border areas included in the projects, and it will also constitute the element of a broader context for the transport system development in the entire European Union.

Subsequent studies on the implementation of the strategy, and especially its vision, will be related to the analysis of stakeholders in the multimodal transport ecosystem.

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Leader-Follower Well-Being Cross-Over Effect Mediated By Leadership Style

Przemysław ZBIEROWSKI
University of Economics in Katowice, Katowice, Poland
przemek@zbierowski.com

Milena GOJNY-ZBIEROWSKA
University of Economics in Katowice, Katowice, Poland
milena.gojny@ue.katowice.pl

Abstract

Well-being of employees is largely dependent on behaviors of leaders. But does it matter for the happiness of followers if the leader is happy as well? And do happy leaders behave differently towards their subordinates than unhappy ones? In this study we make an attempt to unpack the mechanism of cross-over of well-being from the leader to the follower. Specifically, we consider both direct relationship involving emotional contagion and indirect relationship mediated by perceived support and empowerment. Using the responses from 406 leader-follower dyads we find that the well-being cross-over effect is both direct and indirect. Moreover, we find that behavior of the leader are strongly dependent on level of well-being. Happy leaders are more supportive towards their followers and more likely to give away some of the power.

Keywords: leader's well-being; follower's well-being; well-being cross-over effect; social support; empowerment

Introduction

Well-being of employees as an outcome of behaviors of the leader has been a matter of intense scholarly investigation (Inceoglu et al., 2018). It has been found mainly related to specific leadership styles, such as transformational leadership (Nielsen et al., 2008) or authentic leadership (Ilies et al., 2005). However, few studies considered the cross-over effect of well-being from the leader to the follower and its underlying mechamism (Skakon et al., 2010). The existence of such cross-over effects has been proven in relation to some well-being-related outcomes, such as emotional exhaustion and work engagement (Wirtz et al., 2017), job dissatisfaction (Sutherland & Davidson, 1989) or burnout (Ten Brummelhuis et al., 2013; Huang et al., 2014). Moreover, while there is evidence on the effect of specific leadership styles on both follower's (see e.g. Inceloglu et al., 2020 for a review) and leader's well-being (Ilies et al., 2005), little is known about the dependence of certain leadership behaviors and style on the level of leader's well-being. Therefore, in this study we ask the question of how happiness changes the way in which the leader behaves, and how is that conveyed to happiness of followers, both directly and indirectly. More specifically, we investigate the direct effect of leader's well-being as well as indirect effect mediated by support given to the follower and the extend to which the follower is empowered by the leader.

We contribute to the body of literature on leader's behaviors and well-being. We contribute by reversing the question on the effect of leadership style on well-being. Instead of asking what is the effect of certain leader's behaviors on leader's well-being (Ilies et al., 2005, Bernerth & Hirschfeld, 2016; Kaluza et al., 2020) we ask and investigate how are leader's behaviors driven by the level of leader's well-being. We also further unpack the mechamism by which the well-being of the leader is crossed-over to the well-being of the follower. We point to relational leadership styles: supportive and empowering as mediators and empirically prove that they play important role in the well-being cross-over effect. The research was carried out within research project 2017/27/B/HS4/02172 funded by National Science Centre, Poland.

Theoretical background

Our theoretical framework, firstly, considers the cross-over effect between the leader's and the follower's well-being. We focus on well-being in a broader sense than just satisfaction with work, and take into consideration satisfaction with life. The existence of cross-over effect of well-being related states from the leader to the follower has been proven before (Ten Brummelhuis et al., 2013; Huang et al., 2014; Köppe et al., 2018). The mechamism of that effect

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is, however, still largely unknown. The two competing hypotheses explain this effect either by the transfer of emotions from the leader to the follower (affective cross-over) or due to specific behaviors of the leader (behavioral cross-over). There is some empirical support for the direct hypothesis of emotional contagion (Ten Brummelhuis et al., 2013), therefore we hypothesize:

H1. Well-being of the leader has direct effect on the well-being of the follower.

We argue that the transition of well-being of the leader to the well-being of the follower is only partly direct and based on mechanisms such as emotional contagion (Köppe et al., 2018). We further argue that the other part of the cross-over effect of well-being of the leader to that of the follower is transferred through specific type of leader's behaviors, especially relationship-oriented behaviors and leadership style (Yukl et al., 2002; DeRue, 2011), such as supportive leadership or empowering leadership (Inceoglu et al., 2018).

We adopt the understanding of supportive leadership based on House's (1981) approach which combines emotional, informational, instrumental and appraisal support to followers. Instead of paying attention to leader's behaviors we approach (and measure) supportive leadership by the support actually received by the follower. This way we are able to capture not just the leader's behavior but the outcome that this behavior intends to achieve. For that reason we use perceived organizational support (Eisenberger et al., 1986) as our mediator between well-being of the leader and that of the follower.

There is evidence that leader's own well-being is linked the supportive behaviors. Maurya and Agarwal (2015) found that followers are satisfied with their jobs if their leaders supportive behaviors are linked to leaders' well-being. Ten Brummelhuis et al. (2013) argue that leader's burnout is negatively related to leader's supportive behaviors. We therefore theorize that higher level of leader's well-being will be beneficial for the support that is provided by the leader to the follower.

The effect of support received from the leader on follower's well-being has been of particular interest in the occupational stress field (e.g. Cohen & Wills, 1985; Kahn & Byosiere, 1992). The research in that field describes two models explaining the effect of social support on well-being of employee. The 'buffering hypothesis' argues that social support affects well-being mainly when the receipient of the support is likely to experience high level of stress. In this case the support protects the receipient from the potentially negative influence of stressful event. The 'main effect' model proposes that social support has positive effect on well-being of the receipient of support regardless of the experienced stress (Rafferty & Griffin, 2006). The positive effect of received support on follower's well-being has been also supported by others (e.g. Schmidt et al., 2014; Ceasens et al., 2016; Kim & Beehr, 2018; Skakon et al., 2010 for a review). Together with the hypothesized effect of the leader's well-being on supportive behaviors we hypothesized that:

H2. Support received by the follower mediates the relationship between leader's and follower's well-being.

Psychological empowerment in its most prevalent conceptualization (Spreitzer, 1995; 1996) is composed of four cognitions reflecting an individual's orientation to his ore her work role: meaning, competence (self-efficacy), self-determination, and impact. Srivastava et al. (2006) make an attempt to integrate the two perspectives of empowering leadership. The first focuses on leader's behaviors, especially sharing power or giving more responsibility and autonomy to followers. The second perspective focuses on outcomes of empowering leadership among followers. We follow that integrative view and link the leader's well-being to empowering behaviors which, in turn, enhance psychological empowerment of employees.

Similarly to supportive leadership there is very little evidence on dependence of empowering leader's behaviors on level of well-being. Chi et al. (2011) argue that happy leaders are more transformational, a view also echoed by Joseph et al. (2015). As transformational leadership has been found to result in high follower's empowerment (Kark et al., 2003) we argue that this type of leadership is, in fact, empowering and that leaders well-being is positively related to empowering subordinates.

The effect of leader's empowering behaviors on follower's well-being is rather well-documented (Tuckey et al., 2012; Skakon et al., 2010 for a review). Therefore, we hypothesize that:

H3. Empowerment of the follower mediates the relationship between leader's and follower's well-being.

The result of our theorizing is the conceptual framework that assumes the existence of both direct and indirect cross-over effect of well-being from the leader to the follower (Figure 1).

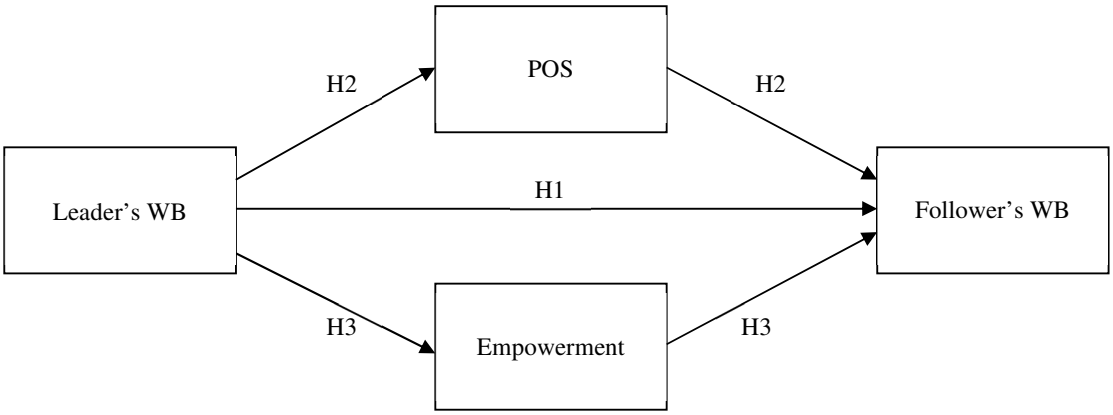

Figure 1: Conceptual framework of leader-follower well-being cross-over effects.

Methodology

To test our hypotheses we collected the data using multi-source approach from 406 dyads of leaders and followers. The sample was randomly chosen among small, medium and large organizations with the exclusion of micro-enterprises, as leader-follower relations in those kind of organizations most often involve the owner of the business.

We use the Satisfaction with Life Scale (5-item, Pavot & Diener, 2008) to measure well-being of the leaders (Cronbach alpha .83) and followers (Cronbach alpha .85). To measure follower's perceived organizational support we use the Survey of Perceived Organizational Support (13-item, Eisenberger et al., 1986, Cronbach alpha .78). Finally, we use Spreitzer's (1995) scale to measure empowerment of followers (12-item, Cronbach alpha .86). We control for leader's and follower's age, gender and tenure.

We test our hypotheses using structural equations modeling, we use SEM module of Stata software.

Results

First, we test the model with only leader's well-being as independent variable and control variables (without supportive and empowering leadership). The results are presented as model (Table 1). The relationship between leader's and follower's well-being is rather strong and statistically significant.

Table 1: Results of structural equations modeling

	(1)	(2)	(2)	(2)
Dependent variable	Follower'sWB	Follower's WB	POS	Empowerment
POS		0.495***		
		(0.0673)		
Empowerment		0.352***		
		(0.0553)		
Leader's WB	0.382***	0.123**	0.251***	0.381***
Direct effect	(0.0538)	(0.0473)	(0.0387)	(0.0471)
Leader's WB		0.124***		
Mediated by POS		(0.0255)		
Leader's WB		0.134***		
Mediated by Empowerment		(0.0268)		
Follower's age	0.00249	0.00310	-0.00246	0.00173
	(0.00740)	(0.00600)	(0.00532)	(0.00647)
Follower's tenure	-0.0183†	-0.0225*	0.00106	0.0102
	(0.0108)	(0.00877)	(0.00776)	(0.00944)
Follower's gender	0.0103	-0.0337	0.0250	0.0900
	(0.0928)	(0.0753)	(0.0667)	(0.0811)

Leader's age	-0.00242	-0.00115	-0.00249	-0.000117
	(0.00620)	(0.00503)	(0.00446)	(0.00542)
Leader's gender	-0.0289	-0.0575	0.0111	0.0657
	(0.0927)	(0.0752)	(0.0666)	(0.0810)
Leader's tenure	0.00711	0.000157	0.00981†	0.00596
	(0.00754)	(0.00614)	(0.00542)	(0.00659)
Constant	2.801***	0.248	3.293***	2.624***
	(0.418)	(0.387)	(0.301)	(0.366)
Observations	406	406	406	406

*Note. Standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. POS – perceived organizational suport, WB – well-being*

To test the hypotheses we test the model 2 which is our conceptual framework. The results indicate that with the inclusion of POS and empowerment the direct relationship between leader's and follower's well-being is weakened, but still statistically significant (Figure 2). This proves the existence of direct relationship and supports H1. Also the indirect effects with the mediation by perceived organizational support and empowerment are statistically significant which provides support for hypotheses H2 and H3.

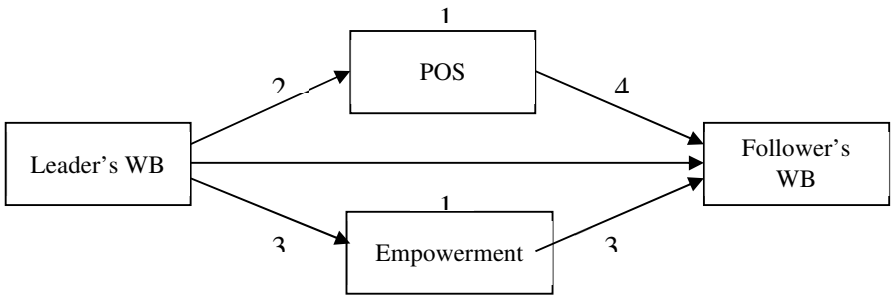

Figure 2: Conceptual framework of leader-follower well-being cross-over effects.

As robustness checks we tested the models with only perceived organizational support and only empowerment as mediators in the relationship between well-being of the leader and the follower. When empowerment was removed from the model the direct relationship and indirect relationship (mediated by POS) were both significant (.2, p<.001; .18, p<.001, respectively). When POS was removed from the model the direct relationship and indirect relationship (mediated by empowerment) were both significant (.16, p<.001; .22, p<.001, respectively).

Discussion and Implications

First of all, we confirm the hypothesized cross-over effect of well-being from the leader to the follower. This corroborates earlier findings in relation to other well-being-related constructs (Sutherland & Davidson, 1989; Ten Brummelhuis et al., 2013; Huang et al., 2014; Wirtz et al., 2017). We can then state that happiness of the leaders tends to spread to followers. We further unpack the mechamism of such cross-over effect and conclude that it is partly due to affective cross-over or emotional contagion. Leaders influence followers and this is also true for well-being. Spending considerable time with another person results in contagion of emotions.

We also found that majority of the cross-over effect is indirect and mediated by certain leadership behaviors resulting in certain follower's outcomes, such as perceived organizational support and empowerment. It seems that those two styles of leadership, and their consequences are reinforcing themselves, their combination is beneficial for well-being and performance of employees (Butts et al., 2009).

An important implication of our study is the support for the hypothesized relationship between well-being of the leader and supportive and empowering leadership styles. This proves that happy leaders are more inclined to give support and power to their followers. This finding is important as earlier studies almost exclusively focused on well-being of employees and very few that took into consideration well-being of the leader used it as dependent variable. We uncover that leader's happiness might be an important resource in leading employees (Chi et al., 2011; Joseph et al., 2015).

Our study unpacks the mechanism of well-being cross-over effect, however, one piece that might be still missing is the relationship between leader's well-being and perceived support and empowerment of followers. Therefore, future studies should consider additional variables related to leader's behaviors and employ more sophisticated research methods such as diary studies.

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Green Marketing as a Tool for Building the Corporate Reputation as a Socially Responsible Organization – Critical Approach

Danuta SZWAJCA

Silesian University of Technology, Faculty of Organization and Management, Zabrze, Poland,
E-mail: danuta.szwajca@polsl.pl

Abstract

Enterprises are trying to build their reputation as socially responsible organizations due to the growing environmental awareness of consumers and the pressure of other stakeholder groups on corporate social involvement. To this end, they use the concept and tools of green marketing. It turns out, however, that many companies only use green marketing tools to create the desired green image, not reputation. In many cases, this leads to manipulation and simulation of pro-ecological and pro-social activities, i.e. greenwashing, which is counterproductive when it comes to building a "green" reputation. The article presents the importance of green marketing in building the company's reputation as a socially responsible organization, indicating the negative effects of greenwashing practices, and proposes methods of using green marketing that give companies the chance to build the desired reputation more effectively. The research methodology was based on a critical analysis of the literature, a thematic review of research results and deductive inference.

Keywords: Green Marketing, Corporate Reputation, CSR, Greenwashing.

Introduction

Reputation is considered the most valuable asset of a company, and the risk of its deterioration or loss - the greatest threat to its existence and development (Porter, Kramer, 2006; Creedon 2011; Marcellis-Warin, Teodoresco 2012). Reputation is the opinion of various groups of stakeholders about an enterprise, its offer and the results of its activities, on the basis of which they make their market decisions. This opinion is built on the basis of information provided by the company to the environment, opinions of other entities about the company, but above all, on the basis of own experience or information about the experiences of other stakeholders in contacts with the company.

For many years, an important criterion through which the activity of enterprises is assessed by almost all stakeholder groups has been corporate social responsibility. The company's social commitment is noticed and appreciated by stakeholders, which translates into their market decisions: customers are more willing to buy the company's products, employees show greater commitment and are better motivated to work, business partners have greater confidence in establishing cooperation, investors are more willing to finance the company's activities (Trudel & Cotte, 2009; Haigh & Dardis, 2012; Pfau, 2008). Therefore, companies try to build their reputation as a socially responsible organization (the so-called "green" reputation), using the ideas of green marketing. It turns out, however, that many companies use green marketing tools primarily to be perceived as a socially responsible organization. So in fact, they strive to create the desired image of such an organization, which is not the same as obtaining such a reputation. The firm striving of enterprises to create the desired, "green" image often leads to simulating specific actions, deceiving and misleading customers as to the environmental performance of products and social commitment, which is referred to as greenwashing.

The aim of the article is to indicate the importance of the concept of green marketing in building the company's reputation as a socially responsible organization, indicating the negative consequences of using greenwashing practices and to propose such methods and ways of operating with the use of green marketing to make building the desired reputation more effective. Therefore, an attempt was made to answer the following research questions:

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1. What is the importance of green marketing in building the company's reputation as a socially responsible organization?

2. Do the companies using green marketing build a reputation or rather the image of a socially responsible organization?

3. What are the negative effects of greenwashing practices in the context of building a "green" corporate reputation?

4. How to use green marketing as a more effective tool for building the company's reputation as a socially responsible organization?

The following research methods were used: critical analysis of the literature, review of thematic research results and deductive inference based on the analysis of the following concepts: corporate reputation concept, stakeholder theory, creating shared value, hybrid value chain, corporate social innovation, CSR 2.0 and the ideas of sustainable development.

The importance and use of green marketing in building the company's reputation

The growing ecological awareness of societies and the increasing pressure of stakeholders result in increased requirements for enterprises as regards their social responsibility, environmental and climate protection. Therefore, all industries give up the “wave of responsibility” and the need to quickly move towards more sustainable, ethically correct practices (Laasch & Conaway, 2015). Enterprises are changing their approach to management, implementing the so-called good practices, environmental standards of the ISO 14000 series, formulate internal or industry codes of ethics, undertake environmental initiatives and pro-ecological projects carried out together with their stakeholders. Kotler (2011) notes that "more and more consumers would rather buy goods and services from companies that are concerned for the environment, which is why company managers and owners have to add the ecological vector to the administration". The approach to marketing is also changing, because its traditional concept and assumptions are criticized in the context of CSR and sustainable development (Szwajca, 2013). The approach to marketing evolves towards the concept of social marketing and Marketing 3.0, which calls for partnership and co-creation of a market offer with stakeholders, taking into account the good of the consumer and the whole society (Kotler, Kartajaya, Setiawan, 2011), as well as towards green or sustainable marketing.

Green marketing is defined as "the process of creating, communicating and delivering value to customers. in a way that makes it possible to protect or strengthen both environmental and social capital in all respects ”(Martin, Schouten, 2012, p. 10). Leitner (2010) or Belz and Peattie (2010) emphasize that green marketing should cover all activities of the company, ensuring ecological and social benefits throughout the product life cycle, from the idea to the withdrawal of the finished product from the market and its disposal

Sustainable marketing understood in this way requires the development and implementation of sustainable marketing mix tools. Belz and Peattie (2012) proposed a new "4C" composition instead of the classic "4P" marketing mix structure (Table 1).

Table 1: Traditional marketing mix versus sustainable marketing mix

Traditional marketing mix	TRANSFORMATION	Sustainable marketing mix
Product	→	**C**ustomer solution
Price	→	**C**ustomer cost
Promotion	→	**C**ommunication
Place	→	**C**onvenience

Source: Belz, Peattie, 2012.

In the presented approach, the manufactured and offered products or services are to solve specific problems of consumers, not only without generating social or environmental problems, but also serving to limit and eliminate them. Sustainable price is seen primarily as a cost source for the customer, therefore these costs must be well justified and documented. Instead of traditional promotion, based on the use of classic advertising and PR tools, communication

based on dialogue and cooperation with clients and other stakeholder groups should be introduced. Green communication is primarily intended to serve the environmental education of consumers, popularize and highlight the advantages of green products, and promote the idea of sustainable consumption.

The task of green distribution is to provide the customer with the convenience of accessing products, saving time and energy when purchasing, the possibility of disposing of the used product and / or its packaging, etc., while striving to minimize the consumption of natural, human and material resources.

Since the 1990s, international concerns and enterprises on almost all continents have been implementing green production technologies and green methods of manufacturing products throughout their entire life cycles, from design to disposal, achieving better economic results (Sarkis, 2017). The Swedish car manufacturer Volvo entered the Japanese market in 1996, promoting environmentally friendly systems for the production and operation of cars and the possibility of recycling each model. The company believes that it was mainly due to these actions that it increased its share in the Japanese car market by 17% over the next few years (Erginel. 2001) and is following a green strategy in the European, American and Australian markets. Japanese concern Sony in 1994 launched the "Greenplus Project", the aim of which was to improve the environmental performance of the company's products. As a result, by 2000, over 500 Sony products had been awarded the "Greenplus" label (Elwood, Case, 2000). A good example of a green product are Nike shoes from the Nike Considered line, made of vegetable-tanned leather without the use of toxic chromium (Sarkis, 2017).

According to many authors, the adoption and implementation of a green business strategy leads and will lead to gaining a competitive advantage in the future (Kiran, 2012; Leonidou et al., 2017). Therefore, enterprises are increasingly implementing green solutions and using green marketing tools because they want to be perceived and assessed as socially responsible organizations. The positive impact of green marketing on the product / brand image, corporate image and corporate reputation, the level of trust and loyalty of customers is confirmed by research conducted in many countries around the world (Ko, Hwang, Kim, 2012; Supeková, 2014; Kumar, Ghode, 2015; Wu, Lin , 2016; Bati, 2016; Mallek, Alipour, 2016; Widyastuti et al., 2019). Luo and Bhattaacharya (2009) suggest that the benefits to corporate social responsibility associated with marketing may also lead to the creation of so-called moral capital that protects the value of the company's shares.

The cited examples of pro-ecological orientation of enterprises and the implementation of green marketing tools as well as the results of many studies allow us to claim that green marketing is effective in building both the image and reputation of the company as a socially responsible organization. However, many companies use green marketing to build not so much a reputation, but only the image of a socially sensitive organization, that is, they want to be seen as such in the first place. Image is not the same as reputation, although these are interrelated categories.

Corporate reputation versus corporate image

Most authors believe that reputation and image are not the same concepts, although there is no full agreement as to the mutual relations between them (Fombrun, 1996; Barnett et al., 2006; Walker, 2010, Abratt & Kleyn, 2012). The indicated differences relate to the definition, nature, stability over time, mechanism and tools for creating these resources by the enterprise. The image is defined as a picture, set of impressions, ideas and associations about the company that arise in the minds of recipients. This image is the result of the accumulation of stimuli and information coming to the recipient from various sources, which are interpreted by him through the prism of his individual knowledge, beliefs and feelings. The image is not very permanent, it can be created relatively quickly by the company using appropriate Public Relations tools or suggestive advertising campaigns. On the other hand, reputation is understood as an opinion about the company and its activities, formulated by various groups of stakeholders through the prism of their interests and expectations towards the company. Reputation is the result of verifying the compliance of deeds with words, that is, the actual actions of the company with its promises and declarations. Thus, the image as an effect of various external stimuli can be artificially created in the minds of recipients, while reputation cannot. Reputation requires "hard evidence", because stakeholders assess the real effects of the company's operations. Reputation cannot be built overnight, it takes a longer time, measured in years. The foundation of reputation is the trust of stakeholders, which is not easy to gain in a short time (see: Szwajca, 2016). The differences between the image and reputation are presented in Table 2.

Table 2: Corporate image versus corporate reputation

Corporate image	Corporate reputation
Perception of the company	Evaluation of the company
It has an individual character	It has a social character
Built more on perception	Built more on experience
Mainly based on communication	Based on the identity and activities of the company
It can be artificially created	Based on verifying actions with words
Created in relatively short time	Created in relatively long time
More unstable in time	More stable in time

Source: Szwajca, 2018.

At this point, it should be noted that the image and reputation are valuable resources for the company that should support each other: a positive, reliable image, responsible for a credible message, strengthens the reputation, and a good reputation contributes to creating a favorable image (Fig. 1).

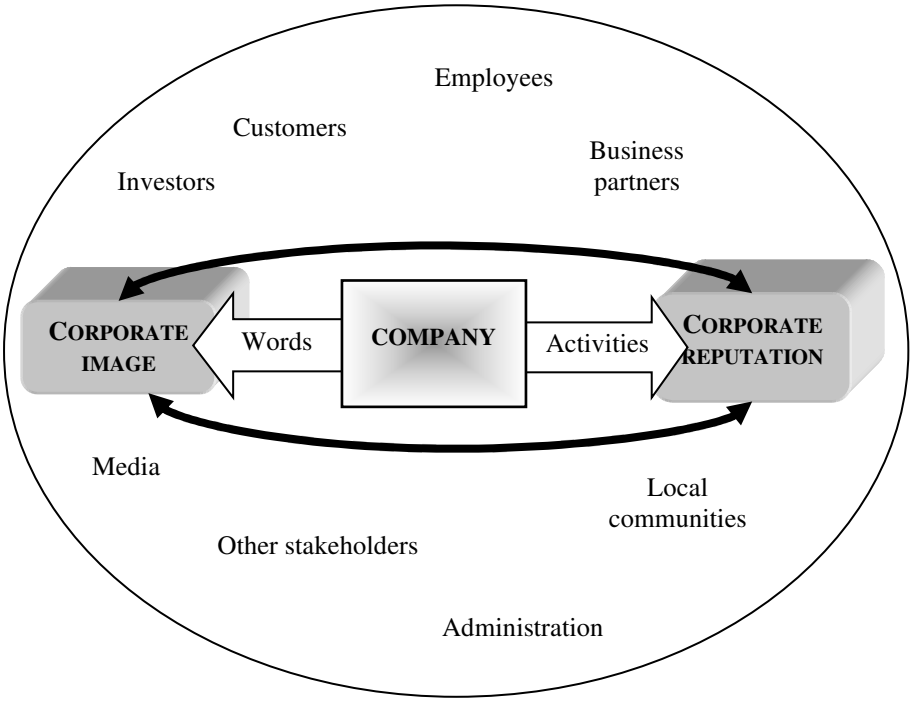

Fig. 1: Corporate image and corporate image – interaction

Source: Szwajca, 2018.

The pursuit of enterprises to build the image of an environmentally friendly and socially responsible organization leads to abuse, manipulation and misleading public opinion as to actual actions and behavior, which is called greenwashing. The term "greenwashing" was coined by renowned New York Times environmentalist and journalist Jay Westerveld, who in a 1986 essay revealed that the hotel industry falsely promotes towel reuse as part of a broader environmental strategy, when in fact it is about the economic benefits of reducing laundry (Orange and Cohen, 2010). Greenwashing emerges both at the level of corporate strategies and at the level of the marketing mix tools used, and includes various forms of deceptive communication (Lyon and Montgomery, 2015; Markham et al., 2014).

It turns out that greenwashing is a practice quite commonly used by companies. In 2008-2009, researchers from TerraChoice reviewed over 1,000 products of large American companies, presented as environmentally friendly

products. It turned out that all the tested products (except one) showed some form of greenwashing (Aji, Sutikno, 2015). Ecologists, journalists, activists and various social associations reveal many greenwashin practices (Wiech, 2019).

By applying unfair green marketing practices, enterprises are following a certain trend towards being green and are probably not fully aware of the negative consequences, taking into account the fact of growing awareness of consumers and other stakeholder groups, access to information, its quick dissemination and high probability of revealing the truth. Research carried out by the PR Cone Communication agency showed a growing distrust towards pro-ecological slogans used by companies in promotional messages. The vast majority of Americans surveyed (80%) show serious skepticism about the pro-ecological attitude and actions of enterprises subject to the principles of sustainable development (Bzdyra-Maciorowska, 2012).

The effects of greenwashing practices in the context of building a "green" reputation

The negative effects of greenwashing have been the subject of research and analysis for many years and have been identified by many researchers from different countries and continents (Krafft, Saito, 2014). These effects relate to: the company's image and reputation, brand image and capital, buyers' purchasing reactions, customer loyalty and trust and other stakeholder groups, and as a result, the company's profitability and financial results. A study by Chen and Chang (2013) among Taiwanese consumers in the electronics market revealed negative links between greenwashing and customer confidence. It turned out that there are two important factors that weaken buyer confidence: 'green confusion' and perceived 'green risk'. This is because customers feel cheated and misled, which causes them a negative feeling of disorientation and serious fear of purchasing the company's product again.

Similar conclusions can be drawn from research on "green capital" of the brand of gas stations in Turkey. Research has shown that greenwashing negatively and directly affects brand value, and what's more, it also generates 'green confusion' and 'green risk', which in turn reduce the trust of environmentally sensitive consumers in the brand (Avcilar, Demingunes, 2017). Berrone et al. (2017), after researching 325 US publicly traded companies operating in the most environmentally harmful industries, found that the pro-environmental activities undertaken by these companies help them obtain environmental legitimacy. However, when environmental indicators deteriorate and NGO control reveals mocking of the company's environmental activities, i.e. greenwashing, the company may lose its environmental legitimacy, which translates into its stock exchange quotations.

On the other hand, research conducted among consumers in India showed that they are more and more aware of the unfair use of "green marketing" tools by enterprises, which negatively affects the level of trust in brands promoted as organic, as well as undermines the green image of these brands and weakens consumer loyalty towards them (More, 2019). Similarly, Szabo and Webster (2020) proved that greenwashing can result in ethical damage: negative perception of the company's products and consumer skepticism, which in turn leads to a decrease in their confidence in the company and dissemination of unfavorable opinion to other stakeholder groups. Consequently, ethical damage adversely affects the company's profitability.

In view of the presented unfavorable consequences of greenwashing, the question arises: how can enterprises use green marketing to prevent it from being negatively perceived and exposing the company to another "green" reputation risk?

Cooperation with stakeholders as a method of more effective building of a "green" corporate reputation - discussion

It seems that one of the effective methods of building the company's reputation as a socially responsible organization with the use of "green marketing" tools is engaging stakeholders in the process of creating a market offer. According to the theory of stakeholders, enterprises are forced to take into account the interests and requirements of various groups of stakeholders, as these groups have more and more opportunities and power to influence the decisions and results of the enterprise (Rydzewska, 2016). Therefore, in the context of the stakeholder theory, it seems reasonable to cooperate with stakeholders and jointly develop a product offer. The idea of co-creating an offer with stakeholders (primarily with customers) has been propagated for several years by Prahalad and Ramaswamy (2004), suggesting the need to move from the space of creating products to the space of creating solutions to specific problems. It is about developing third-generation collaboration, which concerns joint action along the entire value chain by developing innovative green products and creating new markets (SustainAbility, 2007). Research in the UK construction sector has shown that

stakeholder engagement can be a driving force in the implementation of green business models (Abuzeinab & Arif, 2014). The authors of the research suggest that the organisation's competence to interact and cooperate with stakeholders in creating innovative, ecological offers will be the main factor changing the conditions of competition.

The proposed cooperation with stakeholders in the field of green marketing refers to the concept of the so-called social innovations based on the theory of social consent by K. Davis, as well as the concepts of creating shared value, hybrid value chain, corporate social innovation or CSR 2.0, along with such tools for generating ideas as crowdsourcing and crowdfunding (Szwajca, 2017). Social innovation involves the development and implementation of new ideas (products, services, business models) to meet social needs and create new social relationships. They are based on the ingenuity and cooperation of various entities and stakeholder groups: citizens, non-profit organizations, local communities, enterprises, public institutions (Herrera, 2015; Osburg, Schmidpeter, 2013). Stakeholders may, on the one hand, be inspiring and co-creators, and on the other hand, beneficiaries of such innovations, which will contribute to building their satisfaction and good opinion about the company. Research conducted by Padgett and Moura-Leite (2012) showed a positive relationship between reputation and corporate expenditure on innovations that generate high social benefits. It is worth adding that this approach may also contribute to reducing the risk of innovative activities of enterprises (Nawrocki, 2016).

There are examples of many companies that cooperate with stakeholders and implement socially engaged investments and social innovations. The Yara company, the world's largest producer of mineral fertilizers, has been cooperating with local authorities and governments of many African countries in the development of logistics infrastructure for years. The effects of this cooperation are: better access of African farmers to mineral fertilizers and modern cultivation methods, an increase in agricultural production efficiency, and thus - an increase in sales and revenues of farmers, and a decrease in unemployment (Driessen Hillebrand, 2013). In the 1980s, Nike established a team of specialists to improve the company's processes and products in the context of sustainable development, and companies such as GM, Wal-Mart, Coca-Cola and Clorox cooperate with social organizations for environmental protection (Martin, Schouten , 2012).

Effective cooperation with stakeholders requires their proper selection, taking into account their substantive skills, ethical qualifications, as well as willingness to cooperate. One solution to this problem seems to be encouraging stakeholders and making attempts at such cooperation. This is confirmed by, among others the results of research by Driessen and Hillebrand (2013), which showed that companies involving stakeholders in the processes of creating "green products":

- first, they have developed and apply techniques to identify relevant stakeholder groups,

- secondly, they use mechanisms to detect contentious issues and tensions between stakeholder groups with conflicting expectations,

- developed rules allowing to prioritize ecological criteria by assigning them appropriate weights.

Cooperation with appropriately selected groups of stakeholders gives a chance to build their trust and credibility in terms of the reliability of activities undertaken in the field of green marketing, and trust is the foundation of reputation. In this way, green marketing can become an effective tool for building the company's reputation as a socially responsible organization.

Conclusions

The concept of green marketing is a response to the accusations made against traditional marketing, the concept and assumptions of which are contrary to the philosophy of CSR and sustainable development. The essence of green marketing consists in striving to reduce the negative impact on the environment through the use of a green marketing mix: an environmentally friendly product, socially reasonable price, promotion of ecological products and a healthy lifestyle, low-energy distribution combined with waste disposal.
Due to the growing environmental awareness and the pressure of key stakeholder groups, enterprises strive to build their green reputation, i.e. the reputation of a socially responsible organization. As many studies show, companies successfully use green marketing tools for this purpose. However, in many cases, green marketing is mainly used to

create a green image rather than a green reputation. The image as the image of the company in the mind of the recipient can be artificially created by means of green advertising and PR, while the reputation is based on confronting the company's declarations with real facts.

Too strong striving of companies to be perceived as environmental organizations leads to greenwashing - manipulation and misleading about the harmlessness of products, environmental involvement of the company, etc. These unfair practices are exposed in a shorter or longer time, which results in very unfavorable consequences for the companies using it. Greenwashing increases the skepticism of consumers and other stakeholder groups, which reduces the popularity and effectiveness of green marketing, and moreover, generates so-called "green" risk. Companies that really care about the environment and offer ecological products, thus promoting them run the risk of a lack of credibility, accusation of fraud and deliberate misleading of the public.

In order for green marketing to be an effective tool for building the company's green reputation, a method was proposed based on developing cooperation between the company and appropriately selected groups of stakeholders in creating a green offer and implementing the so-called social innovation. It is especially about designing innovative, environmentally friendly products throughout their life cycle - from the idea to the disposal of the finished product. This solution creates an opportunity to build the credibility and trust of stakeholders, which are the foundation of reputation. The research initiated in this area allows for the formulation of such a hypothesis, the confirmation of which requires extensive research and argumentation.

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Regional Observatory of Technology as a Tool Supporting Development of Innovative Businesses in Region

Lilla KNOP
Silesian University of Technology, Gliwice, Poland
lilla.knop@polsl.pl

Sławomir OLKO
Silesian University of Technology, Gliwice, Poland
slawomir.olko@polsl.pl

Abstract

The paper describes the areas where the regional technological observatory can be useful for innovative companies that tie their development with the development of regional smart specializations. The paper presents the scope of information presented by the Regional Technology Observatories in the Silesian Province matched with the expectations of entrepreneurs representing smart specializations. The Regional Technology Observatories have been created as instruments for monitoring development strategy at the regional self-government level. The scope of gathered information may be useful for the companies sector that are one of the most important stakeholders of the implemented pro-innovative policy. Because the scope of gathered information on smart specializations within European regions is similar, the presented recommendations may be useful in different regions based on analogy even if there are no specialist observatories or other initiatives to monitor economic data within the scope of research and development, innovation and development of individual sectors.

Keywords: Observatory of Technology, Business Development, Business Strategy.

Introduction

The main role of the observatory of technology is to provide knowledge to decisionmakers about the current state of technology (Santa Soriano et al., 2018). Monitoring or observing the technology is a very important operation that allows for orienting the operations within the scope of technology first and foremost in case of companies that use them in practice. The nature of the technology makes it difficult to observe. According to Burgelman et al. (2009) technology „*is the theoretical and practical knowledge, skills and artifacts that can be used to develop product and services, as well as their production and delivery systems. Technologies can be embodied in people materials, cognitive and physical processes, plant, equipment and tools. Key elements of technology may be implicit, existing only in an embedded form (like trade secrets based on know-how) and may have a large tacit component.*" Mastering the technology by companies and knowledge on technologies used in the sector are key elements of company's knowledge management. It is due to these reasons that the companies monitor technological areas using various sources of information and specific methods and techniques. This information business entities use to formulate strategy or to make strategic decisions in the area of research and development. This area develops the resources of the organization and requires analysis of environmental analysis and economic analysis (Patz, 1986).

An important practical question emerges: What should be the role of the self-government authorities of the region in supporting the business sector? What kind of information and knowledge analysed by regional authorities is especially valuable for business? Experience of the Silesian Voivodeship and entities supporting the regional innovative policy partially answer these questions. The purpose of the paper is to present the activities Network of Regional Specialized Observatories (NRSO), information collected by the observatories and their role for business sector in innovation-based development.

Literature Review

Innovations and smart growth are at the forefront of current challenges related to regions development. The issues such as resilience, digitization and smart specialization are key determinants of the regional innovation strategies

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that enable to focus on providing research and development infrastructure, financial support for innovation at companies or technology transfer resulting from cooperation with R&D entities.

Approach such as this emerged from innovative regions and environments (Camagni, 1991; Crevoisier L., 1997), hi-tech sectors (Keeble and Wilkinson, 2000), knowledge based clusters and industries (Cooke, 2002) and the phenomena of knowledge infiltration (Bottazzi and Peri, 2003). The Innovation Policy of the European Union (Derlukiewicz, 2010), results directly from the European Strategy of Development - Europe 2020 - based on smart development. The policy of smart specialisations raise political, social and scientific disputes concerning the level of public support concentration, impact on the level of regional product and unemployment rate. Category of smart specialisation (Foray and Van Ark B., 2007; Foray at al., 2009; Foray, 2009; Kardas, 2011), in particular, means that competitive edge is based on knowledge resources that allow for improvement, development and introduction of breakthrough solutions. System support of innovations within the region concerns also the sector of companies which used the innovations to support business models (Brzóska, 2014).

Smart specialization is to stimulate mutual support of technology and disciplines based on inter-sectoral relationships and dissemination of knowledge not only within the scope of the region. The strategy focuses on using current knowledge and technology to implement innovative solutions under any and all possible forms, including organizational and marketing innovations and innovations oriented at users and society. This does not imply that the regions should not create new knowledge, especially those which are at the brink of breakthrough changes. This means that smart specialization strategy sees the role of technological and non-technological innovativeness as well as applies to both hi-tech and traditional sectors. It this case, it was assumed that:

1. regions cannot do everything in science, technology and innovation and;
2. they need to promote what should make their knowledge base unique and superior to others. (Foray D. et al. 2009; OECD, 2013).

Based on the assumptions, the selection of smart specializations should be based among other things on (European Commission, 2012):

- the existence of key assets and capabilities (incl. specialised skills and labour pools) for each of the areas proposed and, if possible, an original combination of these (cross-sector; cross-cluster),
- the diversification potential of these sectors, cross-sectors or domains,
- critical mass and/or critical potential within each sector,
- the international position of the region as a local node in global value chains. Process approach in implementing regional innovation strategy consists in identifying.

Regions, especially in EU, maintain their own policy of innovative development that is a complementation of the innovative policy of the state. The literature provides relationships of region development with such issues as: knowledge management and intellectual capital. Lönnqvist and Laihonen point to four basic areas of knowledge management in the context of the region development: business intelligence, intellectual capital management and information management (Lönnqvist and Laihonen, 2013). Zhao and Ordoñez de Pablos (2011), in the theory of management, proposed placing the knowledge management at the regional level. It results from it that a region can be treated as a specific organization that implements all management functions (planning, organizing, motivating and controlling) for its stakeholders.

Components of the regional innovation system are the instruments implementing the innovative policy at the regional level that covers entities engaged in operations supporting their tools and operations. The system uses tools such as clusters, innovative grids and platforms (Cooke, 2012).

Technology used by the regional sector of business represents a very important element of an innovative development. Even though most of the technologies are of global character, there is a regional adaptation of these technologies and their development for the benefit of the companies in the region (Martinez and Rodriguez 2019).
Andersen & Andersen (2014) introduced the term Innovation System Foresight (ISF) i.e. a system that allows for predicting important changes of technological and social character, considering current level of social, technological and economical maturity of states and regions.

Implementation of smart specialization strategies necessitates its proper monitoring and evaluation. The monitoring relates to the necessity to trace implementation progress. Evaluation is assessment whether and how the strategic goals are met. First and foremost, the paper focuses on the issue of monitoring the smart specialization development. The fact that the process of monitoring the regions development is a subject that has been evolving for at least two decades is key in this case. In order to evaluate the results of the regional policy and strategy,

analyses of processes and phenomena as well as development trends are performed. Records in the monitoring system usually show a set of indicators that grows every year.

The term "indicator" has been used for the first time in 1942 by the American sociologist Dodd (1942). The methodology of creating and applying the indicators has been focused mostly on social and civil indicators and has been related to public programmes in order to improve the social situation of the selected social groups in the Unites States and United Kingdom. In Poland, the issue of indicators in public policies has been propagated since 2004, i.e. since the Polish accession to the European Union and implementing the financial programmes from the structural funds. This caused that evaluation of indicators in Poland is strongly affected by the European Commission methodology. Indicators of products, results and impact are the most common ones. When looking at the indicators as the measure of the determined objective, achieved result, it is assumed that they should consist of definition, value and unit of measure.

The purpose of the observatory of technology was based on the observatory established in the area of Key Enabling Technologies (KET): "Observatory aims to provide EU, national and regional policymakers with information on the deployment of KETs both within the EU-28 and in comparison to other world regions (East Asia and North America)" (European Commission 2015).

Regional Observatory of Technology (ROT) is the undertaking the purpose of which was to win and deliver knowledge on development of technology to the major stakeholders of regional development: regional authorities, companies established within a given region and institutions cooperating with companies. The organizational form of ROT may correspond to differentiated configuration of entities composing the regional innovation system: it may be hierarchical, heterarchical (network form), polycentric, it may also have dual nature, i.e. have some hierarchical and heterarchical features (Cooke et al. 1997). The hierarchical organization is important in case of shaping the regional development policy, in turn, heterarchy is better suited in peer-to-peer relationships of entities engaged in the innovative processes.

Analytical tools applied by the technology observatories include among other things analyses of publication bases, bibliometric analyses, analyses of patent or scientific publication bases (Carbonell et al. 2017).

According to RIS3, the system of indicators should include (European Commision 2012):

- indicators reflecting the research and innovations within the region such as the level of R&D and technological specialization, based on the existing data such as patents, publications, expenditures on R&D, HR in R&D, new products and technologies,
- economic indicators that may indicate new sectors or traditional ones with the potential for development based on research and innovations and with good perspectives such as predictable share in market, incomes, level of productivity,
- indicators related to evaluation of the level of cooperation between the R&D system specific for a given business process and the latter, showing the chances for relationships between the actors, such as number of inventions, common publications, cooperation contracts, common projects, spin-off companies, public-private partnerships, clusters, etc.

However, emphasized indicators should meet the following criteria:

- Clear – should be precise and unique,
- Relevant – adapted to the evaluation object,
- Economic – attainable with reasonable costs,
- Adequate – should suffice to evaluate the results,
- Monitorable – subject to assessment by independent experts.

Network of Regional Specialized Observatories (NRSO) – organisation and provided information

Methodology

The paper adopts the case study method, wherein the case is the undertaking of creating the Network of Regional Specialized Observatories (NRSO). In the case study the following areas were analysed: organisation of NRSO, activities undertaken by NRSO and analysed information and its value for the business sector.

Organisation of NRSO

The assumption underlying the cooperation within the NRSO is the contract specifying duties of each institution participating in the network and mutual relationships and relations between these entities (Bondaruk et al., 2016). The contract specifies tasks of the entities within the frameworks of the presented scientific and technological specializations. In particular, the network members committed themselves to search for financial support for the network operations in the form of projects.

Organizational form of NRSO such as understanding is without time limit and imposes specified duties on the partners however without specifying consequences from failure to complete the said duties. In the contract, the partners express their intent to search for financial support of the observatories operations in the form of projects without any limitations as to the scope of financial support source. Adoption of a project-based approach provides an opportunity to adapt short-term objectives specified in the project to current needs of the stakeholders in the region. Another important consequence of applying the project-based approach in NRSO is the precise determination of project products which are at the same time the effects of NRSO functioning. The products must be achieved and the partners implementing the project are liable for it. Failure to achieve the project products in case of public financial support imposes financial consequences on the partners - project-based approach enforces therefore the mechanism of coordination and verification of the observatory tasks.

There are 8 active observatories in the NRSO:

1. **The Observatory for Energy** has been established in 2013. It is created by the consortium in the following composition: Scientific and technological part „Euro-Centrum" Sp. z o.o. – leader, Agencja Rozwoju Regionalnego w Częstochowie S.A. (Regional Development Agency in Częstochowa) Operations of the observatory are based on the supporting entrepreneurs in the sectors related to energy efficiency and RES utilization. These operations are based on creating and strengthening market standing of companies by delivering technological and useful knowledge for the purposes of energy management in the production processes and within current operations. At the moment, the observatory supplies information given in the sectoral reports and technological reports to the interested entities. The reports mostly include the analyses of RES and EE technological trends, strategic recommendations, information on specific RES and EE market segment, comparative analyses (technological benchmarking), R&D work monitoring within the scope of RES and EE in the region and country. Within the competences of the Observatory the following key indicators are developed i.e. Green Energy Index, Knowledge Index and Index of Green Poviats.
2. Specialist observatory within the **Technologies for the Medicine** area, established in 2013 - consortium in the following composition: Górnośląska Agencja Przedsiębiorczości i Rozwoju Sp. z o.o. (Upper Silesian Entrepreneurship and Development Agency) – leader, Fundacja Rozwoju Kardiochirurgii im. prof. Zbigniewa Religi (Prof. Zbigniew Religa Cardiosurgery Development Fund), Instytut Techniki i Aparatury Medycznej ITAM (Institute of Medical Technology and Equipment), Silesian University of Technology. In the global economy, the industry of medical products belongs to the most profitable and the fastest developing areas. This is an industry of advanced technologies, intensively developing in highly industrialized countries with innovative economies and high national income per capita. The Silesian Province has significant intellectual and economic resources within the scope of medicine and related advanced technologies, therefore it was selected within the scope of the Regional Innovation Strategy, as one of three smart specializations of the region.
3. The specialist observatory within the area of **Information and Telecommunication Technologies**, established in 2013. Park Naukowo-Technologiczny „Technopark Gliwice" Sp. z o.o. is the chief coordinator. The main objective of the observatory is development of the technological and innovative potential of the region through building competitive edge of entities operation within the ICT sector.
4. The specialist observatory within the area of **Technologies for Aviation Industry** has been established in 2019 and it is represented by the Silesian Science and Technology Centre of Aviation Industry. Operations of the observatory are aimed at strengthening the region development through supporting the regional scientific and technological potential within aviation and related technologies. It is also an attempt to transfer the scientific and research cooperation to international level which is important for the aviation sector and sectors where the aviation technologies are applied due to their global character and dissemination of innovations. The monitored aviation technologies are positioned from the perspective of capacity of practical application in other related industry sectors.
5. The specialist observatory within the area of **Nanotechnologies and Nanomaterials** has been established in 2014 - composition of the consortium: University of Silesia in Katowice - leader, NANONET Foundation for Nano Sciences and Nanotechnologies, Non-Ferrous Metals Institute and Centre of Polymer and Carbon Materials PAN. Operations of the observatory are focused on building competitive edge of the

province through development of the technological and innovative potential of the region. Information analysed and provided by NRSO.

6. Specialist observatory within the **Technologies for Environment Protection**, established in 2013 by Central Mining Institute. This observatory has been established to answer the specific needs of the stakeholders of the Silesian Province innovation ecosystem within the scope of creating modern mechanism for monitoring the results of innovative region development within particular technological areas.
7. The specialist observatory within the area of **Materials Production and Processing** - established in 2019 - composition of the consortium: Silesian University of Technology – leader and Non-Ferrous Metals Institute. The scope of operations of this specialist observatory covers gathering information and data necessary for the regional authorities to diagnose the potential within a given technological area, monitoring and evaluating the impact of public interventions on development of the technological area, serving the function of an "animator and advisor" for companies, entities supporting development of the region. Depending on the needs, the observatory offers services in the following form: advisory and training, organization of events, meetings, workshops, seminars, study visits, etc., cooperation with national and foreign observatories.
8. The specialist observatory within the area of **Transport and Logistics** under establishment wherein the Silesian University of Technology is its chief coordinator. The results of the first works of the observatories will be the model of cooperation of companies with the cities within the scope of the last mile transport organization. Different paths of the product commercialization will be developed. Advisory services performed based on the developed model will be provided to companies performing logistic services. Companies coming to the observatory will obtain the knowledge within the scope of: options and methods of establishing cooperation with cities and knowledge on available solutions and barriers related to the last mile transport within a given city and possible organizational solutions based on the city potential.

Information analysed by observatories

From among the statistical data that might be important for the companies representing smart specializations, the following must be mentioned:

- number of enterprises operating in the sector corresponding to smart specialisation,
- production value,
- value of investment of the companies sector within the regional and sector array
- value of expenditures on R&D within the regional and sector array

This values are presented in Table 1 for the industries corresponding to material production and processing. However the regional data for these industries are not available in public statistics. According to information obtained in regional statistic office they are estimated for the regional purposes.

Table 1: Basic characteristics of material production and processing sector in Poland

Division of NACE	Description	Number of enterprises		Production value [mln EUR]	
		2010	2018	2010	2018
22	Manufacture of rubber and plastic products	8 233	9 458	12.979.7	22,790.0
23	Manufacture of other non-metallic mineral products	10 028	10 735	9,984.0	14,377,9
24	Manufacture of metals	1 047	1 427	9,447.3	14,519.9
25	Manufacture of fabricated metal products, except machinery and equipment	28 127	44 736	14,775.7	27,789.4

Source: Eurostat, 2020

The value of gross expenditures of enterprises for innovation for the region and Poland is presented in Fig. 1. The regional data for specific industries representing smart specialisation are not available in public statistics while they could be very valuable for regional business. The role of NSRO could be estimation of these date to provide current, regional data according to expectations of business sector.

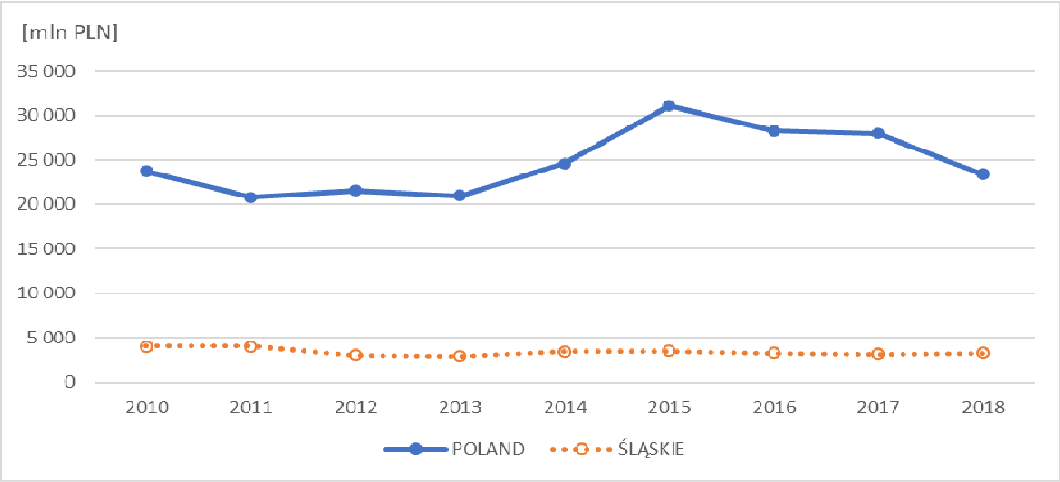

Fig. 1: Gross expenditures of enterprises for innovation in the Śląskie region and in Poland 2010-2019, Source: Central Statistical Office (GUS), access: 2020

NSRO collecting the data of development of each of the regional specialisation. The list of uniform indicators for the specialist areas has been developed based on available data with division to types of indicators, according to the determined pattern:

- uniform indicators for the observatories within the scope of technological areas of reporting type,
- indicators characterizing the potential of a given technological area within annual scale,
- components of regional progress indicators.

In the tables 2, 3, 4 these information are presented for the two selected observatories: Environment protection technologies and ICT. In accordance with the assumptions of the NRSO functioning, every active observatory will prepare the data in

Table 2: Uniform indicators for the observatories within the scope of technological areas of reporting type

No	Indicator	Unit of measure	Environment protection technology		ICT	
			Year	Value	Year	Value
1	Number/type of performed services within a given technological area in favour of entrepreneurs, including SME, R&D sector entities	pcs	2014	2	2017	91
2	Number/type of reports developed in favour of entrepreneurs, including SME, R&D sector entities within a given technological area	pcs	2014	1	2017	1
3	Number / type of developed publications within a given technological area	pcs	2014	1	2017	n.d.
4	Number of companies, including SME, R&D sector entities using the services within a given technological area	pcs	2014	45	2017	n.d.
5	Number / type of organized workshops, trainings, seminars within a given technological area	pcs	2014	2	2017	10
6	Number of participants in the workshops, trainings, seminars within a given technological area	pcs	2014	53	2017	83

Source: reports provided by NSRO

Table 3: Indicators characterizing the potential of a given technological area within annual scale

No	Indicator	Unit of measure	Environment protection technology		ICT	
			Year	Value	Year	Value
1	Number of persons raising their professional qualifications within a given technological area	pcs	2014	2	2017	4,5%
2	Size and structure of employment within a given technological area	pcs	2013	36 136	2017	21 332
3	Number of graduates within a given technological area	pcs	2013	773	2017	1 499
4	Number of new employees within a given technological area	pcs	2013	-2094	2016	4 396
5	Number of publications within a given technological area	pcs	2013	64	n.d.	n.d.
6	Number of projects within a given technological area	pcs	2007-2013	45	2007-2014	46
7	Number of licenses within a given technological area	pcs	n.d.	n.d.	n.d.	n.d.
8	Number of patents within a given technological area	pcs	2012	12	2011	5
9	Number of companies from the Silesian Province within a given technological area	pcs	2012	1 621	2017	12 196
10	Level of expenditure on R&D within a given technological area	PLN	2007-2013	180 678 600	2017	25 393 000
11	Number of entities declaring science-industry collaboration	pcs	2013	industry 5,3% services 3,0%	n.d.	n.d.

Source: reports provided by NSRO

Table 4: Components of regional progress indicators

No	Indicator	Unit of measure	Environment protection technology		ICT	
			Year	Value	Year	Value
1	Number/type of World Class Clusters within a given technological area	n.d.	n.d.	n.d.	2017	0
2	Number/type of objects of common research and development infrastructure within a given technological area	n.d.	n.d.	n.d.	2017	1
3	Number/type of key competence centres within a given technological area	n.d.	n.d.	n.d.	2017	n.d.
4	Number/type of living labs within a given technological area	n.d.	n.d.	n.d.	2017	n.d.
5	Number of EU framework projects led by entities from a given technological area	pcs	2007-2013	10	2017	n.d.
6	Number/type of research and development consortia within a given technological area	pcs	2007-2013	45	2017	n.d.

Source: reports provided by NSRO

Conclusions

NRSO functioning as ROT was subordinated to practical objective of shaping innovative policy of a region and assisting in making decisions. Based on analysis of NRSO activities including information analysed by the observatories, the following conclusions may be drawn:

1. The information analysed by NSRO are used mainly for the realisation of regional innovation policy: monitoring if implementing smart specialization, and adjusting the public support of innovation.
2. The Silesian Voivodeship is one of few regions in the EU that performs systematic observation of technological areas important for the development of a region in the form of ROT. The region also develops the Technology Development Programme (TDP) as a separate strategic document orienting the technological development of the region, representing the complementation of the Regional Innovation Strategy and support for smart specializations of the region. Such approach should be applied especially within the industrialized areas, whose smart specializations are strongly related to technology.
3. Analytical methods used by NRSO are relatively straightforward, experts in their disciplines used the generally available technological reports as well as scientific and patent databases. The main problems of analysing these kind of information are related to the limited possibilities of extracting regional data.

4. The observatories face a challenge of lack of specific regional data. According to the presented reports sometimes it is caused by unclear definition (e.g. key competence center, living lab). In other cases, the reason is missing regional data in official statistics.
5. Despite the participation of the companies sector in the observatory works, the interest of companies in the observatory works results is moderate. This is also related to a significant weakness of the region within the scope of innovation - low level of financial support for R&D from private sources. Representatives of entrepreneurs did not show any interest in prospective studies - presenting possible scenarios of technology development, evaluating them as not reliable enough in the context of rapid changes in the environment or too general, despite the sectorial nature of the reports of each of the specialist observatories.
6. Considering the presented activities of NRSO and providing information, note that this is a kind of a regional information system available for many regional stakeholders including business sector. Utility and success of this undertaking depends on engagement of users of the delivered knowledge on technologies, therefore NRSO operations should be continuously adapted to expectations of the business users.

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Perception of Consumer Generations on Influencers' Posts in Social Media

Maria-Alexandra CALINOIU

University of Craiova, Craiova, Romania
ale.calinoiu@gmail.com

Abstract
The purpose of this article is to analyse the perception consumer generations have on influencers' posts on various Social Media platforms such as blogs, YouTube, Instagram and Facebook. The research methodology will consist in interpreting the results of a questionnaire applied to a number of 324 respondents regarding the impact of notoriety, trust, authenticity of expertise and creativity of influencers' posts on the decision to purchase a brand. The conclusion of the research is that brands are able to exponentially increase the visibility of their products and services by appealing to the popularity influencers enjoy, thus reaching the target audience much faster and more efficiently.

Keywords: consumer generations, Social Media platforms, influencer marketing, eWOM.

Introduction

Social Media gives users the opportunity to express their opinions about various products and services as a result of the consumption experience in order to share them with others. This has led to an increased desire for brands to maintain a positive image and generate favourable customer experiences, minimizing negative reviews that can easily spread among potential customers.

Many brands use Social Influencers not to sell a product, but rather to expose consumers to the brand as well as its story (Alderton, 2014). Moreover, this type of marketing is effective for brands that want to strengthen their market position and reach a younger demographic (Steimer, 2017).

Given the fact that new generations of consumers are increasingly moving away from traditional media, their interests are moving online and clustering around trusted influencers who share their experiences in Social Media (Soltysinska, 2017). According to an official finding report by ANA (The Association of National Advertisers), 86% of brands use Influencer Marketing in their promotion strategies. Out of these, only 0.6% consider content generated by influencers to be irrelevant, while 53% of brands consider it very valuable.

The Collaboration between Brands and Social Influencers

Uzunoğlu and Kip (2014) argue that it is vital for brands to work with influencers to build a trustworthy and authentic presence in the online communities. And also that brands benefit from buzz-power from influencers that translate into increased visibility through exposure in the influencer's community.

Moreover, Chau and Xu (2012) argue that social networks are the most important marketing channels because of the strong competition that electronic Word-of-Mouth (eWOM) generates. Influencers increase the efficiency of these channels. According to Li et al. (2015), identifying effective influencers in social networks is essential both for reducing promotional spending and for creating business opportunities in eWOM marketing.

Choosing the right influencers has a significant impact on the brand image as influencers can effectively manage reviews, amplifying the value of positive ones and diminishing the effect of negative ratings (Li and Du, 2014). According to a study by Jansen, 50% of product and service evaluations carried out on Social Media are positive, while 33% are negative, with the remaining 17% inconclusive (Jansen et al., 2009). The same study revealed that a negative rating causes a brand to lose 30 customers (Jansen et al., 2009). Although the partnership between a brand

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and an influencer is a win-win situation as both parties benefit from this collaboration (Uzunoğlu and Kip, 2014), an influencer may lose credibility by collaborating with a brand whose products and services have questionable quality (Uzunoğlu and Kip, 2014). Moreover, collaboration with influencers must become a strategic alliance based on common values and objectives so that the influencer does not contradict its own values when passing on the brand's message (Booth and Matic, 2011).

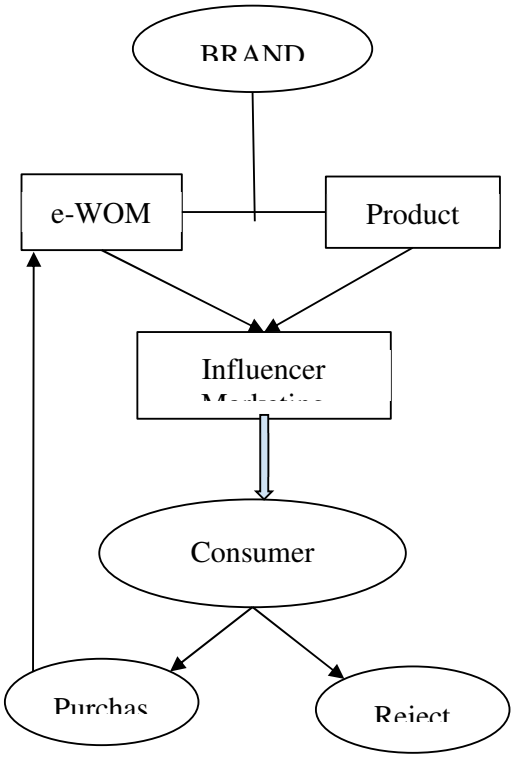

Fig. 1.1. Influencer Marketing Impact on Consumer Behaviour

Source: by author

Direct sales have proven for decades that people prefer recommendations and trust relationships more than marketing messages (Alderton, 2014). Influencers' posts are messages close to WOM recommendations and have a real impact on their loyal audience (Soltysinska, 2017).

Studies have shown that e-WOM influences both consumer behaviour (Chen, Wang and Xie, 2011) and brand sales (Chevalier and Kicka, 2006). In the online environment, recommendations have a positive impact on consumers' views on a particular product or service and therefore encourage a purchase (Cheung, et al., 2009). Teenagers have become much more aware of the products and services they purchase and consume. Therefore, before making a purchase decision, they check customer reviews several times and are not based solely on the product advertising (Sa'ait, Kanyan and Nazrin, 2016). Studies have shown that 90% of online shoppers consult the opinions of other consumers before purchasing anything (Channeladvisor, 2011), and 70% of consumers trust e-WOM (Nielsen, 2012). The more opinions consumers have on a product or service, the greater the influence e-WOM has on purchasing decisions. It is a question when brands pay for reviews and thus obtain less authentic consumer experiences with which they associate. In excess, sponsored e-WOM leads to a decrease in brand confidence. (Sa'ait, Kanyan and Nazrin, 2016). The more relevant an influencer's opinion becomes to readers, the more they gain confidence in that influencer's recommendations, thus positively impacting the e-WOM which acquires a greater degree of authenticity (Colliander and Erlandsson, 2015).

Research Objectives

In order to observe the impact that both influencers and brands have on consumer behaviour, we conducted an online survey based on a questionnaire (Annex 1) applied to a sample of 324 respondents, which was the support for the quantitative research. The survey was conducted between May 7 through 14, 2020, and the data analysis was made in Microsoft Office Excel. The objectives of the research are the following:

- identifying the degree of visibility that an influencer gives a brand
- identifying the degree of trust in the products and services of some brands recommended by influencers
- identifying the degree of authenticity of the experiences that influencers have with brand products and services
- identifying the level of expertise of niche influencers who recommend brand products and services
- identifying the degree of creativity of influencers' brand posts
- the impact of notoriety on the decision to purchase a brand
- the impact of trust in influencers' posts on the decision to purchase a brand
- the impact of authenticity in influencers' posts on the decision to purchase a brand
- the impact of niche influencers' expertise on the decision to purchase a brand
- the impact of creativity in influencers' posts on the decision to purchase a brand
- identifying the channel with the greatest influence on consumers
- breakdown of influences on generations of consumers

Research hypotheses and proposed model

The proposed model identifies purchase and satisfaction as determinants of brand loyalty. The purchase mediates the relationship between satisfaction and loyalty. In return, the purchase of a brand is influenced by five variables: notoriety, trust, authenticity, expertise, creativity. The proposed model is illustrated in Figure 2.1.

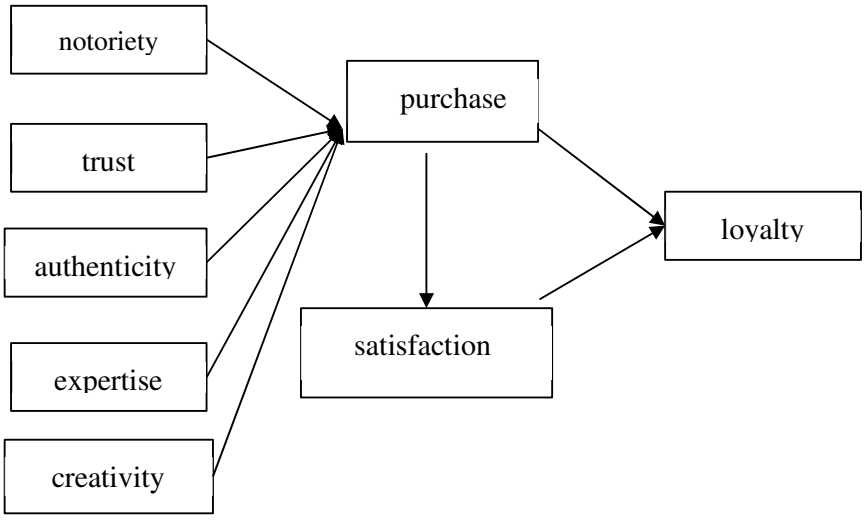

Figure 2.1: Research model

Source: made by the author

The proposed model is consistent with the theories regarding the impact of Influencer Marketing on consumer behaviour (Keller and Kotler, 2016). We started the research from the idea that consumer exposure to online brands will have a similar effect in real life and vice versa, because consumers create a virtual representation of it through the use of the Internet (Schau and Gilly, 2003). This idea leads to the reasoning that the influence that is realized online affects the intention to purchase in real life, as well as the perception on products and services. Notoriety describes the degree of brand visibility offered by influencers by passing on the brand message to the community. Thus, the first hypothesis can be laid down:

H1: Positive notoriety influences the purchase.

The recommendations that a brand receives from someone else are more credible than what the brand says about itself. A third party, whether an influencer or a regular consumer, can reinforce the brand's claims or contradict them through a negative user experience. This outlines the second hypothesis

H2: Positive trust influences the purchase.

Brands have changed their communication strategy and no longer focus on selling, but on creating stories and experiences, shaping experiential marketing. The connecting experiences are made through blogs, vlogs, YouTube, digital publications and podcasts and thus create more and more content that is not aimed at direct sales. Experiences provide the authenticity that consumers expect and develop the desired connection of brands. (Sloof, 2018) The third hypothesis is laid down:

H3: Positive authenticity influences purchase.

Influencers play a very important role and, at the same time, their recognition grows rapidly due to the fact that they provide information synthesized in various forms and functionalities (Akritidis et al., 2011). The main factors that define the consumer's tendency to be influenced by a certain factor largely concern the correct information, at the right time, in the right place and from the right person (Wu, 2012). Thus, the fourth hypothesis is laid down:

H4: Positive expertise influences the purchase.

Influencers spread information through various Social Media channels, such as blogs and social networks, they share stories and images, they tell their experiences, express their opinions on many topics, services and products, and are a portrayal of the very important phenomenon of influence (Alsulaiman et al., 2015; Alhidari et al., 2015). The fifth hypothesis is laid down:

H5: Positive creativity influences the purchase.

Profile of the Respondents

The profile of the respondents in terms of characteristics is presented in Table 2.1 below. They were selected in their own network of acquaintances, being invited to answer the research questionnaire through Social Media channels.

Table 2.1: Profile of quantitative research respondents

Variable	Classification of the variable	Frequency	Total share
Gender	Female	116	35.8%
	Male	208	64.2%
Environment	Urban	254	78.4%
	Rural	70	21.6%
Age	under 25 years old	158	48.8%
	26-42 years old	104	32.1%
	43-53 years old	33	10.2%
	over 54 years old	29	8.9%

Source: made by the author

Research results and hypothesis validation

In the sample structure, the people who are best represented are those under 25 years old - Generation Z (48.8%), closely followed by people aged between 26 and 42 years - Generation Z (32.1%), and respectively the people from the urban environment (78.4%). In terms of gender, males are best represented (64.2%). According to the built methodology, they provided answers regarding their consumption behaviour.
We analysed the factors that influence the purchase of a brand in terms of statements evaluated on a Likert scale from 1 (total disagreement) to 5 (total agreement). Research has shown that the social responsibility of brands has the greatest impact on the purchase of a brand (3.92), followed by the notoriety instilled by influencers (3.82). The lowest result was obtained by the creativity of online posts (2.93).

We comparatively analysed consumers' perception of the factors influencing the purchasing decision (notoriety, trust, authenticity, expertise, creativity) that refer to influencer posts made in order to promote the products and services of some brands they work with, depending on communication channels (blog, YouTube, Instagram, Facebook). The results are given in Table 2.2. According to the research, the biggest influence on the decision to purchase a brand promoted by influencers lays with the blog posts (3.471), followed by YouTube (3.314) and Instagram (3.30). Facebook posts have the least impact due to the degradation of content quality as a following the increase in the number of fake posts. This has led to a decrease in trust in the posts that appeared on Facebook, which had a significant impact on the activity on the other platforms. Influencers focused their attention on blogs, YouTube channels and Instagram accounts, a fact confirmed by the results of the study.

Table 2.2: Analysis of the impact of influencers' posts from the main Social Media platforms on the decision to purchase a brand

	Notoriety	Trust	Authenticity	Expertise	Creativity	Total
Blog	3.74	3.24	3.22	3.20	2.956	**3.471**
YouTube	3.89	3.23	3.31	3.19	2.953	**3.314**
Instagram	3.89	3.25	3.25	3.21	2.953	**3.30**
Facebook	3.77	3.16	3.16	3.10	2.89	**3.20**

Source: made by the author

At the same time, we analysed the impact of the five indicators (notoriety, trust, authenticity, expertise, creativity) on the purchasing decision separately and comparatively for each generation of consumers (Generation Z, Generation Y, Generation X, Baby Boomer).

According to the research results, presented in Table 2.3., Influencers have created brand awareness (notoriety) for brands as follows:

- on the blog, the highest level of notoriety belongs to Generation X (3.78), and the lowest to Generation Z (3.70)
- on YouTube, the highest level of notoriety is found in Generation Z (4.05), and the lowest in Baby Boomer
- on Instagram, the highest level of notoriety is also obtained by Generation Z (4.03), and the lowest by Baby Boomer (3.51)
- on Facebook, the highest level of notoriety belongs to Generation Y (3.96), and the lowest to Generation Z (3.65)

Table 2.3: Perception of the different consumer generations on influencers' posts in Social Media

		Generation Z	Generation Y	Generation Z	Baby Boomer
Notoriety	**Blog**	3.70	3.77	3.78	3.75
	YouTube	4.05	3.76	3.81	3.55
	Instagram	4.03	3.89	3.56	3.51
	Facebook	3.65	3.96	3.81	3.72
Trust	**Blog**	3.02	3.25	3.68	3.89
	YouTube	3.15	3.19	3.59	3.44
	Instagram	3.12	3.19	3.5	3.62
	Facebook	2.84	3.23	3.65	3.44
Authenticity	**Blog**	3.08	3.15	3.56	3.96
	YouTube	3.25	3.31	3.40	3.55
	Instagram	3.13	3.22	3.65	3.62
	Facebook	2.94	3.28	3.65	3.34
Expertise	**Blog**	3.01	3.24	3.40	4
	YouTube	3.10	3.17	3.62	3.34
	Instagram	3.10	3.24	3.56	3.48
	Facebook	2.91	3.16	3.56	3.44
Creativity	**Blog**	2.66	3.99	3.5	3.89
	YouTube	2.81	2.87	3.46	3.48
	Instagram	2.84	2.86	3.37	3.44
	Facebook	2.60	2.98	3.40	3.65

Source: made by the author

These results indicate which channel influencers should focus on in order to take the brand message forward to each generation of consumers, as follows:

- Generation Z is present most on YouTube and Instagram and less on blog and Facebook
- Generation Y is more present on Facebook and less on YouTube
- Generation Z is present most on YouTube and Instagram and less on blog and Facebook
- The Baby Boomer Generation reads blogs and has a weak presence on Instagram

Therefore, the posts of influencers who take the message of brands to consumers will have greater visibility if they are posted on the blog for Baby Boomer, on YouTube for Generations Z and X, on Instagram for Generation Z, on Facebook for Generations Y and X.

After seeing which are the Social Media channels that offer the highest visibility to influencers' posts that promote brands, we analysed the level of consumer confidence in these posts, the results being shown in Table 2.3. Thus:

- on the blog, the highest level of trust in posts comes from the Baby Boomer Generation (3.89) and the lowest from Generation Z (3.02)
- on YouTube, the highest level of trust in posts comes from the Generation X (3.59) and the lowest from Generation Z (3.15)
- on Instagram, the highest level of trust in posts comes from the Baby Boomer Generation (3.62) and the lowest from Generation Z (3.12)
- on Facebook, the highest level of trust in posts comes from the Generation X (3.65), and the lowest from Generation Z (2.84)

These results indicate that Generation Z is the most reluctant to trust the posts of influencers, but is also the generation that follows influencers the most. Generations X and Baby Boomer have the highest level of trust in influencer promotional posts as they believe that if a person appears in public to talk about a product and service, then what they are saying is true, without particularly double-checking the information in other sources.

Regarding the consumers' perception of the authenticity of the posts, shown in Table 2.3, it can be stated that:

- on the blog, the highest level of authenticity indicated by influencer posts is perceived by the Baby Boomer Generation (3.96) and the lowest by Generation Z (3.08)
- on YouTube, the highest level of authenticity indicated by influencer posts is perceived by the Baby Boomer Generation (3.55) and the lowest by Generation Z (3.25)
- on Instagram, the highest level of authenticity indicated by influencer posts is perceived by the Baby Boomer Generation (3.65) and the lowest by Generation Z (3.13)
- on Facebook, the highest level of authenticity indicated by influencer posts is perceived by Generation X (3.65) and the lowest by Generation Z (2.94)

Generation Z retains the same reluctance to the authenticity of influencers' posts, regardless of the Social Media channel on which they are posted. Generations X and Baby Boomer are the ones who deem authentic to the greatest extent these brand promotion posts made by influencers.

We also analysed consumers' perception about the level of expertise they consider influencers who promote brand products and services have, in order to see which generation considers influencers to be experts in the field they work in. The results of the research are shown in Table 2.3. Therefore, we have:

- on the blog, the level of expertise of influencers perceived by consumers has the highest level for Baby Boomer Generation (4) and the lowest for Generation Z (3.01)
- on YouTube, the level of influencers' expertise perceived by the consumers was the highest for Generation X (3.62) and the lowest for Generation Z (3.10)
- on Instagram, the level of influencers' expertise perceived by the consumers was the highest for Generation X (3.56) and the lowest for Generation Z (3.10)
- On Facebook, the level of influencers' expertise perceived by the consumers was the highest for Generation X (3.56) and the lowest for Generation Z (2.91)

The Baby Boomer Generation perceives bloggers as experts in their niche, while Generation Z sees influencers as normal people, just like them, but with an incredible online voice. Generation Z consumers understand that influencers appear online to present their consumer opinion, their personal experiences with brands' products and services, not as brand specialists that have an informed opinion.

The perception on the creativity of the posts has the lowest level of the five factors and the research results are also presented in Table 2.3. Thus:

- blog posts are perceived as creative mostly by Generation Y (3.99) and the least by Generation Z (2.66)
- YouTube posts are perceived as creative mostly by Baby Boomer Generation (3.48) and the least by Generation Z (2.81)
- Instagram posts are perceived as creative mostly by Generation Baby Boomer (3.44) and the least by Generation Z (2.84)
- Facebook posts are perceived as creative mostly by Generation Y (3.65) and the least by Generation Z (2.60)

To the most part, the consumers from the Baby Boomer Generation consider influencers' posts to be creative, while Generation Z is the least impressed by the creativity of influencers' posts on blogs, YouTube, Instagram and Facebook. One explanation for this would be the migration of Generation Z to TikTok.

According to the statistics presented in the Digital Marketing Report, made by iSense Solution, in Romania there are 176,335 TikTok users, most of them young people up to 25 years old, i.e. from Generations Z and Alpha (children born after 2010) - 113,715. On TikTok, the youngsters from Generation Z are very creative, they always strive to bring something new, to impress and stand out.

So, the biggest challenge for both brands and influencers is to go back to being authentic and human in communication, as this is the only way they can get the attention of the Generation Z.

Conclusions

Given that messages and opinions spread quickly on Social Media, the brand is able to exponentially increase the visibility of its products and services, appealing to the popularity enjoyed by influencers, thus reaching the target audience much faster and more efficiently. In return, the influencer enjoys the brand's reputation for the purpose of improving their contact list and level of fame. Influencer Marketing has become a powerful advertising tool that has a much greater impact compared to other forms of promotional communication. This phenomenon is constantly expanding, and its importance is confirmed by a growing number of studies, observations and reports.

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The Role of Trust in Organizational Innovation

Katarzyna WALECKA-JANKOWSKA
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, 27 Wybrzeże Wyspiańskiego st. 50-370 Wroclaw, Poland, katarzyna.walecka-jankowska@pwr.edu.pl

Joanna ZIMMER
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, 27 Wybrzeże Wyspiańskiego st. 50-370 Wroclaw, Poland, joanna.zimmer@pwr.edu.pl

Anna ZGRZYWA-ZIEMAK
Faculty of Computer Science and Management, Wroclaw University of Science and Technology, 27 Wybrzeże Wyspiańskiego st. 50-370 Wroclaw, Poland, anna.zgrzywa-ziemak@pwr.edu.pl

Ewelina PIECHOTA

ewelina.piechota.94@gmail.com

Abstract

Trust in organisation creates a climate conducive to information exchange, sharing ideas, and therefore innovation. It can also be a factor that will be crucial for implementing innovations.
The article presents the results of the empirical research related to the determinants of innovation. The authors concentrates on one of the most important determinants, which is 'trust'. Both practitioners and theoreticians deal with the problems of managing innovation, seeking its determinants which can emerge by minimising barriers to the creation and implementation of innovations. Trust is a decisive factor for a company's innovativeness and performance. On the other hand, innovation can be practised as well as learned. The purpose of this article is to show how to formulate and implement corporate values to promote the development of innovations and their effective use in the development of the long-term value of an organisation. The study was conducted on 50 organisations operating in Poland were examined (they were different in terms of size, industry and ownership structure).

Keywords: Trust, Innovation, Management

Introduction

Both practitioners and theoreticians deal with the problems of managing innovation, seeking its determinants which can emerge by minimising barriers to the creation and implementation of innovations. They focus primarily on the formulation and implementation of various determinants of innovation (e.g. trust), to promote the development of innovations and their effective use in the development of the long-term value of an organisation.

Trust has always been one of the most important determinants of innovation (Bleicher ,1991; Sink, et al. 1995; Lane, 1998; Wilson and Kennedy, 1999; Hacker and Willard, 2002; Sztompka, 2005; Grudzewski, et al. 2009, Walecka-Jankowska, 2014). Innovations, as a the central capability for all organisations interested in maximizing the opportunities for success, is related to the process of creating and sharing knowledge (Dobni 2010; Jaruzelski and Dehoff 2010; Walecka-Jankowska 2011; Gobble 2012). The result of these actions is related to the presence or lack of trust in the organization. Trust will be important at almost every stage of the innovation process, creating an atmosphere for the creativity of employees.

The aim of the article is to indicate what type of trust is conducive to the development of innovations and their effective use in the development of enterprise value.

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Trust - Theoretical Approach

The role of trust in society and organization is more and more often emphasized by many authors, including: Griffin (1996), Zand (1972), Gambetta (1988), Bleicher (1991), Misztal (1996), Fukuyama (1995 and 1997) , Doney, Cannon and Mullen (1998), Handy (1995), Robbins (1998), Keen (1999), Zimniewicz (2000), Zeffane, Connell (2001), Bednarczyk (2001), Grudzewski and Hejduk (2004), Watson (2005), Sztompka (2007); Bianchi and Brockner (2012); Bews (2012); Colquitt, LePine, and Piccolo (2012). An unequivocal definition of the concept is, however, difficult due to the fact that it is an old concept, moreover, of an interdisciplinary nature - the issue of trust is dealt with by sociologists, psychologists, economists and philosophers. As a consequence, there are many definitions in the literature - some of them are presented in Table 1.

Tab 1: Trust definitions

Authors	Definition
Psychology and sociology	
Griffin, 1967	Relying on a person's behavior to achieve a desired but uncertain goal in a risky situation.
Cook, Wall, 1980	The degree to which a person is willing to attribute good intentions to others, to believe their words and actions.
Barney, Hansen, 1995	"(...) mutual belief that neither party will take advantage of the other's vulnerability".
Management	
Zand, 1972	Actions: sensitizing, aimed at someone who is not under control, when the punishment is borne by one party, when it is abusing the other party's sensitivity, is greater than the benefit received by the party using that sensitivity.
Gambetta, 1988	The probability that the person with whom we cooperate will perform appropriately entrusted tasks or at least their actions will not be harmful enough to require breaking the cooperation.
McAllister, 1995	The level to which a person is confident and wants to act on the words, actions and decisions of others.
Fukuyama, 1995	Expecting honest, mutual and repeatable behavior based on standards commonly accepted by some members of the community.
Blomqvist, 1997	The belief that the other party will do what it has committed to.
Böhme, 1998	Ontological trust is based on the fact that the perception of each person is based on the thought patterns developed by him (as part of communication or during gaining experience), helping to organize and interpret the world around him. Ontological trust occurs when you can rely on your thought patterns - to give you sufficient orientation in reality. Institutional trust, in turn, refers to the belief in the functioning of certain institutions, which include the legal system, social order (e.g. the applicable hierarchy) or the laws of nature (e.g. sunrise and sunset).
Doney, Cannon, Mullen, 1998	Willingness to rely on the other party and act when the other party's actions are very important.
Burgol, (2006)	"Trust is something that has been created in an organization for people and by people, and is based on a certain level of predictability (the effects of and consequences)" (p. 22).
Calnan, Rowe, (2006)	“Trust is not an individual attribute or mental state, but it is the result of interpersonal behavior and shared identity. These behaviors result from institutional rules, laws, customs" (pp. 349-358).
Chen, Barnes, (2007)	"Trust is perceived utility, perceived security, perceived privacy, perceived good reputation and the desire to personalize the offer as important prerequisites for initial online trust" (pp. 21-36).
Grudzewski, Hejduk, Wańtuchowicz, 2009	"Trust is the belief on the basis of which Unit A in a specific situation, he accepts the dependence of unit B (person, object, organization), having a sense of relative safety, even though negative consequences are possible”.
Bugdol, 2010	"Is convinced that the actions taken lead to the achievement of the set goals and gaining benefits by all stakeholders).
Organizational behaviours	

Zaheer, McEvily, Perrone, 1998	Expecting the participant to fulfill their obligations, their actions to be predictable, and to act and negotiate fairly, even if they behave opportunistically.
Robbins, 1998	It is integrity, competence, consistency, loyalty and openness. It should be noted, however, that integrity and competence are decisive in whether a person is trusted or not.
Szeloch, 2001	It distinguishes the technical and moral dimension of trust - the technical dimension of trust consists of competences, skills and abilities, and the moral dimension consists of two elements: good will (willingness to do good) and righteousness of character (honesty, justice, truthfulness and faithfulness to one's conscience).
Weber, Deepak, Murnighan, 2005	"Trust is the foundation of social interactions, a valuable, valuable resource located in organizational and interpersonal relations"
Sankowska, 2011	"Trust is the readiness to become sensitive to the actions of the other party based on the assessment of its credibility in a situation of interdependence and risk" (p. 34)
Source: own work based on Walecka-Jankowska, K. (2001), Wpływ zarządzania wiedzą na innowacyjność przedsiębiorstw, PHD dissertation, Politechnika Wrocławska; Wydział Informatyki i Zarządzania. Grudzewski, W.M., et al. (2009), Zarządzanie zaufaniem w przedsiębiorstwie, Wolters Kluwer, Kraków.	

The key issues in defining trust are: kindness (concern and motivation to act in the interests of the other party - is the opposite of opportunistic actions) (Holmes, 1991), honesty (making contracts in good faith, telling the truth, keeping promises) (Bromiley and Cummings, 1995) , competences (actions and / or skills necessary to do what is needed (Barber, 1983), predictability (regarding desired and undesirable actions that are consistent enough to be predicted (Gabarro, 1978; Grudzewski, et al. 2009). Thus, to sum up, trust is associated with the existence of certain expectations about the future, rooted in the social order in which the trustee functions. Trust arises in conditions of acceptance of the other party's behavior and develops in conditions of voluntary and unforced cooperation. At the same time, it exists in conditions of uncertainty and risk. and the trustee has no control over the results based on trust (Grudzewski, et al 2009; Hosmer 1995; Whitener et al. 1998). Importantly - it is a positive concept by nature, moreover, by some it is referred to as fragile (Sztompka, 2007), therefore susceptible to changes, especially under the influence of negative factors, while others consider them permanent, because it grows with progress (Zand, 1972).

Types of trust

Trust may result from various premises and takes different forms in different interpersonal relationships. That is why there are many typologies of organizational trust related to various sources of its origin and the type / durability of the dominant relations, on which this trust is based. Table 2 presents selected typologies of trust.

Tab. 2 Type of trust

Lewicki i Bunker, 1995	
Based on deterrent	based on calculation and logical behavior of partners. Punishment is regarded as a negative factor, a reward as a positive and predictable effect. Based on reward for fulfilling obligations, not fear of punishment.
Knowledge based	based on the prediction of behavior resulting from experiences gained during cooperation in the past.
Based on identification	based on empathy, care, shared values of partners. Focus on shared tasks, not individual needs.
Barney i Hansen, 1994	
Weak	the belief that the other party will not take advantage of their helplessness; lack of control and contract; it occurs when there is no possibility of opportunistic action.
Average	it is based on the control mechanisms: reputation, a contract protecting against opportunistic actions.
Strong	principled, results from the assimilation of the norms and rules governing the activities of business partners and is dependent on control mechanisms.
Sako, 1992	

Contractual	results from the ability to abide by contractual arrangements - common norms, honesty, keeping promises, common understanding of principles and standards.
Competence	it results from the tendency to act in accordance with the promises made.
Good will	it results from commitment and mutual benefits arising from it, it exists when there is an agreement on the principles of fairness (it is considered conducive to cooperation and taking into account the achievement of satisfaction).
Harrison, Cummings i Chervany, 1995	
Personality	based on the structure of the human personality. It is focused on the innate and acquired personality traits of individuals within the organization. The ability to empathize with others, sensitivity, responsibility and emotional restraint are examples of traits that show a high personal tendency to trust.
Calculative	based on a simple calculation of the costs and benefits of a given relationship. The domination of this dimension proves a good motivational system, organizational identity, and the involvement of individuals in organizational matters.
Institutional	based on formal regulations. It consists in shaping a sense of security on the basis of formal safeguards.
Perceptual	is the process of perceiving the behavior of other people. This dimension refers to the cognitive characteristics of individuals and describes trust in terms of observing mutual behavior, reactions, and ways of proceeding.
Cumulative - knowledge-based	this is the most durable category of trust, but requires quite a long initiation time. It develops on the basis of gained and accumulated experience.
Source:Walecka-Jankowska, K. (2011), Wpływ zarządzania wiedzą na innowacyjność przedsiębiorstw, PHD dissertation, Politechnika Wrocławska; Wydział Informatyki i Zarządzania.	

In this study the classification of Lewicki and Bunker (1995) was taken, due to the explicit and direct relationship of trust types indicated by the authors with the sources that build this trust (and therefore relationships dominant in the organization) and the strength/durability of the impact of these relationships on general organizational trust.

Organizational trust based on calculation is rather weak, because it based on concerning transactional relations prevailing in the organization and estimating the risk of decision-making. Hence, this type of trust is associated with "weak trust" (Barney and Hansen, 1994) and contractual trust (Sankowska 2015) or deterrence-based trust (Rousseau, et al., 1998).

Organizational trust based on calculation is rather weak, it is based on the least durable type of relationship between people, because it comes from concerning transactional relations prevailing in the organization and estimating the risk of decision-making. Barney and Hansen (1994) called this type of trust – weak, Sankowska (2015) contractual trust, Rousseau et al. (1998) deterrence-based trust.

Organizational trust based on knowledge (competence-based trust) known as a semi-strong, results from a relationship based on the long-term experience of the organization's participants (Sankowska 2015) and results, in turn, from the previously gathered positive exchange experiences. This type of trust can grows due to a common interaction history that allows to develop generalized expectations for the partner and predict the behavior.

The trust of goodwill (called relational trust) is the strongest one, because it grows on long-term relationships based on values shared by the organization’s participants. As Sankowska (2015) noticed it refers to relationships based on identification. Emotions that arise from the more frequent and longer interactions between the parties of exchange causes that the partners rely on each other, care for each other and focus on common values and needs.

It is possible that the indicated three types of organizational trust can and even exist in the organization at the same time, and general organizational trust is a kind of resultant of relationships and motivations occurring in the organization. Lewicki and Bunkier suggest that trust is evolutionary. Therefore, usually at the beginning of a relationship there is trust based on calculation. At this point, the parties to the transaction most often calculate the possible benefits and losses that may result from the relationship. Most often, to be able to talk about a relationship and develop it, the benefits must be higher than the costs. This stage is followed by an increase in experience resulting from cooperation with a partner. Therefore, we can speak of trust based on knowledge, as the parties are able to predict the reactions of the other partner. The last stage is to understand your partner's needs and care for their welfare. Therefore, one can speak of a trust based on identification. Partners "develop common goals, values and identity, and

there is often a tendency to give up short-term goals for the sake of cooperation." In connection with the above, we can talk about the evolution of trust over time, which depends on the nature and history of cooperation" (Sankowska, 2015).

Trust and innovation

Trust creates a climate conducive to information exchange, sharing ideas, and therefore innovation. It can also be a factor that will be crucial for implementing innovations. Research indicates a positive relation between trust and innovation (Barney and Hansen, 1995, Walecka-Jankowska, 2015). Research of Walecka-Jankowska (2011) indicate the highest impact of trust based on identification. It can be noticed that trust based on a deterrent factor and risk calculation results from formal security measures, and therefore limiting the freedom of employees will not be conducive to innovation. Trust based on knowledge and identification allows for faster adaptation to changing conditions, increases flexibility of action, and limits the freedom to a lesser extent. At the same time, it reduces control, which allows the flow of information that is necessary to integrate different points of view and create new ideas. In the literature it is said that trust is the foundation to sustain innovation processes. Its lack discourages innovative activity. (Sankowska, 2011). Some authors believe that the best premise for creating innovation in an enterprise is the level of trust in the organization (Spitzer, 2007). PricewaterhouseCoopers research also shows that trust is the first factor that distinguishes innovators from the least innovative enterprises. (PWC, 2017). Moreover, trust is seen as an element of social capital (Coleman, 1998; Fukuyama, 1995), which influences the more effective implementation of organizational goals by enabling cooperation, decision making, motivating and connecting people (Grudzewski, et al. 2009).

Due to trust, the parties often give up additional security or detailed contracts, which gives greater flexibility of cooperation. Such connections were investigated by S. Herting, who confirmed that there is a statistically significant correlation between trust and organizational innovations. The author of H. Herting and J. Barney suppose that imputed trust is weakly related to innovation. Because trust based on economic calculations is weak (it relies on security measures that have a negative impact on the freedom to cooperate and thus significantly hinder innovation). Only with medium or strong trust is it possible to achieve a competitive advantage of the enterprise. (Barney, Hansen 1995). Enterprises operating at higher levels of inter-organizational trust, characterized by such features as the aforementioned tendency to trust, self-credibility and adherence to informal rules and standards of operation, achieve better results in the field of innovation"(Grudzewski, 2008).

When there is a high degree of trust, employees can be honest, authentic and open. They can count on mutual professional and personal support. They share their ideas and communicate openly. Trust, openness and a sense of security can stimulate nonconformist behavior in which the employee decides to express his opinion directly, or even to question certain assumptions (Lane, 1998; Wilson and Kennedy, 1999). It is possible when he is not afraid of sanctions from the superior. Openness of the management to the initiative and reporting of employees, as well as placing their trust in them, triggers their involvement, and thus creates fertile ground for the creation of unique innovations. A manifestation of the company's openness is also the readiness to absorb information, communicate with the environment, and focus on the customer. " (Wojtczuk-Turek, 2012). P. Sztompka (2005) is of a similar opinion, pointing out that individual cases of aggregate trust lead to increased mobilization, activity and innovation. Organizations that are trusted by their buyers have the opportunity to sell more product categories, and often for a higher price. Introducing radical innovations and a new assortment will be burdened with a lower risk of lack of interest on the part of buyers (Grudzewski, et al. 2009).

Trust within an organization promotes innovation also thanks to the fact that it enables the creation and functioning of organizational structures that favor the emergence and implementation of innovations. K. Bleicher (1991) believes that the trust that is placed in the members of the organization creates an organization of trust that aims precisely at innovation. The opposite is the distrust organization which combats the weaknesses of the individual thanks to a mechanistic-technocratic structure, also exhibiting the characteristics of an ideal bureaucracy. P. Bourdieu and J. D. Wacquant (1992, p. 119) indicate that for trust it is very important to build a permanent network of relations, more or less institutionalized, of mutual knowledge and recognition. P. Sztompka (2007), however, notes that not every network of relationships constitutes social capital. The network imposed by connections in a bureaucratic organization does not create conditions conducive to innovation. This means that only a bottom-up, voluntary and spontaneous network of relationships creates an element of the trust organization, enabling employees to access the resources of other people in the organization. The final hypothesis adopted in the research is: The higher the level of trust in an organization, the higher its innovativeness.

The problem of the relationship between trust and innovation can be expanded not only by focusing on the level of innovation, but also looking at the stages of the innovation process. If we take into account the Tidd and Bessant model (20018), a detailed analysis of the stages can be carried out: information gathering, idea section (opportunities

should also be consistent with the overall strategy of the organization and built in those areas of technical and market competences in which the company operates efficiently), idea implementation (production) and discounting of value, e.g. in the form of market success, increased market share, cost reduction or in the case of social innovation - changing the world. It seems that at each stage, trust based on identification (the strongest one) will be important as it allows ideas to be freely discussed and shared. Especially in the phase of creating and selecting ideas for implementation, because choosing from the numerous technology and market opportunities is extremely important. However, if the organization has not yet achieved the highest level of trust, relying on trust in the knowledge or experience may prove to be sufficient (eg in the information gathering phase). The implementation and production phase, as a more formalized and procedure-based phase, may also be based on weaker levels of trust.

It seems that the higher the level of trust should lead to the higher the level of innovation. However, too high trust level can lead to a soft, effortless behavior - with the increase in mutual trust, innovation increases, but only to a certain point and then decreases. There seems to be an optimal point above or below which creativity is hindered (Bidault, 2010).

Research Results

In order to examine the relation between the types of trust (taken after Lewicki and Bunker, 1995) and the organizational outcomes, key variables were defined: *trust based on calculation*, *trust based on knowledge*, *trust based on identification* (their names mean saturation with features building a given type of trust), as well as detailed variables referring to the organizational innovation level and stages of innovation process (based on Tidd and Bessant model, 2018): gathering information, verification and selection of ideas, testing and production, discounting. The questionnaire study was carried out covering 60 enterprises (they were different in terms of size, industry and ownership structure). The studies are not representative due to the small sample size. They can be treated as pilot studies. In the future, research should include a larger research sample. All variables were measured, basing on the list of statements according to defined types of trust or organizational outcomes and using a Likert scale. The results of Cronbach's α coefficient measurements indicate rather high internal consistency of the scale and reliability of measurement of particular variables (between 0,502 – 0,958).

In order to analyze the relation between types of trust and stages of innovation processes, an analysis was carried out using the Pearson correlation, as the studied variables have normal distribution. The results are presented in table 3.

Table 3: Relation between the types of trust and innovation and stages of innovation process

		Innovation level	**Gathering information**	**Verification and selection of ideas**	**Testing and production**	**Discounting**
Based on identification (5 items)	Pearson's Correlation	**.325***	.238	.310	.105	.127
	bilateral relevance	.011	.067	.016	.423	.334
Based on knowledge (4 items)	Pearson's Correlation	.180	**.355****	.297	.205	.347
	bilateral relevance	.169	.005	.021	.117	.007
Based on deterrent (4 items)	Pearson's Correlation	.219	- .039	.037	- .071	- .157
	bilateral relevance	.092	.764	.781	.591	.232

Source: own work.

Considering trust based on knowledge, conducted analysis confirmed that there is a positive relation only with innovation, although it must be emphasized that the identified correlation is statistically important, but not very strong.

Also according to the trust based on identification the relation between this type of trust and the first stage of innovation process – gathering information is positive and statistically significant (the correlation is moderate).

Conclusion

Organizations must be creative, because it can ensure the distinction and possibility to earn those, who are willing to pay for having a novelty. Moreover organisations must be innovative constantly, as Craig Wynett (from Procter & Gamble) said - What we've done to encourage innovation is make it ordinary. In world rank – innovation is on the top of the list – that is for the first time that innovations is more important than quality. That shows that direction is changing – wind of change is blowing into new direction, quality is not enough to provide competitiveness.

Research presented in the paper is based on the criterion of origin of relationships, which determines the strength and durability of relationships between individual participants in the organization. In this context, the main research problem outlined in this article was the search for the origin-based type of trust (characterizing by specific durability of the relationship), which would be most conducive to building the organizational innovation level, but it also concentrates on stages of innovation process to be more precisely.

The results of the conducted research show the different impact of particular types of trust on the organizational innovation level, and first stage of innovation process – gathering information. What is surprising that no statistically significant correlations were observed for the other stages of the innovation process.

Level of organizational innovation positively correlates with trust based on identification, the strongest and durable trust. Thus, significant trust resulting from a high level of empathy, care, values shared by partners. Another characteristic of this type of trust is the focus on common tasks rather than individual needs. Every employee is concentrate on innovation as a most important and shared goal and value. Trust based on knowledge is positively correlated with the gathering information. This may be due to the fact that the information gathering process itself is based on facts, information and knowledge. So also trust in this part of the innovation process.

There is a need for in-depth research in the above field. Particular attention should be paid to examining the various stages of the innovation process. Further research could also include other typologies of trust.

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Study On Creating A Local Branding Process To Increase The Attractiveness Of The Area

Mădălina ȘERBAN, Maria-Magdalena TUREK-RAHOVEANU, Luxița Risnoveanu
And Cristian Silviu Simionescu

University "Dunarea de Jos" of Galati, Faculty of Engineering and Agronomy Braila,
29 Calarasilor Street, 810017 Braila, Romania, Phone: +40239612572

E-mails: madalinaserban2010@yahoo.com , magdalena.turek@ugal.ro, luxita.risnoveanu@ugal.ro, cristian.simionescu@ugal.ro
***Corresponding author**: magdalena.turek@ugal.ro*

Abstract

This article aims to present a methodology to analyze how the image of an area is affected by different branding strategies at the level of entrepreneurs. The first methodology aims to stimulate a brand process in which there are sufficient opportunities for an open debate in the process of developing and implementing a local brand. The second methodology refers to the stimulation of an identity-image match in which the image of the place communicates and reflects the identity of the place. It is assumed that each strategy has a positive effect, the reputation of the place, as well as the immediate positive effects by increasing the adoption of the place brand.
The research will be applied structurally by modeling the equation to the data from the local surveys from Podgoria Dealul Mare, in Romania among the professionals working in the field of marketing and branding. The results will follow if the branding of the area will have direct (positive) effects on the reputation of the place. The indirect effect on the reputation of the site mediated by the adoption of the site brand reduces conflicts between stakeholders. The theoretical and managerial implications are discussed.

Keywords: branding, rural areas, sustainable tourism, the attractiveness of the area.

Introduction

Brand issues are a concept that is increasingly applied at different levels, from entities of different sizes, including retail stores, urban or rural shopping centers and why not regions and nations. Scientific research and economic practice in identifying places to be branded has appeared at a multidisciplinary level: history, geography, economics, computer science, etc.

Specialists separate the two notions, namely the branding of the locality / region and the brand of products and services. (Parkerson and Saunders, 2005), tourist destinations (Avraham and Ketter, 2012); (Benedetti et al., 2011), public policy (Kokosalakis et al., 2006) and local government (Anholt, 2008; Lucarelli & Berg, 2011), urban planning (van Assche and Costaglioli, 2012) and local marketing (Dinnie , 2009) (Kotler and Gertner, 2002).

Branding as an emerging discipline has evolved considerably in the last two decades, especially in terms of how it communicates through messages sent to different segments of the public (Braun et al., 2014).

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Through its applications, marketing at the level of governments and tourism organizations has led to more sophisticated applications, including social media (Braun et al., 2014). Marketing has evolved from an approach based on individual promotion to a strategic and holistic vision of place marketing (Ashworth and Voogd, 1994); (Avraham and Ketter, 2012), (Gnoth, 2002), including the concept of local reputation. At the same time, there is evidence that the failures of the global financial crisis of 2008 could have begun in the local branding community (Eisenschitz, 2010), in terms of doubts about the effectiveness of local branding (Medway et al., 2015).

As the concept of "entrepreneurship" became a business-oriented approach to destinations (Hall and Hubbard, 1996), marketing and branding resulted from corporate branding as a result of people's actions, in terms of their perceptions and image (Kavaratzis and Hatch, 2013).

Of course, there are certain limitations regarding the size of the business either at the level of a city or an area, in the sense of improving their business or the presence of retail stores (Steel and Symes, 2005). Specialists appreciate that there are differences between place brand and place management (M. et al., 2011), (Kavaratzis and Ashworth, 2008).

Material and Method

Branding the area - a matter of local government management

Experiences have shown that local authorities cannot brand their own places. First, they lack the resources to apply and experience all the requirements of brand development and communication. Secondly, the local brand depends not only on the actions of local authorities and the way they communicate, but especially on what happens at the level of private companies, social organizations, residents and visitors. Therefore, like most urban policies, place marking is a matter of management in a network of actors, depending on the contribution of stakeholders to local public issues. (Caloffi et al., 2017)).

The literature emphasizes that these processes must be managed to achieve good results (Klijn et al., 2010), (McGuire, 2006) and (Mcguire and Agranoff, 2011), which makes stakeholder management imperative for branding. site Klijn et al., 2010; (Mcguire and Agranoff, 2011).

Another main feature of public administration processes is their complexity. There is often a fundamental uncertainty as to the nature and extent of both the problems involved and their possible solutions.

Reputation of the place: the dependent variable.

The reputation of the place reflects the collective attitude of the people towards something - in this case, a place. Such an attitude allows organizations or places to counteract competition and provides intuitive, relevant and personalized value for target groups (Adesoji, 2011). In the corporate reputation literature, it is argued that reputation is a more stable performance indicator than (brand) image (by Chernatony, 1999), (Fombrun and van Riel, 1997). In this case,
the image concerns only more recent perceptions, while the reputation is made up of several images over time (Fombrun and van Riel, 1997). In other words: "reputation requires increasing the time and consistency of the image" (Markwick, 2000). Reputation is crucial because it is a key factor in people's attitudes and behaviors toward a particular object (Hatch and Schultz, 2002). Summarizing this information in places, we could appreciate that the reputation of a place is the composition of its previous developments, investments, actions, achievements and images of the place (brand). Reputation changes over time, but is generally less volatile than the image of the place. Reputation can be seen as influential on investment decisions, residential location and tourism.

Results and Discussions

The collection of data and variables will be done for the realization of the empirical analysis, using the structural analysis model with data provided from the economic agents that operate around the Pietroasele vineyard. The survey model that will be further developed and sent to professionals and company administrators involved in product marketing and branding in the vicinity of Pietroasele vineyard will be applied.

These places selected by the research team range from small companies in agriculture, trade, services, processors, viticultural organizations, associations. In all cases, the authors collaborated with company professionals to ensure that respondents were effectively involved in marketing and branding. Companies will submit the survey to their members, indicating the website where the survey could be found. This method of surveying the opinion of specialists will be applied to a number of 304 respondents based on email addresses. All respondents who complete only a small part of the survey will be removed from the database. Furthermore, the authors of the survey will ensure that the data set included only one respondent per company or local authority.

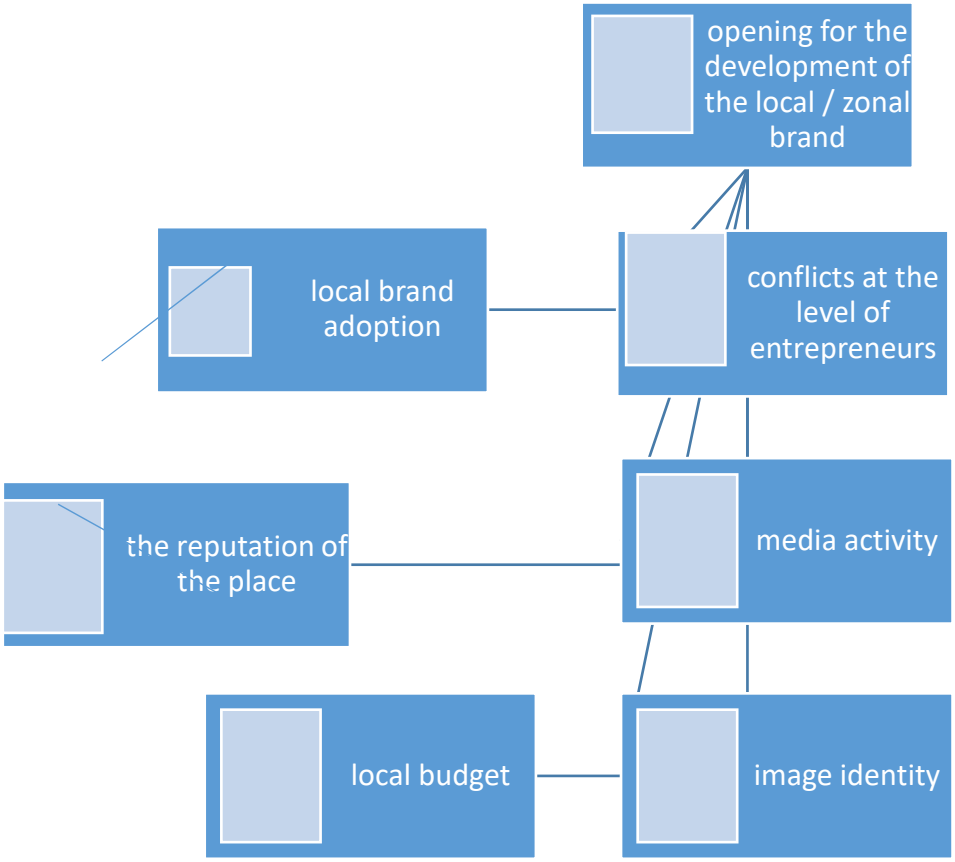

Figure 1: Correlations regarding the construction and development of the zonal brand

Source: authors' processing

Tabel 1

Table 1 shows that each question will receive a different answer. The research questions were

1. How did you find out or were you attracted to participate as a producer in the production activities of the area?
2. From your point of view, in what relationship are you with the processor / employer of Pietroasele Resort?
3. As a local producer, how far (km) are you from the processing site? Specify the location.
4. What are the 5 main qualities of the products you sell on the market?
5. What are the 5 main qualities of the wine-growing area in which you operate?
6. From your point of view, how is the grape transported during the harvest period?
7. As a producer / partner / employee, how did you actively contribute to the development of other economic activities in the area?
8. Specify 5 Initiatives, contributions on issues and proposals already expressed
9. A proposal to improve the relationship with the processor in which field would it come from? How could it be improved?

Source: authors' processing

The main correlations between the variables are shown in Figure 1, the correlations between the dependent variable and the five most important independent variables are significant. The correlation will be made between the adoption of the place brand and the conflicts between the stakeholders, but this was not a hypothetical relationship in the conceptual model. Budget development is correlated with the reputation of the place, while media attention is correlated with conflicts between stakeholders.

Table 1 shows that each question has an open answer, respondents can provide qualitative answers. Respondents will be encouraged to provide valuable information on all questions used to successfully assess the answers and will be excluded from the research. The presented methodology will follow the correlations between table 1 and figure 1 starting from the following hypotheses:

H1: An open branding process has a direct positive effect on the reputation of the place. H2: There is a direct and positive construction between the identity of the place and the budget of the area.
H3: There is a direct and positive construction between the identity of the place and the existing workforce in the area.
H4: There is a direct and positive construction between the identity of the place and visibility, models of good practice at regional level.

Conclusions and Proposals

We know that a construction of a local brand is a demanding management process that involves many companies, individuals and legal entities and characterized by cognitive complexity, having views on the brand and the area has different potential. As such, site branding requires strategies that are appropriate for setting up the branding management network. This research will explore the effects of two strategies to deal with the complexity of branding and improving the reputation of the place. In the following research, the results will show a certain strategy content, namely, in creating a realistic brand with an image communication that suits the identity.

The second strategy is actor-centered, namely stakeholder involvement through a series of processes open to the brand. Our hypothesis is that these two strategies will be positive

it affects the reputation of the local brand, not only directly but also indirectly through the increased adoption of the local brand and the reduction of conflicts between stakeholders. Two control variables (eg budget development and media attention) that could have an effect on the reputation of the site were included.

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Biomedical Reasoning for Child Epilepsy Monitoring. Neurological Environment for Recognition and Verification of Epilepsy Multi-Sensor Mobile Monitoring System.

Mariusz CHMIELEWSKI
Military University of Technology, Warsaw, Poland, mariusz.chmielewski@wat.edu.pl

Sylwia SLAWINSKA
Military University of Technology, Warsaw, Poland, sylwia.slawinska@student.wat.edu.pl

Filip GLOWACKI
Military University of Technology, Warsaw, Poland, filip.glowacki@student.wat.edu.pl

Abstract

Epilepsy monitoring has been one of most recognisable applications of wearable sensors as it can be used to mitigate everyday risks of having seizures. This problem based on statistical data affects children, which from development point of view must be accurately diagnosed and effectively treated. Any exceptions, delays can affect the child's health but especially its development increasing the risk of future conjugate diseases. Described in the paper tool is an attempt to provide a mobile remotely accessible monitoring tool which will alarm, notify and help to report health events which than can be automatically classified as seizures. The algorithms and NERVE tool have been designed not only to identify seizure but also recognise specific four classes of generalised seizures (clonic, tonic, myoclonic, atonic) including evaluation of the intensity of the seizure. This paper discusses the usage of wearable class multi-sensors introducing surface electromyography supplemented with limbs movement and activity evaluation. These data sources need to be selected with regard to not only detection accuracy but also mobility and usability features, which make the measuring process so cumbersome and difficult. To identify a seizure the NERVE tool is using a wireless, attachable, small biomedical sensor capable of autonomous EMG and IMU processing on Arduino platform. Based on the algorithmic signal filtering and evaluation the system identifies, a health treat (an episode) and wirelessly notifies the parent or caregiver. The assistance process allows not only to record the biomedical data but also supplement the episode with video recording and postictal survey describing the health event. Having such detail electronic documentation, epileptologist is capable of identifying the etiology of the disease, proposing a treatment or verifying the efficiency of treatment. The mobile application provides a novel approach in case of child seizures support based also on classification of the seizure based on the survey, which is able to increase the method's accuracy, shorten communication time. This work also demonstrates a quantitative approach to specific physical state evaluation and describes functionality of designed system in the domain of hardware and software components.

Keywords: Epilepsy monitoring, child epilepsy support, mobile system, biomedical sensors, machine learning, seizure

Introduction

Advances in biomedical sensors and popularity of wearable smart devices among users provide new ways of automating medical evaluation processes and supplementing decision tools. Majority of available tools concentrates on data acquisition and simple aggregation, at most providing timeframe characteristics. Moreover most of proposed solutions uses electroencephalography (EEG) as measuring method which is not practical in real-life and day-to-day environment. This work is dedicated to development of a multi-sensor mobile monitoring system capable of identifying specific neurological symptoms during seizures in epilepsy using quantitative signal analysis. For measuring method surface electromyography (sEMG) and accelerometer (ACC) were chosen, as combinations of multiple measuring methods has been shown as most promising in terms of sensitivity and reducing false alarm rate . Other works, such as Empatica

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Embrace Wristband and SmartWatch , also use one or more measuring methods different than EEG resulting with high seizure detection rates.

This research aims to provide parents and caregivers with possibility to react in case of infants's seizure occurrence, and to record, describe and document required symptoms of that seizure for post-event analysis and for treatment effectiveness evaluation by developing a multi-sensor mobile tool consisting of custom wearable sensor and mobile application. In general neurologists and epileptologists require detailed information on seizure preictal and postictal phases to correctly diagnose and identify epilepsy etiology. Combination of the data has to capture specific aspects of a disease such as experienced symptoms and biomedical data recorded during detected seizure.

Research Motivation

Based on recent studies the WHO states that: 'Epilepsy is the most common chronic brain disease and affects people of all ages' . Nearly 50 million people worldwide are affected by it and it is estimated that about 70% of them can be treated and live seizure-free if properly diagnosed and treated. The problem is that epilepsy is hard to control and monitor which makes it hard to properly diagnose and treat, and additionally 30% of epileptics cannot be fully cured and they will suffer from one to several seizures a year for the rest of their lives.

It is obvious that the adult population is able to comply with pharmaceutical treatment and monitoring, however children and minors often do not realize the seriousness of the disease and consequences of their noncompliance and bad health habits. The whole burden lies on their parents and caregivers who often fear not knowing when the next seizure will occur.

Although prevalence of epilepsy increases relatively late in human life (after around 60 years), there is a peak at ages 5 – 10 (Figure 1 a), which means that children at that age are one of the high-risk groups for epilepsy. According to US' Centers for Disease Control and Prevention in US there are registered 3M adult and 470k child epileptics , which means that roughly 15% of epileptics are children, 7% to 20% of which suffers from drug-resistant form of epilepsy (as stated by the paper by Xue-Ping). It is clear that children suffering from epilepsy need to be treated as soon as possible – at ages from 5 to 10 the YLD (Years Lived with Disability) value peaks (Figure 1 b) which means that children suffer from epilepsy longer than adults and also die more often, which can be seen in peak of the YLL (Years of Life Lost) value. With proper treatment those statistics can be altered – by using appropriate tools caregivers and doctors can take better care of the children and give them a future.

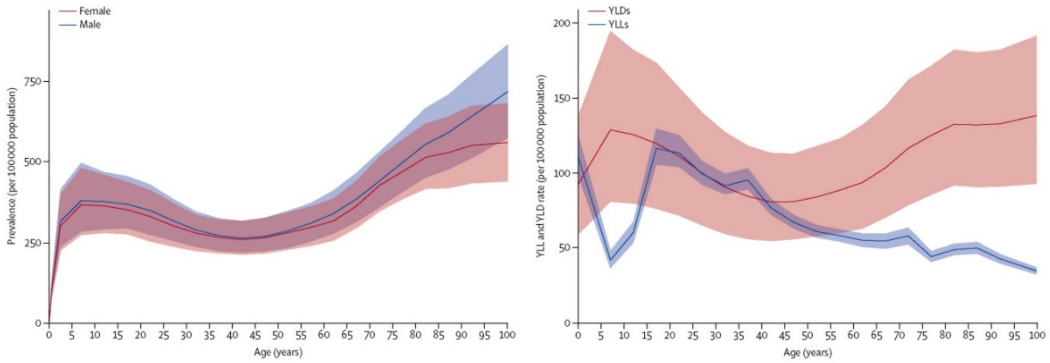

(a) (b)

Figure 1: Global prevalence of idiopathic epilepsy by age and sex (a); Global years lived with disability (YLDs) and years of life lost (YLLs) rates due to idiopathic epilepsy by age (b)

The need and importance of an advanced epilepsy and seizure monitoring system is undeniable. Our goal realized though NERVE is to create a telemedical tool that not only will alarm caregivers about occurring seizure but also will help doctors with diagnosis and therapy planning by supplementing medical documentation with systematically collected data about the disease and by that will help people in need – not only sick children but also their caregivers.

Available Solutions and Methods

Since epilepsy is one of the most common chronic neurological diseases, the vision of creating a reliable method of detecting and diagnosing seizures attracts many researchers. In this chapter, several of the available methods for testing and detecting epilepsy seizures are summarized and reviewed. The purpose of such an analysis is to demonstrate the variety of approaches and sensors

Table 1: Available methods

Authors, year	Applied Sensors and measuring methods	Detection algorithm classification method	Results
I. Conradsen, 2009	4-hour monitoring with EMG, AMG, ECG, EEG on healthy subjects simulating seizure-like movements	Classification based on RMS	Sensitivity of 98%
Sándor Beniczky, 2013	ACC[15] recordings from patients with GTCS	Generic convulsive seizure detection algorithm	Sensitivity of 91%
Sutrisno Warson Ibrahim, 2017	EEG recordings from ten patients with total of 55 seizure events taken from CHB-MIT database	KNN based classifier	Sensitivity of 94.5%
Rahib Abiyev, 2020	Visual inspection of epileptic abnormalities in EEG	CNN based classifier	Sensitivity of 97.67%
Luis Alfredo Moctezuma, 2020	EEG Channel-Selection	Multi-Objective Optimization based classification	Sensitivity > 96% (depending on number of EEG channels)
Yuanfa Wang, 2017	EEG	DWT and SELM based classification	Sensitivity > 98.1%
Qadri Yazdan, 2016	EEG	MFCC and SVM	Sensitivity of 93%
Charles Ákos Szabó, 2015	sEMG with comparison to EEG recordings from patients with GTCS	Algorithm utilizing Hotelling's T-squared power analysis of compound muscle action potentials	Sensitivity of 95%
Giulia Regalia, 2015	Empatica Embrace Wristband (ACC)	SVM classifier	Sensitivity > 92%

EEG – Electroencephalography
AMG – Acoustic Myography
ECG – Electrocardiogram
EMG – Electromyography
sEMG – Surface Electromyography
ACC – Accelerometer
GTCS – Generalized Tonic–Clonic Seizures
RMS – Root Mean Square
KNN – K-Nearest Neighbors Algorithm
CNN – Convoluted Neural Networks
DWT – Discrete Wavelet Transform
SELM – Sparse Extreme Learning Machine
MFCC – Mel Frequency Cepstral Coefficient
SVM – Support Vector Machine

Multisensor wearable for seizure monitoring

This chapter provides a description of a prototype sensor developed particularly for the NERVE project [16]. It will clarify all the design and functionality required to be fulfilled by the sensor. Collecting sEMG [14] signal requires the use of an

appropriate sensor, there are many devices and chips dedicated for this purpose available on the market, they have different usage and different accuracy classes.

Table 2: Communication standards and their features

Technology	Network	Standards based or Proprietary	Range	Throughput	Energy requirement	Adoption
LoRa	LWPA	Proprietary (Semtech)	High	Low	Low	Moderate
ZigBee	802.15.4	Standards based	Low	Moderate	High	Limited PAN & Home
WiFi	802.11	Standards based	Moderate	High	High	Very High
Bluetooth	Bluetooth	Standards based	Moderate	Low	Moderate	Limited Wearables
Nwave	LWPA	Proprietary (Semtech)	High	Low	Low	High
SigFox	LWPA	Proprietary (SigFox)	High	Low	Low	Moderate
NB-IoT	3GPP/LTE	Standards based	High	Moderate	Low	Increasing
Z-wave	Proprietary	Proprietary (Sigma Design)	Low	Low	Moderate	Very Low Home Automation

The sensor required for the proper use of NERVE system must fulfil specific conditions:

- have rechargeable and durable batteries
- ensure communication with the phone by selected communication standards, e.g. Bluetooth depending on the needs
- guarantee the required accuracy of biomedical data
- have appropriate dimensions to be suitable for children

The requirements are based on specific needs, e.g. what standard of communication will be chosen depends on the age of the child, in case of an infant we can use the Bluetooth standard because the parent is always nearby, but if we talk about preschool age child we should use a standard that will allow for a long-distance range because of mobility of the child, which can for example play outside far enough to make the Bluetooth standard not sufficient. The standard that was used to create the prototype is Bluetooth, for several reasons: the highest number of cases of epilepsy happens in the early childhood which guarantees no problems with range, Bluetooth provides high energy efficiency e.g. BLE v5 has 7 modes, with 3.3V power supply it consumes in active mode 1.8 mA in stand-by mode, 26 mA in sleep mode 300 nA and many facilitations in the implementation like AT command control or UART interface - the simplest interface in terms of control which means a simple implementation. An important advantage is the fact that the Bluetooth module can also have its own microprocessor, which provides greater computing power and consequently, greater effectiveness.

The prototype created for NERVE consists of a main unit with a microprocessor, Bluetooth module and a Li-pol battery input, providing operation and charging of batteries, Li-pol battery of 110 mAh capacity, MPU-9250 module which is a 3-axis accelerometer, gyroscope and magnetometer using the I2C bus and EMG sensor - MyoWare Muscle Sensor.

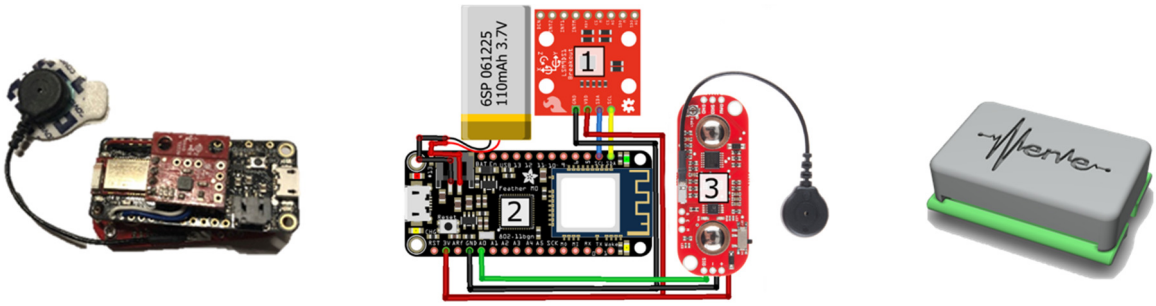

(a) (b) (c)

Figure 2: Nerve multisensor prototype: view of the prototype (a); scheme (b); dedicated case (c)

The main module was chosen because of its construction, which was designed specifically for mobile sensors that meet most of the assumptions that were set for the sensor, while the battery, module MPU-9250, and MyoWare were selected mainly because of their size.

Table 3: NERVE sensor components and their technical specifications

Sensor	Function provided	Specification	
3. MyoWare Muscle Sensor	capture the sEMG signal	Supply Voltage	+2.9V or +5.7V
		Adjustable Gain Potentiometer	0.01 – 100 kΩ
		Input Impedance	110 GΩ
		Supply Current	9 mA - 14 mA
		Common Mode Rejection Ratio	110
		Input Bias	1 pA
2. Adafruit Feather 32u4 Bluefruit	Provide comunication via bluetooth, charging ability, programmable interface,	MicroControler	ATmega32u4 8MHz with 3.3V logic/power
		Memory	32K of flash and 2K of RAM
		Voltage	3.3V regulator with 500mA peak current output
		Pins	20 GPIO pins 7 x PWM pins 10 x analog inputs
		Charger	Built in 100mA lipoly charger with charging status indicator LED
1. MPU-9250		Supply Ramp Time	0.1 - 100 ms
		Operating Range	-40 - 85 °C
	capture the ACC signal	Sensitivity	333.87 LSB/°C
		Room Temp Offset	0 LSB
		Supply Ramp Time	0.01 – 100 ms

Thanks to this design, we obtained a prototype sensor that fits on the child's arm, which allowed us to carry out tests. Tests of the sensor prototype have been positive. The sEMG signal obtained is qualitatively acceptable - it allows for further signal analysis. The inertial sensor functioned correctly and sent accurate data determining the child's movements. The operation of the Bluetooth module and battery life can be assessed equally well. The reason for constructing an own prototype was the need to design a system of the appropriate size to examine children. Another advantage is the possibility to develop the device's logic - to determine how the data should be collected and transmitted. This solution allowed to optimize the tasks between the sensor and the application.

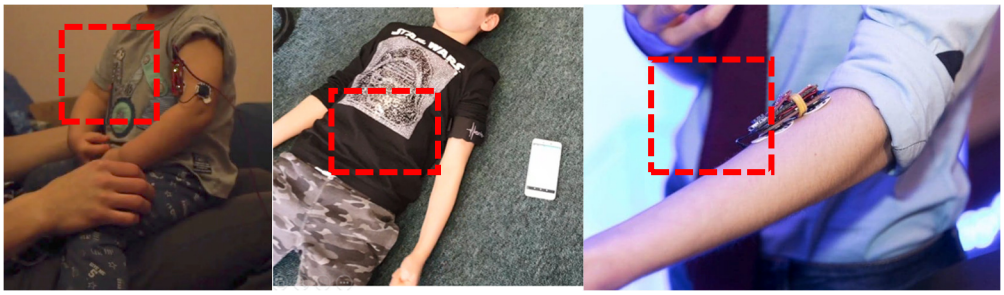

Figure 3: NERVE multisensor presented during the test phases on children and live demonstrations

Tool for Epilepsy Monitoring

NERVE is a system designed for epilepsy treatment and seizures monitoring composed of custom wearable biomedical multisensory, a mobile app and a central knowledge base. The system's central element – mobile app – provides complete set of functions for disease and treatment monitoring, diagnosis and possibility of assessment of pharmacological therapy effectiveness. This chapter describes the mobile app's functionalities – how they work and how they can aid doctors and patients in epilepsy treatment.

The app continuously checks NERVE sensor's readings and coordinates them with the app's seizure monitoring. As soon as a seizure occurs during monitoring - which means that the application will classify three consecutive time windows as a tonic or a clonic, an alarm procedure will be started. During this procedure, the application, based on the results of the classification, notifies the user what stage of the seizure the patient is currently in. The alarm procedure consists of three steps: preliminary alarm, main alarm and postictal questionnaire. The preliminary alarm (Figure 4 a) lasts for pre-set time and can be deactivated if the muscle activity turns out not to be a seizure. It functions mostly as a fail-safe, giving caregivers time to determine if seizure did occur. The main alarm's (Figure 4 b and c) primary objective is to measure the time span of the occurring seizure but also offers number of functions to help during the seizure, such as possibility to record the seizure and add the recordings to patient's medical documentation (such recording are very helpful for doctors), to call the child's caregivers, and to launch first-aid instructions. To make alarm sequence effective, the sensor is continuously collecting biomedical data and sending it to the app which is visualized by live seizure type identification. After the seizure the app sends collected data to cloud for seizure's intensity and type evaluation, by doing so it supports a medical knowledge expert in the analysis and final diagnosis. At the end the child's caregiver is presented with postictal questionnaire (Figure 4 d) which complements the symptomatology. Each question in the questionnaire relates to the events taking place during and after the seizure and was prepared by neurologists who provided a matrix that maps answers to the questionnaire to several epilepsy types.

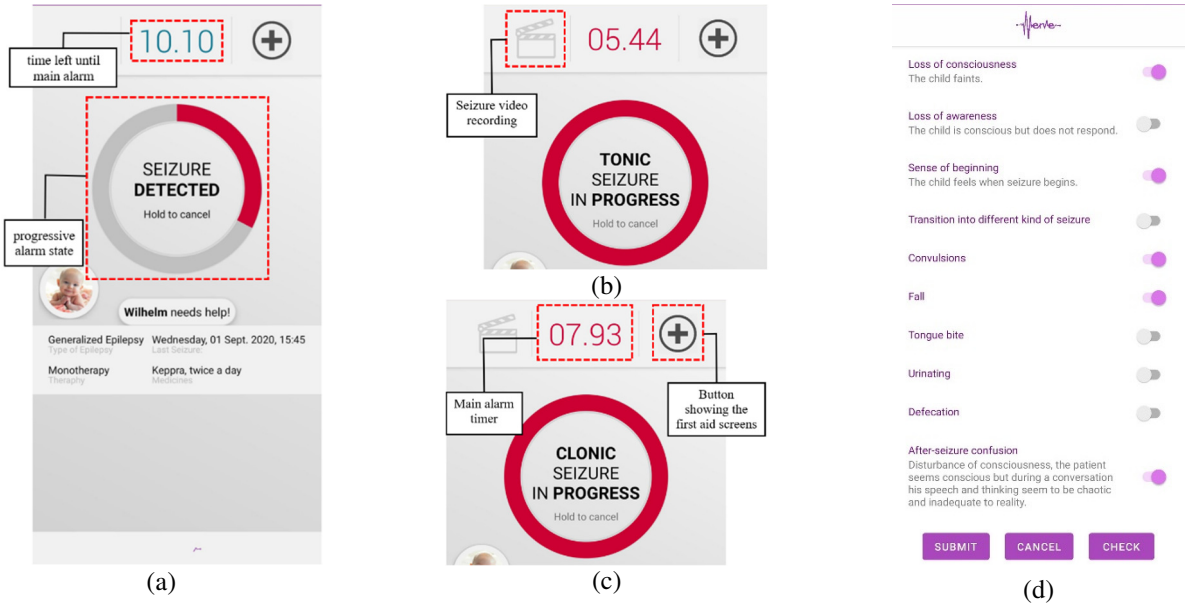

Figure 4: NERVE application view of the preliminary alarm (a), the main alarm presenting the results of the seizure stage classification (tonic (b) and clonic (c)), and the postictal questionnaire (d)

NERVE offers a 'medical expert mode' which visualizes all biomedical data transferred to the app (as shown on

Figure ***5***). It provides live sensory analysis screen to visualize different measurements on various charts and diagrams. The app processes live data and classifies sequences of time windows it as one of the seizures phases, for example as tonic (

Figure ***5*** b) or clonic (

Figure ***5*** c).

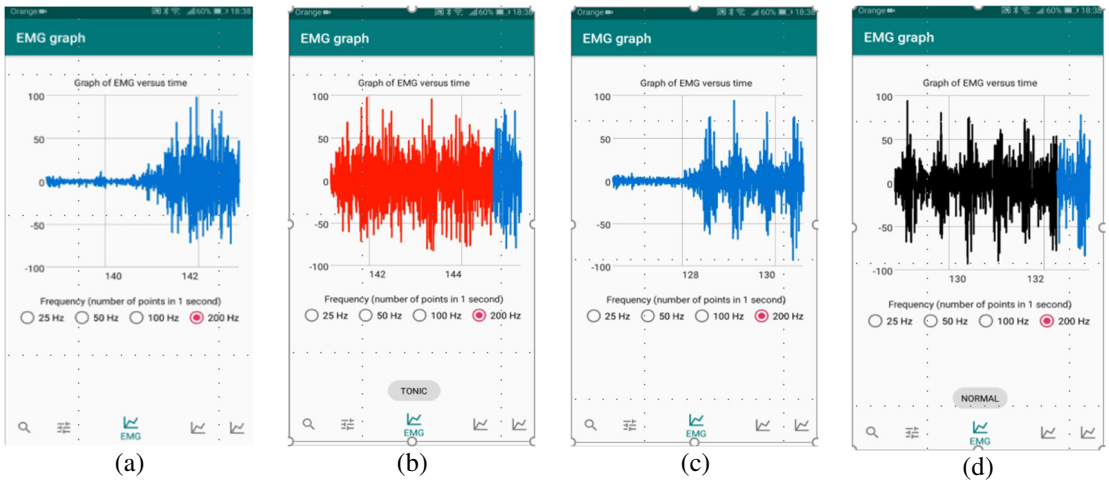

Figure 5 : NERVE application 'medical expert view' showing aggregated sEMG signal with features: during acquisition and before classification (a), classified as tonic phase – SVM classifier (b), before classification (c), classified as clonic phase (d)

The app also helps in creating a patient's medical documentation by tracking patient's day-to-day routine – events such as taken medicines, eaten food, mood etc. through the app's dedicated screens (**Error! Reference source not found.**). Caregivers plan a day schedule (**Error! Reference source not found.** a) and respond to app's notifications by reporting that child completed planned actions (e.g. ate dinner or took medicines) which are then showed in one-day calendar's view (**Error! Reference source not found.** b) along with recorded seizures. The app correlates seizure frequency with other information it gathered (such as taken medicines) in a form of a histogram (**Error! Reference source not found.** c). This way it can visualize trends in number of seizures in conjunction with medicines that were taken. This summary is designed to help doctor with determining the effectiveness of prescribed pharmacological therapy.

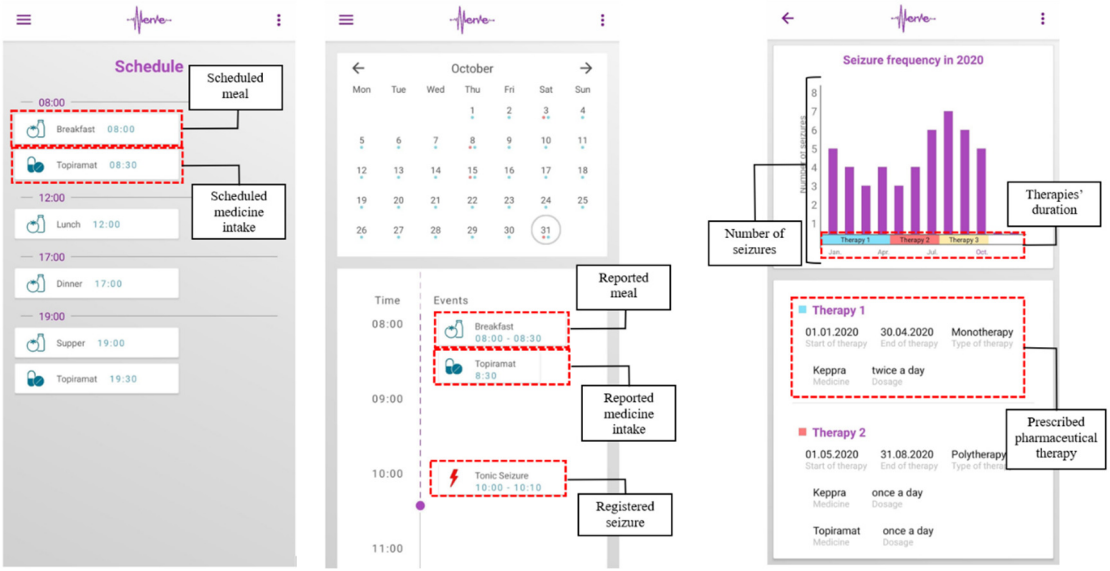

(a) (b) (c)

Figure 6 : NERVE application view of day schedule (a) and calendar with one-day view reported events (b), the histogram of registered seizures demonstrating trends and efficiency of applied pharmacological treatment(c)

Analytical Method

This paragraph describes all stages and methods of signal processing, which are used to transform the collected data into calculated signal characteristics on the basis of which the reasoning is conducted. The diagram below shows the complete procedure for processing sensory data, from activating the monitoring mode - which activates the sensor and starts collecting data, to the moment when the process can be stopped - i.e. deactivating the monitoring mode.

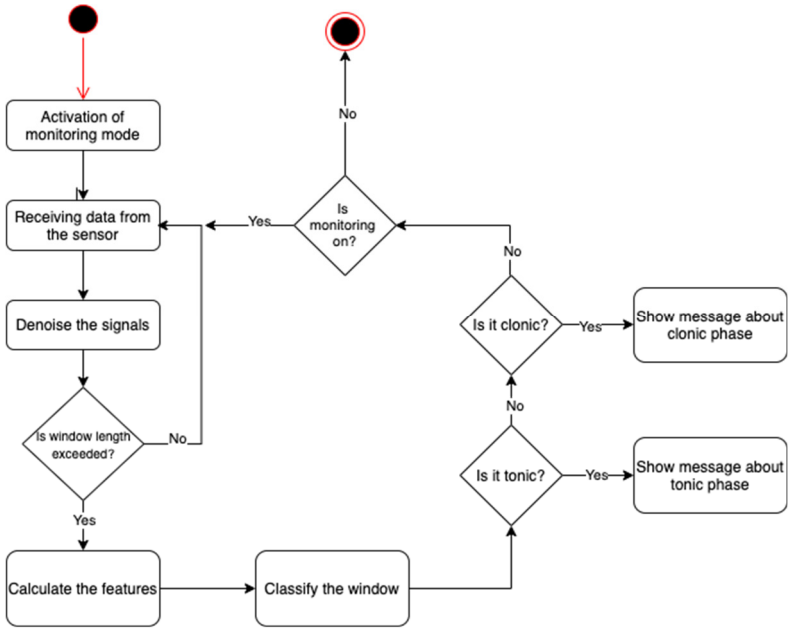

Figure 7: Activity diagram presenting the process of sensor data flow

Once monitoring modes are started, the sensor will stream the collected data of the sEMG and ACC signals to the application in real time. The data is then filtered as it is important to get the best possible quality as the recognition and assessment of the type of seizure is based on the analysis of these signals. The TEKO method [12], which stand for Teager-Kaiser energy-tracking operator, was used for signal denoising.

$$y_t = x_t^2 - x_{t-1}x_{t+1}$$

where:

y – resultant value
x – value of the point from the data set
t – iterator

This method allows to suppress noise, and make signal even larger. The advantage of this method is low computational complexity, which is important in the case of implementation of applications on mobile devices, due to the universal purpose of the application, it is required to maintain the lowest possible consumption of device resources.

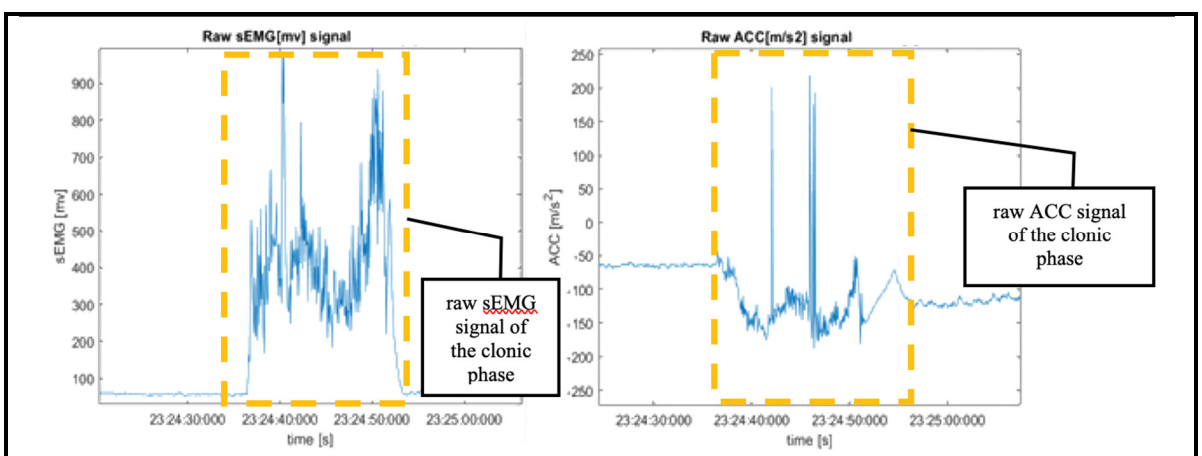

(a) (b)

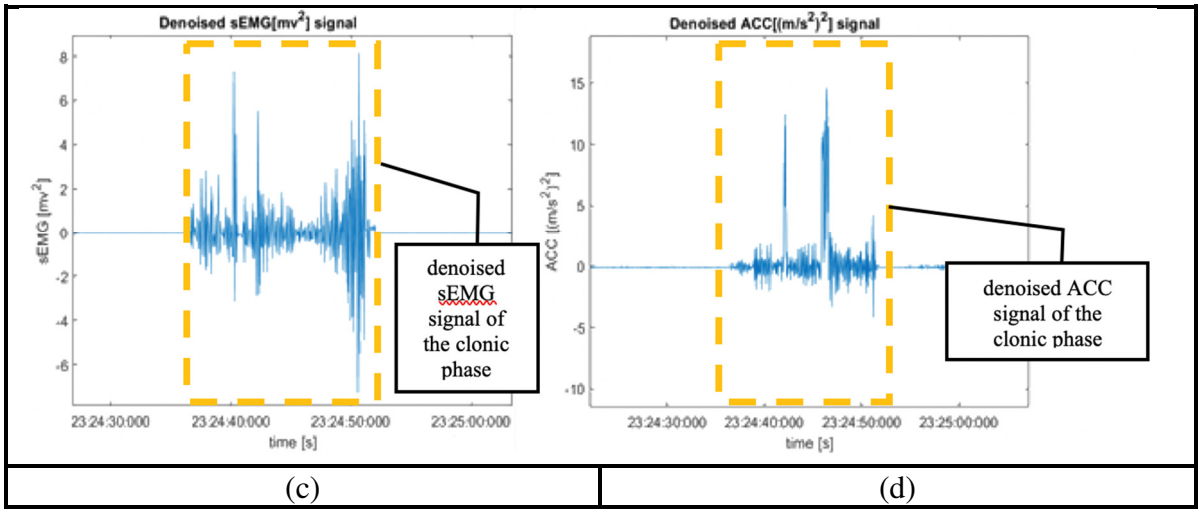

Figure 8 : The graphs show the results of the TEKO method presents the raw sEMG (a) and ACC (b) signals received from the sensor showing a record of the clonic phase of the seizure; presents sEMG (c) and ACC (d) signals denoised by the TEKO method

The data is streamed to the application in real time, which generates the need to process large amounts of data on the mobile application side, in order to make the algorithm efficient and reliable, a dedicated aggregation method is required. Determining the appropriate size of the time windows allows to identify as many possible variants of the signal during a seizure as possible. This will allow to identify and distinguish the stages of the beginning and the end of a seizure as well as individual trends related to the different phases (tonic, clonic) during their occurrence.

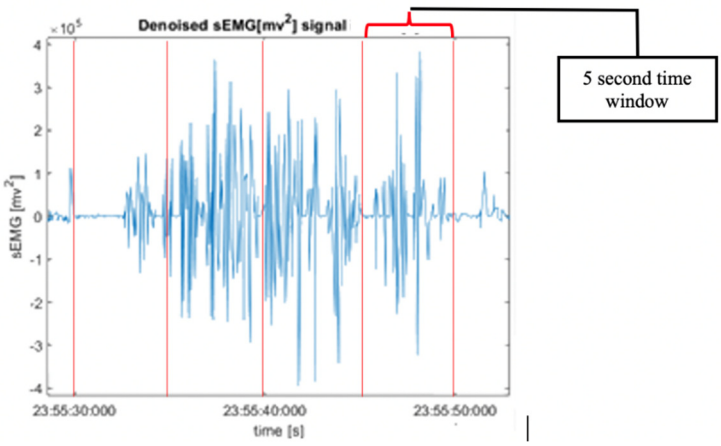

Figure 9: Denoised sEMG signal of a simulated epileptic seizure tonic phase divided into time windows

Subsequently, for each of the time windows, the characteristics [11] of both sEMG and ACC signals are extracted. Based on previous experience, the following set of characteristics was distinguished.

Table 4 : Table (a) provides a list of all characteristics [11] used for classification, table (b) demonstrates examples of characteristic values for time windows of particular types of seizures

Feature full name	Abbr	Feature full name	Abbr
Integrated EMG	**IEMG [mV]**	Difference absolute standard deviation value	**DASDV [mV]**
Mean absolute values	**MAV [mV]**	Variance	**VAR [mV^2]**
Simple square root	**SSI [mV^2]**	Average amplitude change	**AAC [mV]**
Root mean square	**RMS [√mV]**	Zero crossing	**ZC [mV]**
Waveform length	**WL [mV]**	Myopulse percentage	**MYOP [mV]**
LOG indicator	**LOG [mV]**	Slope sign change	**SSC [mV]**
Max value in the frequency domain	**MAXF [u]**	Medium power	**MNP [u]**

Table 5: Average values of signal characteristics for the analyzed epilepsy seizure phases

IEMG_ACC	MAV_ACC	SSI_ACC	VAR_ACC	RMS_ACC	LOG_ACC	WL_ACC	PHASE
90,03	1,17	537,20	7,07	2,10	0,55	126,21	clonic
24,84	0,32	16,16	0,21	0,39	0,22	41,99	tonic
AAC_ACC	DASDV_ACC	ZC_ACC	MYOP_ACC	SSC_ACC	MAXF_ACC	MNP_ACC	PHASE
1,64	2,40	54,00	0,49	59,00	51,67	15,74	clonic
0,54	0,66	47,00	0,45	53,00	8,88	2,69	tonic
IEMG_EMG	MAV_EMG	SSI_EMG	VAR_EMG	RMS_EMG	LOG_EMG	WL_EMG	PHASE
75,41	0,98	154,16	2,04	1,41	0,60	137,20	clonic
93,00	1,19	273,09	3,51	1,67	0,54	161,59	tonic
AAC_EMG	DASDV_EMG	ZC_EMG	MYOP_EMG	SSC_EMG	MAXF_EMG	MNP_EMG	PHASE
1,79	2,58	56,00	0,49	58,00	34,81	9,54	clonic
2,06	2,91	48,00	0,42	56,00	40,16	11,68	tonic

The values in the table 4 are calculated as averages of 3 five-second time windows for each of the analyzed phases of the seizure. The tests were conducted on persons simulating the phases of a seizure using the NERVE multisensor.

Following the procedure presented in figure 9, after calculating the characteristics, the time window is classified. Calculated parameters are sent by API to Azure machine learning studio environment, where a given time window is classified, and then the result of the classification is sent back to the application. End users - parent or caregiver is notified about the classification result using the main alarm screen. Picture 6 demonstrates where the application displays the names of identified attack phases. Whereas picture 7 presents the view in medical expert mode, where time window classification results are presented on signal charts.

Recognition and verification of epilepsy seizure

This chapter highlights how to identify the type of seizure and which tools have been used for this purpose. All classifiers necessary for full NERVE functionality are based on Azure machine learning studio environment [13]. The decision to export the inquiry mechanism from the application was made in order to offload the load on the mobile device, taking into account, that the solution uses two complementary classifiers and processes biomedical signals, the computational and memory complexity could have a negative impact on the application and the device. The flow of the reasoning process is illustrated by the diagram below.

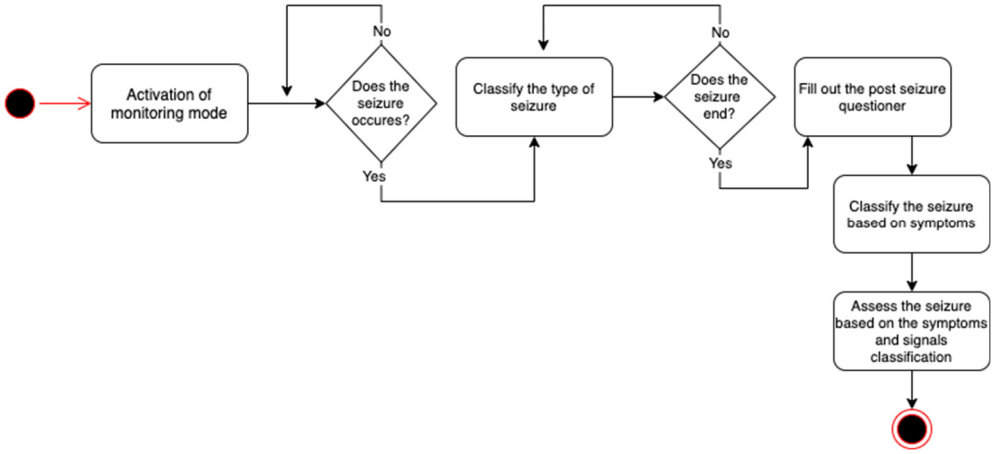

Figure 10 : Diagram of the flow of the reasoning process

There are two classifiers in the entire NERVE system; one is responsible for detecting and classifying the type of seizure based on the sensor signals, the other classifies the type of seizure based on a sophisticated questionnaire, which contains a list of symptoms that may occur during individual phases of the attack.

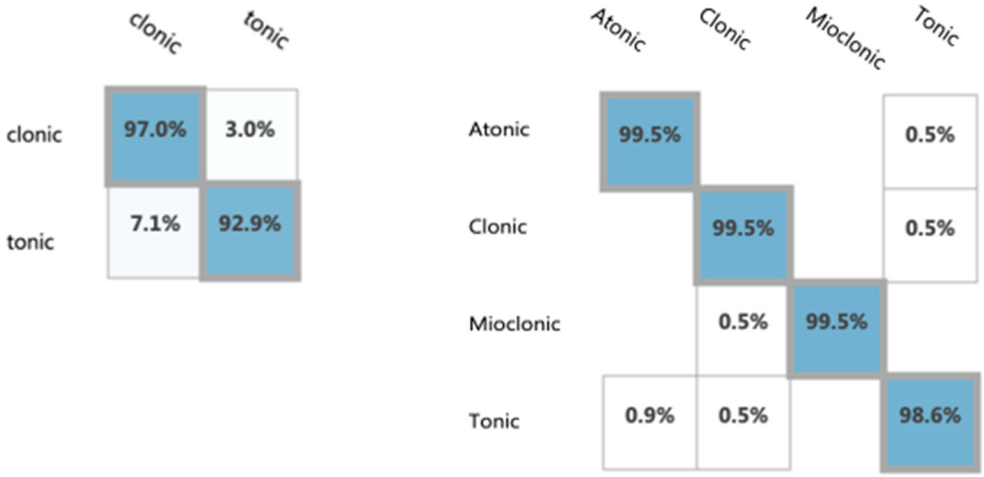

(a) (b)

Figure 11: A matrixes presenting the results of the accuracy of classification (a) of sEMG and ACC signals; (b) the symptoms contained in the post-seizure questionnaire

Table 6: Table indicating parameters of artificial neural networks used as classifiers.

ANN parameters	Signals classifier	Symptoms classifier
Create trainer mode	Single Parameter	Single Parameter
Hidden layer specification	Fully-connected case	Fully-connected case
Number of hidden nodes	100	100
The learning rate	0,1	0,1
Number of learning iteration	100	100
The initial learning weights diameter	0,1	0,1
The type of normalizer	Gaussian normalizer	Do not normalize

Both classifiers utilize the neural network classifiers in Azure machine learning studio in the default configuration. The classification result displayed during a seizure is based on the classification of sEMG and ACC signals, while the final result registered in the calendar is delivered to the user based on the signal and symptoms classification.

Conclusions and Discussion

This paper presents a quantitative approach implemented within NERVE application, and further extensions in form of dedicated non-invasive IoT platform-based NERVE sensor (sEMG, IMU) designed specially to supplemented NERVE mobile application hosting data acquisition, filtering and analysis. NERVE is a comprehensive healthcare assistant tool with time-constraint support for monitoring and auditing drug intake, surveying and sensor test. The application provides a detailed medical history of the child epilepsy supports efficient diagnostics and medical treatment decisions. The approach assumes that seizure symptoms are detected on the basis of electromyography and inertial data which feed seizure detection algorithms, responsible for health event detection and alarms. Demonstrated signal processing algorithms, have been tested mainly on simulated and generated data, preparing next stage of testing. Test procedure examined > 10 various data scenarios to provide a dataset for recognition and identification of motor onset (both focal and generalized) seizures. Electromyography and actigraphy data fusion techniques has contributed to an increase of the correctness of the classification in the process of recognition of movement seizures utilized wearable sensor data. The classification algorithms for simulated seizure data reached – 95% accuracy only for ~300 datasets. Presented method evaluates the intensity of neurological disease symptoms for epileptologii based on the signal features and machine learning techniques. As a further development we will concentrate on moving a part of analytical algorithms towards hardware sensor thus separating components so as to provide recognition of seizures even without NERVE application to making the system more reliable. There is also considered an acquisition of real child patient data sets for clonic and tonic seizures. Moreover, the extension of biomedical signals is planned. Future version of system will utilize the GSR (Galvanic Skin Response) and PPG (photopletysmography) to provide alternative data channels. Analytical method however will be calibrated and connected to multicriterial approach merging various (CNN, ANN, SVM, kNN) classificators.

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A Study of Lexical Semantics in the Vocabulary of International Trade

Lydia U. EDET
Department of Languages and General Studies, Covenant University, Ota, Nigeria.
Lydia.edet@stu.cu.edu.ng

Charles U. OGBULOGO
Department of Languages and General Studies, Covenant University, Ota, Nigeria.
Charles.ogbulogo@covenantuniversity.edu.ng

Innocent E. CHILUWA
Department of Languages and General Studies, Covenant University, Ota, Nigeria.
Innocent.chiluwa@covenantuniversity.edu.ng

Abstract

Semantics theories have great relevance in human and business communication. As such, semantics as a subfield of linguistics emphasizes meaning in all spheres of life. In this connection, semantics has gone beyond the remit of the theoretical aspect of linguistics to the realm of providing practical solutions to human life. One of such areas of applicability of semantics is in the domain of international trade where meaning in business interactions can make or mar a business deal. This paper intends to identify the existence of lexical relations in the international trade vocabulary particularly in the Supply Chain Management (SCM) section. A total of twenty terms selected from Supply Chain and Logistics glossary were analysed for their semantic information. In line with the theory of lexical semantics which is concerned primarily with word meaning, definitions for the selected concepts were provided from the glossary. This engendered a link to their sense relations with other words in the supply chain vocabulary. Some of the sense relations which are also tools of analyses include antonymy, hyponymy and synonymy. In the Nigerian context, for example, there is paucity of studies on sense relations and meaning making mechanisms of online linguistic resources in international trade. It is this observation that provides motivation for this study. Thus, this study has implications for the clarity and understanding of SCM terms in international trade.

Keywords: Lexical Semantics, International Trade, Supply Chain Management

Introduction

Semantic studies relates to meaning that can be expressed (Leech 1981). The current research aligns with linguistic meaning which denotes or signifies an expression in a particular language. For instance, linguistic meaning constitutes semantic concepts such as the vocabulary of the language of international trade, as exemplified in the supply chain management sector of the domain. However, this study highlights lexical semantics as a theoretical framework of language use in the business context of international trade. The relevance of semantics in international trade demands a wider and holistic investigation that will highlight its implication in business domains. This thorough investigation calls for the examination of available linguistic resources, such as the glossary of supply chain management. On the long run, an interplay between language and business projects a common platform for flow of communication business communications. Below are some of the existing views to expatiate the concept of lexical semantics.

Stringer (2019) assumes that lexical semantics entails the meaning of words and the semantic relationships between terms and the forms in which word meaning is related to syntactic structure. The essence of lexical semantics is mainly concerned with the meaning of, as well as the ways in which word meaning is related to syntactic structure. Murphy (2016) emphasized that lexical semantics as the study of word meaning is focused on lexical (content)

word. These include nouns, verbs, adjectives, contentful adverbs, prepositions excluding grammatical words. The key concern of Lexical semantics is the definition and meaning of the smallest part of sentences and it is the systematic study of word meanings and how the meanings are structured (Cruse, 2001; Pustejovsky, 2006). As such, language users require the knowledge of words or morphemes which is critical for understanding the lexicon (Malmkjaer, 2010; Geeraerts, 2015). This notion aligns with Kearns (2008) assertion that the term lexical semantics is used in contrast to formal semantics. Formal linguistics highlight explicit mathematical procedures utilized for

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language interpretation (Chierchia, 2006). In the context of this study, the meanings of words are strictly examined to identify their lexical relations which highlight the information required for knowledge in semantic interpretation (Asher, 1994).

In literature, Aristotle's theory of meaning is observed as the watershed for investigations into word meaning. This connotes that lexical semantics has its origin in the philosophical tradition with Locke, Hume, Reid, Socrates and Parmenides as philosophers who paid close attention to the meaning of words. However, the 19th Century witnessed the rise of the 'philological and psychological' investigation of word meaning with contributions from Breal (1897), Erdnon (1900), Trier (1931) and Stern (1931/1968). These linguists contributed to the nature of meaning by investigating how words acquire meanings; and the relationship between words and their worldly denotations (Pustejovsky, 2006). At present, lexical semanticists are concerned with the description of word meaning and how to account for the variability of meaning from context to context (Cruse, 2001). The domain of lexical semantics comprises vital aspects in the study of meaning in human language and by extension business communication. Lexical semantics as a prominent approach in language study incorporates lexical relations tools as expatiated below.

Key Concepts

Lexical Relations

Lexical Relations is an approach subsumed in lexical semantics, a linguistic theory that investigates word meaning. Lexical relations include antonyms, homonyms, hyponyms, polysemy, meronyms and synonyms (Stringer, 2019).

Antonymy

In lexical semantic relationships, antonymy is unique in that it involves one-to-one relationships rather than one-to-many or many-to-many, as seen in other word relationships (Lynne, Paradis & Willners, 2002). Ogbulogo (2005) asserts that antonymy is usually regarded as semantic opposition. In the view of Palmer (1976:59 cited in Ogbulogo, 2005), it is a word or expression which is opposite in meaning or two words that express opposing concepts. For instance, in the SCM vocabulary, the terms business-to-business (B2B)/business-to-consumer (B2C) express opposition. In English language, for example, the words hot/cold, black/white, sweet/sour, old/new, wet/dry, do uphold the views of Palmer.

In literature, Aarts & McMahon (2008) identifies the main types of antonymy as contrary, complementary, and converse. The contrary antonymy comprises contrasting pairs of adjectives such as hard/soft copy, fast/slow, good/bad. The second type comprises complementary adjectives such as open/close, dead/alive, true/false. Converse antonyms include comparative adjectives which are known to relate by an entailment of the general form. For instance, x is warmer than y is entailed that y is cooler than x. In this connection, antonyms are important in structuring English vocabulary as commonly observed in adjectives though not restricted to it (Jackson & Amvela, 2000).

Homonymy

Homonymy refers to the existence of two or more words having the same spelling or pronunciation but different meanings and origins (Hasa, 2016). A homonymous word has two or more unrelated meanings. For instance, the term bank in used in many senses: as in a river and as in a financial institution (Crossley, Salsbury &McNamara, 2010).

Hyponymy

Fakoya (2004:37)highlights hyponymy as a meaning association between a superordinate term lexeme and two or more terms (hyponyms) indicating more particular instances of the superordinate term. Hyponymy involves the notion of inclusion which is a matter of class membership (Palmer 1981:85; Saeed, 2009). This word relationship is regarded as the inclusive lower terms of a superordinate concept showing that the meaning of one form is included in the meaning of another. This forms a type of hierarchical relationship among words. For instance, the word animal is a super ordinate term with other lower terms such as aquatic animals, domestic animals, and wild animals. It is observed that a hyponym shares a type of relationship with its hypernym. For instance, High Density PolyEthylene (HDPE), PolyEthylene Terephthalate (PET) is co- hyponyms of plastic (their hypernym). Hypernymy is commonly referred to as either a general concept or semantic field or lexical domain (Palmer, 1981 & McGregory 2009). In the SCM sector of international trade, terms such as Global Positioning

System (GPS), plastic and inventory lend themselves to hyponymic analysis as observed later. According to Jackson & Amvela (2000:102), the relation of hyponymy serves to structure large parts of a language vocabulary.

Meronymy

In semantics, a meronym denotes a constituent part or a member of something. For example, mango is a meronym of mango tree (Nordquist, 2019).

Polysemy

Polysemous words are words with more than one related sense. Furthermore, a polysemic term, in contrast to a homonym, has one core meaning with different related senses. For example, the word 'class' has at least six related definitions, including socioeconomic class, a group of students, a course of study, a set of items t hat share similar qualities, a quality league (usually related to sports), and eleg-ance in clothing or conduct (Crossley, Salsbury, & McNamara, 2010). Yule (2010 in Oni, 2020) defines polysemy as one form (written or spoken) with multiple meanings that are related by extension.

Synonymy

Synonymy is the relation of sameness or close similarity of meaning (McGregor, 2009). It is a word which simplifies another by serving as an alternative meaning, therefore, lexemes related in this way are synonyms. Synonyms may sound different but have the same or nearly the same meaning as in the following pairs: smell/odour, pail/bucket, teacher/tutor, power/might, seize/grasp, oats/porridge, noodles/indomie, big/large, meals/covers. There are some observed levels or varieties of synonyms: absolute synonyms, cognitive synonyms and near- synonyms (Kearns, 2008; McGregor, 2009). Absolute synonyms are words that can be substituted one for another in any context without a change of meaning, for instance, anyhow/anyway, everybody/everyone. Cognitive synonyms illustrate differences in style and choice of words among language users, toilet/lavatory/restroom. Near- synonyms comprises plesionyms and cognitive synonyms. According to Cruse (1986 in Aarts &McMahon, 2008), plesionyms are words with slight differences in denotational meaning such as misty and foggy, swamp, fen, bog and marsh.

Synonyms can also belong to different dialects of the same standard language as indicated by (McGregory 2009:137) in the examples: togs, swimmers, cossies and trunks which belong to different dialects of Australian English. Some synonyms at the word level refer to the same thing but differ in the degree of formality. Typical examples include: toilet/lavatory; restroom/convenience. The set of words above shows instances of language used according to social context. In the SCM context, Accessorial Charges/ Accessorial Fee; Accumulation bin/ assembly bin; Accounts Payable/ Accounts Receivable are recognized synonyms.

International Trade

International trade entails the exchange of products and services between countries (Daoui, 2017). Certain factors are responsible for this exchange of capital, goods, and services across international borders or territories. Primarily, every country of the world have a demand for goods and services to satisfy their people, hence the need for exchange of goods and services among nations of the world. In this connection, International trade is an offshoot and a product of international business. International business encompasses all commercial activities that take place to promote the transfer of goods, services, resources, people, ideas, and technologies across national borders. The multifaceted nature of global business includes the transfer of goods from one country to another (exporting, importing, trading), contractual arrangements permitting foreign companies to use products, services and processes from other countries (licensing, franchising), the establishment and operatio n of foreign market sales, manufacturing, research and development and distribution facilities in foreign markets. These varieties of international business create healthy economic development for citizens of nations (Grozdanovska, Jankulovski & Bojkovska, 2017).

The earliest form of international business occurred as a result of surplus farm produce. Specifically, in 3000B.C Sumerian farmers had to exchange their excess grains in a barter system for copper from Sinai Desert traders located several hundred miles away. This international business initiated the earliest international trade which afforded the two countries opportunity to enjoy what they could not produce (Gaspar, Bierman, Kolaari, Arreola-Risa, Hise, & Smith, 2017). The exchange of goods among different countries in global trade is enhanced by the activities of a critical sector highlighted below.

Supply Chain Management

The Supply Chain Management (hereafter SCM), is an important concept in the domain of International trade, which represents a world of service. As observed in literature, SCM has a diversified nature with a broad composition of different concepts: logistics, purchasing, supplies, internet, transportation and haulage. As such, its emergence in the value chain was perceived as a means to meeting the demands of the end consumer in business.

SCM terms form a critical component of the language of international trade. In this era of globalization, uniformity in the language of global trade is critical and non-negotiable for global relevance and business sustainability (Ross, 2013). This investigation is purely borne out of the need for highlighting the meaning relations in the SCM, hence the need for the analysis of SCM terms. As opined by Croxton, Garcia-Dastugue, Sebastian, Lambert, Rogers and Dale (2001). Customer Relationship Management, Cusstomer Service Management and Demand Management are some of the processes that form the core of the SCM. As such, quite a number of intellectual efforts have gone into the explication of SCM, as observed in the many definitions in literature. For instance, The Institute of Supply Chain Management described SCM as "the design and management of seamless value-added processes across organizational boundaries to meet the end customer's real needs. The growth and integration of people and technical capital is essential to the effective integration of the supply chain.

The APICS dictionary defined supply chain as the processes from the initial raw material to the ultimate consumption of the finished product linking across supplier – user companies.

SCM is the design and management of flows of product information and funds throughout the supply chain. As a complete business concept, it coordinates and manages all the activities of supply chain (Sanders, 2012).

As such the meaning of terms, for instance those in SCM is made available in plain language for purposes of clarity in communication and negotiation. In addition, making a head-start in global business demands mutual intelligibility in the language of trade at the global scene. Therefore, a mastering of the English word stock and understanding the SCM for business communications skills remain critical in the emerging informational economy and society. This is the bane of most operators in international trade. In this direction, it is possible to argue that an investigation of lexical semantics in SCM terms will deliver or incorporate meaning making resources to the lexicon of business people and language users. This we believe will have far reaching implications for the Nigerian business environment and for the emerging entrepreneurs in international trade. This relevance is apt for the emerging and trending concept of supply chain management in global trade, especially in a post Covid-19 era.

Data and Methodology

The data for this paper is corpus derived from Supply Chain and Logistics Glossary, a reference resource on supply chain management terms. Another criterion for data selection was based on the credibility and authenticity of the compilers. In actualizing the eligibility test, the background of the glossary compilers was investigated so as to verify the quality of data. It is on this premise that data was selected from the resources of Supply Chain Visions, a renowned and passionate stakeholder in the SCM domain being investigated.

Supply Chain Visions is a private management consulting firm dedicated to assisting companies with supply chain and network strategy, implementation and education. It was founded in 2001, with headquarters in Arlington, VA (https://ng. linkedin.com/company/supply-chain-visions). Their expertise and professionalism with a collaborative approach helps clients create strategic and cost effective schemes that achieves efficiency. From organizing independent producers in Afghanistan into a dynamic business community in a global market, through collaborations with top universities, to leading graduate and executive education, Supply Chain Visions meet client needs exceptionally. This they do by drawing on a deep bench of experts to analyze and execute strategic insights more than other organizations. According to its website, Supply Chain Visions are the experts the experts turn to. Hence, their strategists, planners, logisticians, operators, scientists, trainers, and educators typically have over 25 years of experience that are published across government, business, aerospace, and defense (http://www.supplychainvisions.com).

The data selected comprise of SCM terms that have meaning relations with other words in the sector. Forty terms were purposively selected from the glossary for close examination. In applying lexical semantics analysis to the selected data, some procedures were observed. Following the tradition of lexical semantics, word meaning is paramount. Hence, identification of the words is followed by word meaning which is paramount in lexical semantics. All meanings of the terms are highlighted in the glossary except the term 'soft copy' defined by the researchers. A few exception of any undefined term indicates unavailability in the selected glossary. That is, each of the terms was defined before investigating any type of existing relations among them. Investigations on all the

word relations were carried out in this particular study so as to ascertain their occurrence in the lexical items of the selected glossary. This was followed by a presentation of the identified sense relations among selected lexical items.

The investigation report was to identify lexical relations in the SCM sector of international trade, thereby indicating the interrelatedness among terms in supply chain management and how meaning is derived. The words identified as having relations were displayed on a table for ease of reference. A major objective of the investigation reported here was to find out the preponderant lexical relations in the vocabulary of the SCM in international trade. In this connection, the tools of synonymy, antonymy, hyponymy, meronymy and homonymy were investigated in this context to determine their existence in terms of similarity, oppositeness or nearness, and their relationship with other words as presented below.

Sense Relations in the Supply Chain Management Vocabulary

There are some established forms of lexical relations in the SCM lexicon as presented below. Each of the identified type of meaning relation forms a tool of analysis; which also contributes to vocabulary development in the supply chain sector of the industry. In this regard, the selected terms and their definitions from the glossary are paired with the identified lexical relations. Those observed in this study include antonymy, hyponymy, and synonymy as highlighted below.

Antonymy

Lexical items that have antonymous relations include:

Business -to –Business(B2B) / Business-to-consumer(B2C), Hard copy/Soft Copy, House to House/ Door to Port, Full- container Load/ Less- Than-Container load/ Half container load, First In First Out (FIFO)/ Last In First Out, Extranet/Intranet.

Definitions of the terms in Antonymy

1. Business-to-Business (B2B)/ business-to-consumer (B2C)

b. Business-to-Business (B2B): "Many companies are now focusing on this strategy, and their sites are aimed at businesses (think wholesale) and only other businesses can access or buy products on the site. Internet analysts predict this will be the biggest sector on the Web". This is as opposed to business-to-consumer (B2C). Business-to-Consumer (B2C): "The hundreds of e-commerce Web sites that sell goods directly to consumers are considered as B2C". This distinction is important when comparing web sites that are B2B as the entire business model, strategy, execution, and fulfillment is different.

2. **Hard copy/Soft Copy**
   Hard copy: "computer output printed on paper".

b. Soft copy: an unprinted computer file stored inside a computer.

3. **House to House/ Door to Port**
   House to House: "the through-transport of goods from consignor to consignee".

b. Door to Port: "the through transport service from consignor to port of importation".

4. **Full container load/ Less- Than-Container load/ Half container load**
   Full Container load (FCL): "a term used when goods occupy a whole container".
   b. Less-Than-Container load (LCL): "a term used when goods do not completely occupy an entire container". When many shipper's goods occupy a single container, each shipper's shipment is considered to be LCL.
   Suggested antonym: Half container load.
5. **First In First Out (FIFO)/ Last in First Out**
   First In First Out (FIFO): "In inventory control and financial accounting, this refers to the practice of using stock from inventory on the basis of what was received first and is consumed first".
   b. Antonym: Last In First Out.
6. **Extranet/Intranet**
   Extranet: "A computer term describing a private network (or a secured link on the public Internet) that links separate organizations and uses the same software and protocols as the Internet". It is used for improving supply chain management. For example, extranets are used to provide access to a supply chain partner's internal inventory data which is not available to unrelated parties.

b. Antonym: Intranet

Hyponymy

Some terms were observed have hyponymous relations with other words within the SCM lexicon as indicated below.

1. Code: "A numeric, or alphanumeric, representation of text for exchanging commonly used information". Examples are: commodity codes, carrier codes, bar codes.

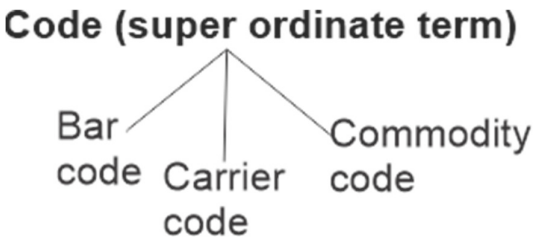

Figure 1: Hyponymous relations of code
Source: Researchers

2. Inventory includes raw materials, work-in-progress, finished goods and supplies required for creation of a company's goods and services. The number of units/and or value of the stock of goods held by a company.

A. Active Inventory: "Materials held in a facility, which are intended to be consumed in manufacturing / assembly, or sold in a specified period".
B. Consignment Inventory: "Goods or products that are paid for when they are sold by the reseller, not at the time they are shipped to the reseller". (2) "Goods or products which are owned by the vendor until they are sold to the consumer".
C. Co-Managed Inventory (CMI): "A form of continuous replenishment in which the manufacturer is responsible for replenishment of standard merchandise, while the retailer manages the replenishment of promotional merchandise".
D. Cycle Inventory: "An inventory system where counts are performed continuously, often eliminating the need for an annual overall inventory". It is usually set up so that A items are counted regularly (i.e., every month), B items are counted semi-regularly (every quarter or six months), and C items are counted perhaps only once a year.
E. Vendor-Managed Inventory (VMI): "The practice of retailers making suppliers responsible for determining order size and timing, usually based on receipt of retail POS and inventory data". Its goal is to increase retail inventory turns and reduce stock outs.
F. Wall-to-Wall Inventory: "An inventory management technique in which material enters a plant and is processed through the plant into finished goods without ever having entered a formal stock area".
G. Distributed Inventory: "Inventory that is geographically dispersed. For example, where a company maintains inventory in multiple distribution centers to provide a higher level of customer service".
H. Finished Goods Inventory (FG or FGI): "Products completely manufactured, packaged, stored, and ready for distribution".
I. In-Transit Inventory: "Material moving between two or more locations, usually separated geographically; for example, finished goods being shipped from a plant to a distribution center". In-transit inventory is an easily overlooked component of total supply chain availability.
J. Perpetual Inventory: "An inventory record keeping system where each transaction in and out is recorded and a new balance is computed".
K. Supplier-Owned-Inventory: "A variant of Vendor-Managed Inventory and Consignment Inventory". In this case the supplier not only manages the inventory, but also owns the stock close to or at the customer location until the point of consumption or usage by the customer.
L. Wall-to-Wall Inventory: "An inventory management technique in which material enters a plant and is processed through the plant into finished goods without ever having entered a formal stock area".

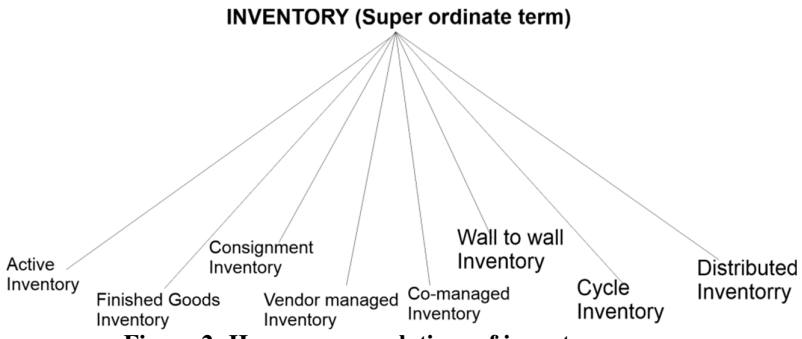

Figure 2: Hyponymous relations of inventory

Source: Researchers.

3. Conveyor: "A materials handling device that moves freight from one area to another in a warehouse". Roller conveyors make use of gravity, whereas belt conveyors use motors. Examples include: roller conveyors and belt conveyors.

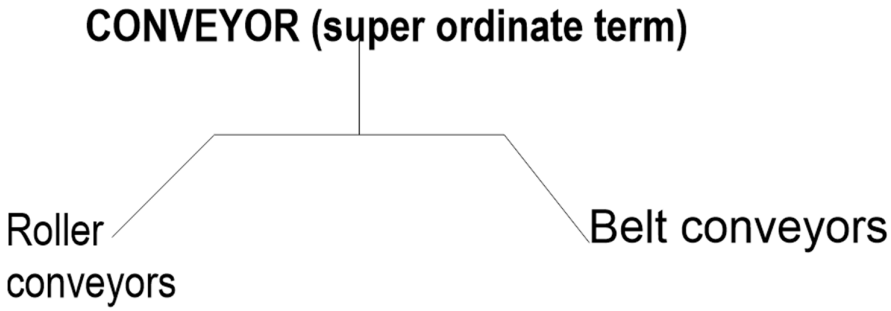

Figure 3

Source: Researchers

4. Picking: "The operations involved in pulling products from storage areas to complete a customer's order". Among the types of picking are: picking by aisle, picking by source, pick to light, order picking, wave picking.

A. Picking by Aisle: "A method by which pickers pick all needed items in an aisle regardless of the items' ultimate destination; the items must be sorted later".

B. Picking by Source: "A method in which pickers successively pick all items going to a particular destination regardless of the aisle in which each item is located".

C. Pick to Light: "A laser identifies the bin for the next item in the rack; when the picker completes the pick, the bar code is scanned and the system then points the laser at the next bin".

D. Order Picking: "Assembling a customer's order from items in storage".

E. Wave Picking: "A method of selecting and sequencing picking lists to minimize the waiting time of the delivered material". Shipping orders may be picked in waves combined by a common product, common carrier, or destination, and manufacturing orders in waves related to work centers.

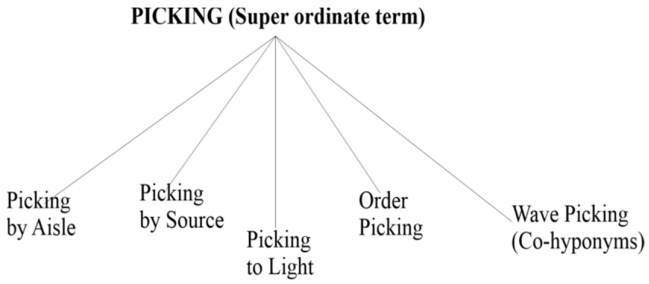

Figure 4: Hyponymous relations of Picking.

Source: Researchers

Table 1: Antonymy and Hyponymy in Supply Chain Management Vocabulary

S/N	Antonymy		Hyponymy	
			Superordinate Term	Co-hyponyms
1	Business-to-Business (B2B)	Business-to-Consumer (B2C)	Code	Bar, carrier, commodity
2	House to House	Door to Port	Inventory	Active, Consignment, Co-managed, Cycle, Distributed, Finished Goods, Vendor managed, Wall to Wall.
3	Full container load(FCL)	Less- Than-Container load (LCL)/Half container load	Conveyor	Roller, belt.
4	First In First Out (FIFO	Last In First Out	Picking	Picking by Aisle, Picking by Source, Pick to Light, Order Picking, Wave Picking.
5	Extranet	Intranet		
6	Hard copy	Soft copy		

Source: Researchers

Synonymy

The under listed lexical items from the glossary were observed to highlight a relationship of close relatedness of similarity in word meaning. Examples of the terms include:

Accessorial Charges/ Accessorial Fee; Accounts Payable/ Accounts Receivable; Accumulation bin/ assembly bin; After-Sale Service/ Field Service; Backlog/back order; Blanket Purchase Order/blanket order; Bullwhip Effect/ Forrester Effect/Whiplash Effect; Call Center/ Customer Interaction Centre; Commodity/ goods; Co-packer/ co-manufacturer; distributor/wholesaler; door-to-door/house to house; End Item/Finished Goods Inventory; Fabricator/manufacturer; Flatbed/haul brite; freight carriers/for-hire carriers; Full container load/ Full Truckload (FTL); gross margin/ gross profit margin; hazardous goods/dangerous goods; Just-in-Time Logistics/Quick Response; Kaizen/continuous process improvement; Key performance indicator/ score card/ dashboard; Private label/store brand, dealer brand; Quality circle/ Small Group Improvement Activity; Landed cost/ total Landed Cost of Net Landed Costs; Subcontracting/outsource; Trailer on a flat car (TOFC)/piggyback; Transparency/visibility; Value chain/supply chain/demand chain; Vendor/ supplier.

Definitions of the Terms in Synonymy

1. Accessorial Charges: “A carrier’s charge for accessorial services such as loading, unloading, pickup, and delivery”. Synonym: Accessorial Fee.
2. Accounts Payable (A/P): “A financial term referring to the amount of transactions which have been accrued but not paid to a vendor”. Synonym: Accounts receivable.
   Accounts receivable (A/R): “On a company's balance sheet, accounts receivable is the amount that customers owe to that company”. Sometimes called trade receivables, they are classified as current assets assuming that they are due within one year. Synonym: Trade receivables.
3. Accumulation Bin: “A place, usually a physical location, used to accumulate all components that go into an assembly before the assembly is sent out to the assembly floor”. Synonymy: Assembly bin.
4. After-Sale Service: “Services provided to the customer after products have been delivered”. This can include repairs, maintenance and/or telephone support. Synonym: Field Service/support.

Field Service/Support – "Field service, customer and field support, technical service, service/call management, returns, warranty tracking".

5. Backlog: "Product ordered by customer but not yet delivered. It is very similar to back order".
   Backorder: "unsatisfied product demand for which customer is willing to wait for
   shipment later, rather than cancel the order". A backorder may cause accounting complications because a vendor typically cannot charge for a product that has not been shipped, in particular if payment is made by credit card.
6. Blanket Purchase Order: "A long-term commitment to a supplier for material against which short-term releases will be generated to satisfy requirements". Oftentimes, blanket orders cover only one item with predetermined delivery dates. Synonyms: Blanket Order, Standing Order.
7. Bullwhip Effect: "It is an observed phenomenon in forecast-driven distribution channels. The oscillating demand magnification upstream a supply chain is reminiscent of a cracking whip". The concept has its roots in J Forrester's Industrial Dynamics (1961) and thus it is also known as the Forrester Effect. Synonyms: Forrester Effect, Whiplash Effect.
8. Call Center: "A facility housing personnel who respond to customer phone queries. These personnel may provide customer service or technical support". Call center services may be in house or outsourced. Synonym: Customer Interaction Center.
9. Co-Packer: "A contract co-packer produces goods and/or services for other companies, usually under the other company's label or name". Co-Packers are more frequently seen in CPG and Foods. Synonym: Co-manufacturer.
10. Distributor: "A business that does not manufacture its own products, but purchases and resells these products. Such a business usually maintains a finished goods inventory". Synonym: wholesaler.
11. Door to Door: "The through-transport of goods from consignor to consignee". Synonym: House to House.
12. End Item: "A product sold as a completed item or repair part; any item subject to a customer order or sales forecast". Synonym: Finished Goods Inventory.
    Finished Goods Inventory (FG or FGI): "Products completely manufactured, packaged, stored, and ready for distribution".
13. Fabricator/manufacturer
    Fabricator: "A manufacturer that turns the product of a raw materials supplier into a larger variety of products". A fabricator may turn steel rods into nuts, bolts, and twist drills, or may turn paper into bags and boxes. Suggested synonym: manufacturer.
14. Flatbed: "A flatbed, also called a haul brite, is a type of trailer on a truck that consists of a floor and no enclosure". Synonym: Haul brite.
15. Freight Carriers: "Companies that haul freight, also called "for-hire" carriers". Methods of transportation include trucking, railroads, airlines, and sea borne shipping. Synonym: for-hire carriers.
    For-hire carriers: "A carrier that provides transportation service to the public on a fee basis".
16. Full Container load (FCL): "A term used when goods occupy a whole container".
    Synonym: Full Truckload (FTL): Same as Full Container load, but in reference to motor carriage instead of containers.
17. Goods: A term associated with more than one definition: 1) "Common term indicating movable property, merchandise, or wares". 2) "All materials which are used to satisfy demands". 3) "Whole or part of the cargo received from the shipper, including any equipment supplied by the shipper".
    Product: "Something that has been or is being produced".
    Commodity: "An item that is traded in commerce". The term usually implies an undifferentiated product competing primarily on price and availability.
18. Gross Margin: "The difference between total revenue and the cost-of-goods sold". Synonym: Gross Profit Margin.
19. Hazardous goods/dangerous goods
    Hazardous goods: "Articles or substances capable of posing a significant risk to health, safety, or property, and that ordinarily require special attention when transported". Synonym: dangerous goods.
20. Just-in-Time Logistics (or Quick Response): "The process of minimizing the times required to source, handle, produce, transport, and deliver products in order to meet customer requirements". Synonym: Quick Response.
21. Kaizen: "A Japanese term for improvement - continuing improvement involving everyone managers and workers. In manufacturing, kaizen relates to finding and eliminating waste in machinery, labor, or production methods". Synonym: Continuous Process Improvement.
    Continuous Process Improvement (CPI): Continuous Process Improvement is a strategic approach for developing a culture of continuous improvement in the areas of reliability, process cycle times, costs in terms of less total resource consumption, quality, and productivity.

22. Key Performance Indicator (KPI): "A measure which is of strategic importance to a company or department". For example, supply chain flexibility metric is Supplier On-Time Delivery Performance which indicates the percentage of orders that fulfilled on or before the original requested date. Synonym: Scorecard.
    Scorecard: "A performance measurement tool used to capture a summary of the key performance indicators (KPIs)/metrics of a company". Metrics dashboards/scorecards should be easy to read and usually have red, yellow, green indicators to flag when the company is not meeting its metrics targets. Synonym: Dashboard.
    Dashboard: "A performance measurement tool used to capture a summary of the key performance indicators/metrics of a company". In addition, scorecards should be reviewed regularly - at least on a monthly basis, and weekly in key functions such as manufacturing and distribution where activities are critical to the success of a company. The dashboards/scorecards philosophy can also be applied to external supply chain partners like suppliers to ensure that their objectives and practices align. Synonym: Scorecard.
23. Landed Cost: "Cost of product plus relevant logistics costs, such as transportation, warehousing, handling". Synonym: Total Landed Cost of Net Landed Costs.
24. Private Label: "Products that are designed, produced, controlled by, and which carry the name of the store or a name owned by the store; also known as a store brand or dealer brand". An example is Wal-Mart's "Sam's Choice" products. Synonyms: Private label/store brand/ dealer brand.
25. Quality Circle/ Small Group Improvement Activity: "In quality management, a small group of people who normally work as a unit and meet frequently to uncover and solve problems concerning the quality of items produced, process capability, or process control". Synonyms: Small Group Improvement Activity.
    Small Group Improvement Activity: "An organizational technique for involving employees in continuous improvement activities". Suggested synonym: Committee of practice
26. Subcontracting/Outsource
    Subcontracting: "Sending production work outside to another manufacturer. This can involve specialized operations such as plating metals or complete functional operations". Synonym: Outsource.
    Outsource: "To utilize a third party provider to perform services previously performed in house". Examples include manufacturing of products and call center/customer support.
27. Trailer on a Flat Car (TOFC)/Piggyback: "A specialized form of containerization in which motor and rail transport coordinate". Synonym: Piggyback.
    Piggyback: Terminology used to describe a truck trailer being transported on a railroad flatcar.
28. Transparency: "The ability to gain access to information without regard to the system's landscape or architecture". An example would be where an online customer could access a vendor's web site to place an order and receive availability information supplied by a third party outsource manufacturer or shipment information from a third party logistics provider. Synonym: Visibility.
    Visibility: "The ability to access or view pertinent data or information as it relates to logistics and the supply chain, regardless of the point in the chain where the data exists".
29. Value chain/Supply chain/Demand chain
    "A series of activities, when combined, define a business process; the series of activities from manufacturers to the retail stores that define the industry supply chain".
    Supply Chain: (1) "Starting with unprocessed raw materials and ending with the final customer using the finished goods, the supply chain links many companies together". (2) "The material and informational interchanges in the logistical process, stretching from acquisition of raw materials to delivery of finished products to the end user". These include all vendors, service providers, and customers are links in the supply chain.
30. Vendor/ Supplier
    Vendor: "The manufacturer or distributor of an item or product line". Synonym: Supplier.

Table 2: Terms in Synonymous Relations

	Terms	Synonyms	Suggested Synonyms
1	Accessorial Charges	Accessorial fees	
2	Accounts Payable (A/P):	Accounts receivable	
3	Accumulation bin/	Assembly bin	
4	After-Sale Service	Field service	Customer service
5	Backlog	Backorder	
6	Blanket Purchase Order	Blanket order	
7	Bullwhip Effect	Forrester effect/whiplash effect	
8	Call Centre	Customer interaction centre	

9	Co-packer	-	co-manufacturer
10	Distributor	Wholesaler	
11	Door-to-door	House to house	
12	End item inventory	Finished goods	
13	Fabricator	-	Manufacturer
14	Flatbed	Haul brite	
15	Freight carriers	For-hire carriers	
16	Full container Load	Full truckload (ftl)	
17	Goods	Product	Commodity
18	Gross margin	Gross profit margin	
19	Hazardous goods	Dangerous goods	
20	Just-in-Time Logistics	Quick Response	
21	Kaizen	continuous Process Improvement	
22	Key performance indicator	Scoreboard/dashboard	
23	Landed Cost	Total Landed Cost of Net Landed Costs	
24	Private label	Store brand, dealer brand	
25	Quality Circle	Small Group Improvement Activity	committee of practice
26	Subcontracting	Outsource	
27	Trailer on a Flat Car (TOFC)	Piggyback	
28	Transparency	Visibility	
29	Value chain	Supply chain/demand chain	
30	Vendor	Supplier	

Source: Researchers

Discussion of Findings

From the above discussions, it is evident that lexical relations (antonymy, hyponymy, synonymy) exist among terms in the SCM vocabulary. However, lexical relations such as homonymy, meronymy and polysemy have not been observed in this study. Table 1 above displays antonyms and hyponyms highlighted in the vocabulary of SCM. A close scrutiny indicates six terms that have antonymous relations with other words and four terms as hyponyms. The antonyms include: Business-to-Business (B2B)/ Business-to-Consumer (B2C); House to House/Door to Port; Full container load (FCL)/Less- Than-Container load (LCL)/ Half container load; First In First Out (FIFO/ Last In First Out; Extranet/Intranet; Hard Copy/Soft Copy. All the pairs of antonyms are derived from a close scrutiny of entries in the glossary. Two exceptions are the terms 'Half container load' and 'soft copy' which are not indicated in the glossary but was derived from the meanings of 'Full container load' and 'hard copy', hence they are suggestions by the researchers. The hyponyms indicated above are Code, Inventory, Conveyor, and Picking. From a close scrutiny of the glossary by the researchers, it was discovered that these key words have components or different types; hence the co-hyponyms highlighted on the table were derived from the glossary.

In Table 2 above, thirty synonyms as derived from the Supply Chain and Logistics Glossary were highlighted. This shows a preponderant occurrence of words with similar meanings in the SCM vocabulary. The second column 'synonyms' indicates words that are observed in the glossary. On the other hand, the last column tagged 'suggested synonym' highlights the original inputs of the researchers where related or similar terms are added to the keywords. In this connection are words such as customer service, co-manufacturer, manufacturer, commodity, community of practice (henceforth CoP). For the purpose of clarity, Communities of practice are groups of individuals who share a concern or a passion for what they do and learn to do it better when they connect regularly. It is a concept in learning theory coined by Anthropologist Jean Lave and Etienne Wenger in 1991 to describe a method of learning otherwise known as apprenticeship as a learning model. Instead of simply acquiring information through a coded source, this includes regular interactions

and sharing of knowledge amongst subject matter experts. In organisations, CoP exist as as learning networks, thematic groups, or tech clubs (Wenger-Trayner &Wenger-Trayner, 2015). For example, a group of fashion designers who meet on weekly basis will definitely discuss trends and challenges in their businesses. Arguably, CoP can also be identified in the General Annual Meetings of accountants, engineers, lawyers and other professions in Nigeria.

Conclusion

The study concludes by affirming that lexical semantics can be applied to the vocabulary of SCM. In specific terms, the semantic functions of lexical relations such as antonymy, hyponymy, polysemy and synonymy can also be identified as a meaning making mechanism whereby meaning can be derived from the interrelatedness of words. This aligns with the views of Oni (2020) that meaning of words may not always be analysed using dictionary or denotative meaning. From the study, it can be observed that words relations can exist beyond what is indicated as available resources of the selected glossary. For consideration is the words 'soft copy' as an antonym of hard copy, and CoP, a suggested synonymy of quality service.

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The Semantics of International Trade in the Knowledge Economy: the Nigerian Example

Lydia U. EDET
Department of Languages and General Studies, Covenant University, Ota, Nigeria.
lydia.edet@stu.cu.edu.ng

Charles U. OGBULOGO
Department of Languages and General Studies, Covenant University, Ota, Nigeria.
charles.ogbulogo@covenantuniversity.edu.ng

Innocent E. CHILUWA
Department of Languages and General Studies, Covenant University, Ota, Nigeria.
Innocent.chiluwa@covenantuniversity.edu.ng

Abstract

According to Carayannis in the editor's note, the knowledge economy emphasizes views on economics, management, law, and political science. Interestingly, this spectrum does not accommodate language and linguistics which should ordinarily provide the basics for any knowledge. For instance, ambiguity a central part of semantics is considered a fundamental issue in language and communication hence the need to situate a robust study on the knowledge economy from a semantic platform. Indeed, from literature, the greatest challenge of the modern society appears to be related to meaning in communication. In the business context for example, observation shows that revisions on International Commercial Terms (INCOTERMS), may lead to misconceptions, and misunderstanding of terms in international trade. Inevitably, it appears that modules of training in entrepreneurship studies in our higher education have not incorporated sufficient complements of language studies; hence this study explores the nature of meaning in the bourgeoning knowledge economy. This reality provides justification for this study. Data drawn from five sectors of international trade comprised a hundred (100) lexical items for 20 graduate and 30 undergraduate students in the Entrepreneurial Development Studies (EDS) class of Covenant University. A questionnaire was used to elicit the respondents understanding of key concepts. Findings revealed that only 146 (24.33%) out of 600 items were interpreted correctly by the undergraduates whereas the postgraduate students had 35.5% of correct elicitations. The methodological framework is the Business Semantics Management by Pieter De Leenheer (2009) that converges stakeholders to fashion out meaning in business interactions.

Keywords: Semantics, Business Semantics Management, Knowledge Economy

Introduction

There is a strong correlation between language and capacity building in the knowledge economy. The basic medium for providing sustainable education is language hence knowledge, skills, literacy is only transferable to learners through the use of language and meaningful communication in every aspect of training. An Understanding of how words create meaning in communication indicates the significance of language in all aspect of human endeavours. As an indispensable tool of communication, language is pivotal in the realization of destinies: it answers to the economy, mental, educational, religious pursuits of man to mention a few.

Human communication is observed as a process of creating meaning between two or more people as much as 'a bridge between diverse people' Scott and Brydon (1997). In a society where the most brilliant men exist without a means of communication, such groups of people wallow in dearth of survival, obscurity, confusion and absence of any meaningful development. Communication is therefore crucial for advancement in life. A prominent aspect of study which highlights meaning and mutual understanding among interlocutors in a specific context of language use is semantics. Very critical to entrepreneurial development and success therefore, is the study of semantics considered a fundamental issue in business communication in the Knowledge Economy.

According to Ross (2018), communication quality focuses on whether the meaning of a message is clear. Notwithstanding, linguistic in capabilities and misunderstanding have been the bane of our populace and

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entrepreneurs in their economic pursuits at the global level. When these create vagueness and barriers in meaning, agreements are in conclusive because majority of key concepts in the domains are not understood during communication. Indeed the greatest challenge of the modern society appears to be related to appropriate meaning in communication as exemplified by its magnitudes of losses and litigations in the various transactions of international trade. How can language provide the panacea for global trade in this era of knowledge economy in the Nigeria context?

This paper therefore highlights the role of language for expressive, intelligible, and robust communication, knowledge transfer, clarity of meaning and correct interpretations of concepts in the domains investigated. Such linguistic awareness definitely promotes entrepreneurship, and enhances rapid global relevance for entrepreneurs in international trade. Since a study of lexical resources highlights diverse business terms in the knowledge economy, the issue of misunderstanding and delays for parties in global transactions will be drastically reduced. Therefore, situating a study based on language in the knowledge economy not only discusses meaning and the correct interpretation of information but it significantly contributes to strengthening, and re-shaping the entrepreneurial capacities in Nigerian businesses.

The need for countries to engage in bilateral and multilateral trade transactions for the sales of goods and services creates an international economic order, 'where the developed are self- reliant and the developing countries dependent on them for survival'. However, international trade is observed as the escape route for under-development in the developing countries since the developed ones are viewed as, 'holding the key to rapid economic development' hence economic transactions with them cannot be ignored (Olofin 2001). This trading involves tangible products, (consumables) and intangible products (services) traded on the global market or world economy where prices, supply and demand affect and are affected by global events (Heakal, 2015). In this study, banking, logistics, supply, transportation are services which are intangible products exchanged globally between the nations of the world.

Arising from the above discourse, the overall aim of this paper is to identify and authenticate the lexical resources available in specific domains of international trade mentioned above. In addition, an examination of language in the business context of international trade impacts on knowledge to build capacities for entrepreneurial development in Nigeria. The study begins with a theoretical framework of Business Semantics Management and its role in business communication, a literature review of the scope of semantics, semantics and the professions, semantics and international trade as well as the era of knowledge economy.

The study was concluded with recommendations**,** first to curriculum developers on how to incorporate domains of international trade into academic scheme of work; the need to introduce courses and skills in entrepreneurial development studies (EDS) valuable for export thereby boosting the students' interest. To the students, the need to utilize online resources for entrepreneurial skills would definitely yield dividends. That is, a keen search and 'devotion' beyond their field of study.

The Scope of Semantics

Kim Ballard (2007) posits that semantics is the study of meaning as a crucial component in language and communication study because it deals with meaning which is central to language as a human activity. Linguistics semantics is exclusively concerned with making meanings out of words, phrases, grammatical forms and sentences which are linguistic expressions.

Lobner (2013) asserts that the central objective of semantics is to expose the knowledge of the meaning of words and sentences.

These definitions highlight the import of shared meaning which can be observed at the level of ideas, concepts, individual words, symbols. Moreover, meaning also extends to professional life and everyday living in the society. That is, communication can never be achieved when meaning is elusive and not shared by interlocutors.

Semantics and the Professions

Ogbulogo (2005) asserts that different disciplines, occupations and fields of specialization utilize special terms, concepts and expressions known as registers in their everyday activities.

According to Lunenburg (2010) when communication takes place in an organization within a framework of shared experience, there is benefit that the message sent and received will have a shared- meaning, otherwise efforts in

communicating will be wasted. However, choice of language in business setting will vary depending on the formality and informality of a given situation.

Moore (2013) highlights that for example; successful communication by school administrators is the essence of a productive school organization. School administrators communicate with other people during administrative function and activity, whether in planning and organizing or leading and monitoring, hence the importance of direct or indirect communication. This view aligns with the notion of success being linked to communication in any setting as upheld in this paper.

Ross (2013) highlights that a shared, well-structured business vocabulary provides meaning (semantics), and coherency to business rules and requirements. Therefore, a precise definition for each term should be given explicitly in a business-oriented fashion, free of any IT jargon to communicate business rules effectively in today's ever more knowledge intensive world.

According to Crichton (2018), there is the growing importance of communication as a form of professional expertise that needs to be made visible and developed as a resource for the professionals. This highlights language and communication as significant to professionals, their clients and stakeholders.

Semantics and international trade

The homepage of Scarbrough highlights language as one of the most complex and important tools of global trade. As in any complex and sophisticated business, small changes in wording can have a major impact on all aspects of a business agreement. They further assert that word definitions vary according to industry as observed in global trade. As such for business terminology to be effective, phrases must mean the same thing throughout a particular industry. The position of Scarbrough is accepted as truly semantic since it highlights the import of meaning and lexical resources in international trade.

Melitz and Toubal (2014 in Egger and Lassmann, 2015) provide a significant step towards understanding the bilateral trade effect of common languages. This was based on data from 195 countries with 42 common native and spoken languages. The joint influence of the various aspects of common languages is found to be at least twice as high as that of a common official language. Their findings demonstrate that common spoken languages are particularly important. The ease of communication, indeed, highlights the essence of common languages for bilateral trade.

Methodological Framework

Business Semantics Management (hereinafter BSM) is the collection of activities according to De Leenheer (2009) to put company stakeholders together to collaboratively realize the reconciliation of their diverse metadata; and then the application of the derived company semantics patterns to create semantic alignment between the underlying data structures. He also says,' In BSM, market experts settle on a shared base of business semantics. That is, the meaning of vocabulary and rules used for procedures, data and applications to be communicated and structured. Once again, this happens according to those rules and company objectives. By heterogeneous metadata, he refers to existing and varied business information at the disposal of individual organisations which need to be collated and merged, 'scoped' before being utilized by stakeholders.

Since BSM exposes how business stakeholders negotiate meanings in organising data that pertain to their businesses, emphasis is on communication of information in business. This is achieved through two complementary processes of semantic Reconciliation and Semantic Application Cycles that establish BSM. Below is a diagram from De Leenheer's page that shows the full-cycle business semantics management. This is achieved through two complementary processes of semantic Reconciliation and Semantic Application Cycles that establish BSM.

The Business semantics management is established by two operational cycles each grouping a number of modeling activities. As the first cycle of the BSM approach, Semantic Reconciliation uses the extraction, refinement, articulation and consolidation of fact-types from existing sources, such as natural language definitions, existing metadata, which produces a range of consolidated language-neutral semantic patterns with informal description of meaning (for example, WordNet word senses) useful for the construction of different semantic applications. This first stage aligns with the terms selected from existing glossaries for investigation in the different domains. According to De Leenheer, the Semantic Application as the second cycle of business semantics management entails two activities: select and commit.

This denotes a selection of relevant semantic patterns from established sources of knowledge and resources that are dedicated to a stakeholder's semantic understanding. That is, stakeholders engage in the negotiation of meanings of the common terms they share within organisations in the industry. For instance, in pursuit of building bridges of meaning across diverse international business operators, the International Chamber of Commerce (ICC) created the International Commercial Terms (INCOTERMS) since 1936. The purpose was to provide a set of international rules for the interpretation of the most commonly used trade terms such as DAF: 'Delivered at Frontier'; CPT: Carriage Paid To (named place of destination) among others.

With the use of INCOTERMS, the uncertainties of different interpretations of trade terms, in different countries have been reduced to a considerable degree. (http://www.rhinotrans.com/clients/incoterms/article/2205/). This informs the need for entrepreneurs to engage the methodology of BSM which thrives at making business organisations to excel in business communication and information management, thereby making entrepreneurs masters in their field of endeavours. As such, BSM as a methodology aligns with the ideals of General Semantic Theory (GST) which aims at 'delineating human beings from their weaknesses to make them masters of their own fates' (Korzybski, 1933). This position corroborates De Leenheer (2009) view of 'capture the semantics of a business domain in a way that would enable …….value creation aspects'.

Basically, a 'problematization of the world within which language operates' indicates the existence of communication barriers without a good grasp of common lexical concepts and terminology in any industry. Since language facilitates communication in business, the need for shared meaning among stakeholders in any business context becomes non- negotiable. Hence, to fill this gap in the language of international trade demands an explication of available lexical resources which this study sets out to accomplish. On this premise lies the essence of Business Semantic Management, a methodological approach in business organisations.

The starting point of any BSM is the identification of domains and collection of meta language. Since this work is exploratory for the purpose of right methodology, we intend to draw from existing wordstock domains and to test the extent to which prospective business persons and professionals can identify with these terms.

The Era of Business Semantics Management

De Leenheer (2009) identifies Business Semantics Management as the set of activities which enables business stakeholders to collaboratively realize the reconciliation of their heterogeneous metadata; and consequently the application of the derived business semantics patterns to establish semantic alignment between the underlying data structures. Thus, business experts decide on the meaning of vocabulary used to communicate and coordinate processes, data, and applications in the different corporations based on certain rules and business goals. By heterogeneous metadata, De Leenheer refers to existing and varied business information at the disposal of individual organisations which need to be collated, merged, and 'scoped' before being utilized by stakeholders.

The Knowledge Economy

The knowledge economy is observed to be a dynamic new era where intangible resources such as knowledge, social capital, information and communication technologies are seen as the 21st century drivers of economic growth**.** In this context, there is greater reliance on intellectual prowess and capacities instead of the traditional factors of production (Takeuchi & Shibata, 2006; Carayannis, Popescu, Sipp & Stewart 2006). In a related event, Nonaka & Takeuchi (1995 in Tan & Rao, 2013), argues that the creation of new knowledge extends beyond information processing. Takeuchi et al (2006), highlights certain strategies and interventions that enable the knowledge economy to thrive. These include technology and especially ICT, harmonious policy and institutional environment, a regulatory framework, and an innovative business environment that promotes innovation.

However, the World Bank Knowledge Economy Assessment (KEA) framework cited in Keber (2011) opines that the four pillars of the knowledge economy are economy incentive, innovation, and education and information infrastructure. In line with the views of the World Bank, this study leverages on education and information infrastructure (ICT) as tools for innovation. This informs the choice of our respondents as university students. As such, education is a critical component of the knowledge economy which is non-negotiable for sustainable development in any country. Through education and training policy 'more highly skilled workers' are developed to support innovation and entrepreneurship (Brown, Lauder, & Ashton on behalf of TLRP, 2008).

The involvement of education in economic growth occurs through the creation of new knowledge and the transfer of knowledge and information. That is, schools provide the education necessary for learning and transmission of this new information and technology. In this regard, language therefore remains crucial for literacy, transfer of knowledge and skills to learners in every aspect of teaching and training. In essence, 'the innovators or creators of

new technology' can only be those individuals who have received specialized training in their education (Cavusoglua 2015).

The Knowledge Economy in the Nigerian Context

The Nigerian economy has not maximized the provisions of the knowledge-driven ethos. Faborode (2016), for instance, describes the Nigerian situation as 'a mono-cultural economy. That is, overdependence on the oil mineral at the detrimental productive sectors like agriculture and manufacturing. As hinted by the author, an investment in the manufacturing sector, for instance, in the oil sector and the agro industry will fast track Nigeria's enlistment in the 'globally competitive industrial countries' through high level knowledge activities. Even within the framework of industrialization, a critical factor would be the knowledge-base which would depend on the quality of our education.

It is therefore imperative and in line with Osinbajo (2014) and Faborode (2016) that purpose driven research be conducted in the area of the knowledge economy. This will require leveraging on ICT and advancing the scope of study in core areas such as international trade. It is believed that a good starting point would be the language domain hence, the need for this research. Carayannis, Popescu, Sipp & Stewart (2006) opine that some economic factors such as improved speed and ease of communications and interaction in the productive cycle are created by innovative technologies to reshape the global economic landscape. Therefore, technological learning and information and communication technologies (ICT) are identified as fostering entrepreneurial development (businesses) in the knowledge economy of developing and transitioning economies (Bukht, Rumana, Heeks & Richard, 2018).

As such, the way forward for the Nigerian economy is tied to the development of education at all levels. Indeed, the relevance of higher education for national development should not be compromised as opined by (Osinbajo, 2014; Faborode, 2016). More significantly, the university is reckoned a beacon of hope and centre of excellence for creative innovations, as such a study on the knowledge economy is worth being situated in the university context.

Methodology and Data Collection

The survey method of research was used in collecting data for this study. A face-to-face survey questionnaire was used to elicit information from students of Covenant University as the primary source of information. The research instrument was a customized semantic questionnaire administered by the researchers to a total of 50 students at various locations on the campus. These questionnaires had twenty questions structured on five domains of international trade such as banking, logistics, supply, transport and trade terms each requesting the meaning of twenty concepts in those service areas.

The system of the face-to face- questionnaire presented some unique advantages as each respondent wrote only what he knew about the concepts in each domain investigated. That is, none utilized other reference materials to derive meaning. Moreso, the researchers had the control of identifying the respondents' colleges and level of study. This method gave the researchers uninhibited raw data from the subjects.

Since it was impossible in terms of time constraint and limited resources to collect linguistic data from every student in this academic community, the study opted for a convenience purposive sampling. The undergraduate students drawn from the four colleges of the university had the following distribution. Colleges of Business and Social Sciences (CBSS) and College of Science and Technology (CST) had a distribution of 8 respondents each whereas College of Leadership & Development Studies(CLDS), and College of Engineering (COE) had 7 respondents each, totaling 30 students reflecting their differentials in students population. However, with an equal distribution of 20 postgraduate students, there were five respondents in each of the four colleges where each of them answered 20 questions (1 questionnaire). Hence, this study was restricted to only thirty undergraduate and twenty postgraduate students of Covenant University in Nigeria.

The rationale for using this research design include: to identify the service domain most familiar to the students, and to determine the level of entrepreneurial capacities of EDS students in the knowledge economy. Also, an investigation of the meanings given by the respondents will equally reflect the semantic prowess of students and their level of exposure in the observed language of global trade. Thus, the research design enabled this study to account for the variations in the level of familiarity among students. Data were analysed under three columns: 'Correct', for acceptable meaning, 'No Idea (NI)' for blank spaces, denoting concepts the respondents had no idea of and 'Wrong (W)' for mis-defined terms. However, during tabulation the NI and W labels were compressed for easy calculation of results which were presented in simple percentages.

Domain Selection Rationale

The five domains for this study: banking, logistics, supply, transport and trade terms were purposively selected based on their significance in the transactions of international trade. Banking, logistics, supply, transportation are prominent service domains in global business while trade terms are formulated by the International Chamber of Commerce (ICC) to facilitate communication among members. The banking sector provides the needed financial support to international businesses by providing letters of credit and other financial services for exporters and importers. The banks also act as intermediaries protecting the financial interest of the parties involved to avoid losses in international businesses. Aside business funding, transportation and delivery of commodities are essential services in the system as enabled by the above domains.

International Commercial Terms (INCOTERMS) provide trade terms which are technical lexical resources that facilitate trade transactions among other domains. According to Scarbrough 'In order for business terminology to be successful, phrases must mean the same thing throughout the industry, so INCOTERMS are intended to build a bridge between various industry stakeholders wherever their business operates. For the purpose of assessing lexical resources of those international trade domains, the online sites visited are listed below: https://www.iaspaper.net/incoterms-ddp-up.sc, Glossary of Supply Chain Terms from http://www.inboundlogistics.com/cms/logistics-glossary/.

Data Presentation and Analysis

This section presents the interpretation and analysis of the findings from the data collected in this study. The first section presents the word list used to elicit meaning in two out of the five domains of international trade whereas the next section presents the respondents' test score numerically using simple percentages.

Table 1: Semantics of International Trade: Undergraduates Respondents

DOMAINS OF INTERNATIONAL TRADE	COLLEGES	NO. OF RESPONDENTS/NO OF QUESTIONS		SCORES OF RESPONDENTS		PERCENTAGE OF SCORES	
		RESPONDENTS	NO OF QUEST-ONS	CORRECT (MEANING ACHIEVED)	WRONG (VAGUE)	CORRECT %	WRONG %
BANKING	CBBS	2	40	18	22	45	55
	CST	2	40	9	31	22.5	77.5
	CLDS	2	40	13	27	32.5	67.5
	COE	2	40	7	33	17.5	82.5
LOGISTICS	CBBS	1	20	2	18	10	90
	CST	1	20	4	16	20	80
	CLDS	1	20	1	19	5	95
	COE	1	20	3	17	15	85
SUPPLY	CBBS	2	40	22	18	55	45
	CST	2	40	2	38	5	95
	CLDS	1	20	7	13	35	65
	COE	1	20	8	12	40	60
TRANSPORT	CBBS	2	40	10	30	25	75
	CST	2	40	7	33	17.5	82.5
	CLDS	2	40	12	28	27.5	72.5
	COE	2	40	5	35	12.5	87.5
TRADE TERMS	CBBS	I	20	3	17	15	85
	CST	1	20	3	17	15	85
	CLDS	1	20	4	16	20	80
	COE	1	20	6	14	30	70
TOTAL	4	30	600	146	454	24.33	75.67

Source: Researchers

Table 2: Semantics of International Trade: Postgraduate Respondents

DOMAINS OF INTERNATIONAL TRADE	COLLEGES	NO. OF RESPONDENTS/ NO. OF QUESTIONS		SCORES OF RESPONDENTS		PERCENTAGE OF SCORES	
		RESPONDENTS	NO OF QUEST-ONS	CORRECT (MEANING ACHIEVED)	WRONG (VAGUE)	CORRECT %	WRONG %
BANKING	**CBBS**	1	20	12	8	60	40
	CST	1	20	10	10	50	50
	CLDS	1	20	12	8	60	40
	COE	1	20	7	13	35	65
LOGISTICS	**CBBS**	1	20	14	6	70	30
	CST	1	20	5	15	25	75
	CLDS	1	20	3	17	15	85
	COE	1	20	16	4	80	20
SUPPLY	**CBBS**	1	20	9	11	45	55
	CST	1	20	8	12	40	60
	CLDS	1	20	9	11	45	55
	COE	1	20	8	12	40	60
TRANSPORT	**CBBS**	1	20	4	16	20	80
	CST	1	20	6	14	30	70
	CLDS	1	20	4	16	20	80
	COE	1	20	3	17	15	85
TRADE TERMS	**CBBS**	1	20	3	17	15	85
	CST	1	20	3	17	15	85
	CLDS	1	20	3	17	15	85
	COE	1	20	3	17	15	85
TOTAL	**4**	**20**	**400**	**142**	**258**	**35.5**	**64.5**

Source: Researchers

Discussion, Findings, and Recommendation

From the undergraduate respondents' scores, only 146 (24.33%) items were given correct elicitations out of a total of 600 concepts, meaning 454 (75.67%) were wrongly interpreted. A look at the different columns of the domains of international trade presents the following numerical and percentage scores: banking: 47(29.38%) correct meanings against 113 (70.62%) wrongs. Logistics had 10(12.5%) correct meanings against 70 (87.5%) wrongs, Supply had 39(32.5%) correct meanings against 81(67.5%) wrongs, Transportation had 34(21.25%) correct meanings against 126 (78.75%) wrongs, Trade Terms had 16 (20%) correct meanings against 64 (80%) wrongs.

One of the main purposes of investigating language in the domains of international trade is to identify and highlight linguistic meaning of the concepts used within the different domains. When data from the different industry were collated and analysed, the following were observed as findings.

Some of the domains in international trade, for instance, trade terms, logistics, transportation appear too technical for the non-professionals, as shown in the report of scores above. However, most respondents felt more 'at home' with terms in the domain of banking.

A high level of vagueness was exhibited when respondents rely on the surface meaning of the lexical items in the concepts. This increased the range of difficulty encountered by the respondents with regard to the meanings of the terms in each domain. Consequently, respondents were quick to remark that the domains on the questionnaires were unrelated to their field of study. The significance of meaning to the language of international trade upholds the notion of De Leenheer that 'business is only possible when there is an expectation of shared meaning among parties in transactions'.

Thus the results demonstrate that the respondents' acquired proficiency in English cannot salvage the impact of language barriers caused by ignorance in the language of international trade.

Conclusion

From the observations, it would appear that the business climate is scarcely understood by a greater percentage of our sample size. This position can be extrapolated for a wider population bearing in mind that Covenant University is a purpose built institution for leadership, professionalism and entrepreneurship.

Our observations could also suggest that a lot of prospective entrants into the world of entrepreneurship are basically ill-equipped. Thus there is a huge suspicion that Nigeria may not be primed well enough for the knowledge economy.

We consider this research as a catalyst to a more rigorous investigation of the state of affairs. That is why our emphasis has been to point the way forward to more elaborate engagements in the global trade domain.
We now recommend a strong overhaul of our language teaching modules to incorporate aspects of English for business purposes. And in that remodel package, business semantics will find a good place.

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Gender-Based Violence and Negative Outcomes in Post-Primary Educational Institutions: Implications for Strategic Leadership Engagements

Olusolami Bamidele OKUNLOLA, Abiodun Matthew GESINDE, Adedayo Jonathan ODUKOYA & Gbadebo Olubunmi ADEJUMO

Department of Psychology, Covenant University,
Ota, Nigeria

solami.okunlola@gmail.com; abidoun.gesinde@covenantuniversity.edu.ng; adedayo.odukoya@covenantuniversity.edu.ng; gbadebo.adejumo@covenantuniversity.edu

Abstract

Gender-based violence (GBV) is a 21st century reality across all nations of the world. GBV is observed to present various long and short term negative outcomes in women and girls especially. These outcomes could be educational, social, physical or/and psychological consequences, including low self-esteem. Low self-esteem tends to hamper adolescents' academic motivation and psychological wellbeing. This study investigated the self-esteem outcomes of GBV among adolescent girls in post-primary schools across Lagos, Nigeria. The design adopted for the study was descriptive survey using multistage sampling technique to enlist a total of 588 sexually abused and 576 non-sexually abused female adolescents from three educational districts of Lagos State. The Rosenberg Self-esteem Scale (RSES) and Child Sexual Abuse Questionnaire (CSAQ) were used to obtain data. The results indicate that female adolescents who had experienced GBV in form of sexual abuse reported lower self-esteem levels than their non-sexually abused counterparts. The implications of the findings for strategic leadership engagements at home, school, community and national levels were discussed.

Keywords: Gender-based violence, sexual abuse, self-esteem, secondary school adolescents.

Introduction

Gender-based violence (GBV) is a 21st century reality across all nations of the world. GBV is a brutal human rights violation with no social, racial, economic or geographical boundaries (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2014.). It refers to both acts of violence directed towards persons on gender basis and violence against women and girls in particular (David et al. 2018; United Nations [UN] Women, 2020). GBV encompasses various kinds of violence including child trafficking, female genital mutilation, forced/early marriage, acts of domestic violence, and physical, emotional or psychological as well as sexual violence/abuse (UN Glossary, n.d.; UN Women, 2020). More specifically, in sexual violence research, sexual violence against children and adolescents as a form of GBV is employed as an umbrella term for various kinds of sexual acts, including Child sexual abuse [CSA] (Together for Girls [TFG], 2019; UNICEF, 2020).

Although the true burden of GBV is unknown, the World Health Organization (WHO, 2013) estimates that physical or sexual intimate partner violence or non-partner sexual violence is experienced by at least 33% of women, globally. In Nigeria in particular, the National Demographic Health Survey (NDHS, 2018) reported the 30% of girls and women between ages 15 and 49 had suffered from sexual abuse. In reality, GBV begins at childhood with many survivors of GBV being under the age of 18 (Multiple Indicator Cluster Survey (MICS, 2018). These figures present the reality of the situation of girls in Nigeria and indeed Africa as a whole. The statistics are fuelled by the gender discrimination allowed by African traditional norms and milieu which permits a culture of toxic masculinity. Adverse religious beliefs also contribute to the pervasiveness of GBV in Nigeria (David et al., 2018). Furthermore, the culture of silence built around most African societies, the fear of stigmatization makes most cases of GBV underreported (UN Women, 2020). While GBV also occurs with men and boys, and perpetuated by females, the menace occurs more with women and girls as perpetuated by males (David et al., 2018).

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The outcomes of GBV in women and girls often present in different shades of long and short term negative consequences. These outcomes could be educational, social, physical or/and psychological consequences. Educationally, GBV could stand as an obstacle to education and learning (Gesinde, Okunlola & Dada, 2019; UN women, 2020). Socially, GBV victims tend to be withdrawn (W.H.O., 2020) and physically victims could experience unwanted pregnancies and HIV/AIDS (UN Women, 2020). Psychologically, GBV could yield negative outcomes such as anxiety and depression (Ali & Ali, 2014); suicidal ideation (UNICEF, 2017), as well as low self-esteem (Freeman & Temple, 2010; Ali & Ali, 2014; Adigeb & Mbua 2015).

Previous studies had indicated that the major source of human self-esteem is experience (Nigussie, 2014; Henriques & Shivakumara, 2015). This presupposes that negative experiences such as exposure to GBV, including sexual abuse, could have distressing effects on a person's evaluation of his or her self-worth (Henriques and Shivakumara, 2015). A number of studies have established that adolescents, who experience GBV including sexual abuse, tend to show significantly lower levels of self-esteem than their non-abused counterparts (Lamoureaux, Palmieri, Jackson & Hobfoll, 2011; Foster & Hagedorn, 2014; Singh, Parkesar & Nair, 2014). Just like sexual abuse, emotional abuse has also been reported to influence adolescents' self-concept. For instance, Gesinde (2011) reports that seven dimensions of emotional abuse mutually account for 28.0% of the variance in adolescents' self-concept.

In a Swedish research among high school students, Priebe, Hannson and Svedin (2010) conducted a school based study among 1,107 students; the results showed that sexual abuse was highly related to various negative outcomes including poor level of coherence, emotional and behavioural difficulties, as well as low self-esteem. The study revealed that participants who reported a history of sexual abuse had significant correlations with reduced self-esteem. Similarly, an Indian study (Henriques & Shivakumara, 2015) comprising 40 sexually abused and 40 non-sexually abused adolescents, investigated the self-esteem and psychological distress of sexually abused and sexually non-abused adolescents. They found that the self-esteem of the participants differed significantly, with the sexually abused participants having lower self-esteem levels than their non-abused counterparts. Priebe et al. (2010) also found that the more the severity of the abuse, the poorer the psychosocial health of the adolescents.

While low-self-esteem is not the only negative outcome that sexual abuse as a form of GBV presents, a healthy self-esteem is important for a person's overall functionality. Meanwhile in modern day mental health research, self-esteem has been recognised as an important factor in adolescent health and well-being (WHO, 2015; UNICEF 2017); and low self-esteem tends to hamper adolescents' academic motivation and psychological wellbeing (Chinawa et al., 2015). Apart from this, low-self- esteem has also been listed has one of the leading contributors to adolescent suicidal behaviour (WHO, 2017). Self-esteem refers to self-liking, self-respect and a person's perception of his self-worth (Rosenberg, 1965). It is a subjective and personal assessment of a worthiness of a person (Harris & Orth, 2019). Theoretically, the underpinnings of Maslow (1987) present self-esteem as a very important need of not only adolescents, but all human beings.

Sexual abuse as a form of GBV is indeed widespread (UN Women, 2020) and appears to be on the increase (Sodipo et al., 2019). Its negative outcomes on adolescents in educational institutions are also evident (UNESCO, 2014), including low-esteem (UNESCO, 2014; David et al., 2018). These evidences however appear to be more researched among the western and Asian contexts leaving a lacuna within the Nigerian context. Put in another form, published evidences on the relationship of GBV and decreased self-esteem among adolescents appear far-fetched within the Nigerian research space (Okunlola, Odukoya & Gesinde, 2018). This study therefore investigated low-self-esteem as one of the negative outcomes associated with GBV among both sexually abused and non-sexually abused adolescents from post-primary (or secondary) educational institutions in Lagos, Nigeria with the view of comparing which of the groups reported lower self-esteem levels. The study also highlighted the implications of strategic leadership engagements across various levels of leadership.

Methods

This study adopted a survey research design and was conducted within the 2018/2019 school year. The population for the study included all public secondary school female adolescents in Lagos State, South west Nigeria. Out of the six educational districts of the state, only three were randomly selected. A total of 1164 participants, aged 11-19 were selected through a set of multistage sampling protocols. Authorisation for the study was gotten from both the Covenant University Research Ethics Committee and the Lagos State Head of Public Service. Assent and consent were also obtained from participants, school heads and parents of participants below age 18. The participants confidentially completed measures of sexual abuse and self-esteem using the Child Sexual Abuse Questionnaire (CSAQ) and the Rosenberg Self-esteem Scale (RSES) respectively. The CSAQ is a 15-items questionnaire developed by Mohler-Kuo, Landolt, Maier, Meidert, Schonbucher, and Schnyder (2014. Participants were required to answer "yes" or "no" to the items indicating experiences of contact and non-contact forms of sexual abuse. The RSES on the other hand is a 10-items scale developed by Rosenberg (1965) and it follows a 4- point Likert scale form which ranges from strongly

agree (SA) to strongly disagree (SD). To analyse the data obtained, descriptive statistics was performed using the Statistical Package for Social Sciences software (SPSS) version 23.0.

Results

Table I: Comparison of the Level of Self-esteem between Sexually Abused and Non-Sexually Abused Adolescents in the Study

	Sexual Abuse Status			
Self- esteem	**Non- Sexually Abused**		**Sexually Abused**	
	F	**%**	**F**	**%**
High	44	3.8	14	1.2
Moderate	426	36.6	390	33.5
Low	106	9.1	184	15.8
Total	**576**		**588**	

As shown in table 1, slightly more than half of the adolescents (n=588, 50.5%) reported a history of GBV in the form of sexual abuse, while 576 (45.5%) reported they had never experienced sexual abuse. The table also reveals that among the non-sexually abused, 44 (3.8%) reported a high level of self-esteem, whereas, only 14 of the sexually abused participants (1.2%) reported same. Meanwhile 106 non- sexually abused participants (9.1%) reported low levels of self-esteem while among the sexually abused participants, 184 (15.8%). This indicates that sexually abused adolescents experienced lower self-esteem levels than their non-sexually abused counterparts.

Discussion

The findings from this present study reveals that female adolescents from public post-primary educational institutions in Lagos state, who have experienced GBV in the form sexual abuse show lower levels of self-esteem than their non-sexually abused counterparts. This finding confirms previous literature that established decreased self-esteem outcomes among adolescents with various gender-based violence experneices, including sexual abuse. In the study of Duckett (2015), the influence of sexual abuse on the identity development and self-esteem was examined. 208 first-year female undergraduate students were sampled from Illinois State University, USA, and found that sexual abuse was related to decreased self-esteem in the participants. Other studies such as Kim, Park and Park (2017) in Korea and Mutavi, Obondo, Mathai, Kokonya, and Dako-Gyeke (2018) in Kenya, also confirm the findings from this study. Conversely however, Park, Lee and Jun (2017) in their study comparing self-esteem levels of North Korean Adolescent Defectors (NKADs) and South Korean Adolescents (SKAs) who had experienced sexual abuse, discovered that a significant positive relationship between sexual abuse and self-esteem among the NKADs in their study but not with their counterparts from South Korea. This implied that among the NKADs, sexually abused participants reported higher self-esteem. The authors suggested that the outcome might be due to the psychological relief that the NKADs may have experienced, following a relocation from their home countries where their sexual abuse experiences took place and were likely to evaluate themselves in a more positive light. The psychosocial support received by the NKADs may also have influenced the association between the traumatic experiences and self-esteem of the adolescents.

Implications for Strategic Leadership Engagements

Gender Based Violence (GBV) prevention requires strong strategic leadership engagements and interventions, (The United Nations High Commissioner for Refugees [UNHCR], 2011). A menace such as GBV including sexual abuse has truncated the dreams and aspirations of much young adolescence in Nigeria; it has led to marital challenges, loss of job and even death in some instances (Small Arms Survey, 2016). GBV requires strategic efforts from leaders at various organizational levels not only to prevent the problem, but also to make the strategies effective and sustainable. Strategic leadership has been described as that phenomenon which deals with "the possession of unique abilities that allows for the absorption and learning of new information and ideas, and having the adaptive capacity to appropriately respond to the dynamism and complexity of the external environment" (Shoemaker & Krupp, 2015). In responding to gender based violence, it involves application of different strategies to resolving the challenge in our society.

Leadership at various levels such as the government, civil societies, educational institutions, religious institutions and community institutions can play different roles in curbing the peril of gender based violence including sexual abuse. It is a common knowledge that gender based violence including sexual abuse is often perpetuated by individuals, preventing it or dealing with its outcomes requires an all-inclusive approach (Krug, Dahlberg, Mercy, Zwi, & Lozano,

2002) Therefore, leadership across various levels can play a huge role in managing the consequences and outcomes of gender based violence.

- Government – the Government has the responsibility of churning policies, developing legislations and enforcing the framework that creates safe environments for citizens particularly those at risk of gender based violence. There is the need for government to create alertness on the issues of gender based violence including sexual abuse. This will help people to know what to do to prevent it from happening and in case it happens, it will help them to know what to do. The government is also responsible for the training and empowerment of the law enforcement agencies so as to enforce the law adequately and promptly against perpetrators.
- Civil Societies – at the level of civil society leadership, advocacy and lobbying could be a great strategy to ensuring that government measure up to her responsibilities. Civil society organizations have also been known to provide medical care, counselling, skills training, and food for the survivors of gender based violence (UN Women, 2020).
- Educational Institutions – educational institution is one of the social establishments outside of the family and needs to first of all provide a safe environment for children against any form of abuse (UNESCO, 2014). Educational institutions need a clear policy on gender based violence including sexual abuse, which should be displayed conspicuously in the school premises.
- Religious Institutions – Religious institutions and leaders are assumed to be powerful and highly influential. The climate of religious institutions and the posture of religious leaders have the ability to drive attitudinal change and bring profound social change, including regarding GBV. Religious leaders can be intentional in the pursuit of attitudinal change through teaching, training and discipleship. They also can provide spiritual care and support for the survivors of gender based violence through counselling and psychotherapy, assuming they have the capacity and certification to provide such services.
- Community Institutions - community leaders are often respected by their people and as such they command great influence in their communities. Community leadership is one of the oldest institutions in Africa and it has huge influence at the grass root level. Community leaders can therefore push for initiatives that can prevent GBV, Teffo-Menziwa, Mullick, and Dlamini (2010). Community leaders can play significant role in advocating and driving social mobilisation interventions. The social mobilisations can strengthen community and cultural norms, values and social practices that can address gender based violence, Teffo-Menziwa et al. (2010).

Conclusion and Recommendation

This study concludes that gender-based violence, including sexual abuse against female adolescents in post-primary educational institutions results in negative outcomes in the life of victims, including low self-esteem. This is a public health concern that requires urgent attention from not only adolescent caregivers, but also national, community and religious leaders. The findings from this study also have implications for psychological or counselling interventions. Gesinde and Sanu (2015) suggest that seeking professional counselling intercession could resolve problems. The study therefore recommends a strategic leadership thrust, led by the government to re-orientate, educate and engage the Nigerian citizenry towards prevention of GBV as well as prosecute perpetrators. We further recommend that the government should fund counselling interventions for identified sexual abuse victims who may have suffered low self-esteem among other negative outcomes of gender-based violence.

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The Manager Toxicity and Its Influence on Social Psychological Climate Within A Crisis Enterprise

Alena FEDOROVA
Ural Federal University, Yekaterinburg, Russian Federation, a.e.fedorova@urfu.ru

Marina CHUDINOVSKIKH
Ural State University of Economics, Yekaterinburg, Russian Federation, chud-marina@mail.ru

Ilona POLENTS
University of West Bohemia, Plzen, Czech Republic, watt@bk.ru

Elena KOSTITSYNA
Ural Federal University, Yekaterinburg, Russian Federation, volnovav7@gmail.com

Abstract

During periods of organizational crisis, it is especially important for employees to feel the care and support of the employer, to trust the supervisor and follow him as a leader capable of managing and overcoming crisis situations. The social psychological climate within the work community plays a significant role in maintaining the stability of the enterprise, the formation of which is in the zone of managerial responsibility. A large number of previous studies of leadership are aimed at studying the professionally necessary qualities of leaders, and less attention has been paid to the influence of their personal characteristics on the social psychological climate. To identify causal relationships between the leader's individual characteristics and the social psychological climate within the labour collective forced to work under organizational crisis, the authors used a quali-quantitative approach, including such research methods as a case study, questionnaires and narrative interviews of employees. The presented study was conducted on the basis of a dairy industry enterprise in December 2019 - January 2020 with the participation of 75 employees, who, using the assessment tools proposed by the authors, characterized the adverse factors of the intra-organizational environment, as well as the personal and behavioural features of the enterprise manager. Based on the results of the study, the authors conclude that the employees of the dairy company assess the social psychological climate as unfavourable, and the manager toxic behaviour led to the emergence of a personnel crisis, which reduces the effectiveness of efforts to maintain the enterprise stability.

Keywords: crisis situation, toxicity of the internal organizational environment, social psychological climate, toxic manager.

Introduction

It is well known that one of the most important factors that determine the level of the psychological climate of the work collective is the management staff of the organization: the leaders' personal qualities, style and methods, as well as the authority of the leaders. Therefore, the main attention of researchers of the social psychological climate is often paid to the leader and the study of such characteristics as competence, education level, and work experience and management style. At the same time, less attention is paid to such a factor as the personal qualities of the leader, which determine the quality of his relationship with personnel in the organization.

Most of the research is aimed at determining the professionally significant qualities of a leader (Lysenko, Vazquez, 2019) but the influence of leader's personal characteristics on the social psychological climate in the organization has been studied to a lesser extent. Much attention is paid to the study of management styles that determine a certain course of internal processes in the team.

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It should be noted that modern business, due to the high risks associated with globalization, digitalization and the high risk of epidemiological outbreaks, is forced to work in conditions of the VUCA times, characterized by instability and a large number of crisis situations (Kraaijenbrink, 2018, Pesha, Tonkikh, 2020). In times of crisis, it is especially important for a leader to be attentive to the needs of subordinates and to do everything that can be done with no harm for the company and the well-being of employees. Indifference, insensibility, abstraction of the manager from real problems determines his toxicity, aggravating the situation of the crisis, in which the personnel find themselves. While workers expect sympathy, care and confidence in the future from their leaders.

The essence of HR management in a crisis is that employees want to trust their managers (Shook, Lacy, 2020). The basis for building trust is the ability of managers to meet three groups of workers' needs: 1) natural (meeting the needs for safety and protection), 2) mental (meeting the needs for increasing psychological stability) and 3) emotional (meeting the needs for unity and involvement). Thus, in times of crisis, management based on social psychological aspects, such as culture, trust, respect and values, becomes relevant (Fedorova, Dvorakova, et al, 2018).

Naumenko (2002) determines the effectiveness of the control action by the following characteristics: 1) social status, authority of the leader, prestige of the position, etc., 2) personal qualities of a leader - charm, strong-willed, intellectual superiority, wit, self-confidence, attention to others, the capability to captivate, 3) the level of the leader's skills to adequately apply techniques, rules and methods of influencing the control object, taking into account the purpose and specific of communication, 4) the features of the leader's role behaviour. For example, a leader must possess some traits of charm, capable of generating fear and awe in people, 5) the nature of the leader's attitude to his subordinate: benevolent, tactful and helpful; depending on the situation - demanding, strict, principled.

Insufficient attention to the above personal characteristics of the leader leads to the emergence of toxic management in the company. The concept of toxic manager is used to identify an employee in a managerial position who harms the social and psychological well-being of staff, in particular, and the organization as a whole (Fedorova, 2013, Kulkova, 2017, Koropets, 2019). The destructive influence of a toxic manager is the cause of the crisis of the organization's personnel. Such leadership style has a negative impact on employees: it contributes to the emergence of a "distrust syndrome", reduces the level of involvement and motivation of employees, and worsens the social psychological climate in the team.

Moreover, the presence of toxic management directly leads to deterioration in the social psychological well-being of employees and to a decrease in the effectiveness of their activities. For example, Lubit, who studied the phenomenon of toxic management, believes that for effective management of people it is necessary to understand and correctly assess their behaviour (2008). The capability to understand and manage your own and other people's feelings and emotions is called "emotional intelligence". Salouay (1990) and Mayer (1981), studying emotional intelligence, define it as the ability to perceive and understand personality manifestations expressed in emotions, to control emotions through intellectual processes. According to Goleman, emotional intelligence is divided into four parts: 1) the ability to perceive both one's own emotions and those of others, 2) the ability to use emotions in favour of the mind, 3) the ability to understand emotions, 4) the ability to control emotions (1998). Later, a connection was found between the characteristics of emotional intelligence and business performance: leaders, whose emotional intelligence is more developed, manage their teams much better.

On the contrary, the individual qualities of a leader associated with his deformation and the appearance of rigid stereotypes in the personality structure reflect both the wrong perception of the organization and himself as a manager in the organizational structure and the choice of an adequate communication style, which often gives rise to interpersonal conflicts in the “leader –subordinate” dyad. In accordance with Chernikov (2012), the conflict index of the “direct boss – subordinate” dyad exceeds the average conflict level of the "employee – employee" dyad by about 30 times. An assessment of trends in the quality of activity in the “boss – subordinate” dyad shows that the quality of work of a subordinate decreases about three times more often than that of a boss (Tsvetkov, Tanov, 2017).

Contradictions are exacerbated in a crisis, when management activities require mandatory consideration of additional factors that have a negative impact on the leader's personality: the unfavourable influence of the external and internal environment of the organization, great dynamism of the situation, a high level of stress when performing official duties, severe consequences of wrong decisions, physical and mental overload, uncertainty of the situation, tension in the team.

The personal qualities of the leader, influencing the social psychological climate, are assessed, among other things, by the subordinates. The presented article is devoted to the results obtained at a particular Russian milk processing enterprise on the basis of a quali-quantitative approach using a number of research tools.

Methods

In order to identify causal links between the personal characteristics of the leader and the level of the social psychological climate in the work collective, forced to work in context of an organizational crisis, the authors used a quali-quantitative approach, including such research methods as a case study (the object of research is an particular enterprise - production of processed liquid milk), employee questionnaires (provides quantitative assessments) and narrative interviews (provides qualitative assessments).

The presented study was conducted on the basis of the Ural branch of the joint-stock company operating in the Russian dairy industry, in December 2019 – January 2020. The financial problems of the enterprise, associated, among other things, with the stagnation of the Russian dairy market, led to the need for its restructuring with a subsequent reduction in the number of personnel. Over the past year, the following changes have taken place in the personnel policy of the dairy plant: a massive reduction in the number of employees (more than 50 people per month or more than 20% of employees per year), the removal of part of the employees from the company's staff and dismissal due to the transfer of certain works to outsourcing. The restructuring of an enterprise or a certain department affected 62.7% of the staff, and 14.7% of employees faced a forced decrease in working hours.

The total number of workers at the dairy plant at the end of 2019 was 84 people. The study involved 75 employees (89.3%), most of whom have open-ended employment contracts (80%). The structure of respondents by categories of personnel includes: specialists – 32%, manual workers – 21.4%; department heads – 9.3%; line personnel – 37.3%. Most of the respondents are women (55%). More than half of the respondents (53.3%) are 35-50 years old, 36% of the respondents belong to the age group under 35 and 10.7% are over 51 years old.

Based on the previously established fact of general dissatisfaction of the personnel with the management of the plant (namely, the manager of the branch), at the first stage of collecting empirical data, respondents were asked to fill out a questionnaire containing a number of questions aimed at identifying toxic personnel management practices used at the enterprise. Particular attention was paid to judgments regarding the personal and behavioural characteristics of the head of the branch (woman, over 50 years old). At the second stage, on a voluntary basis, was formed a focus group of respondents (12 people), who gave their consent to a narrative interview. During the interview each of them was asked to share their opinion and examples of destructive interaction with the head of the branch. Generalization of the results of questionnaire and narrative surveys, considered in the context of a dairy enterprise in a crisis situation due to the current restructuring processes, will provide data for analysis and determination of the significance of toxic management as one of the factors of crisis in the organization.

Results

The analysis of the results of dairy plant workers survey was carried out by the authors taking into account the gender characteristics of the respondents' perception of the personal and behavioural characteristics of the manager. Fig. 1 shows the distribution of the answers of the interviewed male and female workers as to how they would characterize the head of the branch.

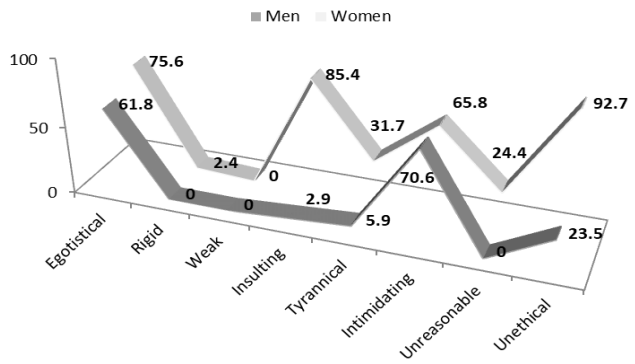

Fig. 1: Distribution of respondents' answers to the question of toxic personal characteristics of the assessed manager, %

Comparison of the aggregate of the answers of men and women shows the presence of both insignificant and significant differences in the assessments. It is obvious that female respondents generally have a more negative assessment of the branch manager, than men have. The difference is especially noticeable in the following cases: 1) a significant majority of women consider the top manager to be "offensive", while almost none of the men indicated this characteristic; 2) 3.9 times more women than men consider a top manager "unethical"; 3) every fourth woman (but not a single man) calls a top manager unreasonable; 4) 5.4 times more women than men indicate the tyrannical character of the top manager.

Similarities and differences in the assessments of the interviewed male and female workers are also observed in the distribution of answers to the question regarding the behavioural characteristics of the assessed manager (Fig. 2).

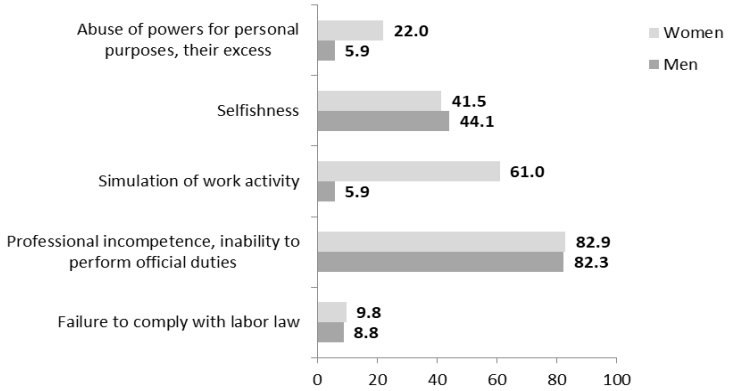

Fig. 2: Distribution of respondents' answers to the question regarding toxic behavioural characteristics of the assessed leader, %

The most noticeable differences in the assessments of women and men are that slightly less than two-thirds of female respondents believe that the head of a branch imitates work activity, and every fifth indicates that a top manager is abusing power. And only a small number of male respondents have the same opinion.

A more detailed list of behavioural characteristics of a toxic manager was offered to the respondents to select the appropriate, in their opinion, the top manager they were assessing (Table 1).

Table 1: Distribution of respondents' answers to the question about toxic models of interaction in the dyad "boss – subordinate" of the leader they assess, %

Factor	Men	Women
My boss deliberately provides me with false or misleading information	14.7	24.4
My boss lies to me sometimes	2.9	39.0
My boss deliberately withholds information from me that I need to do my work	5.9	61.0
My boss tells me how I should manage my free time	2.9	2.9
My boss humiliates me in front of other employees	5.9	29.3
My boss calls me unflattering names	0.0	14.5
My boss usually thinks I'm the worst and blames me whenever something goes wrong	20.6	85.4
My boss treats me unfairly	44.1	51.2
My boss steals my good ideas or work and claims it for herself	0.0	12.2
My boss expresses his emotions in public by shouting, swearing, or throwing things at me	0.0	22.0
My boss criticizes my personality and personal life, not my work	0.0	14.6
My boss is impolite to me	35.3	73.2
My boss disregards my opinion	2.9	68.3
My boss often blames me for her failures	2.9	2.4
My boss threatens me to get what she wants	70.6	65.8

The table shows a higher level of harshness in the assessment of female respondents in comparison with surveyed men. Gender specificity is manifested here, for example, in the fact that men are little worried about such destructive manifestations in the behaviour of a leader as his dishonesty, hiding information necessary for work, humiliating and emotionally offensive behaviour that she demonstrates in relation to a subordinate. At the same time, men slightly more often than women (70.6% versus 65.8%) point to the fact that the assessed leader uses threats as a motivation tool. A third of the male respondents consider the manager to be impolite, and every fifth notes the accusatory position that the leader most often takes. The women surveyed are in solidarity with men in all of the above assessments, but in addition, two-thirds of them worry that the branch manager does not take their opinion into account.

At the stage of narrative analysis, primary data processing was carried out using the grouping method, and toxicity factors of labour relations were identified (Table 2).

Table 2: Identification of toxic factors in labour relations based on the analysis of narratives of the interviewed dairy company workers

Narrative elements	Toxic factors
– “The leader is completely inadequate, constantly yells for no reason, humiliates. Subtracted [from salary - note. authors] for everything. Always unhappy with everything. The unskilful leader pursues only own interests. Apparently, she only needs money. " – “As a leader, she doesn't cope. She constantly says that we have nothing to think with (no brains). " – “Person - mood. When she is in the good mood, she will thank and praise, but when she is angry, it is better not to approach, hide and be silent, not to say anything across her. " – "In stressful situations, she behaves inappropriately, uses foul language."	Destructive (abusive) behaviour of the leader
– “When I got a job at this plant, at the interview I was told that everything is official, the salary is clear, the benefits. But I worked there for 3 months and still haven't paid for the medical examination costs. " – “When I was applying for a job, they promised that work on holidays and weekends would be paid double. At first everything was great, but now the work	False promises in hiring

schedule has been changed and double payments are almost never paid. "	
– “Our company has low salaries. Now the company is at the stage of a change of administration, and I am glad that I am still working at all. Many are laid off, many leave on their own. They constantly say that all of us at this plant are not eternal, making it clear that we can be fired for no reason. " – "I did not violate law, I have a sick leave officially, but they threaten me that the patience of the managers will burst and they will ask me to go." – "The manager deliberately humiliates, puts spokes in the wheel, as it is necessary to push the employee to quit."	Lack or poor interaction with leader
– “Relationships in the team are tense. We all endure each other, each has his own opinion, and there is no team. " – “There is no team, what kind of relationship can be here? Purely business communication "me to you, and you to me". "	Toxic relationships in collective
– “I have been working as a senior accountant at the company for 3 years. The workplace was identified in the tiny room, there is no direct sunlight, there is no ventilation either. " – "Terrible working conditions." – "The management changed the system of motivation for the worse."	Poor working conditions

It should be noted that in most cases in the story of an individual respondent there is simultaneously an indication of 2-3 toxic factors of labour relations. As can be seen from the table, the most common factor noted by respondents is the destructive (insulting) behaviour of the leader. The next most frequently mentioned factor is the factor of deception in employment, as well as unfriendly relationships in the team.

Thus, the data of the narrative interview supplement the results of a structured survey of dairy plant workers and provide a more complete picture of the conditions under which the personnel of the studied enterprise that going through a crisis period is forced to work and which factors have the most negative impact on the workers well-being.

Conclusion

Based on the results of the study, it can be claimed that the personnel of the dairy plant assess the general social psychological climate as unfavourable. The financial problems of the enterprise led to the need for its restructuring with a subsequent reduction in the number of personnel. The toxic behaviour of the head of the dairy plant branch under study, due to her psychological unsuitability for profession, aggravated the expected deterioration of the social psychological climate in the work collective.

The psychological conditions in which employees find themselves affect the formation of relationships between members of the work collective in the dyads "boss - subordinate" and "colleague – colleague". These conditions can either increase or decrease the level of well-being in the workplace, and the role of the social and psychological climate in the work collective becomes especially important in crisis situations.

The results of the case study show that the branch manager assessed by the respondents can be identified as a toxic manager who generates crisis situations by his behaviour in interaction with subordinates, and, as a consequence, has a negative impact on the performance indicators of both individual employees and the enterprise as a whole. It becomes obvious that the interviewed workers are more concerned about the toxicity of the manager, and not the crisis state of the dairy company. It should be emphasized that the toxicity of the assessed manager led to the emergence of a crisis of the enterprise personnel, which manifests itself in the absence / lack of satisfaction of the social needs of workers. In these conditions, it is difficult for employees to hope for a successful getting out of the enterprise from the crisis, which explains the general pessimistic attitude of the collective.

Acknowledgment

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Sub-Zones in The Euro Area as Optimum Currency Areas

Bogdan WLODARCZYK

University of Warmia and Mazury, Olsztyn, Poland
bogdan.wlodarczyk@uwm.edu.pl,

Paulina PUKIN

University of Warmia and Mazury, Olsztyn, Poland
paulina.pukin@uwm.edu.pl

Abstract

Researchers assert that the euro area is not an optimum currency area (OCA). Hence, the currency union is characterized by considerable vulnerability of economies to asymmetric shocks and the ECB's monetary policy is unable to counteract negative consequences of the implementation of the common currency. However, researchers highlight that some of the EU countries could become an optimum currency area. The objective of this study was to verify the assertion put forth by B. Eichengreen and T. Bayoumi, implicating the existence of several groups of countries in the EU (to which two other sub-areas were added: Central Eastern Europe, and Cyprus and Malta) which can be distinguished based on macroeconomic criteria. In line with the assumptions made by economists, the sub-zones could satisfy the criteria devised in the OCA theory, as suggested by the main proponents of this concept, that is the convergence of business cycles, labour mobility, inflation and liberal economy. The research results implicate that the analyzed euro sub-zones do not fully satisfy these criteria. However, three countries, Germany, France and the Netherlands, could create a sub-zone of optimum currency area.

Keywords: the euro, the euro area, optimum currency areas

Introduction

The euro area is an example of a territory endowed with high economic integration. Its formation was among the most significant challenges in the world of modern-day international finances and an extremely important element in European integration. The idea of a European common currency area, ever since it was articulated in the 1950s, has given rise to numerous controversies, stirred by the inclusion of various, sometimes extreme concepts to lay the foundations of the euro area.

One of the most influential ideas in the creation of the eurozone was the theory of optimum currency areas (TOCA). This concept originated and was further developed in 1960-1999, and the founders and main contributors were R. Mundell, R. McKinnon, P. Kenen as well as J.C. Ingram, or J.A. Frankel and A. Rose. Economists considered the idea of creating a common currency (or only of stiffening the exchange rate) in the context of macroeconomic shocks. Although they disagreed about certain details, it was universally claimed that an optimum currency area (OCA) is a region where a floating rate of currency exchange should be foregone because benefits to be gained from a fixed rate of exchange prevailed over threats. The literature emphasizes that the chief benefits from creating an optimum currency area are: declining interest rates, access to greater capital resources and higher market liquidity as a result of the merger of national capital markets as well as stronger macroeconomic stability of less developed countries owing to their access to an area of a stable and reliable currency.

The authors of TOCA strove to define the criteria that should be met by countries intending to adopt a common currency. K. Piłat (2011) mentioned such parameters as: mobility of production means (mainly labour force), elasticity

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of prices and salaries, liberal economy, diversification of production, similar preferences regarding inflation and fiscal integration.

Although the European Union member states did not meet the aforementioned TOCA conditions in the 1990s, it was decided to introduce a common currency in an area that actually did not satisfy the theory's assumptions. An assertion was made that monetary integration would contribute to greater economic convergence and economic cooperation. Beside, several initiatives with an aim to support economic convergence of the EU member states were undertaken at the same time. Nevertheless, some twenty years after euro was created, the euro area cannot be deemed as an optimum currency area due to large socio-economic disproportions

Economists continue to ponder which European countries might create an OCA. However, all pertinent analyses are incomplete and provide inconclusive results, which is due to numerous imperfections and inaccuracies of the theory of optimum currency areas, mainly the ambiguity of criteria. Later on, economists either developed some of the theoretical assumptions or presented entirely different opinions thereof (e.g. a dispute about open or closed economy, or discussions about the role of labour mobility in the theory). There is also a contradiction between diversification of production versus specialization and innovative approach. Other imperfections of the theory are: lack of a hierarchy of criteria, and failure to take into consideration several pertinent issues related to modern-day international finances and competitiveness of economies.

Research objective and methodology

Previous analyses made by economists may lead to the conclusion that a solution to structural problems of the eurozone is to create euro sub-zones, which would meet the criteria set by the theory of optimum currency areas. They would most probably be smaller regions with a similar socio-economic situation.

The aim of this study was to verify the assertion put forth by B. Eichengreen and T. Bayoumi, implicating the existence of several groups of countries in the EU (with two more groups distinguishable, such as the states of Central and Eastern Europe, and Cyprus and Malta), which could be distinguished according to macroeconomic criteria. The economists noted that the EU's core countries (Germany, France, Belgium, the Netherlands and Denmark) are characterized by the convergence of macroeconomic shocks, which allows them to implement a shared and effective monetary policy. As assumed by the economists, individual sub-zones would satisfy the criteria of the theory of optimum currency areas suggested by the theory's founders. This assertion has been verified.

To this intent, the key criteria in the OCA theory were considered, that is convergence of business cycles (GDP dynamics), mobility of labour force (a share of emigrants in total population, share of emigrants who decide to leave for a country in the eurozone and in a given sub-zone as well as most important directions of emigration chosen by citizens of every country), inflation (an annual rate of price change), and economic openness (a ratio of export to the GDP, major trade partners). The research results can serve as a basis for further studies on the question whether the designation of several sub-zones in the European common currency would be economically viable in line with the theory of optimum currency areas.

The European Union was divided into a few sub-zones, according to earlier observations and determinations reported by economists, and in line with the socio-economic development of each country, size of national economy and, last but not least, political and economic history. Four groups of countries were identified:

- sub-zone A, with the highest socio-economic development level, identified in the research by B. Eichengreen and B. Tayoumi; four countries belong to this sphere: Germany, France, Belgium, the Netherlands and Denmark.

- sub-zone B, the PIIGS countries – Portugal, Italy, Ireland, Greece and Spain,

- sub-zone C – countries of Central and Eastern Europe: Lithuania, Latvia, Estonia, Poland, the Czech Republic, Slovakia and Hungary,

- sub-zone D – small, insular countries: Cyprus and Malta.

No groups were created for Austria, Finland, Luxemburg, Slovenia, Romania, Croatia and Bulgaria. The exclusion of these states is a consequence of the fact that they had not been considered in earlier analyses and their socio-economic position is completely different from that of the remaining countries.

The time span chosen for the study - from 1998 to 2018 – helped to verify whether the EU countries satisfied the optimization criteria *ex ante* and/or *ex post*.

The methods applied in the study were as follows: critical perusal of scientific sources and statistical analysis. The former method served to describe the evolution of the theory of optimum currency areas, while the latter was applied to check if the above sub-zones fulfilled the criteria defined in the theory of optimum currency areas.

Statistical data originated from official webpages of the World Bank and Trading Economics.

Theory of optimum currency areas

The major part of the concept known as the theory of optimum currency areas (TOCA) provides a set of criteria, referred to as optimization criteria. Researchers have been making efforts to identify the criteria that countries should meet so that the benefits gained from fixing a currency exchange rate would surpass the losses.

R. Mundell was the founder of the theory of optimum currency areas. This Canadian economist (1961) tried to determine the conditions that ought to be met by countries which intended to lock exchange rates between each other. According to that researcher, representing supply-side economics, an optimum currency area (OCA) can be created from regions of a country or from a few countries which are distinguished by high workforce mobility as well as elasticity of prices and wages. R. Mundell concluded that the above were the basic conditions that allowed a given area to restore balance in cases of macroeconomic shocks. A similar definition was later proposed by F.P. Mongelli (2002), who emphasized that an optimum currency area is a region in the geographical sense where either only one currency is used or all currencies have locked currency exchange rates between them. In this study, it was assumed that an optimum currency area is a monetary union which satisfies the criteria set in the optimum currency area theory.

R. McKinnon (1963) identified major benefits from founding an OCA, such as ensuring full employment, balanced international payments, and internal level of prices. This economist initiated a long discussion about the significance of economic openness in a currency union. He concluded that a high level of economic integration should enable absorption of macroeconomic shocks.

P. Kenen (1969) asserted that countries wishing to form an optimal currency area should present a high level of diversification of production. In his opinion, specialization is a perfect element of an OCA, as this allows for greater absorption of macroeconomic shocks than workforce mobility does. Diversification of the production of export goods can spread the risk when a state of imbalance appears. The mentioned economists also highlighted the role of a common budget for a currency union, as another instrument for absorbing macroeconomic shocks.

J.C. Ingram (1972) also suggested that a currency union in Europe should be preceded by fiscal coordination. P. Kenen shared this view. He believed that there should be fiscal solidarity between countries that compose a monetary union. The states entering the union should implement fiscal transfers only when some unfavourable changes happen, e.g. growing unemployment.

A new approach in the TOCA was developed by J.A. Frankel and A. Rose (1997), who agreed that the biggest gains to be achieved are: broader economic international connections, possible increase in specialization and convergence of business cycles. These economists proposed a new look at a currency union, where the states that compose a sphere of a shared currency do not need to meet the TOCA before a shared currency is implemented in all interested countries. Introduction of a new currency in itself can stimulate a rise in convergence between the involved countries.

Sub-zones in the euro area – theoretical background

Most economists agree that the euro area did not meet the criteria of the TOCA. The literature most often mentions such shortcomings as the lack of a budget for the currency union, or low mobility of labour force. These are frequently implicated as significant hurdles to the effectiveness of the European Central Bank. Furthermore, the currency union in

the EU is an organization composed of too many (19) countries, with highly diverse social and economic situation. Some economists (e.g. R. Mundell, B. Eicheengreen and T. Bayoumi, H. Caraveli, W. Bartlett et al. Prica) have pondered whether it could be possible to distinguish some of the EU states in order to form an optimum currency area. R. Mundell is called 'the father of the euro area'. According to this academic, the European currency area back in the 1970s should have comprised Great Britain, France, Italy, Belgium and Luxemburg.

B. Eichengreen and R. Bayoumi (1992), having analyzed degrees of synchronization of supply shocks, divided the European Union into two parts: the core, that is Germany, France, the Netherlands and Denmark, where high correlation appeared, and the periphery, that is Greece, Ireland, Portugal, Spain and the UK, where synchronization was distinctly lower. In consequence, highly developed countries have a better chance to counteract macroeconomic shocks in the future.

A similar division can be found in other scientific references. The core countries are Germany, Austria, Finland, Belgium, the Netherlands and France, while the remaining countries are Italy, Spain, Portugal, Ireland and Greece.

H. Caraveli (2016) mentioned a similar classification of countries, into core ones, with the highest GDP per capita, and peripheral ones. The core countries comprised: Austria, Belgium, Ireland, Luxemburg, the Netherlands, Germany, Finland, France, Italy, Spain (and others, for example Iceland, Norway, Switzerland, Sweden, Denmark, and the UK). The latter group was composed of Cyprus, Malta, Slovenia, the Czech Republic, Greece, Portugal, Slovakia, Lithuania, Latvia, Estonia, Hungary, Poland, Croatia, Romania and Bulgaria. An average GDP per capita in the core countries is twice as high as in the peripheral ones.

W. Bartlett and I. Prica (2016) divided the countries into core and peripheral ones taking into account whether a given country was in the euro area and in the EU. The first group *(Inner Core*) contains Austria, Belgium, Finland, France, Germany and the Netherlands, while the second group (*Outer Peripery*) comprises the Czech Republic, Denmark, Estonia, Lithuania, Poland, Slovakia, Sweden and the UK; the third category (*Inner Periphery*) consists of Cyprus, Greece, Ireland, Italy, Portugal and Spain, and the fourth one (*Outer Periphery*) encompasses the countries outside the euro area, such as Bulgaria, Hungary, Romania, and finally the fifth group (*Super Periphery*) (countries with connections to euro but not EU members) includes Albania, Croatia, Macedonia and Serbia. Now, this publication was issued in 2016 and some countries should now be transferred to other groups, e.g. Estonia, Lithuania and Latvia would now belong to the first group, while Croatia should enter the fourth one.

P. De Grauwe (2003) drew the conclusion that Germany and France together with the Benelux states satisfy the OCA criteria on trade. However, it is worth considering whether the euro area composed of highly developed countries could be named an optimum currency area. The cited researcher arrived at this conclusion only on the basis of studies on the correlation between economic convergence and labour market in every country. De Grauwe mentioned Austria, Ireland, Portugal, Spain and Italy as countries that might co-create an OCA with highly developed countries. However, no detailed analysis is available now to testify whether the above set of countries would meet the OCA requirements.

J. Stiglitz (2017), without mentioning specific countries, has concluded that a solution to the problems in the euro area is to divide this monetary union into several groups. The Nobel Prize winner believes that it would be worthwhile to introduce flexible euro in all countries within the common currency area in the EU.

Sub-zones in the euro area versus optimum currency areas

Business Cycles

The first indicator submitted to the analysis is the GDP annual growth rate in the researched group of countries. An analysis of this indicator over a long time period can indicate convergence of business cycles in the chosen group of countries. Convergence of business cycles would facilitate decreased susceptibility to various macroeconomic shocks. Moreover, convergence of business cycles should contribute to an improved effectiveness of common monetary policy.

Business cycles in the whole European Union are approximate but not identical. They also differ within the distinguished sub-zones (Figure 1-4).

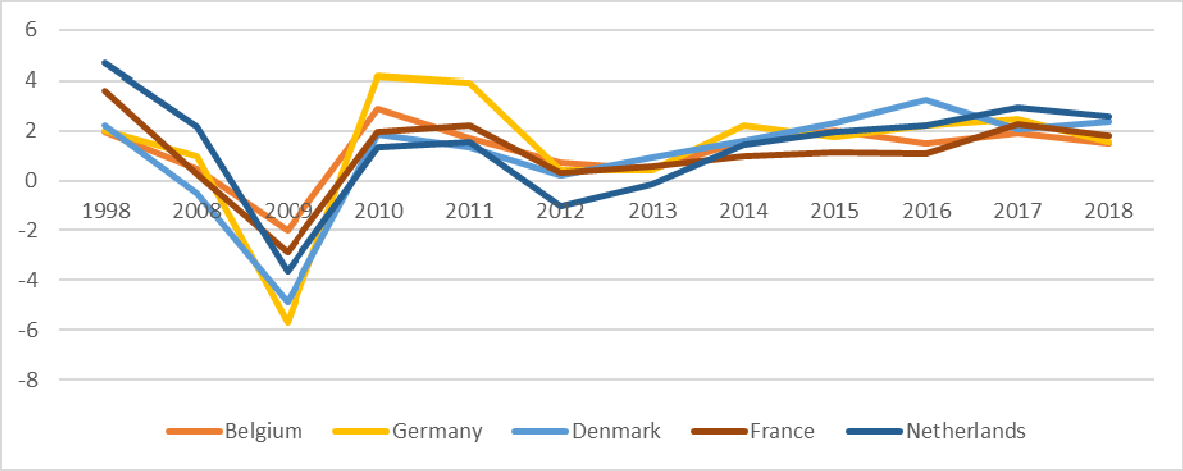

Fig. 1: Business cycles in group A

Source: own study based on World Bank data

Group A displays very similar business cycles. It can be assumed that all these states meet the criterion of convergence of business cycles because their economies are mutually correlated. One might suspect that this was also the case in Western Europe prior to the introduction of euro. All group A countries experienced a similar decrease in the GDP in 2009 (approximately -5% relative to the previous year) as well as a high growth in the GDP in 1999, 2010 and 2016.

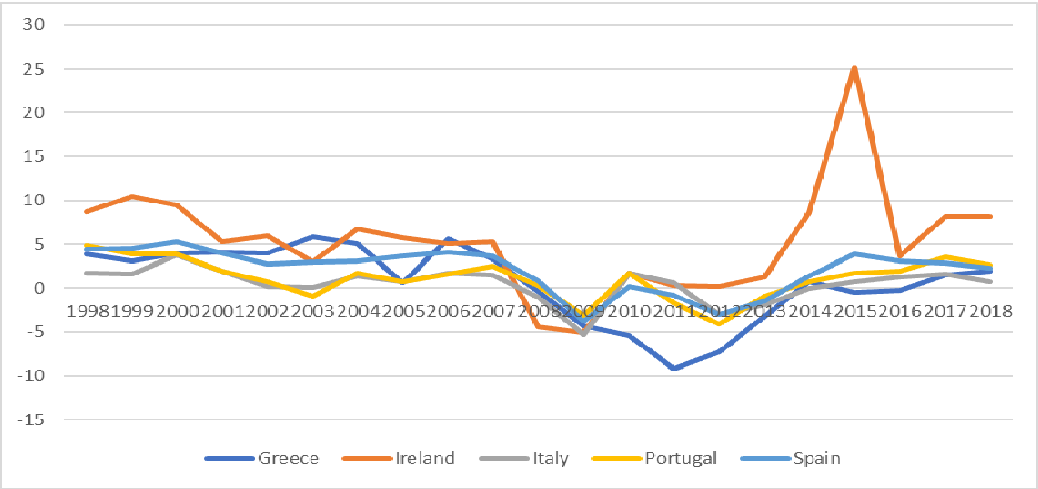

Fig. 2: Business cycles in group B

Source: own study based on World Bank data

Larger disproportions in terms of business cycles occur in sub-zone B. A country with a distinctly different course of business cycles than the remainder is Ireland, which stood out with its highest GDP growth over that time period. A much higher increase in the GDP was noted in this country in 2015 (25.16%). Another country with a different business cycle from the other group members is Greece, where a decrease in the GDP during the crisis was demonstrably the biggest. Portugal and Italy have most similar business cycles. These two countries also present a relatively high level of correlation of business cycles with Spain (especially since 2016). It can be assumed that only these countries meet the analyzed OAC criterion.

Group C countries are characterized by similar business cycles. The countries which have adopted euro, i.e. Latvia, Estonia and Lithuania, tended to suffer a greater decline in the GDP in 2009 (-15%), whereas the GPD in Poland increased by a few percent in the same year.

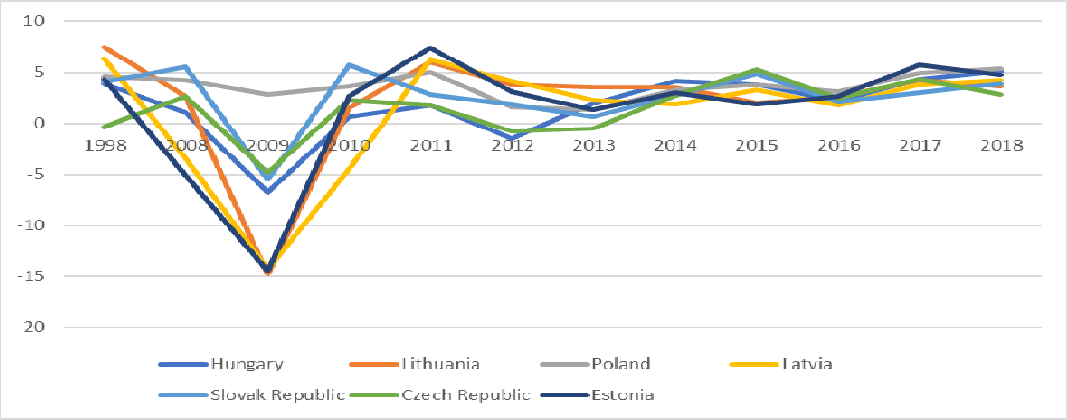

Fig. 3: Business cycles in group C

Source: own study based on World Bank data

In 1998-2011, the business cycles of the two countries in sub-zone D were convergent. In that time period (in 2008), both of these countries adopted euro. Afterwards, there were some notable disproportions in the development of Cyprus and Malta. In 2013, Cyprus suffered the highest decrease in the GDP; in the same year, the GDP of Malta was on the increase. The GDP in both countries was increasing in 2013-2015, to decline slightly afterwards. However, it is difficult to state conclusively whether these two countries satisfy the analyzed criterion.

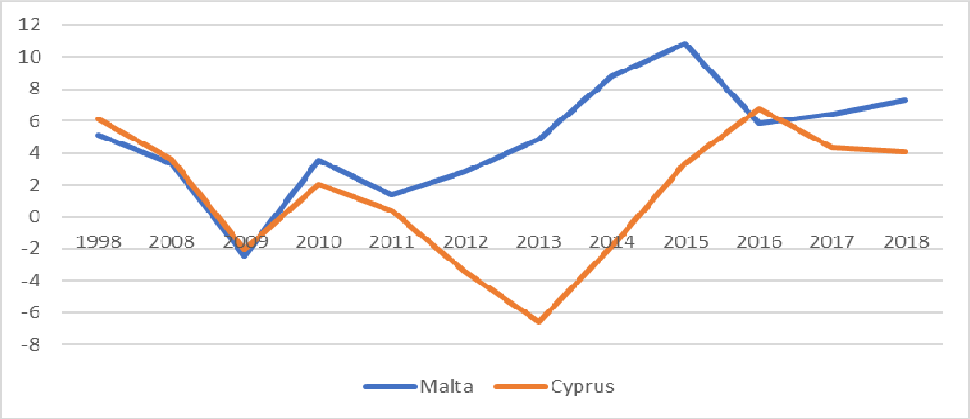

Fig. 4: Business cycles in group D

Source: own study based on World Bank data

Economic Openness

Economic openness is another significant indicator. It is most often expressed as the share of exports of goods and services in the country's GDP. A monetary union composed of countries with a high degree of economic openness would be more likely to successfully handle macroeconomic shocks.

The European Union member states vary in terms of economic openness. Distinct differences can be noted in all the sub-zones (Table 1).

Table 1: Economic openness in the European Union

Sub-zone	Country Name	1998	2018
A	Belgium	124,71	165,42
	Denmark	71,30	105,24
	France	49,51	64,48
	Germany	51,58	88,67
	Netherlands	112,55	157,65
B	Greece	42,27	72,52
	Italy	45,09	60,51
	Ireland	157,98	211,51
	Portugal	63,83	87,00
	Spain	52,66	67,52
C	Czech Republic	84,69	150,54
	Estonia	157,06	145,00
	Hungary	107,43	165,50
	Latvia	90,81	123,19
	Lithuania	89,65	149,30
	Poland	56,66	107,48
	Slovak Republic	102,07	190,42
D	Malta	223,31	268,77
	Cyprus	134,91	145,34

Source: own study based on World Bank data

Group A shows differentiation with respect to economic openness. The most open countries are Belgium and the Netherlands (over 100%). Countries with a lower degree of economic openness are Denmark, Germany and France, of which the latter country scores the lowest among group A states regarding economic openness. It also has one of the lowest economic openness scores among all EU member states.

Most countries in sub-zone B present similar economic openness recorded in 1998 and 2018. While it was equal 45-63% in 1998 and 60-87% in 2018, the lowest values in both years were noted in Greece, while the highest were ascribed to Portugal. Portugal has a high degree of economic openness, which continues to increase (from 157.98 to 211.51% between 1998 and 2018).

The economic openness in 1998 and in 2018 varied among the countries classified as sub-zone C ones. The demonstrably lowest trade to GDP ratio was observed in Poland (56.66 in 1998 and 107.48% in 2018). In the remaining countries, it reached at least 90% in 1998 and 120% in 2018.

Cyprus and Malta are characterized by a high degree of economic openness (over 100%), although it is much higher in Cyprus than in Malta.

In the light of the above information, it is difficult to determine whether the aforementioned countries satisfy the economic openness criterion. All EU states are open, although it is possible to observe a high degree of diversity with respect to the contribution of exports to the GDP in individual countries and even within some of the sub-zones. For instance, relatively much variation in this indicator can be noted in sub-zone A, but the countries with a lower degree of economic openness (France, Germany) are ones with big economies, whose nominal value of exports exceeds the trade

exchange of the remaining countries. A similar observation can be made in sub-zone C. The lack of reference values makes it even more difficult to identify the countries which should create euro sub-areas.

The adaptation of euro should contribute to an increase in exports and economic openness. Notably, there was an increase in the share of exports in the GDP in all EU member states between 2001 and 2011. However, the European Union countries achieve different nominal values of exports of goods and services (Table 2).

Table 2: Export in the European Union

countries	increase in economic openness in 2001-2011	exports of goods and services (current USD prices, million)	Sub-zone
Cyprus	107,92	18238,67	D
Malta	224,75	21082,89	D
Latvia	413,50	21094,24	C
Estonia	424,08	22820,68	C
Lithuania	487,97	40403,54	C
Greece	136,79	78773,23	B
Slovak Republic	379,15	101764,1	C
Portugal	153,01	104745,7	B
Hungary	250,37	134104	C
Czech Republic	390,99	192222,9	C
Denmark	146,63	197903,5	A
Poland	333,87	325572,7	C
Belgium	148,99	448189	A
Ireland	136,92	467882	B
Spain	149,90	498320,1	B
Italy	105,77	655446,9	B
Netherlands	150,09	770414,9	A
France	109,02	870409,4	A
Germany	172,51	1871808	A

Source: own study based on World Bank data

After the introduction of euro (2001-2011), all European countries recorded a rise in exports. The highest increase was noted in group C, i.e. in Lithuania, Estonia, Latvia, the Czech Republic, Poland and Hungary (250-480%). This growth, however, was caused by the fact that all these economies were becoming more open. Quite a high increase in exports was also noted in the other counties, e.g. in Germany, Portugal and the Netherlands, in Spain, Belgium and Denmark (circa 150%). The smallest increase in trade in 2001-2011 occurred in Italy, Cyprus, France (107-110%) and in Greece and Ireland (136%).

The highest values of exports were noted in 2018 in group A, mainly in Germany, France and the Netherlands (870-187 billion USD), followed by sub-zone B. The peripheral countries are characterized by large values of exported goods and

services in the EU (Italy, Spain – nearly 500 b USD). Much lower values of exports are achieved by Cyprus and Malta (18-21 million USD) as well as Latvia, Estonia, Lithuania and Slovenia (21-46 b USD).

Countries in an optimum currency area should not only feature high economic openness but, even more importantly, are expected to have a large share of trade with partners from the currency union. Nearly all EU countries are characterized by high economic openness towards other European countries (especially towards Germany and the UK), although not necessarily towards other partners from the euro area, and even less so towards other countries from the distinguished euro sub-zones (Table 3). It can be noticed that much of the exports from particular countries reached either the geographically closest countries or the highly developed EU member states.

Table 3: The most important trading partners of the European Union Member States

Sub-zone	Country Name	The most important trading partners of the European Union Member States
A	Belgium	Germany (18%), France (14%), Nethelands (12%), UK (7,7%), USA (6,3%)
	Denmark	Germany (17%), Sweden (12%), Norway (7,2%), United Kingdom (6,9%)
	France	Germany (15%), USA (8,0%), Spain (7,95), Italy (7,6%), Belgium (7,2%)
	Germany	USA (9,1%), France (8,2%), China (7,4%), Nethelands (6,3%), UK (6,0%)
	Netherlands	Germany (22%), Belgium (10%), UK (8,3%), France (8,0%), USA (5,0%)
B	Italy	Germany (12%), France (11%), USA (9,8%), Switzerland (5,6%), USA (5,3%)
	Ireland	USA (31%), UK (11%), Belgium (10%), Germany (9,1%), Netherlands (5,8%)
	Portugal	Spain (26%), France (13%), Germany (12%), UK (6,2%), USA (5,2%)
	Spain	France (16%), Germany (11%), Italy (8,2%), Portugal (7,8%), USA (7,0%)
C	Czech Republic	Germany (32%), Slovak R. (7,6%), Poland (6,0%), France (5,1%), GB (4,5%)
	Estonia	Finland (16%), Sweden (10,0%), Latvia (8,8%), Russia (8,5%), USA (6,9%)
	Hungary	Germany (28%), Italy (5,2%), Slovak R. (5,2%), Romania (5,1%), Austria (4,6%)
	Latvia	Lithuania (17%), Estonia (12%), Russia (9,2%), Germany (7,2%), Sweden (6,6%)
	Lithuania	Russia (14%), Latvia (9,5%), Poland (8,0%), Germany (7,6%), Estonia (5,1%)
	Poland	Germany (28%), Czech R. (6,2%), GB (6,1%), France (5,8%), Italy (4,6%)
	Slovak Republic	Germany (22%), Czech R. (11%), Poland (7,5%), France (7,0%), Hungary (6,3%)
D	Cyprus	Netherlands (15%), Libya (12%), Greece (8,8%), UK (7,0%), Hong Kong (3,0%)
	Malta	Germany (17%), Italy (9,6%), France (9,0%), Japan (5,3%), UK (5,3%)

Source: own study based on Trading Economics data

Significant partners for group A countries are Germany and the USA, and sometimes the Netherlands and Belgium. The most popular trade partners for group B countries are Germany, France, the USA and the UK. Spain also exports its

commodities to Italy and Portugal, while Portugal sends much of its exported goods to Spain. Among group C countries, popular destinations for exports are France, Russia for Lithuania and Latvia, and Poland. The only important trade partner for group D countries is Germany. No large trade exchange was observed between Malta and Cyprus.

In the light of the above, the highest share of exports reaches highly developed countries (Germany, the USA, France, the UK) or neighbour countries (e.g. Russia in the case of sub-zone C countries). Far less often decisions are made to enter export-import relations with countries from the same sub-zone, which leads to the conclusion that sub-zones B and D certainly fail to meet the criterion of high economic openness within a common currency area. In the case of group C, it would be possible to distinguish two sub-groups: the Czech Republic-Slovakia-Poland and Lithuania-Latvia-Estonia.

Inflation

Another criterion is the similarity of inflation rates. Both convergence of inflation and convergence of business cycles make it easier to deal with macroeconomic shocks. The European Union member states have similar, low inflation rates, which in most of these countries tend to decrease (Table 4).

Table 4: Inflation

sub-zone	country	1998	2008	2018
A	Belgium	0,95	4,49	2,05
	Germany	0,91	2,63	1,73
	France	0,65	2,81	1,85
	Netherlands	1,96	2,49	1,70
B	Greece	4,77	4,15	0,63
	Ireland	2,42	4,06	0,49
	Italy	1,96	3,35	1,14
	Portugal	2,57	2,59	0,99
	Spain	1,83	4,08	1,68
C	Czech Republic	10,70	6,36	2,15
	Estonia	8,21	10,36	3,44
	Hungary	14,15	6,04	2,85
	Lithuania	5,07	10,93	2,7
	Poland	11,6	4,16	1,81
	Latvia	4,64	15,4	2,53
	Slovak Republic	6,67	4,6	2,51
D	Malta	2,39	4,26	1,16
	Cyprus	2,23	4,67	1,44

Source: own study based on World Bank data

Group A countries are diverse in terms of inflation, although differences in inflation in particular years are small (especially in 1998). Over the entire time period, inflation in all countries except the Netherlands nearly doubled, and its highest rise was noted during the economic crisis.

Likewise, sub-zone B countries are varied in this respect. Italy and Spain showed relatively similar rates of inflation during the analyzed years. However, inflation in all countries from this sub-zone was on the decrease, which most probably was a consequence of their adaptation of euro. Greece was distinguished by a considerable rise in prices. The growth in prices in this country was the highest in the whole group in 1998 and 2008, while the inflation in this country was relatively low.

Sub-zone C is characterized by the highest diversity in terms of inflation. In 1998, the inflation in these countries oscillated around 4/64 – 14.14%. Some countries (Lithuania, Latvia) with the lowest inflation in 1998 recorded the highest increase in prices during the financial crises. However, the inflation in Central and Eastern European countries can be observed to be increasingly convergent. Most of these countries had similar inflation rates in 2018 (1.74-3.44%).

Sub-zone D countries had similar inflation rates in all analyzed years.

Labour Force Mobility

Mobility of workforce is one of the criteria considered in the theory of optimum currency areas. The European Union presents differences in this scope, and overall has lower labour force mobility than the USA or even the ASEAN countries. International migration expressed as the share of migrants in total population (in 2017) ranges from a few to no more than twenty percent. Sub-zone C comprises countries with large differences in this parameter. Most countries have between 1 to 5% of emigrants in total population, but this percentage goes up to 13-15% in Estonia and Latvia.

Table 5: Share of emigrants in the total population, emigrants to the euro area and sub-zones

Sub-zone	Country name	International migration as percentage of total population	The eurozone	Sub-zone
A	Belgium	11,10	63,86%	52,82%
	Denmark	11,50	21,73%	41,25%
	France	12,20	38,19%	26,33%
	Germany	14,80	30,43%	25,95%
	Netherlands	12,10	40,40%	42,44%
B	Italy	10,00	41,38%	16,43%
	Ireland	16,90	7,82%	57,02%
	Portugal	6,30	49,18%	2,39%
	Spain	12,80	43,18%	15,11%
	Greece	10,90	9,06%	2,05%
C	Czech Republic	4,10	55,50%	51,99%
	Estonia	14,70	33,57%	1,84%
	Hungary	5,20	49,39%	0,57%
	Latvia	13,20	21,97%	0,50%
	Lithuania	4,30	21,14%	18,36%

	Poland	1,70	47,88%	3,78%
	Slovak Republic	3,40	19,62%	7,95%
D	Malta	10,60	4,86%	0
	Cypr	N/A	15,29%	0

Source: own study based on: World Bank, United Nations, International Migration Report data

The share of European emigrants who translocate to countries in the eurozone to the general number of emigrants is highly varied among the analyzed countries. In sub-zone A, Belgian citizens most often chose to emigrate to the euro area countries (63,86%), while the Dutch (40.40%), French (38.19%) and Germans (30.34%) were less likely to migrate and Danes made such decisions least often (21.73%). Among countries classified to group B, the highest percentage of emigrants opting for the eurozone was observed in Portugal, Spain and Italy (49.18%, 43.18% and 41.38%, respectively). Among sub-zone B countries, the popularity of countries that had adopted euro as destinations for emigrants was moderate, and the lowest percentage of emigrants translocating to the euro area was noted in Ireland and Greece (7.82 and 9.06%, respectively).

In group C, the highest share of emigrants who chose the eurozone countries as places of their future residence was recorded in the Czech Republic (55.50%), Hungary (49.39%) and Poland (47.88%). In the remaining countries, this percentage oscillated around 20-35%. A small percentage of emigrants from Malta or Cyprus decided to settle down in a European country that had adopted euro (4.86 and 15.29%, respectively).

Most citizens of European countries who chose to emigrate decided to translocate to the most developed countries (group A states or the USA) or else to the countries where the official languages were English, German or French. The choice of a destination was also dictated by the two countries involved sharing historical past (e.g. Poland-Lithuania, Austria-Germany, or the Czech Republic-Slovakia).

Citizens of the countries categorized as sub-zone A ones decided to emigrate to countries in the same sub-zone or to other highly developed countries, and emigration to sub-zones B, C or D was a far less obvious choice. Citizens of most countries decide to emigrate to Germany (from the Netherlands), Switzerland (from Germany), the USA (from all countries except Belgium and the Netherlands). Emigrants from Scandinavian countries most often emigrate to nearby countries (also the ones on the Scandinavian Peninsula) or to North America. Another popular destination is the United Kingdom (for Germans).

In sub-zone B, popular destinations for emigrants were Germany and France. Italian citizens also migrated to Canada, Portuguese to Switzerland and the USA, while citizens of Spain often moved to the UK. Citizens of countries classified as sub-zone B rarely make decisions to emigrate to countries from the same sub-zone.

Citizens of sub-zone C countries chose to emigrate to highly developed countries, mainly to Germany, the USA, the UK, to Russia and to the countries which are adjacent to their native countries, and the latter tendency gives rise to bilateral migrations: the Czech Republic-Slovakia, Estonia-Finland, Hungary-Austria, Lithuania-Poland. Decisions to migrate to other countries of sub-zone C are made far less often.

In group D, only a few dozen of people a year chose to emigrate within this sub-zone. Citizens of these countries most often left for the UK and Australia, as well as from Cyprus to Greece and from Malta to the USA.

Table 6: The most important directions of emigration of citizens of selected countries

Sub-zone	Country	The most important directions of emigration		
A	Belgium	France (27,77%)	Netherlands (9,87%)	Italy (8,11%)
	Denmark	Sweden (16,16%)	USA (13,01%)	Norway (9,67%)
	France	Spain (9,88%)	Belgium (8,966%)	USA (8,54%)
	Germany	USA (13,63%)	Switzerland (8,47%)	United Kingdom (7,23%)
	Netherlands	Germany (14,83%)	Belgium (14,36%)	Canada (12,82%)
B	Italy	Germany (18,9%)	France (11,76%)	Canada (10,53%)
	Ireland	United Kingdom (51,96%)	USA (16,43%)	Australia (11,29%)
	Portugal	France (32%)	Switzerland (9,83%)	USA (7,81%)
	Spain	France (21,77%)	Germany (11,3%)	United Kingdom (10,85%)
	Greece	Germany (34,85%)	USA (13,55%)	Australia (11,66%)
C	Czech Republic	Germany (19,19%)	Slovak R. (18,12%)	USA (15,4%)
	Estonia	Russia (29,12%)	Finland (22,04%)	USA (5,88%)
	Hungary	Germany (27,28%)	United Kingdom (14,18%)	Austria (9,61%)
	Latvia	United Kingdom (25,65%)	Russia (22,49%)	Germany (7,29%)
	Lithuania	United Kingdom (29,1%)	Russia (10,89%)	Poland (7,29%)
	Poland	Germany (31,06%)	United Kingdom (30,64%)	USA (14,36%)
	Slovak Republic	Czech R. (21,77%)	Germany (11,3%)	United Kingdom (10,85%)
D	Malta	United Kingdom (42,39%)	Greece (11,83%)	Australia (11,32%)
	Cyprus	Australia (40,75%)	United Kingdom (32,32%)	USA (11,31%)

Source: own study based on World Bank data

The share of emigrants who decided to translocate to other countries in their sub-zone was also analyzed. Most countries in sub-zone A are characterized by a high share of emigrants to the sub-zone, although lower percentages, ca 40-60%, were noted in the case of Belgium, Denmark and the Netherlands, while the lowest ones, 25-30%, appeared in the case of France and Germany. In sub-zone B, Italy and Spain represented lower values (15-16.5%) of this indicator than Portugal and Greece. There is much diversity in this regard among sub-zone C countries. 52% of the Czech citizens decided to emigrate to one of the selected Central and Eastern Europe, with Lithuania (18.36%) and Slovakia (7.95%) behind. In the remaining countries within this sub-zone, the share of such migrants is negligible (3.78% at the most). Finally, Malta is not an attractive destination for emigrants from Cyprus and vice versa.

Conclusion

The theory of optimum currency areas indicates the criteria which should be satisfied for the countries that intend to forego a floating currency rate. The OCA theory is imperfect due to several reasons: some criteria are contradictory, the theory lacks any hierarchy of criteria, and there are no appropriate indicators or reference values; all this means that any empirical studies in this field are difficult. As a result, researchers may arrive at completely different conclusions.

A solution to the structural problems experienced in the euro area is to create euro sub-zones. Nevertheless, the assertion that there are a few groups of countries within the EU which would satisfy the OAC criteria, which was accepted in the 1990s, remains valid. Studies completed by B. Eichengreen and T. Bayoumi, as well as the authors' own observations, prove that the core countries present much convergence of macroeconomic shocks, which enables them to implement together an effective monetary policy that could prevent macroeconomic shocks. The accession of some Central and Eastern European countries led to a higher number of sub-zones, characterized by much diversity of socio-economic positions. Thus, the situation is different than 30 years ago.

According to the research results:

1) Sub-zone A is characterized by the highest degree of economic convergence. These countries fulfill all the mentioned criteria.

2) Sub-zone B are countries of the 'old' EU with a lower level of socio-economic development. Spain, Portugal and Italy have convergent business cycles but do not meet the other criteria. The countries which should not be classified in this group are Greece and Ireland.

3) Sub-zone C are countries of Central and Eastern Europe, with some being in the euro area. Two sub-groups could be distinguished in this sub-zone: one composed of the Czech Republic, Slovakia and Poland, and the other comprising Lithuania, Latvia and Estonia. However, these countries do not constitute significant partners to one another. They are characterized by growing economic convergence.

4) Sub-zone D are insular countries, which are not recommended to create a sub-zone of common currency because they are different in the socio-economic situation and do not meet most of the criteria specified by the theory of optimum currency areas.

For most of the countries, a good solution would be to create a currency union with Germany and France. However, both Germany and France most often enter cooperation with highly developed countries (such as the United States of America).

In view of the above considerations, a euro sub-zone that would meet the criteria defined in the theory of OCA could comprise Germany, France, Belgium, the Netherlands and Denmark. A common currency union composed of these countries would be quite resilient to macroeconomic shocks and their common policy might be effective (it would correspond to the so-called 'one size fits all' requirement).

The remaining EU countries should not opt for a fixed currency rate among them, in the sense envisaged in the theory of optimum currency areas.
This study contributes to the national and international debate on monetary integration in Europe. It can also serve as a starting point for further research dedicated to the issue of the creation of euro sub-zones.

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Knowledge Deficits in a Supply Chain

Katarzyna DOHN

Silesian University of Technology, Gliwice, Poland
katarzyna.dohn@polsl.pl

Adam GUMINSKI

Silesian University of Technology, Gliwice, Poland
adam.guminski@polsl.pl

Abstract

The article presents the results of the study focused on the elaboration of a method to identify knowledge deficits, particularly from the point of view of a supply chain. The proposed method enables to identify knowledge deficits and makes it possible to determine active actions to improve the level of logistic customer service in a supply chain. The research process consisted of two stages and was aimed primarily at acquiring qualitative information in the field of knowledge processes implemented in logistic processes concerning the execution of make-to-order contracts in a machine-building industry supply chain. The study needed to prepare focused questionnaires for both stages. The first stage was focused on the general determination of knowledge deficits in all logistic processes in an analysed supply chain. The second stage was to characterize and structure identified deficits to get their sources and consequences basing on direct interviews with internal and external experts. The main achieved objective ~~result~~ of the research was the elaboration of a knowledge deficits matrix as an authorial method enabling the identification and evaluation of knowledge deficits in a machine-building industry supply chain. The method, in business practice, enables to determine interconnections between disruptions and knowledge deficits in logistic processes in a supply chain. As a result, it supports managers to undertake actions eliminating or reducing existing problems, and consequently improving the efficiency of logistic processes execution.

Keywords: Knowledge Management, Knowledge Deficits Matrix, Supply Chain.

Introduction

Effective and efficient supply chain management requires adequate coordination of a logistic supply system and a logistic distribution system. The integration of both systems is extremely important for efficient and effective supply chain management, wherein mainly efficient material and information flows are key elements enabling the coordination of these systems. Moreover, a supply chain is a loosely linked system of separate and independently managed units of diverse internal structures. The consequence of the lack of integration in these units is inefficiency, especially as the unsatisfactory level of logistic customer service. The key element is the lack of knowledge which affects the execution of logistic processes in a supply chain. The authors' study was focused on analysing existing knowledge deficits in these processes in Polish machine-building industry. Knowledge deficits are the quantitative and qualitative difference between the required and available knowledge needed to execute processes effectively. The authors have undertaken research in Polish machine-building industry aiming at examining deeply logistic processes in the context of knowledge deficits. The main aim of the study from business and scientific points of view was to elaborate an authorial method enabling the identification and evaluation of knowledge deficits in a machine-building industry supply chain.

The literature review on knowledge management in a supply chain

The supply chain is a functional chain structure linking suppliers, manufacturers, distributors, retailers all the way to end users (Pan et al., 2013). Today, a traditional supply chain is facing important challenges, such as the need to shorten the time to market, minimize production costs and manage products that are increasingly technologically complex (Li and Hu, 2012; del-Rey-Chamorro et al., 2003). Demanding customers, changing demand patterns, short product life cycles, proliferation and individualization of products, rapid product innovations and geographically dispersed locations of buyers and suppliers are important incentives for contemporary supply chain managers (Bhosale & Kant, 2016; p. 141, Fugate et al., 2012). Therefore, it can be concluded that knowledge management is

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becoming one of the basic factors, but also a necessary condition for the development of modern supply chains (Li and Hu, 2012).

It is not the intention of the authors to define what is the role of knowledge in the supply chain, it is widely analyzed in many publications, while the literature review conducted by the authors showed that basically knowledge management is mostly considered a tool for supply chain integration. However, due to a different approach to the issue of knowledge management in a supply chain, Table 1 presents a list of selected studies along with the area of knowledge they concern.

Table 1: The List of selected publications in the field of knowledge management in the supply chain

Authors	Subject of study	Research methods
Dyer and Nobeoka (2000, p. 350)	Knowledge Transfer Network	Case study based on 30 interviews with Toyota management and senior management + research on 21 first-tier suppliers (USA + Japan)
Hansen (2002, p. 236)	Sharing knowledge in an international company	Case study of 120 new product development projects in 41 business units of a large electronics company
Bessant et al. (2003, s. 180-181)	Product development projects; Inter-organizational learning	Case study of six industries (semiconductor equipment, oil and gas, computer hardware manufacturing, aviation, chemicals manufacturing); Sharing knowledge on the web; Case study of 42 US Toyota automotive suppliers and US car makers
Wadhwa I Saxena (2006, pp. 28-31)	Knowledge exchange between members of the supply chain; Connecting with supply chain performance	Development of demonstration models to disseminate knowledge sharing concepts; Application of the model to improve supply chain management
Collins et al. (2010, p. 949)	A conceptual overview of the linkages between knowledge management, supply chain, technology investments, and overall business performance	Development of a set of supply chain performance indicators supported by knowledge management technology
Marra, Ho, Edwards (2012, pp. 6103-6110)	Analysis and evaluation of the relationship between knowledge management and supply chain management by analyzing existing theoretical and empirical work.	Desk research based on 58 scientific articles published between 2000 and 2010, coming from the ScienceDirect and ProQuest databases, searched on the basis of the keywords “supply chain management and knowledge management”
Cerchione, Esposito (2016)	A systematic review of the literature on knowledge management in the supply chain to identify the state of the art, highlight research gaps and identify research questions to be addressed.	The literature review divided into two main phases: 1. The publication selection phase (full search by identifying keywords, constructing search strings, selecting databases – Scopus, Web of Science, etc., browsing databases using search strings, selecting publications for detailed analysis);

		2. Phase of descriptive and content-related analysis of selected publications;
Łupicka, Grzybowska (2020, p. 5-6)	Presentation of the role of social capital competences in creating knowledge, as well as cooperation of partners in supply chains or the integration of communication tools and IT systems	Using the SECI model as a model for creating knowledge in complex systems. The results of empirical research showing the ways of acquiring knowledge in these systems are presented

However, it should be emphasized that after analyzing the literature, there are relatively few studies on elements that limit or have a negative impact on the integration of the supply chain. Undoubtedly, such elements are deficits (gaps) in the flow of knowledge, understood as quantitative and qualitative differences between the required and available knowledge in a supply chain.

The concept of knowledge deficits in a supply chain

The concept of knowledge deficit was presented by Wild (Wild et al. 2002) defining the chain of knowledge value, according to the fact that a knowledge value chain consists of four processes:

1. the identification of strategic knowledge for an organization,
2. the determination of knowledge gaps,
3. the fulfilment of a knowledge gap through the creation of new knowledge, buying knowledge, improvement of existing knowledge, the removal of outdated or irrelevant knowledge,
4. the dissemination and application of knowledge.

A knowledge gap is understood by the authors as a quantitative and qualitative difference between the required and available knowledge in an organization. McBriar and others (2003) define the knowledge gap as the difference between the knowledge which an organization needs to achieve its objectives and that one it possesses recruiting the staff with appropriate qualifications or maintaining other forms of knowledge resources.

The authors emphasize that knowledge in the form of a computer archive is not always the same knowledge that organizations are able to retain and use to support business processes. A knowledge gap can refer to acquired and archived knowledge, or can refer to movable knowledge. The company can create knowledge gaps, leading to inactive knowledge (an employee transfer to the position where his knowledge is partly no longer used). and Tseng (2005) identified five different knowledge gaps that may appear during the implementation of knowledge management.

The first knowledge gap is based on bridging the gap between the knowledge required to enhance an enterprise's competitiveness as perceived by top managers, and the knowledge actually required. **The second knowledge gap** is connected with the mismatch between the perception of the top managers and the enactment of the plan for a knowledge management system (it concerns, among others, the situation in which managers admit the need of knowledge acquiring, but they cannot precisely define due to the inability to determine effectively what they need). **Third knowledge gap** is connected with the implementation process of knowledge management in an organization, and it appears because employees may not fully understand what a knowledge management system is or are afraid that their personal value might be negatively affected after sharing their knowledge. Employees' unwillingness to share their own knowledge or their inability to understand exactly a knowledge management system will create a gap between the internalization and externalization processes when implementation occurs. **Fourth knowledge gap** concerns the problem "how to evaluate knowledge". However, although a variety of measures have been proposed, knowledge assets are still difficult to be measured appropriately using the existing accounting systems due to the tacit nature of knowledge and its dynamism. The study presented by Tiwana (Tiwana, 2001) proves that firms usually fail to evaluate the results of knowledge management in order to determine whether or not it meets the expectations. **Fifth knowledge gap** is connected with the essential problem in an organization concerning gaps between the perceptions of top managers and that of employees due to the differences of position, role, and professional knowledge (Nonaka, 1991; Paiva, 2003).

To ease the effects of emerging gaps in knowledge management, companies should visualize operational performance in more detail than the end profitability does by focusing on incentives, control mechanisms, and benchmarking

(Drew, 1997; Stachowicz, Olko, 2015). In addition, it is necessary for the firm to have a well-developed technology that is accessible and easy to leverage knowledge management (Desouza & Evaristo, 2003). Many authors emphasize the great influence of disruptions on the creation of knowledge deficits, particularly in relation to the processes carried out in a supply chain (Hendricks, Singhal, 2005, Hillman, 2006, Ji, Zhu, 2008, Kramarz, Kramarz, 2014; Kleindorfer, 2005, Kull, 2008, Kumar, Du Fresne, Hahler, 2007, Kumar, Jensen, Menge, 2008, Norrman, Sweden, Jansson, 2004). Kramarz M and W (2015) pointed to an increase in the number of participants in a supply chain and network relations which resulted in an increase in the complexity of the entire logistic and production system. Consequently, there appear additional potential sources of disruptions in material flows.

Disruptions were defined by Barroso and others (2008) as as unforeseen or foreseen events that intrude scheduled processes or the stability of an organization. Disruptions are similarly defined by Svensson (2000), Ji G. and Zhu C. (2008), Kleindorfer and others (2005), describing them as unforeseen and unexpected events that intrude a material flow in a supply chain. Disruptions that cause variations in a material flow, in the literature, are classified, among others, according to the criterion of sources of their generation. Mason - Jones and Towill, (1998), and Christopher and Peck (2004) consider four categories of disruption sources: processes in a supply chain (transport, storage, information processes), suppliers, customers, core business activity (planning, organization and control). Other authors, among others Brzóska (2012), Tang (2006) and Ji and Zhu (2008), continuing the problem of risk identification in material flows, consider supply management, demand management, production management, and information management as four areas demanding the strategy of smoothing variations occurring as a result of disruptions. Disruption management (Xia Y., Yand, Golany et al., 2004) is in an unstable environment, which is changed constantly by the unpredictable events, system parameters, availability of resources, new restrictions. This characteristic forces disruption managers to make decisions in real time. Lijun S., Xiangpei H., Yan F., (2008) reported that knowledge representation was the basis of the real-time problem-solving process.

Research Methodology

The research process consisted of two stages and was aimed primarily at acquiring qualitative information concerning the knowledge deficits identification in customer's order in machine-building industry supply chain. The study procedure included two steps:

1. The acquire and analysis of information of knowledge processes in customer's order execution in machine-building industry.
2. The identification of key disruptions in contract execution, to link them to specific knowledge deficits, and finally to develop the method of knowledge deficits identification in logistics customer service processes.

The research required the detailed analyses of selected actors in a machine-building industry supply chain based on research questionnaires, which provided the basis for interviews with representatives of the senior management. The study was conducted in 38 enterprises located in Poland, in Silesian province.

In analysed supply chain the design and technology are usually developed individually for specific customer orders. Projects are generally unique with specific requirements concerning technical planning, production management, expenses scheduling, and accounting methods. Orders repeatability is low or even none. The order execution in this type of environment requires a distinctive support of knowledge management. Within the scope of order execution processes, pre-transaction, transaction and post-transaction elements are very important for the level of a customer service. Pre-transaction elements are associated with preparation processes for customer service. They play a significant role in shaping customers' expectations and affect the perception of a company, as well as the satisfaction with an offer. Transaction elements decide about appropriate and coherent customer's expectations. Post-transaction elements provide customers with the appropriate use of products.

The research model is given in Fig. 1. Based on research assumptions, the main objective of questionnaire survey was to determine the detailed scope of knowledge processes in a customer order execution. The expert method was applied to identify key disruptions in a contract execution process. The team of chosen experts (24 people from 7 enterprises), was presented the preliminary list of potential disruptions, and experts were asked to supplement the list. Disruption factors, collected in this way, were divided into 5 main groups (macroprocesses of a logistics customer service). The list of 35 collected factors was divided as follows (in the brackets there are numbers of factors in each group):

- Contract preparation (5):
    - incorrect setting of contract's conditions,
    - problems with an information flow,
    - too long time of information transmission,

    - inappropriate cooperation with contractors,
    - insufficient access to integrated systems supporting a design process.
- Supply (8):
    - inappropriate cooperation with suppliers,
    - incorrect fulfilment of order forms,
    - default of contract conditions by carriers, logistics operators,
    - materials and components price volatility,
    - default of technical standards and raw materials by suppliers;
    - errors in material requirements planning;
    - incorrect fulfilment of internal order documents;
    - incorrect issuance of warehouse documents.
- Production (9):
    - inappropriate material supply for production in terms of quantity, quality, time, location and costs,
    - qualifications and experience of production workers,
    - mistakes of office workers,
    - misinterpretation of commands,
    - the lack of modern instruments of planning and control,
    - the lack of quick access to production departments' data,
    - long ways of the flow of materials and products,
    - possession of surplus interoperable stocks,
    - shortages of production inputs.
- Distribution (5):
    - damage of products or product parts during delivery to a customer,
    - incorrect data on a transport document,
    - the lack of adequate means of transport,
    - the lack of qualified personnel to implement processes to install the product at a customer,
    - insufficient contact with a customer.
- Supportive processes (8):
    - damage during internal transport,
    - inappropriate material management,
    - shortages of materials,
    - the lack of a material quality control system,
    - damage during storage,
    - shortage of workers,
    - incorrect labels making impossible to identify material, goods, etc.,
    - the lack of adequate packaging.

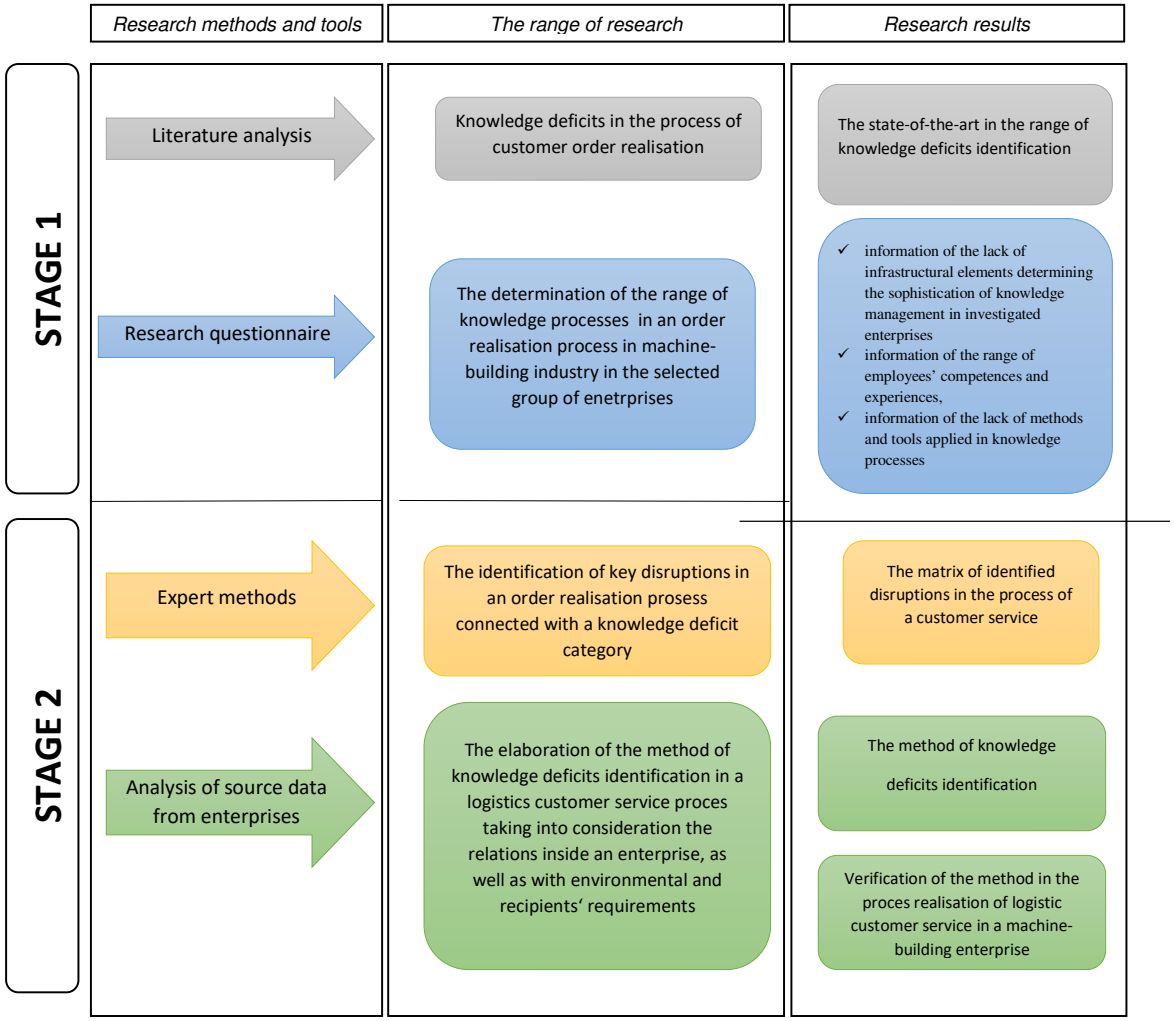

Figure 1: Research model

Characteristics of a knowledge deficits identification method

The knowledge deficit in logistics processes can be defined as a knowledge gap (total or partial deficit), which reduces the effective implementation of processes in make-to-order contracts. In order to analyse systematically existing knowledge gaps and to take actions to minimize them, it is necessary to develop a method for identification and evaluation of knowledge deficits. To achieve this objective the study has been conducted in two stages.

In 1. stage of the study, the structure of logistics processes in the analysed enterprises was determined. Additionally, knowledge deficits categories were determined taking into account infrastructure, competence and knowledge tools gaps. Questionnaire surveys enabled to determine typical disruptions, their assignment to the specific processes of a logistics customer service and to indicate links between disruptions and knowledge deficits. For each disruption a direct or indirect negative effect was indicated and necessary actions to minimize the deficit.

In 2. stage of the study, the method of knowledge deficits identification was developed. The method allows categorization and evaluation of analysed deficits. As a result, the matrix was elaborated to identify knowledge deficits, which enables to determine the level of negative impact of knowledge deficits on the effectiveness of processes in a make-to-order contract.

The main effect of applying the method of knowledge deficits identification in logistics processes in supply chain is the systematic identification of emerging disruptions, linking them with knowledge deficits and possible actions to reduce these deficits. An important aspect of the proposed method is the matrix which enables to store of codified knowledge of analysed deficits. It results in the ability to transfer this knowledge and to use it repeatedly. The application of the method makes it possible, in a medium term, to identify necessary changes in the configuration of a logistics system and actions to improve knowledge management.

The method of knowledge deficits identification in a machine-building industry supply chain should take into account the following assumptions:

1. The determination of disruptions and associated knowledge deficits requires expert knowledge in the field of a logistics customer service.
2. Disruptions and knowledge deficits should be assigned to 5 main macroprocesses, and then assigned to specific logistics processes or operations.
3. Negative effects of disruptions need to be elaborated, as well as the categorization and evaluation of knowledge deficits that are the source of disruptions. And finally necessary changes should be given to minimize the deficit.
4. The elaboration of the matrix of knowledge deficits identification needs two stages. The first stage (developed by external or internal experts) should include the determination of disruptions, their negative effects, assignment to macroprocesses and logistics processes, and the source of a disruption in the form of a knowledge deficit. The second stage (developed by internal experts) should include categorizing and evaluating knowledge deficits and actions to minimize the negative impact of knowledge deficits.

For the purposes of the study, a disruption in logistics processes in a machine-building enterprise is defined as a disability or an inappropriate intended or unintended action that causes a negative effect lowering logistics customer service, and its source is a knowledge deficit. For example, an problem with the installation of a component in a production process (**a disruption**), which directly or indirectly results in the need to re-order or re-design of a final product, which may lead to a delay in a contract (**a negative effect**) derives from the lack of the precise specification of a component (**a knowledge deficit**). The appropriate identification of a knowledge deficit and its evaluation i.e. the determination of the weight of its negative impact and its incidence allows to take necessary actions to minimize its adverse effects. For this purpose, on the basis of an analogical solution, some elements of the risk measurement card, a project management tool widely used in business practice (Dohn & Gumiński, 2013), can be used.

Identifying which disruptions determine the level of a logistics customer service can be developed with the indication of different logistics service elements. In the process of disruptions identification it is also possible to point to an order execution:

- pre-transaction elements (customer service policy, flexible service system, service procedure),
- transaction elements (order information, expedition of goods and services, the availability of substitutes),
- post-transaction elements (guarantee, complaint, returns and replacement of products and spare parts).

In order to identify knowledge deficits affecting the level of a logistics customer service, the elaboration should be focused on essential elements determining the efficient implementation of knowledge processes. In fact, in terms of consistently appearing disruptions arising directly or indirectly from knowledge deficits as tool or system deficits. For the research purposes, 3 categories of knowledge deficits were determined as follows:

- knowledge deficit in the field of infrastructure (infrastructural knowledge deficit - IKD), which means a deficit in terms of infrastructural elements determining knowledge management that are codified, representing explicit knowledge (e.g. implementation procedures, schedules, processes maps, IT tools),
- knowledge deficit in the competence and experience of personnel (competence knowledge deficit- CKD), is the lack of tacit knowledge,
- knowledge deficit of tools and methods used in knowledge processes (tools knowledge deficit – TKD), which determines the efficiency of knowledge management (the lack of or limited range of procedures and tools for acquiring, storing and updating, transfer, and use of knowledge).

To develop the matrix of knowledge deficits, the assignment of disruptions to macroprocesses and logistics processes or operations should be done. As a result, the knowledge deficits matrix allows to determine what and in what scale is missing of knowledge management in the processes of a logistics customer service in a machine-building company. In turn, it would enable the indication of specific enhancing actions (to minimize knowledge deficits) on the basis of identified disruptions. Any disruption requires to develop:

- the assignment to a logistics customer service macroprocess,
- the assignment to a logistics process or operation,
- the determination of direct / indirect negative effects of a disruption,
- the characteristics of the source of a disruption in the form of a knowledge deficit.

In the next stage, it is important to determine the category of knowledge deficit (infrastructural, competence, or tools deficit), as well as its evaluation i.e. to determine the weight of knowledge deficit, and as a result of a deficit existence,

the incidence of disruption occurrence. Based on the analysis of the impact force of a knowledge deficit within a macroprocess of a logistics customer service, it is possible to propose actions to minimize the negative effects of knowledge deficits.

The disruption can be induced by one, two or even three knowledge deficits categories. It is essential that an expert (or an employee) decides about the category of a knowledge deficit. The impact force of knowledge deficits on the level of a logistics customer service is determined indirectly through the effects of a particular disruption in logistics processes, i.e. the incidence and its validity, as the impact level on an emerging disruption. Both the weight and the impact incidence of a knowledge deficit should be determined in a scale of 1 to 5 (where 1 - very low weight / incidence, 5 - very high weight / incidence). The indicator of **the impact force of knowledge deficit (IFKD)** is the product of the value of knowledge deficit weight and the values of its incidence. In the assessment situation, done by a few experts, the weighted average should be accepted. Descriptively the following scale of the impact force of knowledge deficit was determined as follows:

Table 2: The form of a knowledge deficits identification matrix for a macroprocess "distribution" in a machine-building enterprise

Macroprocesses of a logistics customer service	Id.	Identified disruptions	Logistics customer service processes / operations	Direct /indirect negative impact of a disruption	Description of knowledge deficit	Categorisation and evaluation of knowledge deficits										Proposed enhancing actions
						IKD			CKD			TKD			Total impact	
						weight	incidence	impact	weight	incidence	impact	weight	incidence	impact		
Distribution	1.1.															
	1.2.															
	1.3.															
	1.4.															
	1.5.															
	...															
	The maximal impact force of knowledge deficits for a macroprocess															
	The average impact force of knowledge deficits for a macroprocess															

IKD – infrastructural knowledge deficit

CKD – competence knowledge deficit

TKD – tools knowledge deficit

- if IFKD> = 14, the impact is unacceptable (an absolute indication to take actions to eliminate or minimize knowledge deficits),
- if 6 <IFKD <14, the impact is significant but acceptable (a conditional indication to take actions to eliminate or minimize knowledge deficits),
- if IFKD <= 6, the impact is low (indicating the lack of actions to minimize knowledge deficits).

For a macroprocess it should be determined the maximum and the average impact force of knowledge deficits on the effectiveness of logistics processes, both for each category of knowledge deficits, and totally for all categories. The comparative analysis of the impact force of individual knowledge deficits provides the indication of the most necessary actions to limit negative effects of these deficits, especially those for which the index IFKD has exceeded 14.

The matrix of knowledge deficits identification requires the determination of elementary disruptions in all logistics processes and operations required for a logistics customer service. The form of the matrix of knowledge deficits identification, given in Table 2., enables the identification and evaluation of knowledge deficits in 5 macroprocesses: contract preparation, supply, production, distribution and supportive processes.

The proposed method, i.e. a knowledge deficits identification matrix, has been positively verified in Polish machine-building companies. It was applied in these companies to determine knowledge deficits and consequently to undertake necessary actions to increase logistic processes efficiency.

Conclusions and Discussion

Appropriate storing and using of knowledge is one of key factors determining the level of a logistics customer service in a machine-building enterprise. The proposed method, focused on developing the matrix to identify knowledge deficits in logistic processes, enables to link emerging disruptions in the entire process of make-to-order contract implementation with existing infrastructure, employees competences and tools deficits, which are the direct or indirect sources of these disruptions. The matrix to identify knowledge deficits reflects the impact force of individual deficits, and thus provides a tool for determining necessary actions to eliminate or reduce a negative impact.

The further study should bring in a IT tool supporting the elaboration of a knowledge deficits identification matrix in logistics processes. The tool would facilitate the preparation and implementation of all information necessary to determine the matrix, and on the other hand, would enable averaging and aggregation of knowledge deficits from various experts. And in turn, it would increase the correctness of an analysis, especially at the stage of categorization and evaluation of knowledge deficits. The tool supporting the identification of knowledge deficits would allow further indication of knowledge deficits, which are the sources of various disruptions or problems in the execution of make-to-order contracts.

The above-mentioned IT tool, based on the method elaborated by the authors, would support storing and transferring of knowledge deficits concerning disruptions in logistics processes, and decide on necessary actions to prevent from negative effects of their impact. This should lead to gradual improvement of logistic processes efficiency and consequently the level of a logistics customer service in a machine-building enterprise.

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Sustainable Development in The Strategies of Organisations Cooperating in Distribution Network

Marzena KRAMARZ
Silesian University of Technology, Faculty of Organization and Management, Gliwice, Poland,
marzena.kramarz@polsl.pl

Edyta PRZYBYLSKA
Silesian University of Technology, Faculty of Organization and Management, Gliwice, Poland,
edyta.przybylska@polsl.pl

Abstract

Sustainable development constitutes an idea based on three main perspectives: social, environmental and economic. Especially the first two have become more and more important in recent years. The reference of the sustainable development concept is also visible in the logistic processes implemented in distribution networks. However, fulfilment of the sustainable development idea in material flows is conditioned by its implementation by specific economic entities that are the main participants of the network. In relation to that, the authors of the paper considered the influence of cooperation established in distribution network on implementation of the sustainable development concept in the strategies of enterprises participating in the network. On this basis, the aim of the paper was formulated as showing the dependencies between the models of cooperation in distribution networks and maturity of the network in terms of implementation of the sustainable development concept. In the conducted research, the relationships in a chosen distribution network were mapped, two main models of cooperation occurring in the studied network were characterised, and the survey research in the nodes creating the network were performed. The survey research was focused on assessing the awareness of sustainable development and the level of incorporation of the sustainable development pillars in strategies of the entities creating the analysed distribution network. Conducted research allowed to obtain an answer to the question: *does the maturity in terms of the concept of sustainable development of distribution network with participation of the logistic operator depend on the type of the model of cooperation in the network?* The dependencies indicated by the authors became the reason for developing the network maturity model concept in terms of the concept of sustainable development of enterprises that includes specific stages of cooperation in the network.

Keywords: sustainable development, distribution network, cooperation models, network maturity.

Introduction

Współpraca pomiędzy przedsiębiorstwami definiowana jest jako “similar or complementary coordinated actions taken by firms in interdependent relationships to achieve mutual outcomes with expected reciprocation over time” ’Idea podejmowania współpracy w sieciach dystrybucji Idea współpracy pomiędzy przedsiębiorstwami bazuje na trzech głównych elementach: (1) wzajemnego powiązania zachowań współpracujących stron, (2) dobrowolności oraz (3) chęcią osiągnięcia wspólnych celów. Cooperation in distribution networks is directed on ensuring an availability of the products in time and place expected by the clients. It allows to obtain the so called "relational rent", defined as additional benefits possible to achieve by enterprises thanks to established cooperation (Cruijssen, Cools, Dullaert, 2007), among them, the improvement of the level of customer service is indicated (Wang, at al., 2017), as well as the benefits resulting from sharing the information, risk, knowledge and profits (Leitner, Meizer, Prochazka, Sihn, 2011). It is indicated as an important chance of counteracting the negative effects that an uncertainty of the environment creates for the policy makers. At the same time, many researchers emphasise that cooperation in the network creates an environment conducive to increasing the innovation. Complex relationships created between the producers, trading companies and logistic organisations can be indicated on the level of distribution systems. Defining the cooperation as the type of a relationship, the focus is oriented on: (1) interconnection of activities of cooperating parties, (2) voluntary establishment of relationships and (3) willingness to achieve common goals by engaged entities (Mehta et al., 2006).

Three models of cooperation are mentioned in the literature (Kramarz, Twaróg, 2017):

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- Simple model of cooperation in which the producers in order to ensure the effectiveness of the trading connections use various forms of motivation based on the stimulus – response principle;
- Model of the long-term partnership in which the producer presents his expectations for the intermediaries. They concern the way of reaching the recipients, level of resources, marketing development, technical counselling, organisation of the logistic processes. Participants share the tasks in the network and determine which works will be implemented together (Muda, 2018). This model is strongly based on trust and coordination of information flows between partners (Wei, Wong, Lai, 2012);
- Model of the distribution programming, that is creating on the producer's initiative a planned and professionally managed, vertically integrated marketing system that combines both the needs of the producer and intermediaries (Meiklejohn, 2017).

Network cooperation conduces to innovations, both in terms of promoting their development and disseminating them (Pittaway, Robertson, Munir, Neely, 2004). However, considerations on the influence of cooperation on innovativeness related to implementation of the sustainable development concept were undertaken in the paper. Therefore, the aim of the paper is to indicate dependencies between the models of cooperation in distribution networks and maturity of the network in terms of implementation of the sustainable development concept.

Sustainable development in cooperation models – theoretical background

Analysing the evolution of cooperation of the partners in the delivery chain, Cordón and Vollmann (2008) have distinguished four basic phases. Phase 1 assumes the beginning of cooperation between the organisations. Enterprises undertake common activities in order to implement strategic goals. Phase 2 is delving into the cost aspect (Total Cost of Ownership). Through the cooperation, organisations try to decrease the total costs of functioning. They assume that such activities will allow to attain competitive advantage. There are more elements of cooperation than competition. In Phase 3, cooperation is still developing, but also stabilising. Partners go beyond the cost criterion. They notice that increasing the costs is only one of the elements of attaining advantage on the market. Bigger attention is being paid to the environmental aspects, sustainable development concept or implementation of innovations. Organisations start to exchange competencies and know-how. The key factor in this aspect is a mutual declaration on maintaining the individuality and respecting intellectual property of the entities (Van Weele, 2014). At this stage, common designing and creating the product takes place. Phase 4 is the process of strategic matching of the enterprises. Reaching this stage is very difficult and complicated. Partners are open to cooperation and share competencies important for them. Common areas include managing the risk, or creating the organisation's value. It is worth pointing out that the transition form the lower to higher phase is possible only when the enterprises decide that they are fully ready for it and all former phases have ended successfully (Cordón, Vollmann, 2008).

Partners analyse the partnership on the basis of criteria that is crucial for them. The duration of a given partnership is most often analysed. Figure 1 presents an adequate path of creating value in the partnership and its measurement (Sulejewicz, 1997).

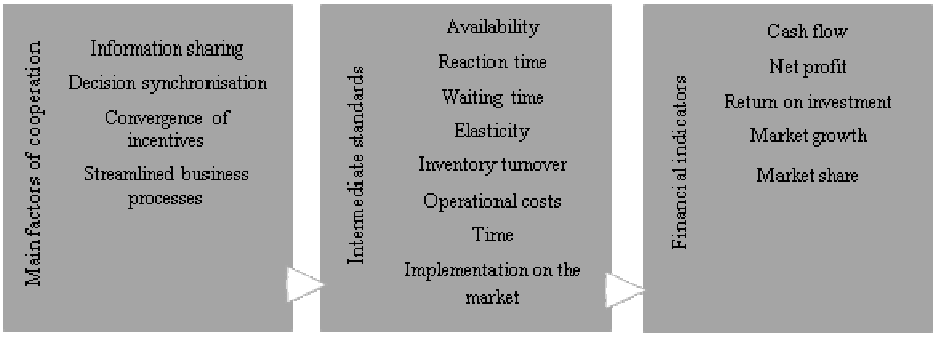

Fig 1. Model of value creation path

Source: (Simatupang, Sridharan, 2005).

Model of value creation path shows what are the main factors of cooperation, intermediate standards and financial indicators. Analysing the cooperation factors, it can be noticed that sharing the information, decision synchronisation, convergence of incentives and streamlined business processes are the indicators of developing the sustainable development concept in the distribution networks. Indicated intermediate standards should be balanced with the standards in the sustainable development area. Whereas financial standards in the model of value creation path do not include the effects of sustainable development.

Sustainable development requires from the society a change in current thinking and in an approach to the global economy development. Zegar (2003, s. 37) indicated that sustainable development is „a new approach to the philosophy of life, acceptable production techniques, consumption model, use of environmental resources, protection of biodiversity, maximum use of closed cycles for waste accompanying human activities“. Present enterprises more often realise that introducing ecologically justified activities means not only improving the general enterprise image, but also concrete and measurable material benefits. Organisations change their way of perceiving the products or services for the more pro-ecological one. Such activities are treated as creation of the added value to the products or provided services. It can be noticed that all definitions of the sustainable development concept are related to cooperation of the human with natural environment. One of the basic areas, in which the use and implementation of the rules of sustainable development is being advised, is the broadly understood logistics, what is especially difficult in the complex logistic system which are the distribution networks (Sisco, Chorn, Pruzan-Jorgensen, 2010).

As Martins, Anholon, Quelhas, Filho (2019) emphasise, most of the research on the relationship between the sustainable development and the logistics is concentrated on limiting the influence of the logistic activity on the environment. The idea of sustainable development in the logistics is mainly manifested in sustainable orders, sustainable transport, sustainable packaging, sustainable distribution and return logistics, designing and controlling the activities in terms of sustainable delivery chain. However, the basic areas of the logistics that influence the sustainable development most strongly are:

- transport processes - in this term, a special attention should be paid to the sustainable transport development, activities related to the implementation of transports using vehicles that meet the latest exhaust emission standards and the implementation of the full truck loads with the maximum use of the loading area. Sustainable transport system has to meet the transport needs and at the same time not to endanger human health and not to destroy the ecosystem (Balaman, Matopoulos, Wright, Scott, 2018);
- warehouse processes - combining the warehousing process with sustainable development is mainly interfering with the warehouses, their centralisation, location, area optimisation, equipment, applied storing technologies, or use of the picking warehouses. Sustainable warehousing uses a range of technologies and organisational solutions designed in terms of improvement of the processes efficiency, maintaining the quality standards, improvement of the economic effectiveness, as well as decreasing the impact on the environment (Akandere, 2016).
- processes related to managing the packaging and waste (Sadowski, Szołtysek, 2013) - this area combines economic and ecological aspects through applied technology in reverse logistics, as well as designing the packaging. It enters the issue of designing the products with consideration of reverse logistics (ecological cycle of the product's life).

In distribution networks, this challenge is especially faced by logistic companies that are looking for the right balance between the strategic goals and an adverse impact on the natural environment. It seems that keeping the balance between these activities in compliance with the policy of sustainable development may be the key for achieving a desirable competitive advantage. Undoubtedly, a good example of a logistic organisation that combines these two poles is the global logistic operator DB Schenker (2020). The enterprise has introduced, among others, a DB 2020 climate protection programme that assumes limiting the CO_2 emission by 20% in the years 2006-2020, in the land, oceanic and air transport. Moreover, the company has implemented an Integrated System of Managing the Quality, Work Safety and Environment. A package of solutions for the clients, including Emission Reporting Programme, or Ecological Calculator, was also implemented. Another example is the Raben Group (2020), which has the environmental aspects included in its action strategy. Among the main programmes implemented by the enterprise there may be indicated: development of the low-emission fleet, development of the low-emission buildings, neutralisation of the activity's impact on the environment, or the pro-environmental Eco2way campaign. In a research conducted in the United States on a sample of 250 enterprises, it was found that more than a half of them (52%) performs classification of their suppliers on the basis of environmental criteria. Moreover, the remaining 39% of the companies have already undertook the actions in this area. It is worth noticing that most of the analysed companies generate incomes on the level of 1 billion Euro. Therefore, it can be presumed that it is the biggest organisations that concentrate their activities on sustainable development.

The problem of incorporating the sustainable development concept in the strategies of all enterprises cooperating in distribution network seems to be extremely important at the moment. As the research on cohesiveness of the marketing and logistic strategies with the pillars of sustainable development shows, more and more often also the production and trade organisations show understanding for the need to be included in logistic and marketing activities of the sustainable development principles. However, they not always have the knowledge on how to do this. The concept of including the pillars of sustainable development in the logistic and marketing strategy was proposed by Kauf, Kramarz, Sadowski (2019), indicating the importance of their incorporation in the normative, strategic and operational sphere.

Relational abilities in terms of cooperation with all stakeholders are extremely important for the implementation of assumptions indicated by Kauf, Kramarz and Sadowski (2019). As Czakon (2015) indicates, the relational ability is: „the potential of cooperation resulting from former experiences, manifesting as organisational routines, tendency to achieve the goals together and creation of individual organisational entities specialised in supporting the effective cooperation ".- Kauf, Kramarz and Sadowski (2019) emphasise that the concept of sustainable development requires creation of the long-term relationships with suppliers, intermediaries and organisations of the business environment. This concept has to be included in creation and promotion of the products (goal of the marketing) and in the assurance of the products' availability in time and place expected by the customer (goal of the logistics). Creation of the needs and ensuring the availability of the products should include the requirements of environment and society (goal resulting from the concept of sustainable development). In the marketing and logistic planning that incorporates the pillars of sustainable development, it is necessary to include such factors as: reduction of social and environmental costs (including land occupation, noise, accidents, environment pollution).

The need for integrating the activities oriented on sustainable development on the level of cooperating organisations network results from the indicated concept. At the same time, the answer to the following question was searched for in the next stages of research:

Does the maturity in terms of the concept of sustainable development of distribution network with participation of the logistic operator depend on the type of the model of cooperation in the network?

In the conducted research, the relationships in the chosen network were mapped, the models of cooperation were characterised, and the survey research in the nodes creating the network were performed. The survey research was focused on the assessment of sustainable development awareness and the level of incorporation of the sustainable development pillars in strategies of the entities creating analysed network.

Concept of studying the aspects of sustainable development in the strategies of organisations cooperating in distribution networks

The problem of cooperation and the concept of sustainable development was analysed on the basis of a case study of a chosen distribution network. The central logistic link was distinguished in it, which is the enterprise specialised in distribution of the food products in controlled temperatures, as well as in transportation of industrial goods in the country, all European Union and the countries of Eastern Europe. The centrality of the formerly mentioned link is evidenced by organisation of the material flows in the studied distribution network, in which the remaining participants were characterised from the perspective of the connection with central logistic link.

For the reliable implementation of the logistic processes in distribution networks, the central logistic link very often uses external transport companies performing activities on behalf of the logistic operator. Logistic partners work in conjunction with logistic operator, this means that in case of the need of a transport service, those companies meet the need of the operator as first. Analysing relationships between the operator and the shipping companies, bigger bargaining power (or dominating position) belongs to the operator. The dominating position is influenced by owned resources, number of served clients and experience in forwarding work. In case of the studied operator, the number of subcontractors in the form of transport companies is very large. Identification of the relationships between the participants of the distribution network and the directions of flows of the streams of services, finances, information and deliveries occurring in the network allowed to identify the models of cooperation in the studied distribution network.

The conducted research was performed in compliance with adopted model (Fig. 2) and discussed stages. They were conducted at the end of 2019 and at the beginning of 2020.

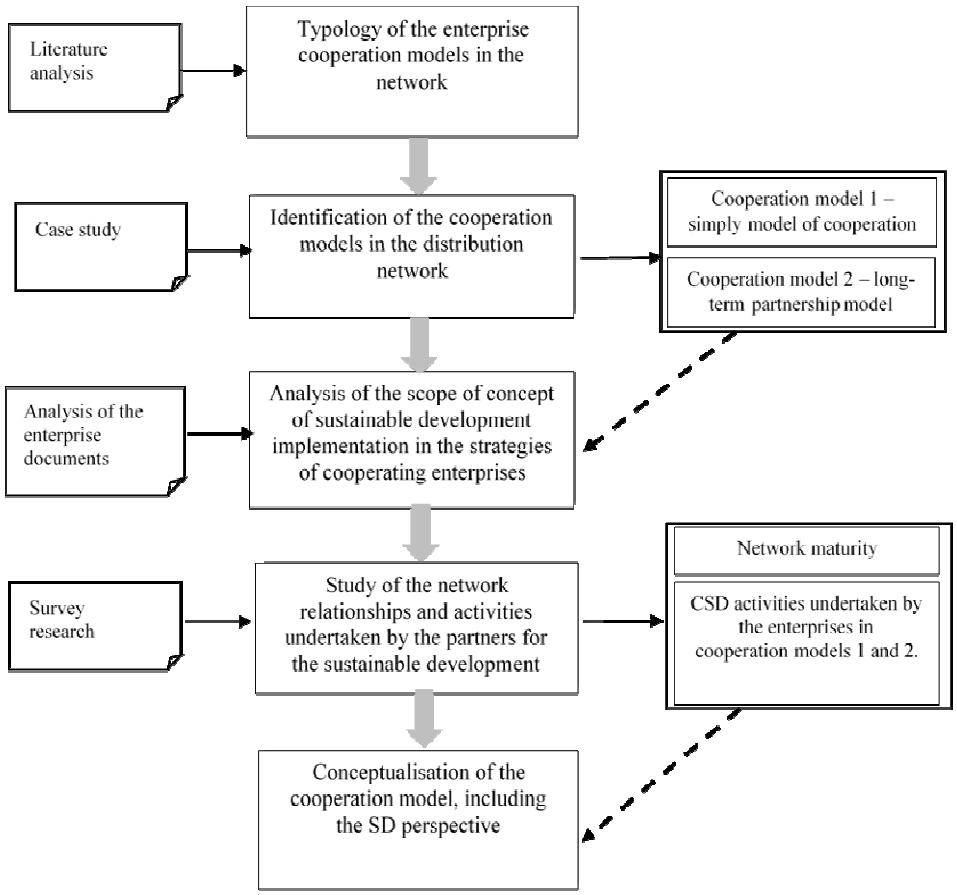

Fig. 2: Research model

Source: own study.

Stages of conducted research:

- Stage 1 - identification of the cooperation models in the studied distribution network.
- Stage 2 - determining the scope of implementation of the sustainable development concept in the strategies of enterprises cooperating with the logistic operator. The strategies of the enterprise's partners in both cooperation models in terms of including the pillars of sustainable development in them were analysed for this purpose. 20 organisations cooperating with the logistic operator (10 partners from each of the cooperation models) were analysed.
- Stage 3 - evaluation of the actual actions taken by the partners for the sustainable development. The survey questionnaire was developed for the assessment, composed of 13 closed, single-choice questions. They were divided into two different blocks studying the organisations in terms of sustainable development and cooperation models. The survey was conducted once. The questionnaire was sent by e-mail to 20 enterprises (in accordance with the second stage of the study. The direct respondents were the main managers of enterprises (managers of administrative and development units). Enterprises were chosen in terms of their role in the delivery network, these were the companies providing transport services, warehousing services and the customers commissioning the logistics operator to provide the service. Among the enterprises participating in the study, 50% of them execute over 1000 orders in cooperation with the operator. The remaining 50% are the enterprises executing less than 1000 orders per month.
- Stage 4 - conceptualisation of the cooperation model with taking into account the perspective of sustainable development.

Results and Discussion

Simple model of cooperation is the first one observed in the cooperation models network. This model is best seen in the relation logistic operator – external transport company. These companies mutually motivate and drive each other. Receiving the order by the logistic operator often starts the transfer of the order to the transport company. It is worth noticing that cooperation is voluntary, because each of these organisations could function independently. However, cooperation generates specific, measurable benefits. Thanks to cooperation, the enterprises can realise their individual goals more effectively. Of course, it is possible only by meeting certain rules, such as: understanding the idea of cooperation, clear definition of who plays what role in the cooperation model, definition of the scope of each of the participants' duties, trust, efficient communication, coordination of activities.

The second observed cooperation model is the model of a long-term partnership. Logistic operator clearly presents his expectations towards the subcontractors and intermediaries, that is the transport and warehousing companies, in terms of the quality and configuration of the transport service. In the eyes of the client, service is performed by the operator, and so it is important for him that the level of service is satisfying. This results form the fact that he takes a full responsibility for its delivery. In case of not meeting the quality needs, the client will submit claims against the logistic operator. Participants in the observed cooperation model perceive cooperation as very much needed and effective. They care about their own and the partner's good. The key for such state of things is mutual trust. In case of the occurrence of conflicts on the line operator – transport company, they are resolved very quickly due to the will of maintaining a long-term cooperation.

The identification of cooperation models in the studied network was a stage preceding the analysis of the company's partners strategies in both models in terms of including the pillars of sustainable development in them. In compliance with the assumptions indicated in the research model, the research was conducted on the group of 20 organisations cooperating with the logistic operator. In Table 1, the scopes of including the concept of sustainable development in the mission and strategic goals of the companies cooperating in the studied network were indicated. The table includes only those enterprises that incorporate sustainability aspects in their strategies. Remaining studied organisations (not included in the table) do not show the elements of sustainable development in the base strategy.

Table 1: the concept of sustainable development in the base strategies of the distribution network partners

Type of the partner	Coope-ration model	Mission	Strategic goals
Supplier 1	Model 1	Sustainable development	Environmental policy in terms of: carbon footprint, products, packaging, delivery, waste, infrastructure
Supplier 2	Model 1	Sustainable development from the social, environmental and operational point of view. The key value are the workers	Priority: work safety Social responsibility - good practices shared with business partners
Logistic operator (central enterprise)	Model 1 and 2	Care for ecology and safety	Elimination of unnecessary office materials, locating the offices on the Eurocentrum areas, supplying with power and a range of solutions related to alternative and renewable energy sources, full truckload transport.
Transport company 1	Model 1	Care for safety and natural environment	Selective waste collecting storage of hazardous substances and waste on paved and roofed areas in appropriate containers
Transport company 2	Model 2	Social responsibility, where the attention is focused on implementation of the	Supporting local communities, this pillar assumes donations to actions organised at schools, through the

		business projects and development of the company, as well as on supporting the environment in which the organisation operates. Moreover, the attention is paid to engaging in the development of the local communities.	purchase of school products and by supporting the entities and cultural events taking place in the neighbourhood. Minimising the influence on the environment in accordance with the Think Eco Logistics idea, these activities are implemented through the waste collection, its segregation and economical management of the natural resources. Creating the organisational culture that aims at supporting employers by conducting the internal recruitment. Many people that used to occupy the lowest positions, manage the company today.
Transport company 3	Model 2	Social responsibility of the business	Activities supporting the socially responsible business The company undertakes initiatives for education, promotion of the healthy and active lifestyle, or supporting the development of children and youth.
Ware-housing company	Model 1	No reference to the sustainable development	Use of the safe and modern sources of power that use significantly less electricity and the use of cooling methods that are not harmful to the natural environment
Ware-housing company 2	Model 2	Future proof properties, speaking of wisely conducted building investments that are capable of facing the challenges of the modern world. The company cares about using the techniques and practices on the basis of sustainable technologies and materials. Energy solutions are the energetic innovations that constitute the basis of development. From the renewable energy to the intelligent heat networks and ultra-efficient lighting. Data intelligence, that is the use of data potential for the more sustainable character of conducted investments at all stages of a life cycle. The knowledge allows to make more accurate decisions.	70% of the new investments after 2011 received ecological certificates. Moreover, 80% of the warehouses were designed in ecological way.
Client 1	Model 1	Sustainable development, natural environment protection	Development of effective power sources with zero emissions
Client 2	Model 2	Innovations in terms of sustainable development	A plan assuming cooperation with suppliers on the basis of sustainable development principles. Activities in the field of sustainable development include help in the development of the poorest regions of the world,

			providing basic hygiene measures and clean water, sourcing raw materials from sustainable crops (palm oil), supporting small agricultural producers making healthy and ecological food.

Source: own study on the basis of available materials from the enterprises cooperating in the network.

The partners, both in the first and second model of cooperation, spot the importance of aspects related to sustainable development, although with different intensity. In the first model, organisations focus more strongly on the social responsibility of the business, while in the second model - on the factors related to the green delivery chains (environmental factors). In both groups of partners there are organisations that do not mention factors related to the sustainable development neither in the mission nor in the strategic goals – it means that presently this is not the criterion that determines selection of partners for the central enterprise.

At the next stage of the research (survey research), actual activities undertaken by the partner for the sustainable development were evaluated. In the first question, the respondents were to evaluate the form of cooperation with the logistic operator (Table 2).

Table 2: characteristic of the cooperation forms in the studied network

No.	Description of cooperation	Number of indications
1	We recognise ourselves as partners, but we coordinate the actions and planning to a limited extent. It is a short-term cooperation that engages single departments of our organisation.	8
2	When cooperating, we integrate the activities of many departments and functions sharing the processes (e.g. planning, forecasting, stores managing) in the delivery chain in a longer time horizon.	7
3	Strategic partnership We implement common strategy of achieving shared, superior to our own goals through the actions that use the resources and management structures of both autonomous enterprises. The cooperation is long-term.	5

Source: own study.

Among the surveyed enterprises, 40% of them indicated first of the relationship descriptions as the closest one to an actual functioning of the organisation. 35% has chosen the description characterising more personal relationships, the remaining organisations declare the strategic partnership with the logistic operator.

Aspects related to the sustainable development, green delivery chains, or renewable energy sources, are considered in the strategies of 65% of the enterprises. More than a half of the studied organisations do not implement the elements of sustainable development and related actions in their activities. However, functioning in compliance with the sustainable development concept declares 40% of the interviewees. Among the answers provided by the enterprises in terms of ranking the pillars of sustainable development, the indications on economic pillar were dominating. Such answer was indicated by half of the organisations, 20% of the responses were given to the environment and 30% to the social pillar. Therefore, it is the economic pillar that is the most important for the respondents, and in it the respondents assigned the key role to economic stability, profitability and risk management. Among the environmental factors, respondents indicated the importance of the environment protection, preventing pollution, reducing CO_2 emissions and recycling. In the factors defining the social pillar, respondents indicated political stability, Safety at Work and organisational culture.

Characterising the network relationships in the studied distribution network, 50% of the respondents indicated that they include the sustainable development concept in the strategy. At the same time, dominating number of organisations (65%) do not discuss the principles resulting from the sustainable development concept with the partners. Moreover, 65% of the organisations indicated that implementation of the sustainable development principles in potential partner does not influence the conclusion of a business contract. The same percentage of the respondents believes that implementation of the principles resulting from the sustainable development concept does not influence the quality (efficiency) of cooperation.

For the needs of the analysis of the cooperation models in distribution network, respondents defined duration time of the relationship with the central link. The mid-term and long-term relationships, that is from 1 to 3 years and over the 3 years, were dominating in this network. Whereas in assigning the relationship to the level of maturity of the network, the question concerning the trust between the partners (Table 3) and the unity of goals (Table 4) was important.

Table 3: level of trust in the studied network

No.	Answer	Number of indications
1	It is an initial kind of trust based on the calculation of possible benefits and losses that are evaluated in connection with every transaction.	8
2	We have gained experience by working together, we know each other and we have verified the cooperation on the basis of performed transactions, we continue the trust based on the knowledge.	7
3	We understand the needs of our partner and we care for his well-being. We have common goals, identity and values. We put the good of cooperation above our own short-term goals. Trust based on identification.	5

Source: own study.

Among the surveyed enterprises, 40% of them indicated first of the trust level descriptions as the closest one to an actual functioning of the organisation. 35% has chosen the description characterising more personal relationships, the remaining organisations declare the trust based on identification.

Table 4: unity of goals in the studied network

No.	Answer	Number of indications
1	Each of us pursues our own separate goals.	8
2	We pursue the goals together, but we do not put them above the goals of our own organisation.	6
3	The common goals in a long-term perspective are the most important for us and it is them that we concentrate on by putting them above the individual goals.	6

Source: own study.

The respondents answered the question about the compliance of goals in a similar way as to the question in which the level of trust was checked.

Conducted survey research allow for detailed characterisation of the cooperation models with taking into account the unities of goals and inter-organisational trust. In the first model, most of the organisations (80%) indicated that each of them pursues their own, individual goals. Whereas the 20% indicated that the goals are pursued along with the partner and their achievement solidifies the achievement of the individual goals. In this model, the answers concerning trust are in 70% defined by the answer „a“, which means that these organisations are in the first phase of the network relationships. 30% of organisations indicated the answer „b“. The second model of cooperation gathers organisations declaring that the goals of a quasi organisation, which is the cooperation model, are more important than the individual goals (60%). 40% of organisations declares a unity in pursuing the goal of a quasi organisation, however, they do not put these goals above the individual strategic goals. These are the organisations that assess the level of an inter-organisational trust very positively (50% of organisations indicated the answer „b“ and 50% the answer „c“), what places this model of cooperation in the third phase of the network relationships.

The literature and empirical research conducted at this stage, based on a case study of the chosen distribution network, allowed for the conceptualisation of the cooperation model that includes the sustainable development perspective. In relation to the fact that the research concerns a chosen distribution network, it cannot be stated that the obtained results are statistically relevant and representative. However, the dependencies that allow to answer affirmatively to the research question in the studied network were observed: Does the maturity in terms of the concept of sustainable development of distribution network with participation of the logistic operator depend on the type of the model of cooperation in the network? Indicated dependencies became the reason for the development of the network maturity model concept in terms of the concept of sustainable development of enterprises that include the phases of cooperation in the network (Fig. 3).

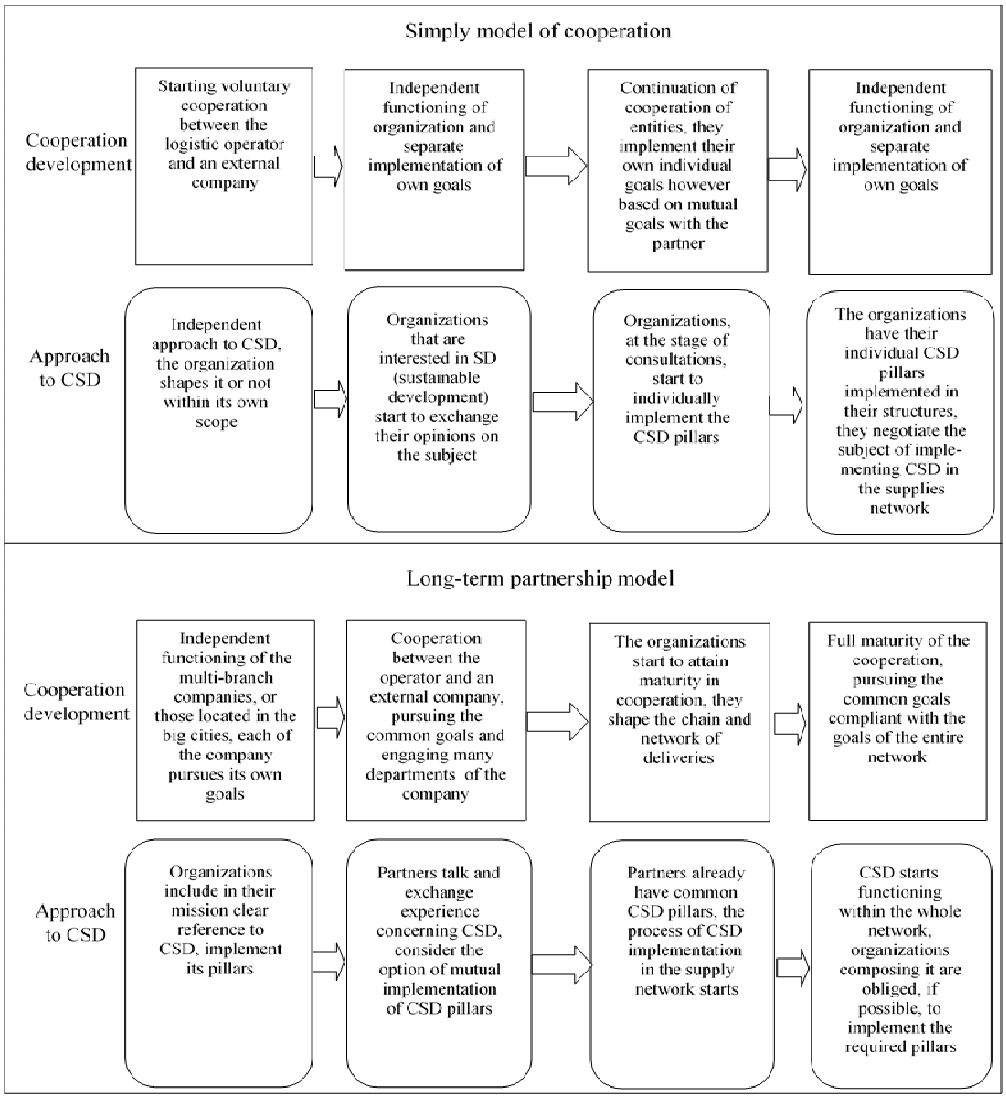

CSD - concept of sustainable development

Fig 3: The concept of the maturity model considering the pillars of sustainable development of companies

Source: own study.

Certainly, an efficient implementation of sustainable development necessitates wider perspective than of only one organization. Results from the performed analyses, confirming the previous research of other authors, are disturbing. It results from them that during selection of partners one does not take into account environmental or social aspects. Only the economic criteria are predominating. Implementation of the sustainable development concept at the network level requires the achievement of cooperation maturity by the organizations. Only when the partners are ready to deepen the cooperation and already have the sustainable concept pillars implemented in their structures, they start walking together towards further, successive implementation of elements of the sustainable development concept within the whole distribution network. Results of the studies show that models of cooperation between an operator and external companies determine implementation of the sustainable development concept. Most often, the talks concerning implementation of the sustainable development concept take place with multitask organizations of high relationship abilities. Moreover, these are the companies that have shown in the questionnaire the most advanced level of trust and very close consensus of goals. Frequently, the negotiations concerning the concepts of sustainable development are affected by strategic partnership present between the subcontractor and logistic operator.

When implementing the sustainable development concept in the distribution network, proper selection of subcontracting partners, i.e. transporting and warehousing organizations, is critical. The more advanced partnership between the entities the more advanced negotiations and will of the partners to jointly implement the concepts of sustainable development. The results of the studies also show that organizations that adopted the description corresponding to model 2 of the cooperation (advanced or very advanced level of partnership) show more interest in the sustainable development concept than organizations in model 1 (simply model of cooperation) and show the options of cooperation within the scope of mutual implementation of this concept. It is worth mentioning that the interval of a relationship very strongly determines the type of cooperation. It has never happened that organizations being in a relationship less than 1 year achieved at least the 2nd level o cooperation. It is understandable because the development of cooperation in the distribution network necessitates a significant effort from the cooperating organizations related to the exchange of information with a partner and engage even more cells of the organization Short cooperation time does not favour this due to a fear of loss of key information or competences.

Conclusions

The concept of sustainable development shows how important is to care for the natural environment. It also shows the great benefits emerging from correct and reasonable natural resources management. The concept of sustainable development should be considered in three basic pillars related to ecology, economy and society. The sustainable development is shaped by many different factors. It can be noticed that all definitions of the sustainable development concept are related to cooperation of the human with natural environment.

The basic areas of logistics where the sustainable development concept is most popular are the transport processes, warehousing processes and processes related to packages and waste management. Proper cooperation and gradual integration of the partners within the distribution network may allow for achieving the economical, social and environmental benefits.

The main benefits related to implementation of the sustainable development concept in enterprises cooperating in distribution network are: reduction of CO_2 emissions, reduction of other external costs of transport and logistic activities, optimisation of distribution costs, improvement of the company's image. They can be achieved by a number of activities e.g. by consolidation of deliveries and planning the transport in distribution network, minimisation of empty runs, use of an alternative transport (more ecological one), use of returnable packaging, implementation of pro-ecological solutions in warehouses. It has to be emphasised that the mentioned activities are often reflected simultaneously in two or three pillars of the sustainable development, generating benefits of ecological, social or economic nature.

Based on the performed studies it can be stated that: the model of cooperation determines the implementation of the sustainable development concept. Therefore, the obtained results allowed for developing the concept of cooperation model that considers the sustainable development perspectives. The performed analyses are based on a concrete case study - selected distribution network. Because of such an approach, one can point to some dependencies between the factors characterising the cooperation model, such as consensus of goals or the level of trust with an approach to the sustainable development concept. However, at this stage the results of the studies cannot be considered as fully representative. They require further detailed analyses. Because of this, they will be the starting point of detailed research on large study samples and multiple case study composed of different networks of distribution.

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Chaos Management as A Tool for Strategic Analysis of Trends in The Development of Social Enterprises in The Context of The Uncertainty of the COVID-19 Crisis

Alexander Annayarovich Stepanov

Doctor of Economics, Professor, Professor of the Department of Innovation Management (Odintsovo Branch of the Moscow State Institute of International Relations, Ministry of Foreign Affairs of Russia. Moscow region, Odintsovo, Novo-Sportivnaya st. , 3)
E-mail: step-916@yandex.ru

Margarita Vitalievna Savina

Doctor of Economic Sciences, professor of the department
economy and enterprises (Russian state social university. 4, bldg 1, Vilgelma Pika Str., Moscow)
E-mail: marg.savina@yandex.ru

Ilja Alexandrovich Stepanov

PhD in Economics Associate Professor of the Department of Management
and sociology of management Branch "Kotelniki" State University "Dubna" (house 35, md. Silicat, Kotelniki, Moscow region)
E-mail: apeks7@yandex.ru

Annotation

The article reveals the problems of development and implementation of chaos management as a tool for strategic analysis of trends in the development of social enterprises in the face of uncertainty of the COVID-19 crisis. The urgency and expediency of introducing a new management methodology - chaos management - into the practice of social enterprise management has been substantiated. The methodical features of the use of tools and methods of chaos management in overcoming the COVID-19 crisis by social enterprises have been determined.

Keywords: chaos management, governance, crisis, COVID-19 pandemic, methods, tools, unknown reality, turbulence

Introduction

Social entrepreneurship is an innovative activity, a social brand of a full range of social interactions in various spheres of human activity, including educational, healthcare, etc. The range of its activities is aimed at solving or mitigating social problems of society on the basis of self-sufficiency and sustainable development of the social sphere. (Plotnikova, 2020).

The field of activity of social enterprises affects numerous sectors, such as culture, education, physical education, tourism, social services, employment-related activities, etc. (Gerasikova, 2019).

Social entrepreneurship solves the problems of society, which the state and business structures cannot cope with. It integrates all the most progressive and the best from the public and private sectors, therefore it is the best way (relative to public or commercial approaches) to solve social problems. (Buyanova, 2015).

In the Russian Federation, according to statistics, more than 71.3 million people are employed (Statistika, 2020). The rest are disabled. They need a developed network of social enterprises that provide jobs, implement business projects, etc., in order to be able to realize themselves and not feel superfluous.

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The world is currently in a state of global crisis caused by the COVID-19 pandemic. This "plague of the 21st century" has fundamentally changed the world. It has fundamentally changed the place, role and opportunities of social enterprises. (Kramchenko, 2020).

Social enterprises, like all mankind, are faced with a new unknown reality, chaos, where the traditional models of organizing the work of enterprises turn out to be incompetent, where inexorable progress is far from humanism and sometimes very hard to resist.

Traditional management skills and technologies, which have proven themselves in social enterprises, today do not lead to the desired results.

Social enterprises, like all business, live in a situation of total uncertainty, and often in the expectation of collapse.

Nobody is ready to say how and according to what scenario the events will develop. What are the consequences for the business? How to minimize risks?

The time of the COVID-19 crisis has convincingly shown that the modern theory of classical management, built on the principles of predictability, does not correspond to the realities when chaos becomes a global phenomenon.

The current crisis has exacerbated the inconsistency of the organizational and managerial mechanisms for managing sustainable socio-economic development adopted by science and practice, neither in the short, nor in the medium, nor in the long term. The models used in management practice do not meet new realities.

This, of course, requires a serious revision of the theory and methodology of management used in practice today and the development of fundamentally new algorithms, technologies and management methods in situations of total chaos, including in social enterprises.

Chaos management, its management concept of non-standard behavioral strategies will allow business to ensure that the COVID-19 crisis is overcome.

Methods

In the development of social entrepreneurship, situations of chaos constantly arise, which are not possible to take into account either at the initial stages of analysis or when developing their forecasts. At the same time, traditional concepts and research methods of control systems do not allow explaining their turbulence in a state of chaos. Moreover, the use of in modern management well-known and widely used practices of technologies, algorithms and methods leads, as a rule, to the opposite result, practically, negating all efforts to achieve the goal. For the sake of fairness, it should be noted that the existing formal toolkit for studying the main signs of chaos so far remains practically underdeveloped.

In the conditions of the previously unparalleled global total chaos caused by the COVID-19 pandemic, the proposed toolkit for analyzing trends in the development of social enterprises is based not so much on the imperative of the methodological postulates of chaos theory, but on their intuitive understanding and impromptu adaptation.

Chaos-management is the concept of analysis of the state of chaos, the concept of transition to a new order, to a new model of building and functioning of the social enterprise system in the face of uncertainty.

The methodological basis of the concept of controlled chaos is the systemic creative analysis. This methodology is designed to develop non-standard management solutions in the face of uncertainty, including social entrepreneurship, "... both in order to strategic development, and to overcome ever-emerging emergencies and crises, when it is necessary to find and implement fundamentally new ways of survival...". (Savina, A. A. Stepanov, I. A. Stepanov et al., 2016).

Systemic and creative analysis allows making effective decisions in non-standard situations and “synchronizing the state of the controlled organization with the realities of unpredictability and chaos. This effect [...] is achieved through the use of creative potential [...], tools, methods and technologies for making non-standard management decisions. " (Savina, A. A. Stepanov, I. A. Stepanov, 2015).

The methodology of systematic creative analysis ensures the formation of effective management systems in a state of chaos, including in social enterprises. With its help, in the development of management systems in conditions of chaos, urgent problems of social enterprises are solved, such as:

- Determination of specific features of chaos processes inherent in a particular enterprise;
- Identification of problems and shortcomings of the existing system of business process management in social enterprises in the conditions of chaos;

- Substantiation of goals, objectives, technologies and methods of creating a management model of chaos management in relation to the characteristics of social business enterprises. (Morozova, A. Stepanov, I. Stepanov, 2016).

Heuristic (informal), mathematical (formal) and combined methods are used as research methods. At the same time, priority is given to heuristic methods that are most widely used in chaos management in the development of non-standard management decisions, and, in particular, methods such as the method of scripting, the morphological method, the method of collective idea generation, the method for determining the degree of preference, etc. (Stepanov , Savina, Krasyukova et al., 2018).

Results

In the context of the COVID-19 crisis, it is very important to understand its true origins and socio-economic consequences, not only from the standpoint of "what happened", but also "how", and, most importantly, "why"? Today, it is necessary not only to analyze the available information, but, most importantly, to explain and understand through what socio-economic and organizational-management mechanisms this happened, and what served as a trigger for this process.

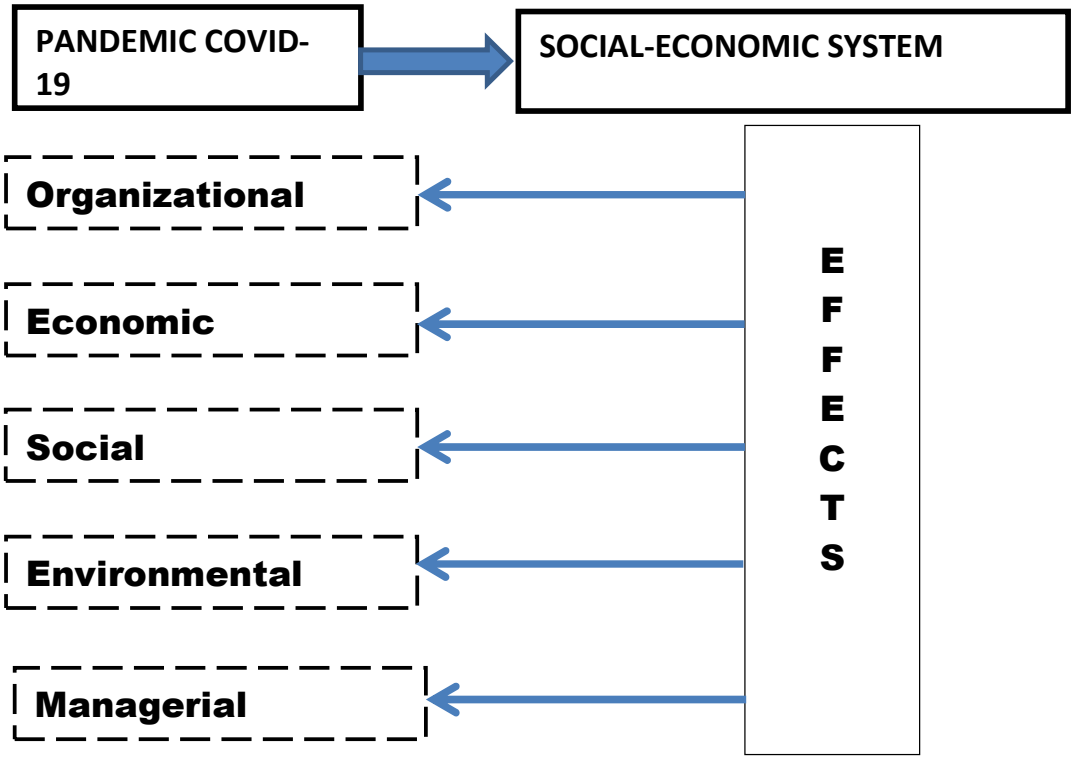

Picture 1: Corona crisis 2020: socio-economic implications for business
Source: compiled by the author

World governments are taking unprecedented measures to contain the spread of the COVID-19 pandemic. However, the overwhelming majority of the measures taken have significantly changed the usual conditions and the content of work in almost all areas of business. Many businesses have either partially suspended their work or continued to work online.

Restrictive measures resulted in a combination of negative consequences for business: organizational, economic, social, environmental, managerial, etc. (Picture 1).

Today, the main problems of business, including social, are: shutdown of enterprises; severance of socio-economic and technological ties; breaking down traditional business processes; decrease in profits; lease payments, taxes; credit

stagnation; rising unemployment; falling solvency; large-scale socio-psychological problems, changes in product preferences and demand, etc. (Sheremet, 2020).

In the context of the global COVID-19 crisis, the management and owners of enterprises in the field of social enterprises are faced with the task of not only retaining staff, but also carrying out production and economic activities in these non-standard conditions, which should not only be equal in terms of their socio-economic results, but also surpass them. (Klochkova, 2016).

What's in practice? Neither the modern management system, nor the modern management cadres, nor digitalization, nor management science and education turned out to be able to quickly solve global problems at a high level.

Most enterprises and organizations see financial support in various forms as the main way out of the crisis (money for businesses; deferred loans; distribution of "helicopter money"; introduction of tax holidays, etc.). These are important and necessary, but far from the only ones and perhaps, in the conditions of the current crisis not always priority measures.

In order to use various kinds of support from the state and society, each enterprise must independently decide what will be the effective model of its adaptation to a new unknown reality.

New challenges require significant changes, the search for new strategies and forms of organizing the activities of social enterprises. It is obvious that in the conditions of a total socio-economic crisis, the main strategic goal of business should be to rely on its own capabilities.

In this regard, representatives of social enterprises have many questions:

- How to change strategy and tactics in the chaos of COVID-19, self-reliantly?
- What social-psychological, intellectual, organizational, personnel, behavioral and other intra-organizational capabilities are advisable to use to save business in a situation of total chaos of the COVID-19 crisis?
- In what forms should rapid retraining and advanced training of personnel be carried out in the context of the corona crisis?
- How to motivate and train staff? What new knowledge and skills, rather than outdated, when the competences available today are counterproductive?
- How to combine support measures provided by the government to business with its own understanding and vision of the problems of its preservation and salvation?

The theory and practice of modern chaos management and the tools of strategic analysis will help to answer these and many other questions.

Irreversible processes of transformation of modern socio-economic systems, due to the acceleration of the implementation of the achievements of scientific and technological progress, digitalization, innovation along with intensive processes of expansion of sanctions regimes by the leading scientific and industrial powers, and now the total isolation of the world economy as a consequence of the corona-virus crisis has caused the current stage of socio-economic development as a period of total chaos, uncertainty and unpredictability of development.

The primary task of analyzing the situation of chaos is to determine its main features-characteristics and tools for their study.

The main characteristics of chaos are: turbulence, temporality, delocality and desynchronization.

Turbulence of a socio-economic system is an abrupt mismatch of the elements of its system and the rate of their change, which leads to critical imbalances and is one of its main features. (Kormanovskaya, 2015).

Turbulence manifests itself in the “disordered” state of the socio-economic system, characterized by abrupt unstable fluctuations, changes in the behavior of the system and processes, a rapid change in trends with a sharp increase or decrease in their speed and significant fluctuations in economic characteristics (indicators). As a result, the stability of the functioning of socio-economic systems is disrupted.

Chaos and its state of turbulence characterize the transition of a socio-economic system from an evolutionary to a revolutionary model of development, a transition to revolutionary changes in all elements and relations of the socio-economic system.

As a result of the diagnosis of turbulence as a key sign of chaos, there is an awareness of the contours of a new, unknown structure and content of fundamentally different relations between subjects of social entrepreneurship as an objective prerequisite for maintaining its controllability through the formation of an innovative management system.

Other key features-characteristics of chaos in the system of social enterprises are:

- *Temporality* - a sharp abrupt change in the dynamics of the speed of the turbulence process of systems;
- *Delocality* - blurring of the topos, place and space of systems functioning, in which their former locality ceases to matter;
- *Desynchronization* - discrepancies between the rhythms of the system and the rhythms of its elements, connections and environment in time and space.

We propose a toolkit for analyzing the key features-characteristics of chaos in the activities of social enterprises.

Based on the above methodological message, it is obvious that the basic provisions of controlled chaos from the standpoint of systemic creative analysis are:

- Chaos is one of the most important life cycles of transformation in social enterprises, characterizing their qualitative transition from one state to another;
- Chaos is not an absence of order (disorder, "Brownian motion"), but a new reality that we do not know; the un-deciphered new order that exists in our heads due to the limitedness of our ability to decipher it today;
- Having learned the patterns of behavioral models of chaos, you can use them as an effective management tool in conditions of unpredictability and uncertainty;
- To manage social-economic systems in a situation of chaos, it is necessary to use a management tool - chaos management as management of the state of chaos, the state of transition to a new order, to a new model of building and functioning of the socio-economic system.

Conclusions

Research has shown that chaos management is the management of a state of chaos, a state of transition to a new order, to a new model of building and functioning of social entrepreneurship in the face of uncertainty.

Chaos management as a “technology of destructive creation” can be used as an effective management tool in an environment of unpredictability and total uncertainty.

Management concepts of chaos-management are aimed at solving fundamentally new problems and developing management solutions that can ensure the exit of social entrepreneurship from the state of chaos, and in the future to ensure high rates of its development. Chaos management is the management of an organization to overcome chaos in its socio-economic development. By its content, chaos management is a set of special tools and methods, with the help of which the state of chaos is considered not as an absence of order, disorder or confusion, but as a potential opportunity that opens up new prospects for effective socio-economic development based on the transition to a new model of building and functioning of the organization. (Academic, 2020).

The main objectives of chaos management application are:

- Creating an effective project management system in social enterprises to deal with sudden situations;
- Regular monitoring and preparation of preventive measures to prevent the occurrence of situations of chaos;
- Development of scenarios for the possible development of the situation and the implementation of operational measures to create systems of anti-chaos control based on the analysis and assessment of the reliability of information, the implementation of regular control over the implementation of anti-chaos measures;
- Preparation and implementation of a comprehensive program to overcome the negative consequences of chaos situations. (Stepanov A.A., Stepanov I.A., Savina, 2015).

The analysis of chaos problems in social enterprises using chaos management tools should be carried out in stages:

- *The first stage:* defining the model of the state of chaos in the organization. In the process of analysis, the most characteristic indicators for the enterprise are identified, which allow to assess the state of the chaos processes taking place;
- *Second stage*: identifying transformations of key parameters of the enterprise in a state of chaos. Revealing negative and positive tendencies, as well as parameters of chaos processes. Such an assessment is carried out using the method of express analysis of the current state. In this case, indicators-indicators are used that reflect the signs of chaos processes;
- *Third stage*: identification of production potential opportunities in the process of developing an innovative enterprise development strategy;
- *Fourth stage*: conducting an expert assessment of possible trends and development trends of an enterprise which is in the crisis phase of its development cycle;
- *The fifth stage*: determining the patterns of the formation of business behavioral strategies in a crisis;

- *The sixth stage*: conducting a comparative analysis of the possible parameters of the enterprise development when comparing situations before and after the chaos;

- *The seventh stage*: formation of parameters of the model of the efficiency of enterprise chaos management, its criteria and indicators.

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Stock Market Development in Africa: The Critical Macroeconomic Issues

Paul UZUM
Department of Banking & Finance,
Covenant University, Ota, Nigeria
[paul.uzum@yahoo.com]

Ochei Ailemen IKPEFAN
Department of Banking & Finance,
Covenant University, Ota, Nigeria
[ochei.ikpefan@covenantuniversity.edu.ng]

Alexander Ehimare OMANKHANLEN
Department of Banking & Finance,
Covenant University, Ota, Nigeria
[alexander.omankhanlen@covenantuniversity.edu.ng]

Jeremiah EJEMEYOVWI
Department of Economics & Development Studies, and Research Fellow, Centre for Economic Policy and Development Research (CEPDeR), Covenant University, Ota, Nigeria
[jeremiah.ejemeyovwi@covenantuniversity.edu.ng]

Abstract

The aim of this research was to analyze the key economic drivers of stock market development in Africa. The study used market capitalization as the explained variable to represent stock market development; credit availed to the private sector, external reserves, foreign direct investment, broad money supply, external trade, GDP per capita, inflation and lending rate to represent macroeconomic factors. Eight African countries were used to represent Africa's stock markets- Egypt, Nigeria, South Africa, Morocco, Tunisia, Ghana, Kenya, and Mauritius. The study concludes that broad money supply, credit to the private sector, and GDP per capita were the most important variables that drive African stock markets.

Introduction

The stock market performs critical roles in the economy of nations. Alongside the banks, Pension funds, and the Insurance sector, they constitute the "heart of the financial system" of a country. It provides a mechanism for transforming savings from surplus economic units into financing for economic agents in need of long-term capital. According to the World Exchange Federation (2017), efficient stock markets promotes growth in the economy by encouraging the deployment of financial assets-by putting together people who are in need of long term funds to innovate and expand with people with resources to invest. Another primary role of the stock market is that it provides an avenue for an orderly and seamless transfer of shares of companies among shareholders. The stock market also promotes financial system efficiency by providing competition to other classes of financial instruments like bonds, treasury bills, commercial papers, and certificate of deposits. It provides investment outlay to large institutional investors as well as small retail investors by providing them the opportunity to invest in not only shares, but derivatives, exchange traded products (ETPs), collective or pooled investment schemes like mutual funds, unit trust, and real estate investment trust, as well as stock options and futures.

Stock markets also promotes good governance in business practices (World Federation of Exchanges, 2017). It promotes effective management of companies by providing a framework for corporate governance and thus ensuring that corporate entities are run in the best interest of investors and society in general. It provides companies with the opportunity to tap into the benefits of financial globalization by providing them with diversified foreign portfolio investors. It facilitates growth of companies through mergers, acquisitions, and takeovers there by

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providing opportunities to enlarge product lines, improve supply channels, hedge risk, and grow their share of the market. The stock market also provide employment for several individuals in investment banks, issuing houses, stockbroking firms, registrars, fund/asset managers and stock exchanges.

The performance of a nation's equity market reflects the health of its economy; it may help explain the past, understand the present and predict future economic trend. While economic fundamentals influence the performance of equity markets, the later provides a feedback mechanism to policy formulators on the perception of investors on the trend in economic activities. Thus, it is imperative for governments to keep a close eye on activities in the equity market and to build the enabling environment for stock markets to thrive. Stock market development may be visualized from varied standpoints; it refers to increase in the market capitalisation, stock market index, number of listed businesses, level of market liquidity, performance of listed entities, level of participation among local and foreign investors, and reduction in market concentration.

Stock market development is shaped by events in the macroeconomic environment in which it is domiciled. This explains why the most developed and efficient stock markets are found in the most industrialized countries of the world. The biggest stock markets are in the world's leading economies -United States and China with a stock market capitalisation of USD 32.1trn and USD 8.7trn respectively as at the end of 2017 (World Development Indicator, 2018). Apart from having a large economy, these countries are characterized by macroeconomic stability with minimal inflation, moderate interest rate and stable exchange rate; they also have a thriving private sector. Innovations in monetary and fiscal policy, exchange rate, the distribution of income, inflation, trade balances and even crude oil prices have consequences for stock market development. Again, the size of the economy and its structure are also important factors. Limitations on foreign shareholding in stock markets can lead to inadequate market depth and liquidity, especially where there is absence of a large and diverse base of local/domestic investors. International investors need confidence that their funds and income can be repatriated at will. This may however lead to economic problems for the host nation when there is a mass exodus of foreign capital due to exogenous shocks outside the control of the country.

Stock markets also require a sound banking system to support its development as listed companies would perform better in countries where credits are readily available. When credits are readily available; margin lending and security lending activity increases which helps to boost stock market liquidity. The level of financial deepening or participation of the population of a country in financial activities is another factor. Therefore, this work aims to examine the economic issues which account for stock market development in Africa. The work shall be a cross country study with focus on eight African stock markets- South Africa, Nigeria, Egypt, Kenya, Mauritius, Morocco, Tunisia, and Ghana. The rest of this paper is divided into five sessions, session two is the literature review, session three is the empirical literature, session four is the econometric methodology and data, session five is the empirical analysis and end with session 6 which is the conclusion and recommendations.

The Literature Review

Several studies have been carried out by researcher in various countries on the link between economic variables and development in the stock market. Azeez and Obalade (2019) examines the macroeconomic drivers of stock market development in Nigeria. The research was based on the ARDL bound testing technique. The key drivers of stock market development in Nigeria were identified to be a developed banking system, liquidity in the stock market, foreign investment flow and national income. However, inflation which is a proxy for economic instability, and savings rate are not significantly factors that account for stock market development.

Mroua and Trabelsi (2019) probed the link between exchange rates and equity market indices in BRICS nations using the Generalized Method of Moments (GMM) regression technique. The research findings were that changes in exchange rate is a vital factor in explaining both the previous and present volatility of the equity market index in the economy of BRICS countries. Tsaurai (2018) examined the drivers of equity market development in developing stock markets. He made use of the pooled ordinary least squares, the fixed and random effects methodology; the major factors influencing stock market development were found to include economic growth, foreign direct investment, and development of infrastructures. Others were exchange rates, price level (inflation), savings, trade openness, a developed banking system and the levels of liquidity in the market.

Kabuga (2018) examines the connection between fiscal deficit and stock market performance in Eight African Countries. Using the dynamic fixed effects (DFE), granger causality test for panel data, and cointegration, the findings confirm evidence of long run cointegration between budget deficits and stock prices; and that budget deficits depress stock market performance in the short-run, but have a direct relationship with stock market performance in the long run. Agyapong and Badjabeng (2018) examined how foreign direct investment and external debt influence financial sector growth in Africa. Using the generalized method of moment estimation technique,

the results showed that both foreign direct investment and external debt do have a direct relationship with financial sector growth in Africa. Nyasha and Odhiambo (2018) examined the key drivers of equity market development in Brazil. Based on the ARDL Bound test, the research findings were that stock market development in Brazil has a positive and direct relationship with trade openness, exchange rate and a developed banking system both in the long and short run. However, the levels of market liquidity and investment were found to exhibit negative effect on the Brazilian equity market.

Adebowale and Akosile (2018) examines the link between exchange rate, interest rate, and stock market development in Nigeria. Using the OLS regression technique the empirical findings revealed that interest rate had a negative impact and the foreign exchange rate exhibits a positive effect on the growth of the Nigerian equity market. Khan (2017) examined the economic drivers of stock market development in South Asian countries. Using the ARDL bound test technique, the empirical findings was that that Inflation and exchange rate are positively related to stock returns in China, while an inverse relationship was observed between interest rate and the returns on equities. Duy and Hau (2017) investigated the macroeconomic factors that account for stock market index in Vietnam's Stock Exchange. Using the VECM, stock prices in Vietnam were found to be influenced by inflation, exchange rate, supply of money and market prices. Furthermore, increases in the supply of money and the index of market prices enhances the price of equities, while whenever inflation and exchange rate rise, share prices declines.

Jamaludin, Ismail and Manaf (2017) investigated the link between economic variables and equity market returns in ASEAN countries of Singapore, Malaysia, and Indonesia. Using the panel least square regression analysis, inflation and exchange rate were found to influence stock market returns while money supply is not an important factor in explaining stock market return. The study concludes that inflation is inversely related to stock market returns and the effect is greater than that of exchange rate. Rasiah. Habibullah and Hamid (2017) examines the relationship between equity market returns and its key determinants which includes income, inflation, and happiness on selected OECD countries with data ranging from 1973 to 2012. Based on the dynamic heterogenous panel estimation techniques of the Dynamic Fixed Effects (DFE), Mean Group (MG), and Pooled Mean Group (PMG), the empirical findings were that income has a direct effect on the returns on equities, inflation inhibits stock market returns and happiness is not an important factor in explaining stock returns.

Matadeen (2017) explores the economic factors that account for stock market development in 14 Sub-Sahara African nations. Based on the panel vector error correction model, the result indicated that a developed banking sector, economic growth, liquidity in the equity market, the level of investment and stable economic conditions are principal drivers of equity market development in Sub-Sahara Africa. More so, savings was found to have a negative implication for the growth of equity markets for nations in Sub-Sahara Africa. In the short run, economic growth indirectly stimulates stock market development. Ho and Odhiambo (2017) analyzed the macroeconomic determinants of growth in the Hong Kong equity market. They used ARDL bound test, to examine this relationship and the result was that a developed banking system as well as economic growth are directly correlated to equity market development in the long-run; but trade openness and inflation exhibit an inverse relationship with equity market development. The short run empirical results showed that while economic growth has a positive effect; the real interest rate, inflation, and external trade have a negative effect on the development of the stock market. Ho (2017) examines this relationship for Malaysia using the same analytical technique and found that economic performance and openness to trade do have a direct long-term effect, while banking sector development exhibits a negative long-term effect on equity market development. Balogun,
Dahalan and Hassan (2016) studied the effect of market liberalization and financial growth on equity market development in seven Sub-Saharan African nations. Using dynamic heterogenous panel (Pooled Mean Group) estimation technique, the empirical findings was that, on average, stock market liberalization have a positive long-term effect on the economies of the selected nations; more so financial sector growth also has a major positive long-term effect on the growth of stock markets. The macroeconomic determinant of stock market growth in Turkey was examined by Bayar (2016). Using ARDL bound test, the results showed that economic growth and the level of liquidity in the market had positive effects, while inflation had a negative effect on the growth of stock market in Turkey.

Data and Empirical Model

Data

The study employs panel data for eight selected African for the empirical analysis. The countries selected for this study include South Africa, Nigeria, Egypt, Morocco, Tunisia, Ghana, Kenya and Mauritius with data spanning 24 years from 1994 to 2018. The countries were selected based on the strength of their economy as well as to represent the regions in Africa.

Model and estimation Technique

This study adopts the Calderon-Rossell (1990) stock market model. The model expresses some of the economic determinants of the Stock market. The model is specified thus:

$$Y_{it} = \alpha_i + \delta Y_{it-1} + \beta M_{it} + \varepsilon_{it} \quad (1)$$

Where Y represents the market capitalization of the stock exchange; αi represents the unobserved country specific fixed effect; eit is the white noise error term; M is an array of macroeconomic variables comprising per capita GDP, private sector credit, external reserve, inflation, foreign direct investment, lending interest rate, broad money supply, and external trade.

The study further utilizes the mean group (MG) estimator which assumes heterogeneity across panels (both the slopes and the intercepts are permitted to vary across countries). This estimation technique was used in the research of Balogun Dahalan and Hassan (2016); and Rasiah Habibullah and Hamid (2017).

Results and Discussion

Africa's Stock Market Stylised Facts

Table 1: Number of Listed Companies in Stock Exchange

NUMBER OF LISTED COMPANIES IN STOCK EXCHANGE IN 2017					
AFRICA		G- 7		BRIC	
South Africa	294	United States	4336	India	5615
Egypt	252	Japan	3598	China	3485
Nigeria	166	Canada	3278	Brazil	335
Tunisia	81	UK	1858	Rusia	230
Mauritius	74	France	465		
Morocco	73	Germany	450		
Kenya	65	Italy	290		
Ghana	30				

Source: World Development Indicators (2018)

Table 1 is a snapshot of the number of listed companies across stock exchanges in Africa. South Africa tops the table with 294 companies followed by Egypt with a total of 252 companies. Nigeria had a total of 166 in 2017 while the least is Ghana with a total of 30 companies. When compared with those of G7 countries and BRIC countries the table shows that countries like India, United States, Japan, China, Canada and the United Kingdom have listed companies that outnumbers the total number of listed firms in all stock exchanges in Africa.

Table 2: Trend in Number of Listed Companies in Africa

TREND IN NUMBER OF LISTED COMPANIES IN AFRICA								
	1997	2000	2003	2006	2009	2012	2015	2017
Egypt.	654	1075	977	595	312	234	250	252
South Africa	615	604	390	359	353	338	316	294
Nigeria	182	194	206	201	214	189	183	166
Ghana	21	22	25	29	31	29	29	30
Kenya	57	56	47	52	55	60	64	65
Morocco	49	53	52	63	76	76	74	73
Mauritius	30	31	28	62	64	60	71	74
Tunisia	32	44	45	48	52	59	78	81

Source: World Development Indicators (2018)

Table B gives a trend in the number of listed companies across Africa Stock Exchanges. From the table, both South Africa and Egypt recorded significant decline over the period with South Africa recording a significant decline from 615 companies in 1997 to 294 in 2017 and Egypt falling from a high of 654 in 1997 to 252 in 2017. Nigeria recorded a modest fall from 182 in 1997 to 166 in 2017. These declines are largely attributable to delisting of companies that fail to meet listing standards and sometimes voluntary delisting by companies.

Table 3: Market Capitalisation of Stock Exchanges

2017 MARKET CAPITALISATION OF STOCK EXCHANGES (USD'bn)					
AFRICA		G- 7		BRIC	
South Africa	1,231.0	United States	32,121	China	8,711.30
Morocco	67.0	Japan	6,223	India	2,331.60
Egypt	46.5	Canada	2,367	Brazil	954.70
Nigeria	37.2	UK	1,868	Rusia	623.40
Kenya	10.2	France	2,749		
Mauritius	9.7	Germany	2,262		
Tunisia	8.9	Italy	587		
Ghana	3.1				

Source: World Development Indicators (2018)

Table 3 shows the market capitalization of stock exchanges in Africa, compared with the trend in major countries of the world. From the table it shows that South Africa has the most capitalized stock exchange in Africa with a market capitalization more than 85% of the combined market capitalization of all exchanges in Africa.

Table 4: Market Capitalization as Percentage of GDP

2017 MARKET CAPITALISATION AS PERCENTAGE OF GDP					
AFRICA		G- 7		BRIC	
South Africa	352.8	United States	165.7	India	89.6
Mauritius	73.4	Canada	143.2	China	71.2
Morocco	61.1	Japan	127.7	Brazil	46.4
Kenya	24.3	France	106.5	Rusia	39.5
Tunisia	22.3	UK	64.6		
Egypt	19.8	Germany	61.5		
Nigeria	9.9	Italy	27.3		
Ghana	7.8				

Source: World Development Indicators (2018)

Table 4 shows the market capitalization as a proportion of GDP and is called the capitalization ratio which is a relative measure of stock market development. It measures the degree to which the equity market supports growth of the economy. South Africa has the highest market capitalization relative to its national income in Africa with a market capitalization three and half times that of its GDP. Mauritius and Morocco also recoded a relatively good percentage of 73.4% and 61.1% respectively.

Table 5: Stock Market Liquidity in Africa

2017 STOCK MARKET LIQUIDITY (VALUE OF STOCK TRADED IN USD'BN)					
AFRICA		G- 7		BRIC	
South Africa	409.7	United States	39,785.9	China	17,171.6
Egypt	14.4	Italy	5,912.7	India	1,186.0
Morocco	4.2	Japan	5,778.4	Brazil	642.5
Nigeria	4.1	UK	4,402.9	Rusia	145.5
Kenya	0.8	Germany	1,558.6		
Mauritius	0.4	France	1,357.9		
Tunisia	n/a	Canada	1,279.5		
Ghana	n/a				

Source: World Development Indicators (2018)

Table 5 gives a snapshot of the level of liquidity in Africa's stock markets. By liquidity we refer to the annual value of stocks traded in the market. It is a critical variable used by foreign portfolio investors to appraise the ease of disposal of their investment should they decide to sell. South Africa being the most developed market in Africa is also the most liquid with an annual turnover of USD 409.7bn in 2017, though lesser than those of all G7 nations, it performed better than Russia which recorded USD 145.5bn in 2017.

Empirical Result

Table 6 shows the estimated mean group regression results. The results from the mean group estimator indicate that broad money supply is the only important macroeconomic variable affecting stock market development in the long run. Furthermore, broad money supply indicated a positive nexus, which imply the fact that broad money supply is a significant positive driver of the stock market in the long run. All other economic variables were found to be insignificant. In the short run, change in credit to the private sector, broad money, and GDP per capita were found to be significant determining factors explaining stock market development in Africa. However, foreign direct investment, external reserve, inflation, trade openness and lending interest were found to be insignificant.

Table 6: Econometric Results from the Mean Group Estimator

	Mean Group (Long run)	**Mean Group (Short run)**
Dependent variable: Market Capitilisation	Coefficient (Z Score)	Coefficient (Z Score)
Credit to Private Sector	-1.096 (-1.01)	1.242 (2.06) **
FDI	-0.059 (-0.78)	0.009 (0.2)
External Reserves	-0.403 (-0.66)	0.286 (0.4)
M2	3.371 (2.14) **	-3.772 (-2.06) **
Trade Openness	-0.503 (-1.2)	-0.073 (-0.15)
Inflation ***	-0.038 (-0.78)	0.035 (1.5)
GDP Per Capita	-0.075 (-0.05)	3.006 (1.93) **
Lending rate	0.032 (0.57)	0.08 (1.06)
Constant		-15.728 (-1.1)
Error Correction (EC)		-1.131 (-8.52) ***

*Where: *, **, and *** indicate significance at 10 %, ** at 5 % and *** at 1 % respectively. These estimations were done using (xtpmg) approach in Stata. The first set of panels are the long-run results; while the second set of panels are the short-run results Source: Authors' estimations.*

Conclusion and Recommendation

The research examined how macroeconomic factors affect stock market development in Africa. Among these macroeconomic variables were GDP per capita, credit to the private sector, external reserve, inflation, lending interest rate, broad money supply, foreign direct investment, and external trade which were used as explanatory variables, while market capitalisation was used as the dependent variable to capture stock market development in Africa. The study finds that in the long run, only broad money supply significantly drives stock market development, while in the short run, credit to the private sector, broad money, and GDP per capita were found to drive stock market development.

Based on the findings, the study concludes that efforts to develop African stock markets enact policies to encourage credit to the private sector, manage the broad money supply properly and improve the GDP per capita. We therefore recommend that governments of African nations pursue privatization and compulsory listing of public utilities as stock market development is a private sector driven activity. There is also the need to enhance credit to private sector through deliberate intervention funds for private companies, and promotion of sound economic policies that will accelerate economic growth and growth in per-capital income which will enable people to invest more in stocks.

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The Process of Origin New Fintech Institutions as A Result of Financial Innovations in Banking Sector

Alicja SZYSZKO

Department of Management and Social Communication, Jagiellonian University, Poland
alicja.szyszko@uj.edu.pl

Abstract

The financial sector is in the process of fundamental transformation caused by the financial crisis, the new regulatory architecture and the technology revolution. The consequence of these shifts is the appearance of fine-tech players in the banking sector. They are increasingly competing with traditional banks, and the offer of innovative digital solutions is a major challenge for them. In the specialist literature, there are different names of the fintechs operating in the banking sector, which are used interchangeably. The aim of the articles is to present the most frequently applied classifications in relation to fintech entities. On the analysis of the literature and case studies, it has been proposed to classify these institutions and to identify their features. The analysis of the prepared case studies allows to verify the research hypothesis: there is no single, universal way of establishment of new, digital banking institutions.

Keywords: Fintech, Challenger Bank, Digital Bank.

Introduction

The global financial crisis of 2007-2009 was a turning point in the financial sector. It triggered a loss of confidence in banks which had been saved by the government from bankruptcy and a shift of customers towards parabanks. In the post-crisis period, the transformations in the financial sector were enhanced by a technological revolution and regulatory amendments. In recent years, the use of digital technologies in the financial sector has increased dynamically and new actors, instruments and tools have emerged. The post-crisis regulatory architecture has responded to these changes. In the European Union, the Payment Services Directive II (PSD2) was implemented in 2018 regarding banks' sharing of their customer data with third-party providers. The openness of the banking market to entities from outside this sector made it essential for banks to adapt to the changing needs and the expectations of customers. As a consequence of these transformations in the financial sector, new financial institutions, known as fintech, began to appear alongside the banks. This term was formed by combining the two words 'financial' and 'technology'.

The term fintech is commonly associated with the use of technology to provide new financial solutions (Arner, Barberis, Buckley, 2017). The second understanding of fitechs refers to new technologies, such as artificial intelligence, blockchain technology, colud computing, robo-advisory (Leong, Sung, 2018). In this sense, the introduction of new technologies enables the improvement of these traditional banks' services. (e.g. credit scoring analysis based additionally on big data). Some researchers also point out that these are the new generation of technology startups which are causing deep transformations in the financial sector (Sia, Soh, Weill, 2016).

The emergence of fintech entities is causing greater competitiveness in the banking sector. Due to the use of sophisticated digital technology, these entities have a significant advantage over traditional banks. Fintech entities base their activities on the digital banking model, using mobile and online access channels. Their operations are focused on understanding and satisfying the customers' expectations, in particular the Millennials. They provide an innovative, personalised products and services, use efficient sales channels, significantly reduce or completely eliminate fees and commissions (Mackenzie 2015). Most of the customer's relationships with the bank have been standardised, their services are simplified and remote provided (KPMG, A new landscape. Challenger banking annual results, 2016). According to the PWC report (Customers in the spotlight. How FinTech is reshaping banking, 2016) customer-oriented activities in fintech represent 80%, while in traditional banks only 53%.

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The technological development and the regulatory environment over the last decade have made the fintech entities become a complementary element of the banking system. It is estimated that the number of users of digital banks in the world is around 2.6 billion, and the leading players include European countries, the United States, Singapore, Israel, India and China (FindexAble, The Global Fintech Index 2020, 2019). The major digital banks are: Revolut, N26, Monzo. The success of those companies results from their rapid ability to adapt to changes in the banking sector using modern technology.

Technological development in the financial sector is extensively discussed in both domestic and English language literature. The existing publications can be divided into two main categories. The first group refers to the transformation of the financial sector, which can be analysed from the level of banking, i.e. BankTech (Schwab, Guibaud, 2016), insurance, i.e. InsurTech, or regulation, i.e. RegTech (Rogowski, 2017). he second category of studies concerns the application of new technologies in the product range. These include blockchain technology (Gou, Liang, 2016), artificial intelligence (Vieira, Sehgal, 2018), big data analysis (Hassani, Huang, Silva 2018) cloud computing (Bejju 2014).

The research trends indicated also focus to a large extent on the institutional dimension of the banking sector, which includes financial start-ups. In the literature they are identified as digital banks, challenger banks, neobanks or virtual banks. These terms were originally used interchangeably. With the rapid growth of the number of these institutions, a diversity of names has appeared. The paper attempts to systematise the terms used in reference to new financial institutions established as a result of the technological revolution. The aim of the articles is to describe the process of origin of these institutions and to suggest their classification. For the purpose of the study, the following research questions have been posed:

1. what are the drivers of the transformation in the financial sector?
2. what kind of new fintech institutions established as a technological revolution stand out?
3. what are the characteristics of the new fintech entities?
4. is there one universal process for the origin of these entities?

The research hypothesis, based on the literature studies and research questions posed, is as following: there is no single, universal way to establish new, digital entities in the banking sector.

Literature Review

After the global financial crisis of 2007-2009, the technological revolution brought about changes in the financial sector. Alongside traditional banks, new banks using digital access channels began to emerge. In the literature, these institutions are usually referred to as digital banks, challengers banks or neobanks. In the initial research these terms were used interchangeably. With the deepening of technological transformation in the financial sector and the emergence of new institutions, an approach has been developed that these entities are completely digital, have similar operating principles, are based on digital operating models, but these institutions cannot be considered as the same and the current concepts cannot be used alternatively.

The first type of entities created by the fintech revolution are digital banks. This term refers to institutions based on digital solutions, characterised by simple and fast operation. Customers can access them anywhere and anytime through electronic channels. They offer both classic and new products of the highest quality using digital solutions (PWC, Consumer Digital Banking Survey, 2019). Digital banks have a greater capacity to innovate because they are not limited by the institutional framework, they do not rely solely on third parties (Zhuplev 2018).

The fundamental division applied to new financial institutions includes neobanks and challenger banks. These entities can be classified as digital banks. The literature studies made it possible to list the differences between these institutions. Challenger banks are entities that use innovative digital solutions and thus challenge traditional banking. Most often they hold a banking license, and from an organisational point of view, they are typical fine-tech entities that do not have links with traditional banks. Nowadays, the following entities can be identified: Monzo (after obtaining a licence), N26, MyBank, Starling Bank, Revolut. Neobanks, on the other hand, do not have a banking license, therefore they are not supervised and regulated. Their activities are based on cooperation with traditional banks and provide them with their products and services (Molnár 2018), korzystając using their institutional support and traditional infrastructure. Examples are: Moven, Yolt, Lunarway.

The initial research on Fintech entities included only digital banks, challengers banks and neobanks. Further literature analysis made it possible to divide the challenger banks into three categories (Citi GPS, Bank X. The New New Banks, 2019):

- Standalone challenger banks: these are starups created by fintech companies that use technological solutions to improve retail banking (e.g. Starling Bank, Dozen, Bank Zero).
- Incumbent-led challenger banks: these are digital entities established by traditional banks to improve customer service by investing in technology (e.g. Marcus, New Hong Kong Virtual Bank, DBS Digibank, aiBank, Richard).
- Big-tech-led challanger banks: these are startups formed by technology giants with an extensive big data analysis, which allows for quick customer acquisition (e.g. WeBank, MyBank).

The different classification includes new challenger banks, which are licensed as banks and compete with traditional banking. These are e.g. Monzo, Starling, Revolut. Other categories are neobanks that do not have a licence, e.g. WeBank, Yolt and non-banks that have no connection with traditional banking but are licensed by non-banking entities, e.g. Monese (Cox, 2019). A similar classification also includes new banks, e.g. Monzo, Revolut, N26, neobanks, e.g. Yolt, Moven, and non-banks, e.g. Monese. A new category is beta banks, i.e. digital entities created by traditional banks, e.g. AiBank, Simple (Caicedo, 2019).

This classification is complemented by the PWC report (Who are you calling a 'challenger'? How competition is improving customer choice and driving innovation in the UK banking market, 2017). It identifies the differences between newly established digital banks and traditional banks that use digital access channels and introduces a new category of entities that have been established by the retailers:

- Mid-size ful service banks: these are traditional banks that have moved to digital channels, but still maintain traditional access channels (e.g. cooperative banks or TSB in the UK).
- Specialist banks: these are specialist banks that provide a large network of branches but focus more on call centres, digital channels or third party intermediation (e.g. Secure Trust, Aldermore, Shawbrook).
- Digital only banks: these are banks operating exclusively with digital technology, with innovative technological solutions (e.g. Starling, Monzo, Tandem).
- Non-banks brands: these are entities whose owners are operating outside the financial sector. Most often they are large retailers (Tesco Bank, Sainsbury's Bank, Virgin Money).

All the indicated institutions have similar operating principles and are based on digital operating models. However, these terms cannot be used alternatively for all institutions created as a result of the digital revolution in the financial sector. The basic differences between them result, among others, from the type of founding entity, the profile of the institution's operations, its experience and presence on the market or the possession of a banking licence.

Following the literature studies all fintech institutions can be classified as digital banks and defined as challengers, i.e. using digital access channels and challenging traditional banking. In this group, technological start-ups can be identified as new banks, standalone challenger banks or digital only banks. Another category is neobanks and incumbent-led challenger banks, also known as beta banks. Another category is made up of banks created by technology companies, i.e. big tech banks and retaliers' banks. The last category is made up of non-banks, i.e. entities using licences from non-banking financial institutions.

Research Methods

The researchers' approach includes inductive reasoning. The methodology of scientific research indicates that induction consists in moving from empirical observations to theoretical generalizations, however, conducting observations is closely related to understanding and analysing theoretical knowledge (Lindström, 1998).

The research process has been divided into two stages. The first part of the research included literature studies, which were conducted using the Web of Sience databases. The following keywords were entered: digital banks, neobanks challengers banks, fintech, and then articles were read both in Polish and English from the period 2010-2020. The review of available literature made it possible to check the validity of the research topic and to define in detail the theoretical development of the article. On the basis of the literature research, various proposals for terminology, division and examples of new bank entities created as a result of the technological revolution were detailed.

The second stage of the study is to conduct case studies for selected financial institutions. Six groups of banks have been identified from the literature studies and one example each has been selected and metrics have been developed for them. The case study scheme includes the following data:

- entity name
- country of origin
- year of funding
- type of business
- owner
- type of activity performed by the founding entity
- type of licence
- financial market experience
- availability (countries)

On the analysis of the case studies, the specific features of the individual entities were identified. Then it was proposed to systematise the banking entities created as a result of the technological revolution. At the beginning, only two types of financial institutions were specified: neobanks and new digital banks. Further analysis of the literature made it possible to specify beta banks, non-banks, big tech banks and retailers' banks. In addition, neobanks and new digital banks were classified as one group of bank challengers.

Results and Discussion

In order to identify and qualify new types of digital banks emerging as a result of the technological revolution in the financial sector, case studies of selected entities were conducted. On the ground of the literature studies, six different groups of entities were identified, from which one example was selected. Table 1 presents case studies for the following institutions: Simple, Monese, Yolt, N26, WeBank, Banqi.

Table 1: Case studies for selected fintech institutions.

Entity name	Simple	Monese	Yolt	N26	WeBank	BanQi
Country of origin	USA	UK	UK	Germany	China	Brazil
Year of funding	2013	(2013) 2015	2017	2013	2014	2019
Type of business	Digital bank	Multicurrency mobile banking application	Platform integrating bank accounts (mobile application)	Digital bank (mobile, online)	Digital bank	Mobile bank application
Owner	Bank	Prywat investor, Norris Koppel	ING Ventures	Private investors, subsequent emission (Tencet, Allianz,Valar)	Privat investors, Tencent Holding	Retailers, Via Varejo
Type of activity performed by the funding entity	Banking	Non-banking	Non-banking (investment fund)	Non-banking	Non-banking	Non-banking
Type of licence	Banking licence	Payment institution's licence	Licence of ING Bank N. V.	Banking licence	Banking licence	Mastercard's licence
Financial market experience	Expirience d	Beginners	Beginners	Beginners y	Beginners	Beginners
Availability (countries)	USA	EOG countries	UK, France, Italy	Euro area founders members + Slovakia i Estonia, USA	China	Brazil

Source: Own study based on source materials.

On the ground of case studies prepared for six fintech institutions, some of their characteristics can be identified. The basic differences between them result, among others, from the type of founding entity, the institution's business profile, its position on the market or holding a banking license. These institutions are most often established as

startups of technology companies or large retail chains, whose core business is not related to the financial sector. They enter the market as new players, owing to innovative solutions they acquire customers very quickly, thus increasing competition and forcing traditional banks to adjust themselves. Under great pressure to digitalise services, bank holding companies create their own entities, take over the start-ups that have been created or enter into cooperation with them

Table 2: Classification of fintech institutions according to their features.

Financial market experience	Expirienced	Beginners				
Core business	Banking	Non-banking				
Type of banking licence	Yes, (use a holding company license)	No, (use non-banking financial institutions, e.g. electronic money, licence)	Nie (use a licence of cooperating entities)	yes	Tak (the entity is licensed or partially licensed)	
Owner	Bank	Private investor	Technological startups, private investors		Big tech	Retailers
Type of fintech	Beta bank	Non bank	Neo bank*	New bank	Big tech bank	Retailer bank
Example	AiBank, Simple	Monese	Yolt, Lunarway, Moven	Monzo (po uzyskaniu licencji), N26,MyBank, Starling Bank, Revolut	MyBank, WeBank	BanQi (Via Varejo), Cashi (Walmart), Oney Bank (Auchan)

** may also have its own banking licence*
Source: Own study based on case studies and literature.

On the ground of the case-studies carried out, a systematisation of different categories of digital banks was developed (Table 2). The largest ownership links with the traditional banking sector have beta banks, while other institutions were established by entities from outside the banking sector. Cooperation with the banking sector is characteristic of neo-banks and i.e. new banks, e.g. by using their banking license or providing innovative products and services. The competition with existing banks is focused on non-banks, which use licences of non-banking financial institutions and big tech banks and retailers banks, which have their own licence.

Beta banks represent the new players that are most associated with traditional banks, as they conduct corporate governance. They function as separate entities from traditional banks or as joint ventures. These banks are licensed by the banking holding company to which they belong. In particular, they focus on the Milenials Group and digitally-oriented clients. Thanks to the new digital solutions, they effectively avoid the restrictions characteristic of traditional banks and offer a wide range of banking products and services adapted to specific customer groups.

Non-banks are completely independent of the traditional banking sector. They do not have their own banking licence and do not use the banking licences of their partners. The business is based on the provision of financial services other than banking. Therefore, they benefit from a licence granted to electronic money institutions (e.g. Monese).

Another group are the so-called new banks, which are new participants in the banking market. They were established by start-up companies and therefore do not have any ownership links with the traditional banking sector. These entities most often have a banking licence, and if there is no licence, they use a partner's banking licence.

Big techs' banks were established by large technology companies for which the banking sector is not a core business. They do not have much experience in entering the market, but have a technological advantage over traditional institutions. At large, they gain part of the market, especially customer-oriented ones. Some examples of

these banks include MyBank, which was launched by Alibaba, or WeBank, which was set up by Tencet. These banks have a strong emphasis on efficient, hassle-free customer service and therefore use their data for effective credit risk and working capital management. Technology enterprises called GAFA (Google, Apple, Facebook, Amazon) are more focused on new technologies, applications and data collection and processing (Ruddenklau 2018). They operate in the financial market by offering innovative solutions, such as mobile payments (Google Pay or Apple Pay).

In recent years, large retailers have introduced financial services into their offer. The undertaking of activities which do not coincide with their core business involves reducing the costs of payment services, supporting sales by offering credit services or providing investment and insurance services. Nowadays, retailers increasingly provide financial services independently of other entities according to the DIY (do-it-yurself) model. They are independent financial service providers, creating their own entities that are becoming new players in the financial market (Risso 2010). Banks formed by retailers have their own banking licence. The most important new financial service providers are the retailers such as Walmart and Auchan.

Conclusions

On the basis of the literature research conducted, the variety of classifications of new fintech institutions operating in the banking sector can be indicated. All the analysed companies can be classified as digital banks and bank challengers. Based on the literature and case studies identified six basic groups to which fintech entities can be classified. These are beta banks, non-banks, neobanks, new banks, big tech banks and banks created by retail chains.

There is no single, universal model of establishment for these entities. The largest part of the institutions is formed by companies operating outside the banking sector: technology start-ups, large technology companies or retailers. The examples of such entities are: non-banks, noo-banks, new banks, big tech banks or retailer banks. The establishment of new business is driven to a lesser extent by the banking sector, and these are beta banks. Most of these institutions are licensed as banks, or eventually they will be licensed. Focused on close cooperation with traditional banks are the neobanks, which use a license of the counterparty.. Non-banks do not have their own banking licence, but operate using a licence for non-banking financial institutions.

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Technological and Media Platforms: Redefinition of Meanings as Symbolic Power over the Discourse

Jan Kreft

Gdansk University of Technology, Gdansk, Poland
kreftjan@gmail.com

Abstract

Redefining the meanings of such social terms as "likes" and "friends" on Facebook is a popular practice. In terms of consistency, the (auto)-redefinition of the term "platform" is itself particularly important from a media management perspective. The article proposes to consider the redefinition of meanings as a form of wielding non-transparent power over discourse. From this perspective, redefining a meaning is a form of holding symbolic power, i.e. imposing meaning and thus concealing the system of powers existing at its base.
The article is theoretical in its nature and complements the framework that explains how, by redefining and imposing new meanings, media and technology platform managing companies can use a new interpretation of the relationship between the organization and the user and other entities. The aim of the article is to stimulate research on the redefinition of meanings as a form of media management by providing a new theoretical perspective.
Hermeneutics, that provides a framework for looking at the redefinition of meanings, was taken as the theoretical perspective.

Keywords: platforms, symbolic power.

Introduction

In the article, hermeneutics was applied as a research perspective of redefinition of meanings. It provides a convenient framework for looking at the interpretation process and is suitable for studying changes in meanings, and can lead to complementary explanations as to why some firms have a greater potential to redefine meanings.

Although the traditionally interpretational character of hermeneutics concerns written texts, the works of Mats Alvesson and Kaj Sköldberg extend it to activities in general1. This remark needs to be complemented by the philosophical suggestion of Hans Georg that one may only reach the truth of a situation through understanding, as in a case of a translation, and not by an "objective measurement" characteristic for the modern science2.

Considering the nature of the analysis, a particularly significant concept in hermeneutics is that parts of an action or situation can be understood only when placed in context, and vice versa, context can be understood only when these parts are understood.

Hermeneutic reflection requires critical creativity and confrontation of different perspectives as well as putting oneself in the analyzed situation, drawing on intuition and one's own knowledge. It is also important to seek different interpretations in a continuous and active manner, to introduce new information channels and to adopt different perspectives.

The hermeneutic approach opens up to the constant reinterpretation of the surrounding world. Instead of keeping one constant perspective, the idea is to introduce a few perspectives. Rather than deciding on a permanent course, continual adjustments are in the centre of attention. In a word, it suggests the potential of redefining subsequent terms characterizing close social relationships and using these redefinitions in the management process.

[1] Alvesson, M., & Sköldberg, K. (2008) Interpretation and reflection: Philosophy of science and qualitative method.
[2] Habermas, J. (1990) A review of Gadamer's Truth and Method. *The hermeneutic tradition: From Ast to Ricoeur*, 213-244.

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The above framework of hermeneutics matches the nature of redefining meanings, because hermeneutics allows directing further research in this matter, especially when it refers to the role of individual actors in the process of interpretation and the market consequences of redefining meanings.

The hermeneutic approach enables a better understanding of how innovative it is to use redefinition of meanings in the management process. The more innovative this non-transparent management factor is, going beyond the traditional connections between a media organization and users, the more innovative is the interpretation of the relationship between a company and the users of its services.

Redefning the meanings

Commonly known are the endeavours to redefine meanings in the environment of the new media and new technologies: the famous "likes" and "friends" of "friends" as well as claimed formation of societies joined the examples of cases when words are stripped of their original meanings and acquire new ones.

Assuming that words provide structure to public discourse, redefining the meaning as the essence of the process of using or even overusing a word and expanding the contexts where the words appear or creating exceptional collocations3.

In the process of redefinition, the meaning changes towards that preferred by the sender4. When the expected and imposed meanings become meanings decoded by the recipients, an effective redefinition takes place.

"Platform" as a semantic camouflage

The redefinition of meanings has fundamental market importance in the case of media and technology corporations that manage platforms. When they define themselves as "technological" and not as "media", it signifies an escape from responsibility for the content that is present on their platforms.

The (auto)-reduction of platforms to a technological and programming entity is consistent with the message sent to users. For example, when Facebook makes efforts to convince others that it does not operate in the business of selecting what the world should read and watch, but in the "business of connecting people and ideas" (this is a classic example of "society rhetoric"), it escapes the responsibility for selecting and recommending media content, and the role of Facebook's algorithms is only to provide users with what they expect, based on data analysis – and this is one of the objectives of this redefinition.

The management of discourses on the essence of the platform concerns, first of all, establishing the criteria according to which new "platform" technologies will be assessed and is aimed at building a protective shield in the public awareness. Some of the issues were included by Tarleton Gillespie in his essay "The Politics of 'Platforms'"[5] noting that there were four semantic territories for shaping the discourse around the "platform": technical (as a computing platform, infrastructure supporting the design and development of operating systems, etc.), architectural (with an emphasis on physical shape – for example, an elevated surface on which people can stand), figurative (as a basis for action, metaphysical reference for opportunity and insight) and political (as a place to speak, a political position, a place open to all)[6].

There is no possibility to point to a discourse that is more important or less important – they affect knowing the essence of a "platform" in a similar way, but knowing is never final, because it is sensitive to the "ethical catastrophes" of platform managers and to the evolution of managing the attention of platform users, to changing trends or, finally, dominant beliefs about their role. Such factors as, for example, the political environment (and its representatives), which is subject to the same discursive treatment as other users, are purposefully not mentioned.

In the environment of digital media and technology, every wave of new solutions, research and investment – from e-commerce, through Internet services, online advertising, to mobile and digital devices – brings those that are re-labelled using the term "platform" pushing its semantic boundary. It is a never-ending management process. This is what happened with user-generated content, blogs, and vlogs, and this is what is happening today – Gillespie published his essay in 2010 – when destructive innovations related to big data, cloud management and the expansion of artificial intelligence appeared.

[3] Warchala J. (2019) Formy perswazji, Wydawnictwo Uniwersytetu Śląskiego, Katowice, p. 269.
[4] Ibidem.
[5] Gillespie, T. (2010), 'The politics of 'platforms', *New media & society* 12(3), 347-364.
[6] Ibidem.

The level of utility of this practice is demonstrated in how handy it becomes in emphasizing the opposition (and superiority) of new media organizations to traditional mass media. The "platform" not only promises the disappearance of gatekeepers and giving voice to those who were not heard before (as passive recipients/consumers not allowed to speak by gatekeepers), but also elevating – which is an outstanding rhetorical procedure – all its users equally.

The greatest benefit of using the term "platform" is the reconciliation of various discourses. The use of the same terminology for all interested parties makes it possible to address amateurs and professional users, advertisers and marketers and other institutional partners; it enables the reconciliation of what seems impossible: supplying advertisers with users' attention on the platform while empowering the latter ones. As Gillespie precisely pointed out the above mentioned practices, under the label of a "platform" one can offer anything[7]. Users receive the promise of egalitarianism, advertisers get the environment to create a brand and launch a product on a market as well as access to users (target groups), while media producers get access to audiences and consumers. Gillespie describes this status as a "figurative platform of opportunity" (empowerment, sales, exchange) that takes into account various activities such as brand creation, popularity, affirmation, but also profit and wealth. In the platform, everyone can thus see (and expect) what is expected and what is suggested to him/her, while losing sight of what is important, and the social proof of rightness in the form of the presence of billions of individual and institutional entities does not facilitate the formulation of varying opinions.

"Platform" has become a word – a contrivance containing a powerful persuasive charge that makes it easier to assume a position at any time, on any topic, towards various groups of interested parties. This is a useful trick, because in legislative works it supports the idea of free competition, and above all, broadly understood neutrality, sometimes demonstrated in the corporate mission records, as in the case of Google. It also makes it easier for platform managers to implement efforts to uphold the competition rules in their role for upholding civil rights[8]. When the corporation managing the "platform" becomes identified with it, in social perception it begins to act as a defender of freedom. The skilfully combined figurative, political and technical aspects make it easier to downplay and use limited liability, the platform then acts as a purely neutral "carrier" environment of social "networks", or possibly an indifferent "medium" providing services to the entire society.

Platforms but not media - redefinition objectives

The fact that Facebook is not a media company, but a neutral (technological) platform is to be proved primarily by the fact that it is not a producer of media content[9]. An equally important argument is the nature of the staff of Facebook and other organizations; Google, for example, is not supposed to be a media company, because it is managed by three scientists. The third argument in favour of the technological character is the lack of human intervention, because it is the algorithms that filter, classify and categorize the content, reflecting in their operation the expectations of the recipients, so it is a process without direct human intervention. This emphasized lack of an active human role in content-related processes is the basic logic behind the perception of media platforms as technology companies. The lack of direct human editorial interventions is to facilitate the further perception of neutrality in the content selection process and clearly differ from editorial practices in the traditional media.

Representatives of the so-called digital platforms argue that they differ from traditional media in the nature of their interaction with their audience, since they have much greater autonomy – the audience members determine which content they will consume, and platforms are merely neutral moderators. Such auto-defining is an expression of the evolution of the organization and takes place on many planes.

In this context, the term "platform" assumes various appearances; it is a labile term, useful in opinion-forming processes. Sometimes it poses as a technical platform, next as a platform of opportunities, perfectly meeting the needs of digital media organizations. It is ambiguous, it allows for shaping the information policy of an organization, but also claiming limited liability for the content posted by users.

In fact, by collecting and analyzing their data, for example, platforms have at their disposal technological solutions for identifying the needs of recipients that are more effective than traditional media. In this sense, more significant application of algorithms (but also greater dependence on them) is to ensure better satisfaction of the needs of users and institutional clients.

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[7] Ibidem.

[8] Meinrath, S. and Pickard, V. (2006), 'The new network neutrality: Criteria for Internet freedom' TPRC.

[9] Baral S. (2016), 'Is Facebook A Tech Or Media Company? CEO Mark Zuckerberg Weighs In', [Online], [Retrived May 22,2020], http://www.ibtimes.com/facebook-tech-or-media-company-ceo-mark-zuckerberg-weighs-2409428

In addition, referring to the technological orientation of personnel or management as an argument in favour of non-mediality puts media organizations out of the mainstream of technological advances in the media. The media and the development of technology are often juxtaposed as separate, based on different professional skills. Traditional media, such as workplace or radio, are to perish in history in the process of evolution, along with their propaganda connotations. In opposition to them and on their ruins, technological organizations using the new terminology are to be free from the media burden of social influence, particularly in its pejorative, manipulative contexts.

Such interpretations are accepted, but to a limited extent. For example, the European Commission uses the terms "media platforms" and "media intermediaries" interchangeably to refer to search engines, social networking sites, news sites and video streaming services, information aggregators, payment systems and applications.[10]. There is no definition of media platforms in the academic discourse, but they appear in the concept of Internet gatekeepers controlling information and showing the methods of executing the control[11]. So far, the efforts to clarify the terminology were related primarily to the determination of the scope of responsibilities – this was achieved, among other things, by the separation of the gatekeepers who control the flow of information and the gatekeepers who, as a result of this control, influence participation and reflection in the culture of democracy[12], which enables the identification of the group of dominant corporations sometimes referred to as GAFA (Google, Amazon, Facebook and Apple) from Internet providers.

Facebook, Twitter and many other platforms have been and continue to be referred to as new media/social media. However, the problem of their auto-definition is more and more important due to their growing importance as a source of information in cyberspace[13]. The terminology used to describe Google and Facebook is therefore not only semantic, thus having important social implications. There are also other reasons for the "escape from the mediality". For example, legal protection that neither Google, Facebook, nor other "tech companies" would have had if they had been subject to the US Communications Decency Act and the European e-commerce directive that would have made them liable for spam, just like traditional media publishers.

Arguing that Facebook is obviously a media company, and not a "technological" company, Ian Bogost avoids taking any side of the dispute by pondering, first of all, over what makes the company defined as "technological"[14]. The term "technology" in the high-tech sector is a synthesis for the term of "computer technology". Companies in this sector are involved in developing software, manufacturing hardware, peripherals, providing data processing services, digital advertising, etc., Therefore non-computer companies, for the obvious reason, do not belong to this sector[15]. Verification of this thesis should be sought on NASDAQ, where Google, Facebook, Amazon and many others are listed. They are classified in that stock exchange in accordance with the Industry Classification Benchmark (ICB), a system developed on the London Stock Exchange. "Internet" belongs to "computer software and services" there and the allocation of a company to a sector and sub-sector depends on its largest source of income. Microsoft, for example, is in the "technology, software and computer services" industry because this is the source of the corporation's main revenue. Meanwhile, almost all revenues of Alphabet (Google), Facebook and Twitter come from advertising, which is why they are media organizations. In the case of Alphabet, the problem is more difficult, because it dealt with electric cars, and now, for example, it deals with artificial intelligence and health care (Calico), but the vast majority of its revenues still come from the advertising market.

These comments are important since distribution is a defining feature of the media; it is an element of the media value chain, both in the case of traditional and so-called new media. Creating media content, however, has never been the defining element of an enterprise from the regulatory perspective of the media sector. Therefore, the argument that the creation/possession of media content clearly differentiates the "technological" companies associated with them

[10] European Commission (2015), 'Press Release - Have your say on geo-blocking and the role of platforms in the online economy', [Online], [Retrived April 23, 2020] http://europa.eu/rapid/ press-release_IP-15-5704_en.htm

[11] Barzilai-Nahon, K. (2008), 'Toward a theory of network gatekeeping: A framework for exploring information control', *Journal of the Association for Information Science and Technology* 59(9), 1493-1512.

[12] Laidlaw, E. B. (2010), 'A framework for identifying Internet information gatekeepers', *International Review of Law, Computers & Technology* 24(3), 263-276.

[13] Gesenhues A. (2017), 'Pew Research Center says 45% of Americans get their news from Facebook. The number of people getting news from social media continues to increase', [Online], [Retrived April 8, 2020], https://marketingland.com/pew-research-center-says-45-americans-get-news-facebook-228001

[14] Bogost I. (2016), 'Facebook Is Not a Technology Company', *The Atlantic*. [Online], [Retrived April 2, 2020], https://www.theatlantic.com/technology/archive/2016/08/facebook-is-not-a-technology-company/494183/

[15] Ibidem.

from media sector companies reflects a "naive" or insufficient understanding of the media, or intentional attempts to redefine what a "media company" is, motivated by organizational strategies[16].

In the digital media environment, especially confronted with the development of the Internet, the arguments in favour of the "mediality" of Facebook and others are provided by a discussion on communication policies in particular countries, where the policies have been subject to adaptation to changes related to digitization, and where the disputes related primarily to whether the previous regulations could be applied to the Internet, which combined many traditional functions, but also offered new ones. This discussion highlights the importance of what language and what terms are used in the formulation of regulatory policy and the meaning of discourse analysis, as they have an impact on the application of various normative acts.

Redefining "platforms" as wielding symbolic power over discourse

The problem of power is present in numerous studies undertaken from many perspectives offering insight into a fragment of reality. From this perspective, the redefinition of meaning should be considered as a form of exercising symbolic power. It is the power of imposing a meaning, concealing the systems of forces existing at its base and manifesting itself in communication based on rationality[17].

Symbolic power becomes particularly strong when it does not manifest itself, when those who are subject to power are subject to forms and thought patterns (here, imposed by signs and symbols that re-identify "friendship" and "likes") and participate in its construction without perceiving subordination, and they actually make the forms and thought patterns stronger[18].

Therefore, symbolic power takes place where it is not noticed, it is accepted without reflection and the perceived world is obvious, understandable, natural, because the measures applied to it come from this world. Submission then becomes obvious and legitimate and inevitable, and the subordinates favour particular interests. This power is concentrated in the hands of a few members of society and their organizations, symbolic elite that has social, political, cultural and economic capital in their constant conversion.

In the case of platforms, it is consistent with the logic of co-modification, superior when considering the market goals of the platforms, including the new logic of accumulation based on the market benefits of big data analytics[19].

In the analysed context of new technology and media platforms, the symbolic power is in essence exercising power over discourse interpreted within the discourse analysis initiated thirty years ago[20] with its large base of streams and impressive network of notions[21]. In this approach, the analysis initially presented the way in which political power was exercised through language. Later, this trend included advertising, and more broadly speaking, promotion and media discourse, and, further, more areas of exercising symbolic power.

The sources of this reflection, however, should be seen in the critical theory, in the Frankfurt school (discourse can be used by groups of power) and the deliberations of Michel Foucault, from whom the critical analysis of discourse took over the belief that it was a kind of social activity, therefore social activities could be explained through linguistic analysis. Contemporary analysis deals primarily with social inequalities in research into power asymmetry, use, manipulation and structural inequalities through the study of media language, and promotional culture[22]. Importantly, the research programme, which in essence is a critical discourse analysis, is flexible and evolving, which means that such terms as power are defined differently. Norman Fairclough places research on social practices, i.e. forms of activity articulated in order to continue various social fields, institutions and organizations at the centre of this analysis.[23]

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[16] Napoli, P. M. and Caplan, R. (2016), 'Why media companies insist they're not media companies, why they're wrong, and why it matters', *First Monday*.. [Online], [Retrived May 3, 2020], https://journals.uic.edu/ojs/index.php/fm/article/download/7051/6124

[17] Bourdieu, P. (2000), *Pascalian meditations.* Stanford University Press.

[18] Dębska, H. (2014), Od władzy normatywnej do władzy symbolicznej, Wydawnictwo Adam Marszałek, Toruń.

[19] Zuboff, S. (2015), 'Big other: surveillance capitalism and the prospects of an information civilization', *Journal of Information Technology* 30(1), 75-89.

[20] Fairclough, N. (1989) Discourse and power. Language and power, Longman, London.

[21] Jabłońska, B. (2012) 'Władza i wiedza w krytycznych studiach nad dyskursem–szkic teoretyczny', *Studia Socjologiczne* 204(1), 75-92.

[22] Blommaert, J. and Bulcaen, C. (2000) 'Critical discourse analysis', *Annual review of Anthropology* 29(1), 447-466.

[23] Fairclough, N. (1989) op. cit., p 24.

It should be added that in the critical analysis of discourse, the socio-cultural school (Fairclough) or the analysis of discursive phenomena (van Dijk) concern the relationship of power and knowledge. In the post-structural tradition, power becomes a process related to knowledge and discourse, permeates social relations, manifests itself in the actions of actors, which means that there is no social reality without a power relationship[24]. Moreover, it can only be defined in relation to discourse (i.e. language in use), that is in relation to what is not a "reflection of the world" but "violence inflicted on things", therefore discourse is related to power and involves imposing a way of thinking and speaking about reality[25]. Discourse is therefore used to influence people and their perception of the world, and the notion of "hegemony" is used in such an analysis.

As part of the analysis of the relationship between various social spheres and organizations, research is carried out between various orders of discourse, understood as the social structuring of semiotic diversity. Typically, one manner of setting an order one aspect of creating a meaning dominate in the process while others are either marginalized or treated as oppositional.

Summary

"Technological" rhetoric in combination with a pro-social or society-related image is to emphasize the pioneering, unique character of the organizations in question and concentrate on technological competences and take the attention away from social effects. The interpretation claiming that Google and Facebook are media companies would concentrate on their social impact and responsibility, which involves regulatory interventions in the name of protecting the public interest joined with political issues, diversity and competition. Such interventions concerned and still concern television stations, press publications or cable systems and may concern the so-called new media platforms. This would be in line with the logic that, for example, the differentiation of the access of different content creators to the audience should be the overriding social interest protected by the state. In this situation, managers of websites, applications, search engines and social media try to establish such identity that would exclude or limit similar interventions, and the rhetoric of "non-media" has so far effectively influenced the public discussion on the subject.

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Crystalizing the Effect of Facebook Marketing on Customers Purchasing Behaviour

Mary ADELUA
Department of Mass Communication, Covenant University, Ota, Nigeria;
adeluamary@gmail.com

Tunji OYEDEPO
Department of Mass Communication, Covenant University, Ota, Nigeria;
tunji.oyedepo@covenantuniversitu.edu.ng

Corresponding Author: Adelua mary, adeluamary@gmail.com

Abstract

Technology and internet have played a crucial role in most of the organisational activities. The advances in technology are making a huge impact on how we use social media. In this dispensation, the traditional marketing methods have become small segment of the various approaches used for marketing and branding products. Various organisations are continually looking for new ways to reach and communicate with consumers. Some decades back, broadcast (television and radio) and print (newspaper and magazine) advertising were the vital tools of marketing strategies. Hence, this article focuses on the effect of Facebook on the consumer purchasing behaviour of customers. This study has placed substantial value on how social media can be used to shape consumer brand perception and influence customers' purchasing behaviour. This paper employed desk research, known as secondary research, to obtain related information. The researchers obtained articles and literature from the database of Emerald Insight, PubMed, Research gate, Scopus database and Google scholars. This study creates a platform for organisations and PR practitioners to understand how consumers use technology and especially social media (Facebook) in their online shopping process effectively in meeting their needs.

Keywords: Effect, Facebook marketing, Advertising, customers, purchasing behaviour.

Introduction

Almost every part of our personal lives has been invaded by technology and social media is one of the main beneficiaries of its influence. Several studies have tried to demonstrate how social media could help with emerging technologies (Hung & Yuen, 2010; Lim et al., 2015; Amodu, Omojola, Okorie, Adeyeye, & Adesina, 2019). Without doubt, the internet has grown to become a viable platform for business anchorage, a structural foundation for communication that provides interconnectivity for a large percentage of earth dwellers and most important for Nigerians. Importantly, the effect of the internet on commerce and commercial activities cannot be swept aside, especially in the area of marketing. With the aid of social media, marketing as the world previously knew it had undergone a complete facelift. Almost forever gone is the era when the company's had to employ people to distribute flyers or marketing materials by hand to their target audience.

The social media has proven to be equal to the task of safely conveying advertorial tools and public conveyance of product information or company's existence to its publics (Nyekwere, Kur, & Nyekwere, 2013; Nelson, et al., 2013). With the constant innovations and new business models, Facebook keeps churning out, for its continued relevance. In a report by Deloitte, (2015) titled, Facebook's Global Economic Impact, "Facebook-connected more than 1.3billion people… and enabled global economic impact valued at $227 billion."

The number of views marketing campaigns garners via social media advertising is quite intimidating, when compared with traditional marketing. Lee (2013) posits that "this technical revolution during the last decade has drastically revolutionised the traditional marketing approaches and brought marketers to a new era." He further explains that "in the new marketing era, the social media has redefined the relationship marketers have with retailers, channels of distribution, their ultimate consumers, and so forth." Whether any business owner jumps on this fast-growing social

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media marketing trend or not is solely their decision to make, but anyone sceptical about the peak this will attain might soon find themselves out of customers and patronage. Social media has given consumers uncountable options of products and services, more than at any other time in the history of humanity.

The shift from traditional modes of marketing and accessing goods and services has led to widespread adoption of online shopping in Nigeria. Though the change has been slow-paced, it is gradually gaining traction. Facebook has become one of the most widely used and renowned social networking sites. Initially, it was created to help connect with family and friends; it has, however, expanded to include the use of the platform as an avenue for promoting businesses and generating customers and revenue for businesses. Consumers now have a wide array of businesses they can patronise, especially from the comfort of their mobile devices. As a result, this study examined the following:

(i) To examine the factors that determine the usage of facebook marketing in the business world;
(ii) To assess the determinants and salient indicators of consumer purchasing behaviour;
(iii) To evaluate the influence of facebook marketing on consumers' purchasing behaviour.

Literature Review

Facebook Marketing

To adequately explicate the concept of Facebook marketing, it is imperative to first define marketing as a standard concept (Kotler & Armstrong, Principles of Marketing, 2010). "Marketing is the action, set of establishments, and techniques for generating, communicating, transmitting, and exchanging offerings that have significance for customers, partners, clients, and society at large" (American Marketing Association, 2017 pig). More often than not, marketing is usually mistaken for buying and selling of products or services. Still, the process of attempting to decipher what can be termed as "valuable offerings" is, in fact, what marketing personifies. To create value consumer needs and wants have to be understood, while consumer interaction and purchasing trends have to analyse. In view of this, the marketer has to be steps ahead of the consumer to enable him to predict their needs beyond what is physical foreseeable and futuristically. Carrillat et al. (2014) indicated that Facebook marketing must be, creative and entertaining to induce the desired outcome on consumers. Stokes (2013) advised marketers of branded experiences for its customers with the purpose of stimulating behavioural reactions.

Consumer Purchasing Behaviour

Consumer behaviour encompasses "all actions related with the purchase, usage and discarding of goods and services, comprising the consumer's mental, emotional and behavioural reactions that support or accompany these activities" (Kardes, Cronley, & Cline, 2011:23). The consumer could be a lone individual or a group of people. Without the consumer, the need for organisation's and marketing strategies in any form would be unnecessary. Consumer behaviour has been of unexpected interest to totals of researchers who have acted to widen the depth of factors that impact consumers who are willing to make purchases. Consumer behaviour is an emotional, mental, and physical indication. The purpose of every consumer is to have their needs satisfied as flawlessly as possible, r.thus the numerous behaviour displayed by them when in quest for satisfaction. In an article by Richarme (2007), analysis on customer's decision-making strategy started about 300 years ago. Over the centuries, impressions and findings about consumers have advanced. Consumer behaviour as distinguished by Solomon, Bamossy, et al. (2010) is the technique through which "individuals or groups select, buy, utilize or dispose of services, product, ideas or experiences to fulfill needs and desires".

Theoretical Justification

The concept of consumer behaviour is an interdisciplinary social science that links rudimental principles from psychology, sociology, social anthropology, economies, ethnography and marketing. Theoretical frameworks aid researchers in examining how attitudes, emotions, and preferences influence purchasing behaviour. It is imperative for organisations (with either large or small number of customers) that engage in marketing and sales activities to have a vast understanding of what customer behaviour encompasses, to get the best out of their customers. To achieve this, the knowledge of human behaviour has to be applied to consumer purchasing behaviour.

Theories of consumer behaviour stand for the normal tract of human behaviour theories (Bernstein, 2018). Specifically, the Engel, Blackwell and Miniard Model was examined. The entry point of this model is needed

recognition which occurs when the consumer recognises an inherent lacuna that has to be filled by something specific. The courage of the need drives the whole cycle from start to finish. If the need was just a whim, the desire to meet it fizzles out after the initial urge. Once a need has been determined, the consumer starts an internal and external search for information aided by brand awareness and brand recall. Ideally, the internal search is usually a quick scan in the consumer's memory to identify alternatives, as indicated in Figure 1.

Figure 1: Engel, Blackwell and Miniard Model

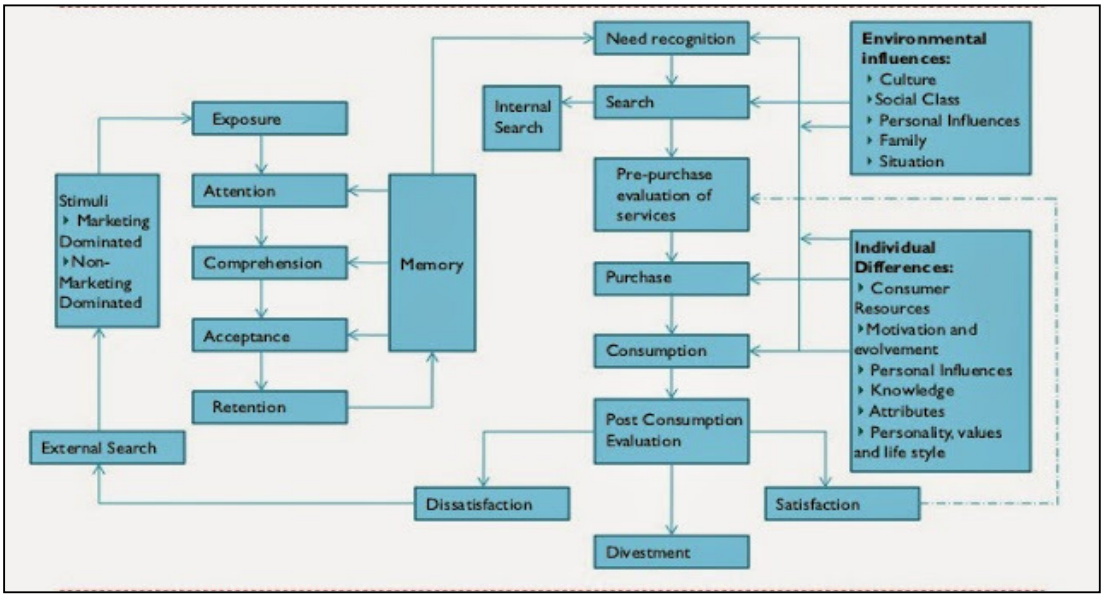

Figure 1: (Blackwell, Miniard, & Engel, 2001)

The internal and external search helps the consumer identify and create a list of existing options of products or services that possess the potential to gratify their needs. Environmental significances such as; personal influences, culture, family, social class, and circumstance (which could be financial, psychological, etc.) influence the consumer's need recognition and purchase decision. The consumer's memory is a poignant point through each of the processes; sort of akin to a car's brain box which monitors and controls engine functions. As depicted in the image, the external information search is influenced by marketing dominated and non-marketing dominated stimuli. During the external search, the consumer passes through five stages; exposure, attention, comprehension, acceptance and retention.

One of the considerations of the consumer at the pre-purchase evaluation of service stage is the amount of satisfaction that will be derived from a purchase. Based on the perceived anticipation of satisfaction, he then goes ahead to purchase. The final purchase decision is influenced by individual differences in the form of; consumer reserves (economic), motivation and involvement, personal influences, knowledge, attributes, and personality, values and lifestyle. The consumer keeps evaluating at every stage of the process, including post-purchase, because it is at this point that the consumer measures the satisfaction derived from the product, compared with his expectations. This ultimately influences the decision to repeat the purchase of that product or never use that product again if he is dissatisfied with his experience. Post consumption evaluation which is a feedback function will result in the consumer deciding that he is satisfied or dissatisfied with his experience. At the same time, divestment indicates that the consumer might discard the product post-consumption.

Methodology

The authors employed desk research, known as secondary research, to obtain related information. The researchers Obtained articles and literature from the database of Emerald Insight, PubMed, Research gate and the Internet. Appropriate information was retrieved from papers indexed in Scopus and Google scholars. The specified articles targeted questions relating to various face book marketing strategies and customer satisfaction behaviour information.

Development of Research Propositions

Factors that determine the usage of facebook marketing in the business world

Extant literature has indicated the various factors that affect Facebook marketing under its Cost per 1,000 Impressions, also known as CPM. Though the list is inexhaustive. It includes:

(i) Target audience**:** Where can your target audience be found? Terkan (2014) exemplifies public restrooms as being choice media for certain types of campaigns to secure unhindered access to a target audience. The target audience answers the question of who should view ads, how to appeal to their emotions, and what to say to them. Age, location, personality trait, income, interests, and needs, amongst various other characteristics are to be considered when determining the target audience, as it gives direction to marketing (Harvey, 2018).

(ii) Schedule and frequency cap of marketing campaigns: This is a pre-specified structure for the number of hours, days, or weeks a campaign should be visible to customers. Frequency cap refers to the maximum number of times an advert will be shown to each individual that is among the target audience.

(iii) Placement: This simply states where an ad will appear. Will they be embedded in videos or as pop-ups while individuals are viewing other posts on their walls?

(iv) Type of creative: The type of creative is used to determine where the ad can be placed. An example is video adverts are usually infused into other video contents.

(v) Budget: Budget is the maximum amount that will be spent on the marketing campaign duration. During festive periods, budgets usually run higher, than off-peak seasons when traffic is much lower.

(vi) Innovative and creative features: Innovation simply put means adopting new methods to achieve an aim. At the same time, creativity requires crafting or envisioning or conceptualising a plan or idea that is entirely new. Creativity is birthed through knowledge, creative thinking and motivation (Adams, 2005). Considering that consumers are bombarded with numerous products and services daily, and spoiled with countless other options if one option fails to meet their expectation. Therefore, marketing campaigns have to be creatively executed. Creativity requires a fresh perspective, a renewed mindset and flexibility in decision making. Fresh insight and perspective can be acquired through observation. Terkan (2014) opines that advertising either thrives or perishes through creative or innovative communiqués.

(vii) Relevancy: Relevancy is a diagnostic measure of the rate at which a marketer's adverts resonates with its target audience, based on the number of impressions it creates. This rate is grouped under either of three rankings: quality ranking, engagement ranking and conversion rate ranking. Results are then further ranked as either above average, average or below average (Robinson, 2019). Perceived relevance positively influences a customer's purchase intentions and continuous patronage.

Determinants of Consumer Buying Behaviour

The determinants of Facebook marketing, as expressed by various authors, include the following:

(i) Brand Awareness:

Every business entity has one goal, which is to maximise sales and make a profit. This goal will only be achieved for businesses that have found a way to create a niche for itself and attract customers who are in need of its market offerings. No matter how attractively packaged a product is and how beneficial service is, it cannot sell itself. If potential customers are ignorant of its existence, it can as well be nonexistent. Brand awareness comes in to bridge the gap between selling in the dark and shooting a brand to the limelight. When a consumer thinks of a product (toothpaste for example), the first brand (which could be Colgate, Close Up, Pepsodent, or Oral B) that comes to his mind is the one he is consciously aware of. Malik et al. (2014) opined that each time a customer willingly patronises the first brand name that pervades his consciousness, it is an indication that this brand has brand awareness. If an organisation's products and services are reputable in the market and have a high acceptance rate, the company can be said to have successfully created brand awareness (Gustafson & Chabot, 2007).

Brand awareness has been positively linked with purchase intentions because the consumer can only buy something he knows exists. Initially, when SLOT Systems introduced its brand of phones into the Nigerian market, it struggled for patronage, because big brands like Samsung, Motorola, Blackberry, and Apple were the rave of the moment. However, with persistent brand awareness creation, many Nigerians now use either a Techno or Infinix phone. Despite being the dominant brand on noodles in Nigeria, Dufil Prima Foods keeps up it's relentless marketing of Indomie to the extent that all other brands of noodles are called Indomie. Indomie is a typical exemplification of brand dominance. The more aware customers are, the more likely there are to purchase and the higher the chances of its acceptance by the market. The advantage Indomie had over the imitation brands was being the first product of its kind in the market. Intensive campaigns that acquaint a higher number people to the message and very frequently expose them to the message are required for success to be achieved with regards to brand awareness (Belch et al., 2009).

Repeated exposure to a brand improves the consumer's ability to recall and recognise the brand (Huang & Sarigollu, 2012). It also helps to maintain awareness creation for new audiences, ensure continued sales and steady ownership percentage of an industry's market share.

Brand awareness is usually measured using four determinants. Firstly, b*rand recognition* which is the degree to which customers can distinguish a brand by its features. Kang (2019) believes that a customer does not need to remember specific brand names but should be able to list the product category when the brand name is stated. Kenton (2018) asserts that a company should use exceptional, emotive and heartwarming narratives that will let customers know the mission of the business. Customers incline to remember brands that they connect with on an emotional level. Secondly, b*rand recall* describes the ability of a consumer to summon up a brand name within its product category, of its own accord with needing any branded paraphernalia to juggle his memory. For example, if a customer hears the word "cornflakes", what specific brand name comes to his mind? Is it Kelloggs, Nasco or Good Morning cornflakes? Typically, a customer can recall no less than two brands, while many can recall as many as seven brand names in a product category (Kang, 2019). Interestingly, awareness of product existence, usage frequency, brand loyalty and circumstance-induced factors are major determinants of the number of brands a consumer can recognise in its product category.

Thirdly, Top-of-mind awareness describes the position of a brand on a consumer's mind, such that that brand is the first that comes to fore in its category or class. Such a brand is frequently referred to as the most remembered brand name (Farris, Bendle, Pfeifer, & Reibstein, 2010)**.** In Nigeria, Milo and Bournvita are the most popular brands of beverages. Still, they are consumers who are favourably loyal to either of the brands and will never consider purchasing the other brand. Having a top-of-mind brand eliminates waste of time and enables quick decision making when confronted with an array of options. The final determinant is b**rand dominance.** Aaker (1996) stated that brand dominance is when a consumer can only recall specific brand names in a category. In such instances, when a brand becomes synonymous with its category, the brand is said to have become genetic. An example is a sellotape which in actuality is a brand of cellulose-based adhesive tape.

(ii) Lead Generation:

Lead generation is the process through which an organisation gathers a catalogue of potential customers whose interest was roused after becoming aware of its existence and what it offers. The initial contact could have been after viewing an e-mail, blog content, targeted advert, promotion, product or service. The customer indicates that interest by whatever medium the organisation makes available, which could be an email or a chat box that encourages the prospective customer to leave their contact details for further information from the company. In summary, it states the prospect's intention to buy. "Lead generation involves technique that characterizes the marketing procedure of involvement and capturing of attention in a product or service which is intended for creating sales plans and as an outcome entreating new clients" (Swieczak & Lukowski, 2016:106).

Lead generation positions the business in the minds of people and fulfils a triple role of audience engagement, brand awareness and attraction of prospects. An upgrade to lead generation would be the conversion of leads to sales. Scott (2013) identified "direct marketing, email, banner, search engine marketing, and social media advertising,, trade show and coold calling" as the lead-generating tactics that yield the most remarkable results. Despite the indication of interest or intention, Riano (2017) stipulates that leads need to be nurtured. Lead nurturing, according to Mawhinney (2018), is the deliberate act of engaging a specific group of people by supplying relevant information in an attempt to push them from prospects to paying/buying customers. The bottom-line of each lead generated is its potential to become a sale.

(iii) Audience Engagement

The audience here can be interchangeably replaced with customers and potential customers. Audience engagement is an attempt by a brand to connect to customers on an emotional level by creating interactive channels such as a Facebook page or other social media pages. Pennington (2012) defineíol pms business engagement as a business communication link between an external individual or group who have a vested interest (a consumer) and an organisation through different channels of communication. Before the advent of social media, companies used experiential marketing as a medium to connect with customers. However, it was more transactional, in that it targeted increase in sales than it was engaging. Television, radio, newspapers, etc, were formerly used to secure consumer engagement; now, customer engagement can occur online on platforms like Facebook. The customer's commitment to a brand as embodied by its website or other computer entities that act as a go-between must be designed to communicate instrument and experiential value from the brand (Mollen & Wilson, 2010). Figure 2 indicated that audience engagement could come in the form of a like, a share, a comment, amongst others; all that matters is that customers are involved, and their attention is unrelenting.

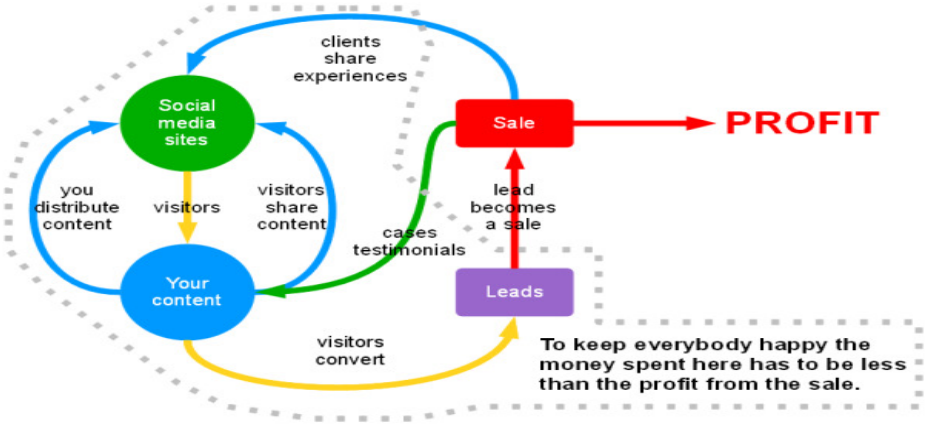

Figure 2: a cycle of chain reactions for Audience Engagement

Source: (Kahil Insights, 2016)

As shown in Figure 2, customer engagement starts with creating content which is then distributed on social media platforms that the company is registered on like Facebook, Twitter, or Instagram; it could also be a website or a blog. Visitors (audience/prospective and existing customers) view the content and engage by reacting, sharing or leaving a comment or as the case might be, indicating an interest in the product or service being offered. These visitors convert to leads, and as stated earlier, leads are potential buyers. These leads then convert to sales and satisfied customers share their experiences with their contacts, and then the cycle begins all over again. Engagement is misunderstood in business as an event rather than a position of being (O'Dell, 2015). This means that engagement with the customer should be a continuous process and put at the top of every business's agenda. In an interview by Chaffey (2017), Richard Sedley defines customer engagement as "repeated exchanges that enhance the psychological, emotional, or physical interest a customer maintains in a brand." For customers to take necessary action in initiating and keeping up with engagement, an organisation must be able to understand its consumers and give them reasons to take action with its marketing message. For there to be continuity or repetition of interactions, the value must be created, offered and exchanged and interactions should be relational.

4. Attractive Adverts

The objective of advertising is to stimulate consumers consciousness of the availability of a product or service through paid media. Advertisement is rooted in the Latin word "advertise", which means "to offer public information or to proclaim publicly". American Marketing Association, define advertising as "any form of non-personal production or promotion of ideas, goods or services, by an identified sponsor." Sponsor in this regard would be the organisation. What is said in advertising is more important than how you say it; ads must be objective. Tell the truth in a fascinating way; breakdown big ideas into simple ideas; keep promises do not use "highfalutin language" in advertising (Ogilvy, 1963:2012). It must communicate what exactly it intends to. Duffett (2014) suggested that adverts should be composed in an interactive and exciting manner to generate appeal. Therefore organisations must ensure that social media is a component of is "marketing communication strategy" to actualise its ultimate potential (Bass, 2017). Bass concludes that "the end objective is to establish strong, immersive experiences that retain consumers tuning in and seeking for more." Extant studies (Bass, 2017; Swieczak & Lukowski, 2016; Duffett, 2014) have identified the various objectives of advertising which includes:

- It is used to generate sales, increase sales and grow sales revenue.
- It aids in stimulating the desire for repeat possession.
- It helps to project the image of an organisation to its intended audience.
- It stimulates market demand.
- It promotes brand awareness and supports lead generation.
- It acts as a call to action.

Types of Advertisement Media

i. Print media
    - Newspapers

- Banners
- Magazines
- Billboard
- Direct mail
- Coupons

ii. Electronic media
- Television
- Radio
- Cinema
- Internet
- Mobile

5. Environmental Factors

The environmental factors are made up of the social, economic, personal, cultural and psychological factors.

- Social Factors: Social factors are traditions, vules and customs established in the society or community the consumer lives. Every community is made up of several individuals who exist within family units. Though the family is always related by blood, each person is distinct in the preferences, choices, wants and needs. The family plays a role in developing a child's purchasing behaviour, as the child observes his parents in action. An adult would likely have an affinity for brands he grew up using.
- Economic Factors: These comprise personal income, family income, consumer credit, income expectations, liquid assets and assets. Each of these is a source of disposable income and influence how much an individual spends to purchase a good or service. Others include inflation, recession, etc.
- Personal Factors: These are factors that are consumer-specific and vary from one person to the other. They are age, occupation, lifestyle and income. For instance, the products a pregnant woman purchases will differ from those of a nursing mother.
- Cultural Factors: This refers to culture (the beliefs, customs and practices of a group of people) and social class. A consumer in the upper social class will tend towards purchasing luxury products, while those in the lower class will majorly make purchases that meet their needs.
- Psychological Factors: Perception, motivation, learning, attitudes and belief are psychological factors that affect consumer purchasing behaviour.

Salient Indicators of Consumer Purchasing Behaviour

These include:

(i) Buying Decision

The human life is faced with a plethora of choices that often require the need to make decisions at each stage. Buying decision process is used by consumers pre-purchase, during purchase and post-purchase. Buying decision explains the set of decisions that a consumer makes while buying (Hoyer et al. 2010). The stages of buying decision, as stated by Kotler (2002) includes:

- Problem/Need Recognition: The customer realises a need that has to be met and pegs it down to the specifics.
- Information Search: The consumer then searches for the product that can meet the recognised need and how to access it. Usually, more than one product is identified within a brand category.
- Evaluation of Alternatives: The consumer evaluates the product alternatives and decides which would be most suitable. Preference comes to play at this stage.
- Purchase Decision: After the consumer has concluded an evaluation of available options, the intention to buy would have taken root and then he goes ahead to buy if all conditions are favourable with regards to price, taste, et cetera.
- Post Purchase Behavior - After the purchase, the consumer measures the extent to which he/she got value from the product choice that was settled for and might also wonder if another product would be offered more benefits.

(ii) Repeat Purchase

Customer repeat purchase is a consumer's decision to buy a product or engage the services of a service provider, as well as a definition of the extent to which this will go (Beránek, Nýdl, & Remeš, 2015). Repeat purchase is an indication that value was gotten from a product or service. All repeat purchase decisions are based on prior experience and satisfaction was derived. Satisfaction is that feeling of fulfilment a consumer gets from having made a purchase

that met a need suitably. Several factors such as benefits, price, quality and alternatives also influence repeat purchase. Brand awareness plays an important role, even in instances of repeat purchase (Hoyer & Brown, 1990; Macdonald & Sharp, 2000). A consumer normally decides to go through a repeat purchase when he/she is generally fulfilled with the brand and is in the final phase of post-purchase behaviour of the consumer buying process" (Kotler & Armstrong, 2016).

(iii) Continuous Patronage
Continuous patronage is a depiction of a customer's loyalty to a brand. Continuous patronage for a high involvement product is an indicator of brand loyalty; whereas repeated patronage for a low involvement product implies habitual purchase behaviour (Sadavisian, Rajakumar, & Rajinikanth, 2011).

Influence of Facebook Marketing on Consumer Buying Behaviour

Having garnered a mammoth size membership of over 2.4 billion people, Facebook is inarguably the largest social media network, and many businesses are discovering just how influential it has become in the online marketplace. The advent of social media opened up a medium of interaction through which individuals interconnect, and businesses connect with customers. Social media is a faction of internet-based applications that enable the production and exchange of user-generated content (Kaplan & Haenlein, 2010). Lu, Zhao, & Wang (2010) assert that online communities on social media have made new structures available to businesses, while Gruzd, Wellman, & Takhteyev (2011) suggest that social media has eliminated the regimental need for physical meetings. Facebook allows users to connect in several ways and gives businesses the ability to project their business to their target market. Facebook allows users to share information; generate content, post photos, videos and pretty much do whatever they wish, as long as they do not violate Facebook policies. In a study conducted by Simmonds (2012) and commissioned by Facebook, it was discovered that at that time, 71% of marketers who were surveyed believed companies could gain competitive advantage by leveraging social media.

Conclusion

The impact of social media marketing, (Facebook) on consumer purchasing behaviour yield unified submission that brand awareness, lead generation, audience engagement and attractive adverts have effects on consumer purchasing behaviour. Marketers should exploit all the benefit of facebook for branded experiences for its audience to elicit behavioural responses from them. Organisations that are wise in combining strategic approaches to the use of social network platforms (Facebook) are most feasible to be successful in reaching, building, and sustaining a customer base relationship. Factors that influence brand perception and behaviour to purchase, entail trends like the economic and personal issue, social and cultural factors. Irrespective of these factors, the organisation should consider device strategies for managing their online customers. Organisations in Nigeria are gradually tuning in with the inherent benefits of online marketing strategies, and consumers are loosening up enough to influence purchase and interact.

Suggestions for further studies

The present study used desk research to source literature on Facebook marketing and customer behaviour future research can use survey quantitative (questionnaire) or qualitative (interview) to collect data. Accordingly, mixed-methods approach (i.e. use of quantitative (questionnaire) and qualitative (interview and focused group) can be used to give more insight into the probable impact of Facebook marketing on customer buying behaviour.

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Citizens, Network Marketing Communication and Herbal Remedies in Lagos, Nigeria and Lusaka, Zambia

[1]Mercy BANDA; mercy.bandapgs@stu.cu.edu.ng
[2] *Oscar ODIBOH; odion.odiboh@covenantuniversity.edu.ng

[1, 2]Department of Mass Communication, Covenant University, Ota, Ogun state.
*Corresponding Author: Oscar Odiboh; odion.odiboh@covenantuniversity.edu.ng

Abstract

This pilot study examines the citizens' awareness of the influence of network marketing communication on their usage of herbal medications. Research locations are two African countries; namely, Nigeria and Zambia. In Africa, many people, especially those living in rural countryside, prefer the use of healing herb when faced with health challenges. They assume that herbal medicines are innocuous, active and valuable. However, the reverse is the case in city-centres where documented reports of active use of herbal medications are few. This study was conducted at the same time in Lagos, Nigeria and Lusaka, Zambia to fill this gap. The two cities are metropolitan with fast-growing industrial hubs, dense population, and having high representative margins of the different groups across the countries. A semi-structured questionnaire was administered on 230 respondents in Lagos and Lusaka using the purposive sampling technique. Results show that there is a high awareness of network marketing communication of herbal medications in both countries; although it is stronger in Nigeria than Zambia. Usage of herbal medications in both countries is above par. Similarly, the respondents do not believe that marketing communicators have marginally influenced the citizens to use herbal medications. This study invites collaborations from other parts of Africa and the world at large.

Keywords: Network Marketing, Marketing Communication, Herbal Medications, Citizens, Nigeria, Zambia

Introduction

Subject area	Marketing Communication
More specific subject areas	Herbal Medication Marketing
Study execution	A survey using a questionnaire instrument.
Study format	Quantitative methodology
Experimental factors	This is an investigational study involving 230 consumers of herbal products in Lagos, Nigeria and Lusaka, Zambia. Study objectives include examining the influence of network marketing communicators of herbal medications on the citizens in Lagos and Lusaka. Descriptive tables indicate the initial results.
Experimental features	Data on citizens' awareness of network marketing communication and its influence on the patronage of herbal medication products appear in this preliminary study.
Preliminary study locations	Lagos, Nigeria and Lusaka, Zambia.
Data accessibility	Authentic data is available to match with similar studies in Africa and the rest of the world.

Value of Study

1. This study provides the prototype for similar studies in different parts of the world, especially African countries.
2. Preliminary findings of this research are prospective background data for future researches on network marketing communication and herbal medications.

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3. This study is supported with the following citations:
    a. Marketing communication. Samples in Odiboh and Oladunjoye (2019); Odiboh, *et al.,* (2020a); Odiboh and Ajayi (2019); Odiboh, Ezenagu, and Okuobeya (2019); Adelua, *et al.* (2020a); Adelua, *et al.,* (2020b); Adelua, *et al.* (2020c); Adelua, *et al.* (2020d); Aiyende, *et al.* (2020a); Aiyende, *et al.* (2020b); Fayemi, *et al.* (2020a); Fayemi, *et al.* (2020b); Fayemi, *et al.* (2020c), Fayemi, *et al.* (2020d), James, *et al.* (2020a), James, *et al.* (2020b, James, *et al.* (2020c), James, *et al.* (2020d), Ndubueze, *et al.* (2020), Ndubueze, *et al* (2019), Nejo, *et al.* (2020a), Nejo, *et al.* (2020b), Nwosu, *et al.* (2020a), Nwosu, *et al.* (2019), Nwosu, *et al.* (2020b), Olabanjo, *et al.* (2020a), Olabanjo, *et al.* (2020b), Olabanjo, *et al.* (2019), Omokiti, *et al.* (2020a), Omokiti, *et al.* (2020b), Salau, *et al.* (2020a), Salau, *et al.* (2020b), DiStaso, McCorkindale, and Wright (2011, 2012); Coombs and Holladay (2012); Diga and Kelleher (2009); Eyrich, Padman and Sweetser (2008); Fitch (2009); Gabriel and Koh (2016); Garding and Bruns (2015; Grunig and Grunig (1992); Grunig and Hunt (1984); Hadina (2010); James (2007); Ji *et al.,* (2017); Kent and & Taylor (1998, 2014); MacNamara (2010); McLennan and Howell (2011; Moreno *et al.*, (2015; Mukhtar and Syed (2017); *News Straits Times.* (2017); Robson and James (2013); Shahizan and Sobihantun, (2015); Statcounter Global Stats (2018); Stříteský and Stránská (2015); Tench and Jones (2015); Valentini (2015); Wright and Hinson (2008, 2009, 2015); Zheng, Liu and (2018).
    b. Herbal products. Samples in Odiboh *et al*. (2018a), Odiboh *et al.*, (2018b), Odiboh *et al*. (2017a), Puri and Puri (2011), Roybal and Skowronski (2000), Sahelian (2004), Sanders and Winter (2007), Sharma (2007), World Population Review. (2018)Yoruba (2014), Yusuff (2005).

Experimental Design, Materials and Methods

This study generated the data for future use. Two hundred and thirty cosmopolitan citizens of Nigeria and Zambia filled the questionnaire designed for this study. However, 223 copies of the questionnaire returned properly filled. The respondents were selected through a random sampling technique. Initial results of the study are shown in the Tables below.

Preliminary Study Results

Descriptive statistics was adopted in this research to indicate mean scores in the data presentation. Frequency distribution tables show the position of each item in the questionnaire. The study used Statistical Package for Social Sciences (SPSS/PASW) software, version 25.

Table 1: Descriptive of individuals' awareness of network marketing communication of herbal medications

			Country		
			Nigeria	**Zambia**	**Total**
Are you aware of network marketing communication of herbal medications?	Yes	Count	112	92	204
		% of Total	50.2%	41.3%	91.5%
	No	Count	6	5	11
		% of Total	2.7%	2.2%	4.9%
	Not sure	Count	7	1	8
		% of Total	3.1%	0.4%	3.6%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

Table 1 shows that majority (91.5%) of the respondents are aware of network marketing communication of herbal medications. This result speaks equally for both countries in the affirmative.

Table 2: Descriptive of individuals' usage of any herbal product

			Country		
			Nigeria	**Zambia**	**Total**
Have you ever used any herbal product?	Yes	Count	112	93	205
		% of Total	50.2%	41.7%	91.9%
	No	Count	6	5	11
		% of Total	2.7%	2.2%	4.9%
	Not sure	Count	7	0	7
		% of Total	3.1%	0.0%	3.1%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

The descriptive result of Table 2 shows that a vast majority (91.9%) of the respondents have used herbal products at one time or another. The result reflects similarly in Nigeria and Zambia. However, few (3.1%) of the Nigerian respondents were not sure of herbal product consumption in the past, while no one was unsure in Zambia.

Table 3: Descriptive of citizens' awareness of network marketing communication of herbal medications

			Country		
			Nigeria	Zambia	Total
Most of the people are aware about network marketing communication of herbal medications	Strongly agree	Count	28	41	69
		% of Total	12.6%	18.4%	30.9%
	Agree	Count	54	26	80
		% of Total	24.2%	11.7%	35.9%
	Not sure	Count	35	16	51
		% of Total	15.7%	7.2%	22.9%
	Disagree	Count	7	7	14
		% of Total	3.1%	3.1%	6.3%
	Strongly disagree	Count	1	8	9
		% of Total	0.4%	3.6%	4.0%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

The descriptive result in Table 3 indicates that the respondents vastly agree that most people in Nigeria and Zambia are aware of network marketing communication of herbal medications. Although more respondents in Nigeria are unsure of this assertion, the low level of disagreement with the statement is common to both countries.

Table 4: Descriptive of network marketing communicators' influence on people to consume herbal medications

			Country		
			Nigeria	Zambia	Total
Marketing communicators of herbal medications have influenced people to consume herbal medications.	Strongly agree	Count	27	28	55
		% of Total	12.1%	12.6%	24.7%
	Agree	Count	38	26	64
		% of Total	17.0%	11.7%	28.7%
	Not sure	Count	45	25	70
		% of Total	20.2%	11.2%	31.4%
	Disagree	Count	11	11	22
		% of Total	4.9%	4.9%	9.9%
	Strongly disagree	Count	4	8	12
		% of Total	1.8%	3.6%	5.4%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

Table 4 shows the agreement among the respondents that marketing communicators have non-marginal influence on the citizens' consumption of herbal medications. However, while majority (20.2%) of Nigerians are not sure, most (12.6%) of their Zambian counterparts strongly agree on the influence of herbal medication usage by network marketing communication.

Conclusion

This preliminary result shows high awareness of network marketing communication of herbal products among the citizens of Nigeria and Zambia. Specifically, the citizens consume herbal products with the preponderant influence of network marketing communication in both countries. Although there are cases where Nigerians are unsure of ever using herbal products, Zambians are not in doubt. The tentative conclusion is that from the perspective of the citizens, network marketing communication of herbal products has the potential to be firmly rooted in Nigeria and Zambia.

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Hereditary Consumption of Herbs and Marketing Communication influence in Nigeria and Zambia

[1]Mercy BANDA; mercy.bandapgs@stu.cu.edu.ng
[2] *Oscar ODIBOH; odion.odiboh@covenantuniversity.edu.ng

[1, 2]Department of Mass Communication, Covenant University, Ota, Ogun state.
*Corresponding Author: Oscar Odiboh; odion.odiboh@covenantuniversity.edu.ng

Abstract

Consumption of herbs is increasing in various parts of the world. However, in many African countries, public perception of hereditary consumption of herbs is yet unclear especially as regards to marketing communication. In Nigeria and Zambia for example, tradition, religion, level of education, economy, healthcare needs and other factors influence hereditary consumption in general terms. Nonetheless, misconceptions still surround the hereditary consumption of herbs specifically relating to marketing communication activities. Quantitative survey design using the questionnaire instrument was deployed. Two hundred and twenty-three out of 230 copies of the questionnaire successfully returned from respondents who were selected through a multi-stage sampling technique. Tentative findings show that hereditary consumption and marketing communication have less than average influence on the uptake of herbs by Nigerians and Zambians. Local and global stakeholders in African herbal medicine will find this study's results beneficial for further investigation.

Keywords: Hereditary Consumption, Herbs, Marketing Communication, Nigeria, Zambia.

Introduction

Subject area		Marketing Communication
More specific subject areas		Consumer Psychology and Consumer Relations
Study execution		A survey using a questionnaire instrument.
Study format		Quantitative methodology
Experimental factors		As a comparable study, 230 hundred copies of questionnaire were drawn up and divided into two to elicit public responses from two targeted areas in Nigeria and Zambia. The respondents were selected through a multi-stage technique. The semi-structured questionnaires were administered by the researcher and other research assistants to get responses from the respondents. Study objectives include examining public perception of hereditary consumption patterns of herbal remedies through marketing communication in Nigeria and Zambia. Preliminary results are included in tables.
Experimental features		Data on public perception of hereditary consumption patterns of herbal remedies through marketing communication in Nigeria and Zambia is included in the initial study.
Preliminary study location		Nigeria, Zambia
Data accessibility		Original data is available to compare with similar investigations anywhere in the world

Value of Study

Hereditary consumption of herbal product involves the practice of consuming remedies as did the forbears. This study is significant as follows:

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1. To consumers of herbs, sellers and marketers of herbs in Africa and other parts of the world.
2. It is also vital to government, healthcare institutions and agencies, healthcare advocators and Afrocentric researchers.

1. The following publications are central to this study:
   a. Hereditary Consumption. Albaum & Peterson, (2012); Ekor, (2014); Euromonitor, (2019); Franco & Gonzalez-Perez, (2016); Goma *et al*. (2016); Jimam, Joseph & Agba, (2017); (2017). Juneja, (2015); Maluma, *et al.* (2017); Merriam-Webster, (2019); Mlenga, Jere, & Davis, 2011; Nworu *et al.* (2015); Oreagba *et al*, (2011); WHO, (2018).
   b. Marketing communication. Sample in DiStaso, McCorkindale, and Wright (2011, 2012); Coombs and Holladay (2012); Diga and Kelleher (2009); Eyrich, Padman and Sweetser (2008); Fitch (2009); Gabriel and Koh (2016); Garding and Bruns (2015; Grunig and Grunig (1992); Grunig and Hunt (1984); Hadina (2010); James (2007); Ji *et al.,* (2017); Kent and & Taylor (1998, 2014); MacNamara (2010); McLennan and Howell (2011; Moreno *et al*., (2015; Mukhtar and Syed (2017); *News Straits Times.* (2017); Robson and James (2013); Shahizan and Sobihantun, (2015); Statcounter Global Stats (2018); Tench and Jones (2015); Valentini (2015); Wright and Hinson (2008, 2009, 2015); Zheng, Liu and (2018).Sample in Odiboh and Oladunjoye (2019), Odiboh, *et al.* (2020a), Odiboh and Ajayi (2019), Odiboh, Ezenagu, and Okuobeya (2019), Adelua, *et al.* (2020a), Adelua, *et al.* (2020b), Adelua, *et al.* (2020c), Adelua, *et al.* (2020d), Aiyende, *et al.* (2020a), Aiyende, *et al.* (2020b), Fayemi, *et al.* (2020a), Fayemi, *et al.* (2020b), Fayemi, *et al.* (2020c), Fayemi, *et al.* (2020d), James, *et al.* (2020a), James, *et al.* (2020b, James, *et al.* (2020c), James, *et al.* (2020d), Ndubueze, *et al.* (2020), Ndubueze, *et al* (2019), Nejo, *et al.* (2020a), Nejo, *et al.* (2020b), Nwosu, *et al.* (2020a), Nwosu, *et al.* (2019), Nwosu, *et al.* (2020b), Olabanjo, *et al.* (2020a), Olabanjo, *et al.* (2020b), Olabanjo, *et al.* (2019), Omokiti, *et al.* (2020a), Omokiti, *et al.* (2020b), Salau, *et al.* (2020a), Salau, *et al.* (2020b). Albaum and Peterson (2012); Angelopulo and Barker (2013); Euromonitor, (2019); Fuchs-tarlovsky *et al*. 2018; Franco and Gonzalez-Perez (2016) Jaina, Singlab and Shashia (2015); Odiboh, Adeyeye and Ekanem, (2018); Odiboh, (2020, 2019) Nuhu *et al.,* (2018); Nagar *et al*. (2014); Valentina, (2015)

Experimental Design, Materials and Methods

Quantitative survey design was applied in executing this study as work-in-progress. Data was generated from a questionnaire designed for all time use. Two hundred and thirty copies of the questionnaire were dispatched, proportionate to the two countries' population. However, 223 responses were generated from correctly-filled forms. The respondents were selected through a multi-stage sampling technique. Tables below show part of the primary results of the study.

Preliminary Study Results

As shown in the data presentation below, this study implemented descriptive statistics to designate mean marks. Each item's position in the questionnaire is represented through frequency distribution tables show below. Statistical Package for Social Sciences (SPSS/PASW) software, version 25 was used.

Table 1: Frequency of herbal consumption

			Country		
			Nigeria	Zambia	Total
How often do you consume herbs?	Once a year	Count	43	33	76
		% of Total	19.3%	14.8%	34.1%
	Twice a month	Count	36	23	59
		% of Total	16.1%	10.3%	26.5%
	Once a week	Count	23	21	44
		% of Total	10.3%	9.4%	19.7%
	Once a day	Count	23	21	44
		% of Total	10.3%	9.4%	19.7%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

Table 1 indicates the daily herbal consumption is slightly higher in Nigeria (10.3%) than in Zambia (9.4%). The weekly consumption 10.3% in Nigeria and 9.4% in Zambia. Twice a month for Nigeria is 16.1% and Zambia is

10.3%. Once a year for Nigeria (19.3 per cent) and Zambia 14.8%. Overall, once-a-year consumption is the highest common frequency in both countries.

Table 2: Consumption of herbs by grandparents and parents

			Country		
			Nigeria	**Zambia**	**Total**
Did your grandparents and parents consume herbs?	Not sure	Count	11	20	31
		% of Total	4.9%	9.0%	13.9%
	No	Count	14	11	25
		% of Total	6.3%	4.9%	11.2%
	Yes	Count	100	67	167
		% of Total	44.8%	30.0%	74.9%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

An overwhelming (74.9%) number of the respondents affirm that their parents and grandparents consumed herbs. Consumption of herbs by grandparents and parents is also higher in Nigeria by 44.8% and 30.0% in Zambia. In Nigeria 6.3% and 4.9% in Zambia respectively indicted their forebears did not consume herbs. Nigeria (4.9%)and Zambia (9.0%) were not certain their parents consumed herbs**.**

Table 3: Hereditary consumption of herbs

			Country		
			Nigeria	**Zambia**	**Total**
Do you consume herbs as your parents did?	Not sure	Count	10	21	31
		% of Total	4.5%	9.4%	13.9%
	No	Count	68	43	111
		% of Total	30.5%	19.3%	49.8%
	Yes	Count	47	34	81
		% of Total	21.1%	15.2%	36.3%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

Majority (49%) of the respondents in both countries do not consume herbs as their parents. Table 3 shows further that the hereditary consumption of herbs is high by 21.1% in Nigeria and 15.2% in Zambia.

Those who said did not consume herbs as parents were 30.5% in Nigeria and 19.3% Zambia. 4.5% and 9.4% respectively indicated were not sure of hereditary consumption. This means that though hereditary consumption of herbs is visible, it is not highly prevalent.

Table 4: Marketers' communication influence of hereditary consumption of herbs

			Country		
			Nigeria	**Zambia**	**Total**
Did marketers' communication efforts influence you to consume herbs like your parents?	Not sure	Count	11	15	26
		% of Total	4.9%	6.7%	11.7%
	No	Count	69	47	116
		% of Total	30.9%	21.1%	52.0%
	Yes	Count	45	36	81
		% of Total	20.2%	16.1%	36.3%
Total		Count	125	98	223
		% of Total	56.1%	43.9%	100.0%

Table 4 shows that marketers' communication have not succeeded in influencing the respondents to consume herbs like their parents and grandparents. However, marketers' communication influence of hereditary consumption of

herbs is higher in Nigeria representing 20.2% and 16.1% in Zambia. Majority (30.9%) of Nigerians and (21.1%) Zambians indicted that they were not influenced by marketers' communication while 4.9% and 6.7% respectively were not sure of marketers' communication influence.

Conclusion

The findings show some patterns in the consumption of herbs in Nigeria and Zambia. Generally, the respondents consumed less herbs than their forbears, suggesting that hereditary consumption is low among the people. Similarly, the people are not able to consume herbs like their parents and grandparents in spite of the acknowledged communication activities of marketers. These findings are interesting for practitioners of African traditional medicine, orthodox healthcare practitioners, researchers, herbal marketers and the World Health organisation (WHO), among others.

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Teachers' and Students' Perception on Influence of Deviant Behaviours On Academic Performance of Secondary School Students in Lagos State

Agatha C. NWABUEZE
nwabuezeca@gmail.com
Department of Psychology, Covenant University, Ogun State.

Olujide A. ADEKEYE
Olujide.adekeye@covenantuniversity.edu.ng
Department of Psychology, Covenant University, Ogun State

Gbadebo O. ADEJUMO
Gbadebo.adejumo@covenantuniversity.edu.ng
Department of Psychology, Covenant University, Ogun State

Georgina O. OSAKWE
ginaosakwe@yahoomail.com
Department of Educational Foundations and Counselling Psychology,
Faculty of Education, Lagos State University Ojo.

Vera N. NWADINOBI
Kiru92007@gmail.com
Department of Guidance and Counselling
Nnamdi Azikiwe University Awka.

Abstract

Deviant behaviours among secondary school students has remained a global concern. It is on the increase and is affecting the educational sector across the nation as it is capable of disrupting teaching and learning process in schools. This study investigated the teachers and students' perceptions of the influence of deviant behaviours on academic performance of senior secondary school students in main land educational district IV of Lagos State. The population was 3,101 participants made up of 290 teachers and 2811 students. Descriptive research design was adopted for the study and simple random sampling was employed to selected 300 participants. The instrument used for the study was "Influence of Deviant Behaviours on Academic Performance of Students (IDBAPS)". The instrument has a test-retest reliability coefficient of 0.91. Collected data were analyzed using mean and standard deviations and t-test to test the null hypotheses at 0. 05 level of significance. The result of the findings revealed that deviant behaviours influence students' academic performance. There was no significant difference in the perception of male and female teachers on the influence of deviant behaviours on the academic performance of students but there was no significant difference in junior and senior teachers' perception of the influence of deviant behaviours on students, academic performance. There was significant difference in male and female students' perceptions of the influence of deviant behaviours on academic performance. Based on the findings, it was recommended that schools should have functional professional counsellors to minimize deviant behaviours.

Keywords: Perceptions, Teachers, Deviant Behaviour, Academic Performance.

Introduction

Deviant behaviours are on the increase globally (Hanimoglu, 2018) and if not arrested, will lead to more serious problems. Deviant behaviour is any behaviour that is contrary to the dominant norms of the society. This departure from social norms is especially more amongst peer groups both at home and in schools. It simply means to deviate from the laid down rules, regulations, norms and value in schools, home community and society at large. Ali, Dada, Isiaka and Salmon (2014) discovered that deviant behaviours were high among secondary school students in Lagos, State.

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There is however no universal definition of deviant behaviour as several authors view it differently. Ayomide & Omotosho (2017) sees deviant behaviour as an act of indiscipline or behaviour disorder which served as a major or great source of some social vices in Nigeria society which are of great concern to the parents, government and teachers. Deviant behaviour is a behaviour that violates laid down rules and regulations of any given organizations or group (Adeusi, Gesinde & Adekeye, 2015; Diche, 2016; Idris, 2016; Bolu-Steve, 2017). Deviant behaviours occur in schools as a result of poor environment, bad peer group, poor school materials such as textbooks and seats, children from broken homes and poor family background, school phobia and parenting styles (Chikwature, Oyedele & Ganayi; 2016). Thibaut (2017), opines that neglectful parenting style which is characterised by lack of care and warmth triggers deviancy among students who use it as protective reactions. According to Asiyai (2019), deviant behaviours in urban secondary schools include assault, not being punctual to school, cheating in examinations, noise making, fighting, indecent appearances, aggressive acts, sexual perversion and truancy. Cheating in examinations and noise making occur most in rural secondary schools.

Deviant behaviours have a long – term effects on the individuals themselves, the family and society in general (Adeusi, Gesinde, Alao, Adejumo & Adekeye, 2015). Asiyai (2019) revealed that deviant behaviour disrupts learning thereby leading to poor academic performance, lateness to school, noise making among deviants can lead to punishments like flogging or missing first lessons. Name-calling used for deviants may make them create phobia for school, low self-esteem and dropping out of school. Bhagavi and Cairio 2017) reported also that deviant behaviours hinder students from learning, thereby leading poor academic performance and abscondment from school. Afe (2017) state that deviant behaviour results from indiscipline which works against effective teaching and learning as well as production of quality school graduates. Afe further stated that there are some other factors which are responsible for them as well such as excessive videogames (Onyemaka, Igbokwe, Adekeye & Agbu, 2017).

Adolescence period is a very turbulent period in child development and most secondary school students are adolescent. According to Nkhata & Mwale (2016), Secondary school students are within a period of growth known as adolescence, a period which falls in between childhood and adulthood. During the period of adolescent, they exhibit unstable emotions like mood swings, challenge authorities, break rules, exhibit anti- social behaviours more than either children or adults (Damron – Bell, 2001). Adolescents participate in problematic behaviours in schools such as fighting, bullying, stealing, truancy, being unruly to authority and many more of such deviant behaviours usually affect their families, academics, social and personal functions. The 21st century schools are characterized by moral value decadence where the students lack love and care in alarming proportion.

Mayo & Siahi (2015) posited that in education academic performance can be measured through students' academic achievement. Academic achievement is the manifestation of skills or knowledge gained in the school subjects (Busari, 2000). Deviant behavoiurs are often exhibited by secondary school students because majority of them are adolescents who want to risk behaviours like sexual activities, smoking, stealing, bullying, examination malpractices, abortion, rape, cultism, loitering, lateness and rudeness (Maiyo & Siali (2015). Unless deviant behaviours in public secondary schools are arrested and managed, it is likely to spill over into the community and society with severe consequences for future national development. Education is the bedrock of every nation and so parents, educational stakeholders are aware that students need sound education to survive in the era where there is unemployment, inflation, scarcity of food. If students engage in deviant behaviours which can affect their academic performance and better future, the essence of their being in school will be therefore defeated. Academic performance according to Bashir & Matto (2012) is the measure of how much knowledge the individual has acquired from school or institution. Also, that academic performance is an important issue in the society as highest levels of abilities attract more economical and social rewards. Furthermore, they reported that students who achieve high academic performance attend all classes, turn in assignments on time, take notes in class, pay attention in class, do not cheat in class while low performing students miss classes, come late to school, submit assignments late, do not take notes in class, have poor time managements. From this report, it follows that students who refuse to carry out the accepted steps to learning, perform poorly in their examination. These are said to exhibit deviant behaviour. At school, adolescents get affected in one way or the other as they socialized either positively or negatively by their fellow students and teachers (Nkhata & Mwale,2016). They further stated that cases of deviant behaviour among adolescents are rampart.

Several studies have been done all over the world with findings showing the prevalence of various forms of deviant behaviour. There is high prevalence of truancy, bullying, fighting, lateness, lying in secondary schools and society (Adekeye, Alao, Chenube et al., 2016; Okorie, 2012). Afe (2017) observed that substance abuse is on the increase among Nigeria youths and this poses a threat to the objective of education in Nigerian schools. He also discovered in his studies that indiscipline work against effective teaching / learning and production of quality graduates. Morris (2016) reported that good order is essential in a school if children are to be able to fulfill their learning potentials. Poor and disruptive behaviour in the classroom reduce children's abilities to concentrate and absorb information. These children and cause immense stress for teachers. However not much have been done on the influence of many collective variables on deviant behaviours on academic performance among secondary school students. Therefore,

this study sets to investigate teachers and students' perceptions on the influence of deviant behaviours on academic performance of secondary school students in main land Educational District (IV) of Lagos State.

Statement of the Problem

Controlling students behaviours in schools especially in Lagos state is one of the biggest challenges being faced by school authorities. Deviant behaviours constitute serious menace to students' academic performance The menace of deviant behaviours has a negative effect on the fulfillment of the adolescent as they grow into adulthood. It also exposes them to even more bigger crimes which may destroy them completely in future. Nkhata & Mwale (2016) shows that cases of deviant behaviour among adolescents are still rampant. Students violate different schools rules and regulations as a result of deviant behaviour which may include among others, coming late to school, truancy, jumping walls to leave school compound, drug abuse, coming to school with dangerous weapons to fight, assault and insult of teachers, disobedience, smoking, vandalizing of school properties, not participating in compulsory school programmes, sexual deviant acts such as those that takes place in classroom toilets, libraries and hidden areas of the school compound, examination malpractices of different kinds and bringing objects not allowed in school like wrist watches, pens, belts, shoe bags, artificial nails and hair attachments among others. If these behaviours are not checked, they will disrupt teaching and learning processes. The innocent and good student may be corrupted. The school may turn into breeding grounds for hooligans and criminals instead of turning out creative well-educated graduates that will accelerate nations economic development. Researchers have reported deviant behaviour as an act of indiscipline and a social problem which is wide spread among secondary school students. Afe (2017) asserted that deviant behaviours result in indiscipline which work against effective teaching and learning as well as in turning out quality school graduates. Therefore, if these deviant behaviours are not given adequate attention by the stakeholders, the educational system of the nation will be heading to chaos. Again, if it is not curbed, it will increase delinquency / indiscipline which invariably affect the students' academic performance. Thus, this study examines teachers and students' perception of influence of deviant behaviour on academic performance of secondary school students in Lagos State, Nigeria and suggest ways of tackling the problem.

Objectives of the Study

The objectives of this study are to investigate teachers' and students' perception of influence of deviant behaviours on academic performance of secondary school students and to also proffer solutions on how to curb the incidence of deviant behaviours in school adolescents.

Research Questions

1. What are teachers' and students' perception of the influence of deviant behaviours on academic performance of secondary school students?
2. What are the differences in male and female teachers/ students' perceptions of the influence of deviant behaviour on academic performance of secondary school students?
3. To what extent do teachers teaching experience affect their perceptions of the influence of deviant behaviours on academic performance of secondary school students?

Hypotheses

To guide this study, three hypotheses were stated and tested at 0.05 level of significance.

H_1: There is no significant difference between junior and senior teachers' perceptions of the influence of deviant behaviours on academic performance of secondary school students.

H_2: There is no significant difference between male and female teachers' perceptions of influence deviant behaviours on academic performance of secondary school students.

H_3: There is no significant difference between male and female students' perceptions of the influence of deviant behaviours on academic performance of secondary school students.

Significance of the Study

This study will reveal the influence of different aspects of deviant behaviour on students' academic performance. The results of the findings and recommendation will help in minimizing deviance in schools and promote academic performance. School management will take both preventive and treatment measures to stop deviance in schools. Parents of deviant students who have discovered some of the reasons of their children's poor academic performance

would increase the supervision of their children's behaviours, conduct at school and academic activities as well as correct and encourage them whenever the need arises. The ministries and boards in charge of education would use the information to improve discipline and methods to achieve optimal academic performance among students. This study also provides a suitable platform for other researchers to work on.

Methodology

Research Design

The descriptive survey design was used for this study

Population of the Study

The population for this study was all male and female teachers in ten public secondary schools and all senior secondary school (SS II) students in mainland Educational District (IV) of Lagos state. The population comprises of 290 teachers (135 male & 155 females) and 2811 students (1495 males & 1316 females).

Sample and Sampling Techniques

The sample for this study comprised of 300 participants made of 50 (males and female) teachers and 250 (male and female) students. This selection was based on simple random technique 10 teachers and 50 students were selected from the sampled schools. 20 (40%) teachers who have less than 5 years teaching experience are termed junior teachers while 30 (60%) teachers who have taught for more than 5 years are termed senior teachers and the students aged between 13 and 18 years. The mean age was 15 years.

Research Instrument

The instrument for data collection was a researcher designed questionnaire titled. Influence of Deviant Behaviour on Secondary School Students' Academic Performance (IDBSAP). The instrument was divided into two sections the first section requires respondents to supply demographic information such as teacher's sex, years of experience and age of students. The second section deals with 20 items that elicit information on influence of different deviant behaviours as perceived by teacher and students. The respondents indicated their response using four-point Likert – types rating scales of strongly Agreed (SA) Agree (A), Strongly Disagree (SD) and Disagree (D)

Validity of Instrument

Influence of Deviant Behaviours on Secondary School Students' Academic Performance Questionnaire was subjected to face and content validity by experts in department of psychology, covenant university, Ota – Ogun State.

Reliability of the Instrument

The reliability of the instrument was determined using Cronbach Alpha value to ensure that the constructs are constituent across items. It yielded a value of 0.91 which was considered high.

Data Collection Procedure

The researcher got access to the schools with permission of the school administrators. Questionnaire were administered collectively in classrooms in the exclusive presence of the researcher and researcher assistants. All participants took part on a voluntary basis. They were informed that the questionnaire was anonymous and is strictly confidential.

Data Analysis

The data was collected, coded and analyzed using the statistical package for the school sciences (SPSS) version 20. Descriptive statistics were used to analyze the distribution responses of each item while independent t-test was used to test null hypotheses at 0.05 significant level.

Results

Data analysis

Table 1: Mean Ratings of Teachers and Students Perceptions of the Influence of Deviant Behaviours on Students Academic Performance

Items	N	SA	A	D	SD	Mean	Standard Deviation	Remark	Rank
Perpetrator of bullying may not perform well in schools	300	57	196	38	9	3.00	0.0662	Agreed	15
Victims of bullying may not do well in tests/ examinations	300	78	156	50	16	2.99	0.807	Agreed	17
Use of substance abuse can cause the Vitim to perform poor in tests / examination	300	119	171	9	1	3.36	0.575	Agreed	8
Students who do not do homework / assignment may fail their exanimation	300	145	97	47	11	3.25	0.862	Agreed	10
Skipping classes can result to poor performance or failure.	300	167	130	3	-	3.55	0.518	Agreed	12
Students are unable to honour their study time table perform below in their examination	300	48	186	22	44	2.78	0.909	Agreed	10
Students who do not revise materials taught frequently may not recall thereby performing below expectation in their examination	300	117	153	29	1	3.28	0.662	Agreed	8
Frequent lateness may lead to poor academic achievement	300	77	195	26	2	3.16	0.589	Agreed	13
Constant noisemaking by students may lead to poor performance.	300	67	156	59	18	2.90	0818	Agreed	18
Truancy may not lead to academic excellence.	300	172	78	28	12	3.39	0.792	Agreed	5
Cultism may lead to failure in studies	300	170	93	23	14	3.40	0.822	Agreed	4
Rudeness can affect academic performance	300	81	161	40	18	31.01	0.834	Agreed	14
Alcoholism may cause the victim to perform poorly in tests/ examination	300	153	126	4	17	3.38	0.778	Agreed	6
Theft may disrupt effective learning process	300	113	143	28	16	3.18	0.089	Agreed	12
Sexual perversions may lead to poor academic achievement	300	142	145	2	11	3.38	0.729	Agreed	7
Teenage pregnancies may lead to poor academic achievement	300	228	67	1	4	3.72	0.573	Agreed	1
Violence may cause the victim to perform poor in test/ examination	300	97	171	10	22	3.14	0.795	Agreed	14
Fights may lead to examination failure	300	47	162	56	35	2.74	0.862	Agreed	20
Abortion can lead to examination	300	143	105	35	17	3.25	0.873	Agreed	11
Examination malpractices can lead to poor academic achievement	300	176	107	4	13	3.49	0.734	Agreed	3
GRAND MEAN						**3.2175**			

Result in Table 1 showed that all respondents have mean score value between 2.74 and 3/72 for all the items. There mean score values are greater than 2.5 which is the criterion mean score value of the studies. This shows that all the respondents agreed that deviant behaviours influence students' academic performance.

Hypotheses Testing

H_o1: There will be no significant difference between junior and senior secondary teachers' perceptions of the influence of deviant behaviour on academic performance of secondary school students

Table 2: Independent t– test of the mean response of junior and senior teachers' perceptions of the influence of deviant behaviours on students' academic performance.

	Teacher's experience						95% C: for Mean Difference		
	Junior			Senior					
Variable	M	SD	n	M	SD	n	t	df	sig(2tailed)
	52.5	5.66	18	60.93	6.66	30	-4.482	48	.000

P<05.

Table 2 shows the result of an independent t-test conducted to compare the junior and senior teachers' perceptions of the influence of deviant behaviours on students' academic performance. There was significant difference in score for junior teachers (M-52.5, SD = 5.66) and senior teachers (M=60.93, D = 6.66); t)46) = 4.482, P = 0.000, two tailed).

Ho2: There will be no significant difference between male and female teachers' perceptions of the influence of deviant behaviour academic performance of secondary school students

Table 3: Independent t-test and descriptive statistics of the means score of male and female teachers' perception of the influence of deviant behaviours on academic performance of students.

	Teacher's experience						95% C: for Mean Difference		
	Male			Female					
Variable	M	SD	n	M	SD	n	t	df	sig(2tailed)
	57.71	8.28	31	58.32	5.81	19	.279	48	.78

P<05.

Table 3 shows the result of an independent t-test conducted to compare the male and female teachers' perceptions of the influence of deviant behaviours on students' academic performance of students. There was no significant difference in score for male teachers (M-57.71, SD = 8.28) and female teachers (M=58.32, 5.81); t (48) = .279, P = .78

Ho3: There will be no significant difference between male and female students' perceptions of the influence of deviant behaviours academic performance of secondary school students

Table 4: Independent t-test and descriptive statistics of the means score of male and female students' perception of the influence of deviant behaviours on academic performance of students.

	Students' Gender						95% C: for Mean Difference		
	Male			Female					
Variable	M	SD	n	M	SD	n	t	df	sig(2tailed)
	60.80	6.19	117	65.90	5.15	133	5.97	248	0.000

P<05.

An independent sample t-test was conducted to compare the male and female students' perceptions of the influence of deviant behaviours. There was a significant difference in the scores for male (M-60.8, SD = 8.19) and female (M=65.9, SD, = 5,15) participants; t (5.97) = 248, P = 0.00.

Discussion of Findings

The mean score values of all the respondents in this study are between 2.74 and 3.72 for all the items. This shows that all respondents agreed that deviant behaviours influence students' academic performance. Table 1: Show the highest respondents mean score of 3.72 that is linked with teenage pregnancy as a predictor of academic performance.

The mean score value of 3.48 which was the third highest agreed that examination malpractices could lead to poor academic achievement. This has the support of Ukpepi & Enukoha (2012) who reported that there is a significant relationship between pupils' perceptions of examination malpractice and academic performance in primary schools.

Table 2 shows that there was significant difference in scores for junior and senior teachers' perceptions of the influence of deviant behaviours in students' academic performance. The P – value of 0.000 which is less than 0.05 (95% confidence intervals) depicted this. Senior teachers have a higher mean score value of 60.93 compared to junior teachers with the mean score value of 52.5. The longer years of encounter and experience with students could have led the senior teachers to assess the influence of deviant behaviours on students' academic behaviours differently from junior teachers. In table 3: The p-value of 0.78 is greater than 0.05 (95% confidence interval). This implies that there is no statistically significant difference in the perceptions of male and female teachers on the influence of deviant behaviours on students' academic performance.

Table 4 shows that gender has no significant impact on the perceptions of the influence of deviant behaviours on the academic performance of students. This is evidence in the p-value of 0.000 which is less than 0.05 (95%) confidence intervals implying the rejection of the hypothesis that states that there is no significant difference in the perceptions of male and female students' on the influence of deviant behaviours an academic performance of students. The mean value of 65.90 of female students is however more than 60.80 of male counterpart.

This may be because females are more sensitive to deviant behaviours than males. The students' perceptions on the influence of deviant behaviour on academic performance is high and it was observed that deviant behaviour may lead to school dropout. This collaborates with the result of the study of Fayomobo & Aremu (2000) which show that drug abuse leads to reduce academic achievement or even halts one's entire academic process. Chikwature, Oyede & Ganyani (2016) in their study opined that deviance behaviour causes poor concentration during teaching. The result is in line with that of Smink & Reimer (2005) who found out that absenteeism within public school has reached a crisis point and it has been linked to school dropout.

Conclusion

Based on the findings, the presence of deviant behaviours in schools affect students' academic performance. Teachers with longer years of teaching experience and female teachers seem to perceive the influence of deviant behaviours on academic performance more than teachers with fewer years of teaching experience. Students' perception of the influence of deviant behaviour on students' academic performance are not gender based. It is evidence that deviant behaviour has a long-term effect on the individuals themselves, the family and society in general. Deviant behaviours in schools can therefore make the students not to acquire personal skills for self-development and fulfillment as well as for the development in the society since it affects their academic performance and can also lead to school drop outs.

Implications for Counselling

Effective counselling services should be established in schools. Counsellors and educational psychologists should provide right information to school adolescents on how to form good study habits and desist from negative effects of deviant behaviours. The accuracy of the information given, will help them to make right decisions and through counselling, discipline can be installed in secondary schools. Adolescents should be counselled on the values associated with behaviours that conform to the law so that they can adhere to such values. Hence counsellors can assist in curbing deviant behaviour problems in schools through counselling and other psychological approaches.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Parents should provide parental care to their children as well and monitor them in order to dictate the early incidents of deviant behaviour in them and take necessary actions in conjunction with the school administrators to address it.
2. School administrators should state clearly the rules and regulations of the school to the students as soon as they enter the school during orientation programme and punish any deviant behaviour act.
3. There is greater need for school authorities and administrators to increase the relationship between parents, teachers and other organizations. Interest in the welfare of students and regular meeting should be held to ensure that specific plans of actions concerning disciplinary matters and its management on deviant behaviour are formulated and implemented by the parents, counsellors, school administrators.

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Green Roofs - A Solution for the Sustainable Development of Urban Space

Andreea MAIER
Technical University of Cluj - Napoca, Romania
andreeaelenamaier@gmail.com

Ioan ASCHILEAN
Technical University of Cluj - Napoca, Romania
aschileanioan@gmail.com

Abstract

Urban green is fast diminishing in the dense cities resulting in a multitude of socio cultural and environmental problems. Urban ecology is the direct victim to the diminishing greens contributing to some extent towards global warming. Green roof concept as it has the potentialities to reduce the adverse ecological effect of the buildings by providing bio-physical diversity benefits, food, temperature and rainfall runoff regulation, wildlife habitat, as well as aesthetic and recreational opportunities. The aim of this paper is to analyze the benefits of implementing green roofs for the building, for the city and also for the society. In the same time the main errors encounter in the designing and construction stage of the green roofs are presented.

Keywords*:* Green Roof, Sustainable Development, Urban Development.

Introduction

Nowadays, more than ever peoples are aware of the importance of protecting the nature and the living environment, and thus this are topics of interest for many countries. Cities expand their peripheries to accommodate more and more peoples attracted by the higher urban living standards than rural living standards. In a recent report of the United Nations, urbanization is forecasted to attain 83% by 2030 in developed countries (UN, 2019). A series of environmental issues arise from this, on a global scale, the most common one is the increased greenhouse gas emissions.

This worldwide urbanization led to an increase demand for new buildings, water, land, and energy. According to United Nations Environmental Program, the construction and maintenance of buildings account for about 40% of the global primary energy requirement and buildings account for 33% of the global greenhouse gas emissions (De Fino *et al.*, 2017). Therefore, the building sector is of particular interest in the reduction of energy use, in order to limit global warming and mitigate the impacts of climate change (Cascone and Sciuto, 2018).

In this context it arise the need to design sustainable buildings and urban spaces by considering the effect of building envelope technologies. Implementing various sustainable approaches (Maier, 2018c) and designing more environmentally friendly components for buildings leads to the realization of low-energy buildings. In addition, roofs are important components of buildings (Maier and Marusciac, 2011), accounting for nearly 20–25% of the overall urban surface area. Therefore, efficiently designed and integrated green roofs have great potential to affect the building and urban environments, replacing the lost green spaces and habitats in modern cities. Specifically, green roofs are engineered roofing systems, planted with different kind of plants on the top of a growth medium (Cascone, 2019).

A roof garden is actually very different from a green roof, although the two terms are often and incorrectly used interchangeably. A roof garden is an area that is generally used for recreation, entertaining, and as an additional outdoor living space for the building's resident(s). It may include planters, plants, dining and lounging furniture, outdoor structures such as pergolas and sheds, and automated irrigation and lighting systems. A green roof is usually constructed to cover a large area in the most economical and efficient means possible with an emphasis on improving the insulation and /or improve the overall energy efficiency within a building. Green roof concept can be most effective in urban areas where the lack of green-open spaces is a common phenomenon. The purpose of this paper is to identify the main benefits of the green roofs and to highlight the challenges of executing this structures.

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Benefits of Green Roofs

The results of increasing the innovation interest in the construction sector (Maier, 2019) can be seen also in the new ways to respond to the environmental issues. As a response to this issues engineers and architects began to look at ways to bring more nature in the urban environment. In the same time the each organization need to came up with solutions to sustainable development (Maier, 2018a) of the society (López-González *et al.*, 2020). In this context green roofs gain great attention because of their ecological advantages comparing to other build elements. The main obvious advantages of green roofs refer to improvement of energy performance, the urban microclimate conditions and the eater retention.

The advantages of green roofs are better felt in summer time conditions. Green roofs are in a continuous development, creating new innovative products or process (Maier, 2018b). The first advantage observed, in summer time conditions, is related to the increased thermal resistance and dissipation of the solar radiations. This is felt both at the building level and also at the outside temperature. The advantages of the green roofs can be observed also in the winter time when green roofs can store heat from solar radiations and reduces the heat loses through the roof part of the building (Cheng *et al.*, 2020). At freezing ambient air conditions, the process of water freezing further improves the energy efficiency of green roofs (Arkar *et al.*, 2019). Considering the multiple benefits of the green roofs we decide to analyse the benefits from three main category of beneficiaries (figure 1.)

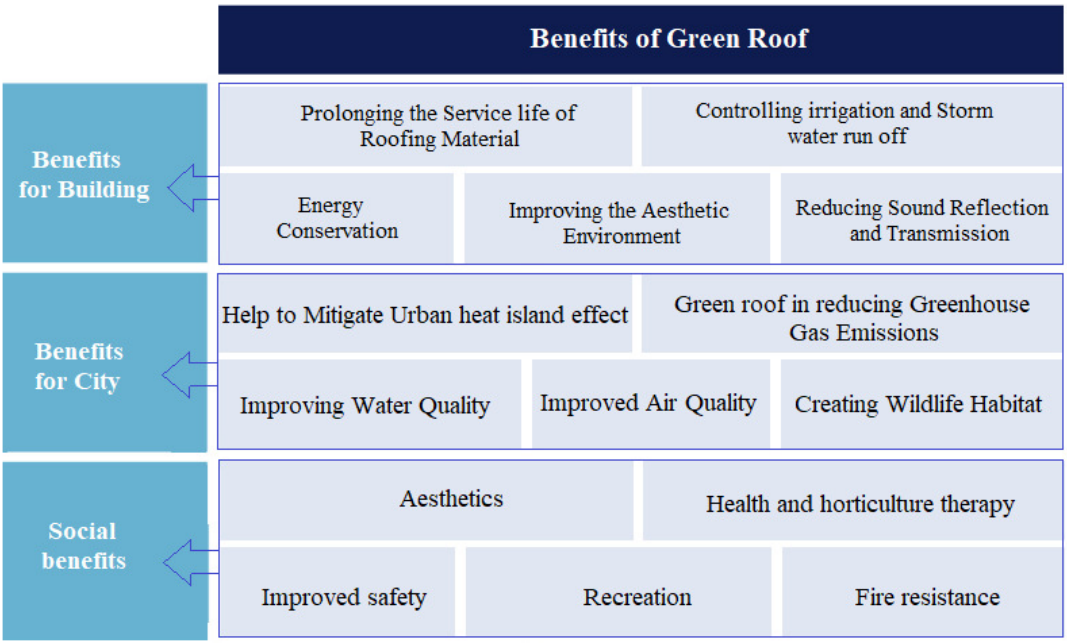

Figure 1: The main benefits of green roofs from building, city and social point of view (author proposal)

When speaking of **Benefits for the Building** one of the benefit is related to the *prolonging the service life of roofing material*. Green roofs protect roofing membranes from extreme temperature fluctuations, the negative impact of ultraviolet radiation and other physical damages. It is estimated that Green roof extends the life of the existing roof fabric by up to 70%. Protection of roof membrane resulting in a longer material lifespan, decreased maintenance and savings in replacement cost (Cascone and Sciuto, 2018).

Another benefit from the category of benefits to the building is that a green roof can *control irrigation and storm water runoff*. The plants capture and hold rainwater. Water is stored in the growing media released to the atmosphere through evaporation and evapotranspiration. Green roofs, in summer, depending on the plants and depth of the growing medium, retain about 70-90% of the precipitation that falls on them, and in winter retain between 25-40% (De Fino *et al.*, 2017). The next benefit felt at the building level is the *energy conservation*. In summer, green roof planting shades the building from solar radiation and through the process of evapotranspiration cools the air reducing the temperature. Reduced energy consumption can cut cooling cost up to 50% and heating by 25% (De Fino *et al.*, 2017).

Improving the Aesthetic Environment is other benefit from the building benefits category. Green roofs contribute significantly towards the aesthetic appeal of urban roof-scape. Green roofs can integrate a building with its natural surroundings, besides offering opportunities for growing a wide range of aesthetically pleasing and vigorous, native

plant species on a large and small scale buildings and structures. The last benefit from this category is r*educing sound reflection and transmission*. Green roofs can be designed to insulate for sound. The growing medium tends to block lower sound frequencies and the plants block higher frequencies. Tests show that green roof with 12 cm substrate layer can reduce 40 decibels and that of 20 cm can reduce sound by 46-50 decibels.

In the category of **benefits for the city** we can identify the effect of green roof over the *improvement of the water quality*. Green roofs help reduce storm water runoff and also moderate the temperature of the water besides acting as natural filters (absorbs metals and pollutants) for runoff water. Other benefit can be felt also on the i*mprovement of the air quality*. Green roofs filter fine, airborne particulates as the air passes over the plants. They trap up to 85% particulates on the surface areas of the greenery. Plants also absorb gaseous pollutants through photosynthesis (De Fino *et al.*, 2017). *Creating Wildlife Habitat* is another benefit from the benefits for the city category. Green roofs are valuable in conserving and restoring endangered habitats and vegetation types. A greater diversity of plant species tends to support a greater diversity of animal species (Cascone and Sciuto, 2018). Green roofs can also h*elp to mitigate urban heat island effect.* Cities of concrete and tarmac retain heat and create 'urban heat islands', as much as 5^0C warmer than surrounding suburbs. Plants through transpiration directly cool the air and can reduce surface roof temperatures by as much as 40^0C. In the end the city can benefit from the green roofs because it *reduces the greenhouse gas emissions*. Buildings are responsible for almost half (48%) of all energy consumption and greenhouse gas emissions and consume 76% of all power plant-generated electricity.

Green roofs can bring **social benefits** also. In this category we can identify *aesthetics,* planting gardens, both at ground level and in the sky, alters both the sensible and psychological climate for the better. *Health and horticulture therapy, t*he variety of sounds, smells, colors and movement provided by plants, can add significantly to human health and wellbeing (Fotopoulou *et al.*, 2018). Other benefit can refer to *improved safety*, a garden on the roof is often considered safer than a garden at grade, because access to the roof is often restricted to building tenants, there is less likelihood of assault or vandalism. *Recreation* is another benefit for the society. Green roof compensates the lack of green open space in many urban areas. Studies show that leisure activities in natural settings such as gardens and parks help people to cope with stress and in meeting other non-stress-related needs. Finally the last benefits from this category is referring to *fire resistance*. Green roof can help slow the spread of a fire to and from the building through the roof, particularly when the growing medium is saturated (Cascone, 2019).

Challenges of green roofs constructions

Considering the multiple benefits of the green roof, it can be stated that the initial investment can be amortized over time, but in order to benefit from these benefits it is important that the roofs are built correctly and efficiently. When green roofs are not proper build not only that they will not offer benefits or the building owners but the cost of repairing them can have a serious impact on the budget (Zhang, He and Dewancker, 2020). There are situations when green roofs occasionally fail to behave like they were design and thus a series of issues arise for the roofs and also for the building. The most common failure include leaks in the roof structure, dying of plants, soil erosion or slope instability (Opatowski, 2018).

In this section of the paper we perform an analysis of the most common green roof failures and how to prevent them. In the analysis process we focus on highlighting the best practices and lessons that can be learned from each potential failure of the green roof system. In this way solution can be offered to the owners, the designers or maintenance staff, solutions that can help to anticipate and overcome any challenges regarding the green roofs.

Choosing the right roofing system is one of the most important aspect to consider regardless of the green roof type. A less maintenance roof with an extensive system having shallower layer or a higher maintenance roof, an intensive system, with deeper soil must be chosen also according to the roofing system (Kumar and Kaushik, 2005). Among the main failure problems identify in the literature we can find:

Damaging the plant life. This is the most visible failure of the green roofs, thus the green part of the roof is transforming in a brown color and the advantages of plants on the roof are lost. The common solution to this problem is to correctly balance the growing medium, the soil layer, with the plants regime of maintenance and water (Teotónio *et al.*, 2020). This means that it is important to respect the correct soil depth, the porosity, the irrigation and the drainage recommendations. In most of the cases green roofs are installed on terrace roofs, with little or no slope. In cases where the green roof is installed on sloping roofs erosion problems can appear. In this case it is important to minimize soil slippage and anchor trees.

Problems on the drainage system. Even if most green roofs seems to be flat roofs, the reality is that in many cases this is not true, the roofs are having a lot of highs and lows. The existence of plants is strictly related to the presence of water and, especially in summer conditions, there is the need for irrigations. In this sense a good drainage system is essential. The water drainage issues must be resolved before installing planting medium and the plants themselves

(Nardini, Andri and Crasso, 2012). There is a common belief that the presence of the soil and plants will absorb all the water and no drainage is needed. This is obvious a big mistake and failure in ensuring the proper drainage system will cause a lot of structural problems for the building. In the same time too much water is bad or the plants. According to (Opatowski, 2018) the best way to prevent ponding is to create a 1:60 slope on flat roofs.

Problems of erosion and uplifting. These are particularly problematic at corners and edges of the roof especially on higher ones. A solution is to include a band of pebbles or paving at the edge and retain trims at the eaves(Green roofing failures: Root causes, 2008). Making sure that vegetation is sectioned and contained by edges of pebbles or gravel paving will allow good drainage of water without taking soil and plants with it. Often these "pathways" double as access for the maintenance staff, so they may already be included in the design (Opatowski, 2018).

Problems of uneven distribution in dead load on the roofing structure. From structural point of view choosing a green roof system will increase the dead load acting on the roof structure. In calculus the dead load is considered to be a uniformly distributed load on the entire structure, thus each of the roof structural element is carrying out a specific equal load. The reality is that depending on the contractor skills and equipment an uneven distribution of the green roof layers can occur. This variations along with live loads acting on the roof can cause local structural failure. Thus it is important that for each job site a proper load distribution should be ensured, from the designing phase and this must be checked in the execution phase. The roof structure must be design so as to resist additional forces on a roof and the possibility of rain-saturated soils. In the execution phase and in the exportation phase must be adapted solutions not to allow concentrated loads are not created by piling up soil or materials.

Problems with the plant and soil selection. The survival of the green roof is determined by correct plant and soil selection. Sedums (similar to succulents) are often selected because they can survive in a variety of climates and require a growing medium that is dry and has low amounts of organic matter (VanWoert *et al.*, 2005). But depending on the needs of your specific project, you may require shrubs or flowers to make the roof more ornamental. If this is the case, make sure you work closely with your contractor to make sure they are knowledgeable of what does best in your local climate. That means using native plants and native soil (although soil left over from the construction site may not necessarily be the best choice). If the architect or contractors are not familiar with soil and plant selection for the local region, hire a horticulturist (Opatowski, 2018). In designing phase of green roofs, the choosing of the plants should be done by a good collaboration between the designer and provider of the roof system.

Problems from improper plant handling. The effect of improper plant handling techniques can causes a series of problems for the green roofs. The green roof contractor should have a working knowledge of plant handling and establishment techniques. A green roof is a living building component, and the plants must be stored and handled with care to ensure their viability. Landscaping is a key trade for the successful installation of a green roof, and landscape contractors have the knowledge and experience with plant material to ensure that the green roof is properly installed and to ensure that precautionary measures are in place to respond to variable climactic conditions. Recognizing the need for this expertise, many roofing contractors who are serious about integrating green roofs into their business models have developed green roof divisions that focus on plant handling, installation, and maintenance (Challenges to Green Roof Construction, 2006).

Problems with moisture penetration. Water has a phenomenal capacity to track through construction. Establishing the point of water entry from manifestation inside the building can be challenging. Before remote testing – such as thermal imaging, electronic leak detection or radio frequency testing – can be attempted, the plants and growing medium may have to be removed. The simplest solution may be to re-roof from scratch. According to (Green roofing failures: Root causes, 2008) waterproofing failures may be caused by:

- Plant root disruption. The effect of rhizomes such as couch grass or Japanese Knotweed may need to be tested separately. Ensure the waterproofing layer is resistant to root growth or incorporate a root resistant membrane
- Poor detailing at junctions, penetrations and edges. If at all possible, avoid penetrations or concentrate them in one area. Keep the roof design simple and minimize junction variations. All junctions should be planned in three dimensions to give installers a clear guide for what is expected. At upstands the waterproofing layer should finish at least 150 mm above the finished roof surface. Allow for drainage at the base of facades.
- Failure of waterproofing upstand. To maintain longevity of the waterproofing membrane, incorporate protection from direct sun exposure.
- Inadequate slope. Flat roofs will result in ponding unless there is at least a 1:60 slope.

Over-watering and over-fertilizing. Over-watering and over-fertilizing typically occur when the cause of plant loss is not apparent. The symptoms of over-watering are very similar to the symptoms of under-watering, and the same is true for over fertilization, therefore, they are easy to misdiagnose. Over-watering can be corrected by cutting off supplemental water. Over-fertilizing can be ameliorated in some cases by adding other amendments to balance nutrient ratios available to plants. It does take time for nutrient levels to stabilize, and additional maintenance may be

required during this time. Laboratory testing of growth medium samples should be conducted before beginning a nutrient amendment course (Challenges to Green Roof Construction, 2006).

Green roofs are also accused of such disadvantages as leakage, condensation of water in the thermal insulation layer, or moulding of their bottom surface. These are not disadvantages, but rather the results of errors made during the design or construction of the cover. The specificity of green roofs, the fact that they constitute a type of water storage, causes that even the slightest deviations result in big losses. Thoughtful design and professional and careful construction ensure the reliable use of such roofs.

Conclusions

In today's society the role of nature is extremely important. Especially in urban areas, innovative technologies that can help to bring more natural elements are becoming more and more successful. One of the most popular solution is choosing green roofs for buildings. Green roofs are also used as a response to the increase requirements of sustainability and biodiversity as well as decreasing the energy consumption, green gas generation and urban heat island in the cities.

Initially they only constituted protection against unfavorable weather conditions, but over time humans began to notice more and more value and possibilities of using this kind of roof cover. Their properties are studied by many researchers. Numerous studies and experiments allow us to confirm the advantages of green roofs. Not only do they protect from heat or cold, but they also have a major impact on improving the living conditions and functioning of the human body, which is not unimportant to one's health. They allow for leisure, recreation and contact with nature even in tightly-built cities. They protect against their bustle and reduce pollution. Green roofs create a good microclimate and, in addition, neutralize the effect of urban heat islands. Green roofs are not only very useful for the environment, they also have many aesthetic qualities. They improve the appearance of cities, give a chance to beautify the ugly, unused roofs of many buildings.

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Importance of Stakeholder Management for Sustainable Construction Industry

Andreea MAIER
Technical University of Cluj - Napoca, Romania, andreeaelenamaier@gmail.com

Ioan ASCHILEAN
Technical University of Cluj - Napoca, Romania, aschileanioan@gmail.com

Abstract

Increasing client expectations, high demands related to construction time and cost, and the growing complexity of construction methods have made the building industry dynamic and multifaceted. The internal and external participants on the construction project are recognized as stakeholders, they are actively involved in the project, and the execution of the project can affect positively or negatively their interests. The aim of this paper is to analyze the process used to identify construction stakeholders, the factors used to manage their needs, their expectations and the implications of mismanaging them in the development of sustainable construction projects. To improve the process of stakeholder management in the constructions projects we proposed a set of eleven steps. By adopting the principles of stakeholder management organizations will satisfy better their constituent needs and balance their interests, which in the end will increase the sustainability of the construction industry overall.

Keywords*:* stakeholder, stakeholder management, construction sector, construction industry, construction projects, management in construction

Introduction

The construction industry is one of the industries that are considered as non-sustainable, mainly due to its high energy consumption and greenhouse gas emissions. In the current social and economic context, where people are becoming increasingly aware of the importance of protecting the environment, the researchers are focusing also on finding ways to improve the sustainability of the construction industry(Maier, 2018b). In the scientific literature we can find approaches regarding promoting green technologies or green innovation of the construction methods reduction of greenhouse gases, reuse of materials and so on. However the subjects needed to be address and resolved are far away from covering the entire spectrum of the construction industry. In this paper we want to approach the subject of stakeholders and their influence on the sustainability of the construction projects.

The construction industry is diverse because construction professionals come together from different backgrounds, with varied training and experience to deliver common project goals. Construction companies must develop plans to survive in the competitive environment filled with client demands, and be competent in identifying those client requirements for contractors that aim for higher quality services (Maier, 2019). Construction projects are complex projects and they involve many stakeholders from different areas of expertise. In addition, the construction industry has many branches, and as such, it encompasses a lot of information about any one construction project. This is information that is very important to a project, and can be the basic foundation for decision-making, procurement and collaboration(Tahir *et al.*, 2018).

A series of researchers, as (Newcombe 2003) have studied the stakeholders importance in the construction projects (Olander, 2007). However, the construction industry has a poor record of stakeholder management during the past decades owing to the complexity and uncertainty of projects (Takim, 2009). If we look at the current project managers we can see that they need to take into consideration also the cultural, organizational and social environments surrounding the project. Understanding such project environment includes identification of project stakeholders and their ability to affect successful outcome of the project

The effective management of project stakeholders is considered as an important key to project success (Jergeas et al., 2000). If stakeholders are not managed effectively, the probability of successful project completion is reduced due to conflicts between stakeholders. Ineffective stakeholder management can also result in dissatisfaction with project outcomes and adverse disruption to budget and schedule. Besides, future works between project team and internal

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stakeholders may become more difficult and the community, as external stakeholders, may have negative reaction to the project (Chinyio and Olomolaiye, 2010).

The aim of this paper is to analyze the process used to identify construction stakeholders, the factors used to manage their needs and expectations, and the implications of mismanaging their needs and expectations in the development of sustainable construction projects. These internal and external participants are recognized as stakeholders who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution.

Theoretical perspectives and implications of stakeholder management

The concept of stakeholder management is accepted as theory, especially in the academic environment. Stakeholder management theory evolved from business management and aims to describe, understand, analyze and manage stakeholders. The first recorded idea regarding stakeholders appear in 1963 at the Stanford Research Institute and means "*those groups without whose support the organization would cease to exist*". In a famous article Freeman and Reed define stakeholders as "*those groups who have a stake in the action of the corporation*" (Freeman & Reed, 1984)

The stakeholder theory evolves from private sector, and from the need to understand the organization and its environment (Mitchell, Agle and Wood, 1997). Stakeholder theory is considered to be a theory of organizational management and ethics. Stakeholder management involves managing relationships in order to motivate stakeholders to behave in ways that support the objectives of a company. The theory posits that businesses, causes, interests and pressure groups have to manage their relationships with those external entities that can influence the achievement of their goals (Maloney, 2006). Stakeholder management is about creating the most positive environment in which a project can be developed (Vogwell, 2003).

Stakeholder Management is about relationships between an organization and their interested groups or stakeholders (Pampliega, 2013). The impact of these relationships can have a positive or negative influence on the success of the project. Therefore the purpose is to find ways of managing the stakeholders in order to minimize the negative impacts and make sure that there are no obstacles in the way of a successful project (Chinyio and Olomolaiye, 2010).

Stakeholder management does not just focus on single stakeholders, but accounts for all stakeholder influence on one another in complex interactions of multiple, and potentially interdependent stakeholders (Beringer, Jonas and Gemunden, 2012). Complexity is the main source of uncertainty and risk in projects, and it affects project performance if participants fail to address this issue from the beginning (Takim, 2009). These participants can be viewed as stakeholders. In any organization a series of management systems can be implemented to achieve the sustainability goals (Maier, 2018a). The complexity of the projects requires systematic approaches and appropriate project management skills to manage stakeholders to achieve the best value for project performance (Mok, Shen and Yang, 2015).

From the original work at the Stanford Institute, the stakeholder notion has diverged into four main research themes: corporate planning, systems theory, corporate social responsibility and organization theory (Freeman, 2010). To unite these themes, Freeman (1984) introduced a strategic management process—a stakeholder approach that has been widely acknowledged as a milestone in the evolution of stakeholder management research, where stakeholders are defined as a party 'who can affect or is affected by the achievement of the organization objectives (Nguyen, Mohamed and Panuwatwanich, 2018) .

Stakeholder management involves identifying and classifying stakeholders, thus facilitating both initial and subsequent engagement with them in a timely, planned and coordinated manner. This engagement involves identifying different categories of stakeholders; gathering information about them; identifying their missions in a project; determining their strengths and weaknesses; identifying their strategies; predicting their behavior and developing and implementing a strategy for managing these stakeholders (Cleland, 2002).

Stakeholders in the construction industry

Identification of stakeholders is the first task in developing projects and without identification of stakeholders probably the project will not be thought successful. In the construction industry, it is especially important to identify stakeholders and understand the roles they play in a project delivery. "*It is not about knowing how to read an architectural or structural drawing or having money to go into real estate and property development that makes one a builder or an engineer, it is all about having the required skill and academic discipline to marry the profession*" (Osuizugbo and Ojelabi, 2020)

In general, the construction projects are difficult and persons involved in this activity needs many different skills. Like any complex work the construction project is a step process that involve the engagement of considerable founds. Ensuring the sustainability of the process can be achieved by quality and innovation (Maier, 2018c) and thus through the entire process there are multiple works that need to be done: planning, designing, logistics and engagement of

people responsible for the performance of the investment. When dealing with the workers evolved in the project each person must have experience, applicable knowledge, occupational background, and, in most cases, adequate professional licenses (Bizon-Górecka and Górecki, 2018). When dealing with the managing personnel each of them must have additional skills, like creativity, innovation, psychological notions and so on. All of this additional skills must be combined with schedule development, planning, organizing and coordinating actions of other people (Bizon-Górecka and Górecki, 2018).

The most common effect of ignoring the specific stakeholders on project execution, is that it can extend the project execution time and in the end it increases the project costs. These two main aspects, of time and money, are the most important issues in construction. Thus the success of a construction project is not related only to the quality standards but is also about respecting the time and the budget of the project (Tahir *et al.*, 2018).

Construction projects by differing nature have organizations and individuals actively involved in the project, or whose interest may be negatively or positively affected by the outcome of the project. Every construction stakeholder, in any project, has specific functions and objectives to the project. According to Vaux (2014), every project begins with the stakeholders working towards a quality, profitable and successful project, but most times conflict emerges to undermine those goals. In fact, construction stakeholders can contribute to the failure or success of a construction project. This challenge can be reduced if construction stakeholders increase their effectiveness, efficiency and choice decisions on projects (Vaux, 2014).

Traditionally, the main participants in a construction project coalition are the client, the architect and the contractor. The interactions and interrelationships between these participants largely determine the overall performance of a construction project, and have the crucial responsibility for delivering a project to successful completion. However, looking upstream and downstream in the construction project life cycle, there are multiple attributes that contribute to the success of a project, and these are influenced by a variety of decisions made by various individuals, bodies and organizations (Figure 1).

The researchers Chinyio and Akintoye (2008) identify as the main construction stakeholders the engineers, builders, architects, contractors, owners, suppliers and subcontractors (Chinyio and Akintoye, 2008). Stakeholders can be divided into *internal and external* (Atkin and Skitmore, 2008). According to Atkin and Skitmore (2008), internal stakeholders such as employees, owners, suppliers and customers, are those directly involved in an organization's decision-making process while external stakeholders like local authorities, local community, neighbors and general public, are those affected by the organization's activities in a significant way.

From the paper of Smith (2000) we can identify in the category of internal construction stakeholders the sponsors, the owners, the team members together with their unions and families, the management level with the functional management and direct management, and functional departments of the organizations like the engineering, marketing, human resources or accounting departments. At the border between internal and external stakeholders we can identify the vendors or suppliers and the customers as clients and inactive accounts. From the category of the external stakeholders we can have the media such as radio, TV, internet of newspapers; the community as the citizens from the construction locations, the boards and clubs or special interest groups; the competitors of the organization and in the end the public administration, the government through regulations, legislations, legal systems, courts, and political parties.

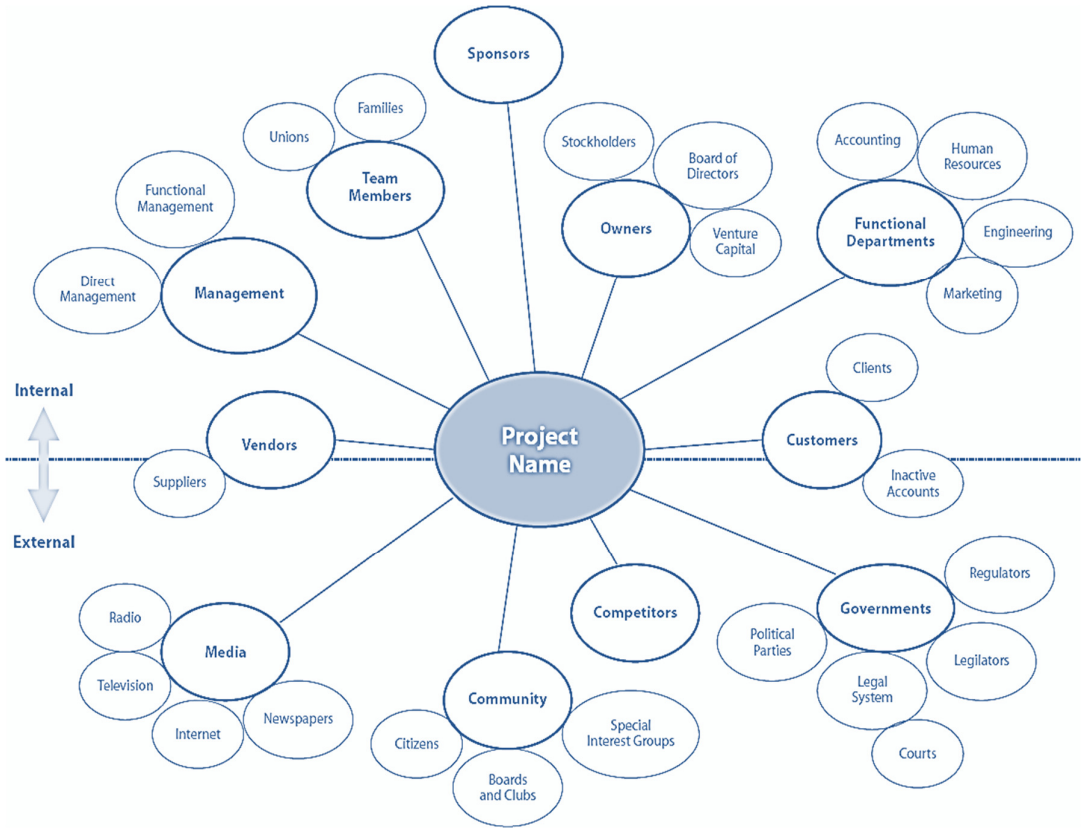

Figure 1: The main stakeholders involved in a construction project (Smith, 2000).

Others researchers pointed out that even if in each particular construction projects are involved different kinds of stakeholders we can have the same two main category, internal and externals. The researchers (Chinyio and Olomolaiye, 2010) grouped the stakeholders into five main groups: *clients, consultants, contractors, external public parties and external private parties*. Clients, consultants and contractors can be grouped together as internal stakeholders, while the remaining parties are considered external stakeholders.

The stakeholders in a construction project are by no means isolated from one another (Figure 2). They are closely interrelated through formal or informal ties during the implementation of a project. The internal stakeholders are linked via legal contracts or direct, while the external stakeholders will also affect or be affected by the construction product through indirect ties. Although the external stakeholders are not decision-makers in the project, they still have a link to the project and can influence the project in a number of ways.

Clients, *consultants* and *contractors* generally have official communication channels, as they are closely interrelated through legal contract ties. In the **initial stage**, the client normally employs consultants to prepare a marketing report in order to understand the existing economic situation and the *customers*' expectations of the site. The client will also seek comments from *general practice surveyors* regarding the purchase of land from the *government*, after describing the client's requirements to the government. If necessary, a *private client* may seek advice from *financial institutions* on a development project. P*ublic clients* may not have any financial difficulties, but, in recent years, they have also placed an emphasis on the need for the support of the *community* and *local residents*.

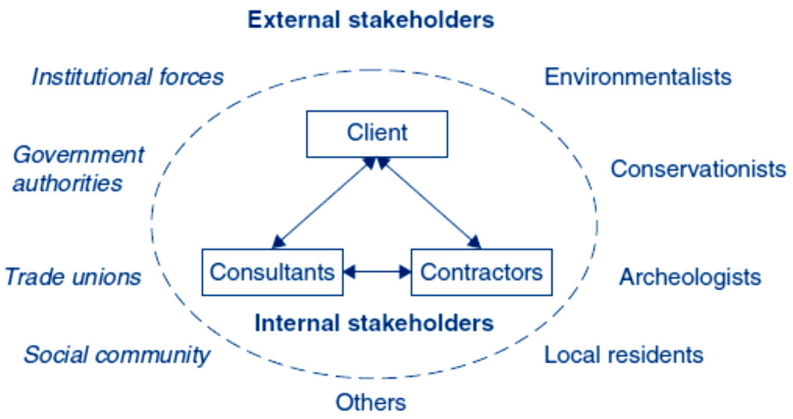

Figure 2: The interconnections between external and internal stakeholders in construction industry

In the **pre-design stage** of a construction project, clients normally employ a group of consultants as internal stakeholders to further investigate the project. In order to ensure that a project will be constructed and operated in a functionally, technically and financially feasible manner, a group of *internal stakeholders* such as the *project manager*, the *architect*, the *engineers* and the *quantity surveyor* have to work together on a feasibility study

During the **design stage**, clients and project *consultants* have to work hand-in-hand to ensure that the design is satisfactory. During the **tendering stage**, there are close interactions between *clients*, *consultants* and *tenderers*. In the **construction stage**, a contractor has to carry out the work on site, working to the Contract Documents. A *construction team*, including the *main contractor*, the *sub-contractors* and *suppliers*, should be formed at this stage. In the **completion and operation stage**, the project has to be handed over to the *client*. The *contractor* will have to deal with *government agencies* to obtain certain permissions. The *project manager* must coordinate his or her work with *other designers*, *surveyors* and contractors to ensure that all the terms of the contract are fulfilled.

Framework for construction stakeholder management

Stakeholders go beyond the people and organizations that populate projects. According to (Gare and Feldman, 2009), it is a common view that stakeholder groups in community development projects are trying to influence the design, implementation, monitoring and evaluation of community development projects. When this happens, it often results in conflicts and disagreements. Many projects with good technical and economic planning have failed because of conflicting interests of stakeholders. Stakeholders end up fighting each other, resulting in many projects failing to achieve their specific objectives, or in worst-case scenarios abandoned midway.

Due to the unique and complex nature with different parties, conflict is inescapable in most construction projects. These complexities and unsure nature of construction projects need effective stakeholder management approaches to contain conflicting stakeholder interests and to build coexistence among construction and ensure attainment of overall organizational goal. Even if an organization has implemented an integrated management systems (Maier, 2018d) this not imply that the problem of stakeholder managed is resolved. According to Beringer et al. (2013), stakeholder management is considered, from both a professional and an academic standpoint, to be extremely important for achieving success in projects. For these authors, the stakeholders have a dual relationship with the performance of the project, because their actions can influence the project, but, on the other hand, the results of the project may affect their interests (Pacagnella Júnior *et al.*, 2015).

From a practical point of view, stakeholder management allows the project leaders to create factors that lead to the effective participation of stakeholders in the project and consequently allow the leaders to reap the benefits of the engagement of the stakeholders with regard to obtaining resources and using their influence (Purvis et al., 2014). The management approaches involve creating an effective framework for the prevention of conflict in construction projects (Figure 3). The essentials of every construction project are its ability to meet up with the stipulated deadline and schedules without any constraint on quality delivery. During the development stages of a project, a stakeholder management strategy should be developed (Yang *et al.*, 2009).

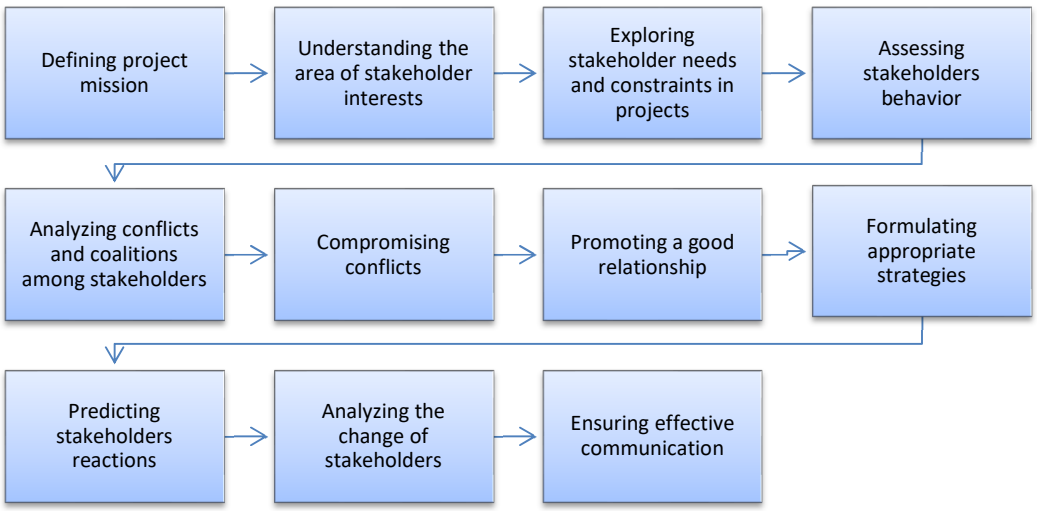

Figure 3: The framework for stakeholder management in the construction industry

The proposed framework for managing the stakeholders in the construction industry involves an 11 steps approach. The first step is to clearly **define the project mission.** Before every activity of stakeholder management, the project manager should have a better understanding of the tasks and objectives at a particular stage of the project lifecycle, including the issues of cost, schedule, budget, etc. The next step is to **understand the area of the interest for stakeholders.** There are various stakeholders' interests due to the complex nature of construction projects. Freeman et al. (2010) believe that identifying stakeholder interests is an important task to assess stakeholders, and they listed stakeholders' interests including product safety, integrity of financial reporting new product services, and financial returns. The third step is to **explore the stakeholder needs and constrains in the project**. During the project process, all the needs of stakeholders should be assessed "so that a satisfactory and realistic solution to the problem being addressed is obtained"(Yang *et al.*, 2009).

The next step is to **assess the stakeholder behavior**. The capacity and willingness of stakeholders to threaten or cooperate with project teams should be measured during stakeholder management process**. Analyzing the conflicts and coalitions among stakeholders** is an important step for stakeholder management. Other step involves **compromising conflicts.** Since there are various conflicts among stakeholders, compromising these conflicts become important for project managers to make decisions (Freeman 1984). In the same idea the next step is to **promote a good relationships** among stakeholders, which is vital for successful delivery of projects and meeting stakeholder expectations. The next step is to **formulate appropriate strategies**, these means that it is very important to know how the project management team treats different stakeholders.

Predicting stakeholders' reactions is also an important factor when managers make decisions about strategies to deal with stockholders. The next issue to address is to **analyze the change of stakeholders**. The concepts of the change and dynamics of stakeholders were acknowledged by Freeman (1984). According to him, in reality stakeholders and their influence change over time, and this depends on the strategic issue under consideration. In the final place, but not having less importance, is the **ensuring of effective communications** between stakeholders. Communication is essential for maintaining the support and commitment of all stakeholders. Effective, regular, and planned communication with all members of the project community is necessary for project success

Conclusions

The construction industry has been criticized as a non-sustainable industry due to its low productivity but high resource consumption. However, there has not yet been an effective tool to monitor and achieve the expected sustainability for construction projects from stakeholders' viewpoints. The overall importance of stakeholder management has been studied and highlighted by both researchers and practitioners

If key stakeholders are not satisfied, at least to a minimal degree, by their standards, it will only be natural that an organization budget and operations will be cut, which will lead to redundancies and abandoned initiatives. Organizations that adopt stakeholder management principles probably better satisfy their constituent needs and balance their interests, which results in higher capacity of goal achievement.

Carefully developed positive and mutually supportive stakeholder relationships that encourage trust and stimulate collaboration by reducing conflict and suspicion can help avoid time delays and increased costs, whose reduction would be beneficial to the normal business of profit generation. In summary, it is necessary for the stakeholders to manage construction projects throughout the development and construction processes due to the dynamic nature of society, the complex nature of construction work and the interplay of multi-stakeholders.

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Industry 4.0 Solutions Implementation Factors: Driving Forces, Barriers and Chances. Planned Research of SME

Anna MICHNA

Silesian University of Technology, Zabrze, Poland
anna.michna@polsl.pl

Joanna KRUSZEWSKA

Grupa K2, Rudy, Poland
joanna.kruszewska@gk2.pl

Abstract

The aim of this article is to present planned empirical study which will take place in 2021 in the area of Poland for small and medium sized enterprises (SME) which consider or are during implementation or plan to implement Industry 4.0 solutions. Authors are going to conduct anonymous survey where the greatest focus will be on the evaluation of the implementation factors such as driving forces, barriers and chances for I4.0 implementation on Polish markets.
As a practical aspect of presented survey authors planned to obtain coherent and comprehensive information related to each implementation factors in order to share that knowledge with organizations which plan to implement I4.0 solutions and would like to prepare their daily activities and project assumptions for all barriers, chances, challenges and risks which are connected with technology changes in their organization.

Keywords: Industry 4.0, solutions, barriers, chances, driving forces

Introduction

The concept of Industry 4.0 means a new paradigm of modern manufacturing. This phenomenon requires continuous innovation processes and technological development from each enterprise – as mentioned by: Durana et al (2019), Mittal et al (2019) or Müller & Voigt (2018). As well as understanding the concept of I4.0, it is important to discuss factors that may encourage companies to move towards this approach, what was the subject of research of Michna & Kmieciak (2020). Ongoing changes on a global level have led to a networked society, affecting both business and private life. They have also resulted in a number of changes for manufacturing companies pointed by Horváth & Szabó (2019). Each of that changes or improvements require proper implementation process which could be driven by a project management process.

In general, for a project to be successful, is has to be delivered on time, within budget, and conform to the client's requirements; requirements analysis is mainly related to determine the needs and conditions to be met for a successful project, taking into account also the possible risks and of course, understand customer's needs and expectations as said by Karamistsos et al (2010).

Current literature examines the research areas of the I4.0 from different perspectives. For this elaboration two aspects are the most important – I4.0 solutions types and technology changes and their implementation factors, in particular driving forces, barriers and chances. Under umbrella of I4.0 Stentoft et al (2019) stating in total 12 technologies. Those are: 1) big data and analytics, 2) autonomous robots, 3) simulations, 4) horizontal and vertical system integration, 5) internet of things -IoT, 6) cyber-security, 7) the cloud, 8) additive manufacturing, 9) augmented reality, 10) artificial intelligence, 11) mobile technologies, 12) RFID and RTLS technologies.

Each solution could be independently implemented as a separate project for the organization. In order to be in line with time, budget and requirements as stated by Karamistsos et al (2010) organizations should become aware of

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driving forces which motivate them to change and implement above I4.0 solutions stated by Stentoft et al (2019) mentioned different types of factors.

As a first should be reviewed determinants which influence on willingness to implement I4.0. Base of recent research made by Michna & Kmieciak (2020) in polish small and medium sized organizations proof that open-mindedness culture, knowledge-sharing, and financial performance in the organizations have a positive impact on willingness to implement solutions of I4.0. Others as pointed by Horváth & Szabó (2019) or Stentoft et al (2019) are dividing factors into certains cathegories. First one related to human resources area like: increasing labor shortages, needs for reducing human work and allocating workforce to other areas. Second one – financial resources and profitability mostly in case of cost reduction in all areas: human, operations and inventory. As a third one authors pointing all managerial factors as: market competition and trends, increasing pressure and customer requirements, new business model innovation together with demands for greater control and needs for continuous monitoring of company performance. Last from the factor's group - productivity, efficiency technological and process integration and cooperation has been recalled. Here errors reduction, lead times improvement and reliable operation has been pointed as well a direct driving forces for enterprises transformation. Base of survey made by Stentoft et al (2019) stating as a main driver: legislation and standards changes, strategy of the organization with cost reduction needs, customer requirements changes, time-to–market improvements and fact that competitors practice I4.0. In relations to work force lack of qualified employees also was mentioned.

Implementation of I4.0 is also connected with certain barriers which shall be defined, analyzed and taken into account during risk assessment performance. Muller (2019) and Moeuf et al (2020) indicate human factors (employee acceptance, lack of competencies and know-how, lack of cooperation among departments, lack of top management support, unclear benefits for employees) data factors (as a data access and protection, lack of capacities, availability and usable data) and others factors (like organizational structure, dependency from machines or too cost driven approach, lack of expertise and a short-term strategy mindset). On the opposite side of barriers, we have chances factors detailed by Li et al (2019), Müller et al (2020) and Müller et al (2018) where they indicate as a chances: mass customization with larger variety of products, interconnection by digital means in real time, process optimization, complexity and flexibility of manufacturing systems, competitiveness growth by better capabilities to meet individual customer's demands, integration of data and new business models.

Planned Empirical Study Scope

Determining implementation of I4.0 solution as a specific project to be managed by enterprises multiple areas shall be taken into consideration. Starting with review of driving factors for process change, verification of actual situation and available resources, barriers which needs to be overtaken, definition of desired target achievement, challenges before and during implementation such as financial aspects, duration possibilities, knowledge and experience of created team and leader, also taking into account opportunities, chances and risks which I4.0 solution will bring to the organization.

Empirical study planned by the authors will be conducted in 2021 via anonymous survey for small and medium sized organization in the area of Poland. Independently of industry type and activities areas questionnaire for survey will be prepared base of three blocks presented on the figure 1 below.

First block – Planning Phase represents all activities which organizations must perform on the stage of decision taking and general planning. In case of the time axis first block is focused on activities before direct implementation. In this area survey questions will be directed into definition of driving forces which convincing single enterprise to consider and / or implement solution of I4.0. It is also a place for questions regarding available help solutions which could be sourced from inside of organization, meaning: internal process, internal guidance, procedures, systems or individual projects directly coordinated by organization itself. External help in the area of law, standards changes, government programs lead by Country, Region or Districts will also be a part of planned survey questionnaire. That unit will be finalized by specified barriers which organizations are facing before implementation phase of I4.0 projects.

Second blocks represent Implementation Activities with main focus on challenges, which are part of a daily project implementation activities. Challenges in implementation phase could be understood as a barrier which block organization to go out from planning phase and prevent step in into next implementation levels. By this group of questions authors plan to receive information which are the biggest challenges for organization during implementation phase. Knowledge about that gives significant lessons learned for other organization which are still in planning phase and base of their internal risk analysis they consider challenges as a blocking points or even strong barriers. Second block of question will be connected with direct list of I4.0 portfolio solutions. By those questions authors assumption is to get information about planned, implemented or desired, by specific enterprises, solution of I4.0 available on the market and in actual technology status.

Last block of questionnaire will be covered by the questions linked with achieved Results. Main focus will be directed into opportunities which I4.0 solutions, tool or methods would potentially and are giving to the verified companies. Considering opportunities authors would not forget about second axis of archived results meaning risks which is linked with I4.0 implementation as well.

Fig.1: Industry 4.0 project implementation factors. Source: Author's own elaboration

Conclusions

Planned research, as a assumption, is intended to clarify and structuralize information in theoretical and practical field. As a desired output in the theoretical area authors shall be able to answer below questions:

- what are the driving forces for organization to implement I 4.0,
- which kind of help solutions organization have from inside (company organization) and outside (society, government, law, associations etc.),
- which kind of barriers shall be overtaken before implementation phase,
- which kind of industry 4.0 solutions are preferably chosen by polish organizations,
- which kind of challenges organization must face during implementation phase,
- which kind of results are desired,
- which kind of opportunities organization will have after successful implementation,
- which kind of risks implementation will bring to organization and its employees, processes, technology etc.

As a practical aspect of presented survey authors pointing direct knowledge sharing and lessons learned which could be used for organization and employees who plan to implement I4.0 solutions and would like to prepare their daily activities and project assumptions for all barriers, chances, challenges and risks which are connected with technology changes in their organization.

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"Challenges for The Technological Area of Materials Production and Processing in The Context of Smart Specializations Development"

Lilla KNOP
Silesian University of Technology, Gliwice, Poland
lilla.knop@polsl.pl

Marek KRANNICH
Silesian University of Technology, Gliwice, Poland
marek.krannich@polsl.pl

Abstract

For the last ten years it has been emphasised that the importance of regions competitiveness depends on identification and development of smart specialisations. According to assumptions identification of smart specialisations allows to focus the investments in research, development and innovation (RDI) on the areas with the greatest innovative and competitive potential in the given region, that is the areas which may be most advantageous to the region and its economy. Regional smart specialisation strategies are integrated economic transformation programmes which build on region's strengths, its competitive advantages and potential for excellence. The strategies focus on selected prioritised areas of development which match regional conditions, thus allowing to achieve competitive advantage in the given area.

The economic area of materials production and processing in the Silesian Voivodeship has had its history but the challenges related innovative development in that area have become of key importance.

The purpose of this paper is to present the potential and market challenges of the materials manufacturing and processing specialisation, as one of the technological areas being developed in the Silesian Voivodeship. This technological area has been identified as a result of the measures taken as part of regional development. This will form the basis for presenting the assumptions of new European Union polices and national and regional strategies as well as the evaluation of the potential and strategic challenges of the analysed specialisation area.

Keywords: regional development, smart specialisations, materials production and processing.

Introduction

Smart specialisation strategy is the key element of EU policy towards regions and its purpose is to make sure that every region develops its own methods of coming out of recession and to guarantee long-term development of a region and thus – of the entire EU. The measures taken on the level of the EU as well as states and regions have combined smart specialisation strategies with innovation strategies (Procesy, 2017). Smart specialisation consists in identification of extraordinary features and assets of every state and region, in emphasising competitive advantage of every region and focusing regional partners and resources around the vision of their future oriented at achievements. It also means reinforcement of regional innovation systems, optimisation of knowledge flow and spreading of the advantages arising from innovation within the entire regional economy. Smart specialisation is of key importance to real effectiveness of research and investment in the area of creation, absorption and diffusion of innovation (Program, 2019).

Analyses carried out in regions indicate that specialisation areas are internally very diverse and from today's perspective not all previously identified subareas have shown appropriate potential that would allow to consider them, at the moment, as smart specialisations which means that the list needs to be verified. The niches identified in technological areas for establishment of new undertakings or for development of existing ones indicate that some smart specialisation areas in the Silesian Voivodeship display significant growth potential which can be used, through appropriate support policy, for further development of the region (Strategia, 2020) These smart specialisations include

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the technological area of materials production and processing. The companies from the materials processing sector are not only particularly exposed to the impact of turbulent environment in which they operate but also are facing new competitive challenges, intensified changes in demand and sensitivity to economic cycles associated with other sectors (such as construction, civil engineering, automotive industry, food industry, health care, etc.).

Regions have been implementing smart specialisation strategies for a couple of years now and their experience in this field gives them a basis for carrying carry out monitoring and taking verification measures. Regions in Poland apply different solutions to monitor and verify regional smart specialisations. Poland and one of the regions which has made an attempt to verify smart specialisations are an example here. The said approach relies on an extensive regional policy based on the national regional development strategy, region development strategy, technology development programme and innovative-region strategy. This has allowed to select another specialisation, that is production and processing of materials, as one of the so-called emerging industries.The purpose of this paper is to present the potential and market challenges of the materials production and processing specialisation in the Silesian Voivodeship. The research has been based on the analyses of strategic documents concerning regional development on the European, national and regional level and also on the evaluation of economic, social, scientific and innovative potential and challenges. Analyses were carried out based on selected technological subgroups, that is: metallic products, ceramic products and polymers.

Theoretical background

Theories of regional development are continuously evolving due to the necessity of taking into account new phenomena which have a significant impact not only on the economic space and economic activity location processes but also on centralisation and decentralisation of manufacturing (Nowińska-Łaźniewska, 2004). The smart specialisation concept is one of those theories and it was proposed by D. Foray and B. Van Ark in 2007 (Foray and Van Ark, 2007). It should be added here that the term “smart” is not a new concept since it has been used with respect to development, especially regional development, in such phrasings as: smart city (Florida, 2003; 20; Komninos, 2002; Giffinger 2007; Glaeser and Berry, 2006; Murray, Minevich and Abdoullaev, 2003; Silva, Khan, and Han, 2018) or smart grid (Coll-Mayor, Paget and Lightner, 2007; Giri and Avila-Rosales, 2009) and also with respect to organisations, e.g. smart organization (Deiser, 2009).

In the beginning the work on smart specialisations focused on the search for the solutions that would increase engagement of science and R&D in the processes of creating and implementing innovation. They considered smart specialisation as an “attempt to create a holistic (comprehensive) perception of the notion of specialisations in the area of science and technology in knowledge based economy” (Nowińska-Łaźniewska, 2009). By combining cohesion policy analysed in the F. Barca’s report (Barca, 2009), which emphasised the necessity to formulate priorities and work out better coordination, with sectorial approach to regional development proposed by P. McCan and R. Ortega (McCann and Ortega-Argilés, 2011) the “Knowledge for Growth” Expert Group developed assumptions of smart specialization. The key idea of this concept is “entrepreneurial discovery” (Foray D. et al, 2012) according to which smart specialisation means “entrepreneurial process of identifying the science and technology areas the specialisation in which might be of advantage to the specific region”. It is emphasised that smart specialisation should be a bottom-up process (hence the term: “entrepreneurial” process – regional organisations (enterprises, science entities, research and development entities and other) should point out orientation of investment, research and development themselves and definitions of smart specialisation strategies cannot be imposed (Foray, David and Hall, 2009). At the moment it is assumed that regions, in order to effectively use the funds invested into science, research and development, should rather strive for reaching appropriate status in the regional “market” than break up their investments into the areas where they would still remain catching up regions (Foray, 2009). Smart specialisation assumes close relationship between research and development activity, human capital development (employees’ qualifications and skills) and economic specificity of regions and countries. Identification and selection of the areas of the greatest potential which may ensure competitive advantage to business entities and regions (subregions) is of key importance. As a result smart specialisation strategy should consist in entrepreneurial (bottom-up) establishment of economic priorities in the RDI area and in focusing investments in the areas which ensure increase of the value added of economy and its competitiveness in foreign markets (Foray and Goenaga, 2013).

It should be kept in mind, however, that smart specialisations: do not necessarily need to be centred around one branch of industry – horizontal solutions are promoted; regional specialisations should give rise not only to innovative products but also organisational, marketing, service and social innovations; they should be based not only on general technologies but also on application of those technologies in one or more areas which are of importance to the region (e.g. not “nanotechnology” but “nanotechnology in cosmetics”). It would be hard, however, to consider the concept of specialisation as something totally new since economists have been interested in it for centuries.

With respect to regional development the following theories may be identified: H. Innes's staples theory according to which regional development is driven by the creation of gradual specialisation (Innes, 1956); flexible production theory which also emphasises the role of specialisation (McCann and Ortega-Argilés, 2011); A. Marshall's industrial district theory (Marshall, 2012; M.E. Porter's cluster theory (Porter, 1997 and Porter, 1990); endogenic development strategy (Friedman, 1986). Furthermore, application of smart specialisations had been preceded by the application of the methods based on the evaluation of regions' competitiveness, including, for example: competitiveness pyramid (Lengyel, 2004 and Lengyel, 2013), competitiveness hat (Martin, 2005), competitiveness tree or Porter's model (Porter, 1997 and Porter, 1990).

Nowadays smart specialisation is a pioneering approach enabling an integrated economic transformation agenda via research and innovation anchored in territories. It allows the identification and the development of competitive advantages by concentrating efforts and resources on the discovery of innovation niches. Smart Specialisation advocates the conjugation of the economic, innovative and scientific potential of a territory and aims to address societal challenges (Prieto, Demblans and Martínez, 2019).

The presented smart specialisation concept will be the basis for evaluation of potential of the technological area selected in the course of smart specialisation verification. It was based on expanding the smart specialisation concept by adding two key approaches: entrepreneurial discovery process and identification of technological areas (D'Adda, Iacobucci and Palloni, 2020). The process of entrepreneurial discovery combines future strengths of field- and knowledge-based regional economy and consists in a bottom-up approach to identification of specialisation areas (Asheim, 2019). In the second approach regions need to identify technological areas and not sectors of industry. In short, we are looking for the specialisations which describe the problem and technological areas and not sectors of economy. Aiming at technological areas and not specific branches of industry allows us to expect an increase in innovativeness and diversification of products by creating and implementing new technologies (Asheim, 2019; D'Adda, Iacobucci and Palloni, 2020; Janik, Ryszko and Szafraniec, 2020).

Methodology on studies

The research was based on the analysis of secondary data, expert analyses prepared by area specialists and the workshops which verify evaluation of region's challenges and potential in the area of materials production and processing. The research process is presented in figure 2.

The Silesian Voivodeship is a region in the south of Poland neighbouring the Opolskie, Łódzkie, Świętokrzyskie and Lesser Poland Voivodeships and bordering the Czech Republic and Slovakia in the south. The area of the region is 12,333 km2, that is 3.9% of Poland's total area, which means they are in the 14th position among all regions of Poland, before the Świętokrzyskie and Opolskie Voivodeships. The Silesian Voivodeship is the most urbanised region of Poland (urban population of 76.7%) with the highest population density in Poland (368 people/km2, whilst the national average is 123 people/km2). Rural areas of the Voivodeship, on the other hand, which make up 69.3% of the region's area, were inhabited by 1.05 million people (23.3% of the total population of the Voivodeship).The Silesian Province has 4.5 million residents which makes up 11.8% of the total population of Poland. From the point of view of population the Silesian Voivodeship ranks second in Poland after the Masovia Voivodeship (14%). Approximately 42.4% of the Gross Value Added generated in the Silesian Voivodeship comes from the industrial and construction sector.

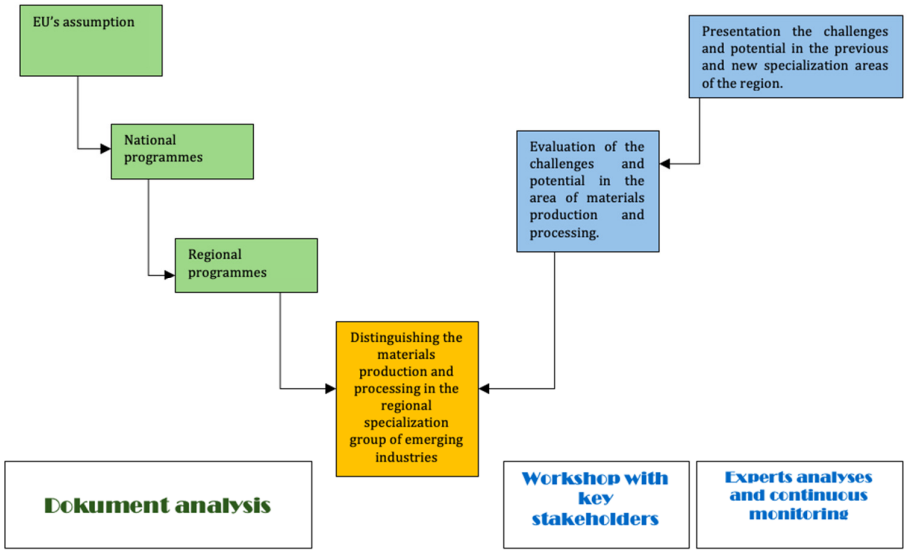

Figure 2: Research methodology.

Source: Own study.
EU, national and regional documents analysis

Apart from having analysed the source documents listed above, the authors of this paper have co-participated in the drawing up and evaluation of a dozen or so expert opinions concerning materials processing. The concept of the research approach focused on matching the analysis and challenges of technological areas (the so called "rising industries") in the Silesian Voivodeship with the Upper Silesia development strategies defined by authorities of the Silesian Region.

The entire approach to the analysis of technological challenges in materials processing must be consistent with the following objectives adopted in the Strategy for the Development of the Silesian Voivodeship – Śląskie 2030 (Strategia, 2020).

- Strategic objective: Silesian Voivodeship as the region of responsible economic transformation
  Operational objectives:
- Diversification of the economic structure and economy 4.0 development, including support for automation processes, increase in flexibility and digitalisation of production in companies and increasing the competence of current and future human resources in the industry.
- Support for creation of new companies and development of the existing ones, including start-ups, based on the region's potential and using the technologies developed in the region, in particular in the areas of regional and intelligent specialisations and creative industries.
  The proposed analytical approach is also consistent with the model of regional development, as regards the substantial aspect of support for the Silesian Voivodeship, proposed in the National Strategy of Regional Development for 2030, the strategic assumption of which is the following: "territorially sustainable development – concentration of support on the economically weaker areas and providing an impetus for their development and their integration with broader surroundings", in the system of adopted topical concentration: "continuation of the measures which support the increase of competitiveness of Polish regions on the European level (the largest infrastructural projects, support for the development of technologies and innovation, enterprises, human resources) implemented in the territory of the entire country with the increasing share of other sources of financing managed on the European and national level"

The methodology proposed in the report entitled "Processes of entrepreneurial discovery in the context of innovative development of the Silesian Voivodeship until 2020" and related to the relationships between science, economy and technologies allows to abandon, in the process of entrepreneurial discovery, the traditional sector approach and attempt to determine key technological areas on which Technology Development Programmes might be based, including a documented condition of technological potential, and in compliance with the provisions of the National Strategy of Regional Development and Development Strategy for the Silesian Voivodeship – Śląskie 2030. From the point of view of application it might be assumed that:

- The area of support from the regional level should go beyond the scope of precisely defined area of specialisation.

- In selection of specialisation areas quiet signals and relations existing in economy should be taken into account more than previously.

A deepened analysis of strategic regional, national and international documents has allowed to make a list of technologies and technology development directions which have an impact on the shape of technological areas.

Presentation the challenges and potential in the previous and new specialisation areas of the region

The selected technological area in the intelligent specialisation of the Silesian Voivodeship indicates that specialisation's capabilities and potential for development. New challenges and experience as well as the knowledge about that area allows to classify them as emerging industries. The technological area of "materials production and processing" is treated as the one which is facing new challenges and opportunities but is based on bottom-up initiatives and long-standing experience. This paper focuses on a singled out direction of technology development, that is production of metallic, ceramic and polymer goods.

To make the most of the great technological potential of materials production and processing it is important not only to overcome technical barriers but also the social and economic ones and also to improve the mechanisms of financing of scientific and development research in Poland. The major identified megatrends in materials processing include: automation of processes and introduction of information technology into processes as well as increase in the share of recycled raw materials.

Large scale of use of innovative metal, polymer and ceramic materials is emphasised here. This applies for example to the technology of energy production and storage, electronic equipment, sensors, intelligent coatings and membranes, composites for aviation, 3D printing or medical products. Metallic products such as steel, aluminium and copper are the materials which are most often used in construction, automotive and energy sectors. Development of polymer plastics is related to the development of the sectors of packaging, medicine, electronics and electrotechnology, transport and communication, machine equipment and machine parts, household, cosmetics, furniture and construction. Ceramic products are broadly used in chemical, environmental protection, power, machinery and household appliance industries.

The major trends identified in the Technology Development Programme for the Silesian Voivodeship with respect to the materials processing area include:

- Development of the foundations for functioning and implementation of circular economy
- Implementation of IT systems for supporting production management
- Robotisation and automation of production processes
- Orientation at an increase in the creation and implementation of all kinds of innovation
- Energy saving in the area of production, distribution and use (also of materials)
- Increase in demand for materials (in particular metallic materials and polymers).
- Increase in labour costs in materials processing

The Silesian Voivodeship is the region in which the largest in Poland steel manufacturer – According to the Polish Steel Association (HIPH) market conditions in the steel industry deteriorated in 2019 when compared to 2018 (Polish Steel Industry, 2020). Significant decrease in the construction industry growth has become a market challenge - it indicated that the stage of finalising many infrastructural investments related to EU funds was approaching. Insignificant increases in machinery, automotive and household appliances industries also fit into this downward trend. The lower growth in steel consuming sectors resulted in a significant drop in the real consumption of steel by over one million tons.

At the beginning of 2020 it seemed that stabilisation would soon occur. At the beginning of 2020 the economic situation was favourable to the companies operating in the steel sector – order portfolios were almost full. However, the crisis related to the Cov-SARS 2 pandemic has seriously revised, downward, the forecasts for the steel market in Europe. Until the end of the first half of the year there were no grounds for stopping steel production in Poland whilst demand, though seriously weakened, still gave a chance for keeping up production, in particular in the construction industry which has never been so severely affected by any market stagnation. The pandemic decrease, however, overlapped with a new market challenge – maintaining the costs of production while keeping in mind the anticipated growth of energy prices.

According to the data for 2018 the total demand for plastic materials amounted in EU and in Norway and Switzerland to 51.4 million tons. The greatest demand for plastic has been in the packaging market (40.7%). The construction segment and the automotive segment also have a significant share in the consumption of plastic in Europe (19.6% and 9.8%, respectively) (Branża, 2019).

Two-dimensional portfolio analysis carried out as part of the Technology Development Programme for the Silesian Voivodeship consisted in analysing interdependencies between the development potential of the given technological line and its importance for the Silesian Voivodeship. It positions technologies and technological groups based on their technical, organisational and intellectual potential in the region, thus leading the way to the discussion about its possible reinforcement and shows importance of the region from the point of view of accomplishment of Voivodeship's strategic objectives, and in particular development and promotion of innovation. Ceramic materials have been classified as least important in the the category of potential/importance for the Silesian Voivodeship of the prepared matrix. Their usefulness for the Voivodeship as well as their potential have been unambiguously classified as “low/little”. This means that there will be no chance for this technological line to be supported in the upcoming years. Metallic materials have been classified as the technological line most predestined for development. They fall into the following categories: “great importance for the Silesian Voivodeship” and “high development potential”. You can clearly see that in the materials processing area this technological line should be reinforced through coordinated measures such as implementation of innovation, active support in entering foreign markets and maximum use of internal sources of competitive advantage, in particular the ability to reduce costs. The technological line of polymers is characterised by “low development potential” and “high importance for the Silesian Voivodeship”. In practice it means putting emphasis on maintaining the current market position, developing and reinforcing cost advantages and focusing on maintaining brand image of current manufacturers in the increasingly competitive market. Another stage of analyses was related to the evaluation of technology and groups of technologies using the criteria related to the interdependencies among them. Selected experts carried out an analysis of the relations between identified key technologies through the prism of the process of generation and absorption of knowledge, skills and competence useful for creation and implementation of technical innovations into the business sphere and based on that they classified technologies into two groups – knot technologies and island technologies. Knot technologies are those closely dependent on the development of other technologies in the region or conditioning the development of other technologies in the Silesian Voivodeship, whereas island technologies are not related to any other technologies of the region and do not condition development of other technologies in the Silesian Voivodeship. Metallic materials and polymer plastics were classified into knot technologies, whilst ceramic products into the group of island technologies. Due to their presence in global value chains knot technologies provide pro-innovative solutions to the entrepreneurs located in the territory of the Silesian Voivodeship, including large entities operating internationally. The next stage of the experts’ work consisted in dividing technologies into two groups based on their impact on region's development, where the first group, that is the endogenous technologies, may be used for development of new products and services which make the region stand out and allow it to be competitive in global markets, whilst the second group, exogenous technologies from outside the region, will have an impact on the region's growth. Polymers and ceramic materials have been classified as exogenous technologies whilst metallic products as endogenous ones. In the case of exogenous technologies it is necessary to develop experimental and test infrastructure in order to ensure their development in the region and link them to the technologies which already exist in the region. This will translate into further increase in competitiveness and innovativeness of the region. Continuous globalisation of economy and development of transnational corporations which use local potential also drive the growth of innovativeness. Such enterprises play a dominant role in creation and diffusion of innovation. In the case of the technological area analysed by authors the process of applying open innovations has varying dynamics and requires a systemic support, in particular development of the methods and tools that would increase trust between the actors in the innovation ecosystem, as well as support for commercialisation of new technological solutions implemented based on the paradigm of open innovations.

Evaluation of the challenges and potential in the area of materials production and processing

You can see that in the distribution of the SWOT analysis carried out by experts with respect to the analysed technological area of “materials production and processing” long-standing experience and tradition, good relations with customers and understanding of their needs and expectations bring significant advantage. The factors which limit development include capital intensity and high energy consumption in production, high fixed costs, necessity for make investments which require high expenditures and little use of external innovations. It is related to the fluctuation of highly qualified personnel and shortages of human resources. The elements which give opportunity for development include the continuously growing demand for innovative materials, robotisation and automation of processes and financial support for development provided by parent groups of companies. High demand for pro-ecological solutions increases the chances for obtaining EU funds and for development of multidirectional cooperation. Threats include growing competition, including from Asiatic countries, as well as unstable prices of components and raw materials.

On the second stage of evaluation technologies were analysed from the point of view of the interdependence criterion. As a result of the analyses technologies were positioned with respect to the strategic initiatives which determine the policy of supporting their development by indicating one of their for orientations (Program Rozwoju Technologii Województwa Śląskiego, 2019):

- Orientation I – orientation at "Leadership through diversification" – endogenous technologies with high level of interdependence with other key technologies of the region.
- Orientation II – orientation at "Leadership through perfection" – endogenous technologies with low level of interdependence with other key technologies of the region.
- Orientation III – orientation at "Technological acquisition for diversification" – exogenous technologies with high level of interdependence with other technologies and high pressure on their use for increase in attractiveness of innovative products in the region.
- Orientation IV – orientation at "Technological acquisition for perfection" – exogenous technologies with low level of interdependence with other technologies and, at the same time, high pressure on their use for increase in attractiveness of innovative products in the region

Ceramic products have been classified into the "Technological acquisition for perfection" orientation, polymers – into "Technological acquisition for diversification" whilst metallic products – into "Leadership through diversification".

Conclusions

At the moment, on the eve of 2021, market challenges in the area of materials processing have a totally different dynamics than two years ago. Unstable impact of the surroundings, inability to formulate verifiable scenarios of the course of events in the surroundings, difficulties in taking investment decisions as well as radical fluctuations in business cycles of many national economies result in a necessity to shorten the time axis of business forecasting and, at the same time, to create many alternative decision making paths while more and less closely related stakeholders continuously undergo some turbulent processes. The primary challenges in the technological area of materials processing may also occur through implementation of post-pandemic market activities, such as learning from partners, internalisation of partner's abilities and resources, knowledge sharing and creation, growth of an enterprise and its greater share in the market, risk and costs sharing in the R&D area, securing against radical innovations with a large-scale executive uncertainty, increasing entry barriers and because of creation of the economies of scale.

The key conditions which determine development approaches in the nearest dozen or so years, synthetically include the following characteristics of economic, innovate, ecological and social processes:

1. Economic conditions:
    - economic effects of the coronavirus pandemic and the resulting rapidly changing business cycles by sector
    - increasing globalisation of economy's internationalisation
    - development of circular economy (including recycling of metals and polymers)
    - development of cooperation networks
    - financial engineering with the use of aid funds, in the view of 2021-2028 financing, for realisation of pro-ecological and energy-saving investments
    - possible increase in demand in selected market sectors after pandemic
2. Innovative conditions:
    - growing competition
    - new models of business with the ability to implement innovations and rules of sustainable development
    - customer value chain extension (development of processing and service)
    - development of ecological innovation and its orientation towards implementation in enterprises
3. Ecological conditions:
    - necessity for radical reduction of gas and dust emissions in production processes
    - increasing importance of regional, national and EU pro-ecological policy
    - increasing energy-saving properties of technologies used, due to the necessity for competitive adaptation to radical costs reduction among the manufacturers operating outside the European Union
4. Social conditions:
    - continuously growing social anxiety resulting from perturbations in the labour market, caused by closing of state economy during the coronavirus pandemic
    - growing demand for improvement of employees' pays, working conditions and personal life
    - growing social awareness of the necessity for environmental protection
    - social behaviour oriented at pro-ecological and energy-saving efforts of industry and of the industrial environment
    - development of the specialisations that would allow for stability in jobs

It seems that in order to define the right development paths of the technological area of "materials processing" it is necessary to implement the recommendations included in the Technology Development Programme for the Silesian Voivodeship (2019-2030), and in particular (Program Rozwoju Technologii Województwa Śląskiego, 2019):

- Intensification of the work on modification and development of regional statistics to collect the data which allow quantification and reliable evaluation of the technological and innovative potential of the region.
- Further development of annual reports on the condition of technological areas together with the results of the entrepreneurial discovery process combined with the structuring of the scope and manner in which results are presented.
- Implementation, as part of the operational programmes for the Silesian Voivodeship, of the directions included in the Technology Development Programme for the Silesian Voivodeship, as well as identified areas of technological specialisations as a criterion for awarding financial support.
- Monitoring and forecasting technological development based on the continuous process of entrepreneurial discovery and foresight implementation the purpose of which is to identify the factors which determine strategic development directions and scenarios of conditions for development of prioritised technologies.

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Determinants of Work-Life Balance That Influence Employee Performance: A Study of Lagos State Ministry of Works and Infrastructure, Lagos, Nigeria

Oderonke Feyikemi ODELOYE [1]
Covenant University
oderonke.odeloyepgs@stu.cu.edu.ng
08031389312

Adewale Omotayo OSIBANJO [2]
Covenant University
ade.osibanjo@covenantuniversity.edu.ng

Chidinma Patience CHUKWU[3]
patience.chukwupgs@stu.cu.edu.ng
Covenant University

Olaleke Oluseye OGUNNAIKE [4]
olaleke.ogunnaike@covenantuniversity.edu.ng
Covenant University

Eseoghene Beryl MAREGA [5]
Covenant University
maregaberyl@gmail.com

Maxwell Ayodele OLOKUNDUN[6]
Maxwell.olokundun@covenantuniversity.edu.ng
Covenant University
Department of Business Management

Abstract

The demand for work-life balance by employees have increased in organizations. Therefore, work life balance must be effectively managed by organization to have competitive advantage over their competitors due to fast pace of economic development. This study therefore identifies the determinants of work-life balance that influence employee performance in organization a study of Lagos state ministry of works and infrastructure. The study sought to determine the influence of flexible work arrangement, wellness programs, family responsibility on employee engagement, employee commitment and employee task performance respectively. For the study, two theories were used, the study adopted survey research design. The population size is 450 employees with sample size of 212 respondents which was determined using Taro Yamen formula. The study employed the use of stratified random sampling technique and structured questionnaire was used for data collection. The data obtained was analyzed using statistical package for social science (SPSS) while linear regression and Pearson correlation were adopted for analysis. the result showed that flexible work environment and wellness programs has effect on employee engagement and employee commitment respectively while there is strong relationship between family responsibility and employee task performance. The study therefore recommends that organization should support flexible-work arrangement, wellness programs and family responsibility to its employees for increased performance. However, organizations and decision makers should endeavor to include determinants of work-life balance such as flexible-work arrangement or wellness programs in their policies so as to improve employee performance which will have positive effect on organizational productivity.

Keywords: commitment, efficiency, employee engagement, performance

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Introduction

All organizations are confronted with the challenge of guiding the strengths of their employees to the mission of attaining the goals and objectives of the firm. In order to achieve this, organizations must develop ways to influence and control the attitudes of their employees so as to maximize their contributions (Benn, Edward, and Williams, 2014). Employee performance accounts for one of the most important management aids adopted in this process. This stems from the belief that a person's performance in a work role is enhanced by having distinctive purposes, comments about their performance and complemented by a suitable compensation system. Employee performance is vital in any firm (Elnaga, and Imran, 2013), however, it has always been a main concern in the management of the organization and seeking useful techniques to encourage employees in accomplishing and delivering higher job performance as well as increasing competition among organizations which is one of the aims of every business environment (Inuwa, 2016). Therefore, studies have shown that employee performance is a key element in ascertain organizational growth and productivity.

Human resource is considered to be the most important asset in any business-oriented environment that help in the day to day activities and functions of a firm (Mudah, Rafiki & Harahap 2014). Likewise, Oluwafemi (2010) affirmed that the level of effectiveness and efficiency of organization depends on how valuable and resourceful the workers in the organization are. Employer's ability to figure out worker's contentment in relations to schedules and daily duties will greatly have an impact on worker's output and performance. In contemporary business world, the performance of employee is a crucial factor in the accomplishment of organizational objectives (Anitha, 2014). Thus, organizations must find various means of encouraging their staffs so they can contribute immensely their invaluable quota to the growth of the organization (Osibanjo, Waribo, Akintayo, Adeniji, and Fadeyi, 2019). Every plan and strategy must be centered on improving the performance of their employee. Inadequate work life balance has become a universal concern that influences organizational productivity as well as employee's welfare and performance (Osabiya, 2015). Employees in government owned organizations are constantly confronted with balancing their personal life and work role. The continual challenge of shuttling between the demand at home and work has increased the relevance of employees over the past decades (Mwangi, Boinett, Tumwet, and Bowen, 2016). This is as a result of change in the place of work and population determinants e.g. lengthy hours of work, numbers of women in labor force, use of complex communication method that does not allows instant contact within the work environment, an aging population etc. An organization thus needs to attract and conserve valuable employees in this very viable labour force. Therefore, one of the encouraging factors that can ensure the achievement of individual and organizational objectives is the introduction of work-life remunerations and policies in organizations (Dousin, Collins, and Kaur Kler, 2019).

However, work life imbalance can have an adverse impact on the employee's mental health, physical health and performance as a whole (Haar, Russo, Suñe, and Ollier-Malaterre, 2014). Work life imbalance affects the employer in such a way that it constricts the operation of its staffs thereby affecting organizational productivity (Ola 2019). Thus, there is an urgent need for organizations to be informed about actions that must be taken so as to successfully implement the management of work life balance strategies. Hence, this research study focuses on evaluating the determinants of work life balance and its influence on the employees' performance using Lagos state ministry of works and infrastructure as a case study.

Objectives of the Study

The aim of this research work is to critically examine the determinants of work life balance and its influence on employees' performance in an organization: a study of Lagos State Ministry of Works and Infrastructure, Alausa, Lagos, Nigeria. The specific objectives include to:

- evaluate the effect of flexible work arrangement on employee engagement in an organization.
- examine the impact of employee's wellness program on employee commitment in an organization.
- examine the relationship of family responsibilities on employee task performance in an organization.

Research Hypotheses

The following null hypotheses will be tested within the framework of this research work;

- There is no significant relationship between flexible work arrangement and employee engagement in an organization.
- There is no significant relationship between employees' wellness program and employee commitment in an organization.
- There is no significant relationship between family responsibilities and employee task performance in an organization.

Review of literature

Due to changes that often occur in the place of work, there is need to level up work life and non-work life of a worker. This concept is intended to enhance work precision and career stability. According to Paryani (2014) work life balance and stress are interconnected ideas. Biron & Burke (2014) opined that the concept should involve training program and proper time utilization as though, there are penalties attached to it such as work stress and melancholy. Similarly, Delecta (2011) described work life fit to be the combination of work fulfillment and excellent performance with minimal dispute. According to Oludayo, Gberevbie, Popoola & Omonijo (2015) described work life balance practices in terms of the challenges faced by employees and these include flexible work arrangement, leave policies, dependent care schemes and wellness programs.

Mungania (2017) described flexible work arrangement to be replacement of the normal work activity that allows staffs to choose the time and place so far, their responsibilities are met. This usually depends on the policies adopted by the management of the organization in enhancing worker's flexibility in terms of time and place where tasks can be performed (Mungania, Waiganjo & Kihoro, 2016). The common flexible work programs include flexi-time, job sharing, constricted work weeks, flexible shift work, part-time work flexible holidays, telecommute, controlled schedule of meetings (Mwangi, Theuri & Sang, 2018).

According to Mujtaba and Cavico (2013) wellness programs in organization surfaced as a significant matter for employers. Taylor and Don (2010) described health maintenance programs as method used for maintaining sound health status within the organization rather than amelioration of poor health. Wellness programs include athletic activities, psychological and spiritual development practices and are of benefit to the organization as they enhance employee performance thereby boosting overall productivity of the organization (Mungania, Waiganjo, & Kihoro, 2016).

According to Amazue (2013) individuals or workers who have children or elderly ones to take care sometimes risk their job by decreasing hours to be spent on work so as to cater for their family necessities. Subsequently, parenthood experiences which form an important family responsibility play an important role on how they work and balance up with their family life with little or no consequences for both men and women (Kelly, Moen, & Tranby, 2011).

Thus, it is crucial for employers to uphold work life balance practices in order to obey the statutory preconditions that grant working parents the right to flexible work arrangement, employee wellness programs and family responsibility Ojo, Salau, and Falola (2014). This will promote equal privileges within the organization as employees with family responsibilities are not deprived and are guaranteed an easy accessibility to be rewarded for work performed and job privileges. Failure to uphold work life balance practices has an adverse effect not only on the performance of employees and value of service delivery but also on their families (Quo & Zhao, 2012).

Employee performance

The achievement of a worker has continually been a crucial issue to the management of any organization (Kelidbari, Dizgah, and Yusefi, 2011). Consequently, staff's performance is a vital structure of the workplace thus, must be critically examined by the management so as to ensure successful work environment. According to Ahmad and Khurram (2011) employee achievement represents the general conviction of personnel about their behavior as well as efforts geared towards achievement of organizational objectives. Ahmad and Shahzad (2011) is of the opinion that apparent employee achievement encompasses the entire view of the personnel of organization on how they behave and participate or involve in attaining organizational objectives and proceeds to state that reward programs, performance appraisal and promotional measures are factors that determines the degree to which they perform. Likewise, Anitha (2014) describes employee performance as a measure of the employee's output that is linked with the achievement of organizational productivity and further stated that work condition, management, team and co-employee's relationship, compensation programs, codes and conducts as well as employee's appointment are the major determinants of employee performance.

An outstanding performance of an employee is essential to the workplace this is because organizational success depends on employee's creativity, innovation and dedication. Out of all these aforementioned resources, manpower is the most important. Manpower performs a significant role in tasks accomplishment. In order to improve employee performance, organizations must identify ways to ensure that employees are engaged, committed as well as workers' competency in performing their responsibilities.

According to Anitha (2014) employee engagement is the main factor that determines the success and sustainability of an organization especially where the cost of labor accounts for the larger part of the total operational cost of the organization. Bhuvanaiah and Raya (2014) posited that employers and managements of organizations need to devise strategic plans that would enable them achieve high yield while minimizing costs. Thus, employers and managements of organizations must consider investing in the interaction between workers and their work environ as it minimizes cost and enhances employee's effectiveness which therefore improves the growth of the organization.

Employee commitment on the other hand is a vital work behavior (Nongo & Ikyanyon, 2012). The level of employee commitment focuses on a number of factors such as employee contentment and organization's reward system. Thus, the complexity in and significance of understanding employee commitment makes it an important aspect of management duty.
Employee becomes committed to an organization due to various reasons. Thus, commitment exits in different forms depending on the context. Three-dimensional framework of commitment has been established by scholars based on employee's perspective (Johnson, Chang, & Yang, 2010).

They include;

- Affective commitment: This is a positive emotional bond connecting the employee as well as the organization. Here, a strong, productive relationship exists between the employee and their employer thus, making the employee to be willing to stay.
- Continuance Commitment: This is a form of controversial relationship that exists between staffs and business owners. Here, the workers feel unsettled but cannot leave as leaving would cost him a lot. This can be due to some financial implications or benefits that would be forfeited if he leaves. Such an employee stays with the organization because he or she is tied in
- Normative commitment: refers to an obligatory relationship in the workplace. Here, the personnel feel indebted to where they work and perform the duties for which he's been employed for.
- The significance of differentiating between these frameworks is that they have distinctive effects on employee attitude and this attitude has impact on the employee performance.

Theoretical Framework

This section equips other theories to understand the existence between work-life balance practices and employee performance in an organization. Two theories were adopted as a guide for this study, they include; component theory and spill over theory.

Component theory

Component theory highlights balance as a direct formative latent construct meaning that work life balance is comprised of information that presage stability and gives interpretations (Mungania, 2017). According to Baral and Bhargava (2010), professional life synergy includes stability in work hour, engagement balance and satisfaction balance. Stability in work hour means assigning equal hour for work, while involvement balance means equality in the mental effort inputted to work and satisfaction balance can be explained as the fulfillment derived in performing a given task and family responsibilities. Professional life balance includes work life dispute and work enrichment. The advantage of this theory is that one can use different work life practices that will ensure balance in the workplace. As a result, employees will be able to identify different ways in which they meet up with their responsibilities (Mungania, 2017).

Spillover theory

This theory explains that there is relationship in what transpire within the work environment and family settings (Md-Sidin, Sambasivan & Ismail, 2010). It identifies the tendency of the employee to transfer the feelings, abilities, passion and behavior they get at work into their non-work life (Md-Sidin et al., 2010). This theory may have harmful and helpful impact on the workforce. The harmful effect of it can be in form of work stress while the positive impact helps to develop employee performance. From a business perspective, positive spill over theory can directly affect the financial status of the organization. For example, positive spill over can lead to increased productivity, it can as well increase customer satisfaction, employee loyalty and vice versa.

The importance of this model to the study is that organizations institutions should have a helpful work life balance method that will encourage employee to improve on their performance or encourage them in accomplishing laid down goals.

Methodology

This research employed the use of descriptive design because it allows researchers gather detailed information and permit gathering of primary data on the factors that determine work life balance (independent variable) and its influence on employee performance (dependent variable) from Lagos State Ministry of Works and Infrastructure staffs

In this study, the population is made up of the entire staff of The Lagos State Ministry of Works and Infrastructure, Alausa, Lagos State Nigeria. As at the time of this research work the ministry had a total number of 450 employees which range from the low-level staff to the top managerial staff of different departments, based on the information given by the records department. The sample size of 212 employees was determined using Taro Yamen formula. The primary data collected through the administered questionnaire were gathered, classified, and evaluated with the use of Statistical Package for Social Sciences (SPSS).

Results and Discussion

The demographic information for the survey is illustrated in table 1. This therefore shows that the information gathered is adequate enough for the purpose of the research objective.

Table 1 Socio demographic information

S/N			Frequency	Percent
1	Gender	Male	75	41.2
		Female	107	58.8
		Total	182	100
2.	Age	21-30	49	26.9
		31-40	121	66.5
		41-50	12	6.6
		Total	182	100
3	Educational qualification	SSCE	4	2.2
		NCE/OND	10	5.5
		BSc/HND	110	60.4
		Postgraduate	58	31.9
		Total	182	100
4.	Marital Status	Single	73	40.1
		Married	109	59.9
		Total	182	100
5.	Dependent	None	56	30.8
		Parent	86	47.3
		Siblings	40	22.0
		Total	182	100
6	Position in organization	Top level	50	27.5
		Middle level	113	62.1
		Low level	19	10.4
		Total	182	100
7	Years of service	Less than 10 years	149	81.5
		10-20 years	21	11.5
		20 above	12	6.6
		Total	182	100
8	Time Spent at work	Both	34	18.7
		Day	147	80,8
		Night	1	.5
		Total	182	100
9	Hours of work	5-9 Hours	136	74.7
		10-12 Hours	46	25.3
		Total	182	100

Hypotheses Testing

In this study, three (3) hypotheses were identified and analyzed with the use of regression analysis and correlation. In regression analysis, when the significant (sig) value is less than 0.05 for 95% confidence level or less than 0.01 for 99% confidence level we accept the alternative hypothesis and reject the null hypothesis and vice versa.

- Hypothesis one

Ho Flexible work arrangement has no significant effect on employee engagement
Regression was used to test hypothesis one because it determines the cause and effect of independent variable (flexible work arrangement) on dependent variable (employee engagement)

Table 2: Regression Analysis

Model Summary	R	R^2	Adj. R^2	Std. Error of the Estimate				
	.258[a]	.066	.061	.81179				
ANOVA	Model	Sum of Squares	Df	Mean Square	F	Sig.		
	Regression	8.445	1	8.445	12.815	.000[b]		
	Residual	118.621	180	.526				
	Total	127.066	181					
Coefficients[a]		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	Model	B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound
	(Constant)	1.576	.168		9.378	.000	1.244	1.907
	Flexible-work arrangement	.217	.061	.258	3.580	.000	.097	.336

a. Dependent Variable: Employee Engagement

b. Predictors: (Constant), Flexible Work Arrangement

Interpretation

From table 2, the Model Summary shows how much variance in the dependent variable (Employee Engagement) is explained by the model (Flexible work Environment). In this case, the R square value is 0.066 expressed in a percentage 6.6% of the variance with Flexible work environment and adjusted R square of 0.061. Also, the ANOVA table in 2 reveals the test of the statistical implication of the outcome. The ANOVA table tests the null hypothesis to determine if it is statistically substantial. From the results, the model in this table is statistically substantial (F=12.815, p=0.000). Hence, the alternative hypothesis is accepted because our p-value is less than 0.05 significant level while null hypothesis is rejected. The coefficient table depicts that a one unit increase in Flexible Work Environment (independent variable) leads to a 0.217 unit increase in Employee Engagement (dependent variable) with other variables held constant.

Decision**:** The alternate hypothesis which states flexible work arrangement has effect on employee engagement was accepted while the null hypothesis was rejected.

Hypothesis Two
H_0 Employee wellness programs have no effect on employee commitment

Table 3: Regression Analysis

Model Summary	R	R2	Adj. R^2	Std. Error of the Estimate				
	.477[a]	.227	.223	.79799				
ANOVA	Model	Sum of Squares	Df	Mean Square	F	Sig.		
	Regression	33.679	1	33.679	52.888	.000[b]		
	Residual	114.623	180	.637				
	Total	148.302	181					
Coefficients [a]		Unstand ardized Coeffi cients		Standardized Coefficients			95.0% Confidence Interval for B	
	Model	B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound
	(Constant)	.955	.151		6.310	.000	.656	1.253
	Recognition Strategy	.421	.058	.477	7.272	.000	.307	.535

a. *Dependent Variable: Employee Commitment.*
b. *Predictors: (Constant), Employee Wellness Programs.*

Interpretation

From table 4.4.2, model summary shows how much variance in the dependent variable (Employee Commitment) is explained by the model (Employee wellness program). In this case, the R square value is 0.227 expressed in a percentage 22.7% of the variance with Employee wellness program and adjusted R square of 0.223. Likewise, ANOVA reveals the test of the statistical implication of the outcome. The ANOVA table tests the null hypothesis to determine if it is statistically substantial. From the results, the model in this table is statistically substantial (F=52.888, p=0.000). Hence, the alternative hypothesis is accepted because our p-value is less than 0.05 significant level while null hypothesis is rejected. The coefficient table reveals that one unit increase in Employee wellness program (independent variable) leads to a 0.421 unit increase in Employee Commitment (dependent variable) with other variables held constant.

Decision: The alternate hypothesis which state employee wellness programs has significant effect on employee performance was accepted while the null hypothesis was rejected.

- Hypothesis Three

H_0 Family responsibility has no significant relationship on employee task performance.

Correlation analysis was used of this hypothesis because it deals with the degree of relationship between independent and dependent variables.

Table 4: Correlation Analysis

		Family_respons ibility	**Employee_task _performance**
Family_responsibility	Pearson Correlation	1	.522**
	Sig. (2-tailed)		.000
	N	182	182
Employee_task_performan	Pearson Correlation	.522**	1
	Sig. (2-tailed) ce	.000	
	N	182	182

Interpretation

From the tables above, it shows that there is moderately positive relationship between family responsibility and Employee task performance with a Pearson correlation coefficient of r=0.522. Meaning that family responsibility affects employee task performance.

Decision**:** The alternate hypothesis was accepted which states family responsibility has significant relationship with employee task performance while the null hypothesis was rejected.

Summary, conclusion and recommendation

Summary

The main objective of this study was to ascertain the factors that influence work-life balance on employee performance in Lagos State Ministry of works and Infrastructure. The result of the findings in hypothesis one shows that flexible work arrangement has significant effect on employee engagement. This however conforms to the findings of Christopher (2014) that employees who have the opportunity to harmonize their work itinerary with their personal needs display positive characters not only in their individual life but also in their work life. The study indicated that flexible work arrangement provides employees with the opportunity to prioritize the effort they input to work at the appropriate time.

The result of the findings in hypothesis two **table 3** shows that wellness programs have effect on employee commitment. This also conforms to the result of Carlson (2014) that top managers in organizations should adopt wellness programs and genuinely show concern about the welfare of their employees. It is therefore apparent from the foregoing discussions how important wellness programs are to an organization as they ensure that employees are healthy and motivated.

The result from the third hypothesis **table 4** shows that there is moderate positive relationship between family responsibility and employee task performance. Family responsibilities comprise of derivatives that can increase the level of effectiveness by creating rooms for personal life, child care, dependent care and spending adequate time with family. Family responsibilities also stimulate social growth by ordering time and responsibility productively.

Conclusion

The study centers on determinants of work-life balance that influence employee performance a study of Lagos State Ministry of Works and Infrastructure. Considering what has been discussed from previous chapters, it is important to note that for employees to have work-life synergy, there is need for organization to put into considerations factors like flexible work arrangement employee wellness programs, and family responsibility which implies that if all the determinants mentioned above are not put in place, there would be reduction in employee engagement, commitment as well as employee task performance. Therefore, it is safe to say that the above factors or determinants have influence on employee performance.

Recommendations

In order to improve employee performance, the following recommendation should be put in to consideration

- The results from the findings show that work-balance has a positive influence on employee performance. Therefore, there is a need for organizations to continually review their policies and ensure that flexible work arrangement, employee wellness programs, and family responsibility are considered to improve employee performance.
- Secondly, managers should show support to their subordinates by ensuring that they have a good rapport with them and also treat them with respect. By so doing, employees show more dedication to their work.
- Thirdly, fitness programs, and health counseling must be organized regularly. By so doing, their level of satisfaction will increase, this would lead to increased performance.
- Organizations should ensure that training and career development programs are organized for new and existing employees. This in a way will make employees to be more engaged and also boast their confidence in doing their work.
- Organizations need to reschedule working hours and ensure that employees do not work overtime because this might lead to stress and affect their productivity.
- Organizations should provide financial and non-financial benefits to employees in order to engage them towards performing a given responsibility.

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Effect of Conflict Management Taxonomy on Employee Performance: A Study of Nestle Nigeria Plc, Agbara Industrial Estate, Ota, Nigeria.

Oyetola Ibukun ADEYERI[1]
oyetola.adeyeripgs@stu.cu.edu.ng

Mercy OGBARI[2]
mercy.ogbari@covenantuniversity.edu.ng

Oderonke Feyikemi ODELOYE[3]
oderonke.odeloyepgs@stu.cu.edu.ng

Adewale Omotayo OSIBANJO[4]
ade.osibanjo@covenantuniversity.cu.edu.ng

IMUZEZE Comfort Uwayeme[5]
Comfort.imuzezepgs@stu.cu.edu.ng

Anthonia ADENIJI [6]
anthonia.adeniji@covenantuniversity.cu.edu.ng

Department of Business Management, Covenant University, Ota, Ogun State, Nigeria.

Abstract

The survival and relevance of an organisation hang on its achievement of set purpose and aspirations. Conflict can be destructive but in some other times constructive. However, if managed properly, it can have a constructive impact on employee contentment and performance. The main purpose of this research is to critically analyse the effects of conflict management taxonomy on employee performance in manufacturing industries. The manufacturing industry selected for this study is the Nestle Nigeria Plc, located at Agbara Industrial Estate, Ota, Nigeria. Descriptive survey design involving quantitative method was used for this research study to obtain data through sample selection and analysis. The data was collected over a period of 7 days. The survey started on the 5th of March and the last day was 12th of March, 2020. The data collected through the administered questionnaire was subjected to sorting and analysis. Data analysis was conducted using Statistical Package for Social Sciences (SPSS).
Three hundred and thirty-eight (338) copies of questionnaires were administered via the random sampling technique to Nestle Nigeria Plc workers., a total of two hundred and eighty-six (286) questionnaire copies were correctly collected and adequately completed, reflecting an 84.6 percent input ratio. For the analysis of results, descriptive statistics were used; linear regression analysis was also used to test all hypotheses. The findings from this study revealed that compromise, accommodation, competition and collaboration conflict management styles are significant predictors of employee engagement, commitment, task performance and productivity respectively as measures of employee performance.

Keywords: Conflict management, employee performance, Employee Commitment, Collaboration

Introduction

The survival and relevance of an organisation hang on its achievement of set purpose and aspirations. This entails the effectiveness of its material contribution with the human factor being very important (Nwaeke and Obiekwe, 2017). Nevertheless, the human factors needed to aid this achievement frequently involve in disagreement over issues like interest, opinions, and management styles amid others. This intransigent effect due to apparent mismatches is term conflict. Consequently, all organisations are faced with the challenge of guiding the strengths of their employees to the mission of attaining the goals and objectives of the firm. In order to achieve this, organisations must develop ways

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to influence and control the attitudes of their employees so as to maximize their contributions (Benn, Edward, and Williams, 2014). Employee performance accounts for one of the most important management aid adopted in this process. Employee performance is vital in any firm (Elnaga, and Imran, 2013), however, it has constantly remained a main concern in organisational administration and employing active ways to manage conflicts within the organization will help inspire workers to achieve and deliver better job performance and improve the productivity of the company. (Inuwa, 2016). It is therefore believed that conflict is significant to employee performance and organizational productivity.

Employees are considered as the most important business assets that aid the day to day happenings and functions of an organization (Inunwa, 2017). Likewise, Oluwafemi (2010) believed that the organization's level of productivity and effectiveness depends on how productive and successful the organization's employees are. The ability of managers to consider the happiness of workers as it relates to schedules and everyday duties can have a direct effect on employee engagement and efficiency.

Industrial conflict is said to have started as soon as the employer-employee relationship surfaces in the course of organisational development (Malkhandi, 2018). In contemporary business world, the performance of employee is a crucial factor in the accomplishment of organisational objectives (Anitha, 2014). Thus, organizations must find various means of encouraging their staffs so they can contribute immensely their invaluable quota to the growth of the organisation. Every plan and strategy must be centered on improving the performance of their employee.

Conflict in most organizations in Nigeria has become so recurrent and alarming that it has hindered their development. This is as a result of the inability of the board of these industries to properly and effectively manage conflict that arises within the organization. This inability mostly results to high rate of strike, harmful opposition between and among employees within an organization, disrupt at place of work, truancy, lack of production, slow work, suppression of information and a host of others that are being executed by employees in an organization. Against this background, this research seeks to evaluate the effect of compromise conflict management technique on employee engagement. To study the effect of accommodation conflict management technique on employee commitment, it seeks to determine how trying to soothe the other person's feelings in order to preserve relationship affects how employees are passionate about their work. To identify the effect of competition conflict management technique on employee task performance, this research seeks to examine how being firm in pursuing one's side of the issue during conflict affect how workers get work done well at the least possible cost in good time. Lastly, to appraise the effect of collaboration conflict management technique on employee productivity, this research seeks to evaluate how bringing all concerns out in the open during conflict in order to resolve issues in the best possible way affect how employees are able to meet their daily targets.

Objectives of The Study

The main purpose of this research is to critically examine the effects of conflict management taxonomy on employee performance, a case of Nestle Nigeria Plc, Agbara Industrial Estate, Ota, Nigeria. In specific terms, the objectives of this research include;

- To evaluate the effect of compromise on employee's engagement.
- To examine the effect of accommodation on employee's commitment.
- To identify the effect of competition on employee's task performance.
- To appraise the effect of collaboration on employee's productivity.

Research Hypothesis

The following will be tested within the framework of this research work;

- H0: A significant relationship exists between compromise and commitment of employees.

H1: No substantial relationship exists between compromise and commitment of employees.

- H0: The relationship between accommodation and employee engagement is significant.

H1: The relationship between accommodation and employee engagement is not important.

- H0: A major relationship exists between competition and the success of the role of the employee.

H1: There is no important association between rivalry and the efficiency of employee tasks.

- H0: A major relationship exists between teamwork and the productivity of employees.

H1: No substantial relationship exists between teamwork and the productivity of employees.

Review of Literature

The word 'conflict' comes from the Latin 'confligere', the literal translation of which is 'to bend together or to tense'. It's a tension situation where people who rely on each other seek to achieve incompatible goals or execute different action plans (Kreyenberg, 2010).

The concept of conflict has so many prospective ideas and viewpoints; nevertheless, the whole ideological perspective of conflict is due to disagreement (Akume and Abdullahi, 2015). Conflict is perceived to be an aftermath of conduct which is an inherent part of human life (Ojo and Abolade, 2014). It occurs whenever the activity of one group is envisaged as suppressing or clashing with the objectives, aspirations or activities of another group. It may emerge from a few industrial experiences such as incompatible objectives, divergent standards and beliefs, unconstructive emotions, disparity in the interpretation of facts, or disagreement over shared resources. As earlier described, conflict tends to be related with pessimistic attributes and circumstances which results to incompetence, ineptitude or dysfunctional consequences. Sometimes, it can really fuel innovative problem solving skills and enhance the circumstance for all groups involved.

Industrial conflict has been described in numerous ways by various authors. Chukwuemeka, Ugwu, Enugu, and Igwegbe (2018) define industrial conflict as any controversy between employees and managers over a violation of terms of agreement. In as much as employees and employer heed to the terms of contract, it is certain there will be peace and harmony within the organization. Disputes resulting from violation of terms of job agreement have been recognized as one of the cause of industrial conflicts.

Abolade (2015) industrial conflict is as a result of the difference in interests and emerges from contrasting behaviours. At the entity, group or organizational level, it can happen. In the absence of common interests in organisations, conflict is thus likely to occur.

Conflict management means preventing unnecessary conflicts after noticing their early signs, before focusing on handling current conflicts constructively or maybe even facilitating and fostering beneficial conflicts (Kreyenberg, 2010). Conflict management in an organization is a process of minimizing the adverse effect of conflict and increasing the positive aspect of conflict so as to enhance and improve the performance of the employees and the productivity of the organization at large (Rahim, 2015). This is the achieved by devising effective approaches and procedures to manage these conflicts. Thus, conflict management does not essentially mean avoidance of conflict but the reduction of unproductive confrontations. This is the idea all organizations employ in order to handle effectively inevitable grudges and disagreements consistently occurring within the work environs and this helps them to make the right decision.

According to Inuwa (2016) performance is closely related to output's quality and quantity, output's timeliness, job's presence and attendance, level of efficiency and effectiveness in the completion of task. Employee performance refers to an outstanding execution of job duties by an employee or group of employees as addressed and determined by the management of the organization to an established benchmark while systematically and logically making use of the available resources within a dynamic environment. An outstanding performance of an employee is essential to the organization as the success of an organization is dependent on the employee's creativity, innovation and dedication. All organizations are set up with clear and definite goals and objectives to accomplish. These goals can only be accomplished by employing resources such as manpower, machines, materials and money. Out of all these aforementioned resources, manpower is the most important. Manpower performs a significant role in tasks accomplishment. Consequently, there has been a drastic change in the business environment due to uncontrollable environmental factors which are beyond the control of the management of organizations.

According to Longe (2015) it is convenient when the subject of the controversy is more significant to the other party. Accommodation technique entails sacrifice and concession which are often employed to satisfy the opponent in order to sustain peace and harmony within the work environment. Often times, this is used later for commendation as the party who made the sacrifice earns social credit. This technique however, does not permit the expression of individual views. People or employees who engage in accommodation strategy unavoidably hold back their grievances and resentment.

Competition involves the use of challenge or contest as a way of settling disputes most especially when the resources available for employees are limited for example when there are few job positions to be filled through promotion. In this case, one party will use better ability and intellect to surge the other party (Rahim, 2015).

This technique involves each of the parties yielding or gives up valuable thing so as to settle the dispute. This results to a no-win, no-lose situation. It leads to "no winner, no loser." It requires adjusting so as to reach an agreement (Rahim, 2015). Compromise attempts to settle dispute by trying to satisfy at least some of the grievances of both parties thus, leading to a compromised result.

According to Longe (2015) all the parties involved in the dispute openly and honestly express all their concerns, angers are cooled and solutions deliberated. Collaboration strategy functions perfectly well once it is vital to resolve a shared problem and often results to a win-win situation. It completely deals with the demands and concerns of the conflicting parties and reaches a mutual resolution.

According to Anitha (2017) employee engagement is the major factor that defines an organization's effectiveness and sustainability especially where the cost of labour accounts for the larger part of the total operational cost of the organization.

Employee commitment is vital work behaviour (Nongo & Ikyanyon, 2012). The level of employee commitment depends on a number of factors such as employee contentment, organization's reward system etc. Thus, the complexity in and significance of understanding employee commitment makes it an important aspect of management duty.

Employee task performance is an organizational outcome (Osei, and Ackah, 2015). To achieve this outcome, employees need to recognize and convert this idea into a motivating factor of achievement, consequently, employees should be provided with necessary material inputs to make them accomplish this.

According to Rohan and Madhumita (2012) employee productivity is the economic degree of amount produced per unit of effort of an employee in an organization.

Theoretical Framework

A theory is a body of reasoned supposition submitted to offer explanations to ideas, issues or hypothetical propositions. In view of this, it is pertinent to attempt a theoretical exploration as to the incidence of conflict management especially within the Nigerian environment. In doing so, this study borrows from the Marxist theories of industrial relations and expectancy theory.

Marxist (conflict) theory

The conflict theory as suggested by Karl Marx claims that because of competition for the scarce resources available, society is in a state of persistent and permanent conflict. It maintains that social order is maintained instead of agreement and agreement through superiority and authority. (Richmond, 2010). Those with affluence and authority always make effort to preserve it by any means possible mostly by suppressing the deprived and weak ones in the society. Therefore, the underlying foundation of the philosophy of conflict theory is that persons and groups of individuals work together within a society to maximize their own benefits. (Dobre, 2013).

Expectancy Theory

Expectancy theory focused on subjective precedents that engage in motivation and human interaction (Barba-Sánchez and Atienza-Sahuquillo, 2017). That is, the theory of expectation is a logical motivational philosophy based on the idea that there is a relationship between the work effort of people, the success of people in achieving this effort, and the benefits of people from their effort and performance. Specifically, people tend to be motivated when there is an assurance that their strong effort leads to good performance and good performance results to good rewards. Expectancy theory was first developed by Victor Vroom with a direct focus on organizational setting and Porter and Lawler, and others, later extended and polished it (De Simone, 2015).

Empirical Review

Several studies have looked at the effect of conflict resolution strategies on the efficiency and productivity rates of workers. Even several of these studies from their study obtained similar findings. Eunice, Jacqueline, Buyeke, Wafula and Musyoki, (2014) Examined the impact of interpersonal conflict on organizational performance, a case study of some selected hotels in the city of Kisii. The research work followed both descriptive survey and explanatory study methods, using 368 staff of specifically selected hotels. Data obtained using concise and inferential statistics is analysed. Consequently, multiple regressions were used to test the hypotheses. Results from the data analysis revealed that interpersonal conflict strategies, relationship conflict and task conflict have an important effect on organizational performance, while interpersonal conflict results have no important effect on organizational performance, respectively.

Wamocha, Nasongo and Injendi (2012) "The idea of "conflict management" in their study entitled "Intervention steps for conflict management in secondary school boarding in the western province of Kenya was indicated as a method or way of settling disagreements among two or extra people involve. The significance of the outcomes in this research work was that it provides the administrators of secondary schools with more knowledge and understanding on the mediation methods in handling conflict especially in boarding high schools. Consequently, the findings of this study

will be used to inform policy-makers, school boards, administrators, staff and students on the correct classification of a penalty for conflict management (Wamocha et al., 2019).

Obasan (2011) The impact of conflict management on employee performance was analyzed, using the branch of First Bank Nigeria Plc Lagos as a case study. To check the sense of answer, the study used a pupil distribution and use of purposeful sampling technique to pick the bank of choice randomly. 50 respondents who spread over all First Bank of Nigeria plc (Lagos Branch) were administered a self-design questionnaire. staff cadres. The study indicated that the organization 's major causes of conflict contribute to beliefs and value problems and subsequently, employees with high morale often performs their tasks excellently well when conflict is effectively managed. Thus, there is a strong connection between conflict resolution and success of employees.

Agwu (2013) With the Julius Berger Nigeria Plc case study, Bonny Island, researcher explored the connection between conflict management and employee efficiency. The study work followed a descriptive research design using 50 nominated survey respondents comprising of 25 managers and 25 non-managers of Julius Berger Nigeria Plc, Bonny Island. Much of this research work involves using cross-sectional survey research design to produce the key data needed. For the analysis of the collected data, descriptive and inferential statistics were used. The outcomes of the study revealed that there is a substantial connection between the understanding of the efficacy of conflict resolution approaches by managerial and non-managerial employees.

Methodology

Research Plan

Descriptive survey design involving quantitative method was used for this research study to obtain data through sample selection and analysis. This research plan assisted the researcher in data gathering, presentation and interpretation for the purpose of explanation**.**

Study Population

The study population refers to all the workers of Nestle Nigeria Plc, Agbara Industrial Estate, Ota and the entire population is 2,200 employees (Nestle Nigeria Plc Annual report and account, 2017).

Sample Size Determination

The computed sample size for this study is three hundred and thirty-eight (338) employees from a study population of two thousand two hundred (2200) employees using Taro Yamane formulae for sample size calculation (Taro Yamane, 1967). This study used a 5% error margin (confidence interval) and 95% confidence level in the evaluation for its sample size

Data Analysis

Data obtained by questionnaire from the respondents were collected and analysed using the Social Science Statistical Package (SPSS) as provided below.

Result and Discussion

This segment shows the personal information of the respondents based on the data collected and analysed showing their distribution as regards age, gender, marital status, educational status, position in the organization, as well as years worked in the organization.

SN			Frequency	Percentage
1	Gender	Male	162	56.6
		Female	124	43.4
		Total	100	100
2	Age	21-30	72	25.2
		31-40	83	29.0
		41-50	96	33.6
		51above	35	12.2
		Total	286	100
3	Educational Status	O'level	57	19.9
		NCE/OND	91	31.8
		HND/BSC	113	39.5
		Postgraduate Degree	25	8.8
		Total	286	100
4	Marital Status	Single	93	32.5
		Married	151	52.8
		Widow/Widower	33	11.5
		Divorced	9	3.2
		Total	286	100
5	Job Status	Senior Staff	34	11.9
		Junior Staff	107	37.4
		Contract Staff	89	31.1
		Casual Staff	56	19.6
		Total	286	100
6	Length of years	Less than 10 year	42	23.1
		11-20years	79	43.4
		21years above	61	33.5
		Total	286	100

Hypothesis Testing

Four (4) hypotheses were proposed and proven using regression analysis. In regression analysis, the alternative hypothesis is accepted and null hypothesis is rejected when the significant (sig) value is less than 0.05 for 95% confidence level or less than 0.01 for 99% confidence level and vice versa.

Hypothesis 1
Compromise has no significant effect on employee engagement.

Model Summary		R	R^2	Adj. R^2	Std.Error of the Estimate			
	1	.144[a]	.207	.173	.464292085			
Anova		Model	Sum of Squares	Df	Mean Square	F	Sig	
		Regression Residual Total	1.29697 61.22188 62.51885	1 284 285	1.29697 .21557	6.0165	.00148	
Coefficients[a]			Unstandardized Coefficients	Standardized Coefficients			95.0% Confidence Interval for B	
	Model	B	Std. Error	Beta	T	Sig.		
	(Constant) Employee Engagement	2.985 0.136	0.204 0.055	.136	14.622 2.453	0.000		

a. *Regress: Employee Engagement*
b. *Regressor: (Constant), Compromise*

Interpretation

The result presented in the Table above indicates that there is a significant association at R=0.144 between Compromise and Employee engagement. Also, from the Table above, R2 = 0.207, thus, the implication of this value is that compromise accounts for 20.7% change in employment engagement, hence, having a considerable impact on employee engagement. Mean Square Regression (1.29697) and Mean Square Residual (0.21557), to obtain F= 6.0165. The implication of this value is that the model used in this study is statistically significantly (sig= .00148). Thus, Compromise is a strong covariate of employee engagement at F (1,284) = 6.0165. From the ANOVA results, the level of significance for all parameters are less than 0.01, thus, the alternative hypothesis is accepted and the null hypothesis is rejected. Hence, Compromise has a significant effect on employee engagement.

Hypothesis 2

Accommodation has no significant effect on employee commitment

Model Summary		R	R^2	Adj.R^2	Std Error of the Estimate		
	1	.793[a]	.629	.278	.61839464		
Anova		Model	Sum of Square	Df	Mean Square	F	Sig
		Regression Residual Total	6.87318 108.60501 115.47819	1 248 258	6.87318 .382412	17.973	.0018
Coefficients			Unstandardized Coefficients	Standardized Coefficients			95% Confidence Interval for B
	Model	B	Std. Error	Beta	T	Sig	
	(Constant) Employee Commitment	3.875 0.733	0.197 0.055	.733	19.674 -1.341	0.000	

a. Regress: Employee Commitment
b. Regressor: (Constant), Accommodation

Interpretation

The result presented in the Table above indicates that there is a significant association at R=0.793 between Accommodation and Employee commitment. Also, from the Table above, R2 = 0.629, thus, the implication of this value is that accommodation accounts for 62.9% change in employment commitment, hence, having a considerable impact on employee commitment. The F-value is calculated from division of Mean Square Regression (6.87318) and Mean Square Residual (0.382412), to obtain F= 17.973. The implication of this value is that the model used in this study is statistically significantly (sig= .0018). Thus, Accommodation is a strong covariate of employee commitment at F (1,284) = 17.973. From the ANOVA results, the level of significance for all parameters are less than 0.01, thus, the alternative hypothesis is accepted and the null hypothesis is rejected. Hence, Accommodation has a significant effect on employee commitment.

HYPOTHESIS 3

Competition has no significant effect on employee task performance.

Model Summary		R	R^2	Adj.R^2	Std.Error of the Estimate		
	1	.573[a]	.328	.226	.253870668		
Anova		Model	Sum of Square	DF	Mean of Square	F	Sig
		Regression Residual Total	0.60306 18.30380 18.90686	1 284 285	0.60306 .06445	9.35702	.00033
Coefficients			Unstandardized Coefficients	Standardized Coefficients			95% Confidence Interval for B
	Model	B	Std .Error	Beta	T	Sig	
	(Constant) Employee Task Performance	4.458 0.192	0.073 0.020	.192	60.778 -0.967	0.000	

Intrepretation

The result presented in the Table above indicates that there is a significant association at R=0.573 between Competition and Employee task performance. Also, from the Table

above, R2 = 0.328, thus, the implication of this value is that competition accounts for 32.8% change in employment task performance, hence, having a considerable impact on employee task performance. The F-value is calculated from division of Mean Square Regression (0.60306) and Mean Square Residual (0.06445), to obtain F= 9.35702. The implication of this value is that the model used in this study is statistically significantly (sig= .00033). Thus, Competition is a strong covariate of employee task performance at F (1,284) = 9.35702. From the ANOVA results, the level of significance for all parameters are less than 0.01, thus, the alternative hypothesis is accepted and the null hypothesis is rejected. Hence, Competition has a significant effect on employee task performance.

Hypothesis 4

Collaboration has no significant effect on employee productivity

Model of Summary		R	R2	Adj.R	Std.Error of the Estimate		
	1	.208[a]	.431	.431	.309710954		
Anova		Model	Sum of Square	DF	Mean of Square	F	Sig
		Regression Residual Total	1.17584 27.24128 28.41712	1 284 285	1.17584 .09592	12.25855	.00072
Coefficients			Unstandardized Coefficients	Standardized Coefficients			95% Cofidence Interval for B
	Model	B	Std.Error	Beta	T	Sig	
	(Constant) Employee Productivity	4.312 0.265	0.120 0.034	.265	35.994 -0.350	0.000	

Intrepretation

The result presented in the Table above indicates that there is a significant association at R=0.208 between Collaboration and Employee productivity. Also, from the Table above, R2 = 0.431, thus, the implication of this value is that collaboration accounts for 43.1% change in employee productivity, hence, having a considerable impact on employee productivity. The F-value presented is calculated from division of Mean Square Regression (1.17584) and Mean Square Residual (0.09592), to obtain F= 12.25855. The implication of this value is that the model used in this study is statistically significantly (sig= .00072). Thus, Collaboration is a strong covariate of employee productivity at F (1,284) = 12.25855. From the ANOVA, the level of significance for all parameters are less than 0.01, thus, the alternative hypothesis is accepted and the null hypothesis is rejected. Hence, Collaboration has a significant effect on employee productivity.

Conclusion/Recommendation

The findings of this research have demonstrated the significant role of conflict management approaches and thus encourage organizations to adopt these approaches as they motivate employees towards achieving the goals of the organization. Also, this study expressed the need to create awareness on conflict management styles within organizations as they are crucial in ensuring the achievement of the organization's objectives. The results of this study recommend that organizations should cautiously design a suitable approach in the adoption of conflict management practices so that they complement one another in making sure that the goal of both the organization and employees is accomplished.

Finally, this study recommends that management or policy makers in organizations should evaluate and make policies that support conflict management practices thus, ensuring that employees are adequately motivated on the job. Also, appraisal of conflict management practices in terms of how they contribute to the achievement of organization's objective and employees' performance should be ensured. This will in turn increase worker's morale leading to a competitive advantage over greater commitment levels, employee engagement, task productivity levels and better performance.

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Online Newspapers and Reportage of Covid-19 In Nigeria: The Implication for Awareness and Prevention

[1]Sonate OGABI, ogabi.sonate@covenantuniversity.edu.ng
[2]Lanre AMODU, lanre.amodu@covenantuniversity.edu.ng

[1, 2] Department of Mass Communication, Covenant University, Ota, Nigeria.

Abstract

This study examined online newspapers reportage of COVID-19 in Nigeria during the lockdown period with a focus on the frequency, depth of coverage, story format and news sources. For epidemic/pandemic disease control, knowledge is critical. For the population, public health crises like COVID-19 and the ensuing lockdown instituted a challenging time, especially towards the identification of valid updates on the local and international situation, as well as avoiding rumours and conspiracy theories. Two widely read newspapers were content analysed within the month of April. However, it was observed that the coverage of COVID-19 stories was not frequently reported in both newspapers. Punch reported seventeen (17) while the Nation only reported nine (9) for the whole of April. Also, the coverage was not in-depth, as most reported stories were short and mostly straight news. It was also observed that the media cited more of the government officials, the society, and the Nigeria Centre for Disease Control (NCDC). Most common topics were coverage of cases in Nigeria, death rates, closures of businesses, risk of COVID-19 to essential health workers and worries about Nigeria's preparedness. However, there were few or no stories on sensitising the public about the virus. The online newspapers should capitalise more on educating the people on the best practices to take in curbing the spread of the virus. The Agenda Setting Theory propounded by Marshall McCombs and Shaw, as well as the Technological Determinism Theory by Thorsten Veblen, were the foundation theories for this study.

Keywords: Online Newspapers, COVID-19, Awareness and prevention, Lockdown.

Introduction

COVID-19 is an infectious disease caused by the novel Coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; previously called 2019-nCoV) (Cennimo, 2020). It was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China in December 2019. Wuhan is Central China's most populous city, with a population of about 11 million (Li, 2020). All Covid-19 cases discovered were related to Huainan Seafood in Wuhan Wholesale market, which trades in fish and livestock species, including bats, snakes, and marmots (Sohrabi et al., 2020). Since its outbreak, more than 1 million people worldwide have died from the virus, including Nigeria. However, over 26 million people were reported to have recovered from the virus, with over 7 million active cases as of October 6, 2020 (Worldometer, 2020). This is the third severe Coronavirus outbreak in less than 20 years, following SARS in 2002-2003 and Mers in 2012 (Yang et al., 2020).In January 2020, the World Health Organization declared the COVID-19 outbreak a global health emergency (WHO, 2020).

Unfortunately, on February 27, 2020, the first case of Covid-19 was confirmed in Lagos, the commercial capital of Nigeria, with a population of 21 million. The index case came from Milan, Italy, then the fourth high-incidence country (371 cases) and entered the country on February 25, 2020, via Lagos Airport. Where there was nothing serious on the ground from suspected places with acute infections to check or monitor new entrants into the world. The man who worked at Lafarge Cement Corporation, a multi-billion-dollar multinational, went to a meeting at the company's factory in Ewekoro, Ogun State, an adjacent form to Lagos. The case was identified at the Lafarge medical centre in Ewekoro when he declared ill, was sent for testing, and confirmed he had the Covid-19 virus (NCDC, 2020). After that, more cases were discovered.

There were over 4000 reported cases of Covid-19 and 150 deaths as of May 11, 2020, in Nigeria, which is the most populated Nation on the continent with an estimated population of 200 million (NCDC, 2020). This informed the government's decision to impose a compulsory an initial two weeks lockdown in the three high-risk states (Lagos, Ogun, and Abuja) in April 2020 as part of the measures to reduce the spread of the virus (CNBC Africa, 2020) which was later extended by an additional two week period (Nairametrics & Olisah, 2020). During this period, many people sought the media for information on the best practices to adopt to stay safe (Anwar et al., 2020).

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Mass media are recognised as a powerful force that shapes how we experience the world and ourselves (Ivan et al., 2020). Media are one category of several technologies developed to accelerate, smoothen, and make information accessible betimes or on-demand. The role of mass media, including Television, Radio, Print and recently Social media, in the curbing of past pandemics (Ebenso & Otu, 2020), has remained influential. Knowledge has also been disseminated through these media on positive public health measures such as social distancing, hand washing, respiratory hygiene, and government strategies in combating outbreaks (Mustapha et al., 2020). The pervasiveness of the Internet and the degree to which it relies on specific facets of human life especially during the pandemic make it hard to believe that the Internet only became available to the public commercially in the 1980s (Amodu et al., 2019).

In December 2019, in Wuhan Province, China, the coronavirus outbreak created an explosion of health problems and crises for different media outlets to cover, including newspapers. Since its inception, the spread of the pandemic may have genuinely engaged newspaper organisations in a news rivalry. The media, including the newspaper organisations, may have embarked on a reporting spree since the outbreak to keep the public fully aware of the prevalence, deaths, and preventive measures (Adegbija et al., 2013).

Now, regardless of the impact of the global pandemic which affected many businesses including the media industry, they must carry out their role as the "Fourth Estate of the Realm" and the "watchdog of culture" in liberal theory, suggesting that the media exist as an instrument of information sourcing and distribution, promotion of education, surveillance, social enlightenment, and mobilisation. Such roles distinguish the media as an essential one. The conventional Newspaper business model, underpinned by advertisement and distribution, may have collapsed from the shock of the unprecedented epidemic/pandemic (Ajasa & Okere, 2019). One of the conclusions from the results of (Cribb et al., 2020) released in April 2020, demonstrated that the Coronavirus epidemic had forced publishers in America to move quickly to minimise print-related expenditures and shift their business models to news and information channels that are more digitally based. In Nigeria, however, Punch newspapers, one of the largest publications in the Nation, decreased the number of pages of its print media from 62 to 32, while attempting to place more focus on its web arm (Odutola, 2020).

For epidemic/pandemic disease control, knowledge is critical. Panic in the population is caused by the inaccurate transmission of information (Ahmad & Murad, 2020). For individuals and families, public health crises like COVID-19 lockdown was a challenging time (Mustapha et al., 2020). The identification, evaluation, and response to rumours, stigma, and conspiracy theories and their effect on public health in real-time are a challenge for novel epidemic and pandemic diseases.

Social media functions as a two-edged sword despite the Nigerian situation as it allows people to be privy to data without impediments. This same method, however, has been used to misinform the population and circulate unverifiable and misleading messages to people. Online newspapers have been described as one of the most vital outlets among the public to track disinformation and debunk rumours, stigma, and conspiracy theories (Obi-Ani et al., 2020).

As a type of mass media, newspaper play a significant role in educating people about current events in various sectors of life, keeping them up-to-date with recent events (Kilgo et al., 2019), and in particular about this COVID-19 pandemic during the COVID-19 lockdown, and how to stay healthy and how best to respond to it. If newspapers are unable to deliver the correct information, individuals may take actions that may be harmful to their wellbeing, and this may impact the public (Chowdhury & Halder, 2016). Studies analysing media coverage of COVID-19 lockdown are scarce, to the best of our understanding. This paper is one of the first to research the quality of the COVID-19 outbreak coverage in Nigerian newspapers during the lockdown.

The latest research aims to display media coverage of Nigeria's COVID-19 pandemic. It also helps to assess whether media attention increases awareness and educates the masses about the preventive steps to be taken. In Nigeria, the focus was on two widely read newspapers: The Nation and Punch. The following objectives and questions guide this study:

1. To ascertain the depth of COVID-19 content that the sampled online newspapers published during the COVID-19 lockdown.

2. To evaluate the consistency with which online news published updates on COVID-19 in the sampled newspapers.

3. To examine the story format used by the sampled newspapers in the coverage of the COVID-19 outbreak in Nigeria.

4. To find out the dominant news sources engaged by the sampled newspapers in the reporting of the COVID-19 outbreak.

Literature Review

Agenda Setting Theory was propounded by Marshall McCombs and Shaw in 1972 (McCombs & Shaw, 1972). The theory believes that there is a substantial correlation between media coverage and the rating of public concerns by people. The theory provides a connection between the rate at which the media and the importance report a story that individuals place on such a story. This shows that the media dictate which issues society should consider being more relevant. This is achieved by reporting frequency, prominence given to the reports by headline display, images, newspaper layout, magazines, graphics, or timing. During the COVID-19 lockdown, people depended on the media as their source for information.

Technological Determinism Theory by Thorsten Veblen in 1967. The theoretical framework used in this study is the Technological Determinism theory. This theory postulates that technology dictates how the future of society will be (Bimber, 1990). Thorsten Veblen coined the term 'technological determinism', and this revolves around the idea that technology defines the nature of its community (Brette, 2003). During the lockdown, a lot of businesses focused more online because of the movement restriction in place which also affected the sale of printed newspapers thus causing most newspaper organisations to place more focus online especially during the period of lockdown (Odutola, 2020).

Technological determinism is primarily used as the concept of a critic, used to refute such classes of theoretical and empirical statements. According to (Bimber, 1990), Marx's literature reveals contradictory claims regarding technology's role in social change. Most of the topic can be due to uncertainty about what 'Technological Determinism' entails. There are many approaches to this concept:' Standard-Based Accounts' interpret Technological Determinism as a mostly cultural phenomenon;' Unintended Consequences Accounts' interpret it in terms of the technical enterprise's unforeseen social outcomes.

One of the issues with technological determinism is that it leaves no space for human choice or interference and, in addition, relieves us of responsibility for the technologies that we produce and use. If technologies are built beyond collective interests, therefore the application and consequences of these technologies have very few choices for employees, residents, and others (Hackett et al., 2008). This serves the needs of those responsible, irrespective of whether they are consumer goods or power stations, for creating new technologies.

According to (Smith et al., 1994), a sense of technology's power as a crucial agent of change has a prominent place in the culture of modernity. It belongs to the body of the widely shared tacit knowledge that is more likely to be acquired by direct experience than by the transmittal of clear ideas. If the technology takes an inexorable course, then technological determinism helps all of us to disclaim responsibility for and mock the technological decisions we make individually and collectively. Technological determinism is a useful and influential viewpoint, more productively interpreted as referring to arguments that put a greater focus on the autonomous and social-shaping patterns of technology (Dafoe, 2015).

Methodology

A quantitative content analysis research design (CA) in online newspaper reporting was used to study the COVID-19 lockdown scourge in Nigeria. Two widely read Nigerian newspapers available online were selected for this study. The Vanguard and Punch are the newspapers. These newspapers were chosen due to their national reach and readership. Furthermore, since they are popular in the west (Ogun and Lagos), they were selected. The coverage deadline was April 2020. This time was chosen because the first lockdown was introduced by Ogun, Lagos and Abuja in Nigeria, which was later extended to its second phase by another two weeks to curb the spread of the virus. For the sample size, two widely read newspapers in Nigeria: Punch and The Nation.

Sampling Technique

On the newspaper website, an online search was carried out using keywords such as “COVID-19”, “COVID-19 outbreak”, “COVID-19 lockdown”, “COVID-19 prevention”, and “COVID-19 knowledge”. Thirty-three articles consisting of articles in ‘news’, ‘editorials’, ‘feature’, and ‘opinion’ were retrieved by the total quest. For inclusion, articles required to report on COVID-19 in Nigeria were included; therefore, articles on the reporting of COVID-19 in other countries were not included. Furthermore, papers that merely listed coronavirus in the body were also omitted. Using these parameters, seven papers were omitted, leaving a final list of 26 articles for review.

Unit of Analysis

The unit of analysis for this study were news stories on COVID-19 found under the sections; news, editorials, features and opinion.

Depth of Coverage and Frequency

To realise the depth of coverage, the word counts were noted and classified as long, short or medium for each article. For instance, 400-word news stories were deemed long, while 200-399-word stories were deemed medium, and 1-199-word stories were deemed short. This categorisation refers to previous studies (Apuke & Tunca, 2020). Also, to determine the frequency, the research checked and selected the number of articles of COVID-19 outbreak in Nigeria during the lockdown.

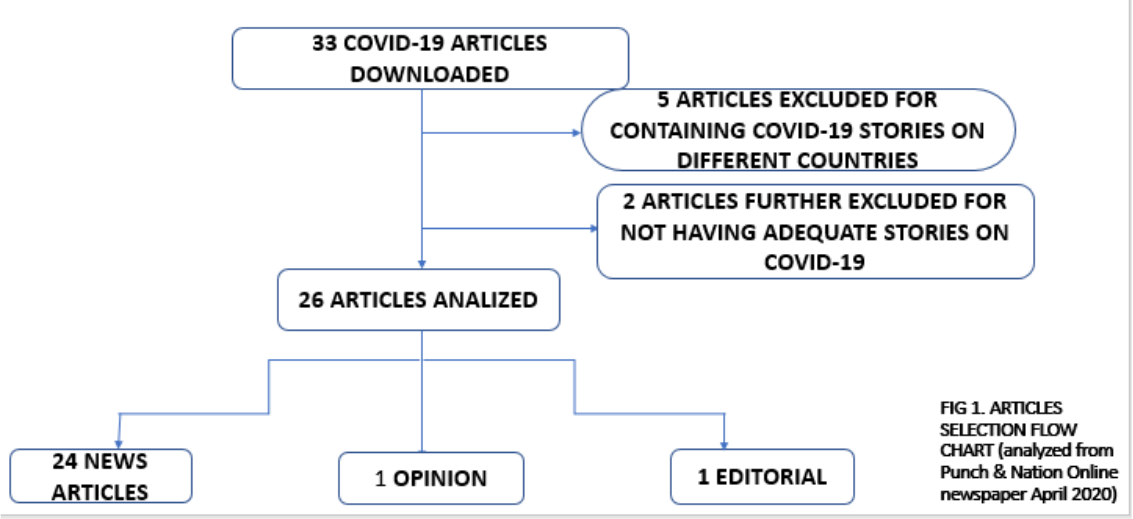

FIG 1. ARTICLES SELECTION FLOW CHART (analyzed from Punch & Nation Online newspaper April 2020)

The researcher downloaded 33 articles on COVID-19. 5 were excluded for containing COVID-19 stories in different countries. Two were further excluded for not having adequate information on COVID-19. 26 articles were analysed. Twenty-four of the articles were news, while one was an opinion and the other a feature.

Results

RQ1. What is the level of consistency of published news updates on COVID-19 outbreak in the online newspapers during the lockdown?

Table I.

Table I: Frequency of COVID-19 coverage in April 2020

Newspaper	No. of stories covered	Frequency (%)
Punch	17	65.4
Nation	9	34.6
Total	26	100

The conclusion from this content analysis study revealed that newspapers were not ready for the lockdown because of the inconsistency in the reportage of news stories online, as revealed in table I. Furthermore, the researcher discovered that the stories were few or far between. The result shows that neither of them published one story each day in 28 days. This reason could be because they were unprepared and had not fully recovered from the shock of the pandemic. Also, the number of stories published from both newspapers demonstrated that the public had insufficient information about the COVID-19 outbreak in Nigeria during the period of lockdown. The public was less enlightened on precautionary measures to take to curb the spread of the virus. However, knowledge is crucial in the struggle to curb epidemic/pandemic. Inaccurate or intentional misinformation could lead to panic. This is not a patent mitigator in the campaign to adequately inform the public on staying safe and healthy during such seasons.

RQ2. What is the level of depth of coverage of the COVID-19 outbreak published in the online newspapers during the lockdown?

Table II.

Table II. Depth of words in the articles								
Newspaper	400 and above (long) (%)		200–399 (medium) (%)		1–199 (short) (%)		Combined total (%)	
Punch	3	(75)	11	(64.7)	3	(60)	17	(65.4)
Nation	1	(25)	6	(35.3)	2	(40)	9	(34.6)
Total	4	100	17	100	5	100	26	(100%)

As revealed in table II, the depth of content in both newspapers under investigation is a matter of concern because very few of their stories provided the detailed public information on COVID-19, awareness, and prevention. This categorisation is consistent with prior research (Apuke & Tunca, 2019). The Punch and the Nation newspaper are among the most widely read newspapers in Nigeria, and one would expect from them comprehensive and credible information about the virus and most importantly during the lockdown period when the movement was restricted. People who could not get the printed newspaper to buy or read because of the lockdown would have wanted to get updated news about the virus online. Since sufficient information on the virus was unavailable to the readers on the Punch and the Nation newspaper online, readers may have sought for information from other sources that may not be credible or reliable and which could have an adverse effect on their health. The lack of in-depth information in the newspaper articles could be because journalists are under pressure to produce content rapidly in the contemporary digital news environment (Veen & Thomas, 2020).

RQ3. What is the story format used in the coverage of the COVID-19 outbreak in Nigeria during the lockdown?

Table III.

Table III Story Format						
Newspaper	News (%)		Opinion (%)		Feature (%)	
Punch	15	(62.5)	1	(100)	1	(100)
Nation	9	(37.5)	-	-	-	
Total	24	100	1	100	1	100

Table III shows a significant variation in story format. The News story format was dominantly used by both newspapers, The Punch (62.6%) and the Nation newspaper (37.5%). However, a trivial number of feature and opinion also constituted a source of the Punch and the Nation newspaper. This study result in table III is also consistent with similar research that analysed the reportage of COVID-19 outbreak in Nigerian newspapers (Apuke & Omar, 2020). We, therefore, maintain that Nigerian newspapers use more straight news because they are more concerned with delivering the information on COVID-19 first-hand to the public.

RQ4. What are the dominant news sources of COVID-19 outbreak in the sampled newspapers during the lockdown?

Table IV.

Table IV Sources Cited						
	Punch (%)		Nation (%)		Combined Total	
Other Government Officials	7	(41.2)	4	(44.4)	11	(42.3)
Society (citizens, corporate bodies/agencies, business and so on)	6	(35.3)	2	(22.2)	8	(30.8)
NCDC	3	(17.6)	1	(11.1)	4	(15.4)
Health Officials	-	-	1	(11.9)	1	(3.8)
Newspaper reporters/editorials	1	(5.9)	1	(11.9)	2	(7.7)
Total	17	100	9	100	26	100

Table IV sought to determine the sources of media reports on COVID-19 pandemic in Nigeria. The researchers aim is to discover the most sources cited across the sampled newspapers. The results revealed variation in the usage of sources. The highest source cited in the two newspapers was by other government officials (42.3%) followed by the society (30.8%), NCDC (15.4%), Newspaper reports (7.7%) and the least sources came from Health officials (3.8%), this was a striking aspect of the result as only a few sources came from the health officers during the period of lockdown. In these critical health circumstances, such as the latest coronavirus pandemic, one of the vital resources of the mass media are from the health officials.

Discussion

Based on the interview given by nairametrics in May, as cited in (Odutola, 2020), It was revealed that the Punch and the Nation newspapers did not make any financial or business profit during the lockdown period. This result is consistent with the study by Obadofin (2020). The pandemic was unprecedented as most of the newspaper organisations were unprepared for the sudden economic downturn that resulted in a massive loss in April 2020 (Mustapha et al., 2020). For this purpose, some newspaper organisations have had to lay off their staff and cut down on their newspaper pages to cushion the effect of the pandemic. The reason they suffered significant loss during this lockdown could be because they relied heavily on the adverts from the printed version of the newspaper; this conclusion is consistent with Osunrinde, (2020) findings. According to the Nairametrics, for Punch, one of the reputable and widely read newspapers in Nigeria, they explored the option of slashing pages of their dailies from 62 to 32 pages. In the case of the Nation, findings revealed that the medium served over 100 staff across the department's letters of disengagement. The Nation also slashed salaries of staff earning over N60,000 by 50% (Odutola, 2020).

Concerning the frequency of coverage, we found out that the media reported 26 stories (Punch, 22 and the Nation, 9) on COVID-19 outbreak in Nigeria in April 2020. However, this outcome is contrary to a research by (Apuke & Omar, 2020) which found out that Daily Sun, Daily Trust, Vanguard, and Leadership newspaper had many published stories on COVID-19 during the period under review. This study also discovered that the story format used for more than half of the information is that of the straight news format, which is consistent the researcher's result. We, therefore, maintain that Nigerian newspapers use more straight news because they are more concerned with delivering the information on COVID-19 first-hand to the public.

Additionally, previous research has shown that the source of news plays a vital role in assigning significance to some aspects of the issue (Dwivedi et al., 2020). From this viewpoint, we have found that news from the Government officials (42.3%), the society (30.8%) accompanied by the NCDC (15.4 %) was the primary source cited. Furthermore, the news source attributed to these stories were applaudable because the sources were valid. However, the information contained little or no recommendations on what steps citizens can take to prevent contracting or spreading the virus within the context of Nigeria since they were getting sources from NCDC, the federal government and the ministry of health. A possible reason for referencing the NCDC more in the newspapers could be the fact that they are accountable for handling infectious diseases in Nigeria. However, news from the ministry of health and newspaper reporters or editorials have been sparingly cited. Besides, we noted that newspaper reporters/ editors themselves were the least cited sources. This outcome is somewhat different from that of Asaolu et al., (2016), who found that the most widely quoted sources in the coverage of the Ebola crisis in Nigeria were reporters/editors and medical experts. We argue that because a large number of the stories quoted government officials, such as ministers, senators, House of Representative Members and presidential spokespersons, there are possibilities that politics could influence true coverage of the COVID-19 outbreak in Nigeria. Adesoji (2006) stressed that due to its active

involvement with partisan politics, the Nigerian media had been found lacking. The media regulatory authority should therefore be more sensitive to media coverage and representation by further controlling media acts (Itabiyi et al., 2019), especially in the reporting of stories on sensitive issues.

Limitation of the Study

This research focused only on COVID-19's online newspaper reports. The month of April, which was the time when the government implemented the lockdown as part of efforts to curb the epidemic's spread.

Conclusion

We conclude that online newspapers in Nigeria paid little attention to the COVID-19 outbreak during the lockdown period, as demonstrated in the frequency of reporting, the news stories were not detailed therefore lacked depth and also most stories were straight news. The conclusion to the issue of the COVID-19 outbreak from this content analysis study revealed that newspapers were not ready for the lockdown because of the inconsistency in the reportage of news stories. We contend that the Nigerian online newspaper did not do enough in creating awareness of the outbreak during the lockdown period. Furthermore, the news sources attributed to these stories were applaudable because the sources were valid. However, the stories contained little or no recommendations on what steps citizens can take to prevent contracting or spreading the virus within the context of Nigeria since they were getting sources from NCDC, the federal government and the ministry of health. Public health crises like COVID-19 and the ensuing lockdown instituted a challenging time, especially towards the identification of valid updates on the local and international situation. However, for epidemic/pandemic control, knowledge is crucial in the struggle to curb epidemic/pandemic, and panic caused to inaccurate or intentional misinformation is a patent mitigator in the campaign to adequately inform the public on staying safe and healthy during such seasons

Recommendation

Online newspapers are recommended as preferable information sources at such times among the public to not only stay informed, but also track disinformation, rumours, and conspiracy theories. This paper is one of the first to research the coverage quality of the COVID-19 outbreak in Nigerian online newspapers during the lockdown period in April 2020. This could be done by increasing their emphasis on educating the public about the pandemic mode of infection and transmission, symptoms, risk, face mask use, hand washing with hand sanitizer and social distancing. To inform and educate Nigerians about the pandemic, they should provide opinions and editorials, as well as include a thorough overview of the measures to be taken to curb the spread of the virus.

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Impact of The Installed Tire Pressure Monitoring System (TPMS) In Heavy Transport Vehicles on Tread Wear Height in Tires.

Bożena SZCZUCKA-LASOTA
Faculty of Transport, The Silesian University of Technology, Katowice, Poland.
Bozena.Szczucka-Lasota@polsl.pl

Joanna KAMIŃSKA
Department of Mathematics, Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland.joanna.kaminska@upwr.edu.pl

Iwona KRZYŻEWSKA
Department of Transport and Information Technology, WSB University, Dąbrowa Górnicza, Poland, ikrzyzewska@wsb.edu.pl

Krzysztof WILCZYŃSKI
Centralny Ośrodek Badawczo-Rozwojowy Aparatury Badawczej i Dydaktycznej, Warsaw, Poland, krzysztof.wilczynski@cobrabid.pl

Abstract

The construction of a modern tyre, due to its durability and resistance to external factors, is very complicated. The tread is undoubtedly the most important element of a tyre. Its design and thickness have an impact on driving comfort. Lack of driver's reaction to the signals and alerts coming from the monitoring system exposes the company to losses in the form of too early tyres being worn out, increased combustion and even damage to the axle or transported goods. Therefore, it was advisable to develop a continuous monitoring system enabling pressure and temperature measurements with a frequency adjusted to the vehicle's driving course, and enabling the reduction of data stream for the management of vehicle operation procedures, e.g. by controlling the drivers' decision-making process. The purpose of paper is to determine the impact of installing the developed system of continuous monitoring of tyre performance values on the tread wear of truck tyres. With the installation of a performance monitoring system on a tyre it is possible to react quickly and make decisions about the condition of the tyre (e.g. regrooving or replacing the tyre). The paper presents data on the abrasive tread wear of tyres in vehicles with and without a system. Statistical calculations have also been made - statistical tests of the significance of differences in tread wear.

Keywords: Tread Wear, Tire, Monitoring, Pressure.

Introduction

The construction of a modern tyre, due to its durability and resistance to external factors, is very complicated. The tread is undoubtedly the most important element of a tyre. Its design and thickness have an impact on driving comfort. The tread is made of a rubber layer of variable thickness. It consists of a front, shoulder and side parts, In study by Chomka et al. (2012).

Due to the structure of the tread pattern, a distinction is made between summer, winter, off-road and universal tyres. Tyres should be selected according to their needs and purpose. Tyres for long-distance, regional, mixed or other applications have different, often divergent characteristics. In addition to the type of tread, the most important thing to choose is to match the right tyre size to the vehicle. Poor tyre selection can result in malfunctioning ABS, ESP and other electronic systems calibrated to a specific tyre size. Identical tyres should be fitted on one axle. Authors as: Polasik et al. (2017), Schlie and Yip (2000), Meyer (2006) have indicated that, is particularly important as different types of tyres may have different traction parameters. The main factor which significantly weakens the tyre is the improper use of the tyre. Many drivers at the wrong time (usually too late) change tires for season-related tires (summer and winter tires). Using a tyre designed to be used at a different time of the year contributes significantly to excessive tire wear In study by Mukherjee (2014). Therefore, Toretta et al. (2015) mentioned that, the service life of a tyre (its service life) will be determined both by its structure and by the appropriate tyre operation adjusted to the conditions and driving course.

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An unresolved problem in the car fleet of transport companies is the inability to immediately check whether the driver reacted properly to the monitoring signal. One of the tasks of drivers is to react to the emerging alerts as well as to track the tread height in tires, In connection with authors: Chomka et al. (2012), Polasik et al. (2017), Schlie and Yip (2000), Oduro et al. (2013), Meyer (2006), Mukherjee (2014), Toretta et al. (2015), Skarbek-Żabkin and Kamińska (2015). Lack of driver's reaction to the signals and alerts coming from the monitoring system exposes the company to losses in the form of too early tyres being worn out, increased combustion and even damage to the axle or transported goods. Therefore, it was advisable to develop a continuous monitoring system enabling pressure and temperature measurements with a frequency adjusted to the vehicle's driving course, and enabling the reduction of data stream for the management of vehicle operation procedures, e.g. by controlling the drivers' decision-making process. The installed system of continuous monitoring of tyre operating parameters allows for the sudden detection of tyre pressure drops and sudden temperature increases. In addition, it will enable the generation of alarms and alerts, which allows for immediate response and decisions on corrective actions in the tyre life process. The system indirectly reduces fuel consumption and waste in the form of used tyres as well as tyre tread wear and improves the passive safety of trucks.

The purpose of paper is to determine the impact of installing the developed system of continuous monitoring of tyre performance values on the tread wear of truck tyres. With the installation of a performance monitoring system on a tyre it is possible to react quickly and make decisions about the condition of the tyre (e.g. regrooving or replacing the tyre). The paper presents data on the abrasive tread wear of tyres in vehicles with and without a system. Statistical calculations have also been made - statistical tests of the significance of differences in tread wear.

Material and Methods

Of all the vehicles available in the company's fleet, 10 sets consisting of 6x2 three-axle trucks and MegaTele trailers were selected for the basic tests, as it was found that, for these sets, the operating conditions of the vehicles would be the closest to each other in terms of length of journey, weight of goods transported, etc. In addition, these sets are the most used vehicles in the company investigated. A monitoring system has been installed in five sets of vehicles. The performance monitoring system has been developed specifically for use in fleets of vehicles to meet challenges such as: quick response to changes in tyre pressure and temperature parameters to increase passive vehicle safety. It was assumed that an immediate response to changes in the monitored parameters will enable the proper use of the tyres, contributing to a reduction in operating costs (maintenance, excessive tread wear, fuel consumption). It was validated and verified.

The vehicles (truck + trailer) are identified by the letters A to E (for monitored vehicles) and A_N to E_N (for non-monitored vehicles). The test material are tyres. For the purpose of the test, new tyres (from Michelin) have been purchased and fitted to all vehicles tested. The truck tyres used for transport in the vehicle fleet of the company tested vary in size:

- 22.5 inches used for trucks,
- 17.5 inches used for trailers.

During the tests, undamaged tyres were not replaced or converted to a different axle-layout. These tyres were only inflated, and some of them were regrooved. The tyres for each vehicle were marked using the marking system adopted in Figure 1 (Fig 1.).

Example recording: vehicle A - 1D tyre - means the tyre D in the first axle of vehicle A.

In the surveyed company, tread depth measurements are made with a manual laser scanner. The manual laser scanner (Fig 2.) measures the height of the tyre's tread by scanning the entire tread surface, giving an average result based on point measurements. This result is affected by a measurement error of 0.1 mm.

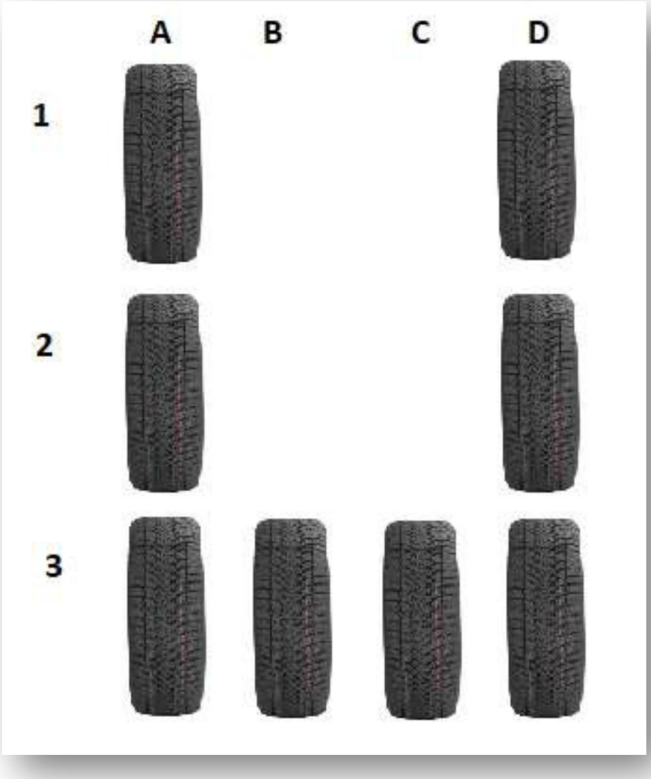

Fig 1. Model of tires symbol (own study)

Fig 2. Handheld laser scanner to measure tread height (own study)

Tread height measurements were carried out in the same way for all tyres of both monitored and unmonitored vehicles with the monitoring system.

The tread height was measured with a handheld laser scanner with an accuracy of 0.1 mm. Measurements were made both in selected vehicles of the company's car fleet without an installed system and in those with a system of

continuous monitoring of pressure and temperature in the tyres. Each time the vehicle descended to the transport base, the tread height of the tyres was measured. When a value equal to or less than 4 mm was obtained for at least two tyres, the tread was regrooved. The tread was extented (regrooved) in all tyres except the tyres on the first axle of the truck, as this is not in accordance with the applicable legislation.

Result

Analysis of measurement results for vehicles without a monitoring system installed

The tables (Tables 1-4.) show the tread height measurements in selected vehicles without monitoring system. Tire tread height for a three-axle trucks with 6×2 drive B_N vehicle took place in July, while for C_N vehicle the tread had to be regrooved already in June. The highest abrasive wear of the tread was recorded for the third axle of the vehicles (Tables 1-2). This axle is the most stressed in the analyzed trucks.

Table 1: Measurement of the tread height [mm] of vehicle tyres B_N (own study)

Vehicle B_N	Measuring tread height [mm] per month:						
tire symbol	December	February	April	June	July	Extension	September
1A	13	12	12	11	10	10	10
1D	12	12	12	11	10	10	10
2A	11	11	10	10	8	8	7
2D	11	11	10	10	7	8	7
3A	12	9	8	8	7	8	7
3B	14	7	6	6	6	8	8
3C	14	7	7	6	4	6	5
3D	14	7	6	6	4	6	5

Table 2: Measurement of the tread height [mm] of C_N vehicle tyres (own study)

Vehicle C_N	Measuring tread height [mm] per month:						
tire symbol	December	February	April	June	Extension	July	September
1A	11	10	10	10	10	10	10
1D	11	10	10	10	10	10	9
2A	10	10	9	9	9	8	7
2D	10	10	10	7	8	7	6
3A	12	7	7	5	7	6	5
3B	12	7	5	4	6	6	5
3C	11	5	5	3	5	5	4
3D	11	7	6	5	7	7	6

Similar results were obtained for the remaining vehicles. In order to facilitate the interpretation of the results, diagrams were prepared (Fig 3.). The column diagram showing the measurements of the tread height during the successive months of tyre operation for a truck (B_N vehicle) clearly shows the changes in tread height, indicating the abrasive wear of the tyres during operation.

For the most heavily loaded third axle of the analyzed vehicle, changes in tread height from 1 to even 7 mm between consecutive months were recorded. The tread height in the third axle of the vehicles changed by up to 50%

during the winter months. The biggest difference was observed between the initial value (14 mm - new tyre) and the measured value after 7 months of operation (4 mm), which represents tread wear of more than 70% of the initial value. With these measurement values, the treads of the vehicle's tyres on axles 2 and 3 were regrooved. The data obtained for the other vehicles were analysed in a similar way. An example of a C_N vehicle is shown in Figure 4 (Fig 4.).

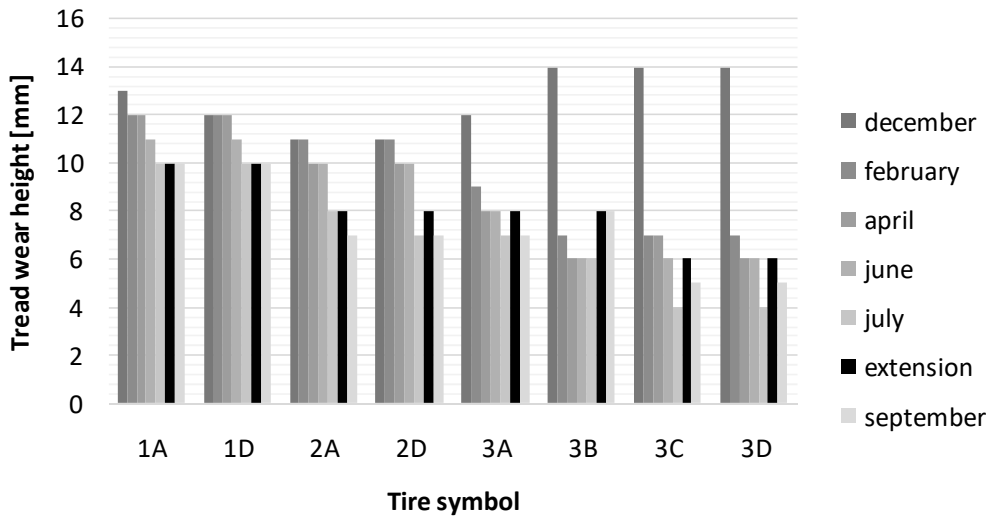

Fig 3: Measurement of the tread height in the subsequent months for a truck tractor (vehicle B_N); black columns indicate the tread extension (own study)

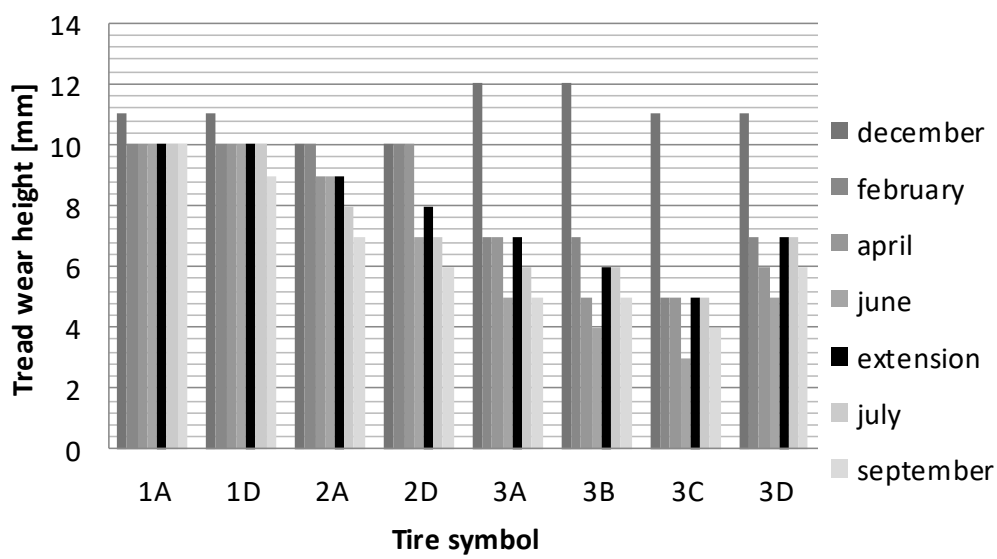

Fig 4. Measurement of the tread height in the subsequent months for a truck tractor (C_N vehicle); black columns indicate the tread extension (own study)

In this case, the recorded results of tread height measurements after 7 months of operation represented about 33% of the initial value for tyres fitted on the third axle of the vehicle. The recorded value of tread height measurements of the tyre at the same level in subsequent months (e.g. for tyre 1A the measurement result in the months December-June was 10 mm – Fig 4.) does not prove the lack of abrasive wear of the analysed materials. Abrasive wear occurs and the results obtained only indicate that no measurable tread wear was recorded during the month of vehicle operation.

The research also analysed the tread height measurements of Mega Tele trailers. Diagrams were drawn up on the basis of the obtained measurement results (example – Table 3).

Table 3. Measurement of the tread height [mm] of vehicle tyres A_N (own study)

Vehicle A_N	Measuring tread height [mm] per month:					
tire symbol	December	February	April	June	July	September
1A	12	12	11	9	7	7
1B	13	12	7	6	6	5
1C	13	11	9	7	6	6
1D	11	11	10	9	7	6
2A	12	11	9	7	7	7
2B	11	10	9	9	9	8
2C	11	8	7	7	6	5
2D	11	8	7	7	5	5
3A	12	11	11	10	8	6
3B	12	11	10	10	8	6
3C	12	9	9	8	7	7
3D	11	10	10	8	8	8

Based on the results of the measurements, it can be concluded that in a Mega Tele trailer, the tread height was between 5 and 8 mm in September, i.e. after 10 months of operation. The recorded tread height in September compared to December last year was around 50 -73% of the initial value, which means that there was 27-50% tread wear on the tyres (Fig 5).

The highest abrasive wear of the tread was observed in the wheels of a trailer's third axle, which is associated with a heavy load on the trailer. On the other hand, the slowest process of abrasive wear of the tyre tread was observed in the tyres of the first and secondo axle of the trailer.

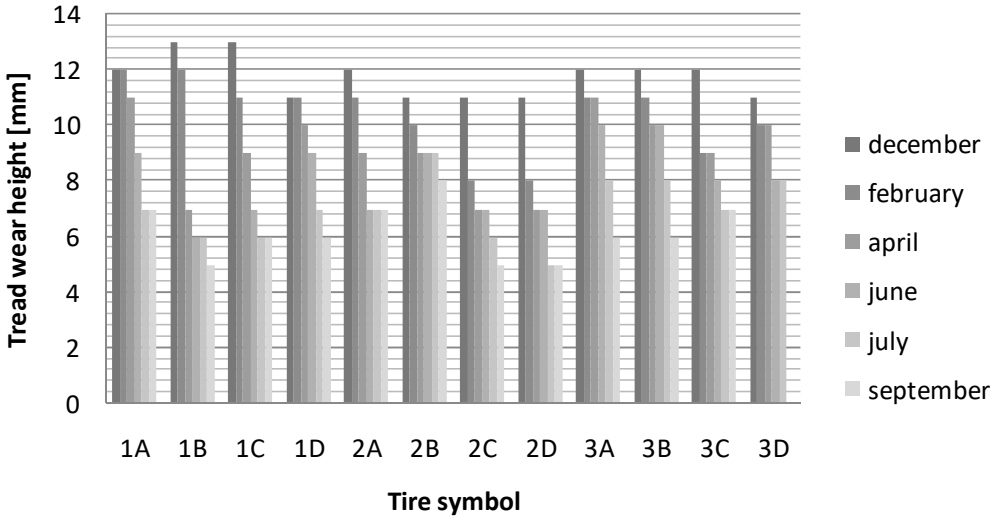

Fig 5. Measurement of the tread height in the subsequent months of tyre operation for a trailer (vehicle A_N) (own study)

The differences between the individual tread height measurements were up to 4 mm for tyres operating in the first axle of the vehicle, 6 mm for tyres operating in the second axle and 5-7 mm for tyres operating in the third axle of the vehicle (Table 4.).

Table 4: Measurement of the tread height [mm] of MegaTele trailer E_N (own study)

Vehicle E_N	Measuring tread height [mm] per month:					
tire symbol	December	February	April	June	July	September
1A	11	11	10	10	10	10
1B	11	11	10	9	7	7
1C	10	10	9	9	8	7
1D	11	10	9	9	7	7
2A	13	13	11	11	10	8
2B	13	13	11	11	9	8
2C	13	11	11	10	7	7
2D	13	13	10	10	7	7
3A	12	12	10	10	8	7
3B	13	13	11	10	7	6
3C	13	12	10	10	8	8
3D	12	12	10	10	7	7

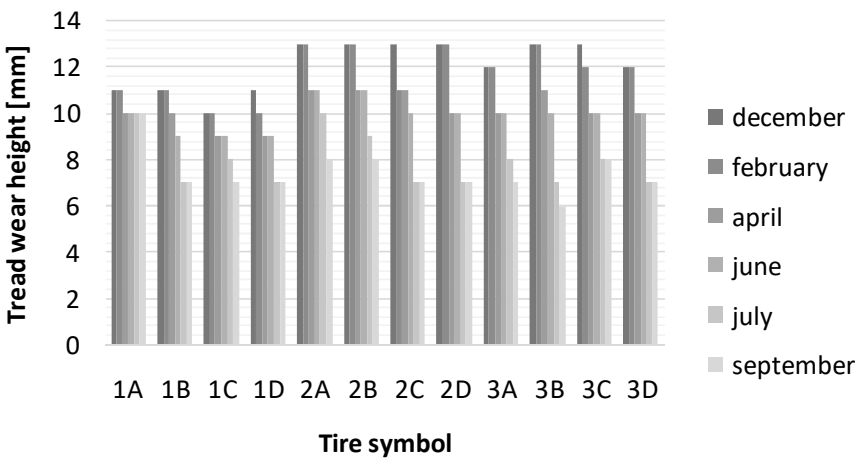

Fig. 6: Measurement of the tread height in the subsequent months of tyre operation for a trailer (vehicle E_N) (own study)

The highest abrasive tread wear in the tyres was observed in these vehicles for tyres running on the second and third axle of a trailer (example – Fig 6.). After ten months of operation, the maximum level of abrasive wear of the tread height of 56% (initial height) was recorded. The slowest abrasive wear of the tread was recorded in the tyres of the first axle of the trailer.

Analysis of measurement results for vehicles with monitoring system installed

Tread height measurements were taken after each vehicle's descent to the transport base. The data obtained indicate that the abrasive wear of the tread is lower in these vehicles compared to non-monitored ones (comparison of the results from Tables 1 and 2 respectively with the statements presented in Tables 5 and 6). It can be concluded that the relatively low abrasive tread wear of the tyres of monitored vehicles is primarily influenced by the decision-making process. Properly responding to changes in tyre pressure and alerts sent out by the installed monitoring system, as well as the ability to control the driver whether he has taken appropriate measures to achieve the tyre pressure equalization, has made it possible to maintain the tyre pressure in the range 0.8 - 1.1 MPa.

Table 5: Measurement of the tread height [mm] of tractor vehicle A (own study)

Vehicle A	Measuring tread height [mm] per month:					
tire symbol	**December**	**February**	**April**	**June**	**July**	**September**
1A	10	10	10	10	10	10
1D	10	9	9	9	9	9
2A	9	9	8	8	8	8
2D	9	9	8	8	8	8
3A	10	10	10	10	9	9
3B	9	9	9	9	9	9
3C	9	9	9	9	8	7
3D	9	9	9	9	9	9

Tables 6: Measurement of the tread height [mm] of truck vehicle D (own study)

Vehicle D	Measuring tread height [mm] per month:					
tire symbol	**December**	**February**	**April**	**June**	**July**	**September**
1A	12	12	12	12	11	11
1D	11	11	11	11	10	10
2A	11	11	10	9	9	9
2D	11	11	11	10	10	10
3A	10	10	10	10	10	10
3B	11	11	10	10	10	10
3C	9	9	9	8	8	8
3D	9	9	9	9	9	8

In turn, ensuring the correct tyre pressure has contributed to achieving the right operating conditions for the tyres, in line with the manufacturers' recommendations, which has led to a longer service life of the tyre material. The recorded abrasive wear of the tread is therefore lower compared to vehicles without a monitoring system supporting the decision-making process. In the truck of vehicle A, the values of the tread height after 10 months of operation were 7 to 10 mm respectively (Fig 7.).

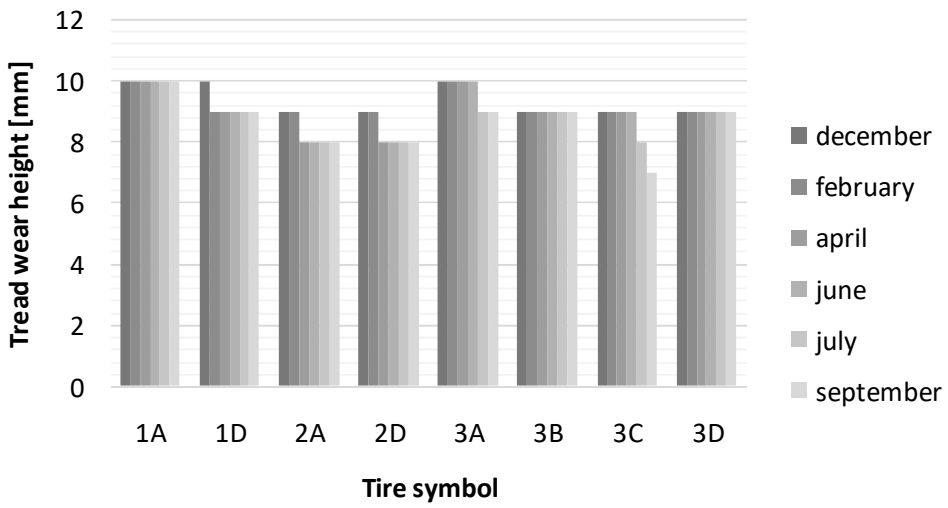

Fig. 7: Measurement of the tread height in the subsequent months of tyre operation for a truck (vehicle A) (own study)

The difference between successive measurements was a maximum of 1 mm, which represented 6.67 % of the abrasive wear of the tread. During the entire test period it was not necessary to cut the tread of the tyres. The slowest process of abrasive wear of the tread was observed in the tyres of the first axle of a truck.

Analogous results were obtained for trucks of vehicle B, C, D and E. Tread height values ranged from 7 to 12 mm (Fig 8.). The recorded value of measuring the tyre tread height at the same level in subsequent months for a given tyre only indicates a slow, long lasting process of abrasive wear of the analysed materials during operation.

As with vehicle A, the difference between successive measurements was 1 mm, representing 6.67% of the tyre's optimum tread height, and the largest difference between successive measurements was 2 mm, representing 13.34% of the tyre's optimum tread height (Fig 9).

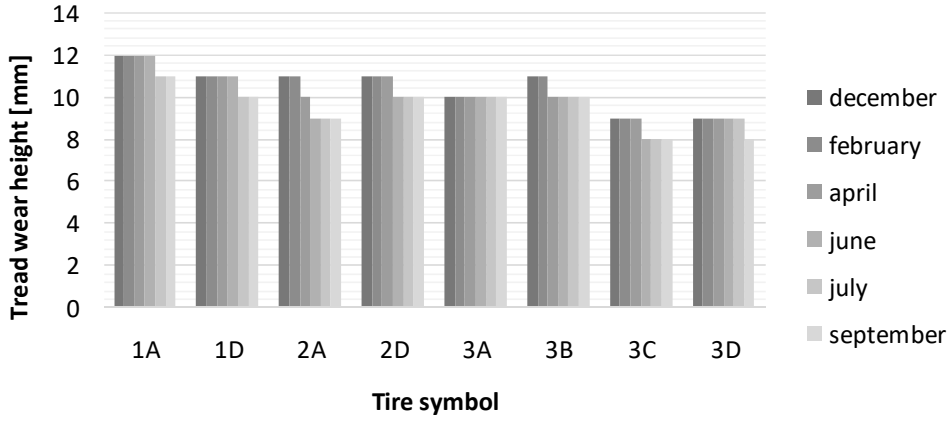

Fig. 8: Measurement of the tread height in the subsequent months of tyre operation for a truck (vehicle D) (own elaboration)

In the case of these vehicles, a positive impact of the monitoring and decision making system on the state of the tyre quality was also observed, with no need to cut the tread during the entire test period in any of the kits analysed.

In trailers of vehicles monitored from A to E, the tread height after 10 months of operation ranged from 8 to 11 mm (Tables 7 and 8).

Table 7: Measurement of the tread height [mm] of MegaTele vehicle B trailer (own study)

Vehicle B	Measuring tread height [mm] per month:					
tire symbol	**December**	**February**	**April**	**June**	**July**	**September**
1A	10	10	10	10	10	10
1B	10	10	9	9	9	9
1C	9	9	9	9	9	9
1D	9	9	9	9	9	9
2A	11	11	11	11	10	10
2B	11	11	11	11	11	11
2C	12	11	11	11	11	11
2D	11	10	10	10	9	9
3A	9	9	9	9	9	9
3B	9	9	9	9	9	8
3C	9	9	8	8	8	8
3D	9	9	9	9	9	9

The highest abrasive tread wear in these trailers' tyres was observed at 2 mm, representing about 13.34 % of the optimal tread height in the tyres (Table 8.).

Table 8: Measurement of the tread height [mm] of MegaTele vehicle C trailer (own study)

Vehicle C	Measuring tread height [mm] per month:					
tire symbol	**December**	**February**	**April**	**June**	**July**	**September**
1A	9	9	9	9	9	9
1B	9	8	8	8	8	8
1C	9	9	9	9	9	9
1D	8	8	8	8	8	8
2A	12	12	11	11	11	10
2B	12	11	11	11	11	11
2C	10	10	10	10	10	10
2D	10	10	10	9	9	10
3A	8	8	8	8	8	8
3B	9	9	9	9	9	8
3C	9	9	9	9	9	9
3D	9	9	9	9	9	8

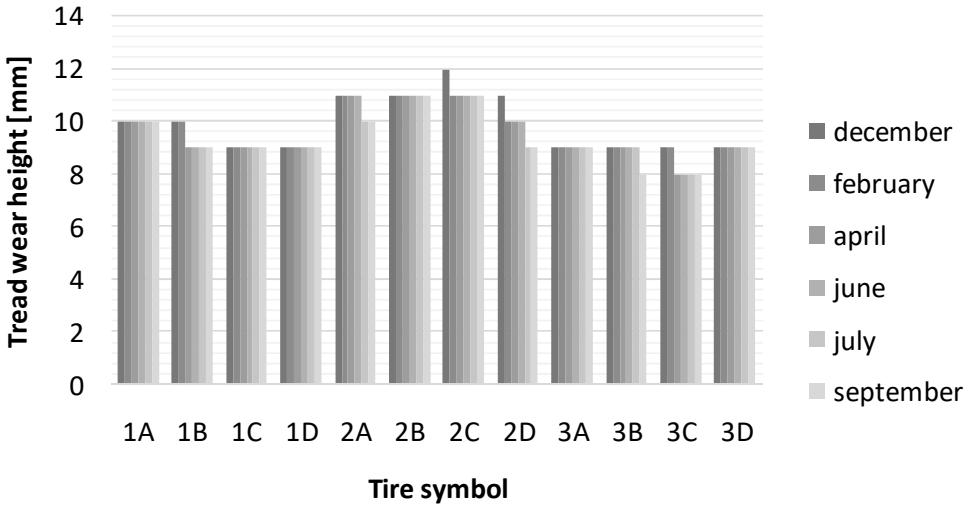

Fig. 9: Measurement of the tread height in the subsequent months of tyre operation for a trailer (vehicle C) (own study)

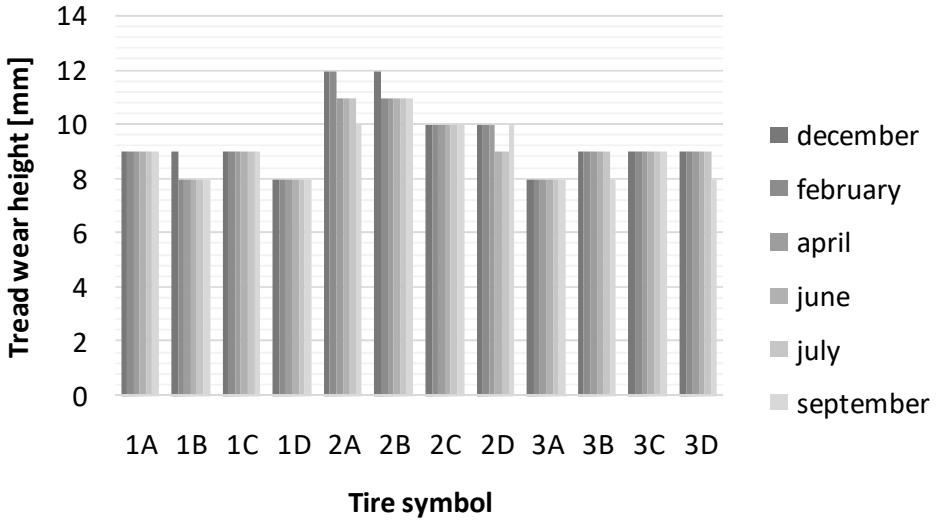

Fig. 10: Measurement of the tread height in the subsequent months of tyre operation for a Mega Tele trailer (vehicle B) (own study)

The tyres of axles 1 and 3 of trailers were used the most, which was observed Turing registration of tread height measurements (Fig 10.). The middle axles (2) of trailers were characterized by the highest values of tread height, which may indicate uneven distribution of loads on the trailer.

On the basis of the data presented and their analysis, it can be concluded that the tread wear is much slower in the trucks of the vehicles to be monitored than in the trucks of vehicles without a monitoring system installed. The recorded tread wear of tyres in heavy transport vehicles with monitoring was between 6.67 and 13.34%, while in the same period (after 10 months of operation), it was as high as 50-70% in vehicles without monitoring. In trucks for these vehicles, regrooving had to be done.

Therefore, it can be concluded that maintaining the tire pressure at the appropriate level recommended by the manufacturers results in longer tire life and lower tread wear, which is consistent with the results of the authors'

research: Kulikowski et al (2014), Oduro et al. (2015) and in Regulation (EC) No 661/2009. Additionally, the literature shows that lower tread wear translates into to increase vehicle traction. Therefore, continuous monitoring of the tyre pressure with an accuracy of 0.01 MPa, it allowed procedures to be initiated to correct the incompatible parameters, which contributed to lower tread wear and thus improved vehicle traction. Thus, the validity of the test hypotheses was demonstrated.

Concluding, it should be stressed that the relatively low abrasive wear of the tread of the tyres of monitored vehicles is primarily influenced by the decision-making process. The quick and immediate reaction to changes in tyre pressure makes it possible to ensure a proper tyre life process. It can be concluded that the newly developed system installed is an effective tool to make the right decision on the alignment of monitored parameters during vehicle operation. In addition, it should be noted that the alerts sent by the installed monitoring system to both the driver and the dispatcher have resulted in drivers not ignoring the alerts. Dual control of their decisions has eliminated the cases of delayed driver's reaction to an emerging alert. Maintaining the correct tyre pressure during vehicle operation has resulted in longer service life and reduced abrasive wear compared to tyres used in trucks without a continuous monitoring system to support the decision-making process.

Statistical tests for the significance of differences in tread wear

Statistical tests were carried out on the significance of the differences between tread wear in vehicles with and without monitoring. The tread wear of tyres on the wheels of trucks and trailers was considered separately. Due to the highly differentiated initial tread height, wear during the month expressed in [mm] was determined. Cases in which the recorded tread height in the following month was higher than in the previous month were considered as measurement errors and removed. Four such cases were noted. Measurements after regrooving were not taken into account due to the heterogeneity of the data sequence resulting from the combination of values before and after regrooving. After the regrooving operation, the tyre tread wears much faster and the regrooving was only carried out on car tyres without monitoring. The table presents basic statistics on the monthly tread wear values and the *N-test* size (Table 9).

Tab. 9. Statistical parameters (own study)

Variable	N	Average	Median	Min.	Max.	Lower Quartile	Upper Quartile	Std dev.
truck with monitoring	220	0,15	0,0	0,00	2,0	0,00	0,0	0,39
truck without monitoring	116	0,80	0,5	0,00	7,0	0,00	1,0	1,20
trailer with monitoring	330	0,10	0,0	0,00	2,0	0,00	0,0	0,30
trailer without monitoring	252	1,00	1,0	0,00	7,0	0,00	1,0	1,13

The differentiation of monthly consumption values is also presented in the box diagram (Fig 11.).

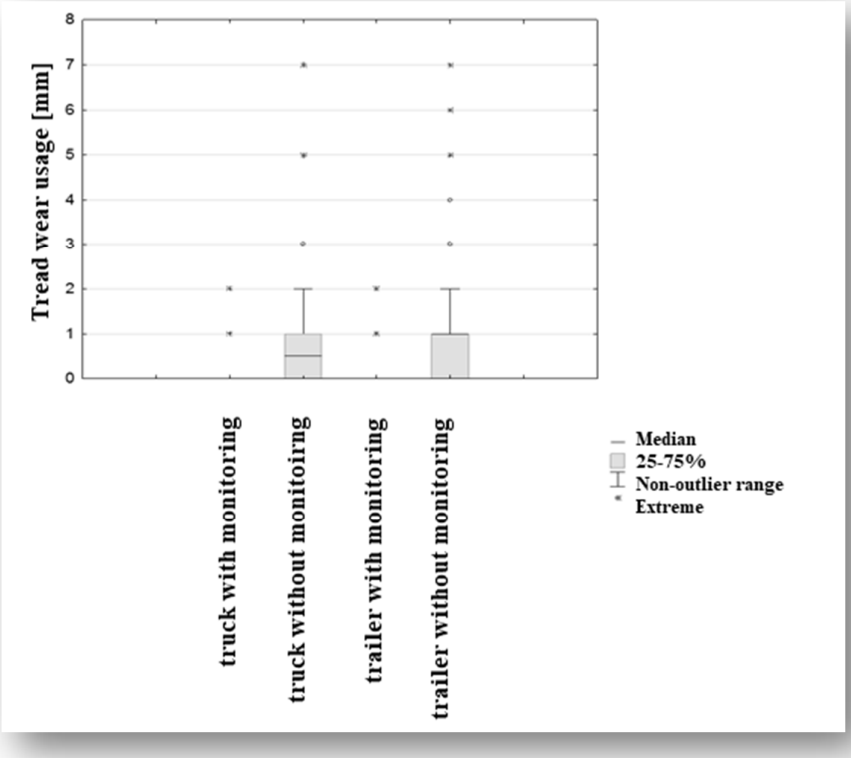

Fig. 11: Box diagram of statistical parameters (own study)

Significantly greater variation and higher tread values are visible for car tyres without monitoring. For both truck and trailer tyres with monitoring, the third quartile is equal to zero, which means that at least 75% of the measurements show no measurable tread wear during the month of operation. Tires without monitoring were wearing faster and tread was as high as 7 mm for both truck and trailer tires. In order to objectively assess the significance of the differences in tread wear between tyres with and without installed monitoring system, a t-test of equality for independent variables was conducted. The tread on the wheels of trucks and trailers was compared separately. Each time a zero hypothesis of equal average tread values was made with an alternative hypothesis of their differences. A variance compatibility test was also carried out for each pair of variables. The results of statistical tests are presented in Table 10.

Table 10: Student's t test (own study)

Variables	The value of the statistics t	p-value	decision	Quote F variance	decision
Trucks with/without monitoring	-7,33	0,00	Reject H_0 They differ	9,31	Different variants
Trailers with/without monitoring	-13,88	0,00	Reject H_0 They differ	12,91	Different variants

In each case, test t indicated a rejection of the zero hypothesis in favour of an alternative hypothesis indicating a statistically significant difference of α=0.05 between the wear of the tread without monitoring and with it. The F-value of variance indicated that also the variation measured by the variance is statistically significantly different.

The analysis confirms the effectiveness and legitimacy of monitoring in terms of reducing tread wear and thus increasing tyre life and reducing costs for tyre replacement.

Conclusion

The installed system of continuous monitoring of tyre performance allows for the sudden detection of drops in tyre performance. In addition, it has enabled the generation of alarms and notifications, allowing immediate reactions and decisions on corrective actions to be taken in the process of tyre operation. The system has indirectly reduced waste in the form of used tyres, as well as the wear and tear of tyres and improved the passive safety of heavy transport vehicles.

The following conclusions were drawn during the research:

1. Tyre tread wear was reported to be between 7 and 13% for vehicles equipped with a monitoring system, while for the same period (after 10 months of operation), it was as high as 50-70% for vehicles without monitoring,
2. in trucks of vehicles without monitoring, a regrooving should have been done. In trucks of monitored vehicles, such a necessity has not been noted,
3.the statistical analysis carried out confirms the effectiveness and legitimacy of monitoring in terms of reducing tread wear and, consequently, increasing the durability of tyres and reducing the costs of replacing them.

On the basis of the studies and observations carried out, it can be considered that making decisions on the basis of the measurement results obtained from the monitoring system makes it possible to reduce the company's costs related to the operation of its tyres through lower tread wear and less frequent tyre replacement.

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Methodological Basis of the Market Rent Determination for Specialised Property of the Enterprise

Svetlana PUPENTSOVA
Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia, pupentsova_sv@spbstu.ru

Maria LIVINTSOVA
Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia, livintsova_mg@spbstu.ru

Olga SHABROVA
Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia,
shabrova@list.ru

Abstract

Purpose – The purpose of this paper is to solve the problem of validation of the market rental rate for specialised movable and immovable property.
Design/methodology/approach – It uses the method of iterative calculations in the framework of the cost approach.
Findings – The paper presents a step-by-step algorithm for the implementation of the method of assessing the market rental payment for specialised property of the enterprise in underdeveloped market, where there are no proposals for renting of such objects. It allows to develop a methodology for assessing market rental rate. To determine the rental rate of surplus and non-core property, it is necessary firstly to calculate the market value of such property, and then at a known value of the object and the market rate of return on capital to choose rental payment that will allow recouping capital investments and ensuring regular income. In the construction of cash flows of the rental business, tax payments and management costs are taken into account.
Practical implications – The obtained value of the rate of return on equity for cash flow can be used in the calculation of the current value of cash flows of rental income.
Originality/value – The paper clarifies the market rental payment for specialised property of the enterprise received using the cost approach. The paper calculated the discount rate on the models of the CAPM and the WACC and received rental income for the transfer of specialised property for rent.

Keywords: Asset valuation, Specialised assets, Market value of the rent, Rental payment

Introduction

In the post-crisis period, when the company's cash flows slow down the growth rate, the management of surplus and non-core assets will help to maintain the competitive position of the company in the market, and in the most successful cases, to bring an increase in the market value of the equity. Excess and non-core property, as a rule, requires maintenance costs (including tax payments) and is not involved in the generation of income of the enterprise. The lease of such property will allow the company to cover the necessary operating costs and increase the non-operating profit of the company. To offer this property for rent, the owner will be required to assign a market-based rental rate.

The scientific novelty of this research is in presentation of a model for the implementation of the method of assessing the market rental payment for surplus and non-core property of the enterprise, developing a methodology for determining the market rental payment.

The paper solves the problem of justification of the market rental payment using the method of iterative calculations in the framework of the cost approach. The proposed step-by-step algorithm for determining the rental income is suitable for defining of the market rental payment for specialised assets of the company in an underdeveloped market.

The paper deals with specialised assets that are a business forming unit (part of the property complex) at industrial enterprises of chemical, coal, oil and gas industries. Specialised assets are defined in paragraph 14 of the FSO No. 10 (2015) as “a set of technologically related objects that are not presented on the market as an independent object and have a significant value only as part of the business”. Here is an example of an aggregated list of specialised

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production assets on the balance sheet of three organisations in Russia (for example of the chemical industry) (see Fig. 1).

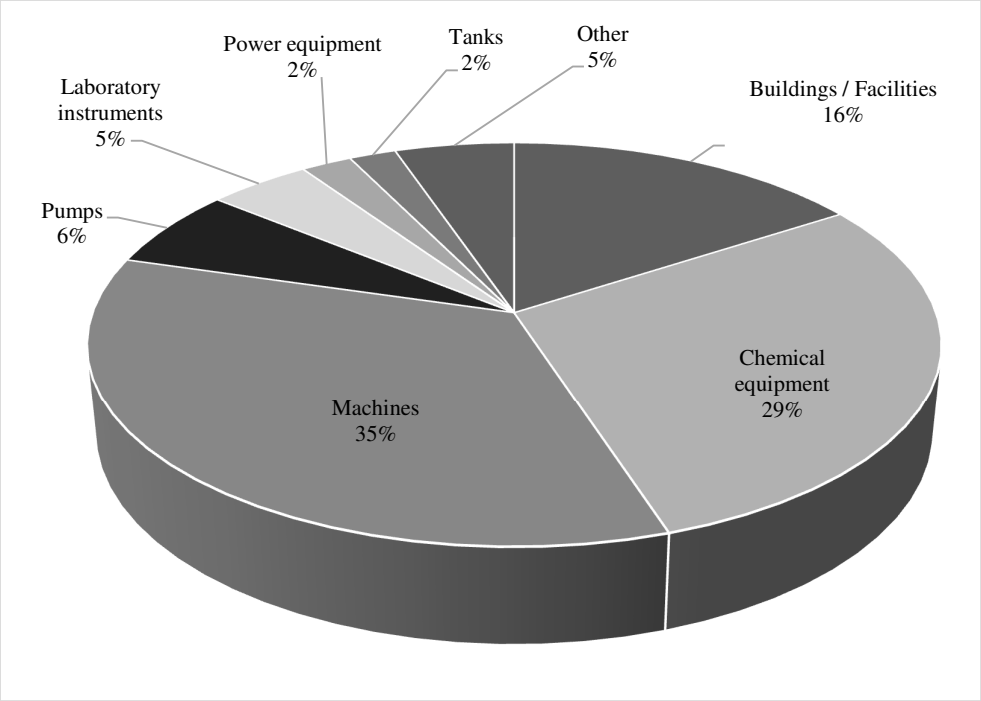

Source: Data of public joint stock companies of chemical industry.

Fig. 1: The structure of assets of chemical enterprises.

It can be seen on the diagram (Fig. 1) that about 70 % of the initial balance cost is contained in machines, chemical equipment and pumps, another 20 % is contained in real estate (buildings, facilities and tanks). It should be noted that specialised property does not have an independent utility for continued use. The use of specialised property as a part of the entire production complex determines the usefulness of such assets. The rented objects can have an independent utility only in liquidation proceedings. However, the authors in the framework of this paper do not consider such situation.

Literature Review

The chosen research topic extends the Value Based Management (VBM) approach, since the company increases cash flows by leasing surplus specialised property. The principles and methods of VBM are widely used in many corporations in different countries. The works of the founders of two consulting companies (Stewart, 1991; Rappaport, 1999) were main catalyst for the development of the VBM approach. In these works, an attempt is made to rethink the main role of hired managers of the company, which, according to the authors' opinion, is to create and increase the value of the company in the interests of its owners. Recognition of this purpose means the need for the next review of corporate strategic guidelines, as well as criteria for assessing the efficiency of the assets in-use that are at the disposal and control of company's managers (Izmaylov and Kobzev, 2019).

Surplus assets without management outflow the company's cash, while the option of leasing such assets will solve this problem.

Works (Damodaran, 1996; Damodaran, 2002) raise the issue of increasing the cost of equity through the management of excess assets. Such assets may generate additional rental income. However, author does not consider the issue of setting a market rental rate for such assets of the enterprise.

Ozerov and Pupentsova (2015) give an algorithm for calculating the rental rate of the real estate. This algorithm is applicable to commercial real estate objects in the established rental market.

Pupentsova and Livintsova (2018) propose an algorithm for determining the market rental rate of the commercial real estate in a developed market with a sufficient number of analogous objects.

In the Federal valuation standard (FSO No. 10, 2015), it is proposed to apply the methods of the cost approach to assess specialised property.

In the methodology of Gazprom, PJSC (Yatsenko, 2012), when determining the rental payment of excess property, only the lessor's costs and the rate of profit are taken as the basis. Moreover, the rate of profit is justified by federal and domestic norms of the enterprise.

In the works of the above-mentioned authors, not enough attention is paid to the procedure of assessment of the rental income from the specialised assets in an underdeveloped market.

It should be noted that the issue of assigning market rental payment for such specialised assets, despite its relevance, is not disclosed in the normative documents on property valuation and in the works of the authors (Bakhvalov et al., 2015; Rhaiem et al., 2007; Bukharin et al., 2011; Pupentsova, 2012; Shabrova et al., 2017; Kozlov et al., 2017; Fitz-Gibbon, 2018; Konowalczuk, 2018; Grigoryev and Kozin, 2006).

Jansen van Vuuren (2016) argues that the profits method, specifically a discounted cash flow (DCF) based profits method, should be the preferred method of valuation when valuing specialised property than the cost approach in taking into account systematic and unsystematic risk.

A Description of The Methodology

The specialised assets of an enterprise are limited to a specific type of functional use and have a closed, non-competitive, passive or asymmetric market, or none at all. When evaluating such assets, a limited set of approaches, methods and valuation techniques can be applied. They often require modification or revision.

According to the valuation methodology, the market property rental rate is determined by the methods of comparative, cost and income approaches. In practice, the most commonly used comparative approach is based on information about similar transactions (offers to rent transactions), which implies the existence of a well-developed market. If there are no data on the rental rates typical for the lease of specialised non-core and excess property of the enterprise, the comparative approach is not applicable.

From the point of view of the cost approach when determining the rental rate, the lessor intends to ensure the return of capital and income on capital invested in the creation of the object. To determine the rental rate, it is necessary "at the first step to assess the market value of the rented object by the methods of the cost approach (of course, taking into account the profit of the developer's project and the value losses due to wear and obsolescence). If the new owner has purchased an object for use as a financial asset, then as a property owner he will accept the evaluation of the object by the method of comparative analysis of transactions. For a typical lessor, it is advisable to determine the market value at this first step using both cost-based and comparative approaches. At the second step, the appraiser finds the potential total income and rental rate at the known value of the object and the market rate of return on capital" (Ozerov and Pupentsova, 2015, pp. 291-292).

To determine the market rental rate by using the income approach, it is necessary to determine the maximum allowable for the tenant "the value of the rental rate, based on his ideas about the permissible value of the expected business income, which he would consider possible to give for the use and ownership of the rented property extracting these revenues. Here the annual income from the business of a typical tenant is necessary to distribute between all types of factors of production, isolating the amount "generated" by the rented specialised property, that is, determining the "additional productivity" of improvements on the residual principle. This amount ("additional productivity") will determine the amount of market rental rate of a typical tenant for the use of the object during the relevant period" (Ozerov and Pupentsova, 2015, p. 292). As a rule, the income approach is not used for determining the market rental rate, since the allocation of the total amount of income and expenses of the part that is directly related to the estimated specialised asset is associated with a large error.

Let us consider the algorithm for calculating the market value of rental rate for specialised property, including real estate and technological equipment, which is excessive for business. The implementation of the algorithm includes iterative calculations, that is, multiple calculations on the argument x (rental rate). The *iterative process* of solving the equation $f(x) = 0$ consists in a sequential refinement of some initial approximation of x_0. The sequence of approximate values of the root: $x_1, \ldots, x_n$, is a result of iterations. If these values with an increase in the number of n iterations approach the exact value of the root x^* (that is $\lim_{x\to\infty} x_k \to x^*$), it is said that the iterative process of the solution converges, otherwise, it diverges (Bakhvalov et al., 2015, p. 326). Calculation steps will be considered further:

1. First of all, the full cost of the expenses of reproduction (replacement) of rented specialised production assets must be calculated in order to determine the market value of the rental rate of specialised objects. Next, the presence or absence of external wear should be identified. The value of the costs of creating the entire production complex needs to be determined.

The cost of reproduction (replacement) of leased specialised assets is determined by the methods of comparative and / or cost approaches. Physical and functional wear is assumed to be zero, since, most often, under rent agreements, all expenses associated with the payment of current and capital repairs are paid by the tenant independently. The reproduction costs are adjusted by the amount of external wear, if any.

2. The discount rate (the rate of return on capital) is determined. As a rule, the rate of return of rental cash flows will be lower than the rate assessed for the enterprise industry due to a lower risk premium and a different capital structure from the business.

3. The value of rental income is entered in the initial approximation of x_0.

4. The amount of operating expenses (at least, property tax and management expenses) is calculated.

5. The cash flow is constructed for the assigned approximate rental income.

6. The capitalisation ratio is determined for the reversion and the value of the reversion.

7. The current value of cash flows is calculated.

8. An iterative calculation of rental income is made, in which the present value of cash flows is equal to the market value of the specialised property of the enterprise.

Results and Discussions

Based on the experience of assessing the assets of enterprises, the revalued value of non-current assets may exceed its book value several times. The owner needs to compensate for the return of capital on the reproduction of assets, so the use of book value as a basis for determining the amount of rental payment for specialised property is not acceptable. First, it is necessary to calculate the full cost of the reproduction or replacement of rented specialised production assets due to determine the market value of the rental payment of specialised objects. Next, the presence or absence of external wear should be identified. It is necessary to determine the value of the cost of creating the entire production complex. The methodology of determining the cost of reproduction (replacement) with use of comparative and cost approaches, as well as methods for identifying and calculating the amount of external wear are not considered in the current study. Detailed approaches and methods of assessing the market value of assets can be found in any methodological publication on the valuation of assets, for example, in (Ozerov and Pupentsova, 2015; Bakhvalov et al., 2015; Damodaran, 1996 & 2002; Rhaiem et al., 2007; Bukharin et al., 2011; Pupentsova, 2012; Yaskevich, 2005; Zelenski, 2008; Grijalva et al., 2018; Sharov & Schneiderman, 2015; Giglio et al., 2015; Gloukhov et al., 2014; Bril et al., 2018).

The discount rate is determined for the invested capital according to the WACC (weighted average cost of capital) model (Damodaran, 1996 & 2002; Rhaiem et al., 2007; Bukharin et al., 2011; Pupentsova, 2012; Magni, 2015):

$$Y_o = M \cdot Y_m + Ye_{rur} \cdot (1 - M), \tag{1}$$

where

Y_O – the weighted average rate of return on invested capital;
Y_m – the rate of return on borrowed capital;
M – the share of borrowed capital;
Ye_{rur} – the rouble rate of return on equity.

The rate of return on equity is determined by the modified CAPM model (capital assets price model). The algorithm for calculating the rate of return on equity is given in (Bukharin et al., 2011; Pupentsova, 2012; Bakhramov and Gloukhov, 2011):

$$Ye_{\$} = Y_{rf} + \beta \cdot (Y_{\max} - Y_{rf}) + S_1 + S_2 + S_3, \tag{2}$$

where
$Ye_{\$}$ – investor's expected rate of return on equity;
Y_{rf} – the risk-free yield (in the US);
β – the beta-ratio;
$(Y_{max} - Y_{rf})$ – the market premium for equity risk (in the US);
S_1 – the premium for country risk (for example, Russia compared with the US);
S_2 – the premium for a small capitalisation;
S_3 – the premium for the specific risk of the assessed company.

Despite the fact that a large share of the property falls on specialised equipment, the size of the beta-ratio (β) is chosen for the "Real Estate (Operations & Services)" industry. Such choice is because when renting equipment the industry (chemical, coal, oil, etc.) risks are minimised and become the most similar to the risks when renting real estate.

The specific risk is assumed to be 0 %, since the object of the study is the property complex, which has no specific risks.

The transition to the rouble norm is carried out, taking into account the assumption that the excess of the absolute value of the rouble cost of capital (Ye_{rur}) over the US dollar ($Ye_{\$}$) is equal to the excess of the yield of Russian government long-term bonds denominated in roubles (R_{rur}) over the yield of Eurobonds ($R_{\$}$), and is made according to the formula:

$$Ye_{rur} = \frac{(1+R_{rur})\cdot(1+Ye_{\$})}{(1+R_{\$})} - 1. \quad (3)$$

The cost of borrowed capital is determined at the level of interest rates on loans issued by banks to non-financial organisations for a period of more than three years.

The initial data for calculating the rate of return on equity are given in Table 1.

Table 1: Parameters for calculating the discount rate on the CAPM model (January 2019)

Name of indicator	Target value	Definition base / Source	Reference to a source
The risk-free yield – Y_{rf}	2.92%	30-year US Treasury bonds yield, %	Economic Time Series Page[1]
The market premium for equity risk – $(Y_{max} - Y_{rf})$	3.26%	Excess of the yield of shares of public companies over the yield on US Treasury bonds for the period from 1928 to 2017	Damodaran, A.[2]
The beta-ratio without financial leverage – β	0.90	Damodaran industry (US): Real Estate (Operations & Services)	Damodaran, A.[3]
The country risk premium – S_1	3.47%	The long-term credit rating of Russia established by international rating agencies is used	Damodaran, A.[4]

[1] Analytical materials on the main market indicators. Economic Time Series Page. [Online]. Available: URL: http://www.economagic.com/em-cgi/data.exe/fedbog/day-tcm30y (accessed 07.04.2019).

[2] Damodaran, A. Analytical materials on the main market indicators. [Online]. Available: URL: http://pages.stern.nyu.edu/~adamodar/pc/datasets/histretSP.xls (accessed 05.05.2019).

[3] Damodaran, A. Analytical materials on the main market indicators. [Online]. Available: URL: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html (accessed 05.05.2019).

[4] Damodaran, A. Analytical materials on the main market indicators. [Online]. Available: URL: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html (accessed 07.04.2019).

Name of indicator	Target value	Definition base / Source	Reference to a source
The small capitalization premium – S_2	1.75%	The difference between the average return on investments in the US stock market and the average return on investments in the company's business with a particular capitalization	Valuation Edition 2018 Yearbook[5]
The yield of Russian government long-term bonds denominated in rubles – R_{rur}	8.75%	OFZ-46020 repayment 06.02.2036, Ticker: RU000A0GN9A7	Markets now[6]
The yield of Eurobonds denominated in dollars – $R_{\$}$	4.86%	Eurobonds of the Russian Federation 2042 repayment 04.04.2042, Ticker: XS0767473852	Markets now[7]

The transition from the beta-ratio excluding financial leverage to the beta-ratio taking into account the financial leverage is not performed, as the cash flows of the model are built before taxation. The rate of return for the currency cash flow on the CAPM model, calculated before tax, will be:

$$Ye_{\$} = 2.92\% + 0.90 \times 3.26\% + 3.47\% + 1.75\% = 11.07\%.$$

Then, the rouble rate of return on equity on the CAPM model for cash flow calculated before taxation will be equal to:

$$Ye_{\text{rur}} = (1 + 11.07\%) \times (1 + 8.75\%) / (1 + 4.86\%) = 15.2\%.$$

The following input parameters are accepted for the WACC investment rate:
– the cost of borrowed capital is determined on the basis of interest rates on loans for more than 3 years issued in roubles. According to the Central Bank of the Russian Federation it is equal to 8.63 % (Banking Bulletin, 2019);

– the target capital structure for the Real Estate (Operations & Services) industry according to (Damodaran, 2019[4]) is 65.34 %. As mentioned above, the choice is due to the fact that when renting the risks of the industry (chemical, coal, oil, etc.) are minimized, and become most similar to the risks of renting real estate. Then the optimal share of the debt capital for the selected industry corresponds to 39.52 %.

Thus, the rate of return on invested capital under the WACC model for pre-tax cash flow, as a weighted average of the capital structure, is:

$$Yo = 15.2\% \times (1 - 39.52\%) + 8.63\% \times 39.52\% = 12.6\%.$$

It should be noted that in Russia the above discussed models are often used in real estate and specialised property appraisal practice. But, taking into account the opinion of the authors (French, 2004; French and Gabrielli, 2018) that at present the CAPM and WACC models are not widely used in practice in European countries for property valuation, the obtained result will be confirmed by the opinion of professional experts. This paper authors recommend specialists of the Committee for Appraisal Activity of the Association of Banks of the North-West (Russia) as experts.

Recommended specialists annually, within the framework of the project for collecting opinions of banks, issue a survey of the opinion of specialists from the collateral divisions of seven banks.

According to the survey results (2018), experts of the Committee for Appraisal Activity of the Association of Banks of the North-West recommend using the discount rate for the real estate market and specialized equipment at the level of 11-16 %. Further the average value of the discount rate for the valued property will be determined. To do this, from the expert opinion on the recommended rates, the segments that are most suitable for the valued property are selected and the average value for the groups is calculated (see Table 2).

[5] Stocks, Bonds, Bills and Inflation, SBBI. [Online]. Valuation Edition 2018 Yearbook. Available: URL: https://duffandphelps.onfastspring.com/books (accessed 22.04.2019).

[6] Bonds. Markets now. [Online]. Available: URL: www.quotenet.com (accessed 22.04.2019).

Table 2: Recommended discount rate by property segments

Segment	Lower limit	Upper limit	Average value
Office property (class C, detached buildings)	11%	14%	12%
Warehouse property (class C, detached buildings)	11%	15%	13%
Industrial and warehouse real estate, detached buildings, complexes	12%	15%	12%
Special purpose equipment	13%	24%	16%
Standard equipment	8%	14%	10%
Mean	11%	16%	12,6%

Source: Committee for Appraisal Activity of the Association of Banks of the North-West, 2018.

Thus, the result of the discount rate, determined by modelling according to formulas (1) and (2), is confirmed by experts' opinion based on the survey of highly professional experts in the field of appraisal, collateral and financing. Further, for the calculations, the authors choose the discount rate determined by the WACC model and confirmed by experts' opinion at the level of 12.6 %.

Operating expenses of an enterprise that leases specialised property include property tax and management costs. In the framework of the study, an assumption is introduced that under the terms of the lease agreement the tenant carries out the current and major repairs. Therefore, the repair costs are not taken into account in the construction of cash flows.

Property tax according to the Tax code of the Russian Federation is 2.2 % of the average annual value of the property (Article 380 of the Tax code of the Russian Federation).

Management costs are usually determined by the level of expenses of management companies, which for real estate are from 5 % to 25 % of the revenue. Large values of management costs are associated with the need for advertising, searching for tenants and the organisation of public services.

To calculate the depreciation, weighted average period of economic life (WAL) is determined according to the formula (Pupentsova et al., 2017):

$$WAL = \frac{\sum_{i=1}^{t}(TRC_i \times Pel_i)}{\sum_{i=1}^{t} TRC_i}, \quad (4)$$

where

TRC – the total cost of reproduction or replacement of property and equipment;
t – the number of property and equipment;
Pel – the period of the economic life of the property.

Thus, in Table 3, the weighted average economic life of the leased property is 30 years. Then the annual depreciation rate for the analysed group of assets is 1/30.

Table 3: The calculation of the weighted average economic life (chemical industry enterprise)

Type of property and equipment	Share by costs of reproduction, %	Depreciation of property and equipment, %	The period of the economic life, year	WAL, year
Total	100%			
Reinvested property, including:	65%	45%	30	17
reinvested short-lived	*4%*	*50%*	*10*	*5*
reinvested long-lived	*96%*	*45%*	*31*	*17*
Nonreinvested property	35%			

Source: own study.

The next step, the amount of rent is entered in the first approximation, for example, 10 % of the market value of the leased objects. Cash flows for the entire forecast period are calculated. An annual increase in rental payment at the level of inflation is planned to lay in the lease agreement. Inflation is accepted according to data of the Ministry of economic development of the Russian Federation (Forecast of social and economic development 2019).

The present value of cash flows is calculated by the formula:

$$Vo = \sum_{j=1}^{n} \frac{Io_j}{(1+Yo)^j} + \frac{Vo_n}{(1+Yo)^n}, \quad (5)$$

Where

Io_j – the cash flow of the *j*-th forecast period;
Vo_n – the property value at the end of the forecast period (reversion value);
Yo – the discount rate determined by the WACC model;
n – the forecast period, years.

Gordon's model is used to calculate the reversion (Bukharin et al., 2011; Pupentsova, 2012; Shabrova et al., 2017; Giglio et al., 2015; Michaletz & Artemenkov, 2018). The value of the property at the end of the forecast period is determined by the ratio of cash flow in the *n*+1 period to the capitalisation ratio, which is equal to the difference between the discount rate and the growth rate of cash flows in the post-forecast period (Ozerov et al., 2018).

Since the market rent is determined on the basis of the condition that the invested capital should not only pay off, but also bring a regular income, the resulting current value of cash flows is reduced to the market value of the lease objects by selecting the market rental payment by iterative calculations. Table 4 shows an example of calculation of cost of rental payment of the specialised assets based on the assumption that the cost of reproduction or replacement is equal to 100 million c. u. (1 c. u. = 1 Euro), the average percentage of depreciation is equal to 1/30 (*Pel* = 30 years), the rate of return is 12.6 %. The rate of return includes inflation and is adopted constant for the entire forecast period. Management costs are taken at 5 %. The average annual growth of cash flows for the last 2 years of the forecast period was 5 %. This level is adopted for the post-forecast period.

Table 4: The calculation of the market rent by an iterative calculation

Indicator	Data at the valuation date	1	2	3	4	5	6	7	8	9	10	Post-forecast
The value of the asset, million c. u.	100	97	93	90	87	83	80	77	73	70	67	63
Depreciation, million c. u. per year	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Inflation, %	4.27	5.0	4.2	4.2	4.2	4.1	4.1	4.1	4.0	4.0	4.0	4.0
Rental income, million c. u. per year	*9.2*	*9.7*	*10.1*	*10.5*	*11.0*	*11.4*	*11.9*	*12.4*	*12.9*	*13.4*	*13.9*	*14.5*
The estimated property tax, million c. u. per year	–	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5	1.4
Management costs, million c. u. per year	–	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7
Total costs, million c. u. per year	–	2.7	2.6	2.5	2.5	2.5	2.4	2.3	2.3	2.3	2.2	2.1

Indicator	Data at the valuation date	1	2	3	4	5	6	7	8	9	10	Post-forecast
The operating income, million c. u. per year	–	7.0	7.5	8.0	8.5	8.9	9.5	10.1	10.6	11.1	11.7	12.4
Cash flow growth, %									55.42	55.32	55.22	55.14
Reversion, million c. u.											168	
Present value of the net operating income, million c. u.	48.6											
The present value of the reversion, million c. u.	51.4											
The present value of the asset, million c. u.	100											
Descent	0											

Source: own study.

Thus, with a rental payment of 9.2 million c. u. on the valuation date given at the rate of profit, the value of cash flows becomes equal to the estimated on the valuation date cost of leased property, which is equal to 100 million c. u. Therefore, provided that if "the invested capital should not only return, but also bring a regular expected income" (Ozerov & Pupentsova, 2015; Ozerov et al., 2018), then the market rental payment for specialised property will be 9.2 million c. u.

Conclusion

The step-by-step algorithm for determining the rental income for defining of the market rental payment for specialised assets of the company was proposed.

The simplicity of use of the developed algorithm for calculating the rental payment for the considered property will allow company's managers to offer an economically reasonable result. The logic of the calculation is clear and understandable to managers at all levels. The rental rate is selected depending on the market value of such property, the rate of return on capital and the payback period of capital investments. Tax payments and management costs should be taken into account when building cash flows for the rental business.

The result of the rental payment is sensitive to the rate of return on capital. Therefore, this paper focuses on the justification of the discount rate. The authors note that the discount rate is modelled for the Real Estate (Operations & Services) market. Such a choice is due to the fact that when renting specialised property, the risks of the industry are minimized and become most similar to the risks when renting the real estate.

In addition, within the framework of the paper, the discount rate has been determined by using the models of the CAPM and WACC for the Real Estate (Operations & Services) industry as of February 2019:

– the rouble rate of return on equity on the model of the CAPM for cash flow calculated before taxation was 15.2 %;

– the rate of return on invested capital on the WACC model was obtained at the level of 12.6 %.

The resulting value of the rate of return on equity for cash flow in roubles can be used to calculate the current value of cash flows of the rental income.

Future directions for further research are related to the construction of a model taking into account risk analysis and the application of the simulation method.

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An Overview of The Most Used Databases on The Portuguese Local Government

[1,2]Filipe SA, [1]Pedro MARTINS and [3]Maryam ABBASI

[1]CISeD - Research Centre in Digital Services, Polytechnic of Viseu, Portugal
[2]Artificial Intelligence and Computer Science Laboratory, University of Porto, Portugal
[3]University of Coimbra, Computer Sciences Department, Coimbra, Portugal
filipe.sa@estgv.ipv.pt, pedromom@estgv.ipv.pt, maryam@dei.uc.pt

Abstract

Selecting a database engine for governmental electronic services provided by different institutions has a direct impact on the performance. This paper compiled a ranking of the most used databases in the Portuguese town halls in the year 2019. For each DBMS, this study evaluates the IT department satisfaction, focusing on the following technical dimensions: customer support, global evaluation, licensing costs, documentation, ease of use, maintenance, performance, and security. Additionally, are identified the motives that lead to the selection of each DBMS. To gather information, 308 Portuguese city halls, were inquired, 104 answered (33,7%), allowing a confidence level of 95% with an error over the answers of 8%. The resulting DBMS ranking, the 2019 most used database engines in Portuguese city halls, is as follows (from the most relevant to the least): SQL Server Express, Informix, MySQL, SQL Server (pro version), Access, and Postgres.

Keywords: Survey, Database, Data Analysis, E-Government, Information Systems, Local Government.

Introduction

Recently, all public services work on top of electronic platforms. Most of these platforms have a front-end (where available services are available to the general target audience), back-office (where services are configured and managed), and one or more databases. Information stored inside the databases is intensively used to provide all kind of services to general citizens [28]. Therefore, the acquisition and implementation of a database management system (DBMS), should be carefully planned since it will have a significant real impact on the information availability. As the internet evolves, and consequently the cloud computing, the databases must cope with the large volumes of data efficiently, requiring performance for both read and write operations [11]. Abadi, Boncz [1], mention in their study that, the performance of the database systems is directly related with the efficiency of the system to store data, and in the ability to move them to the CPU registers for processing. In all sectors, the databases have a critical role, especially in business, electronic commerce, engineering, healthcare, genetics, education, library science and others [6]. Sharing the before mentioned point of view, Abramova, Bernardino [3], consider the databases the organization's vital point. The selection and decision of a database must obey to strict approaches, methodologies and rules, which abide organizational growth without harming performance. Even though when data is structured, its size is small, and databases operate relatively well. The increase of data volume requires, performance tuning and maintenance by specialized technicians, for instance, normalization and indexation [25].

This paper presents a study of the most used databases in the Portuguese public town halls, having into account the main reasons to select the adopted databases. Conclusions in this study consisted of several quizzes sent to the IT managers responsible for the IT town halls, aiming to find more about how and why they used their databases. Presented results allow to study the quality factors and pondered reasons to acquire a database management system, in the scope of the Portuguese government. Additionally, it allows concluding what the most adopted database management systems are.

This document contains five sections. Section 2 presents the state-of-the-art review. Section 3, describes how the quiz was performed, organized, and distributed to obtain answers regarding the motivations to select and use specific

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databases software. Section 4 shows the obtained results. Finally, in Section 5 conclusions are drawn, followed by the introduction of future work guidelines.

State of the art

Information systems comprehend several organizational activities which concern data; these activities include acquire data; storage; recover; manipulation; transmit information to other users [14]. Almost all information system includes data storage, which is done internally using databases, relational or non-relational. These databases present themselves as essential for managing modern society's information [3].

According to Silberschatz, Korth [21], database management systems differ significantly from storage systems and from programming environments. A DBMS consists of a collection of programs and services, that allow the user to insert, update, delete and query the stored data, therefore, making it easier to maintain and access the data [18]. It is essential to underline that relational databases were created as a technology to store structured data as tables., allowing to perform queries using SQL (Structured Query Language) [7]. For the authors, Viscusi, Batini [28], each DBMS represents a logical data schema, divided into classes where each relates between them. At the same time, the authors mention that relational databases within governmental institutions are constantly in use. Not only central government but also at local municipalities, electronic stores, sensors, city halls, mobile devices. For all cases where databases fit, vast amounts of data are being produced with different data-rates [8]. As proof of the importance of databases, in a study dated from 1989, the number of estimated databases in the world was already five million [9]. The most known and utilized database model is the relational, developed in 1969 by E. F. Codd, working as a researcher at IBM, the model assumes a set of theory and predicate logic [12]. Despite the familiarization with relational databases, in the last decades, many NoSQL databases were adopted in many large organizations [16]. According to [17], NoSQL databases were developed around 2000 to deal with the limitations of traditional SQL databases, especially concerning scalability, replication and the storage of non-structured data. For the author Vaish [27], NoSQL is the terminology for the database class that does not follow the same principles of relation databases, concerning ACID (Atomicity, Consistency, Isolation e Durability) properties. NoSQL is equipped to manage with scalability vs speed for enterprises such as google, facebook, yahoo, Twitter. When comparing NoSQL with traditional relational databases, NoSQL databases are projected to store data with simple structures, or like the object-oriented programming languages [24]. In studies carried by Bassil [5], the author tested and compared the database engines SQL Server, Oracle, IBM DB2, MySQL and the MS Access. In this comparative study, the author concludes that IBM DB2 shows a better performance, despite consuming more memory. At the same time, MS Access uses less CPU. These conclusions are supported by other authors, Sing, Sharma [22], that also tested query performance.

The 2019 ranking "DB-engines" identifies 330 database engines. By this ranking, in 2018 and 2019, the six most popular databases are Oracle, MySQL, SQL Server, PostgreSQL, MongoDB, and IBM DB2. Note that, in this top 6, there are six relational databases, and only one non-relational (MongoDB). The selection of a database engine has direct implications on the daily performance and organization of both enterprises and research [29]. The authors Abbasi, Sa [2], in the context of smart cities, consider the performance of database engines, test, and suggest the use of Cassandra, which is a NoSQL oriented engine. Another author, Liu and Luo [13] use PostgreSQL in their project, eGovMon, in the field of eGovernment, justifying the choice with the resources that PostgreSQL provides for data warehousing. Then authors Sourouni, Lampathaki [23] use SQL Server to implement ontology is oriented to represent concept relations in the domain of eGovernment and the development of associated services. Authors claim that the decision relies on performance and scalability.

In turn, Signore, Chesi [20], based on the eGovernment project CiTel, Oracle DBMS was the choice. Baraka and Madoukh [4], do not mention which DBMS engine is used to improve the Palestinian eGovernment but suggest that the SOA oriented model surpasses the actual in-place model in performance, interoperability, flexibility, and management. Authors Tsai, Choi [26], for the implementation of a GIS web-based project, decide to use Oracle or SQL Server for licensing reasons, aiming to reuse the organization DBMS's licences and optimize costs. The decision on which database to use is not consensual; it is not possible to say which is good or bad without first analyzing the context. The DBMS should be chosen very carefully, due to his cost and importance for the entire surrounding systems [19]. Based on all factors, this paper presents a study that allows assessing the most used DBMS's in the Portuguese government, having into account the specificity of the city town halls.

Survey/Quiz

Based on a survey, the central objective of this study is to identify the most used DBMS's by the Portuguese city town halls. From Marconi and Lakatos [15], a questionnaire is an instrument for collecting data with the resource to a set of ordered questions. This author points the negative aspect that questions answers are in written format, without the presence of the interviewer. By Gil [10], the survey is a technique based on a set of cross-questions to an individual with the aim to garter information regarding knowledge, beliefs, feelings, values, interests, expectations, aspirations, fears, behaviour, and others.

This study comprehends 308 Portuguese governmental city halls which were selected, aiming to maximize the number of answers, and obtain a clear picture of the reality.

The questionnaire was sent by email to all Portuguese city halls (On May 15, 2019), directed to the encharged of the department of Information Systems, and the limit date to reply to the questionnaire was until 2019, June 10.

The questionnaire questions are designed using the application "survey do Zoho". Based on the state-of-the-art literature, the questions are performed to the users.

- First page contains key sociodemographic questions. After validating that the inquired belongs to a city hall, it is essential to understand the number of inhabitants influences the: amount of provided services; technological resources; the number of IT workers.
- Next question is to understand the number of IT workers in the organizational IT department. The dimension of the IT department directly relates to the capacity to define, chose and identify work policies, data selection, and where to store it.
- - Other question aims to gather generic characteristics of DBMS's that participants value. By presenting to the user a set of possible features, participants can answer by selecting the most relevant ones. Table 1, , resumes the list of state-of-the-art DBMS most relevant features. Note that, an open field is also available, "others" so that participants can include new features.

After the generic database characteristics are select, participants must identify which DBMS they have in the governmental institution where they are associated. The list with possible databases to select is set accounting thirty most used databases present in the db-engines.com (2018). Anyway, to include all database engines, the user can add additional database engines. According to DBMS's identified by the user as being the most used in their organization, two further questions are performed individually.

- First (Q1): "What are the characteristics did you take into account to select/install/use the DBMS in the organization?"

Table 1: Database characteristics

Technical support	Key-value oriented	Support for transactions
Recovery in case of disaster/crash	Graph oriented	Support for the cloud
Compatibility with other softwares	Map-Reduce oriented	Support for ACID operations (Atomic, Consistency, Isolation e Durability)
Price	Memory oriented	Support for functions
Scalability	NoSQL oriented	Support for indexation
Available as a cloud service	Object oriented	Support for PL/SQL
Easy to install	Support for XML	Support for procedures
Easy to use	Performance	Support for SQL
Existing licensing	Global ranking	Support for triggers
Opensource	Required computational resources	Others

- Second (Q2): "How do you evaluate the DBMS that is currently in use in the organization?"

The Q1 reuses the listed databases shown in Table 1, with two extra options: “Used by a web-based software”; and “Used by an Enterprise Resource Planning (ERP) software”. These options exist to include specific databases software requirements, such as ERP software’s.

Q2 evaluates individually the installation and utilization of each DBMS in use. This evaluation uses the Likert scale with five positions. Considered dimensions for the Likert range include technical assistance; global evaluation; price; documentation; usage easiness; maintenance; performance; and security. Additionally, it is also provided with an open option for users to include new dimensions and observations.

After acquiring all the necessary data for the proposed study, with SPSS software data was imported for analysis.

Results

Obtained data for this result analysis, results from a quiz to 308 Portuguese town halls, from which 104 (33,7%) replied, allowing a trust level of 95% with an error of 8%. This sample is considered a valid reality representation of the DBMS’s utilization over the Portuguese central government institutions.

From the example, 11% of participants have a graduation, 18% have certification, 3% have higher education, 19% have a BSc, 15% have an MSc, and 3% have a PhD. Note that IT departments are gradually hiring better professionals with more academic formation. Moreover, most of the regional city councils have an average of 3 technicians. Finally, results show that larger cities have more significant IT departments. However, most of the participants show to have less than 50 thousand inhabitants (Table 2).

Regarding the results to the question “what are the most valued characteristics in a DBMS”, 67% of the participants selected “recovery in case of disaster/crash”. This identifies the importance and value that information plays in an organization.

Second most relevant characteristic is the “technical support” with 58.3% of the

Table 2: Number of answers by city hall size

More than 200.000	4
Between 150.001 and 199.999	5
Between 100.000 and 150.000	5
Between 50.001 and 99.999	16
Less than 50.000	74

answers. This choice demonstrates that public services consider the availability of their services as important. At the same time, because public services do not deal directly with the problems, having a good support service available in case of trouble is a critical factor.

Understandably, the performance is the third most relevant characteristic with 57.5% (the response time is directly related to users satisfaction). Compatibility and scalability, both with 50% of the votes. The price is the sixth identified characteristic, with 49% of the inquired selection. Pleasantly, it is good to know that public institutions consider the cost of the tools.

On the other side of the choices, characteristics such as NoSQL oriented, Global ranking, and memory oriented, are the less selected options, with respectively, 0.9%, 1.8%, 1.8%.

Table 3 shows all results, with a variance of 87.72, and a standard deviation of 9.26.

Table 3: Most valued characteristics in a DBMS

Characteristic	Frequency of times it is selected	Relative Frequency (%)	Variance	Standard Deviation
Recovery in case of disaster/crash	73	70,19%	0,209	0,457
Technical support	63	60,58%	0,239	0,489
Performance	62	59,62%	0,241	0,491
Compatibility with other software	54	51,92%	0,250	0,500
Scalability	54	51,92%	0,250	0,500
Price	53	50,96%	0,250	0,500
Support for SQL	53	50,96%	0,250	0,500
Easy to use	45	43,27%	0,245	0,495
Existent licensing	32	30,77%	0,213	0,462
Easy to install	30	28,85%	0,205	0,453
Open-source	27	25,96%	0,192	0,438
Required computational resources	21	20,19%	0,161	0,401
Support for transactions	17	16,35%	0,137	0,370
Support for PL/SQL	16	15,38%	0,130	0,361
Support for triggers	16	15,38%	0,130	0,361
Support for indexation	13	12,50%	0,109	0,331
Support for procedures	13	12,50%	0,109	0,331
Support for functions	10	9,62%	0,087	0,295
Support for XML	10	9,62%	0,087	0,295
Object oriented	8	7,69%	0,071	0,266
Support for ACID operations	8	7,69%	0,071	0,266
Support for the cloud	7	6,73%	0,063	0,251
Available as a cloud service	4	3,85%	0,037	0,192
Memory oriented	2	1,92%	0,019	0,137
Global ranking	2	1,92%	0,019	0,137
NoSQL oriented	1	0,96%	0,010	0,098

Regarding the databases, Table 4 shows the list of the most used databases. Gathered results present a variance of 39.67 and a standard deviation of 6.3. In general, the preferred database engine in this study is the SQLServer Express, which is present in 68.2% of the Portuguese town halls. Other results metrics show that participants evaluate the SQLServer Express in 3.51 points in a total of 5. Important to highlight that the "price" is characteristic with more relevance, showing an average of 4.17 points in 5. With average, 3.4 points in 5, are the characteristics of performance and security. Performance and Technical Support have an evaluation of 3.5 points in 5. Performance and technical support have 3.5 points in 5. Characteristics, easy to use, and documentation, are evaluated with 3.7 points in 5. In general, the features considered more relevance in this study, when choosing the SQLServer Express are the price, easy to install, easy to use, easy to, and integrate with an ERP software.

This study second most used DBMS is IBM Informix, which is present in 65.4% of the inquired users. Technical assistance and security have 4.01 points in 5. Informix global evaluation is 3.94 points in 5, followed by the performance with 3.85 points in 5. Licensing price, easiness to use, maintenance, and performance stand between 3

and 4 points (in a total of 5). Note that, most Informix users select this database based on ERP software, widely used among the town halls, which requires this DBMS. Already mentioned before, technical assistance and licensing are essential factors when pondering a DBMS section. Third BMS in the list is MySQL with 61% of the votes. Regarding the price for licencing, it has punctuation of 4.14 points in 5. Easiness to use, maintenance and performance, 3.9 points in 5. Despite having proper punctuation, the worst detected characteristic with 3.22 points in 5, is the technical assistance.

The fourth DBMS in the list is the SQL Server (commercial version) with 56.7% of the votes. Although characteristics are very similar to the express version, the price has worse punctuation. On the other hand, technical assistance improves. The identified requirement to use this DBMS is the dependability of web-based software.

Surprisingly, MS access is the fifth-ranked database, with 44.2% of participants preference. This position is due to the easiness to install and use. At last, in the fifth position is PostgreSQL with 37.5% of the votes.

Less used DBMS are ActionVector, ElasticSearch, Redis, SQLanyWhere, PostGIS and Disan. These last engines are used only by one town hall (Table 4 resumes the findings).

Table 4: Most used databases in Portuguese town halls in 2018

Databases	Frequency of times it is selected	Relative Frequency (%)	Variance	Standard Deviation
SQLServer Express	71	68,27%	0,217	0,465
Informix	68	65,38%	0,226	0,476
MySQL	64	61,54%	0,237	0,487
SQLServer – Empresarial Version	59	56,73%	0,245	0,495
Access	46	44,23%	0,247	0,497
Postgres	39	37,50%	0,234	0,484
Libreoffice	20	19,23%	0,155	0,394
Oracle	16	15,38%	0,130	0,361
MariaDB	14	13,46%	0,116	0,341
db2 - IBM	13	12,50%	0,109	0,331
Sqllite	7	6,73%	0,063	0,251
MongoDB,	4	3,85%	0,037	0,192
MS azure database	3	2,88%	0,028	0,167
Outra DB	2	1,92%	0,019	0,137
ActianVector vectorwise	1	0,96%	0,010	0,098
ElasticSearch	1	0,96%	0,010	0,098
Redis	1	0,96%	0,010	0,098
Sqlanywhere	1	0,96%	0,010	0,098
PostGis	1	0,96%	0,010	0,098
Disam	1	0,96%	0,010	0,098

Conclusions

This research work reflects an initial study that intends to identify the most used DBMS by the Portuguese government in the city town halls. Simultaneously, it is also recognized the reasons which lead to such selection/implementation, as well as the satisfaction level of each participant in the study.

In this study, based a set of questions, sent to 308 Portuguese town halls by email, 104 valid answers were collected, from which the ranking in this study results. Each database system is evaluated regarding, satisfaction, technical

assistance, globally, price, documentation, easiness to use, maintenance, performance, security, and performance. In simultaneous, the characteristics that justify the inquired participants were also collected.

The raking of the most used DBMSs presents in Table 4 show that, the DBMS with more votes are, SQL Server Express, Informix, MySQL, SQL Server (commercial version), Access, and PostgreSQL. The less-used databases, last in rank, are DiSAM, PostGIS, Redis, and ElastichSearch. In general, it is possible to conclude that the database administrators across studied institutions, value the Technical Assistance, Security and Performance, as critical aspects.

Additionally, it is also visible that because of software requirements such as ERP's, specific DBMS's are required to be installed, obligating the municipalities o use/integrate such databases, Informix and SQL Server are examples of such cases.

Future Work

As future work, this study is going to be extended to understand the reasons that make users choose and acquire DBMS's. Inline of this study completeness, the quiz will be repeated annually, to understand the evolution of the Portuguese local government. Moreover, based on gathered information, this study aims to help IT departments in the acquisition and selection of a DBMS.

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The Causality Effect of Foreign Direct Investment on Economic Growth in Sub Saharan Africa: An Empirical Evidence from Chad Using ARDL Approach

Ganama MOUSTAPHA GUEME[1]
ganamamoustapha@gmail.com
Department of Technology Management, Faculty of Technology Management and Business,
Universiti Tun Hussein Onn Malaysia (UTHM) Parit Rajah, Batu Pahat, Johor, Malaysia.

Maimunah Binti ALI[1]
maimunah@uthm.edu.my
Department of Technology Management, Faculty of Technology Management and Business,
Universiti Tun Hussein Onn Malaysia (UTHM) Parit Rajah, Batu Pahat, Johor, Malaysia.

Khalil KAYA[2]
khalilbinkaya@gmail.com
Department of Technology Management, Faculty of Technology Management and Business,
Universiti Tun Hussein Onn Malaysia (UTHM) Parit Rajah, Batu Pahat, Johor, Malaysia.

Hissein ARABY NOUR[2]
hisseinaraby1981@gmail.com
Faculty of Economics Science and Management (Faculté des Sciences Économiques
et Gestions (FSEG), University of N'Djamena, Chad

Khadar Ahmed DIRIE[2]
qadarqaadi143@gmail.com
School of Islamic Business Studies, Universiti Utara Malaysia (UUM) Sintok, Kedah, Malaysia

Abstract

Foreign direct investment (FDI) towards developing nations is eventually intended to help host countries attain sustainable economic growth. As such, the recipient country ultimately achieves poverty reduction and improved human development. Over the past decades, the justification for increasing foreign direct investment to developing and under developing countries have constantly grabbed the attention among scholars and researchers. However, despite inflow of FDI towards the Sub Sharan African (SSA) countries, economic growth is still inconsistent in these regions. And even though foreign direct investment in Chad has grown in the recent years, the country still faces development constraints. This study aims to assess the effect of FDI on economic growth in Chad using time series data collected from the World Bank from 1980 to 2019. The autoregressive distributed lag (ARDL) and error correction (ECM) models were estimated among the variables. Hence, both the long run and short run dynamics regression estimates revealed that FDI has a significant effect on economic growth in Chad within the period. Nonetheless, there is a strong sign of convergence towards long run equilibrium as the speed of adjustment is significantly high at -122.7133%. The findings explain evidence of a uni-directional causality (one-way) running from FDI to economic growth. Furthermore, the paper recommended that both public and private foreign investors should invest in specific needs and exhaust every prudential step in making sure the inflow of FDI is efficiently used for the target aimed to boost the overall economic growth of the country especially by enhancing infrastructure, openness, and inflation target.

Keywords*:* Foreign direct investment, Economic growth, ARDL, ECM, Republic of Chad.

Introduction

Economic growth is referred to as the increase in the output per capita of an economy (Ivic, 2015) whereby, an increase in per capita output under the growth of GDP not only increases the total volume of production, but a

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simultaneous increase in the total population as well. Therefore, capital output will also increase over time to maintain the same growth rate (Gueme et al., 2020). On the other hand, foreign direct investment (FDI) often to the physical investments and purchases made by a company in a foreign country, typically by opening plants and buying buildings, machines, factories and other equipment in the foreign country (Altzinger & Bellak, 1999). As such, FDI can be classified in two categories namely direct and indirect (Varghese, 2015). These types of direct investments generate much more benefits since they are generally considered as long-term investments and help strengthen the economy of the foreign country. While the indirect investments include the equity instruments such as stocks, and also debt instruments such as bonds (Altzinger & Bellak, 1999; Kalotay, 2012). More often, FDI is undertaken by multinational firms and it is undeniable that foreign direct investment is a major catalyst to development towards increased growth (Carbonell & Werner, 2018). Moreover, it is also an integral part of an open and effective international economic system (Patmawati & Maimunah, 2013).

Most of the flows of FDI originate from OECD countries with developed countries contributing to advancing this itinerary. Considering the importance of FDI to the implementation of less developing countries' economies, it is primordial to understand its contribution and significance towards the economic growth of both developing and under developing countries. Since these countries play a role in facilitating developing countries to access the international markets as well as the technology (Fahad, 2014; Adegboye, 2017; Ma *et al*., 2018). However, unlike developed economies, developing countries and other poor countries with limited resources such as Chad must still dependent on foreign intervention. It has been known for decades that Foreign direct investment (FDI) is undeniably recognized as a catalyst for stimulating growth, especially in many developing countries that have limited capacity to promote domestic investment and finance long-term development (Gichamo, 2012; Senkuku & Gharleghi, 2015; Kadiatou, 2017). Decades of economic stagnation and declining standard of livings have turned the Sub-Saharan Africa among the world's poorest region in the globe.

Beside, economic growth is often failing to reach those who are more in need along different social dimensions (UNCTAD, 2019; The Global Fund, 2018) as FDI is an important channel for the transfer of technology between countries, due to the fact that it promotes international trade through access to foreign markets, A number of empirical studies have mainly focused on the relationship between economic growth and foreign direct investment (for e.g. Masry, 2015; Loots & Kabundi, 2017; Carbonell & Werner, 2018). In order to investigate the effect of FDI on economic growth in Sub Sahara African (SSA) countries by selecting GDP per capita as the dependent variable, a panel data of 32 SSA countries during 2008 to 2014 were collected using static panel regression techniques. The dynamic panel estimates were employed to assess the causal relationship between population size and the effect of the 2009 European debt crisis. As such, the implications of foreign direct investment towards economic growth remains a topic of great concern among researchers (Nations Encyclopedia, 2019).

Although FDI in Chad has increased significantly over the years, it is yet to be visible due to its concentration towards the non-primary sector of the economic growth of the country (agriculture). And because agriculture is the primary sector of the economic growth of the country, the huge concentration of FDI in other sectors made it difficult to boost up the economy. On the other hand, the services sector has lately attracted telecommunications and banking sectors where the country's main investors are Nigeria, France, the United Kingdom and South Korea (Nordea Trade, 2019). furthermore, the value of announced greenfield FDI projects in Chad increased by 319% during 2014. Nevertheless, Chad's ranking in the "where to invest in Africa Report" dropped from 33 in 2014 to 34 in 2015 due to a deteriorating operating environment. With poor rankings in the "Ease of Doing Business Survey" in 2015, the consumer price index (CPI) are ranging at 3% and 12% (Nations Encyclopedia, 2019).
Therefore, does FDI significantly affect economic growth in SSA countries and especially in Chad?

It is no doubt to consider there is countless extensive literature about the role of FDI for developing economies. More often, foreign direct investment increases the stock of capital of a country and generates public revenue through taxation, but the main channels for FDI are to improve economic growth. For example, the evaluation of the SSA (Sub Saharan African) countries has shown that agriculture has a big share in the GDP (with the majority of the population working in the primary sector), however agricultural FDI remain extremely low and it only accounts for 2% to 3% of the total FDI volume (Dike, 2018).

Additionally, the theoretical arguments on the contribution of FDI to host economies have been extensively articulated, with the overall benefits broadly categorized into the direct and indirect macroeconomic effects (Haller, 2012). The direct effects of macroeconomic factors of foreign direct investment occur when there is increase in the investment level of the host economy. For instance, the increase in tax revenues can generate government spending, creating employment and increasing foreign exchange receipts. Furthermore, the indirect effects or micro level in regard to FDI contribute to the long-term growth and development which occur through technology spillovers to the domestic firms (Fagan et al.,2016; Abd Rahman Ahmad et al., 2019). More particularly, it has been proven that FDI can accelerate growth through increases in total factor productivity, and thus overall efficiency of resource use in the

host countries (Kargbo & Dunne, 2017). Therefore, the main aim of this paper is to investigate the effects of foreign direct investment on economic growth in Chad using the ARDL, and ECM approaches as well as the causal effects of the variables.

Literature Review

The Effect of Foreign Direct Investment on Economic growth

To confirm the source of growth in Ghana, Antwi et al (2013) proved that foreign direct investment (FDI) has been a vital source of growth by bringing in the capital investment, technology, and management knowledge needed for the country's growth. As such, these finding embrace practical implications for policy makers and investors as well (Oshodi, 2018). Besides, in order to assess FDI inflows as a percentage of GDP (FDI ratio) and economic growth (GDP growth rate) in Tanzania, a study conducted by Senkuku & Gharleghi, (2015) tested the cause-and-effect relationship between variables selected for period from 1970 to 2007. The study employed the granger causality test procedure which refers to an innovative econometric methodology and more effective for testing the direction of causality between variables. The results based on the Granger causality criterion clearly shown that there exist a bilateral or bidirectional causality between FDI inflows and economic growth. This means that FDI stimulates growth and that growth stimulates FDI, which shows that in Tanzania foreign direct investment inflows have led to economic growth and that GDP growth has attracted inflows of FDI (Senkuku & Gharleghi, 2015).

Adegbite & Ayadi (2011) conducted a similar study in Nigeria in order to obtain the best unbiased linear estimators, the study used several econometric tests based on the model using ordinary least squares (OLS) regression analysis and yielded the best linear non-linear estimators. The results of the study confirmed the beneficial role (relationship) between FDI and growth. However, Adegbite & Ayadi (2011) found that the role of FDI on growth could be limited by human capital. The study concluded that if FDI promotes economic growth, then more attention is needed for infrastructure development. Since Sebnem *et al* (2006) confirmed that other local conditions such as human capital and market structure are among the important factors that have effect of FDI on economic growth. On the other hand, Koyuncu & Ünver (2016) have proven that population growth and inflation do not have statistically significant effect on FDI. It is essential to ensure a sound macroeconomic environment and to develop human capital to boost productivity and FDI flows (Adegbite & Ayadi, 2011). In the meantime, Sayek et al. (2006) suggested that holding the extent of foreign presence constant often allow the financially well- developed economies to experience growth rate situated at almost the double of those economies as compared to those with poor financial markets. And secondly, they (Sayek et al., 2006) also suggested that increase in the share of FDI or relative productivity of the foreign firm leads to higher additional growth in financially developed economies as compared to those in poor countries. Similarly, another study conducted in Australia by Pandya & Sisombat (2017) using the regression analysis between FDI and different measures of growth found that FDI inflows are considered to be a vital source of economic growth and it play an immense role in growth regarding the gross domestic product (GDP), infrastructure improvement, employment creation, trade performance and export. On the other hand, the mining and quarrying sector have been identified as an attractive sector which contributed to 7% of the GDP of the country' s large amount of capital invested and employing intensive labour. The findings provide insight from the critical information to Australian policy decision makers to sort an informed decision with regard to attracting investment sectors and policies in encouraging foreign investors to invest in the country.

Similarly, Jugurnath, Chuckun, & Fauzel (2016) have investigated the effect of FDI on economic growth in Europe and have found that despite its negative impact on economic growth, the inclusion of the 2009 Euro zone crisis did not diverge the results based on static random effects. Which shows that the contribution of FDI is observed to be relatively higher than domestic investment despite its negative effect (Jugurnath, Chuckun & Fauzel, 2016). For instance, Sebnem et al. (2006) stipulated that financial markets usually allow the inverse relationship between foreign and domestic firms to turn into FDI spillovers since the effect is not significant. Overall, both results from Adegbite & Ayadi (2011); and Chuckun, & Fauzel (2016) suggested that FDI does have a positive and significant relationship with economic growth and therefore consistent with literature with respect to developing countries. Moreover, the relationship between FDI and economic growth in Spain with data collected from 1984 to 2010 show that there is no evidence for FDI towards stimulating economic growth in Spain (Carbonell & Werner, 2018).

From the review, there exist a relationship between FDI and economic growth from various dimensions. And then, the nature of the relationship is either negative of positive. The studies show that for the Sub Saharan Africa (SSA) region, most of the finding have negative effect between FDI and economic growth due to the absence of proper application of the factors affecting economic growth which led to a lower FDI.

Data and Methodology

A systematic way of systematically solving a research problem can be done through methodology. By doing so, methodology allows us to achieve the answer to the main objective of the research. As earlier pointed out, the current study sought to investigate the effect of foreign direct investment on economic growth of Chad. Thus, quantitative methodology was employed in this study in which annual time series data were collected from 1980 to 2019. The data are being estimated using the autoregressive distributed lag model (ARDL) and the Granger causality test. The Augmented Dickey-Fuller method was used to test the unit root of the variables whether at first difference or at level (I (0) or I (1). Next, the bound test for cointegration was employed to determine whether there is a long run relationship between the variables according to Pesaran *et al* (2001).

The process of using ARDL includes lag determination, the bound-test for cointegration including the long-run and short-run estimation of the variables' coefficients. Many recent studies have shown that the ARDL approach to cointegration is more reliable than other approaches such as Engle and Granger (1987), Johansen (1988), Johansen and Juselius (1990); Gregory and Hansen (1996). One of the reasons that favour the ARDL approach is that it is applicable irrespective of whether the regressors are integrated of the same order or not. Thus, the ARDL model boycott the problems resulting from non-stationary time series data at different level (Pesaran *et al.*, 1996; Pesaran *et al*., 2001). Which means under the ARDL method, both the long run and short run coefficients in the model are estimated simultaneously. And from there, the model can be developed and utilised for cointegration test even if all the variables are not stationary after the first difference at I (1) or at level at I (0); as long as none is integrated at the second difference at I(2). Therefore, the necessary condition is that some variables are integrated at I (1) and or at I(0) but none at I(2). ARDL model can be developed when this condition is met (Ugwuanyi et al., 2017). Thus, the description of the variables in this study are illustrated in Table 1.

Table 1: Data description

Variable description	Unit of Measurement	Source
GDPG growth (GDPG)	Gross Domestic Product growth (annual %)	World Bank Development Indicators
Foreign direct investment Inflows (FDI)	FDI net inflows (% of GDP)	
Gross capital formation (GCF)	Gross capital formation (% of GDP)	
Inflation (INF)	Inflation, consumer prices (annual %)	
Openness (OP)	Trade Openness (%GDP)	

Economists have used both theory and empirical research to explain economic growth. As a result, economic growth is measured as a percentage increase in real gross domestic product (GDP) (Fouthe & Ndedi, 2017). The variables in this study are presented in Table 1 where, real GDP growth is used as the dependent variable and FDI inflow as the independent variable. While gross capital formation, inflation, and openness are employed as the control variables in the model. The data on FDI inflows and real GDP growth as well as the control variables come from the World Development Indicators and measured as the net FDI inflows of investment and GDP Growth prior to literature (Sun, 2002; Mengistu & Adams, 2007; Antwi & Poku, 2013; Blonigen, 2019).

Theoretical Framework

The economic theory of development shows many ways in which FDI could contribute to the growth of the real income of the host country. First, the classical and neoclassical theories of capital movements or foreign investment reveal the restrictive constraint of national savings through the inflow of foreign capital. More specifically, international capital flows involve a flow of investment funds from countries where capital is relatively abundant for countries and where capital is relatively scarce (Fouthe and Ndedi, 2017). For example, the evidence from the statistical analysis of Jugurnath et al (2016) suggested that cumulative FDI had a significant positive effect on economic growth. More specifically, in the long run, Dike (2018) confirmed the existence of a long-term relationship between FDI inflows and economic growth. Apart from this, FDI often plays a unique role in job creation (employment) and modernization of host countries. Indeed, many countries, especially developing countries, view FDI as an important element of their economic development strategy (Samuel, 2009) including economic growth. According to Ricardo's classic theory of growth, an increase in capital and labor would lead to growth in output. In

the Harrod Domar growth model, the change in the capital stock (investment) and the additional capital / output ratio (ICOR) determine the growth of national income (GNI). For a given ICOR, an increase in investment will result in an increase in output. For example, Adams (2009) found that FDI had a significant positive effect on economic growth and overall, FDI tend to improve and encourage domestic investment.

Conceptual framework and hypothesis development

Literature particularly for developing countries have shown that the flow of FDI is moving towards a country especially where rapid economic growth has been recorded. For example, when FDI contributes significantly to economic growth, faster economic growth attracts more FDI. Because it increases the confidence of foreign investors in the economy, which further pushes the rate of growth (Blonigen, 2019; Owusu-Antwi et al., 2013). However, in the least developed countries like Chad, studies have shown that FDI is in fact tracking, rather than a form of initial growth or at least a promise of growth (Sun, 2002). Therefore, the proposed framework has blended and modified the existing economic theories to effectively fit the role of FDI towards economic growth.

The following hypotheses are established to examine the various relationships between foreign direct investment factors and economic growth factors in the Republic of Chad.

H_1: Foreign direct investment has a significant influence towards economic growth in the Republic of Chad.

H_{1a}: There is a significant relationship between FDI inflow and GDP Growth in Chad.
H_{1b}: There exist a directional causality between FDI and GDP growth in Chad.

Model Specification

In an econometric model, the relationship between economic variables is not precise. Firstly, the theory and assumptions must be consistent with the available data and the problem specification. Secondly, it is essential to make statistical inferences from a particular dataset (estimation and test models); and lastly, draw appropriate conclusions, including forecasts and policy implications, from the estimated model (Ogunyinka & Tang, 2013; Wakyereza, 2017). The role of foreign direct investment and economic growth by Osano & Koine (2016) in Kenya have shown an evidence of a strong relationship between foreign direct investment variables and economic growth. Tus, the applied model for this paper follows the primary linear model which attempted to ascertain if FDI inflow is effective in improving economic growth then, the single linear regression equation is modified from Acquah (2016); as follow;

$$EG_t = \alpha + \beta FDI_t + e_t \quad (1)$$

More specifically, Equation (1) will be modified to reflect the peculiarity of the study and the selected variables. The long run model is therefore expressed as;

$$GDPG_t = \alpha + \beta FDI_t + e_t \quad (2)$$

Where t indicates the country and time (year); α is the constant number (the intercept) ≠ 0; FDI represents the FDI inflow; EG represents economic growth; GDPG defines GDP growth; e_t is the error term; and β represent the parameter estimates. Hence, equation (1) will be modified to reflect the peculiarity of the study and variables selected. The ARDL model with error correction parameter and short-run dynamic model can be derived from equation (2) and presented as;

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{i=1}^{p} \delta_i \Delta x_{t-i} + \sum_{i=1}^{p} \varepsilon_i \Delta z_{t-i} + \lambda_1 y_{t-1} + \lambda_2 x_{t-1} + \lambda_3 Z_{t-1} + u_t \quad (3)$$

The first part of the equation with β, δ, and ε represents the short run dynamics of the model. The second part including λs represents the long run relationship. The null hypothesis in the equation is $\lambda_1 + \lambda_2 + \lambda_3 = 0$, which means non-existence of long run relationship; and Δ represents the first differing operator.

The error correction model (ECM) illustrated in the equation (4) and (5) integrates the short-run dynamics together with the long-run equilibrium without losing long-run information, since ECM illustrates the speed of adjustment towards the long-run equilibrium from the short-run after the shock. The error correction models for Y_t, and X_t are as follows:

$$\Delta Y_t = \mu_Y + \alpha_Y \varepsilon_{t-1} + \sum_{h=1}^{I} \alpha_{1h} \Delta Y_{t-h} + \sum_{h=1}^{I} b_{1h} \Delta X_{t-h} + u_{Yt} \quad (4)$$

$$\Delta X_t = \mu_X + \alpha_X \varepsilon_{t-1} + \sum_{h=1}^{I} \alpha_{2h} \Delta Y_{t-h} + \sum_{h=1}^{I} b_{2h} \Delta X_{t-h} + u_{Xt} \quad (5)$$

Where, μ_{Yt} and μ_{Xt} are stationary with noise processes for some number of lags l and the coefficients in the cointegration equation give the estimated long-run relationship among the variables and coefficients on the ECM describe how deviations from that long-run relationship affect the changes on them in next period.

Likewise, causality among the variables are to be employed for the direction of granger causality between FDI, and economic growth. The necessary condition to perform the causality test is that if the bound test for cointegration revealed that the series are cointegrated then the study will employ the error correction model estimation for the equation (6) in the model as follow;

$$EG_t = \sum_{i=1}^{n} \alpha_i FDI_{t-i} + \sum_{j=1}^{n} \beta_j EG_{t-j} + u_{1t} \quad (6)$$

Thus, the results of the study are presented below in order to achieve the objective of the study.

Results and Discussion

Trend Analysis

Figure 2 below illustrates the trend analysis for Chad between the year 2000 to 2019 shows that between these periods, the economic growth in Chad is fluctuating. Whereby, the country experience high growth rate from 2003 to 2006 where it starts to dramatically decline and slightly raise; then kinky shaped curve until 2019. Seemingly, FDI in Chad has experienced a systematic increase from 2000 and sharply started to decline between year 2005 to 2006. Which then experienced a sharp fluctuation until 2018 then experience a slight increase from mid-2018.

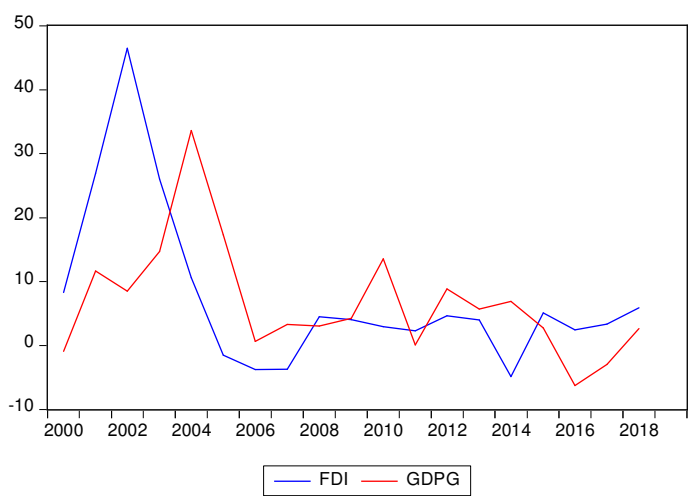

Figure 2: Trend Analysis of FDI and Economic growth of Chad

Hence, between 1961 to 2018, the average value of economic growth in Chad varied between 3.48 % to -21.44% in 1979. With a maximum of 33.63 % average value in 2004 after the country become an oil producer (African Development Bank Group, 2019). According to the African Development Bank Group (2019) the average growth rate of Chad is approximately 2 to 3 % a year. Hence, a significant and strong growth rate of an economy should consistently grow in minimum at nearly 5 % a year or more in a year, which can imply a substantial rate of economic growth. The Group also suggested that a 7 to 8 % of economic growth rate is extraordinary which means the country is performing well. However in Chad, the scenario is totally different and still at low growth rate (African

Development Bank Group, 2019). As a result, poverty continues to afflict a large proportion of the population (Khalil Kaya et al., 2020).

Since oil production has been the largest target of foreign direct investment in Chad and since 2003, the petroleum sector has dominated the economic activities of the country. Nevertheless, the majority of the population are dependent on livestock breeding and agriculture as the major and important economic activities and sector of employment. As such, the government has prioritized these sectors in order to diversify the economy and to maximize non-petroleum tax receipts due to the decrease and fluctuations in the overall global oil prices (Nour & Rahman, 2017). Which have led to low oil revenues (which account for over 70 percent of government revenue) (Nour, 2015). Though Chad net FDI inflows fluctuated substantially in recent years, it tended to increase through 1999 - 2018 period ending at 662 million US dollars in 2018. For instance, in 2018, net FDI inflows was 662 million US dollars and during that period, the average value was 3.74 percent with a minimum of -4.85 percent in 2014; and a maximum value of 46.49 percent in 2002. The latest value from 2018 is 5.87 percent (World Bank, 2019). According to the World Bank (2019); and Nour (2015), foreign direct investment in Chad in 1995 was only $7 million, or 0.6% of GDP, but from 1997 to 2000, the range was $15 million to $16 million.

Descriptive Statistic Results

The skewness and kurtosis of each of these variables from the normal distribution, the probability is the probability that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. Whereby a small probability leads to the rejection of the null hypothesis of a normal distribution. The results of the descriptive statistics are illustrated in Table 2.

Table 2: Descriptive statistics

	GDPG	FDI	GCF	INF	OP
Mean	6.71	7.57	19.9	3.60	61.80
Median	4.22	4.05	20.7	3.51	53.80
Maximum	33.63	46.49	60.2	41.72	126.4
Minimum	-6.26	-4.85	2.73	-13.0	20.1
Std. Dev.	8.96	12.64	13.1	9.77	21.86
Skewness	1.38	1.88	0.99	1.58	0.65
Kurtosis	5.36	6.01	4.13	7.72	3.26
Jarque-Bera	10.44	18.31	8.40	48.37	2.91
Probability	0.005	0.0001	0.01	0.00	0.23
Sum	127.42	143.79	775	129.4	2471
Sum Sq. Dev.	1445.8	2876.6	6530	3339	18628

Note: Symbols are used to represent variables for convenience (i.e. GDPG, FDI, GCF, INF, OP are GDP growth, FDI Inflow, Gross capital formation, Inflation, Openness respectively).

Therefore, the probability value of the descriptive test results from Table 2 show that GDPG, and FDI values are less than 5% (< 5%) and are significant, which imply the data are not normally distributed for these variables. While among the control variables, only the p-value of openness was not significant and implies normal distribution.

Unit Root Test results

Table 3 results show that FDI, GDPG, and INF are stationary at first difference I(1). While GCF, and OP are stationary at level I (0) with trend and intercept at 1% and 5% significance levels.

Table 3: Unit Root Test Results

		Level			**1rst Difference**		**Results**
Variables		ADF		ADF			
	Constant	Trend & Constant	No trend & intercept	Constant	Trend & Constant	No trend & intercept	
GDPG	-5.604	-5.529	-1.856**	-2.823**	-1.739	-5.737	I(1)
FDI	-3.808	-3.789***	-4.755	-4.565**	-4.502*	-3.238	I(1)
OP	-1.519**	-2.017**	0.072**	-5.397**	-9.277	-2.873**	I(0)
GCF	-2.751**	-3.571***	-0.571**	-5.288	-5.304	-5330	I(0)
INF	-6.373	-6.270*	-5.856	-6.43***	-6.399	-6.549**	I(1)

*Notes: ***, **, * denotes rejection of the null hypothesis of a unit root at the 1%, 5%, and 10% significance level. No asterisk indicates that the series is non-stationary*

In addition, since some variables are stationary at I(0) and others at the I(1), and others are both of each of the specified models, is it therefore appropriate to employ the bound test for cointegration relationship between FDI and economic growth in Chad. Therefore, the ARDL representation of the equation (3), (4), and (5) are formulated as follow:

$$\Delta GDPG_t = \alpha_0 + \sum_{i=1}^{n} \beta_{1i}\, \Delta GDPG_{t-i} + \sum_{i=1}^{n} \beta_{2i}\, \Delta FDI_{t-i} + \sum_{i=1}^{n} \beta_{3_i}\, \Delta GCF_{t-i} + \sum_{i=1}^{n} \beta_{4_i}\, \Delta INF_{t-i} + \sum_{i=1}^{n} \beta_{5_i}\, \Delta OP_{t-i} + \lambda_1 GDPG_{t-1} + \lambda_2 FDI_{t-1} + \lambda_3 GCF_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 OP_{t-1} + u_t \quad (7)$$

The first part with the difference (Δ) sign represents the ECM (error correction model) for the short run representation; while the second part with the lambda (λ) sign represent the ARDL long run relationship part. Hence, before carrying out the co-integration test, it is very important to choose an appropriate lag length for the specified models.

Lag Length Criteria

Several criteria can determine the optimal lag length such as the Likelihood Ratio (LR) test, Akaike Information Criterion (AIC), Schwartz Bayesian Criterion (SBC), Final Prediction Error (FPE), and Hannan Quinn criterion (HQC). The study firstly focusses on the optimum lag length selection which entails the Vector Auto Regression (VAR) model by building the models and taking into consideration the dynamic time series properties.

Table 4: Lag Determination criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-127.3245	NA	13893.35	15.2147	15.3127	15.2243
1	-115.0959	20.1413	5314.986	14.2466	14.5406	14.2758
2	-105.3531	13.7544*	2782.223*	13.5716*	14.0611*	13.6197*

The results from Table 4 shows that the numbers in * indicates lag order selected by the criterion employ the vector autoregressive (VAR) based on the Akaike information criterion (AIC) for both the FDI and GDPG selected lag (2,2) for the model since AIC indicates the smallest value (13.5716). Thus, the relationship between FDI inflow and GDP growth using the ARDL model using Lag (1,1) as best suited for the consistency of the results for both the long run and short run models.

Bound Test Results

The ARDL cointegration approach was developed by Pesaran and Shin (1999) and Pesaran *et al* (2001). This test was carried out on the models to examine the existence of a long run relationship between the specified variables with the aid of the previously selected lag length.

Table 5: ARDL Bound test for cointegration

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	4.87113	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

The dependent variable from the result is unrestricted constant and no trend. F statistic value = 4.87113 which is greater than (>) the upper bound I(1) and the lower bound I(0) at both 5%, and 10% levels of significance. Therefore, there is co integration between the variables and the null hypothesis of no long run relationship is rejected. Hence, the next step consists to determine the long run and short run relationship models of the variables.

Long Run Estimation

After establishing that the series in the models move together in the long run, an ARDL (1, 0, 1, 0, 0) was chosen for the FDI and economic growth model in order to achieve the objective this the study. The results of the estimated coefficients in Table 6, along with the F-statistic for GDPG and FDI equation model show the variations of the selected independent variables explained certain changes of the dependent variable. Furthermore, the inclusion of the control variables (e.g.: gross capital formation, inflation, openness) in the model help to explain more clearly the occurrence of changes and effect of FDI to GDP growth.

Table 6: ARDL Long run estimation

Variables	**Coefficients**	**T-statistics**
GDPG(-1)	0.054733	(0.330613)
FDI	0.322211	(1.567083)**
GCF	-0.589652	(-2.176759)**
GCF(-1)	0.585898	(2.840158)***
INF	0.353197	(2.432647)**
OP	0.051525	(0.446822)
C	-0.818306	(-0.173005)

Note: *, ** and *** denote statistical significance at 10, 5 and 1 percent respectively. Symbols are used to represent variables for convenience (i.e. GDPG, FDI, GCF, INF, OP are GDP growth, FDI Inflow, Gross capital formation, Inflation, Openness respectively). Figures in parentheses beside the coefficient values are the t-statistic values.

The estimated outputs suggest that foreign direct investment inflow FDI (-1) coefficient is statistically significant (p-value< 5%) at the 5 % level of significance. Interestingly, FDI (-1) positively affect GDPG, thus FDI promotes economic growth. And a unit change in FDI leads to 32.22% increase in economic growth (GDPG). In addition, among the control variables the first lag of gross capital formation as a proxy of physical infrastructure (GCF) is positive and significant at 1 percent level. The results show that when gross capital formation (CCF) increases by 1%, GDPG tend to decrease by nearly 58.96%. When openness increases by 1 percent, GDPG tend to increase by 5.125 percent. It implies that an increase in infrastructure encourage openness to FDI which tend affect economic growth. Further statistical test from the control variables (inflation rate) reveal a strong positive evidence of INF on GDPG at 5 percent level. A unit increase in inflation has led to 35.32 increase in economic volatility which prevent growth. Hence, this higher and significant inflation rate indicates a volatile climate of investment that will eventually inhibit real growth. Therefore, infrastructure (GCF) has a significant positive effect on economic growth which means that improved infrastructure will allow the increase in inflow of FDI in the country. Nevertheless, if infrastructure is negative but significant it means that the country level of infrastructure needs expansion in order to attract investors. Therefore, since infrastructure is not enhanced in Chad in the long run, openness (OP) has not significant effect on economic growth (GDPG).

Short Run Estimation

Table 7 display the error correction model representation for the selected ARDL (1,1,1,2,0,1,0,1) for the short run representation of FDI and economic growth model (4.1).

Table 7: Short run estimation ARDL (1,1,1,2,0,1,0,1)

Variable	Coefficient	t-statistics
Δ (GDPG(-1))	0.211490	(1.380421)
Δ (FDI(-1))	-0.732466	(-3.866563)***
Δ (GCF(-1))	0.799185	(3.954409)***
Δ (GCF(-2))	0.296049	(1.724984)
Δ (INF)	0.364926	(4.316050)***
Δ (INF(-1))	0.039223	(0.372003)
Δ (OP)	-0.002368	(-0.035267)
C	-0.623083	(-0.650510)
ECM (-1)	-1.227133	(-5.397273)***

Note: *, ** and *** denote statistical significance at 10, 5 and 1 percent respectively. Symbols are used to represent variables for convenience (i.e. GDPG, FDI, GCF, INF, OP are GDP growth, FDI Inflow, Gross capital formation, Inflation, Openness respectively). Figures in parentheses beside the coefficient values are the t-statistic values.

The outcome obtained for the ECM estimation for FDI and economic growth revealed that almost all the independent variables have been proven to be significant and adjusting variables for the short run equilibrium of the dependent variable (GDPG). Among all the variables, foreign direct investment inflow (FDI (-1)), gross capital formation (GCF(-1)), and inflation rate (INF) turned out to be significant; whereas openness (OP) is insignificant. However, the insignificance of openness has a negative effect on GDPG and a unit increase in OP lead to a decrease in GDPG by -0.2368% which is make FDI to have a negative significant effect on GDPG by a decline of -73.2466. Interestingly in the short run, 1% increase in GCF (-1) significantly increases GDPG by 79.9185%; 1% increase in INF significantly increases GDPG by 36.4926% in relation to economic instability which imply the significant influence of the economic activities by the explanatory variables in the short run model. Furthermore, the error correction term (ECT) coefficient (-1.227) has a negative sign and highly significant, reflecting the joint significance of the long run coefficients indicating a high speed of adjustment to disequilibrium in the short run at -122.7133%. Next, the Granger causality test is employed in the following section in order to find which variable causes the other to change.

Granger Causality Result

The result of the Pairwise Granger causality test among the variables is employed to examine the direction of causality between FDI and economic growth are presented in the Table 8.

Table 8: Pairwise Granger Causality result among the variables

Null Hypothesis	P-value at level of significance (F-test)	Results
FDI does not granger cause GDPG	12.2937***	rejected
FDI does not granger cause GDPPG	11.0561***	rejected

Note: 10%, 5% and 1% level of significance are represented by *, ** and *** respectively. Null Hypothesis: there is no Granger Causality.

The results reveal that there is evidence of causality running from foreign direct investment inflow (FDI) and economic. Thus, the outcome of the direction of causality show that there exists a uni-directional causality (one-way) between FDI to economic growth but it does not go the other way. As such, the findings indicate that FDI is dominant and have huge impact on the economic growth in Chad. It means when FDI inflow is significant and boost the economy, then implying that GDP growth tend to considerably grow as a result of the importance and the high influence of FDI to Chad which then improve infrastructure, openness and stabilizing inflation rate.

Diagnostic Tests Result

Several diagnostic tests were conducted to determine the suitability of the ARDL and the ECM models in this study in order to determine the relationship between the variables are presented in the following Table 9.

Table 9: Diagnostic test results

Tests	Statistics	Probability
a. Jarque-Bera (normality test):	1.9273	0.3815
b. Breusch-Godfrey Serial Correlation LM test:		
F statistics	0.4429	0.6475
Obs R-squared	1.2609	0.5324
c. Heteroskedasticity test Breusch-Pagan-Godfrey:		
F statistics	1.053942	0.4247
Obs R-squared	8.574903	0.3794

Notes: 1. denote the respective model (4.1) of the study.

The diagnostic test results show that since the p-values of the dependent and independent variables are greater than 5% level which means not significant, indicate that the model does not suffer from serial correlation, no heteroscedasticity and the error term is normally distributed.

Similarly, the residual stability from the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUM of squares) test are displayed in the Figure 3.

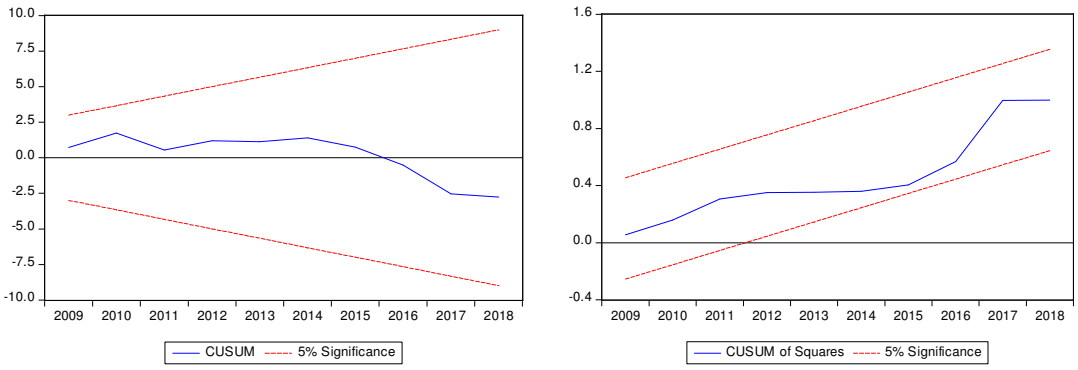

Figure 3: Model Stability diagnostic test

The results of both CUSUM and CUSUMQ of OLS recursive residuals clearly demonstrate a steady state of the specified ARDL model in the study at both long and short run levels. Since the residuals denoted in the blue line lie between the lower and upper critical boundaries at 5 percent, therefore, the long run coefficient of the repressors is stable and thus the results suggest that the estimated parameters of the respective models specified are generally steady over the study period. Furthermore, the next section discusses the findings of the study in relation to literature.

Discussions

The results show that FDI inflow has a significant long run and short run effect on the economic growth in Chad. Hence, in the long run, the relationship is significant and positive, while in the short run, the relationship is negative and significant. Similarly, the control variables have a significant effect on economic growth in both long run and short run, except for openness. More specifically, the result revealed that in the long run, gross capital formation (in line with Ndambiri *et al.*, 2012), inflation (GCF, INF) have a significant positive effect on economic growth; and openness (OP) has a positive (in the long run) and negative (in the short run) effect on economic growth. Therefore, the findings are in line with the study conducted by Otto & Ukpere (2014); Jugurnath *et al* (2016); Saini *et al* (2016); Loots & Kabundi (2017); Carbonell & Werner (2018); Masipa (2018); Dkhili & Dhiab (2018); Baiashvili & Gattini (2020) which suggested that cumulative FDI had a significant positive effect on economic growth as a result of the beneficial role of FDI to stimulate growth.

Mbogela (2019) conducted a study for 49 African countries using cointegration and granger causality where the empirical results revealed that FDI flows, openness and gross capital formation shown to have a significant effect on economic growth in the selected African countries. Besides, Blonigen (2019) confirmed that when FDI contributes significantly to economic growth, faster economic growth attracts more FDI inflow thus FDI encourage domestic. As such, prominent finding from studies in the Sub Saharan Africa (SSA) regions including Chad have revealed that most of the finding have negative effect for FDI on economic growth due to the absence of proper application of the factors affecting economic growth which led to a lower FDI. Besides, other local conditions such as human capital and market structure are among the important factors for the effect of FDI on economic growth, although Koyuncu & Ünver (2016) have proven that population growth and inflation do not have statistically significant effect on FDI.

On the contrary to this study, finding by Jugurnath, Chuckun & Fauzel (2016) confirmed that there is no significant effect of foreign direct investment in the Euro zone although the contribution of FDI is relatively higher than domestic investment (Jugurnath, Chuckun & Fauzel, 2016). Moreover, in Spain, the study conducted by Carbonell & Werner (2018) has shown no evidence of FDI towards stimulating economic growth. Therefore, FDI can significantly influence economic growth in developing countries than in the developed countries and the findings thus support the hypothesis H_{1a}.

The results of the hypothesis H_{1b} of this study was achieved and partially support the hypothesis. The findings explain that there is evidence of causality from foreign direct investment inflow (FDI) to economic growth. And it shows the existence of a uni-directional causality (one-way) between FDI to economic growth but it does not go the other way. As such, the findings indicate that FDI is dominant and have huge impact on the economic growth in Chad. It means that when FDI inflow is significant and boost the economy, then GDP growth tend to considerably grow as a result of the importance and the high influence of FDI to Chad which then improve infrastructure, openness and stabilizing inflation rate. In line with this study, Mbogela (2019) confirmed the existence of the unidirectional causality between FDI and economic growth which highlight the importance of FDI to stimulate growth. The study thus suggested that the export and investment would be more advantageous for the growth of African countries if it would increase real incomes and economic structural transformation of these countries. However, a contradiction was found where Vo *et al* (2019) employed the Granger causality test and the system generalized method of moments (GMM) found a bidirectional causality between economic growth and foreign investment in the middle income countries. In addition to the comparison on the contrary from previous studies conducted, the results of the causality test of this study is partially supported from the study conducted by Senkuku & Gharleghi (2015) who found evidence of a bilateral causality between FDI inflows and economic growth. This means that FDI stimulates growth and that growth stimulates FDI in Tanzania which led to economic growth and GDP growth in Tanzania has attracted inflows of FDI.

Therefore, the outcome of this paper thus suggests that an improvement in trade openness and a strong infrastructure will lead to more significant economic growth; while inflation rate needs to be monitored in order to achieve the inflation target of the country's treasury bank and reduce instability in the economic climate. Dike (2018) argued that agricultural FDI only account for 2% to 3% which can contribute less to the GDP or economic growth of these countries including Chad. In addition, since agriculture is the primary sector of income of poor countries such as Chad, foreign investors are encouraged to invest more in the agriculture sector and mild or less amount towards industrialization for the moment.

Limitation, Conclusion and Recommendations

This study has investigated the effects of FDI on economic growth in Chad. The study collected time series data from the World Bank database dated between 1980 and 2019. The data were analyzed using the autoregressive distributed lag (ARDL) techniques to estimate the long run and short run models and the error correction representation, as well as the pairwise Granger causality test. In the long run, the ARDL estimation for FDI and economic growth analysis revealed a strong evidence that the individual dimensions of foreign direct investment including the control variables (GCF, INF, OP) indicators have a significant effect on economic growth in Chad and are also revealed to be the important factors in explaining economic growth in Chad. While in the short run, the effect is significant but negative.

The results of this study evocate the need for the government as well as the policy makers to enhance openness, infrastructure, and inflation by improving the skill labors so that the country is able to attract more investment (FDI) and improve the overall economic growth of the country. In addition, strategies that can enhance economic growth should be developed. First, because FDI and GDP growth were retarded by technical inefficiencies, mismanagement and miss guidance which indicate that a robust policy should be developed. Second, government should also encourage local contribution than foreign involvement as a sole aim of step in the direction to improve efficiency and boost foreign investor's confidence.

This paper hence highlights some limitations firstly in terms of the limited availability of FDI inflow data per sector of investment. The data per sector of investment were only available prior to three-year period instead of 1980 to 2019. Therefore, the data would not be as useful and meaningful for each sector in the analysis which combine all sectors as inflow of FDI. In addition, from the literature, there have been very little studies conducted in the same area equally to the current research which make it difficult to have more information about the existing researches conducted in Chad. Moreover, using a time series dataset would allow the researcher to identify and estimate the effects that are simply not detectable in either pure cross-sectional or pure time-series data across countries.

Direction of future research should then focus on a wide range of every state of Chad or at least from every region (in rural and urban) in order to clearly identify and specify the effects and determinants of economic growth accordingly. In addition, more variables like market integration, natural resources intensity and specific human capital factors may also be point of focus. Therefore, future studies should have to investigate specific impact of FDI (a particular sector) on economic growth performance (by investigating featured variables) to see the effects and significance of these variables.

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The Habitability In Street In Bogotá From A Media Observatory: Actions From The University Social Responsibility

Félix Fernando DUEÑAS GAITÁN
Corporación Universitaria Minuto de Dios - UNIMINUTO, Bogotá, Colombia, felix.duenas@uniminuto.edu

Diego Fernando PEÑA GARNICA
Corporación Universitaria Minuto de Dios - UNIMINUTO, Bogotá, Colombia, diego.pena.g@uniminuto.edu

Gloria Stella ACUÑA DAZA
Universidad Santo Tomás, Tunja, Colombia,
gloria.acuna@usantoto.edu.co

Andrea del Pilar GARCÍA DONATO
Secretaría Distrital de Educación, Bogotá, Colombia
andreita.gardo@gmail.com

Abstract

In the face of the production of discourses-practices on the "phenomenon of habitability in the street" in Bogotá, to think of a Media Observatory is an academic commitment to build contextual knowledge, taking into account that "the observatories are born of the first conviction that the power that the media has today in our democratic societies does not correspond to an exercise that is always responsible for its mission. The media, like any other actor, also makes mistakes" (Herrera, 2006, p. 3). However, beyond judging the media, we will attempt to analyze how the media builds discourses around street living and how it reinforces institutional ideas to justify decisions or measures in the face of policies, programs and projects designed to benefit those who live on the street. The proposal is constituted from the method of discourse analysis and the mixed approach to research.

Keywords: Street habitation, media, university social responsibility, discourse analysis.

Introduction

Colombian society as a group of people and organizations that share a territory, common interests, specific objectives of well-being and growth, carried out within a defined order, where each one fulfills functions; subject to clear authority, laws and norms of conduct, requires that its Institutions of Higher Education - IES -, transcend doing in their communities with respect to generating competencies with their teaching, learning and research processes; to become observers of the national reality to support their ethical and responsible development, applied in the economic, political, legal, technological, cultural, ecological and of course social aspects. In this last and special way, the IES must with their activities of social responsibility, transcend from only applying and supporting with their knowledge the multiple disciplines of thought in business sectors and specific regions to become the constructive social critical conscience of a society to which invitations must be given to reflect and act appropriately, when problematic situations are found that affect their members. This vision is more relevant in Colombia, a country that does not have the resources and even in some cases the sufficient political and ethical will to solve its innumerable problems, even more so if it is from vulnerable populations that do not have visibility. Even the 697 IES (Ministry of National Education, 2019) of the country, may have university observatories, but very few materialize it on the management of the media informing on the street inhabitants (Acuña, 2020); In this way, there is a gap on the possible media observatories in front of the street habitability in Bogotá; situation that the VII census of its inhabitants, "found 9538 people in this condition, especially located in three localities: Los Mártires, Santa Fe and Kennedy" (Bogotá Secretary of Social Integration, 2018).

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Research Question

How does UNIMINUTO contribute to the analysis of the media in the face of the phenomenon of street living and contribute to the transformation of some social representations in the towns of Los Mártires, Santa Fe and Kennedy?

State of the art

In 2013, with the enactment of Law 1641, "which establishes the guidelines for the formulation of social public policy for street inhabitants", the institutional measures for addressing this problem in Colombia are indicated. However, it is important to clarify that in Bogotá the different district governments, through their development plans, began to include the problem in 1995. Of special importance are Decree 136 of 2005 and Agreement 366 of 2009, which begin to establish measures to provide integral attention to the street population, to define the district entities responsible for carrying out these processes, and to establish the main public policy guidelines for attention, inclusion and improvement of the quality of life of the street inhabitant (Sánchez, 2015).

The official figures of street dwellers in Bogotá established the presence of 4,515 people in the 1997 Census of Homeless People and 7,817 in the II Census of Street Inhabitants in 1999. Two analyses can be made in this regard, firstly, the change in the population's nomination, and secondly, a significant increase in the population in just two years, immediately following the intervention and eviction of the area known as El Cartucho, to make way for the Third Millennium Park. In 1998 the "Program of Attention to the Street Inhabitants" was created: Vida libre, a lo bien por la vida" was created in 1998, which advances its action through Projects 7151 "Attention to the street inhabitant" and 7159 "Street outreach brigades" in the framework of the Development Plan. The operation is developed by the Administrative Department of Social Welfare - DABS together with NGOs that attend to the drug-dependent population" (SDIS, 2015).

In this way, the already mentioned Law 1641 of 2013 arises, which "aims to establish the general guidelines for the formulation of social public policy for street dwellers aimed at guaranteeing, promoting, protecting and restoring the rights of these people, in order to achieve their comprehensive care, rehabilitation and social inclusion". There, the Public Policy is defined as "... a set of principles, guidelines, strategies, mechanisms and tools that will guide the actions of the Colombian State in the search to guarantee, promote, protect and reestablish the rights of the people living on the streets, with the purpose of achieving their rehabilitation and social inclusion

Within the framework of this same law, the Forum "Habitability in the Streets: Human Dignity, Citizenship and Coexistence" was held in September 2014, organized by the District Secretary for Social Integration through the Sub-Directorate for Adults and the Ministry of Health and Social Protection, with the aim of jointly building alternative solutions to this problem. This space was replicated in other cities in the country such as Medellin, Barranquilla, Cali and Bucaramanga in search of unifying proposals at the national level for the formulation of social public policy for the street dweller, in addition to identifying social support networks and visualizing actions to promote coexistence.

Theoretical Framework

The media play an important role in the construction and consolidation of social imaginaries through the reiteration of representations of street inhabitants. Although there was an effort in the documentary genre to show the life stories of former street dwellers on television, some patterns such as poverty, consumption, domestic violence and marginality were not able to be overcome or adapted in a dignified way so that these lives would be recognized as possible lives. And when they tried to show "overcoming", they sought to vindicate the work of the institutions in favor of this population, taking away from them again the capacity of agency for decision making as opposed to following or leaving the streets and leaving aside certain group practices for the organization of daily experiences (García, 2014).

Therefore, an active role of the media in prevention is required when analyzing how some documentary and fiction productions can contribute to mitigate certain risks in children, adolescents and youth. Collecting communication inputs and putting them at the service of the communities, as well as contributing to the monitoring and generation of knowledge in the face of the phenomenon is a task that we as a university must undertake (SDIS, 2015). For example, few reports showed police abuse or mistreatment of street inhabitants, who were forced to attend and stay in shelters against their will (CPAT and Parces, 2017).

Methodology

The study is proposed from the method of Discourse Analysis (DA), providing a mixed approach to research, which allows the use of quantitative methods in one phase, and qualitative methods in another (Pereira, 2011). Considering the postulates of Sayago (2014), who states that it is common to resort to DA as a form of analysis for two reasons: "a) because the object of study asks for it, or b) because we decide to carry out a work of discourse analysis and, then, we start from the choice of the technique of analysis and, then, we choose a topic that fits the possibilities that this technique opens to us" (p. 4). During the process, databases are built for the processing of qualitative and quantitative information. The following instruments are being used: Public policy analysis matrix, interviews, surveys, database with the 2016-2019 media corpus, Strategic Communication Plan for the design of multimedia content. Likewise, the interviews conducted by District officials and the surveys of the inhabitants of the three selected locations, in the neighborhoods most impacted by the presence of CHC, as well as the academic community of UNIMINUTO will allow the analysis of university social responsibility.

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Non-Financial Reporting – Examples of Good Practices in Poland

Magdalena WÓJCIK-JURKIEWICZ

Cracow University of Economics, Department of Accounting, Institute of Management,
College of Management Sciences and Quality,
Kraków, Poland
magdalena.wojcik-jurkiewicz@uek.krakow.pl

Beata SADOWSKA

University of Szczecin, Department of Accounting, Faculty of Economics and Management, Szczecin,Poland
beata.sadowska@usz.edu.pl

Abstract

The article attempts to assess the current state of non-financial reporting, or rather the practices applied by companies fulfilling the statutory obligation in the first two years. The main aim of the article is to examine the current practices in Poland in the field of non-financial reporting and to attempt to evaluate them. Taking the above into account, the Authors decided that the purpose of the article is to answer two research questions: 1) Based on what good practices, companies prepare their non-financial reports, taking into account various industries? 2) What are the trends of non-financial reporting in Poland in the analysed years? A total of 94 companies were examined. The results obtained indicate that the form of disclosures made is very different. The research used research methods and techniques, including: methods of induction and deduction, analysis and synthesis, critical analysis of domestic and foreign literature on the subject, the method of comparative analysis and content analysis. Previous studies in this field did not cover the 2017 and 2018 reporting period, i.e. the first two years after the change of guidelines. Therefore, the obtained results allow to determine the level of preparation of the analysed companies, belonging to various sectors, to new reporting obligations and indicate the current trends in the field of applied practices. The authors clearly indicated, as a result of the conducted research, the need to introduce a uniform framework for the disclosure of non-financial information.

Keywords: non-financial reporting, standards, good practices in Poland, EU Non-Financial Reporting Directive (NFRD)

Introduction

Nowadays, financial statements are only one of the sources that present information on a company at times when information plays a critical role and the area of non-financial reporting becomes fundamental. For capital owners, financial statements data are no longer sufficient . A growing number of companies have started to implement and incorporate principles into their activities (Bauer, Baran, 2015; Jurkiewicz, Wójcik-Jurkiewicz, 2014; Zimoń, 2016; Łojek, 2020; Bauer, 2018). This activity consists of publishing, apart from standard financial statements, also social reports. As a result, a need has arisen to revise the existing reporting of businesses and to create reporting on social responsibility (Lulek, 2014; Sadowska, Lulek, 2020; Wójcik-Jurkiewicz, Sadowska, 2018; Berniak-Woźny, Wójcik-Jurkiewicz and Sroka, 2018). As J. Fijałkowska points out, the accounting system requires new solutions for accounting and communication of companies' achievements, as the approach related to non-financial reporting is increasingly being implemented by businesses (Fijałkowska, 2012, p. 146).

Therefore, the results obtained make it possible to determine the degree of preparation of the analysed companies from different sectors for new reporting obligations or indicate existing trends in this respect. The authors determined, as a result of the conducted research, the need to establish one standard in this area, binding for all public companies. An analysis of domestic and foreign subject literature has also been performed which emphasized the multidimensionality of actions taken by companies in this respect.

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Non-financial Reporting in the light of legislative changes: Literature Review

The significance of non-financial reporting has increased in recent years, which has contributed to the emergence of new challenges and expectations regarding the quality of information, especially in the domain of legal regulations in this area and the manner in which it is reported. The change in approach to non-financial reporting takes on the effective form of regulatory and standardisation activities. In recent years, these principles have been formalised by means of legislative actions, and have adopted the form of Directive 2014/95/EU (EU NFRD) which has introduced non-financial data reporting obligations for certain groups of companies starting from 2017.

The non-financial information reporting requirements applicable since December 2016, resulting from the implementation to the Polish law, i.e. the Accounting Act, of the provisions of Directive 2014/95/EU (EU NFRD) has resulted in a significant increase in the number of companies which are obliged to report data on environmental, social, labour, human rights, and anti-corruption issues, i.e. areas indicated by statutory requirements. In December 2014, Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 on disclosure of non-financial and diversity information by certain large undertakings and group, entered into force. The Directive on non-financial disclosure was adopted as a consequence of the European Commission indication about the need to increase the transparency of social and environmental information submitted by entities of all sectors to achieve an equal level in all Member States.

The obligation to draw up statements or reports on non-financial information has covered nearly 300 companies in Poland. More than 200 of them are listed companies, and the rest are public interest entities mainly from other sectors. Observations taken in recent years show that only a few companies listed on the WSE have published reports at least partially convergent with the current scope of reporting. However, for most companies, drawing up a report for 2017 was a new challenging experience. The primary criterion determining whether a listed company is obliged to report non-financial information is the number of employees, i.e. 500+. One of two financial criteria must additionally be met – revenue of PLN 170m or more or total assets of PLN 85m or more. The legislator allowed companies to freely choose the standard or guidelines according to which the companies draw up their reports but set a minimum content for each report. The Directive is estimated to cover six thousand companies in the EU. The Directive's nature is dual, i.e. in addition to disclosing extended non-financial information (including policies in specific areas), it also requires disclosure of diversity in policy information.

The object of these studies was mainly to present the idea of non-financial reporting on it, empirical research in the field of applied practices and factors influencing the scope and quality of information presented. Among the many authors and studies in this research, it is worth pointing out, among others, (Hejase et al.,2017; Fernandez-Feijoo et al., 2014; Hahn and Kuehnen, 2013; Aguinis and Galvas, 2012; Visser, 2010; Morhardt, 2009; Cooper and Owen, 2007; Adams, 2002; Moir, 2001; Adams et al., 1995, 1998; Belkaoui and Karpik, 1989; Deegan, Gordon, 1996; Gray, Kouhy and Lavers, 1995 and Preston et.al., 1978).

Interestingly, most of the papers by Polish authors concerning CSR focus on issues in the area of management rather than financial reporting, although even here there are a number of studies (Marcinkowska, 2010; Roszkowska, 2011; Samelak, 2013; Stefańska, 2013; Krasodomska 2014; Mikulska and Michalczuk, 2014; Macuda et al., 2015; Ignatowski and Wójcik-Jurkiewicz, 2016; Waniak-Michalak et al.,2016; Krasodomska, 2017; Matuszak and Różańska, 2017; Wójcik-Jurkiewicz, 2017; Posłuszna and Kaczmarek, 2018; Śnieżek, Krasodomska and Szadziewska, 2018; Sadowska and Wójcik-Jurkiewicz, 2018; Kaczmarek and Posłuszna, 2018; Zimoń and Zimoń, 2019; Fijałkowska and Macuda, 2019; Lulek and Sadowska, 2020; Berniak-Woźny, Walotek-Ściańska and Wójcik-Jurkiewicz, 2020).

Research has unequivocally shown the need for uniform solutions related to non-financial information reporting as it is increasingly recommended and recognised as s good practice in companies. Within the data disclosure process, each company would be able to apply its guidelines, standards or principles. The most popular guidelines in this area include the Global Reporting Initiative (GRI), GRI G4, EMAS standards, ISO, UN Global Compact and Polish Standard SIN.

The Directive does not exclude the use of its own corporate standards or other internationally recognised principles either yet requires the company to inform of its choice. It is essential to bear in mind, however, that the above statutory regulations are not identical to the idea of non-financial reporting as they do not entail a change in approach to doing business.

Good Practices in Non-Financial Reporting: Evidence from Poland

The issue of non-financial reporting has become crucial in the last few years. Since 2007, a project called "Raporty społeczne" ("Social Reports") has been implemented taking on the form of a competition in which prizes are awarded to companies that develop and present, in the opinion of the Jury, the best reports on corporate social responsibility. The competition confirms the observation that social reporting is slowly becoming a trend in the Polish business. So far, 396 social reports have been drawn up and submitted, and Table 2 lists the winning companies.

In the "Raporty społeczne" ("Social Reports") competition, prizes are awarded for the best reports on corporate social responsibility. It is an initiative aimed at promoting the idea of corporate social responsibility (CSR), sustainable development, environmental protection, and social commitment directed to companies and organisations that publish reports on their activities in these areas. The first edition of the competition took place in 2007. The promoters of the project were then The Responsible Business Forum and Deloitte. The form of the competition has undergone transformation on two occasions, i.e. in 2011 and then in 2017, with the competition organised by PwC and CSR Consulting until 2014 and SGS since 2015.

The main objective of the competition is to emphasize the significance of non-financial reporting by highlighting a catalogue of good practices in this area. This initiative recognises companies that not only operate in the interest of society and the environment but are also able to present their achievements in a clear, transparent, and credible manner in published non-financial reports. The following three major and primary evaluation criteria used in the competition since 2011 have included:

– 40% completeness,
– 40% reliability,
– 20% communication.

The contest contributes to maintaining transparency and accountability in the activities of organisations and companies when undertaking dialogue with stakeholders; the criteria of the competition were developed on the basis of the reporting guidelines of the European Sustainability Reporting Association (ESRA) and verified by means of the dialogue with experts in 2008 (bearing in mind that the first competition was held as early as in 2007 and included data from 2006 reports).

Table 1: List of Winners of All Editions of "Raporty społeczne" Competition in the period 2007–2019

Year of Competition	Name of a Company Awarded with the Main Prize
2019	SANTANDER BANK POLSKA
2018	LPP
2017	CEMEX POLSKA S.A.
2016	GK LUBELSKI WĘGIEL "BOGDANKA" S.A.
2015	CEMEX POLSKA S.A.
2014	ORANGE POLSKA S.A.
2013	CEMEX POLSKA sp. z o. o.
2012	KOMPANIA PIWOWARSKA S.A.
2011*	POLSKI KONCERN NAFTOWY ORLEN S.A.
2010	DANONE Sp. z o. o.
2009	BRE BANK S.A.
2008	GRUPA LOTOS S.A.
2007	DANONE Sp. z o. o.

**During the first five years, i.e. years 2007–2011, 72 reports were submitted to the "Raporty społeczne" project.*

When assessing social reporting, it should be noted that companies submitting their reports to the competition most often submit reports on sustainable development, corporate social responsibility, including activities for environmental protection and social involvement, where Danone presented a CSR review and received the Main Award in the first edition (Table 1). Due to the diversified range of reports submitted to the competition, a specific systematised nomenclature is noticeable, as shown in Figure 1.

Fig. 1: Most Frequently Used Report Terms (Names)

Such a wide variety of terms results from no uniform definition, no uniform standards or, in principle, no uniform approach to the broadly understood issues of non-financial reporting, both in economic theory and practice. Determination of the volume of reports submitted to the "Raporty społeczne" competition from the beginning of its existence is presented in Figure 2.

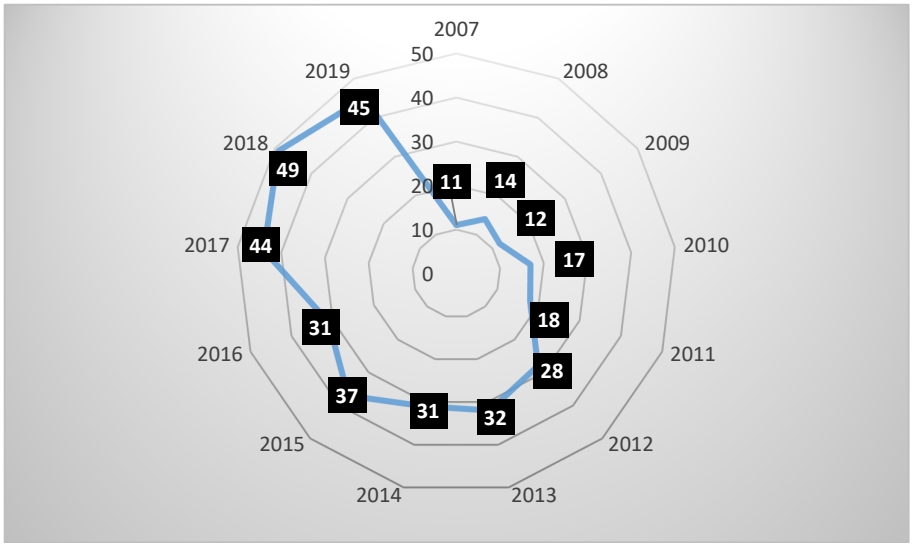

Fig. 2: Number of Reports Submitted to the "Social Reports" Competition in the years 2007–2019

In the 13th edition, i.e. the last one organised at the end of 2019, 45 reports competed, including 15 debuts, 11 integrated reports, and eight reports from non-business institutions (including four reports from public administration bodies, three from NGOs, and one from a university). In the 12th penultimate edition conducted at the end of 2018, 49 reports competed for the title of the best report, including six reports from non-business institutions (including three reports from public administration bodies, three from NGOs, and one from a university). In the analysed years, the winners were selected in the following categories: the best integrated report, the best social report, the best debut, internet users' award, journalists' jury award, Ministry of Investment and Development's award, and Warsaw Stock Exchange's award. The companies which received honours were also selected, as shown in Table 2.

Table 2 : Results of the Last Two Editions of "Raporty społeczne" ("SOCIAL REPORTS") Competition

Results of 12th Edition of "Raporty społeczne" Competition in 2018	
Type of Award	Winner
Social Report award	**CYFROWY POLSAT S.A.**
Stock Exchange Award	**ORANGE POLSKA S.A.**
The best non-business organisation report	**Fundacja im. Doktora Piotra Janaszka PODAJ DALEJ**
Journalists' award	**KOMPANIA PIWOWARSKA**
Internet users' award	**Fundacja Hospicjum Onkologiczne św. Krzysztofa**
Results of 13th Edition of "Raporty społeczne" Competition in 2019	
Social Report award	**SANTANDER BANK POLSKA**
Award of the Minister of Investment and Development	**GRUPA ENERGA**
Internet users' award	**BENEFIT SYSTEMS S.A.**
Integrated report award	**ORANGE POLSKA**

Source: Own elaboration based on the data published at www.raportyspoleczne.pl

Table 3: Number of 2018–2019 Non-Financial Reports Analysed by the Authors

Branch	2019	2018	In Total	In Total
	number	number	number	percent
Building industry	3	4	**9**	***9,57***
Power industry	3	7	**10**	***10,64***
Pharmaceutical industry	-	1	**1**	***1,06***
Finance	9	9	**18**	***19,15***
Commerce	2	2	**2**	***2,13***
Hotel industry	1	-	**1**	***1,06***
Media	2	2	**4**	***4,25***
New technologies and IT	1	-	**1**	***1,06***
NGOs	3	3	**6**	***6,38***
Chemical industry	1	3	**4**	***4,25***
Heavy industry	2	3	**5**	***5,33***
Wood, paper, and furniture industry	-	1	**1**	***1,06***
Electrical machinery industry	1	-	**1**	***1,06***
Clothing industry	1	1	**2**	***2,13***

Food industry	3	2	**5**	***5,33***
Recycling	1	-	**1**	***1,06***
Raw materials and fuels	2	2	**4**	***4,25***
Telecommunication	1	1	**2**	***2,13***
Transport and logistics	1	2	**3**	***3,19***
Services	3	2	**5**	***5,33***
Water and sewerage services	-	1	**1**	***1,06***
Others	5	3	**8**	***8,52***
In total	45	49	**94**	***100***

Source: Own elaboration based on the data published at www.raportyspoleczne.pl

The authors examined 94 non-financial reports submitted to the "Social Reports" competition in the last two editions, evaluating them by means of the content method (their detailed structure is presented in Table 3). The data presented in Table 3 show that the number of non-financial reports has decreased despite the legislative obligation. The authors, examining trends in non-financial reporting of companies, noticed that the number of reports prepared for 2017, i.e. submitted to the "Social reports" competition in 2018, did not differ from the number of reports for 2018, and submitted to the project in 2019 . This drew a special attention of researchers, as despite statutory restrictions did not increase significantly the number of non-financial reports, as expected. The authors of this study, referring the obtained research results to previous years in the framework of the "Social Reports" competition, did not notice any visible changes, whether the status quo was either maintained or a downward trend became apparent.

Increasing number of companies witness the benefits of generating financial reports that inform about non-financial categories. Reports, which present a transparent picture of management and responsible business activity, allow companies to increase their credibility and trust among investors and stakeholders. Via non-financial reporting, companies can demonstrate how they respond to the needs of their environment and how they operate in the interests of society and the environment.

Another initiative is a report published for 18 consecutive years by the Responsible Business Forum (FOB) entitled "Responsible Business in Poland 2019. Good practices". In these reports, the primary classification key for practices continues to be seven areas defined by ISO 26000. They include organisational governance, human rights, labour practices, environment, fair operating practices, consumer issues, social engagement, and community development. The good practices are grouped into areas and then divided into categories, i.e. leading themes in each area. The number of practices in the category reflects the changes in the activity of companies, their involvement, but also indicates encountered challenges. Two reports concerning the same period as previously presented were also evaluated by the authors, who assessed each of them as three independent experts. They include the reports published by the Socially Responsible Business Portal, containing a detailed analysis of the companies' reports. Another area was constituted by the adopted examples of good practices published in the 2019 Report by 214 companies and the 2018 Report by 316. In both cases, they were very diverse business entities.

The authors of the study, examining examples of good practices among public companies in the field of non-financial reporting, noticed a strongly declining trend. The decrease that was recorded among companies amounted to 100 (exactly from 316 to 214). The authors, as independent experts, finalizing the conducted research, unanimously expressed their opinion on the need for immediate changes in the scope of establishing (developing) guidelines as to the quality of information contained in non-financial reports prepared by companies.

Conclusions

In the light of the presented considerations and the research carried out by the authors, it results that the issue of the method of non-financial reporting needs to be clarified at the national or even international level. The failure of the European Commission and Polish legislators to precisely define the shape and direction of standards for the development of non-financial reporting also translates into requirements for qualitatively new reporting elements close to the idea of non-financial reporting. Non-financial reporting, both in Poland and globally, results in an increasing number of companies drawing up reports in this area, not only by obliged companies, which also affects the quality of information presented by public companies worldwide. Unfortunately, businesses still lack sufficient knowledge in this area clearly visible by the information chaos indicated by the authors in terms of what and how to non-financial disclosure. Research has unequivocally recognized the need for uniform solutions related to non-financial information reporting as it is increasingly recommended and recognised as s good practice in companies.

The authors are fully aware of certain limitations in the extrapolation of the results presented in this paper to all public companies operating in Poland, due to the preliminary nature of the research and a relatively small test sample. Therefore, any possible application of findings from this research to the general population may lead to erroneous results. The analysis made it possible to identify trends in non-financial reporting of public companies in Poland according to new guidelines, and thus, it will allow to address further challenges in this area, in the field of ESG reporting with a diagnosis of what to do next.

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Agenda para el E-government y la Transformación Digital: Liderazgo como Factor Individual

Miguel CUYA LEANDRO
Universidad Nacional Mayor de San Marcos, Lima Perú, miguel.cuya1@unmsm.edu.pe

Sussy BAYONA-ORÉ[1,2]
[1] Universidad Autónoma del Perú, Lima- Perú, sbayonao@hotmail.com
[2]Universidad Nacional Mayor de San Marcos, Lima-Perú, sbayonao@hotmail.com

Abstract

Las organizaciones públicas y privadas de los diferentes sectores, proponen nuevos modelos de negocio para brindar mejores productos y servicios a sus clientes, por decisión de la organización o por la necesidad de satisfacer a un cliente cada vez más exigente. En el sector público, el paradigma gobierno electrónico (e-government) ha evolucionado a gobierno digital y Transformación Digital (TD). Esta transformación implica un cambio en la forma como las organizaciones públicas prestan los servicios al ciudadano. Conducir con éxito los procesos de transformación digital, requiere de personas con habilidades y conocimientos. En este artículo se presentan los resultados de la revisión de literatura para determinar factores que deben ser tomados en cuenta en las iniciativas de transformación digital en las organizaciones. Los resultados muestran que las competencias individuales tales como liderazgo, la comunicación y la visión de negocio, son mencionados por los autores con más frecuencia. El liderazgo es una competencia individual que cobra importancia en las iniciativas de transformación digital.

Keywords: Liderazgo, transformación digital, paradigma, e-government.

Introducción

La incorporación de las Tecnologías de Información y las Comunicaciones (TIC) en las organizaciones públicas y privadas ha cambiado la forma de hacer negocios, las actividades diarias, el tratamiento de los datos (Mehta, 2019), la prestación de los servicios y la innovación de productos. Los consumidores de productos y servicios son cada vez más exigentes. Esta situación, obliga a los líderes de las organizaciones adoptar nuevas tecnologías digitales que les permita atender las exigencias de los consumidores (Kazim, 2019). De esta forma las organizaciones, independientemente del sector al que pertenecen, abordan cambios drásticos en la cultura corporativa, con el propósito de adaptar sus estructuras, procesos y modelos para hacer frente a los nuevos paradigmas que respondan al contexto de la revolución digital, en adelante se denomina Transformación Digital (Wang, Zhang & Li, 2020; Muñoz, Sebastián & Núñez, 2019).

La Transformación Digital (TD) es un proceso que requiere la incorporación de la tecnología en las diferentes áreas de negocio para cambiar la forma de operar y aportar valor a los clientes. Es considerada un fenómeno complejo y multidimensional (Profirio et al., 2020) que implica dar una nueva orientación a la estrategia de la organización (Morabito, 2016) y del modelo de negocio. La característica de ser multidimensional hace que el éxito de la TD de la organización dependa de varios factores; la etapa de madurez en la que se encuentra la organización, la cultura, los tipos de iniciativa, el valor de las iniciativas, la estructura de los equipos centrados en la experiencia del cliente (Kazim, 2019) y la Gobernanza efectiva de TIC. En la literatura revisada, diversos factores han sido mencionados como habilitadores de la TD. Cabe mencionar, el error común de entender a la TD como la adquisición y uso de tecnología de vanguardia sin considerar los demás factores, esta práctica de inversión en TI basado solo en la innovación tecnológica podría no ser suficiente para lograr el impacto transformador esperado, los expertos atribuyen este tipo de fracaso a la falta de cultura digital en los líderes y tomadores de decisión (Álvarez, Capelo & Álvarez, 2019; Davenport & Redman, 2020; Abbu, Mugge, Gudergan & Kwiatkowiski, 2020).

Adoptar la TD será entonces, una prioridad en la Alta Dirección para buscar nuevos modelos de negocios sobre la base de las necesidades actuales de los clientes. De esta forma, se aprovechará al máximo los grupos de talentos de la organización para encontrar una respuesta estratégica a la tendencia de la economía y la tecnología digital (Wang,

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Zhang & Li, 2020; McGrath & McManus, 2020). Sin embargo, en la revisión hermenéutica de casos prácticos, de análisis de modelos y discusiones estratégicas al respecto, se ha encontrado evidencias que el éxito de estas iniciativas dependen de la decisión del líder, además del compromiso, las capacidades, característica y estilo de liderazgo de este, durante todo el proceso de transformación (Kazim, 2019).

En este artículo se presenta una revisión de literatura sobre el liderazgo en TD de las organizaciones. Se elabora un análisis epistemológico desde un enfoque holístico y sistémico en la búsqueda de conocer los factores predominantes en los líderes de las organizaciones para conducir con éxito los procesos de TD. El término sistémico está relacionado con el todo en un sistema, a su vez definido "como el conjunto de elementos relacionados entre sí funcionalmente, de modo que cada elemento del sistema es función de algún otro elemento, no habiendo ningún elemento aislado" (Terán et al., 2017, Pág. 216). Otro punto importante en la investigación es la metodología en hallar nuevas verdades, estas verdades emanan del análisis entorno a un conjunto de creencias o paradigmas (Bunge, 2019).

En esta investigación se busca describir los factores individuales del líder en los procesos de TD en las organizaciones plasmadas en los casos de éxito y fracaso, modelos de madurez y discusiones estratégicas, extraídos de la literatura. Para este propósito, se realizó una revisión de la literatura sobre los aspectos predominantes del papel del líder como actor fundamental en los cambios de cultura y modelos requeridos para la TD. Un total de 22 artículos publicados en el periodo 2017-2020 fueron analizados. En este trabajo nos centraremos en la característica individual del líder y la relación de este en las organizaciones en la TD, presentes en la literatura. Con este estudio se propone mejorar el conocimiento de los factores que contribuyen al éxito de iniciativas de transformación digital y responder a la pregunta:

¿Qué características individuales contribuyen a avanzar en la Transformación Digital en las organizaciones?

Marco Teórico

Transformación Digital

El avance de la tecnología disruptiva obliga a las organizaciones a encontrar nuevas formas de hacer negocios para que puedan adaptarse y evolucionar, evitando así el riesgo de salir del mercado (Metha, 2019). El proceso de cambio que están viviendo las organizaciones como la digitalización, es visto por muchos profesionales como una mega tendencia global denominada Transformación Digital, el cual cuenta con la capacidad de cambiar fundamentalmente las industrias y sus operaciones (Kazim, 2019).

La TD es un "… proceso de gestión que orienta la cultura, la estrategia, las metodologías y las capacidades de una organización a partir de las tecnologías digitales" (Cuenca-Fontbona, Matilla & Compte-Pujol, 2020, Pág. 78). Este proceso está condicionado por diversos inconvenientes, pero se hace imprescindible adoptar la transformación para poder así mantenerse en el mercado. Sin embargo, es importante considerar que la transformación digital puede ser una gran oportunidad para obtener mejores beneficios económicos (Mugge, Abbu, Michaelis, Kwiatkowski & Gudergan, 2020).

Para una verdadera TD es importante tener en cuenta el estado de preparación de la organización que le permita adoptar con éxito los cambios requeridos, a este estado se le denomina madurez digital. Esta madurez se logra a través del compromiso, la inversión y el liderazgo. Las empresas con madurez digital establecen prioridades realistas y se comprometen con el arduo trabajo de lograr la madurez digital (Mugge, Abbu, Michaelis, Kwiatkowski & Gudergan, 2020). Alcanzar la madurez no solo es contar con todos los procesos digitalizados, sino que el pensamiento o cultura digital es parte del accionar de los miembros de la organización.

Liderazgo y Competencias

Liderazgo es la capacidad de una persona para influir sobre otras para dinamizar, apoyar o animar a conseguir el objetivo de un proyecto en común y alcanzar mejoras en la organización (Baque, Triviño & Viteri, 2020). La influencia del líder sobre el grupo hace posible alcanzar una visión conjunta. Es un proceso orientado a la transacción e interrelación social que se produce entre líderes y colaboradores en el cumplimiento de objetivos comunes (Cortez-Valiente, 2017). Diversos estudios concuerdan que el liderazgo en los equipos de dirección cumplen un papel fundamental en un proceso de integración digital, puesto que son los principales agentes de cambio (Villar & Araya-Castillo).

El estilo de liderazgo se refiere a cómo el líder toma las decisiones y su estudio se basa en la perspectiva del comportamiento; carismático, atribucional, transaccional y transformacional (Villar & Araya, 2019). El estilo de liderazgo depende de motivos de diversa índole (Jiménez &Villanueva, 2018). En las organizaciones el enfoque transformacional es el más recomendado, ya que el líder cumple el papel de coach motivacional. El líder transformacional potencia los deseos de los seguidores, estimulándolos a lograr las metas en un desarrollo común (Peñafiel et al, 2019). Asimismo, puede entenderse como la organización o individuo que hace uso calculado de los activos digitales de una empresa para lograr los objetivos comerciales (Breuer, 2019). Competencia hace referencia a los conocimientos las habilidades, destrezas, actitudes y valores de las personas.

Líderes para la Transformación Digital

El liderazgo es una característica del individuo y es considerado un factor crítico de éxito cuando se conducen iniciativas de e-government (Morales & Bayona, 2019), iniciativas de mejoras de procesos (Bayona-Oré et al., 2014) e iniciativas de TD (Cuenca-Fontbona, Matilla & Compte-Pujol, 2020). Según Yokoi et al (2019) existe un amplio consenso de la importancia y la influencia del liderazgo para conducir procesos de TD. Alcanzar la misión y los resultados está relacionado con el rol que juegan las personas como elementos claves para la transformación del gobierno, considerado dentro del quinto driver "Personas" de los siete mencionados por Chenok et al. (2017). Es así como el líder digital deberá poseer habilidades tecnológicas con capacidad integradora estableciendo retroalimentación significativa a tiempo real con sus equipos desarrollando redes ágiles (Petrucci, 2018). El líder digital está relacionado con el uso de la tecnología para mejorar la vida, el bienestar y las circunstancias de los demás, mientras que el líder transformacional busca desarrollar e inspirar al subordinado a la responsabilidad, compromiso con objetivos desafiantes, estimulación intelectual y la consideración individualizada.

Metodología

La investigación se plantea, una revisión de la literatura especializada correspondiente a modelos, estrategias, casos de éxitos y fracasos que experimentan las organizaciones durante la adopción a la TD y se enfoca en los factores individuales predominantes del líder mediante un razonamiento inductivo y sistémico. Con este propósito, se revisaron artículos científicos publicados en el periodo 2017 - 2020. Para extraer la información relevante de cada uno de los artículos científicos se diseñó un formato en Excel con la siguiente información, datos generales del artículo, competencias del líder TD, estilos de liderazgo, definiciones de las competencias y la influencia de las competencias en la TD.

Resultados y Discusión

Los resultados de la revisión de literatura muestran que existe un conjunto de competencias de los líderes de TIC que contribuyen al éxito de iniciativas de TD en las organizaciones (véase Fig. 1). La mayoría de los estudios de casos corresponden a regiones de países desarrollados en áreas tecnológicas, esto indicaría que a pesar de que la tecnología es de tendencia global, la adopción a la TD en países menos desarrollados tiene algún tipo de freno paradigmático, el cual podría motivar futuras investigaciones. El factor liderazgo es el factor que se menciona con frecuencia en los estudios. El proceso de TD requiere considerar el valor del capital intelectual y humano, y es el líder, el responsable de gestionar el cambio a través de esos recursos (Breuer & Szillat, 2019).

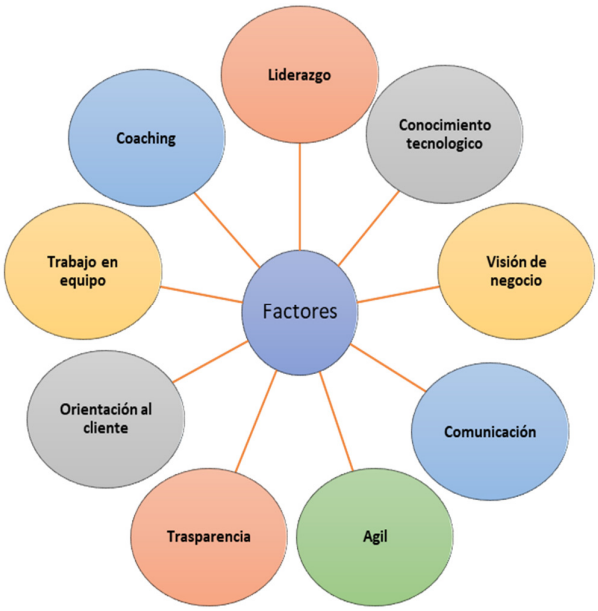

Fig.1 Factores que impactan en iniciativas de TD

Le sigue en orden de importancia la comunicación como competencia del líder con miras a superar el desafío de impedimentos culturales y operativos que la organización presenta en la adopción de la TD (Mugge, Abbu, Michaelis, Kwiatkowski & Gudergan, 2020; Alunni, 2018). Así mismo, permite mantener la comunicación continúa con el cliente (Sebastian et al., 2017). En la Tabla1 se presenta la lista de los factores identificados.

Tabla 1: Factores individuales para la TD

Item	Descripción
Liderazgo	
	El liderazgo es considerado como uno de los pilares necesarios para afrontar el cambio de la TD (Alunni & Llambías, 2018).
	El liderazgo para impulsar la transformación digital se refiere a la "intensidad de la gestión transformacional, la convicción y la creencia por parte del gobierno de la organización que apuesta por el valor diferencial y beneficiosa para el consumidor" (Cuenca-Fontbona, Matilla & Compte-Pujol, 2020).
	La carencia del liderazgo es un factor inhibidor (Area, Santana, Sanabria, 2020). Es reconocido como uno de los factores predominantes en los problemas de adopción a la transformación digital.
Comunicación	
	La comunicación efectiva es un pilar para motivar a todo el personal acerca del potencial de la nueva tecnología y evitar así la resistencia al cambio (Albukhitan, 2020). La comunicación es considerada como uno de los factores de importancia para llevar adelante una TD con éxito (Alunni & Llambías, 2018). Los mensajes clave sobre la TD para toda la organización, deben identificarse y articularse con claridad. Los mensajes deben enviarse a través de múltiples canales, como charlas de liderazgo, volantes y mensajes de marca, y deben sincronizarse con los eventos de implementación (Mehta, 2019).
Visión de negocio	
	Se requiere que las empresas, para dar respuestas al entorno, cuenten con personas que se adapten fácilmente a los cambios, estratégicos, creativos, receptivos y que tengan la capacidad de responder al quehacer de la empresa, sino que también proponer un nuevo *cómo* (Meriño, 2020). Un factor negativo para la TD es la falta de visión compartida por parte del equipo directivo es decir la falta de visión de Negocio (Area, Santana & Sanabria, 2020).
Conocimiento Tecnológico	
	Se refiere a la" intensidad de las iniciativas tecnológicas en las que una

Item	Descripción
	organización invierte para cambiar su gestión operativa y aumentar su competitividad" (Cuenca-Fontbona, Matilla & Compte-Pujol, 2020).
	La carencia de conocimientos y competencias tecnológicas y la ausencia de un plan de integración tecnológica adecuadamente temporalizado es considerado un factor negativo (Area, Santana & Sanabria, 2020).
Ágil	
	Los equipos deben ser ágiles y seleccionados en función a sus habilidades (Petrucci & Rivera, 2018; Breuer & Szillat, 2019).
Transparencia	
	Los pensamientos claros del liderazgo sénior sobre una estrategia de transformación digital son vitales para que la estrategia se traduzca en una ejecución eficaz en todos los niveles de la organización. Los equipos se animarán para darlo todo cuando vean el compromiso de la alta dirección (Metha, 2019).
	La transparencia es un pilar para minimizar la resistencia al cambio (Albukhitan, 2020).
Orientación al cliente	
	Bajo el entendimiento del concepto TD, que requiere un entendimiento de los nuevos hábitos de consumo de los clientes, se debe rearticular el liderazgo con un enfoque en los cambios de los procesos y cultura con base en nuevas políticas, e incluso un cambio de la organización con una nueva propuesta de valor orientado al cliente (Alunni & Llambías, 2018).
Trabajo en Equipo	
	El trabajo en equipo permite potenciar y afianzar la sinergia en la organización. Müller et al. (2019) resalta la falta de cohesión en el equipo, que permita ver los cambios digitales, es un riesgo inminente en la organización.
	Los líderes deberán influir incluso en los equipos informales, crear redes de intercambio de conocimiento mediante un entorno inclusivo (Petrucci & Rivera, 2018).
Coaching	
	El líder debe potenciar al equipo mediante un papel de mentor, coach y tutor (Breuer & Szillat, 2019; Kazim, 2019).

Conclusiones

La transformación digital es un proceso que las organizaciones podrán adoptar con el fin de ajustar sus productos y servicios, debido a que los clientes y proveedores vienen cambiando su forma de interactuar. El proceso de transformación se asocia a las TIC, sin embargo existen otros factores que deben ser considerados cuando se conduce iniciativas de TD. Los resultados de la revisión de literatura de artículos científicos que han sido publicados en el periodo 2017-2020 muestran que existen otros factores que deben tomarse en cuenta en el proceso de transformación. Considerando que la TD no solo es mejorar los recursos tecnológicos de la organización ni mejorar los procesos, sino de revisar y replantear una reingeniería desde el modelo del negocio con una visión estratégica y digital, se requiere de personas con habilidades de liderazgo. Por consiguiente, es importante conocer si las competencias y estilos de liderazgos del líder potencian los factores habilitadores del proceso de transformación. Los resultados de la revisión de literatura resaltan los factores liderazgo, comunicación y visión del negocio, con más frecuencia. Como trabajo futuro se propone definir perfiles de los responsables de conducir iniciativas de TD y su influencia en la TD de las organizaciones.

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SMART VILLAGE - Perspectives of Rural Development in The South East Region

Liviu-Marian DOBROTĂ, Phd.student
University "Dunărea de Jos" of Galați, Faculty of Engineering and Agronomy, Brăila, România, e-mail: liviudobrota82@gmail.com

Cristinel FERTU, PhD student
University "Dunărea de Jos" of Galați, Faculty of Engineering and Agronomy, Brăila, Romania, e-mail : cristi_fertu@yahoo.com

Maria-Magdalena TUREK – RAHOVEANU, Phd.
University "Dunărea de Jos" of Galați, Faculty of Engineering and Agronomy, Brăila, România, e-mail: mturek2003@yahoo.com

Ina Mogildea, Phd.student
University "Dunărea de Jos" of Galați, Faculty of Engineering and Agronomy, Brăila, România, e-mail: inamog792@gmail.com

Abstract

As an approach to local development, smart villages reflect the contemporary mechanism and path of development actions, as well as the challenges of the community. The concept comes not only from the examination of actions that take place in rural areas but also from " ideas, giving rise to innovation, actions that are the subject of a large-scale propagation of the concept of intelligent development.
In Romania, the presence of services with internet access is lower in rural areas than in cities. Information transmission networks are constantly expanding. However, the advancement of technology is not enough to develop smart domains. The concept of smart villages concerns rural areas through their communities and largely includes their regional and local characteristics.
A notable feature of smart villages would be traditional and new networks and services that are strengthened through digital technologies, telecommunications, innovation and better knowledge, with a focus on the benefit of residents and businesses. The objectives of this paper are:

- description of areas of interest with an impact on the development of smart villages, - establishing the perspectives of rural development.

The research hypothesis of this article raising the awareness of the inhabitants of rural areas will support the development of the concept of smart village.

Keywords: Rural Development, Smart Village, Internet Access.

Introduction

It is topical that there is a dynamic development of the digital economy resulting from the speed with which IT technologies are advancing. The transition to the digital economy is similar to the massive advertising on the use of information technology and, very importantly, the advanced exchange of data, as well as the revolution of new forms of communication introduced in the community. Improvement refers to the whole of society and yet the speed with which it is achieved depends on some divisions and differences between urban and rural. Access to resources and markets is different for peripheral regions in terms of socio economic conditions and social structures.

In a broader view, they are characterized by imbalance in terms of migration and different levels of education of residents with low potential for endogenous development (Bilbao Osorio, Rodriguez Pose 2004; Naldi et al., 2015).

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In Romania, the market of internet access services has reached a higher level in the urban area than in the rural one. However, information transmission networks are constantly expanding. The concept of smart villages refers to rural areas and communities. It must certainly include to a large extent the characteristic regional and local features. Here, traditional services based on internet access and us are strengthened with the help of digital technologies, telecommunications, innovation and a better use of knowledge to support the community and the business environment.

The objectives of the article are: indicating and presenting the areas of influence on the development of smart villages and establishing the prospects for rural development.

Material and Method

We aim to see if an increase in awareness of the rural community for the integrated development of smart rural areas. Through the assumed objective and the hypothesis adopted by the article, the following research question arises What actions should be taken in order to materialize the efforts to implement the concept of smart village?

The research methods used in this paper are studies from the literature and a study conducted with residents of Chiscani commune in Romania.

The notion of smart villages comes from the reflection of the image on smart cities. At the beginning, the concept of smart city involved the creation of the city from top to bottom, with an increased focus on technical solutions, a condition that stimulates the economic development of cities and improves the quality of life within them (2015). The concept of smart city shows us the need for widespread use of new technologies in order to improve the environmental conditions of the city (Fernandes et al., 2011).

However, the main idea of the notion of smart villages (analogous to the concept of smart cities) is that technological development, combined with other rural development initiatives, can create new opportunities for additional income, service provision and fortification. social potential, significantly improving the quality of life in rural areas (van Gevelt, Holmes, 2015).

The data reported above show the differences between smart cities and smart villages. If we refer to smart cities, the greater emphasis is on the high volume of data sets and the ability to transform the way cities work thanks to the associated digital technologies. Smart villages do not only mean spreading the principles of the concept in scattered areas. In this case, more emphasis is placed on local communities that directly face the challenges of everyday life often but not specifically, with the hel of digital technologies. Smart villages are a prototype of local rural development, with an emphasis on the the dynamics and contemporary methods of development processes and the challenges facing the community.

This approach comes not only from the study of processes that take place in villages (Naldi et.al.,2015), but also from remarkable ideas that are subsequently widely promoted, for example as a notion of intelligent development. The concept of smart development is highlighted as one of the main elements of European economic policy found in the document "Europe 2020", defining strategic actions aimed at accelerating economic growth in reducing social disparities. Putting the smart development concept into practice can be problematic because it depends mainly on the specifics and resource s in each area's portfolio.

Results and Discussions

The smart village represents the entity that through advanced technologies wants to improve the quality of life, thus maintaining the principles of sustainable development, pays attention to environmental protection, ensuring to obtain these results through lower costs and bearable in the long run.

Figure 1: The key elements for the development of the smart village concept

Source: author' s study

As shown in Figure 1, the main conditions for the development of the concept of smart village depend on the use of techniques and technologies for transmitting information. In this context, a community with creative thinking and open to change, focused on improving the quality of life, is a major gain for the promotion and development of this concept. It is topical that more and more attention is paid to the participation of local communities and their ideas in creating a modern village (2017) and creativity and openness to the new, to change, must come from both residents and the part of their representatives, or of the councilors of the communes or of the mayors. So, local authorities must make efforts to live up to the expectations of nthe local community by creating villages with visible transformations in terms of quality of life (Bruska, 2012).

A creative community and the use of ICT support a dynamic development. Below are the differences found in the ownership of computers in large households and in rural areas and the degree of use . In 2017, almost 70% of households had at least one computer at home. Given the different types of households, owning computers is quite diverse. In large cities, the percentage of computer equipped households and the number of users was higher than in rural areas, as shown in Figure 2.

Figure 2: Households with computers **Households with an access to the Internet at home**

Source: consultations Romania's statistical yearbook ,accessed 2020

The fact that homes are equipped with computers is not really relevant because they can be used sporadically. However, compared to 2012-2013, the largest increase was recorded in rural areas. In contrast, in rural areas, the share of homes with internet access is considerably lower than homes in urban are as. Later, in 2019, this percentage of households in rural areas rose to 66.7%, while in large cities to 82.5%. Compared to 2015, the highest increase was registered in rural areas by 20.1% and 10.6%, respectively, as shown in chart no.2.

The above information emphasizes the importance of providing internet in rural households even if the low number of households that use the computer is also worrying. We can look at this as a challenge and pay more attention to residents about using computers and the internet. The application of digital technologies solves significantly the problems of rural areas resulting from distance and low population den sity, by providing instant communication via the Internet and access to electronic services.

Implementing the concept of "smart village"

The smart village is a functional village in the future, created from several areas of interest and based on the active involvement of responsible, independent and determined citizens. These areas include:

- smart governance participation,
- intelligent people social and human capital, - intelligent environment natural resources, - smart economy competitiveness.

An important contribution to establishing local links with other areas can come from the economic area through intelligent development. Through competitiveness, this could be achieved through technologically advanced products or services, as well as through innovation. The introduction of innovations should be strictly and organized on specializations, so as to create territorial competitive advantages (Rodriguess Pose, 2004).

M.Wojcik makes known the smart specialization in rural areas in three contexts (Wojcik 2018,pp. 8 9), namely:

- integration the establishment of commercial entities in the territory is a sign of maturity in economic development; cultural conditions also play an important role. Aspects such as social proximity and family should not be overlooked;
- connections and closeness closely related to the process of knowledge transfer. The economic technical social relationship can be considered the link between the dissemination of information and basic knowledge. In the transfer of knowledge, the role of space is important, ie it takes place mainly at the local level and even neighborhoods;
- connectivity - this aspect is based on the inclusion of networks as an essential feature of economic and social life, especially in the era of rapid development of new technologies. First of all, it is the mobility of people in physical space and the ease with which they can move in different environments of social interest and secondly, it is the mobility in the virtual space, having the capacity to act in parallel with reality.

Intelligent environment refers to the sustainable use of natural resources through continuous efforts to increase the use of renewable energy resources. Some examples would be: controlled street lighting pollution is measured, controlled and monitored, renovation of buildings to reduce energy consumption, etc. This field presents difficulties of understanding and implementation, especially for the rural inhabitants, they do not have notions about the harmfulness of the solutions adopted but outdated and used by them for many years.

Klodzinsky stressed that in marginalized areas, it is very important to train local communities so that they use the notions of sustainable development in an operational way. The continuous development of training capacity and lifelong learning is currently the main problem and, at the same time, the basic way to change the human mentality (Klodzinski 2014, p. 109).

The delimitation of an area of intelligent people shows us that the promoters of change in rural areas should be residents who, in terms of high qualifications and skills, creativity and willingness to cooperate and with the support of information and communication technologies (ICT) can work to improve quality life in rural areas.

In the field of smart governance, an important role is assigned to the involvement of society in decision making, transparency of actions, quality and access to public services. It is necessary to promote civic participation. Citizen involvement, in general, could be understood as a more or less direct involvement in social, public and political life (Kazmierczak, 2011).

By social or community involvement is meant the participation of the inhabitants in the common activities, which presupposes, first of all: the active presence at the creation and functioning of the civic groups and of the non-profit organizations, as well as the permanent or occasional volunteer activity. At the same time, each individual can express his own intention to participate in the elections, actions and daily plans related to the character and type of the society in which he wants to operate.

A good example to follow would be the establishment of a separate budget called the civic budget or the citizens' budget. This implies the possibility for the inhabitants to decide on directing the funds of a separate part of the communal budget, by vote, to different projects.

Idea implemented by many European states but not by Romania at the moment. I chose to present the advantages and disadvantages of introducing the civic budget in several localities in Poland. Here, the decision to set up a civic budget was adopted relatively late, in 2011, when the city of Sopot became the initiator of this type of project.
Later, civic budgets were introduced in other cities and rural areas. Despite the rapid spread of this idea, it is not yet a common form of activity for residents in the process of co deciding on the fate of the environment in which they live.

In Dobra commune, for example, in 2018, 23 projects from the civic budget were registered (11 investment projects and 12 projects without investments). The implementation of these projects started in 2019. The number of registered residents of Dobra commune amounts to almost 21,000, while only 1,416 people participated in the vote. Participation in the interview consisted of 56 residents in order to obtain information on the reasons why residents did not vote and the reasons that led to the vote.

The main reasons for not participating in the vote for the projects from the civic budget were:

- lack of knowledge about the possibility to vote,
- refusal to vote, on the grounds that the citizen does not have the feeling of being a member of a larger community (lack of a sen se of belonging),
- the refusal to vote, as a result of the feeling of electoral political disappointment, the conviction that this vote will not change anything,
- lack of confidence that a person's vote can influence the selection of projects.

Another in terview was based on 30 residents who voted in the civic budget. 66% of them stated that their participation in the vote was due to the distribution of information by another person on virtual social networks. Other people indicated that their involvement was the result of the desire to participate in the development of communal areas and the conviction of civic responsibility.

Therefore, the above studies show that the basis should be the strengthening of social ties. Volunteers from local rural communities who will be involved in developing these commitments will be a real help to the community. Social responsibility will lead to the identification of members of society with the rural area in which they live, which will amplify the feeling of duty to involvement in civic life. This should be supported by the use of new techniques and technologies, for example by setting up focus groups of local communities. The steps that should be followed to initiate the development of smart villages are shown in Figure 3.

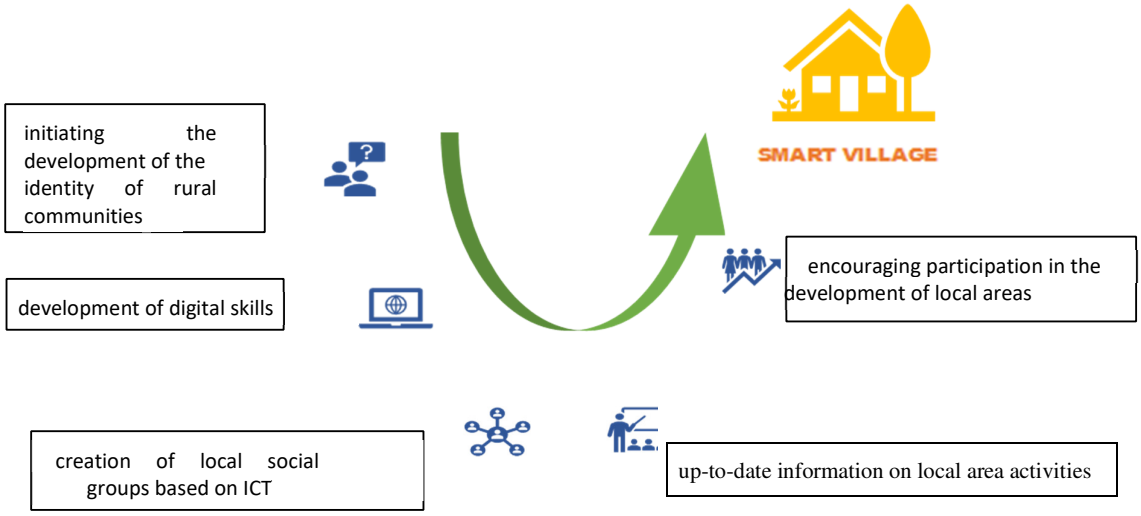

Figure 3: Measures for the implementation of the concept of smart villages

Source: author's processing

Awareness of the possibility of making decisions is very important. The availability of local communities to participate in decision making depends on this. The responsibility for the initial development stage of smart villages falls on the shoulders of the local community, jointly developing strategies based on local resource s and aspirations.

Conclusions and proposals

The development of digital infrastructure must be supported, as well as the competencies of its use, but also providing assistance to the inhabitants of rural areas in identifying solutions to increase the viability and sustainability of the countryside due to social innovation and smart specialization. This will lead to the development of a smart village. Looking to the future, the intelligent village, in its development will exceed the limits of its borders. Even if the initiatives take place at the local level, smart communities must agree that the village's role in establishing a specific landscape is also associated with other villages and towns. Therefore, they should activate these links.

There is no standa rd model of smart village and no methods or tools to use.

Rural areas oriented towards the development of a smart village, assess their resources, apply the best available knowledge and act in shaping the surrounding reality.

In terms of multifunctional de velopment, it will differ from region to region, depending on local conditions. The economic recovery of rural areas depends on changes and interest in development. The objectives of rural development towards a smart village must be adopted by local organizations and rural residents, creating partnerships using modern ICT to project the image of the smart village in the future. Taking into account the objectives of the article, a presentation of the areas that influence the development of the smart village and the directions to a developed rural area was made. The result of this study also included demonstrating the hypothesis that in the development of the concept of smart village, an essential aspect is the awareness of the inhabitants of rural areas. In conclusion, we emphasize that this article is a signal of the evolution and development potential of the smart village concept.

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Liquidity Management and Profitability of Banks in Nigeria (2007-2017)

OKEREKE KARACHI YVONNE[1]
karachi.okerekepgs@stu.cu.edu.ng

Olokoyo Felicia[2]
felicia.olokoyo@covenantuniversity.edu.ng

Omankhanlen Alexander Ehimare[3]
alexander.omanhklanlem@covenantuniversity.edu.ng

AKINJARE VICTORIA Abosede[4]
Victoria.akinjare@covenantuniversity.edu.ng

[1,2,3,4.] Department of Banking and Finance, Covenant University, Ota, Ogun State, Nigeria.

Abstract

This study investigates the relationship between liquidity management and the profitability of Banks in Nigeria over the period 2007-2017. The study examined the liquidity-profitability trade-off taking a sample of five banks in the banking industry. The empirical results revealed that liquidity management inversely influences the operations of deposit money banks. Data includes Descriptive research design and panel data regression which describes as institutions that are cross-sectional data and time series also known as collected historical data. This implies that liquidity management of DMBs has no significant impact on the returns on their assets and returns to their equity's shareholders. There is therefore the need for banks to balance the trade-off between their liquidity management and profitability; this is because excess liquidity reduces profitability while excessive illiquidity exposes DMBs to insolvency.

Keywords: Liquidity, Profitability, Deposit Money Banks, Management

Introduction

Deposit money banks have become a much-needed institution within the financial system as it helps promote the transfer of (political / monetary / economic) assets which are less desirable for the more desirable public needing the financial assets. Appropriate financial intermediation needs the bank management's attention and focus on profitability and liquidity. In practice, profitability and liquidity is a meaningful indicator of the firm's profits and the quality not only of depositing money bank but of any profit-orienting business. Such performance indicators are important to a bank's major public investors and depositors. Managing cash flow involves having sufficient balance sheet and financial instrument accounts Toward certain customers ' needs as and when necessary, as well as ensuring that funds for organizational business processes (Bhattacharyya & Sahoo, 2011). Liquidity Management is a factor to meet everyday withdrawal demands of the clients of the organization (G. Bassey, Tobi, I. Bassey, & Ekwere, 2016). the extent to meet up with the customer withdrawals and other needs Its the outcome of handling the cash flow. Handling flexibility is an essential factor which is used in operation in business whether financial institutions Or company.it helps to know how solid the firm is.which is based on profitability (Otekunrin et al., 2018). the main aim is by improving the investments and increasing revenues for a corporation.wealth maximization is the increase in the fair value of share capital with earnings increment per share of shareholders while profit maximization is the firm's objective of measure of efficiency and effectiveness in the firms operation which is a reward for firms performance. Although cash which is considered liquid, is a vital factor in a financial institution that helps to meet up the financial obligations of the firm. Being liquid is considered as having so much returns to disburse loan and make investment to get dividend at the end of the month to shareholders and stakeholders of the firm. For instance, in September 2018, the Nigerian Central Bank (CBN) announced Skye Bank's liquidation with Polaris Bank to step over the problem of the flexibility specifications non-compliance. Recently, in 2019; Nigeria's Central Bank has extended the recapitalization deadline .In the case of microfinance institutions, this raised the financial cash reserves for regional microfinance institutions from 2 billion naira to 5 billion naira by 2021, while those of the government expanded from 100 million naira to 1 billion. Nigeria's Central

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Bank launched changes to strengthen a strong financial sector in 2019. The goal is to Working to improve the financial system's capacity, creating awareness of the accomplishments in policy making and daily routine in the financial system. The concern for most banking sector in Nigeria is that those who appear to concentrate on more shareholder profit than trying to take cash flow measures to identify the customer's requirements and keep their word to their customers because they remove a significant percentage of their customers when it is due in that process. This research is evaluated against the profitability ratio evaluated with return on assets (ROA) and return on equity (ROE) in the liquidity ratios and non-performing loans. However, the study aims at reviewing the following objectives which are:To ascertain why the solvency ratio impacts profitability in Deposit Money Banks and also to determine the effect of equity on profitability in Deposit Money Banks.

Review of Literature

Olagunju, Olanrewaju and Olabode (2011) stated that Liquidity will allow a firm to escape a circumstance where the related issues of selling off assets at depressed rates and the additional fees charged to lawyers, default investors and insolvency underwriters would compel a firm to repatriate.

Francis (2016) analysed Liquidity Components which include Vault profit, adjusts retained With CBN, adjusts Held With Other nigerian banks, cash reserves With Offices & sections Outside Nigeria, cash At request In Nigeria, placing with financial sector, government securities, federal reserve Certificates, expenditure in sustaining financial instruments, expenses reduced in price payments made In Nigeria, Negotiable payment accreditation. Liquidity is the rate and ease at which assets are transformed into cash to satisfy financial obligations without loss of interest or money. Types include: cash re-serves, bonds for government debts, etc. Liquidity is an important factor in fulfilling daily demands for withdrawal at all times.

Omankhanlen, Ilori and Isibor (2018) further examined the nexus between monetary policy and the achievement of a bank's profit objective. This study was carried out to establish the influence of variables like Liquidity Ratio, Interest and Money supply (M 2) which are used as monetary policy instruments on deposit money bank profitability objective. The study revealed that there was a positive long run relationship between Liquidity Ratio and deposit money bank's profitability; there also existed a negative long run relationship between interest rate and deposit money bank profitability; lastly there existed a positive long run relationship between Money Supply (M 2) and deposit money bank's profitability.

Bhunia & Khan (2011) analyze that Profitability is the fundamental goal of any company and that is why investors are always looking for returns on their investments. Returns foregone by not investing in capital with higher return rates are the opportunity cost of remaining liquid. Financial management decisions include liquidity management decisions and ensure a trade-off between stability and efficiency.It also impacts banks ' daily operations.

Oru and Odumusor (2019), liquidity management theory assists to manage a firm’s lendings to its subsidiaries. It is likewise known as the actual bills doctrine, as it impacts both bank lending and global industrial enterprises.

Rewane (2019) observed the merger of Access Bank Plc and Diamond Bank Plc behind the level addition of liquidity.

Bawacha(2018)Liquidity plays a significant role in the sustainable development of banks and the stability of the financial system, strict liquidity regulations are supposed to put forward to guard against problems due to the lack of liquidity.

The World Bank (2020) observed that the 2007/2008 crises brought into focus significant limitations in market discipline, regulation, supervision and ushered in incisive policy debates on the regulation of the whole system of finance in any country. The crises led to revert in focus to an emphasis on more effective regulation of the banking systems as well as on making the supervisory institution’s toolkit become efficient and thus enhance their ability to act far more quickly when there are distresses in the system.

Bhunia (2010) stated that the cash flow performance of the system relies on specific environment about a corporation, and no clear requirement for selecting the right level of liquidity a firm needs to sustain to promote a great impact on the profitability.

Financial liquidity refers to the finance industry's ways to maintain that findings are available at all times for fulfilling financial obligations or fully mature commitments at a decent cost. Deposit Money banks sustainability is highly dependent on how solvent they are, since volatility is a sign of impending recession that can rapidly undermine community confidence in the financial sector and payment productivity. Equally significant is the use of a adequate income from loan interest to support full supply of productive resources and stability. Getting excess surplus capital in the bank or bank lending is also inefficient for banks, and economically inefficient. Capital adequacy includes the implementation and controlling necessary to ensure that the organization retains sufficient

cash flow either as a responsibility on the clients of the entity to fulfill such unintentional responsibilities to the operation of the business, or as an indicator to conform with financial authorities of the banking system

So it is necessary for a bank to take advantage of its longevity and development in the long term. It's also required to maximize sufficient revenue from funding the operational plans collect credit for the success and development of the bank. CAMELS (capital adequacy, asset quality , management efficiency, earnings performance, liquidity manager) describes the key financial variables of the financial institutions; This evaluates not just the Asset Return (ROA) and Equity Return (ROE) as well as other metrics relevant to different aspects of banking activities There's many various financial considerations that apply to both investors that decide the magnitude of the ability of the institution to make income from its invested money. According to Tabari, Ahmadi and Emami (2013) state that two alternative measures represent the profitability variable: the profit-to-asset ratio, i.e., the return on assets (ROA) and the return on equity (ROE) Return on assets (ROA) in general. This signifies a business's ability to generate income even though the even if the-balance-sheet actions may tilt it. ROE indicates investor returns on investment, which is equivalent to ROA times the total asset-to-equity ratio. A bank with such a capital adequacy level has greater risk of success sustainability and stable growth.

Allen and Marguez (2011) also stated that this might lead to a large participant of reserves in market competition, as liquidity risk is a more efficient guarantee for financial viability and thus enables the institution to sell more credit to lenders. The aim is to expand the optimum amount of leverage at the institution.

Ehimare,Babjide,Achugamonu,.Lawrence, and Emena (2018) investigated the extent to which undercapitalization of money deposit banks and frequent loan delinquency on the part of the active poor influence the ability of deposit money banks to drive the inclusive growth agenda of the Central Bank of Nigeria. The study found that loan delinquency, undercapitalization and payment of utility bills were significant in measuring the inclusive growth initiative of the Central Bank of Nigeria.

Theoretical Review

There are several theories that provide insights into the fundamental relation between stability and productivity of deposit money banks that has been put forward. Some of which includes:

Deposit money Loan Theory

This model postulates that the cash flow of a deposit money bank will be expected as lengthy as the securities were retained in short-term a loan which is divested in the ordinary course of events. Financial institutions are required to fund the transport of goods via the subsequent levels of construction to demand or what would currently be called stock or capital expenditure lenders.

The Shift Ability Theory

The theory of shift ability is based on the assumption that the reserves owned by the banks are to either be sold to other creditors or stakeholders or to be transferred to the banking system that is ready to buy the resources available for sale. For instance whereby the Central Bank purchases asset from the Deposit Money Banks as 10% of the deposit to reach out to them as cash reserves which happens every month.

The Anticipated Income theory

This theory says that cash flow can be guaranteed if the borrower makes slated interest payments on potential earnings. This principle applies to profit repayment of the loan that security depends on. This theory also suggests that the duration trend of debts and financial assets will affect a banks debt.It is regarded as a long term loan depending on the scheduled maturity period that the customer makes payment in advance of the loan required by the borrower before the period elapsed

The Liability Management Theory

The theory of liability management suggests that financial institutions can fulfill their liquidity requirement by competing on the marketplace for sufficient funds to satisfy interest rates on loans and deduction of funds. this means that being involved in returns on investment to gather more funds to the institution and meet the demands of the clients.

Empirical Review

Francis, Frank and Raymond (2013) Evaluated the monitoring of credit risk and bank efficiency in nigeria over the period 2000-2010.It analyzed the relationship between banks ' performance factors and financial stability variables using that as measures money order, reserve fund requirement, financial expenditure and cash ratio. The sources of

data were primarily gathered from statistical report of CBN. Those were and simple linear regression has been used to assess the data gathered. The results of the study after all imply the close connection exists between it and the company investment and reserve ratio need, and bank expenditure and liquidity ratios. The study suggested that businesses must not focus solely on reserves but instead should take those certain methods to decrease liquidity issues in this sector.

Godwin Bassey (2015) evaluated the cash flow-profit commerce off financial institutions in Nigeria by conducting research on fifteen corporations to make purchases in Nigeria and filled the 2010 to 2012 panel data. The study adopted the Ordinary Least Squares (OLS) method to analyse the data. The findings from such a research it's been shown that there is a quantitative connection among them cash measures-current ratio of financial institutions, liquidity ratio, financial leverage, loan-to - deposit ratio, loan-to-account ratio, and investment returns. Bassey and Moses (2015) studied the connection between bank profitability and cash flow was also evaluated. The target population for this study consisted of 15 institutions. With assistance of recent literature, the information was gathered only using secondary information, and evaluated information using OLS method. Empirical results indicate there is a devastating relationship between cash reserves proportion and returns on equity while an ideally favorable comparison is made between bank loans, asset ratio, loans and returns on equities. We suggest that banks concentrate not only on the main objective of optimizing income, as well as on liquidity management techniques to satisfy the customers.

Daniel (2017) Capital adequacy in Nigeria was also surveyed, and its impact on banks profitability. The total amount of time had been 25 years (1986–2011). The population of the study had based on 24 banks. Analytical test data were gathered using the SPSS kit from secondary test data. The findings of the study reveal financial leverage influences transfer funds favorably banking activities. Using correlation analysis, the researcher also stated the data revealed that equity prices and positive income cash reserve are directly significant while equity prices and payment lender ratio are inversely significant. He advises that institutions follow optimal stability structure to improve company runs smoothly.

Ndoka, Islami, and Shima (2017) also conducted another study on how financial leverage relates to performance management. Test data from Secondary data sources were collected and analysed using Program E-Views. The production was measured using after-tax profits, while using funds, investments, and securities, the cash flow was calculated. The relationship among net income and funds was significantly positive, whereas the connection among income and investments was.

Akinjare, Ojo, Adetiloye and Akinjare (2019) examined the extent to which domestic investment has contributed to the growth of the industrial output in Nigeria from the period of 1985 till 2016. Evidence from the result shows that there exists an inverse relationship between gross fixed capital formation and Industrial output. Lending rate estimates show a direct positive relationship with industrial output but not significant in the long run. Detailed analysis of gross domestic savings reveals a significant direct relationship with Industrial output at 1% level significance and finally, distribution of commercial bank loans to the industrial sector indicates a significant direct relationship between industrial outputs. The study, therefore, recommends that government should assist DMBs to develop long-term savings for the real sector fund. Also, interest rate on deposit should be increase to improve the savings culture of citizens.

Methodology

It was premised on secondary sources that were obtained from the financial institutions' annual financial report for the particular timeframe. Research is conducted on five deposit money banks in Nigeria which include UBA, ACCESS, ZENITH, GTB and FIRST Bank. The The rationale for this research is to assess the effects of liquidity management on output in Nigeria. The data are collected from the financial institutions' annual financial statements for the time span of 10 years 2007-2017. It includes Descriptive statistics and uses panel data regression which describes as institutions that are cross-sectional data and time series also known as collected historical data. Our main focus is Profitability and Liquidity. A correlated random effect- hausman test was done to choose which of the estimated models should be accepted under a null hypothesis, and an alternative hypothesis.

Profitability: There are various methods used for measuring profitability of an organization. The efficiency of these institutions will be calculated for the purposes of this analysis using return on assets and the return on equity (ROA and ROE)
Liquidity: The liquidity will be calculated using Current ratio and Non-performing loans
Population: It covers the 5 deposit money banks in Nigeria
Sample size: For the purpose of this study, the sample size is the five selected banks; UBA, ACCESS, ZENITH, GTB and FIRST Bank.

Model Specification

The mathematical representation of models I and II are presented as follows.

ROA = *f* (CRT, NPL) i)

ROA = α1*CRT*α2NPL+it- (ii)

ROE = f (CRT, NPL) (iii)
ROE = β1 *CRT*β2*NPL+ it (iv)

where:α0 to α2, β0 to β2 are estimated in parameters

it is the stochastic error term

Where ROA = Return on Assets of DMBs in period

CRT = Current ratio i.e. current liability

NPL= Non-performing loans i.e npl to total amount of outstanding loans

ROE= Return on Equities of DMBs in period

Model One: Table 1

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	1.459814	2	0.4820

Model Two: Table 2

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	2.642570	2	0.2668

The Hausman test results in Table I and II clearly accept the null hypothesis because the estimated chi-square statistic values of 1.45 and 2.64 in model I and II respectively for 5 degree of freedom are statistically significant; hence the null hypotheses cannot be rejected in both models. As a result, we adopt the Random Effect Model (REM) for both models.

Data Analysis

The data for this study are panel data analysis because the variables specified in the above models covered all the ten sampled DMBs for a period of ten years (2007 -2017), hence, estimation technique was used for this study.

However, the scientific justification to determine the specific Panel regression techniques to be adopted is the Hausman test for random effects. According to Gujarati and Porter (2009), the null hypothesis underlying the Hausman test is that the Fixed Effect Model (FEM) and Random Effect Model (REM) estimators do not differ substantially. The Hausman test results in Table I and II clearly accept the null hypothesis because the estimated chi-square statistic values of 1.45 and 2.64 in model I and II respectively for 5 degree of freedom are not significant; hence the null hypotheses cannot be rejected in both models. As a result, we adopt the Random Effect Model (REM) for both models. Approximately conclusions drawn from the regression of the fixed effect panel for return on equity are shows in table 2; it demonstrates that the rise of the unit in the current ratio contributes to a decrease of around 0,77 units in return on equity. This is statistically meaningful or against the anticipation of primary concern, as it was forecast to expand bank profitability for the current ratio.It also brings about more revenue to the company because of the strong relationship with the companies. When non-performing loans enhance by one unit, Also non-performing loans are statistically significant which means that the rate in which non -performing loans are being paid is positive and there has not been any bad debt recorded in the bank. Table 2 presents the approximate outcome of a regression of the fixed impact panel for return on assets. A unit increase in total ratio leads from the table to a reduction in return on equity of 8,662 units; a percent increase in the non-performing loan has a favorable decline of 50.20 in return on equity. The estimated result of random effect panel regression for return on equity is presented in Table 3. From the table, a unit increase in current ratio leads to 5.823 unit increase in return on equity; a unit increase in non-performing loan brings about a reasonable decrease on return on equity by 0.004. The diagram of correlation shown in and provided in Table 5 demonstrates the relation that exists between the selected variables for this analysis. The most commonly used correlation coefficient is the Pearson correlation coefficient, was used in this study to assess the occurrence of multi - collinearity among factors. It contrasts two ratio variables, and the main diagonal of the correlation coefficient table is generally a collection of different factors for most of the time since the comparison between a factor itself and is generally 1. The factors display no multicollinearity in Table 5, as the factor is less than 0.8. The qualitative or description statistics of the variables used in the model are given in Table 6. The data analysis shows the trend and full proof about the factors. In the descriptive statistics of the variables the average and the highest amount of the factors are also identified. The average return on assets (ROA) is 1.7521 and varied from – 0 to 6.1; the average return on equity (ROE) is 12.829 and varies from zero to 37; the average value of the present ratio (cr) is roughly 1.7521 and varied from 0.9 to 4; the average value of the current ratio (cr) is estimated 1.7521; of non-performing loan (npl) is 0.0392 and it ranges from 0.006 to 0.3 respectively.

Discussion of Findings

The scientific regression results in both Models I and II demonstrate that the interactions between dependent variables (ROA and ROE) and the independentvariables are not statistically significant. This implies that DMB capital adequacy has no important effect on the return on their resources and on returns for investors of their equity markets. These results further indicate that the liquidity management of Nigeria DMBs has a negative impact on their declared profit. Besides, it also implies that these banks funds and assets was not well utilized and unable to generate sufficient liquidity during these periods. This means that the efficient management of these liquidity variables by DMBs decreases their profitability. This result corroborate the findings of Olagunju et al (2011) where a firm is forced into bankruptcy the related issues of selling off assets at troubled rates and the additional fees prosecuted to lawyers, bankruptcy creditors and liquidators.

Recommendation

This research specifically examines the relation between the liquidity management and Deposit Money Banks profitability in Nigeria. The findings of the study show that the capital adequacy does not improve the economy of Nigerian deposit money banks as measured by ROA and ROE substantially. From the above tables which I will pick the Durbin Watson result to give a clear explanation that they are all said to be weak in Fixed and Random Effect table which is said to be weak as shown below. There is still room for improvement to being about stability in the economy and to have a very good balance. Consequently, institutions should reduce their surplus funds as a protection for unforeseen withdrawal requests from customers, DMBs should find it appropriate to take further steps to meet those requirements, while excess funds should be allocated due to seasonal in short-term money market instruments or other assets that will produce more income for banks.

Conclusion

The Financial institutions need to offset the exchanging among controlling their liquidity and profitability; it is because money supply reduces profit margins while excessive volatility uncovers DMBs to bankruptcy. Non-performing loans are not statistically significant from the model above which creates room for improvement in

organizations that undergo crisis running into illiquidity should manage the funds and do some checks and balances before disbursing loans to customers to avoid liquidation.

Appendices
Financial Representation of Data

BANK	YEAR	CR	npl	ROA	ROE	TL
ZENITH	2007	1.2		2.5	23	218,305,419
ZENITH	2008	1.25		2.5	14.2	413,731,491
ZENITH	2009	1.26		1.2	6.1	669,261
ZENITH	2010	1.24	0.022	4.6	23.9	655,253
ZENITH	2011	1.21	0.037	5.4	32.7	767,372
ZENITH	2012	1.22	0.011	6.1	33.8	895,354
ZENITH	2013	1.2	0.027	6.1	37.1	1,126,559
ZENITH	2014	1.18	0.016	4.9	33.6	1,580,250
ZENITH	2015	1.17	0.017	5.1	34	1,849,225
ZENITH	2016	1.5	0.039	4.9	34.3	2,138,132
ZENITH	2017		0.024			1,980,464
ACCESS	2007	0.3		1.9	21.5	107,750,578
ACCESS	2008	0.36		2.4	19	256,004,878
ACCESS	2009	0.35		3.3	15.8	360,387,649
ACCESS	2010	1.3	0.016	0.016	0	403,178,957
ACCESS	2011	1.14	0.035	0.035	0	463,131,979
ACCESS	2012	4	0.018	0.018	0	554,592,199
ACCESS	2013	2.4	0.027	0.027	0	735,300,741
ACCESS	2014	1.8	0.02	0.02	0	1,019,908,848
ACCESS	2015	1.5	0.015	0.015	0	1,243,215,309
ACCESS	2016	0.93	0.018	0.018	0	1,594,562,345
ACCESS	2017		0.047			1,771,282,739
GUARANTEE TRUST	2007	1.18		3.2	32	113,705,183
GUARANTEE TRUST	2008	1.23		5.39	15.51	421,773,158
GUARANTEE TRUST	2009	1.23		5.7	12.97	538,137,569
GUARANTEE TRUST	2010	1.24	0.031	0.047	0	563,383,562
GUARANTEE TRUST	2011	1.18	0.021	0	0	681,756,594
GUARANTEE TRUST	2012	1.22	0.036	0	0	742,436,944
GUARANTEE TRUST	2013	1.21	0.032	0	0	926,967,093
GUARANTEE TRUST	2014	1.2	0.043	0.031	0	1,182,393,874
GUARANTEE TRUST	2015	1.22	0.039	0.021	0	1,265,207,443
GUARANTEE TRUST	2016	1.3	0.033	0.036	0	1,417,217,952
GUARANTEE TRUST	2017		0.046			1,448,553,430
UBA	2007	1.11		3.4	29.2	320,229
UBA	2008	1.14		2.9	22.6	421,748

UBA	2009	1.15		1.6	12.7	543,289
UBA	2010	1.15	0.011	0.4	0.38	569,312
UBA	2011	1.12	0.28	2.6	31.9	596,457
UBA	2012	1.13	0.031	2.4	28.5	570,714
UBA	2013	1.13	0.03	1.8	19.8	796,942
UBA	2014	1.14	0.016	1.7	18.1	884,587
UBA	2015	1.18	0.022	2.2	17.9	822,694
UBA	2016	1.17	0.3	2.2	18.25	1,090,355
UBA	2017		0.047			1,173,214
FIRST	2007	1.15		7.3	9	219,185
FIRST	2008	1.41		3.26	8.97	437,768
FIRST	2009	1.22		2.77	9.99	684,107
FIRST	2010	1.21	0.019	1.44	7.9	1,017,411
FIRST	2011	1.18	0.011	1.2	9	1,128,851
FIRST	2012	1.16	0.026	2.9	22.7	
FIRST	2013	1.18	0.029	2.5	22.4	72,000,000
FIRST	2014	1.14	0.006	2.2	20.1	80,000,000
FIRST	2015	1.16	0.018	0.1	0.5	63,000,000
FIRST	2016	1.17	0.021	0.3	2.2	65,000,000
FIRST	2017		0.024			108,000,000

Model One

Table 1: Fixed Effect or LSDV model

Dependent Variable: ROA				
Method: Panel Least Squares				
Date: 11/15/19 Time: 08:22				
Sample (adjusted): 2010 2016				
Periods included: 7				
Cross-sections included: 5				
Total panel (balanced) observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CR	-1.101751	0.778978	-1.414354	0.1691
NPL	2.523989	6.602875	0.382256	0.7054
C	3.119375	1.141932	2.731666	0.0112
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.101804	Mean dependent var		1.752114
Adjusted R-squared	-0.174564	S.D. dependent var		2.050361
S.E. of regression	2.222126	Akaike info criterion		4.651840
Sum squared residual	128.3840	Schwarz criterion		5.051787
Log likelihood	-72.40720	Hannan-Quinn criter.		4.789902
F-statistic	0.368363	Durbin-Watson stat		0.147108
Prob(F-statistic)	0.927829			

Table 2: Random Effect model

Dependent Variable: ROA				
Method: Panel EGLS (Period random effects)				
Date: 11/15/19 Time: 08:23				
Sample (adjusted): 2010 -2016				
Periods included: 7				
Cross-sections included: 5				
Total panel (balanced) observations: 35				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CR	-0.772842	0.729860	-1.058891	0.2976
NPL	1.567761	6.042547	0.259454	0.7969
C	2.719155	1.088556	2.497948	0.0178
	Effects Specification			
			S.D.	Rho
Period random			0.000000	0.0000
Idiosyncratic random			2.222126	1.0000
	Weighted Statistics			
R-squared	0.043280	Mean dependent var		1.752114
Adjusted R-squared	-0.016515	S.D. dependent var		2.050361
S.E. of regression	2.067223	Sum squared resid		136.7491
F-statistic	0.723805	Durbin-Watson stat		0.173711
Prob(F-statistic)	0.492672			
	Unweighted Statistics			
R-squared	0.043280	Mean dependent var		1.752114
Sum squared residual	136.7491	Durbin-Watson stat		0.173711

Model Two

Table 2: Fixed Effect or LSDV model

Dependent Variable: ROE				
Method: Panel Least Squares				
Date: 11/15/19 Time: 08:27				
Sample (adjusted): 2010 2016				
Periods included: 7				
Cross-sections included: 5				
Total panel (balanced) observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CR	-8.662134	5.000472	-1.732263	0.0951
NPL	50.20673	42.38563	1.184522	0.2469
C	22.38795	7.330367	3.054138	0.0052
	Effects Specification			

Period fixed (dummy variables)				
R-squared	0.202387	Mean dependent var		12.82943
Adjusted R-squared	-0.043033	S.D. dependent var		13.96707
S.E. of regression	14.26443	Akaike info criterion		8.370449
Sum squared resid	5290.320	Schwarz criterion		8.770395
Log likelihood	-137.4829	Hannan-Quinn criter.		8.508510
F-statistic	0.824657	Durbin-Watson stat		0.295449
Prob(F-statistic)	0.588583			

Table 3: Random Effect

Dependent Variable: ROE				
Method: Panel EGLS (Period random effects)				
Date: 11/15/19 Time: 08:31				
Sample (adjusted): 2010 2016				
Periods included: 7				
Cross-sections included: 5				
Total panel (balanced) observations: 35				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CR	-5.823536	4.685168	-1.242973	0.2229
NPL	40.68340	38.78874	1.048846	0.3021
C	18.98377	6.987733	2.716728	0.0105
	Effects Specification			
			S.D.	Rho
Period random			0.000000	0.0000
Idiosyncratic random			14.26443	1.0000
	Weighted Statistics			
R-squared	0.089644	Mean dependent var		12.82943
Adjusted R-squared	0.032746	S.D. dependent var		13.96707
S.E. of regression	13.73648	Sum squared residual		6038.110
F-statistic	1.575535	Durbin-Watson stat		0.326198
Prob(F-statistic)	0.222527			
	Unweighted Statistics			
R-squared	0.089644	Mean dependent var		12.82943
Sum squared residual	6038.110	Durbin-Watson stat		0.326198

Table 4: Correlation Matrix

	ROE	ROA	NPL	CR
ROE	1			
ROA	0.94973	1		
NPL	0.20554	0.06741	1	
CR	-0.23642	-0.20237	-0.09594	1

Table 5: Summary statistic of variables

	ROE	NPL	CR	ROA
Mean	12.82943	0.039229	1.330857	1.752114
Median	7.900000	0.022000	1.180000	1.200000
Maximum	37.10000	0.300000	4.000000	6.100000
Minimum	0.000000	0.006000	0.930000	0.000000
Std. Dev.	13.96707	0.063360	0.524564	2.050361
Skewness	0.439245	3.689355	4.171788	0.886420
Kurtosis	1.566270	15.01183	20.85593	2.439122
Jarque-Bera	4.123184	289.8136	566.4888	5.042260
Probability	0.127251	0.000000	0.000000	0.080369
Sum	449.0300	1.373000	46.58000	61.32400
Sum Sq. Dev.	6632.689	0.136494	9.355674	142.9353
Observations	35	35	35	35

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The Effect of Corporate Social Responsibility on the Firm Value Moderated by Corporate Governance on Mining Sector Listed on IDX Period 2013-2018

Destria Kurnianti
Faculty of Economic State University of Jakarta, Jakarta, Indonesia
destria@unj.ac.id

Andhi Wijayanto
Faculty of Economics, Universitas Negeri Semarang, Indonesia
andhi.wijayanto@mail.unnes.ac.id

Andyka Yudha Satria Putra
Faculty of Economic State University of Jakarta, Jakarta, Indonesia
andykayudha96@gmail.com

Novan Yonatan Seilatu
Faculty of Economic State University of Jakarta, Jakarta, Indonesia
novanseilatu00@gmail.com

Abstract

The aim of this study is to determine the effect of Corporate Social Responsibility on the Firm Value moderated by Corporate Governance on Mining Sector Listed on IDX Period2013-2018. Independent variable of this study is Corporate Social Responsibility as measured by CSRI. Dependent variable of this study is Firm Value with PBV as a proxy. While moderating variable used is Corporate Governance with Audit Committee as the proxy. Then control variable in this study are Firm Size, Profitability, Leverage, and Firm Age. The data used in this study is annual report of Mining Sector listed in Indonesia Stock Exchange (IDX) period 2013-2018. The sampling method of this study is purposive sampling technique. The research model of this study employs panel data analysis with Random Effect Model approach. The empirical result shows that Corporate Social Responsibility does positive effect and significant on Firm Value. Corporate Governance moderated by Audit Committee weakening the relation between Corporate Social Responsibility on Firm Value.

Keywords: Firm Value, Corporate Social Responsibility, Profitability, Leverage, Firm Age.

Introduction

A company is an organization founded on a group of people working to achieve a goal. The main objective of the company being established is not only to maximize profits but also to maximize company value by increasing the prosperity of the owners or shareholders. Firm value is the investor's perception of the company which is often associated with stock prices. When the share price increases, the company value will increase and the welfare of the owner or shareholders will also increase. The better the company value, investors will view the company as having a good reputation because high company value describes good company performance and can describe the prospects for the company's future wealth (Wahyudi, et al, 2016).

The presence of a company should provide benefits to the surrounding community and is required to contribute to the life of the local community as partners in community life because the presence of a company can have good or bad consequences for the surrounding community. To carry out its functions, a company cannot be separated from dependence on other parties (stakeholders). Cooperation to achieve the goals of each stakeholder is an important aspect of a social system, in addition to fulfilling the interests of shareholders. This activity is known as corporate social responsibility (Yanti and Manik, 2018).

In general, the increase in firm value is influenced by financial factors. However, non-financial factors also affect the performance of a company which has an impact on increasing firm value. Corporate social responsibility (CSR)

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is one of the non-financial factors that companies currently need to pay attention to to increase company value (Retno and Priantinah, 2012).

Corporate social responsibility is a form of responsibility carried out by companies in repairing social inequalities and environmental damage that occurs as a result of the company's operational activities. The increasing number of forms of responsibility carried out by companies to their environment, the company's image according to the public's view will increase or the company's image becomes better. Investors are more interested in companies that have a good image in society because the better the company's image, the higher consumer loyalty. As consumer loyalty increases over a long period of time, the company's sales will improve and in the end it is hoped that the level of company profitability will also increase. If the company runs smoothly, the value of the company's shares will increase (Retno and Priantinah, 2012).

Apart from corporate social responsibility, another issue that is also thought to affect firm value is corporate governance. Corporate governance seems familiar to players in the capital and financial market industries, including analysts and investors. As stakeholders of public companies, they have an interest in the implementation of GCG. For them, easy access to correct and transparent information will make it easier to analyze whether a share is purchased or not. Ideally, with good corporate governance, the management of the company concerned is also good.

According to Hidayah (2008) the application of GCG principles with the support of adequate regulations will prevent various forms of dishonesty in financial disclosure that are detrimental to stakeholders, such as expectations that far exceed actual company performance. Companies that have implemented GCG will be more trusted by creditors and investors so that their shares are more liquid and share prices can increase.

In recent years, disclosure and transparency in financial reports have become important issues in Indonesia. The case that occurred at PT Timah (Persero) Tbk which provided fictitious financial reports in the first semester of 2015 is one proof that transparency and compliance with mandatory disclosures is still lacking. This activity was carried out by PT Timah to cover up the company's continued worrying financial performance. Ali Samsuri as chairman of the Timah Employees Association (IKT) revealed that PT Timah's financial condition for the past three years has been unhealthy. The inability of the PT Timah board of directors to escape from the loss trap has resulted in the handover of 80% of PT Timah's mining area to business partners. The handover of PT Timah's mining areas to business partners has negative consequences for PT Timah's future, especially for the 7,000 employees in the company. If you look at the real conditions that have occurred at PT Timah, Ali believes that PT Timah (Persero) Tbk's first semester financial statements are fictitious. Because according to him, in the first semester of 2015, PT Timah's operating profit had suffered a loss of Rp. 59 billion (mining.co.id, 27 January 2016).

From these cases, it is evident that the implementation of corporate governance is still lacking, especially in the audit department. The Institute of Internal Auditors (IIA) recommends that every public company should have an audit committee that is set up as a standing committee. The IIA also recommends the formation of audit committees in other organizations, including non-profit and governmental organizations. With the role of the audit committee in a company, fraud in disclosure and transparency of financial reports can be minimized.

Research conducted by Fiona (2017), Indarti and Setiawan (2016), Martantina (2014), Nahda and Harjito (2011), Retno and Priantinah (2012), and Wulansari and Sapari (2017) revealed that disclosure of corporate social responsibility (CSR) positive effect on firm value. By implementing corporate social responsibility practices, it will be able to improve the company's image both in the eyes of the community and shareholders, besides that the application of corporate social responsibility can maintain harmonious relationships between the company and stakeholders where this good relationship can help the company's business run smoothly. The results of this study are different from those conducted by Putri, et al. (2016) which revealed that CSR has no effect on firm value.

Martantina (2014), and Putra, et al (2013) revealed that GCG as a moderating variable can moderate the relationship between CSR and firm value. The results of this study are different from those conducted by Fiona (2017) which states that GCG as a moderating variable cannot moderate the relationship of CSR to firm value. In this case, the implementation of GCG is still limited to meeting existing regulations, so that shareholders pay more attention to high CSR disclosures to increase image and gain community legitimacy which will later increase company value.

This study is different from previous studies using control variables, including company size, leverage, profitability, and company age. Based on the description above, this study takes the title: "The Influence of Corporate Social Responsibility on Company Value is moderated by Corporate Governance (Empirical Studies on Manufacturing Companies Listed on IDX 2013-2018)".

Literature Review

The Firm Value

According to Yuliyanti and Tripena (2016), "The value of companies that have gone public is the value reflected in the market price of the company's shares, while the value of companies that have not gone public is realized when the company is sold". Firm value is defined as market value because firm value can provide maximum prosperity for shareholders if the company's share price increases (Afzal and Rohman 2012).

Firm value is the investor's perception of the company's success rate which is closely related to its share price (Pangulu and Ghozali 2014). High company value is reflected in high share prices. This also increases market confidence in the company's performance as well as the company's prospects in the future. So that the company tries to increase company value through maximizing share prices.

Company value describes how well or badly management manages its wealth, this can be seen from the measurement of financial performance obtained. A company will try to maximize its company value. An increase in the value of a company is usually marked by an increase in share prices in the stock market.

Corporate Social Responsbility

In the global context, the term corporate social responsibility began to be used in the 1970s and became increasingly popular after the presence of the book Cannibals With Forks: The Triple Bottom Line in 21st Century Business (1998), by John Elkington which developed three important components of sustainable development, namely economic growth, environmental protection, and social equity, which were initiated by The World Commission on Environment and Development (WCED) in the Brundtland Report (1987). Elkington packages CSR into three focuses: 3P, which stands for profit, planet and people. A good company is not only after mere economic gain (profit), but also has a concern for environmental sustainability (planet) and the welfare of society (people) (Mardikanto, 2014).

The World Business Council for Sustainable Development (WBCSD), which is an international institution established in 1955 and has 120 members from 120 multinational companies from 30 countries in the world, defines corporate social responsibility: "continuing commitment by business to behave ethically and contributed to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large". This definition shows that corporate social responsibility is a form of action that departs from the company's ethical considerations directed at improving the economy, which is accompanied by an increase in the quality of life for employees and their families, as well as improving the quality of life of the surrounding community and society more (Santoso, 2016).

According to Marnelly (2012) CSR is a form of cooperation between companies (not only Limited Liability Companies) and all things (stakeholders) who directly or indirectly interact with the company to ensure the existence and sustainability of the company's business (sustainability). According to Hery (2012) CSR is defined as follows: "corporate social responsibility is a business commitment to act ethically, operate legally, and contribute to economic improvement, along with improving the quality of life of employees and their families, local communities, and the wider community".

So, it can be concluded that CSR is a company's commitment to make a long-term contribution to a particular issue in society or the environment in order to create a better environment. Contributions from this company can be in the form of many things, such as financial assistance, expert assistance, assistance in the form of goods, and others.

Good Corporate Governance

In the Decree of the Minister of BUMN (KEP-117 / M-MBU / 2002) regarding good corporate governance, it is stipulated that what is meant by corporate governance is a process and structure used by BUMN people to increase business success and company accountability to realize shareholder value in long term while still paying attention to the interests of other stakeholders, based on laws and regulations and ethical values. Person is the General Meeting of Shareholders (GMS), commissioners and Directors for Corporate Companies (PERSERO), and Capital Owners, Supervisory Board and Directors for Public Companies (PERUM) and Service Companies (PERJAN). SOEs are required to implement GCG consistently and or make GCG their operational basis.

According to The Indonesian Institute for Corporate Governance (IICG) what is meant by corporate governance is a series of mechanisms that direct and control a company so that the company's operations run according to the expectations of stakeholders. The notion of good corporate governance (GCG) is the structure, system and process used by company people as an effort to provide added value to the company in a sustainable manner in the long term, while still paying attention to the interests of other stakeholders, based on moral, ethical, cultural and applicable rules. other. According to the Regulation of the Minister of State for BUMN Number PER- 01 / MBU / 2011, the definition of good corporate governance is: the principles that underlie a process and mechanism for managing a company based on statutory regulations and business ethics.

Based on those definitions, it can be concluded that GCG is a system or set of regulations that regulate, manage and supervise the relationship between company managers and stakeholders in a company. GCG is not only a means of regulation and control but also as an added value for a company.

Theoretical Framework

The Influence of Corporate Social Responsibility on Firm Value

According to Rustiarini (2010), companies that have good social and environmental performance will be responded positively by investors through an increase in share prices. If the company has poor social and environmental performance, investors will doubt and will respond negatively through a decrease in its share price. Fiona (2017), Fitri and Herwiyanti (2015), Indarti and Setiawan (2016), Martantina (2014), Nahda and Harjito (2011), Putra, et al (2013), Retno and Priantinah (2012), Samsi, et al (2014), and Wulansari and Sapari (2017) state that CSR has a significant positive effect on firm value. By implementing corporate social responsibility practices, it will be able to improve the company's image, both in the eyes of the public and shareholders. This will build the trust of investors by increasing the share price of the company concerned.

The Influence of Corporate Governance as Proxied by The Audit Committee in Moderating Corporate Social Responsbility To Firm Value

Agency theory states that one of the objectives of implementing CG is encourage corporate responsibility to society and the environment. This activity aims to optimize company value while paying attention to other stakeholders. All of these things will be done well if the company implements CG. This means that the implementation of CG encourages companies to carry out CSR activities so as to increase company value.

Martantina (2014), and Putra, et al (2013) show that corporate governance is proxied by the board of directors, managerial ownership, institutional ownership, the proportion of independent commissioners and the audit committee as variables. moderation can positively moderate the relationship between corporate social responsibility and firm value.

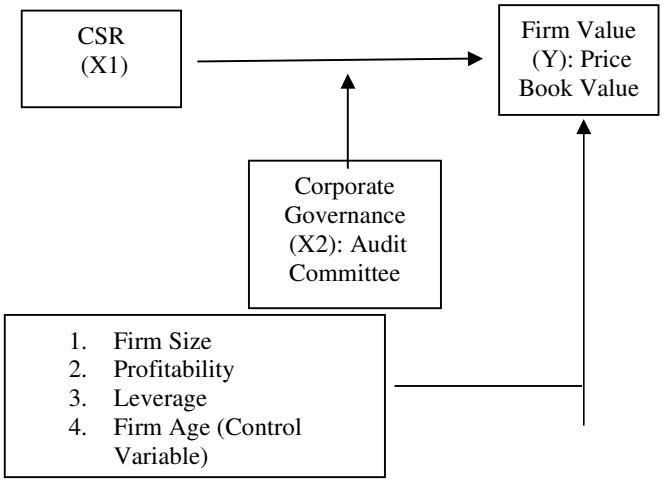

Figure 1: Theoretical Framework

Research Hypotheses

Based on the description in the framework of thought, the research hypothesis can be formulated as follows:

H1: Corporate social responsibility has a positive effect on firm value in manufacturing companies listed on IDX in 2013-2018.
H2: Corporate governance proxied by the audit committee can positively moderate the relationship between corporate social responsibility and firm value in manufacturing companies listed on IDX in 2013-2018.

Research Methodology

In this study, researchers used an associative research method that aims to identify and explain the causal relationship (causality) between one variable and another (variable X against variable Y). The analysis technique used in this research is quantitative analysis (statistics) because the data used is in the form of numbers. The regression that the researchers used is panel data regression because the observations used consist of several companies (cross section) and over a period of several years (time series). The data obtained will be processed, then will be analyzed quantitatively and further processed using the E-views program and the basic theories described previously to provide an overview of the object under study and then will provide conclusions from the results obtained.

In this study, the population used is all manufacturing companies that go public listed on the IDX 2013-2018 period. Sampling in this study using non probability sampling method. The non probability sampling method uses a purposive sampling technique. Therefore, the sampling in this study was adjusted to predetermined criteria. The criteria used are as follows:

1. Manufacturing company registered with IDX for at least one year in the 2013-2018 period.
2. A manufacturing company that has issued audited financial statements as of December 31 and published to BAPEPAM for at least 1 year in the period 2013-2018.
3. The company displays the data and information needed by researchers about the variables in this study completely.

Based on the sampling criteria, there are 95 sample companies to be examined in this study.

Table 1: Sample of Companies

No	Description	Total
1	Manufacturing Companies Listed on the Indonesia Stock Exchange in the 2013 - 2018 Period	127
2	Companies that do not provide information related to the object of research in the form of financial data in a row during the 2013 - 2018 period	(87)
3	Companies that do not provide information related to the object of research in the form of consecutive stock data during the 2013 - 2018 period	(21)
	The number of samples used	19
	Number of Observation	95

Result and Discussion

Descriptive Statistic

Descriptive statistics are carried out with the aim of describing or providing a general description of the object under study through sample data in accordance with the actual situation, then presented and processed in table form to make it easier to understand. The descriptive statistical analysis presented in this study consists of: mean, median, maximum, minimum, and standard deviation obtained from each sample of Manufacturing companies listed on the IDX during the 2013-2018 period of 19 companies so that 95 observations were obtained.

Table 2: Descriptive Statistic

	PBV	CSR	KA	SIZE (milyar)	ROA	DER	AGE
Mean	1,661222	0,184117	3,066667	273,0710	0,017895	1,077483	24,60556
Median	1,040000	0,192308	3,000000	0,934426	0,018500	0,735000	23,00000
Maximum	25,17000	0,461538	7,000000	4022,394	0,364700	14,81000	49,00000
Minimum	-0,750000	0,012821	1,000000	0,004191	-0,644000	-24,12000	2,000000
Std. Dev.	2,570181	0,089593	0,648160	690,0603	0,117330	3,071747	12,51837
Observations	95	95	95	95	95	95	95

Table 3: Descriptive Statistics of CSR Disclosure

	L	E	K3	TK	P	M	U
Mean	3,890511	1,000000	2,210526	2,444444	1,240741	5,224852	5,225806
Sum	533,0000	1,000000	252,0000	44,00000	67,00000	883,0000	810,0000
Observations	137	1	114	18	54	169	155

Based on the descriptive statistical results in table 2 above, the mean value of the firm value variable as proxied by PBV is 1.66122 and the standard deviation value is 2.570181. The average value of the PBV ratio which is smaller than the standard deviation value indicates that the high variability of the PBV ratio in the sample of companies studied is the Manufacturing company. The maximum PBV ratio value of 25.17 000 which came from Kapuas Prima Coal Tbk in 2017. This is because in that year the closing price of the company's shares was Rp. 1,490 per share with 5.050 billion shares in circulation and a total equity of Rp 478,811,061,276. That year, the company received an Effective Statement Letter from the Chief Executive of Capital Market Supervision on behalf of the Board of Commissioners of the Financial Services Authority (OJK) to conduct a public offering of 550,000,000 shares with a nominal value of Rp 100 per share at an offering price of Rp 140 per share. stock. The minimum PBV ratio value of -0.750000 which comes from Bumi Resources Tbk in 2013-2014. This is because in that year the closing price of the company's shares was Rp. 300 per share in 2013 and Rp. 80 per share in 2014 with the number of shares circulated of 20.773 billion shares in 2013 and 36.627 billion shares in 2014. In that year, the average selling price of coal in 2013 was only US $ 63.8 / ton, down 18, 0% from the previous year amounting to US $ 81.5 / ton, while for 2014, the average selling price of coal still decreased from US $ 63.8 / ton to US $ 52.7 / ton down by 17.49% as a result of the decline. an index that reflects the dynamics of changes in world coal demand and supply.

The CSR variable has an average value of 0.184117 and a standard deviation value of 0.089593. The average value of the CSR variable which is greater than the standard deviation value indicates that the low variability of the CSR variable in the sample of companies studied is the Manufacturing company. The maximum value of the CSR variable was 0.461538 which came from Mitrabara Adiperdana Tbk in 2017. This is because in that year, the company disclosed 36 CSR disclosures. In 2017, the Company has spent Rp. 9.6 billion for CSR activities, which increased 69% compared to the previous year. One of the pillars of activity that has experienced a significant increase is the health pillar for clean water pipeline activities and the connection program for clean water PDAM for the community. In addition, in 2017, the company also received 2 awards from Business News in the categories "TOP Leader on CSR Commitment" and "TOP CSR 2017 on Nawacita 7: Rural Electricity Program". These achievements and awards represent the company's real commitment to implementing social responsibility, so that the company's existence can provide benefits to the life and environment around the company's work area. The minimum value for the CSR variable was 0.012821 which came from Mitra Investindo Tbk in 2017. This is because in that year, the company only disclosed 1 CSR disclosure. In that year, the company is still waiting for the completion of regulatory synchronization with the government. The company has reserved CSR funds and remains committed to implementing the CSR program if there are no regulatory obstacles.

Based on table 3 above, it can be seen that Manufacturing companies disclose more of their CSR activities in community aspects, such as cash assistance, community service activities or scholarships. In terms of services, it can be seen such as the repair and construction of 5 places of worship in Tanah Laut district and repair of village roads in Sumber Jaya Village, Kintap District and in Sigam-Sarangtiung Village, Kotabaru Regency carried out by Arutmin Indonesia, which is a business unit of Bumi Resources Tbk. support the availability of facilities and infrastructure for the general public to assist the community around the mine in carrying out their daily activities. Cash assistance can be in the form of the development of fruit and vegetable crops and a capital facility program for laying hen breeders in villages around the mine so that they can improve the living standards of the surrounding communities. Then for scholarships such as the Regional Superior Seed (BUD) scholarship which is a special scholarship for the best students (the best ranked district) to pursue undergraduate education at a partner university (Bogor Agricultural Institute) so as to improve the quality of education, both skills and knowledge for the people around Arutmin's work site.

The corporate governance variable proxied by the audit committee has an average value of 3.066667 and a standard deviation of 0.648160. The average value of the audit committee variable which is greater than the standard deviation value indicates that the low variability of the audit committee variable in the sample of companies studied is the Manufacturing company. The maximum value of the audit committee variable was 7,000,000 which came from Aneka Tambang (Persero) Tbk in 2014. This is because in that year, the company had 7 members, more than the previous year. The minimum value of the audit committee variable was 1,000000 which came from Borneo Lumbung Energi & Metal Tbk in 2015-2017. This is because in that year, the company had only 1 member of the audit committee.

The firm size variable (SIZE) has an average value of Rp. 273.0710 billion and the standard deviation value is Rp. 690,0603 billion. The average value of the firm size variable (SIZE) which is smaller than the standard deviation value indicates that the high variability of the firm size variable (SIZE) in the sample of companies studied is the Manufacturing company. The maximum value of the size variable company (SIZE) of Rp. 4022.394 billion which came from Golden Energi Mines Tbk in 2013. This is because in that year, the company recorded total company assets of Rp. 4.022 billion, an increase of 17% over the previous year of Rp. 3,440 billion. The increase occurred in

trade accounts receivable, which increased by 37% to Rp. 717 billion as of December 31, 2013. The average trade receivables collection period for 2013 and 2012 was 51 days and 35 days, respectively. This increase was due to a change in part of the terms of sale to sales with a 180-day SKBDN (Domestic Letter of Credit) during the current year. Apart from trade receivables, the total non-current assets also increased by Rp. 2,160 billion and Rp. 1,644 billion in 2013 and 2012. This increase was contributed by the increase in net manufacturing assets as of December 31, 2013 was Rp. 1.035 billion compared to December 31, 2012 amounting to Rp. 912 billion. This increase was due to an increase in deferred stripping costs. As of December 31, 2013, the net fixed assets amounted to Rp. 694 billion.

Investments in the main capital expenditures during the year were the capitalization of several assets related to the completion of the Nilau Port and a road project in Sumatra as well as an additional second freight line at the port of Bunati, South Kalimantan. The company's other non-current assets increased by 138% from Rp. 181 billion at the end of 2012 to Rp. 432 billion at the end of 2013 mainly due to an increase in prepaid-land cultivation costs of Rp. 144 billion, down payment for Manufacturing services of Rp. 46 billion and a security deposit of Rp. 43 billion. The minimum value of the company size variable (SIZE) is Rp. 0.004191 billion which came from Elnusa Tbk in 2016. This is because in that year, the company recorded total company assets of Rp. 4.190 billion, down 4.9% from the previous year of Rp. 4.407 billion. This decrease was the result of a decrease in the company's current assets by 10.3% compared to the previous year, mainly due to a decrease in cash and cash equivalents and net inventories. The decline in cash and cash equivalents that occurred during 2016 was mainly due to decreased income due to the lack of projects, repayment of bank loans and funding for the purchase of the company's fixed assets. It is recorded that the company's bank loan has decreased by Rp. 189.9 billion from the position at the end of 2015. So that at the end of 2016 cash and cash equivalents decreased by 20.4%. The company's cash and cash equivalents consist of cash of Rp. 3.1 billion, cash in the bank of Rp. 630.7 billion and deposits of Rp. 113.7 billion. From Rp. 744.4 billion, amounting to 51.1% in Rupiah currency and 48.9% in US Dollar and the rest in Singapore Dollar.

On the principal of these debts during 2013 and the tight restrictions on capital expenditures and funding in this regard. Derivative liabilities, which are fair value of interest rate swap hedges as described in the “Funding Arrangements” section, decreased by 32.4% or approximately US $ 10 million between the end of 2012 and 2013. These decreases were partially offset by increases in benefit liabilities. employment increased by US $ 3 million after taking into account the estimated liability arising from increased benefits based on agreements with the union. The minimum value of the DER ratio is -24.12000 which came from Bumi Resources Tbk in 2013.This is because the Company's short-term liabilities increased 84.4% to US $ 4,719.9 million in 2013, while long-term liabilities decreased by 41.2 % to be valued at US $ 2,586.9 million. The reason is mainly due to part of the debt which will mature in 2014. BUMI has liability instruments in the form of medium term notes, convertible bonds and long-term loans obtained from several of its creditors. Each loan has a different repayment period, with varying interest rates, with an amount according to LIBOR (London Interbank Offered Rate) + 5% to 7%, while others are set at 12% per annum. Total interest-bearing liabilities, which consist of loans, notes and convertible bonds at the end of 2012 amounted to US $ 3,615.2 million. In 2013, these total liabilities were reduced to US $ 3,595.7 million, amounting to US $ 1,563.5 million among them will be due within 1 year. The largest portion of the maturing facility is a loan from CFL (Country Forest Limited) with a total loan amount of US $ 1,787.1 million, with an interest rate of 12% per annum. Of this amount, US $ 1,230.5 million will mature in the third and fourth quarters. In addition to the loan facility from CFL (Country Forest Limited), BUMI is also concentrating on efforts to resolve its convertible bond obligation of US $ 375 million which will be due soon and an increase in amortization obligation of US $ 434.9 million.

Another account that increased quite sharply was accrued expenses which rose 60% to US $ 419.8 million, mainly due to the increase in interest accrued by the company and higher mining and maintenance costs. In managing long-term liabilities, BUMI is consistent in its efforts to reduce overall interest expenses. Given the short-term business conditions that have yet to show signs of recovery, BUMI is striving to reduce the portion of loans with interest rates and realize a loan-to-equity conversion program so that the company has strategic partners who are believed to be able to support long-term business development. It is hoped that the restructuring by refinancing the joint obligations of CIC (China Investment Corporation) is expected to be intensified and implemented for the settlement of other interest-effect loans, so that future interest expenses can be managed at a level that will have the most positive impact on the company's financial performance. Overall, BUMI's long-term liabilities fell 41.2% from 2012's position. Apart from long-term borrowings, the decrease in long-term liabilities was mainly due to a decrease in the premium redemption account and convertible bonds that will mature in the next one year.

The company age variable (AGE) has an average value of 24.60556 and a standard deviation value of 12.51837. The average value of the firm age variable (AGE) which is greater than the standard deviation value indicates that the low variability of the firm age variable (AGE) in the sample of companies studied is the Manufacturing

company. The maximum value of the company age variable (AGE) is 49.00000 which came from Aneka Tambang (Persero) Tbk and Vale Indonesia Tbk in 2017. This is because the company has been established for a long time, namely 1968, so they have experience in managing the company. The minimum value of the company age variable (AGE) is 2.00000 which comes from Alfa Energi Investama Tbk in 2017. This is because for companies that are relatively young or newly established, the company does not have experience in managing its company.

Panel Data Test

Next thing to do is to test the type of panel data that is best for this research model. This is done to get the most suitable regression model. In panel data regression testing, there are three models that can be used, namely: common effect model, fixed effect model, and random effect model. To determine the best model of the three models, the chow and hausman tests must be performed first.

1). Chow Test

The Chow test aims to select whether the model used is a common effect or a fixed effect. The hypothesis used in this research is:
H0: Common effect model
H1: Fixed effect model

In this study, researchers used a significance of 5% ($\alpha = 0.05$). The decision making from this Chow test is if the p-value is ≤ 0.05 then H0 is rejected, which means that the right model for panel data regression is the fixed effect, whereas if the p-value> 0.05 then H0 is accepted which means the right model for panel data regression is a common effect.

The following are the results of the chow test presented in table 4.

Table 4: Chow Test Result

Redundant Fixed Effects	**Tests**		
Equation: EQ01			
Test cross-section fixed	Effects		
Effects Test	Statistic	d.f.	Prob.
Cross-section F	15,714461	(40,132)	0,0000
Cross-section Chi-square	315,229914	40	0,0000

Based on the data in table 4 the chow test results show the chi-square value of 315.229914 with a probability value of 0.0000. With a p-value ≤ 0.05, H0 is rejected and H1 is accepted. So, it can be concluded that the common effect model cannot be used as a panel data regression model because it is not the best model to be used in a sample of Manufacturing companies listed on IDX for the 2013–2017 period. Furthermore, testing with the Hausman test is needed to find the best model between the fixed effect and the random effect.

2). Hausman Test

The Hausman test aims to select whether the model used is a random effect or a fixed effect. The hypothesis used in this research is:
H0: Random effect model
H1: Fixed effect model

In this study, researchers used a significance of 5% ($\alpha = 0.05$). The decision making from this Hausman test is if the p-value is ≤ 0.05 then H0 is rejected, which means that the right model for panel data regression is the fixed effect, whereas if the p-value> 0.05 then H0 is accepted which means the right model for panel data regression is the random effect.

The following are the results of the Hausman test presented in table 5.

Table 5: Hausman Test Result

Correlated Random Effects - Hausman Test			
Equation: EQ01			
Test cross-section random	effects		
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7,798921	7	0,3507

Based on the data in table 5, the results of the Hausman test show that the chi-square value is 7.798921 with a probability value of 0.3507. With a p-value ≥ 0.05, H0 is accepted and H1 is rejected. So, based on the results of the Hausman test, it can be concluded that the best model for conducting panel data regression in the sample of this study is the random effect model so that the LM test to determine between the random effect and common effect models needs to be done.

Lagrangian Multiplier Test

LM test or Lagrangian Multiplier Test to determine whether the best model is random effect or common effect. The decision making from this LM test is if the p-value is ≤ 0.05 then H0 is rejected, which means that the right model for panel data regression is the random effect, whereas if the p-value> 0.05 then H0 is accepted which means the right model for panel data regression is a common effect.

Table 6: Lagrangian Multiplier Test Result

Lagrange Multiplier Tests for Random Effects			
Null hypotheses: No effect	**s**		
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided			
(all others) alternative	**s**		
Test Hypothesis			
	Cross-section	Time	Both
Breusch-Pagan	22,74847	0,741896	23,49036
	(0,0000)	(0,3891)	(0,0000)
Honda	4,769535	0,861334	3,981626
	(0,0000)	(0,1945)	(0,0000)
King-Wu	4,769535	0,861334	2,282038
	(0,0000)	(0,1945)	(0,0112)
Standardized Honda	5,530850	1,284415	-0,115706
	(0,0000)	(0,0995)	
			--
Standardized King-Wu	5,530850	1,284415	-0,367956
	(0,0000)	(0,0995)	--
Gourieroux, et al.*	--	--	23,49036
			(< 0,01)
*Asymptotic criticalvalues:			
1%	7,289		
5%	4,231		
10%	2,952		

Based on the data in table 6, the lagrangian multiplier test results show the cross-section value of the Breusch-pagan cross-section of 22.74847 with a probability value of 0.0000. With a p-value ≤ 0.05, H0 is rejected and H1 is accepted. So, based on the results of the lagrangian multiplier test, it can be concluded that the best model for regression of panel data in the sample of this study is the random effect model.

Multicollinearity Test

This test aims to determine whether in the regression model, there is a correlation between the independent variables. A good regression model should not have a correlation between the independent variables (Ghozali, 2009). To determine whether there is a correlation between the independent variables, it can be seen from the tolerance value between the independent variables. If the tolerance value between variables is greater than 0.9 or close to 1, the regression model is detected to have multicollinearity.

Table 7: Multicollinearity Test Result

	CSR	KA	SIZE	ROA	DER	AGE
CSR	1,000000					
KA	0,158695	1,000000				
SIZE	-0,143996	-0,114611	1,000000			
ROA	0,153815	0,205306	-0,104570	1,000000		
DER	-0,083961	0,170237	-0,009937	0,122106	1,000000	
AGE	0,413729	0,357847	-0,046250	0,028856	-0,091774	1,000000

Based on table 7 it can be seen that there is no correlation coefficient between variables that is greater than 0.9, it can be said that there is no correlation between the independent variables and the control variables used in this study.

Panel Data Regression Test

After conducting the panel data model regression test, it has been determined that the random effect model is the most appropriate model to be used in the panel data regression model in the sample of this study.

Table 8: Panel Data Regression Test Result

Dependent Variable:PBV				
Method: Panel EGLS (Cross-section random effects)				
Date: 06/17/19 Time: 15:06				
Sample: 2013 2017				
Periods included: 5				
Cross-sections included: 41				
Total panel (unbalanced) observations: 180				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1,028376	2,198398	-0,467784	0,6405
CSR	18,30265	9,514167	1,923726	0,0560*
KA	1,317067	0,688269	1,913593	0,0573
CSR*KA	-5,590773	3,114672	-1,794980	0,0744*
SIZE	-9,56E-07	0,000242	-0,003955	0,9968*
ROA	0,882905	1,110735	0,794883	0,4278*
DER	0,170906	0,038697	4,416501	0,0000***

AGE	-0,051791	0,028814	-1,797423	0,0740*
Effects Specification				
			S.D.	Rho
Cross-section random			2,402522	0,8023
Idiosyncratic random			1,192654	0,1977
Weighted Statistics				
R-squared	0,106624	Mean dependent var		0,414358
Adjusted R-squared	0,070266	S.D. dependent var		1,434113
S.E. of regression	1,360370	Sum squared resid		318,3043
F-statistic	2,932601	Durbin-Watson stat		1,610310
Prob(F-statistic)	0,006327			
Unweighted Statistics				
R-squared	0,032915	Mean dependent var		1,661222
Sum squared resid	1143,524	Durbin-Watson stat		0,448236

As in table 8 above, this test is carried out by regressing the independent variable, namely CSR on the dependent variable, namely firm value (PBV) by including the moderating variable, namely the audit committee (KA) and the control variable, namely company size. (SIZE), profitability (ROA), leverage (DER), and company age (AGE) in a sample of Manufacturing companies listed on IDX for the 2013-2018 period. This is to determine CSR with the moderating variable of the audit committee (KA) in terms of affecting firm value (PBV) with the control variable firm size (SIZE), profitability (ROA), leverage (DER), and company age (AGE). The regression equation is: PBV = -1.028376 + 18.30265CSR + 1.317067KA - 5.590773CSR * KA - 9.56E-07SIZE + 0.882905ROA + 0.170906DER - 0.051791AGE

Hypotheses Testing Result

The Influence of Corporate Social Responsibility on Company Value

Table 8 above shows the probability value of corporate social responsibility (CSR) of 0.0560 <0.10. This explains that CSR has a significant and significant effect on firm value at the 10% sig level. The CSR coefficient value of 18.30265 shows that CSR has a positive and significant effect on firm value.

The results of this study are in line with research conducted by Fiona (2017), Fitri and Herwiyanti (2015), Indarti and Setiawan (2016), Martantina (2014), Nahda and Harjito (2011), Putra, et al. (2013), Retno and Priantinah (2012), Samsi, et al (2014), and Wulansari and Sapari (2017), which state that CSR has a significant positive effect on firm value.

This means that the implementation of CSR in a company is one of the determining factors whether or not the company's value is good (Nahda and Harjito, 2011). Companies that disclose CSR will get a positive response from investors by increasing the share price of the company concerned. That way, the company will try to reveal a lot of information about CSR activities to maintain the company's existence which will have an impact on increasing company value.

The influence of Corporate Governance as proxied by the audit committee in moderating Corporate Social Responsibility to Company Value

Table 8 above shows the interaction probability value between CSR and the audit committee of 0.0744 <0.10. This explains that the audit committee is able to moderate the relationship between CSR and firm value at the sig 10%

level. The interaction coefficient value between CSR and the audit committee is -5.590773, indicating that the audit committee has a negative and significant effect in moderating the relationship between CSR and firm value.

The results of this study are in line with research conducted by Fiona (2017), Indarti and Setiawan (2016), and Martantina (2014) which state that corporate governance proxies the audit committee was unable to strengthen the relationship between CSR and firm value.

This shows that based on the criteria of the company's audit committee, one of the members of the audit committee is an independent commissioner, so the audit committee must assist the board of commissioners in optimizing supervision of the company (Martantina, 2014). In addition, the existence of the audit committee does not function properly if the appointment of the audit committee is limited to meeting existing regulatory criteria, so that shareholders pay more attention to high CSR disclosure to increase image and gain community legitimacy which will increase company value (Indarti and Setiawan, 2016).

The effect of the control variables on Firm Size, Profitability, Leverage, and Company Age on Firm Value

Table 8 above shows the probability value of the firm size control variable (SIZE) of 0.9968> 0.10. This explains that company size has no effect on firm value at the 10% sig level. The coefficient value of the company size is -9.56E-07 shows that firm size has no negative effect on firm value.

The results of this study are in line with research conducted by Cheryta, et al. (2017), Rumandor, et al. (2015), Suwardika and Mustanda (2017) which states that company size has no negative effect on firm value. This shows that a large or small company size will not be able to influence firm value. An investor, if he wants to value a company, will not see it in terms of company size which is reflected in the total assets owned by the company. However, investors will look more at various aspects such as paying attention to company performance as seen in the company's financial statements, the company's good name, and tend to pay more attention to companies that carry out CSR activities (Suwardika and Mustanda, 2017).

Table 8 above shows the probability value of the profitability control variable (ROA) of 0.4278> 0.10. This explains that profitability has no effect on firm value at the 10% sig level. The profitability coefficient value of 0.882905 indicates that profitability has no positive effect on firm value. The results of this study are in line with research conducted by Salempang, et al. (2016), Setyani (2018), and Setyawan (2017) which states that profitability has no positive effect on firm value. This means that the size of the profitability of a company will not affect the value of the company. In addition, the absence of the effect of ROA on firm value can be caused by the performance of management that does not have the ability to use their assets which causes net income to be small while the assets owned by the company are very large. In addition, this can also occur because the profits owned by the company cannot reflect the size of the company (Sukmawardini and Ardiansari, 2018).

Table 8 above shows the probability value of the leverage control variable (DER) of 0.0000 <0.01. This explains that leverage has a significant and significant effect on firm value at the 1% sig level. The leverage coefficient of 0.170906 shows that leverage has a positive and significant effect on firm value.
The results of this study are in line with research conducted by Pratama and Wiksuana (2016), Rudangga and Sudiarta (2016), and Suwardika and Mustanda (2017) which state that leverage has a positive and significant effect on firm value. This means that the higher the leverage, the higher the company's value.

This is in accordance with the theory put forward by Modigliani and Miller in 1963 which revealed that with taxes on company income, the use of debt would increase company value because debt interest costs were costs that reduced tax payments (Brigham and Houston, 2006). This can occur because the repayment of interest on loans can reduce the cost burden that should be allocated for tax payments, with this activity it can increase the value of EAT so that company profits increase and market valuation of the company will also increase (Suwardika and Mustanda, 2017).

Table 8 above shows the probability value of the firm age control variable (AGE) of 0.0740 <0.10. This explains that company age has a significant and significant effect on firm value at the 10% sig level. The company age coefficient value is -0.051791, indicating that company age has a negative and significant effect on firm value. The results of this study are in line with research conducted by Gunawan and Juniarti (2014) and Putri and Rachmawati (2017) which state that company age has a negative and significant effect on firm value.
This means that the longer a company has been established, this will decrease the value of the company. The decline in the value of this company is due to the longer a company has been established, it will tend to be stiff, so this causes the company to be less able to keep up with existing developments so that the company is less attractive to investors which causes the company's value to decrease (Gunawan and Juniarti, 2014).

Based on table 8 above, it shows the Adjusted R-squared value of 0.070266. This indicates that the independent variable is able to explain the dependent variable by 7%, while the remaining 93% is explained by other variables that are not used in this study.

Conclusion

This research was conducted to determine the effect of corporate social responsibility on firm value moderated by corporate governance as proxied by the audit committee. This study uses a sample of manufacturing companies listed on IDX during the 2013-2018 period. The following are the conclusions obtained from this study:

1. Corporate social responsibility (CSR) has a significant positive effect on firm value as proxied by PBV in Manufacturing companies listed on IDX for the period 2013-2018.
2. Corporate governance proxied by the audit committee weakens the relationship of CSR to firm value in manufacturing companies listed on IDX for the period 2013-2018.

Suggestion

Based on the research that has been done, there are several suggestions that can be given by researchers for further research:

1. Add a variation of the proxy to the firm value variable, such as: Tobin'sQ.
2. Adding proxy variations to corporate governance variables, such as: managerial ownership, institutional ownership, and independent commissioners.
3. Adding proxy variations to control variables that can affect firm value.

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Accountant's Work Ethics in the Light of Empirical Studies: Case from Poland

Magdalena WÓJCIK-JURKIEWICZ

Cracow University of Economics, Department of Accounting, Institute of Management,
College of Management Sciences and Quality,
Kraków, Poland
magdalena.wojcik-jurkiewicz@uek.krakow.pl

Beata SADOWSKA

University of Szczecin, Department of Accounting, Faculty of Economics and
Management, Szczecin,Poland
beata.sadowska@usz.edu.pl

Abstract

Ethics in the accountant's profession constitutes an unequivocal value and ethical dilemmas were observed in corporate falls that took place at the beginning of the twenty – first century. These scandals pinpointed decision making problem in accounting where estimates and judgements of professionals are of key importance. The main objective of the study is an attempt to answer the two following research questions: The Authors decided that the purpose of the article is to answer two research questions: 1) Whether those responsible for financial information generating are aware of the responsibility they bear? 2) Whether those people follow ethical values on a daily basis? The following methods were applied: survey research, comparative analysis, participant observation, critical analysis of the subject literature and deductive inference. The thesis of the study is contained within the statement that the accounting staff are under pressure and stress, that determine the occurrence of ethical dilemmas. The study confirmed the thesis posed in the paper that in solving their ethical dilemmas employees follow conscience and inner morality without consulting the Professional Code of Ethics in Accounting. As a consequence of the study the authors proved that staff lack familiarity with the potential of the Code and how it could assist them in resolving ethical dilemmas.

Keywords: ethical dilemmas, professional accountants, pilot study, Professional Code of Ethics in Accounting, Poland

Introduction

At the time of strong connections between business entities, globalisation and corporations becoming internationalised the role of ethical approach increases significantly (Chan et al, 2009; Turzyński, 2011; Szychta, 2015; Davis, Welton, 1991; Uysal, 2010). Lack of precision of numerous regulations and a growing impact of estimates on the image of an individual, result in a substantial dependence of this image on the behaviour and intents of people presenting it and not on the facts. Many authors view the accounting based on historical data as more reliable and verifiable, however, it provides less information than the decision makers expect.

Considerable changes to the economy generated a loss in trust to accounting. This state of affairs must not be blamed on the accounting system but on people, those employed in accounting and managers because they create the existing image of accounting. Implementation of ethics programmes is an attempt to provide a conduct compliant with the spirit of accounting principles. Although the countries in Western Europe and the USA have a history of professional codes of ethics, in Poland they are relatively recent. Adjusting the diverse value systems is conditional to social life. Society members with a variety, often contradictory, value systems must create jointly a more or less homogenous model of conduct.

The purpose of this paper is to explore the ways that professional accountants (in Poland) are dealing with ethical

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dilemmas they are facing with in their work. The research is carried out through the questionnaire which "was available as a form to be completed by professional accountants who also study accounting at universities".

The main objective of the study is an attempt to answer the two following research questions:

1. whether those responsible for financial information generating are aware of the responsibility they bear;
2. whether those people follow ethical values on a daily basis;

The following methods were applied: survey research, comparative analysis, participant observation, critical analysis of the subject literature and deductive inference. The thesis of the study is contained within the statement that the accounting staff are under pressure and stress, which determine the occurrence of ethical dilemmas.

Literature Review

Nowadays, the connections between business entities are on the rise and international corporations are of great importance. The responsibility of modern accounting increases significantly. Paradoxically, despite a vast business development, constant pursuit of profit, the need to reach to the origins – to the ethical attitudes – receives a growing attention (Nowak, 2017). Imprecise nature of legal regulations and a widening impact of estimates on an individual's image result in the image being perceived not on the basis of facts but through the vision of those whose role is to present it (Cieślak, 2011, Michalczuk, 2011; Micherda, 2012; Cieciura, 2015). Therefore, the accountants as well as entrepreneurs should make it a priority to become aware that a good opinion and trust are the key aspects of operating on the market. Unethical operation may be beneficial in a short term, however, in a longer perspective they prove to be unprofitable. Notably, the value of honesty increases and its impact on proper market functioning is essential (Wiśniewska, 2014, Piechocka-Kałużna, 2014, Klimczuk, 2014, Jurkiewicz, Wójcik-Jurkiewicz, 2014; Banaszkiewicz, Makowska, 2015; Sadowska, Lulek, 2016).

It is important to emphasise that the accountants' principles of ethics should not stem from a fear of penalties but from an inner conviction that dishonesty does not pay. Principles of ethics ought to be popularised in the society, among accountants as well as investors and business owners to make them aware of the importance of a true and reliable presentation of a financial image of an entity and that eventually observing the provisions of the Code has a positive impact on human relations as well as on the effects of management because any financial information should be advantageous. And the more comparable, timely, comprehensive and verifiable financial information the more advantageous it becomes (Wójcik-Jurkiewicz, 2014).

In some instances, following an ethical dilemma analysis, only one decision seems to be correct. However, one should bear in mind that often there are a number of solutions, therefore people professionally involved in accounting should demonstrate outstanding ethical standards (Wójcik-Jurkiewicz, 2015; Sadowska, Lulek, 2016; Karczewska, 2016, Pilarska, Struzik, 2018).

Materials and Methods

The research conducted on the staff in the field of accounting is aimed at establishing the scale of ethical problems intensity an accountant faces and must confront at work, at verification of the level of familiarity with the subject of ethical conduct and familiarity with codes of ethics.

The study respondents were the staff in the field of accounting as well as finance and accounting students and the nonprobability sample method was applied. The survey questionnaire covered 21 questions concerning 3 research areas.

In the first place, the collected responses regarded the respondents' personal experience with ethical dilemmas. The second part of the survey comprised questions regarding unethical behaviours or ethical conflicts present at businesses. Review of familiarity with the Code of Ethics followed.

Personal information at the beginning of the questionnaire provided data regarding the respondents' age, gender, education, job position and work experience. The main question posed before the respondents considered the existence of an ethical dilemma and how it was resolved. A thorough analysis required posing detailed questions aimed at completing and expanding the general question. One of the most essential pieces of information desired regarded the respondents' perception of the importance of ethics observance and how the ethical dilemmas are currently perceived. The respondent's attitude towards unethical behaviour and the impact of such attitude on their behaviour also provided interesting information. Answers to those questions constitute a significant source of

knowledge about the utility of the code of ethics, the level of ethics of people responsible for the financial data in our country and they may inspire a discussion regarding the potential to introduce changes regarding ethics popularisation among accountants.

Results and Discussion

The survey questionnaire was available as a form to be completed by professional accountants who also study accounting at universities. The study involved 105 respondents – professional accountants. Women – 79% people – predominated in the study. Men constituted only 21% of the total number of respondents. Most respondents were in 21-30 age group (15%), the fewest in the 31-40 group (23%) and 40+ (41%). The respondents were university (100 %) graduates.

In the part of the survey analysing the staff's exposure to ethical dilemmas as many as 61% of respondents were exposed to an ethical dilemma with regards to their work. 4% of the respondents faced them often, 35% of the respondents indicated never. Those dilemmas referred to various aspects of their work. In the question directly related to the source of the dilemma the respondents could mark up to 3 answers. The table 1 presents the answers provided.

Table 1: Aspects the ethical dilemmas concerned among staff

It	Causes of ethical dilemmas occurrence	Number of answers
1	Data manipulation, data fraud	27
2	Conflict of loyalty towards the employer and the ethics principles	18
3	Use of confidential information for own purposes	11
4	I have not faced an ethical dilemma	9
5	Dealing with private matters during work	8
6	Observing professional secret	6
7	Appropriating items from workplace	6
8	Relationship with supervisor	4
9	Relationship with subordinate	2
10	Relationship with colleagues	1

Source: own study on the basis of carried out research

An important aspect which required addressing was the manner of resolving the existing ethical dilemmas. The figure 1 below indicates the respondents' answers.

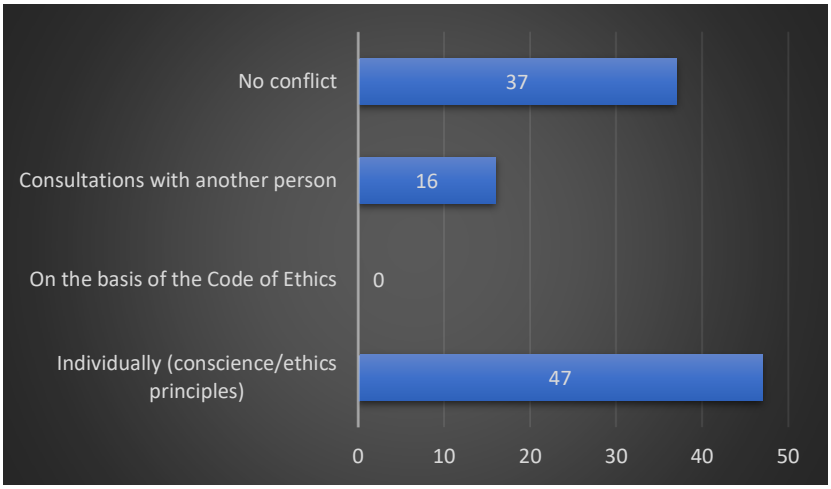

Fig. 1: Manner of resolving ethical dilemmas by respondents (in percent)

Source: own study on the basis of carried out surveys

As it may be noted, no person faced with a dilemma resolved it with the application of the Code of Professional Ethics in Accounting.

The next field subject to the study was how the selected actions are perceived and the impact of individual factors on human behaviour. The respondents were asked to assess, on the 1 to 3 scale, where 1 meant unethical, 2 – I have no opinion, 3 – ethical, their perception of the following actions:

- use of office/business equipment for private purposes,
- dealing with private matters at work
- use confidential information for personal profit.
- data manipulation,
- appropriating items from a workplace.

The respondents were most strict in their assessment of using confidential data (88% respondents deemed this activity very unethical and unethical), data manipulation (82%) and appropriation of items from a workplace (80%). As regards the aspects of dealing with private issues or use of office equipment the opinions varied, as illustrated with the figure 2 below (1 to 3 scale where 1 – unethical, 2 – i have no opinioin, 3 – ethical)

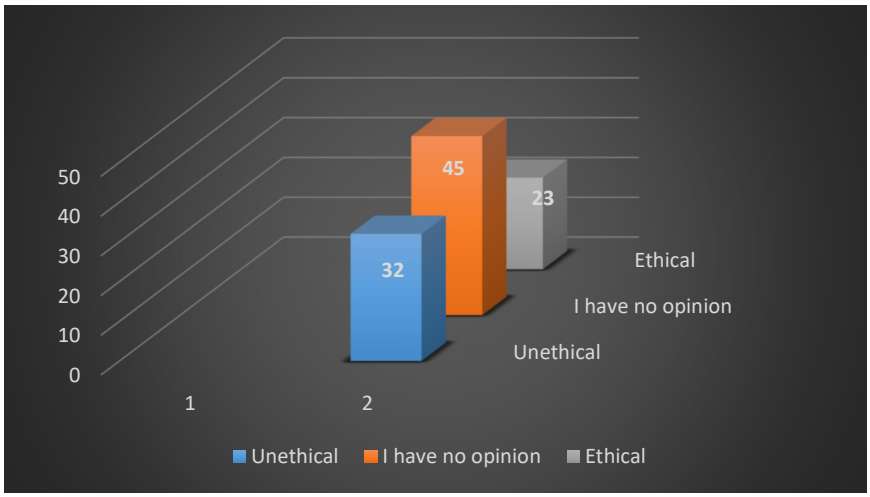

Fig. 2: Manner of perceiving and dealing with private matters during work by staff (in percent)

Source: own study on the basis of carried out research

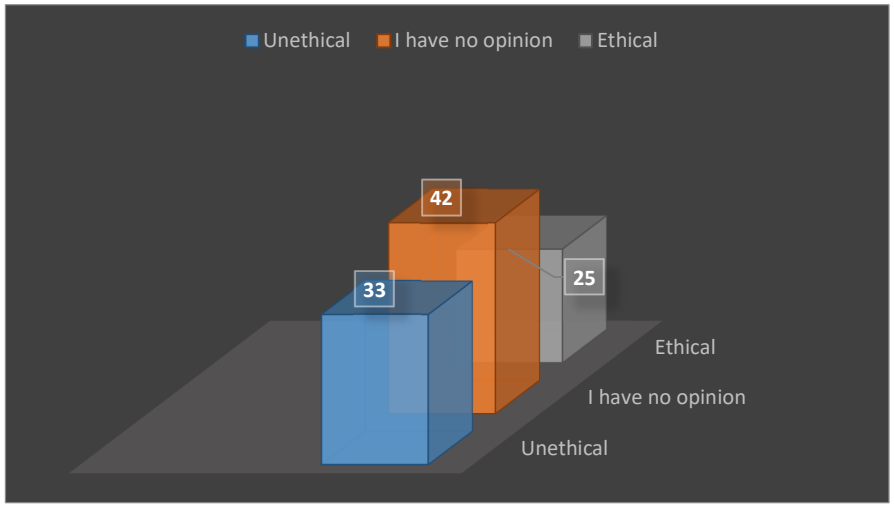

Fig. 3: Manner of perceiving the use of office equipment for private purposes by staff

Source: own study on the basis of carried out research

Every person grows up in a certain environment, in different cultures, society. They are brought up, have their own world view, surround themselves with a group of people and their conscience is shaped. The survey asked how the fundamental elements of every person's life, which shape them, affect the choices they make and how they perceive particular aspects as ethical or unethical. An analysis of the staff's answers shows that they believe that people's decisions regarding ethics principles observance are mostly influenced by:

- fear of penalty/sanctions (90%)
- upbringing (85%),
- conscience (66%),

The factors considered by the respondents to have a lesser impact on the decisions made by people were:

- religion/opinions (74% decided that it had no impact),
- fear of social rejection (34% decided it had no impact),
- environment (26% decided it did not impact deciding what is and what is not ethical),

The last subject addressed among the staff participating in the study concerned their experience related to the application of ethics principles. The staff were asked whether they have ever failed to observe any of the fundamental principles of ethics. 88% of the respondents denied such a situation, whereas 12% of the respondents admitted to a failure to observe the principles of ethics. The direct question regarding a particular principle they failed to observe, received the following answers at the table:

Table 2: Principles of ethics from professional accountant's

	Principles of ethics from respondents
• **Direct Question**	• data manipulation,
	• independence,
	• impartiality,
	• due diligence,
	• professional secret,

Accountants who work in that vocation were also asked whether they had to make an ethics related decision under pressure. 67% of respondents have not been in such situation, whereas 33% have. The results of this question confirm that the situations which should not take place happen regularly.

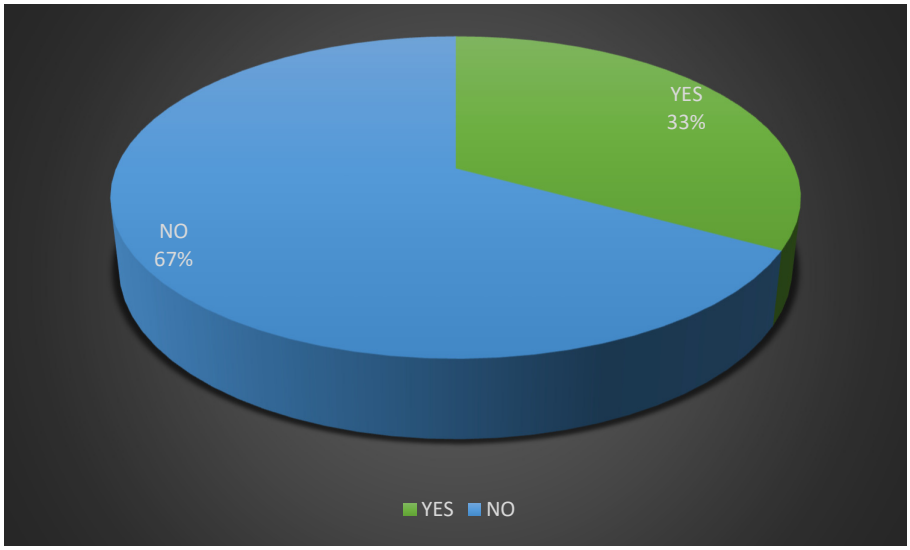

Fig. 4: Necessity to work under pressure connected to an existence of a conflict of ethics

Source: own study on the basis of carried out research

Another situation which should not occur is drawing an employee to a point when they resign from work due to the conflict of ethics. Unfortunately, as many as 19% of respondents replied to this question that they have resigned from work due to an ethics conflict emergence.

As it may be observed on the basis of the study conducted – the accountants are not unfamiliar with the ethical conflict phenomena. They are exposed to their occurrence on a daily basis which results in making decisions aimed at resolving the existing dilemmas. Familiarity with the fundamental principles of ethics formulated by the Professional Code of Ethics in Accounting plays a major role in the process of defining an individual ethical problem and is helpful in resolving it. Hence familiarity with the Code by those professionally involved in accounting is essential.

Conclusions

The posed thesis confirmed that the accounting staff are under pressure and stress which cause the occurrence of ethical dilemmas. It should be considered whether continuous pursuit of profit and creating a positive business image and its results should be conducted through pressure on the accountants so they apply creative accounting on the brink of morality? One should bear in mind that information created by the accounting departments is the source of investors' knowledge, therefore it should be presented with credibility and reliability (in accordance with the principle of a true and fair view). Particular attention to every attempt of unethical behaviour is extremely significant and the instances of pressurising by senior staff require every effort to make a good decision compliant with the principles of ethics.

The presented content was the basis for the conducted pilot study and will be the start of a real scientific research. The study confirmed the thesis posed in the paper that in solving their ethical dilemmas employees follow conscience and inner morality without consulting the Professional Code of Ethics in Accounting. Staff lack familiarity with the potential of the Code and how it could assist them in resolving ethical dilemmas.

In conclusion, a fundamental challenge the accountants in Poland face is becoming aware how important ethical behaviour in accounting is and that they should uphold observance of the principles of ethics. The following question regarding accountants emerges: are they only the ones subjected to pressure or do they draw any forms of benefit from unethical behaviour? The question whether accountants undertake proper efforts to represent their profession – to which they have devoted years of studying and continuous improvement – with dignity shall remain open.

The authors did not present the results of the research using descriptive statistical methods, because it was a pilot study that is already being prepared and will be carried out as the main study on a much larger scale and will cover accountants from all over Poland.

The subject of further research should be to determine the importance of the knowledge of ethical principles in the

positions of accounting professionals.

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Comprehensive Determination of the Exchange Ratio in Mergers and Consolidations. Strategic Considerations and Insights

Prof. Marco Taliento
University of Foggia – Dept of Economics, Foggia, Italy
marco.taliento@unifg.it

Abstract

Mergers synergies are a powerful instrument to create value and to overcome crisis as well. Mergers allow a quick growth potentially without paying cash, yet through a special swap. The share exchange ratio (SER) is a conventional and complex measure to determine the number of shares the acquiring company must issue for each individual share of the target. The present article aims at providing an in-depth analysis with reference to the possible allocation of the controversial synergistic component of the value creation process inside SER, both for absorption-mergers and consolidation-mergers. Such strategic aspect in both cases is still a gap since it is not analyzed in complete and unitary manner. In fact, the economic principle very often assumed in merger valuations is the "stand alone" perspective, based on the current configuration and future prospects of the companies on an independent basis, that is, without taking into account any potential synergies deriving from the merger or amalgamation. Such synergies are somehow conservatively neglected; nonetheless, they keep on be still very critical and material since plausibly create added value for either one or the two groups of shareholders involved. For opposite reasons, it is neither prudent nor convenient the aggressive approach by which the synergies are attributed entirely on one party (usually the acquirer). Therefore, considering the rationales of mergers, we propose four interlocking ways to approach to synergies in SER range determination and define a synthesis formula based on potential splitting of synergies between the two parties based on reasonable criterion.

Keywords: Exchange Ratio – Share Swap Rate – Mergers and Acquisitions – Consolidations – Amalgamations – Synergies – International Accounting – Fair Assessment – Corporate structure

Introductory notes

It is well known that M&As represent a very relevant category of business combinations in the market of corporate control (Coyle, 2000) with important differences inside, especially regarding the consideration to be transferred. In fact, while in Acquisitions the consideration (price of capital acquired) is expressed in money (currency units) in favor of the vendor or in shares of the acquirer, the specific 'price' of Mergers (as well as demergers) is given by a special swap, namely share exchange ratio. Since the latter is a conventional and complex measure – in order to determine the fixed or floating number of shares the acquiring company has to issue for each individual share of the target company, even if the deal was partially cash –, the present article aims at providing an in-depth analysis with reference to the possible allocation of the controversial *synergistic component* of the value creation process inside the ratio. Such strategic aspect for stock swaps is still a gap in literature and in practice since it is not analyzed in complete and unitary manner.

In general, business combinations (M&As) can be classified according to the corporate structure. An acquisition results when one firm sells or transfers (even by a spin-off / conferring) a business or more businesses to another firm that, in turn, purchases it by transferring money or issuing shares, thus getting the right to manage it. If the seller transfers shares the acquirer is assumed to take a controlling ownership on the firm transferred; but also an acquisition can result when A exchanges a business or some of its shares for some shares of B, whereby A becomes the parent company and B the subsidiary. Instead, a merger (vertical, horizontal or conglomerate) is a situation whereby firm A is going to acquire firm B, with only firm A surviving after the combination. A variant of merger is consolidation (amalgamation), which results when firms A and B combine assets and liabilities to form a new firm C (newco).

The economic principle very often adopted in merger valuations is the "stand alone" perspective, which is essentially based on the current configuration and future prospects of the companies going to merge on an independent basis, that

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is, without taking into account any potential synergies deriving from the merger or consolidation. Such synergies are somehow conservatively neglected; nonetheless, they keep on be still very critical and material since they may plausibly create added value for either one or the two groups of shareholders involved.

In this light, under the Corporate Valuation (Capital Asset Pricing Model) and Behavioral theory framework (Damodaran, 2016; Goedhart et al., 2015; Palepu et al., 2020), this paper intends to find whether and to what extent synergies coming from the merger combination of firms can play a correct formal role inside the exchange ratio formulas. Excluding the synergistic value implies that we would prefer the logic of value sacrifice in place of value creation.

That said, the remainder of the paper is organized as follows. The next section (2) briefly provides the theoretical background and then the question of the research concerning the vital ratio. Section 3 presents the share exchange formulas in mergers by absorption and in consolidations (amalgamations of firms), focusing on the fair determination and conventional adjustments. Section 4 adopts a strategic perspective of analysis and it illustrates the reasonable consideration of synergies, showing alternatives and numerical examples on the basis of four interlocking ways of attribution. Section 5 expresses our concluding remarks, while, at the end, the bibliographic references are placed.

Theoretical Background and Question of the Research

As said, through a merger two firms combine themselves in the way that one firm (acquirer) absorbs another (the target) which ceases to exist (in reverse merger the absorbing company is in substance the target). Through a consolidation (amalgamation) a new firm is created after the merge of two or more firms, which receive stock of the former (when firms have same or similar size: merger of equals). Mergers and consolidations allow complete absorption or unification of businesses, whereas financial acquisitions of stock, in turn, are often unfriendly and do not require a vote nor management consent (indeed it is a matter of ownership). Mergers are known of different kind in business practice (Bruner and Perella, 2004; Hakkinen and Hilmola, 2005; Lynch and Smith, 2006; Faulkner et al., 2012; Nelson, 2018):

- Horizontal: the absorbing company and target company operate in the same industry (as competitors);
- Vertical: the absorbing company sells to or buys from the target (products are required at different stages of production cycle);
- Conglomerate: companies involved operate in unrelated industries and merge for diversification (or risk reduction).

A general objective of mergers is a quick business growth in external manner (much quicker than internal growth) potentially without cash payment. Mergers are a growth strategy (Collins and Montgomery, 1997), but motives can be several, economic and meta-economic. However, a recurrent feature of mergers is that they historically come in waves (Andrade et al., 2001; Bureau Van Dijk, 2020), which in turn are correlated with increases in share prices and in price/earnings ratios as well (together with stock market booms and euphory in financial markets). Such waves are differently explained.

The neoclassical theories of merger waves are exposed by Jovanovic and Rousseau (2002) and Harford (2005) as well. Such theories assume that capital markets are efficient, cannot be driven by optimism and managers will always maximize shareholder wealth.

In contrast with the neoclassical theories, there are the behavioral theories of economics and finance (as the managerial discretion theory and the overvaluation theory) based on psychologic stimulations and concrete behaviors of managers and of resulting markets as well (Shleifer and Vishny, 2003; Gugler et al., 2012). The managerial theory is interesting because it takes into proper account mergers financed by cash or debt (merger leveraged buy-out).

As regards the share swap / exchange ratio in mergers (the compensation 'payed' to the acquired entity in form of shares of the acquiring entity), the academic research and the best practice on such conversion ratio consider its determination a hot topic in economic valuation. Jensen (1986), Buckley and Casson (2016) adopt the event research method to test how merger performance can create wealth especially for shareholders of target companies (more intensely in the short term). Moeller et al. (2005) showed a huge wealth destruction with abnormal returns of -12 percent to acquirers during the 1998-2001 merger wave. Among the others, two are the main modern models known in research: the L-G model (Larson and Gronede, 1969) and the Yagil (1987) model. The former sees the price/earnings ratio and price/book value ratio as parameters to determine the swap ratio for mergers (based on the constraint that the wealth of both the shareholders is not reduced, and the synergies of the merger are excluded); the latter expands the

analysis introducing growth expectation and dividend growth (Gordon, 1962), then calculating the proportional boundary value. Empirical tests for the L-G and Yagil models are reported in Conn and Nielsen (1977), Conn (1985), Conn et al. (1991), Cooke et al. (1994), Rossi (1999), Bae and Sakthivel (2000), Andrade et al. (2001), Moretto and Rossi (2008). Some of these works re-examined from an analytical viewpoint the inequalities of L-G and of Yagil exchange ratio static determination. Cigola and Modesti (2008) looked for a possible valuation of future dividends through a dynamical approach.

It is to remark here that in acquisitions or takeovers, the bidders are often used to pay a large premium (about 30%-40% of price) to recognize the value of synergies (Antoniou et al., 2008; Eckbo, 2008). From the acquirer's perspective, the merger is a positive net present value project to the extent that the implied consideration premium does not exceed the predicted synergies that are supposed to be created thanks to the business combination. Synergies (Sirower, 1997) are originated variously as for (Chatterjee, 1986; Damodaran, 2004; Homberg et al. 2009): cost-reductions, revenue-enhancements, economies of scale, economies of scope, vertical integrations, expertise and managerial knowledge gains, competition, technology and innovation (Bena and Li, 2014); monopoly gains, efficiency gains, financial synergies (Leland, 2007), tax savings etc. The gains for acquirer shareholders = Synergies – Premium. The same issue characterizes a merger combination and the parties involved in it. Nonetheless, synergy is often not disclosed explicitly in mergers nor incorporated in their exchange ratio swap.

Hence, the question of the research.

How can the share swap / exchange ratio formulas for mergers and consolidations be plausibly completed or integrated by synergies determined under a strategic combination point of view addressed to added-value creation?

We will answer proposing alternative hypotheses pointing out alternative consideration or allocation of the S (synergy) component inside the SER (share exchange ratio), under both the acquirer and target perspectives, and trying to match them in a unitary framework.

The Share Exchange Ratio in Mergers by Absorption and Conglomerations. Fair Determination and Relating Adjustments

The main issue in merger valuations is determining a fair exchange ratio as price or consideration of the business combination with complete or partial absence of cash deal: it expresses the ratio between the values of the respective shares of companies (acquirer and target) involved in the transaction. For that reason, the standard valuation theory and practice (for example, in Italy) are inclined to set particular attention on the principle of consistency in the stock capital valuation criteria to be applied. In fact, the purpose of merger valuations is not so much the determination of the absolute economic value of the companies which are going to merge, as the appraise of values that can be compared each other in order to obtain a correct exchange ratio. In other terms, merger valuations are meaningful as relative valuations more than as absolute valuations of the companies. The plain formula to obtain the exchange ratio between shares of the acquirer (A) e shares of the target (T) can be written as the following for mergers by absorption (further, we show SERs for consolidations):

$$SER = \frac{W_T}{W_A} * \frac{N_A}{N_T} = \frac{w_T}{w_A}$$

Where *W* is the corporate economic value (wealth), *N* is the number of shares standing before the merger and *w* is the value per share. SER indicates the number of new shares issued by A in change of each share of T.

At least two initial adjustments are important to pass from the pure or theoretical SER above calculated and the actual SER: i) adjustment for rounding the fraction obtained; ii) adjustment to neutralize any percentage *a* of shareholding already held by the acquirer absorbing (because SER is addressed to third parties). We have:

$$SER_{adj} = \left[\frac{w_T}{w_A}(1-a)\right]$$

Other possible adjustments are required in presence of different type of shares denoting different characteristics and prerogatives (an equivalent number of special shares must be converted in ordinary shares based on their respective market prices, if available).

As premised, crucial and delicate is the choice of the methods by which *W* is determined, compliant to A and T company (ie, to their economic structure and performance). Fundamental principles are the consistency and the comparability of the valuation assumptions to be considered as intrinsic parts of a single/unitary valuation process.

The income method. It determines the share exchange ratio based on the earnings per share before the merger of the two parties assuming such multiples unchanged before and after the merger between the two parties.

$$SER = \frac{E_T}{E_A} * \frac{N_A}{N_T} = \frac{EPS_T}{EPS_A}$$

The market price method. It is based on the market price of each share before the merger between the two parties (MV is the market value and MPS is the market price per share; the method is highly suggested for listed companies).

$$SER = \frac{MV_T}{MV_A} * \frac{N_A}{N_T} = \frac{MPS_T}{MPS_A}$$

Often the market value is appraised by means of the P/E (price-earnings) multiple.

$$SER = \frac{P/E_T}{P/E_A} * \frac{E_T}{E_A} * \frac{N_A}{N_T} = \frac{MPS_T}{MPS_A}$$

The Net assets method. It determines the share exchange ratio based on the net assets per share before the merger of the two parties (BVPS is the resulting book value per share).

$$SER = \frac{NAV_T}{NAV_A} * \frac{N_A}{N_T} = \frac{BVPS_T}{BVPS_A}$$

Alternative models. Alternative methods based on performance of companies involved in a merger will take into account their Dividends, Cash Flows, Operating results. In some cases, hybrid methods are used (excess earnings model).

The corporate valuations above are carried out in the stand-alone perspective and are neutral relative to parties' interests. Nonetheless, both parties carry out their own arbitrage valuations in strategic key during their decision-making process.

We can easily argue that: company A will want to keep its own ratio (SER_{acq}) as low as possible; company T will want its own ratio (SER_{targ}) to be as high as possible; both companies would ensure that after the merger, their equivalent value per share will at least equal their pre-merger value per share.

The L-G model as also revisited by Conn and Nielsen (1977) proposed a maximum and a minimum SER to be determined respectively for the acquiring and the target firm, depending on the post-merger expectations of the combined firm and wealth constraints. Such model utilizes the P/E multiple, but no businesses synergies, because the price-earnings multiple of the resulting company is just a weighted average of the price-earnings ratios of the two companies. The SER interval is then determined as follows under a market approach (where price *P* is a proxy of *W* of firms, and symbol C refers to the combined company):

$$\frac{P_T * N_T}{[\frac{P}{E}]_C * (E_A + E_T) - P_T * N_T} \leq SER \leq \frac{[\frac{P}{E}]_C * (E_A + E_T)}{P_A * N_T} - \frac{N_A}{N_T}$$

The more the actual SER (which can fluctuate between such boundaries) is close to the minimum limit, the more it will mean a gain to the acquirer, because the absorbing firm will have to give less shares in swap; the more it is close to the maximum limit, the more it will show the gain to the target, because its shareholders will get more shares in swap.

Here, a key (yet not easily predictable) variable is the P/E of the acquiring entity once the target is absorbed.

It is worth noting that SER valuation is a multiple issue in mergers by consolidations. If we assume that A and B will combine each other resulting in C, we have two SERs (stand-alone perspectives, without synergy):

$$SER_A = \frac{W_A}{W_A + W_B} * \frac{N_C}{N_A} = \frac{w_A}{w_c}; \quad SER_B = \frac{W_B}{W_A + W_B} * \frac{N_C}{N_B} = \frac{w_B}{w_c}$$

The next section, instead, will show through an Income approach (intrinsic or dynamic approach), the introduction of synergy inside the performance model both for absorptions and consolidations.

Plausible consideration of synergies. Alternatives and numerical examples

This time, with the purpose to analyze the wealth changes for target and acquirer shareholders under a performance (income) approach comprehensive of synergies, we let SER fluctuate between the following boundaries min and max:

$$\frac{EPS_T * N_A}{(E_A + E_T)(1+s) - E_T} \leq SER \leq \frac{(E_A + E_T)(1+s) - E_A}{EPS_A * N_T}$$

Where *s* is the synergistic rate of earnings growth. The model appears quite dependent on the EPS variable.

More complicated (but not impossible, if only we think of potential synergies between the intangible assets or other strategic assets involved in the merger) can be the appraisal of synergies within the net asset valuation model or within the hybrid one.

That premised, we can identify a more general performance model of SER (based on future economic streams like net incomes, dividends or cash flows) which is able to consider in explicit manner the synergy value, hence determining the maximum swap ratio to the acquirer and conversely the minimum swap ratio to the acquired entity. In such dynamic framework we decline our assumptions concerning the synergy variable inside the ratio.

First, to the acquirer shareholders, an increase of value will be if:

$$w_{A+T} \geq w_A$$

where w_{A+T} is the value per share after the merger including synergy (reflected by the wealth created by the differential flows W_d) and w_A is the value per share without the merger. To calculate the maximum SER_{acq}, we have to posit $w_{A+T} = w_A$. Hence:

$$w_{A+T} = \frac{W_A + W_T + W_d}{N_A + N_T * SER}$$

Then:

$$SER_{acq\,(\max)} = -\frac{N_A}{N_T} + \frac{W_{A+T}}{w_A * N_T} = -\frac{N_A}{N_T} + \frac{W_A + W_T + W_d}{w_A * N_T}$$

Which simply equals to:

$$SER_{acq\,(\max)} = \frac{W_{A+T} - W_A}{W_A} * \frac{N_A}{N_T} = \frac{W_T + W_d}{W_A} * \frac{N_A}{N_T}$$

Where, as known, $W_{A+T} > W_A + W_T$ due to future synergies (expressed by W_d) that will in place between A and T.

For opposite reason, the target shareholders will judge positively the merger if:

$$w_{A+T} \geq \frac{w_T}{SER}$$

Solving for SER, in similar manner as seen before, we obtain:

$$SER_{targ\ (\min)} = \frac{w_T * N_A}{W_{A+T} - W_T} = \frac{w_T * N_A}{W_A + W_d}$$

Then:

$$SER_{targ\ (\min)} = \frac{W_T}{W_{A+T} - W_T} * \frac{N_A}{N_T} = \frac{W_T}{W_A + W_d} * \frac{N_A}{N_T}$$

As said, corporate value (business wealth) is expressed with respect to flows, that is as a function of F: *W=f(F)*. Yet, the economic value of companies could be measured though net asset valuation. In such case, the value of the net assets *W(BV)* combined could be higher than the sum of the parts involved in merger because of higher value in use, fair value, tax saving, etc. Such incremental net asset value would be counted as W_d.

As obvious, the *actual* swap ratio will be included in our interval *min / max*:

$$SER_{targ\ (\min)} \leq SER_{act} \leq SER_{acq\ (\max)}$$

The distance between the actual value and the minimum will reveal the actual gain or premium to the target:

$$Premium_{targ} = \frac{SER_{act} - SER_{targ\ (\min)}}{SER_{targ\ (\min)}}\%$$

The gap between the actual value and the maximum will reveal the actual gain or premium to the acquirer:

$$Premium_{acq} = \frac{SER_{acq\ (\max)} - SER_{act}}{SER_{acq\ (\max)}}\%$$

Finally, it is interesting to decline the various hypotheses of attribution (or splitting) of the synergies in the business combination and in the SER formulas as a consequence. In order to demonstrate the sensitivity of the exchange ratio when the possible synergic component changes, an example is used.

For ease, the merger by absorption of the company Theta into the company Beta is hypothesized, where the latter does not hold shares in the capital of the former. The following summary data are observed.

- Theta: Stock capital = 100.000 cu; shares = 100.000; nominal value: 1 cu; W = 301.267 cu.
- Beta: Stock capital = 120.000 cu; shares = 60.000; nominal value: 2 cu; W = 524.770 cu.
- Synergy = 151.939 cu.

We could proceed (interlocking cases):

a. without taking into account the merger synergy between Theta and Beta (that is the most accepted classical working hypothesis in business doctrine and practice);

b. by attributing the synergies in full either to Theta, the acquisition target (max SER) or to Beta, the absorbing company (min SER);

c. by sharing the synergies between Theta and Beta, based on the relative percentage weight on the economic value of the capital globally considered pre-synergy (ie, 36% + 64%);

d. by dividing the synergic value on a flat-rate basis (*forfait*), at 50% each party, between the two companies (as in the so-called mergers of equals).

Then we have the following results.

a. SER pure or stand-alone is calculated through the plain formula with no synergy.

$$SER = (W_T / N_T) / (W_B / N_B) = (301.267 / 100.000) / (524.770 / 60.000) = 3{,}01 / 8{,}75 = \mathbf{0{,}34} \text{ (ie, 34/100)}$$

b. SER with full synergy to one party.

$$SER_{max} = ((W_T + S)/ N_T) / (W_B / N_B) = (453.206 / 100.000) / (524.770 / 60.000) = 4{,}53 / 8{,}75 = \mathbf{0{,}52} \text{ (ie, 52/100)}$$

$$SER_{min} = (W_T / N_T) / ((W_B + S)/ N_B) = (301.267 / 100.000) / (676.709 / 60.000) = 3{,}01 / 11{,}28 = \mathbf{0{,}27} \text{ (ie, 27/100)}$$

c. SER with sharing synergies, that is, splitting S (synergy) in S' attributable to the target contribution and S''=S-S' to the acquirer contribution.

$$SER_{acq\ view} = ((W_T + S')/ N_T) / (W_B / N_B) = (355.965 / 100.000) / (524.770 / 60.000) = 3{,}56 / 8{,}75 = \mathbf{0{,}41} \text{ (ie, 41/100)}$$

$$SER_{targ\ view} = (W_T / N_T) / ((W_B+S'') / N_B) = (301.267 / 100.000) / (622.011 / 60.000) = 3{,}01 / 10{,}37 = \mathbf{0{,}29} \text{ (ie, 29/100)}$$

d. SER with 50% synergies both parties.

$$SER_{acq\ view} = ((W_T + S/2)/ N_T) / (W_B / N_B) = (377.237 / 100.000) / (524.770 / 60.000) = 3{,}77 / 8{,}57 = \mathbf{0{,}43} \text{ (ie, 43/100)}$$

$$SER_{targ\ view} = (W_T / N_T) / ((W_B+S/2) / N_B) = (301.267 / 100.000) / (600.739/ 60.000) = 3{,}01 / 10{,}01 = \mathbf{0{,}30} \text{ (ie, 30/100)}$$

We can conclude that the two SERs, respectively for the acquirer point of view and the target point of view, can be expressed through general formulas corrected with coefficients τ and β (between 0 and 1).

$$SER_{acq\ view} = [(W_T + \tau S)/ N_T] / (W_B / N_B)$$

$$SER_{targ\ view} = (W_T / N_T) / [(W_B + \beta S)/ N_B]$$

At the equilibrium point ($\tau = \beta = 0$), both sets of shareholders (that is, acquirer's and target's ownership) will have some gain (based on the distance of the plain SER from the respective boundary SER) even if no synergy is formally taken in consideration into the SER.

Instead, when τ and β are 1, the NPV (net present value) respectively to the acquirer and the target shareholders is zero.

We saw SERs to Beta and to Theta in our example. However, under a strategic framework of unitary analysis matching the acquirer and target perspectives, summary or matching values (SER_{match}) can be identified in the various cases described.

a. $SER_{match} = SER_{no\ synergy}$ for both parties = $(W_T / N_T) / (W_B / N_B) = (301.267 / 100.000) / (524.770 / 60.000) = 3{,}01 / 8{,}75 = \mathbf{0{,}34}$ (ie, 34/100)

b. $SER_{match} = SER_{full\ synergy}$: no formal intersection is possible in this case between 0,52 and 0,27 (anyway we could take their mean value **0,40**, ie 40/100)

c. $SER_{match} = SER_{split\ syn} = ((W_T + S')/ N_T) / ((W_B+S'') / N_B) = (355.965 / 100.000) / (622.011 / 60.000) = 3{,}56 / 10{,}37 = \mathbf{0{,}34}$ (ie, 34/100)

where S' + S'' = S

d. $SER_{match} = SER_{syn\ 50/50} = ((W_T + S/2)/ N_T) / (W_B+S/2) / N_B) = (377.237 / 100.000) / (600.739 / 60.000) = 3{,}77 / 10{,}01 = \mathbf{0{,}38}$ (ie, 38/100)

Definitely, we can state in one:

$$SER_{match} = [(W_{Target} + \tau^* S)/ N_{Target}] / [(W_{Bidder} + \beta^* S)/ N_{Bidder}]$$

where, rationally (in presence of symmetric information (Dionne et al., 2015) between the parties that is vital to a rational splitting) will be that: $\tau^* S + \beta^* S = S$.

Moving on to the special category (quite rare) of consolidation mergers and the relating determination of SERs, we can utilize the same data as before, this time assuming that Theta and Beta companies are going to cease and form a new company Gamma.

In brief, we have the following interlocking cases (*a, b, c, d*), noticing that with amalgamations both the Theta and Beta shareholders will need their own shares to be exchanged obtaining a certain number of Gamma shares issued through a correct determination of SER_{theta} and SER_{beta}.

a. SERs pure or stand-alone are both calculated through the plain formula with no synergy.

$SER_{theta\ plain} = [W_{theta} / (W_{beta} + W_{theta})] \times (N_{gamma} / N_{theta})$ = (301.267 / 826.037) x (220.000 / 100.000) = 36% x 2,20 = **0,80** (ie, 80/100)

$SER_{beta\ plain} = [W_{beta} / (W_{beta} + W_{theta})] \times (N_{gamma} / N_{beta})$ = (524.770 / 826.037) x (220.000 / 60.000) = 64% x 3,67 = **2,35** (ie, 235/100)

b. SERs with full synergy to one party.

$SER_{theta\ max} = [(W_{theta} + S) / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{theta})$ = (453.206 / 977.976) x (220.000 / 100.000) = 46% x 2,20 = **1,02** (ie, 102/100)

$SER_{beta\ a\text{-}syn} = [W_{beta} / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{beta})$ = (524.770 / 977.976) x (220.000 / 60.000) = 54% x 3,67 = **1,98** (ie, 198/100)

or in alternative,

$SER_{beta\ max} = [(W_{beta} + S) / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{beta})$ = (676.709 / 977.976) x (220.000 / 60.000) = 69% x 3,67 = **2,53** (ie, 253/100)

$SER_{theta\ a\text{-}syn} = [W_{theta} / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{theta})$ = (524.770 / 826.037) x (220.000 / 100.000) = 31% x 2,20 = **0,68** (ie, 68/100)

c. SER with sharing synergies, that is, splitting S (synergy) in S' attributable to the Theta contribution and S''=S-S' to the Beta contribution.

$SER_{theta\ split\ syn} = [(W_{theta} + S\ W_{theta} / (W_{beta} + W_{theta})) / (W_{beta} + W_{theta} + S)] \times (N_{gamma} / N_{theta})$ = ((301.267 + 36% 151.939)/ 977.976) x (220.000 / 100.000) = 36% x 2,20 = **0,80** (ie, 80/100)

$SER_{beta\ split\ syn} = [(W_{beta} + S\ W_{beta} / (W_{beta} + W_{theta})) / (W_{beta} + W_{theta} + S)] \times (N_{gamma} / N_{beta})$ = ((524.770 + 64% 151.939)/ 977.976) x (220.000 / 60.000) = 64% x 3,67 = **2,35** (ie, 235/100)

d. SER with 50% synergies both parties.

$SER_{theta\ syn/2} = [(W_{theta} + S/2) / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{theta})$ = ((301.267 + 50% 151.939)/ 977.976) x (220.000 / 100.000) = 39% x 2,20 = **0,85** (ie, 85/100)

$SER_{beta\ syn/2} = [(W_{beta} + S/2) / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{beta})$ = ((524.770 + 50% 151.939)/ 977.976) x (220.000 / 60.000) = 61% x 3,67 = **2,24** (ie, 224/100)

We can conclude that the two SERs, respectively for the Beta point of view and the Theta point of view, can be synthetized as follows:

$$SER_{theta\ split\ syn} = [(W_{theta} + \tau S) / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{theta})$$

$$SER_{beta\ split\ syn} = [(W_{beta} + \beta S) / (W_{theta} + W_{beta} + S)] \times (N_{gamma} / N_{beta})$$

Where $\tau S + \beta S = S$ created through the business combination.

Consolidations may be mergers of equals when businesses have similar economic size; nonetheless, when the wealth of one company (W) is much larger than the other company, the former can be identified as the acquirer entity (as such

will have more stocks and management powers) and the latter as the target entity. Synergies can be split taking into account such aspect.

Discussion and Conclusions

Despite its importance, the problem of the fair determination of the exchange ratio is largely unexplored in financial literature, especially as regards the value of synergy between the entities involved in a merger, since subjective evaluation enters in the determination based on the companies' financial reports data and the planned performance for future (Moretto and Rossi, 2008). But we believe it is an effort that must be made to represent and better understand the strategic dimension that dominates the merger / consolidation negotiation. Often the swap ratio is determined is simple manner, that is, adopting the stand-alone perspective for both companies (plain SER), also because – it is argued – in mergers are not important the absolute valuations of firms. The article tries to fill a gap in literature exposing an in-dept analysis of the possible role of the synergistic value inside the merger and consolidation swap, thus identifying a range of swap ratios to include between the two boundary values: the maximum SER (in which all the synergy is attributed to the acquired entity) and the minimum SER (where all the synergy is attributed to the acquiring entity). The actual SER will drop in such interval and the relative distance from the boundaries will express the actual gain for each party involved in the merger.

Since the returns to acquiring companies' shareholders are inversely related to the market optimism at the time of mergers (Gugler et al., 2012), in period like the present in which trust is absent we believe it reasonable that the swap ratio should be driven by partial contribution of synergies. Furthermore, the literature is unanimous in finding positive abnormal returns to target shareholders, while it disagrees over the effects of mergers on the acquirers' shareholders (in optimistic periods, acquirers' return usually decrease due to overvaluation, even becoming negative). In general, empirical results show how there is no strict evidence that acquirers benefit from mergers, which usually resolve in substantial gains for target's shareholders, e.g. Andrade et al. (2001); Weber (2013). The recognition of full synergy to the target through the maximum SER will increase such disparity.

We indicate different ways to split the synergies and reconcile them in one synthesis formula: $SER_{match} = ((W_{Target} + \tau^{*} S)/ N_{Target}) / ((W_{Bidder} + \beta^{*} S)/ N_{Bidder})$. Only if synergy is calculated as fixed growth rate of the combined wealth s (%), such determination is equal to the plain basic formula without synergy.

$$SER_{match} = (W_{Target} (1+s)/ N_{Target}) / (W_{Bidder} (1+s)/ N_{Bidder}) = (W_{Target} / N_{Target}) / (W_{Bidder} / N_{Bidder})$$

In all the remaining cases, studying the actual and specific performance and structure of the entities involved in the merger / consolidation, the results will be differentiated. Essential is the possibility that the parties involved are willing to share information each other on present structure and planned performance. Furthermore, the disclosure of the value of potential synergies at the time of a merger will support the market valuation during the period following the merger announcement, offsetting the value erosion due to investors reaction to uncertainty.

Similar reflections are valid for demergers, since one company will absorb another business and swap the stocks through the appropriate exchange ratio.

A limitation of the work is in that other factors could influence the SER range (apart the topic of irrationality of choices). As for our splitting, for example, we postulated the existence of divisible synergies; yet, the presence of indivisible synergies (attributable only to the acquirer, excluding the target shareholders; unless the latter will be enabled to contribute to future management) would exert special effect: to raise more the max SER and place the min SER at basic plain SER. The presence of indivisible synergies for both parties can be typical of joint ventures and mergers of equals. Furthermore, the valuation framework could be integrated through the real options approach to synergies (potential real options in mergers: growth options; exit options; options to postpone or abandon an investment; flexibility option (change operating scale); switch option); Bruner and Perella (2004). Finally, a success coefficient should be introduced because the predicted synergies sometimes fail to realize. Ficery et al. (2007), in this regard indicated the most common mistakes that the executives make in forecast: defining synergies too narrowly or broadly; missing the window of opportunity; incorrect or insufficient use of incentives; not having the right people involved in synergy capture; mismatch between culture and systems; and using the wrong process. In fact, the literature explains the failure of deals due to a false evaluation of potential synergies when firms merge (Roll, 1986; Sirower, 1997; Homberg et al., 2009).

The consideration of synergies in the valuation process and dealing is consistent also to the successive accounting and financial reporting process (in fact, Ifrs 3 - Business Combinations recognizes synergetic value as core component of goodwill, emerging in M&A). As for the vital choice of the most eligible method to corporate valuation in mergers and consolidations, we underline that Covid-19 pandemic crisis and consequential market fluctuations will represent an alert with reference to an exclusively market oriented SER (based on P/E), instead suggesting a normalized income or cash flow analysis. Although crises slow down M&A waves, in the strategic management thought synergy (Garzella and Fiorentino, 2014; Kengelbach et al., 2020) is still an effective means to overcome the firms' crisis and value creation challenge (Sudarsanam, 2003).

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Conflict-sensitive Approach to Media Coverage of Religious Conflicts in Nigeria: A Study of Sharia Crisis

Margaret Damola JESUMINURE
Doctoral Candidate, Covenant University, Ota, Ogun State/Lecturer, Mass Communication Department, Adeleke University, Ede, Osun State, Nigeria
email: margaret.ayansolapgs@stu.cu.edu.ng/ margaret.jesuminure@adelekeuniversirty.edu.ng

Lai OSO
Professor, School of Communication, Lagos State University, Ojo, Nigeria.
laioso@ymail.com

Olusola OYERO
Professor, Department of Mass Communication, Anchor University, Ayobo, Lagos, Nigeria.
ooyero@aul.edu.ng

Kehinde OYESOMI
Department of Mass Communication, Covenant University, Ota, Nigeria.
Kehinde.oyesomi@covenantuniversity.edu.ng

Abstract

This paper examines the way and manner by which the print media reported the religious crisis that broke out as a result of the introduction of sharia law in the year 2000 in Kaduna, northern Nigeria. The paper investigates the assumptions that the editorial postures of newspapers on religious conflicts tend to coincide with the views that are dominant in the areas where the newspapers are located, as well as that press coverage of religious crises is an important factor in the prolongation and intensity of such conflicts. A qualitative examination of the reportage of the sharia crisis by two Nigerian Newspapers was conducted. The study reveals that the *New Nigeria*, located in northern Nigeria had a pro-*sharia* stance in contrast to an anti-*sharia* perspective by the *Nigerian Tribune*, located in Southern Nigeria. It concluded that journalists are not neutral arbiters during religious conflicts in Nigeria and that press coverage of religious crisis is an important factor in the prolongation and intensity of the crisis. It recommends that journalists should be trained to frame and define conflict situations in ways that create meeting points between conflicting parties. So also, policy makers should develop and enforce codes and ethics on conflict sensitive journalism so as to better manage religious conflicts and prevent its escalation in Nigeria.

Keywords: Crisis, Management, Media, Religious Conflict

Introduction

This study is about religious conflicts and how they are represented in the media. The post-cold war era has witnessed an upsurge in the incidence of identity conflicts and wars, especially, in Africa and developing countries in general. As Falola and Oyebade (2010) observed, Africa has increasingly become a hotspot replete with conflicts, several of which are related to identity. According to them, many of these conflicts and wars occur because of the inability to integrate societies and nations divided along ethnic and religious lines. Indeed, it has been mentioned that our age is the age of identity and therefore, of controversy and conflict over religious, racial, and ethnic identities (Jesuminure, 2019).

Globally, the role of the media in shaping events, as well as the reciprocal relationship between the outbreak of conflicts, disorders, wars and the media coverage of these conflicts, are an important topic of contemporary discussion (Abiola, 1990; Adebanwi, 2002a; Bamigbetan, 2000; Jesuminure, 2019; Mironko, 2007; Olukotun, 2011; Rangolam, 2014). That is another way of saying that it is recognized that the framing techniques used by the media in times of conflict have an impact on the course as well as the result of those conflicts. Indeed the increasing popularity of conflict-sensitive journalism, which teaches journalists to be more conscious and aware of the

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implications of irresponsible, flamboyant, political, and overtly partisan reporting, is evidence of how well they understand how important the reportorial styles of journalists in times of conflicts are.

The newspapers were selected because of their comparatively wide circulation and national reach. The *Nigerian Tribune* was selected because of its location in an ancient city in southwest Nigeria and for being a national daily that has stood the test of time from the colonial era. The *New Nigeria* on the other hand was chosen because it was the only National daily in northern Nigeria at the time of this case study, the other publication from northern Nigeria that also enjoyed national circulation at the time, was still *Weekly Trust* it has not metamorphosed into *Daily Trust* which made it impossible to be used for this study. *New Nigeria* is also believed to have been around for some time, following its establishment in the year 1966 by the then Northern region before the federal government took over its ownership in 1975.

This is the case in fragile societies with pronounced ethnic and religious cleavages and with a history of violent clashes or civil wars based on these cleavages. Obviously, in countries such as Nigeria where conflicts around such identities as religion and ethnicity often occur and recur, it is important to grapple with the problematic nature of how exactly media reportage and framing of news and commentaries widen or lessen the incidence and intensity of conflicts. Nigeria shares the potential for conflict escalation through media reportage with other countries in Africa such as Kenya, Liberia, Rwanda, Sierra Leone and Uganda, among several others.

Statement of the Problem

Scholars have posited that the way and manner in which the media report events in times of conflicts have consequences on the prolongation or early resolution of such conflicts (Craig & Nurmalanga, 2006; Entman, 1994). Against this background, the study investigated the precise role which the Nigerian media, in this instance, the newspapers, played in either fuelling or reducing the intensity of religious conflict in Nigeria as a result of the introduction of sharia law in the year 2000. An illustration of the nature of this problem is provided by Bamigbetan (2000) when he argues that the pictorial elaboration by the media in August 1999 of the Hausa/Yoruba clashes in Shagamu, Ogun State, sparked off retaliatory clashes and mayhem in Kano located in Northern Nigeria.

The research problem is to show the relationship between newspaper framing and conflict escalation by reference to the content of media output immediately before, during, and immediately after the religious crisis under study. This enabled us to make inferences as to the relationship of media coverage by opposing sides in the conflict to crisis escalation.

In simple terms, did the Nigerian Newspapers play an escalating or reduction role in the religious crisis that broke out in the year 2000, at Kaduna over the introduction of sharia law? What does this suggest to us about the role of the media in religiously divided and conflict-ridden societies? How can the media help in managing conflict situations through conflict sensitive reporting?

Research Questions

i. What are the patterns (ways and manners) of the reportage of the religious crisis in Nigerian newspapers?

ii. Does the ethno-religious affiliations of the selected newspapers impact the reportage of religious crisis under study?

Scope of the Study

The study focuses on print media, in particular, selected newspapers published daily and located in different geographical regions. The print media are emphasised because right from the colonial times they have tended to be arbiters of conflict, enjoying a pedigree derived from their star roles in the anti-colonial and anti-military struggles. Although the circulation and readership of newspapers have declined following a global trend in the last decade, they continue to exercise influence beyond their reach and penetration (Uzochukwu, 2014). The adaptation to the online version for many of them also gives further relevance to a study on newspaper representation.

Literature and Theoretical Review

Identity, Media and Identity Conflict

The concept of identity is derived from the Latin word “idem” which implies uniformity and continuity. According to Olukotun (2011, p. 128), “it is best conceived as a person’s mental image and expressions of their individuality or group affiliation". It exists in the interstices of negotiation between individuality and socially defined roles, indicating that it can be seen as a coterie of group affiliations that define the individual. Language, socialization and cultural attributes are therefore significant in the appreciation of identity as a socially constructed phenomenon; and the media, in all its varied forms, are essential to the creation of identities. This goes to show that there is an intimate relationship between media representation and the various ways in which identities, be it religious, ethnic, or social are constructed and contested.

Media refers to the means of transmitting information. It refers to the different types, devices and systems of mass communication regarded as a whole, including newspapers, magazines, radio stations, television channels and websites. That is to say, communication channels through which news, entertainment, education, data or promotional messages are disseminated. As Kelinar (1995) suggests, it is the media that supply and reinforces symbols and myths from which identities as cultural projects are constructed. Hence, in conflict situations, opposed groups employ media narratives to support their claims and to maintain a sense of "them" and "us". It is for this reason that this media research has focused on the ways and manners in which the media represent identity conflicts, in this instance, religious conflict. It is worthy of note that in many identity conflicts on the African continent and else were, the media has been central to how the conflicts unfolded or escalated (Adebanwi, 2002b; Olukotun & Jesuminure 2018; Onuegbu, 2012).

Conflict Sensitive Journalism Approach

One derivative of Peace journalism is conflict sensitive journalism which emphasises the ways and manners in which journalists can be trained for reportorial strategies that mainstream peace building and less conflictual approaches. The viewpoint behind it, is derived from the awareness that the language and narratives strategies that journalists employ have direct bearing on the outcome and trajectory of conflicts. Hence, the need for them to avoid inflammatory or sensational language capable of stoking conflicts.

Characteristics of peace journalism as identified by Okoro etal (2017) include employing the perspectives of conflict analysis and transformation to achieve even handedness in the reportorial enterprise. The provision of a road map for establishing the sources which journalist use, the narratives they employ as well as the effect of their journalism. It also entails the creation and nurture of an orientation of non-violence which expectedly is to be infused into the Work-a-day chores of journalists. It is important to note that war journalists tend to focus more on the physical narrative of war emphasizing such factors as the number of deaths and such matters as who wins or who losses in something like a zero sum game. On the other hand peace journalism is presented as an alternative approach to war journalism in that rather than take a dispassionate role, it invest efforts in issues and factors that make for peace. According to Okoro et al (2017) war journalism reports conflicts and violence in ways that conduce the audience to place emphasis on violent responses and tends to downplay non-violent alternatives. It is often argued that war as well as conflicts is the natural habitat of journalist to the extent that it makes better news than peace or peace making.

Journalists today must understand that they are more than just a competent observer and a distributor of information. They should be made aware that people know how to build evidence for them to publish. People want to tell the media those details in order to use the media to manipulate the public's opinion of the dispute. News published by journalists can be detrimental to the society by fostering fear and violence, or constructive, by making the people better informed, and even proffering possible solutions to the conflict as well as reporting on efforts to promote conflict resolution. A conflict-sensitive journalist analyses conflicts and looks for new voices and perspectives about the conflict. S/he reports on who is attempting to settle the dispute, looks closely at both sides, and reports on how other disputes have been resolved. A conflict-sensitive journalist does not take sides but is active in the hunt for solutions. Conflict sensitive journalists often carefully select their words.

Brief History of Selected Newspapers

New Nigerian: The newspaper was established in 1966 by the government of the then Northern region. Its purpose was to protect northern interest especially by countering the “negative” press focus from the southwest part of the country (Tsebe, 2016). The newspaper became a national daily following its takeover by the federal government in

the year 1975, it is believed to enjoy wide circulation though, often accused of narrow readership base, due to its deep-rooted sectionalism.

Nigerian Tribune: The Nigerian Tribune was founded in 1949 by an Ibadan based legal practitioner and politician, Obafemi Awolowo who had recently founded the action group to advance his political career (Adewale, 2013). A private newspaper, it is currently the oldest surviving Nigerian newspaper (Nigerian Tribune, 2020). Its maiden edition appeared on November 16 1949 with the publisher, Obafemi Awolowo admonishing that the paper should develop "a frank tongue and a pungent pen, a tongue and a pen that will careless of what the opponent might say or how they might feel and will have enough courage to call hypocrisy, humbug and tyranny by their names" (Fagbohun, 2019).

During the colonial era, the paper identified itself with the anti-colonial struggle in which Awolowo played a prominent role. In the same manner, in the twist and turns of post-independence politics, the paper expectedly continue to identify itself with the action group, spending time to defend the politics and policies of its publisher against the attacks of political opponents and rival newspapers. In other words, like other private newspapers it served as the mouthpiece of its proprietor and founder.

Background to the Crisis

The February 2000 crisis over the *sharia* in Kaduna in terms of its impact and degree of fatalities is one of the worst religious conflicts in Nigerian history (Sampson, 2012). The crisis was precipitated by the enactment of *sharia* law in a multi-religious and multi-ethnic state with the Christian population roughly equal to the Muslim population. The year 2000 *sharia* conflict was due, on one hand, to Muslims' clamour for *sharia* implementation in Kaduna State and, on the other hand, to the Christians' rejection of the implementation of the *sharia* system which they believe would affect them, if it were passed into law (Uroko, 2018). The peaceful demonstration of Christians was challenged by Muslim youths, turning the situation to a violent one (Mavalla, 2014).

Theoretical Framework

Framing Theory

The research is based on the framing theory, which refers to a variety of ways in which journalists structure or pre-structure news and other media outputs by drawing attention to or making some things more important than others. This idea is derived from the word 'frame,' which refers to the marking of borders in the same way as a picture is demarcated by placing a boundary around it. Chandler and Munday (2011) refer to Frames in media theory as the ways in which representations work to re-contextualize (and thereby alter the sense of what they represent. They further argued that frames are tools and instruments used in representations as a way of constraining perception.

News and other media outputs are managed by journalists on selection strategies which are used to lead the audience to view their report in the spec of the codes favoured. The point is that journalists carry along with them certain mental schemes or perceptual maps that not only influence their reportage but also affect their encoding of news in order to favour some interpretations above others. As Entman (1993, p. 52) makes clear "to frame is to select some aspects of a perceived reality and make them more salient in a communication text in such a way as to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation for the item described".

Frames in media theory share borders with two other theories of media effects namely, agenda setting and priming. Agenda setting in broad terms refers to the ability of the media to highlight issues in such a way that the issues that they emphasise are also the issues that the audience pays the most attention to (Severin & Tankard, 1992). Similarly, priming draws our attention to the ways in which journalists employ media content to get the audience to employ specific issues as benchmarks for evaluating the performance of leaders and government (Iyenga & Kinder, 1987). According to Jesuminure (2019), the news media of a particular society tend to construct accounts of events which are structured and framed by the dominant values and interests of that society, and to marginalise (if not necessarily exclude) alternative accounts.

Framing is a theory of media effect that is regarded by some scholars as an extension of both Agenda Setting and Priming, deriving partly from insight in psychology and sociology (Oso, 2017). Framing theory can be located in the relationship between the techniques and devices used by journalists to draw attention to certain issues and how audiences decode or make meaning out of the framing or agenda building. According to Scheufele (1999), frames

are better understood by asking such questions as what specific types of media frames impact on the audiences' perception of particular issues and in what manner does the process work to influence audiences.

The relevance of the theory to a study of representations is obvious in that to give an example describing the sharia which is a form of Islamic jurisprudence as a monster may seem all right to secular journalists or those operating from Christian perspectives. Such a description may however offend or incense Muslims who believe that the sharia is a just and God-ordained political and legal arrangement. Uncovering the frames that journalists located in different regions employ may yield clues as to the build-ups or intensities of religious and ethnic conflicts.

Methodology

This study adopted the discourse analysis method of research design. The population of the study is all national daily newspapers in Nigeria in existence in the year 2000. Two National newspapers were purposefully selected; one from the South and one from the North for a comparative study.

Discourse Analysis

Discourse analysis is usually regarded as the analysis of language beyond the sentence or the text. In other words, it deals not only with what is said, but how it is said and what is left unsaid. It studies the interrelationship between text, context, and subtext (Van Dijk, 2016). More formally, it is a qualitative research method that seeks to investigate power, function, and the construction of meaning in writing or oral text or even sign language. A quantitative perspective does not yield the full significance of media positions and perspectives without an equivalent focus on such matters as style, tone, and tenor of editorial content. Hence, such matters as stereotyping and demonising as well as the use of provocative language with an inflammatory tenor are best unveiled through the mechanisms of discourse analysis. Illustratively, there is a difference between referring to the sharia as a form of Islamic Jurisprudent in neutral terms and calling it the sharia monster. In order words, the study focused on hidden meanings and subtext that are not easily captured by quantitative methodologies. For the purpose of content analysis, News, features, columns, and editorial reports served as the units of analysis. The newspaper articles were analysed based on language, images, and location of the articles within the newspaper.

The contents of the selected newspapers were examined for the two weeks before the crisis and six weeks from the start of the crisis. Therefore, 56 editions of each of the two newspapers were examined, making a total of one hundred and twelve (112) editions.

Findings and Discussion

In this narrative, we are concerned with the first outbreak of violence in Kaduna which began on February 21 and lasted till February 25, 2000. Though, there were other rounds of the crisis, notably in March and May 2000 with spill over effect into such town as BirninGwari, Shakainu among others.

For this study, we have chosen to highlight differential coverage of the February crisis by examining and analysing the discursive strategies of the northern-based but government-owned New Nigeria as well as the privately owned and southern-based Nigerian Tribune. It should be noted in this respect that although the New Nigerian which went off the street in 2012 was based in Kaduna, its ownership by the government suggested that it could not take an anti-government stand because of proprietorial control; in other words, it could not fully express or present the opinions and feeling of the communities of which it was located. Consequently, its coverage of the sharia crisis tended to convey peacebuilding and pro-establishment tenor in the weeks leading to the outbreak of violence of February 21, 2000.

A discursive excursion into the New Nigerian in the weeks before the crisis reveals such stabilizing outlook as “Muslims urge to embrace peace” (February 3, 2000) and “Zamfara Organizing seminar for Royal fathers on Sharia” as well as “Sharia no threat to Nigeria” (February 14, 2000). The February 14 report which was a front-page story adopted a consolatory posture in reporting the outcome or communique on a seminar on sharia. For example, the report quoted the communique as urging “Muslims and non-Muslims to create avenues for regular dialogue in order to foster mutual understanding.

Equally pertinent are feature stories such as “Understanding sharia law” (February 14, 2000). That notwithstanding, some of the opinion articles and commentaries adopted the posture of advocacy and even propaganda on behalf of the sharia. For example, an opinion piece published under the heading “commentary” argues that “we believe that with sharia all good things will come. I personally believe that you need the sharia to effectively cleanse the civil

service of its corrupt nature. Sharia will definitely deal with givers and takers of bribe in such a way that nobody will like to be caught." (New Nigeria, 2000, p. 15).

In other words, the New Nigerian, while for proprietorial reasons avoided frontal and direct publicity for the sharia, managed to smuggle into its opinion pages pro-sharia articles which may have been found threatening by non-Muslims. For example, talking of cleansing the civil service which is a secular institution by using the sharia could not have been calculated to calm or appease civil servants who are not Muslims.

The Tribune located in Ibadan, Southwest Nigeria, had no overt comment or report on the sharia in the weeks before the crisis. However, its opposition to the Sharia found its way into some of its news coverage which quoted influential sources who warned concerning the manipulation of the sharia. For example, a fortnight to the outbreak of violence, the paper quoted a Christian cleric as warning the nation not to treat sharia with levity (Don't treat sharia with levity February 7, 2000). The cleric, founder of Hope of Glory Spiritual Church, Johnson Afolabi OkotoJesu was quoted as saying that the issue of implementing sharia should be downgraded in favour of implementing workers' welfare. The cleric was further quoted as saying "we all need to corporate with the federal government to make our new democratic dispensation a peaceful one and not to bring forth sharia law to foment trouble". Lending further credence to that perspective, a news report in the Nigerian Tribune of 9th February 2000 was titled "Don't use Islam to cause Chaos", the statement attributed to the governor of Gombe state at the time, Abubakar Habu Hashidu. The tenor of the headline suggested that the advocacy and agitation for sharia in the northern part of the country were perceived negatively as an attempt to "cause chaos" or as the earlier news report quoted suggested, to foment trouble.

Hence, while the New Nigerian within the limitation of its proprietorial control adopted a subtle pro-sharia posture, the tribune adopted through its reportorial styles a mildly anti-sharia posture; one viewed the sharia as a blessing while the other considered it an instrument of mischief and troublemaking.

Once the crisis started, the positions of the two papers as gleaned from their discursive strategies tended to confirm a hardening of perspectives. For example, while the New Nigeria continued to report the crises, its tone became assertive as can be seen from such report as "Kano to resist attempt to crush sharia" although the report concerned the neighbouring state of Kano rather than Kaduna, it appears to be sending a message that it is either sharia or nothing. Specifically, the statement (March 9, 2000, p. 3) credited to the speaker of the House of Assembly; Abdulahi Gwarmai quoted him as saying that "neither president Obasanjo, the national council of state or national assembly as the legal power to stop state from implementing the sharia". A similar belligerent tenor is apparent in such a report as "sharia not negotiable" and sharia denial unconstitutional (February 23, 2000, p. 12). It can be argued that this aggressive advocacy may have had something to do with the further outbreak of violence in Kaduna barely three months after the February crisis. Illuminating in the same context is a feature article published by the New Nigerian on March 6, 2000, authored by a well-known northern legal scholar, Professor Auwalu Yadudu and entitled "sharia: time for reflection". Yadudu maintained that the struggle for the sharia does not violate the secular status of the Nigerian state. In his words, "where does the constitution declare Nigeria to be secular and whose version of secularism have we adopted?" This strenuous defence of the sharia by an eminent jurist appears to have been calculated to strengthen the advocacy for sharia in the northern part of the country including Kaduna.

The narrative and discursive approaches of the Nigerian Tribune after the crisis broke out appears to have been unequivocally anti-sharia. For example, its front-page news of 23rd February exclaimed "Sharia will cause chaos" the statement was credited to former Biafran leader Chief Emeka Ojukwu. The report went on to say that "agitation against the introduction of sharia law in some states of the country took a violent turn in Kaduna on Monday when Militant Muslims clashed with Christians protesting against the proposed introduction of the law in the state leaving at least 20 persons dead". The use of the expression "militant Muslims" can be viewed as a loaded attempt to lay the blame of the riot at the door of the Muslims, while the headline was cast in such a way as to raise an alarm concerning the need to tackle sharia before it rips the country apart.

In the same connection, are such stories in the Nigerian Tribune as Oodua Liberation Movement warns Sharia Agitators (24th February 2000, p. 23), Stop the religious killings- Afenifere Abroad as well as, Kaduna Massacre: how soldiers aided rioters (27 February, 2000, p. 1). The report of a warning or threat by the Oodua Liberation Movement stated "the move to introduce sharia is a refortification of the Hausa-Fulani political agenda to maintain the status quo", this indicates a perception of the crises as one orchestrated to foster an anti-Christian and anti-southern political agenda. Expanding on the same narrative, the Nigerian Tribune article of 27th February, informed that "as the casualties of the Kaduna Massacre escalate, it has been revealed that soldiers and police helped the fanatics to perpetrate havoc". The reference to fanatics can be seen as a condemnation not just of the rioters but of the entire sharia agitation, a framing which is further legitimated by the report that law enforcement agencies rather than playing a neutral role took a side on account of their religious affinity with advocates of sharia.

In sum, the discursive strategies of the New Nigerian on one hand and the Nigerian Tribune on the other points to a pro-sharia stance by the New Nigeria in contrast to an anti-sharia perspective by the Nigerian Tribune. This is in agreement with the assertion of Oso and Akanni (2018, p. 163) that "the Nigerian press does not just mirror the character of the Nigerian society and the events happening in it, it is an active participant". They further stated that the media in Nigeria represent very narrow ideological interests, those of the contending factions of the ruling elite, which is seen in this study as most of the reports analysed quoted elites and not the victims. This is also in line with Oyesomi, et al (2019) in a study on Newspapers' compliance with the code of election coverage of the 2015 elections in Nigeria, the study analysed two national newspapers, namely, Punch and the Guardian, it found out that the levels of fairness and balance of the newspapers during the election period were low.

The findings of this study also tally with Adebanwi, (2002b) who argued that no national media exist in Nigeria, but an Ngbati media, Nkenga media, and Arewa media corresponding to Nigeria's major ethnic groups, that is, Yoruba, Igbo, and Hausa media respectively.

Conclusion and Recommendation

It has been established that journalists are not neutral arbiters during religious conflicts in Nigeria. Since press coverage of the religious crisis is known to be an important factor in the prolongation and intensity of such crisis, there is need for journalists to be trained and retrained on the approach of conflict sensitive journalism. It is important for federal government to continually invest in the promotion of positive attitude towards security matters, rather than take sides during conflicts (Amodu, Alege, Oluwatobi, & Ekanem 2017).

By providing conflict sensitive information in a conflict situation, the journalist helps to establish a channel of communication among combatants and to reduce the differences between them. When all parties to a conflict are listened to and their voices heard and not just that of elites. In this respect, training in diversity reporting, how to avoid stereotypes, sensationalism and inflammatory language will be of great help. Improvement of professional standards, through education of journalists on reporting objectively, as opposed to opinionated journalism can assist the search for less fractious journalistic frames. It is also recommended that policymakers need to develop and enforce codes and ethics on conflict sensitive journalism. The Nigerian media need to adopt peace-oriented frames in the reportage of sensitive issues such as religious conflict.

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Analysis of The Effect of Islamic Values and Practices Towards Entrepreneurial Intentions Mediated by Attitudes Towards Entrepreneurship

Muhammad THORIQ[1], N.I.S. PUTRI S.E., M.Sc[2].

1. *Islamic Business Undergraduate Study Program*, Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Depok, 16424, Indonesia. Email: muhammad.thoriq61@ui.ac.id
2. *Department of Management*, Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Depok, 16424, Indonesia. Email: nisputri@ui.ac.id

Corresponding E-mail: nisputri@ui.ac.id

Abstract

Indonesia is a country with a majority Muslim population, which makes Islam is a religion practised by the majority of the Indonesian and it has a great potential in influencing the behavior of Muslims in Indonesia. However, the ratio of the number of entrepreneurs in Indonesia is still low, in which we argue that whether any religious values and teaching has a direct or indirect effect towards Muslim's attitude towards entrepreneurship. This phenomenon is the driving force for this study. Furthermore, this study aims to determine the effect of Islamic values and Islamic practices on entrepreneurial intentions by mediating attitudes towards entrepreneurship. The survey was conducted on 211 Muslims who have career intentions as entrepreneurs. The study found that Islamic values have a significant positive effect on entrepreneurial intentions, either by mediating attitudes towards entrepreneurship or without a mediating role. Furthermore, this research is expected to provide benefits that can be used by parties related to religious education and entrepreneurship, in the form of a description of Islamic values that can foster a Muslim entrepreneurial attitude and intention. Further research can be carried out by limiting the generation or age group of respondents so that the results obtained can answer more specific research problems.

Keywords: Islamic values, Islamic practices, Intention, Entrepreneurship

Introduction

Previous studies have shown that values are significant influence for entrepreneurial attitude and intention. For example, in a study by Krueger, Linan & Nabi (2013) entitled "Cultural values and entrepreneurship", then research by Fayolle, Linan and Moriano (2013) entitled "Beyond entrepreneurial intentions: values and motivation in entrepreneurship" and many other similar studies. Islam is a religion that has universal values that can support entrepreneurial attitudes and intentions (Rehan, Block & Fisch, 2019). Indonesia is a country with a majority Muslim population, this makes Islamic values can play a role in influencing the behavior of Muslims in Indonesia in general, and can play a role in influencing the behavior of Muslims in Indonesia related to entrepreneurship in particular.

Entrepreneurs or entrepreneurs have an important role in creating jobs and reducing poverty (Engle et al., 2010; Bruton, Khavul & Chavez., 2011). One indicator of the resilience of a country's national economy can be seen from the ratio of the number of entrepreneurs to the total population. The ratio of entrepreneurs or entrepreneurs in Indonesia is 3.1 per cent (bps.go.id, 2016). This figure has exceeded the international standard by 2 percent. However, according to the 2019 Global Entrepreneurship Index, this ratio is still below other countries such as Malaysia (5%), China (10%), Singapore (7%), Japan (11%) and the United States (12%).

According to data from the Global Entrepreneurship Index in 2019, Indonesia is ranked 75th in the world, where neighbouring countries such as Malaysia are in 43rd rank, Brunei Darussalam is in 48th, Thailand is in 54th and Vietnam is in 73rd which indicate Indonesia are among the lowest in the region. The Central Statistics Agency as of March 2019, Indonesia has a ratio of poor people of 9.22% or the equivalent of 24.79 million people. Besides, according to the Central Statistics Agency as of February 2020, the open unemployment rate in Indonesia was 4.99% or equivalent to 6.88 million people.

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The problems of unemployment and poverty are big problems for individual Indonesians, both for now and for the next few years. Therefore, entrepreneurs or entrepreneurs are needed to open job vacancies to overcome these two big problems. For that, it is necessary to know about what can influence a person to have entrepreneurial intentions. In this context towards Muslims individuals. Previous research conducted by Rehan, Block and Fisch in 2019 revealed the influence of religion, namely Islamic values and Islamic practices in entrepreneurial intentions. According to Bandura (1977), there are motivational factors to act that affect intention. Then according to Ajzen (1985) intention is influenced by attitude (attitude), subjective norms, and perceived behavior control.

The majority of Indonesians have a mindset that being an employee is more comfortable and safer than opening their own business. According to Widawati (2012) formal and non-formal education in Indonesia is still not oriented towards entrepreneurship. The Ministry of National Education conducted a survey in 2011 regarding interest in becoming a worker or entrepreneur after graduating from the study. As a result, in general, high school graduates (60.87%) and tertiary institutions (83.18%) have a higher interest in becoming workers than in becoming entrepreneurs who can create jobs. Also, according to Widawati (2012), those who have passed the study are considered successful by the community when they can become civil servants (government) or employees of private companies who have a regular income, making their passion or passion become job seekers, not job creators.

Therefore, Islamic values (Islamic religious values) and Islamic practices (Islamic religious practices) can have a strong impact on every Muslim to behave and behave, including attitudes towards entrepreneurship and entrepreneurial intentions. This research will look at how the role of Islamic values and Islamic practices in entrepreneurial intentions using Rehan, Block and Fisch's (2019) research model entitled "Entrepreneurship in Islamic communities: How do Islamic values and Islamic practices influence entrepreneurship intentions?" Where Islamic values are divided into 8 dimensions of Islamic values which Rehan, Block and Fisch (2019) take from Wahab's research (2016), namely: gratitude (syukr), hardworking and optimal effort (mujahadah), benevolence (ihsan), perfectionism (itqan), continuous self-criticism (muhasabah an-nafs), consultation (shura), cooperation (ta'awun) and responsibility (mas'uliyyah). As for Islamic practices, Rehan, Block and Fisch (2019) take 3 pillars of Islam, namely the obligation to pray 5 times, the obligation to fast in the month of Ramadan and the obligation to participate in paying zakat from Raiya's research (2008) to be used as research indicators.

Theoretical Review

Theory of Planned Behavior

Fishbein and Ajzen (2005) stated that the Theory of Planned Behavior (TPB) is one of the most influential frameworks in social research and is a popular concept in that field. According to TPB, human behavior is determined by 3 things: 1. Belief in how the behavior results and evaluation of it (behavioral beliefs). 2. Belief in the important normative expectations of others and how motivation is in agreeing with these expectations (normative beliefs). 3. Perceptions about the presence or absence of factors that can facilitate or inhibit behavior (control beliefs). According to them, three things are the main predictors of influencing behavior intention. The three things are 1) Attitude towards a behavior (attitude towards behavior), 2) Subjective norms, and 3) Perceived behavioral control.

Islamic Values

Islam has a teaching that being an entrepreneur or entrepreneur is a noble and great job if it is in accordance with the guidance of Allah and His Messenger. Rasulullah said in a hadith: "A businessman who is honest (ash-siddiq) and can be trusted (al-amin), will be with the prophets, those who were martyred, and those who are pious." (HR. At-Tirmidhi). Being an entrepreneur or entrepreneur is also a major thing, as stated in the hadith, the Prophet said: "Look at you, actually that trade in this world is nine out of ten (ninety per cent) doors of sustenance." (HR. Ahmad). This hadith is reinforced by another hadith, namely, "The most important business is good buying and selling and the work of a man with his skills," (HR. Ahmad).

The prophet is also a successful entrepreneur whose wife, Khadijah is also a successful businesswoman. Throughout the history of early Muslim, we could see that the closest companions of the Prophet were also entrepreneurs which are not only active in religious activities but they are also an entrepreneurs who gives significant contribution to Muslim community (Syahrial Yusuf, 2013).

Like other religions, Islam also promotes values in society, which are described in the Quran and Hadith. Islamic values serve as principles for followers of religions and help in shaping their attitudes and behavior. Specifically, this study uses 8 Islamic values contained in Wahab (2016), namely: gratitude (thanksgiving), hardworking and optimal effort (mujahadah), benevolence (ihsan), perfectionism (itqan), continuous self-criticism (muhasabah). an-nafs), consultation (shura), cooperation (ta'awun) and responsibility (mas'uliyyah).

Islamic Practices

Certain sacred practices and rituals are very important to Muslims. It is a way for followers of Islam to remember history, express faith, and grow in loyalty. Islamic religious practices and rituals are relatively few but very important. The Five Pillars of Islam are five practices that are considered by all aspects of Islam as essential to Islam (Raiya, 2008).

Islamic practices are the practice of practising ghairu and mahdah worship in one's life (S Quotyo & Amrih, 2016). According to Sutipyo and Amrih (2016), Islamic practices are related to behavior that has been regulated and established in religion. For example, behavior regarding the procedures for worship, praying, fasting, praying, reading the holy book, and so on. In this study, used as research items are obligatory prayers 5 times, fasting in the month of Ramadan, and participation in paying zakat, as found in the research of Raiya (2008).

Entrepreneurial Intentions

Entrepreneurship is not only triggered by passion or passion but is also influenced by spiritual beliefs (Boshoff, 2009). According to Steinberg (2010), religion can influence a person's attitude and behavior in terms of entrepreneurship through the creation of values in religion. Religion is closely related to the level of beliefs and values that a person embraces and how a person applies these values and beliefs in his life (Worthington, Everett L. et al., 2003). These values determine how a person will behave and make decisions. Wahab (2016) explains that values are guidelines for human behavior, in which religion influences these values in terms of transmitting to followers of their religion. Therefore, the values in religion will have a strong impact on the attitudes and behavior of the followers of that religion. Generally, religious values are based on the religious scriptures that teach and promote these values in it. For example, the Holy Quran and Hadiths for Muslims, the Bible for Christians, and the Talmud for Jews (Abdal-Haqq, 2002; Sanders, 2009). Apart from religious values, Guiso et al. (2003) explained that religious practices also influence the formation of attitudes conducive to economic growth. They argue that individuals who participate in religious practice regularly will exhibit stronger attitudes towards entrepreneurship.

Intention is an indication of a person's readiness to do something and is an antecedent of behavior (Ajzen & Fishbein, 1980). Intention is also defined as a motivational factor for behavior and as an indication of how much a person wants and how much effort someone wants to spend when planning to do something, in general, the greater one's intention, the greater the activity will be carried out (Ajzen & Fishbein, 1980). According to Bandura (1977) intention is a person's determination to carry out activities or produce certain conditions in the future. According to him, the intention is an important part of self-regulation owned by individuals. Where it is motivated to act. Based on the description above, intention is a useful indicator for predicting future behavior. This is because a person's intention is closely related to the behavior desired by that individual. Meanwhile, entrepreneurial intention has the meaning of the desire or intention that exists in an individual to run entrepreneurship (Rehan, Block & Fisch, 2019).

Research Methods

Data collection

This study obtained data from the population using online survey techniques. Respondents were asked to fill out a questionnaire and the survey is conducted in the community where Muslim students shows its interest on being an entrepreneur. Later, the data is processed using the LISREL application. Before doing the main survey, first a pretest was carried out on 50 respondents with the respondent's criteria according to the provisions of the main survey. The pretest was carried out to identify and eliminate problems that could occur when filling out the questionnaire (Malhotra, Birks & Wills, 2012). This study uses primary data by conducting a survey using a questionnaire that can be filled out online. The questionnaire consists of questions with a Likert scale of 1-5 (1 = disagree; 2 = slightly disagree; 3 = neutral, 4 = somewhat agree; 5 = agree) and also a Likert scale 0-10 used to measure. This study uses a non-probability sampling method, in more detail this study uses a convenience-purposive sampling technique because researchers need samples with certain conditions.

Conceptual Model and Research Hypothesis

The definition of religiosity by Johnson et al. (2001) suggest that it is closely related to attitude, in line with Fishbein and Ajzen (1975), who wrote that attitude is "the amount of influence for or on an object." A person's beliefs tend to be closely related to his religion, either by direct effect (through sacred texts) or by indirect effect (because individual culture, which is influenced by religion).

Religion and attitude are highly correlated. Confirming this opinion, Foxall and Goldsmith (1994) reported that religion contributes to building a knowledge base that justifies and controls individual attitudes and behavior. Weaver and Agle (2002) agree, adding that it is a person's religious identity that influences his behavior and attitudes.

According to Ajzen (1985) in Theory of Planned Behavior (TPB), there are three things that determine a person's intention to behave. These three things are: 1) Attitude, 2) Subjective norms, and 3) Perceived behavioral control. In this research, the TPB theory becomes the basis for the model being built.

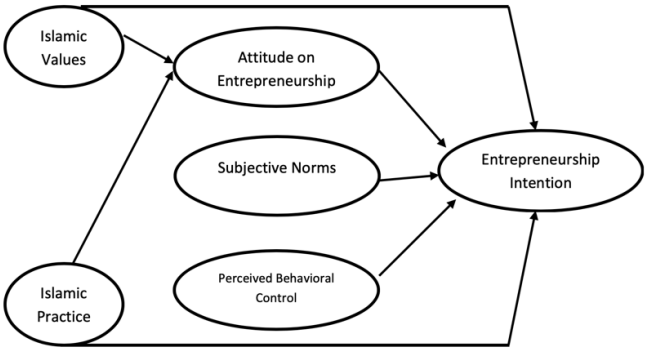

Figure 1: Research Model

(Sources: Rehan, Block & Fisch, 2019)

In TPB, attitude refers to an individual's perception of behavior; that is, how much he has favorable or unfavorable judgments about engagement in behavior (Ajzen, 1991). According to the theory of Fishbein and Ajzen (1975) a person's beliefs about an object determine their attitude towards that object. Therefore, attitude is a function of one's beliefs. Ajzen (1991) states that favorable individual attitudes towards certain jobs increase their intention to do that job. In the context of this study, attitudes towards behavior are considered as attitudes towards entrepreneurship, which affect entrepreneurial intentions (Tkachev & Kolvereid, 1999).

According to (Ajzen, 1991) pressure from influential people can influence a person's decision to do or not to carry out certain behaviors. Influential or important people here are family members and close friends whose opinions are taken into account when making decisions. Bandura (1977) supports the idea, stating that people are relatively likely to engage in behaviors that are witnessed among people who are important to them. Therefore, norms are considered as important antecedents when predicting intentions to engage in entrepreneurial behavior.

From the results of the explanation above, the researchers took the following hypothesis:

H1: Islamic values have a positive influence on attitudes towards entrepreneurship
H2: Islamic practices have a positive influence on attitudes towards entrepreneurship

Ajzen (1991) explains that perceived behavioral control is an individual's perception of how easy or difficult it is for him to carry out the behavior. Researchers have previously found empirical evidence that perceived behavioral control has a significant effect on entrepreneurial intentions (Basu & Virick, 2008; Ruhle et al., 2010; do Paco et al., 2011). Based on this empirical evidence, behavioral control is considered a predictor of entrepreneurial intention; the stronger a person's perception of behavior control, the stronger his intention to choose self-employment as a career choice (Kolvereid, 1996). From the results of the explanation above, the researchers took the following hypothesis:
H3: Attitudes towards entrepreneurship have a positive influence on entrepreneurial intentions
H4: Norms have a positive influence on entrepreneurial intentions
H5: Perceived behavioral control has a positive influence on entrepreneurial intentions
The relationship between religion and entrepreneurship has been well established, in Weber (1930) explained that Protestant (ie Christianity) religion affects individual economic behavior. Recent studies have shown that religion influences individual decisions to undertake entrepreneurial activities (Audretsch et al., 2013; Nikolova & Simroth, 2015). Raiya (2008) explains that several previous researchers have examined the determinants of religiosity in Muslim countries. According to them, because the most important sources that regulate Muslim life are the Qur'an and hadith, these two sources actually summarize the moral and legal code in Islam, one can refer to these two sources to describe Muslim behavior and beliefs that reflect their religiosity. For example, to be a good Muslim requires complete submission to God. According to these two sources of Islamic teaching, individual beliefs, as well as submission, must be seen in their behavior. Thus, Muslims must not only respect the teachings of their religion but also have to practice them (eg prayers, alms). If you deliberately commit sins, take them lightly or intentionally disobey, it can lead to disbelief (Raiya, 2008). Besides that, according to Sequeira et al. (2016) religion has an influence on entrepreneurial intentions directly through religious practice.
From the results of the explanation above, the researchers took the following hypothesis:
H6: Islamic values have a positive influence on entrepreneurial intentions
H7: Islamic practices have a positive influence on entrepreneurial intentions

Previous research has shown that religion has no direct effect on entrepreneurial activities (Dana, 2009). On the contrary, the effect is indirect, where religion promotes social values in a community, which then promotes individual attitudes towards entrepreneurship (Dodd and Gotsis, 2007). In particular, religion influences entrepreneurial intentions (Abdullahi and Suleiman, 2015), either indirectly through values (Dana, 2009; Dodd and Gotsis, 2007) or more directly through religious practice (Sequeira et al., 2016).

Carswell and Rolland (2007) measured the relationship between perceptions of social and individual entrepreneurship and religious compliance. They found that ethnic and religious diversity in the country of New Zealand stimulates entrepreneurial activity and that individual and societal entrepreneurial perceptions are influenced by religious practice.

From the results of the explanation above, the researchers took the following hypothesis:

H8. Islamic values have a positive influence on entrepreneurial intentions, mediated by attitudes towards entrepreneurship.

H9. Islamic practices have a positive influence on entrepreneurial intentions, mediated by attitudes towards entrepreneurship

Data Analysis Methods

In the use of statistical tools for data processing, this study uses Structural Equation Modeling (SEM). Structural Equation Model (SEM) is a statistical modelling technique that can analyze the pattern of relationships between latent variables and their indicators, latent constructs with one another, and errors in the direct measurement. The Structural Equation Model allows analysis to be carried out with several dependent variables and independent variables directly (Hair et al., 2010). Based on the approach, the Structural Equation Model (SEM) is classified by experts into two approaches, namely the Covariance Based SEM (CB-SEM) approach and the Variance Based SEM approach (Hussein, 2015). This study uses CB-SEM techniques to process data with the help of Lisrel 8.8 software.

The analysis of the model is divided into two stages. The first is measurement model analysis followed by structural model analysis. Measurement model analysis means that each latent variable is modelled into one of the factors underlying the observed variable, then structural model analysis describes the relationship between latent variables (Wijanto, 2008).

Research Results

SEM Measurement Model

The measurement model of the SEM method was tested by performing validity tests, reliability tests, and goodness of fit tests. The validity test is conducted to analyze whether the indicators used can represent latent variables well. An indicator is declared valid if it has a t-value ≥ 1.645 (one-tailed) and has a standardized loading factor (SLF) value of ≥ 0.5 (Hair et al., 2014). In this study, all indicators used were declared valid only after two validity tests. Because in the first validity test, there are nine indicators that do not meet the criteria for the validity of SLF ≥ 0.4, namely indicators Z1 (0.38), X1 (0.37), X2 (0.35) X3 (0.32), X9 (0.39), X18 (0.37), and X34 (0.29), X34 (0.35), X37 (0.39), X40 (0.35). Meanwhile, in the second validity test, it was found that all indicators were declared valid because all indicators had SLF values ≥ 0.4.

Furthermore, the reliability test was carried out on the measurement model to determine whether the indicators used in this study had the accuracy and consistency to measure the latent variables. A latent variable can be said to be reliable if the variable has a value of Construct Reliability (CR) ≥ 0.6 and Variance Extracted (VE) ≥ 0.5 Hair et al. (2010). Based on the results of the reliability test, it is known that several variables have VE Value under the provisions of Hair et al. (2010), namely variables of attitudes towards entrepreneurship, subjective norms, perceived behavior control and Islamic values. However, according to Fornell and Larcker (1981) this condition is allowed as long as the construct reliability on the variable is above 0.6. So that based on the opinion of Fornell and Larcker (1981) above, the four variables are reliable.

The goodness of fit measurement model test is a model feasibility test conducted to see how the ability of the research model used can produce estimates that are close to the observed value of the original data. Hair et al. (2010) classified the goodness of fit test into three parts, namely absolute fit measures, incremental fit measures, and parsimonious fit measures. According to Hair et al. (2010), the use of 4–5 goodness of fit criteria is considered sufficient to assess the feasibility of a model, as long as each of the three goodness of fit criteria is represented. From the results of the goodness of fit test carried out, it was found that the measurement model passed the test because it had exceeded the set minimum standard. The result is that each type of measurement contained in this test has at least one good fit indicator.

SEM Structural Model: Hypothesis Testing

At this stage, the goodness of fit test is again carried out as is done in the SEM measurement model, but with a different model. From the tests conducted, it is concluded that the structural model in this study has met the requirements to pass the goodness of fit test and can be analyzed further. After that, a causal relationship analysis is carried out to test the hypothesis on the structural model and to see whether there is a significance and value for the relationship between the variables proposed in the hypothesis.

The causal relationship test is performed by evaluating the t-value, the coefficient of estimation, and the coefficient of determination in the model. A latent variable is declared significant in influencing other latent variables if it has a t-value ≥ 1.645 or ≤ -1.645. Meanwhile, the estimated coefficient indicates the magnitude of the effect. In SEM, the estimation coefficient can be seen in the number of standardized loading factors (SLF) that are generated. The results of the t-value evaluation and the estimated coefficient can be seen in the following table.

The direct effect hypothesis is accepted if the t-value from the test results in this study is ≥ 1.645 or ≤ -1.645, which means that the independent variable has a significant effect on the dependent variable. The direct effect hypothesis is rejected if the t-value is <1.645 or> -1.645, which means that the independent variable does not influence the dependent variable. In the influence analysis using mediation, the criteria t-value is ± 1.96. Of the 9 hypotheses formed, five hypotheses were accepted, while the other four hypotheses were rejected. The rejected hypotheses include H2, H4, H7, H9.

In this mediation analysis, it was found that H8 was included in the mediation classification in the form of Complementary Mediation. This is because the direct effect has a significant result (t-value ≥ 1.96) and the indirect effect has a significant result (t-value ≥ 1.96), both of which have the same direction, which is positive. In this mediation analysis, it was found that H9 was included in the mediation classification in the form of No-effect Nonmediation. This is because the direct effect has insignificant results (t-value> -1.96) and the indirect effect has insignificant results (t-value <1.96).

In the results of the reduced form equation, the variable attitudes towards entrepreneurship can be explained by the Islamic values and Islamic practices variable by 23%. The entrepreneurial intention variable can be explained by the variable Islamic values, Islamic practices, subjective norms and perceived behavior control by 30%.

Table 1: Output of Structural Model

Hypotheses	Statement of Hypotheses	Coefficient of Estimates	T-*value*	T-*value* Significance (+/-)	Result	Result of Previous Study
H1	*Islamic values* have a positive impact on entrepreneurial intention	0,50	5,39	≥ 1,645 or ≤ -1,645	Significant and Positive	Significant and Positive
H2	*Islamic practices* have a positive impact on entrepreneurial intention	-0,08	**-0,88**	≥ 1,645 or ≤ -1,645	Not Significant	Significant and Positive
H3	Attitude to entrepreneurship has positive influence to entrepreneurial intention	0,19	2,15	≥ 1,645 or ≤ -1,645	Significant and Positive	Significant and Positive
H4	Subjective norm has a positive influence to entrepreneurial intention	-0,06	**-0,84**	≥ 1,645 or ≤ -1,645	Not Significant	Significant and Positive
H5	Perceived Behavioral Control has a positive influence toward entrepreneurial intention	0,21	2,19	≥ 1,645 or ≤ -1,645	Signifikan Positif, hipotesis diterima.	Significant and Positive
H6	*Islamic values* has a positive influence to entrepreneurial intention	0,36	3,37	≥ 1,645 or ≤ -1,645	Signifikan Positif, hipotesis diterima.	Significant and Positive
H7	*Islamic practices* have a positive influence on the entrepreneurial intention	-0,11	**-1,39**	≥ 1,645 or ≤ -1,645	Not Significant	Significant and Positive
H8	Islamic values have a positive influence to Intention to Entrepreneurship	0,13	2,79	≥ 1,96 or ≤ -1,96	Signifikan Positif, hipotesis diterima.	Significant and Positive

Hypotheses	Statement of Hypotheses	Coefficient of Estimates	T-*value*	T-*value* Significance (+/-)	Result	Result of Previous Study
	mediated by attitude toward entrepreneurial intention					
H9	*Islamic practices* have a positive influence on the entrepreneurship intention mediated by attitude toward entrepreneurial intention	-0,02	**-0,88**	≥ 1,96 or ≤ -1,96	Not Significant	Significant and Positive

The direct effect hypothesis is accepted if the t-value from the test results in this study is ≥ 1.645 or ≤ -1.645, which means that the independent variable has a significant effect on the dependent variable. The direct effect hypothesis is rejected if the t-value is <1.645 or> -1.645, which means that the independent variable does not influence the dependent variable. In the influence analysis using mediation, the criteria t-value is ± 1.96. Of the 9 hypotheses formed, five hypotheses were accepted, while the other four hypotheses were rejected. The rejected hypotheses include H2, H4, H7, H9.

In this mediation analysis, it was found that H8 was included in the mediation classification in the form of Complementary Mediation. This is because the direct effect has a significant result (t-value ≥ 1.96) and the indirect effect has a significant result (t-value ≥ 1.96), both of which have the same direction, which is positive.

Table 2: Analysis of Mediating Effect

Hypotheses	Path	Mediating Coefficient	T-*value* Mediation	Direct Coefficient	Direct T-*value*	Mediation Type
H8	Islamic Values → Attitude to Entrepreneurship → Entreprenurial Intention	0,09	2,08	0,36	3,37	*Complementary Mediation*
H9	Islamic Practices → Attitude to Entrepreneurship → Entreprenurial Intention	-0,01	-0,83	-0,11	-1,39	*No-effect Nonmediation*

In this mediation analysis, it was found that H9 was included in the mediation classification in the form of No-effect Nonmediation. This is because the direct effect has insignificant results (t-value> -1.96) and the indirect effect has insignificant results (t-value <1.96).

In the results of the reduced form equation, the variable attitudes towards entrepreneurship can be explained by the Islamic values and Islamic practices variable by 23%. The entrepreneurial intention variable can be explained by the variable Islamic values, Islamic practices, subjective norms and perceived behavior control by 30%.

Tabel 3: Reduced Form Equation

Structural Model	**Errorvar**	**Coefficient of Determinatior**
Att = 0.50*ISVAL - 0.076*ISPRA + 0.0*NORM + 0.0*PBC	0.77	0.23
EI = 0.45*ISVAL - 0.13*ISPRA - 0.065*NORM + 0.21*PBC	0.70	0.30

Discussion

Islamic values have a significant positive effect on 1. Attitudes towards entrepreneurship (with a T-Value of 5.39), 2. Intention of entrepreneurship (with a T-Value of 3.37), 3. Intention to be entrepreneurial by mediating attitudes (with T-Value 2 , 79).

Islamic practices have no significant effect on: 1. 1. Attitudes towards entrepreneurship (with T-Value -0.88), 2. Entrepreneurial intention (with T-Value -1.39), 3. Entrepreneurial intention with attitude mediation (with T -Value -0.88).

Attitudes toward entrepreneurship and perceived behavior control have a significant positive effect on entrepreneurial intentions (with T-Value 2.15 and 2.19).

Subjective norms have no significant effect on entrepreneurial intentions (with T-Value -0.84)

The results of this hypothesis test support the research of Dodd and Gotsis (2007) which has the result that religion promotes social values in a community, which then promotes individual attitudes towards entrepreneurship, and is in accordance with Dana's research (2009) which shows that religion does not directly affect entrepreneurial activities, but have an indirect effect through values in religion. Then the research of Miranda, Chamorro-Mera, and Rubio (2017) which shows that subjective norms do not have a positive influence on the entrepreneurial intentions of students at the University of Spain, because most of the surrounding environment, both family and friends, still like to work in companies and agencies. others, or prefer to become job seekers.

Conclusion

Islamic values variable has a positive and significant direct influence on the attitude variable towards entrepreneurship. This is in line with the research of Dodd and Gotsis (2007) which has the result that religion promotes social values in a community, which in turn promotes individual attitudes towards entrepreneurship.

Islamic values variable has a positive and significant direct influence on the entrepreneurial intention variable. This is in line with the research of Muhammad et al (2014), Abdullahi and Suleiman (2015), and Sulung, Ririh, Putri and Robbani (2020) which show that religiosity on entrepreneurial intentions has a positive and significant effect.

The Islamic practices variable has an insignificant effect on the attitude variable towards entrepreneurship. This can be explained through research by Choong et al., (2013) which shows that religiosity is not directly related to a person's behavior.

The Islamic practices variable has an insignificant effect on the entrepreneurial intention variable. This can be explained through Dana's research (2009) which shows that religion does not have a direct effect on entrepreneurial activities but has an indirect effect through values in religion.

The attitude variable towards entrepreneurship has a positive and significant direct effect on the entrepreneurial intention variable. This is in line with the research by Santi, Hamzah, and Rahmawati (2017) as well as Mirawati, Wardana, and Sukaatmadja (2016) which show that attitudes have a positive and significant effect on entrepreneurial intentions.

Perceived behavioral control variables have a positive and significant direct influence on the entrepreneurial intention variable. This is in line with the research of Ambad and Damit (2016) and Tsordia and Papadimitriou (2015) which show that behavioral control has a significant positive effect on entrepreneurial intentions.

The subjective norm variable has an insignificant effect on the entrepreneurial intention variable. This can be explained through research by Miranda, Chamorro-Mera, and Rubio (2017) which shows that subjective norms do not have a positive influence on entrepreneurial intentions.

Islamic values with the mediation of attitudes towards entrepreneurship have a significant positive effect on a person's entrepreneurial intentions, in line with Dana's research (2009) which shows that religion has an indirect influence through the values contained in the religion. This is also in line with the research of Dodd and Gotsis (2007) which shows that religion promotes social values in a community, which in turn promotes individual attitudes towards entrepreneurship. There is also a similarity in the results of research conducted by Weber (1930) which explains that religion influences individual economic behavior. Other studies have also shown that religion influences individual decisions to undertake entrepreneurial activities (Audretsch et al., 2013; Nikolova & Simroth, 2015).

Islamic practices by mediating attitudes towards entrepreneurship do not significantly affect a person's entrepreneurial intentions, in line with research by Choong et al. (2013) which shows that religiosity is not directly related to one's behavior. This is also in line with Dana's research (2009) which states that religion only has an indirect effect on entrepreneurial activities, namely through religious values.

Suggestion

Further research can be carried out by limiting the generation or age group of the respondents so that the results obtained can better answer more specific research problems. It will be important for future study to analyze the behavioral control factors of young respondents because the findings of this study that the majority of respondents were students showed good behavioral control towards entrepreneurship, even higher than the attitude factor towards entrepreneurship.

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Perception and Behavior of Muslim Tourist on Non-Muslim Tourist Destination: Singapore Study Case

Khabibu TOHA, N.I.S. PUTRI

1. *Islamic Business Undergraduate Study Program*, Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Depok, 16424, Indonesia. Email: khabibu.toha@ui.ac.id
.
2. *Department of Management*, Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Depok, 16424, Indonesia. Email: nisputri@ui.ac.id

Corresponding E-mail: nisputri@ui.ac.id

Abstract

This study aims to look the special role of halal-friendly attributes in Singapore in forming destination image and behavioral intention of Muslim travelers. Singapore is among the countries with Muslim minority, yet it manages to capture a significant amount of Muslim tourist. With the growing number of Muslim tourists will be a promising prospect for Singapore's tourism industry. This study uses a Structural Equation Modeling (SEM) method in Lisrel 8.8. The sample used in this study was 259 Indonesian Muslim tourists who had visited Singapore in the last four years. The results of this study found five halal-friendly attributes in Singapore have a positive influence on the overall destination image, revisit intention, and recommendation intention. While the affective destination image does not have an influence on the revisit intention and the recommendation intention.

Keywords: Halal Tourism, Halal Industry, Singapore Tourism, Muslim Travelers.

Introduction

As a fast-growing market, halal tourism is boosted by the growing phenomenon of Muslim travel needs, either for leisure or for work. Responding to this, both Muslim majority and minority country try to address the specific needs of Muslim travelers. Despite some overlapping terms of the concept related to Muslim travel needs, there is some consensus about the essentials of Muslim travellers, which is halal food, family-friendly atmosphere and tourism facilities and infrastructure that meet the needs of Muslim tourists (Samori et al., 2016). Product and services that are catered for Muslim tourist except for the holy pilgrimage or other religious purposes are universal, thus can be used by non-Muslim tourist that are seeking for a family-friendly environment.

Islam is one of the religions that has the largest number of adherents in the world. The Muslim population in the world in 2017 is estimated at 1.7 billion people and is projected to continue to grow until 2050 to 2.76 billion people or 29.7% of the world's population (Pew Research Center, 2017). The increase in the Muslim population in the world will affect the number of Muslim tourists in the world. Based on research conducted by Mastercard & Crescent Rating (2019), it shows that the number of Muslim tourists in 2010 was 98 million, an increase in 2018 to 140 million Muslim tourists, and it is projected that in 2020 before considering the impact of Covid-19, it will increase by 11, 4 per cent to 160 million people. In 2010 the number of Muslim tourists who came to predominantly non-Muslim countries was around 45 million, increasing in 2014 to 52 million, and in 2020 it is projected to reach 82 million (Crescentrating & Mastercard, 2015). The increasing number of Muslim tourists who come to predominantly non-Muslim countries is the obvious target for halal tourism activities.

Southeast Asia is one of the regions with a majority of non-Muslim tourist destination for Muslim tourists, such as Singapore and Thailand. The two countries occupy the 1st and 2nd in the Top 10 Non-OIC Destinations (Mastercard & CrescentRating, 2019). Muslim tourists who come to countries in Southeast Asia continue to experience an increase every year, especially Singapore. Based on data from the Singapore Tourism Board report (2018), it shows that Singapore attracted 18.5 million foreign migrants in 2018, or 1.5 million immigrants each month, dominated by several countries, such as China, Indonesia and Malaysia. The number of Muslim tourists who came to Singapore in 2014 was 3,140,000. The increase occurred compared to that in 2010, Muslim tourists

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who came to Singapore were around 2,350,000 people (COMCEC, 2016). This number will continue to grow as the number of Muslim tourists in the world increases.
Based on Mastercard & CrescentRating (2019), Singapore ranks first in the Top 10 Non-OIC Destinations. Singapore continues to make improvements to provide for the needs of Muslim tourists who come to Singapore. Majlis Ugama Islam Singapore (MUIS) has issued more than 1000 individual halal certifications for restaurants, food vendors, food companies or other dining establishments that comply with the terms and conditions of the halal certification system (COMCEC, 2016). Singapore has one of the strongest halal certification bodies among the Non-OIC countries.

The Singapore government also provides many small prayer rooms which can be found in several shopping centers and entertainment venues as facilities to facilitate Muslim tourists in praying. Seeing the very high enthusiasm of Muslim tourists to come to Singapore and also the readiness of the Singapore government in developing halal tourism in Singapore, the writer is interested in researching by making previous research as a reference and making Muslim tourists who have visited Singapore the object of research. This research was conducted to examine the effect of halal-friendly attributes given by the Singaporean government on Singapore's image of Muslim tourists and the behaviour intention of Muslim tourists. Such as the findings of previous research which found that there was an effect of halal-friendly attributes given by the South Korean government on the image of South Korea from Muslim tourists and the behaviour intention of Muslim tourists (Han et al., 2019). This research is expected by the author to become a reference and consideration to develop halal tourism in Singapore.

Theoretical Review

Halal Tourism

Halal tourism is the provision of tourism products and services that meet the needs of Muslim tourists under Islamic teachings (Mohsin et al., 2016). Halal tourism can be used by many people because of the universal characteristics of its products and services. The term Islamic tourism / halal tourism was first introduced to the public in 2000 at the OIC meeting. He was introduced as an alternative to meet the demand for a tour based on a lifestyle that suits the needs of a Muslim. Tourism products and services, tourist objects, and tourist destinations in halal tourism are the same as products, services, objects and tourism destinations in general as long as they do not conflict with sharia values and ethics. So halal tourism is not limited to religious tourism (Andriani, 2015).

DSN-MUI (2016) in fatwa number 108 defines halal tourism as tourism following sharia principles. Meanwhile, sharia tourist destinations are geographic areas that are in one or more administrative areas in which there are tourist attractions, religious and public facilities, tourism facilities, accessibility, as well as communities that are interrelated and complement the implementation of tourism following sharia principles. There are several important aspects of halal tourism. Important aspects that must be considered are transportation terminals, accommodation services, shopping places, tourist attractions, spas and health centres, conference and event venues, sporting events, travel agencies, and tour guides (COMCEC, 2016).

Halal-friendly attributes

Oktadiana et al., (2016) defines the needs of Muslim tourists covering various aspects, such as halal restaurants, places of worship, Muslim-friendly accommodation, and tourism and transportation that are halal-compliant or Islamic. One of the Halal-friendly forms adopted by inns in non-OIC countries is to provide the Koran, prayer mats, Arabic language TV channels and Qibla direction marking, which shows the direction of Mecca. The results of a study conducted by Eid & El-Gohary (2015) show that the halal attribute will represent the availability of Islamic practices and norms that are relevant to the concept of tourism in tourist destinations. Eid & El-Gohary (2015) also added that some of the main attributes of halal tourism include the availability of places of worship, the availability of halal food and drinks, the prohibition of prostitution, the prohibition of liquor and the prohibition of gambling. Han et al. (2019) in his research explained that there are five aspects of halal-friendly attributes that must be fulfilled and considered, namely the social environment, facilities, food and beverages, staff and residents, and services.

Affective Destination Image

Affectivity is part of the individual decision-making process to help create components of customer satisfaction and loyalty (Oliver, 1999). Destination images or destination images are formed by three different components but are hierarchically linked, called cognitive, affective, and conative (Gartner, 1994). Meanwhile, affective Destination Images or destination Affective images are defined as individual feelings towards a goal or as an individual's

emotional response to a place (Basaran, 2016). Ekinci & Hosany (2006) in their research said that affective image (with goal personality) is a better predictor of intention to recommend tourist destinations to others.

Woodside & Lysonski (1989) argue that affective associations such as positive, negative and neutral feelings are needed to determine global attitudes about whether tourists like, dislike, or do not have an opinion about a destination and that they greatly influence the choice of a tourist destination. Lin et al. (2007) also said that the affective image component can represent a person's feelings towards a destination. Barich & Kotler (1991) states that affective images are centered on individual feelings towards an object.

Overall Destination Image

Retaining existing customers and attracting new customers is the goal of hospitality and tourism marketers because customer retention and attractiveness is directly associated with company profits and success (Han & Hyun, 2013). In this case, the intended customers are tourists.

In previous research, Han & Hwang (2016) explained that the image of the destination as a whole will play a role in achieving these goals. Also, H. Kim & Richardson (2003) defines the image of a destination as the overall impression, beliefs, ideas and hopes, and feelings about a place that accumulate in a certain time. The image of the destination as a whole will have an impact on the intention of tourists to visit the destination again (Dolnicar & Grün, 2013).

Behavioral Intention

Behavioral intentions or behavioral intentions refer to the desire and future actions of individuals to participate in, consume, and use or not use certain products or services (Han & Hyun, 2017). The intention is a decision to behave in the desired way or a stimulus to act, whether consciously or not (Corsini, 2002). The intention is also the beginning of a person's behavior. Chen & Tsai (2007) in their research used the term "behavioral intention" to reflect the intention to visit again and the willingness to recommend to others. Han & Ryu (2007) also reported in their research, that revisiting intention is a substantial and acceptable tool for measuring the future behavior of tourists, while the personal characteristics of customers lead to the formation of their behavioral intentions in upscale restaurant settings.

Research methods

This research is in the form of descriptive in explaining the research model created. The data used in this study are primary data, which is obtained from the results of questionnaires distributed online and in the form of self-administered questionnaires. The researcher processed the research process through three stages, namely the wording test, pre-test, and main test. The criteria for research respondents needed are Indonesian citizens who are Muslim, domiciled in Indonesia over 17 years of age and have visited Singapore in the last four years. Sampling in this study using non-probability sampling procedures and convenience sampling where the chances of each prospective respondent in the sample to be selected are not the same. Researchers in analyzing the data used the Structural Equation Modeling (SEM) method through LISREL 8.8 software.

This research model is the result of a replication of the model of Han et al. (2019), who obtained the following hypotheses:

- H1 : Halal-friendly Attributes have a significant positive effect on Affective Destination Image
- H2 : Halal-friendly Attributes have a significant positive effect on the Overall Destination Image
- H3 : Affective Destination Image has a significant positive effect on the Overall Destination Image
- H4: Affective Destination Image has a significant positive effect on Revisit Intention
- H5 : Affective Destination Image has a significant positive effect on Recommendation Intention
- H6 :Overall Destination Image has a significant positive effect on Revisit Intention
- H7 : Overall Destination Image has a significant positive effect on Recommendation Intention

The core questions in this study have 9 parts, namely 5 dimensions of halal-friendly attributes, namely halal-friendly social environment, halal-friendly facilities, halal-friendly food and beverages, halal-friendly services, and halal-friendly locals and staffs. Then, affective destination image, overall destination image, revisit intention, and recommendation intention. There are a total of 38 question indicators used in this study. Researchers used a Likert scale on the research questionnaire to measure the variables being tested. Following are the question items according to the operationalization table below:

Table 1: Operationalization of Variable

Variable	Indicator	Variabel Operationalization	Source	Scale
Halal-Friendly Social Environment	SOC1	I feel that tourist attractions in Singapore have Halal-friendly decorations and designs	Han et al. (2019)	Likert 1-6
	SOC2	The atmosphere of tourist attractions in Singapore is in accordance with sharia principles		
	SOC3	The Halal-friendly social environment in tourist attractions provides comfort for me as a tourist visiting Singapore		
	SOC4	My overall experience with the halal-friendly social environment in tourist spots is good.		
	SOC5	The social environment of tourist attractions is free of illicit goods (eg night clubs, red-light districts).		
	SOC6	The social environment of tourist spots is safe and clean for Muslim tourists.		
	SOC7	At a tourist location, I enjoy a halal-friendly social environment.		
Halal-Friendly Facilities	FAC1	Easy access to mosques/prayer rooms	Han et al. (2019)	Likert 1-6
	FAC2	Many halal facilities are available in tourist attractions		
	FAC3	Separate facilities for men and women are available at tourist attractions (eg spa, swimming pool, fitness center).		
	FAC4	Separate prayer facilities are available to men and women at tourist spots.		
Halal Food and Beverage	FB1	Halal food outlets and restaurants at tourist sites display the halal logo.	Han et al. (2019)	Likert 1-6
	FB2	Halal food and drinks available at tourist sites are clean, safe and hygienic.		
	FB3	Halal food providers at tourist sites are		

Variable	Indicator	Variabel Operationalization	Source	Scale
		accredited with halal certification.		
	FB4	The availability of halal food makes me interested in visiting tourist attractions.		
Halal-friendly Services	SER1	Halal information on tourist attractions is widely available (eg leaflets, brochures).	Han et al. (2019)	Likert 1-6
	SER2	The tourist information center offers information on halal services		
	SER3	Halal information services at tourist attractions are available in various languages (eg English, Malay).		
	SER4	Halal services available at tourist spots comply with Islamic law		
Halal-friendly locals and staffs	LOC1	At tourist spots, local staff are very aware of halal products and services.	Han et al. (2019)	Likert 1-6
	LOC2	Local staff understand how to offer halal products and services.		
	LOC3	The local people have a good understanding of Islamic and halal rules.		
Affective Destination Image	ADI1	I am very happy when travelling in Singapore	Russell & Pratt (1980)	Likert 1-6
	ADI2	I am very enthusiastic when travelling in Singapore		
	ADI3	I feel comfortable when travelling in Singapore		
	ADI 4	I feel relaxed when travelling in Singapore		
Overall Destination Image	ODI1	My general view of Singapore as a tourist destination is positive	Baloglu & McCleary (1999); Hernández-Mogollón et al. (2018)	Likert 1-6
	ODI2	I enjoy when visiting this destination		
	ODI3	Visiting this destination provides good deals		
	ODI4	This destination has a great name and		

Variable	Indicator	Variabel Operationalization	Source	Scale
		reputation		
Revisit Intention	REV1	I will come back to Singapore in the future	Kim & Han (2008); Jani & Han (2011); Chaulagain et al. (2019)	Likert 1-6
	REV2	I may travel to Singapore again in the future.		
	REV3	Even though other countries are becoming popular, I will still visit Singapore		
	REV4	I have plans to re-visit Singapore		
Recommendation Intention	REC1	I will spread positive news about Singapore.	Jani & Han (2011); Kim & Han (2008); Chaulagain et al. (2019)	Likert 1-6
	REC2	I would recommend a trip to Singapore to friends and others.		
	REC3	I will say positive things about travelling to Singapore to others.		
	REC4	I will encourage my relatives to visit Singapore		

Research Result

Researchers tested the validity and reliability of the measurement model within the first layer and the second layer (higher order). The analysis of the validity test is carried out by paying attention to the t-value and standardized loading factor (SLF) of each indicator (unobserved variable) in the measurement model output. An indicator can be said to be valid if it has an SLF value of ≥ 0.50 and a t-value ≥ 1.645 (one-tailed). Meanwhile, a variable can be said to be reliable if it has a CR value ≥ 0.70 and a VE value ≥ 0.50. Following are the results of the validity and reliability tests on the first-level measurement model.

Table 2: Validity and Reliability Test of the First Order

Variable	Indicator	SLF	Error	Composite Reliability	Variance Extracted
Halal-Friendly Environment	SOC1	0.62	0,61	0,807	0,418
	SOC2	0.57	0,68		
	SOC3	0.71	0,49		
	SOC4	0.80	0,35		
	SOC6	0.46	0,79		
	SOC7	0.66	0,56		
Halal-Friendly Facilities	FAC1	0.84	0,30	0,815	0,542
	FAC2	0.93	0,13		

Variable	Indicator	SLF	Error	Composite Reliability	Variance Extracted
	FAC3	0.42	0,83		
	FAC4	0.65	0,57		
Halal-Friendly Food and Beverages	FB1	0.78	0,40	0,814	0,534
	FB2	0.77	0,41		
	FB3	0.85	0,28		
	FB4	0.47	0,78		
Halal-Friendly Services	SER1	0.81	0,35	0,898	0,690
	SER2	0.89	0,22		
	SER3	0.82	0,32		
	SER4	0.80	0,36		
Halal-Friendly Local and Staff	LOC1	0.86	0,25	0,884	0,719
	LOC2	0.87	0,25		
	LOC3	0.81	0,34		
Affective Destination Image	ADI1	0.91	0,17	0,932	0,776
	ADI2	0.90	0,19		
	ADI3	0.85	0,28		
	ADI 4	0.86	0,25		
Overall Destination Image	ODI1	0.86	0,27	0,891	0,673
	ODI2	0.89	0,21		
	ODI3	0.77	0,40		
	ODI4	0.76	0,43		
Revisit Intention	REV1	0.96	0,09	0,921	0,748
	REV2	0.94	0,11		
	REV3	0.74	0,46		
	REV4	0.81	0,35		
Recommendation Intention	REC1	0.92	0,15	0,946	0,815
	REC2	0.95	0,11		
	REC3	0.89	0,21		
	REC4	0.85	0,27		

Based on the table above, three indicators have a value below 0.50, namely SOC6, FAC3, and FB4. However, if there are indicators that have a standardized loading factor value ≥ 0.30, it can still be considered (Igbaria et al., 1997). So, all indicators can be said to be valid. Then, all variables show a Construct Reliability (CR) value above 0.6. Meanwhile, there is one variable that has a Variance Experience (VE) value below 0.5, namely the halal-

friendly social environment of 0.419. However, Fornell and Larcker (1981, in YH Lee, 2012) explain that the VE value which shows a result <0.50 is still acceptable because it is considered to have no fatal impact, and this result is acceptable if the CR value is still ≥ 0. 60. This indicates that the variable can be said to be reliable. Following are the results of the validity and reliability tests on the second level measurement model analyzed using LISREL 8.8 software.

Table 3: Validity and Reliability Test of the Second Order

Variabel Laten	Dimensi	SLF	T-Values	Composite Reliability	Variance Extracted
Halal-Friendly Attributes	*Halal-Friendly Social Environment*	0.64	7.59	0,96	0,55
	Halal-Friendly Facilities	0.71	10.31		
	Halal-Friendly Food and Beverages	0.82	11.12		
	Halal-Friendly Services	0.87	12.67		
	Halal-Friendly Locals and Staffs	0.8	12.12		

Based on the results of the table above, it shows that measurement model 2 can be said to be good because almost every question indicator has an SLF value above 0.5. Three indicators have SLF values below 0.5, namely SOC6, FAC3, and FB4. However, this indicator does not drop because according to Igbaria et al. (1997), SLF values above 0.3 can still be considered. The results above show that the halal-friendly attributes variable has a VE value of ≥ 0.50 and CR ≥ 0.70. Therefore, it can be said that the indicators in this study have consistency in measuring the latent variables. So, it can be said that all dimensions on the halal-friendly attributes variable are reliable. After it is known that all indicators are valid and reliable, the next step is to test the structural relationship hypothesis from the research model. The results of hypothesis testing in this study are as follows:

Table 4: Hypotheses Testing

Hypotheses		T-*Value*	Estimate of Coefficient	Meaning
H1	*Halal-friendly attributes positively and significantly affecting the Affective destination image*	8.59	0.56	Hipotesis diterima, data mendukung hipotesis
H2	*Halal-friendly attributes positively and significantly affecting* the *Overall destination image*	2.68	0.11	Hipotesis diterima, data mendukung hipotesis
H3	*Affective destination image positively and significantly affecting* the *Overall destination image*	15.79	0.88	Hipotesis diterima, data mendukung hipotesis
H4	*Affective destination image* positively and significantly affecting the *Revisit intention*	0.12	0.02	Hipotesis ditolak, data tidak mendukung hipotesis
H5	*Affective destination image positively and significantly affecting* the *Recommendation intention*	-0.62	-0.13	Hipotesis ditolak, data tidak mendukung hipotesis
H6	*Overall destination image positively and significantly affecting the Revisit intention*	3.68	0.76	Hipotesis diterima, data mendukung hipotesis
H7	*Overall destination image positively and*	4.08	0.90	Hipotesis diterima, data

Hypotheses		T-*Value*	Estimate of Coefficient	Meaning
	significantly affecting the Recommendation intention			mendukung hipotesis

GOFI = $\chi 2$/df (< 5) =0,77 ; *p-value* (≥0,05) = 0,00; ECVI/SECVI= 6,36/5,74; RMSEA(≤0,08) = 0,069; NNFI(≥0,90) = 0,97; NFI(≥0,90) = 0,95; IFI(≥0,90) = 0,97; CFI(≥0,90) = 0,97; AGFI(≥0,90) = 0,74; AIC/SAIC=2041,66/4858,61

Discussion

Hypothesis test results show that the halal-friendly attributes offered by Singapore have a positive influence on the affective and overall image of Singapore from Muslim tourists. The estimated coefficient value between halal-friendly attributes and affective destination image is 0.56. This shows that the halal-friendly attribute given by the Singapore government has an influence of 56% on the affective image created by Muslim tourists towards Singapore. Meanwhile, the estimated coefficient value between the halal-friendly attributes and the overall destination image is 0.11. This shows that the halal-friendly attribute has an influence of 11% on the overall image of a destination. This suggests that the higher the halal-friendly attributes provided by the Singapore government, the higher the image that Muslim tourists will have towards Singapore.

Affective destination image has a significant positive effect on the overall destination image with a value of 15.79 which is higher than the critical value used in this study, namely 1.645 for the upper tail. However, the affective destination image does not influence the revisit intention and recommendation intention variables. The t-value obtained from the output is smaller than the critical value used in this study, which is 1.645. Besides, researchers suspect this is because the majority of study respondents are in the millennial age range.

Mastercard-Halal Trip (2017) in his research shows that millennial Muslim tourists tend to prioritize the price factor in travelling. Therefore, the researchers suspect that this is the reason that there is no influence between the affective image of Muslim tourists towards Singapore to visit again and the intention to recommend to others.

Also, the overall destination image in this study shows that it has a positive effect on revisit intention and recommendation intention. The estimated coefficient value between the overall destination image and revisit intention is 0.76. This shows that the overall image of a destination influences the intention to visit again by 76%. Meanwhile, the higher estimated coefficient value is shown between the overall destination image and recommendation intention, which is 0.90. This shows that the overall image of Muslim tourists towards a destination influences the intention to visit again by 90%. This significant positive effect is in accordance with previous research conducted by (Han et al., 2019).

The findings in this study indicate that the affective image created by Muslim tourists towards Singapore will not affect the intention of Muslim tourists to come back and recommend to others. Artuger & Cetinsoz (2017) also in their research show that the affective image has no role in the intention of tourists to visit again. In addition, no structure defines and operationalizes the relationship between destination image and tourist behavioral intentions (Tasci et al., 2007).

Conclusion

The halal-friendly attribute offered by the Singapore government has a significant positive influence on the image that Muslim tourists will shape towards Singapore both affective and overall. The affective image of Muslim tourists towards Singapore will also improve the image of Muslim tourists as a whole of Singapore. However, the affective image that Muslim tourists create towards Singapore will not affect the intention of Muslim tourists to come back and recommend to others. On the other hand, the overall image that Muslim tourists create of Singapore will influence Muslim tourists' intention to come back and recommend to others.

Suggestion

This research provides findings that can be used by tourism industry policymakers. The Singapore government can improve the halal-friendly attributes offered to Muslim tourists. Technological progress is also one of the main keys to encouraging the quality of facilities and services that will have an impact on the image of Muslim tourists. As with services regarding the convenience of halal information, the Singapore government can improve it through technological advances that can support the convenience of Muslim tourists in carrying out their obligations. The Singapore government can also provide Islamic accommodation at an affordable price range for millennial Muslim tourists. This will provide satisfaction which will have an impact on the affective image that is formed towards a Singapore. Furthermore, the government can create halal tourism promotional content that is easy to obtain, visit and share with Muslim tourists. In addition, the Singapore government can collaborate with Muslim travel influencers to market Singapore's halal tourism so that it will improve the overall image of Muslim tourists towards Singapore.

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Determining Factors Influencing Muslim Donors' Intention to Donate via Social Media

Muhammad Hasbi Alvin SATYAWAN[1], N.I.S PUTRI S.E., M.Sc[2]

1. *Islamic Business Undergraduate Study Program*, Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Depok, 16424, Indonesia. Email: muhammad.hasbi61@ui.ac.id

2. *Department of Management*, Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Depok, 16424, Indonesia. Email: nisputri@ui.ac.id

Corresponding E-mail: nisputri@ui.ac.id

Abstract

Religious based donations significantly contributed to national philanthropic funds collection of Indonesia in 2018. Indonesia was crowned as "the most generous country", according to "CAF World Giving Index 2018". Donations can be collected via online by utilizing social media. This study aims to analyze the factors influencing muslim donors' intention to donate via social media, also the extrinsic factors influencing their attitude. This research adapts the Theory of Planned Behavior and extrinsic factors such as charity project, charity organization, internet technology features, and social network sites features. Quantitative study is conducted using Structural Equation Modelling (SEM) method. Primary data was collected from 234 Indonesian muslim citizens who have made donations through social media. Attitude, subjective norm, and perceived behavioral control positively influence muslim donors' intention to donate via social media. Internet technology features and social network sites features positively influence muslim donors' attitude towards donating via social media. The findings can be used as references for charity organizations to maximize the collection of donations and maintain sustainable relationships with potential donors through social media. This research provides current insights about donating behavior via social media in the largest muslim population country in the world.

Keywords: Intention to donate; social media; social network sites; SNS.

Introduction

Indonesia has funded religious based donation funds up to IDR2,3 trillion in total in 2018 and accounted to two-thirds of all contribution to philanthropy funding in Indonesia (BAZNAS, 2020). "CAF World Giving Index 2018" shows that Indonesia placed in the top three country with highest giving index (Charities Aid Foundation, 2018). The giving index itself has three main criterias which are participation in helping strangers, cash donation, and voluntary activities (Charities Aid Foundation, 2019). Indonesia has going up to the first place in 2018 from the second place in previous year. Azizon & Chater (2020) in PEBS FEB UI (2020) clarified that people tend to be reciprocal and have a sense of togetherness when they share the same vision to achieve something, for example a target that has been set to ease other's burden. It is also related to the maqashid sharia concept in Islamic economics that drives people to merge between self-interest and social interest.

Donating money is closely related to the charity organization's role to implement the donation funding process. Various ways have been implemented to build a strong relationship between the charity organization and its potential donors both from offline and online initiatives. As for offline actions, charity organizations tend to open offices and offline booths in public places. They also utilized technology and the internet, not to mention, social media to boost their online awareness and traffic. We Are Social & Hootsuite (2020) have stated that as of January 2020, the total number of social media users in Indonesia has reached 160 million users which equals to 59% of the total population. Various charity organizations in Indonesia have already facilitated online donations via social media to digital application.

We Are Social & Hootsuite (2020) explained that Indonesia's social media users can be a potential market since it has more than a half of total population penetration. Moreover, Badan Pusat Statistik (2010) stated that Islam is the majority religion in Indonesia. In particular, donating and shodaqoh is recommended by Islam, which can be in the

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form of compulsory (zakat) or sunnah such as infaq, shodaqoh, and waqf. Based on this, the correlation between the muslim population and social media users in Indonesia could be a potential increase in donations funding.

There is numerous research on donation behavior that has been done previously. Smith & McSweeney (2007), Ng et al. (2011), Masser et al. (2012), Knowles et al. (2012), and Charsetad (2016) have reviewed people's donation behavior through Theory of Planned Behavior framework. However, those researches only examine offline donation behavior. Since the research of online donation is still limited, this research will try to explain about online donation behavior. This research focuses on the social media usage as an online donation method.

Sura et al. (2017) have already researched regarding the extrinsic factors influencing people's attitude towards donating via social network sites, also its effect on the behavior intention. Therefore, this study attempts to specifically discuss about donation via social media, by adapting the previous study. This research is also adapting subjective norms and perceived behavioral control variables from previous research by Charsetad (2016), to complement attitude variables that also used in Sura et al. (2017) as a comprehend framework of Theory of Planned Behavior. Furthermore, since research and study regarding online donation through social media in specific is still very limited in Indonesia, we decided to do the research with aims to give more perspective on this topic. This research is relevance to get a deep-dive view of Indonesia's muslim population in online donation activities.

Literature Review

Donating Behavior

Donation is an activity of giving to people in need to increase their welfare (Otto & Bolle, 2011). According to Lim & Putnam (2010), donation aims to serve benefits for human's social-living, that goes along with various religious observance. Islam taught us about donation concept which is also known as infak/shodaqoh, as it was stated on the Qur'an surah Al-Baqarah verse 262. The Qur'an verse stated the rewards for people who donate sincerely, that they will receive the doubled rewards. Kasri (2013) has stated that donation behavior is influenced by donors' perception on understanding, values, and attitude towards donating. Donation could also be affected by external factors that motivate and influence individuals to donate (Treiblmaier & Pollach, 2006). Online donation is an alternative to the offline donation that already ineffective to the monetary donation collection (Hoefer, 2012). One of the determining factors influencing people's donation is a solicitation (Bekkers & Wiepking, 2011). Kim & Lee (2014) have stated that social network sites (SNS) is the best platform to support the solicitation. It is because SNS is believed as a platform to socialize, networking, also maintaining a social relationship through bonding and bridging concepts.

Charity Project

Charity project is a 'project-based' charity whereby the project is already created and people can donate to fund the project (Wash & Solomon, 2014). The charity project is targeting a single human victim whereby the victim has been already identified, or an abstract donation target whereby the victim has been not identified yet (Ein-Gar & Levontin, 2012). Kitabisa as one of the charity organizations in Indonesia has a fundraising concept with segmented donation target created by individuals or groups. Kitabisa categorized their charity projects into various classifications such as natural disaster victims, treatment of diseases, and animals' welfare. Moreover, there is Dompet Dhuafa that has five pillars of charity projects consist of education, health, economy, social and da'wa, also culture. Afterwards, there is Aksi Cepat Tanggap (ACT) that have voluntary concept on their donation activities.

Charity Organization

Charity organization is the organization that has a responsible to reach the potential donors and manage the received money donation, existing donors, and charity project (Sura et al., 2017). Charity organizations play important roles to serve and fulfill the people in need welfare, domestically or internationally (Cheung & Chan, 2000). Indonesia has several charity organizations with various purposes. Kitabisa has a fundraising concept with segmented donation target created by individuals or groups. Moreover, there is Dompet Dhuafa that focused on Islamic philanthropic funding. Furthermore, there is Aksi Cepat Tanggap (ACT) that have voluntary concept on their donation activities such as humanitarian and social mission that already classified. Some of charity organizations in Indonesia have already facilitated online donations via social media to website, such as Kitabisa that is doing the fundraising through their website platform.

Internet Technology Features

The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite to serve billions of users worldwide (Olaniran & Rodriguez, 2013). Internet as an online donation platform has rapidly grown in the last few years (Shier & Handy, 2012). The rapid growth of the internet has driven by the success of online shopping transactions and online banking through internet (Treiblmaier & Pollach, 2006). Furthermore, the internet technology and its features such as security, straight-forward and time saving have driven the donation activities to go online through internet (Shier & Handy, 2012; Wong & Jusoff, 2011). Branston & Bush (2010), Wong & Jusoff (2011), and Shier & Handy (2012) have declared that the internet features such as security, privacy, effectivity and efficiency, to internet trustworthiness can affect its usage, one of which is to donate.

Social Network Sites Features

Social network sites (SNS) is web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they wish to share a connection, and view their list of connections, as well as the connections of those made by others within the system (Boyd & Ellison, 2007). Lovejoy & Saxton (2012) have categorized the communication features of SNS into three main parts; (1) information source that consists of messages and shared elements, (2) community builder that consists of dialogue element, and (3) promotion that consists of campaigns and promotes event elements. SNS has proven its capability to attract wide audiences and appeared to be a well favorable platform for online donations not only to reach potential donors, but also to sustain existing donors (Sura et al., 2017). The charity organizations in Indonesia have utilized the SNS features such as content personalization and customization. One of the created contents is the information about donation and the donating campaign.

Theory of Planned Behavior

Theory of Planned Behavior (TPB) is a theory that developed by Ajzen (1991). This theory was constructed to determine factors that influence people's intention to do certain behavior. TPB was an improvement of the Theory of Reasoned Action conducted by Ajzen in 1975 (Ajzen, 1991). TPB has three variables that influence people's behavioral intention, which are attitude towards behavior, subjective norm, and perceived behavioral control.

Attitude towards behavior is the tendency of individuals to value and evaluate whether good or not is a certain behavior (Fishbein & Ajzen, 2005). The evaluation can be determined as a combination of feeling response, emotion, and cognitive response that influence people's decision making. Attitude towards behavior can be determined by behavioral beliefs, the people's faith about the consequences of doing certain behavior (Ajzen, 2005). Subjective norm stands for people's perception on expectance from the most important people to them (significant others) about whether do or not a certain behavior (Ajzen, 2005). Those most important people can be their family, relatives, friends, partner, or circle. Subjective norm is basically influenced by the individual beliefs. Perceived behavioral control is an individuals' perception on whether easy or not in doing certain behavior (Ajzen, 2005). The perceived behavioral control can also be determined as an assumption about the existence of control beliefs that influence people's certain behavior. Ajzen (2005) explained that the perceived behavioral control can be determined by individual control belief strength such as the availability of resources, compatibility, competence, and opportunity that whether support or not to do a certain behavior.

Method

This research is a quantitative and conclusive study. This study took primary data with a questionnaire from Indonesian muslim citizens who have made donations via social media in the last six months as the research samples. The data was collected using the purposive sampling method. The research questionnaire consists of 38 indicators to explicate 8 variables. This research has collected 234 primary data from the screened respondents.

The purpose of this research is to analyze the determining factors influencing muslim donors' intention to donate via social media. Other than that, this research aims to analyze the extrinsic factors influencing muslim donors' attitude towards donating via social media. This research replicated the Theory of Planned Behavior also the extrinsic factors from Sura et al. (2017) dan Charsetad (2016) to conduct the research model. This research uses eight variables consisting of charity project, charity organization, internet technology features, social network sites features, attitude, subjective norm, perceived behavioral control, and intention to donate via social media, based on the research model.

The application of the Theory of Planned Behavior intends to predict the determining factors influencing intention to donate via social media. Ajzen (1991) assumed that the intention rolled as an important factor regarding how many efforts to do when doing a certain behavior. Furthermore, this research delivers the novelty of extrinsic factors including charity project, charity organization, internet technology features, and social network sites features, which can influence the muslim donors' attitude towards donating via social media. The assumption was supported by the result of the previous studies that state those factors can affect the muslim donors' attitude towards donating via social media (Castillo et al., 2014; Shier & Handy, 2012; Treiblmaier & Pollach, 2006; Van Iwaarden et al., 2009). Therefore, Figure 1 shows the constructed research model:

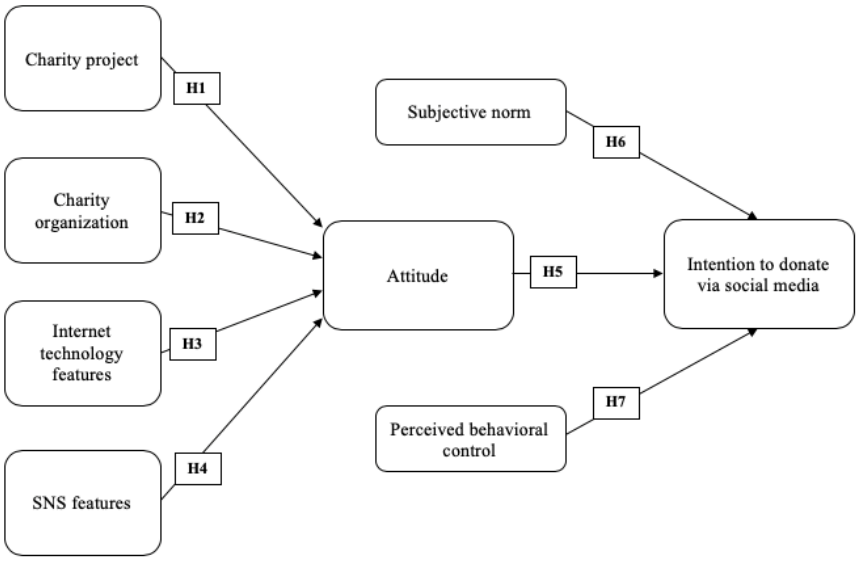

Figure 1: Research Model and Hypothesis

Based on the research model and literature review, this study aims to prove seven hypotheses as follows:

H1: Muslim donors' perception on charity project positively influences attitude towards donating via social media
H2: Muslim donors' perception on charity organization positively influences attitude towards donating via social media
H3: Muslim donors' perception on internet technology features positively influences attitude towards donating via social media
H4: Muslim donors' perception on social network sites features positively influences attitude towards donating via social media
H5: Attitude positively influences the muslim donors' intention to donate via social media
H6: Subjective norm positively influences the muslim donors' intention to donate via social media
H7: Perceived behavioral control positively influences the muslim donors' intention to donate via social media

The research model is analyzed using descriptive statistics and Structural Equation Modelling (SEM) method. This study elaborates the data regarding respondents' demography, social media donation activities, and answered questions about research variables using descriptive statistics. The reason of implementing the Structural Equation Modelling method is because it can analyze the correlation pattern between latent variables and indicators, one latent variable to the other, and find the measurement error simultaneously (Hair et al., 2014).

Structural Equation Modelling method starts with analyzing the measurement model using validity and reliability tests. The measurement model analysis is also using the goodness of fit test. Thereafter, the goodness of fit test is also conducted on the structural model analysis. Besides the goodness of fit test, the causal relationship analysis is also carried out on the structural model analysis that aims to verify the significance of the research hypotheses and its correlation value between variables. The causal relationship analysis consists of evaluating t-values, estimated coefficient (β), and coefficient of determination (R^2) on this research model.

Results

Demography

This research has collected 234 respondents from Indonesian muslim citizens who have made donations via social media in the last six months. Table 1 shows the demographic data of the respondents. Almost seventy percent of respondents are women. This research is dominated by 18-24 years old people (73,5%). About a half of respondents have finished their high school education (51,3%) and most of the others have achieved their bachelor's degree (38%). Most of the respondents have not married yet (76,9%). More than a half of respondents are students (57,3%) and most of the others work in the private sectors (21,8%). Majority of the respondents have IDR2-5 million (38%) and <IDR2 million (31,2%) of average monthly income.

Table 1: Demography

Demography Aspects	Respondents	Percentage	Demography Aspects	Respondents	Percentage
Gender			**Profession**		
Men	76	32,5%	Student	134	57,3%
Women	158	67,5%	Private Sector Employee	51	21,8%
Age			State Sector Employee	8	3,4%
<18 years old	6	2,6%	Teacher/Lecturer	2	0,9%
18-24 years old	172	73,5%	Entrepreneur	10	4,3%
25-39 years old	18	7,7%	Housewife	18	7,7%
40-59 years old	38	16,2%	Others	11	4,6%
Education Background			**Average Monthly Income**		
Senior High School/equivalent	120	51,3%	<IDR2.000.000	73	31,2%
Diploma	12	5,1%	IDR2.000.000 – 5.000.000	89	38%
Bachelor (S1)	89	38%	IDR5.000.001 – 8.000.000	30	12,8%
Master (S2)	13	5,6%	IDR8.000.001 – 11.000.000	12	5,1%
Marriage Status			IDR11.000.001 – 14.000.000	6	2,6%
Married	54	23,1%	IDR14.000.001 – 17.000.000	6	2,6%
Single	180	76,9%	>IDR17.000.000	18	7,7%

Structural Equation Modelling (SEM) Measurement Model

The measurement model was conducted by validity and reliability tests that aim to clarify how accurate indicators can represent its latent variables (Malhotra et al., 2017). An indicator can be stated as a valid indicator if it has ≥ 0,5 of standard loading factor (SLF) value and ≥ 1,645 (one-tailed) or 1,96 (two-tailed) of t-values, based on research hypotheses (Wijanto, 2008). Result of the validity test shows 9 invalid indicators, including all of the charity project variable's indicators, and have to be removed. The re-specification validity test is carried on to the remaining 29 indicators from 7 variables and has resulted in validity. Thereafter, the reliability test was conducted. A latent variable can be clarified as a reliable variable if it has ≥ 0,7 of Construct Reliability (CR) value and ≥ 0,5 of Variance Extracted (VE) value (Hair et al., 2014). The result shows all of the seven variables are reliable. Hence, the indicators are accurate and consistent on measuring the latent variables.

The goodness of fit test is also conducted on measurement model analysis. The goodness of fit test aims to verify how good is the research model to represent the data. The measurement model is good fitted based on a standard for each index according to Wijanto (2008). The result shows that the research model has a minimum of one good fit index from each absolute fit measures and incremental fit measures based on Hair et al. (2014). Therefore, the measurement model well-represents the data.

Structural Equation Modelling (SEM) Structural Model

The goodness of fit test is also conducted on the structural model analysis. The result shows that the research model has a minimum of one good fit index from each absolute fit measures and incremental fit measures based on Hair et al. (2014). Therefore, the structural model is good fitted or it well-represents the data.
The causal relationship analysis is also conducted on the structural model analysis by evaluating t-values, estimated coefficient (β), and coefficient of determination (R^2) on this research model that aims to verify the significance of the correlation value between variables. A latent variable can be stated as significant variable if it has ≥ 1,645 or ≤ -1,645 of t-value, based on a positive or negative hypothesis. Moreover, the estimated coefficient (β) was being used to compare the strength of each independent variable effect on dependent variable. Figure 2 shows that internet technology features (ITF) and social network sites features (SNSF) significantly influence the attitude (ATT) towards donating via social media. Social network sites features with the 0,36 of SLF value has the biggest effect on attitude towards donating via social media. Moreover, attitude (ATT), subjective norm (SN), perceived behavioral control (PBC) significantly influence the intention to donate via social media (INT). Perceived behavioral control with the 0,70 of SLF value has the strongest effect on intention to donate via social media.

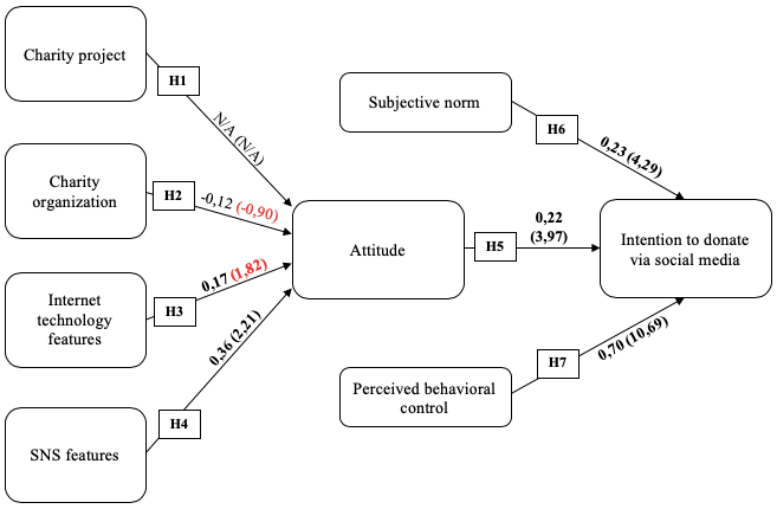

Figure 2: Causal Relationship Analysis SLF and (T-value)

The causal relationship analysis is also conducted by evaluating the coefficient of determination (R^2) to clarify the variance of an endogenous variable that can be determined by exogenous variables. Table 3 shows that the intention to donate via social media can be 67% determined by attitude, subjective norm, and perceived behavioral control, whilst the other 33% are the factors outside the research model. Other than that, attitude can be 17% determined by charity organization, internet technology features, and social network sites features, whilst the other 83% are the factors outside the research model.

Table 2: Research Model Coefficient of Determination (R^2)

Structured Model	Errorvar	Coefficient of Determination (R^2)
INT = 0,22*ATT + 0,23*SN + 0,70*PBC	0,33	0,67
ATT = –0,12*CO + 0,17*ITF + 0,36*SNSF	0,83	0,17

Discussion

This research has accepted five out of seven hypotheses based on Structural Equation Modelling (SEM) method. Attitude, subjective norm, and perceived behavioral control positively and significantly influence the muslim donors' intention to donate via social media, also internet technology features and social network sites features can

affect their attitude. However, charity project and charity organization do not significantly affect the muslim donors' attitude towards donating via social media.

Hypothesis 1 shown that muslim donors' perception on charity project do not significantly affect their attitude towards donating via social media. This result was also founded by Sura et al. (2017). In contrast, Treiblmaier & Pollach (2006), Ranganathan & Henley (2008), and Van Iwaarden et al. (2009) have found that charity project affect someone's intention to donate online. The result implies that if the muslim donors' has a positive perception on: a charity project such as a charity for natural disaster victims; a charity project's location such as an underdeveloped and segregated region; and if they have an emotional attachment to a charity project such as a charity for cancer sufferer; those perceptions do not increase their positive attitude towards donating via social media. Reddick & Ponomariov (2012) and Mejova et al. (2014) have indicated that the result can be caused by a less-association or affiliation between donors to a charity project.

Hypothesis 2 stated that muslim donors' perception on charity organization do not significantly influence their attitude towards donating via social media. The result goes along with a finding from Sura et al. (2017). However, Treiblmaier & Pollach (2006), Ranganathan & Henley (2008), and Van Iwaarden et al. (2009) have found that the perception on charity organization can shape the donors' intention to donate via online. This research finding stated that if muslim donors' have a positive perception on a familiar charity organization that they emotionally attached to, it will not increase their positive attitude towards donating via social media. Afterwards, muslim donors' positive perception on a charity organization with a good track record and transparency will also not increase their positive attitude towards donating via social media. This finding possibly caused by a less-association or affiliation between donors and a charity organization, according to Reddick & Ponomariov (2012) dan Mejova et al. (2014).

Hypothesis 3 shown that muslim donors' perception on internet technology features positively and significantly affect their attitude towards donating via social media. The result is in line with a research finding from Sura et al. (2017). Sura et al. (2017) have stated that social network sites (SNS) operate and driven by the internet, whereby it is a strong foundation of SNS. Therefore, muslim donors aware that the internet drives the operation of social media, with the result that they concerned about the internet technology features. The findings indicate that the more muslim donors concern about internet security, privacy policy, effectiveness, and trustworthiness, also the online transaction reliability, it will increase their positive attitude towards donating via social media.

Hypothesis 4 stated that muslim donors' perception on social network sites (SNS) features positively and significantly influence their attitude toward donating via social media. This finding is not in line with the finding from Sura et al. (2017). According to descriptive statistics analysis, muslim donors have agreed that if they can fully utilize the SNS communication features, they will intend to donate. Muslim donors have also quite agreed that they will donate through a interactive SNS. The utilization of social media's communicative and interactive features by charity organizations can increase the muslim donors' positive attitude towards donating via the social media. Muslim donors have also strongly agreed that they donate based on the donating way informed via social media. It implies that the better a charity organization can inform and solicit muslim donors to donate (Kim & Lee, 2014), it possibly can attract them to donate (Plaisent et al., 2012).

Hypothesis 5 shown that attitude positively and significantly affect muslim donors' intention to donate via social media. The result goes along with a finding from Sura et al. (2017). According to descriptive statistics analysis, respondents have agreed that they experience the ease of use, security, and convenient while donating via social media. Therefore, the more muslim donors' feel easier, secure, and convenient to donate via social media, it will increase their intention to donate via social media.

Hypothesis 6 shown that subjective norm positively and significantly influences muslim donors' intention to donate via social media. This finding is in line with a research finding from Charsetad (2016). The result indicates that the more expectation from the most important and influential people to muslim donors' also their family and friends to donate via social media, it will increase their intention to donate via social media.

Hypothesis 7 stated that perceived behavioral control positively and significantly influences muslim donors' intention to donate via social media. This finding goes along with the result from Charsetad (2016). The result shown that the higher muslim donors' willingness to donate via social media, it will escalate their intention to donate via social media. Moreover, the more muslim donors are independent on making decision to donate via social media, it will increase their intention to donate via social media. Afterwards, the more muslim donors' perceived of ease while donating via social media, it will increase their intention to donate via social media. The results of hypothesis 5, 6, and 7 are in accordance with the Theory of Planned Behavior by Ajzen (1991).

Conclusion

The findings of this study showed that the more muslim donors have a positive attitude, the more driven by their the most important and influential people, and if it is easier to donate via social media, it will increase their intention to donate via social media. The muslim donors' perceived of ease has the strongest effect to escalate their intention to donate via social media Moreover, the results also stated that the more muslim donors aware and concern about the internet's security, privacy policy, effectiveness, and trustworthiness, also the online transaction reliability, it will escalate their positive attitude towards donating via social media. Afterward, the more familiar, easier, interactive, and communicative a social media that used for donating, it will increase muslim donors' positive attitude towards donating via that social media. The social media features have the biggest effect to increase muslim donors' positive attitude towards donating via social media. However, muslim donors' perception on charity project and charity organization do not positively affect their attitude towards donating via social media.

Implication

This study delivers some recommendations for the charity organizations. Perceived behavioral control has the biggest influence on muslim donors' intention to donate via social media. The perceived behavioral control is regarding to muslim donors' desire, independency to make a decision, and perceived of ease to donate via social media. The charity organizations have to concern about muslim donors' willingness and their decision making to donate via social media. The charity organization can utilize the social network sites or other online platforms, such as websites or digital applications, as a most easier donation collection method. Organisasi amal dapat menerapkan situs jejaring sosial maupun platform daring lain, seperti situs web atau aplikasi digital, sebagai metode penghimpunan yang memudahkan. The use of those platforms aims to facilitate the easiest donation methods for muslim donors, with the result that they will not experience barriers and have a willingness to do.

Furthermore, social network sites features has the strongest effect on muslim donors' positive attitude towards donating via social media. Regarding to this study, muslim donors: donate via a familiar social network sites; donate in accordance with a donation method informed via social network sites; and use the user-friendly social network sites. The charity organization can consistently utilize the social network sites and its features as a donation method, particularly to communicate the way to donate that muslim donors can do. The charity organizations can clearly inform the muslim donors how to donate by scanning a QR code and donate with a digital wallet or bank transfer. The charity organizations can also consistently describe their charity projects or donation targets to muslim donors through social media contents. The aim is to attract potential donors and increase the charity organizations' donation collection.

Regardless of the findings, this research has limitations that can possibly be evaluated and developed in further research. This study did not do the analysis on a specific respondents' demography. This study was also dominated by the Z Generation attaining the age of 18 to 24 years old. Moreover, attitude as the endogenous variable can be only 17% determined by the exogenous variables, charity organization, internet technology features, and social network sites features, whilst the other 83% are the factors outside the research model. This study did not investigate a certain social media used for donating. The research findings could be confirmed by its research model with more respondents to generalize the analysis, also with the robustness check. Moreover, the further research could analyze a certain respondents' demographic background and could also do the inspection on a specific social network site usage or compare various sites.

Appendix

Appendix 1: Variables' Indicator

Indicator	Descriptive Statistic
Charity Project	
(CP1) I chose to donate via social media because of the charity project type	5,16
(CP2) I chose to donate via social media because of the location of the charity project	4,20
(CP3) I chose to donate via social media because of the emotional attachment I had to the charity project	4,74
(CP4) I prefer to donate via social media to human welfare charity project	4,92
(CP5) I prefer to donate via social media to a single charity project rather than fundraising	4,43
Charity Organization	

(CO1) I donate via social media only to the familiar charity organization	4,68
(CO2) I donate via social media only to the charity organization that has a good track record	5,19
(CO3) I donate via social media only to the organization that transparent in managing money donation	5,26
(CO4) I donate via social media only to the organization that frequently update its information	4,82
(CO5) I donate via social media only to the organization that I have emotionally attached to it	4,26
Internet Technology Features	
(ITF1) I am concerned about the internet security	5,44
(ITF2) I am concerned about the online transaction reliability	5,46
(ITF3) I am concerned about the internet trustworthiness	5,34
(ITF4) I am concerned about the internet privacy	5,50
(ITF5) I am concerned about the internet effectiveness	5,39
Social Network Sites Features	
(SNSF1) I donate only via the familiar social media	4,74
(SNSF2) I donate based on the donating way informed via social media	5,23
(SNSF3) I donate only via the user-friendly social media	5,09
(SNSF4) I donate only via social media that has fully utilized communication features	4,49
(SNSF5) I donate only via the interactive social media	4,34
Attitude	
(ATT1*) Donating via social media is generally problematic	4,90
(ATT2*) Donating via social media is generally not secure	4,41
(ATT3*) Donating via social media is generally not easy to do	4,81
(ATT4*) Donating via social media is generally inconvenient	4,88
Subjective Norm	
(SN1) Most people who are important to me think that I should donate via social media	3,38
(SN2) The people who influence my decisions think that I should donate via social media	3,32
(SN3) My parent think that I should donate via social media	2,95
(SN4) My friends acknowledge my donation via social media	3,41
Perceived Behavioral Control	
(PBC1) If I wanted to, I could donate via social media	5,26
(PBC2) It is mostly up to me whether or not I donate via social media	5,35
(PBC3) My donation via social media is likely to be influenced by factors beyond my control	4,69
(PBC4) My donation via social media is generally not obstructed by anything	5,15
Intention to Donate via Social Media	
(INT1) I have an intention to donate via social media	5,34
(INT2) I have an intention to donate via social media in the near future	5,38
(INT3) I plan to donate actively via social media in the near future	5,16
(INT4) I plan to contribute myself to a donation program via social media in the near future	4,93
(INT5) I have an intention to donate via social media if I have a chance to do so	5,26
(INT6) I have an intention to donate more via social media	5,08

**reversed code*

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An Innovative Method in Lifelong Learning – E-Learning Platform

Karolina WALANCIK - RYBA, PhD

WSB University

ul. Cieplaka 1c

41-300 Dąbrowa Górnicza, Poland

Email: kwalancik@gmail.com

Recevied from: Agnieszka Piróg APirog@wsb.edu.pl

Abstract

This article presents a description of the application of an innovative method in distance lifelong learning for adults, in international perspective (Poland, Czech Republic, Republic of Lithuania, Republic of Latvia). The participants completed course modules individually. They gained knowledge, skills and competences in the areas of learning Polish, ICT, and entrepreneurship.

Keywords: lifelong learning, e-learning, Moodle platform

Introduction

The purpose of this article is presentation of an innovative lifelong learning method using the *Moodle* Platform in international perspective. This procedure was executed within the scope of the Erasmus+ project carried out by the WSB University.

The project leader, the WSB University, and project partners (the Polish Cultural and Educational Union [PZKO] in the Czech Republic, the Association of Polish Scientists in Lithuania [NPL], Polish Association in Latvia, Association Branch in Jekabpils, Polish Association "Compatriots" [Rodacy] in Jekabpils) assumed that adult education organizations deserve a discussion on education (Dollhausen, Schrader, 2015, s. 174) and practical actions. The proposed method allowed engaging in the process of educating older generations of Poles with the participation of the youth living outside of the country's borders. Engagement is an element of the process of development and self-education (Kuvass, 2006, pp. 504 – 522) of adults, the elderly, and youth who will want to educate or develop e.g. Polish, IST competences, and entrepreneurship. It was assumed that lifelong learning is a part of lifelong learning of adults (Knowles, Holton, Swanson, 2014, pp. 17- 22) understood as the entirety of cognitive activities undertaken during the life for the purpose of gaining knowledge, skills or qualifications (for personal, social, or professional reasons) (Tissot, 2004, p. 103). It is our duty to create possibilities to learn from the youngest years until late adulthood (Seitter, 2015, pp. 87–92).

Methodological Assumptions

The applied research method was a case study. As noted by A. Langley and I. Royer (Loangley, Royer, 2003), research instrumentally based on a case study (then there are so called internal intrinsic studies) provide data and allow to generalize. The case study allowed interpreting the social pluralities, i.e. the use of an innovative learning method including the *Moodle* Platform along with tests in the international dimension. The case study provides three important benefits: motivation, inspiration, and action illustration. The presented case involved an analysis of the execution of the adopted lifelong learning concept in defined social groups using the *Moodle Platform.* The purpose of the Case study was to recognize and describe: How to use innovative learning methods in lifelong education of adults? The initial part of the project included surveys (Babbie, 2001, p. 268) to learn about the expectations of potential course recipients. How to prepare e-learning courses to develop essential competences such as the ability to use Polish, the knowledge of basic entrepreneurship and finance, the knowledge of information technology? The research was conducted in the form of a questionnaire. Local coordinators (the Czech

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Republic, Latvia, Lithuania and Poland) conducted the tests in their parent organizations in January and February 2017. Participants of the research included 58% of women and 42% of men. They were aged 25-60. 75% of respondents were aged 55-70, and 25% were aged 25–45. These persons were residing in Silesia in Poland, the Vilnius region in Latvia, the Morawsko–Silesian region in the Czech Republic and in the Jēkabpils region in Lithuania.

Use of the Moodle Platform as an innovative method in lifelong learning

Three project teams participating in the research were formed for non-formal lifelong learning of mature persons. The non-formal lifelong learning tool was the e-learning platform (www.wiedzabezbarier.eu.) Three courses were installed on the platform. Each of these courses included a different number of modules: Polish language, ICT competences, and entrepreneurship. Communication between partners regarding technical handling of the platform was conducted using the discussion forums on the e-learning platform, www.wiedzabezbaier.eu, by telephone, and by email.

The results of conducted surveys confirmed that older people do not lose flexibility in terms of learning and developing skills that ensure successful functioning (Trempała, 2015, pp. 31- 45). Learning and/or developing Polish was important for respondents. The second priority was gaining ICT competences. The third priority were competences in the area of entrepreneurship. During network meetings, respondents underlined that the form of lifelong education using the e-learning platform allows updating knowledge related with professional activity. Educational activity of respondents was restricted, for various reasons (see Aleksander, 2016, p. 12). The expectations of respondents from different countries were varied. The differences concerned e.g. the Polish language course, which was prepared and adjusted to expectations of individual environments. In Lithuania, most Polish people who live there know Polish very well or well. Therefore, recipients expected to improve their vocabulary only. In Latvia, Polish residents expected a basic form of learning Polish. In the Czech Republic, Polish people mainly expected a basic course of Polish, including youth language. Secondly, they expected course modules aiming at correctness, language „rescue" and a translator. In addition, expectations of Poles living in the Silesian Cieszyn area were accounted for in terms of modules such as e.g. regional Polish kitchen.

In terms of the course on entrepreneurship, respondents expected that modules will include e.g. the basic stages of creating a small business organization (production, trading or services). It was determined that the cognitive purpose of the course is to present participants with the stages of creating independent business entities – their own companies. Participants expected information concerning motivation to start own business, planning ventures, innovation, social inclusion processes, and not exclusion due to age, language barriers and other.

In terms of ICT, expectations of partners were similar. Most respondents (75 %) had basic skills on using IT tools. The course was to allow expanding knowledge, gaining skills and social competences in the area of using IT tools to obtain, assess, maintain, create, present and share information, and to communicate and participate in cooperation networks using the Internet.

Summary

The first correspondence course was conducted in 1728 in the United States

Innovation in the presented case means using e-learning and the Moodle Platform for non-formal education of adults using presented courses, adjusted to the recipients' age, as well as their skills and competences in the area of using ICT tools, preparation of E-books for authors and users of the platform as well as methods of non-formal education. The innovation in this part of Europe also included the fact that remote e-learning and the Moodle Platform were used within the scope of a scientific/social partnership, or, to be exact, a scientific/private/partnering dimension. It is worth to transfer knowledge at the level of platform users, by way of adding more unique courses related e.g. to history, culture, or personal interests. Free use of the platform and making it available for other countries, organizations, associations, support groups, or individuals constitutes added value. Poles living abroad will be able to use it thanks to promoting the platform's results amongst Polish associations worldwide. This type of tool should be used in lifelong education. The benefits of e-learning include:

- Increasing the scope of learning, generally without territorial restrictions;
- Possibility to educate at any place and time;
- Facilitating communication between students and the teacher, expert, mentor;
- Delivering courses adjusted to students' needs and pace;
- Differentiation /enrichment of courses thanks to applying the ICT technology;

- Working time of students adjusted to expectations;
- Minimizing fear and shyness, which may be present in case of traditional learning;
- Individual control and supervision of every individual student;
- Individualized learning process, independent selection of the preferred form of providing knowledge;
- Possibility to use the courses again;
- Organizational profits in case of dispersed education and constantly changing students;
- Developed remote interpersonal relations (creating mutual support groups);
- Profitability and amortization of financial outlays (financial benefits for course organizers: no trainer fee, no costs of lease, accommodation, board and similar, no disorganization of the work of company departments);
- Time savings (no commuting to the location of training; no need to stop the daily routine);
- Better ability to control training by the organizer (Morbitzer, Walancik 2018, p. 13).

Remote learning has its specificity. It requires skills and additional competences as well as engagement, both on the part of the teacher and the student. Without this, the process may not be very effective.

Currently, the use of e-learning courses to gain knowledge, skills, or social competences is becoming increasingly popular (Chang, 2016, pp. 476–485, Aparicio M., Bacao F., Oliveira T. (2016), Aparicio M., Bacao F., Oliveira T. 2016). The presented platform is still operating (www.wiedzabezbarier.eu.)

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Evaluation of Grapevine Production in The World and in the Czech Republic, An Issue of Global Wine-Making Power

Kamila Veselá – Česká zemědělská univerzita v Praze

Lucie Severová – Česká zemědělská univerzita v Praze

Annotation

In vino veritas – "in wine lies the truth" - and it is also true that for centuries wine has belonged among the most popular consumer commodities all over the world, a state of affairs which will probably not change much in the future. Wine production represents an important item in the gross domestic product (GDP) of many economies. In the long term, Italy, Spain and France are undoubtedly among the most significant wine producers, as well as the largest exporters of this commodity. Many studies have been carried out regarding the impact of wine consumption on human health, and several positive influences have been established. This fact probably plays its role in wine consumption. The aim of this text is to evaluate world grape production and wine consumption and to characterize the changing positions of the largest producers and exporters. The article uses time series analysis on the development of grape production, the export and import of grapes, and subsequently wine consumption, in order to analyse and evaluate the role of different countries and their positions on the grape market. Both absolute and relative indicators, as well as the trends of these indicators, are evaluated in the time series analysis. The United States of America, France and Germany can be counted among the countries with the highest wine consumption. They have strong leading positions on the global wine market and therefore they significantly influence its pricing policy.

Keywords: Czech Republic; GDP; wine; vine; harvest; production

Introduction

Wine is one of the commodities with stable consumption and production in virtually all countries around the world. It is a specific commodity, the demand for which depends on a number of factors, such as consumer habits and preferences, but also on current moral attitudes towards drinking wine and alcohol -warning advertisements on the effects (in particular, the negative effects) of alcohol consumption on human health. Consumer behaviour on the Czech wine market has been analysed by researchers such as Chládková (5). The Czech Republic not only has a strong demand for wine and a large number of wine consumers; it is also a country with a long tradition of wine production. The demand for wine has old roots in the Czech Republic, and not only has there virtually always been a demand, but it has been increasing in recent years (8, 10), as evidenced by statistics showing that wine consumption was 15.4 litres per capita in 1995 and 20 litres per capita in 2012 (2). In recent decades, a number of changes have taken place that have also affected the wine market. In the 1990s, the Czech Republic opened up to the world and began actively to export and import wine. Another significant change for the wine market was the accession of the Czech Republic to the EU, which had a significant impact on the structure and scope of the country's foreign trade in wine. Despite this change, most Czech producers are convinced that their wines will be competitive in the EU (11). The key factors influencing the Czech wine market and the issue of measuring its competitive strength were addressed by researchers such as Žufan (16). Chládková et al (6) found that a key innovative element that has an impact on wine production in EU countries is the application and enforcement of unifying European legislation. They also point out that the profitability of Czech viticulture largely depends on domestic consumption within EU countries. Harmsen et al (4) pointed out the trend in European viticulture towards changing its structure and focusing on wines with a higher added value and quality, which is also reflected in pricing policy. Of course, it is not only Czech viticulture that is undergoing changes. The issue of Hungarian viticulture was addressed by Török and Tóth (15), who point out that if Hungarian wine producers were able to share their knowledge with their competitors, they could significantly improve their position in the global market. Stasi et al (9) dealt with the issue of competition on the Italian wine market.

The aim of this article is to evaluate grape production in Europe by analysing viticulture productivity in individual European countries. This aim is realized by assessing the following research theses.

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Research thesis 1: the accession of the Czech Republic to the European Union affected the country's grapevine production.

Research thesis 2: grapevine production in the Czech Republic and around the world is prone to global shocks such as financial crises or drops in global productivity.

Methodology, Data Sources

The article uses secondary data sourced from the Czech Statistical Office, Eurostat and The International Organization of Vine and Wine. Time series are analysed for the period 1995-2016. Research thesis 1 is evaluated by an analysis of the time series of wine production in the Czech Republic, wine exports and imports, and wine consumption. The absolute values of these indicators, the annual deviations in absolute and relative terms, and the trend of the individual functions are all examined. The research also includes an analysis of the area of vineyards in the Czech Republic, including a breakdown by region. The length of the time series makes it possible to monitor any deviations and changes at the time of the Czech Republic's accession to the European Union.

Research question 2 is answered using an analysis of time series on worldwide wine production and consumption. In addition to an analysis of the absolute and relative values, the analysis also includes an examination of the development of the global wine market's structure broken down by individual countries and continents. The question of whether the global wine market is prone to external negative shocks is answered by comparing the development of global wine production and global GDP and measuring their correlation. Calculations and correlations are performed using the SPSS program.

Results and Discussion

As mentioned above, the Czech Republic is one of the countries where viticulture has a long tradition and relatively stable production. The following chart shows the development of the area of vineyards in the Czech Republic (CZ) since 1995. The above chart shows fluctuations in this area, but these are relatively low values. The only years in which a significant change occurred were the years 2002 and 2003, when the area of vineyards increased by almost 17 % per year. Other than these two years, the average area of vineyards increased/decreased by 0.33 %.

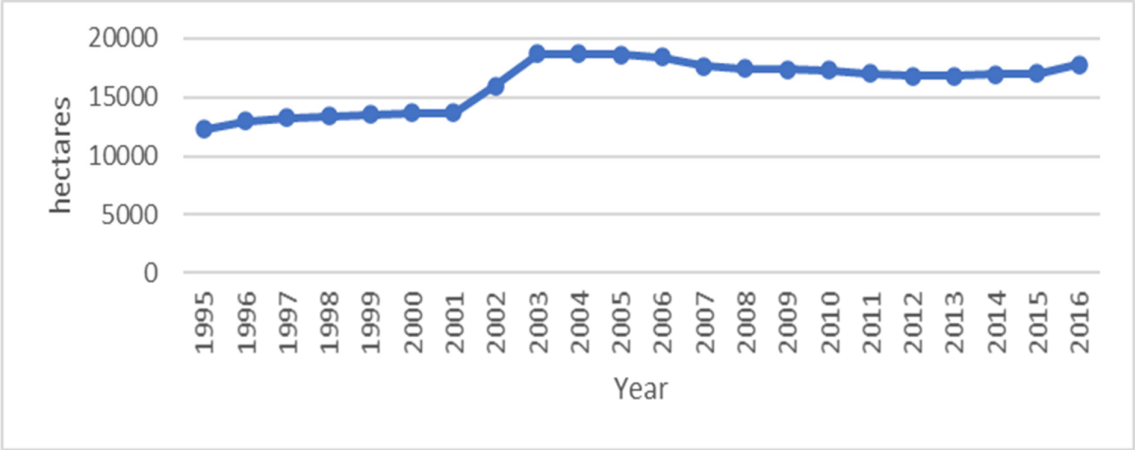

Chart. No. 1 Development of the area of vineyards in CZ

Source: data from the Ministry of Agriculture (3) processed by the author

The South Moravian Region has traditionally been the wine region of the Czech Republic. In 2018, its production made up 93 % of the total Czech production. Of the other regions, the region with the most significant share in Czech wine production is the Zlín Region (which accounts for 3 % of the Czech Republic's total production), followed by the Ústí nad Labem Region (1.8 %) and the Central Bohemia Region (1.7 %). Tomšík and Chládková (14), among others, offer a more detailed analysis of viticulture and winemaking in the Czech Republic.

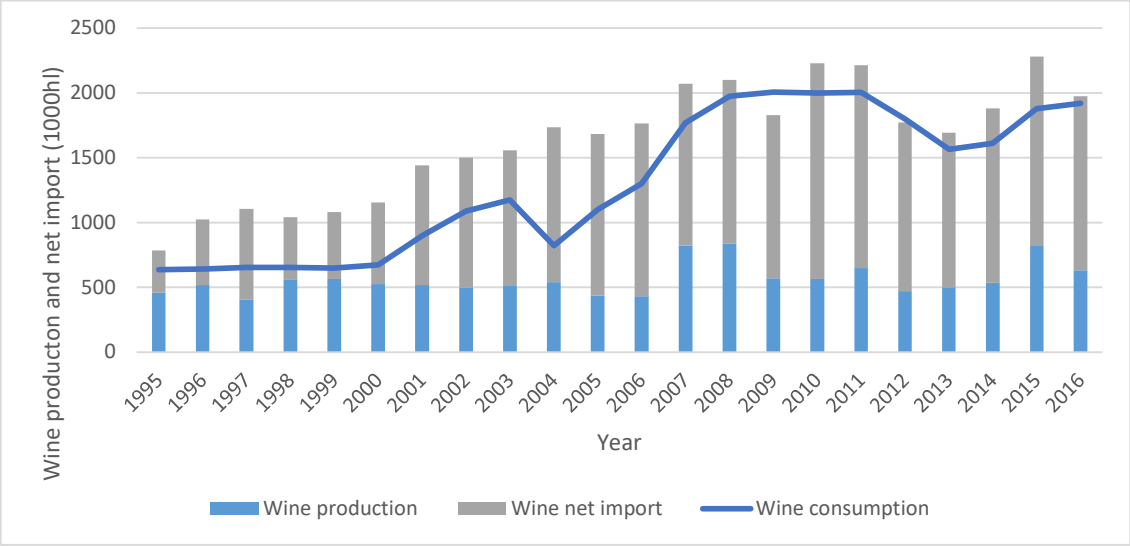

Chart. No. 2 Consumption, production and import of wine to the Czech Republic

Source: data from OIV (12) processed by the author

Chart No. 2 shows the consumption, production and net import (calculated as the difference between total and wine production) of wine to the Czech Republic. Several conclusions can be drawn from the above chart:

1) For the entire monitored period, domestic production was not sufficient to satisfy domestic consumption.

2) The difference between domestic production and domestic consumption is increasing over time (e.g. in 1999, the difference between domestic production and domestic consumption was -87 000 hl, and in 2016 it was as much as -1 289 000 hl). This is due to the clear growth of domestic wine consumption, which more than tripled during the monitored period. Žufan (16) and Kučerová (7) also mention the growing consumption of wine in the Czech Republic.

3) Imports are necessary to ensure the satisfaction of domestic consumption. The sources for satisfying domestic consumption are thus domestic production combined with net imports (imports adjusted for the export of part of domestic production).

4) Apart from small deviations, domestic production shows stable development with an average annual deviation of 4.5 %.

5) Wine consumption and production in the Czech Republic does not show dependence on external shocks, such as the global financial crisis in 2008.

6) Until 2004, i.e. before the Czech Republic joined the EU, the average growth of wine consumption in the Czech Republic was 4.21 % per year, and after the Czech Republic joined the EU the consumption growth rate accelerated to 8.34 % per year.

The structure of the country's foreign trade in wine shows a clear trend in the growth of exports and imports. While exports show an average growth rate of 16.88 %, in the case of imports it is 8.77 %. In absolute terms, however, imports completely dominate exports, which is a consequence of the growing domestic demand for (consumption of) wine and the insufficient domestic production to satisfy it. This is in line with the research of Tomšík and Sedlo (13). Also Černíková (1) pointed out the growing threat to Czech winemakers arising from table wine imports.

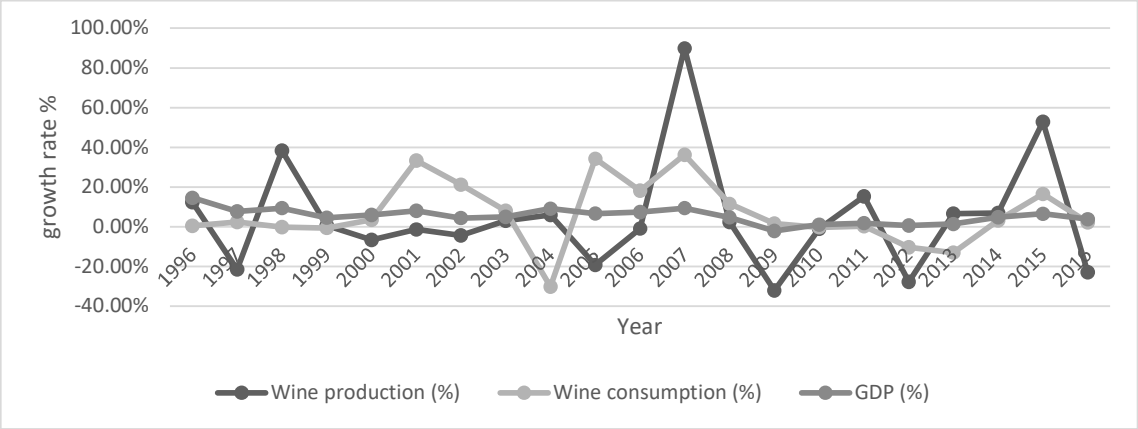

Chart. No. 3 Development of the growth rate

Source: data from the Czech Statistical Office (6) and the Ministry of Agriculture (3) processed by the author

The development of the growth rate of the gross domestic product of the Czech Republic and the production and consumption of wine are shown in Chart 3. When comparing growth rates (measured as an annual percentage change) and determining the degrees of correlation between GDP and wine production and GDP and wine consumption, no direct correlation has been found between GDP and wine production and GDP and wine consumption. The degree of correlation, as expressed using a correlation coefficient (i.e. the Pearson correlation coefficient), was 0.44 for GDP and wine production, and 0.23 for GDP and wine consumption.

Global wine production has seen a positive trend in recent years. In 2018, wine production reached the record-breaking level of 293 million hectolitres (292.3 million hectolitres in 2019). From European countries, the largest wine producers are Italy, Spain and France; and from non-European countries, they are the US, China, Argentina and Chile. Comparing grape production over time, it can be concluded that the global harvest is stable over time. There are slight deviations, mainly due to the weather, which is an important factor in wine production. However, wine production has long been fluctuating around 270 million hectolitres per year.

In a comparison of global wine production from 1995 and 2016, there was an 8 % increase in wine production, and global wine consumption increased by 6.5 %. In 1995, global wine consumption per capita was 41.7 kg, and in 2016 it was 49.4 kg. The average wine consumption per capita for the monitored period was 46 kg. A significant change in consumption did not occur until 2001, when consumption per capita fell to 16.4 kg, which corresponds to a decrease of 65.6 % compared to 2000. In 2002, global consumption had already returned to the long-lasting average values.

The development of the global area of vineyards is also stable in the monitored period. In 2016, the global area of vineyards was 7,453,532 hectares, and the average change in the area of vineyards over the monitored period was 0.21 %. Chart 4 shows the development of global wine production in comparison with its consumption. Several conclusions can be drawn from the information above:

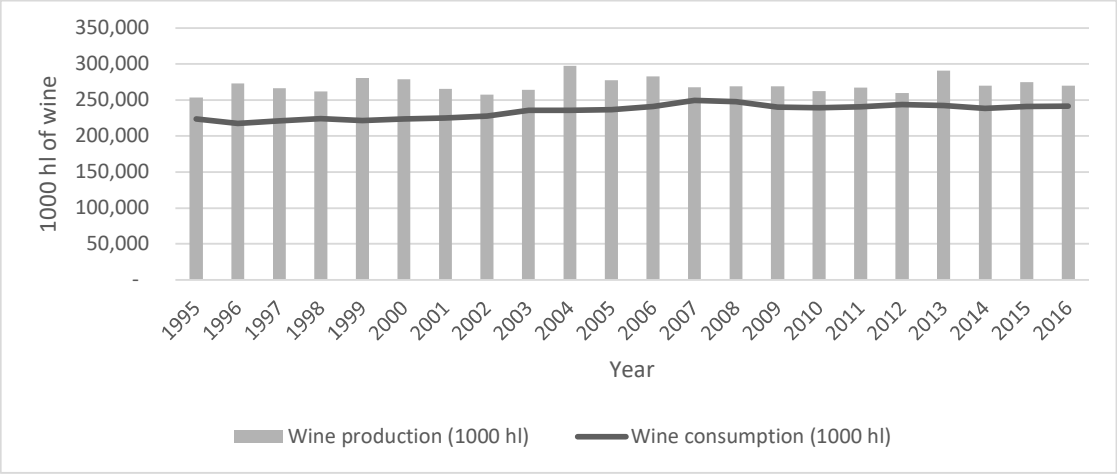

Chart. No. 4 Development of global wine production and consumption

Source: data from OIV (12) processed by the author

1) There is a surplus of production over consumption throughout the monitored period, which is reflected in the fact that the global area of vineyards and wine production are able to meet the global demand for wine throughout the monitored period.

2) The surplus of production over consumption shows relatively stable values - on average, 37 million hectolitres of wine (as follows by the chart no.4).

3) Small annual changes can be observed in both the consumption and the production of wine - on average, 0.38 % per year for global consumption and 0.44 % per year for global production. In the long run, however, both global production and global consumption show a slight trend towards growth as well as the gross domestic product (GDP). The development of the growth rate of wine in comparison with the growth of real GDP shows Chart No. 5.

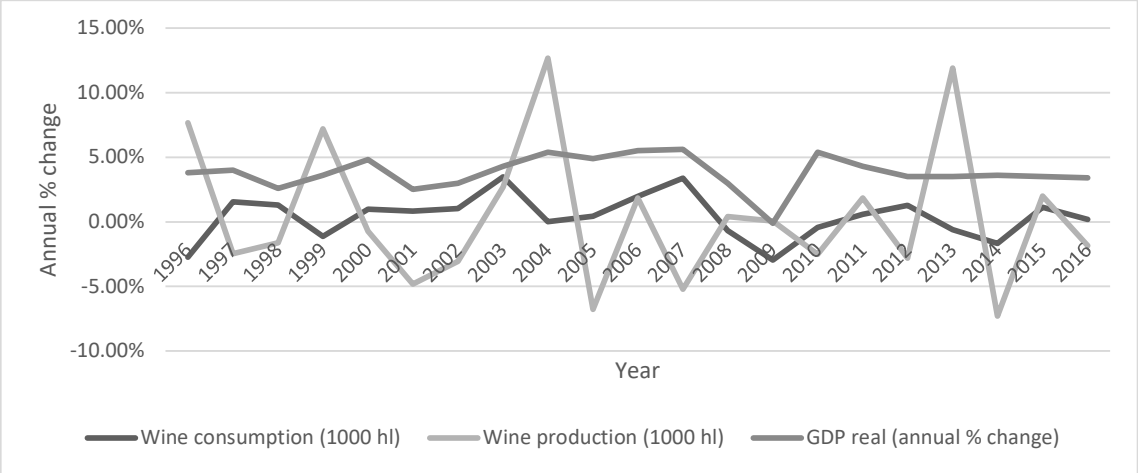

Chart. No. 5 Development of the growth rate of wine production and consumption and real GDP

Source: data from the Czech Statistical Office (6) and the Ministry of Agriculture (3) processed by the author

4) The direct impact of negative external shocks (such as the financial crisis of 2008/2009) on global wine production and consumption has not been demonstrated, although a decline can be observed during and after the financial crisis, in particular in the case of wine consumption. This is also confirmed by the analysis of the correlations between GDP and wine consumption and GDP and wine production. The correlation coefficient (the Pearson correlation coefficient) is 0.48 for the dependence between GDP and global wine consumption, and 0.08 for the dependence between GDP and global wine production.

Conclusion

The wine market in the Czech Republic and the global wine market show similar trends in some cases. Wine consumption has been growing for a long time, both in the Czech Republic and globally. Per capita consumption shows average values of 42–48 kg, and changes in the areas of vineyards have been negligible both in the Czech Republic and globally. In the Czech Republic, however, there has long been an imbalance between wine production and wine consumption. This imbalance has actually been increasing over time, as domestic wine production is unable to meet the growing domestic demand for wine. Negative external shocks have an impact on most markets. The wine market also slowed down in the period after the financial crisis in 2009, but not to any significant degree. The impact of the Covid-19 coronavirus pandemic on future wine production is a question for future analysis.

Acknowledgements

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Risk Model for The Measurement of The Enterprise's Security Condition

Jarosław NAPIÓRKOWSKI
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jaroslaw.napiorkowski@wat.edu.pl

Jerzy STANIK
Institute of Computer and Information Systems, Faculty of Cybernetics,
Military University of Technology, Warsaw, Poland, jerzy.stanik@wat.edu.pl

Abstract

This study focuses on theoretical and practical aspects (elements of best practice) that indicate the possibility of developing and applying a risk model for the measurement of safety performance. Achieving the intended goal required solving the following issues: developing a model to measure the usefulness of the risk management system, distinguishing significant quantities describing its utility attributes, determining the method of measuring utility attributes.

Keywords: Risk, Risk Model, Security Model.

Introduction

Each enterprise for which there is a high risk of threats - regardless of the location, size, nature or type of activity - should consider the possibility/necessity of developing and implementing an appropriate risk model to measure its current safety status. By adopting a proactive approach to measuring the state of security, enterprises not only avoid system failures and potentially costly incidents, but also benefit from business efficiency.

For example, the same threats criteria that reveal whether the risk is under control, can often show whether the working conditions are optimized.

The aim of this article is to identify the possibilities and propose the way of using them to measure the level / state of security of an enterprise. The detailed task is to formulate a risk model for the purpose of measuring safety both in relation to the entire enterprise and its basic components, e.g. domain systems, domains of operation, processes, utility attributes and justification of the method of such conduct that ensures the maintenance of an acceptable level of security. The following elements constitute the main part of the article:

- enterprise security model,
- distinguishing significant values describing the state of security of the enterprise (sets of protected objects, sets of threats, sets of threat criteria / indicators of results and activities along with related measurement systems used to measure the state of security),
- threat risk model,
- the method of measuring the size of the risk of threats.

When building the security model of the enterprise and the appropriate risk model for the purpose of measuring the state of this security, the principle was adopted that enterprises must have specific performance properties that determine such attributes as: functionality, reliability, business continuity, and above all functional security and information security.

Security and enterprise security model.

On the basis of praxeological systems of operation, the state of security of an enterprise can be defined using the following expression:

$$B(t) = \mathcal{F}(\mathrm{Z(t)}, Q(t+T)) \tag{1}$$

where:

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$B(t)$	-	the current security state of the system at time t;
$Z(t)$	-	real level of system security threats at the time t;
$Q(t+T)$	-	real possibilities of counteracting threats in the moment t;
T	-	planning horizon of crisis response.

Due to the great difficulties in studying dynamic safety-shaping systems, taking into account the time factor, in further considerations, the time variable will be replaced with generalized states of potential (hypothetical) and real (real) threats:

$$\mathcal{R}: Z^P \xrightarrow{t \in T} Z^R(t) = Z^R \tag{2}$$

where:

$\mathcal{R}$	-	the function of transforming potential threats into real threats;
Z^P	-	static set of potential threats;
$Z^R(t)$	-	dynamic set of real threats.

Practically, only real threats determine the degree of safeness (danger) of a given enterprise in specific environmental conditions and at specific time. In this sense, a collection real threats is only a certain subset of potential threats, the probability of which is relatively high, and the negative effects and consequences of these events are estimated at a high level of losses or damage.

Following the above definition of security, we adopt a structured five as the security model of enterprise:

$$MB =< POF, PDZ, \mathrm{SZG}, \mathrm{SZB}, \mathrm{WB} > \tag{3}$$

where:

PSF	-	a security or activity subject, which is a set of functional persons creating the organizational structure of the company's security
PDZ	-	the security or activity object, which are selected objects, systems or processes of the enterprise, in relation to which the required level of security should be maintained,
SZG	-	a system of threats, i.e. destruction of the current level of enterprise security,
SZB	-	a security system, i.e. responding to threats or incidents, working to reconstruct this security,
WB	-	set of security indicators.

Subject of security

From the point of view of controlling the current level of security or maintaining an acceptable state of security of the enterprise, the subject of security / operation is a set of functional persons appointed within the security structure or the existing Information Security Management System (ISMS):

$$SF = \{sf_p =< OF_p, NP_p > \in \Theta \times 2^{NP}, p = \overline{1,P}\} \tag{4}$$

where:

P	-	number of distinguished functional positions in the security structure of the enterprise,
Θ	-	a set of functional persons that can be appointed within the security structure (eg security inspector, security specialist, etc.); the set of these people is established at the stage of designing the enterprise security structure or information security management system (ISMS),
NP	-	a set of tools (security measures or mechanisms) at the disposal of functional personnel, necessary to measure the current level of security and maintain the required security level of the enterprise.

Object of security

From the point of view of the possibility of measuring the state of security of the enterprise, the object of security / action is a set of such protection elements $e_j \in E$, the current security status of which may change the system of threats, and establish it as the desired security entity.

$$E = \{e_j =< NZ_j, K_j, ZC_j > \in NZ \times K \times 2^{ZC}, j = \overline{1,J}\} \tag{5}$$

where:

NZ	-	set of protection element names,
K	-	set of protection object category names,
$2^{ZC} \supset ZC_j$	-	set of distinguished features for the j-th protection element,

J - number of distinguished elements of enterprise protection.

Each element from set E is numbered $j \in \mathbb{J}$ and is described by the set ZC_j of feature names. In addition, any element in set E can belong to only one category of security object names: people (L), system (S), process (P), information resource (I). There is at least one security status indicator for each security object feature.

Threats and the system of threats

On the pages of scientific publications of most empirical disciplines, in popular science publications, in everyday life, the term "threat" appears very often and - unfortunately - in various meanings [1, 2, 8, 11, 15].

For the purposes of this article, we assume the following threat is a: *"certain state caused by the perception of phenomena that are subjectively assessed as unfavorable or dangerous, or a situation in which there is a probability of a state dangerous to the environment, or an objective factor causing states of uncertainty and fear "*.

A threat is a potential loss / damage possibility, a virtual creation described by at least two groups of variables:

- the state of the analysis domain that may lead to loss / damage,
- the amount of losses / damages expected as a result of the activation of the threat.

The enterprise's threat system is a set of threats and the connections between them that generate various states of danger for the company. For the purposes of modeling, it can be described by the following expression:

$$SZG =< Z^P, Z^R, C >, \tag{6}$$

where:

Z^P - a set of potential (hypothetical) threats,
Z^R - a set of real and current threats at the moment,
C - a set of risk assessment criteria (a set of risk components).

In order to make further considerations more realistic and bring them closer to the exemplary praxeological applications, the set of potential threats will be initially divided into three categories, concerning, respectively: natural threats, technical threats, and social threats. Individual categories are broken down into different subcategories, classes and types.

The transformation of the static set of potential threats into the categories of dynamic (kinematic) real threats directly affecting the security of a given enterprise takes place using function of the system risk, that in the literature is most often defined as the influence of uncertainty on goals or in a descriptive manner, as a random attribute of decision making.

A set of criteria $\mathbb{C} = \{ C_i : (i = 1,2, \dots , m)\}$ can be decomposed into the following subsets:

1) due to its role in the generally accepted definition of risk:

$$\mathbb{C} = \mathbb{C}^P \cup \mathbb{C}^C, \tag{7}$$

where:

$\mathbb{C}^P$ - criteria describing the Possibility of threat activation
$\mathbb{C}^C$ - criteria describing the Consequences of threat activation

2) due to issues related to the enterprise's security policy:

$$\mathbb{C} = \mathbb{C}^{SC} \cup \mathbb{C}^{GP} \cup \mathbb{C}^{TI} \cup \mathbb{C}^{EC} \cup \mathbb{C}^{RR}, \tag{8}$$

where:

$\mathbb{C}^{SC}$ - Criteria describing a security culture (Policies, personnel and overall security management),
$\mathbb{C}^{GP}$ - criteria describing General Procedures,
$\mathbb{C}^{TI}$ - criteria describing Technical Issues,
$\mathbb{C}^{EC}$ - criteria describing External Cooperation,
$\mathbb{C}^{RR}$ - criteria describing the readiness and responding to emergency situations.

Taking into account the nature of the impact of one or several criteria on the remaining criteria from set C and the risk component quantification scheme, it is a set of criteria $\mathbb{C} = \{ C_i : (i = 1,2, \dots , m)\}$ can be decomposed into the following subsets:

$$\mathbb{C} = \mathbb{C}^T \cup \mathbb{C}^E, \tag{9}$$

where:

$\mathbb{C}^T$ - table criteria,
$\mathbb{C}^E$ - risk enhancers.

The table criteria may refer to any element from set E and directly describe the effects of threat activation. The table criteria are also referred to as the risk component quantification schemes for this criterion. A table-structured diagram of the quantification of the risk component for a given criterion "threat activation effects" as an example is presented in Table 1.

Table 1: Scheme of quantification of the risk component for the criterion "effects of threat activation"

No.	Level	Description
1	Low (green)	**Incident** - any event, other than an accident or major accident, that affects the safety of the company
2	Medium (yellow)	**Accident** - an unwanted or unintentional sudden event or sequence of events with severe consequences
3	High (red)	**Serious accident** - an accident caused by a collision or breakdown, with at least one fatality or at least five seriously injured persons, or causing significant damage to the company's assets or the environment, and other similar accidents having the same consequences and obvious impact on the regulation of the company's safety or on safety management .

This diagram assumes that the activation of each of the threats may lead to at least an incident, which is consistent with the definition of the threat (it always affects the security of the enterprise). The scheme of quantifying the risk components organized by tables leads to the determination of one of three levels of risk (e.g. green, yellow, red or low, medium, high). The levels of risk components determined in words can then be assigned values from the set Ω_i= {1, 2, 3} or Ω_i= {1, 3, 5}.

For an enterprise, it is assumed that the risk components of threats resulting from some criteria have the character of factors influencing the risk value resulting from other criteria. This concept / approach is referred to in the literature as' risk enhancement. Moreover, it is assumed that risk enhancers are characterized by natural numbers w ($w \in \mathbb{N}$), , such as the number of information resources, the number of procedures or the number of services. The maximum permissible value of the characteristic w is known, denoted a w_{MAX}. The impact of such an amplifier on the overall value / value of the risk measure is determined by its factor α, determining the set of measures of risk levels according to a given criterion:

$$\Omega_w = \{1 + \alpha \cdot \frac{0}{w_{MAX}}, 1 + \alpha \cdot \frac{1}{w_{MAX}}, \ , \dots ,1 + \alpha \cdot \frac{w_{MAX}}{w_{MAX}}, \}, \tag{10}$$

where:

Ω_w - a set of measures of risk levels,
α - risk enhancement coefficient,
w_{MAX} - the highest allowable value of the characteristic w.

In such a situation, the level of the risk component is determined by the formula:

$$r_w = 1 + \alpha \cdot \frac{w}{w_{MAX}}, \tag{11}$$

where:

r_w - risk component level according to the risk enhancer,
w - value of the considered characteristic,
α - risk enhancer coefficient,
w_{MAX} - the highest allowable value of the characteristic w.

Due to the nature of risk enhancers, their importance is always assumed to be 1.

Control System

In the security structure of the enterprise, the secondary system is the reaction system, hereinafter referred to as the control system, which is a logical successor of objectively existing potential threats, which under certain conditions turn into active real threats, having a destructive impact on the security level of a given enterprise. The control system is a protective shield of the company's operation system against offensive intentions of the threat system. It will be described in the same convention as the system of threats using the three-element set:

$$\mathrm{SZB} = < SZ^P, SZ^R, \mathrm{G} >, \tag{12}$$

where:

SZ^P - potential system capabilities to act in case of emergency;
SZ^R - real ability of the system to actively counteract;
G - control system operational readiness (efficiency) function.

The transformation of the potential capabilities of the control subsystem for the dynamic requirements of an emergency is performed by the operational readiness function G, which performs a formal transformation of static potential opportunities into dynamic and real operational capabilities that determine the effective operation of the enterprise. The G operational readiness function shows the actual organizational and functional efficiency of the security system to perform specific tasks in the conditions of the highest requirements and dynamic challenges of an emergency

Security Indicators

In this article, an indicator is understood as an observed measure that allows an insight into the security concept of each security object or its security attribute, which is difficult to measure directly. There are two types of indicators: the outcome indicator and the activity indicator.

The outcome indicators are intended to help assess whether the safety-related actions (policies, procedures and practices) are achieving the intended results, and whether such measures actually lead to a lower likelihood of an accident and / or milder consequences of an accident on human health, the environment and / or enterprise assets. They are reaction-based, aim to measure the impact of actions taken to manage safety and are similar to what other documents refer to as "lagging indicators". Outcome indicators often measure a change in safety over time or a poor state of safety.

Outcome indicators say whether the expected results were achieved - did the expected results for the selected utility attribute have been achieved or not?

However, unlike activity indicators, they do not say why the result was achieved or not. The activities indicator are intended to help determine whether the security actor is taking actions that are judged necessary to reduce the risk (e.g. the types of policies, procedures and practices described in the Security Documentation).

Activity indicators often measure safety performance according to a tolerance level that shows deviations from the expected status at a particular point in time. The description of both result indicators and activities consists of two key elements / components:

- Definition that should be clear about what is being measured and against what?
- A measurement system that defines the unit of measure or how an indicator is measured. The measurement system should be accurate enough to highlight trends in utility attributes over time and / or highlight deviations from utility expectations that require action.

The combination of outcome and activity indicators provides two perspectives on whether the basic elements of the enterprise (such as: people, processes, policies, procedures, practices, human resources and technical resources) are useful and operating as they should from a security perspective [3, 4].

Table 2 shows examples of security indicators for the security object named "IT system" belonging to the system category (S) [14] A similar approach should be carried out with regard to the remaining conservation objects from set E. Due to editorial limitations, these issues have not been described in this article - they have been omitted.

Table. 2: Examples of security indicators for an object called an IT system.

Indicator name	Value calculation function [13, 14]	Description	Normalized function	Indicator range after normalization	Measurement method / data source	Measure system	Indicator value	Measurement frequency
Scale of the system	$\alpha_s = \begin{cases} 1, if\ \alpha = 0 \\ 3, if\ \alpha = 1 \\ 5, if\ \alpha = 2 \\ 7, if\ \alpha = 3 \\ 9, if\ \alpha = 4 \end{cases}$	System scale is the level of dispersion and number of system components. The scale of the system is expressed by belonging to the scale class $\alpha \in$ A and denoted as α^{SZR}. A set of membership classes is called a set A = {0,1,2,3,4}, the elements of which discretize the scale of risk management systems, where: 0 - defines a single-workstation system, and 4 defines a global system.	$f(\alpha_s) = 1 + \alpha_s$	1-10	Interviews/Standards	Threshold	<=3 <4-6> <7-10>	once per quarter
Meeting the requirements of the security policy.	$\eta_s = \frac{\sum_{m=1}^{\overline{W^B_{P(O)}}}(p_s^m * s_s^m)}{\sum_{m=1}^{\overline{W^B_{P(O)}}} p_s^m}$ where: p_s^m - priority of the requirements w_m to the system, s_s^m - fulfillment of the requirement w_m to the system.	The set of requirements of the company's security policy O is a finite and countable set $W^B_{P(O)} = \{w_1, w_2, \dots w_m, \dots w_{M^B}\}$, wher e: M^B is the number of security policy requirements in relation to P(O). For each of the requirements $w_m \epsilon W^B_{P(O)}$ we define the size of the priority of the requirement in relation to the given *s*. The priority of the requirements $w_m \epsilon W^B_{P(O)}$ in relation to the system s is the number $p_s^m \in \mathbb{N}$, where eg. 0 - means that the requirement is inadequate to the system, 5 - means that the requirement is as significant to the system as possible.	$f(\eta_s) = 1 + 9 * \left(1 - \frac{\eta_s}{100\%}\right)$	1-10	Combined methods / Policies	Descriptive	<=3 <4-6> <7-10>	once per quarter

Effectiveness of the change management process	$\beta_s = 1 - \frac{W_{\widehat{BP}}}{W_s}$, where: W_s- effectiveness of the change management process, $W_{\widehat{BP}}$ – effectiveness of the change management process without good practice, with : $W_s \neq 0$ i $W_{\widehat{BP}} \leq W_s$	The effectiveness of the change management process is the level of compliance of the change management process of the risk management system with the best practices in this respect in relation to the solutions. It is expressed by the percentage compliance of the change management process existing for the system with the recommendations of standards, eg ITIL in this area.	$f(\beta_s) = 1 + 9 * (1 - \beta_s)$	1-10	Observations, combined methods. / Change log.	Trending	<=3 <4-6> <7-10>	weekly
Log review	$\gamma_s = \frac{L_p}{L}$ 100%, where: L_p - total number of viewed log files L - total number of log files	The information contained in the system logs (e.g. IP address) is used only for technical purposes related to server administration. Information from system logs can also be used to collect general, statistical demographic information - after informing the user and with his consent.	$f(\gamma_s) = 1 + 9 * \left(1 - \frac{\gamma_s}{100\%}\right)$	1-10	Instruments./ Log viewed log files in system directories.	Descriptive	<=3 <4-6> <7-10>	once a month
Password strength	$\lambda_s = \frac{H_p}{H}$ 100%, where: H_p - number of unbreakable passwords H - total number of passwords	Password - a string of letters, numbers or other characters authenticating the person authorized to process data in the system. The password should consist of at least 8 characters, including upper and lower case letters as well as numbers or special characters. It should not contain consecutive characters on the keyboard or the same letters or numbers, or names, surnames, nicknames, initials, dates, car registration numbers, etc.	$f(\lambda_s) = 1 + 9 * \left(1 - \frac{\lambda_s}{100\%}\right)$	1-10	Hybrid attack	Threshold, Descriptive	<=3 <4-6> <7-10>	once a month

The values of the indicators are marked with colors :

- green – required value, no action required,
- yellow – acceptable value, observation and possible preventive actions,
- red – unacceptable value, introduction of corrective and preventive actions is required.

In the case of an acceptable value, the value should be taken, which should differ from the required value by no more than the determined value, e.g. it may be 10% from the required value.

Generalized model of threat risk

Let:

$$Z = \{z_1, z_2, \dots, z_n\} \tag{13}$$

be a finite set of threats identified in a given domain of enterprise analysis.

To assess threats, the risk measure is used, which is the value of the R function defined as:

$$R: Z \longrightarrow V \subset \mathbb{R} \tag{14}$$

which assigns to each of the threats from the set Z values from a certain subset V the set of real numbers $\mathbb{R}$.
Each of the threats is assessed against m criteriaC_i (i = 1,2, … , m), where each of the criteria describes the probability and / or the effects of threat activation.

The result of risk assessment [threat z_k (k = 1,2 … , n) according to the criterion C_i (i = 1,2, … , m)] is the risk component r_i (z_k) (i = 1,2, … , m), which reflects one or more threat features from the set X_i (i = 1,2, … , m):

$$\mathrm{R_i}: 2^{\mathrm{X_i^{z_k}}} \longrightarrow \widehat{\Omega}_\mathrm{i}^{\mathrm{z_k}}, \quad \mathrm{r_i}\,(\widehat{\mathrm{X}}_\mathrm{i}^{\mathrm{z_k}}) = \widehat{\mathrm{s_i}} = \varpi_{\mathrm{i,j}};\ \varpi_{\mathrm{i,j}} \in \widehat{\Omega}_\mathrm{i}^{\mathrm{z_k}} \subset \Omega_\mathrm{i} \tag{15}$$
$$i = 1,2, \dots, m;\ j = 1,2, \dots, \mathrm{s_i}\ ;\ k = 1,2, \dots, n\ ,$$

or

$$R_i: X_i \longrightarrow \Omega_i, \tag{16}$$
$$r_i\,(x_i^{z_k}) = s_i \in \Omega_i \text{ or } r_i\,(z_k) = \omega_{i,j} \in \Omega_i\ ,$$
$$i = 1,2, \dots, m;\ j = 1,2, \dots, s_i\ ;\ k = 1,2, \dots, n\ ,$$

where:

$2^{\mathrm{X_i^{z_k}}} \supset \widehat{\mathrm{X}}_\mathrm{i}^{\mathrm{z_k}}$($i$ = 1,2, … , m) – subset of $\mathrm{z_k}$ features - this threat in relation to $\mathrm{C_i}$ of this criterion (e.g. history of its activation and analysis sector / domain, possibilities of threat activation, number of victims as a result of threat activation),

$\Omega_\mathrm{i} \supset \widehat{\Omega}_\mathrm{i}^{\mathrm{z_k}}$ (i = 1,2, … , m; k = 1,2, … , n ,) – subsets of $\mathrm{s_i}$ values, denoted as $\omega_{\mathrm{i,j}}$, which can be used in estimating risk in relation to i-th criterion,

$\mathrm{X_i}$ (i=1,2,…,m) – set of threat features,

Ω_i (i=1,2,…,m) – set of $\mathrm{s_i}$ values that can be used in risk estimation in relation to the i-th criterion,

Apart from the values of the risk components, the importance of individual criteria$\mathrm{C_i}$ (i = 1,2, … , m).
Let the set A be defined as:

$$A = \{a_1, a_2, \dots, a_m\} \tag{17}$$

where:

$\mathrm{a_1}$ - the importance of the criterion $\mathrm{C_1}$,
$\mathrm{a_2}$ - the importance of the criterion $\mathrm{C_2}$,
$\mathrm{a_m}$ - the importance of the criterion $\mathrm{C_m}$.

In such a case, the measure of risk can be calculated according to the formula:

$$\mathrm{R(z_k)} = \mathrm{f}\left(\mathrm{a_i}, \mathrm{r_i(z_k)}, \mathrm{r_i}\left(\widehat{\mathrm{X}}_\mathrm{i}^{\mathrm{z_k}}\right)\right); \tag{18}$$
$$k = 1,2, \dots, n;\ i = 1,2, \dots, m.$$

The obtained risk measure is then valued, i.e., assigned to one of the risk categories / classes: accepted, tolerated and not accepted. The model proposes to divide the area / risk space resulting from the table criteria into several parts.
An example of calculating the risk value.

When we have specified:

1) Specification of real threats, for example: $\mathbb{Z} = \{z_1, z_2, z_3, z_4, z_5, z_6\}$ and their description by means of sets of threat features X_i (i=1,2,…,m);

Table 3: Examples of threats

Threat No z_k	Threat name z_k
1	phishing
2	hacking
3	loss of confidentiality
4	power failure
5	wiretapping

2) A set of C_i (i = 1,2, … , m) criteria and risk component quantification schemes for individual criteria, e.g. for the criterion of "possibility of threat activation"

Table. 4: The frequency of threat events.

Level (P)	Level characteristics P	Number of events per 100k operating hours of the system.	The frequency of occurrence.
30	Frequent.	>5	Every 1-2 years.
6	Likely	2-5	Once every 10 years.
3	Rare	1	Once every 10 -40 years.
0,1	Unlikely	0	Never in 40 years.

3) For the adopted risk assessment criteria, sets of risk level measures, e.g.

   - for table criteria $\Omega_i = \{1,3,5\}$, i=2,…,5;
   - for enhancers $\Omega_1 = \{1 + 0{,}1\frac{1}{TDP_{MAX}}, 1 + 0{,}1\frac{2}{TDP_{MAX}}, 1 + 0{,}1\frac{3}{TDP_{MAX}}, \dots, 1 + 0{,}1\frac{TDP}{TDP_{MAX}}\}$

4) A set of measures of importance of the analysis criteria np, e.g. :A={1,1,2,3,3}
5) Risk assessment model, e.g.

$$R(z_k) = \alpha_1 * r_1 * \sum_{i=2}^{5} \alpha_i r_i \tag{19}$$

where:

z_k - *k-th* threat for which the value of the risk measure is determined R,
α_i - the importance of the criterion,
r_i - value of the risk component calculated according to criterion i=1,2,…,5.

6) The obtained result, e.g. $R(z_k) = 26$, is then compared with the limit values of the ranges of risk levels, which should facilitate appropriate decisions regarding the risk management strategy. The risk valuation framework sets out the method presented in Table 5.

Table. 5: A scheme for quantifying the risk levels of R.

Value of risk R	Characterization of the risk level of R.
R > 100	Very high
80 < R ≤ 100	High
50 < R ≤ 80	Important
0 < R ≤ 50	Low
R ≤ 0	Negligible

The estimated level of risk can be classified into one of three risk categories: acceptable, tolerated and unacceptable. A given category can be related to risk levels, as shown in Table 6.

Table. 6: Scheme for valuation / valuation of risk categories in relation to risk levels.

Risk category	Risk level
Not acceptable	Very high
	High
Tolerated	Important
Acceptable	Low
	Negligible

Conclusions

Creating useful risk models for measuring the security of an enterprise is not an easy task. On the one hand, due to the little experience of analysts and designers in this field - designing and measuring the state of security of a company is a new trend and must be implemented in the context of cyber threats and cybersecurity [10]. On the other hand, the field of measuring the safety of individual security facilities is at a relatively early stage of development.

In many countries in the world works are carried out on ways to measure safety for a long time. Nevertheless, this problem is very important and still absorbs both scientists and practitioners. In risk measurement and risk management, the two-component model of S.M. Cunningham is still the most frequently used measurement model [6] although there is still controversy over whether the components: possible consequences and the probability of their occurrence should be linked multiplicatively or additively. However, growing evidence shows that the additive model appears to be better in many cases. Due to the difficulty of measuring the state of security, researchers undertaking this task should approach it in a thorough and systematic manner, use the current scientific achievements and use various measures allowing to describe the studied phenomenon as fully as possible.

A best practice for measuring the state of safety is to develop an effective measurement methodology, whose "engine" by an adequate measurement model and a correctly selected set of indicators of results and actions - this is the general conclusion.

The article is not a ready-made recipe for measuring the state of safety, which is the basic link in the enterprise management system. It should be treated as a proposal of the authors of a partial solution to the measurement problem, which would enable the current assessment of the level of enterprise security.

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Values, Human Dignity and Sustainable Development in the Wake of the Economic Globalization

Léonel MATAR

Université Saint-Joseph, Beirut-Lebanon
leonel.matar@usj.edu.lb

Abstract

It is undeniable that some threats to our societal models today are of a global scale. Indeed, all countries, rich and poor, face profound social imbalances, environmental challenges and sustainable development concerns, calling for socially responsible practices from businesses and States. The rampant consumerism, the excessive industrialization and the westernized economic model, which is applied by emerging countries today and will be embraced by developing countries tomorrow, are likely to shake the fate of the world and endanger an already fragile social peace. Indeed, globalization and global capitalism are putting more pressure on our planet and on human development and are increasingly perceived today as the cause of many economic, social and environmental problems. High consumption and intense accumulation bring to the fore questions on sustainable development and social responsibility. These topics are in the media spotlight, obviously, but what is more crucial is that they are to incite public and private organizations to take much needed measures to limit the side effects of globalization. Aren't future generations entitled to the benefits of globalization, which promises to improve living standards, reduce poverty and respect human dignity?

This paper retraces and analyses the concepts of sustainable development and corporate responsibility since their first appearance until today and examines the challenges they impose in the wake of globalization. It offers an analytical debate on the perception of human dignity and sharing with others, the role of the public and private sectors regarding their contribution to social justice and to an egalitarian development. It highlights researches and analyses regarding the evolution of our economic and social environment in the respect of human, personal, social, economic and political rights, to be really worthy of mankind.

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Incentive Factors for Social Entrepreneurship Adoption

Lucia Durac

luciadurac@gmail.com, Dunarea de Jos University of Galati,
47 Domneasca Street, Galati, 800008, Romania

Liliana Mihaela Moga

liliana.moga@gmail.com, Dunarea de Jos University of Galati, 47 Domneasca
Street, Galati, 800008, Romania

Abstract

The stakeholders' reaction caused by the posibility to use a new service, product or conduct a traditional activity in a new way is a continuous subject of study for the researchers. An important role is played by the study of incetinve factors that influence the decision to adopt an innovative activity like the social entrepreneurship is. The approaching of the the social mission by the entrepreneurs leads to the identification of solutions to problems and the improvement of the living conditions of the community, bringing social innovation. The paper aims to identify the factors that influence the adoption of the social entrepreneurship using the diffusion of innovation theory. The research intends to complete the existing entrepreneurial research by identifying the role of the individual entrepreneur in bringing social innovation or the emphasis on the importance of traditional entrepreneurship. The study contributes to determining the factors that influence the orientation of entrepreneurs towards social entrepreneurship approached like an innovative entrepreneurship.

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Non-Reimbursable Financing as A Determining Factor in The Development of Social Entrepreneurship in Romania

Lucia Durac

luciadurac@gmail.com, Dunarea de Jos University of Galati, 47
Domneasca Street, Galati, 800008, Romania

Liliana Mihaela Moga

liliana.moga@gmail.com, Dunarea de Jos University of Galati, 47
Domneasca Street, Galati, 800008, Romania

Abstract

Diverse and numerous categories of entrepreneurs face problems due to the fact that they do not have access to financing for their entrepreneurial ideas with social impact that could create jobs for disadvantaged categories, opportunities for self-employment and finally sustainable local development. In Romania, as in other states, we are witnessing a process of hybridization, which consists in combining various institutional forms that give rise to new structures. Their appearance is due to the need to harmonize the economic objectives with the social ones in the context of permanent changes of the economic-social environment in which they carry out their activity. This article highlights the fact that non-reimbursable financing through operational programs dedicated to human resources or capital is the pre-selected target of entrepreneurs, motivated by the multitude of open financing lines and their considerable volume. The research aims at completing the existing studies on the identified factors with a prominent role in the development of social entrepreneurship and placing the "non-reimbursable financing" factor in the hierarchy of identified factors. Thought in an economic and social way, also correlated with an adequate management and investment policy, but also with a support from the authorities, social entrepreneurship can develop a lot, meeting a significant segment of the needs of the population, including regarding employment.

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Radio Management for Development: The Case of Orisun FM

[1]Funke OMOLE
Covenant University, Ota, Nigeria,
olufunke.idowu@covenantuniversity.edu.ng

[2] Rotimi OLATUNJI
Lagos State University, Lagos, Nigeria,
olatunjirotimi@gmail.com

[3]Olusola OYERO
Covenant University, Ota, Nigeria,
olusola.oyero@covenantuniversity.edu.ng

Abstract

The power of the mass media to influence public opinion enables them to facilitate positive change and development in the society. However, there has been an extensive intellectual criticism of the discriminatory disposition of broadcasting authorities in Nigeria towards majority of the population resident in the rural areas. For communication scholars, one viable way Nigeria can achieve meaningful national development is through the integration of its peoples by the establishment of mass media at the grassroots. Of all the channels of mass communication, radio is widely acknowledged as the most suitable for community development. This study therefore used Orisun FM, a local community radio station located in Ile-Ife, Osun state as case study. The aim was to find out the contributions of the radio station to the development of Ile Ife. Questionnaire was designed for data collection. The data gathered showed that the radio station, which is owned by the state government is contributing significantly to the development of the community. The station does this by helping to meet the development needs of the community residents in such areas as health, the economy, education and agriculture. Nevertheless, as long as the radio station is seen as the property of the state government, members of the community do freely access the radio station. This situation hampers audience participation in the station's programmes. The study recommends therefore that there is a need to for government to amend the management style of radio broadcasting in order to encourage communities to establish and run their own radio stations.

Keywords: Radio, Communication Management, Development.

Introduction

The mass media are an integral part of the society. They mirror the society by painting the picture of the society to itself. In so doing, they influence public opinion in response to the picture they paint of the society. Thus they have the ability to foster positive change in society. It is believed that the mass media have the capacity to contribute to the awareness of potentials of people. The mass media can also take responsibility for setting the agenda for change (Akinfeleye, 2008). The media can contribute to socio-economic development, as well as help to stimulate and educate rural population towards development. This means the mass media can be used to facilitate development in a less developed country like Nigeria. However, the media are not being maximized to aid development in Nigeria.

The major functions of mass communication are to provide informative, educative and entertainment messages, among others, to the audience (Omole and Olatunji, 2019). Communication scholars, have argued that educational and broadcasting authorities in Nigeria direct their activities to the educated urban dwellers, leaving out the majority of Nigerians in the rural areas, almost completely isolated from the national government and their urban counterparts (Moemeka, 2009; Ojebode and Adegbola, 2007 and Ojebode, 2008). They assert that the only way Nigeria can achieve meaningful national development is through the national integration of its peoples by the establishment of mass media at the grassroots. Moreso, the mass media need to be actively involved in setting the agenda, thereby

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effectively managing the communication process in terms of informing and educating the public, especially on development issues (Omole, Olatunji, Oyero, Amodu and Okorie, 2018). The medium capable of achieving this is radio.

Radio possesses certain characteristics that make it suitable for community development (Anaeto, 2011). Radio signals reach remote areas, it transcends language barrier and radio receiving sets can be operated with batteries. Hence in the face of rural non-electrification, it is cheaper, portable and can be carried anywhere. Rural broadcasting provides the marginalised rural dwellers an opportunity to express themselves, highlight issues concerning them and their communities, especially in areas such as their environment, economy, health, education, agriculture, culture, and religion (Ekweme and Akpan, 2011). It is recommended that the mass media be actively involved in setting the agenda, thereby effectively managing the communication process in terms of informing and educating the public.

Clarification of Terms

Community development: for the purpose of this paper refers action that helps people to recognize and develop their potential to organize themselves to respond to shared problems. It supports the establishment of strong communities that promote social justice and help improve the quality of community life.

Communication management: this refers to the way in which the communication system of a country or region is organised and run. In the context of this paper, communication management would therefore mean the way radio broadcasting is organised and run in Nigeria.

Local radio: can be defined as a radio station established within the geographical area of a community, which produces and broadcasts in local language, programmes that address the development needs of members of that community, with their active participation.

Community radio: refers to the radio broadcasting established, managed and transmitted either by a group of people in a community, a community-based organisation or a trust established by all the members of that community (Ekweme and Akpan, 2011). It is important to note that every community is local where it is. Therefore local radio and community radio can be used interchangeably.

The idea of community radio broadcasting came into Nigeria with the liberalisation of broadcasting in 1992. Prior to that year, broadcasting was an exclusive undertaking of the governments at the centre and the states. No private individual or organisation was allowed to partake in the industry, because the government considered it too risky to national stability, to allow private ownership of broadcast stations, given their power and influence. However, grudgingly yielding to massive internal and external pressures to liberalise the industry and allow private participation, the Federal Government enacted the enabling Decree No. 38 of august 1992 (now Act 38 of 1992 as amended), which established the National Broadcasting Commission (NBC), a body entrusted with the delivery of private broadcasting in the country.

The National Broadcasting Commission produced the NBC code; a document containing the policy guidelines, mission, vision, guidelines, objectives, powers and functions of the commission, including licencing, monitoring, supervision, charges and other details regarding private broadcasting in Nigeria. The code makes elaborate provision for applying for and obtaining different kinds of licences which are issued to interested private individuals and organisations, including licence for community broadcasting. Chapter nine of the Nigeria Broadcasting Code is dedicated to community broadcasting.

Local radio has the capability to bring about improved quality of life for the community members and enhance a sustainable community development (Anaeto, 2011). That is, with the proper use of community media, it is expected that local community radio will empower individuals and groups to engage in development activities by providing them with skills and knowledge. It will bring the people together in common self interest, thereby enhancing community spirit. In addition, it will foster responsible local leadership.

The focus of this study therefore is on rural community radio, to find out, in practical terms, how rural community radio broadcasting has helped to achieve community development which is expected to translate into national development. The study uses a local radio station as case study. The radio station is Orisun FM, located Ile-Ife, Osun state.

Orisun FM

Orisun FM station was established in 2007 by the Osun State Government. Located in Ile Ife – a semi-rural community, it broadcasts only in the unique Ife dialect of Yoruba language. Ile-Ife can be described as a small semi-

rural community in Osun state. It has a population of 167,254. An ancient Yoruba town, believed to be where the Yoruba race originated from. Ile-Ife is home to the Obafemi Awolowo University, a Polytechnic, primary and secondary schools. Apart from the University staff and students who live within and around the campus, the larger part of the town is occupied mainly by indigenes and non-indigenes, who are mainly farmers, petty traders and civil servants.

Objectives

1. To ascertain the level of participation of community members in the programmes of the radio station.
2. To find out the extent to which the radio station is meeting the development needs of its community, in the areas of agriculture, economy, health and education.
3. To determine the extent to which the radio station is bringing the needs of the community to the attention of the government.
4. To find out the level of government response to the needs of the community members, brought to its attention by the radio station.

Method

The method adopted for the study is survey. The population of study were adults in Ile Ife community of Osun State, aged 20 years or above. The researchers chose adults who are aged 20 years or above because the researcher believes that persons that fall within this age bracket would be able to assess the impact which the local radio station in their community have on them. A total of 334 respondents was studied in Ile Ife community.

The study employed two sampling techniques – simple random sampling and purposive sampling. The simple random sampling method was used to select the areas in Ile Ife, where questionnaire were distributed. The purposive sampling was used to determine to whom questionnaire were administered. These are adults aged 20 years or above.

The instrument used for the collection of required data for this study was questionnaire. In this study, open-ended questions were asked, which gave respondents the opportunity to express their views on how the local radio station in their community has impacted them. They also had the opportunity to mention, in specific terms, what programmes they have participated in, what programmes they listen to and how those programmes have impacted them.

Findings

Data collected was analysed with the Statistical Package for the Social Sciences. This was necessary, in order to present the data collected in a manner that would facilitate meaningful analysis and interpretation. *The data is presented using frequency distribution tables.*

Table 1: Level of participation in station's programmes

Response	Percent
Yes	55.4%
No	44.6%
Total	100%

Table 1 shows that the number of respondents who participate in the station's programmes is more than those who do not participate. They participate in the programmes mainly by phoning in, while the programmes are on air. Beyond that, they have at one time or the other suggested programmes personnel of the station because, they believe people would have something to learn from the programmes they suggested, as their suggestions would promote unity,

development, good governance and improve the quality of service of the station.

Table 2: Impacts of agricultural programmes

Responses	Percent
Teach small scale farming	42.2%
Encourage youths participation in agriculture	24.1%
Encourage gardening	9.5%
Teach preservation of farm produce	24.2%
Total	100%

The agricultural programmes generally encourage youths in the community actively involved in agriculture. The programmes also let them see the possibility of diversifying within the agricultural sector in to animal husbandry, poultry and fishery.

Table 3: Impacts of educational programmes

Responses	Percent
Teach how to read and write in Yoruba language	13.1%
Preservation of Yoruba cultural heritage	52.3%
Inform and enlighten on current affairs	8.4%
Encourage adult education	26.2%
Total	100.0

The educational programmes teach the people to read and write, where the tutors on air use the same materials as those circulated among interested community members. They also serve as avenues for teaching the young ones about the rich culture of Yoruba people. In addition, community members are kept up to date with happenings in the country and the world at large.

Table 4: Impacts of health programmes

Responses	Percent
Create awareness on government health policies	25.3%
Encourage and mobilize for children immunization	21.1%
Enlighten on good nutrition	10.5%
Teach on hygiene	15.8%
Encourage proper care for children and the aged	9.5%
Teach on prevention of HIV/AIDS	17.9%
Total	100.0

The health programmes offered by the station touch on issues of children immunization, teaching on the importance of good nutrition, personal hygiene and environmental sanitation. They also enlighten the community members on prevention HIV/AIDS.

Table 5: Impacts of economic programmes

Responses	Percent
Teach entrepreneurial skills	42.2%
Inform of market days	28.9%
Teach on investment	23.3%
Monitor and inform of prices of goods in the market	5.5%
Total	100%

The economic programmes teach entrepreneurial skills to the people, teach them how to investment and suggest investment opportunities to them. The programmes also inform them of market days for markets within and around the community; monitor the markets and inform them of prices of goods. This is done to help members of the community make wise purchasing decisions.

Table 6: Extent to which the station has drawn government's attention community needs

Responses	Percent
The station draws government's attention to community needs	80.4%
The station does not draw government's attention to community needs	19.6%
Total	100%

Table 6 above shows that majority of the attest to the fact that the radio station helps them to respondents draw the attention of the state government to the needs of the community.

Table 7: Level of government's response to such needs

Responses	Percent
Government responds to such community needs	74.5
Government does not respond to such community needs	25.5
Total	100.0

The above table reveals that government has in most cases responded to the community needs brought to its attention by the radio station. Those needs that government has attended to, include provision of transformers, proper waste management and provision of adequate security where there is threat to security.

Conclusion and Recommendations

The information gathered show that the radio station, through its programmes, is addressing the development needs of the people. It does do this in the areas of education, agriculture, economy and health. The people are encouraged to enroll their children in schools, while the illiterate adults are taught how to read and write through the radio stations. The younger generation is taught indigenous proverbs and wise sayings, in order to preserve the Yoruba cultural heritage. The station has called the attention of state and local government to the challenges in the community. The people of the community attest to the fact that the station has brought positive changes to their lives.

It is therefore recommended that, in order for the radio station to function better and maximise its potentialities for national development in Nigeria, the government should modify the radio communication management across the country. This can be done by setting up radio stations in rural communities, training members of those communities on how to ensure smooth day-to-day running of such stations, and allow the people to take charge of such radio stations, without any political interference.

Alternatively, rural communities can form partnership with government to set up rural community radio stations, operate together and later transferred completely to the communities, as their own properties. It is also suggested that the Federal government should make licence for rural community radio either free of charge or reduce the cost, to make it affordable for the rural people to obtain. When these are achieved, community radio will be able to contribute more meaningfully to community development. If the similar effects are generated in all or most rural communities in Nigeria, national development will not be farfetched.

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Redefining Community Radio Broadcasting in Nigeria

[1]Funke OMOLE
Covenant University, Ota, Nigeria
olufunke.idowu@covenantuniversity.edu.ng

[2] Rotimi OLATUNJI
Lagos State University, Lagos, Nigeria
olatunjirotimi@gmail.com

[3]Olusola OYERO

Covenant University, Ota, Nigeria,
olusola.oyero@covenantuniversity.edu.ng

Abstract

The media communication management system in any nation cannot be isolated from the system of government the nation operates. Hence, the media system cannot function beyond the extent to which government permits it, whether explicitly articulated or implied. The prolonged reluctance of the Nigerian government to allow community radio operation in the country lends credence to this fact. The existing system of radio broadcasting in Nigeria is incapable of enhancing participation, which is a major characteristic of democracy, especially at the grassroots. This has been the situation, despite the fact that radio has attracted the attention of media scholars and civil society, as a viable tool for national development. The potentiality of community radio is at the bottom of the concerted advocacy for the third of the three-tier structure of broadcasting in Nigeria – community broadcasting, to take off in the country. The paper takes a retrospective, circumspective as well as a prospective look at the narrative of community radio broadcasting in Nigeria. Going forward, the paper calls for a redefinition of community broadcast communication management. The redefinition proposed is not totally characteristic of the conventional community radio which has no government involvement, but that which will fit into Nigeria's peculiar situation. Secondly, the redefinition recommends a change in the habitual emphasis on rural communities when it comes to community radio advocacy. The rising figures of rural-urban migrating populations makes community radio relevant, not only for the rural populace but also the information poor, semi-urban and urban settlers.

Keywords: Radio broadcasting, communication management, community radio, advocacy, redefinition

Introduction

In Nigeria, the media communication management system is composed of the print and broadcast media. The print media comprise mainly newspaper and magazine, while the broadcast comprise radio and television. However, the focus of this paper is on radio. Radio, being the first broadcast channel, started in Nigeria as a colonial venture in 1932 (Akingbulu and Bussiek, 2010). The overseas service of the British Broadcasting Corporation (BBC) was relayed through wired system with loudspeakers at the listening end. The service was referred to as Radio Diffusion System (RDS). The RDS metamorphosed into the Nigeria Broadcasting Service (NBS) in April 1951. As a result, NBS began broadcast services in Lagos, Ibadan, Kaduna, Kano and Enugu on short wave and medium wave transmitters. The creation of more states in 1991 led to a proliferation of radio stations in Nigeria. This made every state in Nigeria to own and operate at least one radio station (Ojebode, 2009). The broadcast industry was deregulated in 1992, and that opened the industry to private broadcasters and further proliferation of radio stations in Nigeria.

For a developing country like Nigeria, the role of the media goes beyond information and entertainment. But to serve as tools for learning, education and cultural expression in the various communities (Dare, 2000). Also, as a multilingual

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country, the mass media in Nigeria are expected to provide the critical function of national integration, which is a precursor for development (Omole and Olatunji, 2019). The goal is social development which, translates into improved life for the people (Anaeto, 2011). The medium identified as capable of achieving this goal is radio.

In recognition of the need for a change in the media communication management towards national development, media scholars and non-governmental bodies both from within and outside Nigeria have engaged persistently in the advocacy for community radio in Nigeria. How has the advocacy fared? What is the present situation with community radio broadcasting in Nigeria? And how can we make a headway in this situation? These are the major questions this work tries to answer.

Radio Broadcasting in Nigeria

The numerous radio stations in Nigeria should put her in a vantage position for effective dissemination of information, but the opposite is the case. Most of the radio stations are situated in the major towns and cities. The Federal Radio Corporation of Nigeria, which is the national radio network has its stations located in either the state capitals or major towns in the states. The state owned stations also operate from the state capitals and the private stations, which are fully commercial, operate in major towns and cities across the country. The situation is same for television and newspaper channels of communication.

The media occupy a decisive place in the mobilization of the population, be it urban or rural, for development purposes. This is particularly so with radio in the mobilization of the rural population. Radio is an inexpensive medium of mass communication with a comparatively simple technology that makes it more suitable for illiterate and peasant communities (Anaeto, 2011).

Importantly, journalism in Africa is basically an urban phenomenon. Helping to maintain this urban posture is the fact that almost all media outfits are located in the urban areas, with little or no reporters in the rural areas (Udoaka, 1998). The present structure of the media of mass communication in the country does not cater for the information needs of the rural population. This urban centred media system still reflects a mass media dysfunction where there is a clear demarcation between a segment of the population that benefits from mass media information and the other segment that does not. The urban media are found culpable for their overbearing coverage of the cities, political news, the government and its officials (Oso, 2002). Their contents appeal mainly to the urban dwellers, with little or no relevance to those living in the rural areas.

The existing system of radio broadcasting in Nigeria is incapable of enhancing participation, which is one major characteristic of democracy, especially at the grassroots. The situation therefore necessitates a restructuring of the mass media to give room for grassroots access and participation in the national communication system**.** Among others reasons, the historical philosophy of community radio has been to use the medium as the voice of the voiceless, and to serve communities that have not been reached and served by conventional communication structures (Wabwire, 2013). Therefore, to ensure grassroots participation and integration into the national media system, the need for community radio becomes imperative.

Theoretical Framework: Democratic Participant Media Theory

The democratic participant media theory is a development oriented theory, introduced in 1987 by Denis McQuail. The theory advocates the democratisation and decentralisation of the media to give opportunity for easy access and popular participation. The central tenet of the theory is that the interests, aspirations and needs of the audience must be the guiding principle for media operation (Moemeka, 2000). The theory advocates media pluralism to allow for grassroots access and participation in the media (Baran and Davis, 2009). It states that individual citizens and minority groups also have the right of access to media and so the media should serve them accordingly.

The theory proposes communication management that allows the establishment of 'small media' by groups and local communities in order for them to meet their needs and that potential media users can have easy access to them. The theory believes that it is such media that can raise the people's aspiration to self-actualisation and grassroots development. The assumption is that the gauge for measuring real development should be the level or the standard of living of the underprivileged. Hence, the theory favours horizontal communication, that is interactive and participatory, rather than vertical communication (Moemeka, 2000 and Anaeto, Onabajo and Osifeso, 2008). The localised mass media method of development communication which, stresses rural community radio, draws strength from the Democratic-Participant

theory. Therefore, the democratic participant theory offers a strong theoretical underpinning for community radio broadcasting in Nigeria.

Community Radio in Nigeria: The Journey so Far

Community radio holds tremendous development potentials for every community and nation where it operates. Ajibade and Alabi (2017) identify some key areas in which community radio can help promote development in Nigeria. They are good healthy living, improved agriculture, adult literacy, environmental sanitation and peaceful co–existence in the culturally pluralistic Nigerian society. Community radio will serve as the voice of the voiceless and give grassroots people a say in the running of the affairs of their locality as well as their country, as it bridges the gap between the government and the governed.

The idea of community broadcasting came into Nigeria with the liberalisation of broadcasting in 1992. Prior to that year, broadcasting was an exclusive venture of the governments at the centre and the states. No private individual or organisation was allowed to partake in the industry. However, in 1992, the Federal Government enacted the enabling Decree 38 of August 1992 (now Act No. 38 of 1992 as amended), that established the National Broadcasting Commission (NBC), a body entrusted with the delivery of private broadcasting in the country.

The National Broadcasting Commission produced the NBC code; a document containing the policy guidelines, mission, vision, guidelines, objectives, powers and functions of the commission, including licencing, monitoring, supervision, charges and other details regarding private broadcasting in Nigeria. The ninth chapter of the Nigeria Broadcasting Code is dedicated to community broadcasting. In its 2006 review, the code made elaborate provision for applying for and obtaining different kinds of licences which are issued to interested private individuals and organisations, including licence for community broadcasting. The review was part of the responses of government to the unrelenting advocacy, especially from the academia and civil society, for community radio in Nigeria. Five phases were identified in the advocacy (Ojebode and Akingbulu, 2009).

Phase I: Academic Agitation

The advocacy for community radio broadcasting in Nigeria, according to (Ojebode and Akingbulu, 2009), began long before the official formation of an advocacy group. The Nigeria Community Radio Coalition (CRC) was formed in 2003. However before then, researchers and scholars had pioneered the movement for the establishment of community radio stations. Beginning from the 1980s, Ojebode and Akingbulu note that it was common for researchers in the area of development scholars end their articles by calling for community radio to be operational in the country.

There were some factors identified as responsible for the agitation. Towards the end of the 1960s, the dominant paradigm of development witnessed radical failure. Then in the 1970s, development scholars, researchers and policy makers strongly articulated the participatory approach to development. That was the response of Nigerian academics the global rethinking on development. Two, global development in community radio broadcasting, which saw the establishment of community radio stations in many developed and developing countries. The third responsible factor was internal, which has to do with the nature of Nigerian society. The centralised broadcast system has continued to give prominence to the majority and inundate the minority groups. Hence, the need for a localised mass communication channel that will protect and give voice to minority groups.

Phase II: Birth of a Coalition

Nigeria transited into democracy in May 1999. The civil society therefore expected immediate loosening of the bottlenecks to community media ownership and operation. When it became clear that this was not to be, segments of the civil society in Nigeria began organized advocacy.

At the forefront of the movement was the Institute for Media and Society (IMS) situated in Lagos. With the support of Panos Institute West Africa (PIWA) and AMARC, IMS in 2003 began an awareness campaign titled “Building Community Radio in Nigeria”. The partnering organizations set up a committee which drafted and articulated an action plan (Institute of Media and Society, 2006). The committee embarked on full-fledged advocacy to educate the Nigerians on issues pertaining to community radio. It was also aimed to convince the government to see reason for a less demanding, licensing regime for community radio. It organized continuous awareness seminars and forums across the country. Specifically, the coalition requested that the Federal government to introduce community broadcasting, the tier of

broadcasting to which Nigeria is a treaty, according to the provisions of the African Chatter on Broadcasting (ACB). In addition, the coalition requested that the licence fee for community be highly subsidized to make it affordable for rural communities. This is because most communities in Nigeria cannot afford to raise N10 million just to get the licence to start a radio station, and after, begin to raise money for the equipment and day-to-day running.

Phase III: Hopes on the Horizon

In year 2005, the IMS organized an editors' roundtable involving editors from radio, television and newspaper organizations. The roundtable was put together for the Nigeria Community Radio Coalition. Twenty editors from print and broadcast media organizations were involved (Ojebode and Akingbulu, 2009). The activities of the coalition gained support from a lot of civil society organizations and international development partners. Some of those organizations were the World Bank and the Association for Progressive Communications. The Federal Government made known its position on the development of community radio. Hence, it became difficult for the federal government to pretend not to be aware of the specific requests of the coalition. To show its seriousness, the federal government put together a panel with the mandate to prepare policy agenda. The panel was headed by Professor Alfred Opubor, a frontline communication scholar. The panel prepared an all-inclusive policy blueprint for the operations of community radio broadcasting in Nigeria. The areas covered by the framework prepared included the vital such as funding, licensing and monitoring the operations of community radio stations in Nigeria. Federal Ministry of Information and Communication received the policy framework in 2006.

Phase IV: Manpower Development for the Takeoff

Having drafted and submitted the policy framework, the coalition was confident that the government would fulfill its promises about community radio. The coalition therefore began intensive manpower development for prospective staff of community radio stations across the country. The training materials were developed, covering areas like audience research, principles and strategies of community development. At the time, six communities across the country had community radio projects initiated by the CRC. However, along the line, the Federal Government granted licenses for eight campus radio stations. This development generated a shock and heated online discussions within the Nigeria Community Radio Coalition.

Phase V: Hopes Dashed and Denouement

The end of the administration of Chief Olusegun Obasanjo took the progress of the coalition in four years back to the scratch. However, the journey of the policy document left a bitter taste in the mouth of the coalition from that point. From May 2007, the new Minister of Information and other key office holders who were expected to act on the document expressed no interest, neither did they show any satisfactory knowledge of the policy document as well as the process that would birth it. This means the advocacy for community radio had to begin afresh (Ojebode and Akingbulu, 2009).

Ojebode and Akingbulu (2009) however identified some achievements of the advocacy. Beginning with 11 members in 2003, the number of organizations and individuals in the Community Radio Coalition has grown 200. Though the advocates were taken from various backgrounds, awareness was adequately created for community radio broadcasting at the community levels across the country. President Goodluck Jonathan in October 2010, while speaking at the opening ceremony of the biennial conference of African broadcasters - AFRICAST disclosed that the NBC had been empowered to issue community radio licences to eligible applicants.

The situation however persisted until September 29, 2015, when the first community radio station in Nigeria was launched into the airwaves from Lavun community in Niger State. The community radio was supported by World Bank's Fadama II and III projects (Leadership Newspaper, 2015). Till date, there is yet to be another community radio launched in Nigeria. This means that though it can be said that the agitations over the years have yielded a positive result, the impact expected of community radio cannot be felt yet, because only one community in one Local Government Area out of 774 Local Government Areas in the country has a community radio. In fact, the functionality of the one community radio is in doubt, as Ajibade and Alabi (2017) lament that Nigeria remains the only country without a community radio in West Africa despite being the largest and richest country in Africa. Hence, the decades of advocacy for community radio broadcasting in Nigeria are yet to be over. The expectations of the agitators have not been satisfactorily met. Given this situation, the advocacy must continue. There must be a way of getting it, even with the political environment which seems not to favour community radio broadcasting.

Conclusion and Recommendations

No doubt, community radio has a key role to play in giving voice to the many unheard communities in Nigeria, and creating a platform for self-expression and mass mobilization and participation in national development.

However, in view of the challenges of community in Nigeria, there is a need for a redefinition of the concept to suit the Nigerian context. A lot of efforts have been put in by communication scholars and non-governmental bodies at making case for community broadcasting. Faced with these realities, the government can, as service to rural communities, provide financial, material and technical resources to establish small radio stations for people and train them on how to run those stations. This is not without the active involvement of the people who, on their part can provide land for construction of the radio stations and labour during the construction exercise. It means the concept of establishment of community radio, that is, community only establishment will give way to joint establishment. This will be backed by a working policy that clearly specifies that the stations are not government owned, and so government cannot exercise any further influence on those stations. The communities will be responsible for providing the financial and human resources to keep the stations running.

The redefinition recognizes that what is being proposed is not totally characteristic of typical community radio which has no government involvement, but that is what can be obtainable in the country, given its peculiar situation. The redefinition also requires that emphasis on rural communities when it comes to advocacy for community radio, needs to change. Considering that the rural/urban population distribution has changed from what it was in the past. The figures are now 53% rural to 47% urban population, as against 80% rural to 20% urban population in the 80s (World Bank, 2015). The migrating population (many of whom are poor) need to be catered for as well. This makes community radio relevant, not only for the rural populace but also the information poor and/or unschooled, semi-urban and urban settlers.

This redefinition retains major characteristics of community radio - access and participation, nonprofit orientation and community ownership. The adjustment is the establishment which one may argue, can influence ownership. But government will, as a matter of policy, hands off the stations after meeting the required provision of financial and technical resources needed for the smooth take off of the stations, after all it is responsible to the generality of the populace. If government can provide borehole water system in communities without exercising control over its use, if it can construct access roads to villages without interfering in the use of the road, it can and should partner with community members to provide community radio stations without any interference thereafter. This would help to enhance and strengthen the internal communication system in the country.

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Analysing Productivity and Capital Market Performance in Nigeria

Jeremiah O. EJEMEYOVWI
Department of Economics and Development Studies,
Covenant University

Victoria I. OKAFOR
Department of Economics and Development Studies,
Covenant University

Ifeoluwa I. Ogunrinola
Department of Economics and Development Studies,
Covenant University

Barnabas Amu
Department of Economics and Development Studies,
Covenant University
&
E. K. Bowale
Department of Economics and Development Studies,
Covenant University

Abstract

To achieve planned levels of sustainable growth and development, authors in literature have argued that a nation would require a lot of investment, and the capital market is one of the verified channels through which this could be made possible. This study examines the nexus between capital market performance and productivity in Nigeria using secondary time series data from 1981 – 2018. The Johansen co integration and Granger causality tests were employed to test the hypothesis of a long run relationship and direction of causality respectively. The study finds that capital market performance positively affects economic growth in the long run, while the causality result shows the existence of a unidirectional relationship running from capital market performance to economic growth. More specifically, a 1 percent increase in capital market investment will lead to a 5.9 percent increase in productivity in Nigeria. This was corroborated by the Granger causality result. The study concludes that capital market performance plays a major role in ensuring economic growth.

Keywords: Capital Market Performance; Economic Growth; Market Capitalization*; Capital Formation.*

JEL Classification*:* E440, O11, G100, O400.

Introduction

Capital markets have the potential to make positive impact on the economy by mobilising liquid financial assets through intermediation as long term projects compete for adequate financing to steer development targets for the investing nation (Ogunrinola & Motilewa, 2015). Public and private sector agents are the usual promoters of these long tenured projects as they commit financial and other resources to interest sectors such as agriculture, manufacturing, banking, education and health, mining and solid minerals, information and communication technology (ICT). When capital markets are sub-optimally operational, then, it may become very difficult to pool financial resources together with the aim of promoting investments that would drive sustainable growth and development.

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To achieve planned levels of sustainable growth and development, Ekundayo (2002) and Ogunrinola, Edo and Bowale, (2019) argue that countries would require a lot of home-based and foreign investment through monetary channels and capital market investments are one of the varied conduits through which this could be made possible. Undoubtedly, availability of funds that can be invested offers the stimulus for a proficient mix of production factors which aids efficiency in production and guarantees maximum returns. These capital resources fully utilised, provides the platform upon which desirable investments may detail into growth leaning patterns for the investing economy. Capital formation by foreign attraction, or other local means by deploying home-based strategies can be achieved through efficient and effective savings programme, countries, including Nigeria, as many African nations are finding it hard to attract enough external capital or to take advantage of inward strategies to expand their domestic capital base.

While various literature has identified with a number of high points in favour of positive impact of Nigeria's capital market in terms of growth and performance (Nurudeen, 2009), increased domestic private investment flows (Ezeoha, Ebele, & Okereke, 2009), inclusive growth (Ejemeyovwi, Osabuohien & Osabuohien, 2018), other scholarly submissions (Popoola, Ejemeyovwi, Alege, Adu & Onabote, 2017) have questioned the efficacy of the market to progressively steer the desired level of performance in Nigeria. This may be due to, among other reasons, the perceived nature of the Nigerian financial system in general on one hand, and, occurrences of frequent episodes of instability experienced in the capital market over time on the other hand. Further, the choice of approach used in investigating the subject matter and/or, the modelling technique employed may also accrue to the inconclusive results reached so far by scholars on the subject matter. This study therefore explores financial sector-led growth literature and investigates how the performance of the Nigerian capital market can drive sustainable growth and development. Essentially, the study seeks to take a stand on the capital-augmenting role that the capital market is expected to play in a bid to eliminate the hindrances created by finance shortages in as nations continue to pursue economic buoyancy and development. The study period was between 1981 and 2017.

The schematic flow of content of this work follows thus: review of empirical literature is dealt with in section two while theoretical framework and methodology is discussed in the third section. Section four concerns data estimation and interpretation of results while the policy recommendation consistent with the study results are presented in the fifth section.

Methods

Empirical Literature

Making medium to long-term funds available and assessable to private businesses and the public sector usually requires a complex system of intermediation protocols housed in part, by the capital market (Jhingan, 2007 & Ogunrinola, Motilewa, 2015). The financial intermediation role of the capital market ensures that it functions as a body, or framework that adds to socioeconomic growth and expansion of developing and industrialized nations of the world. This market serves as an engine for other sectors within an economy given its capabilities to raise funds for long term purposes and to help expand businesses across the sectors (Osaze, 2000).

Various definitions have emerged, about what exactly the capital market entails. However, popular submissions uphold the idea of a market where securities are traded as the major defining factor which characterises what capital markets are. Some specific illustrations as to what the capital market entails exists in the writings of some scholars such as Osammonyi (2005), whose position dwells basically on the quality of long term financing that the market offers. As an exchange system, according to the writer, high quality financial instruments are offered and used to facilitate the execution of projects which will in turn, drive growth and development of the investing nation. To (Owolabi and Adejare, 2013), pooling, pricing and exchanging risks by economic players are carried out by the intermediating forces of the capital market. Accordingly, the riskiness of the instruments being traded foretells the possible returns from the same such that higher yielding investments are synonymous with higher risks, and vice versa. Ewah, Esang and Bassey, (2009) opined that economic growth can be fostered by appropriate investment in existing securities provided by the capital market. Hence, they point out that if the subscription by populous investors in securities and other financial instruments offered by the market is ensured, growth would inevitably be achieved in the various sectors into which investments were directed. By the mobilisation or pooling together of resources that are long tenured, availability of liquidity, risk diversification, investment transfers, project valuation by capital cost determination, the capital market is able to augment other macroeconomic mercenaries to secure increasing growth trends or patterns (Chinwuba & Amos, 2011).

The stock market and economic growth relationship as studied by Demetriades, Arestis and Luintel (2001) with focus on five developed countries found that the stock market's contribution to the growth of an economy might have been exaggerated. The study hence concluded that bank activities holds higher capacities to spur growth than

the stock market. However, some studies still observe that this position may be argued further, as the proxy for bank performance may have led to misleading results. For instance, using savings as proxy for bank performance may be by itself an inefficient measure, as savings deposit alone do not transform to growth yielding ends; it is the pooling together of these savings and channelling them towards real investments that actually yield growth outcomes. Hence, the actual real effects of stock market on the one hand, and bank performance on the other hand, on economic growth may be seen as an existing puzzle, which begs for a definite score.

Examining the effect of capital markets on developed countries' economic growth Mohtadi & Agarwal (2004) used panel data covering twenty-one years (1992-2012). Market turn-over ratio, it was found, is an important determinant for investments, since higher turnover ratios imply higher liquidity of stocks. This liquidity measure is noted in their work as an important factor for aggregate growth. Furthermore, direct investment (DI) had major positive effects on growth, as was, market capitalisation.

Weighing in on the same area of discussion, Nieuwerburh, buelens and Cuyvers (2006) pointed out that for developed nations, capital markets and economic growth shows long run co-integration. Using Belgium as case study, the research discovered that capital markets showed positive and significant long run association with growth, implying the existence of a well-structured as well as growth enhancing financial markets in Belgium. In an attempt to carry out similar stock market analysis in India, Mishra, Mishra, Mishra and Mishra (2010) used annual time series data for the 1991 to 2010 to investigate the influence of efficiency in the stock market on India's economy. Market capitalization, total market turnover and stock price index were used choice variables. The efficiency of India's capital market, it was found in their study result, had strong linkages to economic growth. Market efficiency, gauged by high capitalisation and turnover ratios accounted for the main effects on growth through the ability to effectively and efficiently mobilise capital and diversify risks accordingly, on an economy wide basis. As market capitalisation gains robustness, India's economy would be set on a guaranteed platform of enjoying increasing growth trends by an efficiently managed capital market, the study reveals.

For Nigeria, Adam and Sanni (2005) embarked on analysing the role of stock market in Nigerian economy using using regression and granger causality. Although there was a one-directional causality among the market capitalisation and GDP, the study found a bi-directional causality relationship happening between market sales and the GDP. More so, it was discovered that market turnover and GDP had a positive and significant relationship hence, it was that concluded government can support the capital market as it impacted on economic growth positively. Ariyo and Adelegan (2005) argued that liberalization of the capital markets helps it to expand nonetheless, the effect on general macroeconomic conditions on the stock market are still ignored. The role of Nigeria's stock market as a means of boosting economic growth was investigated by Obamiro (2005) and it was observed that capital market and economic growth in Nigeria exhibited a positive relationship. The study further proposed that government create a more competitive environment to enable increased stock market performance which in turn lead to increased growth in the economy.

In contrast, the study conducted by Osinubi and Amaghionyeodiwe (2003) showed that stock market is not responsible for any growth in the economy. Similarly, Ewah et al., (2009) discovered that the stock market made no significant contribution to the growth of Nigerian economy following the results obtained from the analysis of the time series data conducted. The study indicated that while the stock market had potentials, its impact on economic growth could not be felt because of the issues surrounding the stock market such as; illiquidity, poor absorptive capacity of the market, low capitalization of the market, presence of fraudulent activities among others. Similarly, Afees and Kazeem (2010) using a time series data set performed a causality test to empirically determine the nature of capital market and economic growth relationship in Nigeria. The key variables employed by the study include market capitalisation, total traded ratio and turnover ratio. The findings of the study showed the absence of a causal relationship between total value added and GDP growth grate which served as the indicator for economic growth whereas, a bi-directional causality existed between market capitalisation and economic growth. Thus, it is evident that the indicators of stock market are sensitive to different variable choice.

From the brief review of scholarly studies on this subject matter, and especially for Nigeria, it is clear that no consensus exist in literature on the nature of influence that stock market has on economic growth with the addition of the monetary policy rate which has been omitted in many studies examining the effect of stock market and economic growth to model actual reality for empirical simulation. Hence, this study adds to knowledge on the influence between productivity and capital market performance.

Theoretical Framework

This study adopts the neoclassical growth theory which emphasizes that the determinants of growth capital accumulation and related saving decision. This model opines that capital and labour are major determinants of

output using the production function. And key variables in the determination of the potency and viability of an efficient capital market.

Thus, the labour-augmenting theoretical framework for this study, the neoclassical growth is expressed in the following production function:

$$Y = F(K, AL) \quad \text{(i)}$$

Where *Y* is Gross Domestic Product (*GDP*), *K* is the stock of capital, *L* is the amount of labour and *AL* is the labour-augmenting technological change, which also implies labour productivity. This model is adopted in this paper because its tenets are easily comprehensible and best explains the functioning of the capital market which is the focus of this research. This model lays emphasis on factors of production and technology as the basis for the functioning of the capital market. The model is also best suited for this research because it combines endogenous factors such as fluctuations in the prices of stocks in the capital market and exogenous variables such as the influence of technology in the explanation of the capital market operations. In other words, it presents a holistic approach in the operationalisation of the capital market.

The model is implicity presented below:

$$GDP_t = f(K_t, L_t, MCAP_t, MONRTE_t) \quad \text{(ii)}$$

The model assumes a non-linear form given the Cobb Douglas functional expression. The equation is expressed in its explicit form as

$$GDP_t = \beta_0 . K_t^{\beta 1}.L_t^{\beta 2}.MCAP_t^{\beta 3}.MONTRE_t^{\beta 4}.e_t \quad \text{(ii)}$$

Taking the double log of the explicit function for linearisation and interpretation, we have:

$$Log\ GDP_t = log\ \beta_0 + \beta_1 LogK_t + \beta_2 LogL_t + \beta_3\ LogMCAP_t + \beta_4 LogMONRTEt + \varepsilon_t \quad \text{(iii)}$$

Where *GDP* represents gross domestic product; *K* represents total capital within the economy proxied by the Gross Fixed Capital Formation; L captures the total labour force; *MCAP* represents market capitalization; *MONRTE* represents monetary policy rate; ε_t represents the disturbance term. β_0 represents Constant term; β_1- β_4 represents parameters to be estimated in the model. Expected *a priori* holds that $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$ and $\beta_4 > 0$.

To achieve the objective of this study, it was paramount that secondary be employed for the analysis. The data was however, sourced from the Annual Statistical Bulletin published by the Central Bank of Nigeria. Other resources employed were sourced from the Nigerian Stock Exchange reviews and market bulletins published by Securities and Exchange Commission.

Results and Discussions

Unit Root Test Result

Time series data are expected fluctuate a lot over the years which is technically referred to as Non-stationarity of the data. To resolve this potential problem, it is common to first check for, and purge the data series form non-stationarity. The Augmented Dickey-Fuller test (ADF) is a common technique used by a large number of researchers to determine whether or a unit root is present in the analysis of time series. This paper consequently adopts the ADF technique to perform the test for stationarity in the data used. Table 1 shows the result of the unit root tests and it can be observed that all the variables were integrated of order one. Hence, we proceed to carry out the cointegration test.

Table 1: ADF Unit Root Test

Variables	ADF T-Statistic Value	5 percent Critical Value	Remark	Order of Integration
LGDP	-4.60345	-2.9511	Stationary at first Difference	I(1)
LMCAP	-4.0969	-2.9511	Stationary at first Difference	I(1)
LMONRTE	-6.8851	-2.9511	Stationary at first Difference	I(1)
LCAPITAL	-3.1842	-2.9604	Stationary at first Difference	I(1)
LLABF	-8.1633	-2.9810	Stationary at first Difference	I(1)

Source: Authors' Computation

Co-integration Test Result

The estimation techniques employed for the cointegration test was the Johansson Cointegration which was designed to determine the existence of long run relationship among variables. Tables 2a and b respectively show the cointegration results.

Table 2(a): Johansen co-integration test result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.848822	109.4208	69.81889	0.0000
At most 1 *	0.684873	62.18837	47.85613	0.0013
At most 2 *	0.548209	33.31890	29.79707	0.0189
At most 3	0.386185	13.45550	15.49471	0.0991
At most 4	0.048921	1.253953	3.841466	0.2628

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Table 2(b): Normalized cointegrating coefficients

Normalized co integrating coefficients (standard error in parentheses)				
LGDP	LMCAP	LCAPITAL	LLABFORCE	LMONRTE
1.000000	-0.059373	-0.566813	-0.409451	-0.228986
	(0.029)	(0.042)	(0.406)	(0.060)

Source: Author's Computation

From table 2a, it was observed that there exist long run relationship among the variables. Further, the normalized co-integrating coefficient as shown in table 2(b). The result shows that the coefficient of capital market (*LMCAP*) is approximately 0.06 which is greater than twice the standard error implying that it is significant at 5% level. Hence, in the long run, economic growth can be proportionately induced by a percentage increase in capital market performance. In absolute terms, the coefficient of capital (*LCAP*) which is approximately 0.57 is greater than twice of the standard error and thus, is statistically significant. Therefore, an increase in capital stock is capable of leading to a proportionate increase in economic growth in Nigeria. Specifically, a one percent increase in capital will induce a more than proportionate percent increase in Nigeria's economic growth. Also, in absolute terms, the coefficient of monetary policy rate (*MONRTE*) which is approximately 0.23 is greater than twice of the standard error and is thus, statistically significant. This therefore, implies that monetary policy rate will statistically impact Nigeria's economic growth in the long run.

Granger Causality Result

Granger causality test helps to determine the direction of causal relationship between variables in a model. Table 3 shows the result of the pairwise causality test between market capitalisation (*MCAP*) and real output (*GDP*) in Nigeria over the period of study.

Table 3: Pairwise Granger Causality Tests
Sample: 1981 - 2016

Null Hypothesis:	**Obs**	F-Statistic	**Prob.**
LMCAP does not Granger Cause LGDP	34	4.22718	0.0245
LGDP does not Granger Cause LMCAP		0.64686	0.5311

Lags: 1
Source: Author's Compilation using E-views 9.0

The result obtained from the test as shown in table 3, reveal that market capitalisation granger causes gross domestic product. This implies that the role of capital market performance is vital to achieve effective and sustainable economic growth in Nigeria. However, it is found from the result that gross domestic product does not granger cause market capitalisation, implying that output in Nigeria does not significantly influence capital market performance. It is therefore, safe to say from this result that a unidirectional relationship exists between capital market and economic productivity. This finding has positive implications for sustainability in entrepreneurship (Ejemeyovwi et al, 2019) and inclusive growth (Ejemeyovwi & Osabuohien, 2020; Ejemeyovwi, Osabuohien & Osabohien, 2008; Ejemeyovwi Osabuohien, Johnson & Bowale, 2019) and overall sustainable development which is one of the major goals to be achieved by Nigeria.

Conclusion

This study was carried out with the aim of determining how productivity in Nigeria is determined by Stock market performance. While focusing on the data available from 1981 to 2016, the study employed the use of Johansen Cointegration technique to determine if a long run relationship existed among the variable and granger causality tests to establish the nature of relationship between stock market and the Nigerian economy. The findings of the study revealed that indeed stock market impacted productivity in Nigeria positively. Hence, it becomes paramount for a country like Nigeria to channel its energy that the financial markets is well developed and rightly positioned so the dividend of stock markets efficiency can be enjoyed by all in the society.

It will do the country a world of good to develop the financial markets as better positions the country to attain the sustainable development goal number 8; decent work and economic growth. It has been observed that finance sector forms a major part of the service industry, and it can be a huge employer of labour should the sector maximise its potentials. Hence, the ensuring that the financial markets is well developed can also bring about significant employment of labour thereby leading to productivity in the country.

On this note, the study recommends that the government should ensure that companies are encourage to enlist in the Stock Exchange markets. Major multinational companies are absent in the Nigeria stock market, that is, Nigerians do not get to share in the wealth of these foreigner as their yearly income is being repatriated to their home country since that is where the stakeholders reside. Therefore, encouraging multinationals to enlist is one of the ways to ensure stock market efficiency and guarantee further productivity in the country. Also, the government need to fortify the financial markets against shocks by ensuring that the market operates in a very stable macroeconomic environment. This is another way to build the confidence of the people to invest in the stock market thereby leading to productivity.

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Investigating Privacy Concerns of Public Wireless Networks At the University of Limpopo

Sifiso R. MALOPE
University of Limpopo, Polokwane, South Africa
sifisorodneymalope@gmail.com

Olebogeng H. NOJILA
University of Limpopo, Polokwane, South Africa
olebogeng.nojila@ul.ac.za

Abstract

Packet sniffing is a problem that affects mostly public Wi-Fi networks where a hacker intercept network traffic such as passwords and email messages to mention a few. The aim of this research was to improve network data security by combating packet sniffing at the University of Limpopo focusing on the Edu-room Wi-Fi. The first objective was to measure the strength of the Wi-Fi against packet sniffing. Secondly, we prevented computers running in promiscuous mode from accessing the Wi-Fi. Thirdly, we detected computers that changed their modes to promiscuous whilst already connected. Lastly, we evaluated the different anomaly detection methods to go with the second and third objectives. The security strength of the Edu-room Wi-Fi against packet sniffing was measured using the Wireshark network packet analyser tool. Secondly, models to prevent and/or detect devices suspected to be implementing the packet sniffing attack were then developed and simulated. The results were recorded for two simulation instances; one to add 50 nodes representing a light load network and one to add 100 nodes representing a heavy load network. First simulation showed a 100% prevention of nodes running in promiscuous mode, meaning that all illegitimate nodes were successfully distinguished from the nodes that are legitimate. Second simulation showed a 100% detection of nodes running in promiscuous mode, meaning that all illegitimate nodes were successfully distinguished from the nodes that are legitimate. The research concluded that the use of an intrusion prevention and detection system would effective in fighting against packet sniffing.

Keywords: Packet sniffing, intrusion detection, intrusion prevention, promiscuous mode.

Introduction

Wireless network security has been the area of focus for the past years (Mitrokotsa & Karygiannis, 2008). Many people are now connected to the global network increasing security risks (Rawat & Messiha, 2003). The increasing deployment of unsafe public Wi-Fi networks is increasing the number of cyber-attack cases (Sims, 2018). A public network is accessible to the public and anyone in the connectivity range (Technopedia, 2019).

Subsection 1.1, will put into detail the problem of packet sniffing in public wireless networks. Subsection 1.2, will outline the effects of the packet sniffing problem, the aim of the research and the objectives to be accomplished by the research. Subsection 1.3 will present the summarised version of the proposed solution. Subsection 1.4 will introduce the methodology that is used in this research including the tools and methods.

Problem Statement

Work done by Legezo (2016) measured the security strength of the security methods. The research concluded that there are many inconsistencies in the methods discussed such that the security strength is degraded and causing doubts about the use of wireless networks (Legezo, 2016). Packet sniffing is a traffic interception or eavesdropping attack that allows the hacker to have access to packets that are transmitted through the network (O'Donnell, 2019).Public networks are more vulnerable to this type of attack since they can be accessed by any individual within the network's coverage since they usually employ less authentication security (Bates, 2016).

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There are two major categories of attacks that an attacker can perform on a wireless network depending on the use of the intercepted traffic namely active or passive attacks. The first being the active sniffing attack. With active attacks, the attacker modifies the information being transmitted (Spangler, 2003). Secondly is the passive sniffing attack. With passive attacks, the attacker does not alter the information but intercepts the information with the intention of reading and analysing (Eslami & Kitindi, 2007).

The packet sniffing attack is possible because of two conditions, that is, network connectivity and the intercepting device's ability to run in promiscuous mode (Sanai, 2001). Promiscuous mode is one of the eight modes a computer's Wireless Network Interface Card (WNIC) can run in (Rouse, 2007).Promiscuous mode allows a computer to capture traffic from a network the Network Interface Card is connected to (Trabelsi, et al., 2004). A hacker that is connected to the target wireless network can run their Network Interface Card in promiscuous mode and also run a packet analysis tool to collect packets form the network (Fu, 2017).

Rationale and motivation

Reasons to solve the problem

The South African's right to privacy law in section 14 of the Constitution gives an example of the restrictions that underlie some of the privacy concerns (van der Bank, 2012). Governments and organizations have lost a lot of money through cyberattacks and also through the costs of security measures having to be put to place to combat these attacks (Sobers, 2019). Moore-Colyer reported that packet sniffing attack was used in a Starbucks restaurant public Wi-Fi to pass a malware program to the users of the coffee shop's wireless network to mine crypto-currency (Moore-Colyer, 2017).

Aim

- The research aims to improve network data security by combating packet sniffing at the University of Limpopo Edu-room Wi-Fi. To accomplish this aim, a few objectives have to be addressed.

Objectives

- Determine the strength of the current security implementations of the Edu-room network against packet sniffing attacks.
- To prevent computers that are deemed malicious or have their Wireless Network Card running in promiscuous mode from accessing the network.
- Detect computers that are deemed malicious or have their Wireless Network Card running in promiscuous mode already connected to the network.
- To evaluate the different anomaly detection methods

Proposed solution

The solution proposed in this research is the Intrusion Prevention and Detection System (IPDS). The system is used to identify and remove devices that are a potential threat to the network traffic. Prevention is a security scheme which attempts to prevent attacks from becoming successful after being initiated. The detection scheme detects malicious activities and takes action from the detection. Applying these two schemes in a combined manner improves their security strength and eliminates some of the disadvantages of each scheme.

Methodology

Research Design

Tools

This subsection provides a detailed description of the tools, software and programming language used in this research experiment to ensure the good flow of the research.

Edu room Wi-Fi

The Edu-room network of the University of Limpopo Wi-Fi was used in the data collection part of the research. Edu-room is a Wi-Fi network that was provisioned to be used by students in tertiary institutions.

Acer Intel® Core™ i5

The Acer Intel® Core™ i5-62000U CPU @ 2.30GHz 2.40GHz 64bit laptop with 8GB RAM and running Windows 10 Education version was the primary tool used to collect data on the Edu-room Wi-Fi. The Acer laptop also has a Wireless Network Interfaces Card with the ability of the card to run in promiscuous mode. The Acer laptop also meets the MATHLAB IDEs minimum system requirements.

Wireshark network packet analyser software

To capture the data a free open-source network packet analyser called Wireshark was used. Wireshark is an open-source network packet analyser intended to be used by network administrators for network diagnostics, network protocol analysis and network security problems but has been also used by malicious users to implement several types of attacks including the packet sniffing attack (Verma, 2015).

The reason for picking the Wireshark tool is the simplicity of its User Interface and being able to easily execute complex functions to implement a packet sniffing attack. Another advantage of using Wireshark for packet sniffing is that it automatically changes the Wireless Network Interface Card to promiscuous mode.

MATLAB simulation IDE

MATLAB is a multi-paradigm numerical computing environment and proprietary programming language developed by Mathworks (The Mathworks, Inc, 2019). The reason for using this platform is that it is suitable for simulations (The Mathworks, Inc, 2019).

The MATLAB programming language

A programming language developed by Mathworks to be used on MATLAB was used in developing the simulation. The reason for choosing this programming language is that it is easily compatible to be used with the MATLAB environment.

Data collection sites

The collection of data requires that the computer used for the collection be strongly connected to the Edu-room Wi-Fi network meaning that the location should be within the Wi-Fi range. The researcher has chosen the Computer Science Laboratory located within the Maths Building of the University of Limpopo Turfloop campus.

Data sources

The primary data source was the university's Edu-room Wi-Fi network since this is the intended target of the proposed solution in this research. Secondary data sources included the publication of other researchers and this source was used to intensify the solution proposed by the researcher.

Data collection technique

Preliminary data

Firstly, we had to be connected to the network with the device which is used to capture the packets. Secondly, the machine has to be running in promiscuous mode. Lastly, Wireshark was run on the machine which was used to capture the packets and configured to capture traffic from the wireless interface.

Final data

The simulation must be run in a controlled environment in order to be able to measure its performance without external interference such as people interruptions, and computer hardware failure. The simulation also needs to be run twice in order for a heavy and light load to be attained. The time to run each simulation will be measured and also the detection performance has to be recorded for both instances of the simulation.

Data analysis

The first part of the analysis was about how easy it is to implement a packet sniffer attack. This first analysis is to be done in order to rate the strength of the security of the current security implemented on the Edu-room Wi-Fi network. The second analysis included the results yielded by the simulation. The rate of success and error of the model is detailed in a table and compared when the simulated network has a small (at most 50 number of nodes) or large (at least 100 number of nodes) to connect.

Mode Filter Solution Model

Packet sniffing is possible because of two conditions, namely:

- The malicious machine must be connected to the target network.
- The malicious machine must be running in promiscuous mode.

The method to avoid packet sniffing that is proposed in this research includes eliminating the ability of a computer machine to connect to the wireless network while running in monitor mode. To do this, the machine will have to be scanned if it is running in promiscuous mode while trying to connect to the wireless network. During the connection, the computer machine would have to be regularly checked to identify its NIC mode.

Prevention method: When trying to connect to the network

The filtering occurred just before connecting to the Edu-room network. A computer trying to connect to the network will first pass the Mode Filter solution. If a computer is running in normal mode which is the allowed mode or the mode deemed not harmful to the network users, the computer will be allowed access to the authentication step and will continue to access the network upon successful authentication.

Detection method: When already connected to the network

The filtering will occur when the computers are already successfully connected to the network. Regular checks will be carried out on the devices connected to the network and the devices found to be running in promiscuous mode are blocked.

Reaction method

If a computer node is found to have their Wireless Network Interface Card running in promiscuous mode, the computer will be blocked from progressing to the authentication step and a warning or error message will be sent to the malicious computer.

Challenges

This section will give details of the challenges that were to be overcome during the research.

Problem 1

The first challenge was carrying out a packet sniffing attack on the Edu-room Wi-Fi. The University of Limpopo ICT department does not allow capturing of information or traffic from the Wi-Fi network. The solution was to make an assumption that if the Wi-Fi allows connection with promiscuous mode turned on, then packet sniffing is possible.

Problem 2

The second challenge was with the MATLAB simulation software. Mathworks provides a 30-days trial version of the software that was used up before the completion of the simulation. The solution that was applied was to use the campus-licensed version of the software which is available in the University of Limpopo computer laboratory.

Results and Analysis

Results

Preliminary Results

In response to the restriction to carry out instances of packet sniffing on the real Edu-room Wi-Fi, an assumption had to be made in order to obtain the data and continue with the research. The results show only one instance of the packet sniffing attack that is implemented on the network.

Assumptions

The assumption was that if the first two important steps of implementing a full packet sniffing attack are not detected by the current security implementation of the wireless network, then packet sniffing can be carried out. The two steps are connecting to the network with the computer's Wireless Network Interface card running in promiscuous mode and successfully being able to open a packet sniffer software such as Wireshark.

Results

The Edu-room Wi-Fi was found to be 100% susceptible to packet sniffing attacks. The network does not implement any defence against the attack whether it is prevention or detection of the attack. The computer was able to connect to the Edu-room network whilst having its Wireless Network card running in promiscuous mode.

Final results from simulation

The following subsection gives details about the performance of the simulation against packet sniffing when 50 nodes and 100 nodes are to connect to the network.

Prevention performance

Figure 1.1 shows a graphical representation and summarises the information from both the 50 nodes and 100 nodes simulation run for the prevention mechanism.

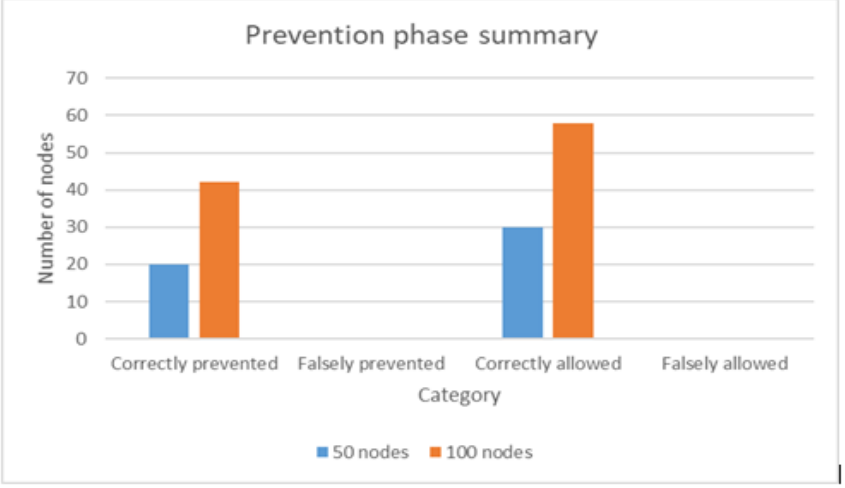

Figure 1.1: Prevention phase summary graph

According to the above graph when the simulation was deployed with 50 nodes, 20 modes running in promiscuous mode were correctly detected and decline access to the simulated network. No legitimate nodes or nodes were falsely declined access or falsely accused of running in promiscuous mode and all 30 of the legitimate nodes running in normal mode were allowed access to the simulated network. No nodes were allowed to the simulated network while having running promiscuous mode.

According to the graph when the simulation was deployed with 100 nodes, 42 modes running in promiscuous mode were correctly detected and decline access to the simulated network. No legitimate nodes or nodes running in normal mode were falsely declined access or falsely accused of running in promiscuous mode and all 58 of the legitimate nodes running in normal mode were allowed access to the simulated network. No nodes were allowed to the simulated network while having running promiscuous mode.

Detection performance

Figure 1.2 shows a graphical representation and summarises the information from both the 50 nodes and 100 nodes simulation run for the detection mechanism.

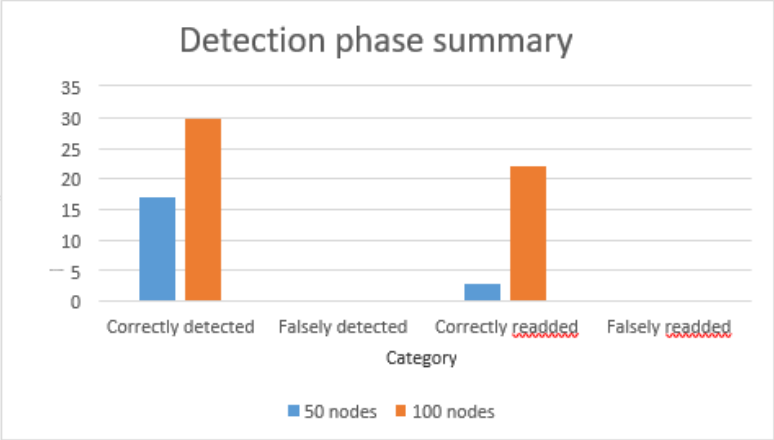

Figure 1.2: Detection phase summary graph

According to the graph when the simulation was deployed with 50 nodes, from the updated data, 17 nodes were detected to have changed their mode to promiscuous mode and none were falsely detected or falsely accused. For

the re-addition process, 3 nodes were successfully added and no nodes were added while running in promiscuous mode.

According to the graph when the simulation was deployed with 100 nodes, from the updated data, 30 nodes were detected to have changed their mode to promiscuous mode and none were falsely detected or falsely accused. For the re-addition process, 22 nodes were successfully added and no nodes were added while running in promiscuous mode.

Overall performance

This subsection will combine the performances of each scheme and summarise the entire performance when the schemes are working as a singular method of fighting against packet sniffing.

Table 1 below, shows the success rate, failure rate and time on the performance of the simulation.

Table 1: Summary of overall performance

Number of nodes	Negative but Detected	Positive and Detected	Positive but undetected	Time
50	0%	100%	0%	2min 2sec
100	0%	100%	0%	4min 4sec

The first row shows the simulation results when the simulation was run with 50 nodes and the second row shows the simulation results when the simulation was run with 100 nodes. The results prove that the system has a 100% detection rate meaning that all the nodes that were running their Network Interface Card in promiscuous mode are successfully detected.

The new component of the results is how the solution would perform looking at time as a factor under the different network loads. The results proved that the time to detect nodes that are running in promiscuous mode would double if the network load doubles.

Conclusion and Recommendations

Measure the current strength of Edu-room

The results from the test proved that there was a 100% success rate of implementing the attack. This proves that the Edu-room Wi-Fi is 100% susceptible to packet sniffing attacks.

Prevention of promiscuous mode

The results of the simulation showed a 100% prevention success rate. According to the simulation, all nodes that were running in promiscuous mode were denied connection to the network. The simulation showed a 100% success rate for granting access to computers that are not malicious. The conclusion is that we have successfully prevented all malicious computers using the Mode Filter solution.

Detection of promiscuous mode

The results of the simulation showed a 100% detection success rate. According to the simulation, all nodes that were running in promiscuous mode were denied access and removed from the network. The simulation showed a 100% success rate for granting access to computers that are not malicious. The conclusion is that we have successfully detected all malicious computers using the Mode Filter solution.

Anomaly detection

The anomaly detection algorithm was then not reported on this document but is still open and might be considered a focus for further research. The lack of data or experimentation leads to a failure to conclude about this area of the Mode Filter solution and thus the solution is incomplete.

Summary of results

The simulation results proved the Mode Filter solution to be an efficient solution to deploy against packet sniffing. When the simulation was run there was a 100% detection and prevention success rate for the Mode Filter in both light and heavy network load. An increase in network load, however, caused the response time of the solution to directly increase. This is however expected since the number of nodes to search through and investigate increases.

Contribution to scientific knowledge

The research has come closer to the elimination of the packet sniffing attack. The research can be used as a guideline on which security schemes to be applied to combat packet sniffing.

Limitations of the study

The restriction to use the real Edu-room Wi-Fi network to implement the packet sniffing attack to measure its resistance against packet sniffing has led to a formulation of an assumption about the connectivity offered even if promiscuous mode is used. The MATLAB simulation tool has no capabilities of simulating a real-life network with the generation of network traffic. MATLAB cannot be thus used for this function and a better simulation tool or real network has to be used.

Recommendations

Firstly, the response time or the time it takes to detect and prevent malicious nodes. The time is directly proportional to the network traffic load meaning that an increase in the network load would cause the Mode Filter to be slower in the detection and prevention of malicious modes. Secondly, because of the restrictions to deploy the Mode Filter on the live Edu-room Wi-Fi, we were unable to develop or improve a real anomaly detection algorithm. The anomaly detection algorithms are an open area of research since the best or 100% efficient anomaly detection algorithm has not yet been developed.

Conclusion

We found out that the Edu-room is susceptible to the packet sniffing attack and no defence mechanism is implemented to stop it. The research proved a 100% success rate for both the detection and the defence mechanism that is proposed in this research in combating packet sniffing. This research has realized that the use of combined or hybrid schemes is an efficient way to eliminate the threat.

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Influence of Work-Life-Balance and Spousal Support on Marital Stability of Working Women in Lagos State, Nigeria

Angela C. OKOJIDE, Gbadebo O. ADEJUMO & *Olujide A. ADEKEYE

PhD candidate, Department of Psychology, Covenant University, Ota, Nigeria
bDepartment of Psychology, Covenant University, Ota, Nigeria

Corresponding Author: jide.adekeye@covenantuniversity.edu.ng

Abstract

This study investigated the influence of work-life balance and spousal support on marital stability of women in Lagos State. A sample of 139 working women from secondary schools, hospitals and banks in Lagos State were randomly selected for the study. The participants completed a measure of the work-life balance and spousal support scale. Two hypotheses were raised to achieve the objectives of the study and were tested at p=0.05. Multiple regression was used to test hypothesis one while independent sample t-test was used to test hypothesis two. The results revealed that there was no significant joint influence of work-life balance and spousal support on marital stability of teachers, health workers and bankers {F(2,108)=66.98, p>.01). Spousal support was found to separately influence marital stability (t=1.168, p<.05). There was no significant difference found in the marriage stability of the old and young women. The study concluded that work-life/family balance should be properly maintained since the two spheres are paramount and are sources of life fulfilment to individuals. Spousal support helps women manage their work and marital lives. It was recommended that work-life policies/initiatives should be regularly reviewed and promoted by stakeholders in both public and private organisations for the welfare of employees, especially women. Finally, the study further recommends that social support network should be encouraged among couples.

Keywords*:* Work-life balance, spousal support, marital stability, influence, working women

Introduction

Marriage is a socially acceptable and recognised union between individuals who are committed to one another with great expectations of having a stable and lasting relationship. Couples work hard and aspire to make life satisfactory and fulfilling. To achieve success in marriage requires the efforts and responsibilities of couples. Couples need love, trust, time, friendship, understanding, honesty, support, and effective communication (Esere, Yusuf and Omotosho, 2011). In life, long term and stable marriage are usually taken as a major life goal and a key indicator for well-being (Proulx, Helms, and Buchler, 2007). A stable marriage reflects in the increase of well-being whereas instability is the most stressful life events among couples (Carr and Springer, 2010).

In the contemporary world of work, maintaining a balance between work-life and personal life as well as social support from spouses are contributing factors of marital satisfaction among working women. When couples engage in paid jobs outside the home without adequate time for family life, it may have an impact on their married life. This situation is more serious for women because of the dual responsibilities which they shoulder. In the past, men were considered as breadwinners. They bore the financial obligations of the family. At the same time, the women acted as caregivers, homemakers and solely in-charge of domestic roles, nurturing of the children and family. Still, in the contemporary world, both men and women work in paid jobs, contributing to the financial needs of the family and there is the competition of proving their effectiveness among themselves (Narang, 2014). Despite these, the responsibilities of child caregiving and family responsibilities have not been removed from the woman. It lies solely on the educated, non-educated, working and

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non-working women. The degree of support from spouse plays an important role in the marital quality of married individuals (Cag, 2011). It is therefore imperative for them to enjoy good work-life balance and support from their spouses and other significant persons.

Statement of the Problem

Marital instability is on the increase globally. Africa, however, is said to have recently experienced a high rate of marriage breakdown. It was estimated that between 40 to 50 per cent of all married people end their relationships in divorce (Adeniran 2015; Cherlin, 2010; Ojukwu, 2013; Takyi, 2001, 2003). This situation is found to have socio-economic, psychological and political effects on the couples, children and the society. The existing economic pressures have necessitated that households have multiple income-earners which have made couples and women in particular to experience role conflicts such as trying to balance the demands at work and at home (Ajala, 2017; Asante-Twum, 2014). Lack of understanding and poor spousal support has resulted in different levels of marital displeasure among married working women in Nigeria (Ebenuwa-Okoh and Osho, 2015)

Objectives

The objectives of this study include:

(i) To examine the joint and separate influence of work-life balance and spousal support on marital stability of working women in Lagos State

(ii) Determine the difference in the marital stability of older and younger working women in Lagos State.

Hypotheses

(i) There will be no significant joint and separate influence of work-life balance and spousal support on marital stability of working women in Lagos State.

(ii) There will be no significant difference in the marital stability of old and younger working women in Lagos State.

Review of Related Literature

Marital Stability

Marriage is said to be stable when couples remain legally married without physical separation, legal separation or divorce and unstable when the reverse is the case. Marital stability explains a marital relationship that is steady, firm and strong. It is a relationship where couples fulfil their marital roles (Adejare, Okolie, Musa, Shehu, and Dalhaty, 2019). Marital stability is closely related to but different from marital adjustment, marital quality, marital satisfactory and marital success and at the same time have a co relationship (Mitchell and Plauche, 2016). Satisfactory and good quality marriage leads to stable marriage respectively. According to Abubakar (2016) a stable marriage enjoys: provision, love and companionship, support, procreation, security, care and training. The stability of marital relationships leads to well functioning and balanced family life which consequently leads to well-adjusted and progressive society (Echebe, 2010). Marital stability is important to women and men because it promotes high level of productivity at both work and home and help to harmonise family and work life (Reddy, 2015).

Africa, however, is said to have recently experienced high rate of marriage breakdown as a result of the influence of western culture, civilisation, urbanisation, economic growth and development which have given rise to nuclear family system and to the breakdown of extended family system which was the former platform for resolution of marital conflict (Adeniran, 2015). Some other common factors responsible for marriage breakdown may also include: lack of communication, work-life imbalance, financial issues, infidelity, poor spousal support and commitment, unsatisfactory sexual life, child-rearing concerns, employment, among others and these have devastating effects on couples, their children and society at large.

Work-life Balance

Work-life balance is an individuals' capacity to successfully go through the huddles of work and non-work lives. A state where the women's work-life balance is described as "good" work-life is when they are able to maintain a balance between their work and other non work commitments (Moore, 2007). Sometimes, reverse is the case. These roles tend to drain them and cause inter-role conflict. When women are not able to strike the expected balance with these multiple roles (jobs, family, in-laws, spouse, friends) it may become difficult and stressful which could lead to anxiety, depression, emotionally unstable, and an unstable person (woman) may become irrational, abusive, frustrated, nagging wife, poor communicator, sick, unhappy, leading to instability in the home. Van Steenbergen, Kluwer and Karney (2014) believe that workers who enjoy good work-life balance usually pass it to family members, especially their spouses and enjoy friendly and optimistic interaction with them.

Spousal Support

One of the negotiator variables in the relationship between recognised conditions of role strain and marital life is spousal support (Neff and Karney, 2005). Spousal support is a coping resource that is critical and important to daily activities which communicate attention and concern. Spousal support is an extremely important parameter in the experience of work-life conflict. Individuals who enjoy support are less likely to overset role demands into conflict (Carlson & Parrewe, 1999). Halbesleben, Wheeler and Rossi (2012) describe spousal support as a pertinent ingredient for female employee work-life balance. The way couples provide daily support for each other is very important in marital functioning. Reevy (2007) opined that spousal support is very important in the romantic and marriage relationship, preventing conflict and instability among couples. Spousal support is a part of social support which includes advice-giving, information, emotional support, financial, helping to cope with problems (Yildirim, 2004). Social support can also take different forms such as emotional, esteem, information and instrumental support. While emotional supports are characterised by empathy, paying attention, listening and hugs, esteem supports are shown in the communication of confidence. Information supports and shares news/advice that will be beneficial to the needs of the receiver and then, instrumental supports are things that others physically do or provide to assist. It can come in the form of tangible things like gifts, physical cash and helping to cook or wash. Support spouse connotes that the partner is cherished, dear, valued and cared for (Cag and Yildirim, 2013).

Work-life balance and Marital Stability

Metwaly and El-Maksoud (2018) reported that female nurses had low quality of work-life balance as they experience stress at work as well as low level of marital adjustment, which negatively affected their marital stability. Also, Adisa, Mordi and Mordi (2014) studied the challenges and realities of work-family balance among female Doctors and Nurses and found several workplaces and domestic problems threaten female doctors and nurses in their struggle to balance work and family commitments. The culture of long working hours and high workload are common problems among employees in Nigerian banking sectors (Epie, 2011 cited in Orogbu, Onyeizugbe, and Chukwuemeke, 2015). These result in women's inability to spend quality time with family. Studies show that working women could not maintain a good work-life balance as it was difficult to squeeze out time for hobbies/leisure activities or maintain friendship and extended family relationships (Delina & Roya, 2013; Olowookere, 2020). The same study revealed that most women hardly spend enough time with their partners because of the pressure and long hours of their work which has resulted in a strained relationship with their partners. Ashwini (2018) indicated a significant relationship between work-life balance and marital satisfaction.

Spousal Support and Marital Stability

Studies have looked at the association between spousal support and marital relationship and found significant relationships (Cag and Yildirin 2018; Stinson et al., 2017; Vural-Batik and Kalkan, 2016). However, Tas and Batik (2019) found that married working women had higher perceived spousal support than non-working married women (M=62.3). Besides, married working women recorded higher marital satisfaction (M=38.14) than non-working women (M=36.03). In the same vein, Kim and Park (2014) found a positive relationship between perceived spousal support and stress management, health responsibility, inter-personal relationship, spiritual growth and nutrition. Boeding. Pukay-Martin, Baucom, Porter and Kirby et al., (2014) found that high level of spousal support has resulted in higher levels of marital satisfaction of husbands of women with breast cancer. Andrea & Volmer (2011) found that help from spouses of working women foretold family satisfaction.

Age and Marital Stability

Age of working women has also been identified as one of the factors that influence marital stability. It is important to examine marital satisfaction/stability and its predictors in middle and old age in recent times. Studies have shown that marital quality reduces with age (Lee and Shchan, 1989). Married couples in mid and late adulthood experience different levels of developmental challenges. In middle age, they encounter the empty nest situation and at midlife, experience the menopausal and other midlife crises. At these stages of life, they strive to cope with changes in their physical, sexual abilities, attractiveness and learn to adjust to new interaction patterns of life (Lachman, 2004). Despite these challenges, couples have to keep their marital bonds and affection. Old age at the other hand brings many new activities. Husbands spend more time at home to do more domestic chores after retirement and couples need to re-develop old age and find new shared activities (Kettlitz, 1977). Therefore, as couples grow more aged, spousal support plays a prominent role in their lives. Spouses have to support each other in dealing with the changes in their emotional and physical health (Gagnon, Kabacoff, and Hasselt, 1999). Schmitt, Kliegel and Shapiro (2007) found that perceived social support and reciprocity played a significant predicting role in the marital satisfaction of old and middle-aged women. Yazdanpanah, Khalili and Keshtkaran (2015) found that both old and young couples had poor marital stability, but instability was, however, higher among younger married couples. On the other hand, Jafarbegloo, Bakouel and Dadkhahtehram (2017) reported no significant difference in the marital satisfaction of couples in young age, midlife and old age.

Methods

This study employed a descriptive survey research design. The population of the study were married women working in hospitals, banks and secondary schools in Lagos State. A sample of 139 (one hundred and thirty-nine) respondents was randomly selected for the study. The instrument used for data collection was a questionnaire which was divided into four sections A-D. The questionnaire was valid and reliable, as recommended by Odukoya, Adekeye, Igbinoba, & Afolabi (2018). The reliability of the instrument was established using a test-retest reliability method. Section A contained the demographic data of the respondents while sections B-D include: marital stability scale which comprises 25 items using five Likert-like scale having Cronbach Alpha of .912, work-life balance scale consisting of 10 items with options 'agree', 'sometimes' and disagree having Cronbach Alpha of .761 and the spousal support scale consisting of 20 items with five Likert-like scale with Cronbach Alpha of .881. Multiple regression analyses was used to test hypothesis one, and independent-sample t-test was used to test the second hypothesis.

Results

Table 1.1 Socio-Demographic Characteristics of Participants (n=139)

	Frequency	Percent
Age		
Young	77	55.4
Old	62	44.6
Education		
NCE/OND	21	15.1
HND/B.Ed/B.Sc	52	37.4
Higher Degree	66	47.5
Occupation		
Teachers	47	33.8
Health worker	50	36.0
Bankers	42	30.2

Table 1.1 shows the demographic characteristics of the participants. Age distribution revealed that 55.4 are young while 44.6 are old. In Educational qualification distribution, 15.1%, were NCE/OND holder, 37.4% had B.Sc./B.Ed./HND while 47.5% had higher degrees. Occupation distribution revealed that 33.8% were teachers, 36% were health workers while 30.25% were bankers.

Hypotheses Testing

This section contains the results of the tested hypotheses and the interpretation of the data analyses. The regression analysis was used to test hypothesis one while the independent sample t-test was used to test the second hypotheses. The results are presented in tables 1.1 to tables 2.2 and the interpretations follows each table.

Hypothesis One: state that there will be no separate and joint significant influence of work-life balance and spousal support on marital stability of working women in Lagos State.

Table 2.1: Summary of Multiple Regression Analysis Showing the Joint Prediction of Work-Life Balance, Spousal Support on Marital Stability.

Model	R^2	Adjusted R^2	β	F	P	t	Sig.
(Constant)	.55	.55		66.98	<.01	3.57	.001
			.72			11.17	.000
			.01			1.53	.13

a. Dependent variable: Marital Stability
b. Predictors: (constant) Spousal Support and Work-life Balance

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	22610.645	2	1305.323	66.975	.000
Residual	18230.328	108	68.799		
Total	40840.973	110			

a.Dependent Variable: MS
b.Predictors: (Constant), SS, WLB

The result in Table 2.1 showed that work-life balance and spousal support did not jointly influence marital stability of working women [F = 66.98, p<.01], accounting for 54.5% variance in marital stability (R^2= .545, p<.01). Spousal support was found to influence marital stability t=11.17, p<.01.

Hypotheses two: sates that there will be no significant difference in the marital stability of old and young working women in Lagos State.

Table 2.2: Independent Samples T-test Showing the Difference in the Marital Stability of Old and Young Working Women in Lagos State.

	N	X	Sd	df	t	P
Young	**69**	**96.13**	**20.248**	**122**	**.842**	**>.05**
Old	**55**	**93.16**	**18.495**			

Table 2.2 shows the mean difference in the marital stability of old and young working women. The result revealed no significance difference in the marital stability old and young teachers, bankers and health workers [t (122) = .842, P>.05]. This implies that age did not influence the marital stability of working women in Lagos State.

Discussion of Findings

The first hypotheses which state there will be no joint influence of work-life balance and spousal support was retained at [F = 66.975, p<.01]], accounting for 54.5% variance in marital stability (R^2= .545, p<.01). This implies that work-life balance and spousal support did not jointly predict marital stability of women in teaching, health and banking sectors. Rather, there was a separate influence of spousal support on marital stability. The finding of this study is in agreement with Kim and Park (2014) who found a positive relationship between perceived spousal support and stress management, health responsibility, inter-personal relationship among women. This is supported by Boeding et al., (2014) who reported that high level of spousal support resulted in higher marital satisfaction of husbands of women with breast cancer. In the same vein Tas and Batik (2019) found that married working women had higher perceived spousal support than the non working married women and also recorded higher marital satisfaction than the non-working women. These have shown beyond reasonable doubt that working women need the support of their spouses to achieve success at work, home and maintain stability in their marriages.

The second hypothesis which states that there will be no significant difference in the marital stability of the old and young was retained at [t (122) = .842, P>.05]. This implies that there is no significant difference in the marital stability of young and old female bankers, teachers and health workers. The finding of this study is in agreement with Jafarbegloo, Bakouel and Dadkhahtehram (2017) who reported no significant difference in the marital satisfaction of couples in young age, midlife and old age. Conversely, Yazdanpanah, Khalili and Keshtkaran (2015) found that both old and young couples had poor marital stability but instability was however higher among younger married couples. The study recommends that work-life balance policies should be promoted and implemented in private and public organisations in Nigeria to enable working women maintain equilibrium between their work and family lives. In addition, social support network should be encouraged by managers of organisations both at work and at home. This is because when individuals receive instrumental, emotional, and other forms of support, they enhance quality work-life and marital stability,

Implications of the Study to the Workplace

Counselling as a helping profession covers different aspects of human endeavours including marriage. The roles counsellors play in helping married people to prevent or overcome work related and marital conflicts cannot be undermined in sustainable national development. They are useful in every stage of life. However, for these to be effectively carried out, counsellors need to develop certain intervention strategies that will help them guide and assist couples in maintaining good working and marital lives. There is also need for them to be equipped with theories, techniques and principles guiding their profession which will help them work with their clients to bring expected change in behaviour. The findings of this study should guide workplace counsellors in the creation and implementation of favourable workplace counselling programmes that will promote social support network, marital stability among the married and work-life balance of workers generally.

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A Study of Configuration Management Database (CMDB) Adoption in It Service Management (ITSM) Implementations Within NJ Community Colleges

Fredrick DANDE
Indiana State University. Terre Haute, 47809 USA

Dr. Phillip LEE
Indiana State University. Terre Haute, 47809 USA

Abstract

With most research regarding the adoption of Configuration Management Database (CMDB) Information Technology Service Management (ITSM) process focusing on private industries, there is a need for a study of CMDB adoption in NJ Community Colleges. CMDB is a robust tool that ensures an organization implements a single source of truth database for IT Service Delivery. The focus of this study is the CMDB process adoption in ITSM implementations in NJ Community Colleges. We introduce a history of CMDB process, its connection to ITIL framework and the value CMDB adds to IT Service Management as the single source of truth database in IT Service Delivery across many organizations.
The study results illustrate some of the CMDB adoption challenges as ITIL training, ITSM deployments in the cloud enabling ease of use, management support, CMDB complexity and the variety of available ITSM solutions.

Keywords: ITIL, ITSM, Configuration Management Database (CMDB) and Key Performance Indicators (KPIs).

INTRODUCTION

As late as 2019, with more than a decade of attempted Configuration Management Database (CMDB) implementations, we still have over 50% failure rates and very low implementations success rates. A 2014 article by Len Guddemi published on Forbes magazine titled "Why 85% Of Companies Fail at Creating A Configuration Management Database (CMDB)" illustrates three reasons why the configuration management implementations fail including; Choice of tool, a tool's security profile, and regular testing of a tool. My goal is to study why this happens and I will focus on New Jersey Community Colleges. Configuration Management is one of the process within the Information technology Infrastructure Library (ITIL) framework. This framework is the most adopted framework worldwide for Information Technology Service Management.

Information Technology Infrastructure Library (ITIL) is a global framework of best practices in IT services compiled from public and private sector organizations (Ahmad & Shamsudin, 2013). The purpose of this framework is to provide high quality IT services for IT Service Management (ITSM), which consists of the activities, processes, policies, and procedures performed by an organization to design, implement, improve, and support IT services (Thomson, 2019). Organizations are implementing ITSM to enhance their focus on customer service and ensure IT governance.

Axelos states that Information technology Infrastructure Library (ITIL) is the most widely accepted approach to IT Service Management (ITSM) in the world. ITIL can help individuals and organizations use IT to realize business change, transformation and growth. ITIL is a framework of best practices for delivering IT services.ITILv3 is composed of 26 processes including configuration management which falls under Service Transition as illustrated in the next slide.

Stanford University with their implementation of Service Now ITSM tool and CMDB process describes the CMDB as the ServiceNow database that stores information about all technical services. Within the CMDB, the support information for each service offering is stored in a Configuration Item (CI) specific to that service.

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This information includes the service name and description, assignment groups, change management approvers and service roles as well as other information directly related to the service support (Stanford 2019).

The notion that the CMDB is the most challenging ITSM module to implement remain true to date; over 15 years after the CMDB was introduced in 2000 with the release of ITIL V2. In his 2014 Forbes Article, Len Guddemi explains why 85% of companies fail at creating Configuration management Database (CMDB). For any service delivery with a clear goal to deliver accurate configuration item (CI) relationships within any environment that will provide the right information, to the right person, at the right moment, a service aware CMDB solution becomes the standard.

The research problem that we investigate for this study is the lack of understanding of the various factors that determine CMDB process adoption with NJ Community colleges.
The idea of manually building relationships to be able to map your IT environment from business application, servers, storage, database, network, business owner and—equally important—the IT support group is just not scalable. Hence an accurate CMDB implementation with some level of intelligence and automation is a requirement.

When considering any ITSM solution, based on your level of maturity, it helps to check the potential of having a fully functional CMDB with the option of mapping your services as part of your phased implementation. The advantage of having this long-term plan is to ensure the solution you pick has the needed capability to eliminate the potential of having to start vendor evaluation when ITSM maturity requires implementation of CMDB and service mapping.

ITIL implementation planning focuses on process improvement and the use of the framework as a guidance that brings about a change in people, process and technology once implemented. With the many SaaS-based ITSM solutions offerings, and the complexity of IT services offered to the business across many industries, planning becomes key to ensure a successfully CMDB implementation to be leveraged for mapping business services with the right ITSM tool.

Related Work

Configuration Management Database

This section includes a summary of available literature that addresses the research topic "Configuration Management Database (CMDB), ITIL Process Adoption in ITSM (IT Service Management) Implementations within NJ community Colleges" and provides some background on the ITIL process.

In the 1950's the US department of Defense created configuration Management as a way to keep track of complicated hardware under its control: things like tanks, weaponry, aircraft, ocean vessels and more. This enabled them to keep track of where their assets were at any given moment (Reynolds, 2019). Over time this method was used for more than just the military, configuration management became the practice of handling changes systematically so that a system maintains its integrity over time by utilizing a series of best practices. Whereas the military originally used it for physical hardware, configuration management under the ITIL (Information Technology Infrastructure Library) framework is used to track and control all aspects of information technology from hardware, hardware settings, software, application settings and any other configuration that can be applied to information technology.

The last decade witnessed a growing trend of IT dependency across all industries and IT became a competitive advantage and not a cost center as previously managed by organizations. In his book The World is Flat, the author Thomas Friedman argues that the world is flat as a result of the global competitive playing ground being leveled. One of the "Ten flatteners" Friedman identifies is The Steroids which include computing, instant messaging to name a few (Friedman, 2006). Information Technology being a flattener increases adoption of various technologies like CMDB which is the core of ITIL V3 Configuration Management process. Due to the growing dependency in IT, IT Service Management relies on about 10 different frameworks that define several processes to ensure efficient IT Service delivery based on ITIL V3 framework. Successful implementation of the ITIL framework used by most organizations requires the adoption of the configuration management process that stores its data in a Datawarehouse called the CMDB. The CMDB implementation defines the success of implementing other processes like Incident, Problem, change and knowledge management.

CMDB In Higher Education

While Many large firms have the resources available to implement existing popular IT Service Management (ITSM) frameworks, SMEs most often do not, nor do they stand to benefit from these existing frameworks. (Molamphy, 2016,) Though community Colleges are usually slower to adopt emerging technologies for their own use as witnessed by the lack of research papers on the subject. There seems to be a slowly growing trend of higher education intuitions adopting some form of framework for service management. In a recent paper, Hannah Prices makes the case that "Administrators, teachers, and even students must receive IT support promptly. In some cases they can't afford to wait. Such incidents can mean that learning opportunities are at stake." (Price, 2019). Price indicated that a lack of structure is a significant service management problem in academia. Where many IT teams struggle with staffing and financial limitations, and "structure" often is one of the first things that gets eliminated, to the detriment of the organization (Price, 2019).

Palilingan and Batmetan reported that academic systems in various universities have been managed with Information systems to make it easier, faster, and more effective and that more than 80 percent of the services provided by the university can be served using an academic information system. With an estimated 84.5 percent of the incidents appearing in academic system being able` to be handled quickly if the appropriate incident management model is implemented. (IOP Publishing, 2018)

Higher education institutions could have a significant benefit in terms of providing faster and more accurate service levels by implementing a framework like ITIL that provides for implanting best practices and by implementing CMDB as part of that framework having a shared service environment to track calls and emails, tickets and inefficient processes and by having a reporting system that provides visibility into operations (Price, 2019). Price goes on to state that one of the primary challenges for educational-based service teams is that most are understaffed. In such cases, the team's members do the thing that they think will best get the job done. However, when these people leave the district of college, voids are left behind. Because of these voids processes begin to fail. ITIL helps eliminate these voids. (Price, 2019, Define Efficiency)

METHODOLOGY

This investigational study was comprised of an online survey to collect data related to the following problem statements concerning CMDB adoption in ITSM implementations:

- What are the common challenges faced by IT employees in NJ community colleges with their current ITSM infrastructure that CMDB adoption would resolve?
- What are the advantages & disadvantages of CMDB adoption in ITSM implementations in NJ community colleges?
- In what areas do the participants in our survey believe that CMDB adoption is an efficient and cost-effective solution to analyze the data within their ITSM infrastructure?

This online survey was used to collect data from IT personnel from NJ community colleges willing to participate in our research. The survey results were collected and analyzed. Below we discuss the survey instrument used to collect the data, the subjects needed to complete the study, the research design, the description of data analysis, and possible risks to the accuracy of the study.

NJ Community Colleges CMDB Survey

An online survey was developed by our research team that addressed the problem statements listed above. The survey instrument consisted of a combination of demographic questions and closed questions. The demographic questions included age, gender, ethnicity, salary, highest education level completed, the NJ community college where the participant was affiliated, and their job title. The demographic characteristics provided a representative distribution of the respondents in our study. The closed questions asked participants about their understanding of ITIL and CMDB, which processes they were using for ITSM, challenges encountered with ITSM implementations, how information is captured in their IT environments, Key Performance Indicators (KPIs) being tracked, and maturity levels of CMDB implementation. These closed questions provided a baseline of information on how NJ community colleges are currently managing their IT infrastructures.

Participants in the Study

The participants in the study were IT personnel from 18 NJ community colleges. We called the directors of the IT departments from each of the colleges to inform them of our research study and asked for their assistance in completing the survey, and to share the survey with their colleagues. We emailed the survey to 219 IT employees

and yielded 19 useable responses, which represented 8.66% of the total surveys distributed. We used the SurveyMonkey software service to create our survey and maintain the response data.

Research Design and Procedures

Our investigative research design was quantitative and used an online analytical survey (Creswell, 2012). The survey response data related to our three problem statements was collected and evaluated. The survey was emailed to the participants via Qualtrics to their work email addresses and was made available for a five-week period to allow enough time to complete the survey. We submitted the survey to all IT personnel three times during this time period and followed up with reminder phone calls prior to the second and third submissions to collect more responses. Incomplete surveys (i.e., partially completed or early exit from the survey) were excluded from the final analysis.

Data Analysis

Sample data included IT personnel from the 18 NJ Community Colleges that were sent emails requesting completion of our online survey. The survey response results were downloaded into Microsoft Excel. The responses for each question were presented in bar charts. Statistical analyses were performed to determine minimum and maximum results, mean, standard deviation, and variance.

Threats to Validity of the Study

Validity represents the extent to which one can draw meaningful and useful conclusions from results. Content validity is one type of validity concerned with the degree to which the instrument fully assesses or measures the construct of interest (Bolarinwa, 2015). The content of a test, survey or measurement method must cover all relevant parts of the subject it aims to measure to produce valid results (Middleton, 2019). The validity of the survey results is threatened when critical aspects are missing from the measurement or irrelevant aspects included in the measurement. Another source of error to consider is sampling error, which can occur if the individuals included in the study do not represent the characteristics of the population (Ponto, 2015). To minimize sampling error, we contacted every IT employee via their work telephone number and left voicemails asking for their help in completing the survey prior to the second and third email reminder submissions in attempt to get at least one survey response from each community college. We received responses from 11 community colleges; 8 of the community colleges did not complete our survey.

CMDB ADOPTION IN ITSM IMPLEMENTATIONS WITHIN NJ COMMUNITY COLLEGES

We discuss the use of an online survey to collect data for our study of CMDB adoption in NJ community colleges, including details of the subjects involved and the method of data collection. Potential sources of error were identified and our solution to minimize error was explained.

Results

This section defines the results of the study to determine the effectiveness of CMDB adoption in ITSM implementations within NJ community colleges. The data analyzed was collected using an online survey created for all IT personnel at NJ community colleges to complete. Survey response rate and a description of the statistics from our survey results are presented.

Response Rate

Our survey was emailed to 219 IT employees from 18 NJ community colleges. The survey was sent three times. There was a phone call reminder prior to the second and third email survey requests. A total of 19 responses were received during this five-week collection period, representing an overall response rate of 8.68%. Partially completed surveys were included in the overall count. The following factors that may have contributed to the low response rate:

- Lack of incentive for IT personnel to complete the survey.
- Survey sent to work email addresses – may have been missed or routed to spam folder.
- Busy schedules of IT personnel.

- The timing of the survey may not have been convenient due to being sent a few weeks before Thanksgiving and the end of the semester.
- Survey fatigue – the survey was designed to be completed within 10 minutes. However, potential respondents might have felt this timeframe was too long, especially with their busy schedules.
- We sent the survey three times over the five-week period, with telephone reminders prior to the second and third submissions. This might have been more effective if we sent out the surveys weekly with telephone and email reminders in-between.
- Some of the email addresses on our initial list were incorrect and the surveys bounced back. Some of these email addresses were not completed until the third submission.

Descriptive Statistics

Descriptive statistics summarizes and organizes data to provide information about variables in a dataset and highlight possible relationships between variables (Narkhede, 2018). The two categories of descriptive statistics are central tendency and measures of variability. Central tendency refers to the number in the middle, such as the mean/average, median, or mode. Variability measures the spread within data results, such as standard deviation, mean deviation, range, percentile, and variance (Narkhede, 2018). The statistical analyses performed on our survey results include minimum and maximum results, mean, standard deviation, and variance. The statistics for survey questions related to our problem statements will be discussed.

Research Question #1

What are the common challenges faced by IT employees in NJ community colleges with their current ITSM infrastructure that CMDB adoption would resolve?

Figure 1 represents a chart of the common challenges faced by NJ community colleges with ITSM implementations. Implementing continuous service improvements appears to be the top challenge at 25.00%, followed by integrating and aligning IT and business goals at 19.44%. Achieving and demonstrating return on investment (ROI) and lack of proper ITIL processes and understanding are tied for the third highest challenges at 13.89%.

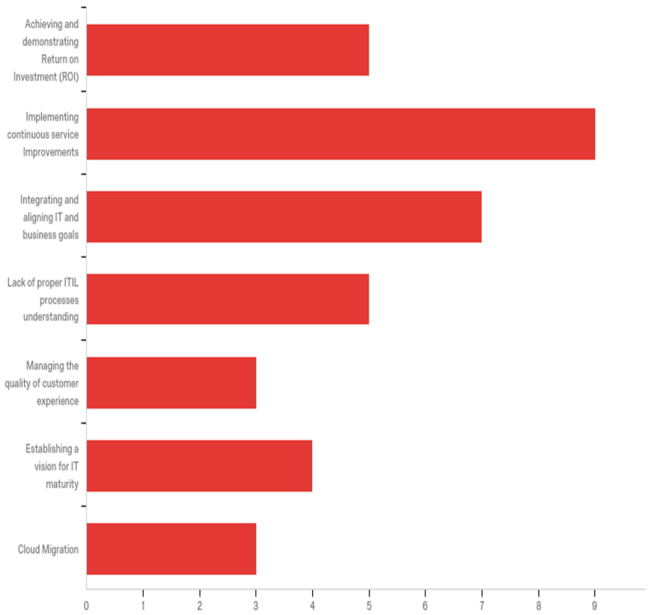

Figure 1: Current challenges of ITSM infrastructure

Research Question #2:

What are the advantages and disadvantages of CMDB adoption in ITSM implementations in NJ community colleges?

Our survey results indicate that 68.75% of respondents understand CMDB and how it relates to ITIL, while 31.25% do not understand, yielding a standard deviation of 0.46 and variance of 0.21. CMDB allows users to capture configurations items (CIs) in their IT environments and store them in a database. The survey respondents are split at 50% between capturing this information in some format using the Configuration Management process, with a standard deviation of 0.50 and variance of 0.25. Figure 2 represents a chart describing the current CMDB implementation process maturity at each of the community colleges. The L1-Initial Phase represents 58.33% of the respondents. L2-Repeatable and L4-Managed each represent 16.67%, and the L3-Defined phase represents 8.33%. While it is advantageous that many of our participants understand ITIL and are using the Configuration Management process to capture CIs, the remaining IT personnel that are not familiar with CMDB and capturing CIs in some format will need to be trained.

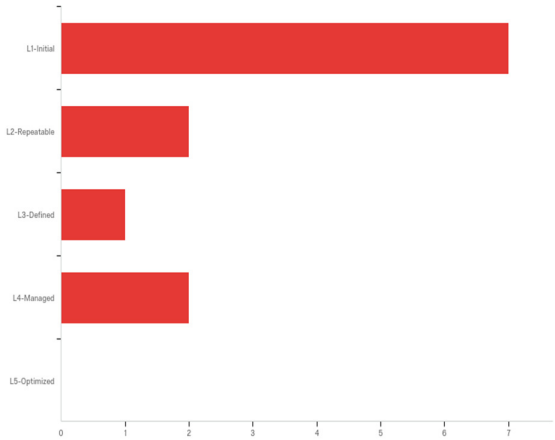

Figure 2: Maturity levels of CMDB implementation

Research Question #3:

In what areas do the participants in our survey believe that CMDB adoption is an efficient and cost-effective solution to analyze the data within their ITSM infrastructure?

Figure 3 represents the following Key Performance Indicators (KPIs) that are being tracked as part of their CMDB process. Approximately 35.00% of respondents are not tracking KPI's, while 30.00% track the number of CIs linked to incidents, problems and changes; 20% track the number of CIs in the CMDB, including numbers discovered versus manually entered; 5.00% track the reductions in the number of CIs that are not connected to any other CI; and 10.00% track the number of CIs audited & percentage of CI records that matched the IT environment. Approximately 53.84% of respondents agree or strongly agree that they would have the appropriate support to maintain their audit schedules, KPIs, and metrics to determine the cost efficiency and effectiveness of CMDB adoption, while 46.15% of respondents disagree or strongly disagree, representing a standard deviation of 2.18 and variance of 4.75.

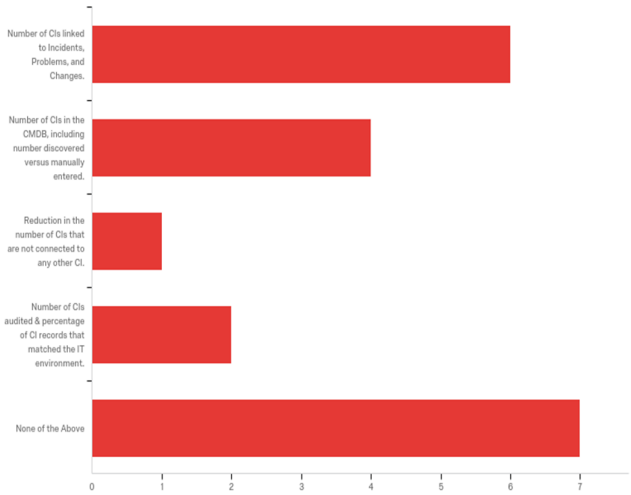

Figure 3: Key Performance Indicators (KPIs)

CONCLUSION

From our findings, we have presented the results from descriptive statistics of the survey data collected for this study. Variability statistics were exhibited for each of the three research questions being assessed. These statistics provide insight on the challenges, advantages and disadvantages, and cost effectiveness of CMDB adoption within ITSM implementations.

This study presents the state of CMDB adoption in ITMS implementations within 18 NJ Community colleges. The results show that the two CMDB implementation challenges are Implementing continuous service improvements appears to be the top challenge at 25.00%, followed by integrating and aligning IT and business goals at 19.44%. On IT professional's knowledge of CMDB and ITIL in general, we found that Our survey results indicate that 68.75% of respondents understand CMDB and how it relates to ITIL, while 31.25% do not understand. This is a factor that may also impact CMDB adoption in NJ Community colleges and necessitates training before CMDB adoption commences during any implementation.

Configuration Management Database was determined to be a single system of record which can maintain all configuration data related to a given IT Infrastructure. As a result the CMDB enables IT teams to better manage their Infrastructure especially in the areas of business services impact analysis, asset management and compliance (ServiceNow).This further illustrated the importance of CMDB adoption in NJ Community Colleges.

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